Note: This is a reference cited in *AP 42, Compilation of Air Pollutant Emission Factors, Volume I Stationary Point and Area Sources.* AP42 is located on the EPA web site at www.epa.gov/ttn/chief/ap42/

The file name refers to the reference number, the AP42 chapter and section. The file name "ref02_c01s02.pdf" would mean the reference is from AP42 chapter 1 section 2. The reference may be from a previous version of the section and no longer cited. The primary source should always be checked.

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# RESULTS OF THE JUNE 7 - 10, 1994 AIR EMISSION COMPLIANCE TESTS AT THE LOUISIANA PACIFIC OSB PLANT IN HAYWARD, WISCONSIN

Submitted to:

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SP/slp

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# ABBREVIATIONS

| | |
|---|---|
| ACFM | actual cubic feet per minute |
| cc (ml) | cubic centimeter (milliliter) |
| DSCFM | dry standard cubic foot of dry gas per minute |
| DSML | dry standard milliliter |
| DEG-F (°F) | degrees Fahrenheit |
| DIA. | diameter |
| FP | finished product for plant |
| FT/SEC | feet per second |
| g | gram |
| GPM | gallons per minute |
| GR/ACF | grains per actual cubic foot |
| GR/DSCF | grains per dry standard cubic foot |
| g/dscm | grams per dry standard cubic meter |
| HP | horsepower |
| HRS | hours |
| IN. | inches |
| IN.HG. | inches of mercury |
| IN.WC. | inches of water |
| LB | pound |
| LB/DSCF | pounds per dry standard cubic foot |
| LB/HR | pounds per hour |
| LB/$10^6$BTU | pounds per million British Thermal Units heat input |
| LB/MMBTU | pounds per million British Thermal Units heat input |
| LTPD | long tons per day |
| MW | megawatt |
| mg/$Nm^3$ | milligrams per dry standard cubic meter |
| ug/$Nm^3$ | micrograms per dry standard cubic meter |
| microns (um) | micrometer |
| MIN. | minutes |
| ng | nanograms |
| ohm-cm | ohm-centimeter |
| PM | particulate matter |
| PPH | pounds per hour |
| PPM | parts per million |
| ppmC | parts per million carbon |
| ppm,d | parts per million, dry |
| ppm,w | parts per million, wet |
| ppt | parts per trillion |
| PSI | pounds per square inch |
| SQ.FT. | square feet |
| TPD | tons per day |
| ug | micrograms |
| v/v | percent by volume |
| w/w | percent by weight |
| < | ≤ (when following a number) |

Standard conditions are defined as 68°F (20°C) and 29.92 IN. of mercury pressure.

g:\stack\wp\misc\abbrev.frm

# 1 INTRODUCTION

During the Period June 7 - 10, 1994 Interpoll Laboratories personnel conducted air emission compliance tests on the following sources at the Louisiana Pacific Corporation (LP) OSB Plant located in Hayward, Wisconsin.

| Source | Parameters |
|---|---|
| Line 1 Press RTO Inlet | PM,THC's |
| Line 1 Press RTO Outlet Stack | PM,$NO_x$,VE,CO,$CH_2O$,MDI,THC's |
| Line 1 Konus Stack | PM,$NO_x$,VE,CO,$CH_2O$,POM's,Phenol,Benzene |
| Line 2 Press RTO Inlet | PM,THC's |
| Line 2 Press RTO Outlet Stack | PM,$NO_x$,VE,CO,$CH_2O$,MDI,THC's |
| Line 2 Konus Stack | PM,$NO_x$,VE,CO,$CH_2O$,POM's,Phenol,Benzene |

On-site testing was performed by Duane Van Hoever, Scott Bainville, Ed Trowbrige, Mark Kaehler, Ed Juers, Dave Vaaler, Ken Rosenthal, Dennis Marso, and Ken Nuessmeier. Coordination between testing activities and plant operation was provided by Sue Somers of LP. The test was witnessed by Jim Ross, Brad Pyle, and Judy Hayducsko of the Wisconsin Department of Natural Resources and Basim Dihu of the Environmental Protection Agency.

The thermal oil heaters tested were manufactured by Konus and are equipped with underfed stokers (pile burners). The oil heaters are fired with bark and wet fines wood waste. The net heat output capacity is 13 $10^6$BTU/HR for the No. 1 and 2 Konus heaters (each unit). Particulate emissions from each oil heater are controlled by Konus multiclones. Cleaned flue gas from the Nos. 1 and 2 Konus heaters exhaust to the atmosphere via a common stack as does the flue gas from the Nos. 3 and 4 Konus heaters. From the multiclones, the exhaust from each pair of Konuses (1 and 2, 3 and 4) is then controlled by an Electrified Filter Bed Manufactured by EFB.

The press vents tested are the exhaust from hoods positioned over the board press and unloader. Particulate emissions are controlled with a Regenerative Thermal Oxidizer (RTO) manufactured by Huntington.

Particulate evaluations were performed in accordance with EPA Methods 2-5, CFR Title 40, Part 60, Appendix A (revised July 1, 1993). A preliminary determination of the gas linear velocity profile was made at each test location before the first particulate determination to allow selection of the appropriate nozzle diameter for isokinetic sample withdrawal. An Interpoll Labs sampling train which meets or exceeds specifications in the above-cited reference was used to isokinetically extract particulate samples by means of a heated glass-lined probe. Wet catch samples were collected in the back half of the Method 5 sampling train and analyzed in accordance with Wisconsin DNR protocol.

Carbon monoxide determinations were performed in accordance with Method 10. A slip stream of sample gas was withdrawn from the exhaust gas stream using a heated stainless steel probe equipped with a filter to remove interfering particulate material. The particulate-free gas was transported to the analyzers by means of a heat-traced probe and filter assembly. After passing through the filter, the gas passed through a chilled condenser-type moisture removal system. The particulate-free dry gas was then transported to the analyzers with the excess exhausted to the atmosphere through a calibrated orifice which was used to ensure that the flow from the stack exceeds the requirements of the analyzers. A three-way valve on the probe was used to introduce standard gas for the "system bias check".

The analog response of the carbon monoxide analyzer was recorded with a strip chart recorder. The analyzer was calibrated with Scott Specialty, National Specialty, and Linde Gases (EPA Protocol 1) and Certified Master standard gases. The instrument was calibrated before and after each run as per EPA Method 10. The sample probe was moved through a three-point traverse (1/6, 3/6, 5/6 of the stack diameter) to measure carbon monoxide concentrations.

Formaldehyde samples were collected using EPA Method 0011 (SW 846 3rd Ed.). The samples were collected isokinetically using a Method 5 sampling train with an aqueous acidic 2,4-dinitrophenylhydrazine absorbing solution and analyzed by high performance liquid chromatography.

Total gaseous hydrocarbon concentrations were determined instrumentally using a Ratfisch Model RS55 heated flame ionization detector (HFID) calibrated against propane in

air standards. The THC concentration was continuously monitored by extracting a slipstream of exhaust gas by means of a heated probe and filter holder. A heat-traced teflon line was used to transport the sample gas from the filter holder outlet to the analyzer inlet.

Phenol concentrations were determined from the Press Vent using a Method 5 sampling train with neutral buffered absorbing reagent followed by extraction with methylene chloride and direct analysis by GC/MS with no concentration (EPA Method 8270). The samples were field spiked with 5.33 mg of phenol d5.

Polyaromatic hydrocarbons sampling was conducted using the EPA Modified Method 5 sampling procedure as per EPA Method 010 SW 846. The four-part sample and field blank were extracted, concentrated to 1000 ul and cleaned up as required (column chromatography as per Interpoll Labs Method II-8904-2 or GPC) prior to final concentration and analysis. The samples were then further concentrated to 100 ul and analyzed in accordance with EPA Method 8270 by HRGC/LRMS using electron impact (EI) with total ion monitoring (TIM). Quantification was performed using the six standard M-8270 internal standards. Each XAD-2 resin cartridge was field spiked with 20 ug of $d_{10}$-fluoroanthene in order to document overall collection and analytical efficiency and recovery. Analytical accuracy and recovery for extraction and cleanup was documented using the six m-8270-recommended surrogate standards.

MDI concentrations were determined in accordance with the 1,2-PP Method as developed by Radian Corporation under contract to USEPA. This method employs collection of MDI with 1,2-PP in toluene reagent, with analysis by HPLC.

Benzene samples were collected in accordance with EPA Method 18 Section 7.4. Charcoal tubes were used for sampling with analysis by GC/FID.

Integrated flue gas samples were extracted simultaneously with each of the above-referenced sampling trains at the dryer test site using a specially designed gas sampling system. Integrated flue gas samples were collected in 44-liter Tedlar bags housed in a protective aluminum container. After sampling was complete, the bags were sealed and returned to the laboratory for Orsat analysis. Prior to sampling, the Tedlar bags are leak checked at 15 IN.HG. vacuum with an in-line rotameter. Bags with any detectable inleakage

are discarded. The integrated flue gas samples collected were analyzed for carbon monoxide in accordance with EPA Method 10 (NDIR).

Testing on the Line 1 Press RTO Stack was conducted from two test ports oriented at 90 degrees on the stack. These test ports are located 5.7 stack diameters downstream of the nearest flow disturbance and 4.5 stack diameters upstream of the stack exit. A 20-point traverse was used to collect the particulate, formaldehyde, and MDI samples. Each traverse point was sampled 3 minutes for a total of 60 minutes per run.

Testing on the Line 1 Press RTO Inlet was conducted from two test ports oriented at 90 degrees. A 24-point traverse was used to collect the particulate samples. Each traverse point was sampled 2.5 minutes for a total of 60 minutes per run.

Testing on the Line 2 Press RTO Stack was conducted from two test ports oriented at 90 degrees on the stack. These test ports are located 5.7 stack diameters downstream of the nearest flow disturbance and 4.5 stack diameters upstream of the stack exit. A 20-point traverse was used to collect the particulate, formaldehyde, and MDI samples. Each traverse point was sampled 3 minutes for a total of 60 minutes per run.

Testing on the Line 2 Press RTO Inlet was conducted from two test ports oriented at 90 degrees. A 12-point traverse was used to collect the particulate samples. Each traverse point was sampled 5 minutes for a total of 60 minutes per run.

Testing on the Line 1 Konus Stack was conducted from two test ports oriented at 90 degrees on the stack. These test ports are located 5.2 diameters downstream and 2.8 diameters upstream of the nearest flow disturbances. A 20-point traverse was used to collect the particulate and formaldehyde samples. Each point was sampled for 3 minutes for a total sampling time of 60 minutes per run. A 24-point traverse was used to collect representative PAH samples. Each point was sampled for 2.5 minutes for a total sampling time of 60 minutes per run. A 3-point traverse was used to collect representative benzene samples.

Testing on the Line 2 Konus Stack was conducted from two test ports oriented at 90 degrees on the stack. These test ports are located 3.5 diameters downstream and 8 diameters upstream of the nearest flow disturbances. A 24-point traverse was used to collect the

particulate, formaldehyde, and PAH samples. Each point was sampled for 2.5 minutes for a total sampling time of 60 minutes per run. A 3-point traverse was used to collect representative benzene samples. Visible emissions determinations were performed on each stack by Ed Juers and Dave Vaaler, both of which are EPA-certified observers.

The important results of the test are summarized in Section 2. Detailed results are presented in Section 3. Field data and all other supporting information are presented in the appendices.

## 2 SUMMARY AND DISCUSSION

The results of the air emission compliance tests are summarized in Tables 1 - 16. An overview of the results is presented in the Table below:

| PARAMETER | | MEASURED |
|---|---|---|
| **Line 1 RTO Press Inlet** | | |
| **Particulate** | | |
| | (GR/DSCF) | 0.0124 |
| | (LB/HR) | 6.5 |
| **Total Hydrocarbons** | | |
| | (ppmC,w) | 64 |
| | (LB/HR) | 7.5 |
| **Line 1 Press RTO Stack** | | |
| *PM Removal Efficiency* | (%) | 17.6 |
| *THC Removal Efficiency* | (%) | 95.0 |
| **Particulate** | | |
| | (GR/DSCF) | 0.0094 |
| | (LB/HR) | 5.4 |
| **Opacity** | (%) | 0 |
| **Oxides of Nitrogen** | | |
| | (ppm,d) | 19 |
| | (LB/HR) | 9 |
| **Carbon Monoxide** | | |
| | (ppm,d) | 12 |
| | (LB/HR) | 3.5 |
| **Total Hydrocarbons** | | |
| | (ppmC,w) | 3 |
| | (LB/HR) | 0.36 |
| **Formaldehyde** | | |
| | (ppm,d) | 0.19 |
| | (LB/HR) | 0.061 |
| **MDI** | | |
| | (ppm) | ≤ 0.0004 |
| | (LB/HR) | ≤ 0.001 |

| PARAMETER | | MEASURED |
|---|---|---|
| **Line 2 RTO Inlet** | | |
| **Particulate** | | |
| | (GR/DSCF) | 0.136 |
| | (LB/HR) | 99.8 |
| **Total Hydrocarbons** | | |
| | (ppmC,w) | 65 |
| | (LB/HR) | 10.5 |
| **Line 2 Press RTO Stack** | | |
| *PM Removal Efficiency* | (%) | 91.1 |
| *THC Removal Efficiency* | (%) | 97.6 |
| **Particulate** | | |
| | (GR/DSCF) | 0.0129 |
| | (LB/HR) | 8.9 |
| **Opacity** | (%) | 0 |
| **Oxides of Nitrogen** | | |
| | (ppm,d) | 11 |
| | (LB/HR) | 6.7 |
| **Carbon Monoxide** | | |
| | (ppm,d) | 15 |
| | (LB/HR) | 3.9 |
| **Total Hydrocarbons** | | |
| | (ppmC,w) | 1.6 |
| | (LB/HR) | 0.25 |
| **Formaldehyde** | | |
| | (ppm,d) | 0.22 |
| | (LB/HR) | 0.082 |
| **MDI** | | |
| | (ppm) | ≤ 0.0005 |
| | (LB/HR) | ≤ 0.002 |

| PARAMETER | | MEASURED |
|---|---|---|
| **Line 1 Konus Stack** | | |
| **Particulate** | | |
| | (GR/DSCF) | 0.0278 |
| | (LB/$10^6$BTU) | 0.125 |
| | (LB/HR) | 2.61 |
| **Oxides of Nitrogen** | | |
| | (ppm,d) | 76 |
| | (LB/$10^6$BTU) | 0.291 |
| | (LB/HR) | 5.95 |
| **Opacity** | (%) | 0 |
| **Carbon Monoxide** | | |
| | (ppm,d) | 115 |
| | (LB/$10^6$BTU) | 0.269 |
| | (LB/HR) | 5.41 |
| **Formaldehyde** | | |
| | (ppm,d) | 0.05 |
| | (LB/HR) | 0.0028 |
| **Phenol** | | |
| | (ppb) | < 175 |
| | (LB/HR) | < 28 |
| **Benzene** | | |
| | (ppm,d) | < 0.0114 |
| | (LB/HR) | < 0.0015 |

| PARAMETER | | MEASURED |
|---|---|---|
| **Line 2 Konus Stack** | | |
| **Particulate** | | |
| | (GR/DSCF) | 0.0185 |
| | (LB/$10^6$BTU) | 0.114 |
| | (LB/HR) | 2.58 |
| **Oxides of Nitrogen** | | |
| | (ppm,d) | 63 |
| | (LB/$10^6$BTU) | 0.323 |
| | (LB/HR) | 7.24 |
| **Opacity** | (%) | 0.96 |
| **Carbon Monoxide** | | |
| | (ppm,d) | 67 |
| | (LB/$10^6$BTU) | 0.213 |
| | (LB/HR) | 4.78 |
| **Formaldehyde** | | |
| | (ppm,d) | 0.05 |
| | (LB/HR) | 0.0044 |
| **Phenol** | | |
| | (ppb) | < 176 |
| | (LB/HR) | < 43 |
| **Benzene** | | |
| | (ppm,d) | < 0.011 |
| | (LB/HR) | < 0.0024 |

No difficulties were encountered in the field by Interpoll Labs or in the laboratory evaluation of the samples which were conducted by Interpoll Labs. On the basis of these facts and a complete review of the data and results, it is our opinion that the results reported herein are accurate and closely reflect the actual values which existed at the time the test was performed.

Table 1a Summary of the Results of the June 10, 1994 Particulate Emission Compliance Test on the Line 1 Press RTO Outlet Stack at the Louisiana Pacific Corporation Plant Located in Hayward, Wisconsin.

| ITEM | Run 1 | Run 2 | Run 3 |
|---|---|---|---|
| Date of test | 06-10-94 | 06-10-94 | 06-10-94 |
| Time runs were done (HRS) | 935/1036 | 1100/1201 | 1220/1321 |
| Volumetric flow | | | |
| actual (ACFM) | 98861 | 96534 | 97230 |
| standard (DSCFM) | 68420 | 65961 | 66157 |
| Gas temperature (DEG-F) | 259 | 264 | 268 |
| Moisture content (%V/V) | 2.45 | 3.06 | 2.93 |
| Gas composition (%V/V,dry) | | | |
| carbon dioxide | 0.40 | 0.40 | 0.40 |
| oxygen | 20.50 | 20.50 | 20.50 |
| nitrogen | 79.10 | 79.10 | 79.10 |
| Isokinetic variation (%) | 99.3 | 99.0 | 99.8 |
| Particulate concentration | | | |
| actual (GR/ACF) | .00737 | .00657 | .00530 |
| standard (GR/DSCF) | .0107 | .00962 | .00779 |
| Part. emission rate (LB/HR) | 6.25 | 5.44 | 4.42 |

97541

264

Note: Dry + Organic/Inorganic Wet Catch

Table 1b Summary of the Results of the June 10, 1994 Particulate Emission Compliance Test on the Line 1 Press RTO Outlet Stack at the Louisiana Pacific Corporation Plant Located in Hayward, Wisconsin.

| ITEM | | Run 1 | Run 2 | Run 3 |
|---|---|---|---|---|
| Date of test | | 06-10-94 | 06-10-94 | 06-10-94 |
| Time runs were done | (HRS) | 935/1036 | 1100/1201 | 1220/1321 |
| Volumetric flow | | | | |
| actual | (ACFM) | 98861 | 96534 | 97230 |
| standard | (DSCFM) | 68420 | 65961 | 66157 |
| Gas temperature | (DEG-F) | 259 | 264 | 268 |
| Moisture content | (%V/V) | 2.45 | 3.06 | 2.93 |
| Gas composition | (%V/V,dry) | | | |
| carbon dioxide | | 0.40 | 0.40 | 0.40 |
| oxygen | | 20.50 | 20.50 | 20.50 |
| nitrogen | | 79.10 | 79.10 | 79.10 |
| Isokinetic variation | (%) | 99.3 | 99.0 | 99.8 |
| Particulate concentration | | | | |
| actual | (GR/ACF) | .00412 | .00222 | .00218 |
| standard | (GR/DSCF) | .00596 | .00324 | .00321 |
| Part. emission rate | (LB/HR) | 3.50 | 1.83 | 1.82 |

Note: Dry Catch Only

Table 2a Summary of the Results of the June 8, 1994 Particulate Emission Compliance Test on the Line 1 Konus Stack at the Louisiana Pacific Corporation Plant Located in Hayward, Wisconsin.

| ITEM | | Run 1 | Run 2 | Run 3 |
|---|---|---|---|---|
| Date of test | | 06-08-94 | 06-08-94 | 06-08-94 |
| Time runs were done | (HRS) | 1538/1640 | 1708/1811 | 1835/1938 |
| Volumetric flow | | | | |
| actual | (ACFM) | 17975 | 18652 | 18575 |
| standard | (DSCFM) | 10771 | 11266 | 10936 |
| Gas temperature | (DEG-F) | 310 | 314 | 314 |
| Moisture content | (%V/V) | 9.70 | 8.55 | 10.88 |
| Gas composition | (%V/V,dry) | | | |
| carbon dioxide | | 6.00 | 5.00 | 7.00 |
| oxygen | | 14.50 | 15.50 | 13.50 |
| nitrogen | | 79.50 | 79.50 | 79.50 |
| Isokinetic variation | (%) | 102.1 | 99.3 | 102.4 |
| Particulate concentration | | | | |
| actual | (GR/ACF) | .0223 | .0126 | .0149 |
| standard | (GR/DSCF) | .0373 | .0209 | .0253 |
| Part. emission rate | (LB/HR) | 3.44 | 2.02 | 2.37 |

Note: Dry + Organic/Inorganic Wet Catch

Table 2b Summary of the Results of the June 8, 1994 Particulate Emission Compliance Test on the Line 1 Konus Stack at the Louisiana Pacific Corporation Plant Located in Hayward, Wisconsin.

| ITEM | | Run 1 | Run 2 | Run 3 |
|---|---|---|---|---|
| Date of test | | 06-08-94 | 06-08-94 | 06-08-94 |
| Time runs were done | (HRS) | 1538/1640 | 1708/1811 | 1835/1938 |
| Volumetric flow | | | | |
| actual | (ACFM) | 17975 | 18652 | 18575 |
| standard | (DSCFM) | 10771 | 11266 | 10936 |
| Gas temperature | (DEG-F) | 310 | 314 | 314 |
| Moisture content | (%V/V) | 9.70 | 8.55 | 10.88 |
| Gas composition | (%V/V,dry) | | | |
| carbon dioxide | | 6.00 | 5.00 | 7.00 |
| oxygen | | 14.50 | 15.50 | 13.50 |
| nitrogen | | 79.50 | 79.50 | 79.50 |
| Isokinetic variation | (%) | 102.1 | 99.3 | 102.4 |
| Particulate concentration | | | | |
| actual | (GR/ACF) | .0195 | .00757 | .0122 |
| standard | (GR/DSCF) | .0326 | .0125 | .0208 |
| Part. emission rate | (LB/HR) | 3.01 | 1.21 | 1.95 |

Note: Dry Catch Only

Table 3a Summary of the Results of the June 10, 1994 Particulate Emission Compliance Test on the Line 1 Press RTO Inlet at the Louisiana Pacific Corporation Plant Located in Hayward, Wisconsin.

| ITEM | | Run 1 | Run 2 | Run 3 | |
|---|---|---|---|---|---|
| Date of test | | 06-10-94 | 06-10-94 | 06-10-94 | |
| Time runs were done | (HRS) | 935/1037 | 1100/1205 | 1220/1322 | |
| Volumetric flow | | | | | |
| actual | (ACFM) | 71543 | 72779 | 72499 | 72,279 |
| standard | (DSCFM) | 61212 | 61735 | 61233 | |
| Gas temperature | (DEG-F) | 121 | 123 | 126 | 123 |
| Moisture content | (%V/V) | 1.92 | 2.46 | 2.30 | |
| Gas composition | (%V/V,dry) | | | | |
| carbon dioxide | | 0.03 | 0.03 | 0.03 | |
| oxygen | | 20.90 | 20.90 | 20.90 | |
| nitrogen | | 79.07 | 79.07 | 79.07 | |
| Isokinetic variation | (%) | 99.8 | 100.6 | 100.1 | |
| Particulate concentration | | | | | |
| actual | (GR/ACF) | .0124 | .00827 | .0109 | .0124 avg |
| standard | (GR/DSCF) | .0145 | .00976 | .0130 | |
| Part. emission rate | (LB/HR) | 7.59 | 5.16 | 6.81 | 6.52 |

Note: Dry + Organic/Inorganic Wet Catch

Table 3b Summary of the Results of the June 10, 1994 Particulate Emission Compliance Test on the Line 1 Press RTO Inlet at the Louisiana Pacific Corporation Plant Located in Hayward, Wisconsin.

| ITEM | | Run 1 | Run 2 | Run 3 |
|---|---|---|---|---|
| Date of test | | 06-10-94 | 06-10-94 | 06-10-94 |
| Time runs were done | (HRS) | 935/1037 | 1100/1205 | 1220/1322 |
| Volumetric flow | | | | |
| actual | (ACFM) | 71543 | 72779 | 72499 |
| standard | (DSCFM) | 61212 | 61735 | 61233 |
| Gas temperature | (DEG-F) | 121 | 123 | 126 |
| Moisture content | (%V/V) | 1.92 | 2.46 | 2.30 |
| Gas composition | (%V/V,dry) | | | |
| carbon dioxide | | 0.03 | 0.03 | 0.03 |
| oxygen | | 20.90 | 20.90 | 20.90 |
| nitrogen | | 79.07 | 79.07 | 79.07 |
| Isokinetic variation | (%) | 99.8 | 100.6 | 100.1 |
| Particulate concentration | | | | |
| actual | (GR/ACF) | .00745 | .00390 | .00699 |
| standard | (GR/DSCF) | .00871 | .00460 | .00828 |
| Part. emission rate | (LB/HR) | 4.57 | 2.43 | 4.34 |

Note: Dry Catch Only

Table 4a Summary of the Results of the June 9, 1994 Particulate Emission Compliance Test on the Line 2 Press RTO Outlet Stack at the Louisiana Pacific Corporation Plant Located in Hayward, Wisconsin.

| ITEM | | Run 1 | Run 2 | Run 3 |
|---|---|---|---|---|
| Date of test | | 06-09-94 | 06-09-94 | 06-09-94 |
| Time runs were done | (HRS) | 1240/1342 | 1425/1527 | 1605/1719 |
| Volumetric flow | | | | |
| actual | (ACFM) | 117314 | 116983 | 114900 |
| standard | (DSCFM) | 81742 | 80986 | 79766 |
| Gas temperature | (DEG-F) | 253 | 256 | 258 |
| Moisture content | (%V/V) | 2.35 | 2.55 | 2.05 |
| Gas composition | (%V/V,dry) | | | |
| carbon dioxide | | 0.40 | 0.40 | 0.40 |
| oxygen | | 20.60 | 20.60 | 20.55 |
| nitrogen | | 79.00 | 79.00 | 79.05 |
| Isokinetic variation | (%) | 99.6 | 99.9 | 99.6 |
| Particulate concentration | | | | |
| actual | (GR/ACF) | .0145 | .00495 | .00738 |
| standard | (GR/DSCF) | .0208 | .00715 | .0106 |
| Part. emission rate | (LB/HR) | 14.57 | 4.96 | 7.27 |

116379
80831

Note: Dry + Organic/Inorganic Wet Catch

Table 4b Summary of the Results of the June 9, 1994 Particulate Emission Compliance Test on the Line 2 Press RTO Outlet Stack at the Louisiana Pacific Corporation Plant Located in Hayward, Wisconsin.

| ITEM | | Run 1 | Run 2 | Run 3 |
|---|---|---|---|---|
| Date of test | | 06-09-94 | 06-09-94 | 06-09-94 |
| Time runs were done | (HRS) | 1240/1342 | 1425/1527 | 1605/1719 |
| Volumetric flow | | | | |
| actual | (ACFM) | 117314 | 116983 | 114900 |
| standard | (DSCFM) | 81742 | 80986 | 79766 |
| Gas temperature | (DEG-F) | 253 | 256 | 258 |
| Moisture content | (%V/V) | 2.35 | 2.55 | 2.05 |
| Gas composition | (%V/V,dry) | | | |
| carbon dioxide | | 0.40 | 0.40 | 0.40 |
| oxygen | | 20.60 | 20.60 | 20.55 |
| nitrogen | | 79.00 | 79.00 | 79.05 |
| Isokinetic variation | (%) | 99.6 | 99.9 | 99.6 |
| Particulate concentration | | | | |
| actual | (GR/ACF) | .0109 | .00256 | .00479 |
| standard | (GR/DSCF) | .0157 | .00370 | .00691 |
| Part. emission rate | (LB/HR) | 10.97 | 2.57 | 4.72 |

Note: Dry Catch Only

Table 5a Summary of the Results of the June 8, 1994 Particulate Emission Compliance Test on the Line 2 Konus Stack at the Louisiana Pacific Corporation Plant Located in Hayward, Wisconsin.

| ITEM | Run 1 | Run 2 | Run 3 |
|---|---|---|---|
| Date of test | 06-08-94 | 06-08-94 | 06-08-94 |
| Time runs were done (HRS) | 757/ 858 | 920/1021 | 1114/1215 |
| Volumetric flow | | | |
| actual (ACFM) | 27063 | 26771 | 26291 |
| standard (DSCFM) | 16583 | 16372 | 15772 |
| Gas temperature (DEG-F) | 319 | 317 | 325 |
| Moisture content (%V/V) | 6.60 | 6.99 | 7.80 |
| Gas composition (%V/V,dry) | | | |
| carbon dioxide | 4.10 | 4.00 | 4.80 |
| oxygen | 16.40 | 16.50 | 15.90 |
| nitrogen | 79.50 | 79.50 | 79.30 |
| Isokinetic variation (%) | 98.6 | 100.3 | 100.8 |
| Particulate concentration | | | |
| actual (GR/ACF) | .0148 | .0100 | .00887 |
| standard (GR/DSCF) | .0242 | .0164 | .0148 |
| Part. emission rate (LB/HR) | 3.44 | 2.30 | 2.00 |

Note: Dry + Organic/Inorganic Wet Catch

Table 5b Summary of the Results of the June 8, 1994 Particulate Emission Compliance Test on the Line 2 Konus Stack at the Louisiana Pacific Corporation Plant Located in Hayward, Wisconsin.

| ITEM | | Run 1 | Run 2 | Run 3 |
|---|---|---|---|---|
| Date of test | | 06-08-94 | 06-08-94 | 06-08-94 |
| Time runs were done | (HRS) | 757/ 858 | 920/1021 | 1114/1215 |
| Volumetric flow | | | | |
| actual | (ACFM) | 27063 | 26771 | 26291 |
| standard | (DSCFM) | 16583 | 16372 | 15772 |
| Gas temperature | (DEG-F) | 319 | 317 | 325 |
| Moisture content | (%V/V) | 6.60 | 6.99 | 7.80 |
| Gas composition | (%V/V,dry) | | | |
| carbon dioxide | | 4.10 | 4.00 | 4.80 |
| oxygen | | 16.40 | 16.50 | 15.90 |
| nitrogen | | 79.50 | 79.50 | 79.30 |
| Isokinetic variation | (%) | 98.6 | 100.3 | 100.8 |
| Particulate concentration | | | | |
| actual | (GR/ACF) | .0113 | .00681 | .00654 |
| standard | (GR/DSCF) | .0185 | .0111 | .0109 |
| Part. emission rate | (LB/HR) | 2.62 | 1.56 | 1.47 |

Note: Dry Catch Only

Table 6.a Summary of the Results of the June 9, 1994 Particulate Emission Compliance Test on the Line 2 Press RTO Inlet at the Louisiana Pacific Corporation Plant Located in Hayward, Wisconsin.

| ITEM | | Run 1 | Run 2 | Run 3 |
|---|---|---|---|---|
| Date of test | | 06-09-94 | 06-09-94 | 06-09-94 |
| Time runs were done | (HRS) | 1240/1345 | 1425/1530 | 1605/1708 |
| Volumetric flow | | | | |
| actual | (ACFM) | 98275 | 101098 | 104155 |
| standard | (DSCFM) | 82705 | 85694 | 88252 |
| Gas temperature | (DEG-F) | 118 | 121 | 120 |
| Moisture content | (%V/V) | 2.46 | 2.37 | 2.58 |
| Gas composition | (%V/V,dry) | | | |
| carbon dioxide | | 0.03 | 0.03 | 0.03 |
| oxygen | | 20.90 | 20.90 | 20.90 |
| nitrogen | | 79.07 | 79.07 | 79.07 |
| Isokinetic variation | (%) | 98.7 | 99.0 | 99.4 |
| Particulate concentration | | | | |
| actual | (GR/ACF) | 0.136 | .0918 | 0.118 |
| standard | (GR/DSCF) | 0.161 | 0.108 | 0.139 |
| Part. emission rate | (LB/HR) | 114.4 | 79.62 | 105.5 |

Note: Dry + Organic/Inorganic Wet Catch

Table 6b Summary of the Results of the June 9, 1994 Particulate Emission Compliance Test on the Line 2 Press RTO Inlet at the Louisiana Pacific Corporation Plant Located in Hayward, Wisconsin.

| ITEM | | Run 1 | Run 2 | Run 3 |
|---|---|---|---|---|
| Date of test | | 06-09-94 | 06-09-94 | 06-09-94 |
| Time runs were done | (HRS) | 1240/1345 | 1425/1530 | 1605/1708 |
| Volumetric flow | | | | |
| actual | (ACFM) | 98275 | 101098 | 104155 |
| standard | (DSCFM) | 82705 | 85694 | 88252 |
| Gas temperature | (DEG-F) | 118 | 121 | 120 |
| Moisture content | (%V/V) | 2.46 | 2.37 | 2.58 |
| Gas composition | (%V/V,dry) | | | |
| carbon dioxide | | 0.03 | 0.03 | 0.03 |
| oxygen | | 20.90 | 20.90 | 20.90 |
| nitrogen | | 79.07 | 79.07 | 79.07 |
| Isokinetic variation | (%) | 98.7 | 99.0 | 99.4 |
| Particulate concentration | | | | |
| actual | (GR/ACF) | 0.133 | .0817 | 0.116 |
| standard | (GR/DSCF) | 0.158 | .0964 | 0.137 |
| Part. emission rate | (LB/HR) | 111.7 | 70.82 | 103.5 |

Note: Dry Catch Only

Table 7a. Summary of the Results of the June, 1994 **Oxides of Nitrogen** Emission Compliance Tests at the Louisiana Pacific OSB Plant in Hayward, Wisconsin.

| Date | Time (HRS) | Concentration (ppm,d) | Emission Rate (LB/HR) |
|---|---|---|---|
| **(Line 1 Press RTO Stack)** | | | |
| 6-10-94 | 0935-1036 | 25 | 12.3 |
| 6-10-94 | 1100-1201 | 17 | 7.9 |
| 6-10-94 | 1220-1321 | 15 | 6.9 |
| Avg | | 19 | 9.0 |
| **(Line 2 Press RTO Stack)** | | | |
| 6-08-94 | 1240-1342 | 14 | 8.3 |
| 6-08-94 | 1425-1527 | 12 | 7.0 |
| 6-08-94 | 1605-1719 | 8 | 4.8 |
| Avg | | 11 | 6.7 |

Table 7b. Summary of the Results of the June, 1994 **Oxides of Nitrogen** Emission Compliance Tests at the Louisiana Pacific OSB Plant in Hayward, Wisconsin.

| Date | Time (HRS) | Concentration (ppm,d) | Emission Factor ($LB/10^6BTU$) | Emission Rate (LB/HR) |
|---|---|---|---|---|
| **(Line 1 Konus Stack)** | | | | |
| 6-08-94 | 1538-1640 | 78 | 0.292 | 5.97 |
| 6-08-94 | 1708-1811 | 80 | 0.355 | 6.42 |
| 6-08-94 | 1835-1938 | 70 | 0.227 | 5.46 |
| Avg | | 76 | 0.291 | 5.95 |
| **(Line 2 Konus Stack)** | | | | |
| 6-08-94 | 0757-0858 | 57 | 0.304 | 6.72 |
| 6-08-94 | 0920-1021 | 58 | 0.316 | 6.81 |
| 6-08-94 | 1114-1215 | 73 | 0.350 | 8.19 |
| Avg | | 63 | 0.323 | 7.24 |

Table 8a. Summary of the Results of the June, 1994 **Carbon Monoxide** Emission Compliance Tests at the Louisiana Pacific OSB Plant in Hayward, Wisconsin.

| Date | Time (HRS) | Concentration (ppm,d) | Emission Rate (LB/HR) |
|---|---|---|---|
| **(Line 1 Press RTO Stack)** | | | |
| 6-10-94 | 0935-1036 | 17 | 5.1 |
| 6-10-94 | 1100-1201 | 10 | 2.8 |
| 6-10-94 | 1220-1321 | 9 | 2.5 |
| Avg. | | 12 | 3.5 |
| **(Line 2 Press RTO Stack)** | | | |
| 6-09-94 | 1240-1342 | 9 | 3.2 |
| 6-09-94 | 1425-1527 | 13 | 4.5 |
| 6-09-94 | 1605-1719 | 23 | 4.0 |
| Avg. | | 15 | 3.9 |

Table 8b. Summary of the June, 1994 **Carbon Monoxide** Emission Compliance Tests at the Louisiana Pacific OSB Plant in Hayward, Wisconsin.

| Date | Time (HRS) | Concentration (ppm,d) | Emission Factor (LB/$10^6$BTU) | Emission Rate (LB/HR) | |
|---|---|---|---|---|---|
| **(Line 1 Konus Stack)** - Malfunction during Run 3 | | | | | |
| 6-08-94 | 1538-1640 | 92 | 0.210 | 4.32 | |
| 6-08-94 | 1708-1811 | 90 | 0.243 | 4.42 | |
| 6-08-94 | 1835-1935 | 704 | 1.39 | 33.6 | |
| Avg. | | 295 | 0.613 | 14.1 | 23 mm |
| 6-09-94 | 1345-1606 | 61 | 0.139 | 2.93 | |
| 6-09-94 | 1632-1743 | 179 | 0.353 | 8.40 | |
| 6-06-94 | 1802-1904 | 53 | 0.115 | 2.52 | |
| Avg. | | 98 | 0.202 | 4.62 | 22.9 |
| (Test used for compliance demonstration) | | | | | |
| 6-09-94 | 0851-1052 | 105 | 0.278 | 4.96 | |
| 6-09-94 | 1240-1534 | 104 | 0.253 | 4.84 | |
| 6-09-94 | 1610-1812 | 135 | 0.277 | 6.42 | |
| Avg. | | 115 | 0.269 | 5.41 | 20.1 |
| **(Line 2 Konus Stack)** | | | | | |
| 6-08-94 | 0757-0858 | 73 | 0.237 | 5.28 | |
| 6-08-94 | 0920-1021 | 67 | 0.222 | 4.78 | |
| 6-08-94 | 1114-1215 | 62 | 0.181 | 4.27 | |
| Avg. | | 67 | 0.213 | 4.78 | 22.94 |

Table 9. Summary of the June, 1994 **Formaldehyde** Emission Compliance Tests at the Louisiana Pacific OSB Plant in Hayward, Wisconsin.

| Date | Time (HRS) | Concentration (ppm,d) | Emission Rate (LB/HR) |
|---|---|---|---|
| **(Line 1 Press RTO Stack)** | | | |
| 6-07-94 | 1250-1352 | 0.24 | 0.075 |
| 6-07-94 | 1420-1522 | 0.01 | 0.002 |
| 6-07-94 | 1545-1646 | 0.33 | 0.105 |
| Avg. | | 0.19 | 0.061 |
| **(Line 2 Press RTO Stack)** | | | |
| 6-10-94 | 0815-0918 | 0.24 | 0.089 |
| 6-10-94 | 0941-1043 | 0.20 | 0.076 |
| 6-10-94 | 1121-1333 | 0.22 | 0.081 |
| Avg. | | 0.22 | 0.082 |
| **(Line 1 Konus Stack)** | | | |
| 6-09-94 | 1345-1606 | 0.03 | 0.0017 |
| 6-09-94 | 1632-1743 | 0.08 | 0.0042 |
| 6-09-94 | 1802-1904 | 0.05 | 0.0024 |
| Avg. | | 0.05 | 0.0028 |
| **(Line 2 Konus Stack)** | | | |
| 06-08-94 | 1446-1553 | 0.05 | 0.0041 |
| 06-08-94 | 1616-1718 | 0.04 | 0.0029 |
| 06-08-94 | 1742-1843 | 0.07 | 0.0061 |
| Avg | | 0.05 | 0.0044 |

Table 10. Summary of the June, 1994 **MDI** Emission Compliance Tests at the Louisiana Pacific OSB Plant in Hayward, Wisconsin.

| Date | Time (HRS) | Concentration (ppm,d) | Emission Rate (LB/HR) |
|---|---|---|---|
| **(Line 1 Press RTO Stack)** | | | |
| 6-08-94 | 0815-0916 | 0.0005 | 0.001 |
| 6-08-94 | 0945-1046 | < 0.0002 | < 0.0006 |
| 6-08-94 | 1115-1216 | 0.0005 | 0.001 |
| Avg. | | ≤ 0.0004 | ≤ 0.001 |
| **(Line 2 Press RTO Stack)** | | | |
| 6-09-94 | 1325-1441 | 0.0007 | 0.002 |
| 6-09-94 | 1518-1641 | < 0.0002 | < 0.0008 |
| 6-09-94 | 1712-1828 | 0.0006 | 0.002 |
| Avg. | | ≤ 0.0005 | ≤ 0.002 |

Table 11. Summary of the June, 1994 **Phenol** Emission Compliance Tests at the Louisiana Pacific OSB Plant in Hayward, Wisconsin.

| Date | Time (HRS) | Concentration (ppb,d) | Emission Rate ($10^{-3}$LB/HR) |
|---|---|---|---|
| **(Line 1 Konus Stack)** | | | |
| 6-09-94 | 0845-0945 | < 175 | < 28 |
| 6-09-94 | 1000-1100 | < 175 | < 27 |
| 6-09-94 | 1111-1320 | < 176 | < 28 |
| Avg. | | < 175 | < 28 |
| **(Line 2 Konus Stack)** | | | |
| 6-08-94 | 1447-1554 | < 176 | < 42 |
| 6-08-94 | 1616-1718 | < 177 | < 41 |
| 6-08-94 | 1743-1844 | < 176 | < 45 |
| Avg. | | < 176 | < 43 |

Table 12a. Summary of the June 9 & 10, 1994 **Total Hydrocarbon** Emission Compliance Tests at the Louisiana Pacific Plant in Hayward, Wisconsin.

| Date | Time (HRS) | Concentration (ppmC,w) | Emission Rate (LB/HR) |
|---|---|---|---|
| **(Line 1 RTO Press Inlet)** | | | |
| 6-10-94 | 0935-1037 | 96 | 11 |
| 6-10-94 | 1100-1205 | 55 | 6.5 |
| 6-10-94 | 1220-1322 | 42 | 4.9 |
| Avg. | | 64 | 7.5 |
| **(Line 1 RTO Press Stack)** | | | |
| 6-10-94 | 0935-1036 | 3 | 0.40 |
| 6-10-94 | 1100-1201 | 3 | 0.37 |
| 6-10-94 | 1220-1321 | 2 | 0.31 |
| Avg. | | 3 | 0.36 |
| **(Line 2 Press RTO Inlet)** | | | |
| 6-09-94 | 1240-1345 | 89 | 14 |
| 6-09-94 | 1425-1530 | 52 | 8.5 |
| 6-09-94 | 1605-1708 | 54 | 9.1 |
| Avg. | | 65 | 10.5 |
| **(Line 2 Press RTO Stack)** | | | |
| 6-09-94 | 1240-1345 | 1.7 | 0.27 |
| 6-09-94 | 1425-1530 | 1.5 | 0.24 |
| 6-09-94 | 1605-1708 | 1.6 | 0.24 |
| Avg. | | 1.6 | 0.25 |

Table 12b. Summary of the Results of the June 9 & 10, 1994 **Total Hydrocarbon Removal Efficiency Tests** at the Louisiana Pacific Corporation Plant in Hayward, Wisconsin.

| Date | Time (HRS) | THC Emission Rate (LB/HR) (Inlet) | (Stack) | Removal Efficiency (%) |
|---|---|---|---|---|
| **(Line 1 Press RTO)** | | | | |
| 6-10-94 | 0935-1037 | 11 | 0.40 | 96 |
| 6-10-94 | 1100-1205 | 7 | 0.37 | 95 |
| 6-10-94 | 1220-1322 | 5 | 0.31 | 94 |
| Average | | | | 95 |
| **(Line 2 Press RTO)** | | | | |
| 6-09-94 | 1240-1435 | 14 | 0.27 | 98 |
| 6-09-94 | 1425-1530 | 9 | 0.24 | 97 |
| 6-09-94 | 1605-1708 | 9 | 0.24 | 97 |
| Average | | | | 97 |

Table 14. Summary of the June, 1994 **Benzene** Emission Compliance Tests at the Louisiana Pacific OSB Plant in Hayward, Wisconsin.

| Date | Time (HRS) | Concentration (ppm,d) | Emission Rate (LB/HR) |
|---|---|---|---|
| **(Line 1 Konus Stack)** | | | |
| 6-09-94 | 0845-0945 | < 0.0115 | < 0.00153 |
| 6-09-94 | 1000-1100 | < 0.0111 | < 0.00144 |
| 6-09-94 | 1111-1320 | < 0.0115 | < 0.00152 |
| Avg. | | < 0.0114 | < 0.00150 |
| **(Line 2 Konus Stack)** | | | |
| 6-07-94 | 0849-0951 | < 0.0106 | < 0.00230 |
| 6-07-94 | 1142-1242 | < 0.0112 | < 0.00243 |
| 6-07-94 | 1436-1536 | < 0.0113 | < 0.00248 |
| Avg. | | < 0.0110 | < 0.00240 |

Table 15 Summary of the Results of the June 9, 1994 Polycyclic Organic Matter Determination on the Line 1 Konus Stack at the Louisiana Pacific Corporation Plant Located in Hayward, Wisconsin.

| Item | RUN 1 | RUN 2 | RUN 3 |
|---|---|---|---|
| **(Concentration ug/Nm³)** | | | |
| Benzo-a-anthracene | .75< | 3.9 | 4.4 |
| Benzo-b-fluoranthene | 21 | 11 | 14 |
| Benzo-a-pyrene | 5.4 | .5< | 3.9 |
| Dibenzo-a,h-anthracene | .36< | .36< | .36< |
| Dibenzo-a,i-pyrene | 8.3< | 8.3< | 8.1< |
| Dibenzo-a,h-acridine | 6.2< | 6.2< | 6.1< |
| Dibenzo-a,j-acridine | .66< | .66< | .65< |
| 7H-Dibenzo-c,g-carbazole | .5< | .5< | .49< |
| Dibenzo-a,h-pyrene | 8.3< | 8.3< | 8.1< |
| Indeno (1-2-3-cd)pyrene | 2.9 | .95 | 1.5 |
| **(Emission Rate 10-⁶g/sec)** | | | |
| Benzo-a-anthracene | 3.8< | 20 | 23 |
| Benzo-b-fluoranthene | 109 | 54 | 71 |
| Benzo-a-pyrene | 28 | 2.5< | 20 |
| Dibenzo-a,h-anthracene | 1.9< | 1.8< | 1.8< |
| Dibenzo-a,i-pyrene | 43< | 42< | 42< |
| Dibenzo-a,h-acridine | 32< | 31< | 31< |
| Dibenzo-a,j-acridine | 3.4< | 3.3< | 3.3< |
| 7H-Dibenzo-c,g-carbazole | 2.6< | 2.5< | 2.5< |
| Dibenzo-a,h-pyrene | 43< | 42< | 42< |
| Indeno (1-2-3-cd)pyrene | 15 | 4.8 | 7.9 |

Table 16 Summary of the Results of the June 9, 1994 Polycyclic Organic Matter Determination on the Line 2 Konus Stack at the Louisiana Pacific Corporation Plant Located in Hayward, Wisconsin.

| Item | RUN 1 | RUN 2 | RUN 3 |
|---|---|---|---|
| **(Concentration ug/Nm³)** | | | |
| Benzo-a-anthracene | .6< | .6< | .59< |
| Benzo-b-fluoranthene | .33< | .33< | .32< |
| Benzo-a-pyrene | 1.6 | .4< | .39< |
| Dibenzo-a,h-anthracene | .29< | .29< | .29< |
| Dibenzo-a,i-pyrene | 6.6< | 6.6< | 6.5< |
| Dibenzo-a,h-acridine | 5< | 5< | 4.9< |
| Dibenzo-a,j-acridine | .53< | .53< | .52< |
| 7H-Dibenzo-c,g-carbazole | .4< | .4< | .39< |
| Dibenzo-a,h-pyrene | 6.6< | 6.6< | 6.5< |
| Indeno (1-2-3-cd)pyrene | .3< | .3< | .29< |
| **(Emission Rate $10^{-6}$g/sec)** | | | |
| Benzo-a-anthracene | 5.0< | 5.0< | 5.0< |
| Benzo-b-fluoranthene | 2.8< | 2.8< | 2.8< |
| Benzo-a-pyrene | 14 | 3.4< | 3.3< |
| Dibenzo-a,h-anthracene | 2.5< | 2.5< | 2.5< |
| Dibenzo-a,i-pyrene | 56< | 56< | 56< |
| Dibenzo-a,h-acridine | 42< | 42< | 42< |
| Dibenzo-a,j-acridine | 4.5< | 4.5< | 4.5< |
| 7H-Dibenzo-c,g-carbazole | 3.4< | 3.4< | 3.3< |
| Dibenzo-a,h-pyrene | 56< | 56< | 56< |
| Indeno (1-2-3-cd)pyrene | 2.5< | 2.5< | 2.5< |

# 3 RESULTS

The results of all field and laboratory evaluations are presented in this section. Gas composition (orsat and moisture) are presented first followed by the computer printout of the particulate, oxides of nitrogen, opacity, carbon monoxide, formaldehyde, MDI, phenol, and PAH results. Preliminary measurements including test port locations are given in the appendices.

The results have been calculated on a personal computer using programs written in Extended BASIC specifically for source testing calculations. EPA-published equations have been used as the basis of the calculation techniques in these programs. The emission rates have been calculated using the product of the concentration times flow method.

## 3.1 Results of Orsat and Moisture Determinations

Test No. 1
Line 1 Press RTO Outlet Stack

**Results of Orsat & Moisture Analyses-----Methods 3 & 4(%v/v)**

| | Run 1 | Run 2 | Run 3 |
|---|---|---|---|
| Date of run | 06-07-94 | 06-07-94 | 06-07-94 |
| **Dry basis (orsat)** | | | |
| carbon dioxide..... | 0.30 | 0.40 | 0.40 |
| oxygen..... | 20.50 | 20.50 | 20.50 |
| nitrogen..... | 79.20 | 79.10 | 79.10 |
| **Wet basis (orsat)** | | | |
| carbon dioxide..... | 0.29 | 0.39 | 0.39 |
| oxygen..... | 20.04 | 20.06 | 19.90 |
| nitrogen..... | 77.42 | 77.42 | 76.77 |
| water vapor..... | 2.25 | 2.12 | 2.95 |
| Dry molecular weight..... | 28.87 | 28.88 | 28.88 |
| Wet molecular weight..... | 28.62 | 28.65 | 28.56 |
| Specific gravity..... | 0.989 | 0.990 | 0.987 |
| Water mass flow.....(LB/HR) | 0.00 | 0.00 | 0.00 |
| FO | 1.333 | 1.000 | 1.000 |

Test No. 2
Line 1 Press RTO Outlet Stack

**Results of Orsat & Moisture Analyses-----Methods 3 & 4(%v/v)**

| | Run 1 | Run 2 | Run 3 |
|---|---|---|---|
| Date of run | 06-08-94 | 06-08-94 | 06-08-94 |
| **Dry basis (orsat)** | | | |
| carbon dioxide..... | 0.40 | 0.40 | 0.40 |
| oxygen..... | 20.60 | 20.60 | 20.60 |
| nitrogen..... | 79.00 | 79.00 | 79.00 |
| **Wet basis (orsat)** | | | |
| carbon dioxide..... | 0.39 | 0.39 | 0.39 |
| oxygen..... | 19.93 | 19.91 | 20.01 |
| nitrogen..... | 76.43 | 76.35 | 76.75 |
| water vapor..... | 3.25 | 3.36 | 2.84 |
| Dry molecular weight..... | 28.89 | 28.89 | 28.89 |
| Wet molecular weight..... | 28.53 | 28.52 | 28.58 |
| Specific gravity..... | 0.986 | 0.985 | 0.987 |
| Water mass flow.....(LB/HR) | 0.00 | 0.00 | 0.00 |
| FO | 0.750 | 0.750 | 0.750 |

Test No. 3
Line 1 Press RTO Outlet Stack

**Results of Orsat & Moisture Analyses-----Methods 3 & 4(%v/v)**

| | Run 1 | Run 2 | Run 3 |
|---|---|---|---|
| Date of run | 06-10-94 | 06-10-94 | 06-10-94 |
| **Dry basis (orsat)** | | | |
| carbon dioxide..... | 0.40 | 0.40 | 0.40 |
| oxygen..... | 20.50 | 20.50 | 20.50 |
| nitrogen..... | 79.10 | 79.10 | 79.10 |
| **Wet basis (orsat)** | | | |
| carbon dioxide..... | 0.39 | 0.39 | 0.39 |
| oxygen..... | 20.00 | 19.87 | 19.90 |
| nitrogen..... | 77.16 | 76.68 | 76.78 |
| water vapor..... | 2.45 | 3.06 | 2.93 |
| Dry molecular weight..... | 28.88 | 28.88 | 28.88 |
| Wet molecular weight..... | 28.62 | 28.55 | 28.57 |
| Specific gravity..... | 0.989 | 0.986 | 0.987 |
| Water mass flow.....(LB/HR) | 4821 | 5843 | 5598 |
| FO | 1.000 | 1.000 | 1.000 |

Test No. 5
Line 1 Press RTO Inlet

**Results of Orsat & Moisture Analyses-----Methods 3 & 4(%v/v)**

| | Run 1 | Run 2 | Run 3 |
|---|---|---|---|
| Date of run | 06-10-94 | 06-10-94 | 06-10-94 |
| **Dry basis (orsat)** | | | |
| carbon dioxide..... | 0.03 | 0.03 | 0.03 |
| oxygen..... | 20.90 | 20.90 | 20.90 |
| nitrogen..... | 79.07 | 79.07 | 79.07 |
| **Wet basis (orsat)** | | | |
| carbon dioxide..... | 0.03 | 0.03 | 0.03 |
| oxygen..... | 20.50 | 20.38 | 20.42 |
| nitrogen..... | 77.56 | 77.12 | 77.25 |
| water vapor..... | 1.92 | 2.46 | 2.30 |
| Dry molecular weight..... | 28.84 | 28.84 | 28.84 |
| Wet molecular weight..... | 28.63 | 28.57 | 28.59 |
| Specific gravity..... | 0.989 | 0.987 | 0.988 |
| Water mass flow.....(LB/HR) | 3353 | 4375 | 4045 |

Test No. 5
Line 1 Konus Stack

**Results of Orsat & Moisture Analyses-----Methods 3 & 4(%v/v)**

| | Run 1 | Run 2 | Run 3 |
|---|---|---|---|
| Date of run | 06-08-94 | 06-08-94 | 06-08-94 |
| **Dry basis (orsat)** | | | |
| carbon dioxide..... | 6.00 | 5.00 | 7.00 |
| oxygen..... | 14.50 | 15.50 | 13.50 |
| nitrogen..... | 79.50 | 79.50 | 79.50 |
| **Wet basis (orsat)** | | | |
| carbon dioxide..... | 5.42 | 4.57 | 6.24 |
| oxygen..... | 13.09 | 14.17 | 12.03 |
| nitrogen..... | 71.79 | 72.70 | 70.85 |
| water vapor..... | 9.70 | 8.55 | 10.88 |
| Dry molecular weight..... | 29.54 | 29.42 | 29.66 |
| Wet molecular weight..... | 28.42 | 28.44 | 28.39 |
| Specific gravity..... | 0.982 | 0.983 | 0.981 |
| Water mass flow.....(LB/HR) | 3244 | 2955 | 3744 |
| FO | 1.067 | 1.080 | 1.057 |

Test No. 6
Line 1 Konus Stack

**Results of Orsat & Moisture Analyses-----Methods 3 & 4(%v/v)**

| | Run 1 | Run 2 | Run 3 |
|---|---|---|---|
| Date of run | 06-09-94 | 06-09-94 | 06-09-94 |
| **Dry basis (orsat)** | | | |
| carbon dioxide..... | 6.20 | 7.10 | 6.50 |
| oxygen..... | 14.50 | 13.50 | 14.20 |
| nitrogen..... | 79.30 | 79.40 | 79.30 |
| **Wet basis (orsat)** | | | |
| carbon dioxide..... | 5.72 | 6.43 | 5.94 |
| oxygen..... | 13.39 | 12.23 | 12.99 |
| nitrogen..... | 73.21 | 71.96 | 72.53 |
| water vapor..... | 7.68 | 9.37 | 8.54 |
| Dry molecular weight..... | 29.57 | 29.68 | 29.61 |
| Wet molecular weight..... | 28.68 | 28.58 | 28.62 |
| Specific gravity..... | 0.991 | 0.987 | 0.988 |
| Water mass flow.....(LB/HR) | 0.00 | 0.00 | 0.00 |
| FO | 1.032 | 1.042 | 1.031 |

Test No. 8
Line 1 Konus Stack

**Results of Orsat & Moisture Analyses-----Methods 3 & 4(%v/v)**

| | Run 1 | Run 2 | Run 3 |
|---|---|---|---|
| Date of run | 06-09-94 | 06-09-94 | 06-09-94 |
| **Dry basis (orsat)** | | | |
| carbon dioxide..... | 5.30 | 5.90 | 6.90 |
| oxygen..... | 15.40 | 14.90 | 13.80 |
| nitrogen..... | 79.30 | 79.20 | 79.30 |
| **Wet basis (orsat)** | | | |
| carbon dioxide..... | 4.87 | 5.40 | 6.22 |
| oxygen..... | 14.16 | 13.63 | 12.43 |
| nitrogen..... | 72.90 | 72.46 | 71.44 |
| water vapor..... | 8.07 | 8.52 | 9.91 |
| Dry molecular weight..... | 29.46 | 29.54 | 29.66 |
| Wet molecular weight..... | 28.54 | 28.56 | 28.50 |
| Specific gravity..... | 0.986 | 0.986 | 0.984 |
| Water mass flow.....(LB/HR) | 0.00 | 0.00 | 0.00 |
| FO | 1.038 | 1.017 | 1.029 |

Test No. 12
Line 2 Press RTO Outlet Stack

**Results of Orsat & Moisture Analyses-----Methods 3 & 4(%v/v)**

| | Run 1 | Run 2 | Run 3 |
|---|---|---|---|
| Date of run | 06-10-94 | 06-10-94 | 06-10-94 |
| **Dry basis (orsat)** | | | |
| carbon dioxide..... | 0.40 | 0.40 | 0.40 |
| oxygen..... | 20.55 | 20.60 | 20.55 |
| nitrogen..... | 79.05 | 79.00 | 79.05 |
| **Wet basis (orsat)** | | | |
| carbon dioxide..... | 0.39 | 0.39 | 0.39 |
| oxygen..... | 20.01 | 20.08 | 20.17 |
| nitrogen..... | 76.99 | 77.01 | 77.57 |
| water vapor..... | 2.61 | 2.52 | 1.87 |
| Dry molecular weight..... | 28.89 | 28.89 | 28.89 |
| Wet molecular weight..... | 28.60 | 28.61 | 28.68 |
| Specific gravity..... | 0.988 | 0.988 | 0.991 |
| Water mass flow.....(LB/HR) | 0.00 | 0.00 | 0.00 |
| FO | 0.875 | 0.750 | 0.875 |

Test No. 13
Line 2 Press RTO Outlet Stack

**Results of Orsat & Moisture Analyses-----Methods 3 & 4(%v/v)**

| | Run 1 | Run 2 | Run 3 |
|---|---|---|---|
| Date of run | 06-09-94 | 06-09-94 | 06-09-94 |
| **Dry basis (orsat)** | | | |
| carbon dioxide..... | 0.03 | 0.03 | 0.03 |
| oxygen..... | 20.90 | 20.90 | 20.90 |
| nitrogen..... | 79.07 | 79.07 | 79.07 |
| **Wet basis (orsat)** | | | |
| carbon dioxide..... | 0.03 | 0.03 | 0.03 |
| oxygen..... | 20.41 | 20.37 | 20.47 |
| nitrogen..... | 77.21 | 77.06 | 77.45 |
| water vapor..... | 2.35 | 2.54 | 2.05 |
| Dry molecular weight..... | 28.84 | 28.84 | 28.84 |
| Wet molecular weight..... | 28.59 | 28.57 | 28.62 |
| Specific gravity..... | 0.987 | 0.987 | 0.989 |
| Water mass flow.....(LB/HR) | 0.00 | 0.00 | 0.00 |

Test No. 14
Line 2 Press RTO Stack

**Results of Orsat & Moisture Analyses-----Methods 3 & 4(%v/v)**

| | Run 1 | Run 2 | Run 3 |
|---|---|---|---|
| Date of run | 06-09-94 | 06-09-94 | 06-09-94 |
| **Dry basis (orsat)** | | | |
| carbon dioxide..... | 0.40 | 0.40 | 0.40 |
| oxygen..... | 20.60 | 20.60 | 20.55 |
| nitrogen..... | 79.00 | 79.00 | 79.05 |
| **Wet basis (orsat)** | | | |
| carbon dioxide..... | 0.39 | 0.39 | 0.39 |
| oxygen..... | 20.11 | 20.08 | 20.13 |
| nitrogen..... | 77.14 | 76.99 | 77.43 |
| water vapor..... | 2.35 | 2.55 | 2.05 |
| Dry molecular weight..... | 28.89 | 28.89 | 28.89 |
| Wet molecular weight..... | 28.63 | 28.61 | 28.66 |
| Specific gravity..... | 0.989 | 0.988 | 0.990 |
| Water mass flow.....(LB/HR) | 5530 | 5940 | 4680 |
| FO | 0.750 | 0.750 | 0.875 |

Test No. 16
Line 2 Konus Stack

**Results of Orsat & Moisture Analyses-----Methods 3 & 4(%v/v)**

| | Run 1 | Run 2 | Run 3 |
|---|---|---|---|
| Date of run | 06-08-94 | 06-08-94 | 06-08-94 |
| **Dry basis (orsat)** | | | |
| carbon dioxide..... | 4.10 | 4.00 | 4.80 |
| oxygen..... | 16.40 | 16.50 | 15.90 |
| nitrogen..... | 79.50 | 79.50 | 79.30 |
| **Wet basis (orsat)** | | | |
| carbon dioxide..... | 3.83 | 3.72 | 4.43 |
| oxygen..... | 15.32 | 15.35 | 14.66 |
| nitrogen..... | 74.26 | 73.94 | 73.12 |
| water vapor..... | 6.60 | 6.99 | 7.80 |
| Dry molecular weight..... | 29.31 | 29.30 | 29.40 |
| Wet molecular weight..... | 28.57 | 28.51 | 28.51 |
| Specific gravity..... | 0.987 | 0.985 | 0.985 |
| Water mass flow.....(LB/HR) | 3285 | 3454 | 3742 |
| FO | 1.098 | 1.100 | 1.042 |

Test No. 17
Line 2 Konus Stack

**Results of Orsat & Moisture Analyses-----Methods 3 & 4(%v/v)**

| | Run 1 | Run 2 | Run 3 |
|---|---|---|---|
| Date of run | 06-08-94 | 06-08-94 | 06-08-94 |
| **Dry basis (orsat)** | | | |
| carbon dioxide..... | 4.40 | 4.40 | 4.30 |
| oxygen..... | 16.60 | 16.60 | 16.60 |
| nitrogen..... | 79.00 | 79.00 | 79.10 |
| **Wet basis (orsat)** | | | |
| carbon dioxide..... | 4.12 | 4.13 | 4.03 |
| oxygen..... | 15.55 | 15.57 | 15.57 |
| nitrogen..... | 74.00 | 74.08 | 74.18 |
| water vapor..... | 6.33 | 6.23 | 6.22 |
| Dry molecular weight..... | 29.37 | 29.37 | 29.35 |
| Wet molecular weight..... | 28.65 | 28.66 | 28.65 |
| Specific gravity..... | 0.990 | 0.990 | 0.990 |
| Water mass flow.....(LB/HR) | 0.00 | 0.00 | 0.00 |
| FO | 0.977 | 0.977 | 1.000 |

Test No. 19
Line 2 Konus Stack

**Results of Orsat & Moisture Analyses-----Methods 3 & 4(%v/v)**

| | Run 1 | Run 2 | Run 3 |
|---|---|---|---|
| Date of run | 06-07-94 | 06-07-94 | 06-07-94 |
| **Dry basis (orsat)** | | | |
| carbon dioxide..... | 5.00 | 4.90 | 4.00 |
| oxygen..... | 15.80 | 15.90 | 16.90 |
| nitrogen..... | 79.20 | 79.20 | 79.10 |
| **Wet basis (orsat)** | | | |
| carbon dioxide..... | 4.58 | 4.51 | 3.68 |
| oxygen..... | 14.49 | 14.64 | 15.56 |
| nitrogen..... | 72.61 | 72.92 | 72.83 |
| water vapor..... | 8.32 | 7.93 | 7.93 |
| Dry molecular weight..... | 29.43 | 29.42 | 29.32 |
| Wet molecular weight..... | 28.48 | 28.51 | 28.42 |
| Specific gravity..... | 0.984 | 0.985 | 0.982 |
| Water mass flow.....(LB/HR) | 0.00 | 0.00 | 0.00 |
| FO | 1.020 | 1.020 | 1.000 |

Test No. 21
Line 2 Press RTO Inlet

**Results of Orsat & Moisture Analyses-----Methods 3 & 4(%v/v)**

| | Run 1 | Run 2 | Run 3 |
|---|---|---|---|
| Date of run | 06-09-94 | 06-09-94 | 06-09-94 |
| **Dry basis (orsat)** | | | |
| carbon dioxide..... | 0.03 | 0.03 | 0.03 |
| oxygen..... | 20.90 | 20.90 | 20.90 |
| nitrogen..... | 79.07 | 79.07 | 79.07 |
| **Wet basis (orsat)** | | | |
| carbon dioxide..... | 0.03 | 0.03 | 0.03 |
| oxygen..... | 20.39 | 20.40 | 20.36 |
| nitrogen..... | 77.12 | 77.20 | 77.03 |
| water vapor..... | 2.46 | 2.37 | 2.58 |
| Dry molecular weight..... | 28.84 | 28.84 | 28.84 |
| Wet molecular weight..... | 28.57 | 28.58 | 28.56 |
| Specific gravity..... | 0.987 | 0.987 | 0.987 |
| Water mass flow.....(LB/HR) | 5859 | 5838 | 6545 |

## 3.2 Results of Particulate Determinations

Test No. 5
Line 1 Press RTO Inlet

**Results of Particulate Loading Determinations-------Method 5**

| | Run 1 | Run 2 | Run 3 |
|---|---|---|---|
| Date of run | 06-10-94 | 06-10-94 | 06-10-94 |
| Time run start/end.....(HRS) | 935/1037 | 1100/1205 | 1220/1322 |
| Static pressure.....(IN.WC) | -2.95 | -2.95 | -2.95 |
| Cross sectional area (SQ.FT) | 15.39 | 15.39 | 15.39 |
| Pitot tube coefficient..... | .840 | .840 | .840 |
| Water in sample gas | | | |
| condenser.....(ML) | 0.0 | 0.0 | 0.0 |
| impingers.....(GRAMS) | 0.0 | 7.0 | 2.0 |
| desiccant.....(GRAMS) | 19.0 | 18.0 | 21.0 |
| total.....(GRAMS) | 19.0 | 25.0 | 23.0 |
| Total particulate material.. | | | |
| .....collected(grams) | 0.0430 | 0.0295 | 0.0387 |
| Gas meter coefficient..... | 0.9961 | 0.9961 | 0.9961 |
| Barometric pressure..(IN.HG) | 28.93 | 28.93 | 28.93 |
| Avg. orif.pres.drop..(IN.WC) | 1.94 | 2.04 | 2.00 |
| Avg. gas meter temp..(DEF-F) | 77.5 | 87.8 | 91.9 |
| Volume through gas meter.... | | | |
| at meter conditions...(CF) | 48.27 | 50.02 | 49.74 |
| standard conditions.(DSCF) | 45.88 | 46.66 | 46.05 |
| Total sampling time....(MIN) | 60.00 | 60.00 | 60.00 |
| Nozzle diameter.....(IN) | .188 | .188 | .188 |
| Avg.stack gas temp ..(DEG-F) | 121 | 123 | 126 |
| Volumetric flow rate..... | | | |
| actual.....(ACFM) | 71543 | 72779 | 72499 |
| dry standard.....(DSCFM) | 61212 | 61735 | 61233 |
| Isokinetic variation.....(%) | 99.8 | 100.6 | 100.1 |
| Particulate concentration... | | | |
| actual.....(GR/ACF) | 0.01237 | 0.00827 | 0.01095 |
| dry standard.....(GR/DSCF) | 0.01446 | 0.00976 | 0.01297 |
| Particle mass rate...(LB/HR) | 7.588 | 5.162 | 6.806 |

Test No. 3
Line 1 Press RTO Outlet Stack

**Results of Particulate Loading Determinations-------Method 5**

| | Run 1 | Run 2 | Run 3 |
|---|---|---|---|
| Date of run | 06-10-94 | 06-10-94 | 06-10-94 |
| Time run start/end.....(HRS) | 935/1036 | 1100/1201 | 1220/1321 |
| Static pressure.....(IN.WC) | -0.43 | -0.43 | -0.43 |
| Cross sectional area (SQ.FT) | 31.09 | 31.09 | 31.09 |
| Pitot tube coefficient..... | .840 | .840 | .840 |
| Water in sample gas | | | |
| condenser.....(ML) | 0.0 | 0.0 | 0.0 |
| impingers.....(GRAMS) | 9.0 | 13.0 | 14.0 |
| desiccant.....(GRAMS) | 15.0 | 16.0 | 14.0 |
| total.....(GRAMS) | 24.0 | 29.0 | 28.0 |
| Total particulate material.. | | | |
| .....collected(grams) | 0.0311 | 0.0270 | 0.0221 |
| Gas meter coefficient..... | 1.0066 | 1.0066 | 1.0066 |
| Barometric pressure..(IN.HG) | 28.93 | 28.93 | 28.93 |
| Avg. orif.pres.drop..(IN.WC) | 1.91 | 1.85 | 1.89 |
| Avg. gas meter temp..(DEF-F) | 71.5 | 84.4 | 90.5 |
| Volume through gas meter.... | | | |
| at meter conditions...(CF) | 46.38 | 45.67 | 46.68 |
| standard conditions.(DSCF) | 45.04 | 43.30 | 43.77 |
| Total sampling time....(MIN) | 60.00 | 60.00 | 60.00 |
| Nozzle diameter.....(IN) | .251 | .251 | .251 |
| Avg.stack gas temp ..(DEG-F) | 259 | 264 | 268 |
| Volumetric flow rate..... | | | |
| actual.....(ACFM) | 98861 | 96534 | 97230 |
| dry standard.....(DSCFM) | 68420 | 65961 | 66157 |
| Isokinetic variation.....(%) | 99.3 | 99.0 | 99.8 |
| Particulate concentration... | | | |
| actual.....(GR/ACF) | 0.00737 | 0.00657 | 0.00530 |
| dry standard.....(GR/DSCF) | 0.01065 | 0.00962 | 0.00779 |
| Particle mass rate...(LB/HR) | 6.248 | 5.440 | 4.418 |

Test No. 5
Line 1 Konus Stack

**Results of Particulate Loading Determinations-------Method 5**

| | Run 1 | Run 2 | Run 3 |
|---|---|---|---|
| Date of run | 06-08-94 | 06-08-94 | 06-08-94 |
| Time run start/end.....(HRS) | 1538/1640 | 1708/1811 | 1835/1938 |
| Static pressure.....(IN.WC) | -0.20 | -0.20 | -0.20 |
| Cross sectional area (SQ.FT) | 14.75 | 14.75 | 14.75 |
| Pitot tube coefficient..... | .840 | .840 | .840 |
| Water in sample gas | | | |
| condenser.....(ML) | 0.0 | 0.0 | 0.0 |
| impingers.....(GRAMS) | 57.0 | 51.0 | 71.0 |
| desiccant.....(GRAMS) | 13.0 | 11.0 | 10.0 |
| total.....(GRAMS) | 70.0 | 62.0 | 81.0 |
| Total particulate material.. | | | |
| .....collected(grams) | 0.0743 | 0.0423 | 0.0513 |
| Gas meter coefficient..... | 0.9974 | 0.9974 | 0.9974 |
| Barometric pressure..(IN.HG) | 28.98 | 28.98 | 28.98 |
| Avg. orif.pres.drop..(IN.WC) | 0.88 | 0.92 | 0.92 |
| Avg. gas meter temp..(DEF-F) | 80.3 | 86.0 | 87.5 |
| Volume through gas meter.... | | | |
| at meter conditions...(CF) | 32.50 | 33.40 | 33.52 |
| standard conditions.(DSCF) | 30.74 | 31.26 | 31.29 |
| Total sampling time....(MIN) | 60.00 | 60.00 | 60.00 |
| Nozzle diameter.....(IN) | .355 | .355 | .355 |
| Avg.stack gas temp ..(DEG-F) | 310 | 314 | 314 |
| Volumetric flow rate..... | | | |
| actual.....(ACFM) | 17975 | 18652 | 18575 |
| dry standard.....(DSCFM) | 10771 | 11266 | 10936 |
| Isokinetic variation.....(%) | 102.1 | 99.3 | 102.4 |
| Particulate concentration... | | | |
| actual.....(GR/ACF) | 0.02234 | 0.01261 | 0.01489 |
| dry standard.....(GR/DSCF) | 0.03730 | 0.02088 | 0.02530 |
| Particle mass rate...(LB/HR) | 3.443 | 2.016 | 2.371 |

Test No. 16
Line 2 Konus Stack

**Results of Particulate Loading Determinations-------Method 5**

| | Run 1 | Run 2 | Run 3 |
|---|---|---|---|
| Date of run | 06-08-94 | 06-08-94 | 06-08-94 |
| Time run start/end.....(HRS) | 757/ 858 | 920/1021 | 1114/1215 |
| Static pressure.....(IN.WC) | -0.28 | -0.28 | -0.28 |
| Cross sectional area (SQ.FT) | 14.47 | 14.47 | 14.47 |
| Pitot tube coefficient..... | .840 | .840 | .840 |
| Water in sample gas | | | |
| condenser.....(ML) | 0.0 | 0.0 | 0.0 |
| impingers.....(GRAMS) | 58.0 | 62.0 | 67.0 |
| desiccant.....(GRAMS) | 15.0 | 16.0 | 18.0 |
| total.....(GRAMS) | 73.0 | 78.0 | 85.0 |
| Total particulate material.. | | | |
| .....collected(grams) | 0.0764 | 0.0520 | 0.0454 |
| Gas meter coefficient..... | 0.9961 | 0.9961 | 0.9961 |
| Barometric pressure..(IN.HG) | 28.98 | 28.98 | 28.98 |
| Avg. orif.pres.drop..(IN.WC) | 2.13 | 2.19 | 2.08 |
| Avg. gas meter temp..(DEF-F) | 62.5 | 74.3 | 80.5 |
| Volume through gas meter.... | | | |
| at meter conditions...(CF) | 49.74 | 51.03 | 50.03 |
| standard conditions.(DSCF) | 48.74 | 48.90 | 47.38 |
| Total sampling time....(MIN) | 60.00 | 60.00 | 60.00 |
| Nozzle diameter.....(IN) | .363 | .363 | .363 |
| Avg.stack gas temp ..(DEG-F) | 319 | 317 | 325 |
| Volumetric flow rate..... | | | |
| actual.....(ACFM) | 27063 | 26771 | 26291 |
| dry standard.....(DSCFM) | 16583 | 16372 | 15772 |
| Isokinetic variation.....(%) | 98.6 | 100.3 | 100.8 |
| Particulate concentration... | | | |
| actual.....(GR/ACF) | 0.01482 | 0.01003 | 0.00887 |
| dry standard.....(GR/DSCF) | 0.02419 | 0.01641 | 0.01478 |
| Particle mass rate...(LB/HR) | 3.438 | 2.302 | 1.999 |

Test No. 21
Line 2 Press RTO Inlet

**Results of Particulate Loading Determinations-------Method 5**

| | Run 1 | Run 2 | Run 3 |
|---|---|---|---|
| Date of run | 06-09-94 | 06-09-94 | 06-09-94 |
| Time run start/end.....(HRS) | 1240/1345 | 1425/1530 | 1605/1708 |
| Static pressure.....(IN.WC) | -4.40 | -4.40 | -4.40 |
| Cross sectional area (SQ.FT) | 18.67 | 18.67 | 18.67 |
| Pitot tube coefficient..... | .840 | .840 | .840 |
| Water in sample gas | | | |
| condenser.....(ML) | 0.0 | 0.0 | 0.0 |
| impingers.....(GRAMS) | 2.0 | 1.0 | 2.0 |
| desiccant.....(GRAMS) | 22.0 | 23.0 | 25.0 |
| total.....(GRAMS) | 24.0 | 24.0 | 27.0 |
| Total particulate material.. | | | |
| .....collected(grams) | 0.4684 | 0.3273 | 0.4352 |
| Gas meter coefficient..... | 1.0066 | 1.0066 | 1.0066 |
| Barometric pressure..(IN.HG) | 28.58 | 28.90 | 28.90 |
| Avg. orif.pres.drop..(IN.WC) | 2.01 | 2.17 | 2.31 |
| Avg. gas meter temp..(DEF-F) | 77.4 | 93.0 | 95.7 |
| Volume through gas meter.... | | | |
| at meter conditions...(CF) | 47.20 | 49.93 | 51.84 |
| standard conditions.(DSCF) | 44.80 | 46.59 | 48.15 |
| Total sampling time....(MIN) | 60.00 | 60.00 | 60.00 |
| Nozzle diameter.....(IN) | .177 | .177 | .177 |
| Avg.stack gas temp ..(DEG-F) | 118 | 121 | 120 |
| Volumetric flow rate..... | | | |
| actual.....(ACFM) | 98275 | 101098 | 104155 |
| dry standard.....(DSCFM) | 82705 | 85694 | 88252 |
| Isokinetic variation.....(%) | 98.7 | 99.0 | 99.4 |
| Particulate concentration... | | | |
| actual.....(GR/ACF) | 0.13571 | 0.09185 | 0.11811 |
| dry standard.....(GR/DSCF) | 0.16132 | 0.10840 | 0.13945 |
| Particle mass rate...(LB/HR) | 114.358 | 79.622 | 105.489 |

Test No. 14
Line 2 Press RTO Stack

**Results of Particulate Loading Determinations-------Method 5**

| | Run 1 | Run 2 | Run 3 |
|---|---|---|---|
| Date of run | 06-09-94 | 06-09-94 | 06-09-94 |
| Time run start/end.....(HRS) | 1240/1342 | 1425/1527 | 1605/1719 |
| Static pressure.....(IN.WC) | -0.98 | -0.98 | -0.98 |
| Cross sectional area (SQ.FT) | 31.71 | 31.71 | 31.71 |
| Pitot tube coefficient..... | .840 | .840 | .840 |
| Water in sample gas | | | |
| condenser.....(ML) | 0.0 | 0.0 | 0.0 |
| impingers.....(GRAMS) | 10.0 | 10.0 | 9.0 |
| desiccant.....(GRAMS) | 16.0 | 18.0 | 13.0 |
| total.....(GRAMS) | 26.0 | 28.0 | 22.0 |
| Total particulate material.. | | | |
| .....collected(grams) | 0.0685 | 0.0234 | 0.0342 |
| Gas meter coefficient..... | 0.9947 | 0.9947 | 0.9947 |
| Barometric pressure..(IN.HG) | 28.90 | 28.90 | 28.90 |
| Avg. orif.pres.drop..(IN.WC) | 2.69 | 2.70 | 2.63 |
| Avg. gas meter temp..(DEF-F) | 86.7 | 96.5 | 101.4 |
| Volume through gas meter.... | | | |
| at meter conditions...(CF) | 54.43 | 55.03 | 54.54 |
| standard conditions.(DSCF) | 50.83 | 50.49 | 49.59 |
| Total sampling time....(MIN) | 60.00 | 60.00 | 60.00 |
| Nozzle diameter.....(IN) | .246 | .246 | .246 |
| Avg.stack gas temp ..(DEG-F) | 253 | 256 | 258 |
| Volumetric flow rate..... | | | |
| actual.....(ACFM) | 117314 | 116983 | 114900 |
| dry standard.....(DSCFM) | 81742 | 80986 | 79766 |
| Isokinetic variation.....(%) | 99.6 | 99.9 | 99.6 |
| Particulate concentration... | | | |
| actual.....(GR/ACF) | 0.01448 | 0.00495 | 0.00738 |
| dry standard.....(GR/DSCF) | 0.02079 | 0.00715 | 0.01064 |
| Particle mass rate...(LB/HR) | 14.568 | 4.964 | 7.275 |

## 3.3 Results of Oxides of Nitrogen Determinations

Test No. 5
Line 1 Konus Stack

**Results of Oxides of Nitrogen (NOx) Determinations---------Method 7**

| | Run 1A | Run 1B | Run 1C | Run 1D |
|---|---|---|---|---|
| Date of run..... | 06-08-94 | 06-08-94 | 06-08-94 | 06-08-94 |
| Time of run.....(HRS) | 1540 | 1552 | 1614 | 1632 |
| Flask number..... | 19 | 20 | 21 | 22 |
| Volume of flask.....(ML) | 2069 | 2060 | 2068 | 2031 |
| **Data: time of sampling** | | | | |
| flask temperature..(DEG-F) | 70.00 | 70.00 | 70.00 | 70.00 |
| bar. press.....(IN.HG) | 28.90 | 28.90 | 28.90 | 28.90 |
| flask vacuum.....(IN.HG) | 27.33 | 27.35 | 27.41 | 27.40 |
| flask abs. press...(IN.HG) | 1.57 | 1.55 | 1.49 | 1.50 |
| **Data: Time of Flask Opening** | | | | |
| flask temperature..(DEG-F) | 72.00 | 72.00 | 72.00 | 72.00 |
| lab. bar. press....(IN.HG) | 28.97 | 28.97 | 28.97 | 28.97 |
| flask static press.(IN.HG) | -0.40 | -0.90 | -3.20 | -0.30 |
| flask abs. press...(IN.HG) | 28.57 | 28.07 | 25.77 | 28.67 |
| Volume gas sampled....(DSML) | 1830 | 1789 | 1644 | 1807 |
| Moisture content.....(%V/V) | 9.70 | 9.70 | 9.70 | 9.70 |
| Nitrate in gas sample...(JG) | 359.0 | 349.0 | 353.0 | 347.0 |
| NO2 in gas sample.....(JG) | 266.4 | 259.0 | 261.9 | 257.5 |
| **NOx Concentration** | | | | |
| (GR/DSCF)..... | 0.0636 | 0.0633 | 0.0696 | 0.0623 |
| (MG/DSCM)..... | 146 | 145 | 159 | 143 |
| (PPM-DRY)..... | 76 | 76 | 83 | 75 |
| (PPM-WET)..... | 69 | 68 | 75 | 67 |
| NOX Emission rate....(LB/HR) | 5.87 | 5.84 | 6.43 | 5.75 |

Test No. 5
Line 1 Konus Stack

**Results of Oxides of Nitrogen (NOx) Determinations---------Method 7**

| | Run 2A | Run 2B | Run 2C | Run 2D |
|---|---|---|---|---|
| Date of run..... | 06-08-94 | 06-08-94 | 06-08-94 | 06-08-94 |
| Time of run.....(HRS) | 1708 | 1723 | 1738 | 1755 |
| Flask number..... | 23 | 24 | 61 | 62 |
| Volume of flask.....(ML) | 2056 | 2031 | 2100 | 2079 |
| **Data: time of sampling** | | | | |
| flask temperature..(DEG-F) | 70.00 | 70.00 | 70.00 | 70.00 |
| bar. press.....(IN.HG) | 28.90 | 28.90 | 28.90 | 28.90 |
| flask vacuum.....(IN.HG) | 27.39 | 27.28 | 27.50 | 27.44 |
| flask abs. press...(IN.HG) | 1.51 | 1.62 | 1.40 | 1.46 |
| **Data: Time of Flask Opening** | | | | |
| flask temperature..(DEG-F) | 72.00 | 72.00 | 72.00 | 72.00 |
| lab. bar. press....(IN.HG) | 28.97 | 28.97 | 28.97 | 28.97 |
| flask static press.(IN.HG) | -1.00 | -0.10 | -0.80 | -2.40 |
| flask abs. press...(IN.HG) | 27.97 | 28.87 | 28.17 | 26.57 |
| Volume gas sampled....(DSML) | 1782 | 1812 | 1841 | 1710 |
| Moisture content.....(%V/V) | 8.55 | 8.55 | 8.55 | 8.55 |
| Nitrate in gas sample...(JG) | 368.0 | 461.0 | 313.0 | 324.0 |
| NO2 in gas sample.....(JG) | 273.0 | 342.1 | 232.2 | 240.4 |
| **NOx Concentration** | | | | |
| (GR/DSCF)..... | 0.0670 | 0.0825 | 0.0551 | 0.0614 |
| (MG/DSCM)..... | 153 | 189 | 126 | 141 |
| (PPM-DRY)..... | 80 | 99 | 66 | 74 |
| (PPM-WET)..... | 73 | 90 | 60 | 67 |
| NOX Emission rate....(LB/HR) | 6.47 | 7.97 | 5.32 | 5.93 |

Test No. 5
Line 1 Konus Stack

**Results of Oxides of Nitrogen (NOx) Determinations---------Method 7**

| | Run 3A | Run 3B | Run 3C | Run 3D |
|---|---|---|---|---|
| Date of run..... | 06-08-94 | 06-08-94 | 06-08-94 | 06-08-94 |
| Time of run.....(HRS) | 1835 | 1850 | 1910 | 1925 |
| Flask number..... | 63 | 64 | 65 | 66 |
| Volume of flask.....(ML) | 2067 | 2087 | 2068 | 2096 |
| **Data: time of sampling** | | | | |
| flask temperature..(DEG-F) | 70.00 | 70.00 | 70.00 | 70.00 |
| bar. press.....(IN.HG) | 28.90 | 28.90 | 28.90 | 28.90 |
| flask vacuum.....(IN.HG) | 27.43 | 27.40 | 27.44 | 27.50 |
| flask abs. press...(IN.HG) | 1.47 | 1.50 | 1.46 | 1.40 |
| **Data: Time of Flask Opening** | | | | |
| flask temperature..(DEG-F) | 72.00 | 72.00 | 72.00 | 72.00 |
| lab. bar. press....(IN.HG) | 28.97 | 28.97 | 28.97 | 28.97 |
| flask static press.(IN.HG) | -2.80 | -0.60 | -2.00 | -1.60 |
| flask abs. press...(IN.HG) | 26.17 | 28.37 | 26.97 | 27.37 |
| Volume gas sampled....(DSML) | 1672 | 1837 | 1728 | 1783 |
| Moisture content.....(%V/V) | 10.88 | 10.88 | 10.88 | 10.88 |
| Nitrate in gas sample...(JG) | 352.0 | 283.0 | 291.0 | 331.0 |
| NO2 in gas sample.....(JG) | 261.2 | 210.0 | 215.9 | 245.6 |
| **NOx Concentration** | | | | |
| (GR/DSCF)..... | 0.0683 | 0.0500 | 0.0546 | 0.0602 |
| (MG/DSCM)..... | 156 | 114 | 125 | 138 |
| (PPM-DRY)..... | 82 | 60 | 65 | 72 |
| (PPM-WET)..... | 73 | 53 | 58 | 64 |
| NOX Emission rate....(LB/HR) | 6.40 | 4.68 | 5.12 | 5.64 |

Test No. 16
Line 2 Konus Stack

**Results of Oxides of Nitrogen (NOx) Determinations---------Method 7**

| | Run 1A | Run 1B | Run 1C | Run 1D |
|---|---|---|---|---|
| Date of run..... | 06-08-94 | 06-08-94 | 06-08-94 | 06-08-94 |
| Time of run.....(HRS) | 800 | 815 | 830 | 845 |
| Flask number..... | 13 | 14 | 15 | 16 |
| Volume of flask.....(ML) | 2060 | 2048 | 2045 | 2067 |
| **Data: time of sampling** | | | | |
| flask temperature..(DEG-F) | 59.00 | 59.00 | 59.00 | 60.00 |
| bar. press.....(IN.HG) | 28.98 | 28.98 | 28.98 | 28.98 |
| flask vacuum.....(IN.HG) | 27.40 | 27.30 | 27.40 | 27.40 |
| flask abs. press...(IN.HG) | 1.58 | 1.68 | 1.58 | 1.58 |
| **Data: Time of Flask Opening** | | | | |
| flask temperature..(DEG-F) | 72.00 | 72.00 | 72.00 | 72.00 |
| lab. bar. press....(IN.HG) | 28.97 | 28.97 | 28.97 | 28.97 |
| flask static press.(IN.HG) | 0.00 | 0.40 | 0.40 | -0.30 |
| flask abs. press...(IN.HG) | 28.97 | 29.37 | 29.37 | 28.67 |
| Volume gas sampled....(DSML) | 1846 | 1855 | 1859 | 1832 |
| Moisture content.....(%V/V) | 6.60 | 6.60 | 6.60 | 6.60 |
| Nitrate in gas sample...(JG) | 264.0 | 272.0 | 272.0 | 270.0 |
| NO2 in gas sample.....(JG) | 195.9 | 201.8 | 201.8 | 200.3 |
| **NOx Concentration** | | | | |
| (GR/DSCF)..... | 0.0464 | 0.0476 | 0.0475 | 0.0478 |
| (MG/DSCM)..... | 106 | 109 | 109 | 109 |
| (PPM-DRY)..... | 55 | 57 | 57 | 57 |
| (PPM-WET)..... | 52 | 53 | 53 | 53 |
| NOX Emission rate....(LB/HR) | 6.59 | 6.76 | 6.74 | 6.79 |

Test No. 16
Line 2 Konus Stack

**Results of Oxides of Nitrogen (NOx) Determinations---------Method 7**

| | Run 2A | Run 2B | Run 2C | Run 2D |
|---|---|---|---|---|
| Date of run..... | 06-08-94 | 06-08-94 | 06-08-94 | 06-08-94 |
| Time of run.....(HRS) | 920 | 935 | 950 | 1005 |
| Flask number..... | 17 | 18 | 55 | 56 |
| Volume of flask.....(ML) | 2054 | 2045 | 2086 | 2069 |
| **Data: time of sampling** | | | | |
| flask temperature..(DEG-F) | 60.00 | 60.00 | 60.00 | 60.00 |
| bar. press.....(IN.HG) | 28.98 | 28.98 | 28.98 | 28.98 |
| flask vacuum.....(IN.HG) | 27.30 | 27.30 | 27.30 | 27.30 |
| flask abs. press...(IN.HG) | 1.68 | 1.68 | 1.68 | 1.68 |
| **Data: Time of Flask Opening** | | | | |
| flask temperature..(DEG-F) | 72.00 | 72.00 | 72.00 | 72.00 |
| lab. bar. press....(IN.HG) | 28.97 | 28.97 | 28.97 | 28.97 |
| flask static press.(IN.HG) | -0.90 | 0.40 | 0.20 | 0.00 |
| flask abs. press...(IN.HG) | 28.07 | 29.37 | 29.17 | 28.97 |
| Volume gas sampled....(DSML) | 1773 | 1852 | 1876 | 1847 |
| Moisture content.....(%V/V) | 6.99 | 6.99 | 6.99 | 6.99 |
| Nitrate in gas sample...(JG) | 273.0 | 252.0 | 283.0 | 291.0 |
| NO2 in gas sample.....(JG) | 202.6 | 187.0 | 210.0 | 215.9 |
| **NOx Concentration** | | | | |
| (GR/DSCF)..... | 0.0499 | 0.0441 | 0.0489 | 0.0511 |
| (MG/DSCM)..... | 114 | 101 | 112 | 117 |
| (PPM-DRY)..... | 60 | 53 | 59 | 61 |
| (PPM-WET)..... | 56 | 49 | 54 | 57 |
| NOX Emission rate....(LB/HR) | 7.01 | 6.19 | 6.86 | 7.17 |

Test No. 16
Line 2 Konus Stack

**Results of Oxides of Nitrogen (NOx) Determinations---------Method 7**

| | Run 3A | Run 3B | Run 3C | Run 3D |
|---|---|---|---|---|
| Date of run..... | 06-08-94 | 06-08-94 | 06-08-94 | 06-08-94 |
| Time of run.....(HRS) | 1115 | 1130 | 1145 | 1200 |
| Flask number..... | 57 | 58 | 59 | 60 |
| Volume of flask.....(ML) | 2062 | 2085 | 2077 | 2066 |
| **Data: time of sampling** | | | | |
| flask temperature..(DEG-F) | 64.00 | 65.00 | 65.00 | 65.00 |
| bar. press.....(IN.HG) | 28.98 | 28.98 | 28.98 | 28.98 |
| flask vacuum.....(IN.HG) | 27.30 | 27.20 | 27.30 | 27.30 |
| flask abs. press...(IN.HG) | 1.68 | 1.78 | 1.68 | 1.68 |
| **Data: Time of Flask Opening** | | | | |
| flask temperature..(DEG-F) | 72.00 | 72.00 | 72.00 | 72.00 |
| lab. bar. press....(IN.HG) | 28.97 | 28.97 | 28.97 | 28.97 |
| flask static press.(IN.HG) | 0.10 | -0.40 | 0.00 | -0.30 |
| flask abs. press...(IN.HG) | 29.07 | 28.57 | 28.97 | 28.67 |
| Volume gas sampled....(DSML) | 1848 | 1828 | 1855 | 1825 |
| Moisture content.....(%V/V) | 7.80 | 7.80 | 7.80 | 7.80 |
| Nitrate in gas sample...(JG) | 320.0 | 325.0 | 340.0 | 389.0 |
| NO2 in gas sample.....(JG) | 237.4 | 241.1 | 252.3 | 288.6 |
| **NOx Concentration** | | | | |
| (GR/DSCF)..... | 0.0561 | 0.0576 | 0.0594 | 0.0691 |
| (MG/DSCM)..... | 128 | 132 | 136 | 158 |
| (PPM-DRY)..... | 67 | 69 | 71 | 83 |
| (PPM-WET)..... | 62 | 64 | 66 | 76 |
| NOX Emission rate....(LB/HR) | 7.59 | 7.79 | 8.03 | 9.34 |

## 3.4 Results of Opacity Observations

Test No. 3
Line 1 Press RTO Outlet Stack

**Results of Opacity Observations ---------- EPA Method 9**

| PERCENT OPACITY | OPTICAL DENSITY | RELATIVE FREQUENCY (%) |
|---|---|---|
| 0 | 0.0000 | 100.00 |
| 5 | 0.0223 | 0.00 |
| 10 | 0.0458 | 0.00 |
| 15 | 0.0706 | 0.00 |
| 20 | 0.0969 | 0.00 |
| 25 | 0.1249 | 0.00 |
| 30 | 0.1549 | 0.00 |
| 35 | 0.1871 | 0.00 |
| 40 | 0.2219 | 0.00 |
| 45 | 0.2596 | 0.00 |
| 50 | 0.3010 | 0.00 |
| 55 | 0.3468 | 0.00 |
| 60 | 0.3979 | 0.00 |
| 65 | 0.4559 | 0.00 |
| 70 | 0.5229 | 0.00 |
| 75 | 0.6021 | 0.00 |
| 80 | 0.6690 | 0.00 |
| 85 | 0.8239 | 0.00 |
| 90 | 1.0000 | 0.00 |
| 95 | 1.3010 | 0.00 |
| 99 | 2.0000 | 0.00 |
| Avg Opac 0.00 | Avg OD 0.0000 | Time average |

Observer: David Vaaler
Cert. Date: 04-06-94
Date of Observation: 06-10-94
Time of Observation: 1100/1200

Test No. 5
Line 1 Konus Stack

**Results of Opacity Observations ---------- EPA Method 9**

| PERCENT OPACITY | OPTICAL DENSITY | RELATIVE FREQUENCY (%) |
|---|---|---|
| 0 | 0.0000 | 100.00 |
| 5 | 0.0223 | 0.00 |
| 10 | 0.0458 | 0.00 |
| 15 | 0.0706 | 0.00 |
| 20 | 0.0969 | 0.00 |
| 25 | 0.1249 | 0.00 |
| 30 | 0.1549 | 0.00 |
| 35 | 0.1871 | 0.00 |
| 40 | 0.2219 | 0.00 |
| 45 | 0.2596 | 0.00 |
| 50 | 0.3010 | 0.00 |
| 55 | 0.3468 | 0.00 |
| 60 | 0.3979 | 0.00 |
| 65 | 0.4559 | 0.00 |
| 70 | 0.5229 | 0.00 |
| 75 | 0.6021 | 0.00 |
| 80 | 0.6690 | 0.00 |
| 85 | 0.8239 | 0.00 |
| 90 | 1.0000 | 0.00 |
| 95 | 1.3010 | 0.00 |
| 99 | 2.0000 | 0.00 |

Avg Opac 0.00 Avg OD 0.0000 Time average

Observer: Edward Juers
Cert. Date: 04-06-94
Date of Observation: 06-08-94
Time of Observation: 1538/1638

Test No. 14
Line 2 Press RTO Outlet Stack

**Results of Opacity Observations ---------- EPA Method 9**

| PERCENT OPACITY | OPTICAL DENSITY | RELATIVE FREQUENCY (%) |
|---|---|---|
| 0 | 0.0000 | 100.00 |
| 5 | 0.0223 | 0.00 |
| 10 | 0.0458 | 0.00 |
| 15 | 0.0706 | 0.00 |
| 20 | 0.0969 | 0.00 |
| 25 | 0.1249 | 0.00 |
| 30 | 0.1549 | 0.00 |
| 35 | 0.1871 | 0.00 |
| 40 | 0.2219 | 0.00 |
| 45 | 0.2596 | 0.00 |
| 50 | 0.3010 | 0.00 |
| 55 | 0.3468 | 0.00 |
| 60 | 0.3979 | 0.00 |
| 65 | 0.4559 | 0.00 |
| 70 | 0.5229 | 0.00 |
| 75 | 0.6021 | 0.00 |
| 80 | 0.6690 | 0.00 |
| 85 | 0.8239 | 0.00 |
| 90 | 1.0000 | 0.00 |
| 95 | 1.3010 | 0.00 |
| 99 | 2.0000 | 0.00 |
| Avg Opac 0.00 | Avg OD 0.0000 | Time average |

Observer: Edward Juers
Cert. Date: 04-06-94
Date of Observation: 06-09-94
Time of Observation: 1240/0140

Test No. 16
Line 2 Konus Stack

**Results of Opacity Observations ---------- EPA Method 9**

| PERCENT OPACITY | OPTICAL DENSITY | RELATIVE FREQUENCY (%) |
|---|---|---|
| 0 | 0.0000 | 80.83 |
| 5 | 0.0223 | 19.17 |
| 10 | 0.0458 | 0.00 |
| 15 | 0.0706 | 0.00 |
| 20 | 0.0969 | 0.00 |
| 25 | 0.1249 | 0.00 |
| 30 | 0.1549 | 0.00 |
| 35 | 0.1871 | 0.00 |
| 40 | 0.2219 | 0.00 |
| 45 | 0.2596 | 0.00 |
| 50 | 0.3010 | 0.00 |
| 55 | 0.3468 | 0.00 |
| 60 | 0.3979 | 0.00 |
| 65 | 0.4559 | 0.00 |
| 70 | 0.5229 | 0.00 |
| 75 | 0.6021 | 0.00 |
| 80 | 0.6690 | 0.00 |
| 85 | 0.8239 | 0.00 |
| 90 | 1.0000 | 0.00 |
| 95 | 1.3010 | 0.00 |
| 99 | 2.0000 | 0.00 |
| Avg Opac 0.96 | Avg OD 0.0043 | Time average |

Observer: Edward Juers
Cert. Date: 04-06-94
Date of Observation: 06-08-94
Time of Observation: 0920/1021

## 3.5 Results of Carbon Monoxide Determinations

Test No. 3
Line 1 Press RTO Outlet Stack

**Results of CO Determinations ----------Method 10**

| | Run 1 | Run 2 | Run 3 |
|---|---|---|---|
| Date of run | 06-10-94 | 06-10-94 | 06-10-94 |
| Time run start/end.....(HRS) | 0935/1036 | 1100/1201 | 1220/1321 |
| Total sampling time....(MIN) | 60.0 | 60.0 | 60.0 |
| Moisture content.....(%V/V) | 2.45 | 3.06 | 2.93 |
| O2 Concentration.....(%V/V) | 20.50 | 20.50 | 20.50 |
| Volumetric flow rate (DSCFM) | 68420 | 65961 | 66157 |
| CO concentration..... | | | |
| (GR/DSCF)..... | 0.0088 | 0.0049 | 0.0044 |
| (MG/DSCM)..... | 20.04 | 11.30 | 10.14 |
| (PPM-WET)..... | 16.78 | 9.40 | 8.45 |
| (PPM-DRY)..... | 17.20 | 9.70 | 8.70 |
| (PPM-DRY @ 7% O2)..... | 481.60 | 271.60 | 243.60 |
| CO emission rate.....(LB/HR) | 5.133 | 2.790 | 2.510 |

CO = Carbon monoxide

A trailing '<' symbol indicates that the true value is less than or equal to the reported value

Test No. 5
Line 1 Konus Stack

**Results of CO Determinations ----------Method 10**

| | Run 1 | Run 2 | Run 3 |
|---|---|---|---|
| Date of run | 06-08-94 | 06-08-94 | 06-08-94 |
| Time run start/end.....(HRS) | 1538/1640 | 1708/1811 | 1835/1938 |
| Total sampling time....(MIN) | 60.0 | 60.0 | 60.0 |
| Moisture content.....(%V/V) | 9.70 | 8.55 | 10.88 |
| O2 Concentration.....(%V/V) | 14.50 | 15.50 | 13.50 |
| Volumetric flow rate (DSCFM) | 10771 | 11266 | 10936 |
| CO concentration..... | | | |
| (GR/DSCF)..... | 0.0468 | 0.0458 | 0.3582 |
| (MG/DSCM)..... | 107.18 | 104.85 | 820.16 |
| (PPM-WET)..... | 83.08 | 82.31 | 627.40 |
| (PPM-DRY)..... | 92.00 | 90.00 | 704.00 |
| (PPM-DRY @ 7% O2)..... | 198.15 | 229.09 | 1314. |
| CO emission rate.....(LB/HR) | 4.322 | 4.422 | 33.578 |

CO = Carbon monoxide

A trailing '<' symbol indicates that the true value is less than or equal to the reported value

Test No. 6
Line 1 Konus Stack

**Results of CO Determinations ----------Method 10**

| | Run 1 | Run 2 | Run 3 |
|---|---|---|---|
| Date of run | 06-09-94 | 06-09-94 | 06-09-94 |
| Time run start/end.....(HRS) | 1345/1606 | 1632/1743 | 1802/1904 |
| Total sampling time....(MIN) | 60.0 | 60.0 | 60.0 |
| Moisture content.....(%V/V) | 7.68 | 9.37 | 8.54 |
| O2 Concentration.....(%V/V) | 14.50 | 13.50 | 14.20 |
| Volumetric flow rate (DSCFM) | 10945 | 10781 | 10817 |
| CO concentration..... | | | |
| (GR/DSCF)..... | 0.0312 | 0.0909 | 0.0271 |
| (MG/DSCM)..... | 71.53 | 208.19 | 62.09 |
| (PPM-WET)..... | 56.68 | 161.96 | 48.75 |
| (PPM-DRY)..... | 61.40 | 178.70 | 53.30 |
| (PPM-DRY @ 7% O2)..... | 132.25 | 333.57 | 109.74 |
| CO emission rate.....(LB/HR) | 2.931 | 8.402 | 2.515 |

CO = Carbon monoxide

A trailing '<' symbol indicates that the true value is less than or equal to the reported value

Test No. 8
Line 1 Konus Stack

**Results of CO Determinations ----------Method 10**

| | Run 1 | Run 2 | Run 3 |
|---|---|---|---|
| Date of run | 06-09-94 | 06-09-94 | 06-09-94 |
| Time run start/end.....(HRS) | 0851/1052 | 1240/1534 | 1610/1812 |
| Total sampling time....(MIN) | 120.0 | 120.0 | 120.0 |
| Moisture content.....(%V/V) | 8.07 | 8.52 | 9.91 |
| O2 Concentration.....(%V/V) | 15.40 | 14.90 | 13.80 |
| Volumetric flow rate (DSCFM) | 10888 | 10670 | 10885 |
| CO concentration..... | | | |
| (GR/DSCF)..... | 0.0532 | 0.0530 | 0.0688 |
| (MG/DSCM)..... | 121.74 | 121.28 | 157.62 |
| (PPM-WET)..... | 96.07 | 95.23 | 121.89 |
| (PPM-DRY)..... | 104.50 | 104.10 | 135.30 |
| (PPM-DRY @ 7% O2)..... | 261.25 | 238.92 | 263.08 |
| CO emission rate.....(LB/HR) | 4.962 | 4.844 | 6.423 |

