# TEST REPORT FOR THE 2011 ENVIRONMENTAL PROTECTION AGENCY INFORMATION COLLECTION REQUEST FOR NATIONAL EMISSION STANDARDS FOR HAZARDOUS AIR POLLUTANTS TESTING AT EXXONMOBIL TORRANCE REFINERY FCC AND CRUDE SAMPLE ANALYSIS

PREPARED FOR:

**EXXONMOBIL TORRANCE REFINERY**
3700 WEST 190TH STREET
TORRANCE, CALIFORNIA 90509

SUBMITTED TO:

**ENVIRONMENTAL PROTECTION AGENCY**
ELECTRONICALLY THROUGH ICR

PREPARED BY:

ALI ALESHAIKER
ARLENE BELL

**DELTA AIR QUALITY SERVICES, INC.**
1845 NORTH CASE STREET
ORANGE, CALIFORNIA 92865
(714) 279-6777

AUGUST 25, 2011

REPORT NUMBER: **R529265**

Delta
Air Quality Services, Incorporated

## REPORT REVIEW AND CERTIFICATION

I certify that all work performed in the preparation and production of this report was performed by me or under my supervision and that all data presented is authentic.

Date: 8/25/11

Ali Aleshaiker
Project Engineer

I certify that I have also reviewed this report, both in form and content, and that all data, calculations, and presentations are authentic, accurate, and complete.

Date: 8/26/11

Arlene Bell
Vice President

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# 1.0 INTRODUCTION AND SUMMARY

## 1.1 EXECUTIVE SUMMARY

| | |
|---|---|
| Plant | ExxonMobil Torrance Refinery |
| Address | 3700 West 190th Street<br>Torrance, California 90509 |
| Source | 2F-7 |
| Test Objective | Environmental Protection Agency Information Collection Request for Hazardous Air Pollutants Testing |
| Test Methods | See Table 3-2 in Section 3.2 |
| Date of Test | June 27 through July 1, 2011 |
| Test Performed By | Delta Air Quality Services, Inc.<br>1845 North Case Street<br>Orange, California 92865-4234 |
| Test Personnel | Ali Aleshaiker, Dave Wonderly, John Peterson, Shannon Scrugham, and Dan Avila of<br>Delta Air Quality Services, Inc. |
| Testing Firm Contact | Ali Aleshaiker, (714) 279-6777 |
| Plant Contacts | Mr. Parvez Abbas (310) 212-1755 |

## 1.2 INTRODUCTION

Delta Air Quality Services, Inc. (Delta) was contracted by ExxonMobil Torrance Refinery (ExxonMobil) to conduct the 2011 Environmental Protection Agency (EPA) Information Collection Request (ICR) for National Emission Standards for Hazardous Air Pollutants (NESHAP) testing on the Fluid Catalytic Cracking (FCC) at their Torrance California facility. This document has been prepared to serve as the source test report for these tests.

Sampling for the FCC test program consisted of the following measurements. The testing is organized in groups of methods as specified in the ICR guidance documents. Concurrent triplicate tests were performed for each parameter in the groups below:

Group A

- Speciated Volatile Organic Hazardous Air Pollutants (HAP)
- Speciated Semi-Volatile Organic HAP
- Aldehydes (Formaldehyde, Acetaldehyde, Propanal)
- Total Hydrocarbons (THC)
- Methane and Ethane
- Carbon Monoxide (CO)

Group B

- Dioxins/Furans/PCBs

Group E

- Hydrogen Chloride (HCl), Chlorine Gas ($Cl_2$), and Hydrogen Fluoride (HF)
- Hydrogen Cyanide (HCN)

Group D

- Mercury (Hg)
- Hexavalent Chromium ($Cr^{6+}$)
- Metals and Filterable Particulate Matter (PM)
- $PM_{2.5}$ (less than 2.5 microns)
- Ammonia ($NH_3$)
- Oxides of Nitrogen ($NO_x$)
- Sulfur Dioxide ($SO_2$)

During the sampling, Delta personnel coordinated with ExxonMobil on test beginning and end times and obtained documentation of operating conditions during each test.

This test report contains a unit description, operating conditions, and sample locations in Section 2. Section 3 contains a test program overview including the test procedures and the test schedule. The Appendices contain additional information including original data, calculations, and quality assurance information.

## 1.3 RESULTS SUMMARY

The following tables contain a brief summary of test results:

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## TABLE 1-1
## SPECIATED VOLATILE ORGANIC HAZARDOUS AIR POLLUTANTS
## EXXONMOBIL TORRANCE REFINERY
## FLUID CATALYTIC CRACKER

| | | | Average | |
|---|---|---|---|---|
| NON-BLANK CORRECTED FOR ERT | | | | |
| Compound | CAS | µg/dscm @ 7% $O_2$ | µg/dscm | lb/hr |
| 1,3-Butadiene | 106-99-0 | ND< 234.16 | ND< 7.59 | ND< 0.24 |
| Pentane | 109-66-0 | ND< 230.50 | ND< 7.45 | ND< 0.23 |
| Acrolein | 107-02-8 | ND< 230.50 | ND< 7.45 | ND< 0.23 |
| Acetone | 67-64-1 | 1,646.05 | 53.20 | 1.68 |
| Acetonitrile | 75-05-8 | 363.45 | 11.75 | 0.37 |
| Carbon Disulfide | 75-15-0 | ND< 230.50 | ND< 7.45 | ND< 0.23 |
| Methylene Chloride | 75-09-2 | ND< 230.50 | ND< 7.45 | ND< 0.23 |
| Acrylonitrile | 107-13-1 | ND< 230.50 | ND< 7.45 | ND< 0.23 |
| Methyl t-Butyl Ether (MTBE) | 1634-04-4 | ND< 230.50 | ND< 7.45 | ND< 0.23 |
| Hexane | 110-54-3 | ND< 230.50 | ND< 7.45 | ND< 0.23 |
| 2,2,4-Trimethylpentane | 540-84-1 | ND< 230.50 | ND< 7.45 | ND< 0.23 |
| Benzene | 71-43-2 | ND< 230.50 | ND< 7.45 | ND< 0.23 |
| Trichloroethene | 79-01-6 | ND< 230.50 | ND< 7.45 | ND< 0.23 |
| 2-Nitropropane | 79-46-9 | ND< 230.50 | ND< 7.45 | ND< 0.23 |
| Methyl iso-Butyl Ketone | 108-10-1 | ND< 230.50 | ND< 7.45 | ND< 0.23 |
| Toluene | 108-88-3 | ND< 230.50 | ND< 7.45 | ND< 0.23 |
| Tetrachloroethene | 127-18-4 | ND< 230.50 | ND< 7.45 | ND< 0.23 |
| 1,2-Dibromoethane | 106-93-4 | ND< 230.50 | ND< 7.45 | ND< 0.23 |
| Chlorobenzene | 108-90-7 | ND< 230.50 | ND< 7.45 | ND< 0.23 |
| Ethylbenzene | 100-41-4 | ND< 230.50 | ND< 7.45 | ND< 0.23 |
| m&p-Xylenes | 108-38-3, 106-42-3 | ND< 230.50 | ND< 7.45 | ND< 0.23 |
| o-Xylene | 95-47-6 | ND< 230.50 | ND< 7.45 | ND< 0.23 |
| Styrene | 79637-11-9 | ND< 230.50 | ND< 7.45 | ND< 0.23 |
| Cumene (Isopropylbenzene) | 98-82-8 | ND< 230.50 | ND< 7.45 | ND< 0.23 |
| Nitrobenzene | 98-95-3 | ND< 1,152.48 | ND< 37.25 | ND< 1.17 |
| BLANK CORRECTED (REAGENT ONLY) | | | | |
| Compound | CAS | µg/dscm @ 7% $O_2$ | µg/dscf | lb/hr |
| Acetone | 67-64-1 | < 234.22 | < 7.57 | < 0.24 |
| Acetonitrile | 75-05-8 | < 230.50 | < 7.45 | < 0.23 |

ND < Indicates all three runs are below the detection limit
< Indicates one or two of the three runs are below the detection limit

## TABLE 1-2
## SPECIATED SEMI-VOLATILE ORGANIC HAZARDOUS AIR POLLUTANTS
## EXXONMOBIL TORRANCE REFINERY
## FLUID CATALYTIC CRACKER

| | | Average | | |
|---|---|---|---|---|
| Compound | CAS | µg/dscm @ 7% $O_2$ | µg/dscf | lb/hr |
| Aniline | 62-53-3 | ND< 0.35397 | ND< $1.14 \times 10^{-2}$ | ND< $3.60 \times 10^{-4}$ |
| Phenol | 108-95-2 | ND< 1.22539 | ND< $3.96 \times 10^{-2}$ | ND< $1.26 \times 10^{-3}$ |
| 2-Methylphenol (o-Cresol) | 95-48-7 | ND< 0.40180 | ND< $1.30 \times 10^{-2}$ | ND< $4.09 \times 10^{-4}$ |
| 4-Methylphenol & 3-Methylphenol (p,m-Cresol) | 106-44-5, 108-39-4 | ND< 1.08104 | ND< $3.49 \times 10^{-2}$ | ND< $1.10 \times 10^{-3}$ |
| o-Toluidine | 95-53-4 | ND< 0.95667 | ND< $3.09 \times 10^{-2}$ | ND< $9.74 \times 10^{-4}$ |
| Isophorone | 78-59-1 | ND< 0.43050 | ND< $1.39 \times 10^{-2}$ | ND< $4.38 \times 10^{-4}$ |
| 2,4-Dimethylphenol | 105-67-9 | ND< 0.49747 | ND< $1.61 \times 10^{-2}$ | ND< $5.07 \times 10^{-4}$ |
| Dibenzofuran | 132-64-9 | ND< 0.44007 | ND< $1.42 \times 10^{-2}$ | ND< $4.48 \times 10^{-4}$ |
| a,a-Dimethylphenethylamine | 122-09-8 | ND< 2.29602 | ND< $7.42 \times 10^{-2}$ | ND< $2.34 \times 10^{-3}$ |
| 1,4-Phenylenediamine | 106-50-3 | ND< 3.44402 | ND< $1.11 \times 10^{-1}$ | ND< $3.51 \times 10^{-3}$ |
| Benzidine | 92-87-5 | ND< 7.27072 | ND< $2.35 \times 10^{-1}$ | ND< $7.40 \times 10^{-3}$ |
| Dimethylaminobenzene | 121-69-7 | ND< 0.38267 | ND< $1.24 \times 10^{-2}$ | ND< $3.90 \times 10^{-4}$ |
| 3,3'-Dimethylbenzidine | 119-93-7 | ND< 5.54871 | ND< $1.79 \times 10^{-1}$ | ND< $5.65 \times 10^{-3}$ |
| 3,3'-Dimethoxybenzidine | 119-90-4 | ND< 5.54871 | ND< $1.79 \times 10^{-1}$ | ND< $5.65 \times 10^{-3}$ |
| Naphthalene | 91-20-3 | 0.15872 | $5.13 \times 10^{-3}$ | $1.62 \times 10^{-4}$ |
| 2-Methylnaphthalene | 91-57-6 | 0.06032 | $1.95 \times 10^{-3}$ | $6.16 \times 10^{-5}$ |
| Acenaphthylene | 208-96-8 | < 0.00870 | < $2.81 \times 10^{-4}$ | < $8.95 \times 10^{-6}$ |
| Acenaphthene | 83-32-9 | ND< 0.00186 | ND< $6.00 \times 10^{-5}$ | ND< $1.92 \times 10^{-6}$ |
| Fluorene | 86-73-7 | < 0.00475 | < $1.54 \times 10^{-4}$ | < $4.87 \times 10^{-6}$ |
| Phenanthrene | 85-01-8 | 0.04140 | $1.34 \times 10^{-3}$ | $4.23 \times 10^{-5}$ |
| Anthracene | 120-12-7 | 0.00169 | $5.46 \times 10^{-5}$ | $1.72 \times 10^{-6}$ |
| Fluoranthene | 206-44-0 | 0.00656 | $2.12 \times 10^{-4}$ | $6.72 \times 10^{-6}$ |
| Pyrene | 129-00-0 | 0.00669 | $2.16 \times 10^{-4}$ | $6.83 \times 10^{-6}$ |
| Benzo(a)anthracene | 56-55-3 | ND< 0.00077 | ND< $2.47 \times 10^{-5}$ | ND< $7.79 \times 10^{-7}$ |
| Chrysene | 218-01-9 | 0.00167 | $5.38 \times 10^{-5}$ | $1.70 \times 10^{-6}$ |
| Benzo(b)fluoranthene | 205-99-2 | ND< 0.00077 | ND< $2.47 \times 10^{-5}$ | ND< $7.79 \times 10^{-7}$ |
| Benzo(k)fluoranthene | 207-08-9 | ND< 0.00077 | ND< $2.47 \times 10^{-5}$ | ND< $7.79 \times 10^{-7}$ |
| Benzo(e)pyrene | 192-97-2 | ND< 0.00077 | ND< $2.47 \times 10^{-5}$ | ND< $7.79 \times 10^{-7}$ |
| Benzo(a)pyrene | 50-32-8 | ND< 0.00077 | ND< $2.47 \times 10^{-5}$ | ND< $7.79 \times 10^{-7}$ |
| Perylene | 198-55-0 | ND< 0.00077 | ND< $2.47 \times 10^{-5}$ | ND< $7.79 \times 10^{-7}$ |
| Indeno(1,2,3-cd)pyrene | 193-39-5 | ND< 0.00077 | ND< $2.47 \times 10^{-5}$ | ND< $7.79 \times 10^{-7}$ |
| Dibenzo(a,h/a,c)anthracene | 53-70-3, 215-58-7 | ND< 0.00077 | ND< $2.47 \times 10^{-5}$ | ND< $7.79 \times 10^{-7}$ |
| Benzo(g,h,i)perylene | 191-24-2 | 0.00149 | $4.83 \times 10^{-5}$ | $1.52 \times 10^{-6}$ |
| 2-Chloronaphthalene (additional) | 91-58-7 | ND< 0.00077 | ND< $2.47 \times 10^{-5}$ | ND< $7.79 \times 10^{-7}$ |
| Biphenyl | 92-52-4 | 0.21635 | $7.00 \times 10^{-3}$ | $2.18 \times 10^{-4}$ |
| 7,12-Dimethylbenzo(a)anthracene | 57-97-6 | ND< 0.00077 | ND< $2.47 \times 10^{-5}$ | ND< $7.79 \times 10^{-7}$ |
| 3-Methylcholanthrene | 56-49-5 | ND< 0.00077 | ND< $2.47 \times 10^{-5}$ | ND< $7.79 \times 10^{-7}$ |
| Dibenzo(a,e)pyrene | 192-65-4 | ND< 0.00077 | ND< $2.47 \times 10^{-5}$ | ND< $7.79 \times 10^{-7}$ |

ND < Indicates all three runs are below the detection limit
< Indicates one or two of the three runs are below the detection limit

## TABLE 1-3
## ALDEHYDES (FORMALDEHYDE, ACETALDEHYDE, PROPANAL)
## EXXONMOBIL TORRANCE REFINERY
## FLUID CATALYTIC CRACKER

| | | Average | | |
|---|---|---|---|---|
| Compound | CAS | µg/dscm @ 7% $O_2$ | µg/dscf | lb/hr |
| Formaldahyde | 50-00-0 | 1,304.21 | 42.07 | 1.34 |
| Acetaldehyde | 75-07-0 | 74.18 | 2.39 | 0.08 |
| Propionaldehyde | 123-38-6 | ND< 2.77 | ND< 0.09 | ND< 0.00 |

ND < Indicates all three runs are below the detection limit
< Indicates one or two of the three runs are below the detection limit

## TABLE 1-4
## TOTAL HYDROCARBONS
## EXXONMOBIL TORRANCE REFINERY
## FLUID CATALYTIC CRACKER

| | | Average | |
|---|---|---|---|
| Compound | CAS | ppmvd | lb/hr |
| Total Hydrocarbons(1) | 40811-14-1 | 61.68 | 101.12 |

(1) As propane

## TABLE 1-5
## METHANE AND ETHANE
## EXXONMOBIL TORRANCE REFINERY
## FLUID CATALYTIC CRACKER

| | | Average | |
|---|---|---|---|
| Compound | CAS | ppmvd | lb/hr |
| Methane | 74-82-8 | 58.05 | 34.52 |
| Ethane | 74-84-0 | 10.87 | 12.13 |

## TABLE 1-6
## DIOXINS/ FURANS AND PCBs
## EXXONMOBIL TORRANCE REFINERY
## FLUID CATALYTIC CRACKER

| | | Average | | |
|---|---|---|---|---|
| Compound | CAS | pg/dscm @ 7% $O_2$ | pg/dscf | lb/hr |
| 2,3,7,8-TCDD | 1746-01-6 | ND< 0.666 | ND< 0.021 | ND< $6.789 \times 10^{-10}$ |
| 1,2,3,7,8-PeCDD | 40321-76-4 | ND< 0.739 | ND< 0.024 | ND< $7.530 \times 10^{-10}$ |
| 1,2,3,4,7,8-HxCDD | 39227-28-6 | ND< 0.598 | ND< 0.019 | ND< $6.107 \times 10^{-10}$ |
| 1,2,3,6,7,8-HxCDD | 57653-85-7 | ND< 0.609 | ND< 0.019 | ND< $6.211 \times 10^{-10}$ |
| 1,2,3,7,8,9-HxCDD | 19408-74-3 | ND< 0.658 | ND< 0.021 | ND< $6.723 \times 10^{-10}$ |
| 1,2,3,4,6,7,8-HpCDD | 35822-46-9 | ND< 0.849 | ND< 0.027 | ND< $8.648 \times 10^{-10}$ |
| OCDD | 3268-87-9 | < 1.409 | < 0.045 | < $1.427 \times 10^{-9}$ |
| 2,3,7,8-TCDF | 51207-31-9 | ND< 0.559 | ND< 0.018 | ND< $5.714 \times 10^{-10}$ |
| 1,2,3,7,8-PeCDF | 57117-41-6 | ND< 0.524 | ND< 0.017 | ND< $5.348 \times 10^{-10}$ |
| 2,3,4,7,8-PeCDF | 57117-31-4 | ND< 0.499 | ND< 0.016 | ND< $5.094 \times 10^{-10}$ |
| 1,2,3,4,7,8-HxCDF | 70648-26-9 | ND< 0.351 | ND< 0.011 | ND< $3.577 \times 10^{-10}$ |
| 1,2,3,6,7,8-HxCDF | 57117-44-9 | ND< 0.338 | ND< 0.011 | ND< $3.447 \times 10^{-10}$ |
| 2,3,4,6,7,8-HxCDF | 60851-34-5 | ND< 0.323 | ND< 0.010 | ND< $3.291 \times 10^{-10}$ |
| 1,2,3,7,8,9-HxCDF | 72918-21-9 | ND< 0.443 | ND< 0.014 | ND< $4.504 \times 10^{-10}$ |
| 1,2,3,4,6,7,8-HpCDF | 67562-39-4 | < 0.551 | < 0.018 | < $5.591 \times 10^{-10}$ |
| 1,2,3,4,7,8,9-HpCDF | 55673-89-7 | ND< 0.845 | ND< 0.027 | ND< $8.575 \times 10^{-10}$ |
| OCDF | 39001-02-0 | ND< 1.736 | ND< 0.055 | ND< $1.774 \times 10^{-9}$ |
| PCB-77 33'44'-TeCB | 32598-13-3 | 6.606 | 0.211 | $6.708 \times 10^{-9}$ |
| PCB-81 344'5-TeCB | 70362-50-4 | < 0.419 | < 0.013 | < $4.275 \times 10^{-10}$ |
| PCB-105 233'44'-PeCB | 32598-14-4 | 12.244 | 0.391 | $1.247 \times 10^{-8}$ |
| PCB-114 2344'5-PeCB | 74472-37-0 | ND< 0.846 | ND< 0.027 | ND< $8.618 \times 10^{-10}$ |
| PCB-118 23'44'5-PeCB | 31508-00-6 | 31.662 | 1.011 | $3.220 \times 10^{-8}$ |
| PCB-123 2'344'5-PeCB | 65510-44-3 | < 1.372 | < 0.044 | < $1.404 \times 10^{-9}$ |
| PCB-126 33'44'5-PeCB | 57465-28-8 | ND< 0.588 | ND< 0.019 | ND< $6.002 \times 10^{-10}$ |
| PCB-156 233'44'5-HxCB | 38380-08-4 | 1.784 | 0.057 | $1.820 \times 10^{-9}$ |
| PCB-157 233'44'5'-HxCB | 69782-90-7 | < 0.532 | < 0.017 | < $5.424 \times 10^{-10}$ |
| PCB-167 23'44'55'-HxCB | 52663-72-6 | < 0.823 | < 0.026 | < $8.421 \times 10^{-10}$ |
| PCB-169 33'44'55'-HxCB | 32774-16-6 | ND< 1.136 | ND< 0.036 | ND< $1.139 \times 10^{-9}$ |
| PCB-189 233'44'55'-HpCB | 39635-31-9 | ND< 0.991 | ND< 0.032 | ND< $1.012 \times 10^{-9}$ |

ND < Indicates all three runs are below the detection limit
< Indicates one or two of the three runs are below the detection limit

## TABLE 1-7
## HYDROGEN CHLORIDE, CHLORINE GAS, AND HYDROGEN FLUORIDE
## EXXONMOBIL TORRANCE REFINERY
## FLUID CATALYTIC CRACKER

| | | Average | | |
|---|---|---|---|---|
| Compound | CAS | µg/dscm @ 7% $O_2$ | µg/dscf | lb/hr |
| Hydrochloric Acid | 7647-01-0 | 1037.21 | 33.11 | 1.01 |
| Chlorine | 7782-50-5 | ND< 22.03 | ND< 0.70 | ND< 0.02 |
| Hydrogen Fluoride | 13981-56-1 | ND< 21.06 | ND< 0.67 | ND< 0.02 |

ND < Indicates all three runs are below the detection limit
< Indicates one or two of the three runs are below the detection limit

## TABLE 1-8
## HYDROGEN CYANIDE
## EXXONMOBIL TORRANCE REFINERY
## FLUID CATALYTIC CRACKER

| | | Average | | |
|---|---|---|---|---|
| Compound | CAS | µg/dscm @ 7% $O_2$ | µg/dscf | lb/hr |
| Total Cyanide | 74-90-8 | 12,099.30 | 387.50 | 11.96 |

## TABLE 1-9
## MERCURY
## EXXONMOBIL TORRANCE REFINERY
## FLUID CATALYTIC CRACKER

| | | Average | | |
|---|---|---|---|---|
| Compound | CAS | µg/dscm | µg/dscf | lb/hr |
| Total Mercury | 7439-97-6 | < 0.947 | $< 2.68 \times 10^{-2}$ | $< 8.51 \times 10^{-4}$ |

ND < Indicates all three runs are below the detection limit
< Indicates one or two of the three runs are below the detection limit

## TABLE 1-10
## HEXAVALENT CHROMIUM
## EXXONMOBIL TORRANCE REFINERY
## FLUID CATALYTIC CRACKER

| | | Average | | |
|---|---|---|---|---|
| Compound | CAS | µg/dscm @ 7% O2 | µg/dscf | lb/hr |
| Hexavalent Chromium | 18540-29-9 | ND< 0.1111 | $ND< 3.60 \times 10^{-3}$ | $ND< 1.13 \times 10^{-4}$ |

ND < Indicates all three runs are below the detection limit

## TABLE 1-11
## METALS
## EXXONMOBIL TORRANCE REFINERY
## FLUID CATALYTIC CRACKER

| | | Average | | |
|---|---|---|---|---|
| NON-BLANK CORRECTED FOR ERT | | | | |
| Compound | CAS | µg/dscm @ 7% $O_2$ | µg/dscf | lb/hr |
| Antimony | 7440-36-0 | ND< 0.284 | ND< $9.21 \times 10^{-3}$ | ND< $2.86 \times 10^{-4}$ |
| Arsenic | 7440-38-2 | ND< 0.244 | ND< $7.90 \times 10^{-3}$ | ND< $2.45 \times 10^{-4}$ |
| Beryllium | 7440-41-7 | ND< 0.244 | ND< $7.90 \times 10^{-3}$ | ND< $2.45 \times 10^{-4}$ |
| Cadmium | 7440-43-9 | ND< 0.244 | ND< $7.90 \times 10^{-3}$ | ND< $2.45 \times 10^{-4}$ |
| Chromium | 7440-47-3 | 1.097 | $3.55 \times 10^{-2}$ | $1.09 \times 10^{-3}$ |
| Cobalt | 7440-48-4 | ND< 0.244 | ND< $7.90 \times 10^{-3}$ | ND< $2.45 \times 10^{-4}$ |
| Lead | 7439-92-1 | < 0.466 | < $1.51 \times 10^{-2}$ | < $4.64 \times 10^{-4}$ |
| Manganese | 7439-96-5 | 0.757 | $2.45 \times 10^{-2}$ | $7.54 \times 10^{-4}$ |
| Nickel | 7440-02-0 | < 0.614 | < $1.98 \times 10^{-2}$ | < $6.08 \times 10^{-4}$ |
| Selenium | 7782-49-2 | < 0.948 | < $3.08 \times 10^{-2}$ | < $9.66 \times 10^{-4}$ |
| BLANK CORRECTED (REAGENT ONLY) | | | | |
| Compound | | µg/dscm @ 7% $O_2$ | µg/dscf | lb/hr |
| Chromium | | 0.890 | $2.88 \times 10^{-2}$ | $8.87 \times 10^{-4}$ |

ND < Indicates all three runs are below the detection limit
< Indicates one or two of the three runs are below the detection limit

## TABLE 1-12
## PARTICULATE MATTER
## EXXONMOBIL TORRANCE REFINERY
## FLUID CATALYTIC CRACKER

| | Average | |
|---|---|---|
| Compound | Grain Loading gr/dscf | lb/hr |
| Filterable Particulate Matter[1] | 0.00064 | 1.26 |
| Total Particulate Matter (less than 2.5 microns) | 0.0090 | 20.98 |

1) Particulate matter from Metals train front half and filter temperature at 320°F.

## TABLE 1-13
## AMMONIA SLIP
## EXXONMOBIL TORRANCE REFINERY
## FLUID CATALYTIC CRACKER

| | | Average | |
|---|---|---|---|
| Compound | CAS | ppmvd | lb/hr |
| Ammonia | 7664-41-7 | 8.38 | 5.49 |

## TABLE 1-14
## CARBON MONOXIDE, OXIDES OF NITROGEN, AND SULFUR DIOXIDE
## EXXONMOBIL TORRANCE REFINERY
## FLUID CATALYTIC CRACKER

| | Average | |
|---|---|---|
| Compound | ppm | lb/hr |
| Carbon Monoxide | 75.47 | 78.56 |
| Oxides of Nitrogen | 14.67 | 25.15 |
| Sulfur Dioxide | 11.99 | 28.36 |

## TABLE 1-15
## CRUDE FUEL SAMPLE
## EXXONMOBIL TORRANCE REFINERY
## FLUID CATALYTIC CRACKER

| Test No. | | 1-CRUDE | 2-CRUDE | 3-CRUDE |
|---|---|---|---|---|
| Date: | | June 6, 2011 | July 7, 2011 | August 8, 2011 |
| Compound | CAS | 1-CRUDE | 2-CRUDE | 3-CRUDE |
| API Gravity (g/cc) | | 15.5 | 16.1 | 15.9 |
| Density @ 60° F (g/cc) | | 0.9628 | 0.9588 | 0.9601 |
| Density @ 60° F (lb/cft) | | 60.1 | 59.9 | 59.9 |
| HHV (Net Btu/US Gal) | | 146,854 | 123,519 | 140,107 |
| HHV (Net Btu/US Lb) | | 18,315 | 15,469 | 17,523 |
| HHV (Gross Btu/US Gal) | | 156,073 | 123,841 | 146,835 |
| HHV (Gross Btu/US Lb) | | 19,464 | 15,509 | 18,365 |
| Total Sulfur (Wt%) | | 1.3 | 1.4 | 1.4 |
| Chlorine (ppm) | 7782-50-5 | 64.7 | 68.0 | 60.8 |
| | | mg/kg | mg/kg | mg/kg |
| Antimony | 7440-36-0 | ND< 23 | ND< 23 | ND< 23 |
| Arsenic | 7440-38-2 | ND< 4.6 | ND< 4.6 | ND< 4.7 |
| Beryllium | 7440-41-7 | ND< 4.6 | ND< 4.6 | ND< 4.7 |
| Cadmium | 7440-43-9 | ND< 2.3 | ND< 2.3 | ND< 2.3 |
| Chromium | 7440-47-3 | ND< 2.3 | ND< 2.3 | ND< 2.3 |
| Cobalt | 7440-48-4 | ND< 2.3 | ND< 2.3 | ND< 2.3 |
| Lead | 7439-92-1 | ND< 4.6 | ND< 4.6 | ND< 4.7 |
| Manganese | 7439-96-5 | ND< 4.6 | ND< 4.6 | ND< 4.7 |
| Mercury | 7439-97-6 | ND< 0.092 | ND< 0.090 | ND< 0.084 |
| Nickel | 7440-02-0 | 46 | 50 | 70 |
| Selenium | 7782-49-2 | ND< 9.2 | ND< 9.3 | ND< 9.3 |

ND < Indicates all three runs are below the detection limit
< Indicates one or two of the three runs are below the detection limit

# 2.0 UNIT DESCRIPTION

## 2.1 PROCESS DESCRIPTION

The Fluid Catalytic Cracker (FCC) located at ExxonMobil Torrance Refinery is equipped with the following pollution control systems:

1. Two parallel ESPs
2. SCR for $NO_x$ reduction

The Two ESPs and SCR exhaust through a single stack location.

Related pages of the facility Title V Permit are provided in Appendix B.1.

## 2.2 OPERATION DURING TESTS

Unit operating conditions were established by ExxonMobil. Process data was collected by the plant data acquisition system and averaged for the day.

The operating parameters during the test are included in Appendix B.

## 2.3 SAMPLE LOCATION

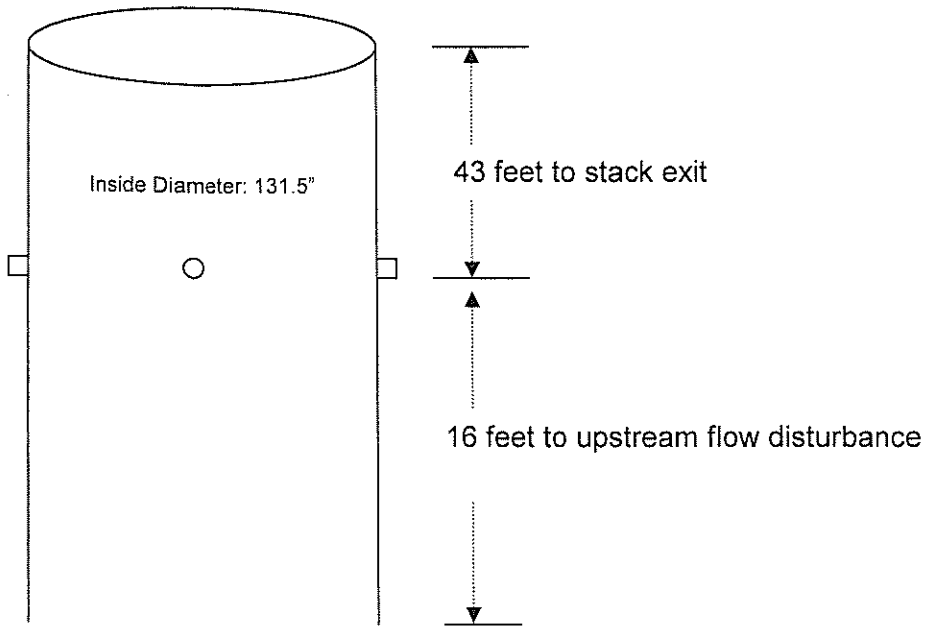
Reference method measurements were performed from sample ports located on the FCC stack. The stack is 131.5 inches in diameter at the sampling elevation. The sample ports are located approximately 43 feet (3.9 diameters) from the upstream disturbance and 16 feet (1.5 diameters) downstream from the stack exit. The sample ports consist of four 4 inch flanged nipples located 90° apart. These sample locations meet the requirements of EPA method 1.

Twenty-four sampling points were used for isokinetic sampling and twelve points for the initial stratification test. A diagram of the stack sample location and individual sample points is shown in Figure 2-1.

A flow check for cyclonic flow (yaw angle) was conducted before testing at the same sampling points. The result of the test showed that the average yaw angle was 2.0°.

A stratification test was conducted before the first CEMS test. The results of the test showed that stratification was less than 10% (3.7% $O_2$, 2.3% CO) at the sample plane.

## FIGURE 2-1
## STACK DIAGRAM AND SAMPLE POINT LOCATION
## EXXONMOBIL TORRANCE REFINERY FCC STACK




Stack Area (ft^2): 94.31
Stack Diameter (in.): 131.5
Coupling Length (in.): 9

D.S. Disturbances (Diam.): 1.5
U.S. Disturbances (Diam): 3.9
Sample Points Required: 24

| | Isokinetic Sample Points (per port) | | | Stratification Sample Points (per port) | | |
|---|---|---|---|---|---|---|
| Point | % of Diameter[1] | Inches from Wall | Inches from Nozzle | % of Diameter[1] | Inches from Wall | Inches from Nozzle |
| 1 | 2.1 | 2.8 | 11.8 | 4.4 | 5.8 | 14.8 |
| 2 | 6.7 | 8.8 | 17.8 | 14.6 | 19.2 | 28.2 |
| 3 | 11.8 | 15.5 | 24.5 | 29.6 | 38.9 | 47.9 |
| 4 | 17.7 | 23.3 | 32.3 | | | |
| 5 | 25.0 | 32.9 | 41.9 | | | |
| 6 | 35.6 | 46.8 | 55.8 | | | |

(1) From EPA Method 1

## 3.0 TEST DESCRIPTION

### 3.1 PROGRAM PARTICIPANTS

The following list contains information on persons to be contacted regarding any aspect of the test program.

Parvez Abbas
ExxonMobil Torrance Refinery
3700 West 190th Street
Torrance, CA 90509
310-212-1755 Phone
310-212-4681 Fax

Ali Aleshaiker
Delta Air Quality Services Incorporated
1845 North Case Street
Orange, California 92865
714-279-6777 Phone
714-279-6781 Fax

Arlene Bell
Delta Air Quality Services Incorporated
1845 North Case Street
Orange, California 92865
714-279-6777 Phone
714-279-6781 Fax

Bob Finken
Delta Air Quality Services Incorporated
1845 North Case Street
Orange, California 92865
714-279-6777 Phone
714-279-6781 Fax

Table 3-1 summarizes the laboratory contacts.

**TABLE 3-1**
**SUMMARY OF LABORATORY CONTACTS**

| Sample Analysis | Organization | Contact | Location | Phone |
|---|---|---|---|---|
| $PM_{2.5}$ Analysis, PM Analysis, $NH_3$ Analysis | Delta Air Quality Services | Arlene Bell | 1845 N. Case St. Orange, CA 92865 | (714) 279-6777 |
| Methane and Ethane Analysis | AtmAA | Mike Porter | 23917 Craftsman Rd. Calabasas, CA 91302 | (818) 223-3277 |
| Aldehydes Analysis, $HCl/Cl_2/HF$ Analysis, CN Analysis | AAC | Sucha Parmar | 1534 Eastman Ave. Ventura, CA 93003 | (805) 650-1642 |
| Mercury Analysis, Metals Analysis, Hexavalent Chromium Analysis | Curtis and Tompkins | John Goyette | 2323 5th St. Berkeley, CA 94710 | (510) 486-0900 |
| Volatile and Semi-Volatile Organics Analysis | ALS Laboratory Group | Ron McLeod | 5420 Mainway Dr. Unit 5 Burlington, ON L7L6A4 | (905) 331-3111 X 222 |
| Dioxins/Furans/PCBs Analysis | Analytical Perspectives | Yves Tondeur | 2714 Exchange Dr. Wilmington, NC 28405 | (910) 794-1613 |
| Fuel Analysis | Quantum Analytical Services | Andrew Kitto | 1210 E. 223rd St., Ste. #314 Carson, CA 90745 | (310) 830-2226 |

## 3.2 TEST METHODS

Table 3-2 summarizes the test methods and techniques used for the tests. The following sections describe each method in further detail.

## TABLE 3-2
## TEST METHODS SUMMARY

| Parameter | Reference Method | Measurement Principle | No. of Replicates | Duration of Test (Min.) | Detection Limit | Notes |
|---|---|---|---|---|---|---|
| Speciated Volatile Organic HAP | Chilled Impinger Method as per ICR FAQ (replaces Method 18/0031) | Gas Chromatography (GC), Mass Spectrometry (MS) Flame Ionization Detector (FID), GC for Methanol | 3 | 60 | 1-5 ppbv | Compound bpt <99°C Spiked impinger and co-located spiked train Methanol in separate train |
| Speciated Semi-Volatile Organic HAP | SW-846 Method 0010 | High Resolution Gas Chromatography (HRGC), High Resolution Mass Spectrometry (HRMS) | 3 | 240 | 3 ng/dscm (PAH) ~30 ng/dscm (other SVOC) | Compound bpt >99°C At least 4 cubic meters/run |
| Aldehydes (Formaldehyde, Acetaldehyde, Propanal) | SW-846 Method 0011 | High Performance Liquid Chromatography (HPLC) | 3 | 120 | 3-6 µg/dscm | At least 1.3 cubic meters/run |
| Total Hydrocarbons (THC) | EPA Method 25A | FID | 3 | 60 | 2% of calibration span | As propane |
| Methane and Ethane | Modified EPA Method 18 | FID, GC | 3 | 60 | 0.04 ppmv | Modified |
| Carbon Monoxide (CO) | EPA Method 10 | Nondispersive Infrared (NDIR) | 3 | 60 | 2% of calibration span | May use certified CEMS data for 30 days |
| Dioxins and Furans (D/F), Polychlorinated biphenyls (PCB) | EPA Method 23 | HRGC, HRMS | 3 | 240 | 0.25-2 pg/dscm (D/F) 0.25-2 pg/dscm (PCB) | At least 3 cubic meters/run |
| Hydrogen Chloride (HCl), Chlorine Gas ($Cl_2$), Hydrogen Fluoride (HF) | EPA Method 26A | Ion Chromatography (IC) | 3 | 120 | 0.1 ppmv | At least 2 cubic meters/run |
| Hydrogen Cyanide (HCN) | EPA OTM 29 | IC | 3 | 60 | 0.1 ppmv | Nominal volume of 0.9 cubic meters |

## TABLE 3-2
## TEST METHODS SUMMARY (CONTINUED)

| Parameter | Reference Method | Measurement Principle | No. of Replicates | Duration of Test (Min.) | Detection Limit | Notes |
|---|---|---|---|---|---|---|
| Mercury (Hg) | ASTM D6784-02 | Cold Vapor Atomic Absorption Spectrometry (CVAAS) | 3 | 120 | 1 µg/dscm | Maximum volume of 2.5 cubic meters |
| Hexavalent Chromium ($Cr^{6+}$) | SW-846 Method 0061 | IC | 3 | 180 | 0.1 µg/dscm | At least 3 cubic meters/run |
| Other Metals and PM (Sb, As, Be, Cd, Cr, Co, Pb, Mn, Ni, Se) | EPA Method 29 and EPA Method 5 | Inductively Coupled Plasma Mass Spectrometry (ICPMS) | 3 | 180 | 0.08-2 µg/dscm (metals) 0.0002 gr/dscf (PM) | At least 3 cubic meters/run Filter temp 320°F Analysis of front and back half separately |
| $PM_{2.5}$ (filterable) | EPA Method 201A and EPA Method 202 | Cyclonic Separation, Gravimetric (Out of Stack Filter) | 3 | 240 | 0.0002 gr/dscf | At least 2 cubic meters/run |
| $PM_{2.5}$ (condensable) | EPA Method 202 (from above) | Condensation, Gravimetric | 3 | 240 | 0.0002 gr/dscf | At least 2 cubic meters/run |
| Ammonia ($NH_3$) | SCAQMD Method 207.1 | Ion Selective Electrode (ISE) | 3 | 60 | 0.1 ppmv | Traverse as per SCAQMD Method 207.1 |
| Oxides of Nitrogen ($NO_x$) | EPA Method 7E | Chemiluminescence | 3 | 120 | 2% of calibration span | May use certified CEMS data for 30 days |
| Sulfur Dioxide ($SO_2$) | EPA Method 6C | Ultraviolet Absorption | 3 | 120 | 2% of calibration span | May use certified CEMS data for 30 days |

## TABLE 3-2
## TEST METHODS SUMMARY (CONTINUED)

| Parameter | Reference Method | Measurement Principle | No. of Replicates | Duration of Test (Min.) | Detection Limit | Notes |
|---|---|---|---|---|---|---|
| Gas Flow Rate | EPA Method 2 | Pitot Traverse | In conjunction with all tests | | N/A | |
| Oxygen ($O_2$), Carbon Dioxide ($CO_2$) | EPA Method 3A | Electrochemical Cell, NDIR | In conjunction with all tests | | 2% of calibration span | |
| Moisture | EPA Method 4 | Gravimetric | In conjunction with all tests | | N/A | |

### 3.2.1 Speciated Volatile Organic Hazardous Air Pollutants

Triplicate samples for volatile organic hazardous air pollutants (HAP) were collected using two separate methods to ensure that the full range of requested volatile compounds can be determined.

The following are volatile organic compounds that were determined for this program:

1,3-Butadiene
Pentane
Methylene Chloride
Carbon Disulfide
Acrolein
Methy t-butyl ether (MTBE)
Acetone
Hexane
Methanol
Acrylonitrile
Acetonitrile
Benzene
Trichloroethene
2,2,4-Trimethylpentane
Toluene
2-Nitropropane
Tetrachloroethene
1,2-Dibromoethane
Chlorobenzene
Ethylbenzene
Xylenes (mixed isomers)
Styrene
Cumene (Isopropylbenzene)
Nitrobenzene
Methylisobutylketone

ALS Laboratory Group in Burlington analyzed the volatile organic samples.

#### 3.2.1.1 Method 18 Methanol Impinger Method

The first type of sample train determined all the volatile organics except for methanol. A recently accepted methodology for the determination of volatile organic compounds has been titled "Method 18 Methanol Impinger Method for Determining Volatile Organic Emissions." This procedure incorporates field spiking to determine accuracy. A copy of the laboratory's procedure is located in Appendix C.1.1.

In this procedure the flue gas was drawn non-isokinetically at 0.25 l/min through two series of co-located, chilled (dry ice and methanol bath) methanol-filled midget impingers. The first series of impingers was spiked with a deuterated spike mix. The second series of impingers contained native spikes.

The train containing the deuterated spike mix consisted of the following components:

- Glass probe
- Teflon line
- Condensing coil (cooled to ice water temperature)
- Empty impinger
- Methanol containing impinger (10 ml methanol plus deuterated spike mix)
- Methanol containing impinger (15 ml methanol)
- Methanol containing impinger (15 ml methanol)
- Silica gel impinger

The train containing the co-located native spike consisted of the following components:

- Glass probe
- Teflon line
- Condensing coil (cooled to ice water temperature)
- Empty impinger
- Methanol containing impinger (5 ml methanol plus native spike mix)
- Methanol containing impinger (15 ml methanol)
- Methanol containing impinger (15 ml methanol)
- Silica gel impinger

Quality assurance samples collected in the field were:

- A field spike control sample with deuterated spike mix
- A field spike control sample with native spike mix
- A field blank train using the glassware from the deuterated sampling train
- A field blank train using the glassware from the native sampling train
- Methanol trip blank

For both sampling trains, the same recovery procedure was used. Samples were recovered in the following sample fractions:

1) Probe, Teflon line, Coil and #1 and #2 Impingers – Methanol rinsed into 40 ml VOA vial filled with methanol with no head space available.
2) #3 Impinger Catch – Methanol rinsed into 20 ml VOA vial filled with methanol with no head space available.
3) #4 Impinger Catch – Methanol rinsed into 20 ml VOA vial filled with methanol with no head space available.

The samples were analyzed using GC/MS by ALS Laboratory Group in Burlington. ALS also provided the methanol reagent and spiking compounds in ampoules. Delta cleaned all glassware with HPLC grade methanol and baked the glassware at 100°C for two hours.

The samples were stored in an electric cooler, which typically maintains a temperature of <4°C. The samples were shipped cold to the laboratory.

#### 3.2.1.2 Methanol

Methanol was collected in a separate train by modified Method 18. Methanol was absorbed on spiked silica tubes. ALS provided the silica tubes and analyzed the samples by GC/FID.

The samples were collected at 0.25 l/min using a heated glass probe, a chilled impinger containing 100 ml HPLC grade water, silica tube, and a low flow dry gas meter.

- The knockout impinger was recovered with HPLC grade water into a pre-cleaned amber glass bottle.
- The silica tube was capped.

Quality assurance samples collected in the field were:

- A field blank silica tube
- A trip blank silica tube

The samples were stored in a separate electric cooler, which typically maintains a temperature of <4°C. The samples were shipped cold to the laboratory.

### 3.2.2 Speciated Semi-Volatile Organic Hazardous Air Pollutants

Triplicate samples for semi-volatile organic hazardous air pollutants (HAP) were collected using EPA Method SW-846 0010.

In this procedure the flue gas was withdrawn isokinetically and passed through a heated glass probe and Method 5 type fiber glass filter, heated to 248°F ± 25°F, to a heated Teflon line, a condenser, and an XAD-2 resin column. The resin column was connected to a series of impingers containing 100 ml each of HPLC-grade water in the first two impingers, followed by an empty impinger, and an impinger containing silica gel.

This method was used to quantify the following semi-volatile species:

Acenaphthene
Acenaphthylene
Aniline
Anthracene
Benzidine
Benz(a)anthracene
Benzo(b)fluoranthene
Benzo(k)fluoranthene
Benzo(g,h,i)perylene
Benzo(a)pyrene
Benzo(e)pyrene
Biphenyl
Cresol (mixed isomers)
Chrysene
Dibenz (a,h)anthracene
Dibenzofuran
Dibenzo (a,e)pyrene
3,3'-Dimethoxybenzidine
Dimethlyaminobenzene
7,12-Dimethylbenz (a)anthracene
3,3'-Dimethlybenzidine
α,α-Dimethylphenethylamine
2,4-Dimethlyphenol
Fluoranthene
Fluorene
Indeno (1,2,3-cd)pyrene
Isophorone
3-Methylcholanthrene
2-Methylnaphthalene
Naphthalene
Perylene
Phenanthrene
Phenol
1,4-Phenylenediamine
Pyrene
0-Toluidine

All sampling media were pre-cleaned to eliminate contamination. All filters were pre-cleaned with solvents and stored in petri dishes lined with hexane rinsed aluminum foil and the XAD-2 resin was extracted until clean. The sampling train components (including the probe, glassware and connecting lines) were pre-cleaned using high purity water, acetone, methanol, and methylene chloride.

Field spikes were added to each XAD-2 resin module by the laboratory.

Semi-volatile organic samples were recovered in the following sample fractions:

1) Filter – Returned to petri dish.
2) Front Half (nozzle, probe, front half of filter holder) – 1:1 Methanol/Methylene Chloride rinsed into pre-cleaned amber glass jar.
3) Impinger Catch – Weighed for moisture content and recovered into pre-cleaned amber glass jar.

4) Impinger, Line, Back Half of Filter Holder, and Condenser Rinse – 1:1 Methanol/Methylene Chloride rinsed into pre-cleaned amber glass jar.
5) XAD-2 resin module – Covered with hexane rinsed aluminum foil.

All samples were stored in electric coolers, which typically maintain a temperature of <4°C, until extraction and analysis.

A field blank was collected during each sampling program. Additionally, a reagent blank of each solvent used was collected (HPLC-grade water, Methanol, and Methylene Chloride).

Samples were analyzed by HRGC/HRMS using modified Method 8270D to obtain lower detection limits per sample per species. The sample analysis combined all sample fractions into one analysis after extraction. Sample analysis also includes analysis of a laboratory method blank and spiking of the samples with deuterated semi-volatile organic species to evaluate the extraction and analysis procedures.

The samples were analyzed by ALS Laboratory Group in Burlington.

### 3.2.3 Aldehydes (Formaldehyde, Acetaldehyde, Propanal)

Triplicate samples for formaldehyde, acetaldehyde, and propanal were collected using EPA Method SW-846 0011.

Gaseous and particulate pollutants were drawn isokinetically and were collected in aqueous acidic 2, 4-dinitrophenylhydrazine. Aldehydes present in the emissions reacted with the 2, 4-dinitrophenylhydrazine to form the dinitrophenylhydrazone derivatives. The dinitrophenylhydrazone derivatives were extracted and analyzed by HPLC.

In this method, the exhaust gas was withdrawn isokinetically through a heated glass probe and into a series of DNPH filled impingers. The first impinger contained 200 ml of DNPH, the second and third impingers contained 100 ml of DNPH, the fourth impinger was empty and the fifth impinger contained silica gel.

The train was recovered in one fraction. The probe and impingers were recovered in a methylene chloride rinse into a 1000 ml pre-cleaned amber glass bottle.

The following QA/QC procedures were conducted:

- Screening of DNPH reagent
- Two field blanks in conjunction with sampling
- Two field spikes (200 ml of DNPH spiked with laboratory provided spike) and recovered with methylene chloride and water
- Sample blank (400 ml DNPH and 200 ml methylene chloride mixed) (section 7.2.2 of the method)
- Methylene Chloride Reagent Blank (200 ml)

- HPLC Water Reagent Blank (200 ml)
- Two DNPH trip blanks
- Two DNPH trip spikes
- Laboratory blanks
- Laboratory matrix spike

The DNPH solution was prepared and the samples were analyzed by AAC in Ventura.

### 3.2.4 Total Hydrocarbons

Total hydrocarbons were determined using EPA Method 25A. The equipment required include a probe, heated Teflon sample line, and heated flame ionization detector (FID) analyzer.

The instrument was calibrated with a series of propane gases according to the requirements of EPA Method 25A. Total hydrocarbons are reported as propane.

### 3.2.5 Methane and Ethane

Methane and ethane were determined using a modified and simplified EPA Method 18. Three samples for analysis were collected in Tedlar bags using a lung-type sampling system. The samples were analyzed for methane and ethane by GC/FID by ATMAA, Inc. located in Calabasas.

### 3.2.6 Dioxins/Furans and PCB

Triplicate PCDD/PCDF/PCB were collected and analyzed according to EPA Method 23 for PCDD/PCDF and according to Method 1668 for PCBs.

In this procedure the flue gas was withdrawn isokinetically and passed through a heated glass probe and Method 5 type fiber glass filter, heated to 248°F ± 25°F, to a heated line, condenser, and XAD-2 resin column. The resin column was connected to a series of impingers. The first impinger was empty, the second and third contained 100 ml each of HPLC-grade water, the fourth impinger was empty, and the fifth impinger contained silica gel.

The components of the sampling train were recovered with high purity GC/MS grade acetone into amber glass bottles cleaned to EPA specifications. A separate toluene rinse of the train components was collected. The impinger catch was weighed for moisture determination and was included for PCB sample analysis, but not dioxin/furan analysis. The impingers were rinsed with acetone and toluene.

The rinse sequence was modified for this test program because of the species that were determined. Acetone only was used instead of acetone and methylene chloride. The toluene rinse was normally analyzed separately, but the results were not added to the overall sample results. The toluene rinse was combined with the other rinses for analysis of PCDD/PCDF and PCBs in the laboratory. In this modification the laboratory recommended that considerably more acetone be used than toluene. This allows a pre-concentration step to be successfully conducted. The laboratory pre-spiked the sample jars to assess accuracy.

All sampling media were pre-cleaned to ensure that there was no contamination. The filters were extracted with toluene and stored in petri dishes lined with hexane rinsed aluminum foil and the XAD-2 resin was extracted until clean.

The sample train was recovered into the following sample fractions:

1) Filter – Returned to petri dish.
2) Nozzle, Probe, Filter Holder (both halves), Heated Line, Impinger, and Condenser Rinse – Acetone rinsed into pre-cleaned, pre-spiked glass jar and separate toluene rinse into un-spiked pre-cleaned glass jar.
3) Impinger Catch – Weighed for moisture content and recovered into pre-cleaned amber glass jar.
4) XAD-2 resin module – Covered with hexane rinsed aluminum foil.

The sample was analyzed into the following fractions:

1. Dioxin/Furan/PCBs: Combined filter, probe wash, XAD-2 resin, condenser and impinger rinses.
2. PCBs only: impinger catch.

Sample analysis for dioxin/furan includes HRGC/HRMS analysis for tetra through octa PCDD/PCDF and all 2, 3, 7, 8 substituted isomers of the combined extracted filter, XAD-2 resin and train rinses that include the following:

OCDD
2,3,7,8-TCDF
1,2,3,7,8-PeCDF
2,3,4,7,8-PeCDF
1,2,3,4,7,8-HxCDF
1,2,3,6,7,8-HxCDF
2,3,4,6,7,8-HxCDF
1,2,3,7,8,9-HxCDF
1,2,3,4,6,7,8-HpCDF
1,2,3,4,7,8,9-HpCDF
OCDF
Other TCDD
Other PeCDD
Other HxCDD
Other HpCDD
Other TCDF
Other PeCDF
Other HxCDF

Other HpCDF
2,3,7,8-TCDD
1,2,3,7,8-PeCDD
1,2,3,4,7,8-HxCDD
1,2,3,6,7,8-HxCDD
1,2,3,7,8,9-HxCDD
1,2,3,4,6,7,8-HpCDD

Sample analysis for PCB's includes HRGC/HRMS analysis of the PCB's required by the ICR that include:

| | |
|---|---|
| (PCB-77) | 3, 3'4, 4'-TCB |
| (PCB-81) | 3, 4, 4', 5-TCB |
| (PCB-105) | 2, 3, 3', 4, 4'-PeCB |
| (PCB-114) | 2, 3, 4, 4', 5-PeCB |
| (PCB-118) | 2, 3', 4, 4', 5-PeCB |
| (PCB-123) | 2', 3, 4, 4', 5-PeCB |
| (PCB-126) | 3, 3', 4, 4', 5-PeCB |
| (PCB-156/157) | 2, 3, 3', 4, 4', 5/2, 3, 3', 4, 4', 5-HxCB |
| (PCB-167) | 2, 3', 4, 4', 5, 5'-HxCB |
| (PCB-169) | 3, 3', 4, 4', 5, 5'-HxCB |
| (PCB-189) | 2, 3, 3', 4, 4', 5, 5'-HpCB |

PCBs were analyzed from two sample fractions as described above.

Appropriate field, pre-extraction, pre-clean-up and internal spikes as required by the reference methods were introduced to the samples by the laboratory and the percent recoveries are reported along with the results.

The analysis was conducted by Analytical Perspectives in North Carolina.

### 3.2.7 Hydrogen Chloride, Chlorine Gas, and Hydrogen Fluoride

Triplicate hydrogen chloride (HCl), chlorine gas ($Cl_2$), and hydrogen fluoride (HF) samples were collected using EPA Method 26A.

The sampling train consisted of:

- A glass nozzle and heated glass probe (248°F ± 25°F)
- A quartz out-of-stack filter in a glass filter holder heated to 248°F ± 25°F
- Two impingers containing 100 ml of 0.1 N $H_2SO_4$ for collection of HCl and HF
- Two impingers containing 100 ml of 0.1 N NaOH for collection of $Cl_2$
- An impinger containing silica gel

Samples were withdrawn isokinetically from the stack. The quartz-fiber filter collected particulate matter. Acidic and alkaline absorbing solutions collected gaseous

HCl, HF, and $Cl_2$, respectively. In the acidified water absorbing solution, the HCl and HF gas was solubilized and formed chloride ($Cl^-$) and fluoride ions. The $Cl_2$ gas present in the emissions had a very low solubility in acidified water and passed through to the alkaline absorbing solution. Sodium thiosulfate was added to the NaOH sample fraction to stabilize the $Cl^-$ ions. Each sample fraction was analyzed for chloride and fluoride by ion chromatography.

The samples were recovered in the following sample fractions:

1) Back half of filter holder, $H_2SO_4$ Impinger Catch – Weighed for moisture content and recovered with DI water into pre-cleaned HDPE bottle.
2) NaOH Impinger Catch – Weighed for moisture content and recovered with DI water into pre-cleaned HDPE bottle.
3) 50 mg of sodium thiosulfate was added to the NaOH impinger catch.
4) The filter and probe wash was not recovered for this test program.

Quality assurance samples collected in the field were:

- A field blank
- A reagent blank: 200 ml of 0.1 N $H_2SO_4$
- A reagent blank: 200 ml of 0.1 N NaOH with 50 mg of sodium thiosulfate added
- A reagent blank: 200 ml of DI water

The samples were analyzed by ion chromatography by AAC in Ventura.

### 3.2.8 Hydrogen Cyanide

Triplicate hydrogen cyanide (HCN) samples were collected using EPA OTM 29.

The sampling train consisted of:

- A glass nozzle and heated glass probe (248°F ± 25°F)
- A quartz out-of-stack filter in a glass filter holder heated to 248°F ± 25°F
- Three impingers containing 100 ml of 6.0 N NaOH
- An impinger containing silica gel

Samples were withdrawn isokinetically from the stack. The quartz-fiber filter collects particulate matter. Hydrogen cyanide in the stack gas reacts with NaOH to form a cyanide ion and is analyzed by ion chromatography. Each fraction was analyzed separately.

The samples were recovered in the following sample fractions:

1) First two NaOH Impinger Catch – Weighed for moisture content and recovered with 0.1 N NaOH into pre-cleaned HDPE bottle.
   - For each impinger, the pH was checked. If the pH wasn't 12 or above, additional 6.0 N NaOH was added in 10 ml increments until pH of 12 was attained.
2) Third NaOH Impinger Catch – Weighed for moisture content and recovered with 0.1 N NaOH into pre-cleaned HDPE bottle.
   - For each impinger, the pH was checked. If the pH wasn't 12 or above, additional 6.0 N NaOH was added in 10 ml increments until pH of 12 was attained.
3) The filter and probe wash were not recovered for this test program.

Quality assurance samples collected in the field were:

- A field blank
- A reagent blank: 100 ml of 6.0 N NaOH
- A field spike: 2 ml of field spike standard added to an impinger containing 100 ml of 6.0 N NaOH. Impinger was recovered with 0.1 N NaOH.

The samples were analyzed by ion chromatography by AAC in Ventura.

### 3.2.9 Mercury

Triplicate mercury (Hg) samples were collected using ASTM D6784-02 titled "Standard Test Method for Elemental, Oxidized, Particle-Bound and Total Mercury in Flue Gas Generated from Coal-Fired Stationary Sources (Ontario Hydro Method)."

In this method, particle-bound mercury was collected on the probe wash, front half rinses and filter; oxidized mercury was collected in impingers containing 1N potassium chloride solution; and elemental mercury is collected in impingers containing 5% nitric acid and 10% hydrogen peroxide solution, and in impingers containing a solution of 4% potassium permanganate and 10% sulfuric acid.

The samples were collected isokinetically through a heated glass probe, tared quartz filter, and a series of impingers.

The sampling train consisted of:

- A glass nozzle and heated glass probe (248°F ± 25°F)
- A tared-quartz out-of-stack filter in a glass filter holder heated to 248°F ± 25°F
- Three impingers containing 100 ml of 1 N potassium chloride (KCl)
- One impinger containing 100 ml of 5% nitric acid ($HNO_3$)/10% hydrogen peroxide ($H_2O_2$) solution

- Three impingers containing 100 ml of 4% potassium permanganate ($KMnO_4$)/10% sulfuric acid ($H_2SO_4$)
- An impinger containing silica gel

The samples were recovered in the following sample fractions:

1) Filter – Returned to petri dish.
2) Probe wash/front half of filter holder – Recovered with 0.1 N $HNO_3$ rinse and brushed into pre-cleaned glass bottle.
3) Back half of filter holder/KCl Impinger catch – Back half of filter holder rinsed with 0.1 N $HNO_3$. Impingers weighed for moisture content. 5% $KMnO_4$ solution added to impingers until color persists. Rinsed with 10% $HNO_3$ into pre-cleaned glass bottle also containing the back half of filter holder rinse. 10% hydroxylamine solution (a few drops) was used with the 10% $HNO_3$ rinse. 5% $KMnO_4$ solution added to sample bottle until color persists. Checked periodically and additional 5% $KMnO_4$ solution was added as needed.
4) $HNO_3/H_2O_2$ Impinger catch – Weighed for moisture content and recovered with 0.1 N $HNO_3$ rinse, into pre-cleaned glass bottle.
5) $KMnO_4/H_2SO_4$ Impinger catch – Weighed for moisture content. Recovered and rinsed into pre-cleaned glass bottle with 0.1 N $HNO_3$ and 10% hydroxylamine solution until brown deposits were removed.

The sample train was rinsed with DI water before the next sampling run.

Quality assurance samples collected in the field were:

- A field blank
- A reagent blank: 50 ml of 0.1 N $HNO_3$
- A reagent blank: 50 ml of 1 N KCl
- A reagent blank: 50 ml of 5% $HNO_3$/10% $H_2O_2$
- A reagent blank: 50 ml of 4% $KMnO_4$/10% $H_2SO_4$
- A reagent blank: 100 ml of 10% hydroxylamine
- 3 unused blank filters

Mercury analysis according to the method by CVAAS was performed by Curtis and Thompkins in Berkeley.

### 3.2.10 Hexavalent Chromium

Triplicate samples for hexavalent chromium were collected using EPA Method SW-846 0061 and analyzed by EPA Method 7199. In this procedure exhaust gas was withdrawn isokinetically through a Teflon recirculation train.

The recirculation train consisted of the following components:

- Glass nozzle
- Glass probe liner in air cooled probe
- Teflon/glass recirculation assembly to circulate KOH absorbing reagent from the first impinger to a location behind the sampling nozzle
- Teflon sample line and Teflon recirculation line
- Teflon impinger train consisting of four Teflon impingers and U-tubes and followed by a silica gel impinger
    - The first impinger contains 150 ml 0.1 N KOH
    - The second and third impingers each contain 75 ml 0.1 N KOH
    - The fourth impinger is empty

The sample recovery consisted of:

- Recorded the pH of the first impinger. A pH of above 8.5 was required. If the pH was below 8.5, then 0.5N KOH may be required.
- A post test nitrogen purge of the impinger train at 10 l/min for 30 minutes.
- Nozzle, aspirator, sample, and recirculation lines – Rinsed with DI water into amber HDPE bottle.
- Impinger catch - Weighed for moisture content. Rinsed impingers and U-tubes with DI water into the same sample bottle as nozzle and Teflon lines rinse.
- Filtered the sample immediately after the rinses were collected through a 0.45 µm acetate filter. All rinses of the filtration process and apparatus were added to the sample.
- Silica gel - Weighed for moisture content.

Total chromium was not determined from this sample train for this test program so the nitric acid rinse steps were not performed.

Quality assurance samples collected were:

- Field blank
- Reagent blank: 300 ml 0.1 N KOH
- Reagent blank: 200 ml DI water

The sample holding time was 14 days. Curtis and Tompkins in Berkeley analyzed these samples by ion chromatography.

### 3.2.11 Metals and Filterable Particulate Matter

Triplicate tests for metals and particulate matter were collected by EPA Method 29.

The metals to be determined were:

Antimony (Sb)
Arsenic (As)
Beryllium (Be)
Cadmium (Cd)
Chromium (Cr)
Cobalt (Co)
Lead (Pb)
Manganese (Mn)
Nickel (Ni)
Selenium (Se)

The option to perform a filterable particulate matter (PM) measurement was used with a filter temperature of 320°F.

Additionally, the samples were analyzed so that a filterable (front half) and gaseous (back half) metals concentration were determined.

The sampling was conducted isokinetically with the following sample train configuration:

- Glass nozzle
- Glass probe heated to 320°F
- Tared quartz filter heated to 320°F
- Two impingers containing 100 ml each of 5% $HNO_3$/10% $H_2O_2$
- An empty impinger
- A silica gel impinger

Sampling reagent and media were all trace metals quality with lot analyses of specific heavy metals. The sampling train was pre-cleaned with DI water, nitric acid, and hydrochloric acid before testing and sealed with parafilm. The filter was tared after being dried at 320°F.

Sample recovery consisted of the following sample fractions:

1. Probe, nozzle, and front half of filter holder - Rinsed and brushed with acetone into amber glass bottle (this sample for PM and metals analysis).
2. Probe, nozzle, and front half of filter holder - Rinsed and brushed with 0.1 N $HNO_3$ into amber HDPE bottle (this sample for metals only).
3. Filter - Returned to pre-numbered Petri dish and sealed (this sample for PM and metals analysis).
4. Back half of filter, $HNO_3$/$H_2O_2$ impingers 1 and 2, and empty impinger - Weighed for moisture content and rinsed with 0.1 N $HNO_3$ into amber HDPE bottle.
5. Silica gel impinger - Weighed for moisture content.

Quality assurance samples that were collected are:

- Field blank
- Reagent blank: 200 ml acetone for PM measurement
- Reagent blank: 300 ml 0.1 N HNO3
- Reagent blank: 100 ml DI water
- Reagent blank: 200 ml 5% $HNO_3$/10% $H_2O_2$
- Reagent blank: three quartz filters for metals analysis

All fractions were stored in acid-washed high density polyethylene (HDPE) bottles. In the field samples were stored in electric coolers that maintain a temperature of 33-36°F. Samples were sent by courier to the laboratory on blue ice.

Particulate analysis was performed by EPA Method 5 procedures on the filter and acetone rinse at Delta's laboratory.

The samples were then analyzed for metals by inductively coupled plasma mass spectrometry (ICP-MS) by Curtis and Tompkins in Berkeley.

### 3.2.12 Particulate Matter (Less Than 2.5 Microns)

Triplicate samples were collected for $PM_{2.5}$ determination using EPA Method 201A (solid $PM_{2.5}$) and EPA Method 202 (condensable $PM_{2.5}$).

Method 201A separates particulate matter less than 2.5 µm from the flue gas using a cyclone of an EPA approved design. A cyclone to separate the solid particles at a 2.5 µm aerodynamic equivalent diameter is allowed under the December 1, 2010 revision of the Method 201A with no prior separation of $PM_{10}$.

The sample train was operated isokinetically at a constant flow rate using a correctly sized sampling nozzle. The dwell time at each of the 12 prescribed sample points was adjusted based on the measured velocity at that point in order to weigh the sample proportionally to the exhaust flow rate. A pretest velocity traverse was performed in order to correctly calculate the nozzle size and sampling rate. The equation for the sampling rate using only the $PM_{2.5}$ cyclone was incorporated into the pre-test calculations. The cyclone was followed by an in-stack filter.

EPA Method 202 was used to collect the condensable particulate matter (CPM). The CPM was collected using a condenser and in a dry dropout impinger, a dry backup impinger, and the CPM filter, after filterable particulate material had been collected using EPA Method 201A. The revisions to the method made in 2010 include the stipulation that no water is added to the impingers prior to the start of sampling and placing an additional filter (CPM filter) between the second and third impingers. Gravimetric analysis was used to determine the particulate mass for inorganic and organic fractions of CPM.

The sampling was conducted isokinetically with the following sample train configuration:

- $PM_{2.5}$ cyclone
- Heated sample probe
- Tared heated out of stack filter heated to 248°F ± 25°
- Heated Teflon line
- Condensing coil
- One empty knock out impinger
- One empty backup impinger
- CPM filter
- One impinger containing 100 ml DI water
- A silica gel impinger

The out of stack filter was recommended for stacks with high temperature.

Figure 3-1 illustrates the sampling train.

Sample recovery consisted of the following sample fractions:

1. Nozzle, cyclone body, and cyclone hopper wash - PM>2.5µm - Rinsed with acetone into amber glass bottle.
2. Cyclone exit fittings, front half of filter housing, and filter - PM<2.5µm - Returned filter to pre-numbered Petri dish and sealed. Rinsed cyclone fittings and front half of filter housing with acetone into amber glass bottle.
3. Back half of filter housing, glass probe, sample line, condenser, impingers, CPM filter - CPM
    a. Back half of filter housing, glass probe, and sample line - Rinsed and brushed with DI water into amber HDPE bottle (Bottle 1).
    b. A post test nitrogen purge of the condenser and impinger train at 14 l/min for 60 minutes was required.
    c. Condenser - Rinsed with DI water into Bottle 1.
    d. Knock out and backup impingers - Weighed for moisture content and rinsed two times with DI water into Bottle 1.
    e. Front half of CPM filter - Rinsed with DI water into Bottle 1.
    f. Rinsed half of filter housing, glass probe, sample line, condenser, knock out impinger, backup impinger, and front half of CPM filter with acetone into amber glass bottle (Bottle 2).
    g. Rinsed half of filter housing, glass probe, sample line, condenser, knock out impinger, backup impinger, and front half of CPM filter twice with hexane into Bottle 2.
    h. Returned CPM filter to pre-numbered Petri dish and sealed.
    i. DI water and silica gel impingers - Weighed for moisture content.

The Method 201A portion of the train was prepared by acetone rinsing and brushing of the sample wetted surfaces to remove all particulate matter. The filters were prepared by baking at 220°F, desiccating for 24 hours, and weighing at intervals of greater than six hours to obtain constant weights.

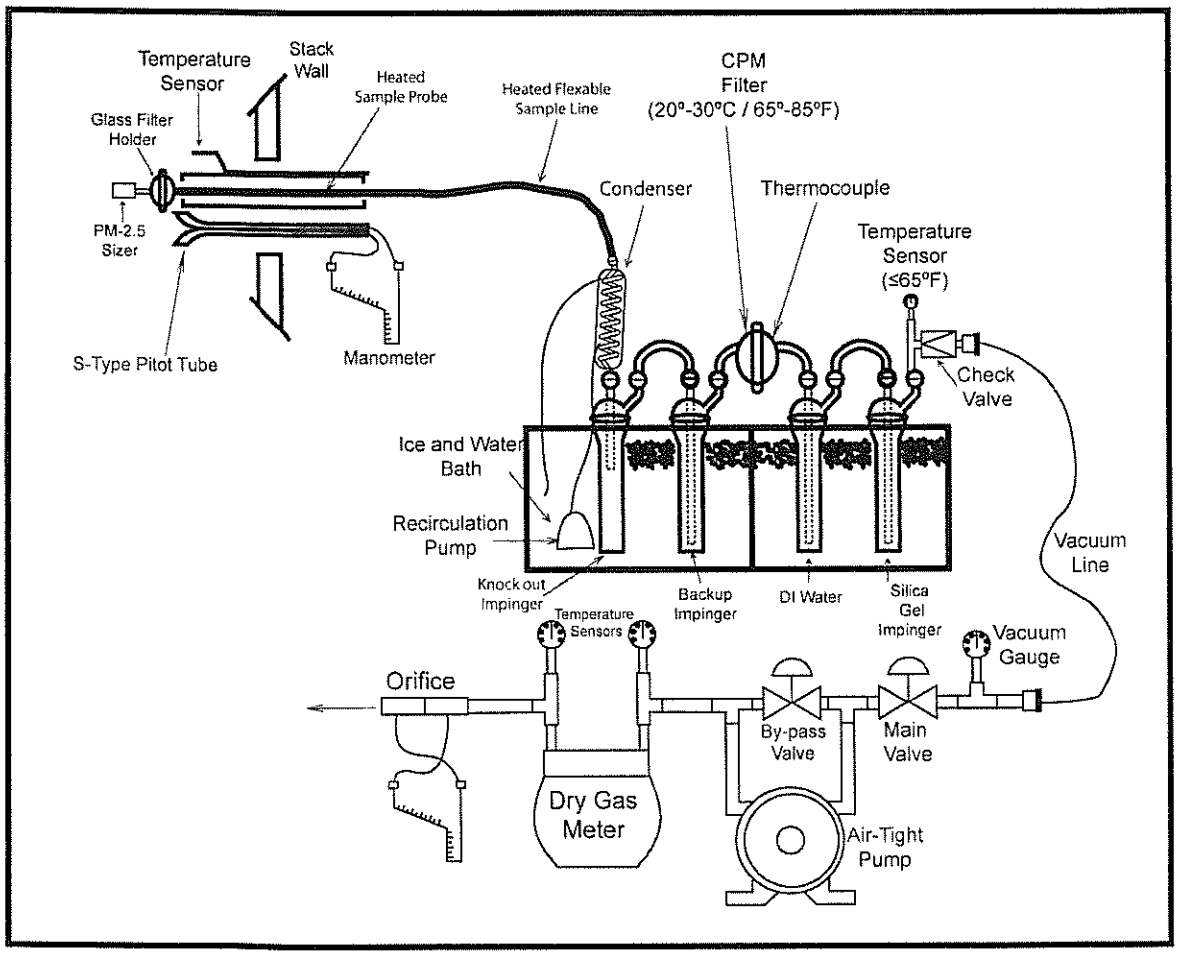
The Method 202 portion of the train was prepared by cleaning all glassware prior to each field test on a source category with soap and tap water and rinsed with tap water, deionized water, acetone, and hexane. The glassware was then baked in an oven at 300°C for at least six hours.

Quality assurance samples that were collected are:

- Field blank
- Reagent blank: 200 ml acetone for PM measurement
- Reagent blank: 200 ml DI water
- Reagent blank: 200 ml hexane

Particulate analysis was performed by EPA Methods 201A and 202 procedures at Delta's laboratory.

## FIGURE 3-1
## EPA METHODS 201A AND 202 SAMPLING TRAIN



### 3.2.13 Ammonia

Four, 60-minute, flue gas samples were collected non-isokinetically using a SCAQMD Method 4.1 sample train. The ammonia slip test was performed using a single point because there was an absence of significant stratification at the sample plane. The sample gas was drawn through a stainless steel probe, Teflon sample line, two impingers each containing approximately 100 ml of 0.1N $H_2SO_4$, an empty impinger, an impinger containing silica gel, and a dry gas meter. The contents of the sample line and the first three impingers were recovered and rinsed with DI water and analyzed by SCAQMD Method 207.1 for ammonia concentration by ion selective electrode. Ammonia slip is reported in units of ppm and ppm corrected to 3% $O_2$. $O_2$ measurements were made concurrently using EPA Method 3A.

### 3.2.14 Gas Flow Rate

The stack gas velocity was measured using EPA Method 2. All pitot tubes were calibrated dimensionally as described in EPA Method 2. Gas flow rate was calculated using $O_2$ and $CO_2$ data for molecular weight, moisture content, and velocity measurements.

Yaw angle measurements were performed prior to the test program. Velocity measurements were made in conjunction with all isokinetic tests performed.

### 3.2.15 Carbon Monoxide, Oxides of Nitrogen, Sulfur Dioxide, Oxygen, and Carbon Dioxide

CO, $NO_x$, $SO_2$, $O_2$, and $CO_2$ concentrations were measured using EPA Methods 10, 7E, 6C, and 3A. These measurements were made with Delta's mobile emission measurement laboratory. The system to be used for this project consisted of a stack probe, heated Teflon sample line, moisture removal system, sample pump, unheated Teflon line, sample filter, and individual component analyzers. The measured concentrations were averaged over each sampling period, and then corrected for system bias and analyzer drift. $O_2$ and $CO_2$ measurements were made in conjunction with all tests performed.

All quality assurance procedures required by EPA methods were performed including pre- and post-test calibration error; sample system bias and analyzer drift before and after each test run, $NO_2$ converter check and daily analyzer linearity. A complete description of the method including the calibration sequence is provided in Appendix A.4.

### 3.2.16 Moisture

The moisture was measured using EPA Method 4. From each wet chemical test performed, the moisture content was determined gravimetrically by the ratio of moisture collected to the total volume (moisture and dry gas) sampled. Moisture measurements were made in conjunction with all wet chemical tests performed.

### 3.2.17 Crude Fuel Sample and Analysis (ICR - Component 3)

ExxonMobil collected three composite samples for analysis at monthly intervals (June 6, 2011, July 7, 2011, and August 8, 2011). These composites were made from three separate five minute samples. The sampling was conducted in accordance with ASTM D4057.

The three monthly samples (total of 9 samples over the duration of the three months) were analyzed separately by Quantum Analytical Services in Carson. Table 3-3 contains the parameters that were analyzed.

## TABLE 3-3
## CRUDE FUEL ANALYSIS PARAMETERS

| Parameter | Analysis Method |
|---|---|
| Sulfur, total | ASTM D129 |
| Selenium, total | EPA 6010B |
| Btu, gross heating value | ASTM D240 |
| API Gravity by density meter | ASTM D4052 |
| Nickel, total | EPA 6010B |
| Mercury, total | EPA 7471A |
| Manganese, total | EPA 6010B |
| Lead, total | EPA 6010B |
| Cobalt, total | EPA 6010B |
| Chromium, total | EPA 6010B |
| Chlorine in oil | SW 846-9076 |
| Cadmium, total | EPA 6010B |
| Beryllium, total | EPA 6010B |
| Arsenic, total | EPA 6010B |
| Antimony, total | EPA 6010B |

## 4.0 RESULTS

The test schedule is presented in Table 4.1. The results of the test program are presented in Tables 4-2 through 4-19 that follow.

A complete summary of the raw test and laboratory data is contained in Appendix C.

## TABLE 4-1
## TEST SCHEDULE
## EXXONMOBIL TORRANCE REFINERY
## FLUID CATALYTIC CRACKER

| Date | Time | Test Number | Test Type |
|---|---|---|---|
| 6/27/2011 | 945/1045 | 1-CO | Carbon Monoxide |
| | 945/1400 | 1-SV | Semi Volatile Organic Compounds |
| | 1013/1113 | 1-MeOH | Methanol |
| | 1112/1212 | 1-Meth/Eth | Methane and Ethane |
| | 1112/1212 | 1-THC | Total Hydrocarbons |
| | 1255/1355 | 1-VOC | Volatile Organic Compounds |
| | 1320/1529 | 1-Ald | Aldehydes |
| | 1325/1425 | 2-THC | Total Hydrocarbons |
| | 1525/1625 | 2-Meth/Eth | Methane and Ethane |
| | 1525/1935 | 2-SV | Semi Volatile Organic Compounds |
| | 1530/1630 | 2-CO | Carbon Monoxide |
| | 1610/1710 | 2-VOC | Volatile Organic Compounds |
| | 1723/1933 | 2-Ald | Aldehydes |
| | 1815/1915 | 2-MeOH | Methanol |
| 6/28/2011 | 802/902 | 3-CO | Carbon Monoxide |
| | 802/902 | 3-Meth/Eth | Methane and Ethane |
| | 802/902 | 3-THC | Total Hydrocarbons |
| | 802/1220 | 3-SV | Semi Volatile Organic Compounds |
| | 805/905 | 3-MeOH | Methanol |
| | 935/1151 | 3-Ald | Aldehydes |
| | 1015/1115 | 3-VOC | Volatile Organic Compounds |
| | 1250/1700 | 1-DF | Dioxins and Furans |
| | 1306/1426 | 1-HCN | Hydrogen Cyanide |
| | 1438/1653 | 1-HCl | Hydrochloric Acid, Chlorine, Hydrogen Fluoride |
| 6/29/2011 | 755/1209 | 2-DF | Dioxins and Furans |
| | 757/1005 | 2-HCN | Hydrogen Cyanide |
| | 1015/1221 | 2-HCl | Hydrochloric Acid, Chlorine, Hydrogen Fluoride |
| | 1235/1641 | 3-DF | Dioxins and Furans |
| | 1246/1407 | 3-HCN | Hydrogen Cyanide |
| | 1414/1541 | 3-HCl | Hydrochloric Acid, Chlorine, Hydrogen Fluoride |
| 6/30/2011 | 1016/1427 | 1-Metals | Metals |
| | 1016/1444 | 1-$PM_{2.5}$ | Particulate Matter (Less than 2.5 microns) |
| | 1019/1435 | 1-Cr | Hexavalent Chromium |
| | 1020/1318 | 1-Hg | Mercury |
| | 1040/1140 | 1-$NO_x/SO_2$ | Oxides of Nitrogen and Sulfur Dioxide |
| | 1520/1620 | 2-$NO_x/SO_2$ | Oxides of Nitrogen and Sulfur Dioxide |
| | 1548/2015 | 2-$PM_{2.5}$ | Particulate Matter (Less than 2.5 microns) |
| | 1554/1957 | 2-Metals | Metals |
| | 1554/1734 | 2-Cr | Hexavalent Chromium |
| | 1600/1849 | 2-Hg | Mercury |
| | 1912/2012 | 1-$NH_3$ | Ammonia Slip |
| 7/1/2011 | 1500/1844 | 3-Hg | Mercury |
| | 1500/1902 | 3-Cr | Hexavalent Chromium |
| | 1500/1907 | 3-Metals | Metals |
| | 1500/1922 | 3-$PM_{2.5}$ | Particulate Matter (Less than 2.5 microns) |
| | 1510/1610 | 2-$NH_3$ | Ammonia Slip |
| | 1635/1735 | 3-$NH_3$ | Ammonia Slip |
| | 1750/1850 | 3-$NO_x/SO_2$ | Oxides of Nitrogen and Sulfur Dioxide |

# TABLE 4-2
# METHOD 18 METHANOL IMPINGER METHOD TEST RESULTS
# EXXONMOBIL TORRANCE REFINERY
# FLUID CATALYTIC CRACKER

| Test No. | 1-VOC | 2-VOC | 3-VOC | Average |
|---|---|---|---|---|
| Date: | June 27, 2011 | June 27, 2011 | June 28, 2011 | |
| Start/Stop Time: | 1255/1355 | 1610/1710 | 1015/1115 | |
| Stack Flow Rate (dscfm): | 240,582 | 244,827 | 238,601 | |
| Sample Volume (dscf): | 0.554 | 0.600 | 0.578 | |
| Stack O2 (%): | 5.03 | 5.14 | 4.94 | |
| Stack CO2 (%): | 14.14 | 14.03 | 14.04 | |

NON-BLANK CORRECTED FOR ERT

| Compound | CAS | µg/dscm @ 7% $O_2$ | µg/dscm @ 7% $O_2$ | µg/dscm @ 7% $O_2$ | µg/dscm @ 7% $O_2$ | µg/dscm | lb/hr |
|---|---|---|---|---|---|---|---|
| 1,3-Butadiene | 106-99-0 | ND< 240.03 | N/A* | ND< 228.28 | ND< 234.16 | ND< 7.59 | ND< 0.24 |
| Pentane | 109-66-0 | ND< 240.03 | ND< 223.17 | ND< 228.28 | ND< 230.50 | ND< 7.45 | ND< 0.23 |
| Acrolein | 107-02-8 | ND< 240.03 | ND< 223.17 | ND< 228.28 | ND< 230.50 | ND< 7.45 | ND< 0.23 |
| Acetone | 67-64-1 | 2,003.95 | 1,463.61 | 1,470.58 | 1,646.05 | 53.20 | 1.68 |
| Acetonitrile | 75-05-8 | 312.59 | 347.74 | 430.02 | 363.45 | 11.75 | 0.37 |
| Carbon Disulfide | 75-15-0 | ND< 240.03 | ND< 223.17 | ND< 228.28 | ND< 230.50 | ND< 7.45 | ND< 0.23 |
| Methylene Chloride | 75-09-2 | ND< 240.03 | ND< 223.17 | ND< 228.28 | ND< 230.50 | ND< 7.45 | ND< 0.23 |
| Acrylonitrile | 107-13-1 | ND< 240.03 | ND< 223.17 | ND< 228.28 | ND< 230.50 | ND< 7.45 | ND< 0.23 |
| Methyl t-Butyl Ether (MTBE) | 1634-04-4 | ND< 240.03 | ND< 223.17 | ND< 228.28 | ND< 230.50 | ND< 7.45 | ND< 0.23 |
| Hexane | 110-54-3 | ND< 240.03 | ND< 223.17 | ND< 228.28 | ND< 230.50 | ND< 7.45 | ND< 0.23 |
| 2,2,4-Trimethylpentane | 540-84-1 | ND< 240.03 | ND< 223.17 | ND< 228.28 | ND< 230.50 | ND< 7.45 | ND< 0.23 |
| Benzene | 71-43-2 | ND< 240.03 | ND< 223.17 | ND< 228.28 | ND< 230.50 | ND< 7.45 | ND< 0.23 |
| Trichloroethene | 79-01-6 | ND< 240.03 | ND< 223.17 | ND< 228.28 | ND< 230.50 | ND< 7.45 | ND< 0.23 |
| 2-Nitropropane | 79-46-9 | ND< 240.03 | ND< 223.17 | ND< 228.28 | ND< 230.50 | ND< 7.45 | ND< 0.23 |
| Methyl iso-Butyl Ketone | 108-10-1 | ND< 240.03 | ND< 223.17 | ND< 228.28 | ND< 230.50 | ND< 7.45 | ND< 0.23 |
| Toluene | 108-88-3 | ND< 240.03 | ND< 223.17 | ND< 228.28 | ND< 230.50 | ND< 7.45 | ND< 0.23 |
| Tetrachloroethene | 127-18-4 | ND< 240.03 | ND< 223.17 | ND< 228.28 | ND< 230.50 | ND< 7.45 | ND< 0.23 |
| 1,2-Dibromoethane | 106-93-4 | ND< 240.03 | ND< 223.17 | ND< 228.28 | ND< 230.50 | ND< 7.45 | ND< 0.23 |
| Chlorobenzene | 108-90-7 | ND< 240.03 | ND< 223.17 | ND< 228.28 | ND< 230.50 | ND< 7.45 | ND< 0.23 |
| Ethylbenzene | 100-41-4 | ND< 240.03 | ND< 223.17 | ND< 228.28 | ND< 230.50 | ND< 7.45 | ND< 0.23 |
| m&p-Xylenes | 108-38-3, 106-42-3 | ND< 240.03 | ND< 223.17 | ND< 228.28 | ND< 230.50 | ND< 7.45 | ND< 0.23 |
| o-Xylene | 95-47-6 | ND< 240.03 | ND< 223.17 | ND< 228.28 | ND< 230.50 | ND< 7.45 | ND< 0.23 |
| Styrene | 79637-11-9 | ND< 240.03 | ND< 223.17 | ND< 228.28 | ND< 230.50 | ND< 7.45 | ND< 0.23 |
| Cumene (Isopropylbenzene) | 98-82-8 | ND< 240.03 | ND< 223.17 | ND< 228.28 | ND< 230.50 | ND< 7.45 | ND< 0.23 |
| Nitrobenzene | 98-95-3 | ND< 1,200.14 | ND< 1,115.87 | ND< 1,141.42 | ND< 1,152.48 | ND< 37.25 | ND< 1.17 |

BLANK CORRECTED (REAGENT ONLY)

| Compound | CAS | µg/dscm @ 7% $O_2$ | µg/dscm @ 7% $O_2$ | µg/dscm @ 7% $O_2$ | µg/dscm @ 7% $O_2$ | µg/dscf | lb/hr |
|---|---|---|---|---|---|---|---|
| Acetone | 67-64-1 | 251.19 | <223.17 | <228.28 | <234.22 | <7.57 | <0.24 |
| Acetonitrile | 75-05-8 | <240.03 | <223.17 | <228.28 | <230.50 | <7.45 | <0.23 |

*No result due to absence of butadiene-d6 recoveries.
ND < Indicates all three runs are below the detection limit
< Indicates one or two of the three runs are below the detection limit

## TABLE 4-3
## METHANOL TEST RESULTS
## EXXONMOBIL TORRANCE REFINERY
## FLUID CATALYTIC CRACKER

| Test No. | | 1-MeOH | 2-MeOH | 3-MeOH | Average | | |
|---|---|---|---|---|---|---|---|
| Date: | | June 27, 2011 | June 27, 2011 | June 28, 2011 | | | |
| Start/Stop Time: | | 1013/1113 | 1815/1915 | 805/905 | | | |
| Stack Flow Rate (dscfm): | | 240,582 | 244,827 | 230,394 | | | |
| Sample Volume (dscf): | | 0.575 | 0.518 | 0.524 | | | |
| Stack $O_2$ (%): | | 5.19 | 5.00 | 4.96 | | | |
| Stack $CO_2$ (%): | | 14.21 | 14.14 | 14.20 | | | |
| Compound | CAS | µg/dscm @ 7% $O_2$ | µg/dscm @ 7% $O_2$ | µg/dscm @ 7% $O_2$ | µg/dscm @ 7% $O_2$ | µg/dscm | lb/hr |
| Methanol | 67-56-1 | ND< 543.04 | ND< 596.50 | ND< 587.81 | ND< 575.79 | ND< 18.60 | ND< 0.5865 |

ND < Indicates all three runs are below the detection limit
< Indicates one or two of the three runs are below the detection limit

# TABLE 4-4
# SPECIATED SEMI-VOLATILE ORGANIC HAZARDOUS AIR POLLUTANTS TEST RESULTS
# EXXONMOBIL TORRANCE REFINERY
# FLUID CATALYTIC CRACKER

| Test No. | | 1-SV | 2-SV | 3-SV | Average | | |
|---|---|---|---|---|---|---|---|
| Date: | | June 27, 2011 | June 27, 2011 | June 28, 2011 | | | |
| Start/Stop Time: | | 945/1400 | 1525/1935 | 802/1220 | | | |
| Stack Flow Rate (dscfm): | | 240,582 | 244,827 | 230,394 | | | |
| Sample Volume (dscf): | | 161.854 | 167.148 | 156.522 | | | |
| Stack O2 (%): | | 5.05 | 5.09 | 4.97 | | | |
| Stack CO2 (%): | | 13.98 | 14.06 | 14.11 | | | |
| Moisture Fraction (%): | | 13.8 | 13.6 | 14.5 | | | |
| Isokinetic Ratio (%): | | 100.1 | 101.6 | 101.1 | | | |
| Compound | CAS | µg/dscm @ 7% $O_2$ | µg/dscm @ 7% $O_2$ | µg/dscm @ 7% $O_2$ | µg/dscm @ 7% $O_2$ | µg/dscf | lb/hr |
| Aniline | 62-53-3 | ND< 0.35405 | ND< 0.34364 | ND< 0.36422 | ND< 0.35397 | ND< $1.14 \times 10^{-2}$ | ND< $3.60 \times 10^{-4}$ |
| Phenol | 108-95-2 | ND< 2.56449 | ND< 0.66870 | ND< 0.44297 | ND< 1.22539 | ND< $3.96 \times 10^{-2}$ | ND< $1.26 \times 10^{-3}$ |
| 2-Methylphenol (o-Cresol) | 95-48-7 | ND< 0.40190 | ND< 0.39008 | ND< 0.41344 | ND< 0.40180 | ND< $1.30 \times 10^{-2}$ | ND< $4.09 \times 10^{-4}$ |
| 4-Methylphenol & 3-Methylphenol (p,m-Cresol) | 106-44-5, 108-39-4 | ND< 1.08130 | ND< 1.04949 | ND< 1.11234 | ND< 1.08104 | ND< $3.49 \times 10^{-2}$ | ND< $1.10 \times 10^{-3}$ |
| o-Toluidine | 95-53-4 | ND< 0.95690 | ND< 0.92875 | ND< 0.98437 | ND< 0.95667 | ND< $3.09 \times 10^{-2}$ | ND< $9.74 \times 10^{-4}$ |
| Isophorone | 78-59-1 | ND< 0.43060 | ND< 0.41794 | ND< 0.44297 | ND< 0.43050 | ND< $1.39 \times 10^{-2}$ | ND< $4.38 \times 10^{-4}$ |
| 2,4-Dimethylphenol | 105-67-9 | ND< 0.49759 | ND< 0.48295 | ND< 0.51187 | ND< 0.49747 | ND< $1.61 \times 10^{-2}$ | ND< $5.07 \times 10^{-4}$ |
| Dibenzofuran | 132-64-9 | ND< 0.44017 | ND< 0.42723 | ND< 0.45281 | ND< 0.44007 | ND< $1.42 \times 10^{-2}$ | ND< $4.48 \times 10^{-4}$ |
| a,a-Dimethylphenethylamine | 122-09-8 | ND< 2.29656 | ND< 2.22900 | ND< 2.36249 | ND< 2.29602 | ND< $7.42 \times 10^{-2}$ | ND< $2.34 \times 10^{-3}$ |
| 1,4-Phenylenediamine | 106-50-3 | ND< 3.44484 | ND< 3.34350 | ND< 3.54374 | ND< 3.44402 | ND< $1.11 \times 10^{-1}$ | ND< $3.51 \times 10^{-3}$ |
| Benzidine | 92-87-5 | ND< 7.27243 | ND< 7.05850 | ND< 7.48122 | ND< 7.27072 | ND< $2.35 \times 10^{-1}$ | ND< $7.40 \times 10^{-3}$ |
| Dimethylaminobenzene | 121-69-7 | ND< 0.38276 | ND< 0.37150 | ND< 0.39375 | ND< 0.38267 | ND< $1.24 \times 10^{-2}$ | ND< $3.90 \times 10^{-4}$ |
| 3,3'-Dimethylbenzidine | 119-93-7 | ND< 5.55001 | ND< 5.38675 | ND< 5.70935 | ND< 5.54871 | ND< $1.79 \times 10^{-1}$ | ND< $5.65 \times 10^{-3}$ |
| 3,3'-Dimethoxybenzidine | 119-90-4 | ND< 5.55001 | ND< 5.38675 | ND< 5.70935 | ND< 5.54871 | ND< $1.79 \times 10^{-1}$ | ND< 5.6[illegible] $^{3}$ |
| Naphthalene | 91-20-3 | 0.19521 | 0.13151 | 0.14943 | 0.15872 | $5.13 \times 10^{-3}$ | 1.6[illegible] |
| 2-Methylnaphthalene | 91-57-6 | 0.08727 | 0.04960 | 0.04410 | 0.06032 | $1.95 \times 10^{-3}$ | $6.16 \times 10^{-5}$ |
| Acenaphthylene | 208-96-8 | ND< 0.00077 | 0.01856 | 0.00679 | < 0.00870 | < $2.81 \times 10^{-4}$ | < $8.95 \times 10^{-6}$ |
| Acenaphthene | 83-32-9 | ND< 0.00077 | ND< 0.00403 | ND< 0.00079 | ND< 0.00186 | ND< $6.00 \times 10^{-5}$ | ND< $1.92 \times 10^{-6}$ |
| Fluorene | 86-73-7 | 0.00643 | 0.00496 | ND< 0.00287 | < 0.00475 | < $1.54 \times 10^{-4}$ | < $4.87 \times 10^{-6}$ |
| Phenanthrene | 85-01-8 | 0.05435 | 0.03994 | 0.02992 | 0.04140 | $1.34 \times 10^{-3}$ | $4.23 \times 10^{-5}$ |
| Anthracene | 120-12-7 | 0.00207 | 0.00148 | 0.00152 | 0.00169 | $5.46 \times 10^{-5}$ | $1.72 \times 10^{-6}$ |
| Fluoranthene | 206-44-0 | 0.00771 | 0.00747 | 0.00451 | 0.00656 | $2.12 \times 10^{-4}$ | $6.72 \times 10^{-6}$ |
| Pyrene | 129-00-0 | 0.00871 | 0.00589 | 0.00547 | 0.00669 | $2.16 \times 10^{-4}$ | $6.83 \times 10^{-6}$ |
| Benzo(a)anthracene | 56-55-3 | ND< 0.00077 | ND< 0.00074 | ND< 0.00079 | ND< 0.00077 | ND< $2.47 \times 10^{-5}$ | ND< $7.79 \times 10^{-7}$ |
| Chrysene | 218-01-9 | 0.00184 | 0.00189 | 0.00126 | 0.00167 | $5.38 \times 10^{-5}$ | $1.70 \times 10^{-6}$ |
| Benzo(b)fluoranthene | 205-99-2 | ND< 0.00077 | ND< 0.00074 | ND< 0.00079 | ND< 0.00077 | ND< $2.47 \times 10^{-5}$ | ND< $7.79 \times 10^{-7}$ |
| Benzo(k)fluoranthene | 207-08-9 | ND< 0.00077 | ND< 0.00074 | ND< 0.00079 | ND< 0.00077 | ND< $2.47 \times 10^{-5}$ | ND< $7.79 \times 10^{-7}$ |
| Benzo(e)pyrene | 192-97-2 | ND< 0.00077 | ND< 0.00074 | ND< 0.00079 | ND< 0.00077 | ND< $2.47 \times 10^{-5}$ | ND< $7.79 \times 10^{-7}$ |
| Benzo(a)pyrene | 50-32-8 | ND< 0.00077 | ND< 0.00074 | ND< 0.00079 | ND< 0.00077 | ND< $2.47 \times 10^{-5}$ | ND< $7.79 \times 10^{-7}$ |
| Perylene | 198-55-0 | ND< 0.00077 | ND< 0.00074 | ND< 0.00079 | ND< 0.00077 | ND< $2.47 \times 10^{-5}$ | ND< $7.79 \times 10^{-7}$ |
| Indeno(1,2,3-cd)pyrene | 193-39-5 | ND< 0.00077 | ND< 0.00074 | ND< 0.00079 | ND< 0.00077 | ND< $2.47 \times 10^{-5}$ | ND< $7.79 \times 10^{-7}$ |
| Dibenzo(a,h/a,c)anthracene | 53-70-3, 215-58-7 | ND< 0.00077 | ND< 0.00074 | ND< 0.00079 | ND< 0.00077 | ND< $2.47 \times 10^{-5}$ | ND< $7.79 \times 10^{-7}$ |
| Benzo(g,h,i)perylene | 191-24-2 | 0.00138 | 0.00153 | 0.00157 | 0.00149 | $4.83 \times 10^{-5}$ | $1.52 \times 10^{-6}$ |
| 2-Chloronaphthalene (additional) | 91-58-7 | ND< 0.00077 | ND< 0.00074 | ND< 0.00079 | ND< 0.00077 | ND< $2.47 \times 10^{-5}$ | ND< $7.79 \times 10^{-7}$ |
| Biphenyl | 92-52-4 | 0.23157 | 0.07690 | 0.34059 | 0.21635 | $7.00 \times 10^{-3}$ | $2.18 \times 10^{-4}$ |
| 7,12-Dimethylbenzo(a)anthracene | 57-97-6 | ND< 0.00077 | ND< 0.00074 | ND< 0.00079 | ND< 0.00077 | ND< $2.47 \times 10^{-5}$ | ND< $7.79 \times 10^{-7}$ |
| 3-Methylcholanthrene | 56-49-5 | ND< 0.00077 | ND< 0.00074 | ND< 0.00079 | ND< 0.00077 | ND< $2.47 \times 10^{-5}$ | ND< $7.79 \times 10^{-7}$ |
| Dibenzo(a,e)pyrene | 192-65-4 | ND< 0.00077 | ND< 0.00074 | ND< 0.00079 | ND< 0.00077 | ND< $2.47 \times 10^{-5}$ | ND< $7.79 \times 10^{-7}$ |

ND < Indicates all three runs are below the detection limit
< Indicates one or two of the three runs are below the detection limit

## TABLE 4-5
## ALDEHYDES (FORMALDEHYDE, ACETALDEHYDE, PROPANOL) TEST RESULTS
## EXXONMOBIL TORRANCE REFINERY
## FLUID CATALYTIC CRACKER

| Test No. | | 1-Ald | 2-Ald | 3-Ald | Average | | |
|---|---|---|---|---|---|---|---|
| Date: | | June 27, 2011 | June 27, 2011 | June 28, 2011 | | | |
| Start/Stop Time: | | 1320/1529 | 1723/1933 | 935/1151 | | | |
| Stack Flow Rate (dscfm): | | 241,362 | 241,632 | 236,177 | | | |
| Sample Volume (dscf): | | 79.339 | 79.059 | 79.266 | | | |
| Stack $O_2$ (%): | | 5.14 | 5.03 | 4.99 | | | |
| Stack $CO_2$ (%): | | 14.08 | 14.12 | 14.09 | | | |
| Moisture Fraction (%): | | 13.9 | 13.5 | 14.1 | | | |
| Isokinetic Ratio (%): | | 97.8 | 97.4 | 99.9 | | | |
| Compound | CAS | µg/dscm @ 7% $O_2$ | µg/dscm @ 7% $O_2$ | µg/dscm @ 7% $O_2$ | µg/dscm @ 7% $O_2$ | µg/dscf | lb/hr |
| Formaldehyde | 50-00-0 | 1,738.66 | 1,200.79 | 973.16 | 1,304.21 | 42.07 | 1.34 |
| Acetaldehyde | 75-07-0 | 80.85 | 77.84 | 63.84 | 74.18 | 2.39 | 0.08 |
| Propionaldehyde | 123-38-6 | ND< 2.45 | ND< 3.18 | ND< 2.68 | ND< 2.77 | ND< 0.09 | ND< 0.00 |

ND < Indicates all three runs are below the detection limit
< Indicates one or two of the three runs are below the detection limit

## TABLE 4-6
## TOTAL HYDROCARBONS TEST RESULTS
## EXXONMOBIL TORRANCE REFINERY
## FLUID CATALYTIC CRACKER

| Test No. | | 1-THC | 2-THC | 3-THC | Average | |
|---|---|---|---|---|---|---|
| Date: | | June 27, 2011 | June 27, 2011 | June 28, 2011 | | |
| Start/Stop Time: | | 1112/1212 | 1325/1425 | 802/902 | | |
| Stack Flow Rate(1) (dscfm) | | 240,582 | 244,827 | 230,394 | | |
| Stack $O_2$ (%): | | 4.99 | 5.11 | 4.96 | | |
| Stack $CO_2$ (%): | | 13.84 | 14.08 | 14.19 | | |
| Compound | CAS | ppmvd | ppmvd | ppmvd | ppmvd | lb/hr |
| Total Hydrocarbons(2) | 40811-14-1 | 60.60 | 63.97 | 60.48 | 61.68 | 101.12 |

(1) Stack flow from Semi-Volatiles test
(2) As propane

## TABLE 4-7
## METHANE AND ETHANE TEST RESULTS
## EXXONMOBIL TORRANCE REFINERY
## FLUID CATALYTIC CRACKER

| Test No. | | 1-M/E | 2-M/E | 3-M/E | Average | |
|---|---|---|---|---|---|---|
| Date: | | June 27, 2011 | June 27, 2011 | June 28, 2011 | | |
| Start/Stop Time: | | 1112/1212 | 1525/1625 | 802/902 | | |
| Stack Flow Rate[1] (dscfm) | | 240,582 | 244,827 | 230,394 | | |
| Stack $O_2$ (%): | | 4.99 | 5.19 | 4.96 | | |
| Stack $CO_2$ (%): | | 13.84 | 14.02 | 14.19 | | |
| Compound | CAS | ppmvd | ppmvd | ppmvd | ppmvd | lb/hr |
| Methane | 74-82-8 | 53.96 | 61.52 | 58.67 | 58.05 | 34.52 |
| Ethane | 74-84-0 | 11.38 | 11.06 | 10.16 | 10.87 | 12.13 |

(1) Stack flow from Semi-Volatiles test

# TABLE 4-8
# DIOXINS/FURANS AND PCBs TEST RESULTS
# EXXONMOBIL TORRANCE REFINERY
# FLUID CATALYTIC CRACKER

| Test No. | | 1-DF | 2-DF | 3-DF | Average | | |
|---|---|---|---|---|---|---|---|
| Date: | | June 28, 2011 | June 29, 2011 | June 29, 2011 | | | |
| Start/Stop Time: | | 1250/1700 | 755/1209 | 1235/1641 | | | |
| Stack Flow Rate (dscfm): | | 255,078 | 238,116 | 232,777 | | | |
| Sample Volume (dscf): | | 172.877 | 160.739 | 159.063 | | | |
| Stack O2 (%): | | 5.13 | 5.34 | 5.23 | | | |
| Stack CO2 (%): | | 13.93 | 13.80 | 13.90 | | | |
| Moisture Fraction (%): | | 13.4 | 12.4 | 12.5 | | | |
| Isokinetic Ratio (%): | | 100.9 | 100.5 | 101.7 | | | |
| Compound | CAS | pg/dscm @ 7% $O_2$ | pg/dscm @ 7% $O_2$ | pg/dscm @ 7% $O_2$ | pg/dscm @ 7% $O_2$ | pg/dscf | lb/hr |
| 2,3,7,8-TCDD | 1746-01-6 | ND< 0.650 | ND< 0.651 | ND< 0.695 | ND< 0.666 | ND< 0.021 | ND< $6.789 \times 10^{-10}$ |
| 1,2,3,7,8-PeCDD | 40321-76-4 | ND< 0.706 | ND< 0.752 | ND< 0.758 | ND< 0.739 | ND< 0.024 | ND< $7.530 \times 10^{-10}$ |
| 1,2,3,4,7,8-HxCDD | 39227-28-6 | ND< 0.607 | ND< 0.544 | ND< 0.644 | ND< 0.598 | ND< 0.019 | ND< $6.107 \times 10^{-10}$ |
| 1,2,3,6,7,8-HxCDD | 57653-85-7 | ND< 0.598 | ND< 0.573 | ND< 0.656 | ND< 0.609 | ND< 0.019 | ND< $6.211 \times 10^{-10}$ |
| 1,2,3,7,8,9-HxCDD | 19408-74-3 | ND< 0.682 | ND< 0.581 | ND< 0.711 | ND< 0.658 | ND< 0.021 | ND< $6.723 \times 10^{-10}$ |
| 1,2,3,4,6,7,8-HpCDD | 35822-46-9 | ND< 0.792 | ND< 0.930 | ND< 0.823 | ND< 0.849 | ND< 0.027 | ND< $8.648 \times 10^{-10}$ |
| OCDD | 3268-87-9 | ND< 1.075 | ND< 1.332 | 1.820 | < 1.409 | < 0.045 | < $1.427 \times 10^{-9}$ |
| 2,3,7,8-TCDF | 51207-31-9 | ND< 0.571 | ND< 0.595 | ND< 0.512 | ND< 0.559 | ND< 0.018 | ND< $5.714 \times 10^{-10}$ |
| 1,2,3,7,8-PeCDF | 57117-41-6 | ND< 0.517 | ND< 0.506 | ND< 0.550 | ND< 0.524 | ND< 0.017 | ND< $5.348 \times 10^{-10}$ |
| 2,3,4,7,8-PeCDF | 57117-31-4 | ND< 0.517 | ND< 0.443 | ND< 0.536 | ND< 0.499 | ND< 0.016 | ND< $5.094 \times 10^{-10}$ |
| 1,2,3,4,7,8-HxCDF | 70648-26-9 | ND< 0.313 | ND< 0.371 | ND< 0.370 | ND< 0.351 | ND< 0.011 | ND< $3.577 \times 10^{-10}$ |
| 1,2,3,6,7,8-HxCDF | 57117-44-9 | ND< 0.311 | ND< 0.353 | ND< 0.351 | ND< 0.338 | ND< 0.011 | ND< $3.447 \times 10^{-10}$ |
| 2,3,4,6,7,8-HxCDF | 60851-34-5 | ND< 0.295 | ND< 0.328 | ND< 0.347 | ND< 0.323 | ND< 0.010 | ND< $3.291 \times 10^{-10}$ |
| 1,2,3,7,8,9-HxCDF | 72918-21-9 | ND< 0.394 | ND< 0.459 | ND< 0.475 | ND< 0.443 | ND< 0.014 | ND< $4.504 \times 10^{-10}$ |
| 1,2,3,4,6,7,8-HpCDF | 67562-39-4 | ND< 0.446 | ND< 0.508 | 0.699 | < 0.551 | < 0.018 | < $5.591 \times 10^{-10}$ |
| 1,2,3,4,7,8,9-HpCDF | 55673-89-7 | ND< 0.717 | ND< 0.771 | ND< 1.046 | ND< 0.845 | ND< 0.027 | ND< $8.575 \times 10^{-10}$ |
| OCDF | 39001-02-0 | ND< 1.797 | ND< 1.713 | ND< 1.698 | ND< 1.736 | ND< 0.055 | ND< $1.774 \times 10^{-9}$ |
| PCB-77 33'44'-TeCB | 32598-13-3 | 5.869 | 4.435 | 9.513 | 6.606 | 0.211 | $6.708 \times 10^{-9}$ |
| PCB-81 344'5-TeCB | 70362-50-4 | ND< 0.430 | ND< 0.349 | 0.477 | < 0.419 | < 0.013 | < $4.275 \times 10^{-10}$ |
| PCB-105 233'44'-PeCB | 32598-14-4 | 12.044 | 7.849 | 16.840 | 12.244 | 0.391 | $1.247 \times 10^{-8}$ |
| PCB-114 2344'5-PeCB | 74472-37-0 | ND< 0.825 | ND< 0.640 | ND< 1.073 | ND< 0.846 | ND< 0.027 | ND< $8.618 \times 10^{-10}$ |
| PCB-118 23'44'5-PeCB | 31508-00-6 | 29.885 | 19.603 | 45.496 | 31.662 | 1.011 | $3.220 \times 10^{-8}$ |
| PCB-123 2'344'5-PeCB | 65510-44-3 | 1.471 | ND< 1.203 | ND< 1.444 | < 1.372 | < 0.044 | < $1.404 \times 10^{-9}$ |
| PCB-126 33'44'5-PeCB | 57465-28-8 | ND< 0.580 | ND< 0.526 | ND< 0.660 | ND< 0.588 | ND< 0.019 | ND< $6.002 \times 10^{-10}$ |
| PCB-156 233'44'5-HxCB | 38380-08-4 | 1.789 | 1.417 | 2.147 | 1.784 | 0.057 | $1.820 \times 10^{-9}$ |
| PCB-157 233'44'5'-HxCB | 69782-90-7 | ND< 0.529 | 0.459 | 0.607 | < 0.532 | < 0.017 | < $5.424 \times 10^{-10}$ |
| PCB-167 23'44'55'-HxCB | 52663-72-6 | 0.907 | ND< 0.640 | 0.922 | < 0.823 | < 0.026 | < $8.421 \times 10^{-10}$ |
| PCB-169 33'44'55'-HxCB | 32774-16-6 | ND< 0.614 | ND< 0.432 | ND< 2.363 | ND< 1.136 | ND< 0.036 | ND< $1.139 \times 10^{-9}$ |
| PCB-189 233'44'55'-HpCB | 39635-31-9 | ND< 0.988 | ND< 1.060 | ND< 0.926 | ND< 0.991 | ND< 0.032 | ND< $1.012 \times 10^{-9}$ |

ND < Indicates all three runs are below the detection limit
< Indicates one or two of the three runs are below the detection limit

## TABLE 4-9
## HYDROGEN CHLORIDE, CHLORINE GAS, AND HYDROGEN FLUORIDE TEST RESULTS
## EXXONMOBIL TORRANCE REFINERY
## FLUID CATALYTIC CRACKER

| Test No. | | 1-HCl | 2-HCl | 3-HCl | Average | | |
|---|---|---|---|---|---|---|---|
| Date: | | June 28, 2011 | June 29, 2011 | June 29, 2011 | | | |
| Start/Stop Time: | | 1438/1653 | 1015/1221 | 1414/1641 | | | |
| Stack Flow Rate (dscfm): | | 228,365 | 243,780 | 219,296 | | | |
| Sample Volume (dscf): | | 77.647 | 81.040 | 74.349 | | | |
| Stack $O_2$ (%): | | 5.21 | 5.27 | 5.22 | | | |
| Stack $CO_2$ (%): | | 13.82 | 13.77 | 13.89 | | | |
| Moisture Fraction (%): | | 13.4 | 12.8 | 13.1 | | | |
| Isokinetic Ratio (%): | | 101.2 | 98.9 | 100.9 | | | |
| Compound | CAS | µg/dscm @ 7% $O_2$ | µg/dscm @ 7% $O_2$ | µg/dscm @ 7% $O_2$ | µg/dscm @ 7% $O_2$ | µg/dscf | lb/hr |
| Hydrochloric Acid | 7647-01-0 | 870.35 | 1049.84 | 1191.43 | 1037.21 | 33.11 | 1.01 |
| Chlorine | 7782-50-5 | ND< 20.55 | ND< 21.62 | ND< 23.91 | ND< 22.03 | ND< 0.70 | ND< 0.02 |
| Hydrogen Fluoride | 13981-56-1 | ND< 22.60 | ND< 21.42 | ND< 19.16 | ND< 21.06 | ND< 0.67 | ND< 0.02 |

ND < Indicates all three runs are below the detection limit
< Indicates one or two of the three runs are below the detection limit

## TABLE 4-10
## HYDROGEN CYANIDE TEST RESULTS
## EXXONMOBIL TORRANCE REFINERY
## FLUID CATALYTIC CRACKER

| Test No. | | 1-HCN | 2-HCN | 3-HCN | Average | | |
|---|---|---|---|---|---|---|---|
| Date: | | June 28, 2011 | June 29, 2011 | June 29, 2011 | | | |
| Start/Stop Time: | | 1306/1426 | 757/1005 | 1246/1407 | | | |
| Stack Flow Rate (dscfm): | | 228,873 | 233,227 | 238,486 | | | |
| Sample Volume (dscf): | | 39.443 | 63.927 | 40.386 | | | |
| Stack $O_2$ (%): | | 5.03 | 5.34 | 5.26 | | | |
| Stack $CO_2$ (%): | | 14.07 | 13.67 | 13.91 | | | |
| Moisture Fraction (%): | | 17.7 | 13.8 | 17.1 | | | |
| Isokinetic Ratio (%): | | 101.4 | 96.8 | 99.6 | | | |
| Compound | CAS | µg/dscm @ 7% $O_2$ | µg/dscm @ 7% $O_2$ | µg/dscm @ 7% $O_2$ | µg/dscm @ 7% $O_2$ | µg/dscf | lb/hr |
| Cyanide (Impingers #1 and #2) | 74-90-8 | 12,081.20 | 4,761.80 | 10,900.26 | 9,247.76 | 296.31 | 9.14 |
| Cyanide (Impinger #3) | 74-90-8 | 2,706.23 | 1,933.74 | 3,914.65 | 2,851.54 | 91.18 | 2.82 |
| Total Cyanide | 74-90-8 | 14,787.43 | 6,695.54 | 14,814.91 | 12,099.30 | 387.50 | 11.96 |

## TABLE 4-11
## MERCURY TEST RESULTS
## EXXONMOBIL TORRANCE REFINERY
## FLUID CATALYTIC CRACKER

| Test No. | | 1-HCl | 2-HCl | 3-HCl | Average | | |
|---|---|---|---|---|---|---|---|
| Date: | | June 30, 2011 | June 30, 2011 | July 1, 2011 | | | |
| Start/Stop Time: | | 1020/1318 | 1600/1849 | 1500/1844 | | | |
| Stack Flow Rate (dscfm): | | 245,360 | 238,540 | 233,319 | | | |
| Sample Volume (dscf): | | 81.453 | 80.221 | 78.059 | | | |
| Stack $O_2$ (%): | | 5.08 | 5.03 | 4.90 | | | |
| Stack $CO_2$ (%): | | 14.02 | 14.11 | 14.31 | | | |
| Moisture Fraction (%): | | 14.0 | 13.8 | 14.0 | | | |
| Isokinetic Ratio (%): | | 97.0 | 98.3 | 97.8 | | | |
| Compound | CAS | µg/dscm | µg/dscm | µg/dscm | µg/dscm | µg/dscf | lb/hr |
| Total Mercury | 7439-97-6 | < 1.162 | < 0.951 | ND< 0.728 | < 0.947 | $< 2.68 \times 10^{-2}$ | $< 8.51 \times 10^{-4}$ |
| Particulate Bound Mercury | | ND< 0.009 | 0.009 | ND< 0.009 | < 0.009 | $< 2.55 \times 10^{-4}$ | $< 8.04 \times 10^{-6}$ |
| Oxidized Mercury | | ND< 0.321 | ND< 0.291 | ND< 0.299 | ND< 0.303 | $ND< 8.59 \times 10^{-3}$ | $ND< 2.72 \times 10^{-4}$ |
| Elemental Mercury | | < 0.832 | < 0.651 | ND< 0.421 | < 0.635 | $< 1.80 \times 10^{-2}$ | $< 5.71 \times 10^{-4}$ |

ND < Indicates all three runs are below the detection limit
< Indicates one or two of the three runs are below the detection limit

## TABLE 4-12
## HEXAVALENT CHROMIUM TEST RESULTS
## EXXONMOBIL TORRANCE REFINERY
## FLUID CATALYTIC CRACKER

| Test No. | | 1-Cr | 2-Cr | 3-Cr | Average | | |
|---|---|---|---|---|---|---|---|
| Date: | | June 30, 2011 | June 30, 2011 | July 1, 2011 | | | |
| Start/Stop Time: | | 1019/1435 | 1554/2002 | 1500/1902 | | | |
| Stack Flow Rate (dscfm): | | 245,224 | 233,757 | 233,445 | | | |
| Sample Volume (dscf): | | 124.691 | 123.884 | 124.836 | | | |
| Stack $O_2$ (%): | | 5.06 | 5.06 | 4.91 | | | |
| Stack $CO_2$ (%): | | 14.03 | 14.08 | 14.31 | | | |
| Moisture Fraction (%): | | 11.4 | 12.8 | 14.5 | | | |
| Isokinetic Ratio (%): | | 94.6 | 98.6 | 99.5 | | | |
| Compound | CAS | µg/dscm @ 7% $O_2$ | µg/dscm @ 7% $O_2$ | µg/dscm @ 7% $O_2$ | µg/dscm @ 7% $O_2$ | µg/dscf | lb/hr |
| Hexavalent Chromium | 18540-29-9 | ND< 0.1009 | ND< 0.1151 | ND< 0.1173 | ND< 0.1111 | $ND< 3.60 \times 10^{-3}$ | $ND< 1.13 \times 10^{-4}$ |

ND < Indicates all three runs are below the detection limit
< Indicates one or two of the three runs are below the detection limit

# TABLE 4-13
# METALS TEST RESULTS
# EXXONMOBIL TORRANCE REFINERY
# FLUID CATALYTIC CRACKER

| Test No. | 1-Mtl | 2-Mtl | 3-Mtl | Average |
|---|---|---|---|---|
| Date: | June 30, 2011 | June 30, 2011 | July 1, 2011 | |
| Start/Stop Time: | 1016/1427 | 1554/1957 | 1500/1907 | |
| Stack Flow Rate (dscfm): | 230,519 | 231,457 | 242,018 | |
| Sample Volume (dscf): | 122.969 | 124.863 | 132.278 | |
| Stack $O_2$ (%): | 5.06 | 5.06 | 4.90 | |
| Stack $CO_2$ (%): | 14.04 | 14.08 | 14.30 | |
| Moisture Fraction (%): | 13.7 | 13.8 | 13.9 | |
| Isokinetic Ratio (%): | 99.2 | 100.3 | 101.7 | |

NON-BLANK CORRECTED FOR ERT

| Compound | CAS | µg/dscm @ 7% $O_2$ | µg/dscm @ 7% $O_2$ | µg/dscm @ 7% $O_2$ | µg/dscm @ 7% $O_2$ | µg/dscf | lb/hr |
|---|---|---|---|---|---|---|---|
| Antimony (Front) | 7440-36-0 | ND< 0.126 | ND< 0.149 | ND< 0.139 | ND< 0.138 | ND< $4.47 \times 10^{-3}$ | ND< $1.39 \times 10^{-4}$ |
| Antimony (Back) | 7440-36-0 | ND< 0.151 | ND< 0.149 | ND< 0.139 | ND< 0.146 | ND< $4.74 \times 10^{-3}$ | ND< $1.47 \times 10^{-4}$ |
| Arsenic (Back) | 7440-38-2 | ND< 0.126 | ND< 0.124 | ND< 0.116 | ND< 0.122 | ND< $3.95 \times 10^{-3}$ | ND< $1.22 \times 10^{-4}$ |
| Arsenic (Front) | 7440-38-2 | ND< 0.126 | ND< 0.124 | ND< 0.116 | ND< 0.122 | ND< $3.95 \times 10^{-3}$ | ND< $1.22 \times 10^{-4}$ |
| Beryllium (Back) | 7440-41-7 | ND< 0.126 | ND< 0.124 | ND< 0.116 | ND< 0.122 | ND< $3.95 \times 10^{-3}$ | ND< $1.22 \times 10^{-4}$ |
| Beryllium (Front) | 7440-41-7 | ND< 0.126 | ND< 0.124 | ND< 0.116 | ND< 0.122 | ND< $3.95 \times 10^{-3}$ | ND< $1.22 \times 10^{-4}$ |
| Cadmium (Back) | 7440-43-9 | ND< 0.126 | ND< 0.124 | ND< 0.116 | ND< 0.122 | ND< $3.95 \times 10^{-3}$ | ND< $1.22 \times 10^{-4}$ |
| Cadmium (Front) | 7440-43-9 | ND< 0.126 | ND< 0.124 | ND< 0.116 | ND< 0.122 | ND< $3.95 \times 10^{-3}$ | ND< $1.22 \times 10^{-4}$ |
| Chromium (Back) | 7440-47-3 | 0.580 | 1.092 | 0.394 | 0.689 | $2.23 \times 10^{-2}$ | $6.86 \times 10^{-4}$ |
| Chromium (Front) | 7440-47-3 | 0.454 | 0.447 | 0.325 | 0.408 | $1.32 \times 10^{-2}$ | $4.08 \times 10^{-4}$ |
| Cobalt (Back) | 7440-48-4 | ND< 0.126 | ND< 0.124 | ND< 0.116 | ND< 0.122 | ND< $3.95 \times 10^{-3}$ | ND< $1.22 \times 10^{-4}$ |
| Cobalt (Front) | 7440-48-4 | ND< 0.126 | ND< 0.124 | ND< 0.116 | ND< 0.122 | ND< $3.95 \times 10^{-3}$ | ND< $1.22 \times 10^{-4}$ |
| Lead (Back) | 7439-92-1 | 0.277 | 0.241 | ND< 0.116 | < 0.211 | < $6.83 \times 10^{-3}$ | < $2.10 \times 10^{-4}$ |
| Lead (Front) | 7439-92-1 | 0.252 | 0.397 | ND< 0.116 | < 0.255 | < $8.24 \times 10^{-3}$ | < $2.54 \times 10^{-4}$ |
| Manganese (Front) | 7439-96-5 | 0.554 | 0.720 | 0.255 | 0.510 | $1.65 \times 10^{-2}$ | $5.07 \times 10$ |
| Manganese (Back) | 7439-96-5 | 0.277 | 0.298 | 0.167 | 0.247 | $8.00 \times 10^{-3}$ | $2.47 \times 10$ |
| Nickel (Front) | 7440-02-0 | 1.235 | ND< 0.124 | ND< 0.116 | < 0.492 | < $1.59 \times 10^{-2}$ | < $4.86 \times 10^{-4}$ |
| Nickel (Back) | 7440-02-0 | ND< 0.126 | ND< 0.124 | ND< 0.116 | ND< 0.122 | ND< $3.95 \times 10^{-3}$ | ND< $1.22 \times 10^{-4}$ |
| Selenium (Front) | 7782-49-2 | 0.529 | 0.248 | 1.577 | 0.785 | $2.55 \times 10^{-2}$ | $8.03 \times 10^{-4}$ |
| Selenium (Back) | 7782-49-2 | ND< 0.126 | 0.248 | ND< 0.116 | < 0.163 | < $5.28 \times 10^{-3}$ | < $1.63 \times 10^{-4}$ |
| Total | | | | | | | |
| Antimony | 7440-36-0 | ND< 0.277 | ND< 0.298 | ND< 0.278 | ND< 0.284 | ND< $9.21 \times 10^{-3}$ | ND< $2.86 \times 10^{-4}$ |
| Arsenic | 7440-38-2 | ND< 0.252 | ND< 0.248 | ND< 0.232 | ND< 0.244 | ND< $7.90 \times 10^{-3}$ | ND< $2.45 \times 10^{-4}$ |
| Beryllium | 7440-41-7 | ND< 0.252 | ND< 0.248 | ND< 0.232 | ND< 0.244 | ND< $7.90 \times 10^{-3}$ | ND< $2.45 \times 10^{-4}$ |
| Cadmium | 7440-43-9 | ND< 0.252 | ND< 0.248 | ND< 0.232 | ND< 0.244 | ND< $7.90 \times 10^{-3}$ | ND< $2.45 \times 10^{-4}$ |
| Chromium | 7440-47-3 | 1.033 | 1.539 | 0.719 | 1.097 | $3.55 \times 10^{-2}$ | $1.09 \times 10^{-3}$ |
| Cobalt | 7440-48-4 | ND< 0.252 | ND< 0.248 | ND< 0.232 | ND< 0.244 | ND< $7.90 \times 10^{-3}$ | ND< $2.45 \times 10^{-4}$ |
| Lead | 7439-92-1 | 0.529 | 0.638 | ND< 0.232 | < 0.466 | < $1.51 \times 10^{-2}$ | < $4.64 \times 10^{-4}$ |
| Manganese | 7439-96-5 | 0.832 | 1.018 | 0.422 | 0.757 | $2.45 \times 10^{-2}$ | $7.54 \times 10^{-4}$ |
| Nickel | 7440-02-0 | < 1.361 | ND< 0.248 | ND< 0.232 | < 0.614 | < $1.98 \times 10^{-2}$ | < $6.08 \times 10^{-4}$ |
| Selenium | 7782-49-2 | < 0.655 | 0.496 | < 1.693 | < 0.948 | < $3.08 \times 10^{-2}$ | < $9.66 \times 10^{-4}$ |

BLANK CORRECTED (REAGENT ONLY)

| Compound | µg/dscm @ 7% $O_2$ | µg/dscm @ 7% $O_2$ | µg/dscm @ 7% $O_2$ | µg/dscm @ 7% $O_2$ | µg/dscf | lb/hr |
|---|---|---|---|---|---|---|
| Chromium (Front) | 0.239 | 0.236 | 0.128 | 0.201 | $6.50 \times 10^{-3}$ | $2.00 \times 10^{-4}$ |
| Total | | | | | | |
| Chromium | 0.819 | 1.328 | 0.522 | 0.890 | $2.88 \times 10^{-2}$ | $8.87 \times 10^{-4}$ |

ND < Indicates all three runs are below the detection limit
< Indicates one or two of the three runs are below the detection limit

## TABLE 4-14
## PARTICULATE MATTER TEST RESULTS
## EXXONMOBIL TORRANCE REFINERY
## FLUID CATALYTIC CRACKER

| Test No. | 1-MH | 2-MH | 3-MH | Average |
|---|---|---|---|---|
| Date: | June 30, 2011 | June 30, 2011 | July 1, 2011 | |
| Start/Stop Time: | 1016/1427 | 1554/1957 | 1500/1907 | |
| Stack Flow Rate (dscfm): | 230,519 | 231,457 | 242,018 | |
| Sample Volume (dscf): | 122.969 | 124.863 | 132.278 | |
| Stack $O_2$ (%): | 5.06 | 5.06 | 4.90 | |
| Stack $CO_2$ (%): | 14.04 | 14.08 | 14.30 | |
| Moisture Fraction (%): | 13.7 | 13.8 | 13.9 | |
| Isokinetic Ratio (%): | 99.2 | 100.3 | 101.7 | |

| Compound | Grain Loading gr/dscf | Grain Loading gr/dscf | Grain Loading gr/dscf | Grain Loading gr/dscf | lb/hr |
|---|---|---|---|---|---|
| Filterable Particulate Matter(1) | 0.00088 | 0.00090 | 0.00013 | 0.00064 | 1.26 |

(1) Particulate matter from Metals train. Front half and filter temperature at 320°F

## TABLE 4-15
## PARTICULATE MATTER (LESS THAN 2.5 MICRONS) TEST RESULTS
## EXXONMOBIL TORRANCE REFINERY
## FLUID CATALYTIC CRACKER

| Test No. | 1-$PM_{2.5}$ | 2-$PM_{2.5}$ | 3-$PM_{2.5}$ | Average | |
|---|---|---|---|---|---|
| Date: | June 30, 2011 | June 30, 2011 | July 1, 2011 | | |
| Start/Stop Time: | 1016/1443 | 1548/2014 | 1500/1921 | | |
| Stack Flow Rate (dscfm): | 244,326 | 247,582 | 252,208 | | |
| Sample Volume (dscf): | 81.652 | 82.996 | 83.261 | | |
| Stack $O_2$ (%): | 5.03 | 5.06 | 4.90 | | |
| Stack $CO_2$ (%): | 13.94 | 14.08 | 14.31 | | |
| Moisture Fraction (%): | 15.2 | 14.6 | 13.4 | | |
| Isokinetic Ratio (%): | 106.3 | 106.0 | 103.7 | | |
| Compound | Grain Loading gr/dscf | Grain Loading gr/dscf | Grain Loading gr/dscf | Grain Loading gr/dscf | lb/hr |
| Total Particulate Matter (less than 2.5 microns) | 0.01431 | 0.00725 | 0.00814 | 0.00990 | 20.98 |
| Solid Particulate Matter (less than 2.5 microns) | 0.00025 | 0.00000 | 0.00000 | 0.00008 | 0.17 |
| Condensible Inorganic Particulate Matter (less than 2.5 microns) | 0.01357 | 0.00666 | 0.00793 | 0.00939 | 19.90 |
| Condensible Organic Particulate Matter (less than 2.5 microns) | 0.00049 | 0.00059 | 0.00020 | 0.00043 | 0.91 |

## TABLE 4-16
## AMMONIA TEST RESULTS
## EXXONMOBIL TORRANCE REFINERY
## FLUID CATALYTIC CRACKER

| Test No. | | 1A-$NH_3$ | 1-$NH_3$ | 2-$NH_3$ | 3-$NH_3$ | Average | |
|---|---|---|---|---|---|---|---|
| Date: | | June 30, 2011 | June 30, 2011 | July 1, 2011 | July 1, 2011 | | |
| Start/Stop Time: | | 1342/1442 | 1912/2012 | 1510/1610 | 1635/1735 | | |
| Stack Flow Rate[1] (dscfm) | | 244,326 | 247,582 | 252,208 | 252,208 | | |
| Stack $O_2$ (%): | | 5.00 | 5.12 | 4.94 | 4.95 | | |
| Stack $CO_2$ (%): | | 14.03 | 14.05 | 14.19 | 14.25 | | |
| Compound | CAS | ppmvd | ppmvd | ppmvd | ppmvd | ppmvd | lb/hr |
| Ammonia | 7664-41-7 | 16.44 | 7.08 | 5.17 | 4.84 | 8.38 | 5.49 |

(1) Stack flow from $PM_{2.5}$ test

## TABLE 4-17
## CARBON MONOXIDE TEST RESULTS
## EXXONMOBIL TORRANCE REFINERY
## FLUID CATALYTIC CRACKER

| Test No. | | 1-CO | 2-CO | 3-CO | Average | |
|---|---|---|---|---|---|---|
| Date: | | July 27, 2011 | July 27, 2011 | July 28, 2011 | | |
| Start/Stop Time: | | 945/1045 | 1530/1630 | 802/902 | | |
| Stack Flow Rate[(1)] (dscfm) | | 240,582 | 244,827 | 230,394 | | |
| Stack $O_2$ (%): | | 5.23 | 5.19 | 4.96 | | |
| Stack $CO_2$ (%): | | 14.25 | 14.02 | 14.19 | | |
| Compound | CAS | ppmvd | ppmvd | ppmvd | ppmvd | lb/hr |
| Carbon Monoxide | 630-08-0 | 75.42 | 77.56 | 73.42 | 75.47 | 78.56 |

(1) Stack flow from Semi-Volatiles test

## TABLE 4-18
## OXIDES OF NITROGEN AND SULFUR DIOXIDE TEST RESULTS
## EXXONMOBIL TORRANCE REFINERY
## FLUID CATALYTIC CRACKER

| Test No. | | 1-$NO_x/SO_2$ | 2-$NO_x/SO_2$ | 3-$NO_x/SO_2$ | Average | |
|---|---|---|---|---|---|---|
| Date: | | June 30, 2011 | June 30, 2011 | July 1, 2011 | | |
| Start/Stop Time: | | 1040/1140 | 1520/1620 | 1750/1850 | | |
| Stack Flow Rate(1) (dscfm) | | 245,224 | 233,757 | 233,445 | | |
| Stack $O_2$ (%): | | 5.08 | 5.00 | 4.88 | | |
| Stack $CO_2$ (%): | | 13.89 | 14.13 | 14.34 | | |
| Compound | CAS | ppmvd | ppmvd | ppmvd | ppmvd | lb/hr |
| Oxides of Nitrogen | 11104-93-1 | 21.77 | 11.13 | 11.11 | 14.67 | 25.15 |
| Sulfur Dioxide | 7446-09-5 | 11.59 | 12.28 | 12.10 | 11.99 | 28.36 |

(1) Stack flow from Hexavalent Chromium test

## TABLE 4-19
## CRUDE FUEL SAMPLE TEST RESULTS
## EXXONMOBIL TORRANCE REFINERY
## FLUID CATALYTIC CRACKER

| Test No. | | 1-CRUDE | 2-CRUDE | 3-CRUDE |
|---|---|---|---|---|
| Date: | | June 6, 2011 | July 7, 2011 | August 8, 2011 |
| Compound | CAS | 1-CRUDE | 2-CRUDE | 3-CRUDE |
| API Gravity (g/cc) | | 15.5 | 16.1 | 15.9 |
| Density @ 60° F (g/cc) | | 0.9628 | 0.9588 | 0.9601 |
| Density @ 60° F (lb/cft) | | 60.1 | 59.9 | 59.9 |
| HHV (Net Btu/US Gal) | | 146,854 | 123,519 | 140,107 |
| HHV (Net Btu/US Lb) | | 18,315 | 15,469 | 17,523 |
| HHV (Gross Btu/US Gal) | | 156,073 | 123,841 | 146,835 |
| HHV (Gross Btu/US Lb) | | 19,464 | 15,509 | 18,365 |
| Total Sulfur (Wt%) | | 1.3 | 1.4 | 1.4 |
| Chlorine (ppm) | 7782-50-5 | 64.7 | 68.0 | 60.8 |
| | | mg/kg | mg/kg | mg/kg |
| Antimony | 7440-36-0 | ND< 23 | ND< 23 | ND< 23 |
| Arsenic | 7440-38-2 | ND< 4.6 | ND< 4.6 | ND< 4.7 |
| Beryllium | 7440-41-7 | ND< 4.6 | ND< 4.6 | ND< 4.7 |
| Cadmium | 7440-43-9 | ND< 2.3 | ND< 2.3 | ND< 2.3 |
| Chromium | 7440-47-3 | ND< 2.3 | ND< 2.3 | ND< 2.3 |
| Cobalt | 7440-48-4 | ND< 2.3 | ND< 2.3 | ND< 2.3 |
| Lead | 7439-92-1 | ND< 4.6 | ND< 4.6 | ND< 4.7 |
| Manganese | 7439-96-5 | ND< 4.6 | ND< 4.6 | ND< 4.7 |
| Mercury | 7439-97-6 | ND< 0.092 | ND< 0.090 | ND< 0.084 |
| Nickel | 7440-02-0 | 46 | 50 | 70 |
| Selenium | 7782-49-2 | ND< 9.2 | ND< 9.3 | ND< 9.3 |

ND < Indicates all three runs are below the detection limit
< Indicates one or two of the three runs are below the detection limit

# APPENDIX A QUALITY ASSURANCE INFORMATION

## QUALITY ASSURANCE PROGRAM

Delta's operations include four major areas of focus which include sampling, sample analysis, equipment maintenance, calibration, data reduction, and reporting. Procedures are in place to ensure that work performed in each one of these areas is performed in a manner consistent with providing emissions test data that is of known quality and is legally defensible. This section provides details on the procedures that are followed to accomplish this assurance of data quality.

## QUALITY ASSURANCE OBJECTIVES FOR MEASUREMENT DATA

Standard methods of assessing data quality such as precision, accuracy and completeness are used. Criteria for acceptable data are generally contained in the reference methods; however, for some projects other criteria are defined. Standard statistical techniques can be applied to assess the data as requested for specific programs. Statistical analysis is not generally included when reporting source test data unless the number of samples and sampling conditions are planned to provide meaningful statistical results.

Delta's quality assurance objectives for precision and accuracy are based on the Reference Methods or published precision and accuracy data.

Completeness is defined as the percentage of measurements which are judged to be valid as compared to the total number of measurements made. Delta's objective is to generate only valid data. For compliance tests, Delta's completeness goal is 100%. For this initial copy of the QAP, the methods which are listed in Delta's capabilities provide results which are available while still on the job site. It is expected that if all quality assurance requirements for a test are not satisfied, the test were invalidated and repeated and the test program will remain 100% complete.

### REPRESENTATIVENESS AND COMPARABILITY

The usefulness and validity of all data is contingent upon 1) the results being representative of the source being tested and 2) comparable with other results generated by Delta or another organization. Delta has adopted the objective is that all measurements be representative and comparable. These objectives were met by performing tests while the process is operating under known and documented conditions, following published reference methods, using standard data reduction techniques and reporting formats, and proper training of personnel.

## TRAINING

Training is an on-going process for all Delta personnel. Personnel completing any task were properly trained before undertaking any task or be under the direct observation and supervision of someone properly trained. There are certain skills which all technical personnel are expected to acquire.

All source test personnel must review the applicable portions of the following technical documents before being involved in any capacity in any test program.

a) 40 CFR Part 60

b) SCAQMD Source Test Manual

c) Delta Quality Assurance Plan

d) EPA Quality Assurance Handbook for Air Pollution Measurement Systems, Volume III.

PROCEDURE SPECIFIC TRAINING

In addition to the general awareness training discussed previously, each person responsible for the performance of a test procedure is required to demonstrate proficiency in the method involved. This demonstration were accomplished through 1) reading of the method, 2) reading of the manuals for the equipment being used, and 3) satisfactorily completing an oral or written exam regarding the above material. Information related to training for specific methods is provided below.

A. Continuous Monitoring of Emissions: EPA Methods 3A, 6C, 7E, 10, 20, Draft CARB Method 100
   1. Understanding of the CEMS schematic drawing
   2. Understanding of the sampling system
   3. Leak check
   4. Analyzer calibrations and adjustments
   5. Sample system bias calibration check
   6. Strip chart recorder operation and documentation
   7. Stratification check
   8. Corrections for sample system bias and analyzer drift

B. Sample Locations: EPA/CARB Method 1
   1. Identify sample locations
   2. Determination of upstream and downstream diameters
   3. Stack area calculations
   4. Determine number and location of sample points
   5. Perform cyclonic flow check and determine sample location acceptability.

C. Stack Gas Velocity and Volumetric Flow Rate: EPA/CARB Method 2

   1. Assemble pitot tube/thermocouple
   2. Perform leak check
   3. Record differential pressure
   4. Record stack temperature
   5. Record static pressure
   6. Record barometric pressure
   7. Calculate stack gas velocity and volumetric flow rate

D. Stack Gas Moisture Content: EPA/CARB Method 4

1. Assemble sample train (probe, sample line, impingers, U-tube, gooseneck, vacuum line, meter, pump, etc.)
2. Record preliminary data: barometric pressure, reference temperature, ambient temperature.
3. Pre- and post-test leak check: < 0.02 cfm
4. Read and record: sample volume, delta H, meter temperatures (in/out), vacuum, impinger outlet temperature
5. Weigh impingers
6. Calculate % moisture

## SAMPLING PROCEDURES

Delta maintains complete copies of federal, state, and local regulatory agency source test methods which serve as the final authority on sampling procedures. This Quality Assurance Plan does not attempt to re-state the source test methods which are available. Delta strives to follow the appropriate source test methods whenever possible. Source test methods are listed in all test plans for review by both clients and regulatory agencies.

The following steps are taken to ensure that the sampling procedures of the source test methods are followed:

1. Training of personnel, as discussed in Section 5,
2. Copies of reference methods are available to all personnel and are taken to every job site,
3. Appropriate selection of project managers
4. Quality assurance reviews of test programs

Occasionally, due to the sample location limitations or other factors, variations from the standard methods were necessary. Any variations from the methods were assessed to determine the effect which the variation will have on data quality. Whenever possible, variations were included in the test plan and receive approval prior to implementation of the program. Any variations were clearly documented in the source test report.

## CHAIN-OF-CUSTODY PROCEDURES

### DATA SHEET CHAIN-OF-CUSTODY

The program manager for each program is responsible for collection of data sheets from sampling personnel as they are completed. The program manager maintains possession of the data sheets or keeps them in locked storage. Upon return to the office, a copy of all field data sheets is made and placed in a locked file. The original field data sheets are used for report preparation and are kept with the final report. Data sheets, test plans, and reports are kept in files, organized by client and project.

A chain-of-custody form is kept at the project file location to log check-out and return of any data sheets or files.

Sample and Reagent Chain of Custody

Chain of Custody procedures begin prior to testing with the preparation of reagents and filters to be used in field testing. Delta personnel who have prepared the filters and reagents complete and sign a reagent chain of custody form which is transferred with the reagents to the field testing team. The field team member receiving the reagents records the transfer on this form. The reagent chain of custody form is included in the final source test report.

At the test site all samples collected are recorded on a chain of custody form as they are taken. This chain of custody form also includes the date, time, test number and a description of the samples and sample fractions. This form is signed by the field team member serving as the sample custodian. This form is left with the sample at all times; it is used to record transfer of the samples to Delta's in-house laboratory or to outside laboratories. Intermediate transfers to shipping agents are also recorded here. Transfers of test equipment between field team members are recorded on the sampling train data sheet.

## CALIBRATION PROCEDURES AND FREQUENCY

All of Delta's major equipment components are calibrated according to the procedures established by EPA, CARB, and SCAQMD. When regulations differ, the stricter of the regulations were followed. Table 9 summarizes the calibration procedures and intervals for the major equipment components.

## DATA REDUCTION, VALIDATION, AND REPORTING

DATA REDUCTION

Data reduction generally occurs in two phases: First, preliminary data reduction occurs on the job site. On-site data reduction may be performed by sampling technicians or the project manager. Preliminary calculations may include velocity, moisture, stack flow, and continuous gaseous measurements. Draft test results are normally available prior to leaving the job site. Calculations are performed manually, with a calculator, or with a portable computer. Whenever possible, standard spreadsheets are used to reduce the data.

The second phase of data reduction occurs after the test team has left the job site. Final results are generated after the project manager has reviewed the data entry, calculations, and reporting units.

The standard calculations are available in the test methods

## TABLE 1
## MAJOR SAMPLING EQUIPMENT CALIBRATION REQUIREMENTS

| Sampling Equipment | Calibration Frequency | Calibration Procedure | Acceptable Calibration Criteria |
|---|---|---|---|
| Continuous Analyzers | Before and after each test day | 3-point calibration error test | < 2% of analyzer range |
| Continuous Analyzers | Before and after each test run | 2-point sample system bias check | < 5% of analyzer range |
| Continuous Analyzers | After each test run | 2-point analyzer drift determination | < 3% of analyzer range |
| CEMS System | Beginning of each day | leak check | < 1 in. Hg decrease in 5 min. at > 20 in. Hg |
| Continuous Analyzers | Beginning of each day | 3-point linearity | < 1% of analyzer range |
| $NO_x$ Analyzer | Beginning of each day | NO2 -> NO converter efficiency | > 90% |
| S-type pitot tube | Semi-annually | Dimensional calibration | Meet dimensional criteria of Method 2 |
| S-type pitot tube | Annually | Wind tunnel calibration | Defined in Method 2 |
| S-type pitot tube | Prior to each project | Visual inspection | Meet dimensional criteria of Method 2 |
| Differential Pressure Gauges (except for manometers) | Semi-annually | Correction factor based on 5-point comparison to standard | +/- 5% |
| Differential Pressure Gauges (except for manometers) | Bi-monthly | 3-point comparison to standard, no correction factor | +/- 5% |
| Manometer | Semi-annually | Clean and replace fluid | |
| Barometer | Semi-annually | Adjusted to mercury-in-glass or National Weather Service Station | +/- 0.1 inches Hg |
| Dry gas meter | Semi-annually | Calibration check at 4 flow rates using a NIST traceable standard | +/- 2% |
| Dry gas meter | Bi-monthly | Calibration check at 2 flow rates using a NIST traceable standard | +/- 2% of semi-annual factor |
| Dry gas meter orifice | Annually | 4-point calibration for ΔH@ | -- |
| Temperature sensors | Semi-annually | 3-point calibration vs. NIST traceable standard | +/- 1.5% |

DATA VALIDATION

All data, data entry, and calculations are double-checked by the originator and reviewed by a second person. Reviews can include re-calculation of results, data entry checks, and calculation of known and accepted data sets using the existing spreadsheet.

REPORTING

Delta promotes the use of a standard reporting format, when possible.

## INTERNAL QUALITY ASSESSMENTS

INTEGRATED WET CHEMICAL SAMPLING EQUIPMENT QUALITY CONTROL

Major equipment maintenance schedules are provided. Additional quality control measures are performed on sampling equipment which includes:

- wind-tunnel calibration of pitot tubes
- 3-point thermocouple/readout calibrations
- bi-monthly meter calibration checks
- pre- and post-test leak checks of sample systems

CONTINUOUS EMISSION MONITORING SYSTEM (CEMS) EQUIPMENT QUALITY CONTROL

Delta uses EPA Protocol gases to perform all QA/QC checks of the analyzers when available. On-site checks include 3-point calibration error (+/- 2% of span), 2-point sample system bias (+/- 5% of span), analyzer drift (+/- 3% of span). Semi-annual checks include analyzer linearity (+/- 1% of span) and $NO_2$ converter efficiency (> 90%).

PERFORMANCE AND SYSTEM AUDITS

The appropriate regulatory agency is notified of all Delta compliance tests. The regulatory agency is allowed the opportunity to perform side-by-side tests and/or observe the Delta setup and sampling. Delta cooperates fully in any pre-arranged regulatory agency audit.

Delta's approval under the South Coast Air Quality Management District (SCAQMD) Laboratory Approval Program (LAP) includes a review of quality assurance procedures, equipment type, maintenance, responsibilities, a laboratory audit, and an external audit of the sampling system which involves analysis and reporting of unknown samples.

## EQUIPMENT MAINTENANCE

Delta performs routine and preventative maintenance on all major sampling equipment. These procedures are in addition to method specific requirements which are summarized earlier in this QAP. Table 2 summarizes the equipment maintenance schedule. This preventative maintenance schedule should minimize equipment failures

and downtime in the field. On the occasion where equipment does break down in the field, Delta personnel have the necessary experience to perform on-site repairs of most problems.

**TABLE 2**
**EQUIPMENT MAINTENANCE SCHEDULE**

| Equipment | Performance Requirement | Maintenance Interval | Corrective Action |
|---|---|---|---|
| Continuous Analyzers | 1. Proper response to zero, span gas<br>2. Absence of malfunction | As required by the manufacturer | As recommended by the manufacturer |
| Mobile Laboratory Sample System | 1. Absence of leaks<br>2. Pass system bias test | Dependent on sources sampled and use intervals | 1. Change filters<br>2. Repair/change gas dryer<br>3. Check for contamination<br>4. Leak check |
| Pumps | 1. Absence of leaks<br>2. Generates manufacturers required pressure, vacuum, and flow | Every 500 hours of operation or 6 months | 1. Visual inspection<br>2. Clean<br>3. Replace worn parts<br>4. Leak check |
| Sample Lines | 1. Pass system bias test | After each test series | 1. Flush with dry gas |

## SPECIFIC PROCEDURES TO ASSESS DATA PRECISION, ACCURACY, AND COMPLETENESS

The QA/QC procedures outlined in the previous sections of this document are provided to ensure data precision, accuracy, and completeness. It is the responsibility of each project team member to 1) complete all pertinent sections of the data sheets, 2) make comments, where appropriate, 3) notify project managers of sampling difficulties which may lead to invalid data, and 4) follow chain-of-custody procedures for all samples, data sheets, and documents.

Each test report is reviewed before release by one of Delta's designated Quality Assurance team members. Procedures, results, and data are reviewed to verify adherence to method requirements, that proper recording procedures are followed, and that calculations are performed properly. These reviews are conducted independently from any project related data reduction and reporting activities.

## QUALITY ASSURANCE REPORTS TO MANAGEMENT AND CORRECTIVE ACTIONS

A "Quality Assurance Incident Report" is completed when an incident occurs which may result in the generation of invalid data. The report originator will provide the report to the program manager upon completion to allow for immediate corrective action to maintain program completion. Following completion of the on-site portion of the program, the form is routed to the Quality Assurance Officer for review. Appropriate action to be taken may include discussions with test personnel, modifications of QA/QC procedures, or additional training. Incidents reports are then filed in the client file and included with the source test report, if appropriate.

Original Quality Assurance records are maintained on-file. Periodic reviews are performed by the QA Officer to ensure that the records are up-to-date, complete, and maintained.

State of California

# Air Resources Board

## Approved Independent Contractor

**Delta Air Quality Services, Incorporated**

This is to certify that the company listed above has been approved by the Air Resources Board to conduct compliance testing pursuant to California Code of Regulations, title 17, section 91207 until June 30, 2011, for those test methods listed below:

**Visible Emissions Evaluation**
**U. S. EPA Test Methods 201A, 202**

Alberto Ayala, Ph.D., M.S.E.
Chief, Monitoring and Laboratory Division

A.2-2

State of California

# Air Resources Board

## Approved Independent Contractor

**Delta Air Quality Services, Incorporated**

This is to certify that the company listed above has been approved by the Air Resources Board to conduct compliance testing pursuant to California Code of Regulations, title 17, section 91207 until June 30, 2012, for those test methods listed below:

**ARB Source Test Methods:**
**1, 2, 3, 4, 5, 6, 8, 17, 20, 501**
**100 ($CO$, $CO_2$, $NO_x$, $O_2$, $SO_2$)**

Alberto Ayala, Ph.D., M.S.E.
Chief, Monitoring and Laboratory Division

A.2-3

## SEMI-ANNUAL DRY GAS M... ..R/ORIFICE CALIBRATION

Orifice Method - Triplicate Runs/Four Calibration Points
English Meter Box Units, English K' Factor
Filename: \\reception\Delta Public\Calibrations\Meters\6-wcs\2011\[Semi-Annual Meter Calibration - 6-WCS 5-06-2011.xls]WCS
File Modified From: APEX 522 Series Meter box Calibration
Revised: 4/8/2005

Model #: 2010.00
ID #: 6WCS
Date: 5/11/2011
Bar. Pressure: 29.95 (in. Hg)
Performed By: M. Edmondson
Meter Serial #: 894082

| DRY GAS METER READINGS | | | | | | | | | CRITICAL ORIFICE READINGS | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Initial Temps. | | Final Temps. | | | | | Ambient Temperature | | |
| dH (in H2O) | Time (min) | Volume Initial (cu ft) | Volume Final (cu ft) | Volume Total (cu ft) | Inlet (deg F) | Outlet (deg F) | Inlet (deg F) | Outlet (deg F) | Orifice Serial# (number) | K' Orifice Coefficient (see above) | Actual Vacuum (in Hg) | Initial (deg F) | Final (deg F) | Average (deg F) |
| 0.13 | 26.00 | 76.547 | 81.862 | 5.315 | 71.0 | 69.0 | 69.0 | 68.0 | 33 | 0.1553 | 25.0 | 69.0 | 70.0 | 69.5 |
| 0.13 | 26.00 | 81.862 | 87.191 | 5.329 | 69.0 | 68.0 | 69.0 | 68.0 | 33 | 0.1553 | 25.0 | 70.0 | 69.0 | 69.5 |
| 0.13 | 26.00 | 87.191 | 92.545 | 5.354 | 69.0 | 68.0 | 69.0 | 68.0 | 33 | 0.1553 | 25.0 | 69.0 | 69.0 | 69.0 |
| 0.57 | 12.00 | 44.000 | 49.431 | 5.431 | 71.0 | 68.0 | 70.0 | 68.0 | 48 | 0.3465 | 23.0 | 69.0 | 69.0 | 69.0 |
| 0.57 | 12.00 | 49.431 | 54.858 | 5.427 | 70.0 | 68.0 | 70.0 | 69.0 | 48 | 0.3465 | 23.0 | 69.0 | 69.0 | 69.0 |
| 0.57 | 12.00 | 54.858 | 60.290 | 5.432 | 70.0 | 69.0 | 70.0 | 69.0 | 48 | 0.3465 | 23.0 | 69.0 | 69.0 | 69.0 |
| 1.80 | 7.00 | 60.290 | 65.700 | 5.410 | 70.0 | 68.0 | 70.0 | 68.0 | 63 | 0.5888 | 21.0 | 69.0 | 70.0 | 69.5 |
| 1.80 | 7.00 | 65.700 | 71.123 | 5.423 | 70.0 | 68.0 | 70.0 | 68.0 | 63 | 0.5888 | 21.0 | 70.0 | 70.0 | 70.0 |
| 1.80 | 7.00 | 71.123 | 76.547 | 5.424 | 70.0 | 68.0 | 71.0 | 69.0 | 63 | 0.5888 | 21.0 | 70.0 | 70.0 | 70.0 |
| 3.40 | 5.00 | 27.800 | 33.101 | 5.301 | 68.0 | 68.0 | 69.0 | 67.0 | 73 | 0.8202 | 19.0 | 68.0 | 68.0 | 68.0 |
| 3.40 | 5.00 | 33.101 | 38.405 | 5.304 | 69.0 | 67.0 | 69.0 | 68.0 | 73 | 0.8202 | 19.0 | 68.0 | 68.0 | 68.0 |
| 3.40 | 5.00 | 38.405 | 43.706 | 5.301 | 69.0 | 68.0 | 70.0 | 69.0 | 73 | 0.8202 | 19.0 | 68.0 | 68.0 | 68.0 |

| DRY GAS METER | | ORIFICE | | | DRY GAS METER CALIBRATION FACTOR | ORIFICE CALIBRATION FACTOR | Individual Run | Individual Orifice | Orifice Average | Orifice Average |
|---|---|---|---|---|---|---|---|---|---|---|
| VOLUME CORRECTED Vm(std) (cu ft) | VOLUME CORRECTED Vm(std) (liters) | VOLUME CORRECTED Vcr(std) (cu ft) | VOLUME CORRECTED Vcr(std) (liters) | VOLUME NOMINAL Vcr (cu ft) | Y Value (number) | dH@ Value (in H2O) | 0.95 < Y < 1.05? | Ymax - Ymin < 0.010? | 0.98 < Y/Yd < 1.02? | dH@ - dH@ av < 0.155? |
| 5.307 | 150.3 | 5.255 | 148.8 | 5.267 | 0.990 | 1.790 | Pass | | | |
| 5.329 | 150.9 | 5.255 | 148.8 | 5.267 | 0.986 | 1.792 | Pass | | | |
| 5.354 | 151.6 | 5.258 | 148.9 | 5.265 | 0.982 | 1.790 | Pass | | | |
| | | | | **Average** | **0.986** | **1.790** | | **Pass** | **Pass** | **Pass** |
| 5.429 | 153.7 | 5.414 | 153.3 | 5.421 | 0.997 | 1.576 | Pass | | | |
| 5.425 | 153.6 | 5.414 | 153.3 | 5.421 | 0.998 | 1.575 | Pass | | | |
| 5.427 | 153.7 | 5.414 | 153.3 | 5.421 | 0.998 | 1.573 | Pass | | | |
| | | | | **Average** | **0.998** | **1.575** | | **Pass** | **Pass** | **Pass** |
| 5.427 | 153.7 | 5.365 | 151.9 | 5.377 | 0.989 | 1.726 | Pass | | | |
| 5.440 | 154.1 | 5.362 | 151.9 | 5.379 | 0.986 | 1.727 | Pass | | | |
| 5.436 | 153.9 | 5.362 | 151.9 | 5.379 | 0.986 | 1.726 | Pass | | | |
| | | | | **Average** | **0.987** | **1.726** | | **Pass** | **Pass** | **Pass** |
| 5.348 | 151.5 | 5.345 | 151.4 | 5.342 | 0.999 | 1.677 | Pass | | | |
| 5.349 | 151.5 | 5.345 | 151.4 | 5.342 | 0.999 | 1.677 | Pass | | | |
| 5.338 | 151.2 | 5.345 | 151.4 | 5.342 | 1.001 | 1.673 | Pass | | | |
| | | | | **Average** | **1.000** | **1.676** | | **Pass** | **Pass** | **Pass** |

**Average Yd: 0.993 dH@: 1.692**

**Q @ dH = 1: 0.577**

SIGNED: Signature on File Date: 5/11/2011

**IMPORTANT** **For valid test results, the Actual Vacuum should be 1 to 2 in. Hg greater than the Theoretical Critical Vacuum shown above.**
**IMPORTANT** **The Critical Orifice Coefficient, K', must be entered in English units, (ft)^3*(deg R)^0.5/((in.Hg)*(min)).**

A.3-2

075

# BI-MONTHLY DRY GAS METER CALIBRATION CHECK

Orifice Method - Triplicate Runs/Four Calibration Points
English Meter Box Units, English K' Factor
Filename: \\reception\Delta Public\Calibrations\Meters\6-wcs\2011\[6wcs - Bimonthly Meter Cal 7-20-11 xls]WCS
File Modified From: APEX 522 Series Meter box Calibration
Revised: 3/21/2002

Model #: NU2010
ID #: 6-WCS
Date: 7/20/2011
Bar. Pressure: 29.88 (in. Hg)
Performed By: G. BRIDGE
Yd from previous semi-annual calibration: 0.993

| DRY GAS METER READINGS | | | | | | | | | CRITICAL ORIFICE READINGS | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Volume | Volume | Volume | Initial Temps. | | Final Temps. | | Orifice | K' Orifice | Actual | Ambient Temperature | | |
| dH (in H2O) | Time (min) | Initial (cu ft) | Final (cu ft) | Total (cu ft) | Inlet (deg F) | Outlet (deg F) | Inlet (deg F) | Outlet | Serial# (number) | Coefficient (see above) | Vacuum (in Hg) | Initial (deg F) | Final (deg F) | Average (deg F) |
| 0.59 | 12.00 | 352.100 | 357.510 | 5.410 | 80.0 | 80.0 | 80.0 | 80.0 | 48 | 0.3465 | 19.0 | 80.0 | 80.0 | 80.0 |
| 0.59 | 12.00 | 357.510 | 362.948 | 5.438 | 80.0 | 80.0 | 81.0 | 80.0 | 48 | 0.3465 | 19.0 | 80.0 | 81.0 | 80.5 |
| 0.59 | 12.00 | 362.948 | 368.386 | 5.438 | 81.0 | 80.0 | 82.0 | 81.0 | 48 | 0.3465 | 19.0 | 81.0 | 81.0 | 81.0 |
| | | | | | | | | | | | | | | |
| 1.90 | 7.00 | 368.386 | 373.783 | 5.397 | 82.0 | 81.0 | 84.0 | 82.0 | 63 | 0.5888 | 15.5 | 81.0 | 82.0 | 81.5 |
| 1.90 | 7.00 | 373.783 | 379.189 | 5.406 | 84.0 | 82.0 | 85.0 | 82.0 | 63 | 0.5888 | 15.5 | 82.0 | 83.0 | 82.5 |
| 1.90 | 7.00 | 379.189 | 384.593 | 5.404 | 85.0 | 82.0 | 86.0 | 83.0 | 63 | 0.5888 | 15.5 | 83.0 | 83.0 | 83.0 |

| DRY GAS METER | | ORIFICE | | | | DRY GAS METER CALIBRATION FACTOR | ORIFICE CALIBRATION FACTOR |
|---|---|---|---|---|---|---|---|
| VOLUME CORRECTED Vm(std) (cu ft) | VOLUME CORRECTED Vm(std) (liters) | VOLUME CORRECTED Vcr(std) (cu ft) | VOLUME CORRECTED Vcr(std) (liters) | VOLUME NOMINAL Vcr (cu ft) | | Y Value (number) | dH@ Value (in H2O) |
| 5.288 | 149.8 | 5.346 | 151.4 | 5.478 | | 1.011 | 1.632 |
| 5.313 | 150.5 | 5.344 | 151.3 | 5.480 | | 1.006 | 1.634 |
| 5.306 | 150.3 | 5.342 | 151.3 | 5.483 | | 1.007 | 1.634 |
| | | | | | **Average** | **1.008** | **1.634** |
| 5.271 | 149.3 | 5.292 | 149.9 | 5.437 | | 1.004 | 1.821 |
| 5.270 | 149.2 | 5.287 | 149.7 | 5.442 | | 1.003 | 1.822 |
| 5.260 | 149.0 | 5.285 | 149.7 | 5.445 | | 1.005 | 1.822 |
| | | | | | **Average** | **1.004** | **1.822** |

| | | | |
|---|---|---|---|
| **Average Yd:** | **1.006** | **dH@:** | **1.728** |
| **Pass** | | **Q @ dH = 1:** | **0.571** |

The Average Yd must be within +/- 2% of the most recent semi-annual calibration Yd. If not, perform 4-point calibration.

SIGNED: Signature on File

Date: 7/20/2011

A.3-3

## SEMI-ANNUAL DRY GAS METER/ORIFICE CALIBRATION

Orifice Method - Triplicate Runs/Four Calibration Points
English Meter Box Units, English K' Factor
Filename: \\reception\Delta Public\Calibrations\Meters\12-wcs\2011\[Semi-Annual Meter Calibration12 wcs 3-7-11.xls]WCS
File Modified From: APEX 522 Series Meter box Calibration
Revised: 4/8/2005

Model #:
ID #: 12 wcs
Date: 3/7/2011
Bar. Pressure: 29.80 (in. Hg)
Performed By: Randy Monzon

| DRY GAS METER READINGS | | | | | | | | | CRITICAL ORIFICE READINGS | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Initial Temps. | | Final Temps. | | | | | Ambient Temperature | | |
| dH (in H2O) | Time (min) | Volume Initial (cu ft) | Volume Final (cu ft) | Volume Total (cu ft) | Inlet (deg F) | Outlet (deg F) | Inlet (deg F) | Outlet (deg F) | Orifice Serial# (number) | K' Orifice Coefficient (see above) | Actual Vacuum (in Hg) | Initial (deg F) | Final (deg F) | Average (deg F) |
| 0.11 | 26.00 | 276.770 | 282.055 | 5.285 | 65.0 | 64.0 | 66.0 | 65.0 | 33 | 0.1553 | 25.0 | 62.0 | 63.0 | 62.5 |
| 0.11 | 26.00 | 282.055 | 287.355 | 5.300 | 66.0 | 65.0 | 67.0 | 66.0 | 33 | 0.1553 | 25.0 | 63.0 | 63.0 | 63.0 |
| 0.11 | 26.00 | 287.355 | 292.640 | 5.285 | 67.0 | 66.0 | 67.0 | 66.0 | 33 | 0.1553 | 25.0 | 63.0 | 63.0 | 63.0 |
| 0.58 | 12.00 | 227.545 | 232.830 | 5.285 | 59.0 | 59.0 | 60.0 | 60.0 | 48 | 0.3465 | 20.0 | 60.0 | 60.0 | 60.0 |
| 0.58 | 12.00 | 232.830 | 238.130 | 5.300 | 60.0 | 60.0 | 62.0 | 61.0 | 48 | 0.3465 | 20.0 | 60.0 | 60.0 | 60.0 |
| 0.58 | 12.00 | 238.130 | 243.430 | 5.300 | 62.0 | 61.0 | 62.0 | 60.0 | 48 | 0.3465 | 20.0 | 60.0 | 60.0 | 60.0 |
| 1.80 | 7.00 | 260.415 | 265.770 | 5.355 | 64.0 | 63.0 | 65.0 | 63.0 | 63 | 0.5888 | 19.0 | 61.0 | 61.0 | 61.0 |
| 1.80 | 7.00 | 265.770 | 271.130 | 5.360 | 65.0 | 63.0 | 65.0 | 64.0 | 63 | 0.5888 | 19.0 | 61.0 | 62.0 | 61.5 |
| 1.80 | 7.00 | 271.130 | 276.490 | 5.360 | 65.0 | 64.0 | 67.0 | 64.0 | 63 | 0.5888 | 19.0 | 62.0 | 62.0 | 62.0 |
| 3.50 | 5.00 | 244.010 | 249.195 | 5.185 | 63.0 | 62.0 | 63.0 | 62.0 | 73 | 0.8202 | 15.0 | 60.0 | 60.0 | 60.0 |
| 3.50 | 5.00 | 249.195 | 254.400 | 5.205 | 63.0 | 62.0 | 64.0 | 62.0 | 73 | 0.8202 | 15.0 | 60.0 | 61.0 | 60.5 |
| 3.50 | 5.00 | 254.400 | 259.635 | 5.235 | 64.0 | 62.0 | 64.0 | 62.0 | 73 | 0.8202 | 15.0 | 61.0 | 60.0 | 60.5 |

| DRY GAS METER | | ORIFICE | | | DRY GAS METER CALIBRATION FACTOR | ORIFICE CALIBRATION FACTOR | Individual Run | Individual Orifice | Orifice Average | Orifice Average |
|---|---|---|---|---|---|---|---|---|---|---|
| VOLUME CORRECTED Vm(std) (cu ft) | VOLUME CORRECTED Vm(std) (liters) | VOLUME CORRECTED Vcr(std) (cu ft) | VOLUME CORRECTED Vcr(std) (liters) | VOLUME NOMINAL Vcr (cu ft) | Y Value (number) | dH@ Value (in H2O) | 0.95 < Y < 1.05? | Ymax - Ymin < 0.010? | 0.98 < Y/Yd < 1.02? | dH@ - dH@ av < 0.155? |
| 5.293 | 149.9 | 5.264 | 149.1 | 5.232 | 0.994 | 1.513 | Pass | | | |
| 5.298 | 150.0 | 5.262 | 149.0 | 5.235 | 0.993 | 1.512 | Pass | | | |
| 5.278 | 149.5 | 5.262 | 149.0 | 5.235 | 0.997 | 1.511 | Pass | | | |
| | | | | Average | **0.995** | **1.512** | | Pass | Pass | Pass |
| 5.355 | 151.7 | 5.434 | 153.9 | 5.375 | 1.015 | 1.611 | Pass | | | |
| 5.358 | 151.7 | 5.434 | 153.9 | 5.375 | 1.014 | 1.608 | Pass | | | |
| 5.353 | 151.6 | 5.434 | 153.9 | 5.375 | 1.015 | 1.608 | Pass | | | |
| | | | | Average | **1.015** | **1.609** | | Pass | Pass | Pass |
| 5.399 | 152.9 | 5.381 | 152.4 | 5.333 | 0.997 | 1.723 | Pass | | | |
| 5.398 | 152.9 | 5.378 | 152.3 | 5.336 | 0.996 | 1.723 | Pass | | | |
| 5.391 | 152.7 | 5.376 | 152.2 | 5.338 | 0.997 | 1.723 | Pass | | | |
| | | | | Average | **0.997** | **1.723** | | Pass | Pass | Pass |
| 5.262 | 149.0 | 5.359 | 151.8 | 5.301 | 1.019 | 1.726 | Pass | | | |
| 5.279 | 149.5 | 5.357 | 151.7 | 5.304 | 1.015 | 1.728 | Pass | | | |
| 5.307 | 150.3 | 5.357 | 151.7 | 5.304 | 1.009 | 1.728 | Pass | | | |
| | | | | Average | **1.014** | **1.727** | | Pass | Pass | Pass |

**Average Yd: 1.005** **dH@: 1.643**

**Q @ dH = 1: 0.585**

SIGNED: Signature on File

Date: 40609.00

A.3-4

077

# BI-MONTHLY DRY GAS METER CALIBRATION CHECK

Orifice Method - Triplicate Runs/Four Calibration Points
English Meter Box Units, English K' Factor
Filename: \\reception\Delta Public\Calibrations\Meters\12-wcs\2011\[Bimonthly Meter Cal 7-12-11 12 wcs.xls]WCS
File Modified From: APEX 522 Series Meter box Calibration
Revised: 3/21/2002

Model #: C5000
ID #: 12WCS
Date: 7/12/2011
Bar. Pressure: 29.77 (in. Hg)
Performed By: G Bridge
Yd from previous semi-annual calibration: 1.005

| DRY GAS METER READINGS | | | | | | | | | CRITICAL ORIFICE READINGS | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Volume | Volume | Volume | Initial Temps. | | Final Temps. | | Orifice | K' Orifice | Actual | Ambient Temperature | | |
| dH (in H2O) | Time (min) | Initial (cu ft) | Final (cu ft) | Total (cu ft) | Inlet (deg F) | Outlet (deg F) | Inlet (deg F) | Outlet | Serial# (number) | Coefficient (see above) | Vacuum (in Hg) | Initial (deg F) | Final (deg F) | Average (deg F) |
| 0.59 | 12.00 | 660.300 | 665.785 | 5.485 | 73.0 | 72.0 | 73.0 | 72.0 | 48 | 0.3465 | 21.0 | 69.0 | 69.0 | 69.0 |
| 0.59 | 12.00 | 665.785 | 671.260 | 5.475 | 73.0 | 72.0 | 73.0 | 72.0 | 48 | 0.3465 | 21.0 | 69.0 | 69.0 | 69.0 |
| 0.59 | 12.00 | 671.260 | 676.718 | 5.458 | 73.0 | 72.0 | 73.0 | 72.0 | 48 | 0.3465 | 21.0 | 69.0 | 70.0 | 69.5 |
| | | | | | | | | | | | | | | |
| 1.90 | 7.00 | 676.718 | 682.113 | 5.395 | 73.0 | 72.0 | 74.0 | 73.0 | 63 | 0.5888 | 17.5 | 70.0 | 71.0 | 70.5 |
| 1.90 | 7.00 | 682.113 | 687.495 | 5.382 | 74.0 | 73.0 | 74.0 | 73.0 | 63 | 0.5888 | 17.5 | 71.0 | 71.0 | 71.0 |
| 1.90 | 7.00 | 687.495 | 692.875 | 5.380 | 74.0 | 73.0 | 75.0 | 73.0 | 63 | 0.5888 | 17.5 | 71.0 | 71.0 | 71.0 |

| DRY GAS METER | | ORIFICE | | | | DRY GAS METER CALIBRATION FACTOR | ORIFICE CALIBRATION FACTOR | |
|---|---|---|---|---|---|---|---|---|
| VOLUME CORRECTED Vm(std) (cu ft) | VOLUME CORRECTED Vm(std) (liters) | VOLUME CORRECTED Vcr(std) (cu ft) | VOLUME CORRECTED Vcr(std) (liters) | VOLUME NOMINAL Vcr (cu ft) | | Y Value (number) | dH@ Value (in H2O) | 625.00 |
| 5.417 | 153.4 | 5.382 | 152.4 | 5.421 | | 0.994 | 1.629 | |
| 5.407 | 153.1 | 5.382 | 152.4 | 5.421 | | 0.995 | 1.629 | |
| 5.390 | 152.7 | 5.379 | 152.3 | 5.424 | | 0.998 | 1.631 | |
| | | | | | **Average** | **0.996** | **1.630** | |
| 5.340 | 151.2 | 5.327 | 150.9 | 5.382 | | 0.998 | 1.821 | |
| 5.323 | 150.7 | 5.325 | 150.8 | 5.384 | | 1.000 | 1.821 | |
| 5.318 | 150.6 | 5.325 | 150.8 | 5.384 | | 1.001 | 1.821 | |
| | | | | | **Average** | **1.000** | **1.821** | |

| | | | |
|---|---|---|---|
| **Average Yd:** | **0.998** | **dH@:** | **1.725** |
| **Pass** | | **Q @ dH = 1:** | **0.571** |

The Average Yd must be within +/- 2% of the most recent semi-annual calibration Yd. If not, perform 4-point calibration.

SIGNED: Signature on File

Date: 7/12/2011

A.3-5

# APEX INSTRUMENTS METER CONSOLE CALIBRATION

| Meter Console Information | | | | | |
|---|---|---|---|---|---|
| Gas Meter Model | SK25 | Gas Meter Serial Numbe | 0000583 | Totalizer Model | N/A |

13 P+M

| Calibration Conditions | | | | | | |
|---|---|---|---|---|---|---|
| Wet Test Meter Idenification | 541008 | Calibration Technician | EW | | Calibration Date | 8-Apr-11 |
| Wet Test Meter Calibration Factor | 1.0020 | Barometric Pressure | ($P_b$) | 755.0 | mm Hg | |

| | Calibration Data | | | | | | Results | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Run Time | Dry Gas Meter | | | Wet Test Meter | | Standardized Volumes | | Dry Gas Meter | | |
| | | | | | | | | | Calibration Factor | | Corrected |
| | Elapsed | Gas Pressure | Gas Volume | Gas Temperature | Gas Volume | Gas Temperature | Dry Gas Meter | Wet Test Meter | Value | Variation | Flowrate |
| | ($\Theta$) | ($P_m$) | ($V_m$) | ($t_m$) | ($V_w$) | ($t_w$) | ($V_{m(std)}$) | ($V_{w(std)}$) | (Y) | ($\Delta$Y) | ($Q_m$) |
| | min | mm $H_2O$ | liters | °C | liters | °C | std liters | std liters | | | slm |
| Run 1 - Initial | 0 | -25 | 344.80 | 23.0 | 832.865 | 23.0 | | | | | |
| Final | 12 | -25 | 355.20 | 23.0 | 843.320 | 23.0 | | | | | |
| Total/Avg | 12 | -25 | 10.40 | 23.0 | 10.455 | 23.0 | 10.209 | 10.309 | 1.0098 | 0.008 | 0.86 |
| Run 2 - Initial | 0 | -24 | 355.20 | 23.0 | 843.320 | 23.0 | | | | | |
| Final | 14 | -24 | 366.30 | 23.0 | 854.368 | 23.0 | | | | | |
| Total/Avg | 14 | -24 | 11.10 | 23.0 | 11.048 | 23.0 | 10.897 | 10.894 | 0.9996 | -0.002 | 0.78 |
| Run 3 - Initial | 0 | -23 | 366.30 | 23.0 | 854.368 | 23.0 | | | | | |
| Final | 18 | -23 | 377.40 | 23.0 | 865.426 | 23.0 | | | | | |
| Total/Avg | 18 | -23 | 11.10 | 23.0 | 11.058 | 23.0 | 10.898 | 10.903 | 1.0004 | -0.002 | 0.61 |
| Run 4 - Initial | 0 | -22 | 377.40 | 23.0 | 865.426 | 23.0 | | | | | |
| Final | 24 | -22 | 388.80 | 23.0 | 876.716 | 23.5 | | | | | |
| Total/Avg | 24 | -22 | 11.40 | 23.0 | 11.290 | 23.3 | 11.194 | 11.123 | 0.9936 | -0.008 | 0.46 |
| Run 5 - Initial | 0 | -22 | 388.80 | 23.0 | 876.716 | 23.5 | | | | | |
| Final | 36 | -22 | 399.10 | 24.0 | 887.048 | 24.0 | | | | | |
| Total/Avg | 36 | -22 | 10.30 | 23.5 | 10.332 | 23.8 | 10.097 | 10.162 | 1.0064 | 0.004 | 0.28 |

| Average Meter Calibration Factor Y | 1.0020 |
|---|---|

Note: For Calibration Factor Y, the ratio of the reading of the calibration meter to the dry gas meter, acceptable tolerance of individual values from the average is +-0.02.

I certify that the above Dry Gas Meter was calibrated in accordance with USEPA Methods, CFR 40 Part 60, using a Precision Wet Test Meter, which in turn was calibrated using the American Bell Prover # 3785, certificate # F107, which is traceable to the National Bureau of Standards (N.I.S.T.).

Signature Eric Webb Date 4/8/11

A.3-6

079

# APEX INSTRUMENTS METER CONSOLE CALIBRATION

| Meter Console Information | | | | | |
|---|---|---|---|---|---|
| Gas Meter Model | PKIII | Gas Meter Serial Numbe | 322452 | Totalizer Model | N/A |

16 P+M

| Calibration Conditions | | | | | |
|---|---|---|---|---|---|
| Wet Test Meter Idenification | 541008 | Calibration Technician | EW | Calibration Date | 8-Apr-11 |
| Wet Test Meter Calibration Factor | 1.0020 | Barometric Pressure | ($P_b$) 755.0 | mm Hg | |

| Calibration Data | | | | | | | Results | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Run Time | Dry Gas Meter | | | Wet Test Meter | | Standardized Volumes | | Dry Gas Meter | | |
| | | | | | | | | | Calibration Factor | | Corrected |
| | Elapsed | Gas Pressure | Gas Volume | Gas Temperatur | Gas Volume | Gas Temperatur | Dry Gas Meter | Wet Test Meter | Value | Variation | Flowrate |
| | ($\Theta$) | ($P_m$) | ($V_m$) | ($t_m$) | ($V_w$) | ($t_w$) | ($V_{m(std)}$) | ($V_{w(std)}$) | (Y) | ($\Delta$Y) | ($Q_m$) |
| | min | mm $H_2O$ | liters | °C | liters | °C | std liters | std liters | | | slm |
| Run 1 - Initial | 0 | -27 | 907.70 | 24.0 | 922.514 | 24.5 | | | | | |
| Final | 12 | -27 | 917.80 | 24.0 | 932.967 | 25.0 | | | | | |
| Total/Avg | 12 | -27 | 10.10 | 24.0 | 10.453 | 24.8 | 9.879 | 10.246 | 1.0371 | 0.015 | 0.85 |
| Run 2 - Initial | 0 | -25 | 917.80 | 24.0 | 932.967 | 25.0 | | | | | |
| Final | 14 | -25 | 928.50 | 24.0 | 943.832 | 25.0 | | | | | |
| Total/Avg | 14 | -25 | 10.70 | 24.0 | 10.865 | 25.0 | 10.468 | 10.641 | 1.0165 | -0.005 | 0.76 |
| Run 3 - Initial | 0 | -24 | 928.50 | 24.0 | 943.832 | 25.0 | | | | | |
| Final | 18 | -24 | 939.40 | 24.0 | 954.872 | 25.0 | | | | | |
| Total/Avg | 18 | -24 | 10.90 | 24.0 | 11.040 | 25.0 | 10.665 | 10.813 | 1.0138 | -0.008 | 0.60 |
| Run 4 - Initial | 0 | -23 | 939.40 | 24.0 | 954.872 | 25.0 | | | | | |
| Final | 24 | -23 | 950.20 | 24.0 | 966.001 | 25.0 | | | | | |
| Total/Avg | 24 | -23 | 10.80 | 24.0 | 11.129 | 25.0 | 10.568 | 10.900 | 1.0314 | 0.010 | 0.45 |
| Run 5 - Initial | 0 | -22 | 950.20 | 24.0 | 966.001 | 25.0 | | | | | |
| Final | 36 | -22 | 960.20 | 24.0 | 976.091 | 25.0 | | | | | |
| Total/Avg | 36 | -22 | 10.00 | 24.0 | 10.090 | 25.0 | 9.786 | 9.882 | 1.0098 | -0.012 | 0.27 |

| Average Meter Calibration Factor Y | 1.0217 |
|---|---|

Note: For Calibration Factor Y, the ratio of the reading of the calibration meter to the dry gas meter, acceptable tolerance of individual values from the average is +-0.02.

I certify that the above Dry Gas Meter was calibrated in accordance with USEPA Methods, CFR 40 Part 60, using a Precision Wet Test Meter, which in turn was calibrated using the American Bell Prover # 3785, certificate # F107, which is traceable to the National Bureau of Standards (N.I.S.T.).

Signature [illegible] Date 4/8/11

A.3-7

080

## SEMI-ANNUAL DRY GAS METER/ORIFICE CALIBRATION

Orifice Method - Triplicate Runs/Four Calibration Points
English Meter Box Units, English K' Factor
Filename: \\reception\Delta Public\Calibrations\Meters\17-wcs\2011\[Semi-Annual Meter Calibration -3-8-11-17-wcs.xls]WCS
File Modified From: APEX 522 Series Meter box Calibration
Revised: 4/8/2005

Model #: C-5000
ID #: 17-WCS
Date: 3/8/2011
Bar. Pressure: 29.97 (in. Hg)
Performed By: G. Bridge
Meter Serial #: 9543628

| DRY GAS METER READINGS | | | | | | | | | CRITICAL ORIFICE READINGS | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Initial Temps. | | Final Temps. | | | | | Ambient Temperature | | |
| dH (in H2O) | Time (min) | Volume Initial (cu ft) | Volume Final (cu ft) | Volume Total (cu ft) | Inlet (deg F) | Outlet (deg F) | Inlet (deg F) | Outlet (deg F) | Orifice Serial# (number) | K' Orifice Coefficient (see above) | Actual Vacuum (in Hg) | Initial (deg F) | Final (deg F) | Average (deg F) |
| 0.11 | 26.00 | 483.487 | 488.683 | 5.196 | 48.0 | 45.0 | 55.0 | 50.0 | 33 | 0.1553 | 24.0 | 53.0 | 53.0 | 53.0 |
| 0.11 | 26.00 | 488.683 | 493.952 | 5.269 | 55.0 | 51.0 | 60.0 | 56.0 | 33 | 0.1553 | 24.0 | 53.0 | 53.0 | 53.0 |
| 0.11 | 26.00 | 493.952 | 499.266 | 5.314 | 61.0 | 58.0 | 62.0 | 60.0 | 33 | 0.1553 | 24.0 | 53.0 | 53.0 | 53.0 |
| 0.55 | 12.00 | 499.266 | 504.659 | 5.393 | 63.0 | 60.0 | 63.0 | 61.0 | 48 | 0.3465 | 21.0 | 54.0 | 54.0 | 54.0 |
| 0.55 | 12.00 | 504.659 | 510.067 | 5.408 | 63.0 | 61.0 | 64.0 | 62.0 | 48 | 0.3465 | 21.0 | 54.0 | 55.0 | 54.5 |
| 0.55 | 12.00 | 510.067 | 515.490 | 5.423 | 64.0 | 62.0 | 64.0 | 62.0 | 48 | 0.3465 | 21.0 | 55.0 | 55.0 | 55.0 |
| 1.70 | 7.00 | 515.490 | 520.833 | 5.343 | 64.0 | 62.0 | 65.0 | 63.0 | 63 | 0.5888 | 18.0 | 56.0 | 56.0 | 56.0 |
| 1.70 | 7.00 | 520.833 | 526.169 | 5.336 | 65.0 | 63.0 | 67.0 | 63.0 | 63 | 0.5888 | 18.0 | 56.0 | 56.0 | 56.0 |
| 1.70 | 7.00 | 526.169 | 531.524 | 5.355 | 67.0 | 63.0 | 68.0 | 64.0 | 63 | 0.5888 | 18.0 | 56.0 | 56.0 | 56.0 |
| 3.50 | 5.00 | 531.524 | 536.765 | 5.241 | 68.0 | 64.0 | 68.0 | 64.0 | 73 | 0.8202 | 15.0 | 56.0 | 56.0 | 56.0 |
| 3.50 | 5.00 | 536.765 | 542.011 | 5.246 | 68.0 | 64.0 | 70.0 | 65.0 | 73 | 0.8202 | 15.0 | 57.0 | 57.0 | 57.0 |
| 3.50 | 5.00 | 542.011 | 547.256 | 5.245 | 70.0 | 65.0 | 70.0 | 65.0 | 73 | 0.8202 | 15.0 | 57.0 | 57.0 | 57.0 |

| DRY GAS METER | | ORIFICE | | | DRY GAS METER CALIBRATION FACTOR | ORIFICE CALIBRATION FACTOR | Individual Run | Individual Orifice | Orifice Average | Orifice Average |
|---|---|---|---|---|---|---|---|---|---|---|
| VOLUME CORRECTED Vm(std) (cu ft) | VOLUME CORRECTED Vm(std) (liters) | VOLUME CORRECTED Vcr(std) (cu ft) | VOLUME CORRECTED Vcr(std) (liters) | VOLUME NOMINAL Vcr (cu ft) | Y Value (number) | dH@ Value (in H2O) | 0.95 < Y < 1.05? | Ymax - Ymin < 0.010? | 0.98 < Y/Yd < 1.02? | dH@ - dH@ av < 0.155? |
| 5.393 | 152.7 | 5.343 | 151.3 | 5.184 | 0.991 | 1.527 | **Pass** | | | |
| 5.405 | 153.1 | 5.343 | 151.3 | 5.184 | 0.988 | 1.509 | **Pass** | | | |
| 5.401 | 153.0 | 5.343 | 151.3 | 5.184 | 0.989 | 1.493 | **Pass** | | | |
| | | | | **Average** | **0.989** | **1.510** | | **Pass** | **Pass** | **Pass** |
| 5.472 | 155.0 | 5.497 | 155.7 | 5.344 | 1.005 | 1.498 | **Pass** | | | |
| 5.479 | 155.2 | 5.494 | 155.6 | 5.347 | 1.003 | 1.497 | **Pass** | | | |
| 5.489 | 155.5 | 5.491 | 155.5 | 5.349 | 1.000 | 1.497 | **Pass** | | | |
| | | | | **Average** | **1.003** | **1.497** | | **Pass** | **Pass** | **Pass** |
| 5.418 | 153.4 | 5.438 | 154.0 | 5.308 | 1.004 | 1.604 | **Pass** | | | |
| 5.401 | 153.0 | 5.438 | 154.0 | 5.308 | 1.007 | 1.602 | **Pass** | | | |
| 5.410 | 153.2 | 5.438 | 154.0 | 5.308 | 1.005 | 1.601 | **Pass** | | | |
| | | | | **Average** | **1.005** | **1.602** | | **Pass** | **Pass** | **Pass** |
| 5.313 | 150.5 | 5.411 | 153.2 | 5.281 | 1.018 | 1.697 | **Pass** | | | |
| 5.310 | 150.4 | 5.405 | 153.1 | 5.286 | 1.018 | 1.699 | **Pass** | | | |
| 5.302 | 150.1 | 5.405 | 153.1 | 5.286 | 1.020 | 1.697 | **Pass** | | | |
| | | | | **Average** | **1.019** | **1.697** | | **Pass** | **Pass** | **Pass** |

**Average Yd: 1.004** **dH@: 1.577**

**Q @ dH = 1: 0.597**

SIGNED: Signature on File

Date: 9/24/2010

A.3-8

# BI-MONTHLY DRY GAS METER CALIBRATION CHECK

Orifice Method - Triplicate Runs/Four Calibration Points
English Meter Box Units, English K' Factor
Filename: \\reception\Delta Public\Calibrations\Meters\17-wcs\2011\[17 wcs 7-21-11 Bimonthly Meter Cal.xls]WCS
File Modified From: APEX 522 Series Meter box Calibration
Revised: 3/21/2002

Model #:
ID #: 17-wcs
Date: 7/21/2011
Bar. Pressure: 29.65 (in. Hg)
Performed By: GARY BRIDGE
Yd from previous semi-annual calibration: 1.004

| DRY GAS METER READINGS | | | | | | | | | CRITICAL ORIFICE READINGS | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Initial Temps. | | Final Temps. | | | | | Ambient Temperature | | |
| dH (in H2O) | Time (min) | Volume Initial (cu ft) | Volume Final (cu ft) | Volume Total (cu ft) | Inlet (deg F) | Outlet (deg F) | Inlet (deg F) | Outlet | Orifice Serial# (number) | K' Orifice Coefficient (see above) | Actual Vacuum (in Hg) | Initial (deg F) | Final (deg F) | Average (deg F) |
| 0.53 | 12.00 | 372.300 | 377.612 | 5.312 | 65.0 | 64.0 | 67.0 | 65.0 | 48 | 0.3465 | 20.5 | 71.0 | 71.0 | 71.0 |
| 0.53 | 12.00 | 377.612 | 382.904 | 5.292 | 67.0 | 65.0 | 69.0 | 67.0 | 48 | 0.3465 | 20.5 | 71.0 | 72.0 | 71.5 |
| 0.53 | 12.00 | 382.904 | 388.238 | 5.334 | 69.0 | 67.0 | 71.0 | 69.0 | 48 | 0.3465 | 20.5 | 72.0 | 73.0 | 72.5 |
| | | | | | | | | | | | | | | |
| 1.70 | 7.00 | 388.238 | 393.520 | 5.282 | 71.0 | 69.0 | 73.0 | 70.0 | 63 | 0.5888 | 17.0 | 73.0 | 73.0 | 73.0 |
| 1.70 | 7.00 | 393.520 | 398.816 | 5.296 | 73.0 | 70.0 | 74.0 | 71.0 | 63 | 0.5888 | 17.0 | 73.0 | 73.0 | 73.0 |
| 1.70 | 7.00 | 398.816 | 404.145 | 5.329 | 74.0 | 71.0 | 75.0 | 72.0 | 63 | 0.5888 | 17.0 | 73.0 | 73.0 | 73.0 |

| DRY GAS METER | | ORIFICE | | | | DRY GAS METER CALIBRATION FACTOR | ORIFICE CALIBRATION FACTOR |
|---|---|---|---|---|---|---|---|
| VOLUME CORRECTED Vm(std) (cu ft) | VOLUME CORRECTED Vm(std) (liters) | VOLUME CORRECTED Vcr(std) (cu ft) | VOLUME CORRECTED Vcr(std) (liters) | VOLUME NOMINAL Vcr (cu ft) | | Y Value (number) | dH@ Value (in H2O) |
| 5.332 | 151.0 | 5.386 | 152.5 | 5.432 | | 1.010 | 1.486 |
| 5.294 | 149.9 | 5.384 | 152.5 | 5.434 | | 1.017 | 1.483 |
| 5.316 | 150.6 | 5.379 | 152.3 | 5.439 | | 1.012 | 1.480 |
| | | | | | **Average** | **1.013** | **1.483** |
| | | | | | | | |
| 5.262 | 149.0 | 5.329 | 150.9 | 5.394 | | 1.013 | 1.641 |
| 5.264 | 149.1 | 5.329 | 150.9 | 5.394 | | 1.012 | 1.638 |
| 5.287 | 149.7 | 5.329 | 150.9 | 5.394 | | 1.008 | 1.635 |
| | | | | | **Average** | **1.011** | **1.638** |

| | | | |
|---|---|---|---|
| **Average Yd:** | **1.012** | **dH@:** | **1.561** |
| **Pass** | | **Q @ dH = 1:** | **0.600** |

The Average Yd must be within +/- 2% of the most recent semi-annual calibration Yd. If not, perform 4-point calibration.

SIGNED: Signature on File

Date: 7/21/2011

A.3-9

## SEMI-ANNUAL DRY GAS METER/ORIFICE CALIBRATION

Orifice Method - Triplicate Runs/Four Calibration Points
English Meter Box Units, English K' Factor
Filename: \\reception\Delta Public\Calibrations\Meters\19-wcs\2011\[Semi-Annual Meter Calibration -19 wcs 1-10-11.xls]WCS
File Modified From: APEX 522 Series Meter box Calibration
Revised: 4/8/2005

Model #: c-5000
ID #: 19-wcs
Date: 1/10/2011
Bar. Pressure: 30.09 (in. Hg)
Performed By: M. Edmondson
Meter Serial #:

| DRY GAS METER READINGS | | | | | | | | | CRITICAL ORIFICE READINGS | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Initial Temps. | | Final Temps. | | | | | Ambient Temperature | | |
| dH (in H2O) | Time (min) | Volume Initial (cu ft) | Volume Final (cu ft) | Volume Total (cu ft) | Inlet (deg F) | Outlet (deg F) | Inlet (deg F) | Outlet (deg F) | Orifice Serial# (number) | K' Orifice Coefficient (see above) | Actual Vacuum (in Hg) | Initial (deg F) | Final (deg F) | Average (deg F) |
| 0.14 | 26.00 | 578.900 | 584.297 | 5.397 | 67.0 | 66.0 | 68.0 | 66.0 | 33 | 0.1553 | 26.0 | 59.0 | 59.0 | 59.0 |
| 0.14 | 26.00 | 584.297 | 589.675 | 5.378 | 68.0 | 66.0 | 69.0 | 67.0 | 33 | 0.1553 | 26.0 | 59.0 | 60.0 | 59.5 |
| 0.14 | 26.00 | 589.675 | 595.065 | 5.390 | 69.0 | 67.0 | 70.0 | 68.0 | 33 | 0.1553 | 26.0 | 60.0 | 61.0 | 60.5 |
| 0.67 | 12.00 | 536.204 | 541.575 | 5.371 | 56.0 | 54.0 | 59.0 | 55.0 | 48 | 0.3465 | 23.0 | 54.0 | 55.0 | 54.5 |
| 0.67 | 12.00 | 541.575 | 546.941 | 5.366 | 59.0 | 55.0 | 61.0 | 57.0 | 48 | 0.3465 | 23.0 | 55.0 | 56.0 | 55.5 |
| 0.67 | 12.00 | 546.941 | 552.315 | 5.374 | 61.0 | 57.0 | 62.0 | 58.0 | 48 | 0.3465 | 23.0 | 56.0 | 57.0 | 56.5 |
| 2.00 | 7.00 | 530.915 | 536.204 | 5.289 | 55.0 | 53.0 | 57.0 | 54.0 | 63 | 0.5888 | 21.0 | 54.0 | 54.0 | 54.0 |
| 2.00 | 7.00 | 552.315 | 557.613 | 5.298 | 57.0 | 54.0 | 57.0 | 55.0 | 63 | 0.5888 | 21.0 | 54.0 | 55.0 | 54.5 |
| 2.00 | 7.00 | 557.613 | 562.953 | 5.340 | 57.0 | 54.0 | 57.0 | 55.0 | 63 | 0.5888 | 21.0 | 55.0 | 55.0 | 55.0 |
| 3.50 | 5.00 | 562.953 | 568.246 | 5.293 | 66.0 | 62.0 | 70.0 | 63.0 | 73 | 0.8202 | 18.0 | 57.0 | 57.0 | 57.0 |
| 3.50 | 5.00 | 568.246 | 573.554 | 5.308 | 70.0 | 63.0 | 71.0 | 63.0 | 73 | 0.8202 | 18.0 | 57.0 | 57.0 | 57.0 |
| 3.50 | 5.00 | 573.554 | 578.855 | 5.301 | 71.0 | 63.0 | 73.0 | 64.0 | 73 | 0.8202 | 18.0 | 57.0 | 57.0 | 57.0 |

| DRY GAS METER | | ORIFICE | | | | DRY GAS METER CALIBRATION FACTOR | ORIFICE CALIBRATION FACTOR | Individual Run | Individual Orifice | Orifice Average | Orifice Average |
|---|---|---|---|---|---|---|---|---|---|---|---|
| VOLUME CORRECTED Vm(std) (cu ft) | VOLUME CORRECTED Vm(std) (liters) | VOLUME CORRECTED Vcr(std) (cu ft) | VOLUME CORRECTED Vcr(std) (liters) | VOLUME NOMINAL Vcr (cu ft) | | Y Value (number) | dH@ Value (in H2O) | 0.95 < Y < 1.05? | Ymax - Ymin < 0.010? | 0.98 < Y/Yd < 1.02? | dH@ - dH@ av < 0.155? |
| 5.440 | 154.1 | 5.333 | 151.0 | 5.215 | | 0.980 | 1.889 | Pass | | | |
| 5.413 | 153.3 | 5.331 | 151.0 | 5.217 | | 0.985 | 1.889 | Pass | | | |
| 5.415 | 153.4 | 5.325 | 150.8 | 5.222 | | 0.983 | 1.890 | Pass | | | |
| | | | | | Average | 0.983 | 1.889 | | Pass | Pass | Pass |
| 5.534 | 156.7 | 5.516 | 156.2 | 5.347 | | 0.997 | 1.841 | Pass | | | |
| 5.507 | 156.0 | 5.511 | 156.1 | 5.352 | | 1.001 | 1.839 | Pass | | | |
| 5.500 | 155.8 | 5.505 | 155.9 | 5.357 | | 1.001 | 1.837 | Pass | | | |
| | | | | | Average | 0.999 | 1.839 | | Pass | Pass | Pass |
| 5.480 | 155.2 | 5.470 | 154.9 | 5.297 | | 0.998 | 1.905 | Pass | | | |
| 5.479 | 155.2 | 5.468 | 154.8 | 5.300 | | 0.998 | 1.903 | Pass | | | |
| 5.523 | 156.4 | 5.465 | 154.8 | 5.302 | | 0.990 | 1.905 | Pass | | | |
| | | | | | Average | 0.995 | 1.904 | | Pass | Pass | Pass |
| 5.395 | 152.8 | 5.427 | 153.7 | 5.286 | | 1.006 | 1.698 | Pass | | | |
| 5.394 | 152.8 | 5.427 | 153.7 | 5.286 | | 1.006 | 1.697 | Pass | | | |
| 5.377 | 152.3 | 5.427 | 153.7 | 5.286 | | 1.009 | 1.695 | Pass | | | |
| | | | | | Average | 1.007 | 1.697 | | Pass | Pass | Pass |

**Average Yd: 0.996 dH@: 1.832**

**Q @ dH = 1: 0.554**

SIGNED: Signature on File

Date: 1/10/2011

A.3-10

083

## SEMI-ANNUAL DRY GAS METER/ORIFICE CALIBRATION

Orifice Method - Triplicate Runs/Four Calibration Points
English Meter Box Units, English K' Factor
Filename: \\reception\Delta Public\Calibrations\Meters\19-wcs\2011\[Semi-Annual Meter Calibration -19 wcs 7-18-11.xls]WCS
File Modified From: APEX 522 Series Meter box Calibration
Revised: 4/8/2005

Model #: c-5000
ID #: 19-wcs
Date: 7/18/2011
Bar. Pressure: 29.77 (in. Hg)
Performed By: GARY BRIDGE
Meter Serial #:

| DRY GAS METER READINGS | | | | | | | | | CRITICAL ORIFICE READINGS | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Initial Temps. | | Final Temps. | | | | | Ambient Temperature | | |
| dH (in H2O) | Time (min) | Volume Initial (cu ft) | Volume Final (cu ft) | Volume Total (cu ft) | Inlet (deg F) | Outlet (deg F) | Inlet (deg F) | Outlet (deg F) | Orifice Serial# (number) | K' Orifice Coefficient (see above) | Actual Vacuum (in Hg) | Initial (deg F) | Final (deg F) | Average (deg F) |
| 0.14 | 26.00 | 711.120 | 716.394 | 5.274 | 71.0 | 71.0 | 72.0 | 71.0 | 33 | 0.1553 | 26.0 | 72.0 | 72.0 | 72.0 |
| 0.14 | 26.00 | 716.394 | 721.657 | 5.263 | 72.0 | 71.0 | 74.0 | 73.0 | 33 | 0.1553 | 26.0 | 72.0 | 72.0 | 72.0 |
| 0.14 | 26.00 | 721.657 | 726.920 | 5.263 | 74.0 | 73.0 | 74.0 | 73.0 | 33 | 0.1553 | 26.0 | 72.0 | 72.0 | 72.0 |
| 0.66 | 12.00 | 726.920 | 732.260 | 5.340 | 74.0 | 73.0 | 74.0 | 74.0 | 48 | 0.3465 | 23.0 | 72.0 | 73.0 | 72.5 |
| 0.66 | 12.00 | 732.260 | 737.611 | 5.351 | 74.0 | 74.0 | 75.0 | 74.0 | 48 | 0.3465 | 23.0 | 73.0 | 73.0 | 73.0 |
| 0.66 | 12.00 | 737.611 | 742.993 | 5.382 | 75.0 | 74.0 | 75.0 | 75.0 | 48 | 0.3465 | 23.0 | 73.0 | 73.0 | 73.0 |
| 1.90 | 7.00 | 742.993 | 748.339 | 5.346 | 75.0 | 75.0 | 76.0 | 75.0 | 63 | 0.5888 | 21.0 | 73.0 | 73.0 | 73.0 |
| 1.90 | 7.00 | 748.339 | 753.707 | 5.368 | 76.0 | 75.0 | 77.0 | 75.0 | 63 | 0.5888 | 21.0 | 73.0 | 74.0 | 73.5 |
| 1.90 | 7.00 | 753.707 | 759.074 | 5.367 | 77.0 | 75.0 | 78.0 | 76.0 | 63 | 0.5888 | 21.0 | 74.0 | 74.0 | 74.0 |
| 3.70 | 5.00 | 759.074 | 764.330 | 5.256 | 78.0 | 76.0 | 79.0 | 76.0 | 73 | 0.8202 | 18.0 | 74.0 | 74.0 | 74.0 |
| 3.70 | 5.00 | 764.330 | 769.595 | 5.265 | 79.0 | 76.0 | 80.0 | 76.0 | 73 | 0.8202 | 18.0 | 74.0 | 74.0 | 74.0 |
| 3.70 | 5.00 | 769.595 | 774.871 | 5.276 | 80.0 | 76.0 | 81.0 | 77.0 | 73 | 0.8202 | 18.0 | 74.0 | 74.0 | 74.0 |

| DRY GAS METER | | ORIFICE | | | | DRY GAS METER CALIBRATION FACTOR | ORIFICE CALIBRATION FACTOR | Individual Run | Individual Orifice | Orifice Average | Orifice Average |
|---|---|---|---|---|---|---|---|---|---|---|---|
| VOLUME CORRECTED Vm(std) (cu ft) | VOLUME CORRECTED Vm(std) (liters) | VOLUME CORRECTED Vcr(std) (cu ft) | VOLUME CORRECTED Vcr(std) (liters) | VOLUME NOMINAL Vcr (cu ft) | | Y Value (number) | dH@ Value (in H2O) | 0.95 < Y < 1.05? | Ymax - Ymin < 0.010? | 0.98 < Y/Yd < 1.02? | dH@ - dH@ av < 0.155? |
| 5.215 | 147.7 | 5.212 | 147.6 | 5.280 | | 0.999 | 1.939 | Pass | | | |
| 5.192 | 147.0 | 5.212 | 147.6 | 5.280 | | 1.004 | 1.936 | Pass | | | |
| 5.182 | 146.8 | 5.212 | 147.6 | 5.280 | | 1.006 | 1.932 | Pass | | | |
| | | | | | **Average** | **1.003** | **1.936** | | **Pass** | **Pass** | **Pass** |
| 5.262 | 149.0 | 5.364 | 151.9 | 5.439 | | 1.019 | 1.829 | Pass | | | |
| 5.268 | 149.2 | 5.362 | 151.8 | 5.442 | | 1.018 | 1.830 | Pass | | | |
| 5.294 | 149.9 | 5.362 | 151.8 | 5.442 | | 1.013 | 1.828 | Pass | | | |
| | | | | | **Average** | **1.017** | **1.829** | | **Pass** | **Pass** | **Pass** |
| 5.270 | 149.2 | 5.315 | 150.5 | 5.394 | | 1.009 | 1.821 | Pass | | | |
| 5.286 | 149.7 | 5.312 | 150.4 | 5.397 | | 1.005 | 1.822 | Pass | | | |
| 5.278 | 149.5 | 5.310 | 150.4 | 5.399 | | 1.006 | 1.822 | Pass | | | |
| | | | | | **Average** | **1.006** | **1.822** | | **Pass** | **Pass** | **Pass** |
| 5.185 | 146.8 | 5.283 | 149.6 | 5.372 | | 1.019 | 1.827 | Pass | | | |
| 5.189 | 146.9 | 5.283 | 149.6 | 5.372 | | 1.018 | 1.827 | Pass | | | |
| 5.192 | 147.0 | 5.283 | 149.6 | 5.372 | | 1.018 | 1.825 | Pass | | | |
| | | | | | **Average** | **1.018** | **1.826** | | **Pass** | **Pass** | **Pass** |

**Average Yd: 1.011** **dH@: 1.853**

**Q @ dH = 1: 0.551**

SIGNED: Signature on File

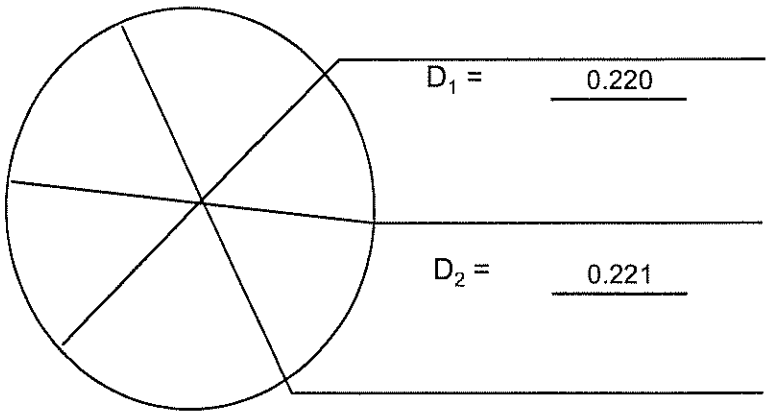
Date: 7/18/2011

A.3-11

Delta
Air Quality Services, Incorporated

## NOZZLE CALIBRATION DATA

| | | | |
|---|---|---|---|
| Nozzle I.D. | XOM 1 | Date | 7/26/2011 |
| Material | Glass | By | AA |
| Configuration (L or Hook) | Hook | | |



$D_1$ = 0.220

$D_2$ = 0.221

$D_3$ = 0.220

Maximum Difference $D_i$ - $D_j$ = **0.001** (must be < 0.02")

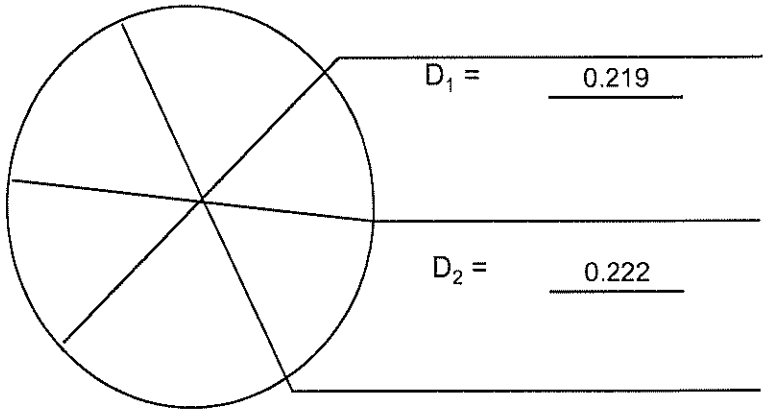
Average Dn = **0.220**

Note: Measure three diameters with micrometer

Delta
Air Quality Services, Incorporated

## NOZZLE CALIBRATION DATA

| | | | |
|---|---|---|---|
| Nozzle I.D. | XOM 2 | Date | 7/26/2011 |
| Material | Glass | By | AA |
| Configuration (L or Hook) | Hook | | |



$D_1$ = 0.219

$D_2$ = 0.222

$D_3$ = 0.220

Maximum Difference $D_i$ - $D_j$ = **0.003** (must be < 0.02")

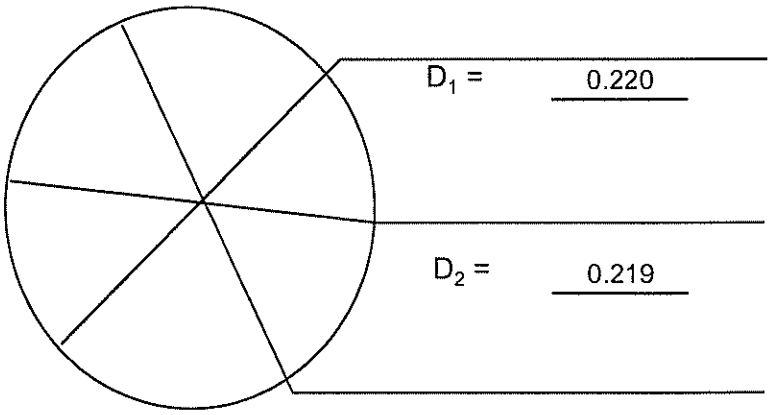
Average Dn = **0.220**

Note: Measure three diameters with micrometer

Delta
Air Quality Services, Incorporated

## NOZZLE CALIBRATION DATA

| | | | |
|---|---|---|---|
| Nozzle I.D. | XOM 3 | Date | 7/26/2011 |
| Material | Glass | By | AA |
| Configuration (L or Hook) | Hook | | |



$D_1$ = 0.220

$D_2$ = 0.219

$D_3$ = 0.222

Maximum Difference $D_i$ - $D_j$ = **0.003** (must be < 0.02")

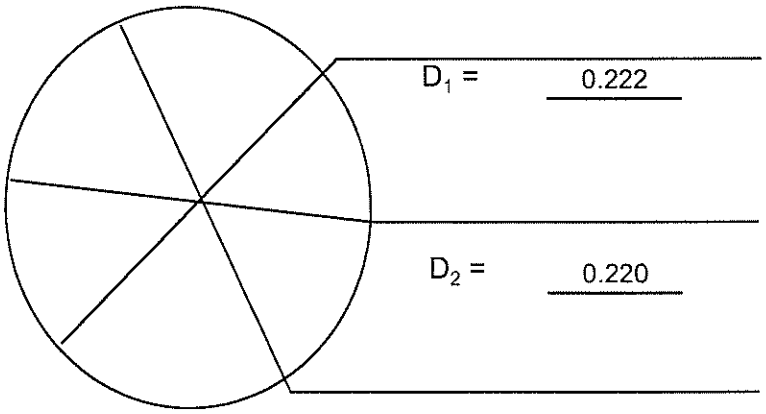
Average Dn = **0.220**

Note: Measure three diameters with micrometer

Delta
Air Quality Services, Incorporated

## NOZZLE CALIBRATION DATA

| | | | |
|---|---|---|---|
| Nozzle I.D. | XOM 4 | Date | 7/26/2011 |
| Material | Glass | By | AA |
| Configuration (L or Hook) | Hook | | |



$D_1$ = 0.222

$D_2$ = 0.220

$D_3$ = 0.217

Maximum Difference $D_i$ - $D_j$ = **0.005** (must be < 0.02")

Average Dn = **0.220**

Note: Measure three diameters with micrometer

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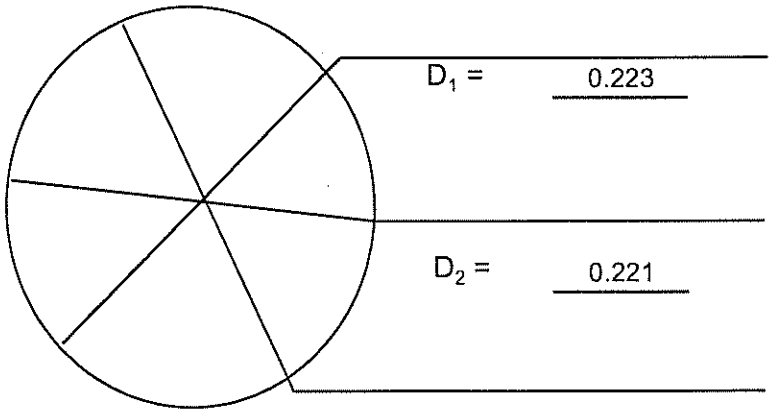
## NOZZLE CALIBRATION DATA

| | | | |
|---|---|---|---|
| Nozzle I.D. | XOM 5 | Date | 7/26/2011 |
| Material | Glass | By | AA |
| Configuration (L or Hook) | Hook | | |



$D_1$ = 0.223

$D_2$ = 0.221

$D_3$ = 0.221

Maximum Difference $D_i$ - $D_j$ = **0.002** (must be < 0.02")

Average Dn = **0.222**

Note: Measure three diameters with micrometer

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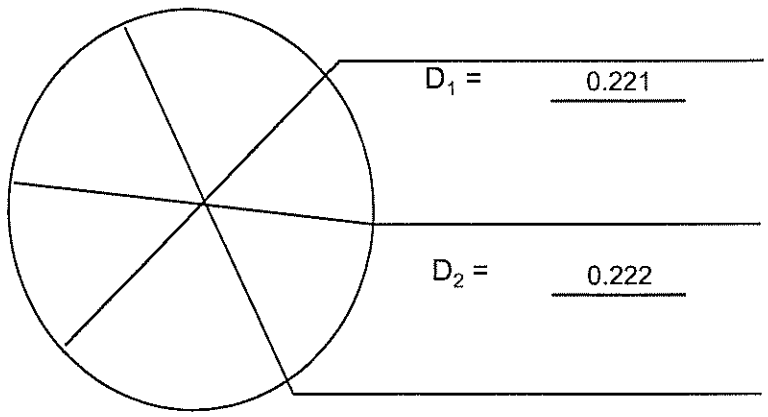
## NOZZLE CALIBRATION DATA

| | | | |
|---|---|---|---|
| Nozzle I.D. | XOM 6 | Date | 7/26/2011 |
| Material | Glass | By | AA |
| Configuration (L or Hook) | Hook | | |



$D_1$ = 0.221

$D_2$ = 0.222

$D_3$ = 0.222

Maximum Difference $D_i$ - $D_j$ = **0.001** (must be < 0.02")

Average Dn = **0.222**

Note: Measure three diameters with micrometer

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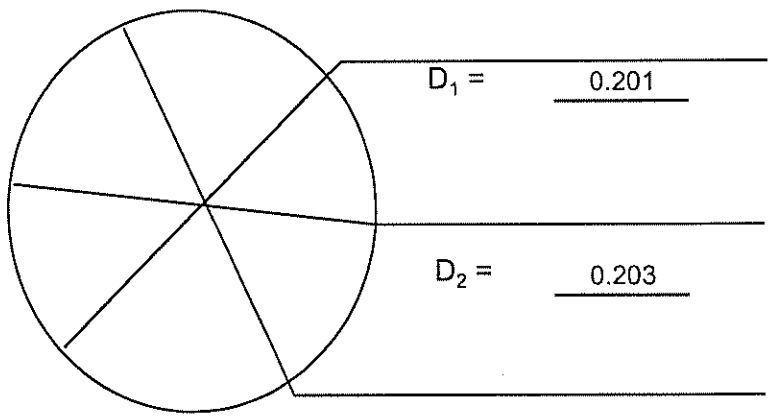
## NOZZLE CALIBRATION DATA

| | | | |
|---|---|---|---|
| Nozzle I.D. | XOM 7 | Date | 7/26/2011 |
| Material | Glass | By | AA |
| Configuration (L or Hook) | Hook | | |



$D_1$ = 0.201

$D_2$ = 0.203

$D_3$ = 0.203

Maximum Difference $D_i$ - $D_j$ = **0.002** (must be < 0.02")

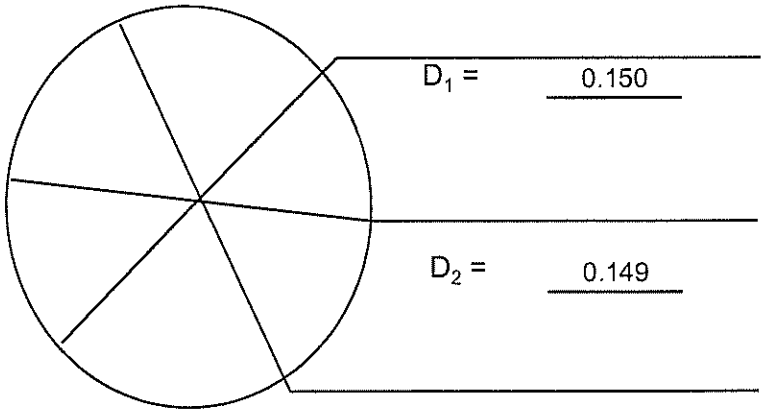
Average Dn = **0.202**

Note: Measure three diameters with micrometer

Delta
Air Quality Services, Incorporated

## NOZZLE CALIBRATION DATA

| | | | |
|---|---|---|---|
| Nozzle I.D. | XOM 8 | Date | 7/26/2011 |
| Material | SS | By | AA |
| Configuration (L or Hook) | Cone | | |



$D_1$ = 0.150

$D_2$ = 0.149

$D_3$ = 0.150

Maximum Difference $D_i$ - $D_j$ = **0.001** (must be < 0.02")

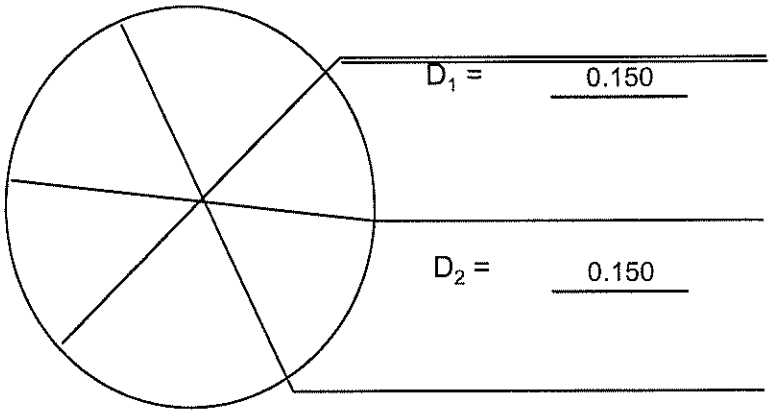
Average Dn = **0.150**

Note: Measure three diameters with micrometer

Delta
Air Quality Services, Incorporated

## NOZZLE CALIBRATION DATA

| | | | |
|---|---|---|---|
| Nozzle I.D. | XOM 9 | Date | 7/26/2011 |
| Material | SS | By | AA |
| Configuration (L or Hook) | Cone | | |



$D_1$ = 0.150

$D_2$ = 0.150

$D_3$ = 0.150

Maximum Difference $D_i$ - $D_j$ = **0.000** (must be < 0.02")

Average Dn = **0.150**

Note: Measure three diameters with micrometer

## TEMPERATURE SYSTEM CALIBRATION
## STYPE

### #5

Reference Thermometer I.D.: T1 F95-195 T2 F95-195 T3 F95-195

| T/C I.D. #5 | Readout I.D. | T/C - Readout °F Reading 1 | Reading 2 | Reading 3 | Average | Reference Thermometer °F Reading 1 | Reading 2 | Reading 3 | Average | Difference °F | %, (°R) | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| OIL | 3WCS | 358 | 358 | 358 | 358 | 360 | 360 | 360 | 360 | 2 | 0.2% | Pass |
| WATER | 3WCS | 212 | 212 | 212 | 212 | 214 | 214 | 214 | 214 | 2 | 0.3% | Pass |
| ICE | 3WCS | 35 | 35 | 35 | 35 | 32 | 32 | 32 | 32 | 3 | 0.6% | Pass |
| OIL | 5WCS | 357 | 357 | 357 | 357 | 360 | 360 | 360 | 360 | 3 | 0.4% | Pass |
| WATER | 5WCS | 213 | 213 | 213 | 213 | 214 | 214 | 214 | 214 | 1 | 0.1% | Pass |
| ICE | 5WCS | 36 | 36 | 36 | 36 | 32 | 32 | 32 | 32 | 4 | 0.8% | Pass |
| OIL | 6WCS | 355 | 355 | 355 | 355 | 360 | 360 | 360 | 360 | 5 | 0.6% | Pass |
| WATER | 6WCS | 213 | 213 | 213 | 213 | 214 | 214 | 214 | 214 | 1 | 0.1% | Pass |
| ICE | 6WCS | 36 | 36 | 36 | 36 | 32 | 32 | 32 | 32 | 4 | 0.8% | Pass |
| OIL | 7WCS | 353 | 353 | 353 | 353 | 360 | 360 | 360 | 360 | 7 | 0.9% | Pass |
| WATER | 7WCS | 209 | 209 | 209 | 209 | 214 | 214 | 214 | 214 | 5 | 0.7% | Pass |
| ICE | 7WCS | 31 | 31 | 31 | 31 | 32 | 32 | 32 | 32 | 1 | 0.2% | Pass |
| OIL | 12WCS | 355 | 355 | 355 | 355 | 360 | 360 | 360 | 360 | 5 | 0.6% | Pass |
| WATER | 12WCS | 212 | 212 | 212 | 212 | 214 | 214 | 214 | 214 | 2 | 0.3% | Pass |
| ICE | 12WCS | 32 | 32 | 32 | 32 | 32 | 32 | 32 | 32 | 0 | 0.0% | Pass |
| OIL | 14WCS | 357 | 357 | 357 | 357 | 360 | 360 | 360 | 360 | 3 | 0.4% | Pass |
| WATER | 14WCS | 214 | 214 | 214 | 214 | 214 | 214 | 214 | 214 | 0 | 0.0% | Pass |
| ICE | 14WCS | 33 | 33 | 33 | 33 | 32 | 32 | 32 | 32 | 1 | 0.2% | Pass |
| OIL | 17WCS | 358 | 358 | 358 | 358 | 360 | 360 | 360 | 360 | 2 | 0.2% | Pass |
| WATER | 17WCS | 213 | 213 | 213 | 213 | 214 | 214 | 214 | 214 | 1 | 0.1% | Pass |
| ICE | 17WCS | 33 | 33 | 33 | 33 | 32 | 32 | 32 | 32 | 1 | 0.2% | Pass |
| OIL | 18WCS | 355 | 355 | 355 | 355 | 360 | 360 | 360 | 360 | 5 | 0.6% | Pass |
| WATER | 18WCS | 212 | 212 | 212 | 212 | 214 | 214 | 214 | 214 | 2 | 0.3% | Pass |
| ICE | 18WCS | 32 | 32 | 32 | 32 | 32 | 32 | 32 | 32 | 0 | 0.0% | Pass |
| OIL | 19WCS | 356 | 356 | 356 | 356 | 360 | 360 | 360 | 360 | 4 | 0.5% | Pass |
| WATER | 19WCS | 215 | 215 | 215 | 215 | 214 | 214 | 214 | 214 | 1 | 0.1% | Pass |
| ICE | 19WCS | 34 | 34 | 34 | 34 | 32 | 32 | 32 | 32 | 2 | 0.4% | Pass |
| OIL | PTC-2 | 353 | 353 | 353 | 353 | 360 | 360 | 360 | 360 | 7 | 0.9% | Pass |
| WATER | PTC-2 | 216 | 216 | 216 | 216 | 214 | 214 | 214 | 214 | 2 | 0.3% | Pass |
| ICE | PTC-2 | 36 | 36 | 36 | 36 | 32 | 32 | 32 | 32 | 4 | 0.8% | Pass |
| OIL | PTC-4 | 354 | 354 | 354 | 354 | 360 | 360 | 360 | 360 | 6 | 0.7% | Pass |
| WATER | PTC-4 | 211 | 211 | 211 | 211 | 214 | 214 | 214 | 214 | 3 | 0.4% | Pass |
| ICE | PTC-4 | 38 | 38 | 38 | 38 | 32 | 32 | 32 | 32 | 6 | 1.2% | Pass |
| OIL | PTC-5 | 355 | 355 | 355 | 355 | 360 | 360 | 360 | 360 | 5 | 0.6% | Pass |
| WATER | PTC-5 | 210 | 210 | 210 | 210 | 214 | 214 | 214 | 214 | 4 | 0.8% | Pass |
| ICE | PTC-5 | 32 | 32 | 32 | 32 | 32 | 32 | 32 | 32 | 0 | 0.0% | Pass |
| OIL | PTC-6 | 354 | 354 | 354 | 354 | 360 | 360 | 360 | 360 | 6 | 0.7% | Pass |
| WATER | PTC-6 | 209 | 209 | 209 | 209 | 214 | 214 | 214 | 214 | 5 | 0.7% | Pass |
| ICE | PTC-6 | 34 | 34 | 34 | 34 | 32 | 32 | 32 | 32 | 2 | 0.4% | Pass |
| OIL | PTC-7 | 355 | 355 | 355 | 355 | 360 | 360 | 360 | 360 | 5 | 0.6% | Pass |
| WATER | PTC-7 | 211 | 211 | 211 | 211 | 214 | 214 | 214 | 214 | 3 | 0.4% | Pass |
| ICE | PTC-7 | 34 | 34 | 34 | 34 | 32 | 32 | 32 | 32 | 2 | 0.4% | Pass |
| OIL | PTC-11 | 353 | 353 | 353 | 353 | 360 | 360 | 360 | 360 | 7 | 0.9% | Pass |
| WATER | PTC-11 | 215 | 215 | 215 | 215 | 214 | 214 | 214 | 214 | 1 | 0.1% | Pass |
| ICE | PTC-11 | 35 | 35 | 35 | 35 | 32 | 32 | 32 | 32 | 3 | 0.6% | Pass |
| OIL | PTC-14 | 355 | 355 | 355 | 355 | 360 | 360 | 360 | 360 | 5 | 0.6% | Pass |
| WATER | PTC-14 | 212 | 212 | 212 | 212 | 214 | 214 | 214 | 214 | 2 | 0.3% | Pass |
| ICE | PTC-14 | 33 | 33 | 33 | 33 | 32 | 32 | 32 | 32 | 1 | 0.2% | Pass |
| OIL | PTC-18 | 354 | 354 | 354 | 354 | 360 | 360 | 360 | 360 | 6 | 0.7% | Pass |
| WATER | PTC-18 | 213 | 213 | 213 | 213 | 214 | 214 | 214 | 214 | 1 | 0.1% | Pass |
| ICE | PTC-18 | 32 | 32 | 32 | 32 | 32 | 32 | 32 | 32 | 0 | 0.0% | Pass |
| OIL | PTC-20 | 356 | 356 | 356 | 356 | 360 | 360 | 360 | 360 | 4 | 0.5% | Pass |
| WATER | PTC-20 | 213 | 213 | 213 | 213 | 214 | 214 | 214 | 214 | 1 | 0.1% | Pass |
| ICE | PTC-20 | 33 | 33 | 33 | 33 | 32 | 32 | 32 | 32 | 1 | 0.2% | Pass |
| OIL | PTC-21 | 355 | 355 | 355 | 355 | 360 | 360 | 360 | 360 | 5 | 0.6% | Pass |
| WATER | PTC-21 | 214 | 214 | 214 | 214 | 214 | 214 | 214 | 214 | 0 | 0.0% | Pass |
| ICE | PTC-21 | 31 | 31 | 31 | 31 | 32 | 32 | 32 | 32 | 1 | 0.2% | Pass |
| OIL | PTC-22 | 356 | 356 | 356 | 356 | 360 | 360 | 360 | 360 | 4 | 0.5% | Pass |
| WATER | PTC-22 | 215 | 215 | 215 | 215 | 214 | 214 | 214 | 214 | 1 | 0.1% | Pass |
| ICE | PTC-22 | 32 | 32 | 32 | 32 | 32 | 32 | 32 | 32 | 0 | 0.0% | Pass |
| OIL | PTC-24 | 354 | 354 | 354 | 354 | 360 | 360 | 360 | 360 | 6 | 0.7% | Pass |
| WATER | PTC-24 | 213 | 213 | 213 | 213 | 214 | 214 | 214 | 214 | 1 | 0.1% | Pass |
| ICE | PTC-24 | 33 | 33 | 33 | 33 | 32 | 32 | 32 | 32 | 1 | 0.2% | Pass |
| OIL | PTC-25 | 355 | 355 | 355 | 355 | 360 | 360 | 360 | 360 | 5 | 0.6% | Pass |
| WATER | PTC-25 | 212 | 212 | 212 | 212 | 214 | 214 | 214 | 214 | 2 | 0.3% | Pass |
| ICE | PTC-25 | 32 | 32 | 32 | 32 | 32 | 32 | 32 | 32 | 0 | 0.0% | Pass |
| OIL | PTC-26 | 355 | 355 | 355 | 355 | 360 | 360 | 360 | 360 | 5 | 0.6% | Pass |
| WATER | PTC-26 | 211 | 211 | 211 | 211 | 214 | 214 | 214 | 214 | 3 | 0.4% | Pass |
| ICE | PTC-26 | 31 | 31 | 31 | 31 | 32 | 32 | 32 | 32 | 1 | 0.2% | Pass |
| OIL | PTC-27 | 356 | 356 | 356 | 356 | 360 | 360 | 360 | 360 | 4 | 0.5% | Pass |
| WATER | PTC-27 | 213 | 213 | 213 | 213 | 214 | 214 | 214 | 214 | 1 | 0.1% | Pass |
| ICE | PTC-27 | 34 | 34 | 34 | 34 | 32 | 32 | 32 | 32 | 2 | 0.4% | Pass |
| OIL | PTC-28 | 354 | 354 | 354 | 354 | 360 | 360 | 360 | 360 | 6 | 0.7% | Pass |
| WATER | PTC-28 | 214 | 214 | 214 | 214 | 214 | 214 | 214 | 214 | 0 | 0.0% | Pass |
| ICE | PTC-28 | 33 | 33 | 33 | 33 | 32 | 32 | 32 | 32 | 1 | 0.2% | Pass |

Calibration Date: 1/3/2011
Calibrated by: David McCune, Daniel Avila, Mike Miller, David Wells, and Mike Edmondson

## TEMPERATURE SYSTEM CALIBRATION
## STYPE

### #5

Reference Thermometer I.D.: T1 F95-195 T2 F95-195 T3 F95-195

| T/C I.D. #5 | Readout I.D. | T/C - Readout °F Reading 1 | Reading 2 | Reading 3 | Average | Reference Thermometer °F Reading 1 | Reading 2 | Reading 3 | Average | Difference °F | %, (°R) | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| OIL | 3WCS | 363 | 363 | 363 | 363 | 370 | 370 | 370 | 370 | 7 | 0.8% | Pass |
| WATER | 3WCS | 212 | 212 | 212 | 212 | 212 | 212 | 212 | 212 | 0 | 0.0% | Pass |
| ICE | 3WCS | 30 | 30 | 30 | 30 | 33 | 33 | 33 | 33 | 3 | 0.6% | Pass |
| OIL | 5WCS | 370 | 370 | 370 | 370 | 370 | 370 | 370 | 370 | 0 | 0.0% | Pass |
| WATER | 5WCS | 211 | 211 | 211 | 211 | 212 | 212 | 212 | 212 | 1 | 0.1% | Pass |
| ICE | 5WCS | 31 | 31 | 31 | 31 | 33 | 33 | 33 | 33 | 2 | 0.4% | Pass |
| OIL | 6WCS | 371 | 371 | 371 | 371 | 370 | 370 | 370 | 370 | 1 | 0.1% | Pass |
| WATER | 6WCS | 210 | 210 | 210 | 210 | 212 | 212 | 212 | 212 | 2 | 0.3% | Pass |
| ICE | 6WCS | 30 | 30 | 30 | 30 | 33 | 33 | 33 | 33 | 3 | 0.6% | Pass |
| OIL | 7WCS | 362 | 362 | 362 | 362 | 370 | 370 | 370 | 370 | 8 | 1.0% | Pass |
| WATER | 7WCS | 210 | 210 | 210 | 210 | 212 | 212 | 212 | 212 | 2 | 0.3% | Pass |
| ICE | 7WCS | 27 | 27 | 27 | 27 | 33 | 33 | 33 | 33 | 6 | 1.2% | Pass |
| OIL | 12WCS | 365 | 365 | 365 | 365 | 370 | 370 | 370 | 370 | 5 | 0.6% | Pass |
| WATER | 12WCS | 212 | 212 | 212 | 212 | 212 | 212 | 212 | 212 | 0 | 0.0% | Pass |
| ICE | 12WCS | 27 | 27 | 27 | 27 | 33 | 33 | 33 | 33 | 6 | 1.2% | Pass |
| OIL | 14WCS | 364 | 364 | 364 | 364 | 370 | 370 | 370 | 370 | 6 | 0.7% | Pass |
| WATER | 14WCS | 214 | 214 | 214 | 214 | 212 | 212 | 212 | 212 | 2 | 0.3% | Pass |
| ICE | 14WCS | 31 | 31 | 31 | 31 | 33 | 33 | 33 | 33 | 2 | 0.4% | Pass |
| OIL | 17WCS | 362 | 362 | 362 | 362 | 370 | 370 | 370 | 370 | 8 | 1.0% | Pass |
| WATER | 17WCS | 210 | 210 | 210 | 210 | 212 | 212 | 212 | 212 | 2 | 0.3% | Pass |
| ICE | 17WCS | 30 | 30 | 30 | 30 | 33 | 33 | 33 | 33 | 3 | 0.6% | Pass |
| OIL | 18WCS | 364 | 364 | 364 | 364 | 370 | 370 | 370 | 370 | 6 | 0.7% | Pass |
| WATER | 18WCS | 212 | 212 | 212 | 212 | 212 | 212 | 212 | 212 | 0 | 0.0% | Pass |
| ICE | 18WCS | 28 | 28 | 28 | 28 | 33 | 33 | 33 | 33 | 5 | 1.0% | Pass |
| OIL | 19WCS | 365 | 365 | 365 | 365 | 370 | 370 | 370 | 370 | 5 | 0.6% | Pass |
| WATER | 19WCS | 214 | 214 | 214 | 214 | 212 | 212 | 212 | 212 | 2 | 0.3% | Pass |
| ICE | 19WCS | 33 | 33 | 33 | 33 | 33 | 33 | 33 | 33 | 0 | 0.0% | Pass |
| OIL | PTC-5 | 363 | 363 | 363 | 363 | 370 | 370 | 370 | 370 | 7 | 0.8% | Pass |
| WATER | PTC-5 | 212 | 212 | 212 | 212 | 212 | 212 | 212 | 212 | 0 | 0.0% | Pass |
| ICE | PTC-5 | 32 | 32 | 32 | 32 | 33 | 33 | 33 | 33 | 1 | 0.2% | Pass |
| OIL | PTC-7 | 364 | 364 | 364 | 364 | 370 | 370 | 370 | 370 | 6 | 0.7% | Pass |
| WATER | PTC-7 | 212 | 212 | 212 | 212 | 212 | 212 | 212 | 212 | 0 | 0.0% | Pass |
| ICE | PTC-7 | 32 | 32 | 32 | 32 | 33 | 33 | 33 | 33 | 1 | 0.2% | Pass |
| OIL | PTC-11 | 362 | 362 | 362 | 362 | 370 | 370 | 370 | 370 | 8 | 1.0% | Pass |
| WATER | PTC-11 | 210 | 210 | 210 | 210 | 212 | 212 | 212 | 212 | 2 | 0.3% | Pass |
| ICE | PTC-11 | 33 | 33 | 33 | 33 | 33 | 33 | 33 | 33 | 0 | 0.0% | Pass |
| OIL | PTC-18 | 371 | 371 | 371 | 371 | 370 | 370 | 370 | 370 | 1 | 0.1% | Pass |
| WATER | PTC-18 | 210 | 210 | 210 | 210 | 212 | 212 | 212 | 212 | 2 | 0.3% | Pass |
| ICE | PTC-18 | 31 | 31 | 31 | 31 | 33 | 33 | 33 | 33 | 2 | 0.4% | Pass |
| OIL | PTC-20 | 367 | 367 | 367 | 367 | 370 | 370 | 370 | 370 | 3 | 0.4% | Pass |
| WATER | PTC-20 | 212 | 212 | 212 | 212 | 212 | 212 | 212 | 212 | 0 | 0.0% | Pass |
| ICE | PTC-20 | 31 | 31 | 31 | 31 | 33 | 33 | 33 | 33 | 2 | 0.4% | Pass |
| OIL | PTC-21 | 366 | 366 | 366 | 366 | 370 | 370 | 370 | 370 | 4 | 0.5% | Pass |
| WATER | PTC-21 | 211 | 211 | 211 | 211 | 212 | 212 | 212 | 212 | 1 | 0.1% | Pass |
| ICE | PTC-21 | 30 | 30 | 30 | 30 | 33 | 33 | 33 | 33 | 3 | 0.6% | Pass |
| OIL | PTC-22 | 365 | 365 | 365 | 365 | 370 | 370 | 370 | 370 | 5 | 0.6% | Pass |
| WATER | PTC-22 | 211 | 211 | 211 | 211 | 212 | 212 | 212 | 212 | 1 | 0.1% | Pass |
| ICE | PTC-22 | 29 | 29 | 29 | 29 | 33 | 33 | 33 | 33 | 4 | 0.8% | Pass |
| OIL | PTC-23 | 365 | 365 | 365 | 365 | 370 | 370 | 370 | 370 | 5 | 0.6% | Pass |
| WATER | PTC-23 | 209 | 209 | 209 | 209 | 212 | 212 | 212 | 212 | 3 | 0.4% | Pass |
| ICE | PTC-23 | 31 | 31 | 31 | 31 | 33 | 33 | 33 | 33 | 2 | 0.4% | Pass |
| OIL | PTC-25 | 367 | 367 | 367 | 367 | 370 | 370 | 370 | 370 | 3 | 0.4% | Pass |
| WATER | PTC-25 | 210 | 210 | 210 | 210 | 212 | 212 | 212 | 212 | 2 | 0.3% | Pass |
| ICE | PTC-25 | 32 | 32 | 32 | 32 | 33 | 33 | 33 | 33 | 1 | 0.2% | Pass |
| OIL | PTC-26 | 364 | 364 | 364 | 364 | 370 | 370 | 370 | 370 | 6 | 0.7% | Pass |
| WATER | PTC-26 | 213 | 213 | 213 | 213 | 212 | 212 | 212 | 212 | 1 | 0.1% | Pass |
| ICE | PTC-26 | 32 | 32 | 32 | 32 | 33 | 33 | 33 | 33 | 1 | 0.2% | Pass |
| OIL | PTC-27 | 362 | 362 | 362 | 362 | 370 | 370 | 370 | 370 | 8 | 1.0% | Pass |
| WATER | PTC-27 | 212 | 212 | 212 | 212 | 212 | 212 | 212 | 212 | 0 | 0.0% | Pass |
| ICE | PTC-27 | 34 | 34 | 34 | 34 | 33 | 33 | 33 | 33 | 1 | 0.2% | Pass |
| OIL | PTC-28 | 369 | 369 | 369 | 369 | 370 | 370 | 370 | 370 | 1 | 0.1% | Pass |
| WATER | PTC-28 | 213 | 213 | 213 | 213 | 212 | 212 | 212 | 212 | 1 | 0.1% | Pass |
| ICE | PTC-28 | 33 | 33 | 33 | 33 | 33 | 33 | 33 | 33 | 0 | 0.0% | Pass |
| OIL | PTC-29 | 367 | 367 | 367 | 367 | 370 | 370 | 370 | 370 | 3 | 0.4% | Pass |
| WATER | PTC-29 | 211 | 211 | 211 | 211 | 212 | 212 | 212 | 212 | 1 | 0.1% | Pass |
| ICE | PTC-29 | 29 | 29 | 29 | 29 | 33 | 33 | 33 | 33 | 4 | 0.8% | Pass |
| OIL | PTC-30 | 362 | 362 | 362 | 362 | 370 | 370 | 370 | 370 | 8 | 1.0% | Pass |
| WATER | PTC-30 | 212 | 212 | 212 | 212 | 212 | 212 | 212 | 212 | 0 | 0.0% | Pass |
| ICE | PTC-30 | 29 | 29 | 29 | 29 | 33 | 33 | 33 | 33 | 4 | 0.8% | Pass |
| OIL | PTC-31 | 364 | 364 | 364 | 364 | 370 | 370 | 370 | 370 | 6 | 0.7% | Pass |
| WATER | PTC-31 | 211 | 211 | 211 | 211 | 212 | 212 | 212 | 212 | 1 | 0.1% | Pass |
| ICE | PTC-31 | 31 | 31 | 31 | 31 | 33 | 33 | 33 | 33 | 2 | 0.4% | Pass |

Calibration Date: 7/7/2011
Calibrated by: David McCune, Daniel Avila, Mike Miller, David Wells, and Mike Edmondson

## TEMPERATURE SYSTEM CALIBRATION
## STYPE

### #27

Reference Thermometer I.D.: T1 F95-195 T2 F95-195 T3 F95-195

| T/C I.D. #27 | Readout I.D. | T/C - Readout °F Reading 1 | Reading 2 | Reading 3 | Average | Reference Thermometer °F Reading 1 | Reading 2 | Reading 3 | Average | Difference °F | %, (°R) | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| OIL | 3WCS | 361 | 361 | 361 | 361 | 370 | 370 | 370 | 370 | 9 | 1.1% | Pass |
| WATER | 3WCS | 212 | 212 | 212 | 212 | 215 | 215 | 215 | 215 | 3 | 0.4% | Pass |
| ICE | 3WCS | 33 | 33 | 33 | 33 | 33 | 33 | 33 | 33 | 0 | 0.0% | Pass |
| OIL | 5WCS | 367 | 367 | 367 | 367 | 370 | 370 | 370 | 370 | 3 | 0.4% | Pass |
| WATER | 5WCS | 217 | 217 | 217 | 217 | 215 | 215 | 215 | 215 | 2 | 0.3% | Pass |
| ICE | 5WCS | 38 | 38 | 38 | 38 | 33 | 33 | 33 | 33 | 5 | 1.0% | Pass |
| OIL | 6WCS | 366 | 366 | 366 | 366 | 370 | 370 | 370 | 370 | 4 | 0.5% | Pass |
| WATER | 6WCS | 216 | 216 | 216 | 216 | 215 | 215 | 215 | 215 | 1 | 0.1% | Pass |
| ICE | 6WCS | 38 | 38 | 38 | 38 | 33 | 33 | 33 | 33 | 5 | 1.0% | Pass |
| OIL | 7WCS | 362 | 362 | 362 | 362 | 370 | 370 | 370 | 370 | 8 | 1.0% | Pass |
| WATER | 7WCS | 210 | 210 | 210 | 210 | 215 | 215 | 215 | 215 | 5 | 0.7% | Pass |
| ICE | 7WCS | 29 | 29 | 29 | 29 | 33 | 33 | 33 | 33 | 4 | 0.8% | Pass |
| OIL | 12WCS | 364 | 364 | 364 | 364 | 370 | 370 | 370 | 370 | 6 | 0.7% | Pass |
| WATER | 12WCS | 212 | 212 | 212 | 212 | 215 | 215 | 215 | 215 | 3 | 0.4% | Pass |
| ICE | 12WCS | 31 | 31 | 31 | 31 | 33 | 33 | 33 | 33 | 2 | 0.4% | Pass |
| OIL | 14WCS | 363 | 363 | 363 | 363 | 370 | 370 | 370 | 370 | 7 | 0.8% | Pass |
| WATER | 14WCS | 213 | 213 | 213 | 213 | 215 | 215 | 215 | 215 | 2 | 0.3% | Pass |
| ICE | 14WCS | 32 | 32 | 32 | 32 | 33 | 33 | 33 | 33 | 1 | 0.2% | Pass |
| OIL | 17WCS | 364 | 364 | 364 | 364 | 370 | 370 | 370 | 370 | 6 | 0.7% | Pass |
| WATER | 17WCS | 212 | 212 | 212 | 212 | 215 | 215 | 215 | 215 | 3 | 0.4% | Pass |
| ICE | 17WCS | 29 | 29 | 29 | 29 | 33 | 33 | 33 | 33 | 4 | 0.8% | Pass |
| OIL | 18WCS | 365 | 365 | 365 | 365 | 370 | 370 | 370 | 370 | 5 | 0.6% | Pass |
| WATER | 18WCS | 212 | 212 | 212 | 212 | 215 | 215 | 215 | 215 | 3 | 0.4% | Pass |
| ICE | 18WCS | 29 | 29 | 29 | 29 | 33 | 33 | 33 | 33 | 4 | 0.8% | Pass |
| OIL | 19WCS | 361 | 361 | 361 | 361 | 370 | 370 | 370 | 370 | 9 | 1.1% | Pass |
| WATER | 19WCS | 213 | 213 | 213 | 213 | 215 | 215 | 215 | 215 | 2 | 0.3% | Pass |
| ICE | 19WCS | 34 | 34 | 34 | 34 | 33 | 33 | 33 | 33 | 1 | 0.2% | Pass |
| OIL | PTC-2 | 366 | 366 | 366 | 366 | 370 | 370 | 370 | 370 | 4 | 0.5% | Pass |
| WATER | PTC-2 | 216 | 216 | 216 | 216 | 215 | 215 | 215 | 215 | 1 | 0.1% | Pass |
| ICE | PTC-2 | 36 | 36 | 36 | 36 | 33 | 33 | 33 | 33 | 3 | 0.6% | Pass |
| OIL | PTC-4 | 367 | 367 | 367 | 367 | 370 | 370 | 370 | 370 | 3 | 0.4% | Pass |
| WATER | PTC-4 | 216 | 216 | 216 | 216 | 215 | 215 | 215 | 215 | 1 | 0.1% | Pass |
| ICE | PTC-4 | 37 | 37 | 37 | 37 | 33 | 33 | 33 | 33 | 4 | 0.8% | Pass |
| OIL | PTC-5 | 370 | 370 | 370 | 370 | 370 | 370 | 370 | 370 | 0 | 0.0% | Pass |
| WATER | PTC-5 | 214 | 214 | 214 | 214 | 215 | 215 | 215 | 215 | 1 | 0.1% | Pass |
| ICE | PTC-5 | 35 | 35 | 35 | 35 | 33 | 33 | 33 | 33 | 2 | 0.4% | Pass |
| OIL | PTC-6 | 372 | 372 | 372 | 372 | 370 | 370 | 370 | 370 | 2 | 0.2% | Pass |
| WATER | PTC-6 | 214 | 214 | 214 | 214 | 215 | 215 | 215 | 215 | 1 | 0.1% | Pass |
| ICE | PTC-6 | 34 | 34 | 34 | 34 | 33 | 33 | 33 | 33 | 1 | 0.2% | Pass |
| OIL | PTC-7 | 370 | 370 | 370 | 370 | 370 | 370 | 370 | 370 | 0 | 0.0% | Pass |
| WATER | PTC-7 | 213 | 213 | 213 | 213 | 215 | 215 | 215 | 215 | 2 | 0.3% | Pass |
| ICE | PTC-7 | 33 | 33 | 33 | 33 | 33 | 33 | 33 | 33 | 0 | 0.0% | Pass |
| OIL | PTC-11 | 370 | 370 | 370 | 370 | 370 | 370 | 370 | 370 | 0 | 0.0% | Pass |
| WATER | PTC-11 | 213 | 213 | 213 | 213 | 215 | 215 | 215 | 215 | 2 | 0.3% | Pass |
| ICE | PTC-11 | 33 | 33 | 33 | 33 | 33 | 33 | 33 | 33 | 0 | 0.0% | Pass |
| OIL | PTC-14 | 371 | 371 | 371 | 371 | 370 | 370 | 370 | 370 | 1 | 0.1% | Pass |
| WATER | PTC-14 | 213 | 213 | 213 | 213 | 215 | 215 | 215 | 215 | 2 | 0.3% | Pass |
| ICE | PTC-14 | 33 | 33 | 33 | 33 | 33 | 33 | 33 | 33 | 0 | 0.0% | Pass |
| OIL | PTC-18 | 370 | 370 | 370 | 370 | 370 | 370 | 370 | 370 | 0 | 0.0% | Pass |
| WATER | PTC-18 | 213 | 213 | 213 | 213 | 215 | 215 | 215 | 215 | 2 | 0.3% | Pass |
| ICE | PTC-18 | 33 | 33 | 33 | 33 | 33 | 33 | 33 | 33 | 0 | 0.0% | Pass |
| OIL | PTC-20 | 369 | 369 | 369 | 369 | 370 | 370 | 370 | 370 | 1 | 0.1% | Pass |
| WATER | PTC-20 | 212 | 212 | 212 | 212 | 215 | 215 | 215 | 215 | 3 | 0.4% | Pass |
| ICE | PTC-20 | 34 | 34 | 34 | 34 | 33 | 33 | 33 | 33 | 1 | 0.2% | Pass |
| OIL | PTC-21 | 371 | 371 | 371 | 371 | 370 | 370 | 370 | 370 | 1 | 0.1% | Pass |
| WATER | PTC-21 | 212 | 212 | 212 | 212 | 215 | 215 | 215 | 215 | 3 | 0.4% | Pass |
| ICE | PTC-21 | 32 | 32 | 32 | 32 | 33 | 33 | 33 | 33 | 1 | 0.2% | Pass |
| OIL | PTC-22 | 370 | 370 | 370 | 370 | 370 | 370 | 370 | 370 | 0 | 0.0% | Pass |
| WATER | PTC-22 | 213 | 213 | 213 | 213 | 215 | 215 | 215 | 215 | 2 | 0.3% | Pass |
| ICE | PTC-22 | 33 | 33 | 33 | 33 | 33 | 33 | 33 | 33 | 0 | 0.0% | Pass |
| OIL | PTC-24 | 368 | 368 | 368 | 368 | 370 | 370 | 370 | 370 | 2 | 0.2% | Pass |
| WATER | PTC-24 | 213 | 213 | 213 | 213 | 215 | 215 | 215 | 215 | 2 | 0.3% | Pass |
| ICE | PTC-24 | 34 | 34 | 34 | 34 | 33 | 33 | 33 | 33 | 1 | 0.2% | Pass |
| OIL | PTC-25 | 367 | 367 | 367 | 367 | 370 | 370 | 370 | 370 | 3 | 0.4% | Pass |
| WATER | PTC-25 | 214 | 214 | 214 | 214 | 215 | 215 | 215 | 215 | 1 | 0.1% | Pass |
| ICE | PTC-25 | 32 | 32 | 32 | 32 | 33 | 33 | 33 | 33 | 1 | 0.2% | Pass |
| OIL | PTC-26 | 369 | 369 | 369 | 369 | 370 | 370 | 370 | 370 | 1 | 0.1% | Pass |
| WATER | PTC-26 | 214 | 214 | 214 | 214 | 215 | 215 | 215 | 215 | 1 | 0.1% | Pass |
| ICE | PTC-26 | 31 | 31 | 31 | 31 | 33 | 33 | 33 | 33 | 2 | 0.4% | Pass |
| OIL | PTC-27 | 370 | 370 | 370 | 370 | 370 | 370 | 370 | 370 | 0 | 0.0% | Pass |
| WATER | PTC-27 | 213 | 213 | 213 | 213 | 215 | 215 | 215 | 215 | 2 | 0.3% | Pass |
| ICE | PTC-27 | 31 | 31 | 31 | 31 | 33 | 33 | 33 | 33 | 2 | 0.4% | Pass |
| OIL | PTC-28 | 370 | 370 | 370 | 370 | 370 | 370 | 370 | 370 | 0 | 0.0% | Pass |
| WATER | PTC-28 | 213 | 213 | 213 | 213 | 215 | 215 | 215 | 215 | 2 | 0.3% | Pass |
| ICE | PTC-28 | 32 | 32 | 32 | 32 | 33 | 33 | 33 | 33 | 1 | 0.2% | Pass |

Calibration Date: 1/3/2011
Calibrated by: David McCune, Daniel Avila, Mike Miller, David Wells, and Mike Edmondson

## TEMPERATURE SYSTEM CALIBRATION
## STYPE

### #27

Reference Thermometer I.D.: T1 F95-195 T2 F95-195 T3 F95-195

| T/C I.D. #27 | Readout I.D. | T/C - Readout °F Reading 1 | Reading 2 | Reading 3 | Average | Reference Thermometer °F Reading 1 | Reading 2 | Reading 3 | Average | Difference °F | %, (°R) | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| OIL | 3WCS | 359 | 359 | 359 | 359 | 370 | 370 | 370 | 370 | 11 | 1.3% | Pass |
| WATER | 3WCS | 213 | 213 | 213 | 213 | 213 | 213 | 213 | 213 | 0 | 0.0% | Pass |
| ICE | 3WCS | 32 | 32 | 32 | 32 | 33 | 33 | 33 | 33 | 1 | 0.2% | Pass |
| OIL | 5WCS | 362 | 362 | 362 | 362 | 370 | 370 | 370 | 370 | 8 | 1.0% | Pass |
| WATER | 5WCS | 214 | 214 | 214 | 214 | 213 | 213 | 213 | 213 | 1 | 0.1% | Pass |
| ICE | 5WCS | 30 | 30 | 30 | 30 | 33 | 33 | 33 | 33 | 3 | 0.6% | Pass |
| OIL | 6WCS | 362 | 362 | 362 | 362 | 370 | 370 | 370 | 370 | 8 | 1.0% | Pass |
| WATER | 6WCS | 212 | 212 | 212 | 212 | 213 | 213 | 213 | 213 | 1 | 0.1% | Pass |
| ICE | 6WCS | 32 | 32 | 32 | 32 | 33 | 33 | 33 | 33 | 1 | 0.2% | Pass |
| OIL | 7WCS | 364 | 364 | 364 | 364 | 370 | 370 | 370 | 370 | 6 | 0.7% | Pass |
| WATER | 7WCS | 211 | 211 | 211 | 211 | 213 | 213 | 213 | 213 | 2 | 0.3% | Pass |
| ICE | 7WCS | 31 | 31 | 31 | 31 | 33 | 33 | 33 | 33 | 2 | 0.4% | Pass |
| OIL | 12WCS | 363 | 363 | 363 | 363 | 370 | 370 | 370 | 370 | 7 | 0.8% | Pass |
| WATER | 12WCS | 212 | 212 | 212 | 212 | 213 | 213 | 213 | 213 | 1 | 0.1% | Pass |
| ICE | 12WCS | 29 | 29 | 29 | 29 | 33 | 33 | 33 | 33 | 4 | 0.8% | Pass |
| OIL | 14WCS | 369 | 369 | 369 | 369 | 370 | 370 | 370 | 370 | 1 | 0.1% | Pass |
| WATER | 14WCS | 209 | 209 | 209 | 209 | 213 | 213 | 213 | 213 | 4 | 0.6% | Pass |
| ICE | 14WCS | 28 | 28 | 28 | 28 | 33 | 33 | 33 | 33 | 5 | 1.0% | Pass |
| OIL | 17WCS | 359 | 359 | 359 | 359 | 370 | 370 | 370 | 370 | 11 | 1.3% | Pass |
| WATER | 17WCS | 213 | 213 | 213 | 213 | 213 | 213 | 213 | 213 | 0 | 0.0% | Pass |
| ICE | 17WCS | 32 | 32 | 32 | 32 | 33 | 33 | 33 | 33 | 1 | 0.2% | Pass |
| OIL | 18WCS | 360 | 360 | 360 | 360 | 370 | 370 | 370 | 370 | 10 | 1.2% | Pass |
| WATER | 18WCS | 211 | 211 | 211 | 211 | 213 | 213 | 213 | 213 | 2 | 0.3% | Pass |
| ICE | 18WCS | 28 | 28 | 28 | 28 | 33 | 33 | 33 | 33 | 5 | 1.0% | Pass |
| OIL | 19WCS | 359 | 359 | 359 | 359 | 370 | 370 | 370 | 370 | 11 | 1.3% | Pass |
| WATER | 19WCS | 211 | 211 | 211 | 211 | 213 | 213 | 213 | 213 | 2 | 0.3% | Pass |
| ICE | 19WCS | 31 | 31 | 31 | 31 | 33 | 33 | 33 | 33 | 2 | 0.4% | Pass |
| OIL | PTC-5 | 361 | 361 | 361 | 361 | 370 | 370 | 370 | 370 | 9 | 1.1% | Pass |
| WATER | PTC-5 | 213 | 213 | 213 | 213 | 213 | 213 | 213 | 213 | 0 | 0.0% | Pass |
| ICE | PTC-5 | 31 | 31 | 31 | 31 | 33 | 33 | 33 | 33 | 2 | 0.4% | Pass |
| OIL | PTC-7 | 363 | 363 | 363 | 363 | 370 | 370 | 370 | 370 | 7 | 0.8% | Pass |
| WATER | PTC-7 | 214 | 214 | 214 | 214 | 213 | 213 | 213 | 213 | 1 | 0.1% | Pass |
| ICE | PTC-7 | 32 | 32 | 32 | 32 | 33 | 33 | 33 | 33 | 1 | 0.2% | Pass |
| OIL | PTC-11 | 362 | 362 | 362 | 362 | 370 | 370 | 370 | 370 | 8 | 1.0% | Pass |
| WATER | PTC-11 | 212 | 212 | 212 | 212 | 213 | 213 | 213 | 213 | 1 | 0.1% | Pass |
| ICE | PTC-11 | 33 | 33 | 33 | 33 | 33 | 33 | 33 | 33 | 0 | 0.0% | Pass |
| OIL | PTC-18 | 361 | 361 | 361 | 361 | 370 | 370 | 370 | 370 | 9 | 1.1% | Pass |
| WATER | PTC-18 | 214 | 214 | 214 | 214 | 213 | 213 | 213 | 213 | 1 | 0.1% | Pass |
| ICE | PTC-18 | 32 | 32 | 32 | 32 | 33 | 33 | 33 | 33 | 1 | 0.2% | Pass |
| OIL | PTC-20 | 360 | 360 | 360 | 360 | 370 | 370 | 370 | 370 | 10 | 1.2% | Pass |
| WATER | PTC-20 | 213 | 213 | 213 | 213 | 213 | 213 | 213 | 213 | 0 | 0.0% | Pass |
| ICE | PTC-20 | 31 | 31 | 31 | 31 | 33 | 33 | 33 | 33 | 2 | 0.4% | Pass |
| OIL | PTC-21 | 359 | 359 | 359 | 359 | 370 | 370 | 370 | 370 | 11 | 1.3% | Pass |
| WATER | PTC-21 | 212 | 212 | 212 | 212 | 213 | 213 | 213 | 213 | 1 | 0.1% | Pass |
| ICE | PTC-21 | 32 | 32 | 32 | 32 | 33 | 33 | 33 | 33 | 1 | 0.2% | Pass |
| OIL | PTC-22 | 358 | 358 | 358 | 358 | 370 | 370 | 370 | 370 | 12 | 1.4% | Pass |
| WATER | PTC-22 | 212 | 212 | 212 | 212 | 213 | 213 | 213 | 213 | 1 | 0.1% | Pass |
| ICE | PTC-22 | 31 | 31 | 31 | 31 | 33 | 33 | 33 | 33 | 2 | 0.4% | Pass |
| OIL | PTC-23 | 360 | 360 | 360 | 360 | 370 | 370 | 370 | 370 | 10 | 1.2% | Pass |
| WATER | PTC-23 | 211 | 211 | 211 | 211 | 213 | 213 | 213 | 213 | 2 | 0.3% | Pass |
| ICE | PTC-23 | 31 | 31 | 31 | 31 | 33 | 33 | 33 | 33 | 2 | 0.4% | Pass |
| OIL | PTC-25 | 361 | 361 | 361 | 361 | 370 | 370 | 370 | 370 | 9 | 1.1% | Pass |
| WATER | PTC-25 | 210 | 210 | 210 | 210 | 213 | 213 | 213 | 213 | 3 | 0.4% | Pass |
| ICE | PTC-25 | 31 | 31 | 31 | 31 | 33 | 33 | 33 | 33 | 2 | 0.4% | Pass |
| OIL | PTC-26 | 361 | 361 | 361 | 361 | 370 | 370 | 370 | 370 | 9 | 1.1% | Pass |
| WATER | PTC-26 | 213 | 213 | 213 | 213 | 213 | 213 | 213 | 213 | 0 | 0.0% | Pass |
| ICE | PTC-26 | 32 | 32 | 32 | 32 | 33 | 33 | 33 | 33 | 1 | 0.2% | Pass |
| OIL | PTC-27 | 360 | 360 | 360 | 360 | 370 | 370 | 370 | 370 | 10 | 1.2% | Pass |
| WATER | PTC-27 | 212 | 212 | 212 | 212 | 213 | 213 | 213 | 213 | 1 | 0.1% | Pass |
| ICE | PTC-27 | 33 | 33 | 33 | 33 | 33 | 33 | 33 | 33 | 0 | 0.0% | Pass |
| OIL | PTC-28 | 360 | 360 | 360 | 360 | 370 | 370 | 370 | 370 | 10 | 1.2% | Pass |
| WATER | PTC-28 | 212 | 212 | 212 | 212 | 213 | 213 | 213 | 213 | 1 | 0.1% | Pass |
| ICE | PTC-28 | 33 | 33 | 33 | 33 | 33 | 33 | 33 | 33 | 0 | 0.0% | Pass |
| OIL | PTC-29 | 359 | 359 | 359 | 359 | 370 | 370 | 370 | 370 | 11 | 1.3% | Pass |
| WATER | PTC-29 | 213 | 213 | 213 | 213 | 213 | 213 | 213 | 213 | 0 | 0.0% | Pass |
| ICE | PTC-29 | 32 | 32 | 32 | 32 | 33 | 33 | 33 | 33 | 1 | 0.2% | Pass |
| OIL | PTC-30 | 361 | 361 | 361 | 361 | 370 | 370 | 370 | 370 | 9 | 1.1% | Pass |
| WATER | PTC-30 | 210 | 210 | 210 | 210 | 213 | 213 | 213 | 213 | 3 | 0.4% | Pass |
| ICE | PTC-30 | 30 | 30 | 30 | 30 | 33 | 33 | 33 | 33 | 3 | 0.6% | Pass |
| OIL | PTC-31 | 362 | 362 | 362 | 362 | 370 | 370 | 370 | 370 | 8 | 1.0% | Pass |
| WATER | PTC-31 | 211 | 211 | 211 | 211 | 213 | 213 | 213 | 213 | 2 | 0.3% | Pass |
| ICE | PTC-31 | 31 | 31 | 31 | 31 | 33 | 33 | 33 | 33 | 2 | 0.4% | Pass |

Calibration Date: 7/7/2011
Calibrated by: David McCune, Daniel Avila, Mike Miller, David Wells, and Mike Edmondson

## TEMPERATURE SYSTEM CALIBRATION
## STYPE

### #44

Reference Thermometer I.D.: T1 F95-195 T2 F95-195 T3 F95-195

| T/C I.D. #44 | Readout I.D. | T/C - Readout °F Reading 1 | Reading 2 | Reading 3 | Average | Reference Thermometer °F Reading 1 | Reading 2 | Reading 3 | Average | Difference °F | %, (°R) | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| OIL | 3WCS | 355 | 355 | 355 | 355 | 360 | 360 | 360 | 360 | 5 | 0.6% | Pass |
| WATER | 3WCS | 212 | 212 | 212 | 212 | 212 | 212 | 212 | 212 | 0 | 0.0% | Pass |
| ICE | 3WCS | 36 | 36 | 36 | 36 | 32 | 32 | 32 | 32 | 4 | 0.8% | Pass |
| OIL | 5WCS | 358 | 358 | 358 | 358 | 360 | 360 | 360 | 360 | 2 | 0.2% | Pass |
| WATER | 5WCS | 215 | 215 | 215 | 215 | 212 | 212 | 212 | 212 | 3 | 0.4% | Pass |
| ICE | 5WCS | 38 | 38 | 38 | 38 | 32 | 32 | 32 | 32 | 6 | 1.2% | Pass |
| OIL | 6WCS | 358 | 358 | 358 | 358 | 360 | 360 | 360 | 360 | 2 | 0.2% | Pass |
| WATER | 6WCS | 215 | 215 | 215 | 215 | 212 | 212 | 212 | 212 | 3 | 0.4% | Pass |
| ICE | 6WCS | 38 | 38 | 38 | 38 | 32 | 32 | 32 | 32 | 6 | 1.2% | Pass |
| OIL | 7WCS | 353 | 353 | 353 | 353 | 360 | 360 | 360 | 360 | 7 | 0.9% | Pass |
| WATER | 7WCS | 209 | 209 | 209 | 209 | 212 | 212 | 212 | 212 | 3 | 0.4% | Pass |
| ICE | 7WCS | 32 | 32 | 32 | 32 | 32 | 32 | 32 | 32 | 0 | 0.0% | Pass |
| OIL | 12WCS | 356 | 356 | 356 | 356 | 360 | 360 | 360 | 360 | 4 | 0.5% | Pass |
| WATER | 12WCS | 210 | 210 | 210 | 210 | 212 | 212 | 212 | 212 | 2 | 0.3% | Pass |
| ICE | 12WCS | 34 | 34 | 34 | 34 | 32 | 32 | 32 | 32 | 2 | 0.4% | Pass |
| OIL | 14WCS | 355 | 355 | 355 | 355 | 360 | 360 | 360 | 360 | 5 | 0.6% | Pass |
| WATER | 14WCS | 211 | 211 | 211 | 211 | 212 | 212 | 212 | 212 | 1 | 0.1% | Pass |
| ICE | 14WCS | 35 | 35 | 35 | 35 | 32 | 32 | 32 | 32 | 3 | 0.6% | Pass |
| OIL | 17WCS | 355 | 355 | 355 | 355 | 360 | 360 | 360 | 360 | 5 | 0.6% | Pass |
| WATER | 17WCS | 212 | 212 | 212 | 212 | 212 | 212 | 212 | 212 | 0 | 0.0% | Pass |
| ICE | 17WCS | 36 | 36 | 36 | 36 | 32 | 32 | 32 | 32 | 4 | 0.8% | Pass |
| OIL | 18WCS | 354 | 354 | 354 | 354 | 360 | 360 | 360 | 360 | 6 | 0.7% | Pass |
| WATER | 18WCS | 211 | 211 | 211 | 211 | 212 | 212 | 212 | 212 | 1 | 0.1% | Pass |
| ICE | 18WCS | 35 | 35 | 35 | 35 | 32 | 32 | 32 | 32 | 3 | 0.6% | Pass |
| OIL | 19WCS | 355 | 355 | 355 | 355 | 360 | 360 | 360 | 360 | 5 | 0.6% | Pass |
| WATER | 19WCS | 210 | 210 | 210 | 210 | 212 | 212 | 212 | 212 | 2 | 0.3% | Pass |
| ICE | 19WCS | 34 | 34 | 34 | 34 | 32 | 32 | 32 | 32 | 2 | 0.4% | Pass |
| OIL | PTC-2 | 358 | 358 | 358 | 358 | 360 | 360 | 360 | 360 | 2 | 0.2% | Pass |
| WATER | PTC-2 | 211 | 211 | 211 | 211 | 212 | 212 | 212 | 212 | 1 | 0.1% | Pass |
| ICE | PTC-2 | 38 | 38 | 38 | 38 | 32 | 32 | 32 | 32 | 6 | 1.2% | Pass |
| OIL | PTC-4 | 360 | 360 | 360 | 360 | 360 | 360 | 360 | 360 | 0 | 0.0% | Pass |
| WATER | PTC-4 | 211 | 211 | 211 | 211 | 212 | 212 | 212 | 212 | 1 | 0.1% | Pass |
| ICE | PTC-4 | 38 | 38 | 38 | 38 | 32 | 32 | 32 | 32 | 6 | 1.2% | Pass |
| OIL | PTC-5 | 354 | 354 | 354 | 354 | 360 | 360 | 360 | 360 | 6 | 0.7% | Pass |
| WATER | PTC-5 | 212 | 212 | 212 | 212 | 212 | 212 | 212 | 212 | 0 | 0.0% | Pass |
| ICE | PTC-5 | 35 | 35 | 35 | 35 | 32 | 32 | 32 | 32 | 3 | 0.6% | Pass |
| OIL | PTC-6 | 354 | 354 | 354 | 354 | 360 | 360 | 360 | 360 | 6 | 0.7% | Pass |
| WATER | PTC-6 | 212 | 212 | 212 | 212 | 212 | 212 | 212 | 212 | 0 | 0.0% | Pass |
| ICE | PTC-6 | 34 | 34 | 34 | 34 | 32 | 32 | 32 | 32 | 2 | 0.4% | Pass |
| OIL | PTC-7 | 353 | 353 | 353 | 353 | 360 | 360 | 360 | 360 | 7 | 0.9% | Pass |
| WATER | PTC-7 | 213 | 213 | 213 | 213 | 212 | 212 | 212 | 212 | 1 | 0.1% | Pass |
| ICE | PTC-7 | 33 | 33 | 33 | 33 | 32 | 32 | 32 | 32 | 1 | 0.2% | Pass |
| OIL | PTC-11 | 353 | 353 | 353 | 353 | 360 | 360 | 360 | 360 | 7 | 0.9% | Pass |
| WATER | PTC-11 | 212 | 212 | 212 | 212 | 212 | 212 | 212 | 212 | 0 | 0.0% | Pass |
| ICE | PTC-11 | 34 | 34 | 34 | 34 | 32 | 32 | 32 | 32 | 2 | 0.4% | Pass |
| OIL | PTC-14 | 355 | 355 | 355 | 355 | 360 | 360 | 360 | 360 | 5 | 0.6% | Pass |
| WATER | PTC-14 | 213 | 213 | 213 | 213 | 212 | 212 | 212 | 212 | 1 | 0.1% | Pass |
| ICE | PTC-14 | 32 | 32 | 32 | 32 | 32 | 32 | 32 | 32 | 0 | 0.0% | Pass |
| OIL | PTC-18 | 356 | 356 | 356 | 356 | 360 | 360 | 360 | 360 | 4 | 0.5% | Pass |
| WATER | PTC-18 | 214 | 214 | 214 | 214 | 212 | 212 | 212 | 212 | 2 | 0.3% | Pass |
| ICE | PTC-18 | 35 | 35 | 35 | 35 | 32 | 32 | 32 | 32 | 3 | 0.6% | Pass |
| OIL | PTC-20 | 357 | 357 | 357 | 357 | 360 | 360 | 360 | 360 | 3 | 0.4% | Pass |
| WATER | PTC-20 | 214 | 214 | 214 | 214 | 212 | 212 | 212 | 212 | 2 | 0.3% | Pass |
| ICE | PTC-20 | 36 | 36 | 36 | 36 | 32 | 32 | 32 | 32 | 4 | 0.8% | Pass |
| OIL | PTC-21 | 358 | 358 | 358 | 358 | 360 | 360 | 360 | 360 | 2 | 0.2% | Pass |
| WATER | PTC-21 | 212 | 212 | 212 | 212 | 212 | 212 | 212 | 212 | 0 | 0.0% | Pass |
| ICE | PTC-21 | 37 | 37 | 37 | 37 | 32 | 32 | 32 | 32 | 5 | 1.0% | Pass |
| OIL | PTC-22 | 357 | 357 | 357 | 357 | 360 | 360 | 360 | 360 | 3 | 0.4% | Pass |
| WATER | PTC-22 | 213 | 213 | 213 | 213 | 212 | 212 | 212 | 212 | 1 | 0.1% | Pass |
| ICE | PTC-22 | 36 | 36 | 36 | 36 | 32 | 32 | 32 | 32 | 4 | 0.8% | Pass |
| OIL | PTC-24 | 356 | 356 | 356 | 356 | 360 | 360 | 360 | 360 | 4 | 0.5% | Pass |
| WATER | PTC-24 | 211 | 211 | 211 | 211 | 212 | 212 | 212 | 212 | 1 | 0.1% | Pass |
| ICE | PTC-24 | 34 | 34 | 34 | 34 | 32 | 32 | 32 | 32 | 2 | 0.4% | Pass |
| OIL | PTC-25 | 355 | 355 | 355 | 355 | 360 | 360 | 360 | 360 | 5 | 0.6% | Pass |
| WATER | PTC-25 | 211 | 211 | 211 | 211 | 212 | 212 | 212 | 212 | 1 | 0.1% | Pass |
| ICE | PTC-25 | 33 | 33 | 33 | 33 | 32 | 32 | 32 | 32 | 1 | 0.2% | Pass |
| OIL | PTC-26 | 354 | 354 | 354 | 354 | 360 | 360 | 360 | 360 | 6 | 0.7% | Pass |
| WATER | PTC-26 | 212 | 212 | 212 | 212 | 212 | 212 | 212 | 212 | 0 | 0.0% | Pass |
| ICE | PTC-26 | 33 | 33 | 33 | 33 | 32 | 32 | 32 | 32 | 1 | 0.2% | Pass |
| OIL | PTC-27 | 354 | 354 | 354 | 354 | 360 | 360 | 360 | 360 | 6 | 0.7% | Pass |
| WATER | PTC-27 | 213 | 213 | 213 | 213 | 212 | 212 | 212 | 212 | 1 | 0.1% | Pass |
| ICE | PTC-27 | 33 | 33 | 33 | 33 | 32 | 32 | 32 | 32 | 1 | 0.2% | Pass |
| OIL | PTC-28 | 354 | 354 | 354 | 354 | 360 | 360 | 360 | 360 | 6 | 0.7% | Pass |
| WATER | PTC-28 | 214 | 214 | 214 | 214 | 212 | 212 | 212 | 212 | 2 | 0.3% | Pass |
| ICE | PTC-28 | 35 | 35 | 35 | 35 | 32 | 32 | 32 | 32 | 3 | 0.6% | Pass |

Calibration Date: 1/3/2011
Calibrated by: David McCune, Daniel Avila, Mike Miller, David Wells, and Mike Edmondson

# TEMPERATURE SYSTEM CALIBRATION
## STYPE

## #44

Reference Thermometer I.D.: T1 F95-195 T2 F95-195 T3 F95-195

| T/C I.D. #44 | Readout I.D. | T/C - Readout °F Reading 1 | Reading 2 | Reading 3 | Average | Reference Thermometer °F Reading 1 | Reading 2 | Reading 3 | Average | Difference °F | %, (°R) | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| OIL | 3WCS | 365 | 365 | 365 | 365 | 360 | 360 | 360 | 360 | 5 | 0.6% | Pass |
| WATER | 3WCS | 212 | 212 | 212 | 212 | 212 | 212 | 212 | 212 | 0 | 0.0% | Pass |
| ICE | 3WCS | 34 | 34 | 34 | 34 | 32 | 32 | 32 | 32 | 2 | 0.4% | Pass |
| OIL | 5WCS | 362 | 362 | 362 | 362 | 360 | 360 | 360 | 360 | 2 | 0.2% | Pass |
| WATER | 5WCS | 214 | 214 | 214 | 214 | 212 | 212 | 212 | 212 | 2 | 0.3% | Pass |
| ICE | 5WCS | 34 | 34 | 34 | 34 | 32 | 32 | 32 | 32 | 2 | 0.4% | Pass |
| OIL | 6WCS | 361 | 361 | 361 | 361 | 360 | 360 | 360 | 360 | 1 | 0.1% | Pass |
| WATER | 6WCS | 212 | 212 | 212 | 212 | 212 | 212 | 212 | 212 | 0 | 0.0% | Pass |
| ICE | 6WCS | 33 | 33 | 33 | 33 | 32 | 32 | 32 | 32 | 1 | 0.2% | Pass |
| OIL | 7WCS | 364 | 364 | 364 | 364 | 360 | 360 | 360 | 360 | 4 | 0.5% | Pass |
| WATER | 7WCS | 210 | 210 | 210 | 210 | 212 | 212 | 212 | 212 | 2 | 0.3% | Pass |
| ICE | 7WCS | 31 | 31 | 31 | 31 | 32 | 32 | 32 | 32 | 1 | 0.2% | Pass |
| OIL | 12WCS | 359 | 359 | 359 | 359 | 360 | 360 | 360 | 360 | 1 | 0.1% | Pass |
| WATER | 12WCS | 214 | 214 | 214 | 214 | 212 | 212 | 212 | 212 | 2 | 0.3% | Pass |
| ICE | 12WCS | 33 | 33 | 33 | 33 | 32 | 32 | 32 | 32 | 1 | 0.2% | Pass |
| OIL | 14WCS | 359 | 359 | 359 | 359 | 360 | 360 | 360 | 360 | 1 | 0.1% | Pass |
| WATER | 14WCS | 213 | 213 | 213 | 213 | 212 | 212 | 212 | 212 | 1 | 0.1% | Pass |
| ICE | 14WCS | 31 | 31 | 31 | 31 | 32 | 32 | 32 | 32 | 1 | 0.2% | Pass |
| OIL | 17WCS | 362 | 362 | 362 | 362 | 360 | 360 | 360 | 360 | 2 | 0.2% | Pass |
| WATER | 17WCS | 212 | 212 | 212 | 212 | 212 | 212 | 212 | 212 | 0 | 0.0% | Pass |
| ICE | 17WCS | 34 | 34 | 34 | 34 | 32 | 32 | 32 | 32 | 2 | 0.4% | Pass |
| OIL | 18WCS | 360 | 360 | 360 | 360 | 360 | 360 | 360 | 360 | 0 | 0.0% | Pass |
| WATER | 18WCS | 213 | 213 | 213 | 213 | 212 | 212 | 212 | 212 | 1 | 0.1% | Pass |
| ICE | 18WCS | 34 | 34 | 34 | 34 | 32 | 32 | 32 | 32 | 2 | 0.4% | Pass |
| OIL | 19WCS | 360 | 360 | 360 | 360 | 360 | 360 | 360 | 360 | 0 | 0.0% | Pass |
| WATER | 19WCS | 211 | 211 | 211 | 211 | 212 | 212 | 212 | 212 | 1 | 0.1% | Pass |
| ICE | 19WCS | 31 | 31 | 31 | 31 | 32 | 32 | 32 | 32 | 1 | 0.2% | Pass |
| OIL | PTC-5 | 363 | 363 | 363 | 363 | 360 | 360 | 360 | 360 | 3 | 0.4% | Pass |
| WATER | PTC-5 | 213 | 213 | 213 | 213 | 212 | 212 | 212 | 212 | 1 | 0.1% | Pass |
| ICE | PTC-5 | 34 | 34 | 34 | 34 | 32 | 32 | 32 | 32 | 2 | 0.4% | Pass |
| OIL | PTC-7 | 363 | 363 | 363 | 363 | 360 | 360 | 360 | 360 | 3 | 0.4% | Pass |
| WATER | PTC-7 | 212 | 212 | 212 | 212 | 212 | 212 | 212 | 212 | 0 | 0.0% | Pass |
| ICE | PTC-7 | 37 | 37 | 37 | 37 | 32 | 32 | 32 | 32 | 5 | 1.0% | Pass |
| OIL | PTC-11 | 365 | 365 | 365 | 365 | 360 | 360 | 360 | 360 | 5 | 0.6% | Pass |
| WATER | PTC-11 | 213 | 213 | 213 | 213 | 212 | 212 | 212 | 212 | 1 | 0.1% | Pass |
| ICE | PTC-11 | 33 | 33 | 33 | 33 | 32 | 32 | 32 | 32 | 1 | 0.2% | Pass |
| OIL | PTC-18 | 365 | 365 | 365 | 365 | 360 | 360 | 360 | 360 | 5 | 0.6% | Pass |
| WATER | PTC-18 | 214 | 214 | 214 | 214 | 212 | 212 | 212 | 212 | 2 | 0.3% | Pass |
| ICE | PTC-18 | 34 | 34 | 34 | 34 | 32 | 32 | 32 | 32 | 2 | 0.4% | Pass |
| OIL | PTC-20 | 368 | 368 | 368 | 368 | 360 | 360 | 360 | 360 | 8 | 1.0% | Pass |
| WATER | PTC-20 | 214 | 214 | 214 | 214 | 212 | 212 | 212 | 212 | 2 | 0.3% | Pass |
| ICE | PTC-20 | 32 | 32 | 32 | 32 | 32 | 32 | 32 | 32 | 0 | 0.0% | Pass |
| OIL | PTC-21 | 370 | 370 | 370 | 370 | 360 | 360 | 360 | 360 | 10 | 1.2% | Pass |
| WATER | PTC-21 | 213 | 213 | 213 | 213 | 212 | 212 | 212 | 212 | 1 | 0.1% | Pass |
| ICE | PTC-21 | 35 | 35 | 35 | 35 | 32 | 32 | 32 | 32 | 3 | 0.6% | Pass |
| OIL | PTC-22 | 364 | 364 | 364 | 364 | 360 | 360 | 360 | 360 | 4 | 0.5% | Pass |
| WATER | PTC-22 | 211 | 211 | 211 | 211 | 212 | 212 | 212 | 212 | 1 | 0.1% | Pass |
| ICE | PTC-22 | 38 | 38 | 38 | 38 | 32 | 32 | 32 | 32 | 6 | 1.2% | Pass |
| OIL | PTC-23 | 365 | 365 | 365 | 365 | 360 | 360 | 360 | 360 | 5 | 0.6% | Pass |
| WATER | PTC-23 | 211 | 211 | 211 | 211 | 212 | 212 | 212 | 212 | 1 | 0.1% | Pass |
| ICE | PTC-23 | 33 | 33 | 33 | 33 | 32 | 32 | 32 | 32 | 1 | 0.2% | Pass |
| OIL | PTC-25 | 363 | 363 | 363 | 363 | 360 | 360 | 360 | 360 | 3 | 0.4% | Pass |
| WATER | PTC-25 | 213 | 213 | 213 | 213 | 212 | 212 | 212 | 212 | 1 | 0.1% | Pass |
| ICE | PTC-25 | 34 | 34 | 34 | 34 | 32 | 32 | 32 | 32 | 2 | 0.4% | Pass |
| OIL | PTC-26 | 367 | 367 | 367 | 367 | 360 | 360 | 360 | 360 | 7 | 0.9% | Pass |
| WATER | PTC-26 | 212 | 212 | 212 | 212 | 212 | 212 | 212 | 212 | 0 | 0.0% | Pass |
| ICE | PTC-26 | 37 | 37 | 37 | 37 | 32 | 32 | 32 | 32 | 5 | 1.0% | Pass |
| OIL | PTC-27 | 365 | 365 | 365 | 365 | 360 | 360 | 360 | 360 | 5 | 0.6% | Pass |
| WATER | PTC-27 | 211 | 211 | 211 | 211 | 212 | 212 | 212 | 212 | 1 | 0.1% | Pass |
| ICE | PTC-27 | 35 | 35 | 35 | 35 | 32 | 32 | 32 | 32 | 3 | 0.6% | Pass |
| OIL | PTC-28 | 365 | 365 | 365 | 365 | 360 | 360 | 360 | 360 | 5 | 0.6% | Pass |
| WATER | PTC-28 | 211 | 211 | 211 | 211 | 212 | 212 | 212 | 212 | 1 | 0.1% | Pass |
| ICE | PTC-28 | 33 | 33 | 33 | 33 | 32 | 32 | 32 | 32 | 1 | 0.2% | Pass |
| OIL | PTC-29 | 363 | 363 | 363 | 363 | 360 | 360 | 360 | 360 | 3 | 0.4% | Pass |
| WATER | PTC-29 | 210 | 210 | 210 | 210 | 212 | 212 | 212 | 212 | 2 | 0.3% | Pass |
| ICE | PTC-29 | 32 | 32 | 32 | 32 | 32 | 32 | 32 | 32 | 0 | 0.0% | Pass |
| OIL | PTC-30 | 359 | 359 | 359 | 359 | 360 | 360 | 360 | 360 | 1 | 0.1% | Pass |
| WATER | PTC-30 | 213 | 213 | 213 | 213 | 212 | 212 | 212 | 212 | 1 | 0.1% | Pass |
| ICE | PTC-30 | 32 | 32 | 32 | 32 | 32 | 32 | 32 | 32 | 0 | 0.0% | Pass |
| OIL | PTC-31 | 361 | 361 | 361 | 361 | 360 | 360 | 360 | 360 | 1 | 0.1% | Pass |
| WATER | PTC-31 | 214 | 214 | 214 | 214 | 212 | 212 | 212 | 212 | 2 | 0.3% | Pass |
| ICE | PTC-31 | 34 | 34 | 34 | 34 | 32 | 32 | 32 | 32 | 2 | 0.4% | Pass |

Calibration Date: 7/7/2011
Calibrated by: David McCune, Daniel Avila, Mike Miller, David Wells, and Mike Edmondson

# TEMPERATURE SYSTEM CALIBRATION
## STYPE

## #62

Reference Thermometer I.D.: T1 F95-195 T2 F95-195 T3 F95-195

| T/C I.D. #62 | Readout I.D. | T/C - Readout °F Reading 1 | Reading 2 | Reading 3 | Average | Reference Thermometer °F Reading 1 | Reading 2 | Reading 3 | Average | Difference °F | %, (°R) | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| OIL | 3WCS | 357 | 357 | 357 | 357 | 360 | 360 | 360 | 360 | 3 | 0.4% | Pass |
| WATER | 3WCS | 214 | 214 | 214 | 214 | 212 | 212 | 212 | 212 | 2 | 0.3% | Pass |
| ICE | 3WCS | 34 | 34 | 34 | 34 | 32 | 32 | 32 | 32 | 2 | 0.4% | Pass |
| OIL | 5WCS | 372 | 372 | 372 | 372 | 360 | 360 | 360 | 360 | 12 | 1.5% | Pass |
| WATER | 5WCS | 218 | 218 | 218 | 218 | 212 | 212 | 212 | 212 | 6 | 0.9% | Pass |
| ICE | 5WCS | 39 | 39 | 39 | 39 | 32 | 32 | 32 | 32 | 7 | 1.4% | Pass |
| OIL | 6WCS | 362 | 362 | 362 | 362 | 360 | 360 | 360 | 360 | 2 | 0.2% | Pass |
| WATER | 6WCS | 217 | 217 | 217 | 217 | 212 | 212 | 212 | 212 | 5 | 0.7% | Pass |
| ICE | 6WCS | 38 | 38 | 38 | 38 | 32 | 32 | 32 | 32 | 6 | 1.2% | Pass |
| OIL | 7WCS | 355 | 355 | 355 | 355 | 360 | 360 | 360 | 360 | 5 | 0.6% | Pass |
| WATER | 7WCS | 212 | 212 | 212 | 212 | 212 | 212 | 212 | 212 | 0 | 0.0% | Pass |
| ICE | 7WCS | 30 | 30 | 30 | 30 | 32 | 32 | 32 | 32 | 2 | 0.4% | Pass |
| OIL | 12WCS | 356 | 356 | 356 | 356 | 360 | 360 | 360 | 360 | 4 | 0.5% | Pass |
| WATER | 12WCS | 212 | 212 | 212 | 212 | 212 | 212 | 212 | 212 | 0 | 0.0% | Pass |
| ICE | 12WCS | 31 | 31 | 31 | 31 | 32 | 32 | 32 | 32 | 1 | 0.2% | Pass |
| OIL | 14WCS | 356 | 356 | 356 | 356 | 360 | 360 | 360 | 360 | 4 | 0.5% | Pass |
| WATER | 14WCS | 213 | 213 | 213 | 213 | 212 | 212 | 212 | 212 | 1 | 0.1% | Pass |
| ICE | 14WCS | 32 | 32 | 32 | 32 | 32 | 32 | 32 | 32 | 0 | 0.0% | Pass |
| OIL | 17WCS | 358 | 358 | 358 | 358 | 360 | 360 | 360 | 360 | 2 | 0.2% | Pass |
| WATER | 17WCS | 214 | 214 | 214 | 214 | 212 | 212 | 212 | 212 | 2 | 0.3% | Pass |
| ICE | 17WCS | 32 | 32 | 32 | 32 | 32 | 32 | 32 | 32 | 0 | 0.0% | Pass |
| OIL | 18WCS | 356 | 356 | 356 | 356 | 360 | 360 | 360 | 360 | 4 | 0.5% | Pass |
| WATER | 18WCS | 211 | 211 | 211 | 211 | 212 | 212 | 212 | 212 | 1 | 0.1% | Pass |
| ICE | 18WCS | 33 | 33 | 33 | 33 | 32 | 32 | 32 | 32 | 1 | 0.2% | Pass |
| OIL | 19WCS | 353 | 353 | 353 | 353 | 360 | 360 | 360 | 360 | 7 | 0.9% | Pass |
| WATER | 19WCS | 213 | 213 | 213 | 213 | 212 | 212 | 212 | 212 | 1 | 0.1% | Pass |
| ICE | 19WCS | 31 | 31 | 31 | 31 | 32 | 32 | 32 | 32 | 1 | 0.2% | Pass |
| OIL | PTC-2 | 358 | 358 | 358 | 358 | 360 | 360 | 360 | 360 | 2 | 0.2% | Pass |
| WATER | PTC-2 | 215 | 215 | 215 | 215 | 212 | 212 | 212 | 212 | 3 | 0.4% | Pass |
| ICE | PTC-2 | 38 | 38 | 38 | 38 | 32 | 32 | 32 | 32 | 6 | 1.2% | Pass |
| OIL | PTC-4 | 356 | 356 | 356 | 356 | 360 | 360 | 360 | 360 | 4 | 0.5% | Pass |
| WATER | PTC-4 | 215 | 215 | 215 | 215 | 212 | 212 | 212 | 212 | 3 | 0.4% | Pass |
| ICE | PTC-4 | 37 | 37 | 37 | 37 | 32 | 32 | 32 | 32 | 5 | 1.0% | Pass |
| OIL | PTC-5 | 357 | 357 | 357 | 357 | 360 | 360 | 360 | 360 | 3 | 0.4% | Pass |
| WATER | PTC-5 | 214 | 214 | 214 | 214 | 212 | 212 | 212 | 212 | 2 | 0.3% | Pass |
| ICE | PTC-5 | 32 | 32 | 32 | 32 | 32 | 32 | 32 | 32 | 0 | 0.0% | Pass |
| OIL | PTC-6 | 356 | 356 | 356 | 356 | 360 | 360 | 360 | 360 | 4 | 0.5% | Pass |
| WATER | PTC-6 | 216 | 216 | 216 | 216 | 212 | 212 | 212 | 212 | 4 | 0.6% | Pass |
| ICE | PTC-6 | 32 | 32 | 32 | 32 | 32 | 32 | 32 | 32 | 0 | 0.0% | Pass |
| OIL | PTC-7 | 358 | 358 | 358 | 358 | 360 | 360 | 360 | 360 | 2 | 0.2% | Pass |
| WATER | PTC-7 | 214 | 214 | 214 | 214 | 212 | 212 | 212 | 212 | 2 | 0.3% | Pass |
| ICE | PTC-7 | 31 | 31 | 31 | 31 | 32 | 32 | 32 | 32 | 1 | 0.2% | Pass |
| OIL | PTC-11 | 357 | 357 | 357 | 357 | 360 | 360 | 360 | 360 | 3 | 0.4% | Pass |
| WATER | PTC-11 | 214 | 214 | 214 | 214 | 212 | 212 | 212 | 212 | 2 | 0.3% | Pass |
| ICE | PTC-11 | 34 | 34 | 34 | 34 | 32 | 32 | 32 | 32 | 2 | 0.4% | Pass |
| OIL | PTC-14 | 355 | 355 | 355 | 355 | 360 | 360 | 360 | 360 | 5 | 0.6% | Pass |
| WATER | PTC-14 | 214 | 214 | 214 | 214 | 212 | 212 | 212 | 212 | 2 | 0.3% | Pass |
| ICE | PTC-14 | 33 | 33 | 33 | 33 | 32 | 32 | 32 | 32 | 1 | 0.2% | Pass |
| OIL | PTC-18 | 360 | 360 | 360 | 360 | 360 | 360 | 360 | 360 | 0 | 0.0% | Pass |
| WATER | PTC-18 | 213 | 213 | 213 | 213 | 212 | 212 | 212 | 212 | 1 | 0.1% | Pass |
| ICE | PTC-18 | 34 | 34 | 34 | 34 | 32 | 32 | 32 | 32 | 2 | 0.4% | Pass |
| OIL | PTC-20 | 361 | 361 | 361 | 361 | 360 | 360 | 360 | 360 | 1 | 0.1% | Pass |
| WATER | PTC-20 | 213 | 213 | 213 | 213 | 212 | 212 | 212 | 212 | 1 | 0.1% | Pass |
| ICE | PTC-20 | 32 | 32 | 32 | 32 | 32 | 32 | 32 | 32 | 0 | 0.0% | Pass |
| OIL | PTC-21 | 358 | 358 | 358 | 358 | 360 | 360 | 360 | 360 | 2 | 0.2% | Pass |
| WATER | PTC-21 | 211 | 211 | 211 | 211 | 212 | 212 | 212 | 212 | 1 | 0.1% | Pass |
| ICE | PTC-21 | 31 | 31 | 31 | 31 | 32 | 32 | 32 | 32 | 1 | 0.2% | Pass |
| OIL | PTC-22 | 362 | 362 | 362 | 362 | 360 | 360 | 360 | 360 | 2 | 0.2% | Pass |
| WATER | PTC-22 | 214 | 214 | 214 | 214 | 212 | 212 | 212 | 212 | 2 | 0.3% | Pass |
| ICE | PTC-22 | 30 | 30 | 30 | 30 | 32 | 32 | 32 | 32 | 2 | 0.4% | Pass |
| OIL | PTC-24 | 364 | 364 | 364 | 364 | 360 | 360 | 360 | 360 | 4 | 0.5% | Pass |
| WATER | PTC-24 | 214 | 214 | 214 | 214 | 212 | 212 | 212 | 212 | 2 | 0.3% | Pass |
| ICE | PTC-24 | 32 | 32 | 32 | 32 | 32 | 32 | 32 | 32 | 0 | 0.0% | Pass |
| OIL | PTC-25 | 364 | 364 | 364 | 364 | 360 | 360 | 360 | 360 | 4 | 0.5% | Pass |
| WATER | PTC-25 | 214 | 214 | 214 | 214 | 212 | 212 | 212 | 212 | 2 | 0.3% | Pass |
| ICE | PTC-25 | 32 | 32 | 32 | 32 | 32 | 32 | 32 | 32 | 0 | 0.0% | Pass |
| OIL | PTC-26 | 364 | 364 | 364 | 364 | 360 | 360 | 360 | 360 | 4 | 0.5% | Pass |
| WATER | PTC-26 | 214 | 214 | 214 | 214 | 212 | 212 | 212 | 212 | 2 | 0.3% | Pass |
| ICE | PTC-26 | 33 | 33 | 33 | 33 | 32 | 32 | 32 | 32 | 1 | 0.2% | Pass |
| OIL | PTC-27 | 365 | 365 | 365 | 365 | 360 | 360 | 360 | 360 | 5 | 0.6% | Pass |
| WATER | PTC-27 | 213 | 213 | 213 | 213 | 212 | 212 | 212 | 212 | 1 | 0.1% | Pass |
| ICE | PTC-27 | 33 | 33 | 33 | 33 | 32 | 32 | 32 | 32 | 1 | 0.2% | Pass |
| OIL | PTC-28 | 365 | 365 | 365 | 365 | 360 | 360 | 360 | 360 | 5 | 0.6% | Pass |
| WATER | PTC-28 | 215 | 215 | 215 | 215 | 212 | 212 | 212 | 212 | 3 | 0.4% | Pass |
| ICE | PTC-28 | 32 | 32 | 32 | 32 | 32 | 32 | 32 | 32 | 0 | 0.0% | Pass |

Calibration Date: 1/3/2011
Calibrated by: David McCune, Daniel Avila, Mike Miller, David Wells, and Mike Edmondson

## TEMPERATURE SYSTEM CALIBRATION
## STYPE

### #62

Reference Thermometer I.D.: T1 F95-195 T2 F95-195 T3 F95-195

| T/C I.D. #62 | Readout I.D. | T/C - Readout °F Reading 1 | Reading 2 | Reading 3 | Average | Reference Thermometer °F Reading 1 | Reading 2 | Reading 3 | Average | Difference °F | %, (°R) | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| OIL | 3WCS | 363 | 363 | 363 | 363 | 370 | 370 | 370 | 370 | 7 | 0.8% | Pass |
| WATER | 3WCS | 210 | 210 | 210 | 210 | 212 | 212 | 212 | 212 | 2 | 0.3% | Pass |
| ICE | 3WCS | 30 | 30 | 30 | 30 | 33 | 33 | 33 | 33 | 3 | 0.6% | Pass |
| OIL | 5WCS | 368 | 368 | 368 | 368 | 370 | 370 | 370 | 370 | 2 | 0.2% | Pass |
| WATER | 5WCS | 213 | 213 | 213 | 213 | 212 | 212 | 212 | 212 | 1 | 0.1% | Pass |
| ICE | 5WCS | 30 | 30 | 30 | 30 | 33 | 33 | 33 | 33 | 3 | 0.6% | Pass |
| OIL | 6WCS | 365 | 365 | 365 | 365 | 370 | 370 | 370 | 370 | 5 | 0.6% | Pass |
| WATER | 6WCS | 212 | 212 | 212 | 212 | 212 | 212 | 212 | 212 | 0 | 0.0% | Pass |
| ICE | 6WCS | 32 | 32 | 32 | 32 | 33 | 33 | 33 | 33 | 1 | 0.2% | Pass |
| OIL | 7WCS | 368 | 368 | 368 | 368 | 370 | 370 | 370 | 370 | 2 | 0.2% | Pass |
| WATER | 7WCS | 212 | 212 | 212 | 212 | 212 | 212 | 212 | 212 | 0 | 0.0% | Pass |
| ICE | 7WCS | 31 | 31 | 31 | 31 | 33 | 33 | 33 | 33 | 2 | 0.4% | Pass |
| OIL | 12WCS | 363 | 363 | 363 | 363 | 370 | 370 | 370 | 370 | 7 | 0.8% | Pass |
| WATER | 12WCS | 210 | 210 | 210 | 210 | 212 | 212 | 212 | 212 | 2 | 0.3% | Pass |
| ICE | 12WCS | 34 | 34 | 34 | 34 | 33 | 33 | 33 | 33 | 1 | 0.2% | Pass |
| OIL | 14WCS | 363 | 363 | 363 | 363 | 370 | 370 | 370 | 370 | 7 | 0.8% | Pass |
| WATER | 14WCS | 209 | 209 | 209 | 209 | 212 | 212 | 212 | 212 | 3 | 0.4% | Pass |
| ICE | 14WCS | 29 | 29 | 29 | 29 | 33 | 33 | 33 | 33 | 4 | 0.8% | Pass |
| OIL | 17WCS | 364 | 364 | 364 | 364 | 370 | 370 | 370 | 370 | 6 | 0.7% | Pass |
| WATER | 17WCS | 210 | 210 | 210 | 210 | 212 | 212 | 212 | 212 | 2 | 0.3% | Pass |
| ICE | 17WCS | 31 | 31 | 31 | 31 | 33 | 33 | 33 | 33 | 2 | 0.4% | Pass |
| OIL | 18WCS | 362 | 362 | 362 | 362 | 370 | 370 | 370 | 370 | 8 | 1.0% | Pass |
| WATER | 18WCS | 212 | 212 | 212 | 212 | 212 | 212 | 212 | 212 | 0 | 0.0% | Pass |
| ICE | 18WCS | 30 | 30 | 30 | 30 | 33 | 33 | 33 | 33 | 3 | 0.6% | Pass |
| OIL | 19WCS | 363 | 363 | 363 | 363 | 370 | 370 | 370 | 370 | 7 | 0.8% | Pass |
| WATER | 19WCS | 212 | 212 | 212 | 212 | 212 | 212 | 212 | 212 | 0 | 0.0% | Pass |
| ICE | 19WCS | 29 | 29 | 29 | 29 | 33 | 33 | 33 | 33 | 4 | 0.8% | Pass |
| OIL | PTC-5 | 364 | 364 | 364 | 364 | 370 | 370 | 370 | 370 | 6 | 0.7% | Pass |
| WATER | PTC-5 | 211 | 211 | 211 | 211 | 212 | 212 | 212 | 212 | 1 | 0.1% | Pass |
| ICE | PTC-5 | 32 | 32 | 32 | 32 | 33 | 33 | 33 | 33 | 1 | 0.2% | Pass |
| OIL | PTC-7 | 364 | 364 | 364 | 364 | 370 | 370 | 370 | 370 | 6 | 0.7% | Pass |
| WATER | PTC-7 | 211 | 211 | 211 | 211 | 212 | 212 | 212 | 212 | 1 | 0.1% | Pass |
| ICE | PTC-7 | 31 | 31 | 31 | 31 | 33 | 33 | 33 | 33 | 2 | 0.4% | Pass |
| OIL | PTC-11 | 363 | 363 | 363 | 363 | 370 | 370 | 370 | 370 | 7 | 0.8% | Pass |
| WATER | PTC-11 | 213 | 213 | 213 | 213 | 212 | 212 | 212 | 212 | 1 | 0.1% | Pass |
| ICE | PTC-11 | 31 | 31 | 31 | 31 | 33 | 33 | 33 | 33 | 2 | 0.4% | Pass |
| OIL | PTC-18 | 362 | 362 | 362 | 362 | 370 | 370 | 370 | 370 | 8 | 1.0% | Pass |
| WATER | PTC-18 | 214 | 214 | 214 | 214 | 212 | 212 | 212 | 212 | 2 | 0.3% | Pass |
| ICE | PTC-18 | 33 | 33 | 33 | 33 | 33 | 33 | 33 | 33 | 0 | 0.0% | Pass |
| OIL | PTC-20 | 367 | 367 | 367 | 367 | 370 | 370 | 370 | 370 | 3 | 0.4% | Pass |
| WATER | PTC-20 | 213 | 213 | 213 | 213 | 212 | 212 | 212 | 212 | 1 | 0.1% | Pass |
| ICE | PTC-20 | 32 | 32 | 32 | 32 | 33 | 33 | 33 | 33 | 1 | 0.2% | Pass |
| OIL | PTC-21 | 359 | 359 | 359 | 359 | 370 | 370 | 370 | 370 | 11 | 1.3% | Pass |
| WATER | PTC-21 | 211 | 211 | 211 | 211 | 212 | 212 | 212 | 212 | 1 | 0.1% | Pass |
| ICE | PTC-21 | 34 | 34 | 34 | 34 | 33 | 33 | 33 | 33 | 1 | 0.2% | Pass |
| OIL | PTC-22 | 360 | 360 | 360 | 360 | 370 | 370 | 370 | 370 | 10 | 1.2% | Pass |
| WATER | PTC-22 | 210 | 210 | 210 | 210 | 212 | 212 | 212 | 212 | 2 | 0.3% | Pass |
| ICE | PTC-22 | 32 | 32 | 32 | 32 | 33 | 33 | 33 | 33 | 1 | 0.2% | Pass |
| OIL | PTC-23 | 361 | 361 | 361 | 361 | 370 | 370 | 370 | 370 | 9 | 1.1% | Pass |
| WATER | PTC-23 | 211 | 211 | 211 | 211 | 212 | 212 | 212 | 212 | 1 | 0.1% | Pass |
| ICE | PTC-23 | 31 | 31 | 31 | 31 | 33 | 33 | 33 | 33 | 2 | 0.4% | Pass |
| OIL | PTC-25 | 361 | 361 | 361 | 361 | 370 | 370 | 370 | 370 | 9 | 1.1% | Pass |
| WATER | PTC-25 | 212 | 212 | 212 | 212 | 212 | 212 | 212 | 212 | 0 | 0.0% | Pass |
| ICE | PTC-25 | 30 | 30 | 30 | 30 | 33 | 33 | 33 | 33 | 3 | 0.6% | Pass |
| OIL | PTC-26 | 364 | 364 | 364 | 364 | 370 | 370 | 370 | 370 | 6 | 0.7% | Pass |
| WATER | PTC-26 | 210 | 210 | 210 | 210 | 212 | 212 | 212 | 212 | 2 | 0.3% | Pass |
| ICE | PTC-26 | 31 | 31 | 31 | 31 | 33 | 33 | 33 | 33 | 2 | 0.4% | Pass |
| OIL | PTC-27 | 360 | 360 | 360 | 360 | 370 | 370 | 370 | 370 | 10 | 1.2% | Pass |
| WATER | PTC-27 | 211 | 211 | 211 | 211 | 212 | 212 | 212 | 212 | 1 | 0.1% | Pass |
| ICE | PTC-27 | 29 | 29 | 29 | 29 | 33 | 33 | 33 | 33 | 4 | 0.8% | Pass |
| OIL | PTC-28 | 360 | 360 | 360 | 360 | 370 | 370 | 370 | 370 | 10 | 1.2% | Pass |
| WATER | PTC-28 | 210 | 210 | 210 | 210 | 212 | 212 | 212 | 212 | 2 | 0.3% | Pass |
| ICE | PTC-28 | 29 | 29 | 29 | 29 | 33 | 33 | 33 | 33 | 4 | 0.8% | Pass |
| OIL | PTC-29 | 362 | 362 | 362 | 362 | 370 | 370 | 370 | 370 | 8 | 1.0% | Pass |
| WATER | PTC-29 | 210 | 210 | 210 | 210 | 212 | 212 | 212 | 212 | 2 | 0.3% | Pass |
| ICE | PTC-29 | 31 | 31 | 31 | 31 | 33 | 33 | 33 | 33 | 2 | 0.4% | Pass |
| OIL | PTC-30 | 364 | 364 | 364 | 364 | 370 | 370 | 370 | 370 | 6 | 0.7% | Pass |
| WATER | PTC-30 | 209 | 209 | 209 | 209 | 212 | 212 | 212 | 212 | 3 | 0.4% | Pass |
| ICE | PTC-30 | 30 | 30 | 30 | 30 | 33 | 33 | 33 | 33 | 3 | 0.6% | Pass |
| OIL | PTC-31 | 361 | 361 | 361 | 361 | 370 | 370 | 370 | 370 | 9 | 1.1% | Pass |
| WATER | PTC-31 | 211 | 211 | 211 | 211 | 212 | 212 | 212 | 212 | 1 | 0.1% | Pass |
| ICE | PTC-31 | 32 | 32 | 32 | 32 | 33 | 33 | 33 | 33 | 1 | 0.2% | Pass |

Calibration Date: 7/7/2011
Calibrated by: David McCune, Daniel Avila, Mike Miller, David Wells, and Mike Edmondson

## TEMPERATURE SYSTEM CALIBRATION
### STYPE

### #72

Reference Thermometer I.D.: T1 F95-195 T2 F95-195 T3 F95-195

| T/C I.D. #72 | Readout I.D. | T/C - Readout °F Reading 1 | Reading 2 | Reading 3 | Average | Reference Thermometer °F Reading 1 | Reading 2 | Reading 3 | Average | Difference °F | %, (°R) | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| OIL | 3WCS | 368 | 368 | 368 | 368 | 370 | 370 | 370 | 370 | 2 | 0.2% | Pass |
| WATER | 3WCS | 217 | 217 | 217 | 217 | 214 | 214 | 214 | 214 | 3 | 0.4% | Pass |
| ICE | 3WCS | 38 | 38 | 38 | 38 | 33 | 33 | 33 | 33 | 5 | 1.0% | Pass |
| OIL | 5WCS | 368 | 368 | 368 | 368 | 370 | 370 | 370 | 370 | 2 | 0.2% | Pass |
| WATER | 5WCS | 218 | 218 | 218 | 218 | 214 | 214 | 214 | 214 | 4 | 0.6% | Pass |
| ICE | 5WCS | 38 | 38 | 38 | 38 | 33 | 33 | 33 | 33 | 5 | 1.0% | Pass |
| OIL | 6WCS | 373 | 373 | 373 | 373 | 370 | 370 | 370 | 370 | 3 | 0.4% | Pass |
| WATER | 6WCS | 221 | 221 | 221 | 221 | 214 | 214 | 214 | 214 | 7 | 1.0% | Pass |
| ICE | 6WCS | 38 | 38 | 38 | 38 | 33 | 33 | 33 | 33 | 5 | 1.0% | Pass |
| OIL | 7WCS | 362 | 362 | 362 | 362 | 370 | 370 | 370 | 370 | 8 | 1.0% | Pass |
| WATER | 7WCS | 212 | 212 | 212 | 212 | 214 | 214 | 214 | 214 | 2 | 0.3% | Pass |
| ICE | 7WCS | 30 | 30 | 30 | 30 | 33 | 33 | 33 | 33 | 3 | 0.6% | Pass |
| OIL | 12WCS | 366 | 366 | 366 | 366 | 370 | 370 | 370 | 370 | 4 | 0.5% | Pass |
| WATER | 12WCS | 209 | 209 | 209 | 209 | 214 | 214 | 214 | 214 | 5 | 0.7% | Pass |
| ICE | 12WCS | 31 | 31 | 31 | 31 | 33 | 33 | 33 | 33 | 2 | 0.4% | Pass |
| OIL | 14WCS | 367 | 367 | 367 | 367 | 370 | 370 | 370 | 370 | 3 | 0.4% | Pass |
| WATER | 14WCS | 213 | 213 | 213 | 213 | 214 | 214 | 214 | 214 | 1 | 0.1% | Pass |
| ICE | 14WCS | 32 | 32 | 32 | 32 | 33 | 33 | 33 | 33 | 1 | 0.2% | Pass |
| OIL | 17WCS | 364 | 364 | 364 | 364 | 370 | 370 | 370 | 370 | 6 | 0.7% | Pass |
| WATER | 17WCS | 211 | 211 | 211 | 211 | 214 | 214 | 214 | 214 | 3 | 0.4% | Pass |
| ICE | 17WCS | 29 | 29 | 29 | 29 | 33 | 33 | 33 | 33 | 4 | 0.8% | Pass |
| OIL | 18WCS | 367 | 367 | 367 | 367 | 370 | 370 | 370 | 370 | 3 | 0.4% | Pass |
| WATER | 18WCS | 213 | 213 | 213 | 213 | 214 | 214 | 214 | 214 | 1 | 0.1% | Pass |
| ICE | 18WCS | 31 | 31 | 31 | 31 | 33 | 33 | 33 | 33 | 2 | 0.4% | Pass |
| OIL | 19WCS | 363 | 363 | 363 | 363 | 370 | 370 | 370 | 370 | 7 | 0.8% | Pass |
| WATER | 19WCS | 212 | 212 | 212 | 212 | 214 | 214 | 214 | 214 | 2 | 0.3% | Pass |
| ICE | 19WCS | 34 | 34 | 34 | 34 | 33 | 33 | 33 | 33 | 1 | 0.2% | Pass |
| OIL | PTC-2 | 368 | 368 | 368 | 368 | 370 | 370 | 370 | 370 | 2 | 0.2% | Pass |
| WATER | PTC-2 | 215 | 215 | 215 | 215 | 214 | 214 | 214 | 214 | 1 | 0.1% | Pass |
| ICE | PTC-2 | 36 | 36 | 36 | 36 | 33 | 33 | 33 | 33 | 3 | 0.6% | Pass |
| OIL | PTC-4 | 368 | 368 | 368 | 368 | 370 | 370 | 370 | 370 | 2 | 0.2% | Pass |
| WATER | PTC-4 | 216 | 216 | 216 | 216 | 214 | 214 | 214 | 214 | 2 | 0.3% | Pass |
| ICE | PTC-4 | 37 | 37 | 37 | 37 | 33 | 33 | 33 | 33 | 4 | 0.8% | Pass |
| OIL | PTC-5 | 370 | 370 | 370 | 370 | 370 | 370 | 370 | 370 | 0 | 0.0% | Pass |
| WATER | PTC-5 | 214 | 214 | 214 | 214 | 214 | 214 | 214 | 214 | 0 | 0.0% | Pass |
| ICE | PTC-5 | 33 | 33 | 33 | 33 | 33 | 33 | 33 | 33 | 0 | 0.0% | Pass |
| OIL | PTC-6 | 370 | 370 | 370 | 370 | 370 | 370 | 370 | 370 | 0 | 0.0% | Pass |
| WATER | PTC-6 | 214 | 214 | 214 | 214 | 214 | 214 | 214 | 214 | 0 | 0.0% | Pass |
| ICE | PTC-6 | 33 | 33 | 33 | 33 | 33 | 33 | 33 | 33 | 0 | 0.0% | Pass |
| OIL | PTC-7 | 369 | 369 | 369 | 369 | 370 | 370 | 370 | 370 | 1 | 0.1% | Pass |
| WATER | PTC-7 | 214 | 214 | 214 | 214 | 214 | 214 | 214 | 214 | 0 | 0.0% | Pass |
| ICE | PTC-7 | 32 | 32 | 32 | 32 | 33 | 33 | 33 | 33 | 1 | 0.2% | Pass |
| OIL | PTC-11 | 368 | 368 | 368 | 368 | 370 | 370 | 370 | 370 | 2 | 0.2% | Pass |
| WATER | PTC-11 | 213 | 213 | 213 | 213 | 214 | 214 | 214 | 214 | 1 | 0.1% | Pass |
| ICE | PTC-11 | 33 | 33 | 33 | 33 | 33 | 33 | 33 | 33 | 0 | 0.0% | Pass |
| OIL | PTC-14 | 370 | 370 | 370 | 370 | 370 | 370 | 370 | 370 | 0 | 0.0% | Pass |
| WATER | PTC-14 | 214 | 214 | 214 | 214 | 214 | 214 | 214 | 214 | 0 | 0.0% | Pass |
| ICE | PTC-14 | 34 | 34 | 34 | 34 | 33 | 33 | 33 | 33 | 1 | 0.2% | Pass |
| OIL | PTC-18 | 370 | 370 | 370 | 370 | 370 | 370 | 370 | 370 | 0 | 0.0% | Pass |
| WATER | PTC-18 | 213 | 213 | 213 | 213 | 214 | 214 | 214 | 214 | 1 | 0.1% | Pass |
| ICE | PTC-18 | 32 | 32 | 32 | 32 | 33 | 33 | 33 | 33 | 1 | 0.2% | Pass |
| OIL | PTC-20 | 371 | 371 | 371 | 371 | 370 | 370 | 370 | 370 | 1 | 0.1% | Pass |
| WATER | PTC-20 | 213 | 213 | 213 | 213 | 214 | 214 | 214 | 214 | 1 | 0.1% | Pass |
| ICE | PTC-20 | 32 | 32 | 32 | 32 | 33 | 33 | 33 | 33 | 1 | 0.2% | Pass |
| OIL | PTC-21 | 369 | 369 | 369 | 369 | 370 | 370 | 370 | 370 | 1 | 0.1% | Pass |
| WATER | PTC-21 | 212 | 212 | 212 | 212 | 214 | 214 | 214 | 214 | 2 | 0.3% | Pass |
| ICE | PTC-21 | 33 | 33 | 33 | 33 | 33 | 33 | 33 | 33 | 0 | 0.0% | Pass |
| OIL | PTC-22 | 368 | 368 | 368 | 368 | 370 | 370 | 370 | 370 | 2 | 0.2% | Pass |
| WATER | PTC-22 | 211 | 211 | 211 | 211 | 214 | 214 | 214 | 214 | 3 | 0.4% | Pass |
| ICE | PTC-22 | 34 | 34 | 34 | 34 | 33 | 33 | 33 | 33 | 1 | 0.2% | Pass |
| OIL | PTC-24 | 370 | 370 | 370 | 370 | 370 | 370 | 370 | 370 | 0 | 0.0% | Pass |
| WATER | PTC-24 | 214 | 214 | 214 | 214 | 214 | 214 | 214 | 214 | 0 | 0.0% | Pass |
| ICE | PTC-24 | 34 | 34 | 34 | 34 | 33 | 33 | 33 | 33 | 1 | 0.2% | Pass |
| OIL | PTC-25 | 368 | 368 | 368 | 368 | 370 | 370 | 370 | 370 | 2 | 0.2% | Pass |
| WATER | PTC-25 | 215 | 215 | 215 | 215 | 214 | 214 | 214 | 214 | 1 | 0.1% | Pass |
| ICE | PTC-25 | 34 | 34 | 34 | 34 | 33 | 33 | 33 | 33 | 1 | 0.2% | Pass |
| OIL | PTC-26 | 369 | 369 | 369 | 369 | 370 | 370 | 370 | 370 | 1 | 0.1% | Pass |
| WATER | PTC-26 | 213 | 213 | 213 | 213 | 214 | 214 | 214 | 214 | 1 | 0.1% | Pass |
| ICE | PTC-26 | 35 | 35 | 35 | 35 | 33 | 33 | 33 | 33 | 2 | 0.4% | Pass |
| OIL | PTC-27 | 369 | 369 | 369 | 369 | 370 | 370 | 370 | 370 | 1 | 0.1% | Pass |
| WATER | PTC-27 | 212 | 212 | 212 | 212 | 214 | 214 | 214 | 214 | 2 | 0.3% | Pass |
| ICE | PTC-27 | 36 | 36 | 36 | 36 | 33 | 33 | 33 | 33 | 3 | 0.6% | Pass |
| OIL | PTC-28 | 370 | 370 | 370 | 370 | 370 | 370 | 370 | 370 | 0 | 0.0% | Pass |
| WATER | PTC-28 | 213 | 213 | 213 | 213 | 214 | 214 | 214 | 214 | 1 | 0.1% | Pass |
| ICE | PTC-28 | 33 | 33 | 33 | 33 | 33 | 33 | 33 | 33 | 0 | 0.0% | Pass |

Calibration Date: 1/3/2011
Calibrated by: David McCune, Daniel Avila, Mike Miller, David Wells, and Mike Edmondson

## TEMPERATURE SYSTEM CALIBRATION
## STYPE

### #72

Reference Thermometer I.D.: T1 F95-195 T2 F95-195 T3 F95-195

| T/C I.D. #72 | Readout I.D. | T/C - Readout °F Reading 1 | Reading 2 | Reading 3 | Average | Reference Thermometer °F Reading 1 | Reading 2 | Reading 3 | Average | Difference °F | %, (°R) | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| OIL | 3WCS | 359 | 359 | 359 | 359 | 370 | 370 | 370 | 370 | 11 | 1.3% | Pass |
| WATER | 3WCS | 212 | 212 | 212 | 212 | 214 | 214 | 214 | 214 | 2 | 0.3% | Pass |
| ICE | 3WCS | 30 | 30 | 30 | 30 | 33 | 33 | 33 | 33 | 3 | 0.6% | Pass |
| OIL | 5WCS | 364 | 364 | 364 | 364 | 370 | 370 | 370 | 370 | 6 | 0.7% | Pass |
| WATER | 5WCS | 211 | 211 | 211 | 211 | 214 | 214 | 214 | 214 | 3 | 0.4% | Pass |
| ICE | 5WCS | 32 | 32 | 32 | 32 | 33 | 33 | 33 | 33 | 1 | 0.2% | Pass |
| OIL | 6WCS | 360 | 360 | 360 | 360 | 370 | 370 | 370 | 370 | 10 | 1.2% | Pass |
| WATER | 6WCS | 210 | 210 | 210 | 210 | 214 | 214 | 214 | 214 | 4 | 0.6% | Pass |
| ICE | 6WCS | 31 | 31 | 31 | 31 | 33 | 33 | 33 | 33 | 2 | 0.4% | Pass |
| OIL | 7WCS | 362 | 362 | 362 | 362 | 370 | 370 | 370 | 370 | 8 | 1.0% | Pass |
| WATER | 7WCS | 210 | 210 | 210 | 210 | 214 | 214 | 214 | 214 | 4 | 0.6% | Pass |
| ICE | 7WCS | 29 | 29 | 29 | 29 | 33 | 33 | 33 | 33 | 4 | 0.8% | Pass |
| OIL | 12WCS | 359 | 359 | 359 | 359 | 370 | 370 | 370 | 370 | 11 | 1.3% | Pass |
| WATER | 12WCS | 211 | 211 | 211 | 211 | 214 | 214 | 214 | 214 | 3 | 0.4% | Pass |
| ICE | 12WCS | 27 | 27 | 27 | 27 | 33 | 33 | 33 | 33 | 6 | 1.2% | Pass |
| OIL | 14WCS | 359 | 359 | 359 | 359 | 370 | 370 | 370 | 370 | 11 | 1.3% | Pass |
| WATER | 14WCS | 210 | 210 | 210 | 210 | 214 | 214 | 214 | 214 | 4 | 0.6% | Pass |
| ICE | 14WCS | 30 | 30 | 30 | 30 | 33 | 33 | 33 | 33 | 3 | 0.6% | Pass |
| OIL | 17WCS | 360 | 360 | 360 | 360 | 370 | 370 | 370 | 370 | 10 | 1.2% | Pass |
| WATER | 17WCS | 213 | 213 | 213 | 213 | 214 | 214 | 214 | 214 | 1 | 0.1% | Pass |
| ICE | 17WCS | 28 | 28 | 28 | 28 | 33 | 33 | 33 | 33 | 5 | 1.0% | Pass |
| OIL | 18WCS | 363 | 363 | 363 | 363 | 370 | 370 | 370 | 370 | 7 | 0.8% | Pass |
| WATER | 18WCS | 210 | 210 | 210 | 210 | 214 | 214 | 214 | 214 | 4 | 0.6% | Pass |
| ICE | 18WCS | 34 | 34 | 34 | 34 | 33 | 33 | 33 | 33 | 1 | 0.2% | Pass |
| OIL | 19WCS | 365 | 365 | 365 | 365 | 370 | 370 | 370 | 370 | 5 | 0.6% | Pass |
| WATER | 19WCS | 213 | 213 | 213 | 213 | 214 | 214 | 214 | 214 | 1 | 0.1% | Pass |
| ICE | 19WCS | 29 | 29 | 29 | 29 | 33 | 33 | 33 | 33 | 4 | 0.8% | Pass |
| OIL | PTC-5 | 364 | 364 | 364 | 364 | 370 | 370 | 370 | 370 | 6 | 0.7% | Pass |
| WATER | PTC-5 | 214 | 214 | 214 | 214 | 214 | 214 | 214 | 214 | 0 | 0.0% | Pass |
| ICE | PTC-5 | 29 | 29 | 29 | 29 | 33 | 33 | 33 | 33 | 4 | 0.8% | Pass |
| OIL | PTC-7 | 363 | 363 | 363 | 363 | 370 | 370 | 370 | 370 | 7 | 0.8% | Pass |
| WATER | PTC-7 | 212 | 212 | 212 | 212 | 214 | 214 | 214 | 214 | 2 | 0.3% | Pass |
| ICE | PTC-7 | 33 | 33 | 33 | 33 | 33 | 33 | 33 | 33 | 0 | 0.0% | Pass |
| OIL | PTC-11 | 362 | 362 | 362 | 362 | 370 | 370 | 370 | 370 | 8 | 1.0% | Pass |
| WATER | PTC-11 | 211 | 211 | 211 | 211 | 214 | 214 | 214 | 214 | 3 | 0.4% | Pass |
| ICE | PTC-11 | 32 | 32 | 32 | 32 | 33 | 33 | 33 | 33 | 1 | 0.2% | Pass |
| OIL | PTC-18 | 361 | 361 | 361 | 361 | 370 | 370 | 370 | 370 | 9 | 1.1% | Pass |
| WATER | PTC-18 | 210 | 210 | 210 | 210 | 214 | 214 | 214 | 214 | 4 | 0.6% | Pass |
| ICE | PTC-18 | 31 | 31 | 31 | 31 | 33 | 33 | 33 | 33 | 2 | 0.4% | Pass |
| OIL | PTC-20 | 360 | 360 | 360 | 360 | 370 | 370 | 370 | 370 | 10 | 1.2% | Pass |
| WATER | PTC-20 | 214 | 214 | 214 | 214 | 214 | 214 | 214 | 214 | 0 | 0.0% | Pass |
| ICE | PTC-20 | 31 | 31 | 31 | 31 | 33 | 33 | 33 | 33 | 2 | 0.4% | Pass |
| OIL | PTC-21 | 361 | 361 | 361 | 361 | 370 | 370 | 370 | 370 | 9 | 1.1% | Pass |
| WATER | PTC-21 | 213 | 213 | 213 | 213 | 214 | 214 | 214 | 214 | 1 | 0.1% | Pass |
| ICE | PTC-21 | 33 | 33 | 33 | 33 | 33 | 33 | 33 | 33 | 0 | 0.0% | Pass |
| OIL | PTC-22 | 363 | 363 | 363 | 363 | 370 | 370 | 370 | 370 | 7 | 0.8% | Pass |
| WATER | PTC-22 | 213 | 213 | 213 | 213 | 214 | 214 | 214 | 214 | 1 | 0.1% | Pass |
| ICE | PTC-22 | 34 | 34 | 34 | 34 | 33 | 33 | 33 | 33 | 1 | 0.2% | Pass |
| OIL | PTC-23 | 364 | 364 | 364 | 364 | 370 | 370 | 370 | 370 | 6 | 0.7% | Pass |
| WATER | PTC-23 | 211 | 211 | 211 | 211 | 214 | 214 | 214 | 214 | 3 | 0.4% | Pass |
| ICE | PTC-23 | 35 | 35 | 35 | 35 | 33 | 33 | 33 | 33 | 2 | 0.4% | Pass |
| OIL | PTC-25 | 365 | 365 | 365 | 365 | 370 | 370 | 370 | 370 | 5 | 0.6% | Pass |
| WATER | PTC-25 | 211 | 211 | 211 | 211 | 214 | 214 | 214 | 214 | 3 | 0.4% | Pass |
| ICE | PTC-25 | 31 | 31 | 31 | 31 | 33 | 33 | 33 | 33 | 2 | 0.4% | Pass |
| OIL | PTC-26 | 361 | 361 | 361 | 361 | 370 | 370 | 370 | 370 | 9 | 1.1% | Pass |
| WATER | PTC-26 | 212 | 212 | 212 | 212 | 214 | 214 | 214 | 214 | 2 | 0.3% | Pass |
| ICE | PTC-26 | 30 | 30 | 30 | 30 | 33 | 33 | 33 | 33 | 3 | 0.6% | Pass |
| OIL | PTC-27 | 362 | 362 | 362 | 362 | 370 | 370 | 370 | 370 | 8 | 1.0% | Pass |
| WATER | PTC-27 | 212 | 212 | 212 | 212 | 214 | 214 | 214 | 214 | 2 | 0.3% | Pass |
| ICE | PTC-27 | 29 | 29 | 29 | 29 | 33 | 33 | 33 | 33 | 4 | 0.8% | Pass |
| OIL | PTC-28 | 363 | 363 | 363 | 363 | 370 | 370 | 370 | 370 | 7 | 0.8% | Pass |
| WATER | PTC-28 | 213 | 213 | 213 | 213 | 214 | 214 | 214 | 214 | 1 | 0.1% | Pass |
| ICE | PTC-28 | 30 | 30 | 30 | 30 | 33 | 33 | 33 | 33 | 3 | 0.6% | Pass |
| OIL | PTC-29 | 363 | 363 | 363 | 363 | 370 | 370 | 370 | 370 | 7 | 0.8% | Pass |
| WATER | PTC-29 | 212 | 212 | 212 | 212 | 214 | 214 | 214 | 214 | 2 | 0.3% | Pass |
| ICE | PTC-29 | 31 | 31 | 31 | 31 | 33 | 33 | 33 | 33 | 2 | 0.4% | Pass |
| OIL | PTC-30 | 365 | 365 | 365 | 365 | 370 | 370 | 370 | 370 | 5 | 0.6% | Pass |
| WATER | PTC-30 | 213 | 213 | 213 | 213 | 214 | 214 | 214 | 214 | 1 | 0.1% | Pass |
| ICE | PTC-30 | 31 | 31 | 31 | 31 | 33 | 33 | 33 | 33 | 2 | 0.4% | Pass |
| OIL | PTC-31 | 362 | 362 | 362 | 362 | 370 | 370 | 370 | 370 | 8 | 1.0% | Pass |
| WATER | PTC-31 | 211 | 211 | 211 | 211 | 214 | 214 | 214 | 214 | 3 | 0.4% | Pass |
| ICE | PTC-31 | 32 | 32 | 32 | 32 | 33 | 33 | 33 | 33 | 1 | 0.2% | Pass |

Calibration Date: 7/7/2011
Calibrated by: David McCune, Daniel Avila, Mike Miller, David Wells, and Mike Edmondson

## TEMPERATURE SYSTEM CALIBRATION
## STYPE

### #73

Reference Thermometer I.D.: T1 F95-195 T2 F95-195 T3 F95-195

| T/C I.D. #73 | Readout I.D. | T/C - Readout °F Reading 1 | Reading 2 | Reading 3 | Average | Reference Thermometer °F Reading 1 | Reading 2 | Reading 3 | Average | Difference °F | %, (°R) | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| OIL | 3WCS | 366 | 366 | 366 | 366 | 370 | 370 | 370 | 370 | 4 | 0.5% | Pass |
| WATER | 3WCS | 213 | 213 | 213 | 213 | 215 | 215 | 215 | 215 | 2 | 0.3% | Pass |
| ICE | 3WCS | 34 | 34 | 34 | 34 | 33 | 33 | 33 | 33 | 1 | 0.2% | Pass |
| OIL | 5WCS | 368 | 368 | 368 | 368 | 370 | 370 | 370 | 370 | 2 | 0.2% | Pass |
| WATER | 5WCS | 218 | 218 | 218 | 218 | 215 | 215 | 215 | 215 | 3 | 0.4% | Pass |
| ICE | 5WCS | 33 | 33 | 33 | 33 | 33 | 33 | 33 | 33 | 0 | 0.0% | Pass |
| OIL | 6WCS | 368 | 368 | 368 | 368 | 370 | 370 | 370 | 370 | 2 | 0.2% | Pass |
| WATER | 6WCS | 219 | 219 | 219 | 219 | 215 | 215 | 215 | 215 | 4 | 0.6% | Pass |
| ICE | 6WCS | 38 | 38 | 38 | 38 | 33 | 33 | 33 | 33 | 5 | 1.0% | Pass |
| OIL | 7WCS | 359 | 359 | 359 | 359 | 370 | 370 | 370 | 370 | 11 | 1.3% | Pass |
| WATER | 7WCS | 213 | 213 | 213 | 213 | 215 | 215 | 215 | 215 | 2 | 0.3% | Pass |
| ICE | 7WCS | 29 | 29 | 29 | 29 | 33 | 33 | 33 | 33 | 4 | 0.8% | Pass |
| OIL | 12WCS | 359 | 359 | 359 | 359 | 370 | 370 | 370 | 370 | 11 | 1.3% | Pass |
| WATER | 12WCS | 214 | 214 | 214 | 214 | 215 | 215 | 215 | 215 | 1 | 0.1% | Pass |
| ICE | 12WCS | 32 | 32 | 32 | 32 | 33 | 33 | 33 | 33 | 1 | 0.2% | Pass |
| OIL | 14WCS | 365 | 365 | 365 | 365 | 370 | 370 | 370 | 370 | 5 | 0.6% | Pass |
| WATER | 14WCS | 214 | 214 | 214 | 214 | 215 | 215 | 215 | 215 | 1 | 0.1% | Pass |
| ICE | 14WCS | 33 | 33 | 33 | 33 | 33 | 33 | 33 | 33 | 0 | 0.0% | Pass |
| OIL | 17WCS | 361 | 361 | 361 | 361 | 370 | 370 | 370 | 370 | 9 | 1.1% | Pass |
| WATER | 17WCS | 212 | 212 | 212 | 212 | 215 | 215 | 215 | 215 | 3 | 0.4% | Pass |
| ICE | 17WCS | 30 | 30 | 30 | 30 | 33 | 33 | 33 | 33 | 3 | 0.6% | Pass |
| OIL | 18WCS | 362 | 362 | 362 | 362 | 370 | 370 | 370 | 370 | 8 | 1.0% | Pass |
| WATER | 18WCS | 214 | 214 | 214 | 214 | 215 | 215 | 215 | 215 | 1 | 0.1% | Pass |
| ICE | 18WCS | 32 | 32 | 32 | 32 | 33 | 33 | 33 | 33 | 1 | 0.2% | Pass |
| OIL | 19WCS | 361 | 361 | 361 | 361 | 370 | 370 | 370 | 370 | 9 | 1.1% | Pass |
| WATER | 19WCS | 213 | 213 | 213 | 213 | 215 | 215 | 215 | 215 | 2 | 0.3% | Pass |
| ICE | 19WCS | 35 | 35 | 35 | 35 | 33 | 33 | 33 | 33 | 2 | 0.4% | Pass |
| OIL | PTC-2 | 363 | 363 | 363 | 363 | 370 | 370 | 370 | 370 | 7 | 0.8% | Pass |
| WATER | PTC-2 | 216 | 216 | 216 | 216 | 215 | 215 | 215 | 215 | 1 | 0.1% | Pass |
| ICE | PTC-2 | 38 | 38 | 38 | 38 | 33 | 33 | 33 | 33 | 5 | 1.0% | Pass |
| OIL | PTC-4 | 368 | 368 | 368 | 368 | 370 | 370 | 370 | 370 | 2 | 0.2% | Pass |
| WATER | PTC-4 | 214 | 214 | 214 | 214 | 215 | 215 | 215 | 215 | 1 | 0.1% | Pass |
| ICE | PTC-4 | 37 | 37 | 37 | 37 | 33 | 33 | 33 | 33 | 4 | 0.8% | Pass |
| OIL | PTC-5 | 368 | 368 | 368 | 368 | 370 | 370 | 370 | 370 | 2 | 0.2% | Pass |
| WATER | PTC-5 | 216 | 216 | 216 | 216 | 215 | 215 | 215 | 215 | 1 | 0.1% | Pass |
| ICE | PTC-5 | 33 | 33 | 33 | 33 | 33 | 33 | 33 | 33 | 0 | 0.0% | Pass |
| OIL | PTC-6 | 368 | 368 | 368 | 368 | 370 | 370 | 370 | 370 | 2 | 0.2% | Pass |
| WATER | PTC-6 | 215 | 215 | 215 | 215 | 215 | 215 | 215 | 215 | 0 | 0.0% | Pass |
| ICE | PTC-6 | 34 | 34 | 34 | 34 | 33 | 33 | 33 | 33 | 1 | 0.2% | Pass |
| OIL | PTC-7 | 366 | 366 | 366 | 366 | 370 | 370 | 370 | 370 | 4 | 0.5% | Pass |
| WATER | PTC-7 | 214 | 214 | 214 | 214 | 215 | 215 | 215 | 215 | 1 | 0.1% | Pass |
| ICE | PTC-7 | 33 | 33 | 33 | 33 | 33 | 33 | 33 | 33 | 0 | 0.0% | Pass |
| OIL | PTC-11 | 365 | 365 | 365 | 365 | 370 | 370 | 370 | 370 | 5 | 0.6% | Pass |
| WATER | PTC-11 | 213 | 213 | 213 | 213 | 215 | 215 | 215 | 215 | 2 | 0.3% | Pass |
| ICE | PTC-11 | 32 | 32 | 32 | 32 | 33 | 33 | 33 | 33 | 1 | 0.2% | Pass |
| OIL | PTC-14 | 365 | 365 | 365 | 365 | 370 | 370 | 370 | 370 | 5 | 0.6% | Pass |
| WATER | PTC-14 | 213 | 213 | 213 | 213 | 215 | 215 | 215 | 215 | 2 | 0.3% | Pass |
| ICE | PTC-14 | 32 | 32 | 32 | 32 | 33 | 33 | 33 | 33 | 1 | 0.2% | Pass |
| OIL | PTC-18 | 366 | 366 | 366 | 366 | 370 | 370 | 370 | 370 | 4 | 0.5% | Pass |
| WATER | PTC-18 | 214 | 214 | 214 | 214 | 215 | 215 | 215 | 215 | 1 | 0.1% | Pass |
| ICE | PTC-18 | 33 | 33 | 33 | 33 | 33 | 33 | 33 | 33 | 0 | 0.0% | Pass |
| OIL | PTC-20 | 365 | 365 | 365 | 365 | 370 | 370 | 370 | 370 | 5 | 0.6% | Pass |
| WATER | PTC-20 | 213 | 213 | 213 | 213 | 215 | 215 | 215 | 215 | 2 | 0.3% | Pass |
| ICE | PTC-20 | 32 | 32 | 32 | 32 | 33 | 33 | 33 | 33 | 1 | 0.2% | Pass |
| OIL | PTC-21 | 367 | 367 | 367 | 367 | 370 | 370 | 370 | 370 | 3 | 0.4% | Pass |
| WATER | PTC-21 | 214 | 214 | 214 | 214 | 215 | 215 | 215 | 215 | 1 | 0.1% | Pass |
| ICE | PTC-21 | 34 | 34 | 34 | 34 | 33 | 33 | 33 | 33 | 1 | 0.2% | Pass |
| OIL | PTC-22 | 367 | 367 | 367 | 367 | 370 | 370 | 370 | 370 | 3 | 0.4% | Pass |
| WATER | PTC-22 | 214 | 214 | 214 | 214 | 215 | 215 | 215 | 215 | 1 | 0.1% | Pass |
| ICE | PTC-22 | 33 | 33 | 33 | 33 | 33 | 33 | 33 | 33 | 0 | 0.0% | Pass |
| OIL | PTC-24 | 364 | 364 | 364 | 364 | 370 | 370 | 370 | 370 | 6 | 0.7% | Pass |
| WATER | PTC-24 | 213 | 213 | 213 | 213 | 215 | 215 | 215 | 215 | 2 | 0.3% | Pass |
| ICE | PTC-24 | 32 | 32 | 32 | 32 | 33 | 33 | 33 | 33 | 1 | 0.2% | Pass |
| OIL | PTC-25 | 365 | 365 | 365 | 365 | 370 | 370 | 370 | 370 | 5 | 0.6% | Pass |
| WATER | PTC-25 | 213 | 213 | 213 | 213 | 215 | 215 | 215 | 215 | 2 | 0.3% | Pass |
| ICE | PTC-25 | 31 | 31 | 31 | 31 | 33 | 33 | 33 | 33 | 2 | 0.4% | Pass |
| OIL | PTC-26 | 364 | 364 | 364 | 364 | 370 | 370 | 370 | 370 | 6 | 0.7% | Pass |
| WATER | PTC-26 | 213 | 213 | 213 | 213 | 215 | 215 | 215 | 215 | 2 | 0.3% | Pass |
| ICE | PTC-26 | 33 | 33 | 33 | 33 | 33 | 33 | 33 | 33 | 0 | 0.0% | Pass |
| OIL | PTC-27 | 365 | 365 | 365 | 365 | 370 | 370 | 370 | 370 | 5 | 0.6% | Pass |
| WATER | PTC-27 | 213 | 213 | 213 | 213 | 215 | 215 | 215 | 215 | 2 | 0.3% | Pass |
| ICE | PTC-27 | 32 | 32 | 32 | 32 | 33 | 33 | 33 | 33 | 1 | 0.2% | Pass |
| OIL | PTC-28 | 366 | 366 | 366 | 366 | 370 | 370 | 370 | 370 | 4 | 0.5% | Pass |
| WATER | PTC-28 | 214 | 214 | 214 | 214 | 215 | 215 | 215 | 215 | 1 | 0.1% | Pass |
| ICE | PTC-28 | 33 | 33 | 33 | 33 | 33 | 33 | 33 | 33 | 0 | 0.0% | Pass |

Calibration Date: 1/3/2011
Calibrated by: David McCune, Daniel Avila, Mike Miller, David Wells, and Mike Edmondson

# TEMPERATURE SYSTEM CALIBRATION
## STYPE

## #73

Reference Thermometer I.D.: T1 F95-195 T2 F95-195 T3 F95-195

| T/C I.D. #73 | Readout I.D. | T/C - Readout °F Reading 1 | Reading 2 | Reading 3 | Average | Reference Thermometer °F Reading 1 | Reading 2 | Reading 3 | Average | Difference °F | %, (°R) | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| OIL | 3WCS | 360 | 360 | 360 | 360 | 370 | 370 | 370 | 370 | 10 | 1.2% | Pass |
| WATER | 3WCS | 210 | 210 | 210 | 210 | 212 | 212 | 212 | 212 | 2 | 0.3% | Pass |
| ICE | 3WCS | 30 | 30 | 30 | 30 | 32 | 32 | 32 | 32 | 2 | 0.4% | Pass |
| OIL | 5WCS | 367 | 367 | 367 | 367 | 370 | 370 | 370 | 370 | 3 | 0.4% | Pass |
| WATER | 5WCS | 211 | 211 | 211 | 211 | 212 | 212 | 212 | 212 | 1 | 0.1% | Pass |
| ICE | 5WCS | 34 | 34 | 34 | 34 | 32 | 32 | 32 | 32 | 2 | 0.4% | Pass |
| OIL | 6WCS | 367 | 367 | 367 | 367 | 370 | 370 | 370 | 370 | 3 | 0.4% | Pass |
| WATER | 6WCS | 210 | 210 | 210 | 210 | 212 | 212 | 212 | 212 | 2 | 0.3% | Pass |
| ICE | 6WCS | 32 | 32 | 32 | 32 | 32 | 32 | 32 | 32 | 0 | 0.0% | Pass |
| OIL | 7WCS | 359 | 359 | 359 | 359 | 370 | 370 | 370 | 370 | 11 | 1.3% | Pass |
| WATER | 7WCS | 212 | 212 | 212 | 212 | 212 | 212 | 212 | 212 | 0 | 0.0% | Pass |
| ICE | 7WCS | 32 | 32 | 32 | 32 | 32 | 32 | 32 | 32 | 0 | 0.0% | Pass |
| OIL | 12WCS | 363 | 363 | 363 | 363 | 370 | 370 | 370 | 370 | 7 | 0.8% | Pass |
| WATER | 12WCS | 213 | 213 | 213 | 213 | 212 | 212 | 212 | 212 | 1 | 0.1% | Pass |
| ICE | 12WCS | 33 | 33 | 33 | 33 | 32 | 32 | 32 | 32 | 1 | 0.2% | Pass |
| OIL | 14WCS | 360 | 360 | 360 | 360 | 370 | 370 | 370 | 370 | 10 | 1.2% | Pass |
| WATER | 14WCS | 213 | 213 | 213 | 213 | 212 | 212 | 212 | 212 | 1 | 0.1% | Pass |
| ICE | 14WCS | 28 | 28 | 28 | 28 | 32 | 32 | 32 | 32 | 4 | 0.8% | Pass |
| OIL | 17WCS | 359 | 359 | 359 | 359 | 370 | 370 | 370 | 370 | 11 | 1.3% | Pass |
| WATER | 17WCS | 211 | 211 | 211 | 211 | 212 | 212 | 212 | 212 | 1 | 0.1% | Pass |
| ICE | 17WCS | 30 | 30 | 30 | 30 | 32 | 32 | 32 | 32 | 2 | 0.4% | Pass |
| OIL | 18WCS | 360 | 360 | 360 | 360 | 370 | 370 | 370 | 370 | 10 | 1.2% | Pass |
| WATER | 18WCS | 210 | 210 | 210 | 210 | 212 | 212 | 212 | 212 | 2 | 0.3% | Pass |
| ICE | 18WCS | 30 | 30 | 30 | 30 | 32 | 32 | 32 | 32 | 2 | 0.4% | Pass |
| OIL | 19WCS | 361 | 361 | 361 | 361 | 370 | 370 | 370 | 370 | 9 | 1.1% | Pass |
| WATER | 19WCS | 209 | 209 | 209 | 209 | 212 | 212 | 212 | 212 | 3 | 0.4% | Pass |
| ICE | 19WCS | 29 | 29 | 29 | 29 | 32 | 32 | 32 | 32 | 3 | 0.6% | Pass |
| OIL | PTC-5 | 363 | 363 | 363 | 363 | 370 | 370 | 370 | 370 | 7 | 0.8% | Pass |
| WATER | PTC-5 | 210 | 210 | 210 | 210 | 212 | 212 | 212 | 212 | 2 | 0.3% | Pass |
| ICE | PTC-5 | 32 | 32 | 32 | 32 | 32 | 32 | 32 | 32 | 0 | 0.0% | Pass |
| OIL | PTC-7 | 365 | 365 | 365 | 365 | 370 | 370 | 370 | 370 | 5 | 0.6% | Pass |
| WATER | PTC-7 | 212 | 212 | 212 | 212 | 212 | 212 | 212 | 212 | 0 | 0.0% | Pass |
| ICE | PTC-7 | 31 | 31 | 31 | 31 | 32 | 32 | 32 | 32 | 1 | 0.2% | Pass |
| OIL | PTC-11 | 361 | 361 | 361 | 361 | 370 | 370 | 370 | 370 | 9 | 1.1% | Pass |
| WATER | PTC-11 | 211 | 211 | 211 | 211 | 212 | 212 | 212 | 212 | 1 | 0.1% | Pass |
| ICE | PTC-11 | 31 | 31 | 31 | 31 | 32 | 32 | 32 | 32 | 1 | 0.2% | Pass |
| OIL | PTC-18 | 360 | 360 | 360 | 360 | 370 | 370 | 370 | 370 | 10 | 1.2% | Pass |
| WATER | PTC-18 | 210 | 210 | 210 | 210 | 212 | 212 | 212 | 212 | 2 | 0.3% | Pass |
| ICE | PTC-18 | 30 | 30 | 30 | 30 | 32 | 32 | 32 | 32 | 2 | 0.4% | Pass |
| OIL | PTC-20 | 364 | 364 | 364 | 364 | 370 | 370 | 370 | 370 | 6 | 0.7% | Pass |
| WATER | PTC-20 | 213 | 213 | 213 | 213 | 212 | 212 | 212 | 212 | 1 | 0.1% | Pass |
| ICE | PTC-20 | 32 | 32 | 32 | 32 | 32 | 32 | 32 | 32 | 0 | 0.0% | Pass |
| OIL | PTC-21 | 363 | 363 | 363 | 363 | 370 | 370 | 370 | 370 | 7 | 0.8% | Pass |
| WATER | PTC-21 | 210 | 210 | 210 | 210 | 212 | 212 | 212 | 212 | 2 | 0.3% | Pass |
| ICE | PTC-21 | 30 | 30 | 30 | 30 | 32 | 32 | 32 | 32 | 2 | 0.4% | Pass |
| OIL | PTC-22 | 362 | 362 | 362 | 362 | 370 | 370 | 370 | 370 | 8 | 1.0% | Pass |
| WATER | PTC-22 | 213 | 213 | 213 | 213 | 212 | 212 | 212 | 212 | 1 | 0.1% | Pass |
| ICE | PTC-22 | 31 | 31 | 31 | 31 | 32 | 32 | 32 | 32 | 1 | 0.2% | Pass |
| OIL | PTC-23 | 360 | 360 | 360 | 360 | 370 | 370 | 370 | 370 | 10 | 1.2% | Pass |
| WATER | PTC-23 | 213 | 213 | 213 | 213 | 212 | 212 | 212 | 212 | 1 | 0.1% | Pass |
| ICE | PTC-23 | 32 | 32 | 32 | 32 | 32 | 32 | 32 | 32 | 0 | 0.0% | Pass |
| OIL | PTC-25 | 363 | 363 | 363 | 363 | 370 | 370 | 370 | 370 | 7 | 0.8% | Pass |
| WATER | PTC-25 | 214 | 214 | 214 | 214 | 212 | 212 | 212 | 212 | 2 | 0.3% | Pass |
| ICE | PTC-25 | 33 | 33 | 33 | 33 | 32 | 32 | 32 | 32 | 1 | 0.2% | Pass |
| OIL | PTC-26 | 361 | 361 | 361 | 361 | 370 | 370 | 370 | 370 | 9 | 1.1% | Pass |
| WATER | PTC-26 | 212 | 212 | 212 | 212 | 212 | 212 | 212 | 212 | 0 | 0.0% | Pass |
| ICE | PTC-26 | 31 | 31 | 31 | 31 | 32 | 32 | 32 | 32 | 1 | 0.2% | Pass |
| OIL | PTC-27 | 362 | 362 | 362 | 362 | 370 | 370 | 370 | 370 | 8 | 1.0% | Pass |
| WATER | PTC-27 | 212 | 212 | 212 | 212 | 212 | 212 | 212 | 212 | 0 | 0.0% | Pass |
| ICE | PTC-27 | 32 | 32 | 32 | 32 | 32 | 32 | 32 | 32 | 0 | 0.0% | Pass |
| OIL | PTC-28 | 365 | 365 | 365 | 365 | 370 | 370 | 370 | 370 | 5 | 0.6% | Pass |
| WATER | PTC-28 | 211 | 211 | 211 | 211 | 212 | 212 | 212 | 212 | 1 | 0.1% | Pass |
| ICE | PTC-28 | 33 | 33 | 33 | 33 | 32 | 32 | 32 | 32 | 1 | 0.2% | Pass |
| OIL | PTC-29 | 359 | 359 | 359 | 359 | 370 | 370 | 370 | 370 | 11 | 1.3% | Pass |
| WATER | PTC-29 | 211 | 211 | 211 | 211 | 212 | 212 | 212 | 212 | 1 | 0.1% | Pass |
| ICE | PTC-29 | 32 | 32 | 32 | 32 | 32 | 32 | 32 | 32 | 0 | 0.0% | Pass |
| OIL | PTC-30 | 360 | 360 | 360 | 360 | 370 | 370 | 370 | 370 | 10 | 1.2% | Pass |
| WATER | PTC-30 | 210 | 210 | 210 | 210 | 212 | 212 | 212 | 212 | 2 | 0.3% | Pass |
| ICE | PTC-30 | 30 | 30 | 30 | 30 | 32 | 32 | 32 | 32 | 2 | 0.4% | Pass |
| OIL | PTC-31 | 361 | 361 | 361 | 361 | 370 | 370 | 370 | 370 | 9 | 1.1% | Pass |
| WATER | PTC-31 | 210 | 210 | 210 | 210 | 212 | 212 | 212 | 212 | 2 | 0.3% | Pass |
| ICE | PTC-31 | 31 | 31 | 31 | 31 | 32 | 32 | 32 | 32 | 1 | 0.2% | Pass |

Calibration Date: 7/7/2011
Calibrated by: David McCune, Daniel Avila, Mike Miller, David Wells, and Mike Edmondson

## TEMPERATURE SYSTEM CALIBRATION
## STYPE

### #89

Reference Thermometer I.D.: T1 F95-195 T2 F95-195 T3 F95-195

| T/C I.D. #89 | Readout I.D. | T/C - Readout °F Reading 1 | Reading 2 | Reading 3 | Average | Reference Thermometer °F Reading 1 | Reading 2 | Reading 3 | Average | Difference °F | %, (°R) | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| OIL | 3WCS | 363 | 363 | 363 | 363 | 360 | 360 | 360 | 360 | 3 | 0.4% | Pass |
| WATER | 3WCS | 215 | 215 | 215 | 215 | 212 | 212 | 212 | 212 | 3 | 0.4% | Pass |
| ICE | 3WCS | 35 | 35 | 35 | 35 | 32 | 32 | 32 | 32 | 3 | 0.6% | Pass |
| OIL | 5WCS | 368 | 368 | 368 | 368 | 360 | 360 | 360 | 360 | 8 | 1.0% | Pass |
| WATER | 5WCS | 217 | 217 | 217 | 217 | 212 | 212 | 212 | 212 | 5 | 0.7% | Pass |
| ICE | 5WCS | 37 | 37 | 37 | 37 | 32 | 32 | 32 | 32 | 5 | 1.0% | Pass |
| OIL | 6WCS | 367 | 367 | 367 | 367 | 360 | 360 | 360 | 360 | 7 | 0.9% | Pass |
| WATER | 6WCS | 216 | 216 | 216 | 216 | 212 | 212 | 212 | 212 | 4 | 0.6% | Pass |
| ICE | 6WCS | 38 | 38 | 38 | 38 | 32 | 32 | 32 | 32 | 6 | 1.2% | Pass |
| OIL | 7WCS | 358 | 358 | 358 | 358 | 360 | 360 | 360 | 360 | 2 | 0.2% | Pass |
| WATER | 7WCS | 212 | 212 | 212 | 212 | 212 | 212 | 212 | 212 | 0 | 0.0% | Pass |
| ICE | 7WCS | 33 | 33 | 33 | 33 | 32 | 32 | 32 | 32 | 1 | 0.2% | Pass |
| OIL | 12WCS | 363 | 363 | 363 | 363 | 360 | 360 | 360 | 360 | 3 | 0.4% | Pass |
| WATER | 12WCS | 213 | 213 | 213 | 213 | 212 | 212 | 212 | 212 | 1 | 0.1% | Pass |
| ICE | 12WCS | 30 | 30 | 30 | 30 | 32 | 32 | 32 | 32 | 2 | 0.4% | Pass |
| OIL | 14WCS | 363 | 363 | 363 | 363 | 360 | 360 | 360 | 360 | 3 | 0.4% | Pass |
| WATER | 14WCS | 212 | 212 | 212 | 212 | 212 | 212 | 212 | 212 | 0 | 0.0% | Pass |
| ICE | 14WCS | 34 | 34 | 34 | 34 | 32 | 32 | 32 | 32 | 2 | 0.4% | Pass |
| OIL | 17WCS | 362 | 362 | 362 | 362 | 360 | 360 | 360 | 360 | 2 | 0.2% | Pass |
| WATER | 17WCS | 211 | 211 | 211 | 211 | 212 | 212 | 212 | 212 | 1 | 0.1% | Pass |
| ICE | 17WCS | 30 | 30 | 30 | 30 | 32 | 32 | 32 | 32 | 2 | 0.4% | Pass |
| OIL | 18WCS | 360 | 360 | 360 | 360 | 360 | 360 | 360 | 360 | 0 | 0.0% | Pass |
| WATER | 18WCS | 214 | 214 | 214 | 214 | 212 | 212 | 212 | 212 | 2 | 0.3% | Pass |
| ICE | 18WCS | 33 | 33 | 33 | 33 | 32 | 32 | 32 | 32 | 1 | 0.2% | Pass |
| OIL | 19WCS | 359 | 359 | 359 | 359 | 360 | 360 | 360 | 360 | 1 | 0.1% | Pass |
| WATER | 19WCS | 210 | 210 | 210 | 210 | 212 | 212 | 212 | 212 | 2 | 0.3% | Pass |
| ICE | 19WCS | 36 | 36 | 36 | 36 | 32 | 32 | 32 | 32 | 4 | 0.8% | Pass |
| OIL | PTC-2 | 367 | 367 | 367 | 367 | 360 | 360 | 360 | 360 | 7 | 0.9% | Pass |
| WATER | PTC-2 | 217 | 217 | 217 | 217 | 212 | 212 | 212 | 212 | 5 | 0.7% | Pass |
| ICE | PTC-2 | 34 | 34 | 34 | 34 | 32 | 32 | 32 | 32 | 2 | 0.4% | Pass |
| OIL | PTC-4 | 370 | 370 | 370 | 370 | 360 | 360 | 360 | 360 | 10 | 1.2% | Pass |
| WATER | PTC-4 | 218 | 218 | 218 | 218 | 212 | 212 | 212 | 212 | 6 | 0.9% | Pass |
| ICE | PTC-4 | 35 | 35 | 35 | 35 | 32 | 32 | 32 | 32 | 3 | 0.6% | Pass |
| OIL | PTC-5 | 367 | 367 | 367 | 367 | 360 | 360 | 360 | 360 | 7 | 0.9% | Pass |
| WATER | PTC-5 | 212 | 212 | 212 | 212 | 212 | 212 | 212 | 212 | 0 | 0.0% | Pass |
| ICE | PTC-5 | 34 | 34 | 34 | 34 | 32 | 32 | 32 | 32 | 2 | 0.4% | Pass |
| OIL | PTC-6 | 365 | 365 | 365 | 365 | 360 | 360 | 360 | 360 | 5 | 0.6% | Pass |
| WATER | PTC-6 | 214 | 214 | 214 | 214 | 212 | 212 | 212 | 212 | 2 | 0.3% | Pass |
| ICE | PTC-6 | 35 | 35 | 35 | 35 | 32 | 32 | 32 | 32 | 3 | 0.6% | Pass |
| OIL | PTC-7 | 364 | 364 | 364 | 364 | 360 | 360 | 360 | 360 | 4 | 0.5% | Pass |
| WATER | PTC-7 | 213 | 213 | 213 | 213 | 212 | 212 | 212 | 212 | 1 | 0.1% | Pass |
| ICE | PTC-7 | 34 | 34 | 34 | 34 | 32 | 32 | 32 | 32 | 2 | 0.4% | Pass |
| OIL | PTC-11 | 364 | 364 | 364 | 364 | 360 | 360 | 360 | 360 | 4 | 0.5% | Pass |
| WATER | PTC-11 | 213 | 213 | 213 | 213 | 212 | 212 | 212 | 212 | 1 | 0.1% | Pass |
| ICE | PTC-11 | 33 | 33 | 33 | 33 | 32 | 32 | 32 | 32 | 1 | 0.2% | Pass |
| OIL | PTC-14 | 364 | 364 | 364 | 364 | 360 | 360 | 360 | 360 | 4 | 0.5% | Pass |
| WATER | PTC-14 | 212 | 212 | 212 | 212 | 212 | 212 | 212 | 212 | 0 | 0.0% | Pass |
| ICE | PTC-14 | 34 | 34 | 34 | 34 | 32 | 32 | 32 | 32 | 2 | 0.4% | Pass |
| OIL | PTC-18 | 363 | 363 | 363 | 363 | 360 | 360 | 360 | 360 | 3 | 0.4% | Pass |
| WATER | PTC-18 | 213 | 213 | 213 | 213 | 212 | 212 | 212 | 212 | 1 | 0.1% | Pass |
| ICE | PTC-18 | 34 | 34 | 34 | 34 | 32 | 32 | 32 | 32 | 2 | 0.4% | Pass |
| OIL | PTC-20 | 363 | 363 | 363 | 363 | 360 | 360 | 360 | 360 | 3 | 0.4% | Pass |
| WATER | PTC-20 | 212 | 212 | 212 | 212 | 212 | 212 | 212 | 212 | 0 | 0.0% | Pass |
| ICE | PTC-20 | 35 | 35 | 35 | 35 | 32 | 32 | 32 | 32 | 3 | 0.6% | Pass |
| OIL | PTC-21 | 363 | 363 | 363 | 363 | 360 | 360 | 360 | 360 | 3 | 0.4% | Pass |
| WATER | PTC-21 | 213 | 213 | 213 | 213 | 212 | 212 | 212 | 212 | 1 | 0.1% | Pass |
| ICE | PTC-21 | 34 | 34 | 34 | 34 | 32 | 32 | 32 | 32 | 2 | 0.4% | Pass |
| OIL | PTC-22 | 362 | 362 | 362 | 362 | 360 | 360 | 360 | 360 | 2 | 0.2% | Pass |
| WATER | PTC-22 | 211 | 211 | 211 | 211 | 212 | 212 | 212 | 212 | 1 | 0.1% | Pass |
| ICE | PTC-22 | 33 | 33 | 33 | 33 | 32 | 32 | 32 | 32 | 1 | 0.2% | Pass |
| OIL | PTC-24 | 360 | 360 | 360 | 360 | 360 | 360 | 360 | 360 | 0 | 0.0% | Pass |
| WATER | PTC-24 | 212 | 212 | 212 | 212 | 212 | 212 | 212 | 212 | 0 | 0.0% | Pass |
| ICE | PTC-24 | 33 | 33 | 33 | 33 | 32 | 32 | 32 | 32 | 1 | 0.2% | Pass |
| OIL | PTC-25 | 362 | 362 | 362 | 362 | 360 | 360 | 360 | 360 | 2 | 0.2% | Pass |
| WATER | PTC-25 | 211 | 211 | 211 | 211 | 212 | 212 | 212 | 212 | 1 | 0.1% | Pass |
| ICE | PTC-25 | 32 | 32 | 32 | 32 | 32 | 32 | 32 | 32 | 0 | 0.0% | Pass |
| OIL | PTC-26 | 363 | 363 | 363 | 363 | 360 | 360 | 360 | 360 | 3 | 0.4% | Pass |
| WATER | PTC-26 | 213 | 213 | 213 | 213 | 212 | 212 | 212 | 212 | 1 | 0.1% | Pass |
| ICE | PTC-26 | 33 | 33 | 33 | 33 | 32 | 32 | 32 | 32 | 1 | 0.2% | Pass |
| OIL | PTC-27 | 362 | 362 | 362 | 362 | 360 | 360 | 360 | 360 | 2 | 0.2% | Pass |
| WATER | PTC-27 | 212 | 212 | 212 | 212 | 212 | 212 | 212 | 212 | 0 | 0.0% | Pass |
| ICE | PTC-27 | 32 | 32 | 32 | 32 | 32 | 32 | 32 | 32 | 0 | 0.0% | Pass |
| OIL | PTC-28 | 363 | 363 | 363 | 363 | 360 | 360 | 360 | 360 | 3 | 0.4% | Pass |
| WATER | PTC-28 | 213 | 213 | 213 | 213 | 212 | 212 | 212 | 212 | 1 | 0.1% | Pass |
| ICE | PTC-28 | 33 | 33 | 33 | 33 | 32 | 32 | 32 | 32 | 1 | 0.2% | Pass |

Calibration Date: 1/3/2011
Calibrated by: David McCune, Daniel Avila, Mike Miller, David Wells, and Mike Edmondson

# TEMPERATURE SYSTEM CALIBRATION
## STYPE

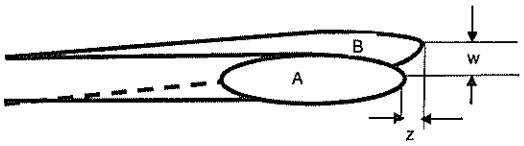
## #89

Reference Thermometer I.D.: T1 F95-195 T2 F95-195 T3 F95-195

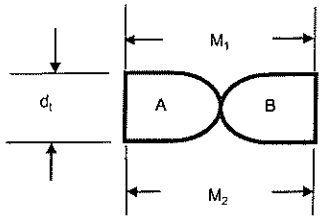
| T/C I.D. #89 | Readout I.D. | T/C - Readout °F Reading 1 | Reading 2 | Reading 3 | Average | Reference Thermometer °F Reading 1 | Reading 2 | Reading 3 | Average | Difference °F | %, (°R) | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| OIL | 3WCS | 360 | 360 | 360 | 360 | 370 | 370 | 370 | 370 | 10 | 1.2% | Pass |
| WATER | 3WCS | 213 | 213 | 213 | 213 | 212 | 212 | 212 | 212 | 1 | 0.1% | Pass |
| ICE | 3WCS | 33 | 33 | 33 | 33 | 32 | 32 | 32 | 32 | 1 | 0.2% | Pass |
| OIL | 5WCS | 359 | 359 | 359 | 359 | 370 | 370 | 370 | 370 | 11 | 1.3% | Pass |
| WATER | 5WCS | 212 | 212 | 212 | 212 | 212 | 212 | 212 | 212 | 0 | 0.0% | Pass |
| ICE | 5WCS | 32 | 32 | 32 | 32 | 32 | 32 | 32 | 32 | 0 | 0.0% | Pass |
| OIL | 6WCS | 359 | 359 | 359 | 359 | 370 | 370 | 370 | 370 | 11 | 1.3% | Pass |
| WATER | 6WCS | 212 | 212 | 212 | 212 | 212 | 212 | 212 | 212 | 0 | 0.0% | Pass |
| ICE | 6WCS | 32 | 32 | 32 | 32 | 32 | 32 | 32 | 32 | 0 | 0.0% | Pass |
| OIL | 7WCS | 361 | 361 | 361 | 361 | 370 | 370 | 370 | 370 | 9 | 1.1% | Pass |
| WATER | 7WCS | 211 | 211 | 211 | 211 | 212 | 212 | 212 | 212 | 1 | 0.1% | Pass |
| ICE | 7WCS | 30 | 30 | 30 | 30 | 32 | 32 | 32 | 32 | 2 | 0.4% | Pass |
| OIL | 12WCS | 360 | 360 | 360 | 360 | 370 | 370 | 370 | 370 | 10 | 1.2% | Pass |
| WATER | 12WCS | 209 | 209 | 209 | 209 | 212 | 212 | 212 | 212 | 3 | 0.4% | Pass |
| ICE | 12WCS | 30 | 30 | 30 | 30 | 32 | 32 | 32 | 32 | 2 | 0.4% | Pass |
| OIL | 14WCS | 359 | 359 | 359 | 359 | 370 | 370 | 370 | 370 | 11 | 1.3% | Pass |
| WATER | 14WCS | 211 | 211 | 211 | 211 | 212 | 212 | 212 | 212 | 1 | 0.1% | Pass |
| ICE | 14WCS | 34 | 34 | 34 | 34 | 32 | 32 | 32 | 32 | 2 | 0.4% | Pass |
| OIL | 17WCS | 362 | 362 | 362 | 362 | 370 | 370 | 370 | 370 | 8 | 1.0% | Pass |
| WATER | 17WCS | 212 | 212 | 212 | 212 | 212 | 212 | 212 | 212 | 0 | 0.0% | Pass |
| ICE | 17WCS | 32 | 32 | 32 | 32 | 32 | 32 | 32 | 32 | 0 | 0.0% | Pass |
| OIL | 18WCS | 364 | 364 | 364 | 364 | 370 | 370 | 370 | 370 | 6 | 0.7% | Pass |
| WATER | 18WCS | 212 | 212 | 212 | 212 | 212 | 212 | 212 | 212 | 0 | 0.0% | Pass |
| ICE | 18WCS | 32 | 32 | 32 | 32 | 32 | 32 | 32 | 32 | 0 | 0.0% | Pass |
| OIL | 19WCS | 360 | 360 | 360 | 360 | 370 | 370 | 370 | 370 | 10 | 1.2% | Pass |
| WATER | 19WCS | 213 | 213 | 213 | 213 | 212 | 212 | 212 | 212 | 1 | 0.1% | Pass |
| ICE | 19WCS | 34 | 34 | 34 | 34 | 32 | 32 | 32 | 32 | 2 | 0.4% | Pass |
| OIL | PTC-5 | 362 | 362 | 362 | 362 | 370 | 370 | 370 | 370 | 8 | 1.0% | Pass |
| WATER | PTC-5 | 211 | 211 | 211 | 211 | 212 | 212 | 212 | 212 | 1 | 0.1% | Pass |
| ICE | PTC-5 | 33 | 33 | 33 | 33 | 32 | 32 | 32 | 32 | 1 | 0.2% | Pass |
| OIL | PTC-7 | 362 | 362 | 362 | 362 | 370 | 370 | 370 | 370 | 8 | 1.0% | Pass |
| WATER | PTC-7 | 211 | 211 | 211 | 211 | 212 | 212 | 212 | 212 | 1 | 0.1% | Pass |
| ICE | PTC-7 | 32 | 32 | 32 | 32 | 32 | 32 | 32 | 32 | 0 | 0.0% | Pass |
| OIL | PTC-11 | 361 | 361 | 361 | 361 | 370 | 370 | 370 | 370 | 9 | 1.1% | Pass |
| WATER | PTC-11 | 213 | 213 | 213 | 213 | 212 | 212 | 212 | 212 | 1 | 0.1% | Pass |
| ICE | PTC-11 | 31 | 31 | 31 | 31 | 32 | 32 | 32 | 32 | 1 | 0.2% | Pass |
| OIL | PTC-18 | 359 | 359 | 359 | 359 | 370 | 370 | 370 | 370 | 11 | 1.3% | Pass |
| WATER | PTC-18 | 214 | 214 | 214 | 214 | 212 | 212 | 212 | 212 | 2 | 0.3% | Pass |
| ICE | PTC-18 | 30 | 30 | 30 | 30 | 32 | 32 | 32 | 32 | 2 | 0.4% | Pass |
| OIL | PTC-20 | 360 | 360 | 360 | 360 | 370 | 370 | 370 | 370 | 10 | 1.2% | Pass |
| WATER | PTC-20 | 213 | 213 | 213 | 213 | 212 | 212 | 212 | 212 | 1 | 0.1% | Pass |
| ICE | PTC-20 | 30 | 30 | 30 | 30 | 32 | 32 | 32 | 32 | 2 | 0.4% | Pass |
| OIL | PTC-21 | 362 | 362 | 362 | 362 | 370 | 370 | 370 | 370 | 8 | 1.0% | Pass |
| WATER | PTC-21 | 212 | 212 | 212 | 212 | 212 | 212 | 212 | 212 | 0 | 0.0% | Pass |
| ICE | PTC-21 | 31 | 31 | 31 | 31 | 32 | 32 | 32 | 32 | 1 | 0.2% | Pass |
| OIL | PTC-22 | 363 | 363 | 363 | 363 | 370 | 370 | 370 | 370 | 7 | 0.8% | Pass |
| WATER | PTC-22 | 211 | 211 | 211 | 211 | 212 | 212 | 212 | 212 | 1 | 0.1% | Pass |
| ICE | PTC-22 | 32 | 32 | 32 | 32 | 32 | 32 | 32 | 32 | 0 | 0.0% | Pass |
| OIL | PTC-23 | 363 | 363 | 363 | 363 | 370 | 370 | 370 | 370 | 7 | 0.8% | Pass |
| WATER | PTC-23 | 211 | 211 | 211 | 211 | 212 | 212 | 212 | 212 | 1 | 0.1% | Pass |
| ICE | PTC-23 | 34 | 34 | 34 | 34 | 32 | 32 | 32 | 32 | 2 | 0.4% | Pass |
| OIL | PTC-25 | 364 | 364 | 364 | 364 | 370 | 370 | 370 | 370 | 6 | 0.7% | Pass |
| WATER | PTC-25 | 210 | 210 | 210 | 210 | 212 | 212 | 212 | 212 | 2 | 0.3% | Pass |
| ICE | PTC-25 | 29 | 29 | 29 | 29 | 32 | 32 | 32 | 32 | 3 | 0.6% | Pass |
| OIL | PTC-26 | 364 | 364 | 364 | 364 | 370 | 370 | 370 | 370 | 6 | 0.7% | Pass |
| WATER | PTC-26 | 211 | 211 | 211 | 211 | 212 | 212 | 212 | 212 | 1 | 0.1% | Pass |
| ICE | PTC-26 | 31 | 31 | 31 | 31 | 32 | 32 | 32 | 32 | 1 | 0.2% | Pass |
| OIL | PTC-27 | 364 | 364 | 364 | 364 | 370 | 370 | 370 | 370 | 6 | 0.7% | Pass |
| WATER | PTC-27 | 212 | 212 | 212 | 212 | 212 | 212 | 212 | 212 | 0 | 0.0% | Pass |
| ICE | PTC-27 | 32 | 32 | 32 | 32 | 32 | 32 | 32 | 32 | 0 | 0.0% | Pass |
| OIL | PTC-28 | 365 | 365 | 365 | 365 | 370 | 370 | 370 | 370 | 5 | 0.6% | Pass |
| WATER | PTC-28 | 212 | 212 | 212 | 212 | 212 | 212 | 212 | 212 | 0 | 0.0% | Pass |
| ICE | PTC-28 | 33 | 33 | 33 | 33 | 32 | 32 | 32 | 32 | 1 | 0.2% | Pass |
| OIL | PTC-29 | 366 | 366 | 366 | 366 | 370 | 370 | 370 | 370 | 4 | 0.5% | Pass |
| WATER | PTC-29 | 211 | 211 | 211 | 211 | 212 | 212 | 212 | 212 | 1 | 0.1% | Pass |
| ICE | PTC-29 | 31 | 31 | 31 | 31 | 32 | 32 | 32 | 32 | 1 | 0.2% | Pass |
| OIL | PTC-30 | 367 | 367 | 367 | 367 | 370 | 370 | 370 | 370 | 3 | 0.4% | Pass |
| WATER | PTC-30 | 210 | 210 | 210 | 210 | 212 | 212 | 212 | 212 | 2 | 0.3% | Pass |
| ICE | PTC-30 | 30 | 30 | 30 | 30 | 32 | 32 | 32 | 32 | 2 | 0.4% | Pass |
| OIL | PTC-31 | 363 | 363 | 363 | 363 | 370 | 370 | 370 | 370 | 7 | 0.8% | Pass |
| WATER | PTC-31 | 209 | 209 | 209 | 209 | 212 | 212 | 212 | 212 | 3 | 0.4% | Pass |
| ICE | PTC-31 | 31 | 31 | 31 | 31 | 32 | 32 | 32 | 32 | 1 | 0.2% | Pass |

Calibration Date: 7/7/2011
Calibrated by: David McCune, Daniel Avila, Mike Miller, David Wells, and Mike Edmondson

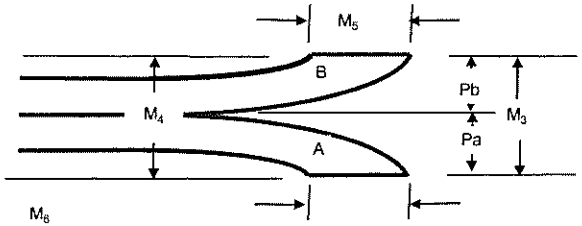
# S Type Pitot Tube Dimensional Calibration Record




Side View




End View




Top View

| Acceptability Criteria | | | z < 1/8" | w < 1/32" | Yes | "3/16" < Dt < 3/8" | n/a | n/a | n/a | n/a | n/a | n/a | 10 degrees | 5 degrees | 1.05 Dt < P < 1.5 Dt | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Pitot ID | Date | Calibrated By | Side View, Impact openings Properly aligned, z < 1/8" | Side View, Impact openings Properly aligned, w < 1/32" | Pa = Pb | Tubing Diameter, dt | M1 | M2 | M3 | M4 | M5 | M6 | Average Face Opening Plane Angle, offset from perpendicular to transverse axis | Average Face Opening Plane Frontal Angle from parallel to Longitudinal Axis | Ratio of P/Dt | Status |
| 005 | 1/5/11 | SS | Y | Y | Y | 0.370 | 0.865 | 0.866 | 0.875 | 0.893 | 0.460 | 0.467 | -0.1 | -1.1 | 1.2 | Pass |
| 027 | 1/5/11 | SS | Y | Y | Y | 0.373 | 0.938 | 0.931 | 0.905 | 0.911 | 0.431 | 0.392 | 0.5 | -0.4 | 1.3 | Pass |
| 044 | 1/5/11 | SS | Y | Y | Y | 0.375 | 0.906 | 0.907 | 0.920 | 0.922 | 0.339 | 0.362 | -0.1 | -0.2 | 1.2 | Pass |
| 062 | 1/5/11 | SS | Y | Y | Y | 0.373 | 0.909 | 0.901 | 0.905 | 0.906 | 0.469 | 0.426 | 0.6 | -0.1 | 1.2 | Pass |
| 072 | 1/5/11 | SS | Y | Y | Y | 0.375 | 0.952 | 0.955 | 0.963 | 0.958 | 0.426 | 0.417 | -0.2 | 0.3 | 1.3 | Pass |
| 073 | 1/5/11 | SS | Y | Y | Y | 0.370 | 0.953 | 0.950 | 0.945 | 0.940 | 0.399 | 0.388 | 0.2 | 0.4 | 1.3 | Pass |
| 089 | 1/5/11 | SS | Y | Y | Y | 0.374 | 0.936 | 0.932 | 0.937 | 0.934 | 0.435 | 0.435 | 0.3 | 0.2 | 1.2 | Pass |

Notes: Reference - Type-S Pitot Tube Calibration Study, Robert F. Vollaro, October 15, 1975
If tube is not visibly deformed, then average face angles to tube axes is presumed to represent each of the individual face angles to the axis

Reference "A Type-S Pitot Tube Calibration Study, Robert F. Vollaro, October 15, 1975
If tube is not visibly deformed it is assumed that Pa = Pb = .5 x avg. of M1 M2, and that average face opening plane angles represent individual angles to tube axis

PRAXAIR

Praxair Distribution, Inc.
5700 S. Alameda St.
Los Angeles, CA 90058
Tel: 323-585-2154
Fax: 714-542-6689

A.3-36

02/10/2011

**PRAXAIR WHSE SANTA ANA CA**
**1545 E EDINGER AVE**
**SANTA ANA, CA 927050000**

Praxair Order No. **15845718**
Customer Reference No.

Product Lot/Batch No. **N109103404**
Praxair Part No. **NI 5.5CE-AS**

# CERTIFICATE OF ANALYSIS

## *Nitrogen, 5.5 Continuous Emission Monitoring Zero*

| Analytes | Specification | Analytical Results | Analytical Principle | Analytical Accuracy |
|---|---|---|---|---|
| **Nitrogen** | **> 99.9995 %** | **> 99.9995 %** | **N** | ------- |
| **Carbon Dioxide** | **< 1 ppm** | **< 0.25 ppm** | **L** | **± 10%** |
| **Carbon Monoxide** | **< 0.5 ppm** | **< 0.5 ppm** | **L** | **± 15%** |
| **Total Hydrocarbons** | **< 0.1 ppm** | **< 0.1 ppm** | **Q** | **± 15%** |
| **Oxides of Nitrogen** | **< 0.1 ppm** | **< 0.01 ppm** | **U** | **± 15%** |
| **Oxygen** | **< 0.5 ppm** | **< 0.38 ppm** | **W** | **± 15%** |
| **Sulfur Dioxide** | **< 0.1 ppm** | **< 0.1 ppm** | **Z** | **± 15%** |
| **Water** | **< 2 ppm** | **< 1.9 ppm** | **P** | **± 10%** |

Analytical Instruments: **Rosemount/Beckman~400A~THC- Total Hydrocarbon Analyzer~FID - Flame Ionization Detector**
**Thermo Environmental~42C~Nitric Oxide Analyzer~Chemiluminescence**
**Horiba Instruments Inc.~GA-360E~NDIR~Non-dispersive Infrared**
**Teledyne Analytical Instuments (TAI)~306WX~Trace Oxygen~Electrochemical**
**AMETEK~921CE~UV SO2 Analyzer~Ultraviolet Absorption**
**Meeco~Aquavolt~Moisture~Electolytic Hygrometer**

Cylinder Style: **AS**
Cylinder Pressure @70F: **2000 psig**
Cylinder Volume: **168 ft3**
Valve Outlet Connection: **CGA-580**
Cylinder No(s). **SA20882**

Filling Method: **Temperature/Pressure**
Date of Fill: **02/03/2011**

Analyst: **Diego Mestanza**

QA Reviewer: **Henry Koung**

This analysis of the product described herein was prepared by Praxair Distribution using instruments whose calibration is certified using Praxair Reference Materials. Praxair Reference Materials are prepared either by weights traceable to the National Institute of Standards and Technology (NIST), Measurement Canada or by using NIST Standard Reference Materials where available.

Note: All expressions for concentration (e.g., % or ppm) are for gas phase, by volume (e.g., ppmv) unless otherwise noted.

Key to Analytical Techniques:

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| A | Flame Ionization with Methanizer | B | Gas Chromatography with Discharge Ionization Detector | C | Gas Chromatography with Electrolytic Conductivity Detector | D | Gas Chromatography with Flame Ionization Detector |
| E | Gas Chromatography with Flame Photometric Detector | F | Gas Chromatography with Helium Ionization Detector | G | Gas Chromatography with Methanizer Carbonizer | H | Gas Chromatography with Photoionization Detector |
| I | Gas Chromatography with Reduction Gas Analyzer | J | Gas Chromatography with Thermal Conductivity Detector | K | Binary Gas Analyzer with Thermal Conductivity Detector | L | Infrared - FTIR or NDIR |
| M | Mass Spectrometry - MS or GC/MS | N | By Difference of Typical Impurities | O | Paramagnetic | P | Specific Water Analyzer |
| Q | Total Hydrocarbon Analyzer | R | Wet Chemical | S | Detector Tube | T | Odor |
| U | Chemiluminescence | V | Gravimetric | W | Electrolytic Cell/Electrochemical | X | Photoionization |
| | Pulsed Fluorescence | Z | UV Spectrometry | | | | |

IPORTANT
The information contained herein has been prepared at your request by personnel within Praxair Distribution. While we believe the information is accurate within the limits of the analytical methods employed and is complete to the extent of the specific analyses performed, we make no warranty or representation as to the suitability of the use of the information for any particular purpose. The information is offered with the understanding that any use of the information is at the sole discretion and risk of the user. In no event shall liability of Praxair Distribution, Inc. arising out of the use of the information contained herein exceed the fee established for providing such information.

PRAXAIR

Praxair
5700 South Alameda Street
Los Angeles, CA 90058
Telephone: (323) 585-2154
Facsimile: (714) 542-6689

A 3-37

DocNumber: 000017814

# CERTIFICATE OF ANALYSIS / EPA PROTOCOL GAS

Delta Air Quality Services, Inc.
1845 N. Case St.
Orange, CA 92865

*Praxair Order Number:* 15260892
*Customer P. O. Number:* 03154242
*Customer Reference Number:*

*Fill Date:* 12/1/2010
*Part Number:* EV NICDOXE53-AS
*Lot Number:* 109035504
*Cylinder Style & Outlet:* AS CGA 580
*Cylinder Pressure & Volume:* 2000 psig 140 cu. ft.

O2 5.00
CO2 10.16
SA 8302
EXP 12/15/13

## *Certified Concentration:*

| Expiration Date: | 12/15/2013 | NIST Traceable |
|---|---|---|
| Cylinder Number: | SA8302 | Analytical Uncertainty: |
| 5.00 % | OXYGEN | ± 1 % |
| 10.16 % | CARBON DIOXIDE | ± 1 % |
| Balance | NITROGEN | |

*Certifcation Information:* *Certification Date:* 12/15/2010 *Term:* 36 Months *Expiration Date:* 12/15/2013

This cylinder was certified according to the 1997 EPA Traceability Protocol, Document #EPA-600/R-97/121, using Procedure G1

Do Not Use this Standard if Pressure is less than 150 PSIG

*Analytical Data:* *(R=Reference Standard, Z=Zero Gas, C=Gas Candidate)*

1. Component: OXYGEN

Requested Concentration: 5 %
Certified Concentration: 5.00 %
Instrument Used: OXYMAT 5E
Analytical Method: PARAMAGNETIC
Last Multipoint Calibration: 12/11/2010

Reference Standard Type: GMIS
Ref. Std. Cylinder # : CC258416
Ref. Std. Conc: 10.01 %
Ref. Std. Traceable to SRM # : vs. 2658a
SRM Sample # : 72-28-B
SRM Cylinder # : CLM-006896

| First Analysis Data: | | | | | | Date: | 12/13/2010 |
|---|---|---|---|---|---|---|---|
| Z: | 0 | R: | 10 | C: | 4.99 | Conc: | 4.99 |
| R: | 10 | Z: | 0 | C: | 5 | Conc: | 5 |
| Z: | 0 | C: | 5 | R: | 10 | Conc: | 5 |
| UOM: | % | | | Mean Test Assay: | | | 5 % |

| Second Analysis Data: | | | | | | Date: | |
|---|---|---|---|---|---|---|---|
| Z: | 0 | R: | 0 | C: | 0 | Conc: | 0 |
| R: | 0 | Z: | 0 | C: | 0 | Conc: | 0 |
| Z: | 0 | C: | 0 | R: | 0 | Conc: | 0 |
| UOM: | % | | | Mean Test Assay: | | | 0 % |

2. Component: CARBON DIOXIDE

Requested Concentration: 10 %
Certified Concentration: 10.16 %
Instrument Used: Siemens Ultramat 5E S/N A12-730
Analytical Method: NDIR
Last Multipoint Calibration: 12/10/2010

Reference Standard Type: GMIS
Ref. Std. Cylinder # : CC66993
Ref. Std. Conc: 10.09%
Ref. Std. Traceable to SRM # : vs. 1675b
SRM Sample # : 6-F-51
SRM Cylinder # : CAL014538

| First Analysis Data: | | | | | | Date: | 12/13/2010 |
|---|---|---|---|---|---|---|---|
| Z: | 0 | R: | 10.15 | C: | 10.25 | Conc: | 10.18 |
| R: | 10.15 | Z: | 0 | C: | 10.23 | Conc: | 10.17 |
| Z: | 0 | C: | 10.19 | R: | 10.15 | Conc: | 10.13 |
| UOM: | % | | | Mean Test Assay: | | | 10.16 % |

| Second Analysis Data: | | | | | | Date: | |
|---|---|---|---|---|---|---|---|
| Z: | 0 | R: | 0 | C: | 0 | Conc: | 0 |
| R: | 0 | Z: | 0 | C: | 0 | Conc: | 0 |
| Z: | 0 | C: | 0 | R: | 0 | Conc: | 0 |
| UOM: | % | | | Mean Test Assay: | | | 0 % |

Analyzed by: Rolonda Kaywood

Certified by: Shameela Jiffrey

Information contained herein has been prepared at your request by qualified experts within Praxair Distribution, Inc. While we believe that the information is accurate within the limits of the analytical methods employed and is complete to the extent of the specific analyses performed, we make no warranty or representation as to the suitability of the use of the information for any purpose. The information is offered with the understanding that any use of the information is at the sole discretion and risk of the user. In no event shall the liability of Praxair Distribution, Inc., arising out of the use of the information con tained herein exceed the fee established for providing such information.

6-9-11

PRAXAIR

A.3-38

**Praxair**
5700 South Alameda Street
Los Angeles, CA 90058
Telephone: (323) 585-2154
Facsimile: (714) 542-6689

DocNumber: 00000021424

# CERTIFICATE OF ANALYSIS / EPA PROTOCOL GAS

*Customer & Order Information:*

Delta AIR QUALITY

*Praxair Order Number:* 10504882-00
*Customer P. O. Number:* 02486379
*Customer Reference Number:* WA260

*Fill Date:*
*Part Number:* EV NICDOXE164AS
*Lot Number:* 109919506
*Cylinder Style & Outlet:* AS 590
*Cylinder Pressure & Volume:* 2000 psi 140 cu ft

O2 8.78
CO2 17.44
CC102051
EXP08/03/12

***Certified Concentration:***

| | | | |
|---|---|---|---|
| Expiration Date: | | 8/3/2012 | |
| Cylinder Number: | | CC 102051 | Analytical Uncertainty: |
| 17.44 | % | CARBON DIOXIDE | ± 1 % |
| 8.78 | % | OXYGEN | ± 1 % |
| | Balance | NITROGEN | |

NOx ppm = N/A NOX Values for Reference Only

*Certification Information:* *Certification Date:* 8/3/2009 *Term:* 36 Months *Expiration Date:* 8/3/2012

This cylinder was certified according to the 1997 EPA Traceability Protocol, Document #EPA-600/R-97/121, using Procedure G1

Do Not Use this Standard if Pressure is less than 150 PSIG

*Analytical Data:* *(R=Reference Standard, Z=Zero Gas, C=Gas Candidate)*

**1 . Component: CARBON DIOXIDE**

Requested Concentration: 18 %
Certified Concentration: 17.44 %
Instrument Used: Siemens Ultramat 5E S/N A12-730
Analytical Method: NDIR
Last Multipoint Calibration: 7/3/2009

Reference Standard Type: GMIS
Ref. Std. Cylinder # : ND 18693
Ref. Std. Conc: 17.83 %
Ref. Std. Traceable to SRM # : vs. 2745
SRM Sample # : 9-8-09
SRM Cylinder # : CAL010768

| First Analysis Data: | | | | | | | Date: | 7/20/2009 |
|---|---|---|---|---|---|---|---|---|
| Z: | 0 | R: | 17.84 | C: | 17.42 | Conc: | 17.41 | |
| R: | 17.84 | Z: | 0 | C: | 17.46 | Conc: | 17.45 | |
| Z: | 0 | C: | 17.46 | R: | 17.84 | Conc: | 17.45 | |
| UOM: | % | | | Mean Test Assay: | | | 17.44 % | |

| Second Analysis Data: | | | | | | | Date: | |
|---|---|---|---|---|---|---|---|---|
| Z: | 0 | R: | 0 | C: | 0 | Conc: | 0 | |
| R: | 0 | Z: | 0 | C: | 0 | Conc: | 0 | |
| Z: | 0 | C: | 0 | R: | 0 | Conc: | 0 | |
| UOM: | % | | | Mean Test Assay: | | | 0 % | |

**2 . Component: OXYGEN**

Requested Concentration: 8.5 %
Certified Concentration: 8.78 %
Instrument Used: OXYMAT 5E
Analytical Method: PARAMAGNETIC
Last Multipoint Calibration: 7/1/2009

Reference Standard Type: GMIS
Ref. Std. Cylinder # : CC 196666
Ref. Std. Conc: 15.10 %
Ref. Std. Traceable to SRM # : vs. 2659a
SRM Sample # : 71-37-B
SRM Cylinder # : CLM-006734

| First Analysis Data: | | | | | | | Date: | 7/20/2009 |
|---|---|---|---|---|---|---|---|---|
| Z: | 0 | R: | 15.1 | C: | 8.78 | Conc: | 8.78 | |
| R: | 15.1 | Z: | 0 | C: | 8.78 | Conc: | 8.78 | |
| Z: | 0 | C: | 8.78 | R: | 15.1 | Conc: | 8.78 | |
| UOM: | % | | | Mean Test Assay: | | | 8.78 % | |

| Second Analysis Data: | | | | | | | Date: | |
|---|---|---|---|---|---|---|---|---|
| Z: | 0 | R: | 0 | C: | 0 | Conc: | 0 | |
| R: | 0 | Z: | 0 | C: | 0 | Conc: | 0 | |
| Z: | 0 | C: | 0 | R: | 0 | Conc: | 0 | |
| UOM: | % | | | Mean Test Assay: | | | 0 % | |

Analyzed by: Ying Yu

Certified by: Nelson Ma

Information contained herein has been prepared at your request by qualified experts within Praxair Distribution, Inc. While we believe that the information is accurate within the limits of the analytical methods employed and is complete to the extent of the specific analyses performed, we make no warranty or representation as to the suitability of the use of the information for any purpose. The information is offered with the understanding that any use of the information is at the sole discretion and risk of the user. In no event shall the liability of Praxair Distribution, Inc., arising out of the use of the information con tained herein exceed the fee established for providing such information.



*Making Our Planet More Productive*

10-5-09 96

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A.3-39

DocNumber: 000018251

# CERTIFICATE OF ANALYSIS / EPA PROTOCOL GAS

Delta Air Quality Services, Inc.
1845 N. Case St.
Orange, CA 92865

*Praxair Order Number:* 15260862
*Customer P. O. Number:* 03154237
*Customer Reference Number:*

*Fill Date:* 12/1/2010
*Part Number:* NI NO22ME-AS
*Lot Number:* 109033502
*Cylinder Style & Outlet:* AS CGA 660
*Cylinder Pressure & Volume:* 2000 psig 140 cu. ft.

NOX 22.7
CC333881
EXP 12/27/12

***Certified Concentration:***

| Expiration Date: | 12/27/2012 | NIST Traceable |
|---|---|---|
| Cylinder Number: | CC333881 | Analytical Uncertainty: |
| 22.5 ppm | NITRIC OXIDE | ± 1 % |
| Balance | NITROGEN | |

**NOx = 22.7 ppm** **NOx for Reference Only**

***Certifcation Information:*** *Certification Date:* 12/27/2010 *Term:* 24 Months *Expiration Date:* 12/27/2012

This cylinder was certified according to the 1997 EPA Traceability Protocol, Document #EPA-600/R-97/121, using Procedure G1

Do Not Use this Standard if Pressure is less than 150 PSIG

***Analytical Data:*** *(R=Reference Standard, Z=Zero Gas, C=Gas Candidate)*

1. **Component: NITRIC OXIDE**

Requested Concentration: 22 ppm
Certified Concentration: 22.5 ppm
Instrument Used: Thermo Electron 42C S/N 518112467
Analytical Method: Chemiluminescence
Last Multipoint Calibration: 12/1/2010

Reference Standard Type: GMIS
Ref. Std. Cylinder # : CC187296
Ref. Std. Conc: 50.2 ppm
Ref. Std. Traceable to SRM # : vs. 1683b
SRM Sample # : 45-U-65
SRM Cylinder # : CAL015626

**First Analysis Data:** **Date:** 12/8/2010

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Z: | 0 | R: | 50.2 | C: | 22.5 | Conc: | 22.5 | | |
| R: | 50.2 | Z: | 0 | C: | 22.5 | Conc: | 22.5 | | |
| Z: | 0 | C: | 22.5 | R: | 50.2 | Conc: | 22.5 | | |
| UOM: | ppm | | | Mean Test Assay: | | | 22.5 ppm | | |

**Second Analysis Data:** **Date:** 12/15/2010

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Z: | 0 | R: | 49.2 | C: | 22.1 | Conc: | 22.5 | | |
| R: | 49.2 | Z: | 0 | C: | 22.1 | Conc: | 22.5 | | |
| Z: | 0 | C: | 22.1 | R: | 49.2 | Conc: | 22.5 | | |
| UOM: | ppm | | | Mean Test Assay: | | | 22.5 ppm | | |

Analyzed by: Ring Yu

Certified by: Helena Tran

Information contained herein has been prepared at your request by qualified experts within Praxair Distribution, Inc. While we believe that the information is accurate within the limits of the analytical methods employed and is complete to the extent of the specific analyses performed, we make no warranty or representation as to the suitability of the use of the information for any purpose. The information is offered with the understanding that any use of the information is at the sole discretion and risk of the user. In no event shall the liability of Praxair Distribution, Inc., arising out of the use of the information con tained herein exceed the fee established for providing such information.

1-18-11 gb

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Praxair
5700 South Alameda Street
Los Angeles, CA 90058
Telephone: (323) 585-2154
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A. 3-40

DocNumber: 000019477

# CERTIFICATE OF ANALYSIS / EPA PROTOCOL GAS

Delta Air Quality Services, Inc.
1845 N. Case St.
Orange, CA 92865

*Praxair Order Number:* 15583553
*Customer P. O. Number:* 03200447
*Customer Reference Number:*

*Fill Date:* 1/12/2011
*Part Number:* NI NO45ME-AS
*Lot Number:* 109101201
*Cylinder Style & Outlet:* AS CGA 660
*Cylinder Pressure & Volume:* 2000 psig 140 cu. ft.

10X47.3
CC76817
XP01/31/13

## *Certified Concentration:*

| | | | |
|---|---|---|---|
| Expiration Date: | 1/31/2013 | | NIST Traceable |
| Cylinder Number: | CC76817 | | Analytical Uncertainty: |
| 46.7 | ppm | NITRIC OXIDE | ± 1 % |
| | Balance | NITROGEN | |

**NOx = 47.3 ppm** **NOx for Reference Only**

*Certifcation Information:* *Certification Date:* 1/31/2011 *Term:* 24 Months *Expiration Date:* 1/31/2013

This cylinder was certified according to the 1997 EPA Traceability Protocol, Document #EPA-600/R-97/121, using Procedure G1

Do Not Use this Standard if Pressure is less than 150 PSIG

*Analytical Data:* *(R=Reference Standard, Z=Zero Gas, C=Gas Candidate)*

1. **Component: NITRIC OXIDE**

Requested Concentration: 45 ppm
Certified Concentration: 46.7 ppm
Instrument Used: Themo Electron 42C S/N 518112467
Analytical Method: Chemiluminescence
Last Multipoint Calibration: 1/10/2011

Reference Standard Type: GMIS
Ref. Std. Cylinder # : CC3352
Ref. Std. Conc: 51.2 ppm
Ref. Std. Traceable to SRM # : vs. 1683b
SRM Sample # : 45-U-65
SRM Cylinder # : CAL015626

| First Analysis Data: | | | | | | Date: | 1/18/2011 |
|---|---|---|---|---|---|---|---|
| Z: | 0 | R: | 51.2 | C: | 46.8 | Conc: | 46.8 |
| R: | 51.2 | Z: | 0 | C: | 46.8 | Conc: | 46.8 |
| Z: | 0 | C: | 46.8 | R: | 51.2 | Conc: | 46.8 |
| UOM: | ppm | | | Mean Test Assay: | | | 46.8 ppm |

| Second Analysis Data: | | | | | | Date: | 1/24/2011 |
|---|---|---|---|---|---|---|---|
| Z: | 0 | R: | 51.2 | C: | 46.5 | Conc: | 46.5 |
| R: | 51.2 | Z: | 0 | C: | 46.6 | Conc: | 46.6 |
| Z: | 0 | C: | 46.6 | R: | 51.2 | Conc: | 46.6 |
| UOM: | ppm | | | Mean Test Assay: | | | 46.6 ppm |

Analyzed by: Jack Fu

Certified by: Eric Yu

Information contained herein has been prepared at your request by qualified experts within Praxair Distribution, Inc. While we believe that the information is accurate within the limits of the analytical methods employed and is complete to the extent of the specific analyses performed, we make no warranty or representation as to the suitability of the use of the information for any purpose. The information is offered with the understanding that any use of the information is at the sole discretion and risk of the user. In no event shall the liability of Praxair Distribution, Inc., arising out of the use of the information con tained herein exceed the fee established for providing such information.

2-4-11 gR

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5700 South Alameda Street
Los Angeles, CA 90058
Telephone: (323) 585-2154
Facsimile: (714) 542-6689

A.3-41

DocNumber: 000018139

# CERTIFICATE OF ANALYSIS / EPA PROTOCOL GAS

Delta Air Quality Services, Inc.
1845 N. Case St.
Orange, CA 92865

*Praxair Order Number:* 15274902
*Customer P. O. Number:* 03155734
*Customer Reference Number:*

*Fill Date:* 4/28/2010
*Part Number:* EV NINX17ME-AS
*Lot Number:* 109011803
*Cylinder Style & Outlet:* AS CGA 660
*Cylinder Pressure & Volume:* 2000 psig 105 cu. ft.

VOz 17.2
SA 8313
EXP 12/21/12

***Certified Concentration:***

| | | | |
|---|---|---|---|
| Expiration Date: | 12/21/2012 | | NIST Traceable |
| Cylinder Number: | SA8313 | | Analytical Uncertainty: |
| 17.2 | ppm | NITROGEN DIOXIDE (as NOx) | ± 1 % |
| | Balance | NITROGEN | |

*Certifcation Information:* *Certification Date:* 12/21/2010 *Term:* 24 Months *Expiration Date:* 12/21/2012

This cylinder was certified according to the 1997 EPA Traceability Protocol, Document #EPA-600/R-97/121, using Procedure G1

Do Not Use this Standard if Pressure is less than 150 PSIG

[NO]=0.2 ppm; for reference only. Last certified concentration was [NOx]=17.0 ppm [NO]=0.2 ppm.

***Analytical Data:*** *(R=Reference Standard, Z=Zero Gas, C=Gas Candidate)*

1 . **Component: NITROGEN DIOXIDE (as NOx)**

Requested Concentration: 17 ppm
Certified Concentration: 17.2 ppm
Instrument Used: Thermo Env. 42H S/N 42H-44979-273
Analytical Method: Chemiluminescence
Last Multipoint Calibration: 12/10/2010

Reference Standard Type: GMIS
Ref. Std. Cylinder # : CC335699
Ref. Std. Conc: 9.90 ppm
Ref. Std. Traceable to SRM # : vs 2628a
SRM Sample # : 49-H-106
SRM Cylinder # : CAL016562

**First Analysis Data:** **Date:** 12/16/2010

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Z: | 0 | R: | 11.09 | C: | 19.52 | Conc: | 17.4 |
| R: | 10.95 | Z: | 0 | C: | 19.4 | Conc: | 17.5 |
| Z: | 0 | C: | 19.52 | R: | 11.21 | Conc: | 17.2 |

UOM: ppm **Mean Test Assay:** 17.4 ppm

**Second Analysis Data:** **Date:**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Z: | 0 | R: | 0 | C: | 0 | Conc: | 0 |
| R: | 0 | Z: | 0 | C: | 0 | Conc: | 0 |
| Z: | 0 | C: | 0 | R: | 0 | Conc: | 0 |

UOM: ppm **Mean Test Assay:** 0 ppm

Analyzed by: Ying Yu

Certified by: Helena Tran

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1-18-11 96

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Los Angeles, CA 90058
Telephone: (323) 585-2154
Facsimile: (714) 542-6689

A.3-42

DocNumber: 000008041

# CERTIFICATE OF ANALYSIS / EPA PROTOCOL GAS

Delta Air Quality Services, Inc.
1845 N. Case St.
Orange, CA 92865

*Praxair Order Number:* 12661840
*Customer P. O. Number:* 02780868
*Customer Reference Number:*

*Fill Date:* 8/25/2009
*Part Number:* EV NINX45ME-AS
*Lot Number:* 109923703
*Cylinder Style & Outlet:* AS CGA 660
*Cylinder Pressure & Volume:* 1800 psig 126 cu. ft.

NO2 45.3
CC307254
EXP 03/19/12

*Certified Concentration:*

| | | | |
|---|---|---|---|
| Expiration Date: | 3/19/2012 | | NIST Traceable |
| Cylinder Number: | CC 307254 | | Analytical Uncertainty: |
| 45.3 | ppm | NITROGEN DIOXIDE (as NOx) | ± 1 % |
| | Balance | NITROGEN | |

*Certifcation Information:* *Certification Date:* 3/19/2010 *Term:* 24 Months *Expiration Date:* 3/19/2012

This cylinder was certified according to the 1997 EPA Traceability Protocol, Document #EPA-600/R-97/121, using Procedure G1

Do Not Use this Standard if Pressure is less than 150 PSIG

Last certified concentration was [NO2]=45.6 ppm (NO=0.2 ppm) on 10/1/2009. NO=0.52 ppm; for reference only.

*Analytical Data:* *(R=Reference Standard, Z=Zero Gas, C=Gas Candidate)*

1. Component: NITROGEN DIOXIDE (as NOx)

Requested Concentration: 45 ppm
Certified Concentration: 45.3 ppm
Instrument Used: Themo Env 42H S/N 42H-44979-273
Analytical Method: Chemiluminescence
Last Multipoint Calibration: 3/8/2010

Reference Standard Type: GMIS
Ref. Std. Cylinder # : CC 256044
Ref. Std. Conc: 50.6 ppm
Ref. Std. Traceable to SRM # : vs 1683b
SRM Sample # : 45-U-65
SRM Cylinder # : CAL015626

**First Analysis Data:** Date: 3/9/2010

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Z: | 0 | R: | 51 | C: | 45.55 | Conc: | 45.2 |
| R: | 51.2 | Z: | 0 | C: | 45.56 | Conc: | 45 |
| Z: | 0 | C: | 45.55 | R: | 51.4 | Conc: | 44.8 |

UOM: ppm Mean Test Assay: 45 ppm

**Second Analysis Data:** Date:

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Z: | 0 | R: | 0 | C: | 0 | Conc: | 0 |
| R: | 0 | Z: | 0 | C: | 0 | Conc: | 0 |
| Z: | 0 | C: | 0 | R: | 0 | Conc: | 0 |

UOM: ppm Mean Test Assay: 0 ppm

Analyzed by: Ben McCauley

Certified by: Ying Yu

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4-2-10

PRAXAIR

**Praxair Distribution Mid-Atlantic**
145 Shimersville Rd.
Bethlehem, PA 18015
Telephone: (610) 317-1608
Facsimile: (610) 758-8382

A.3-43

DocNumber: 000008402

# CERTIFICATE OF ANALYSIS / EPA PROTOCOL GAS

Delta Air Quality Services, Inc.
1845 N. Case St.
Orange, CA 92865

*Praxair Order Number:* 02706774
*Customer P. O. Number:* --None-- 91
*Customer Reference Number:*

*Fill Date:* 12/28/2010
*Part Number:* NI SD13ME-AS
*Lot Number:* 917036221
*Cylinder Style & Outlet:* AS CGA 660
*Cylinder Pressure & Volume:* 2000 psig 140 cu. ft.

SO2 12.9
CC121015
XP 07/12/11

***Certified Concentration:***

| Expiration Date: | 7/12/2011 | NIST Traceable |
|---|---|---|
| Cylinder Number: | CC121015 | Analytical Uncertainty: |
| 12.9 ppm | SULFUR DIOXIDE | ± 1 % |
| Balance | NITROGEN | |

*Certifcation Information:* *Certification Date:* 1/12/2011 *Term:* 6 Months *Expiration Date:* 7/12/2011

This cylinder was certified according to the 1997 EPA Traceability Protocol, Document #EPA-600/R-97/121, using Procedure G1

Do Not Use this Standard if Pressure is less than 150 PSIG

*Analytical Data:* *(R=Reference Standard, Z=Zero Gas, C=Gas Candidate)*

1. **Component: SULFUR DIOXIDE**

Requested Concentration: 13 ppm
Certified Concentration: 12.9 ppm
Instrument Used: SIEMENS ULTRAMAT 5E S/N C7-228
Analytical Method: NON-DISPERSIVE INFRARED
Last Multipoint Calibration: 1/4/2011

Reference Standard Type: GMIS
Ref. Std. Cylinder # : CC121714
Ref. Std. Conc: 15.0 PPM
Ref. Std. Traceable to SRM # : 1693a
SRM Sample # : 96-K-036
SRM Cylinder # : CAL015193

| First Analysis Data: | | | | | | Date: | 1/5/2011 |
|---|---|---|---|---|---|---|---|
| Z: | 0 | R: | 15.2 | C: | 13 | Conc: | 12.857 |
| R: | 15.1 | Z: | 0 | C: | 13 | Conc: | 12.857 |
| Z: | 0 | C: | 13 | R: | 15.2 | Conc: | 12.857 |
| UOM: | PPM | | | Mean Test Assay: | | | 12.857 PPM |

| Second Analysis Data: | | | | | | Date: | 1/12/2011 |
|---|---|---|---|---|---|---|---|
| Z: | 0 | R: | 15.1 | C: | 13 | Conc: | 12.885 |
| R: | 15.2 | Z: | 0 | C: | 13 | Conc: | 12.885 |
| Z: | 0 | C: | 13 | R: | 15.1 | Conc: | 12.885 |
| UOM: | PPM | | | Mean Test Assay: | | | 12.885 PPM |

Analyzed by: Robin Morgan

Certified by: 1/12/11 Michelle Kostik

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2-1-11

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5700 South Alameda Street
Los Angeles, CA 90058
Telephone: (323) 585-2154
Facsimile: (714) 542-6689

A-3-44

DocNumber: 000023217

# CERTIFICATE OF ANALYSIS / EPA PROTOCOL GAS

Delta Air Quality Services, Inc.
1845 N. Case St.
Orange, CA 92865

*Praxair Order Number:* 16412201
*Customer P. O. Number:* 03324563
*Customer Reference Number:*

*Fill Date:* 4/4/2011
*Part Number:* EV NISD22ME-AS
*Lot Number:* 109109412
*Cylinder Style & Outlet:* AS CGA 660
*Cylinder Pressure & Volume:* 2000 psig 140 cu. ft.

$SO_2$ 22.2
CC321694
EXP 10/25/11

## Certified Concentration:

| | | | |
|---|---|---|---|
| Expiration Date: | 10/25/2011 | | NIST Traceable |
| Cylinder Number: | CC321694 | | Analytical Uncertainty: |
| 22.2 | ppm | SULFUR DIOXIDE | ± 1 % |
| | Balance | NITROGEN | |

*Certifcation Information:* *Certification Date:* 4/25/2011 *Term:* 6 Months *Expiration Date:* 10/25/2011

This cylinder was certified according to the 1997 EPA Traceability Prctocol, Document #EPA-600/R-97/121, using Procedure G1

Do Not Use this Standard if Pressure is less than 150 PSIG

*Analytical Data:* *(R=Reference Standard, Z=Zero Gas, C=Gas Candidate)*

1. **Component: SULFUR DIOXIDE**

Requested Concentration: 22 ppm
Certified Concentration: 22.2 ppm
Instrument Used: Ametek 921CE S/N AW-921-S321
Analytical Method: ULTRAVIOLET ABSORPTION
Last Multipoint Calibration: 4/10/2011

Reference Standard Type: GMIS
Ref. Std. Cylinder # : CC167023
Ref. Std. Conc: 49.77 ppm
Ref. Std. Traceable to SRM # : vs. 1693a
SRM Sample # : 96-K-040
SRM Cylinder # : CAL015390

**First Analysis Data:** **Date:** 4/11/2011

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Z: | 0 | R: | 498.4 | C: | 222.3 | Conc: | 22.2 |
| R: | 498.3 | Z: | 0 | C: | 222.4 | Conc: | 22.2 |
| Z: | 0 | C: | 222.6 | R: | 498.5 | Conc: | 22.2 |

UOM: ppm **Mean Test Assay:** 22.2 ppm

**Second Analysis Data:** **Date:** 4/18/2011

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Z: | 0 | R: | 500.7 | C: | 224.4 | Conc: | 22.3 |
| R: | 500.4 | Z: | 0 | C: | 224.3 | Conc: | 22.3 |
| Z: | 0 | C: | 224.5 | R: | 500.3 | Conc: | 22.3 |

UOM: ppm **Mean Test Assay:** 22.3 ppm

Analyzed by: Ying Yu

Certified by: Jack Fu

Information contained herein has been prepared at your request by qualified experts within Praxair Distribution, Inc. While we believe that the information is accurate within the limits of the analytical methods employed and is complete to the extent of the specific analyses performed, we make no warranty or representation as to the suitability of the use of the information for any purpose. The information is offered with the understanding that any use of the information is at the sole discretion and risk of the user. In no event shall the liability of Praxair Distribution, Inc., arising out of the use of the information con tained herein exceed the fee established for providing such information

6-9-11 gs

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Los Angeles, CA 90058
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Facsimile: (714) 542-6689

A.3-45

DocNumber: 000000507

# CERTIFICATE OF ANALYSIS / EPA PROTOCOL GAS

*Customer & Order Information:*

[redacted]

Delta
CO 142
CC 85874
EXP 09/21/12

*Praxair Order Number:* 10952142
*Customer P. O. Number:* 02546449
*Customer Reference Number:*

*Fill Date:* 8/26/2009
*Part Number:* NI CO140E-AS
*Lot Number:* 109923802
*Cylinder Style & Outlet:* AS CGA 350
*Cylinder Pressure & Volume:* 2000 psig 140 cu. ft.

## *Certified Concentration:*

| | | | |
|---|---|---|---|
| Expiration Date: | 9/21/2012 | | NIST Traceable |
| Cylinder Number: | CC 85874 | | Analytical Uncertainty: |
| 142 | ppm | CARBON MONOXIDE | ± 1 % |
| | Balance | NITROGEN | |

*Certifcation Information:* *Certification Date:* 9/21/2009 *Term:* 36 Months *Expiration Date:* 9/21/2012

This cylinder was certified according to the 1997 EPA Traceability Protocol, Document #EPA-600/R-97/121, using Procedure G1

Do Not Use this Standard if Pressure is less than 150 PSIG

*Analytical Data:* *(R=Reference Standard, Z=Zero Gas, C=Gas Candidate)*

1. **Component: CARBON MONOXIDE**

Requested Concentration: 140 ppm
Certified Concentration: 142 ppm
Instrument Used: Siemens Ultramat 5E S/N A12-729
Analytical Method: NDIR
Last Multipoint Calibration: 9/9/2009

Reference Standard Type: GMIS
Ref. Std. Cylinder # : GG 35538
Ref. Std. Conc: 155.4 ppm
Ref. Std. Traceable to SRM # : vs. 2636a
SRM Sample # : 3-I-45
SRM Cylinder # : FF28593

| First Analysis Data: | | | | | | Date: | 9/10/2009 |
|---|---|---|---|---|---|---|---|
| Z: | 0 | R: | 155.4 | C: | 142.2 | Conc: | 142 |
| R: | 155.4 | Z: | 0 | C: | 142.4 | Conc: | 142 |
| Z: | 0 | C: | 142.4 | R: | 155.4 | Conc: | 142 |
| UOM: | ppm | | | Mean Test Assay: | | | 142 ppm |

| Second Analysis Data: | | | | | | Date: | 9/21/2009 |
|---|---|---|---|---|---|---|---|
| Z: | 0 | R: | 155.4 | C: | 143 | Conc: | 143 |
| R: | 155.4 | Z: | 0 | C: | 143 | Conc: | 143 |
| Z: | 0 | C: | 143 | R: | 155.4 | Conc: | 143 |
| UOM: | ppm | | | Mean Test Assay: | | | 143 ppm |

Analyzed by: Ying Yu

Certified by: Nelson Ma

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9-25-09 96

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A.3-46

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5700 South Alameda Street
Los Angeles, CA 90058
Telephone: (323) 585-2154
Facsimile: (714) 542-6689

DocNumber: 00000021060

# CERTIFICATE OF ANALYSIS / EPA PROTOCOL GAS

***Customer & Order Information:***

Delta Air Quality

*Praxair Order Number:* 10251009-00
*Customer P. O. Number:* 02452427
*Customer Reference Number:* WA260

*Fill Date:*
*Part Number:* NI CO240E-AS
*Lot Number:* 109916609
*Cylinder Style & Outlet:* AS 350
*Cylinder Pressure & Volume:* 2000 psi 140 cu ft

CO 248
SA 21216
EXP 07/25/12

***Certified Concentration:***

| | | | |
|---|---|---|---|
| Expiration Date: | | 7/25/2012 | |
| Cylinder Number: | | SA 21216 | Analytical Uncertainty: |
| 248 | ppm | CARBON MONOXIDE | ± 1 % |
| | Balance | NITROGEN | |

NOx ppm = N/A NOX Values for Reference Only

*Certifcation Information:* *Certification Date:* 7/25/2009 *Term:* 36 Months *Expiration Date:* 7/25/2012

This cylinder was certified according to the 1997 EPA Traceability Protocol, Document #EPA-600/R-97/121, using Procedure G1

Do Not Use this Standard if Pressure is less than 150 PSIG

***Analytical Data:*** *(R=Reference Standard, Z=Zero Gas, C=Gas Candidate)*

1 . **Component:** CARBON MONOXIDE

Requested Concentration: 240 ppm
Certified Concentration: 248 ppm
Instrument Used: Siemens Ultramat 5E S/N A12-729
Analytical Method: NDIR
Last Multipoint Calibration: 7/11/2009

Reference Standard Type: GMIS
Ref. Std. Cylinder # : CC 170513
Ref. Std Conc: 252 PPM
Ref. Std. Traceable to SRM # : 2636a
SRM Sample # : 57-9-C
SRM Cylinder # : CLM-004482

**First Analysis Data:** **Date:** 7/16/2009

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Z: | 0 | R: | 252 | C: | 249.6 | Conc: | 250 |
| R: | 252 | Z: | 0 | C: | 247.8 | Conc: | 248 |
| Z: | 0 | C: | 248 | R: | 252 | Conc: | 248 |

UOM: ppm **Mean Test Assay:** 249 ppm

**Second Analysis Data:** **Date:** 7/23/2009

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Z: | 0 | R: | 252 | C: | 247.6 | Conc: | 248 |
| R: | 252 | Z: | 0 | C: | 247.6 | Conc: | 248 |
| Z: | 0 | C: | 247.6 | R: | 252 | Conc: | 248 |

UOM: ppm **Mean Test Assay:** 248 ppm

Analyzed by: Ying Yu

Certified by: Nelson Ma

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*Making Our Planet More Productive*

10-29-1096

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Los Angeles, CA 90058
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A.3-47

DocNumber: 000008613

# CERTIFICATE OF ANALYSIS / EPA PROTOCOL GAS

*Customer & Order Information:*

DELTA AIR QUALITY
SERVICE INC
ORANGE CA 928654

*Praxair Order Number:* 12856764
*Customer P. O. Number:* VERBAL; GARY
*Customer Reference Number:*

*Fill Date:* 3/19/2010
*Part Number:* NI PR25ME-AS
*Lot Number:* 109007802
*Cylinder Style & Outlet:* AS CGA 350
*Cylinder Pressure & Volume:* 2000 psig 140 cu ft.

Propane 24.9
SA 11137
Exp 04/02/13

*Certified Concentration:*

Expiration Date: 4/2/2013
Cylinder Number: SA 11137

24.9 ppm PROPANE
Balance NITROGEN

NIST Traceable
Analytical Uncertainty:
± 1 %

*Certifcation Information:* *Certification Date:* 4/2/2010 *Term:* 36 Months *Expiration Date:* 4/2/2013

This cylinder was certified according to the 1997 EPA Traceability Protocol, Document #EPA-600/R-97/121, using Procedure G1

Do Not Use this Standard if Pressure is less than 150 PSIG

*Analytical Data:* *(R=Reference Standard, Z=Zero Gas, C=Gas Candidate)*

1. Component: PROPANE

Requested Concentration: 25 ppm
Certified Concentration: 24.9 ppm
Instrument Used: HORIBA, FIA-510, 851135122
Analytical Method: Flame Ionization
Last Multipoint Calibration: 3/11/2010

Reference Standard Type: GMIS
Ref. Std Cylinder #: SA 8812
Ref. Std Conc: 25.23 ppm
Ref. Std. Traceable to SRM #: vs 1667b
SRM Sample #: 81-51-H
SRM Cylinder #: CAL-011857

| First Analysis Data: | | | | | | Date: | 4/2/2010 |
|---|---|---|---|---|---|---|---|
| Z: | 0 | R: | 70.5 | C: | 69.6 | Conc: | 24.9 |
| R: | 68.5 | Z: | 0 | C: | 67.3 | Conc: | 24.8 |
| Z: | 0 | C: | 63.9 | R: | 65 | Conc: | 24.8 |
| UOM: | ppm | | | Mean Test Assay: | | | 24.9 ppm |

| Second Analysis Data: | | | | | | Date: | |
|---|---|---|---|---|---|---|---|
| Z: | 0 | R: | 0 | C: | 0 | Conc: | 0 |
| R: | 0 | Z: | 0 | C: | 0 | Conc: | 0 |
| Z: | 0 | C: | 0 | R: | 0 | Conc: | 0 |
| UOM: | ppm | | | Mean Test Assay: | | | 0 ppm |

Analyzed by: Shameela Jiffrey

Shameela Jiffrey

Certified by: NM

Nelson Ma

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4-12-10

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5700 South Alameda Street
Los Angeles, CA 90058
Telephone: (323) 585-2154
Facsimile: (714) 542-6689

A-3-48

DocNumber: 000009227

# CERTIFICATE OF ANALYSIS / EPA PROTOCOL GAS

*Customer & Order Information:*

DELTA AIR QUALITY
SERVICE INC
ORANGE CA 928654

*Praxair Order Number:* 12990993
*Customer P. O. Number:* VERBAL: GARY
*Customer Reference Number:*

*Fill Date:* 4/1/2010
*Part Number:* EV NIPR45ME-AS
*Lot Number:* 109009101
*Cylinder Style & Outlet:* AS CGA 350
*Cylinder Pressure & Volume:* 2000 psig 140 cu ft.

Propane 44.3
SA 3199
EXP 04/19/13

*Certified Concentration:*

| | | | |
|---|---|---|---|
| Expiration Date: | 4/19/2013 | | NIST Traceable |
| Cylinder Number: | SA3199 | | Analytical Uncertainty: |
| 44.3 | ppm | PROPANE | ± 1 % |
| | Balance | NITROGEN | |

*Certification Information:* *Certification Date:* 4/19/2010 *Term:* 36 Months *Expiration Date:* 4/19/2013

This cylinder was certified according to the 1997 EPA Traceability Protocol, Document #EPA-600/R-97/121, using Procedure G1

Do Not Use this Standard if Pressure is less than 150 PSIG

*Analytical Data:* *(R=Reference Standard, Z=Zero Gas, C=Gas Candidate)*

1. Component: PROPANE

Requested Concentration: 45 ppm
Certified Concentration: 44.3 ppm
Instrument Used: HP 5890 Series II+ S/N 3310A48
Analytical Method: G.C. / Flame Ionization
Last Multipoint Calibration: 4/11/2010

Reference Standard Type: GMIS
Ref. Std. Cylinder # : SA 8812
Ref. Std. Conc: 25.23 ppm
Ref. Std. Traceable to SRM # : vs. 1667b
SRM Sample # : 81-51-H
SRM Cylinder # : CAL-011857

| First Analysis Data: | | | | | | Date: | 4/19/2010 |
|---|---|---|---|---|---|---|---|
| Z: | 0 | R: | 220200 | C: | 191126 | Conc: | 44.3 |
| R: | 219782 | Z: | 0 | C: | 191061 | Conc: | 44.3 |
| Z: | 0 | C: | 191096 | R: | 219456 | Conc: | 44.4 |
| UOM: | ppm | | | Mean Test Assay: | | | 44.3 ppm |

| Second Analysis Data: | | | | | | Date: | |
|---|---|---|---|---|---|---|---|
| Z: | 0 | R: | 0 | C: | 0 | Conc: | 0 |
| R: | 0 | Z: | 0 | C: | 0 | Conc: | 0 |
| Z: | 0 | C: | 0 | R: | 0 | Conc: | 0 |
| UOM: | ppm | | | Mean Test Assay: | | | 0 ppm |

Analyzed by: Aruna Nalla

Certified by: Ying Yu

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4-27-10

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Los Angeles, CA 90058
Telephone: (323) 585-2154
Facsimile: (714) 542-6689

A.3-49

DocNumber: 000004498

# CERTIFICATE OF ANALYSIS / EPA PROTOCOL GAS

*Customer & Order Information:*

DELTA AIR QUALITY
SERVICE INC
ORANGE CA 928654

*Praxair Order Number:* 11879741
*Customer P. O. Number:* VERBAL: GARY
*Customer Reference Number:*

*Fill Date:* 12/3/2009
*Part Number:* EV NIPR85ME-AS
*Lot Number:* 109933708
*Cylinder Style & Outlet:* AS CGA 350
*Cylinder Pressure & Volume:* 2000 psig 140 cu. ft.

Propane 86.6
SGAL956
EXP 12/23/12

*Certified Concentration:*

| | | |
|---|---|---|
| Expiration Date: | 12/23/2012 | NIST Traceable |
| Cylinder Number: | SGAL 956 | Analytical Uncertainty: |
| 86.6 ppm | PROPANE | ± 1 % |
| Balance | NITROGEN | |

*Certifcation Information:* *Certification Date:* 12/23/2009 *Term:* 36 Months *Expiration Date:* 12/23/2012

This cylinder was certified according to the 1997 EPA Traceability Protocol, Document #EPA-600/R-97/121, using Procedure G1

Do Not Use this Standard if Pressure is less than 150 PSIG

*Analytical Data:* *(R=Reference Standard, Z=Zero Gas, C=Gas Candidate)*

1. Component: PROPANE

Requested Concentration: 85 ppm
Certified Concentration: 86.6 ppm
Instrument Used: HORIBA, FIA-510, 851135122
Analytical Method: Flame Ionization
Last Multipoint Calibration: 12/20/2009

Reference Standard Type: GMIS
Ref. Std. Cylinder # : SA 19924
Ref. Std. Conc: 99.2 ppm
Ref. Std. Traceable to SRM # : vs. 1668b
SRM Sample # : 83-51-H
SRM Cylinder # : 1668B

| First Analysis Data: | | | | | | Date: | 12/23/2009 |
|---|---|---|---|---|---|---|---|
| Z: | 0 | R: | 280 | C: | 244.4 | Conc: | 86.6 |
| R: | 279.4 | Z: | 0 | C: | 243.9 | Conc: | 86.6 |
| Z: | 0 | C: | 243.1 | R: | 278.5 | Conc: | 86.6 |
| UOM: | ppm | | | Mean Test Assay: | | | 86.6 ppm |

| Second Analysis Data: | | | | | | Date: | |
|---|---|---|---|---|---|---|---|
| Z: | 0 | R: | 0 | C: | 0 | Conc: | 0 |
| R: | 0 | Z: | 0 | C: | 0 | Conc: | 0 |
| Z: | 0 | C: | 0 | R: | 0 | Conc: | 0 |
| UOM: | ppm | | | Mean Test Assay: | | | 0 ppm |

Analyzed by: Nelson Ma
Nelson Ma

Certified by: Shameela Jr
Shameela Jiffrey

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1-5-10 gb

## Continuous Emission Monitoring System

Delta utilizes a mobile emission measurement laboratory for the performance of $O_2$, $CO_2$, CO, $SO_2$, and $NO_x$ measurements. The laboratory is housed in an 18 foot trailer outfitted to provide a clean, quiet, environmentally controlled base for the testing operations. The laboratory has lighting, electrical distribution, air conditioning and heating to support the test instruments and provide for optimal test performance.

$O_2$, $CO_2$, CO, $SO_2$, and $NO_x$ concentrations are measured using an extractive sampling system consisting of a heated probe, a heat traced Teflon sample line connected to a thermo-electrically cooled sample dryer. Following the dryer, the sample is drawn into a Teflon lined pump where it is pressurized and then filtered for delivery to the gas analysis portion of the system.

CO concentration is measured by a Thermo Scientific (Thermo) non-dispersive infrared/gas filter correlation analyzer. The analyzer is microprocessor-based and has user selectable ranges from 0-1 to 0-1000 ppm.

$SO_2$ concentration is measured by a Ametek pulse fluorescence analyzer.

$NO_x$ concentration is determined using a California Analytical chemiluminescence analyzer (model #600CLD). The analyzer has full scale ranges from 2.5 to 10,000 ppm. The analyzer is equipped with a carbon $NO_2$ - NO converter for the determination of total nitrogen oxides without interference from other nitrogen containing compounds.

Oxygen concentration is determined using an AMI electro-chemical cell analyzer (model #201). The analyzer has three full scale ranges; 0-5%, 10%, and 25%. The cell contains an electrolytic fluid that reacts with oxygen to generate an electrical signal proportional to the concentration.

$CO_2$ Is measured using a non-dispersive infrared analyzer manufactured by Horiba Instruments (model #PIR-2000). The analyzer has full scale ranges of up to 0-40%.

The analyzers and sampling system are subjected to a variety of calibration and quality assurance procedures including leak checks, linearity and calibration error determinations before sampling, and system bias and drift determinations as part of each test run. Data are corrected for any observed bias or drift in accordance with the reference methods.

The sampling system is comprised of a stainless steel probe, heated teflon sample line, two-pass thermo-electrically cooled water removal system, teflon lined sample pump and teflon sample line connected to the analyzer gas selection manifold.

## CALIBRATION SEQUENCE AND CALCULATIONS

DEFINITIONS:

1) Analyzer Calibration: Zero and span gas(es) are introduced directly to the analyzer. Adjustments are made to the analyzer zero and upscale readings, as necessary to match the certified concentrations of the calibration gas.

2) Calibration Error: Zero, mid (40-60% of full scale), and high (80-100%) of full scale) calibration gases are introduced directly to the analyzer and the analyzer response to each gas is recorded (without adjustment to the analyzer). The Calibration Error (difference between the analyzer response to the calibration gas and the certified concentration of the calibration gas) must not exceed ±2% of the analyzer full scale for any of the three gases.

3) Analyzer Linearity: Analyzer linearity is defined as the difference between an analyzer response to the mid range gas and the predicted analyzer response to the mid range gas based on the analyzer response to the zero and high range gas. The Analyzer Linearity test is required on a semi-annual basis and must not exceed ±1% of the analyzer range.

4) Sample System Bias: The sample system bias test involves introducing zero and one upscale (mid or high) calibration gas to the entire sampling system and recording the analyzer response. The analyzer response to the calibration gas after it has passed through the entire sample system is compared to the analyzer response to same the calibration gas injected directly to the analyzer. The test is used to determine the effect which the sample system has on the species of interest and correct the measured values for any effect which the system has. The sample system bias is required to be less than ±5% of the analyzer range for both the zero and upscale gas.

5) Analyzer Range: Analyzer range is defined by the EPA as the high span gas value.

PROCEDURES AND CALCULATIONS:

Figure 1 presents a flow chart for the calibration sequence. All calibrations are documented on the Yokogawa strip chart and also in logged as 1-minute electronic averages in the data acquisition system. The appropriate values are marked and the type of calibration performed is written on the chart.

Following assembly of the system, analyzer warm up time, and a successful leak check of the sample system, the calibration/test sequence presented in Figure 1 can begin.

An Analyzer Calibration is performed as necessary by adjusting the zero and span settings of the analyzer. These calibrations are not necessarily recorded on the chart recorder. Calibration Error is then determined at three levels for each range (which is expected to be used) of each analyzer. This check is performed, at a minimum, once at the beginning and once at the end of each test day. The calibration error must not exceed ±2% of the full range of the analyzer as determined by the following equation:

$$\text{Calibration Error} = \frac{\text{Analyzer Response} - \text{Cal. Gas Value}}{\text{Analyzer Range}} * 100\%$$

The data from the Calibration Error test can be used to determine Analyzer Linearity. The analyzer response to the mid gas is predicted using linear regression and the analyzer response to the zero and high calibration gas and the zero and high calibration gas values. The analyzer linearity must be demonstrated on a semi-annual basis using the following equation:

$$\text{Analyzer Linearity} = \frac{\text{Analyzer Response - Predicted Response}}{\text{Analyzer Range}} * 100\%$$

where:

$$\text{Predicted Response} = \frac{\text{Response to High Gas - Response to Zero Gas}}{\text{High Gas Value}} * \text{Mid Gas Value} + \text{Response to Zero Gas}$$

The Sample System Bias test is performed before and after each test run and must not exceed ±5% of the analyzer range for both the zero and upscale span gas. The system bias is calculated using the following equation:

$$\text{Sample System Bias} = \frac{\text{Response to System Bias - Response to Analyzer Cal}}{\text{Analyzer Range}} * 100\%$$

where:

Response to Analyzer Cal = The analyzer response to the last time the same calibration gas was introduced directly to the analyzer (this may be the pre-test calibration error value or a more recent analyzer calibration adjustment)

Zero and Calibration Drift are calculated for each test run based on the analyzer response during the pre- and post-test sample system bias test. Zero and upscale drift must not exceed ±3% of the analyzer range.

$$\text{Analyzer Drift} = \frac{\text{Post - Test System Bias Resonse - Pre - Test System Bias Response}}{\text{Analyzer Range}} * 100\%$$

The pre- and post-test analyzer response during the sample system bias test are used to correct the raw test average for any sample system bias and analyzer drift. The drift/bias corrected data are the actual reported concentrations and are used for subsequent calculations (mass emission rates, lb/MMBtu, corrections to 3% or 15% $O_2$, etc.). The drift/bias corrections is performed using the following equation:

$$C_c = \frac{\overline{C} - C_o}{C_m - C_o} * C_{ma}$$

where:

$C_c$ = Drift/bias corrected concentration

$\overline{C}$ = Raw Test Average

$C_m$ = Average of pre- and post-test response to sample system bias span

$C_o$ = Average of pre- and post-test to sample system bias zero

$C_{ma}$ = Span gas value

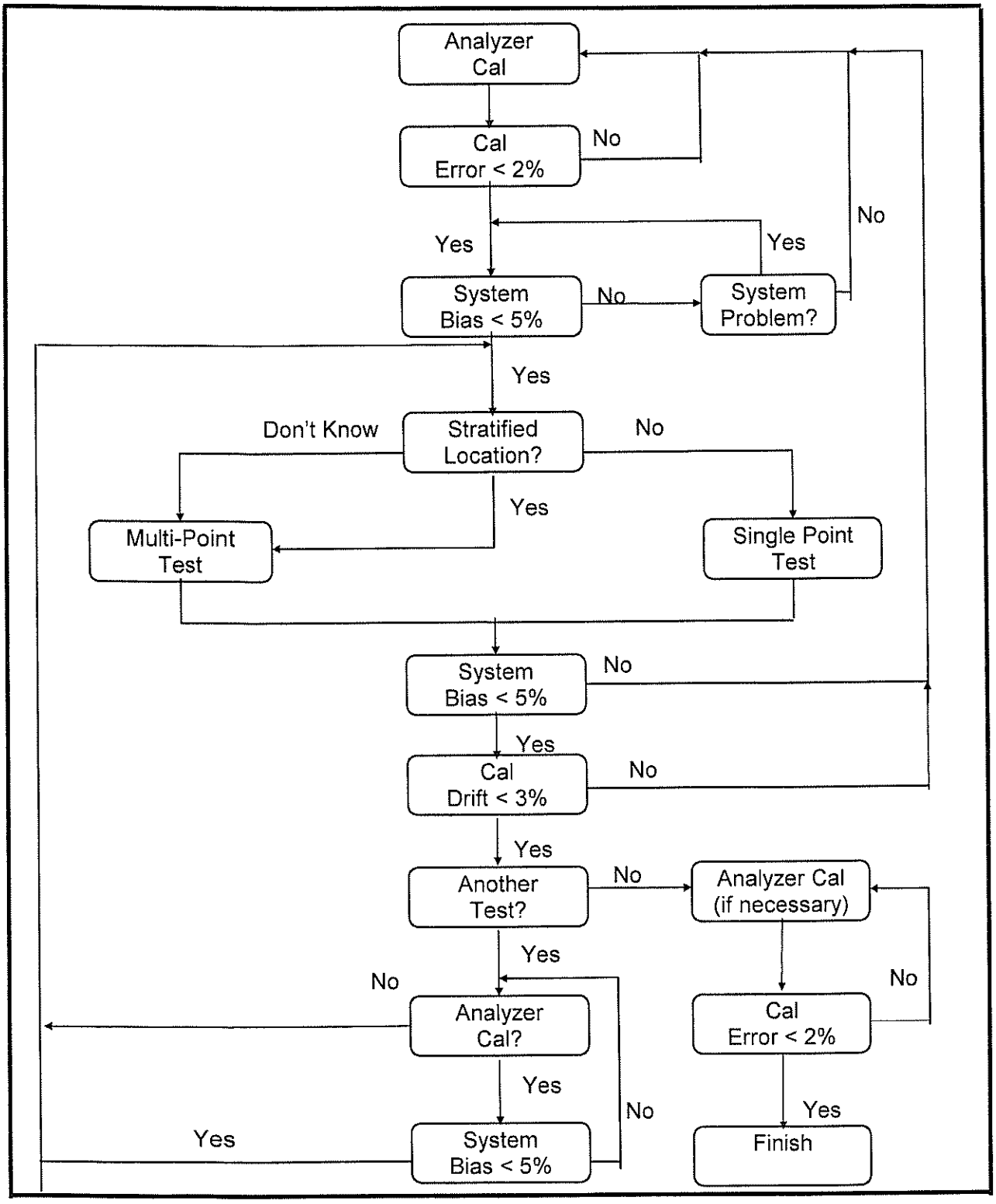


***FIGURE 1: CALIBRATION AND TEST SEQUENCE***

# APPENDIX B PERMIT TO OPERATE AND FACILITY OPERATING DATA

# FACILITY PERMIT TO OPERATE
# EXXONMOBIL OIL CORPORATION

**B.1-2**

## SECTION H: PERMIT TO CONSTRUCT AND TEMPORARY PERMIT TO OPERATE

**The operator shall comply with the terms and conditions set forth below:**

| Equipment | ID No. | Connected To | RECLAIM Source Type/ Monitoring Unit | Emissions* And Requirements | Conditions |
|---|---|---|---|---|---|
| **Process 2: COKING AND RESIDUAL CONDITIONING** | | | | | P13.1 |
| DRUM, 21C-4, COKE, HEIGHT: 59 FT ; DIAMETER: 18 FT 6 IN<br>A/N: 358122<br>Permit to Construct Issued: 05/20/10 | D60 | | | HAP: (10) [40CFR 63 Subpart CC, #2, 6-23-2003]; PM: (9) [RULE 405, 2-7-1986] | |
| DRUM, 21C-5, COKE, HEIGHT: 59 FT ; DIAMETER: 18 FT 6 IN<br>A/N: 358122<br>Permit to Construct Issued: 05/20/10 | D61 | | | HAP: (10) [40CFR 63 Subpart CC, #2, 6-23-2003]; PM: (9) [RULE 405, 2-7-1986] | |
| DRUM, 21C-6, COKE, HEIGHT: 59 FT ; DIAMETER: 18 FT 6 IN<br>A/N: 358122<br>Permit to Construct Issued: 05/20/10 | D62 | | | HAP: (10) [40CFR 63 Subpart CC, #2, 6-23-2003]; PM: (9) [RULE 405, 2-7-1986] | |
| **System 2: SOUTH DELAYED COKING UNIT** | | | | | S1.2, S13.2, S15.1, S15.7 |
| DRUM, 22C-9, COKE, HEIGHT: 59 FT ; DIAMETER: 18 FT 6 IN<br>A/N: 358440<br>Permit to Construct Issued: 05/20/10 | D88 | | | HAP: (10) [40CFR 63 Subpart CC, #2, 6-23-2003]; PM: (9) [RULE 405, 2-7-1986] | |
| DRUM, 22C-10, COKE, HEIGHT: 59 FT ; DIAMETER: 18 FT 6 IN<br>A/N: 358440<br>Permit to Construct Issued: 05/20/10 | D89 | | | HAP: (10) [40CFR 63 Subpart CC, #2, 6-23-2003]; PM: (9) [RULE 405, 2-7-1986] | |
| DRUM, 22C-11, COKE, HEIGHT: 59 FT ; DIAMETER: 18 FT 6 IN<br>A/N: 358440<br>Permit to Construct Issued: 05/20/10 | D90 | | | HAP: (10) [40CFR 63 Subpart CC, #2, 6-23-2003]; PM: (9) [RULE 405, 2-7-1986] | |
| DRUM, 22C-12, COKE, HEIGHT: 59 FT ; DIAMETER: 18 FT 6 IN<br>A/N: 358440<br>Permit to Construct Issued: 05/20/10 | D91 | | | HAP: (10) [40CFR 63 Subpart CC, #2, 6-23-2003]; PM: (9) [RULE 405, 2-7-1986] | |
| **Process 3: Fluid Catalytic Cracking Unit (FCCU)** | | | | | P13.1 |
| **System 1: FCCU, Cracking System** | | | | | S4.1, S13.2, S15.1, S42.2 |

* (1) (1A) (1B) Denotes RECLAIM emission factor
(2) (2A) (2B) Denotes RECLAIM emission rate
(3) Denotes RECLAIM concentration limit
(4) Denotes BACT emission limit
(5) (5A) (5B) Denotes command and control emission limit
(6) Denotes air toxic control rule limit
(7) Denotes NSR applicability limit
(8) (8A) (8B) Denotes 40 CFR limit (e.g. NSPS, NESHAPS, etc.)
(9) See App B for Emission Limits
(10) See section J for NESHAP/MACT requirements

** Refer to section F and G of this permit to determine the monitoring, recordkeeping and reporting requirements for this device.

# FACILITY PERMIT TO OPERATE
# EXXONMOBIL OIL CORPORATION

B.1-3

## SECTION H: PERMIT TO CONSTRUCT AND TEMPORARY PERMIT TO OPERATE

**The operator shall comply with the terms and conditions set forth below:**

| Equipment | ID No. | Connected To | RECLAIM Source Type/ Monitoring Unit | Emissions* And Requirements | Conditions |
|---|---|---|---|---|---|
| **Process 3: Fluid Catalytic Cracking Unit (FCCU)** | | | | | P13.1 |
| REGENERATOR, 2C-3, HEIGHT: 45 FT ; DIAMETER: 37 FT 2 IN<br>512799<br>Permit to Construct Issued: 02/24/11 | D151 | C164 C165 C166 C1590 C1772 C2283 C2284 C2314 | NOX: MAJOR SOURCE**; SOX: MAJOR SOURCE** | **CO: 500 PPMV (8) [40CFR 60 Subpart J, 6-24-2008; CONSENT DECREE CIVIL CASE No. 05 C 5809, 12-13-2005]; CO: 2000 PPMV (5) [RULE 407, 4-2-1982]; HAP: (10) [40CFR 63 Subpart UUU, #2, 4-20-2006]; NH3: 10 PPMV (5) [RULE 1105.1, 11-7-2003]; NOX: 20 PPMV (8) [ CONSENT DECREE CIVIL CASE No. 05 C 5809, 12-13-2005]; NOX: 40 PPMV (8A) [ CONSENT DECREE CIVIL CASE No. 05 C 5809, 12-13-2005]; NOX: 140 PPMV (8B) [ CONSENT DECREE CIVIL CASE No. 05 C 5809, 12-13-2005]; PM: (9) [RULE 404, 2-7-1986; RULE 405, 2-7-1986]; PM: 0.1 GRAINS/SCF (5) [RULE 409, 8-7-1981]; PM: 1 LB(S)/1000 LBS (8) [40CFR 60 Subpart J, 6-24-2008]; PM10: 0.005 GRAINS/SCF (5) [RULE 1105.1, 11-7-2003]; PM10: 2.8 LBS/1000 BBLS (5A) [RULE 1105.1, 11-7-2003]; PM10: 3.6 LBS/HR (5B) [RULE 1105.1, 11-7-2003]; SOX: 25 PPMV (8) [ CONSENT DECREE CIVIL CASE No. 05 C 5809, 12-13-2005]; SOX: 50 PPMV (8A) [40CFR 60 Subpart J,** | A63.4, A99.1, A99.2, A99.3, A195.2, A195.3, A195.4, A195.5, A195.6, A195.7, A195.8, D29.3, D82.2, D82.5, D90.4, E193.18, E193.20, E448.2, H23.17, K67.14, K67.15 |

* (1) (1A) (1B) Denotes RECLAIM emission factor
(2) (2A) (2B) Denotes RECLAIM emission rate
(3) Denotes RECLAIM concentration limit
(4) Denotes BACT emission limit
(5) (5A) (5B) Denotes command and control emission limit
(6) Denotes air toxic control rule limit
(7) Denotes NSR applicability limit
(8) (8A) (8B) Denotes 40 CFR limit (e.g. NSPS, NESHAPS, etc.)
(9) See App B for Emission Limits
(10) See section J for NESHAP/MACT requirements

** Refer to section F and G of this permit to determine the monitoring, recordkeeping and reporting requirements for this device.

# FACILITY PERMIT TO OPERATE
# EXXONMOBIL OIL CORPORATION

**B.1-4**

## SECTION H: PERMIT TO CONSTRUCT AND TEMPORARY PERMIT TO OPERATE

**The operator shall comply with the terms and conditions set forth below:**

| Equipment | ID No. | Connected To | RECLAIM Source Type/ Monitoring Unit | Emissions* And Requirements | Conditions |
|---|---|---|---|---|---|
| **Process 3: Fluid Catalytic Cracking Unit (FCCU)** | | | | | P13.1 |
| INJECTOR, FCCU CYCLE OIL/HYDROTREATED GAS OIL<br><br>INJECTOR, HOPPER, CO PROMOTER CATALYST, 2G-19, D: 2 FT, H: 4 FT 4 IN<br><br>INJECTOR, CATALYST ADDITIVES (GRACE DAVISON OLEFINSMAX ZSM-5), CO PROMOTER (GRACE DAVISON CP-5)<br><br>INJECTOR, BASE CATALYST (GRACE DAVISON GENESIS-2634), BASE CATALYST (SINOPEC RIPP ZDOS-T), BASE CATALYST (GRACE DAVISON ALCYON-U411) | D2423<br><br>D2424 | | | 6-24-2008; CONSENT DECREE CIVIL CASE No. 05 C 5809, 12-13-2005] | |
| VESSEL, ABRASIVE CHARGE/INJECTION, 2C-X, CRUSHED WALNUT SHELLS, LOCATED UPSTREAM OF THE EXPANDER, HEIGHT: 4 FT 1 IN; DIAMETER: 2 FT 2 IN<br>A/N: 485908<br>Permit to Construct Issued: 12/09/08 | D2278 | C164 | | | C1.66, E175.2 |

* (1) (1A) (1B) Denotes RECLAIM emission factor
(2) (2A) (2B) Denotes RECLAIM emission rate
(3) Denotes RECLAIM concentration limit
(4) Denotes BACT emission limit
(5) (5A) (5B) Denotes command and control emission limit
(6) Denotes air toxic control rule limit
(7) Denotes NSR applicability limit
(8) (8A) (8B) Denotes 40 CFR limit (e.g. NSPS, NESHAPS, etc.)
(9) See App B for Emission Limits
(10) See section J for NESHAP/MACT requirements

** Refer to section F and G of this permit to determine the monitoring, recordkeeping and reporting requirements for this device.

# FACILITY PERMIT TO OPERATE
# EXXONMOBIL OIL CORPORATION

**B.1-5**

## SECTION H: PERMIT TO CONSTRUCT AND TEMPORARY PERMIT TO OPERATE

**The operator shall comply with the terms and conditions set forth below:**

| Equipment | ID No. | Connected To | RECLAIM Source Type/ Monitoring Unit | Emissions* And Requirements | Conditions |
|---|---|---|---|---|---|
| **Process 3: Fluid Catalytic Cracking Unit (FCCU)** | | | | | P13.1 |
| STACK, 2F-7, WITH EMERGENCY BYPASS DUCTING, (CONNECTING ESP & BYPASS SCR, WASTE HEAT BOILER & ID FAN). HEIGHT: 89 FT ; DIAMETER: 11 FT 4 IN<br>A/N: 485908<br>Permit to Construct Issued: 12/09/08 | S1739 | C1772 | | | |
| **System 2: FCCU AIR POLLUTION CONTROL SYSTEM** | | | | | |
| BOILER, 2F-3, CARBON MONOXIDE WASTE HEAT, NATURAL GAS, REFINERY GAS, WITH LOW NOX BURNER, 464 MMBTU/HR WITH<br>A/N: 458744<br>Permit to Construct Issued: 03/27/07<br><br>BURNER, NATURAL GAS, REFINERY GAS, FOUR LO-NOX, WITH LOW NOX BURNER, 464 MMBTU/HR | C164 | D151 D2278 D2404 | NOX: MAJOR SOURCE**; SOX: MAJOR SOURCE** | CO: 2000 PPMV (5) [RULE 407, 4-2-1982]; PM: 0.01 GRAINS/SCF (5A) [RULE 476, 10-8-1976]; PM: 0.1 GRAINS/SCF (5) [RULE 409, 8-7-1981]; PM: 11 LBS/HR (5B) [RULE 476, 10-8-1976] | B61.3, D82.2, D90.12, E193.16, E448.2, H23.13, K67.14 |

* (1) (1A) (1B) Denotes RECLAIM emission factor
(2) (2A) (2B) Denotes RECLAIM emission rate
(3) Denotes RECLAIM concentration limit
(4) Denotes BACT emission limit
(5) (5A) (5B) Denotes command and control emission limit
(6) Denotes air toxic control rule limit
(7) Denotes NSR applicability limit
(8) (8A) (8B) Denotes 40 CFR limit (e.g. NSPS, NESHAPS, etc.)
(9) See App B for Emission Limits
(10) See section J for NESHAP/MACT requirements

** Refer to section F and G of this permit to determine the monitoring, recordkeeping and reporting requirements for this device.

# FACILITY PERMIT TO OPERATE
# EXXONMOBIL OIL CORPORATION

**B.1-6**

## SECTION H: PERMIT TO CONSTRUCT AND TEMPORARY PERMIT TO OPERATE

**The operator shall comply with the terms and conditions set forth below:**

| Equipment | ID No. | Connected To | RECLAIM Source Type/ Monitoring Unit | Emissions* And Requirements | Conditions |
|---|---|---|---|---|---|
| **Process 3: Fluid Catalytic Cracking Unit (FCCU)** | | | | | P13.1 |
| ELECTROSTATIC PRECIPITATOR, 2D-2, PLATE-WIRE, DRY, NEGATIVE CORONA, 2 CHAMBERS, 3 FIELDS, 3 T/R SETS, 12 CELLS, BUELL, IN SERIES WITH 2D-1, IDLE MODE, 18 FT L, 57 FT 6 IN W, 30 FT H, 300 KVA WITH<br>A/N: 512801<br>Permit to Construct Issued: 02/24/11 | C166 | D151 D2404 | | | C12.1, C12.2, D29.4, D90.8, D90.9, D90.10, D90.11, D323.1, E102.2, E193.10, E193.19, K40.6, K67.10, K67.16 |
| AMMONIA INJECTION, GRID 1, UPSTREAM OF ESP 2D-1 | | | | | |
| HOPPER, CATALYST DUST, 8 TOTAL | | | | | |

* (1) (1A) (1B) Denotes RECLAIM emission factor
(2) (2A) (2B) Denotes RECLAIM emission rate
(3) Denotes RECLAIM concentration limit
(4) Denotes BACT emission limit
(5) (5A) (5B) Denotes command and control emission limit
(6) Denotes air toxic control rule limit
(7) Denotes NSR applicability limit
(8) (8A) (8B) Denotes 40 CFR limit (e.g. NSPS, NESHAPS, etc.)
(9) See App B for Emission Limits
(10) See section J for NESHAP/MACT requirements

** Refer to section F and G of this permit to determine the monitoring, recordkeeping and reporting requirements for this device.

# FACILITY PERMIT TO OPERATE
# EXXONMOBIL OIL CORPORATION

**B.1-7**

## SECTION H: PERMIT TO CONSTRUCT AND TEMPORARY PERMIT TO OPERATE

**The operator shall comply with the terms and conditions set forth below:**

| Equipment | ID No. | Connected To | RECLAIM Source Type/ Monitoring Unit | Emissions* And Requirements | Conditions |
|---|---|---|---|---|---|
| **Process 3: Fluid Catalytic Cracking Unit (FCCU)** | | | | | P13.1 |
| ELECTROSTATIC PRECIPITATOR, 2D-1, PLATE-WIRE, DRY, NEGATIVE CORONA, 2 CHAMBERS, 2 FIELDS, 2 T/R SETS, 12 CELLS, BUELL, IN SERIES WITH 2D-2, IDLE MODE,18 FT L, 37 FT 6 IN W, 30 FT H, 140 KVA WITH<br>A/N: 512801<br>Permit to Construct Issued: 02/24/11<br><br>AMMONIA INJECTION, GRID 1, UPSTREAM OF ESP 2D-1<br><br>HOPPER, CATALYST DUST, 8 TOTAL | C165 | D151 D2404 | | | C12.1, C12.2, D29.4, D90.8, D90.9, D90.10, D90.11, D323.1, E102.2, E193.10, E193.19, K40.6, K67.10, K67.16 |
| ELECTROSTATIC PRECIPITATOR, 2D-17, PLATE-RDE, DRY, NEGATIVE CORONA, 2 CHAMBERS, 6 FIELDS, 12 T/R SETS, 24 CELLS, HRC, IN PARALEL WITH 2D-18, 54 FT L, 80 FT W, 36 FT H, 1380 KVA WITH<br>A/N: 512802<br>Permit to Construct Issued: 02/24/11<br><br>AMMONIA INJECTION, GRID 2, UPSTREAM OF ESPS 2D-17 & 2D-18<br><br>HOPPER, CATALYST DUST, 24 TOTAL | C2283 | D151 D2404 | | | C12.2, D29.4, D90.8, D90.9, D90.10, D90.11, D323.1, E102.2, E193.18, E193.19, K67.16 |

* (1) (1A) (1B) Denotes RECLAIM emission factor
(2) (2A) (2B) Denotes RECLAIM emission rate
(3) Denotes RECLAIM concentration limit
(4) Denotes BACT emission limit
(5) (5A) (5B) Denotes command and control emission limit
(6) Denotes air toxic control rule limit
(7) Denotes NSR applicability limit
(8) (8A) (8B) Denotes 40 CFR limit (e.g. NSPS, NESHAPS, etc.)
(9) See App B for Emission Limits
(10) See section J for NESHAP/MACT requirements

** Refer to section F and G of this permit to determine the monitoring, recordkeeping and reporting requirements for this device.

# FACILITY PERMIT TO OPERATE
# EXXONMOBIL OIL CORPORATION

**B.1-8**

## SECTION H: PERMIT TO CONSTRUCT AND TEMPORARY PERMIT TO OPERATE

**The operator shall comply with the terms and conditions set forth below:**

| Equipment | ID No. | Connected To | RECLAIM Source Type/ Monitoring Unit | Emissions* And Requirements | Conditions |
|---|---|---|---|---|---|
| **Process 3: Fluid Catalytic Cracking Unit (FCCU)** | | | | | P13.1 |
| ELECTROSTATIC PRECIPITATOR, 2D-17, PLATE-RED, DRY, NEGATIVE CORONA, 2 CHAMBERS, 6 FIELDS, 12 T/R SETS, 24 CELLS, HRC, IN PARALEL WITH 2D-17, 54 FT L, 80 FT W, 36 FT H, 1380 KVA WITH A/N:<br><br>AMMONIA INJECTION, GRID 2, UPSTREAM OF ESPS 2D-17 & 2D-18<br><br>HOPPER, CATALYST DUST, 24 TOTAL | C2284 | D151 D2404 | | | C12.2, D29.4, D90.8, D90.9, D90.10, D90.11, D323.1, E102.2, E193.18, E193.19, K67.16 |
| SELECTIVE CATALYTIC REDUCTION, FIXED BED REACTOR, WITH MITSUBISHI VANADIUM PENTOXIDE HONEYCOMB TYPE CATALYST, WIDTH: 27 FT ; HEIGHT: 56 FT ; LENGTH: 31 FT WITH<br>A/N: 458745<br>Permit to Construct Issued: 03/23/07<br><br>AMMONIA INJECTION, GRID 3 | C1772 | D151 S1739 D2404 | | NH3: 10 PPMV (5) [RULE 1105.1, 11-7-2003] | A195.2, D12.1, D12.2, D28.1, D28.4, D29.4, K40.4, K171.12, K171.13 |
| **System 8: FCCU Base Catalyst/Catalyst Additives Injecting System** | | | | | |

* (1) (1A) (1B) Denotes RECLAIM emission factor
(2) (2A) (2B) Denotes RECLAIM emission rate
(3) Denotes RECLAIM concentration limit
(4) Denotes BACT emission limit
(5) (5A) (5B) Denotes command and control emission limit
(6) Denotes air toxic control rule limit
(7) Denotes NSR applicability limit
(8) (8A) (8B) Denotes 40 CFR limit (e.g. NSPS, NESHAPS, etc.)
(9) See App B for Emission Limits
(10) See section J for NESHAP/MACT requirements

** Refer to section F and G of this permit to determine the monitoring, recordkeeping and reporting requirements for this device.

# FACILITY PERMIT TO OPERATE
# EXXONMOBIL OIL CORPORATION

**B.1-9**

## SECTION H: PERMIT TO CONSTRUCT AND TEMPORARY PERMIT TO OPERATE

**The operator shall comply with the terms and conditions set forth below:**

| Equipment | ID No. | Connected To | RECLAIM Source Type/ Monitoring Unit | Emissions* And Requirements | Conditions |
|---|---|---|---|---|---|
| **Process 3: Fluid Catalytic Cracking Unit (FCCU)** | | | | | P13.1 |
| BULK MATERIAL LOADING STATION, MULTI-LOADING SYSTEM, CABINET, GRACE DAVISON MODEL MLS-2452-AWC, SERIAL # LL130, WITH AUTOMATIC PROGRAMMABLE LOGIC CONTROLLER, W: 6 FT, L: 10 FT, H: 9 FT WITH<br>A/N: 510467<br>Permit to Construct Issued: 02/24/11<br><br>EDUCTOR, VACUUM PRODUCER, 4 HOSES TO DRAW CATALYST FROM STORAGE BIN TO CATALYST COLLECTOR, WITH 2 DUST FILTERS<br><br>SCREEN, DUST/CATALYST COLLECTOR, OPEN/CLOSE VALVE TO DIRECT CATALYST TO TRANSFER POT<br><br>POT, TRANSFER, PRESSURIZED, PRD SET AT 125 PSIG, 6 CF CAPACITY, WITH 3 CATALYST LOAD CELLS FOR WEIGHT MEASURING & RECORDING, WITH SUPPORT LEGS<br><br>EJECTOR, PRESSURIZING CATALYST FROM TRANSFER POT TO REGENERATOR VIA A COMMON HOSE | D2395 | C2397 | | PM: (9) [RULE 404, 2-7-1986; RULE 405, 2-7-1986] | B27.1, C1.67, E71.13, K171.18 |

* (1) (1A) (1B) Denotes RECLAIM emission factor
(2) (2A) (2B) Denotes RECLAIM emission rate
(3) Denotes RECLAIM concentration limit
(4) Denotes BACT emission limit
(5) (5A) (5B) Denotes command and control emission limit
(6) Denotes air toxic control rule limit
(7) Denotes NSR applicability limit
(8) (8A) (8B) Denotes 40 CFR limit (e.g. NSPS, NESHAPS, etc.)
(9) See App B for Emission Limits
(10) See section J for NESHAP/MACT requirements

** Refer to section F and G of this permit to determine the monitoring, recordkeeping and reporting requirements for this device.

# FACILITY PERMIT TO OPERATE
# EXXONMOBIL OIL CORPORATION

**B.1-10**

## SECTION H: PERMIT TO CONSTRUCT AND TEMPORARY PERMIT TO OPERATE

**The operator shall comply with the terms and conditions set forth below:**

| Equipment | ID No. | Connected To | RECLAIM Source Type/ Monitoring Unit | Emissions* And Requirements | Conditions |
|---|---|---|---|---|---|
| **Process 3: Fluid Catalytic Cracking Unit (FCCU)** | | | | | P13.1 |
| FILTER, CARTRIDGE TYPE, CATALYST DUST, 2 IN PARALLEL, CLEMTEX, MODEL FA376094, EACH OD:1 FT 2 IN, ID:9 FT 6 IN, H:2 FT 6 IN, WITH AUTOMATIC AIR PULSE CLEANING, 260 SQ.FT.<br>A/N: 510467<br>Permit to Construct Issued: 02/24/11 | C2397 | D2395 | | | C6.4, D29.6, D322.3, D323.1, E102.1 |
| **Process 4: HYDROTREATING PROCESS** | | | | | P13.1 |
| **System 1: FCCU FEED (GAS OIL) HYDRODESULFURIZATION UNIT** | | | | | S4.1, S13.2, S15.1, S15.2, S15.9, S31.2 |
| TURBINE, HIGH TEMPERATURE SEPARATOR POWER RECOVERY, UNFIRED, 25J-1A<br>A/N: 422931<br>Permit to Construct Issued: 01/07/05 | D169 | | | | |
| TURBINE, HIGH TEMPERATURE SEPARATOR POWER RECOVERY, UNFIRED, 25J-1B<br>A/N: 422931<br>Permit to Construct Issued: 01/07/05 | D170 | | | | |
| TURBINE, RICH DEA POWER RECOVERY, UNFIRED, 25J-02, SERVING 25G-5A<br>A/N: 422931<br>Permit to Construct Issued: 01/07/05 | D171 | | | | |
| EJECTOR, 25J-22A, STEAM JET<br>A/N: 422931<br>Permit to Construct Issued: 01/07/05 | D2184 | | | | |

* (1) (1A) (1B) Denotes RECLAIM emission factor
(2) (2A) (2B) Denotes RECLAIM emission rate
(3) Denotes RECLAIM concentration limit
(4) Denotes BACT emission limit
(5) (5A) (5B) Denotes command and control emission limit
(6) Denotes air toxic control rule limit
(7) Denotes NSR applicability limit
(8) (8A) (8B) Denotes 40 CFR limit (e.g. NSPS, NESHAPS, etc.)
(9) See App B for Emission Limits
(10) See section J for NESHAP/MACT requirements

** Refer to section F and G of this permit to determine the monitoring, recordkeeping and reporting requirements for this device.

# FACILITY PERMIT TO OPERATE
# EXXONMOBIL OIL CORPORATION

**B.1-11**

## SECTION D: FACILITY DESCRIPTION AND EQUIPMENT SPECIFIC CONDITIONS

**The operator shall comply with the terms and conditions set forth below:**

| Equipment | ID No. | Connected To | RECLAIM Source Type/ Monitoring Unit | Emissions* And Requirements | Conditions |
|---|---|---|---|---|---|
| **Process 2: COKING AND RESIDUAL CONDITIONING** | | | | | P13.1 |
| FILTER, SEPARATOR, 21J-22, REFINERY FUEL GAS, VESSEL TYPE, WITH A LOWER BARREL, FOR STORAGE OF THE REMOVED LIQUID, SERVES 3 HEATERS (21F-6, 21F-7 & 21F-8)<br>A/N: 422369 | D2413 | | | | |
| FILTER, SEPARATOR, 22J-28, REFINERY FUEL GAS, VESSEL TYPE, WITH A LOWER BARREL, FOR STORAGE OF THE REMOVED LIQUID, SERVES 3 HEATERS (22F-1, 22F-2 & 22F-3)<br>A/N: 422369 | D2414 | | | | |
| FUGITIVE EMISSIONS, MISCELLANEOUS<br>A/N: 422369 | D2415 | | | HAP: (10) [40CFR 63 Subpart CC, #5A, 6-23-2003] | H23.34 |
| **Process 3: Fluid Catalytic Cracking Unit (FCCU)** | | | | | P13.1 |
| **System 1: FCCU, Cracking System** | | | | | S4.1, S13.2, S15.1, S42.2 |
| VESSEL, SURGE, 2C-17, HOT FRESH FEED, LENGTH: 25 FT ; DIAMETER: 10 FT<br>A/N: 445076 | D155 | | | | E336.9 |
| VESSEL, 2C-18, SURGE, COLD FRESH FEED, LENGTH: 25 FT ; DIAMETER: 10 FT<br>A/N: 445076 | D156 | | | | E336.9 |

* (1) (1A) (1B) Denotes RECLAIM emission factor
(2) (2A) (2B) Denotes RECLAIM emission rate
(3) Denotes RECLAIM concentration limit
(4) Denotes BACT emission limit
(5) (5A) (5B) Denotes command and control emission limit
(6) Denotes air toxic control rule limit
(7) Denotes NSR applicability limit
(8) (8A) (8B) Denotes 40 CFR limit (e.g. NSPS, NESHAPS, etc.)
(9) See App B for Emission Limits
(10) See section J for NESHAP/MACT requirements

** Refer to section F and G of this permit to determine the monitoring, recordkeeping and reporting requirements for this device.

# FACILITY PERMIT TO OPERATE
# EXXONMOBIL OIL CORPORATION

**B.1-12**

## SECTION D: FACILITY DESCRIPTION AND EQUIPMENT SPECIFIC CONDITIONS

**The operator shall comply with the terms and conditions set forth below:**

| Equipment | ID No. | Connected To | RECLAIM Source Type/ Monitoring Unit | Emissions * And Requirements | Conditions |
|---|---|---|---|---|---|
| **Process 3: Fluid Catalytic Cracking Unit (FCCU)** | | | | | P13.1 |
| REACTOR, 2C-4, WITH INTERNAL REACTOR RISER & 1ST & 2ND STAGE CATALYST SEPARATORS, HEIGHT: 44 FT ; DIAMETER: 23 FT 6 IN WITH<br>A/N: 445076<br><br>COLUMN, STRIPPER, 2C-5, HC VAPOR/SPENT CATALYST, HEIGHT: 25 FT 6 IN; DIAMETER: 12 FT 6 IN | D1589 | | | | |
| REGENERATOR, 2C-3, HEIGHT: 45 FT ; DIAMETER: 37 FT 2 IN<br>A/N: | D151 | C164 C165 C166 C1590 C2314 | NOX: MAJOR SOURCE**; SOX: MAJOR SOURCE** | CO: 500 PPMV (8) [40CFR 60 Subpart J, 6-24-2008]; CO: 2000 PPMV (5) [RULE 407, 4-2-1982]; HAP: (10) [40CFR 63 Subpart UUU, #2, 4-20-2006]; PM: (9) [RULE 404, 2-7-1986; RULE 405, 2-7-1986]; PM: 0.1 GRAINS/SCF (5) [RULE 409, 8-7-1981]; PM: 1 LB(S)/1000 LBS (8) [40CFR 60 Subpart J, 6-24-2008] | A63.4, D29.3, D82.2, D90.4, H23.17 |
| BLOWER, 2K-1, REGENERATOR AIR, ALLIS CHALMERS, MODEL VA-1310, 220,000 SCFM<br>A/N: 445076 | D1636 | | | | |
| TURBINE, EXPANDER, UNFIRED, 2K-1E, REGENERATOR FLUE GAS, 28,950 HP WITH<br>A/N: 445076<br><br>GENERATOR, ELECTRIC, 2K-1M, COMMON TO STEAM TURBINE 2K-1T, 7500 KW | D2305 | | | | |

* (1) (1A) (1B) Denotes RECLAIM emission factor
(2) (2A) (2B) Denotes RECLAIM emission rate
(3) Denotes RECLAIM concentration limit
(4) Denotes BACT emission limit
(5) (5A) (5B) Denotes command and control emission limit
(6) Denotes air toxic control rule limit
(7) Denotes NSR applicability limit
(8) (8A) (8B) Denotes 40 CFR limit (e.g. NSPS, NESHAPS, etc.)
(9) See App B for Emission Limits
(10) See section J for NESHAP/MACT requirements

** Refer to section F and G of this permit to determine the monitoring, recordkeeping and reporting requirements for this device.

# FACILITY PERMIT TO OPERATE
# EXXONMOBIL OIL CORPORATION

**B.1-13**

## SECTION D: FACILITY DESCRIPTION AND EQUIPMENT SPECIFIC CONDITIONS

**The operator shall comply with the terms and conditions set forth below:**

| Equipment | ID No. | Connected To | RECLAIM Source Type/ Monitoring Unit | Emissions* And Requirements | Conditions |
|---|---|---|---|---|---|
| **Process 3: Fluid Catalytic Cracking Unit (FCCU)** | | | | | P13.1 |
| TURBINE, STEAM, UNFIRED, 2K-1T, REGENERATOR FLUE GAS, 13,000 HP WITH<br>A/N: 445076<br><br>GENERATOR, ELECTRIC, 2K-1M, COMMON TO EXPANDER/TURBINE 2K-1E, 7500 KW | D2307 | | | | |
| BOILER, WASTE HEAT, UNFIRED, 2F-7<br>A/N: 445076 | D1511 | | | | |
| COMPRESSOR, PROCESS AIR/PURGE GAS, 75K-101, JOY 1, CENTRIFUGAL, 800 HP<br>A/N: 445076 | D2309 | | | | |
| COMPRESSOR, PROCESS AIR/PURGE GAS, 75K-102, JOY 2, CENTRIFUGAL, 1,000 HP<br>A/N: 445076 | D2310 | | | | |
| COMPRESSOR, PROCESS AIR/PURGE GAS, 75K-103, JOY 3, CENTRIFUGAL, 575 HP<br>A/N: 445076 | D2311 | | | | |
| COMPRESSOR, PROCESS AIR/PURGE GAS, 75K-104, JOY 4, CENTRIFUGAL, 1,250 HP<br>A/N: 445076 | D2312 | | | | |
| COMPRESSOR, PROCESS AIR/PURGE GAS, 75K-105/106, JOY 5 & 6, CENTRIFUGAL, 2 TOTAL, 1,500 HP EACH<br>A/N: 445076 | D2313 | | | | |

* (1) (1A) (1B) Denotes RECLAIM emission factor
(2) (2A) (2B) Denotes RECLAIM emission rate
(3) Denotes RECLAIM concentration limit
(4) Denotes BACT emission limit
(5) (5A) (5B) Denotes command and control emission limit
(6) Denotes air toxic control rule limit
(7) Denotes NSR applicability limit
(8) (8A) (8B) Denotes 40 CFR limit (e.g. NSPS, NESHAPS, etc.)
(9) See App B for Emission Limits
(10) See section J for NESHAP/MACT requirements

** Refer to section F and G of this permit to determine the monitoring, recordkeeping and reporting requirements for this device.

# FACILITY PERMIT TO OPERATE
# EXXONMOBIL OIL CORPORATION

**B.1-14**

## SECTION D: FACILITY DESCRIPTION AND EQUIPMENT SPECIFIC CONDITIONS

**The operator shall comply with the terms and conditions set forth below:**

| Equipment | ID No. | Connected To | RECLAIM Source Type/ Monitoring Unit | Emissions* And Requirements | Conditions |
|---|---|---|---|---|---|
| **Process 3: Fluid Catalytic Cracking Unit (FCCU)** | | | | | P13.1 |
| STACK, 2F-7, WITH 2 EMERGENCY BYPASS STACKS (2F-3 EAST & WEST), LOCATED DOWNSTREAM OF ESP & UPSTREAM OF SCR, HEIGHT: 89 FT ; DIAMETER: 11 FT 4 IN<br>A/N: | S1739 | C166 | | | |
| FUGITIVE EMISSIONS, MISCELLANEOUS<br>A/N: 445076 | D1800 | | | HAP: (10) [40CFR 63 Subpart CC, #5A, 6-23-2003] | H23.34 |
| **System 2: FCCU AIR POLLUTION CONTROL SYSTEM** | | | | | |
| CYCLONE, 2C-25, 3RD STAGE SEPARATOR, CATALYST DUST, HEIGHT: 57 FT ; DIAMETER: 26 FT<br>A/N: 512800 | C1590 | D151 D2404 | | | |
| CYCLONE, 2C-26-CY, 4TH STAGE SEPARATOR, CATALYST DUST, HEIGHT: 3 FT 3 IN; DIAMETER: 1 FT 9 IN WITH<br>A/N: 512800<br><br>HOPPER, 2C-26, CATALYST DUST, DIA: 8 FT, H: 12 FT | C2314 | D151 | | | D323.1, E102.2, K67.16 |

* (1) (1A) (1B) Denotes RECLAIM emission factor
(2) (2A) (2B) Denotes RECLAIM emission rate
(3) Denotes RECLAIM concentration limit
(4) Denotes BACT emission limit
(5) (5A) (5B) Denotes command and control emission limit
(6) Denotes air toxic control rule limit
(7) Denotes NSR applicability limit
(8) (8A) (8B) Denotes 40 CFR limit (e.g. NSPS, NESHAPS, etc.)
(9) See App B for Emission Limits
(10) See section J for NESHAP/MACT requirements

** Refer to section F and G of this permit to determine the monitoring, recordkeeping and reporting requirements for this device.

# FACILITY PERMIT TO OPERATE
# EXXONMOBIL OIL CORPORATION

**B.1-15**

## SECTION D: FACILITY DESCRIPTION AND EQUIPMENT SPECIFIC CONDITIONS

**The operator shall comply with the terms and conditions set forth below:**

| Equipment | ID No. | Connected To | RECLAIM Source Type/ Monitoring Unit | Emissions* And Requirements | Conditions |
|---|---|---|---|---|---|
| **Process 3: Fluid Catalytic Cracking Unit (FCCU)** | | | | | P13.1 |
| BOILER, 2F-3, CARBON MONOXIDE WASTE HEAT, NATURAL GAS, REFINERY GAS, WITH LOW NOX BURNER, 464 MMBTU/HR WITH A/N:<br><br>BURNER, NATURAL GAS, REFINERY GAS, PEABODY, MODEL MT-28, FOUR LO-NOX, WITH LOW NOX BURNER, 464 MMBTU/HR<br><br>UREA INJECTION SYSTEM, NOXOUT PROCESS | C164 | D151 C165 C166 | NOX: MAJOR SOURCE**; SOX: MAJOR SOURCE** | CO: 2000 PPMV (5) [RULE 407, 4-2-1982]; PM: 0.01 GRAINS/SCF (5A) [RULE 476, 10-8-1976]; PM: 0.1 GRAINS/SCF (5) [RULE 409, 8-7-1981]; PM: 11 LBS/HR (5B) [RULE 476, 10-8-1976] | B61.3, D82.2, D90.12, E193.16, H23.13 |
| ELECTROSTATIC PRECIPITATOR, 2D-1, TWO STAGE, 42 FT L. X 60 FT - 5.5 IN W. X 49 FT - 4 IN H., 300 KVA WITH A/N:<br><br>AMMONIA INJECTION | C166 | D151 C164 S1739 | | | C12.1, E102.2 |
| ELECTROSTATIC PRECIPITATOR, 2D-2, TWO STAGE, 18 FT L. X 37 FT - 6 IN W. X 30 FT H., 140 KVA WITH A/N:<br><br>AMMONIA INJECTION | C165 | D151 C164 | | | C12.1, E102.2 |
| **System 3: CATALYST/SPENT CATALYST HANDLING AND STORAGE** | | | | | |

* (1) (1A) (1B) Denotes RECLAIM emission factor
(2) (2A) (2B) Denotes RECLAIM emission rate
(3) Denotes RECLAIM concentration limit
(4) Denotes BACT emission limit
(5) (5A) (5B) Denotes command and control emission limit
(6) Denotes air toxic control rule limit
(7) Denotes NSR applicability limit
(8) (8A) (8B) Denotes 40 CFR limit (e.g. NSPS, NESHAPS, etc.)
(9) See App B for Emission Limits
(10) See section J for NESHAP/MACT requirements

** Refer to section F and G of this permit to determine the monitoring, recordkeeping and reporting requirements for this device.

# FACILITY PERMIT TO OPERATE EXXONMOBIL OIL CORPORATION

**B.1-16**

## SECTION D: FACILITY DESCRIPTION AND EQUIPMENT SPECIFIC CONDITIONS

**The operator shall comply with the terms and conditions set forth below:**

| Equipment | ID No. | Connected To | RECLAIM Source Type/ Monitoring Unit | Emissions* And Requirements | Conditions |
|---|---|---|---|---|---|
| **Process 3: Fluid Catalytic Cracking Unit (FCCU)** | | | | | P13.1 |
| STORAGE SILO, 2C-1, FRESH CATALYST (BASE), GRACE DAVISON, SINOPEC RIPP ZDOS-T, GRACE DAVISON GENESIS-2634, GRACE DAVISON ALCYON-U411, HEIGHT: 37 FT 6 IN; DIAMETER: 15 FT<br>A/N: 510469 | D167 | C2317 | | PM: (9) [RULE 404, 2-7-1986; RULE 405, 2-7-1986] | B27.2, D323.1, E71.11 |
| STORAGE SILO, 2C-XADDITIVES, FRESH CATALYST (ADDITIVES), GRACE DAVISON ZSM5, WIDTH: 5 FT ; HEIGHT: 8 FT ; LENGTH: 5 FT<br>A/N: 409307 | D2316 | C2317 | | PM: (9) [RULE 404, 2-7-1986; RULE 405, 2-7-1986] | D323.1, E71.11, K171.14 |
| STORAGE SILO, 2C-2, SPENT CATALYST, HEIGHT: 57 FT ; DIAMETER: 23 FT<br>A/N: 459720 | D168 | C2317 | | PM: (9) [RULE 404, 2-7-1986; RULE 405, 2-7-1986] | D323.1, E71.11 |
| SUMP, HOT WELL, WATER SCRUBBER, 02R-700, CATALYST DUST, COVERED, WIDTH: 6 FT ; DEPTH: 6 FT ; LENGTH: 6 FT WITH<br>A/N: 458741<br><br>EJECTOR, 2H-1, STEAM, SERVES SILOS 2C-1 & 2C-2<br><br>EJECTOR, 2J-XADDITIVES, STEAM, SERVES SILO 2C-XADDITIVES | C2317 | D167 D168 D2316 | | | D323.1, K171.14 |
| **System 4: FCCU HEATERS** | | | | | |

* (1) (1A) (1B) Denotes RECLAIM emission factor
(2) (2A) (2B) Denotes RECLAIM emission rate
(3) Denotes RECLAIM concentration limit
(4) Denotes BACT emission limit
(5) (5A) (5B) Denotes command and control emission limit
(6) Denotes air toxic control rule limit
(7) Denotes NSR applicability limit
(8) (8A) (8B) Denotes 40 CFR limit (e.g. NSPS, NESHAPS, etc.)
(9) See App B for Emission Limits
(10) See section J for NESHAP/MACT requirements

** Refer to section F and G of this permit to determine the monitoring, recordkeeping and reporting requirements for this device.

# FACILITY PERMIT TO OPERATE
# EXXONMOBIL OIL CORPORATION

**B.1-17**

## SECTION D: FACILITY DESCRIPTION AND EQUIPMENT SPECIFIC CONDITIONS

**The operator shall comply with the terms and conditions set forth below:**

| Equipment | ID No. | Connected To | RECLAIM Source Type/ Monitoring Unit | Emissions * And Requirements | Conditions |
|---|---|---|---|---|---|
| **Process 3: Fluid Catalytic Cracking Unit (FCCU)** | | | | | P13.1 |
| HEATER, 2F-1, REGENERATOR STARTUP/AIR HEATER, NATURAL GAS, REFINERY GAS, 132 MMBTU/HR<br>A/N: 431576 | D2320 | | NOX: MAJOR SOURCE**; SOX: MAJOR SOURCE** | CO: 2000 PPMV (5) [RULE 407, 4-2-1982]; PM: (9) [RULE 404, 2-7-1986]; PM: 0.1 GRAINS/SCF (5) [RULE 409, 8-7-1981] | |
| HEATER, FCCU CHARGE OR FRACTIONATION COLUMN CHARGE, 2F-2, NATURAL GAS, REFINERY GAS, WITH LOW NOX BURNER, 108 MMBTU/HR WITH<br>A/N: 455106<br><br>BURNER, NATURAL GAS, REFINERY GAS, EIGHT ULTRA, WITH LOW NOX BURNER, 108 MMBTU/HR | D920 | | NOX: MAJOR SOURCE**; SOX: MAJOR SOURCE** | CO: 2000 PPMV (5) [RULE 407, 4-2-1982]; PM: (9) [RULE 404, 2-7-1986]; PM: 0.1 GRAINS/SCF (5) [RULE 409, 8-7-1981] | B61.3, C1.1, D90.12, D328.1, E193.16, H23.13, K171.15 |
| FUGITIVE EMISSIONS, MISCELLANEOUS<br>A/N: 455106 | D2367 | | | HAP: (10) [40CFR 63 Subpart CC, #5A, 6-23-2003] | H23.34 |
| **System 5: FCCU, Fractionation System** | | | | | S4.1, S13.2, S15.1, S15.2, S15.11 |
| FRACTIONATOR, MAIN COLUMN, 2C-6, HEIGHT: 108 FT ; DIAMETER: 21 FT<br>A/N: 449657 | D152 | | | | |
| VESSEL, RECEIVER, MAIN COLUMN OVERHEAD, 2C-7, LENGTH: 33 FT ; DIAMETER: 11 FT<br>A/N: 449657 | D153 | | | | |

* (1) (1A) (1B) Denotes RECLAIM emission factor
(2) (2A) (2B) Denotes RECLAIM emission rate
(3) Denotes RECLAIM concentration limit
(4) Denotes BACT emission limit
(5) (5A) (5B) Denotes command and control emission limit
(6) Denotes air toxic control rule limit
(7) Denotes NSR applicability limit
(8) (8A) (8B) Denotes 40 CFR limit (e.g. NSPS, NESHAPS, etc.)
(9) See App B for Emission Limits
(10) See section J for NESHAP/MACT requirements

** Refer to section F and G of this permit to determine the monitoring, recordkeeping and reporting requirements for this device.

# FACILITY PERMIT TO OPERATE
# EXXONMOBIL OIL CORPORATION

**B.1-18**

## SECTION D: FACILITY DESCRIPTION AND EQUIPMENT SPECIFIC CONDITIONS

**The operator shall comply with the terms and conditions set forth below:**

| Equipment | ID No. | Connected To | RECLAIM Source Type/ Monitoring Unit | Emissions* And Requirements | Conditions |
|---|---|---|---|---|---|
| **Process 3: Fluid Catalytic Cracking Unit (FCCU)** | | | | | P13.1 |
| COLUMN, STRIPPER, 2C-8, LIGHT CYCLE OIL, LENGTH: 21 FT ; DIAMETER: 6 FT 6 IN<br>A/N: 449657 | D154 | | | | |
| KNOCK OUT POT, 2C-22, MAIN COLUMN BOTTOMS, PARTICLES/FINES KNOCKOUT, HEIGHT: 3 FT 5 IN; DIAMETER: 1 FT 4 IN<br>A/N: 449657 | D2321 | | | | K171.16 |
| SETTLING TANK, 2C-9, SLURRY, HEIGHT: 24 FT ; DIAMETER: 12 FT<br>A/N: 449657 | D163 | | | | |
| ACCUMULATOR, 2C-11, HIGH PRESSURE HYDRAULIC, HEIGHT: 10 FT 6 IN; DIAMETER: 4 FT<br>A/N: 449657 | D2322 | | | | |
| VESSEL, 2C-12, HYDRAULIC SYSTEM RECEIVER, HEIGHT: 10 FT 6 IN; DIAMETER: 4 FT<br>A/N: 449657 | D2323 | | | | |
| FUGITIVE EMISSIONS, MISCELLANEOUS<br>A/N: 449657 | D1740 | | | **HAP**: (10) **[40CFR 63 Subpart CC, #5A, 6-23-2003]** | H23.34 |
| **System 6: NH3 (Liquefied Anhydrous) Storage & Vaporization** | | | | | |
| STORAGE TANK, PRESSURIZED, 75C-118, ANHYDROUS AMMONIA, 1000 GALS; DIAMETER: 3 FT 6 IN; LENGTH: 13 FT 3 IN WITH<br>A/N: 458746<br><br>EVAPORATOR, AMMONIA, 75E-124A, ELECTRIC HEATED | D2324 | | | | K67.13 |

* (1) (1A) (1B) Denotes RECLAIM emission factor
(2) (2A) (2B) Denotes RECLAIM emission rate
(3) Denotes RECLAIM concentration limit
(4) Denotes BACT emission limit
(5) (5A) (5B) Denotes command and control emission limit
(6) Denotes air toxic control rule limit
(7) Denotes NSR applicability limit
(8) (8A) (8B) Denotes 40 CFR limit (e.g. NSPS, NESHAPS, etc.)
(9) See App B for Emission Limits
(10) See section J for NESHAP/MACT requirements

** Refer to section F and G of this permit to determine the monitoring, recordkeeping and reporting requirements for this device.

# FACILITY PERMIT TO OPERATE
# EXXONMOBIL OIL CORPORATION

**B.1-19**

## SECTION D: FACILITY DESCRIPTION AND EQUIPMENT SPECIFIC CONDITIONS

**The operator shall comply with the terms and conditions set forth below:**

| Equipment | ID No. | Connected To | RECLAIM Source Type/ Monitoring Unit | Emissions* And Requirements | Conditions |
|---|---|---|---|---|---|
| **Process 3: Fluid Catalytic Cracking Unit (FCCU)** | | | | | P13.1 |
| STORAGE TANK, PRESSURIZED, 75C-35, ANHYDROUS AMMONIA, 1000 GALS; DIAMETER: 3 FT 6 IN; LENGTH: 13 FT 3 IN WITH A/N: 459719<br><br>EVAPORATOR, AMMONIA, 75E-124B, ELECTRIC HEATED | D2325 | | | | K67.13 |
| **System 7: Fuel Gas Filter Separator** | | | | | S13.2, S15.1 |
| FILTER, SEPARATOR, 2J-6, REFINERY FUEL GAS, VESSEL TYPE, WITH A LOWER BARREL FOR STORAGE OF REMOVED LIQUID, SERVES HEATER 2F-2 A/N: 428465 | D2328 | | | | K171.17 |
| FILTER, SEPARATOR, 2J-7, REFINERY FUEL GAS, VESSEL TYPE, WITH A LOWER BARREL FOR STORAGE OF REMOVED LIQUID, SERVES CO BOILER 2F-3 A/N: 428465 | D2329 | | | | K171.17 |
| FUGITIVE EMISSIONS, MISCELLANEOUS A/N: 428465 | D2330 | | | **HAP: (10) [40CFR 63 Subpart CC, #5A, 6-23-2003]** | H23.34 |
| **Process 4: HYDROTREATING PROCESS** | | | | | P13.1 |
| **System 1: FCCU FEED (GAS OIL) HYDRODESULFURIZATION UNIT** | | | | | S4.1, S13.2, S15.1, S15.2, S15.9, S31.2 |
| TURBINE, HIGH TEMPERATURE SEPARATOR POWER RECOVERY, UNFIRED, 25J-1A A/N: | D169 | | | | |

* (1) (1A) (1B) Denotes RECLAIM emission factor
(2) (2A) (2B) Denotes RECLAIM emission rate
(3) Denotes RECLAIM concentration limit
(4) Denotes BACT emission limit
(5) (5A) (5B) Denotes command and control emission limit
(6) Denotes air toxic control rule limit
(7) Denotes NSR applicability limit
(8) (8A) (8B) Denotes 40 CFR limit (e.g. NSPS, NESHAPS, etc.)
(9) See App B for Emission Limits
(10) See section J for NESHAP/MACT requirements

** Refer to section F and G of this permit to determine the monitoring, recordkeeping and reporting requirements for this device.

B.2-2

RECEIVED

APR - 4 2011

TORRANCE REFINERY MANAGER

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
RESEARCH TRIANGLE PARK, NC 27711

Rec'd: DES. colofsky 4/5/11

[OMB Number 2060-0657]

TO: Craig Sakamoto

March 31, 2011

OFFICE OF
AIR QUALITY PLANNING
AND STANDARDS

David S.

Maxwell Ocansey
Refinery Manager
ExxonMobil Torrance Refinery
3700 West 190th Street
Torrance, CA 90509

Dear Mr. Ocansey:

Pursuant to section 114 of the Clean Air Act (CAA), the Environmental Protection Agency (EPA) is requesting that you provide the information described in this letter. This Information Collection Request (ICR) is being conducted by the EPA Office of Air and Radiation (OAR) to assist the EPA Administrator in rule development pursuant to CAA sections 111 and 112 with respect to the petroleum refineries as described below. EPA requests that you complete the ICR as described in this letter for your petroleum refinery.

On March 8, 1974, the EPA issued Standards of Performance for Petroleum Refineries (40 CFR part 60, subpart J) under section 111 of the CAA. On June 24, 2008, EPA promulgated amendments to the Standards of Performance for Petroleum Refineries and issued new standards of performance for petroleum refinery process units constructed, reconstructed, or modified after May 14, 2007 (40 CFR part 60, subpart Ja). On August 18, 1995, the EPA issued National Emission Standards for Hazardous Air Pollutants (NESHAP) for petroleum refineries (40 CFR part 63, subpart CC) under section 112 of the CAA. On April 11, 2002, the EPA issued NESHAP for catalytic cracking units, catalytic reforming units, and sulfur recovery units at petroleum refineries (40 CFR part 63, subpart UUU) under section 112 of the CAA. As required under CAA sections 111 and 112, EPA must review, and revise as necessary, promulgated emission standards at least every 8 years to account for developments in practices, processes and control technologies. Additionally, under CAA section 112, EPA must consider whether residual risks remain that warrant more stringent standards than achieved through the maximum achievable control technology (MACT) standard, and specifically whether more stringent standards are required to provide an ample margin of safety to protect public health or to prevent an adverse environmental effect. In addition to the review activities required under CAA sections 111 and 112, the EPA is also addressing issues that were raised in petitions for reconsideration on 40 CFR part 60, subpart Ja, including addressing greenhouse gases at new and existing sources and reconsideration of emission limits for certain refinery process units. The process information and emission data sets provided by the individual refineries will be used for EPA's NESHAP residual risk and technology review (RTR) as well as EPA's review and reconsideration of the new source performance standards (NSPS).

This ICR has four components: (1) an electronic survey; (2) an emissions inventory; (3) sampling and testing of the feed to your distillation column; and (4) emissions testing that must be completed for the process(es) described later in this letter. This letter and the Refinery ICR website (https://refineryicr.rti.org) provide information on each of these components. Your Facility ID is CA5A0190. If your petroleum refinery reports the integrated production of two non-contiguous refineries to the Energy Information Agency, you will need to complete these components separately for each of these petroleum refineries. Please contact Ms. Brenda Shine of my staff at (919) 541-3608 or shine.brenda@epa.gov to obtain a separate Facility ID if one was not provided under separate cover for this additional facility.

The first component is a survey that requests information on each petroleum refinery that you operate. We are asking you to report information on processes, control devices, and control costs for each facility. The survey also requests copies of existing test reports for your petroleum refinery processes. You can access the survey response database on the Refinery ICR website (https://refineryicr.rti.org). Please complete the survey in electronic form for your petroleum refinery and submit the completed surveys and existing emissions test data and information no later than May 31, 2011, using one of the submittal options noted below. If there is a limiting factor that precludes you from submitting your data electronically, please contact Ms. Brenda Shine to discuss other options for data submission.

The second component is an emissions inventory. We request that you provide air pollutant emissions information and data as described in the *Emission Estimation Protocol for Petroleum Refineries* at your petroleum refinery. You can access a copy of the *Emission Estimation Protocol for Petroleum Refineries* on the Refinery ICR website (https://refineryicr.rti.org). Please complete the emissions inventory in electronic form for your petroleum refinery and submit the information no later than June 30, 2011, using one of the submittal options noted below.

The third component is sampling and testing of the feed to your distillation column (or first processing unit). We request that you collect representative samples of the crude oil (or other petroleum stream first processed) or samples from the line feeding the distillation column, composite these samples, and analyze the composite sample. Conduct this sampling and analysis on three separate occasions, approximately one month apart, for each unique distillation feed and submit the results as described on the Refinery ICR website (https://refineryicr.rti.org). Please complete the sampling and analysis for your petroleum refinery and submit the results in electronic format no later than August 31, 2011, using one of the submittal options noted below.

The fourth component of this ICR requires testing and reporting of emissions and other test data from your refinery's emissions sources for specific hazardous air pollutants (HAP) and criteria pollutants according to the test protocols provided on the ICR website (https://refineryicr.rti.org). You have been selected to test the fluid catalytic cracking unit at your refinery. If you have more than one of these units with similar operating and emission control characteristics at your refinery, you may select the one you wish to test. If you have more than one of these units and they have different operating or emission control characteristics, please contact Ms. Brenda Shine at (919) 541-3608 or shine.brenda@epa.gov for guidance on which unit we require to be tested. You must complete and submit test results no later than August 31, 2011. Process and emissions testing data must be reported using the EPA Electronic Reporting Tool (ERT) where applicable.

B.2-4

Please note that you do not have to submit a test plan to EPA for approval prior to testing. However, we believe that it is highly advisable for each facility subject to emissions testing as part of this ICR to prepare a site specific test plan prior to testing to assist in the planning and to ensure that you address all of the testing and reporting requirements. A site-specific test plan addresses the planning and quality assurance and quality control procedures and acceptance criteria for all of the testing including the collection of process data. The document *Preparation and Review of Site-Specific Emission Test Plans*, March 1999 (available at http://www.epa.gov/ttn/emc/guidlnd/gd-042.pdf) provides guidance on preparing test plans. In addition, the EPA ERT Version 3, in which EPA requires that data be reported, requires that a test plan be entered into the program prior to submitting test results. We also request that you notify your state air regulatory agency or designated permitting authority at least 21 days before the requested stack tests are scheduled to begin.

You may have submitted test data for some of these pollutants already. If you have conducted any of the requested groups of tests (i.e., any complete set of tests required to be conducted simultaneously) in the past 5 years and reported the data in Part V of this ICR survey, you are not required to do additional testing for those pollutants.

EPA's legal authority to obtain the information requested in the survey and through emissions testing is contained in Section 114 of the CAA, as amended (42 U.S.C. §7414). Enclosure 1 contains a summary of this authority. If you believe that providing any specific information to us would reveal a trade secret, or would compromise confidential business information (CBI), please identify this information clearly in your response and submit your response as detailed in the next section. Also, please clearly label any flow diagrams or other attachments submitted with your survey that contain CBI. However, please do not label your entire response as CBI if only a portion includes trade secrets. The EPA is likely to follow-up with a request for validation of CBI claims for facilities claiming large amounts of information as trade secret, especially information that is readily reported by other facilities without such claims. Any information EPA subsequently determines to constitute CBI or a trade secret under EPA's CBI regulations at 40 CFR part 2, subpart B, will be protected pursuant to those regulations and, for trade secrets, under 18 U.S.C. 1905. If no claim of confidentiality accompanies the information when it is received by EPA, it may be made available to the public by EPA without further notice pursuant to EPA regulations at 40 CFR 2.203.

Because Clean Air Act (CAA) section 114(c) exempts emission data from claims of confidentiality, the emission data you provide will be made available to the public notwithstanding any claims of confidentiality. A clarification of what the EPA considers to be emission data is contained in Enclosure 2.

We have contracted Research Triangle Institute (RTI) (Contract No. EP-D-06-118) to help us gather information about your petroleum refinery, to conduct the survey, and analyze the survey data, sampling results, and emissions test results. As noted in Enclosure 3, we have designated RTI to be our authorized representative. Therefore, RTI has the same rights discussed above and in Enclosure 1. This means that RTI will have access to all information provided to us in your completed survey, sampling results, and emissions test results. As a designated representative of the Agency, RTI is subject to the provisions of 42 U.S.C. §7414(c) respecting confidentiality of methods or processes entitled to protection as trade secrets.

Enclosure 4 summarizes our policies and procedures for handling trade secret (confidential) information and describes how our contractor also is required to use the same procedures as we do. Because our contractors or other authorized representatives are required to follow the requirements in Enclosure 4, we believe that we can ensure your rights and protect any privileged information you submit to us.

We are asking you to submit your non-confidential survey and test data in one of the following ways:

- Upload your files to the following Refinery ICR website (https://refineryicr.rti.org). You will need to register before you can upload your files to this website. You will be prompted to enter a user name and password and provide your name, contact information, and the company and facility for which you are uploading an ICR response. As noted above, your Facility ID is CA5A0190.
- E-mail an electronic copy of all requested files to refineryicr@epa.gov.
- Mail a CD or DVD containing an electronic copy of all requested files to the EPA address shown below. If no electronic copy is available, mail a hard copy of all requested files to the address shown below:

  U.S. Environmental Protection Agency
  Office of Air Quality Planning and Standards
  Sector Policies and Programs Division
  U.S. EPA Mailroom (D205-01)
  Attention: Brenda Shine, Petroleum Refinery Sector Lead
  109 T.W. Alexander Drive
  Research Triangle Park, NC 27711

If your ICR response includes any confidential business information (CBI), then you MUST mail the full response for that component to EPA on CD-ROM or DVD-ROM disk under separate cover to the attention of Mr. Roberto Morales at the address below. Clearly mark the disk and/or the materials with the words "Confidential Business Information" and send either via U.S. Postal Service Express Mail, registered mail, or private courier to:

U.S. Environmental Protection Agency
Office of Air Quality Planning and Standards
U.S. EPA Mailroom (C404-02)
Attn: Mr. Roberto Morales, Document Control Officer (Project 09-01)
109 T.W. Alexander Drive
Research Triangle Park, NC 27711

Additionally, if you are submitting CBI on CD-ROM or DVD-ROM disk, you must submit a non-CBI version of your survey response using one of the three methods listed above for non-CBI responses. DO NOT SEND CONFIDENTIAL BUSINESS INFORMATION TO EPA BY EMAIL, BY OR FAX MACHINE OR TO THE WEBSITE.

Questions regarding this information request should be directed to Ms. Brenda Shine at (919) 541-3608 or shine.brenda@epa.gov. Please complete and submit the survey response (Component 1) by May 31, 2011. Please complete and submit the emissions inventory (Component 2) by June 30, 2011. Please submit the distillation column sampling results and the emissions test results (Components 3 and 4) by August 31, 2011.

I am sure you understand how vital it is for the EPA to use the very best information available to develop the most meaningful standards. Your help in providing this information is greatly appreciated.

Sincerely,

P. Tsirigotis

Peter Tsirigotis
Director, Sector Policies and Programs Division
Office of Air Quality Planning and Standards

4 Enclosures

Enclosure 1: EPA's information gathering authority (section 114 of the CAA)
Enclosure 2: Clarification of what EPA considers to be emissions data
Enclosure 3: Summary of contractor's authority as representative of EPA
Enclosure 4: Procedures for safeguarding CBI under the CAA

cc: James Goldstene, Executive Officer, California Air Resources Board (without enclosures)

Deborah Jordan, Director, Air Division, US EPA, Region 9 (without enclosures)

| 6/15/11 0:00<br>7/16/11 0:00<br>1H | F02012A | F02012B | C02843 | F02443CF | A027035 | A027034 | F02010R | A027030R | A027036R | A027031R | T02057 | J02133C | J02145C | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | KBBL/D TOTAL FCC CHARGE TO RX | KBBL/D FCC FRESH FEED TO RX | LB/HR 2F-7 COKEBURN | KCFD COMP. FG TO CO BOILER | % MAIN DRY O2 | % MAIN WET O2 | KSCFM 2F-7 STACK FLOW | PPM 2F-7 NOX_CONC | PPM 2F-7 CO CONCENTRATION | PPM 2F-7 SOX CONC | DEGF SCR CAT FLUE GAS TEMP | KW ESP-1 Total Power | KW ESP-2 Total Power | LB/HR NH3 Flow CTRL | KW Total ESP Power | % Moisture | KDSCFM Exhaust Flow |
| 6/27/11 0:00 | 93.99 | 81.02 | 67,979.41 | 0.00 | 5.05 | 4.03 | 271.56 | 9.49 | 57.61 | 10.26 | 542.32 | 562.13 | 580.10 | 91.15 | 1,142.23 | 20.14 | 216.87 |
| 6/27/11 1:00 | 93.72 | 80.73 | 68,190.05 | 0.00 | 5.11 | 4.15 | 271.70 | 10.55 | 55.70 | 11.21 | 543.21 | 558.13 | 575.09 | 91.71 | 1,133.22 | 18.82 | 220.58 |
| 6/27/11 2:00 | 93.95 | 80.95 | 67,708.39 | 0.00 | 5.21 | 4.19 | 271.20 | 8.27 | 53.82 | 11.76 | 543.12 | 560.13 | 579.10 | 92.03 | 1,139.23 | 19.54 | 218.21 |
| 6/27/11 3:00 | 93.95 | 80.99 | 67,624.58 | 0.00 | 5.17 | 4.09 | 272.49 | 7.87 | 59.31 | 11.24 | 543.21 | 556.13 | 595.10 | 90.17 | 1,151.23 | 20.80 | 215.82 |
| 6/27/11 4:00 | 93.92 | 80.94 | 67,642.43 | 0.00 | 5.12 | 4.07 | 274.62 | 4.92 | 28.61 | 12.21 | 543.99 | 566.14 | 583.11 | 89.39 | 1,149.25 | 20.63 | 217.97 |
| 6/27/11 5:00 | 94.00 | 81.04 | 67,462.53 | 0.00 | 5.15 | 4.04 | 275.14 | 7.01 | 44.41 | 12.82 | 543.21 | 569.14 | 592.10 | 88.17 | 1,161.25 | 21.63 | 215.62 |
| 6/27/11 6:00 | 94.03 | 81.05 | 67,598.96 | 0.00 | 5.12 | 4.09 | 273.97 | 6.70 | 71.91 | 12.12 | 543.80 | 565.14 | 583.11 | 85.90 | 1,148.25 | 20.16 | 218.74 |
| 6/27/11 7:00 | 93.96 | 80.97 | 67,554.59 | 0.00 | 5.09 | 4.05 | 254.31 | 7.45 | 72.50 | 12.65 | 545.06 | 563.14 | 587.09 | 85.48 | 1,150.22 | 20.33 | 202.60 |
| 6/27/11 8:00 | 93.87 | 80.92 | 67,311.00 | 0.00 | 5.24 | 4.17 | 272.93 | 7.74 | 70.42 | 12.49 | 546.23 | 553.12 | 589.09 | 80.09 | 1,142.21 | 20.32 | 217.47 |
| 6/27/11 9:00 | 93.97 | 80.94 | 66,929.82 | 0.00 | 5.18 | 4.12 | 272.82 | 8.34 | 71.81 | 12.44 | 546.20 | 560.13 | 591.12 | 76.89 | 1,151.26 | 20.47 | 216.98 |
| 6/27/11 10:00 | 93.56 | 80.53 | 67,225.40 | 0.00 | 5.37 | 4.26 | 274.76 | 10.23 | 73.03 | 11.94 | 546.71 | 543.11 | 583.11 | 70.45 | 1,126.22 | 20.72 | 217.84 |
| 6/27/11 11:00 | 93.76 | 80.76 | 66,744.64 | 0.00 | 5.23 | 4.10 | 271.70 | 11.27 | 81.60 | 12.74 | 545.84 | 550.12 | 568.09 | 73.60 | 1,118.20 | 21.58 | 213.07 |
| 6/27/11 12:00 | 93.99 | 81.01 | 67,109.02 | 0.00 | 5.09 | 4.07 | 275.54 | 12.16 | 80.91 | 12.60 | 545.35 | 550.12 | 563.08 | 76.87 | 1,113.20 | 19.98 | 220.50 |
| 6/27/11 13:00 | 93.93 | 80.93 | 67,453.69 | 0.00 | 5.11 | 4.03 | 271.15 | 8.16 | 81.60 | 12.56 | 544.28 | 548.09 | 577.10 | 75.35 | 1,125.19 | 21.17 | 213.76 |
| 6/27/11 14:00 | 93.91 | 80.90 | 67,119.41 | 0.00 | 5.21 | 4.19 | 267.61 | 14.56 | 81.12 | 12.51 | 542.21 | 538.10 | 566.11 | 76.86 | 1,104.21 | 19.46 | 215.54 |
| 6/27/11 15:00 | 94.04 | 81.05 | 67,218.92 | 0.00 | 5.29 | 4.26 | 271.15 | 14.44 | 82.71 | 12.77 | 539.98 | 536.13 | 576.10 | 81.78 | 1,112.22 | 19.50 | 218.26 |
| 6/27/11 16:00 | 93.71 | 80.73 | 67,185.25 | 0.00 | 5.19 | 4.13 | 273.80 | 14.63 | 82.92 | 12.65 | 538.96 | 540.11 | 550.09 | 87.31 | 1,090.20 | 20.39 | 217.98 |
| 6/27/11 17:00 | 93.94 | 80.94 | 67,217.90 | 0.00 | 5.23 | 4.12 | 276.58 | 10.45 | 81.22 | 13.45 | 538.52 | 545.11 | 557.10 | 89.10 | 1,102.21 | 21.08 | 218.29 |
| 6/27/11 18:00 | 93.97 | 80.97 | 67,213.90 | 0.00 | 5.05 | 4.04 | 277.05 | 9.96 | 80.70 | 13.87 | 538.52 | 550.12 | 577.13 | 92.64 | 1,127.25 | 20.04 | 221.53 |
| 6/27/11 19:00 | 93.94 | 80.92 | 67,500.13 | 0.00 | 5.05 | 3.99 | 280.28 | 8.72 | 80.42 | 13.88 | 539.10 | 555.10 | 563.11 | 91.56 | 1,118.21 | 20.99 | 221.45 |
| 6/27/11 20:00 | 94.00 | 80.97 | 67,541.45 | 0.00 | 5.14 | 4.02 | 276.34 | 9.89 | 78.03 | 13.51 | 538.91 | 548.09 | 566.11 | 95.12 | 1,114.20 | 21.77 | 216.18 |
| 6/27/11 21:00 | 94.01 | 80.99 | 67,738.41 | 0.00 | 5.10 | 4.05 | 277.47 | 9.56 | 79.10 | 13.44 | 538.76 | 551.09 | 571.12 | 94.41 | 1,122.21 | 20.62 | 220.25 |
| 6/27/11 22:00 | 93.91 | 80.92 | 67,678.23 | 0.00 | 5.11 | 4.07 | 277.34 | 7.93 | 78.20 | 13.25 | 539.78 | 552.09 | 568.12 | 93.96 | 1,120.21 | 20.34 | 220.91 |
| 6/27/11 23:00 | 94.05 | 81.03 | 67,474.95 | 0.00 | 5.17 | 4.15 | 276.55 | 12.83 | 82.12 | 12.02 | 540.27 | 532.09 | 578.11 | 94.76 | 1,110.20 | 19.83 | 221.71 |
| 6/28/11 0:00 | 94.03 | 81.01 | 67,341.34 | 0.00 | 5.10 | 4.09 | 274.45 | 10.88 | 80.11 | 12.70 | 541.63 | 544.08 | 569.12 | 98.56 | 1,113.20 | 19.82 | 220.05 |
| 6/28/11 1:00 | 93.95 | 80.94 | 67,107.46 | 0.00 | 5.03 | 4.05 | 277.50 | 8.97 | 78.72 | 13.28 | 543.31 | 546.09 | 566.12 | 97.43 | 1,112.21 | 19.48 | 223.46 |
| 6/28/11 2:00 | 93.91 | 80.94 | 67,040.54 | 0.00 | 5.07 | 4.02 | 280.33 | 7.38 | 80.00 | 12.53 | 543.99 | 545.09 | 570.12 | 97.64 | 1,115.21 | 20.79 | 222.04 |
| 6/28/11 3:00 | 94.01 | 81.00 | 67,012.51 | 0.00 | 5.06 | 4.00 | 279.18 | 7.71 | 79.52 | 13.08 | 545.45 | 537.13 | 556.13 | 96.23 | 1,093.25 | 20.92 | 220.79 |
| 6/28/11 4:00 | 93.93 | 80.96 | 67,195.76 | 0.00 | 5.21 | 4.14 | 275.86 | 7.53 | 79.00 | 12.93 | 547.00 | 545.11 | 546.11 | 94.73 | 1,091.22 | 20.42 | 219.52 |
| 6/28/11 5:00 | 93.97 | 80.96 | 67,223.90 | 0.00 | 5.11 | 4.07 | 278.81 | 9.99 | 83.13 | 13.07 | 546.71 | 533.12 | 564.11 | 95.13 | 1,097.22 | 20.44 | 221.84 |
| 6/28/11 6:00 | 94.11 | 81.12 | 67,003.11 | 0.00 | 5.23 | 4.09 | 275.34 | 8.12 | 75.59 | 12.26 | 547.20 | 533.12 | 541.10 | 94.13 | 1,074.23 | 21.78 | 215.38 |
| 6/28/11 7:00 | 93.87 | 80.87 | 67,184.16 | 0.00 | 5.22 | 4.27 | 241.46 | 11.57 | 79.00 | 11.82 | 547.71 | 543.11 | 560.11 | 93.04 | 1,103.22 | 18.25 | 197.39 |
| 6/28/11 8:00 | 93.96 | 80.96 | 67,064.58 | 0.00 | 5.06 | 4.00 | 278.51 | 5.82 | 70.91 | 12.90 | 548.49 | 549.12 | 556.12 | 94.28 | 1,105.24 | 20.94 | 220.19 |
| 6/28/11 9:00 | 93.94 | 80.95 | 66,240.84 | 0.00 | 5.00 | 3.86 | 279.13 | 5.46 | 88.13 | 12.41 | 548.88 | 553.13 | 587.09 | 89.68 | 1,140.22 | 22.78 | 215.55 |
| 6/28/11 10:00 | 93.98 | 81.00 | 66,272.11 | 0.00 | 5.00 | 3.95 | 278.14 | 6.32 | 75.21 | 13.10 | 548.53 | 533.13 | 574.10 | 84.80 | 1,107.22 | 20.97 | 219.80 |
| 6/28/11 11:00 | 93.75 | 80.73 | 66,123.07 | 0.00 | 5.20 | 3.99 | 274.97 | 8.04 | 76.60 | 11.90 | 548.54 | 556.13 | 580.13 | 82.68 | 1,136.26 | 23.18 | 211.22 |
| 6/28/11 12:00 | 94.07 | 81.06 | 66,276.12 | 0.00 | 5.12 | 3.97 | 272.66 | 8.07 | 77.61 | 12.59 | 547.54 | 542.11 | 565.11 | 80.08 | 1,107.21 | 22.49 | 211.33 |
| 6/28/11 13:00 | 93.89 | 80.91 | 66,226.71 | 0.00 | 5.12 | 4.05 | 271.67 | 10.25 | 76.32 | 12.77 | 547.68 | 557.13 | 582.11 | 78.58 | 1,139.24 | 20.91 | 214.87 |
| 6/28/11 14:00 | 93.92 | 80.97 | 66,205.60 | 0.00 | 5.14 | 4.03 | 273.12 | 9.16 | 77.82 | 12.77 | 545.89 | 553.12 | 573.10 | 76.57 | 1,126.22 | 21.71 | 213.83 |
| 6/28/11 15:00 | 93.15 | 80.76 | 66,234.71 | 0.00 | 5.36 | 4.22 | 273.00 | 9.04 | 75.21 | 11.97 | 545.11 | 545.11 | 581.08 | 77.55 | 1,126.19 | 21.39 | 214.62 |
| 6/28/11 16:00 | 93.22 | 80.53 | 66,152.65 | 0.00 | 5.30 | 4.21 | 269.93 | 15.20 | 79.31 | 12.20 | 543.94 | 549.12 | 575.10 | 85.50 | 1,124.22 | 20.57 | 214.41 |
| 6/28/11 17:00 | 93.85 | 80.92 | 66,926.43 | 0.00 | 5.34 | 4.24 | 274.28 | 12.85 | 79.90 | 12.50 | 541.97 | 535.10 | 564.11 | 93.65 | 1,099.21 | 20.63 | 217.68 |
| 6/28/11 18:00 | 93.90 | 80.92 | 67,150.45 | 0.00 | 5.23 | 4.18 | 274.38 | 13.67 | 80.70 | 12.11 | 541.82 | 533.09 | 545.11 | 95.23 | 1,078.20 | 20.07 | 219.32 |
| 6/28/11 19:00 | 93.95 | 80.97 | 67,314.72 | 0.00 | 5.40 | 4.17 | 275.55 | 12.64 | 71.01 | 12.17 | 541.24 | 537.10 | 549.09 | 100.11 | 1,086.19 | 22.73 | 212.93 |
| 6/28/11 20:00 | 94.02 | 81.03 | 67,377.88 | 0.00 | 5.37 | 4.13 | 274.99 | 10.95 | 75.42 | 12.06 | 541.05 | 535.10 | 570.09 | 100.16 | 1,105.19 | 23.20 | 211.19 |

B.3-2

| 6/15/11 0:00<br>7/16/11 0:00<br>1H | F02012A | F02012B | C02843 | F02443CF | A027035 | A027034 | F02010R | A027030R | A027036R | A027031R | T02057 | J02133C | J02145C | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | KBBL/D TOTAL FCC CHARGE TO RX | KBBL/D FCC FRESH FEED TO RX | LB/HR 2F-7 COKEBURN | KCFD COMP. FG TO CO BOILER | % MAIN DRY O2 | % MAIN WET O2 | KSCFM 2F-7 STACK FLOW | PPM 2F-7 NOX_CONC | PPM 2F-7 CO CONCENTRATION | PPM 2F-7 SOX CONC | DEGF SCR CAT FLUE GAS TEMP | KW ESP-1 Total Power | KW ESP-2 Total Power | LB/HR NH3 Flow CTRL | KW Total ESP Power | % Moisture | KDSCFM Exhaust Flow |
| 6/28/11 21:00 | 94.04 | 81.06 | 67,520.98 | 0.00 | 5.31 | 4.15 | 273.53 | 8.29 | 74.52 | 12.26 | 541.05 | 541.11 | 560.08 | 99.51 | 1,101.19 | 21.79 | 213.94 |
| 6/28/11 22:00 | 93.91 | 80.92 | 67,492.16 | 0.00 | 5.34 | 4.27 | 276.93 | 10.58 | 75.70 | 11.62 | 541.24 | 525.11 | 550.09 | 97.91 | 1,075.20 | 20.05 | 221.41 |
| 6/28/11 23:00 | 94.16 | 81.15 | 67,772.98 | 0.00 | 5.43 | 4.25 | 275.25 | 12.50 | 71.43 | 10.73 | 540.07 | 523.10 | 557.10 | 102.83 | 1,080.20 | 21.64 | 215.69 |
| 6/29/11 0:00 | 94.12 | 81.09 | 67,823.47 | 0.00 | 5.47 | 4.39 | 271.62 | 13.34 | 76.81 | 10.03 | 539.25 | 519.10 | 536.10 | 103.80 | 1,055.19 | 19.66 | 218.21 |
| 6/29/11 1:00 | 93.97 | 80.96 | 67,794.15 | 0.00 | 5.48 | 4.33 | 270.46 | 10.99 | 75.21 | 10.57 | 539.10 | 518.10 | 528.09 | 104.65 | 1,046.19 | 21.02 | 213.61 |
| 6/29/11 2:00 | 94.05 | 81.05 | 67,869.60 | 0.00 | 5.52 | 4.43 | 273.96 | 11.59 | 73.51 | 10.12 | 538.71 | 513.09 | 539.10 | 106.49 | 1,052.19 | 19.68 | 220.04 |
| 6/29/11 3:00 | 94.02 | 81.01 | 68,063.05 | 0.00 | 5.59 | 4.48 | 270.02 | 11.98 | 73.62 | 9.61 | 537.74 | 505.09 | 532.09 | 112.45 | 1,037.18 | 19.89 | 216.32 |
| 6/29/11 4:00 | 93.98 | 80.98 | 68,013.19 | 0.00 | 5.61 | 4.40 | 271.22 | 10.99 | 72.02 | 9.88 | 538.13 | 529.09 | 525.08 | 113.25 | 1,054.17 | 21.46 | 213.02 |
| 6/29/11 5:00 | 93.93 | 80.97 | 67,875.65 | 0.00 | 5.58 | 4.41 | 270.73 | 10.93 | 72.23 | 9.92 | 538.18 | 513.09 | 529.11 | 114.30 | 1,042.20 | 21.05 | 213.73 |
| 6/29/11 6:00 | 93.99 | 81.02 | 67,900.73 | 0.00 | 5.53 | 4.48 | 271.94 | 11.27 | 72.92 | 9.67 | 538.33 | 504.08 | 510.11 | 118.16 | 1,014.19 | 19.04 | 220.16 |
| 6/29/11 7:00 | 93.91 | 80.90 | 67,826.34 | 0.00 | 5.49 | 4.55 | 241.33 | 11.08 | 60.42 | 10.31 | 538.76 | 518.10 | 532.09 | 118.36 | 1,050.19 | 17.11 | 200.04 |
| 6/29/11 8:00 | 93.98 | 80.98 | 67,758.88 | 0.00 | 5.63 | 4.47 | 272.49 | 10.03 | 73.82 | 9.72 | 538.86 | 494.06 | 540.10 | 118.29 | 1,034.16 | 20.53 | 216.55 |
| 6/29/11 9:00 | 93.94 | 80.95 | 67,727.93 | 0.00 | 5.47 | 4.40 | 272.47 | 12.13 | 75.70 | 9.66 | 539.25 | 525.11 | 522.10 | 120.41 | 1,047.21 | 19.47 | 219.42 |
| 6/29/11 10:00 | 94.03 | 80.99 | 67,580.79 | 0.00 | 5.44 | 4.36 | 268.96 | 11.88 | 71.22 | 9.82 | 539.30 | 510.09 | 533.09 | 119.12 | 1,043.18 | 19.98 | 215.21 |
| 6/29/11 11:00 | 93.95 | 80.94 | 67,410.43 | 0.00 | 5.47 | 4.31 | 269.60 | 7.99 | 73.72 | 9.96 | 539.39 | 517.10 | 550.12 | 116.65 | 1,067.22 | 21.22 | 212.38 |
| 6/29/11 12:00 | 93.92 | 80.97 | 67,406.22 | 0.00 | 5.31 | 4.26 | 270.70 | 9.85 | 77.61 | 9.71 | 539.10 | 533.09 | 543.08 | 116.77 | 1,076.17 | 19.85 | 216.97 |
| 6/29/11 13:00 | 94.06 | 81.03 | 67,343.50 | 0.00 | 5.39 | 4.30 | 266.33 | 8.14 | 74.62 | 9.88 | 540.07 | 518.10 | 553.09 | 108.84 | 1,071.19 | 20.21 | 212.50 |
| 6/29/11 14:00 | 94.10 | 81.11 | 67,247.25 | 0.00 | 5.32 | 4.21 | 267.85 | 7.66 | 74.21 | 10.00 | 540.12 | 520.08 | 540.08 | 106.14 | 1,060.16 | 20.77 | 212.22 |
| 6/29/11 15:00 | 94.07 | 81.09 | 66,798.99 | 0.00 | 5.32 | 4.31 | 270.79 | 12.91 | 76.43 | 10.33 | 539.10 | 414.97 | 458.02 | 93.75 | 872.99 | 19.10 | 219.08 |
| 6/29/11 16:00 | 93.92 | 80.92 | 66,772.43 | 0.00 | 5.32 | 4.27 | 272.05 | 10.85 | 78.72 | 10.60 | 538.13 | 417.97 | 422.01 | 79.69 | 839.98 | 19.85 | 218.05 |
| 6/29/11 17:00 | 94.01 | 81.01 | 66,648.40 | 0.00 | 5.43 | 4.29 | 274.00 | 18.08 | 81.01 | 9.61 | 537.79 | 403.98 | 429.99 | 83.96 | 833.97 | 21.00 | 216.45 |
| 6/29/11 18:00 | 94.05 | 81.08 | 66,797.93 | 0.00 | 5.46 | 4.30 | 271.36 | 12.26 | 80.11 | 10.78 | 538.76 | 396.97 | 409.01 | 84.40 | 805.98 | 21.19 | 213.87 |
| 6/29/11 19:00 | 93.97 | 80.96 | 66,824.82 | 0.00 | 5.29 | 4.31 | 275.03 | 13.22 | 80.32 | 9.59 | 538.76 | 401.98 | 417.00 | 81.63 | 818.98 | 18.56 | 223.99 |
| 6/29/11 20:00 | 94.10 | 81.10 | 67,034.93 | 0.00 | 5.36 | 4.29 | 271.59 | 12.19 | 77.02 | 10.29 | 538.13 | 399.98 | 402.98 | 82.42 | 802.96 | 20.06 | 217.12 |
| 6/29/11 21:00 | 94.02 | 81.03 | 67,248.43 | 0.00 | 5.24 | 4.20 | 274.05 | 10.79 | 76.50 | 10.19 | 539.15 | 403.96 | 398.00 | 81.32 | 801.95 | 19.81 | 219.75 |
| 6/29/11 22:00 | 94.01 | 81.01 | 67,430.69 | 0.00 | 5.33 | 4.25 | 271.14 | 11.65 | 76.91 | 10.92 | 539.69 | 408.97 | 406.96 | 79.96 | 815.92 | 20.34 | 216.00 |
| 6/29/11 23:00 | 93.93 | 80.91 | 67,090.34 | 0.00 | 5.39 | 4.36 | 271.30 | 11.04 | 67.40 | 9.82 | 539.93 | 382.00 | 384.96 | 82.12 | 766.96 | 19.15 | 219.35 |
| 6/30/11 0:00 | 93.97 | 81.00 | 67,357.73 | 0.00 | 5.27 | 4.27 | 270.62 | 16.84 | 81.22 | 9.60 | 540.71 | 385.95 | 384.98 | 81.14 | 770.94 | 18.90 | 219.48 |
| 6/30/11 1:00 | 93.84 | 80.88 | 67,269.06 | 0.00 | 5.16 | 4.12 | 273.03 | 9.65 | 82.12 | 10.63 | 541.05 | 404.96 | 395.97 | 81.04 | 800.93 | 20.06 | 218.26 |
| 6/30/11 2:00 | 94.13 | 81.14 | 67,478.03 | 0.00 | 5.31 | 4.29 | 272.70 | 12.19 | 76.71 | 10.37 | 541.24 | 394.97 | 393.97 | 83.33 | 788.94 | 19.22 | 220.28 |
| 6/30/11 3:00 | 94.09 | 81.15 | 67,077.68 | 0.00 | 5.11 | 4.08 | 276.66 | 7.02 | 72.23 | 10.44 | 541.24 | 419.98 | 415.98 | 80.40 | 835.96 | 20.28 | 220.55 |
| 6/30/11 4:00 | 94.00 | 81.03 | 67,642.44 | 0.00 | 5.17 | 4.13 | 279.66 | 6.28 | 75.32 | 10.40 | 541.92 | 430.99 | 428.01 | 73.44 | 859.01 | 20.15 | 223.31 |
| 6/30/11 5:00 | 93.96 | 80.97 | 67,538.69 | 0.00 | 5.33 | 4.24 | 275.95 | 12.40 | 77.71 | 9.95 | 542.16 | 406.98 | 410.97 | 71.30 | 817.95 | 20.53 | 219.29 |
| 6/30/11 6:00 | 93.99 | 80.99 | 67,277.39 | 0.00 | 5.32 | 4.22 | 275.07 | 10.70 | 77.12 | 10.48 | 542.44 | 393.97 | 404.98 | 73.23 | 798.95 | 20.75 | 217.99 |
| 6/30/11 7:00 | 94.03 | 81.06 | 67,398.94 | 0.00 | 5.27 | 4.44 | 256.16 | 13.72 | 75.00 | 9.82 | 542.02 | 401.95 | 396.97 | 73.40 | 798.92 | 15.70 | 215.94 |
| 6/30/11 8:00 | 94.00 | 80.99 | 67,328.99 | 0.00 | 5.20 | 4.22 | 278.10 | 11.55 | 77.30 | 10.42 | 541.92 | 408.96 | 386.98 | 74.37 | 795.94 | 18.89 | 225.58 |
| 6/30/11 9:00 | 93.95 | 80.95 | 67,390.42 | 0.00 | 5.07 | 4.10 | 274.80 | 6.89 | 74.90 | 11.84 | 542.97 | 417.00 | 416.00 | 72.68 | 832.99 | 19.12 | 222.26 |
| 6/30/11 10:00 | 93.92 | 80.89 | 67,447.97 | 0.00 | 5.04 | 4.10 | 278.31 | 24.79 | 88.20 | 11.13 | 542.21 | 357.99 | 362.95 | 23.95 | 720.94 | 18.59 | 226.57 |
| 6/30/11 11:00 | 93.90 | 80.92 | 67,066.04 | 0.00 | 5.19 | 4.22 | 273.51 | 25.34 | 82.71 | 10.47 | 539.39 | 339.07 | 336.06 | 65.48 | 675.13 | 18.77 | 222.18 |
| 6/30/11 12:00 | 94.07 | 81.07 | 67,037.76 | 0.00 | 5.01 | 4.06 | 272.26 | 12.75 | 85.42 | 10.99 | 539.30 | 348.02 | 351.06 | 81.26 | 699.08 | 18.91 | 220.79 |
| 6/30/11 13:00 | 94.00 | 80.96 | 67,071.96 | 0.00 | 5.04 | 4.07 | 271.86 | 11.48 | 82.82 | 10.66 | 539.10 | 357.01 | 355.03 | 84.20 | 712.05 | 19.16 | 219.77 |
| 6/30/11 14:00 | 94.04 | 81.05 | 66,988.01 | 0.00 | 5.05 | 4.08 | 271.90 | 12.74 | 84.80 | 10.85 | 538.13 | 353.01 | 346.03 | 85.30 | 699.03 | 19.18 | 219.74 |
| 6/30/11 15:00 | 93.93 | 80.94 | 67,084.69 | 0.00 | 5.00 | 4.06 | 272.88 | 11.49 | 83.13 | 10.55 | 538.86 | 372.98 | 364.00 | 74.14 | 736.99 | 18.80 | 221.58 |
| 6/30/11 16:00 | 94.08 | 81.06 | 67,091.26 | 0.00 | 5.04 | 4.01 | 276.54 | 9.30 | 79.41 | 10.75 | 539.15 | 377.99 | 363.00 | 70.08 | 741.00 | 20.44 | 220.01 |
| 6/30/11 17:00 | 93.99 | 80.93 | 67,301.23 | 0.00 | 5.09 | 4.15 | 273.84 | 11.08 | 76.22 | 11.24 | 538.71 | 400.95 | 389.97 | 69.16 | 790.92 | 18.47 | 223.26 |

| 6/15/11 0:00<br>7/16/11 0:00<br>1H | F02012A | F02012B | C02843 | F02443CF | A027035 | A027034 | F02010R | A027030R | A027036R | A027031R | T02057 | J02133C | J02145C | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | KBBL/D<br>TOTAL FCC CHARGE TO RX | KBBL/D<br>FCC FRESH FEED TO RX | LB/HR<br>2F-7 COKEBURN | KCFD<br>COMP. FG TO CO BOILER | %<br>MAIN DRY O2 | %<br>MAIN WET O2 | KSCFM<br>2F-7 STACK FLOW | PPM<br>2F-7 NOX_CONC | PPM<br>2F-7 CO CONCENTRATION | PPM<br>2F-7 SOX CONC | DEGF<br>SCR CAT FLUE GAS TEMP | KW<br>ESP-1 Total Power | KW<br>ESP-2 Total Power | LB/HR<br>NH3 Flow CTRL | KW<br>Total ESP Power | %<br>Moisture | KDSCFM<br>Exhaust Flow |
| 6/30/11 18:00 | 94.00 | 80.96 | 67,046.72 | 0.00 | 5.02 | 4.05 | 273.39 | 9.42 | 82.71 | 10.90 | 538.18 | 386.99 | 387.96 | 72.74 | 774.95 | 19.33 | 220.55 |
| 6/30/11 19:00 | 94.00 | 80.97 | 67,228.06 | 0.00 | 5.17 | 4.04 | 273.38 | 9.55 | 64.00 | 10.57 | 538.86 | 396.94 | 395.95 | 69.51 | 792.89 | 21.86 | 213.63 |
| 6/30/11 20:00 | 94.09 | 81.06 | 67,311.10 | 0.00 | 5.13 | 4.16 | 273.49 | 11.24 | 63.93 | 10.68 | 539.73 | 410.97 | 412.97 | 73.69 | 823.94 | 18.90 | 221.80 |
| 6/30/11 21:00 | 93.99 | 80.94 | 67,337.46 | 0.00 | 5.09 | 4.22 | 275.58 | 8.47 | 60.32 | 11.02 | 539.88 | 405.99 | 398.97 | 75.66 | 804.96 | 17.13 | 228.38 |
| 6/30/11 22:00 | 93.94 | 80.94 | 67,149.15 | 0.00 | 5.19 | 4.18 | 271.69 | 8.83 | 62.92 | 10.38 | 541.05 | 424.98 | 410.99 | 77.15 | 835.97 | 19.36 | 219.08 |
| 6/30/11 23:00 | 94.08 | 81.07 | 67,307.59 | 0.00 | 5.10 | 4.15 | 272.72 | 7.83 | 58.72 | 9.86 | 541.00 | 427.98 | 420.00 | 72.79 | 847.99 | 18.55 | 222.12 |
| 7/1/11 0:00 | 94.01 | 81.00 | 67,351.62 | 0.00 | 5.22 | 4.32 | 270.67 | 18.01 | 62.82 | 9.65 | 540.85 | 412.97 | 405.96 | 75.14 | 818.93 | 17.14 | 224.29 |
| 7/1/11 1:00 | 93.10 | 80.12 | 67,851.05 | 0.00 | 5.19 | 4.25 | 276.47 | 11.03 | 61.91 | 9.59 | 541.78 | 429.99 | 422.98 | 74.46 | 852.97 | 18.06 | 226.55 |
| 7/1/11 2:00 | 93.14 | 80.14 | 68,168.19 | 0.00 | 5.12 | 4.20 | 275.11 | 8.68 | 57.61 | 9.75 | 542.44 | 437.00 | 424.01 | 65.24 | 861.01 | 17.92 | 225.80 |
| 7/1/11 3:00 | 93.17 | 80.14 | 68,050.67 | 0.00 | 5.18 | 4.19 | 273.57 | 11.86 | 59.52 | 9.69 | 543.02 | 439.00 | 433.00 | 63.96 | 872.00 | 18.96 | 221.70 |
| 7/1/11 4:00 | 93.14 | 80.15 | 67,977.96 | 0.00 | 5.11 | 4.13 | 275.84 | 14.64 | 84.31 | 9.56 | 543.21 | 408.97 | 412.97 | 62.59 | 821.94 | 19.26 | 222.72 |
| 7/1/11 5:00 | 93.12 | 80.13 | 68,106.87 | 0.00 | 5.07 | 4.12 | 275.99 | 13.40 | 85.42 | 9.37 | 543.80 | 381.01 | 382.96 | 62.56 | 763.96 | 18.72 | 224.33 |
| 7/1/11 6:00 | 93.09 | 80.13 | 68,228.31 | 0.00 | 5.04 | 4.08 | 276.08 | 11.87 | 81.71 | 9.47 | 543.89 | 402.00 | 397.95 | 59.66 | 799.95 | 19.01 | 223.61 |
| 7/1/11 7:00 | 93.06 | 80.04 | 68,274.39 | 0.00 | 5.06 | 4.17 | 241.47 | 16.23 | 89.10 | 9.48 | 544.19 | 385.98 | 379.94 | 57.06 | 765.92 | 17.51 | 199.18 |
| 7/1/11 8:00 | 93.04 | 80.06 | 68,122.17 | 0.00 | 5.13 | 4.03 | 272.88 | 12.92 | 84.21 | 9.28 | 543.80 | 390.99 | 388.98 | 59.10 | 779.97 | 21.54 | 214.09 |
| 7/1/11 9:00 | 93.08 | 80.08 | 68,170.10 | 0.00 | 5.18 | 4.08 | 276.73 | 20.84 | 87.23 | 9.10 | 543.21 | 378.99 | 378.97 | 67.54 | 757.96 | 21.26 | 217.90 |
| 7/1/11 10:00 | 93.11 | 80.11 | 68,028.59 | 0.00 | 5.10 | 4.04 | 273.23 | 10.92 | 83.13 | 9.86 | 542.82 | 384.98 | 381.95 | 73.30 | 766.93 | 20.93 | 216.04 |
| 7/1/11 11:00 | 93.08 | 80.08 | 67,975.69 | 0.00 | 5.11 | 4.00 | 272.51 | 10.60 | 79.41 | 9.87 | 540.85 | 393.99 | 384.95 | 65.11 | 778.94 | 21.62 | 213.60 |
| 7/1/11 12:00 | 93.14 | 80.13 | 67,983.31 | 0.00 | 4.98 | 3.90 | 269.61 | 10.33 | 84.31 | 9.86 | 540.27 | 398.00 | 388.96 | 66.42 | 786.95 | 21.65 | 211.24 |
| 7/1/11 13:00 | 93.13 | 80.15 | 67,842.56 | 0.00 | 5.05 | 3.91 | 271.11 | 13.68 | 75.70 | 9.63 | 539.81 | 398.00 | 403.95 | 62.92 | 801.95 | 22.56 | 209.94 |
| 7/1/11 14:00 | 93.12 | 80.09 | 67,577.09 | 0.00 | 5.09 | 4.02 | 265.46 | 15.02 | 80.00 | 9.95 | 538.33 | 398.97 | 394.97 | 64.80 | 793.94 | 20.86 | 210.09 |
| 7/1/11 15:00 | 93.14 | 80.16 | 67,881.58 | 0.00 | 4.94 | 3.90 | 274.77 | 9.45 | 82.12 | 9.81 | 539.10 | 417.97 | 407.96 | 61.04 | 825.94 | 21.05 | 216.93 |
| 7/1/11 16:00 | 93.11 | 80.14 | 67,518.70 | 0.00 | 5.08 | 3.95 | 274.01 | 13.44 | 82.61 | 10.39 | 539.01 | 401.00 | 398.95 | 57.95 | 799.95 | 22.29 | 212.94 |
| 7/1/11 17:00 | 93.14 | 80.12 | 67,704.43 | 0.00 | 5.08 | 3.95 | 274.35 | 13.39 | 88.82 | 10.48 | 536.58 | 395.99 | 393.96 | 63.72 | 789.96 | 22.12 | 213.67 |
| 7/1/11 18:00 | 93.13 | 80.17 | 68,093.07 | 0.00 | 4.95 | 3.90 | 274.92 | 10.25 | 81.91 | 10.42 | 536.99 | 410.97 | 395.95 | 63.72 | 806.92 | 21.19 | 216.67 |
| 7/1/11 19:00 | 93.10 | 80.10 | 68,384.22 | 0.00 | 5.03 | 3.96 | 274.20 | 11.38 | 82.82 | 10.46 | 539.01 | 403.00 | 392.96 | 61.76 | 795.96 | 21.36 | 215.63 |
| 7/1/11 20:00 | 93.09 | 80.07 | 68,091.28 | 0.00 | 5.32 | 4.19 | 269.36 | 18.53 | 81.91 | 10.16 | 538.91 | 382.98 | 389.93 | 62.97 | 772.91 | 21.15 | 212.40 |
| 7/1/11 21:00 | 93.14 | 80.12 | 67,889.22 | 0.00 | 4.96 | 3.91 | 273.36 | 6.39 | 82.12 | 11.23 | 539.88 | 408.98 | 394.97 | 61.04 | 803.96 | 21.09 | 215.70 |
| 7/1/11 22:00 | 93.04 | 80.05 | 68,422.71 | 0.00 | 4.99 | 3.91 | 275.10 | 12.52 | 87.02 | 10.81 | 541.14 | 398.00 | 386.96 | 55.61 | 784.96 | 21.49 | 215.99 |
| 7/1/11 23:00 | 93.11 | 80.08 | 68,155.39 | 0.00 | 4.94 | 3.92 | 274.05 | 12.28 | 82.02 | 10.67 | 542.32 | 405.00 | 401.98 | 54.56 | 806.98 | 20.65 | 217.47 |

# APPENDIX C FIELD AND LABORATORY DATA

AVERAGE VOLATILES EMISSIONS

CLIENT: ExxonMobil

NON-BLANK CORRECTED FOR ERT

| NAME | ug/dscm | | ug/dscm at 7% O2 | | ug/dscf | | lb/hr |
|---|---|---|---|---|---|---|---|
| 1,3-Butadiene | ND < | 268.1 | ND < | 234.2 | ND < | 7.59 | ND < 0.236 |
| Pentane | ND < | 263.1 | ND < | 230.5 | ND < | 7.45 | ND < 0.235 |
| Acrolein | ND < | 263.1 | ND < | 230.5 | ND < | 7.45 | ND < 0.235 |
| Acetone | | 1878.6 | | 1646.0 | | 53.20 | 1.679 |
| Acetonitrile | | 415.0 | | 363.5 | | 11.75 | 0.369 |
| Carbon Disulfide | ND < | 263.1 | ND < | 230.5 | ND < | 7.45 | ND < 0.235 |
| Methylene Chloride | ND < | 263.1 | ND < | 230.5 | ND < | 7.45 | ND < 0.235 |
| Acrylonitrile | ND < | 263.1 | ND < | 230.5 | ND < | 7.45 | ND < 0.235 |
| Methyl t-Butyl Ether (MTBE) | ND < | 263.1 | ND < | 230.5 | ND < | 7.45 | ND < 0.235 |
| Hexane | ND < | 263.1 | ND < | 230.5 | ND < | 7.45 | ND < 0.235 |
| 2,2,4-Trimethylpentane | ND < | 263.1 | ND < | 230.5 | ND < | 7.45 | ND < 0.235 |
| Benzene | ND < | 263.1 | ND < | 230.5 | ND < | 7.45 | ND < 0.235 |
| Trichloroethene | ND < | 263.1 | ND < | 230.5 | ND < | 7.45 | ND < 0.235 |
| 2-Nitropropane | ND < | 263.1 | ND < | 230.5 | ND < | 7.45 | ND < 0.235 |
| Methyl iso-Butyl Ketone | ND < | 263.1 | ND < | 230.5 | ND < | 7.45 | ND < 0.235 |
| Toluene | ND < | 263.1 | ND < | 230.5 | ND < | 7.45 | ND < 0.235 |
| Tetrachloroethene | ND < | 263.1 | ND < | 230.5 | ND < | 7.45 | ND < 0.235 |
| 1,2-Dibromoethane | ND < | 263.1 | ND < | 230.5 | ND < | 7.45 | ND < 0.235 |
| Chlorobenzene | ND < | 263.1 | ND < | 230.5 | ND < | 7.45 | ND < 0.235 |
| Ethylbenzene | ND < | 263.1 | ND < | 230.5 | ND < | 7.45 | ND < 0.235 |
| m&p-Xylenes | ND < | 263.1 | ND < | 230.5 | ND < | 7.45 | ND < 0.235 |
| o-Xylene | ND < | 263.1 | ND < | 230.5 | ND < | 7.45 | ND < 0.235 |
| Styrene | ND < | 263.1 | ND < | 230.5 | ND < | 7.45 | ND < 0.235 |
| Cumene (Isopropylbenzene) | ND < | 263.1 | ND < | 230.5 | ND < | 7.45 | ND < 0.235 |
| Nitrobenzene | ND < | 1315.3 | ND < | 1152.5 | ND < | 37.25 | ND < 1.174 |

BLANK CORRECTED (REAGENT ONLY)

| NAME | ug/blank | ug/train | ug/dscm | ug/dscm at 7% O2 | ug/dscf | lb/hr |
|---|---|---|---|---|---|---|
| Acetone | | < 4.4 | < 267.3 | < 234.2 | < 7.57 | < 0.239 |
| Acetonitrile | | < 4.3 | < 263.1 | < 230.5 | < 7.45 | < 0.235 |

C.1.1-2

VOLATILES CALCULATIONS

| | | | |
|---|---|---|---|
| CLIENT: | ExxonMobil | | AA |
| TEST NUMBER: | 1-VOC | VMSTD(DSCF): | 0.5541 |
| TEST DATE: | 6/27/2011 | QSD(DSCF/MIN): | 240582 |
| T REF (F) | 68 | CO2,%: | 14.14 |
| | | O2,%: | 5.03 |

NON-BLANK CORRECTED FOR ERT

| NAME | ug/train | ug/dscm | ug/dscm at 7% O2 | ug/dscf | lb/hr |
|---|---|---|---|---|---|
| 1,3-Butadiene | ND < 4.3 | ND < 274.0 | ND < 240.0 | ND < 7.76 | ND < 0.247 |
| Pentane | ND < 4.3 | ND < 274.0 | ND < 240.0 | ND < 7.76 | ND < 0.247 |
| Acrolein | ND < 4.3 | ND < 274.0 | ND < 240.0 | ND < 7.76 | ND < 0.247 |
| Acetone | 35.9 | 2287.7 | 2004.0 | 64.79 | 2.060 |
| Acetonitrile | 5.6 | 356.9 | 312.6 | 10.11 | 0.321 |
| Carbon Disulfide | ND < 4.3 | ND < 274.0 | ND < 240.0 | ND < 7.76 | ND < 0.247 |
| Methylene Chloride | ND < 4.3 | ND < 274.0 | ND < 240.0 | ND < 7.76 | ND < 0.247 |
| Acrylonitrile | ND < 4.3 | ND < 274.0 | ND < 240.0 | ND < 7.76 | ND < 0.247 |
| Methyl t-Butyl Ether (MTBE) | ND < 4.3 | ND < 274.0 | ND < 240.0 | ND < 7.76 | ND < 0.247 |
| Hexane | ND < 4.3 | ND < 274.0 | ND < 240.0 | ND < 7.76 | ND < 0.247 |
| 2,2,4-Trimethylpentane | ND < 4.3 | ND < 274.0 | ND < 240.0 | ND < 7.76 | ND < 0.247 |
| Benzene | ND < 4.3 | ND < 274.0 | ND < 240.0 | ND < 7.76 | ND < 0.247 |
| Trichloroethene | ND < 4.3 | ND < 274.0 | ND < 240.0 | ND < 7.76 | ND < 0.247 |
| 2-Nitropropane | ND < 4.3 | ND < 274.0 | ND < 240.0 | ND < 7.76 | ND < 0.247 |
| Methyl iso-Butyl Ketone | ND < 4.3 | ND < 274.0 | ND < 240.0 | ND < 7.76 | ND < 0.247 |
| Toluene | ND < 4.3 | ND < 274.0 | ND < 240.0 | ND < 7.76 | ND < 0.247 |
| Tetrachloroethene | ND < 4.3 | ND < 274.0 | ND < 240.0 | ND < 7.76 | ND < 0.247 |
| 1,2-Dibromoethane | ND < 4.3 | ND < 274.0 | ND < 240.0 | ND < 7.76 | ND < 0.247 |
| Chlorobenzene | ND < 4.3 | ND < 274.0 | ND < 240.0 | ND < 7.76 | ND < 0.247 |
| Ethylbenzene | ND < 4.3 | ND < 274.0 | ND < 240.0 | ND < 7.76 | ND < 0.247 |
| m&p-Xylenes | ND < 4.3 | ND < 274.0 | ND < 240.0 | ND < 7.76 | ND < 0.247 |
| o-Xylene | ND < 4.3 | ND < 274.0 | ND < 240.0 | ND < 7.76 | ND < 0.247 |
| Styrene | ND < 4.3 | ND < 274.0 | ND < 240.0 | ND < 7.76 | ND < 0.247 |
| Cumene (Isopropylbenzene) | ND < 4.3 | ND < 274.0 | ND < 240.0 | ND < 7.76 | ND < 0.247 |
| Nitrobenzene | ND < 21.5 | ND < 1370.1 | ND < 1200.1 | ND < 38.80 | ND < 1.234 |

BLANK CORRECTED (REAGENT ONLY)

| NAME | ug/blank | ug/train | ug/dscm | ug/dscm at 7% O2 | ug/dscf | lb/hr |
|---|---|---|---|---|---|---|
| Acetone | 31.4 | 4.5 | 286.8 | 251.2 | 8.12 | 0.258 |
| Acetonitrile | 4.3 | < 4.3 | < 274.0 | < 240.0 | < 7.76 | < 0.247 |

C.1.1-3

VOLATILES CALCULATIONS

| | | | |
|---|---|---|---|
| CLIENT: | ExxonMobil | | AA |
| TEST NUMBER: | 2-VOC | VMSTD(DSCF): | 0.6001 |
| TEST DATE: | 6/27/2011 | QSD(DSCF/MIN): | 244827 |
| T REF (F) | 68 | CO2,%: | 14.03 |
| | | O2,%: | 5.14 |

NON-BLANK CORRECTED FOR ERT

| NAME | ug/train | | ug/dscm | | ug/dscm at 7% O2 | | ug/dscf | | lb/hr |
|---|---|---|---|---|---|---|---|---|---|
| 1,3-Butadiene | | n/a* | | n/a | | n/a | | n/a | n/a |
| Pentane | ND < | 4.3 | ND < | 253.0 | ND < | 223.2 | ND < | 7.17 | ND < 0.232 |
| Acrolein | ND < | 4.3 | ND < | 253.0 | ND < | 223.2 | ND < | 7.17 | ND < 0.232 |
| Acetone | | 28.2 | | 1659.4 | | 1463.6 | | 46.99 | 1.521 |
| Acetonitrile | | 6.7 | | 394.2 | | 347.7 | | 11.17 | 0.361 |
| Carbon Disulfide | ND < | 4.3 | ND < | 253.0 | ND < | 223.2 | ND < | 7.17 | ND < 0.232 |
| Methylene Chloride | ND < | 4.3 | ND < | 253.0 | ND < | 223.2 | ND < | 7.17 | ND < 0.232 |
| Acrylonitrile | ND < | 4.3 | ND < | 253.0 | ND < | 223.2 | ND < | 7.17 | ND < 0.232 |
| Methyl t-Butyl Ether (MTBE) | ND < | 4.3 | ND < | 253.0 | ND < | 223.2 | ND < | 7.17 | ND < 0.232 |
| Hexane | ND < | 4.3 | ND < | 253.0 | ND < | 223.2 | ND < | 7.17 | ND < 0.232 |
| 2,2,4-Trimethylpentane | ND < | 4.3 | ND < | 253.0 | ND < | 223.2 | ND < | 7.17 | ND < 0.232 |
| Benzene | ND < | 4.3 | ND < | 253.0 | ND < | 223.2 | ND < | 7.17 | ND < 0.232 |
| Trichloroethene | ND < | 4.3 | ND < | 253.0 | ND < | 223.2 | ND < | 7.17 | ND < 0.232 |
| 2-Nitropropane | ND < | 4.3 | ND < | 253.0 | ND < | 223.2 | ND < | 7.17 | ND < 0.232 |
| Methyl iso-Butyl Ketone | ND < | 4.3 | ND < | 253.0 | ND < | 223.2 | ND < | 7.17 | ND < 0.232 |
| Toluene | ND < | 4.3 | ND < | 253.0 | ND < | 223.2 | ND < | 7.17 | ND < 0.232 |
| Tetrachloroethene | ND < | 4.3 | ND < | 253.0 | ND < | 223.2 | ND < | 7.17 | ND < 0.232 |
| 1,2-Dibromoethane | ND < | 4.3 | ND < | 253.0 | ND < | 223.2 | ND < | 7.17 | ND < 0.232 |
| Chlorobenzene | ND < | 4.3 | ND < | 253.0 | ND < | 223.2 | ND < | 7.17 | ND < 0.232 |
| Ethylbenzene | ND < | 4.3 | ND < | 253.0 | ND < | 223.2 | ND < | 7.17 | ND < 0.232 |
| m&p-Xylenes | ND < | 4.3 | ND < | 253.0 | ND < | 223.2 | ND < | 7.17 | ND < 0.232 |
| o-Xylene | ND < | 4.3 | ND < | 253.0 | ND < | 223.2 | ND < | 7.17 | ND < 0.232 |
| Styrene | ND < | 4.3 | ND < | 253.0 | ND < | 223.2 | ND < | 7.17 | ND < 0.232 |
| Cumene (Isopropylbenzene) | ND < | 4.3 | ND < | 253.0 | ND < | 223.2 | ND < | 7.17 | ND < 0.232 |
| Nitrobenzene | ND < | 21.5 | ND < | 1265.1 | ND < | 1115.9 | ND < | 35.83 | ND < 1.159 |

BLANK CORRECTED (REAGENT ONLY)

| NAME | ug/blank | | ug/train | | ug/dscm | | ug/dscm at 7% O2 | | ug/dscf | | lb/hr |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Acetone | 31.4 | < | 4.3 | < | 253.0 | < | 223.2 | < | 7.17 | < | 0.232 |
| Acetonitrile | 4.3 | < | 4.3 | < | 253.0 | < | 223.2 | < | 7.17 | < | 0.232 |

C.1.1-4

VOLATILES CALCULATIONS

| | | | |
|---|---|---|---|
| CLIENT: | ExxonMobil | INITIALS: | AA |
| TEST NUMBER: | 3-VOC | VMSTD(DSCF): | 0.5792 |
| TEST DATE: | 6/28/2011 | QSD(DSCF/MIN): | 230394 |
| T REF (F) | 68 | CO2,%: | 14.04 |
| | | O2,%: | 4.94 |

NON-BLANK CORRECTED FOR ERT

| NAME | ug/train | ug/dscm | ug/dscm at 7% O2 | ug/dscf | lb/hr |
|---|---|---|---|---|---|
| 1,3-Butadiene | ND < 4.3 | ND < 262.2 | ND < 228.3 | ND < 7.42 | ND < 0.226 |
| Pentane | ND < 4.3 | ND < 262.2 | ND < 228.3 | ND < 7.42 | ND < 0.226 |
| Acrolein | ND < 4.3 | ND < 262.2 | ND < 228.3 | ND < 7.42 | ND < 0.226 |
| Acetone | 27.7 | 1688.8 | 1470.6 | 47.83 | 1.456 |
| Acetonitrile | 8.1 | 493.8 | 430.0 | 13.99 | 0.426 |
| Carbon Disulfide | ND < 4.3 | ND < 262.2 | ND < 228.3 | ND < 7.42 | ND < 0.226 |
| Methylene Chloride | ND < 4.3 | ND < 262.2 | ND < 228.3 | ND < 7.42 | ND < 0.226 |
| Acrylonitrile | ND < 4.3 | ND < 262.2 | ND < 228.3 | ND < 7.42 | ND < 0.226 |
| Methyl t-Butyl Ether (MTBE) | ND < 4.3 | ND < 262.2 | ND < 228.3 | ND < 7.42 | ND < 0.226 |
| Hexane | ND < 4.3 | ND < 262.2 | ND < 228.3 | ND < 7.42 | ND < 0.226 |
| 2,2,4-Trimethylpentane | ND < 4.3 | ND < 262.2 | ND < 228.3 | ND < 7.42 | ND < 0.226 |
| Benzene | ND < 4.3 | ND < 262.2 | ND < 228.3 | ND < 7.42 | ND < 0.226 |
| Trichloroethene | ND < 4.3 | ND < 262.2 | ND < 228.3 | ND < 7.42 | ND < 0.226 |
| 2-Nitropropane | ND < 4.3 | ND < 262.2 | ND < 228.3 | ND < 7.42 | ND < 0.226 |
| Methyl iso-Butyl Ketone | ND < 4.3 | ND < 262.2 | ND < 228.3 | ND < 7.42 | ND < 0.226 |
| Toluene | ND < 4.3 | ND < 262.2 | ND < 228.3 | ND < 7.42 | ND < 0.226 |
| Tetrachloroethene | ND < 4.3 | ND < 262.2 | ND < 228.3 | ND < 7.42 | ND < 0.226 |
| 1,2-Dibromoethane | ND < 4.3 | ND < 262.2 | ND < 228.3 | ND < 7.42 | ND < 0.226 |
| Chlorobenzene | ND < 4.3 | ND < 262.2 | ND < 228.3 | ND < 7.42 | ND < 0.226 |
| Ethylbenzene | ND < 4.3 | ND < 262.2 | ND < 228.3 | ND < 7.42 | ND < 0.226 |
| m&p-Xylenes | ND < 4.3 | ND < 262.2 | ND < 228.3 | ND < 7.42 | ND < 0.226 |
| o-Xylene | ND < 4.3 | ND < 262.2 | ND < 228.3 | ND < 7.42 | ND < 0.226 |
| Styrene | ND < 4.3 | ND < 262.2 | ND < 228.3 | ND < 7.42 | ND < 0.226 |
| Cumene (Isopropylbenzene) | ND < 4.3 | ND < 262.2 | ND < 228.3 | ND < 7.42 | ND < 0.226 |
| Nitrobenzene | ND < 21.5 | ND < 1310.8 | ND < 1141.4 | ND < 37.12 | ND < 1.130 |

BLANK CORRECTED (REAGENT ONLY)

| NAME | ug/blank | ug/train | ug/dscm | ug/dscm at 7% O2 | ug/dscf | lb/hr |
|---|---|---|---|---|---|---|
| Acetone | 31.4 | < 4.3 | < 262.2 | < 228.3 | < 7.42 | < 0.226 |
| Acetonitrile | 4.3 | < 4.3 | < 262.2 | < 228.3 | < 7.42 | < 0.226 |

C.1.1-5

# Delta

Deuterated Spike VOC Test Summary

| | | | | |
|---|---|---|---|---|
| Client/Location | ExxonMobil | | Reference Temp (F) | 68 |
| | | | Fuel | Refinery |
| Sample Location | FCC 2F-7 Stack | | Data By | AA |
| Test No. | 1-VOC-Deuterated | 2-VOC-Deuterated | 3-VOC-Deuterated | Average |
| Date | June 27, 2011 | June 27, 2011 | June 28, 2011 | * |
| Start/Stop Time | 12:55/13:55 | 16:10/17:10 | 10:15/11:15 | * |
| Bar Press (in Hg) | 29.80 | 29.80 | 29.77 | * |
| Test Method | Chilled Impinger | Chilled Impinger | Chilled Impinger | * |
| Sample Time (Min) | 60 | 60 | 60 | * |
| Sample Train | 13-P&M | 13-P&M | 13-P&M | * |
| Meter Cal Factor | 1.0020 | 1.0020 | 1.0020 | * |
| Meter Temp (F) | 74.2 | 68.9 | 82.7 | 75.3 |
| Meter Press (iwg) | 0.24 | 0.24 | 0.24 | 0.24 |
| Meter Vol (am^3) | 0.01590 | 0.01705 | 0.01690 | 0.0166 |
| Meter Vol (l) | 15.9 | 17.05 | 16.9 | 16.62 |
| Sample Rate (lpm) | 0.265 | 0.284 | 0.282 | 0.277 |
| Std Sample Vol (SM^3) | 0.0157 | 0.0170 | 0.0164 | 0.0164 |
| Std Sample Vol (dscf) | 0.5541 | 0.6001 | 0.5792 | 0.5778 |
| Stack Flow Rate, DSCFM | 240,582 | 244,827 | 230,394 | 238,601 |
| Flow rate from Test | 1-SV | 2-SV | 3-SV | |

# Delta

Native Spike VOC Test Summary

| | | | | |
|---|---|---|---|---|
| Client/Location | ExxonMobil | | Reference Temp (F) | 68 |
| | | | Fuel | Refinery |
| Sample Location | FCC 2F-7 Stack | | Data By | AA |
| Test No. | 1-VOC-Native | 2-VOC-Native | 3-VOC-Native | Average |
| Date | June 27, 2011 | June 27, 2011 | June 28, 2011 | * |
| Start/Stop Time | 12:55/13:55 | 16:10/17:10 | 10:15/11:15 | * |
| Bar Press (in Hg) | 29.80 | 29.80 | 29.77 | * |
| Test Method | Chilled Impinger | Chilled Impinger | Chilled Impinger | * |
| Sample Time (Min) | 60 | 60 | 60 | * |
| Sample Train | 16-P&M | 16-P&M | 16-P&M | * |
| Meter Cal Factor | 1.0217 | 1.0217 | 1.0217 | * |
| Meter Temp (F) | 75.5 | 73.5 | 82.8 | 77.3 |
| Meter Press (iwg) | 0.28 | 0.30 | 0.30 | 0.29 |
| Meter Vol (am^3) | 0.01410 | 0.01535 | 0.01540 | 0.0150 |
| Meter Vol (l) | 14.1 | 15.35 | 15.4 | 14.95 |
| Sample Rate (lpm) | 0.235 | 0.256 | 0.257 | 0.249 |
| Std Sample Vol (SM^3) | 0.0142 | 0.0155 | 0.0152 | 0.0150 |
| Std Sample Vol (dscf) | 0.4998 | 0.5462 | 0.5381 | 0.5281 |
| Stack Flow Rate, DSCFM | 240,582 | 244,827 | 230,394 | 238,601 |
| Flow rate from Test | 1-SV | 2-SV | 3-SV | |

Delta Air Quality Services, Incorporated

speciated voc Deautreated Spike

# WET CHEMICAL SAMPLING SYSTEM DATA AND WORKSHEET

CLIENT: Exxon Mobil
LOCATION: FCC / 2F-7 Stack
DATE: 6-27-2011
RUN NO: 1-5 - Deautreated
OPERATOR: Dunlap
METER BOX NO: 13-WCS
METER ΔH@: -
METER Yd: 1.002
SAMPLE CUSTODIAN: DW

AMBIENT TEMPERATURE: 75
BAROMETRIC PRESSURE: 29.8
ASSUMED MOISTURE: -
PRE-TEST LEAK RATE: : 0.000 CFM@ 25 in. Hg
POST-TEST LEAK RATE: : 0.000 CFM@ in. Hg
TRAVERSE POINTS, MIN/POINT: 60/4
STACK AREA, FT²:
CHAIN OF CUSTODY: SAMPLE CUSTODIAN SP
SAMPLER: DW

| Imp. # | Contents | Post-Test | Pre-Test | = Difference |
|---|---|---|---|---|
| 1 | empty | | | |
| 2 | MDEOH + Spike (Deautreated) | | | |
| 3 | meoh | | | |
| 4 | meoh | | | |
| 5 | | | | |
| ~~Total~~: | SG | | | |

| Point | Time | Meter Volume, Ltr³ | ΔP in. H₂O | ΔH in. H₂O | Stack Temp, °F | Probe Temp, °F | Filter Temp, °F | Imp. Out Temp, °F | Meter Temp, °C In | Meter Temp, °C Out | Vacuum in. Hg. | O₂ % | Pstatic in. H₂O |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Single | 1255 | 519.90 | | 0.24 | | | | | 75 | 73 | 3 | | |
| | 1305 | 522.5 | | 0.24 | | | | | 75 | 73 | 3 | | |
| | 1315 | 525.5 | | 0.24 | | | | | 75 | 73 | 3 | | |
| | 1325 | 528.8 | | 0.24 | | | | | 75 | 73 | 3 | | |
| | 1335 | 530.4 | | 0.24 | | | | | 75 | 74 | 3 | | |
| | 1345 | 533.2 | | 0.24 | | | | | 75 | 74 | | | |
| | 1355 | 535.80 | | | | | | | | | | | |
| Average: | | | | | | | | | | | | | |

Comments:

8-11-2


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Delta Air Quality Services, Incorporated

Speciate VOC Native Spike

# WET CHEMICAL SAMPLING SYSTEM DATA AND WORKSHEET

CLIENT: Exxon Mobil
LOCATION: FCC / 2F-7 Stack
DATE: 6-27-11
RUN NO: 1-5 - Native Spike
OPERATOR: Dave
METER BOX NO: 16-AM
METER ΔH@: –
METER Yd: 1.0217
SAMPLE CUSTODIAN DW

AMBIENT TEMPERATURE: 75
BAROMETRIC PRESSURE: 29.8
ASSUMED MOISTURE: –
PRE-TEST LEAK RATE: : 0.0000 CFM@ 25 in. Hg
POST-TEST LEAK RATE: : 0.000 CFM@ 25 in. Hg
TRAVERSE POINTS, MIN/POINT: 16
STACK AREA, FT²:
CHAIN OF CUSTODY: SAMPLE CUSTODIAN JP
SAMPLER DW

| Imp. # | Contents | Post-Test | Pre-Test | Difference |
|---|---|---|---|---|
| 1 | empty | | | |
| 2 | meoh + Native Spike | | | |
| 3 | meoh | | | |
| 4 | meoh | | | |
| 5 | | | | |
| Total: | 56 | | | |

| Point | Time | Meter Volume, Ltr³ | ΔP in. H₂O | ΔH in. H₂O | Stack Temp, °F | Probe Temp, °F | Filter Temp, °F | Imp. Out Temp, °F | Meter Temp, °C In | Meter Temp, °C Out | Vacuum in. Hg. | O₂ % | Pstatic in. H₂O |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Single | 1255 | 374.60 | | 0.28 | | | | | 77 | 73 | 3 | | |
| | 1305 | 377.2 | | 0.28 | | | | | 78 | 74 | 3 | | |
| | 1315 | 379.8 | | 0.28 | | | | | 78 | 74 | 3 | | |
| | 1325 | 382.6 | | 0.28 | | | | | 77 | 73 | 3 | | |
| | 1335 | 384.[illegible] | | 0.28 | | | | | 77 | 73 | | | |
| | 1345 | 386.2 | | 0.28 | | | | | 78 | 73 | | | |
| | 1355 | 388.70 | | | | | | | 78 | 74 | | | |
| Average: | | | | | | | | | | | | | |

Comments:

6-27-9


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Delta Air Quality Services, Incorporated

2 - Speciated VOC + Deautrated spike

# WET CHEMICAL SAMPLING SYSTEM DATA AND WORKSHEET

CLIENT: Exxon Mobil
LOCATION: FCC / 2F-7 Stack
DATE: 6-27-11
RUN NO: 2 - S - Deautrated spike
OPERATOR: Dan Wunderly
METER BOX NO: 13-P-M
METER ΔH@: —
METER Yd: 1.002
SAMPLE CUSTODIAN DW

AMBIENT TEMPERATURE: 75
BAROMETRIC PRESSURE: 29.80
ASSUMED MOISTURE: —
PRE-TEST LEAK RATE: : 0.000 CFM@ 25 in. Hg
POST-TEST LEAK RATE: : 0.000 CFM@ 25 in. Hg
TRAVERSE POINTS, MIN/POINT: 60
STACK AREA, FT$^2$:
CHAIN OF CUSTODY: SAMPLE CUSTODIAN JP
SAMPLER DW

| Imp. # | Contents | Post-Test - Pre-Test = Difference |
|---|---|---|
| 1 | empty | |
| 2 | MeOH + Deautrated spike | |
| 3 | MeOH | |
| 4 | MeOH | |
| 5 | | |
| Total: | 36 | |

| Point | Time | Meter Volume, Ltr$^3$ | ΔP in. $H_2O$ | ΔH in. $H_2O$ | Stack Temp, °F | Probe Temp, °F | Filter Temp, °F | Imp. Out Temp, °F | Meter Temp, °C In | Meter Temp, °C Out | Vacuum in. Hg. | $O_2$ % | Pstatic in. $H_2O$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Single | 1610 | 536.75 | | 0.24 | | | | | 68 | 67 | 3 | | |
| | 1620 | 539.4 | | 0.24 | | | | | 68 | 67 | 3 | | |
| | 1630 | 542.3 | | 0.24 | | | | | 69 | 67 | 3 | | |
| | 1640 | 545.2 | | 0.24 | | | | | 70 | 68 | 3 | | |
| | 1650 | 548.0 | | 0.24 | | | | | 71 | 68 | 3 | | |
| | 1700 | 550.8 | | 0.24 | | | | | 71 | 69 | 3 | | |
| | 1710 | ~~554.~~ 553.80 | | | | | | | 72 | 70 | 3 | | |
| Average: | | | | | | | | | | | | | |

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Delta Air Quality Services, Incorporated

2 - Speciated VOC w/ Native Spike

# WET CHEMICAL SAMPLING SYSTEM DATA AND WORKSHEET

CLIENT: Exxon Mobil
LOCATION: FCC / 2F-7 Stack
DATE: 6-27-11
RUN NO: 2-5 - Native spike
OPERATOR: Dave Wonderly
METER BOX NO: 16 - P+M
METER ΔH@: /
METER Yd: 1.0217
SAMPLE CUSTODIAN DW

AMBIENT TEMPERATURE: 75
BAROMETRIC PRESSURE: 29.8
ASSUMED MOISTURE: 6
PRE-TEST LEAK RATE: : 0.000 CFM@ 25 in. Hg
POST-TEST LEAK RATE: : 0.000 CFM@ 25 in. Hg
TRAVERSE POINTS, MIN/POINT: 60
STACK AREA, FT²: /
CHAIN OF CUSTODY: SAMPLE CUSTODIAN SP
SAMPLER DW

| Imp. # | Contents | Post-Test | Pre-Test | Difference |
|---|---|---|---|---|
| 1 | empty | | | |
| 2 | MeOH + Native spike | | | |
| 3 | meoh | | | |
| 4 | meoh | | | |
| Total: | 56 | | | |

| Point | Time | Meter Volume, Ltr³ | ΔP in. H₂O | ΔH in. H₂O | Stack Temp, °F | Probe Temp, °F | Filter Temp, °F | Imp. Out Temp, °F | Meter Temp, °C In | Meter Temp, °C Out | Vacuum in. Hg. | O₂ % | Pstatic in. H₂O |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Single | 1610 | 389.60 | | 0.30 | | | | | 75 | 72 | 3 | | |
| | 1620 | 392.2 | | 0.30 | | | | | 75 | 72 | 3 | | |
| | 1630 | 394.7 | | 0.30 | | | | | 74 | 72 | 3 | | |
| | 1640 | 397.2 | | 0.30 | | | | | 75 | 72 | 3 | | |
| | 1650 | 399.9 | | 0.30 | | | | | 75 | 72 | 3 | | |
| | 1700 | 402.3 | | 0.30 | | | | | 75 | 72 | 3 | | |
| | 1710 | 404.95 | | 0 | | | | | 75 | 73 | 3 | | |
| Average: | | | | | | | | | | | | | |

Comments:

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Delta Air Quality Services, Incorporated

3- speciated VOC Neautrated spike

# WET CHEMICAL SAMPLING SYSTEM DATA AND WORKSHEET

CLIENT: Exxon Mobil
LOCATION: FCC / 2F-7 Stack
DATE: 6-28-11
RUN NO: 3-S- Neutrated spike
OPERATOR: Dan Woody
METER BOX NO: 13-P-m
METER ΔH@: /
METER Yd: 1.002
SAMPLE CUSTODIAN DW

AMBIENT TEMPERATURE: 70
BAROMETRIC PRESSURE: 29.77
ASSUMED MOISTURE: /
PRE-TEST LEAK RATE: : 0.000 CFM@ 25 in. Hg
POST-TEST LEAK RATE: 0.000 CFM@ 25 in. Hg
TRAVERSE POINTS, MIN/POINT: /
STACK AREA, FT²: /
CHAIN OF CUSTODY: SAMPLE CUSTODIAN JP
SAMPLER Dw

| Imp. # | Contents | Post-Test | - Pre-Test | = Difference |
|---|---|---|---|---|
| 1 | empty | | | |
| 2 | MeOH + Neutrated spike | | | |
| 3 | MeOH | | | |
| 4 | MeOH | | | |
| 5 | | | | |
| Total: | 56 | | | |

| Point | Time | Meter Volume, Ltr³ | ΔP in. H₂O | ΔH in. H₂O | Stack Temp, °F | Probe Temp, °F | Filter Temp, °F | Imp. Out Temp °F | Meter Temp, °C In | Meter Temp, °C Out | Vacuum in. Hg. | O₂ % | Pstatic in. H₂O |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Single | 1015 | 588.70 | | 0.24 | | | | | 80 | 77 | 3 | | |
| | 1025 | 591.5 | | 0.24 | | | | | 80 | 77 | 3 | | |
| | 1035 | 594.5 | | 0.24 | | | | | 82 | 78 | 3 | | |
| | 1045 | 597.5 | | 0.24 | | | | | 85 | 81 | 3 | | |
| | 1055 | 600.2 | | 0.24 | | | | | 89 | 86 | 3 | | |
| | 1105 | 603.0 | | 0.24 | | | | | 90 | 87 | 3 | | |
| | 1115 | 605.60 | | | | | | | | | | | |
| Average: | | | | | | | | | | | | | |

Comments:

7-1-11


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3- speciated VOC Nature spike

# WET CHEMICAL SAMPLING SYSTEM DATA AND WORKSHEET

CLIENT: Exxon Mobil
LOCATION: FCC / 2F-7 Stack
DATE: 6-28-11
RUN NO: 3-S- Nature spike
OPERATOR: Dan Woody
METER BOX NO: 16-P-M
METER ΔH@: —
METER Yd: 1.0217
SAMPLE CUSTODIAN DW

AMBIENT TEMPERATURE: 70
BAROMETRIC PRESSURE: 29.78
ASSUMED MOISTURE: 5 %
PRE-TEST LEAK RATE: : 0.000 CFM@ 25 in. Hg
POST-TEST LEAK RATE: 0.000 CFM@ 25 in. Hg
TRAVERSE POINTS, MIN/POINT: 6 —
STACK AREA, FT²: ✓
CHAIN OF CUSTODY: SAMPLE CUSTODIAN SP
SAMPLER Dw

| Imp. # | Contents | Post-Test | Pre-Test | Difference |
|---|---|---|---|---|
| 1 | Empty | | | |
| 2 | MeOH + Nature spike | | | |
| 3 | MeOH | | | |
| 4 | MeOH | | | |
| Total: | 56 | | | |

| Point | Time | Meter Volume, Ltr³ | ΔP in. $H_2O$ | ΔH in. $H_2O$ | Stack Temp, °F | Probe Temp, °F | Filter Temp, °F | Imp. Out Temp, °F | Meter Temp, °C In | Meter Temp, °C Out | Vacuum in. Hg. | $O_2$ % | Pstatic in. $H_2O$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Start | 1015 | 436.00 | | 0.30 | | | | | 79 | 78 | 3 | | |
| | 1025 | 438.6 | | 0.30 | | | | | 80 | 78 | 3 | | |
| | 1035 | 441.3 | | 0.30 | | | | | 82 | 78 | 3 | | |
| | 1045 | 443.9 | | 0.30 | | | | | 85 | 83 | 3 | | |
| | 1055 | 446.3 | | 0.30 | | | | | 88 | 89 | 3 | | |
| | 1105 | 449.0 | | 0.30 | | | | | 89 | 86 | 3 | | |
| | 1115 | 451.4 | | | | | | | | | | | |
| Average: | | | | | | | | | | | | | |

Comments:

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**ExxonMobil**
**STACK $O_2$, $CO_2$ DATA**

**Test #:** **1-VOC**
**Date:** **6/27/2011**
**Time:** **1255/1355**

| | $O_2$ | $CO_2$ | CO |
|---|---|---|---|
| Range | 10 | 20 | 250 |
| Cal Gas | 5.00 | 10.16 | 142 |
| Analyzer Zero | 0.05 | 0.02 | -0.13 |
| Analyzer Span | 4.98 | 9.74 | 143.47 |
| Pre-Bias Zero | 0.05 | 0.02 | -0.13 |
| Pre-Bias Span | 4.98 | 9.74 | 143.47 |
| Post-Bias Zero | 0.04 | 0.02 | -0.11 |
| Post-Bias Span | 4.96 | 9.80 | 143.26 |
| Pre-test zero bias | 0.0% | 0.0% | 0.0% |
| Pre-test span bias | 0.0% | 0.0% | 0.0% |
| Post-test zero bias | 0.0% | 0.0% | 0.0% |
| Post-test span bias | -0.2% | 0.3% | -0.1% |
| Zero Drift | 0.0% | 0.0% | 0.0% |
| Span Drift | -0.2% | 0.3% | -0.1% |
| | PASS | PASS | PASS |
| **Average** | **5.00** | **13.59** | **77.29** |
| **Cal Corrected** | **5.03** | **14.14** | **76.61** |

**ExxonMobil**
**1-VOC**

| Date | Time | O2 % | CO2 % | CO ppm |
|---|---|---|---|---|
| 6/27/2011 | 12:56:00 PM | 4.91 | 13.649 | 76.765 |
| 6/27/2011 | 12:57:00 PM | 4.907 | 13.661 | 77.878 |
| 6/27/2011 | 12:58:00 PM | 4.981 | 13.601 | 78.533 |
| 6/27/2011 | 12:59:00 PM | 4.992 | 13.587 | 77.006 |
| 6/27/2011 | 1:00:00 PM | 4.974 | 13.604 | 77.387 |
| 6/27/2011 | 1:01:00 PM | 4.964 | 13.602 | 77.168 |
| 6/27/2011 | 1:02:00 PM | 4.972 | 13.601 | 76.357 |
| 6/27/2011 | 1:03:00 PM | 4.951 | 13.611 | 77.742 |
| 6/27/2011 | 1:04:00 PM | 4.918 | 13.654 | 78.508 |
| 6/27/2011 | 1:05:00 PM | 4.951 | 13.63 | 78.765 |
| 6/27/2011 | 1:06:00 PM | 4.954 | 13.628 | 77.734 |
| 6/27/2011 | 1:07:00 PM | 4.968 | 13.637 | 77.553 |
| 6/27/2011 | 1:08:00 PM | 5.013 | 13.591 | 76.506 |
| 6/27/2011 | 1:09:00 PM | 5.048 | 13.557 | 74.832 |
| 6/27/2011 | 1:10:00 PM | 5.036 | 13.556 | 75.125 |
| 6/27/2011 | 1:11:00 PM | 4.988 | 13.607 | 77.06 |
| 6/27/2011 | 1:12:00 PM | 5.01 | 13.585 | 76.606 |
| 6/27/2011 | 1:13:00 PM | 5.003 | 13.599 | 75.676 |
| 6/27/2011 | 1:14:00 PM | 4.962 | 13.64 | 77.807 |
| 6/27/2011 | 1:15:00 PM | 4.979 | 13.612 | 77.684 |
| 6/27/2011 | 1:16:00 PM | 5.001 | 13.6 | 77.528 |
| 6/27/2011 | 1:17:00 PM | 4.968 | 13.638 | 76.952 |
| 6/27/2011 | 1:18:00 PM | 4.931 | 13.673 | 78.974 |
| 6/27/2011 | 1:19:00 PM | 4.936 | 13.673 | 79.723 |
| 6/27/2011 | 1:20:00 PM | 4.941 | 13.686 | 79.314 |
| 6/27/2011 | 1:21:00 PM | 5.006 | 13.622 | 77.315 |
| 6/27/2011 | 1:22:00 PM | 5.007 | 13.611 | 76.214 |
| 6/27/2011 | 1:23:00 PM | 5.038 | 13.577 | 77.977 |
| 6/27/2011 | 1:24:00 PM | 5.06 | 13.556 | 76.814 |
| 6/27/2011 | 1:25:00 PM | 5.022 | 13.582 | 77.151 |
| 6/27/2011 | 1:26:00 PM | 5.012 | 13.604 | 77.603 |
| 6/27/2011 | 1:27:00 PM | 5.069 | 13.529 | 77.781 |
| 6/27/2011 | 1:28:00 PM | 5.056 | 13.541 | 75.137 |
| 6/27/2011 | 1:29:00 PM | 4.984 | 13.6 | 76.01 |
| 6/27/2011 | 1:30:00 PM | 4.975 | 13.62 | 78.516 |
| 6/27/2011 | 1:31:00 PM | 4.944 | 13.642 | 77.484 |
| 6/27/2011 | 1:32:00 PM | 4.939 | 13.669 | 79.463 |
| 6/27/2011 | 1:33:00 PM | 4.967 | 13.622 | 79.928 |
| 6/27/2011 | 1:34:00 PM | 4.96 | 13.625 | 78.486 |
| 6/27/2011 | 1:35:00 PM | 4.991 | 13.595 | 77.206 |
| 6/27/2011 | 1:36:00 PM | 4.961 | 13.611 | 77.369 |
| 6/27/2011 | 1:37:00 PM | 4.954 | 13.642 | 76.783 |
| 6/27/2011 | 1:38:00 PM | 4.963 | 13.639 | 78.119 |
| 6/27/2011 | 1:39:00 PM | 5.006 | 13.591 | 77.745 |
| 6/27/2011 | 1:40:00 PM | 5.098 | 13.511 | 77.43 |
| 6/27/2011 | 1:41:00 PM | 5.117 | 13.473 | 75.917 |
| 6/27/2011 | 1:42:00 PM | 5.108 | 13.482 | 74.513 |

| | | | | |
|---|---|---|---|---|
| 6/27/2011 | 1:43:00 PM | 5.088 | 13.5 | 74.971 |
| 6/27/2011 | 1:44:00 PM | 5.034 | 13.55 | 76.489 |
| 6/27/2011 | 1:45:00 PM | 4.996 | 13.575 | 78.079 |
| 6/27/2011 | 1:46:00 PM | 4.954 | 13.634 | 78.627 |
| 6/27/2011 | 1:47:00 PM | 4.987 | 13.613 | 78.776 |
| 6/27/2011 | 1:48:00 PM | 5.031 | 13.57 | 77.993 |
| 6/27/2011 | 1:49:00 PM | 5.072 | 13.537 | 76.953 |
| 6/27/2011 | 1:50:00 PM | 5.116 | 13.49 | 77.02 |
| 6/27/2011 | 1:51:00 PM | 5.103 | 13.516 | 75.881 |
| 6/27/2011 | 1:52:00 PM | 5.106 | 13.502 | 76.611 |
| 6/27/2011 | 1:53:00 PM | 5.121 | 13.476 | 76.7 |
| 6/27/2011 | 1:54:00 PM | 5.056 | 13.543 | 77.121 |
| 6/27/2011 | 1:55:00 PM | 5.087 | 13.524 | 75.85 |
| | Average | 5.00 | 13.59 | 77.29 |

**ExxonMobil**
**STACK $O_2$, $CO_2$ DATA**

**Test #:** **2-VOC**
**Date:** **6/27/2011**
**Time:** **1610/1710**

| | $O_2$ | $CO_2$ | CO |
|---|---|---|---|
| Range | 10 | 20 | 250 |
| Cal Gas | 5.00 | 10.16 | 142 |
| Analyzer Zero | 0.03 | -0.06 | -1.91 |
| Analyzer Span | 5.04 | 10.02 | 142.11 |
| Pre-Bias Zero | 0.04 | 0.02 | -0.11 |
| Pre-Bias Span | 4.96 | 9.80 | 143.26 |
| Post-Bias Zero | 0.05 | 0.02 | -0.07 |
| Post-Bias Span | 4.97 | 9.72 | 142.88 |
| Pre-test zero bias | 0.2% | 0.4% | 0.7% |
| Pre-test span bias | -0.7% | -1.1% | 0.5% |
| Post-test zero bias | 0.2% | 0.4% | 0.7% |
| Post-test span bias | -0.7% | -1.5% | 0.3% |
| Zero Drift | 0.1% | 0.0% | 0.0% |
| Span Drift | 0.0% | -0.4% | -0.2% |
| | PASS | PASS | PASS |
| **Average** | **5.10** | **13.47** | **76.03** |
| **Cal Corrected** | **5.14** | **14.03** | **75.50** |

**ExxonMobil**
**2-VOC**

| Date | Time | O2 % | CO2 % | CO ppm |
|---|---|---|---|---|
| 6/27/2011 | 4:11:00 PM | 5.135 | 13.511 | 80.181 |
| 6/27/2011 | 4:12:00 PM | 5.157 | 13.473 | 79.605 |
| 6/27/2011 | 4:13:00 PM | 5.142 | 13.496 | 77.389 |
| 6/27/2011 | 4:14:00 PM | 5.182 | 13.438 | 77.634 |
| 6/27/2011 | 4:15:00 PM | 5.157 | 13.448 | 75.283 |
| 6/27/2011 | 4:16:00 PM | 5.135 | 13.471 | 75.264 |
| 6/27/2011 | 4:17:00 PM | 5.126 | 13.483 | 76.345 |
| 6/27/2011 | 4:18:00 PM | 5.121 | 13.501 | 78.195 |
| 6/27/2011 | 4:19:00 PM | 5.138 | 13.468 | 78.079 |
| 6/27/2011 | 4:20:00 PM | 5.109 | 13.503 | 77.019 |
| 6/27/2011 | 4:21:00 PM | 5.16 | 13.464 | 76.109 |
| 6/27/2011 | 4:22:00 PM | 5.157 | 13.441 | 75.368 |
| 6/27/2011 | 4:23:00 PM | 5.148 | 13.461 | 74.939 |
| 6/27/2011 | 4:24:00 PM | 5.165 | 13.445 | 75.175 |
| 6/27/2011 | 4:25:00 PM | 5.131 | 13.451 | 74.572 |
| 6/27/2011 | 4:26:00 PM | 5.147 | 13.451 | 74.361 |
| 6/27/2011 | 4:27:00 PM | 5.067 | 13.53 | 74.866 |
| 6/27/2011 | 4:28:00 PM | 5.06 | 13.542 | 76.434 |
| 6/27/2011 | 4:29:00 PM | 5.123 | 13.477 | 75.653 |
| 6/27/2011 | 4:30:00 PM | 5.101 | 13.492 | 76.971 |
| 6/27/2011 | 4:31:00 PM | 5.107 | 13.485 | 75.973 |
| 6/27/2011 | 4:32:00 PM | 5.136 | 13.466 | 76.096 |
| 6/27/2011 | 4:33:00 PM | 5.122 | 13.473 | 77.09 |
| 6/27/2011 | 4:34:00 PM | 5.05 | 13.538 | 78.755 |
| 6/27/2011 | 4:35:00 PM | 5.056 | 13.523 | 77.945 |
| 6/27/2011 | 4:36:00 PM | 5.086 | 13.502 | 73.407 |
| 6/27/2011 | 4:37:00 PM | 5.134 | 13.454 | 62.608 |
| 6/27/2011 | 4:38:00 PM | 5.113 | 13.459 | 60.788 |
| 6/27/2011 | 4:39:00 PM | 5.127 | 13.48 | 60.063 |
| 6/27/2011 | 4:40:00 PM | 5.12 | 13.463 | 65.397 |
| 6/27/2011 | 4:41:00 PM | 5.072 | 13.509 | 73.432 |
| 6/27/2011 | 4:42:00 PM | 5.02 | 13.561 | 77.58 |
| 6/27/2011 | 4:43:00 PM | 5.025 | 13.54 | 78.734 |
| 6/27/2011 | 4:44:00 PM | 5.048 | 13.519 | 77.472 |
| 6/27/2011 | 4:45:00 PM | 5.076 | 13.509 | 76.421 |
| 6/27/2011 | 4:46:00 PM | 5.046 | 13.53 | 76.163 |
| 6/27/2011 | 4:47:00 PM | 5.056 | 13.505 | 77.735 |
| 6/27/2011 | 4:48:00 PM | 4.989 | 13.57 | 78.161 |
| 6/27/2011 | 4:49:00 PM | 5.086 | 13.496 | 78.005 |
| 6/27/2011 | 4:50:00 PM | 5.089 | 13.47 | 78.587 |
| 6/27/2011 | 4:51:00 PM | 5.074 | 13.483 | 78.149 |
| 6/27/2011 | 4:52:00 PM | 5.069 | 13.481 | 77.636 |
| 6/27/2011 | 4:53:00 PM | 5.054 | 13.477 | 77.867 |
| 6/27/2011 | 4:54:00 PM | 5.018 | 13.52 | 78.061 |
| 6/27/2011 | 4:55:00 PM | 5.05 | 13.506 | 79.43 |
| 6/27/2011 | 4:56:00 PM | 5.092 | 13.474 | 77.583 |
| 6/27/2011 | 4:57:00 PM | 5.143 | 13.417 | 75.634 |

| | | | | |
|---|---|---|---|---|
| 6/27/2011 | 4:58:00 PM | 5.13 | 13.422 | 76.433 |
| 6/27/2011 | 4:59:00 PM | 5.118 | 13.438 | 77.222 |
| 6/27/2011 | 5:00:00 PM | 5.121 | 13.424 | 77.865 |
| 6/27/2011 | 5:01:00 PM | 5.14 | 13.41 | 78.064 |
| 6/27/2011 | 5:02:00 PM | 5.073 | 13.464 | 78.966 |
| 6/27/2011 | 5:03:00 PM | 5.092 | 13.457 | 79.375 |
| 6/27/2011 | 5:04:00 PM | 5.113 | 13.425 | 78.424 |
| 6/27/2011 | 5:05:00 PM | 5.115 | 13.413 | 77.426 |
| 6/27/2011 | 5:06:00 PM | 5.141 | 13.399 | 76.711 |
| 6/27/2011 | 5:07:00 PM | 5.105 | 13.412 | 76.61 |
| 6/27/2011 | 5:08:00 PM | 5.063 | 13.456 | 76.375 |
| 6/27/2011 | 5:09:00 PM | 5.102 | 13.442 | 78.16 |
| 6/27/2011 | 5:10:00 PM | 5.157 | 13.375 | 75.816 |
| | Average | 5.10 | 13.47 | 76.03 |

**ExxonMobil**
**STACK $O_2$, $CO_2$ DATA**

**Test #:** **3-VOC**
**Date:** **6/28/2011**
**Time:** **1015/1115**

| | $O_2$ | $CO_2$ | CO |
|---|---|---|---|
| Range | 10 | 20 | 250 |
| Cal Gas | 5.00 | 10.16 | 142 |
| Analyzer Zero | 0.05 | 0.02 | -0.13 |
| Analyzer Span | 4.98 | 9.74 | 143.47 |
| Pre-Bias Zero | 0.04 | 0.02 | -0.16 |
| Pre-Bias Span | 5.01 | 9.97 | 145.30 |
| Post-Bias Zero | 0.04 | 0.01 | -0.16 |
| Post-Bias Span | 5.00 | 10.01 | 145.16 |
| Pre-test zero bias | 0.0% | 0.0% | 0.0% |
| Pre-test span bias | 0.3% | 1.1% | 0.7% |
| Post-test zero bias | -0.1% | 0.0% | 0.0% |
| Post-test span bias | 0.1% | 1.3% | 0.7% |
| Zero Drift | 0.0% | 0.0% | 0.0% |
| Span Drift | -0.1% | 0.2% | -0.1% |
| | PASS | PASS | PASS |
| **Average** | **4.94** | **13.80** | **79.25** |
| **Cal Corrected** | **4.94** | **14.04** | **77.56** |

**ExxonMobil**
**3-VOC**

| Date | Time | O2 % | CO2 % | CO ppm |
|---|---|---|---|---|
| 6/28/2011 | 10:16:00 AM | 4.985 | 13.882 | 71.864 |
| 6/28/2011 | 10:17:00 AM | 4.989 | 13.872 | 73.705 |
| 6/28/2011 | 10:18:00 AM | 4.985 | 13.875 | 72.53 |
| 6/28/2011 | 10:19:00 AM | 4.941 | 13.925 | 74.036 |
| 6/28/2011 | 10:20:00 AM | 4.964 | 13.908 | 73.502 |
| 6/28/2011 | 10:21:00 AM | 4.954 | 13.915 | 73.367 |
| 6/28/2011 | 10:22:00 AM | 4.966 | 13.952 | 75.398 |
| 6/28/2011 | 10:23:00 AM | 4.966 | 13.949 | 74.528 |
| 6/28/2011 | 10:24:00 AM | 5.03 | 13.911 | 74.248 |
| 6/28/2011 | 10:25:00 AM | 5.08 | 13.843 | 73.282 |
| 6/28/2011 | 10:26:00 AM | 5.11 | 13.824 | 71.563 |
| 6/28/2011 | 10:27:00 AM | 5.068 | 13.855 | 70.39 |
| 6/28/2011 | 10:28:00 AM | 5.12 | 14.046 | 70.992 |
| 6/28/2011 | 10:29:00 AM | 4.985 | 13.715 | 69.04 |
| 6/28/2011 | 10:30:00 AM | 4.927 | 13.767 | 71.412 |
| 6/28/2011 | 10:31:00 AM | 4.954 | 13.732 | 72.696 |
| 6/28/2011 | 10:32:00 AM | 4.924 | 13.741 | 71.318 |
| 6/28/2011 | 10:33:00 AM | 4.907 | 13.79 | 71.028 |
| 6/28/2011 | 10:34:00 AM | 4.953 | 13.731 | 71.075 |
| 6/28/2011 | 10:35:00 AM | 4.921 | 13.759 | 70.336 |
| 6/28/2011 | 10:36:00 AM | 4.929 | 13.747 | 69.868 |
| 6/28/2011 | 10:37:00 AM | 4.871 | 13.799 | 70.59 |
| 6/28/2011 | 10:38:00 AM | 4.826 | 13.826 | 90.31 |
| 6/28/2011 | 10:39:00 AM | 4.824 | 13.84 | 84.91 |
| 6/28/2011 | 10:40:00 AM | 4.809 | 13.846 | 92.568 |
| 6/28/2011 | 10:41:00 AM | 4.777 | 13.883 | 175.435 |
| 6/28/2011 | 10:42:00 AM | 4.786 | 13.887 | 126.896 |
| 6/28/2011 | 10:43:00 AM | 4.78 | 13.891 | 167.537 |
| 6/28/2011 | 10:44:00 AM | 4.807 | 13.886 | 147.563 |
| 6/28/2011 | 10:45:00 AM | 4.84 | 13.857 | 92.666 |
| 6/28/2011 | 10:46:00 AM | 4.891 | 13.803 | 78.707 |
| 6/28/2011 | 10:47:00 AM | 4.863 | 13.826 | 77.161 |
| 6/28/2011 | 10:48:00 AM | 4.924 | 13.778 | 73.799 |
| 6/28/2011 | 10:49:00 AM | 4.922 | 13.779 | 73.505 |
| 6/28/2011 | 10:50:00 AM | 4.896 | 13.806 | 73.637 |
| 6/28/2011 | 10:51:00 AM | 4.896 | 13.815 | 74.767 |
| 6/28/2011 | 10:52:00 AM | 4.931 | 13.765 | 73.748 |
| 6/28/2011 | 10:53:00 AM | 4.969 | 13.735 | 71.327 |
| 6/28/2011 | 10:54:00 AM | 5.003 | 13.712 | 70.515 |
| 6/28/2011 | 10:55:00 AM | 5.087 | 13.643 | 70.948 |
| 6/28/2011 | 10:56:00 AM | 5.1 | 13.614 | 70.377 |
| 6/28/2011 | 10:57:00 AM | 5.068 | 13.635 | 69.193 |
| 6/28/2011 | 10:58:00 AM | 4.992 | 13.702 | 70.947 |
| 6/28/2011 | 10:59:00 AM | 5.004 | 13.685 | 70.95 |
| 6/28/2011 | 11:00:00 AM | 5.004 | 13.673 | 69.63 |
| 6/28/2011 | 11:01:00 AM | 5.002 | 13.688 | 69.265 |
| 6/28/2011 | 11:02:00 AM | 4.986 | 13.694 | 68.388 |

| | | | | |
|---|---|---|---|---|
| 6/28/2011 | 11:03:00 AM | 4.941 | 13.738 | 69.331 |
| 6/28/2011 | 11:04:00 AM | 4.885 | 13.796 | 70.865 |
| 6/28/2011 | 11:05:00 AM | 4.873 | 13.821 | 88.322 |
| 6/28/2011 | 11:06:00 AM | 4.888 | 13.795 | 81.019 |
| 6/28/2011 | 11:07:00 AM | 4.874 | 13.824 | 74.04 |
| 6/28/2011 | 11:08:00 AM | 4.924 | 13.775 | 73.662 |
| 6/28/2011 | 11:09:00 AM | 4.887 | 13.797 | 71.301 |
| 6/28/2011 | 11:10:00 AM | 4.867 | 13.831 | 72.175 |
| 6/28/2011 | 11:11:00 AM | 4.902 | 13.827 | 72.654 |
| 6/28/2011 | 11:12:00 AM | 4.902 | 13.823 | 74.827 |
| 6/28/2011 | 11:13:00 AM | 4.963 | 13.763 | 74.721 |
| 6/28/2011 | 11:14:00 AM | 4.953 | 13.765 | 70.671 |
| 6/28/2011 | 11:15:00 AM | 4.979 | 13.756 | 69.857 |
| | Average | 4.94 | 13.80 | 79.25 |

ALS Environmental
5420 Mainway Drive, Unit 5, Burlington ON, L7L 6A4
Phone: 905-331-3111, FAX: 905-331-4567

SCC Accredited Lab ID# 1003-15/779 Ont DW License #: 2285
NELAC Primary Accreditation, NJ DEP ID# CANA003: Secondary Accreditation, TX Cert# T104704433-08-TX

# Certificate of Analysis

**ALS Project Contact:** Ron McLeod
**ALS Project ID:** DEL100
**ALS WO#:** L1025990
**Date of Report** 25-Jul-11
**Date of Sample Receipt** 30-Jun-11

**Client Name:** Delta Air Quality Services, Inc
**Client Address:** 1845 North Case Street
Orange CA 92865-4234

**Client Contact:** Arlene Bell
**Client Project ID:** ICR 2F-7

**COMMENTS:** **VOCs via modified method 18 - Chilled Methanol Impingers - GC/MS Selected Ion Monitoring**

Limits of Reporting have been defined by the level equivalent to the low instrument calibration point and sensitivity standard.

Nitrobenzene quantification suffered from instrument related run-to-run carry-over. Reporting limits for nitrobenzene has been raised to account for uncertainty from this run-to-run carry-over.

Data are not blank corrected.

Field blank recovery responses were used to calibrate the deuterated and native spike recoveries.

**Summary of the Method:**
The sampling train consisted of 4 midget impingers. The 1st impinger was a moisture knock-out. The 2nd, 3rd and 4th impinger contained approximately 15mL each of methanol. Impingers 1 and 2 were recovered combined. Impingers 3 and 4 were each recovered separately. The methanolic impinger solutions were diluted 100-fold into water and analyzed by purge and trap GC/MS (i.e via SW846 5030B/8260B) using selected ion monitoring technique.

Certified by: _____
Ron McLeod, Ph.D.
General Manager and Technical Director

Results in this certificate relate only to the samples as submitted to the laboratory.
This report shall not be reproduced, except in full, without the written permission of ALS Canada Ltd.

# ALS Environmental

## COMPOSITE TARGET ANALYTE DATA

| Sample Name | Run 1 DS | | | Run 2 DS | | | Run 3 DS | | | FB DS | | | REAGENT BL-METHANOL | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ALS Sample ID | L1025990-1/2/3 | | | L1025990-7/8/9 | | | L1025990-13/14/15 | | | L1025990-19/20/21 | | | L1025990-29 | | |
| Matrix | Impinger | | | Impinger | | | Impinger | | | Impinger | | | Impinger | | |
| Sampling Date | 27-Jun-11 | | | 27-Jun-11 | | | 28-Jun-11 | | | 28-Jun-11 | | | 28-Jun-11 | | |
| Date of Receipt | 30-Jun-11 | | | 30-Jun-11 | | | 30-Jun-11 | | | 30-Jun-11 | | | 30-Jun-11 | | |
| **VOC via Modified Method 18** | ug | Qualifier | Data Source | ug | Qualifier | Data Source | ug | Qualifier | Data Source | ug | Qualifier | Data Source | ug | Qualifier | Data Source |
| **Target VOCs** | | | | | | | | | | | | | | | |
| 1,3-Butadiene | <4.3 | BDL | UI1-4 | n/a | | UI1-4 | <4.3 | BDL | UI1-4 | <4.3 | BDL | UI1-2 | <4.3 | BDL | UI1-2 |
| Pentane | <4.3 | BDL | UI1-4 | <4.3 | BDL | UI1-4 | <4.3 | BDL | UI1-4 | <4.3 | BDL | UI1-2 | <4.3 | BDL | UI1-2 |
| Acrolein | <4.3 | BDL | UI1-2 | <4.3 | BDL | UI1-2 | <4.3 | BDL | UI1-2 | <4.3 | BDL | UI1-2 | <4.3 | BDL | UI1-2 |
| Acetone | 35.9 | ADL, B | UI1-2 | 28.2 | ADL, B | UI1-2 | 27.7 | ADL, B | UI1-2 | 31.1 | ADL, B | UI1-2 | 31.4 | ADL | UI1-2 |
| Acetonitrile | 5.6 | ADL, B | UI1-2 | 6.7 | ADL, B | UI1-2 | 8.1 | ADL, B | UI1-2 | 6.1 | ADL, B | UI1-2 | 4.3 | ADL | UI1-2 |
| Carbon Disulfide | <4.3 | BDL | UI1-2 | <4.3 | BDL | UI1-2 | <4.3 | BDL | UI1-2 | <4.3 | BDL | UI1-2 | <4.3 | BDL | UI1-2 |
| Methylene Chloride | <4.3 | BDL | UI1-2 | <4.3 | BDL | UI1-2 | <4.3 | BDL | UI1-2 | <4.3 | BDL | UI1-2 | 6.5 | ADL | UI1-2 |
| Acrylonitrile | <4.3 | BDL | UI1-2 | <4.3 | BDL | UI1-2 | <4.3 | BDL | UI1-2 | <4.3 | BDL | UI1-2 | <4.3 | BDL | UI1-2 |
| Methyl t-Butyl Ether (MTBE) | <4.3 | BDL | UI1-2 | <4.3 | BDL | UI1-2 | <4.3 | BDL | UI1-2 | <4.3 | BDL | UI1-2 | <4.3 | BDL | UI1-2 |
| Hexane | <4.3 | BDL | UI1-2 | <4.3 | BDL | UI1-2 | <4.3 | BDL | UI1-2 | <4.3 | BDL | UI1-2 | <4.3 | BDL | UI1-2 |
| 2,2,4-Trimethylpentane | <4.3 | BDL | UI1-2 | <4.3 | BDL | UI1-2 | <4.3 | BDL | UI1-2 | <4.3 | BDL | UI1-2 | <4.3 | BDL | UI1-2 |
| Benzene | <4.3 | BDL | UI1-2 | <4.3 | BDL | UI1-2 | <4.3 | BDL | UI1-2 | <4.3 | BDL | UI1-2 | <4.3 | BDL | UI1-2 |
| Trichloroethene | <4.3 | BDL | UI1-2 | <4.3 | BDL | UI1-2 | <4.3 | BDL | UI1-2 | <4.3 | BDL | UI1-2 | <4.3 | BDL | UI1-2 |
| 2-Nitropropane | <4.3 | BDL | UI1-2 | <4.3 | BDL | UI1-2 | <4.3 | BDL | UI1-2 | <4.3 | BDL | UI1-2 | <4.3 | BDL | UI1-2 |
| Methyl iso-Butyl Ketone | <4.3 | BDL | UI1-2 | <4.3 | BDL | UI1-2 | <4.3 | BDL | UI1-2 | <4.3 | BDL | UI1-2 | <4.3 | BDL | UI1-2 |
| Toluene | <4.3 | BDL | UI1-2 | <4.3 | BDL | UI1-2 | <4.3 | BDL | UI1-2 | <4.3 | BDL | UI1-2 | <4.3 | BDL | UI1-2 |
| Tetrachloroethene | <4.3 | BDL | UI1-2 | <4.3 | BDL | UI1-2 | <4.3 | BDL | UI1-2 | <4.3 | BDL | UI1-2 | <4.3 | BDL | UI1-2 |
| 1,2-Dibromoethane | <4.3 | BDL | UI1-2 | <4.3 | BDL | UI1-2 | <4.3 | BDL | UI1-2 | <4.3 | BDL | UI1-2 | <4.3 | BDL | UI1-2 |
| Chlorobenzene | <4.3 | BDL | UI1-2 | <4.3 | BDL | UI1-2 | <4.3 | BDL | UI1-2 | <4.3 | BDL | UI1-2 | <4.3 | BDL | UI1-2 |
| Ethylbenzene | <4.3 | BDL | UI1-2 | <4.3 | BDL | UI1-2 | <4.3 | BDL | UI1-2 | <4.3 | BDL | UI1-2 | <4.3 | BDL | UI1-2 |
| m&p-Xylenes | <4.3 | BDL | UI1-2 | <4.3 | BDL | UI1-2 | <4.3 | BDL | UI1-2 | <4.3 | BDL | UI1-2 | <4.3 | BDL | UI1-2 |
| o-Xylene | <4.3 | BDL | UI1-2 | <4.3 | BDL | UI1-2 | <4.3 | BDL | UI1-2 | <4.3 | BDL | UI1-2 | <4.3 | BDL | UI1-2 |
| Styrene | <4.3 | BDL | UI1-2 | <4.3 | BDL | UI1-2 | <4.3 | BDL | UI1-2 | <4.3 | BDL | UI1-2 | <4.3 | BDL | UI1-2 |
| Cumene (Isopropylbenzene) | <4.3 | BDL | UI1-2 | <4.3 | BDL | UI1-2 | <4.3 | BDL | UI1-2 | <4.3 | BDL | UI1-2 | <4.3 | BDL | UI1-2 |
| Nitrobenzene | <21.5 | BDL | UI1-2 | <21.5 | BDL | UI1-2 | <21.5 | BDL | UI1-2 | <21.5 | BDL | UI1-2 | <21.5 | BDL | UI1-2 |

ADL = Below Detection Limit
BDL = Below Detection Limit
DLL = Composite data where at least one data point (but not all data points) is above the detection limit
INT = Interference; Detection Limit Raised
UI# = Impinger Number from the Unspiked Train
SI# = Impinger Number from the Spiked Train

B = Observed in the Field Blank at similar levels to the field run samples

# ALS Environmental

## COMPOSITE SPIKE RECOVERY DATA

| Sample Name | | Run 1 DS | | | Run 2 DS | | | Run 3 DS | | | FB DS | | | Run 1 NS | | | Run 2 NS | | | Run 3 NS | | | FB NS | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ALS Sample ID | | L1025990-1/2/3 | | | L1025990-7/8/9 | | | L1025990-13/14/15 | | | L1025990-19/20/21 | | | L1025990-4/5/6 | | | L1025990-10/11/12 | | | L1025990-16/17/18 | | | L1025990-22/23/24 | | |
| Matrix | | Impinger | | | Impinger | | | Impinger | | | Impinger | | | Impinger | | | Impinger | | | Impinger | | | Impinger | | |
| Sampling Date | | 27-Jun-11 | | | 27-Jun-11 | | | 28-Jun-11 | | | 28-Jun-11 | | | 27-Jun-11 | | | 27-Jun-11 | | | 28-Jun-11 | | | 28-Jun-11 | | |
| Date of Receipt | | 30-Jun-11 | | | 30-Jun-11 | | | 30-Jun-11 | | | 30-Jun-11 | | | 30-Jun-11 | | | 30-Jun-11 | | | 30-Jun-11 | | | 30-Jun-11 | | |
| **VOC via Modified Method 18** | Amount Spiked | % Rec | Qualifier | Data Source | % Rec | Qualifier | Data Source | % Rec | Qualifier | Data Source | % Rec | Qualifier | Data Source | % Rec | Qualifier | Data Source | % Rec | Qualifier | Data Source | % Rec | Qualifier | Data Source | % Rec | Qualifier | Data Source |
| **Labelled Analyte Recoveries** | ug | | | | | | | | | | | | | | | | | | | | | | | | |
| 1,3-Butadiene-d6 | 4000 | 9 | | UI1-4 | 2 | | UI1-4 | 18 | | UI1-4 | 100 | | UI1-2 | - | | | - | | | - | | | - | | |
| Pentane-d12 | 2000 | 20 | | UI1-4 | 7 | | UI1-4 | 36 | | UI1-4 | 100 | | UI1-2 | - | | | - | | | - | | | - | | |
| acrylonitrile-d3 | 1250 | 117 | | UI1-4 | 103 | | UI1-4 | 97 | | UI1-4 | 100 | | UI1-2 | - | | | - | | | - | | | - | | |
| MTBE-d12 | 1000 | 113 | | UI1-4 | 103 | | UI1-4 | 97 | | UI1-4 | 100 | | UI1-2 | - | | | - | | | - | | | - | | |
| n-Hexane-d14 | 2000 | 106 | | UI1-4 | 83 | | UI1-4 | 103 | | UI1-4 | 100 | | UI1-2 | - | | | - | | | - | | | - | | |
| 2,2,4-Trimethylpentane-d18 | 1000 | 122 | | UI1-4 | 109 | | UI1-4 | 105 | | UI1-4 | 100 | | UI1-2 | - | | | - | | | - | | | - | | |
| Benzene-d6 | 1000 | 99 | | UI1-4 | 101 | | UI1-4 | 98 | | UI1-4 | 100 | | UI1-2 | - | | | - | | | - | | | - | | |
| 2-Nitropropane-d6 | 1000 | 88 | | UI1-4 | 99 | | UI1-4 | 95 | | UI1-4 | 100 | | UI1-2 | - | | | - | | | - | | | - | | |
| 1,2-Dibromoethane-d4 | 1000 | 94 | | UI1-4 | 104 | | UI1-4 | 100 | | UI1-4 | 100 | | UI1-2 | - | | | - | | | - | | | - | | |
| Ethylbenzene-d10 | 1000 | 94 | | UI1-4 | 101 | | UI1-4 | 99 | | UI1-4 | 100 | | UI1-2 | - | | | - | | | - | | | - | | |
| Styrene-d8 | 1000 | 105 | | UI1-4 | 114 | | UI1-4 | 111 | | UI1-4 | 100 | | UI1-2 | - | | | - | | | - | | | - | | |
| Nitrobenzene-d5 | 4000 | 137 | | UI1-4 | 125 | | UI1-4 | 125 | | UI1-4 | 100 | | UI1-2 | - | | | - | | | - | | | - | | |
| **Native Analyte Recoveries** | | | | | | | | | | | | | | | | | | | | | | | | | |
| Acrolein | | - | | | - | | | - | | | - | | | 97 | | SI1-4 | 86 | | SI1-4 | 65 | | SI1-4 | 100 | | SI1-2 |
| Acetonitrile | | - | | | - | | | - | | | - | | | 72 | | SI1-4 | 71 | | SI1-4 | 71 | | SI1-4 | 100 | | SI1-2 |
| Trichloroethene | | - | | | - | | | - | | | - | | | 117 | | SI1-4 | 112 | | SI1-4 | 101 | | SI1-4 | 100 | | SI1-2 |
| Methyl iso-Butyl Ketone | | - | | | - | | | - | | | - | | | 101 | | SI1-4 | 106 | | SI1-4 | 103 | | SI1-4 | 100 | | SI1-2 |
| Toluene | | - | | | - | | | - | | | - | | | 115 | | SI1-4 | 108 | | SI1-4 | 94 | | SI1-4 | 100 | | SI1-2 |

INT = Interference
UI# = Impinger Number from the Unspiked Train
SI# = Impinger Number from the Spiked Train

# ALS Environmental

**Instrument Run Date: 08-Jul-11**

## ANALYTICAL DATA FROM INDIVIDUAL GC/MS INSTRUMENT RUNS

| Client Container ID: | 1-S-DS 1ST,2ND IMP,PROBE, LINE | 1-S-DS 3RD IMP | 1-S-DS 4TH IMP | 1-S-NS 1ST,2ND IMP,PROBE, LINE | 1-S-NS 4TH IMP | 2-S-DS 1ST,2ND IMP,PROBE, LINE | 2-S-DS 3RD IMP | 2-S-DS 4TH IMP |
|---|---|---|---|---|---|---|---|---|
| ALS Sample ID | L1025990-1;Ext1 | L1025990-2;Ext1 | L1025990-3;Ext1 | L1025990-4;Ext1 | L1025990-6;Ext1 | L1025990-7;Ext1 | L1025990-8;Ext1 | L1025990-9;Ext1 |
| Instrument File # | 3901039.D | 4001040.D | 4101041.D | 4201042.D | 4401044.D | 4501045.D | 4601046.D | 4701047.D |
| Sample Volume (mL) | 43 | 24 | 24 | 43 | 24 | 43 | 24 | 24 |
| Dilution Factor | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| **VOC via Modified Method 18** | | | | | | | | |
| | ug | ug | ug | ug | ug | ug | ug | ug |
| 1,3-Butadiene | <4.3 | <2.4 | <2.4 | - | - | <4.3 | <2.4 | <2.4 |
| Pentane | <4.3 | <2.4 | <2.4 | - | - | <4.3 | <2.4 | <2.4 |
| Acrolein | <4.3 | <2.4 | <2.4 | 4899 | 237 | <4.3 | <2.4 | <2.4 |
| Acetone | 35.9 | 21.8 | 17.5 | - | - | 28.2 | 24.8 | 19.1 |
| Acetonitrile | 5.6 | 2.5 | <2.4 | 4733 | 52.8 | 6.7 | 3.1 | 2.7 |
| Carbon Disulfide | <4.3 | <2.4 | <2.4 | - | - | <4.3 | <2.4 | <2.4 |
| Methylene Chloride | <4.3 | <2.4 | <2.4 | - | - | <4.3 | <2.4 | <2.4 |
| Acrylonitrile | <4.3 | <2.4 | <2.4 | - | - | <4.3 | <2.4 | <2.4 |
| Methyl t-Butyl Ether (MTBE) | <4.3 | <2.4 | <2.4 | - | - | <4.3 | <2.4 | <2.4 |
| Hexane | <4.3 | <2.4 | <2.4 | - | - | <4.3 | <2.4 | <2.4 |
| 2,2,4-Trimethylpentane | <4.3 | <2.4 | <2.4 | - | - | <4.3 | <2.4 | <2.4 |
| Benzene | <4.3 | <2.4 | <2.4 | - | - | <4.3 | <2.4 | <2.4 |
| Trichloroethene | <4.3 | <2.4 | <2.4 | 3129 | 110 | <4.3 | <2.4 | <2.4 |
| 2-Nitropropane | <4.3 | <2.4 | <2.4 | - | - | <4.3 | <2.4 | <2.4 |
| Methyl iso-Butyl Ketone | <4.3 | <2.4 | <2.4 | 4730 | 14.0 | <4.3 | <2.4 | <2.4 |
| Toluene | <4.3 | <2.4 | <2.4 | 1424 | 25.7 | <4.3 | <2.4 | <2.4 |
| Tetrachloroethene | <4.3 | <2.4 | <2.4 | - | - | <4.3 | <2.4 | <2.4 |
| 1,2-Dibromoethane | <4.3 | <2.4 | <2.4 | - | - | <4.3 | <2.4 | <2.4 |
| Chlorobenzene | <4.3 | <2.4 | <2.4 | - | - | <4.3 | <2.4 | <2.4 |
| Ethylbenzene | <4.3 | <2.4 | <2.4 | - | - | <4.3 | <2.4 | <2.4 |
| m&p-Xylenes | <4.3 | <2.4 | <2.4 | - | - | <4.3 | <2.4 | <2.4 |
| o-Xylene | <4.3 | <2.4 | <2.4 | - | - | <4.3 | <2.4 | <2.4 |
| Styrene | <4.3 | <2.4 | <2.4 | - | - | <4.3 | <2.4 | <2.4 |
| Cumene (Isopropylbenzene) | <4.3 | <2.4 | <2.4 | - | - | <4.3 | <2.4 | <2.4 |
| Nitrobenzene | <21.5 | <12 | <12 | - | - | <21.5 | <12 | <12 |
| **Labelled Analyte Recoveries** | % Rec | % Rec | % Rec | % Rec | % Rec | % Rec | % Rec | % Rec |
| 1,3-Butadiene-d6 | 0 | 2 | 7 | 0 | 0 | 0 | 0 | 2 |
| Pentane-d12 | 1 | 5 | 14 | 0 | 0 | 0 | 2 | 5 |
| acrylonitrile-d3 | 102 | 14 | 1 | 0 | 0 | 86 | 16 | 1 |
| MTBE-d12 | 87 | 23 | 3 | 0 | 0 | 72 | 27 | 4 |
| n-Hexane-d14 | 29 | 43 | 34 | 0 | 0 | 15 | 36 | 32 |
| 2,2,4-Trimethylpentane-d18 | 69 | 40 | 14 | 0 | 0 | 52 | 42 | 15 |
| Benzene-d6 | 77 | 19 | 2 | 0 | 0 | 78 | 20 | 3 |
| 2-Nitropropane-d6 | 84 | 4 | 0 | 0 | 0 | 95 | 4 | 0 |
| 1,2-Dibromoethane-d4 | 89 | 5 | 0 | 0 | 0 | 100 | 4 | 0 |
| Ethylbenzene-d10 | 88 | 5 | 0 | 0 | 0 | 97 | 4 | 0 |
| Styrene-d8 | 101 | 4 | 0 | 0 | 0 | 112 | 2 | 0 |
| Nitrobenzene-d5 | 128 | 7 | 2 | 1 | 0 | 116 | 8 | 2 |
| **Native Analyte Recoveries** | % Rec | % Rec | % Rec | % Rec | % Rec | % Rec | % Rec | % Rec |
| Acrolein | - | - | - | 67 | 3 | - | - | - |
| Acetonitrile | - | - | - | 59 | - | - | - | - |
| Trichloroethene | - | - | - | 83 | 3 | - | - | - |
| Methyl iso-Butyl Ketone | - | - | - | 93 | - | - | - | - |
| Toluene | - | - | - | 89 | 2 | - | - | - |
| **P&T Surrogate Recoveries** | % Rec | % Rec | % Rec | % Rec | % Rec | % Rec | % Rec | % Rec |
| 1,2,-Dichloroethane-d4 | 84 | 120 | 91 | 103 | 124 | 79 | 116 | 103 |
| Toluene-d8 | 86 | 89 | 100 | 104 | 110 | 75 | 101 | 93 |
| 4-Fluorobenzene | 106 | 127 | 123 | 116 | 111 | 103 | 105 | 105 |

INT = Interference
UI# = Impinger Number from the Unspiked Train
SI# = Impinger Number from the Spiked Train

# ALS Environmental

**Instrument Run Date: 08-Jul-11**

## ANALYTICAL DATA FROM INDIVIDUAL GC/MS INSTRUMENT RUNS

| Client Container ID: | 2-S-NS 1ST,2ND IMP,PROBE, LINE | 2-S-NS 3RD IMP | 2-S-NS 4TH IMP | 3-SV-DS 1ST,2ND IMP,PROBE, LINE | 3-SV-DS 3RD IMP | 3-SV-DS 4TH IMP | 3-SV-NS 1ST,2ND IMP,PROBE, LINE | 3-SV-NS 3RD IMP |
|---|---|---|---|---|---|---|---|---|
| ALS Sample ID | L1025990-10;Ext1 | L1025990-11;Ext1 | L1025990-12;Ext1 | L1025990-13;Ext1 | L1025990-14;Ext1 | L1025990-15;Ext1 | L1025990-16;Ext1 | L1025990-17;Ext1 |
| Instrument File # | 4901049.D | 5001050.D | 5101051.D | 5201052.D | 5301053.D | 5401054.D | 5501055.D | 5601056.D |
| Sample Volume (mL) | 43 | 24 | 24 | 43 | 24 | 24 | 43 | 24 |
| Dilution Factor | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| **VOC via Modified Method 18** | | | | | | | | |
| | **ug** | **ug** | **ug** | **ug** | **ug** | **ug** | **ug** | **ug** |
| 1,3-Butadiene | - | - | - | <4.3 | <2.4 | <2.4 | - | - |
| Pentane | - | - | - | <4.3 | <2.4 | <2.4 | - | - |
| Acrolein | 4381 | 1554 | 341 | <4.3 | <2.4 | <2.4 | 3821 | 818 |
| Acetone | - | - | - | 27.7 | 19.7 | 24.7 | - | - |
| Acetonitrile | 4737 | 892 | 81 | 8.1 | 3.1 | 2.9 | 5303 | 391 |
| Carbon Disulfide | - | - | - | <4.3 | <2.4 | <2.4 | - | - |
| Methylene Chloride | - | - | - | <4.3 | <2.4 | <2.4 | - | - |
| Acrylonitrile | - | - | - | <4.3 | <2.4 | <2.4 | - | - |
| Methyl t-Butyl Ether (MTBE) | - | - | - | <4.3 | <2.4 | <2.4 | - | - |
| Hexane | - | - | - | <4.3 | <2.4 | <2.4 | - | - |
| 2,2,4-Trimethylpentane | - | - | - | <4.3 | <2.4 | <2.4 | - | - |
| Benzene | - | - | - | <4.3 | <2.4 | <2.4 | - | - |
| Trichloroethene | 3294 | 856 | 86 | <4.3 | <2.4 | <2.4 | 3424 | 393 |
| 2-Nitropropane | - | - | - | <4.3 | <2.4 | <2.4 | - | - |
| Methyl iso-Butyl Ketone | 5150 | 212 | 6.6 | <4.3 | <2.4 | <2.4 | 5117 | 89 |
| Toluene | 1429 | 270 | 18 | <4.3 | <2.4 | <2.4 | 1366 | 129 |
| Tetrachloroethene | - | - | - | <4.3 | <2.4 | <2.4 | - | - |
| 1,2-Dibromoethane | - | - | - | <4.3 | <2.4 | <2.4 | - | - |
| Chlorobenzene | - | - | - | <4.3 | <2.4 | <2.4 | - | - |
| Ethylbenzene | - | - | - | <4.3 | <2.4 | <2.4 | - | - |
| m&p-Xylenes | - | - | - | <4.3 | <2.4 | <2.4 | - | - |
| o-Xylene | - | - | - | <4.3 | <2.4 | <2.4 | - | - |
| Styrene | - | - | - | <4.3 | <2.4 | <2.4 | - | - |
| Cumene (Isopropylbenzene) | - | - | - | <4.3 | <2.4 | <2.4 | - | - |
| Nitrobenzene | - | - | - | <21.5 | <12 | <12 | - | - |
| **Labelled Analyte Recoveries** | **% Rec** | **% Rec** | **% Rec** | **% Rec** | **% Rec** | **% Rec** | **% Rec** | **% Rec** |
| 1,3-Butadiene-d6 | 0 | 0 | 0 | 0 | 6 | 12 | 0 | 0 |
| Pentane-d12 | 0 | 0 | 0 | 2 | 13 | 21 | 0 | 0 |
| acrylonitrile-d3 | 0 | 0 | 0 | 84 | 13 | 1 | 0 | 0 |
| MTBE-d12 | 0 | 0 | 0 | 76 | 19 | 2 | 0 | 0 |
| n-Hexane-d14 | 0 | 0 | 0 | 33 | 47 | 23 | 0 | 0 |
| 2,2,4-Trimethylpentane-d18 | 0 | 0 | 0 | 66 | 33 | 6 | 0 | 0 |
| Benzene-d6 | 0 | 0 | 0 | 81 | 15 | 1 | 0 | 0 |
| 2-Nitropropane-d6 | 0 | 0 | 0 | 89 | 6 | 0 | 0 | 0 |
| 1.2-Dibromoethane-d4 | 0 | 0 | 0 | 93 | 6 | 0 | 0 | 0 |
| Ethylbenzene-d10 | 0 | 0 | 0 | 92 | 6 | 0 | 0 | 0 |
| Styrene-d8 | 0 | 0 | 0 | 105 | 6 | 0 | 0 | 0 |
| Nitrobenzene-d5 | 1 | 0 | 0 | 109 | 14 | 2 | 1 | 0 |
| **Native Analyte Recoveries** | **% Rec** | **% Rec** | **% Rec** | **% Rec** | **% Rec** | **% Rec** | **% Rec** | **% Rec** |
| Acrolein | 60 | 21 | 5 | - | - | - | 53 | 11 |
| Acetonitrile | 59 | 11 | 1 | - | - | - | 66 | 5 |
| Trichloroethene | 87 | 23 | 2 | - | - | - | 91 | 10 |
| Methyl iso-Butyl Ketone | 101 | 4 | - | - | - | - | 101 | 2 |
| Toluene | 90 | 17 | 1 | - | - | - | 86 | 8 |
| **P&T Surrogate Recoveries** | **% Rec** | **% Rec** | **% Rec** | **% Rec** | **% Rec** | **% Rec** | **% Rec** | **% Rec** |
| 1,2,-Dichloroethane-d4 | 108 | 107 | 104 | 84 | 104 | 120 | 111 | 96 |
| Toluene-d8 | 104 | 94 | 90 | 76 | 90 | 106 | 93 | 99 |
| 4-Fluorobenzene | 110 | 113 | 114 | 100 | 106 | 116 | 118 | 119 |

INT = Interference
UI# = Impinger Number from the Unspiked Train
SI# = Impinger Number from the Spiked Train

# ALS Environmental

**Instrument Run Date: 08-Jul-11**

## ANALYTICAL DATA FROM INDIVIDUAL GC/MS INSTRUMENT RUNS

| Client Container ID: | 3-SV-NS 4TH IMP | FB-DS 1ST,2ND IMP,PROBE, LINE | FB-DS 3RD IMP | FB-DS 4TH IMP | FB-NS 1ST,2ND IMP,PROBE, LINE | FB-NS 3RD IMP | FB-NS 4TH IMP | FIELD SPIKE-DEUTERATED |
|---|---|---|---|---|---|---|---|---|
| ALS Sample ID | L1025990-18;Ext1 | L1025990-19;Ext1 | L1025990-20;Ext1 | L1025990-21;Ext1 | L1025990-22;Ext1 | L1025990-23;Ext1 | L1025990-24;Ext1 | L1025990-25;Ext1 |
| Instrument File # | 5701057.D | 5801058.D | 6001060.D | 6101061.D | 6201062.D | 6301063.D | 6401064.D | 6501065.D |
| Sample Volume (mL) | 24 | 43 | 24 | 24 | 43 | 24 | 24 | 43 |
| Dilution Factor | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| **VOC via Modified Method 18** | | | | | | | | |
| | ug | ug | ug | ug | ug | ug | ug | ug |
| 1,3-Butadiene | - | <4.3 | <2.4 | <2.4 | - | - | - | <4.3 |
| Pentane | - | <4.3 | <2.4 | <2.4 | - | - | - | <4.3 |
| Acrolein | 95 | <4.3 | <2.4 | <2.4 | 7273 | 9.6 | 9.4 | <4.3 |
| Acetone | - | 31.1 | 20.5 | 16.9 | - | - | - | 25.5 |
| Acetonitrile | 26.6 | 6.1 | <2.4 | 2.4 | 8034 | 18.9 | 8.7 | <4.3 |
| Carbon Disulfide | - | <4.3 | <2.4 | <2.4 | - | - | - | <4.3 |
| Methylene Chloride | - | <4.3 | <2.4 | <2.4 | - | - | - | <4.3 |
| Acrylonitrile | - | <4.3 | <2.4 | <2.4 | - | - | - | <4.3 |
| Methyl t-Butyl Ether (MTBE) | - | <4.3 | <2.4 | <2.4 | - | - | - | <4.3 |
| Hexane | - | <4.3 | <2.4 | <2.4 | - | - | - | <4.3 |
| 2,2,4-Trimethylpentane | - | <4.3 | <2.4 | <2.4 | - | - | - | <4.3 |
| Benzene | - | <4.3 | <2.4 | <2.4 | - | - | - | <4.3 |
| Trichloroethene | 20 | <4.3 | <2.4 | <2.4 | 3782 | 3.0 | 4.1 | <4.3 |
| 2-Nitropropane | - | <4.3 | <2.4 | <2.4 | - | - | - | <4.3 |
| Methyl iso-Butyl Ketone | 4.7 | <4.3 | <2.4 | <2.4 | 5081 | 11.3 | 4.0 | <4.3 |
| Toluene | 5.4 | <4.3 | <2.4 | <2.4 | 1593 | <2.4 | <2.4 | <4.3 |
| Tetrachloroethene | - | <4.3 | <2.4 | <2.4 | - | - | - | <4.3 |
| 1,2-Dibromoethane | - | <4.3 | <2.4 | <2.4 | - | - | - | <4.3 |
| Chlorobenzene | - | <4.3 | <2.4 | <2.4 | - | - | - | <4.3 |
| Ethylbenzene | - | <4.3 | <2.4 | <2.4 | - | - | - | <4.3 |
| m&p-Xylenes | - | <4.3 | <2.4 | <2.4 | - | - | - | <4.3 |
| o-Xylene | - | <4.3 | <2.4 | <2.4 | - | - | - | <4.3 |
| Styrene | - | <4.3 | <2.4 | <2.4 | - | - | - | <4.3 |
| Cumene (Isopropylbenzene) | - | <4.3 | <2.4 | <2.4 | - | - | - | <4.3 |
| Nitrobenzene | - | <21.5 | <12 | <12 | - | - | - | <21.5 |
| **Labelled Analyte Recoveries** | % Rec | % Rec | % Rec | % Rec | % Rec | % Rec | % Rec | % Rec |
| 1,3-Butadiene-d6 | 0 | 100 | 0 | 0 | 0 | 0 | 0 | 99 |
| Pentane-d12 | 0 | 100 | 0 | 0 | 0 | 0 | 0 | 98 |
| acrylonitrile-d3 | 0 | 100 | 0 | 0 | 0 | 0 | 0 | 93 |
| MTBE-d12 | 0 | 100 | 0 | 0 | 0 | 0 | 0 | 98 |
| n-Hexane-d14 | 0 | 100 | 0 | 0 | 0 | 0 | 0 | 111 |
| 2,2,4-Trimethylpentane-d18 | 0 | 100 | 0 | 0 | 0 | 0 | 0 | 104 |
| Benzene-d6 | 0 | 100 | 0 | 0 | 0 | 0 | 0 | 101 |
| 2-Nitropropane-d6 | 0 | 100 | 0 | 0 | 0 | 0 | 0 | 92 |
| 1,2-Dibromoethane-d4 | 0 | 100 | 0 | 0 | 1 | 0 | 0 | 104 |
| Ethylbenzene-d10 | 0 | 100 | 0 | 0 | 0 | 0 | 0 | 103 |
| Styrene-d8 | 0 | 100 | 0 | 0 | 0 | 0 | 0 | 117 |
| Nitrobenzene-d5 | 0 | 100 | 2 | 1 | 1 | 0 | 0 | 97 |
| **Native Analyte Recoveries** | % Rec | % Rec | % Rec | % Rec | % Rec | % Rec | % Rec | % Rec |
| Acrolein | 1 | - | - | - | 100 | - | - | - |
| Acetonitrile | - | - | - | - | 100 | - | - | - |
| Trichloroethene | - | - | - | - | 100 | - | - | - |
| Methyl iso-Butyl Ketone | - | - | - | - | 100 | - | - | - |
| Toluene | - | - | - | - | 100 | - | - | - |
| **P&T Surrogate Recoveries** | % Rec | % Rec | % Rec | % Rec | % Rec | % Rec | % Rec | % Rec |
| 1,2,-Dichloroethane-d4 | 108 | 86 | 102 | 102 | 133 | 98 | 101 | 80 |
| Toluene-d8 | 95 | 75 | 96 | 102 | 102 | 97 | 95 | 74 |
| 4-Fluorobenzene | 109 | 106 | 111 | 113 | 108 | 118 | 117 | 103 |

INT = Interference
UI# = Impinger Number from the Unspiked Train
SI# = Impinger Number from the Spiked Train

# ALS Environmental

**Instrument Run Date: 08-Jul-11**

## ANALYTICAL DATA FROM INDIVIDUAL GC/MS INSTRUMENT RUNS

| | |
|---|---|
| **Client Container ID:** | **FIELD SPIKE-NATIVE** |
| ALS Sample ID | L1025990-26;Ext1 |
| Instrument File # | 6601066.D |
| Sample Volume (mL) | 43 |
| Dilution Factor | 1 |
| **VOC via Modified Method 18** | |
| | **ug** |
| 1,3-Butadiene | - |
| Pentane | - |
| Acrolein | 4674 |
| Acetone | - |
| Acetonitrile | 5119 |
| Carbon Disulfide | - |
| Methylene Chloride | - |
| Acrylonitrile | - |
| Methyl t-Butyl Ether (MTBE) | - |
| Hexane | - |
| 2,2,4-Trimethylpentane | - |
| Benzene | - |
| Trichloroethene | 3914 |
| 2-Nitropropane | - |
| Methyl iso-Butyl Ketone | 4887 |
| Toluene | 1627 |
| Tetrachloroethene | - |
| 1,2-Dibromoethane | - |
| Chlorobenzene | - |
| Ethylbenzene | - |
| m&p-Xylenes | - |
| o-Xylene | - |
| Styrene | - |
| Cumene (Isopropylbenzene) | - |
| Nitrobenzene | - |
| **Labelled Analyte Recoveries** | **% Rec** |
| 1,3-Butadiene-d6 | 0 |
| Pentane-d12 | 0 |
| acrylonitrile-d3 | 0 |
| MTBE-d12 | 0 |
| n-Hexane-d14 | 0 |
| 2,2,4-Trimethylpentane-d18 | 0 |
| Benzene-d6 | 0 |
| 2-Nitropropane-d6 | 0 |
| 1.2-Dibromoethane-d4 | 1 |
| Ethylbenzene-d10 | 0 |
| Styrene-d8 | 0 |
| Nitrobenzene-d5 | 9 |
| **Native Analyte Recoveries** | **% Rec** |
| Acrolein | 64 |
| Acetonitrile | 64 |
| Trichloroethene | 103 |
| Methyl iso-Butyl Ketone | 96 |
| Toluene | 102 |
| **P&T Surrogate Recoveries** | **% Rec** |
| 1,2,-Dichloroethane-d4 | 102 |
| Toluene-d8 | 104 |
| 4-Fluorobenzene | 107 |

INT = Interference
UI# = Impinger Number from the Unspiked Train
SI# = Impinger Number from the Spiked Train

# ALS Environmental

**Instrument Run Date: 12-Jul-11**

## ANALYTICAL DATA FROM INDIVIDUAL GC/MS INSTRUMENT RUNS

| | |
|---|---|
| **Client Container ID:** | **1-S-NS 3RD IMP** |
| ALS Sample ID | L1025990-5 |
| Instrument File # | 1201012.D |
| Sample Volume (mL) | 24 |
| Dilution Factor | 1 |
| **VOC via Modified Method 18** | |
| | **ug** |
| 1,3-Butadiene | - |
| Pentane | - |
| Acrolein | 1217 |
| Acetone | - |
| Acetonitrile | 614 |
| Carbon Disulfide | - |
| Methylene Chloride | - |
| Acrylonitrile | - |
| Methyl t-Butyl Ether (MTBE) | - |
| Hexane | - |
| 2,2,4-Trimethylpentane | - |
| Benzene | - |
| Trichloroethene | 1208 |
| 2-Nitropropane | - |
| Methyl iso-Butyl Ketone | 201 |
| Toluene | 395 |
| Tetrachloroethene | - |
| 1,2-Dibromoethane | - |
| Chlorobenzene | - |
| Ethylbenzene | - |
| m&p-Xylenes | - |
| o-Xylene | - |
| Styrene | - |
| Cumene (Isopropylbenzene) | - |
| Nitrobenzene | - |
| **Labelled Analyte Recoveries** | **% Rec** |
| 1,3-Butadiene-d6 | 0 |
| Pentane-d12 | 0 |
| acrylonitrile-d3 | 0 |
| MTBE-d12 | 0 |
| n-Hexane-d14 | 0 |
| 2,2,4-Trimethylpentane-d18 | 0 |
| Benzene-d6 | 0 |
| 2-Nitropropane-d6 | 0 |
| 1.2-Dibromoethane-d4 | 0 |
| Ethylbenzene-d10 | 0 |
| Styrene-d8 | 0 |
| Nitrobenzene-d5 | 0 |
| **Native Analyte Recoveries** | **% Rec** |
| Acrolein | 26 |
| Acetonitrile | 12 |
| Trichloroethene | 31 |
| Methyl iso-Butyl Ketone | 7 |
| Toluene | 24 |
| **P&T Surrogate Recoveries** | **% Rec** |
| 1,2,-Dichloroethane-d4 | 95 |
| Toluene-d8 | 101 |
| 4-Fluorobenzene | 112 |

INT = Interference
UI# = Impinger Number from the Unspiked Train
SI# = Impinger Number from the Spiked Train

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**Instrument Run Date: 19-Jul-11**

## ANALYTICAL DATA FROM INDIVIDUAL GC/MS INSTRUMENT RUNS

| **Client Container ID:** | **REAGENT BL-METHANOL** |
|---|---|
| ALS Sample ID | L1025990-29 |
| Instrument File # | 6101061.D |
| Sample Volume (mL) | 43 |
| Dilution Factor | 1 |
| **VOC via Modified Method 18** | |
| | **ug** |
| 1,3-Butadiene | <4.3 |
| Pentane | <4.3 |
| Acrolein | <4.3 |
| Acetone | 31.4 |
| Acetonitrile | 4.3 |
| Carbon Disulfide | <4.3 |
| Methylene Chloride | 6.5 |
| Acrylonitrile | <4.3 |
| Methyl t-Butyl Ether (MTBE) | <4.3 |
| Hexane | <4.3 |
| 2,2,4-Trimethylpentane | <4.3 |
| Benzene | <4.3 |
| Trichloroethene | <4.3 |
| 2-Nitropropane | <4.3 |
| Methyl iso-Butyl Ketone | <4.3 |
| Toluene | <4.3 |
| Tetrachloroethene | <4.3 |
| 1,2-Dibromoethane | <4.3 |
| Chlorobenzene | <4.3 |
| Ethylbenzene | <4.3 |
| m&p-Xylenes | <4.3 |
| o-Xylene | <4.3 |
| Styrene | <4.3 |
| Cumene (Isopropylbenzene) | <4.3 |
| Nitrobenzene | <21.5 |
| **Labelled Analyte Recoveries** | **% Rec** |
| 1,3-Butadiene-d6 | 0 |
| Pentane-d12 | 0 |
| acrylonitrile-d3 | 0 |
| MTBE-d12 | 0 |
| n-Hexane-d14 | 0 |
| 2,2,4-Trimethylpentane-d18 | 0 |
| Benzene-d6 | 0 |
| 2-Nitropropane-d6 | 0 |
| 1,2-Dibromoethane-d4 | 0 |
| Ethylbenzene-d10 | 0 |
| Styrene-d8 | 0 |
| Nitrobenzene-d5 | 0 |
| **Native Analyte Recoveries** | **% Rec** |
| Acrolein | 0 |
| Acetonitrile | 0 |
| Trichloroethene | 0 |
| Methyl iso-Butyl Ketone | 0 |
| Toluene | 0 |
| **P&T Surrogate Recoveries** | **% Rec** |
| 1,2,-Dichloroethane-d4 | 106 |
| Toluene-d8 | 101 |
| 4-Fluorobenzene | 104 |

INT = Interference
UI# = Impinger Number from the Unspiked Train
SI# = Impinger Number from the Spiked Train

# ALS Environmental

## Analyte Quantitation References

**VOC via Modified Method 18**

| Target VOCs | Corresponding Purge & Trap Internal Standard[2.] | Corresponding Field Spike[1.] |
|---|---|---|
| 1,3-Butadiene | Fluorobenzene | 1,3-Butadiene-d6 |
| Pentane | Fluorobenzene | Pentane-d12 |
| Acrolein | Fluorobenzene | Benzene-d6 |
| Acetone | Fluorobenzene | Acrylonitrile-d3 |
| Acetonitrile | Fluorobenzene | Acrylonitrile-d3 |
| Carbon Disulfide | Fluorobenzene | Benzene-d6 |
| Methylene Chloride | Fluorobenzene | Benzene-d6 |
| Acrylonitrile | Fluorobenzene | Acrylonitrile-d3 |
| Methyl t-Butyl Ether (MTBE) | Fluorobenzene | MTBE-d12 |
| Hexane | Fluorobenzene | n-Hexane-d14 |
| 2,2,4-Trimethylpentane | Chlorobenzene-d5 | 2,2,4-Trimethylpentane-d18 |
| Benzene | Chlorobenzene-d5 | Benzene-d6 |
| Trichloroethene | Chlorobenzene-d5 | Benzene-d6 |
| 2-Nitropropane | Chlorobenzene-d5 | 2-Nitropropane-d6 |
| Methyl iso-Butyl Ketone | Chlorobenzene-d5 | Ethylbenzene-d10 |
| Toluene | Chlorobenzene-d5 | Ethylbenzene-d10 |
| Tetrachloroethene | Chlorobenzene-d5 | Ethylbenzene-d10 |
| 1,2-Dibromoethane | Chlorobenzene-d5 | 1.2-Dibromoethane-d4 |
| Chlorobenzene | Chlorobenzene-d5 | Ethylbenzene-d10 |
| Ethylbenzene | 1,4-Dichlorobenzene-d4 | Ethylbenzene-d10 |
| m&p-Xylenes | 1,4-Dichlorobenzene-d4 | Ethylbenzene-d10 |
| o-Xylene | 1,4-Dichlorobenzene-d4 | Ethylbenzene-d10 |
| Styrene | 1,4-Dichlorobenzene-d4 | Styrene-d8 |
| Cumene (Isopropylbenzene) | 1,4-Dichlorobenzene-d4 | Ethylbenzene-d10 |
| Nitrobenzene | 1,4-Dichlorobenzene-d4 | Nitrobenzene-d5 |
| **Labelled Field Standards[1.]** | | |
| 1,3-Butadiene-d6 | Fluorobenzene | - |
| Pentane-d12 | Fluorobenzene | - |
| Acrylonitrile-d3 | Fluorobenzene | - |
| MTBE-d12 | Fluorobenzene | - |
| n-Hexane-d14 | Fluorobenzene | - |
| 2,2,4-Trimethylpentane-d18 | Chlorobenzene-d5 | - |
| Benzene-d6 | Chlorobenzene-d5 | - |
| 2-Nitropropane-d6 | Chlorobenzene-d5 | - |
| 1.2-Dibromoethane-d4 | Chlorobenzene-d5 | - |
| Ethylbenzene-d10 | 1,4-Dichlorobenzene-d4 | - |
| Styrene-d8 | 1,4-Dichlorobenzene-d4 | - |
| Nitrobenzene-d5 | 1,4-Dichlorobenzene-d4 | - |
| **Purge & Trap Surrogate Standards[2.]** | | |
| 1,2,-Dichloroethane-d4 | Chlorobenzene-d5 | - |
| Toluene-d8 | Chlorobenzene-d5 | - |
| 4-Fluorobenzene | 1,4-Dichlorobenzene-d4 | - |

All target analyte and surrogate data are reported corrected for the corresponding P&T internal standard responses.
Target analyte data including the native spike recoveries are reported uncorrected for corresponding labelled field spike recoveries.

[1.] Spiked into impinger 2 just prior to sampling in the field.
[2.] Spiked into the purge water just prior to instrumental analysis.

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# Method 18 Methanol Impinger Method for Determining Volatile Organic Emissions in Elevated Concentrations of Stack Gas

## *Sampling and Field Procedure for Volatile Organics in Stack Gas*

**Sample Name:** Method 18 Methanol Impinger Method

**Sampler:** Stack Sampling Specialists

**Sampling Locations:** System or Boiler Stack Sampling Platform

**Sampling & Health & Safety Equipment:** Sampling and safety equipment is as follows:

- ☐ Method 18 Midget Impinger Method Train
- ☐ Aluminum foil
- ☐ Glass 20 ml or 40 ml volatile organic analysis (VOA) vials with screw-top caps and Teflon® - lined septa
- ☐ Methanol (Purge & Trap Grade) for Impinger charge and equipment rinses
- ☐ Safety glasses or face shield
- ☐ Latex Gloves and other safety equipment as required
- ☐ Dry Ice/Methanol Bath

**Sample Collection Frequency:**

Continuously at a rate of 0.25 Liters/minute during the sampling run for 80 minutes of sampling. Each impinger train will be used to sample a nominal 20 liters of stack gas. Each impinger will be collected at the end of the run in individual 20 mL VOA vials. Larger 40 mL VOA vials are acceptable but 20 mL vials diminish the volume of the container, for convenience.

**Sampling Procedures:**

**NOTES: Careful planning and handling are required for quality data. It is imperative to minimize losses of VOCs from the samples and the sampling spikes during the sampling process. Particular attention is needed with respect to:**

**a) maintaining chilled temperatures on impingers, samples and spiking ampoules to prevent VOC losses**
**b) minimizing contamination from fugitive VOCs during recoveries**
**c) ensuring that the methanol emissions from the dry-ice methanol bath do not compromise any separate sampling/analysis of methanol.**
**d) Maintain the separate grades of methanol for the baths (lab or reagent grade) versus the impinger contents (purge and trap grade is required)**

The preparation of Method 18 Train glassware, probes, condensers and connecting glassware should incorporate a

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thorough rinsing of these components with an ultrapure grade (Purge & Trap Grade) of Methanol. Glass components should be subsequently baked in an oven at 100 deg C for 2 hours. Teflon® tubing should be cleaned after each test in a similar fashion, or replaced with new tubing.

Persons handling Method 18 Train components should don latex gloves. Fresh gloves should be worn during each separate stage of train handling.

Storage and handling of train components and samples are required to be in a separate trailer or lab space. Persons handling the MM5 Train samples should not participate in the sampling or handling of Method 18 samples at any time since the MM-5 sample recoveries require the open use of acetone, methylene chloride and toluene. These solvents will cross contaminate the Method 18 samples unless deliberate care is taken to prevent exposure.

The midget impingers and connecting glassware will be protected from contamination by placing them in separate clean coolers during shipping and storage. Method 18 components must be stored and handled in an area isolated from the probe rinse solvents used for the MM5 Trains.

Method 18 Operation -- The sample collection procedures will be as described in the standard EPA protocol referenced below. The dry gas meter will be calibrated before arriving at the test site, and the sample train will be cleaned and assembled before charging the midget impingers with methanol. The train will be leak tested near 10 in. Hg in such a manner as to prevent exposure of the train components to the possible contaminants in ambient air. Leak tests will be conducted before and after the sampling interval for each run.

The first four (4) impingers of this train will be set in a dry ice/Methanol bath for the duration of the sampling run. Analytes included in this data set include 1,3- butadiene and acrolein. Under these operating conditions analytes with very low boiling points are efficiently trapped and stored for analysis. Once the analytes are dissolved in Methanol, stability of the samples are easy to maintain.

For each run, a co-located spike train is required for acrylonitrile and acrolein only.

**Train Unspiked with Natives:**
Impinger 1 is left clean without any collection solvent. Impinger 2 is charged with 10mL of purge and trap grade methanol (supplied by ALS). Each of impingers 3 and 4 are charged with 15mL of purge and trap grade methanol. After chilling the impingers in the dry-ice methanol bath and just prior to sampling,

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drop the entire 5mL contents of a chilled ampoule of deuterated pre-spike mix (a methanolic solution in a sealed ampoule provided by ALS) to the 2nd impinger. [Chill the ampoule to approximately 0 deg C before opening. Break open the ampoule just prior to transfer. Transfer the entire contents without any rinsing.]

Once for each source and run condition (i.e. for each set of 3 runs), prepare a field spike by adding the contents of one chilled pre-spike ampoule to 10mL of purge and trap grade methanol in a 20mL VOA vial. Carefully fill the vial with additional methanol and cap with minimal headspace. Submit this as a sample to the laboratory as a field spike control sample.

**Co-Located Train Spiked with Natives:**
Prepare the co-located train as above except:

a) Initially charge the 2nd impinger with 5mL
b) in addition to the deuterated pre-spike mix ampoule, add the 5mL contents of a chilled ampoule containing acylonitrile and acrolein native spikes to the 2nd impinger. [Chill the ampoule to approximately 0 deg C before opening. Break open the ampoule just prior to transfer. Transfer the entire contents without any rinsing.]

Once for each source and run condition (i.e. for each set of 3 runs), prepare a field spike by adding the contents of one chilled native spike ampoule and one chilled labeled ample each into 5mL of purge and trap grade methanol in a 20mL VOA vial. Carefully fill the vial with additional methanol and cap with minimal headspace. Submit this as a sample to the laboratory as a native spike control sample.

Before sampling is commenced, ice water will be circulated through the preimpinger coil condensers. The temperature exiting the first condenser should be <10 deg C in order to provide conditions at the first knockout impinger that will effectively capture low boiling organic components in the stack or vent gas.

The ice water should be monitored regularly during the test to replenish the ice for **maximum** cooling capacity. The probe will be inserted into the sampling port and purged with stack gas. The probe will be heated from 138° to 150°C (280° to 302°F). The stack will be sampled at a rate of 0.25 L/min for 80 minutes to collect a nominal sample volume of 20 L for each run.

Midget Impingers #1 & #2 will be composited, rinsed with a small aliquot of Methanol, and placed in a 40ml VOA vial clearly labeled with the run and fraction number. Using a clean (or new) Teflon squirt bottle rinse the probe, coil condenser, and all related connecting glassware into this fraction. Three (3) small

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volumes of Methanol will suffice to efficiently rinse the train components. An appropriate name for this sample is: Method 18 1st & 2nd Methanol Impinger Composite.

Midget Impinger #3 will be collected with its associated glassware rinses in a separate 20ml VOA vial (or 40ml VOA vial). This fraction will be analyzed separately from the first fraction. An appropriate name for this sample is: Method 18 3rd Methanol Impinger.

Midget Impinger #4 will be collected with its associated glassware rinses in a separate 20ml VOA vial ( or 40ml VOA vial). This fraction will be analyzed separately from the other fractions. An appropriate name for this sample is: Method 18 4th Methanol Impinger.

After collecting the samples, the Methanol samples will be placed in Ziploc® bags and stored in coolers on dry ice.

During a sampling run, a complete field blank train will be set up to simulate the handling of the test sample tubes. The methanol will remain in an identical train for the same length of time required to complete a sampling run. Longer periods are acceptable. Beginning and ending leak checks will be performed on the blank train, and the probe will be heated to the standard operating temperature. Samples will be recovered from the blank train by the same operator and in the same location as those for the standard runs.

For each sample shipment to the laboratory, a methanol trip blank will be removed from storage, assigned a sample number, and logged in as the trip blank sample. This sample will remain sealed during the test and during shipment of associated samples.

Samples will be placed on dry ice in clean coolers, which will be stored in an area away from other samples and potential contamination sources. The Method 18 impinger samples will be stored and shipped in a separate cooler from other samples and preserved by chilling with dry ice. Method 18 samples may be shipped daily by overnight service to the laboratory, or delivered as a sampling batch.

**Analysis:**

The analytical laboratory will screen and analyze the Method 18 Methanol impingers by SW-846 Method 8260B. Generally, a 10ul portion of the impinger sample is placed into the purge and trap device of the instrument. Surrogates and internal standards are subsequently added. Analysis is completed using GC/MS. Theoretically, as much as a 100µl may be added to the purge and trap device, if sample loading permits, to optimize reporting

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and detection limits. Dilutions may also be required before analysis for some samples.

**Quality Control/Quality**

Assurance Requirements:
A Train Blank set of Method 18 samples will be collected one time during each source location. A methanol trip blank will be included with all Method 18 samples sent to the analytical laboratory.

**Method References:**

a) Method 18 – "Measurement of Gaseous Organic Compound Emissions by Gas Chromatography." EPA 40 CFR Part 60, Appendix A.

b) Method 8260 - "Volatile Organic Compounds by Gas Chromatography/Mass Spectrometry (GC/MS)". Taken from Test Methods for Evaluating Solid Waste, Physical/Chemical Methods. SW-846, Third Edition, September 1986. Final Update I (July 1992), Final Update IIA (August 1993), Final Update II (September 1994), Final Update IIB (January 1995), Final Update III (December 1996), and Final Update IIIA (April 1998). USEPA, OSWER, Washington, D.C. 20460.

c) EPA OAQPS Method CTM-008. "Suggested Operating Procedure for the Determination of Acrylonitrile Emissions from Stationary Sources"

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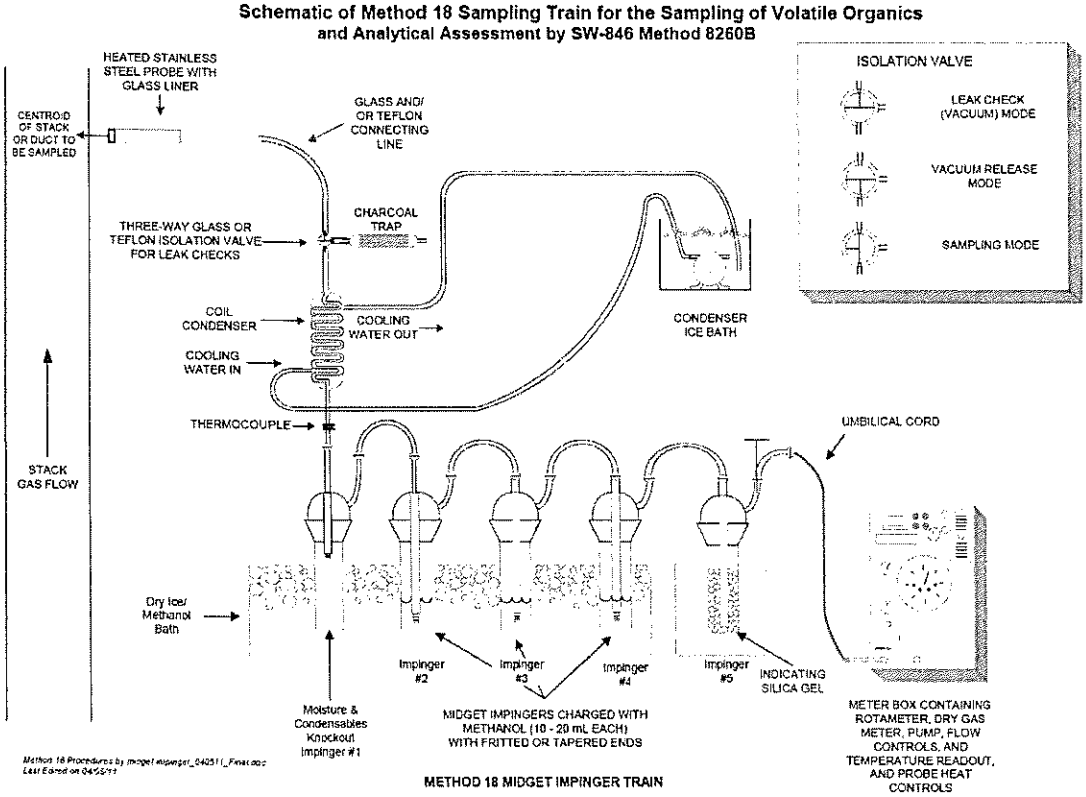
**Schematic of Method 18 Sampling Train for the Sampling of Volatile Organics and Analytical Assessment by SW-846 Method 8260B**




**METHOD 18 MIDGET IMPINGER TRAIN**

AVERAGE METHANOL EMISSIONS

CLIENT: ExxonMobil

| NAME | ug/dscm | | ug/dscm at 7% O2 | | ug/dscf | | lb/hr | |
|---|---|---|---|---|---|---|---|---|
| Methanol | ND < | 656.8 | ND < | 575.8 | ND < | 18.60 | ND < | 0.586 |

METHANOL CALCULATIONS

| | | | |
|---|---|---|---|
| CLIENT: | ExxonMobil | | AA |
| TEST NUMBER: | 1-MeOH | VMSTD(DSCF): | 0.5752 |
| TEST DATE: | 6/27/2011 | QSD(DSCF/MIN): | 240582 |
| T REF (F) | 68 | CO2,%: | 14.21 |
| | | O2,%: | 5.19 |

| NAME | ug/train | ug/dscm | ug/dscm at 7% O2 | ug/dscf | lb/hr |
|---|---|---|---|---|---|
| Methanol | ND < 10 | ND < 613.9 | ND < 543.0 | ND < 17.38 | ND < 0.553 |

METHANOL CALCULATIONS

| | | | |
|---|---|---|---|
| CLIENT: | ExxonMobil | | AA |
| TEST NUMBER: | 2-MeOH | VMSTD(DSCF): | 0.5176 |
| TEST DATE: | 6/27/2011 | QSD(DSCF/MIN): | 244827 |
| T REF (F) | 68 | CO2,%: | 14.14 |
| | | O2,%: | 5.00 |

| NAME | ug/train | ug/dscm | ug/dscm at 7% O2 | ug/dscf | lb/hr |
|---|---|---|---|---|---|
| Methanol | ND < 10 | ND < 682.2 | ND < 596.5 | ND < 19.32 | ND < 0.625 |

METHANOL CALCULATIONS

| | | | |
|---|---|---|---|
| CLIENT: | ExxonMobil | INITIALS: | AA |
| TEST NUMBER: | 3-MeOH | VMSTD(DSCF): | 0.5237 |
| TEST DATE: | 6/28/2011 | QSD(DSCF/MIN): | 230394 |
| T REF (F) | 68 | CO2,%: | 14.20 |
| | | O2,%: | 4.96 |

| NAME | ug/train | ug/dscm | ug/dscm at 7% O2 | ug/dscf | lb/hr |
|---|---|---|---|---|---|
| Methanol | ND < 10 | ND < 674.3 | ND < 587.8 | ND < 19.10 | ND < 0.581 |

# Delta

Methanol Test Summary

| | | | | |
|---|---|---|---|---|
| Client/Location | ExxonMobil | | Reference Temp (F) | 68 |
| | | | Fuel | Refinery |
| Sample Location | FCC 2F-7 Stack | | Data By | AA |
| Test No. | 1-MeOH | 2-MeOH | 3-MeOH | Average |
| Date | June 27, 2011 | June 27, 2011 | June 28, 2011 | * |
| Start/Stop Time | 10:13/11:13 | 18:15/19:15 | 8:05/9:05 | * |
| Bar Press (in Hg) | 29.80 | 29.80 | 29.77 | * |
| Test Method | Modified Method 18 | Modified Method 18 | Modified Method 18 | * |
| Sample Time (Min) | 60 | 60 | 60 | * |
| Sample Train | 13-P&M | 16-P&M | 16-P&M | * |
| Meter Cal Factor | 1.0020 | 1.0217 | 1.0217 | * |
| Meter Temp (F) | 74.0 | 75.5 | 68.8 | 72.8 |
| Meter Press (iwg) | 0.25 | 0.30 | 0.30 | 0.28 |
| Meter Vol (am^3) | 0.01650 | 0.01460 | 0.01460 | 0.0152 |
| Meter Vol (l) | 16.5 | 14.6 | 14.6 | 15.23 |
| Sample Rate (lpm) | 0.275 | 0.243 | 0.243 | 0.254 |
| Std Sample Vol (SM^3) | 0.0163 | 0.0147 | 0.0148 | 0.0153 |
| Std Sample Vol (dscf) | 0.5752 | 0.5176 | 0.5237 | 0.5388 |
| Stack Flow Rate, DSCFM | 240,582 | 244,827 | 230,394 | 238,601 |
| Flow rate from Test | 1-SV | 2-SV | 3-SV | |

# Delta

Spiked Methanol Test Summary

| | | | | |
|---|---|---|---|---|
| Client/Location | ExxonMobil | | Reference Temp (F) | 68 |
| | | | Fuel | Refinery |
| Sample Location | FCC 2F-7 Stack | | Data By | AA |
| Test No. | 1-MeOH-Spiked | 2-MeOH-Spiked | 3-MeOH-Spiked | Average |
| Date | June 27, 2011 | June 27, 2011 | June 28, 2011 | * |
| Start/Stop Time | 10:13/11:13 | 18:15/19:15 | 8:05/9:05 | * |
| Bar Press (in Hg) | 29.80 | 29.80 | 29.77 | * |
| Test Method | Modified Method 18 | Modified Method 18 | Modified Method 18 | * |
| Sample Time (Min) | 60 | 60 | 60 | * |
| Sample Train | 16-P&M | 13-P&M | 13-P&M | * |
| Meter Cal Factor | 1.0217 | 1.0020 | 1.0020 | * |
| Meter Temp (F) | 76.7 | 72.7 | 73.3 | 74.2 |
| Meter Press (iwg) | 0.25 | 0.24 | 0.24 | 0.24 |
| Meter Vol (am^3) | 0.01500 | 0.01635 | 0.01650 | 0.0160 |
| Meter Vol (l) | 15 | 16.35 | 16.5 | 15.95 |
| Sample Rate (lpm) | 0.250 | 0.273 | 0.275 | 0.266 |
| Std Sample Vol (SM^3) | 0.0150 | 0.0162 | 0.0163 | 0.0158 |
| Std Sample Vol (dscf) | 0.5306 | 0.5714 | 0.5754 | 0.5591 |
| Stack Flow Rate, DSCFM | 240,582 | 244,827 | 230,394 | 238,601 |
| Flow rate from Test | 1-SV | 2-SV | 3-SV | |

Delta Air Quality Services, Incorporated

Spiked MEOH Spiked trap # 6688

# WET CHEMICAL SAMPLING SYSTEM DATA AND WORKSHEET

CLIENT: Exxon Mobil
LOCATION: FCC / 2F-7 Stack
DATE: 6-27-2011
RUN NO: 1-MEOH- spiked
OPERATOR: Dave Woods
METER BOX NO: 16 PHM
METER ΔH@: —
METER Yd: 1.0217
SAMPLE CUSTODIAN DW

AMBIENT TEMPERATURE: 75
BAROMETRIC PRESSURE: 29.80
ASSUMED MOISTURE: —
PRE-TEST LEAK RATE: : 0.000 CFM@ 25 in. Hg
POST-TEST LEAK RATE: : 0.000 CFM@ 25 in. Hg
TRAVERSE POINTS, MIN/POINT: 60
STACK AREA, FT$^2$:
CHAIN OF CUSTODY: SAMPLE CUSTODIAN AA
SAMPLER DW

| Imp. # | Contents | Post-Test - Pre-Test = Difference |
|---|---|---|
| 1 | HPLC Grade $H_2O$ | - |
| | | |
| | | |
| | | |
| Total: | | |

| Point | Time | Meter Volume, Ltr$^3$ | ΔP in. $H_2O$ | ΔH in. $H_2O$ | Stack Temp, °F | Probe Temp, °F | Filter Temp, °F | Imp. Out Temp, °F | Meter Temp, °C In | Meter Temp, °C Out | Vacuum in. Hg. | $O_2$ % | Pstatic in. $H_2O$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Single | 10:13 | 359.200 | | 0.25 | | | | | 77 | 75 | 3 | | |
| | 10:23 | 361.5 | | 0.25 | | | | | 77 | 75 | | | |
| | 1033 | 364.3 | | 0.25 | | | | | 77 | 75 | | | |
| | 1043 | 366.7 | | 0.25 | | | | | 78 | 76 | | | |
| | 1053 | 369.3 | | 0.25 | | | | | 79 | 76 | | | |
| | 1103 | 371.8 | | 0.25 | | | | | 79 | 76 | | | |
| | 1113 | 374.20 | | | | | | | | | | | |
| | | | | | | | | | | | | | |
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| | | | | | | | | | | | | | |
| Average: | | | | | | | | | | | | | |

Comments:

C.1.8-8


Date of last revision 11/13/08

DS834034
Master Document Storage\Forms\Datasheets\Field Datasheets

Delta Air Quality Services, Incorporated

trap # 3277109969 Lot 6339

# WET CHEMICAL SAMPLING SYSTEM DATA AND WORKSHEET

CLIENT: Exxon Mobil
LOCATION: FCC / 2F-7 Stack
DATE: 6-27-11
RUN NO: 1- MEOH
OPERATOR: Dave Woodcock
METER BOX NO: 13-WCS
METER ΔH@: —
METER Yd: 1.002
SAMPLE CUSTODIAN DW

AMBIENT TEMPERATURE: 79
BAROMETRIC PRESSURE: 29.80
ASSUMED MOISTURE: — L
PRE-TEST LEAK RATE: : 0.000 CFM@ 25 in. Hg
POST-TEST LEAK RATE: : 0.000 CFM@ 25 in. Hg
TRAVERSE POINTS, MIN/POINT: 60
STACK AREA, FT$^2$: —
CHAIN OF CUSTODY: SAMPLE CUSTODIAN AA
SAMPLER DW

| Imp. # | Contents | Post-Test - Pre-Test = Difference | |
|---|---|---|---|
| 1 | HPLC-Grade H2O | — | |
| | | | |
| | | | |
| | | | |
| Total: | | | |

| Point | Time | Meter Volume, Ltr$^3$ | ΔP in. $H_2O$ | ΔH in. $H_2O$ | Stack Temp, °F | Probe Temp, °F | Filter Temp, °F | Imp. Out Temp, °F | Meter Temp, °C In | Meter Temp, °C Out | Vacuum in. Hg. | $O_2$ % | Pstatic in. $H_2O$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| High | 10:13 | 503.0 | | 0.24 | | | | | 73 | 72 | 3 | | |
| | 1023 | 505.7 | | 0.24 | | | | | 74 | 73 | | | |
| | 1033 | 508.5 | | 0.24 | | | | | 74 | 74 | | | |
| | 1043 | 511.25 | | 0.24 | | | | | 75 | 75 | | | |
| | 1053 | 514.0 | | 0.24 | | | | | 75 | 75 | | | |
| | 1103 | 516.7 | | | | | | | | | | | |
| | 1113 | 519.50 | | | | | | | | | | | |
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| Average: | | | | | | | | | | | | | |

Comments:

C.1.2-9


Date of last revision 11/13/08

DS834034
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Delta Air Quality Services, Incorporated

Spike trap # 6450

# WET CHEMICAL SAMPLING SYSTEM DATA AND WORKSHEET

CLIENT: Exxon Mobil
LOCATION: FCC / 2F-7 Stack
DATE: 6-27-11
RUN NO: 2-MeOH - Spiked
OPERATOR: Dave Wonderly
METER BOX NO: 13-P.M
METER ΔH@: —
METER Yd: 1.0 c 2
SAMPLE CUSTODIAN DW

AMBIENT TEMPERATURE: —
BAROMETRIC PRESSURE: 29.8°
ASSUMED MOISTURE: — ✓
PRE-TEST LEAK RATE: : 0.000 CFM@ 25 in. Hg
POST-TEST LEAK RATE: : 0.000 CFM@ 25 in. Hg
TRAVERSE POINTS, MIN/POINT: —
STACK AREA, FT$^2$: —
CHAIN OF CUSTODY: SAMPLE CUSTODIAN AA
SAMPLER DW

| Imp. # | Contents | Post-Test - Pre-Test = Difference | |
|---|---|---|---|
| 1 | HPLC-H2O | | |
| 2 | SG | | |
| | | | |
| | | | |
| Total: | | | |

| Point | Time | Meter Volume, Ltr$^3$ | ΔP in. $H_2O$ | ΔH in. $H_2O$ | Stack Temp, °F | Probe Temp, °F | Filter Temp, °F | Imp. Out Temp, °F | Meter Temp, °C In | Meter Temp, °C Out | Vacuum in. Hg. | $O_2$ % | Pstatic in. $H_2O$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1815 | 554.75 | | 0.24 | | | | | 73 | 71 | 3 | | |
| | 1825 | 557.3 | | 0.24 | | | | | 73 | 71 | 3 | | |
| | 1835 | 560.2 | | 0.24 | | | | | 74 | 72 | 3 | | |
| | 1845 | 562.8 | | 0.24 | | | | | 75 | 72 | 3 | | |
| | 1855 | 565.8 | | 0.24 | | | | | 75 | 71 | 3 | | |
| | 1905 | 568.4 | | 0.24 | | | | | 74 | 71 | 3 | | |
| | 1915 | 571.10 | | | | | | | | | | | |
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| Average: | | | | | | | | | | | | | |

Comments:

C.1.2-10



Date of last revision 11/13/08

DS834034
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Delta Air Quality Services, Incorporated

2-MeOH trap # 3457906374 Lot # 6811

# WET CHEMICAL SAMPLING SYSTEM DATA AND WORKSHEET

CLIENT: Exxon Mobil
LOCATION: FCC / 2F-7 Stack
DATE: 6-27-11
RUN NO: 2-MeOH
OPERATOR: Dave Windsor
METER BOX NO: 16-P-m
METER ΔH@: –
METER Yd: 1.0217
SAMPLE CUSTODIAN DW

AMBIENT TEMPERATURE: –
BAROMETRIC PRESSURE: 29.80
ASSUMED MOISTURE: – %
PRE-TEST LEAK RATE: : 0.000 CFM@ 25 in. Hg
POST-TEST LEAK RATE: : 0.000 CFM@ 25 in. Hg
TRAVERSE POINTS, MIN/POINT: –
STACK AREA, FT²: –
CHAIN OF CUSTODY: SAMPLE CUSTODIAN AA
SAMPLER DW

| Imp. # | Contents | Post-Test - Pre-Test = Difference | |
|---|---|---|---|
| 1 | HPLC-H2O | | |
| 2 | SG | | |
| | | | |
| | | | |
| Total: | | | |

| Point | Time | Meter Volume, Ltr³ | ΔP in. H2O | ΔH in. H2O | Stack Temp, °F | Probe Temp, °F | Filter Temp, °F | Imp. Out Temp, °F | Meter Temp, °C In | Meter Temp, °C Out | Vacuum in. Hg. | O2 % | Pstatic in. H2O |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1815 | 405.80 | | 0.30 | | | | | 77 | 75 | 3 | | |
| | 1825 | 408.2 | | 0.30 | | | | | 77 | 75 | 3 | | |
| | 1835 | 410.6 | | 0.30 | | | | | 76 | 75 | 3 | | |
| | 1845 | 413.0 | | 0.30 | | | | | 76 | 75 | 3 | | |
| | 1855 | 415.6 | | 0.30 | | | | | 76 | 74 | 3 | | |
| | 1905 | 417.9 | | 0.30 | | | | | 76 | 74 | 3 | | |
| | 1915 | 420.4 | | | | | | | | | | | |
| Average: | | | | | | | | | | | | | |

Comments:

6-27-11


Date of last revision 11/13/08

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Delta Air Quality Services, Incorporated

3-MeOH spiked trap # 6445

# WET CHEMICAL SAMPLING SYSTEM DATA AND WORKSHEET

CLIENT: Exxon Mobil
LOCATION: FCC / 2F-7 Stack
DATE: 6-28-11
RUN NO: 3-MeOH-Spiked
OPERATOR: Dave Wonderly
METER BOX NO: 13-P-M
METER ΔH@: —
METER Yd: 1.002
SAMPLE CUSTODIAN DW

AMBIENT TEMPERATURE: 70
BAROMETRIC PRESSURE: 29.77
ASSUMED MOISTURE: — %
PRE-TEST LEAK RATE: : 0.000 CFM@ 25 in. Hg
POST-TEST LEAK RATE: 0.000 CFM@ 25 in. Hg
TRAVERSE POINTS, MIN/POINT: —
STACK AREA, FT²: —
CHAIN OF CUSTODY: SAMPLE CUSTODIAN AA
SAMPLER DW

| Imp. # | Contents | Post-Test | Pre-Test | Difference |
|---|---|---|---|---|
| 1 | HNO3-H2O | | | |
| 2 | SG | | | |
| 3 | | | | |
| 4 | | | | |
| Total: | | | | |

| Point | Time | Meter Volume, Ltr³ | ΔP in. H2O | ΔH in. H2O | Stack Temp, °F | Probe Temp, °F | Filter Temp, °F | Imp. Out Temp, °F | Meter Temp, °C In | Meter Temp, °C Out | Vacuum in. Hg. | O2 % | Pstatic in. H2O |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Single | 805 | 571.6 | | 0.24 | | | | | 71 | 70 | 3 | | |
| | 815 | 574.4 | | 0.24 | | | | | 74 | 70 | 3 | | |
| | 825 | 577.1 | | 0.24 | | | | | 75 | 72 | 3 | | |
| | 835 | 579.8 | | 0.24 | | | | | 76 | 73 | 3 | | |
| | 845 | 582.7 | | 0.24 | | | | | 75 | 73 | 3 | | |
| | 855 | 585.4 | | | | | | | 75 | 74 | 3 | | |
| | 905 | 588.10 | | | | | | | | | | | |
| Average: | | | | | | | | | | | | | |

Comments: spiked field Blank trap # 6447 6-28-11 . 915

trip spike trap # 6449

7-1-12


Date of last revision 11/13/08

DS834034
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Delta Air Quality Services, Incorporated

3457906381

# WET CHEMICAL SAMPLING SYSTEM DATA AND WORKSHEET

CLIENT: Exxon Mobil
LOCATION: FCC / 2F-7 Stack
DATE: 6-28-14
RUN NO: 3-MeOH
OPERATOR: Dave Woodrey
METER BOX NO: 16-PM
METER ΔH@: –
METER Yd: 1.0217
SAMPLE CUSTODIAN DW

AMBIENT TEMPERATURE: 70
BAROMETRIC PRESSURE: 29.77
ASSUMED MOISTURE: – .2
PRE-TEST LEAK RATE: : 0.000 CFM@ 25 in. Hg
POST-TEST LEAK RATE: : 0.000 CFM@ 25 in. Hg
TRAVERSE POINTS, MIN/POINT: –
STACK AREA, FT$^2$: –
CHAIN OF CUSTODY: SAMPLE CUSTODIAN AA
SAMPLER DW

| Imp. # | Contents | Post-Test - Pre-Test = Difference | |
|---|---|---|---|
| 1 | HAc-H2O | | |
| 2 | SG | | |
| | | | |
| | | | |
| Total: | | | |

| Point | Time | Meter Volume, Ltr$^3$ | ΔP in. $H_2O$ | ΔH in. $H_2O$ | Stack Temp, °F | Probe Temp, °F | Filter Temp, °F | Imp. Out Temp, °F | Meter Temp, °C In | Meter Temp, °C Out | Vacuum in. Hg. | $O_2$ % | Pstatic in. $H_2O$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 805 | 420.80 | | 0.30 | | | | | 70 | 65 | 3 | | |
| | 815 | 423.3 | | 0.30 | | | | | 70 | 65 | 3 | | |
| | 825 | 425.6 | | 0.30 | | | | | 72 | 66 | 3 | | |
| | 835 | 428.1 | | 0.30 | | | | | 73 | 66 | 3 | | |
| | 845 | 430.7 | | 0.30 | | | | | 73 | 66 | 3 | | |
| | 855 | 433.0 | | 0.30 | | | | | 73 | 66 | 3 | | |
| | 905 | 435.40 | | | | | | | | | | | |
| Average: | | | | | | | | | | | | | |

Comments: Field Blank 6-28-11 915 trap # 3457906372
trip Blank 6-28-11 920 trap # 3457906378

C.1.2-13


Date of last revision 11/13/08

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**ExxonMobil**
**STACK $O_2$, $CO_2$ DATA**

**Test #:** **1-MeOH**
**Date:** **6/27/2011**
**Time:** **1013/1113**

| | $O_2$ | $CO_2$ | CO |
|---|---|---|---|
| Range | 10 | 20 | 250 |
| Cal Gas | 5.00 | 10.16 | 142 |
| Analyzer Zero | 0.03 | -0.06 | -1.91 |
| Analyzer Span | 5.04 | 10.02 | 142.11 |
| Pre-Bias Zero | 0.04 | -0.03 | -2.67 |
| Pre-Bias Span | 5.09 | 10.03 | 143.88 |
| Post-Bias Zero | 0.05 | 0.02 | -0.13 |
| Post-Bias Span | 4.98 | 9.74 | 143.47 |
| Pre-test zero bias | 0.1% | 0.2% | -0.3% |
| Pre-test span bias | 0.6% | 0.0% | 0.7% |
| Post-test zero bias | 0.2% | 0.4% | 0.7% |
| Post-test span bias | -0.5% | -1.4% | 0.5% |
| Zero Drift | 0.0% | 0.2% | 1.0% |
| Span Drift | -1.1% | -1.5% | -0.2% |
| | PASS | PASS | PASS |
| **Average** | **5.22** | **13.83** | **79.36** |
| **Cal Corrected** | **5.19** | **14.21** | **79.05** |

**ExxonMobil**
**1-MeOH**

| Date | Time | O2 % | CO2 % | CO ppm |
|---|---|---|---|---|
| 6/27/2011 | 10:14:00 AM | 5.286 | 13.483 | 75.504 |
| 6/27/2011 | 10:15:00 AM | 5.447 | 14.184 | 78.671 |
| 6/27/2011 | 10:16:00 AM | 5.746 | 14.793 | 81.669 |
| 6/27/2011 | 10:17:00 AM | 5.797 | 14.895 | 80.688 |
| 6/27/2011 | 10:18:00 AM | 5.778 | 14.827 | 81.975 |
| 6/27/2011 | 10:19:00 AM | 5.778 | 14.951 | 82.461 |
| 6/27/2011 | 10:20:00 AM | 5.774 | 14.967 | 81.222 |
| 6/27/2011 | 10:21:00 AM | 5.653 | 14.741 | 80.001 |
| 6/27/2011 | 10:22:00 AM | 5.577 | 14.787 | 80.94 |
| 6/27/2011 | 10:23:00 AM | 5.552 | 14.784 | 81.585 |
| 6/27/2011 | 10:24:00 AM | 5.515 | 14.616 | 81.142 |
| 6/27/2011 | 10:25:00 AM | 5.471 | 14.552 | 81.058 |
| 6/27/2011 | 10:26:00 AM | 5.405 | 14.547 | 82.083 |
| 6/27/2011 | 10:27:00 AM | 5.142 | 13.792 | 76.758 |
| 6/27/2011 | 10:28:00 AM | 5.065 | 13.633 | 75.386 |
| 6/27/2011 | 10:29:00 AM | 5.063 | 13.602 | 75.831 |
| 6/27/2011 | 10:30:00 AM | 5.021 | 13.625 | 75.765 |
| 6/27/2011 | 10:31:00 AM | 5.019 | 13.635 | 76.809 |
| 6/27/2011 | 10:32:00 AM | 5.052 | 13.601 | 76.454 |
| 6/27/2011 | 10:33:00 AM | 5.051 | 13.597 | 75.838 |
| 6/27/2011 | 10:34:00 AM | 5.106 | 13.54 | 75.818 |
| 6/27/2011 | 10:35:00 AM | 5.096 | 13.534 | 75.632 |
| 6/27/2011 | 10:36:00 AM | 5.094 | 13.526 | 77.589 |
| 6/27/2011 | 10:37:00 AM | 5.059 | 13.566 | 78.435 |
| 6/27/2011 | 10:38:00 AM | 5.137 | 13.499 | 76.673 |
| 6/27/2011 | 10:39:00 AM | 5.131 | 13.498 | 75.64 |
| 6/27/2011 | 10:40:00 AM | 5.114 | 13.503 | 75.98 |
| 6/27/2011 | 10:41:00 AM | 5.125 | 13.506 | 76.198 |
| 6/27/2011 | 10:42:00 AM | 5.133 | 13.501 | 77.353 |
| 6/27/2011 | 10:43:00 AM | 5.107 | 13.549 | 76.981 |
| 6/27/2011 | 10:44:00 AM | 5.067 | 13.609 | 79.338 |
| 6/27/2011 | 10:45:00 AM | 5.136 | 13.545 | 79.075 |
| 6/27/2011 | 10:46:00 AM | 5.174 | 13.518 | 77.68 |
| 6/27/2011 | 10:47:00 AM | 5.137 | 13.55 | 77.429 |
| 6/27/2011 | 10:48:00 AM | 5.09 | 13.569 | 77.936 |
| 6/27/2011 | 10:49:00 AM | 5.28 | 14.051 | 80.307 |
| 6/27/2011 | 10:50:00 AM | 5.317 | 14.245 | 82.265 |
| 6/27/2011 | 10:51:00 AM | 5.33 | 14.243 | 85.513 |
| 6/27/2011 | 10:52:00 AM | 5.355 | 14.226 | 85.737 |
| 6/27/2011 | 10:53:00 AM | 5.21 | 13.836 | 82.57 |
| 6/27/2011 | 10:54:00 AM | 5.163 | 13.716 | 83.035 |
| 6/27/2011 | 10:55:00 AM | 5.191 | 13.619 | 81.043 |
| 6/27/2011 | 10:56:00 AM | 5.147 | 13.451 | 78.09 |
| 6/27/2011 | 10:57:00 AM | 5.122 | 13.465 | 78.712 |
| 6/27/2011 | 10:58:00 AM | 5.097 | 13.482 | 81.102 |
| 6/27/2011 | 10:59:00 AM | 5.112 | 13.466 | 78.788 |
| 6/27/2011 | 11:00:00 AM | 5.097 | 13.512 | 79.145 |

| | | | | |
|---|---|---|---|---|
| 6/27/2011 | 11:01:00 AM | 5.155 | 13.459 | 79.526 |
| 6/27/2011 | 11:02:00 AM | 5.163 | 13.469 | 79.529 |
| 6/27/2011 | 11:03:00 AM | 5.131 | 13.41 | 79.584 |
| 6/27/2011 | 11:04:00 AM | 5.082 | 13.517 | 80.094 |
| 6/27/2011 | 11:05:00 AM | 5.049 | 13.538 | 82.05 |
| 6/27/2011 | 11:06:00 AM | 5.075 | 13.52 | 80.696 |
| 6/27/2011 | 11:07:00 AM | 5.096 | 13.674 | 80.905 |
| 6/27/2011 | 11:08:00 AM | 5.088 | 13.634 | 81.152 |
| 6/27/2011 | 11:09:00 AM | 5.016 | 13.54 | 81.423 |
| 6/27/2011 | 11:10:00 AM | 5.03 | 13.529 | 81.407 |
| 6/27/2011 | 11:11:00 AM | 5.047 | 13.517 | 80.01 |
| 6/27/2011 | 11:12:00 AM | 5.105 | 13.46 | 79.661 |
| 6/27/2011 | 11:13:00 AM | 5.126 | 13.434 | 79.691 |
| | Average | 5.22 | 13.83 | 79.36 |

**ExxonMobil**
**STACK $O_2$, $CO_2$ DATA**

**Test #:** **2-MeOH**
**Date:** **6/27/2011**
**Time:** **1815/1915**

| | $O_2$ | $CO_2$ | CO |
|---|---|---|---|
| Range | 10 | 20 | 250 |
| Cal Gas | 5.00 | 10.16 | 142 |
| Analyzer Zero | 0.03 | -0.06 | -1.91 |
| Analyzer Span | 5.04 | 10.02 | 142.11 |
| Pre-Bias Zero | 0.05 | 0.02 | -0.07 |
| Pre-Bias Span | 4.97 | 9.72 | 142.88 |
| Post-Bias Zero | 0.05 | 0.01 | 0.02 |
| Post-Bias Span | 4.96 | 9.67 | 143.86 |
| Pre-test zero bias | 0.2% | 0.4% | 0.7% |
| Pre-test span bias | -0.7% | -1.5% | 0.3% |
| Post-test zero bias | 0.2% | 0.3% | 0.8% |
| Post-test span bias | -0.7% | -1.8% | 0.7% |
| Zero Drift | 0.0% | 0.0% | 0.0% |
| Span Drift | 0.0% | -0.3% | 0.4% |
| | PASS | PASS | PASS |
| **Average** | **4.97** | **13.49** | **76.12** |
| **Cal Corrected** | **5.00** | **14.14** | **75.41** |

**ExxonMobil**
**2-MeOH**

| Date | Time | O2 % | CO2 % | CO ppm |
|---|---|---|---|---|
| 6/27/2011 | 6:16:00 PM | 5.04 | 13.435 | 76.258 |
| 6/27/2011 | 6:17:00 PM | 4.999 | 13.46 | 76.175 |
| 6/27/2011 | 6:18:00 PM | 5.003 | 13.458 | 77.365 |
| 6/27/2011 | 6:19:00 PM | 5.008 | 13.474 | 78.776 |
| 6/27/2011 | 6:20:00 PM | 4.996 | 13.467 | 79.774 |
| 6/27/2011 | 6:21:00 PM | 4.97 | 13.491 | 77.311 |
| 6/27/2011 | 6:22:00 PM | 5.005 | 13.459 | 77.923 |
| 6/27/2011 | 6:23:00 PM | 4.932 | 13.521 | 78.367 |
| 6/27/2011 | 6:24:00 PM | 4.946 | 13.521 | 79.843 |
| 6/27/2011 | 6:25:00 PM | 4.961 | 13.525 | 80.278 |
| 6/27/2011 | 6:26:00 PM | 4.941 | 13.531 | 80.875 |
| 6/27/2011 | 6:27:00 PM | 4.961 | 13.475 | 80.885 |
| 6/27/2011 | 6:28:00 PM | 4.991 | 13.476 | 79.688 |
| 6/27/2011 | 6:29:00 PM | 5 | 13.475 | 77.382 |
| 6/27/2011 | 6:30:00 PM | 5.024 | 13.461 | 55.114 |
| 6/27/2011 | 6:31:00 PM | 5 | 13.484 | 47.527 |
| 6/27/2011 | 6:32:00 PM | 5.013 | 13.466 | 47.355 |
| 6/27/2011 | 6:33:00 PM | 4.977 | 13.5 | 63.947 |
| 6/27/2011 | 6:34:00 PM | 4.98 | 13.5 | 73.489 |
| 6/27/2011 | 6:35:00 PM | 4.982 | 13.489 | 76.016 |
| 6/27/2011 | 6:36:00 PM | 4.969 | 13.503 | 78.045 |
| 6/27/2011 | 6:37:00 PM | 4.998 | 13.473 | 78.553 |
| 6/27/2011 | 6:38:00 PM | 4.984 | 13.487 | 79.072 |
| 6/27/2011 | 6:39:00 PM | 4.995 | 13.468 | 78.293 |
| 6/27/2011 | 6:40:00 PM | 4.926 | 13.526 | 79.395 |
| 6/27/2011 | 6:41:00 PM | 5.002 | 13.466 | 79.607 |
| 6/27/2011 | 6:42:00 PM | 5.019 | 13.438 | 78.132 |
| 6/27/2011 | 6:43:00 PM | 4.976 | 13.476 | 78.179 |
| 6/27/2011 | 6:44:00 PM | 4.945 | 13.524 | 78.165 |
| 6/27/2011 | 6:45:00 PM | 4.963 | 13.502 | 75.401 |
| 6/27/2011 | 6:46:00 PM | 4.989 | 13.467 | 63.921 |
| 6/27/2011 | 6:47:00 PM | 4.932 | 13.53 | 61.671 |
| 6/27/2011 | 6:48:00 PM | 4.93 | 13.531 | 66.925 |
| 6/27/2011 | 6:49:00 PM | 4.851 | 13.575 | 76.753 |
| 6/27/2011 | 6:50:00 PM | 4.839 | 13.607 | 79.61 |
| 6/27/2011 | 6:51:00 PM | 4.829 | 13.612 | 80.049 |
| 6/27/2011 | 6:52:00 PM | 4.815 | 13.629 | 82.477 |
| 6/27/2011 | 6:53:00 PM | 4.871 | 13.585 | 79.76 |
| 6/27/2011 | 6:54:00 PM | 4.882 | 13.577 | 78.702 |
| 6/27/2011 | 6:55:00 PM | 4.921 | 13.533 | 79.129 |
| 6/27/2011 | 6:56:00 PM | 4.957 | 13.501 | 78.796 |
| 6/27/2011 | 6:57:00 PM | 4.953 | 13.504 | 77.875 |
| 6/27/2011 | 6:58:00 PM | 4.966 | 13.498 | 78.609 |
| 6/27/2011 | 6:59:00 PM | 4.985 | 13.488 | 78.187 |
| 6/27/2011 | 7:00:00 PM | 4.984 | 13.483 | 76.782 |
| 6/27/2011 | 7:01:00 PM | 4.916 | 13.533 | 79.416 |
| 6/27/2011 | 7:02:00 PM | 4.915 | 13.537 | 79.516 |

| | | | | |
|---|---|---|---|---|
| 6/27/2011 | 7:03:00 PM | 4.89 | 13.567 | 79.638 |
| 6/27/2011 | 7:04:00 PM | 4.966 | 13.498 | 79.024 |
| 6/27/2011 | 7:05:00 PM | 5.039 | 13.421 | 77.236 |
| 6/27/2011 | 7:06:00 PM | 5.012 | 13.444 | 76.147 |
| 6/27/2011 | 7:07:00 PM | 5.047 | 13.422 | 77.118 |
| 6/27/2011 | 7:08:00 PM | 4.983 | 13.478 | 80.592 |
| 6/27/2011 | 7:09:00 PM | 4.953 | 13.484 | 82.002 |
| 6/27/2011 | 7:10:00 PM | 4.987 | 13.463 | 78.527 |
| 6/27/2011 | 7:11:00 PM | 5.013 | 13.443 | 78.13 |
| 6/27/2011 | 7:12:00 PM | 5.027 | 13.427 | 78.569 |
| 6/27/2011 | 7:13:00 PM | 5.033 | 13.407 | 77.216 |
| 6/27/2011 | 7:14:00 PM | 5.014 | 13.436 | 79.97 |
| 6/27/2011 | 7:15:00 PM | 5.088 | 13.371 | 77.899 |
| | Average | 4.97 | 13.49 | 76.12 |

**ExxonMobil**
**STACK $O_2$, $CO_2$ DATA**

**Test #:** **3-MeOH**
**Date:** **6/28/2011**
**Time:** **805/905**

| | $O_2$ | $CO_2$ | CO |
|---|---|---|---|
| Range | 10 | 20 | 250 |
| Cal Gas | 5.00 | 10.16 | 142 |
| Analyzer Zero | 0.05 | 0.00 | 0.49 |
| Analyzer Span | 4.98 | 9.97 | 144.14 |
| Pre-Bias Zero | 0.04 | 0.01 | -0.11 |
| Pre-Bias Span | 4.97 | 9.91 | 143.37 |
| Post-Bias Zero | 0.04 | 0.02 | -0.16 |
| Post-Bias Span | 5.01 | 9.97 | 145.30 |
| Pre-test zero bias | -0.1% | 0.1% | -0.2% |
| Pre-test span bias | -0.2% | -0.3% | -0.3% |
| Post-test zero bias | -0.1% | 0.1% | -0.3% |
| Post-test span bias | 0.2% | 0.0% | 0.5% |
| Zero Drift | 0.0% | 0.0% | 0.0% |
| Span Drift | 0.4% | 0.3% | 0.8% |
| | PASS | PASS | PASS |
| **Average** | **4.94** | **13.88** | **75.37** |
| **Cal Corrected** | **4.96** | **14.20** | **74.21** |

**ExxonMobil**
**3-MeOH**

| Date | Time | O2 % | CO2 % | CO ppm |
|---|---|---|---|---|
| 6/28/2011 | 8:06:00 AM | 5.051 | 13.669 | 71.628 |
| 6/28/2011 | 8:07:00 AM | 5.032 | 13.713 | 71.203 |
| 6/28/2011 | 8:08:00 AM | 5.044 | 13.687 | 71.194 |
| 6/28/2011 | 8:09:00 AM | 5.051 | 13.679 | 70.82 |
| 6/28/2011 | 8:10:00 AM | 5.014 | 13.698 | 72.345 |
| 6/28/2011 | 8:11:00 AM | 5.027 | 13.697 | 71.94 |
| 6/28/2011 | 8:12:00 AM | 5.043 | 13.673 | 70.624 |
| 6/28/2011 | 8:13:00 AM | 5.086 | 13.636 | 69.474 |
| 6/28/2011 | 8:14:00 AM | 5.037 | 13.665 | 68.64 |
| 6/28/2011 | 8:15:00 AM | 5.007 | 13.694 | 68.026 |
| 6/28/2011 | 8:16:00 AM | 4.946 | 13.737 | 69.047 |
| 6/28/2011 | 8:17:00 AM | 4.922 | 13.757 | 70.306 |
| 6/28/2011 | 8:18:00 AM | 4.902 | 13.767 | 69.851 |
| 6/28/2011 | 8:19:00 AM | 4.864 | 13.811 | 71.478 |
| 6/28/2011 | 8:20:00 AM | 4.815 | 13.854 | 77.851 |
| 6/28/2011 | 8:21:00 AM | 4.815 | 13.858 | 77.289 |
| 6/28/2011 | 8:22:00 AM | 4.783 | 13.891 | 75.576 |
| 6/28/2011 | 8:23:00 AM | 4.788 | 13.91 | 77.633 |
| 6/28/2011 | 8:24:00 AM | 4.834 | 13.943 | 92.726 |
| 6/28/2011 | 8:25:00 AM | 4.909 | 13.856 | 77.453 |
| 6/28/2011 | 8:26:00 AM | 4.888 | 13.875 | 72.463 |
| 6/28/2011 | 8:27:00 AM | 4.924 | 13.85 | 70.936 |
| 6/28/2011 | 8:28:00 AM | 4.902 | 13.872 | 70.943 |
| 6/28/2011 | 8:29:00 AM | 4.884 | 13.899 | 70.677 |
| 6/28/2011 | 8:30:00 AM | 4.853 | 13.965 | 73.505 |
| 6/28/2011 | 8:31:00 AM | 4.828 | 14.003 | 86.819 |
| 6/28/2011 | 8:32:00 AM | 4.864 | 14.002 | 80.64 |
| 6/28/2011 | 8:33:00 AM | 4.917 | 14.001 | 74.159 |
| 6/28/2011 | 8:34:00 AM | 4.845 | 13.879 | 71.797 |
| 6/28/2011 | 8:35:00 AM | 4.793 | 13.905 | 79.165 |
| 6/28/2011 | 8:36:00 AM | 4.847 | 13.859 | 77.178 |
| 6/28/2011 | 8:37:00 AM | 4.841 | 13.854 | 75.164 |
| 6/28/2011 | 8:38:00 AM | 4.801 | 13.841 | 77.808 |
| 6/28/2011 | 8:39:00 AM | 4.872 | 13.838 | 76.078 |
| 6/28/2011 | 8:40:00 AM | 4.898 | 13.827 | 72.616 |
| 6/28/2011 | 8:41:00 AM | 4.879 | 13.839 | 72.007 |
| 6/28/2011 | 8:42:00 AM | 4.894 | 13.846 | 71.533 |
| 6/28/2011 | 8:43:00 AM | 4.929 | 13.844 | 70.561 |
| 6/28/2011 | 8:44:00 AM | 4.914 | 13.866 | 71.005 |
| 6/28/2011 | 8:45:00 AM | 4.933 | 13.849 | 72.212 |
| 6/28/2011 | 8:46:00 AM | 4.98 | 13.805 | 69.617 |
| 6/28/2011 | 8:47:00 AM | 5.006 | 13.786 | 68.507 |
| 6/28/2011 | 8:48:00 AM | 5.02 | 13.769 | 67.854 |
| 6/28/2011 | 8:49:00 AM | 5.121 | 14.213 | 70.761 |
| 6/28/2011 | 8:50:00 AM | 5.375 | 14.906 | 75.464 |
| 6/28/2011 | 8:51:00 AM | 5.586 | 15.353 | 76.963 |
| 6/28/2011 | 8:52:00 AM | 4.982 | 13.98 | 71.528 |

| | | | | |
|---|---|---|---|---|
| 6/28/2011 | 8:53:00 AM | 4.931 | 13.84 | 70.322 |
| 6/28/2011 | 8:54:00 AM | 4.96 | 13.822 | 70.618 |
| 6/28/2011 | 8:55:00 AM | 4.929 | 13.842 | 70.884 |
| 6/28/2011 | 8:56:00 AM | 4.911 | 13.853 | 72.201 |
| 6/28/2011 | 8:57:00 AM | 4.878 | 13.904 | 101.265 |
| 6/28/2011 | 8:58:00 AM | 4.887 | 13.908 | 104.816 |
| 6/28/2011 | 8:59:00 AM | 4.898 | 13.91 | 91.678 |
| 6/28/2011 | 9:00:00 AM | 4.899 | 13.897 | 77.005 |
| 6/28/2011 | 9:01:00 AM | 4.917 | 13.871 | 72.879 |
| 6/28/2011 | 9:02:00 AM | 4.927 | 13.869 | 71.157 |
| 6/28/2011 | 9:03:00 AM | 4.901 | 13.895 | 90.25 |
| 6/28/2011 | 9:04:00 AM | 4.985 | 13.847 | 101.332 |
| 6/28/2011 | 9:05:00 AM | 5.01 | 13.783 | 74.739 |
| | Average | 4.94 | 13.88 | 75.37 |

ALS Environmental
5420 Mainway Drive, Unit 5, Burlington ON, L7L 6A4
Phone: 905-331-3111, FAX: 905-331-4567

SCC Accredited Lab ID# 1003-15/779 Ont DW License #: 2285
NELAC Primary Accreditation, NJ DEP ID# CANA003; Secondary Accreditation, TX Cert# T104704433-08-TX

# Certificate of Analysis

**ALS Project Contact:** Ron McLeod
**ALS Project ID:** DEL100
**ALS WO#:** L1026392
**Date of Report** 8-Aug-11
**Date of Sample Receipt** 30-Jun-11

**Client Name:** Delta Air Quality Services, Inc
**Client Address:** 1845 North Case Street
Orange CA 92865-4234

**Client Contact:** Arlene Bell
**Client Project ID:** ICR 2F-7

**COMMENTS:** **Methanol via Method 18 - Silica Gel Tubes and Condenstates**
**Analysis via GC/FID - Direct Aqueous Injection**

This analysis was performed at the ALS Edmonton facility.

**Summary of the Method:**
Silica gel sorbant material was extracted with water. Aqueous samples and extracts were analyzed by direct aqueous injection GC/FID
All analyses were in triplicate. The data as reported are an average of the triplicate injections.
The amount spiked into each of the spiked traps was determined by weight difference between before and after spiking with methanol.
Each methanol spike was added to the front half portion of the traps.

Certified by: _____
Ron McLeod, Ph.D.
General Manager and Technical Director

Results in this certificate relate only to the samples as submitted to the laboratory.
This report shall not be reproduced, except in full, without the written permission of ALS Canada Ltd.