CO = Carbon monoxide

A trailing '<' symbol indicates that the true value is less than or equal to the reported value

Test No. 16
Line 2 Konus Stack

**Results of CO Determinations ----------Method 10**

| | Run 1 | Run 2 | Run 3 |
|---|---|---|---|
| Date of run | 06-08-94 | 06-08-94 | 06-08-94 |
| Time run start/end.....(HRS) | 0757/0858 | 0920/1021 | 1114/1215 |
| Total sampling time....(MIN) | 60.0 | 60.0 | 60.0 |
| Moisture content.....(%V/V) | 6.60 | 6.99 | 7.80 |
| O2 Concentration.....(%V/V) | 16.40 | 16.50 | 15.90 |
| Volumetric flow rate (DSCFM) | 16583 | 16372 | 15772 |
| CO concentration..... | | | |
| (GR/DSCF)..... | 0.0371 | 0.0341 | 0.0315 |
| (MG/DSCM)..... | 85.05 | 78.06 | 72.23 |
| (PPM-WET)..... | 68.18 | 62.32 | 57.16 |
| (PPM-DRY)..... | 73.00 | 67.00 | 62.00 |
| (PPM-DRY @ 7% O2)..... | 222.17 | 208.44 | 170.20 |
| CO emission rate.....(LB/HR) | 5.280 | 4.784 | 4.265 |

CO = Carbon monoxide

A trailing '<' symbol indicates that the true value is less than or equal to the reported value

Test No. 14
Line 2 Press RTO Outlet Stack

**Results of CO Determinations ----------Method 10**

| | Run 1 | Run 2 | Run 3 |
|---|---|---|---|
| Date of run | 06-09-94 | 06-09-94 | 06-09-94 |
| Time run start/end.....(HRS) | 1240/1342 | 1425/1527 | 1605/1719 |
| Total sampling time....(MIN) | 60.0 | 60.0 | 60.0 |
| Moisture content.....(%V/V) | 2.35 | 2.55 | 2.05 |
| O2 Concentration.....(%V/V) | 20.60 | 20.60 | 20.55 |
| Volumetric flow rate (DSCFM) | 81742 | 80986 | 79766 |
| CO concentration..... | | | |
| (GR/DSCF)..... | 0.0046 | 0.0064 | 0.0059 |
| (MG/DSCM)..... | 10.48 | 14.68 | 13.40 |
| (PPM-WET)..... | 8.79 | 12.28 | 11.26 |
| (PPM-DRY)..... | 9.00 | 12.60 | 11.50 |
| (PPM-DRY @ 7% O2)..... | 315.00 | 441.00 | 357.78 |
| CO emission rate.....(LB/HR) | 3.209 | 4.450 | 4.001 |

CO = Carbon monoxide

A trailing '<' symbol indicates that the true value is less than or equal to the reported value

## 3.6 Results of Formaldehyde Determinations

Interpoll Labs Report No. 4-3097
Louisiana Pacific Corporation
Hayward, WI

Test No. 1
Line 1 Press RTO Outlet Stack

**Results of Formaldehyde Tests ---------- EPA Method 0011**

| | Run 1 | Run 2 | Run 3 |
|---|---|---|---|
| Date of run | 06-07-94 | 06-07-94 | 06-07-94 |
| Time run start/end.....(HRS) | 1250/1352 | 1420/1522 | 1545/1646 |
| Static pressure.....(IN.WC) | -0.30 | -0.30 | -0.30 |
| Cross sectional area (SQ.FT) | 31.09 | 31.09 | 31.09 |
| Pitot tube coefficient..... | .840 | .840 | .840 |
| Water in sample gas | | | |
| condenser.....(ML) | 0.0 | 0.0 | 0.0 |
| impingers.....(GRAMS) | 5.0 | 10.0 | 17.0 |
| desiccant.....(GRAMS) | 20.0 | 14.0 | 17.0 |
| total.....(GRAMS) | 25.0 | 24.0 | 34.0 |
| Formaldehyde in sample..(uG) | 430 | 14 | 610 |
| Gas meter coefficient..... | 1.0066 | 1.0066 | 1.0066 |
| Barometric pressure..(IN.HG) | 28.73 | 28.73 | 28.73 |
| Avg. orif.pres.drop..(IN.WC) | 2.58 | 2.68 | 2.73 |
| Avg. gas meter temp..(DEF-F) | 84.2 | 86.5 | 86.8 |
| Volume through gas meter.... | | | |
| at meter conditions...(CF) | 54.39 | 55.52 | 56.16 |
| standard conditions.(DSCF) | 51.32 | 52.18 | 52.76 |
| Total sampling time....(MIN) | 60.00 | 60.00 | 60.00 |
| Nozzle diameter.....(IN) | .270 | .270 | .270 |
| Avg.stack gas temp ..(DEG-F) | 252 | 251 | 252 |
| Volumetric flow rate..... 98075 | | | |
| actual.....(ACFM) | 97234 | 97872 | 99119 |
| dry standard.....(DSCFM) | 67660 | 68218 | 68471 |
| Isokinetic variation.....(%) 68116 | 98.9 | 99.7 | 100.5 |
| CH2O concentration..... | | | |
| (MG/DSCM)..... | 0.30 | 0.01 | 0.41 |
| (PPM-DRY)..... | 0.24 | 0.01 | 0.33 |
| (PPM-WET)..... | 0.23 | 0.01 | 0.32 |
| CH2O emission rate...(LB/HR) | 0.07544 | 0.00244 | 0.10539 |

CH2O = Formaldehyde

A trailing '<' symbol indicates that the true value is less than or equal to the reported value

Test No. 6
Line 1 Konus Stack

**Results of Formaldehyde Tests ---------- EPA Method 0011**

| | Run 1 | Run 2 | Run 3 |
|---|---|---|---|
| Date of run | 06-09-94 | 06-09-94 | 06-09-94 |
| Time run start/end.....(HRS) | 1345/1606 | 1632/1743 | 1802/1904 |
| Static pressure.....(IN.WC) | -0.20 | -0.20 | -0.20 |
| Cross sectional area (SQ.FT) | 14.75 | 14.75 | 14.75 |
| Pitot tube coefficient..... | .840 | .840 | .840 |
| Water in sample gas | | | |
| condenser.....(ML) | 0.0 | 0.0 | 0.0 |
| impingers.....(GRAMS) | 68.0 | 94.0 | 79.0 |
| desiccant.....(GRAMS) | 16.0 | 11.0 | 15.0 |
| total.....(GRAMS) | 84.0 | 105.0 | 94.0 |
| Formaldehyde in sample..(uG) | 56 | 140 | 79 |
| Gas meter coefficient..... | 0.9974 | 0.9974 | 0.9974 |
| Barometric pressure..(IN.HG) | 28.90 | 28.90 | 28.90 |
| Avg. orif.pres.drop..(IN.WC) | 2.12 | 2.14 | 2.14 |
| Avg. gas meter temp..(DEF-F) | 84.3 | 89.0 | 89.0 |
| Volume through gas meter.... | | | |
| at meter conditions...(CF) | 50.66 | 51.40 | 50.95 |
| standard conditions.(DSCF) | 47.58 | 47.86 | 47.45 |
| Total sampling time....(MIN) | 60.00 | 60.00 | 60.00 |
| Nozzle diameter.....(IN) | .445 | .445 | .445 |
| Avg.stack gas temp ..(DEG-F) | 329 | 329 | 327 |
| Volumetric flow rate..... | | | |
| actual.....(ACFM) | 18340 | 18419 | 18268 |
| dry standard.....(DSCFM) | 10945 | 10781 | 10817 |
| Isokinetic variation.....(%) | 99.0 | 101.1 | 99.9 |
| CH2O concentration..... | | | |
| (MG/DSCM)..... | 0.04 | 0.10 | 0.06 |
| (PPM-DRY)..... | 0.03 | 0.08 | 0.05 |
| (PPM-WET)..... | 0.03 | 0.08 | 0.04 |
| CH2O emission rate...(LB/HR) | 0.00171 | 0.00419 | 0.00239 |

CH2O = Formaldehyde

A trailing '<' symbol indicates that the true value is less than or equal to the reported value

Test No. 12
Line 2 Press RTO Outlet Stack

**Results of Formaldehyde Tests ---------- EPA Method 0011**

| | Run 1 | Run 2 | Run 3 |
|---|---|---|---|
| Date of run | 06-10-94 | 06-10-94 | 06-10-94 |
| Time run start/end.....(HRS) | 815/ 918 | 941/1043 | 1121/1333 |
| Static pressure.....(IN.WC) | -0.98 | -0.98 | -0.98 |
| Cross sectional area (SQ.FT) | 31.71 | 31.71 | 31.71 |
| Pitot tube coefficient..... | .840 | .840 | .840 |
| Water in sample gas | | | |
| condenser.....(ML) | 0.0 | 0.0 | 0.0 |
| impingers.....(GRAMS) | 14.0 | 14.0 | 10.0 |
| desiccant.....(GRAMS) | 13.0 | 12.0 | 9.0 |
| total.....(GRAMS) | 27.0 | 26.0 | 19.0 |
| Formaldehyde in sample..(uG) | 400 | 340 | 360 |
| Gas meter coefficient..... | 0.9947 | 0.9947 | 0.9947 |
| Barometric pressure..(IN.HG) | 28.93 | 28.93 | 28.93 |
| Avg. orif.pres.drop..(IN.WC) | 2.32 | 2.37 | 2.35 |
| Avg. gas meter temp..(DEF-F) | 82.1 | 93.8 | 99.9 |
| Volume through gas meter.... | | | |
| at meter conditions...(CF) | 50.53 | 51.53 | 51.63 |
| standard conditions.(DSCF) | 47.60 | 47.52 | 47.09 |
| Total sampling time....(MIN) | 60.00 | 60.00 | 60.00 |
| Nozzle diameter.....(IN) | .240 | .240 | .240 |
| Avg.stack gas temp ..(DEG-F) | 251 | 255 | 255 |
| Volumetric flow rate..... | | | 114272 |
| actual.....(ACFM) | 114407 | 114678 | 113731 |
| dry standard.....(DSCFM) | 79772 | 79658 | 79469 79633 |
| Isokinetic variation.....(%) | 100.4 | 100.4 | 99.7 |
| CH2O concentration..... | | | |
| (MG/DSCM)..... | 0.30 | 0.25 | 0.27 |
| (PPM-DRY)..... | 0.24 | 0.20 | 0.22 |
| (PPM-WET)..... | 0.23 | 0.20 | 0.21 |
| CH2O emission rate...(LB/HR) | 0.08915 | 0.07581 | 0.08080 |

CH2O = Formaldehyde

A trailing '<' symbol indicates that the true value is less than or equal to the reported value

Test No. 17
Line 2 Konus Stack

**Results of Formaldehyde Tests ---------- EPA Method 0011**

| | Run 1 | Run 2 | Run 3 |
|---|---|---|---|
| Date of run | 06-08-94 | 06-08-94 | 06-08-94 |
| Time run start/end.....(HRS) | 1446/1553 | 1616/1718 | 1742/1843 |
| Static pressure.....(IN.WC) | -0.28 | -0.28 | -0.28 |
| Cross sectional area (SQ.FT) | 14.47 | 14.47 | 14.47 |
| Pitot tube coefficient..... | .840 | .840 | .840 |
| Water in sample gas | | | |
| condenser.....(ML) | 0.0 | 0.0 | 0.0 |
| impingers.....(GRAMS) | 54.0 | 52.0 | 59.0 |
| desiccant.....(GRAMS) | 17.0 | 17.0 | 17.0 |
| total.....(GRAMS) | 71.0 | 69.0 | 76.0 |
| Formaldehyde in sample..(uG) | 94 | 66 | 140 |
| Gas meter coefficient..... | 0.9961 | 0.9961 | 0.9961 |
| Barometric pressure..(IN.HG) | 28.98 | 28.98 | 28.98 |
| Avg. orif.pres.drop..(IN.WC) | 2.32 | 2.28 | 2.79 |
| Avg. gas meter temp..(DEF-F) | 88.1 | 93.9 | 93.4 |
| Volume through gas meter.... | | | |
| at meter conditions...(CF) | 52.98 | 52.93 | 58.34 |
| standard conditions.(DSCF) | 49.51 | 48.94 | 54.06 |
| Total sampling time....(MIN) | 60.00 | 60.00 | 60.00 |
| Nozzle diameter.....(IN) | .368 | .368 | .368 |
| Avg.stack gas temp ..(DEG-F) | 326 | 324 | 321 |
| Volumetric flow rate..... | | | |
| actual.....(ACFM) | 26905 | 26135 | 28737 |
| dry standard.....(DSCFM) | 16380 | 15973 | 17642 |
| Isokinetic variation.....(%) | 98.7 | 100.1 | 100.1 |
| CH2O concentration..... | | | |
| (MG/DSCM)..... | 0.07 | 0.05 | 0.09 |
| (PPM-DRY)..... | 0.05 | 0.04 | 0.07 |
| (PPM-WET)..... | 0.05 | 0.04 | 0.07 |
| CH2O emission rate...(LB/HR) | 0.00414 | 0.00286 | 0.00608 |

CH2O = Formaldehyde

A trailing '<' symbol indicates that the true value is less than or equal to the reported value

## 3.7 Results of MDI Determinations

Test No. 2
Line 1 Press RTO Outlet Stack

Results of MDI Determinations.....

| | Run 1 | Run 2 | Run 3 |
|---|---|---|---|
| Date of run | 06-08-94 | 06-08-94 | 06-08-94 |
| Time run start/end.....(HRS) | 815/ 916 | 945/1046 | 1115/1216 |
| Static pressure.....(IN.WC) | -0.35 | -0.35 | -0.35 |
| Cross sectional area (SQ.FT) | 31.09 | 31.09 | 31.09 |
| Pitot tube coefficient..... | .840 | .840 | .840 |
| Water in sample gas | | | |
| condenser.....(ML) | 0.0 | 0.0 | 0.0 |
| impingers.....(GRAMS) | 16.0 | 17.0 | 13.0 |
| desiccant.....(GRAMS) | 10.0 | 10.0 | 10.0 |
| total.....(GRAMS) | 26.0 | 27.0 | 23.0 |
| MDI in Sample.....(ug) | 5.2 | < 2.5 | 5.4 |
| Gas meter coefficient..... | 1.0066 | 1.0066 | 1.0066 |
| Barometric pressure..(IN.HG) | 28.98 | 28.98 | 28.98 |
| Avg. orif.pres.drop..(IN.WC) | 1.24 | 1.28 | 1.31 |
| Avg. gas meter temp..(DEF-F) | 59.5 | 72.1 | 75.2 |
| Volume through gas meter.... | | | |
| at meter conditions...(CF) | 36.68 | 37.74 | 38.41 |
| standard conditions.(DSCF) | 36.45 | 36.62 | 37.05 |
| Total sampling time....(MIN) | 60.00 | 60.00 | 60.00 |
| Nozzle diameter.....(IN) | .225 | .225 | .225 |
| Avg.stack gas temp ..(DEG-F) | 248 | 251 | 253 |
| Volumetric flow rate..... | | | 99062 |
| actual.....(ACFM) | 98092 | 98949 | 100145 |
| dry standard.....(DSCFM) | 68445 | 68682 | 69702 |
| Isokinetic variation.....(%) | 100.0 | 100.1 | 68943 99.8 |
| MDI Concentration | | | |
| .....($mg/Nm^3$) | 0.00504 | < 0.00241 | 0.00515 |
| .....(ppm) | 0.000484 | < 0.000232 | 0.000495 |
| MDI Emission Rate | | | |
| .....(LB/HR) | 0.001292 | < 0.00062 | 0.001344 |

Test No. 13
Line 2 Press RTO Outlet Stack

Results of MDI Determinations.....

| | Run 1 | Run 2 | Run 3 |
|---|---|---|---|
| Date of run | 06-09-94 | 06-09-94 | 06-09-94 |
| Time run start/end.....(HRS) | 1325/1440 | 1518/1641 | 1712/1828 |
| Static pressure.....(IN.WC) | -0.98 | -0.98 | -0.98 |
| Cross sectional area (SQ.FT) | 31.71 | 31.71 | 31.71 |
| Pitot tube coefficient..... | .840 | .840 | .840 |
| Water in sample gas | | | |
| condenser.....(ML) | 0.0 | 0.0 | 0.0 |
| impingers.....(GRAMS) | 0.0 | 0.0 | 0.0 |
| desiccant.....(GRAMS) | 29.0 | 19.0 | 16.0 |
| total.....(GRAMS) | 29.0 | 19.0 | 16.0 |
| MDI in Sample-.....(ug) | 12.2 | < 2.5 | 6.5 |
| Gas meter coefficient..... | 0.9983 | 0.9983 | 0.9983 |
| Barometric pressure..(IN.HG) | 28.90 | 28.90 | 28.90 |
| Avg. orif.pres.drop..(IN.WC) | 2.14 | 0.79 | 0.87 |
| Avg. gas meter temp..(DEF-F) | 87.3 | 93.7 | 95.3 |
| Volume through gas meter.... | | | |
| at meter conditions...(CF) | 60.73 | 37.29 | 39.32 |
| standard conditions.(DSCF) | 56.78 | 34.34 | 36.12 |
| Total sampling time....(MIN) | 72.00 | 72.00 | 72.00 |
| Nozzle diameter.....(IN) | .240 | .189 | .189 |
| Avg.stack gas temp ..(DEG-F) | 256 | 259 | 257 |
| Volumetric flow rate..... | | | 115323 |
| actual.....(ACFM) | 115175 | 112761 | 118035 |
| dry standard.....(DSCFM) | 79909 | 77756 | 81992 |
| Isokinetic variation.....(%) | 99.7 | 99.9 | 79856 99.6 |
| MDI Concentration | | | |
| .....(mg/Nm$^3$) | 0.00759 | < 0.00257 | 0.00635 |
| .....(ppm) | 0.000729 | < 0.000247 | 0.000611 |
| MDI Emission Rate | | | |
| .....(LB/HR) | 0.00227 | < 0.00075 | 0.00195 |

## 3.8 Results of Phenol Determinations

Test No. 7
Line 1 Konus Stack

**Results of Phenol Determinations** ----------

| | Run 1 | Run 2 | Run 3 |
|---|---|---|---|
| Date of run | 06-09-94 | 06-09-94 | 06-09-94 |
| Time run start/end.....(HRS) | 0845/0945 | 1000/1100 | 1111/1320 |
| Barometric pressure..(IN.HG) | 28.90 | 28.90 | 28.90 |
| Meter temperature....(DEG-F) | 72.30 | 76.90 | 79.10 |
| Meter correction coefficient | 0.9974 | 0.9974 | 0.9974 |
| Volume through gas meter.... | | | |
| at meter conditions...(CF) | 45.200 | 45.630 | 45.500 |
| standard conditions (DSCF) | 43.388 | 43.426 | 43.125 |
| Total sampling time....(MIN) | 60.0 | 60.0 | 60.0 |
| Moisture content.....(%V/V) | 6.69 | 7.24 | 7.85 |
| Volumetric flow rate (DSCFM) | 10888 | 10670 | 10885 |
| Phenol in sample.....(uG) | 840.00< | 840.00< | 840.00< |
| Phenol concentration..... | | | |
| (GR/10$^3$DSCF)..... | 0.2987< | 0.2985< | 0.3005< |
| (uG/DSCM)..... | 684.19< | 683.60< | 688.36< |
| (PPB-DRY)..... | 174.84< | 174.69< | 175.90< |
| (PPB-WET)..... | 163.14< | 162.04< | 162.10< |
| Phenol emis. rate(10$^{-3}$LB/HR) | 27.877< | 27.296< | 28.040< |

A trailing '<' symbol indicates that the true value is less than or equal to the reported value

Analysis performed according to NIOSH Method 3502

Test No. 18
Line 2 Konus Stack

**Results of Phenol Determinations** ----------

| | Run 1 | Run 2 | Run 3 |
|---|---|---|---|
| Date of run | 06-08-94 | 06-08-94 | 06-08-94 |
| Time run start/end.....(HRS) | 1447/1554 | 1616/1718 | 1743/1844 |
| Barometric pressure..(IN.HG) | 28.98 | 28.98 | 28.98 |
| Meter temperature....(DEG-F) | 81.29 | 86.33 | 87.38 |
| Meter correction coefficient | 0.9930 | 0.9930 | 0.9930 |
| Volume through gas meter.... | | | |
| at meter conditions...(CF) | 45.700 | 45.960 | 46.350 |
| standard conditions (DSCF) | 43.068 | 42.913 | 43.194 |
| Total sampling time....(MIN) | 60.0 | 60.0 | 60.0 |
| Moisture content.....(%V/V) | 6.33 | 6.23 | 6.22 |
| Volumetric flow rate (DSCFM) | 16380 | 15973 | 17642 |
| Phenol in sample.....(uG) | 840.00< | 840.00< | 840.00< |
| Phenol concentration..... | | | |
| (GR/10$^3$DSCF)..... | 0.3010< | 0.3020< | 0.3001< |
| (uG/DSCM)..... | 689.28< | 691.76< | 687.26< |
| (PPB-DRY)..... | 176.14< | 176.77< | 175.62< |
| (PPB-WET)..... | 164.99< | 165.76< | 164.70< |
| Phenol emis. rate(10-$^3$LB/HR) | 42.251< | 41.350< | 45.373< |

A trailing '<' symbol indicates that the true value is less than or equal to the reported value

Analysis performed according to NIOSH Method 3502

## 3.9 PAH Sampling Data

Test No. 8
Line 1 Konus Stack

**Sampling Data for PAH Determinations-------SW846 Method 0010**

| | Run 1 | Run 2 | Run 3 |
|---|---|---|---|
| Date of run | 06-09-94 | 06-09-94 | 06-09-94 |
| Time run start/end.....(HRS) | 851/1052 | 1240/1534 | 1610/1812 |
| Static pressure.....(IN.WC) | -0.20 | -0.20 | -0.20 |
| Cross sectional area (SQ.FT) | 14.75 | 14.75 | 14.75 |
| Pitot tube coefficient..... | 0.840 | 0.840 | 0.840 |
| Water in sample gas | | | |
| condenser.....(ML) | 133.0 | 139.0 | 160.0 |
| impingers.....(GRAMS) | 0.0 | 0.0 | 0.0 |
| desiccant.....(GRAMS) | 26.0 | 30.0 | 44.0 |
| total.....(GRAMS) | 159.0 | 169.0 | 204.0 |
| Gas meter coefficient..... | 0.9961 | 0.9961 | 0.9961 |
| Barometric pressure..(IN.HG) | 28.90 | 28.90 | 28.90 |
| Avg. orif.pres.drop..(IN.WC) | 1.70 | 1.71 | 1.84 |
| Avg. gas meter temp..(DEF-F) | 78.2 | 84.8 | 92.7 |
| Volume through gas meter.... | | | |
| at meter conditions...(CF) | 89.94 | 91.32 | 94.60 |
| standard conditions.(DSCF) | 85.23 | 85.49 | 87.32 |
| standard conditions..($NM^3$) | 2.413 | 2.421 | 2.473 |
| Total sampling time....(MIN) | 120.00 | 120.00 | 120.00 |
| Nozzle diameter.....(IN) | .422 | .422 | .422 |
| Avg.stack gas temp ..(DEG-F) | 332 | 327 | 329 |
| Volumetric flow rate..... | | | |
| actual.....(ACFM) | 18391 | 18003 | 18707 |
| dry standard.....(DSCFM) | 10888 | 10670 | 10885 |
| Isokinetic variation.....(%) | 99.1 | 101.4 | 101.6 |

Test No. 19
Line 2 Konus Stack

**Sampling Data for PAH Determinations-------SW846 Method 0010**

| | Run 1 | Run 2 | Run 3 |
|---|---|---|---|
| Date of run | 06-07-94 | 06-07-94 | 06-07-94 |
| Time run start/end.....(HRS) | 827/1032 | 1136/1342 | 1425/1627 |
| Static pressure.....(IN.WC) | -0.26 | -0.26 | -0.26 |
| Cross sectional area (SQ.FT) | 14.47 | 14.47 | 14.47 |
| Pitot tube coefficient..... | 0.840 | 0.840 | 0.840 |
| Water in sample gas | | | |
| condenser.....(ML) | 172.0 | 158.0 | 137.0 |
| impingers.....(GRAMS) | 0.0 | 0.0 | 0.0 |
| desiccant.....(GRAMS) | 33.0 | 37.0 | 61.0 |
| total.....(GRAMS) | 205.0 | 195.0 | 198.0 |
| Gas meter coefficient..... | 0.9961 | 0.9961 | 0.9961 |
| Barometric pressure..(IN.HG) | 28.73 | 28.73 | 28.73 |
| Avg. orif.pres.drop..(IN.WC) | 2.64 | 2.71 | 2.80 |
| Avg. gas meter temp..(DEF-F) | 77.1 | 86.1 | 89.3 |
| Volume through gas meter.... | | | |
| at meter conditions...(CF) | 112.39 | 114.57 | 117.00 |
| standard conditions.(DSCF) | 106.35 | 106.64 | 108.30 |
| standard conditions..($NM^3$) | 3.011 | 3.020 | 3.067 |
| Total sampling time....(MIN) | 120.00 | 120.00 | 120.00 |
| Nozzle diameter.....(IN) | .364 | .364 | .364 |
| Avg.stack gas temp ..(DEG-F) | 333 | 338 | 332 |
| Volumetric flow rate..... | | | |
| actual.....(ACFM) | 30553 | 30649 | 30805 |
| dry standard.....(DSCFM) | 17895 | 17923 | 18140 |
| Isokinetic variation.....(%) | 99.2 | 99.3 | 99.6 |

# 4 RESULTS OF FUEL ANALYSIS

**INTERPOLL LABORATORIES, INC.**
**Fuel Laboratory**
**(612) 786-6020**

6/22/94

Client: LOUISIANA PACIFIC, HAYWARD

Laboratory Log Number: 3097-185-7743

Sample Identification: WOOD BARK 6/10/94

## Ultimate Analysis WT %

| Parameter | Moisture & Ash Free | Moisture Free | As Received |
|---|---|---|---|
| Moisture, Total | | | 39.47 |
| Ash | | 3.08 | 1.86 |
| Carbon | 51.83 | 50.23 | 30.41 |
| Hydrogen | 5.63 | 5.46 | 3.30 |
| Nitrogen | 0.28 | 0.27 | 0.16 |
| Oxygen (calculated) | 42.19 | 40.89 | 24.75 |
| Sulfur | 0.07 | 0.07 | 0.07 |
| Heating Value, BTU/LB | 9187 | 8904 | 5390 |

Respectfully submitted,

Jeannie F. O'Neil, Manager
Inorganic Chemistry Group

8761

# APPENDIX A

## VOLUMETRIC FLOW RATE DETERMINATIONS

# APPENDIX A

## VOLUMETRIC FLOW RATE DETERMINATIONS

Test No. 3
Line 1 Press RTO Outlet Stack

**Results of Volumetric Flow Rate Determination-------Method 2**

| | |
|---|---|
| Date of Determination..... | 06-10-94 |
| Time of Determination.....(HRS) | 837 |
| Barometric pressure.....(IN.HG) | 28.93 |
| Pitot tube coefficient..... | .84 |
| Number of sampling ports..... | 2 |
| Total number of points..... | 20 |
| Shape of duct..... | Round |
| Stack diameter.....(IN) | 75.5 |
| Duct area.....(SQ.FT) | 31.09 |
| Direction of flow..... | UP |
| Static pressure.....(IN.WC) | -.43 |
| Avg. gas temp.....(DEG-F) | 252 |
| Moisture content.....(% V/V) | 2.45 |
| Avg. linear velocity.....(FT/SEC) | 51.8 |
| Gas density.....(LB/ACF) | .05326 |
| Molecular weight.....(LB/LBMOLE) | 28.88 |
| Mass flow of gas.....(LB/HR) | 309057 |
| Volumetric flow rate..... | |
| actual.....(ACFM) | 96716 |
| dry standard.....(DSCFM) | 67613 |

Test No. 5
Line 1 Press RTO Inlet

**Results of Volumetric Flow Rate Determination-------Method 2**

| | |
|---|---|
| Date of Determination..... | 06-10-94 |
| Time of Determination.....(HRS) | 841 |
| Barometric pressure.....(IN.HG) | 28.93 |
| Pitot tube coefficient..... | .84 |
| Number of sampling ports..... | 2 |
| Total number of points..... | 24 |
| Shape of duct..... | Round |
| Stack diameter.....(IN) | 53.125 |
| Duct area.....(SQ.FT) | 15.39 |
| Direction of flow..... | DOWN |
| Static pressure.....(IN.WC) | -2.95 |
| Avg. gas temp.....(DEG-F) | 116 |
| Moisture content.....(% V/V) | 1.92 |
| Avg. linear velocity.....(FT/SEC) | 72.0 |
| Gas density.....(LB/ACF) | .06541 |
| Molecular weight.....(LB/LBMOLE) | 28.84 |
| Mass flow of gas.....(LB/HR) | 260943 |
| Volumetric flow rate..... | |
| actual.....(ACFM) | 66488 |
| dry standard.....(DSCFM) | 57368 |

Test No. 5
Line 1 Konus Stack

**Results of Volumetric Flow Rate Determination-------Method 2**

| | |
|---|---|
| Date of Determination..... | 06-08-94 |
| Time of Determination.....(HRS) | 800 |
| Barometric pressure.....(IN.HG) | 28.98 |
| Pitot tube coefficient..... | .84 |
| Number of sampling ports..... | 2 |
| Total number of points..... | 20 |
| Shape of duct..... | Round |
| Stack diameter.....(IN) | 52 |
| Duct area.....(SQ.FT) | 14.75 |
| Direction of flow..... | UP |
| Static pressure.....(IN.WC) | -.2 |
| Avg. gas temp.....(DEG-F) | 326 |
| Moisture content.....(% V/V) | 9.70 |
| Avg. linear velocity.....(FT/SEC) | 24.0 |
| Gas density.....(LB/ACF) | .04800 |
| Molecular weight.....(LB/LBMOLE) | 29.54 |
| Mass flow of gas.....(LB/HR) | 61145 |
| Volumetric flow rate..... | |
| actual.....(ACFM) | 21232 |
| dry standard.....(DSCFM) | 12469 |

Test No. 8
Line 1 Konus Stack

**Results of Volumetric Flow Rate Determination-------Method 2**

| | |
|---|---|
| Date of Determination..... | 06-09-94 |
| Time of Determination.....(HRS) | 830 |
| Barometric pressure.....(IN.HG) | 28.9 |
| Pitot tube coefficient..... | .84 |
| Number of sampling ports..... | 2 |
| Total number of points..... | 24 |
| Shape of duct..... | Round |
| Stack diameter.....(IN) | 52 |
| Duct area.....(SQ.FT) | 14.75 |
| Direction of flow..... | UP |
| Static pressure.....(IN.WC) | -.2 |
| Avg. gas temp.....(DEG-F) | 330 |
| Moisture content.....(% V/V) | 10.29 |
| Avg. linear velocity.....(FT/SEC) | 21.2 |
| Gas density.....(LB/ACF) | .04739 |
| Molecular weight.....(LB/LBMOLE) | 29.46 |
| Mass flow of gas.....(LB/HR) | 53323 |
| Volumetric flow rate..... | |
| actual.....(ACFM) | 18752 |
| dry standard.....(DSCFM) | 10854 |

Test No. 19
Line 2 Konus Stack

**Results of Volumetric Flow Rate Determination-------Method 2**

| | |
|---|---|
| Date of Determination..... | 06-07-94 |
| Time of Determination.....(HRS) | 800 |
| Barometric pressure.....(IN.HG) | 28.73 |
| Pitot tube coefficient..... | .84 |
| Number of sampling ports..... | 2 |
| Total number of points..... | 24 |
| Shape of duct..... | Round |
| Stack diameter.....(IN) | 51.5 |
| Duct area.....(SQ.FT) | 14.47 |
| Direction of flow..... | UP |
| Static pressure.....(IN.WC) | -.26 |
| Avg. gas temp.....(DEG-F) | 328 |
| Moisture content.....(% V/V) | 8.52 |
| Avg. linear velocity.....(FT/SEC) | 35.1 |
| Gas density.....(LB/ACF) | .04950 |
| Molecular weight.....(LB/LBMOLE) | 30.73 |
| Mass flow of gas.....(LB/HR) | 90370 |
| Volumetric flow rate..... | |
| actual.....(ACFM) | 30430 |
| dry standard.....(DSCFM) | 17898 |

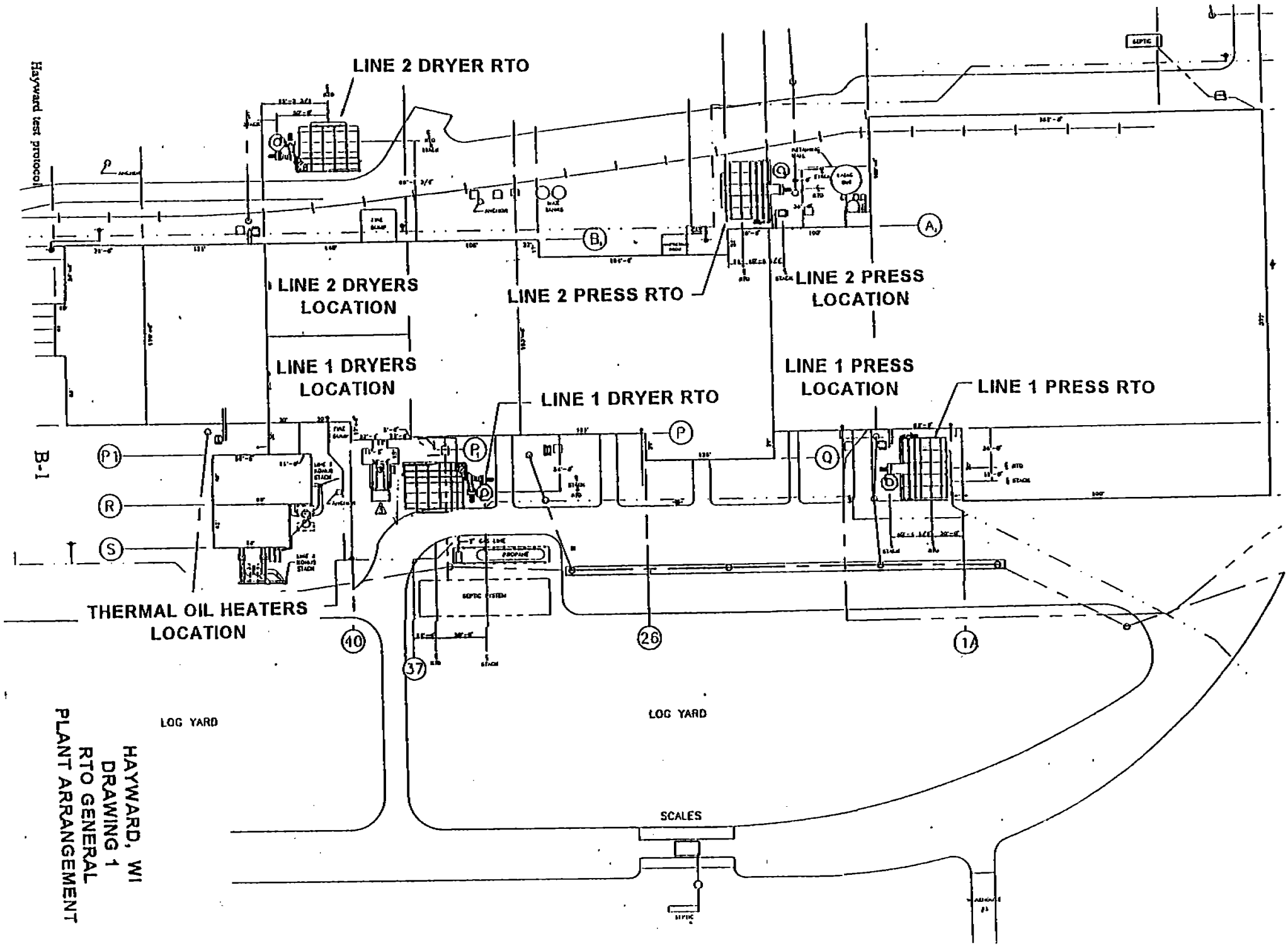
Test No. 21
Line 2 Press RTO Inlet

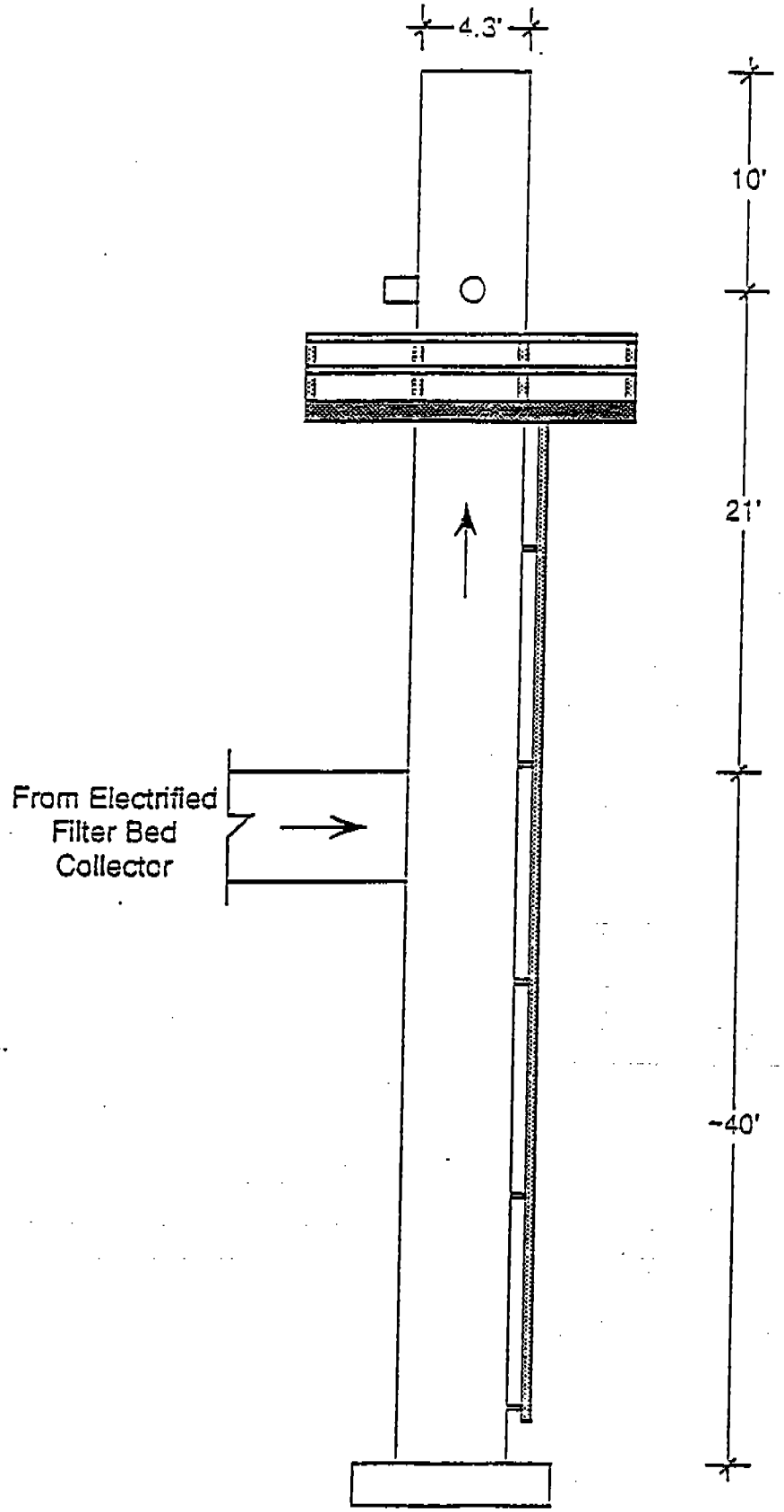
**Results of Volumetric Flow Rate Determination-------Method 2**

| | |
|---|---|
| Date of Determination..... | 06-09-94 |
| Time of Determination.....(HRS) | 1400 |
| Barometric pressure.....(IN.HG) | 28.9 |
| Pitot tube coefficient..... | .84 |
| Number of sampling ports..... | 2 |
| Total number of points..... | 12 |
| Shape of duct..... | Round |
| Stack diameter.....(IN) | 58.5 |
| Duct area.....(SQ.FT) | 18.67 |
| Direction of flow..... | HORIZONTAL |
| Static pressure.....(IN.WC) | -4.4 |
| Avg. gas temp.....(DEG-F) | 116 |
| Moisture content.....(% V/V) | 2.46 |
| Avg. linear velocity.....(FT/SEC) | 81.3 |
| Gas density.....(LB/ACF) | .06493 |
| Molecular weight.....(LB/LBMOLE) | 28.84 |
| Mass flow of gas.....(LB/HR) | 354569 |
| Volumetric flow rate..... | |
| actual.....(ACFM) | 91017 |
| dry standard.....(DSCFM) | 77678 |

# APPENDIX B

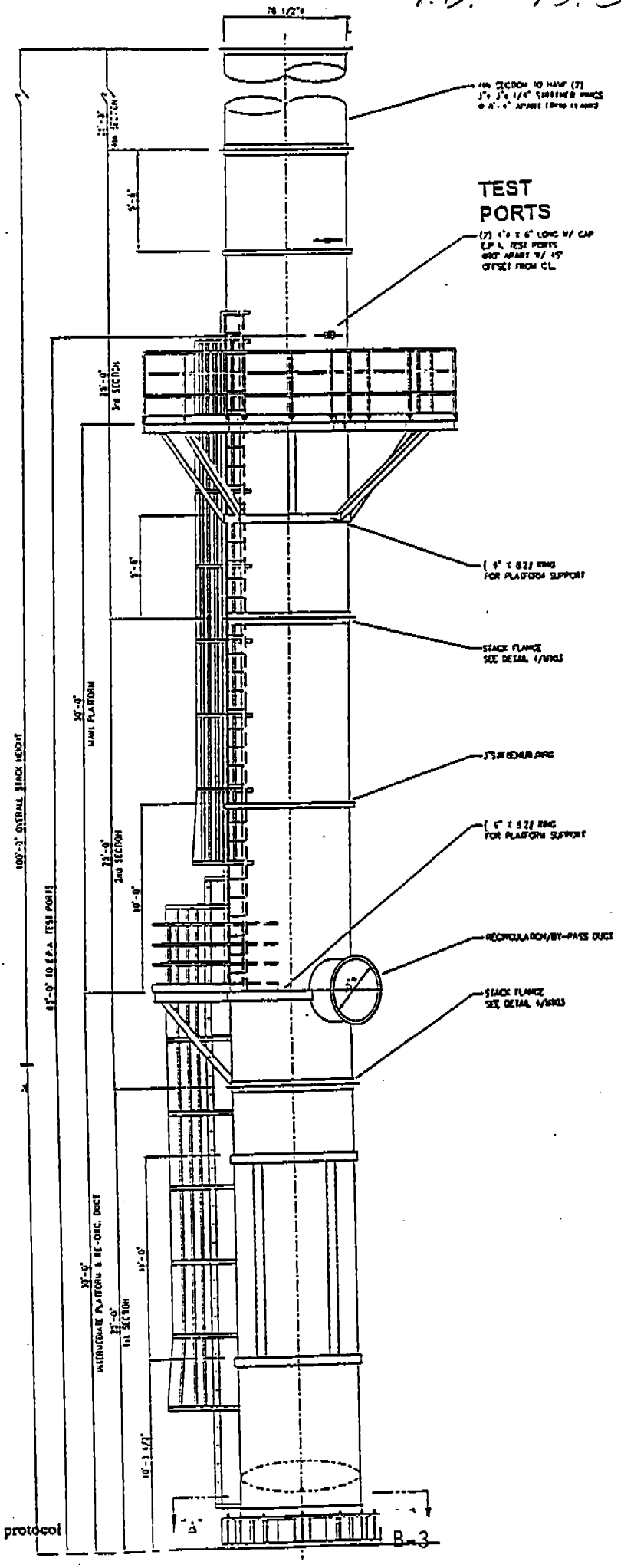
## LOCATION OF TEST PORTS


Hayward test protocol
LINE 2 DRYER RTO
LINE 2 DRYERS LOCATION
LINE 2 PRESS RTO
LINE 2 PRESS LOCATION
LINE 1 DRYERS LOCATION
LINE 1 DRYER RTO
LINE 1 PRESS LOCATION
LINE 1 PRESS RTO
THERMAL OIL HEATERS LOCATION
LOG YARD
LOG YARD
SCALES
B-1
HAYWARD, WI
DRAWING 1
RTO GENERAL
PLANT ARRANGEMENT




HAYWARD, WI
DRAWING 10
LINE 1
THERMAL OIL HEATER
STACK
ELEVATION

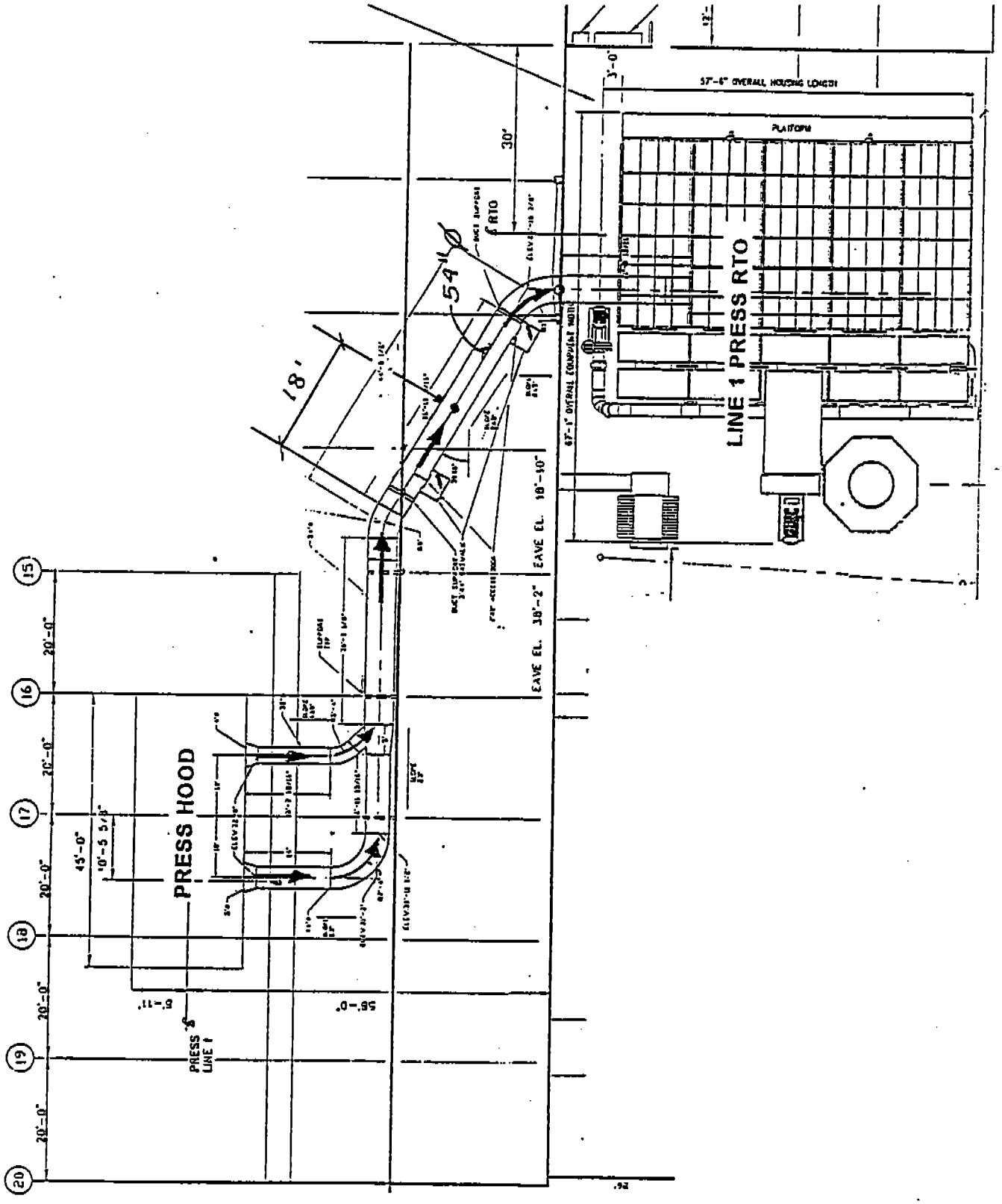
I.D. = 75.5



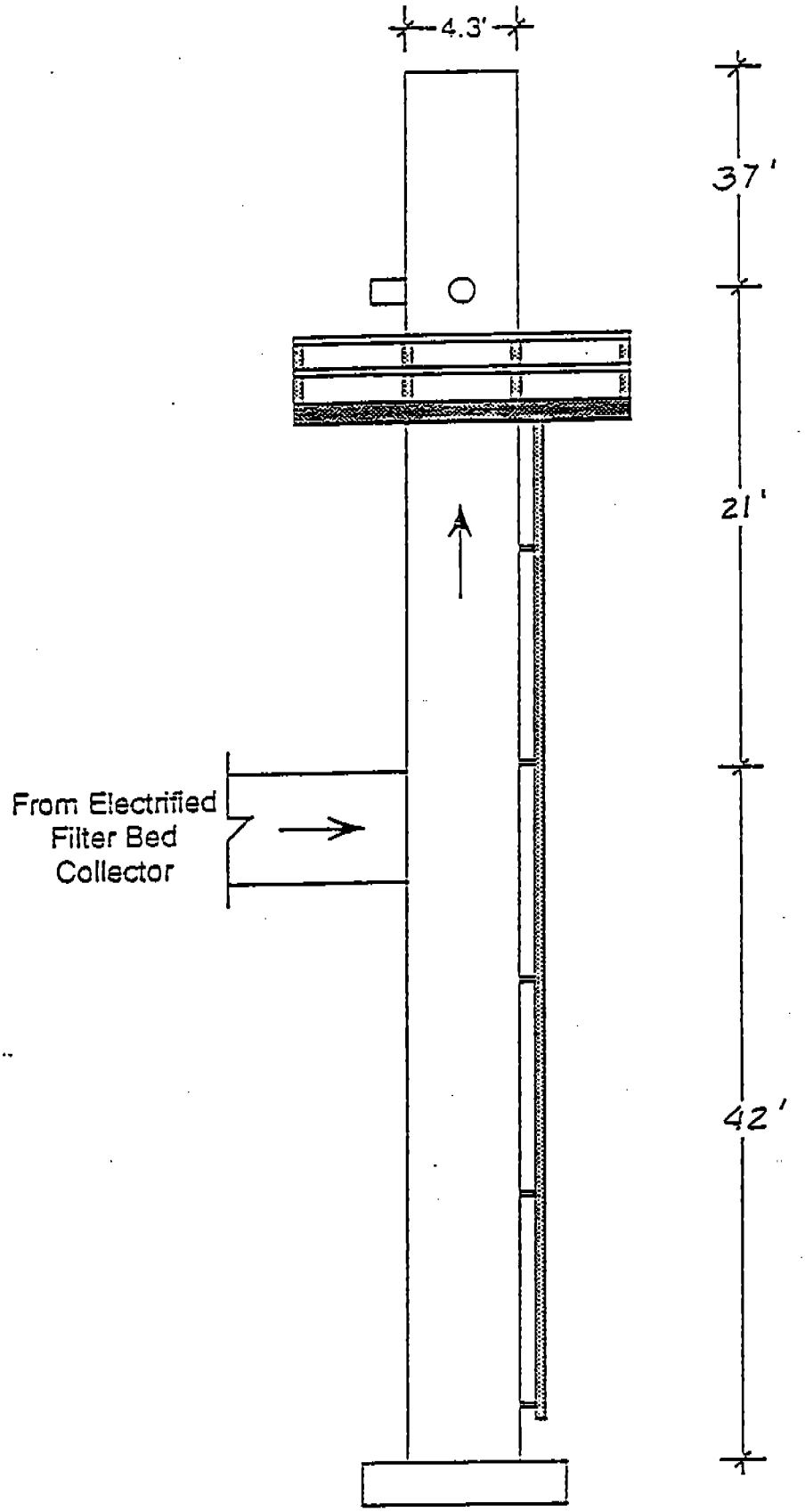

Hayward test protocol

B-3

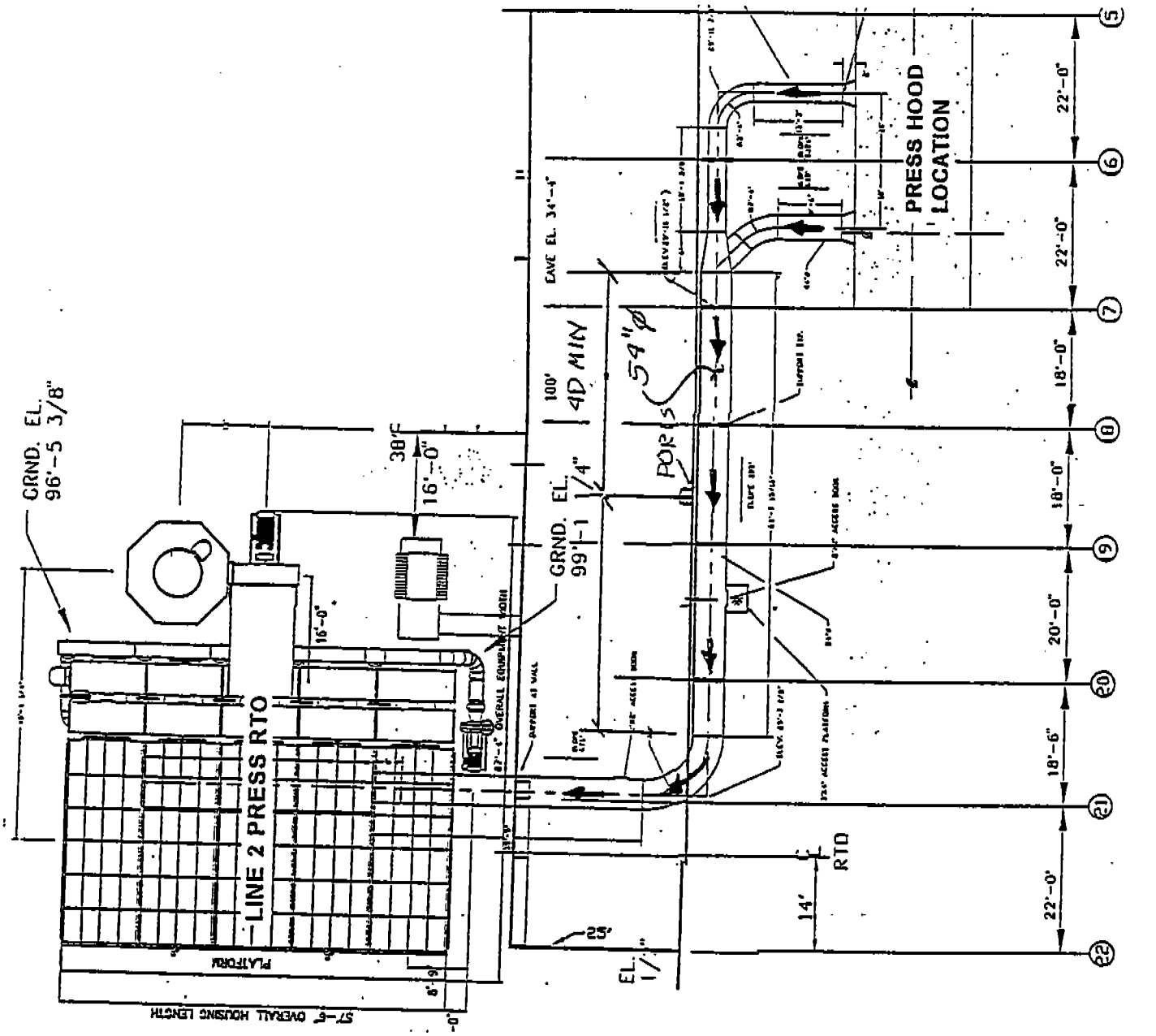
HAYWARD, WI
DRAWING 7
PRESS RTO STACK
TYPICAL FOR BOTH LINES
ELEVATION




HAYWARD, WI
DRAWING 8
GAS FLOW FROM
LINE 1 PRESS
TO RTO
PLAN




HAYWARD, WI
DRAWING 11
LINE 2
THERMAL OIL HEATER
STACK
ELEVATION




HAYWARD, WI
DRAWING 9
GAS FLOW FROM
LINE 2 PRESS
TO RTO
PLAN

# APPENDIX C

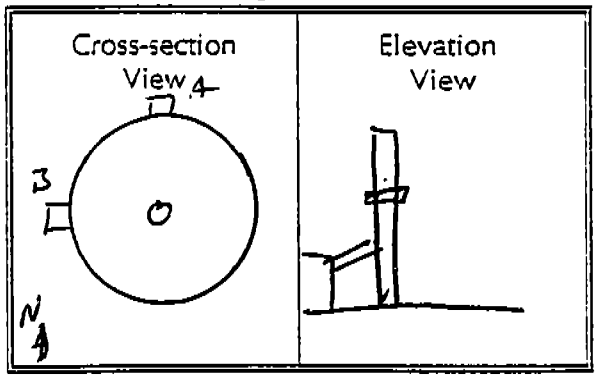
## PRESS RTO FIELD DATA SHEETS

INTERPOLL LABORATORIES, INC.
(612) 786-6020

# EPA Method 2 Field Data Sheet

Job: LP - HAYWARD
Source: DROSS RTO OUTLET STACK
Test: 1 Run: 0 Date: 6-7-94
Stack Dimen.: 75.5 IN.
Dry Bulb: 240 °F Wet bulb: 110 °F
Manometer: ☒ Reg. ☐ Exp ☐ Elec.
Barometric Pressure: 28.73 IN.HG
Static Pressure: - 0.30 IN.WC
Operators: SB + EJ
Pitot No.: 224 - 8 $C_p$: .840
$CH_2O$ IPS

Drawing of Test Site




| Traverse Point No. | Fraction of Diameter | Distance From Stack Wall (IN.) | Distance From End of Port (IN.) | Velocity | Temp. of Gas (°F) |
|---|---|---|---|---|---|
| | | Port Length: 6-375 IN. | | Time Start: | HRS |
| A - 1 | .026 | 1.96 | 8.34 | | |
| 2 | .082 | 6.19 | 12.57 | | |
| 3 | .146 | 11.02 | 17.44 | | |
| 4 | .226 | 17.06 | 23.44 | | |
| 5 | .342 | 25.82 | 32.20 | | |
| 6 | .658 | 49.68 | 56.05 | | |
| 7 | .774 | 58.44 | 64.81 | | |
| 8 | .854 | 64.48 | 70.85 | | |
| 9 | .918 | 69.31 | 75.68 | | |
| 10 | .974 | 73.54 | 79.91 | | |
| B - 1 | | | | | |
| 2 | | | | | |
| 3 | | | | | |
| 4 | | | | | |
| 5 | | | | | |
| 6 | | | | | |
| 7 | | | | | |
| 8 | | | | | |
| 9 | | | | | |
| 10 | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| Temp. Meas. Device & S/N: | | Digital TC - POT29 | | Time End: | HRS |

R or nothing = reg. manometer; S = expanded; E = electronic

INTERPOLL LABORATORIES, INC.
(612) 786-6020

# Interpoll Laboratories EPA Method 5/17 Sample Log Sheet

Job LP - HANWARD
Source PROSS RTO OUTLET STACK
Method 0011 Filter holder: N/A
Sample Train Leak Check:

Date 6-7-94 Test 1 Run 1
No. of traverse points 20
Filter type: N/A

Pretest: ≤ 0.02 cfm at 15 in. Hg. (vac) ☒
Post test: 0.005 cfm at 17 in. Hg. (vac) ☒

**Particulate Catch Data:**

No. of filters used:

N/A

Recovery solvent(s)

☐ acetone
☒ other(s) MEC12

No. of probe wash bottles: 1
Sample recovered by: SB + EJ

**Condensate Data:**

| Item | Weight (g) | | |
|---|---|---|---|
| | Final | Tare | Difference |
| Impinger No. 1 | | | |
| Impinger No. 2 | 484 | 479 | 5 |
| Impinger No. 3 | | | |
| Condenser | | | |
| Desiccant | 1567 | 1547 | 20 |
| | | | |
| Total | | | 25 |

**Integrated Gas Sampling Data:**

Bag Pump No. 223
Bag Material: 5-layer Aluminized Tedlar
Pretest leak check: 00
Time start: 1250
Sampling rate: 400

Box No. 26 Bag No. 1
Size: 44 L
cc/min at 15 in. Hg.
(HRS) Time end: 1352 (HRS)
cc/min Operator: SB

S/N of $O_2$ Analyzer used to monitor train outlet: 11

123095-G:\STACK\WP\METHODS\S-0046RR

# INTERPOLL LABORATORIES 2A METHOD 5 FIELD DATA SHEET

Job LP - HAYWARD
Source PRESS RTO OUTLET STACK
Date 6-7-94 Test 1 Run 1

Operator S.STREET
Meter Box No. 14 Y 1.85 ΔH@
Calculated coeff. 1.0066

Pitot No. 22V-8 Cp .840
Bar. Press. 28.73 inHg H2O 3 %
Nozzle No. G-1 Nozzle Dia .220 IN.

| Traverse Point No. | Sampling Time (min) | Sample Volume (cf) | Velocity Head (inWC) | Orifice Meter (inWC) | Dry. Vol. (cf) | VAC. inHg | Temperatures (°F) Stack | Probe | Oven | Impg. | Gas/In | Gas/Out | Oxygen (xx/x) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | (1250) | (677.10) | | | | | | | | | | | |
| B-10 | 3 | 679.99 | .63 | 2.68 | 9.87 | 10 | 245 | 251 | 254 | 44 | 80 | 78 | 20.6 |
| 9 | 6 | 682.61 | .66 | 2.77 | 2.68 | 12 | 250 | 254 | 254 | 44 | 82 | 78 | 20.6 |
| 8 | 9 | 685.38 | .64 | 2.68 | 5.45 | 12 | 253 | 253 | 258 | 44 | 84 | 78 | 20.6 |
| 7 | 12 | 688.16 | .64 | 2.69 | 8.22 | 12 | 253 | 252 | 256 | 41 | 85 | 78 | 20.6 |
| 6 | 15 | 690.99 | .63 | 2.66 | 0.98 | 12 | 251 | 252 | 257 | 41 | 86 | 78 | 20.8 |
| 5 | 18 | 693.92 | .62 | 2.61 | 3.99 | 11 | 252 | 254 | 258 | 43 | 88 | 78 | 20.7 |
| 4 | 21 | 696.44 | .62 | 2.62 | 6.40 | 11 | 251 | 254 | 257 | 46 | 89 | 78 | 20.8 |
| 3 | 24 | 699.20 | .63 | 2.66 | 9.17 | 12 | 252 | 254 | 256 | 44 | 90 | 78 | 20.7 |
| 2 | 27 | 701.69 | .50 | 2.12 | 1.64 | 10 | 251 | 254 | 256 | 43 | 91 | 78 | 20.7 |
| 1 | 30 | 703.90 | .43 | 1.82 | 3.94 | 9 | 252 | 254 | 256 | 44 | 91 | 78 | 20.8 |
| A-10 | 33 | 706.75 | .64 | 2.72 | 6.74 | 12 | 248 | 255 | 256 | 44 | 91 | 78 | 20.6 |
| 9 | 36 | 709.68 | .66 | 2.80 | 9.58 | 12 | 251 | 254 | 258 | 44 | 93 | 79 | 20.6 |
| 8 | 39 | 712.35 | .64 | 2.71 | 2.37 | 11 | 254 | 254 | 258 | 44 | 93 | 79 | 20.6 |
| 7 | 42 | 715.20 | .66 | 2.80 | 5.22 | 12 | 252 | 255 | 259 | 45 | 93 | 79 | 20.8 |
| 6 | 45 | 718.12 | .64 | 2.72 | 8.02 | 13 | 252 | 257 | 259 | 44 | 93 | 79 | 20.6 |
| 5 | 48 | 720.88 | .66 | 2.79 | 0.86 | 13 | 254 | 258 | 257 | 43 | 93 | 79 | 20.8 |
| 4 | 51 | 723.60 | .62 | 2.62 | 3.61 | 12 | 256 | 257 | 258 | 44 | 93 | 79 | 20.7 |
| 3 | 54 | 726.34 | .63 | 2.66 | 6.38 | 12 | 254 | 257 | 260 | 44 | 94 | 80 | 20.7 |
| 2 | 57 | 729.17 | .63 | 2.68 | 9.17 | 12 | 252 | 260 | 260 | 46 | 94 | 80 | 20.6 |
| 1 | 60 | 731.49 | .43 | 1.83 | 1.47 | 12 | 251 | 257 | 259 | 45 | 95 | 80 | 20.7 |
| | (1252) | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | θ = 60 | Vm = 54.39 | | ΔH = 2.58 | | | | | | | Avg. = 84 | | |

C-3

INTERPOLL LABORATORIES, INC.
(612) 786-6020

# Interpoll Laboratories EPA Method 5/17 Sample Log Sheet

Job CP- HAYWARD
Source PRESS RD OUTLET STACK
Method 0011 Filter holder: N/A
Date 6-7-94 Test 1 Run 2
No. of traverse points 20
Filter type: N/A

**Sample Train Leak Check:**

Pretest: ≤ 0.02 cfm at 15 in. Hg. (vac) ☒
Post test: 0.005 cfm at 14 in. Hg. (vac) ☒

**Particulate Catch Data:**

No. of filters used: N/A

Recovery solvent(s)
☐ acetone
☒ other(s) MeCl2

No. of probe wash bottles: 1
Sample recovered by: SS+ET

**Condensate Data:**

| Item | Weight (g) | | |
|---|---|---|---|
| | Final | Tare | Difference |
| Impinger No. 1 | | | |
| Impinger No. 2 | 510 | 500 | 10 |
| Impinger No. 3 | | | |
| Condenser | | | |
| Desiccant | 1508 | 1494 | 14 |
| | | | |
| Total | | | 24 |

**Integrated Gas Sampling Data:**

Bag Pump No. 22B
Bag Material: 5-layer Aluminized Tedlar
Pretest leak check: 00
Time start: 1420
Sampling rate: 400

Box No. 26 Bag No. 2
Size: 44 L
cc/min at 15 in. Hg.
(HRS) Time end: 1522 (HRS)
cc/min Operator: SS

S/N of $O_2$ Analyzer used to monitor train outlet: 11

123093-G:\STACK\WP\METHODS\S-0046RR

# INTERPOLL LABORATORIES — A METHOD 5 FIELD DATA SHEET

Job: CP - HAYWARD
Source: PRESS RTO OUTLET STACK
Date: 6-7-94 Test 1 Run 2

Operators: SD + ET
Meter Box No. 14 ΔH@ 1.85 (IN WC)
Coeabter coeff.: 1.0066

Pitot No. 22V-8 Cp .840
Bar. Press.: 28.73 in Hg H2O 2 %
Nozzle No. G-4 Nozzle Dia .270 IN.

| Traverse Point No. | Sampling Time (min) | Sample Volume (cf) | Velocity Head (in WC) | Orifice Meter (in WC) | Dry. Vol. (cf) | VAC. in Hg | Temperatures (°F) Stack | Probe | Oven | Impg. | Gas/In | Gas/Out | Oxygen (xx/x) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | (1420) | (733.30 | | | | | | | | | | | |
| A - 10 | 3 | 736.10 | .67 | 2.88 | 6.18 | 11 | 251 | 254 | 260 | 44 | 81 | 78 | 20.6 |
| 9 | 6 | 739.08 | .67 | 2.87 | 9.05 | 12 | 252 | 254 | 259 | 43 | 85 | 78 | 20.7 |
| 8 | 9 | 741.90 | .68 | 2.90 | 1.93 | 12 | 255 | 254 | 258 | 43 | 87 | 78 | 20.6 |
| 7 | 12 | 744.88 | .67 | 2.87 | 4.80 | 12 | 253 | 254 | 257 | 47 | 89 | 79 | 20.7 |
| 6 | 15 | 747.68 | .65 | 2.79 | 7.63 | 12 | 252 | 255 | 262 | 46 | 91 | 80 | 20.8 |
| 5 | 18 | 750.32 | .64 | 2.76 | 0.45 | 12 | 252 | 252 | 249 | 46 | 92 | 80 | 20.8 |
| 4 | 21 | 753.03 | .64 | 2.76 | 3.28 | 12 | 252 | 254 | 248 | 47 | 93 | 81 | 20.7 |
| 3 | 24 | 756.00 | .61 | 2.64 | 6.04 | 12 | 252 | 254 | 246 | 48 | 94 | 81 | 20.6 |
| 2 | 27 | 758.66 | .54 | 2.34 | 8.65 | 10 | 250 | 255 | 249 | 46 | 94 | 81 | 20.8 |
| 1 | 30 | 760.99 | .40 | 1.74 | 0.90 | 9 | 248 | 255 | 250 | 47 | 94 | 80 | 20.7 |
| B - 10 | 33 | 763.96 | .67 | 2.91 | 3.80 | 12 | 248 | 254 | 251 | 46 | 94 | 80 | 20.8 |
| 9 | 36 | 766.82 | .64 | 2.77 | 6.63 | 12 | 252 | 253 | 247 | 46 | 94 | 80 | 20.7 |
| 8 | 39 | 769.54 | .67 | 2.91 | 9.53 | 12 | 249 | 255 | 247 | 46 | 94 | 80 | 20.7 |
| 7 | 42 | 772.54 | .65 | 2.82 | 2.39 | 12 | 250 | 255 | 248 | 46 | 94 | 80 | 20.8 |
| 6 | 45 | 775.36 | .68 | 2.94 | 5.30 | 12 | 251 | 256 | 250 | 46 | 94 | 80 | 20.8 |
| 5 | 48 | 778.23 | .63 | 2.72 | 8.11 | 12 | 252 | 254 | 251 | 46 | 95 | 80 | 20.7 |
| 4 | 51 | 780.99 | .63 | 2.73 | 0.92 | 12 | 251 | 254 | 254 | 44 | 96 | 81 | 20.9 |
| 3 | 54 | 783.87 | .58 | 2.51 | 3.63 | 11 | 253 | 249 | 254 | 47 | 96 | 82 | 20.8 |
| 2 | 57 | 786.58 | .59 | 2.56 | 6.36 | 10 | 251 | 248 | 251 | 46 | 96 | 82 | 20.7 |
| 1 | 60 | 788.82 | .48 | 2.08 | 8.82 | | 254 | 246 | 251 | 46 | 97 | 83 | 20.8 |
| | (1522) | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | θ = 60 | Vs = 55.52 | | ΔH = 2.64 | | | | | | | Avg. = 86.5 | | |

C-5

INTERPOLL LABORATORIES, INC.
(612) 786-6020

# Interpoll Laboratories EPA Method 5/17 Sample Log Sheet

Job CP - HAYWARD
Source PRESS RTO OUTLET STACK
Method 0011 Filter holder: N/A
Sample Train Leak Check:

Dare 6-7-94 Test 1 Run 3
No. of traverse points 20
Filter type: N/A

Pretest: ≤ 0.02 cfm at 15 in. Hg. (vac) ☒
Post test: 0.00 cfm at 15 in. Hg. (vac) ☒

**Particulate Catch Data:**

No. of filters used:

N/A

Recovery solvent(s)

☐ acetone
☒ other(s) MeCl2

No. of probe wash bottles: 1
Sample recovered by: SJB-RET

**Condensate Data:**

| Item | Weight (g) | | |
|---|---|---|---|
| | Final | Tare | Difference |
| Impinger No. 1 | | | |
| Impinger No. 2 | 495 | 478 | 17 |
| Impinger No. 3 | | | |
| Condenser | | | |
| Desiccant | 1536 | 1519 | 17 |
| | | | |
| Total | | | 34 |

**Integrated Gas Sampling Data:**

Bag Pump No. 223
Bag Material: 5-layer Aluminized Tedlar
Pretest leak check: 00
Time start: 1545
Sampling rate: 400

Box No. 26 Bag No. 3
Size: 44 L
cc/min at 15 in. Hg.
(HRS) Time end: 1646 (HRS)
cc/min Operator: SJB

S/N of $O_2$ Analyzer used to monitor train outlet: 11

123093-G:\STACK\WP\METHODS\S-0046RR

# INTERPOLL LABORATORIES EPA METHOD 5 FIELD DATA SHEET

Job LD- HAYWARD
Source PRESS RTO OUTLET STACK
Date 6-7-84 Test 1 Run 3

Operators SJ+EF
Meter Box No. 14 ΔH 1.85 ΔH@
Barometer coeff. 1.0026

Pitot No. 224-8 Cp .840
Bar. Press. 22.77 inHg H2O ≥ X
Nozzle No. G-4 Nozzle Dia .220 IN.

| Traverse Point No. | Sampling Time (min) | Sample Volume (cf) | Velocity Head (inWC) | Orifice Meter (inWC) | Dec. Vol. (cf) | VAC. inHg | Temperatures (°F) Stack | Probe | Oven | Impg. | Gas/In | Gas/Out | Oxygen (xx/x) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | (1545) | (789.20) | | | | | | | | | | | |
| B- 10 | 3 | 792.06 | .63 | 2.73 | 2.00 | 11 | 250 | 254 | 249 | 46 | 83 | 81 | 20.3 |
| 9 | 6 | 794.96 | .68 | 2.92 | 4.90 | 12 | 250 | 254 | 254 | 46 | 86 | 81 | 20.4 |
| 8 | 9 | 797.76 | .66 | 2.84 | 7.76 | 12 | 250 | 254 | 256 | 44 | 88 | 81 | 20.4 |
| 7 | 12 | 800.64 | .67 | 2.89 | 0.64 | 12 | 251 | 254 | 256 | 44 | 88 | 81 | 20.5 |
| 6 | 15 | 803.33 | .67 | 2.88 | 3.52 | 12 | 253 | 255 | 257 | 44 | 89 | 81 | 20.3 |
| 5 | 18 | 806.44 | .68 | 2.92 | 6.42 | 12 | 253 | 255 | 257 | 44 | 89 | 81 | 20.3 |
| 4 | 21 | 809.24 | .64 | 2.75 | 9.24 | 12 | 254 | 256 | 258 | 43 | 93 | 81 | 20.3 |
| 3 | 24 | 811.90 | .58 | 2.50 | 1.93 | 12 | 253 | 255 | 257 | 43 | 93 | 81 | 20.5 |
| 2 | 27 | 814.66 | .60 | 2.59 | 4.67 | 12 | 254 | 249 | 297 | 43 | 93 | 81 | 20.4 |
| 1 | 30 | 817.36 | .58 | 2.50 | 7.36 | 12 | 256 | 254 | 257 | 44 | 94 | 81 | 20.5 |
| A- 10 | 33 | 820.19 | .64 | 2.77 | 0.19 | 12 | 253 | 254 | 257 | 42 | 95 | 81 | 20.5 |
| 9 | 36 | 823.02 | .64 | 2.78 | 3.03 | 12 | 250 | 254 | 254 | 44 | 95 | 81 | 20.5 |
| 8 | 39 | 825.90 | .66 | 2.86 | 5.91 | 12 | 251 | 254 | 257 | 47 | 94 | 81 | 20.5 |
| 7 | 42 | 828.77 | .66 | 2.86 | 8.78 | 12 | 251 | 254 | 257 | 46 | 95 | 82 | 20.6 |
| 6 | 45 | 831.62 | .64 | 2.78 | 1.62 | 12 | 250 | 256 | 258 | 46 | 95 | 82 | 20.5 |
| 5 | 48 | 834.48 | .65 | 2.81 | 4.48 | 12 | 253 | 254 | 258 | 46 | 95 | 82 | 20.5 |
| 4 | 51 | 837.30 | .62 | 2.68 | 7.22 | 11 | 253 | 254 | 257 | 44 | 95 | 82 | 20.6 |
| 3 | 54 | 840.08 | .63 | 2.73 | 0.09 | 12 | 253 | 255 | 257 | 46 | 95 | 82 | 20.3 |
| 2 | 57 | 842.80 | .60 | 2.61 | 2.84 | 11 | 249 | 256 | 258 | 46 | 95 | 82 | 20.6 |
| 1 | 60 | 845.36 | .50 | 2.18 | 5.36 | 11 | 248 | 257 | 256 | 47 | 95 | 82 | 20.6 |
| | (1646) | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | θ = 60 | Vm = 56.16 | | ΔH = 2.73 | | | | | | | Avg. = 86.8 | | |

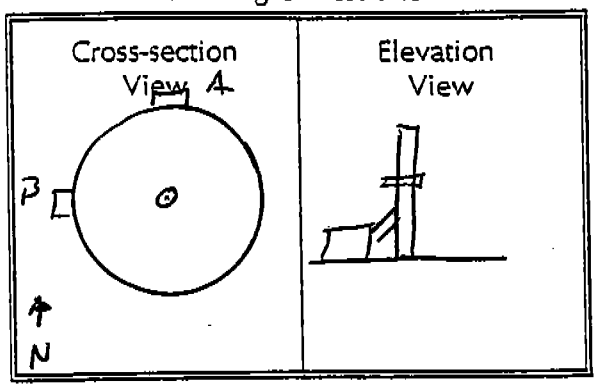
C-7

INTERPOLL LABORATORIES, INC.
(612) 786-6020

# EPA Method 2 Field Data Sheet

Job: LP - HAYWARD
Source: PROCESS RTO OUTLET STACK
Test: 2 Run: 0 Date: 6-8-94
Stack Dimen.: 75.5 IN.
Dry Bulb: 94.2 °F Wet bulb: 109 °F
Manometer: ☒ Reg. ☐ Exp ☐ Elec.
Barometric Pressure: 28.98 IN.HG
Static Pressure: - 0.35 IN.WC
Operators: SB + EJ
Pitot No.: 22V-8 $C_p$: .840
MDI 2P3

Drawing of Test Site




| Traverse Point No. | Fraction of Diameter | Distance From Stack Wall (IN.) | Distance From End of Port (IN.) | Velocity | Temp. of Gas (°F) |
|---|---|---|---|---|---|
| | | Port Length: 6.375 IN. | | Time Start: | HRS |
| A - 1 | .026 | 1.96 | 8.34 | | |
| 2 | .082 | 6.19 | 12.57 | | |
| 3 | .146 | 11.02 | 17.40 | | |
| 4 | .226 | 17.06 | 23.44 | | |
| 5 | .342 | 25.82 | 32.20 | | |
| 6 | .658 | 49.68 | 56.05 | | |
| 7 | .774 | 58.44 | 64.81 | | |
| 8 | .854 | 64.48 | 70.85 | | |
| 9 | .918 | 69.31 | 75.68 | | |
| 10 | .974 | 73.54 | 79.91 | | |
| B - 1 | | | | | |
| 2 | | | | | |
| 3 | | | | | |
| 4 | | | | | |
| 5 | | | | | |
| 6 | | | | | |
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| | | | | | |
| | | | | | |
| Temp. Meas. Device & S/N: DIGITAL TC - PDT 29 | | | | Time End: | HRS |

R or nothing = reg. manometer; S = expanded; E = electronic

032594-G:\STACK\WP\FORMS\S-392.1

INTERPOLL LABORATORIES, INC.
(612) 786-6020

# Interpoll Laboratories EPA Method 5/17 Sample Log Sheet

Job LP-HAYWARD
Source PRESS RTO OUTLET STACK
Method MDI Filter holder: N/A
Sample Train Leak Check:

Date 6-8-94 Test 2 Run 1
No. of traverse points 20
Filter type: N/A

Pretest: ≤ 0.02 cfm at 15 in. Hg. (vac) ☒
Post test: 0.00 cfm at 7 in. Hg. (vac) ☒

**Particulate Catch Data:**

No. of filters used:
N/A

Recovery solvent(s)
~~Acetone~~ TOLUENE
~~Other(s)~~ ACETONITRILE

No. of probe wash bottles: —
Sample recovered by: SB + ET

**Condensate Data:**

| Item | Weight (g) | | |
|---|---|---|---|
| | Final | Tare | Difference |
| Impinger No. 1 | | | |
| Impinger No. 2 | 510 | 494 | 16 |
| Impinger No. 3 | | | |
| Condenser | | | |
| Desiccant | 1544 | 1534 | 10 |
| | | | |
| Total | | | 26 |

**Integrated Gas Sampling Data:**

Bag Pump No. 223
Bag Material: 5-layer Aluminized Tedlar
Pretest leak check: 00
Time start: 0815
Sampling rate: 400

Box No. 24 Bag No. 1
Size: 44 L
cc/min at 15 in. Hg.
(HRS) Time end: 0916 (HRS)
cc/min Operator: SB

S/N of $O_2$ Analyzer used to monitor train outlet: 11

123093-G:\STACK\WP\METHODS\S-0046RR

# INTERPOLL LABORATORIES EPA METHOD 5 FIELD DATA SHEET

Job LP- HAYWARD
Source PRESS RTO OUTLET STACK
Date 6-8-94 Test 2 Run 1

Operators SJ + EJ
Meter Box No. 14 ΔH 1.85 IN WC
Barometer cont: 1.0066

Pitot No. 22U-8 Cp .840
Bar. Press. 28.98 inHg H2O 3 %
Nozzle No. G-4 Nozzle Dia .25 IN.

| Traverse Point No. | Sampling Time (min) | Sample Volume (cf) | Velocity Head (inWC) | Orifice Meter (inWC) | Dev. Vol. (cf) | VAC. inHg | Temperatures (°F) Stack | Probe | Oven | Impg. | Gas In | Gas Out | Oxygen (xx/v) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | (0815) | (846.05) | | | | | | | | | | | |
| B-10 | 3 | 848.04 | .74 | 1.43 | 8.00 | 6 | 244 | 250 | 255 | 48 | 46 | 46 | 20.5 |
| 9 | 6 | 849.99 | .71 | 1.37 | 9.91 | 6 | 245 | 251 | 256 | 48 | 55 | 46 | 20.5 |
| 8 | 9 | 851.95 | .70 | 1.36 | 1.83 | 6 | 245 | 251 | 256 | 47 | 58 | 46 | 20.5 |
| 7 | 12 | 853.77 | .69 | 1.34 | 3.73 | 6 | 248 | 254 | 256 | 47 | 58 | 46 | 20.5 |
| 6 | 15 | 855.60 | .67 | 1.30 | 5.60 | 6 | 249 | 254 | 255 | 47 | 61 | 47 | 20.4 |
| 5 | 18 | 857.45 | .68 | 1.33 | 7.50 | 6 | 247 | 254 | 258 | 46 | 64 | 48 | 20.4 |
| 4 | 21 | 859.30 | .66 | 1.30 | 9.38 | 6 | 246 | 254 | 258 | 46 | 66 | 48 | 20.4 |
| 3 | 24 | 861.20 | .65 | 1.28 | 1.25 | 6 | 245 | 254 | 257 | 46 | 67 | 49 | 20.4 |
| 2 | 27 | 862.95 | .49 | .96 | 2.88 | 5 | 248 | 250 | 258 | 45 | 69 | 49 | 20.6 |
| 1 | 30 | 864.20 | .34 | .67 | 4.23 | 4 | 247 | 251 | 256 | 44 | 70 | 51 | 20.4 |
| A-10 | 33 | 866.14 | .63 | 1.25 | 6.09 | 6 | 245 | 254 | 256 | 41 | 71 | 51 | 20.6 |
| 9 | 36 | 868.03 | .68 | 1.35 | 8.01 | 6 | 247 | 253 | 257 | 44 | 71 | 51 | 20.5 |
| 8 | 39 | 869.99 | .68 | 1.34 | 9.93 | 6 | 250 | 254 | 254 | 45 | 72 | 53 | 20.6 |
| 7 | 42 | 871.85 | .72 | 1.42 | 1.91 | 6 | 250 | 251 | 254 | 44 | 74 | 54 | 20.4 |
| 6 | 45 | 873.85 | .67 | 1.33 | 3.83 | 6 | 250 | 254 | 256 | 44 | 74 | 55 | 20.5 |
| 5 | 48 | 875.70 | .66 | 1.31 | 5.73 | 6 | 251 | 255 | 256 | 44 | 75 | 55 | 20.5 |
| 4 | 51 | 877.70 | .65 | 1.29 | 7.62 | 6 | 253 | 255 | 254 | 43 | 76 | 56 | 20.5 |
| 3 | 54 | 879.40 | .61 | 1.21 | 9.45 | 5 | 254 | 255 | 255 | 44 | 77 | 57 | 20.5 |
| 2 | 57 | 881.18 | .54 | 1.07 | 1.18 | 5 | 254 | 255 | 255 | 44 | 77 | 57 | 20.5 |
| 1 | 60 | 882.73 | .43 | .86 | 2.73 | 4 | 251 | 256 | 254 | 43 | 78 | 58 | 20.6 |
| | (0916) | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | θ = 60 | Vm = 36.68 | | ΔH = 1.24 | | | | | | | Avg. = 59.5 | | |

INTERPOLL LABORATORIES, INC.
(612) 786-6020

# Interpoll Laboratories EPA Method 5/17 Sample Log Sheet

Job LP - HAYWARD
Source PROSS RTO OUTLET STACK
Method MDE Filter holder: N/A
Date 6-8-94 Test 2 Run 2
No. of traverse points 20
Filter type: N/A

**Sample Train Leak Check:**

Pretest: ≤ 0.02 cfm at 15 in. Hg. (vac) ☒
Post test: 0.00 cfm at 7 in. Hg. (vac) ☒

**Particulate Catch Data:**

No. of filters used:

N/A

Recovery solvent(s)

☒~~acetone~~ ACETONITRILE
☒other(s) TOLUENE

No. of probe wash bottles: —
Sample recovered by: SB

**Condensate Data:**

| Item | Weight (g) | | |
|---|---|---|---|
| | Final | Tare | Difference |
| Impinger No. 1 | | | |
| Impinger No. 2 | 527 | 510 | 17 |
| Impinger No. 3 | | | |
| Condenser | | | |
| Desiccant | 1520 | 1510 | 10 |
| | | | |
| Total | | | 27 |

**Integrated Gas Sampling Data:**

Bag Pump No. 223
Bag Material: 5-layer Aluminized Tedlar
Pretest leak check: 00
Time start: 0945
Sampling rate: 400

Box No. 24 Bag No. 2
Size: 44 L
cc/min at 15 in. Hg.
(HRS) Time end: 1046 (HRS)
cc/min Operator: SB

S/N of $O_2$ Analyzer used to monitor train outlet: 11

123095-G:\STACK\WP\METHODS\S-0046RR

# INTERPOLL LABORATORIES EPA METHOD 5 FIELD DATA SHEET

Job LP - HAYWARD
Source DRYER RTO OUTLET STACK
Date 6-8-94 Test 2 Run 2

Operators SP + EJ
Meter Box No. 14 ΔH 1.75 IN. DC
Barometer corr.: 1.0066

Pitot No. 220-8 Cp .840
Bar. Press. 28.98 in Hg H2O 3 %
Nozzle No. ST-Y Nozzle Dia .225 in.

| Traverse Point No. | Sampling Time (min) | Sample Volume (cf) | Velocity Head (in WC) | Orifice Meter (in WC) | Dep. Vol. (cf) | VAC. in Hg | Temperatures (°F) Stack | Probe | Oven | Impy. | Gas/In | Gas/Out | Oxygen (xv/v) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | (0945) | (882.95 | | | | | | | | | | | |
| A - 10 | 3 | 884.80 | .64 | 1.26 | 4.80 | 5 | 251 | 247 | 246 | 41 | 65 | 62 | 20.3 |
| 9 | 6 | 886.67 | .65 | 1.30 | 6.69 | 5 | 246 | 247 | 249 | 44 | 71 | 61 | 20.3 |
| 8 | 9 | 888.70 | .72 | 1.44 | 8.69 | 5 | 246 | 248 | 249 | 44 | 72 | 61 | 20.4 |
| 7 | 12 | 890.70 | .71 | 1.42 | 10.68 | 5 | 248 | 248 | 249 | 44 | 75 | 61 | 20.4 |
| 6 | 15 | 892.59 | .73 | 1.46 | 2.70 | 6 | 248 | 249 | 251 | 46 | 76 | 62 | 20.3 |
| 5 | 18 | 894.62 | .68 | 1.36 | 4.65 | 6 | 250 | 251 | 251 | 46 | 77 | 62 | 20.4 |
| 4 | 21 | 896.50 | .62 | 1.24 | 6.51 | 6 | 254 | 254 | 259 | 48 | 78 | 62 | 20.4 |
| 3 | 24 | 898.68 | .65 | 1.30 | 8.41 | 6 | 255 | 256 | 259 | 42 | 80 | 63 | 20.4 |
| 2 | 27 | 900.10 | .52 | 1.04 | 10.12 | 5 | 254 | 256 | 258 | 41 | 81 | 63 | 20.4 |
| 1 | 30 | 901.25 | .41 | .82 | 1.64 | 5 | 252 | 256 | 258 | 44 | 81 | 64 | 20.4 |
| B - 10 | 33 | 903.82 | .71 | 1.43 | 3.65 | 5 | 250 | 254 | 259 | 43 | 81 | 64 | 20.2 |
| 9 | 36 | 905.89 | .73 | 1.47 | 5.68 | 6 | 251 | 249 | 258 | 43 | 77 | 65 | 20.3 |
| 8 | 39 | 907.70 | .68 | 1.37 | 7.64 | 6 | 250 | 255 | 253 | 43 | 82 | 65 | 20.3 |
| 7 | 42 | 909.70 | .67 | 1.35 | 9.58 | 6 | 253 | 254 | 258 | 44 | 83 | 66 | 20.4 |
| 6 | 45 | 911.55 | .64 | 1.29 | 1.49 | 6 | 252 | 254 | 257 | 43 | 83 | 66 | 20.4 |
| 5 | 48 | 913.52 | .63 | 1.27 | 3.38 | 6 | 253 | 254 | 257 | 43 | 85 | 67 | 20.3 |
| 4 | 51 | 915.34 | .62 | 1.25 | 5.27 | 5 | 254 | 254 | 258 | 44 | 85 | 68 | 20.2 |
| 3 | 54 | 917.16 | .60 | 1.21 | 7.12 | 5 | 254 | 256 | 257 | 41 | 86 | 69 | 20.3 |
| 2 | 57 | 918.95 | .57 | 1.15 | 8.93 | 5 | 254 | 254 | 257 | 44 | 87 | 70 | 20.2 |
| 1 | 60 | 920.67 | .54 | 1.10 | 0.69 | 5 | 253 | 251 | 254 | 41 | 88 | 70 | 20.2 |
| | (1046) | | | | | | | | | | | | |
| | θ = 60 | Vm = 37.74 | | ΔH = 1.28 | | | | | | | Avg. = 72.1 | | |

INTERPOLL LABORATORIES, INC.
(612) 786-6020

# Interpoll Laboratories EPA Method 5/17 Sample Log Sheet

Job LP - HAYWARD
Source PRESS RTO OUTLET STACK
Method 5/17 Filter holder: N/A

Date 6-8-94 Test 2 Run 3
No. of traverse points 20
Filter type: N/A

**Sample Train Leak Check:**

Pretest: ≤ 0.02 cfm at 15 in. Hg. (vac) ☒
Post test: 0.00 cfm at 8 in. Hg. (vac) ☒

**Particulate Catch Data:**

No. of filters used:

N/A

Recovery solvent(s)

☒ ~~Acetone~~, ACETONITRILE
☐ Other(s) TOLUENE

No. of probe wash bottles: —
Sample recovered by: SD + ES

**Condensate Data:**

| Item | Weight (g) | | |
|---|---|---|---|
| | Final | Tare | Difference |
| Impinger No. 1 | | | |
| Impinger No. 2 | 503 | 490 | 13 |
| Impinger No. 3 | | | |
| Condenser | | | |
| Desiccant | 1520 | 1510 | 10 |
| | | | |
| Total | | | 23 |

**Integrated Gas Sampling Data:**

Bag Pump No. 223
Bag Material: 5-layer Aluminized Tedlar
Pretest leak check: 00
Time start: 1115
Sampling rate: 400

Box No. 24 Bag No. 3
Size: 44 L
cc/min at 15 in. Hg.
(HRS) Time end: 1216 (HRS)
cc/min Operator: SD

S/N of $O_2$ Analyzer used to monitor train outlet: 11

123093-G:\STACK\WP\METHODS\S-0046RR

# INTERPOLL LABORATORIES EPA METHOD 5 FIELD DATA SHEET

Job LP- HAYWARD
Source Prosy Pro Outlet Stack
Date 6-8-94 Test 2 Run 3

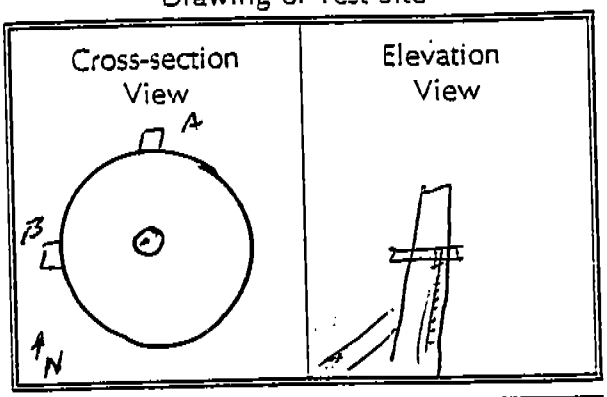
Operators SD+EJ
Meter Box No. 14 ΔH 1.85 ΔH@ 1.9966
Pitot No. 22V-8 Cp .840
Bar. Press. 28.48 inHg H2O 3 %
Nozzle No. G-4 Nozzle Dia .223 IN.

| Traverse Point No. | Sampling Time (min) | Sample Volume (cf) | Velocity Head (inWC) | Orifice Meter (inWC) | Dup. Vol. (cf) | VAC. inHg | Temperatures (°F) Stack | Probe | Oven | Impg. | Gas/In | Gas/Out | Oxygen (xx/x) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | (1115) | (920.95) | | | | | | | | | | | |
| B-10 | 3 | 922.84 | .64 | 1.29 | 2.85 | 6 | 251 | 251 | 258 | 44 | 71 | 66 | 20.3 |
| 9 | 6 | 924.78 | .68 | 1.35 | 4.79 | 6 | 254 | 250 | 258 | 46 | 73 | 66 | 20.3 |
| 8 | 9 | 926.75 | .68 | 1.36 | 6.74 | 6 | 252 | 256 | 257 | 46 | 75 | 66 | 20.3 |
| 7 | 12 | 928.74 | .70 | 1.40 | 8.71 | 6 | 255 | 254 | 257 | 46 | 76 | 65 | 20.1 |
| 6 | 15 | 930.70 | .68 | 1.35 | 0.66 | 6 | 256 | 254 | 259 | 46 | 78 | 66 | 20.1 |
| 5 | 18 | 932.50 | .64 | 1.28 | 2.56 | 6 | 255 | 253 | 258 | 46 | 81 | 67 | 20.2 |
| 4 | 21 | 934.60 | .74 | 1.49 | 4.61 | 6 | 253 | 254 | 257 | 45 | 83 | 69 | 20.2 |
| 3 | 24 | 936.50 | .64 | 1.29 | 6.52 | 6 | 253 | 250 | 258 | 44 | 85 | 70 | 20.3 |
| 2 | 27 | 938.34 | .58 | 1.18 | 8.35 | 6 | 251 | 251 | 257 | 44 | 86 | 70 | 20.4 |
| 1 | 30 | 940.10 | .54 | 1.10 | 0.11 | 5 | 251 | 254 | 257 | 41 | 87 | 71 | 20.3 |
| A-10 | 33 | 942.25 | .67 | 1.36 | 2.08 | 5 | 254 | 256 | 257 | 44 | 87 | 71 | 20.4 |
| 9 | 36 | 944.10 | .68 | 1.38 | 4.06 | 6 | 253 | 254 | 254 | 43 | 82 | 70 | 20.6 |
| 8 | 39 | 946.08 | .66 | 1.33 | 6.00 | 6 | 253 | 254 | 255 | 43 | 85 | 70 | 20.3 |
| 7 | 42 | 947.99 | .68 | 1.37 | 7.98 | 6 | 256 | 254 | 255 | 44 | 85 | 69 | 20.3 |
| 6 | 45 | 949.99 | .67 | 1.35 | 9.93 | 6 | 256 | 254 | 253 | 44 | 84 | 67 | 20.4 |
| 5 | 48 | 951.89 | .68 | 1.37 | 1.90 | 6 | 256 | 254 | 254 | 43 | 84 | 67 | 20.4 |
| 4 | 51 | 953.87 | .69 | 1.39 | 3.88 | 6 | 256 | 250 | 254 | 43 | 84 | 67 | 20.3 |
| 3 | 54 | 955.84 | .63 | 1.28 | 5.78 | 6 | 250 | 254 | 258 | 44 | 85 | 68 | 20.3 |
| 2 | 57 | 957.60 | .58 | 1.18 | 7.61 | 6 | 250 | 254 | 257 | 43 | 87 | 70 | 20.4 |
| 1 | 60 | 959.36 | .53 | 1.08 | 9.36 | 6 | 250 | 254 | 258 | 44 | 88 | 70 | 20.3 |
| | (1216) | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | θ = 60 | Vm = 38.41 | | ΔH = 1.31 | | | | | | | Avg. = 75.2 | | |

INTERPOLL LABORATORIES, INC.
(612) 786-6020

# EPA Method 2 Field Data Sheet

Drawing of Test Site




Job LP - HAYWARD
Source #1 BOILER RED OUTLET
Test 3 Run 0 Date 6-10-94
Stack Dimen. 75.5 IN.
Dry Bulb 241 °F Wet bulb 110 °F
Manometer ☑ Reg. ☐ Exp ☐ Elec.
Barometric Pressure 28.93 IN.HG
Static Pressure -.43 IN.WC
Operators SB + EJ
Pitot No. 220-8 $C_p$ .840
PM / CO / Fuel

| Traverse Point No. | Fraction of Diameter | Distance From Stack Wall (IN.) | Distance From End of Port (IN.) | Velocity | Temp. of Gas (°F) |
|---|---|---|---|---|---|
| | | Port Length: 6.375 IN. | | Time Start: 0837 HRS | |
| A - 1 | .026 | 1.96 | 8.34 | .40 | 250 |
| 2 | .082 | 6.19 | 12.57 | .48 | 251 |
| 3 | .146 | 11.02 | 17.40 | .38 | 251 |
| 4 | .226 | 17.06 | 23.44 | .60 | 251 |
| 5 | .342 | 25.82 | 32.20 | .63 | 251 |
| 6 | .658 | 49.68 | 56.05 | .65 | 254 |
| 7 | .774 | 58.44 | 64.91 | .60 | 253 |
| 8 | .854 | 64.48 | 70.85 | .65 | 252 |
| 9 | .918 | 69.31 | 75.68 | .66 | 251 |
| 10 | .974 | 73.54 | 79.91 | .63 | 254 |
| B - 1 | | | | .42 | 252 |
| 2 | | | | .54 | 252 |
| 3 | | | | .63 | 252 |
| 4 | | | | .61 | 252 |
| 5 | | | | .63 | 251 |
| 6 | | | | .68 | 251 |
| 7 | | | | .66 | 251 |
| 8 | | | | .69 | 251 |
| 9 | | | | .69 | 251 |
| 10 | | | | .69 | 251 |
| | | ACFM = | 97,064 | | |
| | | DSCFM = | 67,437 | | |
| | | FT/Sec = | 52.03 | | |
| | | SCFM = | ~~60,000~~ | 69,164 | |
| | | | | | |
| Temp. Meas. Device & S/N: Digital TC-PDT 29 | | | | Time End: | HRS |

R or nothing = reg. manometer; S = expanded; E = electronic

INTERPOLL LABORATORIES, INC.
(612) 786-6020

# Interpoll Laboratories EPA Method 5/17 Sample Log Sheet

Job LP-HAYWARD
Source #1 PROCESS RTO OUTLET
Method 1-5 Filter holder: GLASS
Date 6-10-94 Test 3 Run 1
No. of traverse points 20
Filter type: 4" G.F.