# ALS Environmental

## Sample Analysis Summary Report

| Sample Name | 1-MEOH SG TUBE# 3277109969 | 2-MEOH SG TUBE# 3457906374 | 3-MEOH SG TUBE# 3457906381 | MEOH-FB SG TUBE# 3457906372 | MEOH TRIP BLANK SG TUBE# 3457906378 | Laboratory Method Blank | Laboratory Control Sample | Laboratory Control Sample Duplicate |
|---|---|---|---|---|---|---|---|---|
| ALS Sample ID | L1026392-1 | L1026392-5 | L1026392-9 | L1026392-13 | L1026392-17 | WG1314941-2 | WG1314941-3 | WG1314941-4 |
| Matrix | STACK | STACK | STACK | STACK | STACK | QC | QC | QC |
| Sampling Date | 27-Jun-11 | 27-Jun-11 | 28-Jun-11 | 28-Jun-11 | 28-Jun-11 | n/a | n/a | n/a |
| Analysis Date | 21-Jul-11 | 21-Jul-11 | 21-Jul-11 | 21-Jul-11 | 21-Jul-11 | 21-Jul-11 | 21-Jul-11 | 21-Jul-11 |
| **Target Analytes** | **ug** | **ug** | **ug** | **ug** | **ug** | **ug** | **% Rec** | **% Rec** |
| Methanol Front Half | <5 | <5 | <5 | <5 | <5 | <5 | - | - |
| Methanol Back Half | <5 | <5 | <5 | <5 | <5 | <5 | - | - |
| Methanol (per Cartridge Total) | <10 | <10 | <10 | <10 | <10 | <10 | 95 | 94 |

C.1.2-24

# ALS Environmental

## Sample Analysis Summary Report

| ALS Sample ID | Client ID | Sample Volume (mL) | Results (ug/mL) | Results (total mg) |
|---|---|---|---|---|
| L1026392-2 | 1-MEOH CONDENSATE | 9.15 | <5 | <0.05 |
| L1026392-4 | 1-MEOH SPIKED CONDENSATE | 8.15 | <5 | <0.05 |
| L1026392-6 | 2-MEOH CONDENSATE | 10.25 | <5 | <0.05 |
| L1026392-8 | 2-MEOH SPIKED CONDENSATE | 11.1 | <5 | <0.05 |
| L1026392-10 | 3-MEOH CONDENSATE | 10.3 | <5 | <0.05 |
| L1026392-12 | 3-MEOH SPIKED CONDENSATE | 10.0 | <5 | <0.05 |
| L1026392-14 | MEOH-FB CONDENSATE | 10.95 | <5 | <0.05 |
| L1026392-16 | MEOH-FB SPIKED CONDENSATE | 11.05 | <5 | <0.05 |
| L1026392-19 | MEOH H2O BLANK 10ML LOT# 104187 | 9.7 | <5 | <0.05 |
| Laboratory Method Blank | Laboratory Method Blank | 10.0 | <5 | <0.05 |
| **Matrix Spike Data** | | | **% Rec** | **% Rec** |
| L1026392-6 MS | Sample Matrix Spike | - | 79 | 79 |
| L1026392-6 MSD | Sample Matrix Spike Duplicate | - | 89 | 89 |
| L1026392-14 MS | Sample Matrix Spike | - | 89 | 89 |
| L1026392-14 MSD | Sample Matrix Spike Duplicate | - | 75 | 75 |

# ALS Environmental

## Sample Analysis Summary Report

| Sample Name | 1-MEOH-SPIKED SG TUBE# 6688 | 2-MEOH-SPIKED SG TUBE# 6450 | 3-MEOH SPIKED SG TUBE# 6445 | MEOH-FB SPIKED SG TUBE# 6447 | MEOH TRIP BLANK SPIKED SG TUBE# 6449 |
|---|---|---|---|---|---|
| ALS Sample ID | L1026392-3 | L1026392-7 | L1026392-11 | L1026392-15 | L1026392-18 |
| Matrix | STACK | STACK | STACK | STACK | STACK |
| Sampling Date | 27-Jun-11 | 27-Jun-11 | 28-Jun-11 | 28-Jun-11 | 28-Jun-11 |
| Analysis Date | 21-Jul-11 | 21-Jul-11 | 21-Jul-11 | 21-Jul-11 | 21-Jul-11 |
| **Target Analytes - Observed** | **ug** | **ug** | **ug** | **ug** | **ug** |
| Methanol Front Half | 30.7 | 391 | 565 | 868 | 752 |
| Methanol Back Half | 20.3 | 324 | 374 | 15.7 | 56.1 |
| Methanol (per Cartridge Total) | 51.0 | 715 | 939 | 884 | 808 |
| **Target Analytes - Amount Spiked** | **ug** | **ug** | **ug** | **ug** | **ug** |
| Methanol (per Cartridge Total) | 990 | 1441 | 1204 | 1307 | 1132 |
| **Total per Cartridge Spike Recoveries** | **% Rec** | **% Rec** | **% Rec** | **% Rec** | **% Rec** |
| Recovery Relative to Design | 5.2 | 50 | 78 | 68 | 71 |
| Recovery Relative to Trip Blank (L1026392-18) | 7.2 | 70 | 109 | 95 | 100 |

AVERAGE SEMI VOLATILES EMISSIONS

CLIENT: ExxonMobil

| NAME | ug/dscm | | ug/dscm at 7% O2 | | ug/dscf | | lb/hr | |
|---|---|---|---|---|---|---|---|---|
| Aniline | ND < | 0.40392 | ND < | 0.35397 | ND < | 1.14E-02 | ND < | 3.60E-04 |
| Phenol | ND < | 1.39714 | ND < | 1.22539 | ND < | 3.96E-02 | ND < | 1.26E-03 |
| 2-Methylphenol (o-Cresol) | ND < | 0.45850 | ND < | 0.40180 | ND < | 1.30E-02 | ND < | 4.09E-04 |
| 4-Methylphenol & 3-Methylphenol (p,m-Cresol) | ND < | 1.23358 | ND < | 1.08104 | ND < | 3.49E-02 | ND < | 1.10E-03 |
| o-Toluidine | ND < | 1.09167 | ND < | 0.95667 | ND < | 3.09E-02 | ND < | 9.74E-04 |
| Isophorone | ND < | 0.49125 | ND < | 0.43050 | ND < | 1.39E-02 | ND < | 4.38E-04 |
| 2,4-Dimethylphenol | ND < | 0.56767 | ND < | 0.49747 | ND < | 1.61E-02 | ND < | 5.07E-04 |
| Dibenzofuran | ND < | 0.50217 | ND < | 0.44007 | ND < | 1.42E-02 | ND < | 4.48E-04 |
| a,a-Dimethylphenethylamine | ND < | 2.62000 | ND < | 2.29602 | ND < | 7.42E-02 | ND < | 2.34E-03 |
| 1,4-Phenylenediamine | ND < | 3.93000 | ND < | 3.44402 | ND < | 1.11E-01 | ND < | 3.51E-03 |
| Benzidine | ND < | 8.29667 | ND < | 7.27072 | ND < | 2.35E-01 | ND < | 7.40E-03 |
| Dimethylaminobenzene | ND < | 0.43667 | ND < | 0.38267 | ND < | 1.24E-02 | ND < | 3.90E-04 |
| 3,3'-Dimethylbenzidine | ND < | 6.33167 | ND < | 5.54871 | ND < | 1.79E-01 | ND < | 5.65E-03 |
| 3,3'-Dimethoxybenzidine | ND < | 6.33167 | ND < | 5.54871 | ND < | 1.79E-01 | ND < | 5.65E-03 |
| Naphthalene | | 0.18110 | | 0.15872 | | 5.13E-03 | | 1.62E-04 |
| 2-Methylnaphthalene | | 0.06881 | | 0.06032 | | 1.95E-03 | | 6.16E-05 |
| Acenaphthylene | < | 0.00992 | < | 0.00870 | < | 2.81E-04 | < | 8.95E-06 |
| Acenaphthene | ND < | 0.00212 | ND < | 0.00186 | ND < | 6.00E-05 | ND < | 1.92E-06 |
| Fluorene | < | 0.00542 | < | 0.00475 | < | 1.54E-04 | < | 4.87E-06 |
| Phenanthrene | | 0.04722 | | 0.04140 | | 1.34E-03 | | 4.23E-05 |
| Anthracene | | 0.00193 | | 0.00169 | | 5.46E-05 | | 1.72E-06 |
| Fluoranthene | | 0.00748 | | 0.00656 | | 2.12E-04 | | 6.72E-06 |
| Pyrene | | 0.00763 | | 0.00669 | | 2.16E-04 | | 6.83E-06 |
| Benzo(a)anthracene | ND < | 0.00087 | ND < | 0.00077 | ND < | 2.47E-05 | ND < | 7.79E-07 |
| Chrysene | | 0.00190 | | 0.00167 | | 5.38E-05 | | 1.70E-06 |
| Benzo(b)flouranthene | ND < | 0.00087 | ND < | 0.00077 | ND < | 2.47E-05 | ND < | 7.79E-07 |
| Benzo(k)fluoranthene | ND < | 0.00087 | ND < | 0.00077 | ND < | 2.47E-05 | ND < | 7.79E-07 |
| Benzo(e)pyrene | ND < | 0.00087 | ND < | 0.00077 | ND < | 2.47E-05 | ND < | 7.79E-07 |
| Benzo(a)pyrene | ND < | 0.00087 | ND < | 0.00077 | ND < | 2.47E-05 | ND < | 7.79E-07 |
| Perylene | ND < | 0.00087 | ND < | 0.00077 | ND < | 2.47E-05 | ND < | 7.79E-07 |
| Indeno(1,2,3-cd)pyrene | ND < | 0.00087 | ND < | 0.00077 | ND < | 2.47E-05 | ND < | 7.79E-07 |
| Dibenzo(a,h/a,c)anthracene | ND < | 0.00087 | ND < | 0.00077 | ND < | 2.47E-05 | ND < | 7.79E-07 |
| Benzo(g,h,i)perylene | | 0.00170 | | 0.00149 | | 4.83E-05 | | 1.52E-06 |
| 2-Chloronaphthalene (additional) | ND < | 0.00087 | ND < | 0.00077 | ND < | 2.47E-05 | ND < | 7.79E-07 |
| Biphenyl | | 0.24723 | | 0.21635 | | 7.00E-03 | | 2.18E-04 |
| 7,12-Dimethylbenzo(a)anthracene | ND < | 0.00087 | ND < | 0.00077 | ND < | 2.47E-05 | ND < | 7.79E-07 |
| 3-Methylcholanthrene | ND < | 0.00087 | ND < | 0.00077 | ND < | 2.47E-05 | ND < | 7.79E-07 |
| Dibenzo(a,e)pyrene | ND < | 0.00087 | ND < | 0.00077 | ND < | 2.47E-05 | ND < | 7.79E-07 |

SEMI VOLATILES CALCULATIONS

| | | | |
|---|---|---|---|
| CLIENT: | ExxonMobil | | AA |
| TEST NUMBER: | 1-SV | VMSTD(DSCF): | 161.8538 |
| TEST DATE: | 6/27/2011 | QSD(DSCF/MIN): | 240582 |
| T REF (F) | 68 | CO2,%: | 13.98 |
| | | O2,%: | 5.05 |

| NAME | | ug/train | | ug/dscm | | ug/dscm at 7% O2 | | ug/dscf | | lb/hr |
|---|---|---|---|---|---|---|---|---|---|---|
| Aniline | ND < | 1.85 | ND < | 0.40360 | ND < | 0.35405 | ND < | 1.14E-02 | ND < | 3.63E-04 |
| Phenol | ND < | 13.4 | ND < | 2.92334 | ND < | 2.56449 | ND < | 8.28E-02 | ND < | 2.63E-03 |
| 2-Methylphenol (o-Cresol) | ND < | 2.1 | ND < | 0.45814 | ND < | 0.40190 | ND < | 1.30E-02 | ND < | 4.13E-04 |
| 4-Methylphenol & 3-Methylphenol (p,m-Cresol) | ND < | 5.65 | ND < | 1.23260 | ND < | 1.08130 | ND < | 3.49E-02 | ND < | 1.11E-03 |
| o-Toluidine | ND < | 5 | ND < | 1.09080 | ND < | 0.95690 | ND < | 3.09E-02 | ND < | 9.82E-04 |
| Isophorone | ND < | 2.25 | ND < | 0.49086 | ND < | 0.43060 | ND < | 1.39E-02 | ND < | 4.42E-04 |
| 2,4-Dimethylphenol | ND < | 2.6 | ND < | 0.56722 | ND < | 0.49759 | ND < | 1.61E-02 | ND < | 5.11E-04 |
| Dibenzofuran | ND < | 2.3 | ND < | 0.50177 | ND < | 0.44017 | ND < | 1.42E-02 | ND < | 4.52E-04 |
| a,a-Dimethylphenethylamine | ND < | 12 | ND < | 2.61792 | ND < | 2.29656 | ND < | 7.41E-02 | ND < | 2.36E-03 |
| 1,4-Phenylenediamine | ND < | 18 | ND < | 3.92688 | ND < | 3.44484 | ND < | 1.11E-01 | ND < | 3.54E-03 |
| Benzidine | ND < | 38 | ND < | 8.29007 | ND < | 7.27243 | ND < | 2.35E-01 | ND < | 7.47E-03 |
| Dimethylaminobenzene | ND < | 2.0 | ND < | 0.43632 | ND < | 0.38276 | ND < | 1.24E-02 | ND < | 3.93E-04 |
| 3,3'-Dimethylbenzidine | ND < | 29 | ND < | 6.32664 | ND < | 5.55001 | ND < | 1.79E-01 | ND < | 5.70E-03 |
| 3,3'-Dimethoxybenzidine | ND < | 29 | ND < | 6.32664 | ND < | 5.55001 | ND < | 1.79E-01 | ND < | 5.70E-03 |
| Naphthalene | | 1.020 | | 0.22252 | | 0.19521 | | 6.30E-03 | | 2.00E-04 |
| 2-Methylnaphthalene | | 0.456 | | 0.09948 | | 0.08727 | | 2.82E-03 | | 8.96E-05 |
| Acenaphthylene | ND < | 0.004 | ND < | 0.00087 | ND < | 0.00077 | ND < | 2.47E-05 | ND < | 7.86E-07 |
| Acenaphthene | ND < | 0.004 | ND < | 0.00087 | ND < | 0.00077 | ND < | 2.47E-05 | ND < | 7.86E-07 |
| Fluorene | | 0.0336 | | 0.00733 | | 0.00643 | | 2.08E-04 | | 6.60E-06 |
| Phenanthrene | | 0.284 | | 0.06196 | | 0.05435 | | 1.75E-03 | | 5.58E-05 |
| Anthracene | | 0.0108 | | 0.00236 | | 0.00207 | | 6.67E-05 | | 2.12E-06 |
| Fluoranthene | | 0.0403 | | 0.00879 | | 0.00771 | | 2.49E-04 | | 7.92E-06 |
| Pyrene | | 0.0455 | | 0.00993 | | 0.00871 | | 2.81E-04 | | 8.94E-06 |
| Benzo(a)anthracene | ND < | 0.004 | ND < | 0.00087 | ND < | 0.00077 | ND < | 2.47E-05 | ND < | 7.86E-07 |
| Chrysene | | 0.0096 | | 0.00209 | | 0.00184 | | 5.93E-05 | | 1.89E-06 |
| Benzo(b)fluoranthene | ND < | 0.004 | ND < | 0.00087 | ND < | 0.00077 | ND < | 2.47E-05 | ND < | 7.86E-07 |
| Benzo(k)fluoranthene | ND < | 0.004 | ND < | 0.00087 | ND < | 0.00077 | ND < | 2.47E-05 | ND < | 7.86E-07 |
| Benzo(e)pyrene | ND < | 0.004 | ND < | 0.00087 | ND < | 0.00077 | ND < | 2.47E-05 | ND < | 7.86E-07 |
| Benzo(a)pyrene | ND < | 0.004 | ND < | 0.00087 | ND < | 0.00077 | ND < | 2.47E-05 | ND < | 7.86E-07 |
| Perylene | ND < | 0.004 | ND < | 0.00087 | ND < | 0.00077 | ND < | 2.47E-05 | ND < | 7.86E-07 |
| Indeno(1,2,3-cd)pyrene | ND < | 0.004 | ND < | 0.00087 | ND < | 0.00077 | ND < | 2.47E-05 | ND < | 7.86E-07 |
| Dibenzo(a,h/a,c)anthracene | ND < | 0.004 | ND < | 0.00087 | ND < | 0.00077 | ND < | 2.47E-05 | ND < | 7.86E-07 |
| Benzo(g,h,i)perylene | | 0.00722 | | 0.00158 | | 0.00138 | | 4.46E-05 | | 1.42E-06 |
| 2-Chloronaphthalene (additional) | ND < | 0.004 | ND < | 0.00087 | ND < | 0.00077 | ND < | 2.47E-05 | ND < | 7.86E-07 |
| Biphenyl | | 1.210 | | 0.26397 | | 0.23157 | | 7.48E-03 | | 2.38E-04 |
| 7,12-Dimethylbenzo(a)anthracene | ND < | 0.004 | ND < | 0.00087 | ND < | 0.00077 | ND < | 2.47E-05 | ND < | 7.86E-07 |
| 3-Methylcholanthrene | ND < | 0.004 | ND < | 0.00087 | ND < | 0.00077 | ND < | 2.47E-05 | ND < | 7.86E-07 |
| Dibenzo(a,e)pyrene | ND < | 0.004 | ND < | 0.00087 | ND < | 0.00077 | ND < | 2.47E-05 | ND < | 7.86E-07 |

SEMI VOLATILES CALCULATIONS

| | | | |
|---|---|---|---|
| CLIENT: | ExxonMobil | | AA |
| TEST NUMBER: | 2-SV | VMSTD(DSCF): | 167.1482 |
| TEST DATE: | 6/27/2011 | QSD(DSCF/MIN): | 244827 |
| T REF (F) | 68 | CO2,%: | 14.06 |
| | | O2,%: | 5.09 |

| NAME | ug/train | ug/dscm | ug/dscm at 7% O2 | ug/dscf | lb/hr |
|---|---|---|---|---|---|
| Aniline | ND < 1.85 | ND < 0.39081 | ND < 0.34364 | ND < 1.11E-02 | ND < 3.58E-04 |
| Phenol | ND < 3.6 | ND < 0.76050 | ND < 0.66870 | ND < 2.15E-02 | ND < 6.97E-04 |
| 2-Methylphenol (o-Cresol) | ND < 2.1 | ND < 0.44362 | ND < 0.39008 | ND < 1.26E-02 | ND < 4.07E-04 |
| 4-Methylphenol & 3-Methylphenol (p,m-Cresol) | ND < 5.65 | ND < 1.19356 | ND < 1.04949 | ND < 3.38E-02 | ND < 1.09E-03 |
| o-Toluidine | ND < 5 | ND < 1.05625 | ND < 0.92875 | ND < 2.99E-02 | ND < 9.68E-04 |
| Isophorone | ND < 2.25 | ND < 0.47531 | ND < 0.41794 | ND < 1.35E-02 | ND < 4.36E-04 |
| 2,4-Dimethylphenol | ND < 2.6 | ND < 0.54925 | ND < 0.48295 | ND < 1.56E-02 | ND < 5.03E-04 |
| Dibenzofuran | ND < 2.3 | ND < 0.48587 | ND < 0.42723 | ND < 1.38E-02 | ND < 4.45E-04 |
| a,a-Dimethylphenethylamine | ND < 12 | ND < 2.53500 | ND < 2.22900 | ND < 7.18E-02 | ND < 2.32E-03 |
| 1,4-Phenylenediamine | ND < 18 | ND < 3.80249 | ND < 3.34350 | ND < 1.08E-01 | ND < 3.48E-03 |
| Benzidine | ND < 38 | ND < 8.02749 | ND < 7.05850 | ND < 2.27E-01 | ND < 7.36E-03 |
| Dimethylaminobenzene | ND < 2.0 | ND < 0.42250 | ND < 0.37150 | ND < 1.20E-02 | ND < 3.87E-04 |
| 3,3'-Dimethylbenzidine | ND < 29 | ND < 6.12624 | ND < 5.38675 | ND < 1.73E-01 | ND < 5.61E-03 |
| 3,3'-Dimethoxybenzidine | ND < 29 | ND < 6.12624 | ND < 5.38675 | ND < 1.73E-01 | ND < 5.61E-03 |
| Naphthalene | 0.708 | 0.14956 | 0.13151 | 4.24E-03 | 1.37E-04 |
| 2-Methylnaphthalene | 0.267 | 0.05640 | 0.04960 | 1.60E-03 | 5.17E-05 |
| Acenaphthylene | 0.0999 | 0.02110 | 0.01856 | 5.98E-04 | 1.93E-05 |
| Acenaphthene | ND < 0.0217 | ND < 0.00458 | ND < 0.00403 | ND < 1.30E-04 | ND < 4.20E-06 |
| Fluorene | 0.0267 | 0.00564 | 0.00496 | 1.60E-04 | 5.17E-06 |
| Phenanthrene | 0.215 | 0.04542 | 0.03994 | 1.29E-03 | 4.16E-05 |
| Anthracene | 0.00798 | 0.00169 | 0.00148 | 4.77E-05 | 1.54E-06 |
| Fluoranthene | 0.0402 | 0.00849 | 0.00747 | 2.41E-04 | 7.78E-06 |
| Pyrene | 0.0317 | 0.00670 | 0.00589 | 1.90E-04 | 6.14E-06 |
| Benzo(a)anthracene | ND < 0.004 | ND < 0.00084 | ND < 0.00074 | ND < 2.39E-05 | ND < 7.74E-07 |
| Chrysene | 0.0102 | 0.00215 | 0.00189 | 6.10E-05 | 1.97E-06 |
| Benzo(b)flouranthene | ND < 0.004 | ND < 0.00084 | ND < 0.00074 | ND < 2.39E-05 | ND < 7.74E-07 |
| Benzo(k)fluoranthene | ND < 0.004 | ND < 0.00084 | ND < 0.00074 | ND < 2.39E-05 | ND < 7.74E-07 |
| Benzo(e)pyrene | ND < 0.004 | ND < 0.00084 | ND < 0.00074 | ND < 2.39E-05 | ND < 7.74E-07 |
| Benzo(a)pyrene | ND < 0.004 | ND < 0.00084 | ND < 0.00074 | ND < 2.39E-05 | ND < 7.74E-07 |
| Perylene | ND < 0.004 | ND < 0.00084 | ND < 0.00074 | ND < 2.39E-05 | ND < 7.74E-07 |
| Indeno(1,2,3-cd)pyrene | ND < 0.004 | ND < 0.00084 | ND < 0.00074 | ND < 2.39E-05 | ND < 7.74E-07 |
| Dibenzo(a,h/a,c)anthracene | ND < 0.004 | ND < 0.00084 | ND < 0.00074 | ND < 2.39E-05 | ND < 7.74E-07 |
| Benzo(g,h,i)perylene | 0.00824 | 0.00174 | 0.00153 | 4.93E-05 | 1.60E-06 |
| 2-Chloronaphthalene (additional) | ND < 0.004 | ND < 0.00084 | ND < 0.00074 | ND < 2.39E-05 | ND < 7.74E-07 |
| Biphenyl | 0.414 | 0.08746 | 0.07690 | 2.48E-03 | 8.01E-05 |
| 7,12-Dimethylbenzo(a)anthracene | ND < 0.004 | ND < 0.00084 | ND < 0.00074 | ND < 2.39E-05 | ND < 7.74E-07 |
| 3-Methylcholanthrene | ND < 0.004 | ND < 0.00084 | ND < 0.00074 | ND < 2.39E-05 | ND < 7.74E-07 |
| Dibenzo(a,e)pyrene | ND < 0.004 | ND < 0.00084 | ND < 0.00074 | ND < 2.39E-05 | ND < 7.74E-07 |

SEMI VOLATILES CALCULATIONS

| | | | |
|---|---|---|---|
| CLIENT: | ExxonMobil | INITIALS: | AA |
| TEST NUMBER: | 3-SV | VMSTD(DSCF): | 156.5225 |
| TEST DATE: | 6/28/2011 | QSD(DSCF/MIN): | 230394 |
| T REF (F) | 68 | CO2,%: | 14.11 |
| | | O2,%: | 4.97 |

| NAME | | ug/train | | ug/dscm | | ug/dscm at 7% O2 | | ug/dscf | | lb/hr |
|---|---|---|---|---|---|---|---|---|---|---|
| Aniline | ND < | 1.85 | ND < | 0.41734 | ND < | 0.36422 | ND < | 1.18E-02 | ND < | 3.60E-04 |
| Phenol | ND < | 2.25 | ND < | 0.50758 | ND < | 0.44297 | ND < | 1.44E-02 | ND < | 4.38E-04 |
| 2-Methylphenol (o-Cresol) | ND < | 2.1 | ND < | 0.47374 | ND < | 0.41344 | ND < | 1.34E-02 | ND < | 4.09E-04 |
| 4-Methylphenol & 3-Methylphenol (p,m-Cresol) | ND < | 5.65 | ND < | 1.27459 | ND < | 1.11234 | ND < | 3.61E-02 | ND < | 1.10E-03 |
| o-Toluidine | ND < | 5 | ND < | 1.12795 | ND < | 0.98437 | ND < | 3.19E-02 | ND < | 9.73E-04 |
| Isophorone | ND < | 2.25 | ND < | 0.50758 | ND < | 0.44297 | ND < | 1.44E-02 | ND < | 4.38E-04 |
| 2,4-Dimethylphenol | ND < | 2.6 | ND < | 0.58654 | ND < | 0.51187 | ND < | 1.66E-02 | ND < | 5.06E-04 |
| Dibenzofuran | ND < | 2.3 | ND < | 0.51886 | ND < | 0.45281 | ND < | 1.47E-02 | ND < | 4.47E-04 |
| a,a-Dimethylphenethylamine | ND < | 12 | ND < | 2.70709 | ND < | 2.36249 | ND < | 7.67E-02 | ND < | 2.33E-03 |
| 1,4-Phenylenediamine | ND < | 18 | ND < | 4.06063 | ND < | 3.54374 | ND < | 1.15E-01 | ND < | 3.50E-03 |
| Benzidine | ND < | 38 | ND < | 8.57244 | ND < | 7.48122 | ND < | 2.43E-01 | ND < | 7.39E-03 |
| Dimethylaminobenzene | ND < | 2.0 | ND < | 0.45118 | ND < | 0.39375 | ND < | 1.28E-02 | ND < | 3.89E-04 |
| 3,3'-Dimethylbenzidine | ND < | 29 | ND < | 6.54213 | ND < | 5.70935 | ND < | 1.85E-01 | ND < | 5.64E-03 |
| 3,3'-Dimethoxybenzidine | ND < | 29 | ND < | 6.54213 | ND < | 5.70935 | ND < | 1.85E-01 | ND < | 5.64E-03 |
| Naphthalene | | 0.759 | | 0.17122 | | 0.14943 | | 4.85E-03 | | 1.48E-04 |
| 2-Methylnaphthalene | | 0.224 | | 0.05053 | | 0.04410 | | 1.43E-03 | | 4.36E-05 |
| Acenaphthylene | | 0.0345 | | 0.00778 | | 0.00679 | | 2.20E-04 | | 6.71E-06 |
| Acenaphthene | ND < | 0.004 | ND < | 0.00090 | ND < | 0.00079 | ND < | 2.56E-05 | ND < | 7.78E-07 |
| Fluorene | ND < | 0.0146 | ND < | 0.00329 | ND < | 0.00287 | ND < | 9.33E-05 | ND < | 2.84E-06 |
| Phenanthrene | | 0.152 | | 0.03429 | | 0.02992 | | 9.71E-04 | | 2.96E-05 |
| Anthracene | | 0.00774 | | 0.00175 | | 0.00152 | | 4.94E-05 | | 1.51E-06 |
| Fluoranthene | | 0.0229 | | 0.00517 | | 0.00451 | | 1.46E-04 | | 4.45E-06 |
| Pyrene | | 0.0278 | | 0.00627 | | 0.00547 | | 1.78E-04 | | 5.41E-06 |
| Benzo(a)anthracene | ND < | 0.004 | ND < | 0.00090 | ND < | 0.00079 | ND < | 2.56E-05 | ND < | 7.78E-07 |
| Chrysene | | 0.00642 | | 0.00145 | | 0.00126 | | 4.10E-05 | | 1.25E-06 |
| Benzo(b)flouranthene | ND < | 0.004 | ND < | 0.00090 | ND < | 0.00079 | ND < | 2.56E-05 | ND < | 7.78E-07 |
| Benzo(k)fluoranthene | ND < | 0.004 | ND < | 0.00090 | ND < | 0.00079 | ND < | 2.56E-05 | ND < | 7.78E-07 |
| Benzo(e)pyrene | ND < | 0.004 | ND < | 0.00090 | ND < | 0.00079 | ND < | 2.56E-05 | ND < | 7.78E-07 |
| Benzo(a)pyrene | ND < | 0.004 | ND < | 0.00090 | ND < | 0.00079 | ND < | 2.56E-05 | ND < | 7.78E-07 |
| Perylene | ND < | 0.004 | ND < | 0.00090 | ND < | 0.00079 | ND < | 2.56E-05 | ND < | 7.78E-07 |
| Indeno(1,2,3-cd)pyrene | ND < | 0.004 | ND < | 0.00090 | ND < | 0.00079 | ND < | 2.56E-05 | ND < | 7.78E-07 |
| Dibenzo(a,h/a,c)anthracene | ND < | 0.004 | ND < | 0.00090 | ND < | 0.00079 | ND < | 2.56E-05 | ND < | 7.78E-07 |
| Benzo(g,h,i)perylene | | 0.00796 | | 0.00180 | | 0.00157 | | 5.09E-05 | | 1.55E-06 |
| 2-Chloronaphthalene (additional) | ND < | 0.004 | ND < | 0.00090 | ND < | 0.00079 | ND < | 2.56E-05 | ND < | 7.78E-07 |
| Biphenyl | | 1.730 | | 0.39027 | | 0.34059 | | 1.11E-02 | | 3.37E-04 |
| 7,12-Dimethylbenzo(a)anthracene | ND < | 0.004 | ND < | 0.00090 | ND < | 0.00079 | ND < | 2.56E-05 | ND < | 7.78E-07 |
| 3-Methylcholanthrene | ND < | 0.004 | ND < | 0.00090 | ND < | 0.00079 | ND < | 2.56E-05 | ND < | 7.78E-07 |
| Dibenzo(a,e)pyrene | ND < | 0.004 | ND < | 0.00090 | ND < | 0.00079 | ND < | 2.56E-05 | ND < | 7.78E-07 |

***Delta***
Speciated Semi Volatiles Test Summary

| | | | | | |
|---|---|---|---|---|---|
| Client/Location..... | ExxonMobil | | | Reference Temp (F): | 68 |
| | | | | Fuel..... | Refinery |
| Sample Location..... | FCC 2F-7 Stack | | | Data By..... | AA |
| Test No..... | 1-SV | 2-SV | 3-SV | Average | |
| Date..... | June 27, 2011 | June 27, 2011 | June 28, 2011 | * | |
| Start/Stop Time..... | 945/1400 | 1525/1935 | 802/1220 | * | |
| Bar Press (in Hg)..... | 29.80 | 29.80 | 29.77 | * | |
| Test Method..... | SW-846 0010 | SW-846 0010 | SW-846 0010 | * | |
| Sample Time (Min)..... | 240 | 240 | 240 | * | |
| Sample Train..... | 19WCS | 19WCS | 19WCS | * | |
| Meter Cal Factor..... | 0.996 | 0.996 | 0.996 | * | |
| Pitot Factor ..... | 0.84 | 0.84 | 0.84 | * | |
| Nozzle Diam (in)..... | 0.220 | 0.220 | 0.220 | * | |
| Stack Area (sq ft)..... | 94.31 | 94.31 | 94.31 | | |
| Stack O2 (%)..... | 5.05 | 5.09 | 4.97 | 5.04 | |
| Stack CO2 (%)..... | 13.98 | 14.06 | 14.11 | 14.05 | |
| Stack Press (iwg)..... | -1.30 | -1.30 | -1.30 | -1.30 | |
| Stack Temp (F)..... | 474.3 | 470.3 | 475.1 | 473.2 | |
| Vel Head (iwg)..... | 1.37 | 1.41 | 1.28 | 1.35 | |
| Meter Temp (F)..... | 82 | 75 | 86 | 81 | |
| Meter Press (iwg)..... | 1.61 | 1.66 | 1.54 | 1.60 | |
| Meter Vol (acf)..... | 166.855 | 170.070 | 162.710 | 166.55 | |
| Liquid Vol (ml)..... | 546.7 | 555.4 | 561.6 | 554.6 | |
| Std Sample Vol (SCF)..... | 161.854 | 167.148 | 156.522 | 161.84 | |
| Std Sample Vol (SCM)..... | 4.583 | 4.733 | 4.432 | 4.583 | |
| Moisture Fraction..... | 0.138 | 0.136 | 0.145 | 0.139 | |
| Stack Gas Mol Wt..... | 28.73 | 28.77 | 28.65 | 28.72 | |
| Stack Gas Velocity (ft/sec)..... | 87.87 | 88.84 | 85.03 | 87.25 | |
| Isokinetic Ratio (%)..... | 100.1 | 101.6 | 101.1 | 100.9 | |
| Stack Flow Rate (wacfm)..... | 497,246 | 502,726 | 481,179 | 493,717 | |
| Stack Flow Rate (wscfm)..... | 278,938 | 283,225 | 269,412 | 277,192 | |
| Stack Flow Rate (dscfm)..... | 240,582 | 244,827 | 230,394 | 238,601 | |
| Stack Flow Rate (mdscf/h)..... | 144.35 | 146.90 | 138.24 | 143.16 | |

RUN 1

| Speciated Semi-Volatile Test Sample Data | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Client/Location: | | ExxonMobil | | | | | | Sample Location: | | | 2F-7 Stack |
| Unit: | | FCC | | | | | | Data By: | | | AA |
| Test No: | 1-SV | ISO | Assumed Moisture | | Sample Factor | | Delta H = | 1.17 | x Delta P | | |
| Date: | 6/27/2011 | 100.1 | 14 | | | Time per Point = | | 10 | Static Pressure = | | -1.30 |
| Port | Point | Time | Meter Volume | Delta P | Factor | Delta H | Stack Temp. | Meter In | Meter Out | Probe | Vacuum |
| A | 6 | 9:45:00 | 440.175 | 1.30 | 1.17 | 1.52 | 474 | 92 | 90 | 265 | 7 |
| A | 5 | 9:55:00 | 447.110 | 1.30 | 1.17 | 1.52 | 474 | 95 | 88 | 266 | 7 |
| A | 4 | 10:05:00 | 454.000 | 1.20 | 1.17 | 1.40 | 475 | 93 | 86 | 265 | 7 |
| A | 3 | 10:15:00 | 460.700 | 1.20 | 1.17 | 1.40 | 475 | 89 | 84 | 260 | 7 |
| A | 2 | 10:25:00 | 467.250 | 1.30 | 1.17 | 1.52 | 473 | 88 | 83 | 264 | 7 |
| A | 1 | 10:35:00 | 474.010 | 1.20 | 1.17 | 1.40 | 473 | 88 | 83 | 264 | 7 |
| | Stop | 10:45:00 | 480.655 | | | | | | | | |
| B | 6 | 10:47:00 | 480.655 | 1.30 | 1.17 | 1.52 | 473 | 84 | 79 | 261 | 7 |
| B | 5 | 10:57:00 | 487.590 | 1.30 | 1.17 | 1.52 | 474 | 85 | 79 | 262 | 7 |
| B | 4 | 11:07:00 | 494.200 | 1.30 | 1.17 | 1.52 | 474 | 85 | 78 | 260 | 7 |
| B | 3 | 11:17:00 | 501.070 | 1.30 | 1.17 | 1.52 | 473 | 85 | 78 | 266 | 7 |
| B | 2 | 11:27:00 | 507.950 | 1.20 | 1.17 | 1.40 | 474 | 86 | 79 | 266 | 7 |
| B | 1 | 11:37:00 | 514.450 | 1.20 | 1.17 | 1.40 | 474 | 85 | 79 | 265 | 7 |
| | Stop | 11:47:00 | 520.990 | | | | | | | | |
| C | 6 | 11:57:00 | 520.990 | 1.40 | 1.17 | 1.63 | 475 | 80 | 76 | 260 | 7 |
| C | 5 | 12:07:00 | 527.919 | 1.40 | 1.17 | 1.63 | 476 | 83 | 76 | 264 | 7 |
| C | 4 | 12:17:00 | 534.857 | 1.40 | 1.17 | 1.63 | 477 | 83 | 76 | 260 | 7 |
| C | 3 | 12:27:00 | 541.803 | 1.70 | 1.17 | 1.99 | 474 | 82 | 76 | 266 | 7 |
| C | 2 | 12:37:00 | 549.458 | 1.90 | 1.17 | 2.22 | 475 | 83 | 76 | 266 | 7 |
| C | 1 | 12:47:00 | 557.539 | 1.80 | 1.17 | 2.10 | 474 | 83 | 76 | 262 | 7 |
| | Stop | 12:57:00 | 565.528 | | | | | | | | |
| D | 6 | 13:00:00 | 565.528 | 1.30 | 1.17 | 1.52 | 475 | 80 | 76 | 264 | 7 |
| D | 5 | 13:10:00 | 572.238 | 1.40 | 1.17 | 1.63 | 475 | 81 | 76 | 261 | 7 |
| D | 4 | 13:20:00 | 579.243 | 1.50 | 1.17 | 1.75 | 475 | 82 | 76 | 261 | 7 |
| D | 3 | 13:30:00 | 586.417 | 1.50 | 1.17 | 1.75 | 475 | 82 | 76 | 261 | 7 |
| D | 2 | 13:40:00 | 593.568 | 1.50 | 1.17 | 1.75 | 475 | 83 | 76 | 262 | 7 |
| D | 1 | 13:50:00 | 600.695 | 1.10 | 1.17 | 1.28 | 470 | 83 | 77 | 261 | 7 |
| | Stop | 14:00:00 | 607.030 | | | | | | | | |
| **Total/Average** | | **240** | **166.855** | **1.3718** | | **1.61** | **474** | **85** | **79** | **263** | **7** |

RUN 2

| Speciated Semi-Volatile Test Sample Data | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Client/Location: | | ExxonMobil | | | | | | Sample Location: | | | 2F-7 Stack |
| Unit: | | FCC | | | | | | Data By: | | | AA |
| Test No: | 2-SV | ISO | Moisture | | Sample Factor | | Delta H = | 1.17 | x Delta P | | |
| Date: | 6/27/2011 | 101.6 | 14 | | | Time per Point = | | 10 | Static Pressure = | | -1.3 |
| Port | Point | Time | Meter Volume | Delta P | Factor | Delta H | Stack Temp. | Meter In | Meter Out | Probe | Vacuum |
| A | 6 | 15:25:00 | 607.380 | 1.30 | 1.17 | 1.52 | 471 | 76 | 74 | 253 | 8 |
| A | 5 | 15:35:00 | 614.305 | 1.50 | 1.17 | 1.75 | 471 | 78 | 74 | 256 | 8 |
| A | 4 | 15:45:00 | 621.568 | 1.60 | 1.17 | 1.87 | 472 | 78 | 74 | 255 | 8 |
| A | 3 | 15:55:00 | 629.024 | 1.60 | 1.17 | 1.87 | 472 | 78 | 74 | 255 | 8 |
| A | 2 | 16:05:00 | 636.447 | 1.50 | 1.17 | 1.75 | 472 | 78 | 74 | 254 | 8 |
| A | 1 | 16:15:00 | 643.889 | 1.10 | 1.17 | 1.28 | 470 | 78 | 75 | 253 | 8 |
| | Stop | 16:25:00 | 650.263 | | | | | | | | |
| B | 6 | 16:26:00 | 650.263 | 1.50 | 1.17 | 1.75 | 471 | 78 | 74 | 253 | 8 |
| B | 5 | 16:36:00 | 657.419 | 1.70 | 1.17 | 1.99 | 471 | 79 | 75 | 256 | 8 |
| B | 4 | 16:46:00 | 665.099 | 1.80 | 1.17 | 2.10 | 470 | 77 | 74 | 255 | 8 |
| B | 3 | 16:56:00 | 673.159 | 1.80 | 1.17 | 2.10 | 471 | 77 | 73 | 258 | 8 |
| B | 2 | 17:06:00 | 681.178 | 1.90 | 1.17 | 2.22 | 470 | 77 | 74 | 257 | 8 |
| B | 1 | 17:16:00 | 689.619 | 1.70 | 1.17 | 1.99 | 471 | 77 | 73 | 256 | 8 |
| | Stop | 17:26:00 | 697.335 | | | | | | | | |
| C | 6 | 17:33:00 | 697.335 | 1.50 | 1.17 | 1.75 | 470 | 75 | 73 | 259 | 8 |
| C | 5 | 17:43:00 | 704.550 | 1.50 | 1.17 | 1.75 | 469 | 76 | 72 | 258 | 8 |
| C | 4 | 17:53:00 | 711.710 | 1.50 | 1.17 | 1.75 | 469 | 77 | 73 | 259 | 8 |
| C | 3 | 18:03:00 | 719.070 | 1.50 | 1.17 | 1.75 | 469 | 77 | 72 | 256 | 8 |
| C | 2 | 18:13:00 | 726.400 | 1.20 | 1.17 | 1.40 | 469 | 77 | 72 | 256 | 8 |
| C | 1 | 18:23:00 | 732.970 | 1.20 | 1.17 | 1.40 | 469 | 77 | 72 | 258 | 8 |
| | Stop | 18:33:00 | 739.560 | | | | | | | | |
| D | 6 | 18:35:00 | 739.560 | 1.20 | 1.17 | 1.40 | 470 | 77 | 73 | 254 | 8 |
| D | 5 | 18:45:00 | 746.040 | 1.20 | 1.17 | 1.40 | 470 | 77 | 73 | 261 | 8 |
| D | 4 | 18:55:00 | 752.500 | 1.20 | 1.17 | 1.40 | 470 | 77 | 73 | 260 | 8 |
| D | 3 | 19:05:00 | 759.500 | 1.10 | 1.17 | 1.28 | 470 | 77 | 72 | 257 | 8 |
| D | 2 | 19:15:00 | 765.210 | 1.10 | 1.17 | 1.28 | 470 | 76 | 71 | 257 | 8 |
| D | 1 | 19:25:00 | 771.210 | 1.00 | 1.17 | 1.17 | 469 | 75 | 71 | 252 | 8 |
| | Stop | 19:35:00 | 777.450 | | | | | | | | |
| **Total/Average** | | **240** | **170.070** | **1.4101** | | **1.66** | **470** | **77** | **73** | | |

RUN 3

| Speciated Semi-Volatile Test Sample Data | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Client/Location: | | ExxonMobil | | | | | | Sample Location: | | | 2F-7 Stack |
| Unit: | | FCC | | | | | | Data By: | | | AA |
| Test No: | 3-SV | ISO | Moisture | | Sample Factor | | Delta H = | 1.20 | x Delta P | | |
| Date: | 6/28/2011 | 101.1 | 14 | | | Time per Point = | | 10 | Static Pressure = | | -1.3 |
| Port | Point | Time | Meter Volume | Delta P | Factor | Delta H | Stack Temp. | Meter In | Meter Out | Probe | Vacuum |
| A | 6 | 8:02:00 | 777.865 | 1.3 | 1.20 | 1.56 | 476 | 77 | 74 | 263 | 7 |
| A | 5 | 8:12:00 | 784.670 | 1.2 | 1.20 | 1.44 | 476 | 85 | 76 | 261 | 7 |
| A | 4 | 8:22:00 | 791.280 | 1.2 | 1.20 | 1.44 | 475 | 87 | 78 | 264 | 7 |
| A | 3 | 8:32:00 | 797.830 | 1.2 | 1.20 | 1.44 | 474 | 87 | 79 | 258 | 7 |
| A | 2 | 8:42:00 | 804.375 | 1.2 | 1.20 | 1.44 | 474 | 88 | 81 | 259 | 7 |
| A | 1 | 8:52:00 | 810.900 | 1.0 | 1.20 | 1.20 | 473 | 89 | 82 | 260 | 7 |
| | Stop | 9:02:00 | 817.045 | | | | | | | | |
| B | 6 | 9:04:00 | 817.045 | 1.2 | 1.20 | 1.44 | 475 | 88 | 83 | 261 | 7 |
| B | 5 | 9:14:00 | 823.502 | 1.3 | 1.20 | 1.56 | 476 | 90 | 84 | 262 | 7 |
| B | 4 | 9:24:00 | 830.259 | 1.2 | 1.20 | 1.44 | 476 | 92 | 89 | 267 | 7 |
| B | 3 | 9:34:00 | 836.798 | 1.1 | 1.20 | 1.32 | 476 | 93 | 85 | 265 | 7 |
| B | 2 | 9:44:00 | 843.135 | 1.1 | 1.20 | 1.32 | 477 | 90 | 83 | 265 | 7 |
| B | 1 | 9:54:00 | 849.500 | 1.1 | 1.20 | 1.32 | 474 | 88 | 82 | 263 | 7 |
| | Stop | 10:04:00 | 855.835 | | | | | | | | |
| C | 6 | 10:18:00 | 855.835 | 1.3 | 1.20 | 1.56 | 476 | 85 | 82 | 264 | 8 |
| C | 5 | 10:28:00 | 862.740 | 1.3 | 1.20 | 1.56 | 475 | 93 | 84 | 261 | 8 |
| C | 4 | 10:38:00 | 869.610 | 1.3 | 1.20 | 1.56 | 475 | 93 | 84 | 261 | 8 |
| C | 3 | 10:48:00 | 876.520 | 1.5 | 1.20 | 1.80 | 475 | 98 | 89 | 259 | 10 |
| C | 2 | 10:58:00 | 883.900 | 1.5 | 1.20 | 1.80 | 474 | 94 | 89 | 262 | 10 |
| C | 1 | 11:08:00 | 891.210 | 1.3 | 1.20 | 1.56 | 473 | 96 | 88 | 264 | 10 |
| | Stop | 11:18:00 | 898.230 | | | | | | | | |
| D | 6 | 11:20:00 | 898.230 | 1.3 | 1.20 | 1.56 | 473 | 96 | 88 | 264 | 10 |
| D | 5 | 11:30:00 | 904.580 | 1.5 | 1.20 | 1.80 | 477 | 89 | 85 | 260 | 10 |
| D | 4 | 11:40:00 | 912.000 | 1.5 | 1.20 | 1.80 | 477 | 86 | 82 | 261 | 10 |
| D | 3 | 11:50:00 | 919.360 | 1.5 | 1.20 | 1.80 | 475 | 85 | 80 | 258 | 10 |
| D | 2 | 12:00:00 | 926.680 | 1.3 | 1.20 | 1.56 | 476 | 85 | 80 | 262 | 10 |
| D | 1 | 12:10:00 | 933.650 | 1.3 | 1.20 | 1.56 | 474 | 85 | 80 | 251 | 10 |
| | Stop | 12:20:00 | 940.575 | | | | | | | | |
| **Total/Average** | | **240** | **162.710** | **1.3** | | **1.54** | **475** | **89** | **83** | | |
| | | | | | | | | **86** | | | |

Delta Air Quality Services, Incorporated

# WET CHEMICAL SAMPLING SYSTEM DATA AND WORKSHEET

CLIENT: Exxon Mobil
LOCATION: FCC / 2F-7 Stack
DATE: 6/28/11
RUN NO: FB-SV
OPERATOR: SS
METER BOX NO 19WCS
METER ΔH@: .554
METER Yd: 0.996
STACK AREA, FT²: /
TRAVERSE POINTS, MIN/POINT: /
ΔH= / X ΔP: /
Probe Condition, pre/post test: /
Silica Gel Expended, Y/N: /
Filter Condition after Test: /
Check Weight: /

AMBIENT TEMPERATURE: 82°
BAROMETRIC PRESSURE: /
ASSUMED MOISTURE: /
PITOT TUBE COEFF, Cp: .84
PROBE ID NO/MATERIAL: #72
PROBE LENGTH: 6'
NOZZLE ID NO/ MATERIAL: 2 / glass
NOZZLE DIAMETER: 0.226
FILTER NO/TYPE: TAP
PRE-TEST LEAK RATE: : 0 CFM@ / in. Hg.
POST-TEST LEAK RATE: : / CFM@ / in. Hg.
PITOT LEAK CHECK - PRE: / POST: /
CHAIN OF CUSTODY: SAMPLE CUSTODIAN JP
SAMPLER SS
SAMPLE CUSTODIAN SK

| Imp. # | Contents | Post-Test | Pre-Test | Difference |
|---|---|---|---|---|
| 1 | 0pt $H_2O$ | 758.5 | 758.5 | 0 |
| 2 | 0pt $H_2O$ | 692.7 | 696.3 | |
| 3 | MT | 593.8 | 594.5 | |
| 4 | SG | 887.3 | 887.1 | |
| | | | | |
| | | | | |
| Total: | | | | |

| Point | Time | Meter Volume, ft³ | ΔP in. $H_2O$ | ΔH in. $H_2O$ | Stack Temp, °F | Probe Temp, °F | Filter Temp, °F | Coil/Imp Out Temp, °F | Meter Temp, °F In | Meter Temp, °F Out | Vac. in. Hg. | $O_2$ % | Htd Sample Line Temp. °F | P. Satic In. $H_2O$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 6 | FB | | | | | | | | | | | | | |
| 5 | 1520 | | | | | | | | | | | | | |
| 4 | 1532 | | | | | | | | | | | | | |
| 3 | | | | | | | | | | | | | | |
| 2 | | | | | | | | | | | | | | |
| 1 | | | | | | | | | | | | | | |
| 0 | | | | | | | | | | | | | | |
| 6 | | | | | | | | | | | | | | |
| 5 | | | | | | | | | | | | | | |
| 4 | | | | | | | | | | | | | | |
| 3 | | | | | | | | | | | | | | |
| 2 | | | | | | | | | | | | | | |
| 1 | | | | | | | | | | | | | | |
| 0 | | | | | | | | | | | | | | |
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Delta Air Quality Services, Incorporated

# WET CHEMICAL SAMPLING SYSTEM DATA AND WORKSHEET

CLIENT: Exxon Mobil
LOCATION: FCC / 2F-7 Stack
DATE: 6/27/11
RUN NO: 1-SV
OPERATOR: SS
METER BOX NO 19405
METER ΔH@: 0.554
METER Yd: 0.998
STACK AREA, FT²: 94.31
TRAVERSE POINTS, MIN/POINT: 10/24
ΔH= 1.17 X ΔP:
Probe Condition, pre/post test: ✓
Silica Gel Expended, Y/N: ✓
Filter Condition after Test: ✓
Check Weight: ✓

AMBIENT TEMPERATURE: 88°
BAROMETRIC PRESSURE: 29.80
ASSUMED MOISTURE: 11%
PITOT TUBE COEFF, Cp: .84
PROBE ID NO/MATERIAL: #605 / glass
PROBE LENGTH: 6'
NOZZLE ID NO/ MATERIAL: # 1 / glass
NOZZLE DIAMETER: 0.220
FILTER NO/TYPE: Cont TRAP #4
PRE-TEST LEAK RATE: 0.002 CFM@ 12 in. Hg.
POST-TEST LEAK RATE: 0.000 CFM@ 12 in. Hg.
PITOT LEAK CHECK - PRE: ✓ POST:
CHAIN OF CUSTODY: SAMPLE CUSTODIAN JP
SAMPLER SS
SAMPLE CUSTODIAN JP

| Imp. # | Contents | Post-Test | Pre-Test | Difference |
|---|---|---|---|---|
| 1 | Opt $H_2O$ | 950.1 | 759.6 | 190.5 |
| 2 | Opt $H_2O$ | 882.5 | 689.4 | 193.1 |
| 3 | MT | 777.1 | 662.8 | 114.3 |
| 4 | SG | 1056.5 | 1008.7 | 47.8 |
| Total: | | | | 546.7 |

| Point | Time | Meter Volume, ft³ | ΔP in. $H_2O$ | ΔH in. $H_2O$ | Stack Temp, °F | Probe Temp, °F | Filter Temp, °F | Coil/Imp Out Temp, °F | Meter Temp, °F In | Meter Temp, °F Out | Vac. in. Hg. | $O_2$ % | Htd Sample Line Temp. °F | P. Satic In. $H_2O$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 6 | 0945 | 440.175 | 1.3 | 1.52 | 474 | 265 | 250 | 42 | 92 | 90 | 7.0 | 3.0 | 300 | -1.3 |
| 5 | 0955 | 447.110 | 1.3 | 1.52 | 474 | 266 | 255 | 42 | 95 | 88 | 7.0 | | 325 | -1 |
| 4 | 1005 | 454.000 | 1.2 | 1.40 | 475 | 265 | 260 | 45 | 93 | 86 | 7.0 | | 360 | |
| 3 | 1015 | 460.700 | 1.2 | 1.40 | 475 | 260 | 265 | 45 | 89 | 84 | 7.0 | | 360 | |
| 2 | 1025 | 467.250 | 1.3 | 1.52 | 473 | 264 | 252 | 53 | 88 | 83 | 7.0 | | 380 | |
| 1 | 1035 | 474.010 | 1.2 | 1.40 | 473 | 264 | 252 | 53 | 88 | 83 | 7.0 | | 380 | |
| 0 | 1045 | 480.655 | | | | | | | | | | | | |
| 6 | 1047 | 480.655 | 1.3 | 1.52 | 473 | 261 | 250 | 57 | 84 | 79 | 7.0 | | 380 | |
| 5 | 1057 | 487.590 | 1.3 | 1.52 | 474 | 262 | 250 | 56 | 85 | 79 | 7.0 | | 380 | |
| 4 | 1107 | 494.200 | 1.3 | 1.52 | 474 | 260 | 253 | 56 | 85 | 78 | 7.0 | | 390 | |
| 3 | 1117 | 501.070 | 1.3 | 1.52 | 473 | 266 | 253 | 56 | 85 | 78 | 7.0 | | 390 | |
| 2 | 1127 | 507.950 | 1.2 | 1.40 | 474 | 266 | 258 | 56 | 86 | 79 | 7.0 | | 390 | |
| 1 | 1137 | 514.450 | 1.2 | 1.40 | 474 | 265 | 260 | 56 | 85 | 79 | 7.0 | | 390 | |
| 0 | 1147 | 520.990 | | | | | | | | | | | | |

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Delta Air Quality Services, Incorporated

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# WET CHEMICAL SAMPLING SYSTEM DATA AND WORKSHEET

CLIENT: Exxon Mobil
LOCATION: FCC / 2F-7 Stack
DATE: 6/27/14
RUN NO: 1SV
OPERATOR:
METER BOX NO
METER ΔH@:
METER Yd:
STACK AREA, FT²:
TRAVERSE POINTS, MIN/POINT: 10/24
ΔH= 1.17 X ΔP:
Probe Condition, pre/post test:
Silica Gel Expended, Y/N:
Filter Condition after Test:
Check Weight:

AMBIENT TEMPERATURE:
BAROMETRIC PRESSURE:
ASSUMED MOISTURE:
PITOT TUBE COEFF, Cp:
PROBE ID NO/MATERIAL: See Page 1
PROBE LENGTH:
NOZZLE ID NO/ MATERIAL:
NOZZLE DIAMETER:
FILTER NO/TYPE:
PRE-TEST LEAK RATE: : CFM@ in. Hg.
POST-TEST LEAK RATE: : CFM@ in. Hg.
PITOT LEAK CHECK - PRE: POST:
CHAIN OF CUSTODY: SAMPLE CUSTODIAN
SAMPLER
SAMPLE CUSTODIAN

| Imp. # | Contents | Post-Test | Pre-Test | = Difference |
|---|---|---|---|---|
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| Total: | | | | |

| Point | Time | Meter Volume, ft³ | ΔP in. H₂O | ΔH in. H₂O | Stack Temp, °F | Probe Temp, °F | Filter Temp, °F | Coil/Imp Out Temp, °F | Meter Temp, °F In | Meter Temp, °F Out | Vac. in. Hg. | O₂ % | Htd Sample Line Temp. °F | P. Satic In. H₂O |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 6 | 1157 | 520.990 | 1.4 | 1.63 | 475 | 260 | 260 | 58 | 80 | 76 | 7.0 | | 390 | -1.3 |
| 5 | 1207 | 527.919 | 1.4 | 1.63 | 476 | 264 | 260 | 56 | 83 | 76 | 7.0 | | 392 | -1.3 |
| 4 | 1217 | 534.857 | 1.4 | 1.63 | 477 | 260 | 260 | 56 | 83 | 76 | 7.0 | | 392 | -1.3 |
| 3 | 1227 | 541.803 | 1.7 | 2.0 | 474 | 266 | 260 | 55 | 82 | 76 | 7.0 | | 391 | -1.3 |
| 2 | 1237 | 549.458 | 1.9 | 2.2 | 475 | 266 | 260 | 56 | 83 | 76 | 7.0 | | 393 | -1.3 |
| 1 | 1247 | 557.539 | 1.8 | 2.1 | 474 | 262 | 260 | 57 | 83 | 76 | 7.0 | | 392 | -1.3 |
| 0 | 1257 | 565.528 | | | | | | | | | | | | |
| 6 | 1300 | 565.528 | 1.3 | 1.5 | 475 | 264 | 260 | 59 | 80 | 76 | 7.0 | | 393 | -1.3 |
| 5 | 1310 | 572.238 | 1.4 | 1.63 | 475 | 261 | 261 | 59 | 81 | 76 | 7.0 | | 391 | -1.3 |
| 4 | 1320 | 579.243 | 1.5 | 1.7 | 475 | 261 | 260 | 58 | 82 | 76 | 7.0 | | 390 | -1.3 |
| 3 | 1330 | 586.417 | 1.5 | 1.7 | 475 | 261 | 260 | 58 | 82 | 76 | 7.0 | | 392 | -1.3 |
| 2 | 1340 | 593.568 | 1.5 | 1.7 | 475 | 262 | 260 | 58 | 83 | 76 | 7.0 | | 391 | -1.3 |
| 1 | 1350 | 600.685 | 1.1 | 1.3 | 470 | 261 | 261 | 59 | 83 | 77 | 7.0 | | 390 | -1.3 |
| 0 | 1400 | 607.030 | | | | | | | | | | | | |
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Comments:



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Delta Air Quality Services, Incorporated

# WET CHEMICAL SAMPLING SYSTEM DATA AND WORKSHEET

CLIENT: Exxon Mobil
LOCATION: FCC / 2F-7 Stack
DATE: 6/27/11
RUN NO: 2-5V
OPERATOR: SS
METER BOX NO 19 WCS
METER ΔH@: .554
METER Yd: .996
STACK AREA, FT²:
TRAVERSE POINTS, MIN/POINT: 10/24
ΔH= 1.17 X ΔP:
Probe Condition, pre/post test: ✓
Silica Gel Expended, Y/N: ✓
Filter Condition after Test: ✓
Check Weight: ✓

AMBIENT TEMPERATURE: 85
BAROMETRIC PRESSURE: 29.8
ASSUMED MOISTURE: 11%
PITOT TUBE COEFF, Cp: .84
PROBE ID NO/MATERIAL: #072 / glass
PROBE LENGTH: 6d
NOZZLE ID NO/ MATERIAL: #2 / glass
NOZZLE DIAMETER: .220
FILTER NO/TYPE: ~~N/A~~ 83 15RAP #5
PRE-TEST LEAK RATE: 70.002 CFM@ 12 in. Hg.
POST-TEST LEAK RATE: 70.002 CFM@ 12 in. Hg.
PITOT LEAK CHECK - PRE: ✓ POST: ✓
CHAIN OF CUSTODY: SAMPLE CUSTODIAN JP
SAMPLER SS
SAMPLE CUSTODIAN JP

| Imp. # | Contents | Post-Test | Pre-Test | Difference |
|---|---|---|---|---|
| 1 | opt $H_2O$ | 963.9 | 756.5 | 207.4 |
| 2 | Opt $H_2O$ | 953.0 | 689.5 | 263.5 |
| 3 | MT | 626.4 | 593.3 | 33.1 |
| 4 | SG | 938.7 | 887.3 | 51.4 |
| | | | | |
| | | | | |
| Total: | | | | 555.4 |

| Point | Time | Meter Volume, ft³ | ΔP in. $H_2O$ | ΔH in. $H_2O$ | Stack Temp, °F | Probe Temp, °F | Filter Temp, °F | Coil/Imp Out Temp, °F | Meter Temp, °F In | Meter Temp, °F Out | Vac. in. Hg. | $O_2$ % | Htd Sample Line Temp. °F | P. Satic In. $H_2O$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 6 | 1525 | 607.390 | 1.3 | 1.52 | ~~250~~ 471 | 253 | 252 | 60 | 76 | 74 | 8.0 | 3% | 250 | -1.3 |
| 5 | 1535 | 614.305 | 1.5 | 1.8 | 471 | 256 | 254 | 57 | 78 | 74 | 8.0 | | 250 | -1.3 |
| 4 | 1545 | 621.568 | 1.6 | 1.9 | 472 | 255 | 255 | 57 | 78 | 74 | 8.0 | | 250 | -1.3 |
| 3 | 1555 | 629.024 | 1.6 | 1.9 | 472 | 255 | 253 | 57 | 78 | 74 | 8.0 | | 250 | -1.3 |
| 2 | 1605 | 636.447 | 1.5 | 1.8 | 472 | 254 | 253 | 57 | 78 | 74 | 8.0 | | 250 | -1.3 |
| 1 | 1615 | 643.889 | 1.1 | 1.3 | 470 | 253 | 254 | 58 | 78 | 75 | 8.0 | | 250 | -1.3 |
| 0 | 1625 | 650.263 | | | | | | | | | | | | |
| 6 | 1626 | 650.263 | 1.5 | 1.8 | 471 | 253 | 250 | 58 | 78 | 74 | 8.0 | | 250 | -1.3 |
| 5 | 1636 | 657.419 | 1.7 | 2.0 | 471 | 256 | 251 | 57 | 79 | 75 | 8.0 | | 250 | -1.3 |
| 4 | 1646 | 665.049 | 1.8 | 2.2 | 470 | 255 | 251 | 57 | 77 | 74 | 8.0 | | 250 | -1.3 |
| 3 | 1656 | 673.159 | 1.8 | 2.2 | 471 | 258 | 250 | 58 | 77 | 73 | 8.0 | | 250 | -1.3 |
| 2 | 1706 | 681.178 | 1.9 | 2.2 | 470 | 257 | 251 | 58 | 77 | 74 | 8.0 | | 250 | -1.3 |
| 1 | 1716 | 689.619 | 1.7 | 2.0 | 471 | 256 | 250 | 56 | 77 | 73 | 8.0 | | 250 | -1.3 |
| 0 | 1726 | 697.335 | | | | | | | | | | | | |
| | | | | | | | | | | | | | | |
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Delta Air Quality Services, Incorporated

# WET CHEMICAL SAMPLING SYSTEM DATA AND WORKSHEET

CLIENT: Exxon Mobil
LOCATION: FCC / 2F-7 Stack
DATE: 6/27/11
RUN NO: 2-SV
OPERATOR: SS
METER BOX NO 19-WCS
METER ΔH@: .554
METER Yd: .996
STACK AREA, FT²:
TRAVERSE POINTS, MIN/POINT: 10/24
ΔH= 1.17 X ΔP:
Probe Condition, pre/post test:
Silica Gel Expended, Y/N:
Filter Condition after Test:
Check Weight:

AMBIENT TEMPERATURE:
BAROMETRIC PRESSURE:
ASSUMED MOISTURE:
PITOT TUBE COEFF, Cp:
PROBE ID NO/MATERIAL:
PROBE LENGTH:
NOZZLE ID NO/ MATERIAL:
NOZZLE DIAMETER:
FILTER NO/TYPE:
PRE-TEST LEAK RATE: _____CFM@_____in. Hg.
POST-TEST LEAK RATE: _____CFM@_____in. Hg.
PITOT LEAK CHECK - PRE:_____POST:_____
CHAIN OF CUSTODY: SAMPLE CUSTODIAN_____
SAMPLER_____
SAMPLE CUSTODIAN_____

| Imp. # | Contents | Post-Test | Pre-Test | Difference |
|---|---|---|---|---|
| | | | | |
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| | | | | |
| | | | | |
| | | | | |
| | | | | |
| Total: | | | | |

SEE Page 1

| Point | Time | Meter Volume, ft³ | ΔP in. H₂O | ΔH in. H₂O | Stack Temp, °F | Probe Temp, °F | Filter Temp, °F | Coil/Imp Out Temp, °F | Meter Temp, °F In | Meter Temp, °F Out | Vac. in. Hg. | O₂ % | Htd Sample Line Temp. °F | P. Satic In. H₂O |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 6 | 1733 | 697.335 | 1.5 | 1.80 | 470 | 259 | 252 | 55 | 75 | 73 | 8.0 | 3 | 235 | -1.3 |
| 5 | 1743 | 704.550 | 1.5 | 1.80 | 469 | 258 | 252 | 54 | 76 | 72 | 8.0 | | 235 | |
| 4 | 1753 | 711.710 | 1.5 | 1.80 | 469 | 259 | 253 | 54 | 77 | 73 | | | 286 | |
| 3 | 1803 | 719.070 | 1.5 | 1.80 | 469 | 256 | 259 | 57 | 77 | 72 | | | 296 | |
| 2 | 1813 | 726.40 | 1.2 | 1.4 | 469 | 256 | 259 | 57 | 77 | 72 | | | 296 | |
| 1 | 1823 | 732.970 | 1.2 | 1.4 | 469 | 258 | 255 | 56 | 77 | 72 | | | 300 | |
| 0 | 1833 | 739.56 | | | | | | | | | | | | |
| 6 | 1835 | 739.560 | 1.2 | 1.4 | 470 | 254 | 255 | 59 | 77 | 73 | | | 318 | |
| 5 | 1845 | 746.040 | 1.2 | 1.4 | 470 | 261 | 257 | 58 | 77 | 73 | | | 320 | |
| 4 | 1855 | 752.500 | 1.2 | 1.4 | 470 | 260 | 258 | 58 | 77 | 73 | | | 320 | |
| 3 | 1905 | 759.500 | 1.1 | 1.3 | 470 | 257 | 255 | 54 | 77 | 72 | | | 285 | |
| 2 | 1915 | 765.210 | 1.1 | 1.3 | 470 | 257 | 252 | 51 | 76 | 71 | | | 274 | |
| 1 | 1925 | 771.210 | 1.0 | 1.2 | 469 | 252 | 255 | 53 | 75 | 71 | | | 271 | |
| 0 | 1935 | 777.450 | | | | | | | | | | | | |
| | | | | | | | | | | | | | | |
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Delta Air Quality Services, Incorporated

# WET CHEMICAL SAMPLING SYSTEM DATA AND WORKSHEET

CLIENT: Exxon Mobil
LOCATION: FCC / 2F-7 Stack
DATE: 6/28/11
RUN NO: 3-5
OPERATOR: SS
METER BOX NO 19WCS
METER ΔH@: 0.554
METER Yd: 0.996
STACK AREA, FT²: ✓
TRAVERSE POINTS, MIN/POINT: 10/24
ΔH= 1.17 X ΔP: 1.2
Probe Condition, pre/post test: good
Silica Gel Expended, Y/N: No
Filter Condition after Test: ✓
Check Weight: ✓

AMBIENT TEMPERATURE: 78°
BAROMETRIC PRESSURE: 29.77
ASSUMED MOISTURE: 11%
PITOT TUBE COEFF, Cp: .84
PROBE ID NO/MATERIAL: Pyrex / glass
PROBE LENGTH: 6'
NOZZLE ID NO/ MATERIAL: #1 / glass
NOZZLE DIAMETER: .220
FILTER NO/TYPE: XAD #5
PRE-TEST LEAK RATE: <0.002 CFM@ 15 in. Hg.
POST-TEST LEAK RATE: <0.002 CFM@ 15 in. Hg.
PITOT LEAK CHECK - PRE: OK POST: OK
CHAIN OF CUSTODY: SAMPLE CUSTODIAN SP
SAMPLER SS
SAMPLE CUSTODIAN SP

| Imp. # | Contents | Post-Test | Pre-Test | Difference |
|---|---|---|---|---|
| 1 | Opt $H_2O$ | 961.9 | 756.9 | 205.0 |
| 2 | Opt $H_2O$ | 897.2 | 688.1 | 209.1 |
| 3 | MT | 768.5 | 662.1 | 106.4 |
| 4 | SG | 1021.0 | 979.9 | 41.1 |
| | | | | |
| | | | | |
| Total: | | | | 561.6 |

| Point | Time | Meter Volume, ft³ | ΔP in. $H_2O$ | ΔH in. $H_2O$ | Stack Temp, °F | Probe Temp, °F | Filter Temp, °F | Coil/Imp Out Temp, °F | Meter Temp, °F In | Meter Temp, °F Out | Vac. in. Hg. | $O_2$ % | Htd Sample Line Temp. °F | P. Satic In. $H_2O$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 6 | 0832 | 777.865 | 1.3 | 1.56 | 476 | 263 | 252 | 60 | 77 | 74 | 7.0 | 3.0 | 300 | -1.3 |
| 5 | 0842 | 784.670 | 1.2 | 1.44 | 476 | 261 | 255 | 48 | 85 | 76 | 7.0 | | 314 | |
| 4 | 0852 | 791.280 | 1.2 | 1.44 | 475 | 264 | 255 | 53 | 87 | 78 | 7.0 | | 400 | |
| 3 | 0862 | 797.830 | 1.2 | 1.44 | 474 | 259 | 253 | 49 | 87 | 79 | 7.0 | | 339 | |
| 2 | 0842 | 804.375 | 1.2 | 1.44 | 474 | 259 | 260 | 54 | 88 | 81 | 7.0 | | 400 | |
| 1 | 0852 | 810.900 | 1.0 | 1.20 | 473 | 260 | 260 | 55 | 89 | 82 | 7.0 | | 410 | |
| 0 | 0902 | 817.045 | | | | | | | | | | | | |
| 6 | 0904 | 817.045 | 1.2 | 1.44 | 475 | 261 | 256 | 56 | 88 | 83 | 7.0 | | 407 | |
| 5 | 0914 | 823.502 | 1.3 | 1.56 | 476 | 262 | 255 | 56 | 90 | 84 | 7.0 | | 409 | |
| 4 | 0924 | 830.259 | 1.2 | 1.44 | 476 | 267 | 256 | 58 | 92 | 89 | 7.0 | | 409 | |
| 3 | 0934 | 836.798 | 1.1 | 1.32 | 476 | 265 | 257 | 57 | 93 | 85 | 7.0 | | 409 | |
| 2 | 0944 | 843.135 | 1.1 | 1.32 | 477 | 265 | 255 | 55 | 90 | 83 | 7.0 | | 420 | |
| 1 | 0954 | 849.500 | 1.1 | 1.32 | 474 | 263 | 255 | 53 | 88 | 82 | 7.0 | | 420 | |
| 0 | 1004 | 855.835 | | | | | | | | | | | | |
| | | | | | | | | | | | | | | |
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Comments:



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Delta Air Quality Services, Incorporated

# WET CHEMICAL SAMPLING SYSTEM DATA AND WORKSHEET

CLIENT: Exxon Mobil
LOCATION: FCC / 2F-7 Stack
DATE: 6/28/11
RUN NO: 3-54
OPERATOR: SS / DA
METER BOX NO 19WC5
METER ΔH@:
METER Yd:
STACK AREA, FT²:
TRAVERSE POINTS, MIN/POINT:
ΔH= X ΔP:
Probe Condition, pre/post test:
Silica Gel Expended, Y/N:
Filter Condition after Test:
Check Weight:

AMBIENT TEMPERATURE:
BAROMETRIC PRESSURE:
ASSUMED MOISTURE:
PITOT TUBE COEFF, Cp:
PROBE ID NO/MATERIAL:
PROBE LENGTH:
NOZZLE ID NO/ MATERIAL:
NOZZLE DIAMETER:
FILTER NO/TYPE:
PRE-TEST LEAK RATE: : CFM@ in. Hg.
POST-TEST LEAK RATE: : CFM@ in. Hg.
PITOT LEAK CHECK - PRE: POST:
CHAIN OF CUSTODY: SAMPLE CUSTODIAN
SAMPLER
SAMPLE CUSTODIAN

SEE Pg 1

| Imp. # | Contents | Post-Test | Pre-Test | Difference |
|---|---|---|---|---|
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| Total: | | | | |

| Point | Time | Meter Volume, ft³ | ΔP in. H₂O | ΔH in. H₂O | Stack Temp, °F | Probe Temp, °F | Filter Temp, °F | Coil/Imp Out Temp, °F | Meter Temp, °F In | Meter Temp, °F Out | Vac. in. Hg. | O₂ % | Htd Sample Line Temp. °F | P. Satic In. H₂O |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 6 | 1018 | 855.835 | 1.3 | 1.56 | 476 | 264 | ~~265~~ 254 | 58 | 85 | 82 | 8.0 | 3% | 345 | -1.3 |
| 5 | 1028 | 862.740 | 1.3 | 1.56 | 475 | 261 | 254 | 52 | 93 | 84 | 8.0 | | 364 | |
| 4 | 1038 | 869.610 | 1.3 | 1.56 | 475 | 261 | 254 | 52 | 93 | 84 | 8.0 | | 364 | |
| 3 | 1048 | 876.520 | 1.5 | 1.80 | 475 | 259 | 254 | 55 | 98 | 89 | 10.0 | | 337 | |
| 2 | 1058 | 883.900 | 1.5 | 1.80 | 474 | 262 | 255 | 58 | 94 | 89 | 10.0 | | 337 | |
| 1 | 1108 | 891.210 | 1.3 | 1.56 | 473 | 264 | 254 | 56 | 96 | 88 | 10.0 | | 380 | |
| 0 | 1118 | 898.230 | | | | | | | | | | | | |
| 6 | 1120 | 898.230 | 1.3 | 1.56 | 473 | 264 | 254 | 56 | 96 | 88 | 10.0 | | 380 | |
| 5 | 1130 | 904.580 | 1.5 | 1.80 | 477 | 260 | 251 | 51 | 89 | 85 | 10.0 | | 355 | |
| 4 | 1140 | 912.000 | 1.5 | 1.80 | 477 | 261 | 253 | 58 | 86 | 82 | 10.0 | | 373 | |
| 3 | 1150 | 919.360 | 1.5 | 1.80 | 475 | 258 | 252 | 53 | 85 | 80 | 10.0 | | 340 | |
| 2 | 1200 | 926.680 | 1.3 | 1.56 | 476 | 262 | 250 | 53 | 85 | 80 | 10.0 | | 350 | |
| 1 | 1210 | 933.630 | 1.3 | 1.56 | 474 | 251 | 261 | 53 | 85 | 80 | 10.0 | | 380 | |
| 0 | 1220 | 940.575 | | | | | | | | | | | | |
| | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | |

Comments:



C-1-16

**ExxonMobil**
**STACK $O_2$, $CO_2$ DATA**

**Test #:** **1-SV**
**Date:** **6/27/2011**
**Time:** **945/1400**

| | $O_2$ | $CO_2$ | CO |
|---|---|---|---|
| Range | 10 | 20 | 250 |
| Cal Gas | 5.00 | 10.16 | 142 |
| Analyzer Zero | 0.03 | -0.06 | -1.91 |
| Analyzer Span | 5.04 | 10.02 | 142.11 |
| Pre-Bias Zero | 0.04 | -0.03 | -2.67 |
| Pre-Bias Span | 5.09 | 10.03 | 143.88 |
| Post-Bias Zero | 0.04 | 0.02 | -0.11 |
| Post-Bias Span | 4.96 | 9.80 | 143.26 |
| Pre-test zero bias | 0.1% | 0.2% | -0.3% |
| Pre-test span bias | 0.6% | 0.0% | 0.7% |
| Post-test zero bias | 0.2% | 0.4% | 0.7% |
| Post-test span bias | -0.7% | -1.1% | 0.5% |
| Zero Drift | 0.0% | 0.2% | 1.0% |
| Span Drift | -1.3% | -1.2% | -0.2% |
| | PASS | PASS | PASS |
| **Average** | **5.08** | **13.64** | **77.64** |
| **Cal Corrected** | **5.05** | **13.98** | **77.42** |

**ExxonMobil**
**1-SV**

| Date | Time | O2 % | CO2 % | CO ppm |
|---|---|---|---|---|
| 6/27/2011 | 9:46:00 AM | 5.067 | 13.975 | 67.108 |
| 6/27/2011 | 9:47:00 AM | 5.08 | 13.985 | 71.188 |
| 6/27/2011 | 9:48:00 AM | 5.076 | 13.997 | 72.917 |
| 6/27/2011 | 9:49:00 AM | 5.096 | 13.986 | 73.15 |
| 6/27/2011 | 9:50:00 AM | 5.122 | 13.937 | 71.51 |
| 6/27/2011 | 9:51:00 AM | 5.146 | 13.934 | 70.22 |
| 6/27/2011 | 9:52:00 AM | 5.219 | 13.87 | 72.13 |
| 6/27/2011 | 9:53:00 AM | 5.362 | 14.102 | 73.359 |
| 6/27/2011 | 9:54:00 AM | 5.277 | 13.936 | 73.02 |
| 6/27/2011 | 9:55:00 AM | 5.306 | 13.916 | 73.876 |
| 6/27/2011 | 9:56:00 AM | 5.32 | 13.969 | 75.711 |
| 6/27/2011 | 9:57:00 AM | 5.365 | 13.928 | 75.107 |
| 6/27/2011 | 9:58:00 AM | 5.259 | 13.578 | 71.586 |
| 6/27/2011 | 9:59:00 AM | 5.306 | 13.5 | 73.063 |
| 6/27/2011 | 10:00:00 AM | 5.294 | 13.507 | 72.408 |
| 6/27/2011 | 10:01:00 AM | 5.22 | 13.574 | 72.056 |
| 6/27/2011 | 10:02:00 AM | 5.184 | 13.619 | 73.051 |
| 6/27/2011 | 10:03:00 AM | 5.212 | 13.585 | 73.669 |
| 6/27/2011 | 10:04:00 AM | 5.276 | 13.528 | 72.857 |
| 6/27/2011 | 10:05:00 AM | 5.275 | 13.519 | 72.043 |
| 6/27/2011 | 10:06:00 AM | 5.268 | 13.515 | 72.639 |
| 6/27/2011 | 10:07:00 AM | 5.265 | 13.506 | 70.329 |
| 6/27/2011 | 10:08:00 AM | 5.223 | 13.525 | 70.959 |
| 6/27/2011 | 10:09:00 AM | 5.197 | 13.562 | 72.94 |
| 6/27/2011 | 10:10:00 AM | 5.198 | 13.565 | 73.093 |
| 6/27/2011 | 10:11:00 AM | 5.193 | 13.574 | 73.237 |
| 6/27/2011 | 10:12:00 AM | 5.225 | 13.552 | 74.416 |
| 6/27/2011 | 10:13:00 AM | 5.254 | 13.514 | 75.04 |
| 6/27/2011 | 10:14:00 AM | 5.286 | 13.483 | 75.504 |
| 6/27/2011 | 10:15:00 AM | 5.447 | 14.184 | 78.671 |
| 6/27/2011 | 10:16:00 AM | 5.746 | 14.793 | 81.669 |
| 6/27/2011 | 10:17:00 AM | 5.797 | 14.895 | 80.688 |
| 6/27/2011 | 10:18:00 AM | 5.778 | 14.827 | 81.975 |
| 6/27/2011 | 10:19:00 AM | 5.778 | 14.951 | 82.461 |
| 6/27/2011 | 10:20:00 AM | 5.774 | 14.967 | 81.222 |
| 6/27/2011 | 10:21:00 AM | 5.653 | 14.741 | 80.001 |
| 6/27/2011 | 10:22:00 AM | 5.577 | 14.787 | 80.94 |
| 6/27/2011 | 10:23:00 AM | 5.552 | 14.784 | 81.585 |
| 6/27/2011 | 10:24:00 AM | 5.515 | 14.616 | 81.142 |
| 6/27/2011 | 10:25:00 AM | 5.471 | 14.552 | 81.058 |
| 6/27/2011 | 10:26:00 AM | 5.405 | 14.547 | 82.083 |
| 6/27/2011 | 10:27:00 AM | 5.142 | 13.792 | 76.758 |
| 6/27/2011 | 10:28:00 AM | 5.065 | 13.633 | 75.386 |
| 6/27/2011 | 10:29:00 AM | 5.063 | 13.602 | 75.831 |
| 6/27/2011 | 10:30:00 AM | 5.021 | 13.625 | 75.765 |
| 6/27/2011 | 10:31:00 AM | 5.019 | 13.635 | 76.809 |
| 6/27/2011 | 10:32:00 AM | 5.052 | 13.601 | 76.454 |

| | | | | |
|---|---|---|---|---|
| 6/27/2011 | 10:33:00 AM | 5.051 | 13.597 | 75.838 |
| 6/27/2011 | 10:34:00 AM | 5.106 | 13.54 | 75.818 |
| 6/27/2011 | 10:35:00 AM | 5.096 | 13.534 | 75.632 |
| 6/27/2011 | 10:36:00 AM | 5.094 | 13.526 | 77.589 |
| 6/27/2011 | 10:37:00 AM | 5.059 | 13.566 | 78.435 |
| 6/27/2011 | 10:38:00 AM | 5.137 | 13.499 | 76.673 |
| 6/27/2011 | 10:39:00 AM | 5.131 | 13.498 | 75.64 |
| 6/27/2011 | 10:40:00 AM | 5.114 | 13.503 | 75.98 |
| 6/27/2011 | 10:41:00 AM | 5.125 | 13.506 | 76.198 |
| 6/27/2011 | 10:42:00 AM | 5.133 | 13.501 | 77.353 |
| 6/27/2011 | 10:43:00 AM | 5.107 | 13.549 | 76.981 |
| 6/27/2011 | 10:44:00 AM | 5.067 | 13.609 | 79.338 |
| 6/27/2011 | 10:45:00 AM | 5.136 | 13.545 | 79.075 |
| 6/27/2011 | 10:48:00 AM | 5.09 | 13.569 | 77.936 |
| 6/27/2011 | 10:49:00 AM | 5.28 | 14.051 | 80.307 |
| 6/27/2011 | 10:50:00 AM | 5.317 | 14.245 | 82.265 |
| 6/27/2011 | 10:51:00 AM | 5.33 | 14.243 | 85.513 |
| 6/27/2011 | 10:52:00 AM | 5.355 | 14.226 | 85.737 |
| 6/27/2011 | 10:53:00 AM | 5.21 | 13.836 | 82.57 |
| 6/27/2011 | 10:54:00 AM | 5.163 | 13.716 | 83.035 |
| 6/27/2011 | 10:55:00 AM | 5.191 | 13.619 | 81.043 |
| 6/27/2011 | 10:56:00 AM | 5.147 | 13.451 | 78.09 |
| 6/27/2011 | 10:57:00 AM | 5.122 | 13.465 | 78.712 |
| 6/27/2011 | 10:58:00 AM | 5.097 | 13.482 | 81.102 |
| 6/27/2011 | 10:59:00 AM | 5.112 | 13.466 | 78.788 |
| 6/27/2011 | 11:00:00 AM | 5.097 | 13.512 | 79.145 |
| 6/27/2011 | 11:01:00 AM | 5.155 | 13.459 | 79.526 |
| 6/27/2011 | 11:02:00 AM | 5.163 | 13.469 | 79.529 |
| 6/27/2011 | 11:03:00 AM | 5.131 | 13.41 | 79.584 |
| 6/27/2011 | 11:04:00 AM | 5.082 | 13.517 | 80.094 |
| 6/27/2011 | 11:05:00 AM | 5.049 | 13.538 | 82.05 |
| 6/27/2011 | 11:06:00 AM | 5.075 | 13.52 | 80.696 |
| 6/27/2011 | 11:07:00 AM | 5.096 | 13.674 | 80.905 |
| 6/27/2011 | 11:08:00 AM | 5.088 | 13.634 | 81.152 |
| 6/27/2011 | 11:09:00 AM | 5.016 | 13.54 | 81.423 |
| 6/27/2011 | 11:10:00 AM | 5.03 | 13.529 | 81.407 |
| 6/27/2011 | 11:11:00 AM | 5.047 | 13.517 | 80.01 |
| 6/27/2011 | 11:12:00 AM | 5.105 | 13.46 | 79.661 |
| 6/27/2011 | 11:13:00 AM | 5.126 | 13.434 | 79.691 |
| 6/27/2011 | 11:14:00 AM | 5.072 | 13.462 | 79.439 |
| 6/27/2011 | 11:15:00 AM | 5.013 | 13.538 | 80.282 |
| 6/27/2011 | 11:16:00 AM | 5.053 | 13.475 | 78.979 |
| 6/27/2011 | 11:17:00 AM | 5.019 | 13.515 | 80.76 |
| 6/27/2011 | 11:18:00 AM | 5.058 | 13.481 | 81.481 |
| 6/27/2011 | 11:19:00 AM | 5.028 | 13.497 | 82.722 |
| 6/27/2011 | 11:20:00 AM | 5.035 | 13.49 | 81.063 |
| 6/27/2011 | 11:21:00 AM | 5.056 | 13.476 | 78.766 |
| 6/27/2011 | 11:22:00 AM | 5.028 | 13.49 | 78.789 |
| 6/27/2011 | 11:23:00 AM | 4.994 | 13.546 | 80.7 |
| 6/27/2011 | 11:24:00 AM | 4.947 | 13.56 | 80.992 |
| 6/27/2011 | 11:25:00 AM | 4.944 | 13.585 | 80.926 |
| 6/27/2011 | 11:26:00 AM | 4.949 | 13.568 | 82.85 |

| | | | | |
|---|---|---|---|---|
| 6/27/2011 | 11:27:00 AM | 5.015 | 13.52 | 82.324 |
| 6/27/2011 | 11:28:00 AM | 4.993 | 13.537 | 79.551 |
| 6/27/2011 | 11:29:00 AM | 5.024 | 13.502 | 79.61 |
| 6/27/2011 | 11:30:00 AM | 5.013 | 13.511 | 78.638 |
| 6/27/2011 | 11:31:00 AM | 4.983 | 13.554 | 79.955 |
| 6/27/2011 | 11:32:00 AM | 4.977 | 13.558 | 81.84 |
| 6/27/2011 | 11:33:00 AM | 5.027 | 13.516 | 82.356 |
| 6/27/2011 | 11:34:00 AM | 5.075 | 13.475 | 79.246 |
| 6/27/2011 | 11:35:00 AM | 5.08 | 13.452 | 79.572 |
| 6/27/2011 | 11:36:00 AM | 5.025 | 13.504 | 80.158 |
| 6/27/2011 | 11:37:00 AM | 5.047 | 13.481 | 80.378 |
| 6/27/2011 | 11:38:00 AM | 5.012 | 13.5 | 80.198 |
| 6/27/2011 | 11:39:00 AM | 4.958 | 13.558 | 81.733 |
| 6/27/2011 | 11:40:00 AM | 4.909 | 13.605 | 82.36 |
| 6/27/2011 | 11:41:00 AM | 4.983 | 13.547 | 81.238 |
| 6/27/2011 | 11:42:00 AM | 5.039 | 13.498 | 80.206 |
| 6/27/2011 | 11:43:00 AM | 5.058 | 13.476 | 80.337 |
| 6/27/2011 | 11:44:00 AM | 5.049 | 13.493 | 78.74 |
| 6/27/2011 | 11:45:00 AM | 5.087 | 13.463 | 79.023 |
| 6/27/2011 | 11:46:00 AM | 5.055 | 13.48 | 78.749 |
| 6/27/2011 | 11:47:00 AM | 4.994 | 13.542 | 80.506 |
| 6/27/2011 | 11:58:00 AM | 5.094 | 13.429 | 78.407 |
| 6/27/2011 | 11:59:00 AM | 5 | 13.496 | 79.11 |
| 6/27/2011 | 12:00:00 PM | 4.979 | 13.537 | 79.46 |
| 6/27/2011 | 12:01:00 PM | 4.896 | 13.62 | 81.958 |
| 6/27/2011 | 12:02:00 PM | 4.966 | 13.538 | 80.9 |
| 6/27/2011 | 12:03:00 PM | 4.991 | 13.521 | 79.806 |
| 6/27/2011 | 12:04:00 PM | 5.038 | 13.476 | 79.618 |
| 6/27/2011 | 12:05:00 PM | 5.053 | 13.456 | 77.029 |
| 6/27/2011 | 12:06:00 PM | 5.021 | 13.496 | 77.028 |
| 6/27/2011 | 12:07:00 PM | 4.998 | 13.511 | 80.191 |
| 6/27/2011 | 12:08:00 PM | 4.946 | 13.551 | 82.309 |
| 6/27/2011 | 12:09:00 PM | 4.957 | 13.553 | 83.014 |
| 6/27/2011 | 12:10:00 PM | 4.942 | 13.551 | 81.553 |
| 6/27/2011 | 12:11:00 PM | 4.944 | 13.568 | 82.051 |
| 6/27/2011 | 12:12:00 PM | 4.952 | 13.548 | 80.61 |
| 6/27/2011 | 12:13:00 PM | 4.963 | 13.536 | 80.426 |
| 6/27/2011 | 12:14:00 PM | 4.957 | 13.547 | 78.831 |
| 6/27/2011 | 12:15:00 PM | 4.931 | 13.57 | 80.49 |
| 6/27/2011 | 12:16:00 PM | 4.974 | 13.531 | 78.894 |
| 6/27/2011 | 12:17:00 PM | 4.97 | 13.52 | 80.372 |
| 6/27/2011 | 12:18:00 PM | 4.962 | 13.527 | 79.906 |
| 6/27/2011 | 12:19:00 PM | 4.988 | 13.509 | 80.706 |
| 6/27/2011 | 12:20:00 PM | 4.964 | 13.527 | 80.344 |
| 6/27/2011 | 12:21:00 PM | 4.958 | 13.555 | 79.139 |
| 6/27/2011 | 12:22:00 PM | 4.934 | 13.579 | 80.36 |
| 6/27/2011 | 12:23:00 PM | 4.954 | 13.557 | 80.136 |
| 6/27/2011 | 12:24:00 PM | 4.973 | 13.53 | 79.48 |
| 6/27/2011 | 12:25:00 PM | 4.919 | 13.573 | 80.484 |
| 6/27/2011 | 12:26:00 PM | 4.912 | 13.59 | 81.474 |
| 6/27/2011 | 12:27:00 PM | 4.949 | 13.543 | 80.703 |
| 6/27/2011 | 12:28:00 PM | 4.886 | 13.622 | 78.974 |

| | | | | |
|---|---|---|---|---|
| 6/27/2011 | 12:29:00 PM | 4.898 | 13.62 | 80.155 |
| 6/27/2011 | 12:30:00 PM | 4.915 | 13.612 | 80.145 |
| 6/27/2011 | 12:31:00 PM | 4.914 | 13.61 | 79.842 |
| 6/27/2011 | 12:32:00 PM | 4.945 | 13.577 | 79.393 |
| 6/27/2011 | 12:33:00 PM | 4.992 | 13.539 | 77.807 |
| 6/27/2011 | 12:34:00 PM | 4.999 | 13.534 | 77.737 |
| 6/27/2011 | 12:35:00 PM | 5.01 | 13.525 | 78.596 |
| 6/27/2011 | 12:36:00 PM | 4.975 | 13.551 | 80.163 |
| 6/27/2011 | 12:37:00 PM | 5.018 | 13.499 | 79.731 |
| 6/27/2011 | 12:38:00 PM | 5.012 | 13.515 | 79.595 |
| 6/27/2011 | 12:39:00 PM | 4.954 | 13.593 | 77.374 |
| 6/27/2011 | 12:40:00 PM | 4.959 | 13.589 | 78.965 |
| 6/27/2011 | 12:41:00 PM | 4.982 | 13.549 | 70.677 |
| 6/27/2011 | 12:42:00 PM | 5.02 | 13.558 | 52.238 |
| 6/27/2011 | 12:43:00 PM | 4.982 | 13.574 | 48.107 |
| 6/27/2011 | 12:44:00 PM | 5.047 | 13.518 | 47.247 |
| 6/27/2011 | 12:45:00 PM | 5.036 | 13.523 | 52.936 |
| 6/27/2011 | 12:46:00 PM | 4.991 | 13.571 | 71.641 |
| 6/27/2011 | 12:47:00 PM | 4.97 | 13.594 | 77.68 |
| 6/27/2011 | 12:48:00 PM | 5.015 | 13.551 | 77.494 |
| 6/27/2011 | 12:49:00 PM | 5.024 | 13.538 | 77.157 |
| 6/27/2011 | 12:50:00 PM | 5.017 | 13.531 | 79.615 |
| 6/27/2011 | 12:51:00 PM | 5.037 | 13.516 | 78.265 |
| 6/27/2011 | 12:52:00 PM | 5.056 | 13.5 | 77.051 |
| 6/27/2011 | 12:53:00 PM | 4.975 | 13.573 | 77.641 |
| 6/27/2011 | 12:54:00 PM | 4.962 | 13.607 | 78.075 |
| 6/27/2011 | 12:55:00 PM | 4.975 | 13.589 | 77.473 |
| 6/27/2011 | 12:56:00 PM | 4.91 | 13.649 | 76.765 |
| 6/27/2011 | 12:57:00 PM | 4.907 | 13.661 | 77.878 |
| 6/27/2011 | 1:01:00 PM | 4.964 | 13.602 | 77.168 |
| 6/27/2011 | 1:02:00 PM | 4.972 | 13.601 | 76.357 |
| 6/27/2011 | 1:03:00 PM | 4.951 | 13.611 | 77.742 |
| 6/27/2011 | 1:04:00 PM | 4.918 | 13.654 | 78.508 |
| 6/27/2011 | 1:05:00 PM | 4.951 | 13.63 | 78.765 |
| 6/27/2011 | 1:06:00 PM | 4.954 | 13.628 | 77.734 |
| 6/27/2011 | 1:07:00 PM | 4.968 | 13.637 | 77.553 |
| 6/27/2011 | 1:08:00 PM | 5.013 | 13.591 | 76.506 |
| 6/27/2011 | 1:09:00 PM | 5.048 | 13.557 | 74.832 |
| 6/27/2011 | 1:10:00 PM | 5.036 | 13.556 | 75.125 |
| 6/27/2011 | 1:11:00 PM | 4.988 | 13.607 | 77.06 |
| 6/27/2011 | 1:12:00 PM | 5.01 | 13.585 | 76.606 |
| 6/27/2011 | 1:13:00 PM | 5.003 | 13.599 | 75.676 |
| 6/27/2011 | 1:14:00 PM | 4.962 | 13.64 | 77.807 |
| 6/27/2011 | 1:15:00 PM | 4.979 | 13.612 | 77.684 |
| 6/27/2011 | 1:16:00 PM | 5.001 | 13.6 | 77.528 |
| 6/27/2011 | 1:17:00 PM | 4.968 | 13.638 | 76.952 |
| 6/27/2011 | 1:18:00 PM | 4.931 | 13.673 | 78.974 |
| 6/27/2011 | 1:19:00 PM | 4.936 | 13.673 | 79.723 |
| 6/27/2011 | 1:20:00 PM | 4.941 | 13.686 | 79.314 |
| 6/27/2011 | 1:21:00 PM | 5.006 | 13.622 | 77.315 |
| 6/27/2011 | 1:22:00 PM | 5.007 | 13.611 | 76.214 |
| 6/27/2011 | 1:23:00 PM | 5.038 | 13.577 | 77.977 |

| | | | | |
|---|---|---|---|---|
| 6/27/2011 | 1:24:00 PM | 5.06 | 13.556 | 76.814 |
| 6/27/2011 | 1:25:00 PM | 5.022 | 13.582 | 77.151 |
| 6/27/2011 | 1:26:00 PM | 5.012 | 13.604 | 77.603 |
| 6/27/2011 | 1:27:00 PM | 5.069 | 13.529 | 77.781 |
| 6/27/2011 | 1:28:00 PM | 5.056 | 13.541 | 75.137 |
| 6/27/2011 | 1:29:00 PM | 4.984 | 13.6 | 76.01 |
| 6/27/2011 | 1:30:00 PM | 4.975 | 13.62 | 78.516 |
| 6/27/2011 | 1:31:00 PM | 4.944 | 13.642 | 77.484 |
| 6/27/2011 | 1:32:00 PM | 4.939 | 13.669 | 79.463 |
| 6/27/2011 | 1:33:00 PM | 4.967 | 13.622 | 79.928 |
| 6/27/2011 | 1:34:00 PM | 4.96 | 13.625 | 78.486 |
| 6/27/2011 | 1:35:00 PM | 4.991 | 13.595 | 77.206 |
| 6/27/2011 | 1:36:00 PM | 4.961 | 13.611 | 77.369 |
| 6/27/2011 | 1:37:00 PM | 4.954 | 13.642 | 76.783 |
| 6/27/2011 | 1:38:00 PM | 4.963 | 13.639 | 78.119 |
| 6/27/2011 | 1:39:00 PM | 5.006 | 13.591 | 77.745 |
| 6/27/2011 | 1:40:00 PM | 5.098 | 13.511 | 77.43 |
| 6/27/2011 | 1:41:00 PM | 5.117 | 13.473 | 75.917 |
| 6/27/2011 | 1:42:00 PM | 5.108 | 13.482 | 74.513 |
| 6/27/2011 | 1:43:00 PM | 5.088 | 13.5 | 74.971 |
| 6/27/2011 | 1:44:00 PM | 5.034 | 13.55 | 76.489 |
| 6/27/2011 | 1:45:00 PM | 4.996 | 13.575 | 78.079 |
| 6/27/2011 | 1:46:00 PM | 4.954 | 13.634 | 78.627 |
| 6/27/2011 | 1:47:00 PM | 4.987 | 13.613 | 78.776 |
| 6/27/2011 | 1:48:00 PM | 5.031 | 13.57 | 77.993 |
| 6/27/2011 | 1:49:00 PM | 5.072 | 13.537 | 76.953 |
| 6/27/2011 | 1:50:00 PM | 5.116 | 13.49 | 77.02 |
| 6/27/2011 | 1:51:00 PM | 5.103 | 13.516 | 75.881 |
| 6/27/2011 | 1:52:00 PM | 5.106 | 13.502 | 76.611 |
| 6/27/2011 | 1:53:00 PM | 5.121 | 13.476 | 76.7 |
| 6/27/2011 | 1:54:00 PM | 5.056 | 13.543 | 77.121 |
| 6/27/2011 | 1:55:00 PM | 5.087 | 13.524 | 75.85 |
| 6/27/2011 | 1:56:00 PM | 5.125 | 13.485 | 75.885 |
| 6/27/2011 | 1:57:00 PM | 5.114 | 13.483 | 76.024 |
| 6/27/2011 | 1:58:00 PM | 5.149 | 13.472 | 75.418 |
| 6/27/2011 | 1:59:00 PM | 5.119 | 13.491 | 74.753 |
| 6/27/2011 | 2:00:00 PM | 5.112 | 13.5 | 76.561 |
| | Average | 5.08 | 13.64 | 77.64 |

**ExxonMobil**
**STACK $O_2$, $CO_2$ DATA**

**Test #:** **2-SV**
**Date:** **6/27/2011**
**Time:** **1525/1935**

| | $O_2$ | $CO_2$ | CO |
|---|---|---|---|
| Range | 10 | 20 | 250 |
| Cal Gas | 5.00 | 10.16 | 142 |
| Analyzer Zero | 0.03 | -0.06 | -1.91 |
| Analyzer Span | 5.04 | 10.02 | 142.11 |
| Pre-Bias Zero | 0.04 | 0.02 | -0.11 |
| Pre-Bias Span | 4.96 | 9.80 | 143.26 |
| Post-Bias Zero | 0.05 | 0.01 | 0.02 |
| Post-Bias Span | 4.96 | 9.67 | 143.86 |
| Pre-test zero bias | 0.2% | 0.4% | 0.7% |
| Pre-test span bias | -0.7% | -1.1% | 0.5% |
| Post-test zero bias | 0.2% | 0.3% | 0.8% |
| Post-test span bias | -0.7% | -1.8% | 0.7% |
| Zero Drift | 0.0% | 0.0% | 0.1% |
| Span Drift | 0.0% | -0.7% | 0.2% |
| | PASS | PASS | PASS |
| **Average** | **5.05** | **13.47** | **76.93** |
| **Cal Corrected** | **5.09** | **14.06** | **76.11** |

**ExxonMobil**
**2-SV**

| Date | Time | O2 % | CO2 % | CO ppm |
|---|---|---|---|---|
| 6/27/2011 | 3:31:00 PM | 5.228 | 13.396 | 78.163 |
| 6/27/2011 | 3:32:00 PM | 5.256 | 13.369 | 77.637 |
| 6/27/2011 | 3:33:00 PM | 5.238 | 13.377 | 77.783 |
| 6/27/2011 | 3:34:00 PM | 5.176 | 13.431 | 77.429 |
| 6/27/2011 | 3:35:00 PM | 5.173 | 13.452 | 76.627 |
| 6/27/2011 | 3:36:00 PM | 5.182 | 13.439 | 78.152 |
| 6/27/2011 | 3:37:00 PM | 5.146 | 13.47 | 79.583 |
| 6/27/2011 | 3:38:00 PM | 5.093 | 13.517 | 78.587 |
| 6/27/2011 | 3:39:00 PM | 5.135 | 13.475 | 78.02 |
| 6/27/2011 | 3:40:00 PM | 5.201 | 13.4 | 77.273 |
| 6/27/2011 | 3:41:00 PM | 5.13 | 13.474 | 77.941 |
| 6/27/2011 | 3:42:00 PM | 5.123 | 13.483 | 78.017 |
| 6/27/2011 | 3:43:00 PM | 5.141 | 13.482 | 77.388 |
| 6/27/2011 | 3:44:00 PM | 5.139 | 13.478 | 78.406 |
| 6/27/2011 | 3:45:00 PM | 5.16 | 13.467 | 79.273 |
| 6/27/2011 | 3:46:00 PM | 5.15 | 13.463 | 78.891 |
| 6/27/2011 | 3:47:00 PM | 5.199 | 13.443 | 78.199 |
| 6/27/2011 | 3:48:00 PM | 5.174 | 13.438 | 78.401 |
| 6/27/2011 | 3:49:00 PM | 5.176 | 13.453 | 78.873 |
| 6/27/2011 | 3:50:00 PM | 5.196 | 13.426 | 78.484 |
| 6/27/2011 | 3:51:00 PM | 5.065 | 13.54 | 78.85 |
| 6/27/2011 | 3:52:00 PM | 5.059 | 13.544 | 80.439 |
| 6/27/2011 | 3:53:00 PM | 5.081 | 13.521 | 81.339 |
| 6/27/2011 | 3:54:00 PM | 5.093 | 13.527 | 80.24 |
| 6/27/2011 | 3:55:00 PM | 5.157 | 13.483 | 78.811 |
| 6/27/2011 | 3:56:00 PM | 5.195 | 13.421 | 77.646 |
| 6/27/2011 | 3:57:00 PM | 5.143 | 13.479 | 78.81 |
| 6/27/2011 | 3:58:00 PM | 5.127 | 13.5 | 79.521 |
| 6/27/2011 | 3:59:00 PM | 5.134 | 13.501 | 82.123 |
| 6/27/2011 | 4:00:00 PM | 5.181 | 13.448 | 80.682 |
| 6/27/2011 | 4:01:00 PM | 5.176 | 13.464 | 79.979 |
| 6/27/2011 | 4:02:00 PM | 5.19 | 13.432 | 80.328 |
| 6/27/2011 | 4:03:00 PM | 5.183 | 13.429 | 79.036 |
| 6/27/2011 | 4:04:00 PM | 5.199 | 13.422 | 77.141 |
| 6/27/2011 | 4:05:00 PM | 5.195 | 13.418 | 78.202 |
| 6/27/2011 | 4:06:00 PM | 5.133 | 13.489 | 79.455 |
| 6/27/2011 | 4:07:00 PM | 5.155 | 13.464 | 79.804 |
| 6/27/2011 | 4:08:00 PM | 5.152 | 13.473 | 80.759 |
| 6/27/2011 | 4:09:00 PM | 5.14 | 13.474 | 80.837 |
| 6/27/2011 | 4:10:00 PM | 5.117 | 13.501 | 79.605 |
| 6/27/2011 | 4:11:00 PM | 5.135 | 13.511 | 80.181 |
| 6/27/2011 | 4:12:00 PM | 5.157 | 13.473 | 79.605 |
| 6/27/2011 | 4:13:00 PM | 5.142 | 13.496 | 77.389 |
| 6/27/2011 | 4:14:00 PM | 5.182 | 13.438 | 77.634 |
| 6/27/2011 | 4:15:00 PM | 5.157 | 13.448 | 75.283 |
| 6/27/2011 | 4:16:00 PM | 5.135 | 13.471 | 75.264 |
| 6/27/2011 | 4:17:00 PM | 5.126 | 13.483 | 76.345 |

| | | | | |
|---|---|---|---|---|
| 6/27/2011 | 4:18:00 PM | 5.121 | 13.501 | 78.195 |
| 6/27/2011 | 4:19:00 PM | 5.138 | 13.468 | 78.079 |
| 6/27/2011 | 4:20:00 PM | 5.109 | 13.503 | 77.019 |
| 6/27/2011 | 4:21:00 PM | 5.16 | 13.464 | 76.109 |
| 6/27/2011 | 4:22:00 PM | 5.157 | 13.441 | 75.368 |
| 6/27/2011 | 4:23:00 PM | 5.148 | 13.461 | 74.939 |
| 6/27/2011 | 4:24:00 PM | 5.165 | 13.445 | 75.175 |
| 6/27/2011 | 4:25:00 PM | 5.131 | 13.451 | 74.572 |
| 6/27/2011 | 4:27:00 PM | 5.067 | 13.53 | 74.866 |
| 6/27/2011 | 4:28:00 PM | 5.06 | 13.542 | 76.434 |
| 6/27/2011 | 4:29:00 PM | 5.123 | 13.477 | 75.653 |
| 6/27/2011 | 4:30:00 PM | 5.101 | 13.492 | 76.971 |
| 6/27/2011 | 4:31:00 PM | 5.107 | 13.485 | 75.973 |
| 6/27/2011 | 4:32:00 PM | 5.136 | 13.466 | 76.096 |
| 6/27/2011 | 4:33:00 PM | 5.122 | 13.473 | 77.09 |
| 6/27/2011 | 4:34:00 PM | 5.05 | 13.538 | 78.755 |
| 6/27/2011 | 4:35:00 PM | 5.056 | 13.523 | 77.945 |
| 6/27/2011 | 4:36:00 PM | 5.086 | 13.502 | 73.407 |
| 6/27/2011 | 4:37:00 PM | 5.134 | 13.454 | 62.608 |
| 6/27/2011 | 4:38:00 PM | 5.113 | 13.459 | 60.788 |
| 6/27/2011 | 4:39:00 PM | 5.127 | 13.48 | 60.063 |
| 6/27/2011 | 4:40:00 PM | 5.12 | 13.463 | 65.397 |
| 6/27/2011 | 4:41:00 PM | 5.072 | 13.509 | 73.432 |
| 6/27/2011 | 4:42:00 PM | 5.02 | 13.561 | 77.58 |
| 6/27/2011 | 4:43:00 PM | 5.025 | 13.54 | 78.734 |
| 6/27/2011 | 4:44:00 PM | 5.048 | 13.519 | 77.472 |
| 6/27/2011 | 4:45:00 PM | 5.076 | 13.509 | 76.421 |
| 6/27/2011 | 4:46:00 PM | 5.046 | 13.53 | 76.163 |
| 6/27/2011 | 4:47:00 PM | 5.056 | 13.505 | 77.735 |
| 6/27/2011 | 4:48:00 PM | 4.989 | 13.57 | 78.161 |
| 6/27/2011 | 4:49:00 PM | 5.086 | 13.496 | 78.005 |
| 6/27/2011 | 4:50:00 PM | 5.089 | 13.47 | 78.587 |
| 6/27/2011 | 4:51:00 PM | 5.074 | 13.483 | 78.149 |
| 6/27/2011 | 4:52:00 PM | 5.069 | 13.481 | 77.636 |
| 6/27/2011 | 4:53:00 PM | 5.054 | 13.477 | 77.867 |
| 6/27/2011 | 4:54:00 PM | 5.018 | 13.52 | 78.061 |
| 6/27/2011 | 4:55:00 PM | 5.05 | 13.506 | 79.43 |
| 6/27/2011 | 4:56:00 PM | 5.092 | 13.474 | 77.583 |
| 6/27/2011 | 4:57:00 PM | 5.143 | 13.417 | 75.634 |
| 6/27/2011 | 4:58:00 PM | 5.13 | 13.422 | 76.433 |
| 6/27/2011 | 4:59:00 PM | 5.118 | 13.438 | 77.222 |
| 6/27/2011 | 5:00:00 PM | 5.121 | 13.424 | 77.865 |
| 6/27/2011 | 5:01:00 PM | 5.14 | 13.41 | 78.064 |
| 6/27/2011 | 5:02:00 PM | 5.073 | 13.464 | 78.966 |
| 6/27/2011 | 5:03:00 PM | 5.092 | 13.457 | 79.375 |
| 6/27/2011 | 5:04:00 PM | 5.113 | 13.425 | 78.424 |
| 6/27/2011 | 5:05:00 PM | 5.115 | 13.413 | 77.426 |
| 6/27/2011 | 5:06:00 PM | 5.141 | 13.399 | 76.711 |
| 6/27/2011 | 5:07:00 PM | 5.105 | 13.412 | 76.61 |
| 6/27/2011 | 5:08:00 PM | 5.063 | 13.456 | 76.375 |
| 6/27/2011 | 5:09:00 PM | 5.102 | 13.442 | 78.16 |
| 6/27/2011 | 5:10:00 PM | 5.157 | 13.375 | 75.816 |

| | | | | |
|---|---|---|---|---|
| 6/27/2011 | 5:11:00 PM | 5.17 | 13.365 | 74.979 |
| 6/27/2011 | 5:12:00 PM | 5.16 | 13.369 | 74.851 |
| 6/27/2011 | 5:13:00 PM | 5.123 | 13.393 | 76.404 |
| 6/27/2011 | 5:14:00 PM | 5.08 | 13.43 | 76.552 |
| 6/27/2011 | 5:15:00 PM | 5.049 | 13.462 | 76.864 |
| 6/27/2011 | 5:16:00 PM | 5.061 | 13.442 | 78.444 |
| 6/27/2011 | 5:17:00 PM | 5.058 | 13.453 | 77.491 |
| 6/27/2011 | 5:18:00 PM | 5.071 | 13.455 | 76.365 |
| 6/27/2011 | 5:19:00 PM | 5.067 | 13.45 | 76.157 |
| 6/27/2011 | 5:20:00 PM | 5.011 | 13.507 | 77.436 |
| 6/27/2011 | 5:21:00 PM | 5.023 | 13.494 | 76.929 |
| 6/27/2011 | 5:22:00 PM | 4.972 | 13.541 | 77.205 |
| 6/27/2011 | 5:23:00 PM | 4.941 | 13.586 | 79.715 |
| 6/27/2011 | 5:24:00 PM | 5.03 | 13.49 | 77.257 |
| 6/27/2011 | 5:25:00 PM | 5.085 | 13.438 | 75.01 |
| 6/27/2011 | 5:26:00 PM | 5.048 | 13.469 | 75.036 |
| 6/27/2011 | 5:34:00 PM | 5.127 | 13.352 | 77.948 |
| 6/27/2011 | 5:35:00 PM | 5.072 | 13.399 | 75.661 |
| 6/27/2011 | 5:36:00 PM | 5.055 | 13.423 | 73.584 |
| 6/27/2011 | 5:37:00 PM | 5.058 | 13.43 | 75.403 |
| 6/27/2011 | 5:38:00 PM | 5.03 | 13.443 | 76.649 |
| 6/27/2011 | 5:39:00 PM | 5.015 | 13.468 | 76.485 |
| 6/27/2011 | 5:40:00 PM | 4.97 | 13.496 | 78.677 |
| 6/27/2011 | 5:41:00 PM | 4.907 | 13.56 | 79.438 |
| 6/27/2011 | 5:42:00 PM | 4.943 | 13.547 | 79.802 |
| 6/27/2011 | 5:43:00 PM | 4.961 | 13.523 | 79.729 |
| 6/27/2011 | 5:44:00 PM | 4.879 | 13.604 | 80.855 |
| 6/27/2011 | 5:45:00 PM | 4.962 | 13.513 | 80.878 |
| 6/27/2011 | 5:46:00 PM | 4.998 | 13.481 | 79.182 |
| 6/27/2011 | 5:47:00 PM | 4.96 | 13.504 | 80.407 |
| 6/27/2011 | 5:48:00 PM | 4.996 | 13.491 | 79.928 |
| 6/27/2011 | 5:49:00 PM | 4.999 | 13.481 | 78.681 |
| 6/27/2011 | 5:50:00 PM | 4.966 | 13.505 | 78.077 |
| 6/27/2011 | 5:51:00 PM | 4.956 | 13.523 | 79.661 |
| 6/27/2011 | 5:52:00 PM | 5.003 | 13.482 | 81.02 |
| 6/27/2011 | 5:53:00 PM | 5.022 | 13.453 | 79.927 |
| 6/27/2011 | 5:54:00 PM | 5.026 | 13.454 | 78.392 |
| 6/27/2011 | 5:55:00 PM | 5.047 | 13.431 | 78.275 |
| 6/27/2011 | 5:56:00 PM | 5.001 | 13.479 | 78.259 |
| 6/27/2011 | 5:57:00 PM | 4.994 | 13.473 | 78.234 |
| 6/27/2011 | 5:58:00 PM | 4.955 | 13.518 | 78.54 |
| 6/27/2011 | 5:59:00 PM | 4.994 | 13.483 | 78.355 |
| 6/27/2011 | 6:00:00 PM | 5.048 | 13.444 | 76.554 |
| 6/27/2011 | 6:01:00 PM | 5.007 | 13.465 | 75.457 |
| 6/27/2011 | 6:02:00 PM | 5 | 13.474 | 76.845 |
| 6/27/2011 | 6:03:00 PM | 5.049 | 13.435 | 78.074 |
| 6/27/2011 | 6:04:00 PM | 5.027 | 13.455 | 78.132 |
| 6/27/2011 | 6:05:00 PM | 5.015 | 13.471 | 79.14 |
| 6/27/2011 | 6:06:00 PM | 5.032 | 13.443 | 78.538 |
| 6/27/2011 | 6:07:00 PM | 5.007 | 13.467 | 77.65 |
| 6/27/2011 | 6:08:00 PM | 5.02 | 13.459 | 78.224 |
| 6/27/2011 | 6:09:00 PM | 4.987 | 13.485 | 78.367 |

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|---|---|---|---|---|
| 6/27/2011 | 6:10:00 PM | 4.995 | 13.486 | 77.693 |
| 6/27/2011 | 6:11:00 PM | 5.01 | 13.464 | 79.286 |
| 6/27/2011 | 6:12:00 PM | 4.979 | 13.495 | 79.227 |
| 6/27/2011 | 6:13:00 PM | 5.013 | 13.462 | 78.269 |
| 6/27/2011 | 6:14:00 PM | 4.998 | 13.473 | 77.041 |
| 6/27/2011 | 6:15:00 PM | 4.989 | 13.489 | 76.638 |
| 6/27/2011 | 6:16:00 PM | 5.04 | 13.435 | 76.258 |
| 6/27/2011 | 6:17:00 PM | 4.999 | 13.46 | 76.175 |
| 6/27/2011 | 6:18:00 PM | 5.003 | 13.458 | 77.365 |
| 6/27/2011 | 6:19:00 PM | 5.008 | 13.474 | 78.776 |
| 6/27/2011 | 6:20:00 PM | 4.996 | 13.467 | 79.774 |
| 6/27/2011 | 6:21:00 PM | 4.97 | 13.491 | 77.311 |
| 6/27/2011 | 6:22:00 PM | 5.005 | 13.459 | 77.923 |
| 6/27/2011 | 6:23:00 PM | 4.932 | 13.521 | 78.367 |
| 6/27/2011 | 6:24:00 PM | 4.946 | 13.521 | 79.843 |
| 6/27/2011 | 6:25:00 PM | 4.961 | 13.525 | 80.278 |
| 6/27/2011 | 6:26:00 PM | 4.941 | 13.531 | 80.875 |
| 6/27/2011 | 6:27:00 PM | 4.961 | 13.475 | 80.885 |
| 6/27/2011 | 6:28:00 PM | 4.991 | 13.476 | 79.688 |
| 6/27/2011 | 6:29:00 PM | 5 | 13.475 | 77.382 |
| 6/27/2011 | 6:30:00 PM | 5.024 | 13.461 | 55.114 |
| 6/27/2011 | 6:31:00 PM | 5 | 13.484 | 47.527 |
| 6/27/2011 | 6:32:00 PM | 5.013 | 13.466 | 47.355 |
| 6/27/2011 | 6:33:00 PM | 4.977 | 13.5 | 63.947 |
| 6/27/2011 | 6:36:00 PM | 4.969 | 13.503 | 78.045 |
| 6/27/2011 | 6:37:00 PM | 4.998 | 13.473 | 78.553 |
| 6/27/2011 | 6:38:00 PM | 4.984 | 13.487 | 79.072 |
| 6/27/2011 | 6:39:00 PM | 4.995 | 13.468 | 78.293 |
| 6/27/2011 | 6:40:00 PM | 4.926 | 13.526 | 79.395 |
| 6/27/2011 | 6:41:00 PM | 5.002 | 13.466 | 79.607 |
| 6/27/2011 | 6:42:00 PM | 5.019 | 13.438 | 78.132 |
| 6/27/2011 | 6:43:00 PM | 4.976 | 13.476 | 78.179 |
| 6/27/2011 | 6:44:00 PM | 4.945 | 13.524 | 78.165 |
| 6/27/2011 | 6:45:00 PM | 4.963 | 13.502 | 75.401 |
| 6/27/2011 | 6:46:00 PM | 4.989 | 13.467 | 63.921 |
| 6/27/2011 | 6:47:00 PM | 4.932 | 13.53 | 61.671 |
| 6/27/2011 | 6:48:00 PM | 4.93 | 13.531 | 66.925 |
| 6/27/2011 | 6:49:00 PM | 4.851 | 13.575 | 76.753 |
| 6/27/2011 | 6:50:00 PM | 4.839 | 13.607 | 79.61 |
| 6/27/2011 | 6:51:00 PM | 4.829 | 13.612 | 80.049 |
| 6/27/2011 | 6:52:00 PM | 4.815 | 13.629 | 82.477 |
| 6/27/2011 | 6:53:00 PM | 4.871 | 13.585 | 79.76 |
| 6/27/2011 | 6:54:00 PM | 4.882 | 13.577 | 78.702 |
| 6/27/2011 | 6:55:00 PM | 4.921 | 13.533 | 79.129 |
| 6/27/2011 | 6:56:00 PM | 4.957 | 13.501 | 78.796 |
| 6/27/2011 | 6:57:00 PM | 4.953 | 13.504 | 77.875 |
| 6/27/2011 | 6:58:00 PM | 4.966 | 13.498 | 78.609 |
| 6/27/2011 | 6:59:00 PM | 4.985 | 13.488 | 78.187 |
| 6/27/2011 | 7:00:00 PM | 4.984 | 13.483 | 76.782 |
| 6/27/2011 | 7:01:00 PM | 4.916 | 13.533 | 79.416 |
| 6/27/2011 | 7:02:00 PM | 4.915 | 13.537 | 79.516 |
| 6/27/2011 | 7:03:00 PM | 4.89 | 13.567 | 79.638 |

| | | | | |
|---|---|---|---|---|
| 6/27/2011 | 7:04:00 PM | 4.966 | 13.498 | 79.024 |
| 6/27/2011 | 7:05:00 PM | 5.039 | 13.421 | 77.236 |
| 6/27/2011 | 7:06:00 PM | 5.012 | 13.444 | 76.147 |
| 6/27/2011 | 7:07:00 PM | 5.047 | 13.422 | 77.118 |
| 6/27/2011 | 7:08:00 PM | 4.983 | 13.478 | 80.592 |
| 6/27/2011 | 7:09:00 PM | 4.953 | 13.484 | 82.002 |
| 6/27/2011 | 7:10:00 PM | 4.987 | 13.463 | 78.527 |
| 6/27/2011 | 7:11:00 PM | 5.013 | 13.443 | 78.13 |
| 6/27/2011 | 7:12:00 PM | 5.027 | 13.427 | 78.569 |
| 6/27/2011 | 7:13:00 PM | 5.033 | 13.407 | 77.216 |
| 6/27/2011 | 7:14:00 PM | 5.014 | 13.436 | 79.97 |
| 6/27/2011 | 7:15:00 PM | 5.088 | 13.371 | 77.899 |
| 6/27/2011 | 7:16:00 PM | 5.076 | 13.359 | 77.319 |
| 6/27/2011 | 7:17:00 PM | 5.089 | 13.361 | 77.616 |
| 6/27/2011 | 7:18:00 PM | 5.1 | 13.361 | 77.736 |
| 6/27/2011 | 7:19:00 PM | 5.082 | 13.364 | 78.655 |
| 6/27/2011 | 7:20:00 PM | 5.073 | 13.366 | 79.72 |
| 6/27/2011 | 7:21:00 PM | 5.084 | 13.364 | 78.224 |
| 6/27/2011 | 7:22:00 PM | 5.056 | 13.402 | 72.528 |
| 6/27/2011 | 7:23:00 PM | 5.075 | 13.395 | 69.785 |
| 6/27/2011 | 7:24:00 PM | 5.077 | 13.369 | 68.659 |
| 6/27/2011 | 7:25:00 PM | 5.045 | 13.379 | 72.079 |
| 6/27/2011 | 7:26:00 PM | 5.012 | 13.416 | 76.867 |
| 6/27/2011 | 7:27:00 PM | 5.005 | 13.443 | 72.251 |
| 6/27/2011 | 7:28:00 PM | 5.005 | 13.441 | 67.873 |
| 6/27/2011 | 7:29:00 PM | 5.023 | 13.431 | 67.652 |
| 6/27/2011 | 7:30:00 PM | 4.981 | 13.451 | 74.008 |
| 6/27/2011 | 7:31:00 PM | 5.043 | 13.413 | 77.177 |
| 6/27/2011 | 7:32:00 PM | 5.039 | 13.403 | 77.163 |
| 6/27/2011 | 7:33:00 PM | 5.011 | 13.429 | 78.423 |
| 6/27/2011 | 7:34:00 PM | 5.028 | 13.413 | 78.586 |
| 6/27/2011 | 7:35:00 PM | 5.023 | 13.417 | 79.968 |
| | Average | 5.05 | 13.47 | 76.93 |

**ExxonMobil**
**STACK $O_2$, $CO_2$ DATA**

**Test #:** **3-SV**
**Date:** **6/28/2011**
**Time:** **802/1220**

| | $O_2$ | $CO_2$ | CO |
|---|---|---|---|
| Range | 10 | 20 | 250 |
| Cal Gas | 5.00 | 10.16 | 142 |
| Analyzer Zero | 0.05 | 0.00 | 0.49 |
| Analyzer Span | 4.98 | 9.97 | 144.14 |
| Pre-Bias Zero | 0.04 | 0.01 | -0.11 |
| Pre-Bias Span | 4.97 | 9.91 | 143.37 |
| Post-Bias Zero | 0.04 | 0.01 | -0.16 |
| Post-Bias Span | 5.00 | 10.01 | 145.16 |
| Pre-test zero bias | -0.1% | 0.1% | -0.2% |
| Pre-test span bias | -0.2% | -0.3% | -0.3% |
| Post-test zero bias | -0.1% | 0.1% | -0.3% |
| Post-test span bias | 0.1% | 0.2% | 0.4% |
| Zero Drift | 0.0% | 0.0% | 0.0% |
| Span Drift | 0.3% | 0.5% | 0.7% |
| | PASS | PASS | PASS |
| **Average** | **4.95** | **13.83** | **75.87** |
| **Cal Corrected** | **4.97** | **14.11** | **74.75** |

**ExxonMobil**
**3-SV**

| Date | Time | O2 % | CO2 % | CO ppm |
|---|---|---|---|---|
| 6/28/2011 | 8:03:00 AM | 4.943 | 13.784 | 73.214 |
| 6/28/2011 | 8:04:00 AM | 4.985 | 13.759 | 72.848 |
| 6/28/2011 | 8:05:00 AM | 5.061 | 13.682 | 71.686 |
| 6/28/2011 | 8:06:00 AM | 5.051 | 13.669 | 71.628 |
| 6/28/2011 | 8:07:00 AM | 5.032 | 13.713 | 71.203 |
| 6/28/2011 | 8:08:00 AM | 5.044 | 13.687 | 71.194 |
| 6/28/2011 | 8:09:00 AM | 5.051 | 13.679 | 70.82 |
| 6/28/2011 | 8:10:00 AM | 5.014 | 13.698 | 72.345 |
| 6/28/2011 | 8:11:00 AM | 5.027 | 13.697 | 71.94 |
| 6/28/2011 | 8:12:00 AM | 5.043 | 13.673 | 70.624 |
| 6/28/2011 | 8:13:00 AM | 5.086 | 13.636 | 69.474 |
| 6/28/2011 | 8:14:00 AM | 5.037 | 13.665 | 68.64 |
| 6/28/2011 | 8:15:00 AM | 5.007 | 13.694 | 68.026 |
| 6/28/2011 | 8:16:00 AM | 4.946 | 13.737 | 69.047 |
| 6/28/2011 | 8:17:00 AM | 4.922 | 13.757 | 70.306 |
| 6/28/2011 | 8:18:00 AM | 4.902 | 13.767 | 69.851 |
| 6/28/2011 | 8:19:00 AM | 4.864 | 13.811 | 71.478 |
| 6/28/2011 | 8:20:00 AM | 4.815 | 13.854 | 77.851 |
| 6/28/2011 | 8:21:00 AM | 4.815 | 13.858 | 77.289 |
| 6/28/2011 | 8:22:00 AM | 4.783 | 13.891 | 75.576 |
| 6/28/2011 | 8:23:00 AM | 4.788 | 13.91 | 77.633 |
| 6/28/2011 | 8:24:00 AM | 4.834 | 13.943 | 92.726 |
| 6/28/2011 | 8:25:00 AM | 4.909 | 13.856 | 77.453 |
| 6/28/2011 | 8:26:00 AM | 4.888 | 13.875 | 72.463 |
| 6/28/2011 | 8:27:00 AM | 4.924 | 13.85 | 70.936 |
| 6/28/2011 | 8:28:00 AM | 4.902 | 13.872 | 70.943 |
| 6/28/2011 | 8:29:00 AM | 4.884 | 13.899 | 70.677 |
| 6/28/2011 | 8:30:00 AM | 4.853 | 13.965 | 73.505 |
| 6/28/2011 | 8:31:00 AM | 4.828 | 14.003 | 86.819 |
| 6/28/2011 | 8:32:00 AM | 4.864 | 14.002 | 80.64 |
| 6/28/2011 | 8:33:00 AM | 4.917 | 14.001 | 74.159 |
| 6/28/2011 | 8:34:00 AM | 4.845 | 13.879 | 71.797 |
| 6/28/2011 | 8:35:00 AM | 4.793 | 13.905 | 79.165 |
| 6/28/2011 | 8:36:00 AM | 4.847 | 13.859 | 77.178 |
| 6/28/2011 | 8:37:00 AM | 4.841 | 13.854 | 75.164 |
| 6/28/2011 | 8:38:00 AM | 4.801 | 13.841 | 77.808 |
| 6/28/2011 | 8:39:00 AM | 4.872 | 13.838 | 76.078 |
| 6/28/2011 | 8:40:00 AM | 4.898 | 13.827 | 72.616 |
| 6/28/2011 | 8:41:00 AM | 4.879 | 13.839 | 72.007 |
| 6/28/2011 | 8:42:00 AM | 4.894 | 13.846 | 71.533 |
| 6/28/2011 | 8:43:00 AM | 4.929 | 13.844 | 70.561 |
| 6/28/2011 | 8:44:00 AM | 4.914 | 13.866 | 71.005 |
| 6/28/2011 | 8:45:00 AM | 4.933 | 13.849 | 72.212 |
| 6/28/2011 | 8:46:00 AM | 4.98 | 13.805 | 69.617 |
| 6/28/2011 | 8:47:00 AM | 5.006 | 13.786 | 68.507 |
| 6/28/2011 | 8:48:00 AM | 5.02 | 13.769 | 67.854 |
| 6/28/2011 | 8:49:00 AM | 5.121 | 14.213 | 70.761 |

| | | | | |
|---|---|---|---|---|
| 6/28/2011 | 8:50:00 AM | 5.375 | 14.906 | 75.464 |
| 6/28/2011 | 8:51:00 AM | 5.586 | 15.353 | 76.963 |
| 6/28/2011 | 8:52:00 AM | 4.982 | 13.98 | 71.528 |
| 6/28/2011 | 8:53:00 AM | 4.931 | 13.84 | 70.322 |
| 6/28/2011 | 8:54:00 AM | 4.96 | 13.822 | 70.618 |
| 6/28/2011 | 8:55:00 AM | 4.929 | 13.842 | 70.884 |
| 6/28/2011 | 8:56:00 AM | 4.911 | 13.853 | 72.201 |
| 6/28/2011 | 8:57:00 AM | 4.878 | 13.904 | 101.265 |
| 6/28/2011 | 8:58:00 AM | 4.887 | 13.908 | 104.816 |
| 6/28/2011 | 8:59:00 AM | 4.898 | 13.91 | 91.678 |
| 6/28/2011 | 9:00:00 AM | 4.899 | 13.897 | 77.005 |
| 6/28/2011 | 9:01:00 AM | 4.917 | 13.871 | 72.879 |
| 6/28/2011 | 9:02:00 AM | 4.927 | 13.869 | 71.157 |
| 6/28/2011 | 9:05:00 AM | 5.01 | 13.783 | 74.739 |
| 6/28/2011 | 9:06:00 AM | 4.956 | 13.866 | 71.131 |
| 6/28/2011 | 9:07:00 AM | 4.955 | 13.899 | 70.771 |
| 6/28/2011 | 9:08:00 AM | 4.955 | 13.902 | 70.894 |
| 6/28/2011 | 9:09:00 AM | 4.982 | 13.907 | 71.463 |
| 6/28/2011 | 9:10:00 AM | 4.954 | 13.947 | 73.592 |
| 6/28/2011 | 9:11:00 AM | 4.903 | 13.895 | 78.797 |
| 6/28/2011 | 9:12:00 AM | 4.884 | 13.786 | 76.582 |
| 6/28/2011 | 9:13:00 AM | 4.81 | 13.855 | 79.662 |
| 6/28/2011 | 9:14:00 AM | 4.797 | 13.873 | 83.009 |
| 6/28/2011 | 9:15:00 AM | 4.808 | 13.889 | 88.696 |
| 6/28/2011 | 9:16:00 AM | 4.835 | 13.851 | 91.936 |
| 6/28/2011 | 9:17:00 AM | 4.869 | 13.824 | 76.746 |
| 6/28/2011 | 9:18:00 AM | 4.901 | 13.827 | 71.571 |
| 6/28/2011 | 9:19:00 AM | 4.925 | 13.833 | 75.217 |
| 6/28/2011 | 9:20:00 AM | 4.896 | 13.856 | 80.727 |
| 6/28/2011 | 9:21:00 AM | 4.851 | 13.906 | 74.311 |
| 6/28/2011 | 9:22:00 AM | 4.841 | 13.925 | 73.532 |
| 6/28/2011 | 9:23:00 AM | 4.858 | 13.925 | 73.427 |
| 6/28/2011 | 9:24:00 AM | 4.873 | 13.923 | 74.075 |
| 6/28/2011 | 9:25:00 AM | 4.941 | 13.858 | 72.167 |
| 6/28/2011 | 9:26:00 AM | 4.975 | 13.821 | 70.74 |
| 6/28/2011 | 9:27:00 AM | 4.893 | 13.9 | 74.206 |
| 6/28/2011 | 9:28:00 AM | 4.927 | 13.864 | 76.185 |
| 6/28/2011 | 9:29:00 AM | 4.952 | 13.843 | 74.017 |
| 6/28/2011 | 9:30:00 AM | 4.962 | 13.829 | 72.437 |
| 6/28/2011 | 9:31:00 AM | 4.891 | 13.884 | 74.045 |
| 6/28/2011 | 9:32:00 AM | 4.924 | 13.86 | 75.787 |
| 6/28/2011 | 9:33:00 AM | 4.92 | 13.854 | 73.99 |
| 6/28/2011 | 9:34:00 AM | 4.899 | 13.888 | 73.381 |
| 6/28/2011 | 9:35:00 AM | 5 | 13.798 | 72.461 |
| 6/28/2011 | 9:36:00 AM | 4.985 | 13.809 | 71.78 |
| 6/28/2011 | 9:37:00 AM | 4.97 | 13.803 | 71.755 |
| 6/28/2011 | 9:38:00 AM | 4.919 | 13.878 | 72.764 |
| 6/28/2011 | 9:39:00 AM | 4.892 | 13.896 | 74.84 |
| 6/28/2011 | 9:40:00 AM | 4.861 | 13.934 | 76.045 |
| 6/28/2011 | 9:41:00 AM | 4.845 | 13.963 | 76.774 |
| 6/28/2011 | 9:42:00 AM | 4.857 | 13.968 | 77.314 |
| 6/28/2011 | 9:43:00 AM | 4.911 | 13.911 | 75.487 |

| | | | | |
|---|---|---|---|---|
| 6/28/2011 | 9:44:00 AM | 4.932 | 13.914 | 73.809 |
| 6/28/2011 | 9:45:00 AM | 4.961 | 13.927 | 72.511 |
| 6/28/2011 | 9:46:00 AM | 5.085 | 14.258 | 75.621 |
| 6/28/2011 | 9:47:00 AM | 5.028 | 13.899 | 74.458 |
| 6/28/2011 | 9:48:00 AM | 4.992 | 13.915 | 76.77 |
| 6/28/2011 | 9:49:00 AM | 5.066 | 13.833 | 75.542 |
| 6/28/2011 | 9:50:00 AM | 5.11 | 13.778 | 71.394 |
| 6/28/2011 | 9:51:00 AM | 5.042 | 13.834 | 69.851 |
| 6/28/2011 | 9:52:00 AM | 5.014 | 13.848 | 70.921 |
| 6/28/2011 | 9:53:00 AM | 5.003 | 13.86 | 71.903 |
| 6/28/2011 | 9:54:00 AM | 4.934 | 13.917 | 74.159 |
| 6/28/2011 | 9:55:00 AM | 4.858 | 14.007 | 77.487 |
| 6/28/2011 | 9:56:00 AM | 4.881 | 13.989 | 78.312 |
| 6/28/2011 | 9:57:00 AM | 4.898 | 13.945 | 74.975 |
| 6/28/2011 | 9:58:00 AM | 4.926 | 13.919 | 73.434 |
| 6/28/2011 | 9:59:00 AM | 4.931 | 13.94 | 73.694 |
| 6/28/2011 | 10:00:00 AM | 4.967 | 13.901 | 74.527 |
| 6/28/2011 | 10:01:00 AM | 4.985 | 13.902 | 74.459 |
| 6/28/2011 | 10:02:00 AM | 4.952 | 13.912 | 75.411 |
| 6/28/2011 | 10:03:00 AM | 4.955 | 13.895 | 75.636 |
| 6/28/2011 | 10:04:00 AM | 4.975 | 13.907 | 75.238 |
| 6/28/2011 | 10:19:00 AM | 4.941 | 13.925 | 74.036 |
| 6/28/2011 | 10:20:00 AM | 4.964 | 13.908 | 73.502 |
| 6/28/2011 | 10:21:00 AM | 4.954 | 13.915 | 73.367 |
| 6/28/2011 | 10:22:00 AM | 4.966 | 13.952 | 75.398 |
| 6/28/2011 | 10:23:00 AM | 4.966 | 13.949 | 74.528 |
| 6/28/2011 | 10:24:00 AM | 5.03 | 13.911 | 74.248 |
| 6/28/2011 | 10:25:00 AM | 5.08 | 13.843 | 73.282 |
| 6/28/2011 | 10:26:00 AM | 5.11 | 13.824 | 71.563 |
| 6/28/2011 | 10:27:00 AM | 5.068 | 13.855 | 70.39 |
| 6/28/2011 | 10:28:00 AM | 5.12 | 14.046 | 70.992 |
| 6/28/2011 | 10:29:00 AM | 4.985 | 13.715 | 69.04 |
| 6/28/2011 | 10:30:00 AM | 4.927 | 13.767 | 71.412 |
| 6/28/2011 | 10:31:00 AM | 4.954 | 13.732 | 72.696 |
| 6/28/2011 | 10:32:00 AM | 4.924 | 13.741 | 71.318 |
| 6/28/2011 | 10:33:00 AM | 4.907 | 13.79 | 71.028 |
| 6/28/2011 | 10:34:00 AM | 4.953 | 13.731 | 71.075 |
| 6/28/2011 | 10:35:00 AM | 4.921 | 13.759 | 70.336 |
| 6/28/2011 | 10:36:00 AM | 4.929 | 13.747 | 69.868 |
| 6/28/2011 | 10:37:00 AM | 4.871 | 13.799 | 70.59 |
| 6/28/2011 | 10:38:00 AM | 4.826 | 13.826 | 90.31 |
| 6/28/2011 | 10:39:00 AM | 4.824 | 13.84 | 84.91 |
| 6/28/2011 | 10:40:00 AM | 4.809 | 13.846 | 92.568 |
| 6/28/2011 | 10:41:00 AM | 4.777 | 13.883 | 175.435 |
| 6/28/2011 | 10:42:00 AM | 4.786 | 13.887 | 126.896 |
| 6/28/2011 | 10:43:00 AM | 4.78 | 13.891 | 167.537 |
| 6/28/2011 | 10:44:00 AM | 4.807 | 13.886 | 147.563 |
| 6/28/2011 | 10:45:00 AM | 4.84 | 13.857 | 92.666 |
| 6/28/2011 | 10:46:00 AM | 4.891 | 13.803 | 78.707 |
| 6/28/2011 | 10:47:00 AM | 4.863 | 13.826 | 77.161 |
| 6/28/2011 | 10:48:00 AM | 4.924 | 13.778 | 73.799 |
| 6/28/2011 | 10:49:00 AM | 4.922 | 13.779 | 73.505 |

| | | | | |
|---|---|---|---|---|
| 6/28/2011 | 10:50:00 AM | 4.896 | 13.806 | 73.637 |
| 6/28/2011 | 10:51:00 AM | 4.896 | 13.815 | 74.767 |
| 6/28/2011 | 10:52:00 AM | 4.931 | 13.765 | 73.748 |
| 6/28/2011 | 10:53:00 AM | 4.969 | 13.735 | 71.327 |
| 6/28/2011 | 10:54:00 AM | 5.003 | 13.712 | 70.515 |
| 6/28/2011 | 10:55:00 AM | 5.087 | 13.643 | 70.948 |
| 6/28/2011 | 10:56:00 AM | 5.1 | 13.614 | 70.377 |
| 6/28/2011 | 10:57:00 AM | 5.068 | 13.635 | 69.193 |
| 6/28/2011 | 10:58:00 AM | 4.992 | 13.702 | 70.947 |
| 6/28/2011 | 10:59:00 AM | 5.004 | 13.685 | 70.95 |
| 6/28/2011 | 11:00:00 AM | 5.004 | 13.673 | 69.63 |
| 6/28/2011 | 11:01:00 AM | 5.002 | 13.688 | 69.265 |
| 6/28/2011 | 11:02:00 AM | 4.986 | 13.694 | 68.388 |
| 6/28/2011 | 11:03:00 AM | 4.941 | 13.738 | 69.331 |
| 6/28/2011 | 11:04:00 AM | 4.885 | 13.796 | 70.865 |
| 6/28/2011 | 11:05:00 AM | 4.873 | 13.821 | 88.322 |
| 6/28/2011 | 11:06:00 AM | 4.888 | 13.795 | 81.019 |
| 6/28/2011 | 11:07:00 AM | 4.874 | 13.824 | 74.04 |
| 6/28/2011 | 11:08:00 AM | 4.924 | 13.775 | 73.662 |
| 6/28/2011 | 11:09:00 AM | 4.887 | 13.797 | 71.301 |
| 6/28/2011 | 11:10:00 AM | 4.867 | 13.831 | 72.175 |
| 6/28/2011 | 11:11:00 AM | 4.902 | 13.827 | 72.654 |
| 6/28/2011 | 11:12:00 AM | 4.902 | 13.823 | 74.827 |
| 6/28/2011 | 11:13:00 AM | 4.963 | 13.763 | 74.721 |
| 6/28/2011 | 11:14:00 AM | 4.953 | 13.765 | 70.671 |
| 6/28/2011 | 11:15:00 AM | 4.979 | 13.756 | 69.857 |
| 6/28/2011 | 11:16:00 AM | 4.978 | 13.744 | 72.493 |
| 6/28/2011 | 11:17:00 AM | 4.999 | 13.719 | 72.432 |
| 6/28/2011 | 11:18:00 AM | 4.95 | 13.758 | 73.357 |
| 6/28/2011 | 11:21:00 AM | 4.931 | 13.784 | 74.673 |
| 6/28/2011 | 11:22:00 AM | 4.944 | 13.776 | 73.325 |
| 6/28/2011 | 11:23:00 AM | 4.981 | 13.744 | 72.925 |
| 6/28/2011 | 11:24:00 AM | 4.995 | 13.743 | 74.097 |
| 6/28/2011 | 11:25:00 AM | 4.976 | 13.751 | 74.647 |
| 6/28/2011 | 11:26:00 AM | 4.992 | 13.739 | 74.779 |
| 6/28/2011 | 11:27:00 AM | 5.028 | 13.717 | 74.119 |
| 6/28/2011 | 11:28:00 AM | 5.106 | 13.636 | 72.632 |
| 6/28/2011 | 11:29:00 AM | 5.073 | 13.651 | 71.038 |
| 6/28/2011 | 11:30:00 AM | 5.081 | 13.656 | 72.115 |
| 6/28/2011 | 11:31:00 AM | 5.072 | 13.652 | 72.594 |
| 6/28/2011 | 11:32:00 AM | 5.005 | 13.717 | 74.624 |
| 6/28/2011 | 11:33:00 AM | 4.918 | 13.799 | 77.696 |
| 6/28/2011 | 11:34:00 AM | 5.017 | 13.724 | 77.317 |
| 6/28/2011 | 11:35:00 AM | 5.047 | 13.697 | 74.722 |
| 6/28/2011 | 11:36:00 AM | 5.104 | 13.639 | 73.54 |
| 6/28/2011 | 11:37:00 AM | 5.117 | 13.646 | 74.131 |
| 6/28/2011 | 11:38:00 AM | 5.122 | 13.652 | 75.83 |
| 6/28/2011 | 11:39:00 AM | 5.128 | 13.618 | 73.559 |
| 6/28/2011 | 11:40:00 AM | 5.111 | 13.643 | 74.886 |
| 6/28/2011 | 11:41:00 AM | 5.115 | 13.613 | 73.592 |
| 6/28/2011 | 11:42:00 AM | 5.081 | 13.642 | 73.862 |
| 6/28/2011 | 11:43:00 AM | 5.074 | 13.654 | 75.116 |

| | | | | |
|---|---|---|---|---|
| 6/28/2011 | 11:44:00 AM | 4.976 | 13.752 | 76.187 |
| 6/28/2011 | 11:45:00 AM | 5.006 | 13.73 | 75.189 |
| 6/28/2011 | 11:46:00 AM | 4.984 | 13.758 | 74.573 |
| 6/28/2011 | 11:47:00 AM | 4.977 | 13.756 | 76.428 |
| 6/28/2011 | 11:48:00 AM | 4.997 | 13.743 | 76.832 |
| 6/28/2011 | 11:49:00 AM | 5.023 | 13.711 | 74.927 |
| 6/28/2011 | 11:50:00 AM | 5.02 | 13.74 | 74.628 |
| 6/28/2011 | 11:51:00 AM | 5.018 | 13.737 | 75.479 |
| 6/28/2011 | 11:52:00 AM | 4.994 | 13.745 | 76.213 |
| 6/28/2011 | 11:53:00 AM | 5.003 | 13.741 | 75.728 |
| 6/28/2011 | 11:54:00 AM | 4.969 | 13.784 | 76.327 |
| 6/28/2011 | 11:55:00 AM | 4.967 | 13.781 | 75.359 |
| 6/28/2011 | 11:56:00 AM | 4.963 | 13.788 | 75.487 |
| 6/28/2011 | 11:57:00 AM | 4.899 | 13.833 | 75.582 |
| 6/28/2011 | 11:58:00 AM | 4.947 | 13.817 | 74.837 |
| 6/28/2011 | 11:59:00 AM | 4.985 | 13.775 | 74.716 |
| 6/28/2011 | 12:00:00 PM | 4.989 | 13.76 | 74.808 |
| 6/28/2011 | 12:01:00 PM | 4.923 | 13.828 | 78.072 |
| 6/28/2011 | 12:02:00 PM | 4.936 | 13.818 | 79.132 |
| 6/28/2011 | 12:03:00 PM | 4.966 | 13.772 | 74.743 |
| 6/28/2011 | 12:04:00 PM | 4.977 | 13.772 | 72.122 |
| 6/28/2011 | 12:05:00 PM | 5.022 | 13.729 | 71.783 |
| 6/28/2011 | 12:06:00 PM | 4.987 | 13.739 | 72.815 |
| 6/28/2011 | 12:07:00 PM | 4.976 | 13.772 | 73.642 |
| 6/28/2011 | 12:08:00 PM | 4.886 | 13.845 | 74.297 |
| 6/28/2011 | 12:09:00 PM | 4.901 | 13.845 | 77.923 |
| 6/28/2011 | 12:10:00 PM | 4.912 | 13.825 | 76.316 |
| 6/28/2011 | 12:11:00 PM | 4.986 | 13.77 | 75.355 |
| 6/28/2011 | 12:12:00 PM | 4.997 | 13.746 | 73.536 |
| 6/28/2011 | 12:13:00 PM | 4.958 | 13.793 | 73.969 |
| 6/28/2011 | 12:14:00 PM | 4.972 | 13.79 | 74.065 |
| 6/28/2011 | 12:15:00 PM | 4.931 | 13.821 | 74.98 |
| 6/28/2011 | 12:16:00 PM | 4.973 | 13.798 | 75.284 |
| 6/28/2011 | 12:17:00 PM | 4.995 | 13.753 | 74.231 |
| 6/28/2011 | 12:18:00 PM | 4.972 | 13.778 | 73.422 |
| 6/28/2011 | 12:19:00 PM | 4.96 | 13.788 | 73.351 |
| 6/28/2011 | 12:20:00 PM | 4.965 | 13.787 | 74.768 |
| | Average | 4.95 | 13.83 | 75.87 |

ALS Environmental
5420 Mainway Drive, Unit 5, Burlington ON, L7L 6A4
Phone: 905-331-3111, FAX: 905-331-4567

SCC Accredited Lab ID# 1003-15/779 Ont DW License #: 2285
NELAC Primary Accreditation, NJ DEP ID# CANA003: Secondary Accreditation, TX Cert# T104704433-08-TX

# Certificate of Analysis

**ALS Project Contact:** Ron McLeod
**ALS Project ID:** DEL100
**ALS WO#:** L1028521
**Date of Report** 15-Jul-11
**Date of Sample Receipt** 7-Jul-11

**Client Name:** Delta Air Quality Services Inc.
1845 North Case Street
Orange,CA
92865-4234
**Client Contact:** Arlene Bell
**Client Project ID:** ICR 2F-7

**COMMENTS:** **SVOC via SW846 Method 3542/8270D**

**Method Summary:**
The 0010 train samples were extracted by SW846 Method 3542. For each train, the front half solids and the XAD2 sorbent were extracted together in a single soxhlet. The extraction standards for 8270D and PAH analyses were spiked into the solids/sorbent media just prior to extraction. The condensates were extracted by B/N/A liquid/liquid extraction technique using separatory funnels and dichloromethane as the extracting solvent. The extract from the soxhlet and the condensates for each train were combined for each train and reduced to a 5mL final volume. A 1/2 portion was removed and concentrated to 1mL for analysis of PAHs via isotope dilution and selected ion monitoring GC/LRMS analysis. A portion of the remaining extract was removed for analysis of semi-volatile organics via SW846 method 8270D.

Certified by: _____
Ron McLeod, Ph.D.
General Manager and Technical Director

Results in this certificate relate only to the samples as submitted to the laboratory.
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# ALS Laboratory Group

## Sample Analysis Summary Report

| Sample Name | Method Blank | | FB-SV | | 1-SV | | 2-SV | | 3-SV | | Target Recovery Acceptance Limits |
|---|---|---|---|---|---|---|---|---|---|---|---|
| ALS Sample ID | WG1309259-1 | | L1028521-4 | | L1028521-1 | | L1028521-2 | | L1028521-3 | | |
| Sample Size | 1 | | 1 | | 1 | | 1 | | 1 | | |
| Sample units | sample | | sample | | sample | | sample | | sample | | |
| Moisture Content | n/a | | n/a | | n/a | | n/a | | n/a | | |
| Matrix | QC | | Stack - M0010 | | Stack - M0010 | | Stack - M0010 | | Stack - M0010 | | |
| Sampling Date | n/a | | 27-Jun-11 | | 27-Jun-11 | | 27-Jun-11 | | 28-Jun-11 | | |
| Extraction Date | 11-Jul-11 | | 11-Jul-11 | | 11-Jul-11 | | 11-Jul-11 | | 11-Jul-11 | | |
| **Target Analytes** | **ug/sample** | | **ug/sample** | | **ug/sample** | | **ug/sample** | | **ug/sample** | | |
| Aniline | <1.85 | U | <1.85 | U | <1.85 | U | <1.85 | U | <1.85 | U | |
| Phenol | <1.95 | U | <0.65 | MR | <13.4 | R | <3.6 | R | <2.25 | R | |
| 2-Methylphenol | <2.1 | U | <2.1 | U | <2.1 | U | <2.1 | U | <2.1 | U | |
| 4-Methylphenol&3-Methylphenol | <5.65 | U | <5.65 | U | <5.65 | U | <5.65 | U | <5.65 | U | |
| o-Toluidine | <5 | U | <5 | U | <5 | U | <5 | U | <5 | U | |
| Nitrobenzene | <1.95 | U | <1.95 | U | <1.95 | U | <1.95 | U | <1.95 | U | |
| Isophorone | <2.25 | U | <2.25 | U | <2.25 | U | <2.25 | U | <2.25 | U | |
| 2,4-Dimethylphenol | <2.6 | U | <2.6 | U | <2.6 | U | <2.6 | U | <2.6 | U | |
| Dibenzofuran | <2.3 | U | <2.3 | U | <2.3 | U | <2.3 | U | <2.3 | U | |
| a,a-Dimethylphenethylamine | <12 | U | <12 | U | <12 | U | <12 | U | <12 | U | |
| 1,4-Phenylenediamine | <18 | U | <18 | U | <18 | U | <18 | U | <18 | U | |
| Benzidine | <38 | U | <38 | U | <38 | U | <38 | U | <38 | U | |
| Dimethylaminobenzene | <2.0 | U | <2.0 | U | <2.0 | U | <2.0 | U | <2.0 | U | |
| 3,3'-Dimethylbenzidine | <29 | U | <29 | U | <29 | U | <29 | U | <29 | U | |
| 3,3'-Dimethoxybenzidine | <29 | U | <29 | U | <29 | U | <29 | U | <29 | U | |
| **Extraction Standards** | **% Rec** | | **% Rec** | | **% Rec** | | **% Rec** | | **% Rec** | | **% Rec** |
| 2-Fluorophenol | 48 | | 43 | | 50 | | 43 | | 43 | | 25-121 |
| d5-Phenol | 49 | | 42 | | 48 | | 42 | | 42 | | 24-113 |
| d5-Nitrobenzene | 72 | | 60 | | 70 | | 64 | | 64 | | 23-120 |
| 2-Fluorobiphenyl | 68 | | 58 | | 75 | | 62 | | 64 | | 30-115 |
| 2,4,6-Tribromophenol | 46 | | 38 | | 58 | | 49 | | 49 | | 19-122 |

U Indicates that this compound was not detected above the LOD.
M Indicates that a peak has been manually integrated.
R Indicates ratio failure on confirming ion due to interference

# ALS Laboratory Group

## ICR Petroleum Sector LCS Data for 0010/3542/8270D on 8270D LCS Performance Compounds

| Sample Name | Laboratory Control Sample (LCS) #3 | Laboratory Control Sample (LCS) #1 | Laboratory Control Sample (LCS) #2 | Target Solids Recovery Acceptance Limits |
|---|---|---|---|---|
| ALS Sample ID | WG1301133-2 | WG1303407-2 | WG1309259-2 | |
| Sample Size | 1 | 1 | 1 | |
| **ALS WO#** | **L1021357** | **L1022356** | **L1028521** | |
| Extraction Date | 23-Jun-11 | 28-Jun-11 | 11-Jul-11 | |
| **Target Analytes** | **% Recovery** | **% Recovery** | **% Recovery** | **% Recovery** |
| Phenol | 56 | 61 | 81 | 26-90 |
| 2-Chlorophenol | 53 | 62 | 53 | 25-102 |
| 1,4-Dichlorobenzene | 52 | 61 | 52 | n/a |
| N-Nitrosodi-n-propylamine | 66 | 66 | 67 | 41-126 |
| 1,2,4-Trichlorobenzene | 64 | 71 | 61 | n/a |
| 4-Chloro-3-methylphenol | 71 | 62 | 67 | 26-103 |
| 2,4-Dinitrotoluene | 71 | 70 | 62 | 28-89 |
| 4-Nitrophenol | 66 | 47 | 67 | 11-114 |
| Acenaphthene | 52 | 57 | 50 | 31-137 |
| Pentachlorophenol | 57 | 19 | 7 * | 17-109 |
| Pyrene | 53 | 59 | 54 | 35-142 |
| **Extraction Standards** | **% Rec** | **% Rec** | **% Rec** | **% Rec** |
| 2-Fluorophenol | 26 | 47 | 42 | 25-121 |
| d5-Phenol | 39 | 43 | 40 | 24-113 |
| d5-Nitrobenzene | 65 | 74 | 68 | 23-120 |
| 2-Fluorobiphenyl | 70 | 71 | 63 | 30-115 |
| 2,4,6-Tribromophenol | 66 | 60 | 47 | 19-122 |

* A bias to low recoveries on non-acidied resin media is common for acidic compounds and is most commonly observed for the more acidic components such as PCP. Note that field 'run' samples do not often show this bias since these samples are usually acidied by the source stack gases.

ALS Environmental
5420 Mainway Drive, Unit 5, Burlington ON, L7L 6A4
Phone: 905-331-3111, FAX: 905-331-4567

SCC Accredited Lab ID# 1003-15/779 Ont DW License #: 2285
NELAC Primary Accreditation, NJ DEP ID# CANA003: Secondary Accreditation, TX Cert# T104704433-08-TX

# Certificate of Analysis

**ALS Project Contact:** Ron McLeod
**ALS Project ID:** DEL100
**ALS WO#:** L1028521
**Date of Report** 15-Jul-11
**Date of Sample Receipt** 7-Jul-11

**Client Name:** Delta Air Quality Services Inc.
1845 North Case Street
Orange,CA
92865-4234
**Client Contact:** Arlene Bell
**Client Project ID:** ICR 2F-7

**COMMENTS:** **PAH by CARB Method 429 (LR Option) - Isotope Dilution**

High laboratory control sample recovery on acenaphthalene (above the target control limit of 50-150%) indicates a potential for high bias on the sample data for this target analyte.

**Method Summary:**
The 0010 train samples were extracted by SW846 Method 3542. For each train, the front half solids and the XAD2 sorbent were extracted together in a single soxhlet. The extraction standards for 8270D and PAH analyses were spiked into the solids/sorbent media just prior to extraction. The condensates were extracted by B/N/A liquid/liquid extraction technique using separatory funnels and dichloromethane as the extracting solvent. The extract from the soxhlet and the condensates for each train were combined for each train and reduced to a 5mL final volume. A 1/2 portion was removed and concentrated to 1mL for analysis of PAHs via isotope dilution and selected ion monitoring GC/LRMS analysis. A portion of the remaining extract was removed for analysis of semi-volatile organics via SW846 method 8270D.

Certified by: R A McLeod
Ron McLeod, Ph.D.
General Manager and Technical Director

Results in this certificate relate only to the samples as submitted to the laboratory.
This report shall not be reproduced, except in full, without the written permission of ALS Canada Ltd.
The test results herein meet all of the requirements of ISO 17025:2005 and NELAC (2003) standards unless stated otherwise in the comments above.

# ALS Environmental

## Sample Analysis Summary Report

| Sample Name | Method Blank | | FB-SV | | 1-SV | | 2-SV | | 3-SV | | Laboratory Control Sample |
|---|---|---|---|---|---|---|---|---|---|---|---|
| ALS Sample ID | WG1309259-1 | | L1028521-4 | | L1028521-1 | | L1028521-2 | | L1028521-3 | | WG1309259-2 |
| Sample Size | 1 | | 1 | | 1 | | 1 | | 1 | | 1 |
| Sample units | sample | | sample | | sample | | sample | | sample | | n/a |
| Moisture Content | n/a | | n/a | | n/a | | n/a | | n/a | | n/a |
| Matrix | QC | | Stack - M0010 | | Stack - M0010 | | Stack - M0010 | | Stack - M0010 | | QC |
| Sampling Date | n/a | | 27-Jun-11 | | 27-Jun-11 | | 27-Jun-11 | | 28-Jun-11 | | n/a |
| Extraction Date | 11-Jul-11 | | 11-Jul-11 | | 11-Jul-11 | | 11-Jul-11 | | 11-Jul-11 | | 11-Jul-11 |
| **Target Analytes** | **ng/sample** | | **ng/sample** | | **ng/sample** | | **ng/sample** | | **ng/sample** | | **% Recovery** |
| Naphthalene | 193 | | 263 | | 1020 | | 708 | | 759 | | 126 |
| 2-Methylnaphthalene | 7 | | 9.48 | | 456 | | 267 | | 224 | | NS |
| Acenaphthylene | <4 | U | 4.84 | | <4 | U | 99.9 | | 34.5 | | 258 |
| Acenaphthene | 4.08 | | <4 | U | <4 | U | <21.7 | EMPC | <4 | U | 121 |
| Fluorene | <4 | U | <4 | U | 33.6 | | 26.7 | | <14.6 | R | 126 |
| Phenanthrene | 6.42 | | 11.5 | | 284 | | 215 | | 152 | | 133 |
| Anthracene | <4 | U | <4 | U | 10.8 | | 7.98 | | 7.74 | | 130 |
| Fluoranthene | <4 | U | <4 | U | 40.3 | | 40.2 | | 22.9 | | 137 |
| Pyrene | 6.8 | | 10.2 | | 45.5 | | 31.7 | | 27.8 | | 112 |
| Benzo(a)anthracene | <4 | U | <4 | U | <4 | U | <4 | U | <4 | U | 128 |
| Chrysene | <4 | U | <4 | U | 9.6 | | 10.2 | | 6.42 | | 139 |
| Benzo(b)flouranthene | <4 | U | <4 | U | <4 | U | <4 | U | <4 | U | 127 |
| Benzo(k)fluoranthene | <4 | U | <4 | U | <4 | U | <4 | U | <4 | U | 142 |
| Benzo(e)pyrene | <4 | U | <4 | U | <4 | U | <4 | U | <4 | U | NS |
| Benzo(a)pyrene | <4 | U | <4 | U | <4 | U | <4 | U | <4 | U | 108 |
| Perylene | 6.54 | | <4 | U | <4 | U | <4 | U | <4 | U | NS |
| Indeno(1,2,3-cd)pyrene | <4 | U | <4 | U | <4 | U | <4 | U | <4 | U | 133 |
| Dibenzo(a,h/a,c)anthracene | <4 | U | <4 | U | <4 | U | <4 | U | <4 | U | 140 |
| Benzo(g,h,i)perylene | <4 | U | <4 | U | 7.22 | | 8.24 | | 7.96 | | 129 |
| **Additional Analytes** | **ng/sample** | | **ng/sample** | | **ng/sample** | | **ng/sample** | | **ng/sample** | | **ng/sample** |
| 2-Chloronaphthalene | <4 | U | <4 | U | <4 | U | <4 | U | <4 | U | NS |
| Biphenyl | 178 | | 178 | | 1210 | | 414 | | 1730 | | NS |
| 7,12-Dimethylbenzo(a)anthracene | <4 | U | <4 | U | <4 | U | <4 | U | <4 | U | NS |
| 3-Methylcholanthrene | <4 | U | <4 | U | <4 | U | <4 | U | <4 | U | NS |
| Dibenzo(a,e)pyrene | <4 | U | <4 | U | <4 | U | <4 | U | <4 | U | NS |
| **Field Sampling Standards** | **% Rec** | | **% Rec** | | **% Rec** | | **% Rec** | | **% Rec** | | **% Rec** |
| d10-Fluorene | NS | | 85 | | 93 | | 89 | | 88 | | NS |
| d14-Terphenyl | NS | | 93 | | 93 | | 92 | | 94 | | NS |
| **Extraction Standards** | **% Rec** | | **% Rec** | | **% Rec** | | **% Rec** | | **% Rec** | | **% Rec** |
| d8-Naphthalene | 79 | | 67 | | 64 | | 63 | | 67 | | 84 |
| d10-2-Methylnaphthalene | 80 | | 70 | | 68 | | 67 | | 72 | | 83 |
| d8-Acenaphthylene | 78 | | 75 | | 75 | | 79 | | 81 | | 70 |
| d10-Phenanthrene | 94 | | 93 | | 97 | | 89 | | 91 | | 89 |
| d10-Anthracene | 89 | | 89 | | 97 | | 92 | | 93 | | 85 |
| d10-Fluoranthene | 86 | | 89 | | 90 | | 90 | | 88 | | 86 |
| d12-Benzo(a)anthracene | 84 | | 84 | | 107 | | 110 | | 92 | | 77 |
| d12-Chrysene | 65 | | 64 | | 70 | | 69 | | 64 | | 63 |
| d12-Benzo(b)fluoranthene | 94 | | 100 | | 105 | | 102 | | 105 | | 103 |
| d12-Benzo(k)fluoranthene | 78 | | 80 | | 81 | | 87 | | 79 | | 87 |
| d12-Benzo(a)pyrene | 95 | | 115 | | 111 | | 114 | | 110 | | 108 |
| d12-Perylene | 84 | | 93 | | 101 | | 101 | | 99 | | 83 |
| d12-Indeno(1,2,3,c-d)pyrene | 75 | | 85 | | 103 | | 92 | | 95 | | 82 |
| d14-Dibenz(a,h)anthracene | 71 | | 82 | | 92 | | 84 | | 87 | | 79 |
| d12-Benzo(ghi)perylene | 71 | | 80 | | 84 | | 78 | | 80 | | 79 |

| | |
|---|---|
| U | Indicates that this compound was not detected above the LOD. |
| NS | Indicates that this compound was not spiked |
| R | Indicates ratio failure on confirming ion due to interference |
| EMPC | Estimated maximum concentration due to interference |

AVERAGE ALDEHYDES EMISSIONS

CLIENT: ExxonMobil

| NAME | ug/dscm | ug/dscm at 7% O2 | ug/dscf | lb/hr |
|---|---|---|---|---|
| Formaldahyde | 1485.46 | 1304.21 | 42.07 | 1.3353 |
| Acetaldehyde | 84.54 | 74.18 | 2.39 | 0.0759 |
| Propionaldehyde | ND < 3.16 | ND < 2.77 | ND < 0.09 | ND < 0.0028 |

ALDEHYDES CALCULATIONS

| | | | |
|---|---|---|---|
| CLIENT: | ExxonMobil | | AA |
| TEST NUMBER: | 1-Ald | VMSTD(DSCF): | 79.34 |
| TEST DATE: | 6/27/2011 | QSD(DSCF/MIN): | 241362 |
| T REF (F) | 68 | CO2,%: | 14.08 |
| | | O2,%: | 5.14 |

| NAME | ug/train | ug/dscm | ug/dscm at 7% O2 | ug/dscf | lb/hr |
|---|---|---|---|---|---|
| Formaldahyde | 4430 | 1971.59 | 1738.66 | 55.84 | 1.7812 |
| Acetaldehyde | 206 | 91.68 | 80.85 | 2.60 | 0.0828 |
| Propionaldehyde | ND < 6.25 | ND < 2.78 | ND < 2.45 | 0.08 | ND < 0.0025 |

ALDEHYDES CALCULATIONS

| | | | |
|---|---|---|---|
| CLIENT: | ExxonMobil | | AA |
| TEST NUMBER: | 2-Ald | VMSTD(DSCF): | 79.06 |
| TEST DATE: | 6/27/2011 | QSD(DSCF/MIN): | 241632 |
| T REF (F) | 68 | CO2,%: | 14.12 |
| | | O2,%: | 5.03 |

| NAME | ug/train | ug/dscm | ug/dscm at 7% O2 | ug/dscf | lb/hr |
|---|---|---|---|---|---|
| Formaldahyde | 3070 | 1371.14 | 1200.79 | 38.83 | 1.2401 |
| Acetaldehyde | 199 | 88.88 | 77.84 | 2.52 | 0.0804 |
| Propionaldehyde | ND < 8.13 | ND < 3.63 | ND < 3.18 | 0.10 | ND < 0.0033 |

ALDEHYDES CALCULATIONS

| | | | |
|---|---|---|---|
| CLIENT: | ExxonMobil | INITIALS: | AA |
| TEST NUMBER: | 3-Ald | VMSTD(DSCF): | 79.27 |
| TEST DATE: | 6/28/2011 | QSD(DSCF/MIN): | 236177 |
| T REF (F) | 68 | CO2,%: | 14.09 |
| | | O2,%: | 4.99 |

| NAME | ug/train | ug/dscm | ug/dscm at 7% O2 | ug/dscf | lb/hr |
|---|---|---|---|---|---|
| Formaldahyde | 2500 | 1113.65 | 973.16 | 31.54 | 0.9845 |
| Acetaldehyde | 164 | 73.06 | 63.84 | 2.07 | 0.0646 |
| Propionaldehyde | ND < 6.88 | ND < 3.06 | ND < 2.68 | 0.09 | ND < 0.0027 |

***Delta***
Aldehydes Test Summary

| | | | | | |
|---|---|---|---|---|---|
| Client/Location..... | ExxonMobil | | | Reference Temp (F): | 68 |
| | | | | Fuel..... | Refinery |
| Sample Location..... | FCC 2F-7 Stack | | | Data By..... | AA |
| Test No..... | 1-Ald | 2-Ald | 3-Ald | Average | |
| Date..... | June 27, 2011 | June 27, 2011 | June 28, 2011 | * | |
| Start/Stop Time..... | 1320/1529 | 1723/1933 | 935/1151 | * | |
| Bar Press (in Hg)..... | 29.80 | 29.80 | 29.77 | * | |
| Test Method..... | SW-846 0010 | SW-846 0010 | SW-846 0010 | * | |
| Sample Time (Min)..... | 120 | 120 | 120 | * | |
| Sample Train..... | 12WCS | 12WCS | 12WCS | * | |
| Meter Cal Factor..... | 1.005 | 1.005 | 1.005 | * | |
| Pitot Factor ..... | 0.84 | 0.84 | 0.84 | * | |
| Nozzle Diam (in)..... | 0.220 | 0.220 | 0.220 | * | |
| Stack Area (sq ft)..... | 94.31 | 94.31 | 94.31 | | |
| Stack O2 (%)..... | 5.14 | 5.03 | 4.99 | 5.05 | |
| Stack CO2 (%)..... | 14.08 | 14.12 | 14.09 | 14.10 | |
| Stack Press (iwg)..... | -1.30 | -1.30 | -1.30 | -1.30 | |
| Stack Temp (F)..... | 480.2 | 476.5 | 483.5 | 480.1 | |
| Vel Head (iwg)..... | 1.39 | 1.38 | 1.35 | 1.37 | |
| Meter Temp (F)..... | 75 | 72 | 83 | 77 | |
| Meter Press (iwg)..... | 1.44 | 1.43 | 1.50 | 1.46 | |
| Meter Vol (acf)..... | 79.965 | 79.345 | 81.238 | 80.18 | |
| Liquid Vol (ml)..... | 270.6 | 262.4 | 275.0 | 269.3 | |
| Std Sample Vol (SCF)..... | 79.339 | 79.059 | 79.266 | 79.22 | |
| Std Sample Vol (SCM)..... | 2.247 | 2.239 | 2.245 | 2.243 | |
| Moisture Fraction..... | 0.139 | 0.135 | 0.141 | 0.138 | |
| Stack Gas Mol Wt..... | 28.73 | 28.77 | 28.70 | 28.73 | |
| Stack Gas Velocity (ft/sec)..... | 88.83 | 88.25 | 87.53 | 88.21 | |
| Isokinetic Ratio (%)..... | 97.8 | 97.4 | 99.9 | 98.4 | |
| Stack Flow Rate (wacfm)..... | 502,691 | 499,422 | 495,314 | 499,142 | |
| Stack Flow Rate (wscfm)..... | 280,218 | 279,486 | 274,852 | 278,185 | |
| Stack Flow Rate (dscfm)..... | 241,362 | 241,632 | 236,177 | 239,724 | |
| Stack Flow Rate (mdscf/h)..... | 144.82 | 144.98 | 141.71 | 143.83 | |

RUN 1

| Aldehydes Test Sample Data | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Client/Location: | | ExxonMobil | | | | | | Sample Location: | | | 2F-7 Stack |
| Unit: | | FCC | | | | | | Data By: | | | AA |
| Test No: | 1-Ald | ISO | Assumed Moisture | | Sample Factor | | Delta H = | 1.03 | x Delta P | | |
| Date: | 6/27/2011 | 97.8 | 14 | | | Time per Point = | | 5 | Static Pressure = | | -1.3 |
| Port | Point | Time | Meter Volume | Delta P | Factor | Delta H | Stack Temp. | Meter In | Meter Out | Probe | Vacuum |
| A | 6 | 13:20:00 | 647.515 | 1.30 | 1.03 | 1.34 | 484 | 73 | 73 | 247 | 4 |
| A | 5 | 13:25:00 | 650.370 | 1.30 | 1.03 | 1.34 | 481 | 75 | 73 | 256 | 4 |
| A | 4 | 13:30:00 | 653.225 | 1.30 | 1.03 | 1.34 | 481 | 74 | 73 | 253 | 4 |
| A | 3 | 13:35:00 | 656.840 | 1.20 | 1.03 | 1.23 | 481 | 74 | 73 | 254 | 4 |
| A | 2 | 13:40:00 | 659.900 | 1.20 | 1.03 | 1.23 | 480 | 75 | 74 | 256 | 4 |
| A | 1 | 13:45:00 | 662.980 | 1.20 | 1.03 | 1.23 | 480 | 75 | 74 | 260 | 4 |
| | Stop | 13:50:00 | 666.015 | | | | | | | | |
| B | 6 | 13:53:00 | 666.015 | 1.50 | 1.03 | 1.54 | 480 | 75 | 75 | 260 | 4 |
| B | 5 | 13:58:00 | 669.510 | 1.50 | 1.03 | 1.54 | 483 | 75 | 75 | 247 | 4 |
| B | 4 | 14:03:00 | 673.099 | 2.00 | 1.03 | 2.06 | 482 | 77 | 74 | 246 | 4 |
| B | 3 | 14:08:00 | 677.039 | 2.00 | 1.03 | 2.06 | 482 | 75 | 74 | 247 | 4 |
| B | 2 | 14:13:00 | 681.013 | 2.00 | 1.03 | 2.06 | 483 | 76 | 74 | 245 | 4 |
| B | 1 | 14:18:00 | 684.011 | 1.80 | 1.03 | 1.85 | 481 | 76 | 74 | 247 | 4 |
| | Stop | 14:23:00 | 688.771 | | | | | | | | |
| C | 6 | 14:25:00 | 688.771 | 1.30 | 1.03 | 1.34 | 482 | 75 | 74 | 246 | 4 |
| C | 5 | 14:30:00 | 692.099 | 1.50 | 1.03 | 1.54 | 481 | 76 | 74 | 247 | 4 |
| C | 4 | 14:35:00 | 695.584 | 1.60 | 1.03 | 1.65 | 481 | 76 | 75 | 252 | 4 |
| C | 3 | 14:40:00 | 699.098 | 1.60 | 1.03 | 1.65 | 481 | 75 | 74 | 251 | 4 |
| C | 2 | 14:45:00 | 702.855 | 1.50 | 1.03 | 1.54 | 480 | 75 | 74 | 250 | 4 |
| C | 1 | 14:50:00 | 706.167 | 1.30 | 1.03 | 1.34 | 480 | 76 | 74 | 250 | 4 |
| | Stop | 14:55:00 | 709.701 | | | | | | | | |
| D | 6 | 14:59:00 | 709.701 | 1.10 | 1.03 | 1.13 | 479 | 75 | 74 | 256 | 4 |
| D | 5 | 15:04:00 | 712.738 | 1.20 | 1.03 | 1.23 | 479 | 75 | 74 | 260 | 4 |
| D | 4 | 15:09:00 | 715.745 | 1.20 | 1.03 | 1.23 | 477 | 75 | 74 | 257 | 4 |
| D | 3 | 15:14:00 | 718.811 | 1.10 | 1.03 | 1.13 | 476 | 75 | 74 | 258 | 4 |
| D | 2 | 15:19:00 | 721.796 | 1.00 | 1.03 | 1.03 | 477 | 75 | 74 | 257 | 4 |
| D | 1 | 15:24:00 | 724.699 | 1.00 | 1.03 | 1.03 | 473 | 75 | 74 | 256 | 4 |
| | Stop | 15:29:00 | 727.480 | | | | | | | | |
| **Total/Average** | | **120** | **79.965** | **1.3933** | | **1.44** | **480** | **75** | **74** | **252** | **4** |

RUN 2

| Aldehydes Test Sample Data | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Client/Location: | | ExxonMobil | | | | | | Sample Location: | | | 2F-7 Stack |
| Unit: | | FCC | | | | | | Data By: | | | AA |
| Test No: | 2-Ald | ISO | Moisture | | Sample Factor | | Delta H = | 1.03 | x Delta P | | |
| Date: | 6/27/2011 | 97.4 | 14 | | | Time per Point = | | 5 | Static Pressure = | | -1.3 |
| Port | Point | Time | Meter Volume | Delta P | Factor | Delta H | Stack Temp. | Meter In | Meter Out | Probe | Vacuum |
| A | 6 | 17:23:00 | 727.800 | 1.20 | 1.03 | 1.23 | 478 | 72 | 72 | 251 | 4 |
| A | 5 | 17:28:00 | 731.175 | 1.10 | 1.03 | 1.13 | 477 | 73 | 72 | 251 | 4 |
| A | 4 | 17:33:00 | 734.111 | 1.10 | 1.03 | 1.13 | 476 | 73 | 72 | 251 | 4 |
| A | 3 | 17:38:00 | 737.002 | 1.10 | 1.03 | 1.13 | 476 | 73 | 72 | 251 | 4 |
| A | 2 | 17:43:00 | 739.901 | 1.00 | 1.03 | 1.03 | 475 | 73 | 72 | 251 | 4 |
| A | 1 | 17:48:00 | 742.753 | 1.00 | 1.03 | 1.03 | 474 | 73 | 72 | 251 | 4 |
| | Stop | 17:53:00 | 745.586 | | | | | | | | |
| B | 6 | 17:56:00 | 745.586 | 1.50 | 1.03 | 1.54 | 475 | 73 | 72 | 251 | 4 |
| B | 5 | 18:01:00 | 749.008 | 1.80 | 1.03 | 1.85 | 478 | 73 | 72 | 251 | 4 |
| B | 4 | 18:06:00 | 752.732 | 1.90 | 1.03 | 1.95 | 479 | 73 | 72 | 251 | 4 |
| B | 3 | 18:11:00 | 756.455 | 2.00 | 1.03 | 2.06 | 478 | 74 | 72 | 251 | 4 |
| B | 2 | 18:16:00 | 760.394 | 1.90 | 1.03 | 1.95 | 477 | 74 | 72 | 251 | 4 |
| B | 1 | 18:21:00 | 764.219 | 1.30 | 1.03 | 1.34 | 473 | 74 | 72 | 251 | 4 |
| | Stop | 18:26:00 | 767.512 | | | | | | | | |
| C | 6 | 18:31:00 | 767.512 | 1.20 | 1.03 | 1.23 | 477 | 73 | 72 | 251 | 4 |
| C | 5 | 18:36:00 | 770.515 | 1.40 | 1.03 | 1.44 | 478 | 74 | 72 | 251 | 4 |
| C | 4 | 18:41:00 | 773.838 | 1.60 | 1.03 | 1.65 | 478 | 74 | 73 | 251 | 4 |
| C | 3 | 18:46:00 | 777.347 | 1.70 | 1.03 | 1.75 | 476 | 74 | 73 | 251 | 4 |
| C | 2 | 18:51:00 | 781.138 | 1.60 | 1.03 | 1.65 | 477 | 74 | 72 | 251 | 4 |
| C | 1 | 18:56:00 | 784.925 | 1.00 | 1.03 | 1.03 | 477 | 73 | 72 | 251 | 4 |
| | Stop | 19:01:00 | 787.888 | | | | | | | | |
| D | 6 | 19:03:00 | 787.888 | 1.60 | 1.03 | 1.65 | 477 | 72 | 71 | 251 | 4 |
| D | 5 | 19:08:00 | 791.332 | 1.50 | 1.03 | 1.54 | 476 | 72 | 71 | 251 | 4 |
| D | 4 | 19:13:00 | 794.765 | 1.40 | 1.03 | 1.44 | 477 | 72 | 71 | 251 | 4 |
| D | 3 | 19:18:00 | 798.101 | 1.30 | 1.03 | 1.34 | 476 | 71 | 70 | 251 | 4 |
| D | 2 | 19:23:00 | 801.342 | 1.10 | 1.03 | 1.13 | 476 | 71 | 70 | 251 | 4 |
| D | 1 | 19:28:00 | 804.271 | 1.00 | 1.03 | 1.03 | 475 | 70 | 69 | 251 | 4 |
| | Stop | 19:33:00 | 807.145 | | | | | | | | |
| **Total/Average** | | **120** | **79.345** | **1.3827** | | **1.43** | **477** | **73** | **72** | | |

| Aldehydes Test Sample Data | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Client/Location: | | ExxonMobil | | | | | | Sample Location: | | | 2F-7 Stack |
| Unit: | | FCC | | | | | | Data By: | | | AA |
| Test No: | 3-Ald | ISO | Moisture | | Sample Factor | | Delta H = | 1.10 | x Delta P | | |
| Date: | 6/28/2011 | 99.9 | 14 | | | | Time per Point = | 5 | Static Pressure = | | -1.3 |
| Port | Point | Time | Meter Volume | Delta P | Factor | Delta H | Stack Temp. | Meter In | Meter Out | Probe | Vacuum |
| A | 6 | 9:35:00 | 810.650 | 1.3 | 1.10 | 1.43 | 486 | 81 | 80 | 247 | 4 |
| A | 5 | 9:40:00 | 814.138 | 1.5 | 1.10 | 1.65 | 485 | 80 | 79 | 250 | 4 |
| A | 4 | 9:45:00 | 817.626 | 1.5 | 1.10 | 1.65 | 485 | 79 | 78 | 252 | 4 |
| A | 3 | 9:50:00 | 821.253 | 1.6 | 1.10 | 1.76 | 486 | 80 | 78 | 253 | 4 |
| A | 2 | 9:55:00 | 824.918 | 1.3 | 1.10 | 1.43 | 485 | 78 | 77 | 252 | 4 |
| A | 1 | 10:00:00 | 828.584 | 1.4 | 1.10 | 1.54 | 483 | 79 | 77 | 253 | 4 |
| | Stop | 10:05:00 | 831.943 | | | | | | | | |
| B | 6 | 10:02:00 | 831.943 | 1.8 | 1.10 | 1.98 | 482 | 80 | 77 | 252 | 4 |
| B | 5 | 10:07:00 | 835.753 | 2.0 | 1.10 | 2.20 | 481 | 81 | 77 | 252 | 4 |
| B | 4 | 10:12:00 | 839.801 | 2.0 | 1.10 | 2.20 | 483 | 84 | 78 | 254 | 4 |
| B | 3 | 10:17:00 | 843.864 | 1.8 | 1.10 | 1.98 | 485 | 87 | 79 | 252 | 4 |
| B | 2 | 10:22:00 | 847.685 | 1.4 | 1.10 | 1.54 | 483 | 89 | 81 | 255 | 4 |
| B | 1 | 10:27:00 | 851.163 | 1.5 | 1.10 | 1.65 | 483 | 92 | 83 | 253 | 4 |
| | Stop | 10:32:00 | 854.845 | | | | | | | | |
| C | 6 | 10:40:00 | 854.845 | 1.4 | 1.10 | 1.54 | 484 | 92 | 86 | 250 | 4 |
| C | 5 | 10:45:00 | 858.268 | 1.3 | 1.10 | 1.43 | 483 | 92 | 87 | 254 | 4 |
| C | 4 | 10:50:00 | 861.635 | 1.3 | 1.10 | 1.43 | 482 | 90 | 87 | 256 | 4 |
| C | 3 | 10:55:00 | 864.982 | 1.2 | 1.10 | 1.32 | 486 | 92 | 88 | 254 | 4 |
| C | 2 | 11:00:00 | 868.173 | 1.1 | 1.10 | 1.21 | 483 | 90 | 86 | 257 | 4 |
| C | 1 | 11:05:00 | 871.269 | 1.0 | 1.10 | 1.10 | 480 | 91 | 86 | 255 | 4 |
| | Stop | 11:10:00 | 874.231 | | | | | | | | |
| D | 6 | 11:21:00 | 874.231 | 1.1 | 1.10 | 1.21 | 484 | 87 | 86 | 259 | 4 |
| D | 5 | 11:26:00 | 877.215 | 1.1 | 1.10 | 1.21 | 483 | 86 | 85 | 258 | 4 |
| D | 4 | 11:31:00 | 880.173 | 1.1 | 1.10 | 1.21 | 483 | 84 | 82 | 258 | 4 |
| D | 3 | 11:36:00 | 883.132 | 1.1 | 1.10 | 1.21 | 483 | 82 | 80 | 259 | 4 |
| D | 2 | 11:41:00 | 886.048 | 1.0 | 1.10 | 1.10 | 482 | 80 | 78 | 258 | 4 |
| D | 1 | 11:46:00 | 888.975 | 1.0 | 1.10 | 1.10 | 484 | 79 | 78 | 257 | 4 |
| | Stop | 11:51:00 | 891.888 | | | | | | | | |
| **Total/Average** | | **120** | **81.238** | **1.3** | | **1.50** | **484** | **85** | **81** | | |
| | | | | | | | | **83** | | | |

Delta Air Quality Services, Incorporated

# WET CHEMICAL SAMPLING SYSTEM DATA AND WORKSHEET

CLIENT: Exxon Mobil
LOCATION: FCC / 2F-7 Stack
DATE: 6/27/11
RUN NO: 1- ALD
OPERATOR: SS
METER BOX NO: 12WC5
METER ΔH@: 1.585
METER Yd: 1.005
STACK AREA, FT²: ✓
TRAVERSE POINTS, MIN/POINT: 5/24
ΔH= 1.03 X ΔP:
Probe Condition, pre/post test: ✓
Silica Gel Expended, Y/N: ✓
Filter Condition after Test: ✓
Check Weight: ✓

AMBIENT TEMPERATURE: 85
BAROMETRIC PRESSURE: 29.80
ASSUMED MOISTURE: 11%
PITOT TUBE COEFF, Cp: .84
PROBE ID NO/MATERIAL: #73
PROBE LENGTH: 6'
NOZZLE ID NO/ MATERIAL: B Glass
NOZZLE DIAMETER: .220
FILTER NO/TYPE: NIX
PRE-TEST LEAK RATE: : <0.002 CFM@ 12 in. Hg.
POST-TEST LEAK RATE: : <0.002 CFM@ 12 in. Hg.
PITOT LEAK CHECK - PRE: ✓ POST: ✓
CHAIN OF CUSTODY: SAMPLE CUSTODIAN JB
SAMPLER SS
SAMPLE CUSTODIAN JP

| Imp. # | Contents | Post-Test | Pre-Test | Difference |
|---|---|---|---|---|
| 1 | DNPH | 968.0 | 818.8 | 149.2 |
| 2 | DNPH | 779.2 | 681.9 | 97.3 |
| 3 | DNPH | 735.3 | 731.5 | 3.8 |
| 4 | SG | 942.2 | 921.9 | 20.3 |
| | Field Blank | 801.4 | | 801.4 |
| Total: | FS | 832.4 | 832.4 | |

270.6

| Point | Time | Meter Volume, ft³ | ΔP in. H₂O | ΔH in. H₂O | Stack Temp, °F | Probe Temp, °F | Filter Temp, °F | Imp. Out Temp, °F | Meter Temp, °F In | Meter Temp, °F Out | Vacuum in. Hg. | O₂ % | ~~Pstatic~~ in. H₂O |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 6 | 1320 | 647.515 | 1.3 | 1.34 | 484 | 247 | N/A | 60 | 73 | 73 | 4.0 | 3.0 | -1.3 |
| 5 | 1325 | 650.370 | 1.3 | 1.34 | 481 | 256 | | 60 | 75 | 73 | 4.0 | | |
| 4 | 1330 | 653.225 | 1.3 | 1.34 | 481 | 253 | | 59 | 74 | 73 | 4.0 | | |
| 3 | 1335 | 656.840 | 1.2 | 1.23 | 481 | 254 | | 57 | 74 | 73 | 4.0 | | |
| 2 | 1340 | 659.900 | 1.2 | 1.23 | 480 | 254 | | 56 | 75 | 74 | 4.0 | | |
| 1 | 1345 | 662.980 | 1.2 | 1.23 | 480 | 260 | | 56 | 75 | 74 | 4.0 | | |
| 0 | 1350 | 666.05 | 1.5 | | | | | | | | | | |
| 6 | 1353 | 666.015 | ~~1.55~~ | 1.55 | 480 | 260 | | 59 | 75 | 75 | 4.0 | | |
| 5 | 1358 | 669.50 | 1.5 | 1.55 | 483 | 247 | | ~~60~~ 58 | 75 | 75 | 4.0 | | |
| 4 | 1403 | 673.099 | 2.0 | ~~2.0~~ 2.1 | 482 | 246 | | 58 | 77 | 74 | 4.0 | | |
| 3 | 1408 | 677.039 | 2.0 | 2.1 | 482 | 247 | | 57 | 75 | 74 | 4.0 | | |
| 2 | 1413 | 681.013 | 2.0 | 2.1 | 483 | 245 | | 57 | 76 | 74 | 4.0 | | |
| 1 | 1418 | 684.011 | 1.8 | 1.9 | 481 | 247 | | 58 | 76 | 74 | 4.0 | | |
| 0 | 1423 | 688.771 | | | | | | | | | | | |
| 6 | 1425 | 688.771 | 1.3 | 1.3 | 482 | 246 | | 58 | 75 | 74 | 4.0 | | |
| 5 | 1430 | 692.099 | 1.5 | 1.5 | 481 | 247 | | 58 | 76 | 74 | 4.0 | | |
| 4 | 1435 | 695.584 | 1.6 | 1.6 | 481 | 252 | | 59 | 76 | 75 | 4.0 | | |
| 3 | 1440 | 699.098 | 1.6 | 1.6 | 481 | 251 | | 59 | 75 | 74 | 4.0 | | |
| 2 | 1445 | 702.855 | 1.5 | 1.5 | 480 | 250 | | 59 | 75 | 74 | 4.0 | | |
| 1 | 1450 | 706.167 | 1.3 | 1.3 | 480 | 250 | | 59 | 76 | 74 | 4.0 | | |
| 0 | 1455 | 709.701 | | | | | | | | | | | |
| Average: | | | | | | | | | | | | | |

Comments:

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Delta Air Quality Services, Incorporated

# WET CHEMICAL SAMPLING SYSTEM DATA AND WORKSHEET

CLIENT: Exxon Mobil
LOCATION: FCC / 2F-7 Stack
DATE: 6/27/11
RUN NO: 1-ALD
OPERATOR: SS/DV
METER BOX NO: 12WCS
METER ΔH@:
METER Yd:
STACK AREA, FT²:
TRAVERSE POINTS, MIN/POINT:
ΔH= _____ X ΔP:
Probe Condition, pre/post test:
Silica Gel Expanded, Y/N:
Filter Condition after Test:
Check Weight:

AMBIENT TEMPERATURE:
BAROMETRIC PRESSURE:
ASSUMED MOISTURE:
PITOT TUBE COEFF, Cp:
PROBE ID NO/MATERIAL:
PROBE LENGTH:
NOZZLE ID NO/ MATERIAL:
NOZZLE DIAMETER:
FILTER NO/TYPE:
PRE-TEST LEAK RATE: : _____ CFM@ _____ in. Hg.
POST-TEST LEAK RATE: : _____ CFM@ _____ in. Hg.
PITOT LEAK CHECK - PRE: _____ POST: _____
CHAIN OF CUSTODY: SAMPLE CUSTODIAN _____
SAMPLER _____
SAMPLE CUSTODIAN _____
SEE Page 1.

| Imp. # | Contents | Post-Test - Pre-Test = Difference | |
|---|---|---|---|
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| Total: | | | |

| Point | Time | Meter Volume, ft³ | ΔP in. H₂O | ΔH in. H₂O | Stack Temp, °F | Probe Temp, °F | Filter Temp, °F | Imp. Out Temp, °F | Meter Temp, °F In | Meter Temp, °F Out | Vacuum in. Hg. | O₂ % | P. static in. H₂O |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 6 | 1459 | 709.701 | 1.1 | 1.1 | 479 | 256 | N/A | 59 | 75 | 74 | 4.0 | 3.0 | -1.3 |
| 5 | 1504 | 712.738 | 1.2 | 1.2 | 479 | 260 | | 59 | 75 | 74 | 4.0 | | |
| 4 | 1509 | 715.745 | 1.2 | 1.2 | 477 | 257 | | 59 | 75 | 74 | 4.0 | | |
| 3 | 1514 | 718.811 | 1.1 | 1.1 | 476 | 258 | | 59 | 75 | 74 | 4.0 | | |
| 2 | 1519 | 721.796 | 1.0 | 1.0 | 477 | 257 | | 61 | 75 | 74 | 4.0 | | |
| 1 | 1524 | 724.699 | ~~1.0~~ 1.0 | 1.0 | 473 | 256 | | 60 | 75 | 74 | 4.0 | | |
| 0 | 1529 | 727.480 | | | | | | | | | | | |
| Average: | | | | | | | | | | | | | |

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Delta Air Quality Services, Incorporated

# WET CHEMICAL SAMPLING SYSTEM DATA AND WORKSHEET

CLIENT: Exxon Mobil
LOCATION: FCC / 2F-7 Stack
DATE: 6/27/11
RUN NO: 2-ACD
OPERATOR: SS / DA
METER BOX NO: 12WCG
METER ΔH@: .585
METER Yd: 1.005
STACK AREA, FT²: ✓
TRAVERSE POINTS, MIN/POINT: 5/24
ΔH= 1.03 X ΔP:
Probe Condition, pre/post test: ✓
Silica Gel Expanded, Y/N: ✓
Filter Condition after Test:
Check Weight: ✓

AMBIENT TEMPERATURE: 78°
BAROMETRIC PRESSURE: 29.8
ASSUMED MOISTURE: 11%
PITOT TUBE COEFF, Cp: .84
PROBE ID NO/MATERIAL: #73 / glass
PROBE LENGTH: 6'
NOZZLE ID NO/ MATERIAL: 4 ~~.220~~ / glass
NOZZLE DIAMETER: .220
FILTER NO/TYPE: N/A
PRE-TEST LEAK RATE: >0.002 CFM@ 12 in. Hg.
POST-TEST LEAK RATE: >0.002 CFM@ 12 in. Hg.
PITOT LEAK CHECK - PRE: ✓ POST: ✓
CHAIN OF CUSTODY: SAMPLE CUSTODIAN [illegible]
SAMPLER SS
SAMPLE CUSTODIAN [illegible]

| Imp. # | Contents | Post-Test | Pre-Test | Difference |
|---|---|---|---|---|
| 1 | DNPH | 960.7 | 817.2 | 143.5 |
| 2 | DNPH | 783.3 | 682.5 | 100.8 |
| 3 | DNPH | 731.2 | 730.8 | 0.4 |
| 4 | SG | 959.9 | 942.2 | 17.7 |
| | FB | 806.1 | 806.1 | |
| | FS | 863.7 | 863.7 | |
| | | | | |
| | | | | |
| Total: | | | | 262.4 |

| Point | Time | Meter Volume, ft³ | ΔP in. $H_2O$ | ΔH in. $H_2O$ | Stack Temp, °F | Probe Temp, °F | Filter Temp, °F | Imp. Out Temp, °F | Meter Temp, °F In | Meter Temp, °F Out | Vacuum in. Hg. | $O_2$ % | P. static in. $H_2O$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 6 | 1723 | 727.800 | 1.2 | 1.24 | 478 | ~~N/A~~ | N/A | 58 | 72 | 72 | 4.0 | 3% | -1.3 |
| 5 | 1728 | 731.175 | 1.1 | 1.1 | 477 | 251 | | 59 | 73 | 72 | 4.0 | | -1.3 |
| 4 | 1733 | 734.111 | 1.1 | 1.1 | 476 | | | 59 | 73 | 72 | 4.0 | | -1.3 |
| 3 | 1738 | 737.002 | 1.1 | 1.1 | 476 | | | 59 | 73 | 72 | 4.0 | | -1.3 |
| 2 | 1743 | 739.901 | 1.0 | 1.0 | 475 | | | 59 | 73 | 72 | 4.0 | | -1.3 |
| 1 | 1748 | 742.753 | 1.0 | 1.0 | 474 | | | 59 | 73 | 72 | 4.0 | | -1.3 |
| 0 | 1753 | 745.580 | | | | | | | | | | | |
| 6 | 1756 | 745.586 | 1.5 | 1.5 | 475 | | | 59 | 73 | 72 | 4.0 | | -1.3 |
| 5 | 1801 | 749.008 | 1.8 | 1.9 | 478 | | | 60 | 73 | 72 | 4.0 | | -1.3 |
| 4 | 1806 | 752.732 | 1.9 | 2.0 | 479 | | | 60 | 73 | 72 | 4.0 | | -1.3 |
| 3 | 1811 | 756.455 | 2.0 | 2.1 | 478 | | | 61 | 74 | 72 | 4.0 | | -1.3 |
| 2 | 1816 | 760.394 | 1.9 | 2.0 | 477 | | | 61 | 74 | 72 | 4.0 | | -1.3 |
| 1 | 1821 | 764.219 | 1.3 | 1.3 | 473 | | | 60 | 74 | 72 | 4.0 | | -1.3 |
| 0 | 1826 | 767.572 | | | | | | | | | | | |
| - | | | | | | | | | | | | | |
| - | | | | | | | | | | | | | |
| - | | | | | | | | | | | | | |
| Average: | | | | | | | | | | | | | |

Comments:

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Delta Air Quality Services, Incorporated

# WET CHEMICAL SAMPLING SYSTEM DATA AND WORKSHEET

CLIENT: Exxon Mobil
LOCATION: FCC / 2F-7 Stack
DATE: 6/27/11
RUN NO: 2-ACD
OPERATOR: SS/DA
METER BOX NO: 12-WCS
METER ΔH@: .585
METER Yd: 1.005
STACK AREA, FT$^2$:
TRAVERSE POINTS, MIN/POINT: 5/24
ΔH= 1.03 X ΔP:
Probe Condition, pre/post test:
Silica Gel Expanded, Y/N:
Filter Condition after Test:
Check Weight:

AMBIENT TEMPERATURE:
BAROMETRIC PRESSURE:
ASSUMED MOISTURE:
PITOT TUBE COEFF, Cp:
PROBE ID NO/MATERIAL:
PROBE LENGTH:
NOZZLE ID NO/ MATERIAL:
NOZZLE DIAMETER:
FILTER NO/TYPE:
PRE-TEST LEAK RATE: : CFM@ in. Hg.
POST-TEST LEAK RATE: : CFM@ in. Hg.
PITOT LEAK CHECK - PRE: POST:
CHAIN OF CUSTODY: SAMPLE CUSTODIAN
SAMPLER
SAMPLE CUSTODIAN

| Imp. # | Contents | Post-Test | Pre-Test | Difference |
|---|---|---|---|---|
| | | | | |
| | | | | |
| | | | | |
| | See pg 1 | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| Total: | | | | |

| Point | Time | Meter Volume, ft$^3$ | ΔP in. $H_2O$ | ΔH in. $H_2O$ | Stack Temp, °F | Probe Temp, °F | Filter Temp, °F | Imp. Out Temp, °F | Meter Temp, °F In | Meter Temp, °F Out | Vacuum in. Hg. | $O_2$ % | P. static in. $H_2O$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 6 | 1831 | 767.512 | 1.2 | 1.2 | 477 | N/A | N/A | 61 | 73 | 72 | 4.0 | 3% | -1.3 |
| 5 | 1836 | 770.515 | 1.4 | 1.4 | 478 | | | 60 | 74 | 72 | 4.0 | | -1.3 |
| 4 | 1841 | 773.938 | 1.6 | 1.6 | 478 | | | 61 | 74 | 73 | 4.0 | | -1.3 |
| 3 | 1846 | 777.347 | 1.7 | 1.8 | 476 | | | 60 | 74 | 73 | 4.0 | | -1.3 |
| 2 | 1851 | 781.138 | 1.6 | 1.6 | 477 | | | 60 | 74 | 72 | 4.0 | | -1.3 |
| 1 | 1856 | 784.925 | 1.0 | 1.0 | 477 | | | 62 | 73 | 72 | 4.0 | | -1.3 |
| 0 | 1901 | 787.888 | | | | | | | | | | | |
| 6 | 1903 | 787.888 | 1.6 | 1.6 | 477 | | | 62 | 72 | 71 | 4.0 | | -1.3 |
| 5 | 1908 | 791.332 | 1.5 | 1.5 | 476 | | | 57 | 72 | 71 | 4.0 | | -1.3 |
| 4 | 1913 | 794.765 | 1.4 | 1.4 | 477 | | | 57 | 72 | 71 | 4.0 | | -1.3 |
| 3 | 1918 | 798.101 | 1.3 | 1.3 | 476 | | | 57 | 71 | 70 | 4.0 | | -1.3 |
| 2 | 1923 | 801.342 | 1.1 | 1.1 | 476 | | | 58 | 71 | 70 | 4.0 | | -1.3 |
| 1 | 1928 | 804.271 | 1.0 | 1.0 | 475 | | | 58 | 70 | 69 | 4.0 | | -1.3 |
| 0 | 1933 | 807.145 | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| Average: | | | | | | | | | | | | | |

Comments:

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Date of last revision 7/19/2010
DS834071
Master Document Storage\Forms\Datasheets\Field Datasheets

Delta Air Quality Services, Incorporated

# WET CHEMICAL SAMPLING SYSTEM DATA AND WORKSHEET

CLIENT: Exxon Mobil
LOCATION: FCC / 2F-7 Stack
DATE: 6/28/11
RUN NO: 3-ALd
OPERATOR: DA/SS
METER BOX NO 12WCS
METER ΔH@: .585
METER Yd: 1.005
STACK AREA, FT²:
TRAVERSE POINTS, MIN/POINT: 5/24
ΔH= 1.1 X ΔP:
Probe Condition, pre/post test: ✓
Silica Gel Expended, Y/N: ✓
Filter Condition after Test: ✓
Check Weight: ✓

AMBIENT TEMPERATURE: 78°
BAROMETRIC PRESSURE: 29.77
ASSUMED MOISTURE: 11%
PITOT TUBE COEFF, Cp: .84
PROBE ID NO/MATERIAL: 73 / glass
PROBE LENGTH: 6'
NOZZLE ID NO/ MATERIAL: 31 glass
NOZZLE DIAMETER: .250
FILTER NO/TYPE: N/A
PRE-TEST LEAK RATE: : >0.002 CFM@ 10 in. Hg.
POST-TEST LEAK RATE: >0.002 CFM@ 10 in. Hg.
PITOT LEAK CHECK - PRE: ✓ ✓ POST: ✓
CHAIN OF CUSTODY: SAMPLE CUSTODIAN JP
SAMPLER SS/DA
SAMPLE CUSTODIAN SS

| Imp. # | Contents | Post-Test | Pre-Test | Difference |
|---|---|---|---|---|
| 1 | DNPH | 967.8 | 817.0 | 150.8 |
| 2 | DNPH | 776.6 | 679.1 | 97.5 |
| 3 | DNPH | 736.4 | 730.8 | 5.6 |
| 4 | SG | 917.0 | 895.9 | 21.1 |
| | | | | |
| | | | | |
| Total: | | | | 275.0 |

| Point | Time | Meter Volume, ft³ | ΔP in. H₂O | ΔH in. H₂O | Stack Temp, °F | Probe Temp, °F | Filter Temp, °F | Coil/Imp Out Temp, °F | Meter Temp, °F In | Meter Temp, °F Out | Vac. in. Hg. | O₂ % | Htd Sample Line Temp. °F | P. Satic In. H₂O |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 6 | 0935 | 810.650 | 1.3 | 1.43 | 486 | 247 | N/A | N/A | 81 | 80 | 4.0 | 3% | NA | -1.3 |
| 5 | 0940 | 814.138 | 1.5 | 1.65 | 485 | 250 | | | 80 | 79 | 4.0 | | | -1.3 |
| 4 | 0945 | 817.626 | 1.5 | 1.65 | 485 | 252 | | | 79 | 78 | 4.0 | | | -1.3 |
| 3 | 0950 | 821.253 | 1.6 | 1.76 | 486 | 253 | | | 80 | 78 | 4.0 | | | -1.3 |
| 2 | 0955 | 824.918 | 1.3 | 1.43 | 485 | 252 | | | 78 | 77 | 4.0 | | | -1.3 |
| 1 | 1000 | 828.584 | 831.943 | | | | | | | | | | | |
| 0 | 1005 | ~~828.584~~ | 1.4 | 1.54 | 483 | 253 | | | 79 | 77 | 4.0 | | | -1.3 |
| 6 | 1007 | 831.943 | 1.8 | 1.98 | 482 | 252 | | | 80 | 77 | 4.0 | | | -1.3 |
| 5 | 1012 | 835.753 | 2.0 | 2.2 | 481 | 252 | | | 81 | 77 | 4.0 | | | -1.3 |
| 4 | 1017 | 839.801 | 2.0 | 2.2 | 483 | 254 | | | 84 | 78 | 4.0 | | | -1.3 |
| 3 | 1022 | 843.864 | 1.8 | 1.98 | 485 | 252 | | | 87 | 79 | 4.0 | | | -1.3 |
| 2 | 1027 | 847.685 | 1.4 | 1.54 | 483 | 255 | | | 89 | 81 | 4.0 | | | -1.3 |
| 1 | 1032 | 851.163 | 1.5 | 1.65 | 483 | 253 | | | 92 | ~~83~~ 83 | 4.0 | | | -1.3 |
| 0 | 1037 | 854.845 | | | | | | | | | | | | |
| | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | |

Comments:

C.3-14





Date of last revision 12/3/2008

DS834058
Master Document Storage\Forms\Datasheets\Field Datasheets

Delta Air Quality Services, Incorporated

# WET CHEMICAL SAMPLING SYSTEM DATA AND WORKSHEET

CLIENT: Exxon Mobil
LOCATION: FCC / 2F-7 Stack
DATE: 6/28/11
RUN NO: 3-ALD
OPERATOR: DA/SS
METER BOX NO 12 WCS
METER ΔH@: .5785
METER Yd: 1.005
STACK AREA, FT²:
TRAVERSE POINTS, MIN/POINT: 5/24
ΔH= 1.1 X ΔP:
Probe Condition, pre/post test:
Silica Gel Expended, Y/N:
Filter Condition after Test:
Check Weight:

AMBIENT TEMPERATURE:
BAROMETRIC PRESSURE:
ASSUMED MOISTURE:
PITOT TUBE COEFF, Cp:
PROBE ID NO/MATERIAL:
PROBE LENGTH:
NOZZLE ID NO/ MATERIAL:
NOZZLE DIAMETER:
FILTER NO/TYPE:
PRE-TEST LEAK RATE: : CFM@ in. Hg.
POST-TEST LEAK RATE: : CFM@ in. Hg.
PITOT LEAK CHECK - PRE: POST:
CHAIN OF CUSTODY: SAMPLE CUSTODIAN
SAMPLER
SAMPLE CUSTODIAN
See Page 1

| Imp. # | Contents | Post-Test | Pre-Test | = Difference |
|---|---|---|---|---|
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| Total: | | | | |

| Point | Time | Meter Volume, ft³ | ΔP in. H₂O | ΔH in. H₂O | Stack Temp, °F | Probe Temp, °F | Filter Temp, °F | Coil/Imp Out Temp, °F | Meter Temp, °F In | Meter Temp, °F Out | Vac. in. Hg. | O₂ % | Htd Sample Line Temp. °F | P. Satic In. H₂O |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 6 | 1040 | 854.845 | 1.4 | 1.54 | 484 | 250 | N/A | N/A | 92 | 86 | 4.0 | 3% | N/A | -1.3 |
| 5 | 1045 | 858.268 | 1.3 | 1.43 | 483 | 254 | | | 92 | 87 | 4.0 | | | -1.3 |
| 4 | 1050 | 861.635 | 1.3 | 1.43 | 482 | 256 | | | 90 | 87 | 4.0 | | | -1.3 |
| 3 | 1055 | 864.982 | 1.2 | 1.32 | 486 | 254 | | | 92 | 88 | 4.0 | | | -1.3 |
| 2 | 1100 | 868.173 | 1.1 | 1.21 | 483 | 257 | | | 90 | 86 | 4.0 | | | -1.3 |
| 1 | 1105 | 871.269 | 1.0 | 1.1 | 480 | 255 | | | 91 | 86 | 4.0 | | | -1.3 |
| 0 | 1110 | 874.231 | | | | | | | | | | | | |
| 6 | 1121 | 874.231 | ~~1.0~~ 1.1 | 1.21 | 484 | 259 | | | 87 | 86 | 4.0 | | | -1.3 |
| 5 | 1126 | 877.215 | 1.1 | 1.21 | 483 | 258 | | | 86 | 85 | 4.0 | | | -1.3 |
| 4 | 1131 | 880.173 | 1.1 | 1.21 | 483 | 258 | | | 84 | 82 | 4.0 | | | -1.3 |
| 3 | 1136 | 883.132 | 1.1 | 1.21 | 483 | 259 | | | 82 | 80 | 4.0 | | | -1.3 |
| 2 | 1141 | 886.048 | 1.0 | 1.1 | 482 | 258 | | | 80 | 78 | 4.0 | | | -1.3 |
| 1 | 1146 | 888.975 | 1.0 | 1.1 | 484 | 257 | | | 79 | 78 | 4.0 | | | -1.3 |
| 0 | 1151 | 891.888 | | | | | | | | | | | | |

Comments:



C.3-15

**ExxonMobil**
**STACK $O_2$, $CO_2$ DATA**

**Test #:** **1-Ald**
**Date:** **6/27/2011**
**Time:** **1320/1529**

| | $O_2$ | $CO_2$ | CO |
|---|---|---|---|
| Range | 10 | 20 | 250 |
| Cal Gas | 5.00 | 10.16 | 142 |
| Analyzer Zero | 0.03 | -0.06 | -1.91 |
| Analyzer Span | 5.04 | 10.02 | 142.11 |
| Pre-Bias Zero | 0.05 | 0.02 | -0.13 |
| Pre-Bias Span | 4.98 | 9.74 | 143.47 |
| Post-Bias Zero | 0.04 | 0.02 | -0.11 |
| Post-Bias Span | 4.96 | 9.80 | 143.26 |
| Pre-test zero bias | 0.2% | 0.4% | 0.7% |
| Pre-test span bias | -0.5% | -1.4% | 0.5% |
| Post-test zero bias | 0.2% | 0.4% | 0.7% |
| Post-test span bias | -0.7% | -1.1% | 0.5% |
| Zero Drift | 0.0% | 0.0% | 0.0% |
| Span Drift | -0.2% | 0.3% | -0.1% |
| | PASS | PASS | PASS |
| **Average** | **5.11** | **13.53** | **77.79** |
| **Cal Corrected** | **5.14** | **14.08** | **77.10** |

**ExxonMobil**
**1-Ald**

| Date | Time | O2 % | CO2 % | CO ppm |
|---|---|---|---|---|
| 6/27/2011 | 1:21:00 PM | 5.006 | 13.622 | 77.315 |
| 6/27/2011 | 1:22:00 PM | 5.007 | 13.611 | 76.214 |
| 6/27/2011 | 1:23:00 PM | 5.038 | 13.577 | 77.977 |
| 6/27/2011 | 1:24:00 PM | 5.06 | 13.556 | 76.814 |
| 6/27/2011 | 1:25:00 PM | 5.022 | 13.582 | 77.151 |
| 6/27/2011 | 1:26:00 PM | 5.012 | 13.604 | 77.603 |
| 6/27/2011 | 1:27:00 PM | 5.069 | 13.529 | 77.781 |
| 6/27/2011 | 1:28:00 PM | 5.056 | 13.541 | 75.137 |
| 6/27/2011 | 1:29:00 PM | 4.984 | 13.6 | 76.01 |
| 6/27/2011 | 1:30:00 PM | 4.975 | 13.62 | 78.516 |
| 6/27/2011 | 1:31:00 PM | 4.944 | 13.642 | 77.484 |
| 6/27/2011 | 1:32:00 PM | 4.939 | 13.669 | 79.463 |
| 6/27/2011 | 1:33:00 PM | 4.967 | 13.622 | 79.928 |
| 6/27/2011 | 1:34:00 PM | 4.96 | 13.625 | 78.486 |
| 6/27/2011 | 1:35:00 PM | 4.991 | 13.595 | 77.206 |
| 6/27/2011 | 1:36:00 PM | 4.961 | 13.611 | 77.369 |
| 6/27/2011 | 1:37:00 PM | 4.954 | 13.642 | 76.783 |
| 6/27/2011 | 1:38:00 PM | 4.963 | 13.639 | 78.119 |
| 6/27/2011 | 1:39:00 PM | 5.006 | 13.591 | 77.745 |
| 6/27/2011 | 1:40:00 PM | 5.098 | 13.511 | 77.43 |
| 6/27/2011 | 1:41:00 PM | 5.117 | 13.473 | 75.917 |
| 6/27/2011 | 1:42:00 PM | 5.108 | 13.482 | 74.513 |
| 6/27/2011 | 1:43:00 PM | 5.088 | 13.5 | 74.971 |
| 6/27/2011 | 1:44:00 PM | 5.034 | 13.55 | 76.489 |
| 6/27/2011 | 1:45:00 PM | 4.996 | 13.575 | 78.079 |
| 6/27/2011 | 1:46:00 PM | 4.954 | 13.634 | 78.627 |
| 6/27/2011 | 1:47:00 PM | 4.987 | 13.613 | 78.776 |
| 6/27/2011 | 1:48:00 PM | 5.031 | 13.57 | 77.993 |
| 6/27/2011 | 1:49:00 PM | 5.072 | 13.537 | 76.953 |
| 6/27/2011 | 1:50:00 PM | 5.116 | 13.49 | 77.02 |
| 6/27/2011 | 1:54:00 PM | 5.056 | 13.543 | 77.121 |
| 6/27/2011 | 1:55:00 PM | 5.087 | 13.524 | 75.85 |
| 6/27/2011 | 1:56:00 PM | 5.125 | 13.485 | 75.885 |
| 6/27/2011 | 1:57:00 PM | 5.114 | 13.483 | 76.024 |
| 6/27/2011 | 1:58:00 PM | 5.149 | 13.472 | 75.418 |
| 6/27/2011 | 1:59:00 PM | 5.119 | 13.491 | 74.753 |
| 6/27/2011 | 2:00:00 PM | 5.112 | 13.5 | 76.561 |
| 6/27/2011 | 2:01:00 PM | 5.164 | 13.445 | 76.933 |
| 6/27/2011 | 2:02:00 PM | 5.197 | 13.419 | 77.133 |
| 6/27/2011 | 2:03:00 PM | 5.17 | 13.43 | 77.074 |
| 6/27/2011 | 2:04:00 PM | 5.116 | 13.483 | 77.218 |
| 6/27/2011 | 2:05:00 PM | 5.115 | 13.481 | 75.773 |
| 6/27/2011 | 2:06:00 PM | 5.087 | 13.523 | 76.383 |
| 6/27/2011 | 2:07:00 PM | 5.036 | 13.57 | 78.528 |
| 6/27/2011 | 2:08:00 PM | 5.023 | 13.585 | 78.99 |
| 6/27/2011 | 2:09:00 PM | 5.101 | 13.507 | 78.68 |
| 6/27/2011 | 2:10:00 PM | 5.061 | 13.557 | 78.182 |

| | | | | |
|---|---|---|---|---|
| 6/27/2011 | 2:11:00 PM | 5.098 | 13.517 | 77.824 |
| 6/27/2011 | 2:12:00 PM | 5.132 | 13.491 | 76.542 |
| 6/27/2011 | 2:13:00 PM | 5.138 | 13.489 | 76.841 |
| 6/27/2011 | 2:14:00 PM | 5.137 | 13.498 | 76.494 |
| 6/27/2011 | 2:15:00 PM | 5.168 | 13.471 | 75.06 |
| 6/27/2011 | 2:16:00 PM | 5.18 | 13.466 | 74.591 |
| 6/27/2011 | 2:17:00 PM | 5.201 | 13.44 | 75.602 |
| 6/27/2011 | 2:18:00 PM | 5.159 | 13.484 | 76.139 |
| 6/27/2011 | 2:19:00 PM | 5.135 | 13.499 | 76.858 |
| 6/27/2011 | 2:20:00 PM | 5.082 | 13.55 | 76.824 |
| 6/27/2011 | 2:21:00 PM | 5.081 | 13.568 | 78.729 |
| 6/27/2011 | 2:22:00 PM | 5.135 | 13.517 | 77.347 |
| 6/27/2011 | 2:23:00 PM | 5.191 | 13.472 | 75.509 |
| 6/27/2011 | 2:26:00 PM | 5.203 | 13.455 | 76.529 |
| 6/27/2011 | 2:27:00 PM | 5.157 | 13.507 | 75.859 |
| 6/27/2011 | 2:28:00 PM | 5.139 | 13.534 | 76.49 |
| 6/27/2011 | 2:29:00 PM | 5.168 | 13.487 | 75.884 |
| 6/27/2011 | 2:30:00 PM | 5.148 | 13.513 | 76.955 |
| 6/27/2011 | 2:31:00 PM | 5.158 | 13.502 | 77.579 |
| 6/27/2011 | 2:32:00 PM | 5.135 | 13.524 | 78.847 |
| 6/27/2011 | 2:33:00 PM | 5.143 | 13.517 | 78.797 |
| 6/27/2011 | 2:34:00 PM | 5.094 | 13.567 | 80.469 |
| 6/27/2011 | 2:35:00 PM | 5.067 | 13.583 | 80.557 |
| 6/27/2011 | 2:36:00 PM | 5.114 | 13.562 | 79.13 |
| 6/27/2011 | 2:37:00 PM | 5.183 | 13.478 | 77.001 |
| 6/27/2011 | 2:38:00 PM | 5.126 | 13.54 | 77.418 |
| 6/27/2011 | 2:39:00 PM | 5.162 | 13.518 | 79.335 |
| 6/27/2011 | 2:40:00 PM | 5.183 | 13.492 | 79.16 |
| 6/27/2011 | 2:41:00 PM | 5.114 | 13.563 | 79.589 |
| 6/27/2011 | 2:42:00 PM | 5.044 | 13.625 | 82.269 |
| 6/27/2011 | 2:43:00 PM | 5.061 | 13.624 | 82.197 |
| 6/27/2011 | 2:44:00 PM | 5.115 | 13.576 | 79.919 |
| 6/27/2011 | 2:45:00 PM | 5.185 | 13.492 | 78.663 |
| 6/27/2011 | 2:46:00 PM | 5.156 | 13.526 | 77.397 |
| 6/27/2011 | 2:47:00 PM | 5.23 | 13.495 | 77.265 |
| 6/27/2011 | 2:48:00 PM | 5.18 | 13.493 | 78.53 |
| 6/27/2011 | 2:49:00 PM | 5.124 | 13.572 | 80.834 |
| 6/27/2011 | 2:50:00 PM | 5.181 | 13.502 | 81.12 |
| 6/27/2011 | 2:51:00 PM | 5.103 | 13.565 | 81.038 |
| 6/27/2011 | 2:52:00 PM | 5.112 | 13.572 | 80.551 |
| 6/27/2011 | 2:53:00 PM | 5.089 | 13.59 | 80.739 |
| 6/27/2011 | 2:54:00 PM | 5.134 | 13.555 | 78.908 |
| 6/27/2011 | 2:55:00 PM | 5.174 | 13.536 | 78.548 |
| 6/27/2011 | 3:00:00 PM | 5.21 | 13.465 | 78.684 |
| 6/27/2011 | 3:01:00 PM | 5.187 | 13.474 | 77.576 |
| 6/27/2011 | 3:02:00 PM | 5.184 | 13.496 | 78.052 |
| 6/27/2011 | 3:03:00 PM | 5.148 | 13.518 | 79.205 |
| 6/27/2011 | 3:04:00 PM | 5.182 | 13.497 | 79.491 |
| 6/27/2011 | 3:05:00 PM | 5.24 | 13.45 | 76.721 |
| 6/27/2011 | 3:06:00 PM | 5.21 | 13.473 | 76.945 |
| 6/27/2011 | 3:07:00 PM | 5.226 | 13.476 | 77.862 |
| 6/27/2011 | 3:08:00 PM | 5.195 | 13.484 | 77.925 |

| | | | | |
|---|---|---|---|---|
| 6/27/2011 | 3:09:00 PM | 5.165 | 13.519 | 78.352 |
| 6/27/2011 | 3:10:00 PM | 5.108 | 13.566 | 80.677 |
| 6/27/2011 | 3:11:00 PM | 5.123 | 13.561 | 80.992 |
| 6/27/2011 | 3:12:00 PM | 5.14 | 13.52 | 78.278 |
| 6/27/2011 | 3:13:00 PM | 5.158 | 13.519 | 77.258 |
| 6/27/2011 | 3:14:00 PM | 5.17 | 13.503 | 77.24 |
| 6/27/2011 | 3:15:00 PM | 5.147 | 13.52 | 77.21 |
| 6/27/2011 | 3:16:00 PM | 5.167 | 13.502 | 76.894 |
| 6/27/2011 | 3:17:00 PM | 5.166 | 13.516 | 78.229 |
| 6/27/2011 | 3:18:00 PM | 5.156 | 13.5 | 77.716 |
| 6/27/2011 | 3:19:00 PM | 5.135 | 13.519 | 78.716 |
| 6/27/2011 | 3:20:00 PM | 5.144 | 13.515 | 79.944 |
| 6/27/2011 | 3:21:00 PM | 5.174 | 13.493 | 79.393 |
| 6/27/2011 | 3:22:00 PM | 5.141 | 13.502 | 78.378 |
| | Average | 5.11 | 13.53 | 77.79 |

**ExxonMobil**
**STACK $O_2$, $CO_2$ DATA**

**Test #:** **2-Ald**
**Date:** **6/27/2011**
**Time:** **1723/1933**

| | $O_2$ | $CO_2$ | CO |
|---|---|---|---|
| Range | 10 | 20 | 250 |
| Cal Gas | 5.00 | 10.16 | 142 |
| Analyzer Zero | 0.03 | -0.06 | -1.91 |
| Analyzer Span | 5.04 | 10.02 | 142.11 |
| Pre-Bias Zero | 0.05 | 0.02 | -0.07 |
| Pre-Bias Span | 4.97 | 9.72 | 142.88 |
| Post-Bias Zero | 0.05 | 0.01 | 0.02 |
| Post-Bias Span | 4.96 | 9.67 | 143.86 |
| Pre-test zero bias | 0.2% | 0.4% | 0.7% |
| Pre-test span bias | -0.7% | -1.5% | 0.3% |
| Post-test zero bias | 0.2% | 0.3% | 0.8% |
| Post-test span bias | -0.7% | -1.8% | 0.7% |
| Zero Drift | 0.0% | 0.0% | 0.0% |
| Span Drift | 0.0% | -0.3% | 0.4% |
| | PASS | PASS | PASS |
| **Average** | **4.99** | **13.47** | **76.94** |
| **Cal Corrected** | **5.03** | **14.12** | **76.22** |

**ExxonMobil**
**2-Ald**

| Date | Time | O2 % | CO2 % | CO ppm |
|---|---|---|---|---|
| 6/27/2011 | 5:34:00 PM | 5.127 | 13.352 | 77.948 |
| 6/27/2011 | 5:35:00 PM | 5.072 | 13.399 | 75.661 |
| 6/27/2011 | 5:36:00 PM | 5.055 | 13.423 | 73.584 |
| 6/27/2011 | 5:37:00 PM | 5.058 | 13.43 | 75.403 |
| 6/27/2011 | 5:38:00 PM | 5.03 | 13.443 | 76.649 |
| 6/27/2011 | 5:39:00 PM | 5.015 | 13.468 | 76.485 |
| 6/27/2011 | 5:40:00 PM | 4.97 | 13.496 | 78.677 |
| 6/27/2011 | 5:41:00 PM | 4.907 | 13.56 | 79.438 |
| 6/27/2011 | 5:42:00 PM | 4.943 | 13.547 | 79.802 |
| 6/27/2011 | 5:43:00 PM | 4.961 | 13.523 | 79.729 |
| 6/27/2011 | 5:44:00 PM | 4.879 | 13.604 | 80.855 |
| 6/27/2011 | 5:45:00 PM | 4.962 | 13.513 | 80.878 |
| 6/27/2011 | 5:46:00 PM | 4.998 | 13.481 | 79.182 |
| 6/27/2011 | 5:47:00 PM | 4.96 | 13.504 | 80.407 |
| 6/27/2011 | 5:48:00 PM | 4.996 | 13.491 | 79.928 |
| 6/27/2011 | 5:49:00 PM | 4.999 | 13.481 | 78.681 |
| 6/27/2011 | 5:50:00 PM | 4.966 | 13.505 | 78.077 |
| 6/27/2011 | 5:51:00 PM | 4.956 | 13.523 | 79.661 |
| 6/27/2011 | 5:52:00 PM | 5.003 | 13.482 | 81.02 |
| 6/27/2011 | 5:53:00 PM | 5.022 | 13.453 | 79.927 |
| 6/27/2011 | 5:57:00 PM | 4.994 | 13.473 | 78.234 |
| 6/27/2011 | 5:58:00 PM | 4.955 | 13.518 | 78.54 |
| 6/27/2011 | 5:59:00 PM | 4.994 | 13.483 | 78.355 |
| 6/27/2011 | 6:00:00 PM | 5.048 | 13.444 | 76.554 |
| 6/27/2011 | 6:01:00 PM | 5.007 | 13.465 | 75.457 |
| 6/27/2011 | 6:02:00 PM | 5 | 13.474 | 76.845 |
| 6/27/2011 | 6:03:00 PM | 5.049 | 13.435 | 78.074 |
| 6/27/2011 | 6:04:00 PM | 5.027 | 13.455 | 78.132 |
| 6/27/2011 | 6:05:00 PM | 5.015 | 13.471 | 79.14 |
| 6/27/2011 | 6:06:00 PM | 5.032 | 13.443 | 78.538 |
| 6/27/2011 | 6:07:00 PM | 5.007 | 13.467 | 77.65 |
| 6/27/2011 | 6:08:00 PM | 5.02 | 13.459 | 78.224 |
| 6/27/2011 | 6:09:00 PM | 4.987 | 13.485 | 78.367 |
| 6/27/2011 | 6:10:00 PM | 4.995 | 13.486 | 77.693 |
| 6/27/2011 | 6:11:00 PM | 5.01 | 13.464 | 79.286 |
| 6/27/2011 | 6:12:00 PM | 4.979 | 13.495 | 79.227 |
| 6/27/2011 | 6:13:00 PM | 5.013 | 13.462 | 78.269 |
| 6/27/2011 | 6:14:00 PM | 4.998 | 13.473 | 77.041 |
| 6/27/2011 | 6:15:00 PM | 4.989 | 13.489 | 76.638 |
| 6/27/2011 | 6:16:00 PM | 5.04 | 13.435 | 76.258 |
| 6/27/2011 | 6:17:00 PM | 4.999 | 13.46 | 76.175 |
| 6/27/2011 | 6:18:00 PM | 5.003 | 13.458 | 77.365 |
| 6/27/2011 | 6:19:00 PM | 5.008 | 13.474 | 78.776 |
| 6/27/2011 | 6:20:00 PM | 4.996 | 13.467 | 79.774 |
| 6/27/2011 | 6:21:00 PM | 4.97 | 13.491 | 77.311 |
| 6/27/2011 | 6:22:00 PM | 5.005 | 13.459 | 77.923 |
| 6/27/2011 | 6:23:00 PM | 4.932 | 13.521 | 78.367 |

| | | | | |
|---|---|---|---|---|
| 6/27/2011 | 6:24:00 PM | 4.946 | 13.521 | 79.843 |
| 6/27/2011 | 6:25:00 PM | 4.961 | 13.525 | 80.278 |
| 6/27/2011 | 6:26:00 PM | 4.941 | 13.531 | 80.875 |
| 6/27/2011 | 6:32:00 PM | 5.013 | 13.466 | 47.355 |
| 6/27/2011 | 6:33:00 PM | 4.977 | 13.5 | 63.947 |
| 6/27/2011 | 6:34:00 PM | 4.98 | 13.5 | 73.489 |
| 6/27/2011 | 6:35:00 PM | 4.982 | 13.489 | 76.016 |
| 6/27/2011 | 6:36:00 PM | 4.969 | 13.503 | 78.045 |
| 6/27/2011 | 6:37:00 PM | 4.998 | 13.473 | 78.553 |
| 6/27/2011 | 6:38:00 PM | 4.984 | 13.487 | 79.072 |
| 6/27/2011 | 6:39:00 PM | 4.995 | 13.468 | 78.293 |
| 6/27/2011 | 6:40:00 PM | 4.926 | 13.526 | 79.395 |
| 6/27/2011 | 6:41:00 PM | 5.002 | 13.466 | 79.607 |
| 6/27/2011 | 6:42:00 PM | 5.019 | 13.438 | 78.132 |
| 6/27/2011 | 6:43:00 PM | 4.976 | 13.476 | 78.179 |
| 6/27/2011 | 6:44:00 PM | 4.945 | 13.524 | 78.165 |
| 6/27/2011 | 6:45:00 PM | 4.963 | 13.502 | 75.401 |
| 6/27/2011 | 6:46:00 PM | 4.989 | 13.467 | 63.921 |
| 6/27/2011 | 6:47:00 PM | 4.932 | 13.53 | 61.671 |
| 6/27/2011 | 6:48:00 PM | 4.93 | 13.531 | 66.925 |
| 6/27/2011 | 6:49:00 PM | 4.851 | 13.575 | 76.753 |
| 6/27/2011 | 6:50:00 PM | 4.839 | 13.607 | 79.61 |
| 6/27/2011 | 6:51:00 PM | 4.829 | 13.612 | 80.049 |
| 6/27/2011 | 6:52:00 PM | 4.815 | 13.629 | 82.477 |
| 6/27/2011 | 6:53:00 PM | 4.871 | 13.585 | 79.76 |
| 6/27/2011 | 6:54:00 PM | 4.882 | 13.577 | 78.702 |
| 6/27/2011 | 6:55:00 PM | 4.921 | 13.533 | 79.129 |
| 6/27/2011 | 6:56:00 PM | 4.957 | 13.501 | 78.796 |
| 6/27/2011 | 6:57:00 PM | 4.953 | 13.504 | 77.875 |
| 6/27/2011 | 6:58:00 PM | 4.966 | 13.498 | 78.609 |
| 6/27/2011 | 6:59:00 PM | 4.985 | 13.488 | 78.187 |
| 6/27/2011 | 7:00:00 PM | 4.984 | 13.483 | 76.782 |
| 6/27/2011 | 7:01:00 PM | 4.916 | 13.533 | 79.416 |
| 6/27/2011 | 7:04:00 PM | 4.966 | 13.498 | 79.024 |
| 6/27/2011 | 7:05:00 PM | 5.039 | 13.421 | 77.236 |
| 6/27/2011 | 7:06:00 PM | 5.012 | 13.444 | 76.147 |
| 6/27/2011 | 7:07:00 PM | 5.047 | 13.422 | 77.118 |
| 6/27/2011 | 7:08:00 PM | 4.983 | 13.478 | 80.592 |
| 6/27/2011 | 7:09:00 PM | 4.953 | 13.484 | 82.002 |
| 6/27/2011 | 7:10:00 PM | 4.987 | 13.463 | 78.527 |
| 6/27/2011 | 7:11:00 PM | 5.013 | 13.443 | 78.13 |
| 6/27/2011 | 7:12:00 PM | 5.027 | 13.427 | 78.569 |
| 6/27/2011 | 7:13:00 PM | 5.033 | 13.407 | 77.216 |
| 6/27/2011 | 7:14:00 PM | 5.014 | 13.436 | 79.97 |
| 6/27/2011 | 7:15:00 PM | 5.088 | 13.371 | 77.899 |
| 6/27/2011 | 7:16:00 PM | 5.076 | 13.359 | 77.319 |
| 6/27/2011 | 7:17:00 PM | 5.089 | 13.361 | 77.616 |
| 6/27/2011 | 7:18:00 PM | 5.1 | 13.361 | 77.736 |
| 6/27/2011 | 7:19:00 PM | 5.082 | 13.364 | 78.655 |
| 6/27/2011 | 7:20:00 PM | 5.073 | 13.366 | 79.72 |
| 6/27/2011 | 7:21:00 PM | 5.084 | 13.364 | 78.224 |
| 6/27/2011 | 7:22:00 PM | 5.056 | 13.402 | 72.528 |

| | | | | |
|---|---|---|---|---|
| 6/27/2011 | 7:23:00 PM | 5.075 | 13.395 | 69.785 |
| 6/27/2011 | 7:24:00 PM | 5.077 | 13.369 | 68.659 |
| 6/27/2011 | 7:25:00 PM | 5.045 | 13.379 | 72.079 |
| 6/27/2011 | 7:26:00 PM | 5.012 | 13.416 | 76.867 |
| 6/27/2011 | 7:27:00 PM | 5.005 | 13.443 | 72.251 |
| 6/27/2011 | 7:28:00 PM | 5.005 | 13.441 | 67.873 |
| 6/27/2011 | 7:29:00 PM | 5.023 | 13.431 | 67.652 |
| 6/27/2011 | 7:30:00 PM | 4.981 | 13.451 | 74.008 |
| 6/27/2011 | 7:31:00 PM | 5.043 | 13.413 | 77.177 |
| 6/27/2011 | 7:32:00 PM | 5.039 | 13.403 | 77.163 |
| 6/27/2011 | 7:33:00 PM | 5.011 | 13.429 | 78.423 |
| | Average | 4.99 | 13.47 | 76.94 |

**ExxonMobil**
**STACK $O_2$, $CO_2$ DATA**

**Test #:** **3-Ald**
**Date:** **6/28/2011**
**Time:** **935/1151**

| | $O_2$ | $CO_2$ | CO |
|---|---|---|---|
| Range | 10 | 20 | 250 |
| Cal Gas | 5.00 | 10.16 | 142 |
| Analyzer Zero | 0.05 | 0.00 | 0.49 |
| Analyzer Span | 4.98 | 9.97 | 144.14 |
| Pre-Bias Zero | 0.04 | 0.01 | -0.11 |
| Pre-Bias Span | 4.97 | 9.91 | 143.37 |
| Post-Bias Zero | 0.04 | 0.01 | -0.16 |
| Post-Bias Span | 5.00 | 10.01 | 145.16 |
| Pre-test zero bias | -0.1% | 0.1% | -0.2% |
| Pre-test span bias | -0.2% | -0.3% | -0.3% |
| Post-test zero bias | -0.1% | 0.1% | -0.3% |
| Post-test span bias | 0.1% | 0.2% | 0.4% |
| Zero Drift | 0.0% | 0.0% | 0.0% |
| Span Drift | 0.3% | 0.5% | 0.7% |
| | PASS | PASS | PASS |
| **Average** | **4.97** | **13.80** | **76.67** |
| **Cal Corrected** | **4.99** | **14.09** | **75.54** |

**ExxonMobil**
**3-Ald**

| Date | Time | O2 % | CO2 % | CO ppm |
|---|---|---|---|---|
| 6/28/2011 | 9:36:00 AM | 4.985 | 13.809 | 71.78 |
| 6/28/2011 | 9:37:00 AM | 4.97 | 13.803 | 71.755 |
| 6/28/2011 | 9:38:00 AM | 4.919 | 13.878 | 72.764 |
| 6/28/2011 | 9:39:00 AM | 4.892 | 13.896 | 74.84 |
| 6/28/2011 | 9:40:00 AM | 4.861 | 13.934 | 76.045 |
| 6/28/2011 | 9:41:00 AM | 4.845 | 13.963 | 76.774 |
| 6/28/2011 | 9:42:00 AM | 4.857 | 13.968 | 77.314 |
| 6/28/2011 | 9:43:00 AM | 4.911 | 13.911 | 75.487 |
| 6/28/2011 | 9:44:00 AM | 4.932 | 13.914 | 73.809 |
| 6/28/2011 | 9:45:00 AM | 4.961 | 13.927 | 72.511 |
| 6/28/2011 | 9:46:00 AM | 5.085 | 14.258 | 75.621 |
| 6/28/2011 | 9:47:00 AM | 5.028 | 13.899 | 74.458 |
| 6/28/2011 | 9:48:00 AM | 4.992 | 13.915 | 76.77 |
| 6/28/2011 | 9:49:00 AM | 5.066 | 13.833 | 75.542 |
| 6/28/2011 | 9:50:00 AM | 5.11 | 13.778 | 71.394 |
| 6/28/2011 | 9:51:00 AM | 5.042 | 13.834 | 69.851 |
| 6/28/2011 | 9:52:00 AM | 5.014 | 13.848 | 70.921 |
| 6/28/2011 | 9:53:00 AM | 5.003 | 13.86 | 71.903 |
| 6/28/2011 | 9:54:00 AM | 4.934 | 13.917 | 74.159 |
| 6/28/2011 | 9:55:00 AM | 4.858 | 14.007 | 77.487 |
| 6/28/2011 | 9:56:00 AM | 4.881 | 13.989 | 78.312 |
| 6/28/2011 | 9:57:00 AM | 4.898 | 13.945 | 74.975 |
| 6/28/2011 | 9:58:00 AM | 4.926 | 13.919 | 73.434 |
| 6/28/2011 | 9:59:00 AM | 4.931 | 13.94 | 73.694 |
| 6/28/2011 | 10:00:00 AM | 4.967 | 13.901 | 74.527 |
| 6/28/2011 | 10:01:00 AM | 4.985 | 13.902 | 74.459 |
| 6/28/2011 | 10:02:00 AM | 4.952 | 13.912 | 75.411 |
| 6/28/2011 | 10:03:00 AM | 4.955 | 13.895 | 75.636 |
| 6/28/2011 | 10:04:00 AM | 4.975 | 13.907 | 75.238 |
| 6/28/2011 | 10:15:00 AM | 5.06 | 13.801 | 70.814 |
| 6/28/2011 | 10:16:00 AM | 4.985 | 13.882 | 71.864 |
| 6/28/2011 | 10:17:00 AM | 4.989 | 13.872 | 73.705 |
| 6/28/2011 | 10:18:00 AM | 4.985 | 13.875 | 72.53 |
| 6/28/2011 | 10:19:00 AM | 4.941 | 13.925 | 74.036 |
| 6/28/2011 | 10:20:00 AM | 4.964 | 13.908 | 73.502 |
| 6/28/2011 | 10:21:00 AM | 4.954 | 13.915 | 73.367 |
| 6/28/2011 | 10:22:00 AM | 4.966 | 13.952 | 75.398 |
| 6/28/2011 | 10:23:00 AM | 4.966 | 13.949 | 74.528 |
| 6/28/2011 | 10:24:00 AM | 5.03 | 13.911 | 74.248 |
| 6/28/2011 | 10:25:00 AM | 5.08 | 13.843 | 73.282 |
| 6/28/2011 | 10:26:00 AM | 5.11 | 13.824 | 71.563 |
| 6/28/2011 | 10:27:00 AM | 5.068 | 13.855 | 70.39 |
| 6/28/2011 | 10:28:00 AM | 5.12 | 14.046 | 70.992 |
| 6/28/2011 | 10:29:00 AM | 4.985 | 13.715 | 69.04 |
| 6/28/2011 | 10:30:00 AM | 4.927 | 13.767 | 71.412 |
| 6/28/2011 | 10:31:00 AM | 4.954 | 13.732 | 72.696 |
| 6/28/2011 | 10:32:00 AM | 4.924 | 13.741 | 71.318 |

| | | | | |
|---|---|---|---|---|
| 6/28/2011 | 10:33:00 AM | 4.907 | 13.79 | 71.028 |
| 6/28/2011 | 10:34:00 AM | 4.953 | 13.731 | 71.075 |
| 6/28/2011 | 10:35:00 AM | 4.921 | 13.759 | 70.336 |
| 6/28/2011 | 10:36:00 AM | 4.929 | 13.747 | 69.868 |
| 6/28/2011 | 10:37:00 AM | 4.871 | 13.799 | 70.59 |
| 6/28/2011 | 10:41:00 AM | 4.777 | 13.883 | 175.435 |
| 6/28/2011 | 10:42:00 AM | 4.786 | 13.887 | 126.896 |
| 6/28/2011 | 10:43:00 AM | 4.78 | 13.891 | 167.537 |
| 6/28/2011 | 10:44:00 AM | 4.807 | 13.886 | 147.563 |
| 6/28/2011 | 10:45:00 AM | 4.84 | 13.857 | 92.666 |
| 6/28/2011 | 10:46:00 AM | 4.891 | 13.803 | 78.707 |
| 6/28/2011 | 10:47:00 AM | 4.863 | 13.826 | 77.161 |
| 6/28/2011 | 10:48:00 AM | 4.924 | 13.778 | 73.799 |
| 6/28/2011 | 10:49:00 AM | 4.922 | 13.779 | 73.505 |
| 6/28/2011 | 10:50:00 AM | 4.896 | 13.806 | 73.637 |
| 6/28/2011 | 10:51:00 AM | 4.896 | 13.815 | 74.767 |
| 6/28/2011 | 10:52:00 AM | 4.931 | 13.765 | 73.748 |
| 6/28/2011 | 10:53:00 AM | 4.969 | 13.735 | 71.327 |
| 6/28/2011 | 10:54:00 AM | 5.003 | 13.712 | 70.515 |
| 6/28/2011 | 10:55:00 AM | 5.087 | 13.643 | 70.948 |
| 6/28/2011 | 10:56:00 AM | 5.1 | 13.614 | 70.377 |
| 6/28/2011 | 10:57:00 AM | 5.068 | 13.635 | 69.193 |
| 6/28/2011 | 10:58:00 AM | 4.992 | 13.702 | 70.947 |
| 6/28/2011 | 10:59:00 AM | 5.004 | 13.685 | 70.95 |
| 6/28/2011 | 11:00:00 AM | 5.004 | 13.673 | 69.63 |
| 6/28/2011 | 11:01:00 AM | 5.002 | 13.688 | 69.265 |
| 6/28/2011 | 11:02:00 AM | 4.986 | 13.694 | 68.388 |
| 6/28/2011 | 11:03:00 AM | 4.941 | 13.738 | 69.331 |
| 6/28/2011 | 11:04:00 AM | 4.885 | 13.796 | 70.865 |
| 6/28/2011 | 11:05:00 AM | 4.873 | 13.821 | 88.322 |
| 6/28/2011 | 11:06:00 AM | 4.888 | 13.795 | 81.019 |
| 6/28/2011 | 11:07:00 AM | 4.874 | 13.824 | 74.04 |
| 6/28/2011 | 11:08:00 AM | 4.924 | 13.775 | 73.662 |
| 6/28/2011 | 11:09:00 AM | 4.887 | 13.797 | 71.301 |
| 6/28/2011 | 11:10:00 AM | 4.867 | 13.831 | 72.175 |
| 6/28/2011 | 11:22:00 AM | 4.944 | 13.776 | 73.325 |
| 6/28/2011 | 11:23:00 AM | 4.981 | 13.744 | 72.925 |
| 6/28/2011 | 11:24:00 AM | 4.995 | 13.743 | 74.097 |
| 6/28/2011 | 11:25:00 AM | 4.976 | 13.751 | 74.647 |
| 6/28/2011 | 11:26:00 AM | 4.992 | 13.739 | 74.779 |
| 6/28/2011 | 11:27:00 AM | 5.028 | 13.717 | 74.119 |
| 6/28/2011 | 11:28:00 AM | 5.106 | 13.636 | 72.632 |
| 6/28/2011 | 11:29:00 AM | 5.073 | 13.651 | 71.038 |
| 6/28/2011 | 11:30:00 AM | 5.081 | 13.656 | 72.115 |
| 6/28/2011 | 11:31:00 AM | 5.072 | 13.652 | 72.594 |
| 6/28/2011 | 11:32:00 AM | 5.005 | 13.717 | 74.624 |
| 6/28/2011 | 11:33:00 AM | 4.918 | 13.799 | 77.696 |
| 6/28/2011 | 11:34:00 AM | 5.017 | 13.724 | 77.317 |
| 6/28/2011 | 11:35:00 AM | 5.047 | 13.697 | 74.722 |
| 6/28/2011 | 11:36:00 AM | 5.104 | 13.639 | 73.54 |
| 6/28/2011 | 11:37:00 AM | 5.117 | 13.646 | 74.131 |
| 6/28/2011 | 11:38:00 AM | 5.122 | 13.652 | 75.83 |

| | | | | |
|---|---|---|---|---|
| 6/28/2011 | 11:39:00 AM | 5.128 | 13.618 | 73.559 |
| 6/28/2011 | 11:40:00 AM | 5.111 | 13.643 | 74.886 |
| 6/28/2011 | 11:41:00 AM | 5.115 | 13.613 | 73.592 |
| 6/28/2011 | 11:42:00 AM | 5.081 | 13.642 | 73.862 |
| 6/28/2011 | 11:43:00 AM | 5.074 | 13.654 | 75.116 |
| 6/28/2011 | 11:44:00 AM | 4.976 | 13.752 | 76.187 |
| 6/28/2011 | 11:45:00 AM | 5.006 | 13.73 | 75.189 |
| 6/28/2011 | 11:46:00 AM | 4.984 | 13.758 | 74.573 |
| 6/28/2011 | 11:47:00 AM | 4.977 | 13.756 | 76.428 |
| 6/28/2011 | 11:48:00 AM | 4.997 | 13.743 | 76.832 |
| 6/28/2011 | 11:49:00 AM | 5.023 | 13.711 | 74.927 |
| 6/28/2011 | 11:50:00 AM | 5.02 | 13.74 | 74.628 |
| 6/28/2011 | 11:51:00 AM | 5.018 | 13.737 | 75.479 |
| | Average | 4.97 | 13.80 | 76.67 |

# Atmospheric Analysis & Consulting, Inc.

Client : Delta Air Quality Services
Client Project Name : ICR 2F-7
AAC Project No. : 110530
Reporting Date : 07/06/2011

On June 30, 2011, Atmospheric Analysis & Consulting, Inc. received ten (10) DNPH impinger contents for Formaldehyde, Acetaldehyde, and Propionaldehyde analysis by EPA Method 0011. Upon receipt, the samples were assigned unique Laboratory ID numbers as follows:

| Client Sample ID | AAC Sample ID |
|---|---|
| 1-Ald | 51241 |
| 2-Ald | 51242 |
| 3-Ald | 51243 |
| 1-FS-Ald | 51244 |
| 2-FS-Ald | 51245 |
| 1-FB-Ald | 51246 |
| 2-FB-Ald | 51247 |
| SB-Ald | 51248 |
| MeCl2-Blank-Ald | 51249 |
| H2O-Blank-Ald | 51250 |

EPA Method 0011– Upon receipt, Methylene Chloride was measured from or added to each vial. A portion of the organic layer was removed from all samples. The organic extracts were concentrated to dryness under a stream of UHP Nitrogen. When the samples reached dryness, the vials were removed from the nitrogen stream and Carbonyl-free Acetonitrile was added. A 10$\mu$L aliquot of the extract was analyzed by HPLC/UV following EPA Method 0011 as specified in the chain of custody. Holding times for preparation and analysis were complied with.

No problems were encountered during preparation and/or analysis of these samples. The test results included in this report meet all requirements of the NELAC Standards and/or AAC SOP# E.0011.02.

I certify that this data is technically accurate, complete and in compliance with the terms and conditions of the contract. The Laboratory Director or his designee, as verified by the following signature, has authorized release of the data contained in this hardcopy data package.

If you have any questions or if you require further explanation of data results, please contact the undersigned.

Marcus Hueppe
Laboratory Director

This report consists of 7 pages.



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# Atmospheric Analysis & Consulting, Inc.

***Laboratory Analysis Report***
**EPA Method 0011**

Client : Delta Air Quality Services
Client Project Name : ICR 2F-7
AAC Project No. : 110530
Analyst : EG/AD
Units : ug/sample

Sampling Date : 06/27/2011
Receiving Date : 06/30/2011
Analysis Date : 07/05/2011
Reporting Date : 07/06/2011

| Client Sample ID | AAC Sample ID | Formaldehyde (ug/sample) | SRL (ug/sample) | Acetaldehyde (ug/sample) | SRL (ug/sample) | Propionaldehyde (ug/sample) | SRL (ug/sample) |
|---|---|---|---|---|---|---|---|
| 1-Ald | 51241 | 4430 | 62.5 | 206 | 6.25 | <SRL | 6.25 |
| 2-Ald | 51242 | 3070 | 8.13 | 199 | 8.13 | <SRL | 8.13 |
| 3-Ald | 51243 | 2500 | 6.88 | 164 | 6.88 | <SRL | 6.88 |
| 1-FS-Ald | 51244 | 875 | 3.35 | 598 | 3.35 | 586 | 3.35 |
| 2-FS-Ald | 51245 | 757 | 2.88 | 521 | 2.88 | 510 | 2.88 |
| 1-FB-Ald | 51246 | <SRL | 3.40 | <SRL | 3.40 | <SRL | 3.40 |
| 2-FB-Ald | 51247 | <SRL | 3.65 | <SRL | 3.65 | <SRL | 3.65 |
| SB-Ald | 51248 | <SRL | 7.10 | <SRL | 7.10 | <SRL | 7.10 |
| MeCl2-Blank-Ald | 51249 | <SRL | 0.250 | <SRL | 0.250 | <SRL | 0.250 |
| H2O-Blank-Ald | 51250 | <SRL | 0.500 | <SRL | 0.500 | <SRL | 0.500 |
| | Trip Blank | <SRL | 0.250 | <SRL | 0.250 | <SRL | 0.250 |
| | Trip Spike | 96.9% Recovery | 0.500 | 99.5% Recovery | 0.500 | 99.8% Recovery | 0.500 |

<SRL - compound was analyzed for but not detected at or above the SRL (Sample Reporting Limit)
SRL (ug/sample) = MRL (0.025ug/mL) x Sample Volume (mL) x Analysis Dilution Factor x Method Dilution Factor
Method Reporting Limit (MRL) - 0.025ug/mL

Marcua Hueppe
Laboratory Director



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# Atmospheric Analysis & Consulting, Inc.

*Laboratory Analysis Report*
**EPA Method 0011**

Client : Delta Air Quality Services
Client Project No. : ICR 2F-7
AAC Project No. : 110530
Analyst : EG/AD
Units : ug/sample

Sampling Date : 06/27/2011
Receiving Date : 06/30/2011
Analysis Date : 07/05/2011
Reporting Date : 07/06/2011

**Spike Recovery Evaluation Spreadsheet**

| Client Sample ID | AAC Sample ID | Target Formaldehyde Concentration (ug/mL) | Measured Formaldehyde Concentration (ug/mL) | Percent Recovery (%) | Target Acetaldehyde Concentration (ug/mL) | Measured Acetaldehyde Concentration (ug/mL) | Percent Recovery (%) | Target Propionaldehyde Concentration (ug/mL) | Measured Propionaldehyde Concentration (ug/mL) | Percent Recovery (%) |
|---|---|---|---|---|---|---|---|---|---|---|
| | Trip Spike | 4.97 | 4.82 | 96.9 | 4.60 | 4.57 | 99.5 | 4.68 | 4.67 | 99.8 |
| | Field Spiking Solution | 3.56 | 3.67 | 103 | 4.01 | 4.12 | 103 | 3.76 | 3.94 | 105 |
| 1-FS-Ald | 51244 | 5.32 | 6.53 | 123 | 5.99 | 4.46 | 74.5 | 5.60 | 4.37 | 78.0 |
| 2-FS-Ald | 51245 | 6.20 | 6.58 | 106 | 6.98 | 4.53 | 65.0 | 6.53 | 4.44 | 67.9 |

Marcus Hueppe
Laboratory Director



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# Atmospheric Analysis & Consulting, Inc.

## *Quality Control/Quality Assurance Report*

**EPA 0011**

*HPLC Calibration Verification of the 03/29/2011 Calibration*

Analysis Date : 07/05/2011 Instrument ID : HPLC 01
Analyst : AD

| Sample ID | Analyte | Theoretical Concentration (ug/mL) | Measured Concentration (ug/mL) | Percent Recovery (%)* |
|---|---|---|---|---|
| Opening CV | Formaldehyde | 2.50 | 2.72 | 109 |
| | Acetaldehyde | 2.50 | 2.69 | 108 |
| | Propionaldehyde | 2.50 | 2.67 | 107 |
| Continuing CV | Formaldehyde | 2.50 | 2.64 | 105 |
| | Acetaldehyde | 2.50 | 2.64 | 106 |
| | Propionaldehyde | 2.50 | 2.64 | 106 |
| Continuing CV | Formaldehyde | 2.50 | 2.62 | 105 |
| | Acetaldehyde | 2.50 | 2.63 | 105 |
| | Propionaldehyde | 2.50 | 2.63 | 105 |
| Continuing CV | Formaldehyde | 2.50 | 2.60 | 104 |
| | Acetaldehyde | 2.50 | 2.59 | 103 |
| | Propionaldehyde | 2.50 | 2.58 | 103 |
| Continuing CV | Formaldehyde | 2.50 | 2.65 | 106 |
| | Acetaldehyde | 2.50 | 2.67 | 107 |
| | Propionaldehyde | 2.50 | 2.64 | 105 |
| Closing CV | Formaldehyde | 2.50 | 2.63 | 105 |
| | Acetaldehyde | 2.50 | 2.61 | 104 |
| | Propionaldehyde | 2.50 | 2.61 | 104 |
| Second Source | Formaldehyde | 2.50 | 2.58 | 103 |
| | Acetaldehyde | 2.50 | 2.56 | 103 |
| | Propionaldehyde | 2.50 | 2.54 | 102 |

* Must be 90 - 110 %
Second Source must be 85 - 115 %

Marcus Hueppe
Laboratory Director



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# Atmospheric Analysis & Consulting, Inc.

## *Quality Control/Quality Assurance Report*
**EPA 0011**

Analysis Date : 07/05/2011 Analyst : AD Instrument ID : HPLC 01

*Laboratory Control Spike Analysis*

| Analyte | Theoretical Sample Concentration (ug/mL) | Theoretical Spike Concentration (ug/mL) | Measured Spike Concentration (ug/mL) | Measured Spike Dup Concentration (ug/mL) | Spike Recovery (%)* | Spike Dup Recovery (%)* | %RPD** |
|---|---|---|---|---|---|---|---|
| Formaldehyde | 0.000 | 1.25 | 1.35 | 1.34 | 108 | 107 | 1.0 |
| Acetaldehyde | 0.000 | 1.25 | 1.35 | 1.34 | 108 | 107 | 0.4 |
| Propionaldehyde | 0.000 | 1.25 | 1.34 | 1.34 | 107 | 107 | 0.3 |

* Must be 85-115%

** Must be ≤ 25%

*Matrix Spike Analysis (110529-51234)*

| Analyte | Theoretical Sample Concentration (ug/mL) | Theoretical Spike Concentration (ug/mL) | Measured Spike Concentration (ug/mL) | Measured Spike Dup Concentration (ug/mL) | Spike Recovery (%)* | Spike Dup Recovery (%)* | %RPD** |
|---|---|---|---|---|---|---|---|
| Formaldehyde | 0.279 | 1.25 | 1.58 | 1.59 | 104 | 105 | 1.0 |
| Acetaldehyde | 0.123 | 1.25 | 1.46 | 1.48 | 107 | 109 | 1.4 |
| Propionaldehyde | 0.000 | 1.25 | 1.34 | 1.35 | 107 | 108 | 1.3 |

* Must be 75-125%

** Must be ≤ 25%

Marcus Hueppe
Laboratory Director







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# Atmospheric Analysis & Consulting, Inc.

## *Quality Control/Quality Assurance Report*
**EPA 0011**

Analysis Date : 07/05/2011 Instrument ID : HPLC 01
Analyst : AD

*Duplicate Analysis*

| Sample ID | Analyte | Sample Concentration (ug/mL) | Duplicate Concentration (ug/mL) | %RPD* |
|---|---|---|---|---|
| 110529-51234 | Formaldehyde | 0.558 | 0.556 | 0.3 |
| | Acetaldehyde | 0.247 | 0.244 | 1.1 |
| | Propionaldehyde | 0.023 | 0.022 | 3.1 |
| 110529-51235x10 | Formaldehyde | 46.6 | 46.6 | 0.1 |
| 110529-51235 | Acetaldehyde | 0.327 | 0.320 | 2.2 |
| | Propionaldehyde | 0.028 | 0.027 | 1.8 |
| 110530-51243 | Formaldehyde | 9.09 | 9.15 | 0.7 |
| | Acetaldehyde | 0.597 | 0.606 | 1.5 |
| | Propionaldehyde | ND | ND | NA |

* Must be <20%

*System and Method Blank Analysis*

| Sample ID | Analyte | Concentration (ug/mL) | RL / SRL (ug/mL) |
|---|---|---|---|
| Opening Acetonitrile Blank | Formaldehyde | <RL | 0.025 |
| | Acetaldehyde | <RL | 0.025 |
| | Propionaldehyde | <RL | 0.025 |
| 110529 Method Blank | Formaldehyde | <SRL | 0.010 |
| | Acetaldehyde | <SRL | 0.010 |
| | Propionaldehyde | <SRL | 0.010 |
| 110530 Method Blank | Formaldehyde | <SRL | 0.010 |
| | Acetaldehyde | <SRL | 0.010 |
| | Propionaldehyde | <SRL | 0.010 |
| Closing Acetonitrile Blank | Formaldehyde | <RL | 0.025 |
| | Acetaldehyde | <RL | 0.025 |
| | Propionaldehyde | <RL | 0.025 |

RL - Reporting Limit
SRL - Sample Reporting Limit

Marcus Hueppe
Laboratory Director



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AAC # 110530

CHAIN OF CUSTODY

CLIENT: ICR 2F-7

TEST DATE(S) 6/27/2011 6/28/2011

LOCATION: FCC

SAMPLER(S): SS

SAMPLE LOCATION: 2F-7 Stack

PROJECT MANAGER:

TEST METHOD(S): SW-846 0011 (Formaldehyde, Acetaldehyde, Propionaldehyde Only)

DATE DUE: 7/12/2011

OUTSIDE LAB REQUIRED?: Yes - AAC

COMPLIANCE TEST? No / ICR

| | DATE | TIME | TEST # | SAMPLE DESCRIPTION | CONTAINERS | SAMPLER | COMMENTS |
|---|---|---|---|---|---|---|---|
| 51241 | 6/27/2011 | | 1-Ald | Probe / Imp Catch & Rinse | 1 | SS | DNPH / MeCl2 |
| 51242 | 6/27/2011 | | 2-Ald | Probe / Imp Catch & Rinse | 1 | SS | DNPH / MeCl2 |
| 51243 | 6/27/2011 | | 3-Ald | Probe / Imp Catch & Rinse | 1 | SS | DNPH / MeCl2 |
| 51244 | 6/27/2011 | | 1-FS-Ald | Imp Catch & Rinse | 1 | JP | DNPH / MeCl2 |
| 51245 | 6/27/2011 | | 2-FS-Ald | Imp Catch & Rinse | 1 | JP | DNPH / MeCl2 |
| 51246 | 6/27/2011 | | 1-FB-Ald | Imp Catch & Rinse | 1 | JP | DNPH / MeCl2 |
| 51247 | 6/27/2011 | | 2-FB-Ald | Imp Catch & Rinse | 1 | JP | DNPH / MeCl2 |
| 51248 | 6/27/2011 | | SB-Ald | DNPH / MeCl2 | 1 | JP | DNPH / MeCl2 |
| 51249 | 6/27/2011 | | MeCl2-Blank-Ald | MeCl2 | 1 | JP | MeCl2 |
| 51250 | 6/27/2011 | | H2O-Blank-Ald | Optima H2O | 1 | JP | Optima H2O |
| 51251 | 6/27/2011 | | 1-TB-Ald | DNPH | 1 | JP | DNPH |
| 51252 | 6/27/2011 | | 2-TB-Ald | DNPH | 1 | JP | DNPH |
| 51253 | 6/27/2011 | | 1-TS-Ald | DNPH | 1 | JP | Spiked DNPH |
| 51254 | 6/27/2011 | | 2-TS-Ald | DNPH | 1 | JP | Spiked DNPH |
| | | | | | | | |
| | | | Total Samples | | 14 | | |
| | | Reagent: | Optima H2O | | | | |
| | | Reagent Lot #'s: | | | | | |

| RELEASED BY | DATE/TIME | RECEIVED BY | DATE/TIME |
|---|---|---|---|
| | 6/28/11 1110 | | 1735 6/28/11 |
| | 6/28/11 1733 | | 6/28/11 |
| | | | 6/28/11 |

ANALYSIS REQUIRED:

Analyze for Formaldehyde, Acetaldehyde, Propionaldehyde

6/30/11 0515

Delta Air Quality Services, Incorporated

TOTAL HYDROCARBONS
TEST DATA SUMMARY

| | | | | |
|---|---|---|---|---|
| Client/Location | ExxonMobil | | | |
| Unit | FCC 2F-7 | | | |
| Sample Location | Stack | | | |
| Test No | 1-THC | 2-THC | 3-THC | Average |
| Date | 6/27/2011 | 6/27/2011 | 6/28/2011 | |
| Start Time | 11:12:00 | 13:25:00 | 8:02:00 | |
| Stop Time | 12:12:00 | 14:25:00 | 9:02:00 | |
| Stack $O_2$ (%) | 4.99 | 5.11 | 4.96 | 5.02 |
| Stack $CO_2$ (%) | 13.84 | 14.08 | 14.19 | 14.04 |
| Stack Moisture[1] (%) | 13.75 | 13.56 | 14.48 | 13.93 |
| Stack Flow Rate[1] (dscfm) | 240,582 | 244,827 | 230,394 | 238,601 |
| Total Hydrocarbons[2] (ppmw) | 52.27 | 55.30 | 51.72 | 53.10 |
| Total Hydrocarbons[2] (ppm) | 60.60 | 63.97 | 60.48 | 61.68 |
| Total Hydrocarbons[2] (lb/hr) | 100.12 | 107.55 | 95.69 | 101.12 |

1) Stack moisture and flow from Semi-Volatiles test
2) As propane

## EPA Method 25A Calibration Gas Selection

**Client:** ExxonMobil
**Location:** Torrance Refinery
**Unit:** FCC 2F-7

**Date:** 06/27/11
**By:** AA

| | Gases Selected | | | | | Spec.,%FS | | Results | |
|---|---|---|---|---|---|---|---|---|---|
| | Content | Content | Cylinder No. | Dilution Factor, | Concentration | min | max | Gas, %FS | Status |
| High | Propane | 86.6 | SGAL956 | 100 | 86.6 | 80 | 90 | 88.4% | OK |
| Mid | Propane | 44.3 | SA3199 | 100 | 44.3 | 45 | 55 | 45.2% | OK |
| Low | Propane | 24.9 | SA11137 | 100 | 24.9 | 25 | 35 | 25.4% | OK |

## EPA METHOD 25A CALIBRATION RESULTS

| | | | |
|---|---|---|---|
| **Client:** | ExxonMobil | **Date:** | 06/27/11 |
| **Location:** | Torrance Refinery | **By:** | AA |
| **Unit:** | FCC 2F-7 | | |

| | |
|---|---|
| **Analyzer Make** | Thermo Environmental |
| **Model** | 51 |
| **Serial No.** | 51HT-65564-348 |

| PRE-TEST CALIBRATION ERROR | | |
|---|---|---|
| **Analyzer Range** | **98.0** | **STATUS** |
| **Zero Gas Value** | 0 | - |
| **Analyzer Reads** | 0.06 | - |
| **High Gas Value** | 86.60 | - |
| **Analyzer Reads** | 87.99 | - |
| **Mid Gas Predicted Value** | 45.07 | - |
| **Analyzer Reads** | 45.51 | - |
| **Error (% of Gas Value)** | 1.0% | Pass |
| **Low Gas Predicted Value** | 25.36 | - |
| **Analyzer Reads** | 25.06 | - |
| **Error (% of Gas Value)** | -1.2% | Pass |

EPA METHOD 25A TEST DATA

| | | | |
|---|---|---|---|
| Client: | ExxonMobil | Date: | 06/27/11 |
| Location: | Torrance Refinery | By: | AA |
| Unit: | FCC 2F-7 | | |
| Run No. | 1-THC | Test Duration, HH:MM | 1:00 |

| | Time | | |
|---|---|---|---|
| Point | Date | Time | Total Hydrocarbons, ppm as Propane |
| 1 | 6/27/2011 | 11:13 | 58.2 |
| 1 | 6/27/2011 | 11:14 | 59.3 |
| 1 | 6/27/2011 | 11:15 | 58.0 |
| 1 | 6/27/2011 | 11:16 | 55.8 |
| 1 | 6/27/2011 | 11:17 | 57.5 |
| 1 | 6/27/2011 | 11:18 | 56.2 |
| 1 | 6/27/2011 | 11:19 | 53.3 |
| 1 | 6/27/2011 | 11:20 | 51.3 |
| 1 | 6/27/2011 | 11:21 | 51.3 |
| 1 | 6/27/2011 | 11:22 | 53.6 |
| 1 | 6/27/2011 | 11:23 | 53.6 |
| 1 | 6/27/2011 | 11:24 | 53.7 |
| 1 | 6/27/2011 | 11:25 | 52.8 |
| 1 | 6/27/2011 | 11:26 | 53.6 |
| 1 | 6/27/2011 | 11:27 | 53.3 |
| 1 | 6/27/2011 | 11:28 | 51.0 |
| 1 | 6/27/2011 | 11:29 | 49.4 |
| 1 | 6/27/2011 | 11:30 | 47.6 |
| 1 | 6/27/2011 | 11:31 | 50.6 |
| 1 | 6/27/2011 | 11:32 | 51.4 |
| 1 | 6/27/2011 | 11:33 | 49.3 |
| 1 | 6/27/2011 | 11:34 | 48.9 |
| 1 | 6/27/2011 | 11:35 | 50.3 |
| 1 | 6/27/2011 | 11:36 | 52.7 |
| 1 | 6/27/2011 | 11:37 | 50.5 |
| 1 | 6/27/2011 | 11:38 | 50.9 |
| 1 | 6/27/2011 | 11:39 | 53.7 |
| 1 | 6/27/2011 | 11:40 | 50.7 |
| 1 | 6/27/2011 | 11:41 | 49.6 |
| 1 | 6/27/2011 | 11:42 | 50.3 |
| 1 | 6/27/2011 | 11:43 | 51.1 |
| 1 | 6/27/2011 | 11:44 | 48.3 |
| 1 | 6/27/2011 | 11:45 | 48.3 |
| 1 | 6/27/2011 | 11:46 | 50.0 |
| 1 | 6/27/2011 | 11:47 | 51.4 |
| 1 | 6/27/2011 | 11:48 | 52.8 |
| 1 | 6/27/2011 | 11:49 | 54.4 |
| 1 | 6/27/2011 | 11:50 | 53.6 |
| 1 | 6/27/2011 | 11:51 | 50.5 |
| 1 | 6/27/2011 | 11:52 | 50.4 |
| 1 | 6/27/2011 | 11:53 | 49.5 |
| 1 | 6/27/2011 | 11:54 | 49.4 |
| 1 | 6/27/2011 | 11:55 | 51.1 |
| 1 | 6/27/2011 | 11:56 | 50.1 |
| 1 | 6/27/2011 | 11:57 | 50.6 |
| 1 | 6/27/2011 | 11:58 | 52.1 |
| 1 | 6/27/2011 | 11:59 | 54.1 |
| 1 | 6/27/2011 | 12:00 | 53.4 |
| 1 | 6/27/2011 | 12:01 | 52.3 |
| 1 | 6/27/2011 | 12:02 | 53.2 |
| 1 | 6/27/2011 | 12:03 | 54.3 |
| 1 | 6/27/2011 | 12:04 | 52.1 |
| 1 | 6/27/2011 | 12:05 | 49.4 |
| 1 | 6/27/2011 | 12:06 | 49.9 |
| 1 | 6/27/2011 | 12:07 | 54.1 |
| 1 | 6/27/2011 | 12:08 | 53.4 |
| 1 | 6/27/2011 | 12:09 | 55.6 |
| 1 | 6/27/2011 | 12:10 | 55.5 |
| 1 | 6/27/2011 | 12:11 | 54.4 |
| 1 | 6/27/2011 | 12:12 | 52.8 |
| Average | | | 52.27 |

| POST TEST DRIFT DETERMINATION | | |
|---|---|---|
| Zero Reads | 0.05 | - |
| Drift, ppm | 0.0 | - |
| Drift, % Full Scale | 0.0% | Pass |
| Mid Gas Reads | 42.96 | - |
| Drift, ppm | 2.6 | - |
| Drift, % Full Scale | 2.6% | Pass |

## EPA METHOD 25A CALIBRATION RESULTS

| | | | |
|---|---|---|---|
| **Client:** | ExxonMobil | **Date:** | 06/27/11 |
| **Location:** | Torrance Refinery | **By:** | AA |
| **Unit:** | FCC 2F-7 | | |

| | |
|---|---|
| **Analyzer Make** | Thermo Environmental |
| **Model** | 51 |
| **Serial No.** | 51HT-65564-348 |

| PRE-TEST CALIBRATION ERROR | | |
|---|---|---|
| **Analyzer Range** | **98.0** | **STATUS** |
| **Zero Gas Value** | 0 | - |
| **Analyzer Reads** | 0.07 | - |
| **High Gas Value** | 86.60 | - |
| **Analyzer Reads** | 87.29 | - |
| **Mid Gas Predicted Value** | 44.72 | - |
| **Analyzer Reads** | 43.83 | - |
| **Error (% of Gas Value)** | -2.0% | Pass |
| **Low Gas Predicted Value** | 25.17 | - |
| **Analyzer Reads** | 24.09 | - |
| **Error (% of Gas Value)** | -4.3% | Pass |

EPA METHOD 25A TEST DATA

| | | | |
|---|---|---|---|
| Client: | ExxonMobil | Date: | 06/27/11 |
| Location: | Torrance Refinery | By: | AA |
| Unit: | FCC 2F-7 | | |
| Run No. | 2-THC | Test Duration, min. | 1:00 |

| | Time | | |
|---|---|---|---|
| Point | Start | Stop | Total Hydrocarbons, ppm as Propane |
| 3 | 6/27/2011 | 15:26 | 53.9 |
| 3 | 6/27/2011 | 15:27 | 55.5 |
| 3 | 6/27/2011 | 15:28 | 57.8 |
| 3 | 6/27/2011 | 15:29 | 59.2 |
| 3 | 6/27/2011 | 15:30 | 59.0 |
| 3 | 6/27/2011 | 15:31 | 56.3 |
| 3 | 6/27/2011 | 15:32 | 55.9 |
| 3 | 6/27/2011 | 15:33 | 57.1 |
| 3 | 6/27/2011 | 15:34 | 56.1 |
| 3 | 6/27/2011 | 15:35 | 53.5 |
| 3 | 6/27/2011 | 15:36 | 56.2 |
| 3 | 6/27/2011 | 15:37 | 55.1 |
| 3 | 6/27/2011 | 15:38 | 51.5 |
| 3 | 6/27/2011 | 15:39 | 51.8 |
| 3 | 6/27/2011 | 15:40 | 52.8 |
| 3 | 6/27/2011 | 15:41 | 54.5 |
| 3 | 6/27/2011 | 15:42 | 56.4 |
| 3 | 6/27/2011 | 15:43 | 56.0 |
| 3 | 6/27/2011 | 15:44 | 57.1 |
| 3 | 6/27/2011 | 15:45 | 55.3 |
| 2 | 6/27/2011 | 15:46 | 55.7 |
| 2 | 6/27/2011 | 15:47 | 55.3 |
| 2 | 6/27/2011 | 15:48 | 53.9 |
| 2 | 6/27/2011 | 15:49 | 54.9 |
| 2 | 6/27/2011 | 15:50 | 54.7 |
| 2 | 6/27/2011 | 15:51 | 58.2 |
| 2 | 6/27/2011 | 15:52 | 59.1 |
| 2 | 6/27/2011 | 15:53 | 60.7 |
| 2 | 6/27/2011 | 15:54 | 58.4 |
| 2 | 6/27/2011 | 15:55 | 56.0 |
| 2 | 6/27/2011 | 15:56 | 53.6 |
| 2 | 6/27/2011 | 15:57 | 53.8 |
| 2 | 6/27/2011 | 15:58 | 54.0 |
| 2 | 6/27/2011 | 15:59 | 55.1 |
| 2 | 6/27/2011 | 16:00 | 54.4 |
| 2 | 6/27/2011 | 16:01 | 56.2 |
| 2 | 6/27/2011 | 16:02 | 55.4 |
| 2 | 6/27/2011 | 16:03 | 54.7 |
| 2 | 6/27/2011 | 16:04 | 51.9 |
| 2 | 6/27/2011 | 16:05 | 54.5 |
| 1 | 6/27/2011 | 16:06 | 53.8 |
| 1 | 6/27/2011 | 16:07 | 53.6 |
| 1 | 6/27/2011 | 16:08 | 56.6 |
| 1 | 6/27/2011 | 16:09 | 56.5 |
| 1 | 6/27/2011 | 16:10 | 54.5 |
| 1 | 6/27/2011 | 16:11 | 53.9 |
| 1 | 6/27/2011 | 16:12 | 54.2 |
| 1 | 6/27/2011 | 16:13 | 53.6 |
| 1 | 6/27/2011 | 16:14 | 54.6 |
| 1 | 6/27/2011 | 16:15 | 53.1 |
| 1 | 6/27/2011 | 16:16 | 56.9 |
| 1 | 6/27/2011 | 16:17 | 59.1 |
| 1 | 6/27/2011 | 16:18 | 59.4 |
| 1 | 6/27/2011 | 16:19 | 57.3 |
| 1 | 6/27/2011 | 16:20 | 53.6 |
| 1 | 6/27/2011 | 16:21 | 53.4 |
| 1 | 6/27/2011 | 16:22 | 54.0 |
| 1 | 6/27/2011 | 16:23 | 52.4 |
| 1 | 6/27/2011 | 16:24 | 52.0 |
| 1 | 6/27/2011 | 16:25 | 53.4 |
| Average | | | 55.30 |

| POST TEST DRIFT DETERMINATION | | |
|---|---|---|
| Zero Reads | 0.09 | - |
| Drift, ppm | 0.0 | - |
| Drift, % Full Scale | 0.0% | Pass |
| Mid Gas Reads | 43.07 | - |
| Drift, ppm | 0.8 | - |
| Drift, % Full Scale | 0.8% | Pass |

| Date | Time | O2 % | CO2 % | CO PPM | HC PPM | |
|---|---|---|---|---|---|---|
| 6/27/2011 | 8:25:00 AM | 8.469 | 17.523 | 249.056 | 99.926 | |
| 6/27/2011 | 8:26:00 AM | 8.47 | 17.524 | 248.215 | 90.804 | |
| 6/27/2011 | 8:27:00 AM | 8.584 | 17.536 | 248.888 | 89.28 | |
| 6/27/2011 | 8:28:00 AM | 8.769 | 17.542 | 248.447 | 77.68 | Cal High |
| 6/27/2011 | 8:29:00 AM | 6.044 | 11.473 | 215.035 | 1.008 | |
| 6/27/2011 | 8:30:00 AM | 5.04 | 10.035 | 143.527 | 0.725 | |
| 6/27/2011 | 8:31:00 AM | 5.032 | 10.028 | 142.057 | 0.143 | |
| 6/27/2011 | 8:32:00 AM | 5.036 | 10.023 | 142.106 | 0.135 | Mid/THC Zero |
| 6/27/2011 | 8:33:00 AM | 5.222 | 10.019 | 141.895 | 0.332 | |
| 6/27/2011 | 8:34:00 AM | 5.239 | 12.78 | 118.384 | 81.716 | |
| 6/27/2011 | 8:35:00 AM | 5.201 | 13.725 | 64.878 | 88.464 | |
| 6/27/2011 | 8:36:00 AM | 5.211 | 13.702 | 63.026 | 88.555 | THC High |
| 6/27/2011 | 8:37:00 AM | 5.075 | 13.811 | 65.575 | 85.879 | |
| 6/27/2011 | 8:38:00 AM | 5.017 | 13.867 | 70.123 | 45.806 | |
| 6/27/2011 | 8:39:00 AM | 5.055 | 13.827 | 69.378 | 45.821 | THC Mid |
| 6/27/2011 | 8:40:00 AM | 5.061 | 13.843 | 67.229 | 41.839 | |
| 6/27/2011 | 8:41:00 AM | 5.07 | 13.853 | 67.091 | 26.062 | |
| 6/27/2011 | 8:42:00 AM | 5.129 | 13.824 | 67.216 | 26.21 | |
| 6/27/2011 | 8:43:00 AM | 5.365 | 14.398 | 69.654 | 27.816 | |
| 6/27/2011 | 8:44:00 AM | 5.864 | 15.899 | 77.356 | 33.356 | |
| 6/27/2011 | 8:45:00 AM | 5.215 | 13.976 | 67.419 | 25.909 | |
| 6/27/2011 | 8:46:00 AM | 5.237 | 13.846 | 66.632 | 25.578 | |
| 6/27/2011 | 8:47:00 AM | 5.218 | 13.84 | 66.538 | 25.551 | |
| 6/27/2011 | 8:48:00 AM | 5.223 | 13.822 | 65.824 | 25.462 | |
| 6/27/2011 | 8:49:00 AM | 5.214 | 13.825 | 64.878 | 25.294 | |
| 6/27/2011 | 8:50:00 AM | 5.233 | 13.807 | 65.021 | 25.297 | |
| 6/27/2011 | 8:51:00 AM | 5.18 | 13.848 | 66.39 | 25.286 | THC Low |
| 6/27/2011 | 8:52:00 AM | 5.15 | 13.881 | 68.407 | 29.036 | |
| 6/27/2011 | 8:53:00 AM | 5.183 | 13.873 | 68.272 | 49.353 | |
| 6/27/2011 | 8:54:00 AM | 5.638 | 12.11 | 67.427 | 54.354 | |
| 6/27/2011 | 8:55:00 AM | 5.303 | 10.447 | 6.502 | 53.655 | |
| 6/27/2011 | 8:56:00 AM | 5.16 | 10.169 | -2.609 | 47.342 | |
| 6/27/2011 | 8:57:00 AM | 5.162 | 10.169 | -2.673 | 45.052 | |
| 6/27/2011 | 8:58:00 AM | 3.934 | 7.314 | 0.061 | 44.785 | |
| 6/27/2011 | 8:59:00 AM | 0.064 | 0.007 | 116.485 | 46.023 | |
| 6/27/2011 | 9:00:00 AM | 0.047 | -0.018 | 145.251 | 46.362 | |
| 6/27/2011 | 9:01:00 AM | 0.041 | -0.026 | 145.504 | 44.642 | CO bias |
| 6/27/2011 | 9:02:00 AM | 2.527 | 7.296 | 135.379 | 45.16 | |
| 6/27/2011 | 9:03:00 AM | 5.426 | 14.572 | 76.947 | 47.438 | |
| 6/27/2011 | 9:04:00 AM | 5.396 | 14.794 | 74.145 | 51.129 | |
| 6/27/2011 | 9:05:00 AM | 5.136 | 14.405 | 74.615 | 48.811 | |
| 6/27/2011 | 9:06:00 AM | 5.113 | 14.426 | 78.915 | 47.444 | |
| 6/27/2011 | 9:07:00 AM | 5.228 | 14.373 | 74.135 | 46.385 | |
| 6/27/2011 | 9:08:00 AM | 5.039 | 14.01 | 71.052 | 44.791 | |
| 6/27/2011 | 9:09:00 AM | 4.976 | 13.782 | 69.691 | 42.163 | |
| 6/27/2011 | 9:10:00 AM | 4.99 | 13.758 | 69.169 | 42.894 | |
| 6/27/2011 | 9:11:00 AM | 4.968 | 13.75 | 69.029 | 42.603 | |
| 6/27/2011 | 9:12:00 AM | 4.922 | 13.805 | 69.958 | 41.537 | |
| 6/27/2011 | 9:13:00 AM | 4.973 | 13.778 | 69.619 | 40.346 | |
| 6/27/2011 | 9:14:00 AM | 5.054 | 13.714 | 68.113 | 41.81 | |
| 6/27/2011 | 9:15:00 AM | 5.026 | 13.726 | 68.321 | 40.8 | |
| 6/27/2011 | 9:16:00 AM | 5.034 | 13.721 | 67.01 | 38.062 | |

| | | | | | | |
|---|---|---|---|---|---|---|
| 6/27/2011 | 9:17:00 AM | 5.044 | 13.738 | 66.634 | 39.038 | |
| 6/27/2011 | 9:18:00 AM | 5.061 | 13.699 | 66.825 | 39.457 | |
| 6/27/2011 | 9:19:00 AM | 4.989 | 13.769 | 67.268 | 39.428 | |
| 6/27/2011 | 9:20:00 AM | 4.963 | 13.796 | 69.732 | 39.756 | |
| 6/27/2011 | 9:21:00 AM | 4.974 | 13.792 | 69.909 | 41.635 | |
| 6/27/2011 | 9:22:00 AM | 4.929 | 13.835 | 69.474 | 42.182 | |
| 6/27/2011 | 9:23:00 AM | 4.93 | 13.846 | 70.939 | 41.692 | |
| 6/27/2011 | 9:24:00 AM | 4.936 | 13.858 | 75.659 | 42.575 | |
| 6/27/2011 | 9:25:00 AM | 5.012 | 13.796 | 69.422 | 42.06 | |
| 6/27/2011 | 9:26:00 AM | 4.98 | 13.815 | 67.159 | 43.855 | |
| 6/27/2011 | 9:27:00 AM | 4.977 | 13.819 | 69.989 | 45.151 | |
| 6/27/2011 | 9:28:00 AM | 5.006 | 13.774 | 68.267 | 45.79 | |
| 6/27/2011 | 9:29:00 AM | 4.952 | 13.822 | 68.131 | 44.719 | |
| 6/27/2011 | 9:30:00 AM | 5.013 | 13.776 | 67.814 | 44.128 | |
| 6/27/2011 | 9:31:00 AM | 5.02 | 13.754 | 67.033 | 42.597 | |
| 6/27/2011 | 9:32:00 AM | 5.031 | 13.733 | 66.782 | 42.16 | |
| 6/27/2011 | 9:33:00 AM | 5.006 | 13.777 | 68.402 | 42.2 | |
| 6/27/2011 | 9:34:00 AM | 4.982 | 13.813 | 71.434 | 42.455 | |
| 6/27/2011 | 9:35:00 AM | 4.998 | 13.802 | 69.599 | 42.143 | |
| 6/27/2011 | 9:36:00 AM | 4.962 | 13.834 | 75.032 | 40.701 | |
| 6/27/2011 | 9:37:00 AM | 5.014 | 13.773 | 73.224 | 41.385 | |
| 6/27/2011 | 9:38:00 AM | 0.392 | 0.204 | 108.433 | 42.675 | |
| 6/27/2011 | 9:39:00 AM | 0.044 | -0.02 | 148.12 | 46.377 | |
| 6/27/2011 | 9:40:00 AM | 0.04 | -0.029 | 143.933 | 42.515 | |
| 6/27/2011 | 9:41:00 AM | 0.043 | -0.026 | 143.881 | 43.13 | CO bias |
| 6/27/2011 | 9:42:00 AM | 3.161 | 6.684 | 108.308 | 41.749 | |
| 6/27/2011 | 9:43:00 AM | 5.087 | 10.017 | 3.384 | 42.257 | |
| 6/27/2011 | 9:44:00 AM | 5.092 | 10.033 | -2.673 | 43.98 | O2/CO2 bias |
| 6/27/2011 | 9:45:00 AM | 5.112 | 12.465 | 11.778 | 43.182 | |
| 6/27/2011 | 9:46:00 AM | 5.067 | 13.975 | 67.108 | 44.64 | |
| 6/27/2011 | 9:47:00 AM | 5.08 | 13.985 | 71.188 | 44.082 | |
| 6/27/2011 | 9:48:00 AM | 5.076 | 13.997 | 72.917 | 45.611 | |
| 6/27/2011 | 9:49:00 AM | 5.096 | 13.986 | 73.15 | 46.165 | |
| 6/27/2011 | 9:50:00 AM | 5.122 | 13.937 | 71.51 | 44.125 | |
| 6/27/2011 | 9:51:00 AM | 5.146 | 13.934 | 70.22 | 45.233 | |
| 6/27/2011 | 9:52:00 AM | 5.219 | 13.87 | 72.13 | 47.008 | |
| 6/27/2011 | 9:53:00 AM | 5.362 | 14.102 | 73.359 | 47.581 | |
| 6/27/2011 | 9:54:00 AM | 5.277 | 13.936 | 73.02 | 48.132 | |
| 6/27/2011 | 9:55:00 AM | 5.306 | 13.916 | 73.876 | 48.928 | |
| 6/27/2011 | 9:56:00 AM | 5.32 | 13.969 | 75.711 | 52.264 | |
| 6/27/2011 | 9:57:00 AM | 5.365 | 13.928 | 75.107 | 50.805 | |
| 6/27/2011 | 9:58:00 AM | 5.259 | 13.578 | 71.586 | 47.375 | |
| 6/27/2011 | 9:59:00 AM | 5.306 | 13.5 | 73.063 | 48.389 | |
| 6/27/2011 | 10:00:00 AM | 5.294 | 13.507 | 72.408 | 47.355 | |
| 6/27/2011 | 10:01:00 AM | 5.22 | 13.574 | 72.056 | 46.844 | |
| 6/27/2011 | 10:02:00 AM | 5.184 | 13.619 | 73.051 | 45.377 | |
| 6/27/2011 | 10:03:00 AM | 5.212 | 13.585 | 73.669 | 46.072 | |
| 6/27/2011 | 10:04:00 AM | 5.276 | 13.528 | 72.857 | 44.814 | |
| 6/27/2011 | 10:05:00 AM | 5.275 | 13.519 | 72.043 | 44.705 | |
| 6/27/2011 | 10:06:00 AM | 5.268 | 13.515 | 72.639 | 43.29 | |
| 6/27/2011 | 10:07:00 AM | 5.265 | 13.506 | 70.329 | 41.122 | |
| 6/27/2011 | 10:08:00 AM | 5.223 | 13.525 | 70.959 | 41.476 | |
| 6/27/2011 | 10:09:00 AM | 5.197 | 13.562 | 72.94 | 42.975 | |
| 6/27/2011 | 10:10:00 AM | 5.198 | 13.565 | 73.093 | 43.513 | |
| 6/27/2011 | 10:11:00 AM | 5.193 | 13.574 | 73.237 | 43.849 | |

| | | | | | | |
|---|---|---|---|---|---|---|
| 6/27/2011 | 10:12:00 AM | 5.225 | 13.552 | 74.416 | 42.975 | |
| 6/27/2011 | 10:13:00 AM | 5.254 | 13.514 | 75.04 | 43.588 | |
| 6/27/2011 | 10:14:00 AM | 5.286 | 13.483 | 75.504 | 43.192 | |
| 6/27/2011 | 10:15:00 AM | 5.447 | 14.184 | 78.671 | 46.023 | |
| 6/27/2011 | 10:16:00 AM | 5.746 | 14.793 | 81.669 | 48.656 | |
| 6/27/2011 | 10:17:00 AM | 5.797 | 14.895 | 80.688 | 50.945 | |
| 6/27/2011 | 10:18:00 AM | 5.778 | 14.827 | 81.975 | 52.28 | |
| 6/27/2011 | 10:19:00 AM | 5.778 | 14.951 | 82.461 | 52.399 | |
| 6/27/2011 | 10:20:00 AM | 5.774 | 14.967 | 81.222 | 52.496 | |
| 6/27/2011 | 10:21:00 AM | 5.653 | 14.741 | 80.001 | 51.745 | |
| 6/27/2011 | 10:22:00 AM | 5.577 | 14.787 | 80.94 | 52.67 | |
| 6/27/2011 | 10:23:00 AM | 5.552 | 14.784 | 81.585 | 52.039 | |
| 6/27/2011 | 10:24:00 AM | 5.515 | 14.616 | 81.142 | 53.492 | |
| 6/27/2011 | 10:25:00 AM | 5.471 | 14.552 | 81.058 | 51.597 | |
| 6/27/2011 | 10:26:00 AM | 5.405 | 14.547 | 82.083 | 52.804 | |
| 6/27/2011 | 10:27:00 AM | 5.142 | 13.792 | 76.758 | 45.487 | |
| 6/27/2011 | 10:28:00 AM | 5.065 | 13.633 | 75.386 | 45.841 | |
| 6/27/2011 | 10:29:00 AM | 5.063 | 13.602 | 75.831 | 44.593 | |
| 6/27/2011 | 10:30:00 AM | 5.021 | 13.625 | 75.765 | 42.987 | |
| 6/27/2011 | 10:31:00 AM | 5.019 | 13.635 | 76.809 | 45.653 | |
| 6/27/2011 | 10:32:00 AM | 5.052 | 13.601 | 76.454 | 46.503 | |
| 6/27/2011 | 10:33:00 AM | 5.051 | 13.597 | 75.838 | 45.324 | |
| 6/27/2011 | 10:34:00 AM | 5.106 | 13.54 | 75.818 | 44.402 | |
| 6/27/2011 | 10:35:00 AM | 5.096 | 13.534 | 75.632 | 44.228 | |
| 6/27/2011 | 10:36:00 AM | 5.094 | 13.526 | 77.589 | 45.535 | |
| 6/27/2011 | 10:37:00 AM | 5.059 | 13.566 | 78.435 | 44.645 | |
| 6/27/2011 | 10:38:00 AM | 5.137 | 13.499 | 76.673 | 43.172 | |
| 6/27/2011 | 10:39:00 AM | 5.131 | 13.498 | 75.64 | 43.745 | |
| 6/27/2011 | 10:40:00 AM | 5.114 | 13.503 | 75.98 | 44.289 | |
| 6/27/2011 | 10:41:00 AM | 5.125 | 13.506 | 76.198 | 45.934 | |
| 6/27/2011 | 10:42:00 AM | 5.133 | 13.501 | 77.353 | 46.397 | |
| 6/27/2011 | 10:43:00 AM | 5.107 | 13.549 | 76.981 | 44.736 | |
| 6/27/2011 | 10:44:00 AM | 5.067 | 13.609 | 79.338 | 43.619 | |
| 6/27/2011 | 10:45:00 AM | 5.136 | 13.545 | 79.075 | 44.422 | |
| 6/27/2011 | 10:46:00 AM | 5.174 | 13.518 | 77.68 | 44.063 | |
| 6/27/2011 | 10:47:00 AM | 5.137 | 13.55 | 77.429 | 44.141 | |
| 6/27/2011 | 10:48:00 AM | 5.09 | 13.569 | 77.936 | 44.437 | |
| 6/27/2011 | 10:49:00 AM | 5.28 | 14.051 | 80.307 | 35.907 | |
| 6/27/2011 | 10:50:00 AM | 5.317 | 14.245 | 82.265 | 1.202 | |
| 6/27/2011 | 10:51:00 AM | 5.33 | 14.243 | 85.513 | 1.316 | |
| 6/27/2011 | 10:52:00 AM | 5.355 | 14.226 | 85.737 | 1.399 | |
| 6/27/2011 | 10:53:00 AM | 5.21 | 13.836 | 82.57 | 0.675 | THC Zero |
| 6/27/2011 | 10:54:00 AM | 5.163 | 13.716 | 83.035 | 18.697 | |
| 6/27/2011 | 10:55:00 AM | 5.191 | 13.619 | 81.043 | 69.745 | |
| 6/27/2011 | 10:56:00 AM | 5.147 | 13.451 | 78.09 | 35.698 | |
| 6/27/2011 | 10:57:00 AM | 5.122 | 13.465 | 78.712 | 35.647 | |
| 6/27/2011 | 10:58:00 AM | 5.097 | 13.482 | 81.102 | 19 | |
| 6/27/2011 | 10:59:00 AM | 5.112 | 13.466 | 78.788 | 0.058 | THC Zero |
| 6/27/2011 | 11:00:00 AM | 5.097 | 13.512 | 79.145 | 19.142 | |
| 6/27/2011 | 11:01:00 AM | 5.155 | 13.459 | 79.526 | 75.44 | |
| 6/27/2011 | 11:02:00 AM | 5.163 | 13.469 | 79.529 | 76.091 | |
| 6/27/2011 | 11:03:00 AM | 5.131 | 13.41 | 79.584 | 86.885 | |
| 6/27/2011 | 11:04:00 AM | 5.082 | 13.517 | 80.094 | 87.985 | THC High |
| 6/27/2011 | 11:05:00 AM | 5.049 | 13.538 | 82.05 | 81.358 | |

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|---|---|---|---|---|---|---|
| 6/27/2011 | 11:06:00 AM | 5.075 | 13.52 | 80.696 | 44.931 | |
| 6/27/2011 | 11:07:00 AM | 5.096 | 13.674 | 80.905 | 45.512 | THC Mid |
| 6/27/2011 | 11:08:00 AM | 5.088 | 13.634 | 81.152 | 41.352 | |
| 6/27/2011 | 11:09:00 AM | 5.016 | 13.54 | 81.423 | 25.147 | |
| 6/27/2011 | 11:10:00 AM | 5.03 | 13.529 | 81.407 | 25.056 | THC Low |
| 6/27/2011 | 11:11:00 AM | 5.047 | 13.517 | 80.01 | 42.12 | |
| 6/27/2011 | 11:12:00 AM | 5.105 | 13.46 | 79.661 | 56.907 | |
| 6/27/2011 | 11:13:00 AM | 5.126 | 13.434 | 79.691 | 58.153 | |
| 6/27/2011 | 11:14:00 AM | 5.072 | 13.462 | 79.439 | 59.3 | |
| 6/27/2011 | 11:15:00 AM | 5.013 | 13.538 | 80.282 | 58.001 | |
| 6/27/2011 | 11:16:00 AM | 5.053 | 13.475 | 78.979 | 55.832 | |
| 6/27/2011 | 11:17:00 AM | 5.019 | 13.515 | 80.76 | 57.488 | |
| 6/27/2011 | 11:18:00 AM | 5.058 | 13.481 | 81.481 | 56.222 | |
| 6/27/2011 | 11:19:00 AM | 5.028 | 13.497 | 82.722 | 53.349 | |
| 6/27/2011 | 11:20:00 AM | 5.035 | 13.49 | 81.063 | 51.252 | |
| 6/27/2011 | 11:21:00 AM | 5.056 | 13.476 | 78.766 | 51.266 | |
| 6/27/2011 | 11:22:00 AM | 5.028 | 13.49 | 78.789 | 53.563 | |
| 6/27/2011 | 11:23:00 AM | 4.994 | 13.546 | 80.7 | 53.602 | |
| 6/27/2011 | 11:24:00 AM | 4.947 | 13.56 | 80.992 | 53.681 | |
| 6/27/2011 | 11:25:00 AM | 4.944 | 13.585 | 80.926 | 52.786 | |
| 6/27/2011 | 11:26:00 AM | 4.949 | 13.568 | 82.85 | 53.553 | |
| 6/27/2011 | 11:27:00 AM | 5.015 | 13.52 | 82.324 | 53.314 | |
| 6/27/2011 | 11:28:00 AM | 4.993 | 13.537 | 79.551 | 50.958 | |
| 6/27/2011 | 11:29:00 AM | 5.024 | 13.502 | 79.61 | 49.435 | |
| 6/27/2011 | 11:30:00 AM | 5.013 | 13.511 | 78.638 | 47.598 | |
| 6/27/2011 | 11:31:00 AM | 4.983 | 13.554 | 79.955 | 50.644 | |
| 6/27/2011 | 11:32:00 AM | 4.977 | 13.558 | 81.84 | 51.369 | |
| 6/27/2011 | 11:33:00 AM | 5.027 | 13.516 | 82.356 | 49.301 | |
| 6/27/2011 | 11:34:00 AM | 5.075 | 13.475 | 79.246 | 48.85 | |
| 6/27/2011 | 11:35:00 AM | 5.08 | 13.452 | 79.572 | 50.32 | |
| 6/27/2011 | 11:36:00 AM | 5.025 | 13.504 | 80.158 | 52.663 | |
| 6/27/2011 | 11:37:00 AM | 5.047 | 13.481 | 80.378 | 50.512 | |
| 6/27/2011 | 11:38:00 AM | 5.012 | 13.5 | 80.198 | 50.85 | |
| 6/27/2011 | 11:39:00 AM | 4.958 | 13.558 | 81.733 | 53.712 | |
| 6/27/2011 | 11:40:00 AM | 4.909 | 13.605 | 82.36 | 50.696 | |
| 6/27/2011 | 11:41:00 AM | 4.983 | 13.547 | 81.238 | 49.57 | |
| 6/27/2011 | 11:42:00 AM | 5.039 | 13.498 | 80.206 | 50.282 | |
| 6/27/2011 | 11:43:00 AM | 5.058 | 13.476 | 80.337 | 51.119 | |
| 6/27/2011 | 11:44:00 AM | 5.049 | 13.493 | 78.74 | 48.264 | |
| 6/27/2011 | 11:45:00 AM | 5.087 | 13.463 | 79.023 | 48.306 | |
| 6/27/2011 | 11:46:00 AM | 5.055 | 13.48 | 78.749 | 49.996 | |
| 6/27/2011 | 11:47:00 AM | 4.994 | 13.542 | 80.506 | 51.4 | |
| 6/27/2011 | 11:48:00 AM | 5.378 | 10.454 | 58.714 | 52.757 | |
| 6/27/2011 | 11:49:00 AM | 4.986 | 9.748 | 2.16 | 54.37 | |
| 6/27/2011 | 11:50:00 AM | 4.983 | 9.741 | -0.133 | 53.579 | O2/CO2 bias |
| 6/27/2011 | 11:51:00 AM | 2.15 | 3.713 | 28.338 | 50.451 | |
| 6/27/2011 | 11:52:00 AM | 0.056 | 0.031 | 136.741 | 50.428 | |
| 6/27/2011 | 11:53:00 AM | 0.047 | 0.017 | 143.472 | 49.458 | CO bias |
| 6/27/2011 | 11:54:00 AM | 1.904 | 5.665 | 138.127 | 49.375 | |
| 6/27/2011 | 11:55:00 AM | 5.005 | 13.47 | 86.293 | 51.149 | |
| 6/27/2011 | 11:56:00 AM | 5.085 | 13.436 | 79.214 | 50.066 | |
| 6/27/2011 | 11:57:00 AM | 5.081 | 13.435 | 78.596 | 50.631 | |
| 6/27/2011 | 11:58:00 AM | 5.094 | 13.429 | 78.407 | 52.097 | |
| 6/27/2011 | 11:59:00 AM | 5 | 13.496 | 79.11 | 54.095 | |
| 6/27/2011 | 12:00:00 PM | 4.979 | 13.537 | 79.46 | 53.415 | |

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|---|---|---|---|---|---|---|
| 6/27/2011 | 12:01:00 PM | 4.896 | 13.62 | 81.958 | 52.302 | |
| 6/27/2011 | 12:02:00 PM | 4.966 | 13.538 | 80.9 | 53.243 | |
| 6/27/2011 | 12:03:00 PM | 4.991 | 13.521 | 79.806 | 54.283 | |
| 6/27/2011 | 12:04:00 PM | 5.038 | 13.476 | 79.618 | 52.14 | |
| 6/27/2011 | 12:05:00 PM | 5.053 | 13.456 | 77.029 | 49.352 | |
| 6/27/2011 | 12:06:00 PM | 5.021 | 13.496 | 77.028 | 49.894 | |
| 6/27/2011 | 12:07:00 PM | 4.998 | 13.511 | 80.191 | 54.109 | |
| 6/27/2011 | 12:08:00 PM | 4.946 | 13.551 | 82.309 | 53.429 | |
| 6/27/2011 | 12:09:00 PM | 4.957 | 13.553 | 83.014 | 55.625 | |
| 6/27/2011 | 12:10:00 PM | 4.942 | 13.551 | 81.553 | 55.498 | |
| 6/27/2011 | 12:11:00 PM | 4.944 | 13.568 | 82.051 | 54.391 | |
| 6/27/2011 | 12:12:00 PM | 4.952 | 13.548 | 80.61 | 52.783 | |
| 6/27/2011 | 12:13:00 PM | 4.963 | 13.536 | 80.426 | 46.251 | |
| 6/27/2011 | 12:14:00 PM | 4.957 | 13.547 | 78.831 | 37.449 | |
| 6/27/2011 | 12:15:00 PM | 4.931 | 13.57 | 80.49 | 37.866 | |
| 6/27/2011 | 12:16:00 PM | 4.974 | 13.531 | 78.894 | 38.338 | |
| 6/27/2011 | 12:17:00 PM | 4.97 | 13.52 | 80.372 | 38.759 | |
| 6/27/2011 | 12:18:00 PM | 4.962 | 13.527 | 79.906 | 39.201 | |
| 6/27/2011 | 12:19:00 PM | 4.988 | 13.509 | 80.706 | 39.652 | |
| 6/27/2011 | 12:20:00 PM | 4.964 | 13.527 | 80.344 | 40.062 | |
| 6/27/2011 | 12:21:00 PM | 4.958 | 13.555 | 79.139 | 40.472 | |
| 6/27/2011 | 12:22:00 PM | 4.934 | 13.579 | 80.36 | 41.103 | |
| 6/27/2011 | 12:23:00 PM | 4.954 | 13.557 | 80.136 | 41.793 | |
| 6/27/2011 | 12:24:00 PM | 4.973 | 13.53 | 79.48 | 42.13 | |
| 6/27/2011 | 12:25:00 PM | 4.919 | 13.573 | 80.484 | 42.216 | |
| 6/27/2011 | 12:26:00 PM | 4.912 | 13.59 | 81.474 | 42.407 | |
| 6/27/2011 | 12:27:00 PM | 4.949 | 13.543 | 80.703 | 42.703 | |
| 6/27/2011 | 12:28:00 PM | 4.886 | 13.622 | 78.974 | 42.812 | |
| 6/27/2011 | 12:29:00 PM | 4.898 | 13.62 | 80.155 | 42.96 | THC Mid |
| 6/27/2011 | 12:30:00 PM | 4.915 | 13.612 | 80.145 | 43.39 | |
| 6/27/2011 | 12:31:00 PM | 4.914 | 13.61 | 79.842 | 5.346 | |
| 6/27/2011 | 12:32:00 PM | 4.945 | 13.577 | 79.393 | 0.055 | |
| 6/27/2011 | 12:33:00 PM | 4.992 | 13.539 | 77.807 | 0.047 | THC Zero |
| 6/27/2011 | 12:34:00 PM | 4.999 | 13.534 | 77.737 | 25.856 | |
| 6/27/2011 | 12:35:00 PM | 5.01 | 13.525 | 78.596 | 64.254 | |
| 6/27/2011 | 12:36:00 PM | 4.975 | 13.551 | 80.163 | 61.185 | |
| 6/27/2011 | 12:37:00 PM | 5.018 | 13.499 | 79.731 | 60.094 | |
| 6/27/2011 | 12:38:00 PM | 5.012 | 13.515 | 79.595 | 58.817 | |
| 6/27/2011 | 12:39:00 PM | 4.954 | 13.593 | 77.374 | 55.693 | |
| 6/27/2011 | 12:40:00 PM | 4.959 | 13.589 | 78.965 | 57.6 | |
| 6/27/2011 | 12:41:00 PM | 4.982 | 13.549 | 70.677 | 47.919 | |
| 6/27/2011 | 12:42:00 PM | 5.02 | 13.558 | 52.238 | 29.787 | |
| 6/27/2011 | 12:43:00 PM | 4.982 | 13.574 | 48.107 | 27.097 | |
| 6/27/2011 | 12:44:00 PM | 5.047 | 13.518 | 47.247 | 27.638 | |
| 6/27/2011 | 12:45:00 PM | 5.036 | 13.523 | 52.936 | 40.848 | |
| 6/27/2011 | 12:46:00 PM | 4.991 | 13.571 | 71.641 | 55.062 | |
| 6/27/2011 | 12:47:00 PM | 4.97 | 13.594 | 77.68 | 56.062 | |
| 6/27/2011 | 12:48:00 PM | 5.015 | 13.551 | 77.494 | 54.719 | |
| 6/27/2011 | 12:49:00 PM | 5.024 | 13.538 | 77.157 | 54.979 | |
| 6/27/2011 | 12:50:00 PM | 5.017 | 13.531 | 79.615 | 55.215 | |
| 6/27/2011 | 12:51:00 PM | 5.037 | 13.516 | 78.265 | 52.452 | |
| 6/27/2011 | 12:52:00 PM | 5.056 | 13.5 | 77.051 | 51.853 | |
| 6/27/2011 | 12:53:00 PM | 4.975 | 13.573 | 77.641 | 52.527 | |
| 6/27/2011 | 12:54:00 PM | 4.962 | 13.607 | 78.075 | 52.362 | |
| 6/27/2011 | 12:55:00 PM | 4.975 | 13.589 | 77.473 | 50.826 | |

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|---|---|---|---|---|---|
| 6/27/2011 | 12:56:00 PM | 4.91 | 13.649 | 76.765 | 49.052 |
| 6/27/2011 | 12:57:00 PM | 4.907 | 13.661 | 77.878 | 48.541 |
| 6/27/2011 | 12:58:00 PM | 4.981 | 13.601 | 78.533 | 51.581 |
| 6/27/2011 | 12:59:00 PM | 4.992 | 13.587 | 77.006 | 51.257 |
| 6/27/2011 | 1:00:00 PM | 4.974 | 13.604 | 77.387 | 52.245 |
| 6/27/2011 | 1:01:00 PM | 4.964 | 13.602 | 77.168 | 51.962 |
| 6/27/2011 | 1:02:00 PM | 4.972 | 13.601 | 76.357 | 51.338 |
| 6/27/2011 | 1:03:00 PM | 4.951 | 13.611 | 77.742 | 51.727 |
| 6/27/2011 | 1:04:00 PM | 4.918 | 13.654 | 78.508 | 51.109 |
| 6/27/2011 | 1:05:00 PM | 4.951 | 13.63 | 78.765 | 53.054 |
| 6/27/2011 | 1:06:00 PM | 4.954 | 13.628 | 77.734 | 52.409 |
| 6/27/2011 | 1:07:00 PM | 4.968 | 13.637 | 77.553 | 50.893 |
| 6/27/2011 | 1:08:00 PM | 5.013 | 13.591 | 76.506 | 49.85 |
| 6/27/2011 | 1:09:00 PM | 5.048 | 13.557 | 74.832 | 48.803 |
| 6/27/2011 | 1:10:00 PM | 5.036 | 13.556 | 75.125 | 50.376 |
| 6/27/2011 | 1:11:00 PM | 4.988 | 13.607 | 77.06 | 50.933 |
| 6/27/2011 | 1:12:00 PM | 5.01 | 13.585 | 76.606 | 51.344 |
| 6/27/2011 | 1:13:00 PM | 5.003 | 13.599 | 75.676 | 52.515 |
| 6/27/2011 | 1:14:00 PM | 4.962 | 13.64 | 77.807 | 55.038 |
| 6/27/2011 | 1:15:00 PM | 4.979 | 13.612 | 77.684 | 55.002 |
| 6/27/2011 | 1:16:00 PM | 5.001 | 13.6 | 77.528 | 54.103 |
| 6/27/2011 | 1:17:00 PM | 4.968 | 13.638 | 76.952 | 53.596 |
| 6/27/2011 | 1:18:00 PM | 4.931 | 13.673 | 78.974 | 54.707 |
| 6/27/2011 | 1:19:00 PM | 4.936 | 13.673 | 79.723 | 53.223 |
| 6/27/2011 | 1:20:00 PM | 4.941 | 13.686 | 79.314 | 53.859 |
| 6/27/2011 | 1:21:00 PM | 5.006 | 13.622 | 77.315 | 51.277 |
| 6/27/2011 | 1:22:00 PM | 5.007 | 13.611 | 76.214 | 52.149 |
| 6/27/2011 | 1:23:00 PM | 5.038 | 13.577 | 77.977 | 52.546 |
| 6/27/2011 | 1:24:00 PM | 5.06 | 13.556 | 76.814 | 49.73 |
| 6/27/2011 | 1:25:00 PM | 5.022 | 13.582 | 77.151 | 50.689 |
| 6/27/2011 | 1:26:00 PM | 5.012 | 13.604 | 77.603 | 52.506 |
| 6/27/2011 | 1:27:00 PM | 5.069 | 13.529 | 77.781 | 51.591 |
| 6/27/2011 | 1:28:00 PM | 5.056 | 13.541 | 75.137 | 48.01 |
| 6/27/2011 | 1:29:00 PM | 4.984 | 13.6 | 76.01 | 49.448 |
| 6/27/2011 | 1:30:00 PM | 4.975 | 13.62 | 78.516 | 52.19 |
| 6/27/2011 | 1:31:00 PM | 4.944 | 13.642 | 77.484 | 50.467 |
| 6/27/2011 | 1:32:00 PM | 4.939 | 13.669 | 79.463 | 51.377 |
| 6/27/2011 | 1:33:00 PM | 4.967 | 13.622 | 79.928 | 52.674 |
| 6/27/2011 | 1:34:00 PM | 4.96 | 13.625 | 78.486 | 52.066 |
| 6/27/2011 | 1:35:00 PM | 4.991 | 13.595 | 77.206 | 51.642 |
| 6/27/2011 | 1:36:00 PM | 4.961 | 13.611 | 77.369 | 52.634 |
| 6/27/2011 | 1:37:00 PM | 4.954 | 13.642 | 76.783 | 51.587 |
| 6/27/2011 | 1:38:00 PM | 4.963 | 13.639 | 78.119 | 54.354 |
| 6/27/2011 | 1:39:00 PM | 5.006 | 13.591 | 77.745 | 52.63 |
| 6/27/2011 | 1:40:00 PM | 5.098 | 13.511 | 77.43 | 52.086 |
| 6/27/2011 | 1:41:00 PM | 5.117 | 13.473 | 75.917 | 48.536 |
| 6/27/2011 | 1:42:00 PM | 5.108 | 13.482 | 74.513 | 46.322 |
| 6/27/2011 | 1:43:00 PM | 5.088 | 13.5 | 74.971 | 48.171 |
| 6/27/2011 | 1:44:00 PM | 5.034 | 13.55 | 76.489 | 50.842 |
| 6/27/2011 | 1:45:00 PM | 4.996 | 13.575 | 78.079 | 50.706 |
| 6/27/2011 | 1:46:00 PM | 4.954 | 13.634 | 78.627 | 49.877 |
| 6/27/2011 | 1:47:00 PM | 4.987 | 13.613 | 78.776 | 50.54 |
| 6/27/2011 | 1:48:00 PM | 5.031 | 13.57 | 77.993 | 49.109 |
| 6/27/2011 | 1:49:00 PM | 5.072 | 13.537 | 76.953 | 48.261 |
| 6/27/2011 | 1:50:00 PM | 5.116 | 13.49 | 77.02 | 47.763 |

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|---|---|---|---|---|---|
| 6/27/2011 | 1:51:00 PM | 5.103 | 13.516 | 75.881 | 44.839 |
| 6/27/2011 | 1:52:00 PM | 5.106 | 13.502 | 76.611 | 47.527 |
| 6/27/2011 | 1:53:00 PM | 5.121 | 13.476 | 76.7 | 46.435 |
| 6/27/2011 | 1:54:00 PM | 5.056 | 13.543 | 77.121 | 47.916 |
| 6/27/2011 | 1:55:00 PM | 5.087 | 13.524 | 75.85 | 47.975 |
| 6/27/2011 | 1:56:00 PM | 5.125 | 13.485 | 75.885 | 48.042 |
| 6/27/2011 | 1:57:00 PM | 5.114 | 13.483 | 76.024 | 49.593 |
| 6/27/2011 | 1:58:00 PM | 5.149 | 13.472 | 75.418 | 48.883 |
| 6/27/2011 | 1:59:00 PM | 5.119 | 13.491 | 74.753 | 49.037 |
| 6/27/2011 | 2:00:00 PM | 5.112 | 13.5 | 76.561 | 49.014 |
| 6/27/2011 | 2:01:00 PM | 5.164 | 13.445 | 76.933 | 49.722 |
| 6/27/2011 | 2:02:00 PM | 5.197 | 13.419 | 77.133 | 49.241 |
| 6/27/2011 | 2:03:00 PM | 5.17 | 13.43 | 77.074 | 48.824 |
| 6/27/2011 | 2:04:00 PM | 5.116 | 13.483 | 77.218 | 49.039 |
| 6/27/2011 | 2:05:00 PM | 5.115 | 13.481 | 75.773 | 48.703 |
| 6/27/2011 | 2:06:00 PM | 5.087 | 13.523 | 76.383 | 50.87 |
| 6/27/2011 | 2:07:00 PM | 5.036 | 13.57 | 78.528 | 50.428 |
| 6/27/2011 | 2:08:00 PM | 5.023 | 13.585 | 78.99 | 51.782 |
| 6/27/2011 | 2:09:00 PM | 5.101 | 13.507 | 78.68 | 52.282 |
| 6/27/2011 | 2:10:00 PM | 5.061 | 13.557 | 78.182 | 52.24 |
| 6/27/2011 | 2:11:00 PM | 5.098 | 13.517 | 77.824 | 51.05 |
| 6/27/2011 | 2:12:00 PM | 5.132 | 13.491 | 76.542 | 49.673 |
| 6/27/2011 | 2:13:00 PM | 5.138 | 13.489 | 76.841 | 48.714 |
| 6/27/2011 | 2:14:00 PM | 5.137 | 13.498 | 76.494 | 47.705 |
| 6/27/2011 | 2:15:00 PM | 5.168 | 13.471 | 75.06 | 46.928 |
| 6/27/2011 | 2:16:00 PM | 5.18 | 13.466 | 74.591 | 46.543 |
| 6/27/2011 | 2:17:00 PM | 5.201 | 13.44 | 75.602 | 47.545 |
| 6/27/2011 | 2:18:00 PM | 5.159 | 13.484 | 76.139 | 48.341 |
| 6/27/2011 | 2:19:00 PM | 5.135 | 13.499 | 76.858 | 48.559 |
| 6/27/2011 | 2:20:00 PM | 5.082 | 13.55 | 76.824 | 47.199 |
| 6/27/2011 | 2:21:00 PM | 5.081 | 13.568 | 78.729 | 47.231 |
| 6/27/2011 | 2:22:00 PM | 5.135 | 13.517 | 77.347 | 47.318 |
| 6/27/2011 | 2:23:00 PM | 5.191 | 13.472 | 75.509 | 46.809 |
| 6/27/2011 | 2:24:00 PM | 5.218 | 13.445 | 74.815 | 45.443 |
| 6/27/2011 | 2:25:00 PM | 5.223 | 13.452 | 76.051 | 46.253 |
| 6/27/2011 | 2:26:00 PM | 5.203 | 13.455 | 76.529 | 46.919 |
| 6/27/2011 | 2:27:00 PM | 5.157 | 13.507 | 75.859 | 45.72 |
| 6/27/2011 | 2:28:00 PM | 5.139 | 13.534 | 76.49 | 45.55 |
| 6/27/2011 | 2:29:00 PM | 5.168 | 13.487 | 75.884 | 45.945 |
| 6/27/2011 | 2:30:00 PM | 5.148 | 13.513 | 76.955 | 47.877 |
| 6/27/2011 | 2:31:00 PM | 5.158 | 13.502 | 77.579 | 48.419 |
| 6/27/2011 | 2:32:00 PM | 5.135 | 13.524 | 78.847 | 49.11 |
| 6/27/2011 | 2:33:00 PM | 5.143 | 13.517 | 78.797 | 49.444 |
| 6/27/2011 | 2:34:00 PM | 5.094 | 13.567 | 80.469 | 50.422 |
| 6/27/2011 | 2:35:00 PM | 5.067 | 13.583 | 80.557 | 50.891 |
| 6/27/2011 | 2:36:00 PM | 5.114 | 13.562 | 79.13 | 48.929 |
| 6/27/2011 | 2:37:00 PM | 5.183 | 13.478 | 77.001 | 46.986 |
| 6/27/2011 | 2:38:00 PM | 5.126 | 13.54 | 77.418 | 46.704 |
| 6/27/2011 | 2:39:00 PM | 5.162 | 13.518 | 79.335 | 47.946 |
| 6/27/2011 | 2:40:00 PM | 5.183 | 13.492 | 79.16 | 41.563 |
| 6/27/2011 | 2:41:00 PM | 5.114 | 13.563 | 79.589 | 34.283 |
| 6/27/2011 | 2:42:00 PM | 5.044 | 13.625 | 82.269 | 34.635 |
| 6/27/2011 | 2:43:00 PM | 5.061 | 13.624 | 82.197 | 35.319 |
| 6/27/2011 | 2:44:00 PM | 5.115 | 13.576 | 79.919 | 36.329 |
| 6/27/2011 | 2:45:00 PM | 5.185 | 13.492 | 78.663 | 37.157 |

| | | | | | | |
|---|---|---|---|---|---|---|
| 6/27/2011 | 2:46:00 PM | 5.156 | 13.526 | 77.397 | 37.792 | |
| 6/27/2011 | 2:47:00 PM | 5.23 | 13.495 | 77.265 | 38.205 | |
| 6/27/2011 | 2:48:00 PM | 5.18 | 13.493 | 78.53 | 38.591 | |
| 6/27/2011 | 2:49:00 PM | 5.124 | 13.572 | 80.834 | 38.94 | |
| 6/27/2011 | 2:50:00 PM | 5.181 | 13.502 | 81.12 | 39.176 | |
| 6/27/2011 | 2:51:00 PM | 5.103 | 13.565 | 81.038 | 39.537 | |
| 6/27/2011 | 2:52:00 PM | 5.112 | 13.572 | 80.551 | 39.808 | |
| 6/27/2011 | 2:53:00 PM | 5.089 | 13.59 | 80.739 | 39.959 | |
| 6/27/2011 | 2:54:00 PM | 5.134 | 13.555 | 78.908 | 40.143 | |
| 6/27/2011 | 2:55:00 PM | 5.174 | 13.536 | 78.548 | 40.122 | |
| 6/27/2011 | 2:56:00 PM | 5.152 | 13.522 | 76.639 | 40.307 | |
| 6/27/2011 | 2:57:00 PM | 5.168 | 13.527 | 78.795 | 40.332 | |
| 6/27/2011 | 2:58:00 PM | 5.191 | 13.474 | 79.633 | 40.366 | |
| 6/27/2011 | 2:59:00 PM | 5.193 | 13.489 | 78.87 | 7.148 | |
| 6/27/2011 | 3:00:00 PM | 5.21 | 13.465 | 78.684 | 0.07 | THC Zero |
| 6/27/2011 | 3:01:00 PM | 5.187 | 13.474 | 77.576 | 0.073 | |
| 6/27/2011 | 3:02:00 PM | 5.184 | 13.496 | 78.052 | 71.044 | |
| 6/27/2011 | 3:03:00 PM | 5.148 | 13.518 | 79.205 | 81.211 | |
| 6/27/2011 | 3:04:00 PM | 5.182 | 13.497 | 79.491 | 81.268 | |
| 6/27/2011 | 3:05:00 PM | 5.24 | 13.45 | 76.721 | 81.265 | |
| 6/27/2011 | 3:06:00 PM | 5.21 | 13.473 | 76.945 | 85.651 | |
| 6/27/2011 | 3:07:00 PM | 5.226 | 13.476 | 77.862 | 87.114 | |
| 6/27/2011 | 3:08:00 PM | 5.195 | 13.484 | 77.925 | 87.293 | THC High |
| 6/27/2011 | 3:09:00 PM | 5.165 | 13.519 | 78.352 | 76.393 | |
| 6/27/2011 | 3:10:00 PM | 5.108 | 13.566 | 80.677 | 43.906 | |
| 6/27/2011 | 3:11:00 PM | 5.123 | 13.561 | 80.992 | 43.832 | THC Mid |
| 6/27/2011 | 3:12:00 PM | 5.14 | 13.52 | 78.278 | 37.556 | |
| 6/27/2011 | 3:13:00 PM | 5.158 | 13.519 | 77.258 | 24.26 | |
| 6/27/2011 | 3:14:00 PM | 5.17 | 13.503 | 77.24 | 24.092 | THC Low |
| 6/27/2011 | 3:15:00 PM | 5.147 | 13.52 | 77.21 | 24.051 | |
| 6/27/2011 | 3:16:00 PM | 5.167 | 13.502 | 76.894 | 35.213 | |
| 6/27/2011 | 3:17:00 PM | 5.166 | 13.516 | 78.229 | 56.956 | |
| 6/27/2011 | 3:18:00 PM | 5.156 | 13.5 | 77.716 | 55.401 | |
| 6/27/2011 | 3:19:00 PM | 5.135 | 13.519 | 78.716 | 58.066 | |
| 6/27/2011 | 3:20:00 PM | 5.144 | 13.515 | 79.944 | 58.126 | |
| 6/27/2011 | 3:21:00 PM | 5.174 | 13.493 | 79.393 | 56.236 | |
| 6/27/2011 | 3:22:00 PM | 5.141 | 13.502 | 78.378 | 55.664 | |
| 6/27/2011 | 3:23:00 PM | 0.907 | 0.465 | 108.04 | 56.499 | |
| 6/27/2011 | 3:24:00 PM | 0.052 | 0.023 | 142.576 | 56.331 | |
| 6/27/2011 | 3:25:00 PM | 0.044 | 0.016 | 143.257 | 58.09 | CO bias |
| 6/27/2011 | 3:26:00 PM | 3.486 | 7.294 | 98.636 | 53.918 | |
| 6/27/2011 | 3:27:00 PM | 4.96 | 9.789 | 4.085 | 55.535 | |
| 6/27/2011 | 3:28:00 PM | 4.962 | 9.8 | -0.109 | 57.79 | O2/CO2 bias |
| 6/27/2011 | 3:29:00 PM | 5.009 | 10.928 | 2.017 | 59.219 | |
| 6/27/2011 | 3:30:00 PM | 5.157 | 13.476 | 65.815 | 59.034 | |
| 6/27/2011 | 3:31:00 PM | 5.228 | 13.396 | 78.163 | 56.338 | |
| 6/27/2011 | 3:32:00 PM | 5.256 | 13.369 | 77.637 | 55.937 | |
| 6/27/2011 | 3:33:00 PM | 5.238 | 13.377 | 77.783 | 57.109 | |
| 6/27/2011 | 3:34:00 PM | 5.176 | 13.431 | 77.429 | 56.081 | |
| 6/27/2011 | 3:35:00 PM | 5.173 | 13.452 | 76.627 | 53.466 | |
| 6/27/2011 | 3:36:00 PM | 5.182 | 13.439 | 78.152 | 56.236 | |
| 6/27/2011 | 3:37:00 PM | 5.146 | 13.47 | 79.583 | 55.113 | |
| 6/27/2011 | 3:38:00 PM | 5.093 | 13.517 | 78.587 | 51.481 | |
| 6/27/2011 | 3:39:00 PM | 5.135 | 13.475 | 78.02 | 51.752 | |

| | | | | | |
|---|---|---|---|---|---|
| 6/27/2011 | 3:40:00 PM | 5.201 | 13.4 | 77.273 | 52.821 |
| 6/27/2011 | 3:41:00 PM | 5.13 | 13.474 | 77.941 | 54.531 |
| 6/27/2011 | 3:42:00 PM | 5.123 | 13.483 | 78.017 | 56.419 |
| 6/27/2011 | 3:43:00 PM | 5.141 | 13.482 | 77.388 | 56.03 |
| 6/27/2011 | 3:44:00 PM | 5.139 | 13.478 | 78.406 | 57.103 |
| 6/27/2011 | 3:45:00 PM | 5.16 | 13.467 | 79.273 | 55.264 |
| 6/27/2011 | 3:46:00 PM | 5.15 | 13.463 | 78.891 | 55.696 |
| 6/27/2011 | 3:47:00 PM | 5.199 | 13.443 | 78.199 | 55.283 |
| 6/27/2011 | 3:48:00 PM | 5.174 | 13.438 | 78.401 | 53.922 |
| 6/27/2011 | 3:49:00 PM | 5.176 | 13.453 | 78.873 | 54.901 |
| 6/27/2011 | 3:50:00 PM | 5.196 | 13.426 | 78.484 | 54.7 |
| 6/27/2011 | 3:51:00 PM | 5.065 | 13.54 | 78.85 | 58.169 |
| 6/27/2011 | 3:52:00 PM | 5.059 | 13.544 | 80.439 | 59.07 |
| 6/27/2011 | 3:53:00 PM | 5.081 | 13.521 | 81.339 | 60.732 |
| 6/27/2011 | 3:54:00 PM | 5.093 | 13.527 | 80.24 | 58.448 |
| 6/27/2011 | 3:55:00 PM | 5.157 | 13.483 | 78.811 | 56.003 |
| 6/27/2011 | 3:56:00 PM | 5.195 | 13.421 | 77.646 | 53.634 |
| 6/27/2011 | 3:57:00 PM | 5.143 | 13.479 | 78.81 | 53.779 |
| 6/27/2011 | 3:58:00 PM | 5.127 | 13.5 | 79.521 | 54.008 |
| 6/27/2011 | 3:59:00 PM | 5.134 | 13.501 | 82.123 | 55.143 |
| 6/27/2011 | 4:00:00 PM | 5.181 | 13.448 | 80.682 | 54.419 |
| 6/27/2011 | 4:01:00 PM | 5.176 | 13.464 | 79.979 | 56.198 |
| 6/27/2011 | 4:02:00 PM | 5.19 | 13.432 | 80.328 | 55.418 |
| 6/27/2011 | 4:03:00 PM | 5.183 | 13.429 | 79.036 | 54.658 |
| 6/27/2011 | 4:04:00 PM | 5.199 | 13.422 | 77.141 | 51.931 |
| 6/27/2011 | 4:05:00 PM | 5.195 | 13.418 | 78.202 | 54.515 |
| 6/27/2011 | 4:06:00 PM | 5.133 | 13.489 | 79.455 | 53.759 |
| 6/27/2011 | 4:07:00 PM | 5.155 | 13.464 | 79.804 | 53.561 |
| 6/27/2011 | 4:08:00 PM | 5.152 | 13.473 | 80.759 | 56.635 |
| 6/27/2011 | 4:09:00 PM | 5.14 | 13.474 | 80.837 | 56.546 |
| 6/27/2011 | 4:10:00 PM | 5.117 | 13.501 | 79.605 | 54.474 |
| 6/27/2011 | 4:11:00 PM | 5.135 | 13.511 | 80.181 | 53.915 |
| 6/27/2011 | 4:12:00 PM | 5.157 | 13.473 | 79.605 | 54.191 |
| 6/27/2011 | 4:13:00 PM | 5.142 | 13.496 | 77.389 | 53.586 |
| 6/27/2011 | 4:14:00 PM | 5.182 | 13.438 | 77.634 | 54.626 |
| 6/27/2011 | 4:15:00 PM | 5.157 | 13.448 | 75.283 | 53.13 |
| 6/27/2011 | 4:16:00 PM | 5.135 | 13.471 | 75.264 | 56.887 |
| 6/27/2011 | 4:17:00 PM | 5.126 | 13.483 | 76.345 | 59.08 |
| 6/27/2011 | 4:18:00 PM | 5.121 | 13.501 | 78.195 | 59.377 |
| 6/27/2011 | 4:19:00 PM | 5.138 | 13.468 | 78.079 | 57.292 |
| 6/27/2011 | 4:20:00 PM | 5.109 | 13.503 | 77.019 | 53.648 |
| 6/27/2011 | 4:21:00 PM | 5.16 | 13.464 | 76.109 | 53.443 |
| 6/27/2011 | 4:22:00 PM | 5.157 | 13.441 | 75.368 | 54.031 |
| 6/27/2011 | 4:23:00 PM | 5.148 | 13.461 | 74.939 | 52.38 |
| 6/27/2011 | 4:24:00 PM | 5.165 | 13.445 | 75.175 | 51.956 |
| 6/27/2011 | 4:25:00 PM | 5.131 | 13.451 | 74.572 | 53.391 |
| 6/27/2011 | 4:26:00 PM | 5.147 | 13.451 | 74.361 | 54.409 |
| 6/27/2011 | 4:27:00 PM | 5.067 | 13.53 | 74.866 | 55.61 |
| 6/27/2011 | 4:28:00 PM | 5.06 | 13.542 | 76.434 | 56.865 |
| 6/27/2011 | 4:29:00 PM | 5.123 | 13.477 | 75.653 | 58.579 |
| 6/27/2011 | 4:30:00 PM | 5.101 | 13.492 | 76.971 | 48.291 |
| 6/27/2011 | 4:31:00 PM | 5.107 | 13.485 | 75.973 | 36.524 |
| 6/27/2011 | 4:32:00 PM | 5.136 | 13.466 | 76.096 | 37.327 |
| 6/27/2011 | 4:33:00 PM | 5.122 | 13.473 | 77.09 | 37.995 |
| 6/27/2011 | 4:34:00 PM | 5.05 | 13.538 | 78.755 | 38.845 |

| | | | | | | |
|---|---|---|---|---|---|---|
| 6/27/2011 | 4:35:00 PM | 5.056 | 13.523 | 77.945 | 40.213 | |
| 6/27/2011 | 4:36:00 PM | 5.086 | 13.502 | 73.407 | 40.988 | |
| 6/27/2011 | 4:37:00 PM | 5.134 | 13.454 | 62.608 | 41.41 | |
| 6/27/2011 | 4:38:00 PM | 5.113 | 13.459 | 60.788 | 41.86 | |
| 6/27/2011 | 4:39:00 PM | 5.127 | 13.48 | 60.063 | 42.096 | |
| 6/27/2011 | 4:40:00 PM | 5.12 | 13.463 | 65.397 | 42.342 | |
| 6/27/2011 | 4:41:00 PM | 5.072 | 13.509 | 73.432 | 42.487 | |
| 6/27/2011 | 4:42:00 PM | 5.02 | 13.561 | 77.58 | 42.577 | |
| 6/27/2011 | 4:43:00 PM | 5.025 | 13.54 | 78.734 | 42.762 | |
| 6/27/2011 | 4:44:00 PM | 5.048 | 13.519 | 77.472 | 42.956 | |
| 6/27/2011 | 4:45:00 PM | 5.076 | 13.509 | 76.421 | 43.127 | |
| 6/27/2011 | 4:46:00 PM | 5.046 | 13.53 | 76.163 | 43.048 | |
| 6/27/2011 | 4:47:00 PM | 5.056 | 13.505 | 77.735 | 43.12 | |
| 6/27/2011 | 4:48:00 PM | 4.989 | 13.57 | 78.161 | 43.057 | |
| 6/27/2011 | 4:49:00 PM | 5.086 | 13.496 | 78.005 | 43.049 | |
| 6/27/2011 | 4:50:00 PM | 5.089 | 13.47 | 78.587 | 43.052 | |
| 6/27/2011 | 4:51:00 PM | 5.074 | 13.483 | 78.149 | 42.921 | |
| 6/27/2011 | 4:52:00 PM | 5.069 | 13.481 | 77.636 | 42.924 | |
| 6/27/2011 | 4:53:00 PM | 5.054 | 13.477 | 77.867 | 42.979 | |
| 6/27/2011 | 4:54:00 PM | 5.018 | 13.52 | 78.061 | 42.929 | |
| 6/27/2011 | 4:55:00 PM | 5.05 | 13.506 | 79.43 | 43.032 | |
| 6/27/2011 | 4:56:00 PM | 5.092 | 13.474 | 77.583 | 43.089 | |
| 6/27/2011 | 4:57:00 PM | 5.143 | 13.417 | 75.634 | 43.087 | |
| 6/27/2011 | 4:58:00 PM | 5.13 | 13.422 | 76.433 | 43.047 | |
| 6/27/2011 | 4:59:00 PM | 5.118 | 13.438 | 77.222 | 42.993 | |
| 6/27/2011 | 5:00:00 PM | 5.121 | 13.424 | 77.865 | 42.967 | |
| 6/27/2011 | 5:01:00 PM | 5.14 | 13.41 | 78.064 | 42.884 | |
| 6/27/2011 | 5:02:00 PM | 5.073 | 13.464 | 78.966 | 42.904 | |
| 6/27/2011 | 5:03:00 PM | 5.092 | 13.457 | 79.375 | 42.913 | |
| 6/27/2011 | 5:04:00 PM | 5.113 | 13.425 | 78.424 | 42.927 | |
| 6/27/2011 | 5:05:00 PM | 5.115 | 13.413 | 77.426 | 42.907 | |
| 6/27/2011 | 5:06:00 PM | 5.141 | 13.399 | 76.711 | 42.959 | |
| 6/27/2011 | 5:07:00 PM | 5.105 | 13.412 | 76.61 | 43.002 | |
| 6/27/2011 | 5:08:00 PM | 5.063 | 13.456 | 76.375 | 42.923 | |
| 6/27/2011 | 5:09:00 PM | 5.102 | 13.442 | 78.16 | 43.016 | |
| 6/27/2011 | 5:10:00 PM | 5.157 | 13.375 | 75.816 | 43.038 | |
| 6/27/2011 | 5:11:00 PM | 5.17 | 13.365 | 74.979 | 43.068 | THC High |
| 6/27/2011 | 5:12:00 PM | 5.16 | 13.369 | 74.851 | 38.995 | |
| 6/27/2011 | 5:13:00 PM | 5.123 | 13.393 | 76.404 | 0.091 | THC Zero |
| 6/27/2011 | 5:14:00 PM | 5.08 | 13.43 | 76.552 | 0.086 | |

## EPA METHOD 25A CALIBRATION RESULTS

| | | | |
|---|---|---|---|
| **Client:** | ExxonMobil | **Date:** | 06/28/11 |
| **Location:** | Torrance Refinery | **By:** | AA |
| **Unit:** | FCC 2F-7 | | |

| | |
|---|---|
| **Analyzer Make** | Thermo Environmental |
| **Model** | 51 |
| **Serial No.** | 51HT-65564-348 |

| PRE-TEST CALIBRATION ERROR | | |
|---|---|---|
| **Analyzer Range** | **98.0** | **STATUS** |
| **Zero Gas Value** | 0 | - |
| **Analyzer Reads** | 0.12 | - |
| **High Gas Value** | 86.60 | - |
| **Analyzer Reads** | 87.85 | - |
| **Mid Gas Predicted Value** | 45.06 | - |
| **Analyzer Reads** | 44.08 | - |
| **Error (% of Gas Value)** | -2.2% | Pass |
| **Low Gas Predicted Value** | 25.38 | - |
| **Analyzer Reads** | 24.23 | - |
| **Error (% of Gas Value)** | -4.6% | Pass |

EPA METHOD 25A TEST DATA

| | | | |
|---|---|---|---|
| Client: | ExxonMobil | Date: | 06/28/11 |
| Location: | Torrance Refinery | By: | AA |
| Unit: | FCC 2F-7 | | |
| Run No. | 3-THC | Test Duration, HH:MM | 1:00 |

| | Time | | |
|---|---|---|---|
| Point | Date | Time | Total Hydrocarbons, ppm as Propane |
| 1 | 6/28/2011 | 8:03 | 53.2 |
| 1 | 6/28/2011 | 8:04 | 55.0 |
| 1 | 6/28/2011 | 8:05 | 54.1 |
| 1 | 6/28/2011 | 8:06 | 53.9 |
| 1 | 6/28/2011 | 8:07 | 53.4 |
| 1 | 6/28/2011 | 8:08 | 53.8 |
| 1 | 6/28/2011 | 8:09 | 53.8 |
| 1 | 6/28/2011 | 8:10 | 53.0 |
| 1 | 6/28/2011 | 8:11 | 53.2 |
| 1 | 6/28/2011 | 8:12 | 51.1 |
| 1 | 6/28/2011 | 8:13 | 51.2 |
| 1 | 6/28/2011 | 8:14 | 50.9 |
| 1 | 6/28/2011 | 8:15 | 51.7 |
| 1 | 6/28/2011 | 8:16 | 50.8 |
| 1 | 6/28/2011 | 8:17 | 50.2 |
| 1 | 6/28/2011 | 8:18 | 50.8 |
| 1 | 6/28/2011 | 8:19 | 54.2 |
| 1 | 6/28/2011 | 8:20 | 53.8 |
| 1 | 6/28/2011 | 8:21 | 54.1 |
| 1 | 6/28/2011 | 8:22 | 55.7 |
| 1 | 6/28/2011 | 8:23 | 55.7 |
| 1 | 6/28/2011 | 8:24 | 52.4 |
| 1 | 6/28/2011 | 8:25 | 53.7 |
| 1 | 6/28/2011 | 8:26 | 53.7 |
| 1 | 6/28/2011 | 8:27 | 54.9 |
| 1 | 6/28/2011 | 8:28 | 54.2 |
| 1 | 6/28/2011 | 8:29 | 52.6 |
| 1 | 6/28/2011 | 8:30 | 51.4 |
| 1 | 6/28/2011 | 8:31 | 51.6 |
| 1 | 6/28/2011 | 8:32 | 48.8 |
| 1 | 6/28/2011 | 8:33 | 47.5 |
| 1 | 6/28/2011 | 8:34 | 50.1 |
| 1 | 6/28/2011 | 8:35 | 51.1 |
| 1 | 6/28/2011 | 8:36 | 51.5 |
| 1 | 6/28/2011 | 8:37 | 50.7 |
| 1 | 6/28/2011 | 8:38 | 52.0 |
| 1 | 6/28/2011 | 8:39 | 51.4 |
| 1 | 6/28/2011 | 8:40 | 52.2 |
| 1 | 6/28/2011 | 8:41 | 49.5 |
| 1 | 6/28/2011 | 8:42 | 48.3 |
| 1 | 6/28/2011 | 8:43 | 49.5 |
| 1 | 6/28/2011 | 8:44 | 51.0 |
| 1 | 6/28/2011 | 8:45 | 49.8 |
| 1 | 6/28/2011 | 8:46 | 47.6 |
| 1 | 6/28/2011 | 8:47 | 47.1 |
| 1 | 6/28/2011 | 8:48 | 47.9 |
| 1 | 6/28/2011 | 8:49 | 52.3 |
| 1 | 6/28/2011 | 8:50 | 57.2 |
| 1 | 6/28/2011 | 8:51 | 59.8 |
| 1 | 6/28/2011 | 8:52 | 51.6 |
| 1 | 6/28/2011 | 8:53 | 49.2 |
| 1 | 6/28/2011 | 8:54 | 49.1 |
| 1 | 6/28/2011 | 8:55 | 48.0 |
| 1 | 6/28/2011 | 8:56 | 48.8 |
| 1 | 6/28/2011 | 8:57 | 49.7 |
| 1 | 6/28/2011 | 8:58 | 49.0 |
| 1 | 6/28/2011 | 8:59 | 48.4 |
| 1 | 6/28/2011 | 9:00 | 52.3 |
| 1 | 6/28/2011 | 9:01 | 51.9 |
| 1 | 6/28/2011 | 9:02 | 52.0 |
| Average | | | 51.72 |

| POST TEST DRIFT DETERMINATION | | |
|---|---|---|
| Zero Reads | 0.09 | - |
| Drift, ppm | 0.0 | - |
| Drift, % Full Scale | 0.0% | Pass |
| Mid Gas Reads | 41.90 | - |
| Drift, ppm | 2.2 | - |
| Drift, % Full Scale | 2.2% | Pass |

| Date | Time | O2 % | CO2 % | CO PPM | HC PPM | |
|---|---|---|---|---|---|---|
| 6/28/2011 | 7:07:00 AM | 5.045 | 13.689 | 77.109 | 48.428 | |
| 6/28/2011 | 7:08:00 AM | 1.911 | 4.298 | 60.543 | 38.673 | |
| 6/28/2011 | 7:09:00 AM | 0.049 | -0.001 | 5.114 | 0.096 | O2/CO2 Zero |
| 6/28/2011 | 7:10:00 AM | 7.551 | 15.965 | 0.541 | 0.404 | |
| 6/28/2011 | 7:11:00 AM | 8.691 | 17.42 | 0.492 | 0.121 | THC/CO Zero |
| 6/28/2011 | 7:12:00 AM | 8.695 | 17.424 | 98.81 | 11.89 | O2/CO2 Cal High |
| 6/28/2011 | 7:13:00 AM | 6.029 | 11.562 | 246.064 | 69.291 | |
| 6/28/2011 | 7:14:00 AM | 4.986 | 9.975 | 249.878 | 70.688 | |
| 6/28/2011 | 7:15:00 AM | 4.983 | 9.961 | 250.158 | 71.686 | |
| 6/28/2011 | 7:16:00 AM | 4.984 | 9.967 | 249.646 | 72.225 | O2/CO2 Mid; CO Cal High |
| 6/28/2011 | 7:17:00 AM | 5.015 | 12.055 | 223.229 | 72.826 | |
| 6/28/2011 | 7:18:00 AM | 4.991 | 13.791 | 145.231 | 73.465 | |
| 6/28/2011 | 7:19:00 AM | 5.013 | 14.057 | 146.232 | 75.589 | |
| 6/28/2011 | 7:20:00 AM | 5.116 | 14.111 | 147.13 | 76.839 | |
| 6/28/2011 | 7:21:00 AM | 5.01 | 13.822 | 144.14 | 75.088 | CO Mid |
| 6/28/2011 | 7:22:00 AM | 5.031 | 13.791 | 109.818 | 75.444 | |
| 6/28/2011 | 7:23:00 AM | 5.004 | 13.826 | 76.128 | 75.743 | |
| 6/28/2011 | 7:24:00 AM | 5.014 | 13.823 | 76.578 | 75.977 | |
| 6/28/2011 | 7:25:00 AM | 5.06 | 13.778 | 75.561 | 76.11 | |
| 6/28/2011 | 7:26:00 AM | 5.051 | 13.785 | 74.436 | 76.138 | |
| 6/28/2011 | 7:27:00 AM | 5.061 | 13.784 | 75.175 | 76.302 | |
| 6/28/2011 | 7:28:00 AM | 5.045 | 13.783 | 75.38 | 85.038 | |
| 6/28/2011 | 7:29:00 AM | 5.004 | 13.835 | 76.084 | 87.99 | |
| 6/28/2011 | 7:30:00 AM | 5.061 | 13.768 | 74.669 | 87.961 | |
| 6/28/2011 | 7:31:00 AM | 5.058 | 13.773 | 73.135 | 87.848 | THC High |
| 6/28/2011 | 7:32:00 AM | 5.064 | 13.761 | 72.002 | 87.913 | |
| 6/28/2011 | 7:33:00 AM | 5.068 | 13.762 | 72.866 | 74.831 | |
| 6/28/2011 | 7:34:00 AM | 5.071 | 13.762 | 73.112 | 44.238 | |
| 6/28/2011 | 7:35:00 AM | 5.052 | 13.773 | 73.992 | 44.077 | THC Mid |
| 6/28/2011 | 7:36:00 AM | 5.109 | 13.73 | 72.282 | 44.082 | |
| 6/28/2011 | 7:37:00 AM | 5.116 | 13.727 | 71.859 | 44.046 | |
| 6/28/2011 | 7:38:00 AM | 5.095 | 13.733 | 72.341 | 29.551 | |
| 6/28/2011 | 7:39:00 AM | 5.145 | 13.693 | 72.74 | 24.233 | THC Low |
| 6/28/2011 | 7:40:00 AM | 5.157 | 13.685 | 72.169 | 23.97 | |
| 6/28/2011 | 7:41:00 AM | 5.282 | 13.938 | 74.531 | 24.923 | |
| 6/28/2011 | 7:42:00 AM | 5.324 | 14.154 | 74.709 | 40.317 | |
| 6/28/2011 | 7:43:00 AM | 5.322 | 14.169 | 73.772 | 57.561 | |
| 6/28/2011 | 7:44:00 AM | 5.357 | 14.302 | 73.69 | 57.623 | |
| 6/28/2011 | 7:45:00 AM | 5.563 | 14.77 | 77.257 | 60.487 | |
| 6/28/2011 | 7:46:00 AM | 5.467 | 14.707 | 76.401 | 58.473 | |
| 6/28/2011 | 7:47:00 AM | 5.581 | 14.998 | 77.665 | 60.993 | |
| 6/28/2011 | 7:48:00 AM | 5.424 | 14.663 | 77.392 | 60.318 | |
| 6/28/2011 | 7:49:00 AM | 5.015 | 13.711 | 73.777 | 54.722 | |
| 6/28/2011 | 7:50:00 AM | 5.246 | 11.813 | 68.108 | 54.897 | |
| 6/28/2011 | 7:51:00 AM | 4.963 | 9.894 | 8.058 | 54.297 | |
| 6/28/2011 | 7:52:00 AM | 4.966 | 9.908 | -0.11 | 54.49 | O2/CO2 bias |
| 6/28/2011 | 7:53:00 AM | 4.969 | 9.911 | -0.184 | 54.528 | |
| 6/28/2011 | 7:54:00 AM | 5.004 | 13.56 | 36.499 | 54.318 | |
| 6/28/2011 | 7:55:00 AM | 4.989 | 13.752 | 72.446 | 54.452 | |
| 6/28/2011 | 7:56:00 AM | 1.16 | 2.326 | 90.116 | 52.702 | |
| 6/28/2011 | 7:57:00 AM | 0.05 | 0.025 | 141.318 | 52.496 | |
| 6/28/2011 | 7:58:00 AM | 0.041 | 0.013 | 143.366 | 54.578 | CO bias |

| | | | | | |
|---|---|---|---|---|---|
| 6/28/2011 | 7:59:00 AM | 2.799 | 8.26 | 127.789 | 54.437 |
| 6/28/2011 | 8:00:00 AM | 5.048 | 13.651 | 73.979 | 54.857 |
| 6/28/2011 | 8:01:00 AM | 5.018 | 13.694 | 71.419 | 53.566 |
| 6/28/2011 | 8:02:00 AM | 4.968 | 13.756 | 72.806 | 54.661 |
| 6/28/2011 | 8:03:00 AM | 4.943 | 13.784 | 73.214 | 53.158 |
| 6/28/2011 | 8:04:00 AM | 4.985 | 13.759 | 72.848 | 55.039 |
| 6/28/2011 | 8:05:00 AM | 5.061 | 13.682 | 71.686 | 54.123 |
| 6/28/2011 | 8:06:00 AM | 5.051 | 13.669 | 71.628 | 53.909 |
| 6/28/2011 | 8:07:00 AM | 5.032 | 13.713 | 71.203 | 53.378 |
| 6/28/2011 | 8:08:00 AM | 5.044 | 13.687 | 71.194 | 53.752 |
| 6/28/2011 | 8:09:00 AM | 5.051 | 13.679 | 70.82 | 53.777 |
| 6/28/2011 | 8:10:00 AM | 5.014 | 13.698 | 72.345 | 52.992 |
| 6/28/2011 | 8:11:00 AM | 5.027 | 13.697 | 71.94 | 53.192 |
| 6/28/2011 | 8:12:00 AM | 5.043 | 13.673 | 70.624 | 51.078 |
| 6/28/2011 | 8:13:00 AM | 5.086 | 13.636 | 69.474 | 51.158 |
| 6/28/2011 | 8:14:00 AM | 5.037 | 13.665 | 68.64 | 50.917 |
| 6/28/2011 | 8:15:00 AM | 5.007 | 13.694 | 68.026 | 51.664 |
| 6/28/2011 | 8:16:00 AM | 4.946 | 13.737 | 69.047 | 50.786 |
| 6/28/2011 | 8:17:00 AM | 4.922 | 13.757 | 70.306 | 50.205 |
| 6/28/2011 | 8:18:00 AM | 4.902 | 13.767 | 69.851 | 50.798 |
| 6/28/2011 | 8:19:00 AM | 4.864 | 13.811 | 71.478 | 54.18 |
| 6/28/2011 | 8:20:00 AM | 4.815 | 13.854 | 77.851 | 53.785 |
| 6/28/2011 | 8:21:00 AM | 4.815 | 13.858 | 77.289 | 54.149 |
| 6/28/2011 | 8:22:00 AM | 4.783 | 13.891 | 75.576 | 55.715 |
| 6/28/2011 | 8:23:00 AM | 4.788 | 13.91 | 77.633 | 55.678 |
| 6/28/2011 | 8:24:00 AM | 4.834 | 13.943 | 92.726 | 52.436 |
| 6/28/2011 | 8:25:00 AM | 4.909 | 13.856 | 77.453 | 53.72 |
| 6/28/2011 | 8:26:00 AM | 4.888 | 13.875 | 72.463 | 53.709 |
| 6/28/2011 | 8:27:00 AM | 4.924 | 13.85 | 70.936 | 54.865 |
| 6/28/2011 | 8:28:00 AM | 4.902 | 13.872 | 70.943 | 54.235 |
| 6/28/2011 | 8:29:00 AM | 4.884 | 13.899 | 70.677 | 52.592 |
| 6/28/2011 | 8:30:00 AM | 4.853 | 13.965 | 73.505 | 51.363 |
| 6/28/2011 | 8:31:00 AM | 4.828 | 14.003 | 86.819 | 51.577 |
| 6/28/2011 | 8:32:00 AM | 4.864 | 14.002 | 80.64 | 48.797 |
| 6/28/2011 | 8:33:00 AM | 4.917 | 14.001 | 74.159 | 47.546 |
| 6/28/2011 | 8:34:00 AM | 4.845 | 13.879 | 71.797 | 50.096 |
| 6/28/2011 | 8:35:00 AM | 4.793 | 13.905 | 79.165 | 51.129 |
| 6/28/2011 | 8:36:00 AM | 4.847 | 13.859 | 77.178 | 51.521 |
| 6/28/2011 | 8:37:00 AM | 4.841 | 13.854 | 75.164 | 50.706 |
| 6/28/2011 | 8:38:00 AM | 4.801 | 13.841 | 77.808 | 52.032 |
| 6/28/2011 | 8:39:00 AM | 4.872 | 13.838 | 76.078 | 51.367 |
| 6/28/2011 | 8:40:00 AM | 4.898 | 13.827 | 72.616 | 52.199 |
| 6/28/2011 | 8:41:00 AM | 4.879 | 13.839 | 72.007 | 49.507 |
| 6/28/2011 | 8:42:00 AM | 4.894 | 13.846 | 71.533 | 48.278 |
| 6/28/2011 | 8:43:00 AM | 4.929 | 13.844 | 70.561 | 49.495 |
| 6/28/2011 | 8:44:00 AM | 4.914 | 13.866 | 71.005 | 51.03 |
| 6/28/2011 | 8:45:00 AM | 4.933 | 13.849 | 72.212 | 49.757 |
| 6/28/2011 | 8:46:00 AM | 4.98 | 13.805 | 69.617 | 47.581 |
| 6/28/2011 | 8:47:00 AM | 5.006 | 13.786 | 68.507 | 47.057 |
| 6/28/2011 | 8:48:00 AM | 5.02 | 13.769 | 67.854 | 47.879 |
| 6/28/2011 | 8:49:00 AM | 5.121 | 14.213 | 70.761 | 52.323 |
| 6/28/2011 | 8:50:00 AM | 5.375 | 14.906 | 75.464 | 57.184 |
| 6/28/2011 | 8:51:00 AM | 5.586 | 15.353 | 76.963 | 59.797 |
| 6/28/2011 | 8:52:00 AM | 4.982 | 13.98 | 71.528 | 51.61 |
| 6/28/2011 | 8:53:00 AM | 4.931 | 13.84 | 70.322 | 49.186 |

| | | | | | | |
|---|---|---|---|---|---|---|
| 6/28/2011 | 8:54:00 AM | 4.96 | 13.822 | 70.618 | 49.05 | |
| 6/28/2011 | 8:55:00 AM | 4.929 | 13.842 | 70.884 | 48.035 | |
| 6/28/2011 | 8:56:00 AM | 4.911 | 13.853 | 72.201 | 48.795 | |
| 6/28/2011 | 8:57:00 AM | 4.878 | 13.904 | 101.265 | 49.731 | |
| 6/28/2011 | 8:58:00 AM | 4.887 | 13.908 | 104.816 | 49.047 | |
| 6/28/2011 | 8:59:00 AM | 4.898 | 13.91 | 91.678 | 48.427 | |
| 6/28/2011 | 9:00:00 AM | 4.899 | 13.897 | 77.005 | 52.322 | |
| 6/28/2011 | 9:01:00 AM | 4.917 | 13.871 | 72.879 | 51.878 | |
| 6/28/2011 | 9:02:00 AM | 4.927 | 13.869 | 71.157 | 52.03 | |
| 6/28/2011 | 9:03:00 AM | 4.901 | 13.895 | 90.25 | 50.069 | |
| 6/28/2011 | 9:04:00 AM | 4.985 | 13.847 | 101.332 | 41.825 | |
| 6/28/2011 | 9:05:00 AM | 5.01 | 13.783 | 74.739 | 36.811 | |
| 6/28/2011 | 9:06:00 AM | 4.956 | 13.866 | 71.131 | 39.01 | |
| 6/28/2011 | 9:07:00 AM | 4.955 | 13.899 | 70.771 | 41.04 | |
| 6/28/2011 | 9:08:00 AM | 4.955 | 13.902 | 70.894 | 41.232 | |
| 6/28/2011 | 9:09:00 AM | 4.982 | 13.907 | 71.463 | 41.864 | |
| 6/28/2011 | 9:10:00 AM | 4.954 | 13.947 | 73.592 | 42.201 | |
| 6/28/2011 | 9:11:00 AM | 4.903 | 13.895 | 78.797 | 41.896 | THC Mid |
| 6/28/2011 | 9:12:00 AM | 4.884 | 13.786 | 76.582 | 41.213 | |
| 6/28/2011 | 9:13:00 AM | 4.81 | 13.855 | 79.662 | 0.327 | |
| 6/28/2011 | 9:14:00 AM | 4.797 | 13.873 | 83.009 | 0.093 | THC Zero |
| 6/28/2011 | 9:15:00 AM | 4.808 | 13.889 | 88.696 | 15.06 | |

**ExxonMobil**
**STACK $O_2$, $CO_2$ DATA**

**Test #:** **1-THC**
**Date:** **6/27/2011**
**Time:** **1112/1212**

| | $O_2$ | $CO_2$ | CO |
|---|---|---|---|
| Range | 10 | 20 | 250 |
| Cal Gas | 5.00 | 10.16 | 142 |
| Analyzer Zero | 0.03 | -0.06 | -1.91 |
| Analyzer Span | 5.04 | 10.02 | 142.11 |
| Pre-Bias Zero | 0.04 | -0.03 | -2.67 |
| Pre-Bias Span | 5.09 | 10.03 | 143.88 |
| Post-Bias Zero | 0.04 | 0.02 | -0.11 |
| Post-Bias Span | 4.96 | 9.80 | 143.26 |
| Pre-test zero bias | 0.1% | 0.2% | -0.3% |
| Pre-test span bias | 0.6% | 0.0% | 0.7% |
| Post-test zero bias | 0.2% | 0.4% | 0.7% |
| Post-test span bias | -0.7% | -1.1% | 0.5% |
| Zero Drift | 0.0% | 0.2% | 1.0% |
| Span Drift | -1.3% | -1.2% | -0.2% |
| | PASS | PASS | PASS |
| **Average** | **5.01** | **13.51** | **80.40** |
| **Cal Corrected** | **4.99** | **13.84** | **80.12** |

**ExxonMobil**
**1-THC**

| Date | Time | O2 % | CO2 % | CO ppm |
|---|---|---|---|---|
| 6/27/2011 | 11:13:00 AM | 5.126 | 13.434 | 79.691 |
| 6/27/2011 | 11:14:00 AM | 5.072 | 13.462 | 79.439 |
| 6/27/2011 | 11:15:00 AM | 5.013 | 13.538 | 80.282 |
| 6/27/2011 | 11:16:00 AM | 5.053 | 13.475 | 78.979 |
| 6/27/2011 | 11:17:00 AM | 5.019 | 13.515 | 80.76 |
| 6/27/2011 | 11:18:00 AM | 5.058 | 13.481 | 81.481 |
| 6/27/2011 | 11:19:00 AM | 5.028 | 13.497 | 82.722 |
| 6/27/2011 | 11:20:00 AM | 5.035 | 13.49 | 81.063 |
| 6/27/2011 | 11:21:00 AM | 5.056 | 13.476 | 78.766 |
| 6/27/2011 | 11:22:00 AM | 5.028 | 13.49 | 78.789 |
| 6/27/2011 | 11:23:00 AM | 4.994 | 13.546 | 80.7 |
| 6/27/2011 | 11:24:00 AM | 4.947 | 13.56 | 80.992 |
| 6/27/2011 | 11:25:00 AM | 4.944 | 13.585 | 80.926 |
| 6/27/2011 | 11:26:00 AM | 4.949 | 13.568 | 82.85 |
| 6/27/2011 | 11:27:00 AM | 5.015 | 13.52 | 82.324 |
| 6/27/2011 | 11:28:00 AM | 4.993 | 13.537 | 79.551 |
| 6/27/2011 | 11:29:00 AM | 5.024 | 13.502 | 79.61 |
| 6/27/2011 | 11:30:00 AM | 5.013 | 13.511 | 78.638 |
| 6/27/2011 | 11:31:00 AM | 4.983 | 13.554 | 79.955 |
| 6/27/2011 | 11:32:00 AM | 4.977 | 13.558 | 81.84 |
| 6/27/2011 | 11:33:00 AM | 5.027 | 13.516 | 82.356 |
| 6/27/2011 | 11:34:00 AM | 5.075 | 13.475 | 79.246 |
| 6/27/2011 | 11:35:00 AM | 5.08 | 13.452 | 79.572 |
| 6/27/2011 | 11:36:00 AM | 5.025 | 13.504 | 80.158 |
| 6/27/2011 | 11:37:00 AM | 5.047 | 13.481 | 80.378 |
| 6/27/2011 | 11:38:00 AM | 5.012 | 13.5 | 80.198 |
| 6/27/2011 | 11:39:00 AM | 4.958 | 13.558 | 81.733 |
| 6/27/2011 | 11:40:00 AM | 4.909 | 13.605 | 82.36 |
| 6/27/2011 | 11:41:00 AM | 4.983 | 13.547 | 81.238 |
| 6/27/2011 | 11:42:00 AM | 5.039 | 13.498 | 80.206 |
| 6/27/2011 | 11:43:00 AM | 5.058 | 13.476 | 80.337 |
| 6/27/2011 | 11:44:00 AM | 5.049 | 13.493 | 78.74 |
| 6/27/2011 | 11:45:00 AM | 5.087 | 13.463 | 79.023 |
| 6/27/2011 | 11:46:00 AM | 5.055 | 13.48 | 78.749 |
| 6/27/2011 | 11:47:00 AM | 4.994 | 13.542 | 80.506 |
| 6/27/2011 | 11:55:00 AM | 5.005 | 13.47 | 86.293 |
| 6/27/2011 | 11:56:00 AM | 5.085 | 13.436 | 79.214 |
| 6/27/2011 | 11:57:00 AM | 5.081 | 13.435 | 78.596 |
| 6/27/2011 | 11:58:00 AM | 5.094 | 13.429 | 78.407 |
| 6/27/2011 | 11:59:00 AM | 5 | 13.496 | 79.11 |
| 6/27/2011 | 12:00:00 PM | 4.979 | 13.537 | 79.46 |
| 6/27/2011 | 12:01:00 PM | 4.896 | 13.62 | 81.958 |
| 6/27/2011 | 12:02:00 PM | 4.966 | 13.538 | 80.9 |
| 6/27/2011 | 12:03:00 PM | 4.991 | 13.521 | 79.806 |
| 6/27/2011 | 12:04:00 PM | 5.038 | 13.476 | 79.618 |
| 6/27/2011 | 12:05:00 PM | 5.053 | 13.456 | 77.029 |
| 6/27/2011 | 12:06:00 PM | 5.021 | 13.496 | 77.028 |

| | | | | |
|---|---|---|---|---|
| 6/27/2011 | 12:07:00 PM | 4.998 | 13.511 | 80.191 |
| 6/27/2011 | 12:08:00 PM | 4.946 | 13.551 | 82.309 |
| 6/27/2011 | 12:09:00 PM | 4.957 | 13.553 | 83.014 |
| 6/27/2011 | 12:10:00 PM | 4.942 | 13.551 | 81.553 |
| 6/27/2011 | 12:11:00 PM | 4.944 | 13.568 | 82.051 |
| 6/27/2011 | 12:12:00 PM | 4.952 | 13.548 | 80.61 |
| | Average | 5.01 | 13.51 | 80.40 |

**ExxonMobil**
**STACK $O_2$, $CO_2$ DATA**

**Test #:** **2-THC**
**Date:** **6/27/2011**
**Time:** **1325/1425**

| | $O_2$ | $CO_2$ | CO |
|---|---|---|---|
| Range | 10 | 20 | 250 |
| Cal Gas | 5.00 | 10.16 | 142 |
| Analyzer Zero | 0.03 | -0.06 | -1.91 |
| Analyzer Span | 5.04 | 10.02 | 142.11 |
| Pre-Bias Zero | 0.05 | 0.02 | -0.13 |
| Pre-Bias Span | 4.98 | 9.74 | 143.47 |
| Post-Bias Zero | 0.04 | 0.02 | -0.11 |
| Post-Bias Span | 4.96 | 9.80 | 143.26 |
| Pre-test zero bias | 0.2% | 0.4% | 0.7% |
| Pre-test span bias | -0.5% | -1.4% | 0.5% |
| Post-test zero bias | 0.2% | 0.4% | 0.7% |
| Post-test span bias | -0.7% | -1.1% | 0.5% |
| Zero Drift | 0.0% | 0.0% | 0.0% |
| Span Drift | -0.2% | 0.3% | -0.1% |
| | PASS | PASS | PASS |
| **Average** | **5.08** | **13.53** | **76.92** |
| **Cal Corrected** | **5.11** | **14.08** | **76.25** |

**ExxonMobil**
**2-THC**

| Date | Time | O2 % | CO2 % | CO ppm |
|---|---|---|---|---|
| 6/27/2011 | 1:26:00 PM | 5.012 | 13.604 | 77.603 |
| 6/27/2011 | 1:27:00 PM | 5.069 | 13.529 | 77.781 |
| 6/27/2011 | 1:28:00 PM | 5.056 | 13.541 | 75.137 |
| 6/27/2011 | 1:29:00 PM | 4.984 | 13.6 | 76.01 |
| 6/27/2011 | 1:30:00 PM | 4.975 | 13.62 | 78.516 |
| 6/27/2011 | 1:31:00 PM | 4.944 | 13.642 | 77.484 |
| 6/27/2011 | 1:32:00 PM | 4.939 | 13.669 | 79.463 |
| 6/27/2011 | 1:33:00 PM | 4.967 | 13.622 | 79.928 |
| 6/27/2011 | 1:34:00 PM | 4.96 | 13.625 | 78.486 |
| 6/27/2011 | 1:35:00 PM | 4.991 | 13.595 | 77.206 |
| 6/27/2011 | 1:36:00 PM | 4.961 | 13.611 | 77.369 |
| 6/27/2011 | 1:37:00 PM | 4.954 | 13.642 | 76.783 |
| 6/27/2011 | 1:38:00 PM | 4.963 | 13.639 | 78.119 |
| 6/27/2011 | 1:39:00 PM | 5.006 | 13.591 | 77.745 |
| 6/27/2011 | 1:40:00 PM | 5.098 | 13.511 | 77.43 |
| 6/27/2011 | 1:41:00 PM | 5.117 | 13.473 | 75.917 |
| 6/27/2011 | 1:42:00 PM | 5.108 | 13.482 | 74.513 |
| 6/27/2011 | 1:43:00 PM | 5.088 | 13.5 | 74.971 |
| 6/27/2011 | 1:44:00 PM | 5.034 | 13.55 | 76.489 |
| 6/27/2011 | 1:45:00 PM | 4.996 | 13.575 | 78.079 |
| 6/27/2011 | 1:46:00 PM | 4.954 | 13.634 | 78.627 |
| 6/27/2011 | 1:47:00 PM | 4.987 | 13.613 | 78.776 |
| 6/27/2011 | 1:48:00 PM | 5.031 | 13.57 | 77.993 |
| 6/27/2011 | 1:49:00 PM | 5.072 | 13.537 | 76.953 |
| 6/27/2011 | 1:50:00 PM | 5.116 | 13.49 | 77.02 |
| 6/27/2011 | 1:51:00 PM | 5.103 | 13.516 | 75.881 |
| 6/27/2011 | 1:52:00 PM | 5.106 | 13.502 | 76.611 |
| 6/27/2011 | 1:53:00 PM | 5.121 | 13.476 | 76.7 |
| 6/27/2011 | 1:54:00 PM | 5.056 | 13.543 | 77.121 |
| 6/27/2011 | 1:55:00 PM | 5.087 | 13.524 | 75.85 |
| 6/27/2011 | 1:56:00 PM | 5.125 | 13.485 | 75.885 |
| 6/27/2011 | 1:57:00 PM | 5.114 | 13.483 | 76.024 |
| 6/27/2011 | 1:58:00 PM | 5.149 | 13.472 | 75.418 |
| 6/27/2011 | 1:59:00 PM | 5.119 | 13.491 | 74.753 |
| 6/27/2011 | 2:00:00 PM | 5.112 | 13.5 | 76.561 |
| 6/27/2011 | 2:01:00 PM | 5.164 | 13.445 | 76.933 |
| 6/27/2011 | 2:02:00 PM | 5.197 | 13.419 | 77.133 |
| 6/27/2011 | 2:03:00 PM | 5.17 | 13.43 | 77.074 |
| 6/27/2011 | 2:04:00 PM | 5.116 | 13.483 | 77.218 |
| 6/27/2011 | 2:05:00 PM | 5.115 | 13.481 | 75.773 |
| 6/27/2011 | 2:06:00 PM | 5.087 | 13.523 | 76.383 |
| 6/27/2011 | 2:07:00 PM | 5.036 | 13.57 | 78.528 |
| 6/27/2011 | 2:08:00 PM | 5.023 | 13.585 | 78.99 |
| 6/27/2011 | 2:09:00 PM | 5.101 | 13.507 | 78.68 |
| 6/27/2011 | 2:10:00 PM | 5.061 | 13.557 | 78.182 |
| 6/27/2011 | 2:11:00 PM | 5.098 | 13.517 | 77.824 |
| 6/27/2011 | 2:12:00 PM | 5.132 | 13.491 | 76.542 |

| | | | | |
|---|---|---|---|---|
| 6/27/2011 | 2:13:00 PM | 5.138 | 13.489 | 76.841 |
| 6/27/2011 | 2:14:00 PM | 5.137 | 13.498 | 76.494 |
| 6/27/2011 | 2:15:00 PM | 5.168 | 13.471 | 75.06 |
| 6/27/2011 | 2:16:00 PM | 5.18 | 13.466 | 74.591 |
| 6/27/2011 | 2:17:00 PM | 5.201 | 13.44 | 75.602 |
| 6/27/2011 | 2:18:00 PM | 5.159 | 13.484 | 76.139 |
| 6/27/2011 | 2:19:00 PM | 5.135 | 13.499 | 76.858 |
| 6/27/2011 | 2:20:00 PM | 5.082 | 13.55 | 76.824 |
| 6/27/2011 | 2:21:00 PM | 5.081 | 13.568 | 78.729 |
| 6/27/2011 | 2:22:00 PM | 5.135 | 13.517 | 77.347 |
| 6/27/2011 | 2:23:00 PM | 5.191 | 13.472 | 75.509 |
| 6/27/2011 | 2:24:00 PM | 5.218 | 13.445 | 74.815 |
| 6/27/2011 | 2:25:00 PM | 5.223 | 13.452 | 76.051 |
| | Average | 5.08 | 13.53 | 76.92 |

**ExxonMobil**
**STACK $O_2$, $CO_2$ DATA**

**Test #:** **3-THC**
**Date:** **6/28/2011**
**Time:** **802/902**

| | $O_2$ | $CO_2$ | CO |
|---|---|---|---|
| Range | 10 | 20 | 250 |
| Cal Gas | 5.00 | 10.16 | 142 |
| Analyzer Zero | 0.05 | 0.00 | 0.49 |
| Analyzer Span | 4.98 | 9.97 | 144.14 |
| Pre-Bias Zero | 0.04 | 0.01 | -0.11 |
| Pre-Bias Span | 4.97 | 9.91 | 143.37 |
| Post-Bias Zero | 0.04 | 0.02 | -0.16 |
| Post-Bias Span | 5.01 | 9.97 | 145.30 |
| Pre-test zero bias | -0.1% | 0.1% | -0.2% |
| Pre-test span bias | -0.2% | -0.3% | -0.3% |
| Post-test zero bias | -0.1% | 0.1% | -0.3% |
| Post-test span bias | 0.2% | 0.0% | 0.5% |
| Zero Drift | 0.0% | 0.0% | 0.0% |
| Span Drift | 0.4% | 0.3% | 0.8% |
| | PASS | PASS | PASS |
| **Average** | **4.94** | **13.88** | **74.56** |
| **Cal Corrected** | **4.96** | **14.19** | **73.42** |

**ExxonMobil**
**3-THC**

| Date | Time | O2 % | CO2 % | CO ppm |
|---|---|---|---|---|
| 6/28/2011 | 8:03:00 AM | 4.943 | 13.784 | 73.214 |
| 6/28/2011 | 8:04:00 AM | 4.985 | 13.759 | 72.848 |
| 6/28/2011 | 8:05:00 AM | 5.061 | 13.682 | 71.686 |
| 6/28/2011 | 8:06:00 AM | 5.051 | 13.669 | 71.628 |
| 6/28/2011 | 8:07:00 AM | 5.032 | 13.713 | 71.203 |
| 6/28/2011 | 8:08:00 AM | 5.044 | 13.687 | 71.194 |
| 6/28/2011 | 8:09:00 AM | 5.051 | 13.679 | 70.82 |
| 6/28/2011 | 8:10:00 AM | 5.014 | 13.698 | 72.345 |
| 6/28/2011 | 8:11:00 AM | 5.027 | 13.697 | 71.94 |
| 6/28/2011 | 8:12:00 AM | 5.043 | 13.673 | 70.624 |
| 6/28/2011 | 8:13:00 AM | 5.086 | 13.636 | 69.474 |
| 6/28/2011 | 8:14:00 AM | 5.037 | 13.665 | 68.64 |
| 6/28/2011 | 8:15:00 AM | 5.007 | 13.694 | 68.026 |
| 6/28/2011 | 8:16:00 AM | 4.946 | 13.737 | 69.047 |
| 6/28/2011 | 8:17:00 AM | 4.922 | 13.757 | 70.306 |
| 6/28/2011 | 8:18:00 AM | 4.902 | 13.767 | 69.851 |
| 6/28/2011 | 8:19:00 AM | 4.864 | 13.811 | 71.478 |
| 6/28/2011 | 8:20:00 AM | 4.815 | 13.854 | 77.851 |
| 6/28/2011 | 8:21:00 AM | 4.815 | 13.858 | 77.289 |
| 6/28/2011 | 8:22:00 AM | 4.783 | 13.891 | 75.576 |
| 6/28/2011 | 8:23:00 AM | 4.788 | 13.91 | 77.633 |
| 6/28/2011 | 8:24:00 AM | 4.834 | 13.943 | 92.726 |
| 6/28/2011 | 8:25:00 AM | 4.909 | 13.856 | 77.453 |
| 6/28/2011 | 8:26:00 AM | 4.888 | 13.875 | 72.463 |
| 6/28/2011 | 8:27:00 AM | 4.924 | 13.85 | 70.936 |
| 6/28/2011 | 8:28:00 AM | 4.902 | 13.872 | 70.943 |
| 6/28/2011 | 8:29:00 AM | 4.884 | 13.899 | 70.677 |
| 6/28/2011 | 8:30:00 AM | 4.853 | 13.965 | 73.505 |
| 6/28/2011 | 8:31:00 AM | 4.828 | 14.003 | 86.819 |
| 6/28/2011 | 8:32:00 AM | 4.864 | 14.002 | 80.64 |
| 6/28/2011 | 8:33:00 AM | 4.917 | 14.001 | 74.159 |
| 6/28/2011 | 8:34:00 AM | 4.845 | 13.879 | 71.797 |
| 6/28/2011 | 8:35:00 AM | 4.793 | 13.905 | 79.165 |
| 6/28/2011 | 8:36:00 AM | 4.847 | 13.859 | 77.178 |
| 6/28/2011 | 8:37:00 AM | 4.841 | 13.854 | 75.164 |
| 6/28/2011 | 8:38:00 AM | 4.801 | 13.841 | 77.808 |
| 6/28/2011 | 8:39:00 AM | 4.872 | 13.838 | 76.078 |
| 6/28/2011 | 8:40:00 AM | 4.898 | 13.827 | 72.616 |
| 6/28/2011 | 8:41:00 AM | 4.879 | 13.839 | 72.007 |
| 6/28/2011 | 8:42:00 AM | 4.894 | 13.846 | 71.533 |
| 6/28/2011 | 8:43:00 AM | 4.929 | 13.844 | 70.561 |
| 6/28/2011 | 8:44:00 AM | 4.914 | 13.866 | 71.005 |
| 6/28/2011 | 8:45:00 AM | 4.933 | 13.849 | 72.212 |
| 6/28/2011 | 8:46:00 AM | 4.98 | 13.805 | 69.617 |
| 6/28/2011 | 8:47:00 AM | 5.006 | 13.786 | 68.507 |
| 6/28/2011 | 8:48:00 AM | 5.02 | 13.769 | 67.854 |
| 6/28/2011 | 8:49:00 AM | 5.121 | 14.213 | 70.761 |

| | | | | |
|---|---|---|---|---|
| 6/28/2011 | 8:50:00 AM | 5.375 | 14.906 | 75.464 |
| 6/28/2011 | 8:51:00 AM | 5.586 | 15.353 | 76.963 |
| 6/28/2011 | 8:52:00 AM | 4.982 | 13.98 | 71.528 |
| 6/28/2011 | 8:53:00 AM | 4.931 | 13.84 | 70.322 |
| 6/28/2011 | 8:54:00 AM | 4.96 | 13.822 | 70.618 |
| 6/28/2011 | 8:55:00 AM | 4.929 | 13.842 | 70.884 |
| 6/28/2011 | 8:56:00 AM | 4.911 | 13.853 | 72.201 |
| 6/28/2011 | 8:57:00 AM | 4.878 | 13.904 | 101.265 |
| 6/28/2011 | 8:58:00 AM | 4.887 | 13.908 | 104.816 |
| 6/28/2011 | 8:59:00 AM | 4.898 | 13.91 | 91.678 |
| 6/28/2011 | 9:00:00 AM | 4.899 | 13.897 | 77.005 |
| 6/28/2011 | 9:01:00 AM | 4.917 | 13.871 | 72.879 |
| 6/28/2011 | 9:02:00 AM | 4.927 | 13.869 | 71.157 |
| | Average | 4.94 | 13.88 | 74.56 |

METHANE AND ETHANE
TEST DATA SUMMARY

| | | | | |
|---|---|---|---|---|
| Client/Location | ExxonMobil | | | |
| Unit | FCC 2F-7 | | | |
| Sample Location | Stack | | | |
| Test No. | 1-M/E | 2-M/E | 3-M/E | Average |
| Date | 6/27/2011 | 6/27/2011 | 6/28/2011 | |
| Start Time | 11:12:00 | 15:25:00 | 8:02:00 | |
| Stop Time | 12:12:00 | 16:25:00 | 9:02:00 | |
| Stack $O_2$ (%) | 4.99 | 5.19 | 4.96 | 5.05 |
| Stack $CO_2$ (%) | 13.84 | 14.02 | 14.19 | 14.02 |
| Stack Flow Rate[1] (dscfm) | 240,582 | 244,827 | 230,394 | 238,601 |
| Methane (ppm) | 53.96 | 61.52 | 58.67 | 58.05 |
| Methane (lb/hr) | 32.35 | 37.53 | 33.68 | 34.52 |
| Ethane (ppm) | 11.38 | 11.06 | 10.16 | 10.87 |
| Ethane (lb/hr) | 12.79 | 12.65 | 10.94 | 12.13 |

1) Stack flow from Semi-Volatiles test

**ExxonMobil**
**STACK $O_2$, $CO_2$ DATA**

**Test #:** **1-M/E**
**Date:** **6/27/2011**
**Time:** **1112/1212**

| | $O_2$ | $CO_2$ | CO |
|---|---|---|---|
| Range | 10 | 20 | 250 |
| Cal Gas | 5.00 | 10.16 | 142 |
| Analyzer Zero | 0.03 | -0.06 | -1.91 |
| Analyzer Span | 5.04 | 10.02 | 142.11 |
| Pre-Bias Zero | 0.04 | -0.03 | -2.67 |
| Pre-Bias Span | 5.09 | 10.03 | 143.88 |
| Post-Bias Zero | 0.04 | 0.02 | -0.11 |
| Post-Bias Span | 4.96 | 9.80 | 143.26 |
| Pre-test zero bias | 0.1% | 0.2% | -0.3% |
| Pre-test span bias | 0.6% | 0.0% | 0.7% |
| Post-test zero bias | 0.2% | 0.4% | 0.7% |
| Post-test span bias | -0.7% | -1.1% | 0.5% |
| Zero Drift | 0.0% | 0.2% | 1.0% |
| Span Drift | -1.3% | -1.2% | -0.2% |
| | PASS | PASS | PASS |
| **Average** | **5.01** | **13.51** | **80.40** |
| **Cal Corrected** | **4.99** | **13.84** | **80.12** |

**ExxonMobil**
**1-M/E**

| Date | Time | O2 % | CO2 % | CO ppm |
|---|---|---|---|---|
| 6/27/2011 | 11:13:00 AM | 5.126 | 13.434 | 79.691 |
| 6/27/2011 | 11:14:00 AM | 5.072 | 13.462 | 79.439 |
| 6/27/2011 | 11:15:00 AM | 5.013 | 13.538 | 80.282 |
| 6/27/2011 | 11:16:00 AM | 5.053 | 13.475 | 78.979 |
| 6/27/2011 | 11:17:00 AM | 5.019 | 13.515 | 80.76 |
| 6/27/2011 | 11:18:00 AM | 5.058 | 13.481 | 81.481 |
| 6/27/2011 | 11:19:00 AM | 5.028 | 13.497 | 82.722 |
| 6/27/2011 | 11:20:00 AM | 5.035 | 13.49 | 81.063 |
| 6/27/2011 | 11:21:00 AM | 5.056 | 13.476 | 78.766 |
| 6/27/2011 | 11:22:00 AM | 5.028 | 13.49 | 78.789 |
| 6/27/2011 | 11:23:00 AM | 4.994 | 13.546 | 80.7 |
| 6/27/2011 | 11:24:00 AM | 4.947 | 13.56 | 80.992 |
| 6/27/2011 | 11:25:00 AM | 4.944 | 13.585 | 80.926 |
| 6/27/2011 | 11:26:00 AM | 4.949 | 13.568 | 82.85 |
| 6/27/2011 | 11:27:00 AM | 5.015 | 13.52 | 82.324 |
| 6/27/2011 | 11:28:00 AM | 4.993 | 13.537 | 79.551 |
| 6/27/2011 | 11:29:00 AM | 5.024 | 13.502 | 79.61 |
| 6/27/2011 | 11:30:00 AM | 5.013 | 13.511 | 78.638 |
| 6/27/2011 | 11:31:00 AM | 4.983 | 13.554 | 79.955 |
| 6/27/2011 | 11:32:00 AM | 4.977 | 13.558 | 81.84 |
| 6/27/2011 | 11:33:00 AM | 5.027 | 13.516 | 82.356 |
| 6/27/2011 | 11:34:00 AM | 5.075 | 13.475 | 79.246 |
| 6/27/2011 | 11:35:00 AM | 5.08 | 13.452 | 79.572 |
| 6/27/2011 | 11:36:00 AM | 5.025 | 13.504 | 80.158 |
| 6/27/2011 | 11:37:00 AM | 5.047 | 13.481 | 80.378 |
| 6/27/2011 | 11:38:00 AM | 5.012 | 13.5 | 80.198 |
| 6/27/2011 | 11:39:00 AM | 4.958 | 13.558 | 81.733 |
| 6/27/2011 | 11:40:00 AM | 4.909 | 13.605 | 82.36 |
| 6/27/2011 | 11:41:00 AM | 4.983 | 13.547 | 81.238 |
| 6/27/2011 | 11:42:00 AM | 5.039 | 13.498 | 80.206 |
| 6/27/2011 | 11:43:00 AM | 5.058 | 13.476 | 80.337 |
| 6/27/2011 | 11:44:00 AM | 5.049 | 13.493 | 78.74 |
| 6/27/2011 | 11:45:00 AM | 5.087 | 13.463 | 79.023 |
| 6/27/2011 | 11:46:00 AM | 5.055 | 13.48 | 78.749 |
| 6/27/2011 | 11:47:00 AM | 4.994 | 13.542 | 80.506 |
| 6/27/2011 | 11:55:00 AM | 5.005 | 13.47 | 86.293 |
| 6/27/2011 | 11:56:00 AM | 5.085 | 13.436 | 79.214 |
| 6/27/2011 | 11:57:00 AM | 5.081 | 13.435 | 78.596 |
| 6/27/2011 | 11:58:00 AM | 5.094 | 13.429 | 78.407 |
| 6/27/2011 | 11:59:00 AM | 5 | 13.496 | 79.11 |
| 6/27/2011 | 12:00:00 PM | 4.979 | 13.537 | 79.46 |
| 6/27/2011 | 12:01:00 PM | 4.896 | 13.62 | 81.958 |
| 6/27/2011 | 12:02:00 PM | 4.966 | 13.538 | 80.9 |
| 6/27/2011 | 12:03:00 PM | 4.991 | 13.521 | 79.806 |
| 6/27/2011 | 12:04:00 PM | 5.038 | 13.476 | 79.618 |
| 6/27/2011 | 12:05:00 PM | 5.053 | 13.456 | 77.029 |
| 6/27/2011 | 12:06:00 PM | 5.021 | 13.496 | 77.028 |

| | | | | |
|---|---|---|---|---|
| 6/27/2011 | 12:07:00 PM | 4.998 | 13.511 | 80.191 |
| 6/27/2011 | 12:08:00 PM | 4.946 | 13.551 | 82.309 |
| 6/27/2011 | 12:09:00 PM | 4.957 | 13.553 | 83.014 |
| 6/27/2011 | 12:10:00 PM | 4.942 | 13.551 | 81.553 |
| 6/27/2011 | 12:11:00 PM | 4.944 | 13.568 | 82.051 |
| 6/27/2011 | 12:12:00 PM | 4.952 | 13.548 | 80.61 |
| | Average | 5.01 | 13.51 | 80.40 |

**ExxonMobil**
**STACK $O_2$, $CO_2$ DATA**

**Test #:** **2-M/E**
**Date:** **6/27/2011**
**Time:** **1525/1625**

| | $O_2$ | $CO_2$ | CO |
|---|---|---|---|
| Range | 10 | 20 | 250 |
| Cal Gas | 5.00 | 10.16 | 142 |
| Analyzer Zero | 0.03 | -0.06 | -1.91 |
| Analyzer Span | 5.04 | 10.02 | 142.11 |
| Pre-Bias Zero | 0.04 | 0.02 | -0.11 |
| Pre-Bias Span | 4.96 | 9.80 | 143.26 |
| Post-Bias Zero | 0.05 | 0.02 | -0.07 |
| Post-Bias Span | 4.97 | 9.72 | 142.88 |
| Pre-test zero bias | 0.2% | 0.4% | 0.7% |
| Pre-test span bias | -0.7% | -1.1% | 0.5% |
| Post-test zero bias | 0.2% | 0.4% | 0.7% |
| Post-test span bias | -0.7% | -1.5% | 0.3% |
| Zero Drift | 0.1% | 0.0% | 0.0% |
| Span Drift | 0.0% | -0.4% | -0.2% |
| | PASS | PASS | PASS |
| **Average** | **5.15** | **13.46** | **78.10** |
| **Cal Corrected** | **5.19** | **14.02** | **77.56** |

**ExxonMobil**
**2-M/E**

| Date | Time | O2 % | CO2 % | CO ppm |
|---|---|---|---|---|
| 6/27/2011 | 3:30:00 PM | 5.157 | 13.476 | 65.815 |
| 6/27/2011 | 3:31:00 PM | 5.228 | 13.396 | 78.163 |
| 6/27/2011 | 3:32:00 PM | 5.256 | 13.369 | 77.637 |
| 6/27/2011 | 3:33:00 PM | 5.238 | 13.377 | 77.783 |
| 6/27/2011 | 3:34:00 PM | 5.176 | 13.431 | 77.429 |
| 6/27/2011 | 3:35:00 PM | 5.173 | 13.452 | 76.627 |
| 6/27/2011 | 3:36:00 PM | 5.182 | 13.439 | 78.152 |
| 6/27/2011 | 3:37:00 PM | 5.146 | 13.47 | 79.583 |
| 6/27/2011 | 3:38:00 PM | 5.093 | 13.517 | 78.587 |
| 6/27/2011 | 3:39:00 PM | 5.135 | 13.475 | 78.02 |
| 6/27/2011 | 3:40:00 PM | 5.201 | 13.4 | 77.273 |
| 6/27/2011 | 3:41:00 PM | 5.13 | 13.474 | 77.941 |
| 6/27/2011 | 3:42:00 PM | 5.123 | 13.483 | 78.017 |
| 6/27/2011 | 3:43:00 PM | 5.141 | 13.482 | 77.388 |
| 6/27/2011 | 3:44:00 PM | 5.139 | 13.478 | 78.406 |
| 6/27/2011 | 3:45:00 PM | 5.16 | 13.467 | 79.273 |
| 6/27/2011 | 3:46:00 PM | 5.15 | 13.463 | 78.891 |
| 6/27/2011 | 3:47:00 PM | 5.199 | 13.443 | 78.199 |
| 6/27/2011 | 3:48:00 PM | 5.174 | 13.438 | 78.401 |
| 6/27/2011 | 3:49:00 PM | 5.176 | 13.453 | 78.873 |
| 6/27/2011 | 3:50:00 PM | 5.196 | 13.426 | 78.484 |
| 6/27/2011 | 3:51:00 PM | 5.065 | 13.54 | 78.85 |
| 6/27/2011 | 3:52:00 PM | 5.059 | 13.544 | 80.439 |
| 6/27/2011 | 3:53:00 PM | 5.081 | 13.521 | 81.339 |
| 6/27/2011 | 3:54:00 PM | 5.093 | 13.527 | 80.24 |
| 6/27/2011 | 3:55:00 PM | 5.157 | 13.483 | 78.811 |
| 6/27/2011 | 3:56:00 PM | 5.195 | 13.421 | 77.646 |
| 6/27/2011 | 3:57:00 PM | 5.143 | 13.479 | 78.81 |
| 6/27/2011 | 3:58:00 PM | 5.127 | 13.5 | 79.521 |
| 6/27/2011 | 3:59:00 PM | 5.134 | 13.501 | 82.123 |
| 6/27/2011 | 4:00:00 PM | 5.181 | 13.448 | 80.682 |
| 6/27/2011 | 4:01:00 PM | 5.176 | 13.464 | 79.979 |
| 6/27/2011 | 4:02:00 PM | 5.19 | 13.432 | 80.328 |
| 6/27/2011 | 4:03:00 PM | 5.183 | 13.429 | 79.036 |
| 6/27/2011 | 4:04:00 PM | 5.199 | 13.422 | 77.141 |
| 6/27/2011 | 4:05:00 PM | 5.195 | 13.418 | 78.202 |
| 6/27/2011 | 4:06:00 PM | 5.133 | 13.489 | 79.455 |
| 6/27/2011 | 4:07:00 PM | 5.155 | 13.464 | 79.804 |
| 6/27/2011 | 4:08:00 PM | 5.152 | 13.473 | 80.759 |
| 6/27/2011 | 4:09:00 PM | 5.14 | 13.474 | 80.837 |
| 6/27/2011 | 4:10:00 PM | 5.117 | 13.501 | 79.605 |
| 6/27/2011 | 4:11:00 PM | 5.135 | 13.511 | 80.181 |
| 6/27/2011 | 4:12:00 PM | 5.157 | 13.473 | 79.605 |
| 6/27/2011 | 4:13:00 PM | 5.142 | 13.496 | 77.389 |
| 6/27/2011 | 4:14:00 PM | 5.182 | 13.438 | 77.634 |
| 6/27/2011 | 4:15:00 PM | 5.157 | 13.448 | 75.283 |
| 6/27/2011 | 4:16:00 PM | 5.135 | 13.471 | 75.264 |

| | | | | |
|---|---|---|---|---|
| 6/27/2011 | 4:17:00 PM | 5.126 | 13.483 | 76.345 |
| 6/27/2011 | 4:18:00 PM | 5.121 | 13.501 | 78.195 |
| 6/27/2011 | 4:19:00 PM | 5.138 | 13.468 | 78.079 |
| 6/27/2011 | 4:20:00 PM | 5.109 | 13.503 | 77.019 |
| 6/27/2011 | 4:21:00 PM | 5.16 | 13.464 | 76.109 |
| 6/27/2011 | 4:22:00 PM | 5.157 | 13.441 | 75.368 |
| 6/27/2011 | 4:23:00 PM | 5.148 | 13.461 | 74.939 |
| 6/27/2011 | 4:24:00 PM | 5.165 | 13.445 | 75.175 |
| 6/27/2011 | 4:25:00 PM | 5.131 | 13.451 | 74.572 |
| | Average | 5.15 | 13.46 | 78.10 |

**ExxonMobil**
**STACK $O_2$, $CO_2$ DATA**

**Test #:** **3-M/E**
**Date:** **6/28/2011**
**Time:** **802/902**

| | $O_2$ | $CO_2$ | CO |
|---|---|---|---|
| Range | 10 | 20 | 250 |
| Cal Gas | 5.00 | 10.16 | 142 |
| Analyzer Zero | 0.05 | 0.00 | 0.49 |
| Analyzer Span | 4.98 | 9.97 | 144.14 |
| Pre-Bias Zero | 0.04 | 0.01 | -0.11 |
| Pre-Bias Span | 4.97 | 9.91 | 143.37 |
| Post-Bias Zero | 0.04 | 0.02 | -0.16 |
| Post-Bias Span | 5.01 | 9.97 | 145.30 |
| Pre-test zero bias | -0.1% | 0.1% | -0.2% |
| Pre-test span bias | -0.2% | -0.3% | -0.3% |
| Post-test zero bias | -0.1% | 0.1% | -0.3% |
| Post-test span bias | 0.2% | 0.0% | 0.5% |
| Zero Drift | 0.0% | 0.0% | 0.0% |
| Span Drift | 0.4% | 0.3% | 0.8% |
| | PASS | PASS | PASS |
| **Average** | **4.94** | **13.88** | **74.56** |
| **Cal Corrected** | **4.96** | **14.19** | **73.42** |

**ExxonMobil**
**3-M/E**

| Date | Time | O2 % | CO2 % | CO ppm |
|---|---|---|---|---|
| 6/28/2011 | 8:03:00 AM | 4.943 | 13.784 | 73.214 |
| 6/28/2011 | 8:04:00 AM | 4.985 | 13.759 | 72.848 |
| 6/28/2011 | 8:05:00 AM | 5.061 | 13.682 | 71.686 |
| 6/28/2011 | 8:06:00 AM | 5.051 | 13.669 | 71.628 |
| 6/28/2011 | 8:07:00 AM | 5.032 | 13.713 | 71.203 |
| 6/28/2011 | 8:08:00 AM | 5.044 | 13.687 | 71.194 |
| 6/28/2011 | 8:09:00 AM | 5.051 | 13.679 | 70.82 |
| 6/28/2011 | 8:10:00 AM | 5.014 | 13.698 | 72.345 |
| 6/28/2011 | 8:11:00 AM | 5.027 | 13.697 | 71.94 |
| 6/28/2011 | 8:12:00 AM | 5.043 | 13.673 | 70.624 |
| 6/28/2011 | 8:13:00 AM | 5.086 | 13.636 | 69.474 |
| 6/28/2011 | 8:14:00 AM | 5.037 | 13.665 | 68.64 |
| 6/28/2011 | 8:15:00 AM | 5.007 | 13.694 | 68.026 |
| 6/28/2011 | 8:16:00 AM | 4.946 | 13.737 | 69.047 |
| 6/28/2011 | 8:17:00 AM | 4.922 | 13.757 | 70.306 |
| 6/28/2011 | 8:18:00 AM | 4.902 | 13.767 | 69.851 |
| 6/28/2011 | 8:19:00 AM | 4.864 | 13.811 | 71.478 |
| 6/28/2011 | 8:20:00 AM | 4.815 | 13.854 | 77.851 |
| 6/28/2011 | 8:21:00 AM | 4.815 | 13.858 | 77.289 |
| 6/28/2011 | 8:22:00 AM | 4.783 | 13.891 | 75.576 |
| 6/28/2011 | 8:23:00 AM | 4.788 | 13.91 | 77.633 |
| 6/28/2011 | 8:24:00 AM | 4.834 | 13.943 | 92.726 |
| 6/28/2011 | 8:25:00 AM | 4.909 | 13.856 | 77.453 |
| 6/28/2011 | 8:26:00 AM | 4.888 | 13.875 | 72.463 |
| 6/28/2011 | 8:27:00 AM | 4.924 | 13.85 | 70.936 |
| 6/28/2011 | 8:28:00 AM | 4.902 | 13.872 | 70.943 |
| 6/28/2011 | 8:29:00 AM | 4.884 | 13.899 | 70.677 |
| 6/28/2011 | 8:30:00 AM | 4.853 | 13.965 | 73.505 |
| 6/28/2011 | 8:31:00 AM | 4.828 | 14.003 | 86.819 |
| 6/28/2011 | 8:32:00 AM | 4.864 | 14.002 | 80.64 |
| 6/28/2011 | 8:33:00 AM | 4.917 | 14.001 | 74.159 |
| 6/28/2011 | 8:34:00 AM | 4.845 | 13.879 | 71.797 |
| 6/28/2011 | 8:35:00 AM | 4.793 | 13.905 | 79.165 |
| 6/28/2011 | 8:36:00 AM | 4.847 | 13.859 | 77.178 |
| 6/28/2011 | 8:37:00 AM | 4.841 | 13.854 | 75.164 |
| 6/28/2011 | 8:38:00 AM | 4.801 | 13.841 | 77.808 |
| 6/28/2011 | 8:39:00 AM | 4.872 | 13.838 | 76.078 |
| 6/28/2011 | 8:40:00 AM | 4.898 | 13.827 | 72.616 |
| 6/28/2011 | 8:41:00 AM | 4.879 | 13.839 | 72.007 |
| 6/28/2011 | 8:42:00 AM | 4.894 | 13.846 | 71.533 |
| 6/28/2011 | 8:43:00 AM | 4.929 | 13.844 | 70.561 |
| 6/28/2011 | 8:44:00 AM | 4.914 | 13.866 | 71.005 |
| 6/28/2011 | 8:45:00 AM | 4.933 | 13.849 | 72.212 |
| 6/28/2011 | 8:46:00 AM | 4.98 | 13.805 | 69.617 |
| 6/28/2011 | 8:47:00 AM | 5.006 | 13.786 | 68.507 |
| 6/28/2011 | 8:48:00 AM | 5.02 | 13.769 | 67.854 |
| 6/28/2011 | 8:49:00 AM | 5.121 | 14.213 | 70.761 |

| | | | | |
|---|---|---|---|---|
| 6/28/2011 | 8:50:00 AM | 5.375 | 14.906 | 75.464 |
| 6/28/2011 | 8:51:00 AM | 5.586 | 15.353 | 76.963 |
| 6/28/2011 | 8:52:00 AM | 4.982 | 13.98 | 71.528 |
| 6/28/2011 | 8:53:00 AM | 4.931 | 13.84 | 70.322 |
| 6/28/2011 | 8:54:00 AM | 4.96 | 13.822 | 70.618 |
| 6/28/2011 | 8:55:00 AM | 4.929 | 13.842 | 70.884 |
| 6/28/2011 | 8:56:00 AM | 4.911 | 13.853 | 72.201 |
| 6/28/2011 | 8:57:00 AM | 4.878 | 13.904 | 101.265 |
| 6/28/2011 | 8:58:00 AM | 4.887 | 13.908 | 104.816 |
| 6/28/2011 | 8:59:00 AM | 4.898 | 13.91 | 91.678 |
| 6/28/2011 | 9:00:00 AM | 4.899 | 13.897 | 77.005 |
| 6/28/2011 | 9:01:00 AM | 4.917 | 13.871 | 72.879 |
| 6/28/2011 | 9:02:00 AM | 4.927 | 13.869 | 71.157 |
| | Average | 4.94 | 13.88 | 74.56 |

AtmAA Inc.
23917 Craftsman Rd., Calabasas, CA 91302 • (818) 223-3277 • FAX (818) 223-8250
environmental consultants
laboratory services

July 5, 2011 LTR/116n/11

Ali Aleshaiker
Delta Air Quality
1845 North Case Street
Orange, CA 92865-4234

re: ICR

Dear Ali:

Please find enclosed the laboratory analysis report and the original chain of custody form for three Tedlar bag samples received June 29, 2011.

The bag samples were analyzed for C1 and C2 hydrocarbons by FID/GC.

Also enclosed is a data package for the analysis work performed.

Sincerely,

AtmAA, Inc.

Michael L. Porter
Laboratory Director

Encl.
MLP/krm

AtmAA Inc.
23917 Craftsman Rd., Calabasas, CA 91302 • (818) 223-3277 • FAX (818) 223-8250
environmental consultants
laboratory services

## LABORATORY ANALYSIS REPORT

Speciated Hydrocarbons Analysis in Tedlar Bag Samples

Report Date: July 1, 2011
Client: Delta Air Quality
Site: ICR
Location: FCC
Sample Location: 2F-7 Stack

Date Received: June 29, 2011
Date Analyzed: June 29, 2011

ANALYSIS DESCRIPTION

*Hydrocarbon Speciation analysis was performed by flame ionization detection/gas chromatography (FID/GC), modified EPA-18.*

| AtmAA Lab No.: | 11801-1 | (repeat) | 11801-2 | 11801-3 |
|---|---|---|---|---|
| Sample ID: | 1-C1,C2 | 1-C1,C2 | 2-C1,C2 | 3-C1,C2 |
| | (Concentration in ppmv, component ) | | | |
| Methane | 53.96 | 53.49 | 61.52 | 58.67 |
| Ethene | 13.92 | 13.69 | 13.06 | 13.26 |
| Acetylene | 0.79 | 0.72 | 0.59 | 0.65 |
| Ethane | 11.38 | 11.35 | 11.06 | 10.16 |

*Michael L. Porter*
*Laboratory Director*

## CHAIN OF CUSTODY

CLIENT: ICR

TEST DATE(S): 06/27/11 06/28/11

LOCATION: FCC

SAMPLER(S): DW/SS

SAMPLE LOCATION: 2F-7 Stack

PROJECT MANAGER: Aleshaiker

TEST METHOD(S): EPA 18

DATE DUE: 07/11/11

OUTSIDE LAB REQUIRED?: ATMAA

COMPLIANCE TEST? Yes

| DATE | TIME | TEST # | SAMPLE DESCRIPTION | CONTAINERS | SAMPLER | COMMENTS |
|---|---|---|---|---|---|---|
| 06/27/11 | 1112/1212 | 1-Methane/Ethane | 5 l Tedlar Bag, stack gas | 1 | DW/SS | 11801-1 |
| 06/27/11 | 1525/1625 | 2-Methane/Ethane | 5 l Tedlar Bag, stack gas | 1 | DW/SS | -2 |
| 06/28/11 | 802/902 | 3-Methane/Ethane | 5 l Tedlar Bag, stack gas | 1 | DW/SS | -3 |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |

| RELEASED BY | DATE/TIME | RECEIVED BY | DATE/TIME |
|---|---|---|---|
| | 6/28/11 1600 | | 6/28/11 1930 |
| | 6/29/11 8:50 | | 6/29/11 8:50 |
| | | | |
| | | | |

ANALYSIS REQUIRED: Methane and Ethane

Delta Air Quality Services, Incorporated

Date: July 5, 2011

AtmAA, Inc.

Laboratory Analysis Data Package

Client: Delta Air Quality
Project Name: ICR
Location: FCC / 2F-7 Stack

CHROMATOGRAMS:
HC speciation by FID/GC
for C1 & C2's

6/29/2011 SHIM avg of 3

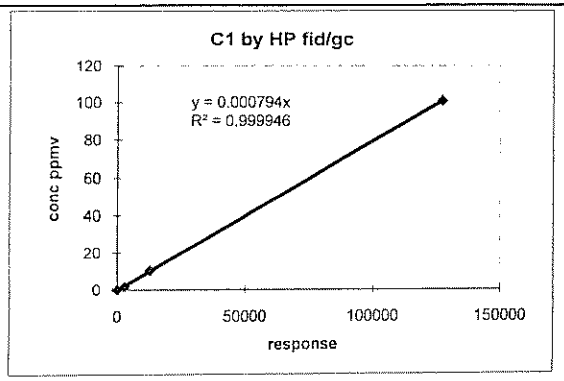
| | | | mw |
|---|---|---|---|
| beginning | 3-point 6/17/11 | c1 | 16 |
| end | 3-point 6/24/11 | c2 | 30 |
| | | c3 | 44 |
| | | c4 | 58 |
| | std check 6-29-11 | c5 | 72 |
| | | c6 | 86 |
| | | c7 | 100 |
| | | c8 | 114 |
| | | c9 | 128 |
| | | c10 | 142 |
| | before after | c11 | 156 |
| | | c12 | 170 |
| | 6/17/2011 6/24/2011 | c13 | 184 |

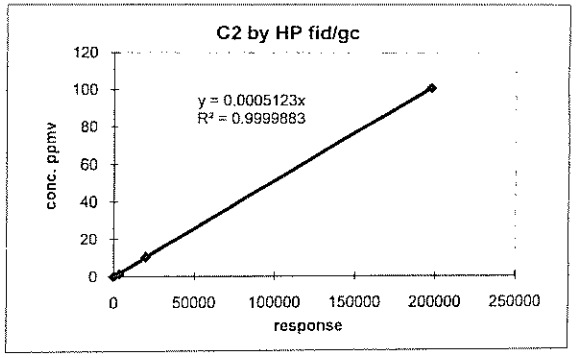
| rf | | l1 | l2 | 1 | 2 | amt | avg |
|---|---|---|---|---|---|---|---|
| 0.0005993 | C1 | 3730 | 2144 | 2.24 | 1.28 | 1.76 | 2937 |
| 0.0004383 | c2 | 3368 | 3157 | 1.48 | 1.38 | 1.43 | 3262.5 |
| 0.0003606 | c3 | 4518 | 4634 | 1.63 | 1.67 | 1.65 | 4576 |
| 0.0002934 | c4 | 5214 | 5352 | 1.53 | 1.57 | 1.55 | 5283 |
| 0.0002662 | c5 | 5807 | 5912 | 1.55 | 1.57 | 1.56 | 5859.5 |
| 0.0002402 | c6 | 6358 | 6715 | 1.53 | 1.61 | 1.57 | 6536.5 |

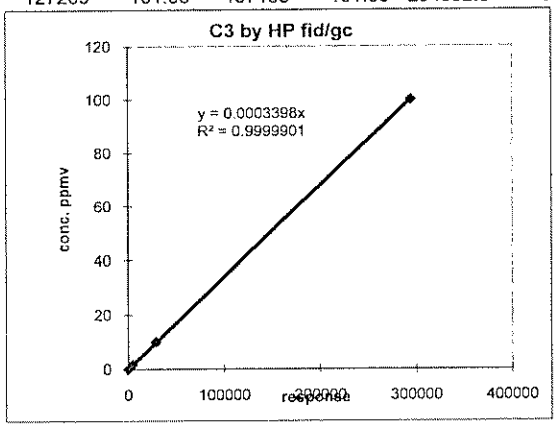
| rf | | m1 | m2 | 1 | 2 | amt | avg |
|---|---|---|---|---|---|---|---|
| 0.0008123 | C1 | 13452 | 12129 | 10.93 | 9.85 | 10.4 | 12790.5 |
| 0.0005203 | c2 | 19775 | 19741 | 10.29 | 10.27 | 10.3 | 19758 |
| 0.0003482 | c3 | 28974 | 28805 | 10.09 | 10.03 | 10.1 | 28889.5 |
| 0.0002978 | c4 | 33239 | 33238 | 9.90 | 9.90 | 9.90 | 33238.5 |
| 0.0002696 | c5 | 37593 | 37267 | 10.13 | 10.05 | 10.1 | 37430 |
| 0.0002397 | c6 | 42220 | 41631 | 10.12 | 9.98 | 10.1 | 41925.5 |

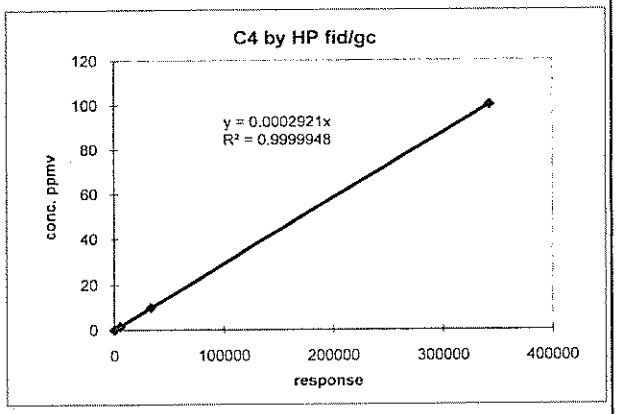
| rf | | h1 | h2 | 1 | 2 | amt | avg |
|---|---|---|---|---|---|---|---|
| 0.000794 | c1 | 132152 | 122266 | 104.9 | 97.1 | 101 | 127209 |
| 0.0005123 | c2 | 197648 | 196668 | 101.3 | 100.7 | 101 | 197158 |
| 0.0003397 | c3 | 295033 | 293752 | 100.2 | 99.8 | 100 | 294392.5 |
| 0.0002921 | c4 | 343634 | 341121 | 100.4 | 99.6 | 100 | 342377.5 |
| 0.000264 | c5 | 388743 | 384098 | 102.6 | 101.4 | 102 | 386420.5 |
| 0.000232 | c6 | 441914 | 437527 | 102.5 | 101.5 | 102 | 439720.5 |

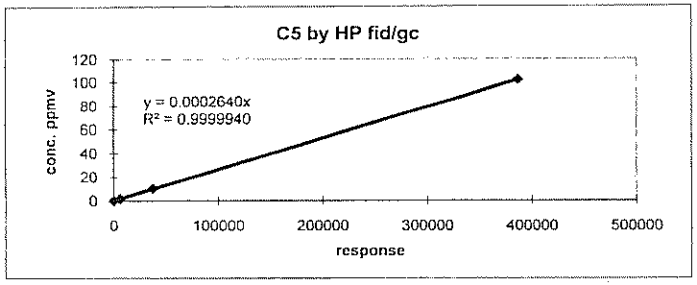
| c1 | | c2 | | c3 | | c4 | | c5 | | c6 | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2937 | 1.76 | 3262.5 | 1.43 | 4576 | 1.65 | 5283 | 1.55 | 5859.5 | 1.56 | 6536.5 | 1.57 |
| 12790.5 | 10.39 | 19758 | 10.28 | 28889.5 | 10.06 | 33238.5 | 9.90 | 37430 | 10.09 | 41925.5 | 10.05 |
| 127209 | 101.00 | 197158 | 101.00 | 294392.5 | 100.00 | 342377.5 | 100.00 | 386420.5 | 102.00 | 439720.5 | 102.00 |

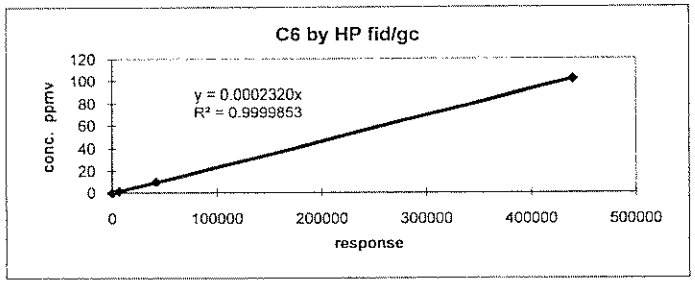



C.5-16

| samples | rf | mw | 6/29/11 std check area hi std | med std | low std | measured hi std conc | measured med std | measured low std | calc label hi std | calc label med std | calc label low std | %R hi std | med std | low std |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| c1 | 0.0007970 | | 122266 | 12129 | 2144 | 97.4 | 9.7 | 1.71 | 101.0 | 10.39 | 1.76 | 96.5 | 93.0 | 97.1 |
| c2 | 0.0005121 | | 196668 | 19741 | 3157 | 100.7 | 10.1 | 1.62 | 101.0 | 10.28 | 1.43 | 99.7 | 98.3 | 113.1 |
| c3 | 0.0003388 | | 293752 | 28805 | 4634 | 99.5 | 9.8 | 1.57 | 100.0 | 10.06 | 1.65 | 99.5 | 97.0 | 95.2 |
| c4 | 0.0002906 | | 341121 | 33238 | 5352 | 99.1 | 9.7 | 1.56 | 100.0 | 9.90 | 1.55 | 99.1 | 97.6 | 100.3 |
| c5 | 0.0002621 | 72 | 384098 | 37267 | 5912 | 100.7 | 9.8 | 1.55 | 102.0 | 10.09 | 1.56 | 98.7 | 96.8 | 99.3 |
| c6 | 0.0002297 | 86 | 437527 | 41631 | 6715 | 100.5 | 9.6 | 1.54 | 102.0 | 10.05 | 1.57 | 98.5 | 95.2 | 98.2 |
| c7 | 0.0001975 | 100 | | | | | | | | | | | | |
| c8 | 0.0001733 | 114 | | ethene | acetylene | | | | | | | | | |
| c9 | 0.0001543 | 128 | | rf | rf | | | | | | | | | |
| c10 | 0.0001391 | 142 | | 0.000478 | 0.000444 | | | | | | | | | |
| c11 | 0.0001266 | 156 | | | | | | | | | | | | |
| c12 | 0.0001162 | 170 | | | | | | | | | | | | |
| c13 | 0.0001074 | 184 | | | | | | | | | | | | |

| lab # | P2/P1 | area c1 | area c=c | area c2 | area c3 | area c4 | area c5 | area c6 | area c7 | ppmv as component ppm c1 | ppm c=c | ppm c2 | ppm c3 | ppm c4 | ppm c5 | ppm c6 | ppm c7 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 11801-1 | 1.00 | 67704 | 29125 | 22220 | | | | | | 53.96 | 13.921 | 11.379 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| | 1.00 | 67114 | 28646 | 22167 | | | | | | 53.49 | 13.692 | 11.352 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| 11801-2 | 1.00 | 77191 | 27335 | 21598 | | | | | | 61.52 | 13.065 | 11.060 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| 11801-3 | 1.00 | 73617 | 27733 | 19847 | | | | | | 58.67 | 13.255 | 10.164 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| | 1.00 | | | | | | | | | 0.00 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| | 1.00 | | | | | | | | | 0.00 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| | 1.00 | | | | | | | | | 0.00 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| | | | | | | | | | | 0.00 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |

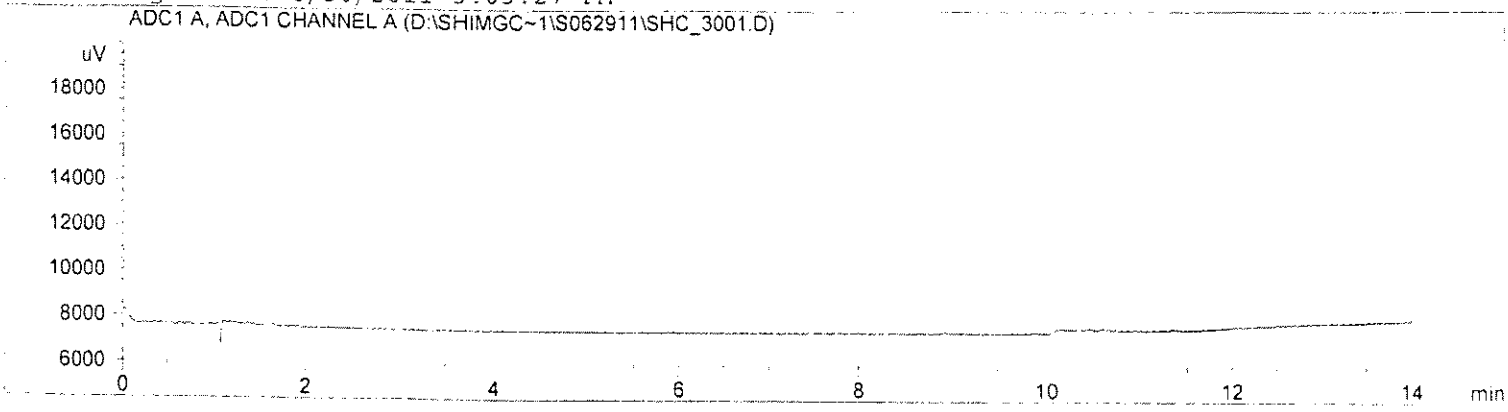
| | c8 | c9 | c10 | c11 | c12 | c13 | acetylene | c8 | c9 | c10 | c11 | c12 | c13 | acetylene |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1.00 | | | | | | | 1772 | 0.00 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.786 |
| 1.00 | | | | | | | 1632 | 0.00 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.724 |
| 1.00 | | | | | | | 1338 | 0.00 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.594 |
| 1.00 | | | | | | | 1469 | 0.00 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.652 |
| 1.00 | | | | | | | | 0.00 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| 1.00 | | | | | | | | 0.00 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| 1.00 | | | | | | | | 0.00 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| | | | | | | | | 0.00 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | |

| | rf | min area | limit, ppm | | min area | limit, ppm |
|---|---|---|---|---|---|---|
| c1 | 0.000797 | 100 | 0.080 | <0.15 | 50 | 0.04 |
| c2 | 0.0005121 | 100 | 0.051 | <0.07 | 50 | 0.03 |
| c3 | 0.0003388 | 100 | 0.034 | <0.05 | 50 | 0.02 |
| c4 | 0.0002906 | 100 | 0.029 | <0.04 | 50 | 0.01 |
| c5 | 0.0002621 | 100 | 0.026 | <0.04 | 50 | 0.01 |
| c6 | 0.0002297 | 100 | 0.023 | <0.03 | 50 | 0.01 |
| >c6 | 0.0002176 | 100 | 0.022 | <0.03 | 50 | 0.01 |

C.5-17

N2
C-5-18

```
==================================================================
Injection Date  : 6/29/2011 11:46:22 AM
Sample Name     :                                Location : Vial 1
Acq. Operator   : mp
Acq. Instrument : shimadzu_gc                  Inj Volume : Manually
Acq. Method     : E:\GCCHEM2\3\METHODS\SHIM09HC.M
Last changed    : 6/17/2011 10:47:07 AM by mp
                  (modified after loading)
Analysis Method : C:\HPCHEM\1\METHODS\SHIMHC.M
Last changed    : 6/30/2011 3:03:27 PM
```

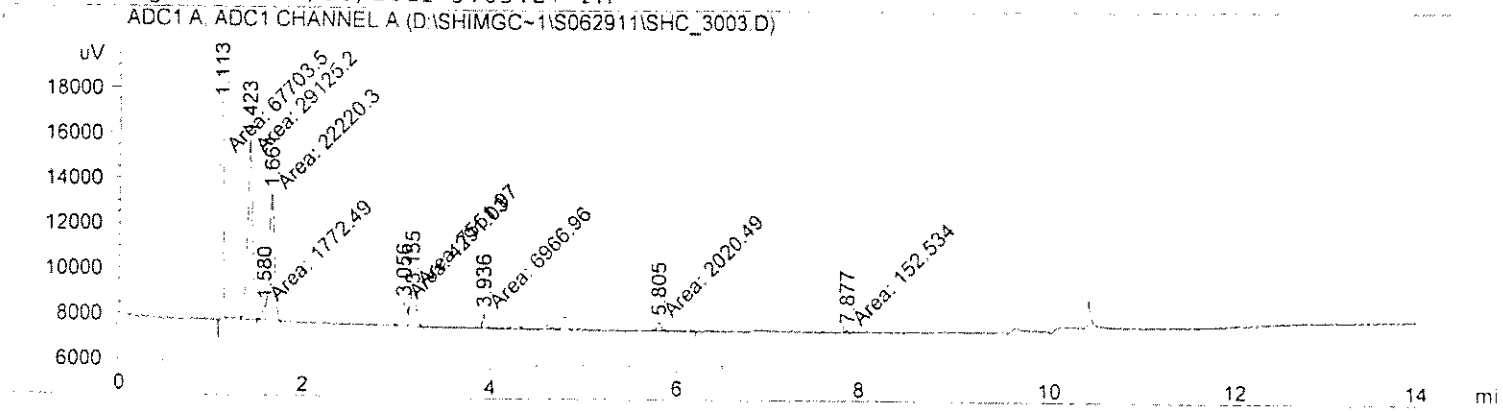



```
==================================================================
                        Area Percent Report
==================================================================

Sorted By             :      Signal
Multiplier            :      1.0000
Dilution              :      1.0000
Use Multiplier & Dilution Factor with ISTDs

No peaks found

==================================================================
                      *** End of Report ***
```

Data File D:\SHIMGC~1\S062911\SHC_3003.D

11801-1
C.5-19

```
==================================================================
Injection Date  : 6/29/2011 12:31:30 PM
Sample Name     :                                  Location : Vial 1
Acq. Operator   : mp
Acq. Instrument : shimadzu_gc                   Inj Volume : Manually
Acq. Method     : E:\GCCHEM2\3\METHODS\SHIM09HC.M
Last changed    : 6/17/2011 10:47:07 AM by mp
                  (modified after loading)
Analysis Method : C:\HPCHEM\1\METHODS\SHIMHC.M
Last changed    : 6/30/2011 3:03:27 PM
```




```
==================================================================
                        Area Percent Report
==================================================================

Sorted By             :      Signal
Multiplier            :      1.0000
Dilution              :      1.0000
Use Multiplier & Dilution Factor with ISTDs


Signal 1: ADC1 A, ADC1 CHANNEL A
```

| Peak # | RetTime [min] | Type | Width [min] | Area [uV*s] | Height [uV] | Area % |
|---|---|---|---|---|---|---|
| 1 | 1.113 | MM | 0.0233 | 6.77035e4 | 4.84365e4 | 47.74426 |
| 2 | 1.423 | MM | 0.0609 | 2.91252e4 | 7968.13379 | 20.53899 |
| 3 | 1.580 | MF | 0.0457 | 1772.49207 | 645.91449 | 1.24995 |
| 4 | 1.661 | FM | 0.0661 | 2.22203e4 | 5604.22363 | 15.66968 |
| 5 | 3.056 | MF | 0.0688 | 4291.02539 | 1038.91638 | 3.02601 |
| 6 | 3.155 | FM | 0.0777 | 7551.97217 | 1619.78821 | 5.32562 |
| 7 | 3.936 | MM | 0.1756 | 6966.96191 | 661.30865 | 4.91307 |
| 8 | 5.805 | MM | 0.0835 | 2020.49023 | 403.27356 | 1.42484 |
| 9 | 7.877 | MM | 0.0254 | 152.53366 | 100.22296 | 0.10757 |

Totals : 1.41805e5 6.64783e4

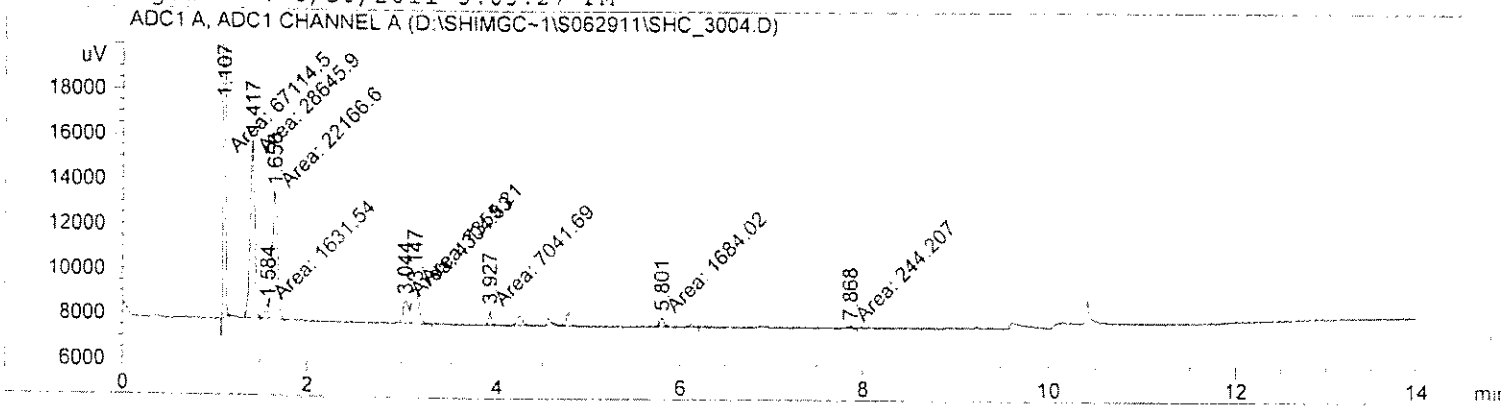
```
Results obtained with enhanced integrator!
==================================================================
                        *** End of Report ***
```

Data File D:\SHIMGC~1\S062911\SHC_3004.D

1801-1
C.5-20

==========

Injection Date : 6/29/2011 1:00:07 PM
Sample Name : Location : Vial 1
Acq. Operator : mp
Acq. Instrument : shimadzu_gc Inj Volume : Manually
Acq. Method : E:\GCCHEM2\3\METHODS\SHIM09HC.M
Last changed : 6/17/2011 10:47:07 AM by mp
(modified after loading)
Analysis Method : C:\HPCHEM\1\METHODS\SHIMHC.M
Last changed : 6/30/2011 3:03:27 PM




==========

Area Percent Report

==========

Sorted By : Signal
Multiplier : 1.0000
Dilution : 1.0000
Use Multiplier & Dilution Factor with ISTDs

Signal 1: ADC1 A, ADC1 CHANNEL A

| Peak # | RetTime [min] | Type | Width [min] | Area [uV*s] | Height [uV] | Area % | |
|---|---|---|---|---|---|---|---|
| 1 | 1.107 | MM | 0.0226 | 6.71145e4 | 4.94307e4 | 47.87446 | 1 |
| 2 | 1.417 | MM | 0.0601 | 2.86459e4 | 7947.33350 | 20.43385 | C=C |
| 3 | 1.584 | MF | 0.0407 | 1631.54285 | 668.73932 | 1.16382 | C≡C |
| 4 | 1.656 | FM | 0.0649 | 2.21666e4 | 5689.53418 | 15.81200 | - M-C2 |
| 5 | 3.044 | MF | 0.0696 | 4304.83203 | 1031.54639 | 3.07075 | |
| 6 | 3.147 | FM | 0.0759 | 7355.20752 | 1615.67273 | 5.24666 | |
| 7 | 3.927 | MM | 0.1773 | 7041.69141 | 662.04333 | 5.02302 | |
| 8 | 5.801 | MM | 0.0671 | 1684.01782 | 418.00876 | 1.20125 | |
| 9 | 7.868 | MM | 0.0439 | 244.20659 | 92.79357 | 0.17420 | |

Totals : 1.40188e5 6.75563e4

Results obtained with enhanced integrator!

==========

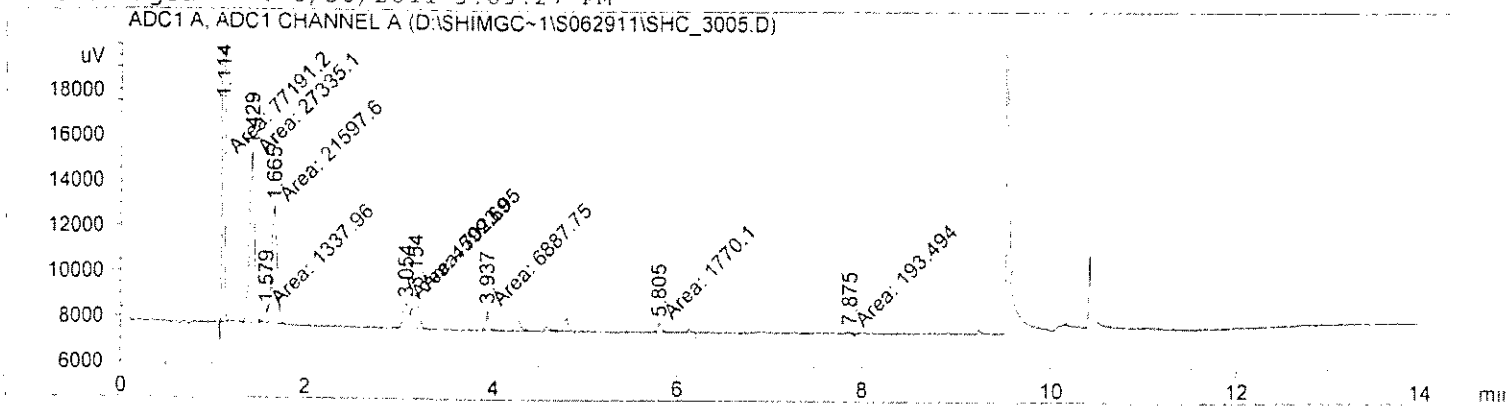
*** End of Report ***

Data File D:\SHIMGC~1\S062911\SHC_3005.D

11801-2

C-5-21

```
==================================================================
Injection Date  : 6/29/2011 2:41:49 PM
Sample Name     :                                  Location : Vial 1
Acq. Operator   : mp
Acq. Instrument : shimadzu_gc                   Inj Volume : Manually
Acq. Method     : E:\GCCHEM2\3\METHODS\SHIM09HC.M
Last changed    : 6/17/2011 10:47:07 AM by mp
                  (modified after loading)
Analysis Method : C:\HPCHEM\1\METHODS\SHIMHC.M
Last changed    : 6/30/2011 3:03:27 PM
```




```
==================================================================
                        Area Percent Report
==================================================================

Sorted By             :      Signal
Multiplier            :      1.0000
Dilution              :      1.0000
Use Multiplier & Dilution Factor with ISTDs


Signal 1: ADC1 A, ADC1 CHANNEL A
```

| Peak # | RetTime [min] | Type | Width [min] | Area [uV*s] | Height [uV] | Area % |
|---|---|---|---|---|---|---|
| 1 | 1.114 | MM | 0.0229 | 7.71912e4 | 5.60855e4 | 52.17847 |
| 2 | 1.429 | MM | 0.0603 | 2.73351e4 | 7560.81738 | 18.47758 |
| 3 | 1.579 | MF | 0.0393 | 1337.95764 | 567.58838 | 0.90441 |
| 4 | 1.665 | FM | 0.0693 | 2.15976e4 | 5191.01660 | 14.59919 |
| 5 | 3.054 | MF | 0.0705 | 4599.69287 | 1087.62146 | 3.10923 |
| 6 | 3.154 | FM | 0.0765 | 7023.94775 | 1529.48511 | 4.74794 |
| 7 | 3.937 | MM | 0.1293 | 6887.75049 | 887.91583 | 4.65587 |
| 8 | 5.805 | MM | 0.0745 | 1770.09644 | 396.00113 | 1.19652 |
| 9 | 7.875 | MM | 0.0365 | 193.49448 | 88.36102 | 0.13080 |

Totals : 1.47937e5 7.33943e4

Results obtained with enhanced integrator!

==================================================================

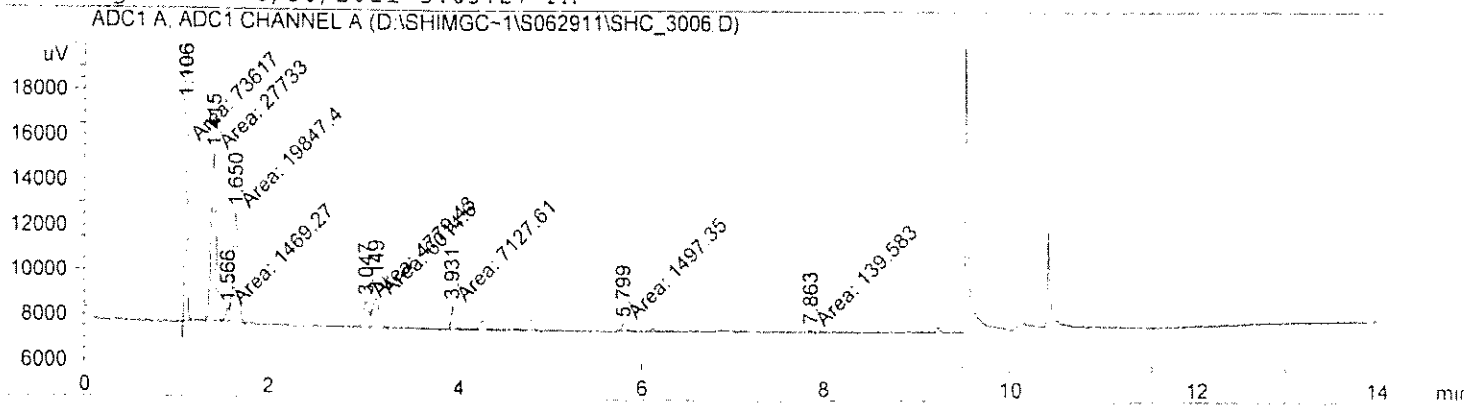
*** End of Report ***

Data File D:\SHIMGC~1\S062911\SHC_3006.D

11801-3

C-5-22

```
==================================================================
Injection Date  : 6/29/2011 3:04:01 PM
Sample Name     :                                  Location : Vial 1
Acq. Operator   : mp
Acq. Instrument : shimadzu_gc                   Inj Volume : Manually
Acq. Method     : E:\GCCHEM2\3\METHODS\SHIM09HC.M
Last changed    : 6/17/2011 10:47:07 AM by mp
                  (modified after loading)
Analysis Method : C:\HPCHEM\1\METHODS\SHIMHC.M
Last changed    : 6/30/2011 3:03:27 PM
```




```
==================================================================
                        Area Percent Report
==================================================================

Sorted By              :       Signal
Multiplier             :       1.0000
Dilution               :       1.0000
Use Multiplier & Dilution Factor with ISTDs


Signal 1: ADC1 A, ADC1 CHANNEL A
```

| Peak # | RetTime [min] | Type | Width [min] | Area [uV*s] | Height [uV] | Area % | |
|---|---|---|---|---|---|---|---|
| 1 | 1.106 | MM | 0.0226 | 7.36170e4 | 5.43090e4 | 51.76084 | |
| 2 | 1.415 | MM | 0.0619 | 2.77330e4 | 7468.17383 | 19.49933 | C=C |
| 3 | 1.566 | MF | 0.0416 | 1469.26599 | 587.95966 | 1.03306 | C≡C |
| 4 | 1.650 | FM | 0.0674 | 1.98474e4 | 4908.62158 | 13.95494 | n-C2 |
| 5 | 3.047 | MF | 0.0690 | 4779.43213 | 1154.73669 | 3.36047 | |
| 6 | 3.149 | FM | 0.0775 | 6014.59521 | 1294.14270 | 4.22892 | |
| 7 | 3.931 | MM | 0.1110 | 7127.60938 | 1070.03809 | 5.01150 | |
| 8 | 5.799 | MM | 0.0736 | 1497.35425 | 338.87891 | 1.05281 | |
| 9 | 7.863 | MM | 0.0302 | 139.58313 | 77.05904 | 0.09814 | |

Totals : 1.42225e5 7.12086e4

Results obtained with enhanced integrator!

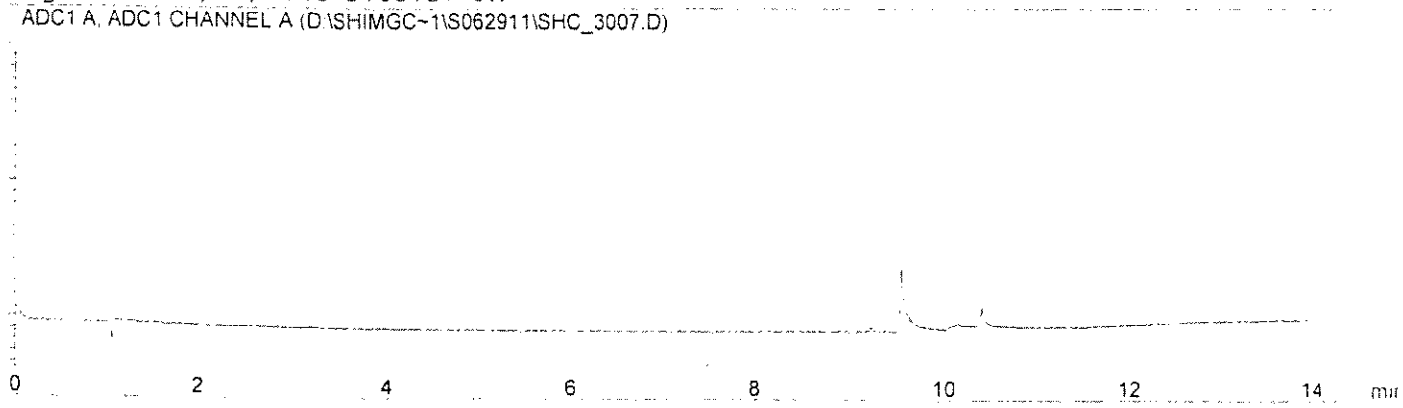
==================================================================

*** End of Report ***

Data File D:\SHIMGC~1\S062911\SHC_3007.D

$N_2$
6.5-23

```
==================================================================
Injection Date  : 6/29/2011 3:26:15 PM
Sample Name     :                                  Location : Vial 1
Acq. Operator   : mp
Acq. Instrument : shimadzu_gc                   Inj Volume : Manually
Acq. Method     : E:\GCCHEM2\3\METHODS\SHIM09HC.M
Last changed    : 6/17/2011 10:47:07 AM by mp
                  (modified after loading)
Analysis Method : C:\HPCHEM\1\METHODS\SHIMHC.M
Last changed    : 6/30/2011 3:03:27 PM
```

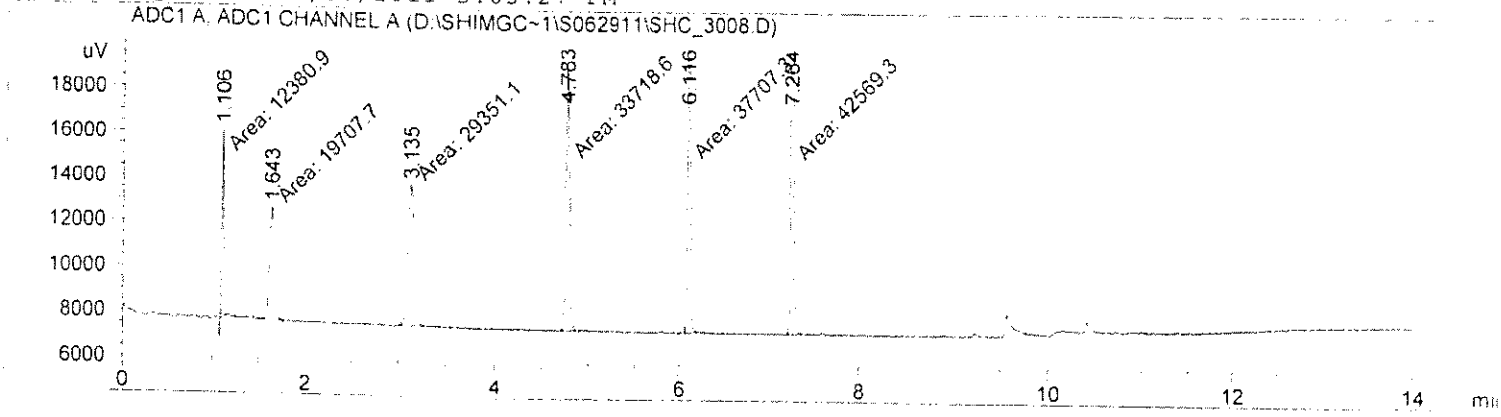



```
==================================================================
                         Area Percent Report
==================================================================

Sorted By             :      Signal
Multiplier            :      1.0000
Dilution              :      1.0000
Use Multiplier & Dilution Factor with ISTDs

No peaks found

==================================================================
                        *** End of Report ***
```

Data File D:\SHIMGC~1\S062911\SHC_3008.D

mid Std Check 6-5-24

```
==========================================================================
Injection Date  : 6/29/2011 3:47:08 PM
Sample Name     :                                   Location : Vial 1
Acq. Operator   : mp
Acq. Instrument : shimadzu_gc                       Inj Volume : Manually
Acq. Method     : E:\GCCHEM2\3\METHODS\SHIM09HC.M
Last changed    : 6/17/2011 10:47:07 AM by mp
                  (modified after loading)
Analysis Method : C:\HPCHEM\1\METHODS\SHIMHC.M
Last changed    : 6/30/2011 3:03:27 PM
```




```
==========================================================================
                          Area Percent Report
==========================================================================

Sorted By             :       Signal
Multiplier            :       1.0000
Dilution              :       1.0000
Use Multiplier & Dilution Factor with ISTDs


Signal 1: ADC1 A, ADC1 CHANNEL A
```

| Peak # | RetTime [min] | Type | Width [min] | Area [uV*s] | Height [uV] | Area % |
|---|---|---|---|---|---|---|
| 1 | 1.106 | MM | 0.0246 | 1.23809e4 | 8381.12500 | 7.05726 |
| 2 | 1.643 | MM | 0.0657 | 1.97077e4 | 5000.71143 | 11.23364 |
| 3 | 3.135 | MM | 0.0782 | 2.93511e4 | 6259.19922 | 16.73047 |
| 4 | 4.783 | MM | 0.0478 | 3.37186e4 | 1.17584e4 | 19.21998 |
| 5 | 6.116 | MM | 0.0375 | 3.77073e4 | 1.67640e4 | 21.49363 |
| 6 | 7.264 | MM | 0.0333 | 4.25693e4 | 2.12768e4 | 24.26502 |
| Totals : | | | | 1.75435e5 | 6.94402e4 | |

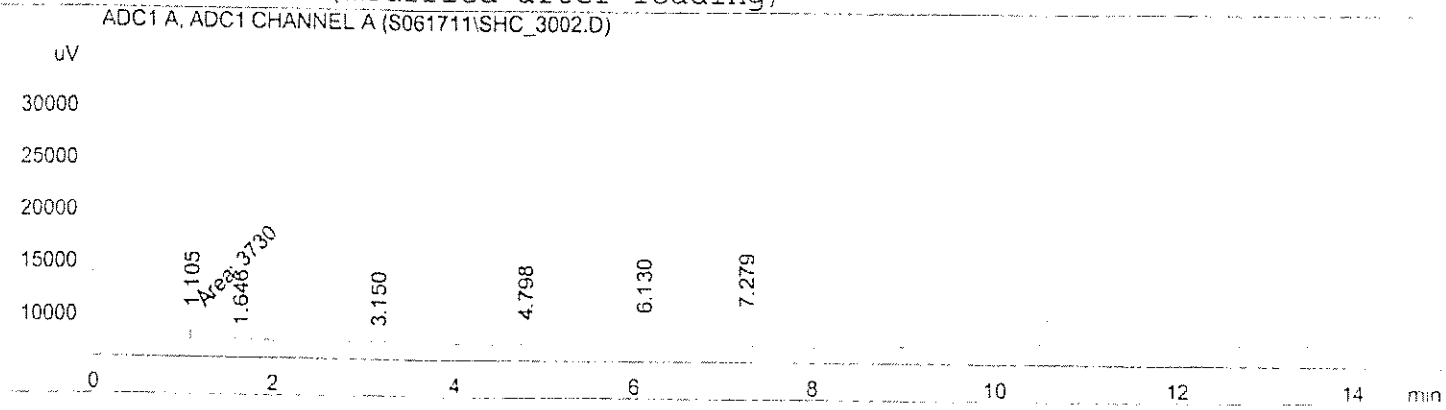
```
Results obtained with enhanced integrator!
==========================================================================
                          *** End of Report ***
```

Data File C:\HPCHEM\3\DATA\S061711\SHC_3002.D

low

==========

Injection Date : 6/17/11 11:20:43 AM
Sample Name :
Vial : 1 C.5-25
Acq. Operator : mp
Inj Volume : Manually
Acq. Method : E:\GCCHEM2\3\METHODS\SHIM09HC.M
Last changed : 6/17/11 10:47:07 AM by mp
(modified after loading)
Analysis Method : C:\HPCHEM\1\METHODS\M18HC.M
Last changed : 6/16/11 4:40:54 PM
(modified after loading)




==========

Area Percent Report

==========

Sorted By : Signal
Multiplier : 1.0000
Dilution : 1.0000

Signal 1: ADC1 A, ADC1 CHANNEL A

| Peak # | RetTime [min] | Type | Width [min] | Area [uV*s] | Height [uV] | Area % |
|---|---|---|---|---|---|---|
| 1 | 1.105 | MM | 0.0251 | 3729.99902 | 2479.35840 | 12.86424 |
| 2 | 1.646 | BB | 0.0659 | 3368.38281 | 804.05786 | 11.61708 |
| 3 | 3.150 | BB | 0.0734 | 4518.07520 | 951.86224 | 15.58220 |
| 4 | 4.798 | BB | 0.0457 | 5213.70020 | 1807.15002 | 17.98132 |
| 5 | 6.130 | BP | 0.0365 | 5807.33008 | 2552.96289 | 20.02866 |
| 6 | 7.279 | BB | 0.0329 | 6357.61133 | 3099.42432 | 21.92650 |
| Totals : | | | | 2.89951e4 | 1.16948e4 | |

Results obtained with enhanced integrator!

==========

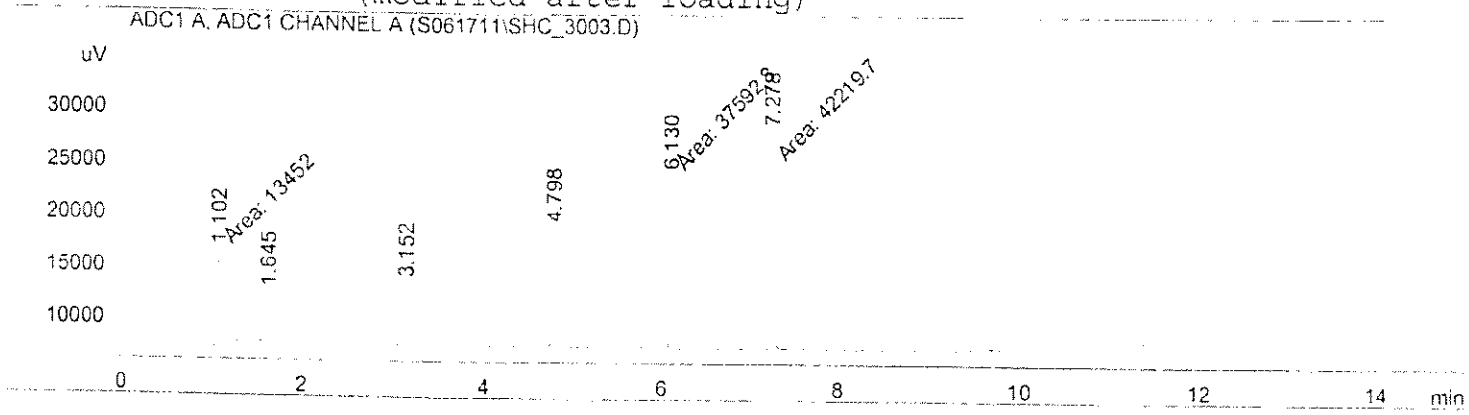
*** End of Report ***

Data File C:\HPCHEM\3\DATA\S061711\SHC_3003.D

C.5.26

==========

Injection Date : 6/17/11 11:44:56 AM
Sample Name :
Vial : 1
Acq. Operator : mp
Inj Volume : Manually
Acq. Method : E:\GCCHEM2\3\METHODS\SHIM09HC.M
Last changed : 6/17/11 10:47:07 AM by mp
(modified after loading)
Analysis Method : C:\HPCHEM\1\METHODS\M18HC.M
Last changed : 6/16/11 4:40:54 PM
(modified after loading)




==========

Area Percent Report

==========

Sorted By : Signal
Multiplier : 1.0000
Dilution : 1.0000

Signal 1: ADC1 A, ADC1 CHANNEL A

| Peak # | RetTime [min] | Type | Width [min] | Area [uV*s] | Height [uV] | Area % |
|---|---|---|---|---|---|---|
| 1 | 1.102 | MM | 0.0252 | 1.34520e4 | 8889.91309 | 7.67581 |
| 2 | 1.645 | BP | 0.0639 | 1.97748e4 | 4915.40723 | 11.28362 |
| 3 | 3.152 | BP | 0.0758 | 2.89741e4 | 6053.09229 | 16.53284 |
| 4 | 4.798 | BP | 0.0457 | 3.32386e4 | 1.15048e4 | 18.96618 |
| 5 | 6.130 | MM | 0.0376 | 3.75928e4 | 1.66521e4 | 21.45072 |
| 6 | 7.278 | MM | 0.0339 | 4.22197e4 | 2.07849e4 | 24.09084 |
| Totals : | | | | 1.75252e5 | 6.88001e4 | |

Results obtained with enhanced integrator!

==========

*** End of Report ***

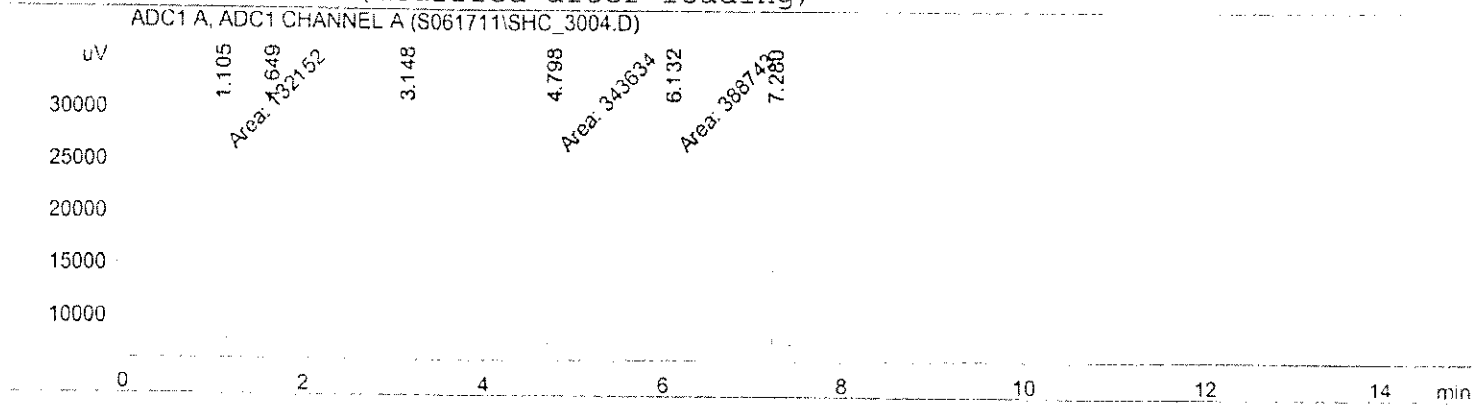
Data File C:\HPCHEM\3\DATA\S061711\SHC_3004.D

Hi

C.5-27

==========

Injection Date : 6/17/11 12:09:19 PM
Sample Name :
Vial : 1
Acq. Operator : mp
Inj Volume : Manually
Acq. Method : E:\GCCHEM2\3\METHODS\SHIM09HC.M
Last changed : 6/17/11 10:47:07 AM by mp
(modified after loading)
Analysis Method : C:\HPCHEM\1\METHODS\M18HC.M
Last changed : 6/16/11 4:40:54 PM
(modified after loading)




==========

Area Percent Report

==========

Sorted By : Signal
Multiplier : 1.0000
Dilution : 1.0000

Signal 1: ADC1 A, ADC1 CHANNEL A

| Peak # | RetTime [min] | Type | Width [min] | Area [uV*s] | Height [uV] | Area % |
|---|---|---|---|---|---|---|
| 1 | 1.105 | MM | 0.0254 | 1.32152e5 | 8.67821e4 | 7.34537 |
| 2 | 1.649 | BB | 0.0635 | 1.97648e5 | 4.85472e4 | 10.98580 |
| 3 | 3.148 | BB | 0.0747 | 2.95033e5 | 6.18407e4 | 16.39868 |
| 4 | 4.798 | MM | 0.0477 | 3.43634e5 | 1.19968e5 | 19.10009 |
| 5 | 6.132 | MM | 0.0373 | 3.88743e5 | 1.73595e5 | 21.60734 |
| 6 | 7.280 | BB | 0.0314 | 4.41914e5 | 2.19959e5 | 24.56272 |
| Totals : | | | | 1.79912e6 | 7.10692e5 | |

Results obtained with enhanced integrator!

==========

*** End of Report ***

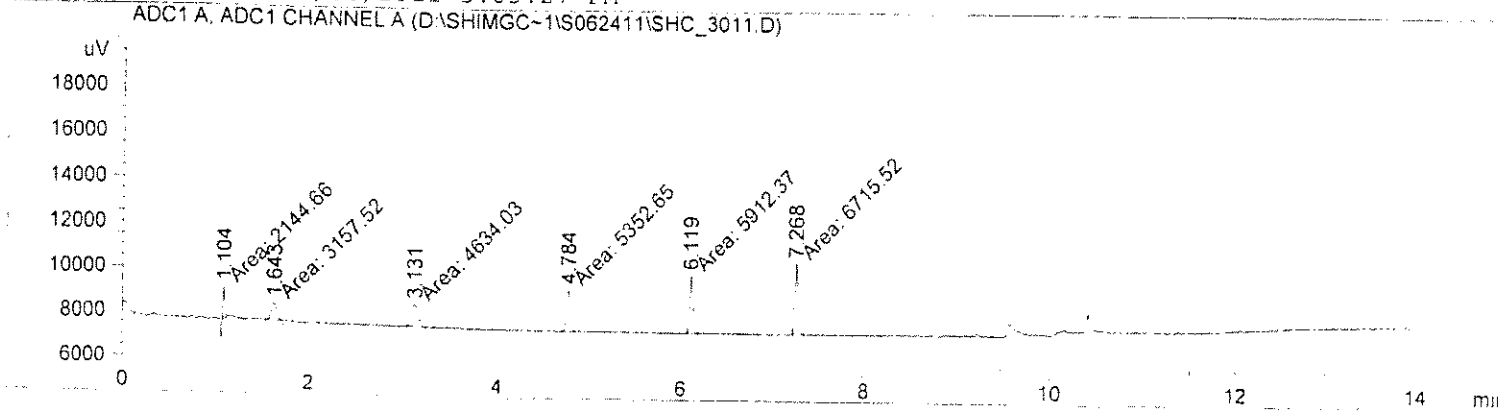


Shimadzu qc 6/17/11 2:30:22 PM

Data File D:\SHIMGC~1\S062411\SHC_3011.D

Low
C.5-28

```
==================================================================
Injection Date  : 6/24/2011 2:23:34 PM
Sample Name     :                                   Location : Vial 1
Acq. Operator   : mp
Acq. Instrument : shimadzu_gc                     Inj Volume : Manually
Acq. Method     : E:\GCCHEM2\3\METHODS\SHIM09HC.M
Last changed    : 6/17/2011 10:47:07 AM by mp
                  (modified after loading)
Analysis Method : C:\HPCHEM\1\METHODS\SHIMHC.M
Last changed    : 6/30/2011 3:03:27 PM
```



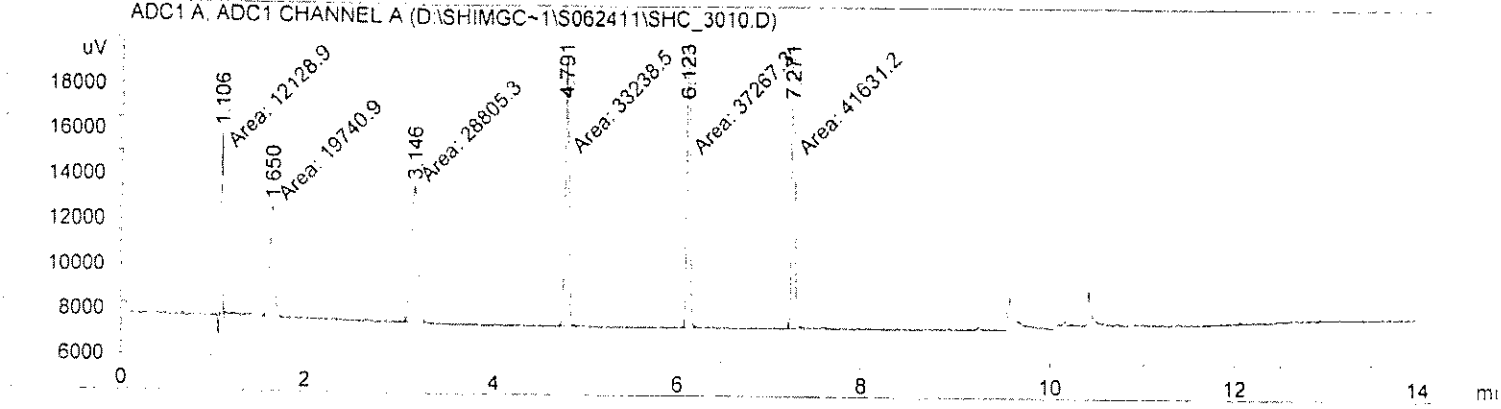

```
==================================================================
                        Area Percent Report
==================================================================

Sorted By             :      Signal
Multiplier            :      1.0000
Dilution              :      1.0000
Use Multiplier & Dilution Factor with ISTDs


Signal 1: ADC1 A, ADC1 CHANNEL A

Peak RetTime Type  Width     Area      Height     Area
  #   [min]        [min]    [uV*s]      [uV]       %
----|-------|----|-------|----------|----------|--------|
   1   1.104 MM   0.0250 2144.65552 1427.26111  7.68233
   2   1.643 MM   0.0672 3157.51660  783.43231 11.31048
   3   3.131 MM   0.0781 4634.02832  989.34167 16.59946
   4   4.784 MM   0.0479 5352.64648 1862.10938 19.17361
   5   6.119 MM   0.0379 5912.36621 2600.80371 21.17857
   6   7.268 MM   0.0350 6715.52344 3201.03296 24.05555

Totals :                 2.79167e4  1.08640e4

 Results obtained with enhanced integrator!
==================================================================
                      *** End of Report ***
```

Data File D:\SHIMGC~1\S062411\SHC_3010.D

Mcd
C.5129

==========

Injection Date : 6/24/2011 2:02:06 PM
Sample Name :
Location : Vial 1
Acq. Operator : mp
Acq. Instrument : shimadzu_gc
Inj Volume : Manually
Acq. Method : E:\GCCHEM2\3\METHODS\SHIM09HC.M
Last changed : 6/17/2011 10:47:07 AM by mp
(modified after loading)
Analysis Method : C:\HPCHEM\1\METHODS\SHIMHC.M
Last changed : 6/30/2011 3:03:27 PM

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Area Percent Report

==========

Sorted By : Signal
Multiplier : 1.0000
Dilution : 1.0000
Use Multiplier & Dilution Factor with ISTDs

Signal 1: ADC1 A, ADC1 CHANNEL A

| Peak # | RetTime [min] | Type | Width [min] | Area [uV*s] | Height [uV] | Area % |
|---|---|---|---|---|---|---|
| 1 | 1.106 | MM | 0.0249 | 1.21289e4 | 8115.82666 | 7.01852 |
| 2 | 1.650 | MM | 0.0664 | 1.97409e4 | 4958.03809 | 11.42333 |
| 3 | 3.146 | MM | 0.0789 | 2.88053e4 | 6083.57178 | 16.66859 |
| 4 | 4.791 | MM | 0.0479 | 3.32385e4 | 1.15632e4 | 19.23390 |
| 5 | 6.123 | MM | 0.0379 | 3.72673e4 | 1.63973e4 | 21.56523 |
| 6 | 7.271 | MM | 0.0336 | 4.16312e4 | 2.06808e4 | 24.09043 |
| Totals : | | | | 1.72812e5 | 6.77988e4 | |

Results obtained with enhanced integrator!

==========

*** End of Report ***



nstrument 1 7/1/2011 10:13:53 AM

Page 1 of 1

Data File D:\SHIMGC~1\S062411\SHC_3012.D

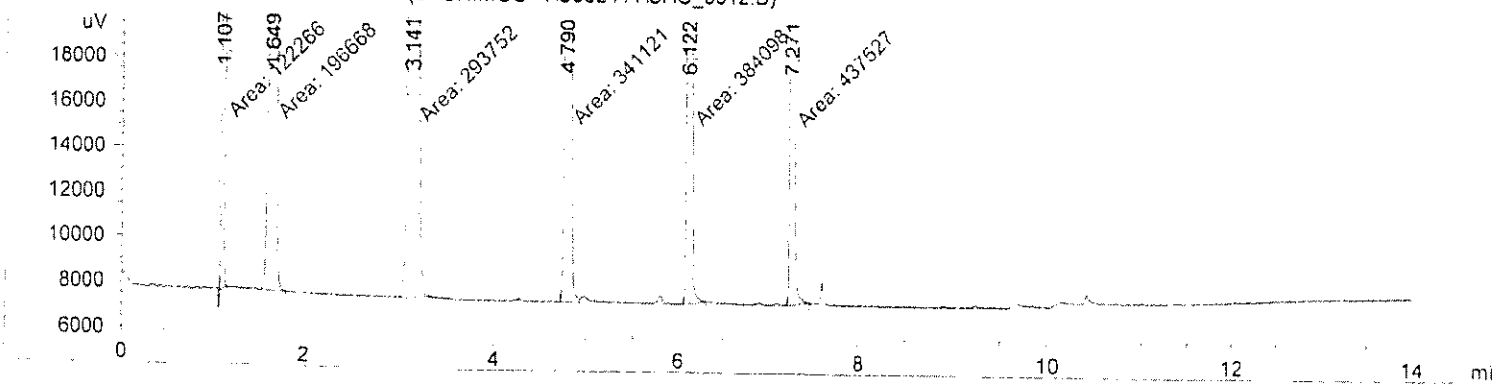
Hi

C-5-30

==========

Injection Date : 6/24/2011 2:45:03 PM
Sample Name :
Location : Vial 1
Acq. Operator : mp
Acq. Instrument : shimadzu_gc
Inj Volume : Manually
Acq. Method : E:\GCCHEM2\3\METHODS\SHIM09HC.M
Last changed : 6/17/2011 10:47:07 AM by mp
(modified after loading)
Analysis Method : C:\HPCHEM\1\METHODS\SHIMHC.M
Last changed : 6/30/2011 3:03:27 PM

ADC1 A, ADC1 CHANNEL A (D:\SHIMGC~1\S062411\SHC_3012.D)

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Area Percent Report

==========

Sorted By : Signal
Multiplier : 1.0000
Dilution : 1.0000
Use Multiplier & Dilution Factor with ISTDs

Signal 1: ADC1 A, ADC1 CHANNEL A

| Peak # | RetTime [min] | Type | Width [min] | Area [uV*s] | Height [uV] | Area % |
|---|---|---|---|---|---|---|
| 1 | 1.107 | MM | 0.0253 | 1.22266e5 | 8.04477e4 | 6.88655 |
| 2 | 1.649 | MM | 0.0669 | 1.96668e5 | 4.89749e4 | 11.07718 |
| 3 | 3.141 | MM | 0.0781 | 2.93752e5 | 6.26769e4 | 16.54539 |
| 4 | 4.790 | MM | 0.0473 | 3.41121e5 | 1.20100e5 | 19.21342 |
| 5 | 6.122 | MM | 0.0372 | 3.84098e5 | 1.71857e5 | 21.63406 |
| 6 | 7.271 | MM | 0.0330 | 4.37527e5 | 2.21095e5 | 24.64340 |
| Totals : | | | | 1.77543e6 | 7.05150e5 | |

Results obtained with enhanced integrator!

==========

*** End of Report ***

AVERAGE DIOXINS/FURANS AND PCBs EMISSIONS

CLIENT: ExxonMobil

| NAME | pg/dscm | | pg/dscm at 7% O2 | | pg/dscf | | lb/hr | |
|---|---|---|---|---|---|---|---|---|
| 2,3,7,8-TCDD | ND < | 0.75 | ND < | 0.67 | ND < | 0.021 | ND < | 6.79E-10 |
| 1,2,3,7,8-PeCDD | ND < | 0.83 | ND < | 0.74 | ND < | 0.024 | ND < | 7.53E-10 |
| 1,2,3,4,7,8-HxCDD | ND < | 0.67 | ND < | 0.60 | ND < | 0.019 | ND < | 6.11E-10 |
| 1,2,3,6,7,8-HxCDD | ND < | 0.69 | ND < | 0.61 | ND < | 0.019 | ND < | 6.21E-10 |
| 1,2,3,7,8,9-HxCDD | ND < | 0.74 | ND < | 0.66 | ND < | 0.021 | ND < | 6.72E-10 |
| 1,2,3,4,6,7,8-HpCDD | ND < | 0.96 | ND < | 0.85 | ND < | 0.027 | ND < | 8.65E-10 |
| OCDD | < | 1.59 | < | 1.41 | < | 0.045 | < | 1.43E-09 |
| 2,3,7,8-TCDF | ND < | 0.63 | ND < | 0.56 | ND < | 0.018 | ND < | 5.71E-10 |
| 1,2,3,7,8-PeCDF | ND < | 0.59 | ND < | 0.52 | ND < | 0.017 | ND < | 5.35E-10 |
| 2,3,4,7,8-PeCDF | ND < | 0.56 | ND < | 0.50 | ND < | 0.016 | ND < | 5.09E-10 |
| 1,2,3,4,7,8-HxCDF | ND < | 0.40 | ND < | 0.35 | ND < | 0.011 | ND < | 3.58E-10 |
| 1,2,3,6,7,8-HxCDF | ND < | 0.38 | ND < | 0.34 | ND < | 0.011 | ND < | 3.45E-10 |
| 2,3,4,6,7,8-HxCDF | ND < | 0.36 | ND < | 0.32 | ND < | 0.010 | ND < | 3.29E-10 |
| 1,2,3,7,8,9-HxCDF | ND < | 0.50 | ND < | 0.44 | ND < | 0.014 | ND < | 4.50E-10 |
| 1,2,3,4,6,7,8-HpCDF | < | 0.62 | < | 0.55 | < | 0.018 | < | 5.59E-10 |
| 1,2,3,4,7,8,9-HpCDF | ND < | 0.95 | ND < | 0.84 | ND < | 0.027 | ND < | 8.58E-10 |
| OCDF | ND < | 1.96 | ND < | 1.74 | ND < | 0.055 | ND < | 1.77E-09 |
| PCB-77 33'44'-TeCB | | 7.45 | | 6.61 | | 0.211 | | 6.71E-09 |
| PCB-81 344'5-TeCB | < | 0.47 | < | 0.42 | < | 0.013 | < | 4.28E-10 |
| PCB-105 233'44'-PeCB | | 13.81 | | 12.24 | | 0.391 | | 1.25E-08 |
| PCB-114 2344'5-PeCB | ND < | 0.95 | ND < | 0.85 | ND < | 0.027 | ND < | 8.62E-10 |
| PCB-118 23'44'5-PeCB | | 35.71 | | 31.66 | | 1.011 | | 3.22E-08 |
| PCB-123 2'344'5-PeCB | < | 1.55 | < | 1.37 | < | 0.044 | < | 1.40E-09 |
| PCB-126 33'44'5-PeCB | ND < | 0.66 | ND < | 0.59 | ND < | 0.019 | ND < | 6.00E-10 |
| PCB-156 233'44'5-HxCB | | 2.01 | | 1.78 | | 0.057 | | 1.82E-09 |
| PCB-157 233'44'5'-HxCB | < | 0.60 | < | 0.53 | < | 0.017 | < | 5.42E-10 |
| PCB-167 23'44'55'-HxCB | < | 0.93 | < | 0.82 | < | 0.026 | < | 8.42E-10 |
| PCB-169 33'44'55'-HxCB | ND < | 1.28 | ND < | 1.14 | ND < | 0.036 | ND < | 1.14E-09 |
| PCB-189 233'44'55'-HpCB | ND < | 1.12 | ND < | 0.99 | ND < | 0.032 | ND < | 1.01E-09 |

DIOXINS/FURANS AND PCBs CALCULATIONS

| | | | |
|---|---|---|---|
| CLIENT: | ExxonMobil | | AA |
| TEST NUMBER: | 1-D/F | VMSTD(DSCF): | 172.8766 |
| TEST DATE: | 6/28/2011 | QSD(DSCF/MIN): | 255078 |
| T REF (F) | 68 | CO2,%: | 13.93 |
| | | O2,%: | 5.13 |

| NAME | pg/train | | pg/dscm | | pg/dscm at 7% O2 | | pg/dscf | | lb/hr |
|---|---|---|---|---|---|---|---|---|---|
| 2,3,7,8-TCDD | ND < | 3.61 | ND < | 0.74 | ND < | 0.65 | ND < | 0.021 | ND < 7.04E-10 |
| 1,2,3,7,8-PeCDD | ND < | 3.92 | ND < | 0.80 | ND < | 0.71 | ND < | 0.023 | ND < 7.64E-10 |
| 1,2,3,4,7,8-HxCDD | ND < | 3.37 | ND < | 0.69 | ND < | 0.61 | ND < | 0.019 | ND < 6.57E-10 |
| 1,2,3,6,7,8-HxCDD | ND < | 3.32 | ND < | 0.68 | ND < | 0.60 | ND < | 0.019 | ND < 6.47E-10 |
| 1,2,3,7,8,9-HxCDD | ND < | 3.79 | ND < | 0.77 | ND < | 0.68 | ND < | 0.022 | ND < 7.39E-10 |
| 1,2,3,4,6,7,8-HpCDD | ND < | 4.4 | ND < | 0.90 | ND < | 0.79 | ND < | 0.025 | ND < 8.58E-10 |
| OCDD | ND < | 5.97 | ND < | 1.22 | ND < | 1.07 | ND < | 0.035 | ND < 1.16E-09 |
| 2,3,7,8-TCDF | ND < | 3.17 | ND < | 0.65 | ND < | 0.57 | ND < | 0.018 | ND < 6.18E-10 |
| 1,2,3,7,8-PeCDF | ND < | 2.87 | ND < | 0.59 | ND < | 0.52 | ND < | 0.017 | ND < 5.60E-10 |
| 2,3,4,7,8-PeCDF | ND < | 2.87 | ND < | 0.59 | ND < | 0.52 | ND < | 0.017 | ND < 5.60E-10 |
| 1,2,3,4,7,8-HxCDF | ND < | 1.74 | ND < | 0.36 | ND < | 0.31 | ND < | 0.010 | ND < 3.39E-10 |
| 1,2,3,6,7,8-HxCDF | ND < | 1.73 | ND < | 0.35 | ND < | 0.31 | ND < | 0.010 | ND < 3.37E-10 |
| 2,3,4,6,7,8-HxCDF | ND < | 1.64 | ND < | 0.33 | ND < | 0.30 | ND < | 0.009 | ND < 3.20E-10 |
| 1,2,3,7,8,9-HxCDF | ND < | 2.19 | ND < | 0.45 | ND < | 0.39 | ND < | 0.013 | ND < 4.27E-10 |
| 1,2,3,4,6,7,8-HpCDF | ND < | 2.48 | ND < | 0.51 | ND < | 0.45 | ND < | 0.014 | ND < 4.84E-10 |
| 1,2,3,4,7,8,9-HpCDF | ND < | 3.98 | ND < | 0.81 | ND < | 0.72 | ND < | 0.023 | ND < 7.76E-10 |
| OCDF | ND < | 9.98 | ND < | 2.04 | ND < | 1.80 | ND < | 0.058 | ND < 1.95E-09 |
| PCB-77 33'44'-TeCB | | 32.6 | | 6.66 | | 5.87 | | 0.189 | 6.36E-09 |
| PCB-81 344'5-TeCB | ND < | 2.39 | ND < | 0.49 | ND < | 0.43 | ND < | 0.014 | ND < 4.66E-10 |
| PCB-105 233'44'-PeCB | | 66.9 | | 13.66 | | 12.04 | | 0.387 | 1.30E-08 |
| PCB-114 2344'5-PeCB | ND < | 4.58 | ND < | 0.94 | ND < | 0.82 | ND < | 0.026 | ND < 8.93E-10 |
| PCB-118 23'44'5-PeCB | | 166 | | 33.91 | | 29.88 | | 0.960 | 3.24E-08 |
| PCB-123 2'344'5-PeCB | | 8.17 | | 1.67 | | 1.47 | | 0.047 | 1.59E-09 |
| PCB-126 33'44'5-PeCB | ND < | 3.22 | ND < | 0.66 | ND < | 0.58 | ND < | 0.019 | ND < 6.28E-10 |
| PCB-156 233'44'5-HxCB | | 9.94 | | 2.03 | | 1.79 | | 0.057 | 1.94E-09 |
| PCB-157 233'44'5'-HxCB | ND < | 2.94 | ND < | 0.60 | ND < | 0.53 | ND < | 0.017 | ND < 5.73E-10 |
| PCB-167 23'44'55'-HxCB | | 5.04 | | 1.03 | | 0.91 | | 0.029 | 9.83E-10 |
| PCB-169 33'44'55'-HxCB | ND < | 3.41 | ND < | 0.70 | ND < | 0.61 | ND < | 0.020 | ND < 6.65E-10 |
| PCB-189 233'44'55'-HpCB | ND < | 5.49 | ND < | 1.12 | ND < | 0.99 | ND < | 0.032 | ND < 1.07E-09 |

DIOXINS/FURANS AND PCBs CALCULATIONS

| | | | |
|---|---|---|---|
| CLIENT: | ExxonMobil | | AA |
| TEST NUMBER: | 2-D/F | VMSTD(DSCF): | 160.7387 |
| TEST DATE: | 6/29/2011 | QSD(DSCF/MIN): | 238116 |
| T REF (F) | 68 | CO2,%: | 13.80 |
| | | O2,%: | 5.34 |

| NAME | | pg/train | | pg/dscm | | pg/dscm at 7% O2 | | pg/dscf | | lb/hr |
|---|---|---|---|---|---|---|---|---|---|---|
| 2,3,7,8-TCDD | ND < | 3.32 | ND < | 0.73 | ND < | 0.65 | ND < | 0.021 | ND < | 6.50E-10 |
| 1,2,3,7,8-PeCDD | ND < | 3.83 | ND < | 0.84 | ND < | 0.75 | ND < | 0.024 | ND < | 7.50E-10 |
| 1,2,3,4,7,8-HxCDD | ND < | 2.77 | ND < | 0.61 | ND < | 0.54 | ND < | 0.017 | ND < | 5.42E-10 |
| 1,2,3,6,7,8-HxCDD | ND < | 2.92 | ND < | 0.64 | ND < | 0.57 | ND < | 0.018 | ND < | 5.72E-10 |
| 1,2,3,7,8,9-HxCDD | ND < | 2.96 | ND < | 0.65 | ND < | 0.58 | ND < | 0.018 | ND < | 5.80E-10 |
| 1,2,3,4,6,7,8-HpCDD | ND < | 4.74 | ND < | 1.04 | ND < | 0.93 | ND < | 0.029 | ND < | 9.28E-10 |
| OCDD | ND < | 6.79 | ND < | 1.49 | ND < | 1.33 | ND < | 0.042 | ND < | 1.33E-09 |
| 2,3,7,8-TCDF | ND < | 3.03 | ND < | 0.67 | ND < | 0.59 | ND < | 0.019 | ND < | 5.93E-10 |
| 1,2,3,7,8-PeCDF | ND < | 2.58 | ND < | 0.57 | ND < | 0.51 | ND < | 0.016 | ND < | 5.05E-10 |
| 2,3,4,7,8-PeCDF | ND < | 2.26 | ND < | 0.50 | ND < | 0.44 | ND < | 0.014 | ND < | 4.42E-10 |
| 1,2,3,4,7,8-HxCDF | ND < | 1.89 | ND < | 0.42 | ND < | 0.37 | ND < | 0.012 | ND < | 3.70E-10 |
| 1,2,3,6,7,8-HxCDF | ND < | 1.8 | ND < | 0.40 | ND < | 0.35 | ND < | 0.011 | ND < | 3.52E-10 |
| 2,3,4,6,7,8-HxCDF | ND < | 1.67 | ND < | 0.37 | ND < | 0.33 | ND < | 0.010 | ND < | 3.27E-10 |
| 1,2,3,7,8,9-HxCDF | ND < | 2.34 | ND < | 0.51 | ND < | 0.46 | ND < | 0.015 | ND < | 4.58E-10 |
| 1,2,3,4,6,7,8-HpCDF | ND < | 2.59 | ND < | 0.57 | ND < | 0.51 | ND < | 0.016 | ND < | 5.07E-10 |
| 1,2,3,4,7,8,9-HpCDF | ND < | 3.93 | ND < | 0.86 | ND < | 0.77 | ND < | 0.024 | ND < | 7.69E-10 |
| OCDF | ND < | 8.73 | ND < | 1.92 | ND < | 1.71 | ND < | 0.054 | ND < | 1.71E-09 |
| PCB-77 33'44'-TeCB | | 22.6 | | 4.96 | | 4.43 | | 0.141 | | 4.42E-09 |
| PCB-81 344'5-TeCB | ND < | 1.78 | ND < | 0.39 | ND < | 0.35 | ND < | 0.011 | ND < | 3.49E-10 |
| PCB-105 233'44'-PeCB | | 40 | | 8.79 | | 7.85 | | 0.249 | | 7.83E-09 |
| PCB-114 2344'5-PeCB | ND < | 3.26 | ND < | 0.72 | ND < | 0.64 | ND < | 0.020 | ND < | 6.38E-10 |
| PCB-118 23'44'5-PeCB | | 99.9 | | 21.95 | | 19.60 | | 0.622 | | 1.96E-08 |
| PCB-123 2'344'5-PeCB | ND < | 6.13 | ND < | 1.35 | ND < | 1.20 | ND < | 0.038 | ND < | 1.20E-09 |
| PCB-126 33'44'5-PeCB | ND < | 2.68 | ND < | 0.59 | ND < | 0.53 | ND < | 0.017 | ND < | 5.25E-10 |
| PCB-156 233'44'5-HxCB | | 7.22 | | 1.59 | | 1.42 | | 0.045 | | 1.41E-09 |
| PCB-157 233'44'5'-HxCB | | 2.34 | | 0.51 | | 0.46 | | 0.015 | | 4.58E-10 |
| PCB-167 23'44'55'-HxCB | ND < | 3.26 | ND < | 0.72 | ND < | 0.64 | ND < | 0.020 | ND < | 6.38E-10 |
| PCB-169 33'44'55'-HxCB | ND < | 2.2 | ND < | 0.48 | ND < | 0.43 | ND < | 0.014 | ND < | 4.31E-10 |
| PCB-189 233'44'55'-HpCB | ND < | 5.4 | ND < | 1.19 | ND < | 1.06 | ND < | 0.034 | ND < | 1.06E-09 |

DIOXINS/FURANS AND PCBs CALCULATIONS

| | | | |
|---|---|---|---|
| CLIENT: | ExxonMobil | INITIALS: | AA |
| TEST NUMBER: | 3-D/F | VMSTD(DSCF): | 159.0634 |
| TEST DATE: | 6/29/2011 | QSD(DSCF/MIN): | 232777 |
| T REF (F) | 68 | CO2,%: | 13.90 |
| | | O2,%: | 5.23 |

| NAME | | pg/train | | pg/dscm | | pg/dscm at 7% O2 | | pg/dscf | | lb/hr |
|---|---|---|---|---|---|---|---|---|---|---|
| 2,3,7,8-TCDD | ND < | 3.53 | ND < | 0.78 | ND < | 0.70 | ND < | 0.022 | ND < | 6.83E-10 |
| 1,2,3,7,8-PeCDD | ND < | 3.85 | ND < | 0.85 | ND < | 0.76 | ND < | 0.024 | ND < | 7.45E-10 |
| 1,2,3,4,7,8-HxCDD | ND < | 3.27 | ND < | 0.73 | ND < | 0.64 | ND < | 0.021 | ND < | 6.32E-10 |
| 1,2,3,6,7,8-HxCDD | ND < | 3.33 | ND < | 0.74 | ND < | 0.66 | ND < | 0.021 | ND < | 6.44E-10 |
| 1,2,3,7,8,9-HxCDD | ND < | 3.61 | ND < | 0.80 | ND < | 0.71 | ND < | 0.023 | ND < | 6.98E-10 |
| 1,2,3,4,6,7,8-HpCDD | ND < | 4.18 | ND < | 0.93 | ND < | 0.82 | ND < | 0.026 | ND < | 8.08E-10 |
| OCDD | | 9.24 | | 2.05 | | 1.82 | | 0.058 | | 1.79E-09 |
| 2,3,7,8-TCDF | ND < | 2.6 | ND < | 0.58 | ND < | 0.51 | ND < | 0.016 | ND < | 5.03E-10 |
| 1,2,3,7,8-PeCDF | ND < | 2.79 | ND < | 0.62 | ND < | 0.55 | ND < | 0.018 | ND < | 5.40E-10 |
| 2,3,4,7,8-PeCDF | ND < | 2.72 | ND < | 0.60 | ND < | 0.54 | ND < | 0.017 | ND < | 5.26E-10 |
| 1,2,3,4,7,8-HxCDF | ND < | 1.88 | ND < | 0.42 | ND < | 0.37 | ND < | 0.012 | ND < | 3.64E-10 |
| 1,2,3,6,7,8-HxCDF | ND < | 1.78 | ND < | 0.40 | ND < | 0.35 | ND < | 0.011 | ND < | 3.44E-10 |
| 2,3,4,6,7,8-HxCDF | ND < | 1.76 | ND < | 0.39 | ND < | 0.35 | ND < | 0.011 | ND < | 3.40E-10 |
| 1,2,3,7,8,9-HxCDF | ND < | 2.41 | ND < | 0.53 | ND < | 0.47 | ND < | 0.015 | ND < | 4.66E-10 |
| 1,2,3,4,6,7,8-HpCDF | | 3.55 | | 0.79 | | 0.70 | | 0.022 | | 6.87E-10 |
| 1,2,3,4,7,8,9-HpCDF | ND < | 5.31 | ND < | 1.18 | ND < | 1.05 | ND < | 0.033 | ND < | 1.03E-09 |
| OCDF | ND < | 8.62 | ND < | 1.91 | ND < | 1.70 | ND < | 0.054 | ND < | 1.67E-09 |
| PCB-77 33'44'-TeCB | | 48.3 | | 10.72 | | 9.51 | | 0.304 | | 9.34E-09 |
| PCB-81 344'5-TeCB | | 2.42 | | 0.54 | | 0.48 | | 0.015 | | 4.68E-10 |
| PCB-105 233'44'-PeCB | | 85.5 | | 18.98 | | 16.84 | | 0.538 | | 1.65E-08 |
| PCB-114 2344'5-PeCB | ND < | 5.45 | ND < | 1.21 | ND < | 1.07 | ND < | 0.034 | ND < | 1.05E-09 |
| PCB-118 23'44'5-PeCB | | 231 | | 51.28 | | 45.50 | | 1.452 | | 4.47E-08 |
| PCB-123 2'344'5-PeCB | ND < | 7.33 | ND < | 1.63 | ND < | 1.44 | ND < | 0.046 | ND < | 1.42E-09 |
| PCB-126 33'44'5-PeCB | ND < | 3.35 | ND < | 0.74 | ND < | 0.66 | ND < | 0.021 | ND < | 6.48E-10 |
| PCB-156 233'44'5-HxCB | | 10.9 | | 2.42 | | 2.15 | | 0.069 | | 2.11E-09 |
| PCB-157 233'44'5'-HxCB | | 3.08 | | 0.68 | | 0.61 | | 0.019 | | 5.96E-10 |
| PCB-167 23'44'55'-HxCB | | 4.68 | | 1.04 | | 0.92 | | 0.029 | | 9.05E-10 |
| PCB-169 33'44'55'-HxCB | ND < | 12 | ND < | 2.66 | ND < | 2.36 | ND < | 0.075 | ND < | 2.32E-09 |
| PCB-189 233'44'55'-HpCB | ND < | 4.7 | ND < | 1.04 | ND < | 0.93 | ND < | 0.030 | ND < | 9.09E-10 |

***Delta***
Dioxins and Furans Test Summary

| | | | | | |
|---|---|---|---|---|---|
| Client/Location..... | ExxonMobil | | | Reference Temp (F): | 68 |
| | | | | Fuel..... | Refinery |
| Sample Location..... | FCC 2F-7 Stack | | | Data By..... | AA |
| Test No..... | 1-DF | 2-DF | 3-DF | Average | |
| Date..... | June 28, 2011 | June 29, 2011 | June 29, 2011 | * | |
| Start/Stop Time..... | 1250/1700 | 755/1209 | 1235/1641 | * | |
| Bar Press (in Hg)..... | 29.77 | 29.85 | 29.85 | * | |
| Test Method..... | EPA M23 | EPA M23 | EPA M23 | * | |
| Sample Time (Min)..... | 240 | 240 | 240 | * | |
| Sample Train..... | 19WCS | 19WCS | 19WCS | * | |
| Meter Cal Factor..... | 0.996 | 0.996 | 0.996 | * | |
| Pitot Factor ..... | 0.84 | 0.84 | 0.84 | * | |
| Nozzle Diam (in)..... | 0.220 | 0.220 | 0.220 | * | |
| Stack Area (sq ft)..... | 94.31 | 94.31 | 94.31 | | |
| Stack O2 (%)..... | 5.13 | 5.34 | 5.23 | 5.23 | |
| Stack CO2 (%)..... | 13.93 | 13.80 | 13.90 | 13.87 | |
| Stack Press (iwg)..... | -1.30 | -1.30 | -1.30 | -1.30 | |
| Stack Temp (F)..... | 472.9 | 469.9 | 469.7 | 470.8 | |
| Vel Head (iwg)..... | 1.53 | 1.30 | 1.25 | 1.36 | |
| Meter Temp (F)..... | 82 | 76 | 76 | 78 | |
| Meter Press (iwg)..... | 1.85 | 1.57 | 1.50 | 1.64 | |
| Meter Vol (acf)..... | 178.210 | 163.506 | 161.985 | 167.90 | |
| Liquid Vol (ml)..... | 564.3 | 482.6 | 481.0 | 509.3 | |
| Std Sample Vol (SCF)..... | 172.877 | 160.739 | 159.063 | 164.23 | |
| Std Sample Vol (SCM)..... | 4.895 | 4.552 | 4.504 | 4.650 | |
| Moisture Fraction..... | 0.134 | 0.124 | 0.125 | 0.128 | |
| Stack Gas Mol Wt..... | 28.77 | 28.88 | 28.88 | 28.84 | |
| Stack Gas Velocity (ft/sec)..... | 92.70 | 85.10 | 83.25 | 87.01 | |
| Isokinetic Ratio (%)..... | 100.9 | 100.5 | 101.7 | 101.0 | |
| Stack Flow Rate (wacfm)..... | 524,551 | 481,569 | 471,087 | 492,402 | |
| Stack Flow Rate (wscfm)..... | 294,378 | 271,860 | 266,002 | 277,413 | |
| Stack Flow Rate (dscfm)..... | 255,078 | 238,116 | 232,777 | 241,990 | |
| Stack Flow Rate (mdscf/h)..... | 153.05 | 142.87 | 139.67 | 145.19 | |

RUN 1

| Dioxin / Furan Test Sample Data | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Client/Location: | | ExxonMobil | | | | | | Sample Location: | | | 2F-7 Stack |
| Unit: | | FCC | | | | | | Data By: | | | AA |
| Test No: | 1-DF | ISO | Assumed Moisture | | Sample Factor | | Delta H = | 1.20 | x Delta P | | |
| Date: | 6/28/2011 | 100.9 | 14 | | | Time per Point = | | 10 | Static Pressure = | | -1.30 |
| Port | Point | Time | Meter Volume | Delta P | Factor | Delta H | Stack Temp. | Meter In | Meter Out | Probe | Vacuum |
| A | 6 | 12:50:00 | 940.700 | 1.50 | 1.20 | 1.80 | 474 | 89 | 83 | 250 | 7 |
| A | 5 | 13:00:00 | 948.070 | 1.50 | 1.20 | 1.80 | 474 | 89 | 83 | 249 | 7 |
| A | 4 | 13:10:00 | 955.600 | 2.00 | 1.20 | 2.40 | 478 | 90 | 83 | 259 | 7 |
| A | 3 | 13:20:00 | 963.830 | 2.00 | 1.20 | 2.40 | 477 | 91 | 83 | 261 | 7 |
| A | 2 | 13:30:00 | 972.250 | 2.00 | 1.20 | 2.40 | 476 | 89 | 83 | 258 | 7 |
| A | 1 | 13:40:00 | 980.750 | 1.50 | 1.20 | 1.80 | 476 | 90 | 83 | 253 | 7 |
| | Stop | 13:50:00 | 988.130 | | | | | | | | |
| B | 6 | 13:52:00 | 988.130 | 1.30 | 1.20 | 1.56 | 474 | 88 | 83 | 258 | 7 |
| B | 5 | 14:02:00 | 995.210 | 1.30 | 1.20 | 1.56 | 474 | 88 | 83 | 262 | 7 |
| B | 4 | 14:12:00 | 1002.310 | 1.30 | 1.20 | 1.56 | 473 | 88 | 82 | 258 | 7 |
| B | 3 | 14:22:00 | 1009.300 | 1.20 | 1.20 | 1.44 | 472 | 88 | 82 | 254 | 7 |
| B | 2 | 14:32:00 | 1016.000 | 1.20 | 1.20 | 1.44 | 472 | 85 | 81 | 253 | 7 |
| B | 1 | 14:42:00 | 1022.700 | 1.20 | 1.20 | 1.44 | 472 | 85 | 81 | 247 | 7 |
| | Stop | 14:52:00 | 1029.330 | | | | | | | | |
| C | 6 | 14:58:00 | 1029.330 | 1.50 | 1.20 | 1.80 | 470 | 81 | 79 | 249 | 9 |
| C | 5 | 15:08:00 | 1036.550 | 1.50 | 1.20 | 1.80 | 470 | 82 | 80 | 250 | 9 |
| C | 4 | 15:18:00 | 1043.700 | 1.50 | 1.20 | 1.80 | 473 | 81 | 78 | 253 | 9 |
| C | 3 | 15:28:00 | 1050.910 | 1.60 | 1.20 | 1.92 | 473 | 80 | 78 | 253 | 9 |
| C | 2 | 15:38:00 | 1058.400 | 1.60 | 1.20 | 1.92 | 473 | 81 | 79 | 253 | 9 |
| C | 1 | 15:48:00 | 1066.000 | 1.60 | 1.20 | 1.92 | 473 | 79 | 76 | 257 | 9 |
| | Stop | 15:58:00 | 1073.150 | | | | | | | | |
| D | 6 | 16:00:00 | 1073.150 | 1.50 | 1.20 | 1.80 | 470 | 77 | 74 | 257 | 9 |
| D | 5 | 16:10:00 | 1088.770 | 1.50 | 1.20 | 1.80 | 470 | 79 | 75 | 255 | 9 |
| D | 4 | 16:20:00 | 1088.190 | 1.50 | 1.20 | 1.80 | 473 | 79 | 75 | 259 | 9 |
| D | 3 | 16:30:00 | 1095.525 | 1.60 | 1.20 | 1.92 | 472 | 78 | 76 | 258 | 9 |
| D | 2 | 16:40:00 | 1102.957 | 2.00 | 1.20 | 2.40 | 471 | 79 | 76 | 257 | 9 |
| D | 1 | 16:50:00 | 1111.400 | 1.50 | 1.20 | 1.80 | 470 | 80 | 75 | 250 | 9 |
| | Stop | 17:00:00 | 1118.910 | | | | | | | | |
| **Total/Average** | | **240** | **178.210** | **1.5296** | | **1.85** | **473** | **84** | **80** | **255** | **8** |

RUN 2

| Dioxin / Furan Test Sample Data | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Client/Location: | | ExxonMobil | | | | | | Sample Location: | | | 2F-7 Stack |
| Unit: | | FCC | | | | | | Data By: | | | AA |
| Test No: | 2-DF | ISO | Moisture | | Sample Factor | | Delta H = | 1.20 | x Delta P | | |
| Date: | 6/29/2011 | 100.5 | 14 | | | Time per Point = | | 10 | Static Pressure = | | -1.3 |
| Port | Point | Time | Meter Volume | Delta P | Factor | Delta H | Stack Temp. | Meter In | Meter Out | Probe | Vacuum |
| A | 6 | 7:55:00 | 119.350 | 1.20 | 1.20 | 1.44 | 469 | 66 | 64 | 262 | 7 |
| A | 5 | 8:05:00 | 125.790 | 1.20 | 1.20 | 1.44 | 470 | 71 | 65 | 263 | 7 |
| A | 4 | 8:15:00 | 132.270 | 1.50 | 1.20 | 1.80 | 470 | 74 | 66 | 261 | 7 |
| A | 3 | 8:25:00 | 139.600 | 1.50 | 1.20 | 1.80 | 470 | 76 | 67 | 261 | 7 |
| A | 2 | 8:35:00 | 146.970 | 1.50 | 1.20 | 1.80 | 470 | 78 | 68 | 266 | 7 |
| A | 1 | 8:45:00 | 154.260 | 1.50 | 1.20 | 1.80 | 470 | 77 | 75 | 269 | 7 |
| | Stop | 8:55:00 | 161.210 | | | | | | | | |
| B | 6 | 8:57:00 | 161.210 | 1.50 | 1.20 | 1.80 | 470 | 78 | 71 | 256 | 7 |
| B | 5 | 9:07:00 | 168.670 | 1.50 | 1.20 | 1.80 | 470 | 82 | 72 | 266 | 7 |
| B | 4 | 9:17:00 | 175.780 | 1.50 | 1.20 | 1.80 | 470 | 82 | 72 | 266 | 7 |
| B | 3 | 9:27:00 | 183.330 | 1.50 | 1.20 | 1.80 | 472 | 83 | 74 | 262 | 8 |
| B | 2 | 9:37:00 | 190.819 | 1.50 | 1.20 | 1.80 | 472 | 85 | 75 | 262 | 8 |
| B | 1 | 9:47:00 | 198.335 | 1.50 | 1.20 | 1.80 | 472 | 85 | 75 | 262 | 8 |
| | Stop | 9:57:00 | 205.900 | | | | | | | | |
| C | 6 | 10:07:00 | 205.900 | 1.20 | 1.20 | 1.44 | 474 | 82 | 74 | 250 | 8 |
| C | 5 | 10:17:00 | 212.460 | 1.20 | 1.20 | 1.44 | 474 | 82 | 74 | 250 | 8 |
| C | 4 | 10:27:00 | 218.930 | 1.00 | 1.20 | 1.20 | 469 | 83 | 75 | 265 | 8 |
| C | 3 | 10:37:00 | 225.870 | 1.00 | 1.20 | 1.20 | 467 | 83 | 75 | 260 | 8 |
| C | 2 | 10:47:00 | 231.355 | 1.00 | 1.20 | 1.20 | 467 | 82 | 75 | 263 | 8 |
| C | 1 | 10:57:00 | 237.550 | 1.00 | 1.20 | 1.20 | 468 | 81 | 75 | 261 | 8 |
| | Stop | 11:07:00 | 243.710 | | | | | | | | |
| D | 6 | 11:09:00 | 243.710 | 1.20 | 1.20 | 1.44 | 470 | 78 | 74 | 264 | 8 |
| D | 5 | 11:19:00 | 249.830 | 1.20 | 1.20 | 1.44 | 469 | 79 | 73 | 265 | 8 |
| D | 4 | 11:29:00 | 255.400 | 1.30 | 1.20 | 1.56 | 469 | 79 | 73 | 260 | 8 |
| D | 3 | 11:39:00 | 262.825 | 1.30 | 1.20 | 1.56 | 468 | 79 | 73 | 258 | 8 |
| D | 2 | 11:49:00 | 269.590 | 1.30 | 1.20 | 1.56 | 469 | 79 | 73 | 259 | 8 |
| D | 1 | 11:59:00 | 276.280 | 1.20 | 1.20 | 1.44 | 469 | 79 | 73 | 258 | 8 |
| | Stop | 12:09:00 | 282.856 | | | | | | | | |
| **Total/Average** | | **240** | **163.506** | **1.3016** | | **1.57** | **470** | **79** | **72** | | |

| Dioxin / Furan Test Sample Data | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Client/Location: | | ExxonMobil | | | | | | Sample Location: | | | 2F-7 Stack |
| Unit: | | FCC | | | | | | Data By: | | | AA |
| Test No: | 3-DF | ISO | Moisture | | Sample Factor | | Delta H = | 1.20 | x Delta P | | |
| Date: | 6/29/2011 | 101.7 | 14 | | | Time per Point = | | 10 | Static Pressure = | | -1.3 |
| Port | Point | Time | Meter Volume | Delta P | Factor | Delta H | Stack Temp. | Meter In | Meter Out | Probe | Vacuum |
| A | 6 | 12:35:00 | 283.015 | 1.2 | 1.20 | 1.44 | 471 | 79 | 73 | 253 | 7 |
| A | 5 | 12:45:00 | 289.590 | 1.2 | 1.20 | 1.44 | 470 | 79 | 73 | 261 | 7 |
| A | 4 | 12:55:00 | 296.200 | 1.2 | 1.20 | 1.44 | 470 | 80 | 74 | 254 | 7 |
| A | 3 | 13:05:00 | 302.630 | 1.0 | 1.20 | 1.20 | 470 | 80 | 74 | 258 | 7 |
| A | 2 | 13:15:00 | 309.300 | 1.0 | 1.20 | 1.20 | 470 | 80 | 74 | 258 | 7 |
| A | 1 | 13:25:00 | 315.080 | 1.0 | 1.20 | 1.20 | 469 | 80 | 74 | 260 | 7 |
| | Stop | 13:35:00 | 321.280 | | | | | | | | |
| B | 6 | 13:37:00 | 321.280 | 1.3 | 1.20 | 1.56 | 470 | 80 | 73 | 260 | 7 |
| B | 5 | 13:47:00 | 328.300 | 1.3 | 1.20 | 1.56 | 470 | 78 | 72 | 260 | 7 |
| B | 4 | 13:57:00 | 335.400 | 1.3 | 1.20 | 1.56 | 470 | 77 | 73 | 257 | 7 |
| B | 3 | 14:07:00 | 343.000 | 1.3 | 1.20 | 1.56 | 470 | 77 | 73 | 260 | 7 |
| B | 2 | 14:17:00 | 348.050 | 1.2 | 1.20 | 1.44 | 468 | 77 | 73 | 257 | 7 |
| B | 1 | 14:27:00 | 354.476 | 1.2 | 1.20 | 1.44 | 470 | 77 | 72 | 252 | 7 |
| | Stop | 14:37:00 | 361.115 | | | | | | | | |
| C | 6 | 14:39:00 | 361.115 | 1.2 | 1.20 | 1.44 | 470 | 77 | 74 | 250 | 7 |
| C | 5 | 14:49:00 | 367.541 | 1.2 | 1.20 | 1.44 | 470 | 78 | 74 | 265 | 7 |
| C | 4 | 14:59:00 | 374.300 | 1.5 | 1.20 | 1.80 | 470 | 79 | 74 | 258 | 7 |
| C | 3 | 15:09:00 | 381.590 | 1.5 | 1.20 | 1.80 | 470 | 80 | 75 | 260 | 8 |
| C | 2 | 15:19:00 | 388.870 | 1.5 | 1.20 | 1.80 | 471 | 79 | 75 | 255 | 8 |
| C | 1 | 15:29:00 | 396.230 | 1.5 | 1.20 | 1.80 | 470 | 78 | 74 | 259 | 8 |
| | Stop | 15:39:00 | 404.000 | | | | | | | | |
| D | 6 | 15:41:00 | 404.000 | 1.2 | 1.20 | 1.44 | 468 | 78 | 75 | 247 | 8 |
| D | 5 | 15:51:00 | 410.650 | 1.2 | 1.20 | 1.44 | 468 | 78 | 75 | 251 | 8 |
| D | 4 | 16:01:00 | 417.210 | 1.5 | 1.20 | 1.80 | 468 | 78 | 75 | 253 | 8 |
| D | 3 | 16:11:00 | 425.610 | 1.5 | 1.20 | 1.80 | 470 | 78 | 75 | 265 | 8 |
| D | 2 | 16:21:00 | 433.210 | 1.0 | 1.20 | 1.20 | 470 | 79 | 75 | 265 | 8 |
| D | 1 | 16:31:00 | 440.000 | 1.0 | 1.20 | 1.20 | 470 | 79 | 75 | 265 | 8 |
| | Stop | 16:41:00 | 445.000 | | | | | | | | |
| **Total/Average** | | **240** | **161.985** | **1.2** | | **1.50** | **470** | **79** | **74** | | |
| | | | | | | | | **76** | | | |

Delta Air Quality Services, Incorporated

# WET CHEMICAL SAMPLING SYSTEM DATA AND WORKSHEET

CLIENT: Exxon Mobil
LOCATION: FCC / 2F-7 Stack
DATE: 6/29/11
RUN NO: FB-DF
OPERATOR:
METER BOX NO
METER ΔH@:
METER Yd:
STACK AREA, FT$^2$:
TRAVERSE POINTS, MIN/POINT:
ΔH= _____ X ΔP:
Probe Condition, pre/post test:
Silica Gel Expended, Y/N:
Filter Condition after Test:
Check Weight:

AMBIENT TEMPERATURE:
BAROMETRIC PRESSURE:
ASSUMED MOISTURE:
PITOT TUBE COEFF, Cp:
PROBE ID NO/MATERIAL: 72 / glass
PROBE LENGTH: 6'
NOZZLE ID NO/ MATERIAL: #2 / glass
NOZZLE DIAMETER: 0.220
FILTER NO/TYPE: 83-470
PRE-TEST LEAK RATE: : _____ CFM@ _____ in. Hg.
POST-TEST LEAK RATE: : _____ CFM@ _____ in. Hg.
PITOT LEAK CHECK - PRE: _____ POST:
CHAIN OF CUSTODY: SAMPLE CUSTODIAN
SAMPLER
SAMPLE CUSTODIAN

| Imp. # | Contents | Post-Test | Pre-Test | Difference |
|---|---|---|---|---|
| 1 | MT | | 666.4 | |
| 2 | Opt $H_2O$ | | 719.6 | |
| 3 | Opt $H_2O$ | | 757.4 | |
| 4 | MT | | 627.2 | |
| 5 | SG | | 792.1 | |
| | | | | |
| Total: | | | | |

| Point | Time | Meter Volume, ft$^3$ | ΔP in. $H_2O$ | ΔH in. $H_2O$ | Stack Temp, °F | Probe Temp, °F | Filter Temp, °F | Coil/Imp Out Temp, °F | Meter Temp, °F In | Meter Temp, °F Out | Vac. in. Hg. | $O_2$ % | Htd Sample Line Temp. °F | P. Satic In. $H_2O$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 6 | | | | | | | | | | | | | | |
| 5 | | | | | | | | | | | | | | |
| 4 | | | | | | | | | | | | | | |
| 3 | | | | | | | | | | | | | | |
| 2 | | | | | | | | | | | | | | |
| 1 | | | | | | | | | | | | | | |
| 0 | | | | | | | | | | | | | | |
| 6 | | | | | | | | | | | | | | |
| 5 | | | | | | | | | | | | | | |
| 4 | | | | | | | | | | | | | | |
| 3 | | | | | | | | | | | | | | |
| 2 | | | | | | | | | | | | | | |
| 1 | | | | | | | | | | | | | | |
| 0 | | | | | | | | | | | | | | |
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Delta Air Quality Services, Incorporated

# WET CHEMICAL SAMPLING SYSTEM DATA AND WORKSHEET

CLIENT: Exxon Mobil
LOCATION: FCC / 2F-7 Stack
DATE: 6/23/11
RUN NO: 1-DF
OPERATOR: SS
METER BOX NO 19WC3
METER ΔH@: .554
METER Yd: 0.990
STACK AREA, FT²:
TRAVERSE POINTS, MIN/POINT: 16/24
ΔH= 1.2 X ΔP:
Probe Condition, pre/post test:
Silica Gel Expended, Y/N:
Filter Condition after Test:
Check Weight:

AMBIENT TEMPERATURE: 85
BAROMETRIC PRESSURE: 29.77
ASSUMED MOISTURE: 4%
PITOT TUBE COEFF, Cp: .84
PROBE ID NO/MATERIAL: 72 / S195
PROBE LENGTH: 6'
NOZZLE ID NO/ MATERIAL: 2 / S195
NOZZLE DIAMETER: .220
FILTER NO/TYPE: 474 / 83
PRE-TEST LEAK RATE: : >0.002 CFM@ 12 in. Hg.
POST-TEST LEAK RATE: : >0.002 CFM@ 12 in. Hg.
PITOT LEAK CHECK - PRE: ✓ POST: ✓
CHAIN OF CUSTODY: SAMPLE CUSTODIAN JR
SAMPLER SS
SAMPLE CUSTODIAN JR

| Imp. # | Contents | Post-Test | Pre-Test | Difference |
|---|---|---|---|---|
| 1 | MT | 976.6 | 667.3 | 309.3 |
| 2 | Opt $H_2O$ | 931.5 | 723.6 | 207.9 |
| 3 | Opt $H_2O$ | 764.6 | 757.9 | 3.7 |
| 4 | MT | 630.2 | 627.7 | 2.5 |
| 5 | SG | 860.4 | 819.5 | 40.9 |
| | | | | |
| Total: | | | | 564.3 |

| Point | Time | Meter Volume, ft³ | ΔP in. $H_2O$ | ΔH in. $H_2O$ | Stack Temp, °F | Probe Temp, °F | Filter Temp, °F | Coil/Imp Out Temp, °F | Meter Temp, °F In | Meter Temp, °F Out | Vac. in. Hg. | $O_2$ % | Htd Sample Line Temp. °F | P. Satic In. $H_2O$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 6 | 1250 | 940.700 | 1.5 | 1.80 | 474 | 250 | 260 | 60 | 89 | 83 | 7.0 | 3% | 250 | -1.3 |
| 5 | 1300 | 948.070 | 1.5 | 1.80 | 474 | 249 | 260 | 60 | 89 | 83 | 7.0 | | 270 | |
| 4 | 1310 | 955.600 | 2.0 | 2.4 | 478 | 259 | 255 | 58 | 90 | 83 | 7.0 | | 270 | |
| 3 | 1320 | 963.830 | 2.0 | 2.4 | 477 | 261 | 248 | 56 | 91 | 83 | 7.0 | | 275 | |
| 2 | 1330 | 972.250 | 2.0 | 2.4 | 476 | 258 | 250 | 60 | 89 | 83 | 7.0 | | 283 | |
| 1 | 1340 | 980.750 | 1.5 | 1.80 | 476 | 253 | 250 | 60 | 90 | 83 | | | 275 | |
| 0 | 1350 | 988.130 | | | | | | | | | | | | |
| 6 | 1352 | 988.130 | 1.3 | 1.56 | 474 | 258 | 251 | 59 | 88 | 83 | 7.0 | | 275 | |
| 5 | 1402 | 995.210 | 1.3 | 1.56 | 474 | 262 | 255 | 57 | 88 | 83 | 7.0 | | 268 | |
| 4 | 1412 | 1002.310 | 1.3 | 1.56 | 473 | 258 | 255 | 56 | 88 | 82 | 7.0 | | 265 | |
| 3 | 1422 | 1009.300 | 1.2 | 1.44 | 472 | 259 | 252 | 57 | 88 | 82 | 7.0 | | 270 | |
| 2 | 1432 | 1016.000 | 1.2 | 1.44 | 472 | 253 | 253 | 56 | 85 | 81 | 7.0 | | 264 | |
| 1 | 1442 | 1022.700 | 1.2 | 1.44 | 472 | 247 | 255 | 56 | 83 | 81 | | | 258 | |
| 0 | 1452 | 1029.330 | | | | | | | | | | | | |
| | | | | | | | | | | | | | | |
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Comments:



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Delta Air Quality Services, Incorporated

# WET CHEMICAL SAMPLING SYSTEM DATA AND WORKSHEET

CLIENT: Exxon Mobil
LOCATION: FCC / 2F-7 Stack
DATE: 6/28/11
RUN NO: 1-OF
OPERATOR: SS
METER BOX NO 19605
METER ΔH@:
METER Yd:
STACK AREA, FT²:
TRAVERSE POINTS, MIN/POINT:
ΔH= X ΔP:
Probe Condition, pre/post test:
Silica Gel Expended, Y/N:
Filter Condition after Test:
Check Weight:

AMBIENT TEMPERATURE:
BAROMETRIC PRESSURE:
ASSUMED MOISTURE:
PITOT TUBE COEFF, Cp:
PROBE ID NO/MATERIAL:
PROBE LENGTH:
NOZZLE ID NO/ MATERIAL:
NOZZLE DIAMETER:
FILTER NO/TYPE:
PRE-TEST LEAK RATE: : CFM@ in. Hg.
POST-TEST LEAK RATE: : CFM@ in. Hg.
PITOT LEAK CHECK - PRE: POST:
CHAIN OF CUSTODY: SAMPLE CUSTODIAN
SAMPLER
SAMPLE CUSTODIAN

| Imp. # | Contents | Post-Test | Pre-Test | = Difference |
|---|---|---|---|---|
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| Total: | | | | |

See pg 1

| Point | Time | Meter Volume, ft³ | ΔP in. H₂O | ΔH in. H₂O | Stack Temp, °F | Probe Temp, °F | Filter Temp, °F | Coil/Imp Out Temp, °F | Meter Temp, °F In | Meter Temp, °F Out | Vac. in. Hg. | O₂ % | Htd Sample Line Temp. °F | P. Satic In. H₂O |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 6 | 1458 | 1029.330 | 1.5 | 1.80 | 470 | 249 | 248 | 60 | 81 | 79 | 9.0 | 3% | 253 | -1.3 |
| 5 | 1508 | 1036.550 | 1.5 | 1.80 | 470 | 250 | 250 | 60 | 82 | 80 | 9.0 | | 255 | |
| 4 | 1518 | 1043.700 | 1.5 | 1.80 | 473 | 253 | 254 | 56 | 81 | 78 | 9.0 | | 262 | |
| 3 | 1528 | 1050.910 | 1.6 | 1.92 | 473 | 253 | 258 | 56 | 80 | 78 | 9.0 | | 267 | |
| 2 | 1538 | 1058.400 | 1.6 | 1.92 | 473 | 253 | 258 | 56 | 81 | 79 | 9.0 | | 266 | |
| 1 | 1548 | 1066.000 | 1.6 | 1.92 | 473 | 257 | 256 | 58 | 79 | 76 | 9.0 | | 264 | |
| 0 | 1558 | 1073.150 | | | | | | | | | | | | |
| 6 | 1600 | 1073.150 | 1.5 | 1.80 | 470 | 257 | 246 | 59 | 77 | 74 | 9.0 | | 274 | |
| 5 | 1610 | 1080.770 | 1.5 | 1.80 | 470 | 255 | 252 | 56 | 79 | 75 | 9.0 | | 254 | |
| 4 | 1620 | 1088.190 | 1.5 | 1.80 | 473 | 259 | 249 | 54 | 79 | 75 | 9.0 | | 261 | |
| 3 | 1630 | 1095.525 | 1.6 | 1.92 | 472 | 258 | 250 | 55 | 78 | 76 | 9.0 | | 261 | |
| 2 | 1640 | 1102.957 | 2.0 | 2.4 | 471 | 257 | 250 | 56 | 79 | 76 | 9.0 | | 270 | |
| 1 | 1650 | 1111.400 | 1.5 | 1.8 | 470 | 250 | 250 | 56 | 80 | 75 | 9.0 | | 270 | |
| 0 | 1700 | 1118.940 | | | | | | | | | | | | |
| | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | |
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Comments:



C-6-12

Delta Air Quality Services, Incorporated

# WET CHEMICAL SAMPLING SYSTEM DATA AND WORKSHEET

CLIENT: Exxon Mobil
LOCATION: FCC / 2F-7 Stack
DATE: 6/29/11
RUN NO: 2-DF
OPERATOR: SS DA
METER BOX NO 19003
METER ΔH@: .554
METER Yd: .996
STACK AREA, FT²: ✓
TRAVERSE POINTS, MIN/POINT: 10/24
ΔH= 1.2 X ΔP:
Probe Condition, pre/post test: ✓
Silica Gel Expended, Y/N: ✓
Filter Condition after Test: ✓
Check Weight: ✓

AMBIENT TEMPERATURE: 75°
BAROMETRIC PRESSURE: 29.85
ASSUMED MOISTURE: 4%
PITOT TUBE COEFF, Cp: .84
PROBE ID NO/MATERIAL: #005/glass
PROBE LENGTH: 6'
NOZZLE ID NO/ MATERIAL: #1 /glass
NOZZLE DIAMETER: .220
FILTER NO/TYPE: 83-466
PRE-TEST LEAK RATE: : 0.002 CFM@ 10" in. Hg.
POST-TEST LEAK RATE: 0.002 CFM@ 12" in. Hg.
PITOT LEAK CHECK - PRE: ✓ POST: ✓
CHAIN OF CUSTODY: SAMPLE CUSTODIAN JP
SAMPLER SS
SAMPLE CUSTODIAN JP

| Imp. # | Contents | Post-Test | Pre-Test | Difference |
|---|---|---|---|---|
| 1 | mT | 959.6 | 653.5 | 306.1 |
| 2 | Opt $H_2O$ | 741.3 | 614.3 | 127.0 |
| 3 | Opt $H_2O$ | 766.0 | 766.1 | -0.1 |
| 4 | mT | 523.2 | 522.0 | 1.2 |
| 5 | SG | 928.0 | 879.6 | 48.4 |
| | | | | |
| Total: | | | | 482.6 |

| Point | Time | Meter Volume, ft³ | ΔP in. $H_2O$ | ΔH in. $H_2O$ | Stack Temp, °F | Probe Temp, °F | Filter Temp, °F | Coil/Imp Out Temp, °F | Meter Temp, °F In | Meter Temp, °F Out | Vac. in. Hg. | $O_2$ % | Htd Sample Line Temp. °F | P. Satic In. $H_2O$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 6 | 0755 | 119.350 | 1.2 | 1.44 | 469 | 262 | 249 | 51 | 66 | 64 | 7.0 | 3% | 220 | -1.3 |
| 5 | 0805 | 125.790 | 1.2 | 1.44 | 470 | 263 | 255 | 47 | 71 | 65 | 7.0 | | 250 | |
| 4 | 0815 | 132.270 | 1.5 | 1.80 | 470 | 261 | 254 | 48 | 74 | 66 | 7.0 | | 265 | |
| 3 | 0825 | 139.600 | 1.5 | 1.80 | 470 | 261 | 255 | 49 | 76 | 67 | 7.0 | | 285 | |
| 2 | 0835 | 146.970 | 1.5 | 1.80 | 470 | 266 | 255 | 50 | 78 | 68 | 7.0 | | 290 | |
| 1 | 0845 | 154.260 | 1.5 | 1.80 | 470 | 269 | 255 | 50 | 77 | 75 | 7.0 | | 291 | |
| 0 | 0855 | 161.210 | | | | | | | | | | | | |
| 6 | 0857 | 161.210 | 1.5 | 1.8 | 470 | 256 | 249 | 52 | 78 | 71 | 7.0 | | 281 | |
| 5 | 0907 | 168.610 | 1.5 | 1.8 | 470 | 266 | 250 | 53 | 82 | 72 | 7.0 | | 278 | |
| 4 | 0917 | 175.780 | 1.5 | 1.8 | 470 | 266 | 250 | 53 | 82 | 72 | 7.0 | | 278 | |
| 3 | 0927 | 183.330 | 1.5 | 1.8 | 472 | 262 | 249 | 47 | 83 | 74 | 8.0 | | 275 | |
| 2 | 0937 | 190.819 | 1.5 | 1.8 | 472 | 262 | 252 | 48 | 85 | 75 | 8.0 | | 276 | |
| 1 | 0947 | 198.335 | 1.5 | 1.8 | 472 | 262 | 252 | 45 | 85 | 75 | 8.0 | | 275 | |
| 0 | 0957 | 205.900 | | | | | | | | | | | | |
| | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | |
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Comments:



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Delta Air Quality Services, Incorporated

# WET CHEMICAL SAMPLING SYSTEM DATA AND WORKSHEET

CLIENT: Exxon Mobil
LOCATION: FCC / 2F-7 Stack
DATE: 01/29/11
RUN NO: 2-DF
OPERATOR: SJ
METER BOX NO 19W05
METER ΔH@:
METER Yd:
STACK AREA, FT²:
TRAVERSE POINTS, MIN/POINT:
ΔH= _____ X ΔP:
Probe Condition, pre/post test:
Silica Gel Expended, Y/N:
Filter Condition after Test:
Check Weight:

AMBIENT TEMPERATURE:
BAROMETRIC PRESSURE: 29.85
ASSUMED MOISTURE:
PITOT TUBE COEFF, Cp:
PROBE ID NO/MATERIAL:
PROBE LENGTH:
NOZZLE ID NO/ MATERIAL:
NOZZLE DIAMETER:
FILTER NO/TYPE:
PRE-TEST LEAK RATE: : _____CFM@_____in. Hg.
POST-TEST LEAK RATE: : _____CFM@_____in. Hg.
PITOT LEAK CHECK - PRE:_____POST:_____
CHAIN OF CUSTODY: SAMPLE CUSTODIAN_____
SAMPLER_____
SAMPLE CUSTODIAN_____

| Imp. # | Contents | Post-Test | Pre-Test | Difference |
|---|---|---|---|---|
| | | | | |
| | SEE Pg 1 | | | |
| | | | | |
| | | | | |
| | | | | |
| Total: | | | | |

| Point | Time | Meter Volume, ft³ | ΔP in. H₂O | ΔH in. H₂O | Stack Temp, °F | Probe Temp, °F | Filter Temp, °F | Coil/Imp Out Temp, °F | Meter Temp, °F In | Meter Temp, °F Out | Vac. in. Hg. | O₂ % | Htd Sample Line Temp. °F | P. Satic In. H₂O |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 6 | 1007 | 205.900 | 1.2 | 1.44 | 474 | 250 | 260 | 48 | 82 | 74 | 8.0 | 3% | 282 | -1.3 |
| 5 | 1017 | 212.460 | 1.2 | 1.44 | 474 | 250 | 266 | 48 | 82 | 74 | 8.0 | | 282 | |
| 4 | 1027 | 218.930 | 1.0 | 1.20 | 469 | 265 | 253 | 48 | 83 | 75 | 8.0 | | 300 | |
| 3 | 1037 | 225.170 | 1.0 | 1.20 | 467 | 260 | 255 | 48 | 83 | 75 | 8.0 | | 313 | |
| 2 | 1047 | 231.355 | 1.0 | 1.20 | 467 | 263 | 255 | 49 | 82 | 75 | 8.0 | | 340 | |
| 1 | 1057 | 237.550 | 1.0 | 1.20 | 468 | 261 | 258 | 51 | 81 | 75 | 8.0 | | 340 | |
| 0 | 1107 | 243.710 | | | | | | | | | | | | |
| 6 | 1109 | 243.710 | 1.2 | 1.44 | 470 | 264 | 263 | 56 | 80 | 74 | 8.0 | | 295 | |
| 5 | 1119 | 249.830 | 1.2 | 1.44 | 469 | 265 | 263 | 51 | 79 | 73 | 8.0 | | 295 | |
| 4 | 1129 | 255.400 | 1.3 | 1.56 | 469 | 260 | 265 | 52 | 79 | 73 | 8.0 | | 330 | |
| 3 | 1139 | 262.825 | 1.3 | 1.56 | 468 | 258 | 255 | 53 | 79 | 73 | 8.0 | | 330 | |
| 2 | 1149 | 269.590 | 1.3 | 1.56 | 469 | 259 | 250 | 54 | 79 | 73 | 8.0 | | 340 | |
| 1 | 1159 | 276.280 | 1.2 | 1.44 | 469 | 258 | 253 | 54 | 79 | 73 | 8.0 | | 340 | |
| 0 | 1209 | 282.856 | | | | | | | | | | | | |
| | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | |
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Comments:

C.6-14

Delta Air Quality Services, Incorporated

# WET CHEMICAL SAMPLING SYSTEM DATA AND WORKSHEET

CLIENT: Exxon Mobil
LOCATION: FCC / 2F-7 Stack
DATE: 6-29-2011
RUN NO: 3-DF
OPERATOR: SB
METER BOX NO 19W65
METER ΔH@: .554
METER Yd: 0.986
STACK AREA, FT²: ✓
TRAVERSE POINTS, MIN/POINT: 10/24
ΔH= 1.2 X ΔP:
Probe Condition, pre/post test: ✓
Silica Gel Expended, Y/N: ✓
Filter Condition after Test: ✓
Check Weight: ✓

AMBIENT TEMPERATURE: 79°
BAROMETRIC PRESSURE: 29.85
ASSUMED MOISTURE: 14%
PITOT TUBE COEFF, Cp: .84
PROBE ID NO/MATERIAL: #72/9/SS
PROBE LENGTH: 6'
NOZZLE ID NO/ MATERIAL: 2/5/SS
NOZZLE DIAMETER: .220
FILTER NO/TYPE: 37DF-476
PRE-TEST LEAK RATE: : <0.002 CFM@ 15 in. Hg.
POST-TEST LEAK RATE: : <0.002 CFM@ 15 in. Hg.
PITOT LEAK CHECK - PRE: ✓ POST: ✓
CHAIN OF CUSTODY: SAMPLE CUSTODIAN SB
SAMPLER SB
SAMPLE CUSTODIAN SB

| Imp. # | Contents | Post-Test | Pre-Test | Difference |
|---|---|---|---|---|
| 1 | empty | 991.7 | 666.2 | 325.5 |
| 2 | optimal $H_2O$ | 833.3 | 712.7 | 120.6 |
| 3 | optimal $H_2O$ | 749.0 | 754.8 | -5.8 |
| 4 | empty | 627.1 | 626.1 | 1.0 |
| 5 | SG | 832.4 | 792.7 | 39.7 |
| | | | | |
| Total: | | | | 481.0 |

| Point | Time | Meter Volume, ft³ | ΔP in. $H_2O$ | ΔH in. $H_2O$ | Stack Temp, °F | Probe Temp, °F | Filter Temp, °F | Coil/Imp Out Temp, °F | Meter Temp, °F In | Meter Temp, °F Out | Vac. in. Hg. | $O_2$ % | Htd Sample Line Temp. °F | P. Satic In. $H_2O$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 6 | 1235 | 283.015 | 1.2 | 1.44 | 471 | 255 | 253 | 60 | 79 | 73 | 7.0 | 8% | 220 | -1.3 |
| 5 | 1245 | 289.510 | 1.2 | 1.44 | 470 | 261 | 255 | 60 | 79 | 73 | 7.0 | | 250 | |
| 4 | 1255 | 296.300 | 1.2 | 1.44 | 470 | 254 | 254 | 60 | 80 | 74 | 7.0 | | 254 | |
| 3 | 1305 | 302.630 | 1.0 | 1.20 | 470 | 258 | 253 | 60 | 80 | 74 | 7.0 | | 268 | |
| 2 | 1315 | 309.300 | 1.0 | 1.20 | 470 | 258 | 255 | 60 | 80 | 74 | 7.0 | | 268 | |
| 1 | 1325 | 316.080 | 1.0 | 1.2 | 469 | 260 | 263 | 55 | 80 | 74 | 7.0 | | 269 | |
| 0 | 1335 | 321.280 | | | | | | | | | | | | |
| 6 | 1337 | 321.280 | 1.3 | 1.56 | 470 | 260 | 265 | 55 | 80 | 73 | 7.0 | | 280 | |
| 5 | 1347 | 328.300 | 1.3 | 1.56 | 470 | 260 | 265 | 56 | 78 | 77 | 7.0 | | 295 | |
| 4 | 1357 | 335.400 | 1.3 | 1.56 | 470 | 257 | 252 | 51 | 77 | 73 | 7.0 | | 269 | |
| 3 | 1407 | 343.000 | 1.3 | 1.56 | 470 | 260 | 250 | 51 | 77 | 73 | 7.0 | | 269 | |
| 2 | 1417 | 348.050 | 1.2 | 1.44 | 468 | 251 | 250 | 51 | 77 | 73 | 7.0 | | 269 | |
| 1 | 1427 | 354.476 | 1.2 | 1.44 | 470 | 252 | 251 | 52 | 77 | 72 | 7.0 | | 271 | |
| 0 | 1437 | 361.115 | | | | | | | | | | | | |
| | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | |

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DS834058
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Delta Air Quality Services, Incorporated

# WET CHEMICAL SAMPLING SYSTEM DATA AND WORKSHEET

CLIENT: Exxon Mobil
LOCATION: FCC / 2F-7 Stack
DATE: 6/29/11
RUN NO: 3-DF
OPERATOR: DS
METER BOX NO 19WCS
METER ΔH@:
METER Yd:
STACK AREA, FT²:
TRAVERSE POINTS, MIN/POINT:
ΔH= _____ X ΔP:
Probe Condition, pre/post test:
Silica Gel Expended, Y/N:
Filter Condition after Test:
Check Weight:

AMBIENT TEMPERATURE:
BAROMETRIC PRESSURE: 29.85
ASSUMED MOISTURE:
PITOT TUBE COEFF, Cp:
PROBE ID NO/MATERIAL:
PROBE LENGTH:
NOZZLE ID NO/ MATERIAL:
NOZZLE DIAMETER:
FILTER NO/TYPE:
PRE-TEST LEAK RATE: _____ CFM@ _____ in. Hg.
POST-TEST LEAK RATE: _____ CFM@ _____ in. Hg.
PITOT LEAK CHECK - PRE: _____ POST: _____
CHAIN OF CUSTODY: SAMPLE CUSTODIAN _____
SAMPLER _____
SAMPLE CUSTODIAN _____

| Imp. # | Contents | Post-Test | Pre-Test | = Difference |
|---|---|---|---|---|
| | SEE PAGE 1 | | | |
| Total: | | | | |

| Point | Time | Meter Volume, ft³ | ΔP in. H₂O | ΔH in. H₂O | Stack Temp, °F | Probe Temp, °F | Filter Temp, °F | Coil/Imp Out Temp, °F | Meter Temp, °F In | Meter Temp, °F Out | Vac. in. Hg. | O₂ % | Htd Sample Line Temp. °F | P. Satic In. H₂O |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 6 | 1439 | 361.115 | 1.2 | 1.44 | 470 | 250 | 250 | 56 | 77 | 74 | 7.0 | 3% | 280 | -1.3 |
| 5 | 1449 | 367.541 | 1.2 | 1.44 | 470 | 265 | 259 | 56 | 78 | 74 | 7.0 | | 280 | |
| 4 | 1459 | 374.300 | 1.5 | 1.80 | 470 | 258 | 249 | 57 | 79 | 74 | 7.0 | | 278 | |
| 3 | 1509 | 381.590 | 1.5 | 1.80 | 470 | 260 | 251 | 58 | 80 | 75 | 8.0 | | 278 | |
| 2 | 1519 | 388.870 | 1.5 | 1.80 | 471 | 255 | 249 | 60 | 79 | 75 | 8.0 | | 275 | |
| 1 | 1529 | 396.230 | 1.5 | 1.80 | 470 | 259 | 249 | 59 | 78 | 74 | 8.0 | | 267 | |
| 0 | 1539 | 404.000 | | | | | | | | | | | | |
| 6 | 1541 | 404.000 | 1.2 | 1.44 | 468 | 247 | 249 | 51 | 79 | 75 | 8.0 | | 266 | |
| 5 | 1551 | 410.650 | 1.2 | 1.44 | 468 | 251 | 250 | 51 | 79 | 75 | 8.0 | | 260 | |
| 4 | 1601 | 417.210 | 1.5 | 1.80 | 468 | 253 | 252 | 51 | 78 | 75 | 8.0 | | 260 | |
| 3 | 1611 | 425.610 | 1.5 | 1.20 | 470 | 265 | 253 | 51 | 78 | 75 | 8.0 | | 280 | |
| 2 | 1621 | 433.210 | 1.0 | 1.20 | 470 | 265 | 259 | 53 | 79 | 75 | 8.0 | | 280 | |
| 1 | 1631 | 440.000 | 1.0 | 1.20 | 470 | 265 | 259 | 53 | 79 | 75 | 8.0 | | 280 | |
| 0 | 1641 | 445.000 | | | | | | | | | | | | |

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Master Document Storage\Forms\Datasheets\Field Datasheets

**ExxonMobil**
**STACK $O_2$, $CO_2$ DATA**

**Test #:** **1-DF**
**Date:** **6/28/2011**
**Time:** **1250/1700**

| | $O_2$ | $CO_2$ |
|---|---|---|
| Range | 10 | 20 |
| Cal Gas | 5.00 | 10.16 |
| Analyzer Zero | 0.05 | 0.00 |
| Analyzer Span | 4.98 | 9.97 |
| Pre-Bias Zero | 0.04 | 0.01 |
| Pre-Bias Span | 5.00 | 10.01 |
| Post-Bias Zero | 0.05 | 0.01 |
| Post-Bias Span | 4.95 | 9.90 |
| Pre-test zero bias | -0.1% | 0.1% |
| Pre-test span bias | 0.1% | 0.2% |
| Post-test zero bias | 0.0% | 0.1% |
| Post-test span bias | -0.3% | -0.3% |
| Zero Drift | 0.1% | 0.0% |
| Span Drift | -0.4% | -0.5% |
| | PASS | PASS |
| **Average** | **5.10** | **13.64** |
| **Cal Corrected** | **5.13** | **13.93** |

**ExxonMobil**
**1-DF**

| Date | Time | O2 % | CO2 % |
|---|---|---|---|
| 6/28/2011 | 12:51:00 PM | 5.046 | 13.953 |
| 6/28/2011 | 12:52:00 PM | 5.106 | 13.915 |
| 6/28/2011 | 12:53:00 PM | 5.111 | 13.899 |
| 6/28/2011 | 12:54:00 PM | 5.085 | 13.929 |
| 6/28/2011 | 12:55:00 PM | 5.104 | 13.926 |
| 6/28/2011 | 12:56:00 PM | 5.074 | 13.956 |
| 6/28/2011 | 12:57:00 PM | 5.102 | 13.915 |
| 6/28/2011 | 12:58:00 PM | 5.088 | 14.022 |
| 6/28/2011 | 12:59:00 PM | 5.113 | 14.052 |
| 6/28/2011 | 1:00:00 PM | 5.107 | 14.073 |
| 6/28/2011 | 1:01:00 PM | 5.093 | 14.076 |
| 6/28/2011 | 1:02:00 PM | 5.082 | 14.089 |
| 6/28/2011 | 1:03:00 PM | 5.076 | 14.107 |
| 6/28/2011 | 1:04:00 PM | 5.029 | 13.89 |
| 6/28/2011 | 1:05:00 PM | 4.934 | 13.773 |
| 6/28/2011 | 1:06:00 PM | 4.877 | 13.823 |
| 6/28/2011 | 1:07:00 PM | 4.911 | 13.772 |
| 6/28/2011 | 1:08:00 PM | 4.887 | 13.805 |
| 6/28/2011 | 1:09:00 PM | 4.917 | 13.776 |
| 6/28/2011 | 1:10:00 PM | 4.933 | 13.77 |
| 6/28/2011 | 1:11:00 PM | 4.889 | 13.822 |
| 6/28/2011 | 1:12:00 PM | 4.908 | 13.792 |
| 6/28/2011 | 1:13:00 PM | 4.898 | 13.798 |
| 6/28/2011 | 1:14:00 PM | 4.893 | 13.813 |
| 6/28/2011 | 1:15:00 PM | 4.889 | 13.797 |
| 6/28/2011 | 1:16:00 PM | 4.896 | 13.809 |
| 6/28/2011 | 1:17:00 PM | 4.938 | 13.79 |
| 6/28/2011 | 1:18:00 PM | 4.936 | 13.812 |
| 6/28/2011 | 1:19:00 PM | 5 | 13.748 |
| 6/28/2011 | 1:20:00 PM | 5.019 | 13.717 |
| 6/28/2011 | 1:21:00 PM | 5.007 | 13.706 |
| 6/28/2011 | 1:22:00 PM | 5.019 | 13.724 |
| 6/28/2011 | 1:23:00 PM | 5.026 | 13.705 |
| 6/28/2011 | 1:24:00 PM | 5.077 | 13.661 |
| 6/28/2011 | 1:25:00 PM | 5.036 | 13.702 |
| 6/28/2011 | 1:26:00 PM | 5.057 | 13.675 |
| 6/28/2011 | 1:27:00 PM | 5.057 | 13.68 |
| 6/28/2011 | 1:28:00 PM | 5.035 | 13.693 |
| 6/28/2011 | 1:29:00 PM | 5.039 | 13.693 |
| 6/28/2011 | 1:30:00 PM | 5.043 | 13.682 |
| 6/28/2011 | 1:31:00 PM | 5.022 | 13.697 |
| 6/28/2011 | 1:32:00 PM | 4.955 | 13.758 |
| 6/28/2011 | 1:33:00 PM | 4.925 | 13.785 |
| 6/28/2011 | 1:34:00 PM | 4.975 | 13.755 |
| 6/28/2011 | 1:35:00 PM | 5.045 | 13.691 |
| 6/28/2011 | 1:36:00 PM | 5.047 | 13.692 |
| 6/28/2011 | 1:37:00 PM | 5.05 | 13.681 |

| | | | |
|---|---|---|---|
| 6/28/2011 | 1:38:00 PM | 5.072 | 13.666 |
| 6/28/2011 | 1:39:00 PM | 5.024 | 13.706 |
| 6/28/2011 | 1:40:00 PM | 5.019 | 13.709 |
| 6/28/2011 | 1:41:00 PM | 4.994 | 13.732 |
| 6/28/2011 | 1:42:00 PM | 4.986 | 13.753 |
| 6/28/2011 | 1:43:00 PM | 4.994 | 13.745 |
| 6/28/2011 | 1:44:00 PM | 5.006 | 13.73 |
| 6/28/2011 | 1:45:00 PM | 4.955 | 13.769 |
| 6/28/2011 | 1:46:00 PM | 4.923 | 13.818 |
| 6/28/2011 | 1:47:00 PM | 4.931 | 13.797 |
| 6/28/2011 | 1:48:00 PM | 4.955 | 13.771 |
| 6/28/2011 | 1:49:00 PM | 4.96 | 13.784 |
| 6/28/2011 | 1:50:00 PM | 4.976 | 13.755 |
| 6/28/2011 | 1:53:00 PM | 4.97 | 13.748 |
| 6/28/2011 | 1:54:00 PM | 5 | 13.706 |
| 6/28/2011 | 1:55:00 PM | 5.001 | 13.717 |
| 6/28/2011 | 1:56:00 PM | 5.01 | 13.715 |
| 6/28/2011 | 1:57:00 PM | 4.974 | 13.752 |
| 6/28/2011 | 1:58:00 PM | 4.963 | 13.77 |
| 6/28/2011 | 1:59:00 PM | 4.963 | 13.772 |
| 6/28/2011 | 2:00:00 PM | 4.912 | 13.835 |
| 6/28/2011 | 2:01:00 PM | 4.96 | 13.764 |
| 6/28/2011 | 2:02:00 PM | 5 | 13.733 |
| 6/28/2011 | 2:03:00 PM | 5.078 | 13.675 |
| 6/28/2011 | 2:04:00 PM | 5.048 | 13.693 |
| 6/28/2011 | 2:05:00 PM | 5.056 | 13.673 |
| 6/28/2011 | 2:06:00 PM | 5.018 | 13.717 |
| 6/28/2011 | 2:07:00 PM | 5.073 | 13.664 |
| 6/28/2011 | 2:08:00 PM | 5.06 | 13.672 |
| 6/28/2011 | 2:09:00 PM | 5.037 | 13.687 |
| 6/28/2011 | 2:10:00 PM | 4.996 | 13.722 |
| 6/28/2011 | 2:11:00 PM | 4.974 | 13.766 |
| 6/28/2011 | 2:12:00 PM | 4.979 | 13.74 |
| 6/28/2011 | 2:13:00 PM | 4.965 | 13.752 |
| 6/28/2011 | 2:14:00 PM | 4.896 | 13.839 |
| 6/28/2011 | 2:15:00 PM | 4.908 | 13.815 |
| 6/28/2011 | 2:16:00 PM | 4.937 | 13.795 |
| 6/28/2011 | 2:17:00 PM | 4.939 | 13.783 |
| 6/28/2011 | 2:18:00 PM | 4.93 | 13.792 |
| 6/28/2011 | 2:19:00 PM | 4.996 | 13.745 |
| 6/28/2011 | 2:20:00 PM | 4.973 | 13.755 |
| 6/28/2011 | 2:21:00 PM | 4.877 | 13.845 |
| 6/28/2011 | 2:22:00 PM | 4.891 | 13.84 |
| 6/28/2011 | 2:23:00 PM | 4.928 | 13.796 |
| 6/28/2011 | 2:24:00 PM | 4.923 | 13.802 |
| 6/28/2011 | 2:25:00 PM | 4.921 | 13.801 |
| 6/28/2011 | 2:26:00 PM | 4.958 | 13.759 |
| 6/28/2011 | 2:27:00 PM | 4.991 | 13.734 |
| 6/28/2011 | 2:28:00 PM | 4.945 | 13.768 |
| 6/28/2011 | 2:29:00 PM | 4.95 | 13.77 |
| 6/28/2011 | 2:30:00 PM | 4.958 | 13.759 |
| 6/28/2011 | 2:31:00 PM | 4.921 | 13.779 |

| | | | |
|---|---|---|---|
| 6/28/2011 | 2:32:00 PM | 4.958 | 13.751 |
| 6/28/2011 | 2:33:00 PM | 4.992 | 13.717 |
| 6/28/2011 | 2:34:00 PM | 4.943 | 13.769 |
| 6/28/2011 | 2:35:00 PM | 4.964 | 13.764 |
| 6/28/2011 | 2:36:00 PM | 4.933 | 13.786 |
| 6/28/2011 | 2:37:00 PM | 4.96 | 13.752 |
| 6/28/2011 | 2:38:00 PM | 4.951 | 13.761 |
| 6/28/2011 | 2:39:00 PM | 4.96 | 13.74 |
| 6/28/2011 | 2:40:00 PM | 4.923 | 13.764 |
| 6/28/2011 | 2:41:00 PM | 4.919 | 13.781 |
| 6/28/2011 | 2:42:00 PM | 4.885 | 13.805 |
| 6/28/2011 | 2:43:00 PM | 4.937 | 13.748 |
| 6/28/2011 | 2:44:00 PM | 4.961 | 13.712 |
| 6/28/2011 | 2:45:00 PM | 4.939 | 13.739 |
| 6/28/2011 | 2:46:00 PM | 4.975 | 13.706 |
| 6/28/2011 | 2:47:00 PM | 4.972 | 13.706 |
| 6/28/2011 | 2:48:00 PM | 4.991 | 13.694 |
| 6/28/2011 | 2:49:00 PM | 4.935 | 13.741 |
| 6/28/2011 | 2:50:00 PM | 4.981 | 13.696 |
| 6/28/2011 | 2:51:00 PM | 4.968 | 13.705 |
| 6/28/2011 | 2:52:00 PM | 4.975 | 13.708 |
| 6/28/2011 | 2:59:00 PM | 5.066 | 13.594 |
| 6/28/2011 | 3:00:00 PM | 5.096 | 13.593 |
| 6/28/2011 | 3:01:00 PM | 5.105 | 13.569 |
| 6/28/2011 | 3:02:00 PM | 5.119 | 13.555 |
| 6/28/2011 | 3:03:00 PM | 5.123 | 13.549 |
| 6/28/2011 | 3:04:00 PM | 5.136 | 13.531 |
| 6/28/2011 | 3:05:00 PM | 5.156 | 13.527 |
| 6/28/2011 | 3:06:00 PM | 5.154 | 13.53 |
| 6/28/2011 | 3:07:00 PM | 5.181 | 13.489 |
| 6/28/2011 | 3:08:00 PM | 5.196 | 13.487 |
| 6/28/2011 | 3:09:00 PM | 5.188 | 13.502 |
| 6/28/2011 | 3:10:00 PM | 5.207 | 13.479 |
| 6/28/2011 | 3:11:00 PM | 5.213 | 13.456 |
| 6/28/2011 | 3:12:00 PM | 5.206 | 13.469 |
| 6/28/2011 | 3:13:00 PM | 5.16 | 13.506 |
| 6/28/2011 | 3:14:00 PM | 5.196 | 13.5 |
| 6/28/2011 | 3:15:00 PM | 5.235 | 13.445 |
| 6/28/2011 | 3:16:00 PM | 5.272 | 13.406 |
| 6/28/2011 | 3:17:00 PM | 5.249 | 13.431 |
| 6/28/2011 | 3:18:00 PM | 5.18 | 13.488 |
| 6/28/2011 | 3:19:00 PM | 5.176 | 13.504 |
| 6/28/2011 | 3:20:00 PM | 5.232 | 13.447 |
| 6/28/2011 | 3:21:00 PM | 5.219 | 13.458 |
| 6/28/2011 | 3:22:00 PM | 5.227 | 13.442 |
| 6/28/2011 | 3:23:00 PM | 5.215 | 13.476 |
| 6/28/2011 | 3:24:00 PM | 5.221 | 13.474 |
| 6/28/2011 | 3:25:00 PM | 5.244 | 13.455 |
| 6/28/2011 | 3:26:00 PM | 5.279 | 13.416 |
| 6/28/2011 | 3:27:00 PM | 5.34 | 13.371 |
| 6/28/2011 | 3:28:00 PM | 5.331 | 13.37 |
| 6/28/2011 | 3:29:00 PM | 5.353 | 13.355 |

| | | | |
|---|---|---|---|
| 6/28/2011 | 3:30:00 PM | 5.319 | 13.364 |
| 6/28/2011 | 3:31:00 PM | 5.266 | 13.421 |
| 6/28/2011 | 3:32:00 PM | 5.203 | 13.474 |
| 6/28/2011 | 3:33:00 PM | 5.167 | 13.52 |
| 6/28/2011 | 3:34:00 PM | 5.162 | 13.508 |
| 6/28/2011 | 3:35:00 PM | 5.185 | 13.505 |
| 6/28/2011 | 3:36:00 PM | 5.152 | 13.534 |
| 6/28/2011 | 3:37:00 PM | 5.168 | 13.517 |
| 6/28/2011 | 3:38:00 PM | 5.151 | 13.543 |
| 6/28/2011 | 3:39:00 PM | 5.132 | 13.55 |
| 6/28/2011 | 3:40:00 PM | 5.154 | 13.559 |
| 6/28/2011 | 3:41:00 PM | 5.178 | 13.552 |
| 6/28/2011 | 3:42:00 PM | 5.256 | 13.473 |
| 6/28/2011 | 3:43:00 PM | 5.274 | 13.453 |
| 6/28/2011 | 3:44:00 PM | 5.239 | 13.478 |
| 6/28/2011 | 3:45:00 PM | 5.224 | 13.504 |
| 6/28/2011 | 3:46:00 PM | 5.192 | 13.529 |
| 6/28/2011 | 3:47:00 PM | 5.207 | 13.548 |
| 6/28/2011 | 3:48:00 PM | 5.222 | 13.517 |
| 6/28/2011 | 3:49:00 PM | 5.204 | 13.537 |
| 6/28/2011 | 3:50:00 PM | 5.217 | 13.499 |
| 6/28/2011 | 3:51:00 PM | 5.164 | 13.557 |
| 6/28/2011 | 3:52:00 PM | 5.129 | 13.598 |
| 6/28/2011 | 3:53:00 PM | 5.145 | 13.586 |
| 6/28/2011 | 3:54:00 PM | 5.137 | 13.586 |
| 6/28/2011 | 3:55:00 PM | 5.129 | 13.619 |
| 6/28/2011 | 3:56:00 PM | 5.194 | 13.546 |
| 6/28/2011 | 3:57:00 PM | 5.19 | 13.534 |
| 6/28/2011 | 3:58:00 PM | 5.15 | 13.57 |
| 6/28/2011 | 4:01:00 PM | 5.092 | 13.626 |
| 6/28/2011 | 4:02:00 PM | 5.051 | 13.662 |
| 6/28/2011 | 4:03:00 PM | 5.077 | 13.636 |
| 6/28/2011 | 4:04:00 PM | 5.129 | 13.602 |
| 6/28/2011 | 4:05:00 PM | 5.166 | 13.561 |
| 6/28/2011 | 4:06:00 PM | 5.127 | 13.607 |
| 6/28/2011 | 4:07:00 PM | 5.163 | 13.599 |
| 6/28/2011 | 4:08:00 PM | 5.24 | 13.513 |
| 6/28/2011 | 4:09:00 PM | 5.261 | 13.505 |
| 6/28/2011 | 4:10:00 PM | 5.294 | 13.455 |
| 6/28/2011 | 4:11:00 PM | 5.32 | 13.435 |
| 6/28/2011 | 4:12:00 PM | 5.283 | 13.464 |
| 6/28/2011 | 4:13:00 PM | 5.21 | 13.538 |
| 6/28/2011 | 4:14:00 PM | 5.181 | 13.584 |
| 6/28/2011 | 4:15:00 PM | 5.237 | 13.534 |
| 6/28/2011 | 4:16:00 PM | 5.249 | 13.529 |
| 6/28/2011 | 4:17:00 PM | 5.317 | 13.471 |
| 6/28/2011 | 4:18:00 PM | 5.367 | 13.428 |
| 6/28/2011 | 4:19:00 PM | 5.371 | 13.409 |
| 6/28/2011 | 4:20:00 PM | 5.418 | 13.362 |
| 6/28/2011 | 4:21:00 PM | 5.376 | 13.386 |
| 6/28/2011 | 4:22:00 PM | 5.311 | 13.446 |
| 6/28/2011 | 4:23:00 PM | 5.28 | 13.473 |

| | | | |
|---|---|---|---|
| 6/28/2011 | 4:24:00 PM | 5.267 | 13.484 |
| 6/28/2011 | 4:25:00 PM | 5.279 | 13.473 |
| 6/28/2011 | 4:26:00 PM | 5.251 | 13.513 |
| 6/28/2011 | 4:27:00 PM | 5.257 | 13.513 |
| 6/28/2011 | 4:28:00 PM | 5.282 | 13.489 |
| 6/28/2011 | 4:29:00 PM | 5.312 | 13.461 |
| 6/28/2011 | 4:30:00 PM | 5.325 | 13.432 |
| 6/28/2011 | 4:31:00 PM | 5.36 | 13.4 |
| 6/28/2011 | 4:32:00 PM | 5.356 | 13.406 |
| 6/28/2011 | 4:33:00 PM | 5.333 | 13.417 |
| 6/28/2011 | 4:34:00 PM | 5.289 | 13.46 |
| 6/28/2011 | 4:35:00 PM | 5.255 | 13.497 |
| 6/28/2011 | 4:36:00 PM | 5.299 | 13.455 |
| 6/28/2011 | 4:37:00 PM | 5.306 | 13.449 |
| 6/28/2011 | 4:38:00 PM | 5.334 | 13.419 |
| 6/28/2011 | 4:39:00 PM | 5.353 | 13.403 |
| 6/28/2011 | 4:40:00 PM | 5.355 | 13.393 |
| 6/28/2011 | 4:41:00 PM | 5.285 | 13.453 |
| 6/28/2011 | 4:42:00 PM | 5.245 | 13.507 |
| 6/28/2011 | 4:43:00 PM | 5.235 | 13.507 |
| 6/28/2011 | 4:44:00 PM | 5.215 | 13.52 |
| 6/28/2011 | 4:45:00 PM | 5.148 | 13.57 |
| 6/28/2011 | 4:46:00 PM | 5.135 | 13.606 |
| 6/28/2011 | 4:47:00 PM | 5.203 | 13.547 |
| 6/28/2011 | 4:48:00 PM | 5.16 | 13.575 |
| 6/28/2011 | 4:49:00 PM | 5.131 | 13.626 |
| 6/28/2011 | 4:50:00 PM | 5.197 | 13.555 |
| 6/28/2011 | 4:51:00 PM | 5.248 | 13.505 |
| 6/28/2011 | 4:52:00 PM | 5.271 | 13.497 |
| 6/28/2011 | 4:53:00 PM | 5.231 | 13.537 |
| 6/28/2011 | 4:54:00 PM | 5.167 | 13.603 |
| 6/28/2011 | 4:55:00 PM | 5.207 | 13.58 |
| 6/28/2011 | 4:56:00 PM | 5.168 | 13.614 |
| 6/28/2011 | 4:57:00 PM | 5.218 | 13.559 |
| 6/28/2011 | 4:58:00 PM | 5.176 | 13.597 |
| 6/28/2011 | 4:59:00 PM | 5.191 | 13.579 |
| 6/28/2011 | 5:00:00 PM | 5.244 | 13.528 |
| | Average | 5.10 | 13.64 |

**ExxonMobil**
**STACK $O_2$, $CO_2$ DATA**

**Test #:** **2-DF**
**Date:** **6/29/2011**
**Time:** **755/1209**

| | $O_2$ | $CO_2$ |
|---|---|---|
| Range | 10 | 20 |
| Cal Gas | 5.00 | 10.16 |
| Analyzer Zero | 0.04 | -0.01 |
| Analyzer Span | 5.06 | 10.00 |
| Pre-Bias Zero | 0.06 | 0.02 |
| Pre-Bias Span | 5.02 | 9.87 |
| Post-Bias Zero | 0.06 | 0.02 |
| Post-Bias Span | 4.98 | 9.82 |
| Pre-test zero bias | 0.2% | 0.2% |
| Pre-test span bias | -0.4% | -0.6% |
| Post-test zero bias | 0.1% | 0.2% |
| Post-test span bias | -0.8% | -0.9% |
| Zero Drift | 0.0% | 0.0% |
| Span Drift | -0.4% | -0.3% |
| | PASS | PASS |
| **Average** | **5.33** | **13.36** |
| **Cal Corrected** | **5.34** | **13.80** |

**ExxonMobil**
**2-DF**

| Date | Time | O2 % | CO2 % |
|---|---|---|---|
| 6/29/2011 | 7:56:00 AM | 5.6 | 13.967 |
| 6/29/2011 | 7:57:00 AM | 5.726 | 14.003 |
| 6/29/2011 | 7:58:00 AM | 5.808 | 14.146 |
| 6/29/2011 | 7:59:00 AM | 5.9 | 14.227 |
| 6/29/2011 | 8:00:00 AM | 5.473 | 13.187 |
| 6/29/2011 | 8:01:00 AM | 5.46 | 13.186 |
| 6/29/2011 | 8:02:00 AM | 5.442 | 13.242 |
| 6/29/2011 | 8:03:00 AM | 5.495 | 13.212 |
| 6/29/2011 | 8:04:00 AM | 5.508 | 13.161 |
| 6/29/2011 | 8:05:00 AM | 5.491 | 13.232 |
| 6/29/2011 | 8:06:00 AM | 5.473 | 13.249 |
| 6/29/2011 | 8:07:00 AM | 5.437 | 13.289 |
| 6/29/2011 | 8:08:00 AM | 5.441 | 13.279 |
| 6/29/2011 | 8:09:00 AM | 5.376 | 13.362 |
| 6/29/2011 | 8:10:00 AM | 5.381 | 13.369 |
| 6/29/2011 | 8:11:00 AM | 5.453 | 13.318 |
| 6/29/2011 | 8:12:00 AM | 5.482 | 13.173 |
| 6/29/2011 | 8:13:00 AM | 5.46 | 13.192 |
| 6/29/2011 | 8:14:00 AM | 5.494 | 13.168 |
| 6/29/2011 | 8:15:00 AM | 5.486 | 13.165 |
| 6/29/2011 | 8:16:00 AM | 5.463 | 13.177 |
| 6/29/2011 | 8:17:00 AM | 5.418 | 13.197 |
| 6/29/2011 | 8:18:00 AM | 5.391 | 13.231 |
| 6/29/2011 | 8:19:00 AM | 5.429 | 13.209 |
| 6/29/2011 | 8:20:00 AM | 5.403 | 13.22 |
| 6/29/2011 | 8:21:00 AM | 5.408 | 13.232 |
| 6/29/2011 | 8:22:00 AM | 5.402 | 13.216 |
| 6/29/2011 | 8:23:00 AM | 5.341 | 13.27 |
| 6/29/2011 | 8:24:00 AM | 5.336 | 13.285 |
| 6/29/2011 | 8:25:00 AM | 5.339 | 13.265 |
| 6/29/2011 | 8:26:00 AM | 5.364 | 13.262 |
| 6/29/2011 | 8:27:00 AM | 5.393 | 13.236 |
| 6/29/2011 | 8:28:00 AM | 5.423 | 13.217 |
| 6/29/2011 | 8:29:00 AM | 5.391 | 13.235 |
| 6/29/2011 | 8:30:00 AM | 5.356 | 13.264 |
| 6/29/2011 | 8:31:00 AM | 5.324 | 13.29 |
| 6/29/2011 | 8:32:00 AM | 5.304 | 13.301 |
| 6/29/2011 | 8:33:00 AM | 5.274 | 13.343 |
| 6/29/2011 | 8:34:00 AM | 5.337 | 13.28 |
| 6/29/2011 | 8:35:00 AM | 5.331 | 13.291 |
| 6/29/2011 | 8:36:00 AM | 5.388 | 13.271 |
| 6/29/2011 | 8:37:00 AM | 5.403 | 13.262 |
| 6/29/2011 | 8:38:00 AM | 5.392 | 13.27 |
| 6/29/2011 | 8:39:00 AM | 5.39 | 13.279 |
| 6/29/2011 | 8:40:00 AM | 5.389 | 13.272 |
| 6/29/2011 | 8:41:00 AM | 5.442 | 13.212 |
| 6/29/2011 | 8:42:00 AM | 5.384 | 13.281 |

| | | | |
|---|---|---|---|
| 6/29/2011 | 8:43:00 AM | 5.387 | 13.285 |
| 6/29/2011 | 8:44:00 AM | 5.436 | 13.247 |
| 6/29/2011 | 8:45:00 AM | 5.436 | 13.252 |
| 6/29/2011 | 8:46:00 AM | 5.41 | 13.253 |
| 6/29/2011 | 8:47:00 AM | 5.465 | 13.198 |
| 6/29/2011 | 8:48:00 AM | 5.456 | 13.21 |
| 6/29/2011 | 8:49:00 AM | 5.442 | 13.211 |
| 6/29/2011 | 8:50:00 AM | 5.409 | 13.235 |
| 6/29/2011 | 8:51:00 AM | 5.346 | 13.311 |
| 6/29/2011 | 8:52:00 AM | 5.315 | 13.317 |
| 6/29/2011 | 8:53:00 AM | 5.259 | 13.382 |
| 6/29/2011 | 8:54:00 AM | 5.306 | 13.344 |
| 6/29/2011 | 8:55:00 AM | 5.331 | 13.332 |
| 6/29/2011 | 8:58:00 AM | 5.372 | 13.291 |
| 6/29/2011 | 8:59:00 AM | 5.411 | 13.245 |
| 6/29/2011 | 9:00:00 AM | 5.374 | 13.265 |
| 6/29/2011 | 9:01:00 AM | 5.377 | 13.27 |
| 6/29/2011 | 9:02:00 AM | 5.355 | 13.268 |
| 6/29/2011 | 9:03:00 AM | 5.334 | 13.285 |
| 6/29/2011 | 9:04:00 AM | 5.329 | 13.3 |
| 6/29/2011 | 9:05:00 AM | 5.313 | 13.32 |
| 6/29/2011 | 9:06:00 AM | 5.321 | 13.323 |
| 6/29/2011 | 9:07:00 AM | 5.327 | 13.313 |
| 6/29/2011 | 9:08:00 AM | 5.358 | 13.293 |
| 6/29/2011 | 9:09:00 AM | 5.424 | 13.245 |
| 6/29/2011 | 9:10:00 AM | 5.402 | 13.25 |
| 6/29/2011 | 9:11:00 AM | 5.384 | 13.277 |
| 6/29/2011 | 9:12:00 AM | 5.361 | 13.285 |
| 6/29/2011 | 9:13:00 AM | 5.281 | 13.38 |
| 6/29/2011 | 9:14:00 AM | 5.292 | 13.354 |
| 6/29/2011 | 9:15:00 AM | 5.309 | 13.353 |
| 6/29/2011 | 9:16:00 AM | 5.346 | 13.319 |
| 6/29/2011 | 9:17:00 AM | 5.336 | 13.322 |
| 6/29/2011 | 9:18:00 AM | 5.321 | 13.339 |
| 6/29/2011 | 9:19:00 AM | 5.351 | 13.319 |
| 6/29/2011 | 9:20:00 AM | 5.365 | 13.29 |
| 6/29/2011 | 9:21:00 AM | 5.335 | 13.316 |
| 6/29/2011 | 9:22:00 AM | 5.38 | 13.276 |
| 6/29/2011 | 9:23:00 AM | 5.351 | 13.302 |
| 6/29/2011 | 9:24:00 AM | 5.349 | 13.299 |
| 6/29/2011 | 9:25:00 AM | 5.371 | 13.28 |
| 6/29/2011 | 9:26:00 AM | 5.374 | 13.288 |
| 6/29/2011 | 9:27:00 AM | 5.331 | 13.313 |
| 6/29/2011 | 9:28:00 AM | 5.315 | 13.337 |
| 6/29/2011 | 9:29:00 AM | 5.303 | 13.342 |
| 6/29/2011 | 9:30:00 AM | 5.345 | 13.306 |
| 6/29/2011 | 9:31:00 AM | 5.326 | 13.306 |
| 6/29/2011 | 9:32:00 AM | 5.32 | 13.327 |
| 6/29/2011 | 9:33:00 AM | 5.288 | 13.359 |
| 6/29/2011 | 9:34:00 AM | 5.293 | 13.356 |
| 6/29/2011 | 9:35:00 AM | 5.292 | 13.35 |
| 6/29/2011 | 9:36:00 AM | 5.323 | 13.334 |

| | | | |
|---|---|---|---|
| 6/29/2011 | 9:37:00 AM | 5.319 | 13.344 |
| 6/29/2011 | 9:38:00 AM | 5.33 | 13.325 |
| 6/29/2011 | 9:39:00 AM | 5.309 | 13.354 |
| 6/29/2011 | 9:40:00 AM | 5.313 | 13.343 |
| 6/29/2011 | 9:41:00 AM | 5.313 | 13.36 |
| 6/29/2011 | 9:42:00 AM | 5.287 | 13.373 |
| 6/29/2011 | 9:43:00 AM | 5.244 | 13.418 |
| 6/29/2011 | 9:44:00 AM | 5.217 | 13.467 |
| 6/29/2011 | 9:45:00 AM | 5.29 | 13.4 |
| 6/29/2011 | 9:46:00 AM | 5.295 | 13.447 |
| 6/29/2011 | 9:47:00 AM | 5.318 | 13.453 |
| 6/29/2011 | 9:48:00 AM | 5.358 | 13.43 |
| 6/29/2011 | 9:49:00 AM | 5.358 | 13.459 |
| 6/29/2011 | 9:50:00 AM | 5.331 | 13.498 |
| 6/29/2011 | 9:51:00 AM | 5.477 | 13.761 |
| 6/29/2011 | 9:52:00 AM | 5.447 | 13.731 |
| 6/29/2011 | 9:53:00 AM | 5.289 | 13.4 |
| 6/29/2011 | 9:54:00 AM | 5.317 | 13.361 |
| 6/29/2011 | 9:55:00 AM | 5.302 | 13.398 |
| 6/29/2011 | 9:56:00 AM | 5.314 | 13.406 |
| 6/29/2011 | 9:57:00 AM | 5.324 | 13.369 |
| 6/29/2011 | 10:08:00 AM | 5.385 | 13.417 |
| 6/29/2011 | 10:09:00 AM | 5.386 | 13.425 |
| 6/29/2011 | 10:10:00 AM | 5.334 | 13.476 |
| 6/29/2011 | 10:11:00 AM | 5.33 | 13.466 |
| 6/29/2011 | 10:12:00 AM | 5.33 | 13.481 |
| 6/29/2011 | 10:13:00 AM | 5.347 | 13.472 |
| 6/29/2011 | 10:14:00 AM | 5.358 | 13.468 |
| 6/29/2011 | 10:15:00 AM | 5.406 | 13.406 |
| 6/29/2011 | 10:16:00 AM | 5.444 | 13.374 |
| 6/29/2011 | 10:17:00 AM | 5.428 | 13.386 |
| 6/29/2011 | 10:18:00 AM | 5.43 | 13.379 |
| 6/29/2011 | 10:19:00 AM | 5.392 | 13.438 |
| 6/29/2011 | 10:20:00 AM | 5.37 | 13.453 |
| 6/29/2011 | 10:21:00 AM | 5.411 | 13.383 |
| 6/29/2011 | 10:22:00 AM | 5.375 | 13.405 |
| 6/29/2011 | 10:23:00 AM | 5.335 | 13.45 |
| 6/29/2011 | 10:24:00 AM | 5.328 | 13.464 |
| 6/29/2011 | 10:25:00 AM | 5.345 | 13.441 |
| 6/29/2011 | 10:26:00 AM | 5.336 | 13.447 |
| 6/29/2011 | 10:27:00 AM | 5.347 | 13.441 |
| 6/29/2011 | 10:28:00 AM | 5.334 | 13.44 |
| 6/29/2011 | 10:29:00 AM | 5.3 | 13.47 |
| 6/29/2011 | 10:30:00 AM | 5.274 | 13.487 |
| 6/29/2011 | 10:31:00 AM | 5.257 | 13.498 |
| 6/29/2011 | 10:32:00 AM | 5.27 | 13.49 |
| 6/29/2011 | 10:33:00 AM | 5.295 | 13.463 |
| 6/29/2011 | 10:34:00 AM | 5.29 | 13.487 |
| 6/29/2011 | 10:35:00 AM | 5.265 | 13.499 |
| 6/29/2011 | 10:36:00 AM | 5.214 | 13.532 |
| 6/29/2011 | 10:37:00 AM | 5.226 | 13.5 |
| 6/29/2011 | 10:38:00 AM | 5.226 | 13.515 |

| | | | |
|---|---|---|---|
| 6/29/2011 | 10:39:00 AM | 5.253 | 13.487 |
| 6/29/2011 | 10:40:00 AM | 5.192 | 13.56 |
| 6/29/2011 | 10:41:00 AM | 5.265 | 13.477 |
| 6/29/2011 | 10:42:00 AM | 5.301 | 13.437 |
| 6/29/2011 | 10:43:00 AM | 5.368 | 13.367 |
| 6/29/2011 | 10:44:00 AM | 5.367 | 13.399 |
| 6/29/2011 | 10:45:00 AM | 5.357 | 13.429 |
| 6/29/2011 | 10:46:00 AM | 5.344 | 13.472 |
| 6/29/2011 | 10:47:00 AM | 5.336 | 13.527 |
| 6/29/2011 | 10:48:00 AM | 5.354 | 13.649 |
| 6/29/2011 | 10:49:00 AM | 5.39 | 13.757 |
| 6/29/2011 | 10:50:00 AM | 5.454 | 13.704 |
| 6/29/2011 | 10:51:00 AM | 5.487 | 13.761 |
| 6/29/2011 | 10:52:00 AM | 5.509 | 13.765 |
| 6/29/2011 | 10:53:00 AM | 5.464 | 13.691 |
| 6/29/2011 | 10:54:00 AM | 5.295 | 13.288 |
| 6/29/2011 | 10:55:00 AM | 5.237 | 13.272 |
| 6/29/2011 | 10:56:00 AM | 5.25 | 13.25 |
| 6/29/2011 | 10:57:00 AM | 5.257 | 13.283 |
| 6/29/2011 | 10:58:00 AM | 5.289 | 13.222 |
| 6/29/2011 | 10:59:00 AM | 5.273 | 13.23 |
| 6/29/2011 | 11:00:00 AM | 5.278 | 13.229 |
| 6/29/2011 | 11:01:00 AM | 5.27 | 13.25 |
| 6/29/2011 | 11:02:00 AM | 5.284 | 13.222 |
| 6/29/2011 | 11:03:00 AM | 5.242 | 13.261 |
| 6/29/2011 | 11:04:00 AM | 5.294 | 13.233 |
| 6/29/2011 | 11:05:00 AM | 5.294 | 13.218 |
| 6/29/2011 | 11:06:00 AM | 5.279 | 13.24 |
| 6/29/2011 | 11:07:00 AM | 5.302 | 13.22 |
| 6/29/2011 | 11:10:00 AM | 5.289 | 13.217 |
| 6/29/2011 | 11:11:00 AM | 5.235 | 13.267 |
| 6/29/2011 | 11:12:00 AM | 5.231 | 13.282 |
| 6/29/2011 | 11:13:00 AM | 5.265 | 13.259 |
| 6/29/2011 | 11:14:00 AM | 5.304 | 13.212 |
| 6/29/2011 | 11:15:00 AM | 5.266 | 13.242 |
| 6/29/2011 | 11:16:00 AM | 5.256 | 13.269 |
| 6/29/2011 | 11:17:00 AM | 5.342 | 13.178 |
| 6/29/2011 | 11:18:00 AM | 5.309 | 13.197 |
| 6/29/2011 | 11:19:00 AM | 5.297 | 13.214 |
| 6/29/2011 | 11:20:00 AM | 5.324 | 13.208 |
| 6/29/2011 | 11:21:00 AM | 5.304 | 13.226 |
| 6/29/2011 | 11:22:00 AM | 5.292 | 13.231 |
| 6/29/2011 | 11:23:00 AM | 5.243 | 13.28 |
| 6/29/2011 | 11:24:00 AM | 5.228 | 13.308 |
| 6/29/2011 | 11:25:00 AM | 5.25 | 13.265 |
| 6/29/2011 | 11:26:00 AM | 5.236 | 13.28 |
| 6/29/2011 | 11:27:00 AM | 5.28 | 13.309 |
| 6/29/2011 | 11:28:00 AM | 5.313 | 13.289 |
| 6/29/2011 | 11:29:00 AM | 5.25 | 13.352 |
| 6/29/2011 | 11:30:00 AM | 5.219 | 13.366 |
| 6/29/2011 | 11:31:00 AM | 5.228 | 13.344 |
| 6/29/2011 | 11:32:00 AM | 5.203 | 13.371 |

| | | | |
|---|---|---|---|
| 6/29/2011 | 11:33:00 AM | 5.242 | 13.331 |
| 6/29/2011 | 11:34:00 AM | 5.234 | 13.342 |
| 6/29/2011 | 11:35:00 AM | 5.233 | 13.362 |
| 6/29/2011 | 11:36:00 AM | 5.259 | 13.326 |
| 6/29/2011 | 11:37:00 AM | 5.218 | 13.375 |
| 6/29/2011 | 11:38:00 AM | 5.173 | 13.411 |
| 6/29/2011 | 11:39:00 AM | 5.23 | 13.377 |
| 6/29/2011 | 11:40:00 AM | 5.238 | 13.374 |
| 6/29/2011 | 11:41:00 AM | 5.29 | 13.333 |
| 6/29/2011 | 11:42:00 AM | 5.29 | 13.324 |
| 6/29/2011 | 11:43:00 AM | 5.302 | 13.323 |
| 6/29/2011 | 11:44:00 AM | 5.268 | 13.348 |
| 6/29/2011 | 11:45:00 AM | 5.25 | 13.364 |
| 6/29/2011 | 11:46:00 AM | 5.229 | 13.367 |
| 6/29/2011 | 11:47:00 AM | 5.233 | 13.368 |
| 6/29/2011 | 11:48:00 AM | 5.202 | 13.389 |
| 6/29/2011 | 11:49:00 AM | 5.221 | 13.382 |
| 6/29/2011 | 11:50:00 AM | 5.198 | 13.401 |
| 6/29/2011 | 11:51:00 AM | 5.133 | 13.466 |
| 6/29/2011 | 11:52:00 AM | 5.129 | 13.471 |
| 6/29/2011 | 11:53:00 AM | 5.108 | 13.509 |
| 6/29/2011 | 11:54:00 AM | 5.143 | 13.476 |
| 6/29/2011 | 11:55:00 AM | 5.164 | 13.467 |
| 6/29/2011 | 11:56:00 AM | 5.209 | 13.405 |
| 6/29/2011 | 11:57:00 AM | 5.212 | 13.409 |
| 6/29/2011 | 11:58:00 AM | 5.235 | 13.403 |
| 6/29/2011 | 11:59:00 AM | 5.208 | 13.408 |
| 6/29/2011 | 12:00:00 PM | 5.248 | 13.372 |
| 6/29/2011 | 12:01:00 PM | 5.241 | 13.382 |
| 6/29/2011 | 12:02:00 PM | 5.293 | 13.344 |
| 6/29/2011 | 12:03:00 PM | 5.305 | 13.309 |
| 6/29/2011 | 12:04:00 PM | 5.319 | 13.315 |
| 6/29/2011 | 12:05:00 PM | 5.257 | 13.371 |
| 6/29/2011 | 12:06:00 PM | 5.205 | 13.416 |
| 6/29/2011 | 12:07:00 PM | 5.254 | 13.366 |
| 6/29/2011 | 12:08:00 PM | 5.236 | 13.39 |
| 6/29/2011 | 12:09:00 PM | 5.246 | 13.382 |
| | Average | 5.33 | 13.36 |

**ExxonMobil**
**STACK $O_2$, $CO_2$ DATA**

**Test #:** **3-DF**
**Date:** **6/29/2011**
**Time:** **1235/1641**

| | $O_2$ | $CO_2$ |
|---|---|---|
| Range | 10 | 20 |
| Cal Gas | 5.00 | 10.16 |
| Analyzer Zero | 0.04 | -0.01 |
| Analyzer Span | 5.06 | 10.00 |
| Pre-Bias Zero | 0.06 | 0.02 |
| Pre-Bias Span | 4.98 | 9.82 |
| Post-Bias Zero | 0.06 | 0.02 |
| Post-Bias Span | 4.98 | 9.84 |
| Pre-test zero bias | 0.1% | 0.2% |
| Pre-test span bias | -0.8% | -0.9% |
| Post-test zero bias | 0.1% | 0.1% |
| Post-test span bias | -0.8% | -0.8% |
| Zero Drift | 0.0% | 0.0% |
| Span Drift | 0.0% | 0.1% |
| | PASS | PASS |
| **Average** | **5.21** | **13.44** |
| **Cal Corrected** | **5.23** | **13.90** |

**ExxonMobil**
**3-DF**

| Date | Time | O2 % | CO2 % |
|---|---|---|---|
| 6/29/2011 | 12:36:00 PM | 5.204 | 13.417 |
| 6/29/2011 | 12:37:00 PM | 5.215 | 13.425 |
| 6/29/2011 | 12:38:00 PM | 5.196 | 13.436 |
| 6/29/2011 | 12:39:00 PM | 5.177 | 13.46 |
| 6/29/2011 | 12:40:00 PM | 5.167 | 13.49 |
| 6/29/2011 | 12:41:00 PM | 5.171 | 13.471 |
| 6/29/2011 | 12:42:00 PM | 5.2 | 13.448 |
| 6/29/2011 | 12:43:00 PM | 5.204 | 13.458 |
| 6/29/2011 | 12:44:00 PM | 5.236 | 13.418 |
| 6/29/2011 | 12:45:00 PM | 5.227 | 13.429 |
| 6/29/2011 | 12:46:00 PM | 5.231 | 13.433 |
| 6/29/2011 | 12:47:00 PM | 5.208 | 13.439 |
| 6/29/2011 | 12:48:00 PM | 5.201 | 13.463 |
| 6/29/2011 | 12:49:00 PM | 5.202 | 13.468 |
| 6/29/2011 | 12:50:00 PM | 5.26 | 13.411 |
| 6/29/2011 | 12:51:00 PM | 5.266 | 13.413 |
| 6/29/2011 | 12:52:00 PM | 5.3 | 13.371 |
| 6/29/2011 | 12:53:00 PM | 5.291 | 13.368 |
| 6/29/2011 | 12:54:00 PM | 5.232 | 13.434 |
| 6/29/2011 | 12:55:00 PM | 5.234 | 13.429 |
| 6/29/2011 | 12:56:00 PM | 5.211 | 13.472 |
| 6/29/2011 | 12:57:00 PM | 5.285 | 13.378 |
| 6/29/2011 | 12:58:00 PM | 5.259 | 13.407 |
| 6/29/2011 | 12:59:00 PM | 5.29 | 13.373 |
| 6/29/2011 | 1:00:00 PM | 5.218 | 13.433 |
| 6/29/2011 | 1:01:00 PM | 5.156 | 13.498 |
| 6/29/2011 | 1:02:00 PM | 5.19 | 13.475 |
| 6/29/2011 | 1:03:00 PM | 5.282 | 13.391 |
| 6/29/2011 | 1:04:00 PM | 5.262 | 13.401 |
| 6/29/2011 | 1:05:00 PM | 5.283 | 13.385 |
| 6/29/2011 | 1:06:00 PM | 5.323 | 13.341 |
| 6/29/2011 | 1:07:00 PM | 5.337 | 13.315 |
| 6/29/2011 | 1:08:00 PM | 5.299 | 13.353 |
| 6/29/2011 | 1:09:00 PM | 5.258 | 13.38 |
| 6/29/2011 | 1:10:00 PM | 5.196 | 13.445 |
| 6/29/2011 | 1:11:00 PM | 5.202 | 13.451 |
| 6/29/2011 | 1:12:00 PM | 5.198 | 13.456 |
| 6/29/2011 | 1:13:00 PM | 5.201 | 13.461 |
| 6/29/2011 | 1:14:00 PM | 5.281 | 13.39 |
| 6/29/2011 | 1:15:00 PM | 5.2 | 13.468 |
| 6/29/2011 | 1:16:00 PM | 5.2 | 13.468 |
| 6/29/2011 | 1:17:00 PM | 5.231 | 13.447 |
| 6/29/2011 | 1:18:00 PM | 5.257 | 13.424 |
| 6/29/2011 | 1:19:00 PM | 5.318 | 13.36 |
| 6/29/2011 | 1:20:00 PM | 5.339 | 13.332 |
| 6/29/2011 | 1:21:00 PM | 5.338 | 13.331 |
| 6/29/2011 | 1:22:00 PM | 5.302 | 13.366 |

| | | | |
|---|---|---|---|
| 6/29/2011 | 1:23:00 PM | 5.237 | 13.415 |
| 6/29/2011 | 1:24:00 PM | 5.227 | 13.429 |
| 6/29/2011 | 1:25:00 PM | 5.209 | 13.44 |
| 6/29/2011 | 1:26:00 PM | 5.208 | 13.448 |
| 6/29/2011 | 1:27:00 PM | 5.235 | 13.435 |
| 6/29/2011 | 1:28:00 PM | 5.207 | 13.454 |
| 6/29/2011 | 1:29:00 PM | 5.185 | 13.501 |
| 6/29/2011 | 1:30:00 PM | 5.222 | 13.436 |
| 6/29/2011 | 1:31:00 PM | 5.258 | 13.4 |
| 6/29/2011 | 1:32:00 PM | 5.23 | 13.437 |
| 6/29/2011 | 1:33:00 PM | 5.207 | 13.492 |
| 6/29/2011 | 1:34:00 PM | 5.179 | 13.522 |
| 6/29/2011 | 1:35:00 PM | 5.199 | 13.515 |
| 6/29/2011 | 1:38:00 PM | 5.24 | 13.468 |
| 6/29/2011 | 1:39:00 PM | 5.199 | 13.513 |
| 6/29/2011 | 1:40:00 PM | 5.276 | 13.437 |
| 6/29/2011 | 1:41:00 PM | 5.33 | 13.371 |
| 6/29/2011 | 1:42:00 PM | 5.259 | 13.441 |
| 6/29/2011 | 1:43:00 PM | 5.26 | 13.449 |
| 6/29/2011 | 1:44:00 PM | 5.238 | 13.444 |
| 6/29/2011 | 1:45:00 PM | 5.142 | 13.527 |
| 6/29/2011 | 1:46:00 PM | 5.15 | 13.532 |
| 6/29/2011 | 1:47:00 PM | 5.142 | 13.551 |
| 6/29/2011 | 1:48:00 PM | 5.155 | 13.526 |
| 6/29/2011 | 1:49:00 PM | 5.161 | 13.526 |
| 6/29/2011 | 1:50:00 PM | 5.166 | 13.516 |
| 6/29/2011 | 1:51:00 PM | 5.164 | 13.517 |
| 6/29/2011 | 1:52:00 PM | 5.209 | 13.483 |
| 6/29/2011 | 1:53:00 PM | 5.144 | 13.557 |
| 6/29/2011 | 1:54:00 PM | 5.201 | 13.517 |
| 6/29/2011 | 1:55:00 PM | 5.214 | 13.491 |
| 6/29/2011 | 1:56:00 PM | 5.211 | 13.49 |
| 6/29/2011 | 1:57:00 PM | 5.167 | 13.535 |
| 6/29/2011 | 1:58:00 PM | 5.21 | 13.473 |
| 6/29/2011 | 1:59:00 PM | 5.251 | 13.43 |
| 6/29/2011 | 2:00:00 PM | 5.226 | 13.454 |
| 6/29/2011 | 2:01:00 PM | 5.228 | 13.443 |
| 6/29/2011 | 2:02:00 PM | 5.261 | 13.42 |
| 6/29/2011 | 2:03:00 PM | 5.217 | 13.448 |
| 6/29/2011 | 2:04:00 PM | 5.113 | 13.541 |
| 6/29/2011 | 2:05:00 PM | 5.154 | 13.526 |
| 6/29/2011 | 2:06:00 PM | 5.172 | 13.497 |
| 6/29/2011 | 2:07:00 PM | 5.224 | 13.459 |
| 6/29/2011 | 2:08:00 PM | 5.28 | 13.37 |
| 6/29/2011 | 2:09:00 PM | 5.16 | 13.458 |
| 6/29/2011 | 2:10:00 PM | 5.172 | 13.463 |
| 6/29/2011 | 2:11:00 PM | 5.145 | 13.488 |
| 6/29/2011 | 2:12:00 PM | 5.141 | 13.48 |
| 6/29/2011 | 2:13:00 PM | 5.196 | 13.433 |
| 6/29/2011 | 2:14:00 PM | 5.277 | 13.355 |
| 6/29/2011 | 2:15:00 PM | 5.305 | 13.323 |
| 6/29/2011 | 2:16:00 PM | 5.28 | 13.353 |

| | | | |
|---|---|---|---|
| 6/29/2011 | 2:17:00 PM | 5.216 | 13.407 |
| 6/29/2011 | 2:18:00 PM | 5.185 | 13.453 |
| 6/29/2011 | 2:19:00 PM | 5.204 | 13.414 |
| 6/29/2011 | 2:20:00 PM | 5.2 | 13.436 |
| 6/29/2011 | 2:21:00 PM | 5.19 | 13.438 |
| 6/29/2011 | 2:22:00 PM | 5.237 | 13.395 |
| 6/29/2011 | 2:23:00 PM | 5.211 | 13.407 |
| 6/29/2011 | 2:24:00 PM | 5.245 | 13.41 |
| 6/29/2011 | 2:25:00 PM | 5.233 | 13.426 |
| 6/29/2011 | 2:26:00 PM | 5.23 | 13.387 |
| 6/29/2011 | 2:27:00 PM | 5.197 | 13.408 |
| 6/29/2011 | 2:28:00 PM | 5.207 | 13.407 |
| 6/29/2011 | 2:29:00 PM | 5.26 | 13.366 |
| 6/29/2011 | 2:30:00 PM | 5.24 | 13.372 |
| 6/29/2011 | 2:31:00 PM | 5.27 | 13.343 |
| 6/29/2011 | 2:32:00 PM | 5.201 | 13.408 |
| 6/29/2011 | 2:33:00 PM | 5.229 | 13.371 |
| 6/29/2011 | 2:34:00 PM | 5.258 | 13.337 |
| 6/29/2011 | 2:35:00 PM | 5.219 | 13.377 |
| 6/29/2011 | 2:36:00 PM | 5.241 | 13.354 |
| 6/29/2011 | 2:37:00 PM | 5.191 | 13.387 |
| 6/29/2011 | 2:40:00 PM | 5.179 | 13.419 |
| 6/29/2011 | 2:41:00 PM | 5.26 | 13.339 |
| 6/29/2011 | 2:42:00 PM | 5.272 | 13.323 |
| 6/29/2011 | 2:43:00 PM | 5.256 | 13.323 |
| 6/29/2011 | 2:44:00 PM | 5.234 | 13.343 |
| 6/29/2011 | 2:45:00 PM | 5.254 | 13.324 |
| 6/29/2011 | 2:46:00 PM | 5.179 | 13.394 |
| 6/29/2011 | 2:47:00 PM | 5.171 | 13.397 |
| 6/29/2011 | 2:48:00 PM | 5.179 | 13.438 |
| 6/29/2011 | 2:49:00 PM | 5.197 | 13.43 |
| 6/29/2011 | 2:50:00 PM | 5.163 | 13.446 |
| 6/29/2011 | 2:51:00 PM | 5.167 | 13.411 |
| 6/29/2011 | 2:52:00 PM | 5.14 | 13.451 |
| 6/29/2011 | 2:53:00 PM | 5.166 | 13.415 |
| 6/29/2011 | 2:54:00 PM | 5.208 | 13.374 |
| 6/29/2011 | 2:55:00 PM | 5.236 | 13.332 |
| 6/29/2011 | 2:56:00 PM | 5.208 | 13.356 |
| 6/29/2011 | 2:57:00 PM | 5.241 | 13.341 |
| 6/29/2011 | 2:58:00 PM | 5.231 | 13.366 |
| 6/29/2011 | 2:59:00 PM | 5.277 | 13.342 |
| 6/29/2011 | 3:00:00 PM | 5.272 | 13.322 |
| 6/29/2011 | 3:01:00 PM | 5.256 | 13.33 |
| 6/29/2011 | 3:02:00 PM | 5.243 | 13.331 |
| 6/29/2011 | 3:03:00 PM | 5.192 | 13.393 |
| 6/29/2011 | 3:04:00 PM | 5.216 | 13.364 |
| 6/29/2011 | 3:05:00 PM | 5.168 | 13.406 |
| 6/29/2011 | 3:06:00 PM | 5.168 | 13.434 |
| 6/29/2011 | 3:07:00 PM | 5.174 | 13.439 |
| 6/29/2011 | 3:08:00 PM | 5.197 | 13.41 |
| 6/29/2011 | 3:09:00 PM | 5.204 | 13.397 |
| 6/29/2011 | 3:10:00 PM | 5.197 | 13.415 |

| | | | |
|---|---|---|---|
| 6/29/2011 | 3:11:00 PM | 5.254 | 13.36 |
| 6/29/2011 | 3:12:00 PM | 5.243 | 13.354 |
| 6/29/2011 | 3:13:00 PM | 5.242 | 13.361 |
| 6/29/2011 | 3:14:00 PM | 5.156 | 13.436 |
| 6/29/2011 | 3:15:00 PM | 5.169 | 13.427 |
| 6/29/2011 | 3:16:00 PM | 5.185 | 13.413 |
| 6/29/2011 | 3:17:00 PM | 5.15 | 13.46 |
| 6/29/2011 | 3:18:00 PM | 5.167 | 13.441 |
| 6/29/2011 | 3:19:00 PM | 5.129 | 13.471 |
| 6/29/2011 | 3:20:00 PM | 5.166 | 13.44 |
| 6/29/2011 | 3:21:00 PM | 5.158 | 13.463 |
| 6/29/2011 | 3:22:00 PM | 5.153 | 13.459 |
| 6/29/2011 | 3:23:00 PM | 5.184 | 13.425 |
| 6/29/2011 | 3:24:00 PM | 5.205 | 13.399 |
| 6/29/2011 | 3:25:00 PM | 5.213 | 13.394 |
| 6/29/2011 | 3:26:00 PM | 5.213 | 13.395 |
| 6/29/2011 | 3:27:00 PM | 5.202 | 13.408 |
| 6/29/2011 | 3:28:00 PM | 5.2 | 13.425 |
| 6/29/2011 | 3:29:00 PM | 5.176 | 13.453 |
| 6/29/2011 | 3:30:00 PM | 5.173 | 13.441 |
| 6/29/2011 | 3:31:00 PM | 5.133 | 13.477 |
| 6/29/2011 | 3:32:00 PM | 5.129 | 13.487 |
| 6/29/2011 | 3:33:00 PM | 5.107 | 13.504 |
| 6/29/2011 | 3:34:00 PM | 5.117 | 13.49 |
| 6/29/2011 | 3:35:00 PM | 5.096 | 13.503 |
| 6/29/2011 | 3:36:00 PM | 5.083 | 13.525 |
| 6/29/2011 | 3:37:00 PM | 5.487 | 14.652 |
| 6/29/2011 | 3:38:00 PM | 5.12 | 13.487 |
| 6/29/2011 | 3:39:00 PM | 5.12 | 13.47 |
| 6/29/2011 | 3:42:00 PM | 5.155 | 13.457 |
| 6/29/2011 | 3:43:00 PM | 5.202 | 13.399 |
| 6/29/2011 | 3:44:00 PM | 5.196 | 13.43 |
| 6/29/2011 | 3:45:00 PM | 5.196 | 13.432 |
| 6/29/2011 | 3:46:00 PM | 5.191 | 13.415 |
| 6/29/2011 | 3:47:00 PM | 5.126 | 13.493 |
| 6/29/2011 | 3:48:00 PM | 5.14 | 13.477 |
| 6/29/2011 | 3:49:00 PM | 5.051 | 13.57 |
| 6/29/2011 | 3:50:00 PM | 5.055 | 13.57 |
| 6/29/2011 | 3:51:00 PM | 5.13 | 13.489 |
| 6/29/2011 | 3:52:00 PM | 5.151 | 13.465 |
| 6/29/2011 | 3:53:00 PM | 5.158 | 13.479 |
| 6/29/2011 | 3:54:00 PM | 5.213 | 13.429 |
| 6/29/2011 | 3:55:00 PM | 5.177 | 13.641 |
| 6/29/2011 | 3:56:00 PM | 5.163 | 13.546 |
| 6/29/2011 | 3:57:00 PM | 5.19 | 13.631 |
| 6/29/2011 | 3:58:00 PM | 5.211 | 13.456 |
| 6/29/2011 | 3:59:00 PM | 5.218 | 13.459 |
| 6/29/2011 | 4:00:00 PM | 5.207 | 13.498 |
| 6/29/2011 | 4:01:00 PM | 5.199 | 13.481 |
| 6/29/2011 | 4:02:00 PM | 5.201 | 13.434 |
| 6/29/2011 | 4:03:00 PM | 5.157 | 13.482 |
| 6/29/2011 | 4:04:00 PM | 5.136 | 13.508 |

| | | | |
|---|---|---|---|
| 6/29/2011 | 4:05:00 PM | 5.152 | 13.492 |
| 6/29/2011 | 4:06:00 PM | 5.16 | 13.47 |
| 6/29/2011 | 4:07:00 PM | 5.118 | 13.525 |
| 6/29/2011 | 4:08:00 PM | 5.159 | 13.485 |
| 6/29/2011 | 4:09:00 PM | 5.214 | 13.432 |
| 6/29/2011 | 4:10:00 PM | 5.229 | 13.43 |
| 6/29/2011 | 4:11:00 PM | 5.292 | 13.374 |
| 6/29/2011 | 4:12:00 PM | 5.346 | 13.308 |
| 6/29/2011 | 4:13:00 PM | 5.289 | 13.36 |
| 6/29/2011 | 4:14:00 PM | 5.355 | 13.304 |
| 6/29/2011 | 4:15:00 PM | 5.37 | 13.279 |
| 6/29/2011 | 4:16:00 PM | 5.312 | 13.329 |
| 6/29/2011 | 4:17:00 PM | 5.201 | 13.432 |
| 6/29/2011 | 4:18:00 PM | 5.194 | 13.446 |
| 6/29/2011 | 4:19:00 PM | 5.213 | 13.43 |
| 6/29/2011 | 4:20:00 PM | 5.215 | 13.438 |
| 6/29/2011 | 4:21:00 PM | 5.265 | 13.395 |
| 6/29/2011 | 4:22:00 PM | 5.251 | 13.421 |
| 6/29/2011 | 4:23:00 PM | 5.268 | 13.424 |
| 6/29/2011 | 4:24:00 PM | 5.218 | 13.433 |
| 6/29/2011 | 4:25:00 PM | 5.244 | 13.404 |
| 6/29/2011 | 4:26:00 PM | 5.261 | 13.374 |
| 6/29/2011 | 4:27:00 PM | 5.274 | 13.362 |
| 6/29/2011 | 4:28:00 PM | 5.28 | 13.358 |
| 6/29/2011 | 4:29:00 PM | 5.226 | 13.407 |
| 6/29/2011 | 4:30:00 PM | 5.196 | 13.425 |
| 6/29/2011 | 4:31:00 PM | 5.119 | 13.511 |
| 6/29/2011 | 4:32:00 PM | 5.145 | 13.486 |
| 6/29/2011 | 4:33:00 PM | 5.19 | 13.43 |
| 6/29/2011 | 4:34:00 PM | 5.169 | 13.445 |
| 6/29/2011 | 4:35:00 PM | 5.166 | 13.472 |
| 6/29/2011 | 4:36:00 PM | 5.155 | 13.473 |
| 6/29/2011 | 4:37:00 PM | 5.123 | 13.516 |
| 6/29/2011 | 4:38:00 PM | 5.128 | 13.513 |
| 6/29/2011 | 4:39:00 PM | 5.116 | 13.521 |
| 6/29/2011 | 4:40:00 PM | 5.153 | 13.473 |
| 6/29/2011 | 4:41:00 PM | 5.136 | 13.485 |
| | Average | 5.21 | 13.44 |

ANALYTICAL PERSPECTIVES

28 July 2011

Arlene Bell
Delta Air Quality Services
1845 N. Cast St.
Orange, CA 92865

Ph.: 714-279-6777

Subject: Certificate of Results

Dear Arlene;

Attached to this narrative are the analytical results you requested on samples submitted for the determination of polychlorinated dibenzo-*p*-dioxins and dibenzofurans and the co-planar polychlorinated biphenyls. The insert below summarizes the relevant information pertaining to your project. In particular, QC annotations bring to your attention specific analytical observations and assessments made during the sample handling and data interpretation phases. Results reported relate only to the items tested.

| Project Information Summary | When applicable, see QC Annotations for details |
|---|---|
| Client Project No. | ICR 2F-7 |
| AP Project # | **A3347** |
| Analytical Protocol | WHO-2+ |
| No. Samples Submitted | 6 |
| No. Samples Analyzed | 4 (2 samples archived) |
| No. Laboratory Method Blanks | 2 |
| No. OPRs / Batch CS3 | 2 |
| No. Outstanding Samples | 0 |
| Date Received | 13-Jul-2011 |
| Condition Received | good |
| Temperature upon Receipt (C) | 4 |
| Extraction within Holding Time | yes |
| Analysis within Holding Time | yes |
| Data meet QA/QC Requirements | yes |
| Exceptions | none |
| Analytical Difficulties | none |

*2714 Exchange Drive*
*Wilmington, NC 28405*
*Ph.: 910-794-1613*

ANALYTICAL PERSPECTIVES

**QC Annotations:**

See Appendix A & B for data qualifier, data attribute, and lab identifier information.

**Analytical Perspectives Certification IDs:**

| | |
|---|---|
| SOUTH CAROLINA | 99054 |
| ARKANSAS | 88-0628 |
| NEW JERSEY (NELAP) | NC005 |
| FLORIDA (PRIMARY NELAP) | E87608 |
| LOUISIANA | 4024 |
| NORTH CAROLINA | 37783 |
| WASHINGTON | C2027 |
| TEXAS (NELAP) | T104704484-10-1 |
| PENNSYLVANIA (NELAP) | 68-01849 |

Analytical Perspectives remains committed to serving you in the most effective manner. Should you have any questions or need additional information and technical support, please do not hesitate to contact us. Thank you for choosing Analytical Perspectives as part of your analytical support team.

Sincerely,

Heather Steele

Heather Steele, Ph.D.
Project Manager

2714 Exchange Drive
Wilmington, NC 28405
Ph: 910-794-1613

ANALYTICAL PERSPECTIVES

| APPENDIX A: DATA QUALIFIERS / DATA ATTRIBUTES | |
|---|---|
| * | The reported concentration exceeds the calibration range (upper point of the calibration curve).[1] |
| > | Indicates high recoveries. Shown with the numeric value at the top of the range.[1] |
| B | The analyte is found in the method blank, at a level that is <=10x the sample concentration. |
| C | Two or more congeners co-elute. In EDDs C denotes the lowest IUPAC congener in a co-elution group and additional co-eluters for the group are shown with the number of the lowest IUPAC co-eluter. |
| E | The reported concentration exceeds the calibration range (upper point of the calibration curve). |
| EMPC | Represents an Estimated Maximum Possible Concentration. EMPC's arise in cases where the signal/noise ratio is not sufficient for peak identification (the determined ion-abundance ratio is outside the allowed theoretical range), where there is a co-eluting interference, or where a single ion is utilized for quantitation due to PFK interference. |
| ETH | Indicates the presence of a diphenyl ether that appears to interfere with the quantitation of a furan. The reported concentration is the maximum. |
| H/h | If the standard recovery is below the method or SOP specified value "H" is assigned. If the obtained value is less than half the specified value "h" is assigned.[1] |
| J | Indicates that an analyte has a concentration below the reporting limit (lowest point of the calibration curve). |
| ND | Indicates a non-detect. |
| NR | Indicates a value that is not reportable. |
| PR | Due to interference, the associated congener is poorly resolved. |
| QI | Indicates the presence of a quantitative interference. |
| Ra | The new ratio – [Ra] -- for 2,3,7,8-TCDD following the $^{37}Cl_4$-2,3,7,8-TCDD correction is shown between squared brackets in the DL column.[1] |
| SI | Denotes "Single Ion Mode" and is utilized for PCBs where the secondary ion trace has a significantly elevated noise level due to background PFK. Responses for such peaks are calculated using an EMPC approach based solely on the primary ion area(s) and may be considered estimates.[1] |
| U | The analyte was not detected. The estimated detection limit (EDL) may be reported for this analyte. |
| V | The labeled standard recovery was found to be outside of the method control limits. |
| X | Indicates results reported from reinjection, refractionation, or repeat analyses. |
| **APPENDIX B: LAB ID IDENTIFIERS** | |
| AR | Indicates use of the archived portion of the sample extract. |
| CU | Indicates a sample that required additional clean-up prior to MS injection/processing. |
| D | Indicates a dilution of the sample extract. The number that follows the "D" indicates the dilution factor. |
| DE | Indicates a dilution performed with the addition of ES (extraction standard) solution. |
| DUP | Designation for a duplicate sample. |
| MS | Designation for a matrix spike. |
| MSD | Designation for a matrix spike duplicate. |
| RJ | Indicates a reinjection of the sample extract. |
| S | Indicates a sample split. The number that follows the "S" indicates the split factor. |

[1]Denotes data qualifiers/attributes whose use will be phased out over time

2714 Exchange Drive
Wilmington, NC 28405
Ph.: 910-794-1613

# A3347 - TEQ

## Project ID: ICR 2F-7

**Sample Summary Part 1** — ANALYTICAL PERSPECTIVES — **Method WHO-2**

| Analyte | Method Blank | FB-DF | 1-DF | 2-DF | 3-DF |
|---|---|---|---|---|---|
| | pg | pg | pg | pg | pg |
| 2,3,7,8-TCDD | (2.25) | (4.13) | (3.61) | (3.32) | (3.53) |
| 1,2,3,7,8-PeCDD | (2.79) | (4.18) | (3.92) | (3.83) | (3.85) |
| 1,2,3,4,7,8-HxCDD | (2.05) | (3.98) | (3.37) | (2.77) | (3.27) |
| 1,2,3,6,7,8-HxCDD | (2.14) | (4.07) | (3.32) | (2.92) | (3.33) |
| 1,2,3,7,8,9-HxCDD | (2.18) | (4.37) | (3.79) | (2.96) | (3.61) |
| 1,2,3,4,6,7,8-HpCDD | (2.45) | (4.24) | (4.4) | (4.74) | (4.18) |
| OCDD | (4.49) | (6.73) | (5.97) | (6.79) | 9.24 |
| 2,3,7,8-TCDF | (1.96) | (3.13) | (3.17) | (3.03) | (2.6) |
| 1,2,3,7,8-PeCDF | (1.86) | (2.79) | (2.87) | (2.58) | (2.79) |
| 2,3,4,7,8-PeCDF | (1.74) | (2.78) | (2.87) | (2.26) | (2.72) |
| 1,2,3,4,7,8-HxCDF | (1.15) | (1.9) | (1.74) | (1.89) | (1.88) |
| 1,2,3,6,7,8-HxCDF | (1.1) | (1.8) | (1.73) | (1.8) | (1.78) |
| 2,3,4,6,7,8-HxCDF | (1.12) | (1.85) | (1.64) | (1.67) | (1.76) |
| 1,2,3,7,8,9-HxCDF | (1.39) | (2.37) | (2.19) | (2.34) | (2.41) |
| 1,2,3,4,6,7,8-HpCDF | (1.74) | (2.56) | (2.48) | (2.59) | 3.55 |
| 1,2,3,4,7,8,9-HpCDF | (2.67) | (4) | (3.98) | (3.93) | (5.31) |
| OCDF | (6.44) | (10.2) | (9.98) | (8.73) | (8.62) |
| **ITEF TEQ (ND=0; EMPC=0)** | 0 | 0 | 0 | 0 | 0.0447 |
| **ITEF TEQ (ND=0; EMPC=EMPC)** | 0 | 0 | 0 | 0 | 0.0447 |
| **ITEF TEQ (ND=DL/2; EMPC=0)** | 3 | 5.11 | 4.68 | 4.28 | 4.61 |
| **ITEF TEQ (ND=DL/2; EMPC=EMPC)** | 3 | 5.11 | 4.68 | 4.28 | 4.61 |
| **ITEF TEQ (ND=DL; EMPC=EMPC)** | 5.99 | 10.2 | 9.37 | 8.56 | 9.17 |
| PCB-77 33'44'-TeCB | [2.62] | 18 | 32.6 | 22.6 | 48.3 |
| PCB-81 344'5-TeCB | (1.15) | (1.23) | [2.39] | [1.78] | 2.42 |
| PCB-105 233'44'-PeCB | 4.15 | [41.9] | 66.9 | 40 | 85.5 |
| PCB-114 2344'5-PeCB | (2.25) | (4.44) | [4.58] | (3.26) | [5.45] |
| PCB-118 23'44'5-PeCB | 9.01 | 108 | 166 | 99.9 | 231 |
| PCB-123 2'344'5-PeCB | (2.12) | 6.48 | 8.17 | [6.13] | [7.33] |
| PCB-126 33'44'5-PeCB | (2.13) | (2.05) | (3.22) | (2.68) | (3.35) |
| PCB-156 233'44'5-HxCB | (1.94) | 6.33 | 9.94 | 7.22 | 10.9 |
| PCB-157 233'44'5'-HxCB | (1.99) | (3.92) | [2.94] | 2.34 | 3.08 |
| PCB-167 23'44'55'-HxCB | (1.85) | [3.3] | 5.04 | [3.26] | 4.68 |
| PCB-169 33'44'55'-HxCB | (2.28) | (2.85) | (3.41) | (2.2) | (12) |
| PCB-189 233'44'55'-HpCB | (4.34) | (8.03) | (5.49) | (5.4) | (4.7) |
| **ITEF + WHO-2005** | | | | | |
| **PCDD/F + PCB TEQs (ND = 0)** | 0.000395 | 0.00543 | 0.0109 | 0.00674 | 0.0603 |
| **PCDD/F + PCB TEQs (ND = DL / 2)** | 3.14 | 5.26 | 4.91 | 4.45 | 4.97 |
| **PCDD/F + PCB TEQs (ND = DL)** | 6.28 | 10.5 | 9.8 | 8.9 | 9.88 |
| **ITEF + WHO-1998** | | | | | |
| **PCDD/F + PCB TEQs (ND = 0)** | 0.00132 | 0.0164 | 0.0324 | 0.021 | 0.0885 |
| **PCDD/F + PCB TEQs (ND = DL / 2)** | 3.12 | 5.25 | 4.9 | 4.45 | 4.88 |
| **PCDD/F + PCB TEQs (ND = DL)** | 6.24 | 10.5 | 9.76 | 8.87 | 9.67 |
| Checkcode | 808-123-DRS | 536-353-LVG | 934-649-MHY | 957-190-BFR | 426-979-LSZ |
| Lab ID | MB1_8841_W2_SDS | A3347_8841_W2_001 | A3347_8841_W2_002 | A3347_8841_W2_003 | A3347_8841_W2_004 |

( ) = DL
[ ] = EMPC

# A3347 - WHO-2005-TEQ

## Project ID: ICR 2F-7

**Sample Summary Part 1**

ANALYTICAL PERSPECTIVES

**Method WHO-2**

| Analyte | Method Blank | FB-DF | 1-DF | 2-DF | 3-DF |
|---|---|---|---|---|---|
| | pg | pg | pg | pg | pg |
| 2,3,7,8-TCDD | (2.25) | (4.13) | (3.61) | (3.32) | (3.53) |
| 1,2,3,7,8-PeCDD | (2.79) | (4.18) | (3.92) | (3.83) | (3.85) |
| 1,2,3,4,7,8-HxCDD | (2.05) | (3.98) | (3.37) | (2.77) | (3.27) |
| 1,2,3,6,7,8-HxCDD | (2.14) | (4.07) | (3.32) | (2.92) | (3.33) |
| 1,2,3,7,8,9-HxCDD | (2.18) | (4.37) | (3.79) | (2.96) | (3.61) |
| 1,2,3,4,6,7,8-HpCDD | (2.45) | (4.24) | (4.4) | (4.74) | (4.18) |
| OCDD | (4.49) | (6.73) | (5.97) | (6.79) | 9.24 |
| 2,3,7,8-TCDF | (1.96) | (3.13) | (3.17) | (3.03) | (2.6) |
| 1,2,3,7,8-PeCDF | (1.86) | (2.79) | (2.87) | (2.58) | (2.79) |
| 2,3,4,7,8-PeCDF | (1.74) | (2.78) | (2.87) | (2.26) | (2.72) |
| 1,2,3,4,7,8-HxCDF | (1.15) | (1.9) | (1.74) | (1.89) | (1.88) |
| 1,2,3,6,7,8-HxCDF | (1.1) | (1.8) | (1.73) | (1.8) | (1.78) |
| 2,3,4,6,7,8-HxCDF | (1.12) | (1.85) | (1.64) | (1.67) | (1.76) |
| 1,2,3,7,8,9-HxCDF | (1.39) | (2.37) | (2.19) | (2.34) | (2.41) |
| 1,2,3,4,6,7,8-HpCDF | (1.74) | (2.56) | (2.48) | (2.59) | 3.55 |
| 1,2,3,4,7,8,9-HpCDF | (2.67) | (4) | (3.98) | (3.93) | (5.31) |
| OCDF | (6.44) | (10.2) | (9.98) | (8.73) | (8.62) |
| **WHO-2005 TEQ (ND=0; EMPC=0)** | **0** | **0** | **0** | **0** | **0.0382** |
| **WHO-2005 TEQ (ND=0; EMPC=EMPC)** | **0** | **0** | **0** | **0** | **0.0382** |
| **WHO-2005 TEQ (ND=DL/2; EMPC=0)** | **3.5** | **5.85** | **5.34** | **4.98** | **5.26** |
| **WHO-2005 TEQ (ND=DL/2; EMPC=EMPC)** | **3.5** | **5.85** | **5.34** | **4.98** | **5.26** |
| **WHO-2005 TEQ (ND=DL; EMPC=EMPC)** | **6.99** | **11.7** | **10.7** | **9.96** | **10.5** |
| Checkcode | 808-123-DRS | 536-353-LVG | 934-649-MHY | 957-190-BFR | 426-979-LSZ |
| Lab ID | MB1_8841_W2_SDS | A3347_8841_W2_001 | A3347_8841_W2_002 | A3347_8841_W2_003 | A3347_8841_W2_004 |

( ) = DL
[ ] = EMPC

# A3347 - Totals

## Project ID: ICR 2F-7

**Sample Summary Part 2**

ANALYTICAL PERSPECTIVES

**Method WHO-2**

| Analyte | Method Blank | FB-DF | 1-DF | 2-DF | 3-DF |
|---|---|---|---|---|---|
| | pg | pg | pg | pg | pg |
| **Totals** | | | | | |
| TCDDs | 8.23 | 10.4 | 9.06 | 18.4 | 17.5 |
| PeCDDs | 0 | 0 | 0 | 0 | 0 |
| HxCDDs | 0 | 0 | 0 | 4.12 | 0 |
| HpCDDs | 0 | 0 | 0 | 0 | 0 |
| OCDD | 0 | 0 | 0 | 0 | 9.24 |
| TCDFs | 0 | 0 | 5.85 | 0 | 0 |
| PeCDFs | 0 | 0 | 0 | 0 | 0 |
| HxCDFs | 0 | 0 | 0 | 0 | 0 |
| HpCDFs | 0 | 0 | 0 | 0 | 3.55 |
| OCDF | 0 | 0 | 0 | 0 | 0 |
| **Total PCDD/Fs (ND=0; EMPC=0)** | **8.23** | **10.4** | **14.9** | **22.5** | **30.3** |
| **Total PCDD/Fs (ND=0; EMPC=EMPC)** | **8.23** | **10.4** | **14.9** | **37.1** | **44.4** |
| **Total PCDD/Fs (2378-X ND=DL; EMPC=EMPC)** | **47.8** | **75.4** | **75.9** | **95.2** | **96** |
| **Total 2378s (ND=0; EMPC=0)** | **0** | **0** | **0** | **0** | **12.8** |
| **Total 2378s (ND=0.5; EMPC=0)** | **19.8** | **32.5** | **30.5** | **29.1** | **38.6** |
| **Total 2378s (ND=1; EMPC=0)** | **39.5** | **65.1** | **61** | **58.1** | **64.4** |
| **Total 2378s (ND=0; EMPC=1)** | **0** | **0** | **0** | **0** | **12.8** |
| **Total 2378s (ND=0.5; EMPC=1)** | **19.8** | **32.5** | **30.5** | **29.1** | **38.6** |
| **Total 2378s (ND=1; EMPC=1)** | **39.5** | **65.1** | **61** | **58.1** | **64.4** |
| Checkcode | 808-123-DRS | 536-353-LVG | 934-649-MHY | 957-190-BFR | 426-979-LSZ |
| Lab ID | MB1_8841_W2_SDS | A3347_8841_W2_001 | A3347_8841_W2_002 | A3347_8841_W2_003 | A3347_8841_W2_004 |

( ) = DL
[ ] = EMPC

# A3347 - Others

## Project ID: ICR 2F-7

**Sample Summary Part 3**

ANALYTICAL PERSPECTIVES

**Method WHO-2**

| Analyte | Method Blank | FB-DF | 1-DF | 2-DF | 3-DF |
|---|---|---|---|---|---|
| | pg | pg | pg | pg | pg |
| **Other PCDD/Fs (ND=0, EMPC=0)** | | | | | |
| Other TCDD | 8.23 | 10.4 | 9.06 | 18.4 | 17.5 |
| Other PeCDD | 0 | 0 | 0 | 0 | 0 |
| Other HxCDD | 0 | 0 | 0 | 4.12 | 0 |
| Other HpCDD | 0 | 0 | 0 | 0 | 0 |
| Other TCDF | 0 | 0 | 5.85 | 0 | 0 |
| Other PeCDF | 0 | 0 | 0 | 0 | 0 |
| Other HxCDF | 0 | 0 | 0 | 0 | 0 |
| Other HpCDF | 0 | 0 | 0 | 0 | 0 |
| **Other PCDD/Fs (ND=0, EMPC=EMPC)** | | | | | |
| Other TCDD | 8.23 | 10.4 | 9.06 | 18.4 | 23.8 |
| Other PeCDD | 0 | 0 | 0 | 0 | 0 |
| Other HxCDD | 0 | 0 | 0 | 4.12 | 0 |
| Other HpCDD | 0 | 0 | 0 | 0 | 0 |
| Other TCDF | 0 | 0 | 5.85 | 14.6 | 7.77 |
| Other PeCDF | 0 | 0 | 0 | 0 | 0 |
| Other HxCDF | 0 | 0 | 0 | 0 | 0 |
| Other HpCDF | 0 | 0 | 0 | 0 | 0 |
| Checkcode | 808-123-DRS | 536-353-LVG | 934-649-MHY | 957-190-BFR | 426-979-LSZ |
| Lab ID | MB1_8841_W2_SDS | A3347_8841_W2_001 | A3347_8841_W2_002 | A3347_8841_W2_003 | A3347_8841_W2_004 |

( ) = DL
[ ] = EMPC

# A3347 - DLs

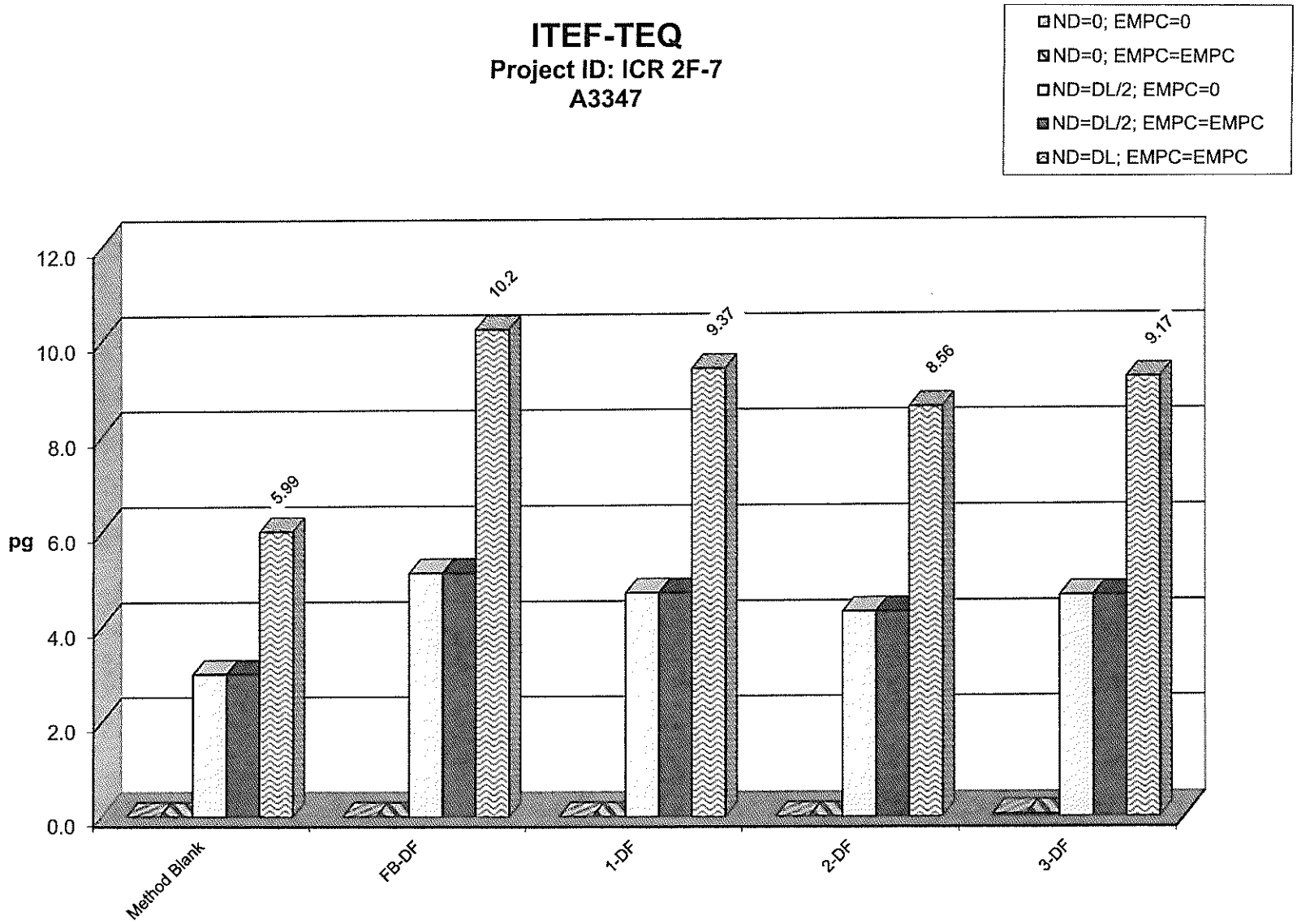
Project ID: ICR 2F-7

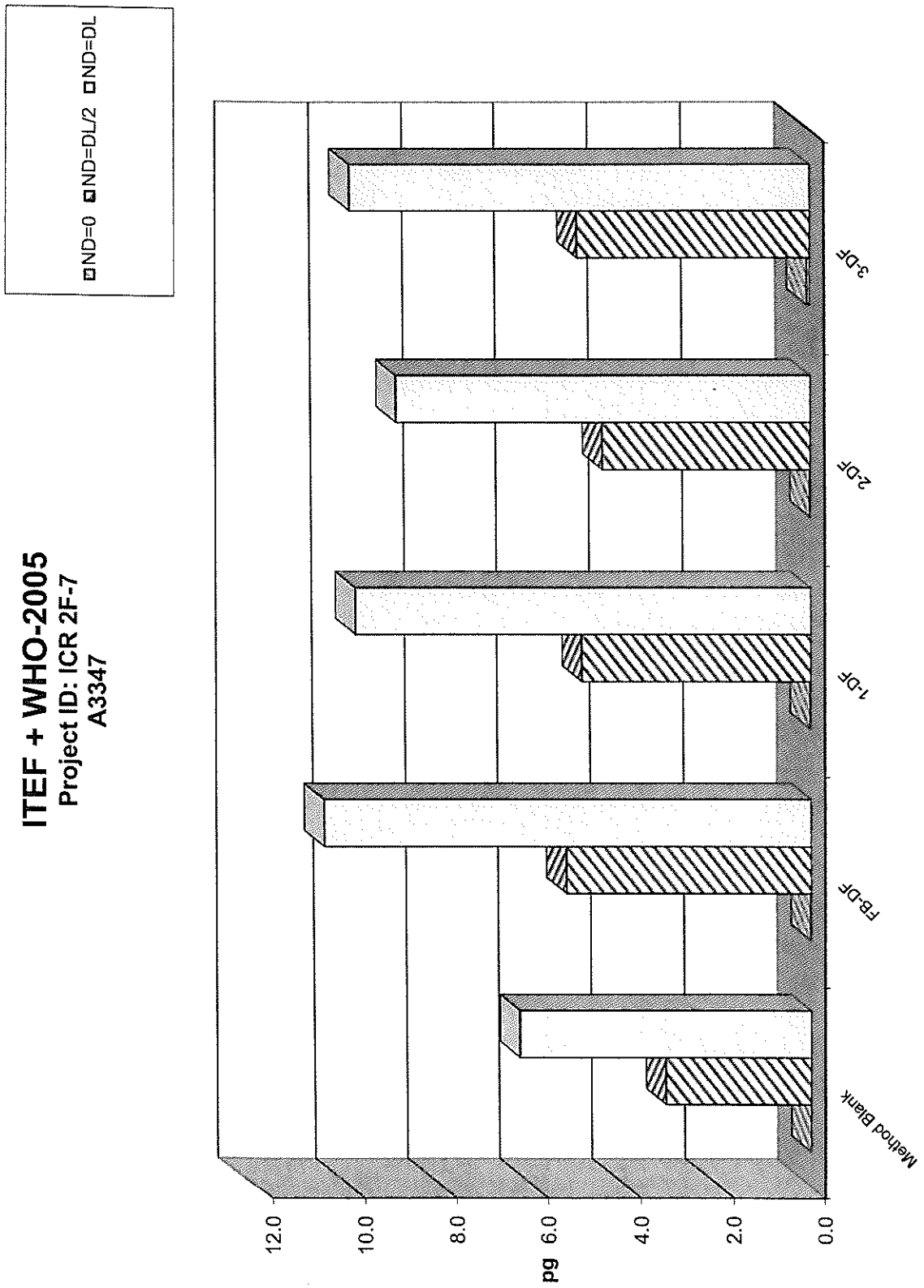
## Sample Summary Part 5

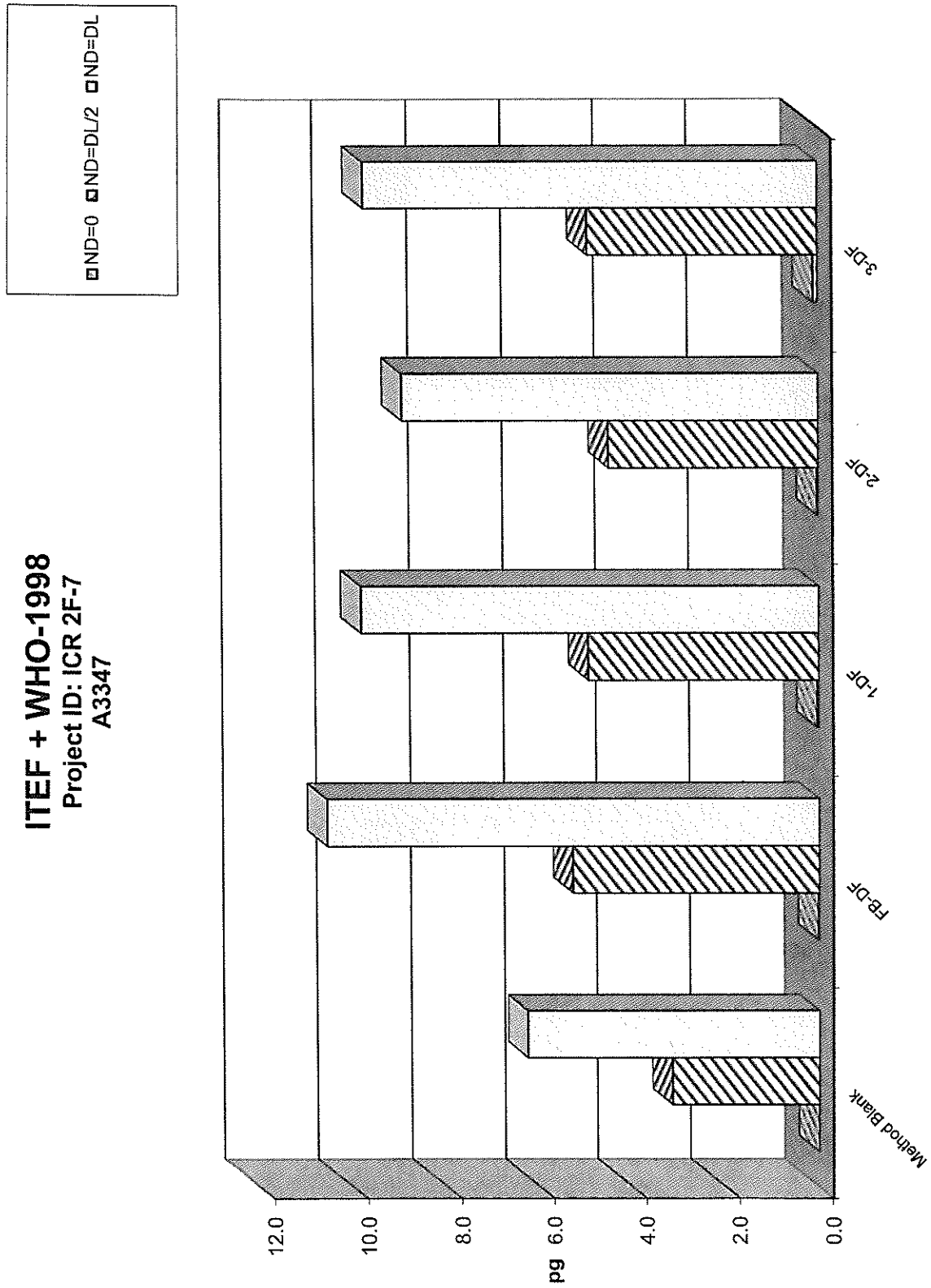
ANALYTICAL PERSPECTIVES

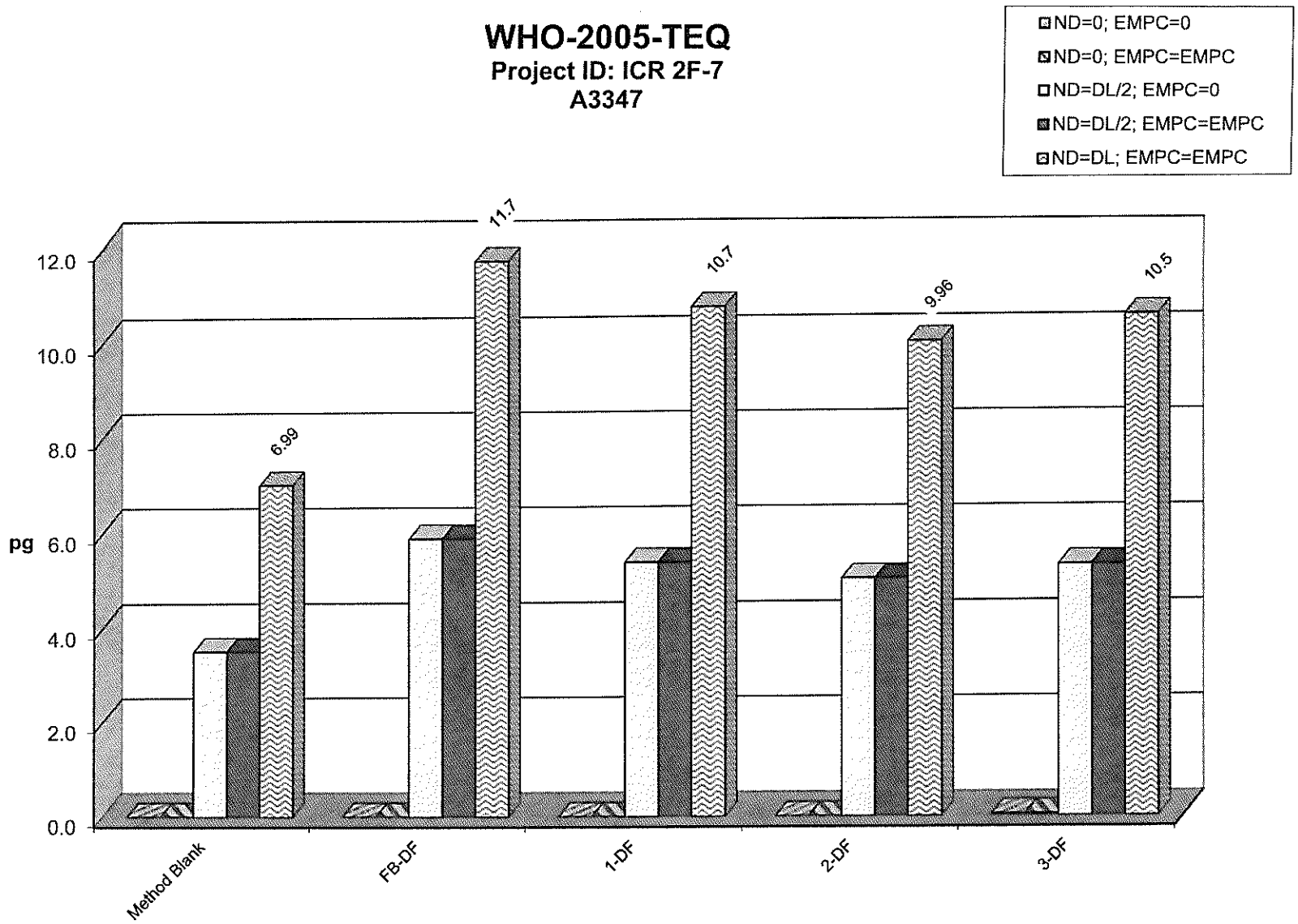
## Method WHO-2

| Analyte | Method Blank | FB-DF | 1-DF | 2-DF | 3-DF |
|---|---|---|---|---|---|
| | pg | pg | pg | pg | pg |
| 2,3,7,8-TCDD | 2.25 | 4.13 | 3.61 | 3.32 | 3.53 |
| 1,2,3,7,8-PeCDD | 2.79 | 4.18 | 3.92 | 3.83 | 3.85 |
| 1,2,3,4,7,8-HxCDD | 2.05 | 3.98 | 3.37 | 2.77 | 3.27 |
| 1,2,3,6,7,8-HxCDD | 2.14 | 4.07 | 3.32 | 2.92 | 3.33 |
| 1,2,3,7,8,9-HxCDD | 2.18 | 4.37 | 3.79 | 2.96 | 3.61 |
| 1,2,3,4,6,7,8-HpCDD | 2.45 | 4.24 | 4.4 | 4.74 | 4.18 |
| OCDD | 4.49 | 6.73 | 5.97 | 6.79 | 5.28 |
| 2,3,7,8-TCDF | 1.96 | 3.13 | 3.17 | 3.03 | 2.6 |
| 1,2,3,7,8-PeCDF | 1.86 | 2.79 | 2.87 | 2.58 | 2.79 |
| 2,3,4,7,8-PeCDF | 1.74 | 2.78 | 2.87 | 2.26 | 2.72 |
| 1,2,3,4,7,8-HxCDF | 1.15 | 1.9 | 1.74 | 1.89 | 1.88 |
| 1,2,3,6,7,8-HxCDF | 1.1 | 1.8 | 1.73 | 1.8 | 1.78 |
| 2,3,4,6,7,8-HxCDF | 1.12 | 1.85 | 1.64 | 1.67 | 1.76 |
| 1,2,3,7,8,9-HxCDF | 1.39 | 2.37 | 2.19 | 2.34 | 2.41 |
| 1,2,3,4,6,7,8-HpCDF | 1.74 | 2.56 | 2.48 | 2.59 | 3.4 |
| 1,2,3,4,7,8,9-HpCDF | 2.67 | 4 | 3.98 | 3.93 | 5.31 |
| OCDF | 6.44 | 10.2 | 9.98 | 8.73 | 8.62 |
| Total TCDD | 2.25 | 4.13 | 3.61 | 3.32 | 3.53 |
| Total PeCDD | 2.79 | 4.18 | 3.92 | 3.83 | 3.85 |
| Total HxCDD | 2.12 | 4.13 | 3.48 | 2.88 | 3.39 |
| Total HpCDD | 2.45 | 4.24 | 4.4 | 4.74 | 4.18 |
| Total TCDF | 1.96 | 3.13 | 3.17 | 3.03 | 2.6 |
| Total PeCDF | 1.8 | 2.78 | 2.87 | 2.42 | 2.75 |
| Total HxCDF | 1.18 | 1.96 | 1.81 | 1.9 | 1.93 |
| Total HpCDF | 2.15 | 3.19 | 3.16 | 3.19 | 4.26 |
| PCB-77 33'44'-TeCB | 1.25 | 1.36 | 1.72 | 1.36 | 1.26 |
| PCB-81 344'5-TeCB | 1.15 | 1.23 | 1.57 | 1.22 | 1.13 |
| PCB-105 233'44'-PeCB | 1.98 | 3.21 | 3.14 | 2.79 | 2.3 |
| PCB-114 2344'5-PeCB | 2.25 | 4.44 | 3.72 | 3.26 | 2.55 |
| PCB-118 23'44'5-PeCB | 2.08 | 4.07 | 3.4 | 3.05 | 2.32 |
| PCB-123 2'344'5-PeCB | 2.12 | 3.95 | 3.18 | 3.26 | 2.4 |
| PCB-126 33'44'5-PeCB | 2.13 | 2.05 | 3.22 | 2.68 | 3.35 |
| PCB-156 233'44'5-HxCB | 1.94 | 4.45 | 3.18 | 2.16 | 2.52 |
| PCB-157 233'44'5'-HxCB | 1.99 | 3.92 | 3.22 | 2.08 | 2.4 |
| PCB-167 23'44'55'-HxCB | 1.85 | 4.77 | 3.14 | 2.12 | 2.34 |
| PCB-169 33'44'55'-HxCB | 2.28 | 2.85 | 3.41 | 2.2 | 12 |
| PCB-189 233'44'55'-HpCB | 4.34 | 8.03 | 5.49 | 5.4 | 4.7 |
| Checkcode | 808-123-DRS | 536-353-LVG | 934-649-MHY | 957-190-BFR | 426-979-LSZ |
| Lab ID | MB1_8841_W2_SDS | A3347_8841_W2_001 | A3347_8841_W2_002 | A3347_8841_W2_003 | A3347_8841_W2_004 |

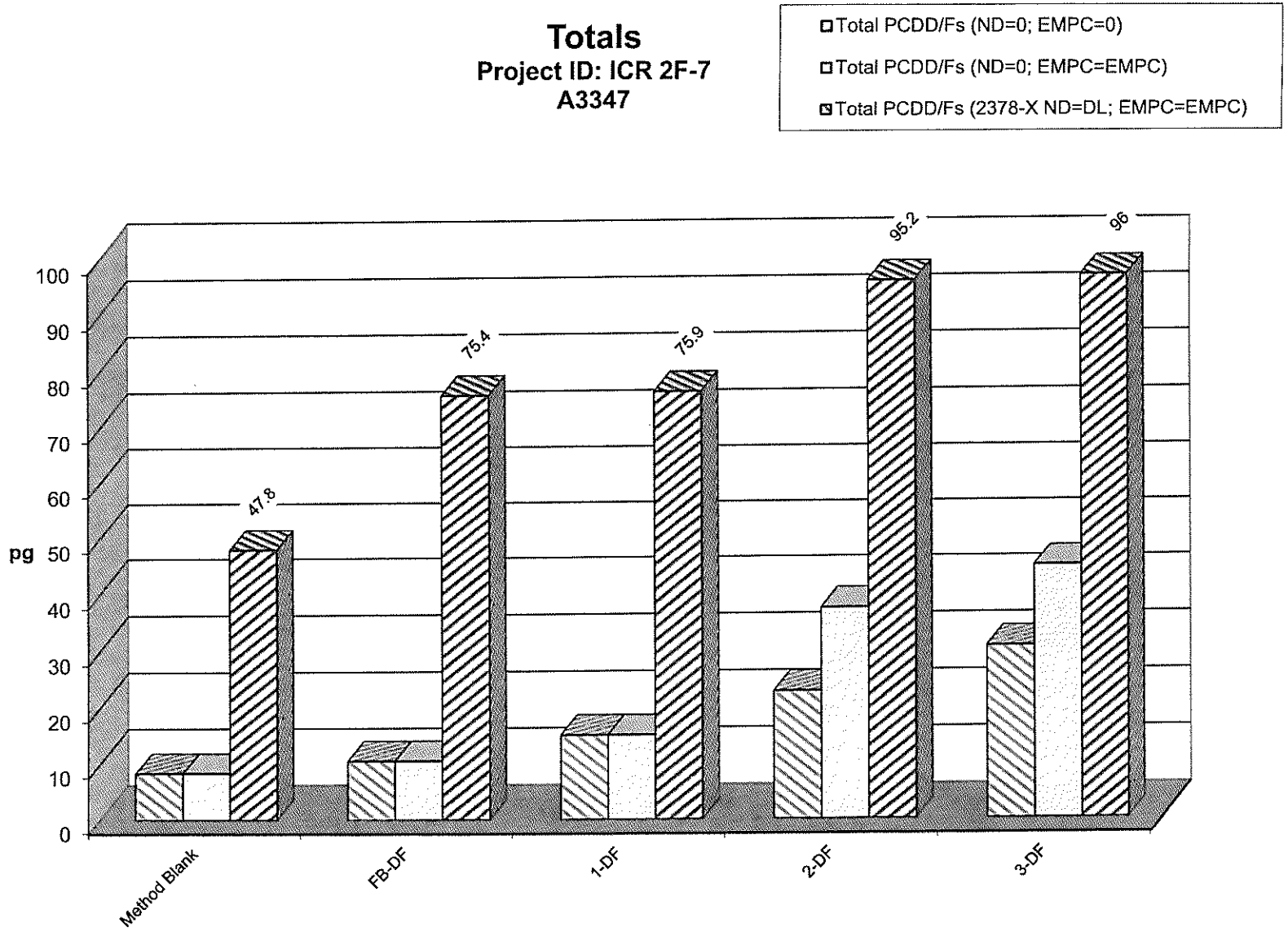

ITEF-TEQ
Project ID: ICR 2F-7
A3347
ND=0; EMPC=0
ND=0; EMPC=EMPC
ND=DL/2; EMPC=0
ND=DL/2; EMPC=EMPC
ND=DL; EMPC=EMPC
pg
12.0
10.0
8.0
6.0
4.0
2.0
0.0
5.99
10.2
9.37
8.56
9.17
Method Blank
FB-DF
1-DF
2-DF
3-DF


ND=0
ND=DL/2
ND=DL
ITEF + WHO-2005
Project ID: ICR 2F-7
A3347
pg
12.0
10.0
8.0
6.0
4.0
2.0
0.0
Method Blank
FB-DF
1-DF
2-DF
3-DF

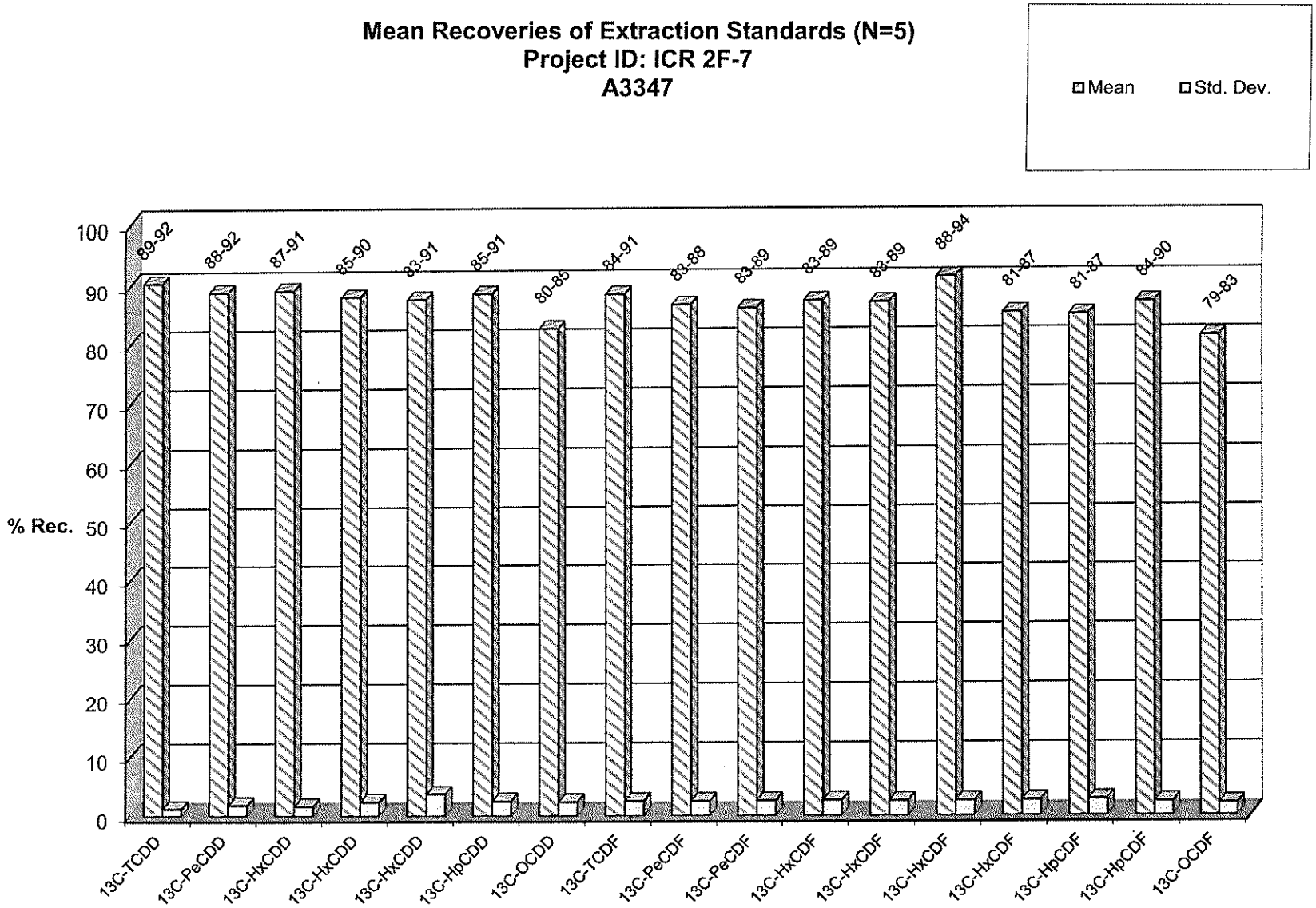

ITEF + WHO-1998
Project ID: ICR 2F-7
A3347
ND=0
ND=DL/2
ND=DL
pg
12.0
10.0
8.0
6.0
4.0
2.0
0.0
Method Blank
FB-DF
1-DF
2-DF
3-DF


WHO-2005-TEQ
Project ID: ICR 2F-7
A3347
ND=0; EMPC=0
ND=0; EMPC=EMPC
ND=DL/2; EMPC=0
ND=DL/2; EMPC=EMPC
ND=DL; EMPC=EMPC
pg
12.0
10.0
8.0
6.0
4.0
2.0
0.0
6.99
11.7
10.7
9.96
10.5
Method Blank
FB-DF
1-DF
2-DF
3-DF

# Totals
**Project ID: ICR 2F-7**
**A3347**

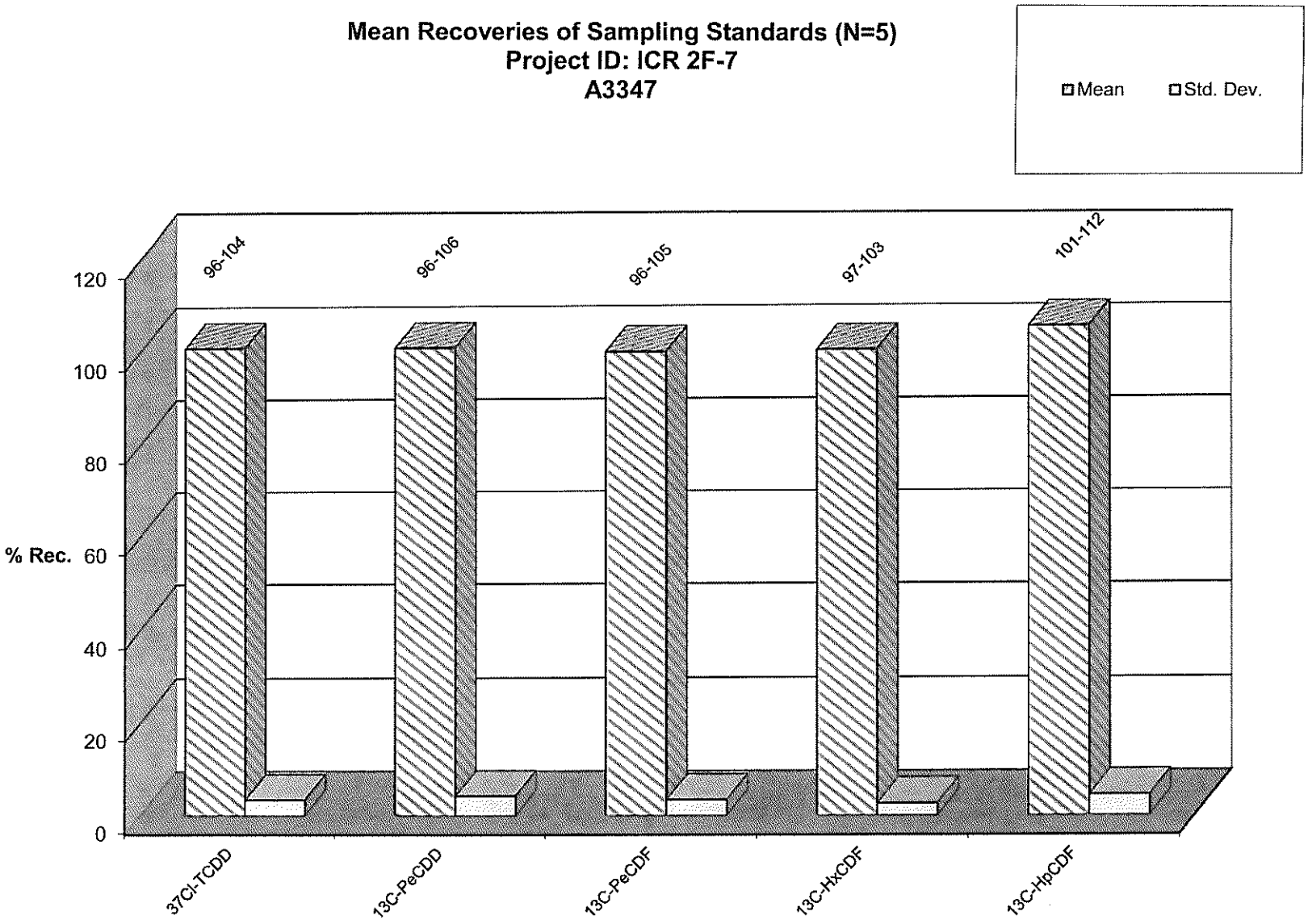


## Mean Recoveries of Extraction Standards (N=5)
## Project ID: ICR 2F-7
## A3347

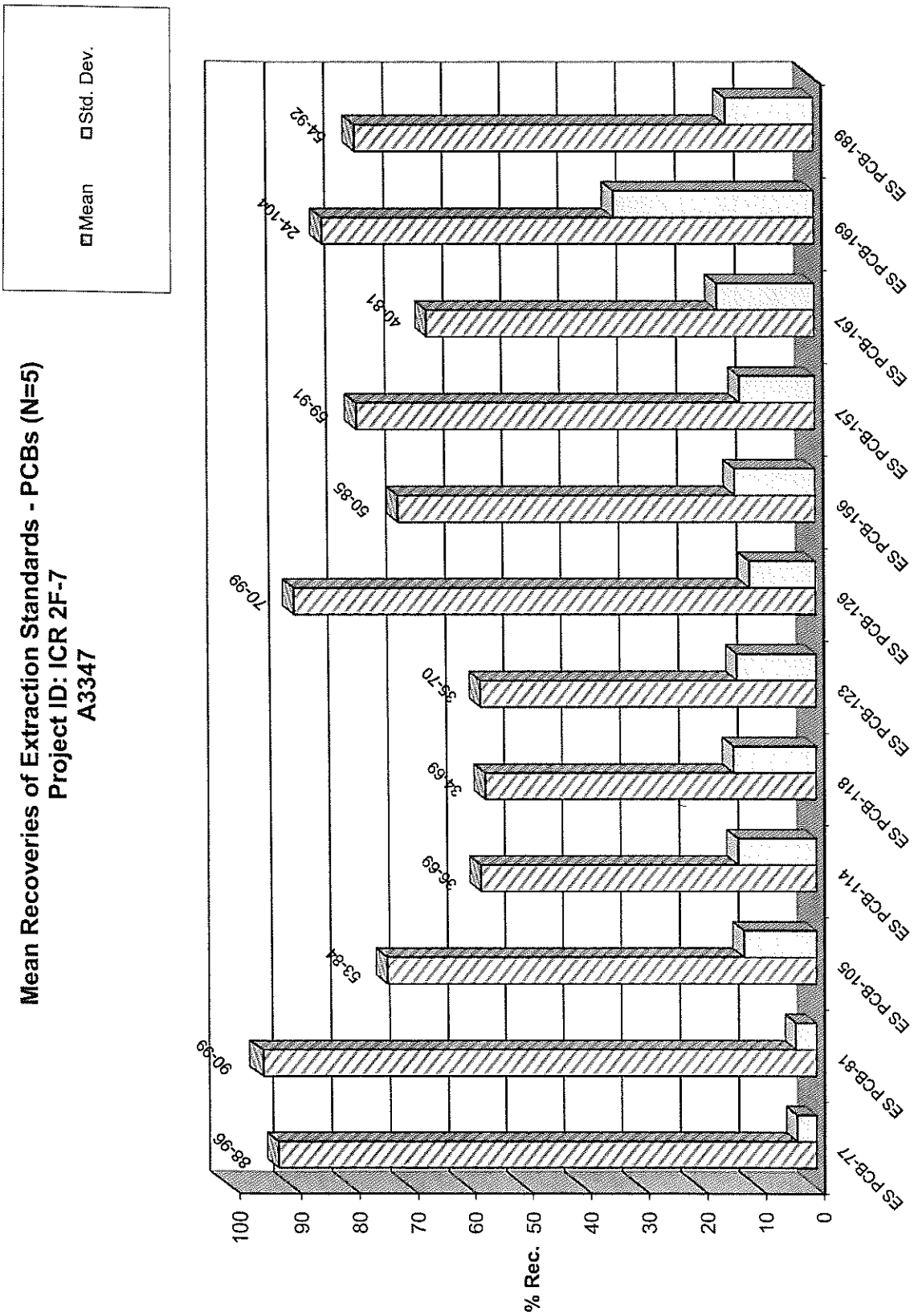


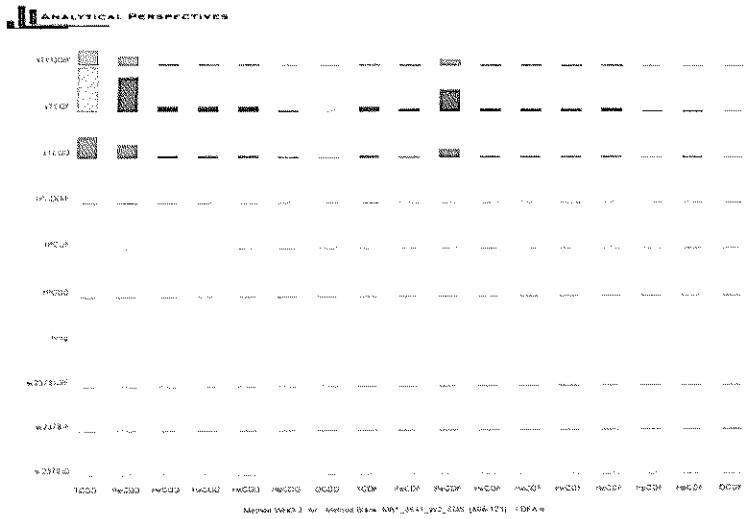

Method Specification Limits: Tetra-Hexa ES: 40-130%, Hepta-Octa ES: 25-130% (F = fail)

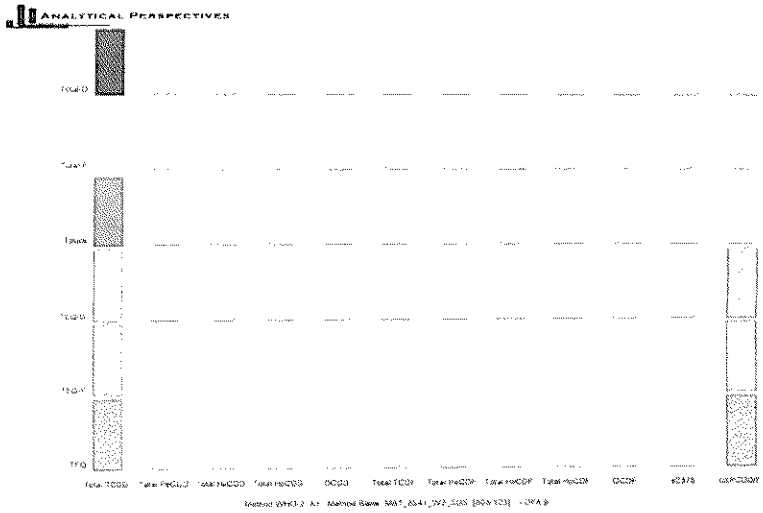
**Mean Recoveries of Sampling Standards (N=5)**
**Project ID: ICR 2F-7**
**A3347**

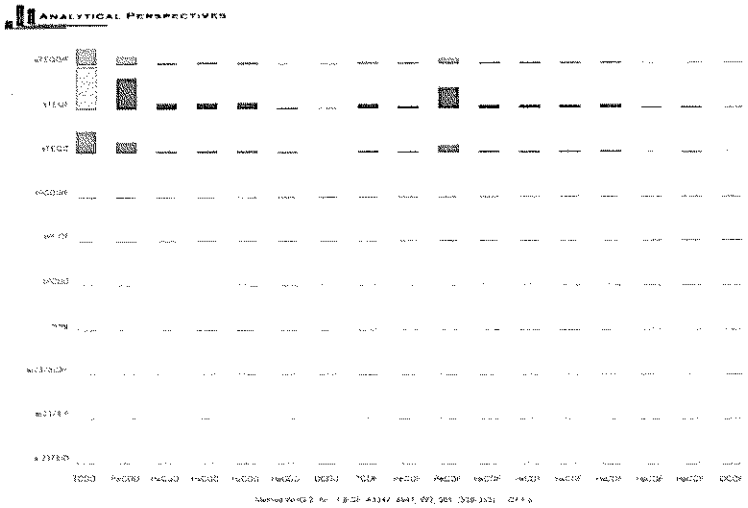


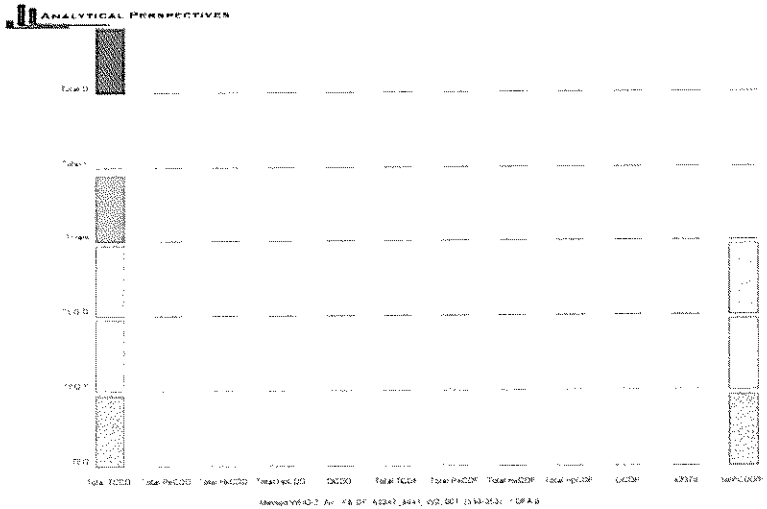

Method Specification Limits: Tetra-Octa SS: 70-130% (F = fail)

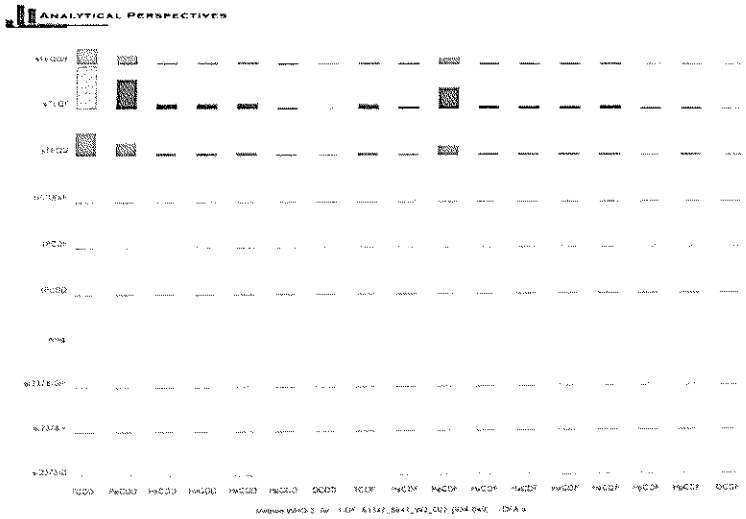

Mean Recoveries of Extraction Standards - PCBs (N=5)
Project ID: ICR 2F-7
A3347
Mean
Std. Dev.
% Rec.
100
90
80
70
60
50
40
30
20
10
0
88-96
90-99
53-84
36-69
34-69
35-70
70-99
50-85
69-91
40-91
24-104
54-92
ES PCB-77
ES PCB-81
ES PCB-105
ES PCB-114
ES PCB-118
ES PCB-123
ES PCB-126
ES PCB-156
ES PCB-157
ES PCB-167
ES PCB-169
ES PCB-189

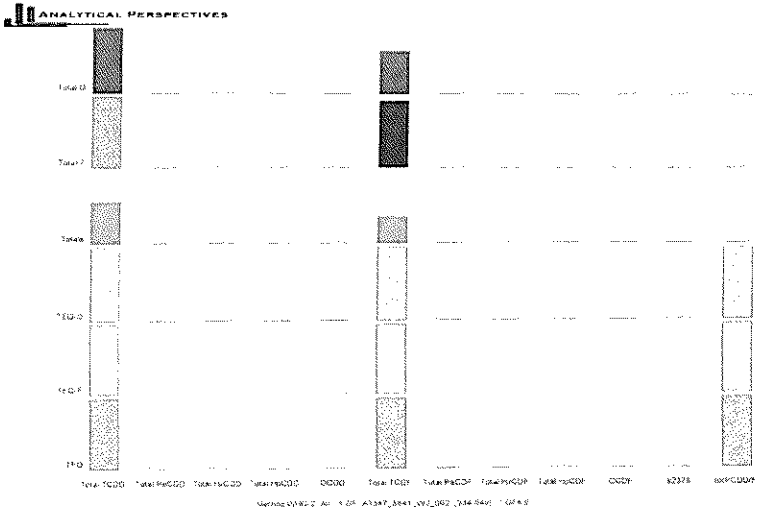

ANALYTICAL PERSPECTIVES

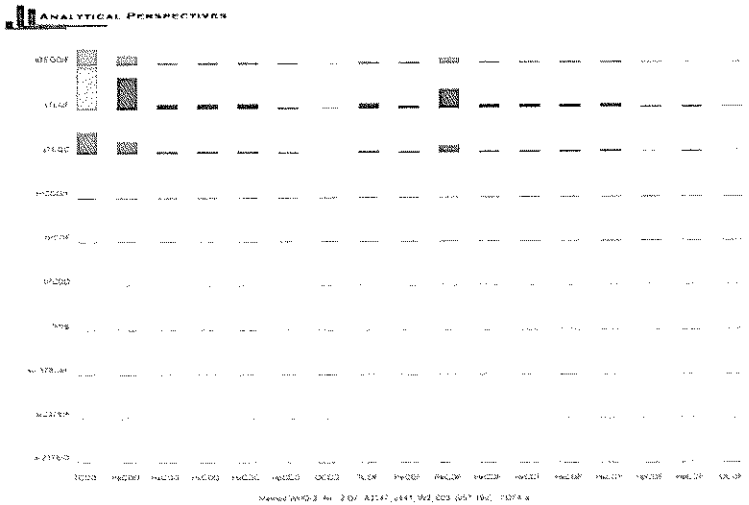

ANALYTICAL PERSPECTIVES

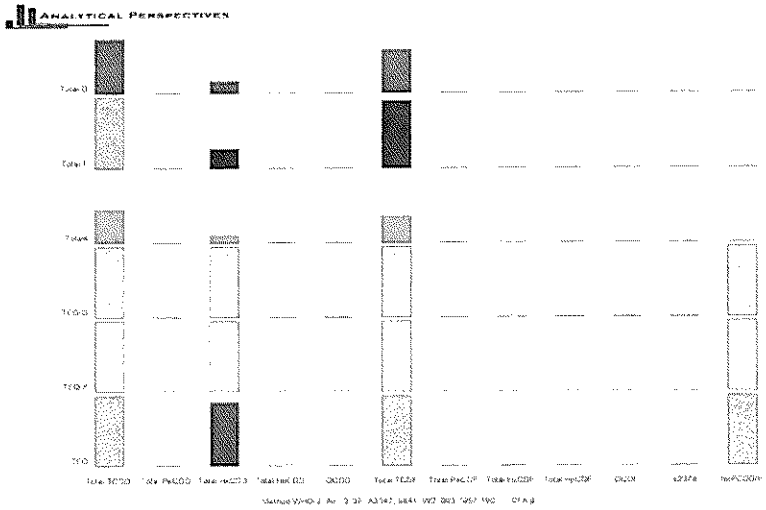

ANALYTICAL PERSPECTIVES


ANALYTICAL PERSPECTIVES



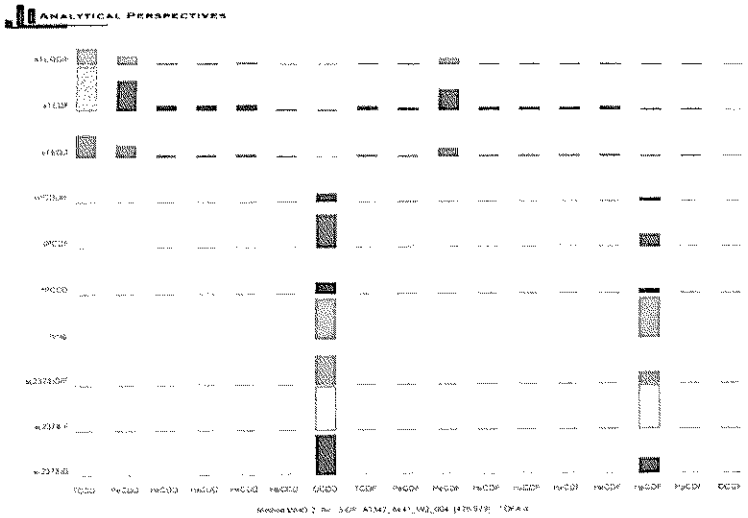



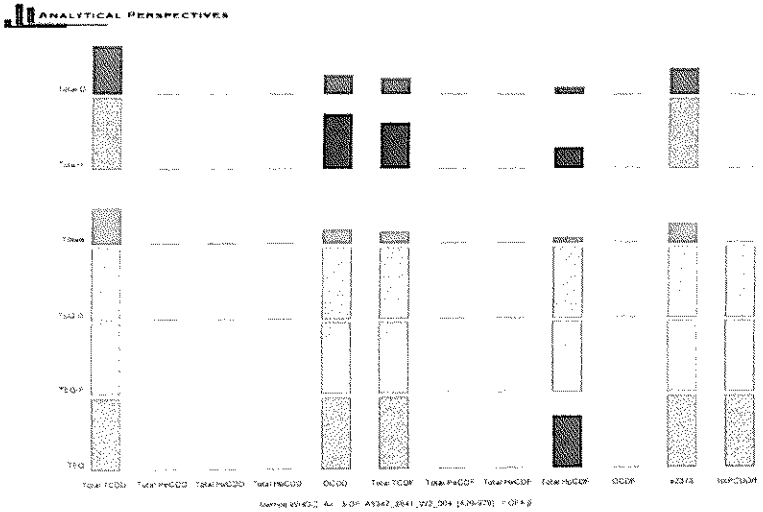




A3347 Page 2 of 3

C.6-53


ANALYTICAL PERSPECTIVES


ANALYTICAL PERSPECTIVES

# Sample ID: Method Blank — Method WHO-2

| Client Data | | Sample Data | | Laboratory Data | | | |
|---|---|---|---|---|---|---|---|
| Name: | Delta Air Quality Services | Matrix: | Air | Lab Project ID: | A3347 | Date Received: | 13-Jul-2011 |
| Project ID: | ICR 2F-7 | Weight/Volume: | 1 | Lab Sample ID | MB1_8841_W2_SDS | Date Extracted: | 18-Jul-2011 |
| Date Collected: | 29-Jun-2011 | | | QC Batch No: | 8841 | Date Analyzed: | 25-Jul-2011 |
| | | Split: | 2 | Dilution: | - | Time Analyzed: | 18:41:35 |

| Analyte | Conc. (pg) | DL (pg) | EMPC (pg) | Qualifiers |
|---|---|---|---|---|
| 2378-TCDD | ND | 2.25 | | |
| 12378-PeCDD | ND | 2.79 | | |
| 123478-HxCDD | ND | 2.05 | | |
| 123678-HxCDD | ND | 2.14 | | |
| 123789-HxCDD | ND | 2.18 | | |
| 1234678-HpCDD | ND | 2.45 | | |
| OCDD | ND | 4.49 | | |
| 2378-TCDF | ND | 1.96 | | |
| 12378-PeCDF | ND | 1.86 | | |
| 23478-PeCDF | ND | 1.74 | | |
| 123478-HxCDF | ND | 1.15 | | |
| 123678-HxCDF | ND | 1.1 | | |
| 234678-HxCDF | ND | 1.12 | | |
| 123789-HxCDF | ND | 1.39 | | |
| 1234678-HpCDF | ND | 1.74 | | |
| 1234789-HpCDF | ND | 2.67 | | |
| OCDF | ND | 6.44 | | |
| **Totals** | | | | |
| Total TCDD | 8.23 | | 8.23 | |
| Total PeCDD | ND | 2.79 | ND | |
| Total HxCDD | ND | 2.12 | ND | |
| Total HpCDD | ND | 2.45 | ND | |
| Total TCDF | ND | 1.96 | ND | |
| Total PeCDF | ND | 1.8 | ND | |
| Total HxCDF | ND | 1.18 | ND | |
| Total HpCDF | ND | 2.15 | ND | |
| **Total PCDD/Fs** | **8.23** | | **8.23** | |
| **ITEF TEQs** | | | | |
| TEQ: ND=0 | 0 | | 0 | |
| TEQ: ND=DL/2 | 3 | 3 | 3 | |
| TEQ: ND=DL | 5.99 | 5.99 | 5.99 | |

| Standard | ES Recoveries | Qualifiers |
|---|---|---|
| ES 2378-TCDD | 90.3 | |
| ES 12378-PeCDD | 87.7 | |
| ES 123478-HxCDD | 90.9 | |
| ES 123678-HxCDD | 90.1 | |
| ES 123789-HxCDD | 90.4 | |
| ES 1234678-HpCDD | 89.9 | |
| ES OCDD | 84.8 | |
| ES 2378-TCDF | 90.8 | |
| ES 12378-PeCDF | 88.2 | |
| ES 23478-PeCDF | 88.8 | |
| ES 123478-HxCDF | 89.2 | |
| ES 123678-HxCDF | 89.2 | |
| ES 234678-HxCDF | 89.5 | |
| ES 123789-HxCDF | 87.1 | |
| ES 1234678-HpCDF | 85.5 | |
| ES 1234789-HpCDF | 86.8 | |
| ES OCDF | 83.2 | |

| Standard | SS/AS/FS/TS Recoveries | Qualifiers |
|---|---|---|
| SS 37Cl-2378-TCDD | 95.5 | |
| SS 12347-PeCDD | 96.6 | |
| SS 12346-PeCDF | 96.5 | |
| SS 123469-HxCDF | 97.1 | |
| SS 1234689-HpCDF | 101 | |
| AS 1368-TCDD | 87.8 | |
| AS 1368-TCDF | 91.3 | |
| FS 1278-TCDD | 94.5 | |
| FS 12478-PeCDD | 96.3 | |
| FS 123468-HxCDD | 93.9 | |
| FS 1234679-HpCDD | 94.6 | |
| TS 1378-TCDD | 100 | |

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2714 Exchange Drive
Wilmington, NC 28405 , USA
info@ultratrace.com
Tel: +1 910 794-1613 (Fax: -3919); Toll-Free 866 846-8290
www.ultratrace.com

# Sample ID: Method Blank — Method WHO-2

| Client Data | | Sample Data | | Laboratory Data | | | |
|---|---|---|---|---|---|---|---|
| Name: | ıelta Air Quality Service | Matrix: | Air | Lab Project ID: | A3347 | Date Received: | 13-Jul-2011 |
| Project ID: | ICR 2F-7 | Weight/Volume: | 1 | Lab Sample ID: | MB1_8841_W2_SDS | Date Extracted: | 18-Jul-2011 |
| Date Collected: | 29-Jun-2011 | | | QC Batch No: | 8841 | Date Analyzed: | 25-Jul-2011 |
| | | Split: | 2 | Dilution: | - | Time Analyzed: | 18:41:35 |

| Analyte | Conc. (pg/g) | DL (pg/g) | EMPC (pg/g) | Qualifiers | Standard | Recovery |
|---|---|---|---|---|---|---|
| PCB-77 33'44'-TeCB | EMPC | | 2.62 | J | ES PCB-77 | 93.2 |
| PCB-81 344'5-TeCB | ND | 1.15 | | | ES PCB-81 | 95.1 |
| PCB-105 233'44'-PeCB | 4.15 | | | J | ES PCB-105 | 82.8 |
| PCB-114 2344'5-PeCB | ND | 2.25 | | | ES PCB-114 | 68 |
| PCB-118 23'44'5-PeCB | 9.01 | | | J | ES PCB-118 | 68.7 |
| PCB-123 2'344'5-PeCB | ND | 2.12 | | | ES PCB-123 | 65.3 |
| PCB-126 33'44'5-PeCB | ND | 2.13 | | | ES PCB-126 | 95.2 |
| PCB-156 233'44'5-HxCB | ND | 1.94 | | | ES PCB-156 | 84.7 |
| PCB-157 233'44'5'-HxCB | ND | 1.99 | | | ES PCB-157 | 90.6 |
| PCB-167 23'44'55'-HxCB | ND | 1.85 | | | ES PCB-167 | 81.1 |
| PCB-169 33'44'55'-HxCB | ND | 2.28 | | | ES PCB-169 | 101 |
| PCB-189 233'44'55'-HpCB | ND | 4.34 | | | ES PCB-189 | 91.9 |
| | | | | | FS PCB-77 (D6) | 102 |

| TEQs | ITEF + WHO-2005 | | | WHO-1998 | | WHO-2005 | |
|---|---|---|---|---|---|---|---|
| | Conc. | EMPC | | Conc. | EMPC | Conc. | EMPC |
| DF+PCB (ND=0) | 0.000395 | 0.000656 | PCB (ND=0) | 0.00132 | 0.00158 | 0.000395 | 0.000656 |
| DF+PCB (ND=DL/2) | 3.14 | 3.14 | PCB (ND=DL/2) | 0.121 | 0.121 | 0.142 | 0.142 |
| DF+PCB (ND=DL) | 6.28 | 6.28 | PCB (ND=DL) | 0.241 | 0.241 | 0.283 | 0.283 |
| DF+PCB (< J-level=0) | 0 | 0.000262 | PCB (< J-level = 0) | 0 | 0.000262 | 0 | 0.000262 |
| | ITEF + WHO-1998 | | | | | | |
| DF+PCB (ND=0) | 0.00132 | 0.00158 | DF+PCB (ND=0) | 0.00132 | 0.00158 | 0.000395 | 0.000656 |
| DF+PCB (ND=DL/2) | 3.12 | 3.12 | DF+PCB (ND=DL/2) | 3.81 | 3.81 | 3.64 | 3.64 |
| DF+PCB (ND=DL) | 6.24 | 6.24 | DF+PCB (ND=DL) | 7.62 | 7.62 | 7.28 | 7.28 |
| DF+PCB (< J-level=0) | 0 | 0.000262 | DF+PCB (< J-level=0) | 0 | 0.000262 | 0 | 0.000262 |

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2714 Exchange Drive
Wilmington, NC 28405 , USA
info@ultratrace.com
Tel: +1 910 794-1613 (Fax: 794-3919); Toll-Free 866 846-8290 www.ultratrace.com

# Sample ID: FB-DF

# Method WHO-2

| Client Data | | Sample Data | | Laboratory Data | | | |
|---|---|---|---|---|---|---|---|
| Name: | Delta Air Quality Services | Matrix: | Air | Lab Project ID: | A3347 | Date Received: | 13-Jul-2011 |
| Project ID: | ICR 2F-7 | Weight/Volume: | 1 | Lab Sample ID | A3347_8841_W2_001 | Date Extracted: | 18-Jul-2011 |
| Date Collected: | 29-Jun-2011 | | | QC Batch No: | 8841 | Date Analyzed: | 25-Jul-2011 |
| | | Split: | 2 | Dilution: | - | Time Analyzed: | 19:29:40 |

| Analyte | Conc. (pg) | DL (pg) | EMPC (pg) | Qualifiers | Standard | ES Recoveries | Qualifiers |
|---|---|---|---|---|---|---|---|
| 2378-TCDD | ND | 4.13 | | | ES 2378-TCDD | 89.9 | |
| 12378-PeCDD | ND | 4.18 | | | ES 12378-PeCDD | 87.6 | |
| 123478-HxCDD | ND | 3.98 | | | ES 123478-HxCDD | 88.9 | |
| 123678-HxCDD | ND | 4.07 | | | ES 123678-HxCDD | 89.3 | |
| 123789-HxCDD | ND | 4.37 | | | ES 123789-HxCDD | 88.8 | |
| 1234678-HpCDD | ND | 4.24 | | | ES 1234678-HpCDD | 89.6 | |
| OCDD | ND | 6.73 | | | ES OCDD | 80.9 | |
| 2378-TCDF | ND | 3.13 | | | ES 2378-TCDF | 89.6 | |
| 12378-PeCDF | ND | 2.79 | | | ES 12378-PeCDF | 88.5 | |
| 23478-PeCDF | ND | 2.78 | | | ES 23478-PeCDF | 87.1 | |
| 123478-HxCDF | ND | 1.9 | | | ES 123478-HxCDF | 89.1 | |
| 123678-HxCDF | ND | 1.8 | | | ES 123678-HxCDF | 88.1 | |
| 234678-HxCDF | ND | 1.85 | | | ES 234678-HxCDF | 92.3 | |
| 123789-HxCDF | ND | 2.37 | | | ES 123789-HxCDF | 86.5 | |
| 1234678-HpCDF | ND | 2.56 | | | ES 1234678-HpCDF | 86.1 | |
| 1234789-HpCDF | ND | 4 | | | ES 1234789-HpCDF | 86.7 | |
| OCDF | ND | 10.2 | | | ES OCDF | 79.4 | |
| **Totals** | | | | | **Standard** | **SS/AS/FS/TS Recoveries** | |
| | | | | | SS 37Cl-2378-TCDD | 104 | |
| Total TCDD | 10.4 | | 10.4 | | SS 12347-PeCDD | 106 | |
| Total PeCDD | ND | 4.18 | ND | | SS 12346-PeCDF | 99.4 | |
| Total HxCDD | ND | 4.13 | ND | | SS 123469-HxCDF | 103 | |
| Total HpCDD | ND | 4.24 | ND | | SS 1234689-HpCDF | 104 | |
| | | | | | AS 1368-TCDD | 93.3 | |
| Total TCDF | ND | 3.13 | ND | | AS 1368-TCDF | 92.1 | |
| Total PeCDF | ND | 2.78 | ND | | FS 1278-TCDD | 62.6 | |
| Total HxCDF | ND | 1.96 | ND | | FS 12478-PeCDD | 59.1 | |
| Total HpCDF | ND | 3.19 | ND | | FS 123468-HxCDD | 48.3 | |
| **Total PCDD/Fs** | **10.4** | | **10.4** | | FS 1234679-HpCDD | 40.1 | |
| **ITEF TEQs** | | | | | TS 1378-TCDD | 104 | |
| TEQ: ND=0 | 0 | | 0 | | | | |
| TEQ: ND=DL/2 | 5.11 | 5.11 | 5.11 | | | | |
| TEQ: ND=DL | 10.2 | 10.2 | 10.2 | | | | |

ANALYTICAL PERSPECTIVES
2714 Exchange Drive
Wilmington, NC 28405 , USA
info@ultratrace.com
Tel: +1 910 794-1613 (Fax: -3919); Toll-Free 866 846-8290
www.ultratrace.com

# Sample ID: FB-DF

# Method WHO-2

| Client Data | | Sample Data | | Laboratory Data | | | |
|---|---|---|---|---|---|---|---|
| Name: | ielta Air Quality Service | Matrix: | Air | Lab Project ID: | A3347 | Date Received: | 13-Jul-2011 |
| Project ID: | ICR 2F-7 | Weight/Volume: | 1 | Lab Sample ID: | A3347_8841_W2_001 | Date Extracted: | 18-Jul-2011 |
| Date Collected: | 29-Jun-2011 | | | QC Batch No: | 8841 | Date Analyzed: | 25-Jul-2011 |
| | | Split: | 2 | Dilution: | - | Time Analyzed: | 19:29:40 |

| Analyte | Conc. (pg/g) | DL (pg/g) | EMPC (pg/g) | Qualifiers | Standard | Recovery |
|---|---|---|---|---|---|---|
| PCB-77 33'44'-TeCB | 18 | | | J B | ES PCB-77 | 95.9 |
| PCB-81 344'5-TeCB | ND | 1.23 | | | ES PCB-81 | 98.7 |
| PCB-105 233'44'-PeCB | EMPC | | 41.9 | B | ES PCB-105 | 53 |
| PCB-114 2344'5-PeCB | ND | 4.44 | | | ES PCB-114 | 35.9 |
| PCB-118 23'44'5-PeCB | 108 | | | | ES PCB-118 | 33.6 |
| PCB-123 2'344'5-PeCB | 6.48 | | | J | ES PCB-123 | 35.2 |
| PCB-126 33'44'5-PeCB | ND | 2.05 | | | ES PCB-126 | 98.9 |
| PCB-156 233'44'5-HxCB | 6.33 | | | J | ES PCB-156 | 50 |
| PCB-157 233'44'5'-HxCB | ND | 3.92 | | | ES PCB-157 | 58.7 |
| PCB-167 23'44'55'-HxCB | EMPC | | 3.3 | J | ES PCB-167 | 40 |
| PCB-169 33'44'55'-HxCB | ND | 2.85 | | | ES PCB-169 | 104 |
| PCB-189 233'44'55'-HpCB | ND | 8.03 | | | ES PCB-189 | 54.5 |
| | | | | | FS PCB-77 (D6) | 98.8 |

| TEQs | ITEF + WHO-2005 | | | WHO-1998 | | WHO-2005 | |
|---|---|---|---|---|---|---|---|
| | Conc. | EMPC | | Conc. | EMPC | Conc. | EMPC |
| DF+PCB (ND=0) | 0.00543 | 0.00678 | PCB (ND=0) | 0.0164 | 0.0207 | 0.00543 | 0.00678 |
| DF+PCB (ND=DL/2) | 5.26 | 5.26 | PCB (ND=DL/2) | 0.136 | 0.14 | 0.151 | 0.152 |
| DF+PCB (ND=DL) | 10.5 | 10.5 | PCB (ND=DL) | 0.255 | 0.259 | 0.297 | 0.298 |
| DF+PCB (< J-level=0) | 0.00325 | 0.0046 | PCB (< J-level = 0) | 0.0108 | 0.015 | 0.00325 | 0.0046 |
| | ITEF + WHO-1998 | | | | | | |
| DF+PCB (ND=0) | 0.0164 | 0.0207 | DF+PCB (ND=0) | 0.0164 | 0.0207 | 0.00543 | 0.00678 |
| DF+PCB (ND=DL/2) | 5.25 | 5.25 | DF+PCB (ND=DL/2) | 6.28 | 6.29 | 6 | 6 |
| DF+PCB (ND=DL) | 10.5 | 10.5 | DF+PCB (ND=DL) | 12.6 | 12.6 | 12 | 12 |
| DF+PCB (< J-level=0) | 0.0108 | 0.015 | DF+PCB (< J-level=0) | 0.0108 | 0.015 | 0.00325 | 0.0046 |

ANALYTICAL PERSPECTIVES
2714 Exchange Drive
Wilmington, NC 28405 , USA
info@ultratrace.com
Tel: +1 910 794-1613 (Fax: 794-3919); Toll-Free 866 846-8290
www.ultratrace.com

# Sample ID: 1-DF

# Method WHO-2

| Client Data | | Sample Data | | Laboratory Data | | | |
|---|---|---|---|---|---|---|---|
| Name: | Delta Air Quality Services | Matrix: | Air | Lab Project ID: | A3347 | Date Received: | 13-Jul-2011 |
| Project ID: | ICR 2F-7 | Weight/Volume: | 1 | Lab Sample ID | A3347_8841_W2_002 | Date Extracted: | 18-Jul-2011 |
| Date Collected: | 28-Jun-2011 | | | QC Batch No: | 8841 | Date Analyzed: | 25-Jul-2011 |
| | | Split: | 2 | Dilution: | - | Time Analyzed: | 20:17:45 |

| Analyte | Conc. (pg) | DL (pg) | EMPC (pg) | Qualifiers |
|---|---|---|---|---|
| 2378-TCDD | ND | 3.61 | | |
| 12378-PeCDD | ND | 3.92 | | |
| 123478-HxCDD | ND | 3.37 | | |
| 123678-HxCDD | ND | 3.32 | | |
| 123789-HxCDD | ND | 3.79 | | |
| 1234678-HpCDD | ND | 4.4 | | |
| OCDD | ND | 5.97 | | |
| 2378-TCDF | ND | 3.17 | | |
| 12378-PeCDF | ND | 2.87 | | |
| 23478-PeCDF | ND | 2.87 | | |
| 123478-HxCDF | ND | 1.74 | | |
| 123678-HxCDF | ND | 1.73 | | |
| 234678-HxCDF | ND | 1.64 | | |
| 123789-HxCDF | ND | 2.19 | | |
| 1234678-HpCDF | ND | 2.48 | | |
| 1234789-HpCDF | ND | 3.98 | | |
| OCDF | ND | 9.98 | | |
| **Totals** | | | | |
| Total TCDD | 9.06 | | 9.06 | |
| Total PeCDD | ND | 3.92 | ND | |
| Total HxCDD | ND | 3.48 | ND | |
| Total HpCDD | ND | 4.4 | ND | |
| Total TCDF | 5.85 | | 5.85 | |
| Total PeCDF | ND | 2.87 | ND | |
| Total HxCDF | ND | 1.81 | ND | |
| Total HpCDF | ND | 3.16 | ND | |
| **Total PCDD/Fs** | **14.9** | | **14.9** | |
| **ITEF TEQs** | | | | |
| TEQ: ND=0 | 0 | | 0 | |
| TEQ: ND=DL/2 | 4.68 | 4.68 | 4.68 | |
| TEQ: ND=DL | 9.37 | 9.37 | 9.37 | |

| Standard | ES Recoveries | Qualifiers |
|---|---|---|
| ES 2378-TCDD | 89.9 | |
| ES 12378-PeCDD | 87.5 | |
| ES 123478-HxCDD | 87.5 | |
| ES 123678-HxCDD | 84.8 | |
| ES 123789-HxCDD | 82.6 | |
| ES 1234678-HpCDD | 85.1 | |
| ES OCDD | 79.5 | |
| ES 2378-TCDF | 88.2 | |
| ES 12378-PeCDF | 84.8 | |
| ES 23478-PeCDF | 83.7 | |
| ES 123478-HxCDF | 82.8 | |
| ES 123678-HxCDF | 83.1 | |
| ES 234678-HxCDF | 87.6 | |
| ES 123789-HxCDF | 81.1 | |
| ES 1234678-HpCDF | 80.9 | |
| ES 1234789-HpCDF | 84 | |
| ES OCDF | 78.6 | |

| Standard | SS/AS/FS/TS Recoveries |
|---|---|
| SS 37Cl-2378-TCDD | 100 |
| SS 12347-PeCDD | 101 |
| SS 12346-PeCDF | 99.8 |
| SS 123469-HxCDF | 99.5 |
| SS 1234689-HpCDF | 105 |
| AS 1368-TCDD | 84.8 |
| AS 1368-TCDF | 86.1 |
| FS 1278-TCDD | 67.2 |
| FS 12478-PeCDD | 65.5 |
| FS 123468-HxCDD | 60.8 |
| FS 1234679-HpCDD | 61.3 |
| TS 1378-TCDD | 100 |

ANALYTICAL PERSPECTIVES
2714 Exchange Drive
Wilmington, NC 28405 , USA
info@ultratrace.com
Tel: +1 910 794-1613 (Fax: -3919); Toll-Free 866 846-8290
www.ultratrace.com

# Sample ID: 1-DF

# Method WHO-2

| Client Data | | Sample Data | | Laboratory Data | | | |
|---|---|---|---|---|---|---|---|
| Name: | lelta Air Quality Service | Matrix: | Air | Lab Project ID: | A3347 | Date Received: | 13-Jul-2011 |
| Project ID: | ICR 2F-7 | Weight/Volume: | 1 | Lab Sample ID: | A3347_8841_W2_002 | Date Extracted: | 18-Jul-2011 |
| Date Collected: | 28-Jun-2011 | | | QC Batch No: | 8841 | Date Analyzed: | 25-Jul-2011 |
| | | Split: | 2 | Dilution: | - | Time Analyzed: | 20:17:45 |

| Analyte | Conc. (pg/g) | DL (pg/g) | EMPC (pg/g) | Qualifiers | Standard | Recovery |
|---|---|---|---|---|---|---|
| PCB-77 33'44'-TeCB | 32.6 | | | | ES PCB-77 | 87.8 |
| PCB-81 344'5-TeCB | EMPC | | 2.39 | J | ES PCB-81 | 90.1 |
| PCB-105 233'44'-PeCB | 66.9 | | | | ES PCB-105 | 74 |
| PCB-114 2344'5-PeCB | EMPC | | 4.58 | J | ES PCB-114 | 57.7 |
| PCB-118 23'44'5-PeCB | 166 | | | | ES PCB-118 | 57.2 |
| PCB-123 2'344'5-PeCB | 8.17 | | | J | ES PCB-123 | 60.7 |
| PCB-126 33'44'5-PeCB | ND | 3.22 | | | ES PCB-126 | 88.6 |
| PCB-156 233'44'5-HxCB | 9.94 | | | J | ES PCB-156 | 71.8 |
| PCB-157 233'44'5'-HxCB | EMPC | | 2.94 | J | ES PCB-157 | 77.1 |
| PCB-167 23'44'55'-HxCB | 5.04 | | | J | ES PCB-167 | 66 |
| PCB-169 33'44'55'-HxCB | ND | 3.41 | | | ES PCB-169 | 97.4 |
| PCB-189 233'44'55'-HpCB | ND | 5.49 | | | ES PCB-189 | 78.5 |
| | | | | | FS PCB-77 (D6) | 95.9 |

| TEQs | ITEF + WHO-2005 | | | WHO-1998 | | WHO-2005 | |
|---|---|---|---|---|---|---|---|
| | Conc. | EMPC | | Conc. | EMPC | Conc. | EMPC |
| DF+PCB (ND=0) | 0.0109 | 0.0119 | PCB (ND=0) | 0.0324 | 0.0364 | 0.0109 | 0.0119 |
| DF+PCB (ND=DL/2) | 4.91 | 4.91 | PCB (ND=DL/2) | 0.213 | 0.215 | 0.224 | 0.224 |
| DF+PCB (ND=DL) | 9.8 | 9.8 | PCB (ND=DL) | 0.393 | 0.393 | 0.436 | 0.436 |
| DF+PCB (< J-level=0) | 0.0102 | 0.0112 | PCB (< J-level = 0) | 0.0265 | 0.0305 | 0.0102 | 0.0112 |
| | ITEF + WHO-1998 | | | | | | |
| DF+PCB (ND=0) | 0.0324 | 0.0364 | DF+PCB (ND=0) | 0.0324 | 0.0364 | 0.0109 | 0.0119 |
| DF+PCB (ND=DL/2) | 4.9 | 4.9 | DF+PCB (ND=DL/2) | 5.87 | 5.87 | 5.57 | 5.57 |
| DF+PCB (ND=DL) | 9.76 | 9.76 | DF+PCB (ND=DL) | 11.7 | 11.7 | 11.1 | 11.1 |
| DF+PCB (< J-level=0) | 0.0265 | 0.0305 | DF+PCB (< J-level=0) | 0.0265 | 0.0305 | 0.0102 | 0.0112 |

ANALYTICAL PERSPECTIVES
2714 Exchange Drive
Wilmington, NC 28405 , USA
info@ultratrace.com
Tel: +1 910 794-1613 (Fax: 794-3919); Toll-Free 866 846-8290 www.ultratrace.com

# Sample ID: 2-DF

# Method WHO-2

| Client Data | | Sample Data | | Laboratory Data | | | |
|---|---|---|---|---|---|---|---|
| Name: | Delta Air Quality Services | Matrix: | Air | Lab Project ID: | A3347 | Date Received: | 13-Jul-2011 |
| Project ID: | ICR 2F-7 | Weight/Volume: | 1 | Lab Sample ID | A3347_8841_W2_003 | Date Extracted: | 18-Jul-2011 |
| Date Collected: | 29-Jun-2011 | | | QC Batch No: | 8841 | Date Analyzed: | 25-Jul-2011 |
| | | Split: | 2 | Dilution: | - | Time Analyzed: | 21:05:49 |

| Analyte | Conc. (pg) | DL (pg) | EMPC (pg) | Qualifiers |
|---|---|---|---|---|
| 2378-TCDD | ND | 3.32 | | |
| 12378-PeCDD | ND | 3.83 | | |
| 123478-HxCDD | ND | 2.77 | | |
| 123678-HxCDD | ND | 2.92 | | |
| 123789-HxCDD | ND | 2.96 | | |
| 1234678-HpCDD | ND | 4.74 | | |
| OCDD | ND | 6.79 | | |
| 2378-TCDF | ND | 3.03 | | |
| 12378-PeCDF | ND | 2.58 | | |
| 23478-PeCDF | ND | 2.26 | | |
| 123478-HxCDF | ND | 1.89 | | |
| 123678-HxCDF | ND | 1.8 | | |
| 234678-HxCDF | ND | 1.67 | | |
| 123789-HxCDF | ND | 2.34 | | |
| 1234678-HpCDF | ND | 2.59 | | |
| 1234789-HpCDF | ND | 3.93 | | |
| OCDF | ND | 8.73 | | |
| **Totals** | | | | |
| Total TCDD | 18.4 | | 18.4 | |
| Total PeCDD | ND | 3.83 | ND | |
| Total HxCDD | 4.12 | | 4.12 | |
| Total HpCDD | ND | 4.74 | ND | |
| Total TCDF | ND | | 14.6 | |
| Total PeCDF | ND | 2.42 | ND | |
| Total HxCDF | ND | 1.9 | ND | |
| Total HpCDF | ND | 3.19 | ND | |
| **Total PCDD/Fs** | **22.5** | | **37.1** | |
| **ITEF TEQs** | | | | |
| TEQ: ND=0 | 0 | | 0 | |
| TEQ: ND=DL/2 | 4.28 | 4.28 | 4.28 | |
| TEQ: ND=DL | 8.56 | 8.56 | 8.56 | |

| Standard | ES Recoveries | Qualifiers |
|---|---|---|
| ES 2378-TCDD | 92.5 | |
| ES 12378-PeCDD | 91.8 | |
| ES 123478-HxCDD | 90.5 | |
| ES 123678-HxCDD | 89.3 | |
| ES 123789-HxCDD | 90.8 | |
| ES 1234678-HpCDD | 90.7 | |
| ES OCDD | 84.6 | |
| ES 2378-TCDF | 88.1 | |
| ES 12378-PeCDF | 87.3 | |
| ES 23478-PeCDF | 86.4 | |
| ES 123478-HxCDF | 87.2 | |
| ES 123678-HxCDF | 87.9 | |
| ES 234678-HxCDF | 94.2 | |
| ES 123789-HxCDF | 86.2 | |
| ES 1234678-HpCDF | 87.4 | |
| ES 1234789-HpCDF | 90.2 | |
| ES OCDF | 82.7 | |

| Standard | SS/AS/FS/TS Recoveries |
|---|---|
| SS 37Cl-2378-TCDD | 101 |
| SS 12347-PeCDD | 96.5 |
| SS 12346-PeCDF | 97.5 |
| SS 123469-HxCDF | 97.9 |
| SS 1234689-HpCDF | 102 |
| AS 1368-TCDD | 89.2 |
| AS 1368-TCDF | 86.2 |
| FS 1278-TCDD | 62.3 |
| FS 12478-PeCDD | 60.3 |
| FS 123468-HxCDD | 50.3 |
| FS 1234679-HpCDD | 50 |
| TS 1378-TCDD | 98.9 |

ANALYTICAL PERSPECTIVES
2714 Exchange Drive
Wilmington, NC 28405 , USA
info@ultratrace.com
Tel: +1 910 794-1613 (Fax: -3919); Toll-Free 866 846-8290
www.ultratrace.com

# Sample ID: 2-DF

# Method WHO-2

| Client Data | | Sample Data | | Laboratory Data | | | |
|---|---|---|---|---|---|---|---|
| Name: | ıelta Air Quality Service | Matrix: | Air | Lab Project ID: | A3347 | Date Received: | 13-Jul-2011 |
| Project ID: | ICR 2F-7 | Weight/Volume: | 1 | Lab Sample ID: | A3347_8841_W2_003 | Date Extracted: | 18-Jul-2011 |
| Date Collected: | 29-Jun-2011 | | | QC Batch No: | 8841 | Date Analyzed: | 25-Jul-2011 |
| | | Split: | 2 | Dilution: | - | Time Analyzed: | 21:05:49 |

| Analyte | Conc. (pg/g) | DL (pg/g) | EMPC (pg/g) | Qualifiers | Standard | Recovery |
|---|---|---|---|---|---|---|
| PCB-77 33'44'-TeCB | 22.6 | | | B | ES PCB-77 | 90.4 |
| PCB-81 344'5-TeCB | EMPC | | 1.78 | J | ES PCB-81 | 93 |
| PCB-105 233'44'-PeCB | 40 | | | B | ES PCB-105 | 75.1 |
| PCB-114 2344'5-PeCB | ND | 3.26 | | | ES PCB-114 | 56.5 |
| PCB-118 23'44'5-PeCB | 99.9 | | | | ES PCB-118 | 56.2 |
| PCB-123 2'344'5-PeCB | EMPC | | 6.13 | J | ES PCB-123 | 55.9 |
| PCB-126 33'44'5-PeCB | ND | 2.68 | | | ES PCB-126 | 92.4 |
| PCB-156 233'44'5-HxCB | 7.22 | | | J | ES PCB-156 | 68.5 |
| PCB-157 233'44'5'-HxCB | 2.34 | | | J | ES PCB-157 | 76.3 |
| PCB-167 23'44'55'-HxCB | EMPC | | 3.26 | J | ES PCB-167 | 64.5 |
| PCB-169 33'44'55'-HxCB | ND | 2.2 | | | ES PCB-169 | 93 |
| PCB-189 233'44'55'-HpCB | ND | 5.4 | | | ES PCB-189 | 76.7 |
| | | | | | FS PCB-77 (D6) | 94.1 |

| TEQs | ITEF + WHO-2005 | | | WHO-1998 | | WHO-2005 | |
|---|---|---|---|---|---|---|---|
| | Conc. | EMPC | | Conc. | EMPC | Conc. | EMPC |
| DF+PCB (ND=0) | 0.00674 | 0.00756 | PCB (ND=0) | 0.021 | 0.0219 | 0.00674 | 0.00756 |
| DF+PCB (ND=DL/2) | 4.45 | 4.45 | PCB (ND=DL/2) | 0.167 | 0.168 | 0.174 | 0.175 |
| DF+PCB (ND=DL) | 8.9 | 8.9 | PCB (ND=DL) | 0.314 | 0.314 | 0.342 | 0.342 |
| DF+PCB (< J-level=0) | 0.00646 | 0.00727 | PCB (< J-level = 0) | 0.0163 | 0.0171 | 0.00646 | 0.00727 |
| | ITEF + WHO-1998 | | | | | | |
| DF+PCB (ND=0) | 0.021 | 0.0219 | DF+PCB (ND=0) | 0.021 | 0.0219 | 0.00674 | 0.00756 |
| DF+PCB (ND=DL/2) | 4.45 | 4.45 | DF+PCB (ND=DL/2) | 5.4 | 5.4 | 5.15 | 5.16 |
| DF+PCB (ND=DL) | 8.87 | 8.87 | DF+PCB (ND=DL) | 10.8 | 10.8 | 10.3 | 10.3 |
| DF+PCB (< J-level=0) | 0.0163 | 0.0171 | DF+PCB (< J-level=0) | 0.0163 | 0.0171 | 0.00646 | 0.00727 |

ANALYTICAL PERSPECTIVES
2714 Exchange Drive
Wilmington, NC 28405 , USA
info@ultratrace.com
Tel: +1 910 794-1613 (Fax: 794-3919); Toll-Free 866 846-8290 www.ultratrace.com

# Sample ID: 3-DF

# Method WHO-2

| Client Data | | Sample Data | | Laboratory Data | | | |
|---|---|---|---|---|---|---|---|
| Name: | Delta Air Quality Services | Matrix: | Air | Lab Project ID: | A3347 | Date Received: | 13-Jul-2011 |
| Project ID: | ICR 2F-7 | Weight/Volume: | 1 | Lab Sample ID | A3347_8841_W2_004 | Date Extracted: | 18-Jul-2011 |
| Date Collected: | 29-Jun-2011 | | | QC Batch No: | 8841 | Date Analyzed: | 25-Jul-2011 |
| | | Split: | 2 | Dilution: | - | Time Analyzed: | 21:53:46 |

| Analyte | Conc. (pg) | DL (pg) | EMPC (pg) | Qualifiers |
|---|---|---|---|---|
| 2378-TCDD | ND | 3.53 | | |
| 12378-PeCDD | ND | 3.85 | | |
| 123478-HxCDD | ND | 3.27 | | |
| 123678-HxCDD | ND | 3.33 | | |
| 123789-HxCDD | ND | 3.61 | | |
| 1234678-HpCDD | ND | 4.18 | | |
| OCDD | 9.24 | | | J |
| 2378-TCDF | ND | 2.6 | | |
| 12378-PeCDF | ND | 2.79 | | |
| 23478-PeCDF | ND | 2.72 | | |
| 123478-HxCDF | ND | 1.88 | | |
| 123678-HxCDF | ND | 1.78 | | |
| 234678-HxCDF | ND | 1.76 | | |
| 123789-HxCDF | ND | 2.41 | | |
| 1234678-HpCDF | 3.55 | | | J |
| 1234789-HpCDF | ND | 5.31 | | |
| OCDF | ND | 8.62 | | |
| **Totals** | | | | |
| Total TCDD | 17.5 | | 23.8 | |
| Total PeCDD | ND | 3.85 | ND | |
| Total HxCDD | ND | 3.39 | ND | |
| Total HpCDD | ND | 4.18 | ND | |
| Total TCDF | ND | | 7.77 | |
| Total PeCDF | ND | 2.75 | ND | |
| Total HxCDF | ND | 1.93 | ND | |
| Total HpCDF | 3.55 | | 3.55 | |
| **Total PCDD/Fs** | **30.3** | | **44.4** | |
| **ITEF TEQs** | | | | |
| TEQ: ND=0 | 0.0447 | | 0.0447 | |
| TEQ: ND=DL/2 | 4.61 | 4.58 | 4.61 | |
| TEQ: ND=DL | 9.17 | 9.16 | 9.17 | |

| Standard | ES Recoveries | Qualifiers |
|---|---|---|
| ES 2378-TCDD | 89.4 | |
| ES 12378-PeCDD | 89.5 | |
| ES 123478-HxCDD | 87.4 | |
| ES 123678-HxCDD | 85.9 | |
| ES 123789-HxCDD | 84.5 | |
| ES 1234678-HpCDD | 86.3 | |
| ES OCDD | 82.2 | |
| ES 2378-TCDF | 84.2 | |
| ES 12378-PeCDF | 82.8 | |
| ES 23478-PeCDF | 82.6 | |
| ES 123478-HxCDF | 86.4 | |
| ES 123678-HxCDF | 85.1 | |
| ES 234678-HxCDF | 91.2 | |
| ES 123789-HxCDF | 83 | |
| ES 1234678-HpCDF | 82.2 | |
| ES 1234789-HpCDF | 85.2 | |
| ES OCDF | 80 | |

| Standard | SS/AS/FS/TS Recoveries |
|---|---|
| SS 37Cl-2378-TCDD | 103 |
| SS 12347-PeCDD | 103 |
| SS 12346-PeCDF | 105 |
| SS 123469-HxCDF | 102 |
| SS 1234689-HpCDF | 112 |
| AS 1368-TCDD | 90.7 |
| AS 1368-TCDF | 89.3 |
| FS 1278-TCDD | 74 |
| FS 12478-PeCDD | 68.6 |
| FS 123468-HxCDD | 60.5 |
| FS 1234679-HpCDD | 57.5 |
| TS 1378-TCDD | 103 |

ANALYTICAL PERSPECTIVES
2714 Exchange Drive
Wilmington, NC 28405 , USA
info@ultratrace.com
Tel: +1 910 794-1613 (Fax: -3919); Toll-Free 866 846-8290
www.ultratrace.com

# Sample ID: 3-DF

# Method WHO-2

| Client Data | | Sample Data | | Laboratory Data | | | |
|---|---|---|---|---|---|---|---|
| Name: | ıelta Air Quality Service | Matrix: | Air | Lab Project ID: | A3347 | Date Received: | 13-Jul-2011 |
| Project ID: | ICR 2F-7 | Weight/Volume: | 1 | Lab Sample ID: | A3347_8841_W2_004 | Date Extracted: | 18-Jul-2011 |
| Date Collected: | 29-Jun-2011 | | | QC Batch No: | 8841 | Date Analyzed: | 25-Jul-2011 |
| | | Split: | 2 | Dilution: | - | Time Analyzed: | 21:53:46 |

| Analyte | Conc. (pg/g) | DL (pg/g) | EMPC (pg/g) | Qualifiers | Standard | Recovery |
|---|---|---|---|---|---|---|
| PCB-77 33'44'-TeCB | 48.3 | | | | ES PCB-77 | 94.8 |
| PCB-81 344'5-TeCB | 2.42 | | | J | ES PCB-81 | 97.8 |
| PCB-105 233'44'-PeCB | 85.5 | | | | ES PCB-105 | 83.5 |
| PCB-114 2344'5-PeCB | EMPC | | 5.45 | J | ES PCB-114 | 69 |
| PCB-118 23'44'5-PeCB | 231 | | | | ES PCB-118 | 67.2 |
| PCB-123 2'344'5-PeCB | EMPC | | 7.33 | J | ES PCB-123 | 69.6 |
| PCB-126 33'44'5-PeCB | ND | 3.35 | | | ES PCB-126 | 70.1 |
| PCB-156 233'44'5-HxCB | 10.9 | | | J | ES PCB-156 | 81.4 |
| PCB-157 233'44'5'-HxCB | 3.08 | | | J | ES PCB-157 | 88.5 |
| PCB-167 23'44'55'-HxCB | 4.68 | | | J | ES PCB-167 | 79.2 |
| PCB-169 33'44'55'-HxCB | ND | 12 | | | ES PCB-169 | 23.7 V |
| PCB-189 233'44'55'-HpCB | ND | 4.7 | | | ES PCB-189 | 89.5 |
| | | | | | FS PCB-77 (D6) | 96.4 |

| TEQs | ITEF + WHO-2005 | | | WHO-1998 | | WHO-2005 | |
|---|---|---|---|---|---|---|---|
| | Conc. | EMPC | | Conc. | EMPC | Conc. | EMPC |
| DF+PCB (ND=0) | 0.0603 | 0.0607 | PCB (ND=0) | 0.0438 | 0.0472 | 0.0156 | 0.016 |
| DF+PCB (ND=DL/2) | 4.97 | 4.97 | PCB (ND=DL/2) | 0.272 | 0.275 | 0.363 | 0.364 |
| DF+PCB (ND=DL) | 9.88 | 9.88 | PCB (ND=DL) | 0.501 | 0.503 | 0.711 | 0.711 |
| DF+PCB (< J-level=0) | 0.0143 | 0.0147 | PCB (< J-level = 0) | 0.0365 | 0.04 | 0.0143 | 0.0147 |
| | ITEF + WHO-1998 | | | | | | |
| DF+PCB (ND=0) | 0.0885 | 0.0919 | DF+PCB (ND=0) | 0.0802 | 0.0836 | 0.0538 | 0.0542 |
| DF+PCB (ND=DL/2) | 4.88 | 4.88 | DF+PCB (ND=DL/2) | 5.83 | 5.83 | 5.62 | 5.62 |
| DF+PCB (ND=DL) | 9.67 | 9.67 | DF+PCB (ND=DL) | 11.6 | 11.6 | 11.2 | 11.2 |
| DF+PCB (< J-level=0) | 0.0365 | 0.04 | DF+PCB (< J-level=0) | 0.0365 | 0.04 | 0.0143 | 0.0147 |

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AVERAGE HCL, CL2, AND HF EMISSIONS

CLIENT: ExxonMobil

| NAME | ug/dscm | ug/dscm at 7% O2 | ug/dscf | lb/hr |
|---|---|---|---|---|
| Hydrochloric Acid | 1169.02 | 1037.21 | 33.11 | 1.0067 |
| Chlorine | ND < 24.83 | ND < 22.03 | ND < 0.70 | ND < 0.0214 |
| Hydrogen Fluoride | ND < 23.74 | ND < 21.06 | ND < 0.67 | ND < 0.0205 |

HCL, CL2, AND HF CALCULATIONS

| | | | |
|---|---|---|---|
| CLIENT: | ExxonMobil | | AA |
| TEST NUMBER: | 1-HCl | VMSTD(DSCF): | 77.65 |
| TEST DATE: | 6/28/2011 | QSD(DSCF/MIN): | 228365 |
| T REF (F) | 68 | CO2,%: | 13.82 |
| | | O2,%: | 5.21 |

| NAME | ug/train | ug/dscm | ug/dscm at 7% O2 | ug/dscf | lb/hr |
|---|---|---|---|---|---|
| Hydrochloric Acid | 2160 | 982.26 | 870.35 | 27.82 | 0.8396 |
| Chlorine | ND < 51.0 | ND < 23.19 | ND < 20.55 | ND < 0.66 | ND < 0.0198 |
| Hydrogen Fluoride | ND < 56.1 | ND < 25.51 | ND < 22.60 | ND < 0.72 | ND < 0.0218 |

HCL, CL2, AND HF CALCULATIONS

| | | | |
|---|---|---|---|
| CLIENT: | ExxonMobil | | AA |
| TEST NUMBER: | 2-HCl | VMSTD(DSCF): | 81.04 |
| TEST DATE: | 6/29/2011 | QSD(DSCF/MIN): | 243780 |
| T REF (F) | 68 | CO2,%: | 13.77 |
| | | O2,%: | 5.27 |

| NAME | | ug/train | | ug/dscm | | ug/dscm at 7% O2 | | ug/dscf | | lb/hr |
|---|---|---|---|---|---|---|---|---|---|---|
| Hydrochloric Acid | | 2710 | | 1180.77 | | 1049.84 | | 33.44 | | 1.0774 |
| Chlorine | ND < | 55.8 | ND < | 24.31 | ND < | 21.62 | ND < | 0.69 | ND < | 0.0222 |
| Hydrogen Fluoride | ND < | 55.3 | ND < | 24.09 | ND < | 21.42 | ND < | 0.68 | ND < | 0.0220 |

HCL, CL2, AND HF CALCULATIONS

| | | | |
|---|---|---|---|
| CLIENT: | ExxonMobil | INITIALS: | AA |
| TEST NUMBER: | 3-HCl | VMSTD(DSCF): | 74.35 |
| TEST DATE: | 6/29/2011 | QSD(DSCF/MIN): | 219296 |
| T REF (F) | 68 | CO2,%: | 13.89 |
| | | O2,%: | 5.22 |

| NAME | | ug/train | | ug/dscm | | ug/dscm at 7% O2 | | ug/dscf | | lb/hr |
|---|---|---|---|---|---|---|---|---|---|---|
| Hydrochloric Acid | | 2830 | | 1344.03 | | 1191.43 | | 38.06 | | 1.1032 |
| Chlorine | ND < | 56.8 | ND < | 26.98 | ND < | 23.91 | ND < | 0.76 | ND < | 0.0221 |
| Hydrogen Fluoride | ND < | 45.5 | ND < | 21.61 | ND < | 19.16 | ND < | 0.61 | ND < | 0.0177 |

***Delta***
Hydrochloric Acid Test Summary

| | | | | | |
|---|---|---|---|---|---|
| Client/Location | ExxonMobil | | | Reference Temp (F): | 68 |
| | | | | Fuel | Refinery |
| Sample Location | FCC 2F-7 Stack | | | Data By | AA |
| Test No | 1-HCl | 2-HCl | 3-HCl | Average | |
| Date | June 28, 2011 | June 29, 2011 | June 29, 2011 | * | |
| Start/Stop Time | 1438/1653 | 1015/1221 | 1414/1641 | * | |
| Bar Press (in Hg) | 29.77 | 29.85 | 29.85 | * | |
| Test Method | EPA M26A | EPA M26A | EPA M26A | * | |
| Sample Time (Min) | 120 | 120 | 120 | * | |
| Sample Train | 12WCS | 12WCS | 12WCS | * | |
| Meter Cal Factor | 1.005 | 1.005 | 1.005 | * | |
| Pitot Factor | 0.84 | 0.84 | 0.84 | * | |
| Nozzle Diam (in) | 0.220 | 0.220 | 0.220 | * | |
| Stack Area (sq ft) | 94.31 | 94.31 | 94.31 | | |
| Stack O2 (%) | 5.21 | 5.27 | 5.22 | 5.23 | |
| Stack CO2 (%) | 13.82 | 13.77 | 13.89 | 13.83 | |
| Stack Press (iwg) | -1.30 | -1.30 | -1.30 | -1.30 | |
| Stack Temp (F) | 476.1 | 475.2 | 474.0 | 475.1 | |
| Vel Head (iwg) | 1.23 | 1.38 | 1.12 | 1.25 | |
| Meter Temp (F) | 76 | 73 | 74 | 74 | |
| Meter Press (iwg) | 1.39 | 1.54 | 1.26 | 1.40 | |
| Meter Vol (acf) | 78.507 | 81.337 | 74.725 | 78.19 | |
| Liquid Vol (ml) | 255.2 | 251.9 | 237.0 | 248.0 | |
| Std Sample Vol (SCF) | 77.647 | 81.040 | 74.349 | 77.68 | |
| Std Sample Vol (SCM) | 2.199 | 2.295 | 2.105 | 2.200 | |
| Moisture Fraction | 0.134 | 0.128 | 0.131 | 0.131 | |
| Stack Gas Mol Wt | 28.75 | 28.83 | 28.81 | 28.79 | |
| Stack Gas Velocity (ft/sec) | 83.35 | 88.00 | 79.32 | 83.56 | |
| Isokinetic Ratio (%) | 101.2 | 98.9 | 100.9 | 100.3 | |
| Stack Flow Rate (wacfm) | 471,644 | 498,003 | 448,887 | 472,845 | |
| Stack Flow Rate (wscfm) | 263,791 | 279,546 | 252,291 | 265,209 | |
| Stack Flow Rate (dscfm) | 228,365 | 243,780 | 219,296 | 230,480 | |
| Stack Flow Rate (mdscf/h) | 137.02 | 146.27 | 131.58 | 138.29 | |

RUN 1

| HCl Test Sample Data | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Client/Location: | | ExxonMobil | | | | | | Sample Location: | | | 2F-7 Stack |
| Unit: | | FCC | | | | | | Data By: | | | AA |
| Test No: | 1-HCl | ISO | Assumed Moisture | | Sample Factor | | Delta H = | 1.10 | x Delta P | | |
| Date: | 6/28/2011 | 101.2 | 14 | | | Time per Point = | | 5 | Static Pressure = | | -1.30 |
| Port | Point | Time | Meter Volume | Delta P | Factor | Delta H | Stack Temp. | Meter In | Meter Out | Probe | Vacuum |
| A | 6 | 14:38:00 | 932.650 | 1.40 | 1.10 | 1.54 | 478 | 79 | 78 | 250 | 6 |
| A | 5 | 14:43:00 | 936.185 | 1.70 | 1.10 | 1.87 | 479 | 79 | 78 | 252 | 6 |
| A | 4 | 14:48:00 | 939.997 | 1.80 | 1.10 | 1.98 | 477 | 78 | 77 | 254 | 6 |
| A | 3 | 14:53:00 | 943.839 | 1.90 | 1.10 | 2.09 | 476 | 79 | 77 | 254 | 6 |
| A | 2 | 14:58:00 | 947.791 | 1.80 | 1.10 | 1.98 | 480 | 79 | 77 | 256 | 6 |
| A | 1 | 15:03:00 | 951.658 | 1.90 | 1.10 | 2.09 | 479 | 78 | 77 | 255 | 6 |
| | Stop | 15:08:00 | 955.637 | | | | | | | | |
| B | 6 | 15:17:00 | 955.637 | 1.40 | 1.10 | 1.54 | 470 | 77 | 76 | 250 | 6 |
| B | 5 | 15:22:00 | 959.101 | 1.20 | 1.10 | 1.32 | 472 | 77 | 75 | 253 | 6 |
| B | 4 | 15:27:00 | 962.316 | 1.30 | 1.10 | 1.43 | 479 | 76 | 75 | 254 | 6 |
| B | 3 | 15:32:00 | 965.632 | 1.30 | 1.10 | 1.43 | 478 | 76 | 75 | 253 | 6 |
| B | 2 | 15:37:00 | 968.938 | 1.10 | 1.10 | 1.21 | 476 | 76 | 75 | 252 | 6 |
| B | 1 | 15:42:00 | 972.042 | 1.00 | 1.10 | 1.10 | 477 | 76 | 75 | 250 | 6 |
| | Stop | 15:47:00 | 975.036 | | | | | | | | |
| C | 6 | 15:50:00 | 975.036 | 1.10 | 1.10 | 1.21 | 475 | 75 | 74 | 251 | 6 |
| C | 5 | 15:55:00 | 978.129 | 1.10 | 1.10 | 1.21 | 476 | 75 | 74 | 254 | 6 |
| C | 4 | 16:00:00 | 981.218 | 1.10 | 1.10 | 1.21 | 477 | 75 | 73 | 250 | 6 |
| C | 3 | 16:05:00 | 984.291 | 1.00 | 1.10 | 1.10 | 476 | 76 | 74 | 251 | 6 |
| C | 2 | 16:10:00 | 987.252 | 1.00 | 1.10 | 1.10 | 477 | 76 | 74 | 250 | 6 |
| C | 1 | 16:15:00 | 990.185 | 1.00 | 1.10 | 1.10 | 475 | 75 | 74 | 251 | 6 |
| | Stop | 16:20:00 | 993.149 | | | | | | | | |
| D | 6 | 16:23:00 | 993.149 | 1.10 | 1.10 | 1.21 | 475 | 75 | 74 | 250 | 6 |
| D | 5 | 16:28:00 | 996.212 | 1.10 | 1.10 | 1.21 | 476 | 75 | 73 | 253 | 6 |
| D | 4 | 16:33:00 | 999.271 | 1.10 | 1.10 | 1.21 | 475 | 76 | 73 | 251 | 6 |
| D | 3 | 16:38:00 | 1002.329 | 1.00 | 1.10 | 1.10 | 476 | 75 | 73 | 250 | 6 |
| D | 2 | 16:43:00 | 1005.271 | 1.00 | 1.10 | 1.10 | 474 | 76 | 73 | 251 | 6 |
| D | 1 | 16:48:00 | 1008.224 | 1.00 | 1.10 | 1.10 | 473 | 75 | 72 | 250 | 6 |
| | Stop | 16:53:00 | 1011.157 | | | | | | | | |
| **Total/Average** | | **120** | **78.507** | **1.2315** | | **1.39** | **476** | **76** | **75** | **252** | **6** |

RUN 2

| HCl Test Sample Data | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Client/Location: | | ExxonMobil | | | | | | Sample Location: | | | 2F-7 Stack |
| Unit: | | FCC | | | | | | Data By: | | | AA |
| Test No: | 2-HCl | ISO | Moisture | | Sample Factor | | Delta H = | 1.10 | x Delta P | | |
| Date: | 6/29/2011 | 98.9 | 14 | | | Time per Point = | | 5 | Static Pressure = | | -1.3 |
| Port | Point | Time | Meter Volume | Delta P | Factor | Delta H | Stack Temp. | Meter In | Meter Out | Probe | Vacuum |
| A | 6 | 10:15:00 | 75.300 | 1.30 | 1.10 | 1.43 | 475 | 75 | 75 | 243 | 5 |
| A | 5 | 10:20:00 | 78.442 | 1.40 | 1.10 | 1.54 | 476 | 76 | 75 | 252 | 5 |
| A | 4 | 10:25:00 | 81.791 | 1.60 | 1.10 | 1.76 | 477 | 76 | 74 | 255 | 5 |
| A | 3 | 10:30:00 | 85.409 | 1.60 | 1.10 | 1.76 | 475 | 75 | 73 | 254 | 5 |
| A | 2 | 10:35:00 | 89.035 | 1.50 | 1.10 | 1.65 | 473 | 76 | 72 | 251 | 5 |
| A | 1 | 10:40:00 | 92.638 | 1.40 | 1.10 | 1.54 | 475 | 76 | 75 | 250 | 5 |
| | Stop | 10:45:00 | 96.054 | | | | | | | | |
| B | 6 | 10:47:00 | 96.054 | 1.60 | 1.10 | 1.76 | 475 | 76 | 75 | 250 | 5 |
| B | 5 | 10:52:00 | 99.658 | 1.90 | 1.10 | 2.09 | 477 | 75 | 75 | 251 | 5 |
| B | 4 | 10:57:00 | 103.572 | 1.80 | 1.10 | 1.98 | 478 | 75 | 74 | 251 | 5 |
| B | 3 | 11:02:00 | 107.401 | 1.80 | 1.10 | 1.98 | 478 | 75 | 74 | 255 | 5 |
| B | 2 | 11:07:00 | 111.225 | 2.00 | 1.10 | 2.20 | 478 | 76 | 74 | 252 | 5 |
| B | 1 | 11:12:00 | 115.232 | 2.00 | 1.10 | 2.20 | 479 | 75 | 73 | 252 | 5 |
| | Stop | 11:17:00 | 119.323 | | | | | | | | |
| C | 6 | 11:19:00 | 119.323 | 1.30 | 1.10 | 1.43 | 474 | 73 | 72 | 251 | 5 |
| C | 5 | 11:24:00 | 122.642 | 1.20 | 1.10 | 1.32 | 475 | 73 | 72 | 250 | 5 |
| C | 4 | 11:29:00 | 125.826 | 1.20 | 1.10 | 1.32 | 474 | 74 | 72 | 253 | 5 |
| C | 3 | 11:34:00 | 129.012 | 1.10 | 1.10 | 1.21 | 475 | 73 | 73 | 250 | 5 |
| C | 2 | 11:39:00 | 132.111 | 1.10 | 1.10 | 1.21 | 477 | 73 | 72 | 250 | 5 |
| C | 1 | 11:44:00 | 135.188 | 1.00 | 1.10 | 1.10 | 473 | 73 | 71 | 252 | 5 |
| | Stop | 11:49:00 | 138.194 | | | | | | | | |
| D | 6 | 11:51:00 | 138.194 | 1.40 | 1.10 | 1.54 | 472 | 72 | 71 | 250 | 5 |
| D | 5 | 11:56:00 | 141.538 | 1.30 | 1.10 | 1.43 | 473 | 71 | 70 | 254 | 5 |
| D | 4 | 12:01:00 | 144.719 | 1.10 | 1.10 | 1.21 | 472 | 72 | 70 | 253 | 5 |
| D | 3 | 12:06:00 | 147.768 | 1.00 | 1.10 | 1.10 | 475 | 71 | 70 | 254 | 5 |
| D | 2 | 12:11:00 | 150.737 | 1.00 | 1.10 | 1.10 | 475 | 72 | 71 | 255 | 5 |
| D | 1 | 12:16:00 | 153.676 | 1.00 | 1.10 | 1.10 | 474 | 72 | 71 | 253 | 5 |
| | Stop | 12:21:00 | 156.637 | | | | | | | | |
| **Total/Average** | | **120** | **81.337** | **1.3815** | | **1.54** | **475** | **74** | **73** | | |

RUN 3

| HCl Test Sample Data | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Client/Location: | | ExxonMobil | | | | | | Sample Location: | | | 2F-7 Stack |
| Unit: | | FCC | | | | | | Data By: | | | AA |
| Test No: | 3-HCl | ISO | Moisture | | Sample Factor | | Delta H = | 1.10 | x Delta P | | |
| Date: | 6/29/2011 | 100.9 | 14 | | | Time per Point = | | 5 | Static Pressure = | | -1.3 |
| Port | Point | Time | Meter Volume | Delta P | Factor | Delta H | Stack Temp. | Meter In | Meter Out | Probe | Vacuum |
| A | 6 | 14:14:00 | 198.001 | 1.3 | 1.10 | 1.43 | 474 | 72 | 71 | 250 | 5 |
| A | 5 | 14:19:00 | 201.266 | 1.5 | 1.10 | 1.65 | 477 | 71 | 71 | 252 | 5 |
| A | 4 | 14:24:00 | 204.899 | 1.5 | 1.10 | 1.65 | 474 | 74 | 72 | 252 | 5 |
| A | 3 | 14:29:00 | 208.382 | 1.5 | 1.10 | 1.65 | 476 | 74 | 71 | 250 | 5 |
| A | 2 | 14:34:00 | 211.945 | 1.6 | 1.10 | 1.76 | 477 | 75 | 73 | 251 | 5 |
| A | 1 | 14:39:00 | 215.621 | 1.3 | 1.10 | 1.43 | 475 | 74 | 71 | 252 | 5 |
| | Stop | 14:44:00 | 218.963 | | | | | | | | |
| B | 6 | 15:05:00 | 219.100 | 1.3 | 1.10 | 1.43 | 475 | 75 | 74 | 250 | 5 |
| B | 5 | 15:10:00 | 222.392 | 1.2 | 1.10 | 1.32 | 476 | 74 | 73 | 252 | 5 |
| B | 4 | 15:15:00 | 225.557 | 1.2 | 1.10 | 1.32 | 475 | 76 | 73 | 253 | 5 |
| B | 3 | 15:20:00 | 228.732 | 1.0 | 1.10 | 1.10 | 476 | 75 | 72 | 252 | 5 |
| B | 2 | 15:25:00 | 231.661 | 1.0 | 1.10 | 1.10 | 475 | 74 | 72 | 255 | 5 |
| B | 1 | 15:30:00 | 234.609 | 1.0 | 1.10 | 1.10 | 471 | 75 | 74 | 250 | 5 |
| | Stop | 15:35:00 | 237.539 | | | | | | | | |
| C | 6 | 15:39:00 | 237.539 | 1.0 | 1.10 | 1.10 | 473 | 75 | 73 | 257 | 5 |
| C | 5 | 15:44:00 | 240.497 | 1.0 | 1.10 | 1.10 | 476 | 74 | 72 | 255 | 5 |
| C | 4 | 15:49:00 | 243.409 | 1.0 | 1.10 | 1.10 | 477 | 73 | 73 | 253 | 5 |
| C | 3 | 15:54:00 | 246.328 | 1.0 | 1.10 | 1.10 | 475 | 76 | 74 | 256 | 5 |
| C | 2 | 15:59:00 | 249.251 | 1.0 | 1.10 | 1.10 | 474 | 74 | 73 | 257 | 5 |
| C | 1 | 16:04:00 | 252.151 | 1.0 | 1.10 | 1.10 | 470 | 77 | 74 | 255 | 5 |
| | Stop | 16:09:00 | 255.067 | | | | | | | | |
| D | 6 | 16:11:00 | 255.067 | 1.0 | 1.10 | 1.10 | 470 | 76 | 74 | 254 | 5 |
| D | 5 | 16:16:00 | 258.005 | 1.1 | 1.10 | 1.21 | 472 | 76 | 74 | 253 | 5 |
| D | 4 | 16:21:00 | 261.628 | 1.0 | 1.10 | 1.10 | 473 | 76 | 74 | 251 | 5 |
| D | 3 | 16:26:00 | 263.968 | 1.0 | 1.10 | 1.10 | 472 | 75 | 74 | 256 | 5 |
| D | 2 | 16:31:00 | 266.887 | 1.0 | 1.10 | 1.10 | 471 | 74 | 74 | 253 | 5 |
| D | 1 | 16:36:00 | 269.799 | 1.0 | 1.10 | 1.10 | 473 | 73 | 73 | 256 | 5 |
| | Stop | 16:41:00 | 272.726 | | | | | | | | |
| **Total/Average** | | **120** | **74.725** | **1.1** | | **1.26** | **474** | **75** | **73** | | |
| | | | | | | | | **74** | | | |

Delta Air Quality Services, Incorporated

# WET CHEMICAL SAMPLING SYSTEM DATA AND WORKSHEET

CLIENT: Exxon Mobil
LOCATION: FCC / 2F-7 Stack
DATE: 6/28/11
RUN NO: 1-HCl-FB
OPERATOR: SS
METER BOX NO:
METER ΔH@:
METER Yd:
STACK AREA, FT²:
TRAVERSE POINTS, MIN/POINT:
ΔH= X ΔP:
Probe Condition, pre/post test:
Silica Gel Expended, Y/N:
Filter Condition after Test:
Check Weight:

AMBIENT TEMPERATURE: 78°
BAROMETRIC PRESSURE: 29.77
ASSUMED MOISTURE: 11%
PITOT TUBE COEFF, Cp:
PROBE ID NO/MATERIAL:
PROBE LENGTH: N/A
NOZZLE ID NO/ MATERIAL:
NOZZLE DIAMETER:
FILTER NO/TYPE:
PRE-TEST LEAK RATE: : CFM@ in. Hg.
POST-TEST LEAK RATE: : CFM@ in. Hg.
PITOT LEAK CHECK - PRE: POST:
CHAIN OF CUSTODY: SAMPLE CUSTODIAN AA
SAMPLER
SAMPLE CUSTODIAN AA

| Imp. # | Contents | Post-Test | Pre-Test = Difference |
|---|---|---|---|
| 1 | 100ml 0.1N $H_2SO_4$ | 745.6 | 745.6 |
| 2 | " | 695.7 | 695.7 |
| 3 | 100ml 0.1N NaOH | 673.4 | 673.4 |
| 4 | " | 767.0 | 767.0 |
| 5 | SG | 1020.8 | 1020.8 |
| Total: | | | |

| Point | Time | Meter Volume, ft³ | ΔP in. $H_2O$ | ΔH in. $H_2O$ | Stack Temp, °F | Probe Temp, °F | Filter Temp, °F | Imp. Out Temp, °F | Meter Temp, °F In | Meter Temp, °F Out | Vacuum in. Hg. | $O_2$ % | Pstatic in. $H_2O$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| FB | | | | | | | | | | | | | |
| Average: | | | | | | | | | | | | | |

Comments:

C.7-10



Date of last revision 3/30/2010

DS834048
Master Document Storage\Forms\Datasheets\Field Datasheets

Delta Air Quality Services, Incorporated

# WET CHEMICAL SAMPLING SYSTEM DATA AND WORKSHEET

CLIENT: Exxon Mobil
LOCATION: FCC / 2F-7 Stack
DATE: 6/28/11
RUN NO: 1-HCl
OPERATOR: DA
METER BOX NO: 12005
METER ΔH@: 0.585
METER Yd: 1.005
STACK AREA, FT²: ✓
TRAVERSE POINTS, MIN/POINT: 5/24
ΔH= 1.1 X ΔP:
Probe Condition, pre/post test: ✓
Silica Gel Expended, Y/N: ✓
Filter Condition after Test: ✓
Check Weight: ✓

AMBIENT TEMPERATURE: 80
BAROMETRIC PRESSURE: 29.77
ASSUMED MOISTURE: 11%
PITOT TUBE COEFF, Cp: .84
PROBE ID NO/MATERIAL: 889 / glass
PROBE LENGTH: 6'
NOZZLE ID NO/ MATERIAL: 4 / glass
NOZZLE DIAMETER: 0.220
FILTER NO/TYPE: Quartz
PRE-TEST LEAK RATE: : <0.002 CFM@ 12 in. Hg.
POST-TEST LEAK RATE: : <0.002 CFM@ 12 in. Hg. ✓
PITOT LEAK CHECK - PRE: ✓ POST: ✓
CHAIN OF CUSTODY: SAMPLE CUSTODIAN AA
SAMPLER GS
SAMPLE CUSTODIAN AA

| Imp. # | Contents | Post-Test | Pre-Test | Difference |
|---|---|---|---|---|
| 1 | 100ml 0.1N $H_2SO_4$ | 923.6 | 743.2 | 180.4 |
| 2 | " | 737.7 | 693.3 | 44.4 |
| 3 | 100ml 0.1N NaOH | 688.7 | 680.8 | 7.9 |
| 4 | " | 695.9 | 696.2 | -0.3 |
| 5 | S.G. | 932.5 | 909.7 | 22.8 |
| Total: | | | | 255.2 |

| Point | Time | Meter Volume, ft³ | ΔP in. $H_2O$ | ΔH in. $H_2O$ | Stack Temp, °F | Probe Temp, °F | Filter Temp, °F | Imp. Out Temp, °F | Meter Temp, °F In | Meter Temp, °F Out | Vacuum in. Hg. | $O_2$ % | Pstatic in. $H_2O$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 6 | 1438 | 932.650 | 1.4 | 1.54 | 478 | 250 | 250 | 60 | 79 | 78 | 6.0 | 3% | -1.3 |
| 5 | 1443 | 936.185 | 1.7 | 1.87 | 479 | 252 | 251 | 60 | 79 | 78 | 6.0 | | |
| 4 | 1448 | 939.997 | 1.8 | 1.98 | 477 | 254 | 251 | 60 | 78 | 77 | 6.0 | | |
| 3 | 1453 | 943.839 | 1.9 | 2.09 | 476 | 254 | 250 | 60 | 79 | 77 | 6.0 | | |
| 2 | 1458 | 947.791 | 1.8 | 1.98 | 480 | 256 | 251 | 56 | 79 | 77 | 6.0 | | |
| 1 | 1503 | 951.658 | 1.9 | 2.09 | 479 | 255 | 252 | 56 | 78 | 77 | 6.0 | | |
| 0 | 1508 | 955.637 | | | | | | | | | | | |
| 6 | 1517 | 955.637 | 1.4 | 1.54 | 470 | 250 | 240 | 61 | 77 | 76 | 6.0 | | |
| 5 | 1522 | 959.101 | 1.2 | 1.32 | 472 | 253 | 250 | 60 | 77 | 75 | 6.0 | | |
| 4 | 1527 | 962.316 | 1.3 | 1.43 | 479 | 254 | 250 | 59 | 76 | 75 | 6.0 | | |
| 3 | 1532 | 965.632 | 1.3 | 1.43 | 478 | 253 | 249 | 59 | 76 | 75 | 6.0 | | |
| 2 | 1537 | 968.938 | 1.1 | 1.21 | 476 | 252 | 248 | 58 | 76 | 75 | 6.0 | | |
| 1 | 1542 | 972.047 | 1.0 | 1.1 | 477 | 250 | 250 | 58 | 76 | 75 | 6.0 | | |
| 0 | 1547 | 975.036 | | | | | | | | | | | |
| 6 | 1550 | 975.036 | 1.1 | 1.21 | 475 | 251 | 251 | 59 | 75 | 74 | 6.0 | | |
| 5 | 1555 | 978.129 | 1.1 | 1.21 | 476 | 254 | 250 | 60 | 75 | 74 | 6.0 | | |
| 4 | 1600 | 981.218 | 1.1 | 1.21 | 477 | 250 | 250 | 60 | 75 | 73 | 6.0 | | |
| 3 | 1605 | 984.291 | 1.0 | 1.1 | 476 | 251 | 249 | 61 | 76 | 74 | 6.0 | | |
| 2 | 1610 | 987.252 | 1.0 | 1.1 | 477 | 250 | 251 | 60 | 76 | 74 | 6.0 | | |
| 1 | 1615 | 990.185 | 1.0 | 1.1 | 475 | 251 | 251 | 60 | 75 | 74 | 6.0 | | |
| 0 | 1620 | 993.149 | | | | | | | | | | | |
| - | | ~~993.149~~ | | | | | | | | | | | |
| - | | | | | | | | | | | | | |
| - | | | | | | | | | | | | | |
| Average: | | | | | | | | | | | | | |

Comments:

C.7-11

See Page 1

# WET CHEMICAL SAMPLING SYSTEM DATA AND WORKSHEET

CLIENT: Exxon Mobil
LOCATION: FCC / 2F-7 Stack
DATE: 6/28/11
RUN NO: 1-Hrl
OPERATOR: DA
METER BOX NO 12 WG5
METER ΔH@: 0.585
METER Yd: 1.006
STACK AREA, FT²:
TRAVERSE POINTS, MIN/POINT: 5/24
ΔH= 1.1 X ΔP:
Probe Condition, pre/post test:
Silica Gel Expended, Y/N:
Filter Condition after Test:
Check Weight:

AMBIENT TEMPERATURE:
BAROMETRIC PRESSURE:
ASSUMED MOISTURE:
PITOT TUBE COEFF, Cp:
PROBE ID NO/MATERIAL:
PROBE LENGTH:
NOZZLE ID NO/ MATERIAL:
NOZZLE DIAMETER:
FILTER NO/TYPE:
PRE-TEST LEAK RATE: : CFM@ in. Hg.
POST-TEST LEAK RATE: : CFM@ in. Hg.
PITOT LEAK CHECK - PRE: POST:
CHAIN OF CUSTODY: SAMPLE CUSTODIAN
SAMPLER
SAMPLE CUSTODIAN

| Imp. # | Contents | Post-Test | Pre-Test | Difference |
|---|---|---|---|---|
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| Total: | | | | |

| Point | Time | Meter Volume, ft³ | ΔP in. H₂O | ΔH in. H₂O | Stack Temp, °F | Probe Temp, °F | Filter Temp, °F | Coil/Imp Out Temp, °F | Meter Temp, °F In | Meter Temp, °F Out | Vac. in. Hg. | O₂ % | Htd Sample Line Temp. °F | P. Satic In. H₂O |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 6 | 1623 | 993.149 | 1.1 | 1.21 | 475 | 250 | 251 | 60 | 75 | 74 | 6.0 | 3% | N/A | -1.3 |
| 5 | 1628 | 996.212 | 1.1 | 1.21 | 476 | 253 | 250 | 60 | 75 | 73 | 6.0 | | | |
| 4 | 1633 | 999.271 | 1.1 | 1.21 | 475 | 251 | 251 | 59 | 76 | 73 | 6.0 | | | |
| 3 | 1638 | 002.329 | 1.0 | 1.1 | 476 | 250 | 253 | 59 | 75 | 73 | 6.0 | | | |
| 2 | 1643 | 005.271 | 1.0 | 1.1 | 474 | 251 | 250 | 58 | 76 | 73 | 6.0 | | | |
| 1 | 1648 | 008.224 | 1.0 | 1.1 | 473 | 250 | 250 | 57 | 75 | 72 | 6.0 | | | |
| 0 | 1653 | 011.157 | | | | | | | | | | | | |
| 6 | | | | | | | | | | | | | | |
| 5 | | | | | | | | | | | | | | |
| 4 | | | | | | | | | | | | | | |
| 3 | | | | | | | | | | | | | | |
| 2 | | | | | | | | | | | | | | |
| 1 | | | | | | | | | | | | | | |
| 0 | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | |

Comments:



C.7-12

Delta Air Quality Services, Incorporated

# WET CHEMICAL SAMPLING SYSTEM DATA AND WORKSHEET

CLIENT: Exxon Mobil
LOCATION: FCC / 2F-7 Stack
DATE: 6/29/11
RUN NO: 2-HC
OPERATOR: DA
METER BOX NO: 12W05
METER ΔH@: .985
METER Yd: 1.005
STACK AREA, FT²: ✓
TRAVERSE POINTS, MIN/POINT: 5/24
ΔH= 1.1 X ΔP:
Probe Condition, pre/post test: ✓
Silica Gel Expended, Y/N: ✓
Filter Condition after Test: ✓
Check Weight: ✓

AMBIENT TEMPERATURE: 79°
BAROMETRIC PRESSURE: 29.85
ASSUMED MOISTURE: 14
PITOT TUBE COEFF, Cp: .84
PROBE ID NO/MATERIAL: 87 / glass
PROBE LENGTH: 6'
NOZZLE ID NO/ MATERIAL: 4 / glass
NOZZLE DIAMETER: 0.220
FILTER NO/TYPE: Quartz
PRE-TEST LEAK RATE: : 0.002 CFM@ 10 in. Hg.
POST-TEST LEAK RATE: : 0.002 CFM@ 12 in. Hg.
PITOT LEAK CHECK - PRE: ✓ POST: ✓
CHAIN OF CUSTODY: SAMPLE CUSTODIAN N/A
SAMPLER SS
SAMPLE CUSTODIAN SS

| Imp. # | Contents | Post-Test | Pre-Test | Difference |
|---|---|---|---|---|
| 1 | 100ml 0.1N $H_2SO_4$ | 950.1 | 765.3 | 184.8 |
| 2 | " | 707.9 | 669.2 | 38.7 |
| 3 | 100ml 0.1N NaOH | 678.3 | 671.0 | 7.3 |
| 4 | " | 765.7 | 762.3 | 3.0 |
| 5 | SG. | 1078 | 1019.9 | 18.1 |
| Total: | | | | 251.9 |

| Point | Time | Meter Volume, ft³ | ΔP in. H₂O | ΔH in. H₂O | Stack Temp, °F | Probe Temp, °F | Filter Temp, °F | Imp. Out Temp, °F | Meter Temp, °F In | Meter Temp, °F Out | Vacuum in. Hg. | O₂ % | Pstatic in. H₂O |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 6 | 1015 | 075.300 | 1.3 | 1.43 | 475 | 243 | 243 | 55 | 75 | 75 | 5.0 | 3% | -1.3 |
| 5 | 1020 | 078.442 | 1.4 | 1.54 | 476 | 252 | 257 | 55 | 76 | 75 | 5.0 | | |
| 4 | 1025 | 081.791 | 1.6 | 1.76 | 477 | 255 | 251 | 56 | 76 | 74 | 5.0 | | |
| 3 | 1030 | 085.409 | 1.6 | 1.76 | 475 | 254 | 252 | 56 | 75 | 73 | 5.0 | | |
| 2 | 1035 | 089.035 | 1.5 | 1.65 | 473 | 251 | 257 | 56 | 76 | 72 | 5.0 | | |
| 1 | 1040 | 092.638 | 1.4 | 1.54 | 475 | 250 | 256 | 56 | 76 | 75 | 5.0 | | |
| 0 | 1045 | 096.054 | | | | | | | | | | | |
| 6 | 1047 | 096.054 | 1.6 | 1.76 | 475 | 250 | 256 | 56 | 76 | 75 | 5.0 | | |
| 5 | 1052 | 099.658 | 1.9 | 2.09 | 477 | 251 | 255 | 56 | 75 | 75 | 5.0 | | |
| 4 | 1057 | 103.572 | 1.8 | 1.98 | 478 | 251 | 250 | 57 | 75 | 74 | 5.0 | | |
| 3 | 1102 | 107.401 | 1.8 | 1.98 | 478 | 255 | 254 | 57 | 75 | 74 | 5.0 | | |
| 2 | 1107 | 111.225 | 2.0 | 2.2 | 478 | 252 | 253 | 57 | 76 | 74 | 5.0 | | |
| 1 | 1112 | 115.232 | 2.0 | 2.2 | 479 | 252 | 253 | 58 | 75 | 73 | 5.0 | | |
| 0 | 1117 | 119.323 | | | | | | | | | | | |
| Average: | | | | | | | | | | | | | |

Comments:

C.7-13

Delta Air Quality Services, Incorporated

# WET CHEMICAL SAMPLING SYSTEM DATA AND WORKSHEET

CLIENT: Exxon Mobil
LOCATION: FCC / 2F-7 Stack
DATE: 6/29/11
RUN NO: 2-HCl
OPERATOR: DA
METER BOX NO: 12 WCS
METER ΔH@: -585
METER Yd: 1.005
STACK AREA, FT$^2$:
TRAVERSE POINTS, MIN/POINT: 4/24
ΔH= 1-1 X ΔP:
Probe Condition, pre/post test:
Silica Gel Expended, Y/N:
Filter Condition after Test:
Check Weight:

AMBIENT TEMPERATURE:
BAROMETRIC PRESSURE: 500 PM
ASSUMED MOISTURE:
PITOT TUBE COEFF, Cp:
PROBE ID NO/MATERIAL:
PROBE LENGTH:
NOZZLE ID NO/ MATERIAL:
NOZZLE DIAMETER:
FILTER NO/TYPE:
PRE-TEST LEAK RATE: : CFM@ in. Hg.
POST-TEST LEAK RATE: : CFM@ in. Hg.
PITOT LEAK CHECK - PRE: POST:
CHAIN OF CUSTODY: SAMPLE CUSTODIAN
SAMPLER
SAMPLE CUSTODIAN

| Imp. # | Contents | Post-Test | Pre-Test = Difference |
|---|---|---|---|
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| Total: | | | |

| Point | Time | Meter Volume, ft$^3$ | ΔP in. $H_2O$ | ΔH in. $H_2O$ | Stack Temp, °F | Probe Temp, °F | Filter Temp, °F | Imp. Out Temp, °F | Meter Temp, °F In | Meter Temp, °F Out | Vacuum in. Hg. | $O_2$ % | Pstatic in. $H_2O$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 6 | 1119 | 119.323 | 1.3 | 1.43 | 474 | 251 | 253 | 58 | 73 | 72 | 5.0 | 3% | -1.3 |
| 5 | 1124 | 122.642 | 1.2 | 1.32 | 475 | 250 | 254 | 58 | 73 | 72 | 5.0 | | |
| 4 | 1129 | 125.826 | 1.2 | 1.32 | 474 | 253 | 252 | 58 | 74 | 72 | 5.0 | | |
| 3 | 1134 | 129.012 | 1.1 | 1.21 | 475 | 250 | 250 | 54 | 73 | 73 | 5.0 | | |
| 2 | 1139 | 132.111 | 1.1 | 1.21 | 477 | 250 | 252 | 54 | 73 | 72 | 5.0 | | |
| 1 | 1144 | 135.188 | 1.0 | 1.1 | 473 | 252 | 253 | 55 | 73 | 71 | 5.0 | | |
| 0 | 1149 | 138.194 | | | | | | | | | | | |
| 6 | 1151 | 138.194 | 1.4 | 1.54 | 472 | 250 | 251 | 58 | 72 | 71 | 5.0 | | |
| 5 | 1156 | 141.538 | 1.3 | 1.43 | 473 | 254 | 259 | 57 | 71 | 70 | 5.0 | | |
| 4 | 1201 | 144.719 | 1.1 | 1.21 | 472 | 253 | 258 | 57 | 72 | 70 | 5.0 | | |
| 3 | 1206 | 147.768 | 1.0 | 1.1 | 475 | 254 | 255 | 58 | 71 | 70 | 5.0 | | |
| 2 | 1211 | 150.737 | 1.0 | 1.1 | 475 | 255 | 257 | 58 | 72 | 71 | 5.0 | | |
| 1 | 1216 | 153.676 | 1.0 | 1.1 | 474 | 253 | 254 | 58 | 72 | 71 | 5.0 | | |
| 0 | 1221 | 156.637 | | | | | | | | | | | |
| Average: | | | | | | | | | | | | | |

Comments:

C1-14


Date of last revision 3/30/2010

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DS834048
Master Document Storage\Forms\Datasheets\Field Datasheets

Delta Air Quality Services, Incorporated

# WET CHEMICAL SAMPLING SYSTEM DATA AND WORKSHEET

CLIENT: Exxon Mobil
LOCATION: FCC / 2F-7 Stack
DATE: 6/29/11
RUN NO: 3-HCl
OPERATOR: DA
METER BOX NO: 12WCS
METER ΔH@: -585
METER Yd: 1-005
STACK AREA, FT²: ✓
TRAVERSE POINTS, MIN/POINT: 5/24
ΔH= 1.1 X ΔP:
Probe Condition, pre/post test: ✓
Silica Gel Expended, Y/N: ✓
Filter Condition after Test: ✓
Check Weight: ✓

AMBIENT TEMPERATURE: 79°
BAROMETRIC PRESSURE: 29.85
ASSUMED MOISTURE: 11%
PITOT TUBE COEFF, Cp: 0.84
PROBE ID NO/MATERIAL: 89/glass
PROBE LENGTH: 6"
NOZZLE ID NO/ MATERIAL: 4/glass
NOZZLE DIAMETER: 0.220
FILTER NO/TYPE: Quartz
PRE-TEST LEAK RATE: : 0.002 CFM@ " in. Hg.
POST-TEST LEAK RATE: : 0.002 CFM@ " in. Hg.
PITOT LEAK CHECK - PRE: ✓ POST: ✓
CHAIN OF CUSTODY: SAMPLE CUSTODIAN JD
SAMPLER SS
SAMPLE CUSTODIAN JP

| Imp. # | Contents | Post-Test | Pre-Test | Difference |
|---|---|---|---|---|
| 1 | 100ml 0.1N $H_2SO_4$ | 920.2 | 761.0 | 159.2 |
| 2 | " | 712.6 | 666.1 | 46.5 |
| 3 | 100ml 0.1N $NaOH$ | 699.8 | 689.7 | 10.1 |
| 4 | " | 692.6 | 690.3 | 2.3 |
| 5 | SG | 951.4 | 932.5 | 18.9 |
| Total: | | | | 237.0 |

| Point | Time | Meter Volume, ft³ | ΔP in. $H_2O$ | ΔH in. $H_2O$ | Stack Temp, °F | Probe Temp, °F | Filter Temp, °F | Imp. Out Temp, °F | Meter Temp, °F In | Meter Temp, °F Out | Vacuum in. Hg. | $O_2$ % | Pstatic in. $H_2O$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 6 | 1414 | 198.001 | 1.3 | 1.43 | 474 | 250 | 257 | 59 | 72 | 71 | 5.0 | 3% | -1.3 |
| 5 | 1419 | 201.266 | 1.5 | 1.65 | 477 | 252 | 254 | 58 | 71 | 71 | 5.0 | | |
| 4 | 1424 | 204.899 | 1.5 | 1.65 | 474 | 252 | 255 | 58 | 74 | 72 | 5.0 | | |
| 3 | 1429 | 208.382 | 1.5 | 1.65 | 476 | 250 | 254 | 58 | 74 | 71 | 5.0 | | |
| 2 | 1434 | 211.945 | 1.6 | 1.76 | 477 | 251 | 255 | 59 | 75 | 73 | 5.0 | | |
| 1 | 1439 | 215.621 | 1.3 | 1.43 | 475 | 252 | 250 | 55 | 74 | 71 | 5.0 | | |
| 0 | 1444 | 218.963 | | | | | | | | | | | |
| 6 | | 218.963 | | | | | | | | | | | |
| 6 | 1505 | 219.100 | 1.3 | 1.43 | 475 | 250 | 250 | 57 | 75 | 74 | 5.0 | | |
| 5 | 1510 | 222.392 | 1.2 | 1.32 | 476 | 252 | 251 | 56 | 74 | 73 | 5.0 | | |
| 4 | 1515 | 225.557 | 1.2 | 1.32 | 475 | 253 | 251 | 57 | 76 | 73 | 5.0 | | |
| 3 | 1520 | 228.732 | 1.0 | 1.1 | 476 | 252 | 254 | 57 | 75 | 72 | 5.0 | | |
| 2 | 1525 | 231.661 | 1.0 | 1.1 | 475 | 255 | 257 | 57 | 74 | 72 | 5.0 | | |
| 1 | 1530 | 234.609 | 1.0 | 1.1 | 471 | 250 | 250 | 55 | 75 | 74 | 5.0 | | |
| 0 | 1535 | 237.539 | | | | | | | | | | | |
| Average: | | | | | | | | | | | | | |

Comments: Leak Check

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DS834048
Master Document Storage\Forms\Datasheets\ Datasheets

Delta Air Quality Services, Incorporated

# WET CHEMICAL SAMPLING SYSTEM DATA AND WORKSHEET

CLIENT: Exxon Mobil
LOCATION: FCC / 2F-7 Stack
DATE: 6/29/11
RUN NO: 3 #L
OPERATOR: SS
METER BOX NO: 12 WCS
METER ΔH@:
METER Yd:
STACK AREA, FT²:
TRAVERSE POINTS, MIN/POINT:
ΔH= _____ X ΔP:
Probe Condition, pre/post test:
Silica Gel Expended, Y/N:
Filter Condition after Test:
Check Weight:

AMBIENT TEMPERATURE: See pg. 1
BAROMETRIC PRESSURE:
ASSUMED MOISTURE:
PITOT TUBE COEFF, Cp:
PROBE ID NO/MATERIAL:
PROBE LENGTH:
NOZZLE ID NO/ MATERIAL:
NOZZLE DIAMETER:
FILTER NO/TYPE:
PRE-TEST LEAK RATE: _____ CFM@ _____ in. Hg.
POST-TEST LEAK RATE: _____ CFM@ _____ in. Hg.
PITOT LEAK CHECK - PRE: _____ POST: _____
CHAIN OF CUSTODY: SAMPLE CUSTODIAN _____
SAMPLER _____
SAMPLE CUSTODIAN _____

| Imp. # | Contents | Post-Test | Pre-Test = Difference |
|---|---|---|---|
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| Total: | | | |

| Point | Time | Meter Volume, ft³ | ΔP in. $H_2O$ | ΔH in. $H_2O$ | Stack Temp, °F | Probe Temp, °F | Filter Temp, °F | Imp. Out Temp, °F | Meter Temp, °F In | Meter Temp, °F Out | Vacuum in. Hg. | $O_2$ % | Pstatic in. $H_2O$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 6 | 1539 | 237.539 | 1.0 | 1.1 | 473 | 257 | 259 | 59 | 75 | 73 | 5.0 | 3% | -1.3 |
| 5 | 1544 | 240.497 | 1.0 | 1.1 | 476 | 255 | 257 | 59 | 74 | 72 | 5.0 | | |
| 4 | 1549 | 243.409 | 1.0 | 1.1 | 477 | 253 | 257 | 58 | 73 | 73 | 5.0 | | |
| 3 | 1554 | 246.328 | 1.0 | 1.1 | 475 | 256 | 259 | 58 | 76 | 74 | 5.0 | | |
| 2 | 1559 | 249.251 | 1.0 | 1.1 | 474 | 257 | 258 | 57 | 74 | 73 | 5.0 | | |
| 1 | 1604 | 252.151 | 1.0 | 1.1 | 470 | 255 | 260 | 59 | 77 | 74 | 5.0 | | |
| 0 | 1609 | 255.067 | | | | | | | | | | | |
| 6 | 1611 | 255.067 | 1.0 | 1.1 | 470 | 254 | 261 | 59 | 76 | 74 | 5.0 | | |
| 5 | 1616 | 258.005 | 1.1 | 1.21 | 472 | 253 | 259 | 58 | 76 | 74 | 5.0 | | |
| 4 | 1621 | 261.628 | 1.0 | 1.1 | 473 | 251 | 257 | 58 | 76 | 74 | 5.0 | | |
| 3 | 1626 | 263.968 | 1.0 | 1.1 | 472 | 256 | 257 | 59 | 75 | 74 | 5.0 | | |
| 2 | 1631 | 266.887 | 1.0 | 1.1 | 471 | 253 | 260 | 59 | 74 | 74 | 5.0 | | |
| 1 | 1636 | 269.799 | 1.0 | 1.1 | 473 | 256 | 258 | 58 | 73 | 73 | 5.0 | | |
| 0 | 1641 | 272.726 | | | | | | | | | | | |
| Average: | | | | | | | | | | | | | |

Comments:

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Master Document Storage\Forms\Datasheets\Field Datasheets

**ExxonMobil**
**STACK $O_2$, $CO_2$ DATA**

**Test #:** **1-HCl**
**Date:** **6/28/2011**
**Time:** **1438/1653**

| | $O_2$ | $CO_2$ |
|---|---|---|
| Range | 10 | 20 |
| Cal Gas | 5.00 | 10.16 |
| Analyzer Zero | 0.05 | 0.00 |
| Analyzer Span | 4.98 | 9.97 |
| Pre-Bias Zero | 0.04 | 0.01 |
| Pre-Bias Span | 5.00 | 10.01 |
| Post-Bias Zero | 0.05 | 0.01 |
| Post-Bias Span | 4.95 | 9.90 |
| Pre-test zero bias | -0.1% | 0.1% |
| Pre-test span bias | 0.1% | 0.2% |
| Post-test zero bias | 0.0% | 0.1% |
| Post-test span bias | -0.3% | -0.3% |
| Zero Drift | 0.1% | 0.0% |
| Span Drift | -0.4% | -0.5% |
| | PASS | PASS |
| **Average** | **5.18** | **13.54** |
| **Cal Corrected** | **5.21** | **13.82** |

**ExxonMobil**
**1-HCl**

| Date | Time | O2 % | CO2 % |
|---|---|---|---|
| 6/28/2011 | 2:39:00 PM | 4.96 | 13.74 |
| 6/28/2011 | 2:40:00 PM | 4.923 | 13.764 |
| 6/28/2011 | 2:41:00 PM | 4.919 | 13.781 |
| 6/28/2011 | 2:42:00 PM | 4.885 | 13.805 |
| 6/28/2011 | 2:43:00 PM | 4.937 | 13.748 |
| 6/28/2011 | 2:44:00 PM | 4.961 | 13.712 |
| 6/28/2011 | 2:45:00 PM | 4.939 | 13.739 |
| 6/28/2011 | 2:46:00 PM | 4.975 | 13.706 |
| 6/28/2011 | 2:47:00 PM | 4.972 | 13.706 |
| 6/28/2011 | 2:48:00 PM | 4.991 | 13.694 |
| 6/28/2011 | 2:49:00 PM | 4.935 | 13.741 |
| 6/28/2011 | 2:50:00 PM | 4.981 | 13.696 |
| 6/28/2011 | 2:51:00 PM | 4.968 | 13.705 |
| 6/28/2011 | 2:52:00 PM | 4.975 | 13.708 |
| 6/28/2011 | 2:53:00 PM | 5.023 | 13.674 |
| 6/28/2011 | 2:59:00 PM | 5.066 | 13.594 |
| 6/28/2011 | 3:00:00 PM | 5.096 | 13.593 |
| 6/28/2011 | 3:01:00 PM | 5.105 | 13.569 |
| 6/28/2011 | 3:02:00 PM | 5.119 | 13.555 |
| 6/28/2011 | 3:03:00 PM | 5.123 | 13.549 |
| 6/28/2011 | 3:04:00 PM | 5.136 | 13.531 |
| 6/28/2011 | 3:05:00 PM | 5.156 | 13.527 |
| 6/28/2011 | 3:06:00 PM | 5.154 | 13.53 |
| 6/28/2011 | 3:07:00 PM | 5.181 | 13.489 |
| 6/28/2011 | 3:08:00 PM | 5.196 | 13.487 |
| 6/28/2011 | 3:18:00 PM | 5.18 | 13.488 |
| 6/28/2011 | 3:19:00 PM | 5.176 | 13.504 |
| 6/28/2011 | 3:20:00 PM | 5.232 | 13.447 |
| 6/28/2011 | 3:21:00 PM | 5.219 | 13.458 |
| 6/28/2011 | 3:22:00 PM | 5.227 | 13.442 |
| 6/28/2011 | 3:23:00 PM | 5.215 | 13.476 |
| 6/28/2011 | 3:24:00 PM | 5.221 | 13.474 |
| 6/28/2011 | 3:25:00 PM | 5.244 | 13.455 |
| 6/28/2011 | 3:26:00 PM | 5.279 | 13.416 |
| 6/28/2011 | 3:27:00 PM | 5.34 | 13.371 |
| 6/28/2011 | 3:28:00 PM | 5.331 | 13.37 |
| 6/28/2011 | 3:29:00 PM | 5.353 | 13.355 |
| 6/28/2011 | 3:30:00 PM | 5.319 | 13.364 |
| 6/28/2011 | 3:31:00 PM | 5.266 | 13.421 |
| 6/28/2011 | 3:32:00 PM | 5.203 | 13.474 |
| 6/28/2011 | 3:33:00 PM | 5.167 | 13.52 |
| 6/28/2011 | 3:34:00 PM | 5.162 | 13.508 |
| 6/28/2011 | 3:35:00 PM | 5.185 | 13.505 |
| 6/28/2011 | 3:36:00 PM | 5.152 | 13.534 |
| 6/28/2011 | 3:37:00 PM | 5.168 | 13.517 |
| 6/28/2011 | 3:38:00 PM | 5.151 | 13.543 |
| 6/28/2011 | 3:39:00 PM | 5.132 | 13.55 |

| | | | |
|---|---|---|---|
| 6/28/2011 | 3:40:00 PM | 5.154 | 13.559 |
| 6/28/2011 | 3:41:00 PM | 5.178 | 13.552 |
| 6/28/2011 | 3:42:00 PM | 5.256 | 13.473 |
| 6/28/2011 | 3:43:00 PM | 5.274 | 13.453 |
| 6/28/2011 | 3:44:00 PM | 5.239 | 13.478 |
| 6/28/2011 | 3:45:00 PM | 5.224 | 13.504 |
| 6/28/2011 | 3:46:00 PM | 5.192 | 13.529 |
| 6/28/2011 | 3:47:00 PM | 5.207 | 13.548 |
| 6/28/2011 | 3:51:00 PM | 5.164 | 13.557 |
| 6/28/2011 | 3:52:00 PM | 5.129 | 13.598 |
| 6/28/2011 | 3:53:00 PM | 5.145 | 13.586 |
| 6/28/2011 | 3:54:00 PM | 5.137 | 13.586 |
| 6/28/2011 | 3:55:00 PM | 5.129 | 13.619 |
| 6/28/2011 | 3:56:00 PM | 5.194 | 13.546 |
| 6/28/2011 | 3:57:00 PM | 5.19 | 13.534 |
| 6/28/2011 | 3:58:00 PM | 5.15 | 13.57 |
| 6/28/2011 | 3:59:00 PM | 5.114 | 13.612 |
| 6/28/2011 | 4:00:00 PM | 5.05 | 13.665 |
| 6/28/2011 | 4:01:00 PM | 5.092 | 13.626 |
| 6/28/2011 | 4:02:00 PM | 5.051 | 13.662 |
| 6/28/2011 | 4:03:00 PM | 5.077 | 13.636 |
| 6/28/2011 | 4:04:00 PM | 5.129 | 13.602 |
| 6/28/2011 | 4:05:00 PM | 5.166 | 13.561 |
| 6/28/2011 | 4:06:00 PM | 5.127 | 13.607 |
| 6/28/2011 | 4:07:00 PM | 5.163 | 13.599 |
| 6/28/2011 | 4:08:00 PM | 5.24 | 13.513 |
| 6/28/2011 | 4:09:00 PM | 5.261 | 13.505 |
| 6/28/2011 | 4:10:00 PM | 5.294 | 13.455 |
| 6/28/2011 | 4:11:00 PM | 5.32 | 13.435 |
| 6/28/2011 | 4:12:00 PM | 5.283 | 13.464 |
| 6/28/2011 | 4:13:00 PM | 5.21 | 13.538 |
| 6/28/2011 | 4:14:00 PM | 5.181 | 13.584 |
| 6/28/2011 | 4:15:00 PM | 5.237 | 13.534 |
| 6/28/2011 | 4:16:00 PM | 5.249 | 13.529 |
| 6/28/2011 | 4:17:00 PM | 5.317 | 13.471 |
| 6/28/2011 | 4:18:00 PM | 5.367 | 13.428 |
| 6/28/2011 | 4:19:00 PM | 5.371 | 13.409 |
| 6/28/2011 | 4:20:00 PM | 5.418 | 13.362 |
| 6/28/2011 | 4:24:00 PM | 5.267 | 13.484 |
| 6/28/2011 | 4:25:00 PM | 5.279 | 13.473 |
| 6/28/2011 | 4:26:00 PM | 5.251 | 13.513 |
| 6/28/2011 | 4:27:00 PM | 5.257 | 13.513 |
| 6/28/2011 | 4:28:00 PM | 5.282 | 13.489 |
| 6/28/2011 | 4:29:00 PM | 5.312 | 13.461 |
| 6/28/2011 | 4:30:00 PM | 5.325 | 13.432 |
| 6/28/2011 | 4:31:00 PM | 5.36 | 13.4 |
| 6/28/2011 | 4:32:00 PM | 5.356 | 13.406 |
| 6/28/2011 | 4:33:00 PM | 5.333 | 13.417 |
| 6/28/2011 | 4:34:00 PM | 5.289 | 13.46 |
| 6/28/2011 | 4:35:00 PM | 5.255 | 13.497 |
| 6/28/2011 | 4:36:00 PM | 5.299 | 13.455 |
| 6/28/2011 | 4:37:00 PM | 5.306 | 13.449 |

| | | | |
|---|---|---|---|
| 6/28/2011 | 4:38:00 PM | 5.334 | 13.419 |
| 6/28/2011 | 4:39:00 PM | 5.353 | 13.403 |
| 6/28/2011 | 4:40:00 PM | 5.355 | 13.393 |
| 6/28/2011 | 4:41:00 PM | 5.285 | 13.453 |
| 6/28/2011 | 4:42:00 PM | 5.245 | 13.507 |
| 6/28/2011 | 4:43:00 PM | 5.235 | 13.507 |
| 6/28/2011 | 4:44:00 PM | 5.215 | 13.52 |
| 6/28/2011 | 4:45:00 PM | 5.148 | 13.57 |
| 6/28/2011 | 4:46:00 PM | 5.135 | 13.606 |
| 6/28/2011 | 4:47:00 PM | 5.203 | 13.547 |
| 6/28/2011 | 4:48:00 PM | 5.16 | 13.575 |
| 6/28/2011 | 4:49:00 PM | 5.131 | 13.626 |
| 6/28/2011 | 4:50:00 PM | 5.197 | 13.555 |
| 6/28/2011 | 4:51:00 PM | 5.248 | 13.505 |
| 6/28/2011 | 4:52:00 PM | 5.271 | 13.497 |
| 6/28/2011 | 4:53:00 PM | 5.231 | 13.537 |
| | Average | 5.18 | 13.54 |

**ExxonMobil**
**STACK $O_2$, $CO_2$ DATA**

**Test #:** **2-HCl**
**Date:** **6/29/2011**
**Time:** **1015/1221**

| | $O_2$ | $CO_2$ |
|---|---|---|
| Range | 10 | 20 |
| Cal Gas | 5.00 | 10.16 |
| Analyzer Zero | 0.04 | -0.01 |
| Analyzer Span | 5.06 | 10.00 |
| Pre-Bias Zero | 0.06 | 0.03 |
| Pre-Bias Span | 5.05 | 9.94 |
| Post-Bias Zero | 0.06 | 0.02 |
| Post-Bias Span | 4.98 | 9.82 |
| Pre-test zero bias | 0.2% | 0.2% |
| Pre-test span bias | 0.0% | -0.3% |
| Post-test zero bias | 0.1% | 0.2% |
| Post-test span bias | -0.8% | -0.9% |
| Zero Drift | 0.0% | -0.1% |
| Span Drift | -0.7% | -0.6% |
| | PASS | PASS |
| **Average** | **5.28** | **13.37** |
| **Cal Corrected** | **5.27** | **13.77** |

**ExxonMobil**
**2-HCl**

| Date | Time | O2 % | CO2 % |
|---|---|---|---|
| 6/29/2011 | 10:16:00 AM | 5.444 | 13.374 |
| 6/29/2011 | 10:17:00 AM | 5.428 | 13.386 |
| 6/29/2011 | 10:18:00 AM | 5.43 | 13.379 |
| 6/29/2011 | 10:19:00 AM | 5.392 | 13.438 |
| 6/29/2011 | 10:20:00 AM | 5.37 | 13.453 |
| 6/29/2011 | 10:21:00 AM | 5.411 | 13.383 |
| 6/29/2011 | 10:22:00 AM | 5.375 | 13.405 |
| 6/29/2011 | 10:23:00 AM | 5.335 | 13.45 |
| 6/29/2011 | 10:24:00 AM | 5.328 | 13.464 |
| 6/29/2011 | 10:25:00 AM | 5.345 | 13.441 |
| 6/29/2011 | 10:26:00 AM | 5.336 | 13.447 |
| 6/29/2011 | 10:27:00 AM | 5.347 | 13.441 |
| 6/29/2011 | 10:28:00 AM | 5.334 | 13.44 |
| 6/29/2011 | 10:29:00 AM | 5.3 | 13.47 |
| 6/29/2011 | 10:30:00 AM | 5.274 | 13.487 |
| 6/29/2011 | 10:31:00 AM | 5.257 | 13.498 |
| 6/29/2011 | 10:32:00 AM | 5.27 | 13.49 |
| 6/29/2011 | 10:33:00 AM | 5.295 | 13.463 |
| 6/29/2011 | 10:34:00 AM | 5.29 | 13.487 |
| 6/29/2011 | 10:35:00 AM | 5.265 | 13.499 |
| 6/29/2011 | 10:36:00 AM | 5.214 | 13.532 |
| 6/29/2011 | 10:37:00 AM | 5.226 | 13.5 |
| 6/29/2011 | 10:38:00 AM | 5.226 | 13.515 |
| 6/29/2011 | 10:39:00 AM | 5.253 | 13.487 |
| 6/29/2011 | 10:40:00 AM | 5.192 | 13.56 |
| 6/29/2011 | 10:41:00 AM | 5.265 | 13.477 |
| 6/29/2011 | 10:42:00 AM | 5.301 | 13.437 |
| 6/29/2011 | 10:43:00 AM | 5.368 | 13.367 |
| 6/29/2011 | 10:44:00 AM | 5.367 | 13.399 |
| 6/29/2011 | 10:45:00 AM | 5.357 | 13.429 |
| 6/29/2011 | 10:48:00 AM | 5.354 | 13.649 |
| 6/29/2011 | 10:49:00 AM | 5.39 | 13.757 |
| 6/29/2011 | 10:50:00 AM | 5.454 | 13.704 |
| 6/29/2011 | 10:51:00 AM | 5.487 | 13.761 |
| 6/29/2011 | 10:52:00 AM | 5.509 | 13.765 |
| 6/29/2011 | 10:53:00 AM | 5.464 | 13.691 |
| 6/29/2011 | 10:54:00 AM | 5.295 | 13.288 |
| 6/29/2011 | 10:55:00 AM | 5.237 | 13.272 |
| 6/29/2011 | 10:56:00 AM | 5.25 | 13.25 |
| 6/29/2011 | 10:57:00 AM | 5.257 | 13.283 |
| 6/29/2011 | 10:58:00 AM | 5.289 | 13.222 |
| 6/29/2011 | 10:59:00 AM | 5.273 | 13.23 |
| 6/29/2011 | 11:00:00 AM | 5.278 | 13.229 |
| 6/29/2011 | 11:01:00 AM | 5.27 | 13.25 |
| 6/29/2011 | 11:02:00 AM | 5.284 | 13.222 |
| 6/29/2011 | 11:03:00 AM | 5.242 | 13.261 |
| 6/29/2011 | 11:04:00 AM | 5.294 | 13.233 |

| | | | |
|---|---|---|---|
| 6/29/2011 | 11:05:00 AM | 5.294 | 13.218 |
| 6/29/2011 | 11:06:00 AM | 5.279 | 13.24 |
| 6/29/2011 | 11:07:00 AM | 5.302 | 13.22 |
| 6/29/2011 | 11:08:00 AM | 5.275 | 13.233 |
| 6/29/2011 | 11:09:00 AM | 5.289 | 13.221 |
| 6/29/2011 | 11:10:00 AM | 5.289 | 13.217 |
| 6/29/2011 | 11:11:00 AM | 5.235 | 13.267 |
| 6/29/2011 | 11:12:00 AM | 5.231 | 13.282 |
| 6/29/2011 | 11:13:00 AM | 5.265 | 13.259 |
| 6/29/2011 | 11:14:00 AM | 5.304 | 13.212 |
| 6/29/2011 | 11:15:00 AM | 5.266 | 13.242 |
| 6/29/2011 | 11:16:00 AM | 5.256 | 13.269 |
| 6/29/2011 | 11:17:00 AM | 5.342 | 13.178 |
| 6/29/2011 | 11:20:00 AM | 5.324 | 13.208 |
| 6/29/2011 | 11:21:00 AM | 5.304 | 13.226 |
| 6/29/2011 | 11:22:00 AM | 5.292 | 13.231 |
| 6/29/2011 | 11:23:00 AM | 5.243 | 13.28 |
| 6/29/2011 | 11:24:00 AM | 5.228 | 13.308 |
| 6/29/2011 | 11:25:00 AM | 5.25 | 13.265 |
| 6/29/2011 | 11:26:00 AM | 5.236 | 13.28 |
| 6/29/2011 | 11:27:00 AM | 5.28 | 13.309 |
| 6/29/2011 | 11:28:00 AM | 5.313 | 13.289 |
| 6/29/2011 | 11:29:00 AM | 5.25 | 13.352 |
| 6/29/2011 | 11:30:00 AM | 5.219 | 13.366 |
| 6/29/2011 | 11:31:00 AM | 5.228 | 13.344 |
| 6/29/2011 | 11:32:00 AM | 5.203 | 13.371 |
| 6/29/2011 | 11:33:00 AM | 5.242 | 13.331 |
| 6/29/2011 | 11:34:00 AM | 5.234 | 13.342 |
| 6/29/2011 | 11:35:00 AM | 5.233 | 13.362 |
| 6/29/2011 | 11:36:00 AM | 5.259 | 13.326 |
| 6/29/2011 | 11:37:00 AM | 5.218 | 13.375 |
| 6/29/2011 | 11:38:00 AM | 5.173 | 13.411 |
| 6/29/2011 | 11:39:00 AM | 5.23 | 13.377 |
| 6/29/2011 | 11:40:00 AM | 5.238 | 13.374 |
| 6/29/2011 | 11:41:00 AM | 5.29 | 13.333 |
| 6/29/2011 | 11:42:00 AM | 5.29 | 13.324 |
| 6/29/2011 | 11:43:00 AM | 5.302 | 13.323 |
| 6/29/2011 | 11:44:00 AM | 5.268 | 13.348 |
| 6/29/2011 | 11:45:00 AM | 5.25 | 13.364 |
| 6/29/2011 | 11:46:00 AM | 5.229 | 13.367 |
| 6/29/2011 | 11:47:00 AM | 5.233 | 13.368 |
| 6/29/2011 | 11:48:00 AM | 5.202 | 13.389 |
| 6/29/2011 | 11:49:00 AM | 5.221 | 13.382 |
| 6/29/2011 | 11:52:00 AM | 5.129 | 13.471 |
| 6/29/2011 | 11:53:00 AM | 5.108 | 13.509 |
| 6/29/2011 | 11:54:00 AM | 5.143 | 13.476 |
| 6/29/2011 | 11:55:00 AM | 5.164 | 13.467 |
| 6/29/2011 | 11:56:00 AM | 5.209 | 13.405 |
| 6/29/2011 | 11:57:00 AM | 5.212 | 13.409 |
| 6/29/2011 | 11:58:00 AM | 5.235 | 13.403 |
| 6/29/2011 | 11:59:00 AM | 5.208 | 13.408 |
| 6/29/2011 | 12:00:00 PM | 5.248 | 13.372 |

| | | | |
|---|---|---|---|
| 6/29/2011 | 12:01:00 PM | 5.241 | 13.382 |
| 6/29/2011 | 12:02:00 PM | 5.293 | 13.344 |
| 6/29/2011 | 12:03:00 PM | 5.305 | 13.309 |
| 6/29/2011 | 12:04:00 PM | 5.319 | 13.315 |
| 6/29/2011 | 12:05:00 PM | 5.257 | 13.371 |
| 6/29/2011 | 12:06:00 PM | 5.205 | 13.416 |
| 6/29/2011 | 12:07:00 PM | 5.254 | 13.366 |
| 6/29/2011 | 12:08:00 PM | 5.236 | 13.39 |
| 6/29/2011 | 12:09:00 PM | 5.246 | 13.382 |
| 6/29/2011 | 12:10:00 PM | 5.15 | 13.012 |
| | Average | 5.28 | 13.37 |

**ExxonMobil**
**STACK $O_2$, $CO_2$ DATA**

**Test #:** **3-HCl**
**Date:** **6/29/2011**
**Time:** **1414/1641**

| | $O_2$ | $CO_2$ |
|---|---|---|
| Range | 10 | 20 |
| Cal Gas | 5.00 | 10.16 |
| Analyzer Zero | 0.04 | -0.01 |
| Analyzer Span | 5.06 | 10.00 |
| Pre-Bias Zero | 0.06 | 0.02 |
| Pre-Bias Span | 4.98 | 9.82 |
| Post-Bias Zero | 0.06 | 0.02 |
| Post-Bias Span | 4.98 | 9.84 |
| Pre-test zero bias | 0.1% | 0.2% |
| Pre-test span bias | -0.8% | -0.9% |
| Post-test zero bias | 0.1% | 0.1% |
| Post-test span bias | -0.8% | -0.8% |
| Zero Drift | 0.0% | 0.0% |
| Span Drift | 0.0% | 0.1% |
| | PASS | PASS |
| **Average** | **5.20** | **13.43** |
| **Cal Corrected** | **5.22** | **13.89** |

**ExxonMobil**
**3-HCl**

| Date | Time | O2 % | CO2 % |
|---|---|---|---|
| 6/29/2011 | 2:15:00 PM | 5.305 | 13.323 |
| 6/29/2011 | 2:16:00 PM | 5.28 | 13.353 |
| 6/29/2011 | 2:17:00 PM | 5.216 | 13.407 |
| 6/29/2011 | 2:18:00 PM | 5.185 | 13.453 |
| 6/29/2011 | 2:19:00 PM | 5.204 | 13.414 |
| 6/29/2011 | 2:20:00 PM | 5.2 | 13.436 |
| 6/29/2011 | 2:21:00 PM | 5.19 | 13.438 |
| 6/29/2011 | 2:22:00 PM | 5.237 | 13.395 |
| 6/29/2011 | 2:23:00 PM | 5.211 | 13.407 |
| 6/29/2011 | 2:24:00 PM | 5.245 | 13.41 |
| 6/29/2011 | 2:25:00 PM | 5.233 | 13.426 |
| 6/29/2011 | 2:26:00 PM | 5.23 | 13.387 |
| 6/29/2011 | 2:27:00 PM | 5.197 | 13.408 |
| 6/29/2011 | 2:28:00 PM | 5.207 | 13.407 |
| 6/29/2011 | 2:29:00 PM | 5.26 | 13.366 |
| 6/29/2011 | 2:30:00 PM | 5.24 | 13.372 |
| 6/29/2011 | 2:31:00 PM | 5.27 | 13.343 |
| 6/29/2011 | 2:32:00 PM | 5.201 | 13.408 |
| 6/29/2011 | 2:33:00 PM | 5.229 | 13.371 |
| 6/29/2011 | 2:34:00 PM | 5.258 | 13.337 |
| 6/29/2011 | 2:35:00 PM | 5.219 | 13.377 |
| 6/29/2011 | 2:36:00 PM | 5.241 | 13.354 |
| 6/29/2011 | 2:37:00 PM | 5.191 | 13.387 |
| 6/29/2011 | 2:38:00 PM | 5.178 | 13.399 |
| 6/29/2011 | 2:39:00 PM | 5.1 | 13.48 |
| 6/29/2011 | 2:40:00 PM | 5.179 | 13.419 |
| 6/29/2011 | 2:41:00 PM | 5.26 | 13.339 |
| 6/29/2011 | 2:42:00 PM | 5.272 | 13.323 |
| 6/29/2011 | 2:43:00 PM | 5.256 | 13.323 |
| 6/29/2011 | 2:44:00 PM | 5.234 | 13.343 |
| 6/29/2011 | 3:06:00 PM | 5.168 | 13.434 |
| 6/29/2011 | 3:07:00 PM | 5.174 | 13.439 |
| 6/29/2011 | 3:08:00 PM | 5.197 | 13.41 |
| 6/29/2011 | 3:09:00 PM | 5.204 | 13.397 |
| 6/29/2011 | 3:10:00 PM | 5.197 | 13.415 |
| 6/29/2011 | 3:11:00 PM | 5.254 | 13.36 |
| 6/29/2011 | 3:12:00 PM | 5.243 | 13.354 |
| 6/29/2011 | 3:13:00 PM | 5.242 | 13.361 |
| 6/29/2011 | 3:14:00 PM | 5.156 | 13.436 |
| 6/29/2011 | 3:15:00 PM | 5.169 | 13.427 |
| 6/29/2011 | 3:16:00 PM | 5.185 | 13.413 |
| 6/29/2011 | 3:17:00 PM | 5.15 | 13.46 |
| 6/29/2011 | 3:18:00 PM | 5.167 | 13.441 |
| 6/29/2011 | 3:19:00 PM | 5.129 | 13.471 |
| 6/29/2011 | 3:20:00 PM | 5.166 | 13.44 |
| 6/29/2011 | 3:21:00 PM | 5.158 | 13.463 |
| 6/29/2011 | 3:22:00 PM | 5.153 | 13.459 |

| | | | |
|---|---|---|---|
| 6/29/2011 | 3:23:00 PM | 5.184 | 13.425 |
| 6/29/2011 | 3:24:00 PM | 5.205 | 13.399 |
| 6/29/2011 | 3:25:00 PM | 5.213 | 13.394 |
| 6/29/2011 | 3:26:00 PM | 5.213 | 13.395 |
| 6/29/2011 | 3:27:00 PM | 5.202 | 13.408 |
| 6/29/2011 | 3:28:00 PM | 5.2 | 13.425 |
| 6/29/2011 | 3:29:00 PM | 5.176 | 13.453 |
| 6/29/2011 | 3:30:00 PM | 5.173 | 13.441 |
| 6/29/2011 | 3:31:00 PM | 5.133 | 13.477 |
| 6/29/2011 | 3:32:00 PM | 5.129 | 13.487 |
| 6/29/2011 | 3:33:00 PM | 5.107 | 13.504 |
| 6/29/2011 | 3:34:00 PM | 5.117 | 13.49 |
| 6/29/2011 | 3:35:00 PM | 5.096 | 13.503 |
| 6/29/2011 | 3:40:00 PM | 5.137 | 13.483 |
| 6/29/2011 | 3:41:00 PM | 5.171 | 13.441 |
| 6/29/2011 | 3:42:00 PM | 5.155 | 13.457 |
| 6/29/2011 | 3:43:00 PM | 5.202 | 13.399 |
| 6/29/2011 | 3:44:00 PM | 5.196 | 13.43 |
| 6/29/2011 | 3:45:00 PM | 5.196 | 13.432 |
| 6/29/2011 | 3:46:00 PM | 5.191 | 13.415 |
| 6/29/2011 | 3:47:00 PM | 5.126 | 13.493 |
| 6/29/2011 | 3:48:00 PM | 5.14 | 13.477 |
| 6/29/2011 | 3:49:00 PM | 5.051 | 13.57 |
| 6/29/2011 | 3:50:00 PM | 5.055 | 13.57 |
| 6/29/2011 | 3:51:00 PM | 5.13 | 13.489 |
| 6/29/2011 | 3:52:00 PM | 5.151 | 13.465 |
| 6/29/2011 | 3:53:00 PM | 5.158 | 13.479 |
| 6/29/2011 | 3:54:00 PM | 5.213 | 13.429 |
| 6/29/2011 | 3:55:00 PM | 5.177 | 13.641 |
| 6/29/2011 | 3:56:00 PM | 5.163 | 13.546 |
| 6/29/2011 | 3:57:00 PM | 5.19 | 13.631 |
| 6/29/2011 | 3:58:00 PM | 5.211 | 13.456 |
| 6/29/2011 | 3:59:00 PM | 5.218 | 13.459 |
| 6/29/2011 | 4:00:00 PM | 5.207 | 13.498 |
| 6/29/2011 | 4:01:00 PM | 5.199 | 13.481 |
| 6/29/2011 | 4:02:00 PM | 5.201 | 13.434 |
| 6/29/2011 | 4:03:00 PM | 5.157 | 13.482 |
| 6/29/2011 | 4:04:00 PM | 5.136 | 13.508 |
| 6/29/2011 | 4:05:00 PM | 5.152 | 13.492 |
| 6/29/2011 | 4:06:00 PM | 5.16 | 13.47 |
| 6/29/2011 | 4:07:00 PM | 5.118 | 13.525 |
| 6/29/2011 | 4:08:00 PM | 5.159 | 13.485 |
| 6/29/2011 | 4:09:00 PM | 5.214 | 13.432 |
| 6/29/2011 | 4:12:00 PM | 5.346 | 13.308 |
| 6/29/2011 | 4:13:00 PM | 5.289 | 13.36 |
| 6/29/2011 | 4:14:00 PM | 5.355 | 13.304 |
| 6/29/2011 | 4:15:00 PM | 5.37 | 13.279 |
| 6/29/2011 | 4:16:00 PM | 5.312 | 13.329 |
| 6/29/2011 | 4:17:00 PM | 5.201 | 13.432 |
| 6/29/2011 | 4:18:00 PM | 5.194 | 13.446 |
| 6/29/2011 | 4:19:00 PM | 5.213 | 13.43 |
| 6/29/2011 | 4:20:00 PM | 5.215 | 13.438 |

| | | | |
|---|---|---|---|
| 6/29/2011 | 4:21:00 PM | 5.265 | 13.395 |
| 6/29/2011 | 4:22:00 PM | 5.251 | 13.421 |
| 6/29/2011 | 4:23:00 PM | 5.268 | 13.424 |
| 6/29/2011 | 4:24:00 PM | 5.218 | 13.433 |
| 6/29/2011 | 4:25:00 PM | 5.244 | 13.404 |
| 6/29/2011 | 4:26:00 PM | 5.261 | 13.374 |
| 6/29/2011 | 4:27:00 PM | 5.274 | 13.362 |
| 6/29/2011 | 4:28:00 PM | 5.28 | 13.358 |
| 6/29/2011 | 4:29:00 PM | 5.226 | 13.407 |
| 6/29/2011 | 4:30:00 PM | 5.196 | 13.425 |
| 6/29/2011 | 4:31:00 PM | 5.119 | 13.511 |
| 6/29/2011 | 4:32:00 PM | 5.145 | 13.486 |
| 6/29/2011 | 4:33:00 PM | 5.19 | 13.43 |
| 6/29/2011 | 4:34:00 PM | 5.169 | 13.445 |
| 6/29/2011 | 4:35:00 PM | 5.166 | 13.472 |
| 6/29/2011 | 4:36:00 PM | 5.155 | 13.473 |
| 6/29/2011 | 4:37:00 PM | 5.123 | 13.516 |
| 6/29/2011 | 4:38:00 PM | 5.128 | 13.513 |
| 6/29/2011 | 4:39:00 PM | 5.116 | 13.521 |
| 6/29/2011 | 4:40:00 PM | 5.153 | 13.473 |
| 6/29/2011 | 4:41:00 PM | 5.136 | 13.485 |
| | Average | 5.20 | 13.43 |

# Atmospheric Analysis & Consulting, Inc.

| | |
|---|---|
| Client | : Delta Air Quality Services |
| Client Project Name | : ICR 2F-7 |
| Client Project No. | : NA |
| AAC Project No. | : 110573 |
| Reporting Date | : 07/14/2011 |

On July 06, 2011, Atmospheric Analysis & Consulting, Inc. received eleven (11) liquid samples for HCl, $Cl_2$, and HF analysis by EPA Method 26A. Upon receipt each sample was assigned a unique Laboratory ID number as follows:

| Client Sample ID | AAC Sample ID |
|---|---|
| 1-HCl-$H_2SO_4$ | 51401 |
| 1-HCl-NaOH | 51402 |
| 2-HCl-$H_2SO_4$ | 51403 |
| 2-HCl-NaOH | 51404 |
| 3-HCl-$H_2SO_4$ | 51405 |
| 3-HCl-NaOH | 51406 |
| $H_2SO_4$-Blank | 51407 |
| NaOH-Blank | 51408 |
| $H_2O$-Blank | 51409 |
| FB-HCl-$H_2SO_4$ | 51410 |
| FB-HCl-NaOH | 51411 |

IC Analysis - Samples volumes and pH are measured and up to a 5ml aliquot of the sample is injected into the DIONEX IC for analysis. Acidic and Alkaline samples were analyzed separately with calibration curves analyzed both before and after sample analysis. Client Sample ID "$H_2O$-Blank"(AAC Sample ID 110573-51409) was analyzed along with both the Acidic and Alkaline samples.