**Sample Train Leak Check:**

Pretest: ≤ 0.02 cfm at 15 in. Hg. (vac) ☒
Post test: 000 cfm at 10 in. Hg. (vac) ☒

**Particulate Catch Data:**

No. of filters used: 4041

Recovery solvent(s)
☒acetone
☐other(s)

No. of probe wash bottles: 1
Sample recovered by: SB

**Condensate Data:**

| Item | Weight (g) | | |
|---|---|---|---|
| | Final | Tare | Difference |
| Impinger No. 1 | | | |
| Impinger No. 2 | 507 | 498 | 9 |
| Impinger No. 3 | | | |
| Condenser | | | |
| Desiccant | 1455 | 1440 | 15 |
| | | | |
| Total | | | 24 |

**Integrated Gas Sampling Data:**

Bag Pump No. 228
Bag Material: 5-layer Aluminized Tedlar
Pretest leak check: 00
Time start: 0935
Sampling rate: 400
Box No. 19 Bag No. 1
Size: 44 L
cc/min at 15 in. Hg.
(HRS) Time end: 1036 (HRS)
cc/min Operator: SB

S/N of $O_2$ Analyzer used to monitor train outlet: 11

123093-G:\STACK\WP\METHODS\S-0046RR

# INTERPOLL LABORATORIES EPA METHOD 5 FIELD DATA SHEET

Job LP - HAYWARD
Source #1 PROSI DTO OUTLET
Date 6-10-94 Test 3 Run 1

Operators SD + EJ
Meter Box No. 14 ΔH 1.85 TM 0C
Counter coeff. 1.0006

Pitot No. 220-8 Cp .840
Bar. Press. 28.93 inHg H2O 3 %
Nozzle No. 4-4 Nozzle Dia .251 IN.

| Traverse Point No. | Sampling Time (min) | Sample Volume (cf) | Velocity Head (inWC) | Orifice Meter (inWC) | Dry. Vol. (cf) | VAC. inHg | Temperatures (°F) Stack | Probe | Oven | Impy. | Gas/In | Gas/Out | Oxygen (xx/y) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | (0935) | 162.10 | | | | | | | | | | | |
| A - 10 | 3 | 164.50 | .72 | 2.19 | 4.54 | 8 | 252 | 245 | 254 | 60 | 61 | 61 | 20.5 |
| 9 | 6 | 166.99 | .68 | 2.05 | 6.92 | 8 | 258 | 246 | 254 | 50 | 63 | 61 | 20.6 |
| 8 | 9 | 169.42 | .68 | 2.05 | 9.29 | 7 | 259 | 246 | 254 | 48 | 64 | 61 | 20.6 |
| 7 | 12 | 171.70 | .68 | 2.06 | 1.68 | 7 | 257 | 246 | 255 | 48 | 64 | 61 | 20.6 |
| 6 | 15 | 174.05 | .68 | 2.07 | 4.06 | 7 | 256 | 247 | 255 | 48 | 69 | 62 | 20.5 |
| 5 | 18 | 176.53 | .73 | 2.23 | 6.55 | 8 | 256 | 248 | 253 | 48 | 73 | 62 | 20.5 |
| 4 | 21 | 178.91 | .65 | 1.98 | 8.89 | 7.5 | 260 | 245 | 257 | 47 | 77 | 63 | 20.6 |
| 3 | 24 | 181.32 | .68 | 2.11 | 1.32 | 8 | 260 | 247 | 255 | 47 | 79 | 64 | 20.6 |
| 2 | 27 | 183.56 | .54 | 1.66 | 3.48 | 6.5 | 261 | 249 | 257 | 48 | 81 | 65 | 20.5 |
| 1 | 30 | 185.34 | .38 | 1.17 | 5.30 | 5 | 260 | 250 | 255 | 47 | 81 | 66 | 20.6 |
| B - 10 | 33 | 187.70 | .65 | 2.02 | 7.68 | 7 | 255 | 250 | 256 | 47 | 82 | 66 | 20.6 |
| 9 | 36 | 190.10 | .68 | 2.11 | 0.11 | 8 | 256 | 251 | 255 | 46 | 81 | 67 | 20.4 |
| 8 | 39 | 192.55 | .70 | 2.16 | 2.58 | 8 | 260 | 250 | 254 | 45 | 84 | 67 | 20.7 |
| 7 | 42 | 194.99 | .64 | 1.98 | 4.94 | 8 | 261 | 256 | 254 | 44 | 85 | 68 | 20.4 |
| 6 | 45 | 197.43 | .63 | 1.95 | 7.29 | 7 | 262 | 256 | 254 | 45 | 86 | 68 | 20.5 |
| 5 | 48 | 199.72 | .65 | 2.01 | 9.67 | 7 | 262 | 254 | 258 | 46 | 86 | 68 | 20.5 |
| 4 | 51 | 202.00 | .65 | 2.01 | 2.06 | 7 | 261 | 253 | 257 | 44 | 85 | 67 | 20.4 |
| 3 | 54 | 204.30 | .60 | 1.86 | 4.35 | 7 | 261 | 254 | 257 | 43 | 86 | 67 | 20.4 |
| 2 | 57 | 206.60 | .58 | 1.80 | 6.61 | 7 | 261 | 255 | 258 | 44 | 86 | 67 | 20.5 |
| 1 | 60 | 208.48 | .40 | 1.24 | 8.48 | 6 | 258 | 254 | 257 | 43 | 86 | 68 | 20.5 |
| | (1036) | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | θ = 60 | Vm = 46.38 | | ΔH = 1.91 | | | | | | | Avg. = 71.5 | | |

INTERPOLL LABORATORIES, INC.
(612) 786-6020

# Interpoll Laboratories EPA Method 5/17 Sample Log Sheet

Job CP-HOWARD
Source #1 PRESS RTO OUTLET
Method 1-5 Filter holder: 4" Glass
Date 6-10-94 Test 3 Run 2
No. of traverse points 20
Filter type: 4" GLASS FIBER

**Sample Train Leak Check:**

Pretest: ≤ 0.02 cfm at 15 in. Hg. (vac) ☒
Post test: 0.00 cfm at 15 in. Hg. (vac) ☒

**Particulate Catch Data:**

No. of filters used:
4044

Recovery solvent(s)
☒ acetone
☐ other(s)

No. of probe wash bottles: 1
Sample recovered by: SB + EJ

**Condensate Data:**

| Item | Weight (g) | | |
|---|---|---|---|
| | Final | Tare | Difference |
| Impinger No. 1 | | | |
| Impinger No. 2 | 526 | 513 | 13 |
| Impinger No. 3 | | | |
| Condenser | | | |
| Desiccant | 1535 | 1519 | 16 |
| | | | |
| Total | | | 29 |

**Integrated Gas Sampling Data:**

Bag Pump No. 22B
Bag Material: 5-layer Aluminized Tedlar
Pretest leak check: 00
Time start: 1100
Sampling rate: 400

Box No. 19 Bag No. 2
Size: 44 L
cc/min at 15 in. Hg.
(HRS) Time end: 1201 (HRS)
cc/min Operator: SB

S/N of $O_2$ Analyzer used to monitor train outlet: 11

123093-G:\STACK\WP\METHODS\S-0046RR

Boiler inlet to ESP

LF-011

# INTERPOLL LABORATORIES EPA METHOD 5 FIELD DATA SHEET

Job LP-HAYWARD
Source #1 Process Htg Outlet
Date 6-10-94 Test 3 Run 3

Operators SB + ES
Meter Box No. 14 ΔH 1.85 TM 70
Barometer coeff. 1.0064

Pitot No. 22J-8 Cp .840
Bar. Press. 28.93 inHg H2O 3 %
Nozzle No. 5-4 Nozzle Dia .257 IN.

| Traverse Point No. | Sampling Time (min) | Sample Volume (cf) | Velocity Head (inWC) | Orifice Meter (inWC) | Dec. Vol. (cf) | VAC. inHg | Temperatures (°F) Stack | Probe | Oven | Impg. | Gas/In | Gas/Out | Oxygen (%v/v) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | (1100) | (209.36) | | | | | | | | | | | |
| B-10 | 3 | 211.44 | .63 | 1.94 | 1.42 | 7 | 260 | 250 | 248 | 48 | 74 | 73 | 20.8 |
| 9 | 6 | 213.40 | .63 | 1.94 | 3.76 | 7 | 261 | 251 | 250 | 46 | 80 | 72 | 20.3 |
| 8 | 9 | 216.46 | .64 | 1.98 | 6.12 | 7 | 261 | 251 | 255 | 46 | 83 | 72 | 20.4 |
| 7 | 12 | 218.60 | .65 | 2.02 | 8.52 | 7 | 260 | 254 | 256 | 44 | 84 | 72 | 20.4 |
| 6 | 15 | 220.00 | .64 | 1.97 | 0.88 | 7 | 266 | 253 | 254 | 44 | 88 | 74 | 20.3 |
| 5 | 18 | 223.28 | .69 | 2.14 | 3.35 | 7 | 266 | 253 | 256 | 43 | 89 | 74 | 19.5 |
| 4 | 21 | 225.60 | .64 | 1.98 | 5.23 | 7 | 268 | 255 | 257 | 44 | 91 | 75 | 20.2 |
| 3 | 24 | 228.87 | .66 | 1.87 | 8.04 | 7 | 264 | 255 | 254 | 43 | 83 | 76 | 20.2 |
| 2 | 27 | 230.22 | .56 | 0.36 | 2.03 | 7 | 259 | 253 | 257 | 44 | 94 | 76 | 20.2 |
| 1 | 30 | 232.25 | .40 | 1.26 | 2.20 | 5 | 262 | 257 | 253 | 44 | 94 | 77 | 20.3 |
| A-10 | 33 | 234.57 | .60 | 1.89 | 4.53 | 7 | 260 | 255 | 254 | 43 | 93 | 77 | 20.3 |
| 9 | 36 | 236.94 | .65 | 2.04 | 6.95 | 7 | 262 | 253 | 257 | 43 | 95 | 78 | 20.2 |
| 8 | 39 | 239.44 | .70 | 2.21 | 9.47 | 8 | 260 | 255 | 255 | 44 | 96 | 78 | 20.2 |
| 7 | 42 | 241.79 | .60 | 1.89 | 1.81 | 7 | 266 | 251 | 253 | 43 | 96 | 79 | 20.2 |
| 6 | 45 | 244.10 | .53 | 1.66 | 3.99 | 7 | 268 | 253 | 253 | 43 | 97 | 80 | 20.3 |
| 5 | 48 | 246.33 | .60 | 1.90 | 6.34 | 7 | 260 | 255 | 257 | 44 | 97 | 80 | 20.2 |
| 4 | 51 | 248.63 | .55 | 1.85 | 8.65 | 7 | 267 | 255 | 253 | 43 | 98 | 80 | 20.3 |
| 3 | 54 | 250.90 | .55 | 1.73 | 0.88 | 7 | 268 | 251 | 256 | 44 | 98 | 81 | 20.2 |
| 2 | 57 | 253.16 | .52 | 1.64 | 3.07 | 6 | 267 | 253 | 252 | 43 | 99 | 81 | 20.1 |
| 1 | 60 | 255.03 | .42 | 1.33 | 5.03 | 5 | 265 | 254 | 254 | 40 | 99 | 82 | 20.3 |
| | (1201) | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | θ = 60 | Vm = 45.67 | | ΔH = 1.85 | | | | | | | Avg. = 84.4 | | |

C-19

S-0037R

INTERPOLL LABORATORIES, INC.
(612) 786-6020

# Interpoll Laboratories EPA Method 5/17 Sample Log Sheet

Job CP-HAYWARD
Source #1 PRESS TOTO OUTLET
Method 1-5 Filter holder: 4" Glass
Date 6-10-94 Test 3 Run 3
No. of traverse points 12
Filter type: 4" Glass fiber

**Sample Train Leak Check:**

Pretest: ≤ 0.02 cfm at 15 in. Hg. (vac) ☒
Post test: 0.00 cfm at 12 in. Hg. (vac) ☒

**Particulate Catch Data:**

No. of filters used:
4043

Recovery solvent(s)
☒acetone
☐other(s)

No. of probe wash bottles: 1
Sample recovered by: SD + RJ

**Condensate Data:**

| Item | Weight (g) | | |
|---|---|---|---|
| | Final | Tare | Difference |
| Impinger No. 1 | | | |
| Impinger No. 2 | 514 | 500 | 14 |
| Impinger No. 3 | | | |
| Condenser | | | |
| Desiccant | 1534 | 1520 | 14 |
| | | | |
| Total | | | 28 |

**Integrated Gas Sampling Data:**

Bag Pump No. 223
Bag Material: 5-layer Aluminized Tedlar
Pretest leak check: 00
Time start: 1220
Sampling rate: 400
Box No. 19 Bag No. 3
Size: 44 L
cc/min at 15 in. Hg.
(HRS) Time end: 1321 (HRS)
cc/min Operator: SD

S/N of $O_2$ Analyzer used to monitor train outlet: 11

123093-G:\STACK\WP\METHODS\S-0046RR

# INTERPOLL LABORATORIES — A METHOD 5 FIELD DATA SHEET

Job: LP- HAYWARD
Source: #1 Diesel Aft OUTLET
Date: 6-10-94 Test: 3 Run: 3

Operators: SB + EJ
Meter Box No.: 14 ΔH@ 1.85 (IN WC)
Calibration coeff.: 1.0066

Pitot No.: 22U-8 Cp: .840
Bar. Press.: 29.93 in Hg H2O: 3 %
Nozzle No.: 4-4 Nozzle Dia: .311 IN.

| Traverse Point No. | Sampling Time (min) | Sample Volume (cf) | Velocity Head (in WC) | Orifice Meter (in WC) | Dry Gas Vol. (cf) | VAC. (in Hg) | Temperatures (°F) Stack | Probe | Oven | Impg. | Gas/In | Gas/Out | Oxygen (%v/v) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | (1220) | 255.30 | | | | | | | | | | | |
| A-10 | 3 | 257.70 | .63 | 1.98 | 7.68 | 8 | 262 | 257 | 260 | 40 | 85 | 83 | 20.3 |
| 9 | 6 | 260.20 | .65 | 2.02 | 10.08 | 8 | 264 | 254 | 261 | 44 | 89 | 82 | 20.3 |
| 8 | 9 | 262.40 | .63 | 1.57 | 12.46 | 8 | 266 | 254 | 261 | 45 | 91 | 82 | 20.3 |
| 7 | 12 | 264.80 | .61 | 1.92 | 14.82 | 7 | 261 | 254 | 260 | 46 | 90 | 82 | 20.4 |
| 6 | 15 | 267.15 | .62 | 1.94 | 17.18 | 6 | 268 | 255 | 261 | 47 | 93 | 83 | 20.1 |
| 5 | 18 | 269.68 | .68 | 2.12 | 19.65 | 6 | 268 | 255 | 260 | 47 | 95 | 83 | 20.3 |
| 4 | 21 | 272.02 | .62 | 1.94 | 22.02 | 6 | 270 | 253 | 258 | 47 | 97 | 83 | 20.3 |
| 3 | 24 | 274.33 | .59 | 1.85 | 24.34 | 6.5 | 270 | 253 | 257 | 46 | 98 | 83 | 20.4 |
| 2 | 27 | 276.60 | .55 | 1.73 | 26.58 | 6 | 269 | 255 | 254 | 47 | 98 | 84 | 20.2 |
| 1 | 30 | 278.62 | .45 | 1.42 | 28.61 | 5.5 | 267 | 255 | 258 | 46 | 98 | 84 | 20.2 |
| B-10 | 33 | 280.84 | .55 | 1.74 | 30.86 | 6 | 267 | 259 | 258 | 45 | 98 | 84 | 20.1 |
| 9 | 36 | 283.24 | .65 | 2.04 | 33.29 | 7 | 270 | 256 | 253 | 45 | 99 | 85 | 20.2 |
| 8 | 39 | 285.69 | .64 | 2.02 | 35.71 | 7 | 268 | 258 | 255 | 46 | 100 | 85 | 20.2 |
| 7 | 42 | 288.07 | .61 | 1.92 | 38.08 | 7 | 270 | 253 | 250 | 45 | 100 | 85 | 20.2 |
| 6 | 45 | 290.53 | .66 | 2.08 | 40.54 | 7 | 268 | 253 | 253 | 45 | 101 | 85 | 20.2 |
| 5 | 48 | 292.90 | .60 | 1.89 | 42.89 | 7 | 269 | 257 | 255 | 44 | 101 | 86 | 20.2 |
| 4 | 51 | 295.25 | .59 | 1.87 | 45.22 | 7 | 268 | 257 | 253 | 44 | 101 | 86 | 20.1 |
| 3 | 54 | 297.70 | .67 | 2.12 | 47.71 | 7 | 269 | 256 | 254 | 43 | 101 | 86 | 20.2 |
| 2 | 57 | 299.99 | .54 | 1.70 | 49.94 | 6 | 270 | 256 | 257 | 44 | 101 | 87 | 20.2 |
| 1 | 60 | 301.98 | .45 | 1.43 | 51.98 | 5 | 267 | 254 | 255 | 43 | 101 | 87 | 20.2 |
| | (1321) | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | θ = 60 | Vm = 46.68 | | ΔH = 1.85 | | | | | | | Avg. = 90.5 | | |

C-21

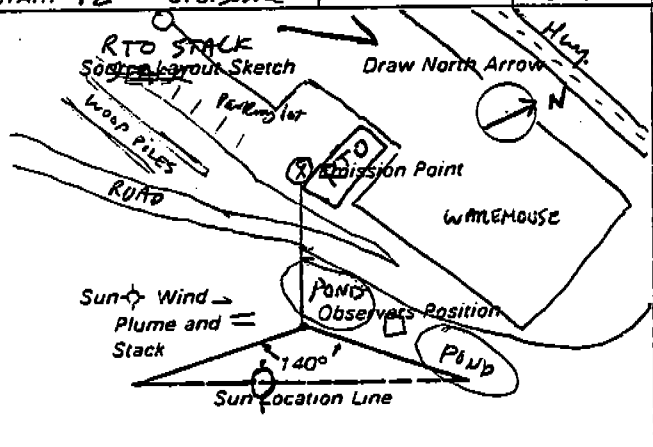
S-0037R

Interpoll Laboratories
(612)786-6020

# Visible Emissions Form

T3

| | |
|---|---|
| SOURCE NAME: L.D Hayward | OBSERVATION DATE: 6-10-94 |
| ADDRESS: Line 1 Press RTO STACK OUTLET Hwy 63 | START TIME: 11:00 |
| CITY: Hayward | STATE: WS |
| ZIP: | STOP TIME: 12:00 |
| PHONE: | SOURCE ID NUMBER: |
| PROCESS EQUIPMENT: Line 1 Press | OPERATING MODE: 100% |
| CONTROL EQUIPMENT: RTO | OPERATING MODE: 100% |
| DESCRIBE EMISSION POINT: START Brown Single STACK | STOP SAME |
| HEIGHT ABOVE GROUND LEVEL: START 100' STOP Same | HEIGHT RELATIVE TO OBSERVER: START 100' STOP Same |
| DISTANCE FROM OBSERVER: START 400' STOP Same | DIRECTION FROM OBSERVER: START NNW STOP Same |
| DESCRIBE EMISSIONS: START N/A | STOP N/A |
| EMISSION COLOR: START N/A STOP N/A | PLUME TYPE: CONTINUOUS ☐ FUGITIVE ☐ INTERMITTENT ☐ |
| WATER DROPLETS PRESENT: NO ☒ YES ☐ | IF WATER DROPLET PLUME: ATTACHED ☐ DETACHED ☐ |
| POINT IN THE PLUME AT WHICH OPACITY WAS DETERMINED: START 1' above STACK | STOP SAME |
| DESCRIBE BACKGROUND: START Sky | STOP Same |
| BACKGROUND COLOR: START BLUE STOP BLUE | SKY CONDITIONS: START CLEAR STOP SAME |
| WIND SPEED: START 0-5 STOP Same | WIND DIRECTION: START SW STOP Same |
| AMBIENT TEMP.: START 72 STOP Same | WET BULB TEMP.: 52 |
| | RH percent: 57% |




# No Emissions Seen : No color or description.

| SEC / MIN | 0 | 15 | 30 | 45 | SEC / MIN | 0 | 15 | 30 | 45 |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 0 | 0 | 0 | 0 | 31 | 0 | 0 | 0 | 0 |
| 2 | 0 | 0 | 0 | 0 | 32 | 0 | 0 | 0 | 0 |
| 3 | 0 | 0 | 0 | 0 | 33 | 0 | 0 | 0 | 0 |
| 4 | 0 | 0 | 0 | 0 | 34 | 0 | 0 | 0 | 0 |
| 5 | 0 | 0 | 0 | 0 | 35 | 0 | 0 | 0 | 0 |
| 6 | 0 | 0 | 0 | 0 | 36 | 0 | 0 | 0 | 0 |
| 7 | 0 | 0 | 0 | 0 | 37 | 0 | 0 | 0 | 0 |
| 8 | 0 | 0 | 0 | 0 | 38 | 0 | 0 | 0 | 0 |
| 9 | 0 | 0 | 0 | 0 | 39 | 0 | 0 | 0 | 0 |
| 10 | 0 | 0 | 0 | 0 | 40 | 0 | 0 | 0 | 0 |
| 11 | 0 | 0 | 0 | 0 | 41 | 0 | 0 | 0 | 0 |
| 12 | 0 | 0 | 0 | 0 | 42 | 0 | 0 | 0 | 0 |
| 13 | 0 | 0 | 0 | 0 | 43 | 0 | 0 | 0 | 0 |
| 14 | 0 | 0 | 0 | 0 | 44 | 0 | 0 | 0 | 0 |
| 15 | 0 | 0 | 0 | 0 | 45 | 0 | 0 | 0 | 0 |
| 16 | 0 | 0 | 0 | 0 | 46 | 0 | 0 | 0 | 0 |
| 17 | 0 | 0 | 0 | 0 | 47 | 0 | 0 | 0 | 0 |
| 18 | 0 | 0 | 0 | 0 | 48 | 0 | 0 | 0 | 0 |
| 19 | 0 | 0 | 0 | 0 | 49 | 0 | 0 | 0 | 0 |
| 20 | 0 | 0 | 0 | 0 | 50 | 0 | 0 | 0 | 0 |
| 21 | 0 | 0 | 0 | 0 | 51 | 0 | 0 | 0 | 0 |
| 22 | 0 | 0 | 0 | 0 | 52 | 0 | 0 | 0 | 0 |
| 23 | 0 | 0 | 0 | 0 | 53 | 0 | 0 | 0 | 0 |
| 24 | 0 | 0 | 0 | 0 | 54 | 0 | 0 | 0 | 0 |
| 25 | 0 | 0 | 0 | 0 | 55 | 0 | 0 | 0 | 0 |
| 26 | 0 | 0 | 0 | 0 | 56 | 0 | 0 | 0 | 0 |
| 27 | 0 | 0 | 0 | 0 | 57 | 0 | 0 | 0 | 0 |
| 28 | 0 | 0 | 0 | 0 | 58 | 0 | 0 | 0 | 0 |
| 29 | 0 | 0 | 0 | 0 | 59 | 0 | 0 | 0 | 0 |
| 30 | 0 | 0 | 0 | 0 | 60 | 0 | 0 | 0 | 0 |

| | |
|---|---|
| AVERAGE OPACITY FOR HIGHEST PERIOD | NUMBER OF READINGS ABOVE % WERE |
| RANGE OF OPACITY READINGS: MINIMUM | MAXIMUM |
| OBSERVER'S NAME (PRINT): DAVID VANDER | |
| COMMENTS: INTERFERENCE FROM downwind STACK but only slight at times | OBSERVER'S SIGNATURE: David Vander — DATE: 6-10-94 |
| | ORGANIZATION: INTERPOLL LABORATORIES |
| I HAVE RECEIVED A COPY OF THESE OPACITY OBSERVATIONS SIGNATURE | CERTIFIED BY: CTA — DATE: 4-6-94 |
| TITLE — DATE | VERIFIED BY — DATE |

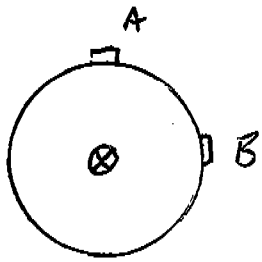


S-0079R

INTERPOLL LABORATORIES - EPA METHOD 2 FIELD DATA SHEET

Job L.P. / Hayward, WI
Source Line / Preis RTO / Inlet
Test 5 Run 0 Date 6-10-94
Stack dimen. 53.125 IN.
Dry bulb 120 °F Wet bulb 75 °F
Manometer: ☒ Reg. ☐ Exp. ☐ Elec.
Barometric pressure 28.93 in Hg
Static pressure -2.95 in WC
Operators M. Kawleski D. Vrazel + K.N.
Pitot No. 24V-8 $C_p$ .84

Cross-section View (UP)




Elevation View

Drawing of Test Site

OM

| Traverse Point No. | Fraction of Diameter | Distance from Stack Wall (in) | Distance from End of Port (in) | Velocity Pressure (in WC) | Temperature of gas (°F) |
|---|---|---|---|---|---|
| | | Port length: 6.375 in. | | Time start: 0941 hrs | |
| A-1 | | | | 1.58 | |
| 2 | | | | 1.75 | |
| 3 | | | | 1.50 | |
| 4 | | | | 1.48 | |
| 5 | | | | 1.32 | |
| 6 | | | | 1.44 | |
| 7 | | | | 1.59 | |
| 8 | | | | 1.60 | |
| 9 | | | | 1.70 | |
| 10 | | | | 1.77 | |
| 11 | | | | 1.72 | |
| 12 | | | | 1.75 | 116 |
| B-1 | | | | 1.37 | |
| 2 | | | | 1.40 | |
| 3 | | | | 1.48 | |
| 4 | B=15 7/8" 223" | | | 1.37 | |
| 5 | A=257" | | | 1.40 | |
| 6 | | | | 1.32 | |
| 7 | | | | 1.36 | |
| 8 | ACFM | 67,252 | | 1.33 | |
| 9 | DSCFM | 57,386 | | 1.24 | |
| 10 | FT/sec | 72.14 | | 1.05 | |
| 11 | SCFM | ~~59,078~~ | 58,775 | 1.18 | |
| 12 | | | | 1.10 | |
| | | | | | |
| Temp. meas. device & S/N: PDT-31 / TC | | | | Time end: 0947 hrs | |

C-23 R or nothing = reg. manometer; S= expanded; E=electronic S-3921

INTERPOLL LABORATORIES, INC.
(612) 786-6020

# Interpoll Laboratories EPA Method 5/17 Sample Log Sheet

Job L.P. / Hayward, WI
Source Line / Press #270 / Inlet
Method 5 Filter holder: Teflon
Sample Train Leak Check:

Date 6-10-94 Test 5 Run 1
No. of traverse points 24
Filter type: 3.52" Pallflex

Pretest: ≤ 0.02 cfm at 15 in. Hg. (vac) ☑
Post test: <0.02 cfm at 10 in. Hg. (vac) ☒

**Particulate Catch Data:**

No. of filters used:
1318

Recovery solvent(s)
☑acetone
☐other(s)

No. of probe wash bottles: 1
Sample recovered by: M. Koehler + K. Nuessmeier

**Condensate Data:**

| Item | Weight (g) | | |
|---|---|---|---|
| | Final | Tare | Difference |
| Impinger No. 1 | | | |
| Impinger No. 2 | 498 | 498 | — |
| Impinger No. 3 | | | |
| Condenser | | | |
| Desiccant | 1509 | 1490 | 19 |
| | | | |
| Total | | | 19 |

**Integrated Gas Sampling Data:** NA/Ambient

Bag Pump No. _____
Bag Material: 5-layer Aluminized Tedlar
Pretest leak check: _____
Time start: _____
Sampling rate: _____

Box No. _____ Bag No. _____
Size: 44 L
cc/min at _____ in. Hg.
(HRS) Time end: _____ (HRS)
cc/min Operator: _____

S/N of $O_2$ Analyzer used to monitor train outlet: _____

123093-G:\STACK\WP\METHODS\S-0046RR

# INTERPOLL LABORATORIES — EPA METHOD 5 FIELD DATA SHEET

Job L.P. / Hayward, WI — Operators M. Kuehler / K. Niessinger — Pitot No. 240-B — Cp .84 — ΔH .93 — inHg H2O 2 X
Source Line 1 Press RTO / Inlet — Meter Box No. 9 — Y 1.78 — ΔH@ 1.78 — Bar. Press. 28.93 — Nozzle No. 240-3 — Nozzle Dia .196 IN.
Date 6-20-94 — Test 5 — Run 1 — Counter coeff. .9961

| Traverse Point No. | Sampling Time (min) | Sample Volume (cf) | Velocity Head (inWC) | Orifice Meter (inWC) | Dec. Vol. (cf) | VAC. inHg | Temperatures (°F) Stack | Probe | Oven | Impg. | Gas/In | Gas/Out | Oxygen (xx/x) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 0935 | 963.00 | | | | | | | | | | | |
| A-12 | 2.5 | 964.77 | 1.24 | 1.42 | 4.69 | 6 | 121 | 237 | 248 | 42 | 67 | 62 | 20.9 |
| 11 | 5 | 966.83 | 1.81 | 2.09 | 6.76 | 8 | 122 | | | | 69 | 67 | |
| 10 | 7.5 | 968.80 | 1.70 | 1.98 | 8.77 | 8 | 118 | 240 | 245 | 42 | 72 | 68 | |
| 9 | 10 | 970.82 | 1.62 | 1.89 | 0.74 | 7.5 | 119 | | | | 74 | 66 | |
| 8 | 12.5 | 972.68 | 1.48 | 1.73 | 2.64 | 7 | 119 | 245 | 251 | 43 | 76 | 69 | |
| 7 | 15 | 974.73 | 1.70 | 1.98 | 4.66 | 8 | 122 | | | | 77 | 69 | |
| 6 | 17.5 | 976.75 | 1.68 | 1.96 | 6.69 | 8 | 122 | 247 | 249 | 43 | 78 | 70 | |
| 5 | 20 | 978.79 | 1.75 | 2.05 | 8.74 | 8 | 122 | | | | 79 | 70 | |
| 4 | 22.5 | 980.93 | 1.90 | 2.22 | 0.88 | 9 | 122 | 244 | 253 | 43 | 80 | 71 | |
| 3 | 25 | 982.99 | 1.80 | 2.11 | 2.98 | 9 | 122 | | | | 81 | 71 | |
| 2 | 27.5 | 984.95 | 1.63 | 1.92 | 4.98 | 8 | 121 | 242 | 250 | 44 | 82 | 72 | |
| 1 | 30 | 986.99 | 1.60 | 1.89 | 6.96 | 8 | 120 | | | | 83 | 73 | |
| B-12 | 32.5 | 989.94 | 1.45 | 1.72 | 8.86 | 6.5 | 120 | 241 | 252 | 44 | 81 | 73 | |
| 11 | 35 | 990.80 | 1.46 | 1.72 | 0.75 | 6.5 | 122 | | | | 93 | 74 | |
| 10 | 37.5 | 992.85 | 1.68 | 1.99 | 2.78 | 8 | 124 | 237 | 248 | 44 | 95 | 77 | |
| 9 | 40 | 994.94 | 1.65 | 1.96 | 4.82 | 8 | 120 | | | | 95 | 77 | |
| 8 | 42.5 | 996.93 | 1.75 | 2.08 | 6.90 | 8 | 121 | 238 | 245 | 46 | 96 | 77 | |
| 7 | 45 | 998.91 | 1.50 | 1.78 | 8.84 | 7.5 | 121 | | | | 96 | 78 | |
| 6 | 47.5 | 1000.92 | 1.68 | 2.00 | 0.89 | 8 | 121 | 235 | 246 | 46 | 87 | 78 | |
| 5 | 50 | 1002.95 | 1.64 | 1.96 | 2.93 | 8 | 119 | | | | 87 | 79 | |
| 4 | 52.5 | 1005.13 | 1.80 | 2.15 | 5.05 | 9 | 120 | 242 | 250 | 46 | 88 | 79 | |
| 3 | 55 | 1007.20 | 1.73 | 2.06 | 7.14 | 8 | 121 | | | | 99 | 90 | |
| 2 | 57.5 | 1009.24 | 1.65 | 1.97 | 9.19 | 8 | 121 | 239 | 248 | 46 | 89 | 80 | |
| 1 | 60 | 1011.27 | 1.70 | 2.03 | 1.25 | 8 | 121 | | | | 89 | 81 | |
| | (1037) | | | | | | | | | | | | |
| | θ = 60 | Vm = 48.27 | | ΔH .94 | | | | | | | Avg. = 77.5 | | |

C-25

S-0037R

INTERPOLL LABORATORIES, INC.
(612) 786-6020

# Interpoll Laboratories EPA Method 5/17 Sample Log Sheet

Job L.P./Hayward, WI
Source Line 1 Press RTO / Inlet
Method 5 Filter holder: Teflon
Sample Train Leak Check:

Date 6/10/94 Test 5 Run 2
No. of traverse points 24
Filter type: 3.52" Pallflex

Pretest: ≤ 0.02 cfm at 15 in. Hg. (vac) ~~Ø~~
Post test: Good cfm at 10 in. Hg. (vac) Ø

**Particulate Catch Data:**

No. of filters used:

1319

Recovery solvent(s)

☒ Acetone
☐ other(s)

No. of probe wash bottles: 1
Sample recovered by: M. Kaehler + L. Meersmeer

**Condensate Data:**

| Item | Weight (g) | | |
|---|---|---|---|
| | Final | Tare | Difference |
| Impinger No. 1 | | | |
| Impinger No. 2 | 407 | 400 | 7 |
| Impinger No. 3 | | | |
| Condenser | | | |
| Desiccant | 1435 | 1417 | 18 |
| | | | |
| Total | | | 25 |

**Integrated Gas Sampling Data:** NA / Ambient

Bag Pump No. _____
Bag Material: 5-layer Aluminized Tedlar
Pretest leak check: _____
Time start: _____
Sampling rate: _____

Box No. _____ Bag No. _____
Size: 44 L
cc/min at _____ in. Hg.
(HRS) Time end: _____ (HRS)
cc/min Operator: _____

S/N of $O_2$ Analyzer used to monitor train outlet: _____

123093-G:\STACK\WP\METHODS\S-0046RR

# INTERPOLL LABORATORIES EPA METHOD 5 FIELD DATA SHEET

Job: L.P. / Hayward, CA. Operators: McKinley + K. Noesmeier Pitot No. 24U-8 Dp .84
Source: Line 1 Pre Htr / Inlet Meter Box No. 9 ΔH 1.28 FM DC Bar. Press. 28.93 inHg H2O 2 %
Date 6-10-94 Test 5 Run 2 Calibr. coeff. .9961 Nozzle No. 24U-3 Nozzle Dia .188 in.

| Traverse Point No. | Sampling Time (min) | Sample Volume (cf) | Velocity Head (inWC) | Orifice Meter (inWC) | Dry. Vol. (cf) | VAC. inHg | Temperatures (°F) Stack | Probe | Oven | Impy. | Gas/In | Gas/Out | Oxygen (%v/v) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1100 | 11.60 | | | | | | | | | | | |
| A-12 | 2.5 | 13.40 | 1.20 | 1.42 | 3.32 | 5 | 121 | 235 | 248 | 46 | 91 | 90 | 20.9 |
| 11 | 5 | 15.93 | 1.70 | 2.02 | 5.37 | 7 | 121 | | | | 91 | 90 | |
| 10 | 7.5 | 17.57 | 1.78 | 2112 | 7.49 | 7.5 | 121 | 240 | 251 | 46 | 96 | 91 | |
| 9 | 10 | 19.82 | 2.05 | 2.45 | 9.76 | 9 | 120 | | | | 99 | 81 | |
| 8 | 12.5 | 21.98 | 1.57 | 1.87 | 1.75 | 7 | 123 | 243 | 247 | 46 | 88 | 92 | |
| 7 | 15 | 23.75 | 1.64 | 1.96 | 3.78 | 7 | 122 | | | | 89 | 82 | |
| 6 | 17.5 | 25.94 | 1.70 | 2.03 | 5.96 | 7 | 122 | 245 | 250 | 44 | 90 | 83 | |
| 5 | 20 | 28.10 | 1.83 | 2.19 | 9.01 | 8 | 122 | | | | 91 | 93 | |
| 4 | 22.5 | 30.32 | 1.90 | 2.28 | 0.21 | 8 | 121 | 248 | 246 | 44 | 92 | 83 | |
| 3 | 25 | 32.54 | 1.88 | 2.26 | 2.40 | 8 | 121 | | | | 92 | 84 | |
| 2 | 27.5 | 34.61 | 1.91 | 2.29 | 4.61 | 8 | 123 | 244 | 248 | 44 | 92 | 84 | |
| 1 | 30 | 36.67 | 1.65 | 1.98 | 6.66 | 7 | 123 | | | | 93 | 85 | |
| A-11 | 32.5 | 38.80 | 1.60 | 1.93 | 8.69 | 7 | 122 | 243 | 250 | 44 | 88 | 84 | |
| 11 | 35 | 40.95 | 1.95 | 2.33 | 0.91 | 8 | 123 | | | | 90 | 85 | |
| 10 | 37.5 | 43.17 | 1.90 | 2.29 | 3.10 | 8 | 123 | 248 | 253 | 45 | 92 | 85 | |
| 9 | 40 | 45.15 | 1.55 | 1.87 | 5.10 | 7 | 121 | | | | 93 | 85 | |
| 8 | 42.5 | 47.27 | 1.73 | 2.07 | 7.20 | 7 | 124 | 244 | 251 | 45 | 94 | 86 | |
| 7 | 45 | 49.20 | 1.53 | 1.84 | 9.18 | 7 | 124 | | | | 94 | 86 | |
| 6 | 47.5 | 51.34 | 1.74 | 2.09 | 1.29 | 7 | 124 | 240 | 246 | 45 | 95 | 87 | |
| 5 | 50 | 53.45 | 1.63 | 1.96 | 3.34 | 7 | 125 | | | | 96 | 87 | |
| 4 | 52.5 | 55.60 | 1.75 | 2.10 | 5.46 | 7 | 125 | 237 | 243 | 45 | 96 | 88 | |
| 3 | 55 | 57.62 | 1.62 | 1.95 | 7.51 | 7 | 124 | | | | 97 | 88 | |
| 2 | 57.5 | 59.73 | 1.72 | 2.08 | 9.62 | 7 | 124 | 241 | 246 | 45 | 97 | 88 | |
| 1 | 60 | 61.62 | 1.30 | 1.57 | 1.45 | 5.5 | 124 | | | | 97 | 89 | |
| | 1205 | | | | | | | | | | | | |
| | θ = 60 | Vm = 50.02 | | ~11 2.04 | | | | | | | Avg. = 91.8 | | |

C-27

S-0037R

INTERPOLL LABORATORIES, INC.
(612) 786-6020

# Interpoll Laboratories EPA Method 5/17 Sample Log Sheet

Job I.P. / Hayward, WI
Source Line 1 Press RTO / Inlet
Method 5 Filter holder: Teflon
Date 6-10-94 Test 5 Run 3
No. of traverse points 24
Filter type: 1.52" Pallflex

**Sample Train Leak Check:**

Pretest: ≤ 0.02 cfm at 15 in. Hg. (vac) ☑
Post test: 0.02 cfm at 10 in. Hg. (vac) ☑

**Particulate Catch Data:**

No. of filters used: 1320

Recovery solvent(s)
☑ Acetone
☐ other(s)

No. of probe wash bottles: 1
Sample recovered by: M. Koehler + K. Woessner

**Condensate Data:**

| Item | Weight (g) | | |
|---|---|---|---|
| | Final | Tare | Difference |
| Impinger No. 1 | | | |
| Impinger No. 2 | 399 | 397 | 2 |
| Impinger No. 3 | | | |
| Condenser | | | |
| Desiccant | 1630 | 1609 | 21 |
| | | | |
| Total | | | 23 |

**Integrated Gas Sampling Data:** NA / Ambient

Bag Pump No. _____
Bag Material: 5-layer Aluminized Tedlar
Pretest leak check: _____
Time start: _____
Sampling rate: _____

Box No. _____ Bag No. _____
Size: 44 L
cc/min at _____ in. Hg.
(HRS) Time end: _____ (HRS)
cc/min Operator: _____

S/N of $O_2$ Analyzer used to monitor train outlet: _____

123095-G:\STACK\WP\METHODS\S-0046RR

CF-011

# INTERPOLL LABORATORIES EPA METHOD 5 FIELD DATA SHEET

Job: L.P. / Hayward, CA
Source: Line / Press A20 / Inlet
Date: 6-10-94 Test: 5 Run: 3

Operators: M. Kaehler / K. Meessmer
Meter Box No.: 9 ΔH: 1.26 IN WC
Coeff.: .9961

Pitot No.: 24U-8 Cp: .84
Bar. Press.: 28.93 inHg H2O: 3.1%
Nozzle No.: 24U-3 Nozzle Dia: .195 IN.

| Traverse Point No. | Sampling Time (min) | Sample Volume (cf) | Velocity Head (inWC) | Orifice Meter (inWC) | Dec. Vol. (cf) | VAC. inHg | Temperatures (°F) Stack | Probe | Oven | Impy. | Gas/In | Gas/Out | Oxygen (x v/v) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1220 | 61.90 | | | | | | | | | | | |
| A-12 | 2.5 | 63.95 | 1.72 | 2.04 | 3.98 | 8 | 123 | 233 | 247 | 47 | 88 | 86 | 20.9 |
| 11 | 5 | 66.24 | 1.93 | 2.29 | 6.18 | 9 | 123 | | | | 90 | 87 | |
| 10 | 7.5 | 68.42 | 1.90 | 2.26 | 8.39 | 9 | 122 | 236 | 250 | 46 | 92 | 87 | |
| 9 | 10 | 70.52 | 1.86 | 2.23 | 0.56 | 9 | 126 | | | | 93 | 87 | |
| 8 | 12.5 | 72.58 | 1.70 | 2.03 | 2.64 | 8 | 124 | 242 | 253 | 46 | 93 | 88 | |
| 7 | 15 | 74.70 | 1.55 | 1.85 | 4.63 | 8 | 124 | | | | 93 | 88 | |
| 6 | 17.5 | 76.64 | 1.40 | 1.67 | 6.52 | 7 | 125 | 241 | 255 | 46 | 94 | 88 | |
| 5 | 20 | 78.60 | 1.61 | 1.92 | 8.54 | 8 | 126 | | | | 95 | 88 | |
| 4 | 22.5 | 80.82 | 1.80 | 2.14 | 0.68 | 8.5 | 128 | 238 | 252 | 46 | 95 | 88 | |
| 3 | 25 | 82.90 | 1.68 | 1.99 | 2.74 | 8 | 129 | | | | 95 | 89 | |
| 2 | 27.5 | 84.90 | 1.60 | 1.90 | 4.76 | 7.5 | 127 | 240 | 253 | 47 | 96 | 88 | |
| 1 | 30 | 86.80 | 1.58 | 1.88 | 6.77 | 7.5 | 127 | | | | 95 | 89 | |
| B-12 | 32.5 | 88.75 | 1.35 | 1.61 | 8.63 | 6.5 | 127 | 244 | 258 | 47 | 94 | 88 | |
| 11 | 35 | 90.83 | 1.72 | 2.04 | 0.72 | 8.5 | 127 | | | | 96 | 89 | |
| 10 | 37.5 | 92.88 | 1.59 | 1.88 | 2.73 | 8 | 126 | 247 | 255 | 47 | 96 | 90 | |
| 9 | 40 | 94.91 | 1.70 | 2.02 | 4.81 | 8.5 | 128 | | | | 97 | 89 | |
| 8 | 42.5 | 96.98 | 1.76 | 2.09 | 6.93 | 8.5 | 128 | 250 | 254 | 49 | 97 | 90 | |
| 7 | 45 | 98.98 | 1.60 | 1.90 | 8.95 | 8 | 129 | | | | 97 | 89 | |
| 6 | 47.5 | 101.10 | 1.73 | 2.06 | 1.06 | 8.5 | 126 | 248 | 251 | 49 | 98 | 90 | |
| 5 | 50 | 103.26 | 1.71 | 2.05 | 3.16 | 8.5 | 125 | | | | 98 | 90 | |
| 4 | 52.5 | 105.39 | 1.75 | 2.09 | 5.28 | 8.5 | 127 | 245 | 252 | 50 | 98 | 90 | |
| 3 | 55 | 107.53 | 1.80 | 2.14 | 7.43 | 8.5 | 128 | | | | 98 | 91 | |
| 2 | 57.5 | 109.65 | 1.82 | 2.19 | 9.59 | 9 | 125 | 243 | 249 | 50 | 98 | 91 | |
| 1 | 60 | 111.64 | 1.38 | 1.65 | 1.48 | 7 | 127 | | | | 90 | 91 | |
| | 1322 | | | | | | | | | | | | |
| | θ = 60 | Vm 50.74 | | ΔH 2.00 | | | | | | | Avg. = | 91.9 | |

C-29

S-0037R

INTERPOLL LABORATORIES, INC.
(612) 786-6020

$CH_2O$

# Interpoll Laboratories EPA Method 5/17 Sample Log Sheet

Pg: .98 Dum = 96.25

Job L.P. Hayward
Source Line 2 Press Vent RTO Stack
Method 0011 Filter holder: NA
Date 6/10/94 Test 12 Run 1
No. of traverse points 24
Filter type: NA

**Sample Train Leak Check:**

Pretest: ≤ 0.02 cfm at 15 in. Hg. (vac) ☒
Post test: 0 cfm at 9 in. Hg. (vac) ☒

**Particulate Catch Data:**

No. of filters used:

Recovery solvent(s)

☐ acetone
☒ other(s) MECL$_2$ & DI $H_2O$

No. of probe wash bottles: 1
Sample recovered by: DUH

**Condensate Data:**

| Item | Weight (g) | | |
|---|---|---|---|
| | Final | Tare | Difference |
| Impinger No. 1 | | | |
| Impinger No. 2 | 214 | 200 | 14 |
| Impinger No. 3 | | | |
| Condenser | | | |
| Desiccant | 1413 | 1400 | 13 |
| | | | |
| Total | | | 27 |

**Integrated Gas Sampling Data:**

Bag Pump No. 233
Bag Material: 5-layer Aluminized Tedlar
Pretest leak check: 0
Time start: 0820
Sampling rate: 400

Box No. 25 Bag No. 1
Size: 44 L
cc/min at 14 in. Hg.
(HRS) Time end: 8918 (HRS)
cc/min Operator: DUH

S/N of $O_2$ Analyzer used to monitor train outlet: 24A

123093-G:\STACK\WP\METHODS\S-0046RR

# INTERPOLL LABORATORIES EPA METHOD 5 FIELD DATA SHEET

Job L.P. Hayward
Source Line 2 Press Vent RTO STACK
Date 6/10/94 Test 12 Run 1

Operators DHH & DM
Meter Box No. 6 ΔH@ 1.97 IN WC
Coeff. .9947

Pitot No. 4115-8 Cp .84
Bar. Press. 28.93 inHg H2O 2.5 %
Nozzle No. Glass Nozzle Dia .240 IN.

| Traverse Point No. | Sampling Time (min) | Sample Volume (cf) | Velocity Head (inWC) | Orifice Meter (inWC) | Dev. Vol. (cf) | VAC. inHg | Temperatures (°F) Stack | Probe | Oven | Impg. | Gas/In | Gas/Out | Oxygen (xv/v) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 0815 | 900.30 | | | | | | | | | | | |
| A 12 | 2.5 | 902.41 | .82 | 2.32 | 2.38 | 6 | 240 | 250 | 253 | 51 | 67 | 67 | 20.4 |
| 11 | 5 | 904.51 | .89 | 2.45 | 4.51 | 6 | 254 | | | | 74 | 67 | 20.4 |
| 10 | 7.5 | 906.63 | .92 | 2.56 | 6.70 | 6 | 252 | | | | 76 | 67 | 20.6 |
| 9 | 10 | 908.76 | .92 | 2.56 | 8.89 | 7 | 252 | 254 | 256 | 50 | 81 | 68 | 20.4 |
| 8 | 12.5 | 911.05 | .92 | 2.59 | 1.10 | 7 | 249 | | | | 84 | 69 | 20.7 |
| 7 | 15 | 913.16 | .91 | 2.72 | 3.37 | 7 | 252 | | | | 85 | 69 | 20.7 |
| 6 | 17.5 | 915.67 | .86 | 2.39 | 5.50 | 7 | 260 | 257 | 256 | 51 | 86 | 70 | 20.8 |
| 5 | 20 | 917.50 | .80 | 2.24 | 7.57 | 7 | 258 | | | | 89 | 71 | 20.7 |
| 4 | 22.5 | 919.56 | .73 | 2.05 | 9.54 | 7 | 258 | | | | 89 | 71 | 20.8 |
| 3 | 25 | 921.57 | .76 | 1.98 | 1.49 | 7 | 254 | 256 | 257 | 51 | 91 | 72 | 20.8 |
| 2 | 27.5 | 923.30 | .61 | 1.74 | 3.31 | 6 | 249 | | | | 93 | 73 | 20.8 |
| 1 | 30 | 925.14 | .60 | 1.72 | 5.13 | 6 | 247 | | | | 95 | 73 | 20.8 |
| B 12 | 32.5 | 927.11 | .70 | 2.01 | 7.10 | 7 | 247 | 258 | 256 | 52 | 89 | 74 | 20.7 |
| 11 | 35 | 929.07 | .78 | 2.20 | 9.15 | 7 | 256 | | | | 94 | 75 | 20.7 |
| 10 | 37.5 | 931.26 | .81 | 2.31 | 1.24 | 7 | 251 | | | | 96 | 76 | 20.7 |
| 9 | 40 | 933.20 | .83 | 2.38 | 3.20 | 7 | 238 | 256 | 257 | 52 | 96 | 76 | 20.7 |
| 8 | 42.5 | 935.65 | .83 | 2.38 | 5.56 | 7 | 250 | | | | 96 | 76 | 20.7 |
| 7 | 45 | 937.84 | .94 | 2.71 | 7.85 | 7 | 245 | | | | 98 | 77 | 20.8 |
| 6 | 47.5 | 940.06 | .96 | 2.74 | 0.15 | 7 | 254 | 258 | 256 | 53 | 98 | 78 | 20.8 |
| 5 | 50 | 942.13 | .86 | 2.45 | 2.33 | 7 | 256 | | | | 99 | 78 | 20.8 |
| 4 | 52.5 | 944.44 | .90 | 2.56 | 4.56 | 7 | 259 | | | | 100 | 79 | 20.8 |
| 3 | 55 | 946.69 | .93 | 2.67 | 6.83 | 7 | 253 | 257 | 254 | 54 | 100 | 79 | 20.8 |
| 2 | 57.5 | 948.79 | .80 | 2.31 | 8.95 | 7 | 249 | | | | 101 | 80 | 20.8 |
| 1 | 60 | 950.83 | .55 | 1.59 | 0.71 | | 249 | | | | 101 | 80 | 20.8 |
| | 0958 | | | | | | | | | | | | |
| | θ = 60 | Vm = 50.53 | | ΔH = 2.32 | | | | | | | Avg. = 82.1 | | |

INTERPOLL LABORATORIES, INC.
(612) 786-6020

# Interpoll Laboratories EPA Method 5/17 Sample Log Sheet

Job L.P. Hayward Date 6/10/94 Test 12 Run 2
Source Line 12 Press Vent RTO Stack No. of traverse points 24
Method 0011 Filter holder: NA Filter type: NA

**Sample Train Leak Check:**

Pretest: ≤ 0.02 cfm at 15 in. Hg. (vac) ☒
Post test: 0 cfm at 10 in. Hg. (vac) ☒

**Particulate Catch Data:**

No. of filters used:

Recovery solvent(s)

☐ acetone
☒ other(s) $MeCl_2$ + DI $H_2O$

No. of probe wash bottles: 1
Sample recovered by: Britt

**Condensate Data:**

| Item | Weight (g) | | |
|---|---|---|---|
| | Final | Tare | Difference |
| Impinger No. 1 | | | |
| Impinger No. 2 | 214 | 200 | 14 |
| Impinger No. 3 | | | |
| Condenser | | | |
| Desiccant | 1461 | 1449 | 12 |
| | | | |
| Total | | | 26 |

**Integrated Gas Sampling Data:**

Bag Pump No. 233 Box No. 15 Bag No. 2
Bag Material: 5-layer Aluminized Tedlar Size: 44 L
Pretest leak check: 0 cc/min at 14 in. Hg.
Time start: 0945 (HRS) Time end: 1043 (HRS)
Sampling rate: 400 cc/min Operator: DAH

S/N of $O_2$ Analyzer used to monitor train outlet: 24A

123093-G:\STACK\WP\METHODS\S-0046RR

# INTERPOLL LABORATORIES EPA METHOD 5 FIELD DATA SHEET

Job L.P. Hayward
Source Line 2 Press Vent RTO Stack
Date 6/10/94 Test 12 Run 2

Operators Dutt & DM
Meter Box No. 6 ΔH 1.97 IN WC
Cosmeter coeff. .9947

Pitot No. 4MS-8 Cp .84
Bar. Press. 28.93 inHg H2O 2.5 %
Nozzle No. Glass Nozzle Dia. .240 IN.

| Traverse Point No. | Sampling Time (min) | Sample Volume (cf) | Velocity Head (inWC) | Orifice Meter (inWC) | Dec. Vol. (cf) | VAC. inHg | Temperatures (°F) Stack | Probe | Oven | Impg. | Gas/In | Gas/Out | Oxygen (xx/x) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 0941 | 951.10 | | | | | | | | | | | |
| B 12 | 2.5 | 953.06 | .68 | 1.95 | 3.03 | 6 | 247 | 260 | 254 | 46 | 81 | 80 | 20.6 |
| 11 | 5 | 955.07 | .77 | 2.16 | 5.06 | 6 | 259 | | | | 88 | 80 | 20.5 |
| 10 | 7.5 | 957.26 | .85 | 2.41 | 7.21 | 7 | 260 | | | | 92 | 81 | 20.5 |
| 9 | 10 | 959.50 | .87 | 2.47 | 9.39 | 7 | 257 | 261 | 256 | 47 | 95 | 81 | 20.6 |
| 8 | 12.5 | 961.64 | .84 | 2.40 | 1.55 | 7 | 255 | | | | 96 | 81 | 20.6 |
| 7 | 15 | 963.91 | .94 | 2.71 | 3.84 | 8 | 250 | | | | 99 | 82 | 20.6 |
| 6 | 17.5 | 966.14 | .91 | 2.64 | 6.11 | 8 | 247 | 260 | 254 | 49 | 101 | 83 | 20.6 |
| 5 | 20 | 968.41 | .90 | 2.61 | 8.36 | 8 | 249 | | | | 102 | 83 | 20.7 |
| 4 | 22.5 | 970.65 | .85 | 2.47 | 0.56 | 8 | 249 | | | | 103 | 84 | 20.6 |
| 3 | 25 | 972.80 | .81 | 2.32 | 2.69 | 8 | 261 | 261 | 256 | 50 | 104 | 84 | 20.7 |
| 2 | 27.5 | 974.66 | .71 | 2.04 | 4.69 | 8 | 259 | | | | 105 | 85 | 20.6 |
| 1 | 30 | 976.50 | .56 | 1.62 | 6.47 | 8 | 256 | | | | 105 | 85 | 20.6 |
| A 12 | 32.5 | 978.70 | .81 | 2.36 | 8.63 | 8 | 249 | 261 | 257 | 51 | 102 | 86 | 20.6 |
| 11 | 35 | 980.90 | .90 | 2.62 | 0.89 | 8 | 249 | | | | 105 | 86 | 20.6 |
| 10 | 37.5 | 983.20 | .90 | 2.59 | 3.14 | 8 | 260 | | | | 106 | 87 | 20.6 |
| 9 | 40 | 985.32 | .86 | 2.48 | 5.35 | 8 | 258 | 257 | 256 | 51 | 107 | 87 | 20.5 |
| 8 | 42.5 | 987.66 | .92 | 2.67 | 7.64 | 8 | 256 | | | | 107 | 87 | 20.5 |
| 7 | 45 | 990.01 | 1.0 | 2.90 | 0.03 | 8 | 265 | | | | 108 | 88 | 20.5 |
| 6 | 47.5 | 992.40 | 1.0 | 2.93 | 2.43 | 8 | 249 | 256 | 256 | 51 | 109 | 88 | 20.5 |
| 5 | 50 | 994.60 | .84 | 2.47 | 4.64 | 8 | 248 | | | | 109 | 87 | 20.5 |
| 4 | 52.5 | 996.97 | .87 | 2.53 | 6.88 | 8 | 257 | | | | 109 | 89 | 20.5 |
| 3 | 55 | 998.99 | .75 | 2.17 | 8.95 | 7 | 261 | 258 | 257 | 52 | 109 | 90 | 20.5 |
| 2 | 57.5 | 1000.86 | .62 | 1.80 | 0.81 | 7 | 261 | | | | 109 | 90 | 20.5 |
| 1 | 60 | 1002.63 | .50 | 1.45 | 2.53 | 7 | 261 | | | | 109 | 90 | 20.4 |
| | (1043) | | | | | | | | | | | | |
| | θ = 60 | Vm = 51.53 | | ΔH = 2.37 | | | | | | | Avg. = 93.8 | | |

INTERPOLL LABORATORIES, INC.
(612) 786-6020

# Interpoll Laboratories EPA Method 5/17 Sample Log Sheet

Job L.P. Hayward
Source Line 2 Press Vent RTO Stack
Method 0011 Filter holder: NA
Date 6/10/94 Test 12 Run 3
No. of traverse points 24
Filter type: NA

**Sample Train Leak Check:**

Pretest: ≤ 0.02 cfm at 15 in. Hg. (vac) ☒
Post test: 0 cfm at 10 in. Hg. (vac) ~~☒~~

**Particulate Catch Data:**

No. of filters used:

Recovery solvent(s)

☐ acetone
☒ other(s) $MECL_2$ + DI $H_2O$

No. of probe wash bottles: 1
Sample recovered by: DUH

**Condensate Data:**

| Item | Weight (g) | | |
|---|---|---|---|
| | Final | Tare | Difference |
| Impinger No. 1 | | | |
| Impinger No. 2 | 210 | 200 | 10 |
| Impinger No. 3 | | | |
| Condenser | | | |
| Desiccant | 1422 | 1413 | 9 |
| | | | |
| Total | | | 19 |

**Integrated Gas Sampling Data:**

Bag Pump No. 23 B
Bag Material: 5-layer Aluminized Tedlar
Pretest leak check: 0
Time start:
Sampling rate: 400

Box No. 15 Bag No. 3
Size: 44 L
cc/min at 14 in. Hg.
(HRS) Time end: (HRS)
cc/min Operator: DUH

S/N of $O_2$ Analyzer used to monitor train outlet: 24 A

123093-G:\STACK\WP\METHODS\S-0046RR

# INTERPOLL LABORATORIES EPA METHOD 5 FIELD DATA SHEET

Job L.P. Hayward
Source Line 2 Press Vent RTO Stack
Date 6/10/94 Test 12 Run 3

Operators DVH + D.M
Meter Box No. 6 ΔH 1.97 IN WC
Coeffic coeff. .9947

Pitot No. 4115-8 Cp .84
Bar. Press. 28.93 inHg H2O 25 X
Nozzle No. Glass Nozzle Dia .240 IN.

| Traverse Point No. | Sampling Time (min) | Sample Volume (cf) | Velocity Head (inWC) | Orifice Meter (inWC) | Dev. Vol. (cf) | VAC. inHg | Temperatures (°F) Stack | Probe | Oven | Impg. | Gas/In | Gas/Out | Oxygen (%v/v) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1121 | 2.92 | | | | | | | | | | | |
| A 12 | 2.5 | 3.04 | .79 | 2.29 | 5.03 | 6.5 | 251 | 254 | 256 | 50 | 89 | 89 | 20.6 |
| 11 | 5 | 7.26 | .89 | 2.53 | 7.25 | 7 | 259 | | | | 104 | 90 | 20.6 |
| 10 | 7.5 | 9.55 | .86 | 2.50 | 9.47 | 7 | 255 | | | | 108 | 90 | 20.6 |
| 9 | 10 | 11.86 | .96 | 2.80 | 11.82 | 7 | 253 | 256 | 257 | 50 | 109 | 90 | 20.6 |
| 8 | 12.5 | 14.15 | .90 | 2.63 | 4.10 | 7 | 253 | | | | 110 | 91 | 20.6 |
| 7 | 15 | 16.40 | .90 | 2.64 | 6.38 | 7 | 253 | | | | 110 | 91 | 20.6 |
| 6 | 17.5 | 18.61 | .84 | 2.47 | 8.59 | 7 | 252 | 256 | 257 | 51 | 112 | 91 | 20.6 |
| 5 | 20 | 20.61 | .73 | 2.13 | 0.65 | 6 | 259 | | | | 113 | 91 | 20.6 |
| 4 | 22.5 | 22.67 | .65 | 1.90 | 2.59 | 6 | 259 | | | | 113 | 93 | 20.6 |
| 3 | 25 | 24.70 | .69 | 2.02 | 4.60 | 6 | 259 | 256 | 257 | 51 | 113 | 93 | 20.6 |
| 2 | 27.5 | 26.50 | .50 | 1.47 | 6.31 | 5 | 256 | | | | 113 | 93 | 20.6 |
| 1 | 30 | 28.20 | .57 | 1.68 | 8.14 | 6 | 254 | | | | 114 | 94 | 20.6 |
| B 12 | 32.5 | 30.37 | .75 | 2.21 | 0.24 | 6 | 254 | 254 | 256 | 51 | 110 | 94 | 20.6 |
| 11 | 35 | 32.45 | .77 | 2.24 | 2.35 | 6 | 260 | | | | 114 | 94 | 20.6 |
| 10 | 37.5 | 34.64 | .88 | 2.59 | 4.62 | 7 | 255 | | | | 114 | 94 | 20.6 |
| 9 | 40 | 36.80 | .80 | 2.35 | 6.78 | 7 | 257 | 253 | 253 | 53 | 114 | 94 | 20.6 |
| 8 | 42.5 | 39.13 | .94 | 2.77 | 9.13 | 8 | 254 | | | | 115 | 96 | 20.6 |
| 7 | 45 | 41.34 | .84 | 2.51 | 1.36 | 8 | 254 | | | | 92 | 92 | 20.6 |
| 6 | 47.5 | 43.58 | .93 | 2.68 | 3.65 | 8 | 255 | 254 | 254 | 53 | 95 | 92 | 20.6 |
| 5 | 50 | 46.03 | 1.0 | 2.87 | 6.02 | 8 | 258 | | | | 98 | 92 | 20.6 |
| 4 | 52.5 | 48.36 | .95 | 2.74 | 8.33 | 8 | 256 | | | | 99 | 93 | 20.6 |
| 3 | 55 | 50.46 | .80 | 2.33 | 0.47 | 8 | 253 | 256 | 257 | 53 | 103 | 94 | 20.6 |
| 2 | 57.5 | 52.47 | .65 | 1.91 | 2.41 | 8 | 251 | | | | 106 | 95 | 20.6 |
| 1 | 60 | 54.55 | .77 | 2.25 | 4.53 | 8 | 255 | | | | 107 | 96 | 20.6 |
| | 1333 | | | | | | | | | | | | |
| | θ = 60 | Vm = 51.63 | | ΔH = 2.3 | | | | | | | Avg. = | 99.9 | |

Est. Tes 12: RES 18:5

MDI

INTERPOLL LABORATORIES, INC.
(612) 786-6020

# Interpoll Laboratories EPA Method 5/17 Sample Log Sheet

Pg = -.98 Diam = 96.25"

Job N.P. Hayward
Source Line #2 Press Rto Stack
Method 1-2PP Filter holder: NA
Sample Train Leak Check:

Date 6/9/94 Test 13 Run 1
No. of traverse points 24
Filter type: NA

Pretest: ≤ 0.02 cfm at 15 in. Hg. (vac) ☑
Post test: 0.02 cfm at 10 in. Hg. (vac) ☒

**Particulate Catch Data:**

No. of filters used:

Recovery solvent(s)

☐ acetone
☑ other(s) Acetonitrile + Toluene

No. of probe wash bottles: 1
Sample recovered by: DWH

**Condensate Data:**

| Item | Weight (g) | | |
|---|---|---|---|
| | Final | Tare | Difference |
| Impinger No. 1 | | | |
| Impinger No. 2 | | | |
| Impinger No. 3 | | | |
| Condenser | | | |
| Desiccant | | | |
| | | | |
| Total | | | 29 |

**Integrated Gas Sampling Data:** – during same time as TSP

Bag Pump No. 1
Bag Material: 5-layer Aluminized Tedlar
Pretest leak check:
Time start:
Sampling rate:

Box No. ____ Bag No. ____
Size: 44 L
cc/min at ____ in. Hg.
(HRS) Time end: ____ (HRS)
cc/min Operator:

S/N of $O_2$ Analyzer used to monitor train outlet:

123093-G:\STACK\WP\METHODS\S-0046RR

# INTERPULL LABORATORIES, L.A. METHOD 5 FIELD DATA SHEET

Job: L.P. Hayward
Source: Line 2 Press Vent RTO Stack
Date: 6/3/94 Test: 13 Run: 1

Operators: DM & DM
Meter Box No.: 3 ΔH@ 1.80 IN WC
Counter coeff.: 9983

Pitot No.: 4115-8 Cp: .84
Bar. Press: 28.90 in Hg H2O: 2.5 %
Nozzle No.: 0165 Nozzle Dia: .240 IN.

| Traverse Point No. | Sampling Time (min) | Sample Volume (cf) | Velocity Head (in WC) | Orifice Meter (in WC) | Dry. Vol. (cf) | VAC. in Hg | Temperatures (°F) Stack | Probe | Oven | Impg. | Gas/In | Gas/Out | Oxygen (xv/v) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1325 | 216.62 | | | | | | | | | | | |
| B 12 | 3 | 218.85 | .66 | 1.65 | 8.81 | 6 | 262 | 251 | 257 | 46 | 71 | 71 | 20.6 |
| 11 | 6 | 221.20 | .82 | 2.08 | 1.28 | 6 | 254 | | | | 76 | 72 | 20.6 |
| 10 | 9 | 223.54 | .83 | 2.12 | 3.78 | 6 | 251 | | | | 81 | 73 | 20.6 |
| 9 | 12 | 226.11 | .84 | 2.14 | 6.29 | 6 | 260 | 253 | 256 | 49 | 83 | 74 | 20.6 |
| 8 | 15 | 228.76 | .88 | 2.24 | 8.87 | 8 | 260 | | | | 85 | 77 | 20.6 |
| 7 | 18 | 231.45 | .91 | 2.34 | 1.51 | 8 | 257 | | | | 86 | 78 | 20.6 |
| 6 | 21 | 234.12 | .91 | 2.34 | 4.15 | 8 | 257 | 254 | 257 | 50 | 88 | 79 | 20.6 |
| 5 | 24 | 236.68 | .82 | 2.10 | 6.66 | 8 | 262 | | | | 89 | 80 | 20.5 |
| 4 | 27 | 239.16 | .71 | 1.83 | 9.00 | 8 | 262 | | | | 91 | 81 | 20.5 |
| 3 | 30 | 241.85 | .86 | 2.23 | 1.60 | 8 | 256 | 251 | 256 | 51 | 92 | 82 | 20.5 |
| 2 | 33 | 243.40 | .64 | 1.65 | 3.83 | 8 | 264 | | | | 93 | 83 | 20.5 |
| 1 | 36 | 246.40 | .82 | 2.14 | 6.37 | 8 | 254 | | | | 94 | 84 | 20.5 |
| A 12 | 39 | 248.94 | .82 | 2.15 | 8.92 | 8 | 254 | 253 | 257 | 51 | 93 | 85 | 20.6 |
| 11 | 42 | 251.45 | .80 | 2.07 | 1.43 | 8 | 262 | | | | 95 | 86 | 20.6 |
| 10 | 45 | 254.03 | .93 | 2.42 | 4.13 | 9 | 262 | | | | 97 | 87 | 20.6 |
| 9 | 48 | 256.84 | .91 | 2.41 | 6.83 | 9 | 251 | 254 | 256 | 51 | 98 | 87 | 20.6 |
| 8 | 51 | 259.61 | 1.0 | 2.65 | 9.67 | 9 | 250 | | | | 98 | 88 | 20.5 |
| 7 | 54 | 262.48 | .99 | 2.62 | 2.49 | 9 | 252 | | | | 98 | 89 | 20.7 |
| 6 | 57 | 265.16 | .99 | 2.62 | 5.32 | 9 | 251 | 264 | 257 | 51 | 98 | 89 | 20.5 |
| 5 | 60 | 267.92 | .81 | 2.15 | 7.88 | 8 | 250 | | | | 98 | 89 | 20.6 |
| 4 | 63 | 270.71 | .82 | 2.16 | 0.45 | 8 | 255 | | | | 98 | 89 | 20.6 |
| 3 | 66 | 272.78 | .65 | 1.72 | 2.74 | 7 | 255 | 264 | 256 | 52 | 98 | 90 | 20.6 |
| 2 | 69 | 275.14 | .69 | 1.83 | 5.10 | 7 | 251 | | | | 99 | 91 | 20.6 |
| 1 | 72 | 277.35 | .61 | 1.62 | 7.33 | 7 | 252 | | | | 100 | 91 | 20.5 |
| | (1441) | | | | | | | | | | | | |
| | θ = 72 | Vm = 60.73 | | ΔH = 2.14 | | | | | | | Avg. = 87.3 | | |

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S-0037R

INTERPOLL LABORATORIES, INC.
(612) 786-6020

# Interpoll Laboratories EPA Method 5/17 Sample Log Sheet

Job CP/HAYWARD
Source CLAD 2 PRESS VENT-RTO STACK
Method 1-220 Filter holder: 4
Date 6-9-94 Test 13 Run 2
No. of traverse points 24
Filter type: A4

**Sample Train Leak Check:**

Pretest: ≤ 0.02 cfm at 15 in. Hg. (vac) ☑
Post test: 0.0 cfm at 7 in. Hg. (vac) ☒

**Particulate Catch Data:**

No. of filters used:

Recovery solvent(s)

☐acetone
☐other(s)

No. of probe wash bottles:
Sample recovered by:

**Condensate Data:**

| Item | Weight (g) | | |
|---|---|---|---|
| | Final | Tare | Difference |
| Impinger No. 1 | | | |
| Impinger No. 2 | | | |
| Impinger No. 3 | | | |
| Condenser | | | |
| Desiccant | | | |
| | | | |
| Total | | | 9 |

**Integrated Gas Sampling Data:**

Bag Pump No.
Bag Material: 5-layer Aluminized Tedlar
Pretest leak check:
Time start:
Sampling rate:

Box No. Bag No.
Size: 44 L
cc/min at in. Hg.
(HRS) Time end: (HRS)
cc/min Operator:

S/N of $O_2$ Analyzer used to monitor train outlet:

123093-G:\STACK\WP\METHODS\S-0046RR

# INTERPULL LABORATORIES — A METHOD 5 FIELD DATA SHEET

Job: CPI HAYWARD
Source: TILE 2 PRESS LOAD RTO STACK
Date: 6-9-94 Test 13 Run 2

Operators: DUH DM
Meter Box No: 3 Kfm 1.80 IN WC
Coeff: .9963

Pitot No. V415-8 Cp
Bar. Press: 28.90 inHg H2O X
Nozzle No. 6455 Nozzle Dia .157 IN.

| Traverse Point No. | Sampling Time (min) | Sample Volume (cf) | Velocity Head (inWC) | Orifice Meter (inWC) | Dec. Vol. (cf) | VAC. inHg | Temperatures (°F) Stack | Probe | Oven | Impg. | Gas In | Gas Out | Oxygen (xx/x) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1518 | 277.75 | | | | | | | | | | | |
| C-12 | 3 | 279.90 | .63 | .63 | 9.13 | 3 | 256 | 257 | 255 | 40 | 86 | 86 | 20.5 |
| 11 | 6 | 280.71 | .74 | .74 | 0.63 | 4 | 257 | | | | 87 | 87 | 20.5 |
| 10 | 9 | 282.38 | .86 | .86 | 2.25 | 5 | 259 | | | | 94 | 87 | 20.5 |
| 9 | 12 | 283.81 | .80 | .79 | 3.80 | 5 | 269 | 255 | 259 | 37 | 93 | 88 | 20.6 |
| 8 | 15 | 285.34 | .73 | .73 | 5.29 | 5 | 264 | | | | 95 | 89 | 20.5 |
| 7 | 18 | 286.94 | .81 | .81 | 6.86 | 5 | 264 | | | | 96 | 89 | 20.6 |
| 6 | 21 | 288.54 | .79 | 79 | 8.42 | 5 | 262 | 256 | 258 | 46 | 97 | 90 | 20.5 |
| 5 | 24 | 290.06 | .87 | .88 | 0.06 | 5 | 261 | | | | 97 | 90 | 20.6 |
| 4 | 27 | 291.68 | .84 | .84 | 1.67 | 5 | 262 | | | | 97 | 90 | 20.6 |
| 3 | 30 | 293.30 | .84 | .85 | 3.28 | 5 | 261 | 257 | 256 | 47 | 99 | 91 | 20.6 |
| 2 | 33 | 294.93 | .80 | .81 | 4.86 | 5 | 261 | | | | 99 | 91 | 20.6 |
| 1 | 36 | 296.51 | .81 | .82 | 6.44 | 5 | 260 | | | | 99 | 91 | 20.6 |
| B-12 | 39 | 297.15 | .77 | .78 | 7.99 | 5 | 261 | 257 | 254 | 48 | 99 | 91 | 206 |
| 11 | 42 | 299.68 | .89 | .91 | 9.66 | 5 | 252 | | | | 99 | 91 | 20.6 |
| 10 | 45 | 901.36 | .88 | .90 | 1.32 | 5 | 252 | | | | 100 | 92 | 20.6 |
| 9 | 48 | 303.15 | .97 | .99 | 3.07 | 5 | 252 | 257 | 256 | 49 | 100 | 92 | 20.6 |
| 8 | 51 | 304.80 | .96 | .98 | 4.81 | 5 | 253 | | | | 95 | 41 | 20.6 |
| 7 | 54 | 306.41 | .88 | .89 | 6.47 | 5 | 253 | | | | 96 | 91 | 20.7 |
| 6 | 57 | 308.00 | .80 | .80 | 8.04 | 4 | 263 | 255 | 259 | 48 | 99 | 92 | 20.7 |
| 5 | 60 | 309.65 | .81 | .82 | 9.63 | 4 | 260 | | | | 99 | 93 | 20.7 |
| 4 | 63 | 311.10 | .68 | .69 | 1.08 | 4 | 264 | | | | 100 | 93 | 20.7 |
| 3 | 66 | 312.54 | .60 | .61 | 2.45 | 4 | 261 | 256 | 260 | 49 | 100 | 93 | 20.7 |
| 2 | 69 | 313.90 | .55 | .56 | 3.76 | 4 | 258 | | | | 100 | 93 | 20.7 |
| 1 | 72 | 315.04 | .52 | .53 | 5.04 | | 260 | | | | 100 | 93 | 20.7 |
| | (1641) | | | | | | | | | | | | |
| | θ = 72 | Vm = ~~36.29~~ 37.29 | | ΔH = .79 | | | | | | | Avg. = 93.7 | | |

S-0037R

INTERPOLL LABORATORIES, INC.
(612) 786-6020

# Interpoll Laboratories EPA Method 5/17 Sample Log Sheet

Job LP/HAYWARD
Source LIME 2 PRESS VENT-RTO STACK
Method 1-2PP Filter holder: NA
Date 6-2-94 Test 13 Run 3
No. of traverse points 24
Filter type: EA

**Sample Train Leak Check:**

Pretest: ≤ 0.02 cfm at 15 in. Hg. (vac) ☑
Post test: 0 cfm at 10 in. Hg. (vac) ☒

**Particulate Catch Data:**

No. of filters used:

Recovery solvent(s)

☐ acetone
☐ other(s)

No. of probe wash bottles:
Sample recovered by:

**Condensate Data:**

| Item | Weight (g) | | |
|---|---|---|---|
| | Final | Tare | Difference |
| Impinger No. 1 | | | |
| Impinger No. 2 | | | |
| Impinger No. 3 | | | |
| Condenser | | | |
| Desiccant | | | |
| | | | |
| Total | | | 16 |

**Integrated Gas Sampling Data:**

Bag Pump No.
Bag Material: 5-layer Aluminized Tedlar
Pretest leak check:
Time start:
Sampling rate:

Box No. Bag No.
Size: 44 L
cc/min at in. Hg.
(HRS) Time end: (HRS)
cc/min Operator:

S/N of $O_2$ Analyzer used to monitor train outlet:

123093-G:\STACK\WP\METHODS\S-0046RR

# INTERPOLL LABORATORIES 'A' METHOD 5 FIELD DATA SHEET

Job L.P. Hayward
Source Line 2 Press Vent RTO Stack
Date 6/9/94 Test 13 Run 3

Operators DVH & DM
Meter Box No. 3 ΔH 1.80 IN WC
Meter Coefficient .9983

Pitot No. 4MS-8 Cp .84
Bar. Press. 28.90 InHg H2O 2.5 %
Nozzle No. 6/655 Nozzle Dia .189 IN.

| Traverse Point No. | Sampling Time (min) | Sample Volume (cf) | Velocity Head (inWC) | Orifice Meter (inWC) | Dec. Vol. (cf) | VAC. inHg | Temperatures (°F) Stack | Probe | Oven | Impg. | Cool In | Cool Out | Oxygen (x v/v) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1712 | 315.35 | | | | | | | | | | | |
| C-12 | 3 | 316.91 | .71 | .72 | 6.83 | 4 | 256 | 237 | 251 | 49 | 89 | 88 | 20.4 |
| 11 | 6 | 318.50 | .70 | .70 | 8.30 | 4 | 255 | | | | 91 | 89 | 20.5 |
| 10 | 9 | 319.56 | .89 | .90 | 9.95 | 4 | 255 | | | | 92 | 89 | 20.5 |
| 9 | 12 | 321.56 | .81 | .82 | 1.53 | 4 | 256 | 253 | 253 | 51 | 93 | 90 | 20.5 |
| 8 | 15 | 323.35 | .89 | .89 | 3.18 | 4 | 263 | | | | 95 | 90 | 20.5 |
| 7 | 18 | 324.94 | .92 | .92 | 4.86 | 4 | 263 | | | | 95 | 90 | 20.5 |
| 6 | 21 | 326.65 | .90 | .91 | 6.53 | 4 | 257 | 260 | 257 | 51 | 96 | 90 | 20.5 |
| 5 | 24 | 328.37 | .91 | .92 | 8.20 | 4 | 260 | | | | 96 | 90 | 20.5 |
| 4 | 27 | 329.95 | .88 | .89 | 9.85 | 4 | 258 | | | | 97 | 90 | 20.5 |
| 3 | 30 | 331.74 | .85 | .85 | 1.47 | 4 | 262 | 261 | 256 | 52 | 97 | 90 | 20.5 |
| 2 | 33 | 333.10 | .84 | .85 | 3.08 | 4 | 261 | | | | 98 | 91 | 20.5 |
| 1 | 36 | 334.76 | .78 | .78 | 4.63 | 4 | 262 | | | | 98 | 91 | 20.5 |
| B-12 | 39 | 336.26 | .76 | .76 | 6.17 | 4 | 263 | 264 | 257 | 53 | 98 | 91 | 20.5 |
| 11 | 42 | 337.76 | .76 | .77 | 7.70 | 4 | 260 | | | | 98 | 91 | 20.5 |
| 10 | 45 | 339.36 | .81 | .82 | 9.29 | 4 | 260 | | | | 100 | 93 | 20.5 |
| 9 | 48 | 340.99 | .86 | .87 | 0.93 | 4 | 257 | 264 | 257 | 54 | 100 | 93 | 20.5 |
| 8 | 51 | 342.60 | .86 | .88 | 2.58 | 4 | 256 | | | | 101 | 93 | 20.5 |
| 7 | 54 | 344.36 | 1.0 | 1.02 | 4.35 | 4 | 255 | | | | 101 | 93 | 20.5 |
| 6 | 57 | 346.07 | 1.05 | 1.07 | 6.17 | 4 | 254 | 265 | 260 | 54 | 104 | 95 | 20.5 |
| 5 | 60 | 347.91 | 1.0 | 1.03 | 7.95 | 4 | 254 | | | | 104 | 95 | 20.5 |
| 4 | 63 | 349.70 | 1.0 | 1.03 | 9.74 | 4 | 251 | | | | 106 | 97 | 20.5 |
| 3 | 66 | 351.47 | .90 | .93 | 1.44 | 4 | 254 | 261 | 261 | 54 | 106 | 97 | 20.5 |
| 2 | 68 | 353.21 | .87 | .90 | 3.11 | 4 | 253 | | | | 106 | 97 | 20.5 |
| 1 | 72 | 354.67 | .71 | .73 | 4.62 | | 252 | | | | 106 | 97 | 20.5 |
| | (1828) | | | | | | | | | | | | |
| | θ = 72 | Vm = 39.32 | | ΔH = .87 | | | | | | | Avg. = 95.3 | | |

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S-0037R

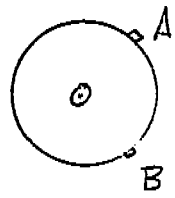
INTERPOLL LABORATORIES, INC.
(612) 786-6020

# EPA Method 2 Field Data Sheet

Job L.P. Hayward
Source Line 2 PressVen + Rto Stack
Test 14 Run Date 6/8/94
Stack Dimen. 76.25 IN.
Dry Bulb °F Wet bulb °F
Manometer ☐ Reg. ☐ Exp ☐ Elec.
Barometric Pressure 28.98 IN.HG
Static Pressure -.98 IN.WC
Operators D. VanHoeven & D. Marso
Pitot No. 4M5 $C_p$ .84

FM

Drawing of Test Site

| Cross-section View | Elevation View |
|---|---|
| |   |

| Traverse Point No. | Fraction of Diameter | Distance From Stack Wall (IN.) | Distance From End of Port (IN.) | Velocity | Temp. of Gas (°F) |
|---|---|---|---|---|---|
| | | Port Length: 6 1/4 IN. | | Time Start: | HRS |
| A 1 | .021 | 1.6 | 7.85 | | |
| 2 | .067 | 5.11 | 11.35 | | |
| 3 | .118 | 9.0 | 15.25 | | |
| 4 | .177 | 13.5 | 19.75 | | |
| 5 | .250 | 19.06 | 25.31 | | |
| 6 | .356 | 27.14 | 33.4 | | |
| 7 | .644 | 49.10 | 55.36 | | |
| 8 | .750 | 57.19 | 63.44 | | |
| 9 | .823 | 62.75 | 69 | | |
| 10 | .882 | 67.25 | 73.5 | | |
| 11 | .933 | 71.14 | 77.39 | | |
| 12 | .979 | 74.65 | 80.90 | | |
| B 1 | | | | | |
| 2 | | | | | |
| 3 | | | | | |
| 4 | | | | | |
| 5 | | | | | |
| 6 | | | | | |
| 7 | | | | | |
| 8 | | | | | |
| 9 | | | | | |
| 10 | | | | | |
| 11 | | | | | |
| 12 | | | | | |
| | | | | | |

Temp. Meas. Device & S/N:

Time End: HRS

R or nothing = reg. manometer; S = expanded; E = electronic

INTERPOLL LABORATORIES, INC.
(612) 786-6020

# Interpoll Laboratories EPA Method 5/17 Sample Log Sheet

Job L.P. Hayward Date 6/9/94 Test 14 Run 1
Source Line 2 Press Vent RTO Stack No. of traverse points 24
Method 5 Filter holder: glass Filter type: Pallflex
**Sample Train Leak Check:**

Pretest: ≤ 0.02 cfm at 15 in. Hg. (vac) ☒
Post test: 0.00 cfm at 12 in. Hg. (vac) ☒

**Particulate Catch Data:**

No. of filters used:

Recovery solvent(s)

☒ acetone
☐ other(s)

No. of probe wash bottles: 1
Sample recovered by: DVH

**Condensate Data:**

| Item | Weight (g) | | |
|---|---|---|---|
| | Final | Tare | Difference |
| Impinger No. 1 | | | |
| Impinger No. 2 | 210 | 200 | 10 |
| Impinger No. 3 | | | |
| Condenser | | | |
| Desiccant | 1435 | 1419 | 16 |
| | | | |
| Total | | | 26 |

**Integrated Gas Sampling Data:**

Bag Pump No. 233
Bag Material: 5-layer Aluminized Tedlar
Pretest leak check: 0
Time start: 1246
Sampling rate: 400

Box No. 22 Bag No. 2
Size: 44 L
cc/min at 14 in. Hg.
(HRS) Time end: 1342 (HRS)
cc/min Operator: DVH

S/N of $O_2$ Analyzer used to monitor train outlet: 24A

123093-G:\STACK\WP\METHODS\S-0046RR

Brian Dillon USEPA

CF-D11

# INTERPOLL LABORATORIES EPA METHOD 5 FIELD DATA SHEET

Job L.P. Hayward
Source Line 2 Press Vent RTO STACK
Date 6/9/94 Test 14 Run 1

Operators DvH & D.M
Meter Box No. 6 ΔH 1.97 IN WC
Coeffic coeff. .9947

Pitot No. 23-8 Cp .840
Bar. Press. 28.96 inHg H2O X
Nozzle No. glass Nozzle Dia .276 IN.

| Traverse Point No. | Sampling Time (min) | Sample Volume (cf) | Velocity Head (inWC) | Orifice Meter (inWC) | Dec. Vol. (cf) | VAC. inHg | Temperatures (°F) Stack | Probe | Oven | Impy. | Gas/In | Gas/Out | Oxygen (x v/v) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | (12:40) | 726.40 | | | | | | | | | | | |
| A 12 | 2.5 | 728.50 | .77 | 2.37 | 8.50 | 6 | 250 | 252 | 253 | 48 | 76 | 74 | 20.2 |
| 11 | 5 | 730.49 | .68 | 2.11 | 0.49 | 6 | 249 | | | | 77 | 74 | 20.1 |
| 10 | 7.5 | 732.67 | .86 | 2.64 | 2.72 | 6 | 258 | | | | 80 | 74 | 20.1 |
| 9 | 10 | 735.09 | .94 | 2.90 | 5.06 | 8 | 255 | 255 | 248 | 49 | 83 | 75 | 20.1 |
| 8 | 12.5 | 737.20 | .83 | 2.57 | 7.27 | 7 | 254 | | | | 85 | 75 | 20.1 |
| 7 | 15 | 739.58 | .93 | 2.89 | 9.61 | 8 | 254 | | | | 87 | 76 | 20.1 |
| 6 | 17.5 | 741.79 | .95 | 2.96 | 1.98 | 8 | 254 | 250 | 252 | 47 | 90 | 77 | 20.1 |
| 5 | 20 | 744.21 | .99 | 3.10 | 4.41 | 9 | 253 | | | | 91 | 77 | 20.1 |
| 4 | 22.5 | 746.68 | .96 | 3.04 | 6.82 | 9 | 246 | | | | 92 | 78 | 20.0 |
| 3 | 25 | 749.06 | .84 | 2.66 | 9.08 | 8 | 248 | 255 | 260 | 49 | 93 | 78 | 20.0 |
| 2 | 27.5 | 751.36 | .93 | 2.94 | 1.45 | 8 | 250 | | | | 94 | 79 | 20.0 |
| 1 | 30 | 753.75 | .98 | 3.10 | 3.89 | 8 | 249 | | | | 96 | 79 | 20.7 |
| B 12 | 32.5 | 755.91 | .72 | 2.29 | 5.99 | 7 | 248 | 258 | 261 | 50 | 93 | 80 | 20.6 |
| 11 | 35 | 758.02 | .73 | 2.31 | 8.10 | 7 | 251 | | | | 96 | 81 | 20.6 |
| 10 | 37.5 | 760.28 | .83 | 2.59 | 0.34 | 7 | 262 | | | | 98 | 81 | 20.6 |
| 9 | 40 | 762.59 | .87 | 2.75 | 2.64 | 8 | 255 | 257 | 260 | 47 | 99 | 82 | 20.6 |
| 8 | 42.5 | 764.97 | .94 | 2.99 | 5.04 | 8 | 251 | | | | 100 | 82 | 20.6 |
| 7 | 45 | 767.34 | .92 | 2.89 | 7.41 | 8 | 262 | | | | 101 | 83 | 20.7 |
| 6 | 47.5 | 769.67 | .83 | 2.67 | 9.68 | 8 | 247 | 260 | 258 | 50 | 102 | 83 | 20.7 |
| 5 | 50 | 771.95 | .87 | 2.74 | 1.99 | 8 | 262 | | | | 103 | 84 | 20.6 |
| 4 | 52.5 | 774.19 | .75 | 2.39 | 4.14 | 7 | 255 | | | | 102 | 85 | 20.6 |
| 3 | 55 | 776.37 | .87 | 2.78 | 6.47 | 7 | 253 | 261 | 255 | 48 | 103 | 85 | 20.6 |
| 2 | 57.5 | 778.66 | .82 | 2.61 | 8.72 | 7 | 257 | | | | 104 | 85 | 20.6 |
| 1 | 60 | 780.83 | .73 | 2.36 | 0.86 | 6 | 247 | | | | 104 | 86 | 20.5 |
| | (134) | | | | | | | | | | | | |
| | θ = 60 | Vm = 54.43 | | ΔH = 2.69 | | | | | | | Avg. = 86.7 | | |

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S-0037R

INTERPOLL LABORATORIES, INC.
(612) 786-6020

# Interpoll Laboratories EPA Method 5/17 Sample Log Sheet

Job L.P. HAYWARD
Source Line 2 Press Vent RTO STACK
Method 5 Filter holder: glass
Date 6/8/94 Test 14 Run 2
No. of traverse points 24
Filter type: pallflex

**Sample Train Leak Check:**

Pretest: ≤ 0.02 cfm at 15 in. Hg. (vac) ☒
Post test: 4.002 cfm at 10 in. Hg. (vac) ☒

**Particulate Catch Data:**

No. of filters used:

Recovery solvent(s)

☒acetone
☐other(s)

No. of probe wash bottles: 1
Sample recovered by: DWH

**Condensate Data:**

| Item | Weight (g) | | |
|---|---|---|---|
| | Final | Tare | Difference |
| Impinger No. 1 | | | |
| Impinger No. 2 | 210 | 200 | 10 |
| Impinger No. 3 | | | |
| Condenser | | | |
| Desiccant | 1428 | 1410 | 18 |
| | | | |
| Total | | | 28 |

**Integrated Gas Sampling Data:**

Bag Pump No. 23 B
Bag Material: 5-layer Aluminized Tedlar
Pretest leak check: 0
Time start: 1430
Sampling rate: 400

Box No. 22 Bag No. 3
Size: 44 L
cc/min at 14 in. Hg.
(HRS) Time end: 1527 (HRS)
cc/min Operator: DWH

S/N of $O_2$ Analyzer used to monitor train outlet: 24A

123093-G:\STACK\WP\METHODS\S-0046RR

# INTERPOLL LABORATORIES EPA METHOD 5 FIELD DATA SHEET

Job L.P. Hayward — Operators DH + DM — Pitot No. 23-S — Cp .840
Source Line 2 Press Vent RTO STACK — Meter Box No. 6 ΔH@ 1.97 IN WC — Bar. Press. 28.90 inHg — H2O X
Date 6/8/94 — Test 14 — Run 2 — Counter coeff. .9949 — Nozzle No. S/ess2 — Nozzle Dia .246 IN.

| Traverse Point No. | Sampling Time (min) | Sample Volume (cf) | Velocity Head (inWC) | Orifice Meter (inWC) | Dev. Vol. (cf) | VAC. inHg | Temperatures (°F) Stack | Probe | Oven | Impg. | Gas/In | Gas/Out | Oxygen (%v/v) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | (1425) | 781.20 | | | | | | | | | | | |
| A 12 | 2.5 | 783.50 | .88 | 2.78 | 3.50 | 8 | 253 | 241 | 260 | 45 | 87 | 85 | 20.6 |
| 11 | 5 | 785.71 | .85 | 2.68 | 5.77 | 7 | 252 | | | | 93 | 85 | 20.5 |
| 10 | 7.5 | 787.89 | .77 | 2.44 | 7.94 | 7 | 254 | | | | 96 | 85 | 20.6 |
| 9 | 10 | 790.21 | .91 | 2.90 | 0.31 | 8 | 250 | 245 | 258 | 47 | 98 | 85 | 20.6 |
| 8 | 12.5 | 792.63 | .90 | 2.86 | 2.66 | 9 | 253 | | | | 100 | 86 | 20.5 |
| 7 | 15 | 795.00 | .93 | 2.94 | 5.05 | 9 | 260 | | | | 101 | 86 | 20.5 |
| 6 | 17.5 | 797.33 | .86 | 2.73 | 7.35 | 8 | 258 | 248 | 261 | 48 | 103 | 87 | 20.5 |
| 5 | 20 | 799.72 | .96 | 3.06 | 9.79 | 8 | 256 | | | | 104 | 88 | 20.5 |
| 4 | 22.5 | 802.13 | .95 | 3.04 | 2.23 | 9 | 254 | | | | 104 | 88 | 20.6 |
| 3 | 25 | 804.40 | .75 | 2.41 | 4.40 | 9 | 251 | 250 | 258 | 50 | 105 | 88 | 20.7 |
| 2 | 27.5 | 806.60 | .78 | 2.50 | 6.62 | 8 | 254 | | | | 106 | 89 | 20.7 |
| 1 | 30 | 808.79 | .76 | 2.44 | 8.80 | 7 | 256 | | | | 107 | 89 | 20.9 |
| AB 12 | 32.5 | 810.98 | .79 | 2.53 | 1.03 | 7 | 256 | 252 | 255 | 49 | 103 | 90 | 20.7 |
| 11 | 35 | 813.17 | .77 | 2.45 | 3.22 | 7 | 259 | | | | 106 | 90 | 20.6 |
| 10 | 37.5 | 815.46 | .90 | 2.87 | 5.59 | 7 | 260 | | | | 107 | 90 | 20.6 |
| 9 | 40 | 817.91 | .96 | 3.06 | 8.04 | 8 | 260 | 254 | 258 | 52 | 108 | 90 | 20.6 |
| 8 | 42.5 | 820.40 | .97 | 3.10 | 0.51 | 9 | 259 | | | | 108 | 91 | 20.6 |
| 7 | 45 | 822.92 | 1.03 | 3.30 | 3.05 | 10 | 257 | | | | 108 | 91 | 20.6 |
| 6 | 47.5 | 825.31 | .83 | 2.66 | 5.34 | 9 | 259 | 256 | 257 | 51 | 109 | 91 | 20.6 |
| 5 | 50 | 827.60 | .81 | 2.63 | 7.61 | 8 | 249 | | | | 109 | 91 | 20.6 |
| 4 | 52.5 | 829.82 | .77 | 2.47 | 9.82 | 8 | 257 | | | | 109 | 91 | 20.5 |
| 3 | 55 | 832.03 | .79 | 2.52 | 2.05 | 7 | 261 | 251 | 254 | 50 | 110 | 92 | 20.5 |
| 2 | 57.5 | 834.15 | .71 | 2.28 | 4.17 | 8 | 260 | | | | 110 | 92 | 20.5 |
| 1 | 60 | 836.23 | .69 | 2.22 | 6.26 | 7 | 259 | | | | 110 | 92 | 20.6 |
| | (1527) | | | | | | | | | | | | |
| | θ = 60 | Vm = 55.03 | | ΔH = 2.78 | | | | | | | Avg. = 96.5 | | |

INTERPOLL LABORATORIES, INC.
(612) 786-6020

# Interpoll Laboratories EPA Method 5/17 Sample Log Sheet

Job L.P. Hayward
Source Line 2 Press Vent RTO Stack
Method 5 Filter holder: glass
Sample Train Leak Check:

Date 6/9/94 Test 14 Run 3
No. of traverse points 24
Filter type: pallflex

Pretest: ≤ 0.02 cfm at 15 in. Hg. (vac) ☒
Post test: 0 cfm at 6 in. Hg. (vac) ☒

**Particulate Catch Data:**

No. of filters used:

Recovery solvent(s)

☒ acetone
☐ other(s)

No. of probe wash bottles: 0
Sample recovered by: DVH

**Condensate Data:**

| Item | Weight (g) | | |
|---|---|---|---|
| | Final | Tare | Difference |
| Impinger No. 1 | | | |
| Impinger No. 2 | 209 | 200 | 9 |
| Impinger No. 3 | | | |
| Condenser | | | |
| Desiccant | 1448 | 1435 | 13 |
| | | | |
| Total | | | 22 |

**Integrated Gas Sampling Data:**

Bag Pump No. 238
Bag Material: 5-layer Aluminized Tedlar
Pretest leak check: 0
Time start: 1608
Sampling rate: 400

Box No. 22 Bag No. 3
Size: 44 L
cc/min at 14 in. Hg.
(HRS) Time end: 1719 (HRS)
cc/min Operator: DVH

S/N of $O_2$ Analyzer used to monitor train outlet: 24A

123093-G:\STACK\WP\METHODS\S-0046RR

# INTERPOLL LABORATORIES EPA METHOD 5 FIELD DATA SHEET

Job L.P. Hayward
Source Line 2 Press Vent RTO Stack
Date 6/7/94 Test 14 Run 3

Operators DVH / DM
Meter Box No. 6 ΔH 1.97 IN WC
Meter coeff. .9947

Pitot No. 23-8 Cp .840
Bar. Press. 28.90 inHg H2O X
Nozzle No. Glass Nozzle Dia .246 IN.

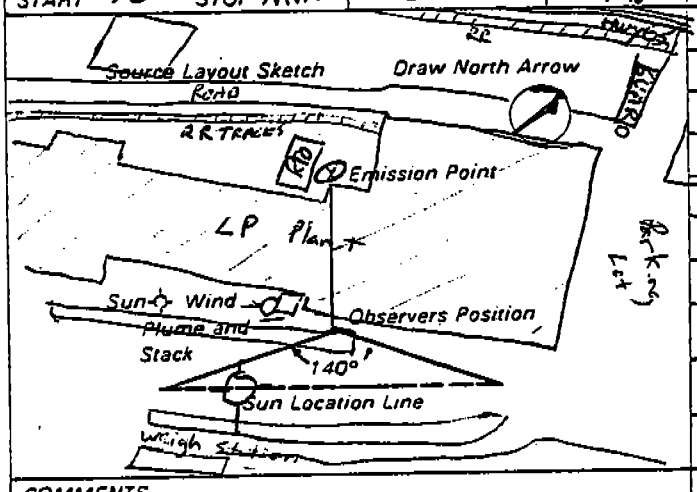
| Traverse Point No. | Sampling Time (min) | Sample Volume (cf) | Velocity Head (inWC) | Orifice Meter (inWC) | Dec. Vol. (cf) | VAC. inHg | Temperatures (°F) Stack | Probe | Oven | Impg. | Gas In | Gas Out | Oxygen (v/v) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | (16:05) | 836.54 | | | | | | | | | | | |
| A 12 | 2.5 | 838.52 | .73 | 2.32 | 8.67 | 6 | 261 | 252 | 248 | 48 | 102 | 92 | 20.6 |
| 11 | 5 | 840.68 | .70 | 2.24 | 0.76 | 6 | 258 | | | | 107 | 92 | 20.6 |
| 10 | 7.5 | 843.87 | .86 | 2.76 | 3.09 | 7 | 257 | | | | 103 | 92 | 20.7 |
| 9 | 10 | 845.22 | .84 | 2.68 | 5.38 | 8 | 260 | 255 | 255 | 50 | 105 | 92 | 20.7 |
| 8 | 12.5 | 847.68 | .94 | 3.00 | 7.80 | 8 | 260 | | | | 107 | 93 | 20.7 |
| 7 | 15 | 850.05 | .95 | 3.02 | 0.24 | 9 | 263 | | | | 108 | 92 | 20.7 |
| 6 | 17.5 | 852.61 | .89 | 2.85 | 2.61 | 9 | 260 | 251 | 256 | 51 | 108 | 93 | 20.7 |
| 5 | 20 | 855.03 | .89 | 2.85 | 4.97 | 8 | 261 | | | | 109 | 93 | 20.7 |
| 4 | 22.5 | 857.33 | .79 | 2.54 | 7.21 | 8 | 257 | | | | 109 | 93 | 20.7 |
| 3 | 25.0 | 859.59 | .85 | 2.74 | 9.54 | 7 | 256 | 254 | 260 | 50 | 110 | 93 | 20.7 |
| 2 | 27.5 | 861.71 | .67 | 2.17 | 1.61 | 7 | 254 | | | | 111 | 93 | 20.7 |
| 1 | 30.0 | 863.85 | .76 | 2.47 | 3.82 | 6 | 251 | | | | 111 | 93 | 20.7 |
| B 12 | 32.5 | 866.63 | .76 | 2.45 | 6.02 | 6 | 256 | 253 | 245 | 47 | 104 | 94 | 20.7 |
| 11 | 35.0 | 868.28 | .84 | 2.71 | 8.32 | 7 | 254 | | | | 110 | 94 | 20.7 |
| 10 | 37.5 | 870.65 | .92 | 2.96 | 0.74 | 7 | 257 | | | | 111 | 94 | 20.7 |
| 9 | 40. | 873.01 | .83 | 2.66 | 3.03 | 8 | 263 | 257 | 246 | 48 | 111 | 94 | 20.7 |
| 8 | 42.5 | 875.36 | .93 | 3.00 | 5.47 | 7 | 257 | | | | 112 | 94 | 20.5 |
| 7 | 45.0 | 877.83 | .95 | 3.06 | 7.92 | 8 | 259 | | | | 112 | 95 | 20.5 |
| 6 | 47.5 | 880.21 | .83 | 2.67 | 0.23 | 8 | 260 | 258 | 248 | 51 | 112 | 94 | 20.5 |
| 5 | 50 | 882.56 | .86 | 2.79 | 2.57 | 8 | 255 | | | | 112 | 95 | 20.5 |
| 4 | 52.5 | 884.75 | .74 | 2.41 | 4.76 | 8 | 252 | | | | 112 | 95 | 20.5 |
| 3 | 55.0 | 886.93 | .74 | 2.40 | 6.94 | 7 | 256 | 257 | 250 | 48 | 112 | 95 | 20.5 |
| 2 | 57.5 | 888.99 | .66 | 2.13 | 8.99 | 6 | 258 | | | | 113 | 95 | 20.4 |
| 1 | 60.0 | 891.08 | .67 | 2.15 | 1.06 | 6 | 262 | | | | 113 | 95 | 20.5 |
| | (17:19) | | | | | | | | | | | | |
| | θ = 60 | Vm = 54.54 | | ΔH = 2.63 | | | | | | | Avg. = 101.4 | | |

Interpoll Laboratories
(612)786-6020

# Visible Emissions Form

T14

| | |
|---|---|
| SOURCE NAME: Louisiana Pacific | OBSERVATION DATE: 6-9-94 |
| ADDRESS: RFD 8 | START TIME: 12:40 |
| CITY: Hayward | STATE: WI ZIP: 54843 |
| PHONE: | SOURCE ID NUMBER: |
| PROCESS EQUIPMENT: Line 2 Press Stack | OPERATING MODE: 100% |
| CONTROL EQUIPMENT: RTO | OPERATING MODE: 100% |
| DESCRIBE EMISSION POINT: START Tall silver stack near RR Tracks on North side STOP SAME | STOP TIME: 1:40 |
| HEIGHT ABOVE GROUND LEVEL: START 400' STOP SAME | HEIGHT RELATIVE TO OBSERVER: START 400' STOP SAME |
| DISTANCE FROM OBSERVER: START 500' STOP SAME | DIRECTION FROM OBSERVER: START 315° STOP SAME |
| DESCRIBE EMISSIONS: START NONE STOP None | |
| EMISSION COLOR: START None STOP SAME | PLUME TYPE: CONTINUOUS ☐ FUGITIVE ☐ INTERMITTENT ☐ |
| WATER DROPLETS PRESENT: NO ☒ YES ☐ | IF WATER DROPLET PLUME: ATTACHED ☐ DETACHED ☐ |
| POINT IN THE PLUME AT WHICH OPACITY WAS DETERMINED: START Directly above Stack Exit STOP SAME | |
| DESCRIBE BACKGROUND: START Clear sky STOP Broken sky | |
| BACKGROUND COLOR: START Blue STOP Blue+ white | SKY CONDITIONS: START Clear STOP Broken |
| WIND SPEED: START 5mph STOP 10mph | WIND DIRECTION: START SW STOP SAME |
| AMBIENT TEMP: START 70 STOP SAME | WET BULB TEMP: 62 RH percent: 71% |




| SEC / MIN | 0 | 15 | 30 | 45 | SEC / MIN | 0 | 15 | 30 | 45 |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 0 | 0 | 0 | 0 | 31 | 0 | 0 | 0 | 0 |
| 2 | 0 | 0 | 0 | 0 | 32 | 0 | 0 | 0 | 0 |
| 3 | 0 | 0 | 0 | 0 | 33 | 0 | 0 | 0 | 0 |
| 4 | 0 | 0 | 0 | 0 | 34 | 0 | 0 | 0 | 0 |
| 5 | 0 | 0 | 0 | 0 | 35 | 0 | 0 | 0 | 0 |
| 6 | 0 | 0 | 0 | 0 | 36 | 0 | 0 | 0 | 0 |
| 7 | 0 | 0 | 0 | 0 | 37 | 0 | 0 | 0 | 0 |
| 8 | 0 | 0 | 0 | 0 | 38 | 0 | 0 | 0 | 0 |
| 9 | 0 | 0 | 0 | 0 | 39 | 0 | 0 | 0 | 0 |
| 10 | 0 | 0 | 0 | 0 | 40 | 0 | 0 | 0 | 0 |
| 11 | 0 | 0 | 0 | 0 | 41 | 0 | 0 | 0 | 0 |
| 12 | 0 | 0 | 0 | 0 | 42 | 0 | 0 | 0 | 0 |
| 13 | 0 | 0 | 0 | 0 | 43 | 0 | 0 | 0 | 0 |
| 14 | 0 | 0 | 0 | 0 | 44 | 0 | 0 | 0 | 0 |
| 15 | 0 | 0 | 0 | 0 | 45 | 0 | 0 | 0 | 0 |
| 16 | 0 | 0 | 0 | 0 | 46 | 0 | 0 | 0 | 0 |
| 17 | 0 | 0 | 0 | 0 | 47 | 0 | 0 | 0 | 0 |
| 18 | 0 | 0 | 0 | 0 | 48 | 0 | 0 | 0 | 0 |
| 19 | 0 | 0 | 0 | 0 | 49 | 0 | 0 | 0 | 0 |
| 20 | 0 | 0 | 0 | 0 | 50 | 0 | 0 | 0 | 0 |
| 21 | 0 | 0 | 0 | 0 | 51 | 0 | 0 | 0 | 0 |
| 22 | 0 | 0 | 0 | 0 | 52 | 0 | 0 | 0 | 0 |
| 23 | 0 | 0 | 0 | 0 | 53 | 0 | 0 | 0 | 0 |
| 24 | 0 | 0 | 0 | 0 | 54 | 0 | 0 | 0 | 0 |
| 25 | 0 | 0 | 0 | 0 | 55 | 0 | 0 | 0 | 0 |
| 26 | 0 | 0 | 0 | 0 | 56 | 0 | 0 | 0 | 0 |
| 27 | 0 | 0 | 0 | 0 | 57 | 0 | 0 | 0 | 0 |
| 28 | 0 | 0 | 0 | 0 | 58 | 0 | 0 | 0 | 0 |
| 29 | 0 | 0 | 0 | 0 | 59 | 0 | 0 | 0 | 0 |
| 30 | 0 | 0 | 0 | 0 | 60 | 0 | 0 | 0 | 0 |

| | |
|---|---|
| AVERAGE OPACITY FOR HIGHEST PERIOD | NUMBER OF READINGS ABOVE % WERE |
| RANGE OF OPACITY READINGS MINIMUM 0 | MAXIMUM 0 |
| OBSERVER'S NAME (PRINT): Edward Jurs III | |
| OBSERVER'S SIGNATURE | DATE 6-9-94 |
| ORGANIZATION: Interpoll Labs Inc. | |
| CERTIFIED BY: Eastern Technical Assoc. | DATE 6-6-94 |
| VERIFIED BY | DATE |

COMMENTS

I HAVE RECEIVED A COPY OF THESE OPACITY OBSERVATIONS
SIGNATURE
TITLE DATE



S-0079R

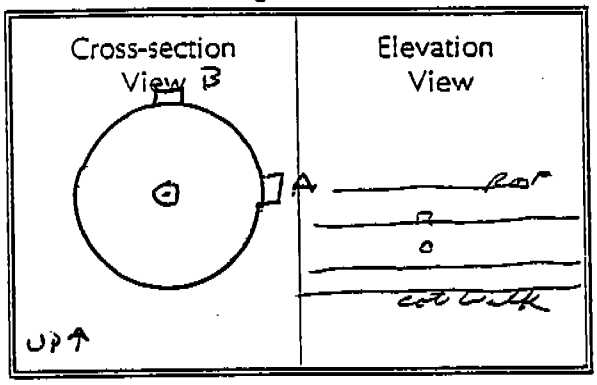
INTERPOLL LABORATORIES, INC.
(612) 786-6020

# EPA Method 2 Field Data Sheet

Job: LP - HAYWARD
Source: #2 PRESS RTO INLET
Test: 21 Run 0 Date: 6-8-94 & 6-9-94
Stack Dimen.: 58.5 IN.
Dry Bulb: 110 °F Wet bulb: ____ °F
Manometer: ☒ Reg. ☐ Exp ☐ Elec.
Barometric Pressure: 28.90 IN.HG
Static Pressure: -4.40 IN.WC
Operators: SB + KN
Pitot No.: 22U - 6 $C_p$ .840

PM

Drawing of Test Site




| Traverse Point No. | Fraction of Diameter | Distance From Stack Wall (IN.) | Distance From End of Port (IN.) | Velocity | Temp. of Gas (°F) |
|---|---|---|---|---|---|
| | | Port Length: | IN. 4 | Time Start: 1400 | HRS |
| A 1 | .044 | 2.574 | 6.574 | .70 | 110 |
| 2 | .146 | 8.541 | 12.541 | 1.50 | 110 |
| 3 | .296 | 17.316 | 21.316 | 2.30 | 110 |
| 4 | .704 | 41.184 | 45.184 | 2.35 | 115 |
| 5 | .854 | 49.959 | 53.959 | 2.30 | 115 |
| 6 | .956 | 55.926 | 59.926 | 2.20 | 118 |
| B 1 | | | | | |
| 2 | | | | | |
| 3 | | | | | |
| 4 | | | | | |
| 5 | | | | | |
| 6 | | | | | |

Temp. Meas. Device & S/N: Digital Tc - PDT 30
Time End: 1405 HRS

R or nothing = reg. manometer; S = expanded; E = electronic

INTERPOLL LABORATORIES, INC.
(612) 786-6020

# Interpoll Laboratories EPA Method 5/17 Sample Log Sheet

Job LD - HAYWARD
Source #2 PROSPECTO INLET
Method 1-5 Filter holder: TEFLON
Date 6-9-94 Test 21 Run - 1
No. of traverse points 12
Filter type: 3.5" PALLFLEX

**Sample Train Leak Check:**

Pretest: ≤ 0.02 cfm at 15 in. Hg. (vac) ☑
Post test: 0.00 cfm at 12 in. Hg. (vac) ☑

**Particulate Catch Data:**

No. of filters used: 1315

Recovery solvent(s)
☑ acetone
☐ other(s)

No. of probe wash bottles: 1
Sample recovered by: SD

**Condensate Data:**

| Item | Weight (g) | | |
|---|---|---|---|
| | Final | Tare | Difference |
| Impinger No. 1 | | | |
| Impinger No. 2 | 504 | 502 | 2 |
| Impinger No. 3 | | | |
| Condenser | | | |
| Desiccant | 1500 | 1478 | 22 |
| | | | |
| Total | | | 24 |

**Integrated Gas Sampling Data:** (ambient air)

Bag Pump No. _____
Bag Material: 5-layer Aluminized Tedlar
Pretest leak check: _____
Time start: _____
Sampling rate: _____

Box No. _____ Bag No. _____
Size: 44 L
cc/min at _____ in. Hg.
(HRS) Time end: _____ (HRS)
cc/min Operator: _____

S/N of $O_2$ Analyzer used to monitor train outlet: _____

123093-G:\STACK\WP\METHODS\S-0046RR

# INTERPOLL LABORATORIES EPA METHOD 5 FIELD DATA SHEET

Job LP - HAYWARD
Source #2 PROCESS STD #NUCOR
Date 6-9-97 Test 2 Run 1

Operators SB / KW
Meter Box No. 14 ΔH .85 TM RC
Cyclometer reads: 1.0066

Pitot No. 22V-C Cp .840
Bar. Press. 29.90 inHg H2O 3 %
Nozzle No. 4-3 Nozzle Dia .272 in.

| Traverse Point No. | Sampling Time (min) | Sample Volume (cf) | Velocity Head (inWC) | Orifice Meter (inWC) | Dry. Vol. (cf) | VAC. inHg | Temperatures (°F) Stack | Probe | Oven | Impg. | Gas/In | Gas/Out | Oxygen (x v/v) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | (1240) | (1008.50) | | | | | | | | | | | |
| A-6 | 5 | 1012.70 | 2.30 | 2.25 | 2.75 | 10 | 113 | 248 | 251 | 40 | 69 | 69 | 20.9 |
| 5 | 10 | 1017.00 | 2.50 | 2.36 | 0.02 | 10 | 110 | 246 | 250 | 41 | 70 | 68 | CO2 |
| 4 | 15 | 1021.00 | 2.30 | 2.14 | 1.08 | 10 | 120 | 246 | 251 | 42 | 85 | 69 | air |
| 3 | 20 | 1025.50 | 2.40 | 2.25 | 5.26 | 10 | 118 | 246 | 250 | 45 | 80 | 70 | |
| 2 | 25 | 1029.40 | 2.40 | 2.24 | 9.46 | 10 | 118 | 246 | 251 | 45 | 82 | 70 | |
| 1 | 30 | 1033.72 | 2.45 | 2.31 | 3.72 | 10 | 118 | 247 | 254 | 46 | 87 | 72 | |
| B-6 | 35 | 1036.45 | .86 | .82 | 6.26 | 8 | 119 | 247 | 256 | 47 | 85 | 71 | |
| 5 | 40 | 1039.38 | 1.50 | 1.42 | 9.61 | 10 | 119 | 248 | 259 | 47 | 87 | 72 | |
| 4 | 45 | 1043.26 | 1.80 | 1.71 | 3.29 | 10 | 120 | 248 | 257 | 47 | 87 | 74 | |
| 3 | 50 | 1047.15 | 2.00 | 1.90 | 7.15 | 10 | 119 | 248 | 257 | 46 | 89 | 75 | |
| 2 | 55 | 1051.54 | 2.35 | 2.41 | 1.52 | 10 | 123 | 247 | 258 | 45 | 92 | 76 | |
| 1 | 60 | 1055.70 | 2.40 | 2.30 | 5.79 | 11 | 118 | 247 | 258 | 46 | 93 | 76 | |
| | (1345) | | | | | | | | | | | | |
| | θ = 60 | Vm = 47.20 | | ΔH = 2.01 | | | | | | | Avg. = | 77.4 | |

INTERPOLL LABORATORIES, INC.
(612) 786-6020

# Interpoll Laboratories EPA Method 5/17 Sample Log Sheet

Job LP - HAYWARD
Source #2 PRESS RD FILTER
Method 1-5 Filter holder: TEFLON
Date 6-9-94 Test 21 Run 2
No. of traverse points 12
Filter type: 3.52" DALFLEX

**Sample Train Leak Check:**

Pretest: ≤ 0.02 cfm at 15 in. Hg. (vac) ☒
Post test: 0.00 cfm at 14 in. Hg. (vac) ☐

**Particulate Catch Data:**

No. of filters used:

1316

Recovery solvent(s)

☒ acetone
☐ other(s)

No. of probe wash bottles: 5B
Sample recovered by: SB + EJ + KN

**Condensate Data:**

| Item | Weight (g) | | |
|---|---|---|---|
| | Final | Tare | Difference |
| Impinger No. 1 | | | |
| Impinger No. 2 | 501 | 500 | 1 |
| Impinger No. 3 | | | |
| Condenser | | | |
| Desiccant | 1549 | 1526 | 23 |
| | | | |
| Total | | | 24 |

**Integrated Gas Sampling Data:** (Ambient Air)

Bag Pump No.
Bag Material: 5-layer Aluminized Tedlar
Pretest leak check:
Time start:
Sampling rate:

Box No. Bag No.
Size: 44 L
cc/min at in. Hg.
(HRS) Time end: (HRS)
cc/min Operator:

S/N of $O_2$ Analyzer used to monitor train outlet:

123093-G:\STACK\WP\METHODS\S-0046RR

# INTERPOLL LABORATORIES EPA METHOD 5 FIELD DATA SHEET

Job CP- HAYWARD
Source #2 Press Recup Inlet
Date 6-9-94 Test 21 Run 2

Operators SD+KN
Meter Box No. 14 ΔH@ 1.85 (N) (C)
Coeff. 1.0066

Pitot No. 220-6 Cp .840
Bar. Press. 28.90 inHg H2O 3 %
Nozzle No. 4-3 Nozzle Dia .177 IN.

| Traverse Point No. | Sampling Time (min) | Sample Volume (cf) | Velocity Head (inWC) | Orifice Meter (inWC) | Dry Gas Vol. (cf) | VAC. inHg | Temperatures (°F) Stack | Probe | Oven | Impg. | Gas/In | Gas/Out | Oxygen (v/v) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | (1425) | 1058.85) | | | | | | | | | | | |
| B-6 | 5 | 1062.10 | 1.50 | 1.41 | 2.17 | 6 | 124 | 247 | 251 | 47 | 82 | 81 | 20.9 |
| 5 | 10 | 1065.59 | 1.50 | 1.43 | 5.54 | 8 | 119 | 247 | 254 | 46 | 92 | 87 | Ambient |
| 4 | 15 | 1068.98 | 1.56 | 1.49 | 8.99 | 8 | 120 | 247 | 254 | 46 | 99 | 81 | air |
| 3 | 20 | 1073.62 | 2.60 | 2.57 | 3.48 | 10 | 120 | 247 | 254 | 46 | 102 | 82 | |
| 2 | 25 | 1078.30 | 2.75 | 2.66 | 8.11 | 12 | 120 | 247 | 254 | 46 | 103 | 83 | |
| 1 | 30 | 1082.64 | 2.50 | 2.42 | 5.53 | 11 | 121 | 247 | 255 | 45 | 104 | 83 | |
| A-6 | 35 | 1086.90 | 2.50 | 2.43 | 6.95 | 12 | 121 | 247 | 256 | 45 | 104 | 83 | |
| 5 | 40 | 1091.30 | 2.45 | 2.38 | 1.33 | 10 | 121 | 248 | 257 | 45 | 102 | 87 | |
| 4 | 45 | 1095.60 | 2.35 | 2.28 | 5.63 | 10 | 123 | 250 | 257 | 40 | 105 | 88 | |
| 3 | 50 | 1100.00 | 2.45 | 2.39 | 0.03 | 10 | 121 | 249 | 256 | 40 | 106 | 89 | |
| 2 | 55 | 1104.50 | 2.30 | 2.05 | 4.31 | 10 | 120 | 251 | 254 | 41 | 107 | 90 | |
| 1 | 60 | 1108.78 | 2.50 | 2.45 | 8.78 | 10 | 120 | 250 | 254 | 41 | 108 | 91 | |
| | (1530) | | | | | | | | | | | | |
| | θ = 60 | Vm = 49.93 | | ΔH = 2.17 | | | | | | | Avg. = 92.0 | | |

# INTERPOLL LABORATORIES EPA METHOD 5/17 SAMPLE LOG SHEET

Job LP - HAYWARD Date 6-9-94 Test 2 Run 3
Source #2 PASS RTO INLET No. of traverse points 12
Method 1-5 Filter holder: TELFLON Filter type: 3.52" PALLEX

**Sample Train Leak Check:**

Pretest: < 0.02 cfm at 15 in. Hg. (vac) ☒
Postest: 0.00 cfm at 14 in. Hg. (vac) ☒

**Particulate Catch Data:**

No.s of filters used: 1317

Recovery solvent(s)
☒ acetone
☐ other(s)

No. of probe wash bottles: 1
Sample recovered by: SB + KNIEST

**Condensate Data:**

| Item | Weight(g) | | |
|---|---|---|---|
| | Final | Tare | Difference |
| Impinger No. 1 | | | |
| Impinger No. 2 | 502 | 500 | 2 |
| Impinger No. 3 | | | |
| Condenser | | | |
| Desiccant | 1555 | 1530 | 25 |
| | | | |
| Total | | | 27 |

**Integrated Gas Sampling Data:** (Ambient air)

Bag Pump No. _____ Box No. _____ Bag No. _____

Bag Material: 5-layer Aluminized Tedlar Size: 44 L

Pretest leak check: _____ cc/min at _____ in. Hg.

Time start: _____ (HRS) Time end: _____ (HRS)

Sampling rate: _____ cc/min Operator: _____

S/N of $O_2$ Analyzer used to monitor train outlet: ___

CF-023

CF-011

# INTERPOLL LABORATORIES EPA METHOD 5 FIELD DATA SHEET

Job: CP - HAYWARD
Source: #2 Brasil Mfg Inlet
Date: 8-9-94 Test: 21 Run: 3

Operators: SB+KN
Meter Box No.: 14 ΔH: 1.85 IN WC
Coeff.: 1.0066

Pitot No.: 220-6 Cp: .840
Bar. Press.: 28.80 inHg H2O: 3 x
Nozzle No.: 4-3 Nozzle Dia.: .172 IN.

| Traverse Point No. | Sampling Time (min) | Sample Volume (cf) | Velocity Head (inWC) | Orifice Meter (inWC) | Dec. Vol. (cf) | VAC. inHg | Temperatures (°F) Stack | Probe | Oven | Impg. | Gas/In | Gas/Out | Oxygen (v/v) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | (1605) | (1109.50) | | | | | | | | | | | |
| B-6 | 5 | 1113.74 | 2.25 | 2.18 | 3.69 | 9 | 121 | 245 | 260 | 45 | 91 | 91 | Cabin |
| 5 | 10 | 1118.10 | 2.40 | 2.32 | 8.01 | 10 | 121 | 246 | 259 | 44 | 96 | 90 | Air |
| 4 | 15 | 1122.41 | 2.35 | 2.29 | 2.31 | 10 | 117 | 246 | 260 | 45 | 100 | 90 | 20.9 |
| 3 | 20 | 1126.50 | 2.30 | 2.24 | 6.57 | 10 | 120 | 246 | 260 | 45 | 101 | 90 | |
| 2 | 25 | 1131.32 | 2.70 | 2.63 | 1.19 | 12 | 121 | 246 | 258 | 45 | 102 | 89 | |
| 1 | 30 | 1135.40 | 2.25 | 2.20 | 5.40 | 11 | 120 | 247 | 258 | 48 | 103 | 89 | |
| A-6 | 35 | 1138.89 | 1.50 | 1.47 | 8.86 | 7 | 120 | 247 | 257 | 47 | 104 | 90 | |
| 5 | 40 | 1143.53 | 2.50 | 2.44 | 3.31 | 10 | 121 | 247 | 258 | 46 | 103 | 90 | |
| 4 | 45 | 1147.99 | 2.60 | 2.54 | 7.85 | 10 | 119 | 246 | 257 | 45 | 104 | 90 | |
| 3 | 50 | 1152.44 | 2.55 | 2.50 | 2.36 | 10 | 118 | 245 | 256 | 41 | 105 | 90 | |
| 2 | 55 | 1156.98 | 2.56 | 2.51 | 6.88 | 10 | 118 | 246 | 254 | 40 | 105 | 90 | |
| 1 | 60 | 1161.31 | 2.50 | 2.44 | 1.34 | 9 | 122 | 250 | 254 | 41 | 105 | 91 | |
| | (1708) | | | | | | | | | | | | |
| | θ = 68 | Vm = 51.84 | | ΔH = 2.31 | | | | | | | Avg. = 95.7 | | |

C-56

S-0037R

# VISIBLE EMISSIONS EVALUATOR

*This is to certify that*

David Vaales

*met the specifications of Federal Reference Method 9 and qualified as a visible emissions evaluator. Maximum deviation on white and black smoke did not exceed 7.5% opacity and no single error exceeding 15% opacity was incurred during the certification test conducted by Eastern Technical Associates of Raleigh, North Carolina. This certificate is valid for six months from date of issue.*

Thomas Lore
President

243003
Certificate Number

Vice President

Minneapolis
Location

David B. Savage, Jr.
Program Manager

April 6, 1994
Date of Issue

# VISIBLE EMISSIONS EVALUATOR

*This is to certify that*

Edward Jurs

*met the specifications of Federal Reference Method 9 and qualified as a visible emissions evaluator. Maximum deviation on white and black smoke did not exceed 7.5% opacity and no single error exceeding 15% opacity was incurred during the certification test conducted by Eastern Technical Associates of Raleigh, North Carolina. This certificate is valid for six months from date of issue.*

Thomas Lore
President

243004
Certificate Number

Vice President

Minneapolis
Location

David B. Savage, Jr.
Program Manager

April 6, 1994
Date of Issue

# APPENDIX D

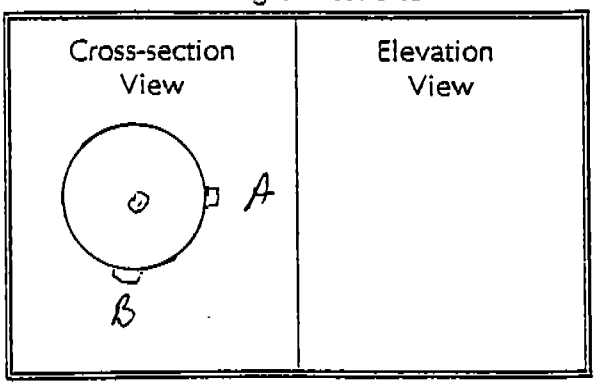
## KONUS FIELD DATA SHEETS

INTERPOLL LABORATORIES, INC.
(612) 786-6020

# EPA Method 2 Field Data Sheet

Job: LP/HAYWARD
Source: LINE 1 KONUS STACK
Test: 5 Run 0 Date 6-8-94
Stack Dimen.: 52.0 IN.
Dry Bulb: ____ °F Wet bulb: ____ °F
Manometer: ☒ Reg. ☐ Exp ☐ Elec.
Barometric Pressure: 25.45 IN.HG
Static Pressure: -.20 IN.WC
Operators: E. TROWBRIDGE - D. WALKER
Pitot No.: 24V-5 $C_p$: .840
PM/NOx

Drawing of Test Site




| Traverse Point No. | Fraction of Diameter | Distance From Stack Wall (IN.) | Distance From End of Port (IN.) | Velocity | Temp. of Gas (°F) |
|---|---|---|---|---|---|
| | | Port Length: 6.5 IN. | | Time Start: 0820 HRS | |
| A 1 | .026 | 1.35 | 7.85 | .11 | |
| 2 | .082 | 4.26 | 10.86 | .13 | |
| 3 | .146 | 7.59 | 14.09 | .13 | |
| 4 | .226 | 11.75 | 18.25 | .13 | |
| 5 | .342 | 17.78 | 24.28 | .12 | 325 |
| 6 | .658 | 34.22 | 40.72 | .12 | |
| 7 | .774 | 40.24 | 46.74 | .11 | |
| 8 | .954 | 44.80 | 50.90 | .12 | |
| 9 | .918 | 48.74 | 54.28 | .11 | |
| 10 | .974 | 50.64 | 57.04 | .08 | |
| B 1 | | | | .09 | |
| 2 | | | | .10 | |
| 3 | | | | .11 | |
| 4 | | | | .11 | 327 |
| 5 | | | | .11 | |
| 6 | | | | .12 | |
| 7 | | | | .13 | |
| 8 | | | | .13 | |
| 9 | | | | .14 | |
| 10 | | | | .15 | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |

Temp. Meas. Device & S/N: PDT-54
Time End: 0812 HRS

R or nothing = reg. manometer; S = expanded; E = electronic

INTERPOLL LABORATORIES, INC.
(612) 786-6020

# Interpoll Laboratories EPA Method 5/17 Sample Log Sheet

Job LP/HAYWARD
Source LINE 1 KONUS STACK
Method 5 Filter holder: 4" GLASS
Date 6-8-94 Test 5 Run 1
No. of traverse points 20
Filter type: 4" PALLFLEX

**Sample Train Leak Check:**

Pretest: ≤ 0.02 cfm at 15 in. Hg. (vac) ☒
Post test: 0 cfm at 6 in. Hg. (vac) ☒

**Particulate Catch Data:**

No. of filters used:

4031

Recovery solvent(s)

☒ Acetone
☐ other(s)

No. of probe wash bottles: 1
Sample recovered by: ET

**Condensate Data:**

| Item | Weight (g) | | |
|---|---|---|---|
| | Final | Tare | Difference |
| Impinger No. 1 | | 100 | |
| Impinger No. 2 | 257 | 100 | 57 |
| Impinger No. 3 | | 0 | |
| Condenser | | | |
| Desiccant | 1363 | 1350 | 13 |
| | | | |
| Total | | | 70 |

**Integrated Gas Sampling Data:**

Bag Pump No. 248
Bag Material: 5-layer Aluminized Tedlar
Pretest leak check: 0
Time start: 1539
Sampling rate: 400

Box No. 17 Bag No. 1
Size: 44 L
cc/min at 1.5 in. Hg.
(HRS) Time end: 1639 (HRS)
cc/min Operator: ET

S/N of $O_2$ Analyzer used to monitor train outlet: 248

123093-G:\STACK\WP\METHODS\S-0046RR

# INTERPOLL LABORATORIES EPA METHOD 5 FIELD DATA SHEET

Job LP/HAYWARD
Source 2.1/02 RORUS STACK
Date 6-8-94 Test 5 Run 2

Operators ET-DV
Meter Box No. 02 ΔH 1.77 ΔH@ .9924
Barometer coeff.:

Pitot No. 24-5 Dp .840
Bar. Press. 28.98 inHg H2O x
Nozzle No. 1-6 Nozzle Dia .353 in.

| Traverse Point No. | Sampling Time (min) | Sample Volume (cf) | Velocity Head (inH2O) | Orifice Meter (inH2O) | Dep. Vol. (cf) | VAC. inHg | Temperatures (°F) Stack | Probe | Oven | Impg. | Gas/In | Gas>Out | Oxygen (xx/x) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1538 | 781.90 | | | | | | | | | | | |
| B 10 | 3 | 783.70 | .10 | 1.85 | 6.68 | 4.5 | 286 | 255 | 260 | 43 | 74 | 73 | 17.4 |
| 9 | 6 | 785.60 | .12 | 1.27 | 5.62 | 5 | 270 | | | | 76 | 73 | 17.6 |
| 8 | 9 | 787.55 | .13 | 1.30 | 7.60 | 6 | 314 | 257 | 262 | 43 | 76 | 73 | 17.8 |
| 7 | 12 | 789.55 | .13 | 1.29 | 9.57 | 6 | 316 | | | | 78 | 74 | 16.0 |
| 6 | 15 | 791.40 | .11 | 1.09 | 1.38 | 5 | 316 | 255 | 258 | 45 | 79 | 74 | 15.7 |
| 5 | 18 | 793.10 | .09 | .90 | 3.03 | 4 | 317 | | | | 80 | 74 | 15.7 |
| 4 | 21 | 794.75 | .09 | .90 | 4.67 | 4 | 317 | 258 | 261 | 45 | 83 | 74 | 14.8 |
| 3 | 24 | 796.29 | .08 | .80 | 6.23 | 4 | 316 | | | | 84 | 75 | 14.2 |
| 2 | 27 | 797.62 | .06 | .60 | 7.59 | 3 | 314 | 260 | 262 | 45 | 84 | 75 | 14.4 |
| 1 | 30 | 798.80 | .05 | .50 | 8.82 | 3 | 314 | | | | 84 | 75 | 13.9 |
| A 10 | 33 | 800.45 | .08 | .80 | 0.39 | 4 | 315 | 258 | 259 | 46 | 85 | 76 | 14.7 |
| 9 | 36 | 802.05 | .09 | .91 | 2.05 | 4 | 310 | | | | 88 | 77 | 14.7 |
| 8 | 39 | 803.65 | .08 | .81 | 3.63 | 4 | 311 | 259 | 261 | 42 | 89 | 77 | 14.6 |
| 7 | 42 | 805.28 | .09 | .91 | 5.30 | 4 | 313 | | | | 90 | 77 | 14.9 |
| 6 | 45 | 806.93 | .09 | .91 | 6.97 | 4 | 312 | 257 | 260 | 43 | 90 | 78 | 14.9 |
| 5 | 48 | 808.40 | .09 | .91 | 8.64 | 4 | 314 | | | | 91 | 78 | 14.6 |
| 4 | 51 | 810.20 | .08 | .81 | 0.22 | 4 | 314 | 255 | 258 | 45 | 91 | 78 | 14.9 |
| 3 | 54 | 811.72 | .07 | .71 | 1.69 | 3.5 | 315 | | | | 91 | 78 | 15.4 |
| 2 | 57 | 813.05 | .06 | .61 | 5.06 | 3 | 312 | 257 | 259 | 45 | 91 | 79 | 15.0 |
| 1 | 60 | 814.40 | .05 | .51 | 4.31 | 3 | 312 | | | | 91 | 79 | 15.1 |
| | (1640) | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | θ = 60 | Vm = 32.50 | | ΔH = 1.88 | | | | | | | Avg. = 80.3 | | |

INTERPOLL LABORATORIES, INC.
(612) 786-6020

# Interpoll Laboratories EPA Method 5/17 Sample Log Sheet

Job LP/HAYWARD
Source LINE 1 BONUS STACK
Method 5 Filter holder: 4" GLASS
Date 6-8-94 Test 5 Run 2
No. of traverse points 20
Filter type: 4" PALL FLEX

**Sample Train Leak Check:**

Pretest: ≤ 0.02 cfm at 15 in. Hg. (vac) ☒
Post test: 0 cfm at 6 in. Hg. (vac) ☒

**Particulate Catch Data:**

No. of filters used:
4032

Recovery solvent(s)
☒acetone
☐other(s)

No. of probe wash bottles: 1
Sample recovered by: ET

**Condensate Data:**

| Item | Weight (g) | | |
|---|---|---|---|
| | Final | Tare | Difference |
| Impinger No. 1 | | 100 | |
| Impinger No. 2 | 251 | 100 | 51 |
| Impinger No. 3 | | 0 | |
| Condenser | | | |
| Desiccant | 1434 | 1423 | 11 |
| | | | |
| Total | | | 62 |

**Integrated Gas Sampling Data:**

Bag Pump No. 248
Bag Material: 5-layer Aluminized Tedlar
Pretest leak check: 0
Time start: 1709
Sampling rate: 400

Box No. 17 Bag No. 2
Size: 44 L
cc/min at 15 in. Hg.
(HRS) Time end: 1810 (HRS)
cc/min Operator: ET

S/N of $O_2$ Analyzer used to monitor train outlet: 248

123093-G:\STACK\WP\METHODS\S-0046RR

# INTERPOLL LABORATORIES EPA METHOD 5 FIELD DATA SHEET

Job LP/HOWARD
Source LINDE, KANSAS STACK
Date 6-8-94 Test 5 Run 2

Operators ET-DV
Meter Box No. 2 ΔH 1.77 IN WC
Counter coeff. .9974

Pitot No. 24Y-5 Cp .84
Bar. Press. 28.95 inHg ΔZD X
Nozzle No. 1-2 Nozzle Dia .353 IN.

| Traverse Point No. | Sampling Time (min) | Sample Volume (cf) | Velocity Head (inWC) | Orifice Meter (inWC) | Dry Gas Vol. (cf) | VAC. inHg | Temperatures (°F) Stack | Probe | Oven | Impg. | Gas/In | Gas/Out | Oxygen (xx/x) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1708 | 815.90 | | | | | | | | | | | |
| B 10 | 3 | 817.69 | .10 | .98 | 7.62 | 4 | 312 | 244 | 253 | 44 | 82 | 79 | 16.4 |
| 9 | 6 | 819.55 | .12 | 1.19 | 9.52 | 5 | 303 | | | | 84 | 79 | 15.4 |
| 8 | 9 | 821.50 | .13 | 1.28 | 1.50 | 5.8 | 309 | 251 | 254 | 45 | 85 | 79 | 14.7 |
| 7 | 12 | 823.51 | .14 | 1.38 | 3.54 | 6 | 312 | | | | 87 | 79 | 14.8 |
| 6 | 15 | 825.46 | .12 | 1.19 | 5.44 | 6 | 308 | 250 | 256 | 46 | 88 | 80 | 15.2 |
| 5 | 18 | 827.20 | .10 | .99 | 7.18 | 5 | 310 | | | | 89 | 80 | 15.2 |
| 4 | 21 | 828.86 | .09 | .88 | 8.83 | 4 | 318 | 252 | 254 | 47 | 90 | 80 | 15.0 |
| 3 | 24 | 830.42 | .08 | .78 | 0.38 | 4 | 317 | | | | 91 | 81 | 15.0 |
| 2 | 27 | 831.88 | .07 | .69 | 1.84 | 4 | 315 | 250 | 255 | 48 | 91 | 81 | 14.7 |
| 1 | 30 | 833.10 | .05 | .49 | 3.07 | 3 | 315 | | | | 91 | 81 | 15.0 |
| A 10 | 33 | 834.65 | .08 | .79 | 4.63 | 4 | 314 | 253 | 250 | 46 | 92 | 81 | 15.5 |
| 9 | 36 | 836.30 | .09 | .89 | 6.29 | 4 | 310 | | | | 93 | 82 | 15.5 |
| 8 | 39 | 837.98 | .09 | .89 | 7.94 | 4 | 315 | 255 | 253 | 47 | 93 | 82 | 15.6 |
| 7 | 42 | 839.70 | .10 | .99 | 9.68 | 4 | 316 | | | | 94 | 82 | 16.6 |
| 6 | 45 | 841.39 | .09 | .89 | 1.34 | 4 | 318 | 250 | 255 | 48 | 94 | 82 | 17.1 |
| 5 | 48 | 843.10 | .10 | .99 | 5.08 | 4 | 317 | | | | 94 | 83 | 17.6 |
| 4 | 51 | 844.78 | .09 | .89 | 4.74 | 4 | 318 | 248 | 253 | 48 | 95 | 83 | 16.8 |
| 3 | 54 | 846.32 | .08 | .79 | 6.30 | 4 | 318 | | | | 95 | 83 | 16.9 |
| 2 | 57 | 847.90 | .08 | .79 | 7.86 | 4 | 318 | 245 | 250 | 48 | 95 | 83 | 17.0 |
| 1 | 60 | 849.30 | .06 | .59 | 9.22 | 3 | 315 | | | | 95 | 83 | 16.8 |
| | (1811) | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | θ = 60 | Vm = 33.40 | | ΔH = .92 | | | | | | | Avg. = 86.0 | | |

INTERPOLL LABORATORIES, INC.
(612) 786-6020

# Interpoll Laboratories EPA Method 5/17 Sample Log Sheet

Job LP/HAYWARD
Source LINE1 KOMUS STACK
Method 5 Filter holder: 4" GLASS
Date 6-8-94 Test 5 Run 3
No. of traverse points 20
Filter type: 4" Pall Flex

**Sample Train Leak Check:**

Pretest: ≤ 0.02 cfm at 15 in. Hg. (vac) ✓
Post test: 0 cfm at 6 in. Hg. (vac) ✓

**Particulate Catch Data:**

No. of filters used:
4033

Recovery solvent(s)
☒ acetone
☐ other(s)

No. of probe wash bottles: 1
Sample recovered by: ET

**Condensate Data:**

| Item | Weight (g) | | |
|---|---|---|---|
| | Final | Tare | Difference |
| Impinger No. 1 | | 100 | |
| Impinger No. 2 | 271 | 100 | 71 |
| Impinger No. 3 | | 0 | |
| Condenser | | | |
| Desiccant | 1375 | 1365 | 10 |
| | | | |
| Total | | | 81 |

**Integrated Gas Sampling Data:**

Bag Pump No. 24B
Bag Material: 5-layer Aluminized Tedlar
Pretest leak check: 0
Time start: 1836
Sampling rate: 400

Box No. 17 Bag No. 3
Size: 44 L
cc/min at 15 in. Hg.
(HRS) Time end: 1937 (HRS)
cc/min Operator: ET

S/N of $O_2$ Analyzer used to monitor train outlet: 24B

123095-G:\STACK\WP\METHODS\S-0046RR

# INTERPOLL LABORATORIES EPA METHOD 5 FIELD DATA SHEET

Job LP/HAYWARD — Operators ET-DV — Pitot No. 24V-5 — Cp .84
Source LINE 1 RONUS STACK — Meter Box No. 2 — ΔH 1.77 — ΓH 1.77 IN DC — Bar. Press. 28.98 inHg — H2O —
Date 6-8-94 — Test 5 — Run 5 — Coeabter coeff. .9974 — Nozzle No. 1-6 — Nozzle Dia .355 IN.

| Traverse Point No. | Sampling Time (min) | Sample Volume (cf) | Velocity Head (inWC) | Orifice Meter (inWC) | Dry. Vol. (cf) | VAC. inHg | Temperatures (°F) Stack | Probe | Oven | Impg. | Gas/In | Gas/Out | Oxygen (%v/v) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1835 | 849.50 | | | | | | | | | | | |
| B 10 | 3 | 851.27 | .10 | 1.00 | 1.25 | 4 | 318 | 251 | 250 | 45 | 84 | 82 | 13.8 |
| 9 | 6 | 853.20 | .12 | 1.21 | 3.17 | 5 | 312 | | | | 86 | 82 | 13.6 |
| 8 | 9 | 855.14 | .13 | 1.30 | 5.16 | 5 | 312 | 254 | 252 | 45 | 88 | 82 | 14.4 |
| 7 | 12 | 857.12 | .13 | 1.30 | 7.16 | 5 | 313 | | | | 90 | 82 | 15.1 |
| 6 | 15 | 859.10 | .12 | 1.20 | 9.07 | 5 | 315 | 255 | 250 | 47 | 90 | 82 | 16.0 |
| 5 | 18 | 860.80 | .10 | 1.00 | 0.82 | 4 | 315 | | | | 91 | 83 | 15.0 |
| 4 | 21 | 862.51 | .09 | .90 | 2.49 | 4 | 314 | 252 | 253 | 48 | 92 | 83 | 16.1 |
| 3 | 24 | 864.05 | .08 | .80 | | 4 | 313 | | | | 92 | 83 | 16.2 |
| 2 | 27 | 865.52 | .07 | .70 | 5.54 | 4 | 310 | 250 | 255 | 48 | 93 | 83 | 16.5 |
| 1 | 30 | 866.80 | .05 | .50 | 6.79 | 3 | 310 | | | | 93 | 83 | 14.0 |
| A 10 | 33 | 868.30 | .08 | .81 | 8.86 | 4 | 311 | 258 | 254 | 46 | 93 | 83 | 13.8 |
| 9 | 36 | 870.01 | .09 | .92 | 0.04 | 4 | 303 | | | | 94 | 83 | 15.5 |
| 8 | 39 | 871.71 | .09 | .90 | 1.71 | 4 | 315 | 260 | 257 | 48 | 94 | 83 | 14.8 |
| 7 | 42 | 873.38 | .09 | .90 | 3.38 | 4 | 317 | | | | 95 | 83 | 12.8 |
| 6 | 45 | 875.05 | .09 | .90 | 5.05 | 4 | 318 | 256 | 258 | 48 | 95 | 83 | 12.2 |
| 5 | 48 | 876.79 | .10 | 1.00 | 6.81 | 4 | 317 | | | | 95 | 83 | 12.2 |
| 4 | 51 | 878.41 | .09 | .90 | 8.48 | 4 | 316 | 253 | 252 | 48 | 94 | 84 | 11.8 |
| 3 | 54 | 880.10 | .08 | .80 | 0.05 | 4 | 316 | | | | 94 | 84 | 13.7 |
| 2 | 57 | 881.65 | .08 | .80 | 1.62 | 4 | 313 | 250 | 254 | 48 | 95 | 84 | 14.0 |
| 1 | 60 | 883.02 | .06 | .60 | 2.98 | 3 | 317 | | | | 95 | 84 | 14.0 |
| | (1938) | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | θ = 60 | Vm = 33.52 | | ΔH = .92 | | | | | | | Avg. = 87.5 | | |

D-7

Interpoll Laboratories
(612)786-6020

**EPA Method 7 Sample Collection**
**Field Data Sheet**

Job L.P Hayward Date 6-8-94 Bar. Pressure 28.90 IN.HG.
Test Location STACK Fuel Type BARK Sample Train No. BULK
Line 1 KONUS Technician D.J Pump No. 24A

| No. | Test Run Point | Flask No. | Time (HRS) | Vacuum (IN.HG.) | Flask Temp. (°F) | Leak Rate <0.4 IN.HG./MIN. |
|---|---|---|---|---|---|---|
| 1 | 5-1-1 | 19 | 1540 | 27.33 | 70 | ☑ Yes ☐ No |
| 2 | 5-1-1 | 20 | 1552 | 27.35 | 70 | ☑ Yes ☐ No |
| 3 | 5-1-1 | 21 | 1604 | 27.41 | 70 | ☑ Yes ☐ No |
| 4 | 5-1-1 | 22 | 1632 | 27.40 | 70 | ☑ Yes ☐ No |
| 5 | 5-2-1 | 23 | 1708 | 27.39 | 70 | ☑ Yes ☐ No |
| 6 | 5-2-1 | 24 | 1723 | 27.28 | 70 | ☑ Yes ☐ No |
| 7 | 5-2-1 | 61 | 1738 | 27.50 | 70 | ☑ Yes ☐ No |
| 8 | 5-2-1 | 62 | 1755 | 27.44 | 70 | ☑ Yes ☐ No |
| 9 | 5-3-1 | 63 | 1835 | 27.41 | 70 | ☑ Yes ☐ No |
| 10 | 5-3-1 | 64 | 1850 | 27.40 | 70 | ☑ Yes ☐ No |
| 11 | 5-3-1 | 65 | 1910 | 27.44 | 70 | ☑ Yes ☐ No |
| 12 | 5-3-1 | 66 | 1925 | 27.50 | 70 | ☑ Yes ☐ No |
| 13 | | | | | | ☐ Yes ☐ No |
| 14 | | | | | | ☐ Yes ☐ No |
| 15 | | | | | | ☐ Yes ☐ No |
| 16 | | | | | | ☐ Yes ☐ No |
| 17 | | | | | | ☐ Yes ☐ No |
| 18 | | | | | | ☐ Yes ☐ No |
| 19 | | | | | | ☐ Yes ☐ No |
| 20 | | | | | | ☐ Yes ☐ No |
| 21 | | | | | | ☐ Yes ☐ No |
| 22 | | | | | | ☐ Yes ☐ No |
| 23 | | | | | | ☐ Yes ☐ No |
| 24 | | | | | | ☐ Yes ☐ No |
| 25 | | | | | | ☐ Yes ☐ No |
| 26 | | | | | | ☐ Yes ☐ No |
| 27 | | | | | | ☐ Yes ☐ No |



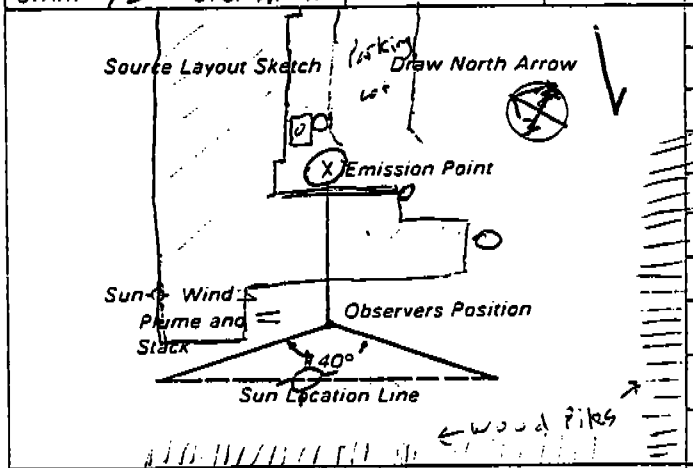
S-263R

Interpoll Laboratories
(612)786-6020

# Visible Emissions Form

T5

| | | |
|---|---|---|
| SOURCE NAME: Louisiana Pacific | OBSERVATION DATE: 6-8-94 | START TIME: 15:38 |
| ADDRESS: | | STOP TIME: 16:38 |
| CITY: Hayward | STATE: WI | ZIP: |
| PHONE: | SOURCE ID NUMBER: | |
| PROCESS EQUIPMENT: Konus-Line 1 | OPERATING MODE: 100% | |
| CONTROL EQUIPMENT: EFB | OPERATING MODE: 100% | |
| DESCRIBE EMISSION POINT: Shared stack on south START: East side of Building | STOP: SAME | |
| HEIGHT ABOVE GROUND LEVEL: START ~72' STOP SAME | HEIGHT RELATIVE TO OBSERVER: START ~72' STOP SAME | |
| DISTANCE FROM OBSERVER: START ~300' STOP SAME | DIRECTION FROM OBSERVER: START 355° STOP SAME | |
| DESCRIBE EMISSIONS: START NONE | STOP SAME | |
| EMISSION COLOR: START NONE STOP SAME | PLUME TYPE: CONTINUOUS ☐ FUGITIVE ☐ INTERMITTENT ☐ | |
| WATER DROPLETS PRESENT: NO ☒ YES ☐ | IF WATER DROPLET PLUME: ATTACHED ☐ DETACHED ☐ | |
| POINT IN THE PLUME AT WHICH OPACITY WAS DETERMINED: START Directly Above Stack Exit | STOP SAME | |
| DESCRIBE BACKGROUND: START Blue Sky | STOP SAME | |
| BACKGROUND COLOR: START Blue Sky STOP SAME | SKY CONDITIONS: START Clear STOP SAME | |
| WIND SPEED: START 15 mph STOP SAME | WIND DIRECTION: START NW STOP SAME | |
| AMBIENT TEMP. START 72° STOP SAME | WET BULB TEMP. 63° | RH percent 72% |




| SEC / MIN | 0 | 15 | 30 | 45 | SEC / MIN | 0 | 15 | 30 | 45 |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 0 | 0 | 0 | 0 | 31 | 0 | 0 | 0 | 0 |
| 2 | 0 | 0 | 0 | 0 | 32 | 0 | 0 | 0 | 0 |
| 3 | 0 | 0 | 0 | 0 | 33 | 0 | 0 | 0 | 0 |
| 4 | 0 | 0 | 0 | 0 | 34 | 0 | 0 | 0 | 0 |
| 5 | 0 | 0 | 0 | 0 | 35 | 0 | 0 | 0 | 0 |
| 6 | 0 | 0 | 0 | 0 | 36 | 0 | 0 | 0 | 0 |
| 7 | 0 | 0 | 0 | 0 | 37 | 0 | 0 | 0 | 0 |
| 8 | 0 | 0 | 0 | 0 | 38 | 0 | 0 | 0 | 0 |
| 9 | 0 | 0 | 0 | 0 | 39 | 0 | 0 | 0 | 0 |
| 10 | 0 | 0 | 0 | 0 | 40 | 0 | 0 | 0 | 0 |
| 11 | 0 | 0 | 0 | 0 | 41 | 0 | 0 | 0 | 0 |
| 12 | 0 | 0 | 0 | 0 | 42 | 0 | 0 | 0 | 0 |
| 13 | 0 | 0 | 0 | 0 | 43 | 0 | 0 | 0 | 0 |
| 14 | 0 | 0 | 0 | 0 | 44 | 0 | 0 | 0 | 0 |
| 15 | 0 | 0 | 0 | 0 | 45 | 0 | 0 | 0 | 0 |
| 16 | 0 | 0 | 0 | 0 | 46 | 0 | 0 | 0 | 0 |
| 17 | 0 | 0 | 0 | 0 | 47 | 0 | 0 | 0 | 0 |
| 18 | 0 | 0 | 0 | 0 | 48 | 0 | 0 | 0 | 0 |
| 19 | 0 | 0 | 0 | 0 | 49 | 0 | 0 | 0 | 0 |
| 20 | 0 | 0 | 0 | 0 | 50 | 0 | 0 | 0 | 0 |
| 21 | 0 | 0 | 0 | 0 | 51 | 0 | 0 | 0 | 0 |
| 22 | 0 | 0 | 0 | 0 | 52 | 0 | 0 | 0 | 0 |
| 23 | 0 | 0 | 0 | 0 | 53 | 0 | 0 | 0 | 0 |
| 24 | 0 | 0 | 0 | 0 | 54 | 0 | 0 | 0 | 0 |
| 25 | 0 | 0 | 0 | 0 | 55 | 0 | 0 | 0 | 0 |
| 26 | 0 | 0 | 0 | 0 | 56 | 0 | 0 | 0 | 0 |
| 27 | 0 | 0 | 0 | 0 | 57 | 0 | 0 | 0 | 0 |
| 28 | 0 | 0 | 0 | 0 | 58 | 0 | 0 | 0 | 0 |
| 29 | 0 | 0 | 0 | 0 | 59 | 0 | 0 | 0 | 0 |
| 30 | 0 | 0 | 0 | 0 | 60 | 0 | 0 | 0 | 0 |

| | |
|---|---|
| AVERAGE OPACITY FOR HIGHEST PERIOD | NUMBER OF READINGS ABOVE % WERE |
| RANGE OF OPACITY READINGS: 0 MINIMUM | MAXIMUM |
| OBSERVER'S NAME (PRINT): Edward Suers III | |
| OBSERVER'S SIGNATURE | DATE 6-8-94 |
| ORGANIZATION: Interpoll Labs, Inc. | |
| CERTIFIED BY: Eastern Tech. Assoc. | DATE 4-6-94 |
| VERIFIED BY | DATE |

COMMENTS

I HAVE RECEIVED A COPY OF THESE OPACITY OBSERVATIONS
SIGNATURE
TITLE DATE



S-0079R

INTERPOLL LABORATORIES, INC.
(612) 786-6020

# EPA Method 2 Field Data Sheet

Job LP/HAYWARD
Source LINE 1 KANUS
Test 6 Run Date 6-4-94
Stack Dimen. 52 IN.
Dry Bulb °F Wet bulb °F
Manometer ☒ Reg. ☐ Exp ☐ Elec.
Barometric Pressure 28.90 IN.HG
Static Pressure -.20 IN.WC
Operators E. TROWBRIDGE - K. ROSENTHAL
Pitot No. 24L-5 $C_p$ .840
CH₂O / CO

Drawing of Test Site

| Cross-section View | Elevation View |
|---|---|
| | |

| Traverse Point No. | Fraction of Diameter | Distance From Stack Wall (IN.) | Distance From End of Port (IN.) | Velocity | Temp. of Gas (°F) |
|---|---|---|---|---|---|
| | | Port Length: | IN. | Time Start: | HRS |
| A 1 | | | | | |
| 2 | | | | | |
| 3 | | | | | |
| 4 | | | | | |
| 5 | | | | | |
| 6 | | | | | |
| 7 | | | | | |
| 8 | | | | | |
| 9 | | | | | |
| 10 | | | | | |
| | | | | | |
| | | | | | |
|

INTERPOLL LABORATORIES, INC.
(612) 786-6020

# Interpoll Laboratories EPA Method 5/17 Sample Log Sheet

Job CP/HAYWARD
Source LINE 1 KONUS STACK
Method 5001I Filter holder: N/A
Sample Train Leak Check:

Date 6-9-94 Test 6 Run 1
No. of traverse points 20
Filter type: NA

Pretest: ≤ 0.02 cfm at 15 in. Hg. (vac) ☒
Post test: 0 cfm at 13 in. Hg. (vac) ☒

**Particulate Catch Data:**

No. of filters used:

NA

Recovery solvent(s)

☐ acetone
☒ other(s) MC

No. of probe wash bottles:
Sample recovered by:

**Condensate Data:**

| Item | Weight (g) | | |
|---|---|---|---|
| | Final | Tare | Difference |
| Impinger No. 1 | | 100 | |
| Impinger No. 2 | 768 | 700 | 68 |
| Impinger No. 3 | | 0 | |
| Condenser | | | |
| Desiccant | 1522 | 1506 | 16 |
| | | | |
| Total | | | 84 |

**Integrated Gas Sampling Data:**

Bag Pump No. 243
Bag Material: 5-layer Aluminized Tedlar
Pretest leak check: 0
Time start:
Sampling rate: 400

Box No. 17 Bag No. 1
Size: 44 L
cc/min at 15 in. Hg.
(HRS) Time end: (HRS)
cc/min Operator: RT

S/N of $O_2$ Analyzer used to monitor train outlet: 248

123095-G:\STACK\WP\METHODS\S-0046RR

CF-D11

# INTERPOLL LABORATORIES EPA METHOD 5 FIELD DATA SHEET

Job LP/HAYWARD
Source LINE 1 KOHLS STACK
Date 6-9-94 Test 6 Run 1

Operators ET-KR
Meter Box No. 2 Y 1.022 ΔH@ 1.77
Barometer cont: 29.94

Pitot No. 24V-5 Cp .84
Bar. Press. 29.90 inHg H2O x
Nozzle No. GLASS Nozzle Dia .485 IN.

| Traverse Point No. | Sampling Time (min) | Sample Volume (cf) | Velocity Head (inWC) | Orifice Meter (inWC) | Dep. Vol. (cf) | VAC. inHg | Temperatures (°F) Stack | Probe | Oven | Impg. | Gas/In | Gas/Out | Oxygen (xx/x) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1345 | 31.10 | | | | | | | | | | | |
| 10 | 3 | 34.01 | .120 | 2.89 | 4.07 | 13 | 329 | 256 | 250 | 44 | 83 | 78 | 14.7 |
| 9 | 6 | 36.70 | .100 | 2.38 | 4.76 | 12 | 331 | | | | 85 | 79 | 14.7 |
| 8 | 9 | 39.30 | .090 | 2.15 | 9.32 | 11 | 330 | 255 | 253 | 44 | 86 | 79 | 14.2 |
| 7 | 12 | 41.78 | .090 | 2.15 | 1.88 | 11 | 331 | | | | 89 | 79 | 14.0 |
| 6 | 15 | 44.18 | .100 | 2.40 | 4.58 | 12 | 330 | 254 | 257 | 45 | 90 | 81 | 13.9 |
| 5 | 18 | 47.07 | .090 | 2.19 | 7.18 | 11 | 329 | | | | 90 | 81 | 14.0 |
| 4 | 21 | 49.70 | .090 | 2.18 | 9.78 | 11 | 331 | 252 | 259 | 46 | 91 | 81 | 14.6 |
| 3 | 24 | 52.17 | .080 | 1.93 | 2.21 | 10 | 330 | | | | 91 | 81 | 14.1 |
| 2 | 27 | 54.70 | .080 | 1.93 | 4.64 | 10 | 329 | 250 | 257 | 46 | 92 | 82 | 14.1 |
| 1 | 30 | 56.79 | .060 | 1.45 | 6.75 | 7 | 329 | | | | 92 | 82 | 15.0 |
| 10 | 33 | 59.25 | .08 | 1.93 | 9.19 | 8 | 330 | 254 | 260 | 45 | 80 | 79 | 14.2 |
| 9 | 36 | 61.64 | .08 | 1.90 | 1.59 | 8 | 330 | | | | 81 | 79 | 15.9 |
| 8 | 39 | 64.28 | .10 | 2.38 | 4.27 | 10 | 330 | 257 | 259 | 42 | 84 | 79 | 14.3 |
| 7 | 42 | 66.90 | .09 | 2.15 | 6.83 | 10 | 330 | | | | 84 | 79 | 14.2 |
| 6 | 45 | 69.40 | .10 | 2.39 | 9.52 | 10 | 330 | 258 | 260 | 49 | 87 | 80 | 15.5 |
| 5 | 48 | 72.14 | .09 | 2.17 | 2.09 | 10 | 326 | | | | 88 | 80 | 15.3 |
| 4 | 51 | 74.66 | .09 | 2.17 | 4.66 | 10 | 327 | 245 | 261 | 46 | 89 | 80 | 14.5 |
| 3 | 54 | 77.20 | .09 | 2.18 | 7.24 | 10 | 323 | | | | 90 | 80 | 14.8 |
| 2 | 57 | 79.00 | .07 | 1.70 | 9.52 | 8 | 323 | 245 | 261 | 46 | 90 | 81 | 14.7 |
| 1 | 60 | 81.76 | .07 | 1.70 | 1.81 | 8 | 323 | | | | 91 | 81 | 15.1 |
| | (1606) | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | θ = 60 | Vm = 50.66 | | ^1.7312 | | | | | | | Avg. = 84.3 | | |

1450 ALT 2000 OK 1.35 TESTING

D-12

S-0037R

INTERPOLL LABORATORIES, INC.
(612) 786-6020

# Interpoll Laboratories EPA Method 5/17 Sample Log Sheet

Job LP/HAYWARD
Source LINE 1 ROHUS STACK
Method 5 0011 Filter holder: NA
Date 6-9-94 Test 6 Run 2
No. of traverse points 20
Filter type: NA

**Sample Train Leak Check:**

Pretest: ≤ 0.02 cfm at 15 in. Hg. (vac) ☒
Post test: 0 cfm at 13 in. Hg. (vac) ☒

**Particulate Catch Data:**

No. of filters used:

NA

Recovery solvent(s)

☐ acetone
☒ other(s) MC

No. of probe wash bottles: 1
Sample recovered by: ET

**Condensate Data:**

| Item | Weight (g) | | |
|---|---|---|---|
| | Final | Tare | Difference |
| Impinger No. 1 | | 100 | |
| Impinger No. 2 | | 100 | 94 |
| Impinger No. 3 | | 0 | |
| Condenser | | | |
| Desiccant | 1533 | 1522 | 11 |
| | | | |
| Total | | | 105 |

**Integrated Gas Sampling Data:**

Bag Pump No. 048
Bag Material: 5-layer Aluminized Tedlar
Pretest leak check: 0
Time start: 1633
Sampling rate: 400 cc/min

Box No. 17 Bag No. 2
Size: 44 L
cc/min at 15 in. Hg.
(HRS) Time end: 1742 (HRS)
cc/min Operator: ET

S/N of $O_2$ Analyzer used to monitor train outlet: 048

123093-G:\STACK\WP\METHODS\S-0046RR

# INTERPOLL LABORATORIES PA METHOD 5 FIELD DATA SHEET

Job CP/HAYWARD
Source CINO 1 ROTUS STACK
Date 6-2-94 Test 2 Run 2

Operators ET-KR
Meter Box No 2 ΔH@ 1.77 IN WC
Coumeter coeff. .9924

Pitot No. 24Y-5 Cp .84
Bar. Press. 28.52 inHg H2O X
Nozzle No. GLASS Nozzle Dia .495 IN.

| Traverse Point No. | Sampling Time (min) | Sample Volume (cf) | Velocity Head (inWC) | Orifice Meter (inWC) | Dec. Vol. (cf) | VAC. inHg | Temperatures (°F) Stack | Probe | Oven | Impg. | Gas/In | Gas/Out | Oxygen (xx/v) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1632 | 82.10 | | | | | | | | | | | |
| A 10 | 3 | 84.55 | .08 | 1.97 | 4.55 | 7 | 326 | 254 | 260 | 44 | 82 | 80 | 15.6 |
| 9 | 6 | 87.11 | .09 | 2.19 | 7.12 | 6 | 328 | | | | 84 | 80 | 15.0 |
| 8 | 9 | 89.83 | .10 | 2.44 | 9.84 | 9 | 329 | 256 | 262 | 45 | 86 | 80 | 15.7 |
| 7 | 12 | 92.55 | .10 | 2.44 | 2.57 | 9 | 329 | | | | 87 | 80 | 15.7 |
| 6 | 15 | 95.18 | .09 | 2.20 | 5.16 | 8 | 330 | 258 | 260 | 46 | 88 | 80 | 14.7 |
| 5 | 18 | 97.75 | .09 | 2.20 | 7.75 | 8 | 330 | | | | 89 | 80 | 14.3 |
| 4 | 21 | 100.45 | .10 | 2.44 | 0.48 | 9 | 331 | 255 | 259 | 46 | 91 | 81 | 14.3 |
| 3 | 24 | 102.92 | .08 | 1.96 | 2.93 | 8 | 331 | | | | 92 | 81 | 14.4 |
| 2 | 27 | 105.39 | .08 | 1.96 | 5.38 | 8 | 331 | 253 | 255 | 48 | 93 | 82 | 14.2 |
| 1 | 30 | 107.52 | .06 | 1.46 | 7.50 | 5 | 339 | | | | 94 | 82 | 13.9 |
| B 10 | 33 | 110.12 | .09 | 2.21 | 0.11 | 8 | 331 | 250 | 261 | 45 | 88 | 82 | 13.2 |
| 9 | 36 | 112.95 | .11 | 2.69 | 2.97 | 10 | 331 | | | | 89 | 82 | 13.1 |
| 8 | 39 | 116.00 | .13 | 3.19 | 6.09 | 13 | 329 | 253 | 258 | 47 | 90 | 82 | 13.4 |
| 7 | 42 | 119.02 | .12 | 2.95 | 9.09 | 12 | 327 | | | | 91 | 82 | 12.1 |
| 6 | 45 | 121.87 | .10 | 2.46 | 1.83 | 11 | 327 | 250 | 256 | 48 | 92 | 83 | 12.1 |
| 5 | 48 | 124.62 | .10 | 2.47 | 4.58 | 11 | 327 | | | | 93 | 83 | 13.2 |
| 4 | 51 | 127.10 | .08 | 1.98 | 7.05 | 8 | 326 | 252 | 258 | 48 | 93 | 84 | 13.0 |
| 3 | 54 | 129.40 | .07 | 1.73 | 9.36 | 7 | 326 | | | | 95 | 84 | 12.1 |
| 2 | 57 | 131.55 | .06 | 1.48 | 1.50 | 6 | 329 | 250 | 256 | 48 | 96 | 84 | 12.0 |
| 1 | 60 | 133.50 | .05 | 1.24 | 3.46 | 5 | 328 | | | | 97 | 85 | 13.3 |
| | (1743) | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | θ = 60 | Vm = 51.40 | | ΔH = 2.14 | | | | | | | Avg. | 89.0 | |

INTERPOLL LABORATORIES, INC.
(612) 786-6020

# Interpoll Laboratories EPA Method 5/17 Sample Log Sheet

Job LP/HAYWARD
Source LINE 1 KOMUS STACK
Method 5 or 17 Filter holder: NA
Date 6-9-94 Test 6 Run 3
No. of traverse points 20
Filter type: NA

**Sample Train Leak Check:**

Pretest: ≤ 0.02 cfm at 15 in. Hg. (vac) ~~X~~
Post test: 0 cfm at 13 in. Hg. (vac) ~~X~~

**Particulate Catch Data:**

No. of filters used: NA

Recovery solvent(s)
☐ acetone
☒ other(s) MC

No. of probe wash bottles: 1
Sample recovered by: ET

**Condensate Data:**

| Item | Weight (g) | | |
|---|---|---|---|
| | Final | Tare | Difference |
| Impinger No. 1 | | 100 | |
| Impinger No. 2 | 794 | 100 | 79 |
| Impinger No. 3 | | 0 | |
| Condenser | | | |
| Desiccant | 1440 | 1425 | 15 |
| | | | |
| Total | | | 94 |

**Integrated Gas Sampling Data:**

Bag Pump No. 24B
Bag Material: 5-layer Aluminized Tedlar
Pretest leak check: 0
Time start: 1803
Sampling rate: 400 cc/min

Box No. 17 Bag No. 3
Size: 44 L
15 in. Hg.
(HRS) Time end: 1903 (HRS)
cc/min Operator: ET

S/N of $O_2$ Analyzer used to monitor train outlet: 246

123095-G:\STACK\WP\METHODS\S-0046RR

# INTERPOLL LABORATORIES - PA METHOD 5 FIELD DATA SHEET

Job 48/HAYWARD
Source LINO1 ROTUS STACK
Date 6-9-94 Test 2 Run 3

Operators ET-KP
Meter Box No. 2 ΔH@ 1.77 IN WC
Coeabler coeff. .9974

Pitot No. 24V-5 Cp .84
Bar. Press. 29.90 inHg H2O X
Nozzle No. GLASS Nozzle Dia .485 IN.

| Traverse Point No. | Sampling Time (min) | Sample Volume (cf) | Velocity Head (inWC) | Orifice Meter (inWC) | Dec. Vol. (cf) | VAC. inHg | Temperatures (°F) Stack | Probe | Oven | Impy. | Gas/In | Gas/Out | Oxygen (xx/x) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1802 | 134.00 | | | | | | | | | | | |
| B 10 | 3 | 136.82 | .11 | 2.66 | 6.85 | 10 | 326 | 242 | 249 | 42 | 87 | 84 | 14.8 |
| 9 | 6 | 139.80 | .12 | 2.90 | 9.82 | 12 | 326 | | | | 89 | 84 | 14.9 |
| 8 | 9 | 142.82 | .13 | 3.14 | 2.92 | 13 | 327 | 250 | 253 | 44 | 89 | 84 | 14.5 |
| 7 | 12 | 145.74 | .11 | 2.66 | 5.77 | 11 | 327 | | | | 89 | 84 | 14.6 |
| 6 | 15 | 148.60 | .11 | 2.66 | 8.63 | 11 | 327 | 249 | 254 | 44 | 89 | 84 | 14.7 |
| 5 | 18 | 151.30 | .10 | 2.46 | 1.34 | 10 | 329 | | | | 90 | 84 | 14.0 |
| 4 | 21 | 153.80 | .08 | 1.94 | 3.78 | 9 | 328 | 252 | 255 | 45 | 91 | 84 | 14.3 |
| 3 | 24 | 156.10 | .07 | 1.69 | 6.07 | 7 | 329 | | | | 92 | 85 | 14.4 |
| 2 | 27 | 158.21 | .06 | 1.45 | 8.19 | 6 | 329 | 247 | 253 | 45 | 94 | 85 | 13.7 |
| 1 | 30 | 160.15 | .05 | 1.22 | 0.13 | 5 | 327 | | | | 95 | 85 | 13.7 |
| A 10 | 33 | 162.60 | .08 | 1.94 | 2.58 | 8 | 329 | 252 | 250 | 44 | 96 | 85 | 14.1 |
| 9 | 36 | 165.31 | .10 | 2.44 | 5.32 | 10 | 327 | | | | 96 | 86 | 14.4 |
| 8 | 39 | 167.97 | .09 | 2.20 | 7.93 | 9 | 325 | 254 | 251 | 45 | 96 | 86 | 13.9 |
| 7 | 42 | 170.58 | .09 | 2.20 | 0.55 | 9 | 326 | | | | 95 | 84 | 14.8 |
| 6 | 45 | 173.15 | .09 | 2.19 | 3.13 | 9 | 327 | 252 | 253 | 45 | 95 | 86 | 14.5 |
| 5 | 48 | 175.60 | .08 | 1.95 | 5.59 | 8 | 329 | | | | 95 | 84 | 14.6 |
| 4 | 51 | 178.04 | .08 | 1.95 | 8.04 | 8 | 329 | 250 | 249 | 45 | 95 | 86 | 14.6 |
| 3 | 54 | 180.50 | .08 | 1.95 | 0.49 | 8 | 329 | | | | 95 | 86 | 14.7 |
| 2 | 57 | 182.80 | .07 | 1.71 | 2.79 | 7 | 326 | 248 | 251 | 45 | 95 | 86 | 14.2 |
| 1 | 60 | 184.95 | .06 | 1.41 | 4.92 | 6 | 325 | | | | 95 | 86 | 14.2 |
| | (1404) | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | θ = 60 | Vm = 50.95 | | ΔH = 2.14 | | | | | | | Avg. = 89.0 | | |

INTERPOLL LABORATORIES, INC.
(612) 786-6020

# EPA Method 2 Field Data Sheet

Job LP/HAYWARD
Source LINE 1 KONUS STACK
Test 7 Run Date 6-5-94
Stack Dimen. _____ IN.
Dry Bulb _____ °F Wet bulb _____ °F
Manometer ☐ Reg. ☐ Exp ☐ Elec.
Barometric Pressure ≈28.90 IN.HG
Static Pressure _____ IN.WC
Operators ET - KR
Pitot No. _____ $C_p$ _____
Phenol

Drawing of Test Site

| Cross-section View | Elevation View |
|---|---|
| | |

| Traverse Point No. | Fraction of Diameter | Distance From Stack Wall (IN.) | Distance From End of Port (IN.) | Velocity | Temp. of Gas (°F) |
|---|---|---|---|---|---|
| | | Port Length: 6.5 IN. | | Time Start: | HRS |
| 1 | | 8.66 | 15.16 | | |
| 2 | | 26.00 | 32.5 | | |
| 3 | | 43.33 | 49.83 | | |
| | | | | | |
| | | | | | |
| | | |

INTERFOLL LABORATORIES

EPA Method 4 and 6 Field Data Sheet

Job LI/HARRIARD
Source LINE 1 KANUS STACK
Date 6-9-94 Test 7 Run 1

Operator(s) E. TRUBRIDGE K. ROSENTHAL
Meter Box No. 2 Gasmeter coef. .9574
ΔH@ 1.77 in.WC Bar. press 28.90 in.Hg

Sample Train Leak Check:
Pretest: < 0.02 cfm at 15 in. Hg.
Posttest: 0 cfm at 11 in. Hg.

| Trav. Point No. | Samp. Time (min) | Sample Volume (cf) | Orif. Meter (inWC) | VAC. inHg | Temperatures (°F) | | | | | Oxygen (%v/v) |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Probe | Oven | Impg. | Gas/In | Gas/Out | |
| | 0845 | 893.40 | | | | | | | | |
| 1 | 5 | 897.40 | 1.77 | 10 | 245 | 250 | 43 | 68 | 62 | 15.9 |
| 1 | 10 | 901.20 | 1.77 | 9.8 | 248 | 252 | 45 | 73 | 63 | 15.7 |
| 1 | 15 | 904.95 | 1.77 | 9.8 | 251 | 255 | 45 | 74 | 63 | 16.0 |
| 1 | 20 | 908.70 | 1.77 | 9.8 | 250 | 256 | 47 | 75 | 64 | 15.7 |
| 2 | 25 | 912.46 | 1.77 | 9.8 | 230 | 244 | 40 | 76 | 65 | 15.2 |
| 2 | 30 | 916.25 | 1.77 | 9.8 | 235 | 248 | 40 | 78 | 66 | 15.0 |
| 2 | 35 | 919.95 | 1.77 | 9.8 | 242 | 251 | 42 | 80 | 67 | 16.7 |
| 2 | 40 | 923.66 | 1.77 | 9.8 | 245 | 250 | 42 | 80 | 67 | 16.5 |
| 3 | 45 | 927.40 | 1.77 | 9.8 | 242 | 253 | 42 | 81 | 68 | 16.4 |
| 3 | 50 | 931.12 | 1.77 | 9.8 | 240 | 251 | 42 | 83 | 69 | 16.3 |
| 3 | 55 | 934.90 | 1.77 | 9.8 | 240 | 255 | 42 | 85 | 70 | 16.8 |
| 3 | 60 | 938.80 | 1.77 | 9.8 | 257 | 249 | 42 | 86 | 72 | 16.3 |
| | (0945) | | | | | | | | | |
| | θ=60 | $V_m$=45.20 | $(\Delta H)_{avg}$=1.77 | | | | | $(t_m)_{avg.}$=72.3 | | |

Condensate Data:

| Item | Weight (g) | | |
|---|---|---|---|
| | Final | Tare | Difference |
| Impingers | 254 | 200 | 54 |
| Condenser | | | |
| | | | |
| Desiccant | 1441 | 1429 | 12 |
| | | Total | 66 |

| Preliminary results of $SO_2$ concentration determination | |
|---|---|
| $V_{std}$ | = 43.39 DSCF |
| Moisture | = 6.69 %v/v |
| $SO_2$, dry | = ppm |
| $SO_2$, wet | = ppm |
| LB/MMBtu | = |

INTERFOLL LABORATORIES

EPA Method 4 and 6 Field Data Sheet

Job CP/HAYWARD
Source Duel Recirc Stack
Date 6-9-94 Test 1 Run 2

Operator(s) ET-KR
Meter Box No. 2 Gasmeter coef. .9974
ΔH@ 1.77 in.WC Bar. press 29.64 in.Hg

Sample Train Leak Check:
Pretest: < 0.02 cfm at 15 in. Hg.
Posttest: 0 cfm at 10 in. Hg.

| Trav. Point No. | Samp. Time (min) | Sample Volume (cf) | Orif. Meter (inWC) | VAC. inHg | Temperatures (°F) Probe | Oven | Impg. | Gas/In | Gas/Out | Oxygen (%v/v) |
|---|---|---|---|---|---|---|---|---|---|---|
| | 1000 | 939.20 | | | | | | | | |
| | 5 | 943.00 | 1.77 | 9.8 | 245 | 251 | 39 | 79 | 73 | 16.2 |
| | 10 | 946.70 | 1.77 | 9.8 | 251 | 253 | 40 | 79 | 73 | 15.1 |
| | 15 | 950.45 | 1.77 | 9.8 | 250 | 252 | 40 | 79 | 73 | 14.5 |
| | 20 | 954.30 | 1.77 | 9.8 | 252 | 254 | 40 | 79 | 74 | 14.5 |
| | 25 | 958.10 | 1.77 | 9.8 | 250 | 251 | 41 | 79 | 74 | 15.0 |
| | 30 | 961.94 | 1.77 | 9.8 | 254 | 252 | 41 | 79 | 74 | 15.4 |
| | 35 | 965.80 | 1.77 | 9.8 | 250 | 254 | 42 | 79 | 74 | 16.0 |
| | 40 | 969.65 | 1.77 | 9.8 | 250 | 253 | 42 | 79 | 74 | 14.7 |
| | 45 | 973.40 | 1.77 | 9.8 | 261 | 263 | 48 | 80 | 75 | 16.1 |
| | 50 | 977.21 | 1.77 | 10 | 260 | 261 | 48 | 81 | 75 | 16.8 |
| | 55 | 981.02 | 1.77 | 10 | 262 | 260 | 48 | 82 | 75 | 16.4 |
| | 60 | 984.83 | 1.77 | 10 | 260 | 258 | 48 | 82 | 75 | 16.1 |
| | (1100) | | | | | | | | | |
| | θ=60 | $V_m$=45.63 | (ΔH)avg=1.77 | | | | | $(t_m)_{avg}$=76.9 | | |

Condensate Data:

| Item | Weight (g) Final | Tare | Difference |
|---|---|---|---|
| Impingers | 261 | 200 | 61 |
| Condenser | | | |
| | | | |
| Desiccant | 1506 | 1495 | 11 |
| | | Total | 72 |

| Preliminary results of $SO_2$ concentration determination | |
|---|---|
| $V_{std}$ | = 43.43 DSCF |
| Moisture | = 7.24 %v/v |
| $SO_2$, dry | = ppm |
| $SO_2$, wet | = ppm |
| LB/MMBtu | = |

INTERFOLL LABORATORIES

EPA Method 4 and 6 Field Data Sheet

Job LP/HAYWARD
Source CINCI KONUS STACK
Date 6-3-94 Test 2 Run 3

Operator(s) ET-KR
Meter Box No. 2 Gasmeter coef. .9974
ΔH@ 1.77 in.WC Bar. press 28.90 in.Hg

Sample Train Leak Check:
Pretest: < 0.02 cfm at 15 in. Hg.
Posttest: 0 cfm at 11 in. Hg.

| Trav. Point No. | Samp. Time (min) | Sample Volume (cf) | Orif. Meter (inWC) | VAC. inHg | Temperatures (°F) Probe | Oven | Impg. | Gas/In | Gas/Out | Oxygen (%v/v) |
|---|---|---|---|---|---|---|---|---|---|---|
| | 1111 | 985.30 | | | | | | | | |
| 1 | 5 | 989.22 | 1.77 | 10 | 247 | 258 | 42 | 81 | 75 | 14.5 |
| 1 | 10 | 993.25 | 1.77 | 10 | 252 | 260 | 42 | 83 | 75 | 16.0 |
| 1 | 15 | 996.90 | 1.77 | 10 | 255 | 261 | 44 | 83 | 75 | 16.0 |
| 1 | 20 | 1000.87 | 1.77 | 10 | 256 | 260 | 44 | 84 | 75 | 17.0 |
| 2 | 25 | 1004.66 | 1.77 | 10 | 252 | 261 | 40 | 76 | 74 | 15.0 |
| 2 | 30 | 1008.50 | 1.77 | 10 | 255 | 258 | 42 | 78 | 74 | 15.0 |
| 2 | 35 | 1012.10 | 1.77 | 10 | 257 | 260 | 44 | 81 | 74 | 16.2 |
| 2 | 40 | 1015.99 | 1.77 | 10 | 259 | 258 | 44 | 83 | 74 | 15.6 |
| 3 | 45 | 1019.77 | 1.77 | 10 | 262 | 256 | 45 | 85 | 76 | 14.9 |
| 3 | 50 | 1023.45 | 1.77 | 10 | 260 | 258 | 46 | 87 | 77 | 15.4 |
| 3 | 55 | 1027.20 | 1.77 | 10 | 256 | 260 | 46 | 88 | 77 | 15.3 |
| 3 | 60 | 1030.80 | 1.77 | 10 | 250 | 254 | 46 | 89 | 78 | 15.7 |
| | (1320) | | | | | | | | | |
| | θ=60 | $V_m$=45.50 | (ΔH)avg=1.77 | | | | | $(t_m)_{avg}$ = 79.1 | | |

1129 L WN in ml

Condensate Data:

| Item | Weight (g) Final | Tare | Difference |
|---|---|---|---|
| Impingers | 253 | 200 | 53 |
| Condenser | | | |
| | | | |
| Desiccant | 1415 | 1390 | 25 |
| | | Total | 78 |

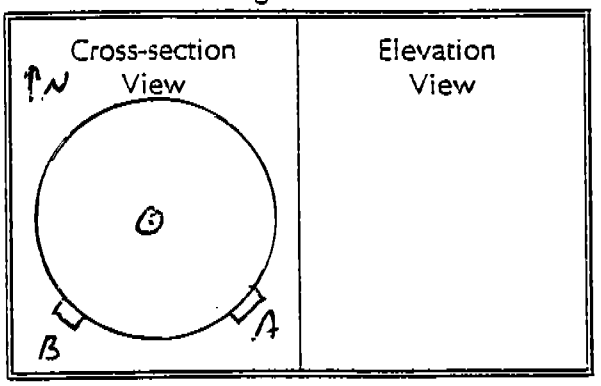
| Preliminary results of $SO_2$ concentration determination | |
|---|---|
| $V_{std}$ | = 43.13 DSCF |
| Moisture | = 7.85 %v/v |
| $SO_2$, dry | = ppm |
| $SO_2$, wet | = ppm |
| LB/MMBtu | = |

INTERPOLL LABORATORIES, INC.
(612) 786-6020

# EPA Method 2 Field Data Sheet

Job L.P. / Hayward, WI
Source Line 1 Kraus / Stack
Test B Run 0 Date 6-9-94
Stack Dimen. 52.0 IN.
Dry Bulb 330 °F Wet bulb 134 °F
Manometer ☐ Reg. ☒ Exp ☐ Elec.
Barometric Pressure 28.90 IN.HG
Static Pressure -.20 IN.WC
Operators M. Kaehler + K. Rowenhal
Pitot No. MM5-6 $C_p$ .84
MM5/CD

Drawing of Test Site




| Traverse Point No. | Fraction of Diameter | Distance From Stack Wall (IN.) | Distance From End of Port (IN.) | Velocity | Temp. of Gas (°F) |
|---|---|---|---|---|---|
| | | Port Length: 6.5 IN. | | Time Start: 0930 HRS | |
| A-1 | .024 | 1.09 | 7.59 | .060 | |
| 2 | .067 | 3.48 | 9.99 | .063 | |
| 3 | .118 | 6.14 | 12.64 | .075 | |
| 4 | .177 | 9.20 | 15.70 | .095 | |
| 5 | .250 | 13.00 | 19.50 | .090 | |
| 6 | .356 | 18.51 | 25.01 | .095 | |
| 7 | .644 | 33.49 | 39.99 | .102 | |
| 8 | .750 | 39.00 | 45.50 | .112 | |
| 9 | .823 | 42.80 | 49.30 | .120 | ↑ |
| 10 | .992 | 45.96 | 52.36 | .130 | |
| 11 | .933 | 48.52 | 55.02 | .125 | |
| 12 | .979 | 50.91 | 57.41 | .122 | 330 |
| B-1 | | | | .063 | |
| 2 | | | | .068 | ↓ |
| 3 | | | | .075 | |
| 4 | | | | .082 | |
| 5 | | | | .085 | |
| 6 | | | | .093 | |
| 7 | | | | .090 | |
| 8 | | | | .095 | |
| 9 | | | | .100 | |
| 10 | | | | .085 | |
| 11 | | | | .093 | |
| 12 | | | | .098 | |
| | | | | | |

Temp. Meas. Device & S/N: PDT-31 / TC
Time End: 0938 HRS

R or nothing = reg. manometer; S = expanded; E = electronic

# INTERPOLL LABORATORIES EPA MODIFIED METHOD 5 SAMPLE LOG SHEET

Job L.P. / Hayward, WI
Source Line 1 Konus / Stack
Cyclone: ☐ Yes ☒ No Filter holder: MMS
Analytes: POM
Field recovery spike added: ☒ Yes ☐ No

Date 6-9-94 Test 8 Run 1
No. of traverse points 24
Filter type: 4" Glass fiber
XAD-2 resin: ___ g Batch No. ___
Reference: EPA SW-846 Method 0010

Sample Train Leak Check:

Pretest: < 0.02 cfm at 15 in. Hg. (vac) ☒
Postest: ≤ 0.02 cfm at 13 in. Hg. (vac) ☒

Semivolatile Catch Data:

No.s of filters used: 0347

Recovery solvent(s)
☒ MeCl2 ~~* MeOH (50/50) v/v~~
☒ other(s) Acetone

No. of bottles for condensate trap catch: 1
Samples recovered by: M. Kaehler + K. Rosenthal

Condensate Data:

| Item | Weight (g) | | |
|---|---|---|---|
| | Final | Tare | Difference |
| Condensate trap | | | |
| Condensate trap | 133 | 0 | 133 |
| Condensate trap | | | |
| | | | |
| Impingers | | | |
| Desiccant | 1474 | 1448 | 26 |
| Total | | | 159 |

Integrated Gas Sampling Data:

Bag Pump No. 294 Box No. 27 Bag No. 1

Bag Material: 4-layer Aluminized Tedlar Size: 44 L

Pretest leak check: 0 cc/min at 20 in. Hg.

Time start: 0851 (HRS) Time end: 1052 (HRS)

Sampling rate: 200 cc/min O2 Analyzer S/N: 9

INTERPOLL LABORATORIES EPA MM -1ED METHOD 5 FIELD DATA SHEET

Job L.P. / Hayward, CA
Source Line 1 Recirc / Stack
Date 6-9-94 Test B Run 1

Operators M. Knebler + K. Rosenthal
Meter Box No. 9
Gasmeter coeff. .9961

Nozzle No. MM5-7
Nozzle Dia. .422 in.
Bar. Pres. 28.50 in. Hg

Pitot No. A-5-6
Cp .84
$H_2O$ 9 %

| Traverse Point No. | Sampling Time (min) | Sample Volume (cf) | Velocity Head (inWC) | Orifice Meter (inWC) | Dev. Vol. (cf) | VAC. inHg | Temperatures (°F) | | | | | | | Oxygen (%V/V) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | Stack | Probe | Oven | XAD2 | Imp. | Meter (In/Out) | | |
| | 0851 | 677.20 | | | | | | | | | | | | |
| B-12 | 5 | 681.21 | .105 | 1.95 | 1.17 | 7.5 | 335 | 243 | 255 | 43 | 41 | 61 | 60 | 15.4 |
| 11 | 10 | 684.85 | .087 | 1.62 | 9.79 | 7 | 336 | 247 | 252 | 43 | 41 | 65 | 61 | 15.3 |
| 10 | 15 | 688.57 | .095 | 1.77 | 8.59 | 7 | 335 | 250 | 256 | 43 | 42 | 70 | 62 | 15.6 |
| 9 | 20 | 692.48 | .100 | 1.88 | 2.51 | 8 | 335 | 252 | 255 | 43 | 42 | 74 | 64 | 14.7 |
| 8 | 25 | 696.31 | .095 | 1.80 | 6.36 | 8 | 335 | 255 | 253 | 43 | 42 | 76 | 65 | 14.8 |
| 7 | 30 | 700.06 | .086 | 1.62 | 0.02 | 7 | 336 | 250 | 259 | 44 | 42 | 78 | 66 | 15.5 |
| 6 | 35 | 703.74 | .085 | 1.62 | 3.69 | 7 | 331 | 248 | 263 | 44 | 42 | 79 | 68 | 16.6 |
| 5 | 40 | 707.70 | .097 | 1.86 | 7.61 | 8 | 332 | 245 | 260 | 44 | 42 | 80 | 69 | 16.4 |
| 4 | 45 | 711.37 | .085 | 1.63 | 1.29 | 7 | 332 | 245 | 264 | 45 | 42 | 82 | 70 | 16.5 |
| 3 | 50 | 714.63 | .066 | 1.27 | 4.55 | 6 | 334 | 247 | 260 | 45 | 43 | 83 | 72 | 16.6 |
| 2 | 55 | 717.95 | .065 | 1.25 | 7.28 | 6 | 335 | 250 | 257 | 44 | 43 | 85 | 75 | 16.8 |
| 1 | 60 | 720.98 | .062 | 1.20 | 0.96 | 6 | 333 | 255 | 258 | 44 | 43 | 85 | 76 | 16.5 |
| A-12 | 65 | 725.24 | .110 | 2.13 | 5.19 | 10 | 334 | 258 | 255 | 45 | 43 | 87 | 78 | 16.3 |
| 11 | 70 | 729.25 | .124 | 2.40 | 9.68 | 11 | 335 | 254 | 259 | 44 | 43 | 87 | 78 | 16.4 |
| 10 | 75 | 734.31 | .128 | 2.49 | 4.26 | 11 | 332 | 251 | 263 | 44 | 44 | 87 | 79 | 16.4 |
| 9 | 80 | 738.65 | .115 | 2.23 | 8.59 | 10.5 | 334 | 255 | 260 | 44 | 44 | 87 | 79 | 15.2 |
| 8 | 85 | 742.92 | .112 | 2.19 | 2.90 | 10 | 327 | 254 | 263 | 46 | 44 | 88 | 79 | 15.5 |
| 7 | 90 | 747.11 | .102 | 2.00 | 7.01 | 9 | 327 | 250 | 264 | 46 | 44 | 88 | 80 | 15.3 |
| 6 | 95 | 750.87 | .088 | 1.72 | 0.93 | 8 | 329 | 247 | 264 | 46 | 44 | 88 | 80 | 15.6 |
| 5 | 100 | 754.22 | .067 | 1.31 | 4.17 | 6.5 | 328 | 245 | 261 | 46 | 44 | 89 | 81 | 14.4 |
| 4 | 105 | 757.48 | .063 | 1.24 | 2.41 | 6 | 328 | 248 | 256 | 47 | 45 | 90 | 82 | 16.0 |
| 3 | 110 | 760.94 | .075 | 1.48 | 0.96 | 7 | 325 | 246 | 249 | 45 | 43 | 91 | 82 | 15.7 |
| 2 | 115 | 764.15 | .057 | 1.13 | 4.06 | 5.5 | 324 | 245 | 252 | 45 | 43 | 91 | 83 | 16.6 |
| 1 | 120 | 767.14 | .055 | 1.09 | 7.11 | 5.5 | 324 | 242 | 250 | 45 | 44 | 92 | 84 | 16.8 |
| | (1052) | | | | | | | | | | | | | |
| | θ= 120 | Va=89.94 | | ^H=1.70 | | | | | | | | Avg. = | 78.2 | |

D-23

S-405

CF-025

# INTERPOLL LABORATORIES EPA MODIFIED METHOD 5 SAMPLE LOG SHEET

Job L.P. / Hayward, WI
Source Line 1 Kenus / Stack
Cyclone: ☐ Yes ☒ No Filter holder: MM5
Analytes: POM
Field recovery spike added: ☒ Yes ☐ No

Date 6-9-94 Test 8 Run 2
No. of traverse points 24
Filter type: 4" Glass fiber
XAD-2 resin: ___ g Batch No. ___
Reference: EPA SW-846 Method 0010

Sample Train Leak Check:

Pretest: < 0.02 cfm at 15 in. Hg. (vac) ☒
Postest: < 0.02 cfm at 10 in. Hg. (vac) ☒

Semivolatile Catch Data:

No.s of filters used: 348

Recovery solvent(s)
☒ MeCl2 ~~* MeOH (50:50 v/v)~~
☒ other(s) Acetone

No. of bottles for condensate trap catch: 1
Samples recovered by: M. Koehler

Condensate Data:

| Item | Weight(g) | | |
|---|---|---|---|
| | Final | Tare | Difference |
| Condensate trap | 404 | 265 | 139 |
| Condensate trap | | | |
| Condensate trap | | | |
| | | | |
| Impingers | | | |
| Desiccant | 1458 | 1428 | 30 |
| Total | | | 169 |

Integrated Gas Sampling Data:

Bag Pump No. 294 Box No. 27 Bag No. 2

Bag Material: 4-layer Aluminized Tedlar Size: 44 L

Pretest leak check: 0 cc/min at 20 in. Hg.

Time start: 1240 (HRS) Time end: 1534 (HRS)

Sampling rate: 200 cc/min O2 Analyzer S/N: 9

Rev.1 CF-026

INTERPOLL LABORATORIES EPA M-5 FIELD METHOD 5 FIELD DATA SHEET

Job LP Hayward
Source Line 1 Reheat 1 Stack
Date 6/9/94 Test ____ Run ____
Operators MK ARI
Meter Box No. 9
Gasmeter coeff. .9961
Nozzle No. M5-7
Nozzle Dia. .422 In.
Bar. Pres. 28.90 In. Hg
Pitot No. M56
Cp .84
$H_2O$ 8 %

| Traverse Point No. | Sampling Time (min) | Sample Volume (cf) | Velocity Head (inWC) | Orifice Meter (inWC) | Dgs. Vol. (cf) | VAC. inHg | Temperatures (°F) Stack | Probe | Oven | XAD2 | Imp. | Meter (In / Out) | | Oxygen (%v/v) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | (1240) | 767.51 | | | | | | | | | | | | |
| A-12 | 5 | 771.77 | .105 | 2.10 | 1.70 | 7 | 318 | 240 | 257 | 42 | 42 | 76 | 77 | 15.2 |
| 11 | 10 | 776.22 | .120 | 2.39 | 6.16 | 8 | 319 | 244 | 255 | 42 | 41 | 80 | 78 | 15.1 |
| 10 | 15 | 780.62 | .116 | 2.31 | 0.56 | 8 | 321 | 245 | 260 | 42 | 41 | 93 | 79 | 16.5 |
| 9 | 20 | 784.93 | .107 | 2.14 | 4.80 | 7 | 320 | 249 | 261 | 42 | 41 | 86 | 80 | 16.4 |
| 8 | 25 | 788.97 | .100 | 2.00 | 8.92 | 7 | 323 | 252 | 256 | 43 | 42 | 88 | 91 | 15.2 |
| 7 | 30 | 792.94 | .090 | 1.81 | 2.83 | 6 | 323 | 253 | 259 | 43 | 42 | 90 | 82 | 16.0 |
| 6 | 35 | 796.37 | .070 | 1.41 | 6.29 | 5 | 324 | 250 | 257 | 44 | 42 | 91 | 83 | 14.9 |
| 5 | 40 | 799.77 | .070 | 1.41 | 9.76 | 5 | 325 | 247 | 260 | 44 | 42 | 92 | 84 | 15.1 |
| 4 | 45 | 803.15 | .067 | 1.35 | 3.16 | 5 | 327 | 245 | 261 | 44 | 42 | 93 | 84 | 15.5 |
| 3 | 50 | 906.45 | .060 | 1.21 | 6.37 | 5 | 329 | 245 | 258 | 45 | 42 | 94 | 85 | 13.9 |
| 2 | 55 | 809.52 | .056 | 1.17 | 9.54 | 4.5 | 329 | 249 | 255 | 45 | 43 | 94 | 85 | 13.2 |
| 1 | 60 | 812.85 | .063 | 1.27 | 2.93 | 5 | 327 | 248 | 257 | 45 | 43 | 95 | 86 | 14.1 |
| B-12 | 65 | 816.75 | .090 | 1.82 | 6.78 | 7.5 | 328 | 245 | 260 | 46 | 43 | 95 | 86 | 14.2 |
| 11 | 70 | 820.92 | .094 | 1.90 | 0.92 | 8 | 329 | 242 | 261 | 47 | 43 | 96 | 88 | 15.6 |
| 10 | 75 | 825.00 | .103 | 2.07 | 5.02 | 8 | 331 | 246 | 258 | 46 | 44 | 97 | 88 | 14.8 |
| 9 | 80 | 829.10 | .098 | 1.98 | 9.15 | 8 | 331 | 251 | 255 | 46 | 44 | 98 | 89 | 13.8 |
| 8 | 85 | 833.10 | .099 | 1.81 | 3.09 | 8 | 329 | 248 | 257 | 46 | 44 | 97 | 90 | 14.0 |
| 7 | 90 | 836.97 | .084 | 1.70 | 6.91 | 7 | 331 | 249 | 260 | 47 | 45 | 98 | 90 | 14.4 |
| 6 | 95 | 840.84 | .089 | 1.81 | 0.86 | 8 | 329 | 245 | 263 | 47 | 45 | 99 | 90 | 14.7 |
| 5 | 100 | 844.82 | .085 | 1.73 | 4.72 | 7.5 | 329 | 251 | 261 | 47 | 46 | 98 | 90 | 15.8 |
| 4 | 105 | 848.40 | .073 | 1.48 | 8.30 | 6 | 329 | 253 | 261 | 48 | 46 | 99 | 91 | 16.2 |
| 3 | 110 | 851.84 | .070 | 1.42 | 1.90 | 6 | 332 | 255 | 259 | 48 | 46 | 99 | 91 | 16.2 |
| 2 | 115 | 855.61 | .081 | 1.65 | 5.57 | 7 | 330 | 254 | 262 | 44 | 43 | 96 | 95 | 16.0 |
| 1 | 120 | 858.83 | .060 | 1.20 | 8.76 | 5.5 | 331 | 251 | 260 | 44 | 42 | 88 | 94 | 16.2 |
| | (1534) | | | | | | | | | | | | | |
| | θ= 120 | Va= 91.32 | | ΔH=1.71 | | | | | | | | Avg.= 84.8 | | |

DOWN 1430
RESTART 1522

Rev 1

D-25

S-405

CF-025

# INTERPOLL LABORATORIES EPA MODIFIED METHOD 5 SAMPLE LOG SHEET

Job L.P. / Hayward, WI
Source Line 1 Konus / Stack
Cyclone: ☐ Yes ☒ No Filter holder: MMS
Analytes: POM
Field recovery spike added: ☒ Yes ☐ No

Date 6-9-94 Test 8 Run 3
No. of traverse points 24
Filter type: 4" Glass fiber
XAD-2 resin: ___ g Batch No. ___
Reference: EPA SW-846 Method 0010

**Sample Train Leak Check:**

Pretest: ≤ 0.02 cfm at 15 in. Hg. (vac)
Postest: ≤ 0.02 cfm at 10 in. Hg. (vac)

**Semivolatile Catch Data:**

No.s of filters used: 349

Recovery solvent(s)
☒ MeCl2 ~~☐ MeOH (50:50 v/v)~~
☒ other(s) Acetone

No. of bottles for condensate trap catch: 1
Samples recovered by: M. Koehler & K. Rosenthal

**Condensate Data:**

| Item | Weight(g) | | |
|---|---|---|---|
| | Final | Tare | Difference |
| Condensate trap | | | |
| Condensate trap | 427 | 267 | 160 |
| Condensate trap | | | |
| | | | |
| Impingers | | | |
| Desiccant | 1499 | 1455 | 44 |
| Total | | | 204 |

**Integrated Gas Sampling Data:**

Bag Pump No. 294 Box No. 27 Bag No. 3
Bag Material: 4-layer Aluminized Tedlar Size: 44 L
Pretest leak check: 0 cc/min at 20 in. Hg.
Time start: 1610 (HRS) Time end: 1812 (HRS)
Sampling rate: 200 cc/min O2 Analyzer S/N: 9

Rev. 1 CF-026

INTERPOLL LABORATORIES EPA M FIED METHOD 5 FIELD DATA SHEET

Job L.P. / Hayward, WI
Source Line 1 Kenics / Starch
Date 6-9-94 Test 8 Run 3

Operators McKaehler + K. Rosenthal
Meter Box No. 9
Gasmeter coeff. .9961

Nozzle No. M-5-7
Nozzle Dia. .422 in.
Bar. Pres. 28.90 in. Hg

Pitot No. S-405-6
Cp .84 .84
$H_2O$ 8.5 %

| Traverse Point No. | Sampling Time (min) | Sample Volume (ct) | Velocity Head (inWC) | Orifice Meter (inWC) | Dec. Vol. (ct) | VAC. inHg | Temperatures (°F) Stack | Probe | Oven | XAD2 | Imp. | Meter (In/Out) | | Oxygen (%V/V) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1610 | 859.20 | | | | | | | | | | | | |
| A-12 | 5 | 863.72 | .124 | 2.45 | 3.75 | 7 | 330 | 243 | 255 | 43 | 43 | 81 | 91 | 15.3 |
| 11 | 10 | 868.54 | .137 | 2.69 | 8.50 | 8 | 329 | 248 | 259 | 43 | 43 | 85 | 92 | 15.0 |
| 10 | 15 | 873.14 | .128 | 2.52 | 3.11 | 7.5 | 329 | 253 | 260 | 44 | 43 | 88 | 93 | 15.4 |
| 9 | 20 | 877.94 | .133 | 2.63 | 7.83 | 8 | 329 | 250 | 262 | 44 | 43 | 91 | 84 | 15.8 |
| 8 | 25 | 882.39 | .128 | 2.55 | 2.31 | 7.5 | 327 | 245 | 259 | 44 | 43 | 92 | 84 | 16.0 |
| 7 | 30 | 886.68 | .102 | 2.03 | 6.64 | 6 | 328 | 249 | 257 | 44 | 43 | 93 | 84 | 14.5 |
| 6 | 35 | 890.95 | .105 | 2.09 | 0.86 | 6 | 329 | 244 | 253 | 45 | 43 | 94 | 86 | 15.5 |
| 5 | 40 | 894.64 | .079 | 1.58 | 9.54 | 4.5 | 330 | 247 | 258 | 45 | 44 | 95 | 86 | 14.5 |
| 4 | 45 | 898.15 | .072 | 1.44 | 8.05 | 4.5 | 331 | 250 | 255 | 46 | 44 | 96 | 87 | 14.2 |
| 3 | 50 | 901.20 | .056 | 1.12 | 1.15 | 3 | 331 | 252 | 253 | 46 | 44 | 97 | 88 | 13.9 |
| 2 | 55 | 904.26 | .056 | 1.13 | 4.27 | 3 | 328 | 255 | 250 | 46 | 44 | 98 | 88 | 13.4 |
| 1 | 60 | 907.10 | .051 | 1.02 | 7.23 | 3 | 334 | 251 | 256 | 46 | 44 | 98 | 89 | 13.5 |
| B-12 | 65 | 911.00 | .093 | 1.66 | 1.02 | 5 | 332 | 246 | 261 | 48 | 45 | 97 | 99 | 12.8 |
| 11 | 70 | 915.00 | .094 | 1.89 | 5.05 | 6 | 329 | 244 | 264 | 48 | 45 | 99 | 90 | 13.1 |
| 10 | 75 | 919.03 | .089 | 1.80 | 8.99 | 6 | 327 | 248 | 263 | 48 | 46 | 100 | 91 | 11.7 |
| 9 | 80 | 923.33 | .103 | 2.09 | 3.13 | 6.5 | 326 | 245 | 258 | 48 | 46 | 101 | 91 | 13.2 |
| 8 | 85 | 927.05 | .086 | 1.74 | 7.11 | 5.5 | 326 | 249 | 255 | 48 | 47 | 101 | 92 | 12.6 |
| 7 | 90 | 931.14 | .091 | 1.84 | 1.10 | 6 | 329 | 253 | 257 | 48 | 47 | 102 | 92 | 12.4 |
| 6 | 95 | 934.97 | .083 | 1.66 | 4.90 | 5.5 | 339 | 250 | 254 | 48 | 48 | 102 | 92 | 13.0 |
| 5 | 100 | 938.78 | .088 | 1.79 | 8.82 | 6 | 329 | 246 | 254 | 48 | 48 | 102 | 93 | 12.9 |
| 4 | 105 | 942.52 | .075 | 1.52 | 2.46 | 5 | 328 | 243 | 259 | 49 | 48 | 103 | 93 | 12.7 |
| 3 | 110 | 945.98 | .070 | 1.42 | 5.97 | 5 | 329 | 247 | 255 | 50 | 48 | 103 | 94 | 13.7 |
| 2 | 115 | 949.99 | .090 | 1.83 | 9.96 | 6 | 326 | 244 | 252 | 50 | 48 | 103 | 94 | 13.5 |
| 1 | 120 | 953.80 | .084 | 1.71 | 3.82 | 6 | 326 | 240 | 249 | 51 | 48 | 104 | 95 | 13.1 |
| | (1812) | | | | | | | | | | | | | |
| | θ= 120 | Va= 94.60 | | ^H= 1.84 | | | | | | | | Avg.= 92.7 | | |

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S-405

CF-025

INTERPOLL LABORATORIES

BENZENE Field Data Sheet

Job API HAYWARD Operator(s) E. TRUXBRIDGE
Source LINE 1 KONUS STACK Meter Box No. 25 Meter coef. 1.007B
Date 6-9-94 Test 9 Run 1 Barometric Pressure 28.90 in.Hg

Sample Train Leak Check:
Pretest: 0 cc/min at 20 in.Hg
Posttest: 0 cc/min at 20 in.Hg

Benzene

| Trav. Point No. | Samp. Time (min) | Sample Volume (cf) | Sample Rate (cc/min) | VAC. (inHg) | Temperature (oF) | | |
|---|---|---|---|---|---|---|---|
| | | | | | Stack | Probe | Gasmeter |
| | 0845 | 436.910 | | | | | |
| | 5 | 437.100 | 1000 | 4 | | — | 72 |
| | 10 | 437.280 | 1000 | 4 | | | 78 |
| | 15 | 437.445 | 1000 | 4 | | | 84 |
| | 20 | 437.640 | 1000 | 4 | | | 90 |
| | 25 | 437.899 | 1000 | 4 | | | 92 |
| | 30 | 438.062 | 1000 | 4 | | | 96 |
| | 35 | 438.215 | 1000 | 4 | | | 100 |
| | 40 | 438.368 | 1000 | 4 | | | 103 |
| | 45 | 438.520 | 1000 | 4 | | | 105 |
| | 50 | 438.670 | 1000 | 4 | | | 107 |
| | 55 | 438.860 | 1000 | 4 | | | 108 |
| | 60 | 439.050 | 1000 | 4 | | | 109 |
| | θ=60 | Vm=27.140 | | | | | tm=95.3 |

(0945)

$V_{STD}$ = 1.981

S-476

INTERPOLL LABORATORIES

BENZENE Field Data Sheet

Job LP/Haywood
Source Line 1, Lower Stack
Date 6-9-94 Test Q Run 2

Operator(s) ET
Meter Box No. 25 Meter coef. 1.0078
Barometric Pressure 29.80 in.Hg

Sample Train Leak Check:
Pretest: 0 cc/min at 20 in.Hg
Posttest: 0 cc/min at 20 in.Hg

| Trav. Point No. | Samp. Time (min) | Sample Volume (cf) | Sample Rate (cc/min) | VAC. (inHg) | Temperature (oF) | | |
|---|---|---|---|---|---|---|---|
| | | | | | Stack | Probe | Gasmeter |
| | 1000 | 439.092 | | | | | |
| | 5 | 439.295 | 1000 | 4 | | | 110 |
| | 10 | 439.490 | 1000 | 4 | | | 115 |
| | 15 | 439.720 | 1000 | 4 | | | 118 |
| | 20 | 439.890 | 1000 | 4 | | | 118 |
| | 25 | 440.085 | 1000 | 4 | | | 118 |
| | 30 | 440.280 | 1000 | 4 | | | 119 |
| | 35 | 440.470 | 1000 | 4 | | | 119 |
| | 40 | 440.665 | 1000 | 4 | | | 120 |
| | 45 | 440.852 | 1000 | 4 | | | 121 |
| | 50 | 441.042 | 1000 | 4 | | | 122 |
| | 55 | 441.228 | 1000 | 4 | | | 124 |
| | 60 | 441.414 | 1000 | 4 | | | 124 |
| | θ= 60 | Vm= 2.322 | | | | | tm= 119.0 |

(1100)

$V_{STD} = 2.061$

S-476

INTERPOLL LABORATORIES

Benzene Field Data Sheet

Job EPI/HAYWARD Operator(s) ET
Source LINE 1 KANSAS STACK Meter Box No. 2B Meter coef. 1.0078
Date 6-9-94 Test 2 Run 3 Barometric Pressure 28.90 in.Hg

Sample Train Leak Check:
Pretest: 0 cc/min at 20 in.Hg
Posttest: 0 cc/min at 20 in.Hg

| Trav. Point No. | Samp. Time (min) | Sample Volume (cf) | Sample Rate (cc/min) | VAC. (inHg) | Temperature (oF) | | |
|---|---|---|---|---|---|---|---|
| | | | | | Stack | Probe | Gasmeter |
| | 1111 | 441.480 | | | | | |
| | 5 | 441.700 | 1000 | 4 | | | 124 |
| | 10 | 441.897 | 1000 | 4 | | | 125 |
| | 15 | 442.085 | 1000 | 4 | | | 124 |
| | 20 | 442.275 | 1000 | 4 | | | 105 |
| | 25 | 442.468 | 1000 | 4 | | | 105 |
| | 30 | 442.645 | 1000 | 4 | | | 105 |
| | 35 | 442.820 | 1000 | 4 | | | 105 |
| | 40 | 443.005 | 1000 | 4 | | | 105 |
| | 45 | 443.170 | 1000 | 4 | | | 105 |
| | 50 | 443.344 | 1000 | 4 | | | 105 |
| | 55 | 443.518 | 1000 | 4 | | | 106 |
| | 60 | 443.688 | 1000 | 4 | | | 106 |
| | θ= 60 (1320) | Vm= 2.208 | | | | | tm= 1100 |

1124 DOWN
1236 ON

$V_{STD}$ = 1.991

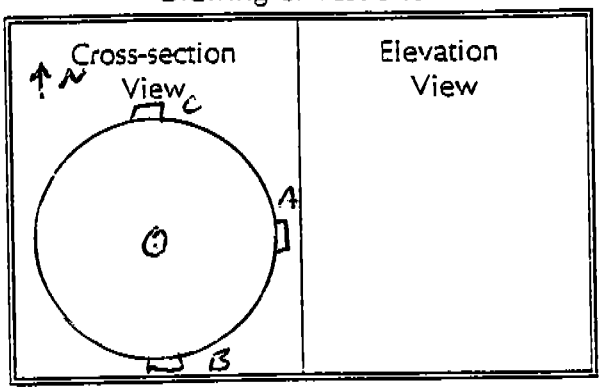
S-476

INTERPOLL LABORATORIES, INC.
(612) 786-6020

# EPA Method 2 Field Data Sheet

Job: L.P. / Hayward, WI
Source: Line 2 Kraus / Stack
Test: 16 Run: 2 Date: 6-8-94
Stack Dimen.: 51.5 IN.
Dry Bulb: 325 °F Wet bulb: 130 °F
Manometer: ☒ Reg. ☐ Exp ☐ Elec.
Barometric Pressure: 28.98 IN.HG
Static Pressure: -.28 IN.WC
Operators: M. Kaehler + K. Rosenthal
Pitot No.: 22V-5 $C_p$: .84
PM

Drawing of Test Site




| Traverse Point No. | Fraction of Diameter | Distance From Stack Wall (IN.) | Distance From End of Port (IN.) | Velocity | Temp. of Gas (°F) |
|---|---|---|---|---|---|
| | | Port Length: 3.5 IN. | | Time Start: NA HRS | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | Refer to Test 19 for pts and Flows | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | |

INTERPOLL LABORATORIES, INC.
(612) 786-6020

# Interpoll Laboratories EPA Method 5/17 Sample Log Sheet

Job S.P. / Hayward, WI
Source Line 2 Heats / Stack
Method 5 Filter holder: Glass
Sample Train Leak Check:

Date 6-8-94 Test 16 Run 1
No. of traverse points 24
Filter type: 4" Pallflex

Pretest: ≤ 0.02 cfm at 15 in. Hg. (vac) ☒
Post test: 0.02 cfm at 14 in. Hg. (vac) ☒

**Particulate Catch Data:**

No. of filters used: 4035

Recovery solvent(s)
☑ acetone
☐ other(s)

No. of probe wash bottles: 1
Sample recovered by: M. Kaehler & K. Rosenthal

**Condensate Data:**

| Item | Weight (g) | | |
|---|---|---|---|
| | Final | Tare | Difference |
| Impinger No. 1 | 452 | 394 | X58 |
| Impinger No. 2 | | | |
| Impinger No. 3 | | | |
| Condenser | | | |
| Desiccant | 1402 | 1387 | 15 |
| | | | |
| Total | | | X73 |

**Integrated Gas Sampling Data:**

Bag Pump No. 29A
Bag Material: 5-layer Aluminized Tedlar
Pretest leak check: 0
Time start: 0757
Sampling rate: 400

Box No. 27 Bag No. 1
Size: 44 L
cc/min at 20 in. Hg.
(HRS) Time end: 0958 (HRS)
cc/min Operator: M. Kaehler

S/N of $O_2$ Analyzer used to monitor train outlet: 9

123093-G:\STACK\WP\METHODS\S-0046RR

INTERPOLL LABORATORIES — METHOD 5 FIELD DATA SHEET

Job: A.P. / Hayward, WI
Source: Line 2 Ronas / Stack
Date: 6-8-94 Test: 16 Run: 1

Operators: M. Kuehlert / K. Rosenthal
Meter Box No.: 9 ΔH@ 1.28 (H) (C)
Chamber coeff.: .9961

Pitot No.: 22V-5 Cp: .84
Bar. Press.: 28.99 inHg H2O: 8 %
Nozzle No.: B-6 Nozzle Dia: .363 in.

| Traverse Point No. | Sampling Time (min) | Sample Volume (cf) | Velocity Head (inH2O) | Orifice Meter (inH2O) | Dry Vol. (cf) | VAC. inHg | Temperatures (°F) Stack | Probe | Oven | Impg. | Gas In | Gas Out | Oxygen (%v/v) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 0757 | 351.30 | | | | | | | | | | | |
| B-12 | 2.5 | 353.44 | .23 | 2.37 | 3.46 | 10 | 322 | 243 | 250 | 40 | 51 | 50 | 17.2 |
| 11 | 5 | 355.64 | .22 | 2.27 | 5.58 | 9.5 | 321 | | | | 54 | 51 | 17.0 |
| 10 | 7.5 | 357.63 | .19 | 1.97 | 7.55 | 8 | 321 | 247 | 252 | 40 | 56 | 51 | 16.9 |
| 9 | 10 | 359.40 | .17 | 1.77 | 9.43 | 7 | 321 | | | | 60 | 52 | 17.3 |
| 8 | 12.5 | 361.19 | .14 | 1.46 | 1.14 | 6 | 320 | 244 | 257 | 40 | 62 | 53 | 16.8 |
| 7 | 15 | 362.97 | .15 | 1.57 | 2.92 | 6 | 320 | | | | 64 | 54 | 17.2 |
| 6 | 17.5 | 364.76 | .15 | 1.58 | 4.70 | 6 | 319 | 248 | 254 | 40 | 64 | 54 | 17.1 |
| 5 | 20 | 366.85 | .21 | 2.21 | 6.81 | 9 | 319 | | | | 65 | 55 | 16.8 |
| 4 | 22.5 | 368.94 | .20 | 2.11 | 8.87 | 9 | 319 | 245 | 253 | 42 | 67 | 56 | 17.0 |
| 3 | 25 | 371.22 | .25 | 2.64 | 1.18 | 11 | 320 | | | | 68 | 56 | 16.9 |
| 2 | 27.5 | 373.60 | .27 | 2.85 | 3.58 | 13 | 319 | 244 | 259 | 42 | 68 | 57 | 16.9 |
| 1 | 30 | 375.98 | .27 | 2.86 | 5.98 | 13 | 319 | | | | 68 | 57 | 16.6 |
| A-12 | 32.5 | 378.04 | .19 | 2.01 | 7.99 | 8.5 | 320 | 241 | 255 | 43 | 67 | 58 | 16.3 |
| 11 | 35 | 380.14 | .21 | 2.22 | 0.11 | 9 | 322 | | | | 69 | 58 | 16.4 |
| 10 | 37.5 | 382.16 | .20 | 2.11 | 2.19 | 9 | 327 | 246 | 251 | 43 | 70 | 59 | 15.8 |
| 9 | 40 | 384.26 | .20 | 2.13 | 4.26 | 9 | 317 | | | | 71 | 60 | 15.9 |
| 8 | 42.5 | 386.29 | .18 | 1.92 | 6.24 | 9.5 | 320 | 245 | 257 | 43 | 71 | 61 | 16.6 |
| 7 | 45 | 388.25 | .17 | 1.82 | 8.16 | 8 | 318 | | | | 72 | 62 | 16.4 |
| 6 | 47.5 | 390.16 | .17 | 1.82 | 0.09 | 8 | 317 | 244 | 260 | 43 | 73 | 64 | 16.4 |
| 5 | 50 | 392.20 | .20 | 2.15 | 2.19 | 9.5 | 317 | | | | 75 | 64 | 16.2 |
| 4 | 52.5 | 394.44 | .22 | 2.37 | 4.39 | 11 | 316 | 242 | 261 | 44 | 75 | 64 | 16.4 |
| 3 | 55 | 396.77 | .24 | 2.58 | 6.69 | 12 | 316 | | | | 75 | 65 | 16.5 |
| 2 | 57.5 | 398.94 | .22 | 2.37 | 9.90 | 11 | 315 | 246 | 257 | 44 | 74 | 65 | 16.3 |
| 1 | 60 | 401.04 | .19 | 2.04 | 0.95 | 9 | 317 | | | | 75 | 65 | 16.3 |
| | (0858) | | | | | | | | | | | | |
| | θ = 60 | Vm = 49.74 | | ΔH 2.13 | | | | | | | Avg. = 62.5 | | |

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S-0037R

INTERPOLL LABORATORIES, INC.
(612) 786-6020

# Interpoll Laboratories EPA Method 5/17 Sample Log Sheet

Job L.P. / Hayward, WI
Source Line 2 Kraus / Stack
Method 5 Filter holder: Glass
Sample Train Leak Check:

Date 6-8-94 Test 16 Run 2
No. of traverse points 24
Filter type: 4" Pallflex

Pretest: ≤ 0.02 cfm at 15 in. Hg. (vac) ☒
Post test: 0.02 cfm at 19 in. Hg. (vac) ☒

**Particulate Catch Data:**

No. of filters used:

4036

Recovery solvent(s)

☒acetone
☐other(s)

No. of probe wash bottles: 1
Sample recovered by: M. Kaehler & K. Rosenthal

**Condensate Data:**

| Item | Weight (g) | | |
|---|---|---|---|
| | Final | Tare | Difference |
| Impinger No. 1 | 460 | 398 | 62 |
| Impinger No. 2 | | | |
| Impinger No. 3 | | | |
| Condenser | | | |
| Desiccant | 1480 | 1464 | 16 |
| | | | |
| Total | | | 78 |

**Integrated Gas Sampling Data:**

Bag Pump No. 29A
Bag Material: 5-layer Aluminized Tedlar
Pretest leak check: 0
Time start: 0920
Sampling rate: 400

Box No. 27 Bag No. 2
Size: 44 L
cc/min at 20 in. Hg.
(HRS) Time end: 1021 (HRS)
cc/min Operator: M. Kaehler

S/N of $O_2$ Analyzer used to monitor train outlet: 9

123093-G:\STACK\WP\METHODS\S-0046RR

# INTERPOLL LABORATORIES — METHOD 5 FIELD DATA SHEET

Job G.P. / Hayward, WI
Source Line 2 Reaus / Stack
Date 6-8-94 Test 16 Run 2

Operators M. Kuebler / K. Koreyath
Meter Box No. 9 ΔH@ 1.79 Y 1.00
Counter conft. .9961

Pitot No. 22U-5 Cp .94
Bar. Press. 28.49 Stdy H2O 6.6 %
Nozzle No. B-6 Nozzle Dia .363 IN.

| Traverse Point No. | Sampling Time (min) | Sample Volume (cf) | Velocity Head (inHO) | Orifice Meter (inHO) | Dry. Vol. (cf) | VAC. (inHg) | Temperatures (°F) Stack | Probe | Oven | Impg. | Gas/In | Gas/Out | Oxygen (%v/v) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 0920 | 401.50 | | | | | | | | | | | |
| A-12 | 2.5 | 403.75 | .22 | 2.39 | 3.69 | 10 | 318 | 243 | 252 | 43 | 67 | 65 | 17.2 |
| 11 | 5 | 405.93 | .21 | 2.31 | 5.86 | 9.5 | 315 | | | | 69 | 66 | 16.5 |
| 10 | 7.5 | 408.05 | .20 | 2.19 | 7.98 | 9 | 320 | 249 | 260 | 39 | 72 | 66 | 16.1 |
| 9 | 10 | 409.99 | .18 | 1.98 | 9.94 | 8 | 318 | | | | 72 | 67 | 16.3 |
| 8 | 12.5 | 412.10 | .18 | 1.98 | 2.01 | 8 | 318 | 251 | 255 | 39 | 74 | 67 | 16.8 |
| 7 | 15 | 413.97 | .16 | 1.77 | 3.92 | 7 | 315 | | | | 75 | 67 | 17.0 |
| 6 | 17.5 | 415.80 | .16 | 1.77 | 5.83 | 7 | 318 | 247 | 256 | 39 | 77 | 68 | 16.9 |
| 5 | 20 | 417.99 | .20 | 2.22 | 7.97 | 9 | 317 | | | | 78 | 69 | 16.3 |
| 4 | 22.5 | 420.23 | .22 | 2.44 | 0.21 | 10.5 | 319 | 245 | 258 | 40 | 79 | 69 | 16.7 |
| 3 | 25 | 422.58 | .23 | 2.56 | 2.51 | 11 | 315 | | | | 78 | 70 | 16.9 |
| 2 | 27.5 | 424.79 | .22 | 2.45 | 4.76 | 11 | 316 | 248 | 261 | 40 | 79 | 70 | 16.9 |
| 1 | 30 | 426.97 | .20 | 2.23 | 6.91 | 9 | 316 | | | | 79 | 70 | 16.8 |
| B-12 | 32.5 | 428.96 | .18 | 2.00 | 8.95 | 8 | 317 | 245 | 260 | 42 | 78 | 70 | 16.9 |
| 11 | 35 | 431.23 | .21 | 2.33 | 1.14 | 10 | 316 | | | | 80 | 71 | 16.6 |
| 10 | 37.5 | 433.26 | .18 | 2.01 | 3.18 | 8 | 315 | 247 | 263 | 43 | 81 | 72 | 16.8 |
| 9 | 40 | 435.15 | .15 | 1.68 | 5.05 | 7 | 316 | | | | 81 | 72 | 17.0 |
| 8 | 42.5 | 436.94 | .14 | 1.56 | 6.86 | 6.5 | 319 | 250 | 259 | 44 | 82 | 72 | 17.1 |
| 7 | 45 | 438.65 | .14 | 1.56 | 8.66 | 6.5 | 319 | | | | 82 | 73 | 16.7 |
| 6 | 47.5 | 440.66 | .16 | 1.79 | 0.60 | 7 | 316 | 252 | 257 | 44 | 83 | 73 | 16.7 |
| 5 | 50 | 442.88 | .21 | 2.35 | 2.81 | 10 | 316 | | | | 84 | 74 | 16.9 |
| 4 | 52.5 | 445.32 | .26 | 2.91 | 5.27 | 14 | 318 | 251 | 253 | 47 | 84 | 74 | 16.8 |
| 3 | 55 | 447.69 | .25 | 2.80 | 7.69 | 13 | 317 | | | | 83 | 74 | 16.9 |
| 2 | 57.5 | 450.20 | .26 | 2.91 | 0.15 | 14 | 317 | 250 | 256 | 47 | 83 | 74 | 16.7 |
| 1 | 60 | 452.53 | .22 | 2.47 | 2.42 | 11 | 316 | | | | 82 | 75 | 16.9 |
| | (1021) | | | | | | | | | | | | |
| | θ = 60 | Vm = 51.03 | | ΔH 2.19 | | | | | | | Avg. = 74.3 | | |

INTERPOLL LABORATORIES, INC.
(612) 786-6020

# Interpoll Laboratories EPA Method 5/17 Sample Log Sheet

Job L.P. / Hayward, WI
Source Line 2 Kiln's / Stack
Method 5 Filter holder: Glass
Sample Train Leak Check:

Date 6-8-94 Test 16 Run 3
No. of traverse points 24
Filter type: 4" PallFlex

Pretest: ≤ 0.02 cfm at 15 in. Hg. (vac) ☒
Post test: 0.02 cfm at 14 in. Hg. (vac) ☒

**Particulate Catch Data:**

No. of filters used:

4037

Recovery solvent(s)

☒ acetone
☐ other(s)

No. of probe wash bottles: 1
Sample recovered by: M. Koebbeler + K. Rosenthal

**Condensate Data:**

| Item | Weight (g) | | |
|---|---|---|---|
| | Final | Tare | Difference |
| Impinger No. 1 | 462 | 395 | 67 |
| Impinger No. 2 | | | |
| Impinger No. 3 | | | |
| Condenser | | | |
| Desiccant | 1420 | 1409 | 18 |
| | | | |
| Total | | | 85 |

**Integrated Gas Sampling Data:**

Bag Pump No. 29A
Bag Material: 5-layer Aluminized Tedlar
Pretest leak check: 0
Time start: 1114
Sampling rate: 400

Box No. 27 Bag No. 3
Size: 44 L
cc/min at 20 in. Hg.
(HRS) Time end: 1215 (HRS)
cc/min Operator: M. Koebbeler

S/N of $O_2$ Analyzer used to monitor train outlet: 9

123093-G:\STACK\WP\METHODS\S-0046RR

# INTERPOLL LABORATORIES — 1 METHOD 5 FIELD DATA SHEET

Job L.P. / Hayward, WI. — Operators M. Koehler-EK. Rosenthal — Pitot No. 220.5 — Cp .84
Source Line 1 Kanus / Stack — Meter Box No. 9 ΔH 1.78 ΔH@ — Bar. Press. 28.79 inHg — H2O 2.0%
Date 6-8-94 — Test 16 — Run 3 — Chamber cont. .9961 — Nozzle No. B-6 — Nozzle Dia .363 in.