No problems were encountered during receiving, preparation, and/or analysis of these samples. The test results included in this report meet all requirements of the NELAC Standards and/or AAC SOP# E.26_26A.04.

I certify that this data is technically accurate, complete and in compliance with the terms and conditions of the contract. The Laboratory Director or his designee, as verified by the following signature, has authorized the release of the data contained in this hardcopy data package.

If you have any questions or require further explanation of data results, please contact the undersigned.

Marcus Hueppe
Laboratory Director

This report consists of 10 pages.

ACCREDITED IN ACCORDANCE WITH nelac Certificate#E87837



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# Atmospheric Analysis & Consulting, Inc.

*Laboratory Analysis Report*
*Anion Analysis by IC*

| | | | |
|---|---|---|---|
| Client | : Delta Air Quality Services | Sampling Dates | : 06/28-29/2011 |
| Client Project Name | : ICR 2F-7 | Receiving Date | : 07/06/2011 |
| AAC Project No. | : 110573 | Analysis Date | : 07/13-14/2011 |
| Analyst | : AD/EG | Reporting Date | : 07/14/2011 |

## HCl, $CL_2$, and HF Analysis by EPA Method 26A

| Client Sample ID | AAC Sample ID | Sample Volume (mL) | HCl (ug/sample) | HCl Sample Reporting Limit (ug/sample) | $CL_2$ (ug/sample) | $CL_2$ Sample Reporting Limit (ug/sample) | HF (ug/sample) | HF Sample Reporting Limit (ug/sample) |
|---|---|---|---|---|---|---|---|---|
| 1-HCl-$H_2SO_4$ | 51401 | 533 | 2160 | 54.8 | <SRL | 107 | <SRL | 56.1 |
| 1-HCl-NaOH | 51402 | 255 | <SRL | 26.2 | <SRL | 51.0 | <SRL | 26.9 |
| 2-HCl-$H_2SO_4$ | 51403 | 525 | 2710 | 54.0 | <SRL | 105 | <SRL | 55.3 |
| 2-HCl-NaOH | 51404 | 279 | <SRL | 28.7 | <SRL | 55.8 | <SRL | 29.4 |
| 3-HCl-$H_2SO_4$ | 51405 | 432 | 2830 | 44.4 | <SRL | 86.4 | <SRL | 45.5 |
| 3-HCl-NaOH | 51406 | 284 | <SRL | 29.2 | <SRL | 56.8 | <SRL | 29.9 |
| $H_2SO_4$-Blank | 51407 | 204 | <SRL | 21.0 | <SRL | 40.8 | <SRL | 21.5 |
| NaOH-Blank | 51408 | 206 | <SRL | 21.2 | <SRL | 41.2 | <SRL | 21.7 |
| $H_2O$-Blank* | 51409 | 197 | <SRL | 20.3 | <SRL | 39.4 | <SRL | 20.7 |
| FB-HCl-$H_2SO_4$ | 51410 | 317 | <SRL | 32.6 | <SRL | 63.4 | <SRL | 33.4 |
| FB-HCl-NaOH | 51411 | 304 | <SRL | 31.3 | <SRL | 60.8 | <SRL | 32.0 |

<SRL-compound was analyzed for but not detected at or above the SRL (Sample Reporting Limit)

SRL (ug sample) =Method Reporting Limit (MRL) (0.100 ug mL) x Sample Volume (mL) x Dilution Factors(if applicable) x Ion conv Factor (example CL- to HCL)

*$H_2O$-Blank was analyzed with both Acidic and Alkaline samples and the results were both <SRL for all analytes

Marcus Hueppe
Laboratory Director







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# Atmospheric Analysis & Consulting, Inc.

## *QUALITY CONTROL/ASSURANCE REPORT*

*EPA Method 26A-Acidic Solution-Hydrogen Halides Analysis*

Analysis Date : 07/13/11
Analyst : AD/EG

Instrument ID : DIONEX IC # 1

*Method Blank Analysis*

| Analyte | Concentration (ug/mL) | Reporting Limit (ug/mL) |
|---|---|---|
| Fluoride | <SRL | 0.100 |
| Chloride | <SRL | 0.100 |

*Laboratory Control Spike Analysis*

| Analyte | Theoretical Sample Concentration (ug/mL) | Theoretical Spike Concentration (ug/mL) | Lab Spike Concentration (ug/mL) | Duplicate Lab Spike Concentration (ug/mL) | Spike Recovery (%)** | Duplicate Spike Recovery (%)** | % RPD**** |
|---|---|---|---|---|---|---|---|
| Fluoride | 0.000 | 12.5 | 12.4 | 12.3 | 99.1 | 98.0 | 1.1 |
| Chloride | 0.000 | 12.5 | 11.8 | 11.7 | 94.1 | 93.4 | 0.8 |

*Matrix Spike Analysis [Sample 110573-51401]*

| Analyte | Theoretical Sample Concentration (ug/mL) | Theoretical Spike Concentration (ug/mL) | Matrix Spike Concentration (ug/mL) | Duplicate Matrix Spike Concentration (ug/mL) | Spike Recovery (%)*** | Duplicate Spike Recovery (%)*** | % RPD**** |
|---|---|---|---|---|---|---|---|
| Fluoride | 0.00 | 12.5 | 12.7 | 12.7 | 101 | 101 | 0.1 |
| Chloride | 1.97 | 12.5 | 13.6 | 13.7 | 93.4 | 93.7 | 0.3 |

*Duplicate Sample Analysis*

| Sample ID | Analyte | Result (ug/mL) | Duplicate Result (ug/mL) | %RPD * | DF |
|---|---|---|---|---|---|
| 110573-51401 | Fluoride | <SRL | <SRL | NA | 1 |
| | Chloride | 3.96 | 3.92 | 1.0 | 1 |
| 110573-51403 | Fluoride | <SRL | <SRL | NA | 1 |
| | Chloride | 5.02 | 5.02 | 0.0 | 1 |
| 110573-51405 | Fluoride | <SRL | <SRL | NA | 1 |
| | Chloride | 6.36 | 6.36 | 0.0 | 1 |
| 110573-51407 | Fluoride | <SRL | <SRL | NA | 1 |
| | Chloride | <SRL | <SRL | NA | 1 |
| 110573-51409 | Fluoride | <SRL | <SRL | NA | 1 |
| | Chloride | <SRL | <SRL | NA | 1 |
| 110573-51410 | Fluoride | <SRL | <SRL | NA | 1 |
| | Chloride | <SRL | <SRL | NA | 1 |

* Must be <5%
** Must be 85-115%
*** Must be 75-125%
**** Must be < 25%

Marcus Hueppe
Laboratory Director



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# Atmospheric Analysis & Consulting, Inc.

## QUALITY CONTROL/QUALITY ASSURANCE REPORT

*EPA Method 26A-Acidic Solution-Hydrogen Halides Analysis*

Analysis Date : 07/13/11 Instrument ID : DIONEX IC # 1
Analyst : AD/EG

**EPA 26A Hydrogen Halide Calibration Curves**

| Fluoride Concentration (ug/mL) | Initial Curve Result (Area) | Final Curve Result (Area) | Mean Area | %RPD* |
|---|---|---|---|---|
| 0.100 | 23337 | 23051 | 23194 | 1.2 |
| 0.50 | 118681 | 117609 | 118145 | 0.9 |
| 2.50 | 493583 | 493809 | 493696 | 0.0 |
| 10.0 | 2206381 | 2293896 | 2250139 | 3.9 |
| 25.0 | 5944040 | 6093422 | 6018731 | 2.5 |
| 37.5 | 9329795 | 9381819 | 9355807 | 0.6 |
| 50.0 | 12335971 | 12411268 | 12373620 | 0.6 |
| **Chloride Concentration (ug/mL)** | **Initial Curve Result (Area)** | **Final Curve Result (Area)** | **Mean Area** | **%RPD*** |
| 0.100 | 61836 | 62610 | 62223 | 1.2 |
| 0.50 | 121623 | 121571 | 121597 | 0.0 |
| 2.50 | 413302 | 414326 | 413814 | 0.2 |
| 10.0 | 1752465 | 1791579 | 1772022 | 2.2 |
| 25.0 | 4697787 | 4654998 | 4676393 | 0.9 |
| 37.5 | 7543471 | 7562157 | 7552814 | 0.2 |
| 50.0 | 10405089 | 10441384 | 10423237 | 0.3 |

* Must be <5%

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Laboratory Director



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# Atmospheric Analysis & Consulting, Inc.

## *Quality Control/Quality Assurance Report*

*EPA Method 26A-Alkaline Solution-Halogens Analysis*

Analysis Date : 07/14/11
Analyst : AD/EG
Instrument ID : DIONEX IC # 1

*Calibration Verification of the 07/14/2011 Calibration*

| Sample ID | Analyte | Theoretical Concentration (ug/mL) | Practical Concentration (ug/mL) | Percent Recovery (%)* |
|---|---|---|---|---|
| Opening CV | Fluoride | 25.0 | 25.2 | 101 |
| | Chloride | 25.0 | 25.0 | 99.9 |
| Continuing CV | Fluoride | 25.0 | 25.8 | 103 |
| | Chloride | 25.0 | 25.5 | 102 |
| Continuing CV | Fluoride | 25.0 | 25.3 | 101 |
| | Chloride | 25.0 | 25.1 | 100 |
| Closing CV | Fluoride | 25.0 | 26.1 | 104 |
| | Chloride | 25.0 | 25.8 | 103 |
| Second Source | Fluoride | 25.0 | 24.9 | 99.5 |
| | Chloride | 25.0 | 24.8 | 99.2 |

* Must be 90-110%

Marcus Hueppe
Laboratory Director



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# Atmospheric Analysis & Consulting, Inc.

## *QUALITY CONTROL/ASSURANCE REPORT*

*EPA Method 26A-Alkaline Solution-Halogens Analysis*

Analysis Date : 07/14/11
Analyst : AD/EG

Instrument ID : DIONEX IC # 1

*Method Blank Analysis*

| Analyte | Concentration (ug/mL) | Reporting Limit (ug/mL) |
|---|---|---|
| Fluoride | <SRL | 0.100 |
| Chloride | <SRL | 0.100 |

*Laboratory Control Spike Analysis*

| Analyte | Theoretical Sample Concentration (ug/mL) | Theoretical Spike Concentration (ug/mL) | Lab Spike Concentration (ug/mL) | Duplicate Lab Spike Concentration (ug/mL) | Spike Recovery (%)** | Duplicate Spike Recovery (%)** | % RPD**** |
|---|---|---|---|---|---|---|---|
| Fluoride | 0.000 | 12.5 | 12.5 | 12.6 | 100 | 101 | 0.5 |
| Chloride | 0.000 | 12.5 | 12.1 | 12.3 | 97.0 | 98.5 | 1.6 |

*Matrix Spike Analysis [Sample 110573-51402]*

| Analyte | Theoretical Sample Concentration (ug/mL) | Theoretical Spike Concentration (ug/mL) | Matrix Spike Concentration (ug/mL) | Duplicate Matrix Spike Concentration (ug/mL) | Spike Recovery (%)*** | Duplicate Spike Recovery (%)*** | % RPD**** |
|---|---|---|---|---|---|---|---|
| Fluoride | 0.00 | 12.5 | 12.5 | 12.5 | 100 | 100 | 0.1 |
| Chloride | 0.00 | 12.5 | 12.1 | 12.1 | 97.0 | 96.9 | 0.1 |

*Duplicate Sample Analysis*

| Sample ID | Analyte | Result (ug/mL) | Duplicate Result (ug/mL) | %RPD * | DF |
|---|---|---|---|---|---|
| 110573-51402 | Fluoride | <SRL | <SRL | NA | 1 |
| | Chloride | <SRL | <SRL | NA | 1 |
| 110573-51404 | Fluoride | <SRL | <SRL | NA | 1 |
| | Chloride | <SRL | <SRL | NA | 1 |
| 110573-51406 | Fluoride | <SRL | <SRL | NA | 1 |
| | Chloride | <SRL | <SRL | NA | 1 |
| 110573-51408 | Fluoride | <SRL | <SRL | NA | 1 |
| | Chloride | <SRL | <SRL | NA | 1 |
| 110573-51409 | Fluoride | <SRL | <SRL | NA | 1 |
| | Chloride | <SRL | <SRL | NA | 1 |
| 110573-51411 | Fluoride | <SRL | <SRL | NA | 1 |
| | Chloride | <SRL | <SRL | NA | 1 |

* Must be <5%
** Must be 85-115%
*** Must be 75-125%
**** Must be < 25%

Marcus Hueppe
Laboratory Director



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# Atmospheric Analysis & Consulting, Inc.

## QUALITY CONTROL/QUALITY ASSURANCE REPORT

*EPA Method 26A-Alkaline Solution-Halogens Analysis*

Analysis Date : 07/14/11 Instrument ID : DIONEX IC # 1
Analyst : AD/EG

**EPA 26A Halogens Calibration Curves**

| Fluoride Concentration (ug/mL) | Initial Curve Result (Area) | Final Curve Result (Area) | Mean Area | %RPD* |
|---|---|---|---|---|
| 0.100 | 24809 | 23373 | 24091 | 6.0 |
| 0.50 | 116631 | 113540 | 115086 | 2.7 |
| 2.50 | 708038 | 705209 | 706624 | 0.4 |
| 10.0 | 2369918 | 2357917 | 2363918 | 0.5 |
| 25.0 | 6345278 | 6353820 | 6349549 | 0.1 |
| 37.5 | 9444895 | 9466625 | 9455760 | 0.2 |
| 50.0 | 12278225 | 12507011 | 12392618 | 1.8 |
| **Chloride Concentration (ug/mL)** | **Initial Curve Result (Area)** | **Final Curve Result (Area)** | **Mean Area** | **%RPD*** |
| 0.100 | 54727 | 54525 | 54626 | 0.4 |
| 0.50 | 105447 | 104298 | 104873 | 1.1 |
| 2.50 | 384672 | 382776 | 383724 | 0.5 |
| 10.0 | 1600457 | 1595061 | 1597759 | 0.3 |
| 25.0 | 4459896 | 4502760 | 4481328 | 1.0 |
| 37.5 | 7197773 | 7291437 | 7244605 | 1.3 |
| 50.0 | 9861801 | 10061903 | 9961852 | 2.0 |

* Must be <5%

Marcus Hueppe
Laboratory Director



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# Atmospheric Analysis & Consulting, Inc.

## *Quality Control/Quality Assurance Report*

*EPA Method 26A-Acidic Solution-Hydrogen Halides Analysis*

Analysis Date : 07/13/11
Analyst : AD/EG
Instrument ID : DIONEX IC # 1

*Calibration Verification of the 07/13/2011 Calibration*

| Sample ID | Analyte | Theoretical Concentration (ug/mL) | Practical Concentration (ug/mL) | Percent Recovery (%)* |
|---|---|---|---|---|
| Opening CV | Fluoride | 25.0 | 25.2 | 101 |
| | Chloride | 25.0 | 24.6 | 98.3 |
| Continuing CV | Fluoride | 25.0 | 25.6 | 102 |
| | Chloride | 25.0 | 25.0 | 100 |
| Continuing CV | Fluoride | 25.0 | 25.1 | 100 |
| | Chloride | 25.0 | 24.6 | 98.6 |
| Closing CV | Fluoride | 25.0 | 25.7 | 103 |
| | Chloride | 25.0 | 25.0 | 100 |
| Second Source | Fluoride | 25.0 | 25.3 | 101 |
| | Chloride | 25.0 | 24.7 | 98.7 |

* Must be 90-110%

Marcus Hueppe
Laboratory Director



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AAC#110573

# CHAIN OF CUSTODY

CLIENT: ICR 2F-7

TEST DATE(S): 6/28/2011 6/29/2011

LOCATION: FCC

SAMPLER(S): SS

SAMPLE LOCATION: 2F-7 Stack

PROJECT MANAGER: Ali Aleshakir

TEST METHOD(S): EPA M26A

DATE DUE: 7/13/2011

OUTSIDE LAB REQUIRED?: Yes

COMPLIANCE TEST? No

| | DATE | TIME | TEST # | SAMPLE DESCRIPTION | CONTAINERS | SAMPLER | COMMENTS |
|---|---|---|---|---|---|---|---|
| 51401 | 6/28/2011 | | 1-HCl | B½ filter / H2SO4 Imp | 1 | SS | .1N H2SO4 ✓ |
| 51402 | 6/28/2011 | | 1-HCl | NaOH Impinger | 1 | SS | .1N NaOH ✓ |
| 51403 | 6/29/2011 | | 2-HCl | B½ filter / H2SO4 Imp | 1 | SS | .1N H2SO4 ✓ |
| 51404 | 6/29/2011 | | 2-HCl | NaOH Impinger | 1 | SS | .1N NaOH ✓ |
| 51405 | 6/29/2011 | | 3-HCl | B½ filter / H2SO4 Imp | 1 | SS | .1N H2SO4 ✓ |
| 51406 | 6/29/2011 | | 3-HCl | NaOH Impinger | 1 | SS | .1N NaOH ✓ |
| 51407 | 6/28/2011 | | H2SO4-Blank | H2SO4 | 1 | JP | .1N H2SO4 ✓ |
| 51408 | 6/28/2011 | | NaOH-Blank | NaOH | 1 | JP | .1N NaOH ✓ |
| 51409 | 6/28/2011 | | H2O-Blank | H2O | 1 | JP | DI H2O ✓ |
| 51410 | 6/28/2011 | | FB-HCl | B½ filter / H2SO4 Imp | 1 | SS | .1N H2SO4 ✓ |
| 51411 | 6/28/2011 | | FB-HCl | NaOH Impinger | 1 | SS | .1N NaOH ✓ |
| | | | | | | | |
| | | | Total Samples | | 11 | | |
| | | Reagent: | DI H2O | | | | |
| | | Reagent Lot #'s: | #9 | | | | |

| RELEASED BY | DATE/TIME | RECEIVED BY | DATE/TIME |
|---|---|---|---|
| D McCune | 7/1/11 1913 | [illegible] | 7/6/11 |
| | | Sent via courier to DDA C | |
| | | [illegible] | 7/6/11 1350 |

ANALYSIS REQUIRED: HCl, Cl2 and HF by IC by EPA M 26A

Delta Air Quality Services, Incorporated

AAC# 110573

# CHAIN OF CUSTODY

CLIENT: ICR 2F-7

TEST DATE(S): 6/28/2011 6/29/2011

LOCATION: FCC

SAMPLER(S): SS

SAMPLE LOCATION: 2F-7 Stack

PROJECT MANAGER: Ali Aleshakir

TEST METHOD(S): EPA OTM29

DATE DUE: 7/13/2011

OUTSIDE LAB REQUIRED?: Yes

COMPLIANCE TEST? No

| | DATE | TIME | TEST # | SAMPLE DESCRIPTION | CONTAINERS | SAMPLER | COMMENTS |
|---|---|---|---|---|---|---|---|
| 51388 | 6/28/2011 | | 1-CN | #1 and #2 NaOH Imp | 1 | SS | 6 1N NaOH |
| 51387 | 6/28/2011 | | 1-CN | #3 NaOH Impinger | 1 | SS | 6 1N NaOH |
| 51390 | 6/29/2011 | | 2-CN | #1 and #2 NaOH Imp | 1 | SS | 6 1N NaOH |
| 51391 | 6/29/2011 | | 2-CN | #3 NaOH Impinger | 1 | SS | 6 1N NaOH |
| 51392 | 6/29/2011 | | 3-CN | #1 and #2 NaOH Imp | 1 | SS | 6 1N NaOH |
| 51393 | 6/29/2011 | | 3-CN | #3 NaOH Impinger | 1 | SS | 6 1N NaOH |
| 51394 | 6/28/2011 | | NaOH-Blank (6N 1000ul) | NaOH | 1 | JP | 6N NaOH |
| 51395 | 6/28/2011 | | FS-CN -1 | Field Spike Imp | 1 | JP | 6N NaOH 100ul Spike |
| 51396 | 6/28/2011 | | FB-CN | #1 and #2 NaOH Imp | 1 | SS | 6 1N NaOH |
| 51397 | 6/28/2011 | | FB-CN | #3 NaOH Impinger | 1 | SS | 6 1N NaOH |
| 51398 | 6/30/11 | | FS-CN-2 | Field Spike | 1 | JP | 6N NaOH 500ul Spike |
| | | 51399 | Total Samples | FS-CN-3 Field Spike | 1 ~~10~~ 12 | JP | 6N NaOH 1000ul Spike |
| | Reagent: | | | | | | |
| | Reagent Lot #'s: | | | | | | |

| RELEASED BY | DATE/TIME | RECEIVED BY | DATE/TIME |
|---|---|---|---|
| D McCune | 7/1/11 1913 | [illegible] | 7/6/11 |
| | | [illegible] | 7/6/11 1350 |

ANALYSIS REQUIRED: HCN analysis by OTM29

Delta Air Quality Services, Incorporated

Not Spike from vial labeled 210041, 2000 µg

AVERAGE CYANIDE EMISSIONS

CLIENT: ExxonMobil

| NAME | ug/dscm | ug/dscm at 7% O2 | ug/dscf | lb/hr |
|---|---|---|---|---|
| Cyanide (Impingers #1 and #2) | 10462.8 | 9247.8 | 296.3 | 9.14 |
| Cyanide (Impinger #3) | 3219.7 | 2851.5 | 91.2 | 2.82 |
| Total Cyanide | 13682.5 | 12099.3 | 387.5 | 11.96 |

CYANIDE CALCULATIONS

| | | | |
|---|---|---|---|
| CLIENT: | ExxonMobil | | AA |
| TEST NUMBER: | 1-HCN | VMSTD(DSCF): | 39.44 |
| TEST DATE: | 6/28/2011 | QSD(DSCF/MIN): | 228873 |
| T REF (F) | 68 | CO2,%: | 14.07 |
| | | O2,%: | 5.03 |

| NAME | ug/train | ug/dscm | ug/dscm at 7% O2 | ug/dscf | lb/hr |
|---|---|---|---|---|---|
| Cyanide (Impingers #1 and #2) | 15406 | 13791.9 | 12081.2 | 390.6 | 11.82 |
| Cyanide (Impinger #3) | 3451 | 3089.4 | 2706.2 | 87.5 | 2.65 |
| Total Cyanide | 18857 | 16881.3 | 14787.4 | 478.1 | 14.46 |

CYANIDE CALCULATIONS

| | | | |
|---|---|---|---|
| CLIENT: | ExxonMobil | | AA |
| TEST NUMBER: | 2-HCN | VMSTD(DSCF): | 63.93 |
| TEST DATE: | 6/29/2011 | QSD(DSCF/MIN): | 233227 |
| T REF (F) | 68 | CO2,%: | 13.67 |
| | | O2,%: | 5.34 |

| NAME | ug/train | ug/dscm | ug/dscm at 7% O2 | ug/dscf | lb/hr |
|---|---|---|---|---|---|
| Cyanide (Impingers #1 and #2) | 9648 | 5329.0 | 4761.8 | 150.9 | 4.65 |
| Cyanide (Impinger #3) | 3918 | 2164.1 | 1933.7 | 61.3 | 1.89 |
| Total Cyanide | 13566 | 7493.1 | 6695.5 | 212.2 | 6.54 |

CYANIDE CALCULATIONS

| | | | |
|---|---|---|---|
| CLIENT: | ExxonMobil | INITIALS: | AA |
| TEST NUMBER: | 3-HCN | VMSTD(DSCF): | 40.39 |
| TEST DATE: | 6/29/2011 | QSD(DSCF/MIN): | 238486 |
| T REF (F) | 68 | CO2,%: | 13.91 |
| | | O2,%: | 5.26 |

| NAME | ug/train | ug/dscm | ug/dscm at 7% O2 | ug/dscf | lb/hr |
|---|---|---|---|---|---|
| Cyanide (Impingers #1 and #2) | 14031 | 12267.5 | 10900.3 | 347.4 | 10.95 |
| Cyanide (Impinger #3) | 5039 | 4405.7 | 3914.6 | 124.8 | 3.93 |
| Total Cyanide | 19070 | 16673.2 | 14814.9 | 472.2 | 14.88 |

***Delta***
Hydrogen Cyanide Test Summary

| | | | | | |
|---|---|---|---|---|---|
| Client/Location..... | ExxonMobil | | | Reference Temp (F): | 68 |
| | | | | Fuel..... | Refinery |
| Sample Location..... | FCC 2F-7 Stack | | | Data By..... | AA |
| Test No..... | 1-HCN | 2-HCN | 3-HCN | Average | |
| Date..... | June 28, 2011 | June 29, 2011 | June 29, 2011 | * | |
| Start/Stop Time..... | 1306/1426 | 757/1005 | 1246/1407 | * | |
| Bar Press (in Hg)..... | 29.77 | 29.85 | 29.85 | * | |
| Test Method..... | EPA M23 | EPA M23 | EPA M23 | * | |
| Sample Time (Min)..... | 72 | 120 | 72 | * | |
| Sample Train..... | 12WCS | 12WCS | 12WCS | * | |
| Meter Cal Factor..... | 1.005 | 1.005 | 1.005 | * | |
| Pitot Factor ..... | 0.84 | 0.84 | 0.84 | * | |
| Nozzle Diam (in)..... | 0.202 | 0.202 | 0.202 | * | |
| Stack Area (sq ft)..... | 94.31 | 94.31 | 94.31 | | |
| Stack O2 (%)..... | 5.03 | 5.34 | 5.26 | 5.21 | |
| Stack CO2 (%)..... | 14.07 | 13.67 | 13.91 | 13.88 | |
| Stack Press (iwg)..... | -1.30 | -1.30 | -1.30 | -1.30 | |
| Stack Temp (F)..... | 480.5 | 474.3 | 475.4 | 476.7 | |
| Vel Head (iwg)..... | 1.35 | 1.29 | 1.44 | 1.36 | |
| Meter Temp (F)..... | 80 | 70 | 72 | 74 | |
| Meter Press (iwg)..... | 0.96 | 0.90 | 1.02 | 0.96 | |
| Meter Vol (acf)..... | 40.256 | 63.810 | 40.498 | 48.19 | |
| Liquid Vol (ml)..... | 180.3 | 216.1 | 176.7 | 191.0 | |
| Std Sample Vol (SCF)..... | 39.443 | 63.927 | 40.386 | 47.92 | |
| Std Sample Vol (SCM)..... | 1.117 | 1.810 | 1.144 | 1.357 | |
| Moisture Fraction..... | 0.177 | 0.138 | 0.171 | 0.162 | |
| Stack Gas Mol Wt..... | 28.24 | 28.70 | 28.31 | 28.41 | |
| Stack Gas Velocity (ft/sec)..... | 88.33 | 85.06 | 90.60 | 88.00 | |
| Isokinetic Ratio (%)..... | 101.4 | 96.8 | 99.6 | 99.3 | |
| Stack Flow Rate (wacfm)..... | 499,852 | 481,330 | 512,686 | 497,956 | |
| Stack Flow Rate (wscfm)..... | 278,255 | 270,440 | 287,737 | 278,811 | |
| Stack Flow Rate (dscfm)..... | 228,873 | 233,227 | 238,486 | 233,529 | |
| Stack Flow Rate (mdscf/h)..... | 137.32 | 139.94 | 143.09 | 140.12 | |

RUN 1

| HCN Test Sample Data | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Client/Location: | | ExxonMobil | | | | | | Sample Location: | | | 2F-7 Stack |
| Unit: | | FCC | | | | | | Data By: | | | AA |
| Test No: | 1-HCN | ISO | Assumed Moisture | | Sample Factor | | Delta H = | 0.70 | x Delta P | | |
| Date: | 6/28/2011 | 101.4 | 14 | | | Time per Point = | | 3 | Static Pressure = | | -1.30 |
| Port | Point | Time | Meter Volume | Delta P | Factor | Delta H | Stack Temp. | Meter In | Meter Out | Probe | Vacuum |
| A | 6 | 13:06:00 | 892.218 | 1.00 | 0.70 | 0.70 | 480 | 81 | 80 | 246 | 3 |
| A | 5 | 13:09:00 | 893.680 | 1.10 | 0.70 | 0.77 | 480 | 81 | 80 | 247 | 3 |
| A | 4 | 13:12:00 | 895.200 | 1.00 | 0.70 | 0.70 | 481 | 81 | 80 | 248 | 3 |
| A | 3 | 13:15:00 | 896.680 | 1.05 | 0.70 | 0.74 | 481 | 81 | 80 | 249 | 3 |
| A | 2 | 13:18:00 | 898.160 | 0.90 | 0.70 | 0.63 | 480 | 80 | 80 | 241 | 3 |
| A | 1 | 13:21:00 | 899.550 | 0.75 | 0.70 | 0.53 | 479 | 80 | 80 | 245 | 3 |
| | Stop | 13:24:00 | 900.847 | | | | | | | | |
| B | 6 | 13:26:00 | 900.847 | 1.20 | 0.70 | 0.84 | 480 | 81 | 80 | 250 | 3 |
| B | 5 | 13:29:00 | 902.400 | 1.30 | 0.70 | 0.91 | 479 | 80 | 80 | 257 | 3 |
| B | 4 | 13:32:00 | 904.050 | 1.30 | 0.70 | 0.91 | 480 | 81 | 80 | 255 | 3 |
| B | 3 | 13:35:00 | 905.650 | 1.30 | 0.70 | 0.91 | 480 | 80 | 80 | 255 | 3 |
| B | 2 | 13:38:00 | 907.370 | 1.20 | 0.70 | 0.84 | 480 | 81 | 80 | 250 | 3 |
| B | 1 | 13:41:00 | 908.930 | 1.00 | 0.70 | 0.70 | 480 | 81 | 80 | 251 | 3 |
| | Stop | 13:44:00 | 910.388 | | | | | | | | |
| C | 6 | 13:47:00 | 910.388 | 1.20 | 0.70 | 0.84 | 480 | 81 | 80 | 255 | 3 |
| C | 5 | 13:50:00 | 912.000 | 1.50 | 0.70 | 1.05 | 480 | 81 | 80 | 249 | 3 |
| C | 4 | 13:53:00 | 913.800 | 1.60 | 0.70 | 1.13 | 482 | 81 | 80 | 251 | 3 |
| C | 3 | 13:56:00 | 915.600 | 1.60 | 0.70 | 1.13 | 482 | 80 | 80 | 249 | 3 |
| C | 2 | 13:59:00 | 917.500 | 1.50 | 0.70 | 1.05 | 481 | 80 | 80 | 248 | 3 |
| C | 1 | 14:02:00 | 919.150 | 1.40 | 0.70 | 0.98 | 480 | 80 | 80 | 250 | 3 |
| | Stop | 14:05:00 | 920.886 | | | | | | | | |
| D | 6 | 14:08:00 | 920.886 | 1.50 | 0.70 | 1.05 | 480 | 80 | 79 | 249 | 3 |
| D | 5 | 14:11:00 | 922.630 | 1.60 | 0.70 | 1.13 | 480 | 80 | 79 | 250 | 3 |
| D | 4 | 14:14:00 | 924.500 | 1.80 | 0.70 | 1.27 | 482 | 80 | 79 | 251 | 3 |
| D | 3 | 14:17:00 | 926.500 | 1.90 | 0.70 | 1.34 | 482 | 80 | 79 | 251 | 3 |
| D | 2 | 14:20:00 | 928.400 | 2.00 | 0.70 | 1.41 | 482 | 80 | 79 | 250 | 3 |
| D | 1 | 14:23:00 | 930.400 | 2.00 | 0.70 | 1.41 | 481 | 80 | 79 | 245 | 3 |
| | Stop | 14:26:00 | 932.474 | | | | | | | | |
| **Total/Average** | | **72** | **40.256** | **1.3524** | | **0.96** | **481** | **80** | **80** | **250** | **3** |

| HCN Test Sample Data | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Client/Location: | | ExxonMobil | | | | | | Sample Location: | | | 2F-7 Stack |
| Unit: | | FCC | | | | | | Data By: | | | AA |
| Test No: | 2-HCN | ISO | Moisture | | Sample Factor | | Delta H = | 0.70 | x Delta P | | |
| Date: | 6/29/2011 | 96.8 | 14 | | | Time per Point = | | 5 | Static Pressure = | | -1.3 |
| Port | Point | Time | Meter Volume | Delta P | Factor | Delta H | Stack Temp. | Meter In | Meter Out | Probe | Vacuum |
| A | 6 | 7:57:00 | 11.319 | 1.10 | 0.70 | 0.77 | 470 | 64 | 63 | 250 | 4 |
| A | 5 | 8:02:00 | 13.857 | 1.00 | 0.70 | 0.70 | 472 | 64 | 62 | 252 | 4 |
| A | 4 | 8:07:00 | 16.258 | 1.00 | 0.70 | 0.70 | 474 | 65 | 63 | 250 | 4 |
| A | 3 | 8:12:00 | 18.647 | 1.00 | 0.70 | 0.70 | 473 | 64 | 63 | 253 | 4 |
| A | 2 | 8:17:00 | 21.039 | 1.00 | 0.70 | 0.70 | 472 | 65 | 64 | 254 | 4 |
| A | 1 | 8:22:00 | 23.432 | 1.00 | 0.70 | 0.70 | 473 | 64 | 63 | 254 | 4 |
| | Stop | 8:27:00 | 25.843 | | | | | | | | |
| B | 6 | 8:30:00 | 25.843 | 1.20 | 0.70 | 0.84 | 473 | 64 | 63 | 250 | 4 |
| B | 5 | 8:35:00 | 28.284 | 1.30 | 0.70 | 0.91 | 472 | 63 | 63 | 251 | 4 |
| B | 4 | 8:40:00 | 30.695 | 1.30 | 0.70 | 0.91 | 470 | 64 | 63 | 253 | 4 |
| B | 3 | 8:45:00 | 33.763 | 1.20 | 0.70 | 0.84 | 476 | 72 | 68 | 253 | 4 |
| B | 2 | 8:50:00 | 36.352 | 1.10 | 0.70 | 0.77 | 475 | 72 | 69 | 256 | 4 |
| B | 1 | 8:55:00 | 38.812 | 1.00 | 0.70 | 0.70 | 474 | 72 | 69 | 257 | 4 |
| | Stop | 9:00:00 | 41.231 | | | | | | | | |
| C | 6 | 9:03:00 | 41.231 | 1.20 | 0.70 | 0.84 | 472 | 72 | 70 | 252 | 4 |
| C | 5 | 9:08:00 | 43.801 | 1.50 | 0.70 | 1.05 | 471 | 73 | 70 | 254 | 4 |
| C | 4 | 9:13:00 | 46.676 | 1.60 | 0.70 | 1.13 | 473 | 74 | 70 | 255 | 4 |
| C | 3 | 9:18:00 | 49.562 | 1.60 | 0.70 | 1.13 | 478 | 74 | 71 | 251 | 4 |
| C | 2 | 9:23:00 | 52.439 | 1.60 | 0.70 | 1.13 | 478 | 75 | 71 | 250 | 4 |
| C | 1 | 9:28:00 | 55.331 | 1.50 | 0.70 | 1.05 | 478 | 76 | 73 | 250 | 4 |
| | Stop | 9:33:00 | 58.222 | | | | | | | | |
| D | 6 | 9:35:00 | 58.222 | 1.20 | 0.70 | 0.84 | 478 | 76 | 73 | 250 | 4 |
| D | 5 | 9:40:00 | 60.778 | 1.30 | 0.70 | 0.91 | 477 | 77 | 73 | 251 | 4 |
| D | 4 | 9:45:00 | 63.483 | 1.60 | 0.70 | 1.13 | 476 | 77 | 74 | 250 | 4 |
| D | 3 | 9:50:00 | 66.374 | 1.50 | 0.70 | 1.05 | 478 | 78 | 74 | 250 | 4 |
| D | 2 | 9:55:00 | 69.304 | 1.60 | 0.70 | 1.13 | 475 | 76 | 75 | 253 | 4 |
| D | 1 | 10:00:00 | 72.265 | 1.40 | 0.70 | 0.98 | 476 | 76 | 75 | 252 | 4 |
| | Stop | 10:05:00 | 75.129 | | | | | | | | |
| **Total/Average** | | **120** | **63.810** | **1.2859** | | **0.90** | **474** | **71** | **68** | | |

RUN 3

| HCN Test Sample Data | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Client/Location: | | ExxonMobil | | | | | | Sample Location: | | | 2F-7 Stack |
| Unit: | | FCC | | | | | | Data By: | | | AA |
| Test No: | 3-HCN | ISO | Moisture | | Sample Factor | | Delta H = | 0.70 | x Delta P | | |
| Date: | 6/29/2011 | 99.6 | 14 | | | Time per Point = | | 3 | Static Pressure = | | -1.3 |
| Port | Point | Time | Meter Volume | Delta P | Factor | Delta H | Stack Temp. | Meter In | Meter Out | Probe | Vacuum |
| A | 6 | 12:46:00 | 157.300 | 1.4 | 0.70 | 0.98 | 474 | 74 | 73 | 250 | 4 |
| A | 5 | 12:49:00 | 160.143 | 1.5 | 0.70 | 1.05 | 475 | 73 | 72 | 250 | 4 |
| A | 4 | 12:52:00 | 161.672 | 1.5 | 0.70 | 1.05 | 475 | 73 | 71 | 251 | 4 |
| A | 3 | 12:55:00 | 163.201 | 1.1 | 0.70 | 0.77 | 476 | 74 | 72 | 252 | 4 |
| A | 2 | 12:58:00 | 164.239 | 1.1 | 0.70 | 0.77 | 475 | 74 | 71 | 253 | 4 |
| A | 1 | 13:01:00 | 165.768 | 1.1 | 0.70 | 0.77 | 476 | 74 | 72 | 254 | 4 |
| | Stop | 13:04:00 | 166.788 | | | | | | | | |
| B | 6 | 13:05:00 | 166.788 | 1.4 | 0.70 | 0.98 | 476 | 74 | 71 | 256 | 4 |
| B | 5 | 13:08:00 | 168.487 | 1.3 | 0.70 | 0.91 | 475 | 74 | 72 | 254 | 4 |
| B | 4 | 13:11:00 | 170.109 | 1.3 | 0.70 | 0.91 | 474 | 74 | 73 | 254 | 4 |
| B | 3 | 13:14:00 | 171.732 | 1.2 | 0.70 | 0.84 | 476 | 72 | 72 | 252 | 4 |
| B | 2 | 13:17:00 | 173.292 | 1.1 | 0.70 | 0.77 | 475 | 73 | 72 | 252 | 4 |
| B | 1 | 13:20:00 | 174.802 | 1.0 | 0.70 | 0.70 | 476 | 72 | 71 | 251 | 4 |
| | Stop | 13:23:00 | 176.299 | | | | | | | | |
| C | 6 | 13:28:00 | 176.299 | 1.5 | 0.70 | 1.05 | 476 | 75 | 72 | 252 | 4 |
| C | 5 | 13:31:00 | 178.075 | 1.6 | 0.70 | 1.13 | 475 | 74 | 71 | 251 | 4 |
| C | 4 | 13:34:00 | 179.869 | 1.9 | 0.70 | 1.34 | 477 | 73 | 70 | 251 | 4 |
| C | 3 | 13:37:00 | 181.758 | 2.0 | 0.70 | 1.41 | 478 | 72 | 71 | 258 | 4 |
| C | 2 | 13:40:00 | 183.671 | 2.0 | 0.70 | 1.41 | 473 | 71 | 70 | 255 | 4 |
| C | 1 | 13:43:00 | 185.616 | 2.0 | 0.70 | 1.41 | 472 | 71 | 71 | 256 | 4 |
| | Stop | 13:46:00 | 187.564 | | | | | | | | |
| D | 6 | 13:49:00 | 187.564 | 1.3 | 0.70 | 0.91 | 473 | 73 | 72 | 249 | 4 |
| D | 5 | 13:52:00 | 189.202 | 1.5 | 0.70 | 1.05 | 476 | 72 | 71 | 250 | 4 |
| D | 4 | 13:55:00 | 190.923 | 1.5 | 0.70 | 1.05 | 476 | 73 | 72 | 250 | 4 |
| D | 3 | 13:58:00 | 192.649 | 1.6 | 0.70 | 1.13 | 477 | 72 | 71 | 251 | 4 |
| D | 2 | 14:01:00 | 194.389 | 1.5 | 0.70 | 1.05 | 476 | 71 | 71 | 250 | 4 |
| D | 1 | 14:04:00 | 196.089 | 1.5 | 0.70 | 1.05 | 477 | 71 | 71 | 250 | 4 |
| | Stop | 14:07:00 | 197.798 | | | | | | | | |
| **Total/Average** | | **72** | **40.498** | **1.4** | | **1.02** | **475** | **73** | **71** | | |
| | | | | | | | | **72** | | | |

Delta Air Quality Services, Incorporated

# WET CHEMICAL SAMPLING SYSTEM DATA AND WORKSHEET

CLIENT: Exxon Mobil
LOCATION: FCC / 2F-7 Stack
DATE: 6/28/11
RUN NO: 1-FBHCN
OPERATOR: SS
METER BOX NO:
METER ΔH@:
METER Yd:
STACK AREA, FT²:
TRAVERSE POINTS, MIN/POINT:
ΔH= X ΔP:
Probe Condition, pre/post test:
Silica Gel Expended, Y/N:
Filter Condition after Test:
Check Weight:

AMBIENT TEMPERATURE: 78°
BAROMETRIC PRESSURE: 29.77
ASSUMED MOISTURE: 1%
PITOT TUBE COEFF, Cp: ~~.84 N/A .84~~
PROBE ID NO/MATERIAL: N/A
PROBE LENGTH: N/A
NOZZLE ID NO/ MATERIAL: N/A
NOZZLE DIAMETER: N/A
FILTER NO/TYPE: N/A
PRE-TEST LEAK RATE: : CFM@ in. Hg.
POST-TEST LEAK RATE: : CFM@ in. Hg.
PITOT LEAK CHECK - PRE: POST:
CHAIN OF CUSTODY: SAMPLE CUSTODIAN JP
SAMPLER SS
SAMPLE CUSTODIAN JP

| Imp. # | Contents | Post-Test | Pre-Test | = Difference |
|---|---|---|---|---|
| 1 | 100ml 6N NaOH | 783.8 | 783.8 | |
| 2 | " | 782.9 | 782.9 | |
| 3 | " | 791.6 | 791.6 | |
| 4 | Sg | 913.8 | 913.8 | |
| | | | | |
| Total: | | | | |

| Point | Time | Meter Volume, ft³ | ΔP in. H₂O | ΔH in. H₂O | Stack Temp, °F | Probe Temp, °F | Filter Temp, °F | Imp. Out Temp, °F | Meter Temp, °F In | Meter Temp, °F Out | Vacuum in. Hg. | O₂ % | Pstatic in. H₂O |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| FB | | | | | | | | | | | | | |
| Average: | | | | | | | | | | | | | |

Comments: Imp 1 pH:14, 2 pH:14, 3 pH:14

2.5-10


Date of last revision 3/30/2010
DS834048
Master Document Storage\Forms\Datasheets\Field Datasheets

Delta Air Quality Services, Incorporated

pg 1 of 2

# WET CHEMICAL SAMPLING SYSTEM DATA AND WORKSHEET

CLIENT: Exxon Mobil
LOCATION: FCC / 2F-7 Stack
DATE: 6-28-11
RUN NO: 1-HCN
OPERATOR: Dave Wondercy
METER BOX NO: 12-WCS
METER ΔH@: 1.643
METER Yd: 1.005
STACK AREA, FT²:
TRAVERSE POINTS, MIN/POINT: 3 x 24
ΔH= 0.7 X ΔP:
Probe Condition, pre/post test: ✓
Silica Gel Expended, Y/N: ✓
Filter Condition after Test: ✓
Check Weight: ✓

AMBIENT TEMPERATURE: 75
BAROMETRIC PRESSURE: 29.73
ASSUMED MOISTURE: 11%
PITOT TUBE COEFF, Cp: 0.85
PROBE ID NO/MATERIAL: 89 - glass
PROBE LENGTH: 9'
NOZZLE ID NO/ MATERIAL: 7 / glass
NOZZLE DIAMETER: 0.202
FILTER NO/TYPE: Quartz
PRE-TEST LEAK RATE: : 0.005 CFM@ 15" in. Hg.
POST-TEST LEAK RATE: 0.005 CFM@ 10" in. Hg.
PITOT LEAK CHECK - PRE: ok POST: ok
CHAIN OF CUSTODY: SAMPLE CUSTODIAN AA
SAMPLER DW
SAMPLE CUSTODIAN AA

| Imp. # | Contents | Post-Test | Pre-Test | Difference |
|---|---|---|---|---|
| 1 | 100 mL 6N NaOH | 834.2 | 721.5 | 112.7 |
| 2 | " | 645.8 | 607.2 | 38.6 |
| 3 | " | 744.1 | 728.1 | 16.0 |
| 4 | S.G. | 885.4 | 872.4 | 13.0 |
| | | | | |
| Total: | | | | 180.3 |

| Point | Time | Meter Volume, ft³ | ΔP in. H₂O | ΔH in. H₂O | Stack Temp, °F | Probe Temp, °F | Filter Temp, °F | Imp. Out Temp, °F | Meter Temp, °F In | Meter Temp, °F Out | Vacuum in. Hg. | O₂ % | Pstatic in. H₂O |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| E 6 | 1306 | 892.218 | 1.0 | ~~1.0~~ 0.7 | 480 | 246 | 238 | 68 | 81 | 80 | 3 | | -1.5 |
| 5 | 1309 | 893.68 | 1.1 | 0.77 | 480 | 247 | 247 | 68 | 81 | 80 | 3 | | |
| 4 | 1312 | 895.2 | 1.0 | 0.7 | 481 | 248 | 249 | 67 | 81 | 80 | 3 | | |
| 3 | 1315 | 896.68 | 1.05 | 0.74 | 481 | 249 | 250 | 67 | 81 | 80 | 3 | | |
| 2 | 1318 | 898.16 | 0.90 | 0.63 | 480 | 241 | 248 | 66 | 80 | 80 | 3 | | |
| 1 | ~~stop~~ 1321 | 899.55 | 0.75 | 0.53 | 479 | 245 | 251 | 65 | 80 | 80 | 3 | | |
| stop | 1324 | 900.847 | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| 6 | 1326 | 900.847 | 1.2 | 0.84 | 480 | 250 | 248 | 65 | 81 | 80 | 3 | | |
| 5 | 1329 | 902.4 | 1.3 | 0.91 | 479 | 257 | 249 | 65 | 80 | 80 | 3 | | |
| 4 | 1332 | 904.05 | 1.3 | 0.91 | 480 | 255 | 248 | 65 | 81 | 80 | 3 | | |
| 3 | 1335 | 905.65 | 1.3 | 0.91 | 480 | 255 | 249 | 64 | 80 | 80 | 3 | | |
| 2 | 1338 | 907.37 | 1.2 | 0.84 | 480 | 250 | 251 | 63 | 81 | 80 | 3 | | |
| 1 | 1341 | 908.93 | 1.0 | 0.70 | 480 | 251 | 255 | 63 | 81 | 80 | 3 | | |
| | 1344 | 910.388 | | | | | | | | | | | |
| Average: | | | | | | | | | | | | | |

Comments: #1 Imp 11.5 pH as found added 20 mL 6N NaOH #2 - 12 pH #3 14 pH

11-8-7

470

Date of last revision 3/30/2010

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DS834048 Datasheets

Delta Air Quality Services, Incorporated

Pg 2 of 2

# WET CHEMICAL SAMPLING SYSTEM DATA AND WORKSHEET

CLIENT: Exxon Mobil
LOCATION: FCC / 2F-7 Stack
DATE: 6-28-11
RUN NO: 1- HCN
OPERATOR: Dave Woody
METER BOX NO: 12-WCS
METER ΔH@: 1.643
METER Yd: 1.005
STACK AREA, FT$^2$:
TRAVERSE POINTS, MIN/POINT: 3x24
ΔH= 0. X ΔP:
Probe Condition, pre/post test:
Silica Gel Expended, Y/N:
Filter Condition after Test:
Check Weight:

AMBIENT TEMPERATURE: 75
BAROMETRIC PRESSURE: 29.77
ASSUMED MOISTURE: 11%
PITOT TUBE COEFF, Cp: 0.84
PROBE ID NO/MATERIAL: #89 - glass
PROBE LENGTH: 6'
NOZZLE ID NO/ MATERIAL: glass
NOZZLE DIAMETER: 0.202
FILTER NO/TYPE: Quartz
PRE-TEST LEAK RATE: : CFM@ in. Hg.
POST-TEST LEAK RATE: : CFM@ in. Hg.
PITOT LEAK CHECK - PRE: POST:
CHAIN OF CUSTODY: SAMPLE CUSTODIAN
SAMPLER
SAMPLE CUSTODIAN

| Imp. # | Contents | Post-Test - Pre-Test = Difference |
|---|---|---|
| | | |
| | | |
| | See pg 1 | |
| | | |
| | | |
| Total: | | |

| Point | Time | Meter Volume, ft$^3$ | ΔP in. $H_2O$ | ΔH in. $H_2O$ | Stack Temp, °F | Probe Temp, °F | Filter Temp, °F | Imp. Out Temp, °F | Meter Temp, °F In | Meter Temp, °F Out | Vacuum in. Hg. | $O_2$ % | Pstatic in. $H_2O$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| N6 | 1347 | 910.388 | 1.2 | 0.84 | 480 | 255 | 251 | 65 | 81 | 80 | 3 | | |
| 5 | 1350 | 912.0 | 1.5 | 1.05 | 480 | 249 | 255 | 65 | 81 | 80 | 3 | | -1.3 |
| 4 | 1353 | 913.8 | 1.6 | 1.12 | 482 | 251 | 253 | 64 | 81 | 80 | 3 | | |
| 3 | 1356 | 915.6 | 1.6 | 1.12 | 482 | 249 | 251 | 64 | 80 | 80 | 3 | | |
| 2 | 1359 | 917.5 | 1.5 | 1.05 | 481 | 249 | 252 | 63 | 80 | 80 | 3 | | |
| 1 | 1402 | 919.15 | 1.4 | 0.98 | 480 | 250 | 252 | 61 | 80 | 80 | 3 | | |
| Stop | 1405 | 920.886 | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| W6 | 1408 | 920.886 | 1.5 | 1.05 | 480 | 249 | 250 | 61 | 80 | 79 | 3 | | |
| 5 | 1411 | 922.63 | 1.6 | 1.12 | 480 | 250 | 245 | 61 | 80 | 79 | 3 | | |
| 4 | 1414 | 924.5 | 1.8 | 1.26 | 482 | 251 | 246 | 60 | 80 | 79 | 3 | | |
| 3 | 1417 | 926.5 | 1.9 | 1.33 | 482 | 251 | 248 | 60 | 80 | 79 | 3 | | |
| 2 | 1420 | 928.4 | 2.0 | 1.4 | 482 | 250 | 250 | 60 | 80 | 79 | 3 | | |
| 1 | 1423 | 930.4 | 2.0 | 1.4 | 481 | 245 | 243 | 60 | 80 | 79 | 3 | | |
| end | 1426 | 932.474 | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
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| | | | | | | | | | | | | | |
| Average: | | | | | | | | | | | | | |

Comments:

C-8-12



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DS834048
Master Document Storage\Forms\Datasheets\Field Datasheets

Delta Air Quality Services, Incorporated

# WET CHEMICAL SAMPLING SYSTEM DATA AND WORKSHEET

CLIENT: Exxon Mobil
LOCATION: FCC / 2F-7 Stack
DATE: 6/29/11
RUN NO: 2-ACN
OPERATOR: D. Avila
METER BOX NO: 12-WCS
METER ΔH@: .585
METER Yd: 1.005
STACK AREA, FT²:
TRAVERSE POINTS, MIN/POINT: 8/24
ΔH= 2.7 X ΔP:
Probe Condition, pre/post test: ✓
Silica Gel Expended, Y/N: ✓
Filter Condition after Test: ✓
Check Weight: ✓

AMBIENT TEMPERATURE: 78°
BAROMETRIC PRESSURE: 29.85
ASSUMED MOISTURE: 14.4
PITOT TUBE COEFF, Cp: 0.84
PROBE ID NO/MATERIAL: 84 glass
PROBE LENGTH: N/A
NOZZLE ID NO/ MATERIAL: 71 glass
NOZZLE DIAMETER: 0.202
FILTER NO/TYPE: Quartz
PRE-TEST LEAK RATE: : 0.002 CFM@ 10" in. Hg.
POST-TEST LEAK RATE: : 0.002 CFM@ 10 in. Hg.
PITOT LEAK CHECK - PRE: OK POST: –
CHAIN OF CUSTODY: SAMPLE CUSTODIAN SP
SAMPLER SS
SAMPLE CUSTODIAN SP

| Imp. # | Contents | Post-Test | Pre-Test | Difference |
|---|---|---|---|---|
| 1 | 100-1 BNN.OH | 940.4 | 787.8 | 152.6 |
| 2 | " | 835.9 | 787.0 | 48.9 |
| 3 | " | 793.7 | 792.4 | 1.3 |
| 4 | Sg. | 926.6 | 913.3 | 13.3 |
| | | | | |
| Total: | | | | 216.1 |

| Point | Time | Meter Volume, ft³ | ΔP in. $H_2O$ | ΔH in. $H_2O$ | Stack Temp, °F | Probe Temp, °F | Filter Temp, °F | Imp. Out Temp, °F | Meter Temp, °F In | Meter Temp, °F Out | Vacuum in. Hg. | $O_2$ % | Pstatic in. $H_2O$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 6 | 0757 | 011.319 | 1.1 | .77 | 470 | 250 | 256 | 58 | 64 | 63 | 4.0 | 3% | -1.3 |
| 5 | 0802 | 013.857 | 1.0 | .70 | 472 | 252 | 256 | 58 | 64 | 62 | 4.0 | | |
| 4 | 0807 | 016.258 | 1.0 | .70 | 474 | 250 | 257 | 57 | 65 | 63 | 4.0 | | |
| 3 | 0812 | 018.647 | 1.0 | .70 | 473 | 253 | 256 | 57 | 64 | 63 | 4.0 | | |
| 2 | 0817 | 020.039 | 1.0 | .70 | 472 | 254 | 254 | 57 | 65 | 64 | 4.0 | | |
| 1 | 0822 | 023.432 | 1.0 | .70 | 473 | 254 | 255 | 56 | 64 | 63 | 4.0 | | |
| 0 | 0827 | 025.843 | | | | | | | | | | | |
| 6 | 0830 | 025.843 | 1.2 | .84 | 473 | 250 | 253 | 56 | 64 | 63 | 4.0 | | |
| 5 | 0835 | 028.284 | 1.3 | .91 | 472 | 251 | 254 | 56 | 63 | 63 | 4.0 | | |
| 4 | 0840 | 030.695 | 1.3 | .91 | 470 | 253 | 253 | 56 | 64 | 63 | 4.0 | | |
| 3 | 0845 | 033.763 | 1.2 | .84 | 476 | 253 | 258 | 57 | 72 | 68 | 4.0 | | |
| 2 | 0850 | 036.352 | 1.1 | .77 | 475 | 256 | 257 | 57 | 72 | 69 | 4.0 | | |
| 1 | 0855 | 038.812 | 1.0 | .70 | 474 | 257 | 256 | 57 | 72 | 69 | 4.0 | | |
| 0 | 0900 | 041.231 | | | | | | | | | | | |
| | | 041.231 | | | | | | | | | | | |
| Average: | | | | | | | | | | | | | |

Comments:

C.8-13



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Delta Air Quality Services, Incorporated

# WET CHEMICAL SAMPLING SYSTEM DATA AND WORKSHEET

CLIENT: Exxon Mobil
LOCATION: FCC / 2F-7 Stack
DATE: 6/29/11
RUN NO: 2KU
OPERATOR: D. Avila
METER BOX NO: 12-WCS
METER ΔH@: .595
METER Yd: 1.005
STACK AREA, FT²:
TRAVERSE POINTS, MIN/POINT: 5/24
ΔH= .7 X ΔP:
Probe Condition, pre/post test:
Silica Gel Expended, Y/N:
Filter Condition after Test:
Check Weight:

AMBIENT TEMPERATURE: See PM
BAROMETRIC PRESSURE: 29.85
ASSUMED MOISTURE:
PITOT TUBE COEFF, Cp:
PROBE ID NO/MATERIAL:
PROBE LENGTH:
NOZZLE ID NO/ MATERIAL:
NOZZLE DIAMETER: 0.202
FILTER NO/TYPE:
PRE-TEST LEAK RATE: : CFM@ in. Hg.
POST-TEST LEAK RATE: CFM@ in. Hg.
PITOT LEAK CHECK - PRE: POST:
CHAIN OF CUSTODY: SAMPLE CUSTODIAN
SAMPLER
SAMPLE CUSTODIAN

| Imp. # | Contents | Post-Test | Pre-Test = Difference |
|---|---|---|---|
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| Total: | | | |

| Point | Time | Meter Volume, ft³ | ΔP in. H₂O | ΔH in. H₂O | Stack Temp, °F | Probe Temp, °F | Filter Temp, °F | Imp. Out Temp, °F | Meter Temp, °F In | Meter Temp, °F Out | Vacuum in. Hg. | O₂ % | Pstatic in. H₂O |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 6 | 0903 | 041.231 | 1.2 | .84 | 472 | 252 | 255 | 57 | 72 | 70 | 4.0 | 3% | -1.3 |
| 5 | 0908 | 043.801 | 1.5 | 1.05 | 471 | 254 | 256 | 57 | 73 | 70 | 4.0 | | |
| 4 | 0913 | 046.676 | 1.6 | 1.12 | 473 | 255 | 256 | 58 | 74 | 70 | 4.0 | | |
| 3 | 0918 | 049.562 | 1.6 | 1.12 | 478 | 251 | 259 | 58 | 74 | 71 | 4.0 | | |
| 2 | 0923 | 052.439 | 1.6 | 1.12 | 478 | 250 | 259 | 58 | 75 | 71 | 4.0 | | |
| 1 | 0928 | 055.331 | 1.5 | 1.05 | 478 | 250 | 259 | 58 | 76 | 73 | 4.0 | | |
| 0 | 0933 | 058.222 | | | | | | | | | | | |
| 6 | 0935 | 058.222 | 1.2 | .84 | 478 | 250 | 259 | 58 | 76 | 73 | 4.0 | | |
| 5 | 0940 | 060.778 | 1.3 | .91 | 477 | 251 | 259 | 57 | 77 | 73 | 4.0 | | |
| 4 | 0945 | 063.483 | 1.6 | 1.12 | 476 | 250 | 258 | 57 | 77 | 74 | 4.0 | | |
| 3 | 0950 | 066.374 | 1.5 | 1.05 | 478 | 250 | 259 | 57 | 78 | 74 | 4.0 | | |
| 2 | 0955 | 069.304 | 1.6 | 1.12 | 475 | 253 | 258 | 59 | 76 | 75 | 4.0 | | |
| 1 | 1000 | 072.265 | 1.4 | .98 | 476 | 252 | 256 | 59 | 76 | 75 | 4.0 | | |
| 0 | 1005 | 075.129 | | | | | | | | | | | |
| Average: | | | | | | | | | | | | | |

Comments:

C.8-14

Delta Air Quality Services, Incorporated

# WET CHEMICAL SAMPLING SYSTEM DATA AND WORKSHEET

CLIENT: Exxon Mobil
LOCATION: FCC / 2F-7 Stack
DATE: 6-29-11
RUN NO: 3- HCN
OPERATOR: DA
METER BOX NO: 12WC9
METER ΔH@: .565
METER Yd: 1.005
STACK AREA, FT²:
TRAVERSE POINTS, MIN/POINT: 3/24
ΔH= 6.7 X ΔP:
Probe Condition, pre/post test:
Silica Gel Expended, Y/N:
Filter Condition after Test:
Check Weight:

AMBIENT TEMPERATURE: 80
BAROMETRIC PRESSURE: ~~29.79~~ 29.85
ASSUMED MOISTURE: 14%
PITOT TUBE COEFF, Cp: 0.84
PROBE ID NO/MATERIAL: 1 SS
PROBE LENGTH: 6
NOZZLE ID NO/ MATERIAL: 7/9 SS
NOZZLE DIAMETER: 0.202
FILTER NO/TYPE: Quartz
PRE-TEST LEAK RATE: : <0.002 CFM@ 12 in. Hg.
POST-TEST LEAK RATE: : <0.002 CFM@ 12 in. Hg.
PITOT LEAK CHECK - PRE: ✓ POST: ✓
CHAIN OF CUSTODY: SAMPLE CUSTODIAN SP
SAMPLER SP
SAMPLE CUSTODIAN SP

| Imp. # | Contents | Post-Test | Pre-Test | Difference |
|---|---|---|---|---|
| 1 | 100 ml 6N NaOH | 887.7 | 779.6 | 108.1 |
| 2 | " | 818.5 | 780.4 | 38.1 |
| 3 | " | 806.8 | 788.1 | 18.7 |
| 4 | Silica Gel | 938.4 | 926.6 | 11.8 |
| Total: | | | | 176.7 |

| Point | Time | Meter Volume, ft³ | ΔP in. H₂O | ΔH in. H₂O | Stack Temp, °F | Probe Temp, °F | Filter Temp, °F | Imp. Out Temp, °F | Meter Temp, °F In | Meter Temp, °F Out | Vacuum in. Hg. | O₂ % | Pstatic in. H₂O |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 6 | 1246 | 157.300 | 1.4 | .98 | 474 | 250 | 255 | 55 | 74 | 73 | 4.0 | 3% | -1.3 |
| 5 | 1249 | 160.143 | 1.5 | 1.05 | 475 | 250 | 256 | 55 | 73 | 72 | 4.0 | | |
| 4 | 1252 | 161.672 | 1.5 | 1.05 | 475 | 251 | 256 | 55 | 73 | 71 | 4.0 | | |
| 3 | 1255 | 163.201 | 1.1 | .77 | 476 | 252 | 254 | 56 | 74 | 72 | 4.0 | | |
| 2 | 1258 | 164.239 | 1.1 | .77 | 475 | 253 | 255 | 56 | 74 | 71 | 4.0 | | |
| 1 | 1301 | 165.768 | 1.1 | .77 | 476 | 254 | 260 | 56 | 74 | 72 | 4.0 | | |
| 0 | 1303 | 166.788 | | | | | | | | | | | |
| 6 | 1305 | 166.788 | 1.4 | .98 | 476 | 256 | 250 | 57 | 74 | 71 | 4.0 | | |
| 5 | 1308 | 168.487 | 1.3 | .91 | 475 | 254 | 252 | 57 | 74 | 72 | 4.0 | | |
| 4 | 1311 | 170.109 | 1.3 | .91 | 474 | 254 | 254 | 57 | 74 | 73 | 4.0 | | |
| 3 | 1314 | 171.732 | 1.2 | .84 | 476 | 252 | 250 | 59 | 72 | 72 | 4.0 | | |
| 2 | 1317 | 173.292 | 1.1 | .77 | 475 | 252 | 250 | 59 | 73 | 72 | 4.0 | | |
| 1 | 1320 | 174.802 | 1.0 | .70 | 476 | 251 | 252 | 59 | 72 | 71 | 4.0 | | |
| 0 | 1323 | 176.299 | ~~.70~~ | | | | | | | | | | |
| Average: | | | | | | | | | | | | | |

Comments: #1-2 11.5 pH added 70 ml 6N NaOH #3 12.5 pH

C.8-15

Delta Air Quality Services, Incorporated

# WET CHEMICAL SAMPLING SYSTEM DATA AND WORKSHEET

CLIENT: Exxon Mobil
LOCATION: FCC / 2F-7 Stack
DATE: 6/29/11
RUN NO: 3-HCl
OPERATOR: DA
METER BOX NO: 12WCS
METER ΔH@: .585
METER Yd: 1.005
STACK AREA, FT²:
TRAVERSE POINTS, MIN/POINT: 3/24
ΔH= 0.7 X ΔP:
Probe Condition, pre/post test:
Silica Gel Expended, Y/N:
Filter Condition after Test:
Check Weight:

AMBIENT TEMPERATURE:
BAROMETRIC PRESSURE: 29.85
ASSUMED MOISTURE:
PITOT TUBE COEFF, Cp:
PROBE ID NO/MATERIAL:
PROBE LENGTH:
NOZZLE ID NO/ MATERIAL:
NOZZLE DIAMETER:
FILTER NO/TYPE:
PRE-TEST LEAK RATE: : CFM@ in. Hg.
POST-TEST LEAK RATE: : CFM@ in. Hg.
PITOT LEAK CHECK - PRE: POST:
CHAIN OF CUSTODY: SAMPLE CUSTODIAN
SAMPLER
SAMPLE CUSTODIAN

| Imp. # | Contents | Post-Test - Pre-Test = Difference | |
|---|---|---|---|
| | | | |
| Gel | 1 | | |
| | | | |
| | | | |
| | | | |
| Total: | | | |

| Point | Time | Meter Volume, ft³ | ΔP in. $H_2O$ | ΔH in. $H_2O$ | Stack Temp, °F | Probe Temp, °F | Filter Temp, °F | Imp. Out Temp, °F | Meter Temp, °F In | Meter Temp, °F Out | Vacuum in. Hg. | $O_2$ % | Pstatic in. $H_2O$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 6 | 1328 | 176.299 | 1.5 | 1.05 | 476 | 252 | 253 | 59 | 75 | 72 | 4.0 | 3% | -1.3 |
| 5 | 1331 | 178.075 | 1.6 | 1.12 | 475 | 251 | 252 | 59 | 74 | 71 | 4.0 | | |
| 4 | 1334 | 179.869 | 1.9 | 1.33 | 477 | 251 | 250 | 59 | 73 | 70 | 4.0 | | |
| 3 | 1337 | 181.758 | 2.0 | 1.4 | 478 | 258 | 252 | 59 | 72 | 71 | 4.0 | | |
| 2 | 1340 | 183.671 | 2.0 | 1.4 | 473 | 255 | 256 | 57 | 71 | 70 | 4.0 | | |
| 1 | 1343 | 185.616 | 2.0 | 1.4 | 472 | 256 | 255 | 57 | 71 | 71 | 4.0 | | |
| 0 | 1346 | 187.524 | | | | | | | | | | | |
| 6 | 1349 | 187.564 | 1.3 | .91 | 473 | 249 | 250 | 59 | 73 | 72 | 4.0 | | |
| 5 | 1352 | 189.202 | 1.5 | 1.05 | 476 | 250 | 250 | 59 | 72 | 71 | 4.0 | | |
| 4 | 1355 | 190.923 | 1.5 | 1.05 | 476 | 250 | 255 | 59 | 73 | 72 | 4.0 | | |
| 3 | 1358 | 192.649 | 1.6 | 1.12 | 477 | 251 | 250 | 59 | 72 | 71 | 4.0 | | |
| 2 | 1401 | 194.389 | 1.5 | 1.05 | 476 | 250 | 256 | 59 | 71 | 71 | 4.0 | | |
| 1 | 1404 | 196.089 | 1.5 | 1.05 | 477 | 250 | 255 | 58 | 71 | 71 | 4.0 | | |
| 0 | 1408 | 197.798 | | | | | | | | | | | |
| Average: | | | | | | | | | | | | | |

Comments:

C-8-10


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**ExxonMobil**
**STACK $O_2$, $CO_2$ DATA**

**Test #:** **1-HCN**
**Date:** **6/28/2011**
**Time:** **1306/1426**

| | $O_2$ | $CO_2$ |
|---|---|---|
| Range | 10 | 20 |
| Cal Gas | 5.00 | 10.16 |
| Analyzer Zero | 0.05 | 0.02 |
| Analyzer Span | 4.98 | 9.74 |
| Pre-Bias Zero | 0.04 | 0.01 |
| Pre-Bias Span | 5.00 | 10.01 |
| Post-Bias Zero | 0.08 | 0.05 |
| Post-Bias Span | 4.89 | 9.87 |
| Pre-test zero bias | -0.1% | 0.0% |
| Pre-test span bias | 0.1% | 1.3% |
| Post-test zero bias | 0.3% | 0.2% |
| Post-test span bias | -0.9% | 0.6% |
| Zero Drift | 0.4% | 0.2% |
| Span Drift | -1.0% | -0.7% |
| | PASS | PASS |
| **Average** | **4.97** | **13.75** |
| **Cal Corrected** | **5.03** | **14.07** |

**ExxonMobil**
**1-HCN**

| Date | Time | O2 % | CO2 % |
|---|---|---|---|
| 6/28/2011 | 1:07:00 PM | 4.911 | 13.772 |
| 6/28/2011 | 1:08:00 PM | 4.887 | 13.805 |
| 6/28/2011 | 1:09:00 PM | 4.917 | 13.776 |
| 6/28/2011 | 1:10:00 PM | 4.933 | 13.77 |
| 6/28/2011 | 1:11:00 PM | 4.889 | 13.822 |
| 6/28/2011 | 1:12:00 PM | 4.908 | 13.792 |
| 6/28/2011 | 1:13:00 PM | 4.898 | 13.798 |
| 6/28/2011 | 1:14:00 PM | 4.893 | 13.813 |
| 6/28/2011 | 1:15:00 PM | 4.889 | 13.797 |
| 6/28/2011 | 1:16:00 PM | 4.896 | 13.809 |
| 6/28/2011 | 1:17:00 PM | 4.938 | 13.79 |
| 6/28/2011 | 1:18:00 PM | 4.936 | 13.812 |
| 6/28/2011 | 1:19:00 PM | 5 | 13.748 |
| 6/28/2011 | 1:20:00 PM | 5.019 | 13.717 |
| 6/28/2011 | 1:21:00 PM | 5.007 | 13.706 |
| 6/28/2011 | 1:22:00 PM | 5.019 | 13.724 |
| 6/28/2011 | 1:23:00 PM | 5.026 | 13.705 |
| 6/28/2011 | 1:24:00 PM | 5.077 | 13.661 |
| 6/28/2011 | 1:27:00 PM | 5.057 | 13.68 |
| 6/28/2011 | 1:28:00 PM | 5.035 | 13.693 |
| 6/28/2011 | 1:29:00 PM | 5.039 | 13.693 |
| 6/28/2011 | 1:30:00 PM | 5.043 | 13.682 |
| 6/28/2011 | 1:31:00 PM | 5.022 | 13.697 |
| 6/28/2011 | 1:32:00 PM | 4.955 | 13.758 |
| 6/28/2011 | 1:33:00 PM | 4.925 | 13.785 |
| 6/28/2011 | 1:34:00 PM | 4.975 | 13.755 |
| 6/28/2011 | 1:35:00 PM | 5.045 | 13.691 |
| 6/28/2011 | 1:36:00 PM | 5.047 | 13.692 |
| 6/28/2011 | 1:37:00 PM | 5.05 | 13.681 |
| 6/28/2011 | 1:38:00 PM | 5.072 | 13.666 |
| 6/28/2011 | 1:39:00 PM | 5.024 | 13.706 |
| 6/28/2011 | 1:40:00 PM | 5.019 | 13.709 |
| 6/28/2011 | 1:41:00 PM | 4.994 | 13.732 |
| 6/28/2011 | 1:42:00 PM | 4.986 | 13.753 |
| 6/28/2011 | 1:43:00 PM | 4.994 | 13.745 |
| 6/28/2011 | 1:44:00 PM | 5.006 | 13.73 |
| 6/28/2011 | 1:48:00 PM | 4.955 | 13.771 |
| 6/28/2011 | 1:49:00 PM | 4.96 | 13.784 |
| 6/28/2011 | 1:50:00 PM | 4.976 | 13.755 |
| 6/28/2011 | 1:51:00 PM | 4.977 | 13.749 |
| 6/28/2011 | 1:52:00 PM | 5.007 | 13.713 |
| 6/28/2011 | 1:53:00 PM | 4.97 | 13.748 |
| 6/28/2011 | 1:54:00 PM | 5 | 13.706 |
| 6/28/2011 | 1:55:00 PM | 5.001 | 13.717 |
| 6/28/2011 | 1:56:00 PM | 5.01 | 13.715 |
| 6/28/2011 | 1:57:00 PM | 4.974 | 13.752 |
| 6/28/2011 | 1:58:00 PM | 4.963 | 13.77 |

| | | | |
|---|---|---|---|
| 6/28/2011 | 1:59:00 PM | 4.963 | 13.772 |
| 6/28/2011 | 2:00:00 PM | 4.912 | 13.835 |
| 6/28/2011 | 2:01:00 PM | 4.96 | 13.764 |
| 6/28/2011 | 2:02:00 PM | 5 | 13.733 |
| 6/28/2011 | 2:03:00 PM | 5.078 | 13.675 |
| 6/28/2011 | 2:04:00 PM | 5.048 | 13.693 |
| 6/28/2011 | 2:05:00 PM | 5.056 | 13.673 |
| 6/28/2011 | 2:09:00 PM | 5.037 | 13.687 |
| 6/28/2011 | 2:10:00 PM | 4.996 | 13.722 |
| 6/28/2011 | 2:11:00 PM | 4.974 | 13.766 |
| 6/28/2011 | 2:12:00 PM | 4.979 | 13.74 |
| 6/28/2011 | 2:13:00 PM | 4.965 | 13.752 |
| 6/28/2011 | 2:14:00 PM | 4.896 | 13.839 |
| 6/28/2011 | 2:15:00 PM | 4.908 | 13.815 |
| 6/28/2011 | 2:16:00 PM | 4.937 | 13.795 |
| 6/28/2011 | 2:17:00 PM | 4.939 | 13.783 |
| 6/28/2011 | 2:18:00 PM | 4.93 | 13.792 |
| 6/28/2011 | 2:19:00 PM | 4.996 | 13.745 |
| 6/28/2011 | 2:20:00 PM | 4.973 | 13.755 |
| 6/28/2011 | 2:21:00 PM | 4.877 | 13.845 |
| 6/28/2011 | 2:22:00 PM | 4.891 | 13.84 |
| 6/28/2011 | 2:23:00 PM | 4.928 | 13.796 |
| 6/28/2011 | 2:24:00 PM | 4.923 | 13.802 |
| 6/28/2011 | 2:25:00 PM | 4.921 | 13.801 |
| 6/28/2011 | 2:26:00 PM | 4.958 | 13.759 |
| | Average | 4.97 | 13.75 |

**ExxonMobil**
**STACK $O_2$, $CO_2$ DATA**

**Test #:** **2-HCN**
**Date:** **6/29/2011**
**Time:** **757/1005**

| | $O_2$ | $CO_2$ |
|---|---|---|
| Range | 10 | 20 |
| Cal Gas | 5.00 | 10.16 |
| Analyzer Zero | 0.05 | 0.02 |
| Analyzer Span | 4.98 | 9.74 |
| Pre-Bias Zero | 0.06 | 0.02 |
| Pre-Bias Span | 5.02 | 9.87 |
| Post-Bias Zero | 0.06 | 0.03 |
| Post-Bias Span | 5.05 | 9.94 |
| Pre-test zero bias | 0.1% | 0.0% |
| Pre-test span bias | 0.3% | 0.6% |
| Post-test zero bias | 0.1% | 0.1% |
| Post-test span bias | 0.7% | 1.0% |
| Zero Drift | 0.0% | 0.1% |
| Span Drift | 0.4% | 0.3% |
| | PASS | PASS |
| **Average** | **5.38** | **13.32** |
| **Cal Corrected** | **5.34** | **13.67** |

**ExxonMobil**
**2-HCN**

| Date | Time | O2 % | CO2 % |
|---|---|---|---|
| 6/29/2011 | 7:58:00 AM | 5.808 | 14.146 |
| 6/29/2011 | 7:59:00 AM | 5.9 | 14.227 |
| 6/29/2011 | 8:00:00 AM | 5.473 | 13.187 |
| 6/29/2011 | 8:01:00 AM | 5.46 | 13.186 |
| 6/29/2011 | 8:02:00 AM | 5.442 | 13.242 |
| 6/29/2011 | 8:03:00 AM | 5.495 | 13.212 |
| 6/29/2011 | 8:04:00 AM | 5.508 | 13.161 |
| 6/29/2011 | 8:05:00 AM | 5.491 | 13.232 |
| 6/29/2011 | 8:06:00 AM | 5.473 | 13.249 |
| 6/29/2011 | 8:07:00 AM | 5.437 | 13.289 |
| 6/29/2011 | 8:08:00 AM | 5.441 | 13.279 |
| 6/29/2011 | 8:09:00 AM | 5.376 | 13.362 |
| 6/29/2011 | 8:10:00 AM | 5.381 | 13.369 |
| 6/29/2011 | 8:11:00 AM | 5.453 | 13.318 |
| 6/29/2011 | 8:12:00 AM | 5.482 | 13.173 |
| 6/29/2011 | 8:13:00 AM | 5.46 | 13.192 |
| 6/29/2011 | 8:14:00 AM | 5.494 | 13.168 |
| 6/29/2011 | 8:15:00 AM | 5.486 | 13.165 |
| 6/29/2011 | 8:16:00 AM | 5.463 | 13.177 |
| 6/29/2011 | 8:17:00 AM | 5.418 | 13.197 |
| 6/29/2011 | 8:18:00 AM | 5.391 | 13.231 |
| 6/29/2011 | 8:19:00 AM | 5.429 | 13.209 |
| 6/29/2011 | 8:20:00 AM | 5.403 | 13.22 |
| 6/29/2011 | 8:21:00 AM | 5.408 | 13.232 |
| 6/29/2011 | 8:22:00 AM | 5.402 | 13.216 |
| 6/29/2011 | 8:23:00 AM | 5.341 | 13.27 |
| 6/29/2011 | 8:24:00 AM | 5.336 | 13.285 |
| 6/29/2011 | 8:25:00 AM | 5.339 | 13.265 |
| 6/29/2011 | 8:26:00 AM | 5.364 | 13.262 |
| 6/29/2011 | 8:27:00 AM | 5.393 | 13.236 |
| 6/29/2011 | 8:31:00 AM | 5.324 | 13.29 |
| 6/29/2011 | 8:32:00 AM | 5.304 | 13.301 |
| 6/29/2011 | 8:33:00 AM | 5.274 | 13.343 |
| 6/29/2011 | 8:34:00 AM | 5.337 | 13.28 |
| 6/29/2011 | 8:35:00 AM | 5.331 | 13.291 |
| 6/29/2011 | 8:36:00 AM | 5.388 | 13.271 |
| 6/29/2011 | 8:37:00 AM | 5.403 | 13.262 |
| 6/29/2011 | 8:38:00 AM | 5.392 | 13.27 |
| 6/29/2011 | 8:39:00 AM | 5.39 | 13.279 |
| 6/29/2011 | 8:40:00 AM | 5.389 | 13.272 |
| 6/29/2011 | 8:41:00 AM | 5.442 | 13.212 |
| 6/29/2011 | 8:42:00 AM | 5.384 | 13.281 |
| 6/29/2011 | 8:43:00 AM | 5.387 | 13.285 |
| 6/29/2011 | 8:44:00 AM | 5.436 | 13.247 |
| 6/29/2011 | 8:45:00 AM | 5.436 | 13.252 |
| 6/29/2011 | 8:46:00 AM | 5.41 | 13.253 |
| 6/29/2011 | 8:47:00 AM | 5.465 | 13.198 |

| | | | |
|---|---|---|---|
| 6/29/2011 | 8:48:00 AM | 5.456 | 13.21 |
| 6/29/2011 | 8:49:00 AM | 5.442 | 13.211 |
| 6/29/2011 | 8:50:00 AM | 5.409 | 13.235 |
| 6/29/2011 | 8:51:00 AM | 5.346 | 13.311 |
| 6/29/2011 | 8:52:00 AM | 5.315 | 13.317 |
| 6/29/2011 | 8:53:00 AM | 5.259 | 13.382 |
| 6/29/2011 | 8:54:00 AM | 5.306 | 13.344 |
| 6/29/2011 | 8:55:00 AM | 5.331 | 13.332 |
| 6/29/2011 | 8:56:00 AM | 5.349 | 13.299 |
| 6/29/2011 | 8:57:00 AM | 5.367 | 13.277 |
| 6/29/2011 | 8:58:00 AM | 5.372 | 13.291 |
| 6/29/2011 | 8:59:00 AM | 5.411 | 13.245 |
| 6/29/2011 | 9:00:00 AM | 5.374 | 13.265 |
| 6/29/2011 | 9:04:00 AM | 5.329 | 13.3 |
| 6/29/2011 | 9:05:00 AM | 5.313 | 13.32 |
| 6/29/2011 | 9:06:00 AM | 5.321 | 13.323 |
| 6/29/2011 | 9:07:00 AM | 5.327 | 13.313 |
| 6/29/2011 | 9:08:00 AM | 5.358 | 13.293 |
| 6/29/2011 | 9:09:00 AM | 5.424 | 13.245 |
| 6/29/2011 | 9:10:00 AM | 5.402 | 13.25 |
| 6/29/2011 | 9:11:00 AM | 5.384 | 13.277 |
| 6/29/2011 | 9:12:00 AM | 5.361 | 13.285 |
| 6/29/2011 | 9:13:00 AM | 5.281 | 13.38 |
| 6/29/2011 | 9:14:00 AM | 5.292 | 13.354 |
| 6/29/2011 | 9:15:00 AM | 5.309 | 13.353 |
| 6/29/2011 | 9:16:00 AM | 5.346 | 13.319 |
| 6/29/2011 | 9:17:00 AM | 5.336 | 13.322 |
| 6/29/2011 | 9:18:00 AM | 5.321 | 13.339 |
| 6/29/2011 | 9:19:00 AM | 5.351 | 13.319 |
| 6/29/2011 | 9:20:00 AM | 5.365 | 13.29 |
| 6/29/2011 | 9:21:00 AM | 5.335 | 13.316 |
| 6/29/2011 | 9:22:00 AM | 5.38 | 13.276 |
| 6/29/2011 | 9:23:00 AM | 5.351 | 13.302 |
| 6/29/2011 | 9:24:00 AM | 5.349 | 13.299 |
| 6/29/2011 | 9:25:00 AM | 5.371 | 13.28 |
| 6/29/2011 | 9:26:00 AM | 5.374 | 13.288 |
| 6/29/2011 | 9:27:00 AM | 5.331 | 13.313 |
| 6/29/2011 | 9:28:00 AM | 5.315 | 13.337 |
| 6/29/2011 | 9:29:00 AM | 5.303 | 13.342 |
| 6/29/2011 | 9:30:00 AM | 5.345 | 13.306 |
| 6/29/2011 | 9:31:00 AM | 5.326 | 13.306 |
| 6/29/2011 | 9:32:00 AM | 5.32 | 13.327 |
| 6/29/2011 | 9:33:00 AM | 5.288 | 13.359 |
| 6/29/2011 | 9:36:00 AM | 5.323 | 13.334 |
| 6/29/2011 | 9:37:00 AM | 5.319 | 13.344 |
| 6/29/2011 | 9:38:00 AM | 5.33 | 13.325 |
| 6/29/2011 | 9:39:00 AM | 5.309 | 13.354 |
| 6/29/2011 | 9:40:00 AM | 5.313 | 13.343 |
| 6/29/2011 | 9:41:00 AM | 5.313 | 13.36 |
| 6/29/2011 | 9:42:00 AM | 5.287 | 13.373 |
| 6/29/2011 | 9:43:00 AM | 5.244 | 13.418 |
| 6/29/2011 | 9:44:00 AM | 5.217 | 13.467 |

| | | | |
|---|---|---|---|
| 6/29/2011 | 9:45:00 AM | 5.29 | 13.4 |
| 6/29/2011 | 9:46:00 AM | 5.295 | 13.447 |
| 6/29/2011 | 9:47:00 AM | 5.318 | 13.453 |
| 6/29/2011 | 9:48:00 AM | 5.358 | 13.43 |
| 6/29/2011 | 9:49:00 AM | 5.358 | 13.459 |
| 6/29/2011 | 9:50:00 AM | 5.331 | 13.498 |
| 6/29/2011 | 9:51:00 AM | 5.477 | 13.761 |
| 6/29/2011 | 9:52:00 AM | 5.447 | 13.731 |
| 6/29/2011 | 9:53:00 AM | 5.289 | 13.4 |
| 6/29/2011 | 9:54:00 AM | 5.317 | 13.361 |
| 6/29/2011 | 9:55:00 AM | 5.302 | 13.398 |
| 6/29/2011 | 9:56:00 AM | 5.314 | 13.406 |
| 6/29/2011 | 9:57:00 AM | 5.324 | 13.369 |
| 6/29/2011 | 9:58:00 AM | 5.338 | 13.364 |
| 6/29/2011 | 9:59:00 AM | 5.336 | 13.354 |
| 6/29/2011 | 10:00:00 AM | 5.295 | 13.038 |
| | Average | 5.38 | 13.32 |

**ExxonMobil**
**STACK $O_2$, $CO_2$ DATA**

**Test #:** **3-HCN**
**Date:** **6/29/2011**
**Time:** **1246/1407**

| | $O_2$ | $CO_2$ |
|---|---|---|
| Range | 10 | 20 |
| Cal Gas | 5.00 | 10.16 |
| Analyzer Zero | 0.05 | 0.02 |
| Analyzer Span | 4.98 | 9.74 |
| Pre-Bias Zero | 0.06 | 0.02 |
| Pre-Bias Span | 4.98 | 9.82 |
| Post-Bias Zero | 0.06 | 0.02 |
| Post-Bias Span | 4.98 | 9.84 |
| Pre-test zero bias | 0.1% | 0.0% |
| Pre-test span bias | 0.0% | 0.4% |
| Post-test zero bias | 0.1% | 0.0% |
| Post-test span bias | 0.0% | 0.5% |
| Zero Drift | 0.0% | 0.0% |
| Span Drift | 0.0% | 0.1% |
| | PASS | PASS |
| **Average** | **5.23** | **13.44** |
| **Cal Corrected** | **5.26** | **13.91** |

**ExxonMobil**
**3-HCN**

| Date | Time | O2 % | CO2 % |
|---|---|---|---|
| 6/29/2011 | 12:47:00 PM | 5.208 | 13.439 |
| 6/29/2011 | 12:48:00 PM | 5.201 | 13.463 |
| 6/29/2011 | 12:49:00 PM | 5.202 | 13.468 |
| 6/29/2011 | 12:50:00 PM | 5.26 | 13.411 |
| 6/29/2011 | 12:51:00 PM | 5.266 | 13.413 |
| 6/29/2011 | 12:52:00 PM | 5.3 | 13.371 |
| 6/29/2011 | 12:53:00 PM | 5.291 | 13.368 |
| 6/29/2011 | 12:54:00 PM | 5.232 | 13.434 |
| 6/29/2011 | 12:55:00 PM | 5.234 | 13.429 |
| 6/29/2011 | 12:56:00 PM | 5.211 | 13.472 |
| 6/29/2011 | 12:57:00 PM | 5.285 | 13.378 |
| 6/29/2011 | 12:58:00 PM | 5.259 | 13.407 |
| 6/29/2011 | 12:59:00 PM | 5.29 | 13.373 |
| 6/29/2011 | 1:00:00 PM | 5.218 | 13.433 |
| 6/29/2011 | 1:01:00 PM | 5.156 | 13.498 |
| 6/29/2011 | 1:02:00 PM | 5.19 | 13.475 |
| 6/29/2011 | 1:03:00 PM | 5.282 | 13.391 |
| 6/29/2011 | 1:04:00 PM | 5.262 | 13.401 |
| 6/29/2011 | 1:06:00 PM | 5.323 | 13.341 |
| 6/29/2011 | 1:07:00 PM | 5.337 | 13.315 |
| 6/29/2011 | 1:08:00 PM | 5.299 | 13.353 |
| 6/29/2011 | 1:09:00 PM | 5.258 | 13.38 |
| 6/29/2011 | 1:10:00 PM | 5.196 | 13.445 |
| 6/29/2011 | 1:11:00 PM | 5.202 | 13.451 |
| 6/29/2011 | 1:12:00 PM | 5.198 | 13.456 |
| 6/29/2011 | 1:13:00 PM | 5.201 | 13.461 |
| 6/29/2011 | 1:14:00 PM | 5.281 | 13.39 |
| 6/29/2011 | 1:15:00 PM | 5.2 | 13.468 |
| 6/29/2011 | 1:16:00 PM | 5.2 | 13.468 |
| 6/29/2011 | 1:17:00 PM | 5.231 | 13.447 |
| 6/29/2011 | 1:18:00 PM | 5.257 | 13.424 |
| 6/29/2011 | 1:19:00 PM | 5.318 | 13.36 |
| 6/29/2011 | 1:20:00 PM | 5.339 | 13.332 |
| 6/29/2011 | 1:21:00 PM | 5.338 | 13.331 |
| 6/29/2011 | 1:22:00 PM | 5.302 | 13.366 |
| 6/29/2011 | 1:23:00 PM | 5.237 | 13.415 |
| 6/29/2011 | 1:29:00 PM | 5.185 | 13.501 |
| 6/29/2011 | 1:30:00 PM | 5.222 | 13.436 |
| 6/29/2011 | 1:31:00 PM | 5.258 | 13.4 |
| 6/29/2011 | 1:32:00 PM | 5.23 | 13.437 |
| 6/29/2011 | 1:33:00 PM | 5.207 | 13.492 |
| 6/29/2011 | 1:34:00 PM | 5.179 | 13.522 |
| 6/29/2011 | 1:35:00 PM | 5.199 | 13.515 |
| 6/29/2011 | 1:36:00 PM | 5.269 | 13.439 |
| 6/29/2011 | 1:37:00 PM | 5.266 | 13.435 |
| 6/29/2011 | 1:38:00 PM | 5.24 | 13.468 |
| 6/29/2011 | 1:39:00 PM | 5.199 | 13.513 |

| | | | |
|---|---|---|---|
| 6/29/2011 | 1:40:00 PM | 5.276 | 13.437 |
| 6/29/2011 | 1:41:00 PM | 5.33 | 13.371 |
| 6/29/2011 | 1:42:00 PM | 5.259 | 13.441 |
| 6/29/2011 | 1:43:00 PM | 5.26 | 13.449 |
| 6/29/2011 | 1:44:00 PM | 5.238 | 13.444 |
| 6/29/2011 | 1:45:00 PM | 5.142 | 13.527 |
| 6/29/2011 | 1:46:00 PM | 5.15 | 13.532 |
| 6/29/2011 | 1:50:00 PM | 5.166 | 13.516 |
| 6/29/2011 | 1:51:00 PM | 5.164 | 13.517 |
| 6/29/2011 | 1:52:00 PM | 5.209 | 13.483 |
| 6/29/2011 | 1:53:00 PM | 5.144 | 13.557 |
| 6/29/2011 | 1:54:00 PM | 5.201 | 13.517 |
| 6/29/2011 | 1:55:00 PM | 5.214 | 13.491 |
| 6/29/2011 | 1:56:00 PM | 5.211 | 13.49 |
| 6/29/2011 | 1:57:00 PM | 5.167 | 13.535 |
| 6/29/2011 | 1:58:00 PM | 5.21 | 13.473 |
| 6/29/2011 | 1:59:00 PM | 5.251 | 13.43 |
| 6/29/2011 | 2:00:00 PM | 5.226 | 13.454 |
| 6/29/2011 | 2:01:00 PM | 5.228 | 13.443 |
| 6/29/2011 | 2:02:00 PM | 5.261 | 13.42 |
| 6/29/2011 | 2:03:00 PM | 5.217 | 13.448 |
| 6/29/2011 | 2:04:00 PM | 5.113 | 13.541 |
| 6/29/2011 | 2:05:00 PM | 5.154 | 13.526 |
| 6/29/2011 | 2:06:00 PM | 5.172 | 13.497 |
| 6/29/2011 | 2:07:00 PM | 5.224 | 13.459 |
| | Average | 5.23 | 13.44 |

# DAT Reports®

Data Analysis Technologies, Inc.
7715 Corporate Blvd.
Plain City, OH 43064
800-733-8644

## Sample Analysis Certificate

| | | | |
|---|---|---|---|
| Client: | Atmoshperic Analysis & Consulting, Inc. | Date: | 7/25/2011 |
| Address: | 1534 Eastman Avenue, Suite A<br>Ventura, CA 93003 | DAT Project ID: | 0711009 |
| | | Date Received: | 7/8/2011 |
| | | Date Analyzed: | 7/22/2011 |

Attn: Marcus Hueppe
Client Project: 1F-7 # 110573
Analysis: OTM29

The following samples were received on 7/8/2011:

| DAT Sample ID | Client Sample ID | Date Sampled | Matrix |
|---|---|---|---|
| 0711009-01 | 51388 | 6/28/2011 | Liquid |
| 0711009-02 | 51389 | 6/28/2011 | Liquid |
| 0711009-03 | 51390 | 6/28/2011 | Liquid |
| 0711009-04 | 51391 | 6/28/2011 | Liquid |
| 0711009-05 | 51392 | 6/28/2011 | Liquid |
| 0711009-06 | 51393 | 6/28/2011 | Liquid |
| 0711009-07 | 51394 | 6/28/2011 | Liquid |
| 0711009-08 | 51395 | 6/28/2011 | Liquid |
| 0711009-09 | 51396 | 6/28/2011 | Liquid |
| 0711009-10 | 51397 | 6/28/2011 | Liquid |
| 0711009-11 | 51398 | 6/30/2011 | Liquid |
| 0711009-12 | 51399 | 6/30/2011 | Liquid |

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**Results:** See attached summary.

**QC:** Met the criteria for the method. See attached summary.

Reviewed and approved for release by: _____ Date: 7/25/11

Ronald K. Mitchum, Ph.D.
President, DAT

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Data Analysis Technologies, Inc.
7715 Corporate Blvd.
Plain City, OH 43064

## Data Summary Table

| | |
|---|---|
| Client: | Atmospheric Analysis & Consulting, Inc. |
| Client Project: | 2F-7 #110573 |
| Analysis: | Cyanide by OTM-29 |
| DAT Project: | 0711009 |
| Extraction Date: | 6/28/11 |
| Analysis Date: | 7/22/11 |

| Client ID | DAT ID | | *MDL* *ug* | Total Cyanide Conc., ug | Q |
|---|---|---|---|---|---|
| 51394 NaOH-Blank | 0711009- | 7 | *0.550* | ND | |
| 51388 1-CN -#1 and #2 | 0711009- | 1 | *243.000* | 15406 | D |
| 51389 1-CN-#3 | 0711009- | 2 | *119.000* | 3451 | D |
| 51390 2-CN -#1 and #2 | 0711009- | 3 | *335.000* | 9648 | D |
| 51391 2-CN-#3 | 0711009- | 4 | *118.000* | 3918 | D |
| 51392 3-CN -#1 and #2 | 0711009- | 5 | *279.500* | 14031 | D |
| 51393 3-CN-#3 | 0711009- | 6 | *110.500* | 5039 | D |
| 51395 FS-CN -1 | 0711009- | 8 | *0.600* | 98 | |
| 51396 FB-CN-#1 and #2 | 0711009- | 9 | *1.350* | ND | |
| 51397 FB-CN-#3 | 0711009- | 10 | *0.600* | ND | |
| 51398 FS-CN -2 | 0711009- | 11 | *5.700* | 467 | D |
| 51399 FS-CN -3 | 0711009- | 12 | *30.500* | 915 | D |

D= Value from a dilution

Data Analysis Technologies, Inc.
7715 Corporate Blvd.
Plain City, OH 43064

# QC Summary Table

| | |
|---|---|
| **Client:** | Atmospheric Analysis & Consulting, Inc. |
| **Client Project:** | 2F-7 #110573 |
| **Analysis:** | Cyanide by OTM-29 |
| **DAT Project:** | 0711009 |
| **Extraction Date:** | 6/28/11 |
| **Analysis Date:** | 7/22/11 |
| **Spike Amt. Added, ug:** | 0.2 |

| Client ID: | DAT ID: | % Rec | % RPD | Q |
|---|---|---|---|---|
| Cal Check Standard | Concal 1 ug/mL () | 100 | | |
| Instr Blank | ACN Blank () | | | |
| Sample | 0711009-6 | | | |
| Sample Duplicate | 0711009-6 Dup | | 4 | |
| Cal Check Standard | Concal 1 ug/mL () | 106 | | |
| Instr Blank | ACN Blank () | | | |
| Matrix Spike | 0711009-3 MS | 106 | | |
| Matrix Spike Duplicate | 0711009-3 MSD | 102 | 2 | |
| Field Spike 1 | 0711009-8 | 98 | | |
| Field Spike 2 | 0711009-11 | 93 | | |
| Field Spike 3 | 0711009-12 | 92 | | |
| Lab Spike | LS | 104 | | |
| Cal Check Standard | Concal 1 ug/mL () | 106 | | |
| Instr Blank | ACN Blank () | | | |

ND = Not detected at the reporting limit shown.

# DOCUMENTATION

ATMOSPHERIC ANALYSIS & CONSULTING, INC.
1534 Eastman Avenue, Suite A
Ventura, California 93003
Phone (805) 650-1642 Fax (805) 650-1644
E-mail: info@aaclab.com

AAC Project No. 110573 Page 1 1

# CHAIN OF CUSTODY / ANALYSIS REQUEST FORM

Client Name: AAC, Inc.
Project Name: 2F-7
Project Mgr (Print Name): Marcus Hueppe
Project Number: 110573
Sampler's Name (Print Name):
Sampler's Signature:

Analysis Requested: EPA OTM29

Send Report:
Attn: Marcus Hueppe
Phone #: 805-650-1642
Fax #: 805-650-1644

Send Invoice to:
Attn: Marcus Hueppe
P.O. #

Turn Around Time
24-Hr ____ 48-Hr ____
5 day ____ Normal X
Other (Specify)

Special Intructions / remarks:
HCN Analysis by OTM 29

| AAC Sample No. | Date Sampled | Time Sampled | Sample Type | Client Sample ID/Description | Type/No. of containers | EPA OTM29 |
|---|---|---|---|---|---|---|
| 51388 | 6/28/2011 | | Liquid | 1 - CN - #1 and #2 | 1 | x |
| 51389 | 6/28/2011 | | Liquid | 1 - CN - #3 | 1 | x |
| 51390 | 6/28/2011 | | Liquid | 2 - CN - #1 and #2 | 1 | x |
| 51391 | 6/28/2011 | | Liquid | 2 - CN - #3 | 1 | x |
| 51392 | 6/28/2011 | | Liquid | 3 - CN - #1 and #2 | 1 | x |
| 51393 | 6/28/2011 | | Liquid | 3 - CN - #3 | 1 | x |
| 51394 | 6/28/2011 | | Liquid | NaOH - Blank | 1 | x |
| 91395 | 6/28/2011 | | Liquid | FS - CN - 1 | 1 | x |
| 91396 | 6/28/2011 | | Liquid | FB - CN # 1 and #2 | 1 | x |
| 91397 | 6/28/2011 | | Liquid | FB - CN #3 | 1 | x |
| 91398 | 6/30/2011 | | Liquid | FS - CN - 2 | 1 | x |
| 51399 | 6/30/2011 | | Liquid | FS - CN - 3 | 1 | x |

| Relinquished by (Signature) | Print name: | Date/Time | Received by (Signature) | Print Name |
|---|---|---|---|---|
| [signature] | Wesley Horn | 7/7/2011 1420 | | |
| Relinquished by (Signature) | Print name: | Date/Time | Received by (Signature) | Print Name |
| | | | Linda [signature] | 7-8-11 1500 |

0711009

# DAT SAMPLE RECEIVING

7715 Corporate Blvd. Plain City,OH 43064.

**Project Number:** 0711009

| | | | |
|---|---|---|---|
| **Date Received:** | 7/8/2011 | **Carrier:** | Fed-X overnight |
| **Client Name:** | Atomospheric Analysis & | **Analysis:** | OTM29 |
| **Tracking number:** | 794950476707 | **Package Temp:** | 10.6 (Ice-Cooler) |
| **Custody Seals ?:** | No | **COC:** ☑ | check if COC from client |

**Sample Information**

| Client ID: | Laboratory ID | Date | Matrix: | Container: | Comment: |
|---|---|---|---|---|---|
| 51388 | 0711009-01 | 6/28/2011 | Liquid | 500ml Brown Nalgene Bottle | |
| 51389 | 0711009-02 | 6/28/2011 | Liquid | 500ml Brown Nalgene Bottle | |
| 51390 | 0711009-03 | 6/28/2011 | Liquid | 1liter Brown Nalgene Bottle | |
| 51391 | 0711009-04 | 6/28/2011 | Liquid | 500ml Brown Nalgene Bottle | |
| 51392 | 0711009-05 | 6/28/2011 | Liquid | 1liter Brown Nalgene Bottle | |
| 51393 | 0711009-06 | 6/28/2011 | Liquid | 500ml Brown Nalgene Bottle | |
| 51394 | 0711009-07 | 6/28/2011 | Liquid | 500ml Brown Nalgene Bottle | |

lq

*Laboratory Receiving Initials*

0711009

7/8/2011 4:29:36 PM

# DAT SAMPLE RECEIVING

7715 Corporate Blvd. Plain City,OH 43064.

**Project Number:** 0711009

| Client ID: | Laboratory ID | Date | Matrix: | Container: | Comment: |
|---|---|---|---|---|---|
| 51395 | 0711009-08 | 6/28/2011 | Liquid | 500ml Brown Nalgene Bottle | |
| 51396 | 0711009-09 | 6/28/2011 | Liquid | 500ml Brown Nalgene Bottle | |
| 51397 | 0711009-10 | 6/28/2011 | Liquid | 500ml Brown Nalgene Bottle | |
| 51398 | 0711009-11 | 6/30/2011 | Liquid | 500ml Brown Nalgene Bottle | |
| 51399 | 0711009-12 | 6/30/2011 | Liquid | 500ml Brown Nalgene Bottle | |

Laboratory Receiving Initials

0711009

7/8/2011 4:29:36 PM

# DAT Labs Inc.
# Sample Receipt Report

Client/Number: Atmospheric Analysis & Consulting (10141)
Custodian Initial: LE Date: 7-8-11

The client has been contacted.
_____ Yes _____ No

Secondary Review: Initials: Date:

Upon receipt of samples, check if any of the following discrepancies have been noted.

| | Discrepancy Type | Specify applicable client ID or "all" |
|---|---|---|
| X | COC and samples do not match | |
| | No unique sample identifications | |
| | Samples received outside of the required temp criteria. **Receipt Temp:** 10.0 C | |
| | No preservation type was noted **Correction Factor:** +0.6 C | |
| | No date of collection stated **Corrected Temp:** 10.6 C | (Ice-Cooler) |
| X | No time of collection stated | |
| X | The sample collector was not named | |
| | Sample containers were not appropriate | |
| | Sample labels were destroyed or unreadable | |
| | Samples were received outside of holding time | |
| | There was not enough sample to perform the requested analysis. | |
| | Samples showed sign of damage or contamination. | |
| | Aqueous samples for volatile analysis: Headspace? Y N If Yes, list sample ID(s) in details: | |
| | | |

Details: _____

Sample pH for nonvolatile aqueous samples and presence or absence of headspace (Y or N) for VOA aqueous samples shall be recorded at time of sample log-in.
Under no circumstances shall VOA vials be opened at time of sample receipt.

*Other Discrepancies:*

| Sample ID | Discrepancy |
|---|---|
| 071009-08thru11 | COC states 91395 ex... thur 91398 Bottles are labeled 51395 ex... thur 51398 Used Bottle label |

**Container Return**
Yes / No
Price:
Size:
Return Spl wt:

☒ *Upon receipt, the samples met all of DAT's acceptance criteria.* *DAT Project #* 071009

Effective 05/03/11

DATFRM1049 Revision 4

From: (805) 650-1642
Wesley Horn
AAC
1534 EASTMAN AVENUE, SUITE A

VENTURA, CA 93003

Origin ID: OXRA

FedEx Express

Ship Date: 07JUL11
ActWgt: 10.0 LB
CAD: 1251647/INET3180

Delivery Address Bar Code

SHIP TO: (800) 733-8644
BILL SENDER

Ronald K. Mitchum
DAT Laboratory
7715 CORPORATE BLVD

PLAIN CITY, OH 43064

Ref #
Invoice #
PO #
Dept #

TRK# 7949 5047 6707
0201

FRI - 08 JUL A2
STANDARD OVERNIGHT

NK CMHA

43064
OH-US
LCK

**After printing this label:**
1. Use the 'Print' button on this page to print your label to your laser or inkjet printer.
2. Fold the printed page along the horizontal line.
3. Place label in shipping pouch and affix it to your shipment so that the barcode portion of the label can be read and scanned.

Warning: Use only the printed original label for shipping. Using a photocopy of this label for shipping purposes is fraudulent and could result in additional billing charges, along with the cancellation of your FedEx account number.

Use of this system constitutes your agreement to the service conditions in the current FedEx Service Guide, available on fedex.com.FedEx will not be responsible for any claim in excess of $100 per package, whether the result of loss, damage, delay, non-delivery,misdelivery,or misinformation, unless you declare a higher value, pay an additional charge, document your actual loss and file a timely claim.Limitations found in the current FedEx Service Guide apply. Your right to recover from FedEx for any loss, including intrinsic valueof the package, loss of sales, income interest, profit, attorney's fees, costs, and other forms of damage whether direct, incidental,consequential, or special is limited to the greater of $100 or the authorized declared value. Recovery cannot exceed actual documented loss.Maximum for items of extraordinary value is $500, e.g. jewelry, precious metals, negotiable instruments and other items listed in our ServiceGuide. Written claims must be filed within strict time limits, see current FedEx Service Guide.

## Mercury Results

| Test | 1-Hg | 2-Hg | 3-Hg | Average |
|---|---|---|---|---|
| **Stack Mercury Speciation** | | | | |
| Date | 6/30/2011 | 6/30/2011 | 7/1/2011 | |
| Sample Volume,dscf | 81.453 | 80.221 | 78.059 | 79.911 |
| Sample Volume,dscm | 2.307 | 2.272 | 2.211 | 2.263 |
| Stack Flow,dscfm | 245,360 | 238,540 | 233,319 | 239,073 |
| O2,% | 5.08 | 5.03 | 4.90 | 5.01 |
| Particulate Mercury | | | | |
| ug/dscm | ND< 0.009 | 0.009 | ND< 0.009 | < 0.009 |
| ug/dscf | ND< 2.46E-04 | 2.62E-04 | ND< 2.56E-04 | ND< 2.55E-04 |
| lb/hr | ND< 7.96E-06 | 8.25E-06 | ND< 7.90E-06 | < 8.04E-06 |
| % of Total Mercury | 0.7% | 1.0% | 1.2% | 0.9% |
| Oxidized Mercury | | | | |
| ug/dscm | ND< 0.321 | ND< 0.291 | ND< 0.299 | ND< 0.303 |
| ug/dscf | ND< 9.08E-03 | ND< 8.23E-03 | ND< 8.46E-03 | ND< 8.59E-03 |
| lb/hr | ND< 2.95E-04 | ND< 2.59E-04 | ND< 2.61E-04 | ND< 2.72E-04 |
| % of Total Mercury | 27.6% | 30.5% | 41.0% | 33.0% |
| Elemental Mercury | | | | |
| ug/dscm | < 0.832 | < 0.651 | ND< 0.421 | < 0.635 |
| ug/dscf | < 2.36E-02 | < 1.84E-02 | ND< 1.19E-02 | < 1.80E-02 |
| lb/hr | < 7.64E-04 | < 5.82E-04 | < 3.67E-04 | < 5.71E-04 |
| % of Total Mercury | 71.6% | 68.5% | 57.8% | 66.0% |
| Total Mercury | | | | |
| ug/dscm | < 1.162 | < 0.951 | ND< 0.728 | < 0.947 |
| ug/dscf | < 3.29E-02 | < 2.69E-02 | ND< 2.06E-02 | < 2.68E-02 |
| lb/hr | < 1.07E-03 | < 8.49E-04 | ND< 6.36E-04 | < 8.51E-04 |

CAS Number 7439-97-6

ND < Indicates all three runs are below the detection limit

< Indicates one or two of the three runs are below the detection limit

***Delta***
Mercury Test Summary Data

| | | | | | |
|---|---|---|---|---|---|
| Client/Location..... | ExxonMobil | | | Reference Temp (F): | 68 |
| | | | | Fuel..... | Refinery |
| Sample Location..... | FCC 2F-7 Stack | | | Data By..... | AA |
| Test No..... | 1-Hg | 2-Hg | 3-Hg | Average | |
| Date..... | June 30, 2011 | June 30, 2011 | July 1, 2011 | * | |
| Start/Stop Time..... | 1020/1318 | 1600/1849 | 1500/1844 | * | |
| Bar Press (in Hg)..... | 29.85 | 29.85 | 29.74 | * | |
| Test Method..... | OH Mercury | OH Mercury | OH Mercury | * | |
| Sample Time (Min)..... | 120 | 120 | 120 | * | |
| Sample Train..... | 17WCS | 17WCS | 17WCS | * | |
| Meter Cal Factor..... | 1.004 | 1.004 | 1.004 | * | |
| Pitot Factor ..... | 0.84 | 0.84 | 0.84 | * | |
| Nozzle Diam (in)..... | 0.222 | 0.222 | 0.222 | * | |
| Stack Area (sq ft)..... | 94.31 | 94.31 | 94.31 | | |
| Stack O2 (%)..... | 5.08 | 5.03 | 4.90 | 5.01 | |
| Stack CO2 (%)..... | 14.02 | 14.11 | 14.31 | 14.14 | |
| Stack Press (iwg)..... | -1.30 | -1.30 | -1.30 | -1.30 | |
| Stack Temp (F)..... | 475.2 | 478.1 | 473.1 | 475.5 | |
| Vel Head (iwg)..... | 1.43 | 1.36 | 1.30 | 1.36 | |
| Meter Temp (F)..... | 78 | 73 | 76 | 76 | |
| Meter Press (iwg)..... | 1.44 | 1.36 | 1.30 | 1.37 | |
| Meter Vol (acf)..... | 82.509 | 80.608 | 79.183 | 80.77 | |
| Liquid Vol (ml)..... | 281.8 | 273.1 | 268.4 | 274.4 | |
| Std Sample Vol (SCF)..... | 81.453 | 80.221 | 78.059 | 79.91 | |
| Std Sample Vol (SCM)..... | 2.306 | 2.272 | 2.210 | 2.263 | |
| Moisture Fraction..... | 0.140 | 0.138 | 0.140 | 0.139 | |
| Stack Gas Mol Wt..... | 28.70 | 28.73 | 28.74 | 28.72 | |
| Stack Gas Velocity (ft/sec)..... | 89.85 | 87.43 | 85.50 | 87.59 | |
| Isokinetic Ratio (%)..... | 97.0 | 98.3 | 97.8 | 97.7 | |
| Stack Flow Rate (wacfm)..... | 508,456 | 494,752 | 483,822 | 495,676 | |
| Stack Flow Rate (wscfm)..... | 285,426 | 276,870 | 271,186 | 277,827 | |
| Stack Flow Rate (dscfm)..... | 245,360 | 238,540 | 233,319 | 239,073 | |
| Stack Flow Rate (mdscf/h)..... | 147.22 | 143.12 | 139.99 | 143.44 | |

| Mercury Test Sample Data | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Client/Location: | | ExxonMobil | | | | | | Sample Location: | | | 2F-7 Stack |
| Unit: | | FCC | | | | | | Data By: | | | AA |
| Test No: | 1-Hg | ISO | Assumed Moisture | | Sample Factor | | Delta H = | 0.99 | x Delta P | | |
| Date: | 6/30/2011 | 97.0 | 14 | | | Time per Point = | | 5 | Static Pressure = | | -1.30 |
| Port | Point | Time | Meter Volume | Delta P | Factor | Delta H | Stack Temp. | Meter In | Meter Out | Probe | Vacuum |
| A | 6 | 10:20:00 | 12.800 | 1.30 | 0.99 | 1.29 | 474 | 85 | 82 | 260 | 4.5 |
| A | 5 | 10:25:00 | 16.148 | 1.30 | 0.99 | 1.29 | 474 | 85 | 82 | 259 | 4.5 |
| A | 4 | 10:30:00 | 19.518 | 1.40 | 0.99 | 1.39 | 476 | 84 | 82 | 252 | 4.5 |
| A | 3 | 10:35:00 | 22.999 | 1.40 | 0.99 | 1.39 | 476 | 83 | 81 | 250 | 4.5 |
| A | 2 | 10:40:00 | 26.443 | 1.10 | 0.99 | 1.09 | 475 | 82 | 81 | 250 | 4.5 |
| A | 1 | 10:45:00 | 29.525 | 1.00 | 0.99 | 0.99 | 472 | 82 | 80 | 250 | 4.5 |
| | Stop | 10:50:00 | 32.497 | | | | | | | | |
| B | 6 | 11:13:00 | 32.497 | 1.20 | 0.99 | 1.19 | 473 | 79 | 77 | 250 | 4.5 |
| B | 5 | 11:18:00 | 35.652 | 1.10 | 0.99 | 1.09 | 472 | 78 | 77 | 252 | 4.5 |
| B | 4 | 11:23:00 | 38.701 | 1.10 | 0.99 | 1.09 | 474 | 79 | 76 | 250 | 4.5 |
| B | 3 | 11:28:00 | 41.738 | 1.10 | 0.99 | 1.09 | 474 | 78 | 77 | 250 | 4.5 |
| B | 2 | 11:33:00 | 44.771 | 1.00 | 0.99 | 0.99 | 473 | 77 | 77 | 251 | 4.5 |
| B | 1 | 11:38:00 | 47.777 | 1.00 | 0.99 | 0.99 | 474 | 78 | 77 | 250 | 4.5 |
| | Stop | 11:43:00 | 50.719 | | | | | | | | |
| C | 6 | 12:15:00 | 50.719 | 1.50 | 0.99 | 1.49 | 473 | 76 | 75 | 250 | 4.5 |
| C | 5 | 12:20:00 | 54.202 | 1.60 | 0.99 | 1.58 | 478 | 75 | 74 | 249 | 4.5 |
| C | 4 | 12:25:00 | 57.782 | 1.70 | 0.99 | 1.68 | 478 | 75 | 75 | 250 | 4.5 |
| C | 3 | 12:30:00 | 61.517 | 1.60 | 0.99 | 1.58 | 477 | 76 | 75 | 252 | 4.5 |
| C | 2 | 12:35:00 | 65.149 | 1.40 | 0.99 | 1.39 | 478 | 76 | 75 | 250 | 4.5 |
| C | 1 | 12:40:00 | 68.603 | 1.20 | 0.99 | 1.19 | 473 | 75 | 73 | 250 | 4.5 |
| | Stop | 12:45:00 | 71.778 | | | | | | | | |
| D | 6 | 12:48:00 | 71.778 | 1.70 | 0.99 | 1.68 | 476 | 77 | 75 | 251 | 4.5 |
| D | 5 | 12:53:00 | 75.501 | 1.80 | 0.99 | 1.78 | 477 | 77 | 75 | 252 | 4.5 |
| D | 4 | 12:58:00 | 79.409 | 2.10 | 0.99 | 2.08 | 478 | 76 | 75 | 250 | 4.5 |
| D | 3 | 13:03:00 | 83.348 | 2.10 | 0.99 | 2.08 | 477 | 76 | 75 | 250 | 4.5 |
| D | 2 | 13:08:00 | 87.378 | 2.10 | 0.99 | 2.08 | 477 | 76 | 74 | 250 | 4.5 |
| D | 1 | 13:13:00 | 91.389 | 2.00 | 0.99 | 1.98 | 475 | 75 | 74 | 252 | 4.5 |
| | Stop | 13:18:00 | 95.309 | | | | | | | | |
| **Total/Average** | | **120** | **82.509** | **1.4339** | | **1.44** | **475** | **78** | **77** | **251** | **5** |

RUN 2

| Mercury Test Sample Data | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Client/Location: | | ExxonMobil | | | | | | Sample Location: | | | 2F-7 Stack |
| Unit: | | FCC | | | | | | Data By: | | | AA |
| Test No: | 2-Hg | ISO | Moisture | | Sample Factor | | Delta H = | 0.99 | x Delta P | | |
| Date: | 6/30/2011 | 98.3 | 14 | | | Time per Point = | | 5 | Static Pressure = | | -1.3 |
| Port | Point | Time | Meter Volume | Delta P | Factor | Delta H | Stack Temp. | Meter In | Meter Out | Probe | Vacuum |
| A | 6 | 16:00:00 | 138.300 | 1.20 | 0.99 | 1.19 | 478 | 78 | 76 | 237 | 5 |
| A | 5 | 16:05:00 | 141.300 | 1.40 | 0.99 | 1.39 | 479 | 80 | 77 | 243 | 5 |
| A | 4 | 16:10:00 | 144.900 | 1.50 | 0.99 | 1.49 | 479 | 81 | 77 | 250 | 5 |
| A | 3 | 16:15:00 | 148.300 | 1.60 | 0.99 | 1.58 | 479 | 79 | 76 | 250 | 6 |
| A | 2 | 16:20:00 | 152.100 | 1.60 | 0.99 | 1.58 | 479 | 78 | 76 | 251 | 6 |
| A | 1 | 16:25:00 | 155.900 | 1.30 | 0.99 | 1.29 | 478 | 79 | 76 | 250 | 6 |
| | Stop | 16:30:00 | 159.211 | | | | | | | | |
| B | 6 | 16:46:00 | 159.211 | 1.60 | 0.99 | 1.58 | 478 | 75 | 74 | 257 | 6 |
| B | 5 | 16:51:00 | 162.695 | 1.70 | 0.99 | 1.68 | 477 | 75 | 75 | 257 | 6 |
| B | 4 | 16:56:00 | 166.411 | 1.90 | 0.99 | 1.88 | 479 | 75 | 73 | 255 | 6 |
| B | 3 | 17:01:00 | 170.298 | 1.80 | 0.99 | 1.78 | 479 | 76 | 73 | 255 | 6 |
| B | 2 | 17:06:00 | 174.158 | 1.90 | 0.99 | 1.88 | 478 | 76 | 73 | 256 | 6 |
| B | 1 | 17:11:00 | 178.083 | 2.00 | 0.99 | 1.98 | 478 | 74 | 73 | 257 | 6 |
| | Stop | 17:16:00 | 181.911 | | | | | | | | |
| C | 6 | 17:46:00 | 181.911 | 1.40 | 0.99 | 1.39 | 479 | 72 | 70 | 254 | 6 |
| C | 5 | 17:51:00 | 185.322 | 1.40 | 0.99 | 1.39 | 477 | 73 | 71 | 254 | 6 |
| C | 4 | 17:56:00 | 188.738 | 1.30 | 0.99 | 1.29 | 477 | 71 | 70 | 252 | 6 |
| C | 3 | 18:01:00 | 192.045 | 1.10 | 0.99 | 1.09 | 478 | 72 | 71 | 250 | 6 |
| C | 2 | 18:06:00 | 195.117 | 1.00 | 0.99 | 0.99 | 478 | 71 | 70 | 251 | 6 |
| C | 1 | 18:11:00 | 198.071 | 1.00 | 0.99 | 0.99 | 479 | 71 | 69 | 252 | 6 |
| | Stop | 18:16:00 | 201.058 | | | | | | | | |
| D | 6 | 18:19:00 | 201.058 | 1.10 | 0.99 | 1.09 | 479 | 71 | 69 | 252 | 6 |
| D | 5 | 18:24:00 | 204.048 | 1.10 | 0.99 | 1.09 | 478 | 71 | 69 | 252 | 6 |
| D | 4 | 18:29:00 | 207.065 | 1.10 | 0.99 | 1.09 | 478 | 70 | 69 | 251 | 6 |
| D | 3 | 18:34:00 | 210.058 | 1.00 | 0.99 | 0.99 | 477 | 70 | 69 | 252 | 6 |
| D | 2 | 18:39:00 | 213.018 | 1.00 | 0.99 | 0.99 | 477 | 71 | 68 | 251 | 6 |
| D | 1 | 18:44:00 | 215.968 | 1.00 | 0.99 | 0.99 | 476 | 71 | 68 | 253 | 6 |
| | Stop | 18:49:00 | 218.908 | | | | | | | | |
| **Total/Average** | | **120** | **80.608** | **1.3550** | | **1.36** | **478** | **74** | **72** | | |

RUN 3

| Mercury Test Sample Data | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Client/Location: | | ExxonMobil | | | | | | Sample Location: | | | 2F-7 Stack |
| Unit: | | FCC | | | | | | Data By: | | | AA |
| Test No: | 3-Hg | ISO | Moisture | | Sample Factor | | Delta H = | 0.99 | x Delta P | | |
| Date: | 7/1/2011 | 97.8 | 14 | | | | Time per Point = | 5 | Static Pressure = | | -1.3 |
| Port | Point | Time | Meter Volume | Delta P | Factor | Delta H | Stack Temp. | Meter In | Meter Out | Probe | Vacuum |
| A | 6 | 15:00:00 | 288.205 | 1.3 | 0.99 | 1.29 | 472 | 76 | 75 | 250 | 4.5 |
| A | 5 | 15:05:00 | 291.654 | 1.3 | 0.99 | 1.29 | 471 | 76 | 75 | 250 | 4.5 |
| A | 4 | 15:10:00 | 294.973 | 1.2 | 0.99 | 1.19 | 474 | 78 | 75 | 249 | 4.5 |
| A | 3 | 15:15:00 | 298.263 | 1.1 | 0.99 | 1.09 | 473 | 79 | 76 | 250 | 4.5 |
| A | 2 | 15:20:00 | 301.311 | 1.0 | 0.99 | 0.99 | 472 | 80 | 77 | 260 | 4.5 |
| A | 1 | 15:25:00 | 304.311 | 1.0 | 0.99 | 0.99 | 470 | 81 | 77 | 260 | 4.5 |
| | Stop | 15:30:00 | 307.314 | | | | | | | | |
| B | 6 | 15:54:00 | 307.314 | 1.1 | 0.99 | 1.09 | 474 | 79 | 78 | 260 | 4.5 |
| B | 5 | 15:59:00 | 310.309 | 1.1 | 0.99 | 1.09 | 473 | 78 | 78 | 262 | 4.5 |
| B | 4 | 16:04:00 | 313.335 | 1.0 | 0.99 | 0.99 | 473 | 77 | 76 | 262 | 4.5 |
| B | 3 | 16:09:00 | 316.338 | 1.1 | 0.99 | 1.09 | 474 | 80 | 77 | 260 | 4.5 |
| B | 2 | 16:14:00 | 319.391 | 1.0 | 0.99 | 0.99 | 473 | 80 | 78 | 261 | 4.5 |
| B | 1 | 16:19:00 | 322.235 | 1.0 | 0.99 | 0.99 | 470 | 80 | 79 | 260 | 4.5 |
| | Stop | 16:24:00 | 325.038 | | | | | | | | |
| C | 6 | 17:22:00 | 325.038 | 1.2 | 0.99 | 1.19 | 472 | 76 | 74 | 261 | 4.5 |
| C | 5 | 17:27:00 | 328.168 | 1.3 | 0.99 | 1.29 | 472 | 76 | 73 | 262 | 4.5 |
| C | 4 | 17:32:00 | 331.508 | 1.5 | 0.99 | 1.49 | 473 | 76 | 74 | 259 | 4.5 |
| C | 3 | 17:37:00 | 335.013 | 1.6 | 0.99 | 1.58 | 474 | 75 | 73 | 259 | 4.5 |
| C | 2 | 17:42:00 | 338.639 | 1.5 | 0.99 | 1.49 | 474 | 76 | 73 | 258 | 4.5 |
| C | 1 | 17:47:00 | 342.184 | 1.1 | 0.99 | 1.09 | 473 | 76 | 74 | 257 | 4.5 |
| | Stop | 17:52:00 | 345.283 | | | | | | | | |
| D | 6 | 18:14:00 | 345.283 | 1.4 | 0.99 | 1.39 | 475 | 75 | 72 | 258 | 4.5 |
| D | 5 | 18:19:00 | 348.659 | 1.7 | 0.99 | 1.68 | 473 | 75 | 72 | 256 | 4.5 |
| D | 4 | 18:24:00 | 352.361 | 1.8 | 0.99 | 1.78 | 475 | 76 | 72 | 260 | 4.5 |
| D | 3 | 18:29:00 | 356.158 | 1.8 | 0.99 | 1.78 | 476 | 77 | 73 | 252 | 4.5 |
| D | 2 | 18:34:00 | 359.981 | 1.8 | 0.99 | 1.78 | 475 | 78 | 73 | 261 | 4.5 |
| D | 1 | 18:39:00 | 363.768 | 1.6 | 0.99 | 1.58 | 474 | 78 | 75 | 262 | 4.5 |
| | Stop | 18:44:00 | 367.388 | | | | | | | | |
| **Total/Average** | | **120** | **79.183** | **1.3** | | **1.30** | **473** | **77** | **75** | | |
| | | | | | | | | **76** | | | |

Delta Air Quality Services, Incorporated

# WET CHEMICAL SAMPLING SYSTEM DATA AND WORKSHEET

CLIENT: Exxon Mobil
LOCATION: FCC / 2F-7 Stack
DATE: 6/30/11
RUN NO: F3-Hg
OPERATOR: DW
METER BOX NO: 17WG
METER ΔH@: 1.577
METER Yd: 1.004
STACK AREA, FT²:
TRAVERSE POINTS, MIN/POINT:
ΔH= X ΔP:
Probe Condition, pre/post test:
Silica Gel Expanded, Y/N:
Filter Condition after Test:
Check Weight:

AMBIENT TEMPERATURE:
BAROMETRIC PRESSURE:
ASSUMED MOISTURE:
PITOT TUBE COEFF, Cp: 0.84
PROBE ID NO/MATERIAL: 62 / glass
PROBE LENGTH: 6'
NOZZLE ID NO/ MATERIAL: 5 / glass
NOZZLE DIAMETER: 0.222
FILTER NO/TYPE: Fused Quartz
PRE-TEST LEAK RATE: : CFM@ in. Hg.
POST-TEST LEAK RATE: : CFM@ in. Hg.
PITOT LEAK CHECK - PRE: POST:
CHAIN OF CUSTODY: SAMPLE CUSTODIAN AA
SAMPLER DW
SAMPLE CUSTODIAN AA

| Imp. # | Contents | Post-Test | Pre-Test | Difference |
|---|---|---|---|---|
| 1 | 1N KCl | | | 768.1 |
| 2 | " | | | 726.6 |
| 3 | " | | | 695.5 |
| 4 | 5% $HNO_3$ / 10% $H_2O_2$ | | | 657.5 |
| 5 | 4% $KMnO_4$ / 10% $H_2SO_4$ | | | 763.6 |
| 6 | " | | | 647.4 |
| 7 | " | | | 730.0 |
| 8 | SG | | | 947.5 |
| Total: | | | | |

| Point | Time | Meter Volume, ft³ | ΔP in. $H_2O$ | ΔH in. $H_2O$ | Stack Temp, °F | Probe Temp, °F | Filter Temp, °F | Imp. Out Temp, °F | Meter Temp, °F In | Meter Temp, °F Out | Vacuum in. Hg. | $O_2$ % | P static in. $H_2O$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | |
| Average: | | | | | | | | | | | | | |

Comments:

C.4-7


Date of last revision 7/19/2010
DS834071
Master Document Storage\Forms\Datasheets\Field Datasheets

Delta Air Quality Services, Incorporated

# WET CHEMICAL SAMPLING SYSTEM DATA AND WORKSHEET

CLIENT: Exxon Mobil
LOCATION: FCC / 2F-7 Stack
DATE: 6-30-11
RUN NO: 1-Hg
OPERATOR: Dave Lounch
METER BOX NO: 17-WCS
METER ΔH@: 1.577
METER Yd: 1.004
STACK AREA, FT²:
TRAVERSE POINTS, MIN/POINT: 5 x 24
ΔH= 0.99 X ΔP:
Probe Condition, pre/post test: ✓
Silica Gel Expanded, Y/N: ✓
Filter Condition after Test: ✓
Check Weight: ✓

AMBIENT TEMPERATURE: 75
BAROMETRIC PRESSURE: 29.85
ASSUMED MOISTURE: 11
PITOT TUBE COEFF, Cp: 0.84
PROBE ID NO/MATERIAL: #62 glass
PROBE LENGTH: 6'
NOZZLE ID NO/ MATERIAL: 5 glass
NOZZLE DIAMETER: 0.222
FILTER NO/TYPE: 83-UP-565
PRE-TEST LEAK RATE: 0.004 CFM@ 12" in. Hg.
POST-TEST LEAK RATE: 0.007 CFM@ 12" in. Hg.
PITOT LEAK CHECK - PRE: ok POST: ok
CHAIN OF CUSTODY: SAMPLE CUSTODIAN AA
SAMPLER DW
SAMPLE CUSTODIAN AA

| Imp. # | Contents | Post-Test | Pre-Test | Difference |
|---|---|---|---|---|
| 1 | 100 ml 1N KCl | 973 | 765.9 | 207.6 |
| 2 | " | 746.5 | 723.1 | 43.4 |
| 3 | " | 699.6 | 690.9 | 8.7 |
| 4 | 100 ml 5% $HNO_3$ / 10% $H_2O_2$ | 664.1 | 662.2 | 1.9 |
| 5 | 100 ml 4% $KMnO_4$ / 10% $H_2SO_4$ | 713.3 | 712.4 | 0.9 |
| 6 | " | 641.7 | 641.8 | -0. |
| 7 | " | 728.0 | 728.7 | -0. |
| 8 | S.G. | 947.5 | 927.4 | 20. |
| Total: | | | | 281.8 |

| Point | Time | Meter Volume, ft³ | ΔP in. $H_2O$ | ΔH in. $H_2O$ | Stack Temp, °F | Probe Temp, °F | Filter Temp, °F | Imp. Out Temp, °F | Meter Temp, °F In | Meter Temp, °F Out | Vacuum in. Hg. | $O_2$ % | P. static in. $H_2O$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 6 | 1020 | 012.800 | 1.3 | 1.3 | ~~474~~ 474 | ~~254~~ 260 | 254 | 57 | 85 | 82 | 4.5" | | -1.3 |
| 5 | 1025 | 016.148 | 1.3 | 1.3 | 474 | 259 | 255 | 57 | 85 | 82 | 4.5" | | |
| 4 | 1030 | 019.518 | 1.4 | 1.4 | 476 | 252 | 251 | 57 | 84 | 82 | 4.5" | | |
| 3 | 1035 | 022.999 | 1.4 | 1.4 | 476 | 250 | 251 | 57 | 83 | 81 | 4.5" | | |
| 2 | 1040 | 026.443 | 1.1 | 1.1 | 475 | 250 | 250 | 56 | 82 | 81 | 4.5" | | |
| 1 | 1045 | 029.525 | 1.0 | .99 | 472 | 250 | 251 | 56 | 82 | 80 | 4.5" | | |
| 0 | 1050 | 032.497 | | | | | | | | | | | |
| 6 | 1113 | 032.497 | 1.2 | 1.2 | 473 | 250 | 251 | 59 | 79 | 77 | 4.5" | | |
| 5 | 1118 | 035.652 | 1.1 | 1.1 | 472 | 252 | 250 | 59 | 78 | 77 | 4.5" | | |
| 4 | 1123 | 038.701 | 1.1 | 1.1 | 474 | 250 | 252 | 58 | 79 | 76 | 4.5" | | |
| 3 | 1128 | 041.738 | 1.1 | 1.1 | 474 | 250 | 250 | 58 | 78 | 77 | 4.5" | | |
| 2 | 1133 | 044.771 | 1.0 | .99 | 473 | 251 | 250 | 57 | 77 | 77 | 4.5" | | |
| 1 | 1138 | 047.777 | 1.0 | .99 | 474 | 250 | 250 | 58 | 78 | 77 | 4.5" | | |
| 0 | 1143 | 050.719 | | | | | | | | | | | |
| Average: | | | | | | | | | | | | | |

Comments:

C-9-8

Delta Air Quality Services, Incorporated

# WET CHEMICAL SAMPLING SYSTEM DATA AND WORKSHEET

CLIENT: Exxon Mobil
LOCATION: FCC / 2F-7 Stack
DATE: 6-30-11
RUN NO: 1-Hg
OPERATOR: DA/DW
METER BOX NO: 17 WCS
METER ΔH@: 1.577
METER Yd: 1.004
STACK AREA, FT²:
TRAVERSE POINTS, MIN/POINT: 5+24
ΔH= 0.99 X ΔP:
Probe Condition, pre/post test:
Silica Gel Expanded, Y/N:
Filter Condition after Test:
Check Weight:

AMBIENT TEMPERATURE:
BAROMETRIC PRESSURE:
ASSUMED MOISTURE:
PITOT TUBE COEFF, Cp:
PROBE ID NO/MATERIAL:
PROBE LENGTH:
NOZZLE ID NO/ MATERIAL:
NOZZLE DIAMETER:
FILTER NO/TYPE:
PRE-TEST LEAK RATE: : CFM@ in. Hg.
POST-TEST LEAK RATE: : CFM@ in. Hg.
PITOT LEAK CHECK - PRE: POST:
CHAIN OF CUSTODY: SAMPLE CUSTODIAN
SAMPLER
SAMPLE CUSTODIAN

| Imp. # | Contents | Post-Test - Pre-Test = Difference |
|---|---|---|
| | See page | |
| Total: | | |

| Point | Time | Meter Volume, ft³ | ΔP in. $H_2O$ | ΔH in. $H_2O$ | Stack Temp, °F | Probe Temp, °F | Filter Temp, °F | Imp. Out Temp, °F | Meter Temp, °F In | Meter Temp, °F Out | Vacuum in. Hg. | $O_2$ % | P. static in. $H_2O$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 6 | 1215 | 050.719 | 1.5 | 1.5 | 473 | 250 | 252 | 59 | 76 | 75 | 4.5" | | |
| 5 | 1220 | 054.202 | 1.6 | 1.6 | 478 | 249 | 249 | 59 | 75 | 74 | 4.5" | | |
| 4 | 1225 | 057.782 | 1.7 | 1.7 | 478 | 250 | 250 | 61 | 75 | 75 | 4.5" | | |
| 3 | 1230 | 061.517 | 1.6 | 1.6 | 477 | 252 | 250 | 60 | 76 | 75 | 4.5" | | |
| 2 | 1235 | 065.149 | 1.4 | 1.4 | 478 | 250 | 251 | 60 | 76 | 75 | 4.5" | | |
| 1 | 1240 | 068.603 | 1.2 | 1.2 | 473 | 250 | 250 | 60 | 75 | 73 | 4.5" | | |
| 0 | 1245 | 071.778 | | | | | | | Trm | | | | |
| 6 | 1248 | 071.778 | 1.7 | 1.7 | 476 | 251 | 250 | 61 | 77 | 75 | 4.5" | | |
| 5 | 1253 | 075.501 | 1.8 | 1.8 | 477 | 252 | 251 | 60 | 77 | 75 | 4.5" | | |
| 4 | 1258 | 079.409 | 2.1 | 2.1 | 478 | 250 | 250 | 60 | 76 | 75 | 4.5" | | |
| 3 | 1303 | 083.348 | 2.1 | 2.1 | 477 | 250 | 251 | 62 | 76 | 75 | 4.5" | | |
| 2 | 1308 | 087.378 | 2.1 | 2.1 | 477 | 250 | 251 | 60 | 76 | 74 | 4.5" | | |
| 1 | 1313 | 091.389 | 2.0 | 2.0 | 475 | 252 | 250 | 59 | 75 | 74 | 4.5" | | |
| 0 | 1318 | 095.309 | | | | | | | | | | | |
| | | | | | | | | | | | | | |
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| | | | | | | | | | | | | | |
| Average: | | | | | | | | | | | | | |

Comments:

C.9-9


Date of last revision 7/19/2010

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DS834071
Master Document Storage\Forms\Datasheets\Field Datasheets

Delta Air Quality Services, Incorporated

# WET CHEMICAL SAMPLING SYSTEM DATA AND WORKSHEET

CLIENT: Exxon Mobil
LOCATION: FCC / 2F-7 Stack
DATE: 6-30-2011
RUN NO: 2-H
OPERATOR: DA / Dave Wunderly
METER BOX NO: 17-WCS
METER ΔH@: 1.577
METER Yd: 1.004
STACK AREA, FT²: ✓
TRAVERSE POINTS, MIN/POINT: 5+24
ΔH= 0.99 X ΔP:
Probe Condition, pre/post test: ✓
Silica Gel Expanded, Y/N: ✓
Filter Condition after Test: ✓
Check Weight: ✓

AMBIENT TEMPERATURE: 75
BAROMETRIC PRESSURE: 29.85
ASSUMED MOISTURE: 11
PITOT TUBE COEFF, Cp: 0.89
PROBE ID NO/MATERIAL: #72 S/GSI
PROBE LENGTH: 6'
NOZZLE ID NO/ MATERIAL: 6 S/GSI
NOZZLE DIAMETER: 0.228
FILTER NO/TYPE: 87-UP-C Red Quartz
PRE-TEST LEAK RATE: : .008 CFM@ 12" in. Hg.
POST-TEST LEAK RATE: : .008 CFM@ 12.5" in. Hg.
PITOT LEAK CHECK - PRE: DW POST: DW
CHAIN OF CUSTODY: SAMPLE CUSTODIAN AA
SAMPLER DW
SAMPLE CUSTODIAN AA

| Imp. # | Contents | Post-Test | Pre-Test | Difference |
|---|---|---|---|---|
| 1 | 100 ml 1N KCl | 882.3 | 724.7 | 157.6 |
| 2 | " | 784.4 | 724.0 | 60.4 |
| 3 | " | 702.8 | 688.3 | 14.5 |
| 4 | 100 ml 5% $HNO_3$ / 10% $H_2O_2$ | 741.4 | 736.5 | 4.9 |
| 5 | 100 ml 4% $KMnO_4$ / 10% $H_2SO_4$ | 753.8 | 753.6 | 0.2 |
| 6 | " | 738.5 | 735.8 | 2.7 |
| 7 | " | 724.2 | 726.6 | -2.4 |
| 8 | SG | 991.9 | 956.7 | 35.2 |
| Total: | | | | 273.1 |

| Point | Time | Meter Volume, ft³ | ΔP in. $H_2O$ | ΔH in. $H_2O$ | Stack Temp, °F | Probe Temp, °F | Filter Temp, °F | Imp. Out Temp, °F | Meter Temp, °F In | Meter Temp, °F Out | Vacuum in. Hg. | $O_2$ % | P. static in. $H_2O$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| N 6 | 1600 | 138.300 | 1.24 | 1.2 | 478 | 237 | 248 | 100 | 78 | 76 | 5 | | -1.3 |
| 5 | 1605 | 141.3 | 1.4 | 1.4 | 479 | 243 | 249 | 63 | 80 | 77 | 5 | | |
| 4 | 1610 | 149.9 | 1.5 | 1.5 | 475 | 250 | 252 | 61 | 81 | 77 | 5 | | |
| 3 | 1615 | 148.3 | 1.6 | 1.6 | 479 | 250 | 250 | 60 | 79 | 76 | 6 | | |
| 2 | 1620 | 152.1 | 1.6 | 1.6 | 479 | 251 | 252 | 60 | 78 | 76 | 6 | | |
| 1 | 1625 | 155.9 | 1.3 | 1.3 | 478 | 250 | 251 | 60 | 79 | 76 | 6 | | |
| 0 | 1630 | 159.211 | | | | | | | | | | | |
| 6 | 1646 | 159.211 | 1.6 | 1.6 | 478 | 257 | 250 | 59 | 75 | 74 | 6 | | |
| 5 | 1651 | 162.695 | 1.7 | 1.7 | 477 | 257 | 252 | 59 | 75 | 75 | 6 | | |
| 4 | 1656 | 166.411 | 1.9 | 1.9 | 479 | 255 | 253 | 59 | 75 | 73 | 6 | | |
| 3 | 1701 | 170.298 | 1.8 | 1.8 | 479 | 255 | 252 | 60 | 76 | 73 | 6 | | |
| 2 | 1706 | 174.158 | 1.9 | 1.9 | 478 | 256 | 250 | 60 | 76 | 73 | 6 | | |
| 1 | 1711 | 178.083 | 2.0 | 2.0 | 478 | 257 | 251 | 60 | 74 | 73 | 6 | | |
| 0 | 1716 | 181.911 | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| Average: | | | | | | | | | | | | | |

Comments:

C-9-10

Delta Air Quality Services, Incorporated

# WET CHEMICAL SAMPLING SYSTEM DATA AND WORKSHEET

CLIENT: Exxon Mobil
LOCATION: FCC / 2F-7 Stack
DATE: 6-30-2011
RUN NO: 2-Hg
OPERATOR: DA/DW
METER BOX NO: 17-WCS
METER ΔH@: 1.577
METER Yd: 1.004
STACK AREA, FT²:
TRAVERSE POINTS, MIN/POINT:
ΔH= 0.99 X ΔP:
Probe Condition, pre/post test:
Silica Gel Expanded, Y/N:
Filter Condition after Test:
Check Weight:

AMBIENT TEMPERATURE:
BAROMETRIC PRESSURE:
ASSUMED MOISTURE:
PITOT TUBE COEFF, Cp:
PROBE ID NO/MATERIAL:
PROBE LENGTH:
NOZZLE ID NO/ MATERIAL:
NOZZLE DIAMETER:
FILTER NO/TYPE:
PRE-TEST LEAK RATE: : CFM@ in. Hg.
POST-TEST LEAK RATE: : CFM@ in. Hg.
PITOT LEAK CHECK - PRE: POST:
CHAIN OF CUSTODY: SAMPLE CUSTODIAN
SAMPLER
SAMPLE CUSTODIAN

| Imp. # | Contents | Post-Test | Pre-Test | Difference |
|---|---|---|---|---|
| | | | | |
| | | | | |
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| | | | | |
| | | | | |
| | | | | |
| | | | | |
| Total: | | | | |

181.911

| Point | Time | Meter Volume, ft³ | ΔP in. H₂O | ΔH in. H₂O | Stack Temp, °F | Probe Temp, °F | Filter Temp, °F | Imp. Out Temp, °F | Meter Temp, °F In | Meter Temp, °F Out | Vacuum in. Hg. | O₂ % | P. static in. H₂O |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 6 | 1746 | ~~178.083~~ | 1.4 | 1.4 | 479 | 254 | 250 | 58 | 72 | 70 | 6 | | |
| 5 | 1751 | 185.322 | 1.4 | 1.4 | 477 | 254 | 252 | 58 | 73 | 71 | 6 | | |
| 4 | 1756 | 188.738 | 1.3 | 1.3 | 477 | 252 | 251 | 58 | 71 | 70 | 6 | | |
| 3 | 1801 | 192.045 | 1.1 | 1.1 | 478 | 250 | 252 | 59 | 72 | 71 | 6 | | |
| 2 | 1806 | 195.117 | 1.0 | 1.0 | 478 | 251 | 251 | 59 | 71 | 70 | 6 | | |
| 1 | 1811 | 198.071 | 1.0 | 1.0 | 479 | 252 | 260 | 59 | 71 | 69 | 6 | | |
| 0 | 1816 | 201.058 | | | | | | | | | | | |
| 6 | 1819 | 201.058 | 1.1 | 1.1 | 479 | 252 | 260 | 59 | 71 | 69 | 6 | | |
| 5 | 1824 | 204.048 | 1.1 | 1.1 | 478 | 252 | 259 | 60 | 71 | 69 | 6 | | |
| 4 | 1829 | 207.065 | 1.1 | 1.1 | 478 | 251 | 256 | 60 | 70 | 69 | 6 | | |
| 3 | 1834 | 210.058 | 1.0 | 1.0 | 477 | 252 | 253 | 60 | 70 | 69 | 6 | | |
| 2 | 1839 | 213.018 | 1.0 | 1.0 | 477 | 251 | 260 | 60 | 71 | 68 | 6 | | |
| 1 | 1844 | 215.968 | 1.0 | 1.0 | 476 | 253 | 258 | 60 | 71 | 68 | 6 | | |
| 0 | 1849 | 218.908 | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| Average: | | | | | | | | | | | | | |

Comments:

C. 6-11

Delta Air Quality Services, Incorporated

# WET CHEMICAL SAMPLING SYSTEM DATA AND WORKSHEET

CLIENT: Exxon Mobil
LOCATION: FCC / 2F-7 Stack
DATE: 7-6-11
RUN NO: 3-Hg
OPERATOR: Dave Woody
METER BOX NO: 17-WCS
METER ΔH@: 1.577
METER Yd: 1.009
STACK AREA, FT²: ✓
TRAVERSE POINTS, MIN/POINT: 5 x 24
ΔH= 0.99 X ΔP:
Probe Condition, pre/post test: ✓
Silica Gel Expanded, Y/N: ✓
Filter Condition after Test: ✓
Check Weight: ✓

AMBIENT TEMPERATURE: 75
BAROMETRIC PRESSURE: 29.74
ASSUMED MOISTURE: "
PITOT TUBE COEFF, Cp: 0.84
PROBE ID NO/MATERIAL: #62 glass
PROBE LENGTH: 5'
NOZZLE ID NO/ MATERIAL: 5-1 glass
NOZZLE DIAMETER: 0.222
FILTER NO/TYPE: Tared Quartz
PRE-TEST LEAK RATE: .002 CFM@ 12 in. Hg.
POST-TEST LEAK RATE: 0.002 CFM@ 12 in. Hg.
PITOT LEAK CHECK - PRE: ok POST: ok
CHAIN OF CUSTODY: SAMPLE CUSTODIAN AA
SAMPLER DW
SAMPLE CUSTODIAN AA

| Imp. # | Contents | Post-Test | Pre-Test | Difference |
|---|---|---|---|---|
| 1 | 1N KCl | 959 | 765.5 | 194.0 |
| 2 | " | 766.5 | 729.7 | 36.8 |
| 3 | " | 698.2 | 692.2 | 6.0 |
| 4 | 9% $HNO_3$ / 10% $H_2O_2$ | 659.0 | 655.5 | 3.5 |
| 5 | 4% $KMnO_4$ / 10% $H_2SO_4$ | 762.5 | 760.2 | 2.3 |
| 6 | " | 646.0 | 646.4 | -0.4 |
| 7 | " | 734.9 | 735.2 | -0.3 |
| 8 | SG | 974.2 | 947.7 | 26.5 |
| Total: | | | | 268.4 |

| Point | Time | Meter Volume, ft³ | ΔP in. H₂O | ΔH in. H₂O | Stack Temp, °F | Probe Temp, °F | Filter Temp, °F | Imp. Out Temp, °F | Meter Temp, °F In | Meter Temp, °F Out | Vacuum in. Hg. | O₂ % | P. static in. H₂O |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| S C | 1500 | 288.205 | 1.3 | 1.3 | 472 | 250 | 250 | 57 | 76 | 75 | 4.5" | | -1.3 |
| 5 | 1505 | 291.654 | 1.3 | 1.3 | 471 | 250 | 250 | 57 | 76 | 75 | 4.5" | | |
| 4 | 1510 | 294.973 | 1.2 | 1.2 | 474 | 249 | 250 | 58 | 78 | 75 | 4.5" | | |
| 3 | 1515 | 298.263 | 1.1 | 1.1 | 473 | 250 | 250 | 58 | 79 | 76 | 4.5" | | |
| 2 | 1520 | 301.311 | 1.0 | 1.0 | 472 | 260 | 252 | 58 | 80 | 77 | 4.5" | | |
| 1 | 1525 | 304.311 | 1.0 | 1.0 | 470 | 260 | 251 | 59 | 81 | 77 | 4.5" | | |
| Stop | 1530 | 307.314 | | | | | | | | | | | |
| 6 | 1554 | 307.314 | 1.1 | 1.1 | 474 | 260 | 250 | 59 | 79 | 78 | 4.5" | | |
| 5 | 1559 | 310.309 | 1.1 | 1.1 | 473 | 262 | 250 | 59 | 78 | 78 | 4.5" | | |
| 4 | 1604 | 313.335 | 1.0 | 1.0 | 473 | 262 | 252 | 59 | 77 | 76 | 4.5" | | |
| 3 | 1609 | 316.338 | 1.1 | 1.1 | 474 | 260 | 249 | 61 | 80 | 77 | 4.5" | | |
| 2 | 1614 | 319.391 | 1.0 | 1.0 | 473 | 261 | 252 | 60 | 80 | 78 | 4.5" | | |
| 1 | 1619 | 322.235 | 1.0 | 1.0 | 470 | 260 | 251 | 59 | 80 | 79 | 4.5" | | |
| stop | 1624 | 325.038 | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| Average: | | | | | | | | | | | | | |

Comments:

C-6-12

Delta Air Quality Services, Incorporated

# WET CHEMICAL SAMPLING SYSTEM DATA AND WORKSHEET

CLIENT: Exxon Mobil
LOCATION: FCC / 2F-7 Stack
DATE: 7-1-11
RUN NO: 3-Hg
OPERATOR: DA/BW
METER BOX NO: 17-WCS
METER ΔH@: 1.577
METER Yd: 1.004
STACK AREA, FT²:
TRAVERSE POINTS, MIN/POINT:
ΔH= 0.99 X ΔP:
Probe Condition, pre/post test:
Silica Gel Expanded, Y/N:
Filter Condition after Test:
Check Weight:

AMBIENT TEMPERATURE:
BAROMETRIC PRESSURE:
ASSUMED MOISTURE:
PITOT TUBE COEFF, Cp:
PROBE ID NO/MATERIAL:
PROBE LENGTH:
NOZZLE ID NO/ MATERIAL:
NOZZLE DIAMETER:
FILTER NO/TYPE:
PRE-TEST LEAK RATE: : CFM@ in. Hg.
POST-TEST LEAK RATE: : CFM@ in. Hg.
PITOT LEAK CHECK - PRE: POST:
CHAIN OF CUSTODY: SAMPLE CUSTODIAN
SAMPLER
SAMPLE CUSTODIAN

| Imp. # | Contents | Post-Test - Pre-Test = Difference |
|---|---|---|
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| Total: | | |

| Point | Time | Meter Volume, ft³ | ΔP in. $H_2O$ | ΔH in. $H_2O$ | Stack Temp, °F | Probe Temp, °F | Filter Temp, °F | Imp. Out Temp, °F | Meter Temp, °F In | Meter Temp, °F Out | Vacuum in. Hg. | $O_2$ % | P. static in. $H_2O$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 6 | 1722 | 325.038 | 1.2 | 1.2 | 472 | 261 | 250 | 61 | 76 | 74 | 4.5 | | |
| 5 | 1727 | 328.168 | 1.3 | 1.3 | 472 | 262 | 251 | 58 | 76 | 73 | 4.5 | | |
| 4 | 1732 | 331.508 | 1.5 | 1.5 | 473 | 259 | 250 | 57 | 76 | 74 | 4.5 | | |
| 3 | 1737 | 335.013 | 1.6 | 1.6 | 474 | 259 | 251 | 57 | 75 | 73 | 4.5 | | |
| 2 | 1742 | 338.639 | 1.5 | 1.5 | 474 | 258 | 259 | 57 | 76 | 73 | 4.5 | | |
| 1 | 1747 | 342.184 | 1.1 | 1.1 | 473 | 257 | 260 | 58 | 76 | 74 | 4.5 | | |
| | 1752 | 345.283 | | | | | | | | | | | |
| 6 | 1814 | 345.283 | 1.4 | 1.4 | 475 | 258 | 257 | 57 | 75 | 72 | 4.5 | | |
| 5 | 1819 | 348.659 | 1.7 | 1.7 | 473 | 256 | 259 | 58 | 75 | 72 | 4.5 | | |
| 4 | 1824 | 352.361 | 1.8 | 1.8 | 475 | 260 | 250 | 58 | 76 | 72 | 4.5 | | |
| 3 | 1829 | 356.158 | 1.8 | 1.8 | 476 | 252 | 251 | 59 | 77 | 73 | 4.5 | | |
| 2 | 1834 | 359.981 | 1.8 | 1.8 | 475 | 261 | 250 | 57 | 78 | 73 | 4.5 | | |
| 1 | 1839 | 363.768 | 1.6 | 1.6 | 474 | 262 | 258 | 57 | 78 | 75 | 4.5 | | |
| | 1844 | 367.388 | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| Average: | | | | | | | | | | | | | |

Comments:

C-9-13



Date of last revision 7/19/2010

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DS834071
Master Document Storage\Forms\Datasheets\Field Datasheets

**ExxonMobil**
**STACK $O_2$, $CO_2$ DATA**

**Test #:** **1-Hg**
**Date:** **6/30/2011**
**Time:** **1020/1318**

| | $O_2$ | $CO_2$ |
|---|---|---|
| Range | 10 | 20 |
| Cal Gas | 5.00 | 10.16 |
| Analyzer Zero | 0.09 | 0.00 |
| Analyzer Span | 5.04 | 9.94 |
| Pre-Bias Zero | 0.08 | 0.00 |
| Pre-Bias Span | 4.99 | 10.00 |
| Post-Bias Zero | 0.10 | 0.01 |
| Post-Bias Span | 4.94 | 9.90 |
| Pre-test zero bias | -0.1% | 0.0% |
| Pre-test span bias | -0.6% | 0.3% |
| Post-test zero bias | 0.1% | 0.1% |
| Post-test span bias | -1.0% | -0.2% |
| Zero Drift | 0.2% | 0.0% |
| Span Drift | -0.5% | -0.5% |
| | PASS | PASS |
| **Average** | **5.04** | **13.73** |
| **Cal Corrected** | **5.08** | **14.02** |

**ExxonMobil**
**1-Hg**

| Date | Time | O2 % | CO2 % |
|---|---|---|---|
| 6/30/2011 | 10:40:00 AM | 5.045 | 13.832 |
| 6/30/2011 | 10:41:00 AM | 5.157 | 13.777 |
| 6/30/2011 | 10:42:00 AM | 5.182 | 13.755 |
| 6/30/2011 | 10:43:00 AM | 5.16 | 13.772 |
| 6/30/2011 | 10:44:00 AM | 5.138 | 13.866 |
| 6/30/2011 | 10:45:00 AM | 5.267 | 14.234 |
| 6/30/2011 | 10:46:00 AM | 5.151 | 13.856 |
| 6/30/2011 | 10:47:00 AM | 5.124 | 13.67 |
| 6/30/2011 | 10:48:00 AM | 5.109 | 13.671 |
| 6/30/2011 | 10:49:00 AM | 5.081 | 13.7 |
| 6/30/2011 | 10:50:00 AM | 5.069 | 13.697 |
| 6/30/2011 | 11:14:00 AM | 5.079 | 13.621 |
| 6/30/2011 | 11:15:00 AM | 5.047 | 13.651 |
| 6/30/2011 | 11:16:00 AM | 4.983 | 13.717 |
| 6/30/2011 | 11:17:00 AM | 4.971 | 13.746 |
| 6/30/2011 | 11:18:00 AM | 4.988 | 13.73 |
| 6/30/2011 | 11:19:00 AM | 5.007 | 13.712 |
| 6/30/2011 | 11:20:00 AM | 4.953 | 13.767 |
| 6/30/2011 | 11:21:00 AM | 4.983 | 13.738 |
| 6/30/2011 | 11:22:00 AM | 5.021 | 13.713 |
| 6/30/2011 | 11:23:00 AM | 5.035 | 13.683 |
| 6/30/2011 | 11:24:00 AM | 4.994 | 13.729 |
| 6/30/2011 | 11:25:00 AM | 4.966 | 13.759 |
| 6/30/2011 | 11:26:00 AM | 5.029 | 13.7 |
| 6/30/2011 | 11:27:00 AM | 5.046 | 13.686 |
| 6/30/2011 | 11:28:00 AM | 5.036 | 13.707 |
| 6/30/2011 | 11:29:00 AM | 5.065 | 13.676 |
| 6/30/2011 | 11:30:00 AM | 5.053 | 13.673 |
| 6/30/2011 | 11:31:00 AM | 5.061 | 13.687 |
| 6/30/2011 | 11:32:00 AM | 5.125 | 13.618 |
| 6/30/2011 | 11:33:00 AM | 5.13 | 13.613 |
| 6/30/2011 | 11:34:00 AM | 5.105 | 13.633 |
| 6/30/2011 | 11:35:00 AM | 5.106 | 13.646 |
| 6/30/2011 | 11:36:00 AM | 5.092 | 13.654 |
| 6/30/2011 | 11:37:00 AM | 5.112 | 13.645 |
| 6/30/2011 | 11:38:00 AM | 5.092 | 13.655 |
| 6/30/2011 | 11:39:00 AM | 5.096 | 13.64 |
| 6/30/2011 | 11:40:00 AM | 5.056 | 13.681 |
| 6/30/2011 | 11:41:00 AM | 5.042 | 13.698 |
| 6/30/2011 | 11:42:00 AM | 5.041 | 13.697 |
| 6/30/2011 | 11:43:00 AM | 5.074 | 13.664 |
| 6/30/2011 | 12:16:00 PM | 4.973 | 13.79 |
| 6/30/2011 | 12:17:00 PM | 4.996 | 13.774 |
| 6/30/2011 | 12:18:00 PM | 5.069 | 13.696 |
| 6/30/2011 | 12:39:00 PM | 4.889 | 13.825 |
| 6/30/2011 | 12:40:00 PM | 4.915 | 13.805 |
| 6/30/2011 | 12:41:00 PM | 4.939 | 13.802 |

| | | | |
|---|---|---|---|
| 6/30/2011 | 12:42:00 PM | 4.977 | 13.771 |
| 6/30/2011 | 12:43:00 PM | 5 | 13.736 |
| 6/30/2011 | 12:44:00 PM | 4.979 | 13.759 |
| 6/30/2011 | 12:45:00 PM | 5.016 | 13.727 |
| 6/30/2011 | 12:49:00 PM | 4.994 | 13.743 |
| 6/30/2011 | 12:50:00 PM | 5 | 13.739 |
| 6/30/2011 | 12:51:00 PM | 5.019 | 13.736 |
| 6/30/2011 | 12:52:00 PM | 5.018 | 13.74 |
| 6/30/2011 | 12:53:00 PM | 5.022 | 13.728 |
| 6/30/2011 | 12:54:00 PM | 4.988 | 13.763 |
| 6/30/2011 | 12:55:00 PM | 4.996 | 13.759 |
| 6/30/2011 | 12:56:00 PM | 4.999 | 13.753 |
| 6/30/2011 | 12:57:00 PM | 5.011 | 13.734 |
| 6/30/2011 | 12:58:00 PM | 5.001 | 13.734 |
| 6/30/2011 | 12:59:00 PM | 4.952 | 13.79 |
| 6/30/2011 | 1:00:00 PM | 4.98 | 13.765 |
| 6/30/2011 | 1:01:00 PM | 5.052 | 13.706 |
| 6/30/2011 | 1:02:00 PM | 5.054 | 13.702 |
| 6/30/2011 | 1:03:00 PM | 5.033 | 13.729 |
| 6/30/2011 | 1:04:00 PM | 5.025 | 13.728 |
| 6/30/2011 | 1:05:00 PM | 5.002 | 13.749 |
| 6/30/2011 | 1:06:00 PM | 5.037 | 13.729 |
| 6/30/2011 | 1:07:00 PM | 5.045 | 13.727 |
| 6/30/2011 | 1:08:00 PM | 5.045 | 13.724 |
| 6/30/2011 | 1:09:00 PM | 5.021 | 13.739 |
| 6/30/2011 | 1:10:00 PM | 4.997 | 13.77 |
| 6/30/2011 | 1:11:00 PM | 4.966 | 13.775 |
| 6/30/2011 | 1:12:00 PM | 4.995 | 13.766 |
| 6/30/2011 | 1:13:00 PM | 5.037 | 13.727 |
| 6/30/2011 | 1:14:00 PM | 5.059 | 13.701 |
| 6/30/2011 | 1:15:00 PM | 5.078 | 13.692 |
| 6/30/2011 | 1:16:00 PM | 5.088 | 13.667 |
| 6/30/2011 | 1:17:00 PM | 5.058 | 13.696 |
| 6/30/2011 | 1:18:00 PM | 5.031 | 13.732 |
| | Average | 5.04 | 13.73 |

**ExxonMobil**
**STACK $O_2$, $CO_2$ DATA**

**Test #:** **2-Hg**
**Date:** **6/30/2011**
**Time:** **1600/1849**

| | $O_2$ | $CO_2$ |
|---|---|---|
| Range | 10 | 20 |
| Cal Gas | 5.00 | 10.16 |
| Analyzer Zero | 0.09 | 0.00 |
| Analyzer Span | 5.04 | 9.94 |
| Pre-Bias Zero | 0.10 | 0.01 |
| Pre-Bias Span | 4.94 | 9.90 |
| Post-Bias Zero | 0.17 | 0.00 |
| Post-Bias Span | 4.99 | 9.81 |
| Pre-test zero bias | 0.1% | 0.1% |
| Pre-test span bias | -1.0% | -0.2% |
| Post-test zero bias | 0.8% | 0.0% |
| Post-test span bias | -0.5% | -0.7% |
| Zero Drift | 0.7% | 0.0% |
| Span Drift | 0.5% | -0.5% |
| | PASS | PASS |
| **Average** | **4.99** | **13.68** |
| **Cal Corrected** | **5.03** | **14.11** |

**ExxonMobil**
**2-Hg**

| Date | Time | O2 % | CO2 % |
|---|---|---|---|
| 6/30/2011 | 4:01:00 PM | 4.967 | 13.708 |
| 6/30/2011 | 4:02:00 PM | 4.967 | 13.721 |
| 6/30/2011 | 4:03:00 PM | 4.956 | 13.722 |
| 6/30/2011 | 4:04:00 PM | 4.924 | 13.752 |
| 6/30/2011 | 4:05:00 PM | 4.895 | 13.78 |
| 6/30/2011 | 4:06:00 PM | 4.923 | 13.763 |
| 6/30/2011 | 4:07:00 PM | 4.899 | 13.768 |
| 6/30/2011 | 4:08:00 PM | 4.893 | 13.8 |
| 6/30/2011 | 4:09:00 PM | 4.986 | 13.716 |
| 6/30/2011 | 4:10:00 PM | 5.005 | 13.683 |
| 6/30/2011 | 4:11:00 PM | 5.012 | 13.67 |
| 6/30/2011 | 4:12:00 PM | 5.004 | 13.686 |
| 6/30/2011 | 4:13:00 PM | 4.991 | 13.692 |
| 6/30/2011 | 4:14:00 PM | 4.92 | 13.766 |
| 6/30/2011 | 4:15:00 PM | 4.949 | 13.744 |
| 6/30/2011 | 4:16:00 PM | 4.963 | 13.727 |
| 6/30/2011 | 4:17:00 PM | 4.992 | 13.705 |
| 6/30/2011 | 4:18:00 PM | 5.027 | 13.669 |
| 6/30/2011 | 4:19:00 PM | 5.084 | 13.615 |
| 6/30/2011 | 4:20:00 PM | 5.025 | 13.66 |
| 6/30/2011 | 4:21:00 PM | 5.047 | 13.654 |
| 6/30/2011 | 4:22:00 PM | 5.033 | 13.645 |
| 6/30/2011 | 4:23:00 PM | 4.98 | 13.693 |
| 6/30/2011 | 4:24:00 PM | 4.956 | 13.727 |
| 6/30/2011 | 4:25:00 PM | 4.969 | 13.721 |
| 6/30/2011 | 4:26:00 PM | 4.964 | 13.717 |
| 6/30/2011 | 4:27:00 PM | 4.985 | 13.704 |
| 6/30/2011 | 4:28:00 PM | 4.964 | 13.711 |
| 6/30/2011 | 4:29:00 PM | 4.984 | 13.7 |
| 6/30/2011 | 4:30:00 PM | 4.956 | 13.728 |
| 6/30/2011 | 4:47:00 PM | 4.982 | 13.705 |
| 6/30/2011 | 4:48:00 PM | 5.015 | 13.68 |
| 6/30/2011 | 4:49:00 PM | 5.031 | 13.67 |
| 6/30/2011 | 4:50:00 PM | 4.984 | 13.707 |
| 6/30/2011 | 4:51:00 PM | 5.007 | 13.67 |
| 6/30/2011 | 4:52:00 PM | 4.996 | 13.671 |
| 6/30/2011 | 4:53:00 PM | 5.017 | 13.655 |
| 6/30/2011 | 4:54:00 PM | 5.002 | 13.675 |
| 6/30/2011 | 4:55:00 PM | 4.977 | 13.704 |
| 6/30/2011 | 4:56:00 PM | 4.932 | 13.757 |
| 6/30/2011 | 4:57:00 PM | 5.018 | 13.668 |
| 6/30/2011 | 4:58:00 PM | 5.043 | 13.644 |
| 6/30/2011 | 4:59:00 PM | 5.053 | 13.629 |
| 6/30/2011 | 5:00:00 PM | 5.021 | 13.664 |
| 6/30/2011 | 5:01:00 PM | 4.991 | 13.679 |
| 6/30/2011 | 5:02:00 PM | 4.932 | 13.747 |
| 6/30/2011 | 5:03:00 PM | 4.971 | 13.708 |

| | | | |
|---|---|---|---|
| 6/30/2011 | 5:04:00 PM | 4.965 | 13.729 |
| 6/30/2011 | 5:05:00 PM | 5.011 | 13.68 |
| 6/30/2011 | 5:06:00 PM | 4.996 | 13.692 |
| 6/30/2011 | 5:07:00 PM | 5.04 | 13.652 |
| 6/30/2011 | 5:08:00 PM | 4.966 | 13.696 |
| 6/30/2011 | 5:09:00 PM | 4.989 | 13.7 |
| 6/30/2011 | 5:10:00 PM | 5.061 | 13.636 |
| 6/30/2011 | 5:11:00 PM | 5.062 | 13.622 |
| 6/30/2011 | 5:12:00 PM | 5.036 | 13.647 |
| 6/30/2011 | 5:13:00 PM | 4.986 | 13.695 |
| 6/30/2011 | 5:14:00 PM | 4.947 | 13.738 |
| 6/30/2011 | 5:15:00 PM | 4.98 | 13.705 |
| 6/30/2011 | 5:16:00 PM | 4.99 | 13.679 |
| 6/30/2011 | 5:47:00 PM | 4.991 | 13.668 |
| 6/30/2011 | 5:48:00 PM | 5.011 | 13.662 |
| 6/30/2011 | 5:49:00 PM | 5.042 | 13.631 |
| 6/30/2011 | 5:50:00 PM | 5.014 | 13.657 |
| 6/30/2011 | 5:51:00 PM | 5.024 | 13.657 |
| 6/30/2011 | 5:52:00 PM | 5.038 | 13.634 |
| 6/30/2011 | 5:53:00 PM | 5.08 | 13.598 |
| 6/30/2011 | 5:54:00 PM | 5.031 | 13.631 |
| 6/30/2011 | 5:55:00 PM | 5 | 13.67 |
| 6/30/2011 | 5:56:00 PM | 4.895 | 13.761 |
| 6/30/2011 | 5:57:00 PM | 4.931 | 13.742 |
| 6/30/2011 | 5:58:00 PM | 5.005 | 13.667 |
| 6/30/2011 | 5:59:00 PM | 5.008 | 13.665 |
| 6/30/2011 | 6:00:00 PM | 5.03 | 13.638 |
| 6/30/2011 | 6:01:00 PM | 5.04 | 13.629 |
| 6/30/2011 | 6:20:00 PM | 4.955 | 13.678 |
| 6/30/2011 | 6:21:00 PM | 4.986 | 13.654 |
| 6/30/2011 | 6:22:00 PM | 5.016 | 13.617 |
| 6/30/2011 | 6:23:00 PM | 4.992 | 13.633 |
| 6/30/2011 | 6:24:00 PM | 4.98 | 13.645 |
| 6/30/2011 | 6:25:00 PM | 5.007 | 13.639 |
| 6/30/2011 | 6:26:00 PM | 4.998 | 13.65 |
| 6/30/2011 | 6:27:00 PM | 4.994 | 13.634 |
| 6/30/2011 | 6:28:00 PM | 5.002 | 13.641 |
| 6/30/2011 | 6:29:00 PM | 5.005 | 13.632 |
| 6/30/2011 | 6:30:00 PM | 5.03 | 13.615 |
| 6/30/2011 | 6:31:00 PM | 5.039 | 13.604 |
| 6/30/2011 | 6:32:00 PM | 5.071 | 13.592 |
| 6/30/2011 | 6:33:00 PM | 5.066 | 13.575 |
| 6/30/2011 | 6:34:00 PM | 5.076 | 13.582 |
| 6/30/2011 | 6:35:00 PM | 5.079 | 13.577 |
| 6/30/2011 | 6:36:00 PM | 4.979 | 13.661 |
| 6/30/2011 | 6:37:00 PM | 5.015 | 13.652 |
| 6/30/2011 | 6:38:00 PM | 4.985 | 13.672 |
| 6/30/2011 | 6:39:00 PM | 4.966 | 13.684 |
| 6/30/2011 | 6:40:00 PM | 4.988 | 13.672 |
| 6/30/2011 | 6:41:00 PM | 4.954 | 13.694 |
| 6/30/2011 | 6:42:00 PM | 4.986 | 13.662 |
| 6/30/2011 | 6:43:00 PM | 4.971 | 13.702 |

| | | | |
|---|---|---|---|
| 6/30/2011 | 6:44:00 PM | 4.931 | 13.741 |
| 6/30/2011 | 6:45:00 PM | 4.974 | 13.689 |
| 6/30/2011 | 6:46:00 PM | 4.989 | 13.677 |
| 6/30/2011 | 6:47:00 PM | 4.976 | 13.682 |
| 6/30/2011 | 6:48:00 PM | 5.002 | 13.663 |
| 6/30/2011 | 6:49:00 PM | 4.986 | 13.683 |
| | Average | 4.99 | 13.68 |

**ExxonMobil**
**STACK $O_2$, $CO_2$ DATA**

**Test #:** **3-Hg**
**Date:** **7/1/2011**
**Time:** **1500/1844**

| | $O_2$ | $CO_2$ |
|---|---|---|
| Range | 10 | 20 |
| Cal Gas | 5.00 | 10.16 |
| Analyzer Zero | 0.06 | -0.01 |
| Analyzer Span | 5.15 | 9.98 |
| Pre-Bias Zero | 0.20 | 0.01 |
| Pre-Bias Span | 4.90 | 9.87 |
| Post-Bias Zero | 0.22 | 0.00 |
| Post-Bias Span | 5.02 | 9.90 |
| Pre-test zero bias | 1.3% | 0.1% |
| Pre-test span bias | -2.5% | -0.6% |
| Post-test zero bias | 1.6% | 0.1% |
| Post-test span bias | -1.3% | -0.4% |
| Zero Drift | 0.3% | 0.0% |
| Span Drift | 1.2% | 0.2% |
| | PASS | PASS |
| **Average** | **4.87** | **13.91** |
| **Cal Corrected** | **4.90** | **14.31** |

**ExxonMobil**
**3-Hg**

| Date | Time | O2 % | CO2 % |
|---|---|---|---|
| 7/1/2011 | 3:01:00 PM | 4.824 | 13.884 |
| 7/1/2011 | 3:02:00 PM | 4.779 | 13.902 |
| 7/1/2011 | 3:03:00 PM | 4.813 | 13.874 |
| 7/1/2011 | 3:04:00 PM | 4.831 | 13.857 |
| 7/1/2011 | 3:05:00 PM | 4.853 | 13.855 |
| 7/1/2011 | 3:06:00 PM | 4.854 | 13.849 |
| 7/1/2011 | 3:07:00 PM | 4.806 | 13.912 |
| 7/1/2011 | 3:08:00 PM | 4.8 | 13.909 |
| 7/1/2011 | 3:09:00 PM | 4.808 | 13.905 |
| 7/1/2011 | 3:10:00 PM | 4.783 | 13.938 |
| 7/1/2011 | 3:11:00 PM | 4.866 | 13.849 |
| 7/1/2011 | 3:12:00 PM | 4.888 | 13.818 |
| 7/1/2011 | 3:13:00 PM | 4.848 | 13.852 |
| 7/1/2011 | 3:14:00 PM | 4.821 | 13.891 |
| 7/1/2011 | 3:15:00 PM | 4.876 | 13.798 |
| 7/1/2011 | 3:16:00 PM | 4.866 | 13.807 |
| 7/1/2011 | 3:17:00 PM | 4.908 | 13.778 |
| 7/1/2011 | 3:18:00 PM | 4.911 | 13.767 |
| 7/1/2011 | 3:19:00 PM | 4.897 | 13.772 |
| 7/1/2011 | 3:20:00 PM | 4.874 | 13.794 |
| 7/1/2011 | 3:21:00 PM | 4.85 | 13.826 |
| 7/1/2011 | 3:22:00 PM | 4.854 | 13.822 |
| 7/1/2011 | 3:23:00 PM | 4.842 | 13.821 |
| 7/1/2011 | 3:24:00 PM | 4.849 | 13.82 |
| 7/1/2011 | 3:25:00 PM | 4.784 | 13.891 |
| 7/1/2011 | 3:26:00 PM | 4.754 | 13.924 |
| 7/1/2011 | 3:27:00 PM | 4.779 | 13.881 |
| 7/1/2011 | 3:28:00 PM | 4.797 | 13.889 |
| 7/1/2011 | 3:29:00 PM | 4.835 | 13.852 |
| 7/1/2011 | 3:30:00 PM | 4.841 | 13.853 |
| 7/1/2011 | 3:55:00 PM | 4.883 | 13.816 |
| 7/1/2011 | 3:56:00 PM | 4.911 | 13.789 |
| 7/1/2011 | 3:57:00 PM | 4.929 | 13.776 |
| 7/1/2011 | 3:58:00 PM | 4.904 | 13.79 |
| 7/1/2011 | 3:59:00 PM | 4.886 | 13.811 |
| 7/1/2011 | 4:00:00 PM | 4.892 | 13.802 |
| 7/1/2011 | 4:01:00 PM | 4.888 | 13.822 |
| 7/1/2011 | 4:02:00 PM | 4.831 | 13.869 |
| 7/1/2011 | 4:03:00 PM | 4.878 | 13.813 |
| 7/1/2011 | 4:04:00 PM | 4.873 | 13.833 |
| 7/1/2011 | 4:05:00 PM | 4.911 | 13.786 |
| 7/1/2011 | 4:06:00 PM | 4.883 | 13.813 |
| 7/1/2011 | 4:07:00 PM | 4.876 | 13.828 |
| 7/1/2011 | 4:08:00 PM | 4.868 | 13.821 |
| 7/1/2011 | 4:09:00 PM | 4.898 | 13.809 |
| 7/1/2011 | 4:10:00 PM | 4.89 | 13.79 |
| 7/1/2011 | 4:11:00 PM | 4.934 | 13.766 |

| | | | |
|---|---|---|---|
| 7/1/2011 | 4:12:00 PM | 4.942 | 13.771 |
| 7/1/2011 | 4:13:00 PM | 4.937 | 13.774 |
| 7/1/2011 | 4:14:00 PM | 4.905 | 13.804 |
| 7/1/2011 | 4:15:00 PM | 4.892 | 13.81 |
| 7/1/2011 | 4:16:00 PM | 4.909 | 13.785 |
| 7/1/2011 | 4:17:00 PM | 4.904 | 13.804 |
| 7/1/2011 | 4:18:00 PM | 4.861 | 13.863 |
| 7/1/2011 | 4:19:00 PM | 4.892 | 13.824 |
| 7/1/2011 | 4:20:00 PM | 4.884 | 13.832 |
| 7/1/2011 | 4:21:00 PM | 4.86 | 13.845 |
| 7/1/2011 | 4:22:00 PM | 4.919 | 13.795 |
| 7/1/2011 | 4:23:00 PM | 4.911 | 13.803 |
| 7/1/2011 | 4:24:00 PM | 4.936 | 13.795 |
| 7/1/2011 | 5:42:00 PM | 4.958 | 14.262 |
| 7/1/2011 | 5:43:00 PM | 4.932 | 14.259 |
| 7/1/2011 | 5:44:00 PM | 5.031 | 14.513 |
| 7/1/2011 | 5:45:00 PM | 5.3 | 15.576 |
| 7/1/2011 | 5:46:00 PM | 5.363 | 15.697 |
| 7/1/2011 | 5:47:00 PM | 4.856 | 14.098 |
| 7/1/2011 | 5:48:00 PM | 4.885 | 14.067 |
| 7/1/2011 | 5:49:00 PM | 4.877 | 14.088 |
| 7/1/2011 | 5:50:00 PM | 4.852 | 14.111 |
| 7/1/2011 | 5:51:00 PM | 4.917 | 14.033 |
| 7/1/2011 | 5:52:00 PM | 4.893 | 14.066 |
| 7/1/2011 | 6:15:00 PM | 4.797 | 13.887 |
| 7/1/2011 | 6:16:00 PM | 4.832 | 13.866 |
| 7/1/2011 | 6:17:00 PM | 4.843 | 13.853 |
| 7/1/2011 | 6:18:00 PM | 4.869 | 13.817 |
| 7/1/2011 | 6:19:00 PM | 4.898 | 13.798 |
| 7/1/2011 | 6:20:00 PM | 4.857 | 13.828 |
| 7/1/2011 | 6:21:00 PM | 4.859 | 13.837 |
| 7/1/2011 | 6:22:00 PM | 4.875 | 13.792 |
| 7/1/2011 | 6:23:00 PM | 4.851 | 13.836 |
| 7/1/2011 | 6:24:00 PM | 4.846 | 13.818 |
| 7/1/2011 | 6:25:00 PM | 4.861 | 13.821 |
| 7/1/2011 | 6:26:00 PM | 4.758 | 13.912 |
| 7/1/2011 | 6:27:00 PM | 4.822 | 13.859 |
| 7/1/2011 | 6:28:00 PM | 4.864 | 13.807 |
| 7/1/2011 | 6:29:00 PM | 4.842 | 13.823 |
| 7/1/2011 | 6:30:00 PM | 4.801 | 13.875 |
| 7/1/2011 | 6:31:00 PM | 4.822 | 13.861 |
| 7/1/2011 | 6:32:00 PM | 4.819 | 13.857 |
| 7/1/2011 | 6:33:00 PM | 4.827 | 13.842 |
| 7/1/2011 | 6:34:00 PM | 4.812 | 13.869 |
| 7/1/2011 | 6:35:00 PM | 4.862 | 13.87 |
| 7/1/2011 | 6:36:00 PM | 4.865 | 13.871 |
| 7/1/2011 | 6:37:00 PM | 4.852 | 13.922 |
| 7/1/2011 | 6:38:00 PM | 4.791 | 13.962 |
| 7/1/2011 | 6:39:00 PM | 4.872 | 13.905 |
| 7/1/2011 | 6:40:00 PM | 4.904 | 13.88 |
| 7/1/2011 | 6:41:00 PM | 4.887 | 13.91 |
| 7/1/2011 | 6:42:00 PM | 4.834 | 13.964 |

| | | | |
|---|---|---|---|
| 7/1/2011 | 6:43:00 PM | 4.8 | 14.047 |
| 7/1/2011 | 6:44:00 PM | 4.787 | 14.06 |
| | Average | 4.87 | 13.91 |

Curtis & Tompkins, Ltd., Analytical Laboratories, Since 1878
2323 Fifth Street, Berkeley, CA 94710, Phone (510) 486-0900

**Laboratory Job Number 229828**
**ANALYTICAL REPORT**

| | |
|---|---|
| Delta Air Quality Services<br>1845 North Case St.<br>Orange, CA 92865 | Project : STANDARD<br>Location : 2F-7 Stack<br>Level : II |

| Sample ID | Lab ID |
|---|---|
| 1-HG FILTER | 229828-001 |
| 1-HG FH/PW | 229828-002 |
| 1-HG BH/KCL | 229828-003 |
| 1-HG HNO3/H2O2 | 229828-004 |
| 1-HG KMNO4/H2SO4 | 229828-005 |
| 2-HG FILTER | 229828-006 |
| 2-HG FH/PW | 229828-007 |
| 2-HG BH/KCL | 229828-008 |
| 2-HG HNO3/H2O2 | 229828-009 |
| 2-HG KMNO4/H2SO4 | 229828-010 |
| 3-HG FILTER | 229828-011 |
| 3-HG FH/PW | 229828-012 |
| 3-HG BH/KCL | 229828-013 |
| 3-HG HNO3/H2O2 | 229828-014 |
| 3-HG KMNO4/H2SO4 | 229828-015 |
| HNO3 BLANK | 229828-016 |
| KCL BLANK | 229828-017 |
| HNO3/H2O2 BLANK | 229828-018 |
| KMNO4/H2SO4 BLANK | 229828-019 |
| HYD BLANK | 229828-020 |
| FILTER BLANK | 229828-021 |
| FB-HG FILTER | 229828-022 |
| FB-HG FH/PW | 229828-023 |
| FB-HG BH/KCL | 229828-024 |
| FB-HG HNO3/H2O2 | 229828-025 |
| FB-HG KMNO4/H2SO4 | 229828-026 |

This data package has been reviewed for technical correctness and completeness. Release of this data has been authorized by the Laboratory Manager or the Manager's designee, as verified by the following signature. The results contained in this report meet all requirements of NELAC and pertain only to those samples which were submitted for analysis. This report may be reproduced only in its entirety.

Signature: Desirée N. Tétrault
Project Manager

Date: 08/10/2011

NELAP # 01107CA

Curtis & Tompkins, Ltd.

# CASE NARRATIVE

| | |
|---|---|
| Laboratory number: | **229828** |
| Client: | **Delta Air Quality Services** |
| Location: | **2F-7 Stack** |
| Request Date: | **07/29/11** |
| Samples Received: | **07/11/11** |

This data package contains sample and QC results for twenty one air samples, requested for the above referenced project on 07/29/11. The samples were received intact.

**Metals (EPA 7470A):**

No analytical problems were encountered.

229828



CHAIN OF CUSTODY

CLIENT: ICR 2F-7

TEST DATE(S): 6/30/2011 7/1/2011

LOCATION: FCC

SAMPLER(S): SS

SAMPLE LOCATION: 2F-7 Stack

PROJECT MANAGER: Ali Aleshakir

TEST METHOD(S): ASTM D6784-02

DATE DUE: 7/15/2011

OUTSIDE LAB REQUIRED?: Yes

COMPLIANCE TEST? No

| DATE | TIME | TEST # | SAMPLE DESCRIPTION | CONTAINERS | SAMPLER | COMMENTS |
|---|---|---|---|---|---|---|
| 6/30/2011 | 10:20 | 1-Hg | Filter | 1 | SS | Filter |
| 6/30/2011 | 10:20 | 1-Hg | Noz/Prbe/F½ Filter | 1 | SS | .1N HNO3 |
| 6/30/2011 | 10:20 | 1-Hg 1 | B½ Filter/KCl Impinger | 1 | SS | KMnO4/HNO3 |
| 6/30/2011 | 10:20 | 1-Hg | HNO3/H2O2 Impinger | 1 | SS | .1N HNO3 |
| 6/30/2011 | 10:20 | 1-Hg | KMnO4/H2SO4 Impinger | 1 | SS | .1N HNO3/hydroxylamine |
| 6/30/2011 | 16:00 | 2-Hg | Filter | 1 | SS | Filter |
| 6/30/2011 | 16:00 | 2-Hg | Noz/Prbe/F½ Filter | 1 | SS | .1N HNO3 |
| 6/30/2011 | 16:00 | 2-Hg 2 | B½ Filter/KCl Impinger | 1 | SS | KMnO4/HNO3 |
| 6/30/2011 | 16:00 | 2-Hg | HNO3/H2O2 Impinger | 1 | SS | .1N HNO3 |
| 6/30/2011 | 16:00 | 2-Hg | KMnO4/H2SO4 Impinger | 1 | SS | .1N HNO3/hydroxylamine |
| 7/1/2011 | 15:00 | 3-Hg | Filter | 1 | SS | Filter |
| 7/1/2011 | 15:00 | 3-Hg | Noz/Prbe/F½ Filter | 1 | SS | .1N HNO3 |
| 7/1/2011 | 15:00 | 3-Hg 3 | B½ Filter/KCl Impinger | 1 | SS | KMnO4/HNO3 |
| 7/1/2011 | 15:00 | 3-Hg | HNO3/H2O2 Impinger | 1 | SS | .1N HNO3 |
| 7/1/2011 | 15:00 | 3-Hg | KMnO4/H2SO4 Impinger | 1 | SS | .1N HNO3/hydroxylamine |
| 6/30/2011 | 12:00 | HNO3-Blank | 50ml .1N HNO3 | 1 | JP | .1N HNO3 |
| 6/30/2011 | 12:00 | KCl-Blank 4 | 50ml 1N KCl | 1 | JP | 1N KCl |
| 6/30/2011 | 12:00 | HNO3/H2O2-Blank | 50ml 5% HNO3/10% H2O2 | 1 | JP | 5% HNO3/10% H2O2 |
| 6/30/2011 | 12:00 | KMnO4/H2SO4-Blank | 50ml 4% KMnO4/10% H2SO4 | 1 | JP | 4% KMnO4/10% H2SO4 |
| 6/30/2011 | 12:00 | hyd-Blank | 100ml 10% hydryoxylamine | 1 | JP | 10% hydryoxylamine |
| 6/30/2011 | 12:00 | Filter-Blank-1 | Tared Quartz Filter | 1 | JP | Unused Tared Quartz Filter |
| 6/30/2011 | 12:00 | Filter-Blank-2 | Tared Quartz Filter | 1 | JP | Unused Tared Quartz Filter |
| 6/30/2011 | 12:00 | Filter-Blank-3 | Tared Quartz Filter | 1 | JP | Unused Tared Quartz Filter |
| 6/30/2011 | 12:00 | FB-Hg | Filter | 1 | SS | Filter |
| 6/30/2011 | 12:00 | FB-Hg | Noz/Prbe/F½ Filter | 1 | SS | .1N HNO3 |
| 6/30/2011 | 12:00 | FB-Hg 5 | B½ Filter/KCl Impinger | 1 | SS | KMnO4/HNO3 |
| 6/30/2011 | 12:00 | FB-Hg | HNO3/H2O2 Impinger | 1 | SS | .1N HNO3 |
| 6/30/2011 | 12:00 | FB-Hg | KMnO4/H2SO4 Impinger | 1 | SS | .1N HNO3/hydroxylamine |
| | | Total Samples | | 28 | | |
| Reagent: | | | | | | |
| Reagent Lot #'s: | | | | | | |

| RELEASED BY | DATE/TIME | RECEIVED BY | DATE/TIME |
|---|---|---|---|
| | 7/2/11 12:15 | | 7/6/11 0800 |
| | | | 7-11-11 0900 |

ANALYSIS REQUIRED:

Delta

**COOLER RECEIPT CHECKLIST**

Curtis & Tompkins, Ltd.

Login # D9828 Date Received 7/11/11 Number of coolers 1
Client Delta Project

Date Opened 7/11/11 By (print) R. Parris (sign)
Date Logged in 7/29/11 By (print) Vidya Qureshi (sign)

1. Did cooler come with a shipping slip (airbill, etc) YES NO
   Shipping info GSO 104394096

2A. Were custody seals present? .... ☐ YES (circle) on cooler on samples ☒ NO
   How many Name Date
2B. Were custody seals intact upon arrival? YES NO N/A
3. Were custody papers dry and intact when received? YES NO
4. Were custody papers filled out properly (ink, signed, etc)? YES NO
5. Is the project identifiable from custody papers? (If so fill out top of form) YES NO
6. Indicate the packing in cooler: (if other, describe)

☒ Bubble Wrap ☐ Foam blocks ☒ Bags ☐ None
☐ Cloth material ☐ Cardboard ☐ Styrofoam ☐ Paper towels

7. Temperature documentation: * Notify PM if temperature exceeds 6°C

Type of ice used: ☐ Wet ☒ Blue/Gel ☐ None Temp(°C)

☒ Samples Received on ice & cold without a temperature blank

☐ Samples received on ice directly from the field. Cooling process had begun

8. Were Method 5035 sampling containers present? YES NO
   If YES, what time were they transferred to freezer?
9. Did all bottles arrive unbroken/unopened? YES NO
10. Are samples in the appropriate containers for indicated tests? YES NO
11. Are sample labels present, in good condition and complete? YES NO
12. Do the sample labels agree with custody papers? YES NO
13. Was sufficient amount of sample sent for tests requested? YES NO
14. Are the samples appropriately preserved? YES NO N/A
15. Did you check preservatives for all bottles for each sample? YES NO N/A
16. Did you document your preservative check? YES NO N/A
17. Did you change the hold time in LIMS for unpreserved VOAs? YES NO N/A
18. Are bubbles > 6mm absent in VOA samples? YES NO N/A
19. Was the client contacted concerning this sample delivery? YES NO
   If YES, Who was called? By Date:

COMMENTS

Rev 8, 6/11

Curtis & Tompkins, Ltd.

## Mercury by Thermal Decomposition AA

| | | | |
|---|---|---|---|
| Lab #: | 229828 | Location: | 2F-7 Stack |
| Client: | Delta Air Quality Services | Prep: | METHOD |
| Project#: | STANDARD | Analysis: | EPA 7470A |
| Analyte: | Mercury | Received: | 07/11/11 |
| Matrix: | Air | Prepared: | 08/09/11 |
| Units: | ug/s | Analyzed: | 08/09/11 |
| Diln Fac: | 1.000 | | |

| Field ID | Type | Lab ID | Result | RL | Batch# | Sampled |
|---|---|---|---|---|---|---|
| 1-HG FH/PW | SAMPLE | 229828-002 | ND | 0.020 | 177630 | 06/30/11 |
| 1-HG BH/KCL | SAMPLE | 229828-003 | ND | 0.74 | 177631 | 06/30/11 |
| 1-HG HNO3/H2O2 | SAMPLE | 229828-004 | ND | 0.32 | 177633 | 06/30/11 |
| 1-HG KMNO4/H2SO4 | SAMPLE | 229828-005 | 1.6 | 0.62 | 177635 | 06/30/11 |
| 2-HG FH/PW | SAMPLE | 229828-007 | 0.021 | 0.020 | 177630 | 06/30/11 |
| 2-HG BH/KCL | SAMPLE | 229828-008 | ND | 0.66 | 177631 | 06/30/11 |
| 2-HG HNO3/H2O2 | SAMPLE | 229828-009 | ND | 0.28 | 177633 | 06/30/11 |
| 2-HG KMNO4/H2SO4 | SAMPLE | 229828-010 | 1.2 | 0.66 | 177635 | 06/30/11 |
| 3-HG FH/PW | SAMPLE | 229828-012 | ND | 0.020 | 177630 | 07/01/11 |
| 3-HG BH/KCL | SAMPLE | 229828-013 | ND | 0.66 | 177631 | 07/01/11 |
| 3-HG HNO3/H2O2 | SAMPLE | 229828-014 | ND | 0.31 | 177633 | 07/01/11 |
| 3-HG KMNO4/H2SO4 | SAMPLE | 229828-015 | ND | 0.62 | 177635 | 07/01/11 |
| HNO3 BLANK | SAMPLE | 229828-016 | ND | 0.020 | 177630 | 06/30/11 |
| KCL BLANK | SAMPLE | 229828-017 | ND | 0.056 | 177631 | 06/30/11 |
| HNO3/H2O2 BLANK | SAMPLE | 229828-018 | ND | 0.14 | 177633 | 06/30/11 |
| KMNO4/H2SO4 BLANK | SAMPLE | 229828-019 | ND | 0.049 | 177635 | 06/30/11 |
| HYD BLANK | SAMPLE | 229828-020 | ND | 0.020 | 177635 | 06/30/11 |
| FB-HG FH/PW | SAMPLE | 229828-023 | ND | 0.020 | 177630 | 06/30/11 |
| FB-HG BH/KCL | SAMPLE | 229828-024 | ND | 0.40 | 177631 | 06/30/11 |
| FB-HG HNO3/H2O2 | SAMPLE | 229828-025 | ND | 0.27 | 177633 | 06/30/11 |
| FB-HG KMNO4/H2SO4 | SAMPLE | 229828-026 | ND | 0.60 | 177635 | 06/30/11 |
| | BLANK | QC603517 | ND | 0.020 | 177630 | |
| | BLANK | QC603523 | ND | 0.020 | 177631 | |
| | BLANK | QC603528 | ND | 0.020 | 177633 | |
| | BLANK | QC603530 | ND | 0.020 | 177635 | |

ND= Not Detected
RL= Reporting Limit

Curtis & Tompkins, Ltd.

Batch QC Report

## Mercury by Thermal Decomposition AA

| | | | |
|---|---|---|---|
| Lab #: | 229828 | Location: | 2F-7 Stack |
| Client: | Delta Air Quality Services | Prep: | METHOD |
| Project#: | STANDARD | Analysis: | EPA 7470A |
| Analyte: | Mercury | Diln Fac: | 1.000 |
| Type: | SDUP | Received: | 07/11/11 |
| Matrix: | Air | Prepared: | 08/09/11 |
| Units: | ug/s | Analyzed: | 08/09/11 |

| Field ID | MSS Lab ID | Lab ID | MSS Result | | Result | RL | RPD | Lim | Batch# | Sampled |
|---|---|---|---|---|---|---|---|---|---|---|
| 1-HG FH/PW | 229828-002 | QC603518 | <0.02000 | ND | | 0.02000 | NC | 24 | 177630 | 06/30/11 |
| 2-HG FH/PW | 229828-007 | QC603519 | 0.02050 | ND | | 0.02000 | NC | 24 | 177630 | 06/30/11 |
| 3-HG FH/PW | 229828-012 | QC603520 | <0.02000 | ND | | 0.02000 | NC | 24 | 177630 | 07/01/11 |
| HNO3 BLANK | 229828-016 | QC603521 | <0.02000 | ND | | 0.02000 | NC | 24 | 177630 | 06/30/11 |
| FB-HG FH/PW | 229828-023 | QC603522 | <0.02000 | ND | | 0.02000 | NC | 24 | 177630 | 06/30/11 |
| 1-HG BH/KCL | 229828-003 | QC603568 | <0.7380 | ND | | 0.7380 | NC | 24 | 177631 | 06/30/11 |
| 2-HG BH/KCL | 229828-008 | QC603569 | <0.6592 | ND | | 0.6592 | NC | 24 | 177631 | 06/30/11 |
| 3-HG BH/KCL | 229828-013 | QC603570 | <0.6631 | ND | | 0.6631 | NC | 24 | 177631 | 07/01/11 |
| KCL BLANK | 229828-017 | QC603571 | <0.05602 | ND | | 0.05602 | NC | 24 | 177631 | 06/30/11 |
| FB-HG BH/KCL | 229828-024 | QC603572 | <0.3968 | ND | | 0.3968 | NC | 24 | 177631 | 06/30/11 |
| 1-HG HNO3/H2O2 | 229828-004 | QC603563 | <0.3205 | ND | | 0.3205 | NC | 24 | 177633 | 06/30/11 |
| ·HG HNO3/H2O2 | 229828-009 | QC603564 | <0.2762 | ND | | 0.2762 | NC | 24 | 177633 | 06/30/11 |
| ·HG HNO3/H2O2 | 229828-014 | QC603565 | <0.3145 | ND | | 0.3145 | NC | 24 | 177633 | 07/01/11 |
| HNO3/H2O2 BLANK | 229828-018 | QC603566 | <0.1381 | ND | | 0.1381 | NC | 24 | 177633 | 06/30/11 |
| FB-HG HNO3/H2O2 | 229828-025 | QC603567 | <0.2660 | ND | | 0.2660 | NC | 24 | 177633 | 06/30/11 |
| 1-HG KMNO4/H2SO4 | 229828-005 | QC603573 | 1.606 | | 1.966 | 0.6211 | 20 | 24 | 177635 | 06/30/11 |
| 2-HG KMNO4/H2SO4 | 229828-010 | QC603574 | 1.234 | | 1.365 | 0.6579 | 10 | 24 | 177635 | 06/30/11 |
| 3-HG KMNO4/H2SO4 | 229828-015 | QC603575 | <0.6211 | ND | | 0.6211 | NC | 24 | 177635 | 07/01/11 |
| KMNO4/H2SO4 BLANK | 229828-019 | QC603576 | <0.04902 | ND | | 0.04902 | NC | 24 | 177635 | 06/30/11 |
| HYD BLANK | 229828-020 | QC603577 | <0.02000 | ND | | 0.02000 | NC | 24 | 177635 | 06/30/11 |
| FB-HG KMNO4/H2SO4 | 229828-026 | QC603578 | <0.5988 | ND | | 0.5988 | NC | 24 | 177635 | 06/30/11 |

NC= Not Calculated
ND= Not Detected
= Reporting Limit
= Relative Percent Difference

AVERAGE HEXAVALENT CHROMIUM EMISSIONS

CLIENT: ExxonMobil

| NAME | ug/dscm | | ug/dscm at 7% O2 | | ug/dscf | | lb/hr | |
|---|---|---|---|---|---|---|---|---|
| Hexavalent Chromium | ND < | 0.127 | ND < | 0.111 | ND < | 3.60E-03 | ND < | 1.13E-04 |

HEXAVALENT CHROMIUM CALCULATIONS

| | | | |
|---|---|---|---|
| CLIENT: | ExxonMobil | | AA |
| TEST NUMBER: | 1-Cr | VMSTD(DSCF): | 124.69 |
| TEST DATE: | 6/30/2011 | QSD(DSCF/MIN): | 245224 |
| T REF (F) | 68 | CO2,%: | 14.03 |
| | | O2,%: | 5.06 |

| NAME | ug/train | ug/dscm | ug/dscm at 7% O2 | ug/dscf | lb/hr |
|---|---|---|---|---|---|
| Hexavalent Chromium | ND < 0.406 | ND < 0.115 | ND < 0.101 | ND < 3.26E-03 | ND < 1.06E-04 |

HEXAVALENT CHROMIUM CALCULATIONS

| | | | |
|---|---|---|---|
| CLIENT: | ExxonMobil | | AA |
| TEST NUMBER: | 2-Cr | VMSTD(DSCF): | 123.88 |
| TEST DATE: | 6/30/2011 | QSD(DSCF/MIN): | 233757 |
| T REF (F) | 68 | CO2,%: | 14.08 |
| | | O2,%: | 5.06 |

| NAME | ug/train | ug/dscm | ug/dscm at 7% O2 | ug/dscf | lb/hr |
|---|---|---|---|---|---|
| Hexavalent Chromium | ND < 0.460 | ND < 0.131 | ND < 0.115 | ND < 3.71E-03 | ND < 1.15E-04 |

HEXAVALENT CHROMIUM CALCULATIONS

| | | | |
|---|---|---|---|
| CLIENT: | ExxonMobil | INITIALS: | AA |
| TEST NUMBER: | 3-Cr | VMSTD(DSCF): | 124.84 |
| TEST DATE: | 7/1/2011 | QSD(DSCF/MIN): | 233445 |
| T REF (F) | 68 | CO2,%: | 14.31 |
| | | O2,%: | 4.91 |

| NAME | | ug/train | | ug/dscm | | ug/dscm at 7% O2 | | ug/dscf | | lb/hr |
|---|---|---|---|---|---|---|---|---|---|---|
| Hexavalent Chromium | ND < | 0.477 | ND < | 0.135 | ND < | 0.117 | ND < | 3.82E-03 | ND < | 1.18E-04 |

***Delta***
Hexavalent Chromium Summary

| | | | | | |
|---|---|---|---|---|---|
| Client/Location..... | ExxonMobil | | | Reference Temp (F): | 68 |
| | | | | Fuel..... | Refinery |
| Sample Location..... | FCC 2F-7 Stack | | | Data By..... | AA |
| Test No..... | 1-Cr | 2-Cr | 3-Cr | Average | |
| Date..... | June 30, 2011 | June 30, 2011 | July 1, 2011 | * | |
| Start/Stop Time..... | 1019/1435 | 1554/2002 | 1500/1902 | * | |
| Bar Press (in Hg)..... | 29.85 | 29.85 | 29.74 | * | |
| Test Method..... | SW-846 0061 | SW-846 0061 | SW-846 0061 | * | |
| Sample Time (Min)..... | 192 | 192 | 192 | * | |
| Sample Train..... | 6WCS | 6WCS | 6WCS | * | |
| Meter Cal Factor..... | 0.993 | 0.993 | 0.993 | * | |
| Pitot Factor ..... | 0.84 | 0.84 | 0.84 | * | |
| Nozzle Diam (in)..... | 0.220 | 0.220 | 0.220 | * | |
| Stack Area (sq ft)..... | 94.31 | 94.31 | 94.31 | | |
| Stack O2 (%)..... | 5.06 | 5.06 | 4.91 | 5.01 | |
| Stack CO2 (%)..... | 14.03 | 14.08 | 14.31 | 14.14 | |
| Stack Press (iwg)..... | -1.30 | -1.30 | -1.30 | -1.30 | |
| Stack Temp (F)..... | 478.3 | 477.5 | 479.0 | 478.3 | |
| Vel Head (iwg)..... | 1.37 | 1.27 | 1.32 | 1.32 | |
| Meter Temp (F)..... | 83 | 79 | 83 | 82 | |
| Meter Press (iwg)..... | 1.49 | 1.41 | 1.44 | 1.45 | |
| Meter Vol (acf)..... | 129.006 | 127.218 | 129.723 | 128.65 | |
| Liquid Vol (ml)..... | 341.1 | 385.0 | 448.0 | 391.4 | |
| Std Sample Vol (SCF)..... | 124.691 | 123.884 | 124.836 | 124.47 | |
| Std Sample Vol (SCM)..... | 3.531 | 3.508 | 3.535 | 3.525 | |
| Moisture Fraction..... | 0.114 | 0.128 | 0.145 | 0.129 | |
| Stack Gas Mol Wt..... | 29.02 | 28.86 | 28.68 | 28.85 | |
| Stack Gas Velocity (ft/sec)..... | 87.46 | 84.59 | 86.61 | 86.22 | |
| Isokinetic Ratio (%)..... | 94.6 | 98.6 | 99.5 | 97.5 | |
| Stack Flow Rate (wacfm)..... | 494,915 | 478,685 | 490,102 | 487,900 | |
| Stack Flow Rate (wscfm)..... | 276,887 | 268,045 | 272,987 | 272,640 | |
| Stack Flow Rate (dscfm)..... | 245,224 | 233,757 | 233,445 | 237,475 | |
| Stack Flow Rate (mdscf/h)..... | 147.13 | 140.25 | 140.07 | 142.49 | |

| Hex Chrome Test Sample Data | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Client/Location: | | ExxonMobil | | | | | | Sample Location: | | | 2F-7 Stack |
| Unit: | | FCC | | | | | | Data By: | | | AA |
| Test No: | 1-Cr | ISO | Assumed Moisture | | Sample Factor | | Delta H = | 1.08 | x Delta P | | |
| Date: | 6/30/2011 | 94.6 | 14 | | | Time per Point = | | 8 | Static Pressure = | | -1.30 |
| Port | Point | Time | Meter Volume | Delta P | Factor | Delta H | Stack Temp. | Meter In | Meter Out | Probe | Vacuum |
| A | 6 | 10:19:00 | 958.186 | 1.30 | 1.08 | 1.41 | 478 | 84 | 83 | N/A | 4 |
| A | 5 | 10:27:00 | 963.400 | 1.10 | 1.08 | 1.19 | 478 | 86 | 83 | N/A | 4 |
| A | 4 | 10:35:00 | 968.100 | 1.10 | 1.08 | 1.19 | 478 | 91 | 89 | N/A | 4 |
| A | 3 | 10:43:00 | 973.400 | 1.10 | 1.08 | 1.19 | 479 | 92 | 88 | N/A | 4 |
| A | 2 | 10:51:00 | 977.800 | 1.00 | 1.08 | 1.08 | 479 | 89 | 86 | N/A | 4 |
| A | 1 | 10:59:00 | 983.000 | 0.85 | 1.08 | 0.92 | 479 | 87 | 85 | N/A | 4 |
| | Stop | 11:07:00 | 987.405 | | | | | | | | |
| B | 6 | 11:14:00 | 987.405 | 1.30 | 1.08 | 1.41 | 479 | 85 | 82 | N/A | 4 |
| B | 5 | 11:22:00 | 992.500 | 1.30 | 1.08 | 1.41 | 479 | 85 | 82 | N/A | 4 |
| B | 4 | 11:30:00 | 997.800 | 1.30 | 1.08 | 1.41 | 475 | 85 | 83 | N/A | 4 |
| B | 3 | 11:38:00 | 1003.100 | 1.20 | 1.08 | 1.30 | 478 | 86 | 83 | N/A | 4 |
| B | 2 | 11:46:00 | 1008.340 | 1.00 | 1.08 | 1.08 | 477 | 84 | 82 | N/A | 4 |
| B | 1 | 11:54:00 | 1013.100 | 0.85 | 1.08 | 0.92 | 476 | 84 | 82 | N/A | 4 |
| | Stop | 12:02:00 | 1016.464 | | | | | | | | |
| C | 6 | 12:50:00 | 1016.464 | 1.40 | 1.08 | 1.51 | 478 | 83 | 82 | N/A | 5 |
| C | 5 | 12:58:00 | 1021.950 | 1.50 | 1.08 | 1.62 | 479 | 84 | 81 | N/A | 5 |
| C | 4 | 13:06:00 | 1027.600 | 1.70 | 1.08 | 1.84 | 479 | 82 | 79 | N/A | 5 |
| C | 3 | 13:14:00 | 1034.300 | 1.70 | 1.08 | 1.84 | 479 | 83 | 81 | N/A | 5 |
| C | 2 | 13:22:00 | 1039.800 | 1.70 | 1.08 | 1.84 | 479 | 82 | 81 | N/A | 5 |
| C | 1 | 13:30:00 | 1046.100 | 1.10 | 1.08 | 1.19 | 479 | 82 | 80 | N/A | 5 |
| | Stop | 13:38:00 | 1051.220 | | | | | | | | |
| D | 6 | 13:47:00 | 1051.220 | 1.70 | 1.08 | 1.84 | 479 | 82 | 80 | N/A | 6 |
| D | 5 | 13:55:00 | 1056.800 | 1.80 | 1.08 | 1.95 | 479 | 82 | 80 | N/A | 6 |
| D | 4 | 14:03:00 | 1063.500 | 1.90 | 1.08 | 2.05 | 479 | 82 | 79 | N/A | 6 |
| D | 3 | 14:11:00 | 1069.500 | 2.00 | 1.08 | 2.16 | 479 | 82 | 79 | N/A | 6 |
| D | 2 | 14:19:00 | 1075.500 | 2.00 | 1.08 | 2.16 | 478 | 81 | 78 | N/A | 6 |
| D | 1 | 14:27:00 | 1081.900 | 1.20 | 1.08 | 1.30 | 478 | 81 | 78 | N/A | 6 |
| | Stop | 14:35:00 | 1087.192 | | | | | | | | |
| **Total/Average** | | **192** | **129.006** | **1.3693** | | **1.49** | **478** | **84** | **82** | **#DIV/0!** | **5** |

| Hex Chrome Test Sample Data | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Client/Location: | | ExxonMobil | | | | | | Sample Location: | | | 2F-7 Stack |
| Unit: | | FCC | | | | | | Data By: | | | AA |
| Test No: | 2-Cr | ISO | Moisture | | Sample Factor | | Delta H = | 1.08 | x Delta P | | |
| Date: | 6/30/2011 | 98.6 | 14 | | | Time per Point = | | 8 | Static Pressure = | | -1.3 |
| Port | Point | Time | Meter Volume | Delta P | Factor | Delta H | Stack Temp. | Meter In | Meter Out | Probe | Vacuum |
| A | 6 | 15:54:00 | 90.100 | 1.50 | 1.08 | 1.62 | 479 | 84 | 81 | N/A | 5 |
| A | 5 | 16:02:00 | 95.700 | 1.60 | 1.08 | 1.73 | 479 | 84 | 79 | N/A | 5 |
| A | 4 | 16:10:00 | 101.500 | 1.70 | 1.08 | 1.84 | 479 | 86 | 82 | N/A | 5 |
| A | 3 | 16:18:00 | 107.600 | 1.80 | 1.08 | 1.95 | 479 | 89 | 84 | N/A | 5 |
| A | 2 | 16:26:00 | 113.800 | 1.80 | 1.08 | 1.95 | 479 | 86 | 81 | N/A | 5 |
| A | 1 | 16:34:00 | 119.800 | 1.20 | 1.08 | 1.30 | 478 | 86 | 81 | N/A | 7 |
| | Stop | 16:42:00 | 125.175 | | | | | | | | |
| B | 6 | 16:46:00 | 125.175 | 1.40 | 1.08 | 1.51 | 478 | 82 | 79 | N/A | 6 |
| B | 5 | 16:54:00 | 130.500 | 1.60 | 1.08 | 1.73 | 479 | 85 | 82 | N/A | 6 |
| B | 4 | 17:02:00 | 136.300 | 1.70 | 1.08 | 1.84 | 478 | 85 | 81 | N/A | 6 |
| B | 3 | 17:10:00 | 142.400 | 1.20 | 1.08 | 1.30 | 479 | 85 | 82 | N/A | 6 |
| B | 2 | 17:18:00 | 147.900 | 1.40 | 1.08 | 1.51 | 478 | 86 | 82 | N/A | 6 |
| B | 1 | 17:26:00 | 153.300 | 1.40 | 1.08 | 1.51 | 479 | 85 | 79 | N/A | 6 |
| | Stop | 17:34:00 | 158.620 | | | | | | | | |
| C | 6 | 18:21:00 | 158.620 | 1.30 | 1.08 | 1.41 | 478 | 79 | 76 | N/A | 8 |
| C | 5 | 18:29:00 | 163.700 | 1.30 | 1.08 | 1.41 | 479 | 77 | 75 | N/A | 8 |
| C | 4 | 18:37:00 | 169.200 | 1.30 | 1.08 | 1.41 | 477 | 77 | 74 | N/A | 8 |
| C | 3 | 18:45:00 | 174.800 | 1.20 | 1.08 | 1.30 | 476 | 75 | 74 | N/A | 8 |
| C | 2 | 18:53:00 | 179.700 | 1.10 | 1.08 | 1.19 | 478 | 75 | 74 | N/A | 8 |
| C | 1 | 19:01:00 | 184.400 | 0.80 | 1.08 | 0.87 | 474 | 76 | 75 | N/A | 5 |
| | Stop | 19:09:00 | 189.985 | | | | | | | | |
| D | 6 | 19:14:00 | 189.985 | 1.10 | 1.08 | 1.19 | 476 | 76 | 73 | N/A | 6 |
| D | 5 | 19:22:00 | 193.900 | 1.00 | 1.08 | 1.08 | 475 | 76 | 74 | N/A | 6 |
| D | 4 | 19:30:00 | 198.900 | 1.10 | 1.08 | 1.19 | 475 | 75 | 73 | N/A | 6 |
| D | 3 | 19:38:00 | 203.700 | 1.10 | 1.08 | 1.19 | 475 | 75 | 72 | N/A | 6 |
| D | 2 | 19:46:00 | 208.600 | 0.90 | 1.08 | 0.97 | 476 | 75 | 73 | N/A | 6 |
| D | 1 | 19:54:00 | 213.000 | 0.80 | 1.08 | 0.87 | 477 | 74 | 72 | N/A | 6 |
| | Stop | 20:02:00 | 217.318 | | | | | | | | |
| **Total/Average** | | **192** | **127.218** | **1.2749** | | **1.41** | **478** | **81** | **77** | | |

| Hex Chrome Test Sample Data | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Client/Location: | | ExxonMobil | | | | | | Sample Location: | | | 2F-7 Stack |
| Unit: | | FCC | | | | | | Data By: | | | AA |
| Test No: | 3-Cr | ISO | Moisture | | Sample Factor | | Delta H = | 1.08 | x Delta P | | |
| Date: | 7/1/2011 | 99.5 | 14 | | | Time per Point = | | 8 | Static Pressure = | | -1.3 |
| Port | Point | Time | Meter Volume | Delta P | Factor | Delta H | Stack Temp. | Meter In | Meter Out | Probe | Vacuum |
| A | 6 | 15:00:00 | 219.325 | 1.10 | 1.08 | 1.19 | 480 | 82 | 79 | N/A | 6 |
| A | 5 | 15:08:00 | 224.300 | 1.10 | 1.08 | 1.19 | 480 | 85 | 79 | N/A | 6 |
| A | 4 | 15:16:00 | 229.500 | 1.10 | 1.08 | 1.19 | 481 | 85 | 80 | N/A | 6 |
| A | 3 | 15:24:00 | 234.300 | 0.95 | 1.08 | 1.03 | 480 | 88 | 80 | N/A | 6 |
| A | 2 | 15:32:00 | 239.300 | 0.90 | 1.08 | 0.97 | 481 | 89 | 85 | N/A | 6 |
| A | 1 | 15:40:00 | 244.000 | 0.75 | 1.08 | 0.81 | 481 | 89 | 85 | N/A | 6 |
| | Stop | 15:48:00 | 248.200 | | | | | | | | |
| B | 6 | 15:54:00 | 248.200 | 1.20 | 1.08 | 1.30 | 481 | 87 | 83 | N/A | 6 |
| B | 5 | 16:02:00 | 253.200 | 1.20 | 1.08 | 1.30 | 480 | 85 | 82 | N/A | 6 |
| B | 4 | 16:10:00 | 258.300 | 1.20 | 1.08 | 1.30 | 481 | 90 | 85 | N/A | 9 |
| B | 3 | 16:18:00 | 263.600 | 1.30 | 1.08 | 1.41 | 480 | 88 | 83 | N/A | 9 |
| B | 2 | 16:26:00 | 269.200 | 1.10 | 1.08 | 1.19 | 480 | 87 | 84 | N/A | 9 |
| B | 1 | 16:34:00 | 274.000 | 0.85 | 1.08 | 0.92 | 479 | 88 | 83 | N/A | 9 |
| | Stop | 16:42:00 | 278.532 | | | | | | | | |
| C | 6 | 17:22:00 | 278.532 | 1.70 | 1.08 | 1.84 | 477 | 80 | 82 | N/A | 9 |
| C | 5 | 17:30:00 | 284.200 | 1.80 | 1.08 | 1.95 | 477 | 84 | 79 | N/A | 9 |
| C | 4 | 17:38:00 | 290.600 | 1.90 | 1.08 | 2.05 | 477 | 83 | 78 | N/A | 9 |
| C | 3 | 17:46:00 | 296.800 | 1.90 | 1.08 | 2.05 | 477 | 83 | 78 | N/A | 9 |
| C | 2 | 17:54:00 | 303.300 | 1.80 | 1.08 | 1.95 | 478 | 83 | 79 | N/A | 9 |
| C | 1 | 18:02:00 | 309.200 | 1.40 | 1.08 | 1.51 | 478 | 84 | 80 | N/A | 9 |
| | Stop | 18:10:00 | 314.843 | | | | | | | | |
| D | 6 | 18:14:00 | 314.843 | 1.40 | 1.08 | 1.51 | 478 | 84 | 81 | N/A | 8 |
| D | 5 | 18:22:00 | 320.200 | 1.50 | 1.08 | 1.62 | 479 | 86 | 81 | N/A | 8 |
| D | 4 | 18:30:00 | 326.000 | 1.50 | 1.08 | 1.62 | 478 | 86 | 81 | N/A | 8 |
| D | 3 | 18:38:00 | 331.800 | 1.50 | 1.08 | 1.62 | 478 | 86 | 81 | N/A | 8 |
| D | 2 | 18:46:00 | 337.700 | 1.50 | 1.08 | 1.62 | 477 | 86 | 81 | N/A | 8 |
| D | 1 | 18:54:00 | 343.700 | 1.30 | 1.08 | 1.41 | 478 | 86 | 82 | N/A | 8 |
| | Stop | 19:02:00 | 349.048 | | | | | | | | |
| **Total/Average** | | **192** | **129.723** | **1.32** | | **1.44** | **479** | **86** | **81** | | |
| | | | | | | | | **83** | | | |

Delta Air Quality Services, Incorporated

# WET CHEMICAL SAMPLING SYSTEM DATA AND WORKSHEET

CLIENT: Exxon Mobil
LOCATION: FCC / 2F-7 Stack
DATE: 6/30/11
RUN NO: FB-C5
OPERATOR: JP
METER BOX NO: 6WC5
METER ΔH@: 0.577
METER Yd: 0.993
STACK AREA, FT²:
TRAVERSE POINTS, MIN/POINT:
ΔH= _____ X ΔP:
Probe Condition, pre/post test:
Silica Gel Expended, Y/N:
Filter Condition after Test:
Check Weight:

AMBIENT TEMPERATURE: 75
BAROMETRIC PRESSURE: 29.55
ASSUMED MOISTURE: 14%
PITOT TUBE COEFF, Cp: 0.84
PROBE ID NO/MATERIAL: GLASS
PROBE LENGTH: 6'
NOZZLE ID NO/ MATERIAL: GLASS 0.220
NOZZLE DIAMETER: 0.220
FILTER NO/TYPE: —
PRE-TEST LEAK RATE: : _____ CFM@ _____ in. Hg.
POST-TEST LEAK RATE: : _____ CFM@ _____ in. Hg.
PITOT LEAK CHECK - PRE: _____ POST: _____
CHAIN OF CUSTODY: SAMPLE CUSTODIAN JP
SAMPLER JP
SAMPLE CUSTODIAN JP

| Imp. # | Contents | Post-Test - Pre-Test = Difference | |
|---|---|---|---|
| 1 | KOH | ~~824.7~~ 818.0 | |
| 2 | KOH | 565.0 | |
| 3 | KOH | 575.0 | |
| 4 | MT | 493.3 | |
| 5 | SG | 982.4 | |
| Total: | | | |

| Point | Time | Meter Volume, ft³ | ΔP in. $H_2O$ | ΔH in. $H_2O$ | Stack Temp, °F | Probe Temp, °F | Filter Temp, °F | Imp. Out Temp, °F | Meter Temp, °F In | Meter Temp, °F Out | Vacuum in. Hg. | $O_2$ % | Pstatic in. $H_2O$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | |
| Average: | | | | | | | | | | | | | |

Comments:

C.10-10

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# WET CHEMICAL SAMPLING SYSTEM DATA AND WORKSHEET

CLIENT: Exxon Mobil
LOCATION: FCC / 2F-7 Stack
DATE: 6/30/11
RUN NO: 1-Cr
OPERATOR: Dave Wonderly
METER BOX NO: 6-405
METER ΔH@: 1.642
METER Yd: 0.993
STACK AREA, FT²: ✓
TRAVERSE POINTS, MIN/POINT: 8 x 24
ΔH= 1.08 X ΔP:
Probe Condition, pre/post test: ✓
Silica Gel Expended, Y/N: ✓
Filter Condition after Test: ✓
Check Weight: ✓

AMBIENT TEMPERATURE: 75
BAROMETRIC PRESSURE: 29.85
ASSUMED MOISTURE: 11
PITOT TUBE COEFF, Cp: 0.84
PROBE ID NO/MATERIAL: glass
PROBE LENGTH: 6'
NOZZLE ID NO/ MATERIAL: 3/ glass
NOZZLE DIAMETER: 0.[illegible]
FILTER NO/TYPE: —
PRE-TEST LEAK RATE: : 0.002 CFM@ 12 in. Hg.
POST-TEST LEAK RATE: : 0.001 CFM@ 12 in. Hg.
PITOT LEAK CHECK - PRE: ok POST: ok
CHAIN OF CUSTODY: SAMPLE CUSTODIAN SP
SAMPLER [illegible]
SAMPLE CUSTODIAN SP

| Imp. # | Contents | Post-Test | Pre-Test | Difference |
|---|---|---|---|---|
| 1 | KOH | 823.8 | 822.0 | 1.8 |
| 2 | KOH | 678.8 | 572.3 | 106.5 |
| 3 | KOH | 673.6 | 629.3 | 44.3 |
| 4S | SG | 980.2 | 899.6 | 80.6 |
| 4 | MT | 700.0 | 492.1 | 207.9 |
| Total: | LR-100 | | | -100 |
| | | | | 341.1 |

| Point | Time | Meter Volume, ft³ | ΔP in. H₂O | ΔH in. H₂O | Stack Temp, °F | Probe Temp, °F | Filter Temp, °F | Imp. Out Temp, °F | Meter Temp, °F In | Meter Temp, °F Out | Vacuum in. Hg. | O₂ % | Pstatic in. H₂O |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| E 6 | 1019 | 958.186 | ~~1.0~~ 1.3 | ~~1.40~~ 1.4 | 478 | | | 66 | 84 | 83 | 4 | | -.3 |
| 5 | 1027 | 963.4 | 1.1 | 1.2 | 478 | | | 65 | 86 | 83 | 4 | | |
| 4 | 1035 | 968.1 | 1.1 | 1.2 | 478 | | | 64 | 91 | 85 | 4 | | |
| 3 | 1043 | 973.4 | 1.1 | 1.2 | 479 | | | 62 | 92 | 88 | 4 | | |
| 2 | 1051 | 977.8 | 1.0 | 1.1 | 479 | | | 62 | 89 | 86 | 4 | | |
| 1 | 1059 | 987 | 0.85 | 0.91 | 479 | | | 62 | 87 | 85 | 4 | | |
| stop | 1107 | 987.405 | | | | | | ~~61~~ | ~~85~~ | ~~82~~ | ~~4~~ | | |
| | | | | | | | | | | | | | |
| S 6 | 1114 | 987.405 | 1.3 | 1.4 | 479 | | | 61 | 85 | 82 | 4 | | |
| 5 | 1122 | 992.5 | 1.3 | 1.4 | 479 | | | 61 | 85 | 82 | 4 | | |
| 4 | 1130 | 997.8 | 1.3 | 1.4 | 479 | | | 61 | 85 | 83 | 4 | | |
| 3 | 1138 | 1003.1 | 1.2 | 1.3 | 478 | | | 60 | 86 | 83 | 4 | | |
| 2 | 1146 | 1008.74 | 1.0 | 1.1 | 477 | | | 60 | 84 | 82 | 4 | | |
| 1 | 1154 | 1013.1 | 0.85 | 0.91 | 476 | | | 60 | 84 | 82 | 4 | | |
| stop | 1200 | 1016.464 | | | | | | | | | | | |
| Average: | | | | | | | | | | | | | |

Comments: PH Port 1 8.5
Port 2 8.5
Port 3 8.5
end 8.5

7-10-11


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# WET CHEMICAL SAMPLING SYSTEM DATA AND WORKSHEET

CLIENT: Exxon Mobil
LOCATION: FCC / 2F-7 Stack
DATE: 6/30/11
RUN NO: 1-CrG
OPERATOR:
METER BOX NO:
METER ΔH@:
METER Yd:
STACK AREA, FT$^2$:
TRAVERSE POINTS, MIN/POINT:
ΔH= _____ X ΔP:
Probe Condition, pre/post test:
Silica Gel Expended, Y/N:
Filter Condition after Test:
Check Weight:

AMBIENT TEMPERATURE:
BAROMETRIC PRESSURE:
ASSUMED MOISTURE:
PITOT TUBE COEFF, Cp:
PROBE ID NO/MATERIAL:
PROBE LENGTH:
NOZZLE ID NO/ MATERIAL:
NOZZLE DIAMETER:
FILTER NO/TYPE:
PRE-TEST LEAK RATE: : _____ CFM@ _____ in. Hg.
POST-TEST LEAK RATE: : _____ CFM@ _____ in. Hg.
PITOT LEAK CHECK - PRE: _____ POST: _____
CHAIN OF CUSTODY: SAMPLE CUSTODIAN _____
SAMPLER _____
SAMPLE CUSTODIAN _____

| Imp. # | Contents | Post-Test - Pre-Test = Difference | |
|---|---|---|---|
| | | | |
| | | | |
| | See pg 1 | | |
| | | | |
| | | | |
| Total: | | | |

| Point | Time | Meter Volume, ft$^3$ | ΔP in. $H_2O$ | ΔH in. $H_2O$ | Stack Temp, °F | Probe Temp, °F | Filter Temp, °F | Imp. Out Temp, °F | Meter Temp, °F In | Meter Temp, °F Out | Vacuum in. Hg. | $O_2$ % | Pstatic in. $H_2O$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| N 6 | 1250 | 1016.464 | 1.4 | 1.5 | 478 | | | 60 | 83 | 82 | 5 | | |
| 5 | 1258 | 1021.75 | 1.5 | 1.5 | 479 | | | 60 | 84 | 81 | 5 | | -.13 |
| 4 | 1306 | 1027.6 | 1.7 | 1.8 | 479 | | | 60 | 82 | 79 | 5 | | |
| 3 | 1314 | 1034.3 | 1.7 | 1.8 | 479 | | | 60 | 83 | 81 | 5 | | |
| 2 | 1322 | 1079.8 | 1.7 | 1.8 | 479 | | | 61 | 82 | 81 | 5 | | |
| 1 | 1330 | 1046.1 | 1.1 | 1.2 | 479 | | | 61 | 82 | 80 | 5 | | |
| stop | 1338 | 1051.220 | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| 6 | 1347 | 1051.220 | 1.7 | 1.8 | 479 | | | 61 | 82 | 80 | 6 | | |
| 5 | 1355 | 1056.8 | 1.8 | 1.9 | 475 | | | 61 | 82 | 80 | 6 | | |
| 4 | 1403 | 1063.5 | 1.9 | 1.9 | 479 | | | 60 | 82 | 79 | 6 | | |
| 3 | 1411 | 1069.5 | 2.0 | 1.9 | 479 | | | 60 | 82 | 79 | 6 | | |
| 2 | 1419 | 1075.5 | 2.0 | 1.9 | 478 | | | 61 | 81 | 78 | 6 | | |
| 1 | 1427 | 1081.9 | 1.2 | 1.3 | 478 | | | 61 | 81 | 78 | 6 | | |
| end | 1435 | 1087.192 | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
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| | | | | | | | | | | | | | |
| Average: | | | | | | | | | | | | | |

Comments:

C-1D-12

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# WET CHEMICAL SAMPLING SYSTEM DATA AND WORKSHEET

CLIENT: Exxon Mobil
LOCATION: FCC / 2F-7 Stack
DATE: 6/30/11
RUN NO: 2-Cr
OPERATOR: Dan Wunderly
METER BOX NO: 6-wet
METER ΔH@: 1.692
METER Yd: 0.993
STACK AREA, FT²: ✓
TRAVERSE POINTS, MIN/POINT: 8 x 24
ΔH= 1.08 X ΔP:
Probe Condition, pre/post test: ✓
Silica Gel Expended, Y/N: ✓
Filter Condition after Test: ✓
Check Weight: ✓

AMBIENT TEMPERATURE: 25
BAROMETRIC PRESSURE: 29.85
ASSUMED MOISTURE: 11
PITOT TUBE COEFF, Cp: 0.84
PROBE ID NO/MATERIAL: 3/4 B
PROBE LENGTH: 6'
NOZZLE ID NO/ MATERIAL: 4/8 Lass
NOZZLE DIAMETER: 0.220
FILTER NO/TYPE: -
PRE-TEST LEAK RATE: : .015 CFM@ 15 in. Hg.
POST-TEST LEAK RATE: : .015 CFM@ 15 in. Hg.
PITOT LEAK CHECK - PRE: OK POST: DW
CHAIN OF CUSTODY: SAMPLE CUSTODIAN JP
SAMPLER DW
SAMPLE CUSTODIAN JP

| Imp. # | Contents | Post-Test | Pre-Test | Difference |
|---|---|---|---|---|
| 1 | KOH | 876.4 | 780.6 | 95.8 |
| 2 | KOH | 679.9 | 569.8 | 210.1 |
| 3 | KOH | 604.9 JP | ~~639.3~~ 583.5 | 21 |
| 4 | SGMT | 727.6 | ~~813.2~~ JP 605.3 | 122 |
| 5 | SG | 848.6 | 813.2 | 35.4 |
| Total: | CR - | 100 | | 100 |

385.0

| Point | Time | Meter Volume, ft³ | ΔP in. H₂O | ΔH in. H₂O | Stack Temp, °F | Probe Temp, °F | Filter Temp, °F | Imp. Out Temp, °F | Meter Temp, °F In | Meter Temp, °F Out | Vacuum in. Hg. | O₂ % | Pstatic in. H₂O |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| W 6 | 1554 | 90.100 | 1.5 | 1.6 | 479 | | | Ice | 84 | 81 | 5 | | -1.3 |
| 5 | 1602 | 95.7 | 1.6 | 1.7 | 479 | | | 63 | 84 | 79 | 8 | | |
| 4 | 1610 | 101.5 | 1.7 | 1.8 | 479 | | | 61 | 86 | 82 | 8 | | |
| 3 | 1618 | 107.6 | 1.8 | 1.9 | 479 | | | 61 | 89 | 84 | 8 | | |
| 2 | 1626 | 113.8 | 1.8 | 1.9 | 479 | | | 60 | 86 | 81 | 8 | | |
| 1 | 1634 | 119.8 | 1.2 | 1.3 | 478 | | | 61 | 86 | 81 | 7 | | |
| Stop | 1642 | 125.175 | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| N 6 | 1646 | 125.175 | 1.4 | 1.5 | 478 | | | 60 | 82 | 79 | 6 | | |
| 5 | 1654 | 130.5 | 1.6 | 1.7 | 479 | | | 62 | 85 | 82 | 6 | | |
| 4 | 1702 | 136.3 | 1.7 | 1.8 | 478 | | | 60 | 85 | 81 | 6 | | |
| 3 | 1710 | 142.4 | 1.2 | 1.3 | 479 | | | 60 | 85 | 82 | 6 | | |
| 2 | 1718 | 147.9 | 1.4 | 1.5 | 478 | | | 61 | 86 | 82 | 6 | | |
| 1 | 1726 | 153.3 | 1.4 | 1.5 | 479 | | | 60 | 85 | 79 | 6 | | |
| | 1734 | 158.620 | | | | | | | | | | | |
| Average: | | | | | | | | | | | | | |

Comments: Reagent PH port 1 8.0
port 2 8.5
port 3 8.5
end 8.5

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# WET CHEMICAL SAMPLING SYSTEM DATA AND WORKSHEET

CLIENT: Exxon Mobil
LOCATION: FCC / 2F-7 Stack
DATE: 6-30-2011
RUN NO: 2-CCC
OPERATOR: Dan Woodby
METER BOX NO:
METER ΔH@:
METER Yd:
STACK AREA, FT$^2$:
TRAVERSE POINTS, MIN/POINT:
ΔH= X ΔP:
Probe Condition, pre/post test:
Silica Gel Expended, Y/N:
Filter Condition after Test:
Check Weight:

AMBIENT TEMPERATURE:
BAROMETRIC PRESSURE:
ASSUMED MOISTURE:
PITOT TUBE COEFF, Cp:
PROBE ID NO/MATERIAL:
PROBE LENGTH:
NOZZLE ID NO/ MATERIAL:
NOZZLE DIAMETER:
FILTER NO/TYPE:
PRE-TEST LEAK RATE: : CFM@ in. Hg.
POST-TEST LEAK RATE: : CFM@ in. Hg.
PITOT LEAK CHECK - PRE: POST:
CHAIN OF CUSTODY: SAMPLE CUSTODIAN
SAMPLER
SAMPLE CUSTODIAN

| Imp. # | Contents | Post-Test | Pre-Test = Difference |
|---|---|---|---|
| | | | |
| | | | |
| | | See Pg 1 | |
| | | | |
| | | | |
| | | | |
| Total: | | | |

| Point | Time | Meter Volume, ft$^3$ | ΔP in. $H_2O$ | ΔH in. $H_2O$ | Stack Temp, °F | Probe Temp, °F | Filter Temp, °F | Imp. Out Temp, °F | Meter Temp, °F In | Meter Temp, °F Out | Vacuum in. Hg. | $O_2$ % | Pstatic in. $H_2O$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| S 6 | 1821 | 158.620 | 1.3 | 1.4 | 478 | | | 60 | 79 | 76 | 5 | | |
| 5 | 1829 | 163.7 | 1.3 | 1.4 | 479 | | | 60 | 77 | 75 | 5 | | -1.3 |
| 4 | 1837 | 169.2 | 1.3 | 1.4 | 477 | | | 60 | 77 | 74 | 8 | | |
| 3 | 1845 | 174.8 | 1.2 | 1.3 | 476 | | | 59 | 75 | 74 | 8 | | |
| 2 | 1853 | 179.7 | 1.1 | 1.2 | 478 | | | 59 | 75 | 73 | 8 | | |
| 1 | 1801 | 184.4 | 0.8 | 0.86 | 474 | | | 55 | 76 | 75 | 5 | | |
| 1700 | 1909 | 189.985 | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| E 6 | 1914 | 189.985 | 1.1 | 1.2 | 476 | | | 58 | 76 | 73 | 6 | | |
| 5 | 1922 | 193.9 | 1.0 | 1.1 | 475 | | | 58 | 76 | 74 | 6 | | |
| 4 | 1930 | 198.9 | 1.1 | 1.2 | 475 | | | 58 | 75 | 73 | 6 | | |
| 3 | 1938 | 203.7 | 1.1 | 1.2 | 475 | | | 59 | 75 | 72 | 6 | | |
| 2 | 1946 | 208.6 | 0.90 | 0.95 | 476 | | | 59 | 75 | 73 | 6 | | |
| 1 | 1954 | 213.0 | 0.80 | 0.86 | 477 | | | 60 | 74 | 72 | 6 | | |
| End | 2002 | 217.318 | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
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| | | | | | | | | | | | | | |
| Average: | | | | | | | | | | | | | |

Comments:

C-10-14


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Delta Air Quality Services, Incorporated

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# WET CHEMICAL SAMPLING SYSTEM DATA AND WORKSHEET

CLIENT: Exxon Mobil
LOCATION: FCC / 2F-7 Stack
DATE: 7/1/11
RUN NO: 3-Cr
OPERATOR: Dan Woody
METER BOX NO: 16-WS
METER ΔH@: 1.642
METER Yd: 0.993
STACK AREA, FT²:
TRAVERSE POINTS, MIN/POINT: 8 x 24
ΔH= 1.08 X ΔP:
Probe Condition, pre/post test: ✓
Silica Gel Expended, Y/N: ✓
Filter Condition after Test: ✓
Check Weight: ✓

AMBIENT TEMPERATURE: 75
BAROMETRIC PRESSURE: 29.74
ASSUMED MOISTURE: 11
PITOT TUBE COEFF, Cp: 0.84
PROBE ID NO/MATERIAL: 5168
PROBE LENGTH: 6'
NOZZLE ID NO/ MATERIAL: 3 5168
NOZZLE DIAMETER: 0.320
FILTER NO/TYPE: —
PRE-TEST LEAK RATE: .005 CFM@ 15 in. Hg.
POST-TEST LEAK RATE: .005 CFM@ 15 in. Hg.
PITOT LEAK CHECK - PRE: ok POST: ok
CHAIN OF CUSTODY: SAMPLE CUSTODIAN JP
SAMPLER DW
SAMPLE CUSTODIAN JP

| Imp. # | Contents | Post-Test | Pre-Test | Difference |
|---|---|---|---|---|
| 1 | KOH | 868.5 | 824.7 | 43.8 |
| 2 | KOH | 699.7 | 569.7 | 130 |
| 3 | KOH | 684.1 | 572.2 | 111.9 |
| 4 | MT | 707.3 | 550.5 | 156.8 |
| 5 | Si | 989.8 | 884.3 | 105.5 |
| Total: | | CR | -100 | -100 |
| | | | | 448.0 |

| Point | Time | Meter Volume, ft³ | ΔP in. H₂O | ΔH in. H₂O | Stack Temp, °F | Probe Temp, °F | Filter Temp, °F | Imp. Out Temp, °F | Meter Temp, °F In | Meter Temp, °F Out | Vacuum in. Hg. | O₂ % | Pstatic in. H₂O |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| E 6 | 1500 | 219.325 | 1.1 R | 1.2 | 480 | | | 16 | 82 | 79 | 6 | | -.13 |
| 5 | 1508 | 224.3 | 1.1 | 1.2 | 480 | | | 64 | 85 | 79 | 6 | | |
| 4 | 1516 | 229.5 | 1.1 | 1.2 | 481 | | | 64 | 85 | 80 | 6 | | |
| 3 | 1524 | 234.3 | 0.95 | 1.0 | 480 | | | 64 | 88 | 80 | 6 | | |
| 2 | 1532 | 239.3 | 0.90 | 0.95 | 481 | | | 67 | 89 | 85 | 6 | | |
| 1 | 1540 | 244.0 | 0.75 | 0.80 | 481 | | | 63 | 88 | 85 | 6 | | |
| Stop | 1548 | 248.200 | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| 6 | 1554 | 248.200 | 1.2 | 1.3 | 481 | | | 63 | 87 | 82 | 6 | | |
| 5 | 1602 | 253.2 | 1.2 | 1.3 | 480 | | | 63 | 85 | 82 | 6 | | |
| 4 | 1610 | 258.3 | 1.2 | 1.3 | 481 | | | 62 | 90 | 85 | 4 | | |
| 3 | 1618 | 263.6 | 1.3 | 1.4 | 480 | | | 67 | 88 | 83 | 4 | | |
| 2 | 1626 | 269.2 | 1.1 | 1.2 | 480 | | | 67 | 87 | 84 | 4 | | |
| 1 | 1634 | 274.0 | .85 | .90 | 479 | | | 63 | 88 | 83 | 4 | | |
| Stop | 1642 | 278.532 | | | | | | | | | | | |
| Average: | | | | | | | | | | | | | |

Comments: Reagent pH = Port 1 8.5
Port 2 8.5
Port 3 8.5
end 8.5

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# WET CHEMICAL SAMPLING SYSTEM DATA AND WORKSHEET

CLIENT: Exxon Mobil
LOCATION: FCC / 2F-7 Stack
DATE: 7-1-11
RUN NO: 3 - Cr6
OPERATOR: Dave Windy
METER BOX NO:
METER ΔH@:
METER Yd:
STACK AREA, FT²:
TRAVERSE POINTS, MIN/POINT:
ΔH= _____ X ΔP:
Probe Condition, pre/post test:
Silica Gel Expended, Y/N:
Filter Condition after Test:
Check Weight:

AMBIENT TEMPERATURE:
BAROMETRIC PRESSURE:
ASSUMED MOISTURE:
PITOT TUBE COEFF, Cp:
PROBE ID NO/MATERIAL:
PROBE LENGTH:
NOZZLE ID NO/ MATERIAL:
NOZZLE DIAMETER:
FILTER NO/TYPE:
PRE-TEST LEAK RATE: : _____ CFM@ _____ in. Hg.
POST-TEST LEAK RATE: : _____ CFM@ _____ in. Hg.
PITOT LEAK CHECK - PRE: _____ POST: _____
CHAIN OF CUSTODY: SAMPLE CUSTODIAN _____
SAMPLER _____
SAMPLE CUSTODIAN _____

| Imp. # | Contents | Post-Test - Pre-Test = Difference | |
|---|---|---|---|
| | | | |
| | | | |
| | See pg 1 | | |
| | | | |
| | | | |
| Total: | | | |

| Point | Time | Meter Volume, ft³ | ΔP in. $H_2O$ | ΔH in. $H_2O$ | Stack Temp, °F | Probe Temp, °F | Filter Temp, °F | Imp. Out Temp, °F | Meter Temp, °F In | Meter Temp, °F Out | Vacuum in. Hg. | $O_2$ % | Pstatic in. $H_2O$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 6 | 1722 | 278.532 | 1.7 | 1.8 | 477 | | | 63 | 80 | 82 | 9 | | -1.5 |
| 5 | 1730 | 284.2 | 1.8 | 1.9 | 477 | | | 63 | 84 | 79 | 9 | | |
| 4 | 1738 | 290.6 | 1.9 | 1.9 | 477 | | | 63 | 83 | 78 | 9 | | |
| 3 | 1746 | 296.8 | 1.9 | 1.9 | 477 | | | 63 | 83 | 78 | 9 | | |
| 2 | 1754 | 303.3 | 1.8 | 1.9 | 478 | | | 63 | 83 | 79 | 9 | | |
| 1 | 1802 | 309.2 | 1.4 | 1.5 | 478 | | | 63 | 84 | 80 | 9 | | |
| stop | 1810 | 314.843 | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| 6 | 1814 | 314.843 | 1.4 | 1.5 | 478 | | | 63 | 84 | 81 | 8 | | |
| 5 | 1822 | 320.2 | 1.5 | 1.6 | 479 | | | 64 | 86 | 81 | 8 | | |
| 4 | 1830 | 326.0 | 1.5 | 1.6 | 478 | | | 63 | 86 | 81 | 8 | | |
| 3 | 1838 | 331.8 | 1.5 | 1.6 | 478 | | | 62 | 81 | 81 | 8 | | |
| 2 | 1846 | 337.7 | 1.5 | 1.5 | 477 | | | 64 | 86 | 81 | 8 | | |
| 1 | 1854 | 343.7 | 1.3 | 1.4 | 478 | | | 65 | 86 | 82 | 8 | | |
| end | 1902 | 349.048 | | | | | | | | | | | |
| Average: | | | | | | | | | | | | | |

Comments:

C-10-16


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**ExxonMobil**
**STACK $O_2$, $CO_2$ DATA**

**Test #:** **1-Cr6**
**Date:** **6/30/2011**
**Time:** **1019/1435**

| | $O_2$ | $CO_2$ |
|---|---|---|
| Range | 10 | 20 |
| Cal Gas | 5.00 | 10.16 |
| Analyzer Zero | 0.09 | 0.00 |
| Analyzer Span | 5.04 | 9.94 |
| Pre-Bias Zero | 0.08 | 0.00 |
| Pre-Bias Span | 4.99 | 10.00 |
| Post-Bias Zero | 0.10 | 0.01 |
| Post-Bias Span | 4.94 | 9.90 |
| Pre-test zero bias | -0.1% | 0.0% |
| Pre-test span bias | -0.6% | 0.3% |
| Post-test zero bias | 0.1% | 0.1% |
| Post-test span bias | -1.0% | -0.2% |
| Zero Drift | 0.2% | 0.0% |
| Span Drift | -0.5% | -0.5% |
| | PASS | PASS |
| **Average** | **5.02** | **13.74** |
| **Cal Corrected** | **5.06** | **14.03** |

**ExxonMobil**
**1-Cr6**

| Date | Time | O2 % | CO2 % |
|---|---|---|---|
| 6/30/2011 | 10:40:00 AM | 5.045 | 13.832 |
| 6/30/2011 | 10:41:00 AM | 5.157 | 13.777 |
| 6/30/2011 | 10:42:00 AM | 5.182 | 13.755 |
| 6/30/2011 | 10:43:00 AM | 5.16 | 13.772 |
| 6/30/2011 | 10:44:00 AM | 5.138 | 13.866 |
| 6/30/2011 | 10:45:00 AM | 5.267 | 14.234 |
| 6/30/2011 | 10:46:00 AM | 5.151 | 13.856 |
| 6/30/2011 | 10:47:00 AM | 5.124 | 13.67 |
| 6/30/2011 | 10:48:00 AM | 5.109 | 13.671 |
| 6/30/2011 | 10:49:00 AM | 5.081 | 13.7 |
| 6/30/2011 | 10:50:00 AM | 5.069 | 13.697 |
| 6/30/2011 | 10:51:00 AM | 5.058 | 13.709 |
| 6/30/2011 | 10:52:00 AM | 5.002 | 13.748 |
| 6/30/2011 | 10:53:00 AM | 5.042 | 13.723 |
| 6/30/2011 | 10:54:00 AM | 5.032 | 13.743 |
| 6/30/2011 | 10:55:00 AM | 5.04 | 13.847 |
| 6/30/2011 | 10:56:00 AM | 5.101 | 13.788 |
| 6/30/2011 | 10:57:00 AM | 5.148 | 13.715 |
| 6/30/2011 | 10:58:00 AM | 5.17 | 13.717 |
| 6/30/2011 | 10:59:00 AM | 5.199 | 13.668 |
| 6/30/2011 | 11:00:00 AM | 5.16 | 13.683 |
| 6/30/2011 | 11:01:00 AM | 5.132 | 13.716 |
| 6/30/2011 | 11:02:00 AM | 5.008 | 13.715 |
| 6/30/2011 | 11:03:00 AM | 5.032 | 13.698 |
| 6/30/2011 | 11:04:00 AM | 5.082 | 13.648 |
| 6/30/2011 | 11:05:00 AM | 5.068 | 13.669 |
| 6/30/2011 | 11:06:00 AM | 5.048 | 13.679 |
| 6/30/2011 | 11:07:00 AM | 5.02 | 13.701 |
| 6/30/2011 | 11:15:00 AM | 5.047 | 13.651 |
| 6/30/2011 | 11:16:00 AM | 4.983 | 13.717 |
| 6/30/2011 | 11:17:00 AM | 4.971 | 13.746 |
| 6/30/2011 | 11:18:00 AM | 4.988 | 13.73 |
| 6/30/2011 | 11:19:00 AM | 5.007 | 13.712 |
| 6/30/2011 | 11:20:00 AM | 4.953 | 13.767 |
| 6/30/2011 | 11:21:00 AM | 4.983 | 13.738 |
| 6/30/2011 | 11:22:00 AM | 5.021 | 13.713 |
| 6/30/2011 | 11:23:00 AM | 5.035 | 13.683 |
| 6/30/2011 | 11:24:00 AM | 4.994 | 13.729 |
| 6/30/2011 | 11:25:00 AM | 4.966 | 13.759 |
| 6/30/2011 | 11:26:00 AM | 5.029 | 13.7 |
| 6/30/2011 | 11:27:00 AM | 5.046 | 13.686 |
| 6/30/2011 | 11:28:00 AM | 5.036 | 13.707 |
| 6/30/2011 | 11:29:00 AM | 5.065 | 13.676 |
| 6/30/2011 | 11:30:00 AM | 5.053 | 13.673 |
| 6/30/2011 | 11:31:00 AM | 5.061 | 13.687 |
| 6/30/2011 | 11:32:00 AM | 5.125 | 13.618 |
| 6/30/2011 | 11:33:00 AM | 5.13 | 13.613 |

| | | | |
|---|---|---|---|
| 6/30/2011 | 11:34:00 AM | 5.105 | 13.633 |
| 6/30/2011 | 11:35:00 AM | 5.106 | 13.646 |
| 6/30/2011 | 11:36:00 AM | 5.092 | 13.654 |
| 6/30/2011 | 11:37:00 AM | 5.112 | 13.645 |
| 6/30/2011 | 11:38:00 AM | 5.092 | 13.655 |
| 6/30/2011 | 11:39:00 AM | 5.096 | 13.64 |
| 6/30/2011 | 11:40:00 AM | 5.056 | 13.681 |
| 6/30/2011 | 11:41:00 AM | 5.042 | 13.698 |
| 6/30/2011 | 11:42:00 AM | 5.041 | 13.697 |
| 6/30/2011 | 11:43:00 AM | 5.074 | 13.664 |
| 6/30/2011 | 11:44:00 AM | 5.102 | 13.641 |
| 6/30/2011 | 11:45:00 AM | 5.007 | 13.727 |
| 6/30/2011 | 11:46:00 AM | 5.023 | 13.725 |
| 6/30/2011 | 11:47:00 AM | 5.023 | 13.698 |
| 6/30/2011 | 11:48:00 AM | 5.05 | 13.683 |
| 6/30/2011 | 11:49:00 AM | 4.984 | 13.75 |
| 6/30/2011 | 11:50:00 AM | 5.015 | 13.732 |
| 6/30/2011 | 11:51:00 AM | 5.03 | 13.708 |
| 6/30/2011 | 11:52:00 AM | 4.981 | 13.757 |
| 6/30/2011 | 11:53:00 AM | 5.004 | 13.735 |
| 6/30/2011 | 11:54:00 AM | 5.004 | 13.74 |
| 6/30/2011 | 11:55:00 AM | 4.988 | 13.742 |
| 6/30/2011 | 11:56:00 AM | 4.954 | 13.765 |
| 6/30/2011 | 11:57:00 AM | 4.958 | 13.765 |
| 6/30/2011 | 11:58:00 AM | 5.002 | 13.752 |
| 6/30/2011 | 11:59:00 AM | 5.011 | 13.735 |
| 6/30/2011 | 12:00:00 PM | 5.019 | 13.714 |
| 6/30/2011 | 12:01:00 PM | 5.022 | 13.724 |
| 6/30/2011 | 12:02:00 PM | 5.043 | 13.703 |
| 6/30/2011 | 12:51:00 PM | 5.019 | 13.736 |
| 6/30/2011 | 12:52:00 PM | 5.018 | 13.74 |
| 6/30/2011 | 12:53:00 PM | 5.022 | 13.728 |
| 6/30/2011 | 12:54:00 PM | 4.988 | 13.763 |
| 6/30/2011 | 12:55:00 PM | 4.996 | 13.759 |
| 6/30/2011 | 12:56:00 PM | 4.999 | 13.753 |
| 6/30/2011 | 12:57:00 PM | 5.011 | 13.734 |
| 6/30/2011 | 12:58:00 PM | 5.001 | 13.734 |
| 6/30/2011 | 12:59:00 PM | 4.952 | 13.79 |
| 6/30/2011 | 1:00:00 PM | 4.98 | 13.765 |
| 6/30/2011 | 1:01:00 PM | 5.052 | 13.706 |
| 6/30/2011 | 1:02:00 PM | 5.054 | 13.702 |
| 6/30/2011 | 1:03:00 PM | 5.033 | 13.729 |
| 6/30/2011 | 1:04:00 PM | 5.025 | 13.728 |
| 6/30/2011 | 1:05:00 PM | 5.002 | 13.749 |
| 6/30/2011 | 1:06:00 PM | 5.037 | 13.729 |
| 6/30/2011 | 1:07:00 PM | 5.045 | 13.727 |
| 6/30/2011 | 1:08:00 PM | 5.045 | 13.724 |
| 6/30/2011 | 1:09:00 PM | 5.021 | 13.739 |
| 6/30/2011 | 1:10:00 PM | 4.997 | 13.77 |
| 6/30/2011 | 1:11:00 PM | 4.966 | 13.775 |
| 6/30/2011 | 1:12:00 PM | 4.995 | 13.766 |
| 6/30/2011 | 1:13:00 PM | 5.037 | 13.727 |

| | | | |
|---|---|---|---|
| 6/30/2011 | 1:14:00 PM | 5.059 | 13.701 |
| 6/30/2011 | 1:15:00 PM | 5.078 | 13.692 |
| 6/30/2011 | 1:16:00 PM | 5.088 | 13.667 |
| 6/30/2011 | 1:17:00 PM | 5.058 | 13.696 |
| 6/30/2011 | 1:18:00 PM | 5.031 | 13.732 |
| 6/30/2011 | 1:19:00 PM | 5.055 | 13.707 |
| 6/30/2011 | 1:20:00 PM | 5.038 | 13.694 |
| 6/30/2011 | 1:21:00 PM | 4.995 | 13.749 |
| 6/30/2011 | 1:22:00 PM | 4.955 | 13.791 |
| 6/30/2011 | 1:23:00 PM | 4.991 | 13.765 |
| 6/30/2011 | 1:24:00 PM | 4.985 | 13.78 |
| 6/30/2011 | 1:25:00 PM | 5.004 | 13.761 |
| 6/30/2011 | 1:26:00 PM | 4.981 | 13.785 |
| 6/30/2011 | 1:27:00 PM | 5.017 | 13.744 |
| 6/30/2011 | 1:28:00 PM | 5 | 13.762 |
| 6/30/2011 | 1:29:00 PM | 5.049 | 13.727 |
| 6/30/2011 | 1:30:00 PM | 5.05 | 13.713 |
| 6/30/2011 | 1:31:00 PM | 5.024 | 13.745 |
| 6/30/2011 | 1:32:00 PM | 5.066 | 13.704 |
| 6/30/2011 | 1:33:00 PM | 5.041 | 13.726 |
| 6/30/2011 | 1:34:00 PM | 5.023 | 13.744 |
| 6/30/2011 | 1:35:00 PM | 4.979 | 13.786 |
| 6/30/2011 | 1:36:00 PM | 4.996 | 13.78 |
| 6/30/2011 | 1:37:00 PM | 5.025 | 13.732 |
| 6/30/2011 | 1:38:00 PM | 5.065 | 13.72 |
| 6/30/2011 | 1:48:00 PM | 5.026 | 13.762 |
| 6/30/2011 | 1:49:00 PM | 5.05 | 13.726 |
| 6/30/2011 | 1:50:00 PM | 5.014 | 13.759 |
| 6/30/2011 | 1:51:00 PM | 5.025 | 13.749 |
| 6/30/2011 | 1:52:00 PM | 5.03 | 13.744 |
| 6/30/2011 | 1:53:00 PM | 4.988 | 13.775 |
| 6/30/2011 | 1:54:00 PM | 5.018 | 13.734 |
| 6/30/2011 | 1:55:00 PM | 4.965 | 13.796 |
| 6/30/2011 | 1:56:00 PM | 4.964 | 13.776 |
| 6/30/2011 | 1:57:00 PM | 4.985 | 13.794 |
| 6/30/2011 | 1:58:00 PM | 5.011 | 13.749 |
| 6/30/2011 | 1:59:00 PM | 4.945 | 13.825 |
| 6/30/2011 | 2:00:00 PM | 4.945 | 13.822 |
| 6/30/2011 | 2:01:00 PM | 4.998 | 13.745 |
| 6/30/2011 | 2:02:00 PM | 4.984 | 13.773 |
| 6/30/2011 | 2:03:00 PM | 5.014 | 13.746 |
| 6/30/2011 | 2:04:00 PM | 4.971 | 13.786 |
| 6/30/2011 | 2:05:00 PM | 4.922 | 13.826 |
| 6/30/2011 | 2:06:00 PM | 4.916 | 13.834 |
| 6/30/2011 | 2:07:00 PM | 4.982 | 13.782 |
| 6/30/2011 | 2:08:00 PM | 5.031 | 13.726 |
| 6/30/2011 | 2:09:00 PM | 4.98 | 13.772 |
| 6/30/2011 | 2:10:00 PM | 4.998 | 13.757 |
| 6/30/2011 | 2:11:00 PM | 4.973 | 13.788 |
| 6/30/2011 | 2:12:00 PM | 4.919 | 13.829 |
| 6/30/2011 | 2:13:00 PM | 4.938 | 13.796 |
| 6/30/2011 | 2:14:00 PM | 4.979 | 13.772 |

| | | | |
|---|---|---|---|
| 6/30/2011 | 2:15:00 PM | 4.986 | 13.75 |
| 6/30/2011 | 2:16:00 PM | 5.002 | 13.728 |
| 6/30/2011 | 2:17:00 PM | 4.866 | 13.861 |
| 6/30/2011 | 2:18:00 PM | 4.872 | 13.861 |
| 6/30/2011 | 2:19:00 PM | 4.978 | 13.761 |
| 6/30/2011 | 2:20:00 PM | 5.038 | 13.701 |
| 6/30/2011 | 2:21:00 PM | 5.061 | 13.68 |
| 6/30/2011 | 2:22:00 PM | 5.022 | 13.721 |
| 6/30/2011 | 2:23:00 PM | 4.98 | 13.75 |
| 6/30/2011 | 2:24:00 PM | 4.872 | 13.844 |
| 6/30/2011 | 2:25:00 PM | 4.898 | 13.83 |
| 6/30/2011 | 2:26:00 PM | 4.935 | 13.787 |
| 6/30/2011 | 2:27:00 PM | 4.977 | 13.765 |
| 6/30/2011 | 2:28:00 PM | 4.987 | 13.761 |
| 6/30/2011 | 2:29:00 PM | 4.958 | 13.778 |
| 6/30/2011 | 2:30:00 PM | 4.942 | 13.792 |
| 6/30/2011 | 2:31:00 PM | 4.984 | 13.752 |
| 6/30/2011 | 2:32:00 PM | 4.964 | 13.753 |
| 6/30/2011 | 2:33:00 PM | 4.966 | 13.766 |
| 6/30/2011 | 2:34:00 PM | 4.945 | 13.772 |
| 6/30/2011 | 2:35:00 PM | 4.93 | 13.795 |
| | Average | 5.02 | 13.74 |

**ExxonMobil**
**STACK $O_2$, $CO_2$ DATA**

**Test #:** **2-Cr6**
**Date:** **6/30/2011**
**Time:** **1554/2002**

| | $O_2$ | $CO_2$ |
|---|---|---|
| Range | 10 | 20 |
| Cal Gas | 5.00 | 10.16 |
| Analyzer Zero | 0.09 | 0.00 |
| Analyzer Span | 5.04 | 9.94 |
| Pre-Bias Zero | 0.10 | 0.01 |
| Pre-Bias Span | 4.94 | 9.90 |
| Post-Bias Zero | 0.17 | 0.00 |
| Post-Bias Span | 4.99 | 9.81 |
| Pre-test zero bias | 0.1% | 0.1% |
| Pre-test span bias | -1.0% | -0.2% |
| Post-test zero bias | 0.8% | 0.0% |
| Post-test span bias | -0.5% | -0.7% |
| Zero Drift | 0.7% | 0.0% |
| Span Drift | 0.5% | -0.5% |
| | PASS | PASS |
| **Average** | **5.03** | **13.65** |
| **Cal Corrected** | **5.06** | **14.08** |

**ExxonMobil**
**2-Cr6**

| Date | Time | O2 % | CO2 % |
|---|---|---|---|
| 6/30/2011 | 3:55:00 PM | 4.938 | 13.729 |
| 6/30/2011 | 3:56:00 PM | 4.885 | 13.78 |
| 6/30/2011 | 3:57:00 PM | 4.909 | 13.75 |
| 6/30/2011 | 3:58:00 PM | 4.951 | 13.722 |
| 6/30/2011 | 3:59:00 PM | 5.034 | 13.641 |
| 6/30/2011 | 4:00:00 PM | 4.991 | 13.68 |
| 6/30/2011 | 4:01:00 PM | 4.967 | 13.708 |
| 6/30/2011 | 4:02:00 PM | 4.967 | 13.721 |
| 6/30/2011 | 4:03:00 PM | 4.956 | 13.722 |
| 6/30/2011 | 4:04:00 PM | 4.924 | 13.752 |
| 6/30/2011 | 4:05:00 PM | 4.895 | 13.78 |
| 6/30/2011 | 4:06:00 PM | 4.923 | 13.763 |
| 6/30/2011 | 4:07:00 PM | 4.899 | 13.768 |
| 6/30/2011 | 4:08:00 PM | 4.893 | 13.8 |
| 6/30/2011 | 4:09:00 PM | 4.986 | 13.716 |
| 6/30/2011 | 4:10:00 PM | 5.005 | 13.683 |
| 6/30/2011 | 4:11:00 PM | 5.012 | 13.67 |
| 6/30/2011 | 4:12:00 PM | 5.004 | 13.686 |
| 6/30/2011 | 4:13:00 PM | 4.991 | 13.692 |
| 6/30/2011 | 4:14:00 PM | 4.92 | 13.766 |
| 6/30/2011 | 4:15:00 PM | 4.949 | 13.744 |
| 6/30/2011 | 4:16:00 PM | 4.963 | 13.727 |
| 6/30/2011 | 4:17:00 PM | 4.992 | 13.705 |
| 6/30/2011 | 4:18:00 PM | 5.027 | 13.669 |
| 6/30/2011 | 4:19:00 PM | 5.084 | 13.615 |
| 6/30/2011 | 4:20:00 PM | 5.025 | 13.66 |
| 6/30/2011 | 4:21:00 PM | 5.047 | 13.654 |
| 6/30/2011 | 4:22:00 PM | 5.033 | 13.645 |
| 6/30/2011 | 4:23:00 PM | 4.98 | 13.693 |
| 6/30/2011 | 4:24:00 PM | 4.956 | 13.727 |
| 6/30/2011 | 4:25:00 PM | 4.969 | 13.721 |
| 6/30/2011 | 4:26:00 PM | 4.964 | 13.717 |
| 6/30/2011 | 4:27:00 PM | 4.985 | 13.704 |
| 6/30/2011 | 4:28:00 PM | 4.964 | 13.711 |
| 6/30/2011 | 4:29:00 PM | 4.984 | 13.7 |
| 6/30/2011 | 4:30:00 PM | 4.956 | 13.728 |
| 6/30/2011 | 4:31:00 PM | 4.979 | 13.724 |
| 6/30/2011 | 4:32:00 PM | 4.969 | 13.719 |
| 6/30/2011 | 4:33:00 PM | 4.985 | 13.715 |
| 6/30/2011 | 4:34:00 PM | 5.005 | 13.684 |
| 6/30/2011 | 4:35:00 PM | 5.04 | 13.656 |
| 6/30/2011 | 4:36:00 PM | 5.014 | 13.68 |
| 6/30/2011 | 4:37:00 PM | 5.025 | 13.673 |
| 6/30/2011 | 4:38:00 PM | 4.991 | 13.703 |
| 6/30/2011 | 4:39:00 PM | 4.977 | 13.714 |
| 6/30/2011 | 4:40:00 PM | 5.013 | 13.687 |
| 6/30/2011 | 4:41:00 PM | 5.052 | 13.647 |

| | | | |
|---|---|---|---|
| 6/30/2011 | 4:42:00 PM | 5.038 | 13.65 |
| 6/30/2011 | 4:47:00 PM | 4.982 | 13.705 |
| 6/30/2011 | 4:48:00 PM | 5.015 | 13.68 |
| 6/30/2011 | 4:49:00 PM | 5.031 | 13.67 |
| 6/30/2011 | 4:50:00 PM | 4.984 | 13.707 |
| 6/30/2011 | 4:51:00 PM | 5.007 | 13.67 |
| 6/30/2011 | 4:52:00 PM | 4.996 | 13.671 |
| 6/30/2011 | 4:53:00 PM | 5.017 | 13.655 |
| 6/30/2011 | 4:54:00 PM | 5.002 | 13.675 |
| 6/30/2011 | 4:55:00 PM | 4.977 | 13.704 |
| 6/30/2011 | 4:56:00 PM | 4.932 | 13.757 |
| 6/30/2011 | 4:57:00 PM | 5.018 | 13.668 |
| 6/30/2011 | 4:58:00 PM | 5.043 | 13.644 |
| 6/30/2011 | 4:59:00 PM | 5.053 | 13.629 |
| 6/30/2011 | 5:00:00 PM | 5.021 | 13.664 |
| 6/30/2011 | 5:01:00 PM | 4.991 | 13.679 |
| 6/30/2011 | 5:02:00 PM | 4.932 | 13.747 |
| 6/30/2011 | 5:03:00 PM | 4.971 | 13.708 |
| 6/30/2011 | 5:04:00 PM | 4.965 | 13.729 |
| 6/30/2011 | 5:05:00 PM | 5.011 | 13.68 |
| 6/30/2011 | 5:06:00 PM | 4.996 | 13.692 |
| 6/30/2011 | 5:07:00 PM | 5.04 | 13.652 |
| 6/30/2011 | 5:08:00 PM | 4.966 | 13.696 |
| 6/30/2011 | 5:09:00 PM | 4.989 | 13.7 |
| 6/30/2011 | 5:10:00 PM | 5.061 | 13.636 |
| 6/30/2011 | 5:11:00 PM | 5.062 | 13.622 |
| 6/30/2011 | 5:12:00 PM | 5.036 | 13.647 |
| 6/30/2011 | 5:13:00 PM | 4.986 | 13.695 |
| 6/30/2011 | 5:14:00 PM | 4.947 | 13.738 |
| 6/30/2011 | 5:15:00 PM | 4.98 | 13.705 |
| 6/30/2011 | 5:16:00 PM | 4.99 | 13.679 |
| 6/30/2011 | 5:17:00 PM | 5.044 | 13.644 |
| 6/30/2011 | 5:18:00 PM | 5.021 | 13.666 |
| 6/30/2011 | 5:19:00 PM | 5.047 | 13.64 |
| 6/30/2011 | 5:20:00 PM | 4.97 | 13.724 |
| 6/30/2011 | 5:21:00 PM | 4.989 | 13.694 |
| 6/30/2011 | 5:22:00 PM | 5.044 | 13.645 |
| 6/30/2011 | 5:23:00 PM | 5.05 | 13.636 |
| 6/30/2011 | 5:24:00 PM | 5.057 | 13.634 |
| 6/30/2011 | 5:25:00 PM | 5.041 | 13.633 |
| 6/30/2011 | 5:26:00 PM | 4.932 | 13.749 |
| 6/30/2011 | 5:27:00 PM | 4.962 | 13.729 |
| 6/30/2011 | 5:28:00 PM | 5.01 | 13.678 |
| 6/30/2011 | 5:29:00 PM | 5.021 | 13.665 |
| 6/30/2011 | 5:30:00 PM | 4.998 | 13.682 |
| 6/30/2011 | 5:31:00 PM | 5.067 | 13.617 |
| 6/30/2011 | 5:32:00 PM | 5.031 | 13.642 |
| 6/30/2011 | 5:33:00 PM | 5.056 | 13.615 |
| 6/30/2011 | 5:34:00 PM | 5.042 | 13.62 |
| 6/30/2011 | 6:22:00 PM | 5.016 | 13.617 |
| 6/30/2011 | 6:23:00 PM | 4.992 | 13.633 |
| 6/30/2011 | 6:24:00 PM | 4.98 | 13.645 |

| | | | |
|---|---|---|---|
| 6/30/2011 | 6:25:00 PM | 5.007 | 13.639 |
| 6/30/2011 | 6:26:00 PM | 4.998 | 13.65 |
| 6/30/2011 | 6:27:00 PM | 4.994 | 13.634 |
| 6/30/2011 | 6:28:00 PM | 5.002 | 13.641 |
| 6/30/2011 | 6:29:00 PM | 5.005 | 13.632 |
| 6/30/2011 | 6:30:00 PM | 5.03 | 13.615 |
| 6/30/2011 | 6:31:00 PM | 5.039 | 13.604 |
| 6/30/2011 | 6:32:00 PM | 5.071 | 13.592 |
| 6/30/2011 | 6:33:00 PM | 5.066 | 13.575 |
| 6/30/2011 | 6:34:00 PM | 5.076 | 13.582 |
| 6/30/2011 | 6:35:00 PM | 5.079 | 13.577 |
| 6/30/2011 | 6:36:00 PM | 4.979 | 13.661 |
| 6/30/2011 | 6:37:00 PM | 5.015 | 13.652 |
| 6/30/2011 | 6:38:00 PM | 4.985 | 13.672 |
| 6/30/2011 | 6:39:00 PM | 4.966 | 13.684 |
| 6/30/2011 | 6:40:00 PM | 4.988 | 13.672 |
| 6/30/2011 | 6:41:00 PM | 4.954 | 13.694 |
| 6/30/2011 | 6:42:00 PM | 4.986 | 13.662 |
| 6/30/2011 | 6:43:00 PM | 4.971 | 13.702 |
| 6/30/2011 | 6:44:00 PM | 4.931 | 13.741 |
| 6/30/2011 | 6:45:00 PM | 4.974 | 13.689 |
| 6/30/2011 | 6:46:00 PM | 4.989 | 13.677 |
| 6/30/2011 | 6:47:00 PM | 4.976 | 13.682 |
| 6/30/2011 | 6:48:00 PM | 5.002 | 13.663 |
| 6/30/2011 | 6:49:00 PM | 4.986 | 13.683 |
| 6/30/2011 | 6:50:00 PM | 4.977 | 13.702 |
| 6/30/2011 | 6:51:00 PM | 5.007 | 13.674 |
| 6/30/2011 | 6:52:00 PM | 5.016 | 13.659 |
| 6/30/2011 | 6:53:00 PM | 5.009 | 13.67 |
| 6/30/2011 | 6:54:00 PM | 4.993 | 13.69 |
| 6/30/2011 | 6:55:00 PM | 4.956 | 13.728 |
| 6/30/2011 | 6:56:00 PM | 4.943 | 13.748 |
| 6/30/2011 | 6:57:00 PM | 5.002 | 13.692 |
| 6/30/2011 | 6:58:00 PM | 5.07 | 13.62 |
| 6/30/2011 | 6:59:00 PM | 5.111 | 13.589 |
| 6/30/2011 | 7:00:00 PM | 5.095 | 13.603 |
| 6/30/2011 | 7:01:00 PM | 5.136 | 13.561 |
| 6/30/2011 | 7:02:00 PM | 5.051 | 13.653 |
| 6/30/2011 | 7:03:00 PM | 5.057 | 13.646 |
| 6/30/2011 | 7:04:00 PM | 5.089 | 13.615 |
| 6/30/2011 | 7:05:00 PM | 5.085 | 13.609 |
| 6/30/2011 | 7:06:00 PM | 5.046 | 13.647 |
| 6/30/2011 | 7:07:00 PM | 5.03 | 13.667 |
| 6/30/2011 | 7:08:00 PM | 4.998 | 13.697 |
| 6/30/2011 | 7:09:00 PM | 5.017 | 13.683 |
| 6/30/2011 | 7:15:00 PM | 5.074 | 13.612 |
| 6/30/2011 | 7:16:00 PM | 5.104 | 13.589 |
| 6/30/2011 | 7:17:00 PM | 5.079 | 13.612 |
| 6/30/2011 | 7:18:00 PM | 5.091 | 13.606 |
| 6/30/2011 | 7:19:00 PM | 5.046 | 13.654 |
| 6/30/2011 | 7:20:00 PM | 5.054 | 13.658 |
| 6/30/2011 | 7:21:00 PM | 5.09 | 13.623 |

| | | | |
|---|---|---|---|
| 6/30/2011 | 7:22:00 PM | 5.115 | 13.591 |
| 6/30/2011 | 7:23:00 PM | 5.117 | 13.578 |
| 6/30/2011 | 7:24:00 PM | 5.129 | 13.572 |
| 6/30/2011 | 7:25:00 PM | 5.15 | 13.538 |
| 6/30/2011 | 7:26:00 PM | 5.108 | 13.573 |
| 6/30/2011 | 7:27:00 PM | 5.097 | 13.585 |
| 6/30/2011 | 7:28:00 PM | 5.131 | 13.537 |
| 6/30/2011 | 7:29:00 PM | 5.09 | 13.585 |
| 6/30/2011 | 7:30:00 PM | 5.103 | 13.582 |
| 6/30/2011 | 7:31:00 PM | 5.108 | 13.564 |
| 6/30/2011 | 7:32:00 PM | 5.031 | 13.645 |
| 6/30/2011 | 7:33:00 PM | 5.07 | 13.613 |
| 6/30/2011 | 7:34:00 PM | 5.105 | 13.578 |
| 6/30/2011 | 7:35:00 PM | 5.109 | 13.565 |
| 6/30/2011 | 7:36:00 PM | 5.109 | 13.575 |
| 6/30/2011 | 7:37:00 PM | 5.149 | 13.539 |
| 6/30/2011 | 7:38:00 PM | 5.11 | 13.564 |
| 6/30/2011 | 7:39:00 PM | 5.121 | 13.553 |
| 6/30/2011 | 7:40:00 PM | 5.146 | 13.521 |
| 6/30/2011 | 7:41:00 PM | 5.134 | 13.538 |
| 6/30/2011 | 7:42:00 PM | 5.101 | 13.562 |
| 6/30/2011 | 7:43:00 PM | 5.066 | 13.598 |
| 6/30/2011 | 7:44:00 PM | 5.017 | 13.64 |
| 6/30/2011 | 7:45:00 PM | 5.074 | 13.588 |
| 6/30/2011 | 7:46:00 PM | 5.062 | 13.606 |
| 6/30/2011 | 7:47:00 PM | 5.077 | 13.579 |
| 6/30/2011 | 7:48:00 PM | 5.094 | 13.563 |
| 6/30/2011 | 7:49:00 PM | 5.097 | 13.561 |
| 6/30/2011 | 7:50:00 PM | 5.096 | 13.594 |
| 6/30/2011 | 7:51:00 PM | 5.096 | 13.581 |
| 6/30/2011 | 7:52:00 PM | 5.132 | 13.54 |
| 6/30/2011 | 7:53:00 PM | 5.166 | 13.51 |
| 6/30/2011 | 7:54:00 PM | 5.141 | 13.515 |
| 6/30/2011 | 7:55:00 PM | 5.159 | 13.511 |
| 6/30/2011 | 7:56:00 PM | 5.057 | 13.609 |
| 6/30/2011 | 7:57:00 PM | 5.097 | 13.559 |
| 6/30/2011 | 7:58:00 PM | 5.125 | 13.532 |
| 6/30/2011 | 7:59:00 PM | 5.134 | 13.52 |
| 6/30/2011 | 8:00:00 PM | 5.102 | 13.54 |
| 6/30/2011 | 8:01:00 PM | 5.035 | 13.606 |
| 6/30/2011 | 8:02:00 PM | 5.006 | 13.637 |
| | Average | 5.03 | 13.65 |

**ExxonMobil**
**STACK $O_2$, $CO_2$ DATA**

**Test #:** **3-Cr6**
**Date:** **7/1/2011**
**Time:** **1500/1902**

| | $O_2$ | $CO_2$ |
|---|---|---|
| Range | 10 | 20 |
| Cal Gas | 5.00 | 10.16 |
| Analyzer Zero | 0.06 | -0.01 |
| Analyzer Span | 5.15 | 9.98 |
| Pre-Bias Zero | 0.20 | 0.01 |
| Pre-Bias Span | 4.90 | 9.87 |
| Post-Bias Zero | 0.22 | 0.00 |
| Post-Bias Span | 5.02 | 9.90 |
| Pre-test zero bias | 1.3% | 0.1% |
| Pre-test span bias | -2.5% | -0.6% |
| Post-test zero bias | 1.6% | 0.1% |
| Post-test span bias | -1.3% | -0.4% |
| Zero Drift | 0.3% | 0.0% |
| Span Drift | 1.2% | 0.2% |
| | PASS | PASS |
| **Average** | **4.87** | **13.91** |
| **Cal Corrected** | **4.91** | **14.31** |

**ExxonMobil**
**3-Cr6**

| Date | Time | O2 % | CO2 % |
|---|---|---|---|
| 7/1/2011 | 3:01:00 PM | 4.824 | 13.884 |
| 7/1/2011 | 3:02:00 PM | 4.779 | 13.902 |
| 7/1/2011 | 3:03:00 PM | 4.813 | 13.874 |
| 7/1/2011 | 3:04:00 PM | 4.831 | 13.857 |
| 7/1/2011 | 3:05:00 PM | 4.853 | 13.855 |
| 7/1/2011 | 3:06:00 PM | 4.854 | 13.849 |
| 7/1/2011 | 3:07:00 PM | 4.806 | 13.912 |
| 7/1/2011 | 3:08:00 PM | 4.8 | 13.909 |
| 7/1/2011 | 3:09:00 PM | 4.808 | 13.905 |
| 7/1/2011 | 3:10:00 PM | 4.783 | 13.938 |
| 7/1/2011 | 3:11:00 PM | 4.866 | 13.849 |
| 7/1/2011 | 3:12:00 PM | 4.888 | 13.818 |
| 7/1/2011 | 3:13:00 PM | 4.848 | 13.852 |
| 7/1/2011 | 3:14:00 PM | 4.821 | 13.891 |
| 7/1/2011 | 3:15:00 PM | 4.876 | 13.798 |
| 7/1/2011 | 3:16:00 PM | 4.866 | 13.807 |
| 7/1/2011 | 3:17:00 PM | 4.908 | 13.778 |
| 7/1/2011 | 3:18:00 PM | 4.911 | 13.767 |
| 7/1/2011 | 3:19:00 PM | 4.897 | 13.772 |
| 7/1/2011 | 3:20:00 PM | 4.874 | 13.794 |
| 7/1/2011 | 3:21:00 PM | 4.85 | 13.826 |
| 7/1/2011 | 3:22:00 PM | 4.854 | 13.822 |
| 7/1/2011 | 3:23:00 PM | 4.842 | 13.821 |
| 7/1/2011 | 3:24:00 PM | 4.849 | 13.82 |
| 7/1/2011 | 3:25:00 PM | 4.784 | 13.891 |
| 7/1/2011 | 3:26:00 PM | 4.754 | 13.924 |
| 7/1/2011 | 3:27:00 PM | 4.779 | 13.881 |
| 7/1/2011 | 3:28:00 PM | 4.797 | 13.889 |
| 7/1/2011 | 3:29:00 PM | 4.835 | 13.852 |
| 7/1/2011 | 3:30:00 PM | 4.841 | 13.853 |
| 7/1/2011 | 3:31:00 PM | 4.837 | 13.859 |
| 7/1/2011 | 3:32:00 PM | 4.832 | 13.864 |
| 7/1/2011 | 3:33:00 PM | 4.833 | 13.867 |
| 7/1/2011 | 3:34:00 PM | 4.884 | 13.821 |
| 7/1/2011 | 3:35:00 PM | 4.893 | 13.813 |
| 7/1/2011 | 3:36:00 PM | 4.861 | 13.852 |
| 7/1/2011 | 3:37:00 PM | 4.816 | 13.912 |
| 7/1/2011 | 3:38:00 PM | 4.845 | 13.861 |
| 7/1/2011 | 3:39:00 PM | 4.897 | 13.798 |
| 7/1/2011 | 3:40:00 PM | 4.903 | 13.794 |
| 7/1/2011 | 3:41:00 PM | 4.893 | 13.811 |
| 7/1/2011 | 3:42:00 PM | 4.928 | 13.779 |
| 7/1/2011 | 3:43:00 PM | 4.913 | 13.798 |
| 7/1/2011 | 3:44:00 PM | 4.88 | 13.805 |
| 7/1/2011 | 3:45:00 PM | 4.855 | 13.844 |
| 7/1/2011 | 3:46:00 PM | 4.843 | 13.847 |
| 7/1/2011 | 3:47:00 PM | 4.797 | 13.88 |

| | | | |
|---|---|---|---|
| 7/1/2011 | 3:48:00 PM | 4.825 | 13.857 |
| 7/1/2011 | 3:55:00 PM | 4.883 | 13.816 |
| 7/1/2011 | 3:56:00 PM | 4.911 | 13.789 |
| 7/1/2011 | 3:57:00 PM | 4.929 | 13.776 |
| 7/1/2011 | 3:58:00 PM | 4.904 | 13.79 |
| 7/1/2011 | 3:59:00 PM | 4.886 | 13.811 |
| 7/1/2011 | 4:00:00 PM | 4.892 | 13.802 |
| 7/1/2011 | 4:01:00 PM | 4.888 | 13.822 |
| 7/1/2011 | 4:02:00 PM | 4.831 | 13.869 |
| 7/1/2011 | 4:03:00 PM | 4.878 | 13.813 |
| 7/1/2011 | 4:04:00 PM | 4.873 | 13.833 |
| 7/1/2011 | 4:05:00 PM | 4.911 | 13.786 |
| 7/1/2011 | 4:06:00 PM | 4.883 | 13.813 |
| 7/1/2011 | 4:07:00 PM | 4.876 | 13.828 |
| 7/1/2011 | 4:08:00 PM | 4.868 | 13.821 |
| 7/1/2011 | 4:09:00 PM | 4.898 | 13.809 |
| 7/1/2011 | 4:10:00 PM | 4.89 | 13.79 |
| 7/1/2011 | 4:11:00 PM | 4.934 | 13.766 |
| 7/1/2011 | 4:12:00 PM | 4.942 | 13.771 |
| 7/1/2011 | 4:13:00 PM | 4.937 | 13.774 |
| 7/1/2011 | 4:14:00 PM | 4.905 | 13.804 |
| 7/1/2011 | 4:15:00 PM | 4.892 | 13.81 |
| 7/1/2011 | 4:16:00 PM | 4.909 | 13.785 |
| 7/1/2011 | 4:17:00 PM | 4.904 | 13.804 |
| 7/1/2011 | 4:18:00 PM | 4.861 | 13.863 |
| 7/1/2011 | 4:19:00 PM | 4.892 | 13.824 |
| 7/1/2011 | 4:20:00 PM | 4.884 | 13.832 |
| 7/1/2011 | 4:21:00 PM | 4.86 | 13.845 |
| 7/1/2011 | 4:22:00 PM | 4.919 | 13.795 |
| 7/1/2011 | 4:23:00 PM | 4.911 | 13.803 |
| 7/1/2011 | 4:24:00 PM | 4.936 | 13.795 |
| 7/1/2011 | 4:25:00 PM | 4.9 | 13.818 |
| 7/1/2011 | 4:26:00 PM | 4.851 | 13.88 |
| 7/1/2011 | 4:27:00 PM | 4.915 | 13.801 |
| 7/1/2011 | 4:28:00 PM | 4.908 | 13.822 |
| 7/1/2011 | 4:29:00 PM | 4.913 | 13.823 |
| 7/1/2011 | 4:30:00 PM | 4.971 | 13.79 |
| 7/1/2011 | 4:31:00 PM | 4.981 | 13.754 |
| 7/1/2011 | 4:32:00 PM | 4.961 | 13.789 |
| 7/1/2011 | 4:33:00 PM | 4.932 | 13.806 |
| 7/1/2011 | 4:34:00 PM | 4.929 | 13.81 |
| 7/1/2011 | 4:35:00 PM | 4.92 | 13.811 |
| 7/1/2011 | 4:36:00 PM | 4.939 | 13.809 |
| 7/1/2011 | 4:37:00 PM | 4.888 | 13.855 |
| 7/1/2011 | 4:38:00 PM | 4.807 | 13.945 |
| 7/1/2011 | 4:39:00 PM | 4.894 | 13.833 |
| 7/1/2011 | 4:40:00 PM | 4.888 | 13.845 |
| 7/1/2011 | 4:41:00 PM | 4.927 | 13.822 |
| 7/1/2011 | 4:42:00 PM | 4.915 | 13.833 |
| 7/1/2011 | 5:42:00 PM | 4.958 | 14.262 |
| 7/1/2011 | 5:43:00 PM | 4.932 | 14.259 |
| 7/1/2011 | 5:44:00 PM | 5.031 | 14.513 |

| | | | |
|---|---|---|---|
| 7/1/2011 | 5:45:00 PM | 5.3 | 15.576 |
| 7/1/2011 | 5:46:00 PM | 5.363 | 15.697 |
| 7/1/2011 | 5:47:00 PM | 4.856 | 14.098 |
| 7/1/2011 | 5:48:00 PM | 4.885 | 14.067 |
| 7/1/2011 | 5:49:00 PM | 4.877 | 14.088 |
| 7/1/2011 | 5:50:00 PM | 4.852 | 14.111 |
| 7/1/2011 | 5:51:00 PM | 4.917 | 14.033 |
| 7/1/2011 | 5:52:00 PM | 4.893 | 14.066 |
| 7/1/2011 | 5:53:00 PM | 4.897 | 14.047 |
| 7/1/2011 | 5:54:00 PM | 4.888 | 14.073 |
| 7/1/2011 | 5:55:00 PM | 4.842 | 14.107 |
| 7/1/2011 | 5:56:00 PM | 4.82 | 14.124 |
| 7/1/2011 | 5:57:00 PM | 4.85 | 14.086 |
| 7/1/2011 | 5:58:00 PM | 4.87 | 14.073 |
| 7/1/2011 | 5:59:00 PM | 4.892 | 14.157 |
| 7/1/2011 | 6:00:00 PM | 4.891 | 14.219 |
| 7/1/2011 | 6:01:00 PM | 4.872 | 14.236 |
| 7/1/2011 | 6:02:00 PM | 4.853 | 14.248 |
| 7/1/2011 | 6:03:00 PM | 4.857 | 14.259 |
| 7/1/2011 | 6:04:00 PM | 4.914 | 14.223 |
| 7/1/2011 | 6:05:00 PM | 4.902 | 14.251 |
| 7/1/2011 | 6:06:00 PM | 4.878 | 14.29 |
| 7/1/2011 | 6:07:00 PM | 4.883 | 14.3 |
| 7/1/2011 | 6:08:00 PM | 4.901 | 14.293 |
| 7/1/2011 | 6:09:00 PM | 4.907 | 14.332 |
| 7/1/2011 | 6:10:00 PM | 4.976 | 14.343 |
| 7/1/2011 | 6:15:00 PM | 4.797 | 13.887 |
| 7/1/2011 | 6:16:00 PM | 4.832 | 13.866 |
| 7/1/2011 | 6:17:00 PM | 4.843 | 13.853 |
| 7/1/2011 | 6:18:00 PM | 4.869 | 13.817 |
| 7/1/2011 | 6:19:00 PM | 4.898 | 13.798 |
| 7/1/2011 | 6:20:00 PM | 4.857 | 13.828 |
| 7/1/2011 | 6:21:00 PM | 4.859 | 13.837 |
| 7/1/2011 | 6:22:00 PM | 4.875 | 13.792 |
| 7/1/2011 | 6:23:00 PM | 4.851 | 13.836 |
| 7/1/2011 | 6:24:00 PM | 4.846 | 13.818 |
| 7/1/2011 | 6:25:00 PM | 4.861 | 13.821 |
| 7/1/2011 | 6:26:00 PM | 4.758 | 13.912 |
| 7/1/2011 | 6:27:00 PM | 4.822 | 13.859 |
| 7/1/2011 | 6:28:00 PM | 4.864 | 13.807 |
| 7/1/2011 | 6:29:00 PM | 4.842 | 13.823 |
| 7/1/2011 | 6:30:00 PM | 4.801 | 13.875 |
| 7/1/2011 | 6:31:00 PM | 4.822 | 13.861 |
| 7/1/2011 | 6:32:00 PM | 4.819 | 13.857 |
| 7/1/2011 | 6:33:00 PM | 4.827 | 13.842 |
| 7/1/2011 | 6:34:00 PM | 4.812 | 13.869 |
| 7/1/2011 | 6:35:00 PM | 4.862 | 13.87 |
| 7/1/2011 | 6:36:00 PM | 4.865 | 13.871 |
| 7/1/2011 | 6:37:00 PM | 4.852 | 13.922 |
| 7/1/2011 | 6:38:00 PM | 4.791 | 13.962 |
| 7/1/2011 | 6:39:00 PM | 4.872 | 13.905 |
| 7/1/2011 | 6:40:00 PM | 4.904 | 13.88 |

| | | | |
|---|---|---|---|
| 7/1/2011 | 6:41:00 PM | 4.887 | 13.91 |
| 7/1/2011 | 6:42:00 PM | 4.834 | 13.964 |
| 7/1/2011 | 6:43:00 PM | 4.8 | 14.047 |
| 7/1/2011 | 6:44:00 PM | 4.787 | 14.06 |
| 7/1/2011 | 6:45:00 PM | 4.84 | 14.042 |
| 7/1/2011 | 6:46:00 PM | 4.744 | 13.929 |
| 7/1/2011 | 6:47:00 PM | 4.738 | 13.881 |
| 7/1/2011 | 6:48:00 PM | 4.822 | 13.803 |
| 7/1/2011 | 6:49:00 PM | 4.836 | 13.786 |
| 7/1/2011 | 6:50:00 PM | 4.802 | 13.824 |
| 7/1/2011 | 6:51:00 PM | 4.835 | 13.784 |
| 7/1/2011 | 6:52:00 PM | 4.884 | 13.737 |
| 7/1/2011 | 6:53:00 PM | 4.873 | 13.751 |
| 7/1/2011 | 6:54:00 PM | 4.835 | 13.799 |
| 7/1/2011 | 6:55:00 PM | 4.835 | 13.787 |
| 7/1/2011 | 6:56:00 PM | 4.843 | 13.789 |
| 7/1/2011 | 6:57:00 PM | 4.875 | 13.759 |
| 7/1/2011 | 6:58:00 PM | 4.884 | 13.742 |
| 7/1/2011 | 6:59:00 PM | 4.859 | 13.774 |
| 7/1/2011 | 7:00:00 PM | 4.833 | 13.798 |
| 7/1/2011 | 7:01:00 PM | 4.863 | 13.768 |
| 7/1/2011 | 7:02:00 PM | 4.813 | 13.804 |
| | Average | 4.87 | 13.91 |

Curtis & Tompkins, Ltd., Analytical Laboratories, Since 1878
2323 Fifth Street, Berkeley, CA 94710, Phone (510) 486-0900

**Laboratory Job Number 229289**
**ANALYTICAL REPORT**

| | |
|---|---|
| Delta Air Quality Services<br>1845 North Case St.<br>Orange, CA 92865 | Project : STANDARD<br>Location : 2F-7 Stack<br>Level : II |

| Sample ID | Lab ID |
|---|---|
| 1-CR | 229289-001 |
| 2-CR | 229289-002 |
| 3-CR | 229289-003 |
| KOH-BLANK | 229289-004 |
| H2O-BLANK | 229289-005 |
| FB-CR | 229289-006 |

This data package has been reviewed for technical correctness and completeness. Release of this data has been authorized by the Laboratory Manager or the Manager's designee, as verified by the following signature. The results contained in this report meet all requirements of NELAC and pertain only to those samples which were submitted for analysis. This report may be reproduced only in its entirety.

Signature: Desirée N. Tetrault
Project Manager

Date: 07/15/2011

NELAP # 01107CA

Curtis & Tompkins, Ltd.

# CASE NARRATIVE

| | |
|---|---|
| Laboratory number: | **229289** |
| Client: | **Delta Air Quality Services** |
| Location: | **2F-7 Stack** |
| Request Date: | **07/11/11** |
| Samples Received: | **07/11/11** |

This data package contains sample and QC results for six water samples, requested for the above referenced project on 07/11/11. The samples were received cold and intact.

**Hexavalent Chromium by Ion Chromatograph (EPA 7199):**
No analytical problems were encountered.

Curtis & Tompkins, Ltd.

# Hexavalent Chromium

| | | | |
|---|---|---|---|
| Lab #: | 229289 | Location: | 2F-7 Stack |
| Client: | Delta Air Quality Services | Prep: | METHOD |
| Project#: | STANDARD | Analysis: | EPA 7199 |
| Matrix: | Water | Batch#: | 176653 |
| Units: | ug/L | Received: | 07/11/11 |
| Diln Fac: | 1.000 | | |

| | | | |
|---|---|---|---|
| Field ID: | 1-CR | Sampled: | 06/30/11 10:19 |
| Type: | SAMPLE | Analyzed: | 07/11/11 16:44 |
| Lab ID: | 229289-001 | | |

| Analyte | Result | RL |
|---|---|---|
| Hexavalent Chromium | ND | (ND) 0.50 x 0.812 → 0.406 |

| | | | |
|---|---|---|---|
| Field ID: | 2-CR | Sampled: | 06/30/11 15:54 |
| Type: | SAMPLE | Analyzed: | 07/11/11 16:57 |
| Lab ID: | 229289-002 | | |

| Analyte | Result | RL |
|---|---|---|
| Hexavalent Chromium | ND | 0.50 x .920 → 0.460 |

| | | | |
|---|---|---|---|
| Field ID: | 3-CR | Sampled: | 07/01/11 15:00 |
| Type: | SAMPLE | Analyzed: | 07/11/11 17:09 |
| Lab ID: | 229289-003 | | |

| Analyte | Result | RL |
|---|---|---|
| Hexavalent Chromium | ND | 0.50 x .954 → 0.477 |

| | | | |
|---|---|---|---|
| Field ID: | KOH-BLANK | Sampled: | 06/30/11 12:00 |
| Type: | SAMPLE | Analyzed: | 07/11/11 17:22 |
| Lab ID: | 229289-004 | | |

| Analyte | Result | RL |
|---|---|---|
| Hexavalent Chromium | ND | 0.50 x .300 → 0.150 |

= Not Detected
= Reporting Limit

Curtis & Tompkins, Ltd.

# Hexavalent Chromium

| | | | |
|---|---|---|---|
| Lab #: | 229289 | Location: | 2F-7 Stack |
| Client: | Delta Air Quality Services | Prep: | METHOD |
| Project#: | STANDARD | Analysis: | EPA 7199 |
| Matrix: | Water | Batch#: | 176653 |
| Units: | ug/L | Received: | 07/11/11 |
| Diln Fac: | 1.000 | | |

| | | | |
|---|---|---|---|
| Field ID: | H2O-BLANK | Sampled: | 06/30/11 12:00 |
| Type: | SAMPLE | Analyzed: | 07/11/11 17:35 |
| Lab ID: | 229289-005 | | |

| Analyte | Result | RL |
|---|---|---|
| Hexavalent Chromium | ND | 0.50 x .200 → 0.100 |

| | | | |
|---|---|---|---|
| Field ID: | FB-CR | Sampled: | 06/30/11 12:00 |
| Type: | SAMPLE | Analyzed: | 07/11/11 17:47 |
| Lab ID: | 229289-006 | | |

| Analyte | Result | RL |
|---|---|---|
| Hexavalent Chromium | ND | 0.50 x .394 → 0.197 |

| | | | |
|---|---|---|---|
| Type: | BLANK | Analyzed: | 07/11/11 16:01 |
| Lab ID: | QC599570 | | |

| Analyte | Result | RL |
|---|---|---|
| Hexavalent Chromium | ND | 0.50 |

ND= Not Detected
RL= Reporting Limit

Curtis & Tompkins, Ltd.

Batch QC Report

## Hexavalent Chromium

| | | | |
|---|---|---|---|
| Lab #: | 229289 | Location: | 2F-7 Stack |
| Client: | Delta Air Quality Services | Prep: | METHOD |
| Project#: | STANDARD | Analysis: | EPA 7199 |
| Field ID: | 1-CR | Batch#: | 176653 |
| MSS Lab ID: | 229289-001 | Sampled: | 06/30/11 10:19 |
| Matrix: | Water | Received: | 07/11/11 |
| Units: | ug/L | | |

Type: LCS
Lab ID: QC599571
Diln Fac: 1.000
Analyzed: 07/11/11 16:14

| Analyte | Spiked | Result | %REC | Limits |
|---|---|---|---|---|
| Hexavalent Chromium | 20.00 | 20.22 | 101 | 90-110 |

Type: MS
Lab ID: QC599572
Diln Fac: 1.010
Analyzed: 07/11/11 18:00

| Analyte | MSS Result | Spiked | Result | %REC | Limits |
|---|---|---|---|---|---|
| Hexavalent Chromium | <0.1250 | 10.10 | 10.18 | 101 | 85-115 |

Type: MSD
Lab ID: QC599573
Diln Fac: 1.010
Analyzed: 07/11/11 18:12

| Analyte | Spiked | Result | %REC | Limits | RPD | Lim |
|---|---|---|---|---|---|---|
| Hexavalent Chromium | 10.10 | 10.34 | 102 | 85-115 | 2 | 30 |

J= Relative Percent Difference

229289

# CHAIN OF CUSTODY

CLIENT: ICR 2F-7

TEST DATE(S): 6/30/2011 7/1/2011

LOCATION: FCC

SAMPLER(S): SS

SAMPLE LOCATION: 2F-7 Stack

PROJECT MANAGER: Ali Aleshakir

TEST METHOD(S): SW-846 Method 0061

DATE DUE: 7/15/2011

OUTSIDE LAB REQUIRED?: Yes

COMPLIANCE TEST? No

| DATE | TIME | TEST # | SAMPLE DESCRIPTION | CONTAINERS | SAMPLER | COMMENTS | Original TV, ml |
|---|---|---|---|---|---|---|---|
| 6/30/2011 | 10:19 | 1-Cr | Noz/Recirc line/Imp | 1 | SS | DI H2O / KOH | 812 |
| 6/30/2011 | 15:54 | 2-Cr | Noz/Recirc line/Imp | 1 | SS | DI H2O / KOH | ~~954~~ 920 |
| 7/1/2011 | 15:00 | 3-Cr | Noz/Recirc line/Imp | 1 | SS | DI H2O / KOH | 954 |
| 6/30/2011 | 12:00 | KOH-Blank | 300 ml .1N KOH | 1 | JP | .1N KOH | 300 |
| 6/30/2011 | 12:00 | H2O-Blank | 200 ml DI H2O | 1 | JP | DI H2O | 200 |
| 6/30/2011 | 12:00 | FB-Cr | Noz/Recirc line/Imp | 1 | SS | DI H2O / KOH | 394 |
| | | | | | | | |
| Total Samples | | | | 6 | | | |
| Reagent: | | DI H2O | | | | | |
| Reagent Lot #'s: | | | | | | | |

| RELEASED BY | DATE/TIME | RECEIVED BY | DATE/TIME |
|---|---|---|---|
| [signature] | 7/2/11 12:15 | [signature] | 7/6/11 0800 |
| | | shipped via courier to C.I.T. | |
| | | | |
| | | | |

ANALYSIS REQUIRED:

Cr6+ by 0061 (Total Cr not required)

Delta Air Quality Services, Incorporated

Note: 100 ml removed for archiving at Delta laboratory refrigerator
Use original TV noted for µg/sample calculation

Received @ C.I.T. [signature] 7-11-11 0900

C.10-37

3 of 7

**COOLER RECEIPT CHECKLIST**

Curtis & Tompkins, Ltd.

Login # 229289 Date Received 7/11/11 Number of coolers 1
Client Delta Project FCC 2F-7 Stack

Date Opened 7/11/11 By (print) R. Parris (sign) [signature]
Date Logged in ↓ By (print) ↓ (sign) ↓

1. Did cooler come with a shipping slip (airbill, etc) (YES) NO
   Shipping info GSO 1043940916

2A. Were custody seals present? .... ☐ YES (circle) on cooler on samples ☒ NO
   How many _____ Name _____ Date _____
2B. Were custody seals intact upon arrival? _____ YES NO (N/A)
3. Were custody papers dry and intact when received? _____ (YES) NO
4. Were custody papers filled out properly (ink, signed, etc)? _____ (YES) NO
5. Is the project identifiable from custody papers? (If so fill out top of form) ___ (YES) NO
6. Indicate the packing in cooler: (if other, describe) _____

☒ Bubble Wrap ☐ Foam blocks ☒ Bags ☐ None
☐ Cloth material ☐ Cardboard ☐ Styrofoam ☐ Paper towels

7. Temperature documentation: * Notify PM if temperature exceeds 6°C

Type of ice used: ☐ Wet ☒ Blue/Gel ☐ None Temp(°C) _____

☒ Samples Received on ice & cold without a temperature blank

☐ Samples received on ice directly from the field. Cooling process had begun

8. Were Method 5035 sampling containers present? _____ YES (NO)
   If YES, what time were they transferred to freezer? _____
9. Did all bottles arrive unbroken/unopened? _____ (YES) NO
10. Are samples in the appropriate containers for indicated tests? _____ (YES) NO
11. Are sample labels present, in good condition and complete? _____ (YES) NO
12. Do the sample labels agree with custody papers? _____ (YES) NO
13. Was sufficient amount of sample sent for tests requested? _____ (YES) NO
14. Are the samples appropriately preserved? _____ YES NO (N/A)
15. Did you check preservatives for all bottles for each sample? _____ YES NO (N/A)
16. Did you document your preservative check? _____ YES NO (N/A)
17. Did you change the hold time in LIMS for unpreserved VOAs? _____ YES NO (N/A)
18. Are bubbles > 6mm absent in VOA samples? _____ YES NO (N/A)
19. Was the client contacted concerning this sample delivery? _____ YES (NO)
   If YES, Who was called? _____ By _____ Date: _____

COMMENTS

_____

Rev 8, 6/11

AVERAGE METALS EMISSIONS

CLIENT: ExxonMobil

NON-BLANK CORRECTED FOR ERT

| NAME | ug/dscm | | ug/dscm at 7% O2 | | ug/dscf | | lb/hr |
|---|---|---|---|---|---|---|---|
| Antimony (Front) | ND < | 0.158 | ND < | 0.138 | ND < | 4.47E-03 | ND < 1.39E-04 |
| Antimony (Back) | ND < | 0.167 | ND < | 0.146 | ND < | 4.74E-03 | ND < 1.47E-04 |
| Arsenic (Back) | ND < | 0.139 | ND < | 0.122 | ND < | 3.95E-03 | ND < 1.22E-04 |
| Arsenic (Front) | ND < | 0.139 | ND < | 0.122 | ND < | 3.95E-03 | ND < 1.22E-04 |
| Beryllium (Back) | ND < | 0.139 | ND < | 0.122 | ND < | 3.95E-03 | ND < 1.22E-04 |
| Beryllium (Front) | ND < | 0.139 | ND < | 0.122 | ND < | 3.95E-03 | ND < 1.22E-04 |
| Cadmium (Back) | ND < | 0.139 | ND < | 0.122 | ND < | 3.95E-03 | ND < 1.22E-04 |
| Cadmium (Front) | ND < | 0.139 | ND < | 0.122 | ND < | 3.95E-03 | ND < 1.22E-04 |
| Chromium (Back) | | 0.786 | | 0.689 | | 2.23E-02 | 6.86E-04 |
| Chromium (Front) | | 0.467 | | 0.408 | | 1.32E-02 | 4.08E-04 |
| Cobalt (Back) | ND < | 0.139 | ND < | 0.122 | ND < | 3.95E-03 | ND < 1.22E-04 |
| Cobalt (Front) | ND < | 0.139 | ND < | 0.122 | ND < | 3.95E-03 | ND < 1.22E-04 |
| Lead (Back) | < | 0.241 | < | 0.211 | < | 6.83E-03 | < 2.10E-04 |
| Lead (Front) | < | 0.291 | < | 0.255 | < | 8.24E-03 | < 2.54E-04 |
| Manganese (Front) | | 0.582 | | 0.510 | | 1.65E-02 | 5.07E-04 |
| Manganese (Back) | | 0.282 | | 0.247 | | 8.00E-03 | 2.47E-04 |
| Nickel (Front) | < | 0.561 | < | 0.492 | < | 1.59E-02 | < 4.86E-04 |
| Nickel (Back) | ND < | 0.139 | ND < | 0.122 | ND < | 3.95E-03 | ND < 1.22E-04 |
| Selenium (Front) | | 0.900 | | 0.785 | | 2.55E-02 | 8.03E-04 |
| Selenium (Back) | < | 0.187 | < | 0.163 | < | 5.28E-03 | < 1.63E-04 |

TOTAL

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Antimony | ND < | 0.325 | ND < | 0.284 | ND < | 9.21E-03 | ND < 2.86E-04 |
| Arsenic | ND < | 0.279 | ND < | 0.244 | ND < | 7.90E-03 | ND < 2.45E-04 |
| Beryllium | ND < | 0.279 | ND < | 0.244 | ND < | 7.90E-03 | ND < 2.45E-04 |
| Cadmium | ND < | 0.279 | ND < | 0.244 | ND < | 7.90E-03 | ND < 2.45E-04 |
| Chromium | | 1.253 | | 1.097 | | 3.55E-02 | 1.09E-03 |
| Cobalt | ND < | 0.279 | ND < | 0.244 | ND < | 7.90E-03 | ND < 2.45E-04 |
| Lead | < | 0.532 | < | 0.466 | < | 1.51E-02 | < 4.64E-04 |
| Manganese | | 0.864 | | 0.757 | | 2.45E-02 | 7.54E-04 |
| Nickel | < | 0.700 | < | 0.614 | < | 1.98E-02 | < 6.08E-04 |
| Selenium | < | 1.087 | < | 0.948 | < | 3.08E-02 | < 9.66E-04 |

BLANK CORRECTED

| NAME | ug/blank | ug/train | ug/dscm | ug/dscm at 7% O2 | ug/dscf | lb/hr |
|---|---|---|---|---|---|---|
| Chromium (Front) | 0.85 | 0.8 | 0.229 | 0.201 | 6.50E-03 | 2.00E-04 |

TOTAL BLANK CORRECTED

| | | | | | |
|---|---|---|---|---|---|
| Chromium | 3.6 | 1.016 | 0.890 | 2.88E-02 | 8.87E-04 |

METALS CALCULATIONS

| | | | |
|---|---|---|---|
| CLIENT: | ExxonMobil | | AA |
| TEST NUMBER: | 1-Metals | VMSTD(DSCF): | 122.969 |
| TEST DATE: | 6/30/2011 | QSD(DSCF/MIN): | 230519.04 |
| T REF (F) | 68 | CO2,%: | 14.04 |
| | | O2,%: | 5.06 |

NON-BLANK CORRECTED FOR ERT

| NAME | ug/train | ug/dscm | ug/dscm at 7% O2 | ug/dscf | lb/hr |
|---|---|---|---|---|---|
| Antimony (Front) | ND < 0.50 | ND < 0.144 | ND < 0.126 | ND < 4.07E-03 | ND < 1.24E-04 |
| Antimony (Back) | ND < 0.60 | ND < 0.172 | ND < 0.151 | ND < 4.88E-03 | ND < 1.49E-04 |
| Arsenic (Back) | ND < 0.50 | ND < 0.144 | ND < 0.126 | ND < 4.07E-03 | ND < 1.24E-04 |
| Arsenic (Front) | ND < 0.50 | ND < 0.144 | ND < 0.126 | ND < 4.07E-03 | ND < 1.24E-04 |
| Beryllium (Back) | ND < 0.50 | ND < 0.144 | ND < 0.126 | ND < 4.07E-03 | ND < 1.24E-04 |
| Beryllium (Front) | ND < 0.50 | ND < 0.144 | ND < 0.126 | ND < 4.07E-03 | ND < 1.24E-04 |
| Cadmium (Back) | ND < 0.50 | ND < 0.144 | ND < 0.126 | ND < 4.07E-03 | ND < 1.24E-04 |
| Cadmium (Front) | ND < 0.50 | ND < 0.144 | ND < 0.126 | ND < 4.07E-03 | ND < 1.24E-04 |
| Chromium (Back) | 2.3 | 0.660 | 0.580 | 1.87E-02 | 5.70E-04 |
| Chromium (Front) | 1.8 | 0.517 | 0.454 | 1.46E-02 | 4.46E-04 |
| Cobalt (Back) | ND < 0.50 | ND < 0.144 | ND < 0.126 | ND < 4.07E-03 | ND < 1.24E-04 |
| Cobalt (Front) | ND < 0.50 | ND < 0.144 | ND < 0.126 | ND < 4.07E-03 | ND < 1.24E-04 |
| Lead (Back) | 1.1 | 0.316 | 0.277 | 8.95E-03 | 2.73E-04 |
| Lead (Front) | 1.0 | 0.287 | 0.252 | 8.13E-03 | 2.48E-04 |
| Manganese (Front) | 2.2 | 0.632 | 0.554 | 1.79E-02 | 5.45E-04 |
| Manganese (Back) | 1.1 | 0.316 | 0.277 | 8.95E-03 | 2.73E-04 |
| Nickel (Front) | 4.9 | 1.407 | 1.235 | 3.98E-02 | 1.21E-03 |
| Nickel (Back) | ND < 0.50 | ND < 0.144 | ND < 0.126 | ND < 4.07E-03 | ND < 1.24E-04 |
| Selenium (Front) | 2.1 | 0.603 | 0.529 | 1.71E-02 | 5.20E-04 |
| Selenium (Back) | ND < 0.50 | ND < 0.144 | ND < 0.126 | ND < 4.07E-03 | ND < 1.24E-04 |

BLANK CORRECTED (REAGENT ONLY)

| NAME | ug/blank | ug/train | ug/dscm | ug/dscm at 7% O2 | ug/dscf | lb/hr |
|---|---|---|---|---|---|---|
| Chromium (Front) | 0.85 | 1.0 | 0.273 | 0.239 | 7.73E-03 | 2.35E-04 |

TOTAL

| | | | | | |
|---|---|---|---|---|---|
| Antimony | ND < 1.10 | ND < 0.316 | ND < 0.277 | ND < 8.95E-03 | ND < 2.73E-04 |
| Arsenic | ND < 1.00 | ND < 0.287 | ND < 0.252 | ND < 8.13E-03 | ND < 2.48E-04 |
| Beryllium | ND < 1.00 | ND < 0.287 | ND < 0.252 | ND < 8.13E-03 | ND < 2.48E-04 |
| Cadmium | ND < 1.00 | ND < 0.287 | ND < 0.252 | ND < 8.13E-03 | ND < 2.48E-04 |
| Chromium | 4.1 | 1.177 | 1.033 | 3.33E-02 | 1.02E-03 |
| Cobalt | ND < 1.00 | ND < 0.287 | ND < 0.252 | ND < 8.13E-03 | ND < 2.48E-04 |
| Lead | 2.1 | 0.603 | 0.529 | 1.71E-02 | 5.20E-04 |
| Manganese | 3.3 | 0.948 | 0.832 | 2.68E-02 | 8.18E-04 |
| Nickel | < 5.4 | < 1.551 | < 1.361 | < 4.39E-02 | < 1.34E-03 |
| Selenium | < 2.6 | < 0.747 | < 0.655 | < 2.11E-02 | < 6.44E-04 |

TOTAL BLANK CORRECTED (REAGENT ONLY)

| | | | | | |
|---|---|---|---|---|---|
| Chromium | 3.3 | 0.933 | 0.819 | 2.64E-02 | 8.05E-04 |

METALS CALCULATIONS

| | | | |
|---|---|---|---|
| CLIENT: | ExxonMobil | | AA |
| TEST NUMBER: | 2-Metals | VMSTD(DSCF): | 124.863 |
| TEST DATE: | 6/30/2011 | QSD(DSCF/MIN): | 231456.86 |
| T REF (F) | 68 | CO2,%: | 14.08 |
| | | O2,%: | 5.06 |

NON-BLANK CORRECTED FOR ERT

| NAME | ug/train | ug/dscm | ug/dscm at 7% O2 | ug/dscf | lb/hr |
|---|---|---|---|---|---|
| Antimony (Front) | ND < 0.60 | ND < 0.170 | ND < 0.149 | ND < 4.81E-03 | ND < 1.47E-04 |
| Antimony (Back) | ND < 0.60 | ND < 0.170 | ND < 0.149 | ND < 4.81E-03 | ND < 1.47E-04 |
| Arsenic (Back) | ND < 0.50 | ND < 0.141 | ND < 0.124 | ND < 4.00E-03 | ND < 1.22E-04 |
| Arsenic (Front) | ND < 0.50 | ND < 0.141 | ND < 0.124 | ND < 4.00E-03 | ND < 1.22E-04 |
| Beryllium (Back) | ND < 0.50 | ND < 0.141 | ND < 0.124 | ND < 4.00E-03 | ND < 1.22E-04 |
| Beryllium (Front) | ND < 0.50 | ND < 0.141 | ND < 0.124 | ND < 4.00E-03 | ND < 1.22E-04 |
| Cadmium (Back) | ND < 0.50 | ND < 0.141 | ND < 0.124 | ND < 4.00E-03 | ND < 1.22E-04 |
| Cadmium (Front) | ND < 0.50 | ND < 0.141 | ND < 0.124 | ND < 4.00E-03 | ND < 1.22E-04 |
| Chromium (Back) | 4.4 | 1.244 | 1.092 | 3.52E-02 | 1.08E-03 |
| Chromium (Front) | 1.8 | 0.509 | 0.447 | 1.44E-02 | 4.41E-04 |
| Cobalt (Back) | ND < 0.50 | ND < 0.141 | ND < 0.124 | ND < 4.00E-03 | ND < 1.22E-04 |
| Cobalt (Front) | ND < 0.50 | ND < 0.141 | ND < 0.124 | ND < 4.00E-03 | ND < 1.22E-04 |
| Lead (Back) | 0.97 | 0.274 | 0.241 | 7.77E-03 | 2.38E-04 |
| Lead (Front) | 1.6 | 0.452 | 0.397 | 1.28E-02 | 3.92E-04 |
| Manganese (Front) | 2.9 | 0.820 | 0.720 | 2.32E-02 | 7.10E-04 |
| Manganese (Back) | 1.2 | 0.339 | 0.298 | 9.61E-03 | 2.94E-04 |
| Nickel (Front) | ND < 0.50 | ND < 0.141 | ND < 0.124 | ND < 4.00E-03 | ND < 1.22E-04 |
| Nickel (Back) | ND < 0.50 | ND < 0.141 | ND < 0.124 | ND < 4.00E-03 | ND < 1.22E-04 |
| Selenium (Front) | 1.0 | 0.283 | 0.248 | 8.01E-03 | 2.45E-04 |
| Selenium (Back) | 1.0 | 0.283 | 0.248 | 8.01E-03 | 2.45E-04 |

BLANK CORRECTED (REAGENT ONLY)

| NAME | ug/blank | ug/train | ug/dscm | ug/dscm at 7% O2 | ug/dscf | lb/hr |
|---|---|---|---|---|---|---|
| Chromium (Front) | 0.85 | 1.0 | 0.269 | 0.236 | 7.61E-03 | 2.33E-04 |

TOTAL

| | | | | | |
|---|---|---|---|---|---|
| Antimony | ND < 1.20 | ND < 0.339 | ND < 0.298 | ND < 9.61E-03 | ND < 2.94E-04 |
| Arsenic | ND < 1.00 | ND < 0.283 | ND < 0.248 | ND < 8.01E-03 | ND < 2.45E-04 |
| Beryllium | ND < 1.00 | ND < 0.283 | ND < 0.248 | ND < 8.01E-03 | ND < 2.45E-04 |
| Cadmium | ND < 1.00 | ND < 0.283 | ND < 0.248 | ND < 8.01E-03 | ND < 2.45E-04 |
| Chromium | 6.2 | 1.753 | 1.539 | 4.97E-02 | 1.52E-03 |
| Cobalt | ND < 1.00 | ND < 0.283 | ND < 0.248 | ND < 8.01E-03 | ND < 2.45E-04 |
| Lead | 2.6 | 0.727 | 0.638 | 2.06E-02 | 6.30E-04 |
| Manganese | 4.1 | 1.159 | 1.018 | 3.28E-02 | 1.00E-03 |
| Nickel | ND < 1.0 | ND < 0.283 | ND < 0.248 | ND < 8.01E-03 | ND < 2.45E-04 |
| Selenium | 2.0 | 0.566 | 0.496 | 1.60E-02 | 4.90E-04 |

TOTAL BLANK CORRECTED (REAGENT ONLY)

| | | | | | |
|---|---|---|---|---|---|
| Chromium | 5.4 | 1.513 | 1.328 | 4.28E-02 | 1.31E-03 |

METALS CALCULATIONS

| | | | |
|---|---|---|---|
| CLIENT: | ExxonMobil | INITIALS: | AA |
| TEST NUMBER: | 3-Metals | VMSTD(DSCF): | 132.278 |
| TEST DATE: | 7/1/2011 | QSD(DSCF/MIN): | 242017.83 |
| T REF (F) | 68 | CO2,%: | 14.30 |
| | | O2,%: | 4.90 |

NON-BLANK CORRECTED FOR ERT

| NAME | ug/train | ug/dscm | ug/dscm at 7% O2 | ug/dscf | lb/hr |
|---|---|---|---|---|---|
| Antimony (Front) | ND < 0.60 | ND < 0.160 | ND < 0.139 | ND < 4.54E-03 | ND < 1.45E-04 |
| Antimony (Back) | ND < 0.60 | ND < 0.160 | ND < 0.139 | ND < 4.54E-03 | ND < 1.45E-04 |
| Arsenic (Back) | ND < 0.50 | ND < 0.133 | ND < 0.116 | ND < 3.78E-03 | ND < 1.21E-04 |
| Arsenic (Front) | ND < 0.50 | ND < 0.133 | ND < 0.116 | ND < 3.78E-03 | ND < 1.21E-04 |
| Beryllium (Back) | ND < 0.50 | ND < 0.133 | ND < 0.116 | ND < 3.78E-03 | ND < 1.21E-04 |
| Beryllium (Front) | ND < 0.50 | ND < 0.133 | ND < 0.116 | ND < 3.78E-03 | ND < 1.21E-04 |
| Cadmium (Back) | ND < 0.50 | ND < 0.133 | ND < 0.116 | ND < 3.78E-03 | ND < 1.21E-04 |
| Cadmium (Front) | ND < 0.50 | ND < 0.133 | ND < 0.116 | ND < 3.78E-03 | ND < 1.21E-04 |
| Chromium (Back) | 1.7 | 0.454 | 0.394 | 1.29E-02 | 4.11E-04 |
| Chromium (Front) | 1.4 | 0.374 | 0.325 | 1.06E-02 | 3.39E-04 |
| Cobalt (Back) | ND < 0.50 | ND < 0.133 | ND < 0.116 | ND < 3.78E-03 | ND < 1.21E-04 |
| Cobalt (Front) | ND < 0.50 | ND < 0.133 | ND < 0.116 | ND < 3.78E-03 | ND < 1.21E-04 |
| Lead (Back) | ND < 0.50 | ND < 0.133 | ND < 0.116 | ND < 3.78E-03 | ND < 1.21E-04 |
| Lead (Front) | ND < 0.50 | ND < 0.133 | ND < 0.116 | ND < 3.78E-03 | ND < 1.21E-04 |
| Manganese (Front) | 1.1 | 0.294 | 0.255 | 8.32E-03 | 2.66E-04 |
| Manganese (Back) | 0.72 | 0.192 | 0.167 | 5.44E-03 | 1.74E-04 |
| Nickel (Front) | ND < 0.50 | ND < 0.133 | ND < 0.116 | ND < 3.78E-03 | ND < 1.21E-04 |
| Nickel (Back) | ND < 0.50 | ND < 0.133 | ND < 0.116 | ND < 3.78E-03 | ND < 1.21E-04 |
| Selenium (Front) | 6.8 | 1.815 | 1.577 | 5.14E-02 | 1.64E-03 |
| Selenium (Back) | ND < 0.50 | ND < 0.133 | ND < 0.116 | ND < 3.78E-03 | ND < 1.21E-04 |

BLANK CORRECTED (REAGENT ONLY)

| NAME | ug/blank | ug/train | ug/dscm | ug/dscm at 7% O2 | ug/dscf | lb/hr |
|---|---|---|---|---|---|---|
| Chromium (Front) | 0.85 | 0.6 | 0.147 | 0.128 | 4.16E-03 | 1.33E-04 |

TOTAL

| | | | | | |
|---|---|---|---|---|---|
| Antimony | ND < 1.20 | ND < 0.320 | ND < 0.278 | ND < 9.07E-03 | ND < 2.90E-04 |
| Arsenic | ND < 1.00 | ND < 0.267 | ND < 0.232 | ND < 7.56E-03 | ND < 2.42E-04 |
| Beryllium | ND < 1.00 | ND < 0.267 | ND < 0.232 | ND < 7.56E-03 | ND < 2.42E-04 |
| Cadmium | ND < 1.00 | ND < 0.267 | ND < 0.232 | ND < 7.56E-03 | ND < 2.42E-04 |
| Chromium | 3.1 | 0.828 | 0.719 | 2.34E-02 | 7.50E-04 |
| Cobalt | ND < 1.00 | ND < 0.267 | ND < 0.232 | ND < 7.56E-03 | ND < 2.42E-04 |
| Lead | ND < 1.0 | ND < 0.267 | ND < 0.232 | ND < 7.56E-03 | ND < 2.42E-04 |
| Manganese | 1.8 | 0.486 | 0.422 | 1.38E-02 | 4.40E-04 |
| Nickel | ND < 1.0 | ND < 0.267 | ND < 0.232 | ND < 7.56E-03 | ND < 2.42E-04 |
| Selenium | < 7.3 | < 1.949 | < 1.693 | < 5.52E-02 | < 1.77E-03 |

TOTAL BLANK CORRECTED (REAGENT ONLY)

| | | | | | |
|---|---|---|---|---|---|
| Chromium | 2.3 | 0.601 | 0.522 | 1.70E-02 | 5.44E-04 |

Particulate Sample Weight Data

| TEST NO: | 1-MTL | 2-MTL | 3-MTL |
|---|---|---|---|
| DATA BY: | AA | AA | AA |
| ACETONE BLANK, mg/ml: | 0.0000 | 0.0000 | 0.0000 |
| Filter I.D. | 83-QHT-6 | 83-QHT-8 | 83-QHT-4 |
| Final Weight | 0.4695 | 0.4651 | 0.4587 |
| Tare Weight | 0.4665 | 0.4600 | 0.4605 |
| Gain, mg | 3.0 | 5.1 | 0.0 |
| Probe Wash Beaker I.D. | 9773 | 9774 | 9775 |
| Total Volume, ml | 120 | 133 | 159 |
| Evaporated Volume, ml | 120 | 133 | 159 |
| Final Weight, g | 29.4555 | 29.2402 | 29.3593 |
| Tare Weight, g | 29.4515 | 29.2380 | 29.3582 |
| Difference, mg | 4.0 | 2.2 | 1.1 |
| Gain, mg | 4.0 | 2.2 | 1.1 |
| Aliquot Correction, ND | 1.00 | 1.00 | 1.00 |
| Net Gain, mg | 4.0 | 2.2 | 1.1 |
| | 7.0 | 7.3 | 1.1 |

***Delta***
Metals Test Summary

| | | | | | |
|---|---|---|---|---|---|
| Client/Location..... | ExxonMobil | | | Reference Temp (F): | 68 |
| | | | | Fuel..... | Refinery |
| Sample Location..... | FCC 2F-7 Stack | | | Data By..... | AA |
| Test No..... | 1-Mtl | 2-Mtl | 3-Mtl | Average | |
| Date..... | June 30, 2011 | June 30, 2011 | July 1, 2011 | * | |
| Start/Stop Time..... | 1016/1427 | 1554/1957 | 1500/1907 | * | |
| Bar Press (in Hg)..... | 29.85 | 29.85 | 29.74 | * | |
| Test Method..... | EPA 29/5 | EPA 29/5 | EPA 29/5 | * | |
| Sample Time (Min)..... | 192 | 192 | 192 | * | |
| Sample Train..... | 12WCS | 12WCS | 12WCS | * | |
| Meter Cal Factor..... | 1.005 | 1.005 | 1.005 | * | |
| Pitot Factor ..... | 0.84 | 0.84 | 0.84 | * | |
| Nozzle Diam (in)..... | 0.220 | 0.220 | 0.220 | * | |
| Stack Area (sq ft)..... | 94.31 | 94.31 | 94.31 | | |
| Stack O2 (%)..... | 5.06 | 5.06 | 4.90 | 5.01 | |
| Stack CO2 (%)..... | 14.04 | 14.08 | 14.30 | 14.14 | |
| Stack Press (iwg)..... | -1.30 | -1.30 | -1.30 | -1.30 | |
| Stack Temp (F)..... | 476.7 | 476.5 | 473.7 | 475.6 | |
| Vel Head (iwg)..... | 1.26 | 1.27 | 1.39 | 1.31 | |
| Meter Temp (F)..... | 79 | 75 | 78 | 77 | |
| Meter Press (iwg)..... | 1.39 | 1.40 | 1.53 | 1.44 | |
| Meter Vol (acf)..... | 124.790 | 125.700 | 134.540 | 128.34 | |
| Liquid Vol (ml)..... | 412.3 | 423.1 | 450.7 | 428.7 | |
| Std Sample Vol (SCF)..... | 122.969 | 124.863 | 132.278 | 126.70 | |
| Std Sample Vol (SCM)..... | 3.482 | 3.536 | 3.746 | 3.588 | |
| Moisture Fraction..... | 0.137 | 0.138 | 0.139 | 0.138 | |
| Stack Gas Mol Wt..... | 28.75 | 28.74 | 28.76 | 28.75 | |
| Stack Gas Velocity (ft/sec)..... | 84.19 | 84.63 | 88.62 | 85.81 | |
| Isokinetic Ratio (%)..... | 99.2 | 100.3 | 101.7 | 100.4 | |
| Stack Flow Rate (wacfm)..... | 476,394 | 478,921 | 501,514 | 485,610 | |
| Stack Flow Rate (wscfm)..... | 267,000 | 268,476 | 280,939 | 272,138 | |
| Stack Flow Rate (dscfm)..... | 230,519 | 231,457 | 242,018 | 234,665 | |
| Stack Flow Rate (mdscf/h)..... | 138.31 | 138.87 | 145.21 | 140.80 | |

| Metals Test Sample Data | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Client/Location: | | ExxonMobil | | | | | | Sample Location: | | | 2F-7 Stack |
| Unit: | | FCC | | | | | | Data By: | | | AA |
| Test No: | 1-Mtl | ISO | Assumed Moisture | | Sample Factor | | Delta H = | 1.10 | x Delta P | | |
| Date: | 6/30/2011 | 99.2 | 14 | | | Time per Point = | | 8 | Static Pressure = | | -1.30 |
| Port | Point | Time | Meter Volume | Delta P | Factor | Delta H | Stack Temp. | Meter In | Meter Out | Probe | Vacuum |
| A | 6 | 10:16:00 | 273.430 | 1.30 | 1.10 | 1.43 | 475 | 87 | 90 | 336 | 4 |
| A | 5 | 10:24:00 | 278.740 | 1.30 | 1.10 | 1.43 | 475 | 87 | 90 | 338 | 4 |
| A | 4 | 10:32:00 | 283.930 | 1.50 | 1.10 | 1.65 | 479 | 90 | 88 | 338 | 4 |
| A | 3 | 10:40:00 | 289.600 | 1.50 | 1.10 | 1.65 | 479 | 87 | 85 | 341 | 4 |
| A | 2 | 10:48:00 | 295.270 | 1.30 | 1.10 | 1.43 | 479 | 85 | 85 | 338 | 4 |
| A | 1 | 10:56:00 | 300.500 | 1.30 | 1.10 | 1.43 | 478 | 82 | 83 | 341 | 4 |
| | Stop | 11:04:00 | 305.545 | | | | | | | | |
| B | 6 | 11:21:00 | 305.545 | 1.30 | 1.10 | 1.43 | 477 | 79 | 79 | 342 | 4 |
| B | 5 | 11:29:00 | 310.800 | 1.30 | 1.10 | 1.43 | 477 | 79 | 78 | 342 | 4 |
| B | 4 | 11:37:00 | 316.080 | 1.30 | 1.10 | 1.43 | 478 | 79 | 78 | 340 | 4 |
| B | 3 | 11:45:00 | 321.395 | 1.50 | 1.10 | 1.65 | 480 | 79 | 77 | 342 | 4 |
| B | 2 | 11:53:00 | 327.120 | 1.50 | 1.10 | 1.65 | 480 | 79 | 77 | 341 | 4 |
| B | 1 | 12:01:00 | 332.800 | 1.50 | 1.10 | 1.65 | 480 | 78 | 77 | 342 | 4 |
| | Stop | 12:09:00 | 338.480 | | | | | | | | |
| C | 6 | 12:11:00 | 338.480 | 1.30 | 1.10 | 1.43 | 477 | 76 | 75 | 340 | 4 |
| C | 5 | 12:19:00 | 343.790 | 1.30 | 1.10 | 1.43 | 477 | 76 | 75 | 340 | 4 |
| C | 4 | 12:27:00 | 349.070 | 1.30 | 1.10 | 1.43 | 476 | 77 | 75 | 340 | 4 |
| C | 3 | 12:35:00 | 354.320 | 1.30 | 1.10 | 1.43 | 476 | 77 | 75 | 340 | 4 |
| C | 2 | 12:43:00 | 359.650 | 1.30 | 1.10 | 1.43 | 477 | 77 | 75 | 334 | 4 |
| C | 1 | 12:51:00 | 364.890 | 1.30 | 1.10 | 1.43 | 477 | 77 | 75 | 335 | 4 |
| | Stop | 12:59:00 | 370.150 | | | | | | | | |
| D | 6 | 13:39:00 | 370.150 | 1.00 | 1.10 | 1.10 | 476 | 75 | 74 | 332 | 4 |
| D | 5 | 13:47:00 | 374.880 | 1.00 | 1.10 | 1.10 | 476 | 75 | 74 | 315 | 4 |
| D | 4 | 13:55:00 | 379.560 | 1.00 | 1.10 | 1.10 | 476 | 75 | 74 | 317 | 4 |
| D | 3 | 14:03:00 | 384.340 | 1.00 | 1.10 | 1.10 | 473 | 78 | 75 | 317 | 4 |
| D | 2 | 14:11:00 | 389.070 | 1.00 | 1.10 | 1.10 | 472 | 78 | 75 | 317 | 4 |
| D | 1 | 14:19:00 | 393.490 | 1.00 | 1.10 | 1.10 | 470 | 78 | 75 | 320 | 4 |
| | Stop | 14:27:00 | 398.220 | | | | | | | | |
| **Total/Average** | | **192** | **124.790** | **1.2589** | | **1.39** | **477** | **80** | **79** | **335** | **4** |

| Metals Test Sample Data | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Client/Location: | | ExxonMobil | | | | | | Sample Location: | | | 2F-7 Stack |
| Unit: | | FCC | | | | | | Data By: | | | AA |
| Test No: | 2-Mtl | ISO | Moisture | | Sample Factor | | Delta H = | 1.10 | x Delta P | | |
| Date: | 6/30/2011 | 100.3 | 14 | | | Time per Point = | | 8 | Static Pressure = | | -1.3 |
| Port | Point | Time | Meter Volume | Delta P | Factor | Delta H | Stack Temp. | Meter In | Meter Out | Probe | Vacuum |
| A | 6 | 15:54:00 | 398.800 | 1.30 | 1.10 | 1.43 | 477 | 77 | 76 | 311 | 4 |
| A | 5 | 16:02:00 | 404.080 | 1.20 | 1.10 | 1.32 | 477 | 77 | 78 | 322 | 4 |
| A | 4 | 16:10:00 | 409.360 | 1.20 | 1.10 | 1.32 | 477 | 78 | 77 | 317 | 4 |
| A | 3 | 16:18:00 | 414.640 | 1.20 | 1.10 | 1.32 | 476 | 77 | 76 | 319 | 4 |
| A | 2 | 16:26:00 | 419.300 | 1.00 | 1.10 | 1.10 | 474 | 78 | 77 | 323 | 4 |
| A | 1 | 16:34:00 | 424.045 | 1.00 | 1.10 | 1.10 | 474 | 78 | 77 | 323 | 4 |
| | Stop | 16:42:00 | 428.780 | | | | | | | | |
| B | 6 | 16:53:00 | 428.780 | 1.30 | 1.10 | 1.43 | 475 | 78 | 77 | 319 | 4 |
| B | 5 | 17:01:00 | 434.700 | 1.30 | 1.10 | 1.43 | 476 | 77 | 76 | 321 | 4 |
| B | 4 | 17:09:00 | 440.620 | 1.30 | 1.10 | 1.43 | 476 | 80 | 77 | 320 | 4 |
| B | 3 | 17:17:00 | 445.050 | 1.00 | 1.10 | 1.10 | 476 | 80 | 77 | 320 | 4 |
| B | 2 | 17:25:00 | 449.480 | 1.00 | 1.10 | 1.10 | 471 | 79 | 75 | 312 | 4 |
| B | 1 | 17:33:00 | 454.980 | 1.00 | 1.10 | 1.10 | 471 | 79 | 75 | 312 | 4 |
| | Stop | 17:41:00 | 459.560 | | | | | | | | |
| C | 6 | 17:46:00 | 459.560 | 1.30 | 1.10 | 1.43 | 478 | 75 | 74 | 321 | 4 |
| C | 5 | 17:54:00 | 464.880 | 1.30 | 1.10 | 1.43 | 479 | 75 | 74 | 325 | 4 |
| C | 4 | 18:02:00 | 470.200 | 1.30 | 1.10 | 1.43 | 479 | 75 | 74 | 330 | 4 |
| C | 3 | 18:10:00 | 475.460 | 1.50 | 1.10 | 1.65 | 478 | 73 | 73 | 323 | 4 |
| C | 2 | 18:18:00 | 481.120 | 1.50 | 1.10 | 1.65 | 479 | 74 | 73 | 322 | 4 |
| C | 1 | 18:26:00 | 486.850 | 1.30 | 1.10 | 1.43 | 478 | 74 | 73 | 321 | 4 |
| | Stop | 18:34:00 | 492.210 | | | | | | | | |
| D | 6 | 19:09:00 | 492.210 | 1.50 | 1.10 | 1.65 | 476 | 70 | 71 | 321 | 4 |
| D | 5 | 19:17:00 | 497.870 | 1.50 | 1.10 | 1.65 | 476 | 70 | 71 | 321 | 4 |
| D | 4 | 19:25:00 | 503.530 | 1.50 | 1.10 | 1.65 | 478 | 70 | 70 | 321 | 4 |
| D | 3 | 19:33:00 | 509.300 | 1.50 | 1.10 | 1.65 | 478 | 71 | 70 | 324 | 4 |
| D | 2 | 19:41:00 | 514.320 | 1.30 | 1.10 | 1.43 | 478 | 71 | 70 | 321 | 4 |
| D | 1 | 19:49:00 | 519.550 | 1.30 | 1.10 | 1.43 | 478 | 71 | 70 | 321 | 4 |
| | Stop | 19:57:00 | 524.500 | | | | | | | | |
| **Total/Average** | | **192** | **125.700** | **1.2721** | | **1.40** | **476** | **75** | **74** | | |

| Metals Test Sample Data | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Client/Location: | | ExxonMobil | | | | | | Sample Location: | | | 2F-7 Stack |
| Unit: | | FCC | | | | | | Data By: | | | AA |
| Test No: | 3-Mtl | ISO | Moisture | | Sample Factor | | Delta H = | 1.10 | x Delta P | | |
| Date: | 7/1/2011 | 101.7 | 14 | | | Time per Point = | | 8 | Static Pressure = | | -1.3 |
| Port | Point | Time | Meter Volume | Delta P | Factor | Delta H | Stack Temp. | Meter In | Meter Out | Probe | Vacuum |
| A | 6 | 15:00:00 | 525.460 | 1.3 | 1.10 | 1.43 | 476 | 79 | 78 | 322 | 4 |
| A | 5 | 15:08:00 | 531.300 | 1.3 | 1.10 | 1.43 | 476 | 79 | 78 | 328 | 4 |
| A | 4 | 15:16:00 | 536.650 | 1.5 | 1.10 | 1.65 | 476 | 82 | 80 | 330 | 4 |
| A | 3 | 15:24:00 | 542.160 | 1.4 | 1.10 | 1.54 | 474 | 82 | 79 | 325 | 4 |
| A | 2 | 15:32:00 | 547.510 | 1.4 | 1.10 | 1.54 | 475 | 82 | 79 | 322 | 4 |
| A | 1 | 15:40:00 | 553.700 | 1.4 | 1.10 | 1.54 | 476 | 82 | 81 | 330 | 4 |
| | Stop | 15:48:00 | 558.980 | | | | | | | | |
| B | 6 | 16:05:00 | 558.980 | 1.3 | 1.10 | 1.43 | 475 | 80 | 81 | 327 | 4 |
| B | 5 | 16:13:00 | 564.250 | 1.3 | 1.10 | 1.43 | 474 | 80 | 80 | 329 | 4 |
| B | 4 | 16:21:00 | 569.520 | 1.3 | 1.10 | 1.43 | 476 | 81 | 80 | 325 | 4 |
| B | 3 | 16:29:00 | 574.790 | 1.4 | 1.10 | 1.54 | 476 | 81 | 80 | 322 | 4 |
| B | 2 | 16:37:00 | 580.060 | 1.4 | 1.10 | 1.54 | 476 | 81 | 80 | 321 | 4 |
| B | 1 | 16:45:00 | 585.330 | 1.4 | 1.10 | 1.54 | 475 | 81 | 80 | 320 | 4 |
| | Stop | 16:53:00 | 591.400 | | | | | | | | |
| C | 6 | 17:19:00 | 591.400 | 1.4 | 1.10 | 1.54 | 470 | 77 | 75 | 321 | 4 |
| C | 5 | 17:27:00 | 597.470 | 1.4 | 1.10 | 1.54 | 470 | 77 | 75 | 325 | 4 |
| C | 4 | 17:35:00 | 603.470 | 1.4 | 1.10 | 1.54 | 470 | 78 | 75 | 320 | 4 |
| C | 3 | 17:43:00 | 609.540 | 1.4 | 1.10 | 1.54 | 470 | 78 | 75 | 321 | 4 |
| C | 2 | 17:51:00 | 615.610 | 1.4 | 1.10 | 1.54 | 472 | 78 | 75 | 323 | 4 |
| C | 1 | 17:59:00 | 621.680 | 1.4 | 1.10 | 1.54 | 472 | 78 | 75 | 324 | 4 |
| | Stop | 18:07:00 | 625.500 | | | | | | | | |
| D | 6 | 18:19:00 | 625.500 | 1.5 | 1.10 | 1.65 | 474 | 78 | 75 | 328 | 4 |
| D | 5 | 18:27:00 | 631.350 | 1.5 | 1.10 | 1.65 | 475 | 78 | 76 | 327 | 4 |
| D | 4 | 18:35:00 | 637.150 | 1.5 | 1.10 | 1.65 | 473 | 78 | 76 | 326 | 4 |
| D | 3 | 18:43:00 | 642.950 | 1.5 | 1.10 | 1.65 | 473 | 80 | 76 | 328 | 4 |
| D | 2 | 18:51:00 | 648.950 | 1.3 | 1.10 | 1.43 | 470 | 80 | 76 | 323 | 4 |
| D | 1 | 18:59:00 | 654.150 | 1.3 | 1.10 | 1.43 | 474 | 75 | 76 | 328 | 4 |
| | Stop | 19:07:00 | 660.000 | | | | | | | | |
| **Total/Average** | | **192** | **134.540** | **1.4** | | **1.53** | **474** | **79** | **78** | | |
| | | | | | | | | **78** | | | |

Delta Air Quality Services, Incorporated

# WET CHEMICAL SAMPLING SYSTEM DATA AND WORKSHEET

CLIENT: Exxon Mobil
LOCATION: FCC / 2F-7 Stack
DATE: 7/1/11
RUN NO: FB-M+C
OPERATOR: JP
METER BOX NO: 12 WCS
METER ΔH@: 0.583
METER Yd: 1.005
STACK AREA, FT²:
TRAVERSE POINTS, MIN/POINT:
ΔH= _____ X ΔP:
Probe Condition, pre/post test:
Silica Gel Expanded, Y/N:
Filter Condition after Test:
Check Weight:

AMBIENT TEMPERATURE:
BAROMETRIC PRESSURE:
ASSUMED MOISTURE:
PITOT TUBE COEFF, Cp: 0.84
PROBE ID NO/MATERIAL: #73 / GLASS
PROBE LENGTH: 6'
NOZZLE ID NO/ MATERIAL: GLASS
NOZZLE DIAMETER: 0.220
FILTER NO/TYPE: 83 GHT 2
PRE-TEST LEAK RATE: : _____ CFM@ _____ in. Hg.
POST-TEST LEAK RATE: : _____ CFM@ _____ in. Hg.
PITOT LEAK CHECK - PRE: _____ POST:
CHAIN OF CUSTODY: SAMPLE CUSTODIAN JP
SAMPLER JP
SAMPLE CUSTODIAN JP

| Imp. # | Contents | Post-Test | Pre-Test | Difference |
|---|---|---|---|---|
| 1 | 5% $HNO_3$/10% $H_2O_2$ | 728.4 | 728.4 | |
| 2 | " " | 616.9 | 616.8 | |
| 3 | MT | 606.2 | 606.4 | |
| 4 | Sb | 982.6 | 982.6 | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| Total: | | | | |

| Point | Time | Meter Volume, ft³ | ΔP in. $H_2O$ | ΔH in. $H_2O$ | Stack Temp, °F | Probe Temp, °F | Filter Temp, °F | Imp. Out Temp, °F | Meter Temp, °F In | Meter Temp, °F Out | Vacuum in. Hg. | $O_2$ % | P. static in. $H_2O$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | |
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| Average: | | | | | | | | | | | | | |

Comments:

C-11-11


Date of last revision 7/19/2010
DS834071
Master Document Storage\Forms\Datasheets\Field Datasheets

Delta
Air Quality Services, Incorporated

# WET CHEMICAL SAMPLING SYSTEM DATA AND WORKSHEET

CLIENT: Exxon Mobil
LOCATION: FCC / 2F-7 Stack
DATE: 6/30/11
RUN NO: 1-Metals
OPERATOR: SS
METER BOX NO: 12WLS
METER ΔH@: .585
METER Yd: 6.005
STACK AREA, FT²: ✓
TRAVERSE POINTS, MIN/POINT: 8/24
ΔH= 1.1 X ΔP:
Probe Condition, pre/post test: ✓
Silica Gel Expended, Y/N: ✓
Filter Condition after Test: ✓
Check Weight:

AMBIENT TEMPERATURE: 82°
BAROMETRIC PRESSURE: 29.85
ASSUMED MOISTURE: 14%
PITOT TUBE COEFF, Cp: .84
PROBE ID NO/MATERIAL: #005 / glass
PROBE LENGTH: 6'
NOZZLE ID NO/ MATERIAL: 1 / glass
NOZZLE DIAMETER: 0.220
FILTER NO/TYPE: 83 QHT-6
PRE-TEST LEAK RATE: : >0.002 CFM@ 12 in. Hg.
POST-TEST LEAK RATE: : >0.002 CFM@ 12 in. Hg.
PITOT LEAK CHECK - PRE: ✓ POST: ✓
CHAIN OF CUSTODY: SAMPLE CUSTODIAN AA
SAMPLER SS
SAMPLE CUSTODIAN SS

| Imp. # | Contents | Post-Test | Pre-Test | Difference |
|---|---|---|---|---|
| 1 | 100ml 5% $HNO_3$ / 10% $H_2O_2$ | 965.5 | 725.5 | 240.0 |
| 2 | " | 816.8 | 695.2 | 121.6 |
| 3 | empty | 641.8 | 626.4 | 15.4 |
| 4 | S.G. | 981.2 | 945.9 | 35.3 |
| | | | | |
| Total: | | | | 412.3 |

| Point | Time | Meter Volume, ft³ | ΔP in. $H_2O$ | ΔH in. $H_2O$ | Stack Temp, °F | Probe Temp, °F | Filter Temp, °F | Imp. Out Temp, °F | Meter Temp, °F In | Meter Temp, °F Out | Vacuum in. Hg. | $O_2$ % | Pstatic in. $H_2O$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 6 | 1016 | 273.430 | 1.3 | 1.34 | 475 | 336 | 338 | 58 | 87 | 90 | 4.0 | 3% | -1.3 |
| 5 | 1024 | 278.740 | 1.3 | 1.34 | 475 | 338 | 334 | 58 | 87 | 90 | 4.0 | | |
| 4 | 1032 | 283.930 | 1.5 | 1.54 | 479 | 338 | 335 | 58 | 90 | 88 | 4.0 | | |
| 3 | 1040 | 289.600 | 1.5 | 1.54 | 479 | 341 | 337 | 61 | 87 | 85 | 4.0 | | |
| 2 | 1048 | 295.270 | 1.3 | 1.34 | 479 | 338 | 335 | 61 | 85 | 85 | 4.0 | | |
| 1 | 1056 | 300.500 | 1.3 | 1.34 | 478 | 341 | 330 | 61 | 82 | 83 | 4.0 | | |
| 0 | 1104 | 305.545 | | | | | | | | | | | |
| 6 | 1121 | 305.545 | 1.3 | 1.34 | 477 | 342 | 319 | 62 | 79 | 79 | 4.0 | | |
| 5 | 1129 | 310.800 | 1.3 | 1.34 | 477 | 342 | 320 | 62 | 79 | 78 | 4.0 | | |
| 4 | 1137 | 316.080 | 1.3 | 1.34 | 478 | 340 | 316 | 63 | 79 | 78 | 4.0 | | |
| 3 | 1145 | 321.395 | 1.5 | 1.54 | 480 | 342 | 326 | 63 | 79 | 77 | 4.0 | | |
| 2 | 1153 | 327.120 | 1.5 | 1.54 | 480 | 344 | 315 | 62 | 79 | 77 | 4.0 | | |
| 1 | 1201 | 332.800 | 1.5 | 1.54 | 480 | 342 | 315 | 63 | 78 | 77 | 4.0 | | |
| 0 | 1209 | 338.480 | | | | | | | | | | | |
| Average: | | | | | | | | | | | | | |

Comments:

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Delta Air Quality Services, Incorporated

# WET CHEMICAL SAMPLING SYSTEM DATA AND WORKSHEET

CLIENT: Exxon Mobil
LOCATION: FCC / 2F-7 Stack
DATE: 6/30/11
RUN NO: 1- METALS
OPERATOR: [illegible]
METER BOX NO: 12WCS
METER ΔH@:
METER Yd:
STACK AREA, FT²:
TRAVERSE POINTS, MIN/POINT:
ΔH= _____ X ΔP:
Probe Condition, pre/post test:
Silica Gel Expended, Y/N:
Filter Condition after Test:
Check Weight:

AMBIENT TEMPERATURE:
BAROMETRIC PRESSURE:
ASSUMED MOISTURE:
PITOT TUBE COEFF, Cp:
PROBE ID NO/MATERIAL:
PROBE LENGTH:
NOZZLE ID NO/ MATERIAL:
NOZZLE DIAMETER:
FILTER NO/TYPE:
PRE-TEST LEAK RATE: : _____ CFM@ _____ in. Hg.
POST-TEST LEAK RATE: : _____ CFM@ _____ in. Hg.
PITOT LEAK CHECK - PRE: _____ POST: _____
CHAIN OF CUSTODY: SAMPLE CUSTODIAN _____
SAMPLER _____
SAMPLE CUSTODIAN _____

| Imp. # | Contents | Post-Test - Pre-Test = Difference | |
|---|---|---|---|
| | | | |
| | | | |
| | SEE Page 1 | | |
| | | | |
| | | | |
| Total: | | | |

| Point | Time | Meter Volume, ft³ | ΔP in. H₂O | ΔH in. H₂O | Stack Temp, °F | Probe Temp, °F | Filter Temp, °F | Imp. Out Temp, °F | Meter Temp, °F In | Meter Temp, °F Out | Vacuum in. Hg. | O₂ % | Pstatic in. H₂O |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 6 | 1211 | 338.480 | 1.3 | 1.34 | 477 | 340 | 334 | 60 | 76 | 75 | 4.0 | 3% | -1.3 |
| 5 | 1219 | 343.910 | 1.3 | 1.34 | 477 | 340 | 333 | 62 | 76 | 75 | 4.0 | | |
| 4 | 1227 | 349.070 | 1.3 | 1.34 | 476 | 340 | 338 | 62 | 77 | 75 | 4.0 | | |
| 3 | 1235 | 354.32 | 1.3 | 1.34 | 476 | 340 | 338 | 62 | 77 | 75 | 4.0 | | |
| 2 | 1243 | 359.650 | 1.3 | 1.34 | 477 | 334 | 330 | 62 | 77 | 75 | 4.0 | | |
| 1 | 1251 | 364.890 | 1.3 | 1.34 | 477 | 335 | 330 | 62 | 77 | 75 | 4.0 | | |
| 0 | 1259 | 370.150 | | | | | | | | | | | |
| 6 | 1339 | 370.150 | 1.0 | 1.03 | 476 | 332 | 329 | 62 | 75 | 74 | 4.0 | | |
| 5 | 1347 | 374.880 | 1.0 | 1.03 | 476 | 315 | 339 | 63 | 75 | 74 | 4.0 | | |
| 4 | 1355 | 379.560 | 1.0 | 1.03 | 470 | 317 | 340 | 60 | 75 | 74 | 4.0 | | |
| 3 | 1403 | 384.340 | 1.0 | 1.03 | 473 | 317 | 340 | 63 | 78 | 75 | 4.0 | | |
| 2 | 1411 | 389.070 | 1.0 | 1.03 | 472 | 317 | 335 | 63 | 78 | 75 | 4.0 | | |
| 1 | 1419 | 393.490 | 1.0 | 1.03 | 470 | 320 | 334 | 63 | 78 | 75 | 4.0 | | |
| 0 | 1427 | 398.220 | | | | | | | | | | | |
| Average: | | | | | | | | | | | | | |

Comments:

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Master Document Storage\Forms\Datasheets\Field Datasheets

Delta Air Quality Services, Incorporated

# WET CHEMICAL SAMPLING SYSTEM DATA AND WORKSHEET

CLIENT: Exxon Mobil
LOCATION: FCC / 2F-7 Stack
DATE: 6/30/14
RUN NO: 2-Methods
OPERATOR: SS
METER BOX NO: 12W05
METER ΔH@: .585
METER Yd: 1.005
STACK AREA, FT²: ✓
TRAVERSE POINTS, MIN/POINT: 8/24
ΔH= 1.1 X ΔP:
Probe Condition, pre/post test: ✓
Silica Gel Expended, Y/N: ✓
Filter Condition after Test: ✓
Check Weight: ✓

AMBIENT TEMPERATURE: 78°
BAROMETRIC PRESSURE: 29.85
ASSUMED MOISTURE: 14%
PITOT TUBE COEFF, Cp: .84
PROBE ID NO/MATERIAL: #73 / glass
PROBE LENGTH: 6'
NOZZLE ID NO/ MATERIAL: 2 / glass
NOZZLE DIAMETER: 0.220
FILTER NO/TYPE: [illegible] @ 83-QHT-8
PRE-TEST LEAK RATE: : <0.002 CFM@ 10 in. Hg.
POST-TEST LEAK RATE: : >0.002 CFM@ 10 in. Hg.
PITOT LEAK CHECK - PRE: ✓ POST: ✓
CHAIN OF CUSTODY: SAMPLE CUSTODIAN JB
SAMPLER SS
SAMPLE CUSTODIAN JP

| Imp. # | Contents | Post-Test | Pre-Test | Difference |
|---|---|---|---|---|
| 1 | 100ml 5% $HNO_3$/10% $H_2O_2$ | 921.9 | 732.8 | 189.1 |
| 2 | " | 811.6 | 622.3 | 189.3 |
| 3 | empty | 620.6 | 607.6 | 13.0 |
| 4 | S.G | 982.6 | 950.9 | 31.7 |
| | | | | |
| Total: | | | | 423.1 |

| Point | Time | Meter Volume, ft³ | ΔP in. $H_2O$ | ΔH in. $H_2O$ | Stack Temp, °F | Probe Temp, °F | Filter Temp, °F | Imp. Out Temp, °F | Meter Temp, °F In | Meter Temp, °F Out | Vacuum in. Hg. | $O_2$ % | Pstatic in. $H_2O$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 6 | 1554 | 398.800 | 1.3 | 1.34 | 477 | 311 | 339 | 60 | 77 | 76 | 4.0 | 3% | -1.3 |
| 5 | 1602 | 404.080 | 1.2 | 1.23 | 477 | 322 | 336 | 60 | 77 | 76 | 4.0 | | |
| 4 | 1610 | 409.360 | 1.2 | 1.23 | 477 | 317 | 336 | 58 | 78 | 77 | 4.0 | | |
| 3 | 1618 | 414.640 | 1.2 | 1.23 | 476 | 319 | 335 | 58 | 77 | 76 | 4.0 | | |
| 2 | 1626 | 419.300 | 1.0 | 1.03 | 474 | 323 | 334 | 59 | 78 | 77 | 4.0 | | |
| 1 | 1634 | 424.045 | 1.0 | 1.03 | 474 | 323 | 333 | 59 | 78 | 77 | 4.0 | | |
| 0 | 1642 | 428.780 | | | | | | | | | | | |
| 6 | 1653 | 428.780 | 1.3 | 1.34 | 475 | 319 | 320 | 59 | 78 | 77 | 4.0 | | |
| 5 | 1702 | 434.700 | 1.3 | 1.34 | 476 | 321 | 335 | 59 | 77 | 76 | 4.0 | | |
| 4 | 1710 | 440.620 | 1.3 | 1.34 | 476 | 320 | 335 | 59 | 80 | 77 | 4.0 | | |
| 3 | 1718 | 445.050 | 1.0 | 1.03 | 476 | 320 | 338 | 58 | 80 | 77 | 4.0 | | |
| 2 | 1726 | 449.480 | 1.0 | 1.03 | 471 | 312 | 317 | 63 | 79 | 75 | 4.0 | | |
| 1 | 1734 | 454.980 | 1.0 | 1.03 | 471 | 312 | 317 | 63 | 79 | 75 | 4.0 | | |
| 0 | 1742 | 459.560 | | | | | | | | | | | |
| Average: | | | | | | | | | | | | | |