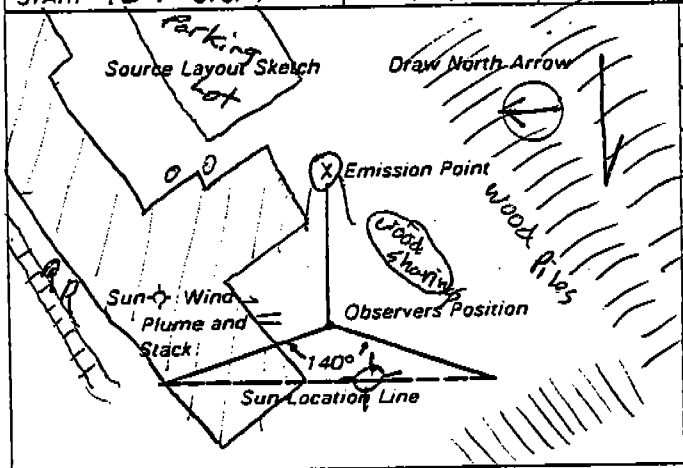
| Traverse Point No. | Sampling Time (min) | Sample Volume (cf) | Velocity Head (inWC) | Orifice Meter (inWC) | Dry. Vol. (cf) | VAC. inHg | Temperatures (°F) Stack | Probe | Oven | Impg. | Gas/In | Gas/Out | Oxygen (xx/x) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1114 | 453.00 | | | | | | | | | | | |
| B-12 | 2.5 | 455.27 | .22 | 2.40 | 5.22 | 10 | 326 | 240 | 261 | 39 | 72 | 71 | 16.3 |
| 11 | 5 | 457.15 | .16 | 1.74 | 7.12 | 7 | 325 | | | | 74 | 71 | 16.0 |
| 10 | 7.5 | 458.99 | .15 | 1.64 | 8.96 | 6.5 | 325 | 245 | 257 | 39 | 76 | 73 | 15.3 |
| 9 | 10 | 460.86 | .15 | 1.64 | 10.80 | 6.5 | 325 | | | | 78 | 73 | 16.4 |
| 8 | 12.5 | 462.72 | .15 | 1.65 | 2.65 | 6.5 | 325 | 243 | 260 | 39 | 79 | 74 | 15.9 |
| 7 | 15 | 464.60 | .16 | 1.76 | 4.57 | 7 | 323 | | | | 81 | 74 | 15.9 |
| 6 | 17.5 | 466.60 | .18 | 1.98 | 6.60 | 8 | 325 | 250 | 252 | 40 | 83 | 75 | 16.1 |
| 5 | 20 | 468.85 | .23 | 2.54 | 9.40 | 11 | 325 | | | | 84 | 75 | 16.0 |
| 4 | 22.5 | 471.17 | .23 | 2.54 | 1.20 | 11 | 326 | 248 | 257 | 40 | 84 | 76 | 16.1 |
| 3 | 25 | 473.52 | .23 | 2.54 | 3.50 | 11 | 326 | | | | 84 | 76 | 16.4 |
| 2 | 27.5 | 475.89 | .24 | 2.65 | 5.86 | 12 | 325 | 245 | 257 | 40 | 85 | 76 | 16.1 |
| 1 | 30 | 478.14 | .21 | 2.32 | 8.06 | 10 | 325 | | | | 84 | 77 | 15.8 |
| A-12 | 32.5 | 480.10 | .17 | 1.88 | 0.05 | 8 | 325 | 246 | 260 | 41 | 83 | 77 | 16.2 |
| 11 | 35 | 482.18 | .19 | 2.10 | 2.14 | 8.5 | 326 | | | | 85 | 77 | 16.5 |
| 10 | 37.5 | 484.27 | .18 | 1.99 | 4.19 | 8.5 | 326 | 248 | 259 | 41 | 86 | 78 | 16.5 |
| 9 | 40 | 486.37 | .18 | 1.99 | 6.23 | 8.5 | 327 | | | | 87 | 78 | 16.5 |
| 8 | 41.5 | 488.08 | .14 | 1.55 | 8.04 | 6.5 | 327 | 245 | 257 | 41 | 87 | 79 | 16.2 |
| 7 | 45 | 489.97 | .15 | 1.67 | 9.91 | 7 | 325 | | | | 88 | 80 | 17.4 |
| 6 | 47.5 | 491.91 | .17 | 1.89 | 1.91 | 8 | 325 | 242 | 259 | 41 | 89 | 80 | 17.4 |
| 5 | 50 | 494.10 | .20 | 2.23 | 4.08 | 10 | 325 | | | | 90 | 80 | 17.0 |
| 4 | 52.5 | 496.43 | .23 | 2.56 | 6.40 | 11.5 | 326 | 246 | 255 | 43 | 90 | 81 | 16.9 |
| 3 | 55 | 498.75 | .22 | 2.45 | 8.68 | 11 | 326 | | | | 90 | 81 | 16.6 |
| 2 | 57.5 | 500.97 | .20 | 2.23 | 0.85 | 10 | 326 | 247 | 253 | 43 | 90 | 81 | 16.4 |
| 1 | 60 | 502.03 | .18 | 2.01 | 2.91 | 9 | 326 | | | | 90 | 82 | 16.8 |
| | (1215) | | | | | | | | | | | | |
| | θ = 60 | Vm = 50.03 | | ΔH 2.09 | | | | | | | Avg. = 80.5 | | |

Interpoll Laboratories
(612)786-6020

# Visible Emissions Form

T16

| | | |
|---|---|---|
| SOURCE NAME: Louisiana Pacific | OBSERVATION DATE: 6-8-94 | START TIME: 9:20 |
| ADDRESS: RFD 3 | | STOP TIME: 10:21 |
| CITY: Hayward | STATE: WI | ZIP: 54843 |
| PHONE | SOURCE ID NUMBER | |
| PROCESS EQUIPMENT: Line 2 Kamyr Stack | OPERATING MODE: 100% | |
| CONTROL EQUIPMENT: ESP | OPERATING MODE: 100% | |
| DESCRIBE EMISSION POINT: START Tallest silver stack at South side of building STOP | | |
| HEIGHT ABOVE GROUND LEVEL: START ~100' STOP SAME | HEIGHT RELATIVE TO OBSERVER: START ~100' STOP SAME | |
| DISTANCE FROM OBSERVER: START ~300' STOP SAME | DIRECTION FROM OBSERVER: START ~360° STOP SAME | |
| DESCRIBE EMISSIONS: START Coming Plume STOP SAME | | |
| EMISSION COLOR: START White STOP SAME | PLUME TYPE: CONTINUOUS ☒ FUGITIVE ☐ INTERMITTENT ☐ | |
| WATER DROPLETS PRESENT: NO ☒ YES ☐ | IF WATER DROPLET PLUME: ATTACHED ☐ DETACHED ☐ | |
| POINT IN THE PLUME AT WHICH OPACITY WAS DETERMINED: START Directly above Stacks Exit STOP SAME | | |
| DESCRIBE BACKGROUND: START Clear Blue Sky STOP SAME | | |
| BACKGROUND COLOR: START Blue STOP SAME | SKY CONDITIONS: START Clear STOP SAME | |
| WIND SPEED: START 15mpH STOP SAME | WIND DIRECTION: START E-NE STOP SAME | |
| AMBIENT TEMP: START 72°F STOP SAME | WET BULB TEMP: 63°F | RH, percent: 72% |




| SEC / MIN | 0 | 15 | 30 | 45 | SEC / MIN | 0 | 15 | 30 | 45 |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 0 | 0 | 0 | 0 | 31 | 0 | 0 | 0 | 0 |
| 2 | 0 | 0 | 0 | 0 | 32 | 0 | 0 | 0 | 0 |
| 3 | 0 | 0 | 0 | 0 | 33 | 0 | 0 | 0 | 0 |
| 4 | 0 | 0 | 0 | 0 | 34 | 0 | 0 | 0 | 0 |
| 5 | 0 | 0 | 0 | 0 | 35 | 0 | 0 | 0 | 0 |
| 6 | 0 | 0 | 5 | 5 | 36 | 0 | 0 | 0 | 0 |
| 7 | 5 | 5 | 0 | 0 | 37 | 5 | 5 | 0 | 0 |
| 8 | 0 | 0 | 0 | 0 | 38 | 5 | 5 | 5 | 5 |
| 9 | 0 | 0 | 5 | 0 | 39 | 0 | 0 | 0 | 0 |
| 10 | 0 | 0 | 0 | 0 | 40 | 0 | 0 | 0 | 0 |
| 11 | 5 | 5 | 5 | 5 | 41 | 0 | 0 | 0 | 0 |
| 12 | 0 | 0 | 0 | 0 | 42 | 0 | 0 | 0 | 0 |
| 13 | 0 | 0 | 0 | 0 | 43 | 0 | 0 | 0 | 0 |
| 14 | 0 | 0 | 0 | 0 | 44 | 0 | 0 | 0 | 0 |
| 15 | 0 | 0 | 0 | 0 | 45 | 0 | 0 | 0 | 0 |
| 16 | 0 | 0 | 0 | 0 | 46 | 0 | 0 | 0 | 0 |
| 17 | 0 | 0 | 0 | 0 | 47 | 0 | 0 | 0 | 0 |
| 18 | 0 | 0 | 0 | 0 | 48 | 0 | 0 | 0 | 0 |
| 19 | 0 | 0 | 0 | 0 | 49 | 0 | 0 | 0 | 0 |
| 20 | 0 | 0 | 0 | 0 | 50 | 0 | 0 | 5 | 5 |
| 21 | 0 | 0 | 0 | 0 | 51 | 5 | 0 | 0 | 0 |
| 22 | 0 | 0 | 0 | 0 | 52 | 0 | 0 | 0 | 0 |
| 23 | 0 | 0 | 0 | 0 | 53 | 5 | 5 | 5 | 0 |
| 24 | 0 | 0 | 0 | 0 | 54 | 0 | 5 | 5 | 5 |
| 25 | 0 | 0 | 0 | 0 | 55 | 5 | 5 | 0 | 0 |
| 26 | 0 | 0 | 0 | 0 | 56 | 5 | 5 | 5 | 5 |
| 27 | 0 | 0 | 0 | 0 | 57 | 5 | 5 | 5 | 5 |
| 28 | 0 | 0 | 0 | 0 | 58 | 5 | 5 | 5 | 5 |
| 29 | 0 | 0 | 0 | 0 | 59 | 5 | 5 | 5 | 5 |
| 30 | 0 | 0 | 0 | 0 | 60 | 5 | 5 | 5 | 5 |

| | |
|---|---|
| AVERAGE OPACITY FOR HIGHEST PERIOD | NUMBER OF READINGS ABOVE % WERE |
| RANGE OF OPACITY READINGS: MINIMUM 0 | MAXIMUM 5 |
| OBSERVER'S NAME (PRINT): Edward Juers III | |
| OBSERVER'S SIGNATURE | DATE 6-8-94 |
| ORGANIZATION: Interpoll Labs, Inc | |
| CERTIFIED BY: Eastern Tech. Assoc. | DATE 6-8-94 |
| VERIFIED BY | DATE |

COMMENTS

I HAVE RECEIVED A COPY OF THESE OPACITY OBSERVATIONS
SIGNATURE
TITLE DATE



S-0079R

Interpoll Laboratories
(612)786-6020

**EPA Method 7 Sample Collection**
**Field Data Sheet**

Job LP / HAYWARD  Date 6-8-94  Bar. Pressure 28.98 IN.HG.
Test Location LINE 2  Fuel Type WOOD  Sample Train No. GREEN
Technician KK  Pump No. 29B

| No. | Test Run Point | Flask No. | Time (HRS) | Vacuum (IN.HG.) | Flask Temp. (°F) | Leak Rate <0.4 IN.HG./MIN. |
|---|---|---|---|---|---|---|
| 1 | #6-1-3 | 13 | 0800 | 27.4 | 59 | ☑ Yes ☐ No |
| 2 | #6-1-2 | 14 | 0815 | 27.3 | 59 | ☑ Yes ☐ No |
| 3 | #6-1-1 | 15 | 0830 | 27.4 | 59 | ☑ Yes ☐ No |
| 4 | #6-1-1 | 16 | 0845 | 27.4 | 60 | ☑ Yes ☐ No |
| 5 | #6-2-2 | 17 | 0920 | 27.3 | 60 | ☑ Yes ☐ No |
| 6 | #6-2-3 | 18 | 0935 | 27.3 | 60 | ☑ Yes ☐ No |
| 7 | #6-2-3 | 55 | 0950 | 27.3 | 60 | ☑ Yes ☐ No |
| 8 | #6-2-2 | 56 | 1005 | 27.3 | 60 | ☑ Yes ☐ No |
| 9 | #6-3-1 | 57 | 1115 | 27.3 | 64 | ☑ Yes ☐ No |
| 10 | #6-3-1 | 58 | 1130 | 27.2 | 65 | ☑ Yes ☐ No |
| 11 | #6-3-2 | 59 | 1145 | 27.3 | 65 | ☑ Yes ☐ No |
| 12 | #6-3-3 | 60 | 1200 | 27.3 | 65 | ☑ Yes ☐ No |
| 13 | | | | | | ☐ Yes ☐ No |
| 14 | | | | | | ☐ Yes ☐ No |
| 15 | | | | | | ☐ Yes ☐ No |
| 16 | | | | | | ☐ Yes ☐ No |
| 17 | | | | | | ☐ Yes ☐ No |
| 18 | | | | | | ☐ Yes ☐ No |
| 19 | | | | | | ☐ Yes ☐ No |
| 20 | | | | | | ☐ Yes ☐ No |
| 21 | | | | | | ☐ Yes ☐ No |
| 22 | | | | | | ☐ Yes ☐ No |
| 23 | | | | | | ☐ Yes ☐ No |
| 24 | | | | | | ☐ Yes ☐ No |
| 25 | | | | | | ☐ Yes ☐ No |
| 26 | | | | | | ☐ Yes ☐ No |
| 27 | | | | | | ☐ Yes ☐ No |

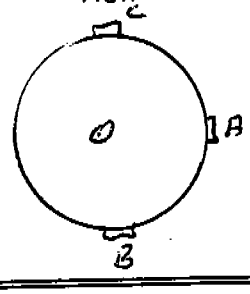
S-263R

INTERPOLL LABORATORIES, INC.
(612) 786-6020

# EPA Method 2 Field Data Sheet

Job: L.P. / Hayward, WI
Source: Line 2 Kovs / Stack
Test: 17 Run: 0 Date: 6-8-94
Stack Dimen.: 51.5 IN.
Dry Bulb: 325 °F Wet bulb: 130 °F
Manometer: ☒ Reg. ☐ Exp ☐ Elec.
Barometric Pressure: 28.98 IN.HG
Static Pressure: -.28 IN.WC
Operators: M. Cuddeback & R. Rosenthal
Pitot No.: 22V-5 $C_p$: .84
CH2O

Drawing of Test Site

| Cross-section View | Elevation View |
|---|---|
|   | |

| Traverse Point No. | Fraction of Diameter | Distance From Stack Wall (IN.) | Distance From End of Port (IN.) | Velocity | Temp. of Gas (°F) |
|---|---|---|---|---|---|
| | | Port Length: 3.5 IN. | | Time Start: NA HRS | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | Refer to Test 19 | | | |
| | | for pts and flows | | | |
| | | | | | |
| | | | | | |
| | |

INTERPOLL LABORATORIES, INC.
(612) 786-6020

# Interpoll Laboratories EPA Method 5/17 Sample Log Sheet

Job L.P. / Hayward, WI
Source Line 2 Recvr / Stack
Method 0011 Filter holder: NA
Sample Train Leak Check:

Date 6-8-94 Test 17 Run 1
No. of traverse points 24
Filter type: NA

Pretest: ≤ 0.02 cfm at 15 in. Hg. (vac) ☒
Post test: <0.02 cfm at 10 in. Hg. (vac) ☒

**Particulate Catch Data:**

No. of filters used:

NA

Recovery solvent(s)

☐ acetone
☒ other(s) $MeCl_2$

No. of probe wash bottles: 0
Sample recovered by: M. Koehler + K. Rosenthal

**Condensate Data:**

| Item | Weight (g) | | |
|---|---|---|---|
| | Final | Tare | Difference |
| Impinger No. 1 | 531 | 477 | 54 |
| Impinger No. 2 | | | |
| Impinger No. 3 | | | |
| Condenser | | | |
| Desiccant | 1497 | 1480 | 17 |
| | | | |
| Total | | | 71 |

**Integrated Gas Sampling Data:**

Bag Pump No. 294
Bag Material: 5-layer Aluminized Tedlar
Pretest leak check: 0
Time start: 1446
Sampling rate: 400

Box No. 25 Bag No. 1
Size: 44 L
cc/min at 20 in. Hg.
(HRS) Time end: 1553 (HRS)
cc/min Operator: M. Koehler

S/N of $O_2$ Analyzer used to monitor train outlet: 9

123093-G:\STACK\WP\METHODS\S-0046RR

# INTERPOLL LABORATORIES EPA METHOD 5 FIELD DATA SHEET

Job L.P. / Hayward, WI
Source Line 2 Recov. / Stack
Date 6-8-94 Test 12 Run 1

Operators M. Buehler / K. Rosenthal
Meter Box No. 9 ΔH@ 1.29 Y 1.00
Cassette cont. .8961

Pitot No. 22V-5 Cp .84
Bar. Press. 28.98 inHg H2O 2.8 %
Nozzle No. Glass-6 Nozzle Dia .368 IN.

| Traverse Point No. | Sampling Time (min) | Sample Volume (cf) | Velocity Head (inWC) | Orifice Meter (inWC) | Dec. Vol. (cf) | VAC. inHg | Temperatures (°F) Stack | Probe | Oven | Impg. | Gas/In | Gas/Out | Oxygen (xx/x) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1446 | 503.60 | | | | | | | | | | | |
| A-12 | 2.5 | 505.87 | .21 | 2.42 | 5.85 | 5 | 324 | 243 | 248 | 41 | 80 | 80 | 17.3 |
| 11 | 5 | 508.13 | .21 | 2.42 | 8.10 | 5 | 325 | | | | 81 | 80 | 17.1 |
| 10 | 7.5 | 510.31 | .20 | 2.31 | 0.29 | 5 | 325 | 247 | 245 | 40 | 84 | 81 | 17.1 |
| 9 | 10 | 512.54 | .19 | 2.21 | 2.45 | 5 | 322 | | | | 85 | 82 | 17.0 |
| 8 | 12.5 | 514.55 | .17 | 1.97 | 4.49 | 5 | 325 | 248 | 251 | 40 | 86 | 82 | 17.0 |
| 7 | 15 | 516.52 | .16 | 1.86 | 6.47 | 4 | 325 | | | | 88 | 83 | 16.7 |
| 6 | 17.5 | 518.55 | .17 | 1.98 | 8.52 | 4.5 | 325 | 245 | 255 | 40 | 89 | 93 | 16.8 |
| 5 | 20 | 520.92 | .23 | 2.67 | 0.89 | 6 | 327 | | | | 90 | 84 | 16.9 |
| 4 | 22.5 | 523.33 | .23 | 2.68 | 3.27 | 6 | 327 | 242 | 254 | 42 | 91 | 94 | 17.0 |
| 3 | 25 | 525.78 | .24 | 2.79 | 5.70 | 6 | 329 | | | | 92 | 84 | 17.5 |
| 2 | 27.5 | 528.20 | .24 | 2.81 | 8.14 | 6 | 325 | 247 | 256 | 42 | 93 | 85 | 17.4 |
| 1 | 30 | 530.57 | .23 | 2.69 | 0.53 | 6 | 327 | | | | 93 | 86 | 16.6 |
| B-12 | 32.5 | 532.54 | .15 | 1.75 | 2.46 | 4 | 330 | 251 | 257 | 43 | 91 | 85 | 16.4 |
| 11 | 35 | 534.60 | .19 | 2.23 | 4.63 | 5 | 324 | | | | 94 | 86 | 16.2 |
| 10 | 37.5 | 536.72 | .16 | 1.88 | 6.64 | 4 | 325 | 255 | 255 | 43 | 90 | 86 | 16.6 |
| 9 | 40 | 538.70 | .16 | 1.97 | 8.63 | 4 | 325 | | | | 92 | 87 | 16.3 |
| 8 | 42.5 | 540.60 | .15 | 1.76 | 0.57 | 4 | 326 | 252 | 258 | 43 | 94 | 87 | 16.3 |
| 7 | 45 | 542.49 | .14 | 1.64 | 2.44 | 3.5 | 327 | | | | 94 | 87 | 16.4 |
| 6 | 47.5 | 544.45 | .17 | 1.99 | 4.51 | 4 | 327 | 253 | 261 | 43 | 95 | 88 | 16.0 |
| 5 | 50 | 546.55 | .17 | 2.00 | 6.57 | 4 | 326 | | | | 96 | 88 | 16.7 |
| 4 | 52.5 | 549.05 | .25 | 2.93 | 9.07 | 6.5 | 329 | 250 | 262 | 43 | 97 | 88 | 16.5 |
| 3 | 55 | 551.56 | .25 | 2.93 | 1.57 | 6.5 | 329 | | | | 98 | 89 | 16.1 |
| 2 | 57.5 | 554.10 | .25 | 2.94 | 4.08 | 6.5 | 329 | 247 | 258 | 43 | 98 | 89 | 16.0 |
| 1 | 60 | 556.58 | .24 | 2.83 | 6.54 | 6 | 327 | | | | 98 | 90 | 15.6 |
| | (1553) | | | | | | | | | | | | |
| | θ = 60 | Vm = 52.98 | | ΔH 2.32 | | | | | | | Avg. = 88.1 | | |

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INTERPOLL LABORATORIES, INC.
(612) 786-6020

# Interpoll Laboratories EPA Method 5/17 Sample Log Sheet

Job L.P. / Hayward, WI
Source Line 2 Kenics / Stack
Method 0011 Filter holder: NA
Sample Train Leak Check:

Date 6-8-94 Test 17 Run 2
No. of traverse points 24
Filter type: NA

Pretest: ≤ 0.02 cfm at 15 in. Hg. (vac) ☑
Post test: 0.02 cfm at 10 in. Hg. (vac) ☑

**Particulate Catch Data:**

No. of filters used:

NA

Recovery solvent(s)

☐ acetone
☑ other(s) MeCl2

No. of probe wash bottles: 0
Sample recovered by: M. Kaehler & K. Rosenthal

**Condensate Data:**

| Item | Weight (g) | | |
|---|---|---|---|
| | Final | Tare | Difference |
| Impinger No. 1 | ~~533~~ 533 | 491 | 52 |
| Impinger No. 2 | | | |
| Impinger No. 3 | | | |
| Condenser | | | |
| Desiccant | 1508 | 1491 | 17 |
| | | | |
| Total | | | 69 |

**Integrated Gas Sampling Data:**

Bag Pump No. 29A
Bag Material: 5-layer Aluminized Tedlar
Pretest leak check: 0
Time start: 1616
Sampling rate: 400

Box No. 25 Bag No. 2
Size: 44 L
cc/min at 20 in. Hg.
(HRS) Time end: 1718 (HRS)
cc/min Operator: M. Kaehler

S/N of $O_2$ Analyzer used to monitor train outlet: 9

123093-G:\STACK\WP\METHODS\S-0046RR

# INTERPOLL LABORATORIES EPA METHOD 5 FIELD DATA SHEET

Job: L.P. / Hayward, Ca
Source: Line 2 Bonus / Stack
Date: 6-8-94 Test: 12 Run: 2

Operators: mcKeehan + K. Rosenthal
Meter Box No.: 9 ΔH: 1.78 Y: .9961
Pitot No.: 22V-5 Cp: .84
Bar. Press.: 28.95 in Hg H2O: 6.3 in.
Nozzle No.: Glass Nozzle Dia.: .368 in.

| Traverse Point No. | Sampling Time (min) | Sample Volume (cf) | Velocity Head (in WC) | Orifice Meter (in WC) | Dec. Vol. (cf) | VAC. in Hg | Temperatures (°F) Stack | Probe | Oven | Impg. | Gas In | Gas Out | Oxygen (% v/v) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1616 | 556.90 | | | | | | | | | | | |
| B-12 | 2.5 | 559.13 | .20 | 2.39 | 9.15 | 5.5 | 329 | 243 | 244 | 43 | 87 | 87 | 15.8 |
| 11 | 5 | 561.07 | .14 | 1.67 | 1.03 | 3.5 | 329 | | | | 89 | 86 | 16.1 |
| 10 | 7.5 | 563.06 | .16 | 1.91 | 3.05 | 4 | 328 | 244 | 251 | 43 | 91 | 87 | 16.5 |
| 9 | 10 | 565.09 | .15 | 1.80 | 5.01 | 4 | 326 | | | | 93 | 87 | 16.4 |
| 8 | 12.5 | 566.97 | .13 | 1.57 | 6.84 | 3 | 326 | 247 | 255 | 44 | 94 | 88 | 16.2 |
| 7 | 15 | 568.71 | .13 | 1.57 | 8.67 | 3 | 324 | | | | 95 | 88 | 16.7 |
| 6 | 17.5 | 570.84 | .17 | 2.06 | 0.77 | 4 | 324 | 249 | 254 | 44 | 96 | 88 | 16.9 |
| 5 | 20 | 572.95 | .18 | 2.18 | 2.93 | 4.5 | 323 | | | | 98 | 89 | 16.5 |
| 4 | 22.5 | 575.40 | .23 | 2.80 | 5.38 | 6 | 323 | 246 | 258 | 44 | 99 | 90 | 16.4 |
| 3 | 25 | 577.82 | .23 | 2.80 | 7.83 | 6 | 323 | | | | 99 | 90 | 16.5 |
| 2 | 27.5 | 580.28 | .23 | 2.80 | 0.28 | 6 | 323 | 244 | 255 | 44 | 99 | 90 | 16.2 |
| 1 | 30 | 582.76 | .23 | 2.80 | 1.73 | 6 | 323 | | | | 99 | 91 | 16.7 |
| A-12 | 32.5 | 584.99 | .19 | 2.32 | 4.96 | 5 | 322 | 247 | 253 | 46 | 97 | 90 | 16.5 |
| 11 | 35 | 587.30 | .20 | 2.43 | 7.24 | 5 | 323 | | | | 99 | 91 | 16.4 |
| 10 | 37.5 | 589.55 | .19 | 2.32 | 9.48 | 5 | 321 | 251 | 250 | 46 | 99 | 91 | 16.7 |
| 9 | 40 | 591.79 | .19 | 2.32 | 1.71 | 5 | 321 | | | | 100 | 91 | 16.4 |
| 8 | 42.5 | 593.77 | .15 | 1.83 | 3.70 | 4 | 324 | 248 | 253 | 46 | 100 | 92 | 16.5 |
| 7 | 45 | 595.80 | .16 | 1.95 | 5.75 | 4 | 324 | | | | 100 | 92 | 16.7 |
| 6 | 47.5 | 598.10 | .19 | 2.32 | 2.99 | 5 | 324 | 245 | 255 | 46 | 101 | 92 | 16.3 |
| 5 | 50 | 600.44 | .21 | 2.56 | 0.33 | 6 | 324 | | | | 102 | 92 | 16.8 |
| 4 | 52.5 | 602.77 | .22 | 2.69 | 2.74 | 6 | 324 | 249 | 252 | 47 | 102 | 93 | 16.5 |
| 3 | 55 | 605.16 | .21 | 2.57 | 5.09 | 6 | 325 | | | | 102 | 93 | 16.1 |
| 2 | 57.5 | 607.50 | .21 | 2.57 | 2.45 | 6 | 324 | 253 | 252 | 47 | 102 | 93 | 16.3 |
| 1 | 60 | 609.83 | .20 | 2.46 | 9.75 | 5.5 | 321 | | | | 102 | 93 | 16.5 |
| | (1718) | | | | | | | | | | | | |
| | θ = 60 | Vm = 52.93 | | ΔH 2.28 | | | | | | | Avg. = | 93.9 | |

INTERPOLL LABORATORIES, INC.
(612) 786-6020

# Interpoll Laboratories EPA Method 5/17 Sample Log Sheet

Job L.P. / Hayward, WI
Source Line 2 Kenus
Method 0011 Filter holder: N/A
Sample Train Leak Check:

Date 6-8-94 Test 17 Run 3
No. of traverse points 24
Filter type: N/A

Pretest: ≤ 0.02 cfm at 15 in. Hg. (vac) ☒
Post test: 0.02 cfm at 10 in. Hg. (vac) ☒

**Particulate Catch Data:**

No. of filters used:

N/A

Recovery solvent(s)

☐ acetone
☒ other(s) Me Cl2

No. of probe wash bottles: 0
Sample recovered by: M. Kaehler + K. Rosenthal

**Condensate Data:**

| Item | Weight (g) | | |
|---|---|---|---|
| | Final | Tare | Difference |
| Impinger No. 1 | 542 | 493 | 59 |
| Impinger No. 2 | | | |
| Impinger No. 3 | | | |
| Condenser | | | |
| Desiccant | 1514 | 1497 | 17 |
| | | | |
| Total | | | 76 |

**Integrated Gas Sampling Data:**

Bag Pump No. 29A
Bag Material: 5-layer Aluminized Tedlar
Pretest leak check: 0
Time start: 1742
Sampling rate: 400

Box No. 25 Bag No. 3
Size: 44 L
cc/min at 20 in. Hg.
(HRS) Time end: 1943 (HRS)
cc/min Operator: M. Kaehler

S/N of $O_2$ Analyzer used to monitor train outlet: 9

123093-G:\STACK\WP\METHODS\S-0046RR

# INTERPOLL LABORATORIES EPA METHOD 5 FIELD DATA SHEET

Job L.P. / Hayward, WI
Source Line 2 Honyr / Stack
Date 6-8-94 Test 17 Run 3

Operators MK/KL/JT/KR/MW
Meter Box No. 9 ΔH 1.78 ΔH WC
Coeff. coeff. .9961

Pitot No. 22V-5 Cp .84
Bar. Press. 28.98 inHg H2O 6.2 %
Nozzle No. Glass-6 Nozzle Dia .368 IN.

| Traverse Point No. | Sampling Time (min) | Sample Volume (cf) | Velocity Head (inWC) | Orifice Meter (inWC) | Dev. Vol. (cf) | VAC. inHg | Temperatures (°F) Stack | Probe | Oven | Impg. | Gas/In | Gas/Out | Oxygen (%v/v) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1742 | 610.10 | | | | | | | | | | | |
| B-12 | 2.5 | 612.35 | .10 | 2.44 | 2.38 | 5 | 323 | 243 | 257 | 43 | 88 | 88 | 16.2 |
| 11 | 5 | 614.62 | .20 | 2.42 | 4.65 | 5 | 322 | | | | 91 | 88 | 16.3 |
| 10 | 7.5 | 616.79 | .17 | 2.07 | 6.74 | 4 | 320 | 240 | 255 | 43 | 93 | 89 | 16.2 |
| 9 | 10 | 618.67 | .13 | 1.58 | 8.58 | 3 | 321 | | | | 94 | 89 | 16.4 |
| 8 | 12.5 | 620.73 | .16 | 1.95 | 10.63 | 4 | 320 | 245 | 258 | 43 | 95 | 89 | 16.3 |
| 7 | 15 | 622.93 | .19 | 2.32 | 2.85 | 5 | 320 | | | | 96 | 89 | 16.6 |
| 6 | 17.5 | 625.40 | .23 | 2.80 | 5.30 | 6 | 321 | 251 | 260 | 44 | 97 | 89 | 17.0 |
| 5 | 20 | 627.84 | .23 | 2.80 | 7.75 | 6 | 322 | | | | 98 | 90 | 17.1 |
| 4 | 22.5 | 630.50 | .30 | 3.66 | 0.54 | 8 | 321 | 248 | 262 | 44 | 97 | 90 | 15.8 |
| 3 | 25 | 633.31 | .30 | 3.66 | 3.33 | 8 | 321 | | | | 97 | 89 | 16.2 |
| 2 | 27.5 | 636.07 | .29 | 3.54 | 6.08 | 8 | 320 | 245 | 257 | 45 | 98 | 89 | 16.4 |
| 1 | 30 | 638.82 | .27 | 3.29 | 8.73 | 7.5 | 321 | | | | 98 | 90 | 16.4 |
| A-12 | 32.5 | 641.22 | .23 | 2.81 | 1.19 | 6 | 320 | 250 | 257 | 45 | 96 | 89 | 16.9 |
| 11 | 35 | 643.77 | .24 | 2.93 | 3.69 | 6 | 320 | | | | 97 | 90 | 16.7 |
| 10 | 37.5 | 646.05 | .20 | 2.44 | 5.98 | 5 | 321 | 247 | 255 | 46 | 98 | 90 | 16.5 |
| 9 | 40 | 648.20 | .18 | 2.20 | 8.15 | 5 | 322 | | | | 99 | 90 | 17.1 |
| 8 | 42.5 | 650.30 | .17 | 2.07 | 0.26 | 4 | 325 | 244 | 258 | 46 | 99 | 90 | 17.2 |
| 7 | 45 | 652.45 | .18 | 2.21 | 2.43 | 5 | 320 | | | | 99 | 91 | 17.0 |
| 6 | 47.5 | 655.10 | .25 | 3.07 | 5.00 | 6.5 | 319 | 243 | 259 | 46 | 100 | 91 | 17.0 |
| 5 | 50 | 657.65 | .27 | 3.31 | 7.66 | 7 | 320 | | | | 101 | 91 | 17.2 |
| 4 | 52.5 | 660.40 | .29 | 3.55 | 0.42 | 7.5 | 321 | 247 | 255 | 46 | 101 | 91 | 17.0 |
| 3 | 55 | 663.30 | .31 | 3.80 | 3.28 | 8.5 | 319 | | | | 100 | 91 | 16.8 |
| 2 | 57.5 | 666.04 | .28 | 3.44 | 5.99 | 7.5 | 319 | 245 | 252 | 46 | 99 | 91 | 16.7 |
| 1 | 60 | 668.44 | .22 | 2.70 | 8.40 | 6 | 318 | | | | 99 | 91 | 17.1 |
| | (1843) | | | | | | | | | | | | |
| | θ = 60 | Vm = 58.34 | | √H 2.79 | | | | | | | Avg. = 93.4 | | |

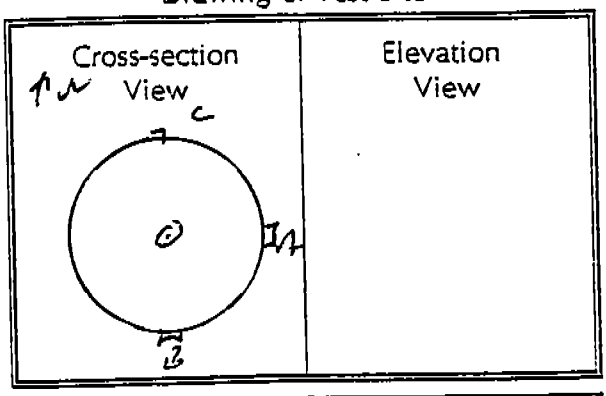
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S-0037R

INTERPOLL LABORATORIES, INC.
(612) 786-6020

# EPA Method 2 Field Data Sheet

Drawing of Test Site




Job H.P. / Hayward, WI
Source Line 2 Knives / Stack
Test 18 Run 0 Date 6-8-94
Stack Dimen. 57.5 IN.
Dry Bulb 325 °F Wet bulb 130 °F
Manometer ☒ Reg. ☐ Exp ☐ Elec.
Barometric Pressure 28.98 IN.HG
Static Pressure -.28 IN.WC
Operators M. Kwapien / K. Ausenhus
Pitot No. 29-6 $C_p$ ~~.84~~ NA
Phend

| Traverse Point No. | Fraction of Diameter | Distance From Stack Wall (IN.) | Distance From End of Port (IN.) | Velocity | Temp. of Gas (°F) |
|---|---|---|---|---|---|
| | | Port Length: 3.5 IN. | | Time Start: NA HRS | |
| C-1 | 1/6 | 8.58 | 12.08 | | 325 |
| 2 | 3/6 | 25.75 | 29.25 | | |
| 3 | 5/6 | 42.92 | 46.42 | | |

Temp. Meas. Device & S/N: PDT-31 / TC
Time End: NA HRS

R or nothing = reg. manometer; S = expanded; E = electronic

INTERFOLL LABORATORIES

EPA Method 4 and 6 Field Data Sheet

Job L.P. / Hayward, Ind
Source Line 2 Kanus / Stack
Date 6-8-94 Test 18 Run 1

Operator(s) M. Kaehlert K. Rosenthal
Meter Box No. 10 Gasmeter coef. .9930
ΔH@ 1.77 in.WC Bar. press 28.95 in.Hg

Sample Train Leak Check:
Pretest: < 0.02 cfm at 15 in. Hg.
Posttest: 0.02 cfm at 10 in. Hg.

| Trav. Point No. | Samp. Time (min) | Sample Volume (cf) | Orif. Meter (inWC) | VAC. inHg | Temperatures (°F) | | | | | Oxygen |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Probe | Oven | Impg. | Gas/In | Gas/Out | (%v/v) |
| | 1417 | 578.60 | | | | | | | | |
| C-3 | 5 | 582.47 | 1.77 | 7 | 247 | 250 | 40 | 74 | 73 | 17.6 |
| 3 | 10 | 586.30 | 1.77 | 7 | 243 | 254 | 40 | 79 | 73 | 17.0 |
| 3 | 15 | 590.12 | 1.77 | 7 | 249 | 251 | 40 | 83 | 74 | 16.7 |
| 3 | 20 | 593.94 | 1.77 | 7 | 245 | 256 | 40 | 86 | 74 | 16.6 |
| 2 | 25 | 597.73 | 1.77 | 7 | 241 | 259 | 41 | 88 | 75 | 17.1 |
| 2 | 30 | 601.53 | 1.77 | 7 | 246 | 261 | 41 | 90 | 76 | 17.4 |
| 2 | 35 | 605.33 | 1.77 | 7 | 253 | 257 | 41 | 90 | 76 | 16.3 |
| 2 | 40 | 609.13 | 1.77 | 7 | 250 | 256 | 41 | 86 | 77 | 16.3 |
| 1 | 45 | 612.96 | 1.77 | 7 | 244 | 260 | 43 | 89 | 77 | 16.1 |
| 1 | 50 | 616.78 | 1.77 | 7 | 242 | 263 | 45 | 91 | 78 | 16.1 |
| 1 | 55 | 620.50 | 1.77 | 7 | 248 | 261 | 45 | 92 | 78 | 16.4 |
| 1 | 60 | 624.30 | 1.77 | 7 | 249 | 258 | 45 | 93 | 79 | 15.5 |
| | (1554) | | | | | | | | | |
| | θ=60 | $V_m$=45.70 | $(\Delta H)_{avg}$=1.77 | | | | | $(t_m)_{avg}$=81.29 | | |

**Condensate Data:**

| Item | Weight (g) | | |
|---|---|---|---|
| | Final | Tare | Difference |
| Impinger# A | 313 | 268 | 45 |
| ~~Condenser~~ Impinger B | 275 | 268 | 7 |
| | | | |
| Desiccant | 1450 | 1432 | 18 |
| | | Total | 70 |

| Preliminary results of $SO_2$ concentration determination | |
|---|---|
| $V_{std}$ | = 43.07 DSCF |
| Moisture | = 7.11 %v/v |
| $SO_2$, dry | = ppm |
| $SO_2$, wet | = ppm |
| LB/MMBtu | = |



S-287 al

INTERPOLL LABORATORIES

EPA Method 4 and 6 Field Data Sheet

Job L.P. / Hayward, WI
Source Line 2 Kanvs / Stack
Date 6-8-94 Test 19 Run 2

Operator(s) M. Kaehlert K. Rusenthal
Meter Box No. 10 Gasmeter coef. .9930
ΔH@ 1.77 in.WC Bar. press 16.98 in.Hg

Sample Train Leak Check:
Pretest: < 0.02 cfm at 15 in. Hg.
Posttest: < 0.02 cfm at 10 in. Hg.

| Trav. Point No. | Samp. Time (min) | Sample Volume (cf) | Orif. Meter (inWC) | VAC. inHg | Temperatures (°F) | | | | | Oxygen (%v/v) |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Probe | Oven | Impg. | Gas/In | Gas/Out | |
| | 1617 | 624.70 | | | | | | | | |
| C-3 | 5 | 628.53 | 1.77 | ? | 247 | 258 | 43 | 81 | 80 | 16.7 |
| 3 | 10 | 632.36 | 1.77 | ? | 252 | 260 | 43 | 96 | 79 | 16.5 |
| 3 | 15 | 636.22 | 1.77 | ? | 248 | 263 | 44 | 89 | 79 | 16.7 |
| 3 | 20 | 640.08 | 1.77 | ? | 245 | 257 | 44 | 91 | 79 | 17.0 |
| 2 | 25 | 643.97 | 1.77 | ? | 241 | 253 | 46 | 93 | 80 | 16.6 |
| 2 | 30 | 647.71 | 1.77 | ? | 246 | 255 | 46 | 94 | 80 | 16.4 |
| 2 | 35 | 651.55 | 1.77 | ? | 250 | 257 | 46 | 92 | 81 | 16.6 |
| 2 | 40 | 655.42 | 1.77 | ? | 249 | 260 | 46 | 95 | 81 | 16.8 |
| 1 | 45 | 659.30 | 1.77 | ? | 246 | 263 | 46 | 95 | 82 | 16.6 |
| 1 | 50 | 663.09 | 1.77 | ? | 249 | 260 | 46 | 96 | 82 | 16.7 |
| 1 | 55 | 666.84 | 1.77 | ? | 253 | 258 | 47 | 96 | 82 | 16.5 |
| 1 | 60 | 670.66 | 1.77 | ? | 250 | 255 | 47 | 96 | 83 | 16.3 |
| | 1718 | | | | | | | | | |
| | θ= 60 | $V_m$= 45.96 | (ΔH)avg= 1.77 | | | | | $(t_m)_{avg.}$ = 86.33 | | |

Condensate Data:

| Item | Weight (g) | | |
|---|---|---|---|
| | Final | Tare | Difference |
| Impinger# A | 310 | 267 | 43 |
| ~~Condenser~~ Impinger B | 277 | 269 | 8 |
| | | | |
| Desiccant | 1434 | 1420 | 14 |
| | | Total | 65 |

| Preliminary results of $SO_2$ concentration determination | |
|---|---|
| $V_{mstd}$ | = 42.91 DSCF |
| Moisture | = 6.66 %v/v |
| $SO_2$, dry | = ppm |
| $SO_2$, wet | = ppm |
| LB/MMBtu | = |



S-287 a1

INTERPOLL LABORATORIES

EPA Method 4 and 6 Field Data Sheet

Job L.P. / Hayward, WI
Source Line 2 Kanus / Stack
Date 6-8-94 Test 1B Run 3

Operator(s) M. Kuehl / K. Rosenthal
Meter Box No. 10 Gasmeter coef. .9930
ΔH@ 1.77 in.WC Bar. press 28.98 in.Hg

4

Sample Train Leak Check:
Pretest: < 0.02 cfm at 15 in. Hg.
Posttest: < 0.02 cfm at 10 in. Hg.

| Trav. Point No. | Samp. Time (min) | Sample Volume (cf) | Orif. Meter (inWC) | VAC. inHg | Temperatures (°F) | | | | | Oxygen |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Probe | Oven | Impg. | Gas/In | Gas/Out | (%v/v) |
| | 1743 | 671.30 | | | | | | | | |
| C-3 | 5 | 675.20 | 1.77 | 7 | 245 | 255 | 45 | 93 | 92 | 16.2 |
| 3 | 10 | 679.08 | 1.77 | 7 | 250 | 252 | 45 | 97 | 92 | 16.3 |
| 3 | 15 | 692.99 | 1.77 | 7 | 253 | 250 | 45 | 90 | 92 | 16.3 |
| 3 | 20 | 686.97 | 1.77 | 7 | 255 | 247 | 45 | 92 | 92 | 17.3 |
| 2 | 25 | 690.74 | 1.77 | 7 | 251 | 253 | 46 | 93 | 92 | 16.3 |
| 2 | 30 | 694.60 | 1.77 | 7 | 248 | 256 | 46 | 94 | 92 | 16.8 |
| 2 | 35 | 698.49 | 1.77 | 7 | 245 | 255 | 46 | 92 | 92 | 16.9 |
| 2 | 40 | 702.33 | 1.77 | 7 | 243 | 258 | 46 | 95 | 92 | 16.8 |
| 1 | 45 | 706.17 | 1.77 | 7 | 248 | 260 | 48 | 95 | 93 | 17.2 |
| 1 | 50 | 710.00 | 1.77 | 7 | 245 | 263 | 48 | 96 | 93 | 17.3 |
| 1 | 55 | 713.85 | 1.77 | 7 | 247 | 263 | 48 | 96 | 93 | 17.2 |
| 1 | 60 | 717.65 | 1.77 | 7 | 250 | 259 | 48 | 96 | 93 | 17.1 |
| | (1844) | | | | | | | | | |
| | θ= 60 | $V_m$=46.35 | (ΔH)avg=1.77 | | | | | $(t_m)_{avg.}$=87.38 | | |

Condensate Data:

| Item | Weight (g) | | |
|---|---|---|---|
| | Final | Tare | Difference |
| Impingers A | 307 | 267 | 40 |
| ~~Condenser~~ Impinger B | 274 | 266 | 8 |
| | | | |
| Desiccant | 1465 | 1450 | 15 |
| | | Total | 63 |

| Preliminary results of $SO_2$ concentration determination | |
|---|---|
| $V_{std}$ | =43.19 DSCF |
| Moisture = | 6.43 %v/v |
| $SO_2$, dry = | ppm |
| $SO_2$, wet = | ppm |
| LB/MMBtu = | |



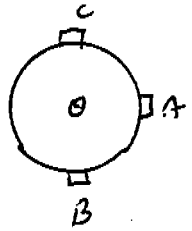
S-287 a1

INTERPOLL LABORATORIES, INC.
(612) 786-6020

# EPA Method 2 Field Data Sheet

Job L.P. / Hayward, WI
Source Line 2 Ilonite / Stack
Test 19 Run 0 Date 6-7-94
Stack Dimen. 51.5 IN.
Dry Bulb 329 °F Wet bulb 130 °F
Manometer ☐ Reg. ☐ Exp ☐ Elec.
Barometric Pressure 28.73 IN.HG
Static Pressure -.26 IN.WC
Operators M. Kuehler + K. Rosenthal
Pitot No. MM5-6 $C_p$ .94

Drawing of Test Site

| Cross-section View | Elevation View |
|---|---|
|   | |

POM

| Traverse Point No. | Fraction of Diameter | Distance From Stack Wall (IN.) | Distance From End of Port (IN.) | Velocity | Temp. of Gas (°F) |
|---|---|---|---|---|---|
| | | Port Length: 3.5 IN. | | Time Start: 0900 HRS | |
| A-1 | .021 | 1.09 | 4.59 | .30 | |
| 2 | .067 | 3.45 | 6.95 | .32 | |
| 3 | .119 | 6.08 | 9.58 | .33 | |
| 4 | .177 | 9.12 | 12.62 | .31 | |
| 5 | .250 | 12.88 | 16.38 | .29 | |
| 6 | .356 | 19.33 | 21.83 | .25 | |
| 7 | .644 | 33.17 | 36.67 | .20 | 329 |
| 8 | .750 | 39.63 | 42.13 | .20 | |
| 9 | .823 | 42.38 | 45.88 | .20 | |
| 10 | .894 | 45.42 | 48.92 | .21 | |
| 11 | .933 | 48.05 | 51.55 | .23 | |
| 12 | .979 | 50.42 | 53.92 | .23 | |
| B-1 | | | | .26 | |
| 2 | | | | .25 | |
| 3 | | | | .28 | |
| 4 | | | | .29 | |
| 5 | | | | .31 | 327 |
| 6 | | | | .32 | |
| 7 | | 35.49 ft/sec | | .28 | |
| 8 | | ACFM 30911 | | .26 | |
| 9 | | DSCFM 19005 | | .20 | |
| 10 | | | | .24 | |
| 11 | | | | .24 | |
| 12 | | | | .22 | |
| | | | | | |
| Temp. Meas. Device & S/N: PDT-31 / TC | | | | Time End: 0909 HRS | |

R or nothing = reg. manometer; S = expanded; E = electronic

# INTERPOLL LABORATORIES EPA MODIFIED METHOD 5 SAMPLE LOG SHEET

Job L.P. / Hayward, WI
Source Line 2 Ronus / Stack
Cyclone: ☐ Yes ☒ No Filter holder: MM5
Analytes: POM
Field recovery spike added: ☒ Yes ☐ No

Date 6-7-94 Test 19 Run 1
No. of traverse points 24
Filter type: 4" Glass fiber
XAD-2 resin: ___ g Batch No. ___
Reference: EPA SW-846 Method 0010

**Sample Train Leak Check:**

Pretest: < 0.02 cfm at 15 in. Hg. (vac) ☒
Postest: 0.02 cfm at 15 in. Hg. (vac) ☒

**Semivolatile Catch Data:**

No.s of filters used: 0343

Recovery solvent(s)
☒ MeCl2 * ~~MeOH (50:50 v/v)~~
☒ other(s) Acetone

No. of bottles for condensate trap catch: 1
Samples recovered by: M. Kuehlert + K. Rosenthal

**Condensate Data:**

| Item | Weight(g) | | |
|---|---|---|---|
| | Final | Tare | Difference |
| Condensate trap | 436 | 264 | 172 |
| Condensate trap | | | |
| Condensate trap | | | |
| | | | |
| ~~Impingers~~ Desiccant | 1438 | 1414 | 24 |
| Desiccant | 1408 | 1399 | 9 |
| Total | | | 205 |

**Integrated Gas Sampling Data:**

Bag Pump No. 294 Box No. 1 Bag No. 1

Bag Material: 4-layer Aluminized Tedlar Size: 44 L

Pretest leak check: 0 cc/min at 20 in. Hg.

Time start: 0927 (HRS) Time end: 1032 (HRS)

Sampling rate: 200 cc/min O2 Analyzer S/N: 9

INTERPOLL LABORATORIES C.A.R.B. TED ... 40D ... ELD A-3

Job L.P. / Hayward, Wi
Source Line 2 Kapus / Stack
Date 6-7-94 Test 14 Run 1

Operators M. Kuehler & K. Rosenthal
Meter Box No. 9
Geometer coeff. .9961

Nozzle No. HMS-6
Nozzle Dia. .364 in.
Bar. Press. 28.23 in. Hg

Pitot No. M-5-6
Cp .84
$H_2O$ 9 %

| Traverse Point No. | Sampling Time (min) | Sample Volume (cf) | Velocity Head (inWC) | Orifice Meter (inWC) | Dev. Vol. (cf) | VAC. inHg | Temperatures (°F) Stack | Probe | Oven | XAD2 | Imp. | Meter (In/Out) | | Oxygen (%V/V) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 0027 | 998.20 | | | | | | | | | | | | |
| B-12 | 5 | 1002.95 | .27 | 2.81 | 2.99 | 8 | 327 | 242 | 253 | 43 | 42 | 62 | 62 | 15.6 |
| 11 | 10 | 1007.20 | .26 | 2.69 | 7.67 | 8 | 328 | 247 | 259 | 43 | 42 | 69 | 62 | 15.6 |
| 10 | 15 | 1012.14 | .23 | 2.40 | 2.10 | 7 | 328 | 248 | 251 | 43 | 41 | 72 | 64 | 15.5 |
| 9 | 20 | 1016.42 | .21 | 2.19 | 6.35 | 7 | 332 | 245 | 253 | 44 | 42 | 74 | 67 | 15.4 |
| 8 | 25 | 1020.40 | .18 | 1.88 | 0.30 | 6 | 334 | 251 | 257 | 44 | 42 | 76 | 68 | 15.7 |
| 7 | 30 | 1024.34 | .18 | 1.88 | 4.26 | 6 | 334 | 253 | 257 | 44 | 43 | 29 | 70 | 15.8 |
| 6 | 35 | 1028.31 | .19 | 2.00 | 8.35 | 6 | 334 | 255 | 260 | 44 | 42 | 79 | 70 | 15.5 |
| 5 | 40 | 1032.90 | .24 | 2.52 | 1.93 | 8 | 334 | 249 | 254 | 46 | 43 | 81 | 71 | 16.6 |
| 4 | 45 | 1037.60 | .25 | 2.63 | 7.62 | 8 | 335 | 245 | 250 | 45 | 43 | 82 | 72 | 16.9 |
| 3 | 50 | 1042.81 | .31 | 3.26 | 2.85 | 10 | 335 | 245 | 253 | 45 | 43 | 83 | 73 | 16.5 |
| 2 | 55 | 1048.20 | .33 | 3.49 | 8.25 | 11 | 333 | 247 | 249 | 45 | 43 | 82 | 74 | 16.1 |
| 1 | 60 | 1053.49 | .32 | 3.37 | 3.57 | 11 | 336 | 247 | 252 | 45 | 43 | 82 | 74 | 15.8 |
| A-12 | 65 | 1058.16 | .24 | 2.54 | 8.18 | 9 | 334 | 244 | 256 | 45 | 44 | 77 | 74 | 15.4 |
| 11 | 70 | 1062.94 | .26 | 2.73 | 2.96 | 9.5 | 335 | 249 | 258 | 46 | 44 | 82 | 75 | 16.4 |
| 10 | 75 | 1067.67 | .25 | 2.66 | 2.69 | 9.5 | 330 | 245 | 253 | 46 | 44 | 84 | 76 | 16.8 |
| 9 | 80 | 1072.27 | .23 | 2.45 | 2.23 | 9 | 333 | 246 | 255 | 46 | 44 | 85 | 77 | 16.7 |
| 8 | 85 | 1076.81 | .23 | 2.45 | 6.78 | 9 | 333 | 249 | 251 | 46 | 44 | 86 | 77 | 16.2 |
| 7 | 90 | 1081.02 | .20 | 2.13 | 1.02 | 8 | 335 | 247 | 258 | 46 | 44 | 86 | 77 | 15.8 |
| 6 | 95 | 1085.49 | .22 | 2.34 | 5.47 | 8.5 | 335 | 247 | 257 | 47 | 46 | 88 | 78 | 15.6 |
| 5 | 100 | 1090.03 | .23 | 2.45 | 0.03 | 9 | 336 | 243 | 261 | 47 | 46 | 87 | 79 | 16.1 |
| 4 | 105 | 1095.02 | .28 | 2.98 | 5.05 | 11 | 337 | 246 | 262 | 47 | 46 | 88 | 79 | 16.5 |
| 3 | 110 | 1100.31 | .31 | 3.30 | 0.33 | 12.5 | 336 | 244 | 260 | 48 | 46 | 88 | 80 | 16.0 |
| 2 | 115 | 1105.66 | .31 | 3.32 | 5.64 | 12.5 | 331 | 247 | 256 | 48 | 46 | 87 | 80 | 15.9 |
| 1 | 120 | 1110.54 | .26 | 2.79 | 0.51 | 11 | 329 | 245 | 257 | 48 | 46 | 87 | 80 | 15.8 |
| | (1032) | | | | | | | | | | | | | |
| | θ = 120 | Va = 112.39 | | ^H 2.64 | | | | | | | | Avg. = 77.1 | | |

D-53

S-405

# INTERPOLL LABORATORIES EPA MODIFIED METHOD 5 SAMPLE LOG SHEET

Job L.P. / Hayward, WI
Source Line 2 Recup. / Stack
Cyclone: ☐ Yes ☒ No Filter holder: MM5
Analytes: POM
Field recovery spike added: ☑ Yes ☐ No

Date 6-7-94 Test 19 Run 2
No. of traverse points 24
Filter type: 4" Glass fiber
XAD-2 resin: ___ g Batch No. ___
Reference: EPA SW-846 Method 0010

**Sample Train Leak Check:**

Pretest: < 0.02 cfm at 15 in. Hg. (vac) ☒
Postest: <0.02 cfm at 14 in. Hg. (vac) ☒

**Semivolatile Catch Data:**

No.s of filters used: 0344

Recovery solvent(s)
☑ MeCl2 ~~* MeOH (50:50 v/v)~~
☑ other(s) Acetone

No. of bottles for condensate trap catch: 1
Samples recovered by: M. Kuchler + K. Rosenthal

**Condensate Data:**

| Item | Weight(g) | | |
|---|---|---|---|
| | Final | Tare | Difference |
| Condensate trap | | | |
| Condensate trap | 422 | 264 | 158 |
| Condensate trap | | | |
| | | | |
| Impingers | | | |
| Desiccant | 1487 | 1450 | 37 |
| Total | | | 195 |

**Integrated Gas Sampling Data:**

Bag Pump No. 29A Box No. 1 Bag No. 2
Bag Material: 4-layer Aluminized Tedlar Size: 44 L
Pretest leak check: 0 cc/min at 20 in. Hg.
Time start: 1136 (HRS) Time end: 1342 (HRS)
Sampling rate: 200 cc/min O2 Analyzer S/N: 9

Rev.1 CF-026

INTERPOLL LABORATORIES EPA M  FIED METHOD 5 FIELD DATA SHEET

Job N.P./ Hayward, WI
Source Line 2 Kiln's / Stack
Date 6-7-94 Test 14 Run 2

Operators M. Kuehlert K. Rosenthal
Meter Box No. 9
Gasmeter coeff. .9961

Nozzle No. M-M5-6
Nozzle Dia. .364 In.
Bar. Pres. 28.23 In. Hg

Pitot No. M-M5-6
Cp .84
$H_2O$ 8.3 %

| Traverse Point No. | Sampling Time (min) | Sample Volume (cf) | Velocity Head (inWC) | Orifice Meter (inWC) | Dev. Vol. (cf) | VAC. inHg | Temperatures (°F) | | | | | | | Oxygen (%v/v) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | Stack | Probe | Oven | XAD2 | Imp. | Meter (In/Out) | | |
| | 1136 | 111.00 | | | | | | | | | | | | |
| A-12 | 5 | 115.89 | .26 | 2.79 | 5.03 | 12 | 331 | 247 | 255 | 44 | 42 | 75 | 75 | 16.5 |
| 11 | 10 | 120.68 | .27 | 2.87 | 0.72 | 12 | 335 | 254 | 264 | 42 | 39 | 78 | 76 | 16.5 |
| 10 | 15 | 125.60 | .26 | 2.77 | 5.54 | 12 | 337 | 249 | 249 | 43 | 40 | 81 | 77 | 16.7 |
| 9 | 20 | 130.07 | .22 | 2.36 | 0.00 | 10.5 | 334 | 245 | 248 | 43 | 40 | 82 | 78 | 16.1 |
| 8 | 25 | 134.56 | .22 | 2.37 | 4.46 | 10.5 | 334 | 246 | 240 | 43 | 40 | 84 | 79 | 15.7 |
| 7 | 30 | 138.81 | .20 | 2.16 | 9.74 | 10 | 333 | 246 | 235 | 43 | 41 | 86 | 79 | 16.1 |
| 6 | 35 | 142.97 | .19 | 2.05 | 2.91 | 9.5 | 337 | 243 | 234 | 43 | 41 | 87 | 79 | 15.5 |
| 5 | 40 | 147.63 | .24 | 2.58 | 2.58 | 11 | 339 | 247 | 234 | 43 | 41 | 89 | 80 | 16.1 |
| 4 | 45 | 152.52 | .27 | 2.91 | 2.55 | 13 | 339 | 247 | 248 | 43 | 41 | 89 | 81 | 16.5 |
| 3 | 50 | 157.85 | .29 | 3.35 | 7.88 | 15 | 336 | 242 | 253 | 44 | 42 | 89 | 82 | 16.5 |
| 2 | 55 | 163.00 | .29 | 3.14 | 3.04 | 14 | 336 | 245 | 249 | 44 | 42 | 89 | 82 | 16.8 |
| 1 | 60 | 168.22 | .30 | 3.24 | 8.29 | 14.5 | 337 | 245 | 247 | 44 | 42 | 89 | 82 | 16.5 |
| B-12 | 65 | 172.86 | .23 | 2.49 | 2.90 | 13 | 335 | 248 | 250 | 44 | 42 | 84 | 82 | 16.1 |
| 11 | 70 | 177.52 | .24 | 2.59 | 7.58 | 13 | 335 | 248 | 253 | 45 | 42 | 87 | 83 | 15.3 |
| 10 | 75 | 182.05 | .22 | 2.37 | 2.07 | 11.5 | 341 | 246 | 251 | 45 | 43 | 90 | 83 | 15.7 |
| 9 | 80 | 186.30 | .19 | 2.05 | 6.26 | 10 | 341 | 242 | 250 | 45 | 43 | 94 | 94 | 16.7 |
| 8 | 85 | 190.42 | .18 | 1.96 | 0.36 | 10 | 339 | 243 | 247 | 45 | 43 | 96 | 85 | 16.8 |
| 7 | 90 | 194.41 | .17 | 1.85 | 4.35 | 9.5 | 340 | 240 | 248 | 44 | 45 | 98 | 86 | 16.8 |
| 6 | 95 | 198.80 | .21 | 2.29 | 8.29 | 11 | 341 | 245 | 251 | 44 | 43 | 99 | 87 | 16.8 |
| 5 | 100 | 203.80 | .27 | 2.94 | 3.83 | 15 | 342 | 242 | 253 | 44 | 43 | 99 | 88 | 16.5 |
| 4 | 105 | 209.15 | .30 | 3.29 | 9.15 | 17 | 337 | 243 | 250 | 44 | 43 | 98 | 88 | 16.7 |
| 3 | 110 | 214.67 | .33 | 3.59 | 4.71 | 18 | 342 | 243 | 252 | 44 | 43 | 99 | 88 | 16.8 |
| 2 | 115 | 220.50 | .32 | 3.48 | 0.57 | 17 | 343 | 247 | 256 | 44 | 43 | 98 | 88 | 16.5 |
| 1 | 120 | 225.57 | .32 | 3.49 | 5.66 | 17 | 341 | 241 | 253 | 44 | 43 | 98 | 87 | 16.5 |
| | (1342) | | | | | | | | | | | | | |
| | θ= | Va= 114.57 | | ^H=2.71 | | | | | | | | Avg.= 86.1 | | |

D-55

S-405

# INTERPOLL LABORATORIES EPA MODIFIED METHOD 5 SAMPLE LOG SHEET

Job L.P. / Hayward, WI
Source Line 2 Kenics / Stack
Cyclone: ☐ Yes ☒ No Filter holder: MM5
Analytes: POM
Field recovery spike added: ☒ Yes ☐ No

Date 6-7-94 Test 19 Run 3
No. of traverse points 24
Filter type: 4" Glass fiber
XAD-2 resin: ___ g Batch No. ___
Reference: EPA SW-846 Method 0010

**Sample Train Leak Check:**

Pretest: < 0.02 cfm at 15 in. Hg. (vac) ☒
Postest: 20.02 cfm at 19 in. Hg. (vac) ☒

**Semivolatile Catch Data:**

No.s of filters used: 0345

Recovery solvent(s)
☒ MeCl2 ~~*-MeOH 450:50 v/v)~~
☒ other(s) Acetone

No. of bottles for condensate trap catch: 1
Samples recovered by: M. Lasalle & K. Rosenthal

**Condensate Data:**

| Item | Weight(g) | | |
|---|---|---|---|
| | Final | Tare | Difference |
| Condensate trap | | | |
| Condensate trap | | | |
| Condensate trap | | | |
| | | | |
| Impingers | 401 | 264 | 137 |
| Desiccant | 1469 | 1408 | 61 |
| Total | | | 198 |

**Integrated Gas Sampling Data:**

Bag Pump No. 29A Box No. 1 Bag No. 3
Bag Material: 4-layer Aluminized Tedlar Size: 44 L
Pretest leak check: 0 cc/min at 20 in. Hg.
Time start: 1425 (HRS) Time end: 1627 (HRS)
Sampling rate: 200 cc/min O2 Analyzer S/N: 9

INTERPOLL LABORATORIES EPA MODIFIED METHOD 5 FIELD DATA SHEET

Job L.P. / Hayward, WI
Source Line 2 Roaus / Stack
Date 6-7-94 Test 14 Run 3

Operators M. Boeflet + K. Rosenthal
Meter Box No. 9
Gasmeter coeff. .9961

Nozzle No. mm5-6
Nozzle Dia. .364 in.
Bar. Pres. 28.73 in. Hg

Pitot No. mm5-6
Cp .84
$H_2O$ 7.9 %

| Traverse Point No. | Sampling Time (min) | Sample Volume (cf) | Velocity Head (inWC) | Orifice Meter (inWC) | Dec. Vol. (cf) | VAC. inHg | Temperatures (°F) | | | | | | | Oxygen (%v/v) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | Stack | Probe | Oven | XAD2 | Imp. | Meter (In/Out) | | |
| | 1425 | 225.90 | | | | | | | | | | | | |
| B-12 | 5 | 230.47 | .23 | 2.53 | 0.54 | 10 | 331 | 243 | 251 | 42 | 40 | 92 | 82 | 17.6 |
| 11 | 10 | 235.21 | .24 | 2.61 | 5.24 | 10.5 | 333 | 240 | 254 | 42 | 40 | 85 | 82 | 16.9 |
| 10 | 15 | 239.80 | .22 | 2.39 | 9.74 | 10 | 337 | 245 | 255 | 42 | 40 | 88 | 83 | 17.1 |
| 9 | 20 | 244.10 | .20 | 2.18 | 4.05 | 9 | 336 | 241 | 252 | 43 | 40 | 90 | 83 | 17.2 |
| 9 | 25 | 248.30 | .19 | 2.08 | 8.27 | 8 | 336 | 245 | 242 | 41 | 39 | 91 | 93 | 17.9 |
| 7 | 30 | 252.53 | .19 | 2.07 | 2.48 | 8 | 340 | 249 | 235 | 41 | 39 | 92 | 84 | 17.8 |
| 6 | 35 | 257.12 | .22 | 2.41 | 7.02 | 9.5 | 337 | 244 | 238 | 41 | 39 | 93 | 85 | 17.6 |
| 5 | 40 | 261.45 | .20 | 2.19 | 1.35 | 9 | 338 | 247 | 243 | 40 | 39 | 94 | 86 | 17.8 |
| 4 | 45 | 266.55 | .28 | 3.08 | 6.49 | 12.5 | 335 | 250 | 244 | 40 | 39 | 94 | 86 | 17.3 |
| 3 | 50 | 271.07 | .30 | 3.29 | 1.80 | 14 | 337 | 246 | 248 | 40 | 39 | 94 | 86 | 17.2 |
| 2 | 55 | 277.45 | .33 | 3.61 | 7.36 | 16 | 338 | 247 | 252 | 40 | 40 | 94 | 86 | 17.3 |
| 1 | 60 | 282.85 | .31 | 3.42 | 2.77 | 16 | 332 | 243 | 250 | 40 | 40 | 94 | 85 | 17.0 |
| A-12 | 65 | 287.20 | .25 | 2.75 | 7.63 | 12 | 335 | 245 | 256 | 42 | 40 | 90 | 85 | 17.3 |
| 11 | 70 | 292.70 | .27 | 2.96 | 2.65 | 13 | 335 | 240 | 257 | 42 | 40 | 94 | 86 | 17.0 |
| 10 | 75 | 297.68 | .26 | 2.89 | 7.63 | 12 | 328 | 237 | 254 | 42 | 41 | 95 | 86 | 17.1 |
| 9 | 80 | 302.67 | .27 | 3.00 | 2.70 | 13 | 329 | 241 | 253 | 43 | 41 | 97 | 87 | 16.9 |
| 8 | 85 | 307.37 | .22 | 2.45 | 7.29 | 11 | 329 | 244 | 250 | 43 | 41 | 97 | 87 | 17.4 |
| 7 | 90 | 311.73 | .20 | 2.24 | 1.69 | 9.5 | 326 | 245 | 254 | 43 | 41 | 97 | 87 | 17.1 |
| 6 | 95 | 316.55 | .25 | 2.79 | 6.59 | 12.5 | 326 | 247 | 253 | 43 | 41 | 98 | 88 | 16.5 |
| 5 | 100 | 322.00 | .31 | 3.46 | 2.05 | 15 | 327 | 247 | 250 | 43 | 41 | 98 | 87 | 16.7 |
| 4 | 105 | 327.55 | .32 | 3.56 | 7.58 | 16 | 329 | 251 | 250 | 44 | 42 | 96 | 87 | 16.5 |
| 3 | 110 | 332.78 | .28 | 3.12 | 2.76 | 15.5 | 327 | 250 | 254 | 44 | 42 | 94 | 87 | 16.1 |
| 2 | 115 | 337.90 | .27 | 3.01 | 2.84 | 14 | 325 | 247 | 253 | 44 | 42 | 94 | 87 | 16.2 |
| 1 | 120 | 342.90 | .27 | 3.01 | 2.92 | 14 | 326 | 244 | 250 | 44 | 43 | 94 | 87 | 16.1 |
| | 1627 | | | | | | | | | | | | | |
| | θ= 120 | Va= 117.00 | | ^H2.90 | | | | | | | | Avg.= 99.3 | | |

D-57

S-405

INTERPOLL LABORATORIES - EPA METHOD 2 FIELD DATA SHEET

Job L.P. / Hayward, WI

Source Line 2 Kilns / Stack

Test 20 Run 0 Date 6-7-94

Stack dimen. 51.5 IN.

Dry bulb 325 °F Wet bulb 130 °F

Manometer: ☒ Reg. ☐ Exp. ☐ Elec.

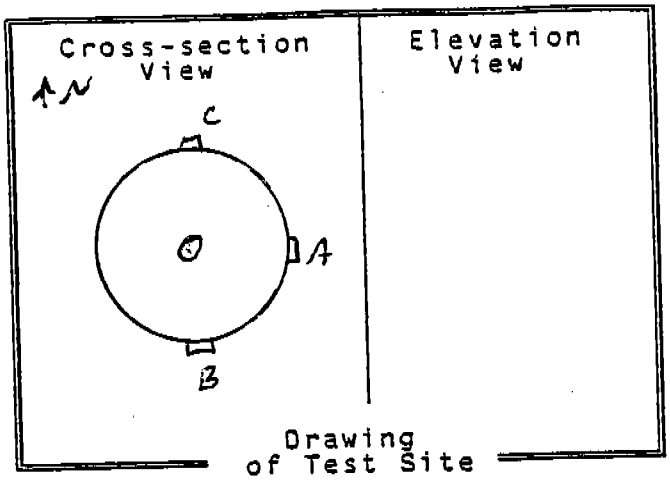
Barometric pressure 28 in Hg

Static pressure 28.73 in WC

Operators M. Kuehl + K. Rosenthal

Pitot No. NA $C_p$ NA

Benzene




| Traverse Point No. | Fraction of Diameter | Distance from Stack Wall (in) | Distance from End of Port (in) | Velocity Pressure (in WC) | Temperature of gas (°F) |
|---|---|---|---|---|---|
| | | Port length: 3.5 in. | | Time start: NA hrs | |
| C-1 | 1/6 | 8.58 | 12.08 | | |
| 2 | 3/6 | 25.75 | 29.25 | | 335 |
| 3 | 5/6 | 42.92 | 46.42 | | |
| | | | | | |
| | | | | | |
| | | |

INTERPOLL LABORATORIES

Benzene Field Data Sheet

Job L.P. / Hayward, WI
Source Line 2 Konus / Stack
Date 6-7-94 Test 20 Run 1

Operator(s) M. Kaehler + K. Rosenthal
Meter Box No. 55 Meter coef. 1.0015
Barometric Pressure 28.73 in.Hg

Sample Train Leak Check:
Pretest: 0 cc/min at 20 in.Hg
Posttest: 0 cc/min at 16 in.Hg

| Trav. Point No. | Samp. Time (min) | Sample Volume (cf) | Sample Rate (cc/min) | VAC. (inHg) | Temperature (°F) | | |
|---|---|---|---|---|---|---|---|
| | | | | | Stack | Probe | Gasmeter |
| | 0949 | 921.500 | | | | | |
| C-3 | 5 | 921.697 | 1000 | 3 | 334 | NA | 70 |
| 3 | 10 | 921.890 | 1000 | 3 | 334 | | 71 |
| 3 | 15 | 922.063 | 1000 | 3 | 334 | | 73 |
| 3 | 20 | 922.250 | 1000 | 3 | 334 | | 75 |
| 2 | 25 | 922.434 | 1000 | 3 | 335 | | 78 |
| 2 | 30 | 922.790 | 1000 | 3 | 335 | | 80 |
| 2 | 35 | 922.910 | 1000 | 4 | 336 | | 85 |
| 2 | 40 | 923.030 | 1000 | 5 | 334 | | 87 |
| 1 | 45 | 923.149 | 1000 | 6 | 334 | | 89 |
| 1 | 50 | 923.335 | 1000 | 6 | 335 | | 90 |
| 1 | 55 | 923.525 | 1000 | 6 | 335 | | 91 |
| 1 | 60 | 923.808 | 1000 | 6 | 330 | | 92 |
| | $\theta$=60 | $V_m$=2.308 | | | | | $t_m$=81.75 |

(0951)

$V_{STD}$ = 2.163

INTERPOLL LABORATORIES

Benzene Field Data Sheet

Job L.P. / Hayward, CA
Source Line 2 Konus / Stack
Date 6-7-94 Test 20 Run 2

Operator(s) M. Kaehler + K. Rosenthal
Meter Box No. 55 Meter coef. 1.0015
Barometric Pressure 28.73 in.Hg

Sample Train Leak Check:
Pretest: 0 cc/min at 16 in.Hg
Posttest: 0 cc/min at 16 in.Hg

| Trav. Point No. | Samp. Time (min) | Sample Volume (cf) | Sample Rate (cc/min) | VAC. (inHg) | Temperature (oF) | | |
|---|---|---|---|---|---|---|---|
| | | | | | Stack | Probe | Gasmeter |
| | 1142 | 924.800 | | | | | |
| C-3 | 5 | 924.800 | 1000 | 3 | 335 | NA | 90 |
| 3 | 10 | 924.897 | 1000 | 3 | 337 | | 91 |
| 3 | 15 | 925.173 | 1000 | 3 | 334 | | 93 |
| 3 | 20 | 925.359 | 1000 | 3 | 334 | | 95 |
| 2 | 25 | 925.545 | 1000 | 3 | 333 | | 97 |
| 2 | 30 | 925.733 | 1000 | 3 | 337 | | 99 |
| 2 | 35 | 925.920 | 1000 | 3 | 339 | | 101 |
| 2 | 40 | 926.007 | 1000 | 3 | 339 | | 103 |
| 1 | 45 | 926.224 | 1000 | 3 | 336 | | 104 |
| 1 | 50 | 926.449 | 1000 | 3 | 336 | | 107 |
| 1 | 55 | 926.669 | 1000 | 3 | 337 | | 108 |
| 1 | 60 | 926.858 | 1000 | 3 | 337 | | 109 |
| | θ= 60 | Vm=2.258 | | | | | tm=99.75 |

(1242)

$V_{STD}$ = 2.048

S-476

INTERPOLL LABORATORIES

Benzene Field Data Sheet

Job L.P. / Hayward, WI
Source Line 2 Reboiler / Stack
Date 6-7-94 Test 10 Run 3

Operator(s) M. Kaehler & K. Rosenthal
Meter Box No. 55 Meter coef. 1.0015
Barometric Pressure 28.73 in.Hg

Sample Train Leak Check:
Pretest: 0 cc/min at 16 in.Hg
Posttest: 0 cc/min at 16 in.Hg

| Trav. Point No. | Samp. Time (min) | Sample Volume (cf) | Sample Rate (cc/min) | VAC. (inHg) | Temperature (oF) | | |
|---|---|---|---|---|---|---|---|
| | | | | | Stack | Probe | Gasmeter |
| | 1436 | 926.90 | | | | | |
| C-3 | 5 | 927.086 | 1000 | 3 | 337 | NA | 94 |
| 3 | 10 | 927.272 | 1000 | 3 | 336 | | 94 |
| 3 | 15 | 927.457 | 1000 | 3 | 336 | | 95 |
| 3 | 20 | 927.642 | 1000 | 3 | 340 | | 97 |
| 2 | 25 | 927.835 | 1000 | 3 | 337 | | 98 |
| 2 | 30 | 928.023 | 1000 | 3 | 338 | | 99 |
| 2 | 35 | 928.210 | 1000 | 3 | 335 | | 101 |
| 2 | 40 | 928.397 | 1000 | 3 | 337 | | 102 |
| 1 | 45 | 928.584 | 1000 | 3 | 338 | | 103 |
| 1 | 50 | 928.772 | 1000 | 3 | 332 | | 104 |
| 1 | 55 | 928.956 | 1000 | 3 | 334 | | 105 |
| 1 | 60 | 929.139 | 1000 | 3 | 335 | | 106 |
| | θ=60 | Vm=2.239 | | | | | tm=99.83 |

(1536)

$V_{STD}$ = 2.031

S-476

# APPENDIX E

## INTERPOLL LABORATORIES ANALYTICAL DATA

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Interpoll Laboratories
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# EPA Method 3 Data Reporting Sheet
## Orsat Analysis

Job L.P Howard
Team Leader SB
Date Submitted 6-13-94
Test No. 1
Date of Analysis 6-15-94

Source Press RTO Outlet
Test Site Stack
Date of Test 6-7-94
No. of Runs Completed 3
Technician C. Helgesen

| Test/ Run | Sample Log Number and Type | No. of An. | Buret Readings (ml) Zero Pt. | After $CO_2$ | After $O_2$ | Conc. $CO_2$ %v/v Dry | Conc. $O_2$ %v/v Dry | $F_o$ |
|---|---|---|---|---|---|---|---|---|
| 1/1 | 3097-101 | 1 | 0.00 | 0.30 | 20.80 | 0.30 | 20.50 | |
| | | 2 | 0.00 | 0.30 | 20.80 | 0.30 | 20.50 | |
| | ☑ B ☐ F | Avg | | | | 0.30 | 20.50 | |
| 1/2 | -102 | 1 | 0.00 | 0.40 | 20.90 | 0.40 | 20.50 | |
| | | 2 | 0.00 | 0.40 | 20.90 | 0.40 | 20.50 | |
| | ☑ B ☐ F | Avg | | | | 0.40 | 20.50 | |
| 1/3 | -103 | 1 | 0.00 | 0.40 | 20.90 | 0.40 | 20.50 | |
| | | 2 | 0.00 | 0.40 | 20.90 | 0.40 | 20.50 | |
| | ☑ B ☐ F | Avg | | | | 0.40 | 20.50 | |
| | | 1 | | | | | | |
| | | 2 | | | | | | |
| | ☐ B ☐ F | Avg | | | | | | |
| | | 1 | | | | | | |
| | | 2 | | | | | | |
| | ☐ B ☐ F | Avg | | | | | | |
| | | 1 | | | | | | |
| | | 2 | | | | | | |
| | ☐ B ☐ F | Avg | | | | | | |
| | | 1 | | | | | | |
| | | 2 | | | | | | |
| | ☐ B ☐ F | Avg | | | | | | |
| | | 1 | | | | | | |
| | | 2 | | | | | | |
| | ☐ B ☐ F | Avg | | | | | | |
| | | 1 | | | | | | |
| | | 2 | | | | | | |
| | ☐ B ☐ F | Avg | | | | | | |

☑ Ambient Air QA Check
☑ Orsat Analyzer System Leak Check
☐ $F_o$ Within EPA M-3 Guidelines for fuel type.

Where $F_o = \frac{20.9 - O_2}{CO_2}$

F=Flask (250 cc all glass)
B=Tedlar Bag (5-layer)

EPA Method 3 Guidelines

| Fuel Type | F0 Range |
|---|---|
| Coal: | |
| Anthracite/Lignite | 1.016-1.130 |
| Bituminous | 1.083-1.230 |
| Oil: | |
| Distillate | 1.260-1.413 |
| Residual | 1.210-1.370 |
| Gas: | |
| Natural | 1.600-1.836 |
| Propane | 1.434-1.586 |
| Butane | 1.405-1.553 |
| Wood/Wood Bark | 1.000-1.130 |

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Interpoll Laboratories
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# EPA Method 3 Data Reporting Sheet
## Orsat Analysis

Job L.P. Hayward
Team Leader SB
Date Submitted 6-13-94
Test No. 2
Date of Analysis 6-15-94

Source Press RTO outlet
Test Site Stack
Date of Test 6-8-94
No. of Runs Completed 3
Technician C. Hultgren

| Test/ Run | Sample Log Number and Type | No. of An. | Buret Readings (ml) Zero Pt. | After $CO_2$ | After $O_2$ | Conc. $CO_2$ %v/v Dry | Conc. $O_2$ %v/v Dry | $F_o$ |
|---|---|---|---|---|---|---|---|---|
| 2/1 | 3097-104 | 1 | 0.00 | 0.40 | 21.00 | 0.40 | 20.60 | |
| | | 2 | 0.00 | 0.40 | 21.00 | 0.40 | 20.60 | |
| | ☑ B ☐ F | Avg | | | | 0.40 | 20.60 | |
| 2/2 | -105 | 1 | 0.00 | 0.40 | 21.00 | 0.40 | 20.60 | |
| | | 2 | 0.00 | 0.40 | 21.00 | 0.40 | 20.60 | |
| | ☑ B ☐ F | Avg | | | | 0.40 | 20.60 | |
| 2/3 | -106 | 1 | 0.00 | 0.40 | 21.00 | 0.40 | 20.60 | |
| | | 2 | 0.00 | 0.40 | 21.00 | 0.40 | 20.60 | |
| | ☑ B ☐ F | Avg | | | | 0.40 | 20.60 | |
| | | 1 | | | | | | |
| | | 2 | | | | | | |
| | ☐ B ☐ F | Avg | | | | | | |
| | | 1 | | | | | | |
| | | 2 | | | | | | |
| | ☐ B ☐ F | Avg | | | | | | |
| | | 1 | | | | | | |
| | | 2 | | | | | | |
| | ☐ B ☐ F | Avg | | | | | | |
| | | 1 | | | | | | |
| | | 2 | | | | | | |
| | ☐ B ☐ F | Avg | | | | | | |
| | | 1 | | | | | | |
| | | 2 | | | | | | |
| | ☐ B ☐ F | Avg | | | | | | |
| | | 1 | | | | | | |
| | | 2 | | | | | | |
| | ☐ B ☐ F | Avg | | | | | | |

☑ Ambient Air QA Check
☑ Orsat Analyzer System Leak Check
☐ $F_o$ Within EPA M-3 Guidelines for fuel type.

Where $F_o = \frac{20.9 - O_2}{CO_2}$

F=Flask (250 cc all glass)
B=Tedlar Bag (5-layer)

EPA Method 3 Guidelines

| Fuel Type | F0 Range |
|---|---|
| Coal: | |
| Anthracite/Lignite | 1.016-1.130 |
| Bituminous | 1.083-1.230 |
| Oil: | |
| Distillate | 1.260-1.413 |
| Residual | 1.210-1.370 |
| Gas: | |
| (Natural) other | 1.600-1.836 |
| Propane | 1.434-1.586 |
| Butane | 1.405-1.553 |
| Wood/Wood Bark | 1.000-1.130 |



LSC-04-RR

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Interpoll Laboratories
(612) 786-6020

# EPA Method 3 Data Reporting Sheet
## Orsat Analysis

Job L.P. Hayward
Team Leader SB
Date Submitted 6-13-94
Test No. 3
Date of Analysis 6-15-94

Source Press RTO outlet
Test Site Stack
Date of Test 6-7-94
No. of Runs Completed 3
Technician E. Helgeson

| Test/ Run | Sample Log Number and Type | No. of An. | Buret Readings (ml) Zero Pt. | After $CO_2$ | After $O_2$ | Conc. $CO_2$ %v/v Dry | Conc. $O_2$ %v/v Dry | $F_o$ |
|---|---|---|---|---|---|---|---|---|
| 3/1 | 3097-113 | 1 | 0.00 | 0.40 | 20.90 | 0.40 | 20.50 | |
| | | 2 | 0.00 | 0.40 | 20.90 | 0.40 | 20.50 | |
| | ☑ B ☐ F | Avg | | | | 0.40 | 20.50 | |
| 3/2 | -114 | 1 | 0.00 | 0.40 | 20.90 | 0.40 | 20.50 | |
| | | 2 | 0.00 | 0.40 | 20.90 | 0.40 | 20.50 | |
| | ☑ B ☐ F | Avg | | | | 0.40 | 20.50 | |
| 3/3 | -115 | 1 | 0.00 | 0.40 | 20.90 | 0.40 | 20.50 | |
| | | 2 | 0.00 | 0.40 | 20.90 | 0.40 | 20.50 | |
| | ☑ B ☐ F | Avg | | | | 0.40 | 20.50 | |
| | | 1 | | | | | | |
| | | 2 | | | | | | |
| | ☐ B ☐ F | Avg | | | | | | |
| | | 1 | | | | | | |
| | | 2 | | | | | | |
| | ☐ B ☐ F | Avg | | | | | | |
| | | 1 | | | | | | |
| | | 2 | | | | | | |
| | ☐ B ☐ F | Avg | | | | | | |
| | | 1 | | | | | | |
| | | 2 | | | | | | |
| | ☐ B ☐ F | Avg | | | | | | |
| | | 1 | | | | | | |
| | | 2 | | | | | | |
| | ☐ B ☐ F | Avg | | | | | | |
| | | 1 | | | | | | |
| | | 2 | | | | | | |
| | ☐ B ☐ F | Avg | | | | | | |

☑ Ambient Air QA Check
☑ Orsat Analyzer System Leak Check
☐ $F_o$ Within EPA M-3 Guidelines for fuel type.

Where $F_o = \frac{20.9 - O_2}{CO_2}$

F=Flask (250 cc all glass)
B=Tedlar Bag (5-layer)

EPA Method 3 Guidelines

| Fuel Type | $F_0$ Range |
|---|---|
| Coal: | |
| Anthracite/Lignite | 1.016–1.130 |
| Bituminous | 1.083–1.230 |
| Oil: | |
| Distillate | 1.260–1.413 |
| Residual | 1.210–1.370 |
| Gas: | |
| Natural | 1.600–1.836 |
| Propane | 1.434–1.586 |
| Butane | 1.405–1.553 |
| Wood/Wood Bark | 1.000–1.130 |



LSC-04-RR

Interpoll Laboratories
(612) 786-6020

# EPA Method 3 Data Reporting Sheet
## Orsat Analysis

Job L. P. Hayward
Team Leader SB
Date Submitted 6-13-94
Test No. 3
Date of Analysis 6-15-94

Source #1 Press RTO
Test Site outlet
Date of Test 6-10-94
No. of Runs Completed 3
Technician C. Helseth

| Test/ Run | Sample Log Number and Type | No. of An. | Buret Readings (ml) Zero Pt. | After $CO_2$ | After $O_2$ | Conc. $CO_2$ %v/v Dry | Conc. $O_2$ %v/v Dry | $F_o$ |
|---|---|---|---|---|---|---|---|---|
| 3/1 | 3097 - 107 | 1 | 0.00 | 0.40 | 20.90 | 0.40 | 20.50 | |
| | ☑B ☐F | 2 | 0.00 | 0.40 | 20.90 | 0.40 | 20.50 | |
| | | Avg | | | | 0.40 | 20.50 | |
| 3/2 | -108 | 1 | 0.00 | 0.40 | 20.90 | 0.40 | 20.50 | |
| | ☑B ☐F | 2 | 0.00 | 0.40 | 20.90 | 0.40 | 20.50 | |
| | | Avg | | | | 0.40 | 20.50 | |
| 3/3 | -109 | 1 | 0.00 | 0.40 | 20.90 | 0.40 | 20.50 | |
| | ☑B ☐F | 2 | 0.00 | 0.40 | 20.90 | 0.40 | 20.50 | |
| | | Avg | | | | 0.40 | 20.50 | |
| | | 1 | | | | | | |
| | ☐B ☐F | 2 | | | | | | |
| | | Avg | | | | | | |
| | | 1 | | | | | | |
| | ☐B ☐F | 2 | | | | | | |
| | | Avg | | | | | | |
| | | 1 | | | | | | |
| | ☐B ☐F | 2 | | | | | | |
| | | Avg | | | | | | |
| | | 1 | | | | | | |
| | ☐B ☐F | 2 | | | | | | |
| | | Avg | | | | | | |
| | | 1 | | | | | | |
| | ☐B ☐F | 2 | | | | | | |
| | | Avg | | | | | | |
| | | 1 | | | | | | |
| | ☐B ☐F | 2 | | | | | | |
| | | Avg | | | | | | |

☑ Ambient Air QA Check
☑ Orsat Analyzer System Leak Check
☐ $F_o$ Within EPA M-3 Guidelines for fuel type.

Where $F_o = \frac{20.9 - O_2}{CO_2}$

F=Flask (250 cc all glass)
B=Tedlar Bag (5-layer)

EPA Method 3 Guidelines

| Fuel Type | F0 Range |
|---|---|
| Coal: | |
| Anthracite/Lignite | 1.016-1.130 |
| Bituminous | 1.083-1.230 |
| Oil: | |
| Distillate | 1.260-1.413 |
| Residual | 1.210-1.370 |
| Gas: | |
| (Natural) | 1.600-1.836 |
| Propane | 1.434-1.586 |
| Butane | 1.405-1.553 |
| Wood/Wood Bark | 1.000-1.130 |



LSC-04-BR

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# EPA Method 3 Data Reporting Sheet
## Orsat Analysis

Job L.P. Hayward — Source Line 1 Konus
Team Leader ET — Test Site Stack
Date Submitted 6-13-94 — Date of Test 6-9-94
Test No. 6 — No. of Runs Completed 3
Date of Analysis 6-15-94 — Technician C. Helseson

| Test/ Run | Sample Log Number and Type | No. of An. | Buret Readings (ml) Zero Pt. | After $CO_2$ | After $O_2$ | Conc. $CO_2$ %v/v Dry | Conc. $O_2$ %v/v Dry | $F_o$ |
|---|---|---|---|---|---|---|---|---|
| 6/1 | 3097-116 | 1 | 0.00 | 6.20 | 20.70 | 6.20 | 14.50 | 1.03 |
| | | 2 | 0.00 | 6.20 | 20.70 | 6.20 | 14.50 | 1.03 |
| | ☑ B ☐ F | Avg | | | | 6.20 | 14.50 | |
| 6/2 | -117 | 1 | 0.00 | 7.10 | 20.60 | 7.10 | 13.50 | 1.04 |
| | | 2 | 0.00 | 7.10 | 20.60 | 7.10 | 13.50 | 1.04 |
| | ☑ B ☐ F | Avg | | | | 7.10 | 13.50 | |
| 6/3 | -118 | 1 | 0.00 | 6.50 | 20.70 | 6.50 | 14.20 | 1.03 |
| | | 2 | 0.00 | 6.50 | 20.70 | 6.50 | 14.20 | 1.03 |
| | ☑ B ☐ F | Avg | | | | 6.50 | 14.20 | |
| | | 1 | | | | | | |
| | | 2 | | | | | | |
| | ☐ B ☐ F | Avg | | | | | | |
| | | 1 | | | | | | |
| | | 2 | | | | | | |
| | ☐ B ☐ F | Avg | | | | | | |
| | | 1 | | | | | | |
| | | 2 | | | | | | |
| | ☐ B ☐ F | Avg | | | | | | |
| | | 1 | | | | | | |
| | | 2 | | | | | | |
| | ☐ B ☐ F | Avg | | | | | | |
| | | 1 | | | | | | |
| | | 2 | | | | | | |
| | ☐ B ☐ F | Avg | | | | | | |
| | | 1 | | | | | | |
| | | 2 | | | | | | |
| | ☐ B ☐ F | Avg | | | | | | |

☑ Ambient Air QA Check
☑ Orsat Analyzer System Leak Check
☐ $F_o$ Within EPA M-3 Guidelines for fuel type.