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Delta
Air Quality Services, Incorporated

# WET CHEMICAL SAMPLING SYSTEM DATA AND WORKSHEET

CLIENT: Exxon Mobil
LOCATION: FCC / 2F-7 Stack
DATE: 6/30/11
RUN NO: 2-METAL
OPERATOR: SS
METER BOX NO: 12WCS
METER ΔH@:
METER Yd:
STACK AREA, FT$^2$:
TRAVERSE POINTS, MIN/POINT:
ΔH= _____ X ΔP:
Probe Condition, pre/post test:
Silica Gel Expended, Y/N:
Filter Condition after Test:
Check Weight:

AMBIENT TEMPERATURE:
BAROMETRIC PRESSURE:
ASSUMED MOISTURE:
PITOT TUBE COEFF, Cp:
PROBE ID NO/MATERIAL:
PROBE LENGTH:
NOZZLE ID NO/ MATERIAL:
NOZZLE DIAMETER:
FILTER NO/TYPE:
PRE-TEST LEAK RATE: : _____ CFM@ _____ in. Hg.
POST-TEST LEAK RATE: : _____ CFM@ _____ in. Hg.
PITOT LEAK CHECK - PRE: _____ POST: _____
CHAIN OF CUSTODY: SAMPLE CUSTODIAN _____
SAMPLER _____
SAMPLE CUSTODIAN _____

| Imp. # | Contents | Post-Test - Pre-Test = Difference | |
|---|---|---|---|
| | SEE Pag 1 | | |
| Total: | | | |

| Point | Time | Meter Volume, ft$^3$ | ΔP in. $H_2O$ | ΔH in. $H_2O$ | Stack Temp, °F | Probe Temp, °F | Filter Temp, °F | Imp. Out Temp, °F | Meter Temp, °F In | Meter Temp, °F Out | Vacuum in. Hg. | $O_2$ % | Pstatic in. $H_2O$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 6 | 1746 | 459.560 | 1.3 | 1.34 | 478 | 321 | 313 | 64 | 75 | 74 | 4.0 | 3% | -1.3 |
| 5 | 1754 | 464.050 | 1.3 | 1.34 | 479 | 325 | 320 | 63 | 75 | 74 | 4.0 | | |
| 4 | 1802 | 470.200 | 1.3 | 1.34 | 479 | 330 | 322 | 63 | 75 | 74 | 4.0 | | |
| 3 | 1810 | 475.460 | 1.5 | 1.54 | 478 | 323 | 320 | 63 | 73 | 73 | 4.0 | | |
| 2 | 1818 | 481.120 | 1.5 | 1.54 | 479 | 322 | 310 | 63 | 74 | 73 | 4.0 | | |
| 1 | 1826 | 486.850 | 1.3 | 1.34 | 478 | 321 | 320 | 59 | 74 | 73 | 4.0 | | |
| 0 | 1834 | 492.210 | | | | | | | | | | | |
| 6 | 1909 | 492.210 | 1.5 | 1.54 | 476 | 321 | 327 | 60 | 70 | 71 | 4.0 | | |
| 5 | 1917 | 497.820 | 1.5 | 1.54 | 476 | 321 | 327 | 60 | 70 | 71 | 4.0 | | |
| 4 | 1925 | 503.530 | 1.5 | 1.54 | 478 | 321 | 318 | 56 | 70 | 70 | 4.0 | | |
| 3 | 1933 | ~~1933~~ 509.300 | 1.5 | 1.54 | 478 | 324 | 323 | 57 | 71 | 70 | 4.0 | | |
| 2 | 1941 | 514.320 | 1.3 | 1.34 | 478 | 321 | 314 | 62 | 71 | 70 | 4.0 | | |
| 1 | 1949 | 519.550 | 1.3 | 1.34 | 478 | 321 | 320 | 62 | 71 | 70 | 4.0 | | |
| 0 | 1957 | 524.590 | | | | | | | | | | | |
| Average: | | | | | | | | | | | | | |

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Delta Air Quality Services, Incorporated

# WET CHEMICAL SAMPLING SYSTEM DATA AND WORKSHEET

CLIENT: Exxon Mobil
LOCATION: FCC / 2F-7 Stack
DATE: 7/1/11
RUN NO: 3-M+L
OPERATOR: SS
METER BOX NO: 12 WCS
METER ΔH@: 0.585
METER Yd: 1.005
STACK AREA, FT²: ✓
TRAVERSE POINTS, MIN/POINT: 8/24
ΔH= 1.1 X ΔP:
Probe Condition, pre/post test: ✓
Silica Gel Expanded, Y/N: ✓
Filter Condition after Test: ✓
Check Weight: ✓

AMBIENT TEMPERATURE: 82°
BAROMETRIC PRESSURE: 29.74
ASSUMED MOISTURE: 14%
PITOT TUBE COEFF, Cp: .84
PROBE ID NO/MATERIAL: #005 /glass
PROBE LENGTH: 6'
NOZZLE ID NO/ MATERIAL: 1 /glass
NOZZLE DIAMETER: .220
FILTER NO/TYPE: 83-GHT-4
PRE-TEST LEAK RATE: >0.002 CFM@ 12 in. Hg.
POST-TEST LEAK RATE: >0.002 CFM@ 12 in. Hg.
PITOT LEAK CHECK - PRE: ✓ POST: ✓
CHAIN OF CUSTODY: SAMPLE CUSTODIAN JP
SAMPLER SS
SAMPLE CUSTODIAN JO

| Imp. # | Contents | Post-Test | Pre-Test | Difference |
|---|---|---|---|---|
| 1 | 5% $HNO_3$/10% $H_2O_2$ | 754.2 | 948.9 | 194.7 |
| 2 | " " | 894.8 | 686.3 | 208.5 |
| 3 | MT | 642.4 | 626.6 | 15.8 |
| 4 | SG | 1106.5 | 1074.8 | 31.7 |
| Total: | | | | 450.7 |

| Point | Time | Meter Volume, ft³ | ΔP in. $H_2O$ | ΔH in. $H_2O$ | Stack Temp, °F | Probe Temp, °F | Filter Temp, °F | Imp. Out Temp, °F | Meter Temp, °F In | Meter Temp, °F Out | Vacuum in. Hg. | $O_2$ % | P. static in. $H_2O$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 6 | 1500 | 525.460 | 1.3 | 1.34 | 476 | 322 | 310 | 63 | 79 | 78 | 4.0 | 3% | -1.3 |
| 5 | 1508 | 531.300 | 1.3 | 1.54 | 476 | 328 | 315 | 63 | 79 | 78 | 4.0 | | |
| 4 | 1516 | 536.650 | 1.5 | 1.54 | 476 | 330 | 313 | 63 | 82 | 80 | 4.0 | | |
| 3 | 1524 | 542.160 | 1.4 | 1.44 | 474 | 325 | 313 | 62 | 82 | 79 | 4.0 | | |
| 2 | 1532 | 547.510 | 1.4 | 1.44 | 475 | 322 | 320 | 62 | 82 | 79 | 4.0 | | |
| 1 | 1540 | 553.700 | 1.4 | 1.44 | 476 | 330 | 314 | 63 | 82 | 81 | 4.0 | | |
| 0 | 1548 | 558.980 | | | | | | | | | | | |
| 6 | 1605 | 558.980 | 1.3 | 1.34 | 475 | 327 | 315 | 63 | 80 | 81 | 4.0 | | |
| 5 | 1613 | 564.250 | 1.3 | 1.34 | 474 | 329 | 312 | 62 | 80 | 80 | 4.0 | | |
| 4 | 1625 | 569.520 | 1.3 | 1.34 | 476 | 325 | 315 | 59 | 81 | 80 | 4.0 | | |
| 3 | 1629 | 574.790 | 1.4 | 1.44 | 476 | 322 | 318 | 59 | 81 | 80 | 4.0 | | |
| 2 | 1637 | 580.060 | 1.4 | 1.44 | 476 | 321 | 330 | 59 | 81 | 80 | 4.0 | | |
| 1 | 1645 | 585.330 | 1.4 | 1.44 | 475 | 320 | 330 | 59 | 81 | 80 | 4.0 | | |
| 0 | 1653 | 591.400 | | | | | | | | | | | |
| Average: | | | | | | | | | | | | | |

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Delta Air Quality Services, Incorporated

# WET CHEMICAL SAMPLING SYSTEM DATA AND WORKSHEET

CLIENT: Exxon Mobil
LOCATION: FCC / 2F-7 Stack
DATE: 8/1/11
RUN NO: 3-METALS
OPERATOR: GS
METER BOX NO: 12W05
METER ΔH@:
METER Yd:
STACK AREA, FT$^2$:
TRAVERSE POINTS, MIN/POINT:
ΔH= _____ X ΔP:
Probe Condition, pre/post test:
Silica Gel Expanded, Y/N:
Filter Condition after Test:
Check Weight:

AMBIENT TEMPERATURE:
BAROMETRIC PRESSURE:
ASSUMED MOISTURE:
PITOT TUBE COEFF, Cp:
PROBE ID NO/MATERIAL:
PROBE LENGTH:
NOZZLE ID NO/ MATERIAL:
NOZZLE DIAMETER:
FILTER NO/TYPE:
PRE-TEST LEAK RATE: : _____ CFM@ _____ in. Hg.
POST-TEST LEAK RATE: : _____ CFM@ _____ in. Hg.
PITOT LEAK CHECK - PRE: _____ POST: _____
CHAIN OF CUSTODY: SAMPLE CUSTODIAN _____
SAMPLER _____
SAMPLE CUSTODIAN _____

| Imp. # | Contents | Post-Test | Pre-Test | Difference |
|---|---|---|---|---|
| | | | | |
| | SEE Pg 1 | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| Total: | | | | |

| Point | Time | Meter Volume, ft$^3$ | ΔP in. $H_2O$ | ΔH in. $H_2O$ | Stack Temp, °F | Probe Temp, °F | Filter Temp, °F | Imp. Out Temp, °F | Meter Temp, °F In | Meter Temp, °F Out | Vacuum in. Hg. | $O_2$ % | P. static in. $H_2O$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 1719 | 591.400 | 1.4 | 1.44 | 470 | 321 | 331 | 60 | 77 | 75 | 4.0 | 3% | -1.3 |
| 2 | 1727 | 597.470 | 1.4 | 1.44 | 470 | 325 | 330 | 60 | 77 | 75 | 4.0 | | |
| 4 | 1735 | 603.47 | 1.4 | 1.44 | 470 | 320 | 333 | 61 | 78 | 75 | 4.0 | | |
| 3 | 1743 | 609.540 | 1.4 | 1.44 | 470 | 321 | 330 | 61 | 78 | 75 | 4.0 | | |
| 2 | 1751 | 615.61 | 1.4 | 1.44 | 472 | 323 | 328 | 62 | 78 | 75 | 4.0 | | |
| 1 | 1759 | 621.68 | 1.4 | 1.44 | 472 | 324 | 335 | 62 | 78 | 75 | 4.0 | | |
| 0 | 1807 | 625.500 | | | | | | | | | | | |
| 6 | 1819 | 625.500 | 1.5 | 1.54 | 474 | 328 | 315 | 63 | 78 | 75 | 4.0 | | |
| 5 | 1827 | 631.350 | 1.5 | 1.54 | 475 | 327 | 315 | 63 | 78 | 76 | 4.0 | | |
| 4 | 1835 | 637.150 | 1.5 | 1.54 | 473 | 328 | 310 | 63 | 78 | 76 | 4.0 | | |
| 3 | 1843 | 642.950 | 1.5 | 1.54 | 473 | 328 | 334 | 60 | 80 | 76 | 4.0 | | |
| 2 | 1851 | 648.950 | 1.3 | 1.34 | 470 | 323 | 335 | 60 | 80 | 76 | 4.0 | | |
| 1 | 1859 | 654.150 | 1.3 | 1.34 | 474 | 328 | 339 | 63 | 75 | 76 | 4.0 | | |
| 0 | 1907 | 660.000 | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| Average: | | | | | | | | | | | | | |

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**ExxonMobil**
**STACK $O_2$, $CO_2$ DATA**

**Test #:** **1-Mtl**
**Date:** **6/30/2011**
**Time:** **1016/1427**

| | $O_2$ | $CO_2$ |
|---|---|---|
| Range | 10 | 20 |
| Cal Gas | 5.00 | 10.16 |
| Analyzer Zero | 0.09 | 0.00 |
| Analyzer Span | 5.04 | 9.94 |
| Pre-Bias Zero | 0.08 | 0.00 |
| Pre-Bias Span | 4.99 | 10.00 |
| Post-Bias Zero | 0.10 | 0.01 |
| Post-Bias Span | 4.94 | 9.90 |
| Pre-test zero bias | -0.1% | 0.0% |
| Pre-test span bias | -0.6% | 0.3% |
| Post-test zero bias | 0.1% | 0.1% |
| Post-test span bias | -1.0% | -0.2% |
| Zero Drift | 0.2% | 0.0% |
| Span Drift | -0.5% | -0.5% |
| | PASS | PASS |
| **Average** | **5.02** | **13.75** |
| **Cal Corrected** | **5.06** | **14.04** |

**ExxonMobil**
**1-Mtl**

| Date | Time | O2 % | CO2 % |
|---|---|---|---|
| 6/30/2011 | 10:40:00 AM | 5.045 | 13.832 |
| 6/30/2011 | 10:41:00 AM | 5.157 | 13.777 |
| 6/30/2011 | 10:42:00 AM | 5.182 | 13.755 |
| 6/30/2011 | 10:43:00 AM | 5.16 | 13.772 |
| 6/30/2011 | 10:44:00 AM | 5.138 | 13.866 |
| 6/30/2011 | 10:45:00 AM | 5.267 | 14.234 |
| 6/30/2011 | 10:46:00 AM | 5.151 | 13.856 |
| 6/30/2011 | 10:47:00 AM | 5.124 | 13.67 |
| 6/30/2011 | 10:48:00 AM | 5.109 | 13.671 |
| 6/30/2011 | 10:49:00 AM | 5.081 | 13.7 |
| 6/30/2011 | 10:50:00 AM | 5.069 | 13.697 |
| 6/30/2011 | 10:51:00 AM | 5.058 | 13.709 |
| 6/30/2011 | 10:52:00 AM | 5.002 | 13.748 |
| 6/30/2011 | 10:53:00 AM | 5.042 | 13.723 |
| 6/30/2011 | 10:54:00 AM | 5.032 | 13.743 |
| 6/30/2011 | 10:55:00 AM | 5.04 | 13.847 |
| 6/30/2011 | 10:56:00 AM | 5.101 | 13.788 |
| 6/30/2011 | 10:57:00 AM | 5.148 | 13.715 |
| 6/30/2011 | 10:58:00 AM | 5.17 | 13.717 |
| 6/30/2011 | 10:59:00 AM | 5.199 | 13.668 |
| 6/30/2011 | 11:00:00 AM | 5.16 | 13.683 |
| 6/30/2011 | 11:01:00 AM | 5.132 | 13.716 |
| 6/30/2011 | 11:02:00 AM | 5.008 | 13.715 |
| 6/30/2011 | 11:03:00 AM | 5.032 | 13.698 |
| 6/30/2011 | 11:04:00 AM | 5.082 | 13.648 |
| 6/30/2011 | 11:22:00 AM | 5.021 | 13.713 |
| 6/30/2011 | 11:23:00 AM | 5.035 | 13.683 |
| 6/30/2011 | 11:24:00 AM | 4.994 | 13.729 |
| 6/30/2011 | 11:25:00 AM | 4.966 | 13.759 |
| 6/30/2011 | 11:26:00 AM | 5.029 | 13.7 |
| 6/30/2011 | 11:27:00 AM | 5.046 | 13.686 |
| 6/30/2011 | 11:28:00 AM | 5.036 | 13.707 |
| 6/30/2011 | 11:29:00 AM | 5.065 | 13.676 |
| 6/30/2011 | 11:30:00 AM | 5.053 | 13.673 |
| 6/30/2011 | 11:31:00 AM | 5.061 | 13.687 |
| 6/30/2011 | 11:32:00 AM | 5.125 | 13.618 |
| 6/30/2011 | 11:33:00 AM | 5.13 | 13.613 |
| 6/30/2011 | 11:34:00 AM | 5.105 | 13.633 |
| 6/30/2011 | 11:35:00 AM | 5.106 | 13.646 |
| 6/30/2011 | 11:36:00 AM | 5.092 | 13.654 |
| 6/30/2011 | 11:37:00 AM | 5.112 | 13.645 |
| 6/30/2011 | 11:38:00 AM | 5.092 | 13.655 |
| 6/30/2011 | 11:39:00 AM | 5.096 | 13.64 |
| 6/30/2011 | 11:40:00 AM | 5.056 | 13.681 |
| 6/30/2011 | 11:41:00 AM | 5.042 | 13.698 |
| 6/30/2011 | 11:42:00 AM | 5.041 | 13.697 |
| 6/30/2011 | 11:43:00 AM | 5.074 | 13.664 |

| | | | |
|---|---|---|---|
| 6/30/2011 | 11:44:00 AM | 5.102 | 13.641 |
| 6/30/2011 | 11:45:00 AM | 5.007 | 13.727 |
| 6/30/2011 | 11:46:00 AM | 5.023 | 13.725 |
| 6/30/2011 | 11:47:00 AM | 5.023 | 13.698 |
| 6/30/2011 | 11:48:00 AM | 5.05 | 13.683 |
| 6/30/2011 | 11:49:00 AM | 4.984 | 13.75 |
| 6/30/2011 | 11:50:00 AM | 5.015 | 13.732 |
| 6/30/2011 | 11:51:00 AM | 5.03 | 13.708 |
| 6/30/2011 | 11:52:00 AM | 4.981 | 13.757 |
| 6/30/2011 | 11:53:00 AM | 5.004 | 13.735 |
| 6/30/2011 | 11:54:00 AM | 5.004 | 13.74 |
| 6/30/2011 | 11:55:00 AM | 4.988 | 13.742 |
| 6/30/2011 | 11:56:00 AM | 4.954 | 13.765 |
| 6/30/2011 | 11:57:00 AM | 4.958 | 13.765 |
| 6/30/2011 | 11:58:00 AM | 5.002 | 13.752 |
| 6/30/2011 | 11:59:00 AM | 5.011 | 13.735 |
| 6/30/2011 | 12:00:00 PM | 5.019 | 13.714 |
| 6/30/2011 | 12:01:00 PM | 5.022 | 13.724 |
| 6/30/2011 | 12:02:00 PM | 5.043 | 13.703 |
| 6/30/2011 | 12:03:00 PM | 5.057 | 13.685 |
| 6/30/2011 | 12:04:00 PM | 5.053 | 13.688 |
| 6/30/2011 | 12:05:00 PM | 5.02 | 13.712 |
| 6/30/2011 | 12:06:00 PM | 5.027 | 13.709 |
| 6/30/2011 | 12:07:00 PM | 5.081 | 13.716 |
| 6/30/2011 | 12:08:00 PM | 5.044 | 13.79 |
| 6/30/2011 | 12:09:00 PM | 4.982 | 13.815 |
| 6/30/2011 | 12:12:00 PM | 5.022 | 13.782 |
| 6/30/2011 | 12:13:00 PM | 4.983 | 13.8 |
| 6/30/2011 | 12:14:00 PM | 5.016 | 13.772 |
| 6/30/2011 | 12:15:00 PM | 4.967 | 13.793 |
| 6/30/2011 | 12:16:00 PM | 4.973 | 13.79 |
| 6/30/2011 | 12:17:00 PM | 4.996 | 13.774 |
| 6/30/2011 | 12:18:00 PM | 5.069 | 13.696 |
| 6/30/2011 | 12:39:00 PM | 4.889 | 13.825 |
| 6/30/2011 | 12:40:00 PM | 4.915 | 13.805 |
| 6/30/2011 | 12:41:00 PM | 4.939 | 13.802 |
| 6/30/2011 | 12:42:00 PM | 4.977 | 13.771 |
| 6/30/2011 | 12:43:00 PM | 5 | 13.736 |
| 6/30/2011 | 12:44:00 PM | 4.979 | 13.759 |
| 6/30/2011 | 12:45:00 PM | 5.016 | 13.727 |
| 6/30/2011 | 12:46:00 PM | 4.989 | 13.757 |
| 6/30/2011 | 12:47:00 PM | 4.996 | 13.751 |
| 6/30/2011 | 12:48:00 PM | 4.99 | 13.751 |
| 6/30/2011 | 12:49:00 PM | 4.994 | 13.743 |
| 6/30/2011 | 12:50:00 PM | 5 | 13.739 |
| 6/30/2011 | 12:51:00 PM | 5.019 | 13.736 |
| 6/30/2011 | 12:52:00 PM | 5.018 | 13.74 |
| 6/30/2011 | 12:53:00 PM | 5.022 | 13.728 |
| 6/30/2011 | 12:54:00 PM | 4.988 | 13.763 |
| 6/30/2011 | 12:55:00 PM | 4.996 | 13.759 |
| 6/30/2011 | 12:56:00 PM | 4.999 | 13.753 |
| 6/30/2011 | 12:57:00 PM | 5.011 | 13.734 |

| | | | |
|---|---|---|---|
| 6/30/2011 | 12:58:00 PM | 5.001 | 13.734 |
| 6/30/2011 | 12:59:00 PM | 4.952 | 13.79 |
| 6/30/2011 | 1:40:00 PM | 5.034 | 13.729 |
| 6/30/2011 | 1:41:00 PM | 5.03 | 13.739 |
| 6/30/2011 | 1:42:00 PM | 4.958 | 13.799 |
| 6/30/2011 | 1:43:00 PM | 4.917 | 13.83 |
| 6/30/2011 | 1:44:00 PM | 4.885 | 13.871 |
| 6/30/2011 | 1:45:00 PM | 4.955 | 13.814 |
| 6/30/2011 | 1:46:00 PM | 4.989 | 13.777 |
| 6/30/2011 | 1:47:00 PM | 5.006 | 13.759 |
| 6/30/2011 | 1:48:00 PM | 5.026 | 13.762 |
| 6/30/2011 | 1:49:00 PM | 5.05 | 13.726 |
| 6/30/2011 | 1:50:00 PM | 5.014 | 13.759 |
| 6/30/2011 | 1:51:00 PM | 5.025 | 13.749 |
| 6/30/2011 | 1:52:00 PM | 5.03 | 13.744 |
| 6/30/2011 | 1:53:00 PM | 4.988 | 13.775 |
| 6/30/2011 | 1:54:00 PM | 5.018 | 13.734 |
| 6/30/2011 | 1:55:00 PM | 4.965 | 13.796 |
| 6/30/2011 | 1:56:00 PM | 4.964 | 13.776 |
| 6/30/2011 | 1:57:00 PM | 4.985 | 13.794 |
| 6/30/2011 | 1:58:00 PM | 5.011 | 13.749 |
| 6/30/2011 | 1:59:00 PM | 4.945 | 13.825 |
| 6/30/2011 | 2:00:00 PM | 4.945 | 13.822 |
| 6/30/2011 | 2:01:00 PM | 4.998 | 13.745 |
| 6/30/2011 | 2:02:00 PM | 4.984 | 13.773 |
| 6/30/2011 | 2:03:00 PM | 5.014 | 13.746 |
| 6/30/2011 | 2:04:00 PM | 4.971 | 13.786 |
| 6/30/2011 | 2:05:00 PM | 4.922 | 13.826 |
| 6/30/2011 | 2:06:00 PM | 4.916 | 13.834 |
| 6/30/2011 | 2:07:00 PM | 4.982 | 13.782 |
| 6/30/2011 | 2:08:00 PM | 5.031 | 13.726 |
| 6/30/2011 | 2:09:00 PM | 4.98 | 13.772 |
| 6/30/2011 | 2:10:00 PM | 4.998 | 13.757 |
| 6/30/2011 | 2:11:00 PM | 4.973 | 13.788 |
| 6/30/2011 | 2:12:00 PM | 4.919 | 13.829 |
| 6/30/2011 | 2:13:00 PM | 4.938 | 13.796 |
| 6/30/2011 | 2:14:00 PM | 4.979 | 13.772 |
| 6/30/2011 | 2:15:00 PM | 4.986 | 13.75 |
| 6/30/2011 | 2:16:00 PM | 5.002 | 13.728 |
| 6/30/2011 | 2:17:00 PM | 4.866 | 13.861 |
| 6/30/2011 | 2:18:00 PM | 4.872 | 13.861 |
| 6/30/2011 | 2:19:00 PM | 4.978 | 13.761 |
| 6/30/2011 | 2:20:00 PM | 5.038 | 13.701 |
| 6/30/2011 | 2:21:00 PM | 5.061 | 13.68 |
| 6/30/2011 | 2:22:00 PM | 5.022 | 13.721 |
| 6/30/2011 | 2:23:00 PM | 4.98 | 13.75 |
| 6/30/2011 | 2:24:00 PM | 4.872 | 13.844 |
| 6/30/2011 | 2:25:00 PM | 4.898 | 13.83 |
| 6/30/2011 | 2:26:00 PM | 4.935 | 13.787 |
| 6/30/2011 | 2:27:00 PM | 4.977 | 13.765 |
| | Average | 5.02 | 13.75 |

**ExxonMobil**
**STACK $O_2$, $CO_2$ DATA**

**Test #:** **2-Mtl**
**Date:** **6/30/2011**
**Time:** **1554/1957**

| | $O_2$ | $CO_2$ |
|---|---|---|
| Range | 10 | 20 |
| Cal Gas | 5.00 | 10.16 |
| Analyzer Zero | 0.09 | 0.00 |
| Analyzer Span | 5.04 | 9.94 |
| Pre-Bias Zero | 0.10 | 0.01 |
| Pre-Bias Span | 4.94 | 9.90 |
| Post-Bias Zero | 0.17 | 0.00 |
| Post-Bias Span | 4.99 | 9.81 |
| Pre-test zero bias | 0.1% | 0.1% |
| Pre-test span bias | -1.0% | -0.2% |
| Post-test zero bias | 0.8% | 0.0% |
| Post-test span bias | -0.5% | -0.7% |
| Zero Drift | 0.7% | 0.0% |
| Span Drift | 0.5% | -0.5% |
| | PASS | PASS |
| **Average** | **5.03** | **13.65** |
| **Cal Corrected** | **5.06** | **14.08** |

**ExxonMobil**
**2-Mtl**

| Date | Time | O2 % | CO2 % |
|---|---|---|---|
| 6/30/2011 | 3:55:00 PM | 4.938 | 13.729 |
| 6/30/2011 | 3:56:00 PM | 4.885 | 13.78 |
| 6/30/2011 | 3:57:00 PM | 4.909 | 13.75 |
| 6/30/2011 | 3:58:00 PM | 4.951 | 13.722 |
| 6/30/2011 | 3:59:00 PM | 5.034 | 13.641 |
| 6/30/2011 | 4:00:00 PM | 4.991 | 13.68 |
| 6/30/2011 | 4:01:00 PM | 4.967 | 13.708 |
| 6/30/2011 | 4:02:00 PM | 4.967 | 13.721 |
| 6/30/2011 | 4:03:00 PM | 4.956 | 13.722 |
| 6/30/2011 | 4:04:00 PM | 4.924 | 13.752 |
| 6/30/2011 | 4:05:00 PM | 4.895 | 13.78 |
| 6/30/2011 | 4:06:00 PM | 4.923 | 13.763 |
| 6/30/2011 | 4:07:00 PM | 4.899 | 13.768 |
| 6/30/2011 | 4:08:00 PM | 4.893 | 13.8 |
| 6/30/2011 | 4:09:00 PM | 4.986 | 13.716 |
| 6/30/2011 | 4:10:00 PM | 5.005 | 13.683 |
| 6/30/2011 | 4:11:00 PM | 5.012 | 13.67 |
| 6/30/2011 | 4:12:00 PM | 5.004 | 13.686 |
| 6/30/2011 | 4:13:00 PM | 4.991 | 13.692 |
| 6/30/2011 | 4:14:00 PM | 4.92 | 13.766 |
| 6/30/2011 | 4:15:00 PM | 4.949 | 13.744 |
| 6/30/2011 | 4:16:00 PM | 4.963 | 13.727 |
| 6/30/2011 | 4:17:00 PM | 4.992 | 13.705 |
| 6/30/2011 | 4:18:00 PM | 5.027 | 13.669 |
| 6/30/2011 | 4:19:00 PM | 5.084 | 13.615 |
| 6/30/2011 | 4:20:00 PM | 5.025 | 13.66 |
| 6/30/2011 | 4:21:00 PM | 5.047 | 13.654 |
| 6/30/2011 | 4:22:00 PM | 5.033 | 13.645 |
| 6/30/2011 | 4:23:00 PM | 4.98 | 13.693 |
| 6/30/2011 | 4:24:00 PM | 4.956 | 13.727 |
| 6/30/2011 | 4:25:00 PM | 4.969 | 13.721 |
| 6/30/2011 | 4:26:00 PM | 4.964 | 13.717 |
| 6/30/2011 | 4:27:00 PM | 4.985 | 13.704 |
| 6/30/2011 | 4:28:00 PM | 4.964 | 13.711 |
| 6/30/2011 | 4:29:00 PM | 4.984 | 13.7 |
| 6/30/2011 | 4:30:00 PM | 4.956 | 13.728 |
| 6/30/2011 | 4:31:00 PM | 4.979 | 13.724 |
| 6/30/2011 | 4:32:00 PM | 4.969 | 13.719 |
| 6/30/2011 | 4:33:00 PM | 4.985 | 13.715 |
| 6/30/2011 | 4:34:00 PM | 5.005 | 13.684 |
| 6/30/2011 | 4:35:00 PM | 5.04 | 13.656 |
| 6/30/2011 | 4:36:00 PM | 5.014 | 13.68 |
| 6/30/2011 | 4:37:00 PM | 5.025 | 13.673 |
| 6/30/2011 | 4:38:00 PM | 4.991 | 13.703 |
| 6/30/2011 | 4:39:00 PM | 4.977 | 13.714 |
| 6/30/2011 | 4:40:00 PM | 5.013 | 13.687 |
| 6/30/2011 | 4:41:00 PM | 5.052 | 13.647 |

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|---|---|---|---|
| 6/30/2011 | 4:42:00 PM | 5.038 | 13.65 |
| 6/30/2011 | 4:55:00 PM | 4.977 | 13.704 |
| 6/30/2011 | 4:56:00 PM | 4.932 | 13.757 |
| 6/30/2011 | 4:57:00 PM | 5.018 | 13.668 |
| 6/30/2011 | 4:58:00 PM | 5.043 | 13.644 |
| 6/30/2011 | 4:59:00 PM | 5.053 | 13.629 |
| 6/30/2011 | 5:00:00 PM | 5.021 | 13.664 |
| 6/30/2011 | 5:01:00 PM | 4.991 | 13.679 |
| 6/30/2011 | 5:02:00 PM | 4.932 | 13.747 |
| 6/30/2011 | 5:03:00 PM | 4.971 | 13.708 |
| 6/30/2011 | 5:04:00 PM | 4.965 | 13.729 |
| 6/30/2011 | 5:05:00 PM | 5.011 | 13.68 |
| 6/30/2011 | 5:06:00 PM | 4.996 | 13.692 |
| 6/30/2011 | 5:07:00 PM | 5.04 | 13.652 |
| 6/30/2011 | 5:08:00 PM | 4.966 | 13.696 |
| 6/30/2011 | 5:09:00 PM | 4.989 | 13.7 |
| 6/30/2011 | 5:10:00 PM | 5.061 | 13.636 |
| 6/30/2011 | 5:11:00 PM | 5.062 | 13.622 |
| 6/30/2011 | 5:12:00 PM | 5.036 | 13.647 |
| 6/30/2011 | 5:13:00 PM | 4.986 | 13.695 |
| 6/30/2011 | 5:14:00 PM | 4.947 | 13.738 |
| 6/30/2011 | 5:15:00 PM | 4.98 | 13.705 |
| 6/30/2011 | 5:16:00 PM | 4.99 | 13.679 |
| 6/30/2011 | 5:17:00 PM | 5.044 | 13.644 |
| 6/30/2011 | 5:18:00 PM | 5.021 | 13.666 |
| 6/30/2011 | 5:19:00 PM | 5.047 | 13.64 |
| 6/30/2011 | 5:20:00 PM | 4.97 | 13.724 |
| 6/30/2011 | 5:21:00 PM | 4.989 | 13.694 |
| 6/30/2011 | 5:22:00 PM | 5.044 | 13.645 |
| 6/30/2011 | 5:23:00 PM | 5.05 | 13.636 |
| 6/30/2011 | 5:24:00 PM | 5.057 | 13.634 |
| 6/30/2011 | 5:25:00 PM | 5.041 | 13.633 |
| 6/30/2011 | 5:26:00 PM | 4.932 | 13.749 |
| 6/30/2011 | 5:27:00 PM | 4.962 | 13.729 |
| 6/30/2011 | 5:28:00 PM | 5.01 | 13.678 |
| 6/30/2011 | 5:29:00 PM | 5.021 | 13.665 |
| 6/30/2011 | 5:30:00 PM | 4.998 | 13.682 |
| 6/30/2011 | 5:31:00 PM | 5.067 | 13.617 |
| 6/30/2011 | 5:32:00 PM | 5.031 | 13.642 |
| 6/30/2011 | 5:33:00 PM | 5.056 | 13.615 |
| 6/30/2011 | 5:34:00 PM | 5.042 | 13.62 |
| 6/30/2011 | 5:35:00 PM | 5.055 | 13.617 |
| 6/30/2011 | 5:36:00 PM | 5.089 | 13.584 |
| 6/30/2011 | 5:37:00 PM | 5.046 | 13.622 |
| 6/30/2011 | 5:38:00 PM | 5.028 | 13.637 |
| 6/30/2011 | 5:39:00 PM | 5.002 | 13.661 |
| 6/30/2011 | 5:40:00 PM | 4.998 | 13.649 |
| 6/30/2011 | 5:41:00 PM | 4.969 | 13.678 |
| 6/30/2011 | 5:42:00 PM | 4.981 | 13.684 |
| 6/30/2011 | 5:47:00 PM | 4.991 | 13.668 |
| 6/30/2011 | 5:48:00 PM | 5.011 | 13.662 |
| 6/30/2011 | 5:49:00 PM | 5.042 | 13.631 |

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|---|---|---|---|
| 6/30/2011 | 5:50:00 PM | 5.014 | 13.657 |
| 6/30/2011 | 5:51:00 PM | 5.024 | 13.657 |
| 6/30/2011 | 5:52:00 PM | 5.038 | 13.634 |
| 6/30/2011 | 5:53:00 PM | 5.08 | 13.598 |
| 6/30/2011 | 5:54:00 PM | 5.031 | 13.631 |
| 6/30/2011 | 5:55:00 PM | 5 | 13.67 |
| 6/30/2011 | 5:56:00 PM | 4.895 | 13.761 |
| 6/30/2011 | 5:57:00 PM | 4.931 | 13.742 |
| 6/30/2011 | 5:58:00 PM | 5.005 | 13.667 |
| 6/30/2011 | 5:59:00 PM | 5.008 | 13.665 |
| 6/30/2011 | 6:00:00 PM | 5.03 | 13.638 |
| 6/30/2011 | 6:01:00 PM | 5.04 | 13.629 |
| 6/30/2011 | 6:20:00 PM | 4.955 | 13.678 |
| 6/30/2011 | 6:21:00 PM | 4.986 | 13.654 |
| 6/30/2011 | 6:22:00 PM | 5.016 | 13.617 |
| 6/30/2011 | 6:23:00 PM | 4.992 | 13.633 |
| 6/30/2011 | 6:24:00 PM | 4.98 | 13.645 |
| 6/30/2011 | 6:25:00 PM | 5.007 | 13.639 |
| 6/30/2011 | 6:26:00 PM | 4.998 | 13.65 |
| 6/30/2011 | 6:27:00 PM | 4.994 | 13.634 |
| 6/30/2011 | 6:28:00 PM | 5.002 | 13.641 |
| 6/30/2011 | 6:29:00 PM | 5.005 | 13.632 |
| 6/30/2011 | 6:30:00 PM | 5.03 | 13.615 |
| 6/30/2011 | 6:31:00 PM | 5.039 | 13.604 |
| 6/30/2011 | 6:32:00 PM | 5.071 | 13.592 |
| 6/30/2011 | 6:33:00 PM | 5.066 | 13.575 |
| 6/30/2011 | 6:34:00 PM | 5.076 | 13.582 |
| 6/30/2011 | 7:10:00 PM | 5.055 | 13.655 |
| 6/30/2011 | 7:11:00 PM | 5.077 | 13.61 |
| 6/30/2011 | 7:12:00 PM | 5.084 | 13.629 |
| 6/30/2011 | 7:13:00 PM | 5.1 | 13.61 |
| 6/30/2011 | 7:14:00 PM | 5.053 | 13.645 |
| 6/30/2011 | 7:15:00 PM | 5.074 | 13.612 |
| 6/30/2011 | 7:16:00 PM | 5.104 | 13.589 |
| 6/30/2011 | 7:17:00 PM | 5.079 | 13.612 |
| 6/30/2011 | 7:18:00 PM | 5.091 | 13.606 |
| 6/30/2011 | 7:19:00 PM | 5.046 | 13.654 |
| 6/30/2011 | 7:20:00 PM | 5.054 | 13.658 |
| 6/30/2011 | 7:21:00 PM | 5.09 | 13.623 |
| 6/30/2011 | 7:22:00 PM | 5.115 | 13.591 |
| 6/30/2011 | 7:23:00 PM | 5.117 | 13.578 |
| 6/30/2011 | 7:24:00 PM | 5.129 | 13.572 |
| 6/30/2011 | 7:25:00 PM | 5.15 | 13.538 |
| 6/30/2011 | 7:26:00 PM | 5.108 | 13.573 |
| 6/30/2011 | 7:27:00 PM | 5.097 | 13.585 |
| 6/30/2011 | 7:28:00 PM | 5.131 | 13.537 |
| 6/30/2011 | 7:29:00 PM | 5.09 | 13.585 |
| 6/30/2011 | 7:30:00 PM | 5.103 | 13.582 |
| 6/30/2011 | 7:31:00 PM | 5.108 | 13.564 |
| 6/30/2011 | 7:32:00 PM | 5.031 | 13.645 |
| 6/30/2011 | 7:33:00 PM | 5.07 | 13.613 |
| 6/30/2011 | 7:34:00 PM | 5.105 | 13.578 |

| | | | |
|---|---|---|---|
| 6/30/2011 | 7:35:00 PM | 5.109 | 13.565 |
| 6/30/2011 | 7:36:00 PM | 5.109 | 13.575 |
| 6/30/2011 | 7:37:00 PM | 5.149 | 13.539 |
| 6/30/2011 | 7:38:00 PM | 5.11 | 13.564 |
| 6/30/2011 | 7:39:00 PM | 5.121 | 13.553 |
| 6/30/2011 | 7:40:00 PM | 5.146 | 13.521 |
| 6/30/2011 | 7:41:00 PM | 5.134 | 13.538 |
| 6/30/2011 | 7:42:00 PM | 5.101 | 13.562 |
| 6/30/2011 | 7:43:00 PM | 5.066 | 13.598 |
| 6/30/2011 | 7:44:00 PM | 5.017 | 13.64 |
| 6/30/2011 | 7:45:00 PM | 5.074 | 13.588 |
| 6/30/2011 | 7:46:00 PM | 5.062 | 13.606 |
| 6/30/2011 | 7:47:00 PM | 5.077 | 13.579 |
| 6/30/2011 | 7:48:00 PM | 5.094 | 13.563 |
| 6/30/2011 | 7:49:00 PM | 5.097 | 13.561 |
| 6/30/2011 | 7:50:00 PM | 5.096 | 13.594 |
| 6/30/2011 | 7:51:00 PM | 5.096 | 13.581 |
| 6/30/2011 | 7:52:00 PM | 5.132 | 13.54 |
| 6/30/2011 | 7:53:00 PM | 5.166 | 13.51 |
| 6/30/2011 | 7:54:00 PM | 5.141 | 13.515 |
| 6/30/2011 | 7:55:00 PM | 5.159 | 13.511 |
| 6/30/2011 | 7:56:00 PM | 5.057 | 13.609 |
| 6/30/2011 | 7:57:00 PM | 5.097 | 13.559 |
| | Average | 5.03 | 13.65 |

**ExxonMobil**
**STACK $O_2$, $CO_2$ DATA**

**Test #:** **3-Mtl**
**Date:** **7/1/2011**
**Time:** **1500/1907**

| | $O_2$ | $CO_2$ |
|---|---|---|
| Range | 10 | 20 |
| Cal Gas | 5.00 | 10.16 |
| Analyzer Zero | 0.06 | -0.01 |
| Analyzer Span | 5.15 | 9.98 |
| Pre-Bias Zero | 0.20 | 0.01 |
| Pre-Bias Span | 4.90 | 9.87 |
| Post-Bias Zero | 0.22 | 0.00 |
| Post-Bias Span | 5.02 | 9.90 |
| Pre-test zero bias | 1.3% | 0.1% |
| Pre-test span bias | -2.5% | -0.6% |
| Post-test zero bias | 1.6% | 0.1% |
| Post-test span bias | -1.3% | -0.4% |
| Zero Drift | 0.3% | 0.0% |
| Span Drift | 1.2% | 0.2% |
| | PASS | PASS |
| **Average** | **4.87** | **13.91** |
| **Cal Corrected** | **4.90** | **14.30** |

**ExxonMobil**
**3-Mtl**

| Date | Time | O2 % | CO2 % |
|---|---|---|---|
| 7/1/2011 | 3:01:00 PM | 4.824 | 13.884 |
| 7/1/2011 | 3:02:00 PM | 4.779 | 13.902 |
| 7/1/2011 | 3:03:00 PM | 4.813 | 13.874 |
| 7/1/2011 | 3:04:00 PM | 4.831 | 13.857 |
| 7/1/2011 | 3:05:00 PM | 4.853 | 13.855 |
| 7/1/2011 | 3:06:00 PM | 4.854 | 13.849 |
| 7/1/2011 | 3:07:00 PM | 4.806 | 13.912 |
| 7/1/2011 | 3:08:00 PM | 4.8 | 13.909 |
| 7/1/2011 | 3:09:00 PM | 4.808 | 13.905 |
| 7/1/2011 | 3:10:00 PM | 4.783 | 13.938 |
| 7/1/2011 | 3:11:00 PM | 4.866 | 13.849 |
| 7/1/2011 | 3:12:00 PM | 4.888 | 13.818 |
| 7/1/2011 | 3:13:00 PM | 4.848 | 13.852 |
| 7/1/2011 | 3:14:00 PM | 4.821 | 13.891 |
| 7/1/2011 | 3:15:00 PM | 4.876 | 13.798 |
| 7/1/2011 | 3:16:00 PM | 4.866 | 13.807 |
| 7/1/2011 | 3:17:00 PM | 4.908 | 13.778 |
| 7/1/2011 | 3:18:00 PM | 4.911 | 13.767 |
| 7/1/2011 | 3:19:00 PM | 4.897 | 13.772 |
| 7/1/2011 | 3:20:00 PM | 4.874 | 13.794 |
| 7/1/2011 | 3:21:00 PM | 4.85 | 13.826 |
| 7/1/2011 | 3:22:00 PM | 4.854 | 13.822 |
| 7/1/2011 | 3:23:00 PM | 4.842 | 13.821 |
| 7/1/2011 | 3:24:00 PM | 4.849 | 13.82 |
| 7/1/2011 | 3:25:00 PM | 4.784 | 13.891 |
| 7/1/2011 | 3:26:00 PM | 4.754 | 13.924 |
| 7/1/2011 | 3:27:00 PM | 4.779 | 13.881 |
| 7/1/2011 | 3:28:00 PM | 4.797 | 13.889 |
| 7/1/2011 | 3:29:00 PM | 4.835 | 13.852 |
| 7/1/2011 | 3:30:00 PM | 4.841 | 13.853 |
| 7/1/2011 | 3:31:00 PM | 4.837 | 13.859 |
| 7/1/2011 | 3:32:00 PM | 4.832 | 13.864 |
| 7/1/2011 | 3:33:00 PM | 4.833 | 13.867 |
| 7/1/2011 | 3:34:00 PM | 4.884 | 13.821 |
| 7/1/2011 | 3:35:00 PM | 4.893 | 13.813 |
| 7/1/2011 | 3:36:00 PM | 4.861 | 13.852 |
| 7/1/2011 | 3:37:00 PM | 4.816 | 13.912 |
| 7/1/2011 | 3:38:00 PM | 4.845 | 13.861 |
| 7/1/2011 | 3:39:00 PM | 4.897 | 13.798 |
| 7/1/2011 | 3:40:00 PM | 4.903 | 13.794 |
| 7/1/2011 | 3:41:00 PM | 4.893 | 13.811 |
| 7/1/2011 | 3:42:00 PM | 4.928 | 13.779 |
| 7/1/2011 | 3:43:00 PM | 4.913 | 13.798 |
| 7/1/2011 | 3:44:00 PM | 4.88 | 13.805 |
| 7/1/2011 | 3:45:00 PM | 4.855 | 13.844 |
| 7/1/2011 | 3:46:00 PM | 4.843 | 13.847 |
| 7/1/2011 | 3:47:00 PM | 4.797 | 13.88 |

| | | | |
|---|---|---|---|
| 7/1/2011 | 3:48:00 PM | 4.825 | 13.857 |
| 7/1/2011 | 4:06:00 PM | 4.883 | 13.813 |
| 7/1/2011 | 4:07:00 PM | 4.876 | 13.828 |
| 7/1/2011 | 4:08:00 PM | 4.868 | 13.821 |
| 7/1/2011 | 4:09:00 PM | 4.898 | 13.809 |
| 7/1/2011 | 4:10:00 PM | 4.89 | 13.79 |
| 7/1/2011 | 4:11:00 PM | 4.934 | 13.766 |
| 7/1/2011 | 4:12:00 PM | 4.942 | 13.771 |
| 7/1/2011 | 4:13:00 PM | 4.937 | 13.774 |
| 7/1/2011 | 4:14:00 PM | 4.905 | 13.804 |
| 7/1/2011 | 4:15:00 PM | 4.892 | 13.81 |
| 7/1/2011 | 4:16:00 PM | 4.909 | 13.785 |
| 7/1/2011 | 4:17:00 PM | 4.904 | 13.804 |
| 7/1/2011 | 4:18:00 PM | 4.861 | 13.863 |
| 7/1/2011 | 4:19:00 PM | 4.892 | 13.824 |
| 7/1/2011 | 4:20:00 PM | 4.884 | 13.832 |
| 7/1/2011 | 4:21:00 PM | 4.86 | 13.845 |
| 7/1/2011 | 4:22:00 PM | 4.919 | 13.795 |
| 7/1/2011 | 4:23:00 PM | 4.911 | 13.803 |
| 7/1/2011 | 4:24:00 PM | 4.936 | 13.795 |
| 7/1/2011 | 4:25:00 PM | 4.9 | 13.818 |
| 7/1/2011 | 4:26:00 PM | 4.851 | 13.88 |
| 7/1/2011 | 4:27:00 PM | 4.915 | 13.801 |
| 7/1/2011 | 4:28:00 PM | 4.908 | 13.822 |
| 7/1/2011 | 4:29:00 PM | 4.913 | 13.823 |
| 7/1/2011 | 4:30:00 PM | 4.971 | 13.79 |
| 7/1/2011 | 4:31:00 PM | 4.981 | 13.754 |
| 7/1/2011 | 4:32:00 PM | 4.961 | 13.789 |
| 7/1/2011 | 4:33:00 PM | 4.932 | 13.806 |
| 7/1/2011 | 4:34:00 PM | 4.929 | 13.81 |
| 7/1/2011 | 4:35:00 PM | 4.92 | 13.811 |
| 7/1/2011 | 4:36:00 PM | 4.939 | 13.809 |
| 7/1/2011 | 4:37:00 PM | 4.888 | 13.855 |
| 7/1/2011 | 4:38:00 PM | 4.807 | 13.945 |
| 7/1/2011 | 4:39:00 PM | 4.894 | 13.833 |
| 7/1/2011 | 4:40:00 PM | 4.888 | 13.845 |
| 7/1/2011 | 4:41:00 PM | 4.927 | 13.822 |
| 7/1/2011 | 4:42:00 PM | 4.915 | 13.833 |
| 7/1/2011 | 4:43:00 PM | 4.932 | 13.808 |
| 7/1/2011 | 4:44:00 PM | 4.929 | 13.809 |
| 7/1/2011 | 4:45:00 PM | 4.927 | 13.8 |
| 7/1/2011 | 4:46:00 PM | 4.869 | 13.891 |
| 7/1/2011 | 4:47:00 PM | 4.866 | 13.868 |
| 7/1/2011 | 4:48:00 PM | 4.887 | 13.849 |
| 7/1/2011 | 4:49:00 PM | 4.819 | 13.931 |
| 7/1/2011 | 4:50:00 PM | 4.822 | 13.952 |
| 7/1/2011 | 4:51:00 PM | 4.887 | 13.866 |
| 7/1/2011 | 4:52:00 PM | 4.907 | 13.861 |
| 7/1/2011 | 4:53:00 PM | 4.914 | 13.847 |
| 7/1/2011 | 5:42:00 PM | 4.958 | 14.262 |
| 7/1/2011 | 5:43:00 PM | 4.932 | 14.259 |
| 7/1/2011 | 5:44:00 PM | 5.031 | 14.513 |

| | | | |
|---|---|---|---|
| 7/1/2011 | 5:45:00 PM | 5.3 | 15.576 |
| 7/1/2011 | 5:46:00 PM | 5.363 | 15.697 |
| 7/1/2011 | 5:47:00 PM | 4.856 | 14.098 |
| 7/1/2011 | 5:48:00 PM | 4.885 | 14.067 |
| 7/1/2011 | 5:49:00 PM | 4.877 | 14.088 |
| 7/1/2011 | 5:50:00 PM | 4.852 | 14.111 |
| 7/1/2011 | 5:51:00 PM | 4.917 | 14.033 |
| 7/1/2011 | 5:52:00 PM | 4.893 | 14.066 |
| 7/1/2011 | 5:53:00 PM | 4.897 | 14.047 |
| 7/1/2011 | 5:54:00 PM | 4.888 | 14.073 |
| 7/1/2011 | 5:55:00 PM | 4.842 | 14.107 |
| 7/1/2011 | 5:56:00 PM | 4.82 | 14.124 |
| 7/1/2011 | 5:57:00 PM | 4.85 | 14.086 |
| 7/1/2011 | 5:58:00 PM | 4.87 | 14.073 |
| 7/1/2011 | 5:59:00 PM | 4.892 | 14.157 |
| 7/1/2011 | 6:00:00 PM | 4.891 | 14.219 |
| 7/1/2011 | 6:01:00 PM | 4.872 | 14.236 |
| 7/1/2011 | 6:02:00 PM | 4.853 | 14.248 |
| 7/1/2011 | 6:03:00 PM | 4.857 | 14.259 |
| 7/1/2011 | 6:04:00 PM | 4.914 | 14.223 |
| 7/1/2011 | 6:05:00 PM | 4.902 | 14.251 |
| 7/1/2011 | 6:06:00 PM | 4.878 | 14.29 |
| 7/1/2011 | 6:07:00 PM | 4.883 | 14.3 |
| 7/1/2011 | 6:20:00 PM | 4.857 | 13.828 |
| 7/1/2011 | 6:21:00 PM | 4.859 | 13.837 |
| 7/1/2011 | 6:22:00 PM | 4.875 | 13.792 |
| 7/1/2011 | 6:23:00 PM | 4.851 | 13.836 |
| 7/1/2011 | 6:24:00 PM | 4.846 | 13.818 |
| 7/1/2011 | 6:25:00 PM | 4.861 | 13.821 |
| 7/1/2011 | 6:26:00 PM | 4.758 | 13.912 |
| 7/1/2011 | 6:27:00 PM | 4.822 | 13.859 |
| 7/1/2011 | 6:28:00 PM | 4.864 | 13.807 |
| 7/1/2011 | 6:29:00 PM | 4.842 | 13.823 |
| 7/1/2011 | 6:30:00 PM | 4.801 | 13.875 |
| 7/1/2011 | 6:31:00 PM | 4.822 | 13.861 |
| 7/1/2011 | 6:32:00 PM | 4.819 | 13.857 |
| 7/1/2011 | 6:33:00 PM | 4.827 | 13.842 |
| 7/1/2011 | 6:34:00 PM | 4.812 | 13.869 |
| 7/1/2011 | 6:35:00 PM | 4.862 | 13.87 |
| 7/1/2011 | 6:36:00 PM | 4.865 | 13.871 |
| 7/1/2011 | 6:37:00 PM | 4.852 | 13.922 |
| 7/1/2011 | 6:38:00 PM | 4.791 | 13.962 |
| 7/1/2011 | 6:39:00 PM | 4.872 | 13.905 |
| 7/1/2011 | 6:40:00 PM | 4.904 | 13.88 |
| 7/1/2011 | 6:41:00 PM | 4.887 | 13.91 |
| 7/1/2011 | 6:42:00 PM | 4.834 | 13.964 |
| 7/1/2011 | 6:43:00 PM | 4.8 | 14.047 |
| 7/1/2011 | 6:44:00 PM | 4.787 | 14.06 |
| 7/1/2011 | 6:45:00 PM | 4.84 | 14.042 |
| 7/1/2011 | 6:46:00 PM | 4.744 | 13.929 |
| 7/1/2011 | 6:47:00 PM | 4.738 | 13.881 |
| 7/1/2011 | 6:48:00 PM | 4.822 | 13.803 |

| | | | |
|---|---|---|---|
| 7/1/2011 | 6:49:00 PM | 4.836 | 13.786 |
| 7/1/2011 | 6:50:00 PM | 4.802 | 13.824 |
| 7/1/2011 | 6:51:00 PM | 4.835 | 13.784 |
| 7/1/2011 | 6:52:00 PM | 4.884 | 13.737 |
| 7/1/2011 | 6:53:00 PM | 4.873 | 13.751 |
| 7/1/2011 | 6:54:00 PM | 4.835 | 13.799 |
| 7/1/2011 | 6:55:00 PM | 4.835 | 13.787 |
| 7/1/2011 | 6:56:00 PM | 4.843 | 13.789 |
| 7/1/2011 | 6:57:00 PM | 4.875 | 13.759 |
| 7/1/2011 | 6:58:00 PM | 4.884 | 13.742 |
| 7/1/2011 | 6:59:00 PM | 4.859 | 13.774 |
| 7/1/2011 | 7:00:00 PM | 4.833 | 13.798 |
| 7/1/2011 | 7:01:00 PM | 4.863 | 13.768 |
| 7/1/2011 | 7:02:00 PM | 4.813 | 13.804 |
| 7/1/2011 | 7:03:00 PM | 4.823 | 13.804 |
| 7/1/2011 | 7:04:00 PM | 4.8 | 13.821 |
| 7/1/2011 | 7:05:00 PM | 4.84 | 13.824 |
| 7/1/2011 | 7:06:00 PM | 4.841 | 13.81 |
| 7/1/2011 | 7:07:00 PM | 4.849 | 13.793 |
| | Average | 4.87 | 13.91 |

Curtis & Tompkins, Ltd.

# Metals Analytical Report

| | | | |
|---|---|---|---|
| Lab #: | 229291 | Location: | 2F-7 Stack |
| Client: | Delta Air Quality Services | Prep: | EPA 29 |
| Project#: | STANDARD | Analysis: | EPA 6020 |
| Field ID: | 1-MTL | Sampled: | 06/30/11 |
| Lab ID: | 229291-001 | Received: | 07/11/11 |
| Matrix: | Air | Prepared: | 07/18/11 |
| Units: | ug/s | Analyzed: | 07/19/11 |
| Diln Fac: | 100.0 | | |

| Analyte | Result | RL | Batch# |
|---|---|---|---|
| Antimony (Front) | ND | 0.50 | 176925 |
| Antimony (Back) | ND | 0.60 | 176926 |
| Arsenic (Back) | ND | 0.50 | 176926 |
| Arsenic (Front) | ND | 0.50 | 176925 |
| Beryllium (Back) | ND | 0.50 | 176926 |
| Beryllium (Front) | ND | 0.50 | 176925 |
| Cadmium (Back) | ND | 0.50 | 176926 |
| Cadmium (Front) | ND | 0.50 | 176925 |
| Chromium (Back) | 2.3 | 0.50 | 176926 |
| Chromium (Front) | 1.8 | 0.50 | 176925 |
| Cobalt (Back) | ND | 0.50 | 176926 |
| Cobalt (Front) | ND | 0.50 | 176925 |
| Lead (Back) | 1.1 | 0.50 | 176926 |
| Lead (Front) | 1.0 | 0.50 | 176925 |
| Manganese (Front) | 2.2 | 0.50 | 176925 |
| Manganese (Back) | 1.1 | 0.50 | 176926 |
| Nickel (Front) | 4.9 | 0.50 | 176925 |
| Nickel (Back) | ND | 0.50 | 176926 |
| Selenium (Front) | 2.1 | 0.50 | 176925 |
| Selenium (Back) | ND | 0.50 | 176926 |

ND= Not Detected
RL= Reporting Limit
ack= Back Half
Front= Front Half

Curtis & Tompkins, Ltd.

# Metals Analytical Report

| | | | |
|---|---|---|---|
| Lab #: | 229291 | Location: | 2F-7 Stack |
| Client: | Delta Air Quality Services | Prep: | EPA 29 |
| Project#: | STANDARD | Analysis: | EPA 6020 |
| Field ID: | 2-MTL | Sampled: | 06/30/11 |
| Lab ID: | 229291-002 | Received: | 07/11/11 |
| Matrix: | Air | Prepared: | 07/18/11 |
| Units: | ug/s | Analyzed: | 07/19/11 |
| Diln Fac: | 100.0 | | |

| Analyte | Result | RL | Batch# |
|---|---|---|---|
| Antimony (Front) | ND | 0.60 | 176925 |
| Antimony (Back) | ND | 0.60 | 176926 |
| Arsenic (Back) | ND | 0.50 | 176926 |
| Arsenic (Front) | ND | 0.50 | 176925 |
| Beryllium (Back) | ND | 0.50 | 176926 |
| Beryllium (Front) | ND | 0.50 | 176925 |
| Cadmium (Back) | ND | 0.50 | 176926 |
| Cadmium (Front) | ND | 0.50 | 176925 |
| Chromium (Back) | 4.4 | 0.50 | 176926 |
| Chromium (Front) | 1.8 | 0.50 | 176925 |
| Cobalt (Back) | ND | 0.50 | 176926 |
| Cobalt (Front) | ND | 0.50 | 176925 |
| Lead (Back) | 0.97 | 0.50 | 176926 |
| Lead (Front) | 1.6 | 0.50 | 176925 |
| Manganese (Front) | 2.9 | 0.50 | 176925 |
| Manganese (Back) | 1.2 | 0.50 | 176926 |
| Nickel (Front) | ND | 0.50 | 176925 |
| Nickel (Back) | ND | 0.50 | 176926 |
| Selenium (Front) | 1.0 | 0.50 | 176925 |
| Selenium (Back) | 1.0 | 0.50 | 176926 |

ND= Not Detected
RL= Reporting Limit
Back= Back Half
Front= Front Half

Curtis & Tompkins, Ltd.

# Metals Analytical Report

| | | | |
|---|---|---|---|
| Lab #: | 229291 | Location: | 2F-7 Stack |
| Client: | Delta Air Quality Services | Prep: | EPA 29 |
| Project#: | STANDARD | Analysis: | EPA 6020 |
| Field ID: | 3-MTL | Sampled: | 07/01/11 |
| Lab ID: | 229291-003 | Received: | 07/11/11 |
| Matrix: | Air | Prepared: | 07/18/11 |
| Units: | ug/s | Analyzed: | 07/19/11 |
| Diln Fac: | 100.0 | | |

| Analyte | Result | RL | Batch# |
|---|---|---|---|
| Antimony (Front) | ND | 0.60 | 176925 |
| Antimony (Back) | ND | 0.60 | 176926 |
| Arsenic (Back) | ND | 0.50 | 176926 |
| Arsenic (Front) | ND | 0.50 | 176925 |
| Beryllium (Back) | ND | 0.50 | 176926 |
| Beryllium (Front) | ND | 0.50 | 176925 |
| Cadmium (Back) | ND | 0.50 | 176926 |
| Cadmium (Front) | ND | 0.50 | 176925 |
| Chromium (Back) | 1.7 | 0.50 | 176926 |
| Chromium (Front) | 1.4 | 0.50 | 176925 |
| Cobalt (Back) | ND | 0.50 | 176926 |
| Cobalt (Front) | ND | 0.50 | 176925 |
| Lead (Back) | ND | 0.50 | 176926 |
| Lead (Front) | ND | 0.50 | 176925 |
| Manganese (Front) | 1.1 | 0.50 | 176925 |
| Manganese (Back) | 0.72 | 0.50 | 176926 |
| Nickel (Front) | ND | 0.50 | 176925 |
| Nickel (Back) | ND | 0.50 | 176926 |
| Selenium (Front) | 6.8 | 0.50 | 176925 |
| Selenium (Back) | ND | 0.50 | 176926 |

ND= Not Detected
RL= Reporting Limit
Back= Back Half
Front= Front Half

Curtis & Tompkins, Ltd.

# Metals Analytical Report

| | | | |
|---|---|---|---|
| Lab #: | 229291 | Location: | 2F-7 Stack |
| Client: | Delta Air Quality Services | Prep: | EPA 29 |
| Project#: | STANDARD | Analysis: | EPA 6020 |
| Field ID: | REAGENT BLANK | Sampled: | 06/30/11 |
| Lab ID: | 229291-004 | Received: | 07/11/11 |
| Matrix: | Air | Prepared: | 07/18/11 |
| Units: | ug/s | Analyzed: | 07/19/11 |
| Diln Fac: | 100.0 | | |

| Analyte | Result | RL | Batch# |
|---|---|---|---|
| Antimony (Front) | ND | 0.60 | 176925 |
| Antimony (Back) | ND | 0.60 | 176926 |
| Arsenic (Back) | ND | 0.50 | 176926 |
| Arsenic (Front) | ND | 0.50 | 176925 |
| Beryllium (Back) | ND | 0.50 | 176926 |
| Beryllium (Front) | ND | 0.50 | 176925 |
| Cadmium (Back) | ND | 0.50 | 176926 |
| Cadmium (Front) | ND | 0.50 | 176925 |
| Chromium (Back) | ND | 0.50 | 176926 |
| Chromium (Front) | 0.85 | 0.50 | 176925 |
| Cobalt (Back) | ND | 0.50 | 176926 |
| Cobalt (Front) | ND | 0.50 | 176925 |
| Lead (Back) | ND | 0.50 | 176926 |
| Lead (Front) | ND | 0.50 | 176925 |
| Manganese (Front) | ND | 0.50 | 176925 |
| Manganese (Back) | ND | 0.50 | 176926 |
| Nickel (Front) | ND | 0.50 | 176925 |
| Nickel (Back) | ND | 0.50 | 176926 |
| Selenium (Front) | ND | 0.50 | 176925 |
| Selenium (Back) | ND | 0.50 | 176926 |

ND= Not Detected
RL= Reporting Limit
Back= Back Half
Front= Front Half

Curtis & Tompkins, Ltd.

# Metals Analytical Report

| | | | |
|---|---|---|---|
| Lab #: | 229291 | Location: | 2F-7 Stack |
| Client: | Delta Air Quality Services | Prep: | EPA 29 |
| Project#: | STANDARD | Analysis: | EPA 6020 |
| Field ID: | FB-MTL | Sampled: | 07/01/11 |
| Lab ID: | 229291-005 | Received: | 07/11/11 |
| Matrix: | Air | Prepared: | 07/18/11 |
| Units: | ug/s | Analyzed: | 07/19/11 |
| Diln Fac: | 100.0 | | |

| Analyte | Result | RL | Batch# |
|---|---|---|---|
| Antimony (Front) | ND | 0.60 | 176925 |
| Antimony (Back) | ND | 0.60 | 176926 |
| Arsenic (Back) | ND | 0.50 | 176926 |
| Arsenic (Front) | ND | 0.50 | 176925 |
| Beryllium (Back) | ND | 0.50 | 176926 |
| Beryllium (Front) | ND | 0.50 | 176925 |
| Cadmium (Back) | ND | 0.50 | 176926 |
| Cadmium (Front) | ND | 0.50 | 176925 |
| Chromium (Back) | 0.54 | 0.50 | 176926 |
| Chromium (Front) | 1.1 | 0.50 | 176925 |
| Cobalt (Back) | ND | 0.50 | 176926 |
| Cobalt (Front) | ND | 0.50 | 176925 |
| Lead (Back) | ND | 0.50 | 176926 |
| Lead (Front) | ND | 0.50 | 176925 |
| Manganese (Front) | 6.2 | 0.50 | 176925 |
| Manganese (Back) | ND | 0.50 | 176926 |
| Nickel (Front) | ND | 0.50 | 176925 |
| Nickel (Back) | ND | 0.50 | 176926 |
| Selenium (Front) | 2.4 | 0.50 | 176925 |
| Selenium (Back) | ND | 0.50 | 176926 |

ND= Not Detected
RL= Reporting Limit
Back= Back Half
Front= Front Half



6.0

Curtis & Tompkins, Ltd.

Batch QC Report

## Metals Analytical Report

| | | | |
|---|---|---|---|
| Lab #: | 229291 | Location: | 2F-7 Stack |
| Client: | Delta Air Quality Services | Prep: | EPA 29 |
| Project#: | STANDARD | Analysis: | EPA 6020 |
| Type: | BLANK | Diln Fac: | 100.0 |
| Lab ID: | QC600649 | Batch#: | 176925 |
| Matrix: | Air | Prepared: | 07/18/11 |
| Units: | ug/s | Analyzed: | 07/19/11 |

| Analyte | Result | RL |
|---|---|---|
| Antimony (Front) | ND | 0.50 |
| Arsenic (Front) | ND | 0.50 |
| Beryllium (Front) | ND | 0.50 |
| Cadmium (Front) | ND | 0.50 |
| Chromium (Front) | ND | 0.50 |
| Cobalt (Front) | ND | 0.50 |
| Lead (Front) | ND | 0.50 |
| Manganese (Front) | ND | 0.50 |
| Nickel (Front) | ND | 0.50 |
| Selenium (Front) | ND | 0.50 |

ND= Not Detected
RL= Reporting Limit
Front= Front Half

Curtis & Tompkins, Ltd.

Batch QC Report

## Metals Analytical Report

| | | | |
|---|---|---|---|
| Lab #: | 229291 | Location: | 2F-7 Stack |
| Client: | Delta Air Quality Services | Prep: | EPA 29 |
| Project#: | STANDARD | Analysis: | EPA 6020 |
| Field ID: | 1-MTL | Diln Fac: | 100.0 |
| Type: | SDUP | Batch#: | 176925 |
| MSS Lab ID: | 229291-001 | Sampled: | 06/30/11 |
| Lab ID: | QC600650 | Received: | 07/11/11 |
| Matrix: | Air | Prepared: | 07/18/11 |
| Units: | ug/s | Analyzed: | 07/19/11 |

| Analyte | MSS Result | Result | RL | RPD | Lim |
|---|---|---|---|---|---|
| Antimony (Front) | <0.5000 | ND | 0.5000 | NC | 30 |
| Arsenic (Front) | <0.5000 | ND | 0.5000 | NC | 30 |
| Beryllium (Front) | <0.5000 | ND | 0.5000 | NC | 30 |
| Cadmium (Front) | <0.5000 | ND | 0.5000 | NC | 30 |
| Chromium (Front) | 1.809 | 1.897 | 0.5000 | 5 | 30 |
| Cobalt (Front) | <0.5000 | ND | 0.5000 | NC | 30 |
| Lead (Front) | 0.9950 | 0.9590 | 0.5000 | 4 | 30 |
| Manganese (Front) | 2.229 | 2.432 | 0.5000 | 9 | 30 |
| Nickel (Front) | 4.927 | 4.224 | 0.5000 | 15 | 30 |
| Selenium (Front) | 2.091 | 1.795 | 0.5000 | 15 | 30 |

NC= Not Calculated
ND= Not Detected
RL= Reporting Limit
RPD= Relative Percent Difference
Front= Front Half



9.0

Curtis & Tompkins, Ltd.

Batch QC Report

## Metals Analytical Report

| | | | |
|---|---|---|---|
| Lab #: | 229291 | Location: | 2F-7 Stack |
| Client: | Delta Air Quality Services | Prep: | EPA 29 |
| Project#: | STANDARD | Analysis: | EPA 6020 |
| Field ID: | 1-MTL | Diln Fac: | 100.0 |
| Type: | SSPIKE | Batch#: | 176925 |
| MSS Lab ID: | 229291-001 | Sampled: | 06/30/11 |
| Lab ID: | QC600651 | Received: | 07/11/11 |
| Matrix: | Air | Prepared: | 07/18/11 |
| Units: | ug/s | Analyzed: | 07/19/11 |

| Analyte | MSS Result | Spiked | Result | %REC | Limits |
|---|---|---|---|---|---|
| Antimony (Front) | ND | 250.0 | 217.7 | 87 | 66-130 |
| Arsenic (Front) | 0.3140 | 250.0 | 225.3 | 90 | 70-130 |
| Beryllium (Front) | ND | 250.0 | 232.7 | 93 | 58-130 |
| Cadmium (Front) | 0.09500 | 250.0 | 233.6 | 93 | 65-130 |
| Chromium (Front) | 1.809 | 250.0 | 219.8 | 87 | 70-130 |
| Cobalt (Front) | ND | 250.0 | 222.3 | 89 | 70-130 |
| Lead (Front) | 0.9950 | 250.0 | 220.2 | 88 | 64-130 |
| Manganese (Front) | 2.229 | 250.0 | 229.2 | 91 | 70-130 |
| Nickel (Front) | 4.927 | 250.0 | 229.4 | 90 | 70-130 |
| Selenium (Front) | 2.091 | 250.0 | 284.4 | 113 | 62-130 |

ND= Not Detected
Front= Front Half

Curtis & Tompkins, Ltd.

Batch QC Report

## Metals Analytical Report

| | | | |
|---|---|---|---|
| Lab #: | 229291 | Location: | 2F-7 Stack |
| Client: | Delta Air Quality Services | Prep: | EPA 29 |
| Project#: | STANDARD | Analysis: | EPA 6020 |
| Type: | BLANK | Diln Fac: | 100.0 |
| Lab ID: | QC600652 | Batch#: | 176926 |
| Matrix: | Air | Prepared: | 07/18/11 |
| Units: | ug/s | Analyzed: | 07/19/11 |

| Analyte | Result | RL |
|---|---|---|
| Antimony (Back) | ND | 0.50 |
| Arsenic (Back) | ND | 0.50 |
| Beryllium (Back) | ND | 0.50 |
| Cadmium (Back) | ND | 0.50 |
| Chromium (Back) | ND | 0.50 |
| Cobalt (Back) | ND | 0.50 |
| Lead (Back) | ND | 0.50 |
| Manganese (Back) | ND | 0.50 |
| Nickel (Back) | ND | 0.50 |
| Selenium (Back) | ND | 0.50 |

ND= Not Detected
RL= Reporting Limit
Back= Back Half

Curtis & Tompkins, Ltd.

Batch QC Report

## Metals Analytical Report

| | | | |
|---|---|---|---|
| Lab #: | 229291 | Location: | 2F-7 Stack |
| Client: | Delta Air Quality Services | Prep: | EPA 29 |
| Project#: | STANDARD | Analysis: | EPA 6020 |
| Field ID: | 1-MTL | Diln Fac: | 100.0 |
| Type: | SDUP | Batch#: | 176926 |
| MSS Lab ID: | 229291-001 | Sampled: | 06/30/11 |
| Lab ID: | QC600653 | Received: | 07/11/11 |
| Matrix: | Air | Prepared: | 07/18/11 |
| Units: | ug/s | Analyzed: | 07/19/11 |

| Analyte | MSS Result | Result | RL | RPD | Lim |
|---|---|---|---|---|---|
| Antimony (Back) | <0.5000 | ND | 0.5000 | NC | 30 |
| Arsenic (Back) | <0.5000 | ND | 0.5000 | NC | 30 |
| Beryllium (Back) | <0.5000 | ND | 0.5000 | NC | 30 |
| Cadmium (Back) | <0.5000 | ND | 0.5000 | NC | 30 |
| Chromium (Back) | 2.284 | 2.311 | 0.5000 | 1 | 30 |
| Cobalt (Back) | <0.5000 | ND | 0.5000 | NC | 30 |
| Lead (Back) | 1.077 | 0.7060 | 0.5000 | 42 * | 30 |
| Manganese (Back) | 1.110 | 1.171 | 0.5000 | 5 | 30 |
| Nickel (Back) | <0.5000 | ND | 0.5000 | NC | 30 |
| Selenium (Back) | <0.5000 | ND | 0.5000 | NC | 30 |

*= Value outside of QC limits; see narrative
NC= Not Calculated
ND= Not Detected
RL= Reporting Limit
RPD= Relative Percent Difference
Back= Back Half

Curtis & Tompkins, Ltd.

Batch QC Report

## Metals Analytical Report

| | | | |
|---|---|---|---|
| Lab #: | 229291 | Location: | 2F-7 Stack |
| Client: | Delta Air Quality Services | Prep: | EPA 29 |
| Project#: | STANDARD | Analysis: | EPA 6020 |
| Field ID: | 1-MTL | Diln Fac: | 100.0 |
| Type: | SSPIKE | Batch#: | 176926 |
| MSS Lab ID: | 229291-001 | Sampled: | 06/30/11 |
| Lab ID: | QC600654 | Received: | 07/11/11 |
| Matrix: | Air | Prepared: | 07/18/11 |
| Units: | ug/s | Analyzed: | 07/19/11 |

| Analyte | MSS Result | Spiked | Result | %REC | Limits |
|---|---|---|---|---|---|
| Antimony (Back) | ND | 250.0 | 270.8 | 108 | 66-130 |
| Arsenic (Back) | ND | 250.0 | 248.0 | 99 | 70-130 |
| Beryllium (Back) | 0.01450 | 250.0 | 262.8 | 105 | 58-130 |
| Cadmium (Back) | ND | 250.0 | 249.5 | 100 | 65-130 |
| Chromium (Back) | 2.284 | 250.0 | 243.8 | 97 | 70-130 |
| Cobalt (Back) | ND | 250.0 | 243.7 | 97 | 70-130 |
| Lead (Back) | 1.077 | 250.0 | 249.3 | 99 | 64-130 |
| Manganese (Back) | 1.110 | 250.0 | 247.6 | 99 | 70-130 |
| Nickel (Back) | 0.2845 | 250.0 | 250.5 | 100 | 70-130 |
| Selenium (Back) | 0.3695 | 250.0 | 248.5 | 99 | 62-130 |

ND= Not Detected
Back= Back Half



12.0

CHAIN OF CUSTODY

CLIENT: ICR 2F-7 TEST DATE(S): 6/30/2011 7/1/2011

LOCATION: FCC SAMPLER(S): SS

SAMPLE LOCATION: 2F-7 Stack PROJECT MANAGER: Ali Aleshakir

TEST METHOD(S): EPA 29/5 DATE DUE: 7/15/2011

OUTSIDE LAB REQUIRED?: Yes COMPLIANCE TEST? No

| DATE | TIME | TEST # | SAMPLE DESCRIPTION | CONTAINERS | SAMPLER | COMMENTS |
|---|---|---|---|---|---|---|
| 6/30/2011 | 10:16 | 1-Mtl | Noz/Prbe/Filter F½ | 1 | SS | Acetone Beaker # 9773 |
| 6/30/2011 | 10:16 | 1-Mtl 1 | Noz/Prbe/Filter F½ | 1 | SS | .1N HNO3 |
| 6/30/2011 | 10:16 | 1-Mtl | Filter | 1 | SS | 83 mm |
| 6/30/2011 | 10:16 | 1-Mtl | Back ½ /Impinger Rinse | 1 | SS | .1N HNO3 |
| 6/30/2011 | 15:54 | 2-Mtl | Noz/Prbe/Filter F½ | 1 | SS | Acetone Beaker # 9774 |
| 6/30/2011 | 15:54 | 2-Mtl 2 | Noz/Prbe/Filter F½ | 1 | SS | .1N HNO3 |
| 6/30/2011 | 15:54 | 2-Mtl | Filter | 1 | SS | 83 mm |
| 6/30/2011 | 15:54 | 2-Mtl | Back ½ /Impinger Rinse | 1 | SS | .1N HNO3 |
| 7/1/2011 | 15:00 | 3-Mtl | Noz/Prbe/Filter F½ | 1 | SS | Acetone Beaker # 9775 |
| 7/1/2011 | 15:00 | 3-Mtl 3 | Noz/Prbe/Filter F½ | 1 | SS | .1N HNO3 |
| 7/1/2011 | 15:00 | 3-Mtl | Filter | 1 | SS | 83 mm |
| 7/1/2011 | 15:00 | 3-Mtl | Back ½ /Impinger Rinse | 1 | SS | .1N HNO3 |
| 6/30/2011 | 13:00 | H2O-Blank | 100ml DI H2O | 1 | JP | DI H2O |
| 6/30/2011 | 13:00 | Acet-Blank 4 | 200ml Acetone | 1 | JP | Acetone Beaker # 9[illegible] |
| 6/30/2011 | 13:00 | HNO3-Blank | 300ml .1N HNO3 | 1 | JP | .1N HNO3 |
| 6/30/2011 | 13:00 | HNO3/H2O2-Blank | 200ml 5% HNO3/10% H2O2 | 1 | JP | HNO3/H2O2 |
| 6/30/2011 | 13:00 | Filter-Blank-1 | Unused Quartz Filter | 1 | JP | 83 mm |
| 6/30/2011 | 13:00 | Filter-Blank-2 | Unused Quartz Filter | 1 | JP | 83 mm |
| 6/30/2011 | 13:00 | Filter-Blank-3 | Unused Quartz Filter | 1 | JP | 83 mm |
| 6/30/2011 | 13:00 | FB-Mtl | Noz/Prbe/Filter F½ | 1 | SS | Acetone Beaker # 9776 |
| 6/30/2011 | 13:00 | FB-Mtl 5 | Noz/Prbe/Filter F½ | 1 | SS | .1N HNO3 |
| 6/30/2011 | 13:00 | FB-Mtl | Filter | 1 | SS | 83 mm |
| 6/30/2011 | 13:00 | FB-Mtl | Back ½ /Impinger Rinse | 1 | SS | .1N HNO3 |
| | | | | | | |
| | | Total Samples | | 23 | | |
| Reagent: | | DI H2O | Acetone | | | |
| Reagent Lot #'s: | | Lot #9 | 105791 | | | |

| RELEASED BY | DATE/TIME | RECEIVED BY | DATE/TIME |
|---|---|---|---|
| [signature] | 7/2/11 1:15 | [signature] | 7/6/11 0800 |
| | | Shipped using courier service | |
| | | [signature] | 7-11-11 0900 |

ANALYSIS REQUIRED:

Delta

PM analysis on filter & F/h acetone (filter dried @ 320 F after tests)
Metals analysis for Sb, As, Be, Cd, Cr, Co, Pb
Mn, Ni, Se

FRONT and BACK ½ SEPARATELY

Note: Acetone fraction submitted as dried beaker
Acetone dried beaker and filters submitted
via Fed-ex.

**COOLER RECEIPT CHECKLIST**

Curtis & Tompkins, Ltd.

Login # 229291 Date Received 7/11/11 Number of coolers 1
Client Delta Project 2F-7 Stack

Date Opened 7/11/11 By (print) R. Paris (sign) [signature]
Date Logged in ↓ By (print) ↓ (sign) ↓

1. Did cooler come with a shipping slip (airbill, etc) (YES) NO
   Shipping info GSO 104394096

2A. Were custody seals present? .... ☐ YES (circle) on cooler on samples ☒ NO
   How many _____ Name _____ Date _____
2B. Were custody seals intact upon arrival? _____ YES NO (N/A)
3. Were custody papers dry and intact when received? _____ (YES) NO
4. Were custody papers filled out properly (ink, signed, etc)? _____ (YES) NO
5. Is the project identifiable from custody papers? (If so fill out top of form) (YES) NO
6. Indicate the packing in cooler: (if other, describe) _____

☒ Bubble Wrap ☐ Foam blocks ☒ Bags ☐ None
☐ Cloth material ☐ Cardboard ☐ Styrofoam ☐ Paper towels

7. Temperature documentation: * Notify PM if temperature exceeds 6°C

Type of ice used: ☐ Wet ☒ Blue/Gel ☐ None Temp(°C) _____

☒ Samples Received on ice & cold without a temperature blank

☐ Samples received on ice directly from the field. Cooling process had begun

8. Were Method 5035 sampling containers present? _____ YES (NO)
   If YES, what time were they transferred to freezer? _____
9. Did all bottles arrive unbroken/unopened? _____ (YES) NO
10. Are samples in the appropriate containers for indicated tests? _____ (YES) NO
11. Are sample labels present, in good condition and complete? _____ (YES) NO
12. Do the sample labels agree with custody papers? _____ (YES) NO
13. Was sufficient amount of sample sent for tests requested? _____ (YES) NO
14. Are the samples appropriately preserved? _____ YES NO (N/A)
15. Did you check preservatives for all bottles for each sample? _____ YES NO (N/A)
16. Did you document your preservative check? _____ YES NO (N/A)
17. Did you change the hold time in LIMS for unpreserved VOAs? _____ YES NO (N/A)
18. Are bubbles > 6mm absent in VOA samples? _____ YES NO (N/A)
19. Was the client contacted concerning this sample delivery? _____ YES (NO)
   If YES, Who was called? _____ By _____ Date: _____

COMMENTS

_____

Rev 8, 6/11

Delta

# PARTICULATE
# EPA METHOD 5

Project #
Client/Location ICR
Sample Location FCCU
Test # 1-PM/Metals

Acetone Blank mg/ml 0.0000

Sample Date 6/30/11
Data Analysis Date 7/6/11
Analyst Initials [illegible]

| Item | Number | Final Weight (g) | Tare Weight (g) | Gain Weight (mg) | Blank Correction (mg) | Aliquot Correction (ml/ml) | Net Gain (mg/Sample) |
|---|---|---|---|---|---|---|---|
| 1. ~~Glass~~ Fiber Filter Quartz | 83-GDT-6 | 0.4695 | 0.4665 | 3.0 | — | — | 3.0 |
| 2. Probe and Nozzle Wash (Acetone) | 9773 | 29.4555 | 29.4515 | 4.0 | 0.0 | 120/120 | 4.0 |
| Acetone Blank | 9777 | 29.8178 | 29.8178 | 0.0 | — | 218/218 | 0.0000mg/l |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |

Total Particulate = 7.0 mg

| Method of Sample Prep/Notes |
|---|
| with filters prepared for weighing pre/post test @ 320 F |
| Dried acetone beakers submitted for metals analysis |
| |
| |

Delta

# PARTICULATE
# EPA METHOD 5

Project #
Client/Location ICR
Sample Location FCC U
Test # 2-PM/Metals

Acetone Blank mg/ml 0.0000

Sample Date 6/30/11
Data Analysis Date 7/6/11
Analyst Initials

| Item | Number | Final Weight (g) | Tare Weight (g) | Gain Weight (mg) | Blank Correction (mg) | Aliquot Correction (ml/ml) | Net Gain (mg/Sample) |
|---|---|---|---|---|---|---|---|
| 1. ~~Glass~~ Fiber Filter Quartz | 83-QUT-8 | 0.4651 | 0.4600 | 5.1 | — | — | 5.1 |
| 2. Probe and Nozzle Wash (Acetone) | 9774 | 29.2402 | 29.2380 | 2.2 | 0-0 | 133/133 | 2.2 |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |

Total Particulate = 7.3 mg

| Method of Sample Prep/Notes |
|---|
| |
| |
| |
| |

Delta

# PARTICULATE
# EPA METHOD 5

Project #
Client/Location JCR
Sample Location FCCU
Test # 3-PM/Metals

Acetone Blank mg/ml 0.0000

Sample Date 7/1/11
Data Analysis Date 7/16/11
Analyst Initials [illegible]

| Item | Number | Final Weight (g) | Tare Weight (g) | Gain Weight (mg) | Blank Correction (mg) | Aliquot Correction (ml/ml) | Net Gain (mg/Sample) |
|---|---|---|---|---|---|---|---|
| 1. ~~Glass~~ Fiber Filter Quartz | 83-QFT-4 | 0.4587 | 0.4605 | 0.0 | — | — | 0.0 |
| 2. Probe and Nozzle Wash (Acetone) | 9775 | 29.3513 | 29.3502 | 1.1 | 0.0 | 159/159 | 1.1 |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |

Total Particulate = 1.1 mg

| Method of Sample Prep/Notes |
|---|
| |
| filter torn torn edge |
| |
| |

Delta

# PARTICULATE
# EPA METHOD 5

Project #
Client/Location ICR
Sample Location FCCU
Test # FB-PM/Metals

Acetone Blank mg/ml 0.0000

Sample Date 6/30/11
Data Analysis Date 7/6/11
Analyst Initials [illegible]

| Item | Number | Final Weight (g) | Tare Weight (g) | Gain Weight (mg) | Blank Correction (mg) | Aliquot Correction (ml/ml) | Net Gain (mg/Sample) |
|---|---|---|---|---|---|---|---|
| 1. ~~Glass~~ Fiber Filter Quartz | 53-[illegible]J-3 | 0.4644 | 0.4637 | 0.7 | – | – | 0.7 |
| 2. Probe and Nozzle Wash (Acetone) | 9976 | 28.7137 | 28.7117 | 1.0 | 0.0 | 61/61 | 1.0 |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |

Total Particulate = 1.7 mg

| Method of Sample Prep/Notes |
|---|
| |
| |
| |
| |

2.5 201A-202.xls
Results Summary

| Client/Location | ExxonMobil / FCC | ExxonMobil / FCC | ExxonMobil / FCC | Average Runs 1-3 |
|---|---|---|---|---|
| Test Number | 1-PM2.5 | 2-PM2.5 | 3-PM2.5 | |
| Date | 6/30/2011 | 6/30/2011 | 7/1/2011 | |
| Data By | SS | SS | SS | |
| Sample Location | 2F-7 Stack | 2F-7 Stack | 2F-7 Stack | |
| Start Time | 10:16 | 15:48 | 15:00 | |
| Stop Time | 14:43 | 20:14 | 19:21 | |
| Sample Time (Min) | 241.5 | 243.0 | 244.5 | |
| Test Method | 201A/202 | 201A/202 | 201A/202 | |
| Reference Temp (F) | 68 | 68 | 68 | |
| Stack O2 (%) | 5.03 | 5.06 | 4.90 | |
| Stack CO2 (%) | 13.94 | 14.08 | 14.31 | |
| Std Sample Vol (SCF) | 81.652 | 82.996 | 83.261 | |
| Measured Stack Flow Rate (dscfm) | 244,326 | 247,582 | 252,208 | |
| >2.5 micron solid acetone rinse | 0.0 | 0.2 | 0.7 | |
| <2.5 micron solid acetone rinse | 0.0 | 0.0 | 0.0 | |
| Filter, mg | 1.3 | 0.0 | 0.0 | |
| Condensable Inorganic, mg | 71.8 | 35.8 | 42.8 | |
| Condensable Organic Extraction, mg | 2.6 | 3.2 | 1.1 | |
| Total Weight Gain, < 2.5, mg | 73.7 | 37.0 | 41.9 | |
| **Solid Particulate Matter Greater than 2.5 microns Emissions** | | | | |
| Grain Loading, gr/dscf | 0.000000 | 0.000037 | 0.000130 | 0.000056 |
| Grain Loading @ 12% CO2 | 0.000000 | 0.000032 | 0.000109 | 0.000047 |
| Mass Emissions, lb/hr | 0.00 | 0.08 | 0.28 | 0.12 |
| **Solid Particulate Matter Less than 2.5 microns Emissions** | | | | |
| Grain Loading, gr/dscf | 0.000246 | 0.000000 | 0.000000 | 0.000082 |
| Grain Loading @ 12% CO2 | 0.000211 | 0.000000 | 0.000000 | 0.000070 |
| Mass Emissions, lb/hr | 0.51 | 0.00 | 0.00 | 0.17 |
| **Condensible Inorganic Particulate Matter Less than 2.5 microns Emissions** | | | | |
| Grain Loading, gr/dscf | 0.013568 | 0.006656 | 0.007932 | 0.009385 |
| Grain Loading @ 12% CO2 | 0.011677 | 0.005674 | 0.006651 | 0.008000 |
| Mass Emissions, lb/hr | 28.42 | 14.12 | 17.15 | 19.90 |
| **Condensible Organic Particulate Matter Less than 2.5 microns Emissions** | | | | |
| Grain Loading, gr/dscf | 0.000491 | 0.000595 | 0.000204 | 0.000430 |
| Grain Loading @ 12% CO2 | 0.000423 | 0.000507 | 0.000171 | 0.000367 |
| Mass Emissions, lb/hr | 1.03 | 1.26 | 0.44 | 0.91 |
| **Total Particulate Matter Less than 2.5 microns Emissions** | | | | |
| Grain Loading, gr/dscf | 0.014305 | 0.007251 | 0.008136 | 0.009897 |
| Grain Loading @ 12% CO2 | 0.012311 | 0.006181 | 0.006821 | 0.008438 |
| Mass Emissions, lb/hr | 29.96 | 15.39 | 17.59 | 20.98 |

| | | | | |
|---|---|---|---|---|
| Client/Location | ExxonMobil / FCC | ExxonMobil / FCC | ExxonMobil / FCC | |
| Test Number | 1-PM2.5 | 2-PM2.5 | 3-PM2.5 | |
| Date | 6/30/2011 | 6/30/2011 | 7/1/2011 | |
| Data By | SS | SS | SS | |
| Sample Location | 2F-7 Stack | 2F-7 Stack | 2F-7 Stack | |
| Start Time | 10:16 | 15:48 | 15:00 | |
| Stop Time | 14:43 | 20:14 | 19:21 | |
| Sample Time (Min) | 241.5 | 243.0 | 244.5 | |
| Test Method | 201A/202 | 201A/202 | 201A/202 | |
| Reference Temp (F) | 68 | 68 | 68 | |
| Sample Train | 19WCS | 19WCS | 19WCS | |
| Meter Cal Factor | 0.996 | 0.996 | 0.996 | |
| Pitot Factor | 0.840 | 0.84 | 0.84 | |
| Nozzle Diam (in) | 0.150 | 0.150 | 0.150 | |
| Stack Area (sq ft) | 94.31 | 94.31 | 94.31 | |
| Bar Press (in Hg) | 29.85 | 29.85 | 29.74 | Average |
| Delta P, Vel Head (iwg) | 1.4487 | 1.4654 | 1.4991 | **1.4711** |
| Stack Temp (F) | 472.6 | 468.5 | 471.3 | **470.8** |
| Stack Press (iwg) | -1.30 | -1.30 | -1.30 | **-1.30** |
| Stack O2 (%) | 5.03 | 5.06 | 4.90 | **5.00** |
| Stack CO2 (%) | 13.94 | 14.08 | 14.31 | **14.11** |
| Meter Vol (acf) | 83.915 | 84.600 | 85.560 | **84.692** |
| Meter Temp (F) | 79.7 | 75.3 | 77.6 | **77.5** |
| Delta H, Meter Press (iwg) | 0.38 | 0.38 | 0.38 | **0.38** |
| Liquid Vol (ml) | 309.7 | 300.5 | 273.9 | **294.7** |
| Std Sample Vol (SCF) | 81.652 | 82.996 | 83.261 | **82.636** |
| Std Sample Vol (SCM) | 2.312 | 2.350 | 2.358 | **2.340** |
| Moisture Fraction | 0.152 | 0.146 | 0.134 | **0.144** |
| Stack Gas Mol Wt | 28.54 | 28.64 | 28.81 | **28.66** |
| Wet O2, % | 4.3% | 4.3% | 4.2% | **4.3%** |
| Viscosity, micropoise | 263.3 | 262.7 | 264.2 | **263.4** |
| Velocity (ft/sec) | 90.43 | 90.61 | 91.68 | **90.90** |
| Stack Flow Rate (wacfm) | 511,742 | 512,731 | 518,785 | **514,419** |
| Measured Stack Flow Rate (wscfm) | 288,067 | 289,893 | 291,368 | **289,776** |
| Measured Stack Flow Rate (dscfm) | 244,326 | 247,582 | 252,208 | **248,039** |
| Isokinetic Ratio (%) | 106.32 | 105.99 | 103.73 | **105.35** |
| Qimp (through nozzle), wacfm | 0.706 | 0.705 | 0.698 | **0.703** |
| D50 (cut-off diameter), microns | 2.65 | 2.64 | 2.69 | **2.66** |
| **Acceptability criteria (must meet item 1 and either 2a or 2b)** | | | | |
| 1.A. Is D50 < 2.75 um? | YES | YES | YES | |
| 1.B. Is D50 > 2.25 um? | YES | YES | YES | |
| 2a. Number of points outside delta Pmin to delta Pmax? | 0 | 0 | 0 | |
| 2A Acceptable (0=acceptable)? | YES | YES | YES | |
| 2b. Must meet all three cases | | | | |
| (1) Isokinetics < 120%? | YES | YES | YES | |
| (2) Isokinetics > 80%? | YES | YES | YES | |
| (3)16% or less points outside delta P min and max? | Yes | Yes | Yes | |
| | **PM2.5 Results** | | | |
| Pa, "Hg | 29.85 | 29.85 | 29.74 | |
| Stack P | -1.30 | -1.30 | -1.30 | |
| Ts, R | 932.6 | 928.5 | 931.3 | |
| Tm, R | 539.7 | 535.3 | 537.6 | |
| Delta H | 0.38 | 0.38 | 0.38 | |
| O2 | 5.03 | 5.06 | 4.90 | |
| CO2 | 13.94 | 14.08 | 14.31 | |
| H20 | 15.18 | 14.60 | 13.44 | |
| Md | 30.43 | 30.45 | 30.49 | |
| Mw | 28.54 | 28.64 | 28.81 | |
| Ps | 29.75 | 29.75 | 29.64 | |
| Reynolds No. @ IV | 2106 | 2125 | 2091 | |
| Cunninigham Slip Factor @ 2.5 | 1.12 | 1.12 | 1.12 | |
| Viscosity, u | 263.7 | 263.1 | 264.6 | |
| Iteration | | for Re <3162 | | |
| 1 D50 | 2.645 | 2.629 | 2.677 | |
| 1 Cunningham Slip Correction factor | 1.1095 | 1.1095 | 1.1084 | |
| 2 D50 | 2.653 | 2.635 | 2.686 | |
| 2 Cunningham Slip Correction factor | 1.1092 | 1.1093 | 1.1080 | |
| 2 D50 % difference | -0.29% | -0.25% | -0.35% | |
| 3 D50 | 2.653 | 2.636 | 2.687 | |
| 3 Cunningham Slip Correction factor | 1.1092 | 1.1092 | 1.1080 | |
| 3 D50 % difference | -0.01% | -0.01% | -0.02% | |
| 4 D50 | 2.653 | 2.636 | 2.687 | |
| 4 Cunningham Slip Correction factor | 1.1092 | 1.1092 | 1.1080 | |
| 4 D50 % difference | 0.00% | 0.00% | 0.00% | |
| 5 D50 | 2.653 | 2.636 | 2.687 | |
| 5 Cunningham Slip Correction factor | 1.1092 | 1.1092 | 1.1080 | |
| 5 D50 % difference | 0.00% | 0.00% | 0.00% | |

Run 1

| | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| delP@pt1: | | 1.300 | avg delP: | | 1.430 | Target sample time, min | | | | 240 | Tref= | 68 | | | | | | | |
| B.P. | 29.85 | K factor (delH @ 1 cfm) | | | 0.926 | Number of points | | | | 12 | Yd= | 0.9960 | | | | | | | |
| Sample | Dwell | del P | Tn | Actual | | Time | | Meter Readings | | Sample | del H | Stack | Meter | | Ps | Iso@ | Total | D50 | C |
| Pt | Pt. 1 | | | | | START | END | START | END | Volume | | | In | Out | | eachpt | Iso | microns | Slip |
| 1 | 19.07 | 1.30 | | 19 | :00 | 10:16:00 | 10:35:00 | 451.49 | 458.28 | 6.79 | 0.38 | 475 | 80 | 80 | -1.30 | 114.1 | 114.1 | 2.58 | 1.129 |
| 2 | | 1.30 | 19.07 | 19 | :00 | 10:35:00 | 10:54:00 | 458.28 | 464.89 | 6.62 | 0.38 | 475 | 85 | 80 | -1.30 | 110.7 | 112.4 | 2.68 | 1.129 |
| 3 | | 1.50 | 20.49 | 20 | :30 | 10:54:00 | 11:14:30 | 464.89 | 472.00 | 7.11 | 0.38 | 474 | 85 | 80 | -1.30 | 102.6 | 109.1 | 2.69 | 1.129 |
| 4 | | 1.30 | 19.07 | 19 | :00 | 11:20:00 | 11:39:00 | 472.00 | 478.60 | 6.60 | 0.38 | 469 | 84 | 80 | -1.30 | 110.2 | 109.4 | 2.69 | 1.128 |
| 5 | | 1.50 | 20.49 | 20 | :30 | 11:39:00 | 11:59:30 | 478.60 | 485.72 | 7.12 | 0.38 | 475 | 83 | 79 | -1.30 | 103.1 | 108.1 | 2.68 | 1.129 |
| 6 | | 1.50 | 20.49 | 20 | :30 | 11:59:30 | 12:20:00 | 485.72 | 492.90 | 7.18 | 0.38 | 474 | 82 | 78 | -1.30 | 104.1 | 107.5 | 2.65 | 1.129 |
| 7 | | 1.50 | 20.49 | 20 | :30 | 12:32:00 | 12:52:30 | 492.90 | 499.99 | 7.09 | 0.38 | 475 | 79 | 76 | -1.30 | 103.3 | 106.9 | 2.67 | 1.129 |
| 8 | | 1.50 | 20.49 | 20 | :30 | 12:52:30 | 13:13:00 | 499.99 | 507.08 | 7.09 | 0.38 | 474 | 80 | 77 | -1.30 | 103.1 | 106.4 | 2.68 | 1.129 |
| 9 | | 1.50 | 20.49 | 20 | :30 | 13:13:00 | 13:33:30 | 507.08 | 514.25 | 7.17 | 0.38 | 471 | 79 | 76 | -1.30 | 104.2 | 106.1 | 2.64 | 1.129 |
| 10 | | 1.50 | 20.49 | 20 | :30 | 13:42:00 | 14:02:30 | 514.25 | 521.72 | 7.47 | 0.38 | 469 | 79 | 76 | -1.30 | 108.5 | 106.4 | 2.52 | 1.128 |
| 11 | | 1.50 | 20.49 | 20 | :30 | 14:02:30 | 14:23:00 | 521.72 | 528.30 | 6.58 | 0.38 | 470 | 80 | 77 | -1.30 | 95.5 | 105.4 | 2.93 | 1.129 |
| 12 | | 1.50 | 20.49 | 20 | :30 | 14:23:00 | 14:43:30 | 528.30 | 535.40 | 7.10 | 0.38 | 470 | 80 | 77 | -1.30 | 103.0 | 105.2 | 2.68 | 1.129 |
| | | | | 237 | 270 | | | | | 83.92 | 0.38 | 473 | 81 | 78 | -1.30 | | | | |
| | | | | 242 | 4.5 | | | | | | | | | 80 | | | | | |
| | Moisture | | Imp 1 | | | 944.8 | 562.6 | 382.2 | | | | | | | | | | | |
| | Moisture | | Imp 2 | | | 537.6 | 537.6 | 0 | | | | | | | | | | | |
| | Moisture | | Imp 3 | | | 729.2 | 722.8 | 6.4 | | | | | | | | | | | |
| | Moisture | | Imp 4 | | | 920.6 | 899.5 | 21.1 | | | | | | | | | | | |
| | LINE RINSE | | | | | | 100 | | | | | | | | | | | | |
| | | | | | | 3132.2 | 2822.5 | | | | | | | | | | | | |
| | | | | | | Total | 309.7 | | | | | | | | | | | | |

Run 2

| | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| delP@pt1: | 1.300 | avg delP: | | 1.430 | Target sample time, min | | 240 | Tref= | 68 | | | | | | | | | | |
| B.P. | 29.85 | K factor (delH @ 1 cfm) | | 0.926 | Number of points | | 12 | Yd= | 0.9960 | | | | | | | | | | |
| Sample | Dwell | del P | Tn | Actual | Time | | Meter Readings | | Sample | del H | Stack | Meter | | Ps | Iso@ | Total | D50 | C | |
| Pt | Pt. 1 | | | | START | END | START | END | Volume | | | In | Out | | eachpt | Iso | microns | Slip | |
| 1 | 19.07 | 1.30 | | 19 : 00 | 15:48:00 | 16:07:00 | 538.52 | 545.10 | 6.58 | 0.38 | 467 | 78 | 77 | -1.30 | 110.6 | 110.6 | 2.68 | 1.128 | |
| 2 | | 1.50 | 20.49 | 20 : 30 | 16:07:00 | 16:27:30 | 545.10 | 552.23 | 7.13 | 0.38 | 470 | 80 | 78 | -1.30 | 103.3 | 107.0 | 2.67 | 1.129 | |
| 3 | | 1.40 | 19.79 | 19 : 45 | 16:27:30 | 16:47:15 | 552.23 | 559.20 | 6.97 | 0.38 | 466 | 79 | 77 | -1.30 | 108.5 | 107.5 | 2.62 | 1.128 | |
| 4 | | 1.50 | 20.49 | 20 : 30 | 16:55:00 | 17:15:30 | 559.20 | 566.33 | 7.13 | 0.38 | 466 | 79 | 77 | -1.30 | 103.3 | 106.4 | 2.67 | 1.128 | |
| 5 | | 1.50 | 20.49 | 20 : 30 | 17:15:30 | 17:36:00 | 566.33 | 573.70 | 7.37 | 0.38 | 468 | 78 | 77 | -1.30 | 107.0 | 106.5 | 2.56 | 1.128 | |
| 6 | | 1.30 | 19.07 | 19 : 0 | 17:36:00 | 17:55:00 | 573.70 | 580.20 | 6.50 | 0.38 | 468 | 75 | 74 | -1.30 | 110.0 | 107.1 | 2.70 | 1.128 | |
| 7 | | 1.50 | 20.49 | 20 : 30 | 18:05:00 | 18:25:30 | 580.20 | 587.37 | 7.17 | 0.38 | 469 | 75 | 73 | -1.30 | 104.8 | 106.8 | 2.62 | 1.128 | |
| 8 | | 1.50 | 20.49 | 20 : 30 | 18:25:30 | 18:46:00 | 587.37 | 594.45 | 7.08 | 0.38 | 469 | 75 | 73 | -1.30 | 103.5 | 106.4 | 2.66 | 1.128 | |
| 9 | | 1.50 | 20.49 | 20 : 30 | 18:46:00 | 19:06:30 | 594.45 | 601.58 | 7.13 | 0.38 | 469 | 75 | 73 | -1.30 | 104.2 | 106.1 | 2.64 | 1.128 | |
| 10 | | 1.50 | 20.49 | 20 : 30 | 19:12:00 | 19:32:30 | 601.58 | 608.70 | 7.12 | 0.38 | 469 | 73 | 71 | -1.30 | 104.5 | 106.0 | 2.63 | 1.128 | |
| 11 | | 1.60 | 21.16 | 21 : 15 | 19:32:30 | 19:53:45 | 608.70 | 616.10 | 7.40 | 0.38 | 471 | 73 | 71 | -1.30 | 101.5 | 105.6 | 2.62 | 1.129 | |
| 12 | | 1.50 | 20.49 | 20 : 30 | 19:53:45 | 20:14:15 | 616.10 | 623.12 | 7.02 | 0.38 | 470 | 74 | 71 | -1.30 | 103.0 | 105.4 | 2.68 | 1.129 | |
| | | | | 238 : 300 | | | | | 84.60 | 0.38 | 469 | 76 | 74 | -1.30 | | | | | |
| | | | | 243 : 5.0 | | | | | | | | | 75 | | | | | | |
| | | | | | | | | | | | | | | | | | | | |
| | Moisture | | | Imp 1 | 942.1 | 571.3 | 370.8 | | | | | | | | | | | | |
| | Moisture | | | Imp 2 | 612.9 | 612.7 | 0.2 | | | | | | | | | | | | |
| | Moisture | | | Imp 3 | 737.6 | 733 | 4.6 | | | | | | | | | | | | |
| | Moisture | | | Imp 4 | 928.8 | 903.9 | 24.9 | | | | | | | | | | | | |
| | LINE RINSE | | | | | 100 | | | | | | | | | | | | | |
| | | | | | 3221.4 | 2920.9 | | | | | | | | | | | | | |
| | | | | | Total | 300.5 | | | | | | | | | | | | | |

Run 3

| | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| delP@pt1: | | 1.300 | avg delP: | | 1.430 | Target sample time, min | | | 240 | Tref= | 68 | | | | | | | | |
| B.P. | 29.7 | K factor (delH @ 1 cfm) | | | 0.926 | Number of points | | | 12 | Yd= | 0.9960 | | | | | | | | |
| Sample | Dwell | del P | Tn | Actual | Time | | Meter Readings | | Sample | del H | Stack | Meter | | Ps | Iso@ | Total | D50 | C |
| Pt | Pt. 1 | | | | START | END | START | END | Volume | | | In | Out | | eachpt | Iso | microns | Slip |
| 1 | 19.07 | 1.50 | | 19 : 00 | 15:00:00 | 15:19:00 | 624.34 | 630.88 | 6.54 | 0.38 | 477 | 79 | 77 | -1.30 | 102.6 | 102.6 | 2.69 | 1.130 |
| 2 | | 1.50 | 20.49 | 20 : 30 | 15:19:00 | 15:39:30 | 630.88 | 638.10 | 7.22 | 0.38 | 473 | 82 | 79 | -1.30 | 104.3 | 103.5 | 2.64 | 1.129 |
| 3 | | 1.60 | 21.16 | 21 : 15 | 15:39:30 | 16:00:45 | 638.10 | 645.50 | 7.40 | 0.38 | 474 | 83 | 80 | -1.30 | 99.7 | 102.2 | 2.68 | 1.129 |
| 4 | | 1.50 | 20.49 | 20 : 30 | 16:08:00 | 16:28:30 | 645.50 | 652.65 | 7.15 | 0.38 | 472 | 81 | 79 | -1.30 | 103.3 | 102.5 | 2.67 | 1.129 |
| 5 | | 1.60 | 21.16 | 21 : 15 | 16:28:30 | 16:49:45 | 652.65 | 660.15 | 7.50 | 0.38 | 472 | 80 | 79 | -1.30 | 101.4 | 102.3 | 2.63 | 1.129 |
| 6 | | 1.50 | 20.49 | 20 : 30 | 16:49:45 | 17:10:15 | 660.15 | 667.23 | 7.08 | 0.38 | 470 | 78 | 76 | -1.30 | 102.8 | 102.4 | 2.69 | 1.129 |
| 7 | | 1.50 | 20.49 | 20 : 30 | 17:15:45 | 17:36:15 | 667.23 | 674.31 | 7.08 | 0.38 | 470 | 77 | 76 | -1.30 | 102.9 | 102.4 | 2.68 | 1.129 |
| 8 | | 1.50 | 20.49 | 20 : 30 | 17:36:15 | 17:56:45 | 674.31 | 681.36 | 7.05 | 0.38 | 469 | 77 | 75 | -1.30 | 102.5 | 102.4 | 2.69 | 1.129 |
| 9 | | 1.30 | 19.07 | 19 : 00 | 17:56:45 | 18:15:45 | 681.36 | 687.90 | 6.54 | 0.38 | 469 | 77 | 75 | -1.30 | 110.2 | 103.3 | 2.69 | 1.129 |
| 10 | | 1.50 | 20.49 | 20 : 30 | 18:20:00 | 18:40:30 | 687.90 | 695.10 | 7.20 | 0.38 | 469 | 76 | 75 | -1.30 | 104.8 | 103.5 | 2.63 | 1.129 |
| 11 | | 1.50 | 20.49 | 20 : 30 | 18:40:30 | 19:01:00 | 695.10 | 702.50 | 7.40 | 0.38 | 470 | 77 | 75 | -1.30 | 107.6 | 103.8 | 2.54 | 1.129 |
| 12 | | 1.50 | 20.49 | 20 : 30 | 19:01:00 | 19:21:30 | 702.50 | 709.90 | 7.40 | 0.38 | 470 | 76 | 74 | -1.30 | 107.8 | 104.2 | 2.54 | 1.129 |
| | | | | 240 270 | | | | | 85.56 | 0.38 | 471 | 79 | 77 | -1.30 | | | | |
| | | | | 245 4.5 | | | | | | | | | 78 | | | | | |
| | | | | | | | | | | | | | | | | | | |
| | Moisture | | | Imp 1 | 908.9 | 563.9 | 345.0 | | | | | | | | | | | |
| | Moisture | | | Imp 2 | 539.3 | 539.3 | 0 | | | | | | | | | | | |
| | Moisture | | | Imp 3 | 732.8 | 729.1 | 3.7 | | | | | | | | | | | |
| | Moisture | | | Imp 4 | 945.8 | 920.6 | 25.2 | | | | | | | | | | | |
| | LINE RINSE | | | | | 100 | | | | | | | | | | | | |
| | | | | | 3126.8 | 2852.9 | | | | | | | | | | | | |
| | | | | | Total | 273.9 | | | | | | | | | | | | |

| | | | |
|---|---|---|---|
| Client..... | ExxonMobil | Test No..... | 1-PM2.5 |
| Unit..... | FCC | Date..... | 6/30/2011 |
| Location..... | 2F-7 Stack | Data by..... | JP |
| CSR Pitot Coeficient, Cp | | 0.84 | Standard |
| Method 2 Pitot Coeficient, C'p | | 0.84 | Nozzles |
| Lowest Delta p from preliminary traverse: | | 1.10 | 0.136 |
| Highest delta P from preliminary traverse: | | 2.10 | 0.151 |
| Average delta P from preliminary traverse: | | 1.43 | 0.163 |
| Dn,in | 0.150 | | 0.183 |
| Vn,fps | 100.0 | | 0.215 |
| Vmin | 70.29 | | 0.300 |
| Vmax | 125.8 | | 0.400 |
| DelP min | 0.8758 | | 0.450 |
| DelP max | 2.8039 | | 0.500 |
| | | | |
| | | | |

| | | | |
|---|---|---|---|
| Client..... | ExxonMobil | Test No..... | 1-PM2.5 |
| Unit..... | FCC | Date..... | 6/30/2011 |
| Location..... | 2F-7 Stack | Data by..... | JP |
| Pre-test meter calibration: | | | |
| Meter I.D. | 19WCS | Meter coefficient (Y) | 0.996 |
| Pbar, in Hg | 29.88 | Meter T, F | |
| Run time, min | 10 | Meter Pressure, iwg | 1.0000 |
| Meter vol, ft^3 | 5.690 | cfm @ dH of 1 | 0.569 |
| RESULT: Delta H @ | 1.529 | | |
| Pre-test stack assumptions: | | | |
| Stack T, F | 472 | Pbar, in Hg | 29.85 |
| Stack P, iwg | -1.30 | Meter T, F | 85 |
| H2O, % | 14.0 | Delta H @ | 1.529 |
| O2, % dry | 5.0 | CO2, % dry | 13.5 |
| Gas Analysis Results | | | |
| CO2 Fraction, fc | 0.135 | Dry MW, lb/lb-mole | 30.36 |
| O2 Fraction, fo | 0.050 | Wet MW, lb/lb-mole | 28.63 |
| BWo, unitless | 0.140 | Absolute stack P, in Hg | 29.75 |
| Wet O2 fraction | 0.0430 | Viscosity, micropoise | 264.0 |

| Sample Flow Rate Calculations | | | |
|---|---|---|---|
| Estimated Flow Rate, Qs | | 0.40 | |
| Estimated Reynolds No. | | 1196 | |
| Cunningham Slip Correction Factor | | 1.13 | @2.25 |
| **Target D50 for Cyclone IV** | | 2.50 | |
| **Target Flow Rate, Qs** | | 0.736 | |
| Delta H Settings | | | |
| **Target delta H for Qs** | **472** | **0.375** | |
| if Ts > | 522 | 0.338 | |
| if Ts < | 422 | 0.419 | |
| | (Qm, dcfm): | 0.369 | |

| Point | del P | Stack | dP^.5 |
|---|---|---|---|
| 1 | 1.30 | 474 | 1.140 |
| 2 | 1.20 | 474 | 1.095 |
| 3 | 1.30 | 473 | 1.140 |
| 4 | 1.30 | 476 | 1.140 |
| 5 | 1.30 | 477 | 1.140 |
| 6 | 1.20 | 474 | 1.095 |
| 7 | 1.63 | 475 | 1.277 |
| 8 | 2.00 | 475 | 1.414 |
| 9 | 2.10 | 475 | 1.449 |
| 10 | 1.40 | 474 | 1.183 |
| 11 | 1.50 | 475 | 1.225 |
| 12 | 1.10 | 475 | 1.049 |
| | | | |
| min | 1.10 | | |
| max | 2.10 | | |
| avg | 1.4297 | 474.75 | 1.196 |

| | |
|---|---|
| Client/Location: | ExxonMobil |
| Unit: | 2F-7 |
| Sample Location: | Stack |

Particulate Sample Weight Summary

| TEST NO: | 1-PM2.5 | 2-PM2.5 | 3-PM2.5 |
|---|---|---|---|
| DATA BY: | AA | AA | AA |
| **Weights** | | | |
| A. >2.5 microns Acetone Wash | 0.0 | 0.2 | 0.7 |
| B. Filter | 1.3 | 0.0 | 0.0 |
| C. <2.5 microns Acetone Wash | 0.0 | 0.0 | 0.0 |
| D. Impinger Catch | 71.8 | 35.8 | 42.8 |
| D.1 Ammonium Hydroxide addition needed? | no | no | no |
| E. Organic Extraction | 2.6 | 3.2 | 1.1 |
| **Results** | | | |
| Filterable Particulate Matter >2.5 microns (A) | 0.0 | 0.2 | 0.7 |
| Filterable Particulate Matter <2.5 microns (B+C) | 1.3 | 0.0 | 0.0 |
| Condensable Particulate Matter (D+E) | 74.4 | 39.0 | 43.9 |
| Total Particulate Less than 2.5 microns (B+C+D+E) | 75.7 | 39.0 | 43.9 |
| Blank CPM Correction (FB total or 2.0 mg whichever is less) | 2.0 | 2.0 | 2.0 |
| Corrected CPM (CPM - Blank Correction) | 72.4 | 37.0 | 41.9 |
| Corrected Total Particulate <2.5 microns | 73.7 | 37.0 | 41.9 |
| Total Solid Particulate for Comparison with PM from Metals Train | 1.3 | 0.2 | 0.7 |

# PM2.5 SAMPLING DATA

CLIENT: Exxon Mobil
LOCATION: FCC / 2F-7 Stack
DATE: 6/30/11
RUN NO: FB-PM2.5
OPERATOR: JD
METER BOX NO: 19WCS
METER ΔH@: 0.554
METER Yd: 0.996
STACK AREA, FT²: /
TRAVERSE POINTS, MIN/POINT: ~20/12
ΔH= /

AMBIENT TEMPERATURE: 75
BAROMETRIC PRESSURE: 29.85
ASSUMED MOISTURE: 14
PITOT TUBE COEFF, Cp: 0.84
PROBE ID NO/MATERIAL: #27 glass
PROBE LENGTH: 6'
NOZZLE ID NO/ MATERIAL: #8 SS
NOZZLE DIAMETER: 0.150
IN STACK FILTER NO. N/A CPM FILTER NO. 683-CPM
PRE-TEST LEAK RATE: : / CFM@ / in. Hg.
POST-TEST LEAK RATE: : / CFM@ / in. Hg.
PITOT LEAK CHECK - PRE: / POST: /
CHAIN OF CUSTODY: SAMPLE CUSTODIAN JP
SAMPLER JP
SAMPLE CUSTODIAN JP

| Imp. # | Contents | Post-Test | Pre-Test | Difference |
|---|---|---|---|---|
| K.O. | Empty | 667.2 | 564.8 | 102.4 |
| Dry | Empty | 539.5 | 539.5 | 0 |
| 3 | Cold H20 | 729.2 | 729.2 | 0 |
| 4 | S.Gel | 920.6 | 920.6 | 0 |
| Total: | | LR | - 102 | -100 |

| Port | Point | ΔP in. $H_2O$ | Time Start | Time End | Meter Reading Start | Meter Reading End | ΔH in. $H_2O$ | Stack Temp, °F | Probe Temp, °F | Probe Ext Temp, °F | Meter Temp, °F In | Meter Temp, °F Out | CPM Filter. Temp, °F | Imp Exit Temp, °F | Vac. in. $H_g$ | P static in $H_2O$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | | | | |
| Average: | | | | | | | | | | | | | | | | |

Comments:

**Post Test Nitrogen Purge:**

| Time | Nitrogen L/M | CPM Filter Temp |
|---|---|---|
| 1800 | 14 | 70 |
| 1940 | 14 | 72 |

C-18-11


Delta Air Quality Services, Inc. DS1034070
Date of last revision 2/14/2011
Master Document Storage\Forms\Datasheets\Field sheets

# PM2.5 SAM NG DATA

CLIENT: Exxon Mobil
LOCATION: FCC / 2F-7 Stack
DATE: 6/30/11
RUN NO: 1-PM2.5
OPERATOR: SS
METER BOX NO: 19WCS
METER ΔH@: 0.554
METER Yd: 0.996
STACK AREA, FT²: /
TRAVERSE POINTS, MIN/POINT: ~20
ΔH= /

AMBIENT TEMPERATURE: 80°
BAROMETRIC PRESSURE: 29.85
ASSUMED MOISTURE: 14%
PITOT TUBE COEFF, Cp: .84
PROBE ID NO/MATERIAL: #27 / glass
PROBE LENGTH: 6'
NOZZLE ID NO/ MATERIAL: 8 / SS
NOZZLE DIAMETER: 0.150
~~IN~~ STACK FILTER NO. 93-1941 CPM FILTER NO. 4-83 CPM
PRE-TEST LEAK RATE: : >0.002 CFM@ 12 in. Hg.
POST-TEST LEAK RATE: : >0.002 CFM@ 12 in. Hg.
PITOT LEAK CHECK - PRE: ✓ POST: ✓
CHAIN OF CUSTODY: SAMPLE CUSTODIAN JP
SAMPLER SS
SAMPLE CUSTODIAN JP

| Imp. # | Contents | Post-Test | Pre-Test | Difference |
|---|---|---|---|---|
| K.O. | Empty | 944.8 | 562.6 | 382.2 |
| Dry | Empty | 537.6 | 537.6 | 0 |
| 3 | Cold H20 | 729.2 | 722.8 | 6.4 |
| 4 | S.Gel | 920.6 | 899.5 | 21.1 |
| Total: | CR | | -100 | -100 |
| | | | | 309.7 |

65-85° >65°

| Port | Point | ΔP in. $H_2O$ | Time Start | Time End | Meter Reading Start | Meter Reading End | ΔH in. $H_2O$ | Stack Temp, °F | Probe Temp, °F | Probe Ext Temp, °F | Meter Temp, °F In | Meter Temp, °F Out | CPM Filter. Temp, °F | Imp Exit Temp, °F | Vac. in. Hg | P static in $H_2O$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| N | 3 | 1.3 | 1016 | 103500 | 451.485 | 458.275 | .38 | 475 | 259 | 259 | 80 | 80 | 72° | 62 | 4.0 | -1.3 |
| | 2 | 1.3 | 1035 | 10540 | 458.275 | 464.890 | .38 | 475 | 260 | 260 | 85 | 80 | 72° | 60 | 4.0 | -1.3 |
| | 1 | 1.5 | 1054 | 111430 | 464.890 | 472.000 | .38 | 474 | 256 | 256 | 85 | 80 | 71 | 61 | 4.0 | -1.3 |
| | 0 | | | | 472.000 | | | | | | | | | | | |
| W | 3 | 1.3 | 112000 | 113900 | 472.00 | 478.600 | .38 | 469 | 255 | 250 | 84 | 80 | 73 | 61 | 4.0 | -1.3 |
| | 2 | 1.5 | 113900 | 115930 | 478.600 | 485.720 | .38 | 475 | 258 | 252 | 83 | 79 | 78 | 60 | 4.0 | |
| | 1 | 1.5 | 115930 | 122000 | 485.720 | 492.900 | .38 | 474 | 259 | 251 | 82 | 78 | 76 | 58 | 4.0 | |
| | 0 | | | 125230 | | | | | | | | | | | | |
| S | 3 | 1.5 | 123200 | ~~15230~~ | 492.900 | 499.990 | .38 | 475 | 258 | 254 | 79 | 76 | 76 | 62 | 4.0 | |
| | 2 | 1.5 | 125230 | 131300 | 499.990 | 507.680 | .38 | 474 | 254 | 254 | 80 | 77 | 77 | 56 | 4.0 | |
| | 1 | 1.5 | 131300 | 133330 | 507.080 | 514.245 | .38 | 471 | 258 | 255 | 79 | 76 | 73 | 55 | 3.0 | |
| | 0 | | | | | | | | | | | | | | | |
| E | 3 | 1.5 | 134200 | 140230 | 514.245 | 521.715 | .38 | 469 | 256 | 250 | 78 | 76 | 77 | 60 | 3.0 | |
| | 2 | 1.5 | 140230 | 142200 | 521.715 | 528.300 | .38 | 470 | 257 | 254 | 80 | 77 | 77 | 63 | 3.0 | |
| | 1 | 1.5 | 142300 | 144330 | 528.300 | 535.400 | .38 | 470 | 256 | 253 | 80 | 77 | 77 | 63 | 3.0 | |
| | 0 | | | | | | | | | | | | | | | |
| Average: | | | | | | | | | | | | | | | | |

Comments:

**Post Test Nitrogen Purge:**

| Time | Nitrogen L/M | CPM Filter Temp |
|---|---|---|
| 1600 | 14 | 70 |
| 1700 | 14 | 73 |

C.12-13



Delta Air Quality Services, Incorporated DS1034070
Date of last revision 2/14/2011

Master Document Storage\Forms\Datasheets\Field Datasheets

# PM2.5 SAMPLING DATA

CLIENT: Exxon Mobil
LOCATION: FCC / 2F-7 Stack
DATE: 6/30/11
RUN NO: 2-PM2.5
OPERATOR: SS
METER BOX NO: 19W15
METER ΔH@: 0.551
METER Yd: 0.996
STACK AREA, FT²: /
TRAVERSE POINTS, MIN/POINT: ~20/12
ΔH= /

AMBIENT TEMPERATURE: 85
BAROMETRIC PRESSURE: 29.85
ASSUMED MOISTURE: ~14%
PITOT TUBE COEFF, Cp: 0.84
PROBE ID NO/MATERIAL: 89 / glass
PROBE LENGTH: 6
NOZZLE ID NO/ MATERIAL: 9/SS
NOZZLE DIAMETER: 0.150
STACK FILTER NO. 83-1940 CPM FILTER NO. 5-83-CPM4
PRE-TEST LEAK RATE: : >0.002 CFM@ 12 in. Hg.
POST-TEST LEAK RATE: : 0.002 CFM@ 12 in. Hg.
PITOT LEAK CHECK - PRE: ✓ POST: ✓
CHAIN OF CUSTODY: SAMPLE CUSTODIAN SP
SAMPLER SS
SAMPLE CUSTODIAN SP

| Imp. # | Contents | Post-Test | Pre-Test | Difference |
|---|---|---|---|---|
| K.O. | Empty | 842.1 | 571.3 | 370.8 |
| Dry | Empty | 612.9 | 612.7 | 0.2 |
| 3 | Cold H20 | 737.6 | 733.0 | 4.6 |
| S.Gel | | 928.8 | 903.9 | 24.9 |
| Total: | | LR - 100 | | -100 |

300.5

| Port | Point | ΔP in. $H_2O$ | Time Start | Time End | Meter Reading Start | Meter Reading End | ΔH in. $H_2O$ | Stack Temp, °F | Probe Temp, °F | Probe Ext Temp, °F | Meter Temp, °F In | Meter Temp, °F Out | CPM Filter. Temp, °F | Imp Exit Temp, °F | Vac. in. Hg | P static in $H_2O$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| E | 3 | 1.3 | 154800 | 160700 | ~~358.200~~ 538.520 | 545.10 | .38 | 467 | 246 | 255 | 78 | 77 | 76 | 60 | 30 | -1.3 |
| | 2 | 1.5 | 160700 | 162730 | 545.100 | 552.230 | .38 | 476 | 253 | 253 | 80 | 78 | 77 | 58 | 3.0 | |
| | 1 | 1.4 | 162730 | 164715 | 552.230 | 559.200 | .38 | 466 | 246 | 250 | 79 | 77 | 74 | 61 | 3.0 | |
| N | 3 | 1.5 | 165500 | 171530 | 559.200 | 566.330 | .38 | 466 | 253 | 253 | 79 | 77 | 75 | 60 | 3.0 | |
| | 2 | 1.5 | 171530 | 173600 | 566.330 | 573.700 | .38 | 468 | 253 | 256 | 78 | 77 | 75 | 60 | 3.0 | |
| | 1 | 1.3 | 173600 | 1755 | 573.700 | 580.200 | .38 | 468 | 253 | 254 | 75 | 74 | 70 | 60 | 30 | |
| | 3 | 1.5 | 1805 | 182530 | 580.200 | 587.370 | .38 | 469 | 254 | 256 | 75 | 73 | 76 | 63 | 30 | |
| | 2 | 1.5 | 182530 | 184600 | 587.370 | 594.450 | .38 | 469 | 253 | 254 | 75 | 73 | 72 | 59 | 3.0 | |
| | 1 | 1.5 | 184600 | 190630 | 594.450 | 601.580 | .38 | 469 | 249 | 253 | 75 | 73 | 68 | 57 | 3.0 | |
| | 3 | 1.5 | 191200 | 193230 | 601.580 | 608.700 | .38 | 469 | 250 | 248 | 73 | 71 | 68 | 62 | 30 | |
| | 2 | 1.6 | 193230 | 195345 | 608.700 | 616.100 | .38 | 471 | 253 | 251 | 73 | 71 | 70 | 63 | 30 | |
| | 1 | 1.5 | 195345 | 20415 | 616.100 | 623.12 | .38 | 470 | 254 | 251 | 74 | 71 | 70 | 63 | 30 | |
| Average: | | | | | | | | | | | | | | | | |

Comments:

**Post Test Nitrogen Purge:**

| Time | Nitrogen L/M | CPM Filter Temp |
|---|---|---|
| 20:20 | 14 | 70 |
| 21:20 | 14 | 70 |

C-12-14

# PM2.5 SAMPLING DATA

CLIENT: Exxon Mobil
LOCATION: FCC / 2F-7 Stack
DATE: 7/1/11
RUN NO: 3-PM2.5
OPERATOR: SS
METER BOX NO: 19WCS
METER ΔH@: 0.554
METER Yd: 0.996
STACK AREA, FT²: ✓
TRAVERSE POINTS, MIN/POINT: 20/12
ΔH= ✓

AMBIENT TEMPERATURE: 78°
BAROMETRIC PRESSURE: 29.74
ASSUMED MOISTURE: 14%
PITOT TUBE COEFF, Cp: .84
PROBE ID NO/MATERIAL: #27 glass
PROBE LENGTH: 6'
NOZZLE ID NO/ MATERIAL: 8 glass
NOZZLE DIAMETER: 0.150
IN STACK FILTER NO. 33-1938 CPM FILTER NO. 3-33-0 PM4
PRE-TEST LEAK RATE: : <0.002 CFM@ 12 in. Hg.
POST-TEST LEAK RATE: : <0.002 CFM@ 12 in. Hg.
PITOT LEAK CHECK - PRE: ✓ POST: ✓
CHAIN OF CUSTODY: SAMPLE CUSTODIAN JP
SAMPLER SS
SAMPLE CUSTODIAN SP

| Imp. # | Contents | Post-Test | Pre-Test | Difference |
|---|---|---|---|---|
| K.O. | Empty | 908.9 | 563.9 | 345.0 |
| Dry | Empty | 539.3 | 539.3 | 0 |
| 3 | Cold H20 | 732.8 | 729.1 | 3.7 |
| 4 | S.Gel | 945.8 | 920.6 | 25.2 |
| Total: | | CR | -100 | -100 |

273.9

| Port | Point | ΔP in. $H_2O$ | Time Start | Time End | Meter Reading Start | Meter Reading End | ΔH in. $H_2O$ | Stack Temp, °F | Probe Temp, °F | Probe Ext Temp, °F | Meter Temp, °F In | Meter Temp, °F Out | CPM Filter. Temp, °F | Imp Exit Temp, °F | Vac. in. $H_g$ | P static in $H_2O$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 3 | 1.5 | 150000 | 151900 | 624.340 | 630.880 | .38 | 477 | 259 | 252 | 79 | 77 | 72 | 65 | 20 | 7.3 |
| | 2 | 1.5 | 151900 | 153930 | 630.880 | 638.100 | .38 | 473 | 257 | 250 | 82 | 79 | 73 | 63 | 20 | |
| | 1 | 1.6 | 153930 | 160045 | 638.100 | 645.500 | .38 | 474 | 256 | 246 | 83 | 80 | 73 | 63 | 20 | |
| | 0 | 1. | | | ~~645.500~~ | | | | | | | | | | | |
| | 3 | 1.5 | 160800 | 162830 | 645.500 | 652.650 | .38 | 472 | 256 | 253 | 81 | 79 | 73 | 65 | 20 | |
| | 2 | 1.6 | 162830 | 164945 | 652.650 | 660.150 | .38 | 472 | 255 | 254 | 80 | 79 | 73 | 60 | 20 | |
| | 1 | 1.5 | 164945 | 171015 | 660.150 | 667.230 | .38 | 470 | 255 | 254 | 78 | 76 | 71 | 61 | 2.0 | |
| | 0 | | | | | | | | | | | | | | | |
| | 3 | 1.5 | 171545 | 173615 | 667.230 | 674.310 | .38 | 470 | 252 | 251 | 77 | 76 | 73 | 65 | 20 | |
| | 2 | 1.5 | 173615 | 175645 | 674.310 | 681.360 | .38 | 469 | 254 | 251 | 77 | 75 | 75 | 62 | 2.0 | |
| | 1 | 1.3 | 175645 | 181545 | 681.360 | 687.900 | .38 | 469 | 253 | 251 | 77 | 75 | 76 | 63 | 2.0 | |
| | 0 | | | | | | | | | | | | | | | |
| | 3 | 1.5 | 182000 | 184030 | 687.900 | 695.100 | .38 | 469 | 255 | 254 | 76 | 75 | 72 | 63 | 20 | |
| | 2 | 1.5 | 184030 | 190100 | 695.100 | 702.500 | .38 | 470 | 256 | 255 | 77 | 75 | 72 | 63 | 20 | |
| | 1 | 1.5 | 190100 | 192130 | 702.500 | 709.900 | .38 | 470 | 256 | 253 | 76 | 74 | 70 | 60 | 20 | |
| | 0 | | | | | | | | | | | | | | | |
| Average: | | | | | | | | | | | | | | | | |

Comments:

**Post Test Nitrogen Purge:**

| Time | Nitrogen L/M | CPM Filter Temp |
|---|---|---|
| | | |
| | | |
| | | |

7-12-15



Delta Air Quality Services, Incorporated DS1034070
Date of last revision 2/14/2011

Master Document Storage\Forms\Datasheets\Field Datasheets

Delta

# PARTICLE SIZE, $PM_{2.5}$
# EPA METHOD 201A/202

Project # ICR / FCC
Client/Location
Sample Location 2E-7 Stack
Test # 1-PM 2.5

Field Reagent Blanks
DI $H_2O$ Blank mg/ml 0.0013
Hexane Blank mg/ml 0.0000
Acetone Blank mg/ml 0.0002
Acetone, lab rinse 0.0027

Sample Date 6/30/11
Data Analysis Date 7/6/11
Analyst Signature AM

| Item | Number | Final Weight (g) | Tare Weight (g) | Gain Weight (mg) | Blank Correction (mg) | Aliquot Correction (ml/ml) | Net Gain (mg/Sample) |
|---|---|---|---|---|---|---|---|
| 1. >2.5 microns Acetone Wash | 9778 | 29.8551 | 29.8550 | 0.1 | 0.1 | 33/33 | 0.0 |
| 2. Filter (<2.5 microns) | 83-1941 | 0.3747 | 0.3734 | 1.3 | ---------- | ---------- | 1.3 |
| 3. <2.5 microns Acetone Wash | 9779 | 29.7675 | 29.7675 | 0.0 | 0.3 | 95/95 | 0.0 |
| 4.Line Rinse / Impinger: a) Water Fraction | 9784 | 30.1637 | 30.1278 | 35.9 | N/A | 425/213 | 71.8 |
| b) Organic Fraction TV = 510 Hex/Acet field rinse 420 ml + Hexane lab 3 x 30 ml | 9785 | 29.2793 | 29.2767 | 2.6 | N/A | ~~510~~ 425/~~510~~ 425 | 2.6 |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |

Primary (Total) PM (1 + 2 + 3 + 4a + 4b)= 75.7 mg
Filterable PM < 2.5 µm (2 + 3)= 1.3 mg
Condensable PM (4a + 4b)= 74.4 mg
Field Train Recovery Blank (≤ 2.0 mg)= 2.0 mg
Condensable PM (Field Blank Corrected)= 72.4 mg
Primary PM <2.5 µm (2 + 3 + FB corrected CPM)= 73.7 mg

| Method of Sample Prep/Notes |
|---|
| |
| |
| |
| |
| |

Delta

# PARTICLE SIZE, $PM_{2.5}$
# EPA METHOD 201A/202

Project # ICR
Client/Location FCC
Sample Location 2F-7 Stack
Test # 2-PM 2.5

Field Reagent Blanks
DI $H_2O$ Blank mg/ml 0.0013
Hexane Blank mg/ml 0.0000
Acetone Blank mg/ml 0.0002
Acetone lab mg/L 0.0027

Sample Date 6/30/2011
Data Analysis Date 7/6/2011
Analyst Signature AY

| Item | Number | Final Weight (g) | Tare Weight (g) | Gain Weight (mg) | Blank Correction (mg) | Aliquot Correction (ml/ml) | Net Gain (mg/Sample) |
|---|---|---|---|---|---|---|---|
| 1. >2.5 microns Acetone Wash | 9780 | 27.9051 | 27.9048 | 0.3 | 0.1 | 55/55 | 0.2 |
| 2. Filter (<2.5 microns) | 83-1940 | 0.3226 | 0.3249 | 0.0 | ---------- | ---------- | 0.0 |
| 3. <2.5 microns Acetone Wash | 9781 | 29.4164 | 29.4161 | 0.3 | 0.4 | 148/148 | 0.0 |
| 4.Line Rinse / Impinger: a) Water Fraction | 9786 | 28.7027 | 28.6847 | 17.9 | N/A | 450/225 | 35.8 |
| b) Organic Fraction TV = 660 Hex/Acet field rinse 570 ml + Hexane lab 3 x 30 ml | 9787 | 28.2451 | 28.2449 | 3.2 | N/A | 660/660 450/450 | 3.2 |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |

Primary (Total) PM (1 + 2 + 3 + 4a + 4b)= 39.2 mg
Filterable PM < 2.5 µm (2 + 3)= 0.0 mg
Condensable PM (4a + 4b)= 39.0 mg
Field Train Recovery Blank (≤ 2.0 mg)= 2.0 mg
Condensable PM (Field Blank Corrected)= 37.0 mg
Primary PM <2.5 µm (2 + 3 + FB corrected CPM)= 37.0 mg

| Method of Sample Prep/Notes |
|---|
| |
| |
| |
| |
| |

Delta

# PARTICLE SIZE, $PM_{2.5}$
# EPA METHOD 201A/202

Project # ICR
Client/Location FCC
Sample Location 2F-7 Stack
Test # 3-PM 2.5

Field Reagent Blanks
DI $H_2O$ Blank mg/ml 0.0015
Hexane Blank mg/ml 0.0000
Acetone Blank mg/ml 0.0007
Acetone lab mg/L 0.0027

Sample Date 7/1/2011
Data Analysis Date 9/6/2011
Analyst Signature AM

| Item | Number | Final Weight (g) | Tare Weight (g) | Gain Weight (mg) | Blank Correction (mg) | Aliquot Correction (ml/ml) | Net Gain (mg/Sample) |
|---|---|---|---|---|---|---|---|
| 1. >2.5 microns Acetone Wash | 9782 | ~~29.4994~~ | 29.4985 | 0.9 | 0.2 | 76/76 | 0.7 |
| 2. Filter (<2.5 microns) | 83-1938 | 0.3732 | 0.3735 | 0.0 | ---------- | ---------- | 0.0 |
| 3. <2.5 microns Acetone Wash | 9783 | ~~29.9756~~ | ~~29.9755~~ 7 | 0.1 | 0.1 | 39/39 | 0.0 |
| 4.Line Rinse / Impinger: a) Water Fraction | 9788 | ~~29.7730~~ | 29.7516 | 21.4 | N/A | 425/213 | 42.8 |
| b) Organic Fraction TV = 580 Hex/Acet field rinse 490 ml + Hexane lab 3 x 30 ml | 9789 | ~~29.0596~~ | 29.0585 | 1.1 | N/A | ~~580~~ 425 / ~~580~~ 425 | 1.1 |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |

Primary (Total) PM (1 + 2 + 3 + 4a + 4b)= 44.6 mg
Filterable PM < 2.5 µm (2 + 3)= 0.0 mg
Condensable PM (4a + 4b)= 43.9 mg
Field Train Recovery Blank (≤ 2.0 mg)= 2.0 mg
Condensable PM (Field Blank Corrected)= 41.9 mg
Primary PM <2.5 µm (2 + 3 + FB corrected CPM)= 41.9 mg

| Method of Sample Prep/Notes |
|---|
| |
| |
| |
| |
| |

Delta

# PARTICLE SIZE, $PM_{2.5}$
# EPA METHOD 202
# FIELD TRAIN BLANK

Project # ICR
Client/Location FCC
Sample Location 2F - 7 Stack
Test # FB-PM 2.5

Field Reagent Blanks
Water Blank mg/ml
Hexane Blank mg/ml
Acetone Blank mg/ml

Sample Date 6/30/11
Data Analysis Date 7/7/11
Analyst Signature AY

| Item | Number | Final Weight (g) | Tare Weight (g) | Gain Weight (mg) | Aliquot Correction (ml/ml) | Net Gain (mg/Sample) |
|---|---|---|---|---|---|---|
| 4.Impinger Liquid: a) Water Fraction | 9790 | 296903 | 296899 | 0.4 | 310/155 | 0.8 |
| b) Organic Fraction TV = 330 Hex/Acet field rinse 240 ml + Hexane lab 3 x 30 ml | 9791 | 29.7304 | 29.7287 | 1.7 | ~~330~~ 310/~~330~~ 310 | 1.7 |
| | | | | | | |
| | | | | | | |
| | | | | | | |

Field Train Recovery Blank Mass (4a + 4b)= 2.5 mg

Note: Field Blank is used for blank correction on the sample condensable particulate mass. The blank correction is the field train recovery blank or 2.0 mg, whichever is less.

| Method of Sample Prep/Notes |
|---|
| |
| |
| |
| |

Delta

# PARTICLE SIZE, $PM_{2.5}$
# EPA METHOD 201A/202
# REAGENT BLANK

Client/Location: ICR / FCC
Sample Location: 2F-7 Stack
Test #: Blank-Fld / Blank-lab

Sample Date: 6/30/2011
Data Analysis Date: 7/6/2011
Analyst Initials: AM

| Item | Number | Final Weight (g) | Tare Weight (g) | Gain Weight (mg) | Aliquot | Blank mg/ml |
|---|---|---|---|---|---|---|
| Reagent Blank DI $H_2O$ LOT # Lab #1 | 9767 | 29.9031 | 29.9032 | 0.0 | 150/150 | 0.0000 |
| Reagent Blank Hexane LOT # 091080 | 9768 | 29.6952 | 29.4950 | 0.2 | 150/150 | 0.0013 |
| Reagent Blank Acetone LOT # 111508 | 9769 | 29.9059 | 29.9055 | 0.4 | 150/150 | 0.0027 |
| Field Acetone Blank LOT# 111508 | 9770 | 28.9856 | 28.9855 | 0.1 | 150/150 | 0.0007 |
| Field DI $H_2O$ Blank LOT # Lab #7 | 9771 | 29.5964 | 29.5962 | 0.2 | 150/150 | 0.0013 |
| Field Hexane Blank LOT # 091080 | 9772 | 30.0405 | 30.0405 | 0.0 | 150/150 | 0.0000 |

**Notes:**

**ExxonMobil**
**STACK $O_2$, $CO_2$ DATA**

**Test #:** **1-PM2.5**
**Date:** **6/30/2011**
**Time:** **1016/1444**

| | $O_2$ | $CO_2$ |
|---|---|---|
| Range | 10 | 20 |
| Cal Gas | 5.00 | 10.16 |
| Analyzer Zero | 0.09 | 0.00 |
| Analyzer Span | 5.04 | 9.94 |
| Pre-Bias Zero | 0.08 | 0.00 |
| Pre-Bias Span | 4.99 | 10.00 |
| Post-Bias Zero | 0.10 | 0.01 |
| Post-Bias Span | 4.94 | 9.90 |
| Pre-test zero bias | -0.1% | 0.0% |
| Pre-test span bias | -0.6% | 0.3% |
| Post-test zero bias | 0.1% | 0.1% |
| Post-test span bias | -1.0% | -0.2% |
| Zero Drift | 0.2% | 0.0% |
| Span Drift | -0.5% | -0.5% |
| | PASS | PASS |
| **Average** | **4.99** | **13.66** |
| **Cal Corrected** | **5.03** | **13.94** |

**ExxonMobil**
**1-PM2.5**

| Date | Time | O2 % | CO2 % |
|---|---|---|---|
| 6/30/2011 | 10:40:00 AM | 5.045 | 13.832 |
| 6/30/2011 | 10:41:00 AM | 5.157 | 13.777 |
| 6/30/2011 | 10:42:00 AM | 5.182 | 13.755 |
| 6/30/2011 | 10:43:00 AM | 5.16 | 13.772 |
| 6/30/2011 | 10:44:00 AM | 5.138 | 13.866 |
| 6/30/2011 | 10:45:00 AM | 5.267 | 14.234 |
| 6/30/2011 | 10:46:00 AM | 5.151 | 13.856 |
| 6/30/2011 | 10:47:00 AM | 5.124 | 13.67 |
| 6/30/2011 | 10:48:00 AM | 5.109 | 13.671 |
| 6/30/2011 | 10:49:00 AM | 5.081 | 13.7 |
| 6/30/2011 | 10:50:00 AM | 5.069 | 13.697 |
| 6/30/2011 | 10:51:00 AM | 5.058 | 13.709 |
| 6/30/2011 | 10:52:00 AM | 5.002 | 13.748 |
| 6/30/2011 | 10:53:00 AM | 5.042 | 13.723 |
| 6/30/2011 | 10:54:00 AM | 5.032 | 13.743 |
| 6/30/2011 | 10:55:00 AM | 5.04 | 13.847 |
| 6/30/2011 | 10:56:00 AM | 5.101 | 13.788 |
| 6/30/2011 | 10:57:00 AM | 5.148 | 13.715 |
| 6/30/2011 | 10:58:00 AM | 5.17 | 13.717 |
| 6/30/2011 | 10:59:00 AM | 5.199 | 13.668 |
| 6/30/2011 | 11:00:00 AM | 5.16 | 13.683 |
| 6/30/2011 | 11:01:00 AM | 5.132 | 13.716 |
| 6/30/2011 | 11:02:00 AM | 5.008 | 13.715 |
| 6/30/2011 | 11:03:00 AM | 5.032 | 13.698 |
| 6/30/2011 | 11:04:00 AM | 5.082 | 13.648 |
| 6/30/2011 | 11:05:00 AM | 5.068 | 13.669 |
| 6/30/2011 | 11:06:00 AM | 5.048 | 13.679 |
| 6/30/2011 | 11:07:00 AM | 5.02 | 13.701 |
| 6/30/2011 | 11:08:00 AM | 5.071 | 13.647 |
| 6/30/2011 | 11:09:00 AM | 5.06 | 13.659 |
| 6/30/2011 | 11:10:00 AM | 5.121 | 13.593 |
| 6/30/2011 | 11:11:00 AM | 5.113 | 13.602 |
| 6/30/2011 | 11:12:00 AM | 5.067 | 13.632 |
| 6/30/2011 | 11:13:00 AM | 5.058 | 13.648 |
| 6/30/2011 | 11:14:00 AM | 5.079 | 13.621 |
| 6/30/2011 | 11:15:00 AM | 5.047 | 13.651 |
| 6/30/2011 | 11:21:00 AM | 4.983 | 13.738 |
| 6/30/2011 | 11:22:00 AM | 5.021 | 13.713 |
| 6/30/2011 | 11:23:00 AM | 5.035 | 13.683 |
| 6/30/2011 | 11:24:00 AM | 4.994 | 13.729 |
| 6/30/2011 | 11:25:00 AM | 4.966 | 13.759 |
| 6/30/2011 | 11:26:00 AM | 5.029 | 13.7 |
| 6/30/2011 | 11:27:00 AM | 5.046 | 13.686 |
| 6/30/2011 | 11:28:00 AM | 5.036 | 13.707 |
| 6/30/2011 | 11:29:00 AM | 5.065 | 13.676 |
| 6/30/2011 | 11:30:00 AM | 5.053 | 13.673 |
| 6/30/2011 | 11:31:00 AM | 5.061 | 13.687 |

| | | | |
|---|---|---|---|
| 6/30/2011 | 11:32:00 AM | 5.125 | 13.618 |
| 6/30/2011 | 11:33:00 AM | 5.13 | 13.613 |
| 6/30/2011 | 11:34:00 AM | 5.105 | 13.633 |
| 6/30/2011 | 11:35:00 AM | 5.106 | 13.646 |
| 6/30/2011 | 11:36:00 AM | 5.092 | 13.654 |
| 6/30/2011 | 11:37:00 AM | 5.112 | 13.645 |
| 6/30/2011 | 11:38:00 AM | 5.092 | 13.655 |
| 6/30/2011 | 11:39:00 AM | 5.096 | 13.64 |
| 6/30/2011 | 11:40:00 AM | 5.056 | 13.681 |
| 6/30/2011 | 11:41:00 AM | 5.042 | 13.698 |
| 6/30/2011 | 11:42:00 AM | 5.041 | 13.697 |
| 6/30/2011 | 11:43:00 AM | 5.074 | 13.664 |
| 6/30/2011 | 11:44:00 AM | 5.102 | 13.641 |
| 6/30/2011 | 11:45:00 AM | 5.007 | 13.727 |
| 6/30/2011 | 11:46:00 AM | 5.023 | 13.725 |
| 6/30/2011 | 11:47:00 AM | 5.023 | 13.698 |
| 6/30/2011 | 11:48:00 AM | 5.05 | 13.683 |
| 6/30/2011 | 11:49:00 AM | 4.984 | 13.75 |
| 6/30/2011 | 11:50:00 AM | 5.015 | 13.732 |
| 6/30/2011 | 11:51:00 AM | 5.03 | 13.708 |
| 6/30/2011 | 11:52:00 AM | 4.981 | 13.757 |
| 6/30/2011 | 11:53:00 AM | 5.004 | 13.735 |
| 6/30/2011 | 11:54:00 AM | 5.004 | 13.74 |
| 6/30/2011 | 11:55:00 AM | 4.988 | 13.742 |
| 6/30/2011 | 11:56:00 AM | 4.954 | 13.765 |
| 6/30/2011 | 11:57:00 AM | 4.958 | 13.765 |
| 6/30/2011 | 11:58:00 AM | 5.002 | 13.752 |
| 6/30/2011 | 11:59:00 AM | 5.011 | 13.735 |
| 6/30/2011 | 12:00:00 PM | 5.019 | 13.714 |
| 6/30/2011 | 12:01:00 PM | 5.022 | 13.724 |
| 6/30/2011 | 12:02:00 PM | 5.043 | 13.703 |
| 6/30/2011 | 12:03:00 PM | 5.057 | 13.685 |
| 6/30/2011 | 12:04:00 PM | 5.053 | 13.688 |
| 6/30/2011 | 12:05:00 PM | 5.02 | 13.712 |
| 6/30/2011 | 12:06:00 PM | 5.027 | 13.709 |
| 6/30/2011 | 12:07:00 PM | 5.081 | 13.716 |
| 6/30/2011 | 12:08:00 PM | 5.044 | 13.79 |
| 6/30/2011 | 12:09:00 PM | 4.982 | 13.815 |
| 6/30/2011 | 12:10:00 PM | 5.005 | 13.788 |
| 6/30/2011 | 12:11:00 PM | 5.035 | 13.782 |
| 6/30/2011 | 12:12:00 PM | 5.022 | 13.782 |
| 6/30/2011 | 12:13:00 PM | 4.983 | 13.8 |
| 6/30/2011 | 12:14:00 PM | 5.016 | 13.772 |
| 6/30/2011 | 12:15:00 PM | 4.967 | 13.793 |
| 6/30/2011 | 12:16:00 PM | 4.973 | 13.79 |
| 6/30/2011 | 12:17:00 PM | 4.996 | 13.774 |
| 6/30/2011 | 12:18:00 PM | 5.069 | 13.696 |
| 6/30/2011 | 12:19:00 PM | 3.652 | 8.898 |
| 6/30/2011 | 12:20:00 PM | 0.104 | 0.034 |
| 6/30/2011 | 12:39:00 PM | 4.889 | 13.825 |
| 6/30/2011 | 12:40:00 PM | 4.915 | 13.805 |
| 6/30/2011 | 12:41:00 PM | 4.939 | 13.802 |

| | | | |
|---|---|---|---|
| 6/30/2011 | 12:42:00 PM | 4.977 | 13.771 |
| 6/30/2011 | 12:43:00 PM | 5 | 13.736 |
| 6/30/2011 | 12:44:00 PM | 4.979 | 13.759 |
| 6/30/2011 | 12:45:00 PM | 5.016 | 13.727 |
| 6/30/2011 | 12:46:00 PM | 4.989 | 13.757 |
| 6/30/2011 | 12:47:00 PM | 4.996 | 13.751 |
| 6/30/2011 | 12:48:00 PM | 4.99 | 13.751 |
| 6/30/2011 | 12:49:00 PM | 4.994 | 13.743 |
| 6/30/2011 | 12:50:00 PM | 5 | 13.739 |
| 6/30/2011 | 12:51:00 PM | 5.019 | 13.736 |
| 6/30/2011 | 12:52:00 PM | 5.018 | 13.74 |
| 6/30/2011 | 12:53:00 PM | 5.022 | 13.728 |
| 6/30/2011 | 12:54:00 PM | 4.988 | 13.763 |
| 6/30/2011 | 12:55:00 PM | 4.996 | 13.759 |
| 6/30/2011 | 12:56:00 PM | 4.999 | 13.753 |
| 6/30/2011 | 12:57:00 PM | 5.011 | 13.734 |
| 6/30/2011 | 12:58:00 PM | 5.001 | 13.734 |
| 6/30/2011 | 12:59:00 PM | 4.952 | 13.79 |
| 6/30/2011 | 1:00:00 PM | 4.98 | 13.765 |
| 6/30/2011 | 1:01:00 PM | 5.052 | 13.706 |
| 6/30/2011 | 1:02:00 PM | 5.054 | 13.702 |
| 6/30/2011 | 1:03:00 PM | 5.033 | 13.729 |
| 6/30/2011 | 1:04:00 PM | 5.025 | 13.728 |
| 6/30/2011 | 1:05:00 PM | 5.002 | 13.749 |
| 6/30/2011 | 1:06:00 PM | 5.037 | 13.729 |
| 6/30/2011 | 1:07:00 PM | 5.045 | 13.727 |
| 6/30/2011 | 1:08:00 PM | 5.045 | 13.724 |
| 6/30/2011 | 1:09:00 PM | 5.021 | 13.739 |
| 6/30/2011 | 1:10:00 PM | 4.997 | 13.77 |
| 6/30/2011 | 1:11:00 PM | 4.966 | 13.775 |
| 6/30/2011 | 1:12:00 PM | 4.995 | 13.766 |
| 6/30/2011 | 1:13:00 PM | 5.037 | 13.727 |
| 6/30/2011 | 1:14:00 PM | 5.059 | 13.701 |
| 6/30/2011 | 1:15:00 PM | 5.078 | 13.692 |
| 6/30/2011 | 1:16:00 PM | 5.088 | 13.667 |
| 6/30/2011 | 1:17:00 PM | 5.058 | 13.696 |
| 6/30/2011 | 1:18:00 PM | 5.031 | 13.732 |
| 6/30/2011 | 1:19:00 PM | 5.055 | 13.707 |
| 6/30/2011 | 1:20:00 PM | 5.038 | 13.694 |
| 6/30/2011 | 1:21:00 PM | 4.995 | 13.749 |
| 6/30/2011 | 1:22:00 PM | 4.955 | 13.791 |
| 6/30/2011 | 1:23:00 PM | 4.991 | 13.765 |
| 6/30/2011 | 1:24:00 PM | 4.985 | 13.78 |
| 6/30/2011 | 1:25:00 PM | 5.004 | 13.761 |
| 6/30/2011 | 1:26:00 PM | 4.981 | 13.785 |
| 6/30/2011 | 1:27:00 PM | 5.017 | 13.744 |
| 6/30/2011 | 1:28:00 PM | 5 | 13.762 |
| 6/30/2011 | 1:29:00 PM | 5.049 | 13.727 |
| 6/30/2011 | 1:30:00 PM | 5.05 | 13.713 |
| 6/30/2011 | 1:31:00 PM | 5.024 | 13.745 |
| 6/30/2011 | 1:32:00 PM | 5.066 | 13.704 |
| 6/30/2011 | 1:33:00 PM | 5.041 | 13.726 |

| | | | |
|---|---|---|---|
| 6/30/2011 | 1:34:00 PM | 5.023 | 13.744 |
| 6/30/2011 | 1:43:00 PM | 4.917 | 13.83 |
| 6/30/2011 | 1:44:00 PM | 4.885 | 13.871 |
| 6/30/2011 | 1:45:00 PM | 4.955 | 13.814 |
| 6/30/2011 | 1:46:00 PM | 4.989 | 13.777 |
| 6/30/2011 | 1:47:00 PM | 5.006 | 13.759 |
| 6/30/2011 | 1:48:00 PM | 5.026 | 13.762 |
| 6/30/2011 | 1:49:00 PM | 5.05 | 13.726 |
| 6/30/2011 | 1:50:00 PM | 5.014 | 13.759 |
| 6/30/2011 | 1:51:00 PM | 5.025 | 13.749 |
| 6/30/2011 | 1:52:00 PM | 5.03 | 13.744 |
| 6/30/2011 | 1:53:00 PM | 4.988 | 13.775 |
| 6/30/2011 | 1:54:00 PM | 5.018 | 13.734 |
| 6/30/2011 | 1:55:00 PM | 4.965 | 13.796 |
| 6/30/2011 | 1:56:00 PM | 4.964 | 13.776 |
| 6/30/2011 | 1:57:00 PM | 4.985 | 13.794 |
| 6/30/2011 | 1:58:00 PM | 5.011 | 13.749 |
| 6/30/2011 | 1:59:00 PM | 4.945 | 13.825 |
| 6/30/2011 | 2:00:00 PM | 4.945 | 13.822 |
| 6/30/2011 | 2:01:00 PM | 4.998 | 13.745 |
| 6/30/2011 | 2:02:00 PM | 4.984 | 13.773 |
| 6/30/2011 | 2:03:00 PM | 5.014 | 13.746 |
| 6/30/2011 | 2:04:00 PM | 4.971 | 13.786 |
| 6/30/2011 | 2:05:00 PM | 4.922 | 13.826 |
| 6/30/2011 | 2:06:00 PM | 4.916 | 13.834 |
| 6/30/2011 | 2:07:00 PM | 4.982 | 13.782 |
| 6/30/2011 | 2:08:00 PM | 5.031 | 13.726 |
| 6/30/2011 | 2:09:00 PM | 4.98 | 13.772 |
| 6/30/2011 | 2:10:00 PM | 4.998 | 13.757 |
| 6/30/2011 | 2:11:00 PM | 4.973 | 13.788 |
| 6/30/2011 | 2:12:00 PM | 4.919 | 13.829 |
| 6/30/2011 | 2:13:00 PM | 4.938 | 13.796 |
| 6/30/2011 | 2:14:00 PM | 4.979 | 13.772 |
| 6/30/2011 | 2:15:00 PM | 4.986 | 13.75 |
| 6/30/2011 | 2:16:00 PM | 5.002 | 13.728 |
| 6/30/2011 | 2:17:00 PM | 4.866 | 13.861 |
| 6/30/2011 | 2:18:00 PM | 4.872 | 13.861 |
| 6/30/2011 | 2:19:00 PM | 4.978 | 13.761 |
| 6/30/2011 | 2:20:00 PM | 5.038 | 13.701 |
| 6/30/2011 | 2:21:00 PM | 5.061 | 13.68 |
| 6/30/2011 | 2:22:00 PM | 5.022 | 13.721 |
| 6/30/2011 | 2:23:00 PM | 4.98 | 13.75 |
| 6/30/2011 | 2:24:00 PM | 4.872 | 13.844 |
| 6/30/2011 | 2:25:00 PM | 4.898 | 13.83 |
| 6/30/2011 | 2:26:00 PM | 4.935 | 13.787 |
| 6/30/2011 | 2:27:00 PM | 4.977 | 13.765 |
| 6/30/2011 | 2:28:00 PM | 4.987 | 13.761 |
| 6/30/2011 | 2:29:00 PM | 4.958 | 13.778 |
| 6/30/2011 | 2:30:00 PM | 4.942 | 13.792 |
| 6/30/2011 | 2:31:00 PM | 4.984 | 13.752 |
| 6/30/2011 | 2:32:00 PM | 4.964 | 13.753 |
| 6/30/2011 | 2:33:00 PM | 4.966 | 13.766 |

| | | | |
|---|---|---|---|
| 6/30/2011 | 2:34:00 PM | 4.945 | 13.772 |
| 6/30/2011 | 2:35:00 PM | 4.93 | 13.795 |
| 6/30/2011 | 2:36:00 PM | 4.926 | 13.803 |
| 6/30/2011 | 2:37:00 PM | 4.977 | 13.766 |
| 6/30/2011 | 2:38:00 PM | 5.003 | 13.744 |
| 6/30/2011 | 2:39:00 PM | 4.991 | 13.742 |
| 6/30/2011 | 2:40:00 PM | 4.968 | 13.773 |
| 6/30/2011 | 2:41:00 PM | 4.951 | 13.785 |
| 6/30/2011 | 2:42:00 PM | 4.974 | 13.755 |
| 6/30/2011 | 2:43:00 PM | 4.962 | 13.792 |
| 6/30/2011 | 2:44:00 PM | 4.987 | 13.768 |
| | Average | 4.99 | 13.66 |

**ExxonMobil**
**STACK $O_2$, $CO_2$ DATA**

**Test #:** **2-PM2.5**
**Date:** **6/30/2011**
**Time:** **1548/2015**

| | $O_2$ | $CO_2$ |
|---|---|---|
| Range | 10 | 20 |
| Cal Gas | 5.00 | 10.16 |
| Analyzer Zero | 0.09 | 0.00 |
| Analyzer Span | 5.04 | 9.94 |
| Pre-Bias Zero | 0.10 | 0.01 |
| Pre-Bias Span | 4.94 | 9.90 |
| Post-Bias Zero | 0.17 | 0.00 |
| Post-Bias Span | 4.99 | 9.81 |
| Pre-test zero bias | 0.1% | 0.1% |
| Pre-test span bias | -1.0% | -0.2% |
| Post-test zero bias | 0.8% | 0.0% |
| Post-test span bias | -0.5% | -0.7% |
| Zero Drift | 0.7% | 0.0% |
| Span Drift | 0.5% | -0.5% |
| | PASS | PASS |
| **Average** | **5.03** | **13.65** |
| **Cal Corrected** | **5.06** | **14.08** |

**ExxonMobil**
**2-PM2.5**

| Date | Time | O2 % | CO2 % |
|---|---|---|---|
| 6/30/2011 | 3:49:00 PM | 4.904 | 13.768 |
| 6/30/2011 | 3:50:00 PM | 4.895 | 13.771 |
| 6/30/2011 | 3:51:00 PM | 4.912 | 13.728 |
| 6/30/2011 | 3:52:00 PM | 4.909 | 13.743 |
| 6/30/2011 | 3:53:00 PM | 4.928 | 13.739 |
| 6/30/2011 | 3:54:00 PM | 4.932 | 13.726 |
| 6/30/2011 | 3:55:00 PM | 4.938 | 13.729 |
| 6/30/2011 | 3:56:00 PM | 4.885 | 13.78 |
| 6/30/2011 | 3:57:00 PM | 4.909 | 13.75 |
| 6/30/2011 | 3:58:00 PM | 4.951 | 13.722 |
| 6/30/2011 | 3:59:00 PM | 5.034 | 13.641 |
| 6/30/2011 | 4:00:00 PM | 4.991 | 13.68 |
| 6/30/2011 | 4:01:00 PM | 4.967 | 13.708 |
| 6/30/2011 | 4:02:00 PM | 4.967 | 13.721 |
| 6/30/2011 | 4:03:00 PM | 4.956 | 13.722 |
| 6/30/2011 | 4:04:00 PM | 4.924 | 13.752 |
| 6/30/2011 | 4:05:00 PM | 4.895 | 13.78 |
| 6/30/2011 | 4:06:00 PM | 4.923 | 13.763 |
| 6/30/2011 | 4:07:00 PM | 4.899 | 13.768 |
| 6/30/2011 | 4:08:00 PM | 4.893 | 13.8 |
| 6/30/2011 | 4:09:00 PM | 4.986 | 13.716 |
| 6/30/2011 | 4:10:00 PM | 5.005 | 13.683 |
| 6/30/2011 | 4:11:00 PM | 5.012 | 13.67 |
| 6/30/2011 | 4:12:00 PM | 5.004 | 13.686 |
| 6/30/2011 | 4:13:00 PM | 4.991 | 13.692 |
| 6/30/2011 | 4:14:00 PM | 4.92 | 13.766 |
| 6/30/2011 | 4:15:00 PM | 4.949 | 13.744 |
| 6/30/2011 | 4:16:00 PM | 4.963 | 13.727 |
| 6/30/2011 | 4:17:00 PM | 4.992 | 13.705 |
| 6/30/2011 | 4:18:00 PM | 5.027 | 13.669 |
| 6/30/2011 | 4:19:00 PM | 5.084 | 13.615 |
| 6/30/2011 | 4:20:00 PM | 5.025 | 13.66 |
| 6/30/2011 | 4:21:00 PM | 5.047 | 13.654 |
| 6/30/2011 | 4:22:00 PM | 5.033 | 13.645 |
| 6/30/2011 | 4:23:00 PM | 4.98 | 13.693 |
| 6/30/2011 | 4:24:00 PM | 4.956 | 13.727 |
| 6/30/2011 | 4:25:00 PM | 4.969 | 13.721 |
| 6/30/2011 | 4:26:00 PM | 4.964 | 13.717 |
| 6/30/2011 | 4:27:00 PM | 4.985 | 13.704 |
| 6/30/2011 | 4:28:00 PM | 4.964 | 13.711 |
| 6/30/2011 | 4:29:00 PM | 4.984 | 13.7 |
| 6/30/2011 | 4:30:00 PM | 4.956 | 13.728 |
| 6/30/2011 | 4:31:00 PM | 4.979 | 13.724 |
| 6/30/2011 | 4:32:00 PM | 4.969 | 13.719 |
| 6/30/2011 | 4:33:00 PM | 4.985 | 13.715 |
| 6/30/2011 | 4:34:00 PM | 5.005 | 13.684 |
| 6/30/2011 | 4:35:00 PM | 5.04 | 13.656 |

| | | | |
|---|---|---|---|
| 6/30/2011 | 4:36:00 PM | 5.014 | 13.68 |
| 6/30/2011 | 4:37:00 PM | 5.025 | 13.673 |
| 6/30/2011 | 4:38:00 PM | 4.991 | 13.703 |
| 6/30/2011 | 4:39:00 PM | 4.977 | 13.714 |
| 6/30/2011 | 4:40:00 PM | 5.013 | 13.687 |
| 6/30/2011 | 4:41:00 PM | 5.052 | 13.647 |
| 6/30/2011 | 4:42:00 PM | 5.038 | 13.65 |
| 6/30/2011 | 4:43:00 PM | 5.018 | 13.653 |
| 6/30/2011 | 4:44:00 PM | 4.969 | 13.703 |
| 6/30/2011 | 4:45:00 PM | 5.006 | 13.665 |
| 6/30/2011 | 4:46:00 PM | 4.979 | 13.69 |
| 6/30/2011 | 4:47:00 PM | 4.982 | 13.705 |
| 6/30/2011 | 4:48:00 PM | 5.015 | 13.68 |
| 6/30/2011 | 4:56:00 PM | 4.932 | 13.757 |
| 6/30/2011 | 4:57:00 PM | 5.018 | 13.668 |
| 6/30/2011 | 4:58:00 PM | 5.043 | 13.644 |
| 6/30/2011 | 4:59:00 PM | 5.053 | 13.629 |
| 6/30/2011 | 5:00:00 PM | 5.021 | 13.664 |
| 6/30/2011 | 5:01:00 PM | 4.991 | 13.679 |
| 6/30/2011 | 5:02:00 PM | 4.932 | 13.747 |
| 6/30/2011 | 5:03:00 PM | 4.971 | 13.708 |
| 6/30/2011 | 5:04:00 PM | 4.965 | 13.729 |
| 6/30/2011 | 5:05:00 PM | 5.011 | 13.68 |
| 6/30/2011 | 5:06:00 PM | 4.996 | 13.692 |
| 6/30/2011 | 5:07:00 PM | 5.04 | 13.652 |
| 6/30/2011 | 5:08:00 PM | 4.966 | 13.696 |
| 6/30/2011 | 5:09:00 PM | 4.989 | 13.7 |
| 6/30/2011 | 5:10:00 PM | 5.061 | 13.636 |
| 6/30/2011 | 5:11:00 PM | 5.062 | 13.622 |
| 6/30/2011 | 5:12:00 PM | 5.036 | 13.647 |
| 6/30/2011 | 5:13:00 PM | 4.986 | 13.695 |
| 6/30/2011 | 5:14:00 PM | 4.947 | 13.738 |
| 6/30/2011 | 5:15:00 PM | 4.98 | 13.705 |
| 6/30/2011 | 5:16:00 PM | 4.99 | 13.679 |
| 6/30/2011 | 5:17:00 PM | 5.044 | 13.644 |
| 6/30/2011 | 5:18:00 PM | 5.021 | 13.666 |
| 6/30/2011 | 5:19:00 PM | 5.047 | 13.64 |
| 6/30/2011 | 5:20:00 PM | 4.97 | 13.724 |
| 6/30/2011 | 5:21:00 PM | 4.989 | 13.694 |
| 6/30/2011 | 5:22:00 PM | 5.044 | 13.645 |
| 6/30/2011 | 5:23:00 PM | 5.05 | 13.636 |
| 6/30/2011 | 5:24:00 PM | 5.057 | 13.634 |
| 6/30/2011 | 5:25:00 PM | 5.041 | 13.633 |
| 6/30/2011 | 5:26:00 PM | 4.932 | 13.749 |
| 6/30/2011 | 5:27:00 PM | 4.962 | 13.729 |
| 6/30/2011 | 5:28:00 PM | 5.01 | 13.678 |
| 6/30/2011 | 5:29:00 PM | 5.021 | 13.665 |
| 6/30/2011 | 5:30:00 PM | 4.998 | 13.682 |
| 6/30/2011 | 5:31:00 PM | 5.067 | 13.617 |
| 6/30/2011 | 5:32:00 PM | 5.031 | 13.642 |
| 6/30/2011 | 5:33:00 PM | 5.056 | 13.615 |
| 6/30/2011 | 5:34:00 PM | 5.042 | 13.62 |

| | | | |
|---|---|---|---|
| 6/30/2011 | 5:35:00 PM | 5.055 | 13.617 |
| 6/30/2011 | 5:36:00 PM | 5.089 | 13.584 |
| 6/30/2011 | 5:37:00 PM | 5.046 | 13.622 |
| 6/30/2011 | 5:38:00 PM | 5.028 | 13.637 |
| 6/30/2011 | 5:39:00 PM | 5.002 | 13.661 |
| 6/30/2011 | 5:40:00 PM | 4.998 | 13.649 |
| 6/30/2011 | 5:41:00 PM | 4.969 | 13.678 |
| 6/30/2011 | 5:42:00 PM | 4.981 | 13.684 |
| 6/30/2011 | 5:43:00 PM | 4.966 | 13.697 |
| 6/30/2011 | 5:44:00 PM | 5 | 13.665 |
| 6/30/2011 | 5:45:00 PM | 5.005 | 13.652 |
| 6/30/2011 | 5:46:00 PM | 5.014 | 13.662 |
| 6/30/2011 | 5:47:00 PM | 4.991 | 13.668 |
| 6/30/2011 | 5:48:00 PM | 5.011 | 13.662 |
| 6/30/2011 | 5:49:00 PM | 5.042 | 13.631 |
| 6/30/2011 | 5:50:00 PM | 5.014 | 13.657 |
| 6/30/2011 | 5:51:00 PM | 5.024 | 13.657 |
| 6/30/2011 | 5:52:00 PM | 5.038 | 13.634 |
| 6/30/2011 | 5:53:00 PM | 5.08 | 13.598 |
| 6/30/2011 | 5:54:00 PM | 5.031 | 13.631 |
| 6/30/2011 | 5:55:00 PM | 5 | 13.67 |
| 6/30/2011 | 6:20:00 PM | 4.955 | 13.678 |
| 6/30/2011 | 6:21:00 PM | 4.986 | 13.654 |
| 6/30/2011 | 6:22:00 PM | 5.016 | 13.617 |
| 6/30/2011 | 6:23:00 PM | 4.992 | 13.633 |
| 6/30/2011 | 6:24:00 PM | 4.98 | 13.645 |
| 6/30/2011 | 6:25:00 PM | 5.007 | 13.639 |
| 6/30/2011 | 6:26:00 PM | 4.998 | 13.65 |
| 6/30/2011 | 6:27:00 PM | 4.994 | 13.634 |
| 6/30/2011 | 6:28:00 PM | 5.002 | 13.641 |
| 6/30/2011 | 6:29:00 PM | 5.005 | 13.632 |
| 6/30/2011 | 6:30:00 PM | 5.03 | 13.615 |
| 6/30/2011 | 6:31:00 PM | 5.039 | 13.604 |
| 6/30/2011 | 6:32:00 PM | 5.071 | 13.592 |
| 6/30/2011 | 6:33:00 PM | 5.066 | 13.575 |
| 6/30/2011 | 6:34:00 PM | 5.076 | 13.582 |
| 6/30/2011 | 6:35:00 PM | 5.079 | 13.577 |
| 6/30/2011 | 6:36:00 PM | 4.979 | 13.661 |
| 6/30/2011 | 6:37:00 PM | 5.015 | 13.652 |
| 6/30/2011 | 6:38:00 PM | 4.985 | 13.672 |
| 6/30/2011 | 6:39:00 PM | 4.966 | 13.684 |
| 6/30/2011 | 6:40:00 PM | 4.988 | 13.672 |
| 6/30/2011 | 6:41:00 PM | 4.954 | 13.694 |
| 6/30/2011 | 6:42:00 PM | 4.986 | 13.662 |
| 6/30/2011 | 6:43:00 PM | 4.971 | 13.702 |
| 6/30/2011 | 6:44:00 PM | 4.931 | 13.741 |
| 6/30/2011 | 6:45:00 PM | 4.974 | 13.689 |
| 6/30/2011 | 6:46:00 PM | 4.989 | 13.677 |
| 6/30/2011 | 6:47:00 PM | 4.976 | 13.682 |
| 6/30/2011 | 6:48:00 PM | 5.002 | 13.663 |
| 6/30/2011 | 6:49:00 PM | 4.986 | 13.683 |
| 6/30/2011 | 6:50:00 PM | 4.977 | 13.702 |

| | | | |
|---|---|---|---|
| 6/30/2011 | 6:51:00 PM | 5.007 | 13.674 |
| 6/30/2011 | 6:52:00 PM | 5.016 | 13.659 |
| 6/30/2011 | 6:53:00 PM | 5.009 | 13.67 |
| 6/30/2011 | 6:54:00 PM | 4.993 | 13.69 |
| 6/30/2011 | 6:55:00 PM | 4.956 | 13.728 |
| 6/30/2011 | 6:56:00 PM | 4.943 | 13.748 |
| 6/30/2011 | 6:57:00 PM | 5.002 | 13.692 |
| 6/30/2011 | 6:58:00 PM | 5.07 | 13.62 |
| 6/30/2011 | 6:59:00 PM | 5.111 | 13.589 |
| 6/30/2011 | 7:00:00 PM | 5.095 | 13.603 |
| 6/30/2011 | 7:01:00 PM | 5.136 | 13.561 |
| 6/30/2011 | 7:02:00 PM | 5.051 | 13.653 |
| 6/30/2011 | 7:03:00 PM | 5.057 | 13.646 |
| 6/30/2011 | 7:04:00 PM | 5.089 | 13.615 |
| 6/30/2011 | 7:05:00 PM | 5.085 | 13.609 |
| 6/30/2011 | 7:06:00 PM | 5.046 | 13.647 |
| 6/30/2011 | 7:07:00 PM | 5.03 | 13.667 |
| 6/30/2011 | 7:13:00 PM | 5.1 | 13.61 |
| 6/30/2011 | 7:14:00 PM | 5.053 | 13.645 |
| 6/30/2011 | 7:15:00 PM | 5.074 | 13.612 |
| 6/30/2011 | 7:16:00 PM | 5.104 | 13.589 |
| 6/30/2011 | 7:17:00 PM | 5.079 | 13.612 |
| 6/30/2011 | 7:18:00 PM | 5.091 | 13.606 |
| 6/30/2011 | 7:19:00 PM | 5.046 | 13.654 |
| 6/30/2011 | 7:20:00 PM | 5.054 | 13.658 |
| 6/30/2011 | 7:21:00 PM | 5.09 | 13.623 |
| 6/30/2011 | 7:22:00 PM | 5.115 | 13.591 |
| 6/30/2011 | 7:23:00 PM | 5.117 | 13.578 |
| 6/30/2011 | 7:24:00 PM | 5.129 | 13.572 |
| 6/30/2011 | 7:25:00 PM | 5.15 | 13.538 |
| 6/30/2011 | 7:26:00 PM | 5.108 | 13.573 |
| 6/30/2011 | 7:27:00 PM | 5.097 | 13.585 |
| 6/30/2011 | 7:28:00 PM | 5.131 | 13.537 |
| 6/30/2011 | 7:29:00 PM | 5.09 | 13.585 |
| 6/30/2011 | 7:30:00 PM | 5.103 | 13.582 |
| 6/30/2011 | 7:31:00 PM | 5.108 | 13.564 |
| 6/30/2011 | 7:32:00 PM | 5.031 | 13.645 |
| 6/30/2011 | 7:33:00 PM | 5.07 | 13.613 |
| 6/30/2011 | 7:34:00 PM | 5.105 | 13.578 |
| 6/30/2011 | 7:35:00 PM | 5.109 | 13.565 |
| 6/30/2011 | 7:36:00 PM | 5.109 | 13.575 |
| 6/30/2011 | 7:37:00 PM | 5.149 | 13.539 |
| 6/30/2011 | 7:38:00 PM | 5.11 | 13.564 |
| 6/30/2011 | 7:39:00 PM | 5.121 | 13.553 |
| 6/30/2011 | 7:40:00 PM | 5.146 | 13.521 |
| 6/30/2011 | 7:41:00 PM | 5.134 | 13.538 |
| 6/30/2011 | 7:42:00 PM | 5.101 | 13.562 |
| 6/30/2011 | 7:43:00 PM | 5.066 | 13.598 |
| 6/30/2011 | 7:44:00 PM | 5.017 | 13.64 |
| 6/30/2011 | 7:45:00 PM | 5.074 | 13.588 |
| 6/30/2011 | 7:46:00 PM | 5.062 | 13.606 |
| 6/30/2011 | 7:47:00 PM | 5.077 | 13.579 |

| | | | |
|---|---|---|---|
| 6/30/2011 | 7:48:00 PM | 5.094 | 13.563 |
| 6/30/2011 | 7:49:00 PM | 5.097 | 13.561 |
| 6/30/2011 | 7:50:00 PM | 5.096 | 13.594 |
| 6/30/2011 | 7:51:00 PM | 5.096 | 13.581 |
| 6/30/2011 | 7:52:00 PM | 5.132 | 13.54 |
| 6/30/2011 | 7:53:00 PM | 5.166 | 13.51 |
| 6/30/2011 | 7:54:00 PM | 5.141 | 13.515 |
| 6/30/2011 | 7:55:00 PM | 5.159 | 13.511 |
| 6/30/2011 | 7:56:00 PM | 5.057 | 13.609 |
| 6/30/2011 | 7:57:00 PM | 5.097 | 13.559 |
| 6/30/2011 | 7:58:00 PM | 5.125 | 13.532 |
| 6/30/2011 | 7:59:00 PM | 5.134 | 13.52 |
| 6/30/2011 | 8:00:00 PM | 5.102 | 13.54 |
| 6/30/2011 | 8:01:00 PM | 5.035 | 13.606 |
| 6/30/2011 | 8:02:00 PM | 5.006 | 13.637 |
| 6/30/2011 | 8:03:00 PM | 5.031 | 13.614 |
| 6/30/2011 | 8:04:00 PM | 5.007 | 13.644 |
| 6/30/2011 | 8:05:00 PM | 5.015 | 13.633 |
| 6/30/2011 | 8:06:00 PM | 4.997 | 13.64 |
| 6/30/2011 | 8:07:00 PM | 5.038 | 13.627 |
| 6/30/2011 | 8:08:00 PM | 5.054 | 13.613 |
| 6/30/2011 | 8:09:00 PM | 5.095 | 13.578 |
| 6/30/2011 | 8:10:00 PM | 5.112 | 13.559 |
| 6/30/2011 | 8:11:00 PM | 5.134 | 13.531 |
| 6/30/2011 | 8:12:00 PM | 5.143 | 13.525 |
| 6/30/2011 | 8:13:00 PM | 5.135 | 13.54 |
| 6/30/2011 | 8:14:00 PM | 5.159 | 13.507 |
| 6/30/2011 | 8:15:00 PM | 5.153 | 13.526 |
| | Average | 5.03 | 13.65 |

**ExxonMobil**
**STACK $O_2$, $CO_2$ DATA**

**Test #:** **3-PM2.5**
**Date:** **7/1/2011**
**Time:** **1500/1922**

| | $O_2$ | $CO_2$ |
|---|---|---|
| Range | 10 | 20 |
| Cal Gas | 5.00 | 10.16 |
| Analyzer Zero | 0.06 | -0.01 |
| Analyzer Span | 5.15 | 9.98 |
| Pre-Bias Zero | 0.20 | 0.01 |
| Pre-Bias Span | 4.90 | 9.87 |
| Post-Bias Zero | 0.22 | 0.00 |
| Post-Bias Span | 5.02 | 9.90 |
| Pre-test zero bias | 1.3% | 0.1% |
| Pre-test span bias | -2.5% | -0.6% |
| Post-test zero bias | 1.6% | 0.1% |
| Post-test span bias | -1.3% | -0.4% |
| Zero Drift | 0.3% | 0.0% |
| Span Drift | 1.2% | 0.2% |
| | PASS | PASS |
| **Average** | **4.87** | **13.92** |
| **Cal Corrected** | **4.90** | **14.31** |

**ExxonMobil**
**3-PM2.5**

| Date | Time | O2 % | CO2 % |
|---|---|---|---|
| 7/1/2011 | 3:01:00 PM | 4.824 | 13.884 |
| 7/1/2011 | 3:02:00 PM | 4.779 | 13.902 |
| 7/1/2011 | 3:03:00 PM | 4.813 | 13.874 |
| 7/1/2011 | 3:04:00 PM | 4.831 | 13.857 |
| 7/1/2011 | 3:05:00 PM | 4.853 | 13.855 |
| 7/1/2011 | 3:06:00 PM | 4.854 | 13.849 |
| 7/1/2011 | 3:07:00 PM | 4.806 | 13.912 |
| 7/1/2011 | 3:08:00 PM | 4.8 | 13.909 |
| 7/1/2011 | 3:09:00 PM | 4.808 | 13.905 |
| 7/1/2011 | 3:10:00 PM | 4.783 | 13.938 |
| 7/1/2011 | 3:11:00 PM | 4.866 | 13.849 |
| 7/1/2011 | 3:12:00 PM | 4.888 | 13.818 |
| 7/1/2011 | 3:13:00 PM | 4.848 | 13.852 |
| 7/1/2011 | 3:14:00 PM | 4.821 | 13.891 |
| 7/1/2011 | 3:15:00 PM | 4.876 | 13.798 |
| 7/1/2011 | 3:16:00 PM | 4.866 | 13.807 |
| 7/1/2011 | 3:17:00 PM | 4.908 | 13.778 |
| 7/1/2011 | 3:18:00 PM | 4.911 | 13.767 |
| 7/1/2011 | 3:19:00 PM | 4.897 | 13.772 |
| 7/1/2011 | 3:20:00 PM | 4.874 | 13.794 |
| 7/1/2011 | 3:21:00 PM | 4.85 | 13.826 |
| 7/1/2011 | 3:22:00 PM | 4.854 | 13.822 |
| 7/1/2011 | 3:23:00 PM | 4.842 | 13.821 |
| 7/1/2011 | 3:24:00 PM | 4.849 | 13.82 |
| 7/1/2011 | 3:25:00 PM | 4.784 | 13.891 |
| 7/1/2011 | 3:26:00 PM | 4.754 | 13.924 |
| 7/1/2011 | 3:27:00 PM | 4.779 | 13.881 |
| 7/1/2011 | 3:28:00 PM | 4.797 | 13.889 |
| 7/1/2011 | 3:29:00 PM | 4.835 | 13.852 |
| 7/1/2011 | 3:30:00 PM | 4.841 | 13.853 |
| 7/1/2011 | 3:31:00 PM | 4.837 | 13.859 |
| 7/1/2011 | 3:32:00 PM | 4.832 | 13.864 |
| 7/1/2011 | 3:33:00 PM | 4.833 | 13.867 |
| 7/1/2011 | 3:34:00 PM | 4.884 | 13.821 |
| 7/1/2011 | 3:35:00 PM | 4.893 | 13.813 |
| 7/1/2011 | 3:36:00 PM | 4.861 | 13.852 |
| 7/1/2011 | 3:37:00 PM | 4.816 | 13.912 |
| 7/1/2011 | 3:38:00 PM | 4.845 | 13.861 |
| 7/1/2011 | 3:39:00 PM | 4.897 | 13.798 |
| 7/1/2011 | 3:40:00 PM | 4.903 | 13.794 |
| 7/1/2011 | 3:41:00 PM | 4.893 | 13.811 |
| 7/1/2011 | 3:42:00 PM | 4.928 | 13.779 |
| 7/1/2011 | 3:43:00 PM | 4.913 | 13.798 |
| 7/1/2011 | 3:44:00 PM | 4.88 | 13.805 |
| 7/1/2011 | 3:45:00 PM | 4.855 | 13.844 |
| 7/1/2011 | 3:46:00 PM | 4.843 | 13.847 |
| 7/1/2011 | 3:47:00 PM | 4.797 | 13.88 |

| | | | |
|---|---|---|---|
| 7/1/2011 | 3:48:00 PM | 4.825 | 13.857 |
| 7/1/2011 | 3:49:00 PM | 4.739 | 13.954 |
| 7/1/2011 | 3:50:00 PM | 4.707 | 13.98 |
| 7/1/2011 | 3:51:00 PM | 4.799 | 13.909 |
| 7/1/2011 | 3:52:00 PM | 4.854 | 13.842 |
| 7/1/2011 | 3:53:00 PM | 4.853 | 13.857 |
| 7/1/2011 | 3:54:00 PM | 4.872 | 13.846 |
| 7/1/2011 | 3:55:00 PM | 4.883 | 13.816 |
| 7/1/2011 | 3:56:00 PM | 4.911 | 13.789 |
| 7/1/2011 | 3:57:00 PM | 4.929 | 13.776 |
| 7/1/2011 | 3:58:00 PM | 4.904 | 13.79 |
| 7/1/2011 | 3:59:00 PM | 4.886 | 13.811 |
| 7/1/2011 | 4:00:00 PM | 4.892 | 13.802 |
| 7/1/2011 | 4:01:00 PM | 4.888 | 13.822 |
| 7/1/2011 | 4:09:00 PM | 4.898 | 13.809 |
| 7/1/2011 | 4:10:00 PM | 4.89 | 13.79 |
| 7/1/2011 | 4:11:00 PM | 4.934 | 13.766 |
| 7/1/2011 | 4:12:00 PM | 4.942 | 13.771 |
| 7/1/2011 | 4:13:00 PM | 4.937 | 13.774 |
| 7/1/2011 | 4:14:00 PM | 4.905 | 13.804 |
| 7/1/2011 | 4:15:00 PM | 4.892 | 13.81 |
| 7/1/2011 | 4:16:00 PM | 4.909 | 13.785 |
| 7/1/2011 | 4:17:00 PM | 4.904 | 13.804 |
| 7/1/2011 | 4:18:00 PM | 4.861 | 13.863 |
| 7/1/2011 | 4:19:00 PM | 4.892 | 13.824 |
| 7/1/2011 | 4:20:00 PM | 4.884 | 13.832 |
| 7/1/2011 | 4:21:00 PM | 4.86 | 13.845 |
| 7/1/2011 | 4:22:00 PM | 4.919 | 13.795 |
| 7/1/2011 | 4:23:00 PM | 4.911 | 13.803 |
| 7/1/2011 | 4:24:00 PM | 4.936 | 13.795 |
| 7/1/2011 | 4:25:00 PM | 4.9 | 13.818 |
| 7/1/2011 | 4:26:00 PM | 4.851 | 13.88 |
| 7/1/2011 | 4:27:00 PM | 4.915 | 13.801 |
| 7/1/2011 | 4:28:00 PM | 4.908 | 13.822 |
| 7/1/2011 | 4:29:00 PM | 4.913 | 13.823 |
| 7/1/2011 | 4:30:00 PM | 4.971 | 13.79 |
| 7/1/2011 | 4:31:00 PM | 4.981 | 13.754 |
| 7/1/2011 | 4:32:00 PM | 4.961 | 13.789 |
| 7/1/2011 | 4:33:00 PM | 4.932 | 13.806 |
| 7/1/2011 | 4:34:00 PM | 4.929 | 13.81 |
| 7/1/2011 | 4:35:00 PM | 4.92 | 13.811 |
| 7/1/2011 | 4:36:00 PM | 4.939 | 13.809 |
| 7/1/2011 | 4:37:00 PM | 4.888 | 13.855 |
| 7/1/2011 | 4:38:00 PM | 4.807 | 13.945 |
| 7/1/2011 | 4:39:00 PM | 4.894 | 13.833 |
| 7/1/2011 | 4:40:00 PM | 4.888 | 13.845 |
| 7/1/2011 | 4:41:00 PM | 4.927 | 13.822 |
| 7/1/2011 | 4:42:00 PM | 4.915 | 13.833 |
| 7/1/2011 | 4:43:00 PM | 4.932 | 13.808 |
| 7/1/2011 | 4:44:00 PM | 4.929 | 13.809 |
| 7/1/2011 | 4:45:00 PM | 4.927 | 13.8 |
| 7/1/2011 | 4:46:00 PM | 4.869 | 13.891 |

| | | | |
|---|---|---|---|
| 7/1/2011 | 4:47:00 PM | 4.866 | 13.868 |
| 7/1/2011 | 4:48:00 PM | 4.887 | 13.849 |
| 7/1/2011 | 4:49:00 PM | 4.819 | 13.931 |
| 7/1/2011 | 4:50:00 PM | 4.822 | 13.952 |
| 7/1/2011 | 4:51:00 PM | 4.887 | 13.866 |
| 7/1/2011 | 4:52:00 PM | 4.907 | 13.861 |
| 7/1/2011 | 4:53:00 PM | 4.914 | 13.847 |
| 7/1/2011 | 4:54:00 PM | 4.931 | 13.84 |
| 7/1/2011 | 4:55:00 PM | 4.96 | 13.812 |
| 7/1/2011 | 4:56:00 PM | 4.873 | 13.888 |
| 7/1/2011 | 4:57:00 PM | 4.882 | 13.877 |
| 7/1/2011 | 4:58:00 PM | 4.943 | 13.796 |
| 7/1/2011 | 4:59:00 PM | 4.857 | 13.879 |
| 7/1/2011 | 5:00:00 PM | 4.848 | 13.899 |
| 7/1/2011 | 5:01:00 PM | 4.875 | 13.886 |
| 7/1/2011 | 5:02:00 PM | 4.882 | 13.871 |
| 7/1/2011 | 5:03:00 PM | 4.873 | 13.884 |
| 7/1/2011 | 5:04:00 PM | 4.859 | 13.883 |
| 7/1/2011 | 5:05:00 PM | 4.838 | 13.918 |
| 7/1/2011 | 5:06:00 PM | 4.852 | 13.914 |
| 7/1/2011 | 5:07:00 PM | 4.814 | 13.951 |
| 7/1/2011 | 5:08:00 PM | 4.772 | 13.965 |
| 7/1/2011 | 5:09:00 PM | 4.795 | 13.963 |
| 7/1/2011 | 5:10:00 PM | 4.775 | 13.983 |
| 7/1/2011 | 5:11:00 PM | 4.797 | 13.966 |
| 7/1/2011 | 5:16:00 PM | 4.846 | 13.951 |
| 7/1/2011 | 5:17:00 PM | 4.845 | 13.951 |
| 7/1/2011 | 5:18:00 PM | 4.812 | 14.003 |
| 7/1/2011 | 5:19:00 PM | 4.799 | 14.029 |
| 7/1/2011 | 5:20:00 PM | 4.771 | 14.049 |
| 7/1/2011 | 5:42:00 PM | 4.958 | 14.262 |
| 7/1/2011 | 5:43:00 PM | 4.932 | 14.259 |
| 7/1/2011 | 5:44:00 PM | 5.031 | 14.513 |
| 7/1/2011 | 5:45:00 PM | 5.3 | 15.576 |
| 7/1/2011 | 5:46:00 PM | 5.363 | 15.697 |
| 7/1/2011 | 5:47:00 PM | 4.856 | 14.098 |
| 7/1/2011 | 5:48:00 PM | 4.885 | 14.067 |
| 7/1/2011 | 5:49:00 PM | 4.877 | 14.088 |
| 7/1/2011 | 5:50:00 PM | 4.852 | 14.111 |
| 7/1/2011 | 5:51:00 PM | 4.917 | 14.033 |
| 7/1/2011 | 5:52:00 PM | 4.893 | 14.066 |
| 7/1/2011 | 5:53:00 PM | 4.897 | 14.047 |
| 7/1/2011 | 5:54:00 PM | 4.888 | 14.073 |
| 7/1/2011 | 5:55:00 PM | 4.842 | 14.107 |
| 7/1/2011 | 5:56:00 PM | 4.82 | 14.124 |
| 7/1/2011 | 5:57:00 PM | 4.85 | 14.086 |
| 7/1/2011 | 5:58:00 PM | 4.87 | 14.073 |
| 7/1/2011 | 5:59:00 PM | 4.892 | 14.157 |
| 7/1/2011 | 6:00:00 PM | 4.891 | 14.219 |
| 7/1/2011 | 6:01:00 PM | 4.872 | 14.236 |
| 7/1/2011 | 6:02:00 PM | 4.853 | 14.248 |
| 7/1/2011 | 6:03:00 PM | 4.857 | 14.259 |

| | | | |
|---|---|---|---|
| 7/1/2011 | 6:04:00 PM | 4.914 | 14.223 |
| 7/1/2011 | 6:05:00 PM | 4.902 | 14.251 |
| 7/1/2011 | 6:06:00 PM | 4.878 | 14.29 |
| 7/1/2011 | 6:07:00 PM | 4.883 | 14.3 |
| 7/1/2011 | 6:08:00 PM | 4.901 | 14.293 |
| 7/1/2011 | 6:09:00 PM | 4.907 | 14.332 |
| 7/1/2011 | 6:10:00 PM | 4.976 | 14.343 |
| 7/1/2011 | 6:11:00 PM | 4.998 | 14.356 |
| 7/1/2011 | 6:12:00 PM | 5.038 | 14.315 |
| 7/1/2011 | 6:13:00 PM | 5.011 | 14.415 |
| 7/1/2011 | 6:14:00 PM | 4.961 | 14.443 |
| 7/1/2011 | 6:15:00 PM | 4.797 | 13.887 |
| 7/1/2011 | 6:16:00 PM | 4.832 | 13.866 |
| 7/1/2011 | 6:21:00 PM | 4.859 | 13.837 |
| 7/1/2011 | 6:22:00 PM | 4.875 | 13.792 |
| 7/1/2011 | 6:23:00 PM | 4.851 | 13.836 |
| 7/1/2011 | 6:24:00 PM | 4.846 | 13.818 |
| 7/1/2011 | 6:25:00 PM | 4.861 | 13.821 |
| 7/1/2011 | 6:26:00 PM | 4.758 | 13.912 |
| 7/1/2011 | 6:27:00 PM | 4.822 | 13.859 |
| 7/1/2011 | 6:28:00 PM | 4.864 | 13.807 |
| 7/1/2011 | 6:29:00 PM | 4.842 | 13.823 |
| 7/1/2011 | 6:30:00 PM | 4.801 | 13.875 |
| 7/1/2011 | 6:31:00 PM | 4.822 | 13.861 |
| 7/1/2011 | 6:32:00 PM | 4.819 | 13.857 |
| 7/1/2011 | 6:33:00 PM | 4.827 | 13.842 |
| 7/1/2011 | 6:34:00 PM | 4.812 | 13.869 |
| 7/1/2011 | 6:35:00 PM | 4.862 | 13.87 |
| 7/1/2011 | 6:36:00 PM | 4.865 | 13.871 |
| 7/1/2011 | 6:37:00 PM | 4.852 | 13.922 |
| 7/1/2011 | 6:38:00 PM | 4.791 | 13.962 |
| 7/1/2011 | 6:39:00 PM | 4.872 | 13.905 |
| 7/1/2011 | 6:40:00 PM | 4.904 | 13.88 |
| 7/1/2011 | 6:41:00 PM | 4.887 | 13.91 |
| 7/1/2011 | 6:42:00 PM | 4.834 | 13.964 |
| 7/1/2011 | 6:43:00 PM | 4.8 | 14.047 |
| 7/1/2011 | 6:44:00 PM | 4.787 | 14.06 |
| 7/1/2011 | 6:45:00 PM | 4.84 | 14.042 |
| 7/1/2011 | 6:46:00 PM | 4.744 | 13.929 |
| 7/1/2011 | 6:47:00 PM | 4.738 | 13.881 |
| 7/1/2011 | 6:48:00 PM | 4.822 | 13.803 |
| 7/1/2011 | 6:49:00 PM | 4.836 | 13.786 |
| 7/1/2011 | 6:50:00 PM | 4.802 | 13.824 |
| 7/1/2011 | 6:51:00 PM | 4.835 | 13.784 |
| 7/1/2011 | 6:52:00 PM | 4.884 | 13.737 |
| 7/1/2011 | 6:53:00 PM | 4.873 | 13.751 |
| 7/1/2011 | 6:54:00 PM | 4.835 | 13.799 |
| 7/1/2011 | 6:55:00 PM | 4.835 | 13.787 |
| 7/1/2011 | 6:56:00 PM | 4.843 | 13.789 |
| 7/1/2011 | 6:57:00 PM | 4.875 | 13.759 |
| 7/1/2011 | 6:58:00 PM | 4.884 | 13.742 |
| 7/1/2011 | 6:59:00 PM | 4.859 | 13.774 |

| | | | |
|---|---|---|---|
| 7/1/2011 | 7:00:00 PM | 4.833 | 13.798 |
| 7/1/2011 | 7:01:00 PM | 4.863 | 13.768 |
| 7/1/2011 | 7:02:00 PM | 4.813 | 13.804 |
| 7/1/2011 | 7:03:00 PM | 4.823 | 13.804 |
| 7/1/2011 | 7:04:00 PM | 4.8 | 13.821 |
| 7/1/2011 | 7:05:00 PM | 4.84 | 13.824 |
| 7/1/2011 | 7:06:00 PM | 4.841 | 13.81 |
| 7/1/2011 | 7:07:00 PM | 4.849 | 13.793 |
| 7/1/2011 | 7:08:00 PM | 4.86 | 13.785 |
| 7/1/2011 | 7:09:00 PM | 4.789 | 13.858 |
| 7/1/2011 | 7:10:00 PM | 4.808 | 13.828 |
| 7/1/2011 | 7:11:00 PM | 4.78 | 13.866 |
| 7/1/2011 | 7:12:00 PM | 4.771 | 13.874 |
| 7/1/2011 | 7:13:00 PM | 4.749 | 13.9 |
| 7/1/2011 | 7:14:00 PM | 4.717 | 13.925 |
| 7/1/2011 | 7:15:00 PM | 4.787 | 13.852 |
| 7/1/2011 | 7:16:00 PM | 4.83 | 13.833 |
| 7/1/2011 | 7:17:00 PM | 4.868 | 13.806 |
| 7/1/2011 | 7:18:00 PM | 4.976 | 13.775 |
| 7/1/2011 | 7:19:00 PM | 4.971 | 13.803 |
| 7/1/2011 | 7:20:00 PM | 4.974 | 13.806 |
| 7/1/2011 | 7:21:00 PM | 4.988 | 13.789 |
| 7/1/2011 | 7:22:00 PM | 5.019 | 13.772 |
| | Average | 4.87 | 13.92 |

C.13-2

| | | | | | |
|---|---|---|---|---|---|
| Client | **ExxonMobil** | Parameter | | | **NH3** |
| Location | **FCC Stack** | Fuel | | | **N. Gas** |
| Unit | **2F-7** | Data By | | | **A. Aleshaiker** |
| Test Number | 1A-NH3 | 1-NH3 | 2-NH3 | 3-NH3 | |
| Reference Temperature, F | 68 | 68 | 68 | 68 | |
| Test Date | 6/30/2011 | 6/30/2011 | 7/1/2011 | 7/1/2011 | |
| Test Method | SCAQMD 207.1 | SCAQMD 207.1 | SCAQMD 207.1 | SCAQMD 207.1 | |
| Sample Train | 17-WCS | 17-WCS | 17-WCS | 17-WCS | |
| Meter Calibration Factor | 1.004 | 1.004 | 1.004 | 1.004 | |
| Sample Time (Min) | 60 | 60 | 60 | 60 | |
| Barometric Pressure (in Hg) | 29.85 | 29.85 | 29.74 | 29.74 | |
| Start/Stop Time | 1342/1442 | 1912/2012 | 1510/1610 | 1635/1735 | |
| Meter Volume (acf) | 42.624 | 41.591 | 38.100 | 40.320 | |
| Meter Temperature (F) | 76.4 | 67.4 | 89.8 | 90.5 | |
| Meter Pressure (iwg) | 1.5 | 1.5 | 1.5 | 1.5 | |
| Liquid Volume (ml) | 147.8 | 143.0 | 131.8 | 141.9 | |
| Stack O2 (%) | 5.00 | 5.12 | 4.94 | 4.95 | |
| Standard Sample Volume (SCF) | 42.177 | 41.858 | 36.645 | 38.733 | |
| Moisture Fraction | 0.142 | 0.139 | 0.145 | 0.147 | |
| Gas Constant (ft-lbf/lb-mole-R) | 1545.33 | 1545.33 | 1545.33 | 1545.33 | |
| Standard Pressure (lbf/ft2) | 2116.224 | 2116.224 | 2116.224 | 2116.224 | |
| Molecular Weight NH3 (lb/lb-mole) | 17 | 17 | 17 | 17 | |
| Specific Molar Volume (ft3/lb-mole) | 385.3 | 385.3 | 385.3 | 385.3 | |
| Mass Conversion (lb/ug) | 2.20E-09 | 2.20E-09 | 2.20E-09 | 2.20E-09 | |
| O2 Correction Factor (%) | 3 | 3 | 3 | 3 | |
| Mass NH3 (mg) | 13.88 | 5.93 | 3.79 | 3.76 | |
| Mass NH3 (lb) | 3.06E-05 | 1.31E-05 | 8.35E-06 | 8.27E-06 | |
| PPM NH3 (flue gas) | 16.44 | 7.08 | 5.17 | 4.84 | 8.38 |
| PPM NH3 @ O2 Correction | 18.51 | 8.03 | 5.80 | 5.44 | 9.44 |

**NH3 EQUATIONS:**

ppm NH3 = (mass NH3* Gas Const * Ref Temp (deg R)* 106 )/(Sample vol. * Press * MW)

ppm NH3 @ O2 correction = ppm * (20.9-O2 Corr)/(20.9-%O2)

C.13-3

AMMONIA
TEST DATA SUMMARY

| | | | | | |
|---|---|---|---|---|---|
| Client/Location | ExxonMobil | | | | |
| Unit | FCC 2F-7 | | | | |
| Sample Location | Stack | | | | |
| Test No | 1A-NH3 | 1-NH3 | 2-NH3 | 3-NH3 | Average |
| Date | 6/30/2011 | 6/30/2011 | 7/1/2011 | 7/1/2011 | |
| Start Time | 13:42:00 | 19:12:00 | 15:10:00 | 16:35:00 | |
| Stop Time | 14:42:00 | 20:12:00 | 16:10:00 | 17:35:00 | |
| Stack $O_2$ (%) | 5.00 | 5.12 | 4.94 | 4.95 | 5.00 |
| Stack $CO_2$ (%) | 14.03 | 14.05 | 14.19 | 14.25 | 14.13 |
| Stack Flow Rate[1] (dscfm) | 244,326 | 247,582 | 252,208 | 252,208 | 249,081 |
| Std Sample Volume (dscf) | 42.177 | 41.858 | 36.645 | 38.733 | 39.853 |
| Stack $NH_3$ (ppm) | 16.44 | 7.08 | 5.17 | 4.84 | 8.38 |
| Stack $NH_3$ (ppmc @ 3% $O_2$) | 18.51 | 8.03 | 5.80 | 5.44 | 9.44 |
| Stack $NH_3$ (lb/hr) | 10.64 | 4.64 | 3.45 | 3.23 | 5.49 |

1) Stack flow from $PM_{2.5}$ test

Delta Air Quality Services, Incorporated

# WET CHEMICAL SAMPLING SYSTEM DATA AND WORKSHEET

CLIENT: ExxonMobil
LOCATION: FCC 2F-7
DATE: 6/30/11
RUN NO: FB - $NH_3$
OPERATOR:
METER BOX NO:
METER ΔH@:
METER Yd:
STACK AREA, $FT^2$:
TRAVERSE POINTS, MIN/POINT:
ΔH= _____ X ΔP:
Probe Condition, pre/post test:
Silica Gel Expanded, Y/N:
Filter Condition after Test:
Check Weight:

AMBIENT TEMPERATURE:
BAROMETRIC PRESSURE:
ASSUMED MOISTURE:
PITOT TUBE COEFF, Cp:
PROBE ID NO/MATERIAL:
PROBE LENGTH:
NOZZLE ID NO/ MATERIAL:
NOZZLE DIAMETER:
FILTER NO/TYPE:
PRE-TEST LEAK RATE: : _____CFM@_____in. Hg.
POST-TEST LEAK RATE: :_____CFM@_____in. Hg.
PITOT LEAK CHECK - PRE:_____POST:_____
CHAIN OF CUSTODY: SAMPLE CUSTODIAN AA
SAMPLER
SAMPLE CUSTODIAN

| Imp. # | Contents | Post-Test | Pre-Test = Difference |
|---|---|---|---|
| 1 | 0.1N $H_2SO_4$ | | 752.5 |
| 2 | " | | 626.6 |
| 3 | empty | | 585.3 |
| 4 | SG | | 841.7 |
| | | | |
| | | | |
| Total: | | | |

| Point | Time | Meter Volume, $ft^3$ | ΔP in. $H_2O$ | ΔH in. $H_2O$ | Stack Temp, °F | Probe Temp, °F | Filter Temp, °F | Imp. Out Temp, °F | Meter Temp, °F In | Meter Temp, °F Out | Vacuum in. Hg. | $O_2$ % | P. static in. $H_2O$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
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| Average: | | | | | | | | | | | | | |

Comments:

C.13-4

652 Date of last revision 11/24/08

DS83404S
Master Document Storage\Forms\Datasheets\Field Datasheets

Delta Air Quality Services, Incorporated

# WET CHEMICAL SAMPLING SYSTEM DATA AND WORKSHEET

CLIENT: Exxon Mobil
LOCATION: FCC 12F-7 Stack
DATE: 6/30/11
RUN NO: A-NH3
OPERATOR: Dave Wood
METER BOX NO: 17-[illegible]
METER ΔH@: 1.577
METER Yd: 1.004
STACK AREA, FT²: –
TRAVERSE POINTS, MIN/POINT: –
ΔH= – X ΔP:
Probe Condition, pre/post test: ✓
Silica Gel Expanded, Y/N: ✓
Filter Condition after Test: ✓
Check Weight: ✓

AMBIENT TEMPERATURE: ~75°
BAROMETRIC PRESSURE: 29.85
ASSUMED MOISTURE: ~14%
PITOT TUBE COEFF, Cp: –
PROBE ID NO/MATERIAL: glass
PROBE LENGTH: 6'
NOZZLE ID NO/ MATERIAL: –
NOZZLE DIAMETER: –
FILTER NO/TYPE: 83-FG
PRE-TEST LEAK RATE: : .005 CFM@ 12 in. Hg.
POST-TEST LEAK RATE: : .005 CFM@ 12 in. Hg.
PITOT LEAK CHECK - PRE: – POST: –
CHAIN OF CUSTODY: SAMPLE CUSTODIAN AA
SAMPLER [illegible]
SAMPLE CUSTODIAN AA

| Imp. # | Contents | Post-Test | Pre-Test | Difference |
|---|---|---|---|---|
| 1 | 0.1 N $H_2SO_4$ | 883.5 | 774.9 | 108.6 |
| 2 | " | 643.2 | 622.4 | 20.8 |
| 3 | empty | 591.6 | 587.7 | 3.9 |
| 4 | SG | 841.7 | 827.2 | 14.5 |
| | | | | |
| | | | | |
| Total: | | | | 147.8 |

| Point | Time | Meter Volume, ft³ | ΔP in. $H_2O$ | ΔH in. $H_2O$ | Stack Temp, °F | Probe Temp, °F | Filter Temp, °F | Imp. Out Temp, °F | Meter Temp, °F In | Meter Temp, °F Out | Vacuum in. Hg. | $O_2$ % | P. static in. $H_2O$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Single | 1342 | 95.505 | | 1.5 | | 231 | 236 | 62 | 75 | 74 | 4 | | |
| | 1352 | 102.6 | | 1.5 | | 245 | 248 | 63 | 77 | 74 | 4 | | |
| | 1402 | 109.8 | | 1.5 | | 245 | 245 | 62 | 78 | 75 | 4 | | |
| | 1412 | 117.0 | | 1.5 | | 243 | 247 | 62 | 79 | 75 | 4 | | |
| | 1422 | 124.1 | | 1.5 | | 247 | 250 | 61 | 79 | 76 | 4 | | |
| | 1432 | 131.0 | | 1.5 | | 250 | 249 | 61 | 79 | 76 | 4 | | |
| | 1442 | 138.129 | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | | 138.129 | | | | | | | | | | | |
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| Average: | | | | | | | | | | | | | |

Comments:

C-3-5

# WET CHEMICAL SAMPLING SYSTEM DATA AND WORKSHEET

CLIENT: ExxonMobil
LOCATION: FCC 12F- 7 stack
DATE: 6-30-2011
RUN NO: 1-NH3
OPERATOR: DW
METER BOX NO: 17 WCS
METER ΔH@: 1.577
METER Yd: 1.004
STACK AREA, FT²:
TRAVERSE POINTS, MIN/POINT: 10
ΔH= / X ΔP:
Probe Condition, pre/post test: /
Silica Gel Expanded, Y/N: /
Filter Condition after Test: /
Check Weight: /

AMBIENT TEMPERATURE: 70
BAROMETRIC PRESSURE: 29.85
ASSUMED MOISTURE: –
PITOT TUBE COEFF, Cp: –
PROBE ID NO/MATERIAL: glass
PROBE LENGTH: 6'
NOZZLE ID NO/ MATERIAL: –
NOZZLE DIAMETER: –
FILTER NO/TYPE: 83 - FG
PRE-TEST LEAK RATE: : .005 CFM@ 10" in. Hg.
POST-TEST LEAK RATE: .005 CFM@ 10" in. Hg.
PITOT LEAK CHECK - PRE: ok POST: ok
CHAIN OF CUSTODY: SAMPLE CUSTODIAN AA
SAMPLER DW
SAMPLE CUSTODIAN AA

| Imp. # | Contents | Post-Test | Pre-Test | Difference |
|---|---|---|---|---|
| 1 | 0.1 N $H_2SO_4$ | 846.3 | 758.8 | 87.5 |
| 2 | " | 611.8 | 575.1 | 36.7 |
| 3 | ~~SG~~ empty | 665.9 | 662.0 | 3.9 |
| 4 | SG | 850.6 | 835.7 | 14.9 |
| ~~5~~ | ~~SG~~ | | ~~[illegible]~~ | ~~[illegible]~~ |
| | | | | |
| Total: | | | | 143.0 |

| Point | Time | Meter Volume, ft³ | ΔP in. $H_2O$ | ΔH in. $H_2O$ | Stack Temp, °F | Probe Temp, °F | Filter Temp, °F | Imp. Out Temp, °F | Meter Temp, °F In | Meter Temp, °F Out | Vacuum in. Hg. | $O_2$ % | P. static in. $H_2O$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| start | 1912 | 219.247 | | 1.5 | | 250 | 260 | 62 | 68 | 67 | 3 | | |
| | 1922 | 226.0 | | 1.5 | | 254 | 251 | 60 | 69 | 66 | 3 | | |
| | 1932 | 233.1 | | 1.5 | | 253 | 249 | 60 | 69 | 66 | 3 | | |
| | 1942 | 240.3 | | 1.5 | | 251 | 250 | 60 | 69 | 66 | 3 | | |
| | 1952 | 247.0 | | 1.5 | | 252 | 251 | 61 | 69 | 65 | 3 | | |
| | 2002 | 254.0 | | | | | | | | | | | |
| | 2012 | 260.878 | | | | | | | | | | | |
| Average: | | | | | | | | | | | | | |

Comments:

C.13-6

Delta Air Quality Services, Incorporated

# WET CHEMICAL SAMPLING SYSTEM DATA AND WORKSHEET

CLIENT: Exxon Mobil
LOCATION: EUR
DATE: 7-1-11
RUN NO: 2-NH3
OPERATOR: Dave Woody
METER BOX NO: 11-PM
METER ΔH@: 1.269
METER Yd: 0.984
STACK AREA, FT²: —
TRAVERSE POINTS, MIN/POINT: 60
ΔH= — X ΔP:
Probe Condition, pre/post test: ✓
Silica Gel Expanded, Y/N: ✓
Filter Condition after Test: ✓
Check Weight: ✓

AMBIENT TEMPERATURE: 75
BAROMETRIC PRESSURE: 29.74
ASSUMED MOISTURE: —
PITOT TUBE COEFF, Cp: —
PROBE ID NO/MATERIAL: Glass
PROBE LENGTH: 6'
NOZZLE ID NO/ MATERIAL: —
NOZZLE DIAMETER: —
FILTER NO/TYPE: 83-FG
PRE-TEST LEAK RATE: : .001 CFM@ 10" in. Hg.
POST-TEST LEAK RATE: : .005 CFM@ 10" in. Hg.
PITOT LEAK CHECK - PRE: — POST: —
CHAIN OF CUSTODY: SAMPLE CUSTODIAN AA
SAMPLER DW
SAMPLE CUSTODIAN AA

| Imp. # | Contents | Post-Test | Pre-Test | Difference |
|---|---|---|---|---|
| 1 | 0.1N $H_2SO_4$ | 965.2 | 751.9 | 213.3 |
| 2 | 0.1N $H_2SO_4$ | 591.2 | 587.2 | 4.0 |
| 3 | — | 658.3 | 656.7 | 1.6 |
| 4 | 5.6 | 863.1 | 850.2 | 12.9 |
| ~~CR~~ | ~~$D_2H_2O$~~ DW | CR | -100 | -100 |
| | | | | |
| Total: | | | | 131.8 |

| Point | Time | Meter Volume, ft³ | ΔP in. $H_2O$ | ΔH in. $H_2O$ | Stack Temp, °F | Probe Temp, °F | Filter Temp, °F | Imp. Out Temp, °F | Meter Temp, °F In | Meter Temp, °F Out | Vacuum in. Hg. | $O_2$ % | P. static in. $H_2O$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Sinch | 1510 | 754.900 | ~~1.5~~ | 1.5 | | 251 | 248 | 100 | 84 | 80 | 3 | | |
| | 1520 | 761.6 | | 1.5 | | 251 | 249 | 60 | 86 | 85 | 3 | | |
| | 1530 | 768.2 | | 1.5 | | 252 | 248 | 59 | 91 | 87 | 3 | | |
| | 1540 | 774.2 | | 1.5 | | 249 | 251 | 59 | 97 | 90 | 3 | | |
| | 1550 | 780.7 | | 1.5 | | 251 | 250 | 58 | 97 | 91 | 3 | | |
| | 1600 | 786.8 | | 1.5 | | 249 | 247 | 59 | 98 | 92 | 3 | | |
| | 1610 | 793.000 | | | | | | | | | | | |
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| Average: | | | | | | | | | | | | | |

Comments:

C.3-17

Delta Air Quality Services, Incorporated

# WET CHEMICAL SAMPLING SYSTEM DATA AND WORKSHEET

CLIENT: ICF 2F7
LOCATION: 2F-7 Stack
DATE: 7-1-11
RUN NO: 3-NH3
OPERATOR: MW
METER BOX NO: 11-Pitm
METER ΔH@: 1.967
METER Yd: 0.984
STACK AREA, FT²: —
TRAVERSE POINTS, MIN/POINT: 60
ΔH= — X ΔP:
Probe Condition, pre/post test: ✓
Silica Gel Expanded, Y/N: ✓
Filter Condition after Test: ✓
Check Weight: ✓

AMBIENT TEMPERATURE: ~75°
BAROMETRIC PRESSURE: 29.74
ASSUMED MOISTURE: ~14%
PITOT TUBE COEFF, Cp: —
PROBE ID NO/MATERIAL: Glass
PROBE LENGTH: 6'
NOZZLE ID NO/ MATERIAL: —
NOZZLE DIAMETER: —
FILTER NO/TYPE: 87-F-6
PRE-TEST LEAK RATE: : .005 CFM@ 10 in. Hg.
POST-TEST LEAK RATE: : .005 CFM@ 10 in. Hg.
PITOT LEAK CHECK - PRE: — POST: —
CHAIN OF CUSTODY: SAMPLE CUSTODIAN AA
SAMPLER MW
SAMPLE CUSTODIAN AA

| Imp. # | Contents | Post-Test | Pre-Test | Difference |
|---|---|---|---|---|
| 1 | 0.1N $H_2SO_4$ | 978.3 | 767.5 | 210.8 |
| 2 | 0.1N $H_2SO_4$ | 644.6 | 624.3 | 20.3 |
| 3 | — | 584.8 | 583.5 | 1.3 |
| 4 | S.G | 858.0 | 848.5 | 9.5 |
| | | LR | -100 | -100 |
| | | | | |
| Total: | | | | 141.9 |

| Point | Time | Meter Volume, ft³ | ΔP in. $H_2O$ | ΔH in. $H_2O$ | Stack Temp, °F | Probe Temp, °F | Filter Temp, °F | Imp. Out Temp, °F | Meter Temp, °F In | Meter Temp, °F Out | Vacuum in. Hg. | $O_2$ % | P. static in. $H_2O$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1635 | 793.7 | | 1.5 | | 246 | 247 | ice | 90 | 87 | 4 | | |
| | 1645 | 800.0 | | 1.5 | | 252 | 251 | 60 | 93 | 86 | 4 | | |
| | 1655 | 806.9 | | 1.5 | | 253 | 252 | 61 | 95 | 86 | 4 | | |
| | 1705 | 814.1 | | 1.5 | | 252 | 251 | 62 | 96 | 86 | 4 | | |
| | 1715 | 820.5 | | 1.5 | | 249 | 250 | 62 | 90 | 88 | 4 | | |
| | 1725 | 827.3 | | 1.5 | | 251 | 252 | 61 | 95 | 88 | 4 | | |
| | 1735 | 834.020 | | | | | | | | | | | |
| Average: | | | | | | | | | | | | | |

Comments:

C.13-8


Date of last revision 11/24/08
DS834049
Master Document Storage\Forms\Datasheets\Field Datasheets

**ExxonMobil**
**STACK $O_2$, $CO_2$ DATA**

**Test #:** **1A-NH3**
**Date:** **6/30/2011**
**Time:** **1342/1442**

| | $O_2$ | $CO_2$ | NOx | $SO_2$ |
|---|---|---|---|---|
| Range | 10 | 20 | 50 | 25 |
| Cal Gas | 5.00 | 10.16 | 22.7 | 12.9 |
| Analyzer Zero | 0.09 | 0.00 | -0.09 | 0.07 |
| Analyzer Span | 5.04 | 9.94 | 23.03 | 12.53 |
| Pre-Bias Zero | 0.09 | 0.00 | -0.09 | -0.18 |
| Pre-Bias Span | 5.00 | 10.05 | 23.22 | 11.89 |
| Post-Bias Zero | 0.10 | 0.01 | -0.11 | -0.19 |
| Post-Bias Span | 4.94 | 9.90 | 22.84 | 11.85 |
| Pre-test zero bias | -0.1% | 0.0% | 0.0% | -1.0% |
| Pre-test span bias | -0.4% | 0.5% | 0.4% | -2.6% |
| Post-test zero bias | 0.1% | 0.1% | 0.0% | -1.0% |
| Post-test span bias | -1.0% | -0.2% | -0.4% | -2.7% |
| Zero Drift | 0.2% | 0.1% | 0.0% | -0.1% |
| Span Drift | -0.7% | -0.7% | -0.8% | -0.2% |
| | PASS | PASS | PASS | PASS |
| **Average** | **4.97** | **13.78** | **9.82** | **11.26** |
| **Cal Corrected** | **5.00** | **14.03** | **9.74** | **12.25** |

**ExxonMobil**
**1A-NH3**

| Date | Time | O2 % | CO2 % | NOx ppm | SO2 ppm |
|---|---|---|---|---|---|
| 6/30/2011 | 1:43:00 PM | 4.917 | 13.83 | 11.567 | 10.188 |
| 6/30/2011 | 1:44:00 PM | 4.885 | 13.871 | 11.593 | 10.368 |
| 6/30/2011 | 1:45:00 PM | 4.955 | 13.814 | 12.433 | 10.403 |
| 6/30/2011 | 1:46:00 PM | 4.989 | 13.777 | 12.758 | 10.432 |
| 6/30/2011 | 1:47:00 PM | 5.006 | 13.759 | 12.789 | 10.593 |
| 6/30/2011 | 1:48:00 PM | 5.026 | 13.762 | 13.284 | 10.4 |
| 6/30/2011 | 1:49:00 PM | 5.05 | 13.726 | 13.659 | 10.275 |
| 6/30/2011 | 1:50:00 PM | 5.014 | 13.759 | 13.293 | 10.31 |
| 6/30/2011 | 1:51:00 PM | 5.025 | 13.749 | 13.238 | 10.119 |
| 6/30/2011 | 1:52:00 PM | 5.03 | 13.744 | 13.785 | 10.116 |
| 6/30/2011 | 1:53:00 PM | 4.988 | 13.775 | 13.713 | 10.284 |
| 6/30/2011 | 1:54:00 PM | 5.018 | 13.734 | 13.779 | 10.467 |
| 6/30/2011 | 1:55:00 PM | 4.965 | 13.796 | 13.46 | 10.325 |
| 6/30/2011 | 1:56:00 PM | 4.964 | 13.776 | 13.336 | 10.751 |
| 6/30/2011 | 1:57:00 PM | 4.985 | 13.794 | 14.098 | 10.858 |
| 6/30/2011 | 1:58:00 PM | 5.011 | 13.749 | 14.617 | 10.655 |
| 6/30/2011 | 1:59:00 PM | 4.945 | 13.825 | 11.397 | 10.678 |
| 6/30/2011 | 2:00:00 PM | 4.945 | 13.822 | 4.945 | 11.084 |
| 6/30/2011 | 2:01:00 PM | 4.998 | 13.745 | 6.817 | 11.476 |
| 6/30/2011 | 2:02:00 PM | 4.984 | 13.773 | 9.328 | 11.555 |
| 6/30/2011 | 2:03:00 PM | 5.014 | 13.746 | 10.785 | 11.493 |
| 6/30/2011 | 2:04:00 PM | 4.971 | 13.786 | 11.296 | 11.269 |
| 6/30/2011 | 2:05:00 PM | 4.922 | 13.826 | 9.15 | 11.226 |
| 6/30/2011 | 2:06:00 PM | 4.916 | 13.834 | 5.129 | 11.379 |
| 6/30/2011 | 2:07:00 PM | 4.982 | 13.782 | 8.297 | 11.588 |
| 6/30/2011 | 2:08:00 PM | 5.031 | 13.726 | 10.494 | 11.637 |
| 6/30/2011 | 2:09:00 PM | 4.98 | 13.772 | 11.159 | 11.642 |
| 6/30/2011 | 2:10:00 PM | 4.998 | 13.757 | 12.263 | 11.517 |
| 6/30/2011 | 2:11:00 PM | 4.973 | 13.788 | 9.535 | 11.358 |
| 6/30/2011 | 2:12:00 PM | 4.919 | 13.829 | 4.924 | 11.241 |
| 6/30/2011 | 2:13:00 PM | 4.938 | 13.796 | 7.748 | 11.684 |
| 6/30/2011 | 2:14:00 PM | 4.979 | 13.772 | 10.304 | 11.808 |
| 6/30/2011 | 2:15:00 PM | 4.986 | 13.75 | 11.386 | 11.696 |
| 6/30/2011 | 2:16:00 PM | 5.002 | 13.728 | 11.765 | 11.6 |
| 6/30/2011 | 2:17:00 PM | 4.866 | 13.861 | 8.821 | 11.338 |
| 6/30/2011 | 2:18:00 PM | 4.872 | 13.861 | 4.491 | 11.919 |
| 6/30/2011 | 2:19:00 PM | 4.978 | 13.761 | 7.451 | 12.115 |
| 6/30/2011 | 2:20:00 PM | 5.038 | 13.701 | 9.657 | 12.149 |
| 6/30/2011 | 2:21:00 PM | 5.061 | 13.68 | 10.68 | 11.799 |
| 6/30/2011 | 2:22:00 PM | 5.022 | 13.721 | 10.93 | 11.594 |
| 6/30/2011 | 2:23:00 PM | 4.98 | 13.75 | 9.406 | 11.649 |
| 6/30/2011 | 2:24:00 PM | 4.872 | 13.844 | 3.947 | 11.601 |
| 6/30/2011 | 2:25:00 PM | 4.898 | 13.83 | 5.571 | 12.084 |
| 6/30/2011 | 2:26:00 PM | 4.935 | 13.787 | 7.929 | 12.114 |
| 6/30/2011 | 2:27:00 PM | 4.977 | 13.765 | 9.229 | 11.967 |
| 6/30/2011 | 2:28:00 PM | 4.987 | 13.761 | 10.101 | 11.845 |
| 6/30/2011 | 2:29:00 PM | 4.958 | 13.778 | 8.281 | 11.644 |

| | | | | | |
|---|---|---|---|---|---|
| 6/30/2011 | 2:30:00 PM | 4.942 | 13.792 | 3.908 | 11.784 |
| 6/30/2011 | 2:31:00 PM | 4.984 | 13.752 | 5.993 | 11.996 |
| 6/30/2011 | 2:32:00 PM | 4.964 | 13.753 | 7.517 | 11.96 |
| 6/30/2011 | 2:33:00 PM | 4.966 | 13.766 | 8.338 | 11.66 |
| 6/30/2011 | 2:34:00 PM | 4.945 | 13.772 | 8.608 | 11.359 |
| 6/30/2011 | 2:35:00 PM | 4.93 | 13.795 | 8.937 | 11.466 |
| 6/30/2011 | 2:36:00 PM | 4.926 | 13.803 | 9.146 | 11.504 |
| 6/30/2011 | 2:37:00 PM | 4.977 | 13.766 | 10.007 | 11.267 |
| 6/30/2011 | 2:38:00 PM | 5.003 | 13.744 | 10.918 | 11.174 |
| 6/30/2011 | 2:39:00 PM | 4.991 | 13.742 | 11.05 | 11.225 |
| 6/30/2011 | 2:40:00 PM | 4.968 | 13.773 | 6.443 | 11.1 |
| 6/30/2011 | 2:41:00 PM | 4.951 | 13.785 | 5.681 | 11.296 |
| 6/30/2011 | 2:42:00 PM | 4.974 | 13.755 | 8.14 | 11.699 |
| | Average | 4.97 | 13.78 | 9.82 | 11.26 |

**ExxonMobil**
**STACK $O_2$, $CO_2$ DATA**

**Test #:** **1-NH3**
**Date:** **6/30/2011**
**Time:** **1912/2012**

| | $O_2$ | $CO_2$ | NOx | $SO_2$ |
|---|---|---|---|---|
| Range | 10 | 20 | 50 | 25 |
| Cal Gas | 5.00 | 10.16 | 22.7 | 12.9 |
| Analyzer Zero | 0.09 | 0.00 | -0.09 | 0.07 |
| Analyzer Span | 5.04 | 9.94 | 23.03 | 12.53 |
| Pre-Bias Zero | 0.14 | 0.00 | -0.12 | -0.02 |
| Pre-Bias Span | 4.97 | 9.84 | 22.87 | 11.80 |
| Post-Bias Zero | 0.17 | 0.00 | -0.10 | 0.19 |
| Post-Bias Span | 4.99 | 9.81 | 22.81 | 11.91 |
| Pre-test zero bias | 0.5% | 0.0% | -0.1% | -0.3% |
| Pre-test span bias | -0.8% | -0.5% | -0.3% | -2.9% |
| Post-test zero bias | 0.8% | 0.0% | 0.0% | 0.5% |
| Post-test span bias | -0.5% | -0.7% | -0.4% | -2.5% |
| Zero Drift | 0.3% | 0.0% | 0.0% | 0.8% |
| Span Drift | 0.3% | -0.2% | -0.1% | 0.4% |
| | PASS | PASS | PASS | PASS |
| **Average** | **5.09** | **13.58** | **14.53** | **11.28** |
| **Cal Corrected** | **5.12** | **14.05** | **14.48** | **12.27** |

**ExxonMobil**
**1-NH3**

| Date | Time | O2 % | CO2 % | NOx ppm | SO2 ppm |
|---|---|---|---|---|---|
| 6/30/2011 | 7:13:00 PM | 5.1 | 13.61 | 16.868 | 11.261 |
| 6/30/2011 | 7:14:00 PM | 5.053 | 13.645 | 12.085 | 11.193 |
| 6/30/2011 | 7:15:00 PM | 5.074 | 13.612 | 12.33 | 11.356 |
| 6/30/2011 | 7:16:00 PM | 5.104 | 13.589 | 14.351 | 11.199 |
| 6/30/2011 | 7:17:00 PM | 5.079 | 13.612 | 15.166 | 11.143 |
| 6/30/2011 | 7:18:00 PM | 5.091 | 13.606 | 15.69 | 11.067 |
| 6/30/2011 | 7:19:00 PM | 5.046 | 13.654 | 15.993 | 11.056 |
| 6/30/2011 | 7:20:00 PM | 5.054 | 13.658 | 13.592 | 11.075 |
| 6/30/2011 | 7:21:00 PM | 5.09 | 13.623 | 14.522 | 11.272 |
| 6/30/2011 | 7:22:00 PM | 5.115 | 13.591 | 16.402 | 11.343 |
| 6/30/2011 | 7:23:00 PM | 5.117 | 13.578 | 17.128 | 11.035 |
| 6/30/2011 | 7:24:00 PM | 5.129 | 13.572 | 18.423 | 10.821 |
| 6/30/2011 | 7:25:00 PM | 5.15 | 13.538 | 18.954 | 10.935 |
| 6/30/2011 | 7:26:00 PM | 5.108 | 13.573 | 14.121 | 11.04 |
| 6/30/2011 | 7:27:00 PM | 5.097 | 13.585 | 11.679 | 11.312 |
| 6/30/2011 | 7:28:00 PM | 5.131 | 13.537 | 14.693 | 11.464 |
| 6/30/2011 | 7:29:00 PM | 5.09 | 13.585 | 16.113 | 11.509 |
| 6/30/2011 | 7:30:00 PM | 5.103 | 13.582 | 17.012 | 11.407 |
| 6/30/2011 | 7:31:00 PM | 5.108 | 13.564 | 17.299 | 11.281 |
| 6/30/2011 | 7:32:00 PM | 5.031 | 13.645 | 12.732 | 11.403 |
| 6/30/2011 | 7:33:00 PM | 5.07 | 13.613 | 11.009 | 11.526 |
| 6/30/2011 | 7:34:00 PM | 5.105 | 13.578 | 13.861 | 11.617 |
| 6/30/2011 | 7:35:00 PM | 5.109 | 13.565 | 14.883 | 11.461 |
| 6/30/2011 | 7:36:00 PM | 5.109 | 13.575 | 16.05 | 11.596 |
| 6/30/2011 | 7:37:00 PM | 5.149 | 13.539 | 16.715 | 11.469 |
| 6/30/2011 | 7:38:00 PM | 5.11 | 13.564 | 13.005 | 11.059 |
| 6/30/2011 | 7:39:00 PM | 5.121 | 13.553 | 13.203 | 11.185 |
| 6/30/2011 | 7:40:00 PM | 5.146 | 13.521 | 14.874 | 11.419 |
| 6/30/2011 | 7:41:00 PM | 5.134 | 13.538 | 14.996 | 11.079 |
| 6/30/2011 | 7:42:00 PM | 5.101 | 13.562 | 15.42 | 11.157 |
| 6/30/2011 | 7:43:00 PM | 5.066 | 13.598 | 15.502 | 11.28 |
| 6/30/2011 | 7:44:00 PM | 5.017 | 13.64 | 11.525 | 11.317 |
| 6/30/2011 | 7:45:00 PM | 5.074 | 13.588 | 12.113 | 11.378 |
| 6/30/2011 | 7:46:00 PM | 5.062 | 13.606 | 14.111 | 11.562 |
| 6/30/2011 | 7:47:00 PM | 5.077 | 13.579 | 15.219 | 11.666 |
| 6/30/2011 | 7:48:00 PM | 5.094 | 13.563 | 15.931 | 11.634 |
| 6/30/2011 | 7:49:00 PM | 5.097 | 13.561 | 16.229 | 11.233 |
| 6/30/2011 | 7:50:00 PM | 5.096 | 13.594 | 12.403 | 11.098 |
| 6/30/2011 | 7:51:00 PM | 5.096 | 13.581 | 11.19 | 11.184 |
| 6/30/2011 | 7:52:00 PM | 5.132 | 13.54 | 13.973 | 11.297 |
| 6/30/2011 | 7:53:00 PM | 5.166 | 13.51 | 15.419 | 11.252 |
| 6/30/2011 | 7:54:00 PM | 5.141 | 13.515 | 15.867 | 11.17 |
| 6/30/2011 | 7:55:00 PM | 5.159 | 13.511 | 15.922 | 10.919 |
| 6/30/2011 | 7:56:00 PM | 5.057 | 13.609 | 12.096 | 10.98 |
| 6/30/2011 | 7:57:00 PM | 5.097 | 13.559 | 13.191 | 11.444 |
| 6/30/2011 | 7:58:00 PM | 5.125 | 13.532 | 14.982 | 11.526 |
| 6/30/2011 | 7:59:00 PM | 5.134 | 13.52 | 15.682 | 11.4 |

| | | | | | |
|---|---|---|---|---|---|
| 6/30/2011 | 8:00:00 PM | 5.102 | 13.54 | 15.413 | 11.202 |
| 6/30/2011 | 8:01:00 PM | 5.035 | 13.606 | 15.658 | 11.444 |
| 6/30/2011 | 8:02:00 PM | 5.006 | 13.637 | 13.31 | 11.32 |
| 6/30/2011 | 8:03:00 PM | 5.031 | 13.614 | 12.155 | 11.355 |
| 6/30/2011 | 8:04:00 PM | 5.007 | 13.644 | 13.486 | 11.359 |
| 6/30/2011 | 8:05:00 PM | 5.015 | 13.633 | 14.108 | 11.452 |
| 6/30/2011 | 8:06:00 PM | 4.997 | 13.64 | 14.489 | 11.319 |
| 6/30/2011 | 8:07:00 PM | 5.038 | 13.627 | 15.545 | 11.165 |
| 6/30/2011 | 8:08:00 PM | 5.054 | 13.613 | 11.869 | 10.905 |
| 6/30/2011 | 8:09:00 PM | 5.095 | 13.578 | 11.232 | 11.151 |
| 6/30/2011 | 8:10:00 PM | 5.112 | 13.559 | 13.771 | 11.458 |
| 6/30/2011 | 8:11:00 PM | 5.134 | 13.531 | 14.764 | 11.286 |
| 6/30/2011 | 8:12:00 PM | 5.143 | 13.525 | 15.257 | 11.359 |
| | Average | 5.09 | 13.58 | 14.53 | 11.28 |

**ExxonMobil**
**STACK $O_2$, $CO_2$ DATA**

**Test #:** **2-NH3**
**Date:** **7/1/2011**
**Time:** **1510/1610**

| | $O_2$ | $CO_2$ | NOx | $SO_2$ |
|---|---|---|---|---|
| Range | 10 | 20 | 50 | 25 |
| Cal Gas | 5.00 | 10.16 | 22.7 | 12.9 |
| Analyzer Zero | 0.06 | -0.01 | -0.02 | 0.02 |
| Analyzer Span | 5.15 | 9.98 | 22.77 | 12.52 |
| Pre-Bias Zero | 0.20 | 0.01 | -0.10 | -0.10 |
| Pre-Bias Span | 4.90 | 9.87 | 22.87 | 12.02 |
| Post-Bias Zero | 0.12 | -0.01 | -0.11 | -0.18 |
| Post-Bias Span | 4.92 | 9.95 | 23.60 | 11.94 |
| Pre-test zero bias | 1.3% | 0.1% | -0.2% | -0.5% |
| Pre-test span bias | -2.5% | -0.6% | 0.2% | -2.0% |
| Post-test zero bias | 0.5% | 0.0% | -0.2% | -0.8% |
| Post-test span bias | -2.3% | -0.1% | 1.7% | -2.3% |
| Zero Drift | -0.8% | -0.1% | 0.0% | -0.3% |
| Span Drift | 0.2% | 0.4% | 1.5% | -0.3% |
| | PASS | PASS | PASS | PASS |
| **Average** | **4.86** | **13.84** | **13.33** | **11.04** |
| **Cal Corrected** | **4.94** | **14.19** | **13.06** | **11.90** |

**ExxonMobil**
**2-NH3**

| Date | Time | O2 % | CO2 % | NOx ppm | SO2 ppm |
|---|---|---|---|---|---|
| 7/1/2011 | 3:11:00 PM | 4.866 | 13.849 | 13.752 | 11.055 |
| 7/1/2011 | 3:12:00 PM | 4.888 | 13.818 | 14.398 | 10.76 |
| 7/1/2011 | 3:13:00 PM | 4.848 | 13.852 | 13.256 | 10.649 |
| 7/1/2011 | 3:14:00 PM | 4.821 | 13.891 | 9.127 | 11.048 |
| 7/1/2011 | 3:15:00 PM | 4.876 | 13.798 | 11.257 | 11.257 |
| 7/1/2011 | 3:16:00 PM | 4.866 | 13.807 | 13.261 | 11.323 |
| 7/1/2011 | 3:17:00 PM | 4.908 | 13.778 | 14.399 | 11.125 |
| 7/1/2011 | 3:18:00 PM | 4.911 | 13.767 | 14.31 | 10.882 |
| 7/1/2011 | 3:19:00 PM | 4.897 | 13.772 | 13.681 | 10.964 |
| 7/1/2011 | 3:20:00 PM | 4.874 | 13.794 | 13.301 | 10.718 |
| 7/1/2011 | 3:21:00 PM | 4.85 | 13.826 | 13.628 | 10.76 |
| 7/1/2011 | 3:22:00 PM | 4.854 | 13.822 | 14.287 | 10.736 |
| 7/1/2011 | 3:23:00 PM | 4.842 | 13.821 | 14.211 | 10.609 |
| 7/1/2011 | 3:24:00 PM | 4.849 | 13.82 | 14.735 | 10.785 |
| 7/1/2011 | 3:25:00 PM | 4.784 | 13.891 | 12.08 | 10.816 |
| 7/1/2011 | 3:26:00 PM | 4.754 | 13.924 | 6.016 | 11.125 |
| 7/1/2011 | 3:27:00 PM | 4.779 | 13.881 | 8.439 | 11.65 |
| 7/1/2011 | 3:28:00 PM | 4.797 | 13.889 | 10.826 | 11.546 |
| 7/1/2011 | 3:29:00 PM | 4.835 | 13.852 | 12.092 | 11.362 |
| 7/1/2011 | 3:30:00 PM | 4.841 | 13.853 | 12.617 | 11.053 |
| 7/1/2011 | 3:31:00 PM | 4.837 | 13.859 | 13.075 | 10.99 |
| 7/1/2011 | 3:32:00 PM | 4.832 | 13.864 | 12.795 | 10.719 |
| 7/1/2011 | 3:33:00 PM | 4.833 | 13.867 | 14.225 | 10.759 |
| 7/1/2011 | 3:34:00 PM | 4.884 | 13.821 | 15.93 | 10.794 |
| 7/1/2011 | 3:35:00 PM | 4.893 | 13.813 | 16.234 | 10.523 |
| 7/1/2011 | 3:36:00 PM | 4.861 | 13.852 | 16.623 | 10.421 |
| 7/1/2011 | 3:37:00 PM | 4.816 | 13.912 | 14.086 | 10.499 |
| 7/1/2011 | 3:38:00 PM | 4.845 | 13.861 | 6.725 | 10.944 |
| 7/1/2011 | 3:39:00 PM | 4.897 | 13.798 | 9.9 | 11.517 |
| 7/1/2011 | 3:40:00 PM | 4.903 | 13.794 | 12.501 | 11.816 |
| 7/1/2011 | 3:41:00 PM | 4.893 | 13.811 | 14.265 | 11.643 |
| 7/1/2011 | 3:42:00 PM | 4.928 | 13.779 | 15.643 | 11.152 |
| 7/1/2011 | 3:43:00 PM | 4.913 | 13.798 | 15.328 | 10.727 |
| 7/1/2011 | 3:44:00 PM | 4.88 | 13.805 | 13.878 | 10.747 |
| 7/1/2011 | 3:45:00 PM | 4.855 | 13.844 | 14.689 | 10.731 |
| 7/1/2011 | 3:46:00 PM | 4.843 | 13.847 | 15.124 | 10.86 |
| 7/1/2011 | 3:47:00 PM | 4.797 | 13.88 | 14.193 | 11.012 |
| 7/1/2011 | 3:48:00 PM | 4.825 | 13.857 | 13.465 | 10.867 |
| 7/1/2011 | 3:49:00 PM | 4.739 | 13.954 | 10.617 | 10.853 |
| 7/1/2011 | 3:50:00 PM | 4.707 | 13.98 | 5.287 | 11.316 |
| 7/1/2011 | 3:51:00 PM | 4.799 | 13.909 | 8.527 | 11.846 |
| 7/1/2011 | 3:52:00 PM | 4.854 | 13.842 | 10.861 | 11.878 |
| 7/1/2011 | 3:53:00 PM | 4.853 | 13.857 | 12.323 | 11.51 |
| 7/1/2011 | 3:54:00 PM | 4.872 | 13.846 | 14.667 | 11.346 |
| 7/1/2011 | 3:55:00 PM | 4.883 | 13.816 | 14.328 | 11.105 |
| 7/1/2011 | 3:56:00 PM | 4.911 | 13.789 | 13.668 | 11.001 |
| 7/1/2011 | 3:57:00 PM | 4.929 | 13.776 | 14.638 | 11.094 |

| | | | | | |
|---|---|---|---|---|---|
| 7/1/2011 | 3:58:00 PM | 4.904 | 13.79 | 14.953 | 11.016 |
| 7/1/2011 | 3:59:00 PM | 4.886 | 13.811 | 16.144 | 10.861 |
| 7/1/2011 | 4:00:00 PM | 4.892 | 13.802 | 17.234 | 10.936 |
| 7/1/2011 | 4:01:00 PM | 4.888 | 13.822 | 15.021 | 10.914 |
| 7/1/2011 | 4:02:00 PM | 4.831 | 13.869 | 7.979 | 11.112 |
| 7/1/2011 | 4:03:00 PM | 4.878 | 13.813 | 11.502 | 11.68 |
| 7/1/2011 | 4:04:00 PM | 4.873 | 13.833 | 14.676 | 11.449 |
| 7/1/2011 | 4:05:00 PM | 4.911 | 13.786 | 16.574 | 11.345 |
| 7/1/2011 | 4:06:00 PM | 4.883 | 13.813 | 16.811 | 11.026 |
| 7/1/2011 | 4:07:00 PM | 4.876 | 13.828 | 16.864 | 10.896 |
| 7/1/2011 | 4:08:00 PM | 4.868 | 13.821 | 15.57 | 10.672 |
| 7/1/2011 | 4:09:00 PM | 4.898 | 13.809 | 16.214 | 10.811 |
| 7/1/2011 | 4:10:00 PM | 4.89 | 13.79 | 16.817 | 10.882 |
| | Average | 4.86 | 13.84 | 13.33 | 11.04 |

**ExxonMobil**
**STACK $O_2$, $CO_2$ DATA**

**Test #:** **3-NH3**
**Date:** **7/1/2011**
**Time:** **1635/1735**

| | $O_2$ | $CO_2$ | NOx | $SO_2$ |
|---|---|---|---|---|
| Range | 10 | 20 | 50 | 25 |
| Cal Gas | 5.00 | 10.16 | 22.7 | 12.9 |
| Analyzer Zero | 0.06 | -0.01 | -0.02 | 0.02 |
| Analyzer Span | 5.15 | 9.98 | 22.77 | 12.52 |
| Pre-Bias Zero | 0.20 | 0.01 | -0.10 | -0.10 |
| Pre-Bias Span | 4.90 | 9.87 | 22.87 | 12.02 |
| Post-Bias Zero | 0.12 | -0.01 | -0.11 | -0.18 |
| Post-Bias Span | 4.92 | 9.95 | 23.60 | 11.94 |
| Pre-test zero bias | 1.3% | 0.1% | -0.2% | -0.5% |
| Pre-test span bias | -2.5% | -0.6% | 0.2% | -2.0% |
| Post-test zero bias | 0.5% | 0.0% | -0.2% | -0.8% |
| Post-test span bias | -2.3% | -0.1% | 1.7% | -2.3% |
| Zero Drift | -0.8% | -0.1% | 0.0% | -0.3% |
| Span Drift | 0.2% | 0.4% | 1.5% | -0.3% |
| | PASS | PASS | PASS | PASS |
| **Average** | **4.86** | **13.90** | **15.52** | **11.00** |
| **Cal Corrected** | **4.95** | **14.25** | **15.19** | **11.86** |

**ExxonMobil**
**3-NH3**

| Date | Time | O2 % | CO2 % | NOx ppm | SO2 ppm |
|---|---|---|---|---|---|
| 7/1/2011 | 4:36:00 PM | 4.939 | 13.809 | 18.73 | 10.821 |
| 7/1/2011 | 4:37:00 PM | 4.888 | 13.855 | 15.947 | 10.574 |
| 7/1/2011 | 4:38:00 PM | 4.807 | 13.945 | 8.882 | 11.078 |
| 7/1/2011 | 4:39:00 PM | 4.894 | 13.833 | 12.913 | 11.307 |
| 7/1/2011 | 4:40:00 PM | 4.888 | 13.845 | 15.637 | 11.324 |
| 7/1/2011 | 4:41:00 PM | 4.927 | 13.822 | 17.728 | 11.134 |
| 7/1/2011 | 4:42:00 PM | 4.915 | 13.833 | 19.39 | 11.06 |
| 7/1/2011 | 4:43:00 PM | 4.932 | 13.808 | 19.855 | 10.956 |
| 7/1/2011 | 4:44:00 PM | 4.929 | 13.809 | 18.895 | 10.685 |
| 7/1/2011 | 4:45:00 PM | 4.927 | 13.8 | 18.753 | 10.658 |
| 7/1/2011 | 4:46:00 PM | 4.869 | 13.891 | 18.886 | 10.591 |
| 7/1/2011 | 4:47:00 PM | 4.866 | 13.868 | 20.253 | 10.888 |
| 7/1/2011 | 4:48:00 PM | 4.887 | 13.849 | 20.822 | 10.612 |
| 7/1/2011 | 4:49:00 PM | 4.819 | 13.931 | 17.961 | 10.47 |
| 7/1/2011 | 4:50:00 PM | 4.822 | 13.952 | 8.418 | 11.034 |
| 7/1/2011 | 4:51:00 PM | 4.887 | 13.866 | 11.572 | 11.624 |
| 7/1/2011 | 4:52:00 PM | 4.907 | 13.861 | 15.285 | 11.766 |
| 7/1/2011 | 4:53:00 PM | 4.914 | 13.847 | 17.176 | 11.375 |
| 7/1/2011 | 4:54:00 PM | 4.931 | 13.84 | 18.623 | 11.132 |
| 7/1/2011 | 4:55:00 PM | 4.96 | 13.812 | 17.575 | 11.201 |
| 7/1/2011 | 4:56:00 PM | 4.873 | 13.888 | 11.605 | 11.228 |
| 7/1/2011 | 4:57:00 PM | 4.882 | 13.877 | 14.038 | 11.594 |
| 7/1/2011 | 4:58:00 PM | 4.943 | 13.796 | 16.092 | 11.363 |
| 7/1/2011 | 4:59:00 PM | 4.857 | 13.879 | 16.002 | 11.273 |
| 7/1/2011 | 5:00:00 PM | 4.848 | 13.899 | 17.487 | 11.494 |
| 7/1/2011 | 5:01:00 PM | 4.875 | 13.886 | 17.656 | 11.107 |
| 7/1/2011 | 5:02:00 PM | 4.882 | 13.871 | 17.285 | 10.743 |
| 7/1/2011 | 5:03:00 PM | 4.873 | 13.884 | 17.323 | 10.687 |
| 7/1/2011 | 5:04:00 PM | 4.859 | 13.883 | 17.172 | 10.62 |
| 7/1/2011 | 5:05:00 PM | 4.838 | 13.918 | 17.111 | 10.461 |
| 7/1/2011 | 5:06:00 PM | 4.852 | 13.914 | 17.585 | 10.471 |
| 7/1/2011 | 5:07:00 PM | 4.814 | 13.951 | 15.308 | 10.744 |
| 7/1/2011 | 5:08:00 PM | 4.772 | 13.965 | 7.291 | 11.019 |
| 7/1/2011 | 5:09:00 PM | 4.795 | 13.963 | 9.538 | 11.32 |
| 7/1/2011 | 5:10:00 PM | 4.775 | 13.983 | 11.746 | 11.424 |
| 7/1/2011 | 5:11:00 PM | 4.797 | 13.966 | 13.347 | 11.372 |
| 7/1/2011 | 5:12:00 PM | 4.812 | 13.953 | 14.364 | 11.072 |
| 7/1/2011 | 5:13:00 PM | 4.833 | 13.936 | 14.791 | 11.003 |
| 7/1/2011 | 5:14:00 PM | 4.81 | 13.981 | 14.48 | 11.008 |
| 7/1/2011 | 5:15:00 PM | 4.844 | 13.944 | 14.968 | 10.816 |
| 7/1/2011 | 5:16:00 PM | 4.846 | 13.951 | 15.447 | 10.719 |
| 7/1/2011 | 5:17:00 PM | 4.845 | 13.951 | 15.714 | 10.809 |
| 7/1/2011 | 5:18:00 PM | 4.812 | 14.003 | 16.032 | 10.756 |
| 7/1/2011 | 5:19:00 PM | 4.799 | 14.029 | 15.283 | 10.722 |
| 7/1/2011 | 5:20:00 PM | 4.771 | 14.049 | 7.306 | 10.95 |

| | | | | |
|---|---|---|---|---|
| Average | 4.86 | 13.90 | 15.52 | 11.00 |

Delta Air Quality Services, Incorporated

## AMMONIA BY ION SELECTIVE ELECTRODE ANALYSIS

Project #: XOM info District Method: SCAQMD 207.1 Sample Date: 6/30/11
Client/Location: Exxon Mobile Calibration Date: 7/1/11 Analysis Date: 7/1/11
Sample Location: Stack Calibration Curve: -58.9871x +100.5877 Analyst's Initials: AB
Test #'s: 1A-$NH_3$ $R^2$: 1.000

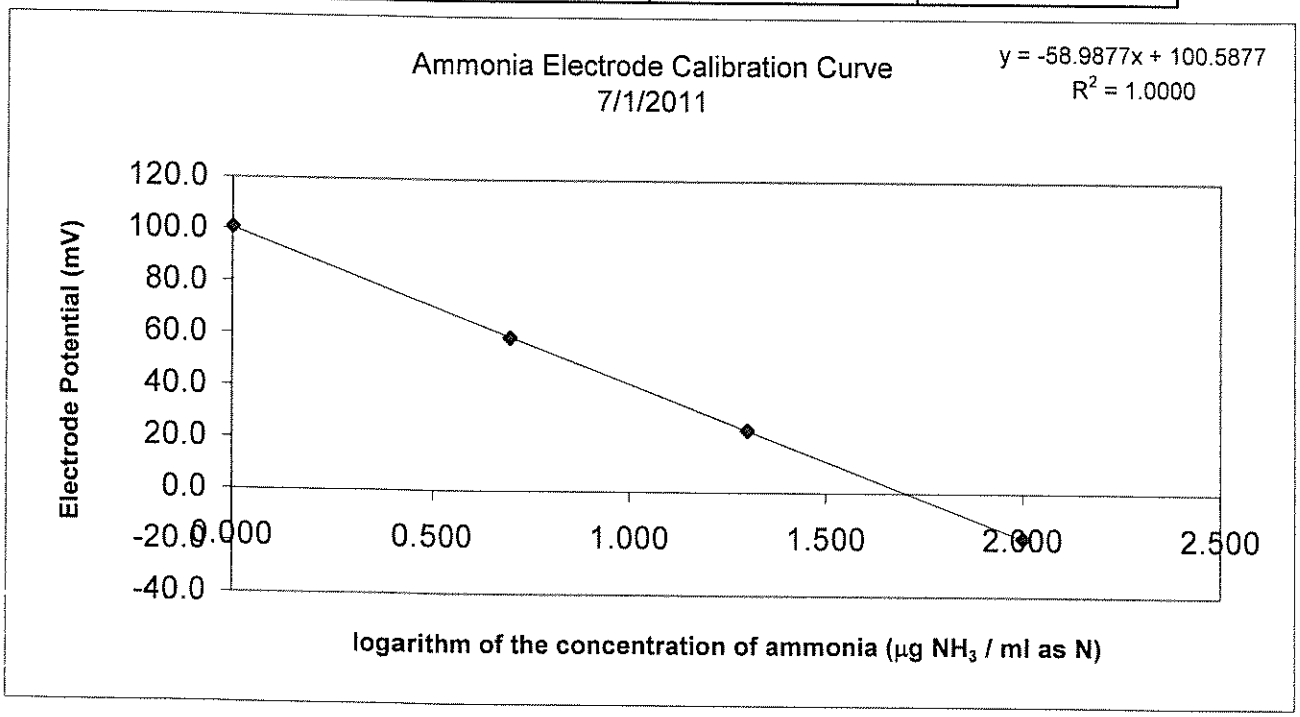
| Sample | Electrode Potential (mV) | TV (ml) | Conc. µg $NH_3$ – N / ml | Cavg (µg $NH_3$ – N / ml) | µg $NH_3$ / sample | Comments/ Temp/pH T=73°F pH<2 |
|---|---|---|---|---|---|---|
| Standard Check: 28 µg $NH_3$/ml | 15.5 | | 27.699 | | | Percent Recovery: T=73°F pH<2 |
| Repeat 28 | 15.4 | | 27.807 | 27.753 | | T=78°F pH<2 |
| | | | | | | |
| 1A-$NH_3$ | 18.8 | | 24.351 | | | T=73°F pH<2 |
| Repeat 1A-$NH_3$ | 18.8 | 469 | 24.351 | 24.351 | 13882.6 | T=73°F pH<2 |
| | | | | | | |
| Reagent Blank | 170.0 | | 0.067 | | | T=73°F pH<2 |
| Repeat Blank | 169.5 | | 0.068 | 0.0672 | | T=73°F pH<2 |
| | | | | | | |
| 2B | 15.3 | | 27.916 | | | T=73°F pH<2 |
| Repeat 2B | 15.3 | | 27.916 | 27.916 | | T=73°F pH<2 |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |

Notes: Total volume of samples and standards used: 100 ml
Volume of pH adjusting ISA used in ml: 2 ml
Absorbing solution: 0.1 N $H_2SO_4$

Calculations: Conc. (µg $NH_3$ – N / ml) = $10^{(P-B)/M}$
P = electrode potential, B = y-intercept and M = slope
Cavg = average result of duplicate analyses (µg $NH_3$ – N / ml) = (C1+C2)/2
µg $NH_3$ / sample = Cavg* 17.03/ 14.01 * TV
mg / sample = µg /sample ÷ 1000
ppm $NH_3$ = mg $NH_3$/sample x 1/Vmstd x 1/454000 x SV/17 x $10^6$

AMMONIA ELECTRODE CALIBRATION CURVE

| $NH_3$ concentration ($\mu g$ $NH_3$ / ml as N) | log $NH_3$ concentration | Electrode potential (mV) | Temperature (F) |
|---|---|---|---|
| 1 | 0.000 | 100.8 | 73 |
| 5 | 0.699 | 59.0 | 73 |
| 20 | 1.301 | 23.9 | 73 |
| 100 | 2.000 | -17.3 | 73 |




| | |
|---|---|
| slope | -58.9877 |
| y-intercept | 100.5877 |

| Concentration ($\mu g$ $NH_3$ / ml as N) | Value LR line | Difference | % Difference |
|---|---|---|---|
| 1 | 0.9917 | -0.0083 | -0.8254 |
| 5 | 5.0702 | 0.0702 | 1.4035 |
| 20 | 19.9555 | -0.0445 | -0.2225 |
| 100 | 99.6584 | -0.3416 | -0.3416 |

**Calculation:**

Regression Line: P=M*log($\mu g$ of $NH_3$/ ml as N)+B

Measured Concentration of Ammonia (C) in $\mu g$ / ml $NH_3$ as N: $C=10^{(P-B)/M}$

where P = electrode potential, M= slope (must be -57±3) and B= intercept

All standards were prepared in 0.04N $H_2SO_4$ and allowed to equilibrate to room temperature.

AMMONIA BY ION SELECTIVE ELECTRODE ANALYSIS CALCULATION

Client/ Location: XOM info
Sample Location: stack
District Method: SCAQMD 207.1
Sample Date: 6/30/2011
Analysis Date: 7/1/2011
Analyst's Initials: AB
Calibration Curve: y= -58.9877 x+ 100.5877
$R^2$ 1.0000

| Sample | P mV | Conc. µg $NH_3$ /ml as N | C avg as N | TV (ml) | C avg as NH3 | µg $NH_3$/ sample |
|---|---|---|---|---|---|---|
| 28 ug NH3 / ml as N<br>repeat 28 ug NH3/ml as N | 15.5<br>15.4 | 27.699<br>27.807 | 27.753 | NA | 33.736 | NA |
| | | | | | | |
| 1A-NH3<br>repeat 1A- NH3 | 18.8<br>18.8 | 24.351<br>24.351 | 24.351 | 469 | 29.600 | 13882.600 |
| | | | | | | |
| Reagent Blank<br>repeat Reagent Blank | 170.0<br>169.5 | 0.067<br>0.068 | 0.0672 | NA | 0.082 | NA |
| | | | | | | |
| 28 NH3/ml as N<br>repeat 28 ug NH3/ml as N | 15.3<br>15.3 | 27.916<br>27.916 | 27.916 | NA | 33.934 | NA |

**Notes:**
Measured Concentration of Ammonia (C) in µg NH3 / ml as N
$C=10^{(P-B)/M}$
P = electrode potential (mV), M=slope and B=intercept
Average Measured Ammonia Concentration (Cavg) = (C1 + C2)/2
where C1, C2 results from duplicate analyses (µg $NH_3$ /ml as N)
Cavg (µg $NH_3$/ml as NH3) = Cavg (µg NH3/ ml as N) * 17.03/ 14.01
µg $NH_3$ / sample = Cavg (µg $NH_3$/ml as $NH_3$) * TV
Used 100 ml of samples and standards with 2 ml ISA and constant stirring rate.
Solution turned blue and remained blue with ISA.

Maximum samples (including blanks) between 28 ug/ml check standard is 5 samples and a spike analyzed in duplicate.

AMMONIA BY ION SELECTIVE ELECTRODE ANALYSIS QUALITY CONTROL

Client/ Location: XOM info
Sample Location: stack
District Method: SCAQMD 207.1
Sample Date: 6/30/2011
Analysis Date: 7/1/2011
Analyst's Initials: AB

| Sample | % recovery | RPD % | RPA % |
|---|---|---|---|
| 28 ug NH3 / ml as N<br>repeat 28 ug NH3/ml as N | NA | -0.39 | -0.881 |
| 1A-NH3<br>repeat 1A- NH3 | NA | 0.00 | NA |
| Reagent Blank<br>repeat Reagent Blank | NA | -1.95 | NA |
| Field Blank<br>repeat Field Blank | NA | -1.95 | NA |
| 28 NH3/ml as N<br>repeat 28 ug NH3/ml as N | NA | 0.00 | -0.299 |

**Notes:**
spike: 100 ml sample + 2 ml (1000 μg NH3 / ml as N)
Matrix Spike Percent Recovery (%R)
%R = (C spike*0.104 - Csample*0.102)/2 *100
Cspike = average result of matrix spike (μg $NH_3$/ ml as N)
Relative Percent Difference (RPD) = (C1-C2)/ Cavg *100 (must be 5% or less)
Relative Percent Accuracy (RPA) (must be 10% or less)
RPA = (Cavg-theoretical value of standard)/ theoretical value of standard * 100

Delta Air Quality Services, Incorporated

## AMMONIA BY ION SELECTIVE ELECTRODE ANALYSIS

Project #: ICR District Method: SCAQMD 207.1 Sample Date: 6/30, 7/1/11
Client/Location: FCCU Calibration Date: 7/4/11 Analysis Date: 7/4/11
Sample Location: Steel * Calibration Curve: y = -58.9009 + 100.6259 Analyst's Initials: [illegible]
Test #'s: 1,2,3-$NH_3$ $R^2$: 1.0000

| Sample | Electrode Potential (mV) | TV (ml) | Conc. µg $NH_3$ – N / ml | Cavg (µg $NH_3$ – N / ml) | µg $NH_3$ / sample | Comments/ Temp/pH |
|---|---|---|---|---|---|---|
| Standard Check: 28 µg $NH_3$/ml | 15.0 | – | 28.427 | – | – | Percent Recovery: Avg = 101.1 / 73°F / <1 pH |
| Repeat 28 | 15.2 | – | 28.205 | 28.316 | – | 73°F / pH<1 |
| 1-$NH_3$ | 46.6 | 621 | 7.948 | – | – | 73°F / pH 2 |
| Repeat 1-$NH_3$ | 48.2 | 621 | 7.764 | 7.856 | 5930 | 73°F pH 2 |
| 2-$NH_3$ | 59.2 | 620 | 5.050 | – | – | 73°F pH 2 |
| Repeat 2-$NH_3$ | 59.4 | 620 | 5.011 | 5.031 | 3791 | 73°F pH 2 |
| 3-$NH_3$ | 54.7 | 512 | 6.022 | – | – | 73°F pH 2 |
| Repeat 3-$NH_3$ | 54.6 | 512 | 6.045 | 6.033 | 3755 | 73°F pH 2 |
| 3+$NH_3$ + 2000 µg spike | 18.7 | – | 24.599 | – | | 73°F pH 2 |
| Repeat Spike | 18.4 | – | 24.889 | 24.744 | – | 97.9% rec / 73°F / pH 2 |
| Field Blank | 144.2 | – | 0.182 | – | | 73°F pH<1 |
| Repeat Field Blk | 144.8 | – | 0.178 | 0.180 | – | 73°F pH<1 |
| 0.1 N $H_2SO_4$ RB | 180.8 | – | 0.044 | – | | 73°F pH<1 |
| Repeat RB | 180.1 | – | 0.045 | 0.044 | – | 73°F pH<1 |
| 28 µg $NH_3$ | 15.8 | – | 27.552 | – | – | 73°F pH<1 |
| Repeat 28 µg $NH_3$ | 15.9 | – | 27.444 | 27.498 | – | 98.2% recovery / 73°F, pH<1 |

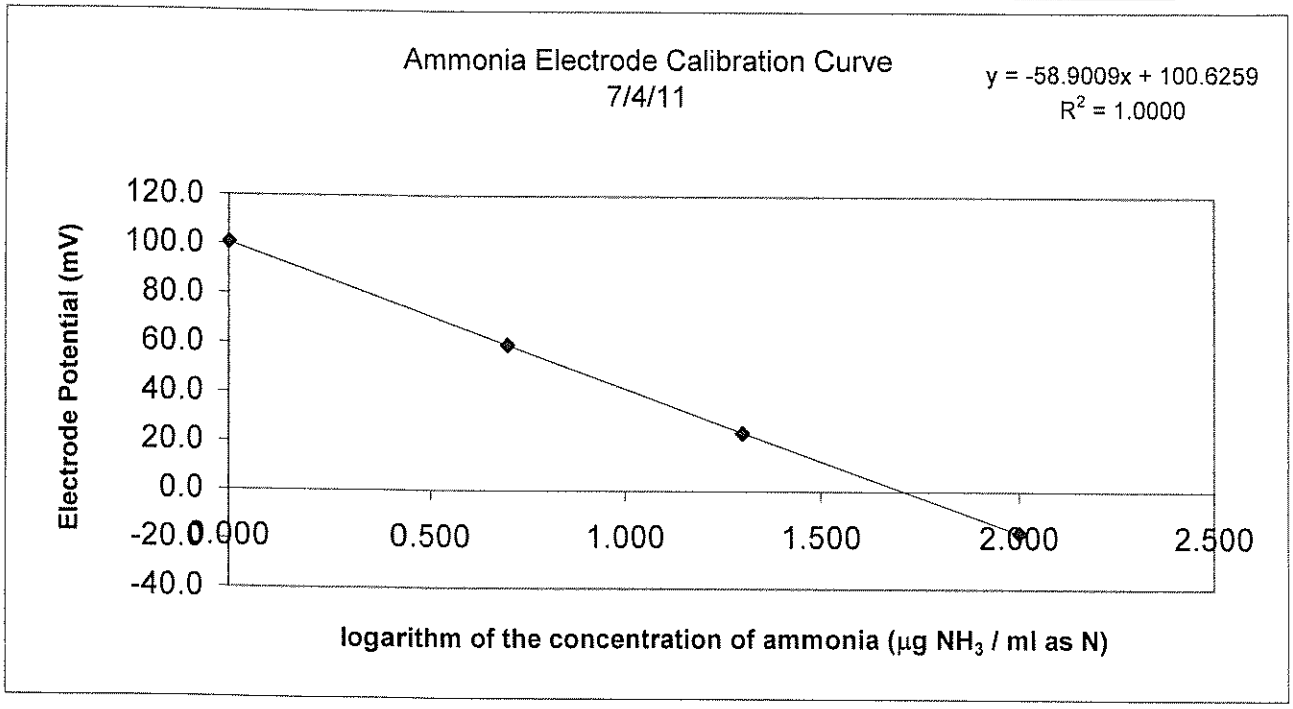
Notes: Total volume of samples and standards used: 100 ml
Volume of pH adjusting ISA used in ml: 2 ml
Absorbing solution: 0.1 N $H_2SO_4$

Calculations: Conc. (µg $NH_3$ – N / ml) = $10^{(P-B)/M}$
P = electrode potential, B = y-intercept and M = slope
Cavg = average result of duplicate analyses (µg $NH_3$ – N / ml) = (C1+C2)/2
µg $NH_3$ / sample = Cavg* 17.03/ 14.01 * TV
mg / sample = µg /sample ÷ 1000
ppm $NH_3$ = mg $NH_3$/sample x 1/Vmstd x 1/454000 x SV/17 x $10^6$

* Calibration 1 = 100.7 mV, 5 = 59.5 mV, 20 = 23.7 mV
100 = -17.0 mV all 73°F, <1 pH

AMMONIA ELECTRODE CALIBRATION CURVE

| $NH_3$ concentration ($\mu g$ $NH_3$ / ml as N) | log $NH_3$ concentration | Electrode potential (mV) | Temperature (F) |
|---|---|---|---|
| 1 | 0.000 | 100.7 | 73 |
| 5 | 0.699 | 59.5 | 73 |
| 20 | 1.301 | 23.7 | 73 |
| 100 | 2.000 | -17.0 | 73 |




| | |
|---|---|
| slope | -58.9009 |
| y-intercept | 100.6259 |

| Concentration ($\mu g$ $NH_3$ / ml as N) | Value LR line | Difference | % Difference |
|---|---|---|---|
| 1 | 0.9971 | -0.0029 | -0.2893 |
| 5 | 4.9914 | -0.0086 | -0.1721 |
| 20 | 20.2312 | 0.2312 | 1.1562 |
| 100 | 99.3147 | -0.6853 | -0.6853 |

**Calculation:**

Regression Line: P=M*log($\mu g$ of $NH_3$/ ml as N)+B

Measured Concentration of Ammonia (C) in $\mu g$ / ml $NH_3$ as N: $C=10^{(P-B)/M}$

where P = electrode potential, M= slope (must be -57±3) and B= intercept

All standards were prepared in 0.04N $H_2SO_4$ and allowed to equilibrate to room temperature.

AMMONIA BY ION SELECTIVE ELECTRODE ANALYSIS CALCULATION

Client/ Location: XOM ICR
Sample Location: Stack
District Method: SCAQMD 207.1
Sample Date: 6/30/2011, 7/1/2011
Analysis Date: 7/4/2011
Analyst's Initials: AB
Calibration Curve: y=-58.9009x+100.6259
$R^2$ 1.0000

| Sample | P mV | Conc. µg $NH_3$ /ml as N | C avg as N | TV (ml) | C avg as NH3 | µg $NH_3$/ sample |
|---|---|---|---|---|---|---|
| 28 ug NH3 / ml as N | 15.0 | 28.427 | | | | |
| repeat 28 ug NH3/ml as N | 15.2 | 28.205 | 28.316 | NA | 34.420 | NA |
| 1-NH3 | 47.6 | 7.948 | | | | |
| repeat 1-NH3 | 48.2 | 7.764 | 7.856 | 621 | 9.549 | 5930.084 |
| 2-NH3 | 59.2 | 5.050 | | | | |
| repeat 2-NH3 | 59.4 | 5.011 | 5.031 | 620 | 6.115 | 3791.307 |
| 3-NH3 | 54.7 | 6.022 | | | | |
| repeat 3-NH3 | 54.6 | 6.045 | 6.033 | 512 | 7.334 | 3755.008 |
| spike 3-NH3 +2000ug | 18.7 | 24.599 | | | | |
| repeat spike | 18.4 | 24.889 | 24.744 | NA | 30.077 | NA |
| Field Blank | 144.2 | 0.182 | | | | |
| repeat Field Blank | 144.8 | 0.178 | 0.1799 | NA | 0.219 | NA |
| 0.1N H2SO4 | 180.8 | 0.044 | | | | |
| repeat 0.1 N H2SO4 | 180.1 | 0.045 | 0.0441 | NA | 0.054 | NA |
| 28 ug NH3 / ml as N | 15.8 | 27.552 | | | | |
| repeat 28 ug NH3/ml as N | 15.9 | 27.444 | 27.498 | NA | 33.425 | NA |

**Notes:**
Measured Concentration of Ammonia (C) in µg NH3 / ml as N
$C=10^{(P-B)/M}$
P = electrode potential (mV), M=slope and B=intercept
Average Measured Ammonia Concentration (Cavg) = (C1 + C2)/2
where C1, C2 results from duplicate analyses (µg $NH_3$ /ml as N)
Cavg (µg $NH_3$/ml as NH3) = Cavg (µg NH3/ ml as N) * 17.03/ 14.01
µg $NH_3$ / sample = Cavg (µg $NH_3$/ml as $NH_3$) * TV
Used 100 ml of samples and standards with 2 ml ISA and constant stirring rate.
Solution turned blue and remained blue with ISA.

Maximum samples (including blanks) between 28 ug/ml check standard is 5 samples and a spike analyzed in duplicate.

AMMONIA BY ION SELECTIVE ELECTRODE ANALYSIS QUALITY CONTROL

Client/ Location: XOM ICR
Sample Location: Stack
District Method: SCAQMD 207.1
Sample Date: 6/30/2011, 7/1/2011
Analysis Date: 7/4/2011
Analyst's Initials: AB

| Sample | % recovery | RPD % | RPA % |
|---|---|---|---|
| 28 ug NH3 / ml as N<br>repeat 28 ug NH3/ml as N | NA | 0.78 | 1.129 |
| 1-NH3<br>repeat 1-NH3 | NA | 2.35 | NA |
| 2-NH3<br>repeat 2-NH3 | NA | 0.78 | NA |
| 3-NH3<br>repeat 3-NH3 | NA | -0.39 | NA |
| spike 3-NH3 +2000ug<br>repeat spike | 97.90 | -1.17 | NA |
| Field Blank<br>repeat Field Blank | NA | 2.35 | NA |
| 0.1N H2SO4<br>repeat 0.1 N H2SO4 | NA | -2.74 | NA |
| 28 ug NH3 / ml as N<br>repeat 28 ug NH3/ml as N | NA | 0.39 | -1.794 |

**Notes:**
spike: 100 ml sample + 2 ml (1000 μg NH3 / ml as N)
Matrix Spike Percent Recovery (%R)
%R = (C spike*0.104 - Csample*0.102)/2 *100
Cspike = average result of matrix spike (μg $NH_3$/ ml as N)
Relative Percent Difference (RPD) = (C1-C2)/ Cavg *100 (must be 5% or less)
Relative Percent Accuracy (RPA) (must be 10% or less)
RPA = (Cavg-theoretical value of standard)/ theoretical value of standard * 100

CARBON MONOXIDE
TEST DATA SUMMARY

| | | | | |
|---|---|---|---|---|
| Client/Location | ExxonMobil | | | |
| Unit | FCC 2F-7 | | | |
| Sample Location | Stack | | | |
| Test No | 1-CO | 2-CO | 3-CO | Average |
| Date | 7/27/2011 | 7/27/2011 | 7/28/2011 | |
| Start Time | 9:45:00 | 15:30:00 | 8:02:00 | |
| Stop Time | 10:45:00 | 16:30:00 | 9:02:00 | |
| Stack $O_2$ (%) | 5.23 | 5.19 | 4.96 | 5.12 |
| Stack $CO_2$ (%) | 14.25 | 14.02 | 14.19 | 14.16 |
| Stack Flow Rate[1] (dscfm) | 240,582 | 244,827 | 230,394 | 238,601 |
| Stack CO (ppm) | 75.42 | 77.56 | 73.42 | 75.47 |
| Stack CO (lb/hr) | 79.12 | 82.80 | 73.75 | 78.56 |

1) Stack flow from Semi-Volatiles test

OXIDES OF NITROGEN AND SULFUR DIOXIDE
TEST DATA SUMMARY

| | | | | |
|---|---|---|---|---|
| Client/Location | ExxonMobil | | | |
| Unit | FCC 2F-7 | | | |
| Sample Location | Stack | | | |
| Test No. | 1-NOX/SO2 | 2-NOX/SO2 | 3-NOX/SO2 | Average |
| Date | 6/30/2011 | 6/30/2011 | 7/1/2011 | |
| Start Time | 10:40:00 | 15:20:00 | 17:50:00 | |
| Stop Time | 11:40:00 | 16:20:00 | 18:50:00 | |
| Stack $O_2$ (%) | 5.08 | 5.00 | 4.88 | 4.99 |
| Stack $CO_2$ (%) | 13.89 | 14.13 | 14.34 | 14.12 |
| Stack Flow Rate[1] (dscfm) | 245,224 | 233,757 | 233,445 | 237,475 |
| Stack $NO_x$ (ppm) | 21.77 | 11.13 | 11.11 | 14.67 |
| Stack $NO_x$ (lb/hr) | 38.24 | 18.63 | 18.58 | 25.15 |
| Stack $SO_2$ (ppm) | 11.59 | 12.28 | 12.10 | 11.99 |
| Stack $SO_2$ (lb/hr) | 28.33 | 28.60 | 28.15 | 28.36 |

1) Stack flow from Hexavalent Chromium test

**ExxonMobil**
**STACK $O_2$, $CO_2$ DATA**

**Test #:** **1-CO**
**Date:** **6/27/2011**
**Time:** **945/1045**

| | $O_2$ | $CO_2$ | CO |
|---|---|---|---|
| Range | 10 | 20 | 250 |
| Cal Gas | 5.00 | 10.16 | 142 |
| Analyzer Zero | 0.03 | -0.06 | -1.91 |
| Analyzer Span | 5.04 | 10.02 | 142.11 |
| Pre-Bias Zero | 0.04 | -0.03 | -2.67 |
| Pre-Bias Span | 5.09 | 10.03 | 143.88 |
| Post-Bias Zero | 0.05 | 0.02 | -0.13 |
| Post-Bias Span | 4.98 | 9.74 | 143.47 |
| Pre-test zero bias | 0.1% | 0.2% | -0.3% |
| Pre-test span bias | 0.6% | 0.0% | 0.7% |
| Post-test zero bias | 0.2% | 0.4% | 0.7% |
| Post-test span bias | -0.5% | -1.4% | 0.5% |
| Zero Drift | 0.0% | 0.2% | 1.0% |
| Span Drift | -1.1% | -1.5% | -0.2% |
| | PASS | PASS | PASS |
| **Average** | **5.26** | **13.87** | **75.65** |
| **Cal Corrected** | **5.23** | **14.25** | **75.42** |

**ExxonMobil**
**1-CO**

| Date | Time | O2 % | CO2 % | CO ppm |
|---|---|---|---|---|
| 6/27/2011 | 9:46:00 AM | 5.067 | 13.975 | 67.108 |
| 6/27/2011 | 9:47:00 AM | 5.08 | 13.985 | 71.188 |
| 6/27/2011 | 9:48:00 AM | 5.076 | 13.997 | 72.917 |
| 6/27/2011 | 9:49:00 AM | 5.096 | 13.986 | 73.15 |
| 6/27/2011 | 9:50:00 AM | 5.122 | 13.937 | 71.51 |
| 6/27/2011 | 9:51:00 AM | 5.146 | 13.934 | 70.22 |
| 6/27/2011 | 9:52:00 AM | 5.219 | 13.87 | 72.13 |
| 6/27/2011 | 9:53:00 AM | 5.362 | 14.102 | 73.359 |
| 6/27/2011 | 9:54:00 AM | 5.277 | 13.936 | 73.02 |
| 6/27/2011 | 9:55:00 AM | 5.306 | 13.916 | 73.876 |
| 6/27/2011 | 9:56:00 AM | 5.32 | 13.969 | 75.711 |
| 6/27/2011 | 9:57:00 AM | 5.365 | 13.928 | 75.107 |
| 6/27/2011 | 9:58:00 AM | 5.259 | 13.578 | 71.586 |
| 6/27/2011 | 9:59:00 AM | 5.306 | 13.5 | 73.063 |
| 6/27/2011 | 10:00:00 AM | 5.294 | 13.507 | 72.408 |
| 6/27/2011 | 10:01:00 AM | 5.22 | 13.574 | 72.056 |
| 6/27/2011 | 10:02:00 AM | 5.184 | 13.619 | 73.051 |
| 6/27/2011 | 10:03:00 AM | 5.212 | 13.585 | 73.669 |
| 6/27/2011 | 10:04:00 AM | 5.276 | 13.528 | 72.857 |
| 6/27/2011 | 10:05:00 AM | 5.275 | 13.519 | 72.043 |
| 6/27/2011 | 10:06:00 AM | 5.268 | 13.515 | 72.639 |
| 6/27/2011 | 10:07:00 AM | 5.265 | 13.506 | 70.329 |
| 6/27/2011 | 10:08:00 AM | 5.223 | 13.525 | 70.959 |
| 6/27/2011 | 10:09:00 AM | 5.197 | 13.562 | 72.94 |
| 6/27/2011 | 10:10:00 AM | 5.198 | 13.565 | 73.093 |
| 6/27/2011 | 10:11:00 AM | 5.193 | 13.574 | 73.237 |
| 6/27/2011 | 10:12:00 AM | 5.225 | 13.552 | 74.416 |
| 6/27/2011 | 10:13:00 AM | 5.254 | 13.514 | 75.04 |
| 6/27/2011 | 10:14:00 AM | 5.286 | 13.483 | 75.504 |
| 6/27/2011 | 10:15:00 AM | 5.447 | 14.184 | 78.671 |
| 6/27/2011 | 10:16:00 AM | 5.746 | 14.793 | 81.669 |
| 6/27/2011 | 10:17:00 AM | 5.797 | 14.895 | 80.688 |
| 6/27/2011 | 10:18:00 AM | 5.778 | 14.827 | 81.975 |
| 6/27/2011 | 10:19:00 AM | 5.778 | 14.951 | 82.461 |
| 6/27/2011 | 10:20:00 AM | 5.774 | 14.967 | 81.222 |
| 6/27/2011 | 10:21:00 AM | 5.653 | 14.741 | 80.001 |
| 6/27/2011 | 10:22:00 AM | 5.577 | 14.787 | 80.94 |
| 6/27/2011 | 10:23:00 AM | 5.552 | 14.784 | 81.585 |
| 6/27/2011 | 10:24:00 AM | 5.515 | 14.616 | 81.142 |
| 6/27/2011 | 10:25:00 AM | 5.471 | 14.552 | 81.058 |
| 6/27/2011 | 10:26:00 AM | 5.405 | 14.547 | 82.083 |
| 6/27/2011 | 10:27:00 AM | 5.142 | 13.792 | 76.758 |
| 6/27/2011 | 10:28:00 AM | 5.065 | 13.633 | 75.386 |
| 6/27/2011 | 10:29:00 AM | 5.063 | 13.602 | 75.831 |
| 6/27/2011 | 10:30:00 AM | 5.021 | 13.625 | 75.765 |
| 6/27/2011 | 10:31:00 AM | 5.019 | 13.635 | 76.809 |
| 6/27/2011 | 10:32:00 AM | 5.052 | 13.601 | 76.454 |

| | | | | |
|---|---|---|---|---|
| 6/27/2011 | 10:33:00 AM | 5.051 | 13.597 | 75.838 |
| 6/27/2011 | 10:34:00 AM | 5.106 | 13.54 | 75.818 |
| 6/27/2011 | 10:35:00 AM | 5.096 | 13.534 | 75.632 |
| 6/27/2011 | 10:36:00 AM | 5.094 | 13.526 | 77.589 |
| 6/27/2011 | 10:37:00 AM | 5.059 | 13.566 | 78.435 |
| 6/27/2011 | 10:38:00 AM | 5.137 | 13.499 | 76.673 |
| 6/27/2011 | 10:39:00 AM | 5.131 | 13.498 | 75.64 |
| 6/27/2011 | 10:40:00 AM | 5.114 | 13.503 | 75.98 |
| 6/27/2011 | 10:41:00 AM | 5.125 | 13.506 | 76.198 |
| 6/27/2011 | 10:42:00 AM | 5.133 | 13.501 | 77.353 |
| 6/27/2011 | 10:43:00 AM | 5.107 | 13.549 | 76.981 |
| 6/27/2011 | 10:44:00 AM | 5.067 | 13.609 | 79.338 |
| 6/27/2011 | 10:45:00 AM | 5.136 | 13.545 | 79.075 |
| | Average | 5.26 | 13.87 | 75.65 |

**ExxonMobil**
**STACK $O_2$, $CO_2$ DATA**

**Test #:** **2-CO**
**Date:** **6/27/2011**
**Time:** **1530/1630**

| | $O_2$ | $CO_2$ | CO |
|---|---|---|---|
| Range | 10 | 20 | 250 |
| Cal Gas | 5.00 | 10.16 | 142 |
| Analyzer Zero | 0.03 | -0.06 | -1.91 |
| Analyzer Span | 5.04 | 10.02 | 142.11 |
| Pre-Bias Zero | 0.04 | 0.02 | -0.11 |
| Pre-Bias Span | 4.96 | 9.80 | 143.26 |
| Post-Bias Zero | 0.05 | 0.02 | -0.07 |
| Post-Bias Span | 4.97 | 9.72 | 142.88 |
| Pre-test zero bias | 0.2% | 0.4% | 0.7% |
| Pre-test span bias | -0.7% | -1.1% | 0.5% |
| Post-test zero bias | 0.2% | 0.4% | 0.7% |
| Post-test span bias | -0.7% | -1.5% | 0.3% |
| Zero Drift | 0.1% | 0.0% | 0.0% |
| Span Drift | 0.0% | -0.4% | -0.2% |
| | PASS | PASS | PASS |
| **Average** | **5.15** | **13.47** | **78.10** |
| **Cal Corrected** | **5.19** | **14.02** | **77.56** |

**ExxonMobil**
**2-CO**

| Date | Time | O2 % | CO2 % | CO ppm |
|---|---|---|---|---|
| 6/27/2011 | 3:31:00 PM | 5.228 | 13.396 | 78.163 |
| 6/27/2011 | 3:32:00 PM | 5.256 | 13.369 | 77.637 |
| 6/27/2011 | 3:33:00 PM | 5.238 | 13.377 | 77.783 |
| 6/27/2011 | 3:34:00 PM | 5.176 | 13.431 | 77.429 |
| 6/27/2011 | 3:35:00 PM | 5.173 | 13.452 | 76.627 |
| 6/27/2011 | 3:36:00 PM | 5.182 | 13.439 | 78.152 |
| 6/27/2011 | 3:37:00 PM | 5.146 | 13.47 | 79.583 |
| 6/27/2011 | 3:38:00 PM | 5.093 | 13.517 | 78.587 |
| 6/27/2011 | 3:39:00 PM | 5.135 | 13.475 | 78.02 |
| 6/27/2011 | 3:40:00 PM | 5.201 | 13.4 | 77.273 |
| 6/27/2011 | 3:41:00 PM | 5.13 | 13.474 | 77.941 |
| 6/27/2011 | 3:42:00 PM | 5.123 | 13.483 | 78.017 |
| 6/27/2011 | 3:43:00 PM | 5.141 | 13.482 | 77.388 |
| 6/27/2011 | 3:44:00 PM | 5.139 | 13.478 | 78.406 |
| 6/27/2011 | 3:45:00 PM | 5.16 | 13.467 | 79.273 |
| 6/27/2011 | 3:46:00 PM | 5.15 | 13.463 | 78.891 |
| 6/27/2011 | 3:47:00 PM | 5.199 | 13.443 | 78.199 |
| 6/27/2011 | 3:48:00 PM | 5.174 | 13.438 | 78.401 |
| 6/27/2011 | 3:49:00 PM | 5.176 | 13.453 | 78.873 |
| 6/27/2011 | 3:50:00 PM | 5.196 | 13.426 | 78.484 |
| 6/27/2011 | 3:51:00 PM | 5.065 | 13.54 | 78.85 |
| 6/27/2011 | 3:52:00 PM | 5.059 | 13.544 | 80.439 |
| 6/27/2011 | 3:53:00 PM | 5.081 | 13.521 | 81.339 |
| 6/27/2011 | 3:54:00 PM | 5.093 | 13.527 | 80.24 |
| 6/27/2011 | 3:55:00 PM | 5.157 | 13.483 | 78.811 |
| 6/27/2011 | 3:56:00 PM | 5.195 | 13.421 | 77.646 |
| 6/27/2011 | 3:57:00 PM | 5.143 | 13.479 | 78.81 |
| 6/27/2011 | 3:58:00 PM | 5.127 | 13.5 | 79.521 |
| 6/27/2011 | 3:59:00 PM | 5.134 | 13.501 | 82.123 |
| 6/27/2011 | 4:00:00 PM | 5.181 | 13.448 | 80.682 |
| 6/27/2011 | 4:01:00 PM | 5.176 | 13.464 | 79.979 |
| 6/27/2011 | 4:02:00 PM | 5.19 | 13.432 | 80.328 |
| 6/27/2011 | 4:03:00 PM | 5.183 | 13.429 | 79.036 |
| 6/27/2011 | 4:04:00 PM | 5.199 | 13.422 | 77.141 |
| 6/27/2011 | 4:05:00 PM | 5.195 | 13.418 | 78.202 |
| 6/27/2011 | 4:06:00 PM | 5.133 | 13.489 | 79.455 |
| 6/27/2011 | 4:07:00 PM | 5.155 | 13.464 | 79.804 |
| 6/27/2011 | 4:08:00 PM | 5.152 | 13.473 | 80.759 |
| 6/27/2011 | 4:09:00 PM | 5.14 | 13.474 | 80.837 |
| 6/27/2011 | 4:10:00 PM | 5.117 | 13.501 | 79.605 |
| 6/27/2011 | 4:11:00 PM | 5.135 | 13.511 | 80.181 |
| 6/27/2011 | 4:12:00 PM | 5.157 | 13.473 | 79.605 |
| 6/27/2011 | 4:13:00 PM | 5.142 | 13.496 | 77.389 |
| 6/27/2011 | 4:14:00 PM | 5.182 | 13.438 | 77.634 |
| 6/27/2011 | 4:15:00 PM | 5.157 | 13.448 | 75.283 |
| 6/27/2011 | 4:16:00 PM | 5.135 | 13.471 | 75.264 |
| 6/27/2011 | 4:17:00 PM | 5.126 | 13.483 | 76.345 |

| | | | | |
|---|---|---|---|---|
| 6/27/2011 | 4:18:00 PM | 5.121 | 13.501 | 78.195 |
| 6/27/2011 | 4:19:00 PM | 5.138 | 13.468 | 78.079 |
| 6/27/2011 | 4:20:00 PM | 5.109 | 13.503 | 77.019 |
| 6/27/2011 | 4:21:00 PM | 5.16 | 13.464 | 76.109 |
| 6/27/2011 | 4:22:00 PM | 5.157 | 13.441 | 75.368 |
| 6/27/2011 | 4:23:00 PM | 5.148 | 13.461 | 74.939 |
| 6/27/2011 | 4:24:00 PM | 5.165 | 13.445 | 75.175 |
| 6/27/2011 | 4:25:00 PM | 5.131 | 13.451 | 74.572 |
| 6/27/2011 | 4:26:00 PM | 5.147 | 13.451 | 74.361 |
| 6/27/2011 | 4:27:00 PM | 5.067 | 13.53 | 74.866 |
| 6/27/2011 | 4:28:00 PM | 5.06 | 13.542 | 76.434 |
| 6/27/2011 | 4:29:00 PM | 5.123 | 13.477 | 75.653 |
| 6/27/2011 | 4:30:00 PM | 5.101 | 13.492 | 76.971 |
| | Average | 5.15 | 13.47 | 78.10 |

**ExxonMobil**
**STACK $O_2$, $CO_2$ DATA**

**Test #:** **3-CO**
**Date:** **6/28/2011**
**Time:** **802/902**

| | $O_2$ | $CO_2$ | CO |
|---|---|---|---|
| Range | 10 | 20 | 250 |
| Cal Gas | 5.00 | 10.16 | 142 |
| Analyzer Zero | 0.05 | 0.00 | 0.49 |
| Analyzer Span | 4.98 | 9.97 | 144.14 |
| Pre-Bias Zero | 0.04 | 0.01 | -0.11 |
| Pre-Bias Span | 4.97 | 9.91 | 143.37 |
| Post-Bias Zero | 0.04 | 0.02 | -0.16 |
| Post-Bias Span | 5.01 | 9.97 | 145.30 |
| Pre-test zero bias | -0.1% | 0.1% | -0.2% |
| Pre-test span bias | -0.2% | -0.3% | -0.3% |
| Post-test zero bias | -0.1% | 0.1% | -0.3% |
| Post-test span bias | 0.2% | 0.0% | 0.5% |
| Zero Drift | 0.0% | 0.0% | 0.0% |
| Span Drift | 0.4% | 0.3% | 0.8% |
| | PASS | PASS | PASS |
| **Average** | **4.94** | **13.88** | **74.56** |
| **Cal Corrected** | **4.96** | **14.19** | **73.42** |

**ExxonMobil**
**3-CO**

| Date | Time | O2 % | CO2 % | CO ppm |
|---|---|---|---|---|
| 6/28/2011 | 8:03:00 AM | 4.943 | 13.784 | 73.214 |
| 6/28/2011 | 8:04:00 AM | 4.985 | 13.759 | 72.848 |
| 6/28/2011 | 8:05:00 AM | 5.061 | 13.682 | 71.686 |
| 6/28/2011 | 8:06:00 AM | 5.051 | 13.669 | 71.628 |
| 6/28/2011 | 8:07:00 AM | 5.032 | 13.713 | 71.203 |
| 6/28/2011 | 8:08:00 AM | 5.044 | 13.687 | 71.194 |
| 6/28/2011 | 8:09:00 AM | 5.051 | 13.679 | 70.82 |
| 6/28/2011 | 8:10:00 AM | 5.014 | 13.698 | 72.345 |
| 6/28/2011 | 8:11:00 AM | 5.027 | 13.697 | 71.94 |
| 6/28/2011 | 8:12:00 AM | 5.043 | 13.673 | 70.624 |
| 6/28/2011 | 8:13:00 AM | 5.086 | 13.636 | 69.474 |
| 6/28/2011 | 8:14:00 AM | 5.037 | 13.665 | 68.64 |
| 6/28/2011 | 8:15:00 AM | 5.007 | 13.694 | 68.026 |
| 6/28/2011 | 8:16:00 AM | 4.946 | 13.737 | 69.047 |
| 6/28/2011 | 8:17:00 AM | 4.922 | 13.757 | 70.306 |
| 6/28/2011 | 8:18:00 AM | 4.902 | 13.767 | 69.851 |
| 6/28/2011 | 8:19:00 AM | 4.864 | 13.811 | 71.478 |
| 6/28/2011 | 8:20:00 AM | 4.815 | 13.854 | 77.851 |
| 6/28/2011 | 8:21:00 AM | 4.815 | 13.858 | 77.289 |
| 6/28/2011 | 8:22:00 AM | 4.783 | 13.891 | 75.576 |
| 6/28/2011 | 8:23:00 AM | 4.788 | 13.91 | 77.633 |
| 6/28/2011 | 8:24:00 AM | 4.834 | 13.943 | 92.726 |
| 6/28/2011 | 8:25:00 AM | 4.909 | 13.856 | 77.453 |
| 6/28/2011 | 8:26:00 AM | 4.888 | 13.875 | 72.463 |
| 6/28/2011 | 8:27:00 AM | 4.924 | 13.85 | 70.936 |
| 6/28/2011 | 8:28:00 AM | 4.902 | 13.872 | 70.943 |
| 6/28/2011 | 8:29:00 AM | 4.884 | 13.899 | 70.677 |
| 6/28/2011 | 8:30:00 AM | 4.853 | 13.965 | 73.505 |
| 6/28/2011 | 8:31:00 AM | 4.828 | 14.003 | 86.819 |
| 6/28/2011 | 8:32:00 AM | 4.864 | 14.002 | 80.64 |
| 6/28/2011 | 8:33:00 AM | 4.917 | 14.001 | 74.159 |
| 6/28/2011 | 8:34:00 AM | 4.845 | 13.879 | 71.797 |
| 6/28/2011 | 8:35:00 AM | 4.793 | 13.905 | 79.165 |
| 6/28/2011 | 8:36:00 AM | 4.847 | 13.859 | 77.178 |
| 6/28/2011 | 8:37:00 AM | 4.841 | 13.854 | 75.164 |
| 6/28/2011 | 8:38:00 AM | 4.801 | 13.841 | 77.808 |
| 6/28/2011 | 8:39:00 AM | 4.872 | 13.838 | 76.078 |
| 6/28/2011 | 8:40:00 AM | 4.898 | 13.827 | 72.616 |
| 6/28/2011 | 8:41:00 AM | 4.879 | 13.839 | 72.007 |
| 6/28/2011 | 8:42:00 AM | 4.894 | 13.846 | 71.533 |
| 6/28/2011 | 8:43:00 AM | 4.929 | 13.844 | 70.561 |
| 6/28/2011 | 8:44:00 AM | 4.914 | 13.866 | 71.005 |
| 6/28/2011 | 8:45:00 AM | 4.933 | 13.849 | 72.212 |
| 6/28/2011 | 8:46:00 AM | 4.98 | 13.805 | 69.617 |
| 6/28/2011 | 8:47:00 AM | 5.006 | 13.786 | 68.507 |
| 6/28/2011 | 8:48:00 AM | 5.02 | 13.769 | 67.854 |
| 6/28/2011 | 8:49:00 AM | 5.121 | 14.213 | 70.761 |

| | | | | |
|---|---|---|---|---|
| 6/28/2011 | 8:50:00 AM | 5.375 | 14.906 | 75.464 |
| 6/28/2011 | 8:51:00 AM | 5.586 | 15.353 | 76.963 |
| 6/28/2011 | 8:52:00 AM | 4.982 | 13.98 | 71.528 |
| 6/28/2011 | 8:53:00 AM | 4.931 | 13.84 | 70.322 |
| 6/28/2011 | 8:54:00 AM | 4.96 | 13.822 | 70.618 |
| 6/28/2011 | 8:55:00 AM | 4.929 | 13.842 | 70.884 |
| 6/28/2011 | 8:56:00 AM | 4.911 | 13.853 | 72.201 |
| 6/28/2011 | 8:57:00 AM | 4.878 | 13.904 | 101.265 |
| 6/28/2011 | 8:58:00 AM | 4.887 | 13.908 | 104.816 |
| 6/28/2011 | 8:59:00 AM | 4.898 | 13.91 | 91.678 |
| 6/28/2011 | 9:00:00 AM | 4.899 | 13.897 | 77.005 |
| 6/28/2011 | 9:01:00 AM | 4.917 | 13.871 | 72.879 |
| 6/28/2011 | 9:02:00 AM | 4.927 | 13.869 | 71.157 |
| | Average | 4.94 | 13.88 | 74.56 |

**ExxonMobil**
**STACK $O_2$, $CO_2$ DATA**

**Test #:** **1-NOxSO2**
**Date:** **6/30/2011**
**Time:** **1040/1140**

| | $O_2$ | $CO_2$ | NOx | $SO_2$ |
|---|---|---|---|---|
| Range | 10 | 20 | 50 | 25 |
| Cal Gas | 5.00 | 10.16 | 22.7 | 12.9 |
| Analyzer Zero | 0.09 | 0.00 | -0.09 | 0.07 |
| Analyzer Span | 5.04 | 9.94 | 23.03 | 12.53 |
| Pre-Bias Zero | 0.08 | 0.00 | -0.08 | -0.06 |
| Pre-Bias Span | 4.99 | 10.00 | 22.93 | 12.07 |
| Post-Bias Zero | 0.09 | 0.00 | -0.09 | -0.18 |
| Post-Bias Span | 5.00 | 10.05 | 23.22 | 11.89 |
| Pre-test zero bias | -0.1% | 0.0% | 0.0% | -0.5% |
| Pre-test span bias | -0.6% | 0.3% | -0.2% | -1.9% |
| Post-test zero bias | -0.1% | 0.0% | 0.0% | -1.0% |
| Post-test span bias | -0.4% | 0.5% | 0.4% | -2.6% |
| Zero Drift | 0.0% | 0.0% | 0.0% | -0.5% |
| Span Drift | 0.2% | 0.3% | 0.6% | -0.7% |
| | PASS | PASS | PASS | PASS |
| **Average** | **5.08** | **13.71** | **22.12** | **10.75** |
| **Cal Corrected** | **5.08** | **13.89** | **21.77** | **11.59** |

**ExxonMobil**
**1-NOxSO2**

| Date | Time | O2 % | CO2 % | NOx ppm | SO2 ppm |
|---|---|---|---|---|---|
| 6/30/2011 | 10:41:00 AM | 5.157 | 13.777 | 19.94 | 10.738 |
| 6/30/2011 | 10:42:00 AM | 5.182 | 13.755 | 19.465 | 10.677 |
| 6/30/2011 | 10:43:00 AM | 5.16 | 13.772 | 19.374 | 10.718 |
| 6/30/2011 | 10:44:00 AM | 5.138 | 13.866 | 19.113 | 10.987 |
| 6/30/2011 | 10:45:00 AM | 5.267 | 14.234 | 20.992 | 11.243 |
| 6/30/2011 | 10:46:00 AM | 5.151 | 13.856 | 21.991 | 11.153 |
| 6/30/2011 | 10:47:00 AM | 5.124 | 13.67 | 22.162 | 10.856 |
| 6/30/2011 | 10:48:00 AM | 5.109 | 13.671 | 21.485 | 10.691 |
| 6/30/2011 | 10:49:00 AM | 5.081 | 13.7 | 21.869 | 10.57 |
| 6/30/2011 | 10:50:00 AM | 5.069 | 13.697 | 22.633 | 10.633 |
| 6/30/2011 | 10:51:00 AM | 5.058 | 13.709 | 22.038 | 10.657 |
| 6/30/2011 | 10:52:00 AM | 5.002 | 13.748 | 22.181 | 10.78 |
| 6/30/2011 | 10:53:00 AM | 5.042 | 13.723 | 23.693 | 10.627 |
| 6/30/2011 | 10:54:00 AM | 5.032 | 13.743 | 24.111 | 10.794 |
| 6/30/2011 | 10:55:00 AM | 5.04 | 13.847 | 25.274 | 10.821 |
| 6/30/2011 | 10:56:00 AM | 5.101 | 13.788 | 27.727 | 10.806 |
| 6/30/2011 | 10:57:00 AM | 5.148 | 13.715 | 29.06 | 10.724 |
| 6/30/2011 | 10:58:00 AM | 5.17 | 13.717 | 29.778 | 10.549 |
| 6/30/2011 | 10:59:00 AM | 5.199 | 13.668 | 29.587 | 10.589 |
| 6/30/2011 | 11:00:00 AM | 5.16 | 13.683 | 27.616 | 10.606 |
| 6/30/2011 | 11:01:00 AM | 5.132 | 13.716 | 26.396 | 10.607 |
| 6/30/2011 | 11:02:00 AM | 5.008 | 13.715 | 26.147 | 10.683 |
| 6/30/2011 | 11:03:00 AM | 5.032 | 13.698 | 27.883 | 10.961 |
| 6/30/2011 | 11:04:00 AM | 5.082 | 13.648 | 28.543 | 11.072 |
| 6/30/2011 | 11:05:00 AM | 5.068 | 13.669 | 27.93 | 10.685 |
| 6/30/2011 | 11:06:00 AM | 5.048 | 13.679 | 27.276 | 10.534 |
| 6/30/2011 | 11:07:00 AM | 5.02 | 13.701 | 26.341 | 10.774 |
| 6/30/2011 | 11:08:00 AM | 5.071 | 13.647 | 26.901 | 10.75 |
| 6/30/2011 | 11:09:00 AM | 5.06 | 13.659 | 28.23 | 10.641 |
| 6/30/2011 | 11:10:00 AM | 5.121 | 13.593 | 28.121 | 10.602 |
| 6/30/2011 | 11:11:00 AM | 5.113 | 13.602 | 26.781 | 10.729 |
| 6/30/2011 | 11:12:00 AM | 5.067 | 13.632 | 25.426 | 10.462 |
| 6/30/2011 | 11:13:00 AM | 5.058 | 13.648 | 24.958 | 10.745 |
| 6/30/2011 | 11:14:00 AM | 5.079 | 13.621 | 23.488 | 10.66 |
| 6/30/2011 | 11:15:00 AM | 5.047 | 13.651 | 22.132 | 10.431 |
| 6/30/2011 | 11:16:00 AM | 4.983 | 13.717 | 20.813 | 10.692 |
| 6/30/2011 | 11:17:00 AM | 4.971 | 13.746 | 20.284 | 10.771 |
| 6/30/2011 | 11:18:00 AM | 4.988 | 13.73 | 19.535 | 10.817 |
| 6/30/2011 | 11:19:00 AM | 5.007 | 13.712 | 19.213 | 10.866 |
| 6/30/2011 | 11:20:00 AM | 4.953 | 13.767 | 18.998 | 10.678 |
| 6/30/2011 | 11:21:00 AM | 4.983 | 13.738 | 19.252 | 10.727 |
| 6/30/2011 | 11:22:00 AM | 5.021 | 13.713 | 19.402 | 10.744 |
| 6/30/2011 | 11:23:00 AM | 5.035 | 13.683 | 18.984 | 10.768 |
| 6/30/2011 | 11:24:00 AM | 4.994 | 13.729 | 18.638 | 10.792 |
| 6/30/2011 | 11:25:00 AM | 4.966 | 13.759 | 19.048 | 10.926 |
| 6/30/2011 | 11:26:00 AM | 5.029 | 13.7 | 19.087 | 10.964 |
| 6/30/2011 | 11:27:00 AM | 5.046 | 13.686 | 18.309 | 10.803 |

| | | | | | |
|---|---|---|---|---|---|
| 6/30/2011 | 11:28:00 AM | 5.036 | 13.707 | 18.542 | 10.741 |
| 6/30/2011 | 11:29:00 AM | 5.065 | 13.676 | 18.692 | 10.963 |
| 6/30/2011 | 11:30:00 AM | 5.053 | 13.673 | 18.167 | 10.891 |
| 6/30/2011 | 11:31:00 AM | 5.061 | 13.687 | 18.007 | 10.744 |
| 6/30/2011 | 11:32:00 AM | 5.125 | 13.618 | 17.529 | 10.909 |
| 6/30/2011 | 11:33:00 AM | 5.13 | 13.613 | 16.996 | 10.79 |
| 6/30/2011 | 11:34:00 AM | 5.105 | 13.633 | 17.218 | 10.536 |
| 6/30/2011 | 11:35:00 AM | 5.106 | 13.646 | 17.412 | 10.631 |
| 6/30/2011 | 11:36:00 AM | 5.092 | 13.654 | 17.505 | 10.703 |
| 6/30/2011 | 11:37:00 AM | 5.112 | 13.645 | 18.052 | 10.641 |
| 6/30/2011 | 11:38:00 AM | 5.092 | 13.655 | 17.623 | 10.696 |
| 6/30/2011 | 11:39:00 AM | 5.096 | 13.64 | 17.041 | 10.874 |
| 6/30/2011 | 11:40:00 AM | 5.056 | 13.681 | 16.506 | 10.809 |
| | Average | 5.08 | 13.71 | 22.12 | 10.75 |

**ExxonMobil**
**STACK $O_2$, $CO_2$ DATA**

**Test #:** **2-NOxSO2**
**Date:** **6/30/2011**
**Time:** **1520/1620**

| | $O_2$ | $CO_2$ | NOx | $SO_2$ |
|---|---|---|---|---|
| Range | 10 | 20 | 50 | 25 |
| Cal Gas | 5.00 | 10.16 | 22.7 | 12.9 |
| Analyzer Zero | 0.09 | 0.00 | -0.09 | 0.07 |
| Analyzer Span | 5.04 | 9.94 | 23.03 | 12.53 |
| Pre-Bias Zero | 0.10 | 0.01 | -0.11 | -0.19 |
| Pre-Bias Span | 4.94 | 9.90 | 22.84 | 11.85 |
| Post-Bias Zero | 0.14 | 0.00 | -0.12 | -0.02 |
| Post-Bias Span | 4.97 | 9.84 | 22.87 | 11.80 |
| Pre-test zero bias | 0.1% | 0.1% | 0.0% | -1.0% |
| Pre-test span bias | -1.0% | -0.2% | -0.4% | -2.7% |
| Post-test zero bias | 0.5% | 0.0% | -0.1% | -0.3% |
| Post-test span bias | -0.8% | -0.5% | -0.3% | -2.9% |
| Zero Drift | 0.4% | 0.0% | 0.0% | 0.7% |
| Span Drift | 0.3% | -0.3% | 0.1% | -0.2% |
| | PASS | PASS | PASS | PASS |
| **Average** | **4.95** | **13.72** | **11.15** | **11.25** |
| **Cal Corrected** | **5.00** | **14.13** | **11.13** | **12.28** |

**ExxonMobil**
**2-NOxSO2**

| Date | Time | O2 % | CO2 % | NOx ppm | SO2 ppm |
|---|---|---|---|---|---|
| 6/30/2011 | 3:21:00 PM | 4.937 | 13.737 | 13.718 | 11.03 |
| 6/30/2011 | 3:22:00 PM | 4.96 | 13.72 | 14.645 | 10.854 |
| 6/30/2011 | 3:23:00 PM | 5.004 | 13.672 | 15.425 | 10.696 |
| 6/30/2011 | 3:24:00 PM | 4.979 | 13.699 | 15.637 | 10.656 |
| 6/30/2011 | 3:25:00 PM | 5.022 | 13.653 | 15.676 | 10.597 |
| 6/30/2011 | 3:26:00 PM | 4.979 | 13.694 | 9.872 | 10.509 |
| 6/30/2011 | 3:27:00 PM | 4.932 | 13.729 | 9.98 | 10.991 |
| 6/30/2011 | 3:28:00 PM | 4.983 | 13.703 | 12.469 | 11.212 |
| 6/30/2011 | 3:29:00 PM | 5.007 | 13.663 | 13.565 | 11.025 |
| 6/30/2011 | 3:30:00 PM | 4.991 | 13.68 | 14.17 | 11.183 |
| 6/30/2011 | 3:31:00 PM | 4.979 | 13.683 | 14.114 | 11.356 |
| 6/30/2011 | 3:32:00 PM | 4.953 | 13.704 | 9.838 | 11.066 |
| 6/30/2011 | 3:33:00 PM | 4.917 | 13.73 | 9.355 | 11.108 |
| 6/30/2011 | 3:34:00 PM | 4.913 | 13.734 | 11.273 | 11.411 |
| 6/30/2011 | 3:35:00 PM | 4.907 | 13.751 | 12.506 | 11.493 |
| 6/30/2011 | 3:36:00 PM | 4.96 | 13.71 | 13.867 | 11.353 |
| 6/30/2011 | 3:37:00 PM | 4.996 | 13.685 | 14.241 | 11.14 |
| 6/30/2011 | 3:38:00 PM | 4.977 | 13.68 | 9.508 | 11.111 |
| 6/30/2011 | 3:39:00 PM | 4.98 | 13.668 | 8.824 | 11.375 |
| 6/30/2011 | 3:40:00 PM | 4.94 | 13.715 | 10.423 | 11.33 |
| 6/30/2011 | 3:41:00 PM | 4.9 | 13.747 | 11.049 | 11.318 |
| 6/30/2011 | 3:42:00 PM | 4.862 | 13.787 | 11.339 | 11.419 |
| 6/30/2011 | 3:43:00 PM | 4.893 | 13.769 | 11.655 | 11.289 |
| 6/30/2011 | 3:44:00 PM | 4.86 | 13.802 | 7.176 | 11.405 |
| 6/30/2011 | 3:45:00 PM | 4.897 | 13.759 | 7.676 | 11.615 |
| 6/30/2011 | 3:46:00 PM | 4.909 | 13.752 | 10.073 | 11.532 |
| 6/30/2011 | 3:47:00 PM | 4.929 | 13.726 | 10.966 | 11.355 |
| 6/30/2011 | 3:48:00 PM | 4.949 | 13.722 | 11.437 | 11.353 |
| 6/30/2011 | 3:49:00 PM | 4.904 | 13.768 | 11.083 | 11.197 |
| 6/30/2011 | 3:50:00 PM | 4.895 | 13.771 | 7.22 | 11.293 |
| 6/30/2011 | 3:51:00 PM | 4.912 | 13.728 | 8.048 | 11.632 |
| 6/30/2011 | 3:52:00 PM | 4.909 | 13.743 | 9.934 | 11.654 |
| 6/30/2011 | 3:53:00 PM | 4.928 | 13.739 | 10.915 | 11.545 |
| 6/30/2011 | 3:54:00 PM | 4.932 | 13.726 | 11.419 | 11.557 |
| 6/30/2011 | 3:55:00 PM | 4.938 | 13.729 | 11.556 | 11.374 |
| 6/30/2011 | 3:56:00 PM | 4.885 | 13.78 | 7.891 | 11.447 |
| 6/30/2011 | 3:57:00 PM | 4.909 | 13.75 | 9.494 | 11.476 |
| 6/30/2011 | 3:58:00 PM | 4.951 | 13.722 | 11.613 | 11.655 |
| 6/30/2011 | 3:59:00 PM | 5.034 | 13.641 | 12.813 | 11.552 |
| 6/30/2011 | 4:00:00 PM | 4.991 | 13.68 | 12.339 | 11.071 |
| 6/30/2011 | 4:01:00 PM | 4.967 | 13.708 | 12.225 | 11.263 |
| 6/30/2011 | 4:02:00 PM | 4.967 | 13.721 | 8.93 | 11.346 |
| 6/30/2011 | 4:03:00 PM | 4.956 | 13.722 | 8.634 | 11.305 |
| 6/30/2011 | 4:04:00 PM | 4.924 | 13.752 | 10.225 | 11.445 |
| 6/30/2011 | 4:05:00 PM | 4.895 | 13.78 | 11.27 | 11.382 |
| 6/30/2011 | 4:06:00 PM | 4.923 | 13.763 | 11.877 | 11.52 |
| 6/30/2011 | 4:07:00 PM | 4.899 | 13.768 | 11.722 | 11.196 |

| | | | | | |
|---|---|---|---|---|---|
| 6/30/2011 | 4:08:00 PM | 4.893 | 13.8 | 8.32 | 11.177 |
| 6/30/2011 | 4:09:00 PM | 4.986 | 13.716 | 9.156 | 11.356 |
| 6/30/2011 | 4:10:00 PM | 5.005 | 13.683 | 11.197 | 11.516 |
| 6/30/2011 | 4:11:00 PM | 5.012 | 13.67 | 12.088 | 11.2 |
| 6/30/2011 | 4:12:00 PM | 5.004 | 13.686 | 12.61 | 11.16 |
| 6/30/2011 | 4:13:00 PM | 4.991 | 13.692 | 11.866 | 11.14 |
| 6/30/2011 | 4:14:00 PM | 4.92 | 13.766 | 7.431 | 11.26 |
| 6/30/2011 | 4:15:00 PM | 4.949 | 13.744 | 8.021 | 11.737 |
| 6/30/2011 | 4:16:00 PM | 4.963 | 13.727 | 10.296 | 11.753 |
| 6/30/2011 | 4:17:00 PM | 4.992 | 13.705 | 11.891 | 11.295 |
| 6/30/2011 | 4:18:00 PM | 5.027 | 13.669 | 13.312 | 10.959 |
| 6/30/2011 | 4:19:00 PM | 5.084 | 13.615 | 13.69 | 10.345 |
| 6/30/2011 | 4:20:00 PM | 5.025 | 13.66 | 9.263 | 10.282 |
| | Average | 4.95 | 13.72 | 11.15 | 11.25 |

**ExxonMobil**
**STACK $O_2$, $CO_2$ DATA**

**Test #:** **3-NOxSO2**
**Date:** **7/1/2011**
**Time:** **1750/1850**

| | $O_2$ | $CO_2$ | NOx | $SO_2$ |
|---|---|---|---|---|
| Range | 10 | 20 | 50 | 25 |
| Cal Gas | 5.00 | 10.16 | 22.7 | 12.9 |
| Analyzer Zero | 0.06 | -0.01 | -0.02 | 0.02 |
| Analyzer Span | 5.15 | 9.98 | 22.77 | 12.52 |
| Pre-Bias Zero | 0.12 | -0.01 | -0.11 | -0.18 |
| Pre-Bias Span | 4.92 | 9.95 | 23.60 | 11.94 |
| Post-Bias Zero | 0.22 | 0.00 | -0.10 | 0.38 |
| Post-Bias Span | 5.02 | 9.90 | 22.93 | 12.23 |
| Pre-test zero bias | 0.5% | 0.0% | -0.2% | -0.8% |
| Pre-test span bias | -2.3% | -0.1% | 1.7% | -2.3% |
| Post-test zero bias | 1.6% | 0.1% | -0.2% | 1.4% |
| Post-test span bias | -1.3% | -0.4% | 0.3% | -1.2% |
| Zero Drift | 1.1% | 0.1% | 0.0% | 2.2% |
| Span Drift | 1.0% | -0.3% | -1.3% | 1.1% |
| | PASS | PASS | PASS | PASS |
| **Average** | **4.86** | **14.01** | **11.34** | **11.34** |
| **Cal Corrected** | **4.88** | **14.34** | **11.11** | **12.10** |

**ExxonMobil**
**3-NOxSO2**

| Date | Time | O2 % | CO2 % | NOx ppm | SO2 ppm |
|---|---|---|---|---|---|
| 7/1/2011 | 5:51:00 PM | 4.917 | 14.033 | 9.069 | 11.495 |
| 7/1/2011 | 5:52:00 PM | 4.893 | 14.066 | 10.829 | 11.537 |
| 7/1/2011 | 5:53:00 PM | 4.897 | 14.047 | 11.491 | 11.548 |
| 7/1/2011 | 5:54:00 PM | 4.888 | 14.073 | 11.81 | 11.375 |
| 7/1/2011 | 5:55:00 PM | 4.842 | 14.107 | 11.901 | 11.367 |
| 7/1/2011 | 5:56:00 PM | 4.82 | 14.124 | 10.843 | 11.123 |
| 7/1/2011 | 5:57:00 PM | 4.85 | 14.086 | 10.794 | 11.136 |
| 7/1/2011 | 5:58:00 PM | 4.87 | 14.073 | 11.19 | 11.142 |
| 7/1/2011 | 5:59:00 PM | 4.892 | 14.157 | 11.457 | 11.003 |
| 7/1/2011 | 6:00:00 PM | 4.891 | 14.219 | 11.553 | 11.031 |
| 7/1/2011 | 6:01:00 PM | 4.872 | 14.236 | 10.399 | 11.012 |
| 7/1/2011 | 6:02:00 PM | 4.853 | 14.248 | 5.087 | 11.344 |
| 7/1/2011 | 6:03:00 PM | 4.857 | 14.259 | 6.706 | 11.964 |
| 7/1/2011 | 6:04:00 PM | 4.914 | 14.223 | 8.689 | 12.089 |
| 7/1/2011 | 6:05:00 PM | 4.902 | 14.251 | 9.331 | 11.884 |
| 7/1/2011 | 6:06:00 PM | 4.878 | 14.29 | 10.123 | 11.614 |
| 7/1/2011 | 6:07:00 PM | 4.883 | 14.3 | 10.052 | 11.473 |
| 7/1/2011 | 6:08:00 PM | 4.901 | 14.293 | 9.573 | 11.436 |
| 7/1/2011 | 6:09:00 PM | 4.907 | 14.332 | 10.659 | 11.327 |
| 7/1/2011 | 6:10:00 PM | 4.976 | 14.343 | 11.586 | 11.251 |
| 7/1/2011 | 6:11:00 PM | 4.998 | 14.356 | 12.641 | 11.228 |
| 7/1/2011 | 6:12:00 PM | 5.038 | 14.315 | 13.139 | 11.246 |
| 7/1/2011 | 6:13:00 PM | 5.011 | 14.415 | 12.145 | 11.228 |
| 7/1/2011 | 6:14:00 PM | 4.961 | 14.443 | 5.737 | 11.498 |
| 7/1/2011 | 6:15:00 PM | 4.797 | 13.887 | 7.536 | 11.888 |
| 7/1/2011 | 6:16:00 PM | 4.832 | 13.866 | 10.009 | 11.861 |
| 7/1/2011 | 6:17:00 PM | 4.843 | 13.853 | 11.581 | 11.413 |
| 7/1/2011 | 6:18:00 PM | 4.869 | 13.817 | 12.973 | 11.226 |
| 7/1/2011 | 6:19:00 PM | 4.898 | 13.798 | 13.228 | 11.015 |
| 7/1/2011 | 6:20:00 PM | 4.857 | 13.828 | 12.774 | 10.992 |
| 7/1/2011 | 6:21:00 PM | 4.859 | 13.837 | 13.853 | 10.964 |
| 7/1/2011 | 6:22:00 PM | 4.875 | 13.792 | 14.52 | 10.797 |
| 7/1/2011 | 6:23:00 PM | 4.851 | 13.836 | 14.67 | 10.772 |
| 7/1/2011 | 6:24:00 PM | 4.846 | 13.818 | 15.891 | 10.969 |
| 7/1/2011 | 6:25:00 PM | 4.861 | 13.821 | 14.594 | 10.663 |
| 7/1/2011 | 6:26:00 PM | 4.758 | 13.912 | 6.716 | 11.017 |
| 7/1/2011 | 6:27:00 PM | 4.822 | 13.859 | 9.652 | 11.666 |
| 7/1/2011 | 6:28:00 PM | 4.864 | 13.807 | 12.295 | 11.588 |
| 7/1/2011 | 6:29:00 PM | 4.842 | 13.823 | 12.764 | 11.671 |
| 7/1/2011 | 6:30:00 PM | 4.801 | 13.875 | 13.317 | 11.443 |
| 7/1/2011 | 6:31:00 PM | 4.822 | 13.861 | 14.233 | 11.372 |
| 7/1/2011 | 6:32:00 PM | 4.819 | 13.857 | 13.884 | 11.242 |
| 7/1/2011 | 6:33:00 PM | 4.827 | 13.842 | 14.015 | 11.18 |
| 7/1/2011 | 6:34:00 PM | 4.812 | 13.869 | 14.892 | 11.052 |
| 7/1/2011 | 6:35:00 PM | 4.862 | 13.87 | 15.109 | 11.118 |
| 7/1/2011 | 6:36:00 PM | 4.865 | 13.871 | 14.978 | 10.976 |
| 7/1/2011 | 6:37:00 PM | 4.852 | 13.922 | 14.204 | 11.049 |

| | | | | | |
|---|---|---|---|---|---|
| 7/1/2011 | 6:38:00 PM | 4.791 | 13.962 | 6.871 | 11.333 |
| 7/1/2011 | 6:39:00 PM | 4.872 | 13.905 | 9.168 | 11.711 |
| 7/1/2011 | 6:40:00 PM | 4.904 | 13.88 | 10.913 | 11.749 |
| 7/1/2011 | 6:41:00 PM | 4.887 | 13.91 | 11.55 | 11.651 |
| 7/1/2011 | 6:42:00 PM | 4.834 | 13.964 | 11.117 | 11.54 |
| 7/1/2011 | 6:43:00 PM | 4.8 | 14.047 | 10.82 | 11.726 |
| 7/1/2011 | 6:44:00 PM | 4.787 | 14.06 | 10.338 | 11.876 |
| 7/1/2011 | 6:45:00 PM | 4.84 | 14.042 | 10.89 | 11.676 |
| 7/1/2011 | 6:46:00 PM | 4.744 | 13.929 | 10.917 | 11.216 |
| 7/1/2011 | 6:47:00 PM | 4.738 | 13.881 | 11.695 | 11.273 |
| 7/1/2011 | 6:48:00 PM | 4.822 | 13.803 | 13.062 | 11.167 |
| 7/1/2011 | 6:49:00 PM | 4.836 | 13.786 | 11.754 | 11.062 |
| 7/1/2011 | 6:50:00 PM | 4.802 | 13.824 | 6.684 | 11.267 |
| | Average | 4.86 | 14.01 | 11.34 | 11.34 |

CRUDE RESULTS

CLIENT: ExxonMobil AA
TEST NUMBER: 1-CRUDE
TEST DATE: 6/6/2011

| NAME | IE1 COMP 1 | IE1 COMP 2 | IE1 COMP 3 | AVERAGE |
|---|---|---|---|---|
| API Gravity (g/cc) | 15.5 | 15.5 | 15.5 | 15.5 |
| Density @ 60° F (g/cc) | 0.9627 | 0.9629 | 0.9629 | 0.9628 |
| Density @ 60° F (lb/cft) | 60.1 | 60.1 | 60.1 | 60.1 |
| HHV (Net BTU/US Gal) | 145,619 | 152,463 | 142,480 | 146,854 |
| HHV (Net BTU/US Lb) | 18,163 | 19,013 | 17,768 | 18,315 |
| HHV (Gross BTU/US Gal) | 154,363 | 163,866 | 149,990 | 156,073 |
| HHV (Gross BTU/US Lb) | 19,254 | 20,435 | 18,704 | 19,464 |
| Total Sulfur (Wt%) | 1.3 | 1.3 | 1.3 | 1.3 |
| Chlorine (ppm) | 61 | 68 | 66 | 64.7 |
| | 71 | 69 | 53 | |
| | mg/kg | mg/kg | mg/kg | |
| Antimony | ND < 23 | ND < 23 | ND < 22 | ND < 23 |
| Arsenic | ND < 4.6 | ND < 4.5 | ND < 4.4 | ND < 4.5 |
| Beryllium | ND < 4.6 | ND < 4.5 | ND < 4.4 | ND < 4.5 |
| Cadmium | ND < 2.3 | ND < 2.3 | ND < 2.2 | ND < 2.3 |
| Chromium | ND < 2.3 | ND < 2.3 | ND < 2.2 | ND < 2.3 |
| Cobalt | ND < 2.3 | ND < 2.3 | ND < 2.2 | ND < 2.3 |
| Lead | ND < 4.6 | ND < 4.5 | ND < 4.4 | ND < 4.5 |
| Manganese | ND < 4.6 | ND < 4.5 | ND < 4.4 | ND < 4.5 |
| Mercury | ND < 0.092 | ND < 0.097 | ND < 0.095 | ND < 0.095 |
| Nickel | 46 | 49 | 42 | 46 |
| Selenium | ND < 9.2 | ND < 9.1 | ND < 8.8 | ND < 9.0 |

CRUDE RESULTS

CLIENT: ExxonMobil AA
TEST NUMBER: 2-CRUDE
TEST DATE: 7/7/2011

| NAME | IE1 COMP 1 | IE1 COMP 2 | IE1 COMP 3 | AVERAGE |
|---|---|---|---|---|
| API Gravity (g/cc) | 16.1 | 16.1 | 16.1 | 16.1 |
| Density @ 60° F (g/cc) | 0.9588 | 0.9589 | 0.9588 | 0.9588 |
| Density @ 60° F (lb/cft) | 59.9 | 59.9 | 59.9 | 59.9 |
| HHV (Net BTU/US Gal) | 122,181 | 124,383 | 123,994 | 123,519 |
| HHV (Net BTU/US Lb) | 15,302 | 15,576 | 15,529 | 15,469 |
| HHV (Gross BTU/US Gal) | 121,982 | 125,038 | 124,503 | 123,841 |
| HHV (Gross BTU/US Lb) | 15,277 | 15,658 | 15,592 | 15,509 |
| Total Sulfur (Wt%) | 1.3 | 1.4 | 1.4 | 1.4 |
| Chlorine (ppm) | 65 | 74 | 66 | 68.0 |
| | 76 | 60 | 67 | |
| | mg/kg | mg/kg | mg/kg | |
| Antimony | ND < 23 | ND < 25 | ND < 24 | ND < 24 |
| Arsenic | ND < 4.6 | ND < 5.0 | ND < 4.7 | ND < 4.8 |
| Beryllium | ND < 4.6 | ND < 5.0 | ND < 4.7 | ND < 4.8 |
| Cadmium | ND < 2.3 | ND < 2.5 | ND < 2.4 | ND < 2.4 |
| Chromium | ND < 2.3 | ND < 2.5 | ND < 2.4 | ND < 2.4 |
| Cobalt | ND < 2.3 | ND < 2.5 | ND < 2.4 | ND < 2.4 |
| Lead | ND < 4.6 | ND < 5.0 | ND < 4.7 | ND < 4.8 |
| Manganese | ND < 4.6 | ND < 5.0 | ND < 4.7 | ND < 4.8 |
| Mercury | ND < 0.090 | ND < 0.083 | ND < 0.092 | ND < 0.088 |
| Nickel | 50 | 59 | 2 | 37 |
| Selenium | ND < 9.3 | ND < 9.9 | ND < 9.4 | ND < 9.5 |

CRUDE RESULTS

| | | | |
|---|---|---|---|
| CLIENT: | ExxonMobil | INITIALS: | AA |
| TEST NUMBER: | 3-CRUDE | | |
| TEST DATE: | 8/8/2011 | | |

| NAME | IE1 COMP 1 | IE1 COMP 2 | IE1 COMP 3 | AVERAGE |
|---|---|---|---|---|
| API Gravity (g/cc) | 15.9 | 15.9 | 15.9 | 15.9 |
| Density @ 60° F (g/cc) | 0.9600 | 0.9601 | 0.9602 | 0.9601 |
| Density @ 60° F (lb/cft) | 59.9 | 59.9 | 59.9 | 59.9 |
| HHV (Net BTU/US Gal) | 139,322 | 139,947 | 141,053 | 140,107 |
| HHV (Net BTU/US Lb) | 17,426 | 17,505 | 17,639 | 17,523 |
| HHV (Gross BTU/US Gal) | 145,746 | 146,615 | 148,143 | 146,835 |
| HHV (Gross BTU/US Lb) | 18,230 | 18,339 | 18,526 | 18,365 |
| Total Sulfur (Wt%) | 1.37 | 1.38 | 1.38 | 1.38 |
| Chlorine (ppm) | 60 | 81 | 48 | 60.8 |
| | 50 | 77 | 49 | |
| | mg/kg | mg/kg | mg/kg | |
| Antimony | ND < 23 | ND < 25 | ND < 24 | ND < 24 |
| Arsenic | ND < 4.7 | ND < 5.0 | ND < 4.7 | ND < 4.8 |
| Beryllium | ND < 4.7 | ND < 5.0 | ND < 4.7 | ND < 4.8 |
| Cadmium | ND < 2.3 | ND < 2.5 | ND < 2.4 | ND < 2.4 |
| Chromium | ND < 2.3 | ND < 2.5 | ND < 2.4 | ND < 2.4 |
| Cobalt | ND < 2.3 | ND < 2.5 | ND < 2.4 | ND < 2.4 |
| Lead | ND < 4.7 | ND < 5.0 | ND < 4.7 | ND < 4.8 |
| Manganese | ND < 4.7 | ND < 5.0 | ND < 4.7 | ND < 4.8 |
| Mercury | ND < 0.084 | ND < 0.090 | ND < 0.091 | ND < 0.088 |
| Nickel | 70 | 72 | 66 | 69 |
| Selenium | ND < 9.3 | ND < 10.0 | ND < 9.4 | ND < 9.6 |

Quantum
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| | |
|---|---|
| **CLIENT:** | **: Delta Air Quality** |
| **CLIENT PROJECT NO** | **: XDM-Crude Unit IE1** |
| **QUANTUM PROJECT NUMBER** | **: 11-392** |
| **REPORT DATE** | **: June 20, 2011** |

Enclosed please find the analytical report for the above referenced project. The samples included in this report were received on June 6, 2011. The samples were assigned a specific laboratory project number, and were analyzed in accordance with the attached chain-of-custody.

I certify that the results in this report are technically accurate and in compliance with the terms and condition of the contract. Release to the data package has been approved by the laboratory president as verified in the following signature. Please contact me if you have any question.

**Thank you for giving us the opportunity to serve you. We appreciate your business and the confidence you have placed in us. Please contact me for further assistance or with any question.**

Andrew Kitto, Ph.D.
President

Quantum Analytical Services Inc.
1210 E. 223rd Street, Suite #314 • Carson, California 90745 • 310/830-2226 • Fax 310/830-2227
www.quantumairlab.com

C.15-6

**CLIENT:** Delta Air Quality
**CLIENT PROJECT:** XOM (Crude Unit IE1)
**PROJECT NO:** 11-392
**SAMPLING DATE:** June 6, 2011
**RECEIVING DATE:** June 6, 2011
**ANALYSIS DATE:** June 6-17, 2011
**REPORT DATE:** June 20, 2011

**Laboratory Analysis Report**

| ANALYTE | Units | Test Method | PQL | Sample ID | | |
|---|---|---|---|---|---|---|
| | | | | IE1 Comp 1 | IE1 Comp 2 | IE1 Comp 3 |
| API Gravity | API | ASTM D-4052 | 0.1 | 15.5 | 15.5 | 15.5 |
| Density@60°F | g/cc | ASTM D-4052 | 0.0001 | 0.9627 | 0.9629 | 0.9629 |
| Density@60°F | lb/cft | ASTM D-4052 | 0.1 | 60.1 | 60.1 | 60.1 |
| HHV Net BTU/US Gal | Net BTU/US Gal | ASTM D-240 | 10 | 145,619 | 152,463 | 142,480 |
| HHV Net BTU/US Lb | Net BTU/US Lb | ASTM D-240 | 10 | 18,163 | 19,013 | 17,768 |
| HHV Gross BTU/US Ga | Gross BTU/US Gal | ASTM D-240 | 10 | 154,363 | 163,866 | 149,990 |
| HHV Gross BTU/US Lb | Gross BTU/US Lb | ASTM D-240 | 10 | 19,254 | 20,435 | 18,704 |
| Total Sulfur | Wt% | ASTM D-2622 | 0.05 | 1.30 | 1.30 | 1.3 |

PQL: Practical Quantitation Limit

Dr. Andrew Kitto

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**CLIENT:** Delta Air Quality
**CLIENT PROJECT:** XDM (Crude Unit IE1)
**PROJECT NO:** 11-392
**SAMPLING DATE:** June 6, 2011
**RECEIVING DATE:** June 6, 2011
**ANALYSIS DATE:** June 6-17, 2011
**REPORT DATE:** June 20, 2011

## Laboratory Analysis Report

| ANALYTE | Units | Test Method | PQL | Sample ID | | |
|---|---|---|---|---|---|---|
| | | | | IE1 Comp 1 | IE1 Comp 2 | IE1 Comp 3 |
| Chlorine | PPM | EPA SW846-9076 | 50 | 61 | 68 | 66 |
| | PPM | EPA SW846-9076 | 50 | 71 | 69 | 53 |

PQL: Practical Quantitation Limit in PPM
Samples were anslyzed in duplicates

## Matrix Spiked

| Sample ID | Units | Method | Amount Spiked (mg) | % Recovery |
|---|---|---|---|---|
| IE1 Comp. 1 | PPM | EPA SW846-9076 | 27.0 | 106.7 |
| IE1 Comp. 1 | PPM | EPA SW846-9076 | 32.6 | 104.8 |
| IE1 Comp. 2 | PPM | EPA SW846-9076 | 40.4 | 106.0 |
| IE1 Comp. 2 | PPM | EPA SW846-9076 | 26.9 | 103.9 |
| IE1 Comp. 3 | PPM | EPA SW846-9076 | 45.8 | 110.0 |
| IE1 Comp. 3 | PPM | EPA SW846-9076 | 35.5 | 105.3 |

Dr. Andrew Kitto
President

ilfield Environmental and Compliance, INC.

| | | |
|---|---|---|
| Quantum Analytical Services, Inc | Project: Distillation Feed Composition | |
| 1210 E. 223rd Street, Suite #314 | Project Number: Delta/XOM 11-392 | **Reported:** |
| Carson CA, 90745 | Project Manager: Dr. Andrew Kitto | 16-Jun-11 12:49 |

## 1E1 Comp #1
### 1102689-01 (Product)

| Analyte | Result | Reporting Limit | Units | Dilution | Batch | Prepared | Analyzed | Method | Notes |
|---|---|---|---|---|---|---|---|---|---|

## Oilfield Environmental and Compliance

**Total Metals by EPA 6000/7000 Series Methods**

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Antimony | ND | 23 | mg/kg | 5 | A106188 | 10-Jun-11 | 15-Jun-11 | EPA 6010B | |
| Arsenic | ND | 4.6 | " | " | " | " | " | " | |
| Beryllium | ND | 4.6 | " | " | " | " | " | " | |
| Cadmium | ND | 2.3 | " | " | " | " | " | " | |
| Chromium | ND | 2.3 | " | " | " | " | " | " | |
| Cobalt | ND | 2.3 | " | " | " | " | " | " | |
| Lead | ND | 4.6 | " | " | " | " | " | " | |
| anganese | ND | 4.6 | " | " | " | " | " | " | |
| Mercury | ND | 0.092 | " | 1 | A106208 | 13-Jun-11 | 13-Jun-11 | EPA 7471A | |
| **Nickel** | **46** | 2.3 | " | 5 | A106188 | 10-Jun-11 | 15-Jun-11 | EPA 6010B | |
| Selenium | ND | 9.2 | " | " | " | " | " | " | |

Oilfield Environmental and Compliance, INC.

| | | |
|---|---|---|
| Quantum Analytical Services, Inc<br>1210 E. 223rd Street, Suite #314<br>Carson CA, 90745 | Project: Distillation Feed Composition<br>Project Number: Delta/XOM 11-392<br>Project Manager: Dr. Andrew Kitto | **Reported:**<br>16-Jun-11 12:49 |

## 1E1 Comp #2
### 1102689-02 (Product)

| Analyte | Result | Reporting Limit | Units | Dilution | Batch | Prepared | Analyzed | Method | Notes |
|---|---|---|---|---|---|---|---|---|---|
| **Oilfield Environmental and Compliance** | | | | | | | | | |
| **Total Metals by EPA 6000/7000 Series Methods** | | | | | | | | | |
| Antimony | ND | 23 | mg/kg | 5 | A106188 | 10-Jun-11 | 15-Jun-11 | EPA 6010B | |
| Arsenic | ND | 4.5 | " | " | " | " | " | " | |
| Beryllium | ND | 4.5 | " | " | " | " | " | " | |
| Cadmium | ND | 2.3 | " | " | " | " | " | " | |
| Chromium | ND | 2.3 | " | " | " | " | " | " | |
| Cobalt | ND | 2.3 | " | " | " | " | " | " | |
| Lead | ND | 4.5 | " | " | " | " | " | " | |
| Manganese | ND | 4.5 | " | " | " | " | " | " | |
| Mercury | ND | 0.097 | " | 1 | A106208 | 13-Jun-11 | 13-Jun-11 | EPA 7471A | |
| **Nickel** | **49** | 2.3 | " | 5 | A106188 | 10-Jun-11 | 15-Jun-11 | EPA 6010B | |
| Selenium | ND | 9.1 | " | " | " | " | " | " | |

## 1E1 Comp #3
### 1102689-03 (Product)

| Analyte | Result | Reporting Limit | Units | Dilution | Batch | Prepared | Analyzed | Method | Notes |
|---|---|---|---|---|---|---|---|---|---|
| **Oilfield Environmental and Compliance** | | | | | | | | | |
| **Total Metals by EPA 6000/7000 Series Methods** | | | | | | | | | |
| Antimony | ND | 22 | mg/kg | 5 | A106188 | 10-Jun-11 | 15-Jun-11 | EPA 6010B | |
| Arsenic | ND | 4.4 | " | " | " | " | " | " | |
| Beryllium | ND | 4.4 | " | " | " | " | " | " | |
| Cadmium | ND | 2.2 | " | " | " | " | " | " | |
| Chromium | ND | 2.2 | " | " | " | " | " | " | |
| Cobalt | ND | 2.2 | " | " | " | " | " | " | |
| Lead | ND | 4.4 | " | " | " | " | " | " | |
| Manganese | ND | 4.4 | " | " | " | " | " | " | |
| Mercury | ND | 0.095 | " | 1 | A106208 | 13-Jun-11 | 13-Jun-11 | EPA 7471A | |
| **Nickel** | **42** | 2.2 | " | 5 | A106188 | 10-Jun-11 | 15-Jun-11 | EPA 6010B | |
| Selenium | ND | 8.8 | " | " | " | " | " | " | |

ilfield Environmental and Compliance, INC.

| | | |
|---|---|---|
| Quantum Analytical Services, Inc | Project: Distillation Feed Composition | |
| 1210 E. 223rd Street, Suite #314 | Project Number: Delta/XOM 11-392 | **Reported:** |
| Carson CA, 90745 | Project Manager: Dr. Andrew Kitto | 16-Jun-11 12:49 |

## Total Metals by EPA 6000/7000 Series Methods - Quality Control

| Analyte | Result | Reporting Limit | Units | Spike Level | Source Result | %REC | %REC Limits | RPD | RPD Limit | Notes |
|---|---|---|---|---|---|---|---|---|---|---|
| **Batch A106188 - EPA 3050B** | | | | | | | | | | |
| **Blank (A106188-BLK1)** | | | | Prepared: 10-Jun-11 Analyzed: 15-Jun-11 | | | | | | |
| Antimony | ND | 5.0 | mg/kg | | | | | | | |
| Arsenic | ND | 1.0 | " | | | | | | | |
| Beryllium | ND | 1.0 | " | | | | | | | |
| Cadmium | ND | 0.50 | " | | | | | | | |
| Chromium | ND | 0.50 | " | | | | | | | |
| Cobalt | ND | 0.50 | " | | | | | | | |
| Lead | ND | 1.0 | " | | | | | | | |
| Manganese | ND | 1.0 | " | | | | | | | |
| Nickel | ND | 0.50 | " | | | | | | | |
| Selenium | ND | 2.0 | " | | | | | | | |
| **LCS (A106188-BS1)** | | | | Prepared: 10-Jun-11 Analyzed: 15-Jun-11 | | | | | | |
| Antimony | 94.4 | 5.0 | mg/kg | 100 | | 94.4 | 85-115 | | | |
| Arsenic | 95.1 | 1.0 | " | 100 | | 95.1 | 85-115 | | | |
| Beryllium | 103 | 1.0 | " | 100 | | 103 | 85-115 | | | |
| Cadmium | 105 | 0.50 | " | 100 | | 105 | 85-115 | | | |
| Chromium | 100 | 0.50 | " | 100 | | 100 | 85-115 | | | |
| Cobalt | 105 | 0.50 | " | 100 | | 105 | 85-115 | | | |
| Lead | 104 | 1.0 | " | 100 | | 104 | 85-115 | | | |
| Manganese | 294 | 1.0 | " | 300 | | 97.9 | 85-115 | | | |
| Nickel | 104 | 0.50 | " | 100 | | 104 | 85-115 | | | |
| Selenium | 96.7 | 2.0 | " | 100 | | 96.7 | 85-115 | | | |
| **LCS Dup (A106188-BSD1)** | | | | Prepared: 10-Jun-11 Analyzed: 15-Jun-11 | | | | | | |
| Antimony | 93.4 | 5.0 | mg/kg | 100 | | 93.4 | 85-115 | 1.03 | 20 | |
| Arsenic | 93.1 | 1.0 | " | 100 | | 93.1 | 85-115 | 2.15 | 20 | |
| Beryllium | 102 | 1.0 | " | 100 | | 102 | 85-115 | 1.17 | 20 | |
| Cadmium | 105 | 0.50 | " | 100 | | 105 | 85-115 | 0.762 | 20 | |
| Chromium | 100 | 0.50 | " | 100 | | 100 | 85-115 | 0.200 | 20 | |
| Cobalt | 103 | 0.50 | " | 100 | | 103 | 85-115 | 1.64 | 20 | |
| Lead | 103 | 1.0 | " | 100 | | 103 | 85-115 | 1.35 | 20 | |
| Manganese | 294 | 1.0 | " | 300 | | 97.8 | 85-115 | 0.102 | 20 | |
| Nickel | 104 | 0.50 | " | 100 | | 104 | 85-115 | 0.672 | 20 | |
| Selenium | 94.8 | 2.0 | " | 100 | | 94.8 | 85-115 | 2.03 | 20 | |

Oilfield Environmental and Compliance, INC.

| | | |
|---|---|---|
| Quantum Analytical Services, Inc<br>1210 E. 223rd Street, Suite #314<br>Carson CA, 90745 | Project: Distillation Feed Composition<br>Project Number: Delta/XOM 11-392<br>Project Manager: Dr. Andrew Kitto | **Reported:**<br>16-Jun-11 12:49 |

## Total Metals by EPA 6000/7000 Series Methods - Quality Control

| Analyte | Result | Reporting Limit | Units | Spike Level | Source Result | %REC | %REC Limits | RPD | RPD Limit | Notes |
|---|---|---|---|---|---|---|---|---|---|---|
| **Batch A106188 - EPA 3050B** | | | | | | | | | | |
| **Duplicate (A106188-DUP1)** | | **Source: 1102674-01** | | Prepared: 10-Jun-11 Analyzed: 15-Jun-11 | | | | | | |
| Antimony | ND | 23 | mg/kg | | ND | | | | 20 | |
| Arsenic | 2.31 | 4.5 | " | | ND | | | | 20 | |
| Beryllium | ND | 4.5 | " | | ND | | | | 20 | |
| Cadmium | ND | 2.3 | " | | ND | | | | 20 | |
| Chromium | 26.6 | 2.3 | " | | 24.1 | | | 9.85 | 20 | |
| Cobalt | 3.12 | 2.3 | " | | 2.40 | | | 25.9 | 20 | QR-04 |
| Lead | 9.72 | 4.5 | " | | 11.1 | | | 12.9 | 20 | |
| Manganese | 121 | 4.5 | " | | 122 | | | 1.06 | 20 | |
| Nickel | 24.9 | 2.3 | " | | 21.3 | | | 15.6 | 20 | |
| Selenium | ND | 9.0 | " | | ND | | | | 20 | |
| **Matrix Spike (A106188-MS1)** | | **Source: 1102674-01** | | Prepared: 10-Jun-11 Analyzed: 15-Jun-11 | | | | | | |
| Antimony | 735 | 98 | mg/kg | 984 | ND | 74.7 | 0-129 | | | |
| Arsenic | 917 | 20 | " | 984 | ND | 93.2 | 70-116 | | | |
| Beryllium | 1020 | 20 | " | 984 | ND | 104 | 75-125 | | | |
| Cadmium | 1020 | 9.8 | " | 984 | ND | 104 | 76-123 | | | |
| Chromium | 1020 | 9.8 | " | 984 | 24.1 | 101 | 62-138 | | | |
| Cobalt | 996 | 9.8 | " | 984 | 2.40 | 101 | 75-125 | | | |
| Lead | 1010 | 20 | " | 984 | 11.1 | 102 | 67-137 | | | |
| Manganese | 6150 | 20 | " | 5910 | 122 | 102 | 49-163 | | | |
| Nickel | 1020 | 9.8 | " | 984 | 21.3 | 102 | 67-133 | | | |
| Selenium | 935 | 39 | " | 984 | ND | 95.0 | 68-118 | | | |
| **Matrix Spike Dup (A106188-MSD1)** | | **Source: 1102674-01** | | Prepared: 10-Jun-11 Analyzed: 15-Jun-11 | | | | | | |
| Antimony | 669 | 89 | mg/kg | 890 | ND | 75.1 | 0-129 | 0.587 | 20 | |
| Arsenic | 843 | 18 | " | 890 | ND | 94.8 | 70-116 | 1.68 | 20 | |
| Beryllium | 948 | 18 | " | 890 | ND | 107 | 75-125 | 2.49 | 20 | |
| Cadmium | 939 | 8.9 | " | 890 | ND | 106 | 76-123 | 1.61 | 20 | |
| Chromium | 951 | 8.9 | " | 890 | 24.1 | 104 | 62-138 | 2.92 | 20 | |
| Cobalt | 908 | 8.9 | " | 890 | 2.40 | 102 | 75-125 | 0.823 | 20 | |
| Lead | 936 | 18 | " | 890 | 11.1 | 104 | 67-137 | 2.20 | 20 | |
| Manganese | 5700 | 18 | " | 5340 | 122 | 104 | 49-163 | 2.30 | 20 | |
| Nickel | 948 | 8.9 | " | 890 | 21.3 | 104 | 67-133 | 2.24 | 20 | |
| Selenium | 853 | 36 | " | 890 | ND | 95.9 | 68-118 | 0.880 | 20 | |

ilfield Environmental and Compliance, INC.

| | | |
|---|---|---|
| Quantum Analytical Services, Inc<br>1210 E. 223rd Street, Suite #314<br>Carson CA, 90745 | Project: Distillation Feed Composition<br>Project Number: Delta/XOM 11-392<br>Project Manager: Dr. Andrew Kitto | **Reported:**<br>16-Jun-11 12:49 |

## Total Metals by EPA 6000/7000 Series Methods - Quality Control

| Analyte | Result | Reporting Limit | Units | Spike Level | Source Result | %REC | %REC Limits | RPD | RPD Limit | Notes |
|---|---|---|---|---|---|---|---|---|---|---|
| **Batch A106208 - EPA 7471A Prep** | | | | | | | | | | |
| **Blank (A106208-BLK1)** | | | | Prepared & Analyzed: 13-Jun-11 | | | | | | |
| Mercury | ND | 0.10 | mg/kg | | | | | | | |
| **LCS (A106208-BS1)** | | | | Prepared & Analyzed: 13-Jun-11 | | | | | | |
| Mercury | 0.868 | 0.10 | mg/kg | 0.833 | | 104 | 85-115 | | | |
| **LCS Dup (A106208-BSD1)** | | | | Prepared & Analyzed: 13-Jun-11 | | | | | | |
| Mercury | 0.878 | 0.10 | mg/kg | 0.833 | | 105 | 85-115 | 1.13 | 20 | |
| **Duplicate (A106208-DUP1)** | | **Source: 1102674-01** | | Prepared & Analyzed: 13-Jun-11 | | | | | | |
| Mercury | 0.0205 | 0.082 | mg/kg | | 0.0179 | | | 13.4 | 20 | |
| **Matrix Spike (A106208-MS1)** | | **Source: 1102674-01** | | Prepared & Analyzed: 13-Jun-11 | | | | | | |
| Mercury | 0.468 | 0.078 | mg/kg | 0.649 | 0.0179 | 69.3 | 75-125 | | | QM-08 |
| **atrix Spike Dup (A106208-MSD1)** | | **Source: 1102674-01** | | Prepared & Analyzed: 13-Jun-11 | | | | | | |
| ercury | 0.878 | 0.10 | mg/kg | 0.833 | 0.0179 | 103 | 75-125 | 39.3 | 20 | QR-04 |

Oilfield Environmental and Compliance, INC.

| | | |
|---|---|---|
| Quantum Analytical Services, Inc<br>1210 E. 223rd Street, Suite #314<br>Carson CA, 90745 | Project: Distillation Feed Composition<br>Project Number: Delta/XOM 11-392<br>Project Manager: Dr. Andrew Kitto | **Reported:**<br>16-Jun-11 12:49 |

## Notes and Definitions

| | |
|---|---|
| QR-04 | The RPD exceeded the QC control limits. |
| QM-08 | The spike recovery was outside acceptance limits for the MS and/or MSD. The QC Batch was accepted based on LCS/LCSD percent recoveries and RPD values. |
| DET | Analyte DETECTED |
| ND | Analyte NOT DETECTED at or above the reporting limit |
| NR | Not Reported |
| dry | Sample results reported on a dry weight basis |
| RPD | Relative Percent Difference |

## CHAIN OF CUSTODY

CONFIDENTIAL

CLIENT: XOM

TEST DATE(S): 6/6/11

LOCATION: Crude Unit (1E1)

SAMPLER(S): D. Kemp / J. Kim / N. Gilbert

SAMPLE LOCATION: 1E1

PROJECT MANAGER: Parvez Abbas

TEST METHOD(S): AS IN PROTOCOL

DATE DUE: 7 DAYS

OUTSIDE LAB REQUIRED?: Yes

COMPLIANCE TEST? NO

| DATE | TIME | TEST # | SAMPLE DESCRIPTION | CONTAINERS | SAMPLER | COMMENTS |
|---|---|---|---|---|---|---|
| 6/6/11 | 10:15 | 1E1 Comp #1 | Crude Oil | 1 | | 10:05 Sample 1 |
| | | | | | | 10:10 Sample 2 |
| | | | | | | 10:15 Sample 3 |
| | | | | | | |
| 6/6/11 | 10:30 | 1E1 Comp #2 | Crude Oil | 1 | | 10:20 Sample 4 |
| | | | | | | 10:25 Sample 5 |
| | | | | | | 10:30 Sample 6 |
| | | | | | | |
| 6/6/11 | 10:45 | 1E1 Comp #3 | Crude Oil | 1 | | 10:35 Sample 7 |
| | | | | | | 10:40 Sample 8 |
| | | | | | | 10:45 Sample 9 |
| | | | | | | |
| | | | | | | |

| RELEASED BY | DATE/TIME | RECEIVED BY | DATE/TIME |
|---|---|---|---|
| Jun Kim | 6/6/11 11:05 AM | [signature] | 6/6/11 11:05 AM |
| D. McCune | 6/6/11 11:25 A.M. | D. McCune | 6/6/11 11:27 AM |
| | | [signature] | 6/6/11 11:25 AM |

ANALYSIS REQUIRED: REFER PROTOCOL (DELTA R529098) - TABLE 3-3

Delta

DS834001

Date of last revision – 11/13/2008

Master Document Storage\Forms\Datasheets\Lab Forms

Quantum Analytical Services Inc.
1210 E. 223rd Street, Suite #314 • Carson, California 90745 • 310/830-2226 • Fax 310/830-2227
www.quantumairlab.com

C.15-15

| | |
|---|---|
| **CLIENT:** | **Delta Air Quality** |
| **CLIENT PROJECT:** | **XOM (Crude Unit IE1)** |
| **PROJECT NO:** | **11-475** |
| **SAMPLING DATE:** | July 7, 2011 |
| **RECEIVING DATE:** | July 7, 2011 |
| **ANALYSIS DATE:** | July 8-18, 2011 |
| **REPORT DATE:** | July 19, 2011 |

**Laboratory Analysis Report**

| ANALYTE | Units | Test Method | PQL | Sample ID | | |
|---|---|---|---|---|---|---|
| | | | | IE1 Comp 1 | IE1 Comp 2 | IE1 Comp 3 |
| **API Gravity** | **API** | ASTM D-4052 | **0.1** | 16.1 | 16.1 | 16.1 |
| **Density@60°F** | g/cc | ASTM D-4052 | **0.0001** | 0.9588 | 0.9589 | 0.9588 |
| **Density@60°F** | lb/cft | ASTM D-4052 | **0.1** | 59.9 | 59.9 | 59.9 |
| **HHV** Net BTU/US Gal | **Net BTU/US Gal** | ASTM D-240 | **10** | 122,181 | 124,383 | 123,994 |
| **HHV** Net BTU/US Lb | **Net BTU/US Lb** | ASTM D-240 | **10** | 15,302 | 15,576 | 15,529 |
| **HHV** Gross BTU/US Gal | **Gross BTU/US Gal** | ASTM D-240 | **10** | 121,982 | 125,038 | 124,503 |
| **HHV** Gross BTU/US Lb | **Gross BTU/US Lb** | ASTM D-240 | **10** | 15,277 | 15,658 | 15,592 |
| **Total Sulfur** | **Wt%** | ASTM D-2622 | **0.05** | 1.3 | 1.4 | 1.4 |

PQL: Practical Quantitation Limit

Dr. Andrew Kitto
President

Quantum Analytical Services Inc.
www.quantumairlab.com
1210 E. 223rd Street, Suite #314 • Carson, California 90745 • 310/830-2226 • Fax 310/830-2227

**CLIENT:** Delta Air Quality
**CLIENT PROJECT:** XOM (Crude Unit IE1)
**PROJECT NO:** 11-475
**SAMPLING DATE:** July 7, 2011
**RECEIVING DATE:** July 7, 2011
**ANALYSIS DATE:** July 8-18, 2011
**REPORT DATE:** July 19, 2011

## Laboratory Analysis Report

| ANALYTE | Units | Test Method | PQL | Sample ID IE1 Comp 1 PPM | IE1 Comp 2 PPM | IE1 Comp 3 PPM |
|---|---|---|---|---|---|---|
| Chlorine | PPM | EPA SW846-9076 | 50 | 65 | 74 | 66 |
| | PPM | EPA SW846-9076 | 50 | 76 | 60 | 67 |

PQL: Practical Quantitation Limit in PPM
Samples were anslyzed in duplicates

## Matrix Spiked

| Sample ID | Units | Method | Amount Spiked (mg) | % Recovery |
|---|---|---|---|---|
| IE1 Comp. 1 | PPM | EPA SW846-9076 | 22.6 | 101.8 |
| IE1 Comp. 1 | PPM | EPA SW846-9076 | 28.7 | 94.4 |
| IE1 Comp. 2 | PPM | EPA SW846-9076 | 38.5 | 96.1 |
| IE1 Comp. 2 | PPM | EPA SW846-9076 | 31.4 | 108.9 |
| IE1 Comp. 3 | PPM | EPA SW846-9076 | 25.7 | 107.3 |

Dr. Andrew Kitto
President

Oilfield Environmental and Compliance, INC.

| | | |
|---|---|---|
| Quantum Analytical Services, Inc<br>1210 E. 223rd Street, Suite #314<br>Carson CA, 90745 | Project: Distillation Feed Composition<br>Project Number: Distillation Feed Composition, 11-475<br>Project Manager: Dr. Andrew Kitto | **Reported:**<br>18-Jul-11 16:30 |

## ANALYTICAL REPORT FOR SAMPLES

| Sample ID | Laboratory ID | Matrix | Date Sampled | Date Received |
|---|---|---|---|---|
| 1E1 Comp #1 | 1103267-01 | Product | 07-Jul-11 10:54 | 08-Jul-11 10:30 |
| 1E1 Comp #2 | 1103267-02 | Product | 07-Jul-11 11:09 | 08-Jul-11 10:30 |
| 1E1 Comp #3 | 1103267-03 | Product | 07-Jul-11 11:24 | 08-Jul-11 10:30 |

ılfield Environmental and Compliance, INC.

| | | |
|---|---|---|
| Quantum Analytical Services, Inc<br>1210 E. 223rd Street, Suite #314<br>Carson CA, 90745 | Project: Distillation Feed Composition<br>Project Number: Distillation Feed Composition, 11-475<br>Project Manager: Dr. Andrew Kitto | **Reported:**<br>18-Jul-11 16:30 |

## 1E1 Comp #1

**1103267-01 (Product)**

| Analyte | Result | Reporting Limit | Units | Dilution | Batch | Prepared | Analyzed | Method | Notes |
|---|---|---|---|---|---|---|---|---|---|

## Oilfield Environmental and Compliance

**Total Metals by EPA 6000/7000 Series Methods**

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Antimony | ND | 23 | mg/kg | 5 | A107215 | 12-Jul-11 | 14-Jul-11 | EPA 6010B | |
| Arsenic | ND | 4.6 | " | " | " | " | " | " | |
| Beryllium | ND | 4.6 | " | " | " | " | " | " | |
| Cadmium | ND | 2.3 | " | " | " | " | " | " | |
| Chromium | ND | 2.3 | " | " | " | " | " | " | |
| Cobalt | ND | 2.3 | " | " | " | " | " | " | |
| Lead | ND | 4.6 | " | " | " | " | " | " | |
| ınganese | ND | 4.6 | " | " | " | " | " | " | |
| ıercury | ND | 0.090 | " | 1 | A107216 | 13-Jul-11 | 13-Jul-11 | EPA 7471A | |
| **Nickel** | **50** | 2.3 | " | 5 | A107215 | 12-Jul-11 | 14-Jul-11 | EPA 6010B | |
| Selenium | ND | 9.3 | " | " | " | " | " | " | |

Oilfield Environmental and Compliance, INC.

| | | |
|---|---|---|
| Quantum Analytical Services, Inc<br>1210 E. 223rd Street, Suite #314<br>Carson CA, 90745 | Project: Distillation Feed Composition<br>Project Number: Distillation Feed Composition, 11-475<br>Project Manager: Dr. Andrew Kitto | **Reported:**<br>18-Jul-11 16:30 |

## 1E1 Comp #2

**1103267-02 (Product)**

| Analyte | Result | Reporting Limit | Units | Dilution | Batch | Prepared | Analyzed | Method | Notes |
|---|---|---|---|---|---|---|---|---|---|
| **Oilfield Environmental and Compliance** | | | | | | | | | |
| **Total Metals by EPA 6000/7000 Series Methods** | | | | | | | | | |
| Antimony | ND | 25 | mg/kg | 5 | A107215 | 12-Jul-11 | 14-Jul-11 | EPA 6010B | |
| Arsenic | ND | 5.0 | " | " | " | " | " | " | |
| Beryllium | ND | 5.0 | " | " | " | " | " | " | |
| Cadmium | ND | 2.5 | " | " | " | " | " | " | |
| Chromium | ND | 2.5 | " | " | " | " | " | " | |
| Cobalt | ND | 2.5 | " | " | " | " | " | " | |
| Lead | ND | 5.0 | " | " | " | " | " | " | |
| Manganese | ND | 5.0 | " | " | " | " | " | " | |
| Mercury | ND | 0.083 | " | 1 | A107216 | 13-Jul-11 | 13-Jul-11 | EPA 7471A | |
| **Nickel** | **59** | 2.5 | " | 5 | A107215 | 12-Jul-11 | 14-Jul-11 | EPA 6010B | |
| Selenium | ND | 9.9 | " | " | " | " | " | " | |

## 1E1 Comp #3

**1103267-03 (Product)**

| Analyte | Result | Reporting Limit | Units | Dilution | Batch | Prepared | Analyzed | Method | Notes |
|---|---|---|---|---|---|---|---|---|---|
| **Oilfield Environmental and Compliance** | | | | | | | | | |
| **Total Metals by EPA 6000/7000 Series Methods** | | | | | | | | | |
| Antimony | ND | 24 | mg/kg | 5 | A107215 | 12-Jul-11 | 14-Jul-11 | EPA 6010B | |
| Arsenic | ND | 4.7 | " | " | " | " | " | " | |
| Beryllium | ND | 4.7 | " | " | " | " | " | " | |
| Cadmium | ND | 2.4 | " | " | " | " | " | " | |
| Chromium | ND | 2.4 | " | " | " | " | " | " | |
| Cobalt | ND | 2.4 | " | " | " | " | " | " | |
| Lead | ND | 4.7 | " | " | " | " | " | " | |
| Manganese | ND | 4.7 | " | " | " | " | " | " | |
| Mercury | ND | 0.092 | " | 1 | A107216 | 13-Jul-11 | 13-Jul-11 | EPA 7471A | |
| **Nickel** | **63** | 2.4 | " | 5 | A107215 | 12-Jul-11 | 14-Jul-11 | EPA 6010B | |
| Selenium | ND | 9.4 | " | " | " | " | " | " | |

Oilfield Environmental and Compliance, INC.

| | | |
|---|---|---|
| Quantum Analytical Services, Inc | Project: Distillation Feed Composition | |
| 1210 E. 223rd Street, Suite #314 | Project Number: Distillation Feed Composition, 11-475 | **Reported:** |
| Carson CA, 90745 | Project Manager: Dr. Andrew Kitto | 18-Jul-11 16:30 |

## Total Metals by EPA 6000/7000 Series Methods - Quality Control

| Analyte | Result | Reporting Limit | Units | Spike Level | Source Result | %REC | %REC Limits | RPD | RPD Limit | Notes |
|---|---|---|---|---|---|---|---|---|---|---|
| **Batch A107215 - EPA 3050B** | | | | | | | | | | |
| **Blank (A107215-BLK1)** | | | | Prepared: 12-Jul-11 Analyzed: 14-Jul-11 | | | | | | |
| Antimony | ND | 5.0 | mg/kg | | | | | | | |
| Arsenic | ND | 1.0 | " | | | | | | | |
| Beryllium | ND | 1.0 | " | | | | | | | |
| Cadmium | ND | 0.50 | " | | | | | | | |
| Chromium | ND | 0.50 | " | | | | | | | |
| Cobalt | ND | 0.50 | " | | | | | | | |
| Lead | ND | 1.0 | " | | | | | | | |
| Manganese | ND | 1.0 | " | | | | | | | |
| Nickel | ND | 0.50 | " | | | | | | | |
| Selenium | ND | 2.0 | " | | | | | | | |
| **LCS (A107215-BS1)** | | | | Prepared: 12-Jul-11 Analyzed: 14-Jul-11 | | | | | | |
| Antimony | 95.3 | 5.0 | mg/kg | 100 | | 95.3 | 85-115 | | | |
| Arsenic | 95.8 | 1.0 | " | 100 | | 95.8 | 85-115 | | | |
| Beryllium | 97.6 | 1.0 | " | 100 | | 97.6 | 85-115 | | | |
| Cadmium | 105 | 0.50 | " | 100 | | 105 | 85-115 | | | |
| Chromium | 101 | 0.50 | " | 100 | | 101 | 85-115 | | | |
| Cobalt | 103 | 0.50 | " | 100 | | 103 | 85-115 | | | |
| Lead | 105 | 1.0 | " | 100 | | 105 | 85-115 | | | |
| Manganese | 322 | 1.0 | " | 300 | | 107 | 85-115 | | | |
| Nickel | 104 | 0.50 | " | 100 | | 104 | 85-115 | | | |
| Selenium | 96.8 | 2.0 | " | 100 | | 96.8 | 85-115 | | | |
| **LCS Dup (A107215-BSD1)** | | | | Prepared: 12-Jul-11 Analyzed: 14-Jul-11 | | | | | | |
| Antimony | 95.7 | 5.0 | mg/kg | 100 | | 95.7 | 85-115 | 0.408 | 20 | |
| Arsenic | 95.8 | 1.0 | " | 100 | | 95.8 | 85-115 | 0.0104 | 20 | |
| Beryllium | 99.6 | 1.0 | " | 100 | | 99.6 | 85-115 | 2.03 | 20 | |
| Cadmium | 105 | 0.50 | " | 100 | | 105 | 85-115 | 0.286 | 20 | |
| Chromium | 102 | 0.50 | " | 100 | | 102 | 85-115 | 1.67 | 20 | |
| Cobalt | 105 | 0.50 | " | 100 | | 105 | 85-115 | 2.02 | 20 | |
| Lead | 104 | 1.0 | " | 100 | | 104 | 85-115 | 0.191 | 20 | |
| Manganese | 327 | 1.0 | " | 300 | | 109 | 85-115 | 1.76 | 20 | |
| Nickel | 104 | 0.50 | " | 100 | | 104 | 85-115 | 0.192 | 20 | |
| Selenium | 96.6 | 2.0 | " | 100 | | 96.6 | 85-115 | 0.176 | 20 | |

Oilfield Environmental and Compliance, INC.

| | | |
|---|---|---|
| Quantum Analytical Services, Inc | Project: Distillation Feed Composition | |
| 1210 E. 223rd Street, Suite #314 | Project Number: Distillation Feed Composition, 11-475 | **Reported:** |
| Carson CA, 90745 | Project Manager: Dr. Andrew Kitto | 18-Jul-11 16:30 |

## Total Metals by EPA 6000/7000 Series Methods - Quality Control

| Analyte | Result | Reporting Limit | Units | Spike Level | Source Result | %REC | %REC Limits | RPD | RPD Limit | Notes |
|---|---|---|---|---|---|---|---|---|---|---|
| **Batch A107215 - EPA 3050B** | | | | | | | | | | |
| **Duplicate (A107215-DUP1)** | | **Source: 1103255-01** | | Prepared: 12-Jul-11 Analyzed: 14-Jul-11 | | | | | | |
| Antimony | ND | 4.6 | mg/kg | | ND | | | | 20 | |
| Arsenic | 3.05 | 0.92 | " | | 3.31 | | | 8.16 | 20 | |
| Beryllium | ND | 0.92 | " | | ND | | | | 20 | |
| Cadmium | 2.81 | 0.46 | " | | 3.06 | | | 8.53 | 20 | |
| Chromium | 12.1 | 0.46 | " | | 10.3 | | | 16.2 | 20 | |
| Cobalt | 5.69 | 0.46 | " | | 6.24 | | | 9.24 | 20 | |
| Lead | 24.9 | 0.92 | " | | 25.4 | | | 2.33 | 20 | |
| Manganese | 195 | 0.92 | " | | 212 | | | 8.52 | 20 | |
| Nickel | 16.8 | 0.46 | " | | 18.4 | | | 9.01 | 20 | |
| Selenium | ND | 1.8 | " | | ND | | | | 20 | |
| **Matrix Spike (A107215-MS1)** | | **Source: 1103255-01** | | Prepared: 12-Jul-11 Analyzed: 14-Jul-11 | | | | | | |
| Antimony | 639 | 96 | mg/kg | 960 | ND | 66.6 | 0-129 | | | |
| Arsenic | 879 | 19 | " | 960 | 3.31 | 91.2 | 70-116 | | | |
| Beryllium | 978 | 19 | " | 960 | ND | 102 | 75-125 | | | |
| Cadmium | 995 | 9.6 | " | 960 | 3.06 | 103 | 76-123 | | | |
| Chromium | 998 | 9.6 | " | 960 | 10.3 | 103 | 62-138 | | | |
| Cobalt | 994 | 9.6 | " | 960 | 6.24 | 103 | 75-125 | | | |
| Lead | 1020 | 19 | " | 960 | 25.4 | 103 | 67-137 | | | |
| Manganese | 6010 | 19 | " | 5760 | 212 | 101 | 49-163 | | | |
| Nickel | 1000 | 9.6 | " | 960 | 18.4 | 103 | 67-133 | | | |
| Selenium | 904 | 38 | " | 960 | ND | 94.2 | 68-118 | | | |
| **Matrix Spike Dup (A107215-MSD1)** | | **Source: 1103255-01** | | Prepared: 12-Jul-11 Analyzed: 14-Jul-11 | | | | | | |
| Antimony | 666 | 95 | mg/kg | 949 | ND | 70.2 | 0-129 | 5.38 | 20 | |
| Arsenic | 894 | 19 | " | 949 | 3.31 | 93.9 | 70-116 | 2.85 | 20 | |
| Beryllium | 1010 | 19 | " | 949 | ND | 106 | 75-125 | 4.30 | 20 | |
| Cadmium | 1010 | 9.5 | " | 949 | 3.06 | 106 | 76-123 | 2.42 | 20 | |
| Chromium | 1020 | 9.5 | " | 949 | 10.3 | 107 | 62-138 | 3.78 | 20 | |
| Cobalt | 1010 | 9.5 | " | 949 | 6.24 | 106 | 75-125 | 3.20 | 20 | |
| Lead | 1030 | 19 | " | 949 | 25.4 | 106 | 67-137 | 2.49 | 20 | |
| Manganese | 6230 | 19 | " | 5690 | 212 | 106 | 49-163 | 4.94 | 20 | |
| Nickel | 1020 | 9.5 | " | 949 | 18.4 | 105 | 67-133 | 2.38 | 20 | |
| Selenium | 922 | 38 | " | 949 | ND | 97.1 | 68-118 | 3.09 | 20 | |

ılfield Environmental and Compliance, INC.

| | | |
|---|---|---|
| Quantum Analytical Services, Inc<br>1210 E. 223rd Street, Suite #314<br>Carson CA, 90745 | Project: Distillation Feed Composition<br>Project Number: Distillation Feed Composition, 11-475<br>Project Manager: Dr. Andrew Kitto | **Reported:**<br>18-Jul-11 16:30 |

## Total Metals by EPA 6000/7000 Series Methods - Quality Control

| Analyte | Result | Reporting Limit | Units | Spike Level | Source Result | %REC | %REC Limits | RPD | RPD Limit | Notes |
|---|---|---|---|---|---|---|---|---|---|---|
| **Batch A107216 - EPA 7471A Prep** | | | | | | | | | | |
| **Blank (A107216-BLK1)** | | | | Prepared & Analyzed: 13-Jul-11 | | | | | | |
| Mercury | ND | 0.10 | mg/kg | | | | | | | |
| **LCS (A107216-BS1)** | | | | Prepared & Analyzed: 13-Jul-11 | | | | | | |
| Mercury | 0.852 | 0.10 | mg/kg | 0.833 | | 102 | 85-115 | | | |
| **LCS Dup (A107216-BSD1)** | | | | Prepared & Analyzed: 13-Jul-11 | | | | | | |
| Mercury | 0.844 | 0.10 | mg/kg | 0.833 | | 101 | 85-115 | 0.944 | 20 | |
| **Duplicate (A107216-DUP1)** | | **Source: 1103255-01** | | Prepared & Analyzed: 13-Jul-11 | | | | | | |
| Mercury | 0.0259 | 0.091 | mg/kg | | 0.0256 | | | 1.09 | 20 | |
| **Matrix Spike (A107216-MS1)** | | **Source: 1103255-01** | | Prepared & Analyzed: 13-Jul-11 | | | | | | |
| Mercury | 0.870 | 0.098 | mg/kg | 0.817 | 0.0256 | 103 | 75-125 | | | |
| **atrix Spike Dup (A107216-MSD1)** | | **Source: 1103255-01** | | Prepared & Analyzed: 13-Jul-11 | | | | | | |
| ıercury | 0.853 | 0.099 | mg/kg | 0.828 | 0.0256 | 99.9 | 75-125 | 3.31 | 20 | |

Oilfield Environmental and Compliance, INC.

| | | |
|---|---|---|
| Quantum Analytical Services, Inc<br>1210 E. 223rd Street, Suite #314<br>Carson CA, 90745 | Project: Distillation Feed Composition<br>Project Number: Distillation Feed Composition, 11-475<br>Project Manager: Dr. Andrew Kitto | **Reported:**<br>18-Jul-11 16:30 |

## Notes and Definitions

| | |
|---|---|
| DET | Analyte DETECTED |
| ND | Analyte NOT DETECTED at or above the reporting limit |
| NR | Not Reported |
| dry | Sample results reported on a dry weight basis |
| RPD | Relative Percent Difference |

11-475

CONFIDENTIAL

# CHAIN OF CUSTODY

CLIENT: XOM

TEST DATE(S): 7/7/11

LOCATION: Crude unit (IEI)

SAMPLER(S): J. KIM / N. Gilbert / Jose Crude operator

SAMPLE LOCATION: IEI

PROJECT MANAGER: Parvez Abbas

TEST METHOD(S): As in protocol

DATE DUE: 7 days

OUTSIDE LAB REQUIRED?: Yes

COMPLIANCE TEST? NO

| DATE | TIME | TEST # | SAMPLE DESCRIPTION | CONTAINERS | SAMPLER | COMMENTS |
|---|---|---|---|---|---|---|
| 7/7/11 | | IEI Comp#1 | Crude Oil | 1 | | #1 10:43, #2 10:48, #3 10:53 — Comp @ #1 11:54 |
| 7/7/11 | | IEI Comp#2 | Crude Oil | 1 | | #4 10:58, #5 11:03, #6 11:08 — Comp @ #2 11:09 |
| 7/7/11 | | IEI Comp#3 | Crude Oil | 1 | | #7 11:13, #8 11:18, #9 11:23 — 11:24 |

| RELEASED BY | DATE/TIME | RECEIVED BY | DATE/TIME |
|---|---|---|---|
| John Kim | 7/7/11 11:46 | | 7/7/11 11:46 |
| | 7/7/11 12:10 | | 7/7/11 @ 1210 |

ANALYSIS REQUIRED:

CONFIDENTIAL

Delta

DS834001

Date of last revision – 11/13/2008

Master Document Storage\Forms\Datasheets\Lab Forms

C.15-24

721

Quantum Analytical Services Inc.
1210 E. 223rd Street, Suite #314 • Carson, California 90745 • 310/830-2226 • Fax 310/830-2227
www.quantumairlab.com

C.15-25

**CLIENT:** Delta Air Quality
**CLIENT PROJECT:** XOM (Crude Unit IE1)
**PROJECT NO:** 11-566
**SAMPLING DATE:** August 8, 2011
**RECEIVING DATE:** August 8, 2011
**ANALYSIS DATE:** August 8-12, 2011
**REPORT DATE:** August 15, 2011

**Laboratory Analysis Report**

| ANALYTE | Units | Test Method | PQL | Sample ID | | |
|---|---|---|---|---|---|---|
| | | | | IE1 Comp 1 | IE1 Comp 2 | IE1 Comp 3 |
| API Gravity | API | ASTM D-4052 | 0.1 | 15.9 | 15.9 | 15.9 |
| Density@60°F | g/cc | ASTM D-4052 | 0.0001 | 0.9600 | 0.9601 | 0.9602 |
| Density@60°F | lb/cft | ASTM D-4052 | 0.1 | 59.9 | 59.9 | 59.9 |
| Total Sulfur | Wt% | ASTM D-2622 | 0.05 | 1.37 | 1.38 | 1.38 |
| HHV Net BTU/US Gal | Net BTU/US Gal | ASTM D-240 | 10 | 139,322 | 139,947 | 141,053 |
| HHV Net BTU/US Lb | Net BTU/US Lb | ASTM D-240 | 10 | 17,426 | 17,505 | 17,639 |
| HHV Gross BTU/US Ga | Gross BTU/US Gal | ASTM D-240 | 10 | 145,746 | 146,615 | 148,143 |
| HHV Gross BTU/US Lb | Gross BTU/US Lb | ASTM D-240 | 10 | 18,230 | 18,339 | 18,526 |

PQL: Practical Quantitation Limit

Dr. Andrew Kitto
President

Oilfield Environmental and Compliance, INC.

| | | |
|---|---|---|
| Quantum Analytical Services, Inc | Project: Distillation Feed Composition | |
| 1210 E. 223rd Street, Suite #314 | Project Number: Distillation Feed Composition | **Reported:** |
| Carson CA, 90745 | Project Manager: Dr. Andrew Kitto | 15-Aug-11 15:51 |

## ANALYTICAL REPORT FOR SAMPLES

| Sample ID | Laboratory ID | Matrix | Date Sampled | Date Received |
|---|---|---|---|---|
| 1E1 Comp #1 | 1103790-01 | Product | 08-Aug-11 00:00 | 09-Aug-11 10:20 |
| 1E1 Comp #2 | 1103790-02 | Product | 08-Aug-11 00:00 | 09-Aug-11 10:20 |
| 1E1 Comp #3 | 1103790-03 | Product | 08-Aug-11 00:00 | 09-Aug-11 10:20 |

Oilfield Environmental and Compliance, INC.

| | | |
|---|---|---|
| Quantum Analytical Services, Inc<br>1210 E. 223rd Street, Suite #314<br>Carson CA, 90745 | Project: Distillation Feed Composition<br>Project Number: Distillation Feed Composition<br>Project Manager: Dr. Andrew Kitto | **Reported:**<br>15-Aug-11 15:51 |

## 1E1 Comp #1

**1103790-01 (Product)**

| Analyte | Result | Reporting Limit | Units | Dilution | Batch | Prepared | Analyzed | Method | Notes |
|---|---|---|---|---|---|---|---|---|---|
| **Oilfield Environmental and Compliance** | | | | | | | | | |
| **Total Metals by EPA 6000/7000 Series Methods** | | | | | | | | | |
| Antimony | ND | 23 | mg/kg | 5 | A108195 | 09-Aug-11 | 15-Aug-11 | EPA 6010B | |
| Arsenic | ND | 4.7 | " | " | " | " | " | " | |
| Beryllium | ND | 4.7 | " | " | " | " | " | " | |
| Cadmium | ND | 2.3 | " | " | " | " | " | " | |
| Chromium | ND | 2.3 | " | " | " | " | " | " | |
| Cobalt | ND | 2.3 | " | " | " | " | " | " | |
| Lead | ND | 4.7 | " | " | " | " | " | " | |
| Manganese | ND | 4.7 | " | " | " | " | " | " | |
| Mercury | ND | 0.084 | " | 1 | A108205 | 10-Aug-11 | 10-Aug-11 | EPA 7471A | |
| **Nickel** | **70** | 2.3 | " | 5 | A108195 | 09-Aug-11 | 15-Aug-11 | EPA 6010B | |
| Selenium | ND | 9.3 | " | " | " | " | " | " | |

.lfield Environmental and Compliance, INC.

| | | |
|---|---|---|
| Quantum Analytical Services, Inc | Project: Distillation Feed Composition | |
| 1210 E. 223rd Street, Suite #314 | Project Number: Distillation Feed Composition | **Reported:** |
| Carson CA, 90745 | Project Manager: Dr. Andrew Kitto | 15-Aug-11 15:51 |

## 1E1 Comp #2

**1103790-02 (Product)**

| Analyte | Result | Reporting Limit | Units | Dilution | Batch | Prepared | Analyzed | Method | Notes |
|---|---|---|---|---|---|---|---|---|---|
| **Oilfield Environmental and Compliance** | | | | | | | | | |
| **Total Metals by EPA 6000/7000 Series Methods** | | | | | | | | | |
| Antimony | ND | 25 | mg/kg | 5 | A108195 | 09-Aug-11 | 15-Aug-11 | EPA 6010B | |
| Arsenic | ND | 5.0 | " | " | " | " | " | " | |
| Beryllium | ND | 5.0 | " | " | " | " | " | " | |
| Cadmium | ND | 2.5 | " | " | " | " | " | " | |
| Chromium | ND | 2.5 | " | " | " | " | " | " | |
| Cobalt | ND | 2.5 | " | " | " | " | " | " | |
| Lead | ND | 5.0 | " | " | " | " | " | " | |
| Manganese | ND | 5.0 | " | " | " | " | " | " | |
| Mercury | ND | 0.090 | " | 1 | A108205 | 10-Aug-11 | 10-Aug-11 | EPA 7471A | |
| **Nickel** | **72** | 2.5 | " | 5 | A108195 | 09-Aug-11 | 15-Aug-11 | EPA 6010B | |
| Selenium | ND | 10 | " | " | " | " | " | " | |

## 1E1 Comp #3

**1103790-03 (Product)**

| Analyte | Result | Reporting Limit | Units | Dilution | Batch | Prepared | Analyzed | Method | Notes |
|---|---|---|---|---|---|---|---|---|---|
| **Oilfield Environmental and Compliance** | | | | | | | | | |
| **Total Metals by EPA 6000/7000 Series Methods** | | | | | | | | | |
| Antimony | ND | 24 | mg/kg | 5 | A108195 | 09-Aug-11 | 15-Aug-11 | EPA 6010B | |
| Arsenic | ND | 4.7 | " | " | " | " | " | " | |
| Beryllium | ND | 4.7 | " | " | " | " | " | " | |
| Cadmium | ND | 2.4 | " | " | " | " | " | " | |
| Chromium | ND | 2.4 | " | " | " | " | " | " | |
| Cobalt | ND | 2.4 | " | " | " | " | " | " | |
| Lead | ND | 4.7 | " | " | " | " | " | " | |
| Manganese | ND | 4.7 | " | " | " | " | " | " | |
| Mercury | ND | 0.091 | " | 1 | A108205 | 10-Aug-11 | 10-Aug-11 | EPA 7471A | |
| **Nickel** | **66** | 2.4 | " | 5 | A108195 | 09-Aug-11 | 15-Aug-11 | EPA 6010B | |
| Selenium | ND | 9.4 | " | " | " | " | " | " | |

Oilfield Environmental and Compliance, INC.

| | | |
|---|---|---|
| Quantum Analytical Services, Inc | Project: Distillation Feed Composition | |
| 1210 E. 223rd Street, Suite #314 | Project Number: Distillation Feed Composition | Reported: |
| Carson CA, 90745 | Project Manager: Dr. Andrew Kitto | 15-Aug-11 15:51 |

## Total Metals by EPA 6000/7000 Series Methods - Quality Control

| Analyte | Result | Reporting Limit | Units | Spike Level | Source Result | %REC | %REC Limits | RPD | RPD Limit | Notes |
|---|---|---|---|---|---|---|---|---|---|---|
| **Batch A108195 - EPA 3050B** | | | | | | | | | | |
| **Blank (A108195-BLK1)** | | | | Prepared: 09-Aug-11 Analyzed: 15-Aug-11 | | | | | | |
| Antimony | ND | 5.0 | mg/kg | | | | | | | |
| Arsenic | ND | 1.0 | " | | | | | | | |
| Beryllium | ND | 1.0 | " | | | | | | | |
| Cadmium | ND | 0.50 | " | | | | | | | |
| Chromium | ND | 0.50 | " | | | | | | | |
| Cobalt | ND | 0.50 | " | | | | | | | |
| Lead | ND | 1.0 | " | | | | | | | |
| Manganese | ND | 1.0 | " | | | | | | | |
| Nickel | ND | 0.50 | " | | | | | | | |
| Selenium | ND | 2.0 | " | | | | | | | |
| **LCS (A108195-BS1)** | | | | Prepared: 09-Aug-11 Analyzed: 15-Aug-11 | | | | | | |
| Antimony | 102 | 5.0 | mg/kg | 100 | | 102 | 85-115 | | | |
| Arsenic | 103 | 1.0 | " | 100 | | 103 | 85-115 | | | |
| Beryllium | 102 | 1.0 | " | 100 | | 102 | 85-115 | | | |
| Cadmium | 106 | 0.50 | " | 100 | | 106 | 85-115 | | | |
| Chromium | 106 | 0.50 | " | 100 | | 106 | 85-115 | | | |
| Cobalt | 110 | 0.50 | " | 100 | | 110 | 85-115 | | | |
| Lead | 112 | 1.0 | " | 100 | | 112 | 85-115 | | | |
| Manganese | 334 | 1.0 | " | 300 | | 111 | 85-115 | | | |
| Nickel | 113 | 0.50 | " | 100 | | 113 | 85-115 | | | |
| Selenium | 104 | 2.0 | " | 100 | | 104 | 85-115 | | | |
| **LCS Dup (A108195-BSD1)** | | | | Prepared: 09-Aug-11 Analyzed: 15-Aug-11 | | | | | | |
| Antimony | 102 | 5.0 | mg/kg | 100 | | 102 | 85-115 | 0.588 | 20 | |
| Arsenic | 104 | 1.0 | " | 100 | | 104 | 85-115 | 0.776 | 20 | |
| Beryllium | 102 | 1.0 | " | 100 | | 102 | 85-115 | 0.00 | 20 | |
| Cadmium | 106 | 0.50 | " | 100 | | 106 | 85-115 | 0.473 | 20 | |
| Chromium | 107 | 0.50 | " | 100 | | 107 | 85-115 | 0.188 | 20 | |
| Cobalt | 110 | 0.50 | " | 100 | | 110 | 85-115 | 0.182 | 20 | |
| Lead | 113 | 1.0 | " | 100 | | 113 | 85-115 | 0.800 | 20 | |
| Manganese | 335 | 1.0 | " | 300 | | 112 | 85-115 | 0.418 | 20 | |
| Nickel | 114 | 0.50 | " | 100 | | 114 | 85-115 | 0.530 | 20 | |
| Selenium | 104 | 2.0 | " | 100 | | 104 | 85-115 | 0.672 | 20 | |

.ilfield Environmental and Compliance, INC.

| | | |
|---|---|---|
| Quantum Analytical Services, Inc<br>1210 E. 223rd Street, Suite #314<br>Carson CA, 90745 | Project: Distillation Feed Composition<br>Project Number: Distillation Feed Composition<br>Project Manager: Dr. Andrew Kitto | **Reported:**<br>15-Aug-11 15:51 |

## Total Metals by EPA 6000/7000 Series Methods - Quality Control

| Analyte | Result | Reporting Limit | Units | Spike Level | Source Result | %REC | %REC Limits | RPD | RPD Limit | Notes |
|---|---|---|---|---|---|---|---|---|---|---|
| **Batch A108195 - EPA 3050B** | | | | | | | | | | |
| **Duplicate (A108195-DUP1)** | | **Source: 1103790-01** | | Prepared: 09-Aug-11 Analyzed: 15-Aug-11 | | | | | | |
| Antimony | ND | 25 | mg/kg | | ND | | | | 20 | |
| Arsenic | ND | 5.0 | " | | ND | | | | 20 | |
| Beryllium | ND | 5.0 | " | | ND | | | | 20 | |
| Cadmium | ND | 2.5 | " | | ND | | | | 20 | |
| Chromium | ND | 2.5 | " | | ND | | | | 20 | |
| Cobalt | 1.05 | 2.5 | " | | 1.12 | | | 6.78 | 20 | |
| Lead | ND | 5.0 | " | | ND | | | | 20 | |
| Manganese | ND | 5.0 | " | | ND | | | | 20 | |
| Nickel | 69.3 | 2.5 | " | | 69.8 | | | 0.793 | 20 | |
| Selenium | ND | 10 | " | | ND | | | | 20 | |
| **Matrix Spike (A108195-MS1)** | | **Source: 1103790-01** | | Prepared: 09-Aug-11 Analyzed: 15-Aug-11 | | | | | | |
| ·timony | 922 | 48 | mg/kg | 951 | ND | 97.0 | 75-125 | | | |
| .enic | 986 | 9.5 | " | 951 | ND | 104 | 75-125 | | | |
| Beryllium | 981 | 9.5 | " | 951 | ND | 103 | 75-125 | | | |
| Cadmium | 985 | 4.8 | " | 951 | ND | 104 | 75-125 | | | |
| Chromium | 994 | 4.8 | " | 951 | ND | 105 | 75-125 | | | |
| Cobalt | 1020 | 4.8 | " | 951 | 1.12 | 107 | 75-125 | | | |
| Lead | 1020 | 9.5 | " | 951 | ND | 107 | 75-125 | | | |
| Manganese | 5660 | 9.5 | " | 5700 | ND | 99.3 | 75-125 | | | |
| Nickel | 1080 | 4.8 | " | 951 | 69.8 | 106 | 75-125 | | | |
| Selenium | 996 | 19 | " | 951 | ND | 105 | 75-125 | | | |
| **Matrix Spike Dup (A108195-MSD1)** | | **Source: 1103790-01** | | Prepared: 09-Aug-11 Analyzed: 15-Aug-11 | | | | | | |
| Antimony | 964 | 50 | mg/kg | 998 | ND | 96.6 | 75-125 | 0.455 | 20 | |
| Arsenic | 1040 | 10 | " | 998 | ND | 104 | 75-125 | 0.385 | 20 | |
| Beryllium | 999 | 10 | " | 998 | ND | 100 | 75-125 | 3.05 | 20 | |
| Cadmium | 1030 | 5.0 | " | 998 | ND | 104 | 75-125 | 0.00 | 20 | |
| Chromium | 1060 | 5.0 | " | 998 | ND | 106 | 75-125 | 1.24 | 20 | |
| Cobalt | 1080 | 5.0 | " | 998 | 1.12 | 108 | 75-125 | 1.12 | 20 | |
| Lead | 1070 | 10 | " | 998 | ND | 108 | 75-125 | 0.372 | 20 | |
| Manganese | 5760 | 10 | " | 5990 | ND | 96.2 | 75-125 | 3.14 | 20 | |
| Nickel | 1130 | 5.0 | " | 998 | 69.8 | 107 | 75-125 | 0.234 | 20 | |
| Selenium | 1050 | 20 | " | 998 | ND | 105 | 75-125 | 0.476 | 20 | |

Oilfield Environmental and Compliance, INC.

| | | |
|---|---|---|
| Quantum Analytical Services, Inc | Project: Distillation Feed Composition | |
| 1210 E. 223rd Street, Suite #314 | Project Number: Distillation Feed Composition | **Reported:** |
| Carson CA, 90745 | Project Manager: Dr. Andrew Kitto | 15-Aug-11 15:51 |

## Total Metals by EPA 6000/7000 Series Methods - Quality Control

| Analyte | Result | Reporting Limit | Units | Spike Level | Source Result | %REC | %REC Limits | RPD | RPD Limit | Notes |
|---|---|---|---|---|---|---|---|---|---|---|
| **Batch A108205 - EPA 7471A Prep** | | | | | | | | | | |
| **Blank (A108205-BLK1)** | | | | Prepared & Analyzed: 10-Aug-11 | | | | | | |
| Mercury | ND | 0.10 | mg/kg | | | | | | | |
| **LCS (A108205-BS1)** | | | | Prepared & Analyzed: 10-Aug-11 | | | | | | |
| Mercury | 0.880 | 0.10 | mg/kg | 0.833 | | 106 | 85-115 | | | |
| **LCS Dup (A108205-BSD1)** | | | | Prepared & Analyzed: 10-Aug-11 | | | | | | |
| Mercury | 0.864 | 0.10 | mg/kg | 0.833 | | 104 | 85-115 | 1.91 | 20 | |
| **Duplicate (A108205-DUP1)** | | **Source: 1103779-01** | | Prepared & Analyzed: 10-Aug-11 | | | | | | |
| Mercury | 0.0384 | 0.087 | mg/kg | | 0.0136 | | | 95.3 | 20 | QR-04 |
| **Matrix Spike (A108205-MS1)** | | **Source: 1103779-01** | | Prepared & Analyzed: 10-Aug-11 | | | | | | |
| Mercury | 0.725 | 0.095 | mg/kg | 0.791 | 0.0136 | 89.9 | 75-125 | | | |
| **Matrix Spike Dup (A108205-MSD1)** | | **Source: 1103779-01** | | Prepared & Analyzed: 10-Aug-11 | | | | | | |
| Mercury | 0.706 | 0.093 | mg/kg | 0.774 | 0.0136 | 89.5 | 75-125 | 0.399 | 20 | |

.ıfield Environmental and Compliance, INC.

| | | |
|---|---|---|
| Quantum Analytical Services, Inc<br>1210 E. 223rd Street, Suite #314<br>Carson CA, 90745 | Project: Distillation Feed Composition<br>Project Number: Distillation Feed Composition<br>Project Manager: Dr. Andrew Kitto | **Reported:**<br>15-Aug-11 15:51 |

## Notes and Definitions

| | |
|---|---|
| QR-04 | The RPD exceeded the QC control limits. |
| DET | Analyte DETECTED |
| ND | Analyte NOT DETECTED at or above the reporting limit |
| NR | Not Reported |
| dry | Sample results reported on a dry weight basis |
| RPD | Relative Percent Difference |

Quantum Analytical Services Inc.
www.quantumairlab.com
1210 E. 223rd Street, Suite #314 • Carson, California 90745 • 310/830-2226 • Fax 310/830-2227

| | |
|---|---|
| CLIENT: | Delta Air Quality |
| CLIENT PROJECT: | XOM (Crude Unit IE1) |
| PROJECT NO: | 11-566 |
| SAMPLING DATE: | August 8, 2011 |
| RECEIVING DATE: | August 8, 2011 |
| ANALYSIS DATE: | August 8-12, 2011 |
| REPORT DATE: | August 17, 2011 |

## Laboratory Analysis Report

| ANALYTE | Units | Test Method | PQL | Sample ID IE1 Comp 1 PPM | IE1 Comp 2 PPM | IE1 Comp 3 PPM |
|---|---|---|---|---|---|---|
| Chlorine | PPM | EPA SW846-9076 | 50 | 60 | 81 | 48 |
| | PPM | EPA SW846-9076 | 50 | 50 | 77 | 49 |

PQL: Practical Quantitation Limit in PPM
Samples were anslyzed in duplicates

## Matrix Spiked

| Sample ID | Units | Method | Amount Spiked (mg) | % Recovery |
|---|---|---|---|---|
| IE1 Comp. 1 | PPM | EPA SW846-9076 | 27.3 | 80.0 |
| IE1 Comp. 1 | PPM | EPA SW846-9076 | 17.1 | 94.3 |

Dr. Andrew Kitto
President

C.16-2

**Delta△**

## FLUE GAS VELOCITY DATA AND WORKSHEET

CLIENT: Exxon Mobil
PERFORMED BY: SS DA
LOCATION: Stack
BAR. PRESSURE: 29.83
UNIT: FCC / 2F-7
STATIC PRESSURE: -1.3
TEST DATE: 6/26/11
TC READOUT ID: PTC-18
TEST NUMBER: 1-Cyclonic
TC ID: #44
LEAK CHECK PRE- ✓ POST- ✓
PITOT TUBE ID: #44 STYPE
ΔP INDICATOR TYPE: 0-10" MANOMETER
PITOT TUBE COEFFICIENT: .84
ΔP INDICATOR ID: CC-3
ZERO: ✓ LEVEL: ✓

| Time | Port | Point | Yaw Angle, Degrees(1) | ΔP, inches $H_2O$ | Temperature, °F |
|---|---|---|---|---|---|
| 1623 | E | 6 | +2.7 | 1.2 | 470 |
| | | 5 | +1.4 | 1.2 | 471 |
| | | 4 | +1.1 | 1.3 | 471 |
| | | 3 | +5.1 | 1.4 | 471 |
| | | 2 | +3.8 | 1.5 | 470 |
| | | 1 | +6.8 | 1.0 | 471 |
| | S | 6 | -1.0 | 1.6 | 471 |
| | | 5 | +0.6 | 1.5 | 473 |
| | | 4 | -0.7 | 1.4 | 474 |
| | | 3 | -1.9 | 1.3 | 474 |
| | | 2 | -2.1 | 1.3 | 473 |
| | | 1 | ~~.09~~ +1.0 | ~~.090~~ .90 | 470 |
| | W | 6 | -1.4 | 1.6 | 473 |
| | | 5 | -3.1 | 1.8 | 476 |
| | | 4 | +1.2 | 2.0 | 477 |
| | | 3 | +1.0 | 2.0 | 477 |
| | | 2 | +3.0 | 2.0 | 477 |
| | | 1 | +3.4 | 1.4 | 470 |
| | N | 6 | +2.1 | 1.5 | 471 |
| | | 5 | 3.4 | 1.8 | 471 |
| | | 4 | 5.2 | 1.8 | 474 |
| | | 3 | 3.3 | 1.9 | 475 |
| | | 2 | 5.7 | 1.5 | 475 |
| 1643 | | 1 | 6.6 | 1.3 | 470 |

Average Yaw = 2.0

Comments: 1) Positive yaw angles correspond to clockwise rotation of the probe.