Where $F_o = \frac{20.9 - O_2}{CO_2}$

F=Flask (250 cc all glass)
B=Tedlar Bag (5-layer)

EPA Method 3 Guidelines

| Fuel Type | F0 Range |
|---|---|
| Coal: | |
| Anthracite/Lignite | 1.016-1.130 |
| Bituminous | 1.083-1.230 |
| Oil: | |
| Distillate | 1.260-1.413 |
| Residual | 1.210-1.370 |
| Gas: | |
| Natural | 1.600-1.836 |
| Propane | 1.434-1.586 |
| Butane | 1.405-1.553 |
| Wood/Wood (Bark) | 1.000-1.130 |

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# EPA Method 3 Data Reporting Sheet
## Orsat Analysis

Job L.P. Hayward — Source Line 1 Kanus
Team Leader MK — Test Site Stack
Date Submitted 6-13-94 — Date of Test 6-9-94
Test No. 8 — No. of Runs Completed 3
Date of Analysis 6-15-94 — Technician C. Helseth

| Test/ Run | Sample Log Number and Type | No. of An. | Buret Readings (ml) Zero Pt. | After $CO_2$ | After $O_2$ | Conc. $CO_2$ %v/v Dry | Conc. $O_2$ %v/v Dry | $F_o$ |
|---|---|---|---|---|---|---|---|---|
| 8/1 | 3097-119 | 1 | 0.00 | 5.30 | 20.70 | 5.30 | 15.40 | 1.04 |
| | | 2 | 0.00 | 5.30 | 20.70 | 5.30 | 15.40 | 1.04 |
| | ☑ B ☐ F | Avg | | | | 5.30 | 15.40 | |
| 8/2 | -120 | 1 | 0.00 | 5.90 | 20.80 | 5.90 | 14.90 | 1.02 |
| | | 2 | 0.00 | 5.90 | 20.80 | 5.90 | 14.90 | 1.02 |
| | ☑ B ☐ F | Avg | | | | 5.90 | 14.90 | |
| 8/3 | -121 | 1 | 0.00 | 6.90 | 20.70 | 6.90 | 13.80 | 1.03 |
| | | 2 | 0.00 | 6.90 | 20.70 | 6.90 | 13.80 | 1.03 |
| | ☑ B ☐ F | Avg | | | | 6.90 | 13.80 | |
| | | 1 | | | | | | |
| | | 2 | | | | | | |
| | ☐ B ☐ F | Avg | | | | | | |
| | | 1 | | | | | | |
| | | 2 | | | | | | |
| | ☐ B ☐ F | Avg | | | | | | |
| | | 1 | | | | | | |
| | | 2 | | | | | | |
| | ☐ B ☐ F | Avg | | | | | | |
| | | 1 | | | | | | |
| | | 2 | | | | | | |
| | ☐ B ☐ F | Avg | | | | | | |
| | | 1 | | | | | | |
| | | 2 | | | | | | |
| | ☐ B ☐ F | Avg | | | | | | |
| | | 1 | | | | | | |
| | | 2 | | | | | | |
| | ☐ B ☐ F | Avg | | | | | | |

☑ Ambient Air QA Check
☑ Orsat Analyzer System Leak Check
☐ $F_o$ Within EPA M-3 Guidelines for fuel type.

Where $F_o = \frac{20.9 - O_2}{CO_2}$

F=Flask (250 cc all glass)
B=Tedlar Bag (5-layer)

EPA Method 3 Guidelines

| Fuel Type | F0 Range |
|---|---|
| Coal: | |
| Anthracite/Lignite | 1.016–1.130 |
| Bituminous | 1.083–1.230 |
| Oil: | |
| Distillate | 1.260–1.413 |
| Residual | 1.210–1.370 |
| Gas: | |
| Natural | 1.600–1.836 |
| Propane | 1.434–1.586 |
| Butane | 1.405–1.553 |
| Wood/Wood (Bark) | 1.000–1.130 |



LSC-04-BR

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Interpoll Laboratories
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# EPA Method 3 Data Reporting Sheet
## Orsat Analysis

Job L.P. Hayward
Team Leader DVH
Date Submitted 6-13-94
Test No. 12
Date of Analysis 6-15-94

Source Line 2 Press Vent
Test Site RTO Stack
Date of Test 6-10-94
No. of Runs Completed 3
Technician C. Helgeson

| Test/ Run | Sample Log Number and Type | No. of An. | Buret Readings (ml) Zero Pt. | After $CO_2$ | After $O_2$ | Conc. $CO_2$ %v/v Dry | Conc. $O_2$ %v/v Dry | $F_o$ |
|---|---|---|---|---|---|---|---|---|
| 12/1 | 3097-125 | 1 | 0.00 | 0.40 | 21.00 | 0.40 | 20.60 | |
| | | 2 | 0.00 | 0.40 | 20.90 | 0.40 | 20.50 | |
| | ☑ B ☐ F | Avg | | | | 0.40 | 20.55 | |
| 12/2 | -126 | 1 | 0.00 | 0.40 | 21.00 | 0.40 | 20.60 | |
| | | 2 | 0.00 | 0.40 | 21.00 | 0.40 | 20.60 | |
| | ☑ B ☐ F | Avg | | | | 0.40 | 20.60 | |
| 12/3 | -127 | 1 | 0.00 | 0.40 | 21.00 | 0.40 | 20.60 | |
| | | 2 | 0.00 | 0.40 | 20.90 | 0.40 | 20.50 | |
| | ☑ B ☐ F | Avg | | | | 0.40 | 20.55 | |
| | | 1 | | | | | | |
| | | 2 | | | | | | |
| | ☐ B ☐ F | Avg | | | | | | |
| | | 1 | | | | | | |
| | | 2 | | | | | | |
| | ☐ B ☐ F | Avg | | | | | | |
| | | 1 | | | | | | |
| | | 2 | | | | | | |
| | ☐ B ☐ F | Avg | | | | | | |
| | | 1 | | | | | | |
| | | 2 | | | | | | |
| | ☐ B ☐ F | Avg | | | | | | |
| | | 1 | | | | | | |
| | | 2 | | | | | | |
| | ☐ B ☐ F | Avg | | | | | | |
| | | 1 | | | | | | |
| | | 2 | | | | | | |
| | ☐ B ☐ F | Avg | | | | | | |

☑ Ambient Air QA Check
☑ Orsat Analyzer System Leak Check
☐ $F_o$ Within EPA M-3 Guidelines for fuel type.

Where $F_o = \frac{20.9 - O_2}{CO_2}$

F=Flask (250 cc all glass)
B=Tedlar Bag (5-layer)

EPA Method 3 Guidelines

| Fuel Type | F0 Range |
|---|---|
| Coal: | |
| Anthracite/Lignite | 1.016-1.130 |
| Bituminous | 1.083-1.230 |
| Oil: | |
| Distillate | 1.260-1.413 |
| Residual | 1.210-1.370 |
| Gas: | |
| Natural | 1.600-1.836 |
| Propane | 1.434-1.586 |
| Butane | 1.405-1.553 |
| E-7 Wood/Wood Bark | 1.000-1.130 |

LSC-04-88

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# EPA Method 3 Data Reporting Sheet
## Orsat Analysis

Job L. P. Hayward
Team Leader DJW
Date Submitted 6-13-94
Test No. 12
Date of Analysis 6-15-94

Source Line 2 Precipitator
Test Site RTO stack
Date of Test 6-8-94
No. of Runs Completed 3
Technician C. Helgeson

| Test/ Run | Sample Log Number and Type | No. of An. | Buret Readings (ml) Zero Pt. | After $CO_2$ | After $O_2$ | Conc. $CO_2$ %v/v Dry | Conc. $O_2$ %v/v Dry | $F_o$ |
|---|---|---|---|---|---|---|---|---|
| 12/1 | 3097-122 | 1 | 0.00 | 0.30 | 20.90 | 0.30 | 20.60 | |
| | | 2 | 0.00 | 0.30 | 20.90 | 0.30 | 20.60 | |
| | ☐ B ☐ F | Avg | | | | 0.30 | 20.60 | |
| 12/2 | -123 | 1 | 0.00 | 0.30 | 20.90 | 0.30 | 20.60 | |
| | | 2 | 0.00 | 0.30 | 20.90 | 0.30 | 20.60 | |
| | ☐ B ☐ F | Avg | | | | 0.30 | 20.60 | |
| 12/3 | -124 | 1 | 0.00 | 0.30 | 20.90 | 0.30 | 20.60 | |
| | | 2 | 0.00 | 0.30 | 20.90 | 0.30 | 20.60 | |
| | ☐ B ☐ F | Avg | | | | 0.30 | 20.60 | |
| | | 1 | | | | | | |
| | | 2 | | | | | | |
| | ☐ B ☐ F | Avg | | | | | | |
| | | 1 | | | | | | |
| | | 2 | | | | | | |
| | ☐ B ☐ F | Avg | | | | | | |
| | | 1 | | | | | | |
| | | 2 | | | | | | |
| | ☐ B ☐ F | Avg | | | | | | |
| | | 1 | | | | | | |
| | | 2 | | | | | | |
| | ☐ B ☐ F | Avg | | | | | | |
| | | 1 | | | | | | |
| | | 2 | | | | | | |
| | ☐ B ☐ F | Avg | | | | | | |
| | | 1 | | | | | | |
| | | 2 | | | | | | |
| | ☐ B ☐ F | Avg | | | | | | |

☑ Ambient Air QA Check
☑ Orsat Analyzer System Leak Check
☐ $F_o$ Within EPA M-3 Guidelines for fuel type.

Where $F_o = \frac{20.9 - O_2}{CO_2}$

F=Flask (250 cc all glass)
B=Tedlar Bag (5-layer)

EPA Method 3 Guidelines

| Fuel Type | F0 Range |
|---|---|
| Coal: | |
| Anthracite/Lignite | 1.016-1.130 |
| Bituminous | 1.083-1.230 |
| Oil: | |
| Distillate | 1.260-1.413 |
| Residual | 1.210-1.370 |
| Gas: | |
| Natural | 1.600-1.836 |
| Propane | 1.434-1.586 |
| Butane | 1.405-1.553 |
| Wood/Wood Bark | 1.000-1.130 |

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# EPA Method 3 Data Reporting Sheet
## Orsat Analysis

Job L.P. Hayward
Team Leader DOH
Date Submitted 6-13-94
Test No. 14
Date of Analysis 6-15-94

Source Line 2 Press
Test Site RTO stack
Date of Test 6-9-94
No. of Runs Completed 3
Technician C. Helgeson

| Test/ Run | Sample Log Number and Type | No. of An. | Buret Readings (ml) Zero Pt. | After $CO_2$ | After $O_2$ | Conc. $CO_2$ %v/v Dry | Conc. $O_2$ %v/v Dry | $F_o$ |
|---|---|---|---|---|---|---|---|---|
| 14/1 | 3097-128 | 1 | 0.00 | 0.40 | 21.00 | 0.40 | 20.60 | |
| | | 2 | 0.00 | 0.40 | 21.00 | 0.40 | 20.60 | |
| | ☑ B ☐ F | Avg | | | | 0.40 | 20.60 | |
| 14/2 | -129 | 1 | 0.00 | 0.40 | 21.00 | 0.40 | 20.60 | |
| | | 2 | 0.00 | 0.40 | 21.00 | 0.40 | 20.60 | |
| | ☑ B ☐ F | Avg | | | | 0.40 | 20.60 | |
| 14/3 | -130 | 1 | 0.00 | 0.40 | 21.00 | 0.40 | 20.60 | |
| | | 2 | 0.00 | 0.40 | 20.90 | 0.40 | 20.50 | |
| | ☑ B ☐ F | Avg | | | | 0.40 | 20.55 | |
| | | 1 | | | | | | |
| | | 2 | | | | | | |
| | ☐ B ☐ F | Avg | | | | | | |
| | | 1 | | | | | | |
| | | 2 | | | | | | |
| | ☐ B ☐ F | Avg | | | | | | |
| | | 1 | | | | | | |
| | | 2 | | | | | | |
| | ☐ B ☐ F | Avg | | | | | | |
| | | 1 | | | | | | |
| | | 2 | | | | | | |
| | ☐ B ☐ F | Avg | | | | | | |
| | | 1 | | | | | | |
| | | 2 | | | | | | |
| | ☐ B ☐ F | Avg | | | | | | |
| | | 1 | | | | | | |
| | | 2 | | | | | | |
| | ☐ B ☐ F | Avg | | | | | | |

☑ Ambient Air QA Check
☑ Orsat Analyzer System Leak Check
☐ $F_o$ Within EPA M-3 Guidelines for fuel type.

Where $F_o = \frac{20.9 - O_2}{CO_2}$

F=Flask (250 cc all glass)
B=Tedlar Bag (5-layer)

EPA Method 3 Guidelines

| Fuel Type | F0 Range |
|---|---|
| Coal: | |
| Anthracite/Lignite | 1.016-1.130 |
| Bituminous | 1.083-1.230 |
| Oil: | |
| Distillate | 1.260-1.413 |
| Residual | 1.210-1.370 |
| Gas: | |
| Natural | 1.600-1.836 |
| Propane | 1.434-1.586 |
| Butane | 1.405-1.553 |
| Wood/Wood Bark | 1.000-1.130 |



LSC-04-8P

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# EPA Method 3 Data Reporting Sheet
## Orsat Analysis

Job L.P. Hayward
Team Leader J MK
Date Submitted 6-13-94
Test No. 17,18
Date of Analysis 6-15-94

Source Line 2 Komus
Test Site Stack
Date of Test 6-8-94
No. of Runs Completed 3
Technician C. Nelson

| Test/ Run | Sample Log Number and Type | No. of An. | Buret Readings (ml) Zero Pt. | After $CO_2$ | After $O_2$ | Conc. $CO_2$ %v/v Dry | Conc. $O_2$ %v/v Dry | $F_o$ |
|---|---|---|---|---|---|---|---|---|
| 17/18 /1 | 3097- | 1 | 0.00 | 4.40 | 21.00 | 4.40 | 16.60 | 1.00 |
| | | 2 | 0.00 | 4.40 | 21.00 | 4.40 | 16.60 | 1.00 |
| | ☑ B ☐ F | Avg | | | | 4.40 | 16.60 | |
| 17/18 /2 | -131 | 1 | 0.00 | 4.40 | 21.00 | 4.40 | 16.60 | 1.00 |
| | | 2 | 0.00 | 4.40 | 21.00 | 4.40 | 16.60 | 1.00 |
| | ☑ B ☐ F | Avg | | | | 4.40 | 16.60 | |
| 17/18 /3 | -132 | 1 | 0.00 | 4.30 | 20.90 | 4.30 | 16.60 | 1.00 |
| | | 2 | 0.00 | 4.30 | 20.90 | 4.30 | 16.60 | 1.00 |
| | ☑ B ☐ F | Avg | | | | 4.30 | 16.60 | |
| | | 1 | | | | | | |
| | | 2 | | | | | | |
| | ☐ B ☐ F | Avg | | | | | | |
| | | 1 | | | | | | |
| | | 2 | | | | | | |
| | ☐ B ☐ F | Avg | | | | | | |
| | | 1 | | | | | | |
| | | 2 | | | | | | |
| | ☐ B ☐ F | Avg | | | | | | |
| | | 1 | | | | | | |
| | | 2 | | | | | | |
| | ☐ B ☐ F | Avg | | | | | | |
| | | 1 | | | | | | |
| | | 2 | | | | | | |
| | ☐ B ☐ F | Avg | | | | | | |
| | | 1 | | | | | | |
| | | 2 | | | | | | |
| | ☐ B ☐ F | Avg | | | | | | |

☑ Ambient Air QA Check
☑ Orsat Analyzer System Leak Check
☐ $F_o$ Within EPA M-3 Guidelines for fuel type.

Where $F_o = \frac{20.9 - O_2}{CO_2}$

F=Flask (250 cc all glass)
B=Tedlar Bag (5-layer)

EPA Method 3 Guidelines

| Fuel Type | F0 Range |
|---|---|
| Coal: | |
| Anthracite/Lignite | 1.016–1.130 |
| Bituminous | 1.083–1.230 |
| Oil: | |
| Distillate | 1.260–1.413 |
| Residual | 1.210–1.370 |
| Gas: | |
| Natural | 1.600–1.836 |
| Propane | 1.434–1.586 |
| Butane | 1.405–1.553 |
| Wood/Wood (Bark) | 1.000–1.130 |



LSC-04-RR

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# EPA Method 3 Data Reporting Sheet
## Orsat Analysis

Job L.P. Hayward
Team Leader MK
Date Submitted 6-13-94
Test No. 19
Date of Analysis 6-15-94

Source Line 2 Konus
Test Site Stack
Date of Test 6-7-94
No. of Runs Completed 3
Technician C. Nelson

| Test/ Run | Sample Log Number and Type | No. of An. | Buret Readings (ml) Zero Pt. | After $CO_2$ | After $O_2$ | Conc. $CO_2$ %v/v Dry | Conc. $O_2$ %v/v Dry | $F_o$ |
|---|---|---|---|---|---|---|---|---|
| 19/1 | 3097-133 | 1 | 0.00 | 5.00 | 20.80 | 5.00 | 15.80 | 1.02 |
| | | 2 | 0.00 | 5.00 | 20.80 | 5.00 | 15.80 | 1.02 |
| | ☑ B ☐ F | Avg | | | | 5.00 | 15.80 | |
| 19/2 | -134 | 1 | 0.00 | 4.90 | 20.80 | 4.90 | 15.90 | 1.02 |
| | | 2 | 0.00 | 4.90 | 20.80 | 4.90 | 15.90 | 1.02 |
| | ☑ B ☐ F | Avg | | | | 4.90 | 15.90 | |
| 19/3 | -135 | 1 | 0.00 | 4.00 | 20.90 | 4.00 | 16.90 | 1.00 |
| | | 2 | 0.00 | 4.00 | 20.90 | 4.00 | 16.90 | 1.00 |
| | ☑ B ☐ F | Avg | | | | 4.00 | 16.90 | |
| | | 1 | | | | | | |
| | | 2 | | | | | | |
| | ☐ B ☐ F | Avg | | | | | | |
| | | 1 | | | | | | |
| | | 2 | | | | | | |
| | ☐ B ☐ F | Avg | | | | | | |
| | | 1 | | | | | | |
| | | 2 | | | | | | |
| | ☐ B ☐ F | Avg | | | | | | |
| | | 1 | | | | | | |
| | | 2 | | | | | | |
| | ☐ B ☐ F | Avg | | | | | | |
| | | 1 | | | | | | |
| | | 2 | | | | | | |
| | ☐ B ☐ F | Avg | | | | | | |
| | | 1 | | | | | | |
| | | 2 | | | | | | |
| | ☐ B ☐ F | Avg | | | | | | |

☑ Ambient Air QA Check
☑ Orsat Analyzer System Leak Check
☐ $F_o$ Within EPA M-3 Guidelines for fuel type.

Where $F_o = \frac{20.9 - O_2}{CO_2}$

F=Flask (250 cc all glass)
B=Tedlar Bag (5-layer)

EPA Method 3 Guidelines

| Fuel Type | F0 Range |
|---|---|
| Coal: | |
| Anthracite/Lignite | 1.016-1.130 |
| Bituminous | 1.083-1.230 |
| Oil: | |
| Distillate | 1.260-1.413 |
| Residual | 1.210-1.370 |
| Gas: | |
| Natural | 1.600-1.836 |
| Propane | 1.434-1.586 |
| Butane | 1.405-1.553 |
| Wood/Wood (Bark) | 1.000-1.130 |



LSC-04-RR

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# EPA Method 5 Data Reporting Sheet
## Impinger Catch/Wisconsin Protocol

Job L.P. Hayward
Team Leader MK
Date Submitted 6-13-94
Test No. 5
Date of Analysis 6-29-94

Source Line 1 Press RTO
Test Site Inlet
Date of Test 6-10-94
No. of Runs Completed 3
Technician C. Helgeson

| | | Solvent Phase | Aqueous Phase |
|---|---|---|---|
| 0 | Test ____ Run 0<br>Field Blank<br>Log Number ____<br>Comments ____ | Dish No. ____<br>Dish Tare Wt. ____ g<br>Dish+Sample Wt. ____ g<br>Sample Wt. ____ g | Dish No. ____<br>Dish Tare Wt. ____ g<br>Dish+Sample Wt. ____ g<br>Sample Wt. ____ g |
| 1 | Test 5 Run 1<br>Log Number 3097-171I<br>Comments ____ | Dish No. 105<br>Dish Tare Wt. 47.8630 g<br>Dish+Sample Wt. 47.8664 g<br>Sample Wt. 0.0034 g | Dish No. 35<br>Dish Tare Wt. 51.0908 g<br>Dish+Sample Wt. 51.1052 g<br>Sample Wt. 0.0144 g |
| 2 | Test 5 Run 2<br>Log Number 172I<br>Comments ____ | Dish No. 520<br>Dish Tare Wt. 48.5275 g<br>Dish+Sample Wt. 48.5310 g<br>Sample Wt. 0.0035 g | Dish No. 312<br>Dish Tare Wt. 45.2347 g<br>Dish+Sample Wt. 45.2475 g<br>Sample Wt. 0.0128 g |
| 3 | Test 5 Run 3<br>Log Number 173I<br>Comments ____ | Dish No. 521<br>Dish Tare Wt. 50.5981 g<br>Dish+Sample Wt. 50.5992 g<br>Sample Wt. 0.0011 g | Dish No. 403<br>Dish Tare Wt. 47.0941 g<br>Dish+Sample Wt. 47.1077 g<br>Sample Wt. 0.0136 g |
| 4 | Test ____ Run ____<br>Log Number ____<br>Comments ____ | Dish No. ____<br>Dish Tare Wt. ____ g<br>Dish+Sample Wt. ____ g<br>Sample Wt. ____ g | Dish No. ____<br>Dish Tare Wt. ____ g<br>Dish+Sample Wt. ____ g<br>Sample Wt. ____ g |
| 5 | Test ____ Run ____<br>Log Number ____<br>Comments ____ | Dish No. ____<br>Dish Tare Wt. ____ g<br>Dish+Sample Wt. ____ g<br>Sample Wt. ____ g | Dish No. ____<br>Dish Tare Wt. ____ g<br>Dish+Sample Wt. ____ g<br>Sample Wt. ____ g |

*Results Solvent Phase:* Blank Solvent Wt. 0.0004 g

| Field Blk. | Run 1 | Run 2 | Run 3 | Run 4 | Run 5 |
|---|---|---|---|---|---|
| | 0.0030 | 0.0031 | 0.0007 | | |

*Results Aqueous Phase:*

| Field Blk. | Run 1 | Run 2 | Run 3 | Run 4 | Run 5 |
|---|---|---|---|---|---|
| | 0.0141 | 0.0125 | 0.0133 | | E-12 |

LSC-03WYR

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# EPA Method 5 Data Reporting Sheet
## Probe/Cyclone Wash

Job L.P. Hayward
Team Leader MK
Date Submitted 6-13-94
Test No. 5
Date of Analysis 6-10-94
Transport Leakage ☒ None ☐ _____ ml

Source Line 1 Press RTO
Test Site Inlet
Date of Test 6-10-94
No. of Runs Completed 3
Technician C. Helgeson
Solvent Acetone

| | | |
|---|---|---|
| B | Test ____ Run B<br>Field Blank<br>Log Number ____<br>Vol. of Solvent ____ ml<br>*Solvent Residue 3.0 ug/ml | Dish No. ____<br>Dish Tare Wt. ____ g<br>Dish+Sample Wt. ____ g<br>Sample Wt. ____ g |
| 1 | Test 5 Run 1<br>Vol. of Solvent 100 ml<br>Log Number 3097-171P<br>Comments ____ | Dish No. 52<br>Dish Tare Wt. 49.8058 g<br>Dish+Sample Wt. 49.8222 g<br>Sample Wt. 0.0164 g |
| 2 | Test 5 Run 2<br>Vol. of Solvent 160 ml<br>Log Number -172P<br>Comments ____ | Dish No. 55<br>Dish Tare Wt. 47.7784 g<br>Dish+Sample Wt. 47.7914 g<br>Sample Wt. 0.0130 g |
| 3 | Test 5 Run 3<br>Vol. of Solvent 140 ml<br>Log Number -173P<br>Comments ____ | Dish No. 62<br>Dish Tare Wt. 50.8877 g<br>Dish+Sample Wt. 50.9002 g<br>Sample Wt. 0.0125 g |
| 4 | Test ____ Run ____<br>Vol. of Solvent ____ ml<br>Log Number ____<br>Comments ____ | Dish No. ____<br>Dish Tare Wt. ____ g<br>Dish+Sample Wt. ____ g<br>Sample Wt. ____ g |
| 5 | Test ____ Run ____<br>Vol. of Solvent ____ ml<br>Log Number ____<br>Comments ____ | Dish No. ____<br>Dish Tare Wt. ____ g<br>Dish+Sample Wt. ____ g<br>Sample Wt. ____ g |

*Solvent Residue ___ ug/ml = [(Sample Wt. ____ g)(10^6)]/Vol. of Sol. ____ ml
EPA-MS Acetone Residue Blank Spec. (7.8 ug/ml

*Results:*

| Field Blk. | Run 1 | Run 2 | Run 3 | Run 4 | Run 5 |
|---|---|---|---|---|---|
| | 0.0161 | 0.0125 | 0.0121 | | |

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# EPA Method 5 Data Reporting Sheet
## Filter Gravimetrics

Job L.P. Hayward
Team Leader MK
Date Submitted
Test No. 5
Date of Analysis 6-29-94

Source Line 1 Press RTO
Test Site Inlet
Date of Test 6-10-94
No. of Runs Completed 3
Technician C. Helseson

**0**
Test ____ Run 0
Field Blank
Log Number
Comments
Filter No.
Filter Type
Filter Tare Wt. ____ g
Filter+Sample Wt. ____ g
Sample Wt. ____ g

**1**
Test 5 Run 1
Log Number 3097-171F
Comments
Filter No. 1318
Filter Type 3.52 Pallflex
Filter Tare Wt. .3582 g
Filter+Sample Wt. .3680 g
Sample Wt. 0.0098 g

**2**
Test 5 Run 2
Log Number 172F
Comments
Filter No. 1319
Filter Type 3.52 Pallflex
Filter Tare Wt. .3588 g
Filter+Sample Wt. .3602 g
Sample Wt. 0.0014 g

**3**
Test 5 Run 3
Log Number 173F
Comments
Filter No. 1320
Filter Type 3.52 Pallflex
Filter Tare Wt. .3516 g
Filter+Sample Wt. .3642 g
Sample Wt. 0.0126 g

**4**
Test ____ Run ____
Log Number
Comments
Filter No.
Filter Type
Filter Tare Wt. ____ g
Filter+Sample Wt. ____ g
Sample Wt. ____ g

**5**
Test ____ Run ____
Log Number
Comments
Filter No.
Filter Type
Filter Tare Wt. ____ g
Filter+Sample Wt. ____ g
Sample Wt. ____ g

*Results:*

| Field Blk. | Run 1 | Run 2 | Run 3 | Run 4 | Run 5 |
|---|---|---|---|---|---|
| | 0.0048 | 0.0014 | 0.0126 | | |

| Field Blk. | Run 1 | Run 2 | Run 3 | Run 4 | Run 5 |
|---|---|---|---|---|---|
| | 0.0430 | 0.0295 | 0.0387 | | |

LSC-02PR

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# EPA Method 5 Data Reporting Sheet
## Impinger Catch/Wisconsin Protocol

Job L.P. Hayward
Team Leader SB
Date Submitted 6-13-94
Test No. 3
Date of Analysis 6-29-94

Source #1 Press RTO
Test Site Outlet
Date of Test 6-10-94
No. of Runs Completed 3
Technician C. Nelson

| | | Solvent Phase | Aqueous Phase |
|---|---|---|---|
| 0 | Test ___ Run 0<br>Field Blank<br>Log Number ___<br>Comments ___ | Dish No. ___<br>Dish Tare Wt. ___ g<br>Dish+Sample Wt. ___ g<br>Sample Wt. ___ g | Dish No. ___<br>Dish Tare Wt. ___ g<br>Dish+Sample Wt. ___ g<br>Sample Wt. ___ g |
| 1 | Test 3 Run 1<br>Log Number 3097-160I<br>Comments ___ | Dish No. 328<br>Dish Tare Wt. 41.9670 g<br>Dish+Sample Wt. 41.9699 g<br>Sample Wt. 0.0029 g | Dish No. 69<br>Dish Tare Wt. 47.9860 g<br>Dish+Sample Wt. 47.9975 g<br>Sample Wt. 0.0115 g |
| 2 | Test 3 Run 2<br>Log Number -161I<br>Comments ___ | Dish No. 506<br>Dish Tare Wt. 48.6421 g<br>Dish+Sample Wt. 48.6461 g<br>Sample Wt. 0.0040 g | Dish No. 404<br>Dish Tare Wt. 47.6374 g<br>Dish+Sample Wt. 47.6520 g<br>Sample Wt. 0.0146 g |
| 3 | Test 3 Run 3<br>Log Number -162I<br>Comments ___ | Dish No. 524<br>Dish Tare Wt. 48.0418 g<br>Dish+Sample Wt. 48.0476 g<br>Sample Wt. 0.0058 g | Dish No. 415<br>Dish Tare Wt. 45.0805 g<br>Dish+Sample Wt. 45.0884 g<br>Sample Wt. 0.0079 g |
| 4 | Test ___ Run ___<br>Log Number ___<br>Comments ___ | Dish No. ___<br>Dish Tare Wt. ___ g<br>Dish+Sample Wt. ___ g<br>Sample Wt. ___ g | Dish No. ___<br>Dish Tare Wt. ___ g<br>Dish+Sample Wt. ___ g<br>Sample Wt. ___ g |
| 5 | Test ___ Run ___<br>Log Number ___<br>Comments ___ | Dish No. ___<br>Dish Tare Wt. ___ g<br>Dish+Sample Wt. ___ g<br>Sample Wt. ___ g | Dish No. ___<br>Dish Tare Wt. ___ g<br>Dish+Sample Wt. ___ g<br>Sample Wt. ___ g |

Blank Solvent Wt. 0.0004 g

*Results Solvent Phase:*

| Field Blk. | Run 1 | Run 2 | Run 3 | Run 4 | Run 5 |
|---|---|---|---|---|---|
| | 0.0025 | 0.0036 | 0.0054 | | |

*Results Aqueous Phase:*

| Field Blk. | Run 1 | Run 2 | Run 3 | Run 4 | Run 5 |
|---|---|---|---|---|---|
| | 0.0112 | 0.0143 | 0.0076 | | |


LSC-03WYR

Interpoll Laboratories
(512) 795-8020

# EPA Method 5 Data Reporting Sheet
## Probe/Cyclone Wash

Job L.P. Hayward
Team Leader SB
Date Submitted 6-13-94
Test No. 3
Date of Analysis 6-30-94
Transport Leakage ☒ None ☐ _____ ml

Source #1 Press RTO
Test Site Outlet
Date of Test 6-10-94
No. of Runs Completed 3
Technician C. Helgeson
Solvent Acetone

**0** Test _____ Run 0
Field Blank
Log Number _____
Vol. of Solvent _____ ml
*Solvent Residue 3.0 ug/ml

Dish No. _____
Dish Tare Wt. _____ g
Dish+Sample Wt. _____ g
Sample Wt. _____ g

**1** Test 3 Run 1
Vol. of Solvent 90 ml
Log Number 3097-160P
Comments _____

Dish No. 40
Dish Tare Wt. 47.6416 g
Dish+Sample Wt. 47.6585 g
Sample Wt. 0.0169 g

**2** Test 3 Run 2
Vol. of Solvent 80 ml
Log Number -161P
Comments _____

Dish No. 43
Dish Tare Wt. 47.3874 g
Dish+Sample Wt. 47.3939 g
Sample Wt. 0.0065 g

**3** Test 3 Run 3
Vol. of Solvent 50 ml
Log Number -162P
Comments _____

Dish No. 59
Dish Tare Wt. 44.7327 g
Dish+Sample Wt. 44.7381 g
Sample Wt. 0.0054 g

**4** Test _____ Run _____
Vol. of Solvent _____ ml
Log Number _____
Comments _____

Dish No. _____
Dish Tare Wt. _____ g
Dish+Sample Wt. _____ g
Sample Wt. _____ g

**5** Test _____ Run _____
Vol. of Solvent _____ ml
Log Number _____
Comments _____

Dish No. _____
Dish Tare Wt. _____ g
Dish+Sample Wt. _____ g
Sample Wt. _____ g

*Solvent Residue ___ ug/ml = [(Sample Wt. _____ g)(10⁶)]/Vol. of Sol. _____ ml
EPA-MS Acetone Residue Blank Spec. ≤ 7.3 ug/ml

*Results:*

| Field Blk. | Run 1 | Run 2 | Run 3 | Run 4 | Run 5 |
|---|---|---|---|---|---|
| | 0.0166 | 0.0063 | 0.0052 | | |


LSC-01YR

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(612) 786-6020

EPA Method 5 Data Reporting Sheet
Filter Gravimetrics

Job L.P. Hayward WI.
Team Leader SB
Date Submitted 6-13-94
Test No. 3
Date of Analysis 6-27-94

Source #1 Press RTO
Test Site Outlet
Date of Test 6-10-94
No. of Runs Completed 3
Technician C. Hulseer

| | | |
|---|---|---|
| 0 | Test ____ Run 0<br>Field Blank<br>Log Number ____<br>Comments ____ | Filter No. ____<br>Filter Type ____<br>Filter Tare Wt. ____ g<br>Filter+Sample Wt. ____ g<br>Sample Wt. ____ g |
| 1 | Test 3 Run 1<br>Log Number 3097-160F<br>Comments ____ | Filter No. 4041<br>Filter Type 4" Pallflex<br>Filter Tare Wt. 0.6264 g<br>Filter+Sample Wt. 0.6272 g<br>Sample Wt. 0.0008 g |
| 2 | Test 3 Run 2<br>Log Number 161F<br>Comments ____ | Filter No. 4044<br>Filter Type 4" Pallflex<br>Filter Tare Wt. 0.6254 g<br>Filter+Sample Wt. 0.6282 g<br>Sample Wt. 0.0028 g |
| 3 | Test 3 Run 3<br>Log Number 162F<br>Comments ____ | Filter No. 4043<br>Filter Type 4" Pallflex<br>Filter Tare Wt. 0.6324 g<br>Filter+Sample Wt. 0.6363 g<br>Sample Wt. 0.0039 g |
| 4 | Test ____ Run ____<br>Log Number ____<br>Comments ____ | Filter No. ____<br>Filter Type ____<br>Filter Tare Wt. ____ g<br>Filter+Sample Wt. ____ g<br>Sample Wt. ____ g |
| 5 | Test ____ Run ____<br>Log Number ____<br>Comments ____ | Filter No. ____<br>Filter Type ____<br>Filter Tare Wt. ____ g<br>Filter+Sample Wt. ____ g<br>Sample Wt. ____ g |

*Results:*

| Field Blk. | Run 1 | Run 2 | Run 3 | Run 4 | Run 5 |
|---|---|---|---|---|---|
| | 0.0008 | 0.0028 | 0.0039 | | |

| Field Blk. | Run 1 | Run 2 | Run 3 | Run 4 | Run 5 |
|---|---|---|---|---|---|
| | 0.0311 | 0.0270 | 0.0275 | | |

LSC-02PR

Interpoll Laboratories
(612) 786-6020

# EPA Method 5 Data Reporting Sheet
## Impinger Catch/Wisconsin Protocol

o L.P. Heyward — Source Press RTO
Team Leader SB — Test Site Inlet
Date Submitted 6-13-94 — Date of Test 6-9-94
Test No. 21 — No. of Runs Completed 3
Date of Analysis 6-30-94 — Technician C. Halverson

| | | Solvent Phase | Aqueous Phase |
|---|---|---|---|
| | Test ____ Run 0<br>Field Blank<br>Log Number ____<br>Comments ____ | Dish No. ____<br>Dish Tare Wt. ____ g<br>Dish+Sample Wt. ____ g<br>Sample Wt. ____ g | Dish No. ____<br>Dish Tare Wt. ____ g<br>Dish+Sample Wt. ____ g<br>Sample Wt. ____ g |
| 1 | Test 21 Run 1<br>Log Number 3097-182I<br>Comments ____ | Dish No. 400<br>Dish Tare Wt. 47.0994 g<br>Dish+Sample Wt 47.1038 g<br>Sample Wt. 0.0044 g | Dish No. 13<br>Dish Tare Wt. 45.7202 g<br>Dish+Sample Wt. 45.7274 g<br>Sample Wt. 0.0072 g |
| 2 | Test 21 Run 2<br>Log Number -183I<br>Comments ____ | Dish No. 401<br>Dish Tare Wt. 49.5238 g<br>Dish+Sample Wt 49.5283 g<br>Sample Wt. 0.0045 g | Dish No. 518<br>Dish Tare Wt. 48.1017 g<br>Dish+Sample Wt. 48.1341 g<br>Sample Wt. 0.0324 g |
| 3 | Test 21 Run 3<br>Log Number -184I<br>Comments ____ | Dish No. 409<br>Dish Tare Wt. 46.1890 g<br>Dish+Sample Wt 46.1937 g<br>Sample Wt. 0.0047 g | Dish No. 619<br>Dish Tare Wt. 47.5523 g<br>Dish+Sample Wt. 47.5568 g<br>Sample Wt. 0.0045 g |
| 4 | Test ____ Run ____<br>Log Number ____<br>Comments ____ | Dish No. ____<br>Dish Tare Wt. ____ g<br>Dish+Sample Wt. ____ g<br>Sample Wt. ____ g | Dish No. ____<br>Dish Tare Wt. ____ g<br>Dish+Sample Wt. ____ g<br>Sample Wt. ____ g |
| 5 | Test ____ Run ____<br>Log Number ____<br>Comments ____ | Dish No. ____<br>Dish Tare Wt. ____ g<br>Dish+Sample Wt. ____ g<br>Sample Wt. ____ g | Dish No. ____<br>Dish Tare Wt. ____ g<br>Dish+Sample Wt. ____ g<br>Sample Wt. ____ g |

*Results Solvent Phase:* Blank Solvent Wt. 0.0004 g

| Field Blk. | Run 1 | Run 2 | Run 3 | Run 4 | Run 5 |
|---|---|---|---|---|---|
| | 0.0040 | 0.0041 | 0.0043 | | |

*Results Aqueous Phase:*

| Field Blk. | Run 1 | Run 2 | Run 3 | Run 4 | Run 5 |
|---|---|---|---|---|---|
| | 0.0068 | 0.0321 | 0.0041 | | E-18 |

LSC-03WYR

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(612) 786-6020

# EPA Method 5 Data Reporting Sheet
## Probe/Cyclone Wash

Job L. P. Hayward
Team Leader SB
Date Submitted 6-13-94
Test No. 21
Date of Analysis 6-30-94
Transport Leakage [None] [ ] ml

Source Press RTO #2
Test Site Inlet
Date of Test 6-9-94
No. of Runs Completed 3
Technician C. Helgeson
Solvent Acetone

| | | |
|---|---|---|
| 0 | Test ___ Run 0<br>Field Blank<br>Log Number ___<br>Vol. of Solvent ___ ml<br>*Solvent Residue 3.0 ug/ml | Dish No. ___<br>Dish Tare Wt. ___ g<br>Dish+Sample Wt. ___ g<br>Sample Wt. ___ g |
| 1 | Test 21 Run 1<br>Vol. of Solvent 100 ml<br>Log Number 3097-182P<br>Comments ___ | Dish No. 29<br>Dish Tare Wt. 48.8864 g<br>Dish+Sample Wt. 48.9088 g<br>Sample Wt. 0.2224 g |
| 2 | Test 21 Run 2<br>Vol. of Solvent 110 ml<br>Log Number -183P<br>Comments ___ | Dish No. 212<br>Dish Tare Wt. 50.3551 g<br>Dish+Sample Wt. 50.4611 g<br>Sample Wt. 0.1060 g |
| 3 | est 21 Run 3<br>Vol. of Solvent 120 ml<br>Log Number -184P<br>Comments ___ | Dish No. 306<br>Dish Tare Wt. 42.8341 g<br>Dish+Sample Wt. 42.9102 g<br>Sample Wt. 0.0761 g |
| 4 | Test ___ Run ___<br>Vol. of Solvent ___ ml<br>Log Number ___<br>Comments ___ | Dish No. ___<br>Dish Tare Wt. ___ g<br>Dish+Sample Wt. ___ g<br>Sample Wt. ___ g |
| 5 | Test ___ Run ___<br>Vol. of Solvent ___ ml<br>Log Number ___<br>Comments ___ | Dish No. ___<br>Dish Tare Wt. ___ g<br>Dish+Sample Wt. ___ g<br>Sample Wt. ___ g |

*Solvent Residue ___ ug/ml = [(Sample Wt. ___ g)(10^6)]/Vol. of Sol. ___ ml
EPA-MS Acetone Residue Blank Spec. (7.8 ug/ml

*Results:*

| Field Blk. | Run 1 | Run 2 | Run 3 | Run 4 | Run 5 |
|---|---|---|---|---|---|
| | 0.2221 | 0.1057 | 0.0757 | | |

E-19

1.SC-01VP

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# EPA Method 5 Data Reporting Sheet
## Filter Gravimetrics

Job L.P. Hayward
Team Leader SB
Date Submitted 6-13-94
Test No. 21
Date of Analysis 6-29-94

Source #2 Press RTO
Test Site Inlet
Date of Test 6-9-94
No. of Runs Completed 3
Technician C. Helgeson

| | | |
|---|---|---|
| | Test ____ Run 0 | Filter No. ____ |
| | Field Blank | Filter Type ____ |
| 0 | Log Number ____ | Filter Tare Wt. ____ g |
| | Comments ____ | Filter+Sample Wt. ____ g |
| | ____ | Sample Wt. ____ g |
| | Test 21 Run 1 | Filter No. 1315 |
| | Log Number 3097-182F | Filter Type 3.52 Pallflex |
| 1 | Comments ____ | Filter Tare Wt. .3566 g |
| | ____ | Filter+Sample Wt. .5920 g |
| | ____ | Sample Wt. 0.2354 g |
| | Test 21 Run 2 | Filter No. 1316 |
| | Log Number -183F | Filter Type 3.52 Pallflex |
| 2 | Comments ____ | Filter Tare Wt. .3647 g |
| | ____ | Filter+Sample Wt. .5501 g |
| | ____ | Sample Wt. 0.1854 g |
| | Test 21 Run 3 | Filter No. 1317 |
| | Log Number -184F | Filter Type 3.52 Pallflex |
| 3 | Comments ____ | Filter Tare Wt. .3639 g |
| | ____ | Filter+Sample Wt. .7150 g |
| | ____ | Sample Wt. 0.3511 g |
| | Test ____ Run ____ | Filter No. ____ |
| | Log Number ____ | Filter Type ____ |
| 4 | Comments ____ | Filter Tare Wt. ____ g |
| | ____ | Filter+Sample Wt. ____ g |
| | ____ | Sample Wt. ____ g |
| | Test ____ Run ____ | Filter No. ____ |
| | Log Number ____ | Filter Type ____ |
| 5 | Comments ____ | Filter Tare Wt. ____ g |
| | ____ | Filter+Sample Wt. ____ g |
| | ____ | Sample Wt. ____ g |

*Results:*

| Field Blk. | Run 1 | Run 2 | Run 3 | Run 4 | Run 5 |
|---|---|---|---|---|---|
| | 0.2354 | 0.1854 | 0.3511 | | |

| Field Blk. | Run 1 | Run 2 | Run 3 | Run 4 | Run 5 |
|---|---|---|---|---|---|
| | 0.4684 | 0.3273 | 0.4352 | | |

LSC-02PR

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# EPA Method 5 Data Reporting Sheet
## Impinger Catch/Wisconsin Protocol

L.P. Hayward — Source: Line 2 Press Vent
Team Leader: DUH — Test Site: RTO Stack
Date Submitted: 6-13-94 — Date of Test: 6-9-94
Test No.: 14 — No. of Runs Completed: 3
Date of Analysis: 6-29-94 — Technician: C. Helgeson

| | Solvent Phase | Aqueous Phase |
|---|---|---|
| Test 14 Run 0<br>Field Blank<br>Log Number 3097-174I<br>Comments | Dish No. 50<br>Dish Tare Wt. 48.3200 g<br>Dish+Sample Wt. 48.3204 g<br>Sample Wt. 0.0004 g | Dish No. 190<br>Dish Tare Wt. 47.5413 g<br>Dish+Sample Wt. 47.5416 g<br>Sample Wt. 0.0003 g |
| Test 14 Run 1<br>Log Number ~175I<br>Comments | Dish No. 53<br>Dish Tare Wt. 47.4067 g<br>Dish+Sample Wt. 47.4099 g<br>Sample Wt. 0.0032 g | Dish No. 200<br>Dish Tare Wt. 44.9349 g<br>Dish+Sample Wt. 44.9493 g<br>Sample Wt. 0.0144 g |
| Test 14 Run 2<br>Log Number ~176I<br>Comments | Dish No. 62<br>Dish Tare Wt. 43.1548 g<br>Dish+Sample Wt 43.1576 g<br>Sample Wt. 0.0028 g | Dish No. 203<br>Dish Tare Wt. 46.8671 g<br>Dish+Sample Wt. 46.8763 g<br>Sample Wt. 0.0092 g |
| Test 14 Run 3<br>Log Number ~177I<br>Comments | Dish No. 65<br>Dish Tare Wt. 44.6586 g<br>Dish+Sample Wt 44.6616 g<br>Sample Wt. 0.0030 g | Dish No. 209<br>Dish Tare Wt. 43.2082 g<br>Dish+Sample Wt. 43.2179 g<br>Sample Wt. 0.0097 g |
| Test ____ Run ____<br>Log Number ____<br>Comments ____ | Dish No. ____<br>Dish Tare Wt. ____ g<br>Dish+Sample Wt. ____ g<br>Sample Wt. ____ g | Dish No. ____<br>Dish Tare Wt. ____ g<br>Dish+Sample Wt. ____ g<br>Sample Wt. ____ g |
| Test ____ Run ____<br>Log Number ____<br>Comments ____ | Dish No. ____<br>Dish Tare Wt. ____ g<br>Dish+Sample Wt. ____ g<br>Sample Wt. ____ g | Dish No. ____<br>Dish Tare Wt. ____ g<br>Dish+Sample Wt. ____ g<br>Sample Wt. ____ g |

*Results Solvent Phase:* Blank Solvent Wt. 0.0004g

| Field Blk. | Run 1 | Run 2 | Run 3 | Run 4 | Run 5 |
|---|---|---|---|---|---|
| | 0.0028 | 0.0024 | 0.0026 | | |

*Results Aqueous Phase:*

| Field Blk. | Run 1 | Run 2 | Run 3 | Run 4 | Run 5 |
|---|---|---|---|---|---|
| | 0.0141 | 0.0089 | 0.0094 | | |



LSC-03WYR

Interpoll Laboratories
(612) 786-6020

# EPA Method 5 Data Reporting Sheet
## Probe/Cyclone Wash

Job L.P. Hayward
Team Leader DUH
Date Submitted 6-13-94
Test No. 14
Date of Analysis 6-30-94
Transport Leakage [X] None [ ] _____ ml

Source Lik 2 Press Vent
Test Site RTO Stack
Date of Test 6-9-94
No. of Runs Completed 3
Technician C. Helgeson
Solvent Acetone

| | |
|---|---|
| Test 14 Run B<br>Field Blank<br>Log Number 3097-174P<br>Vol. of Solvent 100 ml<br>*Solvent Residue 3.0 ug/ml | Dish No. 79<br>Dish Tare Wt. 47.6400 g<br>Dish+Sample Wt. 47.6403 g<br>Sample Wt. _____ g |
| Test 14 Run 1<br>Vol. of Solvent 60 ml<br>Log Number -175 P<br>Comments _____ | Dish No. 80<br>Dish Tare Wt. 49.6254 g<br>Dish+Sample Wt. 49.6726 g<br>Sample Wt. 0.0472 g |
| Test 14 Run 2<br>Vol. of Solvent 60 ml<br>Log Number -176 P<br>Comments _____ | Dish No. 84<br>Dish Tare Wt. 49.1000 g<br>Dish+Sample Wt. 49.1079 g<br>Sample Wt. 0.0079 g |
| st 14 Run 3<br>Vol. of Solvent 110 ml<br>Log Number -177P<br>Comments _____ | Dish No. 407<br>Dish Tare Wt. 47.9943 g<br>Dish+Sample Wt. 48.0157 g<br>Sample Wt. 0.0214 g |
| Test _____ Run _____<br>Vol. of Solvent _____ ml<br>Log Number _____<br>Comments _____ | Dish No. _____<br>Dish Tare Wt. _____ g<br>Dish+Sample Wt. _____ g<br>Sample Wt. _____ g |
| Test _____ Run _____<br>Vol. of Solvent _____ ml<br>Log Number _____<br>Comments _____ | Dish No. _____<br>Dish Tare Wt. _____ g<br>Dish+Sample Wt. _____ g<br>Sample Wt. _____ g |

*Solvent Residue ___ ug/ml = [(Sample Wt. _____ g)(10^6)]/Vol. of Sol. _____ ml
EPA-MS Acetone Residue Blank Spec. ≤ 7.8 ug/ml

*Results:*

| Field Blk. | Run 1 | Run 2 | Run 3 | Run 4 | Run 5 |
|---|---|---|---|---|---|
| | 0.0470 | 0.0077 | 0.0211 | | E-22 |

LSC-01YR

Interpoll Laboratories
(612) 786-6020

# EPA Method 5 Data Reporting Sheet
## Filter Gravimetrics

Job L.P. Hayward
Team Leader DUH
Date Submitted 6-13-94
Test No. 14
Date of Analysis 6-27-94

Source Line 2 Press Vent
Test Site RTO Stack
Date of Test 6-9-94
No. of Runs Completed 3
Technician C. Helgeson

| | | |
|---|---|---|
| 0 | Test 14 Run 0<br>Field Blank<br>Log Number 3097-174F<br>Comments | Filter No. 4010<br>Filter Type 4" Pallflex<br>Filter Tare Wt. 0.6167 g<br>Filter+Sample Wt. 0.6170 g<br>Sample Wt. 0.0003 g |
| 1 | Test 14 Run 1<br>Log Number -175F<br>Comments | Filter No. 4007<br>Filter Type 4" Pallflex<br>Filter Tare Wt. 0.6145 g<br>Filter+Sample Wt. 0.6191 g<br>Sample Wt. 0.0046 g |
| 2 | Test 14 Run 2<br>Log Number -176F<br>Comments | Filter No. 4008<br>Filter Type 4" Pallflex<br>Filter Tare Wt. 0.6300 g<br>Filter+Sample Wt. 0.6344 g<br>Sample Wt. 0.0044 g |
| 3 | Test 14 Run 3<br>Log Number -177F<br>Comments | Filter No. 4009<br>Filter Type 4" Pallflex<br>Filter Tare Wt. 0.6160 g<br>Filter+Sample Wt. 0.6177 g<br>Sample Wt. 0.0017 g |
| 4 | Test ____ Run ____<br>Log Number ____<br>Comments | Filter No. ____<br>Filter Type ____<br>Filter Tare Wt. ____ g<br>Filter+Sample Wt. ____ g<br>Sample Wt. ____ g |
| 5 | Test ____ Run ____<br>Log Number ____<br>Comments | Filter No. ____<br>Filter Type ____<br>Filter Tare Wt. ____ g<br>Filter+Sample Wt. ____ g<br>Sample Wt. ____ g |

*Results:*

| Field Blk. | Run 1 | Run 2 | Run 3 | Run 4 | Run 5 |
|---|---|---|---|---|---|
| | 0.0046 | 0.0044 | 0.0017 | | |

| Field Blk. | Run 1 | Run 2 | Run 3 | Run 4 | Run 5 |
|---|---|---|---|---|---|
| | 0.0685 | 0.0234 | 0.0348 | | |

LSC-02PR

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(612) 786-6020

# EPA Method 5 Data Reporting Sheet
## Impinger Catch/Wisconsin Protocol

Job L.P Hayward
Team Leader CT
Date Submitted 6-13-94
Test No. 5
Date of Analysis 6-29-94

Source Line 1 Kanns
Test Site Stack
Date of Test 6-8-94
No. of Runs Completed 3
Technician C. Hulseson

| | | Solvent Phase | Aqueous Phase |
|---|---|---|---|
| 0 | Test 5 Run 0<br>Field Blank<br>Log Number 3097-167 I<br>Comments | Dish No. 395<br>Dish Tare Wt. 47.2164 g<br>Dish+Sample Wt. 47.2168 g<br>Sample Wt. 0.0004 g | Dish No. 18<br>Dish Tare Wt. 49.9921 g<br>Dish+Sample Wt. 49.9924 g<br>Sample Wt. 0.0003 g |
| 1 | Test 5 Run 1<br>Log Number 168 I<br>Comments | Dish No. 405<br>Dish Tare Wt. 48.4908 g<br>Dish+Sample Wt 48.4935 g<br>Sample Wt. 0.0027 g | Dish No. 27<br>Dish Tare Wt. 52.4441 g<br>Dish+Sample Wt. 52.4514 g<br>Sample Wt. 0.0073 g |
| 2 | Test 5 Run 2<br>Log Number 169 I<br>Comments | Dish No. 410<br>Dish Tare Wt. 50.5575 g<br>Dish+Sample Wt 50.5606 g<br>Sample Wt. 0.0031 g | Dish No. 32<br>Dish Tare Wt. 42.4904 g<br>Dish+Sample Wt. 42.5049 g<br>Sample Wt. 0.0145 g |
| 3 | Test 5 Run 3<br>Log Number 170 I<br>Comments | Dish No. 501<br>Dish Tare Wt. 47.2525 g<br>Dish+Sample Wt 47.2538 g<br>Sample Wt. 0.0013 g | Dish No. 33<br>Dish Tare Wt. 47.9387 g<br>Dish+Sample Wt. 47.9472 g<br>Sample Wt. 0.0085 g |
| 4 | Test ____ Run ____<br>Log Number ____<br>Comments | Dish No. ____<br>Dish Tare Wt. ____ g<br>Dish+Sample Wt. ____ g<br>Sample Wt. ____ g | Dish No. ____<br>Dish Tare Wt. ____ g<br>Dish+Sample Wt. ____ g<br>Sample Wt. ____ g |
| 5 | Test ____ Run ____<br>Log Number ____<br>Comments | Dish No. ____<br>Dish Tare Wt. ____ g<br>Dish+Sample Wt. ____ g<br>Sample Wt. ____ g | Dish No. ____<br>Dish Tare Wt. ____ g<br>Dish+Sample Wt. ____ g<br>Sample Wt. ____ g |

*Results Solvent Phase:* Blank Solvent Wt. 0.0004 g

| Field Blk. | Run 1 | Run 2 | Run 3 | Run 4 | Run 5 |
|---|---|---|---|---|---|
| | 0.0023 | 0.0027 | 0.0009 | | |

*Results Aqueous Phase:*

| Field Blk. | Run 1 | Run 2 | Run 3 | Run 4 | Run 5 |
|---|---|---|---|---|---|
| | 0.0070 | 0.0142 | 0.0082 | | E-24 |

LSC-03WYR

Interpoll Laboratories
(612) 786-6020

# EPA Method 5 Data Reporting Sheet
## Probe/Cyclone Wash

Job L.P. Hayward
Team Leader CT
Date Submitted 6-13-94
Test No. 5
Date of Analysis 6-30-94
Transport Leakage (1) none [ ] _____ ml

Source Line 1 Konus
Test Site Stack
Date of Test 6-8-94
No. of Runs Completed 3
Technician C. Nelson
Solvent Acetone

| | | |
|---|---|---|
| B | Test 5 Run B<br>Field Blank<br>Log Number 3097-167P<br>Vol. of Solvent 100 ml<br>*Solvent Residue 3.0 ug/ml | Dish No. 64<br>Dish Tare Wt. 43.1473 g<br>Dish+Sample Wt. 43.1476 g<br>Sample Wt. 0.0003 g |
| 1 | Test 5 Run 1<br>Vol. of Solvent 160 ml<br>Log Number 168P<br>Comments | Dish No. 513<br>Dish Tare Wt. 47.4130 g<br>Dish+Sample Wt. 47.4450 g<br>Sample Wt. 0.0320 g |
| 2 | Test 5 Run 2<br>Vol. of Solvent 160 ml<br>Log Number 169P<br>Comments | Dish No. 522<br>Dish Tare Wt. 47.0006 g<br>Dish+Sample Wt. 47.0145 g<br>Sample Wt. 0.0139 g |
| 3 | Test 5 Run 3<br>Vol. of Solvent 160 ml<br>Log Number 170P<br>Comments | Dish No. 616<br>Dish Tare Wt. 50.9231 g<br>Dish+Sample Wt. 50.9400 g<br>Sample Wt. 0.0169 g |
| 4 | Test ____ Run ____<br>Vol. of Solvent ____ ml<br>Log Number ____<br>Comments | Dish No. ____<br>Dish Tare Wt. ____ g<br>Dish+Sample Wt. ____ g<br>Sample Wt. ____ g |
| 5 | Test ____ Run ____<br>Vol. of Solvent ____ ml<br>Log Number ____<br>Comments | Dish No. ____<br>Dish Tare Wt. ____ g<br>Dish+Sample Wt. ____ g<br>Sample Wt. ____ g |

*Solvent Residue 3.0 ug/ml = [(Sample Wt. 0.0003 g)(10⁶)]/Vol. of Sol. 100 ml
EPA-M5 Acetone Residue Blank Spec. ≤ 7.3 ug/ml

*Results:*

| Field Blk. | Run 1 | Run 2 | Run 3 | Run 4 | Run 5 |
|---|---|---|---|---|---|
| | 0.0315 | 0.0134 | 0.0164 | | |



LSC-01YR

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EPA Method 5 Data Reporting Sheet
Filter Gravimetrics

Job L.P. Hayward
Team Leader EJ
Date Submitted 6-13-94
Test No. 5
Date of Analysis 6-27-94

Source Line 1 Konus
Test Site Stack
Date of Test 4" Pallflex
No. of Runs Completed 3
Technician C. Helgeson

| | | |
|---|---|---|
| 0 | Test 5 Run 0<br>Field Blank<br>Log Number 3097-167F<br>Comments | Filter No. 4034<br>Filter Type 4" Pallflex<br>Filter Tare Wt. 0.6240 g<br>Filter+Sample Wt. 0.6242 g<br>Sample Wt. 0.0002 g |
| 1 | Test 5 Run 1<br>Log Number -168F<br>Comments | Filter No. 4031<br>Filter Type 4" Pallflex<br>Filter Tare Wt. 0.6230 g<br>Filter+Sample Wt. 0.6565 g<br>Sample Wt. 0.0335 g |
| 2 | Test 5 Run 2<br>Log Number -169F<br>Comments | Filter No. 4032<br>Filter Type 4" Pallflex<br>Filter Tare Wt. 0.6240 g<br>Filter+Sample Wt. 0.6360 g<br>Sample Wt. 0.0120 g |
| 3 | Test 5 Run 3<br>Log Number -170F<br>Comments | Filter No. 4033<br>Filter Type 4" Pallflex<br>Filter Tare Wt. 0.6302 g<br>Filter+Sample Wt. 0.6560 g<br>Sample Wt. 0.0258 g |
| 4 | Test ____ Run ____<br>Log Number ____<br>Comments | Filter No. ____<br>Filter Type ____<br>Filter Tare Wt. ____ g<br>Filter+Sample Wt. ____ g<br>Sample Wt. ____ g |
| 5 | Test ____ Run ____<br>Log Number ____<br>Comments | Filter No. ____<br>Filter Type ____<br>Filter Tare Wt. ____ g<br>Filter+Sample Wt. ____ g<br>Sample Wt. ____ g |

*Results:*

| Field Blk. | Run 1 | Run 2 | Run 3 | Run 4 | Run 5 |
|---|---|---|---|---|---|
| | 0.0335 | 0.0120 | 0.0258 | | |

| Field Blk. | Run 1 | Run 2 | Run 3 | Run 4 | Run 5 |
|---|---|---|---|---|---|
| | 0.0743 | 0.0423 | 0.0513 | | |

LSC-02PR

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# EPA Method 5 Data Reporting Sheet
## Impinger Catch/Wisconsin Protocol

Job L.P. Hayward — Source Liw 2 Kouns
Team Leader MK — Test Site Stack
Date Submitted 6-13-94 — Date of Test 6-8-94
Test No. 16 — No. of Runs Completed 3
Date of Analysis 6-29-94 — Technician C. Helgeson

| | | Solvent Phase | Aqueous Phase |
|---|---|---|---|
| 0 | Test ___ Run 0<br>Field Blank<br>Log Number ___<br>Comments ___ | Dish No. ___<br>Dish Tare Wt. ___ g<br>Dish+Sample Wt. ___ g<br>Sample Wt. ___ g | Dish No. ___<br>Dish Tare Wt. ___ g<br>Dish+Sample Wt. ___ g<br>Sample Wt. ___ g |
| 1 | Test 16 Run 1<br>Log Number 3097-178F<br>Comments ___ | Dish No. 51<br>Dish Tare Wt. 48.8515 g<br>Dish+Sample Wt. 48.8560 g<br>Sample Wt. 0.0045 g | Dish No. 25<br>Dish Tare Wt. 44.3410 g<br>Dish+Sample Wt. 44.3553 g<br>Sample Wt. 0.0143 g |
| 2 | Test 16 Run 2<br>Log Number 179I<br>Comments ___ | Dish No. 54<br>Dish Tare Wt. 49.6696 g<br>Dish+Sample Wt. 49.6725 g<br>Sample Wt. 0.0029 g | Dish No. 32<br>Dish Tare Wt. 57.8046 g<br>Dish+Sample Wt. 57.8191 g<br>Sample Wt. 0.0145 g |
| 3 | Test 16 Run 3<br>Log Number 180I<br>Comments ___ | Dish No. 56<br>Dish Tare Wt. 47.7558 g<br>Dish+Sample Wt. 47.7596 g<br>Sample Wt. 0.0038 g | Dish No. 102<br>Dish Tare Wt. 44.3240 g<br>Dish+Sample Wt. 44.3328 g<br>Sample Wt. 0.0088 g |
| 4 | Test ___ Run ___<br>Log Number ___<br>Comments ___ | Dish No. ___<br>Dish Tare Wt. ___ g<br>Dish+Sample Wt. ___ g<br>Sample Wt. ___ g | Dish No. ___<br>Dish Tare Wt. ___ g<br>Dish+Sample Wt. ___ g<br>Sample Wt. ___ g |
| 5 | Test ___ Run ___<br>Log Number ___<br>Comments ___ | Dish No. ___<br>Dish Tare Wt. ___ g<br>Dish+Sample Wt. ___ g<br>Sample Wt. ___ g | Dish No. ___<br>Dish Tare Wt. ___ g<br>Dish+Sample Wt. ___ g<br>Sample Wt. ___ g |

*Results Solvent Phase:* Blank Solvent Wt. 0.0004 g

| Field Blk. | Run 1 | Run 2 | Run 3 | Run 4 | Run 5 |
|---|---|---|---|---|---|
| | 0.0041 | 0.0025 | 0.0034 | | |

*Results Aqueous Phase:*

| Field Blk. | Run 1 | Run 2 | Run 3 | Run 4 | Run 5 |
|---|---|---|---|---|---|
| | 0.0140 | 0.0142 | 0.0085 | | F-27 |

LSC-03WYR

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# EPA Method 5 Data Reporting Sheet
## Probe/Cyclone Wash

Job L.P. Hayward
Team Leader MK
Date Submitted 6-13-94
Test No. 16
Date of Analysis 6-30-94
Transport Leakage [NONE] [ ] _____ ml

Source Line 2 Konus
Test Site Stack
Date of Test 6-8-94
No. of Runs Completed 3
Technician C. Halgeson
Solvent Acetone

| | | |
|---|---|---|
| | Test ____ Run 2<br>Field Blank | Dish No. ____<br>Dish Tare Wt. ____ g |
| 3 | Log Number ____<br>Vol. of Solvent ____ ml<br>*Solvent Residue 3.0 ug/ml | Dish+Sample Wt. ____ g<br>Sample Wt. ____ g |
| | Test 16 Run 1 | Dish No. 19 |
| 1 | Vol. of Solvent 170 ml<br>Log Number 3097-178P<br>Comments ____ | Dish Tare Wt. 48.9566 g<br>Dish+Sample Wt 48.9692 g<br>Sample Wt. 0.0126 g |
| | Test 16 Run 2 | Dish No. 21 |
| 2 | Vol. of Solvent 190 ml<br>Log Number 179P<br>Comments ____ | Dish Tare Wt. 47.5275 g<br>Dish+Sample Wt. 47.5468 g<br>Sample Wt. 0.0193 g |
| | est 16 Run 3 | Dish No. 28 |
| 3 | Vol. of Solvent 160 ml<br>Log Number 180P<br>Comments ____ | Dish Tare Wt. 46.0409 g<br>Dish+Sample Wt. 46.0570 g<br>Sample Wt. 0.0161 g |
| | Test ____ Run ____ | Dish No. ____ |
| 4 | Vol. of Solvent ____ ml<br>Log Number ____<br>Comments ____ | Dish Tare Wt. ____ g<br>Dish+Sample Wt. ____ g<br>Sample Wt. ____ g |
| | Test ____ Run ____ | Dish No. ____ |
| 5 | Vol. of Solvent ____ ml<br>Log Number ____<br>Comments ____ | Dish Tare Wt. ____ g<br>Dish+Sample Wt. ____ g<br>Sample Wt. ____ g |

*Solvent Residue ___ ug/ml = [(Sample Wt. ____ g)(10⁶)]/Vol. of Sol. ____ ml
EPA-MS Acetone Residue Blank Spec. ≤ 7.3 ug/ml

*Results:*

| Field Blk. | Run 1 | Run 2 | Run 3 | Run 4 | Run 5 |
|---|---|---|---|---|---|
| | 0.0121 | 0.0187 | 0.0156 | | E-28 |

LSC-01YR

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# EPA Method 5 Data Reporting Sheet
## Filter Gravimetrics

Job L.P. Hayward
Team Leader MK
Date Submitted 6-13-94
Test No. 16
Date of Analysis 6-27-94

Source Line 2 Konus
Test Site Stack
Date of Test 6-8-94
No. of Runs Completed 3
Technician C. Helgeson

| | | |
|---|---|---|
| 0 | Test ____ Run 0<br>Field Blank<br>Log Number ____<br>Comments ____ | Filter No. ____<br>Filter Type ____<br>Filter Tare Wt. ____ g<br>Filter+Sample Wt. ____ g<br>Sample Wt. ____ g |
| 1 | Test 16 Run 1<br>Log Number 3097 - 178F<br>Comments ____ | Filter No. 4035<br>Filter Type 4" Pallflex<br>Filter Tare Wt. 0.6176 g<br>Filter+Sample Wt. 0.6638 g<br>Sample Wt. 0.0462 g |
| 2 | Test 16 Run 2<br>Log Number 179F<br>Comments ____ | Filter No. 4036<br>Filter Type 4" Pallflex<br>Filter Tare Wt. 0.6282 g<br>Filter+Sample Wt. 0.6448 g<br>Sample Wt. 0.0166 g |
| 3 | Test 16 Run 3<br>Log Number - 180F<br>Comments ____ | Filter No. 4037<br>Filter Type 4" Pallflex<br>Filter Tare Wt. 0.6276 g<br>Filter+Sample Wt. 0.6455 g<br>Sample Wt. 0.0179 g |
| 4 | Test ____ Run ____<br>Log Number ____<br>Comments ____ | Filter No. ____<br>Filter Type ____<br>Filter Tare Wt. ____ g<br>Filter+Sample Wt. ____ g<br>Sample Wt. ____ g |
| 5 | Test ____ Run ____<br>Log Number ____<br>Comments ____ | Filter No. ____<br>Filter Type ____<br>Filter Tare Wt. ____ g<br>Filter+Sample Wt. ____ g<br>Sample Wt. ____ g |

*Results:*

| Field Blk. | Run 1 | Run 2 | Run 3 | Run 4 | Run 5 |
|---|---|---|---|---|---|
| | 0.0462 | 0.0166 | 0.0179 | | |

| Field Blk. | Run 1 | Run 2 | Run 3 | Run 4 | Run 5 |
|---|---|---|---|---|---|
| | 0.0764 | 0.0520 | 0.0454 | | |

LSC-02PR

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## EPA Method 7A Recovery and Analysis Data Sheet (1)

| **********SOURCE********** | **********RECOVERY********** | **********ANALYTICAL********** |
|---|---|---|
| Job L.P. Hayward | Date of Recovery 6-16-94 | Date of Analysis 6-22-94 |
| Source Line 1 Kouns | Recovered by C.G. | Analyst KDG |
| Date of Sampling 6-8-94 | Recovery volume 500ml ml | Eluent ADHP |
| Test No(s) 5 | Barometric at time 28.97 IN.HG. | Chromatograph: Dionex System 4000i |

Samples collected in accordance with EPA Method 7, CFR Title 40, Part 60, Appendix A. Samples analyzed in accordance with EPA Method 7A by ion chromatography. Mercury manometers used to measure flask pressures/vacuums in sampling and in recovery. Thommen Model TX 19 jewel barometer calibrated against laboratory mercury in glass barometer used to measure field barometric pressure. Three field blanks are prepared and the average used to correct measured nitrate concentrations. All samples are analyzed as a batch using a Dionex Model 4270 Chromatograph Data Intergrator. The integrator is programmed to give the actual concentration of the 500 ml recovered sample even if a subsequent dilution was made. The dilution is indicated here as well as on the chromatogram.

$$C_{RS} = DF(C_{DS}) \qquad M_{NO_3} = (C_{RS} - \overline{C}_B)V_R \qquad \overline{C}_B = (C_{B1} + C_{B2} + C_{B3})/3$$

where: $C_{RS}$ = concentration of nitrate in 500 ml recovered sample in ug/ml

$DF$ = dilution factor

$C_{DS}$ = concentration of nitrate of a 500 ml recovered sample which has been diluted by a factor of DF to bring it into the proper range for the ion chromatograph. This value is an intermediate number and is not outputted by the electronic integrator which is programmed to output the concentration of the original undiluted 500 ml recovered sample.

$M_{NO_3}$ = total mass of nitrate in micrograms in the 500 ml recovered sample and/or in the 2L flask.

$C_B$ = average conc. of nitrate in 500 ml recovered samples from the three field blanks (ug/ml)

$C_{B1}$, $C_{B2}$, $C_{B3}$ = conc. of nitrate in 500 ml recovered samples from the three field blanks (ug/ml)

$V_R$ = recovery volume for samples and field blanks in ml

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## EPA Method 7A Recovery and Analysis Data Sheet (2)

| | Sample Log ID No. | Flask No. | Test/ Run | Final Flask Conditions $t_f$ (°F) | + | - | $\Delta P_g$ (IN.HG.) | Chrom Run No. | DF | Nitrate Concentration (ug/ml) Uncorr. for blank $C_{RS}$ | Corr. for blank ($C_{RS} - C_B$) | Total nitrate in Sample (ug) ($M_{NO_3^-}$) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 7097-136 | 19 | S-1-1 | 72° | | ✓ | 0.4 | | 1 | 0.718 | 0.718 | 359 |
| 2 | -137 | 20 | S-1-1 | ↓ | | ✓ | 0.9 | | 1 | 0.697 | 0.697 | 349 |
| 3 | -138 | 21 | S-1-1 | | | ✓ | 3.2 | | 1 | 0.705 | 0.705 | 353 |
| 4 | -139 | 22 | S-1-1 | | | ✓ | 0.3 | | 1 | 0.693 | 0.693 | 347 |
| 5 | -140 | 23 | S-2-1 | | | ✓ | 1.0 | | 1 | 0.736 | 0.736 | 368 |
| 6 | -141 | 24 | S-2-1 | | | ✓ | 0.1 | | 1 | 0.921 | 0.921 | 461 |
| 7 | -142 | 61 | S-2-1 | | | ✓ | 0.8 | | 1 | 0.625 | 0.625 | 313 |
| 8 | -143 | 62 | S-2-1 | | | ✓ | 2.4 | | 1 | 0.648 | 0.648 | 324 |
| 9 | -144 | 63 | S-3-1 | | | ✓ | 2.8 | | 1 | 0.704 | 0.704 | 352 |
| 10 | -145 | 64 | S-3-1 | | | ✓ | 0.6 | | 1 | 0.565 | 0.565 | 283 |
| 11 | -146 | 65 | S-3-1 | | | ✓ | 2.0 | | 1 | 0.581 | 0.581 | 291 |
| 12 | -147 | 66 | S-3-1 | | | ✓ | 1.6 | | 1 | 0.661 | 0.661 | 331 |
| 13 | | | | | | | | | | | | |
| 14 | | | | | | | | | | | | |
| 15 | | | | | | | | | | | | |
| 16 | | | | | | | | | | | | |
| 17 | | | | | | | | | | | | |
| 18 | | | | | | | | | | | | |
| 19 | | | | | | | | | | | | |
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| 25 | | | | | | | | | | | | |
| 26 | | | | | | | | | | | | |
| 27 | | | | | | | | | | | | |
| Blank 1 | | | | | | | | | 1 | CB1 | | |
| Blank 2 | | | | | | | | | 1 | CB2 | | |
| Blank 3 | | | | | | | | | 1 | CB3 | | |

$\bar{C}_B$ = _____

S-340(2) R-9/85

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## EPA Method 7A Recovery and Analysis Data Sheet (1)

| **********SOURCE********** | **********RECOVERY********** | **********ANALYTICAL********** |
|---|---|---|
| Job L.P. Hayward | Date of Recovery 6-16-94 | Date of Analysis 6-22-94 |
| Source Line 2 | Recovered by C.G. | Analyst KAG |
| Date of Sampling 6-8-94 | Recovery volume 500 ml ml | Eluent AS4A |
| Test No(s) 16 | Barometric at time 28.97 IN.HG. | Chromatograph: Dionex System 4000i |

Samples collected in accordance with EPA Method 7, CFR Title 40, Part 60, Appendix A. Samples analyzed in accordance with EPA Method 7A by ion chromatography. Mercury manometers used to measure flask pressures/vacuums in sampling and in recovery. Thommen Model TX 19 jewel barometer calibrated against laboratory mercury in glass barometer used to measure field barometric pressure. Three field blanks are prepared and the average used to correct measured nitrate concentrations. All samples are analyzed as a batch using a Dionex Model 4270 Chromatograph Data Intergrator. The integrator is programmed to give the actual concentration of the 500 ml recovered sample even if a subsequent dilution was made. The dilution is indicated here as well as on the chromatogram.

$$C_{RS} = DF(C_{DS}) \qquad M_{NO_3} = (C_{RS} - \bar{C}_B)V_R \qquad \bar{C}_B = (C_{B1} + C_{B2} + C_{B3})/3$$

where:

$C_{RS}$ = concentration of nitrate in 500 ml recovered sample in ug/ml

DF = dilution factor

$C_{DS}$ = concentration of nitrate of a 500 ml recovered sample which has been diluted by a factor of DF to bring it into the proper range for the ion chromatograph. This value is an intermediate number and is not outputted by the electronic integrator which is programmed to output the concentration of the original undiluted 500 ml recovered sample.

$M_{NO_3}$ = total mass of nitrate in micrograms in the 500 ml recovered sample and/or in the 2L flask.

$C_B$ = average conc. of nitrate in 500 ml recovered samples from the three field blanks (ug/ml)

$C_{B1}$, $C_{B2}$, $C_{B3}$ = conc. of nitrate in 500 ml recovered samples from the three field blanks (ug/ml)

$V_R$ = recovery volume for samples and field blanks in ml

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S-305RR
(9/90)

## EPA Method 10 NDIR Analysis

Job Name L.P. Hayward
Source Press RTO outlet Stack (6-7-94)
Date of Analysis 6-15-94
Technician C. Helgesen

NDIR Analyzer:
- ☐ Fuji ACS Model 3300
- ☐ Mon. Lab Model 8310
- ☒ Dasibi Model 3003

Range: 0 - 200 ppm
Flow rate: 1000 cc/min

### Pretest Calibration

| | Conc. | Reading | Vendor | Cyl. Number |
|---|---|---|---|---|
| Zero gas: | 0 ppm | 0 ppm | Scott | AAL 17431 |
| Upscale gas: | 41.5 ppm | 41.5 ppm | National | CC 52502 |
| Upscale gas: | 204 ppm | 41.5 ppm | National | CC 81624 |
| Upscale gas: | ppm | ppm | | |

### Post-test Calibration

| | Conc. | Reading | Vendor | Cyl. Number |
|---|---|---|---|---|
| Zero gas: | 0 ppm | 0 ppm | Scott | AAL 17431 |
| Upscale gas: | 41.5 ppm | 41.5 ppm | National | CC 52502 |
| Upscale gas: | 204 ppm | 204 ppm | National | CC 81624 |
| Upscale gas: | ppm | ppm | | |

| Sample Description Test/Run | Sample Log Number | CO Conc. (ppm, Dry) | | |
|---|---|---|---|---|
| | | Dilution Factor | Reading | Actual ppm |
| 3/1 | 30497-113 | - | 11.3 | 11.3 |
| 3/2 | -114 | - | 12.9 | 12.9 |
| 3/3 | -115 | - | 12.5 | 12.5 |
| | | | | |
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| | | | | |

| Sample Description Test/Run | Sample Log Number | CO Conc. (ppm, Dry) | | |
|---|---|---|---|---|
| | | Dilution Factor | Reading | Actual ppm |
| | | | | |
| | | | | |
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Note 1: If sample dilution is required the sample is diluted with CO-free gas prior to analysis.
Note 2: The Fuji ACS model 3300 has a rejection ratio for CO to $CO_2$ greater then 100,000: 1 and the Mon. Labs Model 8310 and Dasibi Model 3003 have rejection ratios greater then 200,000:1 and thus $CO_2$ removal prior to analysis is not required.
Note 3: The analyzer must be zeroed and spanned immediately before and after sample analysis. Additional checks may be performed between sample analyses if required.

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## EPA Method 7A Recovery and Analysis Data Sheet (2)

| | Sample Log ID No. | Flask No. | Test/ Run | Final Flask Conditions $t_f$ (°F) | + | - | ▲Pg (IN.HG.) | Chrom Run No. | DF | Nitrate Concentration (ug/ml) Uncorr. for blank $C_{RS}$ | Corr. for blank ($C_{RS} - \bar{C}_B$) | Total nitrate in Sample (ug) ($M_{NO_3^-}$) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 3097-148 | 13 | 16-1-3 | 72° | ✓ | | — | | 1 | 0.528 | 0.528 | 264 |
| 2 | -149 | 14 | 16-1-2 | | ✓ | | 0.4 | | 1 | 0.543 | 0.543 | 272 |
| 3 | -150 | 15 | 16-1-1 | | ✓ | | 0.4 | | 1 | 0.544 | 0.544 | 272 |
| 4 | -151 | 16 | 16-1-1 | | | ✓ | 0.3 | | 1 | 0.539 | 0.539 | 270 |
| 5 | -152 | 17 | 16-2-2 | | | ✓ | 0.9 | | 1 | 0.545 | 0.545 | 273 |
| 6 | -153 | 18 | 16-2-3 | | ✓ | | 0.4 | | 1 | 0.504 | 0.504 | 252 |
| 7 | -154 | 55 | 16-2-3 | | ✓ | | 0.2 | | 1 | 0.565 | 0.565 | 283 |
| 8 | -155 | 56 | 16-2-2 | | | | — | | 1 | 0.582 | 0.582 | 291 |
| 9 | -156 | 57 | 16-3-1 | | ✓ | | 0.1 | | 1 | 0.639 | 0.639 | 320 |
| 10 | -157 | 58 | 16-3-1 | | | ✓ | 0.4 | | 1 | 0.649 | 0.649 | 325 |
| 11 | -158 | 59 | 16-3-2 | | | | — | | 1 | 0.680 | 0.680 | 340 |
| 12 | -159 | 60 | 16-3-3 | | | ✓ | 0.3 | | 1 | 0.778 | 0.778 | 389 |
| 13 | | | | | | | | | | | | |
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| 25 | | | | | | | | | | | | |
| 26 | | | | | | | | | | | | |
| 27 | | | | | | | | | | | | |
| Blank 1 | | | | | | | | | 1 | CB1 | | |
| Blank 2 | | | | | | | | | 1 | CB2 | | |
| Blank 3 | | | | | | | | | 1 | CB3 | | |

$\bar{C}_B$ = _____

S-340(2) R-9/85

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S-305RR
(9/90)

# EPA Method 10 NDIR Analysis

Job Name L.P. Hayward
Source Line 1 Konus Stack
Date of Analysis 6-15-94
Technician C. Helgeson

NDIR Analyzer:
- ☐ Fuji ACS Model 3300
- ☐ Mon. Lab Model 8310
- ☒ Dasibi Model 3003

Range: 0 - 200 ppm
Flow rate: 1000 cc/min

## Pretest Calibration

| | Conc. | Reading | Vendor | Cyl. Number |
|---|---|---|---|---|
| Zero gas: | 0 ppm | 0 ppm | Scott | AAL 17431 |
| Upscale gas: | 41.5 ppm | 41.5 ppm | National | CC 52502 |
| Upscale gas: | 204 ppm | 204 ppm | National | CC 81624 |
| Upscale gas: | ppm | ppm | | |

## Post-test Calibration

| | Conc. | Reading | Vendor | Cyl. Number |
|---|---|---|---|---|
| Zero gas: | 0 ppm | 0 ppm | Scott | AAL 17431 |
| Upscale gas: | 41.5 ppm | 41.5 ppm | National | CC 52502 |
| Upscale gas: | 204 ppm | 204 ppm | National | CC 81624 |
| Upscale gas: | ppm | ppm | | |

| Sample Description Test/Run | Sample Log Number | CO Conc. (ppm, Dry) | | |
|---|---|---|---|---|
| | | Dilution Factor | Reading | Actual ppm |
| 8/1 | 3097-119 | - | 104.5 | 104.5 |
| 8/2 | -120 | - | 104.1 | 104.1 |
| 8/3 | -121 | - | 135.3 | 135.3 |
| | | | | |
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| Sample Description Test/Run | Sample Log Number | CO Conc. (ppm, Dry) | | |
|---|---|---|---|---|
| | | Dilution Factor | Reading | Actual ppm |
| | | | | |
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Note 1: If sample dilution is required the sample is diluted with CO-free gas prior to analysis.
Note 2: The Fuji ACS model 3300 has a rejection ratio for CO to $CO_2$ greater then 100,000: 1 and the Mon. Labs Model 8310 and Dasibi Model 3003 have rejection ratios greater then 200,000:1 and thus $CO_2$ removal prior to analysis is not required.
Note 3: The analyzer must be zeroed and spanned immediately before and after sample analysis. Additional checks may be performed between sample analyses if required.

17

INTERPOLL LA RATORIES
(612) 786-6020

S-305RR
(9/90)

# EPA Method 10 NDIR Analysis

Job Name L.P. Hayward
Source Line 1 Kenny Stack
Date of Analysis 6-15-94
Technician C. Helgeson

NDIR Analyzer:
- ☐ Fuji ACS Model 3300
- ☐ Mon. Lab Model 8310
- ☒ Dasibi Model 3003

Range: 0 - 200 ppm
Flow rate: 1000 cc/min

## Pretest Calibration

| | Conc. | Reading | Vendor | Cyl. Number |
|---|---|---|---|---|
| Zero gas: | 0 ppm | 0 ppm | Scott | AAL 17431 |
| Upscale gas: | 41.5 ppm | 41.5 ppm | National | CC52502 |
| Upscale gas: | 204 ppm | 203.5 ppm | National | CC 81624 |
| Upscale gas: | ppm | ppm | | |

## Post-test Calibration

| | Conc. | Reading | Vendor | Cyl. Number |
|---|---|---|---|---|
| Zero gas: | 0 ppm | 0 ppm | Scott | AAL 17431 |
| Upscale gas: | 41.5 ppm | 41.8 ppm | National | CC 52502 |
| Upscale gas: | 204 ppm | 204 ppm | National | CC 81624 |
| Upscale gas: | ppm | ppm | | |

| Sample Description Test/Run | Sample Log Number | CO Conc. (ppm, Dry) Dilution Factor | Reading | Actual ppm |
|---|---|---|---|---|
| 6/1 | 3047-116 | – | 61.4 | 61.4 |
| 6/2 | -117 | – | 178.7 | 178.7 |
| 6/3 | -118 | – | 53.3 | 53.3 |
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| Sample Description Test/Run | Sample Log Number | CO Conc. (ppm, Dry) Dilution Factor | Reading | Actual ppm |
|---|---|---|---|---|
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Note 1: If sample dilution is required the sample is diluted with CO-free gas prior to analysis.
Note 2: The Fuji ACS model 3300 has a rejection ratio for CO to $CO_2$ greater then 100,000: 1 and the Mon. Labs Model 8310 and Dasibi Model 3003 have rejection ratios greater then 200,000:1 and thus $CO_2$ removal prior to analysis is not required.
Note 3: The analyzer must be zeroed and spanned immediately before and after sample analysis. Additional checks may be performed between sample analyses if required.

## INTERPOLL LABORATORIES INC.

Formaldehyde Results Using EPA Method 0011
For Dept. 20/LP Hayward Wi. Collected 6/7-10/94

| | Field Spike #1 | | | Test: 1 | | | Source: RTO Press Outlet Stack |
|---|---|---|---|---|---|---|---|
| | Actual | Found | % Recovery | Run 0 | Run 1 | Run 2 | Run 3 |
| Log # | | (3097-05) | | (3097-01) | (3097-02) | (3097-03) | (3097-04) |
| Mass (ug)* | 750 | 451 | 60.1 | 2.6 | 430 | 14 | 610 |

| | Field Spike #2 | | | Test: 6 | | | Source: Line 1 Konus Stack |
|---|---|---|---|---|---|---|---|
| | Actual | Found | % Recovery | Run 0 | Run 1 | Run 2 | Run 3 |
| Log # | | (3097-06) | | | (3097-07) | (3097-08) | (3097-09) |
| Mass (ug)* | 750 | 521 | 69.5 | | 56 | 140 | 79 |

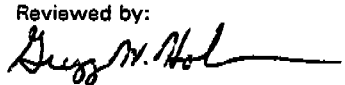
| | Field Spike #3 | | | Test: 12 | | | Source: Line 2 RTO Press Vent Stack |
|---|---|---|---|---|---|---|---|
| | Actual | Found | % Recovery | Run 0 | Run 1 | Run 2 | Run 3 |
| Log # | | (3097-16) | | (3097-18) | (3097-19/20) | (3097-21/22) | (3097-23/24) |
| Mass (ug)* | 750 | 575 | 76.7 | 1.6 | 400 | 340 | 360 |

| | Field Spike #5 | | | Test: 17 | | | Source: Line 2 Konus Stack |
|---|---|---|---|---|---|---|---|
| | Actual | Found | % Recovery | Run 0 | Run 1 | Run 2 | Run 3 |
| Log # | | (3097-10) | | | (3097-11) | (3097-12) | (3097-13) |
| Mass (ug)* | 750 | 513 | 68.4 | | 94 | 66 | 140 |

| | Field Spike #4 | | | Field Spike #6 | | |
|---|---|---|---|---|---|---|
| | Actual | Found | % Recovery | Actual | Found | % Recovery |
| Log # | | (3097-15) | | | (3097-17) | |
| Mass (ug)* | 750 | 567 | 75.6 | 750 | 575 | 76.7 |

* = Total Mass of formaldehyde in the sample in ug. The laboratory method blanks contained 1.1ug and 0.66ug.

Reviewed by:



Gregg W. Holman

# INTERPOLL LABORATORIES INC.

4,4-Methylenebis(phenyl isocyanate) Results
For Dept. 20/LP Hayward Collected 6/8-9/94

| Item | Field Spike | | | Test: 2 | | Source: Press RTO Outlet Stack | |
|---|---|---|---|---|---|---|---|
| | Actual | Found | % Rec. | Run 0 | Run 1 | Run 2 | Run 3 |
| *EPA Draft Method 1,2-PP Impinger 1* | | | | | | | |
| Log # | | 3097-31 | | NP | 3097-25 | 3097-27 | 3097-29 |
| Date Analyzed | | 7/5/94 | | NP | 7/5/94 | 7/5/94 | 7/5/94 |
| **Mass (ug)*** | **296** | **256** | **86** | **NP** | **< 2.5** | **< 2.5** | **< 2.5** |
| *EPA Draft Method 1,2-PP Impinger 2* | | | | | | | |
| Log # | | | | NP | 3097-26 | 3097-28 | 3097-30 |
| Date Analyzed | | | | NP | 7/5/94 | 7/5/94 | 7/5/94 |
| **Mass (ug)*** | | | | **NP** | **5.2** | **< 2.5** | **5.4** |

| Item | Field Spike | | | Test: 13 | | Source: Line 2 Press Vent RTO Stack | |
|---|---|---|---|---|---|---|---|
| | Actual | Found | % Rec. | Run 0 | Run 1 | Run 2 | Run 3 |
| *EPA Draft Method 1,2-PP Impinger 1* | | | | | | | |
| Log # | | NR | | 3097-32 | 3097-33 | 3097-35 | 3097-37 |
| Date Analyzed | | NR | | 7/5/94 | 7/5/94 | 7/5/94 | 7/5/94 |
| **Mass (ug)*** | **NR** | **NR** | **NR** | **< 2.5** | **12.2** | **< 2.5** | **< 2.5** |
| *EPA Draft Method 1,2-PP Impinger 2* | | | | | | | |
| Log # | | | | NR | 3097-34 | 3097-36 | 3097-38 |
| Date Analyzed | | | | NR | 7/5/94 | 7/5/94 | 7/5/94 |
| **Mass (ug)*** | | | | **NR** | **< 2.5** | **< 2.5** | **6.5** |

NP = Not Provided
NR = Not Required
* = Total Mass of MDI in the Sample in ug.

Reviewed By:

Gregg W. Holman

7/1/94

Interpoll Laboratories, Inc.

(612)786-6020

## BTEX/THC as Gas in Air Samples (Charcoal Tubes) by NIOSH Method 1501 Data Reporting Sheet

Client: I.D. 020 C.P. Hayward

Line 2: Konus Stack
Test 20 Run 1
1 of 2

Sample Collected: _____

Sample Received: _____

Sample Log #: 3097-95

Sample Description: charcoal Tube

| Parameter | Units | Analysis Date & Initials | FRONT Detection Limit Front | FRONT Analytical Result Front | FRONT Method Blank Front | BACK Detection Limit Back | BACK Analytical Result Back | BACK Method Blank Back |
|---|---|---|---|---|---|---|---|---|
| Benzene | Total ug | mm 7/1 | x 2.1 | < 2.1 | < 2.1 | x .61 | < .61 | < .61 |
| Toluene | Total ug | 6-22-94 | | | | | | |
| Ethylbenzene | Total ug | | | | | | | |
| Xylenes | Total ug | | | | | | | |
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| Dilution factor | | | | | | | | |
| Total hydrocarbons as gasoline | Total ug | | | | | | | |
| | | | | | | | | |
| Dilution factor | | | | | | | | |

Footnotes: _____

In-House Comments: charcoal was wet

LCI-127

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**BTEX/THC as Gas in Air Samples (Charcoal Tubes) by NIOSH Method 1501 Data Reporting Sheet**

Client: I.D. 020 C.P. Hayward

T20 R1

2 of 2

Sample Collected: _____

Sample Received: _____

Sample Log #: 3097-96

Sample Description: charcoal Tube

| | | | FRONT | | | BACK | | |
|---|---|---|---|---|---|---|---|---|
| Parameter | Units | Analysis Date & Initials | Detection Limit Front | Analytical Result Front | Method Blank Front | Detection Limit Back | Analytical Result Back | Method Blank Back |
| Benzene | Total ug | MMH | x 2.1 | <2.1 | <2.1 | x .61 | <.61 | <.61 |
| Toluene | Total ug | lc 2394 | | | | | | |
| Ethylbenzene | Total ug | | | | | | | |
| Xylenes | Total ug | | | | | | | |
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| Dilution factor | | | | | | | | |
| Total hydrocarbons as gasoline | Total ug | | | | | | | |
| | | | | | | | | |
| Dilution factor | | | | | | | | |

Footnotes: _____

In-House Comments: Manual was wet

LCI-127

1/1/99

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(612)786-6020

**BTEX/THC as Gas in Air Samples (Charcoal Tubes) by NIOSH Method 1501 Data Reporting Sheet**

Client: I.D. 020 C.P. Hayward

T20 R2

1 of 2

Sample Collected: _____

Sample Received: _____

Sample Log #: 3097-97

Sample Description: charcoal Tube

| | | | FRONT | | | BACK | | |
|---|---|---|---|---|---|---|---|---|
| Parameter | Units | Analysis Date & Initials | Detection Limit Front | Analytical Result Front | Method Blank Front | Detection Limit Back | Analytical Result Back | Method Blank Back |
| Benzene | Total ug | [illegible] | x 2.1 | <2.1 | <2.1 | x .01 | <.01 | <.01 |
| Toluene | Total ug | 6/28/94 | | | | | | |
| Ethylbenzene | Total ug | | | | | | | |
| Xylenes | Total ug | | | | | | | |
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| Dilution factor | | | | | | | | |
| Total hydrocarbons as gasoline | Total ug | | | | | | | |
| | | | | | | | | |
| Dilution factor | | | | | | | | |

Footnotes: _____

In-House Comments: _____

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## BTEX/THC as Gas in Air Samples (Charcoal Tubes) by NIOSH Method 1501 Data Reporting Sheet

Client: I.D. 020 C.P. Hayward

T20 R2

2 of 2

Sample Collected: _____

Sample Received: _____

Sample Log #: 3097-98

Sample Description: charcoal Tube

| Parameter | Units | Analysis Date & Initials | FRONT Detection Limit Front | FRONT Analytical Result Front | FRONT Method Blank Front | BACK Detection Limit Back | BACK Analytical Result Back | BACK Method Blank Back |
|---|---|---|---|---|---|---|---|---|
| Benzene | Total ug | [illegible] | < 2.1 | < 2.1 | < 2.1 | < .01 | < .01 | < .01 |
| Toluene | Total ug | 6-22-94 | | | | | | |
| Ethylbenzene | Total ug | | | | | | | |
| Xylenes | Total ug | | | | | | | |
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| Dilution factor | | | | | | | | |
| Total hydrocarbons as gasoline | Total ug | | | | | | | |
| | | | | | | | | |
| Dilution factor | | | | | | | | |

Footnotes: _____

In-House Comments: _____

LCI-127

1/1/94

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**BTEX/THC as Gas in Air Samples (Charcoal Tubes) by NIOSH Method 1501 Data Reporting Sheet**

Client: I.D. 020 C.P. Hayward

T20 R3

1 of 2

Sample Collected: _____

Sample Received: _____

Sample Log #: 3097-99

Sample Description: charcoal Tube

| | | | FRONT | | | BACK | | |
|---|---|---|---|---|---|---|---|---|
| Parameter | Units | Analysis Date & Initials | Detection Limit Front | Analytical Result Front | Method Blank Front | Detection Limit Back | Analytical Result Back | Method Blank Back |
| Benzene | Total ug | MMM - 6-20-94 | x 2.1 | <2.1 | <2.1 | x .61 | <.61 | <.61 |
| Toluene | Total ug | | | | | | | |
| Ethylbenzene | Total ug | | | | | | | |
| lenes | Total ug | | | | | | | |
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| Dilution factor | | | | | | | | |
| Total hydrocarbons as gasoline | Total ug | | | | | | | |
| | | | | | | | | |
| Dilution factor | | | | | | | | |

Footnotes: _____

In-House Comments: _____

LCI-127

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## BTEX/THC as Gas in Air Samples (Charcoal Tubes) by NIOSH Method 1501 Data Reporting Sheet

Client: I.D. 020 C.P. Hayward

T20 R3

2of2

Sample Collected: _____

Sample Received: _____

Sample Log #: 3097-100

Sample Description: charcoal Tube

| Parameter | Units | Analysis Date & Initials | FRONT Detection Limit Front | FRONT Analytical Result Front | FRONT Method Blank Front | BACK Detection Limit Back | BACK Analytical Result Back | BACK Method Blank Back |
|---|---|---|---|---|---|---|---|---|
| Benzene | Total ug | [illegible] | x 2.1 | <2.1 | <2.1 | x .61 | <.61 | <.61 |
| Toluene | Total ug | 10/28/94 | | | | | | |
| Ethylbenzene | Total ug | | | | | | | |
| Xylenes | Total ug | | | | | | | |
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| Dilution factor | | | | | | | | |
| Total hydrocarbons as gasoline | Total ug | | | | | | | |
| | | | | | | | | |
| Dilution factor | | | | | | | | |

Footnotes: _____

In-House Comments: _____

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**BTEX/THC as Gas in Air Samples (Charcoal Tubes) by NIOSH Method 1501 Data Reporting Sheet**

Client: I.D. 020 C.P. Hayward

Line 1 Konus Stack
Test 9 Run 1
1 of 2

Sample Collected: 6-7

Sample Received: 6-13

Sample Log #: 3097-83

Sample Description: charcoal tube

| Parameter | Units | Analysis Date & Initials | FRONT Detection Limit Front | FRONT Analytical Result Front | FRONT Method Blank Front | BACK Detection Limit Back | BACK Analytical Result Back | BACK Method Blank Back |
|---|---|---|---|---|---|---|---|---|
| Benzene | Total ug | MM 6-14 | x 2.1 | <2.1 | <2.1 | x .101 | <.101 | <.101 |
| Toluene | Total ug | 6-14 | | | | | <.101 | |
| Ethylbenzene | Total ug | | | | | | | |
| Xylenes | Total ug | | | | | | | |
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| Dilution factor | | | | | | | | |
| Total hydrocarbons as gasoline | Total ug | | | | | | | |
| | | | | | | | | |
| Dilution factor | | | | | | | | |

Footnotes:

In-House Comments:

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## BTEX/THC as Gas in Air Samples (Charcoal Tubes) by NIOSH Method 1501 Data Reporting Sheet

Client: I.D. 020 C.P. Hayward

T9 R1

2 of 2

Sample Collected: _____

Sample Received: _____

Sample Log #: 3097-84

Sample Description: charcoal Tube

| | | | FRONT | | | BACK | | |
|---|---|---|---|---|---|---|---|---|
| Parameter | Units | Analysis Date & Initials | Detection Limit Front | Analytical Result Front | Method Blank Front | Detection Limit Back | Analytical Result Back | Method Blank Back |
| Benzene | Total ug | MMN | x 2.1 | <2.1 | <2.1 | x .61 | <.61 | <.61 |
| Toluene | Total ug | 6-21-94 | | | | | | |
| Ethylbenzene | Total ug | | | | | | | |
| Xylenes | Total ug | | | | | | | |
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| Dilution factor | | | | | | | | |
| Total hydrocarbons as gasoline | Total ug | | | | | | | |
| | | | | | | | | |
| Dilution factor | | | | | | | | |

Footnotes: _____

In-House Comments: _____

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**BTEX/THC as Gas in Air Samples (Charcoal Tubes) by NIOSH Method 1501 Data Reporting Sheet**

Client: I.D. 030 C.P. Hayward

T 9 R 2

1 of 2

Sample Collected: _____

Sample Received: _____

Sample Log #: 3097-57

Sample Description: charcoal Tube

| | | | FRONT | | | BACK | | |
|---|---|---|---|---|---|---|---|---|
| Parameter | Units | Analysis Date & Initials | Detection Limit Front | Analytical Result Front | Method Blank Front | Detection Limit Back | Analytical Result Back | Method Blank Back |
| Benzene | Total ug | [illegible] | x 2.1 | < 2.1 | < 2.1 | x .61 | < .61 | < .61 |
| Toluene | Total ug | 10/24/94 | | | | | | |
| Ethylbenzene | Total ug | | | | | | | |
| 'enes | Total ug | | | | | | | |
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| Dilution factor | | | | | | | | |
| Total hydrocarbons as gasoline | Total ug | | | | | | | |
| | | | | | | | | |
| Dilution factor | | | | | | | | |

Footnotes: _____

In-House Comments: _____

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(612)786-6020

## BTEX/THC as Gas in Air Samples (Charcoal Tubes) by NIOSH Method 1501 Data Reporting Sheet

Client: I.D. 020 C.P. Hayward

T 9 R 2

2 of 2

Sample Collected: _____

Sample Received: _____

Sample Log #: 3097-88

Sample Description: charcoal Tube

| Parameter | Units | Analysis Date & Initials | FRONT Detection Limit Front | FRONT Analytical Result Front | FRONT Method Blank Front | BACK Detection Limit Back | BACK Analytical Result Back | BACK Method Blank Back |
|---|---|---|---|---|---|---|---|---|
| Benzene | Total ug | mmm | x 2.1 | <2.1 | <2.1 | x .61 | <.61 | <.61 |
| Toluene | Total ug | 10-29-94 | | | | | | |
| Ethylbenzene | Total ug | | | | | | | |
| Xylenes | Total ug | | | | | | | |
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| Dilution factor | | | | | | | | |
| Total hydrocarbons as gasoline | Total ug | | | | | | | |
| | | | | | | | | |
| Dilution factor | | | | | | | | |

Footnotes: _____

In-House Comments: _____

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## BTEX/THC as Gas in Air Samples (Charcoal Tubes) by NIOSH Method 1501 Data Reporting Sheet

Client: I.D. 020 C.P. Hayward

T9 R3

1 of 2

Sample Collected: _____

Sample Received: _____

Sample Log #: 3097-91

Sample Description: charcoal Tube

| Parameter | Units | Analysis Date & Initials | FRONT Detection Limit Front | FRONT Analytical Result Front | FRONT Method Blank Front | BACK Detection Limit Back | BACK Analytical Result Back | BACK Method Blank Back |
|---|---|---|---|---|---|---|---|---|
| Benzene | Total ug | mm | <2.1 | <2.1 | <2.1 | <.101 | <.101 | <.101 |
| Toluene | Total ug | 6/24/94 | | | | | | |
| Ethylbenzene | Total ug | | | | | | | |
| enes | Total ug | | | | | | | |
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| | | | | | | | | |
| Dilution factor | | | | | | | | |
| Total hydrocarbons as gasoline | Total ug | | | | | | | |
| | | | | | | | | |
| Dilution factor | | | | | | | | |

otnotes: _____

In-House Comments: _____

LCI-127

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## BTEX/THC as Gas in Air Samples (Charcoal Tubes) by NIOSH Method 1501 Data Reporting Sheet

Client: I.D. 020 C.P. Hayward

T9R3

2of2

Sample Collected: _____

Sample Received: _____

Sample Log #: 3097-92

Sample Description: charcoal Tube

| | | | FRONT | | | BACK | | |
|---|---|---|---|---|---|---|---|---|
| Parameter | Units | Analysis Date & Initials | Detection Limit Front | Analytical Result Front | Method Blank Front | Detection Limit Back | Analytical Result Back | Method Blank Back |
| Benzene | Total ug | [illegible] | <2.1 | <2.1 | <2.1 | <.61 | <.61 | <.61 |
| Toluene | Total ug | 10-21-94 | | | | | | |
| Ethylbenzene | Total ug | | | | | | | |
| Xylenes | Total ug | | | | | | | |
| | | | | | | | | |
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| | | | | | | | | |
| | | | | | | | | |
| Dilution factor | | | | | | | | |
| Total hydrocarbons as gasoline | Total ug | | | | | | | |
| | | | | | | | | |
| Dilution factor | | | | | | | | |

Footnotes: _____

In-House Comments: _____

LCI-127

# INTERPOLL LABORATORIES INC.

Phenol Result By EPA Method 8270
For Dept. 20/ LP Hayward
Collected 6/8-9/94

| | Test: 7 | | Source: Line 1 Konus Stack |
|---|---|---|---|
| | Run 1 | Run 2 | Run 3 |
| Log # | 3097-39/40 | 3097-41/42 | 3097-43/44 |
| Analysis Date | 6/20/94 | 6/20/94 | 6/20/94 |
| Phenol* | < 840 | < 840 | < 840 |
| 2-Fluorophenol** | 28.3 | 31.4 | 23.4 |
| D6-Phenol** | 21.4 | 22.1 | 28.1 |
| 2,4,6-Tribromophenol*** | 81.4 | 66.8 | 84.8 |

| | Test: 18 | | Source: Line 2 Konus Stack |
|---|---|---|---|
| | Run 1 | Run 2 | Run 3 |
| Log # | 3097-45/46 | 3097-47/48 | 3097-49/50 |
| Analysis Date | 6/20/94 | 6/20/94 | 6/20/94 |
| Phenol* | < 840 | < 840 | < 840 |
| 2-Fluorophenol** | 35.8 | 40.8 | 48.7 |
| D6-Phenol** | 22.1 | 26.6 | 27.0 |
| 2,4,6-Tribromophenol*** | 78.5 | 73.1 | 87.3 |

* = Total mass of the specified compound in the sample in ug.