12 POINT STRATIFICATION TEST

| Port | Point | Date | Time | $O_2$ | CO | Port | Point | 2 min Average $O_2$ | 2 min Average CO |
|---|---|---|---|---|---|---|---|---|---|
| E | 3 | 6/26/2011 | 5:26:00 PM | 5.20 | 69.57 | E | 3 | | |
| E | 3 | 6/26/2011 | 5:27:00 PM | 5.20 | 68.44 | E | 3 | 5.20 | 69.01 |
| E | 2 | 6/26/2011 | 5:28:00 PM | 5.17 | 69.04 | E | 2 | | |
| E | 2 | 6/26/2011 | 5:29:00 PM | 5.10 | 68.35 | E | 2 | 5.17 | 69.04 |
| E | 1 | 6/26/2011 | 5:30:00 PM | 5.05 | 68.14 | E | 1 | | |
| E | 1 | 6/26/2011 | 5:31:00 PM | 5.04 | 69.03 | E | 1 | 5.05 | 68.14 |
| S | 3 | 6/26/2011 | 5:35:00 PM | 4.97 | 69.05 | S | 3 | | |
| S | 3 | 6/26/2011 | 5:36:00 PM | 4.99 | 69.72 | S | 3 | 4.98 | 69.38 |
| S | 2 | 6/26/2011 | 5:37:00 PM | 4.96 | 69.34 | S | 2 | | |
| S | 2 | 6/26/2011 | 5:38:00 PM | 4.91 | 70.24 | S | 2 | 4.96 | 69.34 |
| S | 1 | 6/26/2011 | 5:39:00 PM | 4.92 | 69.69 | S | 1 | | |
| S | 1 | 6/26/2011 | 5:40:00 PM | 4.93 | 67.95 | S | 1 | 4.92 | 69.69 |
| W | 3 | 6/26/2011 | 5:45:00 PM | 4.97 | 69.07 | W | 3 | | |
| W | 3 | 6/26/2011 | 5:46:00 PM | 5.00 | 67.64 | W | 3 | 4.99 | 68.36 |
| W | 2 | 6/26/2011 | 5:47:00 PM | 5.07 | 67.51 | W | 2 | | |
| W | 2 | 6/26/2011 | 5:48:00 PM | 5.06 | 67.10 | W | 2 | 5.07 | 67.51 |
| W | 1 | 6/26/2011 | 5:49:00 PM | 5.04 | 67.17 | W | 1 | | |
| W | 1 | 6/26/2011 | 5:50:00 PM | 5.03 | 68.51 | W | 1 | 5.04 | 67.17 |
| N | 3 | 6/26/2011 | 5:55:00 PM | 4.96 | 68.21 | N | 3 | | |
| N | 3 | 6/26/2011 | 5:56:00 PM | 4.93 | 67.79 | N | 3 | 4.94 | 68.00 |
| N | 2 | 6/26/2011 | 5:57:00 PM | 4.91 | 68.86 | N | 2 | | |
| N | 2 | 6/26/2011 | 5:58:00 PM | 4.93 | 70.73 | N | 2 | 4.91 | 68.86 |
| N | 1 | 6/26/2011 | 5:59:00 PM | 4.97 | 70.33 | N | 1 | | |
| N | 1 | 6/26/2011 | 6:00:00 PM | 4.99 | 70.22 | N | 1 | 4.97 | 70.33 |
| | | | | | | | Max | 5.20 | 70.33 |
| | | | | | | | Min | 4.91 | 67.17 |
| | | | | | | | Avg. | 5.02 | 68.73 |
| | | | | | | | Diff. | 0.19 | 1.59 |
| | | | | | | | %, Diff. | 3.7% | 2.3% |

C.19-3

**Delta Air Quality Services**

## NO2 to NO Converter Efficiency Test

| | | | | |
|---|---|---|---|---|
| Analyzer Manufacturer: | CAI | $NO_x$ Cal Gas Value: | 22.7 | LABEL |
| Analyzer Model: | 600CLD | $NO_2$ Cal Gas Value: | 17.2 | $C_0$ |
| Analyzer Serial Number: | U04004 | Performed By: | AA/DW/JP/SS/DA | |
| Date: | 6/26/2011 | CEMS ID#: | 4-CEMS | |

| GAS | ANALYZER MODE | ANALYZER RESPONSE | LABEL |
|---|---|---|---|
| Zero | NO | -0.01 | -- |
| Zero | $NO_x$ | -0.02 | -- |
| NO | NO | 22.83 | -- |
| NO | $NO_x$ | 22.52 | -- |
| $NO_2$ | NO | 0.11 | $C_1$ |
| $NO_2$ | $NO_x$ | 15.89 | $C_2$ |

| | | Label | Requirement |
|---|---|---|---|
| Abs. Value $C_1$: | 0.11 | $C_1$ | -- |
| Abs. Value $C_2$: | 15.89 | $C_2$ | -- |
| $C_1=(C_1/C_0)*100\%$ | 0.6% | | < 5% |
| $CE =(C_2-C_1)/C_0 * 100\%$: | 91.7% | -- | > 90% |

| | Cylinder # |
|---|---|
| NO bottle: | CC333881 |
| $NO_2$ bottle: | SA8313 |

**Delta Air Quality Services**

## SPAN GAS RECORD AND CALIBRATION ERROR

CLIENT/LOCATION: 2F-7

DATE: 6/26/2011

BY: AA/DW/JP/SS/DA

| | MID SPAN CYLINDER | | HIGH SPAN CYLINDER | |
|---|---|---|---|---|
| | CYLINDER NO. | CONC. | CYLINDER NO. | CONC. |
| ZERO | UZAM | | | |
| $O_2$ | SA8302 | 5.00 | CC102051 | 8.78 |
| $CO_2$ | SA8302 | 10.16 | CC102051 | 17.44 |
| $NO_x$ | CC81503 | 13.1 | CC333881 | 22.7 |
| CO | CC85874 | 142 | SA21216 | 248 |
| $SO_2$ | CC121015 | 12.9 | CC321694 | 22.2 |

## PRE-TEST INSTRUMENT CALIBRATION ERROR

| | ANALYZER | | | | | STATUS |
|---|---|---|---|---|---|---|
| | $O_2$ | $CO_2$ | $NO_x$ | CO | $SO_2$ | |
| Analyzer Range | 10 | 20 | 25 | 250 | 25 | |
| Zero Gas Value | 0 | 0 | 0 | 0 | 0 | -- |
| Analyzer Reads | 0.04 | -0.04 | 0.1 | -0.4 | 0.0 | -- |
| Error (% of Caibration Span) | 0.4% | -0.2% | 0.2% | -0.2% | -0.1% | PASS |
| High Gas Value (Calibration Span) | 8.78 | 17.44 | 22.7 | 248 | 22.2 | -- |
| Analyzer Reads | 8.76 | 17.41 | 22.5 | 245.1 | 22.6 | -- |
| Error (% of Caibration Span) | -0.2% | -0.1% | -0.9% | -1.2% | 1.6% | PASS |
| Mid Gas Value | 5.00 | 10.16 | 13.1 | 142 | 12.9 | -- |
| Analyzer Reads | 5.02 | 9.92 | 13.1 | 140.2 | 12.6 | -- |
| Error (% of Caibration Span) | 0.2% | -1.2% | 0.1% | -0.7% | -1.2% | PASS |

% ERROR CALCULATION:

(AS FOUND - ACTUAL VALUE OF SPAN)/RANGE * 100%

ALLOWABLE DEVIATION IS 2% OF FULL SCALE (2 SQUARES ON STRIPCHART)

Mobil FCC Strat 6-26-11.xls
DAQS Data

| Date | Time | O2 % | CO2 % | NOx PPM | CO PPM | SO2 % |
|---|---|---|---|---|---|---|
| 6/25/2011 | 6:34:00 PM | 9.41 | 17.76 | 40.05 | 261.92 | 23.49 |
| 6/25/2011 | 6:35:00 PM | 9.32 | 17.59 | 27.46 | 259.06 | 23.37 |
| 6/25/2011 | 6:36:00 PM | 8.66 | 17.46 | 48.20 | 258.24 | 23.18 |
| 6/25/2011 | 6:37:00 PM | 8.93 | 18.34 | 48.03 | 268.79 | 24.30 |
| 6/25/2011 | 6:38:00 PM | 8.97 | 16.44 | 46.80 | 242.76 | 22.38 |
| 6/25/2011 | 6:39:00 PM | 12.45 | 0.05 | 5.92 | 49.45 | 12.22 |
| 6/25/2011 | 6:40:00 PM | 12.45 | 0.04 | -0.14 | 1.55 | 1.04 |
| 6/25/2011 | 6:41:00 PM | 12.45 | 0.04 | -0.16 | 0.76 | 0.67 |
| 6/25/2011 | 6:42:00 PM | 12.45 | 0.04 | -0.17 | 0.75 | 0.68 |
| 6/25/2011 | 6:43:00 PM | 11.93 | 2.42 | 0.63 | 1.17 | 0.66 |
| 6/25/2011 | 6:44:00 PM | 5.05 | 13.73 | 10.78 | 49.41 | 0.55 |
| 6/25/2011 | 6:45:00 PM | 4.88 | 13.78 | 10.66 | 69.52 | 0.25 |
| 6/25/2011 | 6:46:00 PM | 4.82 | 13.86 | 10.64 | 71.37 | 0.69 |
| 6/25/2011 | 6:47:00 PM | 4.79 | 13.86 | 10.51 | 70.58 | 3.82 |
| 6/25/2011 | 6:48:00 PM | 4.82 | 13.82 | 9.44 | 70.95 | 3.80 |
| 6/25/2011 | 6:49:00 PM | 4.80 | 13.85 | 9.90 | 70.80 | 3.26 |
| 6/25/2011 | 6:50:00 PM | 4.84 | 13.82 | 10.39 | 69.26 | 2.98 |
| 6/25/2011 | 6:51:00 PM | 4.83 | 13.84 | 10.65 | 67.53 | 2.39 |
| 6/25/2011 | 6:52:00 PM | 4.84 | 13.83 | 11.01 | 69.24 | 1.94 |
| 6/25/2011 | 6:53:00 PM | 4.88 | 13.82 | 11.42 | 69.85 | 1.64 |
| 6/25/2011 | 6:54:00 PM | 4.90 | 13.81 | 10.88 | 69.11 | 1.52 |
| 6/25/2011 | 6:55:00 PM | 4.86 | 13.84 | 7.63 | 68.34 | 1.56 |
| 6/25/2011 | 6:56:00 PM | 4.89 | 13.82 | 9.14 | 67.07 | 1.66 |
| 6/25/2011 | 6:57:00 PM | 4.90 | 13.80 | 10.47 | 67.70 | 1.70 |
| 6/25/2011 | 6:58:00 PM | 4.89 | 13.80 | 11.27 | 68.05 | 1.85 |
| 6/25/2011 | 6:59:00 PM | 4.87 | 13.85 | 11.90 | 69.02 | 2.07 |
| 6/25/2011 | 7:00:00 PM | 4.96 | 13.79 | 11.86 | 69.03 | 2.17 |
| 6/25/2011 | 7:01:00 PM | 4.89 | 13.85 | 10.81 | 69.00 | 2.06 |
| 6/25/2011 | 7:02:00 PM | 4.89 | 13.85 | 7.13 | 70.47 | 2.00 |
| 6/25/2011 | 7:03:00 PM | 4.87 | 13.86 | 8.96 | 70.40 | 2.36 |
| 6/25/2011 | 7:04:00 PM | 4.89 | 13.84 | 10.53 | 70.91 | 2.70 |
| 6/25/2011 | 7:05:00 PM | 4.88 | 13.86 | 10.79 | 72.91 | 2.90 |
| 6/25/2011 | 7:06:00 PM | 4.87 | 13.88 | 11.36 | 72.80 | 2.78 |
| 6/25/2011 | 7:07:00 PM | 4.90 | 13.85 | 11.83 | 72.87 | 3.11 |
| 6/25/2011 | 7:08:00 PM | 4.91 | 13.87 | 11.22 | 72.29 | 3.16 |
| 6/25/2011 | 7:09:00 PM | 4.87 | 13.91 | 7.66 | 74.02 | 2.99 |
| 6/25/2011 | 7:10:00 PM | 4.92 | 13.86 | 9.56 | 72.65 | 3.27 |
| 6/25/2011 | 7:11:00 PM | 4.93 | 13.85 | 10.42 | 72.68 | 3.57 |
| 6/25/2011 | 7:12:00 PM | 4.93 | 13.88 | 10.79 | 71.70 | 3.56 |
| 6/25/2011 | 7:13:00 PM | 4.91 | 13.91 | 11.20 | 71.98 | 3.37 |
| 6/25/2011 | 7:14:00 PM | 4.89 | 13.91 | 11.61 | 73.34 | 3.37 |
| 6/25/2011 | 7:15:00 PM | 4.90 | 13.91 | 11.32 | 72.97 | 3.39 |
| 6/25/2011 | 7:16:00 PM | 4.91 | 13.89 | 9.19 | 72.78 | 3.37 |
| 6/25/2011 | 7:17:00 PM | 4.88 | 13.90 | 9.67 | 72.63 | 3.54 |
| 6/25/2011 | 7:18:00 PM | 4.85 | 13.94 | 10.04 | 72.67 | 3.49 |

Mobil FCC Strat 6-26-11.xls
DAQS Data

| | | | | | | |
|---|---|---|---|---|---|---|
| 6/25/2011 | 7:19:00 PM | 4.89 | 13.91 | 10.92 | 71.70 | 3.70 |
| 6/25/2011 | 7:20:00 PM | 4.93 | 13.87 | 11.54 | 71.97 | 4.22 |
| 6/25/2011 | 7:21:00 PM | 4.95 | 13.84 | 11.47 | 70.76 | 3.78 |
| 6/25/2011 | 7:22:00 PM | 4.92 | 13.87 | 10.71 | 71.91 | 3.33 |
| 6/25/2011 | 7:23:00 PM | 4.88 | 13.91 | 6.99 | 73.54 | 3.13 |
| 6/25/2011 | 7:24:00 PM | 5.01 | 14.12 | 8.92 | 73.64 | 3.37 |
| 6/25/2011 | 7:25:00 PM | 5.28 | 14.86 | 11.48 | 77.14 | 4.10 |
| 6/25/2011 | 7:26:00 PM | 5.11 | 14.22 | 11.74 | 74.29 | 3.84 |
| 6/25/2011 | 7:27:00 PM | 5.41 | 15.07 | 13.12 | 79.10 | 3.62 |
| 6/25/2011 | 7:28:00 PM | 5.33 | 14.67 | 12.56 | 75.86 | 3.38 |
| 6/25/2011 | 7:29:00 PM | 5.27 | 14.77 | 10.38 | 76.16 | 3.48 |
| 6/25/2011 | 7:30:00 PM | 5.01 | 14.18 | 7.77 | 74.43 | 3.50 |
| 6/25/2011 | 7:31:00 PM | 5.00 | 14.10 | 9.47 | 72.85 | 3.97 |
| 6/25/2011 | 7:32:00 PM | 4.93 | 13.87 | 10.14 | 72.38 | 3.72 |
| 6/25/2011 | 7:33:00 PM | 4.91 | 13.87 | 10.82 | 71.98 | 3.34 |
| 6/25/2011 | 7:34:00 PM | 4.92 | 13.87 | 11.69 | 72.05 | 3.07 |
| 6/25/2011 | 7:35:00 PM | 4.93 | 13.83 | 11.49 | 71.69 | 3.13 |
| 6/25/2011 | 7:36:00 PM | 4.92 | 13.86 | 9.98 | 71.81 | 3.28 |
| 6/25/2011 | 7:37:00 PM | 4.89 | 13.88 | 8.11 | 71.96 | 3.74 |
| 6/25/2011 | 7:38:00 PM | 4.94 | 13.84 | 9.75 | 69.29 | 3.95 |
| 6/25/2011 | 7:39:00 PM | 4.91 | 13.87 | 10.28 | 69.53 | 3.64 |
| 6/25/2011 | 7:40:00 PM | 4.90 | 13.87 | 10.50 | 70.99 | 3.39 |
| 6/25/2011 | 7:41:00 PM | 4.88 | 13.88 | 10.53 | 72.23 | 3.24 |
| 6/25/2011 | 7:42:00 PM | 4.85 | 13.92 | 11.18 | 73.75 | 3.25 |
| 6/25/2011 | 7:43:00 PM | 4.86 | 13.91 | 10.85 | 73.17 | 3.33 |
| 6/25/2011 | 7:44:00 PM | 4.91 | 13.86 | 10.76 | 72.70 | 3.32 |
| 6/25/2011 | 7:45:00 PM | 4.95 | 13.82 | 11.31 | 71.26 | 3.46 |
| 6/25/2011 | 7:46:00 PM | 4.96 | 13.80 | 11.37 | 71.20 | 3.50 |
| 6/25/2011 | 7:47:00 PM | 4.90 | 13.86 | 11.24 | 72.51 | 3.43 |
| 6/25/2011 | 7:48:00 PM | 4.87 | 13.88 | 11.40 | 73.48 | 3.51 |
| 6/25/2011 | 7:49:00 PM | 4.87 | 13.88 | 11.30 | 72.43 | 3.59 |
| 6/25/2011 | 7:50:00 PM | 4.84 | 13.91 | 9.91 | 71.88 | 3.67 |
| 6/25/2011 | 7:51:00 PM | 4.84 | 13.90 | 6.86 | 73.04 | 4.00 |
| 6/25/2011 | 7:52:00 PM | 4.88 | 13.86 | 8.79 | 71.89 | 4.40 |
| 6/25/2011 | 7:53:00 PM | 4.88 | 13.86 | 10.43 | 71.73 | 4.14 |
| 6/25/2011 | 7:54:00 PM | 4.90 | 13.83 | 10.77 | 72.00 | 3.67 |
| 6/25/2011 | 7:55:00 PM | 4.92 | 13.81 | 10.64 | 70.93 | 3.35 |
| 6/25/2011 | 7:56:00 PM | 4.95 | 13.79 | 10.45 | 70.19 | 3.22 |
| 6/25/2011 | 7:57:00 PM | 4.89 | 13.87 | 9.11 | 70.25 | 3.32 |
| 6/25/2011 | 7:58:00 PM | 4.87 | 13.88 | 6.48 | 72.57 | 3.55 |
| 6/25/2011 | 7:59:00 PM | 4.90 | 13.84 | 8.36 | 71.89 | 3.77 |
| 6/25/2011 | 8:00:00 PM | 4.90 | 13.85 | 9.72 | 70.29 | 3.37 |
| 6/25/2011 | 8:01:00 PM | 4.85 | 13.88 | 10.33 | 71.94 | 2.99 |
| 6/25/2011 | 8:02:00 PM | 4.86 | 13.90 | 10.61 | 72.57 | 2.77 |
| 6/25/2011 | 8:03:00 PM | 4.90 | 13.84 | 11.07 | 72.47 | 2.70 |
| 6/25/2011 | 8:04:00 PM | 4.89 | 13.86 | 9.70 | 72.52 | 2.70 |
| 6/25/2011 | 8:05:00 PM | 4.93 | 13.83 | 8.55 | 71.79 | 2.87 |

Mobil FCC Strat 6-26-11.xls
DAQS Data

| | | | | | | |
|---|---|---|---|---|---|---|
| 6/25/2011 | 8:06:00 PM | 4.92 | 13.83 | 9.40 | 71.28 | 3.01 |
| 6/25/2011 | 8:07:00 PM | 4.90 | 13.85 | 9.68 | 71.88 | 3.06 |
| 6/25/2011 | 8:08:00 PM | 4.88 | 13.87 | 9.59 | 72.36 | 2.86 |
| 6/25/2011 | 8:09:00 PM | 4.83 | 13.91 | 9.53 | 71.81 | 2.74 |
| 6/25/2011 | 8:10:00 PM | 4.80 | 13.96 | 9.80 | 72.40 | 2.75 |
| 6/25/2011 | 8:11:00 PM | 4.80 | 13.96 | 9.40 | 67.70 | 2.82 |
| 6/25/2011 | 8:12:00 PM | 4.83 | 13.93 | 6.92 | 57.92 | 2.92 |
| 6/25/2011 | 8:13:00 PM | 4.89 | 13.88 | 8.79 | 55.80 | 3.17 |
| 6/25/2011 | 8:14:00 PM | 4.87 | 13.89 | 9.82 | 55.42 | 2.87 |
| 6/25/2011 | 8:15:00 PM | 4.93 | 13.84 | 10.80 | 54.61 | 2.64 |
| 6/25/2011 | 8:16:00 PM | 4.96 | 13.82 | 11.10 | 53.77 | 2.55 |
| 6/25/2011 | 8:17:00 PM | 4.94 | 13.84 | 11.05 | 53.47 | 2.53 |
| 6/25/2011 | 8:18:00 PM | 4.92 | 13.88 | 10.12 | 54.73 | 2.56 |
| 6/25/2011 | 8:19:00 PM | 4.87 | 13.91 | 7.62 | 56.33 | 2.87 |
| 6/25/2011 | 8:20:00 PM | 4.90 | 13.87 | 8.81 | 55.02 | 3.43 |
| 6/25/2011 | 8:21:00 PM | 4.89 | 13.89 | 9.39 | 53.71 | 3.34 |
| 6/25/2011 | 8:22:00 PM | 4.86 | 13.91 | 10.03 | 55.67 | 3.04 |
| 6/25/2011 | 8:23:00 PM | 4.89 | 13.90 | 10.36 | 55.35 | 3.01 |
| 6/25/2011 | 8:24:00 PM | 4.89 | 13.90 | 10.09 | 54.41 | 2.76 |
| 6/25/2011 | 8:25:00 PM | 4.88 | 13.92 | 9.52 | 53.86 | 2.64 |
| 6/25/2011 | 8:26:00 PM | 4.90 | 13.91 | 7.78 | 53.93 | 2.53 |
| 6/25/2011 | 8:27:00 PM | 4.94 | 13.85 | 9.37 | 54.34 | 2.60 |
| 6/25/2011 | 8:28:00 PM | 4.97 | 13.82 | 9.42 | 52.88 | 2.53 |
| 6/25/2011 | 8:29:00 PM | 4.90 | 13.89 | 9.34 | 53.43 | 2.29 |
| 6/25/2011 | 8:30:00 PM | 4.90 | 13.90 | 10.05 | 54.00 | 2.20 |
| 6/25/2011 | 8:31:00 PM | 4.94 | 13.88 | 10.84 | 53.82 | 2.05 |
| 6/25/2011 | 8:32:00 PM | 4.95 | 13.86 | 10.49 | 53.30 | 1.94 |
| 6/25/2011 | 8:33:00 PM | 4.96 | 13.84 | 7.96 | 54.61 | 2.02 |
| 6/25/2011 | 8:34:00 PM | 4.98 | 13.84 | 9.46 | 54.75 | 2.37 |
| 6/25/2011 | 8:35:00 PM | 4.99 | 13.82 | 10.63 | 55.15 | 2.47 |
| 6/25/2011 | 8:36:00 PM | 4.98 | 13.83 | 10.98 | 54.95 | 2.43 |
| 6/25/2011 | 8:37:00 PM | 5.01 | 13.81 | 11.43 | 54.15 | 2.33 |
| 6/25/2011 | 8:38:00 PM | 5.01 | 13.82 | 11.68 | 54.92 | 2.46 |
| 6/25/2011 | 8:39:00 PM | 4.97 | 13.85 | 10.25 | 55.05 | 2.69 |
| 6/25/2011 | 8:40:00 PM | 4.95 | 13.87 | 7.55 | 54.91 | 3.26 |
| 6/25/2011 | 8:41:00 PM | 4.99 | 13.82 | 9.46 | 54.64 | 3.83 |
| 6/25/2011 | 8:42:00 PM | 4.98 | 13.83 | 10.46 | 54.08 | 3.59 |
| 6/25/2011 | 8:43:00 PM | 5.00 | 13.82 | 11.47 | 55.49 | 3.18 |
| 6/25/2011 | 8:44:00 PM | 5.04 | 13.79 | 11.91 | 55.49 | 2.93 |
| 6/25/2011 | 8:45:00 PM | 5.02 | 13.80 | 12.03 | 54.78 | 2.93 |
| 6/25/2011 | 8:46:00 PM | 4.98 | 13.84 | 10.80 | 54.47 | 3.07 |
| 6/25/2011 | 8:47:00 PM | 4.93 | 13.89 | 7.77 | 54.86 | 3.53 |
| 6/25/2011 | 8:48:00 PM | 4.93 | 13.88 | 9.70 | 54.32 | 3.98 |
| 6/25/2011 | 8:49:00 PM | 4.98 | 13.83 | 10.61 | 54.79 | 3.86 |
| 6/25/2011 | 8:50:00 PM | 4.98 | 13.83 | 10.96 | 54.53 | 3.47 |
| 6/25/2011 | 8:51:00 PM | 4.96 | 13.85 | 11.18 | 55.59 | 3.26 |
| 6/25/2011 | 8:52:00 PM | 4.96 | 13.87 | 11.68 | 54.92 | 3.24 |

Mobil FCC Strat 6-26-11.xls
DAQS Data

| | | | | | | |
|---|---|---|---|---|---|---|
| 6/25/2011 | 8:53:00 PM | 4.98 | 13.84 | 11.17 | 55.95 | 3.20 |
| 6/25/2011 | 8:54:00 PM | 4.95 | 13.87 | 9.28 | 55.32 | 3.67 |
| 6/25/2011 | 8:55:00 PM | 4.99 | 13.83 | 10.83 | 55.15 | 3.96 |
| 6/25/2011 | 8:56:00 PM | 5.07 | 13.76 | 11.30 | 53.40 | 3.87 |
| 6/25/2011 | 8:57:00 PM | 5.03 | 13.81 | 11.35 | 52.53 | 3.70 |
| 6/25/2011 | 8:58:00 PM | 4.96 | 13.86 | 11.38 | 55.26 | 3.48 |
| 6/25/2011 | 8:59:00 PM | 4.92 | 13.91 | 11.69 | 54.58 | 3.65 |
| 6/25/2011 | 9:00:00 PM | 4.92 | 13.92 | 11.13 | 54.96 | 3.86 |
| 6/25/2011 | 9:01:00 PM | 4.88 | 13.95 | 7.15 | 55.49 | 4.33 |
| 6/25/2011 | 9:02:00 PM | 4.92 | 13.92 | 9.24 | 55.63 | 4.83 |
| 6/25/2011 | 9:03:00 PM | 4.94 | 13.90 | 10.93 | 56.09 | 4.43 |
| 6/25/2011 | 9:04:00 PM | 4.97 | 13.88 | 11.70 | 55.91 | 3.81 |
| 6/25/2011 | 9:05:00 PM | 5.00 | 13.87 | 12.16 | 55.57 | 3.51 |
| 6/25/2011 | 9:06:00 PM | 5.03 | 13.84 | 11.98 | 54.57 | 3.41 |
| 6/25/2011 | 9:07:00 PM | 4.98 | 13.90 | 11.00 | 54.84 | 3.51 |
| 6/25/2011 | 9:08:00 PM | 4.91 | 13.96 | 7.87 | 56.36 | 3.92 |
| 6/25/2011 | 9:09:00 PM | 4.95 | 13.91 | 9.64 | 56.05 | 4.54 |
| 6/25/2011 | 9:10:00 PM | 4.98 | 13.89 | 10.80 | 54.80 | 4.14 |
| 6/25/2011 | 9:11:00 PM | 4.97 | 13.89 | 11.29 | 54.42 | 3.67 |
| 6/25/2011 | 9:12:00 PM | 5.00 | 13.86 | 11.60 | 54.55 | 3.55 |
| 6/25/2011 | 9:13:00 PM | 4.98 | 13.87 | 11.79 | 54.36 | 3.61 |
| 6/25/2011 | 9:14:00 PM | 4.95 | 13.91 | 11.03 | 55.24 | 3.63 |
| 6/25/2011 | 9:15:00 PM | 4.95 | 13.91 | 8.09 | 55.65 | 3.94 |
| 6/25/2011 | 9:16:00 PM | 4.97 | 13.89 | 9.67 | 55.97 | 4.38 |
| 6/25/2011 | 9:17:00 PM | 4.96 | 13.91 | 11.11 | 54.52 | 4.16 |
| 6/25/2011 | 9:18:00 PM | 4.97 | 13.90 | 11.80 | 55.18 | 3.85 |
| 6/25/2011 | 9:19:00 PM | 4.99 | 13.88 | 12.16 | 55.14 | 3.78 |
| 6/25/2011 | 9:20:00 PM | 4.96 | 13.90 | 12.03 | 55.56 | 3.82 |
| 6/25/2011 | 9:21:00 PM | 4.97 | 13.90 | 11.38 | 55.75 | 3.81 |
| 6/25/2011 | 9:22:00 PM | 4.95 | 13.91 | 10.50 | 54.75 | 4.00 |
| 6/25/2011 | 9:23:00 PM | 4.98 | 13.89 | 11.73 | 54.30 | 4.20 |
| 6/25/2011 | 9:24:00 PM | 4.95 | 13.92 | 12.24 | 55.41 | 4.04 |
| 6/25/2011 | 9:25:00 PM | 4.95 | 13.92 | 12.94 | 55.62 | 4.06 |
| 6/25/2011 | 9:26:00 PM | 5.00 | 13.87 | 13.10 | 55.17 | 4.11 |
| 6/25/2011 | 9:27:00 PM | 5.01 | 13.86 | 13.22 | 54.77 | 4.20 |
| 6/25/2011 | 9:28:00 PM | 4.97 | 13.89 | 11.91 | 54.07 | 4.35 |
| 6/25/2011 | 9:29:00 PM | 4.94 | 13.93 | 7.98 | 54.61 | 4.83 |
| 6/25/2011 | 9:30:00 PM | 4.99 | 13.89 | 10.02 | 55.49 | 5.43 |
| 6/25/2011 | 9:31:00 PM | 4.99 | 13.87 | 11.61 | 56.64 | 4.99 |
| 6/25/2011 | 9:32:00 PM | 4.99 | 13.90 | 12.48 | 56.70 | 4.53 |
| 6/25/2011 | 9:33:00 PM | 4.99 | 13.88 | 12.78 | 56.02 | 4.31 |
| 6/25/2011 | 9:34:00 PM | 5.02 | 13.86 | 13.33 | 54.92 | 4.38 |
| 6/25/2011 | 9:35:00 PM | 5.01 | 13.85 | 13.08 | 55.81 | 4.43 |
| 6/25/2011 | 9:36:00 PM | 4.97 | 13.89 | 11.68 | 55.95 | 4.74 |
| 6/25/2011 | 9:37:00 PM | 5.01 | 13.85 | 12.44 | 54.72 | 4.94 |
| 6/25/2011 | 9:38:00 PM | 4.96 | 13.90 | 12.93 | 55.60 | 4.93 |
| 6/25/2011 | 9:39:00 PM | 5.03 | 13.82 | 13.01 | 55.51 | 4.95 |

Mobil FCC Strat 6-26-11.xls
DAQS Data

| | | | | | | |
|---|---|---|---|---|---|---|
| 6/25/2011 | 9:40:00 PM | 4.99 | 13.85 | 12.11 | 54.36 | 4.89 |
| 6/25/2011 | 9:41:00 PM | 4.97 | 13.88 | 12.24 | 54.89 | 5.06 |
| 6/25/2011 | 9:42:00 PM | 4.95 | 13.90 | 11.58 | 55.76 | 5.09 |
| 6/25/2011 | 9:43:00 PM | 4.95 | 13.91 | 8.00 | 55.40 | 5.66 |
| 6/25/2011 | 9:44:00 PM | 4.99 | 13.86 | 9.90 | 54.27 | 5.92 |
| 6/25/2011 | 9:45:00 PM | 4.99 | 13.86 | 11.10 | 54.54 | 5.05 |
| 6/25/2011 | 9:46:00 PM | 5.00 | 13.84 | 10.92 | 53.55 | 4.63 |
| 6/25/2011 | 9:47:00 PM | 4.89 | 13.95 | 11.04 | 55.23 | 4.33 |
| 6/25/2011 | 9:48:00 PM | 4.89 | 13.95 | 11.66 | 55.53 | 4.43 |
| 6/25/2011 | 9:49:00 PM | 4.86 | 13.97 | 11.18 | 55.26 | 4.36 |
| 6/25/2011 | 9:50:00 PM | 4.86 | 13.98 | 8.33 | 54.78 | 4.47 |
| 6/25/2011 | 9:51:00 PM | 4.89 | 13.95 | 9.19 | 55.04 | 4.70 |
| 6/25/2011 | 9:52:00 PM | 4.92 | 13.92 | 10.38 | 54.29 | 4.39 |
| 6/25/2011 | 9:53:00 PM | 4.91 | 13.95 | 11.08 | 54.58 | 3.91 |
| 6/25/2011 | 9:54:00 PM | 4.96 | 13.89 | 11.52 | 54.28 | 3.60 |
| 6/25/2011 | 9:55:00 PM | 4.97 | 13.89 | 11.51 | 54.66 | 3.54 |
| 6/25/2011 | 9:56:00 PM | 4.97 | 13.90 | 11.33 | 54.99 | 3.46 |
| 6/25/2011 | 9:57:00 PM | 4.96 | 13.91 | 9.73 | 54.36 | 3.74 |
| 6/25/2011 | 9:58:00 PM | 4.99 | 13.88 | 10.86 | 53.66 | 3.90 |
| 6/25/2011 | 9:59:00 PM | 4.98 | 13.89 | 11.21 | 53.96 | 3.63 |
| 6/25/2011 | 10:00:00 PM | 4.95 | 13.92 | 11.23 | 54.23 | 3.64 |
| 6/25/2011 | 10:01:00 PM | 4.96 | 13.91 | 11.40 | 54.24 | 3.54 |
| 6/25/2011 | 10:02:00 PM | 4.92 | 13.94 | 11.60 | 54.11 | 3.59 |
| 6/25/2011 | 10:03:00 PM | 4.92 | 13.97 | 11.30 | 54.81 | 3.83 |
| 6/25/2011 | 10:04:00 PM | 4.91 | 13.99 | 7.93 | 54.25 | 4.03 |
| 6/25/2011 | 10:05:00 PM | 4.94 | 13.94 | 9.49 | 55.11 | 4.51 |
| 6/25/2011 | 10:06:00 PM | 4.97 | 13.90 | 10.99 | 54.30 | 4.06 |
| 6/25/2011 | 10:07:00 PM | 5.02 | 13.88 | 11.47 | 54.07 | 3.65 |
| 6/25/2011 | 10:08:00 PM | 5.01 | 13.87 | 11.28 | 54.24 | 3.19 |
| 6/25/2011 | 10:09:00 PM | 4.97 | 13.93 | 11.23 | 53.63 | 3.23 |
| 6/25/2011 | 10:10:00 PM | 4.93 | 13.96 | 10.54 | 54.94 | 3.42 |
| 6/25/2011 | 10:11:00 PM | 4.90 | 14.00 | 7.66 | 54.80 | 3.62 |
| 6/25/2011 | 10:12:00 PM | 4.97 | 13.91 | 9.53 | 53.49 | 3.98 |
| 6/25/2011 | 10:13:00 PM | 4.96 | 13.90 | 10.24 | 52.24 | 3.71 |
| 6/25/2011 | 10:14:00 PM | 4.92 | 13.93 | 10.34 | 51.90 | 3.46 |
| 6/25/2011 | 10:15:00 PM | 4.90 | 13.94 | 10.91 | 52.24 | 3.36 |
| 6/25/2011 | 10:16:00 PM | 4.85 | 14.00 | 10.92 | 53.44 | 3.25 |
| 6/25/2011 | 10:17:00 PM | 4.84 | 14.01 | 10.58 | 53.61 | 3.23 |
| 6/25/2011 | 10:18:00 PM | 4.84 | 14.00 | 7.25 | 53.89 | 3.53 |
| 6/25/2011 | 10:19:00 PM | 4.90 | 13.96 | 8.79 | 53.98 | 3.81 |
| 6/25/2011 | 10:20:00 PM | 4.89 | 13.96 | 9.42 | 54.11 | 3.25 |
| 6/25/2011 | 10:21:00 PM | 4.87 | 13.98 | 9.88 | 54.56 | 2.71 |
| 6/25/2011 | 10:22:00 PM | 4.87 | 13.97 | 9.96 | 54.07 | 2.51 |
| 6/25/2011 | 10:23:00 PM | 4.90 | 13.95 | 10.23 | 53.05 | 2.39 |
| 6/25/2011 | 10:24:00 PM | 4.87 | 13.97 | 9.52 | 52.80 | 2.20 |
| 6/25/2011 | 10:25:00 PM | 4.91 | 13.94 | 7.98 | 53.10 | 2.26 |
| 6/25/2011 | 10:26:00 PM | 4.93 | 13.92 | 9.30 | 53.15 | 2.45 |

Mobil FCC Strat 6-26-11.xls
DAQS Data

| | | | | | | |
|---|---|---|---|---|---|---|
| 6/25/2011 | 10:27:00 PM | 4.96 | 13.90 | 10.72 | 52.52 | 2.34 |
| 6/25/2011 | 10:28:00 PM | 4.98 | 13.88 | 11.04 | 53.12 | 2.29 |
| 6/25/2011 | 10:29:00 PM | 4.98 | 13.88 | 11.48 | 52.49 | 2.14 |
| 6/25/2011 | 10:30:00 PM | 4.96 | 13.91 | 11.74 | 52.89 | 2.14 |
| 6/25/2011 | 10:31:00 PM | 5.02 | 13.86 | 11.35 | 52.67 | 2.20 |
| 6/25/2011 | 10:32:00 PM | 4.94 | 13.93 | 7.66 | 52.50 | 2.71 |
| 6/25/2011 | 10:33:00 PM | 4.93 | 13.92 | 9.64 | 53.18 | 3.29 |
| 6/25/2011 | 10:34:00 PM | 4.97 | 13.88 | 10.79 | 52.51 | 3.17 |
| 6/25/2011 | 10:35:00 PM | 4.98 | 13.89 | 11.41 | 51.92 | 2.59 |
| 6/25/2011 | 10:36:00 PM | 4.99 | 13.88 | 11.89 | 52.72 | 2.51 |
| 6/25/2011 | 10:37:00 PM | 4.99 | 13.87 | 11.60 | 53.92 | 2.58 |
| 6/25/2011 | 10:38:00 PM | 4.93 | 13.92 | 11.11 | 53.71 | 2.68 |
| 6/25/2011 | 10:39:00 PM | 4.91 | 13.95 | 10.52 | 53.75 | 2.95 |
| 6/25/2011 | 10:40:00 PM | 4.96 | 13.88 | 11.19 | 53.68 | 3.14 |
| 6/25/2011 | 10:41:00 PM | 4.96 | 13.89 | 11.61 | 53.10 | 3.16 |
| 6/25/2011 | 10:42:00 PM | 4.99 | 13.86 | 11.43 | 51.88 | 3.11 |
| 6/25/2011 | 10:43:00 PM | 4.98 | 13.89 | 11.81 | 51.34 | 3.16 |
| 6/25/2011 | 10:44:00 PM | 4.99 | 13.87 | 12.08 | 52.68 | 3.23 |
| 6/25/2011 | 10:45:00 PM | 4.95 | 13.90 | 11.52 | 52.85 | 3.54 |
| 6/25/2011 | 10:46:00 PM | 4.87 | 13.98 | 7.48 | 54.45 | 3.89 |
| 6/25/2011 | 10:47:00 PM | 4.88 | 13.96 | 9.08 | 53.86 | 4.42 |
| 6/25/2011 | 10:48:00 PM | 4.91 | 13.93 | 10.87 | 54.19 | 4.00 |
| 6/25/2011 | 10:49:00 PM | 4.93 | 13.91 | 11.53 | 53.74 | 3.48 |
| 6/25/2011 | 10:50:00 PM | 4.94 | 13.91 | 11.99 | 53.91 | 3.11 |
| 6/25/2011 | 10:51:00 PM | 4.90 | 13.93 | 11.91 | 54.79 | 3.09 |
| 6/25/2011 | 10:52:00 PM | 4.89 | 13.95 | 11.01 | 55.14 | 3.05 |
| 6/25/2011 | 10:53:00 PM | 4.81 | 14.03 | 6.73 | 55.86 | 3.51 |
| 6/25/2011 | 10:54:00 PM | 4.82 | 14.03 | 8.45 | 55.29 | 3.96 |
| 6/25/2011 | 10:55:00 PM | 4.92 | 13.94 | 10.21 | 53.84 | 3.58 |
| 6/25/2011 | 10:56:00 PM | 4.92 | 13.94 | 10.94 | 53.57 | 2.82 |
| 6/25/2011 | 10:57:00 PM | 4.95 | 13.91 | 11.80 | 54.09 | 2.50 |
| 6/25/2011 | 10:58:00 PM | 4.93 | 13.92 | 11.41 | 53.40 | 2.33 |
| 6/25/2011 | 10:59:00 PM | 4.94 | 13.94 | 11.34 | 53.97 | 2.28 |
| 6/25/2011 | 11:00:00 PM | 4.93 | 13.94 | 9.36 | 54.05 | 2.57 |
| 6/25/2011 | 11:01:00 PM | 4.94 | 13.95 | 10.64 | 53.60 | 2.78 |
| 6/25/2011 | 11:02:00 PM | 4.94 | 13.95 | 11.43 | 53.72 | 2.59 |
| 6/25/2011 | 11:03:00 PM | 4.94 | 13.96 | 11.89 | 53.37 | 2.44 |
| 6/25/2011 | 11:04:00 PM | 4.91 | 13.98 | 11.66 | 53.21 | 2.51 |
| 6/25/2011 | 11:05:00 PM | 4.87 | 14.02 | 11.67 | 54.03 | 2.53 |
| 6/25/2011 | 11:06:00 PM | 4.89 | 14.01 | 11.55 | 54.53 | 2.58 |
| 6/25/2011 | 11:07:00 PM | 4.87 | 14.03 | 7.30 | 54.45 | 2.95 |
| 6/25/2011 | 11:08:00 PM | 4.92 | 13.99 | 8.72 | 54.11 | 3.62 |
| 6/25/2011 | 11:09:00 PM | 4.89 | 14.02 | 9.90 | 54.13 | 3.24 |
| 6/25/2011 | 11:10:00 PM | 4.93 | 13.97 | 10.56 | 54.27 | 2.82 |
| 6/25/2011 | 11:11:00 PM | 4.93 | 13.97 | 10.61 | 53.61 | 2.68 |
| 6/25/2011 | 11:12:00 PM | 4.95 | 13.96 | 10.68 | 53.98 | 2.52 |
| 6/25/2011 | 11:13:00 PM | 4.90 | 14.00 | 10.36 | 54.75 | 2.46 |

Mobil FCC Strat 6-26-11.xls
DAQS Data

| | | | | | | |
|---|---|---|---|---|---|---|
| 6/25/2011 | 11:14:00 PM | 4.87 | 14.02 | 7.03 | 55.70 | 2.51 |
| 6/25/2011 | 11:15:00 PM | 4.91 | 13.98 | 8.09 | 54.63 | 2.83 |
| 6/25/2011 | 11:16:00 PM | 4.93 | 13.98 | 9.94 | 54.59 | 2.64 |
| 6/25/2011 | 11:17:00 PM | 4.93 | 13.96 | 10.39 | 53.91 | 2.34 |
| 6/25/2011 | 11:18:00 PM | 4.93 | 13.96 | 11.31 | 55.28 | 1.88 |
| 6/25/2011 | 11:19:00 PM | 4.94 | 13.96 | 9.20 | 55.09 | 1.71 |
| 6/25/2011 | 11:20:00 PM | 4.97 | 13.93 | 9.25 | 53.33 | 1.86 |
| 6/25/2011 | 11:21:00 PM | 4.95 | 13.95 | 10.25 | 52.70 | 1.98 |
| 6/25/2011 | 11:22:00 PM | 4.95 | 13.95 | 7.88 | 53.09 | 1.99 |
| 6/25/2011 | 11:23:00 PM | 4.98 | 13.91 | 8.90 | 52.93 | 2.15 |
| 6/25/2011 | 11:24:00 PM | 4.97 | 13.91 | 9.41 | 52.04 | 2.05 |
| 6/25/2011 | 11:25:00 PM | 4.94 | 13.96 | 9.77 | 52.94 | 1.75 |
| 6/25/2011 | 11:26:00 PM | 4.93 | 13.96 | 9.98 | 53.29 | 1.50 |
| 6/25/2011 | 11:27:00 PM | 4.92 | 13.96 | 10.27 | 52.64 | 1.49 |
| 6/25/2011 | 11:28:00 PM | 4.89 | 14.01 | 10.43 | 53.02 | 1.35 |
| 6/25/2011 | 11:29:00 PM | 4.94 | 13.96 | 10.67 | 53.31 | 1.38 |
| 6/25/2011 | 11:30:00 PM | 4.90 | 13.99 | 10.40 | 53.59 | 1.36 |
| 6/25/2011 | 11:31:00 PM | 4.92 | 13.97 | 10.45 | 52.91 | 1.45 |
| 6/25/2011 | 11:32:00 PM | 4.92 | 13.98 | 10.68 | 52.56 | 1.49 |
| 6/25/2011 | 11:33:00 PM | 4.92 | 14.00 | 10.76 | 53.58 | 1.41 |
| 6/25/2011 | 11:34:00 PM | 4.95 | 13.96 | 11.19 | 53.38 | 1.39 |
| 6/25/2011 | 11:35:00 PM | 4.97 | 13.92 | 11.36 | 51.75 | 1.52 |
| 6/25/2011 | 11:36:00 PM | 4.94 | 13.95 | 11.38 | 51.78 | 1.70 |
| 6/25/2011 | 11:37:00 PM | 4.99 | 13.91 | 11.45 | 51.97 | 1.81 |
| 6/25/2011 | 11:38:00 PM | 4.97 | 13.91 | 10.54 | 51.87 | 1.90 |
| 6/25/2011 | 11:39:00 PM | 4.89 | 13.99 | 10.55 | 51.49 | 2.09 |
| 6/25/2011 | 11:40:00 PM | 4.91 | 13.99 | 10.90 | 51.16 | 2.08 |
| 6/25/2011 | 11:41:00 PM | 4.98 | 13.92 | 11.02 | 51.18 | 1.96 |
| 6/25/2011 | 11:42:00 PM | 4.94 | 13.93 | 10.46 | 49.67 | 1.90 |
| 6/25/2011 | 11:43:00 PM | 4.97 | 13.94 | 10.90 | 49.55 | 1.81 |
| 6/25/2011 | 11:44:00 PM | 4.97 | 13.92 | 10.64 | 49.55 | 1.77 |
| 6/25/2011 | 11:45:00 PM | 4.94 | 13.97 | 10.08 | 49.25 | 1.65 |
| 6/25/2011 | 11:46:00 PM | 4.89 | 14.02 | 10.20 | 50.19 | 1.52 |
| 6/25/2011 | 11:47:00 PM | 4.93 | 13.98 | 10.36 | 50.61 | 1.50 |
| 6/25/2011 | 11:48:00 PM | 4.94 | 13.97 | 10.42 | 50.07 | 1.39 |
| 6/25/2011 | 11:49:00 PM | 4.93 | 13.97 | 10.31 | 49.97 | 1.25 |
| 6/25/2011 | 11:50:00 PM | 4.90 | 14.01 | 10.34 | 50.50 | 1.27 |
| 6/25/2011 | 11:51:00 PM | 4.95 | 13.96 | 10.47 | 50.96 | 1.16 |
| 6/25/2011 | 11:52:00 PM | 4.91 | 14.00 | 10.01 | 51.03 | 1.07 |
| 6/25/2011 | 11:53:00 PM | 4.89 | 14.00 | 10.08 | 51.59 | 1.04 |
| 6/25/2011 | 11:54:00 PM | 4.88 | 14.00 | 9.99 | 51.60 | 0.98 |
| 6/25/2011 | 11:55:00 PM | 4.88 | 14.03 | 10.59 | 51.53 | 0.89 |
| 6/25/2011 | 11:56:00 PM | 4.92 | 13.99 | 10.09 | 51.42 | 0.87 |
| 6/25/2011 | 11:57:00 PM | 4.94 | 13.97 | 9.38 | 50.15 | 0.86 |

**Delta Air Quality Services**

**SPAN GAS RECORD AND EPA CALIBRATION ERROR**

CLIENT/LOCATION: ExxonMobil
TRUCK/CEM I.D.: 4-CEMS

DATE: 6/27/11
BY: AA/DW/JP/SS/DA

| | MID SPAN CYLINDER | | HIGH SPAN CYLINDER | |
|---|---|---|---|---|
| | CYLINDER NO. | CONCENTRATION | CYLINDER NO. | CONCENTRATION |
| ZERO | "CEM Grade $N_2$" | | | |
| $O_2$ | SA8302 | 5.00 | CC102051 | 8.78 |
| $CO_2$ | SA8302 | 10.16 | CC102051 | 17.44 |
| | | | | |
| CO | CC85874 | 142 | SA21216 | 248 |
| | | | | |

**PRE-TEST INSTRUMENT CALIBRATION ERROR**

| | ANALYZER | | | | |
|---|---|---|---|---|---|
| | $O_2$ | $CO_2$ | | CO | |
| Analyzer Range | 10 | 20 | | 250 | |
| Calibration Span | 8.78 | 17.44 | | 248 | |
| Zero Gas Value | 0.0 | 0.0 | | 0.0 | |
| Analyzer Reads | 0.03 | -0.06 | | -1.91 | |
| Difference (% or ppm) | 0.0 | -0.1 | | -1.9 | |
| Error (% of Cal. Span) | 0.3% | -0.3% | | -0.8% | |
| Status(1) | PASS | PASS | | PASS | |
| High Gas Value | 8.78 | 17.44 | | 248 | |
| Analyzer Reads | 8.77 | 17.54 | | 248.45 | |
| Difference (% or ppm) | 0.0 | 0.1 | | 0.4 | |
| Error (% of Cal. Span) | -0.1% | 0.6% | | 0.2% | |
| Status | PASS | PASS | | PASS | |
| Mid Gas Value | 5.00 | 10.16 | | 142 | |
| Analyzer Reads | 5.04 | 10.02 | | 142.11 | |
| Difference (% or ppm) | 0.0 | -0.1 | | 0.1 | |
| Error (% of Cal. Span) | 0.4% | -0.8% | | 0.0% | |
| Status | PASS | PASS | | PASS | |

1) Calibration Error must be within +/- 2.0% of the Calibration Span

| Date | Time | O2 % | CO2 % | CO PPM | HC PPM | |
|---|---|---|---|---|---|---|
| 6/27/2011 | 8:13:00 AM | 5.314 | 12.706 | 70.893 | 29.837 | |
| 6/27/2011 | 8:14:00 AM | 0.178 | 0.008 | 51.52 | 30.304 | |
| 6/27/2011 | 8:15:00 AM | 0.048 | -0.042 | 8.506 | 29.678 | |
| 6/27/2011 | 8:16:00 AM | 0.043 | -0.05 | -1.49 | 2.89 | |
| 6/27/2011 | 8:17:00 AM | 0.046 | -0.039 | -1.881 | 1.107 | |
| 6/27/2011 | 8:18:00 AM | 0.029 | -0.056 | -1.909 | 1.191 | N2 |
| 6/27/2011 | 8:19:00 AM | 7.86 | 16.651 | 103.465 | 1.08 | |
| 6/27/2011 | 8:20:00 AM | 9.429 | 19.212 | 258.504 | 0.744 | |
| 6/27/2011 | 8:21:00 AM | 8.995 | 18.147 | 250.358 | 0.235 | |
| 6/27/2011 | 8:22:00 AM | 8.699 | 17.741 | 247.415 | 21.539 | |
| | | | | | | |
| 6/27/2011 | 8:25:00 AM | 8.469 | 17.523 | 249.056 | 99.926 | |
| 6/27/2011 | 8:26:00 AM | 8.47 | 17.524 | 248.215 | 90.804 | |
| 6/27/2011 | 8:27:00 AM | 8.584 | 17.536 | 248.888 | 89.28 | |
| 6/27/2011 | 8:28:00 AM | 8.769 | 17.542 | 248.447 | 77.68 | Cal High |
| 6/27/2011 | 8:29:00 AM | 6.044 | 11.473 | 215.035 | 1.008 | |
| 6/27/2011 | 8:30:00 AM | 5.04 | 10.035 | 143.527 | 0.725 | |
| 6/27/2011 | 8:31:00 AM | 5.032 | 10.028 | 142.057 | 0.143 | |
| 6/27/2011 | 8:32:00 AM | 5.036 | 10.023 | 142.106 | 0.135 | Mid/THC Zero |
| 6/27/2011 | 8:33:00 AM | 5.222 | 10.019 | 141.895 | 0.332 | |
| 6/27/2011 | 8:34:00 AM | 5.239 | 12.78 | 118.384 | 81.716 | |
| 6/27/2011 | 8:35:00 AM | 5.201 | 13.725 | 64.878 | 88.464 | |
| 6/27/2011 | 8:36:00 AM | 5.211 | 13.702 | 63.026 | 88.555 | THC High |
| 6/27/2011 | 8:37:00 AM | 5.075 | 13.811 | 65.575 | 85.879 | |
| 6/27/2011 | 8:38:00 AM | 5.017 | 13.867 | 70.123 | 45.806 | |
| 6/27/2011 | 8:39:00 AM | 5.055 | 13.827 | 69.378 | 45.821 | THC Mid |
| 6/27/2011 | 8:40:00 AM | 5.061 | 13.843 | 67.229 | 41.839 | |
| 6/27/2011 | 8:41:00 AM | 5.07 | 13.853 | 67.091 | 26.062 | |
| 6/27/2011 | 8:42:00 AM | 5.129 | 13.824 | 67.216 | 26.21 | |
| 6/27/2011 | 8:43:00 AM | 5.365 | 14.398 | 69.654 | 27.816 | |
| 6/27/2011 | 8:44:00 AM | 5.864 | 15.899 | 77.356 | 33.356 | |
| 6/27/2011 | 8:45:00 AM | 5.215 | 13.976 | 67.419 | 25.909 | |
| 6/27/2011 | 8:46:00 AM | 5.237 | 13.846 | 66.632 | 25.578 | |
| 6/27/2011 | 8:47:00 AM | 5.218 | 13.84 | 66.538 | 25.551 | |
| 6/27/2011 | 8:48:00 AM | 5.223 | 13.822 | 65.824 | 25.462 | |
| 6/27/2011 | 8:49:00 AM | 5.214 | 13.825 | 64.878 | 25.294 | |
| 6/27/2011 | 8:50:00 AM | 5.233 | 13.807 | 65.021 | 25.297 | |
| 6/27/2011 | 8:51:00 AM | 5.18 | 13.848 | 66.39 | 25.286 | THC Low |
| 6/27/2011 | 8:52:00 AM | 5.15 | 13.881 | 68.407 | 29.036 | |
| 6/27/2011 | 8:53:00 AM | 5.183 | 13.873 | 68.272 | 49.353 | |
| 6/27/2011 | 8:54:00 AM | 5.638 | 12.11 | 67.427 | 54.354 | |
| 6/27/2011 | 8:55:00 AM | 5.303 | 10.447 | 6.502 | 53.655 | |
| 6/27/2011 | 8:56:00 AM | 5.16 | 10.169 | -2.609 | 47.342 | |
| 6/27/2011 | 8:57:00 AM | 5.162 | 10.169 | -2.673 | 45.052 | O2/CO2 bias |
| 6/27/2011 | 8:58:00 AM | 3.934 | 7.314 | 0.061 | 44.785 | |
| 6/27/2011 | 8:59:00 AM | 0.064 | 0.007 | 116.485 | 46.023 | |
| 6/27/2011 | 9:00:00 AM | 0.047 | -0.018 | 145.251 | 46.362 | |
| 6/27/2011 | 9:01:00 AM | 0.041 | -0.026 | 145.504 | 44.642 | CO bias |
| 6/27/2011 | 9:02:00 AM | 2.527 | 7.296 | 135.379 | 45.16 | |

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|---|---|---|---|---|---|---|
| 6/27/2011 | 9:03:00 AM | 5.426 | 14.572 | 76.947 | 47.438 | |
| 6/27/2011 | 9:04:00 AM | 5.396 | 14.794 | 74.145 | 51.129 | |
| 6/27/2011 | 9:05:00 AM | 5.136 | 14.405 | 74.615 | 48.811 | |
| 6/27/2011 | 9:06:00 AM | 5.113 | 14.426 | 78.915 | 47.444 | |
| 6/27/2011 | 9:07:00 AM | 5.228 | 14.373 | 74.135 | 46.385 | |
| 6/27/2011 | 9:08:00 AM | 5.039 | 14.01 | 71.052 | 44.791 | |
| 6/27/2011 | 9:09:00 AM | 4.976 | 13.782 | 69.691 | 42.163 | |
| 6/27/2011 | 9:10:00 AM | 4.99 | 13.758 | 69.169 | 42.894 | |
| 6/27/2011 | 9:11:00 AM | 4.968 | 13.75 | 69.029 | 42.603 | |
| 6/27/2011 | 9:12:00 AM | 4.922 | 13.805 | 69.958 | 41.537 | |
| 6/27/2011 | 9:13:00 AM | 4.973 | 13.778 | 69.619 | 40.346 | |
| 6/27/2011 | 9:14:00 AM | 5.054 | 13.714 | 68.113 | 41.81 | |
| 6/27/2011 | 9:15:00 AM | 5.026 | 13.726 | 68.321 | 40.8 | |
| 6/27/2011 | 9:16:00 AM | 5.034 | 13.721 | 67.01 | 38.062 | |
| 6/27/2011 | 9:17:00 AM | 5.044 | 13.738 | 66.634 | 39.038 | |
| 6/27/2011 | 9:18:00 AM | 5.061 | 13.699 | 66.825 | 39.457 | |
| 6/27/2011 | 9:19:00 AM | 4.989 | 13.769 | 67.268 | 39.428 | |
| 6/27/2011 | 9:20:00 AM | 4.963 | 13.796 | 69.732 | 39.756 | |
| 6/27/2011 | 9:21:00 AM | 4.974 | 13.792 | 69.909 | 41.635 | |
| 6/27/2011 | 9:22:00 AM | 4.929 | 13.835 | 69.474 | 42.182 | |
| 6/27/2011 | 9:23:00 AM | 4.93 | 13.846 | 70.939 | 41.692 | |
| 6/27/2011 | 9:24:00 AM | 4.936 | 13.858 | 75.659 | 42.575 | |
| 6/27/2011 | 9:25:00 AM | 5.012 | 13.796 | 69.422 | 42.06 | |
| 6/27/2011 | 9:26:00 AM | 4.98 | 13.815 | 67.159 | 43.855 | |
| 6/27/2011 | 9:27:00 AM | 4.977 | 13.819 | 69.989 | 45.151 | |
| 6/27/2011 | 9:28:00 AM | 5.006 | 13.774 | 68.267 | 45.79 | |
| 6/27/2011 | 9:29:00 AM | 4.952 | 13.822 | 68.131 | 44.719 | |
| 6/27/2011 | 9:30:00 AM | 5.013 | 13.776 | 67.814 | 44.128 | |
| 6/27/2011 | 9:31:00 AM | 5.02 | 13.754 | 67.033 | 42.597 | |
| 6/27/2011 | 9:32:00 AM | 5.031 | 13.733 | 66.782 | 42.16 | |
| 6/27/2011 | 9:33:00 AM | 5.006 | 13.777 | 68.402 | 42.2 | |
| 6/27/2011 | 9:34:00 AM | 4.982 | 13.813 | 71.434 | 42.455 | |
| 6/27/2011 | 9:35:00 AM | 4.998 | 13.802 | 69.599 | 42.143 | |
| 6/27/2011 | 9:36:00 AM | 4.962 | 13.834 | 75.032 | 40.701 | |
| 6/27/2011 | 9:37:00 AM | 5.014 | 13.773 | 73.224 | 41.385 | |
| 6/27/2011 | 9:38:00 AM | 0.392 | 0.204 | 108.433 | 42.675 | |
| 6/27/2011 | 9:39:00 AM | 0.044 | -0.02 | 148.12 | 46.377 | |
| 6/27/2011 | 9:40:00 AM | 0.04 | -0.029 | 143.933 | 42.515 | |
| 6/27/2011 | 9:41:00 AM | 0.043 | -0.026 | 143.881 | 43.13 | CO bias |
| 6/27/2011 | 9:42:00 AM | 3.161 | 6.684 | 108.308 | 41.749 | |
| 6/27/2011 | 9:43:00 AM | 5.087 | 10.017 | 3.384 | 42.257 | |
| 6/27/2011 | 9:44:00 AM | 5.092 | 10.033 | -2.673 | 43.98 | O2/CO2 bias |
| 6/27/2011 | 9:45:00 AM | 5.112 | 12.465 | 11.778 | 43.182 | |
| 6/27/2011 | 9:46:00 AM | 5.067 | 13.975 | 67.108 | 44.64 | |
| 6/27/2011 | 9:47:00 AM | 5.08 | 13.985 | 71.188 | 44.082 | |
| 6/27/2011 | 9:48:00 AM | 5.076 | 13.997 | 72.917 | 45.611 | |
| 6/27/2011 | 9:49:00 AM | 5.096 | 13.986 | 73.15 | 46.165 | |
| 6/27/2011 | 9:50:00 AM | 5.122 | 13.937 | 71.51 | 44.125 | |
| 6/27/2011 | 9:51:00 AM | 5.146 | 13.934 | 70.22 | 45.233 | |
| 6/27/2011 | 9:52:00 AM | 5.219 | 13.87 | 72.13 | 47.008 | |
| 6/27/2011 | 9:53:00 AM | 5.362 | 14.102 | 73.359 | 47.581 | |
| 6/27/2011 | 9:54:00 AM | 5.277 | 13.936 | 73.02 | 48.132 | |

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|---|---|---|---|---|---|
| 6/27/2011 | 9:55:00 AM | 5.306 | 13.916 | 73.876 | 48.928 |
| 6/27/2011 | 9:56:00 AM | 5.32 | 13.969 | 75.711 | 52.264 |
| 6/27/2011 | 9:57:00 AM | 5.365 | 13.928 | 75.107 | 50.805 |
| 6/27/2011 | 9:58:00 AM | 5.259 | 13.578 | 71.586 | 47.375 |
| 6/27/2011 | 9:59:00 AM | 5.306 | 13.5 | 73.063 | 48.389 |
| 6/27/2011 | 10:00:00 AM | 5.294 | 13.507 | 72.408 | 47.355 |
| 6/27/2011 | 10:01:00 AM | 5.22 | 13.574 | 72.056 | 46.844 |
| 6/27/2011 | 10:02:00 AM | 5.184 | 13.619 | 73.051 | 45.377 |
| 6/27/2011 | 10:03:00 AM | 5.212 | 13.585 | 73.669 | 46.072 |
| 6/27/2011 | 10:04:00 AM | 5.276 | 13.528 | 72.857 | 44.814 |
| 6/27/2011 | 10:05:00 AM | 5.275 | 13.519 | 72.043 | 44.705 |
| 6/27/2011 | 10:06:00 AM | 5.268 | 13.515 | 72.639 | 43.29 |
| 6/27/2011 | 10:07:00 AM | 5.265 | 13.506 | 70.329 | 41.122 |
| 6/27/2011 | 10:08:00 AM | 5.223 | 13.525 | 70.959 | 41.476 |
| 6/27/2011 | 10:09:00 AM | 5.197 | 13.562 | 72.94 | 42.975 |
| 6/27/2011 | 10:10:00 AM | 5.198 | 13.565 | 73.093 | 43.513 |
| 6/27/2011 | 10:11:00 AM | 5.193 | 13.574 | 73.237 | 43.849 |
| 6/27/2011 | 10:12:00 AM | 5.225 | 13.552 | 74.416 | 42.975 |
| 6/27/2011 | 10:13:00 AM | 5.254 | 13.514 | 75.04 | 43.588 |
| 6/27/2011 | 10:14:00 AM | 5.286 | 13.483 | 75.504 | 43.192 |
| 6/27/2011 | 10:15:00 AM | 5.447 | 14.184 | 78.671 | 46.023 |
| 6/27/2011 | 10:16:00 AM | 5.746 | 14.793 | 81.669 | 48.656 |
| 6/27/2011 | 10:17:00 AM | 5.797 | 14.895 | 80.688 | 50.945 |
| 6/27/2011 | 10:18:00 AM | 5.778 | 14.827 | 81.975 | 52.28 |
| 6/27/2011 | 10:19:00 AM | 5.778 | 14.951 | 82.461 | 52.399 |
| 6/27/2011 | 10:20:00 AM | 5.774 | 14.967 | 81.222 | 52.496 |
| 6/27/2011 | 10:21:00 AM | 5.653 | 14.741 | 80.001 | 51.745 |
| 6/27/2011 | 10:22:00 AM | 5.577 | 14.787 | 80.94 | 52.67 |
| 6/27/2011 | 10:23:00 AM | 5.552 | 14.784 | 81.585 | 52.039 |
| 6/27/2011 | 10:24:00 AM | 5.515 | 14.616 | 81.142 | 53.492 |
| 6/27/2011 | 10:25:00 AM | 5.471 | 14.552 | 81.058 | 51.597 |
| 6/27/2011 | 10:26:00 AM | 5.405 | 14.547 | 82.083 | 52.804 |
| 6/27/2011 | 10:27:00 AM | 5.142 | 13.792 | 76.758 | 45.487 |
| 6/27/2011 | 10:28:00 AM | 5.065 | 13.633 | 75.386 | 45.841 |
| 6/27/2011 | 10:29:00 AM | 5.063 | 13.602 | 75.831 | 44.593 |
| 6/27/2011 | 10:30:00 AM | 5.021 | 13.625 | 75.765 | 42.987 |
| 6/27/2011 | 10:31:00 AM | 5.019 | 13.635 | 76.809 | 45.653 |
| 6/27/2011 | 10:32:00 AM | 5.052 | 13.601 | 76.454 | 46.503 |
| 6/27/2011 | 10:33:00 AM | 5.051 | 13.597 | 75.838 | 45.324 |
| 6/27/2011 | 10:34:00 AM | 5.106 | 13.54 | 75.818 | 44.402 |
| 6/27/2011 | 10:35:00 AM | 5.096 | 13.534 | 75.632 | 44.228 |
| 6/27/2011 | 10:36:00 AM | 5.094 | 13.526 | 77.589 | 45.535 |
| 6/27/2011 | 10:37:00 AM | 5.059 | 13.566 | 78.435 | 44.645 |
| 6/27/2011 | 10:38:00 AM | 5.137 | 13.499 | 76.673 | 43.172 |
| 6/27/2011 | 10:39:00 AM | 5.131 | 13.498 | 75.64 | 43.745 |
| 6/27/2011 | 10:40:00 AM | 5.114 | 13.503 | 75.98 | 44.289 |
| 6/27/2011 | 10:41:00 AM | 5.125 | 13.506 | 76.198 | 45.934 |
| 6/27/2011 | 10:42:00 AM | 5.133 | 13.501 | 77.353 | 46.397 |
| 6/27/2011 | 10:43:00 AM | 5.107 | 13.549 | 76.981 | 44.736 |
| 6/27/2011 | 10:44:00 AM | 5.067 | 13.609 | 79.338 | 43.619 |
| 6/27/2011 | 10:45:00 AM | 5.136 | 13.545 | 79.075 | 44.422 |
| 6/27/2011 | 10:46:00 AM | 5.174 | 13.518 | 77.68 | 44.063 |

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|---|---|---|---|---|---|---|
| 6/27/2011 | 10:47:00 AM | 5.137 | 13.55 | 77.429 | 44.141 | |
| 6/27/2011 | 10:48:00 AM | 5.09 | 13.569 | 77.936 | 44.437 | |
| 6/27/2011 | 10:49:00 AM | 5.28 | 14.051 | 80.307 | 35.907 | |
| 6/27/2011 | 10:50:00 AM | 5.317 | 14.245 | 82.265 | 1.202 | |
| 6/27/2011 | 10:51:00 AM | 5.33 | 14.243 | 85.513 | 1.316 | |
| 6/27/2011 | 10:52:00 AM | 5.355 | 14.226 | 85.737 | 1.399 | |
| 6/27/2011 | 10:53:00 AM | 5.21 | 13.836 | 82.57 | 0.675 | THC Zero |
| 6/27/2011 | 10:54:00 AM | 5.163 | 13.716 | 83.035 | 18.697 | |
| 6/27/2011 | 10:55:00 AM | 5.191 | 13.619 | 81.043 | 69.745 | |
| 6/27/2011 | 10:56:00 AM | 5.147 | 13.451 | 78.09 | 35.698 | |
| 6/27/2011 | 10:57:00 AM | 5.122 | 13.465 | 78.712 | 35.647 | |
| 6/27/2011 | 10:58:00 AM | 5.097 | 13.482 | 81.102 | 19 | |
| 6/27/2011 | 10:59:00 AM | 5.112 | 13.466 | 78.788 | 0.058 | THC Zero |
| 6/27/2011 | 11:00:00 AM | 5.097 | 13.512 | 79.145 | 19.142 | |
| 6/27/2011 | 11:01:00 AM | 5.155 | 13.459 | 79.526 | 75.44 | |
| 6/27/2011 | 11:02:00 AM | 5.163 | 13.469 | 79.529 | 76.091 | |
| 6/27/2011 | 11:03:00 AM | 5.131 | 13.41 | 79.584 | 86.885 | |
| 6/27/2011 | 11:04:00 AM | 5.082 | 13.517 | 80.094 | 87.985 | THC High |
| 6/27/2011 | 11:05:00 AM | 5.049 | 13.538 | 82.05 | 81.358 | |
| 6/27/2011 | 11:06:00 AM | 5.075 | 13.52 | 80.696 | 44.931 | |
| 6/27/2011 | 11:07:00 AM | 5.096 | 13.674 | 80.905 | 45.512 | THC Mid |
| 6/27/2011 | 11:08:00 AM | 5.088 | 13.634 | 81.152 | 41.352 | |
| 6/27/2011 | 11:09:00 AM | 5.016 | 13.54 | 81.423 | 25.147 | |
| 6/27/2011 | 11:10:00 AM | 5.03 | 13.529 | 81.407 | 25.056 | THC Low |
| 6/27/2011 | 11:11:00 AM | 5.047 | 13.517 | 80.01 | 42.12 | |
| 6/27/2011 | 11:12:00 AM | 5.105 | 13.46 | 79.661 | 56.907 | |
| 6/27/2011 | 11:13:00 AM | 5.126 | 13.434 | 79.691 | 58.153 | |
| 6/27/2011 | 11:14:00 AM | 5.072 | 13.462 | 79.439 | 59.3 | |
| 6/27/2011 | 11:15:00 AM | 5.013 | 13.538 | 80.282 | 58.001 | |
| 6/27/2011 | 11:16:00 AM | 5.053 | 13.475 | 78.979 | 55.832 | |
| 6/27/2011 | 11:17:00 AM | 5.019 | 13.515 | 80.76 | 57.488 | |
| 6/27/2011 | 11:18:00 AM | 5.058 | 13.481 | 81.481 | 56.222 | |
| 6/27/2011 | 11:19:00 AM | 5.028 | 13.497 | 82.722 | 53.349 | |
| 6/27/2011 | 11:20:00 AM | 5.035 | 13.49 | 81.063 | 51.252 | |
| 6/27/2011 | 11:21:00 AM | 5.056 | 13.476 | 78.766 | 51.266 | |
| 6/27/2011 | 11:22:00 AM | 5.028 | 13.49 | 78.789 | 53.563 | |
| 6/27/2011 | 11:23:00 AM | 4.994 | 13.546 | 80.7 | 53.602 | |
| 6/27/2011 | 11:24:00 AM | 4.947 | 13.56 | 80.992 | 53.681 | |
| 6/27/2011 | 11:25:00 AM | 4.944 | 13.585 | 80.926 | 52.786 | |
| 6/27/2011 | 11:26:00 AM | 4.949 | 13.568 | 82.85 | 53.553 | |
| 6/27/2011 | 11:27:00 AM | 5.015 | 13.52 | 82.324 | 53.314 | |
| 6/27/2011 | 11:28:00 AM | 4.993 | 13.537 | 79.551 | 50.958 | |
| 6/27/2011 | 11:29:00 AM | 5.024 | 13.502 | 79.61 | 49.435 | |
| 6/27/2011 | 11:30:00 AM | 5.013 | 13.511 | 78.638 | 47.598 | |
| 6/27/2011 | 11:31:00 AM | 4.983 | 13.554 | 79.955 | 50.644 | |
| 6/27/2011 | 11:32:00 AM | 4.977 | 13.558 | 81.84 | 51.369 | |
| 6/27/2011 | 11:33:00 AM | 5.027 | 13.516 | 82.356 | 49.301 | |
| 6/27/2011 | 11:34:00 AM | 5.075 | 13.475 | 79.246 | 48.85 | |
| 6/27/2011 | 11:35:00 AM | 5.08 | 13.452 | 79.572 | 50.32 | |
| 6/27/2011 | 11:36:00 AM | 5.025 | 13.504 | 80.158 | 52.663 | |
| 6/27/2011 | 11:37:00 AM | 5.047 | 13.481 | 80.378 | 50.512 | |
| 6/27/2011 | 11:38:00 AM | 5.012 | 13.5 | 80.198 | 50.85 | |

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|---|---|---|---|---|---|---|
| 6/27/2011 | 11:39:00 AM | 4.958 | 13.558 | 81.733 | 53.712 | |
| 6/27/2011 | 11:40:00 AM | 4.909 | 13.605 | 82.36 | 50.696 | |
| 6/27/2011 | 11:41:00 AM | 4.983 | 13.547 | 81.238 | 49.57 | |
| 6/27/2011 | 11:42:00 AM | 5.039 | 13.498 | 80.206 | 50.282 | |
| 6/27/2011 | 11:43:00 AM | 5.058 | 13.476 | 80.337 | 51.119 | |
| 6/27/2011 | 11:44:00 AM | 5.049 | 13.493 | 78.74 | 48.264 | |
| 6/27/2011 | 11:45:00 AM | 5.087 | 13.463 | 79.023 | 48.306 | |
| 6/27/2011 | 11:46:00 AM | 5.055 | 13.48 | 78.749 | 49.996 | |
| 6/27/2011 | 11:47:00 AM | 4.994 | 13.542 | 80.506 | 51.4 | |
| 6/27/2011 | 11:48:00 AM | 5.378 | 10.454 | 58.714 | 52.757 | |
| 6/27/2011 | 11:49:00 AM | 4.986 | 9.748 | 2.16 | 54.37 | |
| 6/27/2011 | 11:50:00 AM | 4.983 | 9.741 | -0.133 | 53.579 | O2/CO2 bias |
| 6/27/2011 | 11:51:00 AM | 2.15 | 3.713 | 28.338 | 50.451 | |
| 6/27/2011 | 11:52:00 AM | 0.056 | 0.031 | 136.741 | 50.428 | |
| 6/27/2011 | 11:53:00 AM | 0.047 | 0.017 | 143.472 | 49.458 | CO bias |
| 6/27/2011 | 11:54:00 AM | 1.904 | 5.665 | 138.127 | 49.375 | |
| 6/27/2011 | 11:55:00 AM | 5.005 | 13.47 | 86.293 | 51.149 | |
| 6/27/2011 | 11:56:00 AM | 5.085 | 13.436 | 79.214 | 50.066 | |
| 6/27/2011 | 11:57:00 AM | 5.081 | 13.435 | 78.596 | 50.631 | |
| 6/27/2011 | 11:58:00 AM | 5.094 | 13.429 | 78.407 | 52.097 | |
| 6/27/2011 | 11:59:00 AM | 5 | 13.496 | 79.11 | 54.095 | |
| 6/27/2011 | 12:00:00 PM | 4.979 | 13.537 | 79.46 | 53.415 | |
| 6/27/2011 | 12:01:00 PM | 4.896 | 13.62 | 81.958 | 52.302 | |
| 6/27/2011 | 12:02:00 PM | 4.966 | 13.538 | 80.9 | 53.243 | |
| 6/27/2011 | 12:03:00 PM | 4.991 | 13.521 | 79.806 | 54.283 | |
| 6/27/2011 | 12:04:00 PM | 5.038 | 13.476 | 79.618 | 52.14 | |
| 6/27/2011 | 12:05:00 PM | 5.053 | 13.456 | 77.029 | 49.352 | |
| 6/27/2011 | 12:06:00 PM | 5.021 | 13.496 | 77.028 | 49.894 | |
| 6/27/2011 | 12:07:00 PM | 4.998 | 13.511 | 80.191 | 54.109 | |
| 6/27/2011 | 12:08:00 PM | 4.946 | 13.551 | 82.309 | 53.429 | |
| 6/27/2011 | 12:09:00 PM | 4.957 | 13.553 | 83.014 | 55.625 | |
| 6/27/2011 | 12:10:00 PM | 4.942 | 13.551 | 81.553 | 55.498 | |
| 6/27/2011 | 12:11:00 PM | 4.944 | 13.568 | 82.051 | 54.391 | |
| 6/27/2011 | 12:12:00 PM | 4.952 | 13.548 | 80.61 | 52.783 | |
| 6/27/2011 | 12:13:00 PM | 4.963 | 13.536 | 80.426 | 46.251 | |
| 6/27/2011 | 12:14:00 PM | 4.957 | 13.547 | 78.831 | 37.449 | |
| 6/27/2011 | 12:15:00 PM | 4.931 | 13.57 | 80.49 | 37.866 | |
| 6/27/2011 | 12:16:00 PM | 4.974 | 13.531 | 78.894 | 38.338 | |
| 6/27/2011 | 12:17:00 PM | 4.97 | 13.52 | 80.372 | 38.759 | |
| 6/27/2011 | 12:18:00 PM | 4.962 | 13.527 | 79.906 | 39.201 | |
| 6/27/2011 | 12:19:00 PM | 4.988 | 13.509 | 80.706 | 39.652 | |
| 6/27/2011 | 12:20:00 PM | 4.964 | 13.527 | 80.344 | 40.062 | |
| 6/27/2011 | 12:21:00 PM | 4.958 | 13.555 | 79.139 | 40.472 | |
| 6/27/2011 | 12:22:00 PM | 4.934 | 13.579 | 80.36 | 41.103 | |
| 6/27/2011 | 12:23:00 PM | 4.954 | 13.557 | 80.136 | 41.793 | |
| 6/27/2011 | 12:24:00 PM | 4.973 | 13.53 | 79.48 | 42.13 | |
| 6/27/2011 | 12:25:00 PM | 4.919 | 13.573 | 80.484 | 42.216 | |
| 6/27/2011 | 12:26:00 PM | 4.912 | 13.59 | 81.474 | 42.407 | |
| 6/27/2011 | 12:27:00 PM | 4.949 | 13.543 | 80.703 | 42.703 | |
| 6/27/2011 | 12:28:00 PM | 4.886 | 13.622 | 78.974 | 42.812 | |
| 6/27/2011 | 12:29:00 PM | 4.898 | 13.62 | 80.155 | 42.96 | THC Mid |
| 6/27/2011 | 12:30:00 PM | 4.915 | 13.612 | 80.145 | 43.39 | |

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|---|---|---|---|---|---|---|
| 6/27/2011 | 12:31:00 PM | 4.914 | 13.61 | 79.842 | 5.346 | |
| 6/27/2011 | 12:32:00 PM | 4.945 | 13.577 | 79.393 | 0.055 | |
| 6/27/2011 | 12:33:00 PM | 4.992 | 13.539 | 77.807 | 0.047 | THC Zero |
| 6/27/2011 | 12:34:00 PM | 4.999 | 13.534 | 77.737 | 25.856 | |
| 6/27/2011 | 12:35:00 PM | 5.01 | 13.525 | 78.596 | 64.254 | |
| 6/27/2011 | 12:36:00 PM | 4.975 | 13.551 | 80.163 | 61.185 | |
| 6/27/2011 | 12:37:00 PM | 5.018 | 13.499 | 79.731 | 60.094 | |
| 6/27/2011 | 12:38:00 PM | 5.012 | 13.515 | 79.595 | 58.817 | |
| 6/27/2011 | 12:39:00 PM | 4.954 | 13.593 | 77.374 | 55.693 | |
| 6/27/2011 | 12:40:00 PM | 4.959 | 13.589 | 78.965 | 57.6 | |
| 6/27/2011 | 12:41:00 PM | 4.982 | 13.549 | 70.677 | 47.919 | |
| 6/27/2011 | 12:42:00 PM | 5.02 | 13.558 | 52.238 | 29.787 | |
| 6/27/2011 | 12:43:00 PM | 4.982 | 13.574 | 48.107 | 27.097 | |
| 6/27/2011 | 12:44:00 PM | 5.047 | 13.518 | 47.247 | 27.638 | |
| 6/27/2011 | 12:45:00 PM | 5.036 | 13.523 | 52.936 | 40.848 | |
| 6/27/2011 | 12:46:00 PM | 4.991 | 13.571 | 71.641 | 55.062 | |
| 6/27/2011 | 12:47:00 PM | 4.97 | 13.594 | 77.68 | 56.062 | |
| 6/27/2011 | 12:48:00 PM | 5.015 | 13.551 | 77.494 | 54.719 | |
| 6/27/2011 | 12:49:00 PM | 5.024 | 13.538 | 77.157 | 54.979 | |
| 6/27/2011 | 12:50:00 PM | 5.017 | 13.531 | 79.615 | 55.215 | |
| 6/27/2011 | 12:51:00 PM | 5.037 | 13.516 | 78.265 | 52.452 | |
| 6/27/2011 | 12:52:00 PM | 5.056 | 13.5 | 77.051 | 51.853 | |
| 6/27/2011 | 12:53:00 PM | 4.975 | 13.573 | 77.641 | 52.527 | |
| 6/27/2011 | 12:54:00 PM | 4.962 | 13.607 | 78.075 | 52.362 | |
| 6/27/2011 | 12:55:00 PM | 4.975 | 13.589 | 77.473 | 50.826 | |
| 6/27/2011 | 12:56:00 PM | 4.91 | 13.649 | 76.765 | 49.052 | |
| 6/27/2011 | 12:57:00 PM | 4.907 | 13.661 | 77.878 | 48.541 | |
| 6/27/2011 | 12:58:00 PM | 4.981 | 13.601 | 78.533 | 51.581 | |
| 6/27/2011 | 12:59:00 PM | 4.992 | 13.587 | 77.006 | 51.257 | |
| 6/27/2011 | 1:00:00 PM | 4.974 | 13.604 | 77.387 | 52.245 | |
| 6/27/2011 | 1:01:00 PM | 4.964 | 13.602 | 77.168 | 51.962 | |
| 6/27/2011 | 1:02:00 PM | 4.972 | 13.601 | 76.357 | 51.338 | |
| 6/27/2011 | 1:03:00 PM | 4.951 | 13.611 | 77.742 | 51.727 | |
| 6/27/2011 | 1:04:00 PM | 4.918 | 13.654 | 78.508 | 51.109 | |
| 6/27/2011 | 1:05:00 PM | 4.951 | 13.63 | 78.765 | 53.054 | |
| 6/27/2011 | 1:06:00 PM | 4.954 | 13.628 | 77.734 | 52.409 | |
| 6/27/2011 | 1:07:00 PM | 4.968 | 13.637 | 77.553 | 50.893 | |
| 6/27/2011 | 1:08:00 PM | 5.013 | 13.591 | 76.506 | 49.85 | |
| 6/27/2011 | 1:09:00 PM | 5.048 | 13.557 | 74.832 | 48.803 | |
| 6/27/2011 | 1:10:00 PM | 5.036 | 13.556 | 75.125 | 50.376 | |
| 6/27/2011 | 1:11:00 PM | 4.988 | 13.607 | 77.06 | 50.933 | |
| 6/27/2011 | 1:12:00 PM | 5.01 | 13.585 | 76.606 | 51.344 | |
| 6/27/2011 | 1:13:00 PM | 5.003 | 13.599 | 75.676 | 52.515 | |
| 6/27/2011 | 1:14:00 PM | 4.962 | 13.64 | 77.807 | 55.038 | |
| 6/27/2011 | 1:15:00 PM | 4.979 | 13.612 | 77.684 | 55.002 | |
| 6/27/2011 | 1:16:00 PM | 5.001 | 13.6 | 77.528 | 54.103 | |
| 6/27/2011 | 1:17:00 PM | 4.968 | 13.638 | 76.952 | 53.596 | |
| 6/27/2011 | 1:18:00 PM | 4.931 | 13.673 | 78.974 | 54.707 | |
| 6/27/2011 | 1:19:00 PM | 4.936 | 13.673 | 79.723 | 53.223 | |
| 6/27/2011 | 1:20:00 PM | 4.941 | 13.686 | 79.314 | 53.859 | |
| 6/27/2011 | 1:21:00 PM | 5.006 | 13.622 | 77.315 | 51.277 | |
| 6/27/2011 | 1:22:00 PM | 5.007 | 13.611 | 76.214 | 52.149 | |

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|---|---|---|---|---|---|
| 6/27/2011 | 1:23:00 PM | 5.038 | 13.577 | 77.977 | 52.546 |
| 6/27/2011 | 1:24:00 PM | 5.06 | 13.556 | 76.814 | 49.73 |
| 6/27/2011 | 1:25:00 PM | 5.022 | 13.582 | 77.151 | 50.689 |
| 6/27/2011 | 1:26:00 PM | 5.012 | 13.604 | 77.603 | 52.506 |
| 6/27/2011 | 1:27:00 PM | 5.069 | 13.529 | 77.781 | 51.591 |
| 6/27/2011 | 1:28:00 PM | 5.056 | 13.541 | 75.137 | 48.01 |
| 6/27/2011 | 1:29:00 PM | 4.984 | 13.6 | 76.01 | 49.448 |
| 6/27/2011 | 1:30:00 PM | 4.975 | 13.62 | 78.516 | 52.19 |
| 6/27/2011 | 1:31:00 PM | 4.944 | 13.642 | 77.484 | 50.467 |
| 6/27/2011 | 1:32:00 PM | 4.939 | 13.669 | 79.463 | 51.377 |
| 6/27/2011 | 1:33:00 PM | 4.967 | 13.622 | 79.928 | 52.674 |
| 6/27/2011 | 1:34:00 PM | 4.96 | 13.625 | 78.486 | 52.066 |
| 6/27/2011 | 1:35:00 PM | 4.991 | 13.595 | 77.206 | 51.642 |
| 6/27/2011 | 1:36:00 PM | 4.961 | 13.611 | 77.369 | 52.634 |
| 6/27/2011 | 1:37:00 PM | 4.954 | 13.642 | 76.783 | 51.587 |
| 6/27/2011 | 1:38:00 PM | 4.963 | 13.639 | 78.119 | 54.354 |
| 6/27/2011 | 1:39:00 PM | 5.006 | 13.591 | 77.745 | 52.63 |
| 6/27/2011 | 1:40:00 PM | 5.098 | 13.511 | 77.43 | 52.086 |
| 6/27/2011 | 1:41:00 PM | 5.117 | 13.473 | 75.917 | 48.536 |
| 6/27/2011 | 1:42:00 PM | 5.108 | 13.482 | 74.513 | 46.322 |
| 6/27/2011 | 1:43:00 PM | 5.088 | 13.5 | 74.971 | 48.171 |
| 6/27/2011 | 1:44:00 PM | 5.034 | 13.55 | 76.489 | 50.842 |
| 6/27/2011 | 1:45:00 PM | 4.996 | 13.575 | 78.079 | 50.706 |
| 6/27/2011 | 1:46:00 PM | 4.954 | 13.634 | 78.627 | 49.877 |
| 6/27/2011 | 1:47:00 PM | 4.987 | 13.613 | 78.776 | 50.54 |
| 6/27/2011 | 1:48:00 PM | 5.031 | 13.57 | 77.993 | 49.109 |
| 6/27/2011 | 1:49:00 PM | 5.072 | 13.537 | 76.953 | 48.261 |
| 6/27/2011 | 1:50:00 PM | 5.116 | 13.49 | 77.02 | 47.763 |
| 6/27/2011 | 1:51:00 PM | 5.103 | 13.516 | 75.881 | 44.839 |
| 6/27/2011 | 1:52:00 PM | 5.106 | 13.502 | 76.611 | 47.527 |
| 6/27/2011 | 1:53:00 PM | 5.121 | 13.476 | 76.7 | 46.435 |
| 6/27/2011 | 1:54:00 PM | 5.056 | 13.543 | 77.121 | 47.916 |
| 6/27/2011 | 1:55:00 PM | 5.087 | 13.524 | 75.85 | 47.975 |
| 6/27/2011 | 1:56:00 PM | 5.125 | 13.485 | 75.885 | 48.042 |
| 6/27/2011 | 1:57:00 PM | 5.114 | 13.483 | 76.024 | 49.593 |
| 6/27/2011 | 1:58:00 PM | 5.149 | 13.472 | 75.418 | 48.883 |
| 6/27/2011 | 1:59:00 PM | 5.119 | 13.491 | 74.753 | 49.037 |
| 6/27/2011 | 2:00:00 PM | 5.112 | 13.5 | 76.561 | 49.014 |
| 6/27/2011 | 2:01:00 PM | 5.164 | 13.445 | 76.933 | 49.722 |
| 6/27/2011 | 2:02:00 PM | 5.197 | 13.419 | 77.133 | 49.241 |
| 6/27/2011 | 2:03:00 PM | 5.17 | 13.43 | 77.074 | 48.824 |
| 6/27/2011 | 2:04:00 PM | 5.116 | 13.483 | 77.218 | 49.039 |
| 6/27/2011 | 2:05:00 PM | 5.115 | 13.481 | 75.773 | 48.703 |
| 6/27/2011 | 2:06:00 PM | 5.087 | 13.523 | 76.383 | 50.87 |
| 6/27/2011 | 2:07:00 PM | 5.036 | 13.57 | 78.528 | 50.428 |
| 6/27/2011 | 2:08:00 PM | 5.023 | 13.585 | 78.99 | 51.782 |
| 6/27/2011 | 2:09:00 PM | 5.101 | 13.507 | 78.68 | 52.282 |
| 6/27/2011 | 2:10:00 PM | 5.061 | 13.557 | 78.182 | 52.24 |
| 6/27/2011 | 2:11:00 PM | 5.098 | 13.517 | 77.824 | 51.05 |
| 6/27/2011 | 2:12:00 PM | 5.132 | 13.491 | 76.542 | 49.673 |
| 6/27/2011 | 2:13:00 PM | 5.138 | 13.489 | 76.841 | 48.714 |
| 6/27/2011 | 2:14:00 PM | 5.137 | 13.498 | 76.494 | 47.705 |

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|---|---|---|---|---|---|---|
| 6/27/2011 | 2:15:00 PM | 5.168 | 13.471 | 75.06 | 46.928 | |
| 6/27/2011 | 2:16:00 PM | 5.18 | 13.466 | 74.591 | 46.543 | |
| 6/27/2011 | 2:17:00 PM | 5.201 | 13.44 | 75.602 | 47.545 | |
| 6/27/2011 | 2:18:00 PM | 5.159 | 13.484 | 76.139 | 48.341 | |
| 6/27/2011 | 2:19:00 PM | 5.135 | 13.499 | 76.858 | 48.559 | |
| 6/27/2011 | 2:20:00 PM | 5.082 | 13.55 | 76.824 | 47.199 | |
| 6/27/2011 | 2:21:00 PM | 5.081 | 13.568 | 78.729 | 47.231 | |
| 6/27/2011 | 2:22:00 PM | 5.135 | 13.517 | 77.347 | 47.318 | |
| 6/27/2011 | 2:23:00 PM | 5.191 | 13.472 | 75.509 | 46.809 | |
| 6/27/2011 | 2:24:00 PM | 5.218 | 13.445 | 74.815 | 45.443 | |
| 6/27/2011 | 2:25:00 PM | 5.223 | 13.452 | 76.051 | 46.253 | |
| 6/27/2011 | 2:26:00 PM | 5.203 | 13.455 | 76.529 | 46.919 | |
| 6/27/2011 | 2:27:00 PM | 5.157 | 13.507 | 75.859 | 45.72 | |
| 6/27/2011 | 2:28:00 PM | 5.139 | 13.534 | 76.49 | 45.55 | |
| 6/27/2011 | 2:29:00 PM | 5.168 | 13.487 | 75.884 | 45.945 | |
| 6/27/2011 | 2:30:00 PM | 5.148 | 13.513 | 76.955 | 47.877 | |
| 6/27/2011 | 2:31:00 PM | 5.158 | 13.502 | 77.579 | 48.419 | |
| 6/27/2011 | 2:32:00 PM | 5.135 | 13.524 | 78.847 | 49.11 | |
| 6/27/2011 | 2:33:00 PM | 5.143 | 13.517 | 78.797 | 49.444 | |
| 6/27/2011 | 2:34:00 PM | 5.094 | 13.567 | 80.469 | 50.422 | |
| 6/27/2011 | 2:35:00 PM | 5.067 | 13.583 | 80.557 | 50.891 | |
| 6/27/2011 | 2:36:00 PM | 5.114 | 13.562 | 79.13 | 48.929 | |
| 6/27/2011 | 2:37:00 PM | 5.183 | 13.478 | 77.001 | 46.986 | |
| 6/27/2011 | 2:38:00 PM | 5.126 | 13.54 | 77.418 | 46.704 | |
| 6/27/2011 | 2:39:00 PM | 5.162 | 13.518 | 79.335 | 47.946 | |
| 6/27/2011 | 2:40:00 PM | 5.183 | 13.492 | 79.16 | 41.563 | |
| 6/27/2011 | 2:41:00 PM | 5.114 | 13.563 | 79.589 | 34.283 | |
| 6/27/2011 | 2:42:00 PM | 5.044 | 13.625 | 82.269 | 34.635 | |
| 6/27/2011 | 2:43:00 PM | 5.061 | 13.624 | 82.197 | 35.319 | |
| 6/27/2011 | 2:44:00 PM | 5.115 | 13.576 | 79.919 | 36.329 | |
| 6/27/2011 | 2:45:00 PM | 5.185 | 13.492 | 78.663 | 37.157 | |
| 6/27/2011 | 2:46:00 PM | 5.156 | 13.526 | 77.397 | 37.792 | |
| 6/27/2011 | 2:47:00 PM | 5.23 | 13.495 | 77.265 | 38.205 | |
| 6/27/2011 | 2:48:00 PM | 5.18 | 13.493 | 78.53 | 38.591 | |
| 6/27/2011 | 2:49:00 PM | 5.124 | 13.572 | 80.834 | 38.94 | |
| 6/27/2011 | 2:50:00 PM | 5.181 | 13.502 | 81.12 | 39.176 | |
| 6/27/2011 | 2:51:00 PM | 5.103 | 13.565 | 81.038 | 39.537 | |
| 6/27/2011 | 2:52:00 PM | 5.112 | 13.572 | 80.551 | 39.808 | |
| 6/27/2011 | 2:53:00 PM | 5.089 | 13.59 | 80.739 | 39.959 | |
| 6/27/2011 | 2:54:00 PM | 5.134 | 13.555 | 78.908 | 40.143 | |
| 6/27/2011 | 2:55:00 PM | 5.174 | 13.536 | 78.548 | 40.122 | |
| 6/27/2011 | 2:56:00 PM | 5.152 | 13.522 | 76.639 | 40.307 | |
| 6/27/2011 | 2:57:00 PM | 5.168 | 13.527 | 78.795 | 40.332 | |
| 6/27/2011 | 2:58:00 PM | 5.191 | 13.474 | 79.633 | 40.366 | |
| 6/27/2011 | 2:59:00 PM | 5.193 | 13.489 | 78.87 | 7.148 | |
| 6/27/2011 | 3:00:00 PM | 5.21 | 13.465 | 78.684 | 0.07 | THC Zero |
| 6/27/2011 | 3:01:00 PM | 5.187 | 13.474 | 77.576 | 0.073 | |
| 6/27/2011 | 3:02:00 PM | 5.184 | 13.496 | 78.052 | 71.044 | |
| 6/27/2011 | 3:03:00 PM | 5.148 | 13.518 | 79.205 | 81.211 | |
| 6/27/2011 | 3:04:00 PM | 5.182 | 13.497 | 79.491 | 81.268 | |
| 6/27/2011 | 3:05:00 PM | 5.24 | 13.45 | 76.721 | 81.265 | |
| 6/27/2011 | 3:06:00 PM | 5.21 | 13.473 | 76.945 | 85.651 | |

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|---|---|---|---|---|---|---|
| 6/27/2011 | 3:07:00 PM | 5.226 | 13.476 | 77.862 | 87.114 | |
| 6/27/2011 | 3:08:00 PM | 5.195 | 13.484 | 77.925 | 87.293 | THC High |
| 6/27/2011 | 3:09:00 PM | 5.165 | 13.519 | 78.352 | 76.393 | |
| 6/27/2011 | 3:10:00 PM | 5.108 | 13.566 | 80.677 | 43.906 | |
| 6/27/2011 | 3:11:00 PM | 5.123 | 13.561 | 80.992 | 43.832 | THC Mid |
| 6/27/2011 | 3:12:00 PM | 5.14 | 13.52 | 78.278 | 37.556 | |
| 6/27/2011 | 3:13:00 PM | 5.158 | 13.519 | 77.258 | 24.26 | |
| 6/27/2011 | 3:14:00 PM | 5.17 | 13.503 | 77.24 | 24.092 | THC Low |
| 6/27/2011 | 3:15:00 PM | 5.147 | 13.52 | 77.21 | 24.051 | |
| 6/27/2011 | 3:16:00 PM | 5.167 | 13.502 | 76.894 | 35.213 | |
| 6/27/2011 | 3:17:00 PM | 5.166 | 13.516 | 78.229 | 56.956 | |
| 6/27/2011 | 3:18:00 PM | 5.156 | 13.5 | 77.716 | 55.401 | |
| 6/27/2011 | 3:19:00 PM | 5.135 | 13.519 | 78.716 | 58.066 | |
| 6/27/2011 | 3:20:00 PM | 5.144 | 13.515 | 79.944 | 58.126 | |
| 6/27/2011 | 3:21:00 PM | 5.174 | 13.493 | 79.393 | 56.236 | |
| 6/27/2011 | 3:22:00 PM | 5.141 | 13.502 | 78.378 | 55.664 | |
| 6/27/2011 | 3:23:00 PM | 0.907 | 0.465 | 108.04 | 56.499 | |
| 6/27/2011 | 3:24:00 PM | 0.052 | 0.023 | 142.576 | 56.331 | |
| 6/27/2011 | 3:25:00 PM | 0.044 | 0.016 | 143.257 | 58.09 | CO bias |
| 6/27/2011 | 3:26:00 PM | 3.486 | 7.294 | 98.636 | 53.918 | |
| 6/27/2011 | 3:27:00 PM | 4.96 | 9.789 | 4.085 | 55.535 | |
| 6/27/2011 | 3:28:00 PM | 4.962 | 9.8 | -0.109 | 57.79 | O2/CO2 bias |
| 6/27/2011 | 3:29:00 PM | 5.009 | 10.928 | 2.017 | 59.219 | |
| 6/27/2011 | 3:30:00 PM | 5.157 | 13.476 | 65.815 | 59.034 | |
| 6/27/2011 | 3:31:00 PM | 5.228 | 13.396 | 78.163 | 56.338 | |
| 6/27/2011 | 3:32:00 PM | 5.256 | 13.369 | 77.637 | 55.937 | |
| 6/27/2011 | 3:33:00 PM | 5.238 | 13.377 | 77.783 | 57.109 | |
| 6/27/2011 | 3:34:00 PM | 5.176 | 13.431 | 77.429 | 56.081 | |
| 6/27/2011 | 3:35:00 PM | 5.173 | 13.452 | 76.627 | 53.466 | |
| 6/27/2011 | 3:36:00 PM | 5.182 | 13.439 | 78.152 | 56.236 | |
| 6/27/2011 | 3:37:00 PM | 5.146 | 13.47 | 79.583 | 55.113 | |
| 6/27/2011 | 3:38:00 PM | 5.093 | 13.517 | 78.587 | 51.481 | |
| 6/27/2011 | 3:39:00 PM | 5.135 | 13.475 | 78.02 | 51.752 | |
| 6/27/2011 | 3:40:00 PM | 5.201 | 13.4 | 77.273 | 52.821 | |
| 6/27/2011 | 3:41:00 PM | 5.13 | 13.474 | 77.941 | 54.531 | |
| 6/27/2011 | 3:42:00 PM | 5.123 | 13.483 | 78.017 | 56.419 | |
| 6/27/2011 | 3:43:00 PM | 5.141 | 13.482 | 77.388 | 56.03 | |
| 6/27/2011 | 3:44:00 PM | 5.139 | 13.478 | 78.406 | 57.103 | |
| 6/27/2011 | 3:45:00 PM | 5.16 | 13.467 | 79.273 | 55.264 | |
| 6/27/2011 | 3:46:00 PM | 5.15 | 13.463 | 78.891 | 55.696 | |
| 6/27/2011 | 3:47:00 PM | 5.199 | 13.443 | 78.199 | 55.283 | |
| 6/27/2011 | 3:48:00 PM | 5.174 | 13.438 | 78.401 | 53.922 | |
| 6/27/2011 | 3:49:00 PM | 5.176 | 13.453 | 78.873 | 54.901 | |
| 6/27/2011 | 3:50:00 PM | 5.196 | 13.426 | 78.484 | 54.7 | |
| 6/27/2011 | 3:51:00 PM | 5.065 | 13.54 | 78.85 | 58.169 | |
| 6/27/2011 | 3:52:00 PM | 5.059 | 13.544 | 80.439 | 59.07 | |
| 6/27/2011 | 3:53:00 PM | 5.081 | 13.521 | 81.339 | 60.732 | |
| 6/27/2011 | 3:54:00 PM | 5.093 | 13.527 | 80.24 | 58.448 | |
| 6/27/2011 | 3:55:00 PM | 5.157 | 13.483 | 78.811 | 56.003 | |
| 6/27/2011 | 3:56:00 PM | 5.195 | 13.421 | 77.646 | 53.634 | |
| 6/27/2011 | 3:57:00 PM | 5.143 | 13.479 | 78.81 | 53.779 | |
| 6/27/2011 | 3:58:00 PM | 5.127 | 13.5 | 79.521 | 54.008 | |

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|---|---|---|---|---|---|
| 6/27/2011 | 3:59:00 PM | 5.134 | 13.501 | 82.123 | 55.143 |
| 6/27/2011 | 4:00:00 PM | 5.181 | 13.448 | 80.682 | 54.419 |
| 6/27/2011 | 4:01:00 PM | 5.176 | 13.464 | 79.979 | 56.198 |
| 6/27/2011 | 4:02:00 PM | 5.19 | 13.432 | 80.328 | 55.418 |
| 6/27/2011 | 4:03:00 PM | 5.183 | 13.429 | 79.036 | 54.658 |
| 6/27/2011 | 4:04:00 PM | 5.199 | 13.422 | 77.141 | 51.931 |
| 6/27/2011 | 4:05:00 PM | 5.195 | 13.418 | 78.202 | 54.515 |
| 6/27/2011 | 4:06:00 PM | 5.133 | 13.489 | 79.455 | 53.759 |
| 6/27/2011 | 4:07:00 PM | 5.155 | 13.464 | 79.804 | 53.561 |
| 6/27/2011 | 4:08:00 PM | 5.152 | 13.473 | 80.759 | 56.635 |
| 6/27/2011 | 4:09:00 PM | 5.14 | 13.474 | 80.837 | 56.546 |
| 6/27/2011 | 4:10:00 PM | 5.117 | 13.501 | 79.605 | 54.474 |
| 6/27/2011 | 4:11:00 PM | 5.135 | 13.511 | 80.181 | 53.915 |
| 6/27/2011 | 4:12:00 PM | 5.157 | 13.473 | 79.605 | 54.191 |
| 6/27/2011 | 4:13:00 PM | 5.142 | 13.496 | 77.389 | 53.586 |
| 6/27/2011 | 4:14:00 PM | 5.182 | 13.438 | 77.634 | 54.626 |
| 6/27/2011 | 4:15:00 PM | 5.157 | 13.448 | 75.283 | 53.13 |
| 6/27/2011 | 4:16:00 PM | 5.135 | 13.471 | 75.264 | 56.887 |
| 6/27/2011 | 4:17:00 PM | 5.126 | 13.483 | 76.345 | 59.08 |
| 6/27/2011 | 4:18:00 PM | 5.121 | 13.501 | 78.195 | 59.377 |
| 6/27/2011 | 4:19:00 PM | 5.138 | 13.468 | 78.079 | 57.292 |
| 6/27/2011 | 4:20:00 PM | 5.109 | 13.503 | 77.019 | 53.648 |
| 6/27/2011 | 4:21:00 PM | 5.16 | 13.464 | 76.109 | 53.443 |
| 6/27/2011 | 4:22:00 PM | 5.157 | 13.441 | 75.368 | 54.031 |
| 6/27/2011 | 4:23:00 PM | 5.148 | 13.461 | 74.939 | 52.38 |
| 6/27/2011 | 4:24:00 PM | 5.165 | 13.445 | 75.175 | 51.956 |
| 6/27/2011 | 4:25:00 PM | 5.131 | 13.451 | 74.572 | 53.391 |
| 6/27/2011 | 4:26:00 PM | 5.147 | 13.451 | 74.361 | 54.409 |
| 6/27/2011 | 4:27:00 PM | 5.067 | 13.53 | 74.866 | 55.61 |
| 6/27/2011 | 4:28:00 PM | 5.06 | 13.542 | 76.434 | 56.865 |
| 6/27/2011 | 4:29:00 PM | 5.123 | 13.477 | 75.653 | 58.579 |
| 6/27/2011 | 4:30:00 PM | 5.101 | 13.492 | 76.971 | 48.291 |
| 6/27/2011 | 4:31:00 PM | 5.107 | 13.485 | 75.973 | 36.524 |
| 6/27/2011 | 4:32:00 PM | 5.136 | 13.466 | 76.096 | 37.327 |
| 6/27/2011 | 4:33:00 PM | 5.122 | 13.473 | 77.09 | 37.995 |
| 6/27/2011 | 4:34:00 PM | 5.05 | 13.538 | 78.755 | 38.845 |
| 6/27/2011 | 4:35:00 PM | 5.056 | 13.523 | 77.945 | 40.213 |
| 6/27/2011 | 4:36:00 PM | 5.086 | 13.502 | 73.407 | 40.988 |
| 6/27/2011 | 4:37:00 PM | 5.134 | 13.454 | 62.608 | 41.41 |
| 6/27/2011 | 4:38:00 PM | 5.113 | 13.459 | 60.788 | 41.86 |
| 6/27/2011 | 4:39:00 PM | 5.127 | 13.48 | 60.063 | 42.096 |
| 6/27/2011 | 4:40:00 PM | 5.12 | 13.463 | 65.397 | 42.342 |
| 6/27/2011 | 4:41:00 PM | 5.072 | 13.509 | 73.432 | 42.487 |
| 6/27/2011 | 4:42:00 PM | 5.02 | 13.561 | 77.58 | 42.577 |
| 6/27/2011 | 4:43:00 PM | 5.025 | 13.54 | 78.734 | 42.762 |
| 6/27/2011 | 4:44:00 PM | 5.048 | 13.519 | 77.472 | 42.956 |
| 6/27/2011 | 4:45:00 PM | 5.076 | 13.509 | 76.421 | 43.127 |
| 6/27/2011 | 4:46:00 PM | 5.046 | 13.53 | 76.163 | 43.048 |
| 6/27/2011 | 4:47:00 PM | 5.056 | 13.505 | 77.735 | 43.12 |
| 6/27/2011 | 4:48:00 PM | 4.989 | 13.57 | 78.161 | 43.057 |
| 6/27/2011 | 4:49:00 PM | 5.086 | 13.496 | 78.005 | 43.049 |
| 6/27/2011 | 4:50:00 PM | 5.089 | 13.47 | 78.587 | 43.052 |

| | | | | | | |
|---|---|---|---|---|---|---|
| 6/27/2011 | 4:51:00 PM | 5.074 | 13.483 | 78.149 | 42.921 | |
| 6/27/2011 | 4:52:00 PM | 5.069 | 13.481 | 77.636 | 42.924 | |
| 6/27/2011 | 4:53:00 PM | 5.054 | 13.477 | 77.867 | 42.979 | |
| 6/27/2011 | 4:54:00 PM | 5.018 | 13.52 | 78.061 | 42.929 | |
| 6/27/2011 | 4:55:00 PM | 5.05 | 13.506 | 79.43 | 43.032 | |
| 6/27/2011 | 4:56:00 PM | 5.092 | 13.474 | 77.583 | 43.089 | |
| 6/27/2011 | 4:57:00 PM | 5.143 | 13.417 | 75.634 | 43.087 | |
| 6/27/2011 | 4:58:00 PM | 5.13 | 13.422 | 76.433 | 43.047 | |
| 6/27/2011 | 4:59:00 PM | 5.118 | 13.438 | 77.222 | 42.993 | |
| 6/27/2011 | 5:00:00 PM | 5.121 | 13.424 | 77.865 | 42.967 | |
| 6/27/2011 | 5:01:00 PM | 5.14 | 13.41 | 78.064 | 42.884 | |
| 6/27/2011 | 5:02:00 PM | 5.073 | 13.464 | 78.966 | 42.904 | |
| 6/27/2011 | 5:03:00 PM | 5.092 | 13.457 | 79.375 | 42.913 | |
| 6/27/2011 | 5:04:00 PM | 5.113 | 13.425 | 78.424 | 42.927 | |
| 6/27/2011 | 5:05:00 PM | 5.115 | 13.413 | 77.426 | 42.907 | |
| 6/27/2011 | 5:06:00 PM | 5.141 | 13.399 | 76.711 | 42.959 | |
| 6/27/2011 | 5:07:00 PM | 5.105 | 13.412 | 76.61 | 43.002 | |
| 6/27/2011 | 5:08:00 PM | 5.063 | 13.456 | 76.375 | 42.923 | |
| 6/27/2011 | 5:09:00 PM | 5.102 | 13.442 | 78.16 | 43.016 | |
| 6/27/2011 | 5:10:00 PM | 5.157 | 13.375 | 75.816 | 43.038 | |
| 6/27/2011 | 5:11:00 PM | 5.17 | 13.365 | 74.979 | 43.068 | THC High |
| 6/27/2011 | 5:12:00 PM | 5.16 | 13.369 | 74.851 | 38.995 | |
| 6/27/2011 | 5:13:00 PM | 5.123 | 13.393 | 76.404 | 0.091 | THC Zero |
| 6/27/2011 | 5:14:00 PM | 5.08 | 13.43 | 76.552 | 0.086 | |
| 6/27/2011 | 5:15:00 PM | 5.049 | 13.462 | 76.864 | 42.361 | |
| 6/27/2011 | 5:16:00 PM | 5.061 | 13.442 | 78.444 | 62.148 | |
| 6/27/2011 | 5:17:00 PM | 5.058 | 13.453 | 77.491 | 61.876 | |
| 6/27/2011 | 5:18:00 PM | 5.071 | 13.455 | 76.365 | 59.948 | |
| 6/27/2011 | 5:19:00 PM | 5.067 | 13.45 | 76.157 | 60.751 | |
| 6/27/2011 | 5:20:00 PM | 5.011 | 13.507 | 77.436 | 61.033 | |
| 6/27/2011 | 5:21:00 PM | 5.023 | 13.494 | 76.929 | 60.041 | |
| 6/27/2011 | 5:22:00 PM | 4.972 | 13.541 | 77.205 | 60.613 | |
| 6/27/2011 | 5:23:00 PM | 4.941 | 13.586 | 79.715 | 61.548 | |
| 6/27/2011 | 5:24:00 PM | 5.03 | 13.49 | 77.257 | 58.32 | |
| 6/27/2011 | 5:25:00 PM | 5.085 | 13.438 | 75.01 | 55.512 | |
| 6/27/2011 | 5:26:00 PM | 5.048 | 13.469 | 75.036 | 57.682 | |
| 6/27/2011 | 5:27:00 PM | 5.373 | 11.329 | 67.225 | 58.471 | |
| 6/27/2011 | 5:28:00 PM | 4.97 | 9.732 | 6.294 | 57.396 | |
| 6/27/2011 | 5:29:00 PM | 4.967 | 9.723 | -0.073 | 54.762 | O2/CO2 bias |
| 6/27/2011 | 5:30:00 PM | 4.269 | 7.943 | 0.244 | 54.419 | |
| 6/27/2011 | 5:31:00 PM | 0.079 | 0.048 | 104.369 | 54.782 | |
| 6/27/2011 | 5:32:00 PM | 0.049 | 0.018 | 142.88 | 53.835 | CO bias |
| 6/27/2011 | 5:33:00 PM | 3.152 | 8.819 | 126.495 | 54.298 | |
| 6/27/2011 | 5:34:00 PM | 5.127 | 13.352 | 77.948 | 54.12 | |
| 6/27/2011 | 5:35:00 PM | 5.072 | 13.399 | 75.661 | 53.764 | |
| 6/27/2011 | 5:36:00 PM | 5.055 | 13.423 | 73.584 | 51.446 | |
| 6/27/2011 | 5:37:00 PM | 5.058 | 13.43 | 75.403 | 55.599 | |
| 6/27/2011 | 5:38:00 PM | 5.03 | 13.443 | 76.649 | 55.775 | |
| 6/27/2011 | 5:39:00 PM | 5.015 | 13.468 | 76.485 | 55.538 | |
| 6/27/2011 | 5:40:00 PM | 4.97 | 13.496 | 78.677 | 58.496 | |
| 6/27/2011 | 5:41:00 PM | 4.907 | 13.56 | 79.438 | 60.909 | |
| 6/27/2011 | 5:42:00 PM | 4.943 | 13.547 | 79.802 | 59.334 | |

| | | | | | |
|---|---|---|---|---|---|
| 6/27/2011 | 5:43:00 PM | 4.961 | 13.523 | 79.729 | 60.77 |
| 6/27/2011 | 5:44:00 PM | 4.879 | 13.604 | 80.855 | 58.85 |
| 6/27/2011 | 5:45:00 PM | 4.962 | 13.513 | 80.878 | 57.18 |
| 6/27/2011 | 5:46:00 PM | 4.998 | 13.481 | 79.182 | 56.355 |
| 6/27/2011 | 5:47:00 PM | 4.96 | 13.504 | 80.407 | 58.576 |
| 6/27/2011 | 5:48:00 PM | 4.996 | 13.491 | 79.928 | 57.752 |
| 6/27/2011 | 5:49:00 PM | 4.999 | 13.481 | 78.681 | 54.997 |
| 6/27/2011 | 5:50:00 PM | 4.966 | 13.505 | 78.077 | 56.871 |
| 6/27/2011 | 5:51:00 PM | 4.956 | 13.523 | 79.661 | 58.493 |
| 6/27/2011 | 5:52:00 PM | 5.003 | 13.482 | 81.02 | 60.884 |
| 6/27/2011 | 5:53:00 PM | 5.022 | 13.453 | 79.927 | 59.181 |
| 6/27/2011 | 5:54:00 PM | 5.026 | 13.454 | 78.392 | 56.804 |
| 6/27/2011 | 5:55:00 PM | 5.047 | 13.431 | 78.275 | 57.285 |
| 6/27/2011 | 5:56:00 PM | 5.001 | 13.479 | 78.259 | 57.727 |
| 6/27/2011 | 5:57:00 PM | 4.994 | 13.473 | 78.234 | 56.557 |
| 6/27/2011 | 5:58:00 PM | 4.955 | 13.518 | 78.54 | 55.437 |
| 6/27/2011 | 5:59:00 PM | 4.994 | 13.483 | 78.355 | 57.131 |
| 6/27/2011 | 6:00:00 PM | 5.048 | 13.444 | 76.554 | 56.152 |
| 6/27/2011 | 6:01:00 PM | 5.007 | 13.465 | 75.457 | 56.337 |
| 6/27/2011 | 6:02:00 PM | 5 | 13.474 | 76.845 | 58.259 |
| 6/27/2011 | 6:03:00 PM | 5.049 | 13.435 | 78.074 | 58.488 |
| 6/27/2011 | 6:04:00 PM | 5.027 | 13.455 | 78.132 | 58.502 |
| 6/27/2011 | 6:05:00 PM | 5.015 | 13.471 | 79.14 | 59.271 |
| 6/27/2011 | 6:06:00 PM | 5.032 | 13.443 | 78.538 | 56.75 |
| 6/27/2011 | 6:07:00 PM | 5.007 | 13.467 | 77.65 | 57.235 |
| 6/27/2011 | 6:08:00 PM | 5.02 | 13.459 | 78.224 | 58.871 |
| 6/27/2011 | 6:09:00 PM | 4.987 | 13.485 | 78.367 | 57.376 |
| 6/27/2011 | 6:10:00 PM | 4.995 | 13.486 | 77.693 | 56.875 |
| 6/27/2011 | 6:11:00 PM | 5.01 | 13.464 | 79.286 | 56.802 |
| 6/27/2011 | 6:12:00 PM | 4.979 | 13.495 | 79.227 | 56.306 |
| 6/27/2011 | 6:13:00 PM | 5.013 | 13.462 | 78.269 | 56.009 |
| 6/27/2011 | 6:14:00 PM | 4.998 | 13.473 | 77.041 | 55.668 |
| 6/27/2011 | 6:15:00 PM | 4.989 | 13.489 | 76.638 | 53.686 |
| 6/27/2011 | 6:16:00 PM | 5.04 | 13.435 | 76.258 | 54.162 |
| 6/27/2011 | 6:17:00 PM | 4.999 | 13.46 | 76.175 | 54.774 |
| 6/27/2011 | 6:18:00 PM | 5.003 | 13.458 | 77.365 | 54.909 |
| 6/27/2011 | 6:19:00 PM | 5.008 | 13.474 | 78.776 | 55.5 |
| 6/27/2011 | 6:20:00 PM | 4.996 | 13.467 | 79.774 | 50.842 |
| 6/27/2011 | 6:21:00 PM | 4.97 | 13.491 | 77.311 | 49.75 |
| 6/27/2011 | 6:22:00 PM | 5.005 | 13.459 | 77.923 | 50.881 |
| 6/27/2011 | 6:23:00 PM | 4.932 | 13.521 | 78.367 | 52.473 |
| 6/27/2011 | 6:24:00 PM | 4.946 | 13.521 | 79.843 | 54.417 |
| 6/27/2011 | 6:25:00 PM | 4.961 | 13.525 | 80.278 | 55.096 |
| 6/27/2011 | 6:26:00 PM | 4.941 | 13.531 | 80.875 | 55.284 |
| 6/27/2011 | 6:27:00 PM | 4.961 | 13.475 | 80.885 | 54.602 |
| 6/27/2011 | 6:28:00 PM | 4.991 | 13.476 | 79.688 | 54.237 |
| 6/27/2011 | 6:29:00 PM | 5 | 13.475 | 77.382 | 52.476 |
| 6/27/2011 | 6:30:00 PM | 5.024 | 13.461 | 55.114 | 32.192 |
| 6/27/2011 | 6:31:00 PM | 5 | 13.484 | 47.527 | 28.526 |
| 6/27/2011 | 6:32:00 PM | 5.013 | 13.466 | 47.355 | 33.09 |
| 6/27/2011 | 6:33:00 PM | 4.977 | 13.5 | 63.947 | 50.717 |
| 6/27/2011 | 6:34:00 PM | 4.98 | 13.5 | 73.489 | 52.97 |

| | | | | | |
|---|---|---|---|---|---|
| 6/27/2011 | 6:35:00 PM | 4.982 | 13.489 | 76.016 | 54.469 |
| 6/27/2011 | 6:36:00 PM | 4.969 | 13.503 | 78.045 | 54.882 |
| 6/27/2011 | 6:37:00 PM | 4.998 | 13.473 | 78.553 | 54.86 |
| 6/27/2011 | 6:38:00 PM | 4.984 | 13.487 | 79.072 | 57.059 |
| 6/27/2011 | 6:39:00 PM | 4.995 | 13.468 | 78.293 | 57.444 |
| 6/27/2011 | 6:40:00 PM | 4.926 | 13.526 | 79.395 | 58.119 |
| 6/27/2011 | 6:41:00 PM | 5.002 | 13.466 | 79.607 | 56.848 |
| 6/27/2011 | 6:42:00 PM | 5.019 | 13.438 | 78.132 | 60.772 |
| 6/27/2011 | 6:43:00 PM | 4.976 | 13.476 | 78.179 | 60.293 |
| 6/27/2011 | 6:44:00 PM | 4.945 | 13.524 | 78.165 | 63.687 |
| 6/27/2011 | 6:45:00 PM | 4.963 | 13.502 | 75.401 | 57.875 |
| 6/27/2011 | 6:46:00 PM | 4.989 | 13.467 | 63.921 | 45.039 |
| 6/27/2011 | 6:47:00 PM | 4.932 | 13.53 | 61.671 | 44.717 |
| 6/27/2011 | 6:48:00 PM | 4.93 | 13.531 | 66.925 | 52.109 |
| 6/27/2011 | 6:49:00 PM | 4.851 | 13.575 | 76.753 | 57.684 |
| 6/27/2011 | 6:50:00 PM | 4.839 | 13.607 | 79.61 | 59.544 |
| 6/27/2011 | 6:51:00 PM | 4.829 | 13.612 | 80.049 | 60.176 |
| 6/27/2011 | 6:52:00 PM | 4.815 | 13.629 | 82.477 | 61.594 |
| 6/27/2011 | 6:53:00 PM | 4.871 | 13.585 | 79.76 | 57.005 |
| 6/27/2011 | 6:54:00 PM | 4.882 | 13.577 | 78.702 | 54.923 |
| 6/27/2011 | 6:55:00 PM | 4.921 | 13.533 | 79.129 | 58.33 |
| 6/27/2011 | 6:56:00 PM | 4.957 | 13.501 | 78.796 | 61.192 |
| 6/27/2011 | 6:57:00 PM | 4.953 | 13.504 | 77.875 | 57.603 |
| 6/27/2011 | 6:58:00 PM | 4.966 | 13.498 | 78.609 | 58.727 |
| 6/27/2011 | 6:59:00 PM | 4.985 | 13.488 | 78.187 | 57.19 |
| 6/27/2011 | 7:00:00 PM | 4.984 | 13.483 | 76.782 | 57.954 |
| 6/27/2011 | 7:01:00 PM | 4.916 | 13.533 | 79.416 | 60.989 |
| 6/27/2011 | 7:02:00 PM | 4.915 | 13.537 | 79.516 | 58.308 |
| 6/27/2011 | 7:03:00 PM | 4.89 | 13.567 | 79.638 | 58.014 |
| 6/27/2011 | 7:04:00 PM | 4.966 | 13.498 | 79.024 | 55.502 |
| 6/27/2011 | 7:05:00 PM | 5.039 | 13.421 | 77.236 | 52.933 |
| 6/27/2011 | 7:06:00 PM | 5.012 | 13.444 | 76.147 | 51.977 |
| 6/27/2011 | 7:07:00 PM | 5.047 | 13.422 | 77.118 | 55.732 |
| 6/27/2011 | 7:08:00 PM | 4.983 | 13.478 | 80.592 | 58.579 |
| 6/27/2011 | 7:09:00 PM | 4.953 | 13.484 | 82.002 | 57.409 |
| 6/27/2011 | 7:10:00 PM | 4.987 | 13.463 | 78.527 | 56.591 |
| 6/27/2011 | 7:11:00 PM | 5.013 | 13.443 | 78.13 | 56.773 |
| 6/27/2011 | 7:12:00 PM | 5.027 | 13.427 | 78.569 | 56.992 |
| 6/27/2011 | 7:13:00 PM | 5.033 | 13.407 | 77.216 | 55.333 |
| 6/27/2011 | 7:14:00 PM | 5.014 | 13.436 | 79.97 | 58.318 |
| 6/27/2011 | 7:15:00 PM | 5.088 | 13.371 | 77.899 | 54.622 |
| 6/27/2011 | 7:16:00 PM | 5.076 | 13.359 | 77.319 | 55.841 |
| 6/27/2011 | 7:17:00 PM | 5.089 | 13.361 | 77.616 | 58.321 |
| 6/27/2011 | 7:18:00 PM | 5.1 | 13.361 | 77.736 | 58.349 |
| 6/27/2011 | 7:19:00 PM | 5.082 | 13.364 | 78.655 | 59.078 |
| 6/27/2011 | 7:20:00 PM | 5.073 | 13.366 | 79.72 | 59.612 |
| 6/27/2011 | 7:21:00 PM | 5.084 | 13.364 | 78.224 | 58.305 |
| 6/27/2011 | 7:22:00 PM | 5.056 | 13.402 | 72.528 | 53.172 |
| 6/27/2011 | 7:23:00 PM | 5.075 | 13.395 | 69.785 | 51.492 |
| 6/27/2011 | 7:24:00 PM | 5.077 | 13.369 | 68.659 | 53.609 |
| 6/27/2011 | 7:25:00 PM | 5.045 | 13.379 | 72.079 | 54.688 |
| 6/27/2011 | 7:26:00 PM | 5.012 | 13.416 | 76.867 | 57.787 |

| | | | | | | |
|---|---|---|---|---|---|---|
| 6/27/2011 | 7:27:00 PM | 5.005 | 13.443 | 72.251 | 54.717 | |
| 6/27/2011 | 7:28:00 PM | 5.005 | 13.441 | 67.873 | 52.011 | |
| 6/27/2011 | 7:29:00 PM | 5.023 | 13.431 | 67.652 | 51.707 | |
| 6/27/2011 | 7:30:00 PM | 4.981 | 13.451 | 74.008 | 54.206 | |
| 6/27/2011 | 7:31:00 PM | 5.043 | 13.413 | 77.177 | 54.717 | |
| 6/27/2011 | 7:32:00 PM | 5.039 | 13.403 | 77.163 | 57.203 | |
| 6/27/2011 | 7:33:00 PM | 5.011 | 13.429 | 78.423 | 59.047 | |
| 6/27/2011 | 7:34:00 PM | 5.028 | 13.413 | 78.586 | 60.217 | |
| 6/27/2011 | 7:35:00 PM | 5.023 | 13.417 | 79.968 | 60.617 | |
| 6/27/2011 | 7:36:00 PM | 4.963 | 13.476 | 80.828 | 59.187 | |
| 6/27/2011 | 7:37:00 PM | 4.993 | 13.447 | 80.376 | 58.619 | |
| 6/27/2011 | 7:38:00 PM | 5.024 | 13.428 | 77.863 | 59.39 | |
| 6/27/2011 | 7:39:00 PM | 5.05 | 13.401 | 77.428 | 59.703 | |
| 6/27/2011 | 7:40:00 PM | 5.07 | 13.383 | 77.144 | 58.522 | |
| 6/27/2011 | 7:41:00 PM | 4.935 | 12.622 | 77.485 | 59.755 | |
| 6/27/2011 | 7:42:00 PM | 0.214 | 0.063 | 116.276 | 59.949 | |
| 6/27/2011 | 7:43:00 PM | 0.047 | 0.018 | 143.058 | 59.976 | |
| 6/27/2011 | 7:44:00 PM | 0.045 | 0.01 | 143.859 | 59.683 | CO bias |
| 6/27/2011 | 7:45:00 PM | 2.816 | 5.924 | 114.684 | 60.501 | |
| 6/27/2011 | 7:46:00 PM | 4.962 | 9.658 | 7.466 | 57.836 | |
| 6/27/2011 | 7:47:00 PM | 4.963 | 9.669 | 0.023 | 58.918 | O2/CO2 bias |
| 6/27/2011 | 7:48:00 PM | 4.969 | 10.21 | -0.085 | 59.579 | |
| 6/27/2011 | 7:49:00 PM | 4.99 | 13.447 | 54.749 | 61.416 | |

**Delta Air Quality Services**

**SPAN GAS RECORD AND EPA CALIBRATION ERROR**

CLIENT/LOCATION: ExxonMobil
TRUCK/CEM I.D.: 4-CEMS

DATE: 6/28/11
BY: AA/DW/JP/SS/DA

| | MID SPAN CYLINDER | | HIGH SPAN CYLINDER | |
|---|---|---|---|---|
| | CYLINDER NO. | CONCENTRATION | CYLINDER NO. | CONCENTRATION |
| ZERO | "CEM Grade $N_2$" | | | |
| $O_2$ | SA8302 | 5.00 | CC102051 | 8.78 |
| $CO_2$ | SA8302 | 10.16 | CC102051 | 17.44 |
| | | | | |
| CO | CC85874 | 142 | SA21216 | 248 |
| | | | | |

**PRE-TEST INSTRUMENT CALIBRATION ERROR**

| | ANALYZER | | | | |
|---|---|---|---|---|---|
| | $O_2$ | $CO_2$ | | CO | |
| Analyzer Range | 10 | 20 | | 250 | |
| Calibration Span | 8.78 | 17.44 | | 248 | |
| Zero Gas Value | 0.0 | 0.0 | | 0.0 | |
| Analyzer Reads | 0.05 | 0.00 | | 0.49 | |
| Difference (% or ppm) | 0.0 | 0.0 | | 0.5 | |
| Error (% of Cal. Span) | 0.6% | 0.0% | | 0.2% | |
| Status(1) | PASS | PASS | | PASS | |
| High Gas Value | 8.78 | 17.44 | | 248 | |
| Analyzer Reads | 8.70 | 17.42 | | 249.65 | |
| Difference (% or ppm) | -0.1 | 0.0 | | 1.6 | |
| Error (% of Cal. Span) | -1.0% | -0.1% | | 0.7% | |
| Status | PASS | PASS | | PASS | |
| Mid Gas Value | 5.00 | 10.16 | | 142 | |
| Analyzer Reads | 4.98 | 9.97 | | 144.14 | |
| Difference (% or ppm) | 0.0 | -0.2 | | 2.1 | |
| Error (% of Cal. Span) | -0.2% | -1.1% | | 0.9% | |
| Status | PASS | PASS | | PASS | |

1) Calibration Error must be within +/- 2.0% of the Calibration Span

| Date | Time | O2 % | CO2 % | CO PPM | HC PPM | |
|---|---|---|---|---|---|---|
| 6/28/2011 | 7:07:00 AM | 5.045 | 13.689 | 77.109 | 48.428 | |
| 6/28/2011 | 7:08:00 AM | 1.911 | 4.298 | 60.543 | 38.673 | |
| 6/28/2011 | 7:09:00 AM | 0.049 | -0.001 | 5.114 | 0.096 | O2/CO2 Zero |
| 6/28/2011 | 7:10:00 AM | 7.551 | 15.965 | 0.541 | 0.404 | |
| 6/28/2011 | 7:11:00 AM | 8.691 | 17.42 | 0.492 | 0.121 | THC/CO Zero |
| 6/28/2011 | 7:12:00 AM | 8.695 | 17.424 | 98.81 | 11.89 | O2/CO2 Cal High |
| 6/28/2011 | 7:13:00 AM | 6.029 | 11.562 | 246.064 | 69.291 | |
| 6/28/2011 | 7:14:00 AM | 4.986 | 9.975 | 249.878 | 70.688 | |
| 6/28/2011 | 7:15:00 AM | 4.983 | 9.961 | 250.158 | 71.686 | |
| 6/28/2011 | 7:16:00 AM | 4.984 | 9.967 | 249.646 | 72.225 | O2/CO2 Mid; CO Cal High |
| 6/28/2011 | 7:17:00 AM | 5.015 | 12.055 | 223.229 | 72.826 | |
| 6/28/2011 | 7:18:00 AM | 4.991 | 13.791 | 145.231 | 73.465 | |
| 6/28/2011 | 7:19:00 AM | 5.013 | 14.057 | 146.232 | 75.589 | |
| 6/28/2011 | 7:20:00 AM | 5.116 | 14.111 | 147.13 | 76.839 | |
| 6/28/2011 | 7:21:00 AM | 5.01 | 13.822 | 144.14 | 75.088 | CO Mid |
| 6/28/2011 | 7:22:00 AM | 5.031 | 13.791 | 109.818 | 75.444 | |
| 6/28/2011 | 7:23:00 AM | 5.004 | 13.826 | 76.128 | 75.743 | |
| 6/28/2011 | 7:24:00 AM | 5.014 | 13.823 | 76.578 | 75.977 | |
| 6/28/2011 | 7:25:00 AM | 5.06 | 13.778 | 75.561 | 76.11 | |
| 6/28/2011 | 7:26:00 AM | 5.051 | 13.785 | 74.436 | 76.138 | |
| 6/28/2011 | 7:27:00 AM | 5.061 | 13.784 | 75.175 | 76.302 | |
| 6/28/2011 | 7:28:00 AM | 5.045 | 13.783 | 75.38 | 85.038 | |
| 6/28/2011 | 7:29:00 AM | 5.004 | 13.835 | 76.084 | 87.99 | |
| 6/28/2011 | 7:30:00 AM | 5.061 | 13.768 | 74.669 | 87.961 | |
| 6/28/2011 | 7:31:00 AM | 5.058 | 13.773 | 73.135 | 87.848 | THC High |
| 6/28/2011 | 7:32:00 AM | 5.064 | 13.761 | 72.002 | 87.913 | |
| 6/28/2011 | 7:33:00 AM | 5.068 | 13.762 | 72.866 | 74.831 | |
| 6/28/2011 | 7:34:00 AM | 5.071 | 13.762 | 73.112 | 44.238 | |
| 6/28/2011 | 7:35:00 AM | 5.052 | 13.773 | 73.992 | 44.077 | THC Mid |
| 6/28/2011 | 7:36:00 AM | 5.109 | 13.73 | 72.282 | 44.082 | |
| 6/28/2011 | 7:37:00 AM | 5.116 | 13.727 | 71.859 | 44.046 | |
| 6/28/2011 | 7:38:00 AM | 5.095 | 13.733 | 72.341 | 29.551 | |
| 6/28/2011 | 7:39:00 AM | 5.145 | 13.693 | 72.74 | 24.233 | THC Low |
| 6/28/2011 | 7:40:00 AM | 5.157 | 13.685 | 72.169 | 23.97 | |
| 6/28/2011 | 7:41:00 AM | 5.282 | 13.938 | 74.531 | 24.923 | |
| 6/28/2011 | 7:42:00 AM | 5.324 | 14.154 | 74.709 | 40.317 | |
| 6/28/2011 | 7:43:00 AM | 5.322 | 14.169 | 73.772 | 57.561 | |
| 6/28/2011 | 7:44:00 AM | 5.357 | 14.302 | 73.69 | 57.623 | |
| 6/28/2011 | 7:45:00 AM | 5.563 | 14.77 | 77.257 | 60.487 | |
| 6/28/2011 | 7:46:00 AM | 5.467 | 14.707 | 76.401 | 58.473 | |
| 6/28/2011 | 7:47:00 AM | 5.581 | 14.998 | 77.665 | 60.993 | |
| 6/28/2011 | 7:48:00 AM | 5.424 | 14.663 | 77.392 | 60.318 | |
| 6/28/2011 | 7:49:00 AM | 5.015 | 13.711 | 73.777 | 54.722 | |
| 6/28/2011 | 7:50:00 AM | 5.246 | 11.813 | 68.108 | 54.897 | |
| 6/28/2011 | 7:51:00 AM | 4.963 | 9.894 | 8.058 | 54.297 | |
| 6/28/2011 | 7:52:00 AM | 4.966 | 9.908 | -0.11 | 54.49 | O2/CO2 bias |
| 6/28/2011 | 7:53:00 AM | 4.969 | 9.911 | -0.184 | 54.528 | |
| 6/28/2011 | 7:54:00 AM | 5.004 | 13.56 | 36.499 | 54.318 | |
| 6/28/2011 | 7:55:00 AM | 4.989 | 13.752 | 72.446 | 54.452 | |

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|---|---|---|---|---|---|---|
| 6/28/2011 | 7:56:00 AM | 1.16 | 2.326 | 90.116 | 52.702 | |
| 6/28/2011 | 7:57:00 AM | 0.05 | 0.025 | 141.318 | 52.496 | |
| 6/28/2011 | 7:58:00 AM | 0.041 | 0.013 | 143.366 | 54.578 | CO bias |
| 6/28/2011 | 7:59:00 AM | 2.799 | 8.26 | 127.789 | 54.437 | |
| 6/28/2011 | 8:00:00 AM | 5.048 | 13.651 | 73.979 | 54.857 | |
| 6/28/2011 | 8:01:00 AM | 5.018 | 13.694 | 71.419 | 53.566 | |
| 6/28/2011 | 8:02:00 AM | 4.968 | 13.756 | 72.806 | 54.661 | |
| 6/28/2011 | 8:03:00 AM | 4.943 | 13.784 | 73.214 | 53.158 | |
| 6/28/2011 | 8:04:00 AM | 4.985 | 13.759 | 72.848 | 55.039 | |
| 6/28/2011 | 8:05:00 AM | 5.061 | 13.682 | 71.686 | 54.123 | |
| 6/28/2011 | 8:06:00 AM | 5.051 | 13.669 | 71.628 | 53.909 | |
| 6/28/2011 | 8:07:00 AM | 5.032 | 13.713 | 71.203 | 53.378 | |
| 6/28/2011 | 8:08:00 AM | 5.044 | 13.687 | 71.194 | 53.752 | |
| 6/28/2011 | 8:09:00 AM | 5.051 | 13.679 | 70.82 | 53.777 | |
| 6/28/2011 | 8:10:00 AM | 5.014 | 13.698 | 72.345 | 52.992 | |
| 6/28/2011 | 8:11:00 AM | 5.027 | 13.697 | 71.94 | 53.192 | |
| 6/28/2011 | 8:12:00 AM | 5.043 | 13.673 | 70.624 | 51.078 | |
| 6/28/2011 | 8:13:00 AM | 5.086 | 13.636 | 69.474 | 51.158 | |
| 6/28/2011 | 8:14:00 AM | 5.037 | 13.665 | 68.64 | 50.917 | |
| 6/28/2011 | 8:15:00 AM | 5.007 | 13.694 | 68.026 | 51.664 | |
| 6/28/2011 | 8:16:00 AM | 4.946 | 13.737 | 69.047 | 50.786 | |
| 6/28/2011 | 8:17:00 AM | 4.922 | 13.757 | 70.306 | 50.205 | |
| 6/28/2011 | 8:18:00 AM | 4.902 | 13.767 | 69.851 | 50.798 | |
| 6/28/2011 | 8:19:00 AM | 4.864 | 13.811 | 71.478 | 54.18 | |
| 6/28/2011 | 8:20:00 AM | 4.815 | 13.854 | 77.851 | 53.785 | |
| 6/28/2011 | 8:21:00 AM | 4.815 | 13.858 | 77.289 | 54.149 | |
| 6/28/2011 | 8:22:00 AM | 4.783 | 13.891 | 75.576 | 55.715 | |
| 6/28/2011 | 8:23:00 AM | 4.788 | 13.91 | 77.633 | 55.678 | |
| 6/28/2011 | 8:24:00 AM | 4.834 | 13.943 | 92.726 | 52.436 | |
| 6/28/2011 | 8:25:00 AM | 4.909 | 13.856 | 77.453 | 53.72 | |
| 6/28/2011 | 8:26:00 AM | 4.888 | 13.875 | 72.463 | 53.709 | |
| 6/28/2011 | 8:27:00 AM | 4.924 | 13.85 | 70.936 | 54.865 | |
| 6/28/2011 | 8:28:00 AM | 4.902 | 13.872 | 70.943 | 54.235 | |
| 6/28/2011 | 8:29:00 AM | 4.884 | 13.899 | 70.677 | 52.592 | |
| 6/28/2011 | 8:30:00 AM | 4.853 | 13.965 | 73.505 | 51.363 | |
| 6/28/2011 | 8:31:00 AM | 4.828 | 14.003 | 86.819 | 51.577 | |
| 6/28/2011 | 8:32:00 AM | 4.864 | 14.002 | 80.64 | 48.797 | |
| 6/28/2011 | 8:33:00 AM | 4.917 | 14.001 | 74.159 | 47.546 | |
| 6/28/2011 | 8:34:00 AM | 4.845 | 13.879 | 71.797 | 50.096 | |
| 6/28/2011 | 8:35:00 AM | 4.793 | 13.905 | 79.165 | 51.129 | |
| 6/28/2011 | 8:36:00 AM | 4.847 | 13.859 | 77.178 | 51.521 | |
| 6/28/2011 | 8:37:00 AM | 4.841 | 13.854 | 75.164 | 50.706 | |
| 6/28/2011 | 8:38:00 AM | 4.801 | 13.841 | 77.808 | 52.032 | |
| 6/28/2011 | 8:39:00 AM | 4.872 | 13.838 | 76.078 | 51.367 | |
| 6/28/2011 | 8:40:00 AM | 4.898 | 13.827 | 72.616 | 52.199 | |
| 6/28/2011 | 8:41:00 AM | 4.879 | 13.839 | 72.007 | 49.507 | |
| 6/28/2011 | 8:42:00 AM | 4.894 | 13.846 | 71.533 | 48.278 | |
| 6/28/2011 | 8:43:00 AM | 4.929 | 13.844 | 70.561 | 49.495 | |
| 6/28/2011 | 8:44:00 AM | 4.914 | 13.866 | 71.005 | 51.03 | |
| 6/28/2011 | 8:45:00 AM | 4.933 | 13.849 | 72.212 | 49.757 | |
| 6/28/2011 | 8:46:00 AM | 4.98 | 13.805 | 69.617 | 47.581 | |
| 6/28/2011 | 8:47:00 AM | 5.006 | 13.786 | 68.507 | 47.057 | |

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|---|---|---|---|---|---|---|
| 6/28/2011 | 8:48:00 AM | 5.02 | 13.769 | 67.854 | 47.879 | |
| 6/28/2011 | 8:49:00 AM | 5.121 | 14.213 | 70.761 | 52.323 | |
| 6/28/2011 | 8:50:00 AM | 5.375 | 14.906 | 75.464 | 57.184 | |
| 6/28/2011 | 8:51:00 AM | 5.586 | 15.353 | 76.963 | 59.797 | |
| 6/28/2011 | 8:52:00 AM | 4.982 | 13.98 | 71.528 | 51.61 | |
| 6/28/2011 | 8:53:00 AM | 4.931 | 13.84 | 70.322 | 49.186 | |
| 6/28/2011 | 8:54:00 AM | 4.96 | 13.822 | 70.618 | 49.05 | |
| 6/28/2011 | 8:55:00 AM | 4.929 | 13.842 | 70.884 | 48.035 | |
| 6/28/2011 | 8:56:00 AM | 4.911 | 13.853 | 72.201 | 48.795 | |
| 6/28/2011 | 8:57:00 AM | 4.878 | 13.904 | 101.265 | 49.731 | |
| 6/28/2011 | 8:58:00 AM | 4.887 | 13.908 | 104.816 | 49.047 | |
| 6/28/2011 | 8:59:00 AM | 4.898 | 13.91 | 91.678 | 48.427 | |
| 6/28/2011 | 9:00:00 AM | 4.899 | 13.897 | 77.005 | 52.322 | |
| 6/28/2011 | 9:01:00 AM | 4.917 | 13.871 | 72.879 | 51.878 | |
| 6/28/2011 | 9:02:00 AM | 4.927 | 13.869 | 71.157 | 52.03 | |
| 6/28/2011 | 9:03:00 AM | 4.901 | 13.895 | 90.25 | 50.069 | |
| 6/28/2011 | 9:04:00 AM | 4.985 | 13.847 | 101.332 | 41.825 | |
| 6/28/2011 | 9:05:00 AM | 5.01 | 13.783 | 74.739 | 36.811 | |
| 6/28/2011 | 9:06:00 AM | 4.956 | 13.866 | 71.131 | 39.01 | |
| 6/28/2011 | 9:07:00 AM | 4.955 | 13.899 | 70.771 | 41.04 | |
| 6/28/2011 | 9:08:00 AM | 4.955 | 13.902 | 70.894 | 41.232 | |
| 6/28/2011 | 9:09:00 AM | 4.982 | 13.907 | 71.463 | 41.864 | |
| 6/28/2011 | 9:10:00 AM | 4.954 | 13.947 | 73.592 | 42.201 | |
| 6/28/2011 | 9:11:00 AM | 4.903 | 13.895 | 78.797 | 41.896 | THC Mid |
| 6/28/2011 | 9:12:00 AM | 4.884 | 13.786 | 76.582 | 41.213 | |
| 6/28/2011 | 9:13:00 AM | 4.81 | 13.855 | 79.662 | 0.327 | |
| 6/28/2011 | 9:14:00 AM | 4.797 | 13.873 | 83.009 | 0.093 | THC Zero |
| 6/28/2011 | 9:15:00 AM | 4.808 | 13.889 | 88.696 | 15.06 | |
| 6/28/2011 | 9:16:00 AM | 4.835 | 13.851 | 91.936 | 50.757 | |
| 6/28/2011 | 9:17:00 AM | 4.869 | 13.824 | 76.746 | 48.919 | |
| 6/28/2011 | 9:18:00 AM | 4.901 | 13.827 | 71.571 | 49.597 | |
| 6/28/2011 | 9:19:00 AM | 4.925 | 13.833 | 75.217 | 49.15 | |
| 6/28/2011 | 9:20:00 AM | 4.896 | 13.856 | 80.727 | 49.6 | |
| 6/28/2011 | 9:21:00 AM | 4.851 | 13.906 | 74.311 | 49.92 | |
| 6/28/2011 | 9:22:00 AM | 4.841 | 13.925 | 73.532 | 50.368 | |
| 6/28/2011 | 9:23:00 AM | 4.858 | 13.925 | 73.427 | 49.76 | |
| 6/28/2011 | 9:24:00 AM | 4.873 | 13.923 | 74.075 | 49.871 | |
| 6/28/2011 | 9:25:00 AM | 4.941 | 13.858 | 72.167 | 49.59 | |
| 6/28/2011 | 9:26:00 AM | 4.975 | 13.821 | 70.74 | 49.893 | |
| 6/28/2011 | 9:27:00 AM | 4.893 | 13.9 | 74.206 | 51.687 | |
| 6/28/2011 | 9:28:00 AM | 4.927 | 13.864 | 76.185 | 54.792 | |
| 6/28/2011 | 9:29:00 AM | 4.952 | 13.843 | 74.017 | 54.65 | |
| 6/28/2011 | 9:30:00 AM | 4.962 | 13.829 | 72.437 | 52.997 | |
| 6/28/2011 | 9:31:00 AM | 4.891 | 13.884 | 74.045 | 56.024 | |
| 6/28/2011 | 9:32:00 AM | 4.924 | 13.86 | 75.787 | 55.546 | |
| 6/28/2011 | 9:33:00 AM | 4.92 | 13.854 | 73.99 | 54.646 | |
| 6/28/2011 | 9:34:00 AM | 4.899 | 13.888 | 73.381 | 53.47 | |
| 6/28/2011 | 9:35:00 AM | 5 | 13.798 | 72.461 | 54.389 | |
| 6/28/2011 | 9:36:00 AM | 4.985 | 13.809 | 71.78 | 54.898 | |
| 6/28/2011 | 9:37:00 AM | 4.97 | 13.803 | 71.755 | 53.646 | |
| 6/28/2011 | 9:38:00 AM | 4.919 | 13.878 | 72.764 | 55.4 | |
| 6/28/2011 | 9:39:00 AM | 4.892 | 13.896 | 74.84 | 58.682 | |

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|---|---|---|---|---|---|---|
| 6/28/2011 | 9:40:00 AM | 4.861 | 13.934 | 76.045 | 58.192 | |
| 6/28/2011 | 9:41:00 AM | 4.845 | 13.963 | 76.774 | 56.01 | |
| 6/28/2011 | 9:42:00 AM | 4.857 | 13.968 | 77.314 | 58.493 | |
| 6/28/2011 | 9:43:00 AM | 4.911 | 13.911 | 75.487 | 58.145 | |
| 6/28/2011 | 9:44:00 AM | 4.932 | 13.914 | 73.809 | 57 | |
| 6/28/2011 | 9:45:00 AM | 4.961 | 13.927 | 72.511 | 56.425 | |
| 6/28/2011 | 9:46:00 AM | 5.085 | 14.258 | 75.621 | 60.727 | |
| 6/28/2011 | 9:47:00 AM | 5.028 | 13.899 | 74.458 | 57.138 | |
| 6/28/2011 | 9:48:00 AM | 4.992 | 13.915 | 76.77 | 56.352 | |
| 6/28/2011 | 9:49:00 AM | 5.066 | 13.833 | 75.542 | 52.918 | |
| 6/28/2011 | 9:50:00 AM | 5.11 | 13.778 | 71.394 | 48.145 | |
| 6/28/2011 | 9:51:00 AM | 5.042 | 13.834 | 69.851 | 48.244 | |
| 6/28/2011 | 9:52:00 AM | 5.014 | 13.848 | 70.921 | 49.948 | |
| 6/28/2011 | 9:53:00 AM | 5.003 | 13.86 | 71.903 | 51.335 | |
| 6/28/2011 | 9:54:00 AM | 4.934 | 13.917 | 74.159 | 54.484 | |
| 6/28/2011 | 9:55:00 AM | 4.858 | 14.007 | 77.487 | 54.604 | |
| 6/28/2011 | 9:56:00 AM | 4.881 | 13.989 | 78.312 | 54.899 | |
| 6/28/2011 | 9:57:00 AM | 4.898 | 13.945 | 74.975 | 52.045 | |
| 6/28/2011 | 9:58:00 AM | 4.926 | 13.919 | 73.434 | 51.612 | |
| 6/28/2011 | 9:59:00 AM | 4.931 | 13.94 | 73.694 | 54.314 | |
| 6/28/2011 | 10:00:00 AM | 4.967 | 13.901 | 74.527 | 55.301 | |
| 6/28/2011 | 10:01:00 AM | 4.985 | 13.902 | 74.459 | 54.99 | |
| 6/28/2011 | 10:02:00 AM | 4.952 | 13.912 | 75.411 | 54.002 | |
| 6/28/2011 | 10:03:00 AM | 4.955 | 13.895 | 75.636 | 54.6 | |
| 6/28/2011 | 10:04:00 AM | 4.975 | 13.907 | 75.238 | 56.478 | |
| 6/28/2011 | 10:05:00 AM | 2.35 | 5.543 | 88.074 | 54.989 | |
| 6/28/2011 | 10:06:00 AM | 0.053 | 0.028 | 141.145 | 52.618 | |
| 6/28/2011 | 10:07:00 AM | 0.044 | 0.015 | 145.301 | 54.402 | CO bias |
| 6/28/2011 | 10:08:00 AM | 1.453 | 3.328 | 138.355 | 56.265 | |
| 6/28/2011 | 10:09:00 AM | 5.001 | 9.946 | 21.612 | 55.163 | |
| 6/28/2011 | 10:10:00 AM | 5.009 | 9.96 | 0.149 | 53.779 | |
| 6/28/2011 | 10:11:00 AM | 5.008 | 9.969 | -0.159 | 52.676 | O2/CO2 bias |
| 6/28/2011 | 10:12:00 AM | 5.012 | 9.977 | -0.169 | 54.141 | |
| 6/28/2011 | 10:13:00 AM | 5.06 | 12.3 | 14.808 | 51.781 | |
| 6/28/2011 | 10:14:00 AM | 5.104 | 13.762 | 68.578 | 49.083 | |
| 6/28/2011 | 10:15:00 AM | 5.06 | 13.801 | 70.814 | 47.529 | |
| 6/28/2011 | 10:16:00 AM | 4.985 | 13.882 | 71.864 | 47.255 | |
| 6/28/2011 | 10:17:00 AM | 4.989 | 13.872 | 73.705 | 49.834 | |
| 6/28/2011 | 10:18:00 AM | 4.985 | 13.875 | 72.53 | 52.043 | |
| 6/28/2011 | 10:19:00 AM | 4.941 | 13.925 | 74.036 | 54.358 | |
| 6/28/2011 | 10:20:00 AM | 4.964 | 13.908 | 73.502 | 52.761 | |
| 6/28/2011 | 10:21:00 AM | 4.954 | 13.915 | 73.367 | 52.465 | |
| 6/28/2011 | 10:22:00 AM | 4.966 | 13.952 | 75.398 | 53.699 | |
| 6/28/2011 | 10:23:00 AM | 4.966 | 13.949 | 74.528 | 50.349 | |
| 6/28/2011 | 10:24:00 AM | 5.03 | 13.911 | 74.248 | 50.699 | |
| 6/28/2011 | 10:25:00 AM | 5.08 | 13.843 | 73.282 | 51.032 | |
| 6/28/2011 | 10:26:00 AM | 5.11 | 13.824 | 71.563 | 48.722 | |
| 6/28/2011 | 10:27:00 AM | 5.068 | 13.855 | 70.39 | 48.21 | |
| 6/28/2011 | 10:28:00 AM | 5.12 | 14.046 | 70.992 | 49.975 | |
| 6/28/2011 | 10:29:00 AM | 4.985 | 13.715 | 69.04 | 48.702 | |
| 6/28/2011 | 10:30:00 AM | 4.927 | 13.767 | 71.412 | 50.032 | |
| 6/28/2011 | 10:31:00 AM | 4.954 | 13.732 | 72.696 | 51.687 | |

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|---|---|---|---|---|---|
| 6/28/2011 | 10:32:00 AM | 4.924 | 13.741 | 71.318 | 51.385 |
| 6/28/2011 | 10:33:00 AM | 4.907 | 13.79 | 71.028 | 51.841 |
| 6/28/2011 | 10:34:00 AM | 4.953 | 13.731 | 71.075 | 51.884 |
| 6/28/2011 | 10:35:00 AM | 4.921 | 13.759 | 70.336 | 50.26 |
| 6/28/2011 | 10:36:00 AM | 4.929 | 13.747 | 69.868 | 48 |
| 6/28/2011 | 10:37:00 AM | 4.871 | 13.799 | 70.59 | 47.01 |
| 6/28/2011 | 10:38:00 AM | 4.826 | 13.826 | 90.31 | 49.046 |
| 6/28/2011 | 10:39:00 AM | 4.824 | 13.84 | 84.91 | 49.153 |
| 6/28/2011 | 10:40:00 AM | 4.809 | 13.846 | 92.568 | 50.611 |
| 6/28/2011 | 10:41:00 AM | 4.777 | 13.883 | 175.435 | 52.694 |
| 6/28/2011 | 10:42:00 AM | 4.786 | 13.887 | 126.896 | 53.235 |
| 6/28/2011 | 10:43:00 AM | 4.78 | 13.891 | 167.537 | 52.082 |
| 6/28/2011 | 10:44:00 AM | 4.807 | 13.886 | 147.563 | 50.178 |
| 6/28/2011 | 10:45:00 AM | 4.84 | 13.857 | 92.666 | 51.326 |
| 6/28/2011 | 10:46:00 AM | 4.891 | 13.803 | 78.707 | 56.447 |
| 6/28/2011 | 10:47:00 AM | 4.863 | 13.826 | 77.161 | 52.882 |
| 6/28/2011 | 10:48:00 AM | 4.924 | 13.778 | 73.799 | 50.726 |
| 6/28/2011 | 10:49:00 AM | 4.922 | 13.779 | 73.505 | 53.72 |
| 6/28/2011 | 10:50:00 AM | 4.896 | 13.806 | 73.637 | 54.542 |
| 6/28/2011 | 10:51:00 AM | 4.896 | 13.815 | 74.767 | 53.557 |
| 6/28/2011 | 10:52:00 AM | 4.931 | 13.765 | 73.748 | 52.913 |
| 6/28/2011 | 10:53:00 AM | 4.969 | 13.735 | 71.327 | 49.531 |
| 6/28/2011 | 10:54:00 AM | 5.003 | 13.712 | 70.515 | 48.339 |
| 6/28/2011 | 10:55:00 AM | 5.087 | 13.643 | 70.948 | 50.145 |
| 6/28/2011 | 10:56:00 AM | 5.1 | 13.614 | 70.377 | 47.365 |
| 6/28/2011 | 10:57:00 AM | 5.068 | 13.635 | 69.193 | 46.036 |
| 6/28/2011 | 10:58:00 AM | 4.992 | 13.702 | 70.947 | 46.416 |
| 6/28/2011 | 10:59:00 AM | 5.004 | 13.685 | 70.95 | 46.413 |
| 6/28/2011 | 11:00:00 AM | 5.004 | 13.673 | 69.63 | 47.083 |
| 6/28/2011 | 11:01:00 AM | 5.002 | 13.688 | 69.265 | 46.138 |
| 6/28/2011 | 11:02:00 AM | 4.986 | 13.694 | 68.388 | 45.524 |
| 6/28/2011 | 11:03:00 AM | 4.941 | 13.738 | 69.331 | 44.155 |
| 6/28/2011 | 11:04:00 AM | 4.885 | 13.796 | 70.865 | 45.042 |
| 6/28/2011 | 11:05:00 AM | 4.873 | 13.821 | 88.322 | 45.423 |
| 6/28/2011 | 11:06:00 AM | 4.888 | 13.795 | 81.019 | 46.278 |
| 6/28/2011 | 11:07:00 AM | 4.874 | 13.824 | 74.04 | 47.888 |
| 6/28/2011 | 11:08:00 AM | 4.924 | 13.775 | 73.662 | 47.835 |
| 6/28/2011 | 11:09:00 AM | 4.887 | 13.797 | 71.301 | 44.491 |
| 6/28/2011 | 11:10:00 AM | 4.867 | 13.831 | 72.175 | 46.476 |
| 6/28/2011 | 11:11:00 AM | 4.902 | 13.827 | 72.654 | 49.249 |
| 6/28/2011 | 11:12:00 AM | 4.902 | 13.823 | 74.827 | 51.663 |
| 6/28/2011 | 11:13:00 AM | 4.963 | 13.763 | 74.721 | 49.532 |
| 6/28/2011 | 11:14:00 AM | 4.953 | 13.765 | 70.671 | 46.709 |
| 6/28/2011 | 11:15:00 AM | 4.979 | 13.756 | 69.857 | 46.911 |
| 6/28/2011 | 11:16:00 AM | 4.978 | 13.744 | 72.493 | 51.416 |
| 6/28/2011 | 11:17:00 AM | 4.999 | 13.719 | 72.432 | 51.534 |
| 6/28/2011 | 11:18:00 AM | 4.95 | 13.758 | 73.357 | 52.726 |
| 6/28/2011 | 11:19:00 AM | 4.862 | 13.832 | 75.217 | 51.41 |
| 6/28/2011 | 11:20:00 AM | 4.868 | 13.852 | 77.737 | 53.249 |
| 6/28/2011 | 11:21:00 AM | 4.931 | 13.784 | 74.673 | 54.923 |
| 6/28/2011 | 11:22:00 AM | 4.944 | 13.776 | 73.325 | 53.848 |
| 6/28/2011 | 11:23:00 AM | 4.981 | 13.744 | 72.925 | 53.681 |

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|---|---|---|---|---|---|
| 6/28/2011 | 11:24:00 AM | 4.995 | 13.743 | 74.097 | 55.506 |
| 6/28/2011 | 11:25:00 AM | 4.976 | 13.751 | 74.647 | 56.065 |
| 6/28/2011 | 11:26:00 AM | 4.992 | 13.739 | 74.779 | 56.713 |
| 6/28/2011 | 11:27:00 AM | 5.028 | 13.717 | 74.119 | 55.903 |
| 6/28/2011 | 11:28:00 AM | 5.106 | 13.636 | 72.632 | 54.595 |
| 6/28/2011 | 11:29:00 AM | 5.073 | 13.651 | 71.038 | 54.099 |
| 6/28/2011 | 11:30:00 AM | 5.081 | 13.656 | 72.115 | 54.223 |
| 6/28/2011 | 11:31:00 AM | 5.072 | 13.652 | 72.594 | 53.331 |
| 6/28/2011 | 11:32:00 AM | 5.005 | 13.717 | 74.624 | 55.991 |
| 6/28/2011 | 11:33:00 AM | 4.918 | 13.799 | 77.696 | 54.245 |
| 6/28/2011 | 11:34:00 AM | 5.017 | 13.724 | 77.317 | 53.912 |
| 6/28/2011 | 11:35:00 AM | 5.047 | 13.697 | 74.722 | 51.966 |
| 6/28/2011 | 11:36:00 AM | 5.104 | 13.639 | 73.54 | 49.711 |
| 6/28/2011 | 11:37:00 AM | 5.117 | 13.646 | 74.131 | 51.054 |
| 6/28/2011 | 11:38:00 AM | 5.122 | 13.652 | 75.83 | 51.599 |
| 6/28/2011 | 11:39:00 AM | 5.128 | 13.618 | 73.559 | 50.657 |
| 6/28/2011 | 11:40:00 AM | 5.111 | 13.643 | 74.886 | 51.497 |
| 6/28/2011 | 11:41:00 AM | 5.115 | 13.613 | 73.592 | 49.935 |
| 6/28/2011 | 11:42:00 AM | 5.081 | 13.642 | 73.862 | 51.853 |
| 6/28/2011 | 11:43:00 AM | 5.074 | 13.654 | 75.116 | 53.798 |
| 6/28/2011 | 11:44:00 AM | 4.976 | 13.752 | 76.187 | 54.674 |
| 6/28/2011 | 11:45:00 AM | 5.006 | 13.73 | 75.189 | 51.262 |
| 6/28/2011 | 11:46:00 AM | 4.984 | 13.758 | 74.573 | 50.94 |
| 6/28/2011 | 11:47:00 AM | 4.977 | 13.756 | 76.428 | 50.656 |
| 6/28/2011 | 11:48:00 AM | 4.997 | 13.743 | 76.832 | 51.221 |
| 6/28/2011 | 11:49:00 AM | 5.023 | 13.711 | 74.927 | 50.929 |
| 6/28/2011 | 11:50:00 AM | 5.02 | 13.74 | 74.628 | 49.778 |
| 6/28/2011 | 11:51:00 AM | 5.018 | 13.737 | 75.479 | 51.117 |
| 6/28/2011 | 11:52:00 AM | 4.994 | 13.745 | 76.213 | 50.698 |
| 6/28/2011 | 11:53:00 AM | 5.003 | 13.741 | 75.728 | 50.813 |
| 6/28/2011 | 11:54:00 AM | 4.969 | 13.784 | 76.327 | 50.428 |
| 6/28/2011 | 11:55:00 AM | 4.967 | 13.781 | 75.359 | 48.478 |
| 6/28/2011 | 11:56:00 AM | 4.963 | 13.788 | 75.487 | 50.75 |
| 6/28/2011 | 11:57:00 AM | 4.899 | 13.833 | 75.582 | 50.842 |
| 6/28/2011 | 11:58:00 AM | 4.947 | 13.817 | 74.837 | 50.589 |
| 6/28/2011 | 11:59:00 AM | 4.985 | 13.775 | 74.716 | 50.455 |
| 6/28/2011 | 12:00:00 PM | 4.989 | 13.76 | 74.808 | 51.373 |
| 6/28/2011 | 12:01:00 PM | 4.923 | 13.828 | 78.072 | 54.606 |
| 6/28/2011 | 12:02:00 PM | 4.936 | 13.818 | 79.132 | 53.603 |
| 6/28/2011 | 12:03:00 PM | 4.966 | 13.772 | 74.743 | 50.075 |
| 6/28/2011 | 12:04:00 PM | 4.977 | 13.772 | 72.122 | 47.944 |
| 6/28/2011 | 12:05:00 PM | 5.022 | 13.729 | 71.783 | 47.34 |
| 6/28/2011 | 12:06:00 PM | 4.987 | 13.739 | 72.815 | 48.045 |
| 6/28/2011 | 12:07:00 PM | 4.976 | 13.772 | 73.642 | 47.93 |
| 6/28/2011 | 12:08:00 PM | 4.886 | 13.845 | 74.297 | 47.072 |
| 6/28/2011 | 12:09:00 PM | 4.901 | 13.845 | 77.923 | 49.921 |
| 6/28/2011 | 12:10:00 PM | 4.912 | 13.825 | 76.316 | 49.306 |
| 6/28/2011 | 12:11:00 PM | 4.986 | 13.77 | 75.355 | 49.099 |
| 6/28/2011 | 12:12:00 PM | 4.997 | 13.746 | 73.536 | 46.527 |
| 6/28/2011 | 12:13:00 PM | 4.958 | 13.793 | 73.969 | 47.003 |
| 6/28/2011 | 12:14:00 PM | 4.972 | 13.79 | 74.065 | 45.717 |
| 6/28/2011 | 12:15:00 PM | 4.931 | 13.821 | 74.98 | 43.389 |

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|---|---|---|---|---|---|---|
| 6/28/2011 | 12:16:00 PM | 4.973 | 13.798 | 75.284 | 45.913 | |
| 6/28/2011 | 12:17:00 PM | 4.995 | 13.753 | 74.231 | 44.72 | |
| 6/28/2011 | 12:18:00 PM | 4.972 | 13.778 | 73.422 | 45.855 | |
| 6/28/2011 | 12:19:00 PM | 4.96 | 13.788 | 73.351 | 48.025 | |
| 6/28/2011 | 12:20:00 PM | 4.965 | 13.787 | 74.768 | 50.966 | |
| 6/28/2011 | 12:21:00 PM | 4.989 | 13.768 | 74.462 | 51.079 | |
| 6/28/2011 | 12:22:00 PM | 4.925 | 13.829 | 75.636 | 50.318 | |
| 6/28/2011 | 12:23:00 PM | 4.938 | 13.816 | 78.014 | 52.951 | |
| 6/28/2011 | 12:24:00 PM | 4.979 | 13.784 | 76.663 | 53.759 | |
| 6/28/2011 | 12:25:00 PM | 5.024 | 13.717 | 74.462 | 51.25 | |
| 6/28/2011 | 12:26:00 PM | 5.016 | 13.735 | 73.382 | 48.172 | |
| 6/28/2011 | 12:27:00 PM | 5.019 | 13.738 | 71.536 | 47.182 | |
| 6/28/2011 | 12:28:00 PM | 5.011 | 13.735 | 71.847 | 47.496 | |
| 6/28/2011 | 12:29:00 PM | 5.042 | 13.532 | 73.155 | 49.054 | |
| 6/28/2011 | 12:30:00 PM | 5.024 | 9.99 | 28.122 | 48.662 | |
| 6/28/2011 | 12:31:00 PM | 4.999 | 10.004 | 0.152 | 50.217 | |
| 6/28/2011 | 12:32:00 PM | 4.995 | 10.004 | -0.189 | 52.068 | |
| 6/28/2011 | 12:33:00 PM | 4.996 | 10.005 | -0.184 | 54.903 | |
| 6/28/2011 | 12:34:00 PM | 4.996 | 10.011 | -0.181 | 58.684 | |
| 6/28/2011 | 12:35:00 PM | 4.995 | 10.004 | -0.168 | 56.015 | |
| 6/28/2011 | 12:36:00 PM | 4.997 | 10.006 | -0.172 | 50.992 | |
| 6/28/2011 | 12:37:00 PM | 4.995 | 10.007 | -0.163 | 51.431 | O2/CO2 bias |
| 6/28/2011 | 12:38:00 PM | 2.158 | 3.815 | 30.376 | 50.646 | |
| 6/28/2011 | 12:39:00 PM | 0.053 | 0.033 | 139.339 | 52.022 | |
| 6/28/2011 | 12:40:00 PM | 0.044 | 0.017 | 145.057 | 50.454 | |
| 6/28/2011 | 12:41:00 PM | 0.04 | 0.009 | 145.155 | 51.516 | CO bias |
| 6/28/2011 | 12:42:00 PM | 0.07 | 0.196 | | | |
| 6/28/2011 | 12:43:00 PM | 4.763 | 13.818 | | | |
| 6/28/2011 | 12:44:00 PM | 4.996 | 13.923 | | | |
| 6/28/2011 | 12:45:00 PM | 5.004 | 13.911 | | | |
| 6/28/2011 | 12:46:00 PM | 5.019 | 13.907 | | | |
| 6/28/2011 | 12:47:00 PM | 5.017 | 13.912 | | | |
| 6/28/2011 | 12:48:00 PM | 5.023 | 13.926 | | | |
| 6/28/2011 | 12:49:00 PM | 5.04 | 13.939 | | | |
| 6/28/2011 | 12:50:00 PM | 5.052 | 13.949 | | | |
| 6/28/2011 | 12:51:00 PM | 5.046 | 13.953 | | | |
| 6/28/2011 | 12:52:00 PM | 5.106 | 13.915 | | | |
| 6/28/2011 | 12:53:00 PM | 5.111 | 13.899 | | | |
| 6/28/2011 | 12:54:00 PM | 5.085 | 13.929 | | | |
| 6/28/2011 | 12:55:00 PM | 5.104 | 13.926 | | | |
| 6/28/2011 | 12:56:00 PM | 5.074 | 13.956 | | | |
| 6/28/2011 | 12:57:00 PM | 5.102 | 13.915 | | | |
| 6/28/2011 | 12:58:00 PM | 5.088 | 14.022 | | | |
| 6/28/2011 | 12:59:00 PM | 5.113 | 14.052 | | | |
| 6/28/2011 | 1:00:00 PM | 5.107 | 14.073 | | | |
| 6/28/2011 | 1:01:00 PM | 5.093 | 14.076 | | | |
| 6/28/2011 | 1:02:00 PM | 5.082 | 14.089 | | | |
| 6/28/2011 | 1:03:00 PM | 5.076 | 14.107 | | | |
| 6/28/2011 | 1:04:00 PM | 5.029 | 13.89 | | | |
| 6/28/2011 | 1:05:00 PM | 4.934 | 13.773 | | | |
| 6/28/2011 | 1:06:00 PM | 4.877 | 13.823 | | | |
| 6/28/2011 | 1:07:00 PM | 4.911 | 13.772 | | | |

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|---|---|---|---|
| 6/28/2011 | 1:08:00 PM | 4.887 | 13.805 |
| 6/28/2011 | 1:09:00 PM | 4.917 | 13.776 |
| 6/28/2011 | 1:10:00 PM | 4.933 | 13.77 |
| 6/28/2011 | 1:11:00 PM | 4.889 | 13.822 |
| 6/28/2011 | 1:12:00 PM | 4.908 | 13.792 |
| 6/28/2011 | 1:13:00 PM | 4.898 | 13.798 |
| 6/28/2011 | 1:14:00 PM | 4.893 | 13.813 |
| 6/28/2011 | 1:15:00 PM | 4.889 | 13.797 |
| 6/28/2011 | 1:16:00 PM | 4.896 | 13.809 |
| 6/28/2011 | 1:17:00 PM | 4.938 | 13.79 |
| 6/28/2011 | 1:18:00 PM | 4.936 | 13.812 |
| 6/28/2011 | 1:19:00 PM | 5 | 13.748 |
| 6/28/2011 | 1:20:00 PM | 5.019 | 13.717 |
| 6/28/2011 | 1:21:00 PM | 5.007 | 13.706 |
| 6/28/2011 | 1:22:00 PM | 5.019 | 13.724 |
| 6/28/2011 | 1:23:00 PM | 5.026 | 13.705 |
| 6/28/2011 | 1:24:00 PM | 5.077 | 13.661 |
| 6/28/2011 | 1:25:00 PM | 5.036 | 13.702 |
| 6/28/2011 | 1:26:00 PM | 5.057 | 13.675 |
| 6/28/2011 | 1:27:00 PM | 5.057 | 13.68 |
| 6/28/2011 | 1:28:00 PM | 5.035 | 13.693 |
| 6/28/2011 | 1:29:00 PM | 5.039 | 13.693 |
| 6/28/2011 | 1:30:00 PM | 5.043 | 13.682 |
| 6/28/2011 | 1:31:00 PM | 5.022 | 13.697 |
| 6/28/2011 | 1:32:00 PM | 4.955 | 13.758 |
| 6/28/2011 | 1:33:00 PM | 4.925 | 13.785 |
| 6/28/2011 | 1:34:00 PM | 4.975 | 13.755 |
| 6/28/2011 | 1:35:00 PM | 5.045 | 13.691 |
| 6/28/2011 | 1:36:00 PM | 5.047 | 13.692 |
| 6/28/2011 | 1:37:00 PM | 5.05 | 13.681 |
| 6/28/2011 | 1:38:00 PM | 5.072 | 13.666 |
| 6/28/2011 | 1:39:00 PM | 5.024 | 13.706 |
| 6/28/2011 | 1:40:00 PM | 5.019 | 13.709 |
| 6/28/2011 | 1:41:00 PM | 4.994 | 13.732 |
| 6/28/2011 | 1:42:00 PM | 4.986 | 13.753 |
| 6/28/2011 | 1:43:00 PM | 4.994 | 13.745 |
| 6/28/2011 | 1:44:00 PM | 5.006 | 13.73 |
| 6/28/2011 | 1:45:00 PM | 4.955 | 13.769 |
| 6/28/2011 | 1:46:00 PM | 4.923 | 13.818 |
| 6/28/2011 | 1:47:00 PM | 4.931 | 13.797 |
| 6/28/2011 | 1:48:00 PM | 4.955 | 13.771 |
| 6/28/2011 | 1:49:00 PM | 4.96 | 13.784 |
| 6/28/2011 | 1:50:00 PM | 4.976 | 13.755 |
| 6/28/2011 | 1:51:00 PM | 4.977 | 13.749 |
| 6/28/2011 | 1:52:00 PM | 5.007 | 13.713 |
| 6/28/2011 | 1:53:00 PM | 4.97 | 13.748 |
| 6/28/2011 | 1:54:00 PM | 5 | 13.706 |
| 6/28/2011 | 1:55:00 PM | 5.001 | 13.717 |
| 6/28/2011 | 1:56:00 PM | 5.01 | 13.715 |
| 6/28/2011 | 1:57:00 PM | 4.974 | 13.752 |
| 6/28/2011 | 1:58:00 PM | 4.963 | 13.77 |
| 6/28/2011 | 1:59:00 PM | 4.963 | 13.772 |

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|---|---|---|---|
| 6/28/2011 | 2:00:00 PM | 4.912 | 13.835 |
| 6/28/2011 | 2:01:00 PM | 4.96 | 13.764 |
| 6/28/2011 | 2:02:00 PM | 5 | 13.733 |
| 6/28/2011 | 2:03:00 PM | 5.078 | 13.675 |
| 6/28/2011 | 2:04:00 PM | 5.048 | 13.693 |
| 6/28/2011 | 2:05:00 PM | 5.056 | 13.673 |
| 6/28/2011 | 2:06:00 PM | 5.018 | 13.717 |
| 6/28/2011 | 2:07:00 PM | 5.073 | 13.664 |
| 6/28/2011 | 2:08:00 PM | 5.06 | 13.672 |
| 6/28/2011 | 2:09:00 PM | 5.037 | 13.687 |
| 6/28/2011 | 2:10:00 PM | 4.996 | 13.722 |
| 6/28/2011 | 2:11:00 PM | 4.974 | 13.766 |
| 6/28/2011 | 2:12:00 PM | 4.979 | 13.74 |
| 6/28/2011 | 2:13:00 PM | 4.965 | 13.752 |
| 6/28/2011 | 2:14:00 PM | 4.896 | 13.839 |
| 6/28/2011 | 2:15:00 PM | 4.908 | 13.815 |
| 6/28/2011 | 2:16:00 PM | 4.937 | 13.795 |
| 6/28/2011 | 2:17:00 PM | 4.939 | 13.783 |
| 6/28/2011 | 2:18:00 PM | 4.93 | 13.792 |
| 6/28/2011 | 2:19:00 PM | 4.996 | 13.745 |
| 6/28/2011 | 2:20:00 PM | 4.973 | 13.755 |
| 6/28/2011 | 2:21:00 PM | 4.877 | 13.845 |
| 6/28/2011 | 2:22:00 PM | 4.891 | 13.84 |
| 6/28/2011 | 2:23:00 PM | 4.928 | 13.796 |
| 6/28/2011 | 2:24:00 PM | 4.923 | 13.802 |
| 6/28/2011 | 2:25:00 PM | 4.921 | 13.801 |
| 6/28/2011 | 2:26:00 PM | 4.958 | 13.759 |
| 6/28/2011 | 2:27:00 PM | 4.991 | 13.734 |
| 6/28/2011 | 2:28:00 PM | 4.945 | 13.768 |
| 6/28/2011 | 2:29:00 PM | 4.95 | 13.77 |
| 6/28/2011 | 2:30:00 PM | 4.958 | 13.759 |
| 6/28/2011 | 2:31:00 PM | 4.921 | 13.779 |
| 6/28/2011 | 2:32:00 PM | 4.958 | 13.751 |
| 6/28/2011 | 2:33:00 PM | 4.992 | 13.717 |
| 6/28/2011 | 2:34:00 PM | 4.943 | 13.769 |
| 6/28/2011 | 2:35:00 PM | 4.964 | 13.764 |
| 6/28/2011 | 2:36:00 PM | 4.933 | 13.786 |
| 6/28/2011 | 2:37:00 PM | 4.96 | 13.752 |
| 6/28/2011 | 2:38:00 PM | 4.951 | 13.761 |
| 6/28/2011 | 2:39:00 PM | 4.96 | 13.74 |
| 6/28/2011 | 2:40:00 PM | 4.923 | 13.764 |
| 6/28/2011 | 2:41:00 PM | 4.919 | 13.781 |
| 6/28/2011 | 2:42:00 PM | 4.885 | 13.805 |
| 6/28/2011 | 2:43:00 PM | 4.937 | 13.748 |
| 6/28/2011 | 2:44:00 PM | 4.961 | 13.712 |
| 6/28/2011 | 2:45:00 PM | 4.939 | 13.739 |
| 6/28/2011 | 2:46:00 PM | 4.975 | 13.706 |
| 6/28/2011 | 2:47:00 PM | 4.972 | 13.706 |
| 6/28/2011 | 2:48:00 PM | 4.991 | 13.694 |
| 6/28/2011 | 2:49:00 PM | 4.935 | 13.741 |
| 6/28/2011 | 2:50:00 PM | 4.981 | 13.696 |
| 6/28/2011 | 2:51:00 PM | 4.968 | 13.705 |

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|---|---|---|---|---|
| 6/28/2011 | 2:52:00 PM | 4.975 | 13.708 | |
| 6/28/2011 | 2:53:00 PM | 5.023 | 13.674 | |
| 6/28/2011 | 2:54:00 PM | 4.414 | 11.102 | |
| 6/28/2011 | 2:55:00 PM | 0.079 | 0.049 | Zero bias |
| 6/28/2011 | 2:56:00 PM | 1.177 | 2.777 | |
| 6/28/2011 | 2:57:00 PM | 4.892 | 9.865 | O2/CO2 bias |
| 6/28/2011 | 2:58:00 PM | 4.977 | 11.256 | |
| 6/28/2011 | 2:59:00 PM | 5.066 | 13.594 | |
| 6/28/2011 | 3:00:00 PM | 5.096 | 13.593 | |
| 6/28/2011 | 3:01:00 PM | 5.105 | 13.569 | |
| 6/28/2011 | 3:02:00 PM | 5.119 | 13.555 | |
| 6/28/2011 | 3:03:00 PM | 5.123 | 13.549 | |
| 6/28/2011 | 3:04:00 PM | 5.136 | 13.531 | |
| 6/28/2011 | 3:05:00 PM | 5.156 | 13.527 | |
| 6/28/2011 | 3:06:00 PM | 5.154 | 13.53 | |
| 6/28/2011 | 3:07:00 PM | 5.181 | 13.489 | |
| 6/28/2011 | 3:08:00 PM | 5.196 | 13.487 | |
| 6/28/2011 | 3:09:00 PM | 5.188 | 13.502 | |
| 6/28/2011 | 3:10:00 PM | 5.207 | 13.479 | |
| 6/28/2011 | 3:11:00 PM | 5.213 | 13.456 | |
| 6/28/2011 | 3:12:00 PM | 5.206 | 13.469 | |
| 6/28/2011 | 3:13:00 PM | 5.16 | 13.506 | |
| 6/28/2011 | 3:14:00 PM | 5.196 | 13.5 | |
| 6/28/2011 | 3:15:00 PM | 5.235 | 13.445 | |
| 6/28/2011 | 3:16:00 PM | 5.272 | 13.406 | |
| 6/28/2011 | 3:17:00 PM | 5.249 | 13.431 | |
| 6/28/2011 | 3:18:00 PM | 5.18 | 13.488 | |
| 6/28/2011 | 3:19:00 PM | 5.176 | 13.504 | |
| 6/28/2011 | 3:20:00 PM | 5.232 | 13.447 | |
| 6/28/2011 | 3:21:00 PM | 5.219 | 13.458 | |
| 6/28/2011 | 3:22:00 PM | 5.227 | 13.442 | |
| 6/28/2011 | 3:23:00 PM | 5.215 | 13.476 | |
| 6/28/2011 | 3:24:00 PM | 5.221 | 13.474 | |
| 6/28/2011 | 3:25:00 PM | 5.244 | 13.455 | |
| 6/28/2011 | 3:26:00 PM | 5.279 | 13.416 | |
| 6/28/2011 | 3:27:00 PM | 5.34 | 13.371 | |
| 6/28/2011 | 3:28:00 PM | 5.331 | 13.37 | |
| 6/28/2011 | 3:29:00 PM | 5.353 | 13.355 | |
| 6/28/2011 | 3:30:00 PM | 5.319 | 13.364 | |
| 6/28/2011 | 3:31:00 PM | 5.266 | 13.421 | |
| 6/28/2011 | 3:32:00 PM | 5.203 | 13.474 | |
| 6/28/2011 | 3:33:00 PM | 5.167 | 13.52 | |
| 6/28/2011 | 3:34:00 PM | 5.162 | 13.508 | |
| 6/28/2011 | 3:35:00 PM | 5.185 | 13.505 | |
| 6/28/2011 | 3:36:00 PM | 5.152 | 13.534 | |
| 6/28/2011 | 3:37:00 PM | 5.168 | 13.517 | |
| 6/28/2011 | 3:38:00 PM | 5.151 | 13.543 | |
| 6/28/2011 | 3:39:00 PM | 5.132 | 13.55 | |
| 6/28/2011 | 3:40:00 PM | 5.154 | 13.559 | |
| 6/28/2011 | 3:41:00 PM | 5.178 | 13.552 | |
| 6/28/2011 | 3:42:00 PM | 5.256 | 13.473 | |
| 6/28/2011 | 3:43:00 PM | 5.274 | 13.453 | |

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|---|---|---|---|
| 6/28/2011 | 3:44:00 PM | 5.239 | 13.478 |
| 6/28/2011 | 3:45:00 PM | 5.224 | 13.504 |
| 6/28/2011 | 3:46:00 PM | 5.192 | 13.529 |
| 6/28/2011 | 3:47:00 PM | 5.207 | 13.548 |
| 6/28/2011 | 3:48:00 PM | 5.222 | 13.517 |
| 6/28/2011 | 3:49:00 PM | 5.204 | 13.537 |
| 6/28/2011 | 3:50:00 PM | 5.217 | 13.499 |
| 6/28/2011 | 3:51:00 PM | 5.164 | 13.557 |
| 6/28/2011 | 3:52:00 PM | 5.129 | 13.598 |
| 6/28/2011 | 3:53:00 PM | 5.145 | 13.586 |
| 6/28/2011 | 3:54:00 PM | 5.137 | 13.586 |
| 6/28/2011 | 3:55:00 PM | 5.129 | 13.619 |
| 6/28/2011 | 3:56:00 PM | 5.194 | 13.546 |
| 6/28/2011 | 3:57:00 PM | 5.19 | 13.534 |
| 6/28/2011 | 3:58:00 PM | 5.15 | 13.57 |
| 6/28/2011 | 3:59:00 PM | 5.114 | 13.612 |
| 6/28/2011 | 4:00:00 PM | 5.05 | 13.665 |
| 6/28/2011 | 4:01:00 PM | 5.092 | 13.626 |
| 6/28/2011 | 4:02:00 PM | 5.051 | 13.662 |
| 6/28/2011 | 4:03:00 PM | 5.077 | 13.636 |
| 6/28/2011 | 4:04:00 PM | 5.129 | 13.602 |
| 6/28/2011 | 4:05:00 PM | 5.166 | 13.561 |
| 6/28/2011 | 4:06:00 PM | 5.127 | 13.607 |
| 6/28/2011 | 4:07:00 PM | 5.163 | 13.599 |
| 6/28/2011 | 4:08:00 PM | 5.24 | 13.513 |
| 6/28/2011 | 4:09:00 PM | 5.261 | 13.505 |
| 6/28/2011 | 4:10:00 PM | 5.294 | 13.455 |
| 6/28/2011 | 4:11:00 PM | 5.32 | 13.435 |
| 6/28/2011 | 4:12:00 PM | 5.283 | 13.464 |
| 6/28/2011 | 4:13:00 PM | 5.21 | 13.538 |
| 6/28/2011 | 4:14:00 PM | 5.181 | 13.584 |
| 6/28/2011 | 4:15:00 PM | 5.237 | 13.534 |
| 6/28/2011 | 4:16:00 PM | 5.249 | 13.529 |
| 6/28/2011 | 4:17:00 PM | 5.317 | 13.471 |
| 6/28/2011 | 4:18:00 PM | 5.367 | 13.428 |
| 6/28/2011 | 4:19:00 PM | 5.371 | 13.409 |
| 6/28/2011 | 4:20:00 PM | 5.418 | 13.362 |
| 6/28/2011 | 4:21:00 PM | 5.376 | 13.386 |
| 6/28/2011 | 4:22:00 PM | 5.311 | 13.446 |
| 6/28/2011 | 4:23:00 PM | 5.28 | 13.473 |
| 6/28/2011 | 4:24:00 PM | 5.267 | 13.484 |
| 6/28/2011 | 4:25:00 PM | 5.279 | 13.473 |
| 6/28/2011 | 4:26:00 PM | 5.251 | 13.513 |
| 6/28/2011 | 4:27:00 PM | 5.257 | 13.513 |
| 6/28/2011 | 4:28:00 PM | 5.282 | 13.489 |
| 6/28/2011 | 4:29:00 PM | 5.312 | 13.461 |
| 6/28/2011 | 4:30:00 PM | 5.325 | 13.432 |
| 6/28/2011 | 4:31:00 PM | 5.36 | 13.4 |
| 6/28/2011 | 4:32:00 PM | 5.356 | 13.406 |
| 6/28/2011 | 4:33:00 PM | 5.333 | 13.417 |
| 6/28/2011 | 4:34:00 PM | 5.289 | 13.46 |
| 6/28/2011 | 4:35:00 PM | 5.255 | 13.497 |

| | | | | |
|---|---|---|---|---|
| 6/28/2011 | 4:36:00 PM | 5.299 | 13.455 | |
| 6/28/2011 | 4:37:00 PM | 5.306 | 13.449 | |
| 6/28/2011 | 4:38:00 PM | 5.334 | 13.419 | |
| 6/28/2011 | 4:39:00 PM | 5.353 | 13.403 | |
| 6/28/2011 | 4:40:00 PM | 5.355 | 13.393 | |
| 6/28/2011 | 4:41:00 PM | 5.285 | 13.453 | |
| 6/28/2011 | 4:42:00 PM | 5.245 | 13.507 | |
| 6/28/2011 | 4:43:00 PM | 5.235 | 13.507 | |
| 6/28/2011 | 4:44:00 PM | 5.215 | 13.52 | |
| 6/28/2011 | 4:45:00 PM | 5.148 | 13.57 | |
| 6/28/2011 | 4:46:00 PM | 5.135 | 13.606 | |
| 6/28/2011 | 4:47:00 PM | 5.203 | 13.547 | |
| 6/28/2011 | 4:48:00 PM | 5.16 | 13.575 | |
| 6/28/2011 | 4:49:00 PM | 5.131 | 13.626 | |
| 6/28/2011 | 4:50:00 PM | 5.197 | 13.555 | |
| 6/28/2011 | 4:51:00 PM | 5.248 | 13.505 | |
| 6/28/2011 | 4:52:00 PM | 5.271 | 13.497 | |
| 6/28/2011 | 4:53:00 PM | 5.231 | 13.537 | |
| 6/28/2011 | 4:54:00 PM | 5.167 | 13.603 | |
| 6/28/2011 | 4:55:00 PM | 5.207 | 13.58 | |
| 6/28/2011 | 4:56:00 PM | 5.168 | 13.614 | |
| 6/28/2011 | 4:57:00 PM | 5.218 | 13.559 | |
| 6/28/2011 | 4:58:00 PM | 5.176 | 13.597 | |
| 6/28/2011 | 4:59:00 PM | 5.191 | 13.579 | |
| 6/28/2011 | 5:00:00 PM | 5.244 | 13.528 | |
| 6/28/2011 | 5:01:00 PM | 5.304 | 13.469 | |
| 6/28/2011 | 5:02:00 PM | 5.225 | 13.547 | |
| 6/28/2011 | 5:03:00 PM | 5.177 | 13.577 | |
| 6/28/2011 | 5:04:00 PM | 5.165 | 13.599 | |
| 6/28/2011 | 5:05:00 PM | 5.193 | 13.546 | |
| 6/28/2011 | 5:06:00 PM | 5.18 | 13.567 | |
| 6/28/2011 | 5:07:00 PM | 5.169 | 13.579 | |
| 6/28/2011 | 5:08:00 PM | 5.158 | 13.585 | |
| 6/28/2011 | 5:09:00 PM | 5.126 | 13.638 | |
| 6/28/2011 | 5:10:00 PM | 5.173 | 13.578 | |
| 6/28/2011 | 5:11:00 PM | 5.117 | 11.325 | |
| 6/28/2011 | 5:12:00 PM | 4.954 | 9.901 | O2/CO2 bias |
| 6/28/2011 | 5:13:00 PM | 2.545 | 4.593 | |
| 6/28/2011 | 5:14:00 PM | 0.055 | 0.038 | |
| 6/28/2011 | 5:15:00 PM | 0.047 | 0.014 | Zero bias |

**Delta Air Quality Services**

**SPAN GAS RECORD AND EPA CALIBRATION ERROR**

CLIENT/LOCATION: ExxonMobil
TRUCK/CEM I.D.: 4-CEMS

DATE: 6/29/11
BY: AA/DW/JP/SS/DA

| | MID SPAN CYLINDER | | HIGH SPAN CYLINDER | |
|---|---|---|---|---|
| | CYLINDER NO. | CONCENTRATION | CYLINDER NO. | CONCENTRATION |
| ZERO | "CEM Grade $N_2$" | | | |
| $O_2$ | SA8302 | 5.00 | CC102051 | 8.78 |
| $CO_2$ | SA8302 | 10.16 | CC102051 | 17.44 |
| | | | | |
| | | | | |
| | | | | |

**PRE-TEST INSTRUMENT CALIBRATION ERROR**

| | ANALYZER | | | | |
|---|---|---|---|---|---|
| | $O_2$ | $CO_2$ | | | |
| Analyzer Range | 10 | 20 | | | |
| Calibration Span | 8.78 | 17.44 | | | |
| Zero Gas Value | 0.0 | 0.0 | | | |
| Analyzer Reads | 0.04 | -0.01 | | | |
| Difference (% or ppm) | 0.0 | 0.0 | | | |
| Error (% of Cal. Span) | 0.5% | -0.1% | | | |
| Status(1) | PASS | PASS | | | |
| High Gas Value | 8.78 | 17.44 | | | |
| Analyzer Reads | 8.81 | 17.51 | | | |
| Difference (% or ppm) | 0.0 | 0.1 | | | |
| Error (% of Cal. Span) | 0.4% | 0.4% | | | |
| Status | PASS | PASS | | | |
| Mid Gas Value | 5.00 | 10.16 | | | |
| Analyzer Reads | 5.06 | 10.00 | | | |
| Difference (% or ppm) | 0.1 | -0.2 | | | |
| Error (% of Cal. Span) | 0.6% | -0.9% | | | |
| Status | PASS | PASS | | | |

1) Calibration Error must be within +/- 2.0% of the Calibration Span

| Date | Time | O2 % | CO2 % | |
|---|---|---|---|---|
| 6/29/2011 | 7:06:00 AM | 5.222 | 12.771 | |
| 6/29/2011 | 7:07:00 AM | 0.194 | 0.041 | |
| 6/29/2011 | 7:08:00 AM | 0.057 | 0.01 | |
| 6/29/2011 | 7:09:00 AM | 0.043 | -0.011 | Cal Zero |
| 6/29/2011 | 7:10:00 AM | 5.435 | 11.809 | |
| 6/29/2011 | 7:11:00 AM | 8.8 | 17.636 | |
| 6/29/2011 | 7:12:00 AM | 8.813 | 17.509 | Cal High |
| 6/29/2011 | 7:13:00 AM | 8.077 | 15.442 | |
| 6/29/2011 | 7:14:00 AM | 5.068 | 10.003 | |
| 6/29/2011 | 7:15:00 AM | 5.056 | 9.995 | Mid |
| 6/29/2011 | 7:16:00 AM | 5.209 | 11.188 | |
| 6/29/2011 | 7:17:00 AM | 5.543 | 13.373 | |
| 6/29/2011 | 7:18:00 AM | 5.496 | 13.388 | |
| 6/29/2011 | 7:19:00 AM | 5.462 | 13.437 | |
| 6/29/2011 | 7:20:00 AM | 5.399 | 13.484 | |
| 6/29/2011 | 7:21:00 AM | 5.389 | 13.526 | |
| 6/29/2011 | 7:22:00 AM | 5.345 | 13.554 | |
| 6/29/2011 | 7:23:00 AM | 5.428 | 13.473 | |
| 6/29/2011 | 7:24:00 AM | 5.488 | 13.417 | |
| 6/29/2011 | 7:25:00 AM | 5.469 | 13.426 | |
| 6/29/2011 | 7:26:00 AM | 5.431 | 13.42 | |
| 6/29/2011 | 7:27:00 AM | 5.365 | 13.305 | |
| 6/29/2011 | 7:28:00 AM | 5.315 | 13.358 | |
| 6/29/2011 | 7:29:00 AM | 5.358 | 13.324 | |
| 6/29/2011 | 7:30:00 AM | 5.343 | 13.324 | |
| 6/29/2011 | 7:31:00 AM | 5.355 | 13.342 | |
| 6/29/2011 | 7:32:00 AM | 5.413 | 13.277 | |
| 6/29/2011 | 7:33:00 AM | 5.424 | 13.291 | |
| 6/29/2011 | 7:34:00 AM | 5.378 | 13.346 | |
| 6/29/2011 | 7:35:00 AM | 5.361 | 13.33 | |
| 6/29/2011 | 7:36:00 AM | 5.337 | 13.365 | |
| 6/29/2011 | 7:37:01 AM | 5.336 | 13.38 | |
| 6/29/2011 | 7:38:00 AM | 5.449 | 13.277 | |
| 6/29/2011 | 7:39:00 AM | 5.462 | 13.249 | |
| 6/29/2011 | 7:40:00 AM | 0.722 | 0.333 | |
| 6/29/2011 | 7:41:00 AM | 0.051 | 0.016 | |
| 6/29/2011 | 7:42:00 AM | 0.061 | 0.023 | Zero bias |
| 6/29/2011 | 7:43:00 AM | 2.936 | 6.295 | |
| 6/29/2011 | 7:44:00 AM | 5.006 | 9.856 | |
| 6/29/2011 | 7:45:00 AM | 5.016 | 9.869 | O2/CO2 bias |
| 6/29/2011 | 7:46:00 AM | 5.153 | 11.107 | |
| 6/29/2011 | 7:47:00 AM | 5.442 | 13.311 | |
| 6/29/2011 | 7:48:00 AM | 5.467 | 13.317 | |
| 6/29/2011 | 7:49:00 AM | 5.49 | 13.318 | |
| 6/29/2011 | 7:50:00 AM | 5.5 | 13.328 | |
| 6/29/2011 | 7:51:00 AM | 5.508 | 13.363 | |
| 6/29/2011 | 7:52:00 AM | 5.439 | 13.44 | |
| 6/29/2011 | 7:53:00 AM | 5.407 | 13.531 | |
| 6/29/2011 | 7:54:00 AM | 5.472 | 13.537 | |

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|---|---|---|---|
| 6/29/2011 | 7:55:00 AM | 5.538 | 13.662 |
| 6/29/2011 | 7:56:00 AM | 5.6 | 13.967 |
| 6/29/2011 | 7:57:00 AM | 5.726 | 14.003 |
| 6/29/2011 | 7:58:00 AM | 5.808 | 14.146 |
| 6/29/2011 | 7:59:00 AM | 5.9 | 14.227 |
| 6/29/2011 | 8:00:00 AM | 5.473 | 13.187 |
| 6/29/2011 | 8:01:00 AM | 5.46 | 13.186 |
| 6/29/2011 | 8:02:00 AM | 5.442 | 13.242 |
| 6/29/2011 | 8:03:00 AM | 5.495 | 13.212 |
| 6/29/2011 | 8:04:00 AM | 5.508 | 13.161 |
| 6/29/2011 | 8:05:00 AM | 5.491 | 13.232 |
| 6/29/2011 | 8:06:00 AM | 5.473 | 13.249 |
| 6/29/2011 | 8:07:00 AM | 5.437 | 13.289 |
| 6/29/2011 | 8:08:00 AM | 5.441 | 13.279 |
| 6/29/2011 | 8:09:00 AM | 5.376 | 13.362 |
| 6/29/2011 | 8:10:00 AM | 5.381 | 13.369 |
| 6/29/2011 | 8:11:00 AM | 5.453 | 13.318 |
| 6/29/2011 | 8:12:00 AM | 5.482 | 13.173 |
| 6/29/2011 | 8:13:00 AM | 5.46 | 13.192 |
| 6/29/2011 | 8:14:00 AM | 5.494 | 13.168 |
| 6/29/2011 | 8:15:00 AM | 5.486 | 13.165 |
| 6/29/2011 | 8:16:00 AM | 5.463 | 13.177 |
| 6/29/2011 | 8:17:00 AM | 5.418 | 13.197 |
| 6/29/2011 | 8:18:00 AM | 5.391 | 13.231 |
| 6/29/2011 | 8:19:00 AM | 5.429 | 13.209 |
| 6/29/2011 | 8:20:00 AM | 5.403 | 13.22 |
| 6/29/2011 | 8:21:00 AM | 5.408 | 13.232 |
| 6/29/2011 | 8:22:00 AM | 5.402 | 13.216 |
| 6/29/2011 | 8:23:00 AM | 5.341 | 13.27 |
| 6/29/2011 | 8:24:00 AM | 5.336 | 13.285 |
| 6/29/2011 | 8:25:00 AM | 5.339 | 13.265 |
| 6/29/2011 | 8:26:00 AM | 5.364 | 13.262 |
| 6/29/2011 | 8:27:00 AM | 5.393 | 13.236 |
| 6/29/2011 | 8:28:00 AM | 5.423 | 13.217 |
| 6/29/2011 | 8:29:00 AM | 5.391 | 13.235 |
| 6/29/2011 | 8:30:00 AM | 5.356 | 13.264 |
| 6/29/2011 | 8:31:00 AM | 5.324 | 13.29 |
| 6/29/2011 | 8:32:00 AM | 5.304 | 13.301 |
| 6/29/2011 | 8:33:00 AM | 5.274 | 13.343 |
| 6/29/2011 | 8:34:00 AM | 5.337 | 13.28 |
| 6/29/2011 | 8:35:00 AM | 5.331 | 13.291 |
| 6/29/2011 | 8:36:00 AM | 5.388 | 13.271 |
| 6/29/2011 | 8:37:00 AM | 5.403 | 13.262 |
| 6/29/2011 | 8:38:00 AM | 5.392 | 13.27 |
| 6/29/2011 | 8:39:00 AM | 5.39 | 13.279 |
| 6/29/2011 | 8:40:00 AM | 5.389 | 13.272 |
| 6/29/2011 | 8:41:00 AM | 5.442 | 13.212 |
| 6/29/2011 | 8:42:00 AM | 5.384 | 13.281 |
| 6/29/2011 | 8:43:00 AM | 5.387 | 13.285 |
| 6/29/2011 | 8:44:00 AM | 5.436 | 13.247 |
| 6/29/2011 | 8:45:00 AM | 5.436 | 13.252 |
| 6/29/2011 | 8:46:00 AM | 5.41 | 13.253 |

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|---|---|---|---|
| 6/29/2011 | 8:47:00 AM | 5.465 | 13.198 |
| 6/29/2011 | 8:48:00 AM | 5.456 | 13.21 |
| 6/29/2011 | 8:49:00 AM | 5.442 | 13.211 |
| 6/29/2011 | 8:50:00 AM | 5.409 | 13.235 |
| 6/29/2011 | 8:51:00 AM | 5.346 | 13.311 |
| 6/29/2011 | 8:52:00 AM | 5.315 | 13.317 |
| 6/29/2011 | 8:53:00 AM | 5.259 | 13.382 |
| 6/29/2011 | 8:54:00 AM | 5.306 | 13.344 |
| 6/29/2011 | 8:55:00 AM | 5.331 | 13.332 |
| 6/29/2011 | 8:56:00 AM | 5.349 | 13.299 |
| 6/29/2011 | 8:57:00 AM | 5.367 | 13.277 |
| 6/29/2011 | 8:58:00 AM | 5.372 | 13.291 |
| 6/29/2011 | 8:59:00 AM | 5.411 | 13.245 |
| 6/29/2011 | 9:00:00 AM | 5.374 | 13.265 |
| 6/29/2011 | 9:01:00 AM | 5.377 | 13.27 |
| 6/29/2011 | 9:02:00 AM | 5.355 | 13.268 |
| 6/29/2011 | 9:03:00 AM | 5.334 | 13.285 |
| 6/29/2011 | 9:04:00 AM | 5.329 | 13.3 |
| 6/29/2011 | 9:05:00 AM | 5.313 | 13.32 |
| 6/29/2011 | 9:06:00 AM | 5.321 | 13.323 |
| 6/29/2011 | 9:07:00 AM | 5.327 | 13.313 |
| 6/29/2011 | 9:08:00 AM | 5.358 | 13.293 |
| 6/29/2011 | 9:09:00 AM | 5.424 | 13.245 |
| 6/29/2011 | 9:10:00 AM | 5.402 | 13.25 |
| 6/29/2011 | 9:11:00 AM | 5.384 | 13.277 |
| 6/29/2011 | 9:12:00 AM | 5.361 | 13.285 |
| 6/29/2011 | 9:13:00 AM | 5.281 | 13.38 |
| 6/29/2011 | 9:14:00 AM | 5.292 | 13.354 |
| 6/29/2011 | 9:15:00 AM | 5.309 | 13.353 |
| 6/29/2011 | 9:16:00 AM | 5.346 | 13.319 |
| 6/29/2011 | 9:17:00 AM | 5.336 | 13.322 |
| 6/29/2011 | 9:18:00 AM | 5.321 | 13.339 |
| 6/29/2011 | 9:19:00 AM | 5.351 | 13.319 |
| 6/29/2011 | 9:20:00 AM | 5.365 | 13.29 |
| 6/29/2011 | 9:21:00 AM | 5.335 | 13.316 |
| 6/29/2011 | 9:22:00 AM | 5.38 | 13.276 |
| 6/29/2011 | 9:23:00 AM | 5.351 | 13.302 |
| 6/29/2011 | 9:24:00 AM | 5.349 | 13.299 |
| 6/29/2011 | 9:25:00 AM | 5.371 | 13.28 |
| 6/29/2011 | 9:26:00 AM | 5.374 | 13.288 |
| 6/29/2011 | 9:27:00 AM | 5.331 | 13.313 |
| 6/29/2011 | 9:28:00 AM | 5.315 | 13.337 |
| 6/29/2011 | 9:29:00 AM | 5.303 | 13.342 |
| 6/29/2011 | 9:30:00 AM | 5.345 | 13.306 |
| 6/29/2011 | 9:31:00 AM | 5.326 | 13.306 |
| 6/29/2011 | 9:32:00 AM | 5.32 | 13.327 |
| 6/29/2011 | 9:33:00 AM | 5.288 | 13.359 |
| 6/29/2011 | 9:34:00 AM | 5.293 | 13.356 |
| 6/29/2011 | 9:35:00 AM | 5.292 | 13.35 |
| 6/29/2011 | 9:36:00 AM | 5.323 | 13.334 |
| 6/29/2011 | 9:37:00 AM | 5.319 | 13.344 |
| 6/29/2011 | 9:38:00 AM | 5.33 | 13.325 |

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|---|---|---|---|---|
| 6/29/2011 | 9:39:00 AM | 5.309 | 13.354 | |
| 6/29/2011 | 9:40:00 AM | 5.313 | 13.343 | |
| 6/29/2011 | 9:41:00 AM | 5.313 | 13.36 | |
| 6/29/2011 | 9:42:00 AM | 5.287 | 13.373 | |
| 6/29/2011 | 9:43:00 AM | 5.244 | 13.418 | |
| 6/29/2011 | 9:44:00 AM | 5.217 | 13.467 | |
| 6/29/2011 | 9:45:00 AM | 5.29 | 13.4 | |
| 6/29/2011 | 9:46:00 AM | 5.295 | 13.447 | |
| 6/29/2011 | 9:47:00 AM | 5.318 | 13.453 | |
| 6/29/2011 | 9:48:00 AM | 5.358 | 13.43 | |
| 6/29/2011 | 9:49:00 AM | 5.358 | 13.459 | |
| 6/29/2011 | 9:50:00 AM | 5.331 | 13.498 | |
| 6/29/2011 | 9:51:00 AM | 5.477 | 13.761 | |
| 6/29/2011 | 9:52:00 AM | 5.447 | 13.731 | |
| 6/29/2011 | 9:53:00 AM | 5.289 | 13.4 | |
| 6/29/2011 | 9:54:00 AM | 5.317 | 13.361 | |
| 6/29/2011 | 9:55:00 AM | 5.302 | 13.398 | |
| 6/29/2011 | 9:56:00 AM | 5.314 | 13.406 | |
| 6/29/2011 | 9:57:00 AM | 5.324 | 13.369 | |
| 6/29/2011 | 9:58:00 AM | 5.338 | 13.364 | |
| 6/29/2011 | 9:59:00 AM | 5.336 | 13.354 | |
| 6/29/2011 | 10:00:00 AM | 5.295 | 13.038 | |
| 6/29/2011 | 10:01:00 AM | 5.067 | 9.941 | |
| 6/29/2011 | 10:02:00 AM | 5.051 | 9.938 | O2 CO2 Bias |
| 6/29/2011 | 10:03:00 AM | 1.815 | 2.98 | |
| 6/29/2011 | 10:04:00 AM | 0.059 | 0.033 | Zero Bias |
| 6/29/2011 | 10:05:00 AM | 3.289 | 8.948 | |
| 6/29/2011 | 10:06:00 AM | 5.429 | 13.405 | |
| 6/29/2011 | 10:07:00 AM | 5.44 | 13.363 | |
| 6/29/2011 | 10:08:00 AM | 5.385 | 13.417 | |
| 6/29/2011 | 10:09:00 AM | 5.386 | 13.425 | |
| 6/29/2011 | 10:10:00 AM | 5.334 | 13.476 | |
| 6/29/2011 | 10:11:00 AM | 5.33 | 13.466 | |
| 6/29/2011 | 10:12:00 AM | 5.33 | 13.481 | |
| 6/29/2011 | 10:13:00 AM | 5.347 | 13.472 | |
| 6/29/2011 | 10:14:00 AM | 5.358 | 13.468 | |
| 6/29/2011 | 10:15:00 AM | 5.406 | 13.406 | |
| 6/29/2011 | 10:16:00 AM | 5.444 | 13.374 | |
| 6/29/2011 | 10:17:00 AM | 5.428 | 13.386 | |
| 6/29/2011 | 10:18:00 AM | 5.43 | 13.379 | |
| 6/29/2011 | 10:19:00 AM | 5.392 | 13.438 | |
| 6/29/2011 | 10:20:00 AM | 5.37 | 13.453 | |
| 6/29/2011 | 10:21:00 AM | 5.411 | 13.383 | |
| 6/29/2011 | 10:22:00 AM | 5.375 | 13.405 | |
| 6/29/2011 | 10:23:00 AM | 5.335 | 13.45 | |
| 6/29/2011 | 10:24:00 AM | 5.328 | 13.464 | |
| 6/29/2011 | 10:25:00 AM | 5.345 | 13.441 | |
| 6/29/2011 | 10:26:00 AM | 5.336 | 13.447 | |
| 6/29/2011 | 10:27:00 AM | 5.347 | 13.441 | |
| 6/29/2011 | 10:28:00 AM | 5.334 | 13.44 | |
| 6/29/2011 | 10:29:00 AM | 5.3 | 13.47 | |
| 6/29/2011 | 10:30:00 AM | 5.274 | 13.487 | |

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|---|---|---|---|
| 6/29/2011 | 10:31:00 AM | 5.257 | 13.498 |
| 6/29/2011 | 10:32:00 AM | 5.27 | 13.49 |
| 6/29/2011 | 10:33:00 AM | 5.295 | 13.463 |
| 6/29/2011 | 10:34:00 AM | 5.29 | 13.487 |
| 6/29/2011 | 10:35:00 AM | 5.265 | 13.499 |
| 6/29/2011 | 10:36:00 AM | 5.214 | 13.532 |
| 6/29/2011 | 10:37:00 AM | 5.226 | 13.5 |
| 6/29/2011 | 10:38:00 AM | 5.226 | 13.515 |
| 6/29/2011 | 10:39:00 AM | 5.253 | 13.487 |
| 6/29/2011 | 10:40:00 AM | 5.192 | 13.56 |
| 6/29/2011 | 10:41:00 AM | 5.265 | 13.477 |
| 6/29/2011 | 10:42:00 AM | 5.301 | 13.437 |
| 6/29/2011 | 10:43:00 AM | 5.368 | 13.367 |
| 6/29/2011 | 10:44:00 AM | 5.367 | 13.399 |
| 6/29/2011 | 10:45:00 AM | 5.357 | 13.429 |
| 6/29/2011 | 10:46:00 AM | 5.344 | 13.472 |
| 6/29/2011 | 10:47:00 AM | 5.336 | 13.527 |
| 6/29/2011 | 10:48:00 AM | 5.354 | 13.649 |
| 6/29/2011 | 10:49:00 AM | 5.39 | 13.757 |
| 6/29/2011 | 10:50:00 AM | 5.454 | 13.704 |
| 6/29/2011 | 10:51:00 AM | 5.487 | 13.761 |
| 6/29/2011 | 10:52:00 AM | 5.509 | 13.765 |
| 6/29/2011 | 10:53:00 AM | 5.464 | 13.691 |
| 6/29/2011 | 10:54:00 AM | 5.295 | 13.288 |
| 6/29/2011 | 10:55:00 AM | 5.237 | 13.272 |
| 6/29/2011 | 10:56:00 AM | 5.25 | 13.25 |
| 6/29/2011 | 10:57:00 AM | 5.257 | 13.283 |
| 6/29/2011 | 10:58:00 AM | 5.289 | 13.222 |
| 6/29/2011 | 10:59:00 AM | 5.273 | 13.23 |
| 6/29/2011 | 11:00:00 AM | 5.278 | 13.229 |
| 6/29/2011 | 11:01:00 AM | 5.27 | 13.25 |
| 6/29/2011 | 11:02:00 AM | 5.284 | 13.222 |
| 6/29/2011 | 11:03:00 AM | 5.242 | 13.261 |
| 6/29/2011 | 11:04:00 AM | 5.294 | 13.233 |
| 6/29/2011 | 11:05:00 AM | 5.294 | 13.218 |
| 6/29/2011 | 11:06:00 AM | 5.279 | 13.24 |
| 6/29/2011 | 11:07:00 AM | 5.302 | 13.22 |
| 6/29/2011 | 11:08:00 AM | 5.275 | 13.233 |
| 6/29/2011 | 11:09:00 AM | 5.289 | 13.221 |
| 6/29/2011 | 11:10:00 AM | 5.289 | 13.217 |
| 6/29/2011 | 11:11:00 AM | 5.235 | 13.267 |
| 6/29/2011 | 11:12:00 AM | 5.231 | 13.282 |
| 6/29/2011 | 11:13:00 AM | 5.265 | 13.259 |
| 6/29/2011 | 11:14:00 AM | 5.304 | 13.212 |
| 6/29/2011 | 11:15:00 AM | 5.266 | 13.242 |
| 6/29/2011 | 11:16:00 AM | 5.256 | 13.269 |
| 6/29/2011 | 11:17:00 AM | 5.342 | 13.178 |
| 6/29/2011 | 11:18:00 AM | 5.309 | 13.197 |
| 6/29/2011 | 11:19:00 AM | 5.297 | 13.214 |
| 6/29/2011 | 11:20:00 AM | 5.324 | 13.208 |
| 6/29/2011 | 11:21:00 AM | 5.304 | 13.226 |
| 6/29/2011 | 11:22:00 AM | 5.292 | 13.231 |

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|---|---|---|---|---|
| 6/29/2011 | 11:23:00 AM | 5.243 | 13.28 | |
| 6/29/2011 | 11:24:00 AM | 5.228 | 13.308 | |
| 6/29/2011 | 11:25:00 AM | 5.25 | 13.265 | |
| 6/29/2011 | 11:26:00 AM | 5.236 | 13.28 | |
| 6/29/2011 | 11:27:00 AM | 5.28 | 13.309 | |
| 6/29/2011 | 11:28:00 AM | 5.313 | 13.289 | |
| 6/29/2011 | 11:29:00 AM | 5.25 | 13.352 | |
| 6/29/2011 | 11:30:00 AM | 5.219 | 13.366 | |
| 6/29/2011 | 11:31:00 AM | 5.228 | 13.344 | |
| 6/29/2011 | 11:32:00 AM | 5.203 | 13.371 | |
| 6/29/2011 | 11:33:00 AM | 5.242 | 13.331 | |
| 6/29/2011 | 11:34:00 AM | 5.234 | 13.342 | |
| 6/29/2011 | 11:35:00 AM | 5.233 | 13.362 | |
| 6/29/2011 | 11:36:00 AM | 5.259 | 13.326 | |
| 6/29/2011 | 11:37:00 AM | 5.218 | 13.375 | |
| 6/29/2011 | 11:38:00 AM | 5.173 | 13.411 | |
| 6/29/2011 | 11:39:00 AM | 5.23 | 13.377 | |
| 6/29/2011 | 11:40:00 AM | 5.238 | 13.374 | |
| 6/29/2011 | 11:41:00 AM | 5.29 | 13.333 | |
| 6/29/2011 | 11:42:00 AM | 5.29 | 13.324 | |
| 6/29/2011 | 11:43:00 AM | 5.302 | 13.323 | |
| 6/29/2011 | 11:44:00 AM | 5.268 | 13.348 | |
| 6/29/2011 | 11:45:00 AM | 5.25 | 13.364 | |
| 6/29/2011 | 11:46:00 AM | 5.229 | 13.367 | |
| 6/29/2011 | 11:47:00 AM | 5.233 | 13.368 | |
| 6/29/2011 | 11:48:00 AM | 5.202 | 13.389 | |
| 6/29/2011 | 11:49:00 AM | 5.221 | 13.382 | |
| 6/29/2011 | 11:50:00 AM | 5.198 | 13.401 | |
| 6/29/2011 | 11:51:00 AM | 5.133 | 13.466 | |
| 6/29/2011 | 11:52:00 AM | 5.129 | 13.471 | |
| 6/29/2011 | 11:53:00 AM | 5.108 | 13.509 | |
| 6/29/2011 | 11:54:00 AM | 5.143 | 13.476 | |
| 6/29/2011 | 11:55:00 AM | 5.164 | 13.467 | |
| 6/29/2011 | 11:56:00 AM | 5.209 | 13.405 | |
| 6/29/2011 | 11:57:00 AM | 5.212 | 13.409 | |
| 6/29/2011 | 11:58:00 AM | 5.235 | 13.403 | |
| 6/29/2011 | 11:59:00 AM | 5.208 | 13.408 | |
| 6/29/2011 | 12:00:00 PM | 5.248 | 13.372 | |
| 6/29/2011 | 12:01:00 PM | 5.241 | 13.382 | |
| 6/29/2011 | 12:02:00 PM | 5.293 | 13.344 | |
| 6/29/2011 | 12:03:00 PM | 5.305 | 13.309 | |
| 6/29/2011 | 12:04:00 PM | 5.319 | 13.315 | |
| 6/29/2011 | 12:05:00 PM | 5.257 | 13.371 | |
| 6/29/2011 | 12:06:00 PM | 5.205 | 13.416 | |
| 6/29/2011 | 12:07:00 PM | 5.254 | 13.366 | |
| 6/29/2011 | 12:08:00 PM | 5.236 | 13.39 | |
| 6/29/2011 | 12:09:00 PM | 5.246 | 13.382 | |
| 6/29/2011 | 12:10:00 PM | 5.15 | 13.012 | |
| 6/29/2011 | 12:11:00 PM | 1.706 | 3.497 | |
| 6/29/2011 | 12:12:00 PM | 0.057 | 0.021 | Zero bias |
| 6/29/2011 | 12:13:00 PM | 1.184 | 2.808 | |
| 6/29/2011 | 12:14:00 PM | 4.964 | 9.795 | |

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|---|---|---|---|---|
| 6/29/2011 | 12:15:00 PM | 4.98 | 9.815 | O2/CO2 bias |
| 6/29/2011 | 12:16:00 PM | 5.123 | 11.974 | |
| 6/29/2011 | 12:17:00 PM | 5.33 | 13.305 | |
| 6/29/2011 | 12:18:00 PM | 5.264 | 13.348 | |
| 6/29/2011 | 12:19:00 PM | 5.201 | 13.416 | |
| 6/29/2011 | 12:20:00 PM | 5.195 | 13.422 | |
| 6/29/2011 | 12:21:00 PM | 5.178 | 13.447 | |
| 6/29/2011 | 12:22:00 PM | 5.199 | 13.426 | |
| 6/29/2011 | 12:23:00 PM | 5.196 | 13.437 | |
| 6/29/2011 | 12:24:00 PM | 5.277 | 13.371 | |
| 6/29/2011 | 12:25:00 PM | 5.275 | 13.361 | |
| 6/29/2011 | 12:26:00 PM | 5.275 | 13.363 | |
| 6/29/2011 | 12:27:00 PM | 5.278 | 13.359 | |
| 6/29/2011 | 12:28:00 PM | 5.303 | 13.32 | |
| 6/29/2011 | 12:29:00 PM | 5.268 | 13.349 | |
| 6/29/2011 | 12:30:00 PM | 5.275 | 13.371 | |
| 6/29/2011 | 12:31:00 PM | 5.265 | 13.378 | |
| 6/29/2011 | 12:32:00 PM | 5.259 | 13.377 | |
| 6/29/2011 | 12:33:00 PM | 5.223 | 13.4 | |
| 6/29/2011 | 12:34:00 PM | 5.198 | 13.435 | |
| 6/29/2011 | 12:35:00 PM | 5.22 | 13.416 | |
| 6/29/2011 | 12:36:00 PM | 5.204 | 13.417 | |
| 6/29/2011 | 12:37:00 PM | 5.215 | 13.425 | |
| 6/29/2011 | 12:38:00 PM | 5.196 | 13.436 | |
| 6/29/2011 | 12:39:00 PM | 5.177 | 13.46 | |
| 6/29/2011 | 12:40:00 PM | 5.167 | 13.49 | |
| 6/29/2011 | 12:41:00 PM | 5.171 | 13.471 | |
| 6/29/2011 | 12:42:00 PM | 5.2 | 13.448 | |
| 6/29/2011 | 12:43:00 PM | 5.204 | 13.458 | |
| 6/29/2011 | 12:44:00 PM | 5.236 | 13.418 | |
| 6/29/2011 | 12:45:00 PM | 5.227 | 13.429 | |
| 6/29/2011 | 12:46:00 PM | 5.231 | 13.433 | |
| 6/29/2011 | 12:47:00 PM | 5.208 | 13.439 | |
| 6/29/2011 | 12:48:00 PM | 5.201 | 13.463 | |
| 6/29/2011 | 12:49:00 PM | 5.202 | 13.468 | |
| 6/29/2011 | 12:50:00 PM | 5.26 | 13.411 | |
| 6/29/2011 | 12:51:00 PM | 5.266 | 13.413 | |
| 6/29/2011 | 12:52:00 PM | 5.3 | 13.371 | |
| 6/29/2011 | 12:53:00 PM | 5.291 | 13.368 | |
| 6/29/2011 | 12:54:00 PM | 5.232 | 13.434 | |
| 6/29/2011 | 12:55:00 PM | 5.234 | 13.429 | |
| 6/29/2011 | 12:56:00 PM | 5.211 | 13.472 | |
| 6/29/2011 | 12:57:00 PM | 5.285 | 13.378 | |
| 6/29/2011 | 12:58:00 PM | 5.259 | 13.407 | |
| 6/29/2011 | 12:59:00 PM | 5.29 | 13.373 | |
| 6/29/2011 | 1:00:00 PM | 5.218 | 13.433 | |
| 6/29/2011 | 1:01:00 PM | 5.156 | 13.498 | |
| 6/29/2011 | 1:02:00 PM | 5.19 | 13.475 | |
| 6/29/2011 | 1:03:00 PM | 5.282 | 13.391 | |
| 6/29/2011 | 1:04:00 PM | 5.262 | 13.401 | |
| 6/29/2011 | 1:05:00 PM | 5.283 | 13.385 | |
| 6/29/2011 | 1:06:00 PM | 5.323 | 13.341 | |

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|---|---|---|---|
| 6/29/2011 | 1:07:00 PM | 5.337 | 13.315 |
| 6/29/2011 | 1:08:00 PM | 5.299 | 13.353 |
| 6/29/2011 | 1:09:00 PM | 5.258 | 13.38 |
| 6/29/2011 | 1:10:00 PM | 5.196 | 13.445 |
| 6/29/2011 | 1:11:00 PM | 5.202 | 13.451 |
| 6/29/2011 | 1:12:00 PM | 5.198 | 13.456 |
| 6/29/2011 | 1:13:00 PM | 5.201 | 13.461 |
| 6/29/2011 | 1:14:00 PM | 5.281 | 13.39 |
| 6/29/2011 | 1:15:00 PM | 5.2 | 13.468 |
| 6/29/2011 | 1:16:00 PM | 5.2 | 13.468 |
| 6/29/2011 | 1:17:00 PM | 5.231 | 13.447 |
| 6/29/2011 | 1:18:00 PM | 5.257 | 13.424 |
| 6/29/2011 | 1:19:00 PM | 5.318 | 13.36 |
| 6/29/2011 | 1:20:00 PM | 5.339 | 13.332 |
| 6/29/2011 | 1:21:00 PM | 5.338 | 13.331 |
| 6/29/2011 | 1:22:00 PM | 5.302 | 13.366 |
| 6/29/2011 | 1:23:00 PM | 5.237 | 13.415 |
| 6/29/2011 | 1:24:00 PM | 5.227 | 13.429 |
| 6/29/2011 | 1:25:00 PM | 5.209 | 13.44 |
| 6/29/2011 | 1:26:00 PM | 5.208 | 13.448 |
| 6/29/2011 | 1:27:00 PM | 5.235 | 13.435 |
| 6/29/2011 | 1:28:00 PM | 5.207 | 13.454 |
| 6/29/2011 | 1:29:00 PM | 5.185 | 13.501 |
| 6/29/2011 | 1:30:00 PM | 5.222 | 13.436 |
| 6/29/2011 | 1:31:00 PM | 5.258 | 13.4 |
| 6/29/2011 | 1:32:00 PM | 5.23 | 13.437 |
| 6/29/2011 | 1:33:00 PM | 5.207 | 13.492 |
| 6/29/2011 | 1:34:00 PM | 5.179 | 13.522 |
| 6/29/2011 | 1:35:00 PM | 5.199 | 13.515 |
| 6/29/2011 | 1:36:00 PM | 5.269 | 13.439 |
| 6/29/2011 | 1:37:00 PM | 5.266 | 13.435 |
| 6/29/2011 | 1:38:00 PM | 5.24 | 13.468 |
| 6/29/2011 | 1:39:00 PM | 5.199 | 13.513 |
| 6/29/2011 | 1:40:00 PM | 5.276 | 13.437 |
| 6/29/2011 | 1:41:00 PM | 5.33 | 13.371 |
| 6/29/2011 | 1:42:00 PM | 5.259 | 13.441 |
| 6/29/2011 | 1:43:00 PM | 5.26 | 13.449 |
| 6/29/2011 | 1:44:00 PM | 5.238 | 13.444 |
| 6/29/2011 | 1:45:00 PM | 5.142 | 13.527 |
| 6/29/2011 | 1:46:00 PM | 5.15 | 13.532 |
| 6/29/2011 | 1:47:00 PM | 5.142 | 13.551 |
| 6/29/2011 | 1:48:00 PM | 5.155 | 13.526 |
| 6/29/2011 | 1:49:00 PM | 5.161 | 13.526 |
| 6/29/2011 | 1:50:00 PM | 5.166 | 13.516 |
| 6/29/2011 | 1:51:00 PM | 5.164 | 13.517 |
| 6/29/2011 | 1:52:00 PM | 5.209 | 13.483 |
| 6/29/2011 | 1:53:00 PM | 5.144 | 13.557 |
| 6/29/2011 | 1:54:00 PM | 5.201 | 13.517 |
| 6/29/2011 | 1:55:00 PM | 5.214 | 13.491 |
| 6/29/2011 | 1:56:00 PM | 5.211 | 13.49 |
| 6/29/2011 | 1:57:00 PM | 5.167 | 13.535 |
| 6/29/2011 | 1:58:00 PM | 5.21 | 13.473 |

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|---|---|---|---|
| 6/29/2011 | 1:59:00 PM | 5.251 | 13.43 |
| 6/29/2011 | 2:00:00 PM | 5.226 | 13.454 |
| 6/29/2011 | 2:01:00 PM | 5.228 | 13.443 |
| 6/29/2011 | 2:02:00 PM | 5.261 | 13.42 |
| 6/29/2011 | 2:03:00 PM | 5.217 | 13.448 |
| 6/29/2011 | 2:04:00 PM | 5.113 | 13.541 |
| 6/29/2011 | 2:05:00 PM | 5.154 | 13.526 |
| 6/29/2011 | 2:06:00 PM | 5.172 | 13.497 |
| 6/29/2011 | 2:07:00 PM | 5.224 | 13.459 |
| 6/29/2011 | 2:08:00 PM | 5.28 | 13.37 |
| 6/29/2011 | 2:09:00 PM | 5.16 | 13.458 |
| 6/29/2011 | 2:10:00 PM | 5.172 | 13.463 |
| 6/29/2011 | 2:11:00 PM | 5.145 | 13.488 |
| 6/29/2011 | 2:12:00 PM | 5.141 | 13.48 |
| 6/29/2011 | 2:13:00 PM | 5.196 | 13.433 |
| 6/29/2011 | 2:14:00 PM | 5.277 | 13.355 |
| 6/29/2011 | 2:15:00 PM | 5.305 | 13.323 |
| 6/29/2011 | 2:16:00 PM | 5.28 | 13.353 |
| 6/29/2011 | 2:17:00 PM | 5.216 | 13.407 |
| 6/29/2011 | 2:18:00 PM | 5.185 | 13.453 |
| 6/29/2011 | 2:19:00 PM | 5.204 | 13.414 |
| 6/29/2011 | 2:20:00 PM | 5.2 | 13.436 |
| 6/29/2011 | 2:21:00 PM | 5.19 | 13.438 |
| 6/29/2011 | 2:22:00 PM | 5.237 | 13.395 |
| 6/29/2011 | 2:23:00 PM | 5.211 | 13.407 |
| 6/29/2011 | 2:24:00 PM | 5.245 | 13.41 |
| 6/29/2011 | 2:25:00 PM | 5.233 | 13.426 |
| 6/29/2011 | 2:26:00 PM | 5.23 | 13.387 |
| 6/29/2011 | 2:27:00 PM | 5.197 | 13.408 |
| 6/29/2011 | 2:28:00 PM | 5.207 | 13.407 |
| 6/29/2011 | 2:29:00 PM | 5.26 | 13.366 |
| 6/29/2011 | 2:30:00 PM | 5.24 | 13.372 |
| 6/29/2011 | 2:31:00 PM | 5.27 | 13.343 |
| 6/29/2011 | 2:32:00 PM | 5.201 | 13.408 |
| 6/29/2011 | 2:33:00 PM | 5.229 | 13.371 |
| 6/29/2011 | 2:34:00 PM | 5.258 | 13.337 |
| 6/29/2011 | 2:35:00 PM | 5.219 | 13.377 |
| 6/29/2011 | 2:36:00 PM | 5.241 | 13.354 |
| 6/29/2011 | 2:37:00 PM | 5.191 | 13.387 |
| 6/29/2011 | 2:38:00 PM | 5.178 | 13.399 |
| 6/29/2011 | 2:39:00 PM | 5.1 | 13.48 |
| 6/29/2011 | 2:40:00 PM | 5.179 | 13.419 |
| 6/29/2011 | 2:41:00 PM | 5.26 | 13.339 |
| 6/29/2011 | 2:42:00 PM | 5.272 | 13.323 |
| 6/29/2011 | 2:43:00 PM | 5.256 | 13.323 |
| 6/29/2011 | 2:44:00 PM | 5.234 | 13.343 |
| 6/29/2011 | 2:45:00 PM | 5.254 | 13.324 |
| 6/29/2011 | 2:46:00 PM | 5.179 | 13.394 |
| 6/29/2011 | 2:47:00 PM | 5.171 | 13.397 |
| 6/29/2011 | 2:48:00 PM | 5.179 | 13.438 |
| 6/29/2011 | 2:49:00 PM | 5.197 | 13.43 |
| 6/29/2011 | 2:50:00 PM | 5.163 | 13.446 |

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| 6/29/2011 | 2:51:00 PM | 5.167 | 13.411 |
| 6/29/2011 | 2:52:00 PM | 5.14 | 13.451 |
| 6/29/2011 | 2:53:00 PM | 5.166 | 13.415 |
| 6/29/2011 | 2:54:00 PM | 5.208 | 13.374 |
| 6/29/2011 | 2:55:00 PM | 5.236 | 13.332 |
| 6/29/2011 | 2:56:00 PM | 5.208 | 13.356 |
| 6/29/2011 | 2:57:00 PM | 5.241 | 13.341 |
| 6/29/2011 | 2:58:00 PM | 5.231 | 13.366 |
| 6/29/2011 | 2:59:00 PM | 5.277 | 13.342 |
| 6/29/2011 | 3:00:00 PM | 5.272 | 13.322 |
| 6/29/2011 | 3:01:00 PM | 5.256 | 13.33 |
| 6/29/2011 | 3:02:00 PM | 5.243 | 13.331 |
| 6/29/2011 | 3:03:00 PM | 5.192 | 13.393 |
| 6/29/2011 | 3:04:00 PM | 5.216 | 13.364 |
| 6/29/2011 | 3:05:00 PM | 5.168 | 13.406 |
| 6/29/2011 | 3:06:00 PM | 5.168 | 13.434 |
| 6/29/2011 | 3:07:00 PM | 5.174 | 13.439 |
| 6/29/2011 | 3:08:00 PM | 5.197 | 13.41 |
| 6/29/2011 | 3:09:00 PM | 5.204 | 13.397 |
| 6/29/2011 | 3:10:00 PM | 5.197 | 13.415 |
| 6/29/2011 | 3:11:00 PM | 5.254 | 13.36 |
| 6/29/2011 | 3:12:00 PM | 5.243 | 13.354 |
| 6/29/2011 | 3:13:00 PM | 5.242 | 13.361 |
| 6/29/2011 | 3:14:00 PM | 5.156 | 13.436 |
| 6/29/2011 | 3:15:00 PM | 5.169 | 13.427 |
| 6/29/2011 | 3:16:00 PM | 5.185 | 13.413 |
| 6/29/2011 | 3:17:00 PM | 5.15 | 13.46 |
| 6/29/2011 | 3:18:00 PM | 5.167 | 13.441 |
| 6/29/2011 | 3:19:00 PM | 5.129 | 13.471 |
| 6/29/2011 | 3:20:00 PM | 5.166 | 13.44 |
| 6/29/2011 | 3:21:00 PM | 5.158 | 13.463 |
| 6/29/2011 | 3:22:00 PM | 5.153 | 13.459 |
| 6/29/2011 | 3:23:00 PM | 5.184 | 13.425 |
| 6/29/2011 | 3:24:00 PM | 5.205 | 13.399 |
| 6/29/2011 | 3:25:00 PM | 5.213 | 13.394 |
| 6/29/2011 | 3:26:00 PM | 5.213 | 13.395 |
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| 6/29/2011 | 3:28:00 PM | 5.2 | 13.425 |
| 6/29/2011 | 3:29:00 PM | 5.176 | 13.453 |
| 6/29/2011 | 3:30:00 PM | 5.173 | 13.441 |
| 6/29/2011 | 3:31:00 PM | 5.133 | 13.477 |
| 6/29/2011 | 3:32:00 PM | 5.129 | 13.487 |
| 6/29/2011 | 3:33:00 PM | 5.107 | 13.504 |
| 6/29/2011 | 3:34:00 PM | 5.117 | 13.49 |
| 6/29/2011 | 3:35:00 PM | 5.096 | 13.503 |
| 6/29/2011 | 3:36:00 PM | 5.083 | 13.525 |
| 6/29/2011 | 3:37:00 PM | 5.487 | 14.652 |
| 6/29/2011 | 3:38:00 PM | 5.12 | 13.487 |
| 6/29/2011 | 3:39:00 PM | 5.12 | 13.47 |
| 6/29/2011 | 3:40:00 PM | 5.137 | 13.483 |
| 6/29/2011 | 3:41:00 PM | 5.171 | 13.441 |
| 6/29/2011 | 3:42:00 PM | 5.155 | 13.457 |

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|---|---|---|---|
| 6/29/2011 | 3:43:00 PM | 5.202 | 13.399 |
| 6/29/2011 | 3:44:00 PM | 5.196 | 13.43 |
| 6/29/2011 | 3:45:00 PM | 5.196 | 13.432 |
| 6/29/2011 | 3:46:00 PM | 5.191 | 13.415 |
| 6/29/2011 | 3:47:00 PM | 5.126 | 13.493 |
| 6/29/2011 | 3:48:00 PM | 5.14 | 13.477 |
| 6/29/2011 | 3:49:00 PM | 5.051 | 13.57 |
| 6/29/2011 | 3:50:00 PM | 5.055 | 13.57 |
| 6/29/2011 | 3:51:00 PM | 5.13 | 13.489 |
| 6/29/2011 | 3:52:00 PM | 5.151 | 13.465 |
| 6/29/2011 | 3:53:00 PM | 5.158 | 13.479 |
| 6/29/2011 | 3:54:00 PM | 5.213 | 13.429 |
| 6/29/2011 | 3:55:00 PM | 5.177 | 13.641 |
| 6/29/2011 | 3:56:00 PM | 5.163 | 13.546 |
| 6/29/2011 | 3:57:00 PM | 5.19 | 13.631 |
| 6/29/2011 | 3:58:00 PM | 5.211 | 13.456 |
| 6/29/2011 | 3:59:00 PM | 5.218 | 13.459 |
| 6/29/2011 | 4:00:00 PM | 5.207 | 13.498 |
| 6/29/2011 | 4:01:00 PM | 5.199 | 13.481 |
| 6/29/2011 | 4:02:00 PM | 5.201 | 13.434 |
| 6/29/2011 | 4:03:00 PM | 5.157 | 13.482 |
| 6/29/2011 | 4:04:00 PM | 5.136 | 13.508 |
| 6/29/2011 | 4:05:00 PM | 5.152 | 13.492 |
| 6/29/2011 | 4:06:00 PM | 5.16 | 13.47 |
| 6/29/2011 | 4:07:00 PM | 5.118 | 13.525 |
| 6/29/2011 | 4:08:00 PM | 5.159 | 13.485 |
| 6/29/2011 | 4:09:00 PM | 5.214 | 13.432 |
| 6/29/2011 | 4:10:00 PM | 5.229 | 13.43 |
| 6/29/2011 | 4:11:00 PM | 5.292 | 13.374 |
| 6/29/2011 | 4:12:00 PM | 5.346 | 13.308 |
| 6/29/2011 | 4:13:00 PM | 5.289 | 13.36 |
| 6/29/2011 | 4:14:00 PM | 5.355 | 13.304 |
| 6/29/2011 | 4:15:00 PM | 5.37 | 13.279 |
| 6/29/2011 | 4:16:00 PM | 5.312 | 13.329 |
| 6/29/2011 | 4:17:00 PM | 5.201 | 13.432 |
| 6/29/2011 | 4:18:00 PM | 5.194 | 13.446 |
| 6/29/2011 | 4:19:00 PM | 5.213 | 13.43 |
| 6/29/2011 | 4:20:00 PM | 5.215 | 13.438 |
| 6/29/2011 | 4:21:00 PM | 5.265 | 13.395 |
| 6/29/2011 | 4:22:00 PM | 5.251 | 13.421 |
| 6/29/2011 | 4:23:00 PM | 5.268 | 13.424 |
| 6/29/2011 | 4:24:00 PM | 5.218 | 13.433 |
| 6/29/2011 | 4:25:00 PM | 5.244 | 13.404 |
| 6/29/2011 | 4:26:00 PM | 5.261 | 13.374 |
| 6/29/2011 | 4:27:00 PM | 5.274 | 13.362 |
| 6/29/2011 | 4:28:00 PM | 5.28 | 13.358 |
| 6/29/2011 | 4:29:00 PM | 5.226 | 13.407 |
| 6/29/2011 | 4:30:00 PM | 5.196 | 13.425 |
| 6/29/2011 | 4:31:00 PM | 5.119 | 13.511 |
| 6/29/2011 | 4:32:00 PM | 5.145 | 13.486 |
| 6/29/2011 | 4:33:00 PM | 5.19 | 13.43 |
| 6/29/2011 | 4:34:00 PM | 5.169 | 13.445 |

| | | | | |
|---|---|---|---|---|
| 6/29/2011 | 4:35:00 PM | 5.166 | 13.472 | |
| 6/29/2011 | 4:36:00 PM | 5.155 | 13.473 | |
| 6/29/2011 | 4:37:00 PM | 5.123 | 13.516 | |
| 6/29/2011 | 4:38:00 PM | 5.128 | 13.513 | |
| 6/29/2011 | 4:39:00 PM | 5.116 | 13.521 | |
| 6/29/2011 | 4:40:00 PM | 5.153 | 13.473 | |
| 6/29/2011 | 4:41:00 PM | 5.136 | 13.485 | |
| 6/29/2011 | 4:42:00 PM | 5.158 | 13.481 | |
| 6/29/2011 | 4:43:00 PM | 5.184 | 13.448 | |
| 6/29/2011 | 4:44:00 PM | 5.161 | 13.472 | |
| 6/29/2011 | 4:45:00 PM | 5.113 | 13.514 | |
| 6/29/2011 | 4:46:00 PM | 5.092 | 13.557 | |
| 6/29/2011 | 4:47:00 PM | 5.189 | 13.459 | |
| 6/29/2011 | 4:48:00 PM | 5.195 | 13.445 | |
| 6/29/2011 | 4:49:00 PM | 5.202 | 13.459 | |
| 6/29/2011 | 4:50:00 PM | 5.169 | 11.258 | |
| 6/29/2011 | 4:51:00 PM | 4.977 | 9.841 | |
| 6/29/2011 | 4:52:00 PM | 4.979 | 9.84 | O2/CO2 bias |
| 6/29/2011 | 4:53:00 PM | 4.431 | 8.303 | |
| 6/29/2011 | 4:54:00 PM | 0.095 | 0.054 | |
| 6/29/2011 | 4:55:00 PM | 0.058 | 0.025 | |
| 6/29/2011 | 4:56:00 PM | 0.056 | 0.016 | Zero bias |
| 6/29/2011 | 4:57:00 PM | 0.056 | 0.01 | |
| 6/29/2011 | 4:58:00 PM | 28.291 | 57.282 | |
| 6/29/2011 | 4:59:00 PM | 5.221 | 13.517 | |
| 6/29/2011 | 5:00:00 PM | 5.244 | 13.541 | |
| 6/29/2011 | 5:01:00 PM | 5.25 | 13.539 | |
| 6/29/2011 | 5:02:00 PM | 5.259 | 13.536 | |
| 6/29/2011 | 5:03:00 PM | 5.292 | 13.503 | |
| 6/29/2011 | 5:04:00 PM | 5.269 | 13.521 | |
| 6/29/2011 | 5:05:00 PM | 5.302 | 13.494 | |
| 6/29/2011 | 5:06:00 PM | 5.227 | 13.576 | |
| 6/29/2011 | 5:07:00 PM | 5.217 | 13.59 | |
| 6/29/2011 | 5:08:00 PM | 5.212 | 13.612 | |
| 6/29/2011 | 5:09:00 PM | 5.22 | 13.608 | |
| 6/29/2011 | 5:10:00 PM | 5.252 | 13.585 | |
| 6/29/2011 | 5:11:00 PM | 5.255 | 13.572 | |
| 6/29/2011 | 5:12:00 PM | 5.205 | 13.625 | |
| 6/29/2011 | 5:13:00 PM | 5.145 | 13.698 | |
| 6/29/2011 | 5:14:00 PM | 5.216 | 13.619 | |
| 6/29/2011 | 5:15:00 PM | 5.264 | 13.575 | |
| 6/29/2011 | 5:16:00 PM | 5.266 | 13.589 | |
| 6/29/2011 | 5:17:00 PM | 5.286 | 13.573 | |
| 6/29/2011 | 5:18:00 PM | 5.283 | 13.556 | |
| 6/29/2011 | 5:19:00 PM | 5.235 | 13.601 | |
| 6/29/2011 | 5:20:00 PM | 5.181 | 13.662 | |
| 6/29/2011 | 5:21:00 PM | 5.244 | 13.607 | |
| 6/29/2011 | 5:22:00 PM | 5.206 | 13.643 | |
| 6/29/2011 | 5:23:00 PM | 5.203 | 13.668 | |
| 6/29/2011 | 5:24:00 PM | 5.271 | 13.582 | |
| 6/29/2011 | 5:25:00 PM | 5.277 | 13.585 | |
| 6/29/2011 | 5:26:00 PM | 5.22 | 13.499 | |

| | | | |
|---|---|---|---|
| 6/29/2011 | 5:27:00 PM | 5.121 | 13.478 |
| 6/29/2011 | 5:28:00 PM | 5.168 | 13.411 |
| 6/29/2011 | 5:29:00 PM | 5.178 | 13.412 |
| 6/29/2011 | 5:30:00 PM | 5.26 | 13.316 |
| 6/29/2011 | 5:31:00 PM | 5.207 | 13.353 |
| 6/29/2011 | 5:32:00 PM | 5.168 | 13.383 |

**ExxonMobil**
**NO2 to NO Converter Efficiency Test**

| | | | | |
|---|---|---|---|---|
| Analyzer Manufacturer: | CAI | NO Cal Gas Value: | 47.3 | LABEL |
| Analyzer Model: | 600CLD | NO2 Cal Gas Value: | 45.3 | $C_0$ |
| Analyzer Serial Number: | U04004 | Performed By: | AA/DW/JP/SS/DA | |
| Date: | 6/30/2011 | CEMS ID#: | 4-CEMS | |

| GAS | ANALYZER MODE | ANALYZER RESPONSE | LABEL |
|---|---|---|---|
| Zero | NO | 0.05 | -- |
| Zero | NOx | 0.05 | -- |
| NO | NO | 47.48 | -- |
| NO | NOx | 47.20 | -- |
| NO2 | NO | 0.50 | $C_1$ |
| NO2 | NOx | 42.23 | $C_2$ |

| | | Label | Requirement |
|---|---|---|---|
| Abs. Value $C_1$: | 0.5 | C1 | -- |
| Abs. Value $C_2$: | 42.2 | C2 | -- |
| C1=(C1/C0)*100% | 1.1% | | < 5% |
| CE =(C2-C1)/C0 * 100%: | 92.1% | -- | > 90% |

| | Cylinder # |
|---|---|
| NO bottle: | CC76817 |
| NO2 bottle: | CC307254 |

**Delta Air Quality Services**

**SPAN GAS RECORD AND EPA CALIBRATION ERROR**

CLIENT/LOCATION: ExxonMobil DATE: 6/30/11
TRUCK/CEM I.D.: 4-CEMS BY: AA/DW/JP/SS/DA

| | MID SPAN CYLINDER | | HIGH SPAN CYLINDER | |
|---|---|---|---|---|
| | CYLINDER NO. | CONCENTRATION | CYLINDER NO. | CONCENTRATION |
| ZERO | "CEM Grade $N_2$" | | | |
| $O_2$ | SA8302 | 5.00 | CC102051 | 8.78 |
| $CO_2$ | SA8302 | 10.16 | CC102051 | 17.44 |
| $NO_x$ | CC333881 | 22.7 | CC76817 | 47.3 |
| | | | | |
| $SO_2$ | CC121015 | 12.9 | CC321694 | 22.2 |

**PRE-TEST INSTRUMENT CALIBRATION ERROR**

| | ANALYZER | | | | |
|---|---|---|---|---|---|
| | $O_2$ | $CO_2$ | $NO_x$ | | $SO_2$ |
| Analyzer Range | 10 | 20 | 50 | | 25 |
| Calibration Span | 8.78 | 17.44 | 47.3 | | 22.2 |
| Zero Gas Value | 0.0 | 0.0 | 0.0 | | 0.0 |
| Analyzer Reads | 0.09 | 0.00 | -0.09 | | 0.07 |
| Difference (% or ppm) | 0.1 | 0.0 | -0.1 | | 0.1 |
| Error (% of Cal. Span) | 1.0% | 0.0% | -0.2% | | 0.3% |
| Status(1) | PASS | PASS | PASS | | PASS |
| High Gas Value | 8.78 | 17.44 | 47.3 | | 22.2 |
| Analyzer Reads | 8.76 | 17.41 | 47.27 | | 22.50 |
| Difference (% or ppm) | 0.0 | 0.0 | 0.0 | | 0.3 |
| Error (% of Cal. Span) | -0.2% | -0.2% | -0.1% | | 1.3% |
| Status | PASS | PASS | PASS | | PASS |
| Mid Gas Value | 5.00 | 10.16 | 22.7 | | 12.9 |
| Analyzer Reads | 5.04 | 9.94 | 23.03 | | 12.53 |
| Difference (% or ppm) | 0.0 | -0.2 | 0.3 | | -0.4 |
| Error (% of Cal. Span) | 0.5% | -1.3% | 0.7% | | -1.7% |
| Status | PASS | PASS | PASS | | PASS |

1) Calibration Error must be within +/- 2.0% of the Calibration Span

| Date | Time | O2 % | CO2 % | NOx PPM | SO2 % | |
|---|---|---|---|---|---|---|
| 6/30/2011 | 7:19:00 AM | 5.962 | 15.267 | 0.065 | 13.811 | Zero/NO Mode |
| 6/30/2011 | 7:20:00 AM | 0.579 | 0.4 | 0.061 | 13.263 | |
| 6/30/2011 | 7:21:00 AM | 0.092 | -0.001 | 0.064 | 14.052 | O2/CO2 Cal Zero; Zero/NOx Mod |
| 6/30/2011 | 7:22:00 AM | 6.933 | 14.606 | 12.815 | 9.179 | |
| 6/30/2011 | 7:23:00 AM | 9.242 | 18.151 | 23.045 | 0.98 | |
| 6/30/2011 | 7:24:00 AM | 8.778 | 17.244 | 22.111 | 0.836 | |
| 6/30/2011 | 7:25:00 AM | 8.773 | 17.388 | 22.59 | 0.873 | |
| 6/30/2011 | 7:26:00 AM | 8.768 | 17.405 | 22.67 | 0.935 | |
| 6/30/2011 | 7:27:00 AM | 8.764 | 17.407 | 22.661 | 1.024 | NO/NO Mode; O2/CO2 Cal High |
| 6/30/2011 | 7:28:00 AM | 6.096 | 11.28 | 22.581 | 0.423 | |
| 6/30/2011 | 7:29:00 AM | 5.041 | 9.942 | 22.575 | 0.065 | O2/CO2 Mid; NO/NOx Mode; SO2 |
| 6/30/2011 | 7:30:00 AM | 5.147 | 12.351 | 5.405 | 6.341 | |
| 6/30/2011 | 7:31:00 AM | 5.182 | 13.61 | 0.226 | 21.964 | |
| 6/30/2011 | 7:32:00 AM | 5.252 | 13.553 | 0.177 | 22.864 | NO2/NO Mode |
| 6/30/2011 | 7:33:00 AM | 5.264 | 13.534 | 8.654 | 22.906 | |
| 6/30/2011 | 7:34:00 AM | 5.211 | 13.573 | 16.049 | 22.903 | NO2/NOx Mode |
| 6/30/2011 | 7:35:00 AM | 5.201 | 13.577 | 3.298 | 12.805 | |
| 6/30/2011 | 7:36:00 AM | 5.199 | 13.582 | 0.08 | 11.452 | NOx Cal Zero |
| 6/30/2011 | 7:37:00 AM | 5.193 | 13.583 | 10.859 | 15.779 | |
| 6/30/2011 | 7:38:00 AM | 5.209 | 13.583 | 22.337 | 22.372 | |
| 6/30/2011 | 7:39:00 AM | 5.191 | 13.593 | 22.529 | 22.704 | |
| 6/30/2011 | 7:40:00 AM | 5.164 | 13.617 | 22.541 | 22.842 | NOx Cal High |
| 6/30/2011 | 7:41:00 AM | 5.185 | 13.611 | 15.625 | 22.769 | |
| 6/30/2011 | 7:42:00 AM | 5.226 | 13.583 | 13.265 | 22.617 | |
| 6/30/2011 | 7:43:00 AM | 5.247 | 13.556 | 13.208 | 22.307 | NOx Mid |
| 6/30/2011 | 7:44:00 AM | 5.236 | 13.555 | 12.987 | 22.294 | |
| 6/30/2011 | 7:45:00 AM | 5.262 | 13.539 | 14.284 | 20.478 | |
| 6/30/2011 | 7:46:00 AM | 5.284 | 13.515 | 15.325 | 12.744 | |
| 6/30/2011 | 7:47:00 AM | 5.335 | 13.485 | 16.844 | 14.337 | |
| 6/30/2011 | 7:48:00 AM | 5.306 | 13.482 | 14.34 | 21.667 | |
| 6/30/2011 | 7:49:00 AM | 5.279 | 13.516 | 10.77 | 22.288 | |
| 6/30/2011 | 7:50:00 AM | 5.332 | 13.481 | 14.056 | 22.36 | |
| 6/30/2011 | 7:51:00 AM | 5.336 | 13.456 | 15.985 | 22.445 | |
| 6/30/2011 | 7:52:00 AM | 5.31 | 13.488 | 17.143 | 22.497 | SO2 Cal High |
| 6/30/2011 | 7:53:00 AM | 5.307 | 13.47 | 17.359 | 17.408 | |
| 6/30/2011 | 7:54:00 AM | 5.258 | 13.52 | 17.167 | 12.545 | |
| 6/30/2011 | 7:55:00 AM | 5.214 | 13.565 | 14.146 | 12.525 | |
| 6/30/2011 | 7:56:00 AM | 5.184 | 13.591 | 3.234 | 12.532 | SO2 Mid |
| 6/30/2011 | 7:57:00 AM | 5.166 | 13.613 | 0.05 | 12.172 | Zero/NO Mode |
| 6/30/2011 | 7:58:00 AM | 5.145 | 13.661 | 0.053 | 11.432 | |
| 6/30/2011 | 7:59:00 AM | 5.176 | 13.637 | 0.05 | 11.493 | Zero/NOx Mode |
| 6/30/2011 | 8:00:00 AM | 5.211 | 13.615 | 34.967 | 11.294 | |
| 6/30/2011 | 8:01:00 AM | 5.235 | 13.605 | 46.566 | 10.95 | |
| 6/30/2011 | 8:02:00 AM | 5.211 | 13.629 | 47.429 | 10.84 | |
| 6/30/2011 | 8:03:00 AM | 5.251 | 13.598 | 47.422 | 11.029 | |
| 6/30/2011 | 8:04:00 AM | 5.248 | 13.592 | 47.431 | 11.092 | |
| 6/30/2011 | 8:05:00 AM | 5.235 | 13.609 | 47.484 | 11.171 | NO/NO Mode |
| 6/30/2011 | 8:06:00 AM | 5.216 | 13.573 | 47.25 | 11.258 | |

| | | | | | | |
|---|---|---|---|---|---|---|
| 6/30/2011 | 8:07:00 AM | 5.253 | 13.533 | 47.199 | 11.069 | NO/NOx Mode |
| 6/30/2011 | 8:08:00 AM | 5.237 | 13.552 | 14.569 | 10.927 | |
| 6/30/2011 | 8:09:00 AM | 5.203 | 13.591 | 3.865 | 10.842 | |
| 6/30/2011 | 8:10:00 AM | 5.19 | 13.625 | 1.804 | 10.866 | |
| 6/30/2011 | 8:11:00 AM | 5.225 | 13.563 | 1.194 | 10.987 | |
| 6/30/2011 | 8:12:00 AM | 5.231 | 13.564 | 0.849 | 10.791 | |
| 6/30/2011 | 8:13:00 AM | 5.137 | 13.578 | 0.684 | 10.802 | |
| 6/30/2011 | 8:14:00 AM | 5.179 | 13.547 | 0.588 | 10.75 | |
| 6/30/2011 | 8:15:00 AM | 5.072 | 13.287 | 0.503 | 10.459 | NO2/NO Mode |
| 6/30/2011 | 8:16:00 AM | 5.117 | 13.6 | 29.269 | 10.521 | |
| 6/30/2011 | 8:17:00 AM | 5.153 | 13.57 | 42.226 | 10.542 | NO2/NOx Mode |
| 6/30/2011 | 8:18:00 AM | 5.135 | 13.586 | 9.707 | 10.632 | |
| 6/30/2011 | 8:19:00 AM | 5.131 | 13.598 | 0.295 | 10.673 | |
| 6/30/2011 | 8:20:00 AM | 5.183 | 13.548 | 0.217 | 10.475 | |
| 6/30/2011 | 8:21:00 AM | 5.215 | 13.512 | 0.006 | 10.37 | |
| 6/30/2011 | 8:22:00 AM | 5.183 | 13.539 | 0.004 | 10.109 | NOx Cal Zero |
| 6/30/2011 | 8:23:00 AM | 4.862 | 11.882 | 39.57 | 10.233 | |
| 6/30/2011 | 8:24:00 AM | 0.17 | 0.078 | 46.61 | 10.212 | |
| 6/30/2011 | 8:25:00 AM | 0.077 | 0.034 | 46.633 | 11.093 | |
| 6/30/2011 | 8:26:00 AM | 0.075 | 0.027 | 46.865 | 11.353 | |
| 6/30/2011 | 8:27:00 AM | 0.074 | 0.017 | 29.864 | 11.546 | |
| 6/30/2011 | 8:28:00 AM | 0.074 | 0.013 | 0.004 | 11.793 | |
| 6/30/2011 | 8:29:00 AM | 0.075 | 0.012 | -0.038 | 11.882 | |
| 6/30/2011 | 8:30:00 AM | 0.075 | 0.009 | -0.054 | 11.87 | NOx Cal Zero |
| 6/30/2011 | 8:31:00 AM | 0.074 | 0.008 | 11.065 | 11.859 | |
| 6/30/2011 | 8:32:00 AM | 0.074 | 0.006 | 22.953 | 11.931 | |
| 6/30/2011 | 8:33:00 AM | 0.073 | 0.006 | 22.593 | 12.138 | |
| 6/30/2011 | 8:34:00 AM | 0.074 | 0.005 | 22.64 | 12.109 | NOx Cal High |
| 6/30/2011 | 8:35:00 AM | 0.074 | 0.006 | 15.522 | 12.066 | SO2 bias |
| 6/30/2011 | 8:36:00 AM | 0.115 | 0.204 | 13.229 | 12.038 | |
| 6/30/2011 | 8:37:00 AM | 4.8 | 9.801 | 13.2 | 8.656 | NOx Mid |
| 6/30/2011 | 8:38:00 AM | 4.964 | 9.902 | 2.912 | 2.64 | |
| 6/30/2011 | 8:39:00 AM | 4.965 | 9.916 | 0.153 | 0.858 | O2/CO2 bias |
| 6/30/2011 | 8:40:00 AM | 3.773 | 6.85 | 2.777 | 0.433 | |
| 6/30/2011 | 8:41:00 AM | 0.092 | 0.037 | 13.215 | 0.205 | |
| 6/30/2011 | 8:42:00 AM | 0.075 | 0.016 | 13.218 | 0.202 | NOx bias |
| 6/30/2011 | 8:43:00 AM | 2.696 | 8.066 | 13.456 | 0.971 | |
| 6/30/2011 | 8:44:00 AM | 5.102 | 13.629 | 14.505 | 7.885 | |
| 6/30/2011 | 8:45:00 AM | 5.17 | 13.593 | 15.998 | 10.552 | |
| 6/30/2011 | 8:46:00 AM | 5.164 | 13.582 | 15.778 | 10.789 | |
| 6/30/2011 | 8:47:00 AM | 5.141 | 13.629 | 16.276 | 10.824 | |
| 6/30/2011 | 8:48:00 AM | 5.197 | 13.702 | 15.627 | 11.033 | |
| 6/30/2011 | 8:49:00 AM | 5.138 | 13.775 | 8.76 | 11.134 | |
| 6/30/2011 | 8:50:00 AM | 5.205 | 13.842 | 11.052 | 11.603 | |
| 6/30/2011 | 8:51:00 AM | 5.143 | 13.704 | 12.883 | 11.495 | |
| 6/30/2011 | 8:52:00 AM | 5.14 | 13.711 | 13.979 | 11.348 | |
| 6/30/2011 | 8:53:00 AM | 5.155 | 13.687 | 14.146 | 11.27 | |
| 6/30/2011 | 8:54:00 AM | 5.13 | 13.7 | 13.623 | 11.156 | |
| 6/30/2011 | 8:55:00 AM | 5.052 | 13.711 | 11.277 | 11.068 | |
| 6/30/2011 | 8:56:00 AM | 4.935 | 13.813 | 5.075 | 11.418 | |
| 6/30/2011 | 8:57:00 AM | 4.985 | 13.773 | 7.096 | 11.809 | |

| | | | | | |
|---|---|---|---|---|---|
| 6/30/2011 | 8:58:00 AM | 4.975 | 13.787 | 8.702 | 11.911 |
| 6/30/2011 | 8:59:00 AM | 5.019 | 13.752 | 9.842 | 11.96 |
| 6/30/2011 | 9:00:00 AM | 5.016 | 13.75 | 9.856 | 11.596 |
| 6/30/2011 | 9:01:00 AM | 5.036 | 13.741 | 10.718 | 11.246 |
| 6/30/2011 | 9:02:00 AM | 4.997 | 13.77 | 9.247 | 11.11 |
| 6/30/2011 | 9:03:00 AM | 4.94 | 13.824 | 4.62 | 11.383 |
| 6/30/2011 | 9:04:00 AM | 4.983 | 13.795 | 6.716 | 11.457 |
| 6/30/2011 | 9:05:00 AM | 4.962 | 13.801 | 8.46 | 11.675 |
| 6/30/2011 | 9:06:00 AM | 4.999 | 13.781 | 9.453 | 11.678 |
| 6/30/2011 | 9:07:00 AM | 5.012 | 13.801 | 10.232 | 11.386 |
| 6/30/2011 | 9:08:00 AM | 5.073 | 13.826 | 11.066 | 11.282 |
| 6/30/2011 | 9:09:00 AM | 5.054 | 13.851 | 9.793 | 10.999 |
| 6/30/2011 | 9:10:00 AM | 5.048 | 13.847 | 5.183 | 11.161 |
| 6/30/2011 | 9:11:00 AM | 5.136 | 13.756 | 7.179 | 11.395 |
| 6/30/2011 | 9:12:00 AM | 5.128 | 13.759 | 8.722 | 11.383 |
| 6/30/2011 | 9:13:00 AM | 5.079 | 13.812 | 9.291 | 11.304 |
| 6/30/2011 | 9:14:00 AM | 5.046 | 13.84 | 9.641 | 10.9 |
| 6/30/2011 | 9:15:00 AM | 5.059 | 13.828 | 10.796 | 11.058 |
| 6/30/2011 | 9:16:00 AM | 5.067 | 13.838 | 9.919 | 10.935 |
| 6/30/2011 | 9:17:00 AM | 5.021 | 13.862 | 4.81 | 11.079 |
| 6/30/2011 | 9:18:00 AM | 5.034 | 13.847 | 6.157 | 11.611 |
| 6/30/2011 | 9:19:00 AM | 5.056 | 13.846 | 8.194 | 11.677 |
| 6/30/2011 | 9:20:00 AM | 5.088 | 13.803 | 9.152 | 11.649 |
| 6/30/2011 | 9:21:00 AM | 5.043 | 13.852 | 9.529 | 11.482 |
| 6/30/2011 | 9:22:00 AM | 5.099 | 13.801 | 10.543 | 11.326 |
| 6/30/2011 | 9:23:00 AM | 5.08 | 13.809 | 9.725 | 11.119 |
| 6/30/2011 | 9:24:00 AM | 5.025 | 13.868 | 4.8 | 11.225 |
| 6/30/2011 | 9:25:00 AM | 5.049 | 13.822 | 5.459 | 11.806 |
| 6/30/2011 | 9:26:00 AM | 5.053 | 13.827 | 7.274 | 11.874 |
| 6/30/2011 | 9:27:00 AM | 4.986 | 13.89 | 7.962 | 11.792 |
| 6/30/2011 | 9:28:00 AM | 4.961 | 13.916 | 8.419 | 11.699 |
| 6/30/2011 | 9:29:00 AM | 4.98 | 13.91 | 9.225 | 11.564 |
| 6/30/2011 | 9:30:00 AM | 4.979 | 13.916 | 8.705 | 11.397 |
| 6/30/2011 | 9:31:00 AM | 4.894 | 13.986 | 3.926 | 11.586 |
| 6/30/2011 | 9:32:00 AM | 4.913 | 13.954 | 4.256 | 11.89 |
| 6/30/2011 | 9:33:00 AM | 4.913 | 13.964 | 5.878 | 12.407 |
| 6/30/2011 | 9:34:00 AM | 4.915 | 13.975 | 6.71 | 12.205 |
| 6/30/2011 | 9:35:00 AM | 4.915 | 13.974 | 7.103 | 12.074 |
| 6/30/2011 | 9:36:00 AM | 4.944 | 13.953 | 7.517 | 11.91 |
| 6/30/2011 | 9:37:00 AM | 4.923 | 13.982 | 6.848 | 11.714 |
| 6/30/2011 | 9:38:00 AM | 4.874 | 14.046 | 3.152 | 11.687 |
| 6/30/2011 | 9:39:00 AM | 4.934 | 13.96 | 4.095 | 11.9 |
| 6/30/2011 | 9:40:00 AM | 4.977 | 13.912 | 6.054 | 12.009 |
| 6/30/2011 | 9:41:00 AM | 5.004 | 13.917 | 7.452 | 11.985 |
| 6/30/2011 | 9:42:00 AM | 4.983 | 13.932 | 7.943 | 11.881 |
| 6/30/2011 | 9:43:00 AM | 4.993 | 13.939 | 8.618 | 11.812 |
| 6/30/2011 | 9:44:00 AM | 4.982 | 13.931 | 8.202 | 11.593 |
| 6/30/2011 | 9:45:00 AM | 4.938 | 13.991 | 4.54 | 11.579 |
| 6/30/2011 | 9:46:00 AM | 5.051 | 13.885 | 7.449 | 12.001 |
| 6/30/2011 | 9:47:00 AM | 5.088 | 13.839 | 11.286 | 12.092 |
| 6/30/2011 | 9:48:00 AM | 5.077 | 13.838 | 14.045 | 11.941 |
| 6/30/2011 | 9:49:00 AM | 5.085 | 13.836 | 16.477 | 11.602 |

| | | | | | | |
|---|---|---|---|---|---|---|
| 6/30/2011 | 9:50:00 AM | 5.083 | 13.834 | 19.136 | 11.446 | |
| 6/30/2011 | 9:51:00 AM | 5.108 | 13.837 | 20.846 | 11.075 | |
| 6/30/2011 | 9:52:00 AM | 5.067 | 13.861 | 12.544 | 11.138 | |
| 6/30/2011 | 9:53:00 AM | 5.123 | 13.79 | 17.436 | 11.399 | |
| 6/30/2011 | 9:54:00 AM | 5.19 | 13.716 | 24.669 | 11.632 | |
| 6/30/2011 | 9:55:00 AM | 5.168 | 13.744 | 28.673 | 11.53 | |
| 6/30/2011 | 9:56:00 AM | 5.151 | 13.768 | 31.905 | 11.694 | |
| 6/30/2011 | 9:57:00 AM | 5.111 | 13.793 | 34.13 | 11.463 | |
| 6/30/2011 | 9:58:00 AM | 5.068 | 13.85 | 33.391 | 11.479 | |
| 6/30/2011 | 9:59:00 AM | 5.038 | 13.895 | 19.596 | 12.116 | |
| 6/30/2011 | 10:00:00 AM | 5.063 | 13.885 | 21.806 | 11.947 | |
| 6/30/2011 | 10:01:00 AM | 5.086 | 13.844 | 29.059 | 11.812 | |
| 6/30/2011 | 10:02:00 AM | 5.063 | 13.87 | 32.243 | 11.824 | |
| 6/30/2011 | 10:03:00 AM | 5.094 | 13.845 | 34.06 | 11.492 | |
| 6/30/2011 | 10:04:00 AM | 5.052 | 13.883 | 34.213 | 11.323 | |
| 6/30/2011 | 10:05:00 AM | 4.995 | 13.944 | 34.548 | 11.335 | |
| 6/30/2011 | 10:06:00 AM | 4.924 | 14.033 | 19.243 | 11.554 | |
| 6/30/2011 | 10:07:00 AM | 4.985 | 13.974 | 20.817 | 12.349 | |
| 6/30/2011 | 10:08:00 AM | 5.055 | 13.906 | 29.335 | 12.475 | |
| 6/30/2011 | 10:09:00 AM | 5.07 | 13.902 | 34.994 | 12.136 | |
| 6/30/2011 | 10:10:00 AM | 5.08 | 13.884 | 38.202 | 11.703 | |
| 6/30/2011 | 10:11:00 AM | 5.061 | 13.907 | 38.12 | 11.711 | |
| 6/30/2011 | 10:12:00 AM | 5.015 | 13.958 | 36.414 | 11.583 | |
| 6/30/2011 | 10:13:00 AM | 4.901 | 14.095 | 20.25 | 11.591 | |
| 6/30/2011 | 10:14:00 AM | 4.958 | 14.043 | 20.714 | 11.889 | |
| 6/30/2011 | 10:15:00 AM | 4.94 | 13.982 | 29.055 | 12.088 | |
| 6/30/2011 | 10:16:00 AM | 5.008 | 13.864 | 7.362 | 12.022 | |
| 6/30/2011 | 10:17:00 AM | 5.049 | 13.808 | -0.08 | 11.655 | |
| 6/30/2011 | 10:18:00 AM | 5.058 | 13.797 | -0.09 | 11.394 | NOx Cal Zero |
| 6/30/2011 | 10:19:00 AM | 5.17 | 13.939 | 36.984 | 11.299 | |
| 6/30/2011 | 10:20:00 AM | 5.186 | 13.867 | 47.046 | 11.15 | |
| 6/30/2011 | 10:21:00 AM | 4.761 | 10.718 | 41.537 | 10.367 | |
| 6/30/2011 | 10:22:00 AM | 4.968 | 9.977 | 46.638 | 4.403 | |
| 6/30/2011 | 10:23:00 AM | 0.413 | 0.166 | 47.167 | 3.23 | |
| 6/30/2011 | 10:24:00 AM | 0.083 | 0.031 | 47.268 | 9.039 | NOx Cal High |
| 6/30/2011 | 10:25:00 AM | 0.084 | 0.02 | 31.864 | 11.234 | |
| 6/30/2011 | 10:26:00 AM | 0.084 | 0.014 | 23.029 | 11.762 | NOx Mid |
| 6/30/2011 | 10:27:00 AM | 0.083 | 0.013 | 4.939 | 12.002 | |
| 6/30/2011 | 10:28:00 AM | 0.084 | 0.008 | 0.002 | 12.067 | SO2 bias |
| 6/30/2011 | 10:29:00 AM | 0.084 | 0.006 | -0.011 | 12.061 | |
| 6/30/2011 | 10:30:00 AM | 4.057 | 8.758 | -0.063 | 9.637 | |
| 6/30/2011 | 10:31:00 AM | 4.985 | 10.001 | -0.082 | 2.778 | O2/CO2 bias |
| 6/30/2011 | 10:32:00 AM | 4.251 | 7.931 | 2.333 | 0.936 | |
| 6/30/2011 | 10:33:00 AM | 0.106 | 0.035 | 22.799 | 0.388 | |
| 6/30/2011 | 10:34:00 AM | 0.082 | 0.007 | 22.904 | 0.125 | |
| 6/30/2011 | 10:35:00 AM | 0.084 | 0.007 | 22.94 | 0.031 | |
| 6/30/2011 | 10:36:00 AM | 0.084 | 0.005 | 22.945 | -0.049 | |
| 6/30/2011 | 10:37:00 AM | 0.084 | 0.004 | 22.932 | -0.056 | NOx bias |
| 6/30/2011 | 10:38:00 AM | 2.748 | 8.225 | 20.244 | 0.704 | |
| 6/30/2011 | 10:39:00 AM | 5.044 | 13.785 | 17.297 | 7.231 | |
| 6/30/2011 | 10:40:00 AM | 5.045 | 13.832 | 18.794 | 10.296 | |

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|---|---|---|---|---|---|
| 6/30/2011 | 10:41:00 AM | 5.157 | 13.777 | 19.94 | 10.738 |
| 6/30/2011 | 10:42:00 AM | 5.182 | 13.755 | 19.465 | 10.677 |
| 6/30/2011 | 10:43:00 AM | 5.16 | 13.772 | 19.374 | 10.718 |
| 6/30/2011 | 10:44:00 AM | 5.138 | 13.866 | 19.113 | 10.987 |
| 6/30/2011 | 10:45:00 AM | 5.267 | 14.234 | 20.992 | 11.243 |
| 6/30/2011 | 10:46:00 AM | 5.151 | 13.856 | 21.991 | 11.153 |
| 6/30/2011 | 10:47:00 AM | 5.124 | 13.67 | 22.162 | 10.856 |
| 6/30/2011 | 10:48:00 AM | 5.109 | 13.671 | 21.485 | 10.691 |
| 6/30/2011 | 10:49:00 AM | 5.081 | 13.7 | 21.869 | 10.57 |
| 6/30/2011 | 10:50:00 AM | 5.069 | 13.697 | 22.633 | 10.633 |
| 6/30/2011 | 10:51:00 AM | 5.058 | 13.709 | 22.038 | 10.657 |
| 6/30/2011 | 10:52:00 AM | 5.002 | 13.748 | 22.181 | 10.78 |
| 6/30/2011 | 10:53:00 AM | 5.042 | 13.723 | 23.693 | 10.627 |
| 6/30/2011 | 10:54:00 AM | 5.032 | 13.743 | 24.111 | 10.794 |
| 6/30/2011 | 10:55:00 AM | 5.04 | 13.847 | 25.274 | 10.821 |
| 6/30/2011 | 10:56:00 AM | 5.101 | 13.788 | 27.727 | 10.806 |
| 6/30/2011 | 10:57:00 AM | 5.148 | 13.715 | 29.06 | 10.724 |
| 6/30/2011 | 10:58:00 AM | 5.17 | 13.717 | 29.778 | 10.549 |
| 6/30/2011 | 10:59:00 AM | 5.199 | 13.668 | 29.587 | 10.589 |
| 6/30/2011 | 11:00:00 AM | 5.16 | 13.683 | 27.616 | 10.606 |
| 6/30/2011 | 11:01:00 AM | 5.132 | 13.716 | 26.396 | 10.607 |
| 6/30/2011 | 11:02:00 AM | 5.008 | 13.715 | 26.147 | 10.683 |
| 6/30/2011 | 11:03:00 AM | 5.032 | 13.698 | 27.883 | 10.961 |
| 6/30/2011 | 11:04:00 AM | 5.082 | 13.648 | 28.543 | 11.072 |
| 6/30/2011 | 11:05:00 AM | 5.068 | 13.669 | 27.93 | 10.685 |
| 6/30/2011 | 11:06:00 AM | 5.048 | 13.679 | 27.276 | 10.534 |
| 6/30/2011 | 11:07:00 AM | 5.02 | 13.701 | 26.341 | 10.774 |
| 6/30/2011 | 11:08:00 AM | 5.071 | 13.647 | 26.901 | 10.75 |
| 6/30/2011 | 11:09:00 AM | 5.06 | 13.659 | 28.23 | 10.641 |
| 6/30/2011 | 11:10:00 AM | 5.121 | 13.593 | 28.121 | 10.602 |
| 6/30/2011 | 11:11:00 AM | 5.113 | 13.602 | 26.781 | 10.729 |
| 6/30/2011 | 11:12:00 AM | 5.067 | 13.632 | 25.426 | 10.462 |
| 6/30/2011 | 11:13:00 AM | 5.058 | 13.648 | 24.958 | 10.745 |
| 6/30/2011 | 11:14:00 AM | 5.079 | 13.621 | 23.488 | 10.66 |
| 6/30/2011 | 11:15:00 AM | 5.047 | 13.651 | 22.132 | 10.431 |
| 6/30/2011 | 11:16:00 AM | 4.983 | 13.717 | 20.813 | 10.692 |
| 6/30/2011 | 11:17:00 AM | 4.971 | 13.746 | 20.284 | 10.771 |
| 6/30/2011 | 11:18:00 AM | 4.988 | 13.73 | 19.535 | 10.817 |
| 6/30/2011 | 11:19:00 AM | 5.007 | 13.712 | 19.213 | 10.866 |
| 6/30/2011 | 11:20:00 AM | 4.953 | 13.767 | 18.998 | 10.678 |
| 6/30/2011 | 11:21:00 AM | 4.983 | 13.738 | 19.252 | 10.727 |
| 6/30/2011 | 11:22:00 AM | 5.021 | 13.713 | 19.402 | 10.744 |
| 6/30/2011 | 11:23:00 AM | 5.035 | 13.683 | 18.984 | 10.768 |
| 6/30/2011 | 11:24:00 AM | 4.994 | 13.729 | 18.638 | 10.792 |
| 6/30/2011 | 11:25:00 AM | 4.966 | 13.759 | 19.048 | 10.926 |
| 6/30/2011 | 11:26:00 AM | 5.029 | 13.7 | 19.087 | 10.964 |
| 6/30/2011 | 11:27:00 AM | 5.046 | 13.686 | 18.309 | 10.803 |
| 6/30/2011 | 11:28:00 AM | 5.036 | 13.707 | 18.542 | 10.741 |
| 6/30/2011 | 11:29:00 AM | 5.065 | 13.676 | 18.692 | 10.963 |
| 6/30/2011 | 11:30:00 AM | 5.053 | 13.673 | 18.167 | 10.891 |
| 6/30/2011 | 11:31:00 AM | 5.061 | 13.687 | 18.007 | 10.744 |
| 6/30/2011 | 11:32:00 AM | 5.125 | 13.618 | 17.529 | 10.909 |

| | | | | | |
|---|---|---|---|---|---|
| 6/30/2011 | 11:33:00 AM | 5.13 | 13.613 | 16.996 | 10.79 |
| 6/30/2011 | 11:34:00 AM | 5.105 | 13.633 | 17.218 | 10.536 |
| 6/30/2011 | 11:35:00 AM | 5.106 | 13.646 | 17.412 | 10.631 |
| 6/30/2011 | 11:36:00 AM | 5.092 | 13.654 | 17.505 | 10.703 |
| 6/30/2011 | 11:37:00 AM | 5.112 | 13.645 | 18.052 | 10.641 |
| 6/30/2011 | 11:38:00 AM | 5.092 | 13.655 | 17.623 | 10.696 |
| 6/30/2011 | 11:39:00 AM | 5.096 | 13.64 | 17.041 | 10.874 |
| 6/30/2011 | 11:40:00 AM | 5.056 | 13.681 | 16.506 | 10.809 |
| 6/30/2011 | 11:41:00 AM | 5.042 | 13.698 | 16.81 | 10.819 |
| 6/30/2011 | 11:42:00 AM | 5.041 | 13.697 | 17.625 | 10.906 |
| 6/30/2011 | 11:43:00 AM | 5.074 | 13.664 | 17.834 | 10.951 |
| 6/30/2011 | 11:44:00 AM | 5.102 | 13.641 | 17.585 | 10.971 |
| 6/30/2011 | 11:45:00 AM | 5.007 | 13.727 | 16.942 | 10.976 |
| 6/30/2011 | 11:46:00 AM | 5.023 | 13.725 | 17.65 | 11.059 |
| 6/30/2011 | 11:47:00 AM | 5.023 | 13.698 | 17.587 | 11.107 |
| 6/30/2011 | 11:48:00 AM | 5.05 | 13.683 | 17.067 | 11.071 |
| 6/30/2011 | 11:49:00 AM | 4.984 | 13.75 | 16.416 | 10.943 |
| 6/30/2011 | 11:50:00 AM | 5.015 | 13.732 | 16.893 | 11.073 |
| 6/30/2011 | 11:51:00 AM | 5.03 | 13.708 | 16.231 | 11.002 |
| 6/30/2011 | 11:52:00 AM | 4.981 | 13.757 | 14.822 | 11.06 |
| 6/30/2011 | 11:53:00 AM | 5.004 | 13.735 | 14.687 | 11.223 |
| 6/30/2011 | 11:54:00 AM | 5.004 | 13.74 | 14.38 | 11.119 |
| 6/30/2011 | 11:55:00 AM | 4.988 | 13.742 | 14.231 | 11.057 |
| 6/30/2011 | 11:56:00 AM | 4.954 | 13.765 | 13.962 | 11.148 |
| 6/30/2011 | 11:57:00 AM | 4.958 | 13.765 | 14.325 | 11.147 |
| 6/30/2011 | 11:58:00 AM | 5.002 | 13.752 | 14.678 | 11.06 |
| 6/30/2011 | 11:59:00 AM | 5.011 | 13.735 | 14.258 | 11.236 |
| 6/30/2011 | 12:00:00 PM | 5.019 | 13.714 | 13.98 | 11.291 |
| 6/30/2011 | 12:01:00 PM | 5.022 | 13.724 | 14.668 | 11.216 |
| 6/30/2011 | 12:02:00 PM | 5.043 | 13.703 | 15.631 | 11.029 |
| 6/30/2011 | 12:03:00 PM | 5.057 | 13.685 | 15.311 | 10.983 |
| 6/30/2011 | 12:04:00 PM | 5.053 | 13.688 | 15.333 | 10.983 |
| 6/30/2011 | 12:05:00 PM | 5.02 | 13.712 | 15.362 | 11.179 |
| 6/30/2011 | 12:06:00 PM | 5.027 | 13.709 | 15.813 | 11.157 |
| 6/30/2011 | 12:07:00 PM | 5.081 | 13.716 | 15.804 | 11.046 |
| 6/30/2011 | 12:08:00 PM | 5.044 | 13.79 | 15.1 | 11.001 |
| 6/30/2011 | 12:09:00 PM | 4.982 | 13.815 | 14.415 | 11.033 |
| 6/30/2011 | 12:10:00 PM | 5.005 | 13.788 | 14.569 | 11.25 |
| 6/30/2011 | 12:11:00 PM | 5.035 | 13.782 | 14.496 | 11.347 |
| 6/30/2011 | 12:12:00 PM | 5.022 | 13.782 | 14.283 | 11.488 |
| 6/30/2011 | 12:13:00 PM | 4.983 | 13.8 | 14.321 | 11.429 |
| 6/30/2011 | 12:14:00 PM | 5.016 | 13.772 | 14.252 | 11.289 |
| 6/30/2011 | 12:15:00 PM | 4.967 | 13.793 | 13.888 | 11.407 |
| 6/30/2011 | 12:16:00 PM | 4.973 | 13.79 | 14.753 | 11.508 |
| 6/30/2011 | 12:17:00 PM | 4.996 | 13.774 | 15.571 | 11.461 |
| 6/30/2011 | 12:18:00 PM | 5.069 | 13.696 | 16.151 | 11.328 |
| 6/30/2011 | 12:19:00 PM | 3.652 | 8.898 | 12.852 | 10.9 |
| 6/30/2011 | 12:20:00 PM | 0.104 | 0.034 | 0.015 | 10.628 |
| 6/30/2011 | 12:21:00 PM | 0.094 | 0.018 | -0.019 | 11.398 |
| 6/30/2011 | 12:22:00 PM | 0.094 | 0.011 | -0.024 | 11.63 |
| 6/30/2011 | 12:23:00 PM | 0.095 | 0.006 | -0.033 | 11.814 |
| 6/30/2011 | 12:24:00 PM | 0.095 | 0.006 | -0.033 | 11.79 |

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|---|---|---|---|---|---|---|
| 6/30/2011 | 12:25:00 PM | 0.095 | 0.005 | -0.032 | 11.888 | SO2 bias |
| 6/30/2011 | 12:26:00 PM | 1.666 | 3.826 | -0.052 | 11.801 | |
| 6/30/2011 | 12:27:00 PM | 4.986 | 10.01 | -0.094 | 5 | |
| 6/30/2011 | 12:28:00 PM | 5.003 | 10.052 | -0.091 | 1.147 | O2/CO2 bias |
| 6/30/2011 | 12:29:00 PM | 2.447 | 4.233 | 10.982 | 0.366 | |
| 6/30/2011 | 12:30:00 PM | 0.095 | 0.016 | 23.119 | 0.159 | |
| 6/30/2011 | 12:31:00 PM | 0.093 | 0.008 | 23.167 | -0.007 | |
| 6/30/2011 | 12:32:00 PM | 0.083 | 0.002 | 23.201 | -0.046 | |
| 6/30/2011 | 12:33:00 PM | 0.083 | 0.001 | 23.205 | -0.002 | |
| 6/30/2011 | 12:34:00 PM | 0.083 | 0.001 | 23.183 | -0.108 | |
| 6/30/2011 | 12:35:00 PM | 0.084 | 0.001 | 23.19 | -0.164 | |
| 6/30/2011 | 12:36:00 PM | 0.085 | -0.002 | 23.223 | -0.175 | NOx bias |
| 6/30/2011 | 12:37:00 PM | 2.739 | 8.558 | 17.241 | 0.775 | |
| 6/30/2011 | 12:38:00 PM | 4.928 | 14.041 | 11.576 | 7.791 | |
| 6/30/2011 | 12:39:00 PM | 4.889 | 13.825 | 11.647 | 10.546 | |
| 6/30/2011 | 12:40:00 PM | 4.915 | 13.805 | 12.163 | 11.116 | |
| 6/30/2011 | 12:41:00 PM | 4.939 | 13.802 | 12.561 | 11.34 | |
| 6/30/2011 | 12:42:00 PM | 4.977 | 13.771 | 13.153 | 11.486 | |
| 6/30/2011 | 12:43:00 PM | 5 | 13.736 | 13.379 | 11.017 | |
| 6/30/2011 | 12:44:00 PM | 4.979 | 13.759 | 13.091 | 10.661 | |
| 6/30/2011 | 12:45:00 PM | 5.016 | 13.727 | 13.535 | 10.306 | |
| 6/30/2011 | 12:46:00 PM | 4.989 | 13.757 | 13.253 | 10.035 | |
| 6/30/2011 | 12:47:00 PM | 4.996 | 13.751 | 13.197 | 10.205 | |
| 6/30/2011 | 12:48:00 PM | 4.99 | 13.751 | 13.294 | 10.399 | |
| 6/30/2011 | 12:49:00 PM | 4.994 | 13.743 | 13.885 | 10.529 | |
| 6/30/2011 | 12:50:00 PM | 5 | 13.739 | 13.447 | 10.474 | |
| 6/30/2011 | 12:51:00 PM | 5.019 | 13.736 | 13.44 | 10.51 | |
| 6/30/2011 | 12:52:00 PM | 5.018 | 13.74 | 13.155 | 10.564 | |
| 6/30/2011 | 12:53:00 PM | 5.022 | 13.728 | 13.085 | 10.666 | |
| 6/30/2011 | 12:54:00 PM | 4.988 | 13.763 | 12.811 | 10.654 | |
| 6/30/2011 | 12:55:00 PM | 4.996 | 13.759 | 13.246 | 10.884 | |
| 6/30/2011 | 12:56:00 PM | 4.999 | 13.753 | 13.408 | 10.683 | |
| 6/30/2011 | 12:57:00 PM | 5.011 | 13.734 | 12.923 | 10.593 | |
| 6/30/2011 | 12:58:00 PM | 5.001 | 13.734 | 12.317 | 10.549 | |
| 6/30/2011 | 12:59:00 PM | 4.952 | 13.79 | 12.483 | 10.777 | |
| 6/30/2011 | 1:00:00 PM | 4.98 | 13.765 | 12.888 | 10.662 | |
| 6/30/2011 | 1:01:00 PM | 5.052 | 13.706 | 12.839 | 10.275 | |
| 6/30/2011 | 1:02:00 PM | 5.054 | 13.702 | 12.781 | 10.26 | |
| 6/30/2011 | 1:03:00 PM | 5.033 | 13.729 | 13.079 | 10.164 | |
| 6/30/2011 | 1:04:00 PM | 5.025 | 13.728 | 13.144 | 10.175 | |
| 6/30/2011 | 1:05:00 PM | 5.002 | 13.749 | 12.538 | 10.329 | |
| 6/30/2011 | 1:06:00 PM | 5.037 | 13.729 | 13.062 | 10.539 | |
| 6/30/2011 | 1:07:00 PM | 5.045 | 13.727 | 13.153 | 10.444 | |
| 6/30/2011 | 1:08:00 PM | 5.045 | 13.724 | 13.45 | 10.507 | |
| 6/30/2011 | 1:09:00 PM | 5.021 | 13.739 | 13.362 | 10.437 | |
| 6/30/2011 | 1:10:00 PM | 4.997 | 13.77 | 13.506 | 10.525 | |
| 6/30/2011 | 1:11:00 PM | 4.966 | 13.775 | 13.129 | 10.763 | |
| 6/30/2011 | 1:12:00 PM | 4.995 | 13.766 | 13.012 | 10.849 | |
| 6/30/2011 | 1:13:00 PM | 5.037 | 13.727 | 13.342 | 10.638 | |
| 6/30/2011 | 1:14:00 PM | 5.059 | 13.701 | 14.127 | 10.638 | |
| 6/30/2011 | 1:15:00 PM | 5.078 | 13.692 | 14.556 | 10.533 | |
| 6/30/2011 | 1:16:00 PM | 5.088 | 13.667 | 14.567 | 10.457 | |

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|---|---|---|---|---|---|
| 6/30/2011 | 1:17:00 PM | 5.058 | 13.696 | 14.345 | 10.479 |
| 6/30/2011 | 1:18:00 PM | 5.031 | 13.732 | 14.922 | 10.481 |
| 6/30/2011 | 1:19:00 PM | 5.055 | 13.707 | 15.296 | 10.642 |
| 6/30/2011 | 1:20:00 PM | 5.038 | 13.694 | 14.443 | 10.358 |
| 6/30/2011 | 1:21:00 PM | 4.995 | 13.749 | 13.742 | 10.519 |
| 6/30/2011 | 1:22:00 PM | 4.955 | 13.791 | 13.529 | 10.693 |
| 6/30/2011 | 1:23:00 PM | 4.991 | 13.765 | 13.411 | 10.486 |
| 6/30/2011 | 1:24:00 PM | 4.985 | 13.78 | 13.31 | 10.348 |
| 6/30/2011 | 1:25:00 PM | 5.004 | 13.761 | 13.765 | 10.299 |
| 6/30/2011 | 1:26:00 PM | 4.981 | 13.785 | 13.533 | 10.492 |
| 6/30/2011 | 1:27:00 PM | 5.017 | 13.744 | 13.995 | 10.438 |
| 6/30/2011 | 1:28:00 PM | 5 | 13.762 | 13.673 | 10.424 |
| 6/30/2011 | 1:29:00 PM | 5.049 | 13.727 | 14.212 | 10.349 |
| 6/30/2011 | 1:30:00 PM | 5.05 | 13.713 | 13.931 | 10.45 |
| 6/30/2011 | 1:31:00 PM | 5.024 | 13.745 | 13.994 | 10.5 |
| 6/30/2011 | 1:32:00 PM | 5.066 | 13.704 | 14.138 | 10.416 |
| 6/30/2011 | 1:33:00 PM | 5.041 | 13.726 | 14.287 | 10.235 |
| 6/30/2011 | 1:34:00 PM | 5.023 | 13.744 | 14.464 | 10.225 |
| 6/30/2011 | 1:35:00 PM | 4.979 | 13.786 | 14.114 | 9.889 |
| 6/30/2011 | 1:36:00 PM | 4.996 | 13.78 | 14.532 | 9.399 |
| 6/30/2011 | 1:37:00 PM | 5.025 | 13.732 | 14.993 | 9.478 |
| 6/30/2011 | 1:38:00 PM | 5.065 | 13.72 | 15.465 | 9.647 |
| 6/30/2011 | 1:39:00 PM | 5.11 | 13.664 | 15.19 | 9.635 |
| 6/30/2011 | 1:40:00 PM | 5.034 | 13.729 | 14.06 | 9.727 |
| 6/30/2011 | 1:41:00 PM | 5.03 | 13.739 | 13.774 | 9.855 |
| 6/30/2011 | 1:42:00 PM | 4.958 | 13.799 | 12.35 | 9.92 |
| 6/30/2011 | 1:43:00 PM | 4.917 | 13.83 | 11.567 | 10.188 |
| 6/30/2011 | 1:44:00 PM | 4.885 | 13.871 | 11.593 | 10.368 |
| 6/30/2011 | 1:45:00 PM | 4.955 | 13.814 | 12.433 | 10.403 |
| 6/30/2011 | 1:46:00 PM | 4.989 | 13.777 | 12.758 | 10.432 |
| 6/30/2011 | 1:47:00 PM | 5.006 | 13.759 | 12.789 | 10.593 |
| 6/30/2011 | 1:48:00 PM | 5.026 | 13.762 | 13.284 | 10.4 |
| 6/30/2011 | 1:49:00 PM | 5.05 | 13.726 | 13.659 | 10.275 |
| 6/30/2011 | 1:50:00 PM | 5.014 | 13.759 | 13.293 | 10.31 |
| 6/30/2011 | 1:51:00 PM | 5.025 | 13.749 | 13.238 | 10.119 |
| 6/30/2011 | 1:52:00 PM | 5.03 | 13.744 | 13.785 | 10.116 |
| 6/30/2011 | 1:53:00 PM | 4.988 | 13.775 | 13.713 | 10.284 |
| 6/30/2011 | 1:54:00 PM | 5.018 | 13.734 | 13.779 | 10.467 |
| 6/30/2011 | 1:55:00 PM | 4.965 | 13.796 | 13.46 | 10.325 |
| 6/30/2011 | 1:56:00 PM | 4.964 | 13.776 | 13.336 | 10.751 |
| 6/30/2011 | 1:57:00 PM | 4.985 | 13.794 | 14.098 | 10.858 |
| 6/30/2011 | 1:58:00 PM | 5.011 | 13.749 | 14.617 | 10.655 |
| 6/30/2011 | 1:59:00 PM | 4.945 | 13.825 | 11.397 | 10.678 |
| 6/30/2011 | 2:00:00 PM | 4.945 | 13.822 | 4.945 | 11.084 |
| 6/30/2011 | 2:01:00 PM | 4.998 | 13.745 | 6.817 | 11.476 |
| 6/30/2011 | 2:02:00 PM | 4.984 | 13.773 | 9.328 | 11.555 |
| 6/30/2011 | 2:03:00 PM | 5.014 | 13.746 | 10.785 | 11.493 |
| 6/30/2011 | 2:04:00 PM | 4.971 | 13.786 | 11.296 | 11.269 |
| 6/30/2011 | 2:05:00 PM | 4.922 | 13.826 | 9.15 | 11.226 |
| 6/30/2011 | 2:06:00 PM | 4.916 | 13.834 | 5.129 | 11.379 |
| 6/30/2011 | 2:07:00 PM | 4.982 | 13.782 | 8.297 | 11.588 |
| 6/30/2011 | 2:08:00 PM | 5.031 | 13.726 | 10.494 | 11.637 |

| | | | | | |
|---|---|---|---|---|---|
| 6/30/2011 | 2:09:00 PM | 4.98 | 13.772 | 11.159 | 11.642 |
| 6/30/2011 | 2:10:00 PM | 4.998 | 13.757 | 12.263 | 11.517 |
| 6/30/2011 | 2:11:00 PM | 4.973 | 13.788 | 9.535 | 11.358 |
| 6/30/2011 | 2:12:00 PM | 4.919 | 13.829 | 4.924 | 11.241 |
| 6/30/2011 | 2:13:00 PM | 4.938 | 13.796 | 7.748 | 11.684 |
| 6/30/2011 | 2:14:00 PM | 4.979 | 13.772 | 10.304 | 11.808 |
| 6/30/2011 | 2:15:00 PM | 4.986 | 13.75 | 11.386 | 11.696 |
| 6/30/2011 | 2:16:00 PM | 5.002 | 13.728 | 11.765 | 11.6 |
| 6/30/2011 | 2:17:00 PM | 4.866 | 13.861 | 8.821 | 11.338 |
| 6/30/2011 | 2:18:00 PM | 4.872 | 13.861 | 4.491 | 11.919 |
| 6/30/2011 | 2:19:00 PM | 4.978 | 13.761 | 7.451 | 12.115 |
| 6/30/2011 | 2:20:00 PM | 5.038 | 13.701 | 9.657 | 12.149 |
| 6/30/2011 | 2:21:00 PM | 5.061 | 13.68 | 10.68 | 11.799 |
| 6/30/2011 | 2:22:00 PM | 5.022 | 13.721 | 10.93 | 11.594 |
| 6/30/2011 | 2:23:00 PM | 4.98 | 13.75 | 9.406 | 11.649 |
| 6/30/2011 | 2:24:00 PM | 4.872 | 13.844 | 3.947 | 11.601 |
| 6/30/2011 | 2:25:00 PM | 4.898 | 13.83 | 5.571 | 12.084 |
| 6/30/2011 | 2:26:00 PM | 4.935 | 13.787 | 7.929 | 12.114 |
| 6/30/2011 | 2:27:00 PM | 4.977 | 13.765 | 9.229 | 11.967 |
| 6/30/2011 | 2:28:00 PM | 4.987 | 13.761 | 10.101 | 11.845 |
| 6/30/2011 | 2:29:00 PM | 4.958 | 13.778 | 8.281 | 11.644 |
| 6/30/2011 | 2:30:00 PM | 4.942 | 13.792 | 3.908 | 11.784 |
| 6/30/2011 | 2:31:00 PM | 4.984 | 13.752 | 5.993 | 11.996 |
| 6/30/2011 | 2:32:00 PM | 4.964 | 13.753 | 7.517 | 11.96 |
| 6/30/2011 | 2:33:00 PM | 4.966 | 13.766 | 8.338 | 11.66 |
| 6/30/2011 | 2:34:00 PM | 4.945 | 13.772 | 8.608 | 11.359 |
| 6/30/2011 | 2:35:00 PM | 4.93 | 13.795 | 8.937 | 11.466 |
| 6/30/2011 | 2:36:00 PM | 4.926 | 13.803 | 9.146 | 11.504 |
| 6/30/2011 | 2:37:00 PM | 4.977 | 13.766 | 10.007 | 11.267 |
| 6/30/2011 | 2:38:00 PM | 5.003 | 13.744 | 10.918 | 11.174 |
| 6/30/2011 | 2:39:00 PM | 4.991 | 13.742 | 11.05 | 11.225 |
| 6/30/2011 | 2:40:00 PM | 4.968 | 13.773 | 6.443 | 11.1 |
| 6/30/2011 | 2:41:00 PM | 4.951 | 13.785 | 5.681 | 11.296 |
| 6/30/2011 | 2:42:00 PM | 4.974 | 13.755 | 8.14 | 11.699 |
| 6/30/2011 | 2:43:00 PM | 4.962 | 13.792 | 9.611 | 11.547 |
| 6/30/2011 | 2:44:00 PM | 4.987 | 13.768 | 10.569 | 11.476 |
| 6/30/2011 | 2:45:00 PM | 4.991 | 13.752 | 10.394 | 11.474 |
| 6/30/2011 | 2:46:00 PM | 4.979 | 13.74 | 10.199 | 11.18 |
| 6/30/2011 | 2:47:00 PM | 4.959 | 13.76 | 10.306 | 11.181 |
| 6/30/2011 | 2:48:00 PM | 4.949 | 13.775 | 10.679 | 11.265 |
| 6/30/2011 | 2:49:00 PM | 4.952 | 13.772 | 11.664 | 11.257 |
| 6/30/2011 | 2:50:00 PM | 4.993 | 13.74 | 11.865 | 11.143 |
| 6/30/2011 | 2:51:00 PM | 5.016 | 13.702 | 11.888 | 11.024 |
| 6/30/2011 | 2:52:00 PM | 4.997 | 13.731 | 12.111 | 10.746 |
| 6/30/2011 | 2:53:00 PM | 4.999 | 13.741 | 12.663 | 10.584 |
| 6/30/2011 | 2:54:00 PM | 5.029 | 13.69 | 12.892 | 10.712 |
| 6/30/2011 | 2:55:00 PM | 4.995 | 13.713 | 13.101 | 10.79 |
| 6/30/2011 | 2:56:00 PM | 4.975 | 13.727 | 13.135 | 10.71 |
| 6/30/2011 | 2:57:00 PM | 2.465 | 5.754 | 7.937 | 10.722 |
| 6/30/2011 | 2:58:00 PM | 0.116 | 0.026 | -0.012 | 11.065 |
| 6/30/2011 | 2:59:00 PM | 0.113 | 0.012 | -0.018 | 11.331 |
| 6/30/2011 | 3:00:00 PM | 0.112 | 0.008 | -0.029 | 11.412 |

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|---|---|---|---|---|---|---|
| 6/30/2011 | 3:01:00 PM | 0.113 | 0.004 | -0.029 | 11.595 | |
| 6/30/2011 | 3:02:00 PM | 0.114 | 0.006 | -0.034 | 11.682 | |
| 6/30/2011 | 3:03:00 PM | 0.114 | 0.005 | -0.04 | 11.805 | |
| 6/30/2011 | 3:04:00 PM | 0.114 | 0.001 | -0.044 | 11.846 | |
| 6/30/2011 | 3:05:00 PM | 0.114 | -0.001 | -0.043 | 11.997 | |
| 6/30/2011 | 3:06:00 PM | 0.114 | -0.002 | -0.042 | 11.846 | SO2 bias |
| 6/30/2011 | 3:07:00 PM | 2.996 | 6.51 | -0.079 | 10.721 | |
| 6/30/2011 | 3:08:00 PM | 4.949 | 9.905 | -0.108 | 3.365 | |
| 6/30/2011 | 3:09:00 PM | 4.968 | 9.958 | -0.113 | 0.767 | |
| 6/30/2011 | 3:10:00 PM | 4.937 | 9.903 | -0.11 | 0.118 | O2/CO2 bias |
| 6/30/2011 | 3:11:00 PM | 4.933 | 9.9 | -0.102 | -0.038 | |
| 6/30/2011 | 3:12:00 PM | 4.204 | 7.869 | 2.29 | -0.152 | |
| 6/30/2011 | 3:13:00 PM | 0.127 | 0.034 | 22.764 | -0.157 | |
| 6/30/2011 | 3:14:00 PM | 0.103 | 0.012 | 22.842 | -0.194 | NOx bias |
| 6/30/2011 | 3:15:00 PM | 1.652 | 5.213 | 20.189 | -0.031 | |
| 6/30/2011 | 3:16:00 PM | 4.954 | 13.683 | 13.46 | 5.738 | |
| 6/30/2011 | 3:17:00 PM | 4.947 | 13.702 | 13.237 | 9.836 | |
| 6/30/2011 | 3:18:00 PM | 4.888 | 13.76 | 12.871 | 10.533 | |
| 6/30/2011 | 3:19:00 PM | 4.905 | 13.747 | 13.379 | 10.918 | |
| 6/30/2011 | 3:20:00 PM | 4.899 | 13.754 | 13.245 | 11.031 | |
| 6/30/2011 | 3:21:00 PM | 4.937 | 13.737 | 13.718 | 11.03 | |
| 6/30/2011 | 3:22:00 PM | 4.96 | 13.72 | 14.645 | 10.854 | |
| 6/30/2011 | 3:23:00 PM | 5.004 | 13.672 | 15.425 | 10.696 | |
| 6/30/2011 | 3:24:00 PM | 4.979 | 13.699 | 15.637 | 10.656 | |
| 6/30/2011 | 3:25:00 PM | 5.022 | 13.653 | 15.676 | 10.597 | |
| 6/30/2011 | 3:26:00 PM | 4.979 | 13.694 | 9.872 | 10.509 | |
| 6/30/2011 | 3:27:00 PM | 4.932 | 13.729 | 9.98 | 10.991 | |
| 6/30/2011 | 3:28:00 PM | 4.983 | 13.703 | 12.469 | 11.212 | |
| 6/30/2011 | 3:29:00 PM | 5.007 | 13.663 | 13.565 | 11.025 | |
| 6/30/2011 | 3:30:00 PM | 4.991 | 13.68 | 14.17 | 11.183 | |
| 6/30/2011 | 3:31:00 PM | 4.979 | 13.683 | 14.114 | 11.356 | |
| 6/30/2011 | 3:32:00 PM | 4.953 | 13.704 | 9.838 | 11.066 | |
| 6/30/2011 | 3:33:00 PM | 4.917 | 13.73 | 9.355 | 11.108 | |
| 6/30/2011 | 3:34:00 PM | 4.913 | 13.734 | 11.273 | 11.411 | |
| 6/30/2011 | 3:35:00 PM | 4.907 | 13.751 | 12.506 | 11.493 | |
| 6/30/2011 | 3:36:00 PM | 4.96 | 13.71 | 13.867 | 11.353 | |
| 6/30/2011 | 3:37:00 PM | 4.996 | 13.685 | 14.241 | 11.14 | |
| 6/30/2011 | 3:38:00 PM | 4.977 | 13.68 | 9.508 | 11.111 | |
| 6/30/2011 | 3:39:00 PM | 4.98 | 13.668 | 8.824 | 11.375 | |
| 6/30/2011 | 3:40:00 PM | 4.94 | 13.715 | 10.423 | 11.33 | |
| 6/30/2011 | 3:41:00 PM | 4.9 | 13.747 | 11.049 | 11.318 | |
| 6/30/2011 | 3:42:00 PM | 4.862 | 13.787 | 11.339 | 11.419 | |
| 6/30/2011 | 3:43:00 PM | 4.893 | 13.769 | 11.655 | 11.289 | |
| 6/30/2011 | 3:44:00 PM | 4.86 | 13.802 | 7.176 | 11.405 | |
| 6/30/2011 | 3:45:00 PM | 4.897 | 13.759 | 7.676 | 11.615 | |
| 6/30/2011 | 3:46:00 PM | 4.909 | 13.752 | 10.073 | 11.532 | |
| 6/30/2011 | 3:47:00 PM | 4.929 | 13.726 | 10.966 | 11.355 | |
| 6/30/2011 | 3:48:00 PM | 4.949 | 13.722 | 11.437 | 11.353 | |
| 6/30/2011 | 3:49:00 PM | 4.904 | 13.768 | 11.083 | 11.197 | |
| 6/30/2011 | 3:50:00 PM | 4.895 | 13.771 | 7.22 | 11.293 | |
| 6/30/2011 | 3:51:00 PM | 4.912 | 13.728 | 8.048 | 11.632 | |
| 6/30/2011 | 3:52:00 PM | 4.909 | 13.743 | 9.934 | 11.654 | |

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|---|---|---|---|---|---|
| 6/30/2011 | 3:53:00 PM | 4.928 | 13.739 | 10.915 | 11.545 |
| 6/30/2011 | 3:54:00 PM | 4.932 | 13.726 | 11.419 | 11.557 |
| 6/30/2011 | 3:55:00 PM | 4.938 | 13.729 | 11.556 | 11.374 |
| 6/30/2011 | 3:56:00 PM | 4.885 | 13.78 | 7.891 | 11.447 |
| 6/30/2011 | 3:57:00 PM | 4.909 | 13.75 | 9.494 | 11.476 |
| 6/30/2011 | 3:58:00 PM | 4.951 | 13.722 | 11.613 | 11.655 |
| 6/30/2011 | 3:59:00 PM | 5.034 | 13.641 | 12.813 | 11.552 |
| 6/30/2011 | 4:00:00 PM | 4.991 | 13.68 | 12.339 | 11.071 |
| 6/30/2011 | 4:01:00 PM | 4.967 | 13.708 | 12.225 | 11.263 |
| 6/30/2011 | 4:02:00 PM | 4.967 | 13.721 | 8.93 | 11.346 |
| 6/30/2011 | 4:03:00 PM | 4.956 | 13.722 | 8.634 | 11.305 |
| 6/30/2011 | 4:04:00 PM | 4.924 | 13.752 | 10.225 | 11.445 |
| 6/30/2011 | 4:05:00 PM | 4.895 | 13.78 | 11.27 | 11.382 |
| 6/30/2011 | 4:06:00 PM | 4.923 | 13.763 | 11.877 | 11.52 |
| 6/30/2011 | 4:07:00 PM | 4.899 | 13.768 | 11.722 | 11.196 |
| 6/30/2011 | 4:08:00 PM | 4.893 | 13.8 | 8.32 | 11.177 |
| 6/30/2011 | 4:09:00 PM | 4.986 | 13.716 | 9.156 | 11.356 |
| 6/30/2011 | 4:10:00 PM | 5.005 | 13.683 | 11.197 | 11.516 |
| 6/30/2011 | 4:11:00 PM | 5.012 | 13.67 | 12.088 | 11.2 |
| 6/30/2011 | 4:12:00 PM | 5.004 | 13.686 | 12.61 | 11.16 |
| 6/30/2011 | 4:13:00 PM | 4.991 | 13.692 | 11.866 | 11.14 |
| 6/30/2011 | 4:14:00 PM | 4.92 | 13.766 | 7.431 | 11.26 |
| 6/30/2011 | 4:15:00 PM | 4.949 | 13.744 | 8.021 | 11.737 |
| 6/30/2011 | 4:16:00 PM | 4.963 | 13.727 | 10.296 | 11.753 |
| 6/30/2011 | 4:17:00 PM | 4.992 | 13.705 | 11.891 | 11.295 |
| 6/30/2011 | 4:18:00 PM | 5.027 | 13.669 | 13.312 | 10.959 |
| 6/30/2011 | 4:19:00 PM | 5.084 | 13.615 | 13.69 | 10.345 |
| 6/30/2011 | 4:20:00 PM | 5.025 | 13.66 | 9.263 | 10.282 |
| 6/30/2011 | 4:21:00 PM | 5.047 | 13.654 | 11.138 | 10.434 |
| 6/30/2011 | 4:22:00 PM | 5.033 | 13.645 | 12.588 | 10.337 |
| 6/30/2011 | 4:23:00 PM | 4.98 | 13.693 | 12.637 | 10.159 |
| 6/30/2011 | 4:24:00 PM | 4.956 | 13.727 | 13.31 | 10.135 |
| 6/30/2011 | 4:25:00 PM | 4.969 | 13.721 | 13.957 | 10.231 |
| 6/30/2011 | 4:26:00 PM | 4.964 | 13.717 | 11.935 | 10.087 |
| 6/30/2011 | 4:27:00 PM | 4.985 | 13.704 | 13.713 | 10.493 |
| 6/30/2011 | 4:28:00 PM | 4.964 | 13.711 | 14.455 | 10.394 |
| 6/30/2011 | 4:29:00 PM | 4.984 | 13.7 | 14.541 | 10.272 |
| 6/30/2011 | 4:30:00 PM | 4.956 | 13.728 | 14.44 | 10.248 |
| 6/30/2011 | 4:31:00 PM | 4.979 | 13.724 | 15.117 | 10.276 |
| 6/30/2011 | 4:32:00 PM | 4.969 | 13.719 | 10.516 | 10.274 |
| 6/30/2011 | 4:33:00 PM | 4.985 | 13.715 | 10.548 | 10.648 |
| 6/30/2011 | 4:34:00 PM | 5.005 | 13.684 | 12.872 | 10.701 |
| 6/30/2011 | 4:35:00 PM | 5.04 | 13.656 | 14.724 | 10.822 |
| 6/30/2011 | 4:36:00 PM | 5.014 | 13.68 | 15.588 | 10.295 |
| 6/30/2011 | 4:37:00 PM | 5.025 | 13.673 | 16.003 | 10.158 |
| 6/30/2011 | 4:38:00 PM | 4.991 | 13.703 | 11.255 | 10.075 |
| 6/30/2011 | 4:39:00 PM | 4.977 | 13.714 | 11.055 | 10.262 |
| 6/30/2011 | 4:40:00 PM | 5.013 | 13.687 | 13.541 | 10.297 |
| 6/30/2011 | 4:41:00 PM | 5.052 | 13.647 | 14.819 | 10.262 |
| 6/30/2011 | 4:42:00 PM | 5.038 | 13.65 | 14.755 | 10.533 |
| 6/30/2011 | 4:43:00 PM | 5.018 | 13.653 | 14.562 | 10.333 |
| 6/30/2011 | 4:44:00 PM | 4.969 | 13.703 | 11.141 | 10.358 |

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|---|---|---|---|---|---|
| 6/30/2011 | 4:45:00 PM | 5.006 | 13.665 | 12.419 | 10.6 |
| 6/30/2011 | 4:46:00 PM | 4.979 | 13.69 | 13.862 | 11.289 |
| 6/30/2011 | 4:47:00 PM | 4.982 | 13.705 | 14.916 | 11.218 |
| 6/30/2011 | 4:48:00 PM | 5.015 | 13.68 | 15.928 | 10.564 |
| 6/30/2011 | 4:49:00 PM | 5.031 | 13.67 | 16.103 | 10.342 |
| 6/30/2011 | 4:50:00 PM | 4.984 | 13.707 | 11.126 | 10.469 |
| 6/30/2011 | 4:51:00 PM | 5.007 | 13.67 | 11.325 | 10.769 |
| 6/30/2011 | 4:52:00 PM | 4.996 | 13.671 | 12.961 | 11.116 |
| 6/30/2011 | 4:53:00 PM | 5.017 | 13.655 | 13.856 | 11.056 |
| 6/30/2011 | 4:54:00 PM | 5.002 | 13.675 | 13.986 | 10.912 |
| 6/30/2011 | 4:55:00 PM | 4.977 | 13.704 | 14.691 | 10.866 |
| 6/30/2011 | 4:56:00 PM | 4.932 | 13.757 | 9.683 | 10.925 |
| 6/30/2011 | 4:57:00 PM | 5.018 | 13.668 | 10.179 | 11.201 |
| 6/30/2011 | 4:58:00 PM | 5.043 | 13.644 | 11.952 | 11.245 |
| 6/30/2011 | 4:59:00 PM | 5.053 | 13.629 | 12.583 | 11.324 |
| 6/30/2011 | 5:00:00 PM | 5.021 | 13.664 | 12.827 | 10.735 |
| 6/30/2011 | 5:01:00 PM | 4.991 | 13.679 | 12.513 | 10.661 |
| 6/30/2011 | 5:02:00 PM | 4.932 | 13.747 | 8.366 | 10.495 |
| 6/30/2011 | 5:03:00 PM | 4.971 | 13.708 | 9.402 | 10.658 |
| 6/30/2011 | 5:04:00 PM | 4.965 | 13.729 | 11.277 | 10.79 |
| 6/30/2011 | 5:05:00 PM | 5.011 | 13.68 | 12.754 | 10.665 |
| 6/30/2011 | 5:06:00 PM | 4.996 | 13.692 | 13.308 | 10.482 |
| 6/30/2011 | 5:07:00 PM | 5.04 | 13.652 | 13.536 | 10.275 |
| 6/30/2011 | 5:08:00 PM | 4.966 | 13.696 | 8.908 | 10.273 |
| 6/30/2011 | 5:09:00 PM | 4.989 | 13.7 | 10.823 | 10.627 |
| 6/30/2011 | 5:10:00 PM | 5.061 | 13.636 | 13.726 | 10.603 |
| 6/30/2011 | 5:11:00 PM | 5.062 | 13.622 | 14.626 | 10.54 |
| 6/30/2011 | 5:12:00 PM | 5.036 | 13.647 | 14.93 | 10.569 |
| 6/30/2011 | 5:13:00 PM | 4.986 | 13.695 | 14.177 | 10.719 |
| 6/30/2011 | 5:14:00 PM | 4.947 | 13.738 | 11.861 | 10.911 |
| 6/30/2011 | 5:15:00 PM | 4.98 | 13.705 | 13.954 | 11.169 |
| 6/30/2011 | 5:16:00 PM | 4.99 | 13.679 | 15.216 | 11.087 |
| 6/30/2011 | 5:17:00 PM | 5.044 | 13.644 | 16.568 | 10.975 |
| 6/30/2011 | 5:18:00 PM | 5.021 | 13.666 | 16.639 | 10.753 |
| 6/30/2011 | 5:19:00 PM | 5.047 | 13.64 | 16.552 | 10.82 |
| 6/30/2011 | 5:20:00 PM | 4.97 | 13.724 | 10.578 | 10.868 |
| 6/30/2011 | 5:21:00 PM | 4.989 | 13.694 | 12.029 | 11.06 |
| 6/30/2011 | 5:22:00 PM | 5.044 | 13.645 | 14.498 | 11.152 |
| 6/30/2011 | 5:23:00 PM | 5.05 | 13.636 | 15.667 | 10.944 |
| 6/30/2011 | 5:24:00 PM | 5.057 | 13.634 | 16.582 | 10.882 |
| 6/30/2011 | 5:25:00 PM | 5.041 | 13.633 | 15.93 | 10.792 |
| 6/30/2011 | 5:26:00 PM | 4.932 | 13.749 | 11.089 | 10.973 |
| 6/30/2011 | 5:27:00 PM | 4.962 | 13.729 | 13.173 | 10.926 |
| 6/30/2011 | 5:28:00 PM | 5.01 | 13.678 | 15.446 | 10.815 |
| 6/30/2011 | 5:29:00 PM | 5.021 | 13.665 | 16.84 | 10.442 |
| 6/30/2011 | 5:30:00 PM | 4.998 | 13.682 | 16.947 | 10.283 |
| 6/30/2011 | 5:31:00 PM | 5.067 | 13.617 | 17.418 | 10.222 |
| 6/30/2011 | 5:32:00 PM | 5.031 | 13.642 | 11.726 | 10.632 |
| 6/30/2011 | 5:33:00 PM | 5.056 | 13.615 | 12.902 | 10.586 |
| 6/30/2011 | 5:34:00 PM | 5.042 | 13.62 | 14.624 | 10.456 |
| 6/30/2011 | 5:35:00 PM | 5.055 | 13.617 | 15.395 | 10.456 |
| 6/30/2011 | 5:36:00 PM | 5.089 | 13.584 | 15.793 | 10.144 |

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|---|---|---|---|---|---|---|
| 6/30/2011 | 5:37:00 PM | 5.046 | 13.622 | 15.231 | 9.897 | |
| 6/30/2011 | 5:38:00 PM | 5.028 | 13.637 | 11.363 | 9.892 | |
| 6/30/2011 | 5:39:00 PM | 5.002 | 13.661 | 11.922 | 10.215 | |
| 6/30/2011 | 5:40:00 PM | 4.998 | 13.649 | 13.135 | 10.646 | |
| 6/30/2011 | 5:41:00 PM | 4.969 | 13.678 | 13.874 | 10.685 | |
| 6/30/2011 | 5:42:00 PM | 4.981 | 13.684 | 14.824 | 10.776 | |
| 6/30/2011 | 5:43:00 PM | 4.966 | 13.697 | 15.45 | 10.633 | |
| 6/30/2011 | 5:44:00 PM | 5 | 13.665 | 12.141 | 10.966 | |
| 6/30/2011 | 5:45:00 PM | 5.005 | 13.652 | 11.497 | 10.992 | |
| 6/30/2011 | 5:46:00 PM | 5.014 | 13.662 | 13.838 | 11.14 | |
| 6/30/2011 | 5:47:00 PM | 4.991 | 13.668 | 15.102 | 10.979 | |
| 6/30/2011 | 5:48:00 PM | 5.011 | 13.662 | 15.996 | 11.222 | |
| 6/30/2011 | 5:49:00 PM | 5.042 | 13.631 | 16.558 | 10.982 | |
| 6/30/2011 | 5:50:00 PM | 5.014 | 13.657 | 15.824 | 10.74 | |
| 6/30/2011 | 5:51:00 PM | 5.024 | 13.657 | 16.56 | 10.883 | |
| 6/30/2011 | 5:52:00 PM | 5.038 | 13.634 | 17.258 | 10.759 | |
| 6/30/2011 | 5:53:00 PM | 5.08 | 13.598 | 17.866 | 10.605 | |
| 6/30/2011 | 5:54:00 PM | 5.031 | 13.631 | 17.056 | 10.757 | |
| 6/30/2011 | 5:55:00 PM | 5 | 13.67 | 16.208 | 10.759 | |
| 6/30/2011 | 5:56:00 PM | 4.895 | 13.761 | 9.171 | 10.934 | |
| 6/30/2011 | 5:57:00 PM | 4.931 | 13.742 | 9.152 | 11.273 | |
| 6/30/2011 | 5:58:00 PM | 5.005 | 13.667 | 12.18 | 11.363 | |
| 6/30/2011 | 5:59:00 PM | 5.008 | 13.665 | 13.118 | 11.213 | |
| 6/30/2011 | 6:00:00 PM | 5.03 | 13.638 | 13.877 | 11.249 | |
| 6/30/2011 | 6:01:00 PM | 5.04 | 13.629 | 13.931 | 10.957 | |
| 6/30/2011 | 6:02:00 PM | 4.888 | 12.86 | 9.453 | 10.872 | |
| 6/30/2011 | 6:03:00 PM | 0.315 | 0.058 | 1.263 | 10.761 | |
| 6/30/2011 | 6:04:00 PM | 0.153 | 0.02 | -0.013 | 11.431 | |
| 6/30/2011 | 6:05:00 PM | 0.154 | 0.012 | -0.031 | 11.613 | |
| 6/30/2011 | 6:06:00 PM | 0.154 | 0.009 | -0.035 | 11.734 | |
| 6/30/2011 | 6:07:00 PM | 0.153 | 0.004 | -0.032 | 11.777 | |
| 6/30/2011 | 6:08:00 PM | 0.153 | 0.003 | -0.023 | 11.8 | SO2 bias |
| 6/30/2011 | 6:09:00 PM | 0.176 | 0.22 | -0.04 | 11.912 | |
| 6/30/2011 | 6:10:00 PM | 4.783 | 9.795 | -0.102 | 8.134 | |
| 6/30/2011 | 6:11:00 PM | 4.965 | 9.836 | -0.115 | 1.939 | O2/CO2 bias |
| 6/30/2011 | 6:12:00 PM | 4.963 | 9.843 | -0.113 | 0.595 | |
| 6/30/2011 | 6:13:00 PM | 4.96 | 9.842 | -0.11 | 0.199 | |
| 6/30/2011 | 6:14:00 PM | 1.118 | 1.418 | 17.21 | 0.053 | |
| 6/30/2011 | 6:15:00 PM | 0.143 | 0.016 | 22.842 | 0.056 | |
| 6/30/2011 | 6:16:00 PM | 0.143 | 0.008 | 22.872 | 0.015 | |
| 6/30/2011 | 6:17:00 PM | 0.144 | 0.003 | 22.872 | -0.016 | NOx bias |
| 6/30/2011 | 6:18:00 PM | 2.097 | 6.441 | 19.892 | 0.448 | |
| 6/30/2011 | 6:19:00 PM | 4.942 | 13.665 | 15.066 | 6.811 | |
| 6/30/2011 | 6:20:00 PM | 4.955 | 13.678 | 10.359 | 10.358 | |
| 6/30/2011 | 6:21:00 PM | 4.986 | 13.654 | 9.123 | 10.959 | |
| 6/30/2011 | 6:22:00 PM | 5.016 | 13.617 | 11.758 | 11.384 | |
| 6/30/2011 | 6:23:00 PM | 4.992 | 13.633 | 12.724 | 11.328 | |
| 6/30/2011 | 6:24:00 PM | 4.98 | 13.645 | 13.287 | 11.146 | |
| 6/30/2011 | 6:25:00 PM | 5.007 | 13.639 | 14.107 | 11.031 | |
| 6/30/2011 | 6:26:00 PM | 4.998 | 13.65 | 10.7 | 11.046 | |
| 6/30/2011 | 6:27:00 PM | 4.994 | 13.634 | 9.055 | 11.155 | |
| 6/30/2011 | 6:28:00 PM | 5.002 | 13.641 | 11.598 | 11.279 | |

| | | | | | |
|---|---|---|---|---|---|
| 6/30/2011 | 6:29:00 PM | 5.005 | 13.632 | 13.11 | 11.192 |
| 6/30/2011 | 6:30:00 PM | 5.03 | 13.615 | 14.767 | 11.167 |
| 6/30/2011 | 6:31:00 PM | 5.039 | 13.604 | 15.12 | 11.117 |
| 6/30/2011 | 6:32:00 PM | 5.071 | 13.592 | 11.745 | 11.135 |
| 6/30/2011 | 6:33:00 PM | 5.066 | 13.575 | 11.826 | 11.147 |
| 6/30/2011 | 6:34:00 PM | 5.076 | 13.582 | 13.895 | 11.261 |
| 6/30/2011 | 6:35:00 PM | 5.079 | 13.577 | 14.518 | 11.049 |
| 6/30/2011 | 6:36:00 PM | 4.979 | 13.661 | 13.922 | 11.008 |
| 6/30/2011 | 6:37:00 PM | 5.015 | 13.652 | 15.39 | 10.921 |
| 6/30/2011 | 6:38:00 PM | 4.985 | 13.672 | 11.116 | 10.836 |
| 6/30/2011 | 6:39:00 PM | 4.966 | 13.684 | 8.65 | 11.167 |
| 6/30/2011 | 6:40:00 PM | 4.988 | 13.672 | 11.022 | 11.389 |
| 6/30/2011 | 6:41:00 PM | 4.954 | 13.694 | 12.023 | 11.421 |
| 6/30/2011 | 6:42:00 PM | 4.986 | 13.662 | 12.785 | 11.217 |
| 6/30/2011 | 6:43:00 PM | 4.971 | 13.702 | 13.421 | 11.175 |
| 6/30/2011 | 6:44:00 PM | 4.931 | 13.741 | 9.347 | 11.204 |
| 6/30/2011 | 6:45:00 PM | 4.974 | 13.689 | 9.433 | 11.578 |
| 6/30/2011 | 6:46:00 PM | 4.989 | 13.677 | 11.47 | 11.483 |
| 6/30/2011 | 6:47:00 PM | 4.976 | 13.682 | 12.38 | 11.458 |
| 6/30/2011 | 6:48:00 PM | 5.002 | 13.663 | 13.239 | 11.426 |
| 6/30/2011 | 6:49:00 PM | 4.986 | 13.683 | 13.445 | 11.243 |
| 6/30/2011 | 6:50:00 PM | 4.977 | 13.702 | 9.641 | 11.22 |
| 6/30/2011 | 6:51:00 PM | 5.007 | 13.674 | 10.696 | 11.371 |
| 6/30/2011 | 6:52:00 PM | 5.016 | 13.659 | 12.482 | 11.378 |
| 6/30/2011 | 6:53:00 PM | 5.009 | 13.67 | 12.792 | 11.427 |
| 6/30/2011 | 6:54:00 PM | 4.993 | 13.69 | 13.51 | 11.644 |
| 6/30/2011 | 6:55:00 PM | 4.956 | 13.728 | 13.533 | 11.517 |
| 6/30/2011 | 6:56:00 PM | 4.943 | 13.748 | 10.23 | 11.287 |
| 6/30/2011 | 6:57:00 PM | 5.002 | 13.692 | 11.558 | 11.421 |
| 6/30/2011 | 6:58:00 PM | 5.07 | 13.62 | 14.087 | 11.265 |
| 6/30/2011 | 6:59:00 PM | 5.111 | 13.589 | 15.256 | 11.008 |
| 6/30/2011 | 7:00:00 PM | 5.095 | 13.603 | 15.674 | 11.093 |
| 6/30/2011 | 7:01:00 PM | 5.136 | 13.561 | 15.521 | 10.943 |
| 6/30/2011 | 7:02:00 PM | 5.051 | 13.653 | 11.828 | 10.812 |
| 6/30/2011 | 7:03:00 PM | 5.057 | 13.646 | 13.534 | 11.113 |
| 6/30/2011 | 7:04:00 PM | 5.089 | 13.615 | 14.824 | 11.249 |
| 6/30/2011 | 7:05:00 PM | 5.085 | 13.609 | 15.469 | 11.079 |
| 6/30/2011 | 7:06:00 PM | 5.046 | 13.647 | 15.69 | 10.922 |
| 6/30/2011 | 7:07:00 PM | 5.03 | 13.667 | 15.704 | 11.149 |
| 6/30/2011 | 7:08:00 PM | 4.998 | 13.697 | 10.834 | 11.08 |
| 6/30/2011 | 7:09:00 PM | 5.017 | 13.683 | 11.156 | 11.263 |
| 6/30/2011 | 7:10:00 PM | 5.055 | 13.655 | 14.155 | 11.529 |
| 6/30/2011 | 7:11:00 PM | 5.077 | 13.61 | 15.326 | 11.436 |
| 6/30/2011 | 7:12:00 PM | 5.084 | 13.629 | 16.177 | 11.316 |
| 6/30/2011 | 7:13:00 PM | 5.1 | 13.61 | 16.868 | 11.261 |
| 6/30/2011 | 7:14:00 PM | 5.053 | 13.645 | 12.085 | 11.193 |
| 6/30/2011 | 7:15:00 PM | 5.074 | 13.612 | 12.33 | 11.356 |
| 6/30/2011 | 7:16:00 PM | 5.104 | 13.589 | 14.351 | 11.199 |
| 6/30/2011 | 7:17:00 PM | 5.079 | 13.612 | 15.166 | 11.143 |
| 6/30/2011 | 7:18:00 PM | 5.091 | 13.606 | 15.69 | 11.067 |
| 6/30/2011 | 7:19:00 PM | 5.046 | 13.654 | 15.993 | 11.056 |
| 6/30/2011 | 7:20:00 PM | 5.054 | 13.658 | 13.592 | 11.075 |

| | | | | | |
|---|---|---|---|---|---|
| 6/30/2011 | 7:21:00 PM | 5.09 | 13.623 | 14.522 | 11.272 |
| 6/30/2011 | 7:22:00 PM | 5.115 | 13.591 | 16.402 | 11.343 |
| 6/30/2011 | 7:23:00 PM | 5.117 | 13.578 | 17.128 | 11.035 |
| 6/30/2011 | 7:24:00 PM | 5.129 | 13.572 | 18.423 | 10.821 |
| 6/30/2011 | 7:25:00 PM | 5.15 | 13.538 | 18.954 | 10.935 |
| 6/30/2011 | 7:26:00 PM | 5.108 | 13.573 | 14.121 | 11.04 |
| 6/30/2011 | 7:27:00 PM | 5.097 | 13.585 | 11.679 | 11.312 |
| 6/30/2011 | 7:28:00 PM | 5.131 | 13.537 | 14.693 | 11.464 |
| 6/30/2011 | 7:29:00 PM | 5.09 | 13.585 | 16.113 | 11.509 |
| 6/30/2011 | 7:30:00 PM | 5.103 | 13.582 | 17.012 | 11.407 |
| 6/30/2011 | 7:31:00 PM | 5.108 | 13.564 | 17.299 | 11.281 |
| 6/30/2011 | 7:32:00 PM | 5.031 | 13.645 | 12.732 | 11.403 |
| 6/30/2011 | 7:33:00 PM | 5.07 | 13.613 | 11.009 | 11.526 |
| 6/30/2011 | 7:34:00 PM | 5.105 | 13.578 | 13.861 | 11.617 |
| 6/30/2011 | 7:35:00 PM | 5.109 | 13.565 | 14.883 | 11.461 |
| 6/30/2011 | 7:36:00 PM | 5.109 | 13.575 | 16.05 | 11.596 |
| 6/30/2011 | 7:37:00 PM | 5.149 | 13.539 | 16.715 | 11.469 |
| 6/30/2011 | 7:38:00 PM | 5.11 | 13.564 | 13.005 | 11.059 |
| 6/30/2011 | 7:39:00 PM | 5.121 | 13.553 | 13.203 | 11.185 |
| 6/30/2011 | 7:40:00 PM | 5.146 | 13.521 | 14.874 | 11.419 |
| 6/30/2011 | 7:41:00 PM | 5.134 | 13.538 | 14.996 | 11.079 |
| 6/30/2011 | 7:42:00 PM | 5.101 | 13.562 | 15.42 | 11.157 |
| 6/30/2011 | 7:43:00 PM | 5.066 | 13.598 | 15.502 | 11.28 |
| 6/30/2011 | 7:44:00 PM | 5.017 | 13.64 | 11.525 | 11.317 |
| 6/30/2011 | 7:45:00 PM | 5.074 | 13.588 | 12.113 | 11.378 |
| 6/30/2011 | 7:46:00 PM | 5.062 | 13.606 | 14.111 | 11.562 |
| 6/30/2011 | 7:47:00 PM | 5.077 | 13.579 | 15.219 | 11.666 |
| 6/30/2011 | 7:48:00 PM | 5.094 | 13.563 | 15.931 | 11.634 |
| 6/30/2011 | 7:49:00 PM | 5.097 | 13.561 | 16.229 | 11.233 |
| 6/30/2011 | 7:50:00 PM | 5.096 | 13.594 | 12.403 | 11.098 |
| 6/30/2011 | 7:51:00 PM | 5.096 | 13.581 | 11.19 | 11.184 |
| 6/30/2011 | 7:52:00 PM | 5.132 | 13.54 | 13.973 | 11.297 |
| 6/30/2011 | 7:53:00 PM | 5.166 | 13.51 | 15.419 | 11.252 |
| 6/30/2011 | 7:54:00 PM | 5.141 | 13.515 | 15.867 | 11.17 |
| 6/30/2011 | 7:55:00 PM | 5.159 | 13.511 | 15.922 | 10.919 |
| 6/30/2011 | 7:56:00 PM | 5.057 | 13.609 | 12.096 | 10.98 |
| 6/30/2011 | 7:57:00 PM | 5.097 | 13.559 | 13.191 | 11.444 |
| 6/30/2011 | 7:58:00 PM | 5.125 | 13.532 | 14.982 | 11.526 |
| 6/30/2011 | 7:59:00 PM | 5.134 | 13.52 | 15.682 | 11.4 |
| 6/30/2011 | 8:00:00 PM | 5.102 | 13.54 | 15.413 | 11.202 |
| 6/30/2011 | 8:01:00 PM | 5.035 | 13.606 | 15.658 | 11.444 |
| 6/30/2011 | 8:02:00 PM | 5.006 | 13.637 | 13.31 | 11.32 |
| 6/30/2011 | 8:03:00 PM | 5.031 | 13.614 | 12.155 | 11.355 |
| 6/30/2011 | 8:04:00 PM | 5.007 | 13.644 | 13.486 | 11.359 |
| 6/30/2011 | 8:05:00 PM | 5.015 | 13.633 | 14.108 | 11.452 |
| 6/30/2011 | 8:06:00 PM | 4.997 | 13.64 | 14.489 | 11.319 |
| 6/30/2011 | 8:07:00 PM | 5.038 | 13.627 | 15.545 | 11.165 |
| 6/30/2011 | 8:08:00 PM | 5.054 | 13.613 | 11.869 | 10.905 |
| 6/30/2011 | 8:09:00 PM | 5.095 | 13.578 | 11.232 | 11.151 |
| 6/30/2011 | 8:10:00 PM | 5.112 | 13.559 | 13.771 | 11.458 |
| 6/30/2011 | 8:11:00 PM | 5.134 | 13.531 | 14.764 | 11.286 |
| 6/30/2011 | 8:12:00 PM | 5.143 | 13.525 | 15.257 | 11.359 |

| | | | | | | |
|---|---|---|---|---|---|---|
| 6/30/2011 | 8:13:00 PM | 5.135 | 13.54 | 16.045 | 10.946 | |
| 6/30/2011 | 8:14:00 PM | 5.159 | 13.507 | 15.711 | 11.001 | |
| 6/30/2011 | 8:15:00 PM | 5.153 | 13.526 | 15.798 | 11.031 | |
| 6/30/2011 | 8:16:00 PM | 5.145 | 13.519 | 16.454 | 10.735 | |
| 6/30/2011 | 8:17:00 PM | 2.289 | 4.731 | 8.718 | 10.644 | |
| 6/30/2011 | 8:18:00 PM | 0.177 | 0.028 | -0.01 | 11.291 | |
| 6/30/2011 | 8:19:00 PM | 0.175 | 0.014 | -0.029 | 11.913 | |
| 6/30/2011 | 8:20:00 PM | 0.174 | 0.008 | -0.033 | 11.91 | SO2 bias |
| 6/30/2011 | 8:21:00 PM | 1.835 | 4.036 | -0.062 | 11.746 | |
| 6/30/2011 | 8:22:00 PM | 4.992 | 9.805 | -0.103 | 5.425 | O2/CO2 bias |
| 6/30/2011 | 8:23:00 PM | 2.648 | 4.444 | 10.088 | 1.54 | |
| 6/30/2011 | 8:24:00 PM | 0.173 | 0.019 | 22.779 | 0.657 | |
| 6/30/2011 | 8:25:00 PM | 0.174 | 0.007 | 22.812 | 0.348 | |
| 6/30/2011 | 8:26:00 PM | 0.174 | 0.004 | 22.812 | 0.185 | NOx bias |
| 6/30/2011 | 8:27:00 PM | 0.398 | 1.317 | 22.609 | 0.159 | |