** = Percent recovery of the field surrogate. ( 59800 ug 2-Fluorophenol and 5330 ug Phenol-D6 was added to the impinger solution before sampling.)

*** = Percent recovery of the lab surrogates.

Reviewed By:

Gregg W. Holman

# INTERPOLL LABORATORIES INC.

Polycyclic Organic Matter Results By EPA Method 8270
For Dept. 20/ LP Hayward, Collected 6/9/94

| | Test : 8 | | | Source: Line 1 Konus Stack |
|---|---|---|---|---|
| | Run 0 | Run 1 | Run 2 | Run 3 |
| Log # | 3097-51 | 3097-55 | 3097-59 | 3097-63 |
| Compounds of Interest | | | | |
| **Benz(a)anthracene*** | < 1.8 | < 1.8 | 9.4 | 11 |
| **Benzo(b)fluoranthene*** | < 0.99 | 51 | 26 | 34 |
| **Benzo(a)pyrene*** | < 1.2 | 13 | < 1.2 | 9.6 |
| **Dibenz(a,h)acridine*** | < 15 | < 15 | < 15 | < 15 |
| **Dibenz(a,j)acridine*** | < 1.6 | < 1.6 | < 1.6 | < 1.6 |
| **Dibenz(a,h)anthracene*** | < 0.88 | < 0.88 | < 0.88 | < 0.88 |
| **7H-Dibenzo(c,g)carbazole*** | < 1.2 | < 1.2 | < 1.2 | < 1.2 |
| **Dibenzo(a,h)pyrene*** | < 20 | < 20 | < 20 | < 20 |
| **Dibenzo(a,i)pyrene*** | < 20 | < 20 | < 20 | < 20 |
| **Indeno(1,2,3-cd)pyrene*** | < 0.90 | 6.9 | 2.3 | 3.8 |
| Field Surrogate Recovery | | | | |
| D10-Fluoranthene** | 78.0 | 95.5 | 90.5 | 101 |
| Lab Surrogate Recovery | | | | |
| D5-Nitrobenzene*** | 73.8 | 93.8 | 82.8 | 80.8 |
| 2-Fluorobiphenyl*** | 70.4 | 96.8 | 88.6 | 88.6 |
| D14-Terphenyl*** | 92.6 | 101 | 96.2 | 91.2 |

| | Test : 19 | | | Source: Line 2 Konus Stack |
|---|---|---|---|---|
| | Run 0 | Run 1 | Run 2 | Run 3 |
| Log # | 3097-67 | 3097-71 | 3097-75 | 3097-79 |
| Compounds of Interest | | | | |
| **Benz(a)anthracene*** | < 1.8 | < 1.8 | < 1.8 | < 1.8 |
| **Benzo(b)fluoranthene*** | < 0.99 | < 0.99 | < 0.99 | < 0.99 |
| **Benzo(a)pyrene*** | 2.2 | 4.9 | < 1.2 | < 1.2 |
| **Dibenz(a,h)acridine*** | < 15 | < 15 | < 15 | < 15 |
| **Dibenz(a,j)acridine*** | < 1.6 | < 1.6 | < 1.6 | < 1.6 |
| **Dibenz(a,h)anthracene*** | < 0.88 | < 0.88 | < 0.88 | < 0.88 |
| **7H-Dibenzo(c,g)carbazole*** | < 1.2 | < 1.2 | < 1.2 | < 1.2 |
| **Dibenzo(a,h)pyrene*** | < 20 | < 20 | < 20 | < 20 |
| **Dibenzo(a,i)pyrene*** | < 20 | < 20 | < 20 | < 20 |
| **Indeno(1,2,3-cd)pyrene*** | < 0.90 | < 0.90 | < 0.90 | < 0.90 |
| Field Surrogate Recovery | | | | |
| D10-Fluoranthene** | 45.5 | 99.5 | 86.5 | 94.0 |
| Lab Surrogate Recovery | | | | |
| D5-Nitrobenzene*** | 28.4 | 84.8 | 88.0 | 84.6 |
| 2-Fluorobiphenyl*** | 36.8 | 88.6 | 94.8 | 84.4 |
| D14-Terphenyl*** | 58.8 | 95.0 | 107.2 | 95.4 |

* = Total mass of the specified compound in the sample in ug.
** = Percent recovery of the field surrogate.
*** = Percent recovery of the lab surrogates.

Reviewed By:
Gregg W. Holman
Laboratory Director

3097SV.LPH

Interpoll Laboratories
(612) 786-6020

IMPINGER CATCHES

Project Name: LP/Hayward Order Date:
Date Required: 6/6/94 Delivery Date: 6/3/94

| Nature of Spiking Material | Spike Concentration | Spike Volume | Total Mass of Spike |
|---|---|---|---|
| D-6 Phenol (P-67) | 5.3316 mg/mL | 1.0 mL | 5.3316 mg |
| 2-fluorophenol (P-68) | 49.8140 mg/mL | 1.2 mL | 59.7768 mg |
| | | | |
| | | | |

*SPECIAL REQUIREMENTS*

WAO 6/1/94

**Please return this form with the samples.

INTERPOLL LABORATORIES, INC.
(612) 786-6020

# Sample Chain of Custody

Job: LP-HAYWARD | Source: PRESS RTO OUTLET | Site: STACK | Log No.: 3097
Field Engineer: SCB | Date of Test: 6-7-94 | Test No.: 1 | No. of Runs: 3

| No. Items | Sample Type | | Analysis | | Sequence No. | Comments |
|---|---|---|---|---|---|---|
| 4 | Probe Wash:<br>☐ Acetone<br>☒ $MeCl_2$ | ☐DI Water<br>☐_____ | ☐EPA M-5<br>☐EPA M-29 | ☐EPA M-201A<br>☒ 0011 | | |
| 0 | Filter:<br>☐ 4" Glass<br>☐ SS Thimble | ☐Pallflex<br>☐2.5" Glass | ☐EPA M-5<br>☐EPA M-29<br>☐EPA M-201A | ☐EPA M-17 | | |
| 4 | Impingers:<br>☐DI Water<br>☐3% $H_2O_2$<br>☐1N NaOH<br>☒ 2,4-DNPH | ☐$H_2SO_4$<br>☐$HNO_3/H_2O_2$<br>☐$KMnO_4/H_2SO_4$<br>☐_____ | ☐MN Protocol<br>☐WI Protocol<br>☐EPA M-202<br>☐EPA M6,8<br>☐Acid Gases | ☐IA Protocol<br>☒ Formaldehyde (0011)<br>☐EPA M-29<br>☐EPA M-26<br>☐_____ | | |
| 3 | Integrated Gas:<br>☒ Tedlar Bag | ☐_____ | ☒EPA M-3<br>☐_____ | ☐EPA M-10 | | |
| 0 | Oxides of Nitrogen: | | ☐EPA M-7A<br>☐_____ | | | |
| 0 | Fuel Lab:<br>☐Fuel Sample | ☐Aggregate | ☐Per S-0163 | | | |
| 0 | Particle Sizing: | | ☐X-Ray Sdgraph<br>☐_____ | ☐Cascade Imp | | |
| 1 | Miscellaneous: | ☒ Field Spike | ☒ 0011 | | | |

Fuel Type: Coal: ☐Bituminous ☐Anthracite ☐Lignite | Wood: ☐Wood Waste ☐Dust ☐Bark | Oil: ☐Waste Oil ☐No. 2 ☐No. 6 | Misc: ☒Natural Gas ☐RDF ☐_____

| Relinquished by/Affiliation | Accepted by/Affiliation | Date |
|---|---|---|
| Scott Bainville / Interpoll Labs Inc | L Berry, Interpoll | 6/13/94 1000 |
| | | |
| | | |

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INTERPOLL LABORATORIES, INC.
(612) 786-6020

# Sample Chain of Custody

Job: LP-HAYWARD | Source: PROBED OUTLET | Site: STACK | Log No.: 3047
Field Engineer: SB | Date of Test: 6-8-94 | Test No.: 2 | No. of Runs: 3

| No. Items | Sample Type | | Analysis | | Sequence No. | Comments |
|---|---|---|---|---|---|---|
| 0 | Probe Wash:<br>☐ Acetone<br>☐ $MeCl_2$ | ☐DI Water<br>☐_____ | ☐EPA M-5<br>☐EPA M-29 | ☐EPA M-201A<br>☐_____ | | |
| 0 | Filter:<br>☐ 4" Glass<br>☐ SS Thimble | ☐Pallflex<br>☐2.5" Glass | ☐EPA M-5<br>☐EPA M-29<br>☐EPA M-201A | ☐EPA M-17 | | |
| 5 | Impingers:<br>☐DI Water<br>☐3%$H_2O_2$<br>☐1N NaOH<br>☐2,4-DNPH | ☐$H_2SO_4$<br>☐$HNO_3/H_2O_2$<br>☐$KMnO_4/H_2SO_4$<br>☒ 1,2,PP INTOLUENE | ☐MN Protocol<br>☐WI Protocol<br>☐EPA M-202<br>☐EPA M6,8<br>☐Acid Gases | ☐IA Protocol<br>☐Formaldehyde<br>☐EPA M-29<br>☐EPA M-26<br>☒ 1,2 PT BY RADIANT | | 1 - BLANK<br>1 - SPIKE<br>3 - 1ST IMP<br>3 - 2ND IMP |
| 3 | Integrated Gas:<br>☒Tedlar Bag | ☐_____ | ☐EPA M-3<br>☐_____ | ☐EPA M-10 | | |
| 0 | Oxides of Nitrogen: | | ☐EPA M-7A<br>☐_____ | | | |
| 0 | Fuel Lab:<br>☐Fuel Sample | ☐Aggregate | ☐Per S-0163 | | | |
| 0 | Particle Sizing: | | ☐X-Ray Sdgraph<br>☐_____ | ☐Cascade Imp | | |
| 0 | Miscellaneous: | ☐_____ | ☐_____ | | | |

Fuel Type: Coal: ☐Bituminous ☐Anthracite ☐Lignite | Wood: ☐Wood Waste ☐Dust ☐Bark | Oil: ☐Waste Oil ☐No. 2 ☐No. 6 | Misc: ☒Natural Gas ☐RDF ☒_____

| Relinquished by/Affiliation | Accepted by/Affiliation | Date |
|---|---|---|
| Scott D Barnicle/Interpoll Labs | R Berg, Interpoll | 6/13/94 1000 |
| | | |
| | | |

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INTERPOLL LABORATORIES, INC.
(612) 786-6020

# Sample Chain of Custody

Job LP-HAYWARD Source #1 PRESS RTO Site STACK Log No. 3097
Field Engineer SB Date of Test 6-10-94 Test No. 3 No. of Runs 3

| No. Items | Sample Type | | Analysis | | Sequence No. | Comments |
|---|---|---|---|---|---|---|
| 3 | Probe Wash:<br>☑ Acetone<br>☐ $MeCl_2$ | ☐DI Water<br>☐_____ | ☑EPA M-5<br>☐EPA M-29 | ☐EPA M-201A<br>☐_____ | | |
| 3 | Filter:<br>☑ 4" Glass<br>☐ SS Thimble | ☐Pallflex<br>☐2.5" Glass | ☑EPA M-5<br>☐EPA M-29<br>☐EPA M-201A | ☐EPA M-17 | | |
| 3 | Impingers:<br>☑DI Water<br>☐3%$H_2O_2$<br>☐1N NaOH<br>☐2,4-DNPH | ☐$H_2SO_4$<br>☐$HNO_3/H_2O_2$<br>☐$KMnO_4/H_2SO_4$<br>☐_____ | ☐MN Protocol<br>☑WI Protocol<br>☐EPA M-202<br>☐EPA M6,8<br>☐Acid Gases | ☐IA Protocol<br>☐Formaldehyde<br>☐EPA M-29<br>☐EPA M-26<br>☐_____ | | |
| 3 | Integrated Gas:<br>☑Tedlar Bag | ☐_____ | ☑EPA M-3<br>☐_____ | ☑EPA M-10 | | |
| 0 | Oxides of Nitrogen: | | ☐EPA M-7A<br>☐_____ | | | |
| 1 | Fuel Lab:<br>☑Fuel Sample | ☐Aggregate | ☑Rer 5-0163 | | | |
| 0 | Particle Sizing: | | ☐X-Ray Sdgraph<br>☐_____ | ☐Cascade Imp | | |
| 0 | Miscellaneous: | ☐_____ | ☐_____ | | | |

Fuel Type: Coal: ☐Bituminous ☐Anthracite ☐Lignite Wood: ☐Wood Waste ☐Dust ☐Bark Oil: ☐Waste Oil ☐No. 2 ☐No. 6 Misc: ☑Natural Gas ☐RDF ☐_____

| Relinquished by/Affiliation | Accepted by/Affiliation | Date |
|---|---|---|
| Henry J Beilke / Interpoll Labs Inc. | Bob Berg, Interpoll | 6/13/94 1000 |
| | | |

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INTERPOLL LABORATORIES, INC.
(612) 786-6020

# Sample Chain of Custody

Job LP - HAYWARD Source PRESS RTO OUTLET Site STACK Log No. 3097
Field Engineer SAB Date of Test 6-7-94 Test No. 3 No. of Runs 3

| No. Items | Sample Type | | Analysis | | Sequence No. | Comments |
|---|---|---|---|---|---|---|
| 4 | **Probe Wash:**<br>☒ Acetone<br>☐ $MeCl_2$ | ☐DI Water<br>☐_____ | ☒EPA M-5<br>☐EPA M-29 | ☐EPA M-201A<br>☐_____ | | |
| 4 | **Filter:**<br>☒ 4" Glass<br>☐ SS Thimble | ☐Pallflex<br>☐2.5" Glass | ☒EPA M-5<br>☐EPA M-29<br>☐EPA M-201A | ☐EPA M-17 | | |
| 4 | **Impingers:**<br>☒DI Water<br>☐3%$H_2O_2$<br>☐1N NaOH<br>☐2,4-DNPH | ☐$H_2SO_4$<br>☐$HNO_3/H_2O_2$<br>☐$KMnO_4/H_2SO_4$<br>☐_____ | ☐MN Protocol<br>☒WI Protocol<br>☐EPA M-202<br>☐EPA M6,8<br>☐Acid Gases | ☐IA Protocol<br>☐Formaldehyde<br>☐EPA M-29<br>☐EPA M-26<br>☐_____ | | |
| 3 | **Integrated Gas:**<br>☒Tedlar Bag | ☐_____ | ☒EPA M-3<br>☐_____ | ☒EPA M-10 | | |
| 0 | **Oxides of Nitrogen:** | | ☐EPA M-7A<br>☐_____ | | | |
| 0 | **Fuel Lab:**<br>☐Fuel Sample | ☐Aggregate | ☐Per S-0163 | | | |
| 0 | **Particle Sizing:** | | ☐X-Ray Sdgraph<br>☐_____ | ☐Cascade Imp | | |
| 0 | **Miscellaneous:** | ☐_____ | ☐_____ | | | |

**Fuel Type:** Coal: ☐Bituminous ☐Anthracite ☐Lignite Wood: ☐Wood Waste ☐Dust ☐Bark Oil: ☐Waste Oil ☐No. 2 ☐No. 6 Misc: ☒Natural Gas ☐RDF ☐_____

| Relinquished by/Affiliation | Accepted by/Affiliation | Date |
|---|---|---|
| Scott J Burrill / Entropoll Volo Inc. | B Berg, Jr Dorgan II | 6/13/94 1000 |
| | | |
| | | |

Interpoll Laboratories
(612) 786-6020

# SAMPLE CHAIN OF CUSTODY

Job L.P. / Hayward, WI  Source Line 1 Process RTO  Site Stack
Field Engineer M. Kaehler  Date of Test 6-10-94  Test No. 5  No. of Runs 3

| # ITEMS | SAMPLE TYPE | | ANALYSIS | | LOG NUMBER | COMMENTS |
|---|---|---|---|---|---|---|
| 3 | **Probe Wash:**<br>☒ Acetone<br>☐ $MeCl_2$ | ☐DI Water<br>☐_____ | ☒EPA M-5<br>☐EPA M-29 | ☐EPA M-201A<br>☐_____ | | |
| 3 | **Filter:**<br>☐ 4" Glass<br>☐ SS Thimble | ☒Pallflex<br>☐2.5" Glass | ☒EPA M-5<br>☐EPA M-29<br>☐EPA M-201A | ☐EPA M-17 | | |
| 3 | **Impingers:**<br>☒DI Water<br>☐3%$H_2O_2$<br>☐1N NaOH<br>☐2,4-DNPH | ☐$H_2SO_4$<br>☐$HNO_3/H_2O_2$<br>☐$KMnO_4/H_2SO_4$<br>☐_____ | ☐MN Protocol<br>☒WI Protocol<br>☐EPA M-202<br>☐EPA M6,8<br>☐Acid Gases | ☐IA Protocol<br>☐Formaldehyde<br>☐EPA M-29<br>☐EPA M-26<br>☐_____ | | |
| — | **Integrated Gas:**<br>☐Tedlar Bag | ☐_____ | ☐EPA M-3<br>☐_____ | ☐EPA M-10 | | Ambient Air |
| — | **Oxides of Nitrogen:** | | ☐EPA M-7A<br>☐_____ | | | |
| — | **Fuel Lab:**<br>☐Fuel Sample | ☐Aggregate | ☐Per S-0163 | | | |
| — | **Particle Sizing:** | | ☐X-Ray Sdgraph<br>☐_____ | ☐Cascade Imp | | |
| — | **Miscellaneous:** | ☐_____ | ☐_____ | | | |

**Fuel Type:** Coal: ☐Bituminous ☐Anthracite ☐Lignite  Wood: ☐Wood Waste ☐Dust ☒Bark  Oil: ☐Waste Oil ☐No. 2 ☐No. 6  Misc: ☐Natural Gas ☐RDF ☐_____

| Relinquished by/Affiliation | Accepted by/Affiliation | Date |
|---|---|---|
| Mark Kaehler / Interpoll Labs | Bob Berg, Interpoll | 6/13/94 1000 |
| | | |
| | | |

S-278

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E-58

INTERPOLL LAB ATORIES, INC.
(612) 786-6020

# Sample Chain of Custody

Job: LP/HAYWARD  Source: Linoi Kanus  Site: STACK  Log No.: 3097
Field Engineer: E Trautlein  Date of Test: 6-8-94  Test No.: 5  No. of Runs: 3

| No. Items | Sample Type | | Analysis | | Sequence No. | Comments |
|---|---|---|---|---|---|---|
| 4 | Probe Wash:<br>☒ Acetone<br>☐ $MeCl_2$ | ☐DI Water<br>☐_____ | ☒EPA M-5<br>☐EPA M-29 | ☐EPA M-201A<br>☐_____ | | |
| 4 | Filter:<br>☐ 4" Glass<br>☐ SS Thimble | ☒Wallflex<br>☐2.5" Glass | ☒EPA M-5<br>☐EPA M-29<br>☐EPA M-201A | ☐EPA M-17 | | |
| 4 | Impingers:<br>☒DI Water<br>☐3%$H_2O_2$<br>☐1N NaOH<br>☐2,4-DNPH | ☐$H_2SO_4$<br>☐$HNO_3/H_2O_2$<br>☐$KMnO_4/H_2SO_4$<br>☐_____ | ☐MN Protocol<br>☒WI Protocol<br>☐EPA M-202<br>☐EPA M6,8<br>☐Acid Gases | ☐IA Protocol<br>☐Formaldehyde<br>☐EPA M-29<br>☐EPA M-26<br>☐_____ | | |
| 3 | Integrated Gas:<br>☒Tedlar Bag | ☐_____ | ☒EPA M-3<br>☐_____ | ☐EPA M-10 | | Analysis on site |
| 12 | Oxides of Nitrogen: | | ☒EPA M-7A<br>☐_____ | | | |
| | Fuel Lab:<br>☐Fuel Sample | ☐Aggregate | ☐Per S-0163 | | | |
| | Particle Sizing: | | ☐X-Ray Sdgraph<br>☐_____ | ☐Cascade Imp | | |
| | Miscellaneous: | ☐_____ | ☐_____ | | | |

Fuel Type: Coal: ☐Bituminous ☐Anthracite ☐Lignite  Wood: ☐Wood Waste ☐Dust ☒Bark  Oil: ☐Waste Oil ☐No. 2 ☐No. 6  Misc: ☐Natural Gas ☐RDF ☐_____

| Relinquished by/Affiliation | Accepted by/Affiliation | Date |
|---|---|---|
| E Trautlein/Interpoll | R Berg, InTorpil | 6/13/94 1000 |
| | | |
| | | |

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INTERPOLL LABORATORIES, INC.
(612) 786-6020

# Sample Chain of Custody

Job LP/HA/WORLD Source UNIT KONUS Site STACK Log No. 3097
Field Engineer E TROWBRIDGE Date of Test 6-9-94 Test No. 4 No. of Runs

| No. Items | Sample Type | | Analysis | | Sequence No. | Comments |
|---|---|---|---|---|---|---|
| | **Probe Wash:**<br>☐ Acetone<br>☐ $MeCl_2$ | ☐DI Water<br>☐_____ | ☐EPA M-5<br>☐EPA M-29 | ☐EPA M-201A<br>☐_____ | | |
| | **Filter:**<br>☐ 4" Glass<br>☐ SS Thimble | ☐Pallflex<br>☐2.5" Glass | ☐EPA M-5<br>☐EPA M-29<br>☐EPA M-201A | ☐EPA M-17 | | |
| 1 - spike<br>3 | **Impingers:**<br>☐DI Water<br>☐3%$H_2O_2$<br>☐1N NaOH<br>☒2,4-DNPH | ☐$H_2SO_4$<br>☐$HNO_3/H_2O_2$<br>☐$KMnO_4/H_2SO_4$<br>☐_____ | ☐MN Protocol<br>☒WI Protocol<br>☐EPA M-202<br>☐EPA M6,8<br>☐Acid Gases | ☐IA Protocol<br>☐Formaldehyde<br>☐EPA M-29<br>☐EPA M-26<br>☐_____ | | |
| 3 | **Integrated Gas:**<br>☒Tedlar Bag | ☐_____ | ☒EPA M-3<br>☐_____ | ☒EPA M-10 | | |
| | **Oxides of Nitrogen:** | | ☐EPA M-7A<br>☐_____ | | | |
| | **Fuel Lab:**<br>☐Fuel Sample | ☐Aggregate | ☐Per S-0163 | | | |
| | **Particle Sizing:** | | ☐X-Ray Sdgraph<br>☐_____ | ☐Cascade Imp | | |
| | **Miscellaneous:** | ☐_____ | ☐_____ | | | |

**Fuel Type:** Coal: ☐Bituminous ☐Anthracite ☐Lignite Wood: ☐Wood Waste ☐Dust ☒Bark Oil: ☐Waste Oil ☐No. 2 ☐No. 6 Misc: ☐Natural Gas ☐RDF ☐_____

| Relinquished by/Affiliation | Accepted by/Affiliation | Date |
|---|---|---|
| E Trowbridge/Lockwell Labs | Bob Berg, InterPoll | 6/13/94 1000 |
| | | |
| | | |

033094-G:\STACK\WP\FORMS\S-270.2

E-60

INTERPOLL LAB ..ATORIES, INC.
(612) 786-6020

# Sample Chain of Custody

Job: LL/Hayward  Source: LME1 KONUS  Site: Stack  Log No.: 3097
Field Engineer: E Trawbridge  Date of Test: 6-9-94  Test No.: 7  No. of Runs: 3

| No. Items | Sample Type | | Analysis | | Sequence No. | Comments |
|---|---|---|---|---|---|---|
| | **Probe Wash:**<br>☐ Acetone<br>☐ $MeCl_2$ | ☐DI Water<br>☐_____ | ☐EPA M-5<br>☐EPA M-29 | ☐EPA M-201A<br>☐_____ | | |
| | **Filter:**<br>☐ 4" Glass<br>☐ SS Thimble | ☐Pallflex<br>☐2.5" Glass | ☐EPA M-5<br>☐EPA M-29<br>☐EPA M-201A | ☐EPA M-17 | | |
| | **Impingers:**<br>☐DI Water<br>☐3%$H_2O_2$<br>☐1N NaOH<br>☐2,4-DNPH | ☐$H_2SO_4$<br>☐$HNO_3/H_2O_2$<br>☐$KMnO_4/H_2SO_4$<br>☐_____ | ☐MN Protocol<br>☐WI Protocol<br>☐EPA M-202<br>☐EPA M6,8<br>☐Acid Gases | ☐IA Protocol<br>☐Formaldehyde<br>☐EPA M-29<br>☐EPA M-26<br>☐_____ | | |
| | **Integrated Gas:**<br>☐Tedlar Bag | ☐_____ | ☐EPA M-3<br>☐_____ | ☐EPA M-10 | | |
| | **Oxides of Nitrogen:** | | ☐EPA M-7A<br>☐_____ | | | |
| | **Fuel Lab:**<br>☐Fuel Sample | ☐Aggregate | ☐Per S-0163 | | | |
| | **Particle Sizing:** | | ☐X-Ray Sdgraph<br>☐_____ | ☐Cascade Imp | | |
| 6 | **Miscellaneous:** | ☐_____ | ☐ Phenol | | | |

**Fuel Type:** Coal: ☐Bituminous ☐Anthracite ☐Lignite  Wood: ☐Wood Waste ☐Dust ☐Bark  Oil: ☐Waste Oil ☐No. 2 ☐No. 6  Misc: ☐Natural Gas ☐RDF ☐_____

| Relinquished by/Affiliation | Accepted by/Affiliation | Date |
|---|---|---|
| E Trawbridge / Interpoll Labs | Bob Berg / Interpoll | 6/13/94 1006 |
| | | |
| | | |

033094-G:\STACK\WP\FORMS\S-270.2

INTERPOLL LABORATORIES, INC.
(612) 786-6020

# Sample Chain of Custody

Job: CP/HAYWARD  Source: LINE 1 KONUS  Site: STACK  Log No.: 3097
Field Engineer: E TRZUSKOWSKI  Date of Test: 6-9-94  Test No.: 9  No. of Runs: 5

| No. Items | Sample Type | | Analysis | | Sequence No. | Comments |
|---|---|---|---|---|---|---|
| | **Probe Wash:**<br>☐ Acetone<br>☐ $MeCl_2$ | ☐DI Water<br>☐_____ | ☐EPA M-5<br>☐EPA M-29 | ☐EPA M-201A<br>☐_____ | | |
| | **Filter:**<br>☐ 4" Glass<br>☐ SS Thimble | ☐Pallflex<br>☐2.5" Glass | ☐EPA M-5<br>☐EPA M-29<br>☐EPA M-201A | ☐EPA M-17 | | |
| | **Impingers:**<br>☐DI Water<br>☐3%$H_2O_2$<br>☐1N NaOH<br>☐2,4-DNPH | ☐$H_2SO_4$<br>☐$HNO_3/H_2O_2$<br>☐$KMnO_4/H_2SO_4$<br>☐_____ | ☐MN Protocol<br>☐WI Protocol<br>☐EPA M-202<br>☐EPA M6,8<br>☐Acid Gases | ☐IA Protocol<br>☐Formaldehyde<br>☐EPA M-29<br>☐EPA M-26<br>☐_____ | | |
| | **Integrated Gas:**<br>☐Tedlar Bag | ☐_____ | ☐EPA M-3<br>☐_____ | ☐EPA M-10 | | |
| | **Oxides of Nitrogen:** | | ☐EPA M-7A<br>☐_____ | | | |
| | **Fuel Lab:**<br>☐Fuel Sample | ☐Aggregate | ☐Per S-0163 | | | |
| | **Particle Sizing:** | | ☐X-Ray Sdgraph<br>☐_____ | ☐Cascade Imp | | |
| 6 | **Miscellaneous:** | ☒ CHLCOAL | ☒ BENZENE | | | |

**Fuel Type:** Coal: ☐Bituminous ☐Anthracite ☐Lignite  Wood: ☐Wood Waste ☐Dust ☒Bark  Oil: ☐Waste Oil ☐No. 2 ☐No. 6  Misc: ☐Natural Gas ☐RDF ☐_____

| Relinquished by/Affiliation | Accepted by/Affiliation | Date |
|---|---|---|
| [illegible] | Bob Berg, Interpoll | 6/13/94 1000 |
| | | |
| | | |

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INTERPOLLUTANT LABORATORIES, INC.
(612) 786-6020

# Sample Chain of Custody

Job L.P./Hayward, WI Source Line 1 Kenus Site Stack Log No. 3097
Field Engineer M. Kaehler Date of Test 6-9-94 Test No. 8 No. of Runs 3

| No. Items | Sample Type | | Analysis | | Sequence No. | Comments |
|---|---|---|---|---|---|---|
| 3+1 | **Probe Wash:**<br>☒ Acetone<br>☐ $MeCl_2$ | ☐ DI Water<br>☐ _____ | ☐ EPA M-5<br>☐ EPA M-29 | ☐ EPA M-201A<br>☒ POM | | |
| 3+1 | **Filter:**<br>☐ 4" Glass<br>☐ SS Thimble | ☐ Pallflex<br>☐ 2.5" Glass | ☐ EPA M-5<br>☐ EPA M-29<br>☐ EPA M-201A | ☐ EPA M-17<br>☒ POM | | |
| 3+1 | **Impingers:**<br>☒ DI Water<br>☐ 3% $H_2O_2$<br>☐ 1N NaOH<br>☐ 2,4-DNPH | ☐ $H_2SO_4$<br>☐ $HNO_3/H_2O_2$<br>☐ $KMnO_4/H_2SO_4$<br>☐ _____ | ☐ MN Protocol<br>☐ WI Protocol<br>☐ EPA M-202<br>☐ EPA M6,8<br>☐ Acid Gases | ☐ IA Protocol<br>☐ Formaldehyde<br>☐ EPA M-29<br>☐ EPA M-26<br>☒ POM | | |
| 3 | **Integrated Gas:**<br>☐ Tedlar Bag | ☐ _____ | ☒ EPA M-3<br>☐ _____ | ☐ EPA M-10 | | |
| — | **Oxides of Nitrogen:** | | ☐ EPA M-7A<br>☐ _____ | | | |
| — | **Fuel Lab:**<br>☐ Fuel Sample | ☐ Aggregate | ☐ Per S-0163 | | | |
| — | **Particle Sizing:** | | ☐ X-Ray Sdgraph<br>☐ _____ | ☐ Cascade Imp | | |
| — | **Miscellaneous:** | ☐ _____ | ☐ _____ | | | |

**Fuel Type:** Coal: ☐ Bituminous ☐ Anthracite ☐ Lignite
Wood: ☐ Wood Waste ☐ Dust ☒ Bark
Oil: ☐ Waste Oil ☐ No. 2 ☐ No. 6
Misc: ☐ Natural Gas ☐ RDF ☐ _____

| Relinquished by/Affiliation | Accepted by/Affiliation | Date |
|---|---|---|
| Mark Kaehler / Entergell Labs | [illegible] | 6/13/94 1000 |
| | | |

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INTERPOLL LABORATORIES, INC.
(612) 786-6020

# Sample Chain of Custody

Job L.P Hayward Source Line 2 Press Vent Site RTO Stack Log No. 3097
Field Engineer Scott Date of Test 6/10/94 Test No. IV No. of Runs 3

| No. Items | Sample Type | Analysis | Sequence No. | Comments |
|---|---|---|---|---|
| | **Probe Wash:**<br>☐ Acetone ☐DI Water<br>☐ $MeCl_2$ ☐_____ | ☐EPA M-5 ☐EPA M-201A<br>☐EPA M-29 ☐_____ | | |
| | **Filter:**<br>☐ 4" Glass ☐Pallflex<br>☐ SS Thimble ☐2.5" Glass | ☐EPA M-5 ☐EPA M-17<br>☐EPA M-29<br>☐EPA M-201A | | |
| 5 | **Impingers:**<br>☐DI Water ☐$H_2SO_4$<br>☐3%$H_2O_2$ ☐$HNO_3/H_2O_2$<br>☐1N NaOH ☐$KMnO_4/H_2SO_4$<br>☒2,4-DNPH ☐_____ | ☐MN Protocol ☐IA Protocol<br>☐WI Protocol ☐Formaldehyde<br>☐EPA M-202 ☐EPA M-29<br>☐EPA M6,8 ☐EPA M-26<br>☐Acid Gases ☒ 0011 | | 1 Blank<br>1 Spike<br>3 sample runs |
| | **Integrated Gas:**<br>☐Tedlar Bag ☐_____ | ☐EPA M-3 ☐EPA M-10<br>☐_____ | | |
| | **Oxides of Nitrogen:** | ☐EPA M-7A<br>☐_____ | | |
| | **Fuel Lab:**<br>☐Fuel Sample ☐Aggregate | ☐Per S-0163 | | |
| | **Particle Sizing:** | ☐X-Ray Sdgraph ☐Cascade Imp<br>☐_____ | | |
| | **Miscellaneous:** ☐_____ | ☐_____ | | |

**Fuel Type:** Coal: ☐Bituminous ☐Anthracite ☐Lignite Wood: ☐Wood Waste ☐Dust ☐Bark Oil: ☐Waste Oil ☐No. 2 ☐No. 6 Misc: ☐Natural Gas ☐RDF ☐_____

| Relinquished by/Affiliation | Accepted by/Affiliation | Date |
|---|---|---|
| Duane Van Hoeven | | |
| | | |
| | | |

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INTERPOLL LABORATORIES, INC.
(612) 786-6020

# Sample Chain of Custody

Job L.P. Hayward Source Line 2 Presslen Site RTO Stack Log No. 3097
Field Engineer Dirt Date of Test 6/9/94 Test No. 13 No. of Runs 3

| No. Items | Sample Type | | Analysis | | Sequence No. | Comments |
|---|---|---|---|---|---|---|
| | **Probe Wash:**<br>☐ Acetone<br>☐ $MeCl_2$ | ☐DI Water<br>☐_____ | ☐EPA M-5<br>☐EPA M-29 | ☐EPA M-201A<br>☐_____ | | _____<br>_____<br>_____ |
| | **Filter:**<br>☐ 4" Glass<br>☐ SS Thimble | ☐Pallflex<br>☐2.5" Glass | ☐EPA M-5<br>☐EPA M-29<br>☐EPA M-201A | ☐EPA M-17 | | _____<br>_____<br>_____ |
| 5 | **Impingers:**<br>☐DI Water<br>☐3%$H_2O_2$<br>☐1N NaOH<br>☐2,4-DNPH | ☐$H_2SO_4$<br>☐$HNO_3/H_2O_2$<br>☐$KMnO_4/H_2SO_4$<br>☒ 1-2 PP IN TOLUENE | ☐MN Protocol<br>☐WI Protocol<br>☐EPA M-202<br>☐EPA M6,8<br>☐Acid Gases | ☐IA Protocol<br>☐Formaldehyde<br>☐EPA M-29<br>☐EPA M-26<br>☒ MOI | | 1 Blank<br>1 Spike<br>3 1ST impinger<br>3 2ND impinger<br>_____ |
| | **Integrated Gas:**<br>☐Tedlar Bag | ☐_____ | ☐EPA M-3<br>☐_____ | ☐EPA M-10 | | _____<br>_____ |
| | **Oxides of Nitrogen:** | | ☐EPA M-7A<br>☐_____ | | | _____<br>_____ |
| | **Fuel Lab:**<br>☐Fuel Sample | ☐Aggregate | ☐Per S-0163 | | | _____<br>_____ |
| | **Particle Sizing:** | | ☐X-Ray Sdgraph<br>☐_____ | ☐Cascade Imp | | _____<br>_____ |
| | **Miscellaneous:** | ☐_____ | ☐_____ | | | _____ |

**Fuel Type:** Coal: ☐Bituminous ☐Anthracite ☐Lignite Wood: ☐Wood Waste ☐Dust ☐Bark Oil: ☐Waste Oil ☐No. 2 ☐No. 6 Misc: ☐Natural Gas ☐RDF ☐_____

| Relinquished by/Affiliation | Accepted by/Affiliation | Date |
|---|---|---|
| Diane Van Hoeven | | 6/9/94 |
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| | | |

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INTERPOLL LABORATORIES, INC.
(612) 786-6020

# Sample Chain of Custody

Job L.P. Hayward Source Line 2 Presslen Site RTO Stack Log No. 3097
Field Engineer Dutt Date of Test 6/9/94 Test No. 13 No. of Runs 3

| No. Items | Sample Type | Analysis | Sequence No. | Comments |
|---|---|---|---|---|
| | Probe Wash:<br>☐ Acetone ☐DI Water<br>☐ $MeCl_2$ ☐_____ | ☐EPA M-5 ☐EPA M-201A<br>☐EPA M-29 ☐_____ | | |
| | Filter:<br>☐ 4" Glass ☐Pallflex<br>☐ SS Thimble ☐2.5" Glass | ☐EPA M-5 ☐EPA M-17<br>☐EPA M-29<br>☐EPA M-201A | | |
| 5 | Impingers:<br>☐DI Water ☐$H_2SO_4$<br>☐3%$H_2O_2$ ☐$HNO_3/H_2O_2$<br>☐1N NaOH ☐$KMnO_4/H_2SO_4$<br>☐2,4-DNPH ☒ 1-2 PP IN TOLUENE | ☐MN Protocol ☐IA Protocol<br>☐WI Protocol ☐Formaldehyde<br>☐EPA M-202 ☐EPA M-29<br>☐EPA M6,8 ☐EPA M-26<br>☐Acid Gases ☒ MOI | | 1 Blank<br>1 Spike<br>3 1RST impinger<br>3 2ND impinger |
| | Integrated Gas:<br>☐Tedlar Bag ☐_____ | ☐EPA M-3 ☐EPA M-10<br>☐_____ | | |
| | Oxides of Nitrogen: | ☐EPA M-7A<br>☐_____ | | |
| | Fuel Lab:<br>☐Fuel Sample ☐Aggregate | ☐Per S-0163 | | |
| | Particle Sizing: | ☐X-Ray Sdgraph ☐Cascade Imp<br>☐_____ | | |
| | Miscellaneous: ☐_____ | ☐_____ | | |

Fuel Type: Coal: ☐Bituminous ☐Anthracite ☐Lignite Wood: ☐Wood Waste ☐Dust ☐Bark Oil: ☐Waste Oil ☐No. 2 ☐No. 6 Misc: ☐Natural Gas ☐RDF ☐_____

| Relinquished by/Affiliation | Accepted by/Affiliation | Date |
|---|---|---|
| Duane Van Hoesen | Bob Berg, Interpoll | 6/9/94 1000 |
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E-66

INTERPOLLUTANT LABORATORIES, INC.
(612) 786-6020

# Sample Chain of Custody

Job L.P. HAYWARD Source LINE 2 DRYER Site RTO STACK Log No. 3097
Field Engineer DUH Date of Test 6/9/94 Test No. 14 No. of Runs 3

| No. Items | Sample Type | | Analysis | | Sequence No. | Comments |
|---|---|---|---|---|---|---|
| 4 | **Probe Wash:**<br>☒ Acetone<br>☐ $MeCl_2$ | ☐DI Water<br>☐_____ | ☒EPA M-5<br>☐EPA M-29 | ☐EPA M-201A<br>☐_____ | | |
| 4 | **Filter:**<br>☐ 4" Glass<br>☐ SS Thimble | ☒Pallflex<br>☐2.5" Glass | ☒EPA M-5<br>☐EPA M-29<br>☐EPA M-201A | ☐EPA M-17 | | |
| 4 | **Impingers:**<br>☒DI Water<br>☐3%$H_2O_2$<br>☐1N NaOH<br>☐2,4-DNPH | ☐$H_2SO_4$<br>☐$HNO_3/H_2O_2$<br>☐$KMnO_4/H_2SO_4$<br>☐_____ | ☐MN Protocol<br>☒WI Protocol<br>☐EPA M-202<br>☐EPA M6,8<br>☐Acid Gases | ☐IA Protocol<br>☐Formaldehyde<br>☐EPA M-29<br>☐EPA M-26<br>☐_____ | | |
| 3 | **Integrated Gas:**<br>☒Tedlar Bag | ☐_____ | ☒EPA M-3<br>☐_____ | ☐EPA M-10 | | |
| | **Oxides of Nitrogen:** | | ☐EPA M-7A<br>☐_____ | | | |
| | **Fuel Lab:**<br>☐Fuel Sample | ☐Aggregate | ☐Per S-0163 | | | |
| | **Particle Sizing:** | | ☐X-Ray Sdgraph<br>☐_____ | ☐Cascade Imp | | |
| | **Miscellaneous:** | ☐_____ | ☐_____ | | | |

**Fuel Type:** Coal: ☐Bituminous ☐Anthracite ☐Lignite Wood: ☐Wood Waste ☐Dust ☐Bark Oil: ☐Waste Oil ☐No. 2 ☐No. 6 Misc: ☐Natural Gas ☐RDF ☐_____

| Relinquished by/Affiliation | Accepted by/Affiliation | Date |
|---|---|---|
| Duane Van Hoven | | |
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E-67

INTERPOLL LABORATORIES, INC.
(612) 786-6020

# Sample Chain of Custody

Job L.P. HAYWARD Source LINE 2 DRYER Site RTO STACK Log No. 3097
Field Engineer DVH Date of Test 6/9/94 Test No. 14 No. of Runs 3

| No. Items | Sample Type | | Analysis | | Sequence No. | Comments |
|---|---|---|---|---|---|---|
| 4 | Probe Wash:<br>☒ Acetone<br>☐ $MeCl_2$ | ☐DI Water<br>☐_____ | ☒EPA M-5<br>☐EPA M-29 | ☐EPA M-201A<br>☐_____ | | |
| 4 | Filter:<br>☐ 4" Glass<br>☐ SS Thimble | ☒Pallflex<br>☐2.5" Glass | ☒EPA M-5<br>☐EPA M-29<br>☐EPA M-201A | ☐EPA M-17 | | |
| 4 | Impingers:<br>☒DI Water<br>☐3% $H_2O_2$<br>☐1N NaOH<br>☐2,4-DNPH | ☐$H_2SO_4$<br>☐$HNO_3/H_2O_2$<br>☐$KMnO_4/H_2SO_4$<br>☐_____ | ☐MN Protocol<br>☒WI Protocol<br>☐EPA M-202<br>☐EPA M6,8<br>☐Acid Gases | ☐IA Protocol<br>☐Formaldehyde<br>☐EPA M-29<br>☐EPA M-26<br>☐_____ | | |
| 3 | Integrated Gas:<br>☒Tedlar Bag | ☐_____ | ☒EPA M-3<br>☐_____ | ☐EPA M-10 | | |
| | Oxides of Nitrogen: | | ☐EPA M-7A<br>☐_____ | | | |
| | Fuel Lab:<br>☐Fuel Sample | ☐Aggregate | ☐Per S-0163 | | | |
| | Particle Sizing: | | ☐X-Ray Sdgraph<br>☐_____ | ☐Cascade Imp | | |
| | Miscellaneous: | ☐_____ | ☐_____ | | | |

Fuel Type: Coal: ☐Bituminous ☐Anthracite ☐Lignite Wood: ☐Wood Waste ☐Dust ☐Bark Oil: ☐Waste Oil ☐No. 2 ☐No. 6 Misc: ☐Natural Gas ☐RDF ☐_____

| Relinquished by/Affiliation | Accepted by/Affiliation | Date |
|---|---|---|
| Duane Van Hoven | Bob Berg, InTorgell | 6/13/94 1000 |
| | | |
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INTERPOLL LAB .ATORIES, INC.
(612) 786-6020

# Sample Chain of Custody

Job L.P. / Hayward, WI Source Line 2 Ioaus Site Stack Log No. 3097
Field Engineer M. Baebler Date of Test 6-8-94 Test No. 16 No. of Runs 3

| No. Items | Sample Type | | Analysis | | Sequence No. | Comments |
|---|---|---|---|---|---|---|
| 3 | **Probe Wash:**<br>☒ Acetone<br>☐ $MeCl_2$ | ☐ DI Water<br>☐ _____ | ☒ EPA M-5<br>☐ EPA M-29 | ☐ EPA M-201A<br>☐ _____ | | |
| 3 | **Filter:**<br>☐ 4" Glass<br>☐ SS Thimble | ☒ Pallflex<br>☐ 2.5" Glass | ☒ EPA M-5<br>☐ EPA M-29<br>☐ EPA M-201A | ☐ EPA M-17 | | |
| 3 | **Impingers:**<br>☒ DI Water<br>☐ 3% $H_2O_2$<br>☐ 1N NaOH<br>☐ 2,4-DNPH | ☐ $H_2SO_4$<br>☐ $HNO_3/H_2O_2$<br>☐ $KMnO_4/H_2SO_4$<br>☐ _____ | ☐ MN Protocol<br>☒ WI Protocol<br>☐ EPA M-202<br>☐ EPA M6,8<br>☐ Acid Gases | ☐ IA Protocol<br>☐ Formaldehyde<br>☐ EPA M-29<br>☐ EPA M-26<br>☐ _____ | | |
| 3 | **Integrated Gas:**<br>☒ Tedlar Bag | ☐ _____ | ☒ EPA M-3<br>☐ _____ | ☒ EPA M-10 | | Analyzed in Field |
| 12 | **Oxides of Nitrogen:** | | ☒ EPA M-7A<br>☐ _____ | | | |
| — | **Fuel Lab:**<br>☐ Fuel Sample | ☐ Aggregate | ☐ Per S-0163 | | | |
| — | **Particle Sizing:** | | ☐ X-Ray Sdgraph<br>☐ _____ | ☐ Cascade Imp | | |
| — | **Miscellaneous:** | ☐ _____ | ☐ _____ | | | |

**Fuel Type:** Coal: ☐ Bituminous ☐ Anthracite ☐ Lignite
Wood: ☐ Wood Waste ☐ Dust ☒ Bark
Oil: ☐ Waste Oil ☐ No. 2 ☐ No. 6
Misc: ☐ Natural Gas ☐ RDF ☐ _____

| Relinquished by/Affiliation | Accepted by/Affiliation | Date |
|---|---|---|
| Mark Baebler / Interpoll Labs | B. Berry, D. Torgo IC | 6/13/94 6/13/94 |
| | | |

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INTERPOLL LABORATORIES, INC.
(612) 786-6020

# Sample Chain of Custody

Job L.P. / Hayward, WI Source Line 2 Kilns Site Stack Log No. 3097
Field Engineer M. Kaehler Date of Test 6-8-94 Test No. 17 No. of Runs 3

| No. Items | Sample Type | | Analysis | | Sequence No. | Comments |
|---|---|---|---|---|---|---|
| 3+1 | Probe Wash:<br>☐ Acetone<br>☒ $MeCl_2$ | ☐DI Water<br>☐_____ | ☐EPA M-5<br>☐EPA M-29 | ☐EPA M-201A<br>☒ 0011 | | Added to Impinger |
| — | Filter:<br>☐ 4" Glass<br>☐ SS Thimble | ☐Pallflex<br>☐2.5" Glass | ☐EPA M-5<br>☐EPA M-29<br>☐EPA M-201A | ☐EPA M-17 | | |
| 3+1 | Impingers:<br>☐DI Water<br>☐3% $H_2O_2$<br>☐1N NaOH<br>☒2,4-DNPH | ☐$H_2SO_4$<br>☐$HNO_3/H_2O_2$<br>☐$KMnO_4/H_2SO_4$<br>☐_____ | ☐MN Protocol<br>☐WI Protocol<br>☐EPA M-202<br>☐EPA M6,8<br>☐Acid Gases | ☐IA Protocol<br>☒Formaldehyde<br>☐EPA M-29<br>☐EPA M-26<br>☐_____ | | |
| 3 | Integrated Gas:<br>☐Tedlar Bag | ☐_____ | ☒EPA M-3<br>☐_____ | ☐EPA M-10 | | Analyzed in Field |
| ~ | Oxides of Nitrogen: | | ☐EPA M-7A<br>☐_____ | | | |
| — | Fuel Lab:<br>☐Fuel Sample | ☐Aggregate | ☐Per S-0163 | | | |
| ~ | Particle Sizing: | | ☐X-Ray Sdgraph<br>☐_____ | ☐Cascade Imp | | |
| ~ | Miscellaneous: | ☐_____ | ☐_____ | | | |

Fuel Type: Coal: ☐Bituminous ☐Anthracite ☐Lignite Wood: ☐Wood Waste ☐Dust ☒Bark Oil: ☐Waste Oil ☐No. 2 ☐No. 6 Misc: ☐Natural Gas ☐RDF ☐_____

| Relinquished by/Affiliation | Accepted by/Affiliation | Date |
|---|---|---|
| Mark Gaalaas / Interpoll Labs | Bob Burg, Interpoll | 6/13/94 1000 |
| | | |

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INTERPOLL LAB ATORIES, INC.
(612) 786-6020

# Sample Chain of Custody

Job L.P. / Hayward, WI Source Line 2 Kraft Site Stack Log No. 3097
Field Engineer M. Koehler Date of Test 6-8-94 Test No. 1B No. of Runs 3

| No. Items | Sample Type | | Analysis | | Sequence No. | Comments |
|---|---|---|---|---|---|---|
| 1 | **Probe Wash:**<br>☐ Acetone<br>☐ $MeCl_2$ | ☐DI Water<br>☐_____ | ☐EPA M-5<br>☐EPA M-29 | ☐EPA M-201A<br>☐_____ | | |
| 1 | **Filter:**<br>☐ 4" Glass<br>☐ SS Thimble | ☐Pallflex<br>☐2.5" Glass | ☐EPA M-5<br>☐EPA M-29<br>☐EPA M-201A | ☐EPA M-17 | | |
| 3+3 | **Impingers:**<br>☐DI Water<br>☐3%$H_2O_2$<br>☐1N NaOH<br>☐2,4-DNPH | ☐$H_2SO_4$<br>☐$HNO_3/H_2O_2$<br>☐$KMnO_4/H_2SO_4$<br>☒ A+B Phenol | ☐MN Protocol<br>☐WI Protocol<br>☐EPA M-202<br>☐EPA M6,8<br>☐Acid Gases | ☐IA Protocol<br>☐Formaldehyde<br>☐EPA M-29<br>☐EPA M-26<br>☒ Phenol | | |
| 1 | **Integrated Gas:**<br>☐Tedlar Bag | ☐_____ | ☐EPA M-3<br>☐_____ | ☐EPA M-10 | | Simultaneously with $CH_2O$ |
| 1 | **Oxides of Nitrogen:** | | ☐EPA M-7A<br>☐_____ | | | |
| 1 | **Fuel Lab:**<br>☐Fuel Sample | ☐Aggregate | ☐Per S-0163 | | | |
| 1 | **Particle Sizing:** | | ☐X-Ray Sdgraph<br>☐_____ | ☐Cascade Imp | | |
| 1 | **Miscellaneous:** | ☐_____ | ☐_____ | | | |

**Fuel Type:** Coal: ☐Bituminous ☐Anthracite ☐Lignite Wood: ☐Wood Waste ☐Dust ☒Bark Oil: ☐Waste Oil ☐No. 2 ☐No. 6 Misc: ☐Natural Gas ☐RDF ☐_____

| Relinquished by/Affiliation | Accepted by/Affiliation | Date |
|---|---|---|
| Mark Koehler / Interpoll Labs | B. Berg, Jr. Interpoll | 6/13/94 1000 |
| | | |

033094-G:\STACK\WP\FORMS\S-278.2

INTERPOLL LABORATORIES, INC.
(612) 786-6020

# Sample Chain of Custody

Job: L.P. / Hayward, WI  Source: Line 2 Kiln/stack  Site: Stack  Log No.: 3097
Field Engineer: M. Kaebler  Date of Test: 6-7-94  Test No.: 19  No. of Runs: 3

| No. Items | Sample Type | | Analysis | | Sequence No. | Comments |
|---|---|---|---|---|---|---|
| 3+1 | **Probe Wash:**<br>☒ Acetone<br>☒ $MeCl_2$ | ☐ DI Water<br>☐ _____ | ☐ EPA M-5<br>☐ EPA M-29 | ☐ EPA M-201A<br>☒ POM | | |
| 3+1 | **Filter:**<br>☒ 4" Glass<br>☐ SS Thimble | ☐ Pallflex<br>☐ 2.5" Glass | ☐ EPA M-5<br>☐ EPA M-29<br>☐ EPA M-201A | ☐ EPA M-17<br>☒ POM | | |
| 3+1 | **Impingers:**<br>☒ DI Water<br>☐ 3% $H_2O_2$<br>☐ 1N NaOH<br>☐ 2,4-DNPH | ☐ $H_2SO_4$<br>☐ $HNO_3/H_2O_2$<br>☐ $KMnO_4/H_2SO_4$<br>☐ _____ | ☐ MN Protocol<br>☐ WI Protocol<br>☐ EPA M-202<br>☐ EPA M6,8<br>☐ Acid Gases | ☐ IA Protocol<br>☐ Formaldehyde<br>☐ EPA M-29<br>☐ EPA M-26<br>☒ POM | | |
| 3 | **Integrated Gas:**<br>☒ Tedlar Bag | ☐ _____ | ☒ EPA M-3<br>☐ _____ | ☐ EPA M-10 | | |
| — | **Oxides of Nitrogen:** | | ☐ EPA M-7A<br>☐ _____ | | | |
| — | **Fuel Lab:**<br>☐ Fuel Sample | ☐ Aggregate | ☐ Per 5-0163 | | | |
| — | **Particle Sizing:** | | ☐ X-Ray Sdgraph<br>☐ _____ | ☐ Cascade Imp | | |
| — | **Miscellaneous:** | ☐ _____ | ☐ _____ | | | |

**Fuel Type:**
Coal: ☐ Bituminous ☐ Anthracite ☐ Lignite
Wood: ☐ Wood Waste ☐ Dust ☒ Bark
Oil: ☐ Waste Oil ☐ No. 2 ☐ No. 6
Misc: ☐ Natural Gas ☐ RDF ☐ _____

| Relinquished by/Affiliation | Accepted by/Affiliation | Date |
|---|---|---|
| Mark Kaebler / Interpoll Labs | [illegible] Interpoll | 6/12/94 1000 |
| | | |

033094-G:\STACK\WP\FORMS\S-278.2

Interpoll Laboratories
(612) 786-6020

# SAMPLE CHAIN OF CUSTODY

Job L&S / Hayward, WI  Source Line 2 Kilns  Site Stack
Field Engineer M. Kuehler  Date of Test 6-7-94  Test No. 20  No. of Runs 3

| # ITEMS | SAMPLE TYPE | | ANALYSIS | | LOG NUMBER | COMMENTS |
|---|---|---|---|---|---|---|
| — | **Probe Wash:**<br>☐ Acetone<br>☐ $MeCl_2$ | ☐DI Water<br>☐_____ | ☐EPA M-5<br>☐EPA M-29 | ☐EPA M-201A<br>☐_____ | | _____<br>_____<br>_____ |
| — | **Filter:**<br>☐ 4" Glass<br>☐ SS Thimble | ☐Pallflex<br>☐2.5" Glass | ☐EPA M-5<br>☐EPA M-29<br>☐EPA M-201A | ☐EPA M-17 | | _____<br>_____<br>_____ |
| 3 | **Impingers:**<br>☐DI Water<br>☐3%$H_2O_2$<br>☐1N NaOH<br>☐2,4-DNPH | ☐$H_2SO_4$<br>☐$HNO_3/H_2O_2$<br>☐$KMnO_4/H_2SO_4$<br>☒ Charcoal Tubes | ☐MN Protocol<br>☐WI Protocol<br>☐EPA M-202<br>☐EPA M6,8<br>☐Acid Gases | ☐IA Protocol<br>☐Formaldehyde<br>☐EPA M-29<br>☐EPA M-26<br>☒ Benzene | | _____<br>_____<br>_____<br>_____<br>_____ |
| ✓ | **Integrated Gas:**<br>☐Tedlar Bag | ☐_____ | ☐EPA M-3<br>☐_____ | ☐EPA M-10 | | Done during port testing |
| — | **Oxides of Nitrogen:** | | ☐EPA M-7A<br>☐_____ | | | _____<br>_____ |
| — | **Fuel Lab:**<br>☐Fuel Sample | ☐Aggregate | ☐Per S-0163 | | | _____<br>_____ |
| — | **Particle Sizing:** | | ☐X-Ray Sdgraph<br>☐_____ | ☐Cascade Imp | | _____<br>_____ |
| — | **Miscellaneous:** | ☐_____ | ☐_____ | | | _____ |

**Fuel Type:** Coal: ☐Bituminous ☐Anthracite ☐Lignite  Wood: ☐Wood Waste ☐Dust ☒Bark  Oil: ☐Waste Oil ☐No. 2 ☐No. 6  Misc: ☐Natural Gas ☐RDF ☐_____

| Relinquished by/Affiliation | Accepted by/Affiliation | Date |
|---|---|---|
| Mark Kuehler / Interpoll Labs | Jeff Berg, Interpoll | 6/13/94 1010 |
| | | |

E-273

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S-278

INTERPOLL LABORATORIES, INC.
(612) 786-6020

# Sample Chain of Custody

Job: LP - HAYWARD  Source: #2 PRESS RTO  Site: INLET  Log No.: 3097
Field Engineer: SB  Date of Test: 6-8-94 / 6-9-94  Test No.: 21  No. of Runs: 9

| No. Items | Sample Type | | Analysis | | Sequence No. | Comments |
|---|---|---|---|---|---|---|
| 4 | Probe Wash:<br>☒ Acetone<br>☐ $MeCl_2$ | ☐ DI Water<br>☐ _____ | ☒ EPA M-5<br>☐ EPA M-29 | ☐ EPA M-201A<br>☐ _____ | | |
| 4 | Filter:<br>☐ 4" Glass<br>☐ SS Thimble | ☒ Fallflex<br>☐ 2.5" Glass | ☒ EPA M-5<br>☐ EPA M-29<br>☐ EPA M-201A | ☐ EPA M-17 | | |
| 4 | Impingers:<br>☒ DI Water<br>☐ 3% $H_2O_2$<br>☐ 1N NaOH<br>☐ 2,4-DNPH | ☐ $H_2SO_4$<br>☐ $HNO_3/H_2O_2$<br>☐ $KMnO_4/H_2SO_4$<br>☐ _____ | ☐ MN Protocol<br>☒ WI Protocol<br>☐ EPA M-202<br>☐ EPA M6,8<br>☐ Acid Gases | ☐ IA Protocol<br>☐ Formaldehyde<br>☐ EPA M-29<br>☐ EPA M-26<br>☐ _____ | | |
| 0 | Integrated Gas:<br>☐ Tedlar Bag | ☐ _____ | ☐ EPA M-3<br>☐ _____ | ☐ EPA M-10 | | Ambient Air |
| 0 | Oxides of Nitrogen: | | ☐ EPA M-7A<br>☐ _____ | | | |
| 0 | Fuel Lab:<br>☐ Fuel Sample | ☐ Aggregate | ☐ Per S-0163 | | | |
| 0 | Particle Sizing: | | ☐ X-Ray Sdgraph<br>☐ _____ | ☐ Cascade Imp | | |
| 0 | Miscellaneous: | ☐ _____ | ☐ _____ | | | |

Fuel Type: Coal: ☐ Bituminous ☐ Anthracite ☐ Lignite  Wood: ☐ Wood Waste ☐ Dust ☐ Bark  Oil: ☐ Waste Oil ☐ No. 2 ☐ No. 6  Misc: ☐ Natural Gas ☐ RDF ☒ Ambient Air

| Relinquished by/Affiliation | Accepted by/Affiliation | Date |
|---|---|---|
| Heath Sill / Interpoll Labs | Bob Berg, Interpoll | 6/13/94 1000 |
| | | |
| | | |

033094-G:\STACK\WP\FORMS\S-270.2

INTERPOLL ORATORIES, INC.
(612) 786-6020

# Sample Chain of Custody

Job Field Engineer: L.P Hayward / Bart
Source: Line 2 Press Vent
Site: RTO Stack
Log No.: 3097
Date of Test: 6/10/94
Test No.:
No. of Runs: 3

| No. Items | Sample Type | | Analysis | | Sequence No. | Comments |
|---|---|---|---|---|---|---|
| | **Probe Wash:** | | ☐EPA M-5 | ☐EPA M-201A | | |
| | ☐ Acetone | ☐DI Water | ☐EPA M-29 | ☐_____ | | |
| | ☐ $MeCl_2$ | ☐_____ | | | | |
| | **Filter:** | | ☐EPA M-5 | ☐EPA M-17 | | |
| | ☐ 4" Glass | ☐Pallflex | ☐EPA M-29 | | | |
| | ☐ SS Thimble | ☐2.5" Glass | ☐EPA M-201A | | | |
| 5 | **Impingers:** | | ☐MN Protocol | ☐IA Protocol | | 1 Blank |
| | ☐DI Water | ☐$H_2SO_4$ | ☐WI Protocol | ☐Formaldehyde | | 1 Spike |
| | ☐3%$H_2O_2$ | ☐$HNO_3/H_2O_2$ | ☐EPA M-202 | ☐EPA M-29 | | 3 sample runs |
| | ☐1N NaOH | ☐$KMnO_4/H_2SO_4$ | ☐EPA M6,8 | ☐EPA M-26 | | |
| | ☒2,4-DNPH | ☐_____ | ☐Acid Gases | ☒ 0011 | | |
| | **Integrated Gas:** | | ☐EPA M-3 | ☐EPA M-10 | | |
| | ☐Tedlar Bag | ☐_____ | ☐_____ | | | |
| | **Oxides of Nitrogen:** | | ☐EPA M-7A | | | |
| | | | ☐_____ | | | |
| | **Fuel Lab:** | | ☐Per S-0163 | | | |
| | ☐Fuel Sample | ☐Aggregate | | | | |
| | **Particle Sizing:** | | ☐X-Ray Sdgraph | ☐Cascade Imp | | |
| | | | ☐_____ | | | |
| | **Miscellaneous:** | ☐_____ | ☐_____ | | | |

**Fuel Type:**
Coal: ☐Bituminous ☐Anthracite ☐Lignite
Wood: ☐Wood Waste ☐Dust ☐Bark
Oil: ☐Waste Oil ☐No. 2 ☐No. 6
Misc: ☐Natural Gas ☐RDF ☐_____

| Relinquished by/Affiliation | Accepted by/Affiliation | Date |
|---|---|---|
| Duane Van Hoeven | Bob Bay, InterPoll | 6/13/94 1000 |
| | | |
| | | |

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# APPENDIX F

## TOTAL HYDROCARBONS STRIPCHARTS / DATA LOGGER PRINTOUTS

Interpoll Laboratories, Inc.
(612) 786-6020

Printout of ESC Model 80 DAS
for CEM Trailer No. 1
- 1994 -

File Name: LPH14
Job Number: 4-3097
Client: Louisiana Pacific Corporation
Location: Hayward, Wisconsin

Line 1 Press RTO Outlet Stack -- Run 1

| Julian Date | Time (Hrs) | Conc. (dry basis unless noted) NOx (ppmv) | CO (ppmv) | CO2 (%v/v) | O2 (%v/v) |
|---|---|---|---|---|---|
| 161 | 09:36:00 | 22.4 | 16.2 | 1.00 | 20.32 |
| 161 | 09:37:00 | 28.3 | 27.7 | 0.43 | 20.28 |
| 161 | 09:38:00 | 20.9 | 16.2 | 0.39 | 20.30 |
| 161 | 09:39:00 | 22.9 | 15.5 | 0.40 | 20.29 |
| 161 | 09:40:00 | 27.6 | 26.7 | 0.39 | 20.34 |
| 161 | 09:41:00 | 21.5 | 18.7 | 0.41 | 20.24 |
| 161 | 09:42:00 | 22.5 | 14.8 | 0.38 | 20.32 |
| 161 | 09:43:00 | 27.7 | 24.6 | 0.39 | 20.33 |
| 161 | 09:44:00 | 23.1 | 21.2 | 0.43 | 20.25 |
| 161 | 09:45:00 | 22.4 | 14.9 | 0.39 | 20.29 |
| 161 | 09:46:00 | 27.8 | 21.5 | 0.37 | 20.35 |
| 161 | 09:47:00 | 23.2 | 23.7 | 0.43 | 20.24 |
| 161 | 09:48:00 | 22.2 | 14.3 | 0.39 | 20.31 |
| 161 | 09:49:00 | 27.9 | 19.1 | 0.38 | 20.30 |
| 161 | 09:50:00 | 23.9 | 26.3 | 0.41 | 20.30 |
| 161 | 09:51:00 | 22.2 | 14.7 | 0.38 | 20.29 |
| 161 | 09:52:00 | 28.3 | 18.6 | 0.41 | 20.28 |
| 161 | 09:53:00 | 24.5 | 26.8 | 0.37 | 20.34 |
| 161 | 09:54:00 | 23.0 | 15.6 | 0.42 | 20.23 |
| 161 | 09:55:00 | 27.4 | 18.4 | 0.40 | 20.29 |
| 161 | 09:56:00 | 26.2 | 25.3 | 0.38 | 20.32 |
| 161 | 09:57:00 | 23.5 | 16.9 | 0.42 | 20.25 |
| 161 | 09:58:00 | 26.5 | 18.1 | 0.40 | 20.28 |
| 161 | 09:59:00 | 27.6 | 23.3 | 0.35 | 20.36 |
| 161 | 10:00:00 | 22.7 | 19.5 | 0.41 | 20.26 |
| 161 | 10:01:00 | 25.8 | 16.6 | 0.39 | 20.32 |
| 161 | 10:02:00 | 29.3 | 22.6 | 0.39 | 20.28 |
| 161 | 10:03:00 | 22.0 | 20.8 | 0.39 | 20.33 |
| 161 | 10:04:00 | 24.3 | 15.2 | 0.38 | 20.29 |
| 161 | 10:05:00 | 30.0 | 22.3 | 0.40 | 20.30 |
| 161 | 10:06:00 | 20.8 | 22.0 | 0.35 | 20.36 |
| 161 | 10:07:00 | 21.3 | 14.1 | 0.42 | 20.23 |
| 161 | 10:08:00 | 20.7 | 11.4 | 0.41 | 20.25 |
| 161 | 10:09:00 | 20.3 | 10.5 | 0.41 | 20.26 |

Interpoll Laboratories, Inc.
(612) 786-6020

Printout of ESC Model 80 DAS
for CEM Trailer No. 1
- 1994 -

File Name: LPH14
Job Number: 4-3097
Client: Louisiana Pacific Corporation
Location: Hayward, Wisconsin

Line 1 Press RTO Outlet Stack -- Run 1

| Julian Date | Time (Hrs) | Conc. (dry basis unless noted) NOx (ppmv) | CO (ppmv) | CO2 (%v/v) | O2 (%v/v) |
|---|---|---|---|---|---|
| 161 | 10:10:00 | 21.5 | 10.1 | 0.43 | 20.20 |
| 161 | 10:11:00 | 20.9 | 9.3 | 0.41 | 20.24 |
| 161 | 10:12:00 | 19.7 | 8.8 | 0.37 | 20.29 |
| 161 | 10:13:00 | 21.4 | 10.2 | 0.43 | 20.22 |
| 161 | 10:14:00 | 27.3 | 15.6 | 0.41 | 20.27 |
| 161 | 10:15:00 | 28.7 | 20.0 | 0.42 | 20.21 |
| 161 | 10:16:00 | 21.0 | 15.3 | 0.39 | 20.31 |
| 161 | 10:17:00 | 23.8 | 12.6 | 0.39 | 20.26 |
| 161 | 10:18:00 | 31.2 | 19.8 | 0.45 | 20.22 |
| 161 | 10:19:00 | 21.7 | 18.4 | 0.38 | 20.29 |
| 161 | 10:20:00 | 23.9 | 13.7 | 0.43 | 20.22 |
| 161 | 10:21:00 | 30.9 | 19.4 | 0.42 | 20.26 |
| 161 | 10:22:00 | 22.4 | 17.9 | 0.38 | 20.31 |
| 161 | 10:23:00 | 23.1 | 14.0 | 0.41 | 20.24 |
| 161 | 10:24:00 | 29.6 | 18.7 | 0.42 | 20.26 |
| 161 | 10:25:00 | 22.9 | 16.9 | 0.36 | 20.30 |
| 161 | 10:26:00 | 22.5 | 14.6 | 0.41 | 20.26 |
| 161 | 10:27:00 | 28.6 | 17.5 | 0.41 | 20.28 |
| 161 | 10:28:00 | 26.3 | 18.5 | 0.48 | 20.14 |
| 161 | 10:29:00 | 23.9 | 13.8 | 0.50 | 20.12 |
| 161 | 10:30:00 | 29.1 | 13.8 | 0.49 | 20.08 |
| 161 | 10:31:00 | 31.2 | 16.4 | 0.57 | 20.03 |
| 161 | 10:32:00 | 24.1 | 11.5 | 0.50 | 20.08 |
| 161 | 10:33:00 | 30.0 | 12.1 | 0.55 | 20.02 |
| 161 | 10:34:00 | 32.4 | 14.2 | 0.53 | 20.05 |
| 161 | 10:35:00 | 24.8 | 9.6 | 0.52 | 20.07 |
| 161 | 10:36:00 | 29.2 | 10.6 | 0.53 | 20.03 |
| | Run Average | 25.0 | 17.2 | 0.43 | 20.25 |

Interpoll Laboratories, Inc.
(612) 786-6020

Printout of ESC Model 80 DAS
for CEM Trailer No. 1
- 1994 -

File Name: LPH15
Job Number: 4-3097
Client: Louisiana Pacific Corporation
Location: Hayward, Wisconsin

Line 1 Press RTO Outlet Stack -- Run 2

| Julian Date | Time (Hrs) | Conc. (dry basis unless noted) NOx (ppmv) | CO (ppmv) | CO2 (%v/v) | O2 (%v/v) |
|---|---|---|---|---|---|
| 161 | 11:01:00 | 9.5 | 7.1 | 0.47 | 20.07 |
| 161 | 11:02:00 | 13.2 | 9.1 | 0.49 | 20.06 |
| 161 | 11:03:00 | 20.6 | 10.5 | 0.54 | 19.98 |
| 161 | 11:04:00 | 11.3 | 9.3 | 0.46 | 20.10 |
| 161 | 11:05:00 | 12.3 | 7.2 | 0.49 | 20.05 |
| 161 | 11:06:00 | 19.2 | 12.0 | 0.48 | 20.10 |
| 161 | 11:07:00 | 13.8 | 12.3 | 0.53 | 20.00 |
| 161 | 11:08:00 | 12.7 | 7.4 | 0.51 | 20.00 |
| 161 | 11:09:00 | 20.1 | 10.6 | 0.51 | 20.04 |
| 161 | 11:10:00 | 14.0 | 8.7 | 0.48 | 20.05 |
| 161 | 11:11:00 | 12.0 | 8.7 | 0.47 | 20.06 |
| 161 | 11:12:00 | 19.3 | 9.4 | 0.53 | 20.00 |
| 161 | 11:13:00 | 17.0 | 11.1 | 0.47 | 20.08 |
| 161 | 11:14:00 | 12.4 | 7.6 | 0.48 | 20.04 |
| 161 | 11:15:00 | 16.7 | 9.8 | 0.44 | 20.12 |
| 161 | 11:16:00 | 20.2 | 12.6 | 0.53 | 19.99 |
| 161 | 11:17:00 | 13.3 | 7.5 | 0.50 | 20.00 |
| 161 | 11:18:00 | 17.0 | 9.4 | 0.47 | 20.08 |
| 161 | 11:19:00 | 20.0 | 9.2 | 0.47 | 20.05 |
| 161 | 11:20:00 | 12.4 | 9.6 | 0.45 | 20.09 |
| 161 | 11:21:00 | 17.4 | 8.6 | 0.51 | 20.00 |
| 161 | 11:22:00 | 22.8 | 11.2 | 0.48 | 20.05 |
| 161 | 11:23:00 | 13.7 | 9.5 | 0.49 | 20.01 |
| 161 | 11:24:00 | 13.2 | 7.4 | 0.44 | 20.10 |
| 161 | 11:25:00 | 23.9 | 12.0 | 0.52 | 20.01 |
| 161 | 11:26:00 | 16.6 | 10.2 | 0.50 | 19.99 |
| 161 | 11:27:00 | 13.5 | 8.5 | 0.44 | 20.11 |
| 161 | 11:28:00 | 20.7 | 8.9 | 0.47 | 20.05 |
| 161 | 11:29:00 | 16.7 | 13.4 | 0.45 | 20.08 |
| 161 | 11:30:00 | 14.2 | 8.9 | 0.48 | 20.01 |
| 161 | 11:31:00 | 19.2 | 9.6 | 0.45 | 20.05 |
| 161 | 11:32:00 | 19.0 | 12.0 | 0.49 | 20.03 |
| 161 | 11:33:00 | 12.1 | 7.1 | 0.42 | 20.10 |
| 161 | 11:34:00 | 18.2 | 10.0 | 0.48 | 20.06 |

# Interpoll Laboratories, Inc.

(612) 786-6020

Printout of ESC Model 80 DAS
for CEM Trailer No. 1
- 1994 -

File Name: LPH15
Job Number: 4-3097
Client: Louisiana Pacific Corporation
Location: Hayward, Wisconsin

Line 1 Press RTO Outlet Stack -- Run 2

| Julian Date | Time (Hrs) | Conc. (dry basis unless noted) NOx (ppmv) | CO (ppmv) | CO2 (%v/v) | O2 (%v/v) |
|---|---|---|---|---|---|
| 161 | 11:35:00 | 21.8 | 10.5 | 0.52 | 19.96 |
| 161 | 11:36:00 | 12.8 | 8.9 | 0.44 | 20.09 |
| 161 | 11:37:00 | 17.0 | 7.5 | 0.47 | 20.04 |
| 161 | 11:38:00 | 20.5 | 13.6 | 0.47 | 20.07 |
| 161 | 11:39:00 | 13.9 | 10.3 | 0.48 | 20.00 |
| 161 | 11:40:00 | 16.4 | 8.0 | 0.45 | 20.03 |
| 161 | 11:41:00 | 22.1 | 11.9 | 0.49 | 20.04 |
| 161 | 11:42:00 | 12.6 | 7.9 | 0.43 | 20.09 |
| 161 | 11:43:00 | 15.7 | 8.9 | 0.45 | 20.08 |
| 161 | 11:44:00 | 24.3 | 10.6 | 0.51 | 19.97 |
| 161 | 11:45:00 | 13.7 | 10.7 | 0.41 | 20.11 |
| 161 | 11:46:00 | 14.2 | 7.1 | 0.44 | 20.07 |
| 161 | 11:47:00 | 22.4 | 12.1 | 0.44 | 20.11 |
| 161 | 11:48:00 | 16.4 | 13.1 | 0.48 | 19.99 |
| 161 | 11:49:00 | 14.9 | 7.4 | 0.46 | 20.00 |
| 161 | 11:50:00 | 22.8 | 10.9 | 0.47 | 20.05 |
| 161 | 11:51:00 | 16.5 | 9.6 | 0.43 | 20.07 |
| 161 | 11:52:00 | 13.0 | 8.4 | 0.43 | 20.07 |
| 161 | 11:53:00 | 16.4 | 7.2 | 0.49 | 19.99 |
| 161 | 11:54:00 | 22.7 | 11.3 | 0.45 | 20.07 |
| 161 | 11:55:00 | 15.2 | 10.2 | 0.44 | 20.04 |
| 161 | 11:56:00 | 14.2 | 8.0 | 0.40 | 20.12 |
| 161 | 11:57:00 | 24.0 | 12.2 | 0.50 | 19.99 |
| 161 | 11:58:00 | 18.3 | 10.2 | 0.47 | 20.00 |
| 161 | 11:59:00 | 13.6 | 8.2 | 0.42 | 20.10 |
| 161 | 12:00:00 | 18.6 | 8.1 | 0.42 | 20.10 |
| 161 | 12:01:00 | 21.8 | 14.7 | 0.44 | 20.07 |
| | Run Average | 16.8 | 9.7 | 0.47 | 20.05 |

# Interpoll Laboratories, Inc.

(612) 786-6020

Printout of ESC Model 80 DAS
for CEM Trailer No. 1
- 1994 -

File Name: LP16
Job Number: 4-3097
Client: Louisiana Pacific Corporation
Location: Hayward, Wisconsin

Line 1 Press RTO Outlet Stack -- Run 3

| Julian Date | Time (Hrs) | Conc. (dry basis unless noted) NOx (ppmv) | CO (ppmv) | CO2 (%v/v) | O2 (%v/v) |
|---|---|---|---|---|---|
| 161 | 12:21:00 | 11.3 | 9.7 | 0.43 | 20.40 |
| 161 | 12:22:00 | 12.1 | 7.9 | 0.47 | 20.36 |
| 161 | 12:23:00 | 19.1 | 11.3 | 0.44 | 20.42 |
| 161 | 12:24:00 | 13.1 | 13.7 | 0.47 | 20.37 |
| 161 | 12:25:00 | 12.2 | 7.6 | 0.47 | 20.34 |
| 161 | 12:26:00 | 19.6 | 11.2 | 0.44 | 20.45 |
| 161 | 12:27:00 | 13.4 | 9.0 | 0.43 | 20.42 |
| 161 | 12:28:00 | 10.3 | 9.0 | 0.42 | 20.46 |
| 161 | 12:29:00 | 18.9 | 11.2 | 0.48 | 20.37 |
| 161 | 12:30:00 | 17.3 | 11.2 | 0.43 | 20.41 |
| 161 | 12:31:00 | 10.8 | 8.5 | 0.45 | 20.42 |
| 161 | 12:32:00 | 15.0 | 9.2 | 0.41 | 20.48 |
| 161 | 12:33:00 | 18.3 | 13.7 | 0.47 | 20.40 |
| 161 | 12:34:00 | 12.0 | 8.1 | 0.47 | 20.35 |
| 161 | 12:35:00 | 14.9 | 9.0 | 0.42 | 20.45 |
| 161 | 12:36:00 | 17.8 | 9.1 | 0.45 | 20.39 |
| 161 | 12:37:00 | 10.5 | 9.1 | 0.42 | 20.45 |
| 161 | 12:38:00 | 15.3 | 9.0 | 0.47 | 20.34 |
| 161 | 12:39:00 | 19.3 | 10.5 | 0.44 | 20.39 |
| 161 | 12:40:00 | 11.4 | 9.6 | 0.44 | 20.41 |
| 161 | 12:41:00 | 12.1 | 7.3 | 0.40 | 20.47 |
| 161 | 12:42:00 | 20.6 | 12.7 | 0.47 | 20.40 |
| 161 | 12:43:00 | 13.0 | 9.2 | 0.47 | 20.35 |
| 161 | 12:44:00 | 12.9 | 7.7 | 0.43 | 20.41 |
| 161 | 12:45:00 | 20.8 | 8.5 | 0.48 | 20.34 |
| 161 | 12:46:00 | 13.1 | 10.7 | 0.44 | 20.43 |
| 161 | 12:47:00 | 11.8 | 7.5 | 0.45 | 20.35 |
| 161 | 12:48:00 | 10.5 | 5.5 | 0.41 | 20.41 |
| 161 | 12:49:00 | 10.3 | 5.4 | 0.42 | 20.44 |
| 161 | 12:50:00 | 8.5 | 4.6 | 0.38 | 20.50 |
| 161 | 12:51:00 | 9.8 | 5.2 | 0.41 | 20.46 |
| 161 | 12:52:00 | 12.1 | 5.3 | 0.46 | 20.35 |
| 161 | 12:53:00 | 18.1 | 9.5 | 0.41 | 20.45 |
| 161 | 12:54:00 | 16.2 | 9.2 | 0.44 | 20.40 |

# Interpoll Laboratories, Inc.

(612) 786-6020

Printout of ESC Model 80 DAS
for CEM Trailer No. 1
- 1994 -

File Name: LP16
Job Number: 4-3097
Client: Louisiana Pacific Corporation
Location: Hayward, Wisconsin

Line 1 Press RTO Outlet Stack -- Run 3

| Julian Date | Time (Hrs) | Conc. (dry basis unless noted) NOx (ppmv) | CO (ppmv) | CO2 (%v/v) | O2 (%v/v) |
|---|---|---|---|---|---|
| 161 | 12:55:00 | 10.7 | 7.2 | 0.40 | 20.48 |
| 161 | 12:56:00 | 12.1 | 6.7 | 0.46 | 20.34 |
| 161 | 12:57:00 | 18.4 | 8.3 | 0.43 | 20.37 |
| 161 | 12:58:00 | 17.0 | 11.4 | 0.43 | 20.42 |
| 161 | 12:59:00 | 10.6 | 6.4 | 0.38 | 20.47 |
| 161 | 13:00:00 | 16.9 | 9.7 | 0.42 | 20.44 |
| 161 | 13:01:00 | 20.3 | 10.8 | 0.48 | 20.32 |
| 161 | 13:02:00 | 11.1 | 8.1 | 0.38 | 20.47 |
| 161 | 13:03:00 | 14.9 | 6.6 | 0.42 | 20.42 |
| 161 | 13:04:00 | 18.2 | 11.7 | 0.41 | 20.47 |
| 161 | 13:05:00 | 12.8 | 8.9 | 0.45 | 20.35 |
| 161 | 13:06:00 | 15.3 | 6.9 | 0.43 | 20.37 |
| 161 | 13:07:00 | 19.7 | 10.7 | 0.43 | 20.41 |
| 161 | 13:08:00 | 11.5 | 6.6 | 0.37 | 20.47 |
| 161 | 13:09:00 | 11.2 | 6.7 | 0.40 | 20.45 |
| 161 | 13:10:00 | 15.6 | 6.6 | 0.46 | 20.34 |
| 161 | 13:11:00 | 20.4 | 11.0 | 0.41 | 20.43 |
| 161 | 13:12:00 | 12.4 | 8.1 | 0.41 | 20.40 |
| 161 | 13:13:00 | 13.3 | 7.2 | 0.39 | 20.48 |
| 161 | 13:14:00 | 23.3 | 12.3 | 0.48 | 20.33 |
| 161 | 13:15:00 | 14.3 | 8.9 | 0.43 | 20.36 |
| 161 | 13:16:00 | 11.3 | 6.6 | 0.40 | 20.43 |
| 161 | 13:17:00 | 14.5 | 6.4 | 0.39 | 20.44 |
| 161 | 13:18:00 | 21.3 | 12.8 | 0.43 | 20.41 |
| 161 | 13:19:00 | 14.8 | 9.1 | 0.45 | 20.34 |
| 161 | 13:20:00 | 11.7 | 5.9 | 0.38 | 20.46 |
| 161 | 13:21:00 | 11.7 | 4.9 | 0.41 | 20.41 |
| | Run Average | 14.5 | 8.7 | 0.43 | 20.41 |

# Interpoll Laboratories, Inc.
(612) 786-6020

Printout of ESC Model 80 DAS
for CEM Trailer No. 1
- 1994 -

File Name: LPH141
Job Number: 4-3097
Client: Louisiana Pacific Corporation
Location: Hayward, Wisconsin

Line 2 Press RTO Outlet Stack -- Run 1

| Julian Date | Time (Hrs) | Conc. (dry basis unless noted) NOx (ppmv) | CO (ppmv) | CO2 (%v/v) | O2 (%v/v) |
|---|---|---|---|---|---|
| 160 | 12:41:00 | 12.0 | 10.5 | 0.42 | 20.45 |
| 160 | 12:42:00 | 9.9 | 6.0 | 0.39 | 20.48 |
| 160 | 12:43:00 | 14.9 | 8.4 | 0.44 | 20.42 |
| 160 | 12:44:00 | 15.4 | 11.7 | 0.42 | 20.45 |
| 160 | 12:45:00 | 9.4 | 6.5 | 0.39 | 20.44 |
| 160 | 12:46:00 | 12.1 | 6.4 | 0.41 | 20.47 |
| 160 | 12:47:00 | 18.0 | 11.2 | 0.42 | 20.45 |
| 160 | 12:48:00 | 10.6 | 8.0 | 0.41 | 20.44 |
| 160 | 12:49:00 | 11.2 | 6.2 | 0.40 | 20.46 |
| 160 | 12:50:00 | 18.2 | 10.4 | 0.43 | 20.44 |
| 160 | 12:51:00 | 12.3 | 8.3 | 0.42 | 20.42 |
| 160 | 12:52:00 | 10.2 | 6.2 | 0.37 | 20.48 |
| 160 | 12:53:00 | 16.2 | 9.7 | 0.37 | 20.53 |
| 160 | 12:54:00 | 13.0 | 9.2 | 0.39 | 20.47 |
| 160 | 12:55:00 | 10.2 | 6.3 | 0.36 | 20.52 |
| 160 | 12:56:00 | 14.7 | 8.4 | 0.41 | 20.44 |
| 160 | 12:57:00 | 16.1 | 12.3 | 0.39 | 20.46 |
| 160 | 12:58:00 | 10.5 | 6.6 | 0.40 | 20.44 |
| 160 | 12:59:00 | 12.2 | 6.5 | 0.38 | 20.46 |
| 160 | 13:00:00 | 18.6 | 12.5 | 0.38 | 20.49 |
| 160 | 13:01:00 | 11.4 | 9.5 | 0.39 | 20.46 |
| 160 | 13:02:00 | 11.5 | 6.7 | 0.36 | 20.50 |
| 160 | 13:03:00 | 19.4 | 10.3 | 0.41 | 20.43 |
| 160 | 13:04:00 | 12.6 | 13.6 | 0.37 | 20.47 |
| 160 | 13:05:00 | 10.7 | 6.7 | 0.39 | 20.45 |
| 160 | 13:06:00 | 15.2 | 9.0 | 0.39 | 20.47 |
| 160 | 13:07:00 | 16.6 | 12.2 | 0.39 | 20.45 |
| 160 | 13:08:00 | 10.0 | 9.1 | 0.36 | 20.48 |
| 160 | 13:09:00 | 14.4 | 7.9 | 0.40 | 20.43 |
| 160 | 13:10:00 | 18.9 | 12.6 | 0.40 | 20.45 |
| 160 | 13:11:00 | 10.4 | 9.2 | 0.36 | 20.46 |
| 160 | 13:12:00 | 11.9 | 7.8 | 0.36 | 20.52 |
| 160 | 13:13:00 | 20.4 | 9.9 | 0.42 | 20.40 |
| 160 | 13:14:00 | 12.5 | 11.3 | 0.36 | 20.47 |

# Interpoll Laboratories, Inc.

(612) 786-6020

Printout of ESC Model 80 DAS
for CEM Trailer No. 1
- 1994 -

File Name: LPH141
Job Number: 4-3097
Client: Louisiana Pacific Corporation
Location: Hayward, Wisconsin

Line 2 Press RTO Outlet Stack -- Run 1

| Julian Date | Time (Hrs) | Conc. (dry basis unless noted) NOx (ppmv) | CO (ppmv) | CO2 (%v/v) | O2 (%v/v) |
|---|---|---|---|---|---|
| 160 | 13:15:00 | 11.4 | 6.9 | 0.38 | 20.44 |
| 160 | 13:16:00 | 18.9 | 11.5 | 0.37 | 20.48 |
| 160 | 13:17:00 | 14.6 | 9.4 | 0.41 | 20.39 |
| 160 | 13:18:00 | 11.6 | 7.0 | 0.38 | 20.41 |
| 160 | 13:19:00 | 16.4 | 8.9 | 0.39 | 20.45 |
| 160 | 13:20:00 | 16.3 | 14.1 | 0.36 | 20.47 |
| 160 | 13:21:00 | 11.0 | 7.9 | 0.37 | 20.46 |
| 160 | 13:22:00 | 16.3 | 9.0 | 0.40 | 20.42 |
| 160 | 13:23:00 | 19.0 | 11.4 | 0.39 | 20.42 |
| 160 | 13:24:00 | 10.9 | 8.9 | 0.35 | 20.47 |
| 160 | 13:25:00 | 13.9 | 6.9 | 0.36 | 20.47 |
| 160 | 13:26:00 | 22.0 | 10.8 | 0.42 | 20.38 |
| 160 | 13:27:00 | 12.3 | 9.3 | 0.36 | 20.45 |
| 160 | 13:28:00 | 11.9 | 7.0 | 0.34 | 20.48 |
| 160 | 13:29:00 | 20.1 | 10.1 | 0.37 | 20.47 |
| 160 | 13:30:00 | 14.5 | 8.1 | 0.39 | 20.42 |
| 160 | 13:31:00 | 12.2 | 6.8 | 0.36 | 20.45 |
| 160 | 13:32:00 | 17.7 | 8.7 | 0.37 | 20.44 |
| 160 | 13:33:00 | 16.8 | 13.0 | 0.37 | 20.45 |
| 160 | 13:34:00 | 12.3 | 9.9 | 0.38 | 20.40 |
| 160 | 13:35:00 | 16.8 | 8.2 | 0.37 | 20.44 |
| 160 | 13:36:00 | 18.9 | 9.7 | 0.39 | 20.40 |
| 160 | 13:37:00 | 11.0 | 8.4 | 0.32 | 20.50 |
| 160 | 13:38:00 | 12.9 | 5.8 | 0.38 | 20.42 |
| 160 | 13:39:00 | 20.7 | 9.9 | 0.39 | 20.40 |
| 160 | 13:40:00 | 13.9 | 9.7 | 0.36 | 20.44 |
| 160 | 13:41:00 | 10.6 | 6.9 | 0.32 | 20.49 |
| 160 | 13:42:00 | 16.6 | 7.7 | 0.38 | 20.43 |
| | Run Average | 14.2 | 9.0 | 0.38 | 20.45 |

# Interpoll Laboratories, Inc.

(612) 786-6020

Printout of ESC Model 80 DAS
for CEM Trailer No. 1
- 1994 -

File Name: LPH142
Job Number: 4-3097
Client: Louisiana Pacific Corporation
Location: Hayward, Wisconsin

Line 2 Press RTO Outlet Stack -- Run 2

| Julian Date | Time (Hrs) | Conc. (dry basis unless noted) NOx (ppmv) | CO (ppmv) | CO2 (%v/v) | O2 (%v/v) |
|---|---|---|---|---|---|
| 160 | 14:26:00 | 8.0 | 12.2 | 0.35 | 20.45 |
| 160 | 14:27:00 | 9.5 | 10.8 | 0.35 | 20.49 |
| 160 | 14:28:00 | 16.8 | 14.1 | 0.38 | 20.43 |
| 160 | 14:29:00 | 9.1 | 14.1 | 0.35 | 20.46 |
| 160 | 14:30:00 | 8.2 | 10.3 | 0.34 | 20.48 |
| 160 | 14:31:00 | 16.3 | 13.9 | 0.39 | 20.43 |
| 160 | 14:32:00 | 10.3 | 15.4 | 0.36 | 20.44 |
| 160 | 14:33:00 | 7.5 | 10.4 | 0.34 | 20.47 |
| 160 | 14:34:00 | 13.0 | 12.7 | 0.36 | 20.44 |
| 160 | 14:35:00 | 13.6 | 15.1 | 0.38 | 20.43 |
| 160 | 14:36:00 | 7.4 | 11.1 | 0.34 | 20.47 |
| 160 | 14:37:00 | 12.0 | 12.0 | 0.34 | 20.47 |
| 160 | 14:38:00 | 15.3 | 16.2 | 0.39 | 20.40 |
| 160 | 14:39:00 | 7.9 | 12.1 | 0.35 | 20.45 |
| 160 | 14:40:00 | 10.9 | 10.6 | 0.35 | 20.45 |
| 160 | 14:41:00 | 16.1 | 15.7 | 0.38 | 20.40 |
| 160 | 14:42:00 | 8.7 | 13.5 | 0.35 | 20.45 |
| 160 | 14:43:00 | 9.4 | 9.6 | 0.35 | 20.47 |
| 160 | 14:44:00 | 16.1 | 14.2 | 0.36 | 20.42 |
| 160 | 14:45:00 | 10.3 | 14.5 | 0.36 | 20.43 |
| 160 | 14:46:00 | 8.5 | 9.7 | 0.34 | 20.45 |
| 160 | 14:47:00 | 13.9 | 13.2 | 0.35 | 20.46 |
| 160 | 14:48:00 | 12.9 | 13.6 | 0.37 | 20.41 |
| 160 | 14:49:00 | 8.3 | 10.2 | 0.35 | 20.43 |
| 160 | 14:50:00 | 11.9 | 12.0 | 0.36 | 20.45 |
| 160 | 14:51:00 | 14.9 | 14.5 | 0.37 | 20.40 |
| 160 | 14:52:00 | 8.3 | 11.2 | 0.33 | 20.45 |
| 160 | 14:53:00 | 10.7 | 11.0 | 0.33 | 20.47 |
| 160 | 14:54:00 | 15.5 | 15.2 | 0.37 | 20.44 |
| 160 | 14:55:00 | 8.8 | 12.1 | 0.34 | 20.46 |
| 160 | 14:56:00 | 9.6 | 9.8 | 0.34 | 20.45 |
| 160 | 14:57:00 | 16.6 | 14.2 | 0.37 | 20.41 |
| 160 | 14:58:00 | 10.3 | 14.0 | 0.36 | 20.43 |
| 160 | 14:59:00 | 8.9 | 9.8 | 0.33 | 20.44 |

# Interpoll Laboratories, Inc.

(612) 786-6020

Printout of ESC Model 80 DAS
for CEM Trailer No. 1
- 1994 -

File Name: LPH142
Job Number: 4-3097
Client: Louisiana Pacific Corporation
Location: Hayward, Wisconsin

Line 2 Press RTO Outlet Stack -- Run 2

| Julian Date | Time (Hrs) | Conc. (dry basis unless noted) NOx (ppmv) | CO (ppmv) | CO2 (%v/v) | O2 (%v/v) |
|---|---|---|---|---|---|
| 160 | 15:00:00 | 15.8 | 12.9 | 0.35 | 20.44 |
| 160 | 15:01:00 | 12.0 | 14.8 | 0.36 | 20.41 |
| 160 | 15:02:00 | 8.7 | 9.9 | 0.33 | 20.46 |
| 160 | 15:03:00 | 13.4 | 11.8 | 0.34 | 20.47 |
| 160 | 15:04:00 | 15.1 | 16.0 | 0.36 | 20.40 |
| 160 | 15:05:00 | 8.8 | 11.0 | 0.34 | 20.45 |
| 160 | 15:06:00 | 12.0 | 10.3 | 0.34 | 20.46 |
| 160 | 15:07:00 | 16.4 | 16.2 | 0.34 | 20.42 |
| 160 | 15:08:00 | 9.8 | 12.7 | 0.34 | 20.43 |
| 160 | 15:09:00 | 10.6 | 9.7 | 0.34 | 20.45 |
| 160 | 15:10:00 | 17.2 | 14.8 | 0.35 | 20.43 |
| 160 | 15:11:00 | 11.3 | 13.4 | 0.35 | 20.40 |
| 160 | 15:12:00 | 9.6 | 9.5 | 0.33 | 20.44 |
| 160 | 15:13:00 | 15.9 | 13.4 | 0.35 | 20.46 |
| 160 | 15:14:00 | 13.1 | 14.1 | 0.34 | 20.42 |
| 160 | 15:15:00 | 9.5 | 10.1 | 0.33 | 20.44 |
| 160 | 15:16:00 | 13.8 | 12.5 | 0.34 | 20.45 |
| 160 | 15:17:00 | 15.8 | 15.5 | 0.36 | 20.41 |
| 160 | 15:18:00 | 9.6 | 10.4 | 0.33 | 20.45 |
| 160 | 15:19:00 | 12.5 | 11.1 | 0.33 | 20.46 |
| 160 | 15:20:00 | 16.5 | 16.1 | 0.34 | 20.41 |
| 160 | 15:21:00 | 10.0 | 11.3 | 0.34 | 20.43 |
| 160 | 15:22:00 | 10.9 | 9.7 | 0.32 | 20.45 |
| 160 | 15:23:00 | 17.5 | 14.2 | 0.35 | 20.44 |
| 160 | 15:24:00 | 10.9 | 14.1 | 0.35 | 20.40 |
| 160 | 15:25:00 | 9.6 | 9.4 | 0.33 | 20.45 |
| 160 | 15:26:00 | 16.2 | 12.1 | 0.34 | 20.45 |
| 160 | 15:27:00 | 13.3 | 14.9 | 0.34 | 20.40 |
| | Run Average | 12.0 | 12.6 | 0.35 | 20.44 |

# Interpoll Laboratories, Inc.

(612) 786-6020

Printout of ESC Model 80 DAS
for CEM Trailer No. 1
- 1994 -

File Name: LPH143
Job Number: 4-3097
Client: Louisiana Pacific Corporation
Location: Hayward, Wisconsin

Line 2 Press RTO Outlet Stack -- Run 3

| Julian Date | Time (Hrs) | Conc. (dry basis unless noted) NOx (ppmv) | CO (ppmv) | CO2 (%v/v) | O2 (%v/v) |
|---|---|---|---|---|---|
| 160 | 16:06:00 | 13.2 | 15.6 | 0.35 | 20.41 |
| 160 | 16:07:00 | 6.3 | 10.6 | 0.36 | 20.42 |
| 160 | 16:08:00 | 8.1 | 9.7 | 0.34 | 20.43 |
| 160 | 16:09:00 | 13.5 | 14.1 | 0.36 | 20.43 |
| 160 | 16:10:00 | 6.9 | 12.4 | 0.36 | 20.39 |
| 160 | 16:11:00 | 7.0 | 8.9 | 0.34 | 20.44 |
| 160 | 16:12:00 | 13.9 | 12.5 | 0.36 | 20.43 |
| 160 | 16:13:00 | 8.1 | 13.9 | 0.34 | 20.40 |
| 160 | 16:14:00 | 6.4 | 8.7 | 0.35 | 20.42 |
| 160 | 16:15:00 | 11.3 | 10.8 | 0.36 | 20.42 |
| 160 | 16:16:00 | 11.1 | 15.8 | 0.34 | 20.44 |
| 160 | 16:17:00 | 6.1 | 9.6 | 0.35 | 20.42 |
| 160 | 16:18:00 | 9.5 | 10.4 | 0.34 | 20.43 |
| 160 | 16:19:00 | 12.8 | 16.5 | 0.35 | 20.44 |
| 160 | 16:20:00 | 6.3 | 10.8 | 0.34 | 20.41 |
| 160 | 16:21:00 | 8.4 | 9.8 | 0.34 | 20.42 |
| 160 | 16:22:00 | 13.4 | 15.0 | 0.35 | 20.42 |
| 160 | 16:23:00 | 6.7 | 11.1 | 0.34 | 20.41 |
| 160 | 16:24:00 | 6.7 | 8.5 | 0.33 | 20.43 |
| 160 | 16:25:00 | 12.8 | 13.0 | 0.35 | 20.43 |
| 160 | 16:26:00 | 7.9 | 13.2 | 0.32 | 20.42 |
| 160 | 16:27:00 | 5.7 | 9.0 | 0.34 | 20.43 |
| 160 | 16:28:00 | 10.0 | 11.4 | 0.34 | 20.44 |
| 160 | 16:29:00 | 11.1 | 15.2 | 0.34 | 20.43 |
| 160 | 16:30:00 | 5.3 | 9.7 | 0.34 | 20.40 |
| 160 | 16:31:00 | 8.8 | 10.0 | 0.34 | 20.44 |
| 160 | 16:32:00 | 12.9 | 15.2 | 0.35 | 20.43 |
| 160 | 16:33:00 | 5.2 | 10.9 | 0.32 | 20.42 |
| 160 | 16:34:00 | 7.5 | 9.2 | 0.34 | 20.43 |
| 160 | 16:35:00 | 13.5 | 13.8 | 0.36 | 20.41 |
| 160 | 16:36:00 | 5.9 | 12.2 | 0.31 | 20.45 |
| 160 | 16:37:00 | 5.6 | 8.2 | 0.33 | 20.42 |
| 160 | 16:38:00 | 10.6 | 11.2 | 0.34 | 20.41 |
| 160 | 16:39:00 | 10.9 | 16.3 | 0.34 | 20.43 |

# Interpoll Laboratories, Inc.

(612) 786-6020

Printout of ESC Model 80 DAS
for CEM Trailer No. 1
- 1994 -

File Name: LPH143
Job Number: 4-3097
Client: Louisiana Pacific Corporation
Location: Hayward, Wisconsin

Line 2 Press RTO Outlet Stack -- Run 3

| Julian Date | Time (Hrs) | Conc. (dry basis unless noted) NOx (ppmv) | CO (ppmv) | CO2 (%v/v) | O2 (%v/v) |
|---|---|---|---|---|---|
| 160 | 16:40:00 | 5.6 | 9.6 | 0.34 | 20.40 |
| 160 | 16:41:00 | 8.9 | 10.1 | 0.34 | 20.41 |
| 160 | 16:42:00 | 12.4 | 16.0 | 0.35 | 20.42 |
| 160 | 16:43:00 | 5.6 | 10.6 | 0.34 | 20.42 |
| 160 | 16:44:00 | 7.3 | 9.2 | 0.33 | 20.43 |
| 160 | 16:45:00 | 13.1 | 14.3 | 0.35 | 20.42 |
| 160 | 16:46:00 | 5.9 | 11.1 | 0.32 | 20.42 |
| 160 | 16:47:00 | 6.6 | 9.0 | 0.34 | 20.43 |
| 160 | 16:48:00 | 12.8 | 12.9 | 0.34 | 20.42 |
| 160 | 16:49:00 | 6.9 | 13.1 | 0.32 | 20.43 |
| 160 | 16:50:00 | 5.0 | 9.1 | 0.34 | 20.41 |
| 160 | 16:51:00 | 9.5 | 11.4 | 0.32 | 20.45 |
| 160 | 16:52:00 | 10.5 | 15.0 | 0.32 | 20.45 |
| 160 | 16:53:00 | 4.7 | 10.2 | 0.33 | 20.39 |
| 160 | 16:54:00 | 8.1 | 9.7 | 0.35 | 20.42 |
| 160 | 16:55:00 | 12.7 | 14.9 | 0.36 | 20.41 |
| 160 | 16:56:00 | 4.7 | 11.1 | 0.31 | 20.41 |
| 160 | 16:57:00 | 6.9 | 8.8 | 0.34 | 20.41 |
| 160 | 16:58:00 | 13.2 | 13.7 | 0.35 | 20.40 |
| 160 | 16:59:00 | 5.1 | 12.2 | 0.30 | 20.45 |
| 160 | 17:00:00 | 5.7 | 8.8 | 0.33 | 20.41 |
| 160 | 17:01:00 | 12.3 | 12.2 | 0.34 | 20.40 |
| 160 | 17:02:00 | 6.8 | 14.4 | 0.32 | 20.43 |
| 160 | 17:03:00 | 4.5 | 8.2 | 0.33 | 20.41 |
| 160 | 17:04:00 | 7.9 | 9.6 | 0.33 | 20.42 |
| 160 | 17:05:00 | 11.0 | 14.9 | 0.34 | 20.42 |
| 160 | 17:06:00 | 4.7 | 10.0 | 0.32 | 20.42 |
| 160 | 17:07:00 | 6.2 | 8.4 | 0.32 | 20.43 |
| 160 | 17:08:00 | 11.7 | 13.0 | 0.33 | 20.43 |
| 160 | 17:09:00 | 5.1 | 11.1 | 0.30 | 20.43 |
| 160 | 17:10:00 | 5.4 | 8.7 | 0.33 | 20.42 |
| 160 | 17:11:00 | 11.8 | 11.9 | 0.34 | 20.42 |
| 160 | 17:12:00 | 6.1 | 12.6 | 0.31 | 20.44 |
| 160 | 17:13:00 | 4.3 | 8.8 | 0.32 | 20.41 |