**ExxonMobil**
**NO2 to NO Converter Efficiency Test**

| | | | | |
|---|---|---|---|---|
| Analyzer Manufacturer: | CAI | NO Cal Gas Value: | 47.3 | LABEL |
| Analyzer Model: | 600CLD | NO2 Cal Gas Value: | 45.3 | $C_0$ |
| Analyzer Serial Number: | U04004 | Performed By: | AA/DW/JP/SS/DA | |
| Date: | 7/1/2011 | CEMS ID#: | 4-CEMS | |

| GAS | ANALYZER MODE | ANALYZER RESPONSE | LABEL |
|---|---|---|---|
| Zero | NO | 0.04 | -- |
| Zero | NOx | 0.04 | -- |
| NO | NO | 47.19 | -- |
| NO | NOx | 47.04 | -- |
| NO2 | NO | 0.51 | $C_1$ |
| NO2 | NOx | 42.09 | $C_2$ |

| | | Label | Requirement |
|---|---|---|---|
| Abs. Value $C_1$: | 0.5 | C1 | -- |
| Abs. Value $C_2$: | 42.1 | C2 | -- |
| C1=(C1/C0)*100% | 1.1% | | < 5% |
| CE =(C2-C1)/C0 * 100%: | 91.8% | -- | > 90% |

| | Cylinder # |
|---|---|
| NO bottle: | CC76817 |
| NO2 bottle: | CC307254 |

**Delta Air Quality Services**

**SPAN GAS RECORD AND EPA CALIBRATION ERROR**

CLIENT/LOCATION: ExxonMobil DATE: 7/1/11
TRUCK/CEM I.D.: 4-CEMS BY: AA/DW/JP/SS/DA

| | MID SPAN CYLINDER | | HIGH SPAN CYLINDER | |
|---|---|---|---|---|
| | CYLINDER NO. | CONCENTRATION | CYLINDER NO. | CONCENTRATION |
| ZERO | "CEM Grade $N_2$" | | | |
| $O_2$ | SA8302 | 5.00 | CC102051 | 8.78 |
| $CO_2$ | SA8302 | 10.16 | CC102051 | 17.44 |
| $NO_x$ | CC333881 | 22.7 | CC76817 | 47.3 |
| | | | | |
| $SO_2$ | CC121015 | 12.9 | CC321694 | 22.2 |

**PRE-TEST INSTRUMENT CALIBRATION ERROR**

| | ANALYZER | | | | |
|---|---|---|---|---|---|
| | $O_2$ | $CO_2$ | $NO_x$ | | $SO_2$ |
| Analyzer Range | 10 | 20 | 50 | | 25 |
| Calibration Span | 8.78 | 17.44 | 47.3 | | 22.2 |
| Zero Gas Value | 0.0 | 0.0 | 0.0 | | 0.0 |
| Analyzer Reads | 0.06 | -0.01 | -0.02 | | 0.02 |
| Difference (% or ppm) | 0.1 | 0.0 | 0.0 | | 0.0 |
| Error (% of Cal. Span) | 0.7% | -0.1% | 0.0% | | 0.1% |
| Status(1) | PASS | PASS | PASS | | PASS |
| High Gas Value | 8.78 | 17.44 | 47.3 | | 22.2 |
| Analyzer Reads | 8.79 | 17.46 | 46.79 | | 22.46 |
| Difference (% or ppm) | 0.0 | 0.0 | -0.5 | | 0.3 |
| Error (% of Cal. Span) | 0.2% | 0.1% | -1.1% | | 1.2% |
| Status | PASS | PASS | PASS | | PASS |
| Mid Gas Value | 5.00 | 10.16 | 22.7 | | 12.9 |
| Analyzer Reads | 5.15 | 9.98 | 22.77 | | 12.52 |
| Difference (% or ppm) | 0.2 | -0.2 | 0.1 | | -0.4 |
| Error (% of Cal. Span) | 1.8% | -1.0% | 0.1% | | -1.7% |
| Status | PASS | PASS | PASS | | PASS |

1) Calibration Error must be within +/- 2.0% of the Calibration Span

| Date | Time | O2 % | CO2 % | NOx PPM | SO2 % | |
|---|---|---|---|---|---|---|
| 7/1/2011 | 7:15:00 AM | 0.515 | 0 | -0.044 | 7.031 | |
| 7/1/2011 | 7:16:00 AM | 0.356 | -0.011 | 0.04 | 11.282 | CO2 Cal Zero; N2/NO Mode |
| 7/1/2011 | 7:17:00 AM | 4.503 | -0.004 | 0.037 | 11.322 | |
| 7/1/2011 | 7:18:00 AM | 11.329 | 6.13 | 0.041 | 11.635 | |
| 7/1/2011 | 7:19:00 AM | 8.111 | 21.707 | 0.033 | 13.759 | |
| 7/1/2011 | 7:20:00 AM | 5.716 | 19.48 | 0.036 | 12.037 | |
| 7/1/2011 | 7:21:00 AM | 5.559 | 18.552 | 0.031 | 11.207 | |
| 7/1/2011 | 7:22:00 AM | 5.244 | 17.397 | 0.035 | 10.188 | N2/NOx Mode |
| 7/1/2011 | 7:23:00 AM | 5.261 | 17.464 | 13.963 | 9.33 | CO2 Cal High |
| 7/1/2011 | 7:24:00 AM | 5.324 | 14.343 | 46.95 | 0.652 | |
| 7/1/2011 | 7:25:00 AM | 5.337 | 9.984 | 47.179 | -0.229 | |
| 7/1/2011 | 7:26:00 AM | 5.388 | 9.979 | 47.185 | -0.033 | NO/NO Mode |
| 7/1/2011 | 7:27:00 AM | 5.446 | 9.977 | 47.011 | 0.019 | SO2 Cal Zero |
| 7/1/2011 | 7:28:00 AM | 5.449 | 9.976 | 47.041 | 5.431 | NO/NOx Mode |
| 7/1/2011 | 7:29:00 AM | 5.477 | 9.976 | 26.47 | 20.396 | |
| 7/1/2011 | 7:30:00 AM | 5.494 | 9.981 | 2.034 | 22.395 | CO2 Mid |
| 7/1/2011 | 7:31:00 AM | 5.509 | 12.122 | 0.918 | 22.463 | SO2 Cal High |
| 7/1/2011 | 7:32:00 AM | 5.512 | 13.825 | 0.627 | 21.708 | |
| 7/1/2011 | 7:33:00 AM | 5.558 | 13.792 | 0.513 | 13.206 | NO2/NO Mode |
| 7/1/2011 | 7:34:00 AM | 5.576 | 13.78 | 34.686 | 12.558 | |
| 7/1/2011 | 7:35:00 AM | 5.554 | 13.835 | 42.089 | 12.522 | SO2 Mid; NO/NOx Mode |
| 7/1/2011 | 7:36:00 AM | 5.548 | 13.837 | 23.051 | 11.507 | |
| 7/1/2011 | 7:37:00 AM | 5.627 | 13.756 | 0.242 | 10.341 | |
| 7/1/2011 | 7:38:00 AM | 5.665 | 13.722 | 0.064 | 10.156 | |
| 7/1/2011 | 7:39:00 AM | 5.653 | 13.744 | -0.007 | 9.801 | |
| 7/1/2011 | 7:40:00 AM | 5.628 | 13.781 | -0.023 | 10.132 | NOx Cal Zero |
| 7/1/2011 | 7:41:00 AM | 3.137 | 13.794 | 26.464 | 10.117 | |
| 7/1/2011 | 7:42:00 AM | 3.261 | 13.766 | 46.748 | 10.098 | |
| 7/1/2011 | 7:43:00 AM | 5.604 | 13.782 | 46.735 | 10.396 | |
| 7/1/2011 | 7:44:00 AM | 5.633 | 13.758 | 46.792 | 10.118 | NOx Cal High |
| 7/1/2011 | 7:45:00 AM | 5.601 | 13.814 | 26.808 | 10.035 | |
| 7/1/2011 | 7:46:00 AM | 5.575 | 13.82 | 22.801 | 10.1 | |
| 7/1/2011 | 7:47:00 AM | 5.546 | 13.883 | 22.783 | 10.108 | |
| 7/1/2011 | 7:48:00 AM | 4.974 | 13.847 | 22.765 | 10.689 | NOx Mid |
| 7/1/2011 | 7:49:00 AM | 0.481 | 13.792 | 22.778 | 10.968 | |
| 7/1/2011 | 7:50:00 AM | 0.36 | 13.833 | 17.554 | 10.838 | |
| 7/1/2011 | 7:51:00 AM | 0.337 | 13.833 | 16.333 | 10.82 | |
| 7/1/2011 | 7:52:00 AM | 0.351 | 13.782 | 17.331 | 10.317 | |
| 7/1/2011 | 7:53:00 AM | 5.198 | 13.819 | 11.657 | 10.111 | |
| 7/1/2011 | 7:54:00 AM | 5.58 | 13.788 | 10.852 | 10.325 | |
| 7/1/2011 | 7:55:00 AM | 5.589 | 13.783 | 13.19 | 10.505 | |
| 7/1/2011 | 7:56:00 AM | 5.566 | 13.806 | 14.365 | 10.577 | |
| 7/1/2011 | 7:57:00 AM | 5.572 | 13.81 | 14.864 | 10.207 | |
| 7/1/2011 | 7:58:00 AM | 5.589 | 13.796 | 15.751 | 10.093 | |
| 7/1/2011 | 7:59:00 AM | 5.589 | 13.806 | 10.774 | 10.013 | |
| 7/1/2011 | 8:00:00 AM | 5.603 | 13.816 | 10.228 | 10.405 | |
| 7/1/2011 | 8:01:00 AM | 5.588 | 13.81 | 12.519 | 10.422 | |
| 7/1/2011 | 8:02:00 AM | 2.357 | 13.819 | 13.935 | 10.457 | |
| 7/1/2011 | 8:03:00 AM | 0.365 | 13.835 | 15.058 | 10.078 | |

| | | | | | | |
|---|---|---|---|---|---|---|
| 7/1/2011 | 8:04:00 AM | 0.332 | 13.802 | 15.901 | 10.115 | |
| 7/1/2011 | 8:05:00 AM | 0.311 | 13.834 | 11.394 | 9.938 | |
| 7/1/2011 | 8:06:00 AM | 0.294 | 13.835 | 11.071 | 10.265 | |
| 7/1/2011 | 8:07:00 AM | 0.278 | 13.796 | 14.584 | 10.329 | |
| 7/1/2011 | 8:08:00 AM | 0.262 | 13.764 | 16.127 | 10.244 | |
| 7/1/2011 | 8:09:00 AM | 0.249 | 13.774 | 16.446 | 10.244 | |
| 7/1/2011 | 8:10:00 AM | 0.233 | 13.765 | 17.246 | 10.035 | |
| 7/1/2011 | 8:11:00 AM | 0.22 | 13.819 | 11.329 | 10.15 | |
| 7/1/2011 | 8:12:00 AM | 0.206 | 13.74 | 11.187 | 10.362 | |
| 7/1/2011 | 8:13:00 AM | 0.191 | 13.739 | 13.114 | 10.326 | |
| 7/1/2011 | 8:14:00 AM | 0.181 | 13.755 | 14.281 | 10.414 | |
| 7/1/2011 | 8:15:00 AM | 0.171 | 13.813 | 14.052 | 10.274 | |
| 7/1/2011 | 8:16:00 AM | 0.161 | 13.822 | 13.852 | 9.93 | |
| 7/1/2011 | 8:17:00 AM | 0.153 | 13.912 | 8.861 | 9.89 | |
| 7/1/2011 | 8:18:00 AM | 0.146 | 13.868 | 9.507 | 10.358 | |
| 7/1/2011 | 8:19:00 AM | 0.136 | 13.907 | 10.79 | 10.347 | |
| 7/1/2011 | 8:20:00 AM | 0.134 | 13.851 | 12.461 | 10.249 | |
| 7/1/2011 | 8:21:00 AM | 0.125 | 13.842 | 12.517 | 10.078 | |
| 7/1/2011 | 8:22:00 AM | 0.119 | 13.967 | 7.258 | 10.082 | |
| 7/1/2011 | 8:23:00 AM | 0.115 | 13.954 | 8.952 | 10.296 | |
| 7/1/2011 | 8:24:00 AM | 0.107 | 13.87 | 13.694 | 10.16 | |
| 7/1/2011 | 8:25:00 AM | 0.101 | 13.871 | 12.556 | 10.241 | |
| 7/1/2011 | 8:26:00 AM | 0.094 | 13.801 | 13.456 | 9.991 | |
| 7/1/2011 | 8:27:00 AM | 0.085 | 13.747 | 18.066 | 10.176 | |
| 7/1/2011 | 8:28:00 AM | 0.079 | 13.693 | 21.105 | 9.898 | |
| 7/1/2011 | 8:29:00 AM | 0.074 | 13.728 | 24.168 | 9.882 | |
| 7/1/2011 | 8:30:00 AM | 0.074 | 13.716 | 27.171 | 9.958 | |
| 7/1/2011 | 8:31:00 AM | 0.069 | 13.751 | 20.429 | 10 | |
| 7/1/2011 | 8:32:00 AM | 0.063 | 13.761 | 15.203 | 10.263 | |
| 7/1/2011 | 8:33:00 AM | 0.063 | 13.751 | 21.32 | 10.851 | |
| 7/1/2011 | 8:34:00 AM | 0.064 | 13.738 | 24.865 | 10.849 | O2 Cal Zero |
| 7/1/2011 | 8:35:00 AM | 6.982 | 13.736 | 26.76 | 10.735 | |
| 7/1/2011 | 8:36:00 AM | 9.078 | 13.762 | 28.199 | 10.307 | |
| 7/1/2011 | 8:37:00 AM | 8.829 | 13.787 | 21.568 | 10.113 | |
| 7/1/2011 | 8:38:00 AM | 8.818 | 13.777 | 18.558 | 10.315 | |
| 7/1/2011 | 8:39:00 AM | 8.808 | 13.768 | 22.8 | 10.555 | |
| 7/1/2011 | 8:40:00 AM | 8.826 | 13.734 | 24.869 | 10.582 | |
| 7/1/2011 | 8:41:00 AM | 8.847 | 13.768 | 26.775 | 10.56 | |
| 7/1/2011 | 8:42:00 AM | 8.862 | 13.829 | 27.293 | 10.228 | |
| 7/1/2011 | 8:43:00 AM | 8.847 | 13.833 | 19.498 | 10.208 | |
| 7/1/2011 | 8:44:00 AM | 8.79 | 13.804 | 19.317 | 10.359 | |
| 7/1/2011 | 8:45:00 AM | 8.793 | 13.765 | 23.411 | 10.389 | |
| 7/1/2011 | 8:46:00 AM | 8.792 | 13.792 | 25.093 | 10.381 | |
| 7/1/2011 | 8:47:00 AM | 8.792 | 13.822 | 25.951 | 10.518 | |
| 7/1/2011 | 8:48:00 AM | 8.794 | 13.84 | 27.998 | 10.322 | O2 Cal High |
| 7/1/2011 | 8:49:00 AM | 6.443 | 13.843 | 21.76 | 10.369 | |
| 7/1/2011 | 8:50:00 AM | 5.19 | 13.778 | 18.601 | 10.52 | |
| 7/1/2011 | 8:51:00 AM | 5.154 | 13.668 | 23.91 | 10.488 | O2 Mid |
| 7/1/2011 | 8:52:00 AM | 5.21 | 12.149 | 27.009 | 10.473 | |
| 7/1/2011 | 8:53:00 AM | 0.873 | 0.06 | 0.701 | 10.736 | |
| 7/1/2011 | 8:54:00 AM | 0.352 | 0.014 | 0 | 11.812 | |
| 7/1/2011 | 8:55:00 AM | 0.326 | 0.011 | -0.01 | 12.127 | |

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|---|---|---|---|---|---|---|
| 7/1/2011 | 8:56:00 AM | 0.306 | 0.004 | -0.02 | 12.206 | |
| 7/1/2011 | 8:57:00 AM | 0.289 | 0.002 | -0.02 | 12.169 | |
| 7/1/2011 | 8:58:00 AM | 0.272 | 0.001 | 0 | 12.2 | SO2 bias |
| 7/1/2011 | 8:59:00 AM | 2.839 | 6.601 | -0.058 | 10.43 | |
| 7/1/2011 | 9:00:00 AM | 5.026 | 9.863 | -0.089 | 2.543 | |
| 7/1/2011 | 9:01:00 AM | 5.055 | 9.877 | -0.09 | 0.615 | |
| 7/1/2011 | 9:02:00 AM | 5.061 | 9.882 | -0.096 | 0.317 | |
| 7/1/2011 | 9:03:00 AM | 5.068 | 9.883 | -0.093 | 0.111 | O2/CO2 bias |
| 7/1/2011 | 9:04:00 AM | 5.073 | 9.887 | -0.096 | 0.045 | |
| 7/1/2011 | 9:05:00 AM | 1.336 | 0.857 | 18.48 | 0.06 | |
| 7/1/2011 | 9:06:00 AM | 0.308 | 0.015 | 22.655 | 0.07 | |
| 7/1/2011 | 9:07:00 AM | 0.282 | 0.006 | 22.656 | 0.065 | |
| 7/1/2011 | 9:08:00 AM | 0.26 | 0.001 | 22.648 | -0.002 | |
| 7/1/2011 | 9:09:00 AM | 0.244 | -0.001 | 22.654 | -0.012 | NOx bias |
| 7/1/2011 | 9:10:00 AM | 0.229 | -0.003 | 22.686 | -0.033 | |
| 7/1/2011 | 9:11:00 AM | 2.704 | 8.816 | 21.18 | 1.229 | |
| 7/1/2011 | 9:12:00 AM | 5.032 | 13.652 | 19.408 | 7.846 | |
| 7/1/2011 | 9:13:00 AM | 4.975 | 13.769 | 13.876 | 9.663 | |
| 7/1/2011 | 9:14:00 AM | 4.987 | 13.767 | 12.496 | 10.364 | |
| 7/1/2011 | 9:15:00 AM | 5.096 | 13.664 | 16.142 | 10.402 | |
| 7/1/2011 | 9:16:00 AM | 5.132 | 13.641 | 17.692 | 11.767 | |
| 7/1/2011 | 9:17:00 AM | 5.162 | 13.642 | 19.416 | 11.951 | |
| 7/1/2011 | 9:18:00 AM | 5.154 | 13.642 | 20.787 | 12.031 | |
| 7/1/2011 | 9:19:00 AM | 5.141 | 13.68 | 14.61 | 11.767 | |
| 7/1/2011 | 9:20:00 AM | 5.195 | 13.605 | 14.224 | 11.873 | |
| 7/1/2011 | 9:21:00 AM | 5.192 | 13.608 | 16.477 | 10.931 | |
| 7/1/2011 | 9:22:00 AM | 5.149 | 13.655 | 18.525 | 11.148 | |
| 7/1/2011 | 9:23:00 AM | 5.201 | 13.595 | 20.141 | 10.866 | |
| 7/1/2011 | 9:24:00 AM | 5.186 | 13.625 | 20.779 | 10.874 | |
| 7/1/2011 | 9:25:00 AM | 5.121 | 13.698 | 15.414 | 10.026 | |
| 7/1/2011 | 9:26:00 AM | 5.178 | 13.629 | 13.113 | 9.62 | |
| 7/1/2011 | 9:27:00 AM | 5.168 | 13.639 | 15.557 | 9.837 | |
| 7/1/2011 | 9:28:00 AM | 5.157 | 13.646 | 17.274 | 10.466 | |
| 7/1/2011 | 9:29:00 AM | 5.123 | 13.673 | 17.918 | 10.162 | |
| 7/1/2011 | 9:30:00 AM | 5.146 | 13.663 | 19.049 | 10.825 | |
| 7/1/2011 | 9:31:00 AM | 5.132 | 13.676 | 13.726 | 10.879 | |
| 7/1/2011 | 9:32:00 AM | 5.142 | 13.669 | 14.016 | 11.456 | |
| 7/1/2011 | 9:33:00 AM | 5.179 | 13.618 | 16.875 | 11.94 | |
| 7/1/2011 | 9:34:00 AM | 5.192 | 13.614 | 18.131 | 11.913 | |
| 7/1/2011 | 9:35:00 AM | 5.228 | 13.572 | 19.113 | 11.662 | |
| 7/1/2011 | 9:36:00 AM | 5.177 | 13.617 | 18.582 | 11.78 | |
| 7/1/2011 | 9:37:00 AM | 5.101 | 13.693 | 13.428 | 11.778 | |
| 7/1/2011 | 9:38:00 AM | 5.157 | 13.634 | 12.632 | 11.63 | |
| 7/1/2011 | 9:39:00 AM | 5.153 | 13.642 | 14.378 | 11.396 | |
| 7/1/2011 | 9:40:00 AM | 5.111 | 13.692 | 15.754 | 11.66 | |
| 7/1/2011 | 9:41:00 AM | 5.117 | 13.682 | 16.633 | 11.298 | |
| 7/1/2011 | 9:42:00 AM | 5.12 | 13.685 | 17.593 | 11.492 | |
| 7/1/2011 | 9:43:00 AM | 5.108 | 13.68 | 16.364 | 11.049 | |
| 7/1/2011 | 9:44:00 AM | 5.112 | 13.684 | 16.471 | 11.573 | |
| 7/1/2011 | 9:45:00 AM | 5.126 | 13.65 | 17.625 | 12.12 | |
| 7/1/2011 | 9:46:00 AM | 5.111 | 13.666 | 16.886 | 11.832 | |
| 7/1/2011 | 9:47:00 AM | 5.066 | 13.719 | 16.736 | 12.05 | |

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|---|---|---|---|---|---|
| 7/1/2011 | 9:48:00 AM | 5.063 | 13.704 | 16.098 | 12.207 |
| 7/1/2011 | 9:49:00 AM | 5.008 | 13.776 | 10.112 | 11.848 |
| 7/1/2011 | 9:50:00 AM | 5.024 | 13.741 | 7.603 | 12.263 |
| 7/1/2011 | 9:51:00 AM | 5.061 | 13.713 | 10.438 | 12.683 |
| 7/1/2011 | 9:52:00 AM | 5.061 | 13.7 | 12.015 | 12.682 |
| 7/1/2011 | 9:53:00 AM | 5.095 | 13.672 | 13.27 | 12.692 |
| 7/1/2011 | 9:54:00 AM | 5.092 | 13.672 | 13.656 | 12.311 |
| 7/1/2011 | 9:55:00 AM | 5.076 | 13.694 | 9.852 | 12.013 |
| 7/1/2011 | 9:56:00 AM | 5.137 | 13.615 | 9.728 | 11.847 |
| 7/1/2011 | 9:57:00 AM | 5.134 | 13.609 | 11.53 | 12.111 |
| 7/1/2011 | 9:58:00 AM | 5.113 | 13.627 | 12.942 | 11.835 |
| 7/1/2011 | 9:59:00 AM | 5.084 | 13.658 | 13.199 | 11.487 |
| 7/1/2011 | 10:00:00 AM | 5.093 | 13.655 | 13.624 | 10.239 |
| 7/1/2011 | 10:01:00 AM | 5.083 | 13.669 | 10.723 | 10.202 |
| 7/1/2011 | 10:02:00 AM | 5.076 | 13.67 | 8.393 | 10.416 |
| 7/1/2011 | 10:03:00 AM | 5.07 | 13.677 | 10.522 | 10.601 |
| 7/1/2011 | 10:04:00 AM | 5.074 | 13.685 | 12.017 | 10.556 |
| 7/1/2011 | 10:05:00 AM | 5.105 | 13.643 | 12.85 | 10.484 |
| 7/1/2011 | 10:06:00 AM | 5.079 | 13.659 | 12.672 | 10.262 |
| 7/1/2011 | 10:07:00 AM | 5.045 | 13.697 | 10.563 | 10.171 |
| 7/1/2011 | 10:08:00 AM | 5.026 | 13.7 | 7.758 | 10.234 |
| 7/1/2011 | 10:09:00 AM | 5.06 | 13.669 | 9.455 | 10.541 |
| 7/1/2011 | 10:10:00 AM | 5.024 | 13.699 | 10.006 | 10.557 |
| 7/1/2011 | 10:11:00 AM | 5.004 | 13.727 | 10.591 | 10.687 |
| 7/1/2011 | 10:12:00 AM | 4.999 | 13.731 | 10.815 | 10.51 |
| 7/1/2011 | 10:13:00 AM | 4.97 | 13.76 | 7.951 | 10.525 |
| 7/1/2011 | 10:14:00 AM | 4.946 | 13.776 | 7.467 | 10.709 |
| 7/1/2011 | 10:15:00 AM | 4.976 | 13.737 | 9.539 | 10.855 |
| 7/1/2011 | 10:16:00 AM | 4.991 | 13.736 | 11.002 | 10.717 |
| 7/1/2011 | 10:17:00 AM | 5.074 | 13.657 | 12.181 | 10.405 |
| 7/1/2011 | 10:18:00 AM | 5.075 | 13.653 | 12.033 | 10.191 |
| 7/1/2011 | 10:19:00 AM | 5.071 | 13.677 | 8.64 | 10.019 |
| 7/1/2011 | 10:20:00 AM | 5.043 | 13.685 | 7.861 | 10.223 |
| 7/1/2011 | 10:21:00 AM | 5.017 | 13.693 | 9.972 | 10.618 |
| 7/1/2011 | 10:22:00 AM | 5.044 | 13.668 | 11.21 | 10.754 |
| 7/1/2011 | 10:23:00 AM | 5.03 | 13.696 | 11.912 | 10.534 |
| 7/1/2011 | 10:24:00 AM | 5.093 | 13.635 | 13.191 | 10.663 |
| 7/1/2011 | 10:25:00 AM | 5.03 | 13.71 | 10.127 | 10.365 |
| 7/1/2011 | 10:26:00 AM | 5.017 | 13.708 | 7.64 | 10.479 |
| 7/1/2011 | 10:27:00 AM | 5.093 | 13.639 | 10.669 | 10.874 |
| 7/1/2011 | 10:28:00 AM | 5.094 | 13.627 | 11.985 | 10.788 |
| 7/1/2011 | 10:29:00 AM | 5.081 | 13.625 | 12.594 | 10.581 |
| 7/1/2011 | 10:30:00 AM | 5.053 | 13.651 | 12.057 | 10.467 |
| 7/1/2011 | 10:31:00 AM | 4.981 | 13.714 | 9.137 | 10.606 |
| 7/1/2011 | 10:32:00 AM | 4.967 | 13.726 | 7.412 | 10.855 |
| 7/1/2011 | 10:33:00 AM | 4.975 | 13.727 | 9.114 | 11.168 |
| 7/1/2011 | 10:34:00 AM | 4.933 | 13.771 | 10.381 | 11.223 |
| 7/1/2011 | 10:35:00 AM | 4.974 | 13.743 | 11.876 | 10.892 |
| 7/1/2011 | 10:36:00 AM | 5.009 | 13.71 | 12.599 | 10.446 |
| 7/1/2011 | 10:37:00 AM | 5.021 | 13.704 | 9.264 | 10.537 |
| 7/1/2011 | 10:38:00 AM | 5.047 | 13.67 | 8.121 | 10.589 |
| 7/1/2011 | 10:39:00 AM | 5.068 | 13.64 | 10.563 | 10.651 |

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|---|---|---|---|---|---|
| 7/1/2011 | 10:40:00 AM | 5.038 | 13.674 | 12.206 | 10.71 |
| 7/1/2011 | 10:41:00 AM | 5.085 | 13.634 | 13.78 | 10.614 |
| 7/1/2011 | 10:42:00 AM | 5.107 | 13.616 | 13.771 | 10.408 |
| 7/1/2011 | 10:43:00 AM | 5.032 | 13.687 | 10.233 | 10.285 |
| 7/1/2011 | 10:44:00 AM | 5.046 | 13.647 | 9.137 | 10.505 |
| 7/1/2011 | 10:45:00 AM | 5.047 | 13.65 | 11.439 | 10.533 |
| 7/1/2011 | 10:46:00 AM | 5.066 | 13.627 | 12.48 | 10.597 |
| 7/1/2011 | 10:47:00 AM | 5.026 | 13.658 | 12.762 | 10.324 |
| 7/1/2011 | 10:48:00 AM | 4.998 | 13.682 | 12.382 | 10.362 |
| 7/1/2011 | 10:49:00 AM | 4.959 | 13.731 | 9.512 | 10.391 |
| 7/1/2011 | 10:50:00 AM | 4.951 | 13.739 | 7.552 | 10.45 |
| 7/1/2011 | 10:51:00 AM | 4.983 | 13.695 | 9.8 | 10.72 |
| 7/1/2011 | 10:52:00 AM | 4.975 | 13.7 | 10.724 | 10.602 |
| 7/1/2011 | 10:53:00 AM | 4.974 | 13.697 | 11.478 | 10.38 |
| 7/1/2011 | 10:54:00 AM | 4.949 | 13.72 | 11.59 | 10.479 |
| 7/1/2011 | 10:55:00 AM | 4.936 | 13.738 | 8.775 | 10.337 |
| 7/1/2011 | 10:56:00 AM | 4.994 | 13.683 | 8.485 | 10.446 |
| 7/1/2011 | 10:57:00 AM | 5.024 | 13.654 | 11.297 | 10.515 |
| 7/1/2011 | 10:58:00 AM | 5.081 | 13.589 | 12.304 | 10.296 |
| 7/1/2011 | 10:59:00 AM | 5.075 | 13.591 | 13.144 | 10.149 |
| 7/1/2011 | 11:00:00 AM | 5.068 | 13.607 | 13.939 | 10.026 |
| 7/1/2011 | 11:01:00 AM | 5.014 | 13.644 | 10.957 | 10.044 |
| 7/1/2011 | 11:02:00 AM | 4.934 | 13.718 | 6.784 | 10.539 |
| 7/1/2011 | 11:03:00 AM | 4.993 | 13.67 | 9.892 | 11.069 |
| 7/1/2011 | 11:04:00 AM | 5.025 | 13.633 | 11.605 | 10.915 |
| 7/1/2011 | 11:05:00 AM | 4.999 | 13.654 | 12.581 | 10.473 |
| 7/1/2011 | 11:06:00 AM | 5.024 | 13.638 | 13.74 | 10.408 |
| 7/1/2011 | 11:07:00 AM | 4.993 | 13.665 | 10.665 | 10.207 |
| 7/1/2011 | 11:08:00 AM | 4.982 | 13.661 | 9.472 | 10.447 |
| 7/1/2011 | 11:09:00 AM | 5.057 | 13.583 | 11.918 | 10.632 |
| 7/1/2011 | 11:10:00 AM | 5.016 | 13.616 | 12.559 | 10.662 |
| 7/1/2011 | 11:11:00 AM | 4.998 | 13.648 | 13.698 | 10.576 |
| 7/1/2011 | 11:12:00 AM | 5.021 | 13.623 | 14.19 | 10.467 |
| 7/1/2011 | 11:13:00 AM | 5.004 | 13.639 | 13.937 | 10.307 |
| 7/1/2011 | 11:14:00 AM | 4.981 | 13.666 | 14.133 | 10.445 |
| 7/1/2011 | 11:15:00 AM | 5.006 | 13.655 | 15.322 | 10.298 |
| 7/1/2011 | 11:16:00 AM | 4.964 | 13.683 | 16.102 | 10.309 |
| 7/1/2011 | 11:17:00 AM | 4.984 | 13.666 | 17.15 | 10.299 |
| 7/1/2011 | 11:18:00 AM | 4.985 | 13.671 | 17.605 | 10.1 |
| 7/1/2011 | 11:19:00 AM | 5.001 | 13.67 | 12.895 | 10.132 |
| 7/1/2011 | 11:20:00 AM | 4.961 | 13.69 | 8.174 | 10.575 |
| 7/1/2011 | 11:21:00 AM | 4.98 | 13.68 | 11.673 | 10.833 |
| 7/1/2011 | 11:22:00 AM | 5.017 | 13.639 | 13.807 | 10.758 |
| 7/1/2011 | 11:23:00 AM | 4.974 | 13.675 | 14.742 | 10.625 |
| 7/1/2011 | 11:24:00 AM | 4.982 | 13.672 | 15.946 | 10.612 |
| 7/1/2011 | 11:25:00 AM | 4.982 | 13.653 | 12.171 | 10.467 |
| 7/1/2011 | 11:26:00 AM | 4.954 | 13.684 | 9.223 | 10.6 |
| 7/1/2011 | 11:27:00 AM | 4.945 | 13.679 | 11.3 | 10.984 |
| 7/1/2011 | 11:28:00 AM | 4.946 | 13.678 | 12.24 | 11.301 |
| 7/1/2011 | 11:29:00 AM | 4.939 | 13.696 | 13.247 | 10.99 |
| 7/1/2011 | 11:30:00 AM | 4.941 | 13.691 | 13.983 | 10.61 |
| 7/1/2011 | 11:31:00 AM | 4.926 | 13.723 | 11.114 | 10.638 |

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|---|---|---|---|---|---|
| 7/1/2011 | 11:32:00 AM | 4.917 | 13.727 | 9.324 | 10.769 |
| 7/1/2011 | 11:33:00 AM | 4.983 | 13.657 | 12.907 | 10.783 |
| 7/1/2011 | 11:34:00 AM | 5.059 | 13.581 | 15.087 | 10.639 |
| 7/1/2011 | 11:35:00 AM | 5.069 | 13.582 | 16.174 | 10.486 |
| 7/1/2011 | 11:36:00 AM | 5.079 | 13.558 | 16.742 | 10.125 |
| 7/1/2011 | 11:37:00 AM | 5.078 | 13.563 | 16.493 | 10.173 |
| 7/1/2011 | 11:38:00 AM | 5.054 | 13.577 | 16.204 | 9.933 |
| 7/1/2011 | 11:39:00 AM | 5.042 | 13.587 | 16.787 | 10.17 |
| 7/1/2011 | 11:40:00 AM | 5.001 | 13.625 | 17.653 | 9.995 |
| 7/1/2011 | 11:41:00 AM | 4.981 | 13.651 | 19.08 | 10.182 |
| 7/1/2011 | 11:42:00 AM | 4.99 | 13.625 | 19.941 | 9.964 |
| 7/1/2011 | 11:43:00 AM | 4.924 | 13.713 | 14.569 | 10.007 |
| 7/1/2011 | 11:44:00 AM | 4.912 | 13.699 | 8.664 | 10.52 |
| 7/1/2011 | 11:45:00 AM | 4.895 | 13.716 | 12.043 | 11.24 |
| 7/1/2011 | 11:46:00 AM | 4.92 | 13.708 | 14.798 | 11.295 |
| 7/1/2011 | 11:47:00 AM | 4.953 | 13.673 | 15.835 | 11.19 |
| 7/1/2011 | 11:48:00 AM | 4.917 | 13.705 | 16.5 | 10.892 |
| 7/1/2011 | 11:49:00 AM | 4.923 | 13.707 | 14.96 | 10.584 |
| 7/1/2011 | 11:50:00 AM | 4.933 | 13.684 | 10.41 | 10.824 |
| 7/1/2011 | 11:51:00 AM | 4.983 | 13.621 | 12.288 | 11.062 |
| 7/1/2011 | 11:52:00 AM | 4.941 | 13.654 | 13.313 | 10.836 |
| 7/1/2011 | 11:53:00 AM | 4.917 | 13.688 | 14.665 | 10.74 |
| 7/1/2011 | 11:54:00 AM | 4.878 | 13.717 | 14.768 | 10.432 |
| 7/1/2011 | 11:55:00 AM | 4.857 | 13.751 | 10.845 | 10.368 |
| 7/1/2011 | 11:56:00 AM | 4.853 | 13.756 | 8.681 | 10.393 |
| 7/1/2011 | 11:57:00 AM | 4.854 | 13.729 | 10.813 | 10.589 |
| 7/1/2011 | 11:58:00 AM | 4.86 | 13.719 | 12.15 | 10.569 |
| 7/1/2011 | 11:59:00 AM | 4.874 | 13.725 | 13.077 | 10.528 |
| 7/1/2011 | 12:00:00 PM | 4.902 | 13.696 | 14.07 | 10.545 |
| 7/1/2011 | 12:01:00 PM | 4.856 | 13.745 | 10.307 | 10.266 |
| 7/1/2011 | 12:02:00 PM | 4.893 | 13.695 | 7.993 | 10.595 |
| 7/1/2011 | 12:03:00 PM | 4.922 | 13.665 | 10.184 | 10.815 |
| 7/1/2011 | 12:04:00 PM | 4.925 | 13.672 | 11.362 | 10.641 |
| 7/1/2011 | 12:05:00 PM | 4.899 | 13.686 | 11.654 | 10.621 |
| 7/1/2011 | 12:06:00 PM | 4.862 | 13.734 | 12.627 | 10.655 |
| 7/1/2011 | 12:07:00 PM | 4.861 | 13.74 | 9.983 | 10.64 |
| 7/1/2011 | 12:08:00 PM | 4.917 | 13.682 | 9.423 | 10.65 |
| 7/1/2011 | 12:09:00 PM | 4.954 | 13.652 | 11.373 | 10.804 |
| 7/1/2011 | 12:10:00 PM | 4.933 | 13.667 | 12.728 | 10.752 |
| 7/1/2011 | 12:11:00 PM | 4.951 | 13.628 | 12.938 | 10.61 |
| 7/1/2011 | 12:12:00 PM | 4.95 | 13.647 | 13.044 | 10.438 |
| 7/1/2011 | 12:13:00 PM | 4.942 | 13.66 | 10.009 | 10.419 |
| 7/1/2011 | 12:14:00 PM | 4.916 | 13.684 | 8.134 | 10.45 |
| 7/1/2011 | 12:15:00 PM | 4.902 | 13.685 | 10.32 | 10.874 |
| 7/1/2011 | 12:16:00 PM | 4.887 | 13.718 | 11.597 | 10.858 |
| 7/1/2011 | 12:17:00 PM | 4.887 | 13.729 | 13.416 | 10.676 |
| 7/1/2011 | 12:18:00 PM | 4.921 | 13.675 | 13.854 | 10.622 |
| 7/1/2011 | 12:19:00 PM | 4.855 | 13.741 | 10.762 | 10.447 |
| 7/1/2011 | 12:20:00 PM | 4.848 | 13.748 | 7.29 | 10.801 |
| 7/1/2011 | 12:21:00 PM | 4.889 | 13.692 | 9.206 | 11.164 |
| 7/1/2011 | 12:22:00 PM | 4.868 | 13.718 | 9.875 | 11.097 |
| 7/1/2011 | 12:23:00 PM | 4.844 | 13.743 | 10.393 | 10.932 |

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|---|---|---|---|---|---|
| 7/1/2011 | 12:24:00 PM | 4.819 | 13.789 | 11.066 | 10.821 |
| 7/1/2011 | 12:25:00 PM | 4.814 | 13.795 | 9.463 | 10.94 |
| 7/1/2011 | 12:26:00 PM | 4.826 | 13.783 | 7.453 | 11.033 |
| 7/1/2011 | 12:27:00 PM | 4.911 | 13.714 | 10.76 | 11.112 |
| 7/1/2011 | 12:28:00 PM | 4.923 | 13.704 | 12.188 | 11.08 |
| 7/1/2011 | 12:29:00 PM | 4.898 | 13.72 | 12.72 | 11.033 |
| 7/1/2011 | 12:30:00 PM | 4.908 | 13.71 | 13.176 | 10.713 |
| 7/1/2011 | 12:31:00 PM | 4.891 | 13.724 | 9.836 | 10.568 |
| 7/1/2011 | 12:32:00 PM | 4.916 | 13.697 | 8.558 | 10.705 |
| 7/1/2011 | 12:33:00 PM | 4.93 | 13.696 | 10.852 | 11.042 |
| 7/1/2011 | 12:34:00 PM | 4.957 | 13.648 | 11.894 | 11.003 |
| 7/1/2011 | 12:35:00 PM | 4.943 | 13.666 | 11.972 | 10.82 |
| 7/1/2011 | 12:36:00 PM | 4.911 | 13.709 | 11.86 | 10.606 |
| 7/1/2011 | 12:37:00 PM | 4.843 | 13.781 | 10.207 | 10.693 |
| 7/1/2011 | 12:38:00 PM | 4.8 | 13.817 | 7.058 | 10.943 |
| 7/1/2011 | 12:39:00 PM | 4.902 | 13.741 | 10.148 | 11.15 |
| 7/1/2011 | 12:40:00 PM | 4.925 | 13.713 | 11.722 | 10.902 |
| 7/1/2011 | 12:41:00 PM | 4.961 | 13.674 | 12.783 | 10.77 |
| 7/1/2011 | 12:42:00 PM | 4.941 | 13.702 | 13.478 | 10.505 |
| 7/1/2011 | 12:43:00 PM | 4.95 | 13.687 | 13.203 | 10.422 |
| 7/1/2011 | 12:44:00 PM | 4.861 | 13.776 | 12.302 | 10.427 |
| 7/1/2011 | 12:45:00 PM | 4.892 | 13.747 | 13.911 | 10.879 |
| 7/1/2011 | 12:46:00 PM | 4.894 | 13.739 | 14.166 | 10.567 |
| 7/1/2011 | 12:47:00 PM | 4.878 | 13.757 | 14.345 | 10.488 |
| 7/1/2011 | 12:48:00 PM | 4.828 | 13.819 | 14.999 | 10.547 |
| 7/1/2011 | 12:49:00 PM | 4.834 | 13.818 | 11.666 | 10.58 |
| 7/1/2011 | 12:50:00 PM | 4.813 | 13.828 | 6.483 | 10.944 |
| 7/1/2011 | 12:51:00 PM | 4.847 | 13.795 | 9.279 | 11.305 |
| 7/1/2011 | 12:52:00 PM | 4.835 | 13.809 | 11.038 | 11.304 |
| 7/1/2011 | 12:53:00 PM | 4.82 | 13.816 | 11.938 | 11.437 |
| 7/1/2011 | 12:54:00 PM | 4.872 | 13.786 | 13.653 | 11.51 |
| 7/1/2011 | 12:55:00 PM | 4.912 | 13.742 | 13.872 | 10.892 |
| 7/1/2011 | 12:56:00 PM | 4.927 | 13.721 | 13.721 | 10.522 |
| 7/1/2011 | 12:57:00 PM | 4.948 | 13.699 | 14.691 | 10.529 |
| 7/1/2011 | 12:58:00 PM | 4.928 | 13.723 | 14.862 | 10.662 |
| 7/1/2011 | 12:59:00 PM | 4.863 | 13.77 | 14.934 | 10.725 |
| 7/1/2011 | 1:00:00 PM | 4.907 | 13.742 | 16.117 | 10.707 |
| 7/1/2011 | 1:01:00 PM | 4.845 | 13.815 | 11.945 | 10.693 |
| 7/1/2011 | 1:02:00 PM | 4.852 | 13.797 | 7.964 | 11.276 |
| 7/1/2011 | 1:03:00 PM | 4.933 | 13.737 | 11.284 | 11.435 |
| 7/1/2011 | 1:04:00 PM | 4.946 | 13.726 | 13.282 | 11.384 |
| 7/1/2011 | 1:05:00 PM | 4.897 | 13.76 | 14.732 | 11.232 |
| 7/1/2011 | 1:06:00 PM | 4.869 | 13.793 | 15.707 | 11.081 |
| 7/1/2011 | 1:07:00 PM | 4.88 | 13.787 | 15.851 | 10.819 |
| 7/1/2011 | 1:08:00 PM | 4.867 | 13.795 | 15.208 | 10.754 |
| 7/1/2011 | 1:09:00 PM | 4.854 | 13.801 | 14.485 | 10.879 |
| 7/1/2011 | 1:10:00 PM | 4.814 | 13.85 | 14.217 | 10.947 |
| 7/1/2011 | 1:11:00 PM | 4.833 | 13.834 | 14.978 | 10.881 |
| 7/1/2011 | 1:12:00 PM | 4.872 | 13.791 | 15.723 | 10.737 |
| 7/1/2011 | 1:13:00 PM | 4.874 | 13.812 | 12.509 | 10.634 |
| 7/1/2011 | 1:14:00 PM | 4.852 | 13.823 | 6.618 | 11.177 |
| 7/1/2011 | 1:15:00 PM | 4.924 | 13.752 | 9.726 | 11.697 |

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|---|---|---|---|---|---|---|
| 7/1/2011 | 1:16:00 PM | 4.932 | 13.745 | 11.981 | 11.741 | |
| 7/1/2011 | 1:17:00 PM | 4.933 | 13.752 | 13.57 | 11.399 | |
| 7/1/2011 | 1:18:00 PM | 4.93 | 13.747 | 13.676 | 11.022 | |
| 7/1/2011 | 1:19:00 PM | 4.915 | 13.774 | 13.694 | 10.981 | |
| 7/1/2011 | 1:20:00 PM | 4.936 | 13.755 | 13.752 | 10.734 | |
| 7/1/2011 | 1:21:00 PM | 4.943 | 13.748 | 14.37 | 10.746 | |
| 7/1/2011 | 1:22:00 PM | 4.913 | 13.783 | 15.492 | 10.744 | |
| 7/1/2011 | 1:23:00 PM | 4.972 | 13.715 | 16.24 | 10.542 | |
| 7/1/2011 | 1:24:00 PM | 4.916 | 13.763 | 15.828 | 10.439 | |
| 7/1/2011 | 1:25:00 PM | 4.913 | 13.795 | 12.323 | 10.711 | |
| 7/1/2011 | 1:26:00 PM | 4.943 | 13.754 | 8.251 | 10.867 | |
| 7/1/2011 | 1:27:00 PM | 4.967 | 13.73 | 11.159 | 11.348 | |
| 7/1/2011 | 1:28:00 PM | 4.966 | 13.728 | 12.618 | 11.154 | |
| 7/1/2011 | 1:29:00 PM | 4.959 | 13.741 | 14.521 | 11.058 | |
| 7/1/2011 | 1:30:00 PM | 5.002 | 13.695 | 16.335 | 10.785 | |
| 7/1/2011 | 1:31:00 PM | 5.034 | 13.674 | 14.059 | 10.609 | |
| 7/1/2011 | 1:32:00 PM | 4.971 | 13.72 | 10.345 | 10.656 | |
| 7/1/2011 | 1:33:00 PM | 4.959 | 13.737 | 13.127 | 10.862 | |
| 7/1/2011 | 1:34:00 PM | 4.974 | 13.76 | 14.998 | 10.622 | |
| 7/1/2011 | 1:35:00 PM | 4.682 | 11.398 | 16.154 | 10.329 | |
| 7/1/2011 | 1:36:00 PM | 0.376 | 0.04 | 0.189 | 10.218 | |
| 7/1/2011 | 1:37:00 PM | 0.218 | 0.018 | -0.012 | 11.458 | |
| 7/1/2011 | 1:38:00 PM | 0.198 | 0.01 | -0.026 | 11.869 | |
| 7/1/2011 | 1:39:00 PM | 0.187 | 0.005 | -0.025 | 12.117 | |
| 7/1/2011 | 1:40:00 PM | 0.18 | -0.002 | -0.025 | 12.052 | |
| 7/1/2011 | 1:41:00 PM | 0.172 | -0.001 | -0.033 | 12.01 | |
| 7/1/2011 | 1:42:00 PM | 0.163 | 0 | -0.036 | 12.022 | SO2 bias |
| 7/1/2011 | 1:43:00 PM | 2.846 | 6.767 | -0.08 | 10.419 | |
| 7/1/2011 | 1:44:00 PM | 4.875 | 9.851 | -0.099 | 2.799 | |
| 7/1/2011 | 1:45:00 PM | 4.901 | 9.865 | -0.103 | 0.637 | O2/CO2 bias |
| 7/1/2011 | 1:46:00 PM | 4.907 | 9.876 | -0.104 | 0.145 | |
| 7/1/2011 | 1:47:00 PM | 4.916 | 9.884 | -0.101 | 0.041 | |
| 7/1/2011 | 1:48:00 PM | 4.916 | 9.89 | -0.105 | -0.05 | |
| 7/1/2011 | 1:49:00 PM | 4.853 | 9.135 | 0.192 | -0.103 | |
| 7/1/2011 | 1:50:00 PM | 0.452 | 0.042 | 22.187 | -0.071 | |
| 7/1/2011 | 1:51:00 PM | 0.195 | 0.011 | 22.868 | -0.102 | NOx bias |
| 7/1/2011 | 1:52:00 PM | 0.178 | 0.008 | 22.885 | -0.11 | |
| 7/1/2011 | 1:53:00 PM | 2.589 | 8.879 | 17.454 | 0.867 | |
| 7/1/2011 | 1:54:00 PM | 4.825 | 13.814 | 13.826 | 7.402 | |
| 7/1/2011 | 1:55:00 PM | 4.813 | 13.864 | 11.451 | 10.223 | |
| 7/1/2011 | 1:56:00 PM | 4.809 | 13.884 | 9.305 | 10.749 | |
| 7/1/2011 | 1:57:00 PM | 4.869 | 13.838 | 13.175 | 10.693 | |
| 7/1/2011 | 1:58:00 PM | 4.942 | 13.756 | 15.693 | 9.69 | |
| 7/1/2011 | 1:59:00 PM | 4.946 | 13.777 | 17.52 | 9.24 | |
| 7/1/2011 | 2:00:00 PM | 4.986 | 13.724 | 19.154 | 9.286 | |
| 7/1/2011 | 2:01:00 PM | 5.007 | 13.715 | 16.168 | 9.25 | |
| 7/1/2011 | 2:02:00 PM | 4.953 | 13.751 | 11.719 | 9.602 | |
| 7/1/2011 | 2:03:00 PM | 4.916 | 13.786 | 14.294 | 10.067 | |
| 7/1/2011 | 2:04:00 PM | 4.909 | 13.802 | 16.773 | 10.238 | |
| 7/1/2011 | 2:05:00 PM | 4.938 | 13.778 | 18.868 | 10.289 | |
| 7/1/2011 | 2:06:00 PM | 4.98 | 13.71 | 19.711 | 10.258 | |
| 7/1/2011 | 2:07:00 PM | 4.897 | 13.799 | 17.615 | 10.034 | |

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|---|---|---|---|---|---|
| 7/1/2011 | 2:08:00 PM | 4.86 | 13.821 | 16.944 | 10.275 |
| 7/1/2011 | 2:09:00 PM | 4.856 | 13.826 | 16.377 | 10.273 |
| 7/1/2011 | 2:10:00 PM | 4.838 | 13.843 | 15.876 | 10.439 |
| 7/1/2011 | 2:11:00 PM | 4.798 | 13.891 | 15.429 | 10.65 |
| 7/1/2011 | 2:12:00 PM | 4.791 | 13.901 | 15.851 | 10.504 |
| 7/1/2011 | 2:13:00 PM | 4.756 | 13.948 | 12.124 | 10.446 |
| 7/1/2011 | 2:14:00 PM | 4.705 | 13.99 | 6.642 | 10.831 |
| 7/1/2011 | 2:15:00 PM | 4.78 | 13.917 | 9.851 | 11.387 |
| 7/1/2011 | 2:16:00 PM | 4.825 | 13.863 | 11.156 | 11.408 |
| 7/1/2011 | 2:17:00 PM | 4.761 | 13.929 | 11.406 | 10.65 |
| 7/1/2011 | 2:18:00 PM | 4.752 | 13.94 | 11.797 | 10.374 |
| 7/1/2011 | 2:19:00 PM | 4.745 | 13.953 | 11.385 | 10.508 |
| 7/1/2011 | 2:20:00 PM | 4.724 | 13.972 | 11.101 | 10.824 |
| 7/1/2011 | 2:21:00 PM | 4.758 | 13.917 | 11.308 | 10.654 |
| 7/1/2011 | 2:22:00 PM | 4.736 | 13.934 | 11.092 | 10.858 |
| 7/1/2011 | 2:23:00 PM | 4.745 | 13.927 | 11.102 | 10.829 |
| 7/1/2011 | 2:24:00 PM | 4.714 | 13.962 | 10.174 | 10.634 |
| 7/1/2011 | 2:25:00 PM | 4.687 | 14.003 | 8.033 | 10.758 |
| 7/1/2011 | 2:26:00 PM | 4.674 | 14.009 | 4.33 | 10.999 |
| 7/1/2011 | 2:27:00 PM | 4.751 | 13.932 | 7.223 | 11.392 |
| 7/1/2011 | 2:28:00 PM | 4.767 | 13.916 | 8.67 | 11.389 |
| 7/1/2011 | 2:29:00 PM | 4.796 | 13.883 | 9.587 | 11.199 |
| 7/1/2011 | 2:30:00 PM | 4.789 | 13.887 | 9.743 | 11.137 |
| 7/1/2011 | 2:31:00 PM | 4.752 | 13.934 | 9.489 | 11.187 |
| 7/1/2011 | 2:32:00 PM | 4.721 | 13.959 | 9.391 | 11.01 |
| 7/1/2011 | 2:33:00 PM | 4.791 | 13.899 | 10.922 | 10.857 |
| 7/1/2011 | 2:34:00 PM | 4.809 | 13.884 | 11.735 | 10.612 |
| 7/1/2011 | 2:35:00 PM | 4.831 | 13.843 | 12.239 | 10.629 |
| 7/1/2011 | 2:36:00 PM | 4.811 | 13.862 | 11.794 | 10.512 |
| 7/1/2011 | 2:37:00 PM | 4.733 | 13.944 | 9.001 | 10.818 |
| 7/1/2011 | 2:38:00 PM | 4.724 | 13.947 | 4.695 | 11.244 |
| 7/1/2011 | 2:39:00 PM | 4.741 | 13.91 | 6.659 | 11.589 |
| 7/1/2011 | 2:40:00 PM | 4.699 | 13.965 | 7.824 | 11.542 |
| 7/1/2011 | 2:41:00 PM | 4.717 | 13.942 | 8.521 | 11.383 |
| 7/1/2011 | 2:42:00 PM | 4.749 | 13.925 | 9.449 | 11.455 |
| 7/1/2011 | 2:43:00 PM | 4.758 | 13.915 | 9.279 | 11.446 |
| 7/1/2011 | 2:44:00 PM | 4.756 | 13.929 | 8.947 | 11.199 |
| 7/1/2011 | 2:45:00 PM | 4.794 | 13.87 | 9.078 | 10.999 |
| 7/1/2011 | 2:46:00 PM | 4.758 | 13.926 | 8.975 | 10.856 |
| 7/1/2011 | 2:47:00 PM | 4.76 | 13.92 | 9.259 | 10.862 |
| 7/1/2011 | 2:48:00 PM | 4.723 | 13.962 | 8.756 | 10.809 |
| 7/1/2011 | 2:49:00 PM | 4.684 | 14.014 | 6.674 | 10.836 |
| 7/1/2011 | 2:50:00 PM | 4.653 | 14.027 | 3.578 | 11.376 |
| 7/1/2011 | 2:51:00 PM | 4.728 | 13.965 | 6.204 | 11.642 |
| 7/1/2011 | 2:52:00 PM | 4.73 | 13.976 | 7.579 | 11.712 |
| 7/1/2011 | 2:53:00 PM | 4.756 | 13.945 | 8.616 | 11.402 |
| 7/1/2011 | 2:54:00 PM | 4.758 | 13.945 | 8.955 | 11.223 |
| 7/1/2011 | 2:55:00 PM | 4.751 | 13.955 | 9.077 | 11.218 |
| 7/1/2011 | 2:56:00 PM | 4.77 | 13.933 | 9.31 | 11.183 |
| 7/1/2011 | 2:57:00 PM | 4.837 | 13.873 | 10.504 | 10.864 |
| 7/1/2011 | 2:58:00 PM | 4.81 | 13.903 | 10.953 | 10.89 |
| 7/1/2011 | 2:59:00 PM | 4.845 | 13.846 | 11.245 | 10.709 |

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|---|---|---|---|---|---|
| 7/1/2011 | 3:00:00 PM | 4.837 | 13.865 | 11.32 | 10.519 |
| 7/1/2011 | 3:01:00 PM | 4.824 | 13.884 | 9.6 | 10.752 |
| 7/1/2011 | 3:02:00 PM | 4.779 | 13.902 | 5.005 | 11.071 |
| 7/1/2011 | 3:03:00 PM | 4.813 | 13.874 | 7.716 | 11.577 |
| 7/1/2011 | 3:04:00 PM | 4.831 | 13.857 | 9.948 | 11.834 |
| 7/1/2011 | 3:05:00 PM | 4.853 | 13.855 | 11.209 | 11.365 |
| 7/1/2011 | 3:06:00 PM | 4.854 | 13.849 | 11.786 | 10.963 |
| 7/1/2011 | 3:07:00 PM | 4.806 | 13.912 | 10.418 | 10.786 |
| 7/1/2011 | 3:08:00 PM | 4.8 | 13.909 | 7.24 | 10.955 |
| 7/1/2011 | 3:09:00 PM | 4.808 | 13.905 | 9.593 | 11.137 |
| 7/1/2011 | 3:10:00 PM | 4.783 | 13.938 | 11.914 | 11.286 |
| 7/1/2011 | 3:11:00 PM | 4.866 | 13.849 | 13.752 | 11.055 |
| 7/1/2011 | 3:12:00 PM | 4.888 | 13.818 | 14.398 | 10.76 |
| 7/1/2011 | 3:13:00 PM | 4.848 | 13.852 | 13.256 | 10.649 |
| 7/1/2011 | 3:14:00 PM | 4.821 | 13.891 | 9.127 | 11.048 |
| 7/1/2011 | 3:15:00 PM | 4.876 | 13.798 | 11.257 | 11.257 |
| 7/1/2011 | 3:16:00 PM | 4.866 | 13.807 | 13.261 | 11.323 |
| 7/1/2011 | 3:17:00 PM | 4.908 | 13.778 | 14.399 | 11.125 |
| 7/1/2011 | 3:18:00 PM | 4.911 | 13.767 | 14.31 | 10.882 |
| 7/1/2011 | 3:19:00 PM | 4.897 | 13.772 | 13.681 | 10.964 |
| 7/1/2011 | 3:20:00 PM | 4.874 | 13.794 | 13.301 | 10.718 |
| 7/1/2011 | 3:21:00 PM | 4.85 | 13.826 | 13.628 | 10.76 |
| 7/1/2011 | 3:22:00 PM | 4.854 | 13.822 | 14.287 | 10.736 |
| 7/1/2011 | 3:23:00 PM | 4.842 | 13.821 | 14.211 | 10.609 |
| 7/1/2011 | 3:24:00 PM | 4.849 | 13.82 | 14.735 | 10.785 |
| 7/1/2011 | 3:25:00 PM | 4.784 | 13.891 | 12.08 | 10.816 |
| 7/1/2011 | 3:26:00 PM | 4.754 | 13.924 | 6.016 | 11.125 |
| 7/1/2011 | 3:27:00 PM | 4.779 | 13.881 | 8.439 | 11.65 |
| 7/1/2011 | 3:28:00 PM | 4.797 | 13.889 | 10.826 | 11.546 |
| 7/1/2011 | 3:29:00 PM | 4.835 | 13.852 | 12.092 | 11.362 |
| 7/1/2011 | 3:30:00 PM | 4.841 | 13.853 | 12.617 | 11.053 |
| 7/1/2011 | 3:31:00 PM | 4.837 | 13.859 | 13.075 | 10.99 |
| 7/1/2011 | 3:32:00 PM | 4.832 | 13.864 | 12.795 | 10.719 |
| 7/1/2011 | 3:33:00 PM | 4.833 | 13.867 | 14.225 | 10.759 |
| 7/1/2011 | 3:34:00 PM | 4.884 | 13.821 | 15.93 | 10.794 |
| 7/1/2011 | 3:35:00 PM | 4.893 | 13.813 | 16.234 | 10.523 |
| 7/1/2011 | 3:36:00 PM | 4.861 | 13.852 | 16.623 | 10.421 |
| 7/1/2011 | 3:37:00 PM | 4.816 | 13.912 | 14.086 | 10.499 |
| 7/1/2011 | 3:38:00 PM | 4.845 | 13.861 | 6.725 | 10.944 |
| 7/1/2011 | 3:39:00 PM | 4.897 | 13.798 | 9.9 | 11.517 |
| 7/1/2011 | 3:40:00 PM | 4.903 | 13.794 | 12.501 | 11.816 |
| 7/1/2011 | 3:41:00 PM | 4.893 | 13.811 | 14.265 | 11.643 |
| 7/1/2011 | 3:42:00 PM | 4.928 | 13.779 | 15.643 | 11.152 |
| 7/1/2011 | 3:43:00 PM | 4.913 | 13.798 | 15.328 | 10.727 |
| 7/1/2011 | 3:44:00 PM | 4.88 | 13.805 | 13.878 | 10.747 |
| 7/1/2011 | 3:45:00 PM | 4.855 | 13.844 | 14.689 | 10.731 |
| 7/1/2011 | 3:46:00 PM | 4.843 | 13.847 | 15.124 | 10.86 |
| 7/1/2011 | 3:47:00 PM | 4.797 | 13.88 | 14.193 | 11.012 |
| 7/1/2011 | 3:48:00 PM | 4.825 | 13.857 | 13.465 | 10.867 |
| 7/1/2011 | 3:49:00 PM | 4.739 | 13.954 | 10.617 | 10.853 |
| 7/1/2011 | 3:50:00 PM | 4.707 | 13.98 | 5.287 | 11.316 |
| 7/1/2011 | 3:51:00 PM | 4.799 | 13.909 | 8.527 | 11.846 |

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|---|---|---|---|---|---|
| 7/1/2011 | 3:52:00 PM | 4.854 | 13.842 | 10.861 | 11.878 |
| 7/1/2011 | 3:53:00 PM | 4.853 | 13.857 | 12.323 | 11.51 |
| 7/1/2011 | 3:54:00 PM | 4.872 | 13.846 | 14.667 | 11.346 |
| 7/1/2011 | 3:55:00 PM | 4.883 | 13.816 | 14.328 | 11.105 |
| 7/1/2011 | 3:56:00 PM | 4.911 | 13.789 | 13.668 | 11.001 |
| 7/1/2011 | 3:57:00 PM | 4.929 | 13.776 | 14.638 | 11.094 |
| 7/1/2011 | 3:58:00 PM | 4.904 | 13.79 | 14.953 | 11.016 |
| 7/1/2011 | 3:59:00 PM | 4.886 | 13.811 | 16.144 | 10.861 |
| 7/1/2011 | 4:00:00 PM | 4.892 | 13.802 | 17.234 | 10.936 |
| 7/1/2011 | 4:01:00 PM | 4.888 | 13.822 | 15.021 | 10.914 |
| 7/1/2011 | 4:02:00 PM | 4.831 | 13.869 | 7.979 | 11.112 |
| 7/1/2011 | 4:03:00 PM | 4.878 | 13.813 | 11.502 | 11.68 |
| 7/1/2011 | 4:04:00 PM | 4.873 | 13.833 | 14.676 | 11.449 |
| 7/1/2011 | 4:05:00 PM | 4.911 | 13.786 | 16.574 | 11.345 |
| 7/1/2011 | 4:06:00 PM | 4.883 | 13.813 | 16.811 | 11.026 |
| 7/1/2011 | 4:07:00 PM | 4.876 | 13.828 | 16.864 | 10.896 |
| 7/1/2011 | 4:08:00 PM | 4.868 | 13.821 | 15.57 | 10.672 |
| 7/1/2011 | 4:09:00 PM | 4.898 | 13.809 | 16.214 | 10.811 |
| 7/1/2011 | 4:10:00 PM | 4.89 | 13.79 | 16.817 | 10.882 |
| 7/1/2011 | 4:11:00 PM | 4.934 | 13.766 | 18.711 | 10.751 |
| 7/1/2011 | 4:12:00 PM | 4.942 | 13.771 | 19.913 | 10.812 |
| 7/1/2011 | 4:13:00 PM | 4.937 | 13.774 | 17.488 | 10.562 |
| 7/1/2011 | 4:14:00 PM | 4.905 | 13.804 | 9.81 | 10.751 |
| 7/1/2011 | 4:15:00 PM | 4.892 | 13.81 | 12.718 | 11.277 |
| 7/1/2011 | 4:16:00 PM | 4.909 | 13.785 | 14.5 | 11.269 |
| 7/1/2011 | 4:17:00 PM | 4.904 | 13.804 | 15.133 | 11.17 |
| 7/1/2011 | 4:18:00 PM | 4.861 | 13.863 | 15.764 | 11.203 |
| 7/1/2011 | 4:19:00 PM | 4.892 | 13.824 | 15.866 | 10.961 |
| 7/1/2011 | 4:20:00 PM | 4.884 | 13.832 | 15.164 | 11.181 |
| 7/1/2011 | 4:21:00 PM | 4.86 | 13.845 | 16.084 | 11.07 |
| 7/1/2011 | 4:22:00 PM | 4.919 | 13.795 | 17.041 | 10.963 |
| 7/1/2011 | 4:23:00 PM | 4.911 | 13.803 | 17.447 | 10.781 |
| 7/1/2011 | 4:24:00 PM | 4.936 | 13.795 | 17.676 | 10.841 |
| 7/1/2011 | 4:25:00 PM | 4.9 | 13.818 | 14.431 | 10.641 |
| 7/1/2011 | 4:26:00 PM | 4.851 | 13.88 | 7.62 | 11.232 |
| 7/1/2011 | 4:27:00 PM | 4.915 | 13.801 | 10.567 | 11.646 |
| 7/1/2011 | 4:28:00 PM | 4.908 | 13.822 | 12.814 | 11.528 |
| 7/1/2011 | 4:29:00 PM | 4.913 | 13.823 | 14.667 | 11.311 |
| 7/1/2011 | 4:30:00 PM | 4.971 | 13.79 | 16.854 | 10.83 |
| 7/1/2011 | 4:31:00 PM | 4.981 | 13.754 | 16.223 | 10.65 |
| 7/1/2011 | 4:32:00 PM | 4.961 | 13.789 | 15.537 | 10.607 |
| 7/1/2011 | 4:33:00 PM | 4.932 | 13.806 | 16.23 | 10.634 |
| 7/1/2011 | 4:34:00 PM | 4.929 | 13.81 | 17.103 | 11.014 |
| 7/1/2011 | 4:35:00 PM | 4.92 | 13.811 | 17.84 | 10.904 |
| 7/1/2011 | 4:36:00 PM | 4.939 | 13.809 | 18.73 | 10.821 |
| 7/1/2011 | 4:37:00 PM | 4.888 | 13.855 | 15.947 | 10.574 |
| 7/1/2011 | 4:38:00 PM | 4.807 | 13.945 | 8.882 | 11.078 |
| 7/1/2011 | 4:39:00 PM | 4.894 | 13.833 | 12.913 | 11.307 |
| 7/1/2011 | 4:40:00 PM | 4.888 | 13.845 | 15.637 | 11.324 |
| 7/1/2011 | 4:41:00 PM | 4.927 | 13.822 | 17.728 | 11.134 |
| 7/1/2011 | 4:42:00 PM | 4.915 | 13.833 | 19.39 | 11.06 |
| 7/1/2011 | 4:43:00 PM | 4.932 | 13.808 | 19.855 | 10.956 |

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|---|---|---|---|---|---|---|
| 7/1/2011 | 4:44:00 PM | 4.929 | 13.809 | 18.895 | 10.685 | |
| 7/1/2011 | 4:45:00 PM | 4.927 | 13.8 | 18.753 | 10.658 | |
| 7/1/2011 | 4:46:00 PM | 4.869 | 13.891 | 18.886 | 10.591 | |
| 7/1/2011 | 4:47:00 PM | 4.866 | 13.868 | 20.253 | 10.888 | |
| 7/1/2011 | 4:48:00 PM | 4.887 | 13.849 | 20.822 | 10.612 | |
| 7/1/2011 | 4:49:00 PM | 4.819 | 13.931 | 17.961 | 10.47 | |
| 7/1/2011 | 4:50:00 PM | 4.822 | 13.952 | 8.418 | 11.034 | |
| 7/1/2011 | 4:51:00 PM | 4.887 | 13.866 | 11.572 | 11.624 | |
| 7/1/2011 | 4:52:00 PM | 4.907 | 13.861 | 15.285 | 11.766 | |
| 7/1/2011 | 4:53:00 PM | 4.914 | 13.847 | 17.176 | 11.375 | |
| 7/1/2011 | 4:54:00 PM | 4.931 | 13.84 | 18.623 | 11.132 | |
| 7/1/2011 | 4:55:00 PM | 4.96 | 13.812 | 17.575 | 11.201 | |
| 7/1/2011 | 4:56:00 PM | 4.873 | 13.888 | 11.605 | 11.228 | |
| 7/1/2011 | 4:57:00 PM | 4.882 | 13.877 | 14.038 | 11.594 | |
| 7/1/2011 | 4:58:00 PM | 4.943 | 13.796 | 16.092 | 11.363 | |
| 7/1/2011 | 4:59:00 PM | 4.857 | 13.879 | 16.002 | 11.273 | |
| 7/1/2011 | 5:00:00 PM | 4.848 | 13.899 | 17.487 | 11.494 | |
| 7/1/2011 | 5:01:00 PM | 4.875 | 13.886 | 17.656 | 11.107 | |
| 7/1/2011 | 5:02:00 PM | 4.882 | 13.871 | 17.285 | 10.743 | |
| 7/1/2011 | 5:03:00 PM | 4.873 | 13.884 | 17.323 | 10.687 | |
| 7/1/2011 | 5:04:00 PM | 4.859 | 13.883 | 17.172 | 10.62 | |
| 7/1/2011 | 5:05:00 PM | 4.838 | 13.918 | 17.111 | 10.461 | |
| 7/1/2011 | 5:06:00 PM | 4.852 | 13.914 | 17.585 | 10.471 | |
| 7/1/2011 | 5:07:00 PM | 4.814 | 13.951 | 15.308 | 10.744 | |
| 7/1/2011 | 5:08:00 PM | 4.772 | 13.965 | 7.291 | 11.019 | |
| 7/1/2011 | 5:09:00 PM | 4.795 | 13.963 | 9.538 | 11.32 | |
| 7/1/2011 | 5:10:00 PM | 4.775 | 13.983 | 11.746 | 11.424 | |
| 7/1/2011 | 5:11:00 PM | 4.797 | 13.966 | 13.347 | 11.372 | |
| 7/1/2011 | 5:12:00 PM | 4.812 | 13.953 | 14.364 | 11.072 | |
| 7/1/2011 | 5:13:00 PM | 4.833 | 13.936 | 14.791 | 11.003 | |
| 7/1/2011 | 5:14:00 PM | 4.81 | 13.981 | 14.48 | 11.008 | |
| 7/1/2011 | 5:15:00 PM | 4.844 | 13.944 | 14.968 | 10.816 | |
| 7/1/2011 | 5:16:00 PM | 4.846 | 13.951 | 15.447 | 10.719 | |
| 7/1/2011 | 5:17:00 PM | 4.845 | 13.951 | 15.714 | 10.809 | |
| 7/1/2011 | 5:18:00 PM | 4.812 | 14.003 | 16.032 | 10.756 | |
| 7/1/2011 | 5:19:00 PM | 4.799 | 14.029 | 15.283 | 10.722 | |
| 7/1/2011 | 5:20:00 PM | 4.771 | 14.049 | 7.306 | 10.95 | |
| 7/1/2011 | 5:21:00 PM | 4.535 | 11.536 | 9.873 | 11.581 | |
| 7/1/2011 | 5:22:00 PM | 0.322 | 0.037 | 0.157 | 11.193 | |
| 7/1/2011 | 5:23:00 PM | 0.178 | 0.013 | -0.016 | 11.868 | |
| 7/1/2011 | 5:24:00 PM | 0.167 | 0.008 | -0.024 | 11.827 | |
| 7/1/2011 | 5:25:00 PM | 0.157 | 0 | -0.023 | 11.943 | SO2 bias |
| 7/1/2011 | 5:26:00 PM | 1.733 | 4.467 | -0.056 | 11.563 | |
| 7/1/2011 | 5:27:00 PM | 4.882 | 9.931 | -0.101 | 4.167 | |
| 7/1/2011 | 5:28:00 PM | 4.914 | 9.947 | -0.095 | 0.816 | |
| 7/1/2011 | 5:29:00 PM | 4.923 | 9.953 | -0.108 | 0.297 | O2/CO2 bias |
| 7/1/2011 | 5:30:00 PM | 1.94 | 2.539 | 14.946 | 0.156 | |
| 7/1/2011 | 5:31:00 PM | 0.976 | -1.068 | 39.55 | -1.706 | |
| 7/1/2011 | 5:32:00 PM | 2.56 | -2.382 | 49.998 | -4.276 | |
| 7/1/2011 | 5:33:00 PM | 3.027 | -1.754 | 49.998 | -4.026 | |
| 7/1/2011 | 5:34:00 PM | 1.921 | -1.726 | 49.998 | -3.739 | |
| 7/1/2011 | 5:35:00 PM | 1.277 | -1.083 | 41 | -2.167 | |

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|---|---|---|---|---|---|---|
| 7/1/2011 | 5:36:00 PM | 0.139 | -0.023 | 27.891 | -0.079 | |
| 7/1/2011 | 5:37:00 PM | 0.16 | -0.057 | 28.774 | -0.253 | |
| 7/1/2011 | 5:38:00 PM | 0.325 | -0.23 | 27.569 | -0.48 | |
| 7/1/2011 | 5:39:00 PM | 0.116 | -0.007 | 23.602 | -0.175 | NOx bias |
| 7/1/2011 | 5:40:00 PM | 2.695 | 9.52 | 17.91 | 1.101 | |
| 7/1/2011 | 5:41:00 PM | 5.024 | 14.559 | 13.911 | 8.54 | |
| 7/1/2011 | 5:42:00 PM | 4.958 | 14.262 | 14.157 | 10.707 | |
| 7/1/2011 | 5:43:00 PM | 4.932 | 14.259 | 13.932 | 11.192 | |
| 7/1/2011 | 5:44:00 PM | 5.031 | 14.513 | 13.062 | 11.535 | |
| 7/1/2011 | 5:45:00 PM | 5.3 | 15.576 | 14.248 | 12.377 | |
| 7/1/2011 | 5:46:00 PM | 5.363 | 15.697 | 15.334 | 12.635 | |
| 7/1/2011 | 5:47:00 PM | 4.856 | 14.098 | 14.266 | 11.098 | |
| 7/1/2011 | 5:48:00 PM | 4.885 | 14.067 | 14.976 | 11.028 | |
| 7/1/2011 | 5:49:00 PM | 4.877 | 14.088 | 13.37 | 11.071 | |
| 7/1/2011 | 5:50:00 PM | 4.852 | 14.111 | 6.669 | 11.246 | |
| 7/1/2011 | 5:51:00 PM | 4.917 | 14.033 | 9.069 | 11.495 | |
| 7/1/2011 | 5:52:00 PM | 4.893 | 14.066 | 10.829 | 11.537 | |
| 7/1/2011 | 5:53:00 PM | 4.897 | 14.047 | 11.491 | 11.548 | |
| 7/1/2011 | 5:54:00 PM | 4.888 | 14.073 | 11.81 | 11.375 | |
| 7/1/2011 | 5:55:00 PM | 4.842 | 14.107 | 11.901 | 11.367 | |
| 7/1/2011 | 5:56:00 PM | 4.82 | 14.124 | 10.843 | 11.123 | |
| 7/1/2011 | 5:57:00 PM | 4.85 | 14.086 | 10.794 | 11.136 | |
| 7/1/2011 | 5:58:00 PM | 4.87 | 14.073 | 11.19 | 11.142 | |
| 7/1/2011 | 5:59:00 PM | 4.892 | 14.157 | 11.457 | 11.003 | |
| 7/1/2011 | 6:00:00 PM | 4.891 | 14.219 | 11.553 | 11.031 | |
| 7/1/2011 | 6:01:00 PM | 4.872 | 14.236 | 10.399 | 11.012 | |
| 7/1/2011 | 6:02:00 PM | 4.853 | 14.248 | 5.087 | 11.344 | |
| 7/1/2011 | 6:03:00 PM | 4.857 | 14.259 | 6.706 | 11.964 | |
| 7/1/2011 | 6:04:00 PM | 4.914 | 14.223 | 8.689 | 12.089 | |
| 7/1/2011 | 6:05:00 PM | 4.902 | 14.251 | 9.331 | 11.884 | |
| 7/1/2011 | 6:06:00 PM | 4.878 | 14.29 | 10.123 | 11.614 | |
| 7/1/2011 | 6:07:00 PM | 4.883 | 14.3 | 10.052 | 11.473 | |
| 7/1/2011 | 6:08:00 PM | 4.901 | 14.293 | 9.573 | 11.436 | |
| 7/1/2011 | 6:09:00 PM | 4.907 | 14.332 | 10.659 | 11.327 | |
| 7/1/2011 | 6:10:00 PM | 4.976 | 14.343 | 11.586 | 11.251 | |
| 7/1/2011 | 6:11:00 PM | 4.998 | 14.356 | 12.641 | 11.228 | |
| 7/1/2011 | 6:12:00 PM | 5.038 | 14.315 | 13.139 | 11.246 | |
| 7/1/2011 | 6:13:00 PM | 5.011 | 14.415 | 12.145 | 11.228 | |
| 7/1/2011 | 6:14:00 PM | 4.961 | 14.443 | 5.737 | 11.498 | |
| 7/1/2011 | 6:15:00 PM | 4.797 | 13.887 | 7.536 | 11.888 | |
| 7/1/2011 | 6:16:00 PM | 4.832 | 13.866 | 10.009 | 11.861 | |
| 7/1/2011 | 6:17:00 PM | 4.843 | 13.853 | 11.581 | 11.413 | |
| 7/1/2011 | 6:18:00 PM | 4.869 | 13.817 | 12.973 | 11.226 | |
| 7/1/2011 | 6:19:00 PM | 4.898 | 13.798 | 13.228 | 11.015 | |
| 7/1/2011 | 6:20:00 PM | 4.857 | 13.828 | 12.774 | 10.992 | |
| 7/1/2011 | 6:21:00 PM | 4.859 | 13.837 | 13.853 | 10.964 | |
| 7/1/2011 | 6:22:00 PM | 4.875 | 13.792 | 14.52 | 10.797 | |
| 7/1/2011 | 6:23:00 PM | 4.851 | 13.836 | 14.67 | 10.772 | |
| 7/1/2011 | 6:24:00 PM | 4.846 | 13.818 | 15.891 | 10.969 | |
| 7/1/2011 | 6:25:00 PM | 4.861 | 13.821 | 14.594 | 10.663 | |
| 7/1/2011 | 6:26:00 PM | 4.758 | 13.912 | 6.716 | 11.017 | |
| 7/1/2011 | 6:27:00 PM | 4.822 | 13.859 | 9.652 | 11.666 | |

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|---|---|---|---|---|---|
| 7/1/2011 | 6:28:00 PM | 4.864 | 13.807 | 12.295 | 11.588 |
| 7/1/2011 | 6:29:00 PM | 4.842 | 13.823 | 12.764 | 11.671 |
| 7/1/2011 | 6:30:00 PM | 4.801 | 13.875 | 13.317 | 11.443 |
| 7/1/2011 | 6:31:00 PM | 4.822 | 13.861 | 14.233 | 11.372 |
| 7/1/2011 | 6:32:00 PM | 4.819 | 13.857 | 13.884 | 11.242 |
| 7/1/2011 | 6:33:00 PM | 4.827 | 13.842 | 14.015 | 11.18 |
| 7/1/2011 | 6:34:00 PM | 4.812 | 13.869 | 14.892 | 11.052 |
| 7/1/2011 | 6:35:00 PM | 4.862 | 13.87 | 15.109 | 11.118 |
| 7/1/2011 | 6:36:00 PM | 4.865 | 13.871 | 14.978 | 10.976 |
| 7/1/2011 | 6:37:00 PM | 4.852 | 13.922 | 14.204 | 11.049 |
| 7/1/2011 | 6:38:00 PM | 4.791 | 13.962 | 6.871 | 11.333 |
| 7/1/2011 | 6:39:00 PM | 4.872 | 13.905 | 9.168 | 11.711 |
| 7/1/2011 | 6:40:00 PM | 4.904 | 13.88 | 10.913 | 11.749 |
| 7/1/2011 | 6:41:00 PM | 4.887 | 13.91 | 11.55 | 11.651 |
| 7/1/2011 | 6:42:00 PM | 4.834 | 13.964 | 11.117 | 11.54 |
| 7/1/2011 | 6:43:00 PM | 4.8 | 14.047 | 10.82 | 11.726 |
| 7/1/2011 | 6:44:00 PM | 4.787 | 14.06 | 10.338 | 11.876 |
| 7/1/2011 | 6:45:00 PM | 4.84 | 14.042 | 10.89 | 11.676 |
| 7/1/2011 | 6:46:00 PM | 4.744 | 13.929 | 10.917 | 11.216 |
| 7/1/2011 | 6:47:00 PM | 4.738 | 13.881 | 11.695 | 11.273 |
| 7/1/2011 | 6:48:00 PM | 4.822 | 13.803 | 13.062 | 11.167 |
| 7/1/2011 | 6:49:00 PM | 4.836 | 13.786 | 11.754 | 11.062 |
| 7/1/2011 | 6:50:00 PM | 4.802 | 13.824 | 6.684 | 11.267 |
| 7/1/2011 | 6:51:00 PM | 4.835 | 13.784 | 8.929 | 11.911 |
| 7/1/2011 | 6:52:00 PM | 4.884 | 13.737 | 10.813 | 11.625 |
| 7/1/2011 | 6:53:00 PM | 4.873 | 13.751 | 11.314 | 11.366 |
| 7/1/2011 | 6:54:00 PM | 4.835 | 13.799 | 11.724 | 11.218 |
| 7/1/2011 | 6:55:00 PM | 4.835 | 13.787 | 11.937 | 11.154 |
| 7/1/2011 | 6:56:00 PM | 4.843 | 13.789 | 11.534 | 11.151 |
| 7/1/2011 | 6:57:00 PM | 4.875 | 13.759 | 11.995 | 11.057 |
| 7/1/2011 | 6:58:00 PM | 4.884 | 13.742 | 12.184 | 10.999 |
| 7/1/2011 | 6:59:00 PM | 4.859 | 13.774 | 12.328 | 10.92 |
| 7/1/2011 | 7:00:00 PM | 4.833 | 13.798 | 12.681 | 10.97 |
| 7/1/2011 | 7:01:00 PM | 4.863 | 13.768 | 11.848 | 11.084 |
| 7/1/2011 | 7:02:00 PM | 4.813 | 13.804 | 5.678 | 11.343 |
| 7/1/2011 | 7:03:00 PM | 4.823 | 13.804 | 7.684 | 11.944 |
| 7/1/2011 | 7:04:00 PM | 4.8 | 13.821 | 9.334 | 12.192 |
| 7/1/2011 | 7:05:00 PM | 4.84 | 13.824 | 10.343 | 11.878 |
| 7/1/2011 | 7:06:00 PM | 4.841 | 13.81 | 11.009 | 11.504 |
| 7/1/2011 | 7:07:00 PM | 4.849 | 13.793 | 11.156 | 11.496 |
| 7/1/2011 | 7:08:00 PM | 4.86 | 13.785 | 10.314 | 11.373 |
| 7/1/2011 | 7:09:00 PM | 4.789 | 13.858 | 9.771 | 11.354 |
| 7/1/2011 | 7:10:00 PM | 4.808 | 13.828 | 10.297 | 11.478 |
| 7/1/2011 | 7:11:00 PM | 4.78 | 13.866 | 9.903 | 11.697 |
| 7/1/2011 | 7:12:00 PM | 4.771 | 13.874 | 10.299 | 11.672 |
| 7/1/2011 | 7:13:00 PM | 4.749 | 13.9 | 9.616 | 11.669 |
| 7/1/2011 | 7:14:00 PM | 4.717 | 13.925 | 4.477 | 11.934 |
| 7/1/2011 | 7:15:00 PM | 4.787 | 13.852 | 6.265 | 12.097 |
| 7/1/2011 | 7:16:00 PM | 4.83 | 13.833 | 8.537 | 12.025 |
| 7/1/2011 | 7:17:00 PM | 4.868 | 13.806 | 9.373 | 11.901 |
| 7/1/2011 | 7:18:00 PM | 4.976 | 13.775 | 10.379 | 11.687 |
| 7/1/2011 | 7:19:00 PM | 4.971 | 13.803 | 10.508 | 11.602 |

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|---|---|---|---|---|---|---|
| 7/1/2011 | 7:20:00 PM | 4.974 | 13.806 | 10.746 | 11.575 | |
| 7/1/2011 | 7:21:00 PM | 4.988 | 13.789 | 11.64 | 11.392 | |
| 7/1/2011 | 7:22:00 PM | 5.019 | 13.772 | 12.994 | 11.409 | |
| 7/1/2011 | 7:23:00 PM | 5.014 | 13.793 | 14.042 | 11.046 | |
| 7/1/2011 | 7:24:00 PM | 5.047 | 13.756 | 15.255 | 11.047 | |
| 7/1/2011 | 7:25:00 PM | 5.06 | 13.736 | 14.616 | 10.96 | |
| 7/1/2011 | 7:26:00 PM | 4.986 | 13.802 | 7.538 | 11.151 | |
| 7/1/2011 | 7:27:00 PM | 4.989 | 13.801 | 9.574 | 11.765 | |
| 7/1/2011 | 7:28:00 PM | 4.99 | 13.8 | 11.991 | 12.078 | |
| 7/1/2011 | 7:29:00 PM | 5.011 | 13.766 | 12.915 | 11.994 | |
| 7/1/2011 | 7:30:00 PM | 4.991 | 13.815 | 13.658 | 11.601 | |
| 7/1/2011 | 7:31:00 PM | 5.011 | 13.779 | 13.957 | 11.403 | |
| 7/1/2011 | 7:32:00 PM | 5.009 | 13.812 | 14.102 | 11.327 | |
| 7/1/2011 | 7:33:00 PM | 5.042 | 13.779 | 15.868 | 11.578 | |
| 7/1/2011 | 7:34:00 PM | 5.07 | 13.738 | 16.874 | 11.484 | |
| 7/1/2011 | 7:35:00 PM | 5.077 | 13.756 | 18.001 | 11.438 | |
| 7/1/2011 | 7:36:00 PM | 5.06 | 13.767 | 18.546 | 11.1 | |
| 7/1/2011 | 7:37:00 PM | 5.099 | 13.743 | 18.579 | 11.001 | |
| 7/1/2011 | 7:38:00 PM | 5.086 | 13.802 | 9.622 | 11.102 | |
| 7/1/2011 | 7:39:00 PM | 5.07 | 13.806 | 10.233 | 11.707 | |
| 7/1/2011 | 7:40:00 PM | 5.003 | 13.87 | 12.349 | 12.038 | |
| 7/1/2011 | 7:41:00 PM | 5.002 | 13.857 | 14.25 | 11.873 | |
| 7/1/2011 | 7:42:00 PM | 5.011 | 13.812 | 15.526 | 11.67 | |
| 7/1/2011 | 7:43:00 PM | 5.057 | 13.792 | 17.143 | 11.698 | |
| 7/1/2011 | 7:44:00 PM | 5.107 | 13.732 | 17.14 | 11.243 | |
| 7/1/2011 | 7:45:00 PM | 5.138 | 13.696 | 17.494 | 11.083 | |
| 7/1/2011 | 7:46:00 PM | 5.123 | 13.712 | 18.377 | 10.977 | |
| 7/1/2011 | 7:47:00 PM | 5.152 | 13.687 | 18.931 | 11.033 | |
| 7/1/2011 | 7:48:00 PM | 2.137 | 0.277 | 2.124 | 11.245 | |
| 7/1/2011 | 7:49:00 PM | 0.291 | 0.019 | -0.008 | 11.935 | |
| 7/1/2011 | 7:50:00 PM | 0.276 | 0.012 | -0.023 | 12.089 | |
| 7/1/2011 | 7:51:00 PM | 0.261 | 0.007 | -0.024 | 12.23 | SO2 bias |
| 7/1/2011 | 7:52:00 PM | 1.942 | 4.761 | -0.056 | 11.921 | |
| 7/1/2011 | 7:53:00 PM | 4.989 | 9.879 | -0.095 | 4.89 | |
| 7/1/2011 | 7:54:00 PM | 5.024 | 9.897 | -0.098 | 1.623 | O2/CO2 bias |
| 7/1/2011 | 7:55:00 PM | 1.82 | 1.968 | 16.11 | 0.83 | |
| 7/1/2011 | 7:56:00 PM | 0.266 | 0.011 | 22.905 | 0.575 | |
| 7/1/2011 | 7:57:00 PM | 0.245 | 0.009 | 22.916 | 0.441 | |
| 7/1/2011 | 7:58:00 PM | 0.231 | 0.003 | 22.92 | 0.379 | |
| 7/1/2011 | 7:59:00 PM | 0.222 | 0.003 | 22.934 | 0.381 | NOx bias |

# APPENDIX D GENERAL CALCULATIONS

## GENERAL EMISSION CALCULATIONS

I. Stack Gas Velocity

A. Stack gas molecular weight, lb/lb-mole

$$MW_{dry} = 0.44 * \%CO_2 + 0.32 * \%O_2 + 0.28 * \%N_2$$

$$MW_{wet} = MW_{dry} * (1-B_{wo}) + 18 * B_{wo}$$

B. Absolute stack pressure, iwg

$$Ps = Pbar + \frac{Psg}{13.6}$$

C. Stack gas velocity, ft/sec

$$V_s = 2.9 * C_p * \sqrt{\Delta P} * \sqrt{T_s} * \sqrt{\frac{29.92 * 28.95}{P_s * MW_{wet}}}$$

II. Moisture

A. Sample gas volume, dscf

$$V_{mstd} = 0.03342 * V_m * (P_{bar} + \frac{\Delta H}{13.6}) * \frac{T_{ref}}{T_m} * Y_d$$

B. Water vapor volume, scf

$$V_{wstd} = 0.0472 * V_{lc} * \frac{T_{ref}}{528\ ^oR}$$

C. Moisture content, dimensionless

$$B_{wo} = \frac{V_{wstd}}{(V_{mstd} + V_{wstd})}$$

III. Stack gas volumetric flow rate

A. Actual stack gas volumetric flow rate, wacfm

$$Q = V_s * A_s * 60$$

B. Standard stack gas flow rate, dscfm

$$Q_{sd} = Q * (1-B_{wo}) * \frac{T_{ref}}{T_s} * \frac{P_s}{29.92}$$

IV. Gaseous Mass Emission Rates, lb/hr

$$M = \frac{ppm * MW_i * Q_{sd} * 60}{SV * 10^6}$$

V. Emission Rates, lb/MMBtu

$$\frac{lb}{MMBtu} = \frac{ppm * MW_i * F}{SV * 10^6} * \frac{20.9}{20.9 - \%O_2}$$

6. Percent Isokinetic

$$I = \frac{17.32 \ x \ T_s \ (V_m \ std)}{(1 - Bwo)0 \ x \ V_s \ x \ Ps \ x \ Dn^2} \ x \ \frac{528 \circ R}{T_{ref}}$$

7. Particulate emissions

a) Grain loading, gr/dscf

$C = 0.01543 \ (M_n/V_{m\ std})$

b) Grain loading at 12% $CO_2$, gr/dscf

$C_{12\%}\ CO_2 = C\ (12/\%\ CO_2)$

c) Mass emissions, lb/hr

M = C x Qsd x (60 min/hr)/(7000 gr/lb)

d) Particulate emission factor

$$lb / 10^6 \ Btu = C \ x \ \frac{1 \ lb}{7000 gr} \ x \ F \ x \ \frac{20..9}{20.9 - \% O_2}$$

Nomenclature:

| | |
|---|---|
| $A_s$ | = stack area, $ft^2$ |
| $B_{wo}$ | = flue gas moisture content, dimensionless |
| $C_{12\%CO2}$ | = particulate grain loading, gr/dscf corrected to 12% $CO_2$ |
| C | = particulate grain loading, gr/dscf |
| $C_p$ | = pitot calibration factor, dimensionless |
| Dn | = nozzle diameter, in. |
| F | = fuel F-Factor, dscf/MMBtu @ 0% $O_2$ |
| H | = orifice differential pressure, iwg |
| I | = % isokinetics |
| $M_n$ | = mass of collected particulate, mg |
| $M_i$ | = mass emission rate of specie i, lb/hr |
| MW | = molecular weight of flue gas, lb/lb-mole |
| $M_{wi}$ | = molecular weight of specie i: |
| | $SO_2$: 64 |
| | $NO_x$: 46 |
| | CO: 28 |
| | HC: 16 |
| 0 | = sample time, min. |
| $\Delta P$ | = average velocity head, iwg = $(\sqrt{\Delta P})^2$ |
| $P_{bar}$ | = barometric pressure, inches Hg |
| $P_s$ | = stack absolute pressure, inches Hg |
| $P_{sg}$ | = stack static pressure, iwb |
| Q | = wet stack flow rate at actual conditions, wacfm |
| $Q_{sd}$ | = dry standard stack flow rate, dscfm |
| SV | = specific molar volume of an ideal gas at standard conditions, $ft^3$/lb-mole |
| $T_m$ | = meter temperature, $^oR$ |
| $T_{ref}$ | = reference temperature, $^oR$ |
| $T_s$ | = stack temperature, $^oR$ |
| $V_s$ | = stack gas velocity, ft/sec |
| $V_{lc}$ | = volume of liquid collected in impingers, ml |
| $V_m$ | = uncorrected dry meter volume, dcf |
| $V_{mstd}$ | = dry meter volume at standard conditions, dscf |
| $V_{wstd}$ | = volume of water vapor at standard conditions, scf |
| $Y_d$ | = meter calibration coefficient |

# APPENDIX E CHAIN OF CUSTODY

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## CHAIN OF CUSTODY

CLIENT: ICR

TEST DATE(S): 6/27, 6/28/11

LOCATION: CA

SAMPLER(S): DW

SAMPLE LOCATION: Stack

PROJECT MANAGER: AA

TEST METHOD(S): Volatiles by Methanol Impinger Method

DATE DUE: 7/30/11

OUTSIDE LAB REQUIRED?: Yes - ALS

COMPLIANCE TEST? Yes - EPA

Total Dat

| DATE | TIME | TEST # | SAMPLE DESCRIPTION | CONTAINERS | SAMPLER | COMMENTS |
|---|---|---|---|---|---|---|
| 6/27/11 | | 1-S-DS | 1st & 2nd Imp, probe line | 1 | DW | S and SV indicate |
| | | | 3rd Imp | 1 | | Speciated Volatiles |
| | | | 4th Imp | 1 | | |
| 6/27/11 | | 1-S-NS | 1st, 2nd Imp, probe, line | 1 | | DS = deuterated spike |
| | | | 3rd Imp | 1 | | NS = native spike |
| | | | 4th Imp | 1 | | |
| 6/27/11 | | 2-S-DS | 1st & 2nd Imp, probe, line | 1 | | |
| | | | 3rd Imp | 1 | | |
| | | | 4th Imp | 1 | | |
| 6/27/11 | | 2-S-NS | 1st & 2nd Imp, probe, line | 1 | | |
| | | | 3rd Imp | 1 | | |
| | | | 4th Imp | 1 | | |
| | | | | | | |

| RELEASED BY | DATE/TIME | RECEIVED BY | DATE/TIME |
|---|---|---|---|
| [signature] | 6-28-11 1800 | [signature] Shipped via | 6/28/11 1800 Fed-Ex |
| | | | |
| | | | |

ANALYSIS REQUIRED: Volatiles as per ICR Methanol Impinger Method

E-2

Delta

DS834001

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# CHAIN OF CUSTODY

CLIENT: ICR

TEST DATE(S):

LOCATION:

SAMPLER(S):

SAMPLE LOCATION:

PROJECT MANAGER:

TEST METHOD(S):

DATE DUE:

OUTSIDE LAB REQUIRED?:

COMPLIANCE TEST?

Test

| DATE | TIME | TEST # | SAMPLE DESCRIPTION | CONTAINERS | SAMPLER | COMMENTS |
|---|---|---|---|---|---|---|
| 6/28/11 | | 3-SV-DS | 1st & 2nd Trap, probe, line | 1 | DW | |
| | | | 3rd ring | 1 | | |
| | | | 4th ring | 1 | | |
| 6/28/11 | | 3-SV-NS | 1st & 2nd Trap, probe, line | 1 | | |
| | | | 3rd ring | 1 | | |
| | | | 4th ring | 1 | | |
| 6/28/11 | | FB-DS | 1st, 2nd Trap, probe, line | 1 | | Field Blank - deuterated spike |
| | | | 3rd ring | 1 | | |
| | | | 4th ring | 1 | | |
| 6/28/11 | | FB-NS | 1st, 2nd Trap, probe, line | 1 | | Field Blank - native spike |
| | | | 3rd ring | 1 | | |
| | | | 4th ring | 1 | | |
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ANALYSIS REQUIRED:

E-3

Delta

DS834001

Date of last revision – 11/13/2008

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## CHAIN OF CUSTODY

CLIENT: ICR

TEST DATE(S):

LOCATION: see 1

SAMPLER(S):

SAMPLE LOCATION:

PROJECT MANAGER:

TEST METHOD(S):

DATE DUE:

OUTSIDE LAB REQUIRED?:

COMPLIANCE TEST?

Tuf

| DATE | TIME | TEST # | SAMPLE DESCRIPTION | CONTAINERS | SAMPLER | COMMENTS |
|---|---|---|---|---|---|---|
| 6/28/11 | | Field Spike - deuterated | | 1 | | Spike + Methanol |
| 6/28/11 | | Field Spike - native | | 1 | | Spike + methanol |
| 6/28/11 | | Trip Spike - deuterated | | 1 | | unopened spike |
| 6/28/11 | | Trip Spike - native | | 1 | | unopened spike |
| 6/28/11 | | Reagent Bl - Methanol | | 1 | | |
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ANALYSIS REQUIRED:

E-4

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DS834001

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1 of 2

L1026392

# CHAIN OF CUSTODY

CLIENT: ICR

TEST DATE(S): 6/27, 6/28/11

LOCATION: CA

SAMPLER(S): DW

SAMPLE LOCATION: Stack

PROJECT MANAGER: AA

TEST METHOD(S): Methanol on SG tubes (Mod. 18)

DATE DUE: 7/30/11

OUTSIDE LAB REQUIRED?: Yes - ALS Test

COMPLIANCE TEST? Yes EPA

| DATE | TIME | TEST # | SAMPLE DESCRIPTION | CONTAINERS | SAMPLER | COMMENTS |
|---|---|---|---|---|---|---|
| 6/27/11 | | 1-MeOH | SG tube # 3277109969 | 1 | DW | May need to add $H_2O$ to vial to complete analysis (Started w/ 10 ml $H_2O$) |
| | | 1-MeOH | Condensate | 1 | | |
| | | 1-MeOH-Spiked | SG tube # 6688 | 1 | | |
| | | 1-MeOH Spiked | Condensate | 1 | | |
| 6/27/11 | | 2-MeOH | SG tube # 3457906374 | 1 | | |
| | | 2-MeOH | Condensate | 1 | | |
| | | 2-MeOH-Spiked | SG tube # 6450 | 1 | | |
| | | 2-MeOH Spiked | Condensate | 1 | | |
| 6/28/11 | | 3-MeOH | SG tube 3457906381 | 1 | | |
| | | 3-MeOH | Condensate | 1 | | |
| | | 3-MeOH Spiked | SG tube # 6445 | 1 | | |
| | | 3-MeOH Spiked | Condensate | 1 | | |

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|---|---|---|---|
| DW | 6-28-11 1800 | | 6/29/11 1800 |
| | | Shipped to ALS via Fed-ex on blue ice in cooler | |
| | | | |

ANALYSIS REQUIRED: Methanol by Mod. 18 on SG tubes

Delta

JY 30-JUN-11 14:00

16°C

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# CHAIN OF CUSTODY

L1026392

CLIENT: ICR

TEST DATE(S):

LOCATION: COC 1

SAMPLER(S):

SAMPLE LOCATION:

PROJECT MANAGER:

TEST METHOD(S):

DATE DUE:

OUTSIDE LAB REQUIRED?:

COMPLIANCE TEST?

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| DATE | TIME | TEST # | SAMPLE DESCRIPTION | CONTAINERS | SAMPLER | COMMENTS |
|---|---|---|---|---|---|---|
| 6/28/11 | | MeOH-FB | SG Lab # 3457906372 | 1 | DW | |
| | | MeOH-FB | Condensate | 1 | | |
| | | MeOH-FB | Spiked SG Lab # 6447 | 1 | | |
| | | MeOH-FB | Spiked Condensate | 1 | | |
| 6/28/11 | | MeOH Trip | Blank SG Lab # 3457906378 | 1 | | |
| | | MeOH Trip | Blank Spiked SG Lab # 6449 | 1 | | |
| | | MeOH $H_2O$ | Blank 10 ml Lab # 104187 | 1 | | |
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ANALYSIS REQUIRED:

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16°C

Delta

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Date of last revision – 11/13/2008

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CHAIN OF CUSTODY

CLIENT: ICR 2F-7

LOCATION: FCC

SAMPLE LOCATION: 2F-7 Stack

TEST METHOD(S): SW-846 0011

OUTSIDE LAB REQUIRED?:

TEST DATE(S) 6/27/2011 6/28/2011

SAMPLER(S): SS

PROJECT MANAGER:

DATE DUE: 7/12/2011

COMPLIANCE TEST? No

| | DATE | TIME | TEST # | SAMPLE DESCRIPTION | CONTAINERS | SAMPLER | COMMENTS |
|---|---|---|---|---|---|---|---|
| 51241 | 6/27/2011 | | 1-Ald | Probe / Imp Catch & Rinse | 1 | SS | DNPH / MeCl2 |
| 51242 | 6/27/2011 | | 2-Ald | Probe / Imp Catch & Rinse | 1 | SS | DNPH / MeCl2 |
| 51243 | 6/27/2011 | | 3-Ald | Probe / Imp Catch & Rinse | 1 | SS | DNPH / MeCl2 |
| 51244 | 6/27/2011 | | 1-FS-Ald | Imp Catch & Rinse | 1 | JP | DNPH / MeCl2 |
| 51245 | 6/27/2011 | | 2-FS-Ald | Imp Catch & Rinse | 1 | JP | DNPH / MeCl2 |
| 51246 | 6/27/2011 | | 1-FB-Ald | Imp Catch & Rinse | 1 | JP | DNPH / MeCl2 |
| 51247 | 6/27/2011 | | 2-FB-Ald | Imp Catch & Rinse | 1 | JP | DNPH / MeCl2 |
| 51248 | 6/27/2011 | | SB-Ald | DNPH / MeCl2 | 1 | JP | DNPH / MeCl2 |
| 51249 | 6/27/2011 | | MeCl2-Blank-Ald | MeCl2 | 1 | JP | MeCl2 |
| 51250 | 6/27/2011 | | H2O-Blank-Ald | Optima H2O | 1 | JP | Optima H2O |
| 51251 | 6/27/2011 | | 1-TB-Ald | DNPH | 1 | JP | DNPH |
| 51252 | 6/27/2011 | | 2-TB-Ald | DNPH | 1 | JP | DNPH |
| 51253 | 6/27/2011 | | 1-TS-Ald | DNPH | 1 | JP | Spiked DNPH |
| 51254 | 6/27/2011 | | 2-TS-Ald | DNPH | 1 | JP | Spiked DNPH |
| | | | Total Samples | | 14 | | |
| | | Reagent: | Optima H2O | | | | |
| | | Reagent Lot #'s: | | | | | |

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ANALYSIS REQUIRED:

Delta Air Quality Services, International

F-7

## CHAIN OF CUSTODY

CLIENT: ICR

TEST DATE(S): 06/27/11 06/28/11

LOCATION: FCC

SAMPLER(S): DW/SS

SAMPLE LOCATION: 2F-7 Stack

PROJECT MANAGER: Aleshaiker

TEST METHOD(S): EPA 18

DATE DUE: 07/11/11

OUTSIDE LAB REQUIRED?: ATMAA

COMPLIANCE TEST? Yes

| DATE | TIME | TEST # | SAMPLE DESCRIPTION | CONTAINERS | SAMPLER | COMMENTS |
|---|---|---|---|---|---|---|
| 06/27/11 | 1112/1212 | 1-Methane/Ethane | 5 l Tedlar Bag, stack gas | 1 | DW/SS | 11801-1 |
| 06/27/11 | 1525/1625 | 2-Methane/Ethane | 5 l Tedlar Bag, stack gas | 1 | DW/SS | -2 |
| 06/28/11 | 802/902 | 3-Methane/Ethane | 5 l Tedlar Bag, stack gas | 1 | DW/SS | -3 |
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| | 6/28/11 1600 | | 6/28/11 1930 |
| | 6/29/11 8:50 | | 6/29/11 8:50 |
| | | | |
| | | | |

ANALYSIS REQUIRED: Methane and Ethane

Delta Air Quality Services, Incorporated

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CHAIN OF CUSTODY

CLIENT: ICR 2F-7 TEST DATE(S) 6/28/2011 6/29/2011

LOCATION: FCC SAMPLER(S): SS

SAMPLE LOCATION: 2F-7 Stack PROJECT MANAGER: Ali Aleshakir

TEST METHOD(S): EPA M23 and PCB's DATE DUE: 7/13/2011

OUTSIDE LAB REQUIRED?: Yes COMPLIANCE TEST? No

| DATE | TIME | TEST # | SAMPLE DESCRIPTION | CONTAINERS | SAMPLER | COMMENTS |
|---|---|---|---|---|---|---|
| 6/28/2011 | 1710 | 1-DF | Filter | 1 | SS | Filter |
| 6/28/2011 | " | 1-DF | Noz/Prbe/Filter/HL/Coil/Imp Rnse | 1 | SS | Acetone |
| 6/28/2011 | " | 1-DF | Noz/Prbe/Filter/HL/Coil/Imp Rnse | 1 | SS | Toluene |
| 6/28/2011 | " | 1-DF | Impinger Catch | 1 | SS | Optima H2O |
| 6/28/2011 | " | 1-DF | XAD-2 Resin Mod | 1 | SS | XAD |
| 6/29/2011 | 1209 | 2-DF | Filter | 1 | SS | Filter |
| 6/29/2011 | " | 2-DF | Noz/Prbe/Filter/HL/Coil/Imp Rnse | 1 | SS | Acetone |
| 6/29/2011 | " | 2-DF | Noz/Prbe/Filter/HL/Coil/Imp Rnse | 1 | SS | Toluene |
| 6/29/2011 | " | 2-DF | Impinger Catch | 1 | SS | Optima H2O |
| 6/29/2011 | " | 2-DF | XAD-2 Resin Mod | 1 | SS | XAD |
| 6/29/2011 | 1641 | 3-DF | Filter | 1 | SS | Filter |
| 6/29/2011 | " | 3-DF | Noz/Prbe/Filter/HL/Coil/Imp Rnse | 1 | SS | Acetone |
| 6/29/2011 | " | 3-DF | Noz/Prbe/Filter/HL/Coil/Imp Rnse | 1 | SS | Toluene |
| 6/29/2011 | " | 3-DF | Impinger Catch | 1 | SS | Optima H2O |
| 6/29/2011 | " | 3-DF | XAD-2 Resin Mod | 1 | SS | XAD |
| 6/29/2011 | 1200 | H2O-Blank | Optima H2O | 1 | JP | Optima H2O |
| 6/29/2011 | " | Acet-Blank | Acetone | 1 | JP | Acetone |
| 6/29/2011 | " | Toluene-Blank | Toluene | 1 | JP | Toluene |
| 6/29/2011 | 1300 | FB-DF | Filter | 1 | SS | Filter |
| 6/29/2011 | " | FB-DF | Noz/Prbe/Filter/HL/Coil/Imp Rnse | 1 | SS | Acetone |
| 6/29/2011 | " | FB-DF | Noz/Prbe/Filter/HL/Coil/Imp Rnse | 1 | SS | Toluene |
| 6/29/2011 | " | FB-DF | Impinger Catch | 1 | SS | Optima H2O |
| 6/29/2011 | " | FB-DF | XAD-2 Resin Mod | 1 | SS | XAD |
| | | | | | | |
| | | Total Samples | | 23 | | |
| | Reagent: | Optima H2O | Acetone | | | MeCl2 |
| | Reagent Lot #'s: | 112048 | 105791 | | | 092575 |

| RELEASED BY | DATE/TIME | RECEIVED BY | DATE/TIME |
|---|---|---|---|
| J. McCuang | 7/1/11 1909 | [illegible] | 7/6/11 0800 |
| | | | |
| | | | |

ANALYSIS REQUIRED:

Delta

PCDD/PCDF and PCB's for review ICR

Also 2 Acetone spiked control jars
2 Toluene control jars.
Control jars were kept at Delta's laboratory, 150 ml solvent added before evaporation, and evaporated with samples.

- store at Delta
- stage at Delta
- store at Delta

E-9

CHAIN OF CUSTODY

CLIENT: ICR 2F-7

TEST DATE(S): 6/28/2011 6/29/2011

LOCATION: FCC

SAMPLER(S): SS

SAMPLE LOCATION: 2F-7 Stack

PROJECT MANAGER: Ali Aleshakir

TEST METHOD(S): EPA M26A

DATE DUE: 7/13/2011

OUTSIDE LAB REQUIRED?: Yes

COMPLIANCE TEST? No

| DATE | TIME | TEST # | SAMPLE DESCRIPTION | CONTAINERS | SAMPLER | COMMENTS |
|---|---|---|---|---|---|---|
| 6/28/2011 | | 1-HCl | B½ filter / H2SO4 Imp | 1 | SS | .1N H2SO4 ✓ |
| 6/28/2011 | | 1-HCl | NaOH Impinger | 1 | SS | .1N NaOH ✓ |
| 6/29/2011 | | 2-HCl | B½ filter / H2SO4 Imp | 1 | SS | .1N H2SO4 ✓ |
| 6/29/2011 | | 2-HCl | NaOH Impinger | 1 | SS | .1N NaOH ✓ |
| 6/29/2011 | | 3-HCl | B½ filter / H2SO4 Imp | 1 | SS | .1N H2SO4 ✓ |
| 6/29/2011 | | 3-HCl | NaOH Impinger | 1 | SS | .1N NaOH ✓ |
| 6/28/2011 | | H2SO4-Blank | H2SO4 | 1 | JP | .1N H2SO4 ✓ |
| 6/28/2011 | | NaOH-Blank | NaOH | 1 | JP | .1N NaOH ✓ |
| 6/28/2011 | | H2O-Blank | H2O | 1 | JP | DI H2O ✓ |
| 6/28/2011 | | FB-HCl | B½ filter / H2SO4 Imp | 1 | SS | .1N H2SO4 ✓ |
| 6/28/2011 | | FB-HCl | NaOH Impinger | 1 | SS | .1N NaOH ✓ |
| | | | | | | |
| Total Samples | | | | 11 | | |
| Reagent: | | DI H2O | | | | |
| Reagent Lot #'s: | | # 9 | | | | |

| RELEASED BY | DATE/TIME | RECEIVED BY | DATE/TIME |
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| D McCune | 7/1/11 1913 | [illegible] | 7/6/11 |
| | | sent via courier to DAQ | |
| | | | |
| | | | |

ANALYSIS REQUIRED: HCl, $Cl_2$ and HF by IC by EPA M 26A

Delta Air Quality Services, Incorporated

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E-10

CHAIN OF CUSTODY

CLIENT: ICR 2F-7

TEST DATE(S): 6/28/2011 6/29/2011

LOCATION: FCC

SAMPLER(S): SS

SAMPLE LOCATION: 2F-7 Stack

PROJECT MANAGER: Ali Aleshakir

TEST METHOD(S): EPA OTM29

DATE DUE: 7/13/2011

OUTSIDE LAB REQUIRED?: Yes

COMPLIANCE TEST? No

| DATE | TIME | TEST # | SAMPLE DESCRIPTION | CONTAINERS | SAMPLER | COMMENTS |
|---|---|---|---|---|---|---|
| 6/28/2011 | | 1-CN | #1 and #2 NaOH Imp | 1 | SS | 6 1N NaOH |
| 6/28/2011 | | 1-CN | #3 NaOH Impinger | 1 | SS | 6 1N NaOH |
| 6/29/2011 | | 2-CN | #1 and #2 NaOH Imp | 1 | SS | 6 1N NaOH |
| 6/29/2011 | | 2-CN | #3 NaOH Impinger | 1 | SS | 6 1N NaOH |
| 6/29/2011 | | 3-CN | #1 and #2 NaOH Imp | 1 | SS | 6 1N NaOH |
| 6/29/2011 | | 3-CN | #3 NaOH Impinger | 1 | SS | 6 1N NaOH |
| 6/28/2011 | | NaOH-Blank (6N 100ml) | NaOH | 1 | JP | 6N NaOH |
| 6/28/2011 | | FS-CN -1 | Field Spike Imp | 1 | JP | 6N NaOH 100ul Spike |
| 6/28/2011 | | FB-CN | #1 and #2 NaOH Imp | 1 | SS | 6 1N NaOH |
| 6/28/2011 | | FB-CN | #3 NaOH Impinger | 1 | SS | 6 1N NaOH |
| 6/30/11 | | FS-CN-2 | Field Spike | 1 | JP | 6N NAOH 500ul Spike |
| | | Total Samples FS-CN-3 | Field Spike | 1 ~~10~~ 12 | JP | 6N NAOH 1000ul Spike |
| Reagent: | | | | | | |
| Reagent Lot #'s: | | | | | | |

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| D McCune | 7/1/11 1913 | [signature] | 7/6/11 |
| | | | |
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| | | | |

ANALYSIS REQUIRED: HCN analysis by OTM29

Not Spike from vial labeled 210041, 2000 µg

Delta Air Quality Services, Incorporated

E-11

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# CHAIN OF CUSTODY

CLIENT: ICR 2F-7

TEST DATE(S): 6/30/2011 7/1/2011

LOCATION: FCC

SAMPLER(S): SS

SAMPLE LOCATION: 2F-7 Stack

PROJECT MANAGER: Ali Aleshakir

TEST METHOD(S): ASTM D6784-02

DATE DUE: 7/15/2011

OUTSIDE LAB REQUIRED?: Yes

COMPLIANCE TEST? No

| DATE | TIME | TEST # | SAMPLE DESCRIPTION | CONTAINERS | SAMPLER | COMMENTS |
|---|---|---|---|---|---|---|
| 6/30/2011 | 10:20 | 1-Hg | Filter | 1 | SS | Filter |
| 6/30/2011 | 10:20 | 1-Hg | Noz/Prbe/F½ Filter | 1 | SS | .1N HNO3 |
| 6/30/2011 | 10:20 | 1-Hg | B½ Filter/KCl Impinger | 1 | SS | KMnO4/HNO3 |
| 6/30/2011 | 10:20 | 1-Hg | HNO3/H2O2 Impinger | 1 | SS | .1N HNO3 |
| 6/30/2011 | 10:20 | 1-Hg | KMnO4/H2SO4 Impinger | 1 | SS | .1N HNO3/hydroxylamine |
| 6/30/2011 | 16:00 | 2-Hg | Filter | 1 | SS | Filter |
| 6/30/2011 | 16:00 | 2-Hg | Noz/Prbe/F½ Filter | 1 | SS | .1N HNO3 |
| 6/30/2011 | 16:00 | 2-Hg | B½ Filter/KCl Impinger | 1 | SS | KMnO4/HNO3 |
| 6/30/2011 | 16:00 | 2-Hg | HNO3/H2O2 Impinger | 1 | SS | .1N HNO3 |
| 6/30/2011 | 16:00 | 2-Hg | KMnO4/H2SO4 Impinger | 1 | SS | .1N HNO3/hydroxylamine |
| 7/1/2011 | 15:00 | 3-Hg | Filter | 1 | SS | Filter |
| 7/1/2011 | 15:00 | 3-Hg | Noz/Prbe/F½ Filter | 1 | SS | .1N HNO3 |
| 7/1/2011 | 15:00 | 3-Hg | B½ Filter/KCl Impinger | 1 | SS | KMnO4/HNO3 |
| 7/1/2011 | 15:00 | 3-Hg | HNO3/H2O2 Impinger | 1 | SS | .1N HNO3 |
| 7/1/2011 | 15:00 | 3-Hg | KMnO4/H2SO4 Impinger | 1 | SS | .1N HNO3/hydroxylamine |
| 6/30/2011 | 12:00 | HNO3-Blank | 50ml .1N HNO3 | 1 | JP | .1N HNO3 |
| 6/30/2011 | 12:00 | KCl-Blank | 50ml 1N KCl | 1 | JP | 1N KCl |
| 6/30/2011 | 12:00 | HNO3/H2O2-Blank | 50ml 5% HNO3/10% H2O2 | 1 | JP | 5% HNO3/10% H2O2 |
| 6/30/2011 | 12:00 | KMnO4/H2SO4-Blank | 50ml 4% KMnO4/10% H2SO4 | 1 | JP | 4% KMnO4/10% H2SO4 |
| 6/30/2011 | 12:00 | hyd-Blank | 100ml 10% hydryoxylamine | 1 | JP | 10% hydryoxylamine |
| 6/30/2011 | 12:00 | Filter-Blank-1 | Tared Quartz Filter | 1 | JP | Unused Tared Quartz Filter |
| 6/30/2011 | 12:00 | Filter-Blank-2 | Tared Quartz Filter | 1 | JP | Unused Tared Quartz Filter |
| 6/30/2011 | 12:00 | Filter-Blank-3 | Tared Quartz Filter | 1 | JP | Unused Tared Quartz Filter |
| 6/30/2011 | 12:00 | FB-Hg | Filter | 1 | SS | Filter |
| 6/30/2011 | 12:00 | FB-Hg | Noz/Prbe/F½ Filter | 1 | SS | .1N HNO3 |
| 6/30/2011 | 12:00 | FB-Hg | B½ Filter/KCl Impinger | 1 | SS | KMnO4/HNO3 |
| 6/30/2011 | 12:00 | FB-Hg | HNO3/H2O2 Impinger | 1 | SS | .1N HNO3 |
| 6/30/2011 | 12:00 | FB-Hg | KMnO4/H2SO4 Impinger | 1 | SS | .1N HNO3/hydroxylamine |
| | | | | | | |
| | | Total Samples | | 28 | | |
| Reagent: | | | | | | |
| Reagent Lot #'s: | | | | | | |

| RELEASED BY | DATE/TIME | RECEIVED BY | DATE/TIME |
|---|---|---|---|
| [signature] | 7/2/11 12:15 | [signature] | 7/6/11 0800 |

ANALYSIS REQUIRED:

Delta

229289

# CHAIN OF CUSTODY

CLIENT: ICR 2F-7

TEST DATE(S): 6/30/2011 7/1/2011

LOCATION: FCC

SAMPLER(S): SS

SAMPLE LOCATION: 2F-7 Stack

PROJECT MANAGER: Ali Aleshakir

TEST METHOD(S): SW-846 Method 0061

DATE DUE: 7/15/2011

OUTSIDE LAB REQUIRED?: Yes

COMPLIANCE TEST? No

| DATE | TIME | TEST # | SAMPLE DESCRIPTION | CONTAINERS | SAMPLER | COMMENTS | Original TV, ml |
|---|---|---|---|---|---|---|---|
| 6/30/2011 | 10:19 | 1-Cr | Noz/Recirc line/Imp | 1 | SS | DI H2O / KOH | 812 |
| 6/30/2011 | 15:54 | 2-Cr | Noz/Recirc line/Imp | 1 | SS | DI H2O / KOH | ~~954~~ 920 |
| 7/1/2011 | 15:00 | 3-Cr | Noz/Recirc line/Imp | 1 | SS | DI H2O / KOH | 954 |
| 6/30/2011 | 12:00 | KOH-Blank | 300 ml .1N KOH | 1 | JP | .1N KOH | 300 |
| 6/30/2011 | 12:00 | H2O-Blank | 200 ml DI H2O | 1 | JP | DI H2O | 200 |
| 6/30/2011 | 12:00 | FB-Cr | Noz/Recirc line/Imp | 1 | SS | DI H2O / KOH | 394 |
| | | | | | | | |
| Total Samples | | | | 6 | | | |
| Reagent: | | DI H2O | | | | | |
| Reagent Lot #'s: | | | | | | | |

| RELEASED BY | DATE/TIME | RECEIVED BY | DATE/TIME |
|---|---|---|---|
| [signature] | 7/2/11 12:15 | [signature] | 7/6/11 0800 |
| | | shipped via courier to C&T | |
| | | | |

ANALYSIS REQUIRED:

Cr6+ by 0061 (Total Cr not required)

Delta Air Quality Services, Incorporated

Note: 100 ml removed for archiving at Delta laboratory refrigerator

Use original TV noted for µg/sample calculation

Received @ C&T [signature] 7-11-11 0900

E-13

E-14

**COOLER RECEIPT CHECKLIST**

Curtis & Tompkins, Ltd.

Login # 229289 Date Received 7/11/11 Number of coolers 1
Client Delta Project FCC 2F-7 Stack

Date Opened 7/11/11 By (print) R. Parks (sign) [signature]
Date Logged in ↓ By (print) ↓ (sign) ↓

1. Did cooler come with a shipping slip (airbill, etc) (YES) NO
   Shipping info GSO 104394096

2A. Were custody seals present? .... ☐ YES (circle) on cooler on samples ☒ NO
   How many _____ Name _____ Date _____
2B. Were custody seals intact upon arrival? _____ YES NO (N/A)
3. Were custody papers dry and intact when received? _____ (YES) NO
4. Were custody papers filled out properly (ink, signed, etc)? _____ (YES) NO
5. Is the project identifiable from custody papers? (If so fill out top of form) ___ (YES) NO
6. Indicate the packing in cooler: (if other, describe) _____

☒ Bubble Wrap ☐ Foam blocks ☒ Bags ☐ None
☐ Cloth material ☐ Cardboard ☐ Styrofoam ☐ Paper towels

7. Temperature documentation: * Notify PM if temperature exceeds 6°C

Type of ice used: ☐ Wet ☒ Blue/Gel ☐ None Temp(°C) _____

☒ Samples Received on ice & cold without a temperature blank

☐ Samples received on ice directly from the field. Cooling process had begun

8. Were Method 5035 sampling containers present? _____ YES (NO)
   If YES, what time were they transferred to freezer? _____
9. Did all bottles arrive unbroken/unopened? _____ (YES) NO
10. Are samples in the appropriate containers for indicated tests? _____ (YES) NO
11. Are sample labels present, in good condition and complete? _____ (YES) NO
12. Do the sample labels agree with custody papers? _____ (YES) NO
13. Was sufficient amount of sample sent for tests requested? _____ (YES) NO
14. Are the samples appropriately preserved? _____ YES NO (N/A)
15. Did you check preservatives for all bottles for each sample? _____ YES NO (N/A)
16. Did you document your preservative check? _____ YES NO (N/A)
17. Did you change the hold time in LIMS for unpreserved VOAs? _____ YES NO (N/A)
18. Are bubbles > 6mm absent in VOA samples? _____ YES NO (N/A)
19. Was the client contacted concerning this sample delivery? _____ YES (NO)
   If YES, Who was called? _____ By _____ Date: _____

COMMENTS

_____
_____
_____
_____
_____
_____

Rev 8, 6/11

229291 E-15

CHAIN OF CUSTODY

CLIENT: ICR 2F-7 TEST DATE(S): 6/30/2011 7/1/2011

LOCATION: FCC SAMPLER(S): SS

SAMPLE LOCATION: 2F-7 Stack PROJECT MANAGER: Ali Aleshakir

TEST METHOD(S): EPA 29/5 DATE DUE: 7/15/2011

OUTSIDE LAB REQUIRED?: Yes COMPLIANCE TEST? No

| DATE | TIME | TEST # | SAMPLE DESCRIPTION | CONTAINERS | SAMPLER | COMMENTS |
|---|---|---|---|---|---|---|
| 6/30/2011 | 10:16 | 1-Mtl | Noz/Prbe/Filter F½ | 1 | SS | Acetone Beaker # 9773 |
| 6/30/2011 | 10:16 | 1-Mtl 1 | Noz/Prbe/Filter F½ | 1 | SS | .1N HNO3 |
| 6/30/2011 | 10:16 | 1-Mtl | Filter | 1 | SS | 83 mm |
| 6/30/2011 | 10:16 | 1-Mtl | Back ½ /Impinger Rinse | 1 | SS | .1N HNO3 |
| 6/30/2011 | 15:54 | 2-Mtl | Noz/Prbe/Filter F½ | 1 | SS | Acetone Beaker # 9774 |
| 6/30/2011 | 15:54 | 2-Mtl 2 | Noz/Prbe/Filter F½ | 1 | SS | .1N HNO3 |
| 6/30/2011 | 15:54 | 2-Mtl | Filter | 1 | SS | 83 mm |
| 6/30/2011 | 15:54 | 2-Mtl | Back ½ /Impinger Rinse | 1 | SS | .1N HNO3 |
| 7/1/2011 | 15:00 | 3-Mtl | Noz/Prbe/Filter F½ | 1 | SS | Acetone Beaker # 9775 |
| 7/1/2011 | 15:00 | 3-Mtl 3 | Noz/Prbe/Filter F½ | 1 | SS | .1N HNO3 |
| 7/1/2011 | 15:00 | 3-Mtl | Filter | 1 | SS | 83 mm |
| 7/1/2011 | 15:00 | 3-Mtl | Back ½ /Impinger Rinse | 1 | SS | .1N HNO3 |
| 6/30/2011 | 13:00 | H2O-Blank | 100ml DI H2O | 1 | JP | DI H2O |
| 6/30/2011 | 13:00 | Acet-Blank 4 | 200ml Acetone | 1 | JP | Acetone Beaker # 9777 |
| 6/30/2011 | 13:00 | HNO3-Blank | 300ml .1N HNO3 | 1 | JP | .1N HNO3 |
| 6/30/2011 | 13:00 | HNO3/H2O2-Blank | 200ml 5% HNO3/10% H2O2 | 1 | JP | HNO3/H2O2 |
| 6/30/2011 | 13:00 | Filter-Blank-1 | Unused Quartz Filter | 1 | JP | 83 mm |
| 6/30/2011 | 13:00 | Filter-Blank-2 | Unused Quartz Filter | 1 | JP | 83 mm |
| 6/30/2011 | 13:00 | Filter-Blank-3 | Unused Quartz Filter | 1 | JP | 83 mm |
| 6/30/2011 | 13:00 | FB-Mtl | Noz/Prbe/Filter F½ | 1 | SS | Acetone Beaker # 9776 |
| 6/30/2011 | 13:00 | FB-Mtl 5 | Noz/Prbe/Filter F½ | 1 | SS | .1N HNO3 |
| 6/30/2011 | 13:00 | FB-Mtl | Filter | 1 | SS | 83 mm |
| 6/30/2011 | 13:00 | FB-Mtl | Back ½ /Impinger Rinse | 1 | SS | .1N HNO3 |
| | | | | | | |
| | | Total Samples | | 23 | | |
| | Reagent: | DI H2O | Acetone | | | |
| | Reagent Lot #'s: | Lot #9 | 105791 | | | |

| RELEASED BY | DATE/TIME | RECEIVED BY | DATE/TIME |
|---|---|---|---|
| [signature] | 7/2/11 1215 | [signature] | 7/6/11 0800 |
| | | Stamped via courier to C&T | 7-11-11 0900 |

ANALYSIS REQUIRED:

Delta

PM analysis on filter & F½ acetone (filter tared after testing @ 320 F)

Metals analysis for Sb, As, Be, Cd, Cr, Co, Pb Mn, Ni, Se

FRONT and BACK ½ SEPARATELY

Note: Acetone fraction submitted on dried beaker
Acetone dried beaker and filters submitted via Fed-ex.

E-16

CHAIN OF CUSTODY

CLIENT: ICR 2F-7

TEST DATE(S): 6/30/2011 7/1/2011

LOCATION: FCC

SAMPLER(S): SS

SAMPLE LOCATION: 2F-7 Stack

PROJECT MANAGER: Ali Aleshaiker

TEST METHOD(S): EPA 201A/202

DATE DUE: 7/9/2011

OUTSIDE LAB REQUIRED?: No

COMPLIANCE TEST? No

| DATE | TIME | TEST # | SAMPLE DESCRIPTION | CONTAINERS | SAMPLER | COMMENTS |
|---|---|---|---|---|---|---|
| 6/30/2011 | 10:16 | 1-PM2.5 | > 2.5 µ | 1 | SS | Acetone |
| 6/30/2011 | 10:16 | 1-PM2.5 | < 2.5 µ | 1 | SS | Acetone |
| 6/30/2011 | 10:16 | 1-PM2.5 | PM2.5 Filter | 1 | SS | 83 mm Glass |
| 6/30/2011 | 10:16 | 1-PM2.5 | B½ Acet/Hex Rinse | 1 | SS | Acet/Hexane |
| 6/30/2011 | 10:16 | 1-PM2.5 | Impinger Catch | 1 | SS | H20 |
| 6/30/2011 | 10:16 | 1-PM2.5 | CPM Filter | 1 | SS | 83 mm Teflon |
| 6/30/2011 | 15:48 | 2-PM2.5 | > 2.5 µ | 1 | SS | Acetone |
| 6/30/2011 | 15:48 | 2-PM2.5 | < 2.5 µ | 1 | SS | Acetone |
| 6/30/2011 | 15:48 | 2-PM2.5 | PM2.5 Filter | 1 | SS | 83 mm Glass |
| 6/30/2011 | 15:48 | 2-PM2.5 | B½ Acet/Hex Rinse | 1 | SS | Acet/Hexane |
| 6/30/2011 | 15:48 | 2-PM2.5 | Impinger Catch | 1 | SS | H20 |
| 6/30/2011 | 15:48 | 2-PM2.5 | CPM Filter | 1 | SS | 83 mm Teflon |
| 7/1/2011 | 15:00 | 3-PM2.5 | > 2.5 µ | 1 | SS | Acetone |
| 7/1/2011 | 15:00 | 3-PM2.5 | < 2.5 µ | 1 | SS | Acetone |
| 7/1/2011 | 15:00 | 3-PM2.5 | PM2.5 Filter | 1 | SS | 83 mm Glass |
| 7/1/2011 | 15:00 | 3-PM2.5 | B½ Acet/Hex Rinse | 1 | SS | Acet/Hexane |
| 7/1/2011 | 15:00 | 3-PM2.5 | Impinger Catch | 1 | SS | H20 |
| 7/1/2011 | 15:00 | 3-PM2.5 | CPM Filter | 1 | SS | 83 mm Teflon |
| 6/30/2011 | 14:00 | Acet-Blank-Fld | Acetone | 1 | JP | Field Acetone |
| 6/30/2011 | 14:00 | Hex-Blank-Fld | Hexane | 1 | JP | Field Hexane |
| 6/30/2011 | 14:00 | H2O-Blank-Fld | DI H2O | 1 | JP | FieldDI H2O |
| 6/30/2011 | 14:00 | Acet-Blank-Lab | Acetone | 1 | JP | Lab Acetone |
| 6/30/2011 | 14:00 | Hex-Blank-Lab | Hexane | 1 | JP | Lab Hexane |
| 6/30/2011 | 14:00 | H2O-Blank-Lab | DI H2O | 1 | JP | Lab DI H2O |
| 6/30/2011 | 14:00 | FB-PM2.5 | B½ Acet/Hex Rinse | 1 | JP | Acet/Hexane |
| 6/30/2011 | 14:00 | FB-PM2.5 | Impinger Catch | 1 | JP | H20 |
| 6/30/2011 | 14:00 | FB-PM2.5 | CPM Filter | 1 | JP | 83 mm Teflon |
| | | | | | | |
| | | Total Samples | | 27 | | |
| Reagent: | | Water | Acetone | Hexane | | |
| Reagent Lot #'s: | | | | | | |

| RELEASED BY | DATE/TIME | RECEIVED BY | DATE/TIME |
|---|---|---|---|
| [signature] | 7/2/11 1215 | [signature] | 7/6/11 0800 |
| | | | |
| | | | |

ANALYSIS REQUIRED: EPA 201A/202 [redacted]

Delta Air Quality Services, Incorporated

Note: Probe and filter @ 248°F

11-46+

## CHAIN OF CUSTODY

CLIENT: ICR 2F-7 TEST DATE(S): 6/30/11 through 7/1/11

LOCATION: FCC 2F-7 SAMPLER(S): DW

SAMPLE LOCATION: Stack PROJECT MANAGER: AA

TEST METHOD(S): SCAQMD 207.1 DATE DUE: ASAP

OUTSIDE LAB REQUIRED?: Yes COMPLIANCE TEST? No

| DATE | TIME | TEST # | SAMPLE DESCRIPTION | CONTAINERS | SAMPLER | COMMENTS | pH |
|---|---|---|---|---|---|---|---|
| 6/30/11 | | 1-NH3 | Probe / Line / Impinge | 1 | DW | 0.1N H2SO4 TV=621 | 2 |
| 7/1/11 | | 2-NH3 | Probe / Line / Impinge | 1 | DW | 0.1N H2SO4 TV=620 | 2 |
| 7/1/11 | | 3-NH3 | Probe / Line / Impinge | 1 | DW | 0.1N H2SO4 TV=512 | 2 |
| 6/30/11 | | FB-NH3 | Probe / Line / Impinge | 1 | JP | 0.1N H2SO4 TV=412 | <1 |
| 6/30/11 | | RB-NH3 | 0.1N H2SO4 | 1 | JP | 0.1N H2SO4 TV=400 | <1 |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |

| RELEASED BY | DATE/TIME | RECEIVED BY | DATE/TIME |
|---|---|---|---|
| DMcCune | 7/1/11 1916 | [signature] | 7/4/11 1500 |
| [signature] | 7/5/11 0719 | [signature] | 7/5/11 0900 |
| | | | |
| | | | |

ANALYSIS REQUIRED: Analyze in Delta lab and then send to Quantum Analytical

E-17

Delta

DS834001

Date of last revision – 11/13/2008 Master Document Storage\Forms\Datasheets\Lab Forms

## CHAIN OF CUSTODY

CLIENT: XDM

TEST DATE(S): 6/6/11

LOCATION: Crude Unit (IEI)

SAMPLER(S): D. Kemp / J. Kim / N. Gilbert

SAMPLE LOCATION: IEI

PROJECT MANAGER: Parvez Abbas

TEST METHOD(S): AS IN PROTOCOL

DATE DUE: 7 DAYS

OUTSIDE LAB REQUIRED?: YES

COMPLIANCE TEST? NO

| DATE | TIME | TEST # | SAMPLE DESCRIPTION | CONTAINERS | SAMPLER | COMMENTS |
|---|---|---|---|---|---|---|
| 6/6/11 | 10:15 | IEI Comp #1 | Crude Oil | 1 | | 10:05 Sample 1 |
| | | | | | | 10:10 Sample 2 |
| | | | | | | 10:15 Sample 3 |
| | | | | | | |
| 6/6/11 | 10:30 | IEI Comp #2 | Crude Oil | 1 | | 10:20 Sample 4 |
| | | | | | | 10:25 Sample 5 |
| | | | | | | 10:30 Sample 6 |
| | | | | | | |
| 6/6/11 | 10:45 | IEI Comp #3 | Crude Oil | 1 | | 10:35 Sample 7 |
| | | | | | | 10:40 Sample 8 |
| | | | | | | 10:45 Sample 9 |
| | | | | | | |
| | | | | | | |

| RELEASED BY | DATE/TIME | RECEIVED BY | DATE/TIME |
|---|---|---|---|
| Jun Kim | 6/6/11 11:05 AM | D. McCune | 6/6/11 11:05 AM |
| D. McCune | 6/6/11 11:25 A.M. | [illegible] | 6/6/11 11:27 AM |
| | | | 6/6/11 11:25 AM |

ANALYSIS REQUIRED: REFER PROTOCOL (DELTA R529098) - TABLE 3-3

Delta

DS834001

CONFIDENTIAL

# CHAIN OF CUSTODY

CLIENT: XOM

TEST DATE(S): 7/7/11

LOCATION: Crude Unit (IEI)

SAMPLER(S): J. KIM / N. Gilbert / Jose Crude operator

SAMPLE LOCATION: IEI

PROJECT MANAGER: Parvez Abbas

TEST METHOD(S): As in protocol

DATE DUE: 7 days

OUTSIDE LAB REQUIRED?: Yes

COMPLIANCE TEST? No

| DATE | TIME | TEST # | SAMPLE DESCRIPTION | CONTAINERS | SAMPLER | COMMENTS |
|---|---|---|---|---|---|---|
| 7/7/11 | | IEI Comp#1 | Crude Oil | 1 | | #1 10:43, #2 10:48, #3 10:53 — Comp @ #1 11:54 |
| 7/7/11 | | IEI Comp#2 | Crude Oil | 1 | | #4 10:58, #5 11:03, #6 11:08 — Comp @ #2 11:09 |
| 7/7/11 | | IEI Comp#3 | Crude Oil | 1 | | #7 11:13, #8 11:18, #9 11:23 — 11:24 |

| RELEASED BY | DATE/TIME | RECEIVED BY | DATE/TIME |
|---|---|---|---|
| John Kim | 7/7/11 11:46 | | 7/7/11 11:46 |
| | 7/7/11 12:10 | | 7/7/11 @ 1210 |

ANALYSIS REQUIRED:

CONFIDENTIAL

Delta

DS834001

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Fig 19

# CHAIN OF CUSTODY

CLIENT: XoM

TEST DATE(S): 8/8/11

LOCATION: Crude Unit

SAMPLER(S): Sammy / Juan Fiem

SAMPLE LOCATION: IE1

PROJECT MANAGER: Parvez Abbas

TEST METHOD(S): SEE PROTOCOL

DATE DUE: 8/16/2011

OUTSIDE LAB REQUIRED?:

COMPLIANCE TEST?

| DATE | TIME | TEST # | SAMPLE DESCRIPTION | CONTAINERS | SAMPLER | COMMENTS |
|---|---|---|---|---|---|---|
| 8/8/11 | 10:02 | | IE1 Comp #1 | 1 | | IE1 #1 9:50, IE1 #2 9:55, IE2 #3 10:00 — Combined @ 10:02 |
| 8/8/11 | 10:16 | | IE1 Comp #2 | 1 | | IE1 #4 10:05, IE1 #5 10:10, IE1 #6 10:15 — Combined @ 10:16 |
| 8/8/11 | 10:31 | | IE1 Comp #3 | 1 | | IE1 #7 10:20, IE1 #8 10:25, IE1 #9 10:30 — Combined @ 10:31 |

| RELEASED BY | DATE/TIME | RECEIVED BY | DATE/TIME |
|---|---|---|---|
| Juan Fiem | 8/8/11 11:10 | 8/8/11 11:15 | |
| Parvez | 8/8/11 11:35 | | 8/8/11 11:35 |
| DAVID MCCURE | 8/8/11 11:55 | Andrea | 8/8/11 11:55 |

ANALYSIS REQUIRED: See protocol

Delta

DS834001

Date of last revision – 11/13/2008

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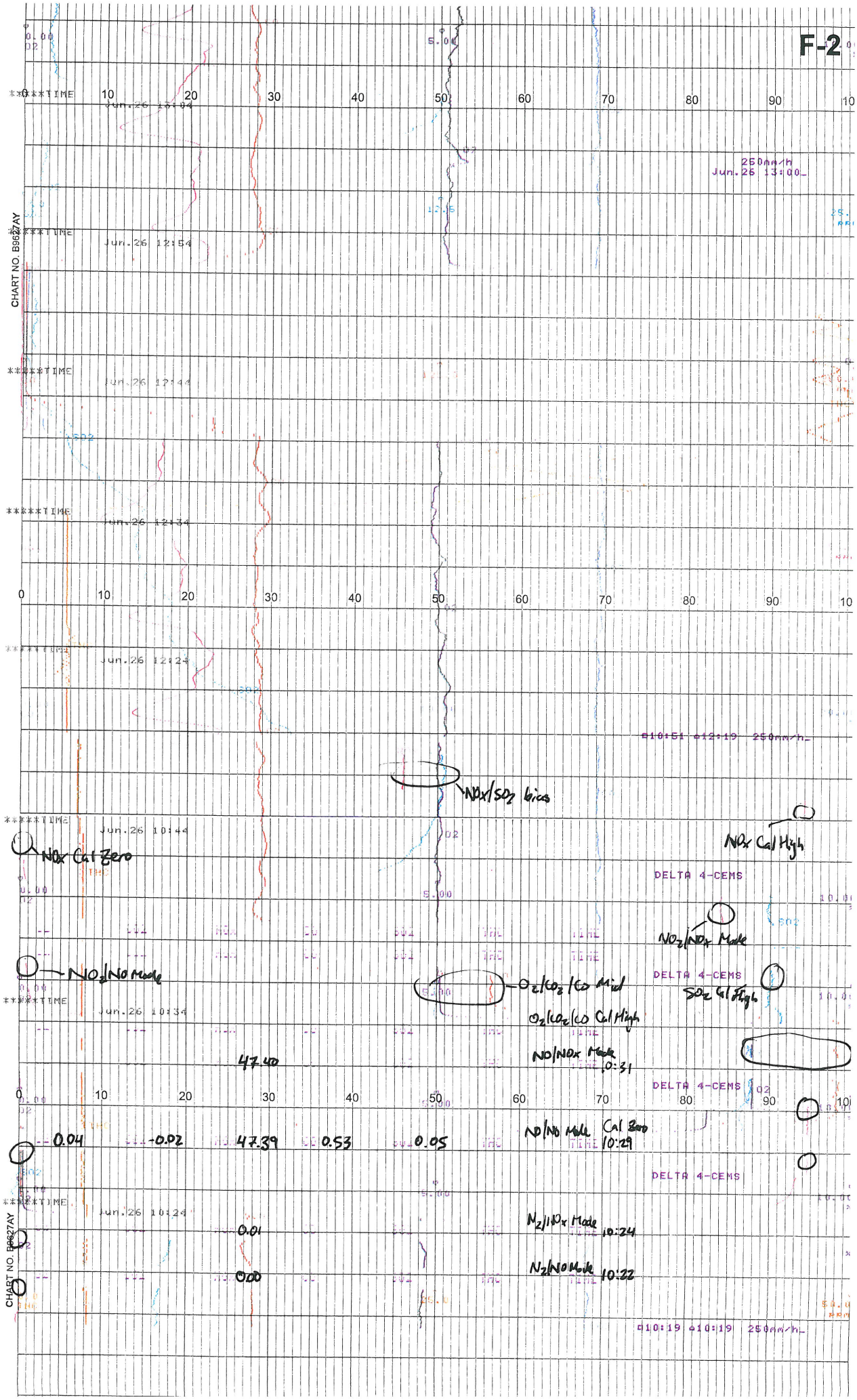
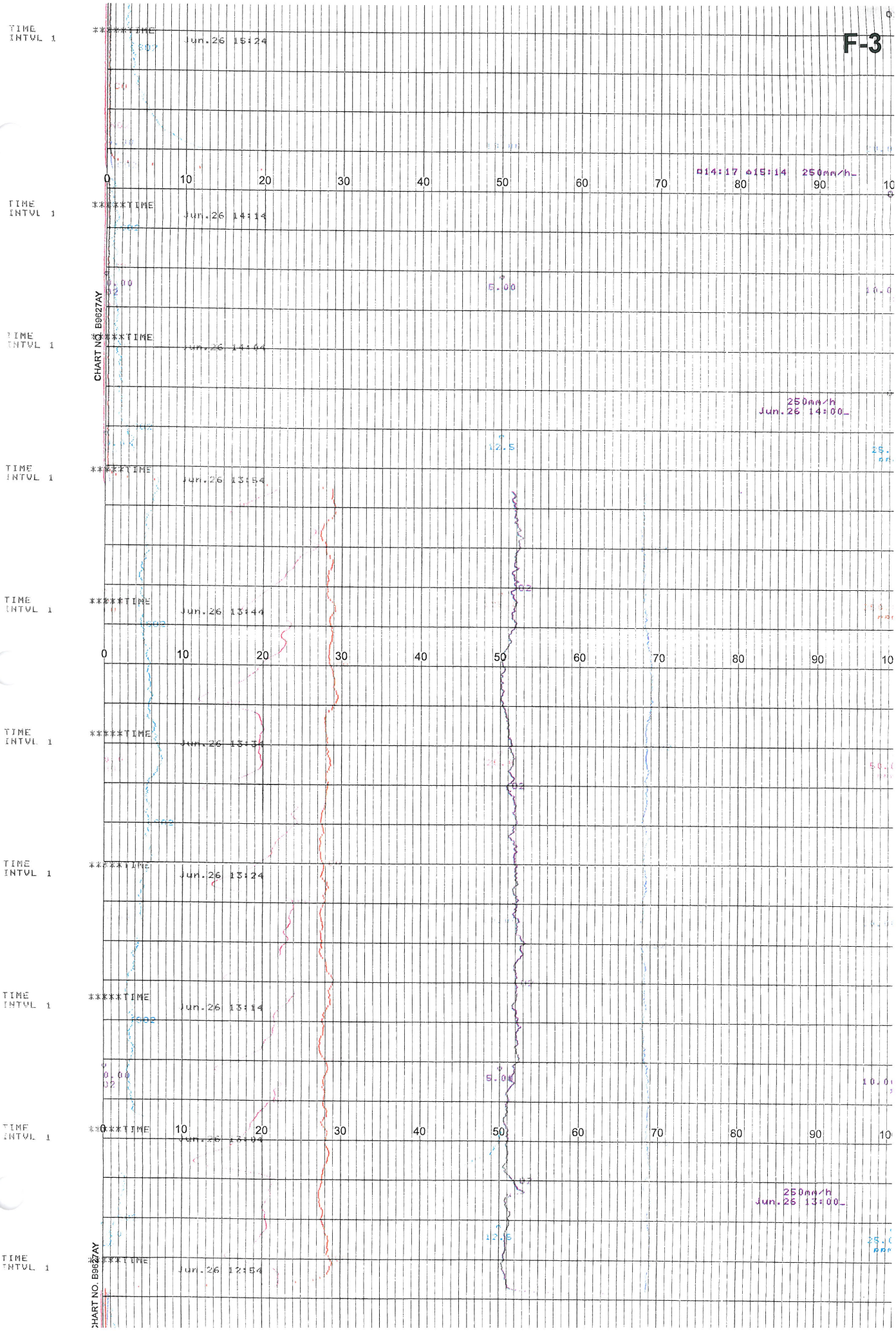
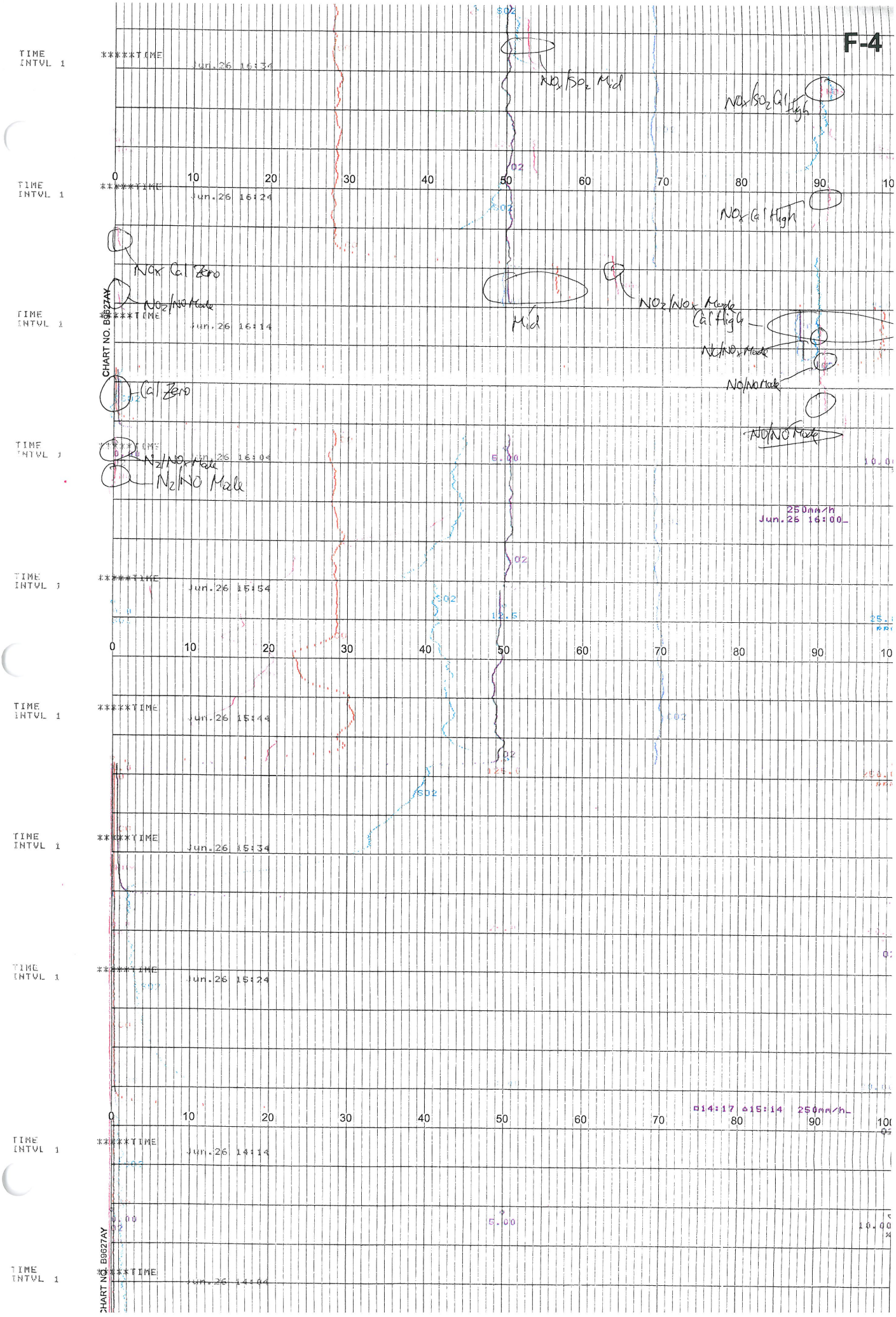
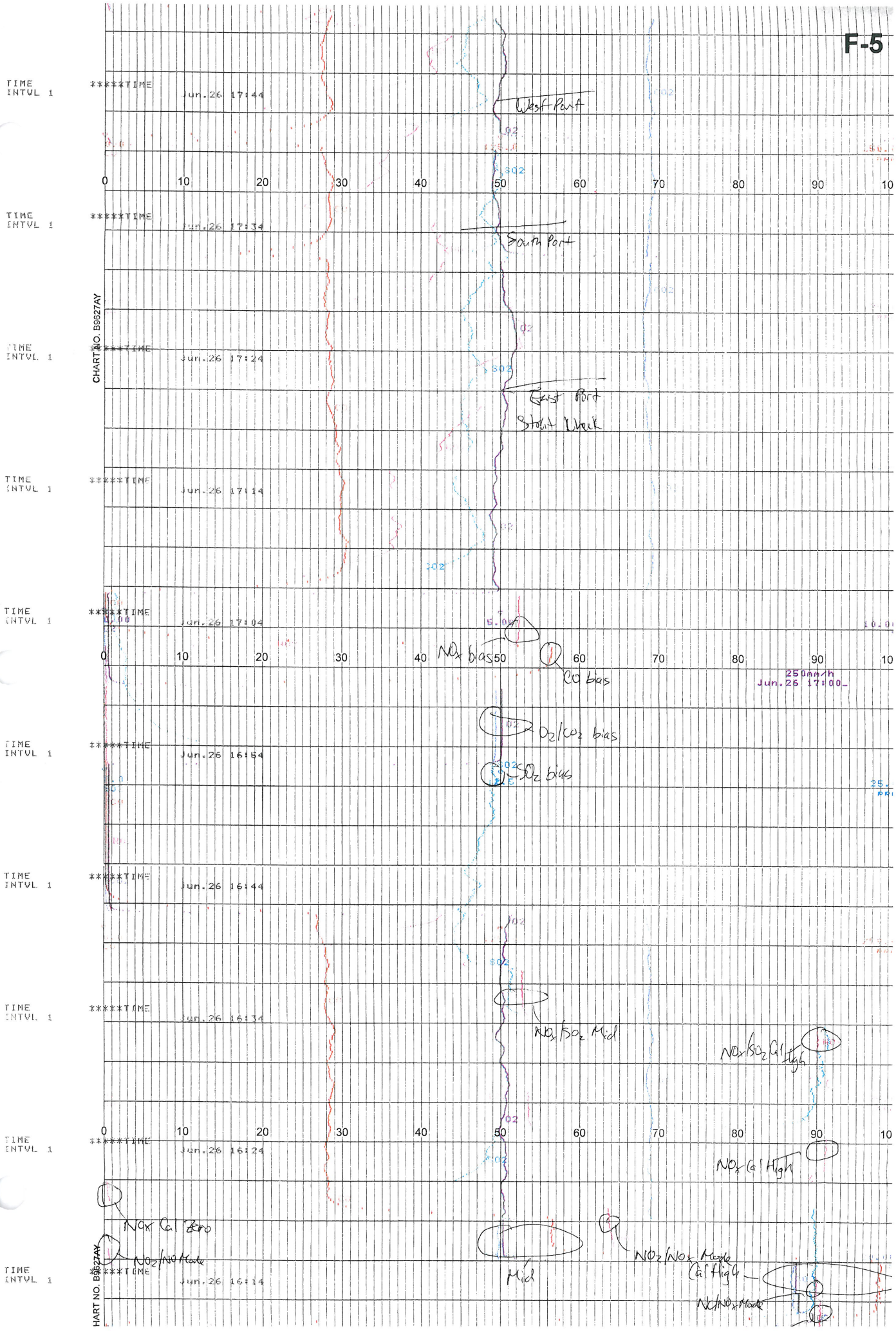
E-20

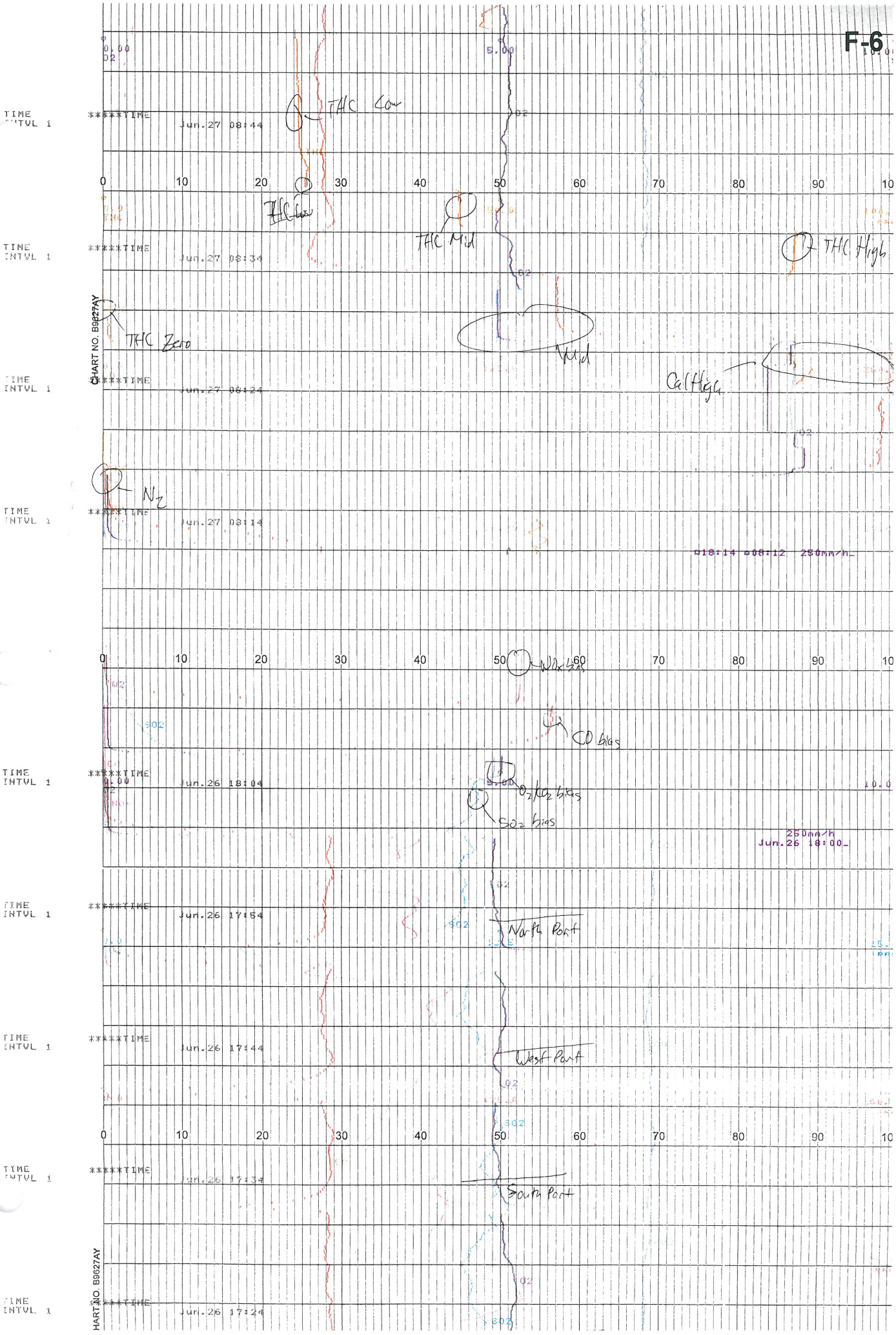
# APPENDIX F INSTRUMENT STRIPCHARTS

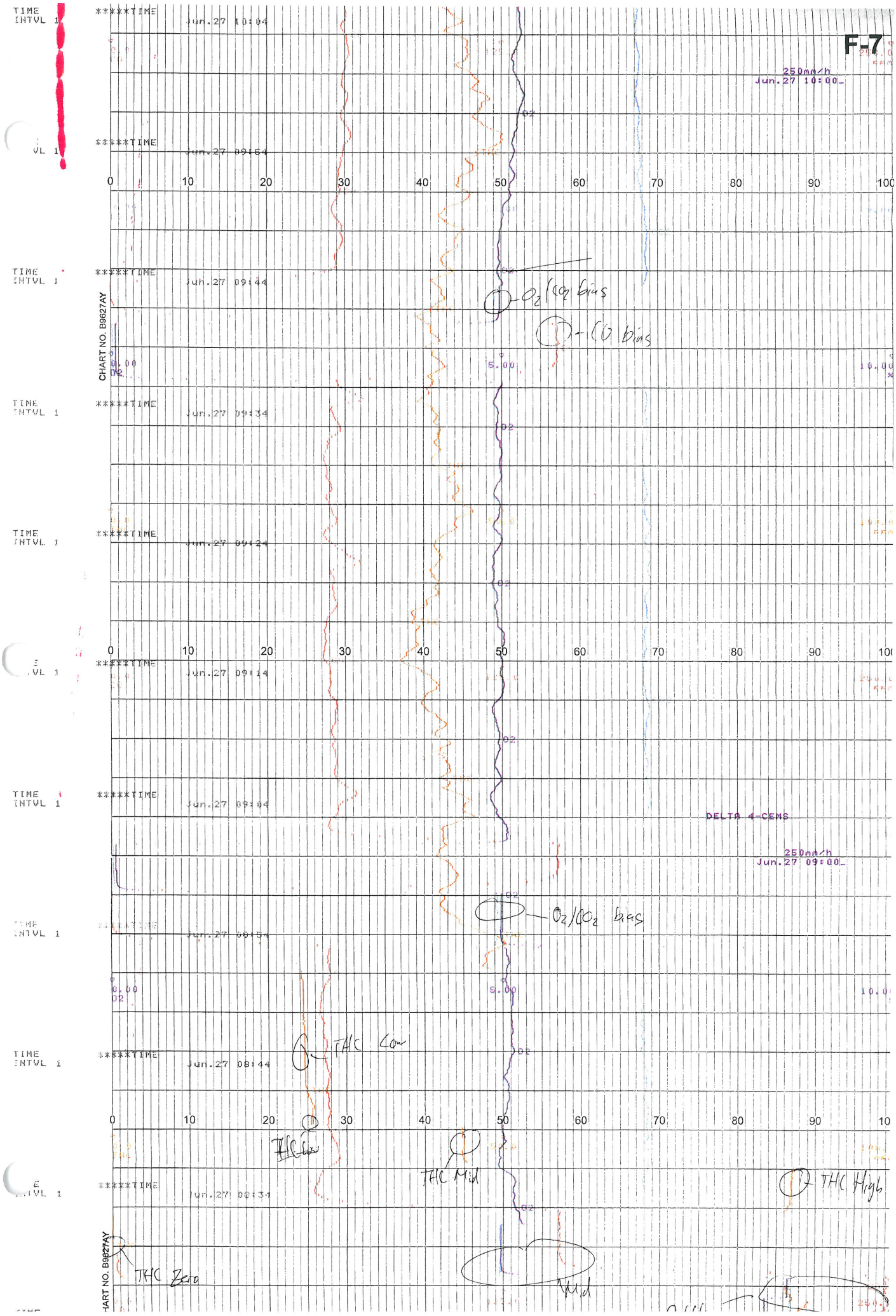

F-2
TIME INTVL 1
CHART NO. B9627AY
Jun.26 13:00
250mm/H
Jun.26 12:54
Jun.26 12:44
Jun.26 12:34
Jun.26 12:24
Jun.26 10:44
Jun.26 10:34
Jun.26 10:24
NOx/SO2 bias
NOx Cal Zero
NOx Cal High
DELTA 4-CEMS
NO2/NOx Mode
NO2/NO Mode
O2/CO2/CO Mid
SO2 Cal High
O2/CO2/CO Cal High
NO/NOx Mode 10:31
47.40
NO/NO Mode Cal Zero 10:29
0.04
-0.02
47.39
0.53
0.05
N2/NOx Mode 10:24
N2/NO Mode 10:22
0.01
0.00
10:19 10:19 250mm/h

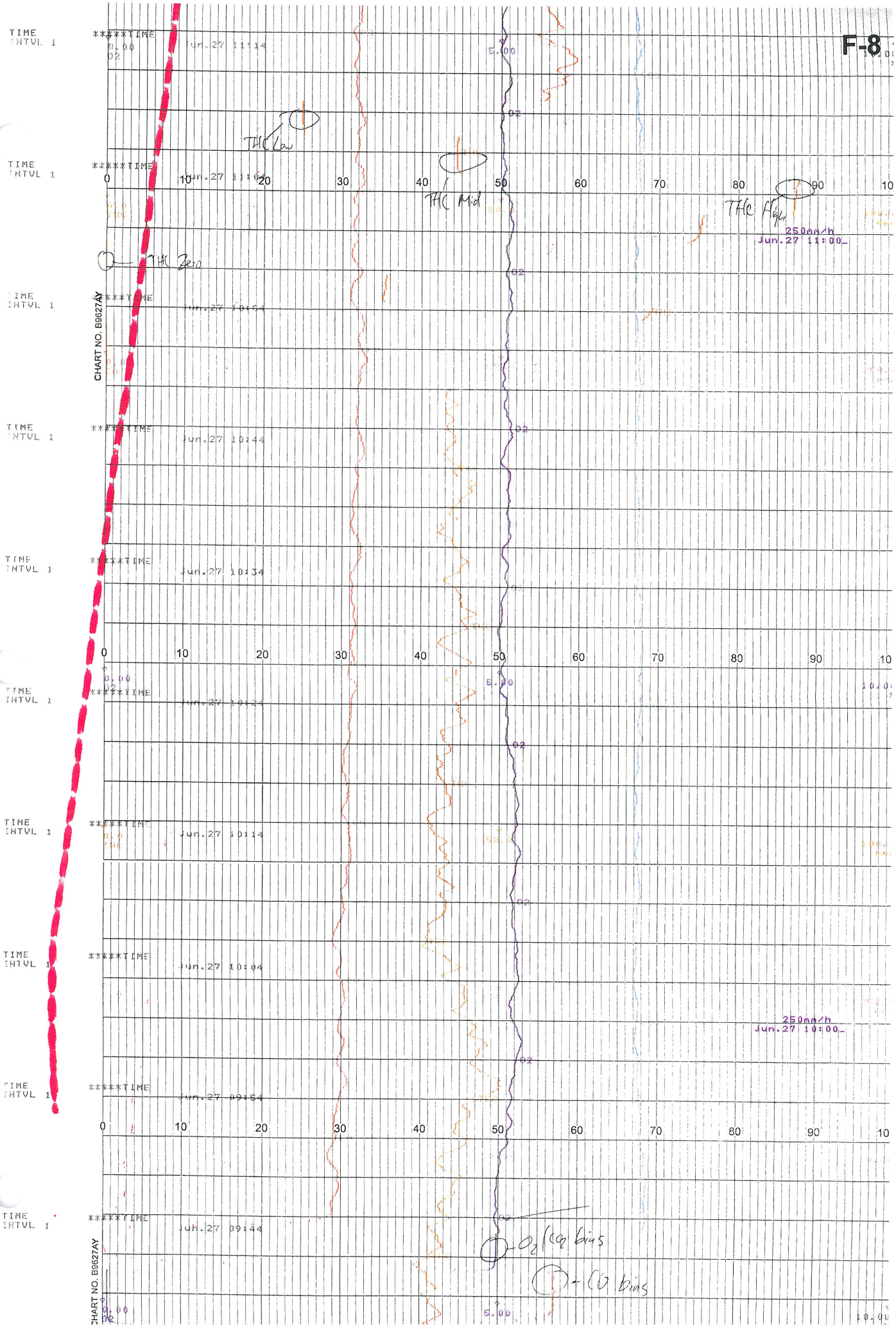

F-3
TIME INTVL 1
*****TIME
Jun.26 15:24
Jun.26 14:14
Jun.26 14:04
Jun.26 13:54
Jun.26 13:44
Jun.26 13:34
Jun.26 13:24
Jun.26 13:14
Jun.26 13:04
Jun.26 12:54
0 10 20 30 40 50 60 70 80 90 100
□14:17 △15:14 250mm/h
250mm/h
Jun.26 14:00
250mm/h
Jun.26 13:00
5.00
12.5
CHART NO. B9627AY

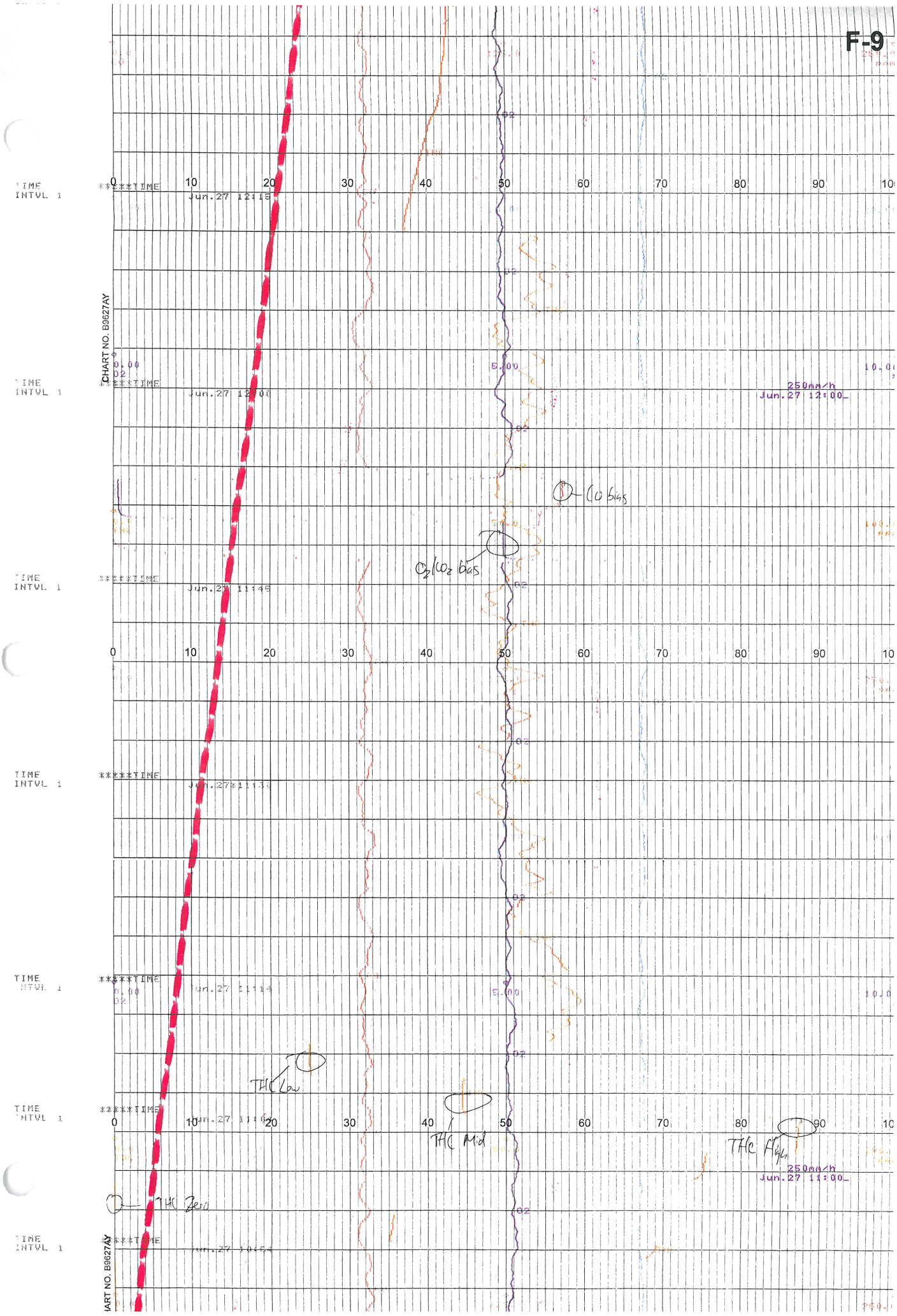

F-4
TIME INTVL 1
*****TIME
Jun.26 16:34
NOx/SO2 Mid
NOx/SO2 Cal High
Jun.26 16:24
NOx Cal High
NOx Cal Zero
NO2/NO Mode
Mid
NO2/NOx Mode
Cal High
Jun.26 16:14
NO/NOx Mode
NO/NO Mode
Cal Zero
N2/NOx Mode
N2/NO Mode
Jun.26 16:04
250mm/h
Jun.26 16:00
Jun.26 15:54
Jun.26 15:44
Jun.26 15:34
Jun.26 15:24
14:17 15:14 250mm/h
Jun.26 14:14
Jun.26 14:04
CHART NO. B9627AY
0 10 20 30 40 50 60 70 80 90 100

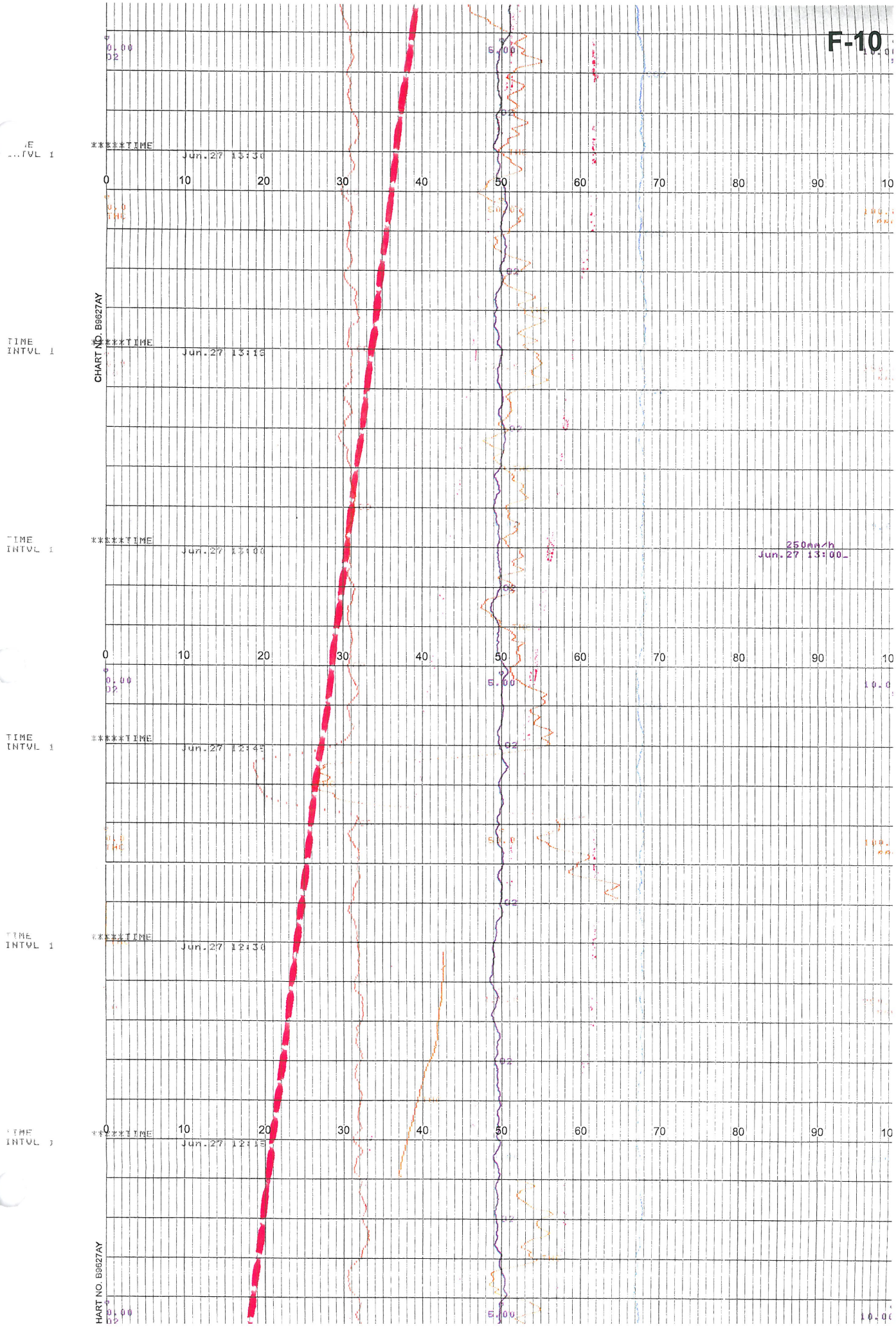

F-5
TIME INTVL 1
*****TIME
Jun.26 17:44
West Port
Jun.26 17:34
South Port
Jun.26 17:24
East Port
Stack Check
Jun.26 17:14
Jun.26 17:04
NOx bias
CO bias
250mm/h
Jun.26 17:00
O2/CO2 bias
SO2 bias
Jun.26 16:54
Jun.26 16:44
Jun.26 16:34
NOx/SO2 Mid
NOx/SO2 Cal High
Jun.26 16:24
NOx Cal High
NOx Cal Zero
NO2/NOx Mode
Mid
NO2/NOx Mode
Cal High
NO/NOx Mode
Jun.26 16:14
CHART NO. B9627AY
0
10
20
30
40
50
60
70
80
90


TIME INTVL 1
*****TIME
Jun.27 08:44
THC Low
Jun.27 08:34
THC Mid
THC High
THC Zero
Mid
Cal High
Jun.27 08:24
N2
Jun.27 08:14
250mm/h
Max Gas
CO bias
Jun.26 18:04
O2/NO2 bias
SO2 bias
Jun.26 18:00
Jun.26 17:54
North Port
Jun.26 17:44
West Port
Jun.26 17:34
South Port
Jun.26 17:24
CHART NO. B9627AY


F-7
250mm/h
Jun.27 10:00
Jun.27 09:54
Jun.27 09:44
Jun.27 09:34
Jun.27 09:24
Jun.27 09:14
Jun.27 09:04
DELTA 4-CEMS
250mm/h
Jun.27 09:00
Jun.27 08:54
Jun.27 08:44
Jun.27 08:34
CHART NO. B9627AY
O2/CO2 bias
CO bias
O2/CO2 bias
THC Low
THC Mid
THC High
THC Zero
Mid


F-8
TIME INTVL 1
*****TIME
Jun.27 11:14
Jun.27 11:04
Jun.27 10:54
Jun.27 10:44
Jun.27 10:34
Jun.27 10:24
Jun.27 10:14
Jun.27 10:04
Jun.27 09:54
Jun.27 09:44
CHART NO. B9627AY
THC Low
THC Mid
THC High
THC Zero
250mm/h
Jun.27 11:00
250mm/h
Jun.27 10:00
O2/CO2 bins
CO bins
0
10
20
30
40
50
60
70
80
90
5.00
02


F-9
CHART NO. B9627AY
TIME
INTVL 1
*****TIME
Jun.27 12:15
Jun.27 12:00
Jun.27 11:45
Jun.27 11:30
Jun.27 11:14
Jun.27 11:00
250mm/h
Jun.27 12:00
Jun.27 11:00
CO bias
O2/CO2 bias
THC Low
THC Mid
THC High
THC Zero
0
10
20
30
40
50
60
70
80
90
5.00
10.00


F-10
CHART NO. B9627AY
TIME INTVL 1
*****TIME
Jun.27 13:30
Jun.27 13:15
Jun.27 13:00
Jun.27 12:45
Jun.27 12:30
Jun.27 12:15
250mm/h
Jun.27 13:00
0 10 20 30 40 50 60 70 80 90 100
0.00
5.00
10.00

F-11

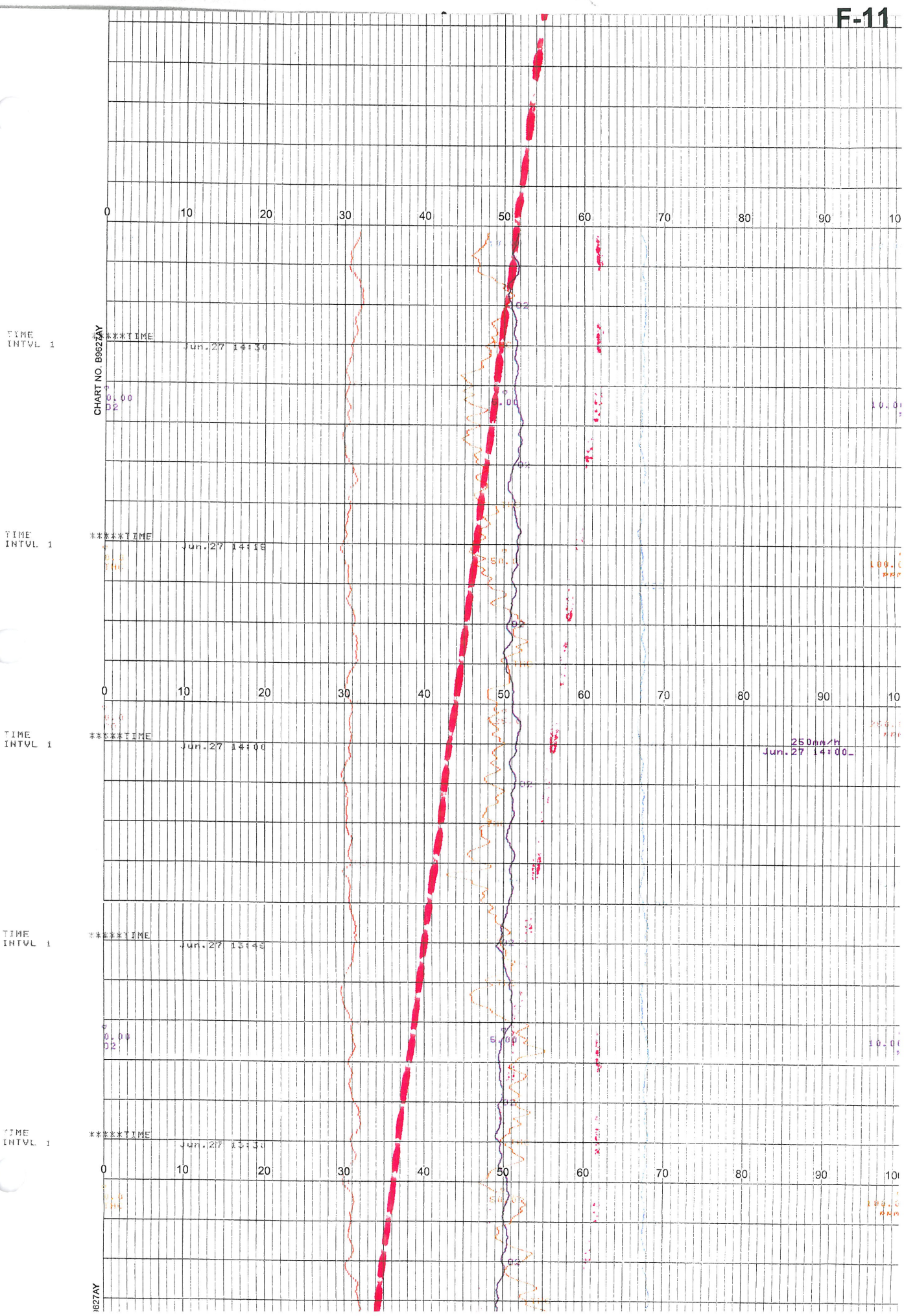
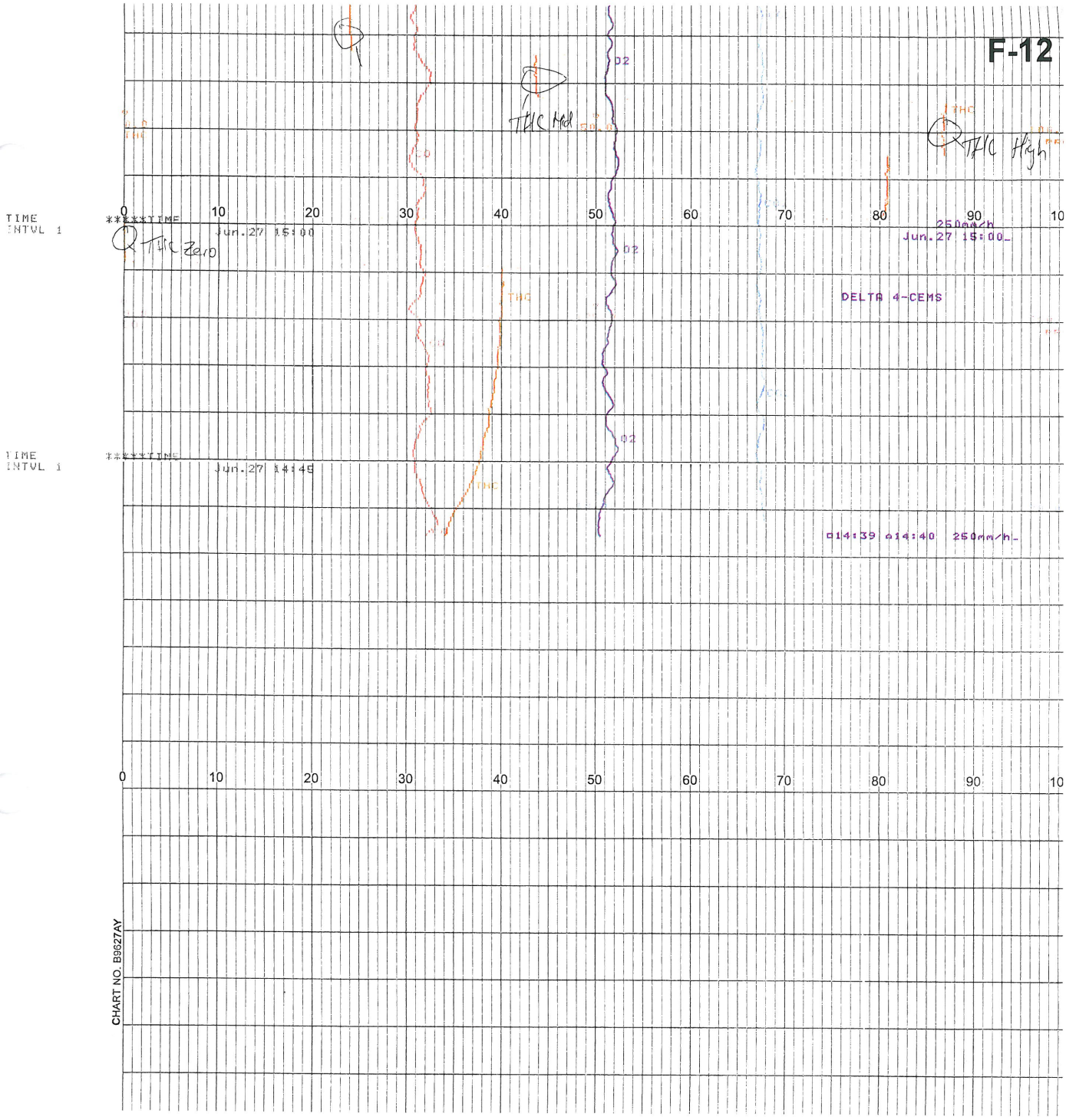
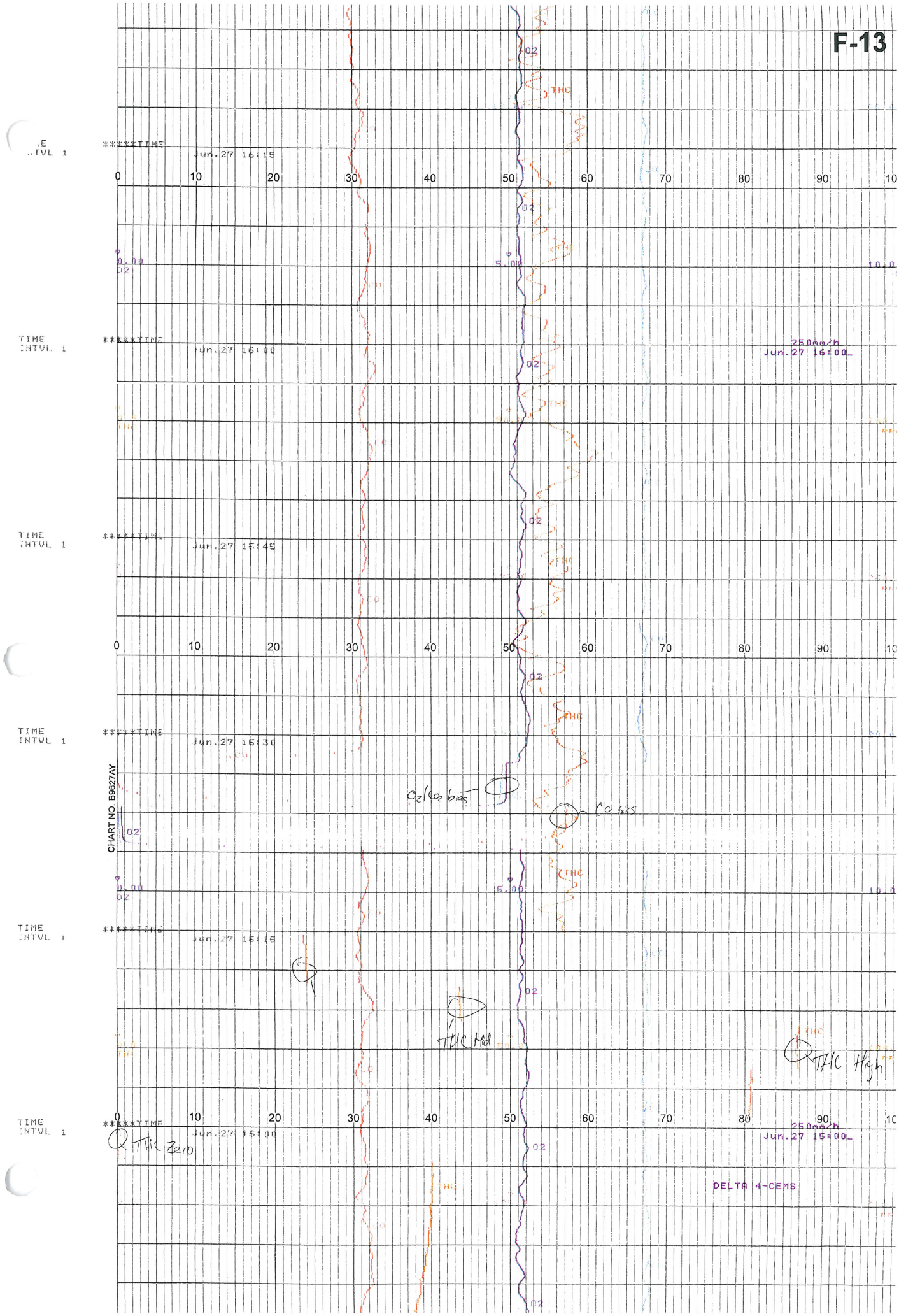
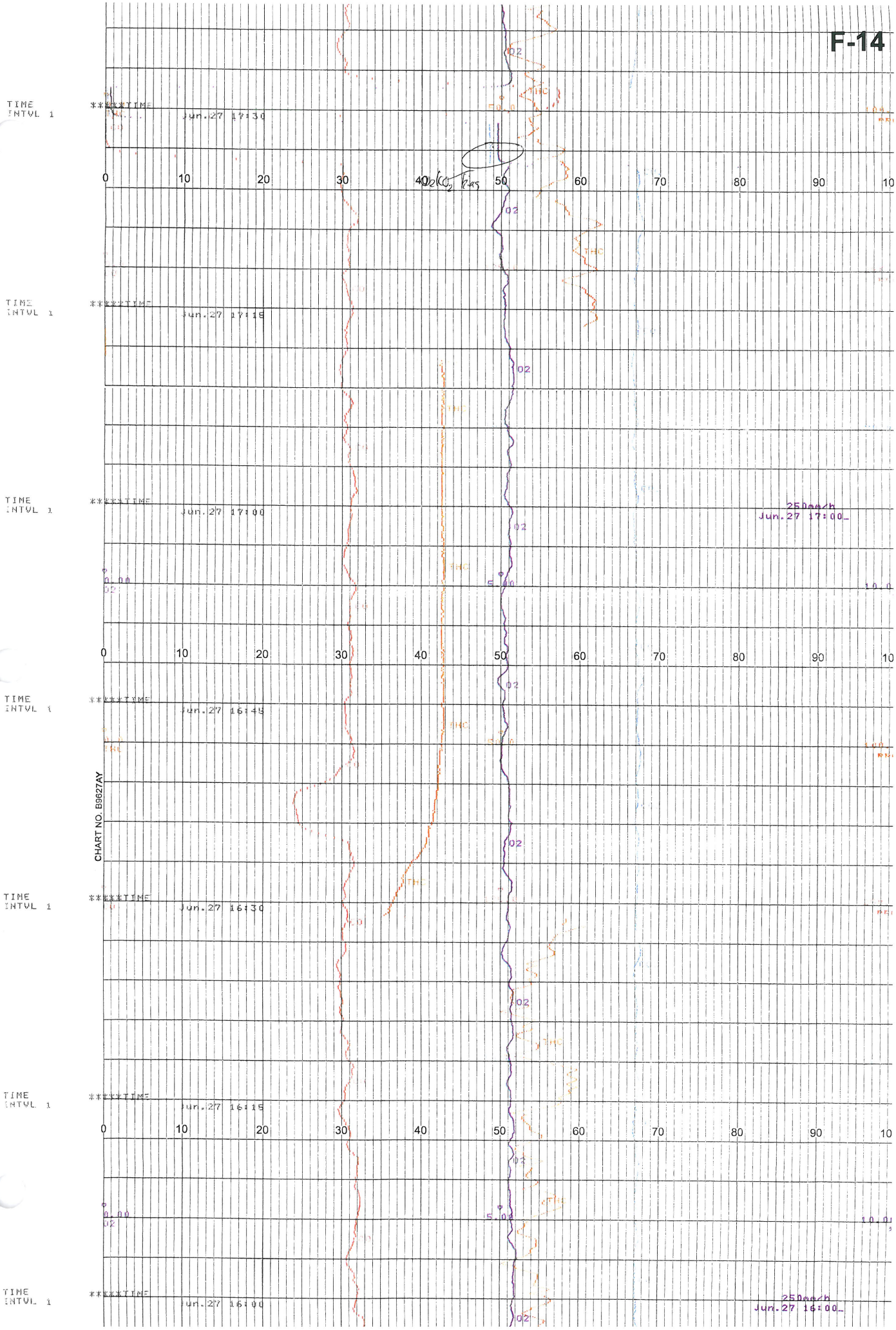


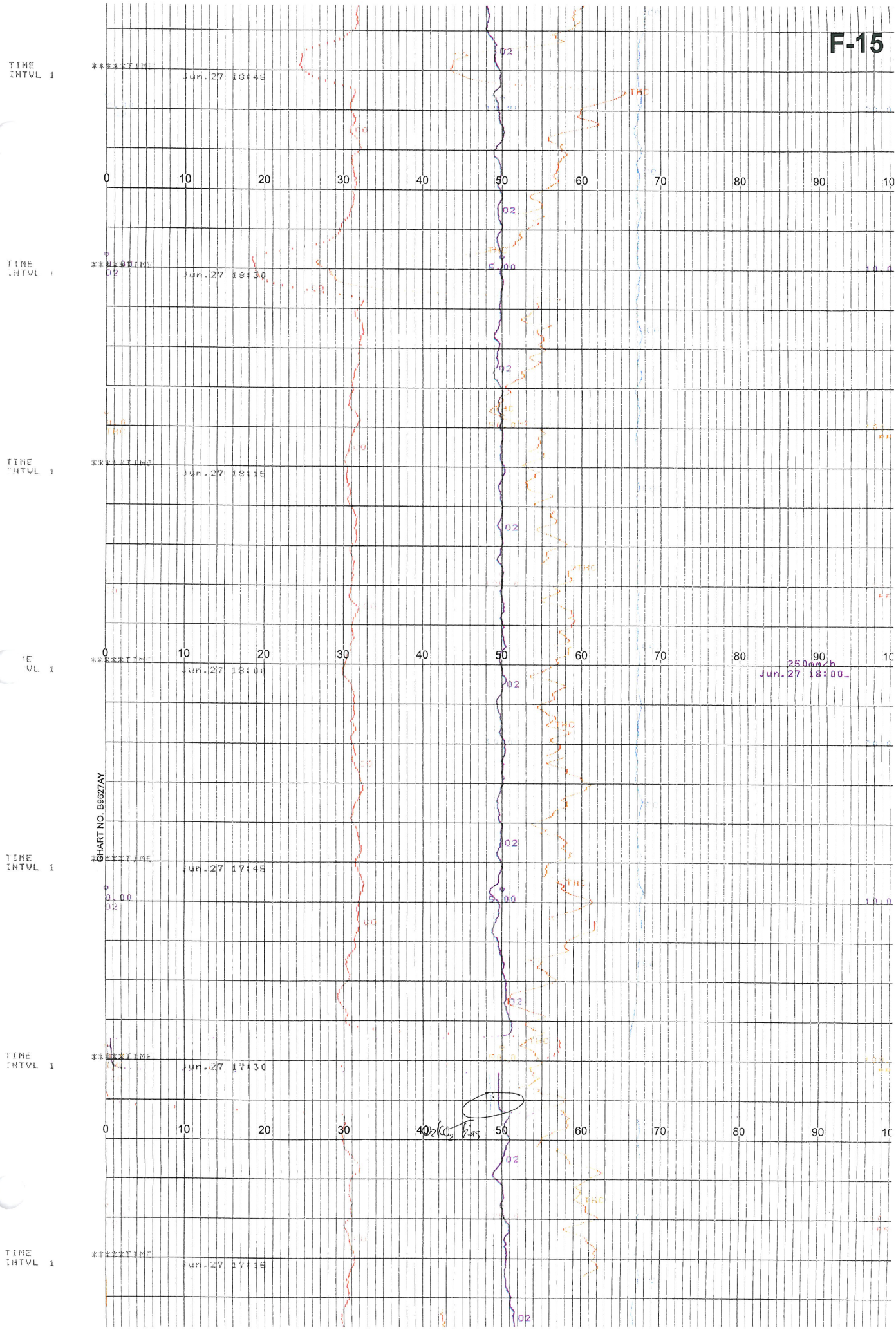
CHART NO. B9627AY
TIME INTVL 1
*****TIME
Jun.27 14:30
Jun.27 14:15
Jun.27 14:00
Jun.27 13:45
Jun.27 13:30
250mm/h
Jun.27 14:00
0
10
20
30
40
50
60
70
80
90
100

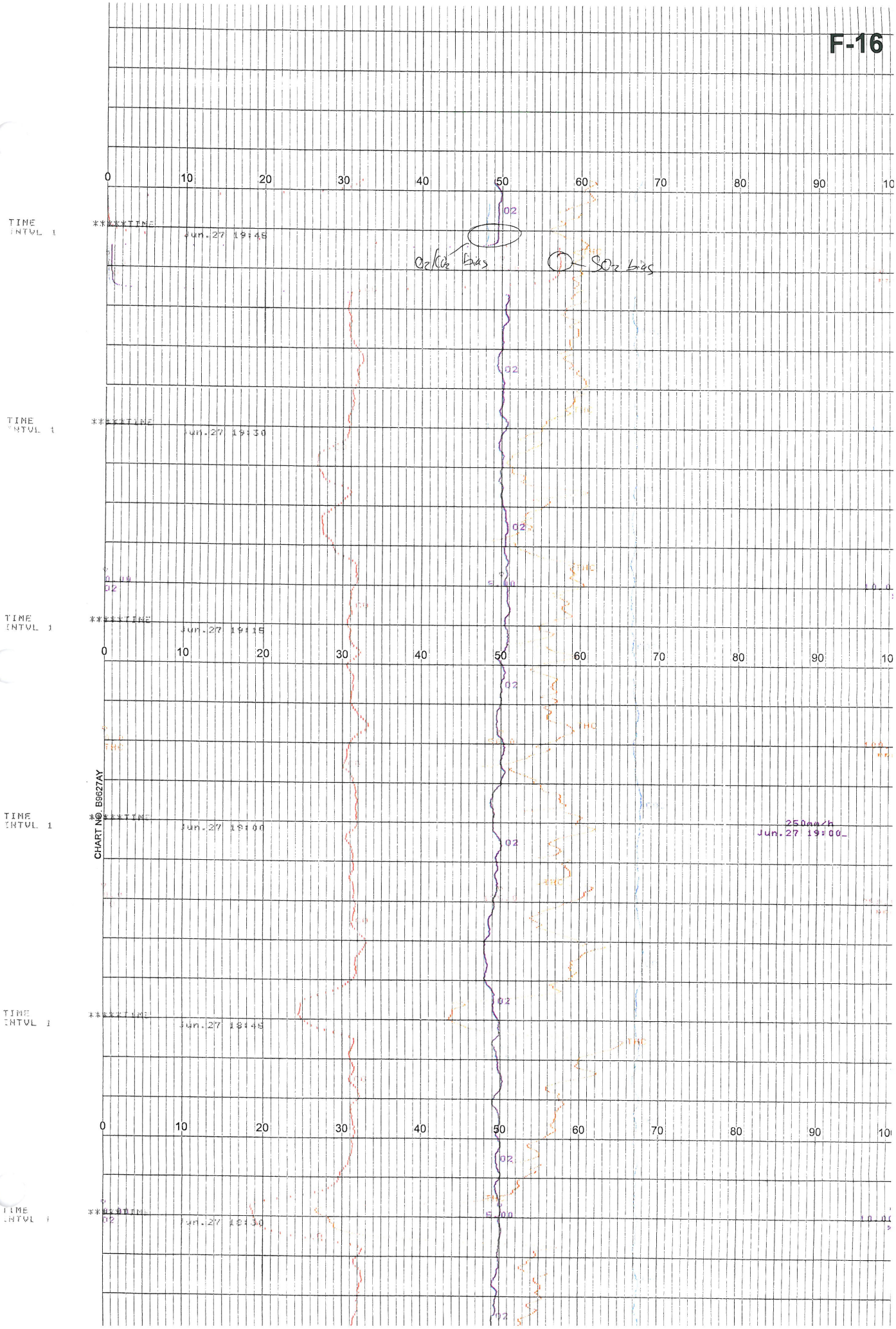
855


F-12
THC Mid
THC High
THC Zero
TIME
INTVL 1
*****TIME
Jun.27 15:00
250mm/h
Jun.27 15:00
DELTA 4-CEMS
TIME
INTVL 1
*****TIME
Jun.27 14:45
14:39 14:40 250mm/h
0
10
20
30
40
50
60
70
80
90
CHART NO. B9627AY

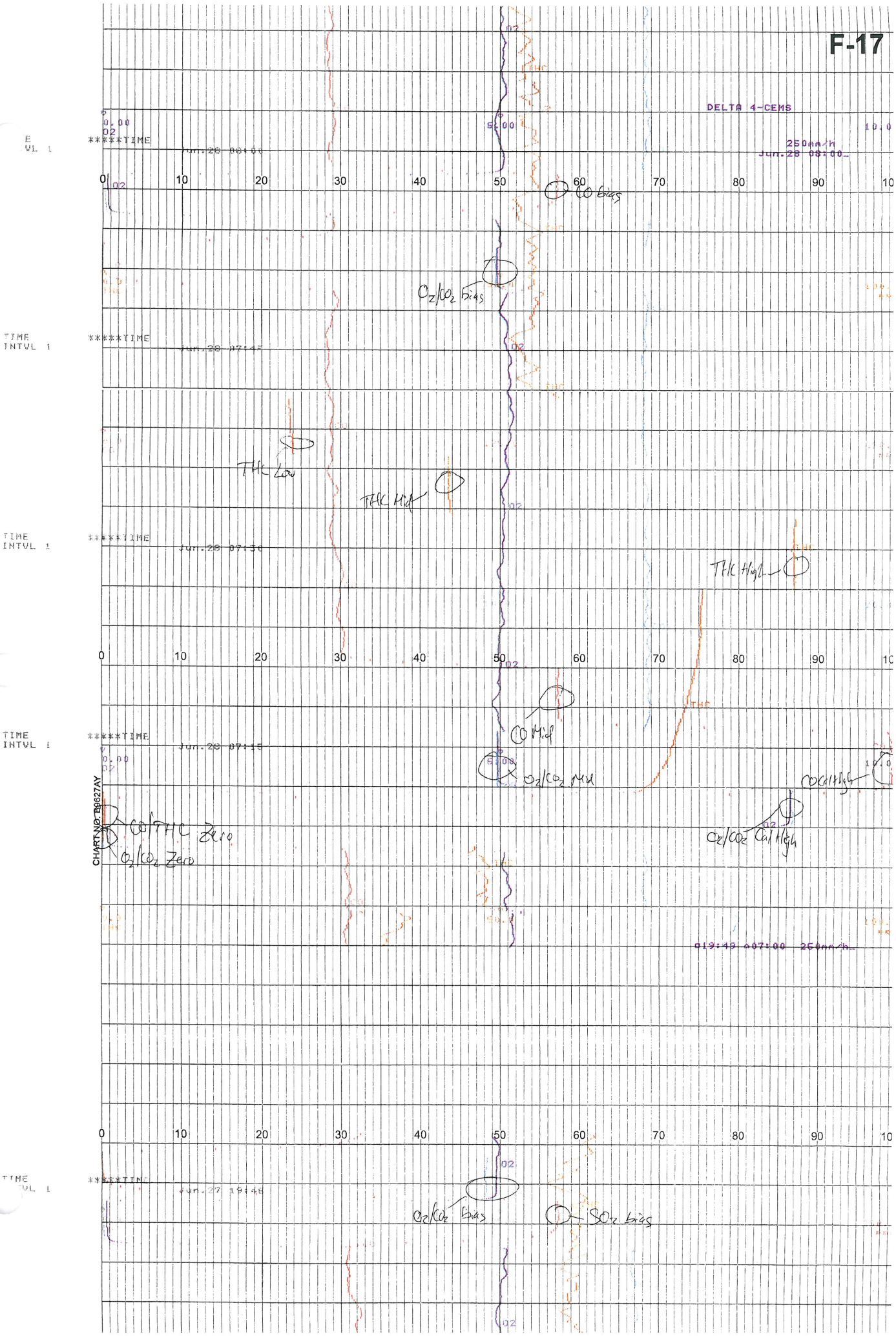

F-13
TIME INTVL 1
Jun.27 16:15
Jun.27 16:00
Jun.27 15:45
Jun.27 15:30
Jun.27 15:15
Jun.27 15:00
250mm/h
Jun.27 16:00
Jun.27 15:00
CHART NO. B9627AY
O2/CO2 bias
CO bias
THC Mid
THC High
THC Zero
DELTA 4-CEMS

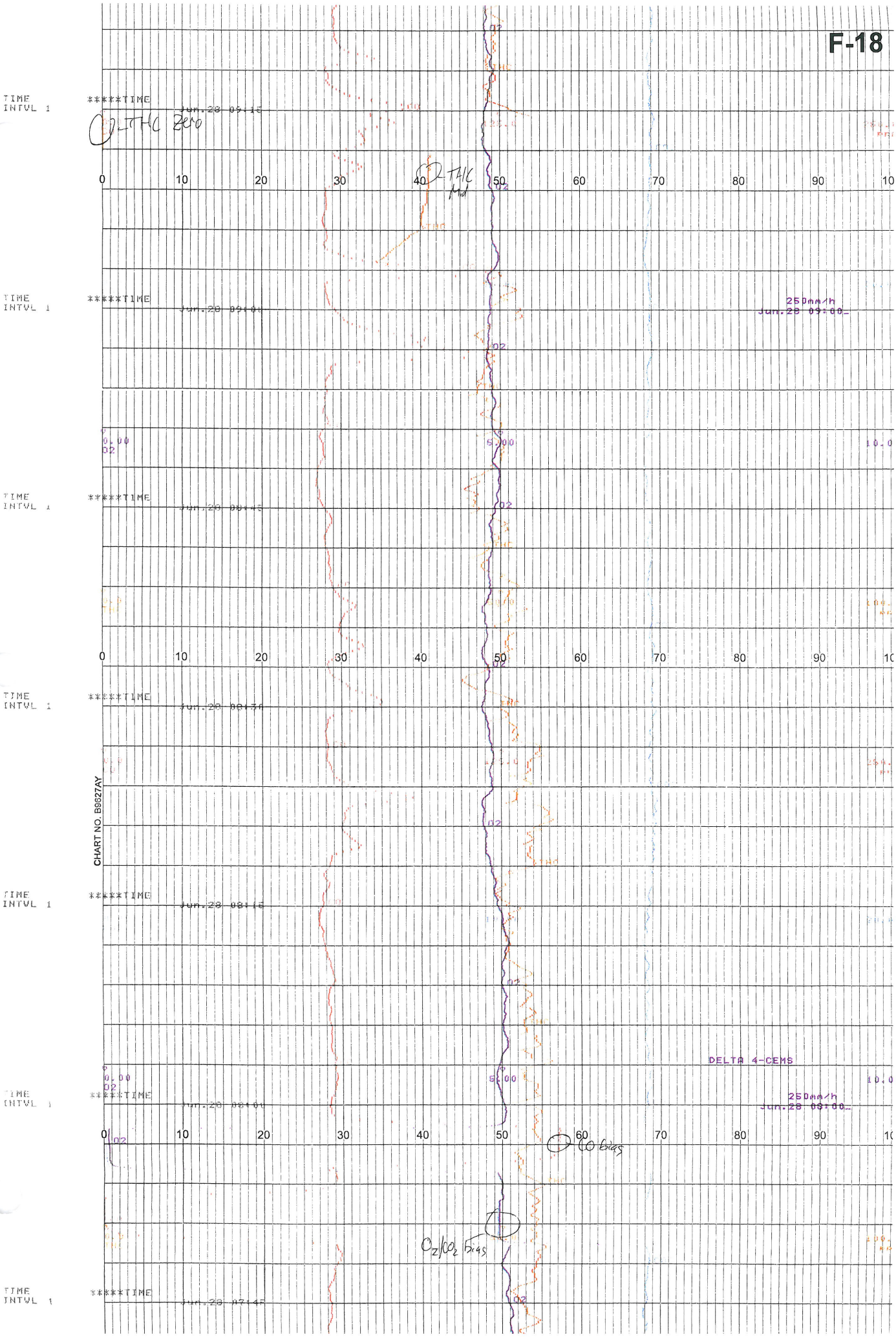

F-14
TIME INTVL 1
Jun.27 17:30
Jun.27 17:15
Jun.27 17:00
Jun.27 16:45
Jun.27 16:30
Jun.27 16:15
Jun.27 16:00
250mm/h
Jun.27 17:00
Jun.27 16:00
CHART NO. B9627AY
0 10 20 30 40 50 60 70 80 90 10
O2
THC
CO
0.00
5.00
10.0

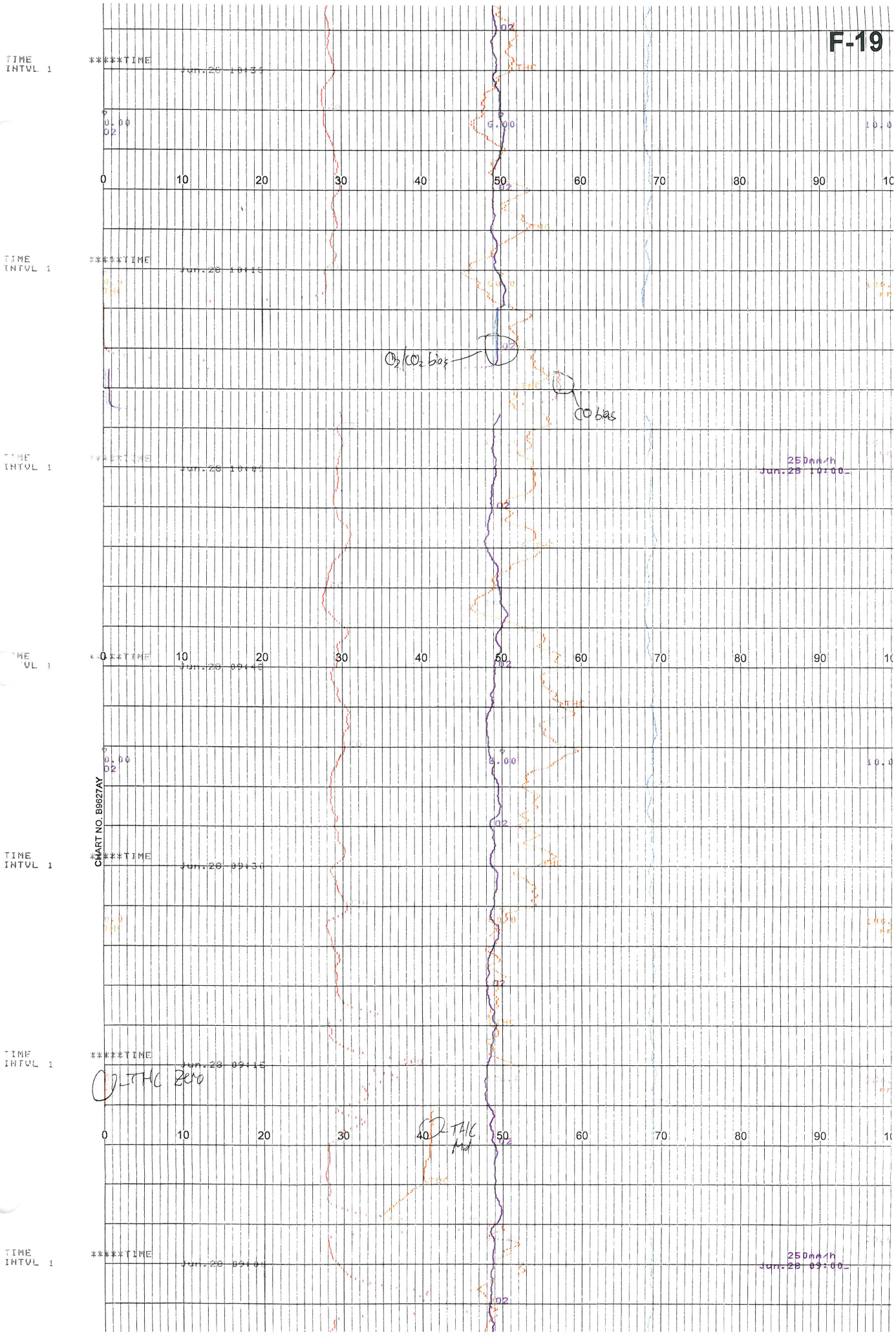

F-15
TIME
INTVL 1
Jun.27 18:45
Jun.27 18:30
Jun.27 18:15
Jun.27 18:00
Jun.27 17:45
Jun.27 17:30
Jun.27 17:15
250mm/h
Jun.27 18:00
CHART NO. B9627AY
0
10
20
30
40
50
60
70
80
90
10
02
THC
CO
5.00
10.0
0.00
$O_2$ $CO_2$ bias

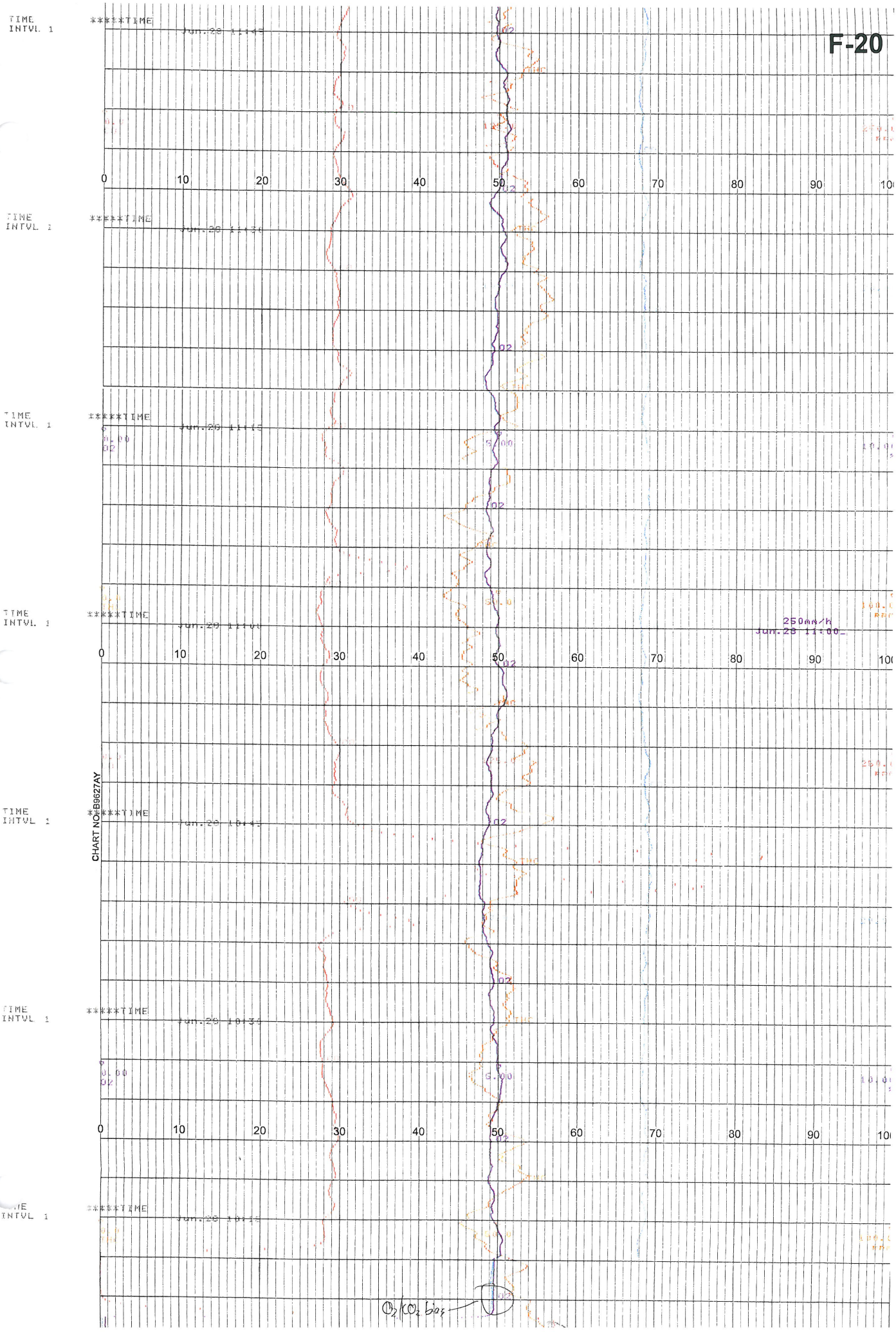

F-16
0 10 20 30 40 50 60 70 80 90 10
TIME INTVL 1
Jun.27 19:45
O2/CO2 bias
SO2 bias
Jun.27 19:30
Jun.27 19:15
Jun.27 19:00
250mm/h
Jun.27 19:00
Jun.27 18:45
Jun.27 18:30
CHART NO. B9627AY

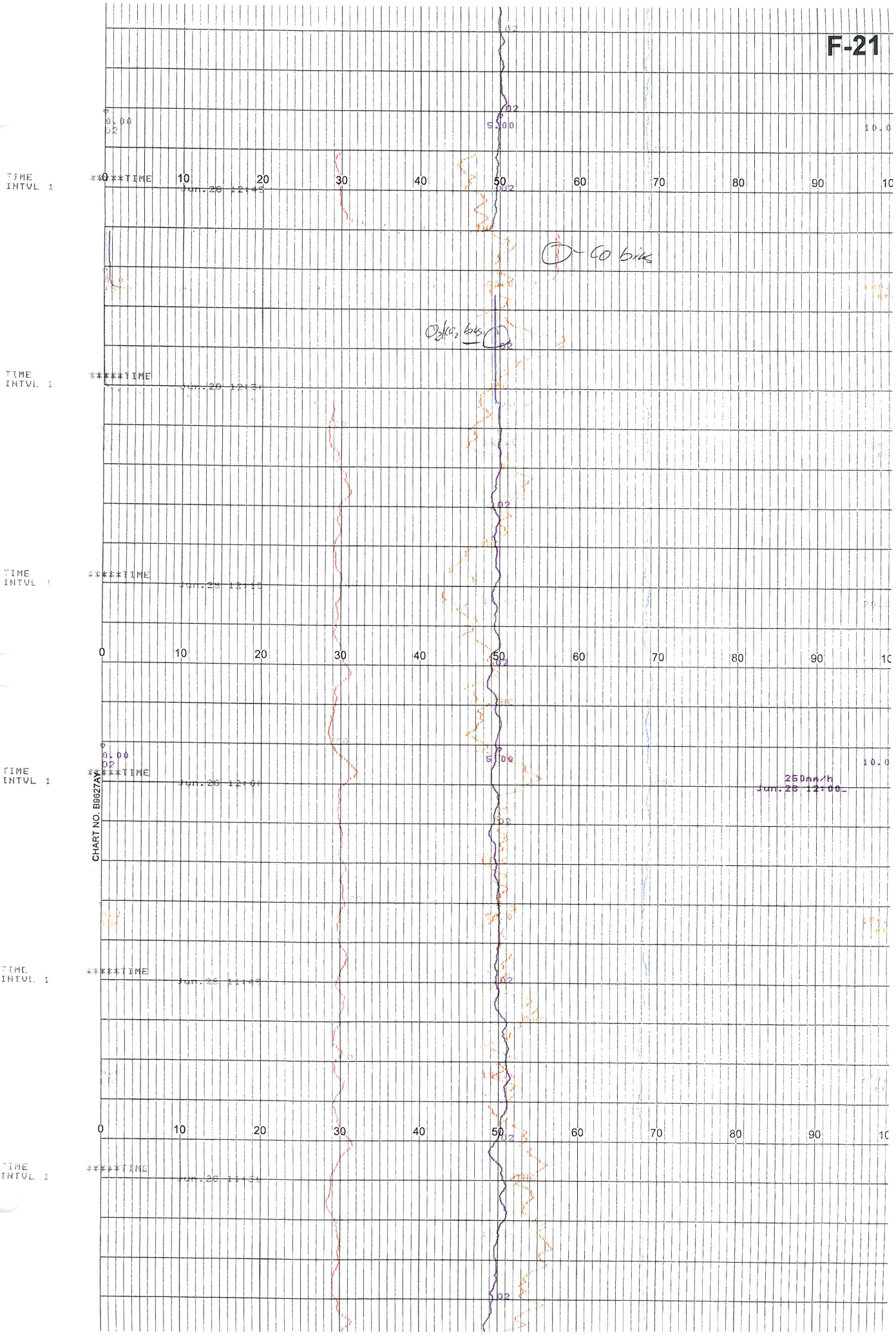
F-17


DELTA 4-CEMS
250mm/h
CO Bias
O2/CO2 Bias
THC Low
THC High
THC High
CO High
O2/CO2 Mid
CO Cal High
O2/CO2 Cal High
CO/THC Zero
O2/CO2 Zero
O2/CO2 Bias
SO2 Bias
CHART NO. B9627AY

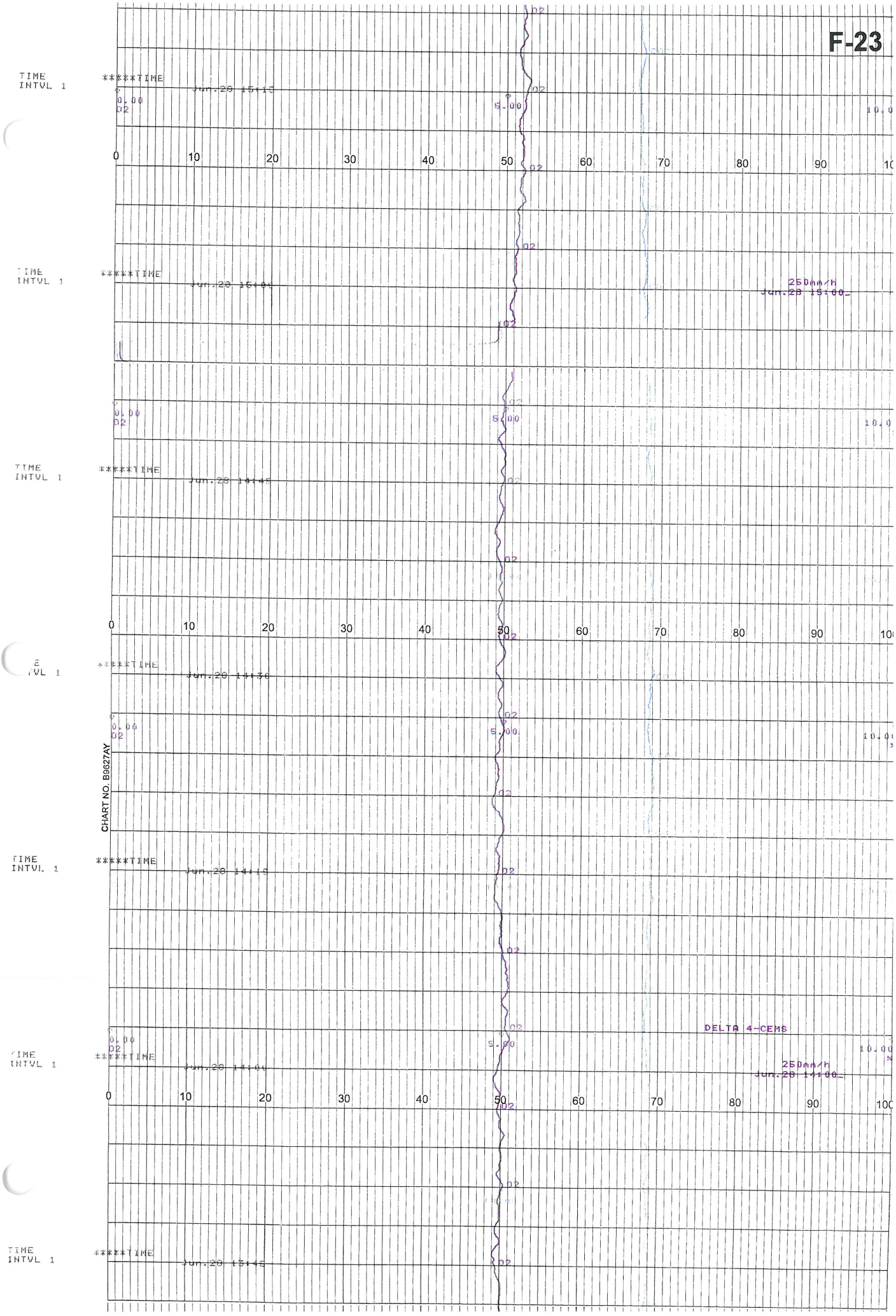

F-18
TIME INTVL 1
*****TIME
Jun.28 09:15
Jun.28 09:01
Jun.28 08:45
Jun.28 08:30
Jun.28 08:15
Jun.28 08:00
Jun.28 07:45
0 10 20 30 40 50 60 70 80 90 10
250mm/h
Jun.28 09:00
0.00
O2
5.00
10.0
CHART NO. B9627AY
DELTA 4-CEMS
THC Zero
THC Mid
CO bias
O2/CO2 bias

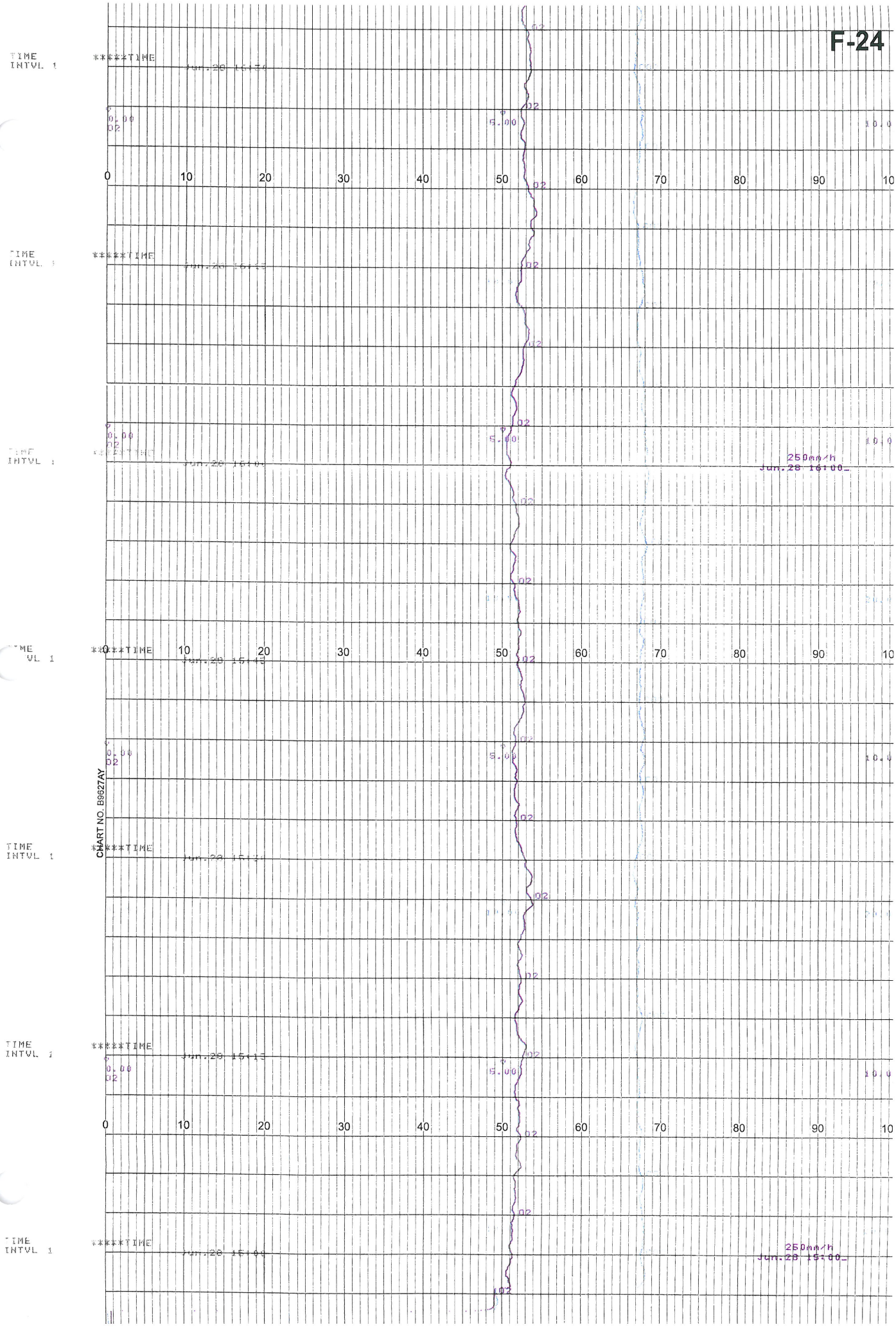

F-19
TIME
INTVL 1
*****TIME
Jun.28 10:30
Jun.28 10:15
Jun.28 10:00
Jun.28 09:45
Jun.28 09:30
Jun.28 09:15
Jun.28 09:00
0.00
O2
5.00
10.0
0
10
20
30
40
50
60
70
80
90
O2/CO2 bias
CO bias
250mm/h
Jun.28 10:00
CHART NO. B9627AY
THC Zero
THC Mid
250mm/h
Jun.28 09:00

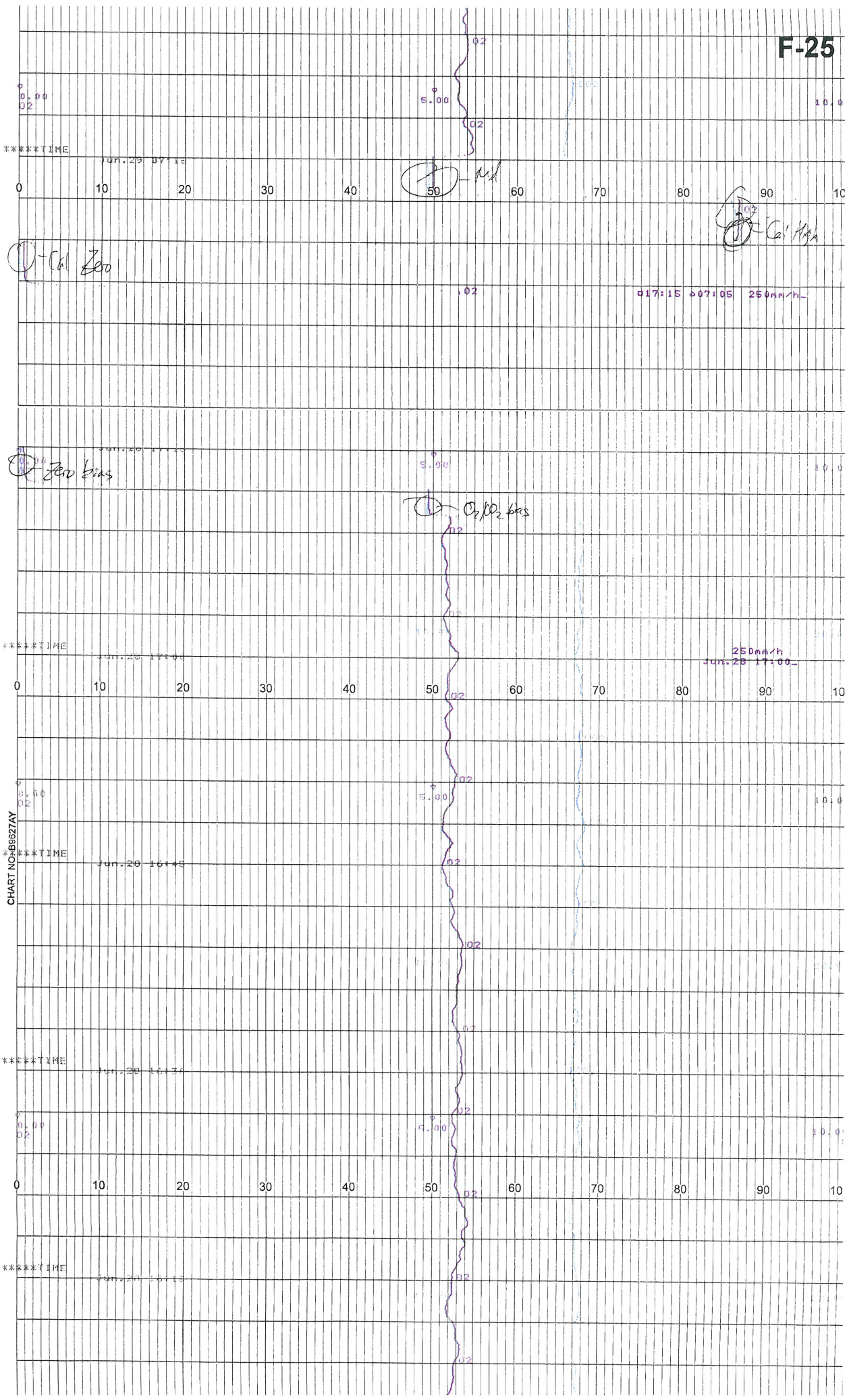

F-20
TIME INTVL 1
*****TIME
Jun.28 11:45
Jun.28 11:30
Jun.28 11:15
Jun.28 11:00
Jun.28 10:45
Jun.28 10:30
Jun.28 10:15
0 10 20 30 40 50 60 70 80 90 100
O2
250mm/h
Jun.28 11:00
CHART NO.B9627AY
O2/CO2 bias

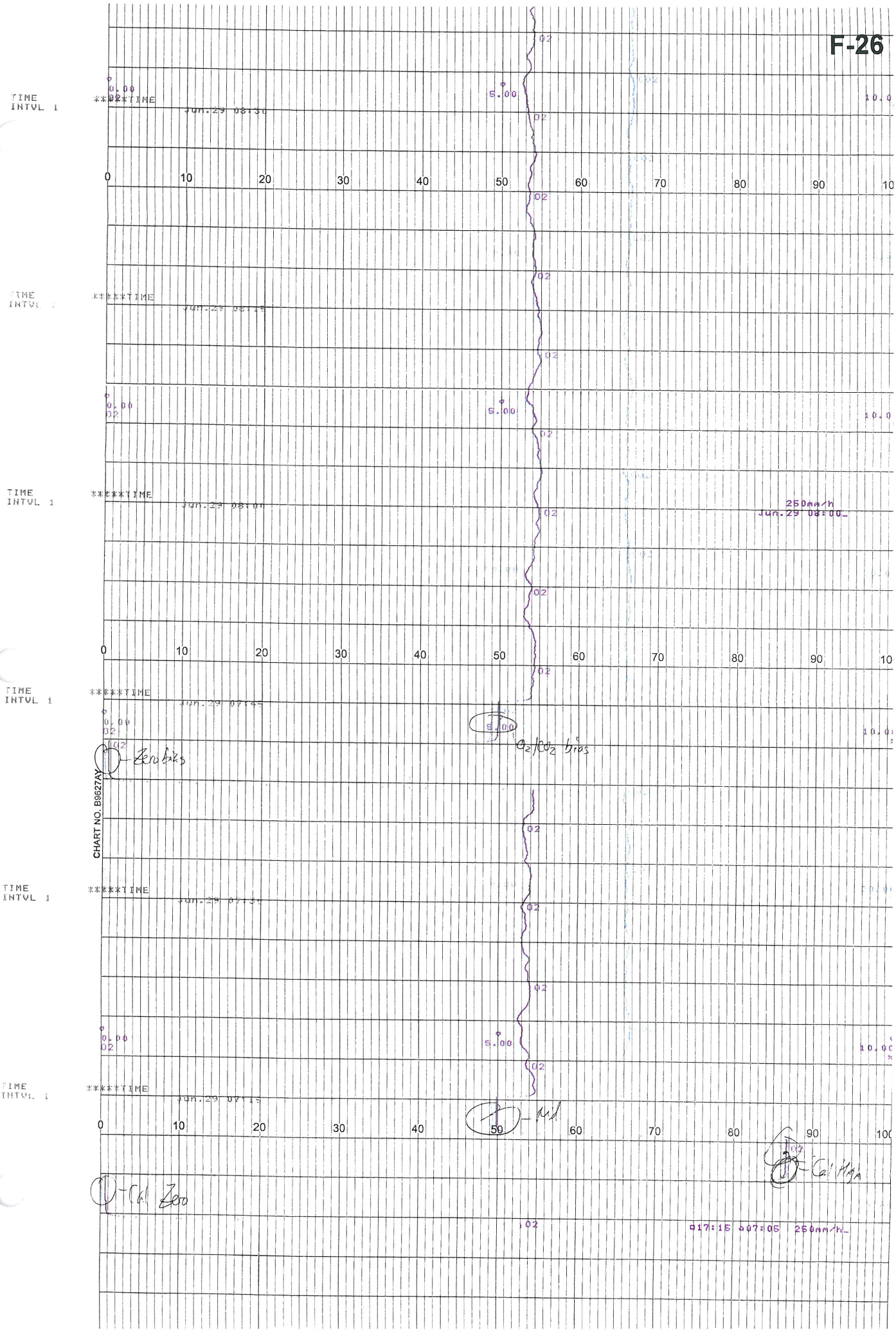

F-21
TIME
INTVL 1
*****TIME
Jun.28 12:45
Jun.28 12:30
Jun.28 12:15
Jun.28 12:00
Jun.28 11:45
Jun.28 11:30
0.00
5.00
10.0
0
10
20
30
40
50
60
70
80
90
CO bias
O2/CO2 bias
250mm/h
Jun.28 12:00
CHART NO. B9627AY

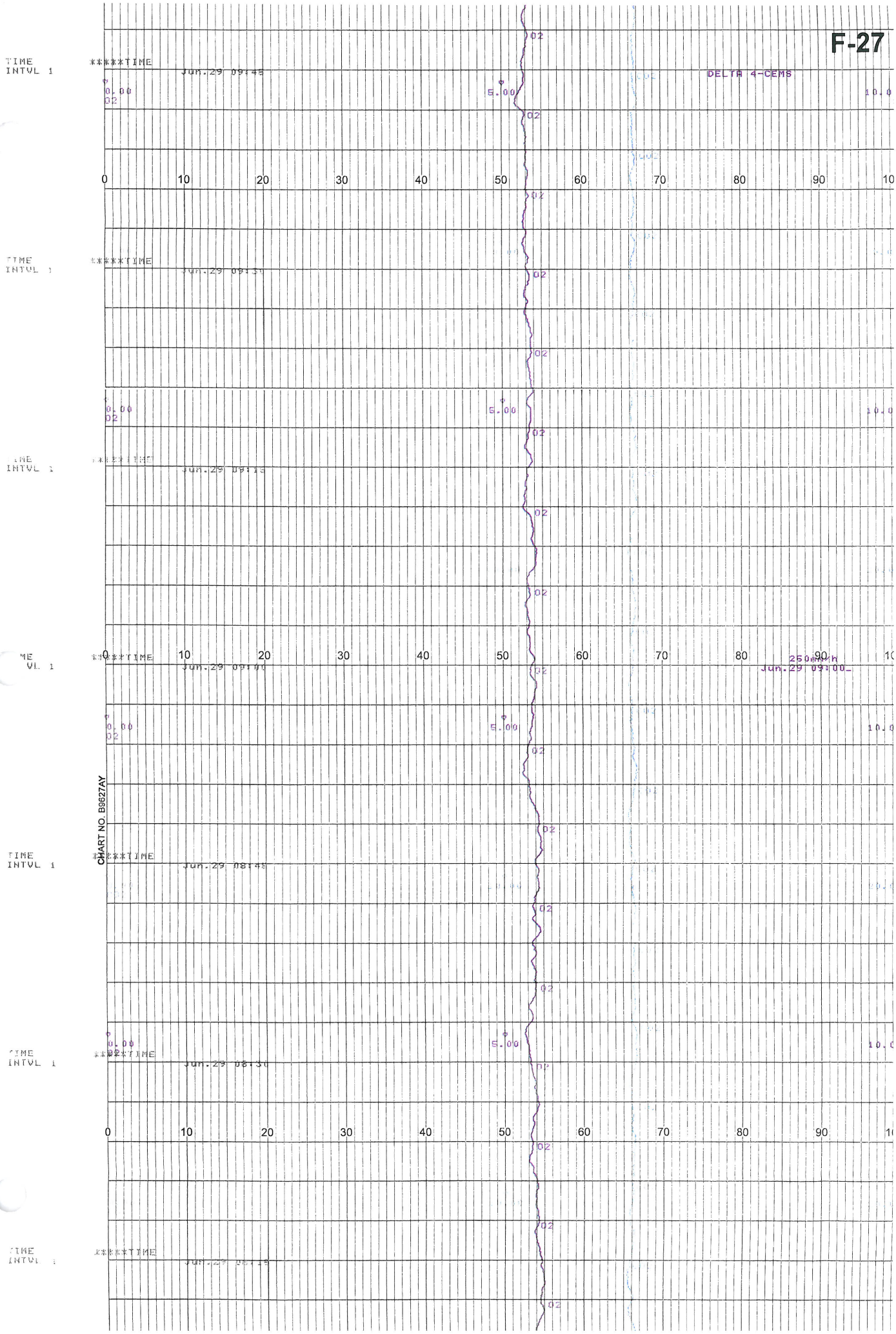
F-22
DELTA 4-CEMS
250mm/h
Jun.28 14:00
Jun.28 13:45
Jun.28 13:30
Jun.28 13:15
Jun.28 13:00
Jun.28 12:45
TIME
INTVL 1
CHART NO. B9627AY
0 10 20 30 40 50 60 70 80 90 10
CO bias
O2/CO2 bias

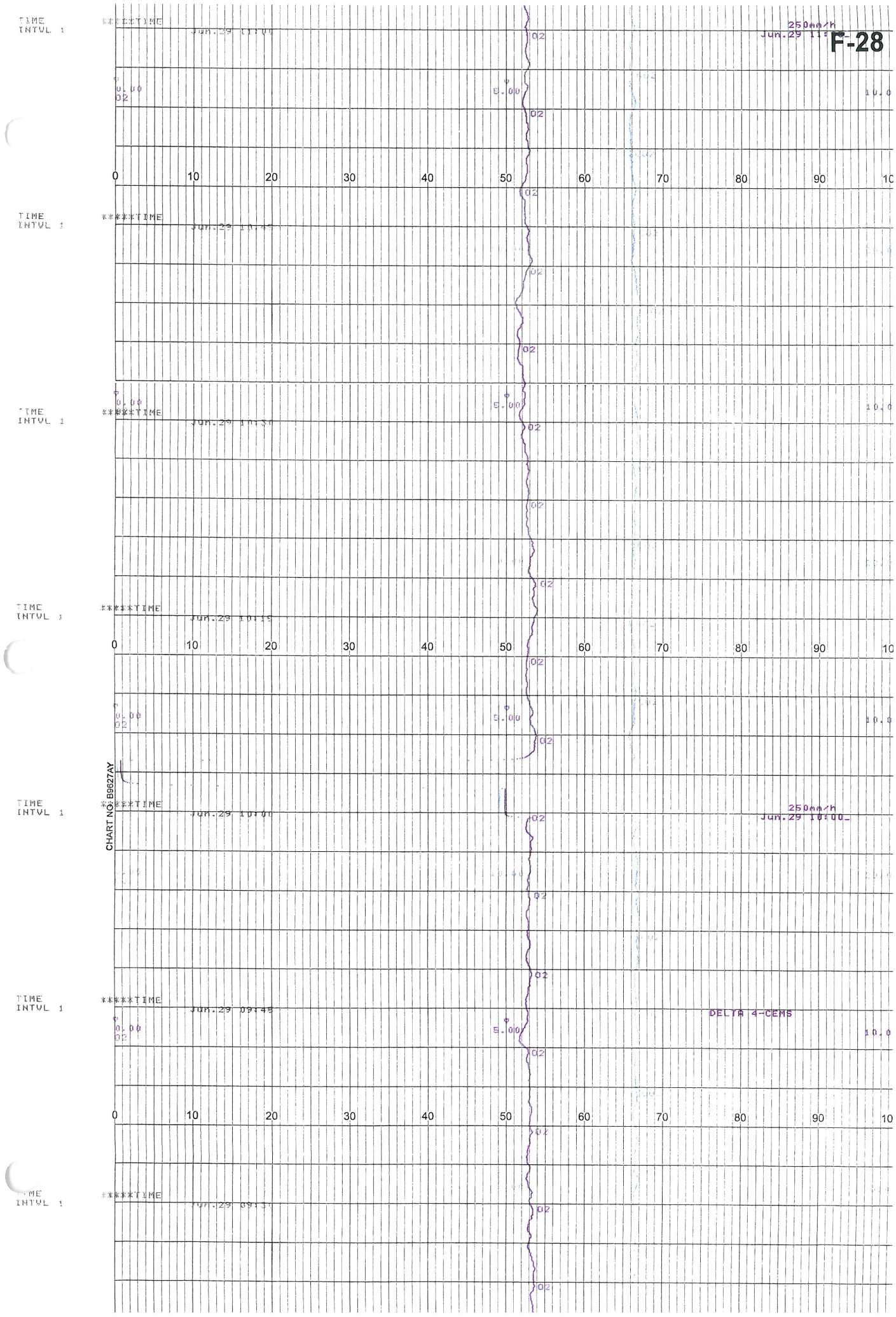

F-23
TIME INTVL 1
*****TIME
Jun.28 15:15
0.00
O2
5.00
10.0
0
10
20
30
40
50
60
70
80
90
100
TIME INTVL 1
*****TIME
Jun.28 15:05
250mm/h
Jun.28 15:00
TIME INTVL 1
*****TIME
Jun.28 14:45
TIME INTVL 1
*****TIME
Jun.28 14:30
CHART NO. B9627AY
TIME INTVL 1
*****TIME
Jun.28 14:15
DELTA 4-CEMS
TIME INTVL 1
*****TIME
Jun.28 14:00
250mm/h
Jun.28 14:00
TIME INTVL 1
*****TIME
Jun.28 13:45

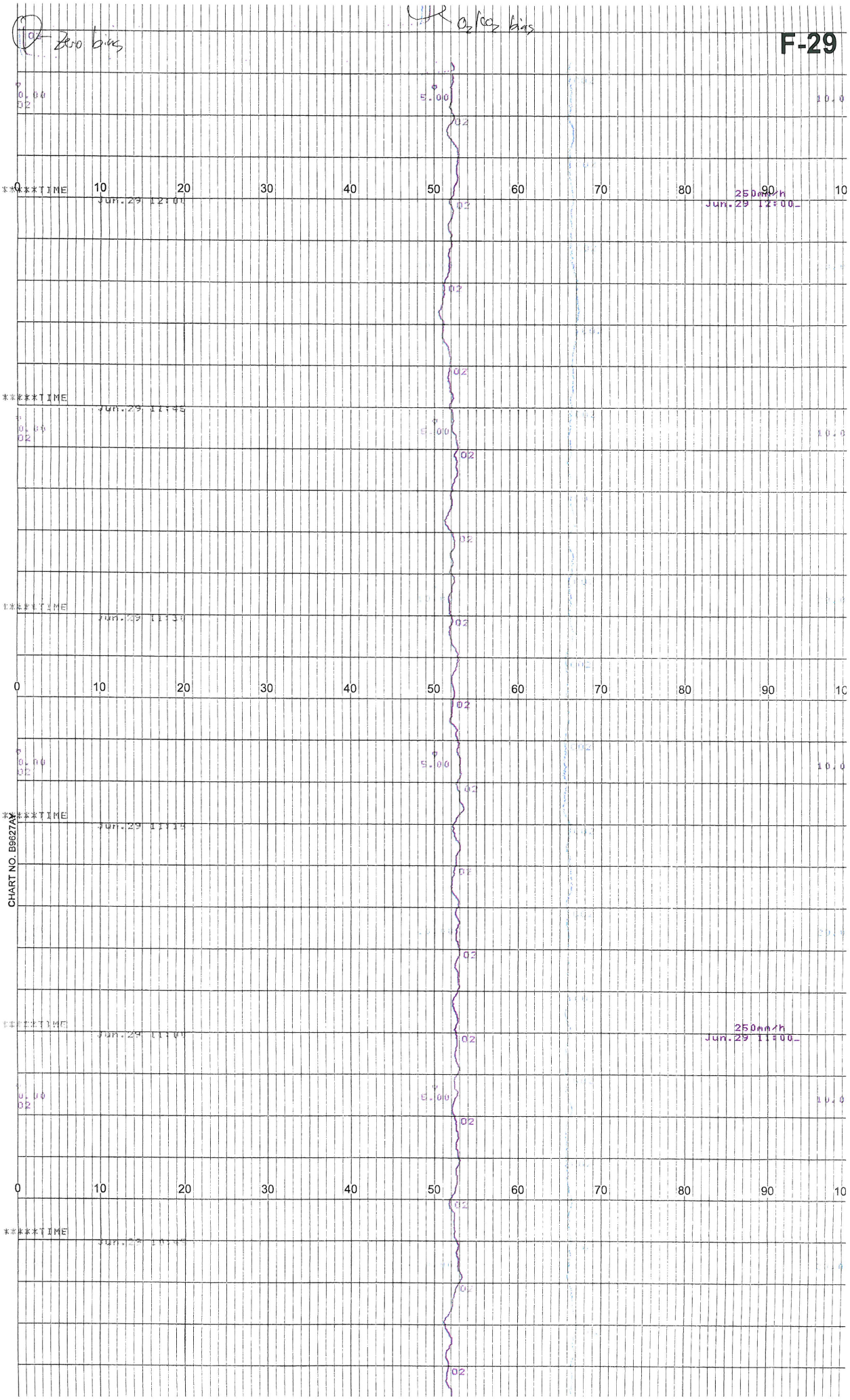

F-24
TIME
INTVL 1
*****TIME
0.00
5.00
10.0
0
10
20
30
40
50
60
70
80
90
250mm/h
Jun.28 16:00
CHART NO. B9627AY

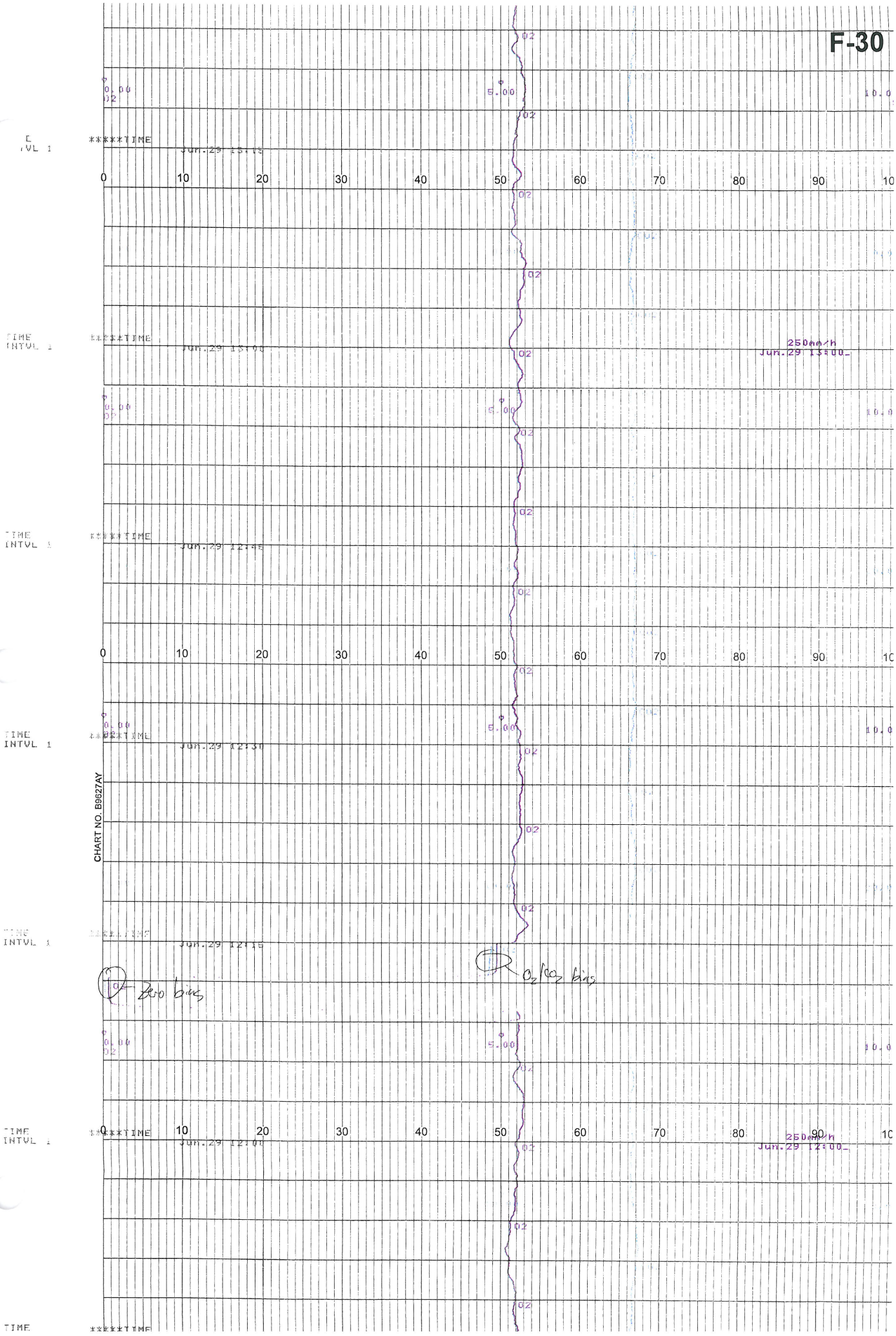

F-25
0.00
O2
5.00
10.0
*****TIME
Jun.29 07:15
0 10 20 30 40 50 60 70 80 90 10
Mid
Cal High
Cal Zero
O2
17:15 07:05 250mm/h
Zero bias
O2/CO2 bias
250mm/h
Jun.28 17:00
Jun.28 16:45
CHART NO.B9627AY

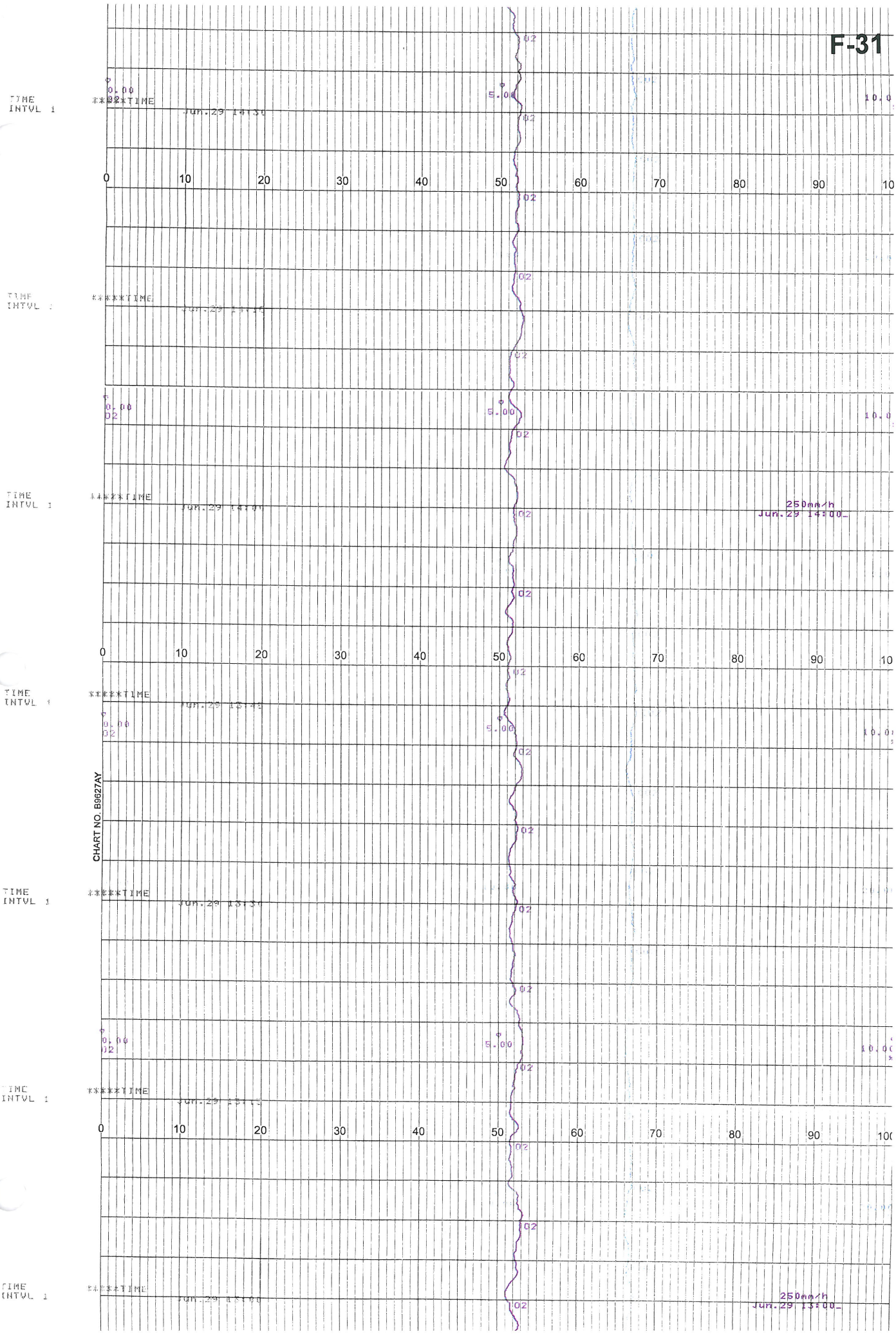

F-26
TIME
INTVL 1
*****TIME
Jun.29 08:30
0.00
5.00
10.0
0 10 20 30 40 50 60 70 80 90 10
TIME
INTVL 1
*****TIME
Jun.29 08:15
0.00
5.00
10.0
TIME
INTVL 1
*****TIME
Jun.29 08:00
250mm/h
Jun.29 08:00
0 10 20 30 40 50 60 70 80 90 10
TIME
INTVL 1
*****TIME
Jun.29 07:45
0.00
5.00
O2/CO2 bias
Zero bias
CHART NO. B9627AY
TIME
INTVL 1
*****TIME
Jun.29 07:30
0.00
5.00
10.00
TIME
INTVL 1
*****TIME
Jun.29 07:15
0 10 20 30 40 50 60 70 80 90 100
Mid
Cal High
Cal Zero
17:15 07:05 250mm/h

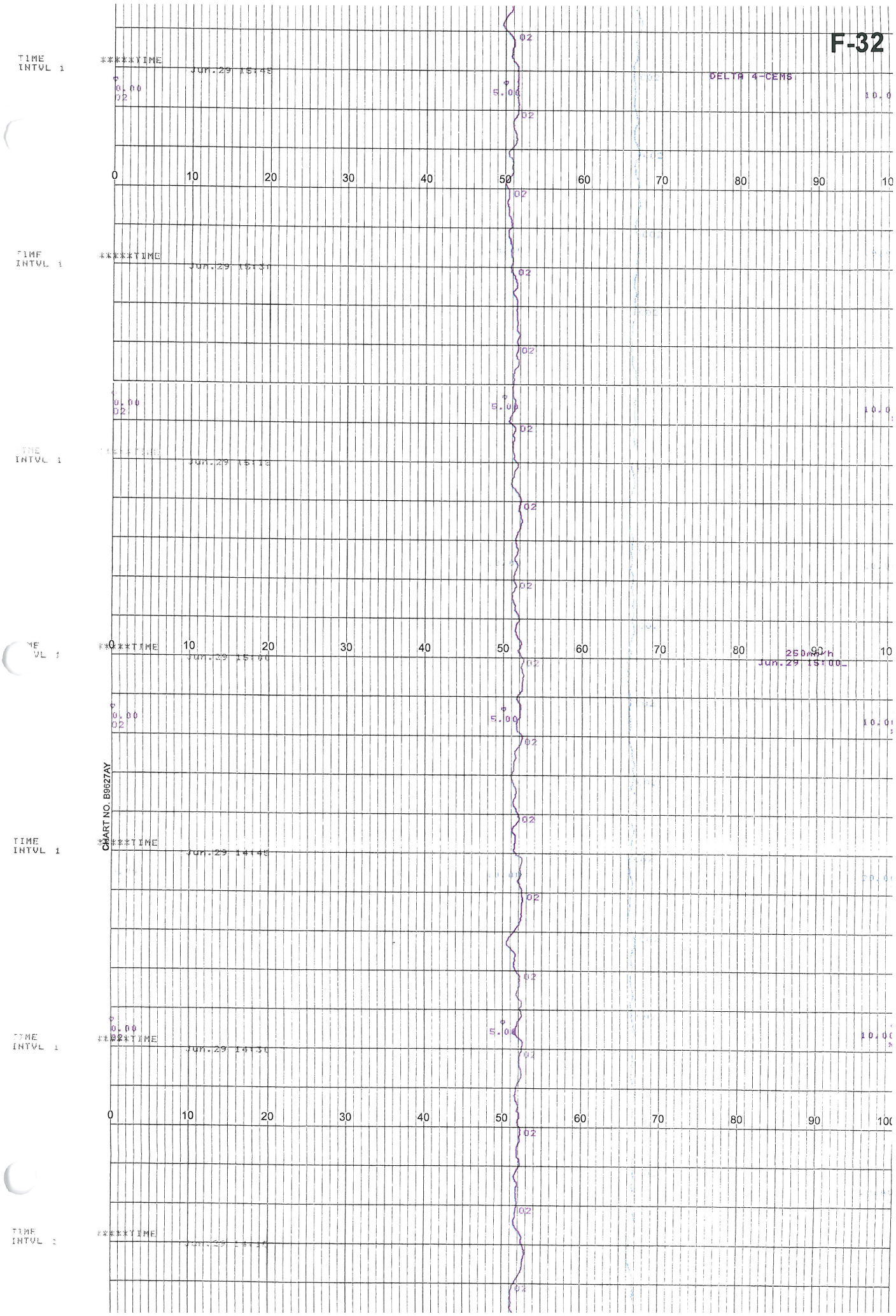

F-27
DELTA 4-CEMS
TIME INTVL 1
*****TIME
Jun.29 09:45
Jun.29 09:15
Jun.29 09:15
Jun.29 09:00
Jun.29 08:45
Jun.29 08:30
0.00
5.00
10.0
0 10 20 30 40 50 60 70 80 90
250mm/h
CHART NO. B9627AY

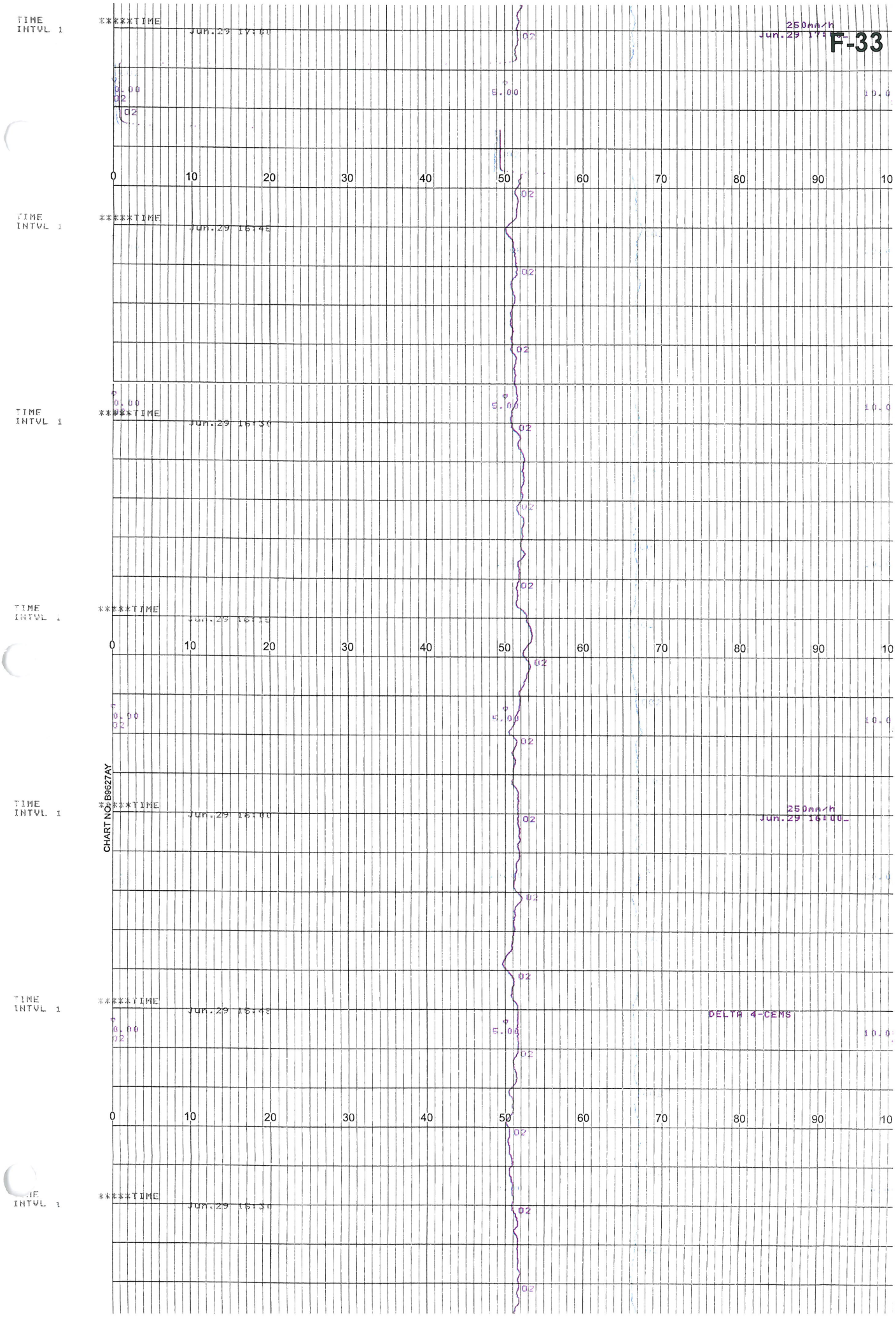

F-28
TIME
INTVL 1
*****TIME
Jun.29 11:00
250mm/h
Jun.29 11:
0.00
02
5.00
10.0
0
10
20
30
40
50
60
70
80
90
10
Jun.29 10:45
Jun.29 10:30
Jun.29 10:15
Jun.29 10:00
Jun.29 10:00
Jun.29 09:45
DELTA 4-CEMS
Jun.29 09:30
CHART NO: B9627AY

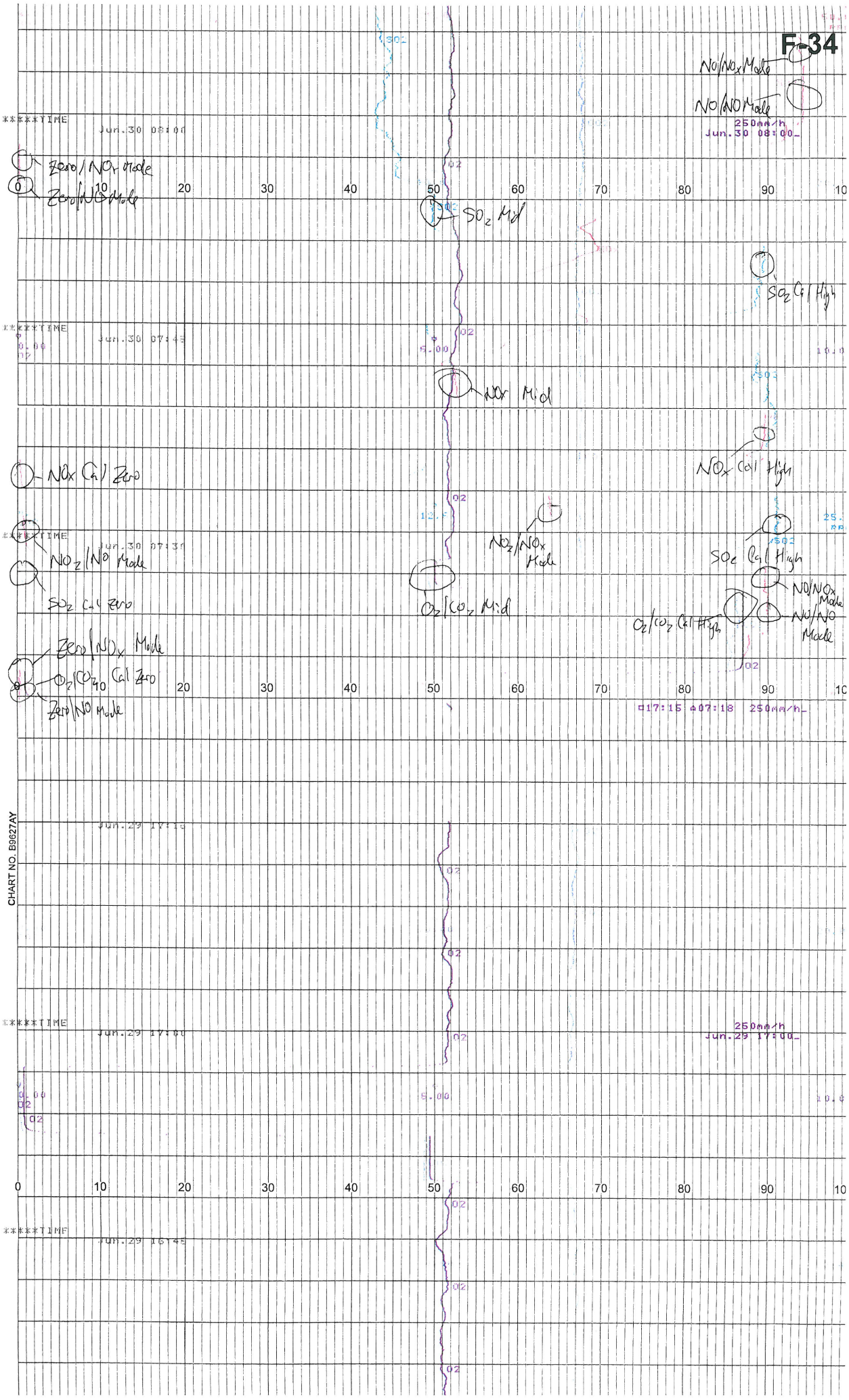

Zero bias
O2/CO2 bias
F-29
TIME
INTVL 1
*****TIME
Jun.29 12:00
250mm/h
Jun.29 12:00
Jun.29 11:45
Jun.29 11:30
Jun.29 11:15
Jun.29 11:00
Jun.29 10:45
0.00
5.00
10.0
O2
0
10
20
30
40
50
60
70
80
90
100
CHART NO. B9627A

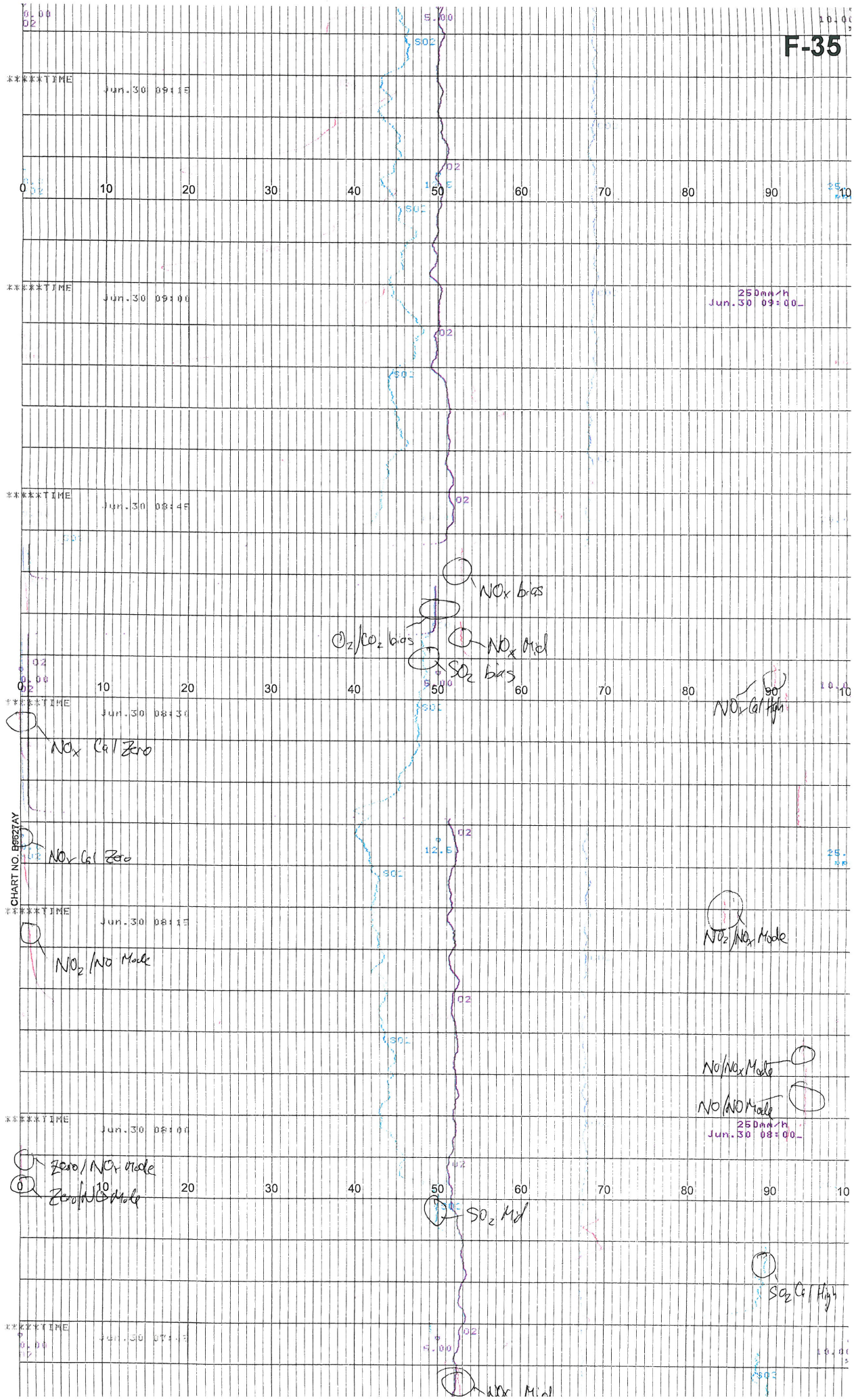

F-30
CHART NO. B9627AY
TIME INTVL 1
*****TIME
Jun.29 13:15
Jun.29 13:00
Jun.29 12:45
Jun.29 12:30
Jun.29 12:15
Jun.29 12:00
250mm/h
Jun.29 13:00
Jun.29 12:00
0 10 20 30 40 50 60 70 80 90 100
0.00
5.00
10.0
O2
Zero bias
O2/CO2 bias

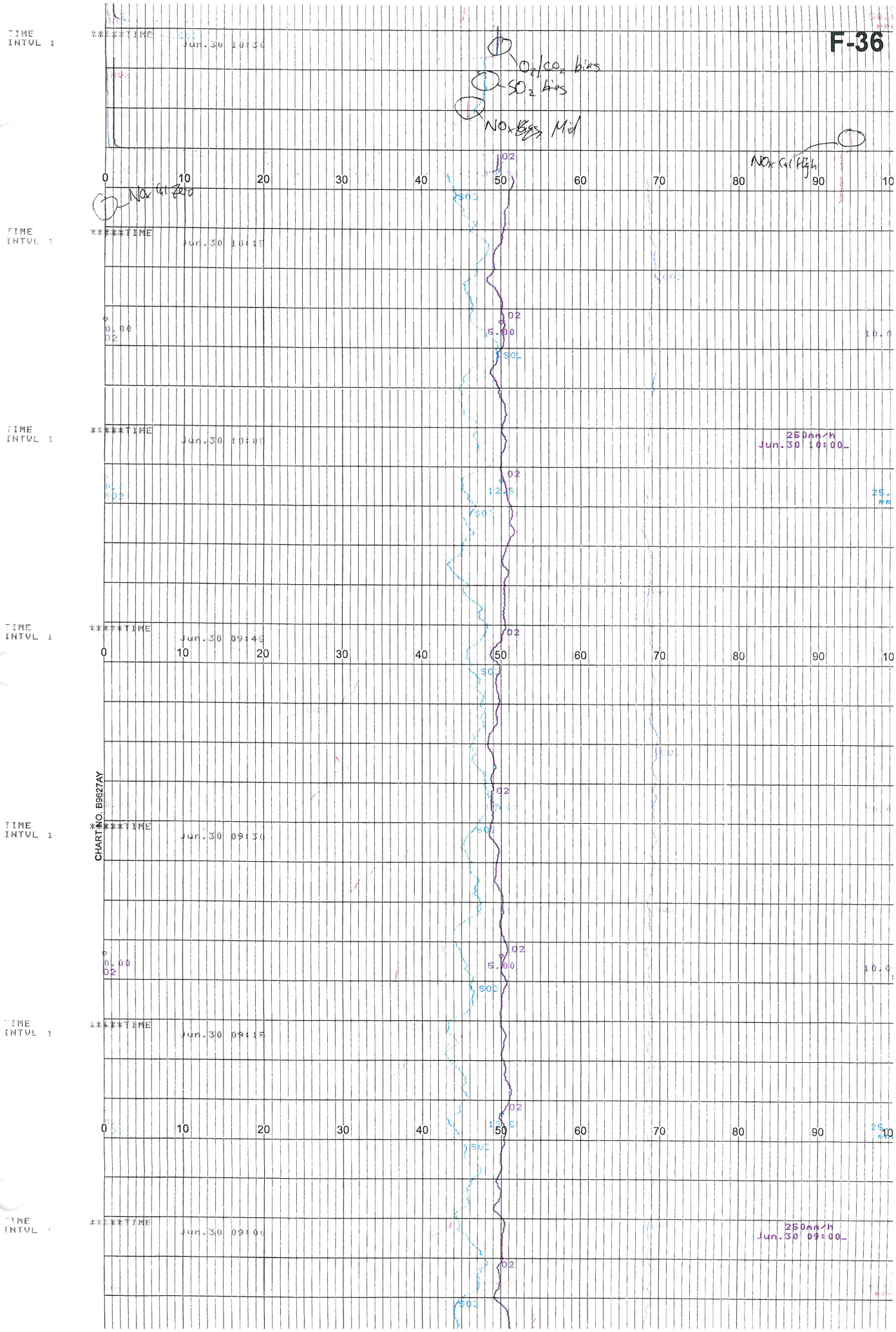

F-31
TIME INTVL 1
*****TIME
Jun.29 14:30
0.00
5.00
10.0
0 10 20 30 40 50 60 70 80 90 100
Jun.29 14:00
250mm/h
Jun.29 14:00
Jun.29 13:30
Jun.29 13:00
CHART NO. B9627AY

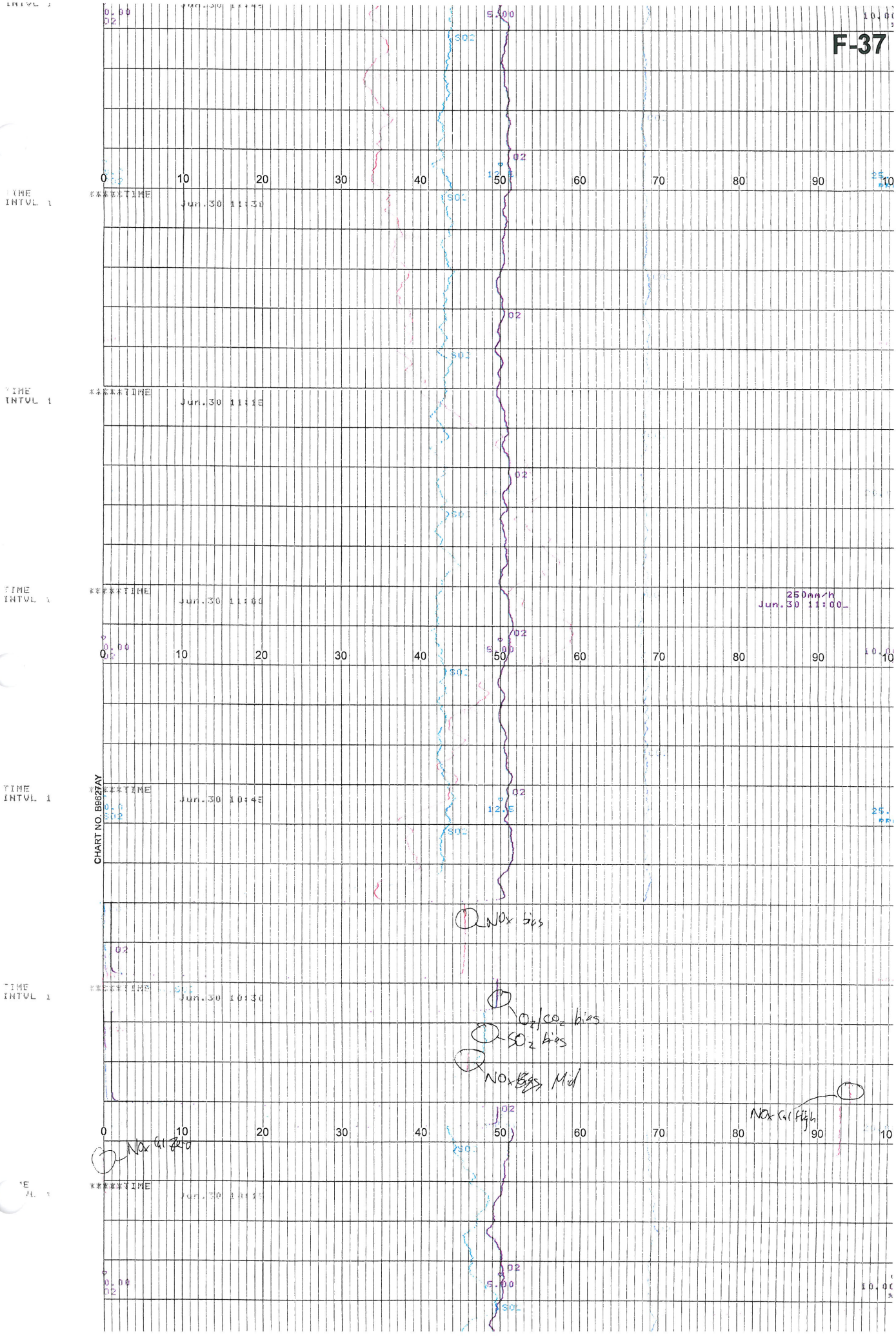

F-32
DELTA 4-CEMS
TIME
INTVL 1
*****TIME
Jun.29 15:45
Jun.29 15:30
Jun.29 15:15
Jun.29 15:00
Jun.29 14:45
Jun.29 14:30
0.00
5.00
10.0
0
10
20
30
40
50
60
70
80
90
100
250mm/h
CHART NO. B9627AY

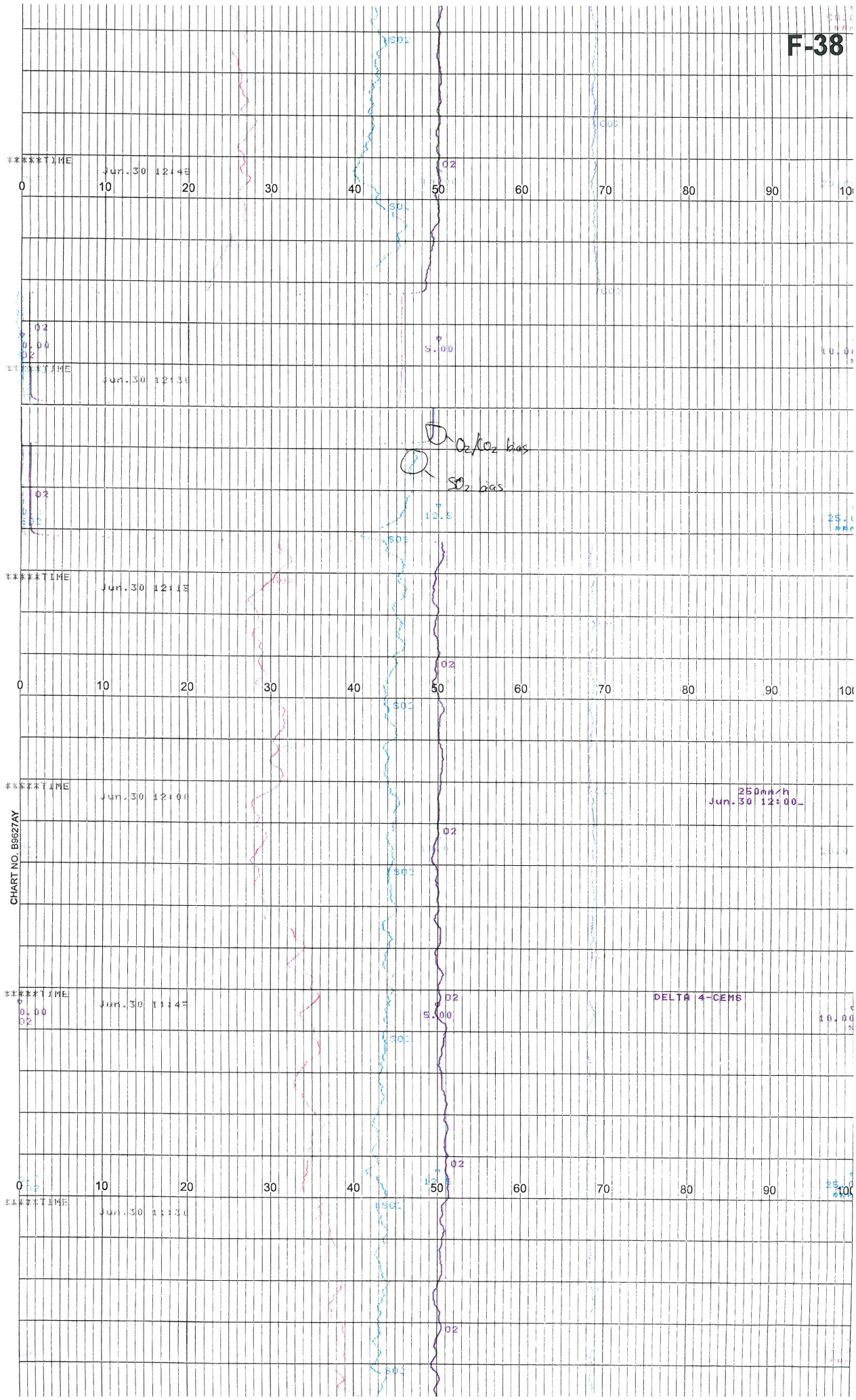

F-33
TIME
INTVL 1
*****TIME
Jun.29 17:00
250mm/h
Jun.29 17:
0.00
5.00
10.0
0
10
20
30
40
50
60
70
80
90
10
Jun.29 16:45
Jun.29 16:30
Jun.29 16:15
Jun.29 16:00
250mm/h
Jun.29 16:00
Jun.29 15:45
DELTA 4-CEMS
Jun.29 15:30
CHART NO.B9627AY

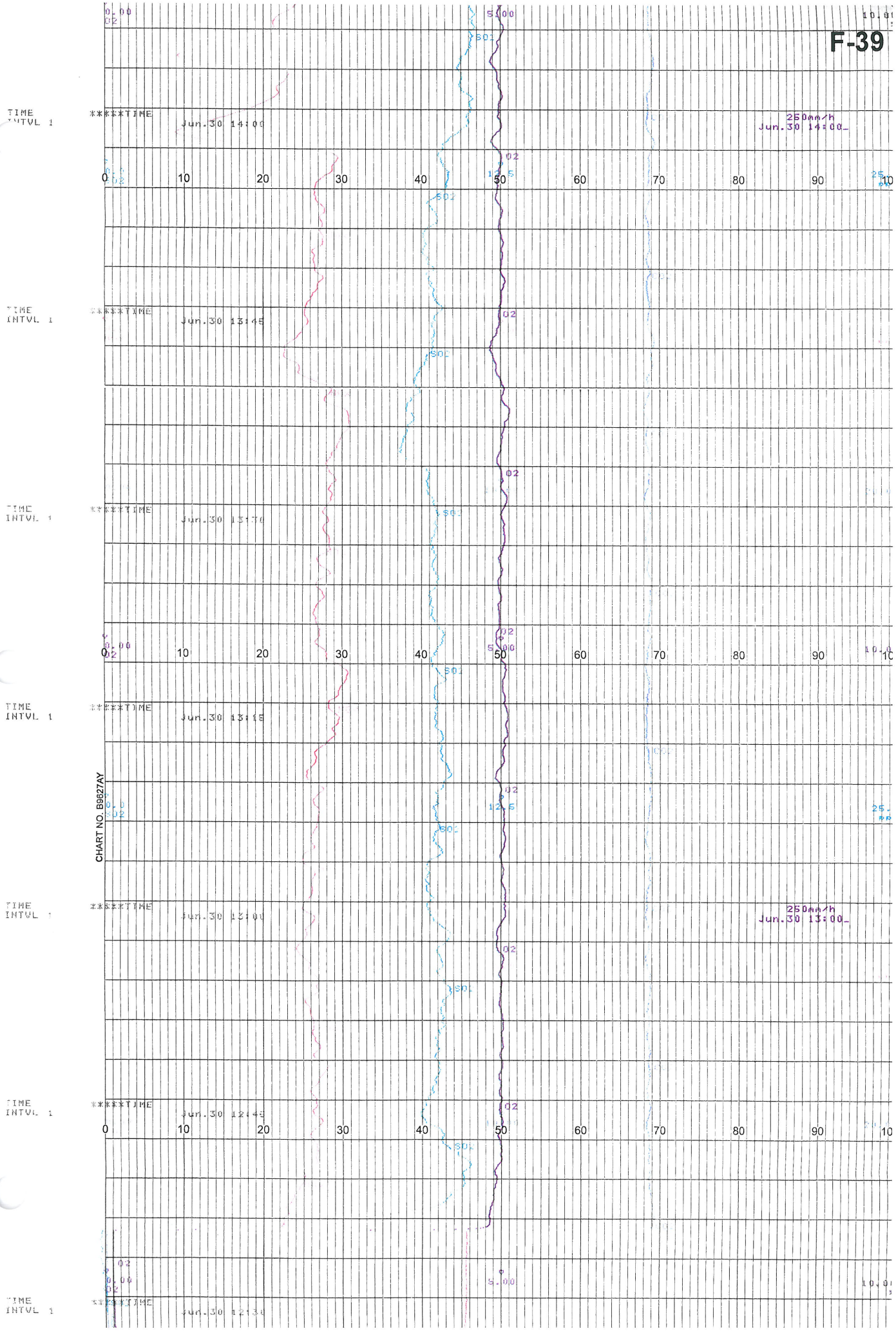

F-34
NO/NOx Mode
NO/NO Mode
250mm/h
Jun.30 08:00
Zero/NOx Mode
Zero/NO Mode
SO2 Mid
SO2 Cal High
Jun.30 07:42
NOx Mid
NOx Cal Zero
NOx Cal High
Jun.30 07:36
NO2/NO Mode
SO2 Cal Zero
NO2/NOx Mode
O2/CO2 Mid
SO2 Cal High
NO/NOx Mode
O2/CO2 Cal High
NO/NO Mode
Zero/NOx Mode
O2/CO2 Cal Zero
Zero/NO Mode
17:15 07:18 250mm/h
Jun.29 17:14
Jun.29 17:00
Jun.29 16:45
CHART NO. B9627AY

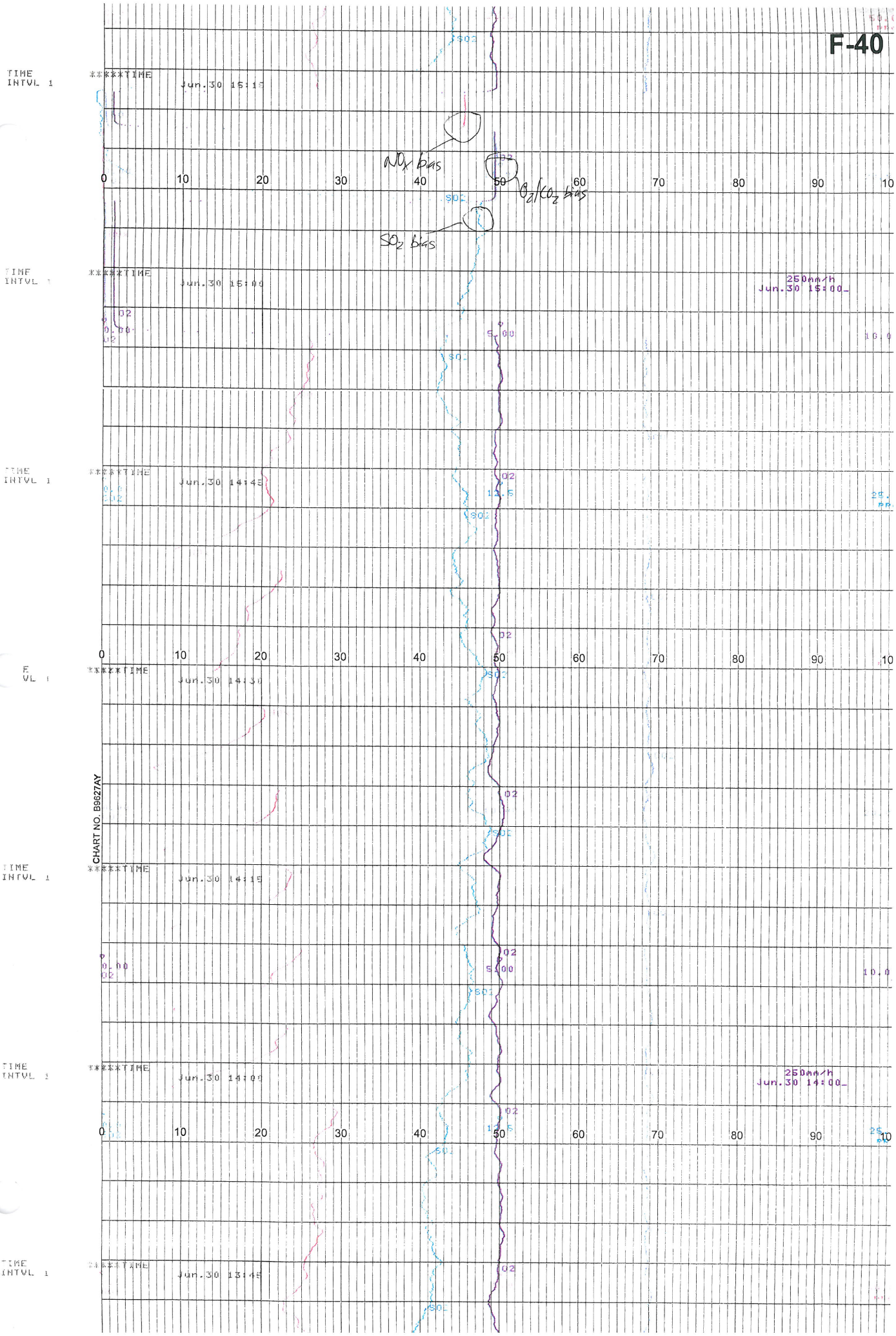

F-35
TIME INTVL 1
*****TIME
Jun.30 09:15
Jun.30 09:00
250mm/h
Jun.30 09:00
Jun.30 08:45
NOx bias
O2/CO2 bias
NOx Mid
SO2 bias
NOx Cal High
Jun.30 08:30
NOx Cal Zero
NOx Cal Zero
CHART NO. B9627AY
Jun.30 08:15
NO2/NO Mode
NO2/NOx Mode
NO/NOx Mode
NO/NO Mode
Jun.30 08:00
250mm/h
Jun.30 08:00
Zero/NOx Mode
Zero/NO Mode
SO2 Mid
SO2 Cal High
NOx Mid

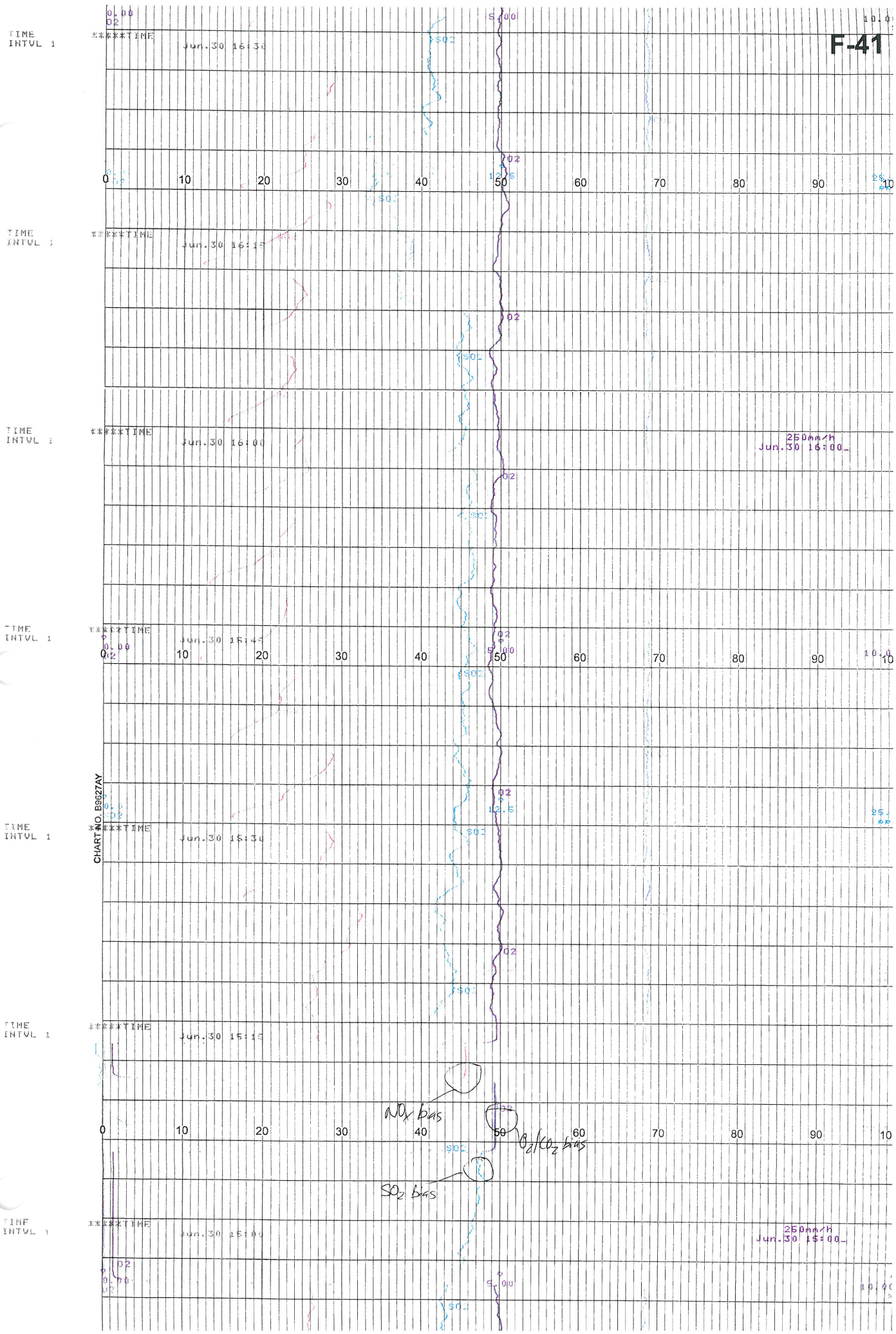

F-36
O2/CO2 bias
SO2 bias
NOx bias Mid
NOx Cal High
NOx Cal Zero
TIME INTVL 1
*****TIME
Jun.30 10:30
Jun.30 10:15
Jun.30 10:00
Jun.30 09:45
Jun.30 09:30
Jun.30 09:15
Jun.30 09:00
250mm/H
Jun.30 10:00
Jun.30 09:00
O2
SO2
CHART NO. B9627AY

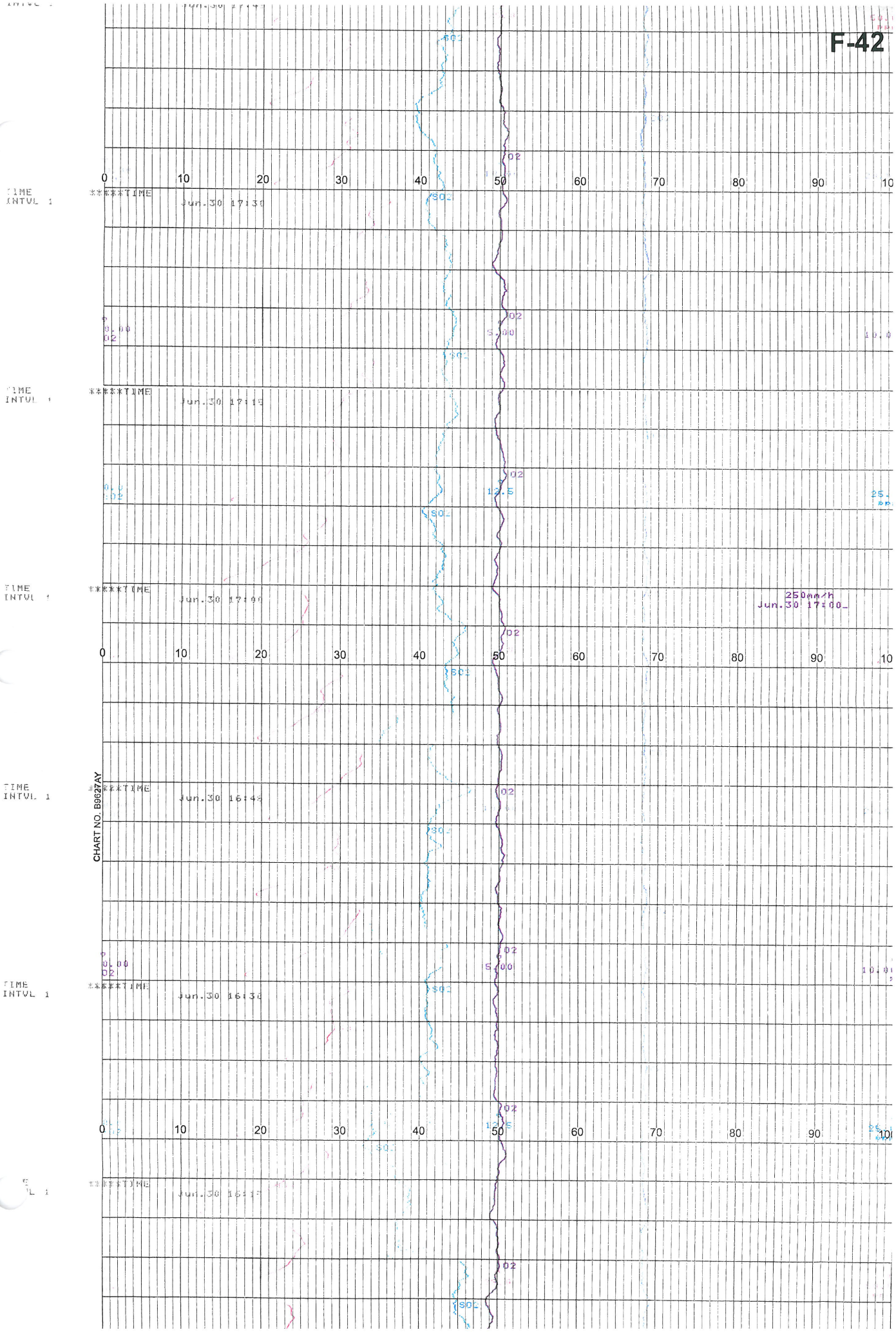

F-37
CHART NO. B9627AY
TIME
INTVL 1
Jun.30 11:30
Jun.30 11:15
Jun.30 11:00
Jun.30 10:45
Jun.30 10:30
250mm/h
Jun.30 11:00
NOx bias
O2/CO2 bias
SO2 bias
NOx Mid
NOx Cal High
NOx Cal Zero
0
10
20
30
40
50
60
70
80
90
10
5.00
12.5
25.

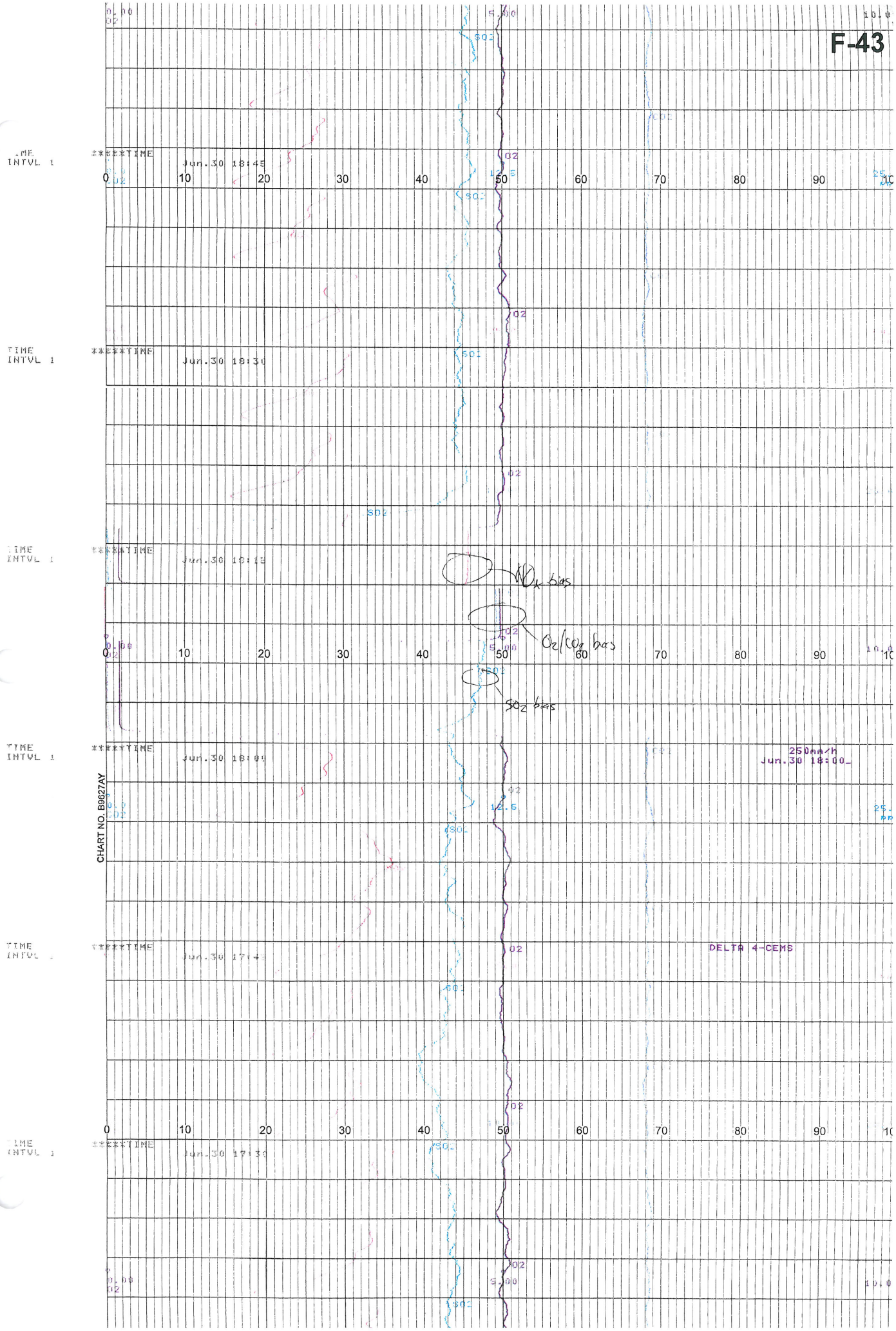

F-38
CHART NO. B9627AY
*****TIME
Jun.30 12:45
Jun.30 12:30
Jun.30 12:15
Jun.30 12:00
Jun.30 11:45
Jun.30 11:30
O2/CO2 bias
SO2 bias
250mm/h
Jun.30 12:00
DELTA 4-CEMS
0
10
20
30
40
50
60
70
80
90
100
SO2
O2
5.00
12.5

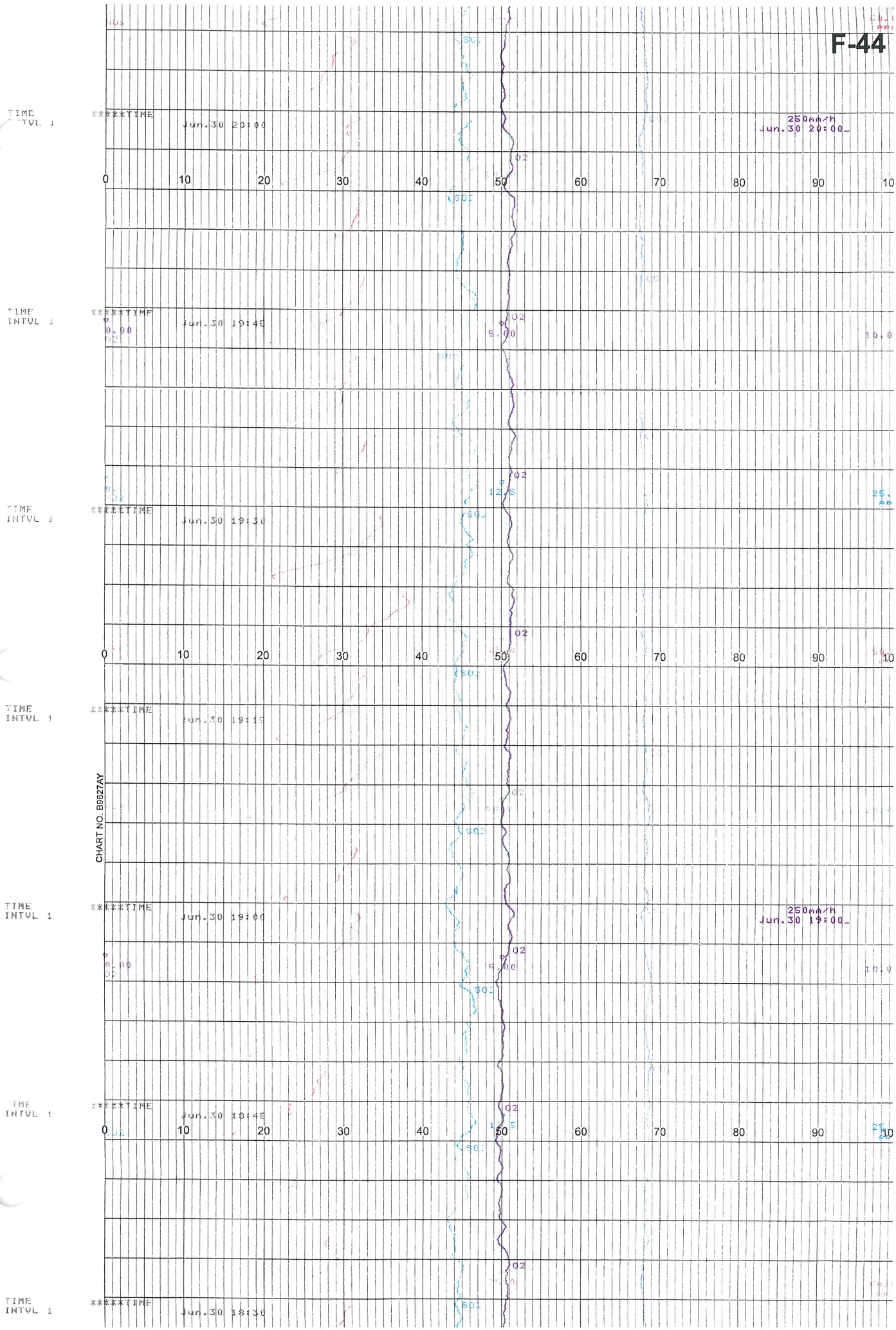

F-39
TIME INTVL 1
*****TIME
Jun.30 14:00
250mm/h
Jun.30 14:00
Jun.30 13:45
Jun.30 13:30
Jun.30 13:15
Jun.30 13:00
Jun.30 12:45
Jun.30 12:30
CHART NO. B9627AY
0
10
20
30
40
50
60
70
80
90
100

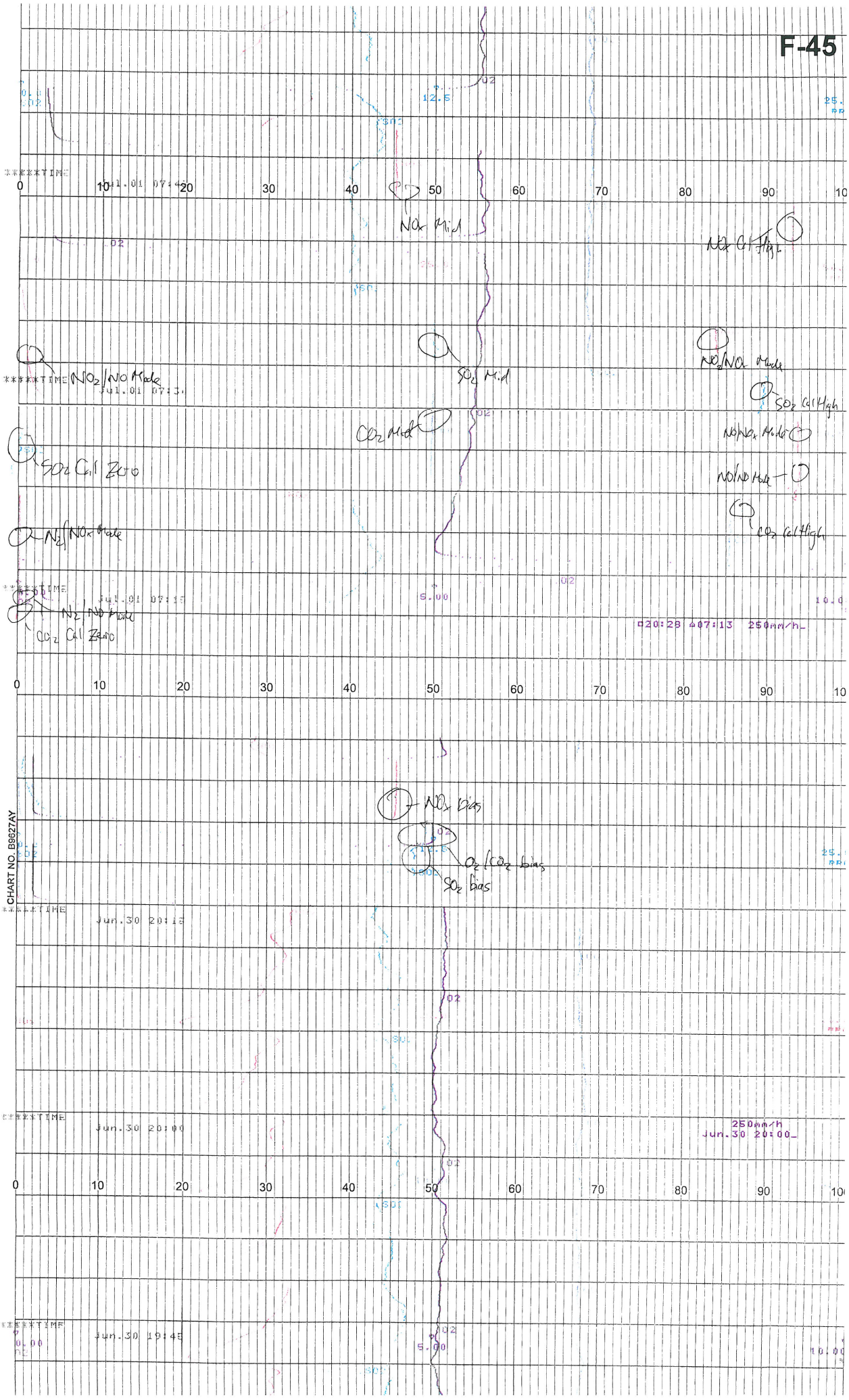

F-40
TIME INTVL 1
*****TIME
Jun.30 15:15
NOx bias
O2/CO2 bias
SO2 bias
Jun.30 15:00
250mm/h
Jun.30 15:00
Jun.30 14:45
Jun.30 14:30
Jun.30 14:15
Jun.30 14:00
Jun.30 13:45
CHART NO. B9627AY
0
10
20
30
40
50
60
70
80
90
100

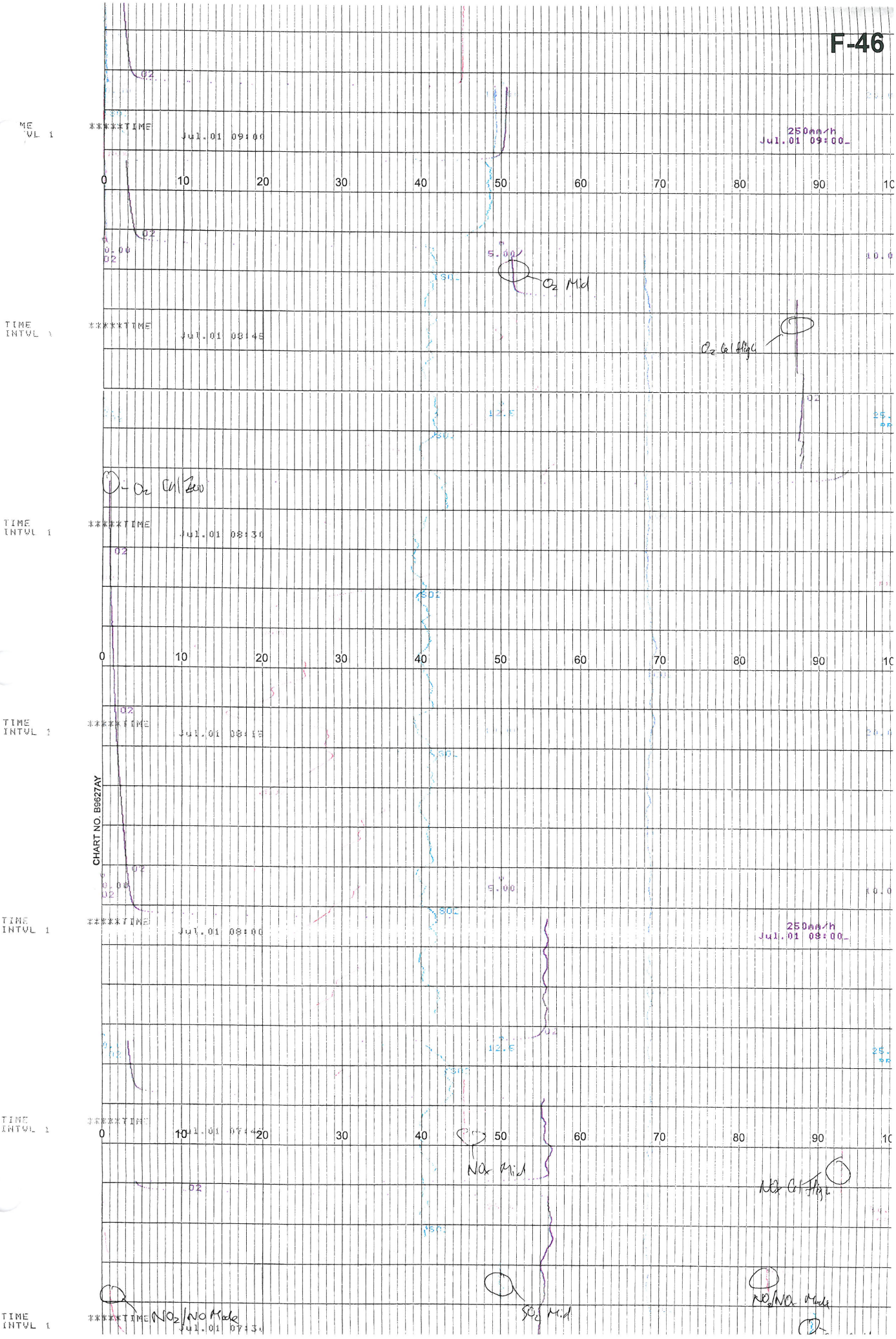

F-41
TIME INTVL 1
Jun.30 16:30
Jun.30 16:15
Jun.30 16:00
Jun.30 15:45
Jun.30 15:30
Jun.30 15:15
Jun.30 15:00
250mm/h
Jun.30 16:00
250mm/h
Jun.30 15:00
CHART NO. B9627AY
NOx bias
O2/CO2 bias
SO2 bias

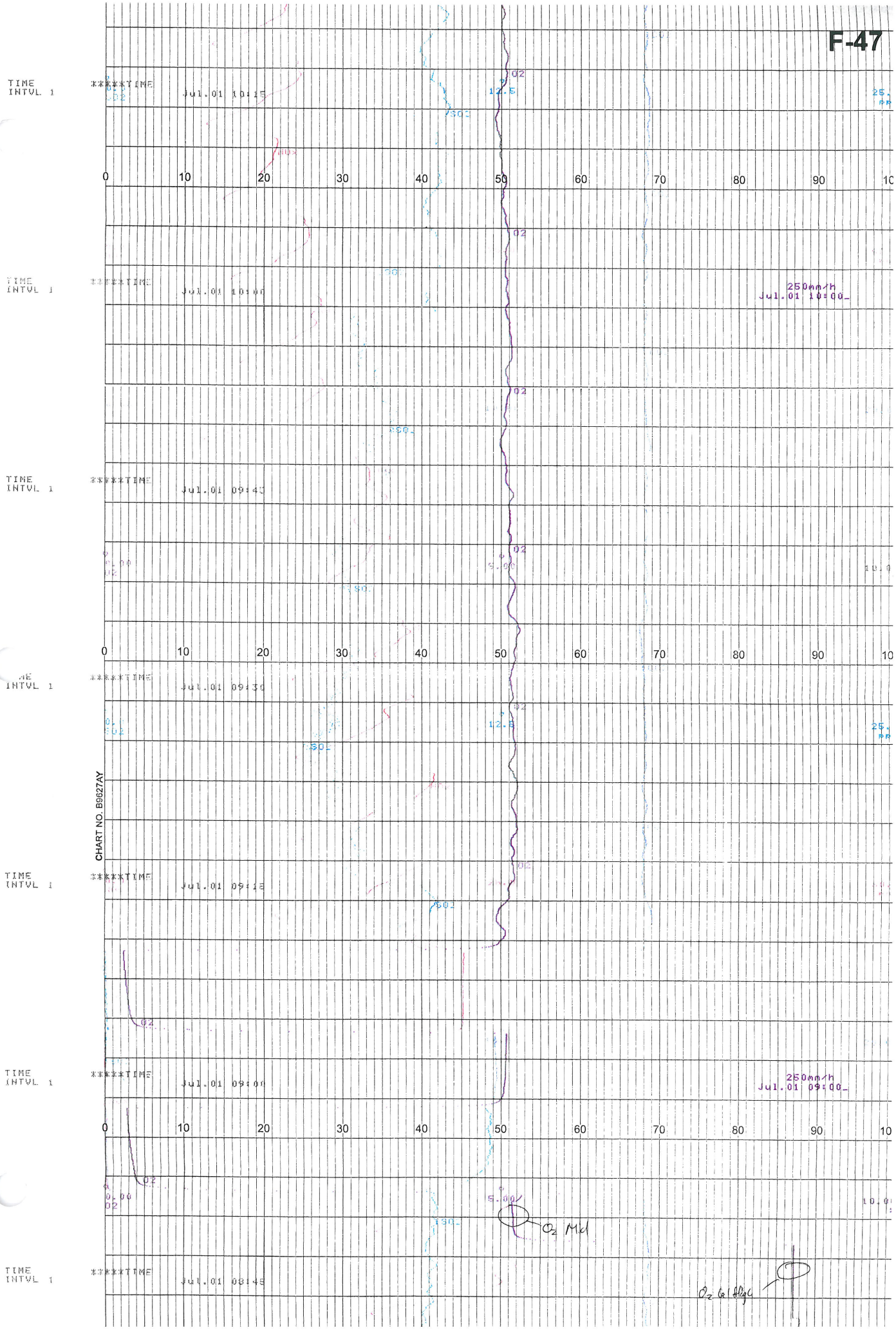

F-42
TIME
INTVL 1
*****TIME
Jun.30 17:30
Jun.30 17:15
Jun.30 17:00
Jun.30 16:45
Jun.30 16:30
250mm/h
Jun.30 17:00
CHART NO. B9627AY
0
10
20
30
40
50
60
70
80
90
SO2
O2
5.00
12.5

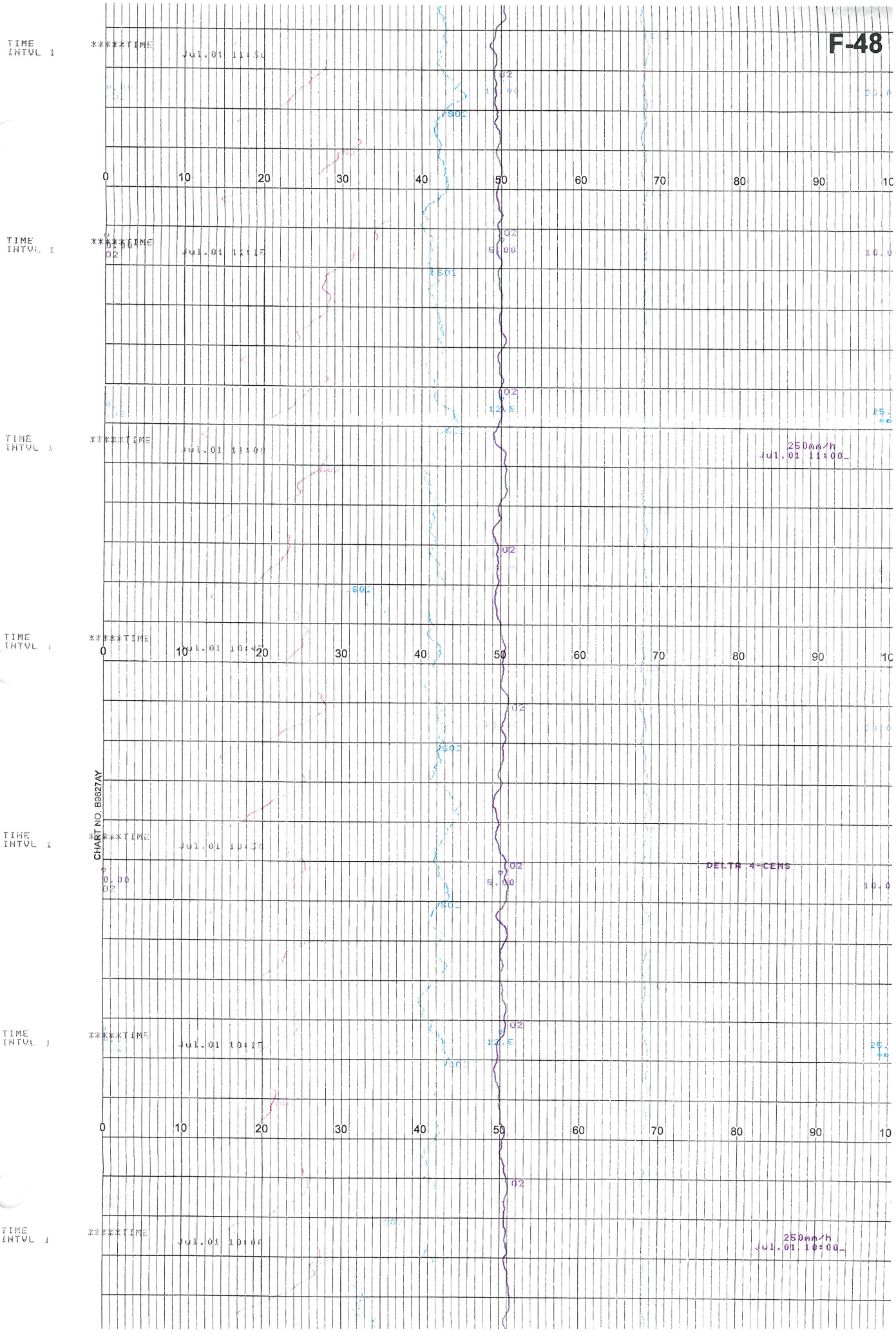

F-43
TIME INTVL 1
*****TIME
Jun.30 18:45
Jun.30 18:30
Jun.30 18:15
Jun.30 18:00
Jun.30 17:45
Jun.30 17:30
0 10 20 30 40 50 60 70 80 90
NOx bias
O2/CO2 bias
SO2 bias
250mm/h
Jun.30 18:00
DELTA 4-CEMS
CHART NO. B9627AY

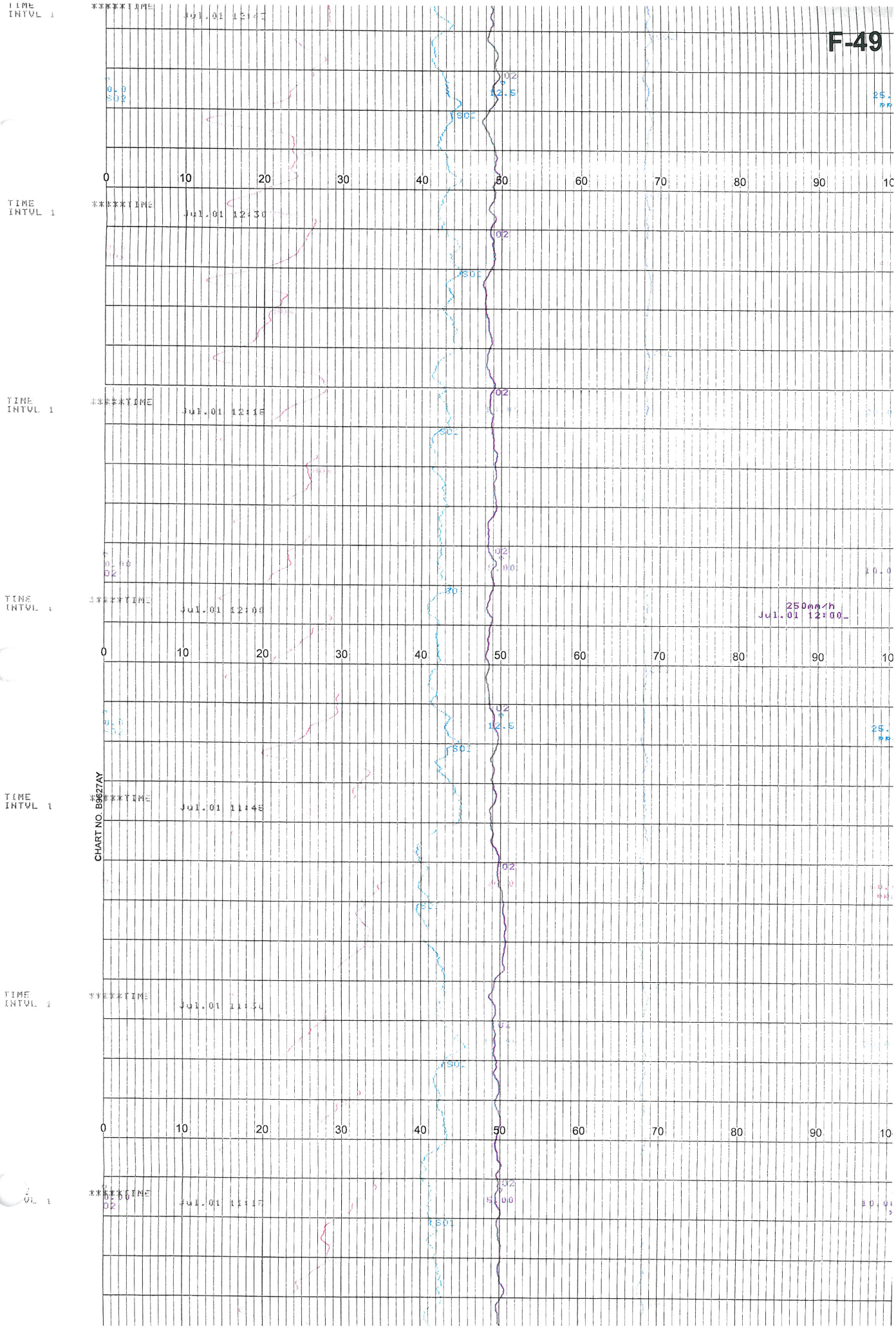

F-44
TIME INTVL 1
Jun.30 20:00
250mm/h
Jun.30 20:00
Jun.30 19:45
Jun.30 19:30
Jun.30 19:15
Jun.30 19:00
250mm/h
Jun.30 19:00
Jun.30 18:45
Jun.30 18:30
0
10
20
30
40
50
60
70
80
90
CHART NO. B9627AY

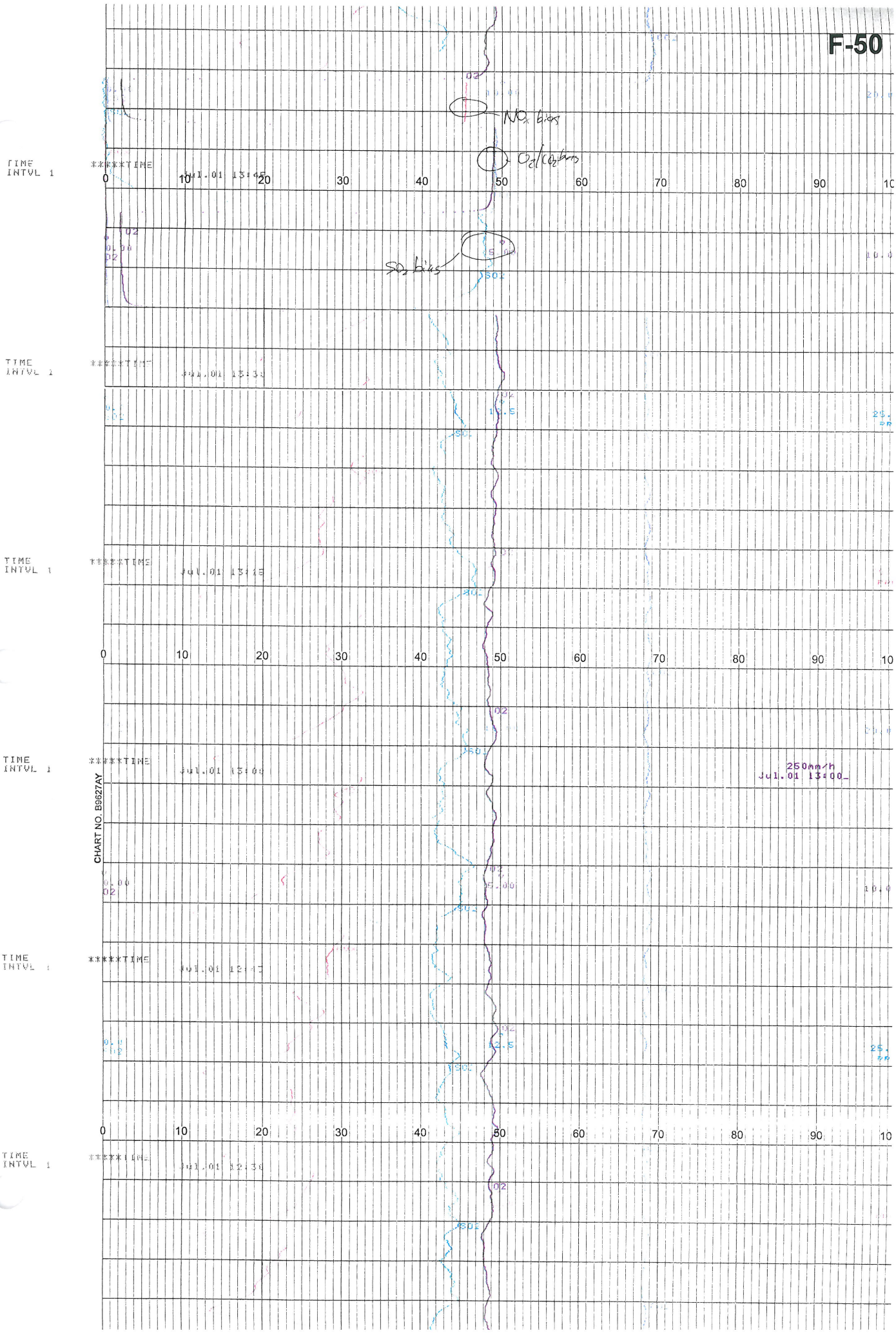

TIME INTVL 1
NOx Mid
NOx Cal High
NO2/NO Mode
SO2 Mid
NO2/NOx Mode
SO2 Cal High
CO2 Mid
NO/NOx Mode
SO2 Cal Zero
NO/NO Mode
CO2 Cal High
N2/NOx Mode
N2/NO Mode
CO2 Cal Zero
NOx bias
O2/CO2 bias
SO2 bias
Jun.30 20:00
250mm/h
Jun.30 20:00
Jun.30 19:45
CHART NO. B9627AY

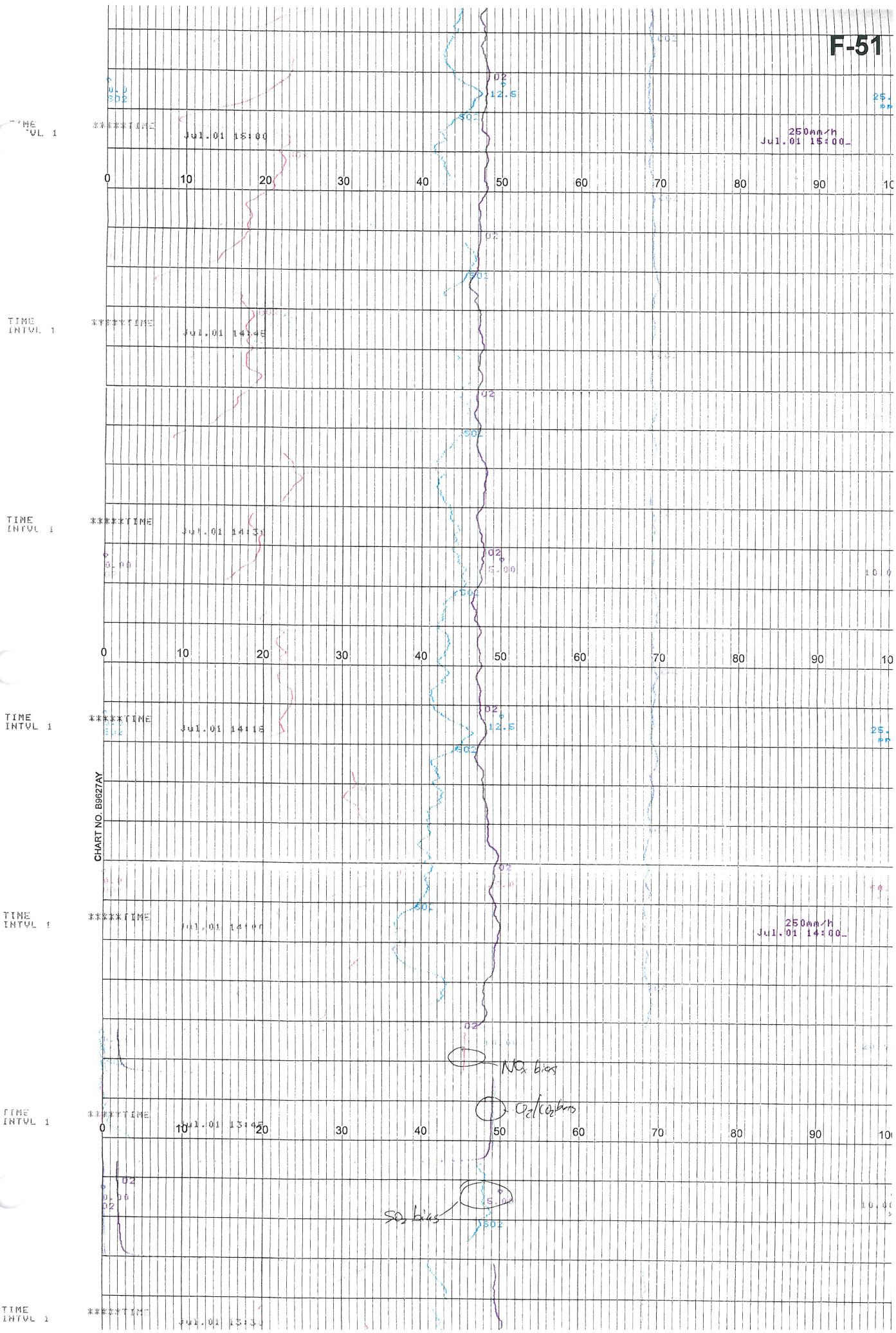

F-46
TIME INTVL 1
*****TIME
Jul.01 09:00
250mm/h
Jul.01 09:00
0 10 20 30 40 50 60 70 80 90 10
O2
0.00
5.00
10.0
O2 Mid
TIME INTVL 1
*****TIME
Jul.01 08:45
O2 Cal High
12.5
25.
O2 Cal Zero
TIME INTVL 1
*****TIME
Jul.01 08:30
0 10 20 30 40 50 60 70 80 90 10
TIME INTVL 1
*****TIME
Jul.01 08:15
CHART NO. B9627AY
0.00
5.00
10.0
TIME INTVL 1
*****TIME
Jul.01 08:00
250mm/h
Jul.01 08:00
12.5
25.
TIME INTVL 1
*****TIME
0 10 20 30 40 50 60 70 80 90 10
NOx Mid
NOx Cal High
NO2/NO Mode
SO2 Mid
NO2/NOx Mode
TIME INTVL 1
*****TIME
Jul.01 07:3

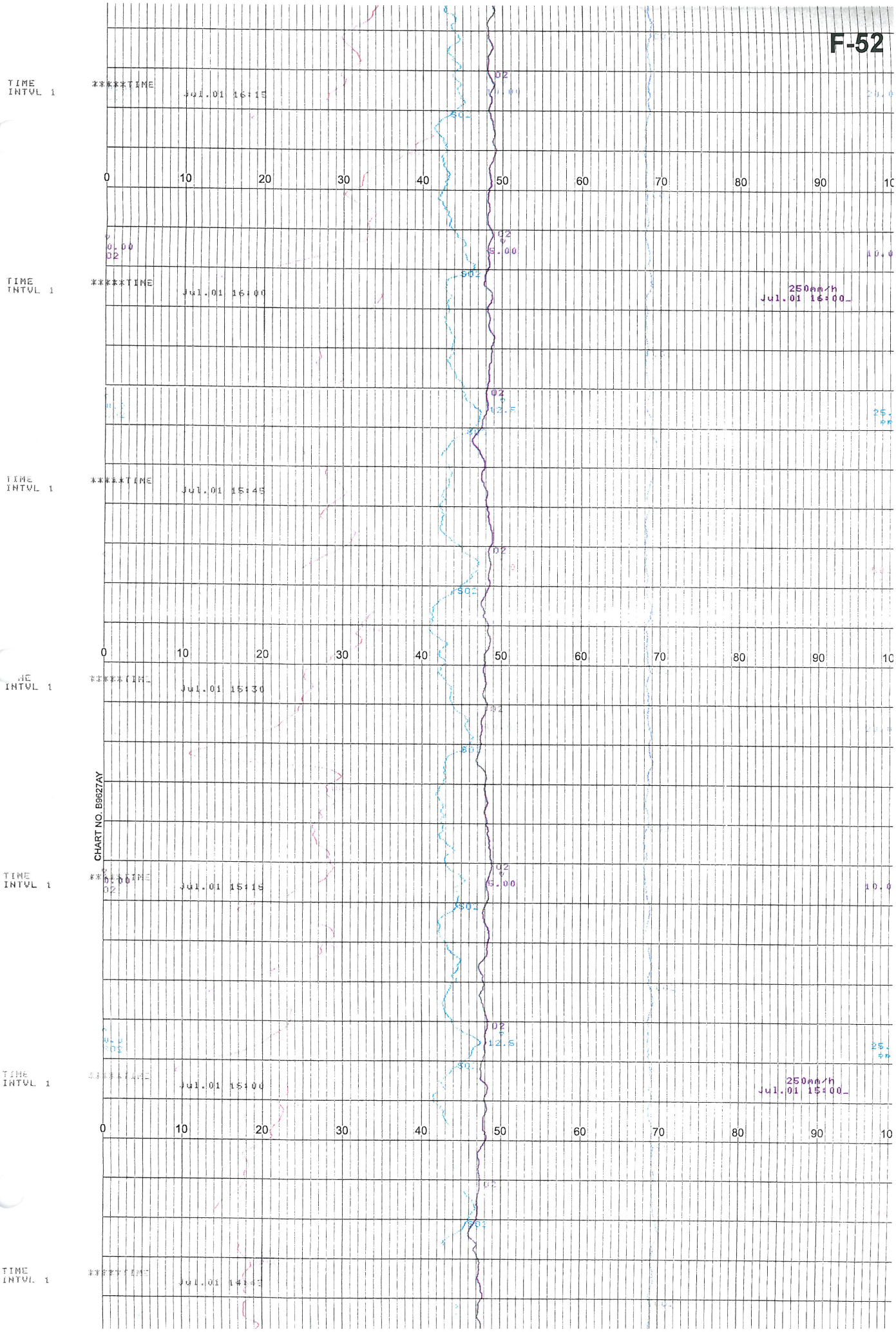

F-47
TIME
INTVL 1
*****TIME
Jul.01 10:15
Jul.01 10:00
250mm/h
Jul.01 10:00
Jul.01 09:45
Jul.01 09:30
Jul.01 09:15
Jul.01 09:00
250mm/h
Jul.01 09:00
Jul.01 08:45
0 10 20 30 40 50 60 70 80 90 10
CHART NO. B9627AY
O2 Md
O2 Ag Hig

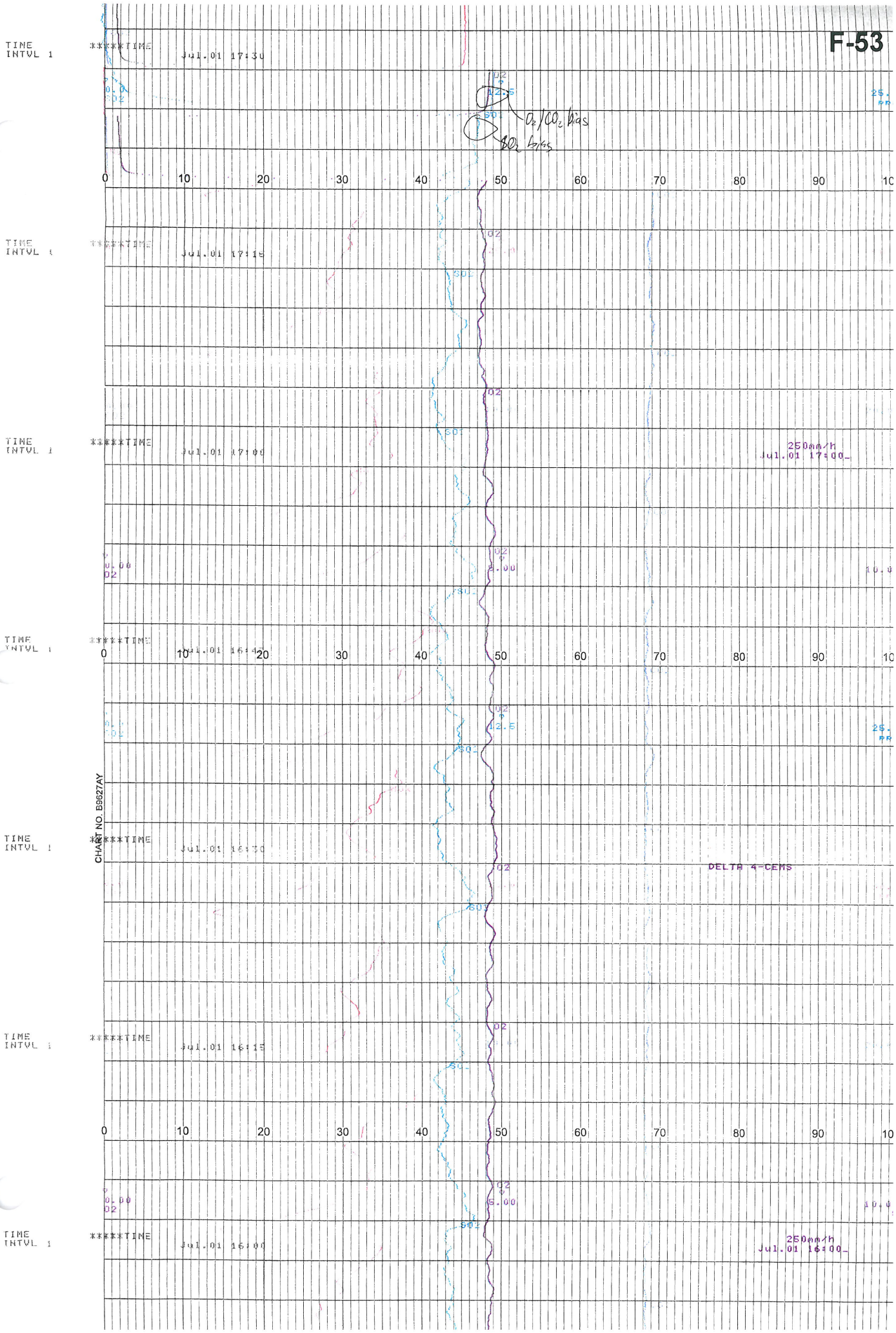

F-48
TIME INTVL 1
*****TIME
Jul.01 11:30
Jul.01 11:15
Jul.01 11:00
Jul.01 10:45
Jul.01 10:30
Jul.01 10:15
Jul.01 10:00
250mm/h
Jul.01 11:00
DELTA 4-CEMS
250mm/h
Jul.01 10:00
CHART NO. B9027AY
0
10
20
30
40
50
60
70
80
90
100

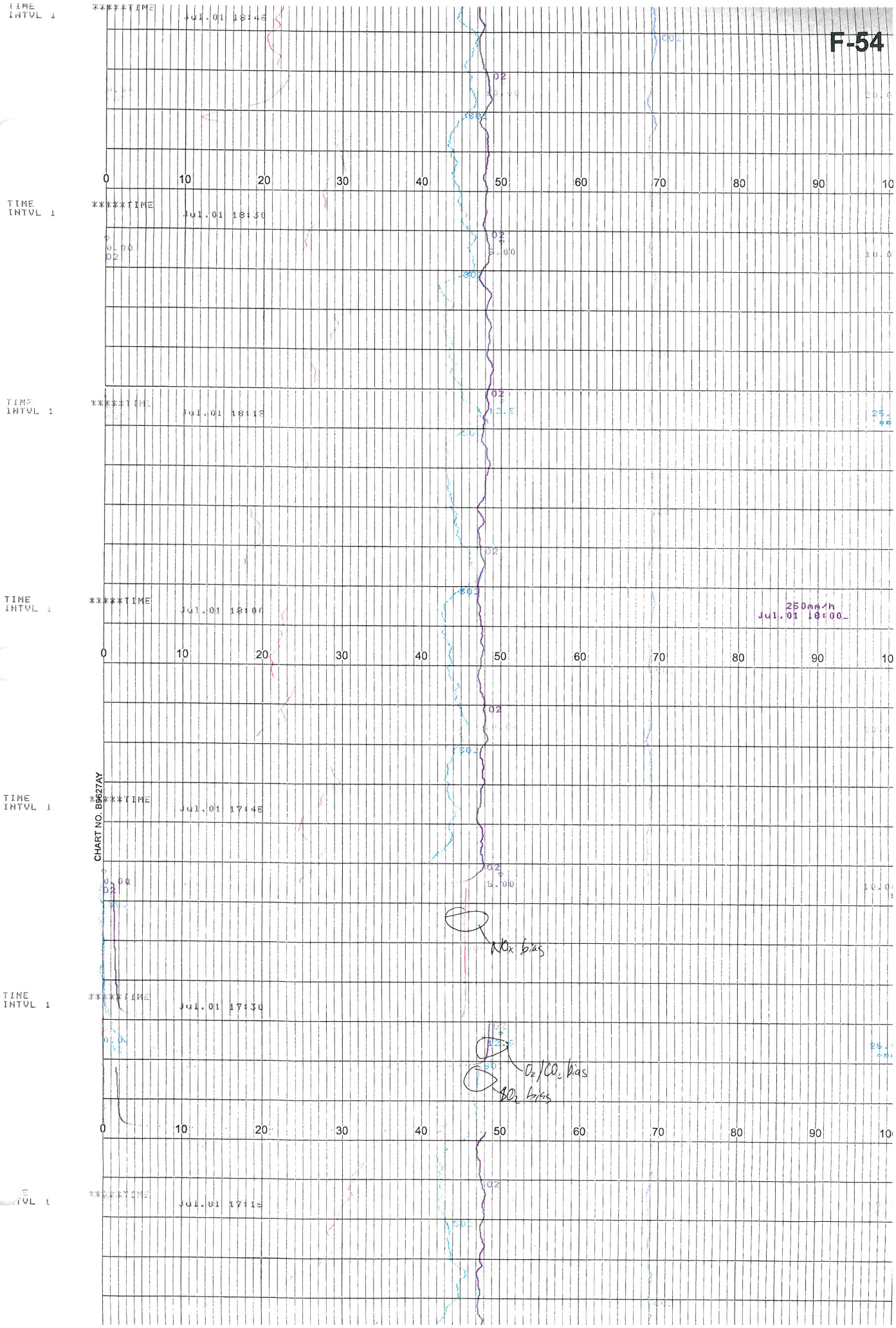

F-49
TIME INTVL 1
Jul.01 12:45
Jul.01 12:30
Jul.01 12:15
Jul.01 12:00
Jul.01 11:45
Jul.01 11:30
Jul.01 11:15
250mm/h
Jul.01 12:00
CHART NO. B9627AY
0
10
20
30
40
50
60
70
80
90

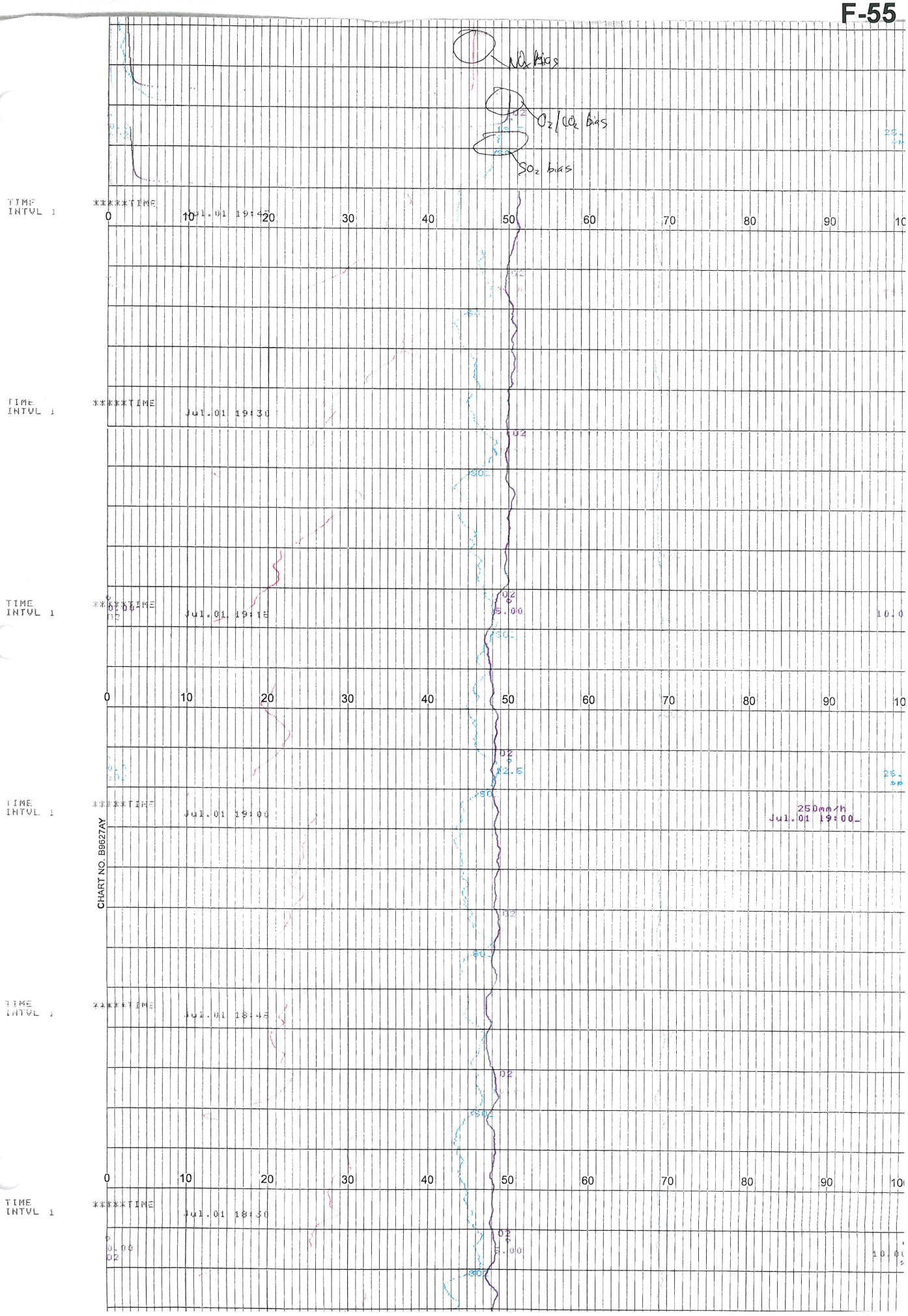

F-50
NOx bias
O2 calibration
SO2 bias
TIME INTVL 1
*****TIME
Jul.01 13:45
Jul.01 13:30
Jul.01 13:15
Jul.01 13:00
Jul.01 12:45
Jul.01 12:30
0
10
20
30
40
50
60
70
80
90
100
250mm/h
Jul.01 13:00
CHART NO. B9627AY


F-51
TIME INTVL 1
*****TIME
Jul.01 15:00
250mm/h
Jul.01 15:00
Jul.01 14:48
Jul.01 14:31
Jul.01 14:18
Jul.01 14:00
Jul.01 13:45
CHART NO. B9627AY
NOx bias
O2/CO2 bias
SO2 bias
0
10
20
30
40
50
60
70
80
90


F-52
TIME INTVL 1
*****TIME
Jul.01 16:15
Jul.01 16:00
Jul.01 15:45
Jul.01 15:30
Jul.01 15:15
Jul.01 15:00
Jul.01 14:45
250mm/h
Jul.01 16:00
Jul.01 15:00
O2
SO2
0
10
20
30
40
50
60
70
80
90
CHART NO. B9627AY


F-53
TIME INTVL 1
*****TIME
Jul.01 17:30
Jul.01 17:15
Jul.01 17:00
Jul.01 16:45
Jul.01 16:30
Jul.01 16:15
Jul.01 16:00
O2/CO2 bias
SO2 bias
250mm/H
Jul.01 17:00
Jul.01 16:00
DELTA 4-CEMS
CHART NO. B9627AY
0
10
20
30
40
50
60
70
80
90
100


F-54
TIME INTVL 1
*****TIME
Jul.01 18:45
Jul.01 18:30
Jul.01 18:15
Jul.01 18:00
Jul.01 17:45
Jul.01 17:30
Jul.01 17:15
250mm/h
Jul.01 18:00
CHART NO. B9627AY
NOx bias
O2/CO2 bias
SO2 bias
0
10
20
30
40
50
60
70
80
90
10


NOx bias
O2/CO2 bias
SO2 bias
TIME
INTVL 1
*****TIME
Jul.01 19:45
Jul.01 19:30
Jul.01 19:15
Jul.01 19:00
Jul.01 18:45
Jul.01 18:30
0
10
20
30
40
50
60
70
80
90
250mm/h
Jul.01 19:00
CHART NO. B9627AY