# Interpoll Laboratories, Inc.

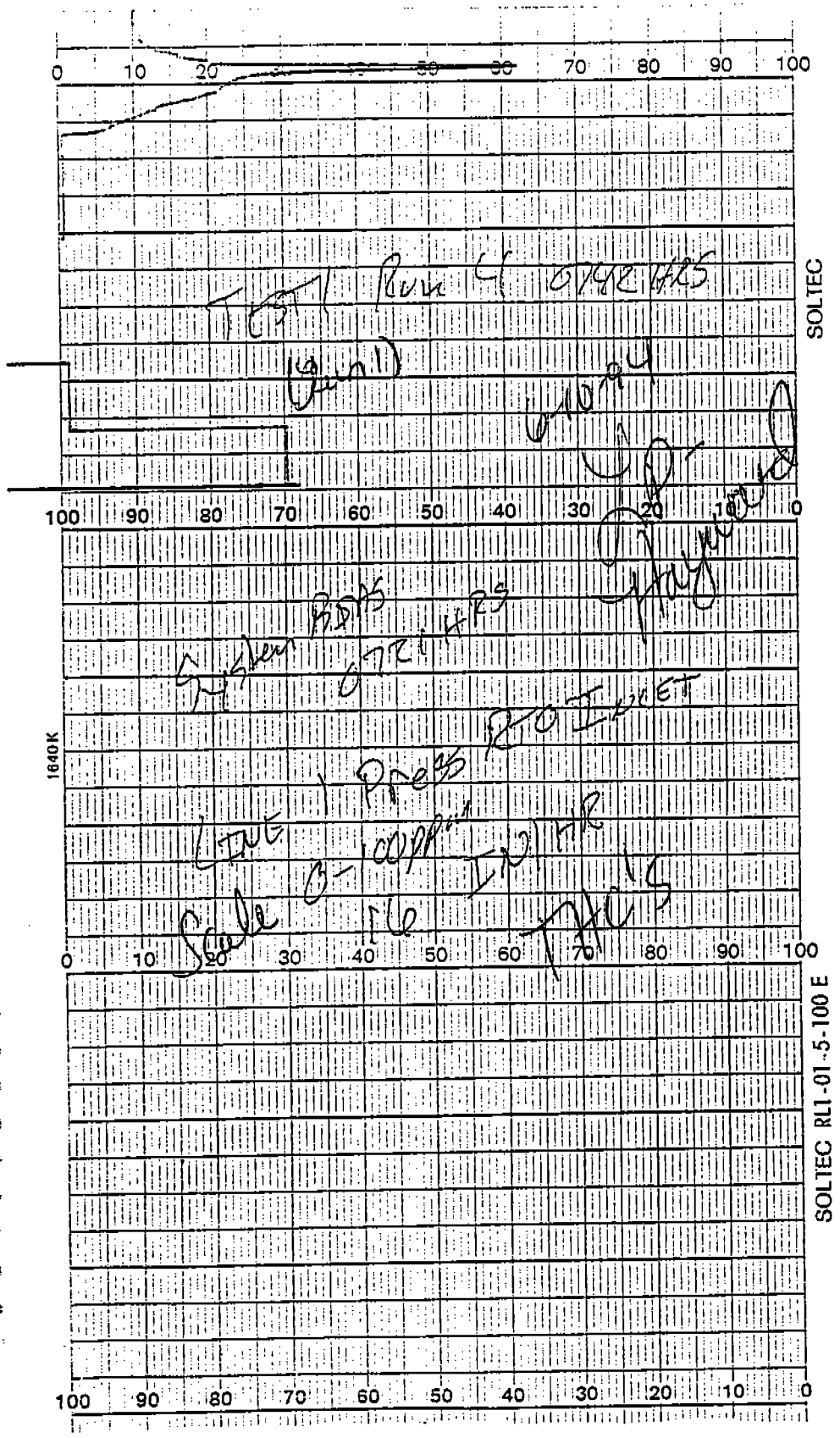
(612) 786-6020

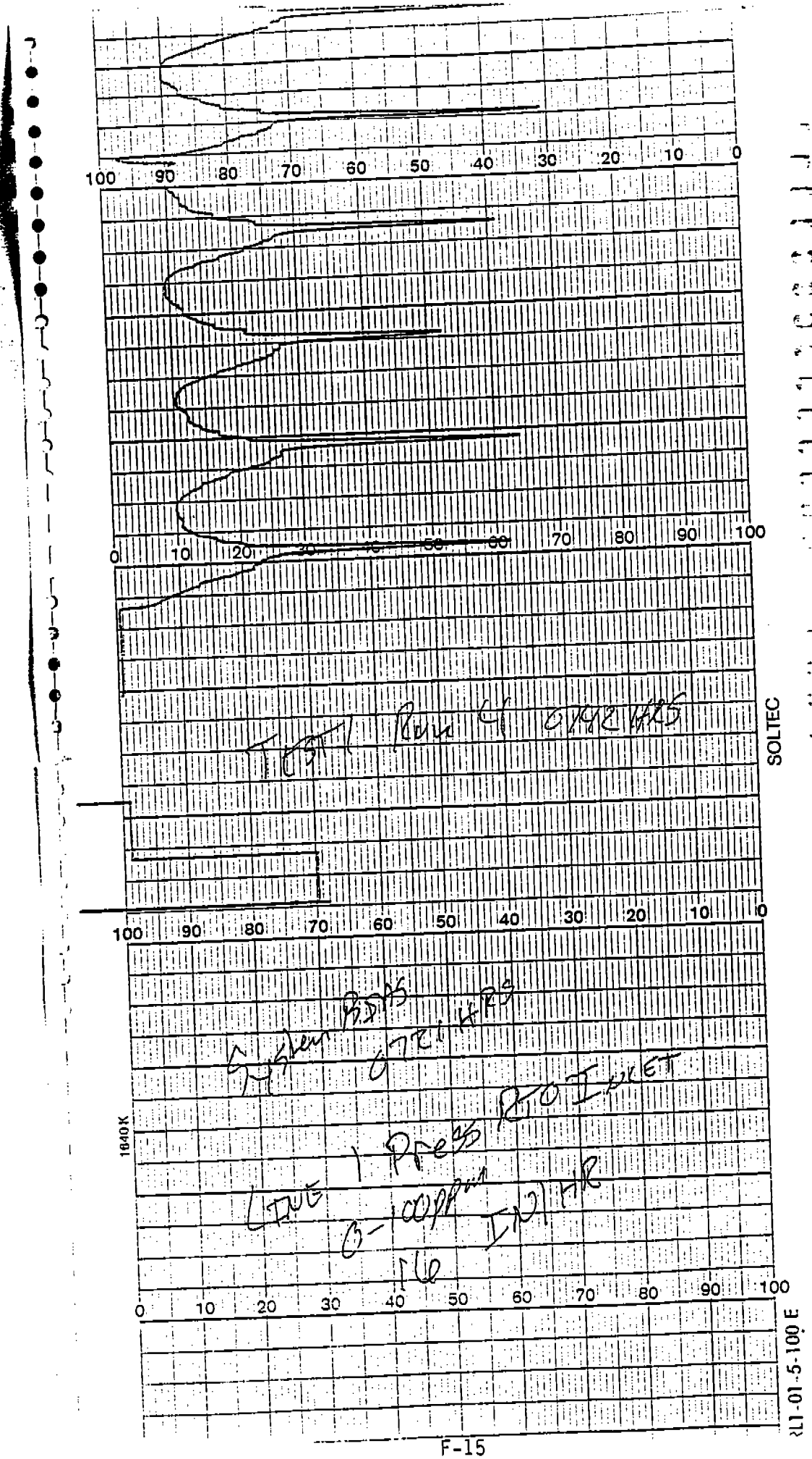
Printout of ESC Model 80 DAS
for CEM Trailer No. 1
- 1994 -

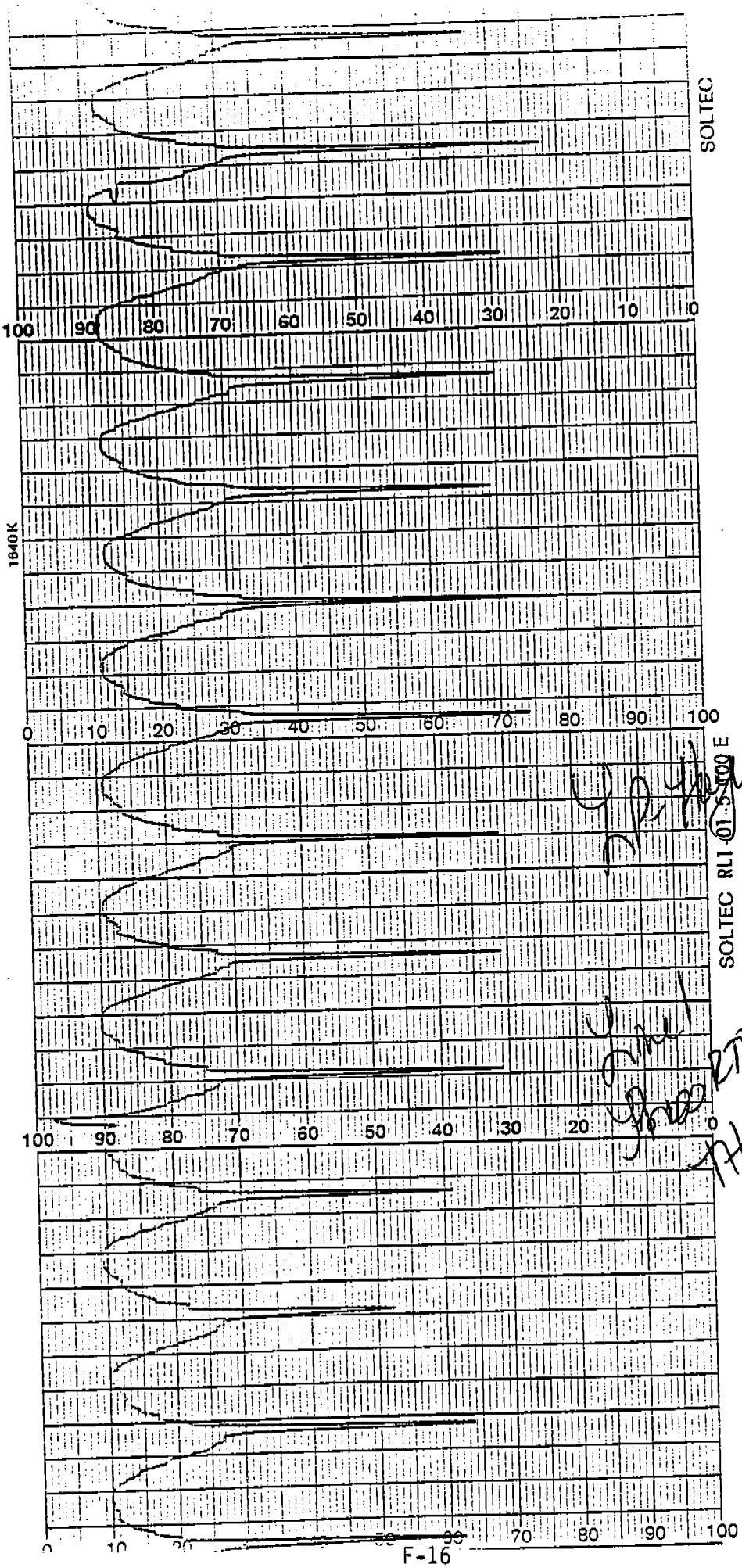
File Name: LPH143
Job Number: 4-3097
Client: Louisiana Pacific Corporation
Location: Hayward, Wisconsin

Line 2 Press RTO Outlet Stack -- Run 3

| Julian Date | Time (Hrs) | Conc. (dry basis unless noted) NOx (ppmv) | CO (ppmv) | CO2 (%v/v) | O2 (%v/v) |
|---|---|---|---|---|---|
| 160 | 17:14:00 | 9.2 | 10.6 | 0.34 | 20.43 |
| 160 | 17:15:00 | 8.4 | 14.1 | 0.33 | 20.43 |
| 160 | 17:16:00 | 3.7 | 8.9 | 0.31 | 20.42 |
| 160 | 17:17:00 | 5.7 | 9.0 | 0.34 | 20.28 |
| | Run Average | 8.4 | 11.5 | 0.34 | 20.42 |

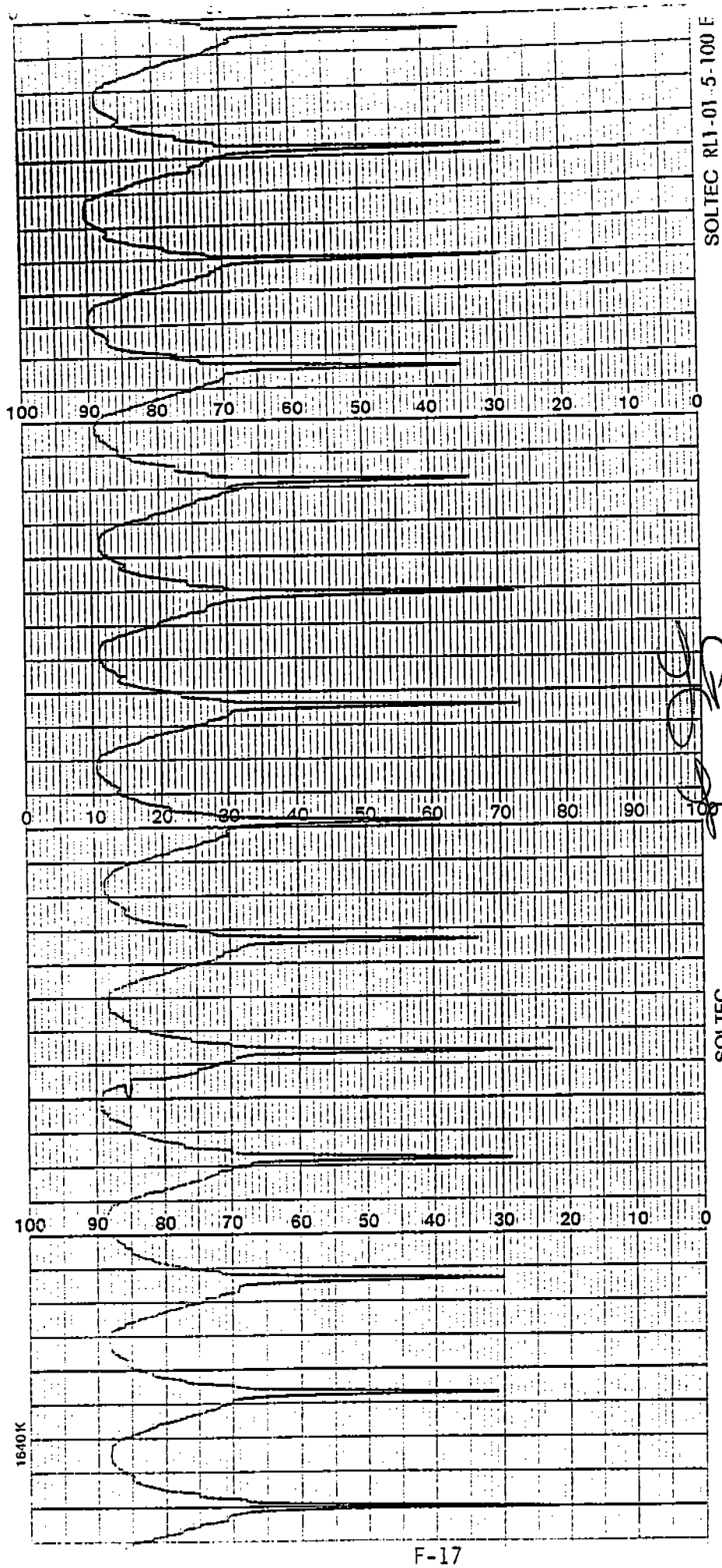

SOLTEC
1640K
SOLTEC RL1-01-5-100 E

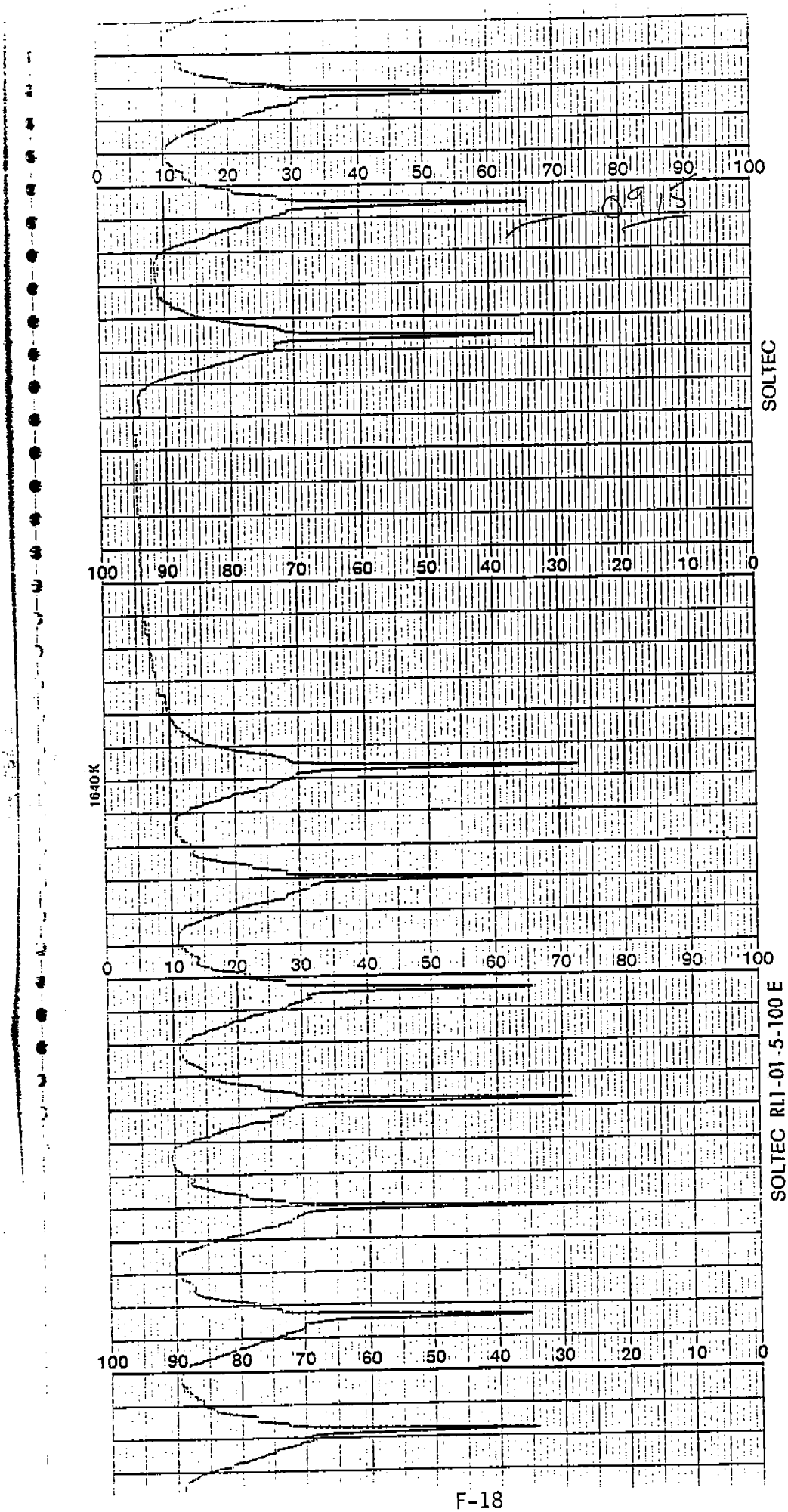

100 90 80 70 60 50 40 30 20 10 0
0 10 20 30 40 50 60 70 80 90 100
SOLTEC
1640K
0 10 20 30 40 50 60 70 80 90 100

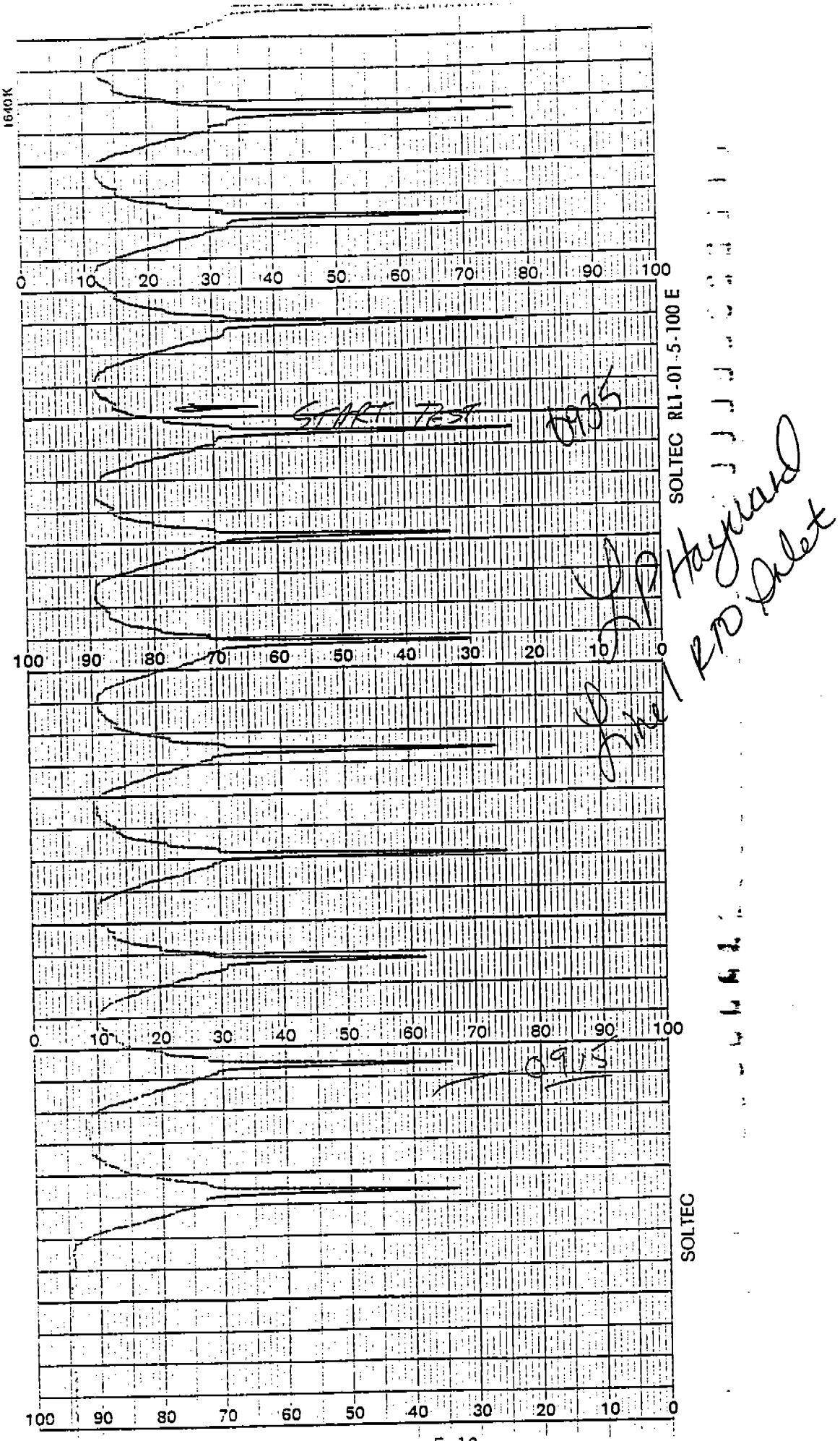


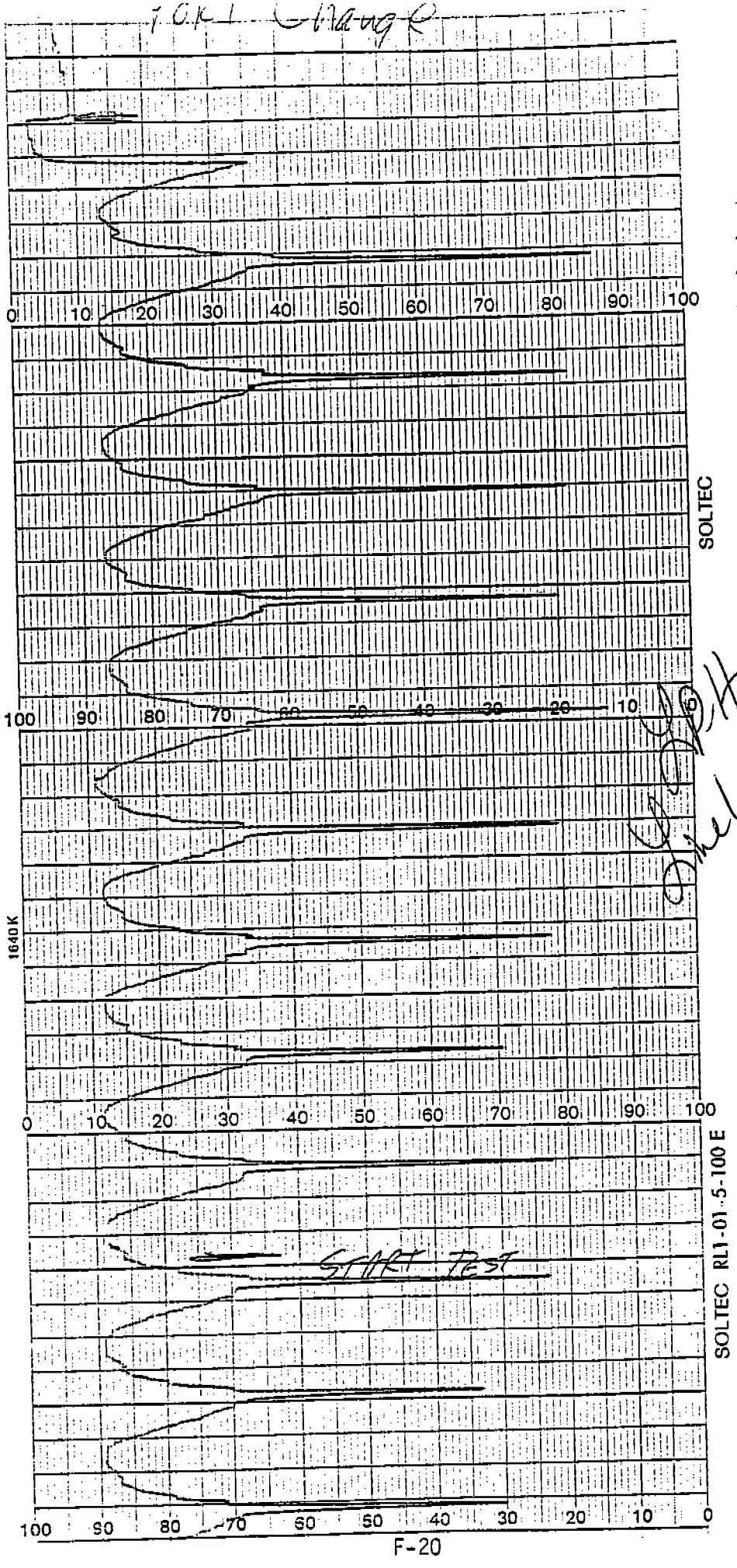

Final Product

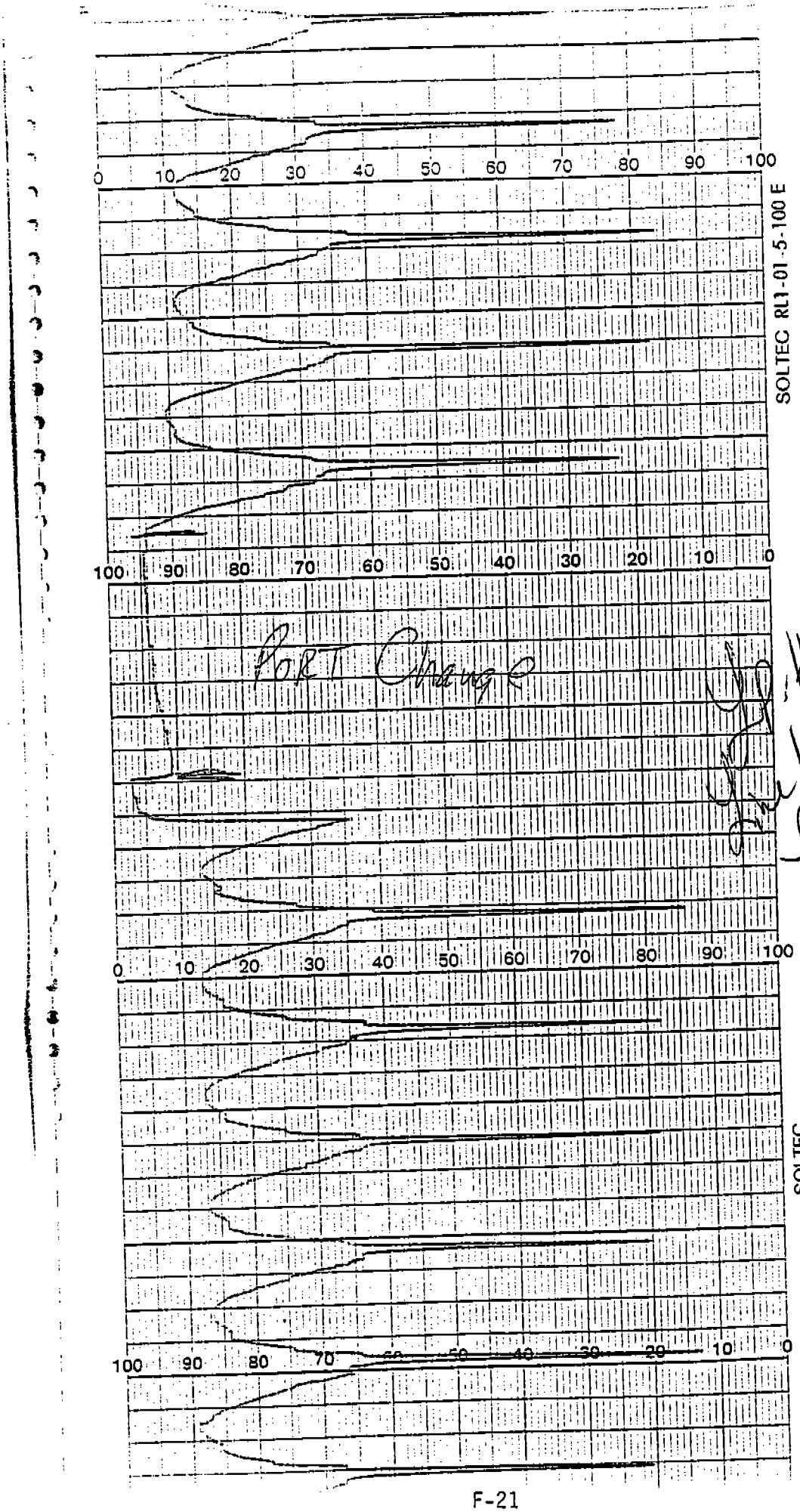
17 C's

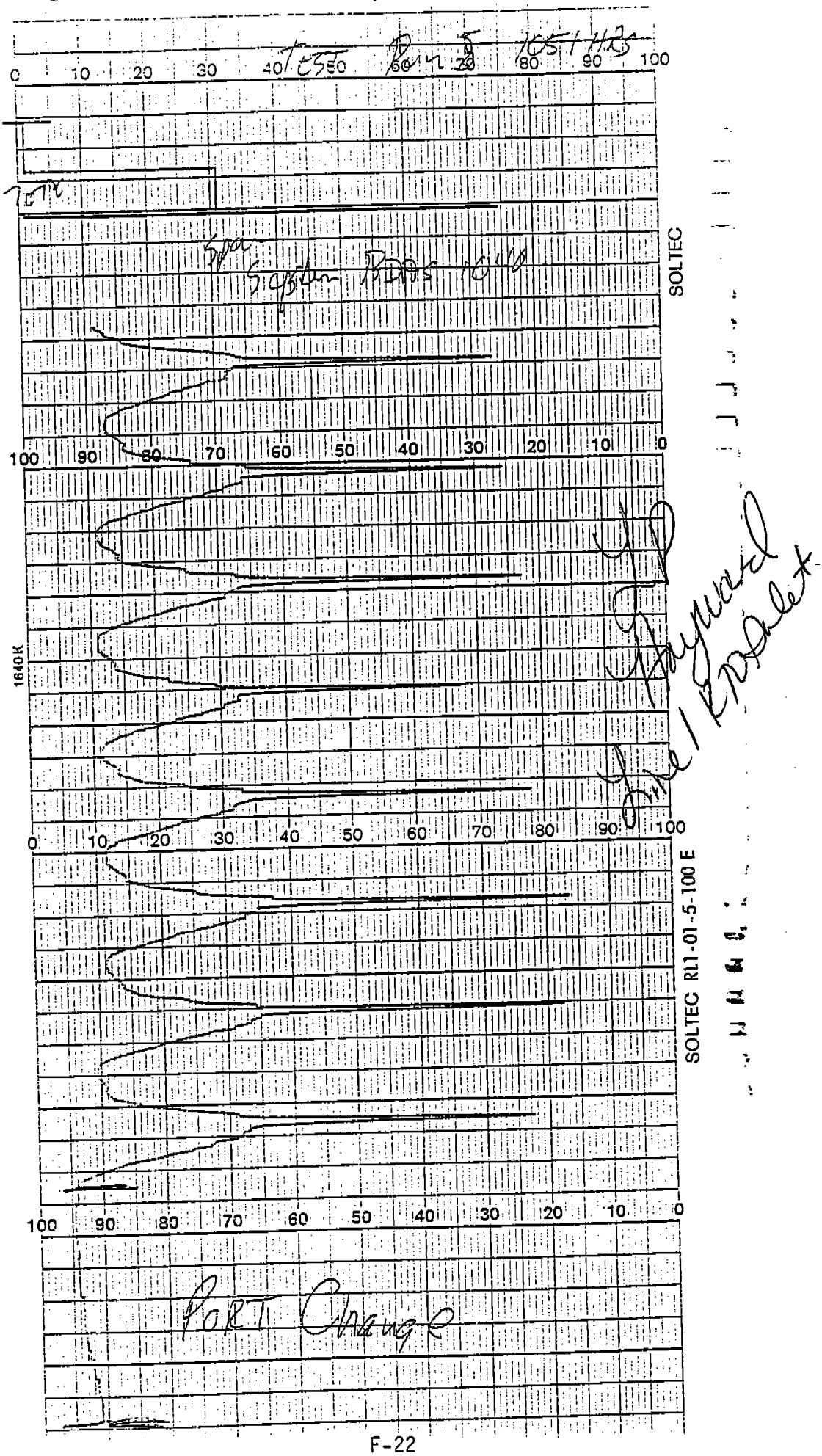

SOLTEC RL1-01-5-100 E
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0 10 20 30 40 50 60 70 80 90 100
SOLTEC
100 90 80 70 60 50 40 30 20 10 0
1640K

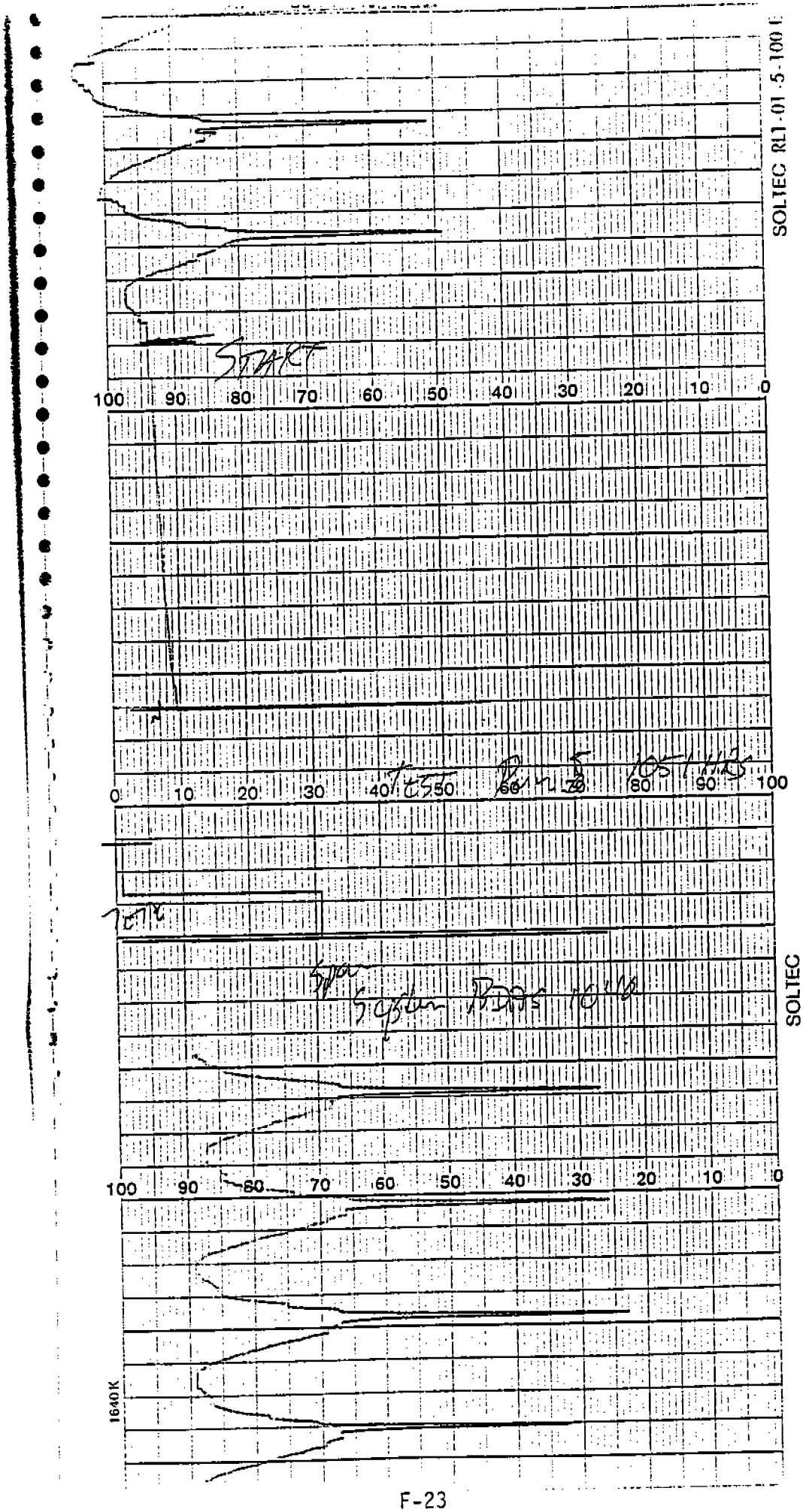

0 10 20 30 40 50 60 70 80 90 100
SOLTEC
100 90 80 70 60 50 40 30 20 10 0
1640K
0 10 20 30 40 50 60 70 80 90 100
SOLTEC RL1-01-5-100 E
100 90 80 70 60 50 40 30 20 10 0


1640K
0 10 20 30 40 50 60 70 80 90 100
START TEST
1935
SOLTEC RL1-01-5-100 E
100 90 80 70 60 50 40 30 20 10 0
0 10 20 30 40 50 60 70 80 90 100
SOLTEC
100 90 80 70 60 50 40 30 20 10 0

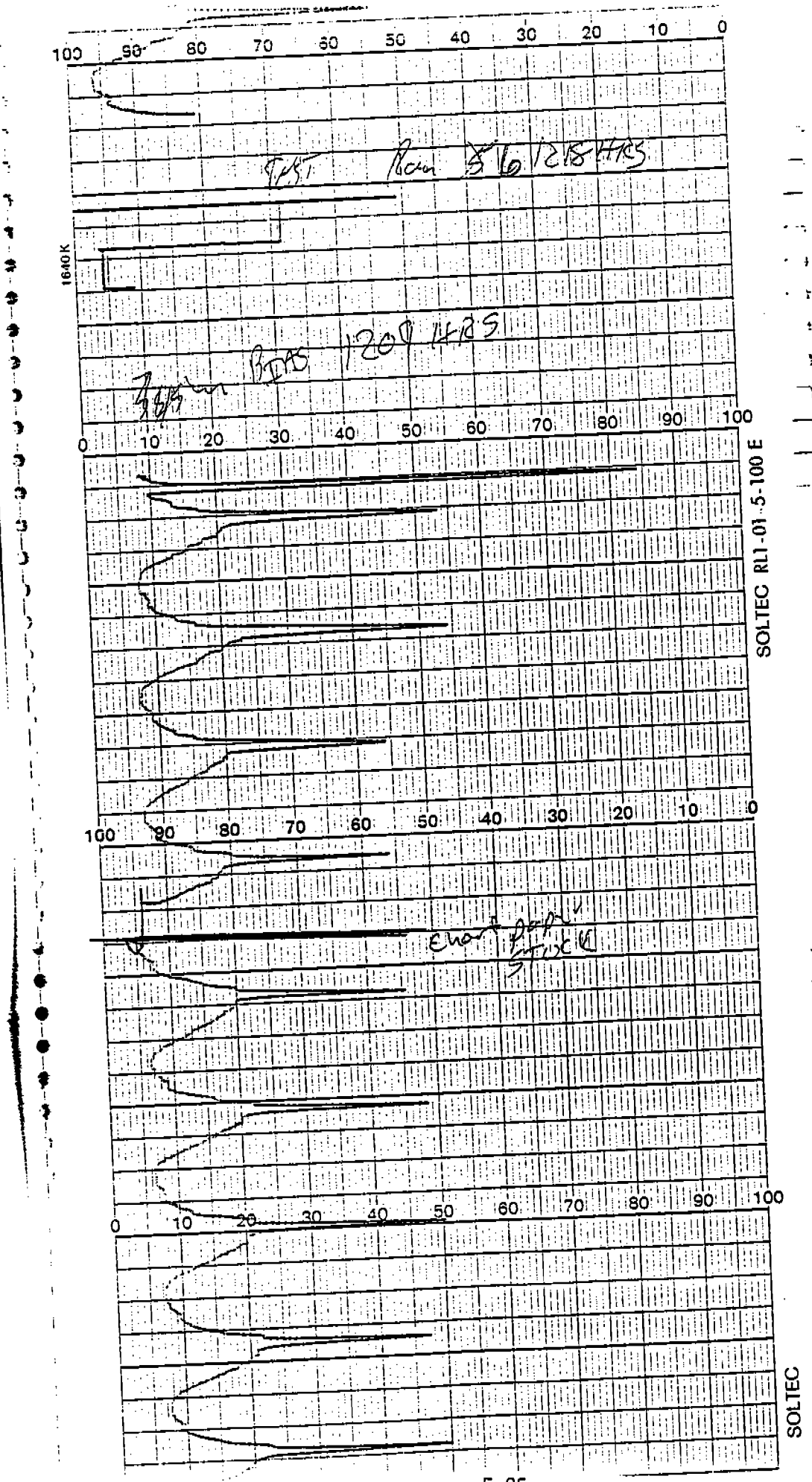

0 10 20 30 40 50 60 70 80 90 100
SOLTEC
100 90 80 70 60 50 40 30 20 10 0
1640K
0 10 20 30 40 50 60 70 80 90 100
SOLTEC RL1-01-5-100 E
START TEST
100 90 80 70 60 50 40 30 20 10 0

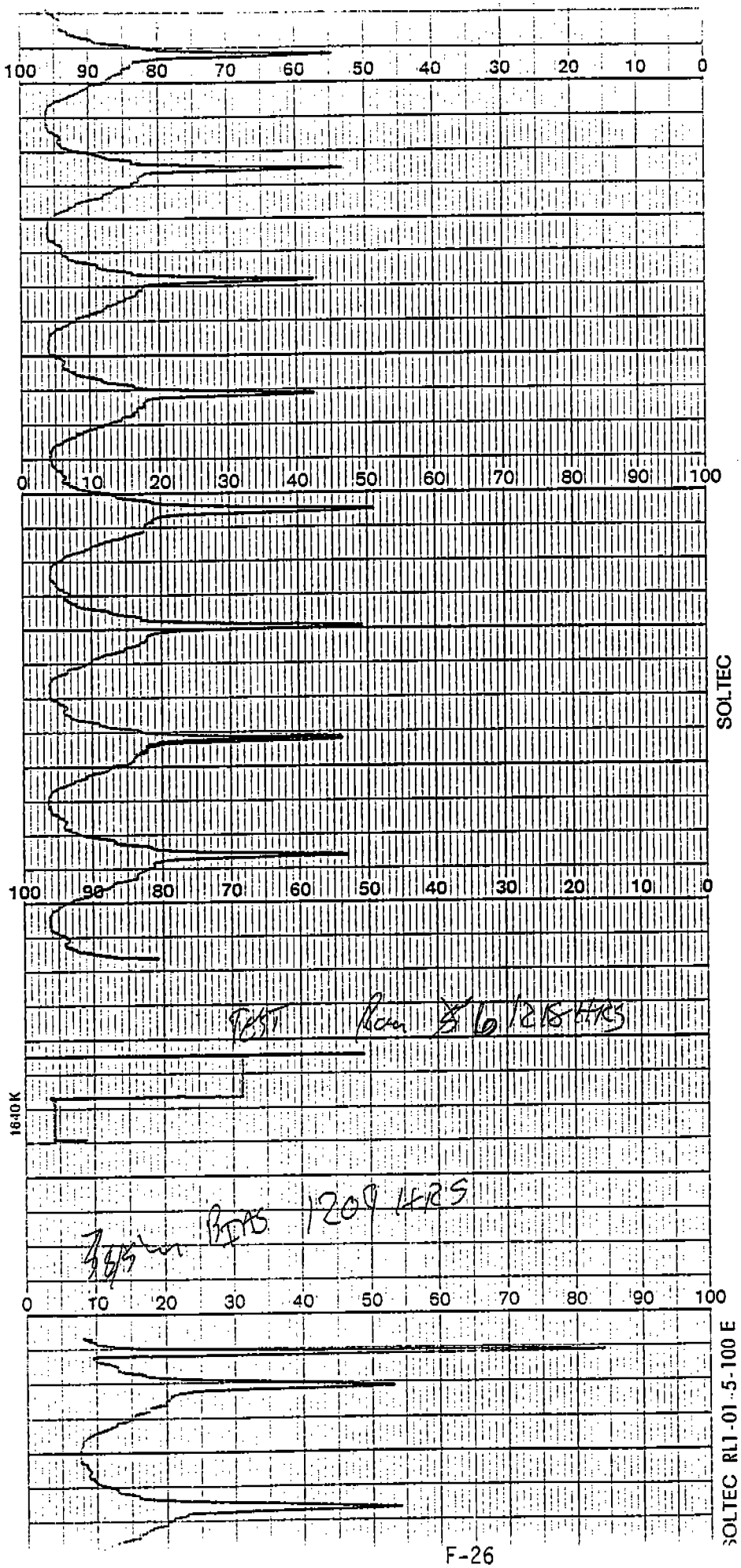

0 10 20 30 40 50 60 70 80 90 100
SOLTEC RL1-01-5-100 E
100 90 80 70 60 50 40 30 20 10 0
Fort Chaffee
Hayward
RL1
Inlet
0 10 20 30 40 50 60 70 80 90 100
SOLTEC
100 90 80 70 60 50 40 30 20 10 0

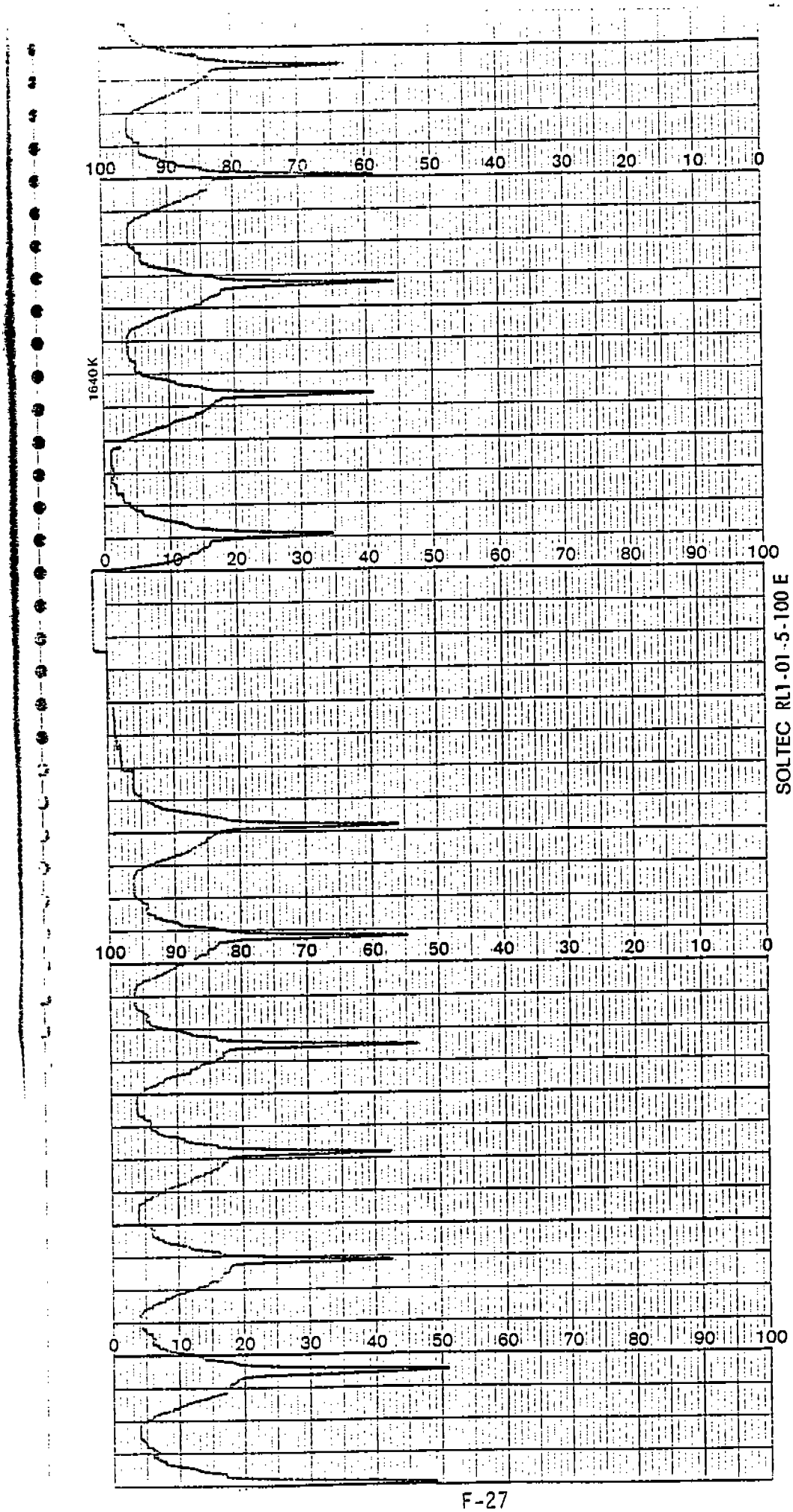

SOLTEC
1640K
SOLTEC RL1-01-5-100 E
Fort Chaffee

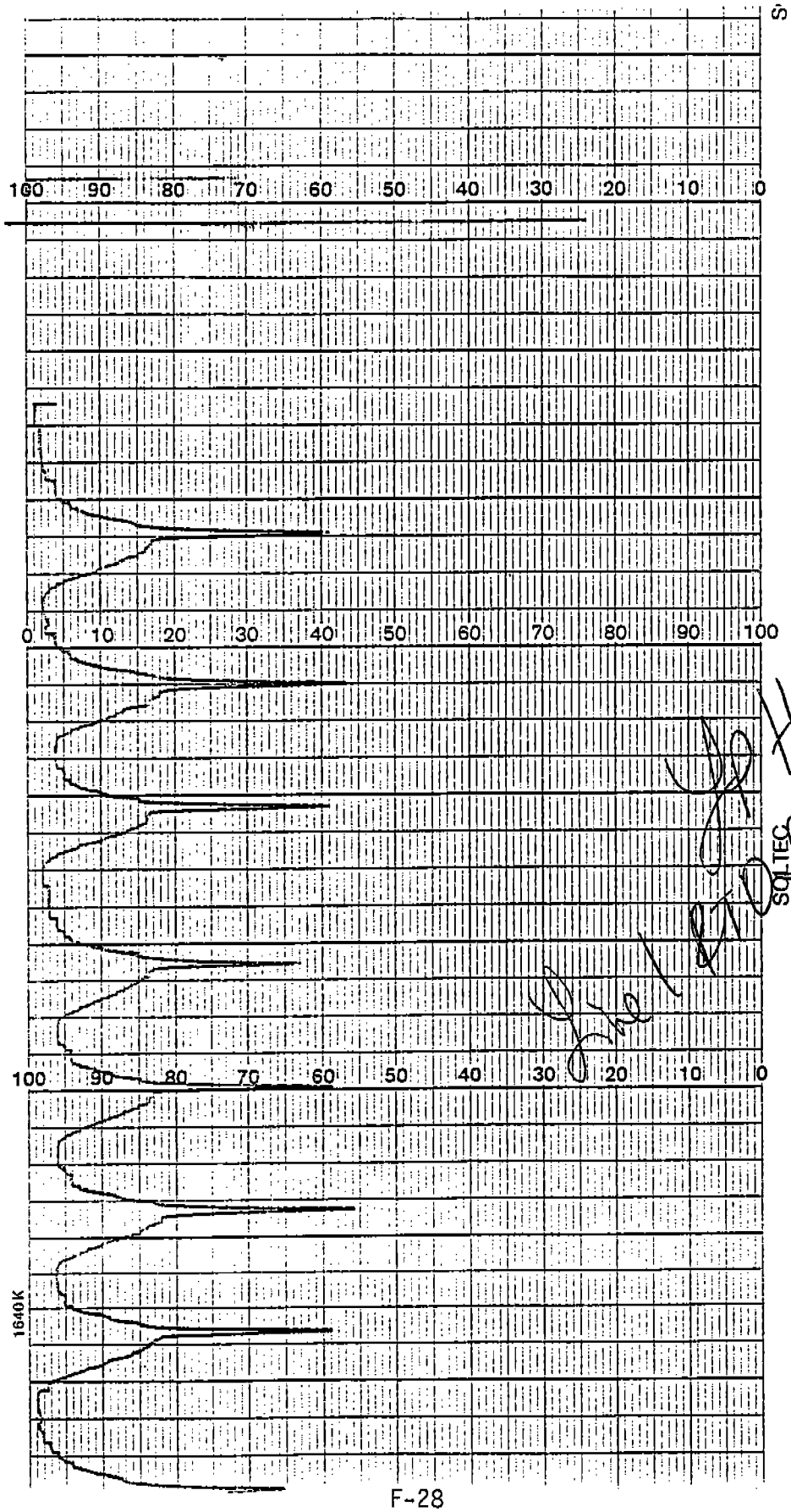

SOLTEC RL1-01-5-100 L
START
100 90 80 70 60 50 40 30 20 10 0
0 10 20 30 40 50 60 70 80 90 100
SOLTEC
100 90 80 70 60 50 40 30 20 10 0
1640K

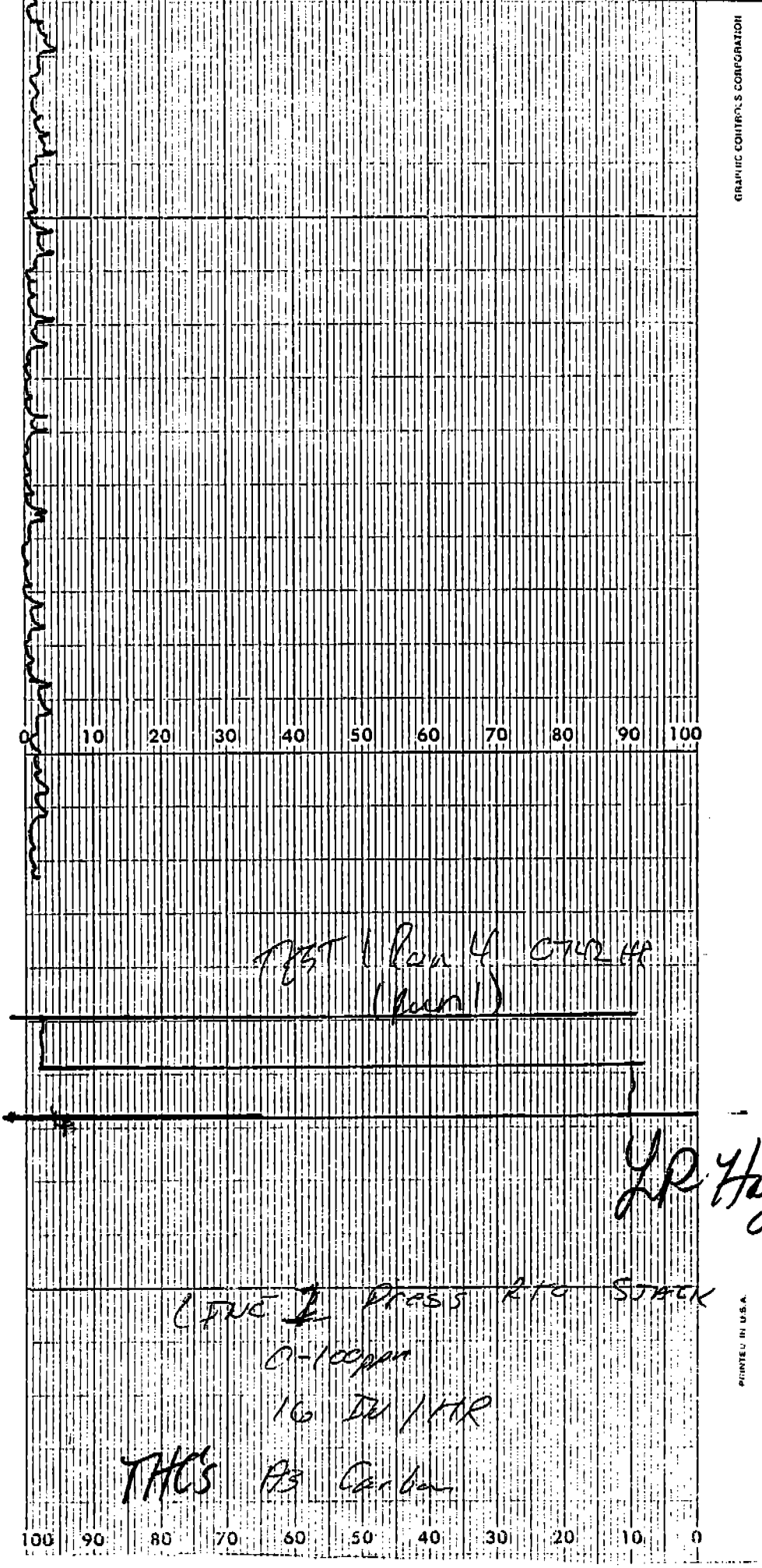
0 10 20 30 40 50 60 70 80 90 100
SOLTEC
100 90 80 70 60 50 40 30 20 10 0
1640K
0 10 20 30 40 50 60 70 80 90 100
SOLTEC R11-01-5-100 E
START
100 90 80 70 60 50 40 30 20 10 0


100 90 80 70 60 50 40 30 20 10 0
1640K
0 10 20 30 40 50 60 70 80 90 100
SOLTEC RL1-01-5-100 E
100 90 80 70 60 50 40 30 20 10 0
0 10 20 30 40 50 60 70 80 90 100
SOLTEC


100 90 80 70 60 50 40 30 20 10 0
0 10 20 30 40 50 60 70 80 90 100
SOLTEC
100 90 80 70 60 50 40 30 20 10 0
1640 K
0 10 20 30 40 50 60 70 80 90 100
SOLTEC RL1-01-5-100 E


100 90 80 70 60 50 40 30 20 10 0
1640K
0 10 20 30 40 50 60 70 80 90 100
100 90 80 70 60 50 40 30 20 10 0
0 10 20 30 40 50 60 70 80 90 100
SOLTEC RL1-01-5-100 E


S
100 90 80 70 60 50 40 30 20 10 0
0 10 20 30 40 50 60 70 80 90 100
100 90 80 70 60 50 40 30 20 10 0
1640K
SOLTEC


GRAPHIC CONTROLS CORPORATION
0
10
20
30
40
50
60
70
80
90
100
TEST 1 Run 4 C7H2 HR
(Run 1)
L R Hayward
CTUC-2 Press RTO STACK
0-100ppm
10 Dil/HR
THCS PS Carbon
100
90
80
70
60
50
40
30
20
10
0
PRINTED IN U.S.A.

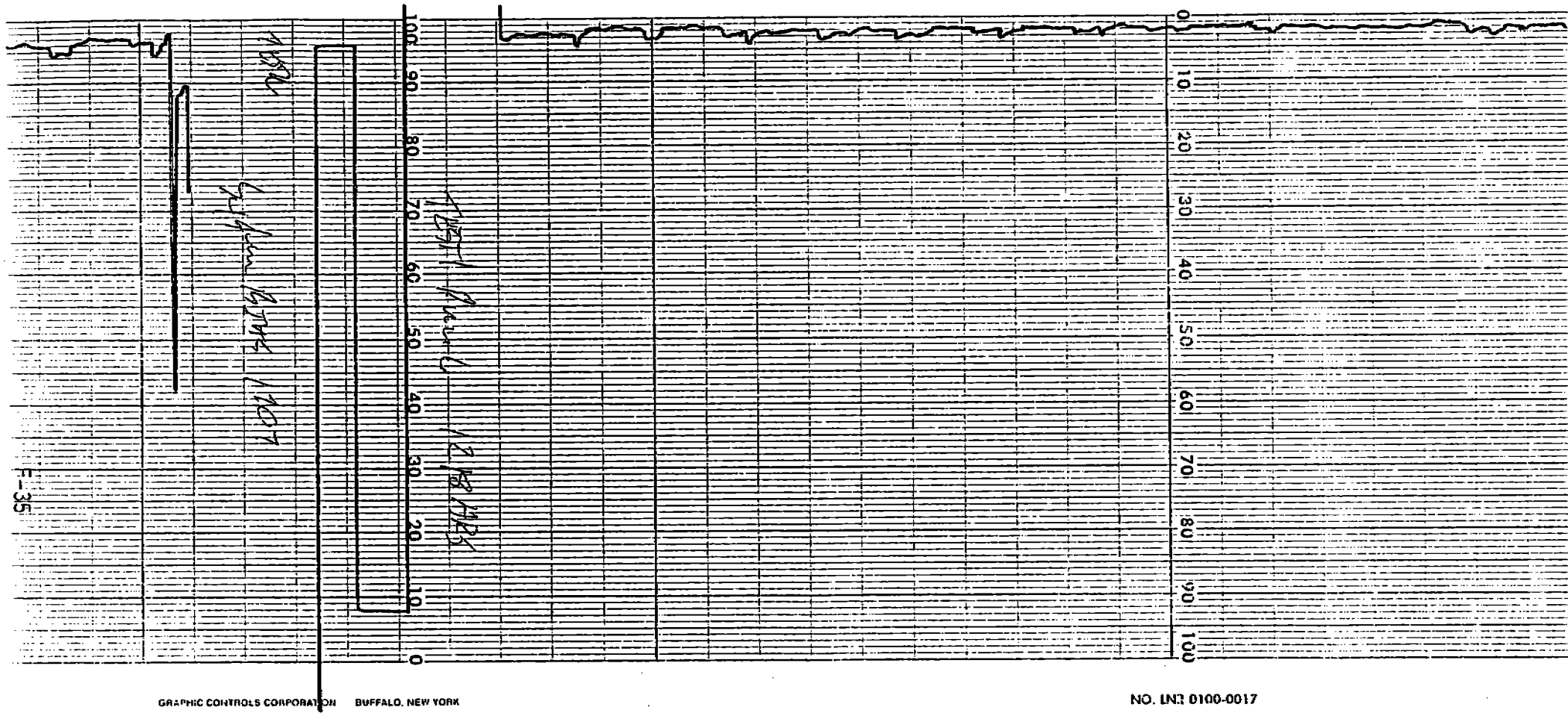
0
10
20
30
40
50
60
70
80
90
100
NO. LNR 0100-0017

0 10 20 30 40 50 60 70 80 90 100
START TEST
Haywood
Line 1 - 270
Stack
100 90 80 70 60 50 40 30 20 10 0
Lowered T&C
0945
PRINTED IN U.S.A.

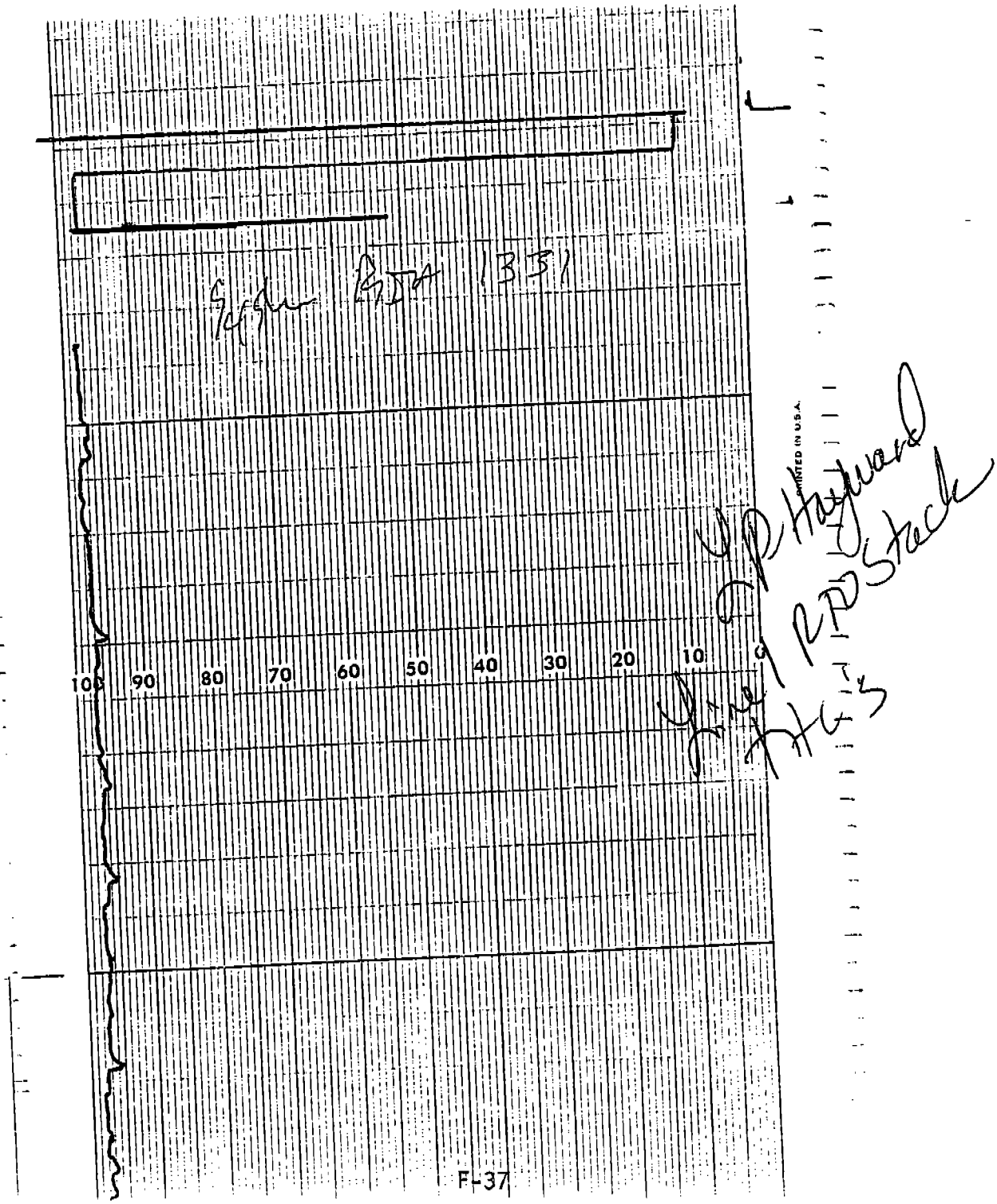
Test 1 Run 5 1051 hrs
Span
Zero
System Test 1047
N
10 90 80 70 60 50 40 30 20 10 0
0 10 20 30 40 50 60 7032 80 90 100
GRAPHIC CONTROLS CORPORATION BUFFALO, NEW YORK
NO. IN
GP-Hayward
Test 1 Trooper
Stack

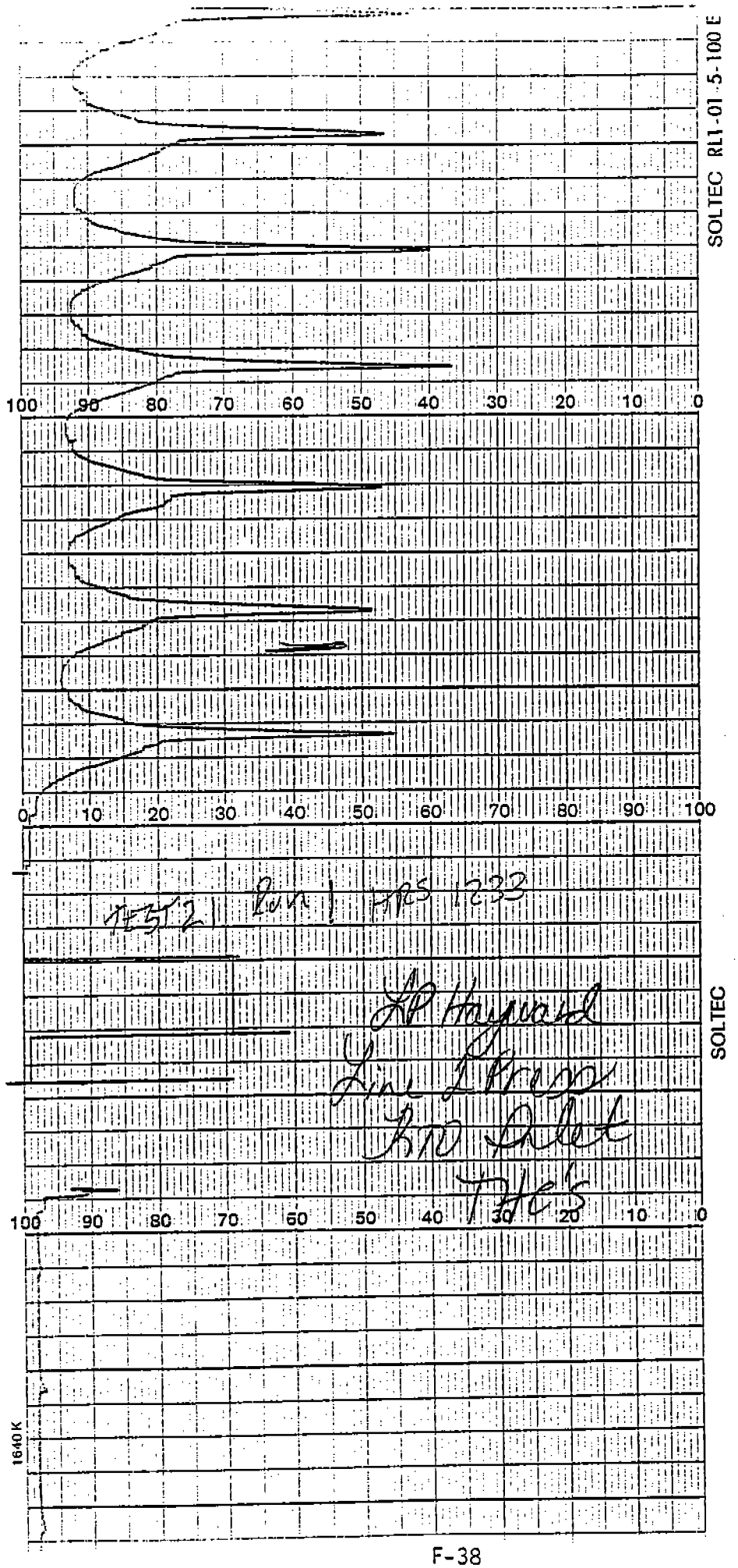
100 90 80 70 60 50 40 30 20 10 0
Line 1
Grid RD
Stack
Basin Drive
Start
0 10 20 30 40 50 60 70 80 90 100
East 1 Road 5 North 1 Road
Start
Road
System Start 1047
PRINTED IN U.S.A.
NO. LNR 6169-0317

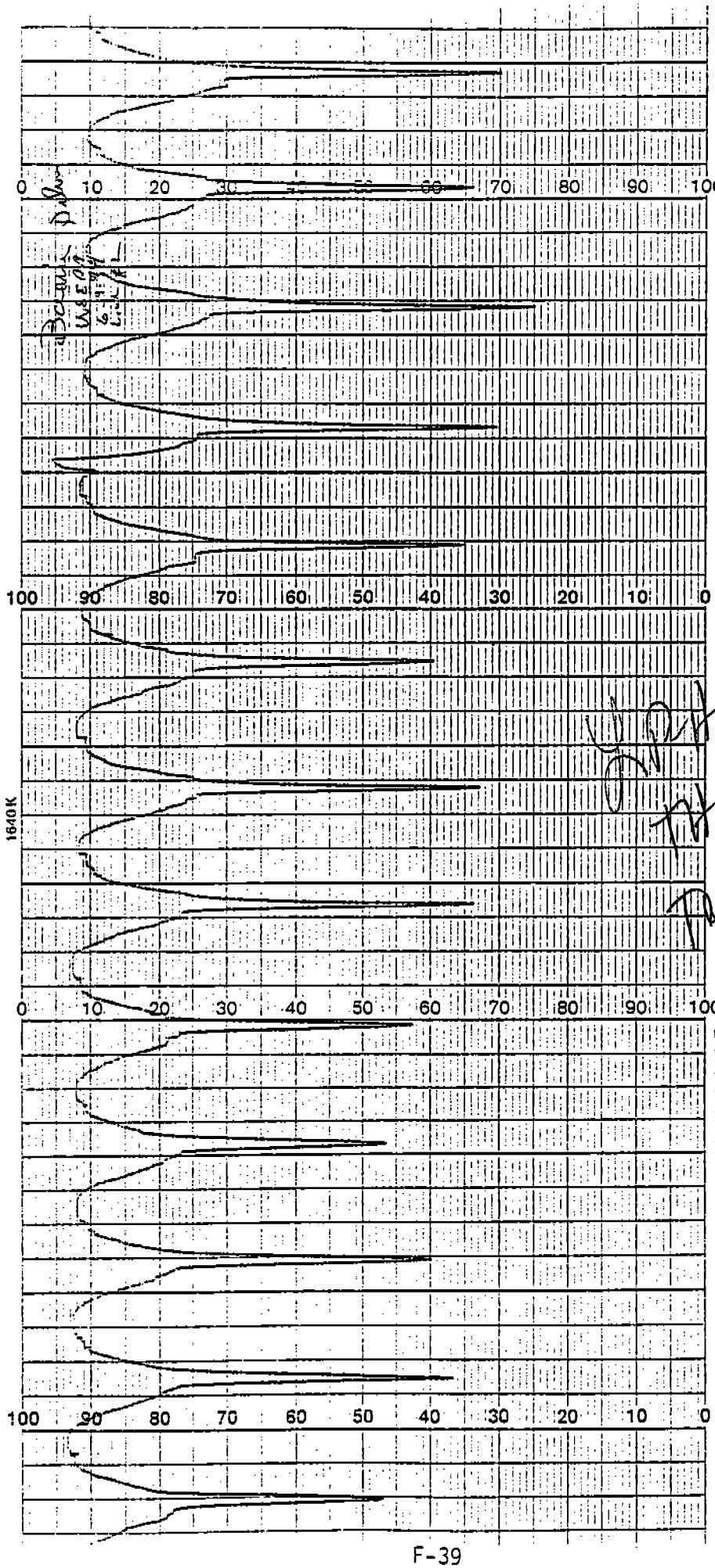
TEST Annul 12 HRS
100 90 80 70 60 50 40 30 20 10 0
1052
System Bldg 1707
0 10 20 30 40 50 60 70 80 90 100
GRAPHIC CONTROLS CORPORATION BUFFALO, NEW YORK
PRINTED IN U.S.A.


100 90 80 70 60 50 40 30 20 10 0
0 10 20 30 40 50 60 70 80 90 100
GRAPHIC CONTROLS CORPORATION BUFFALO, NEW YORK
NO. LN3 0100-0017

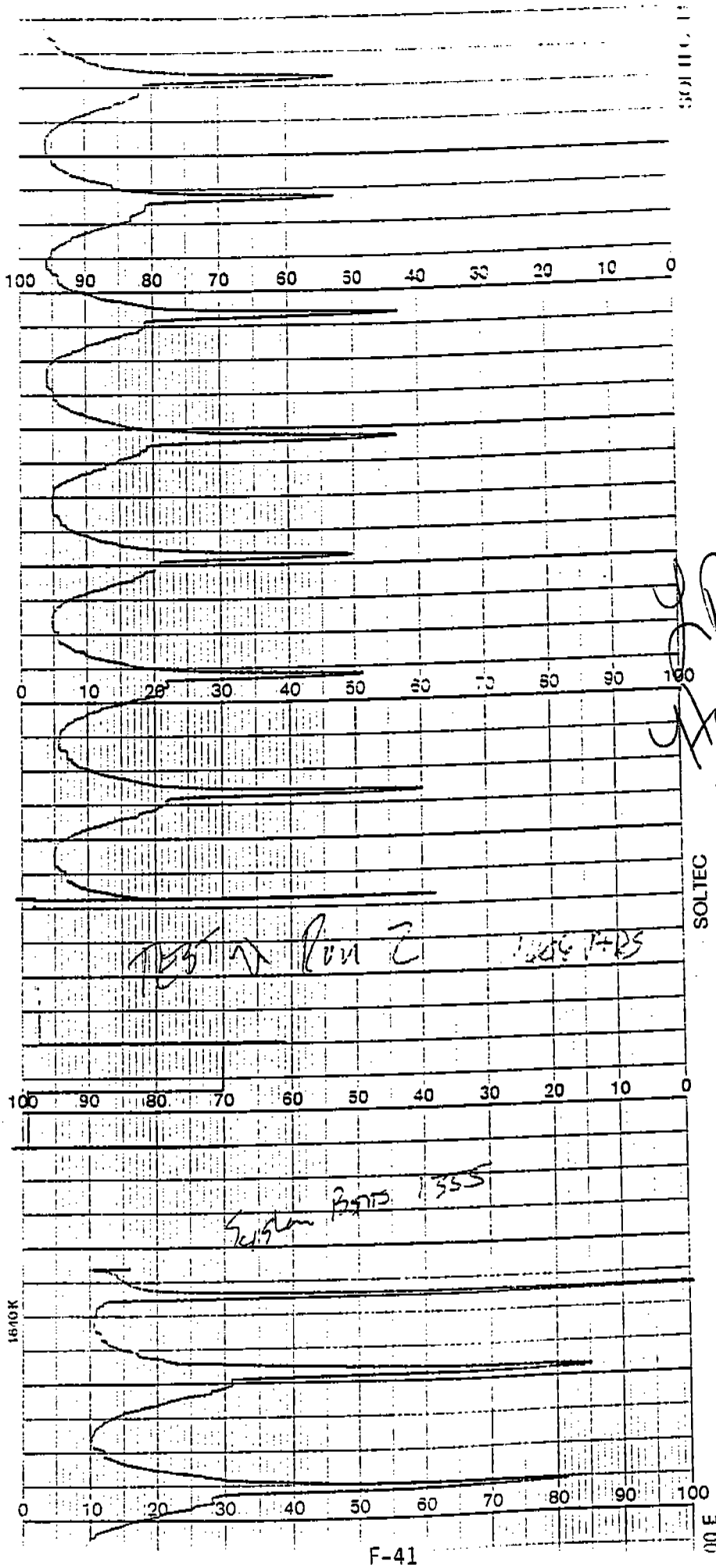
100 90 80 70 60 50 40 30 20 10 0
0 10 20 30 40 50 60 70 80 90 100
PRINTED IN U.S.A.
NO. INS 0100-0017


Taylor EDTA 1351
100
90
80
70
60
50
40
30
20
10
0
PRINTED IN U.S.A.
D/P Hayward
Dual PDStack
#43

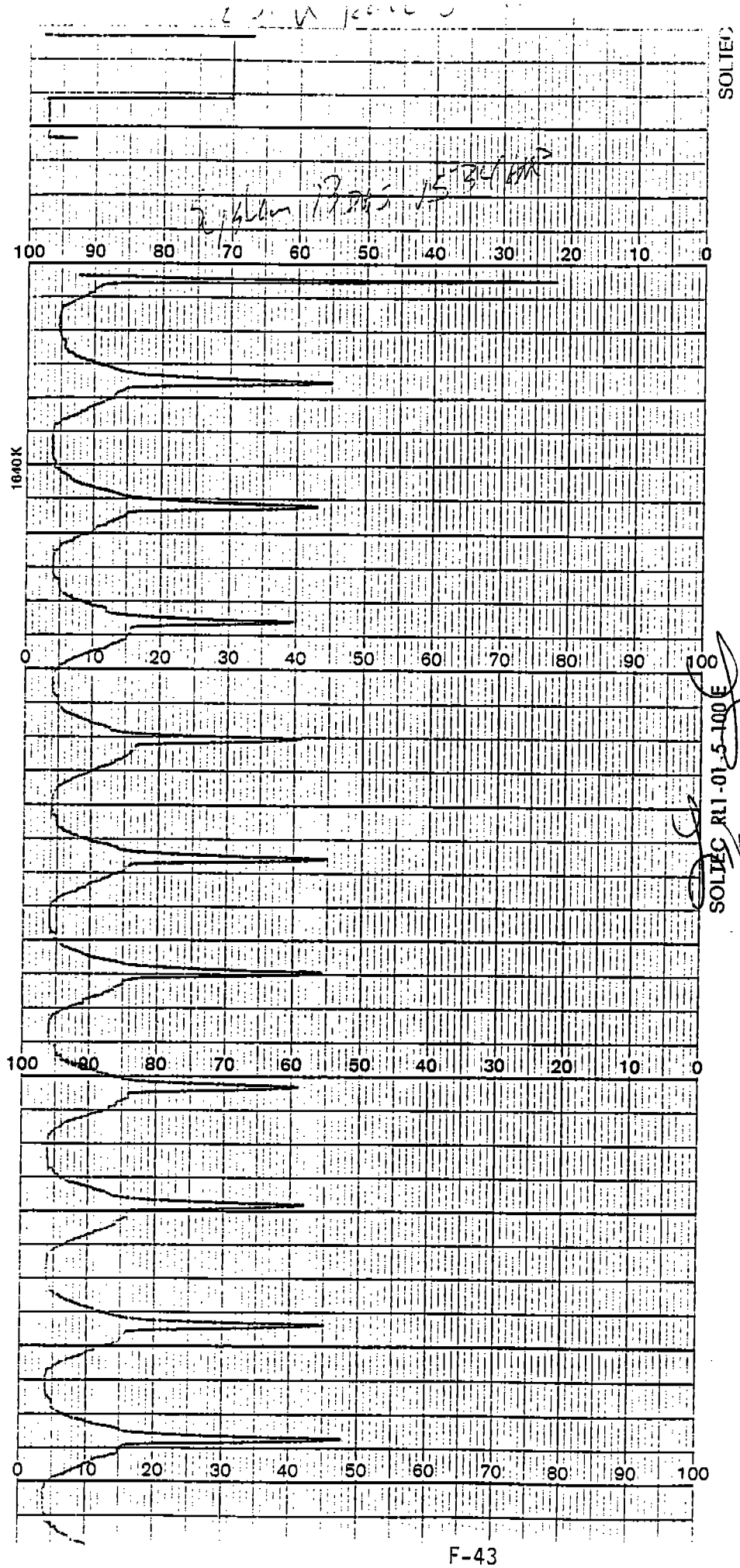

SOLTEC RL1-01-5-100 E
100 90 80 70 60 50 40 30 20 10 0
0 10 20 30 40 50 60 70 80 90 100
TEST Run 1 HRS 1233
LP Hayward
Line Loop
Rig Idle
THS
SOLTEC
100 90 80 70 60 50 40 30 20 10 0
1640 K

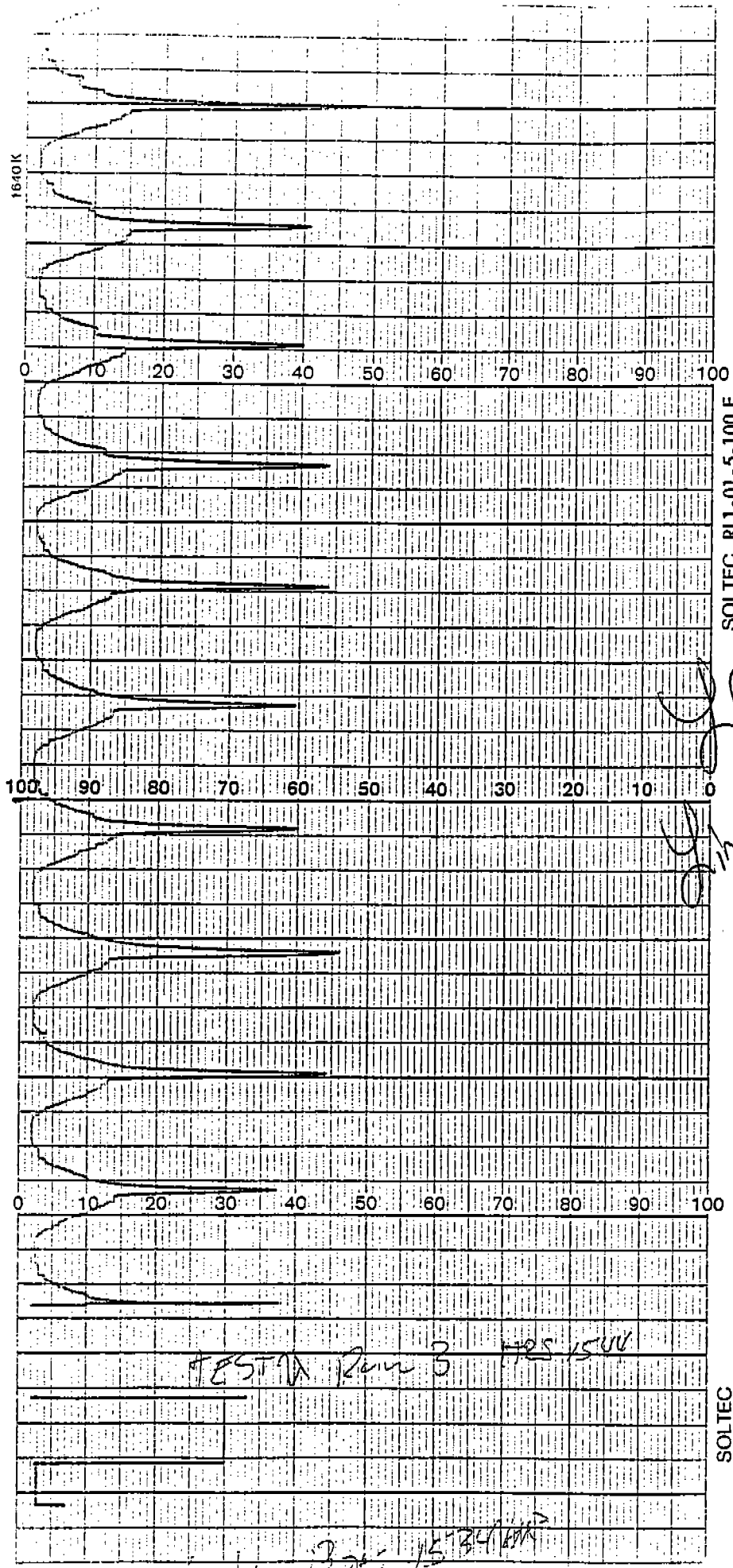

0 10 20 30 40 50 60 70 80 90 100
SOLTEC
100 90 80 70 60 50 40 30 20 10 0
1640K
0 10 20 30 40 50 60 70 80 90 100
SOLTEC RL1-01-5-100 E
100 90 80 70 60 50 40 30 20 10 0

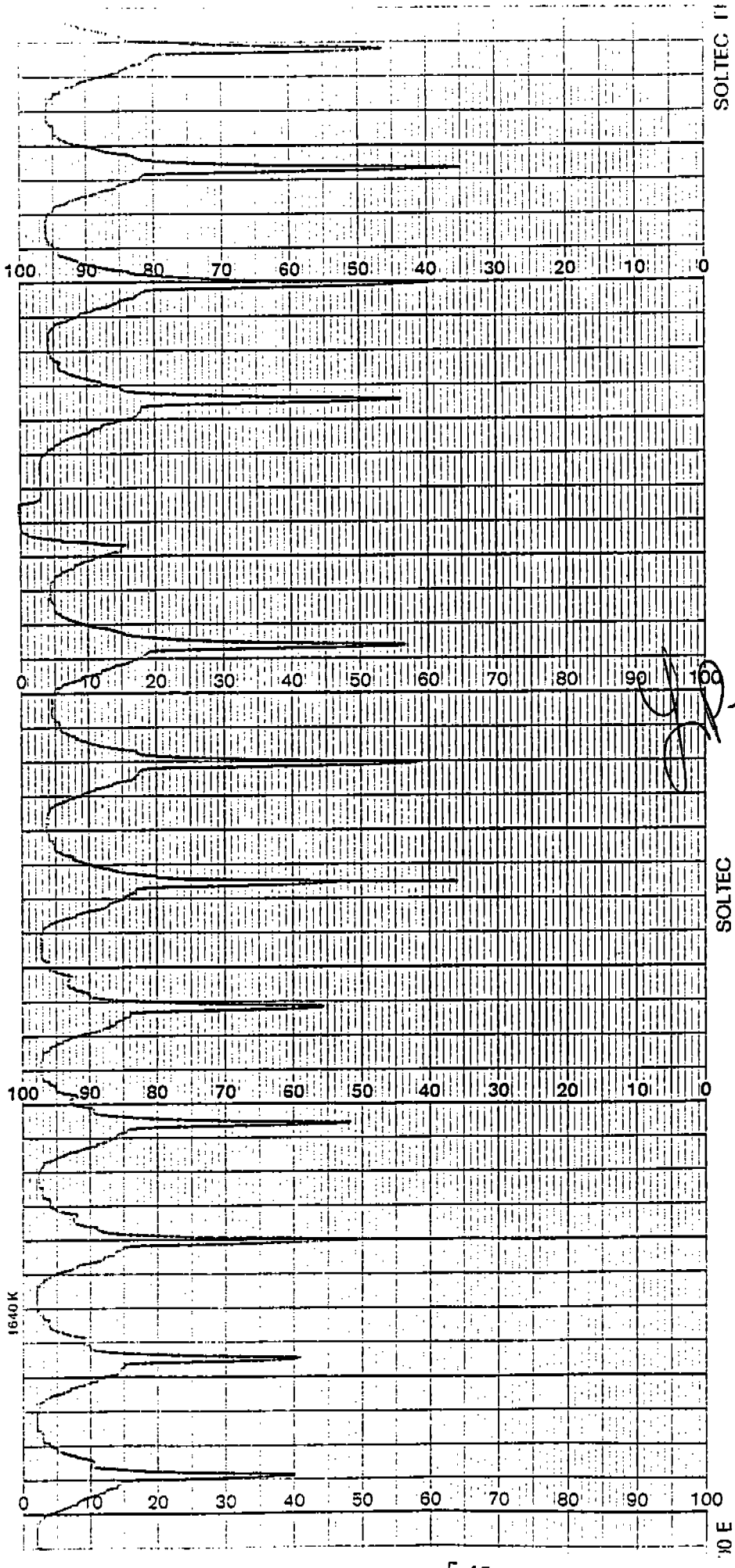
100 90 80 70 60 50 40 30 20 10 0
1640K
0 10 20 30 40 50 60 70 80 90 100
SOLTEC RL1-01-5-100 E
100 90 80 70 60 50 40 30 20 10 0
0 10 20 30 40 50 60 70 80 90 100

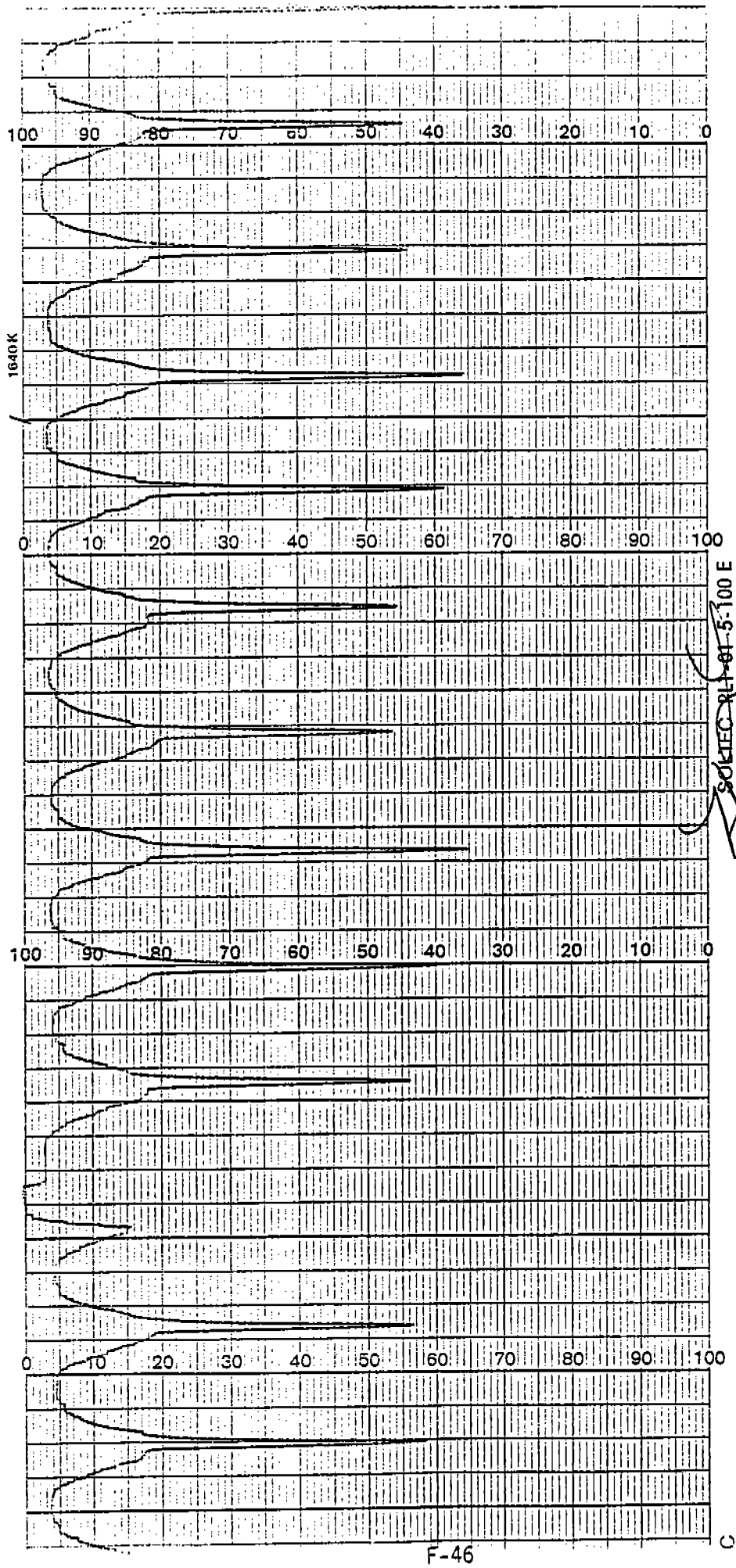

100 90 80 70 60 50 40 30 20 10 0
0 10 20 30 40 50 60 70 80 90 100
SOLTEC
100 90 80 70 60 50 40 30 20 10 0
1640K
0 10 20 30 40 50 60 70 80 90 100

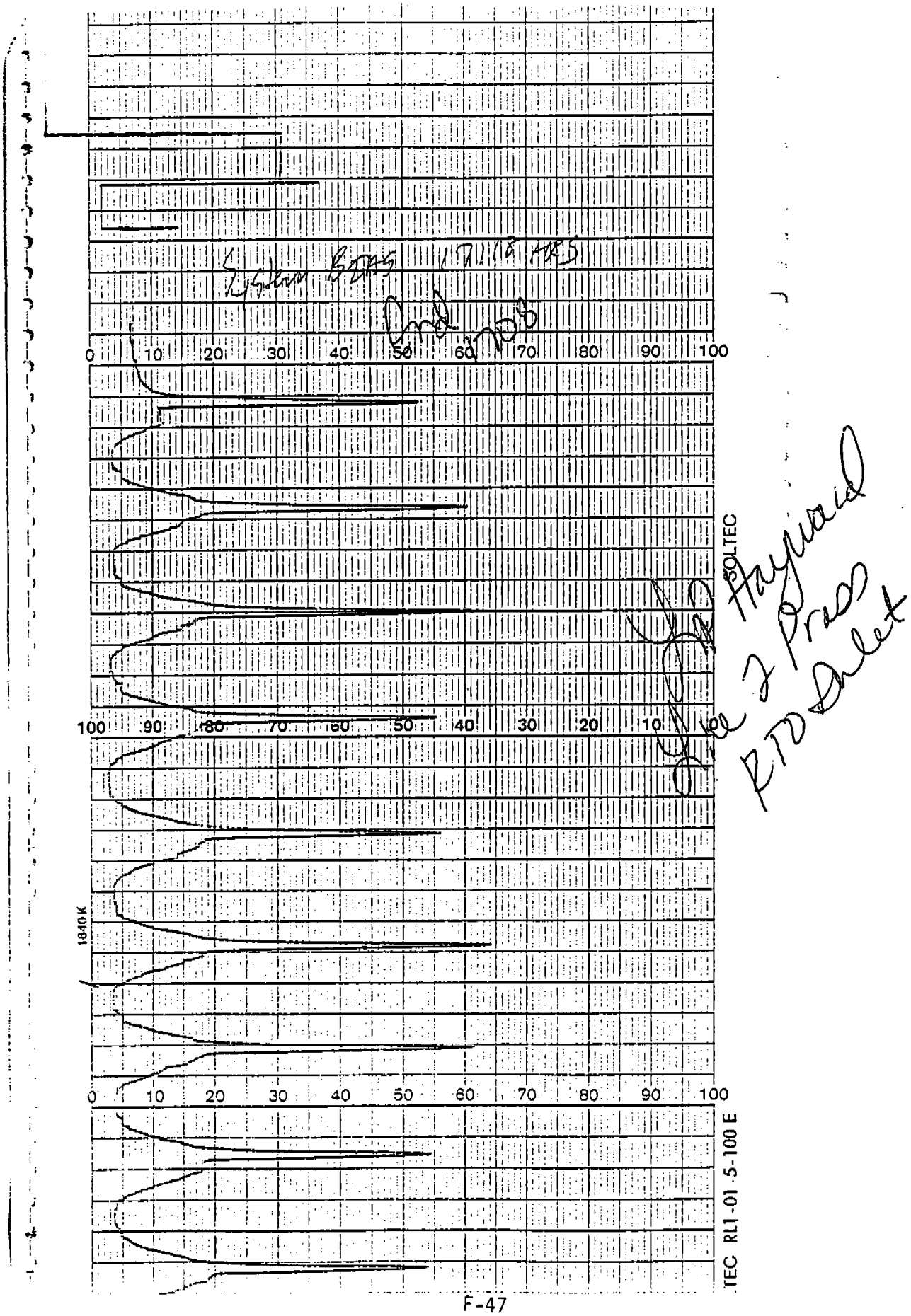
0 10 20 30 40 50 60 70 80 90 100
SOLTEC
100 90 80 70 60 50 40 30 20 10 0
1640 K
0 10 20 30 40 50 60 70 80 90 100
SOLTEC RL1-01-5-100 E
100 90 80 70 60 50 40 30 20 10 0

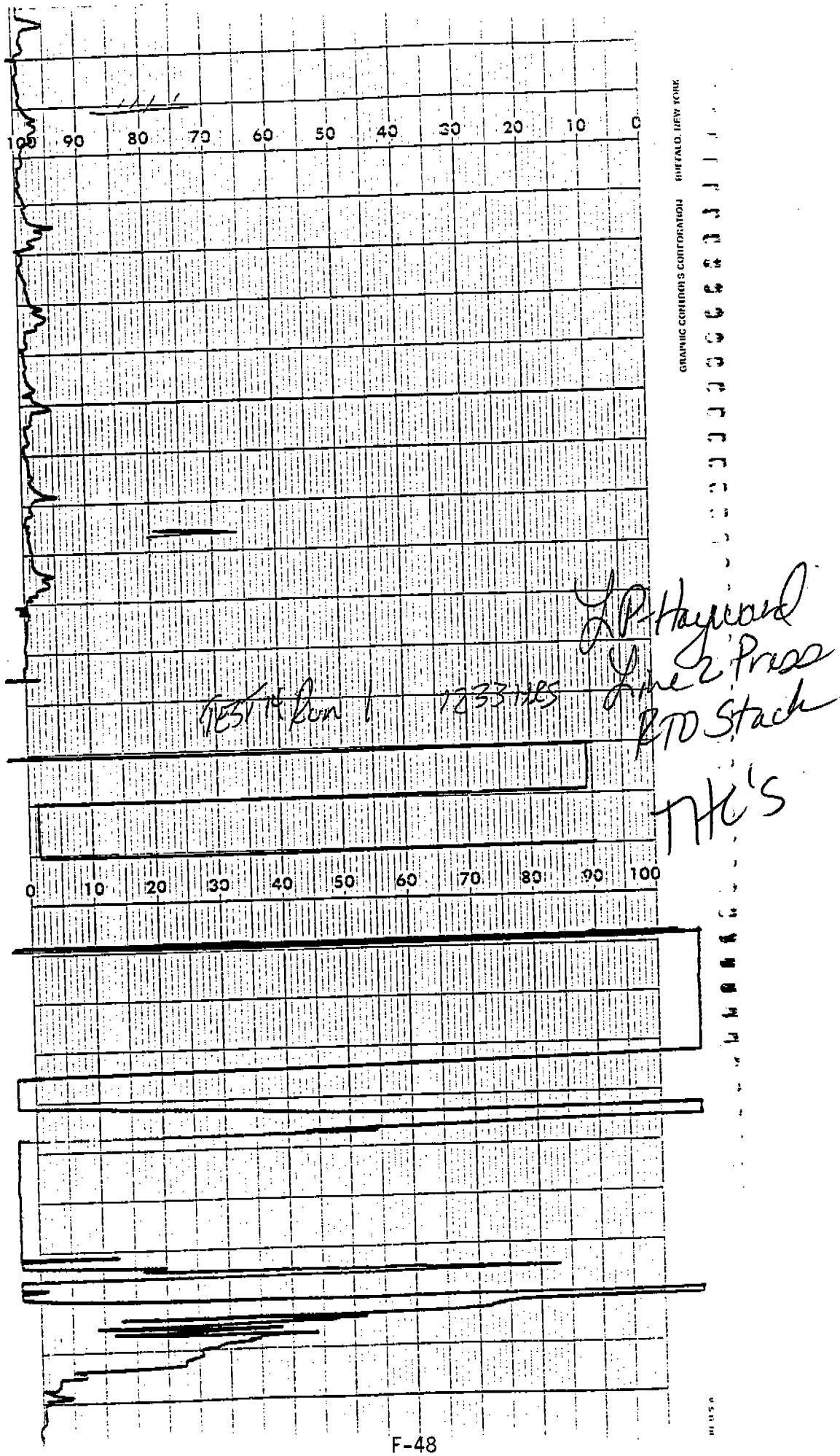

SOLTEC
100 90 80 70 60 50 40 30 20 10 0
1640K
0 10 20 30 40 50 60 70 80 90 100
SOLTEC RU1-01-5-100E
100 90 80 70 60 50 40 30 20 10 0
0 10 20 30 40 50 60 70 80 90 100


1640K
0 10 20 30 40 50 60 70 80 90 100
SOLTEC RL1-01-5-100 E
100 90 80 70 60 50 40 30 20 10 0
0 10 20 30 40 50 60 70 80 90 100
SOLTEC


SOLTEC
100 90 80 70 60 50 40 30 20 10 0
0 10 20 30 40 50 60 70 80 90 100
1640 K


100 90 80 70 60 50 40 30 20 10 0
1640K
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SOLTEC RLT-81-5-100 E
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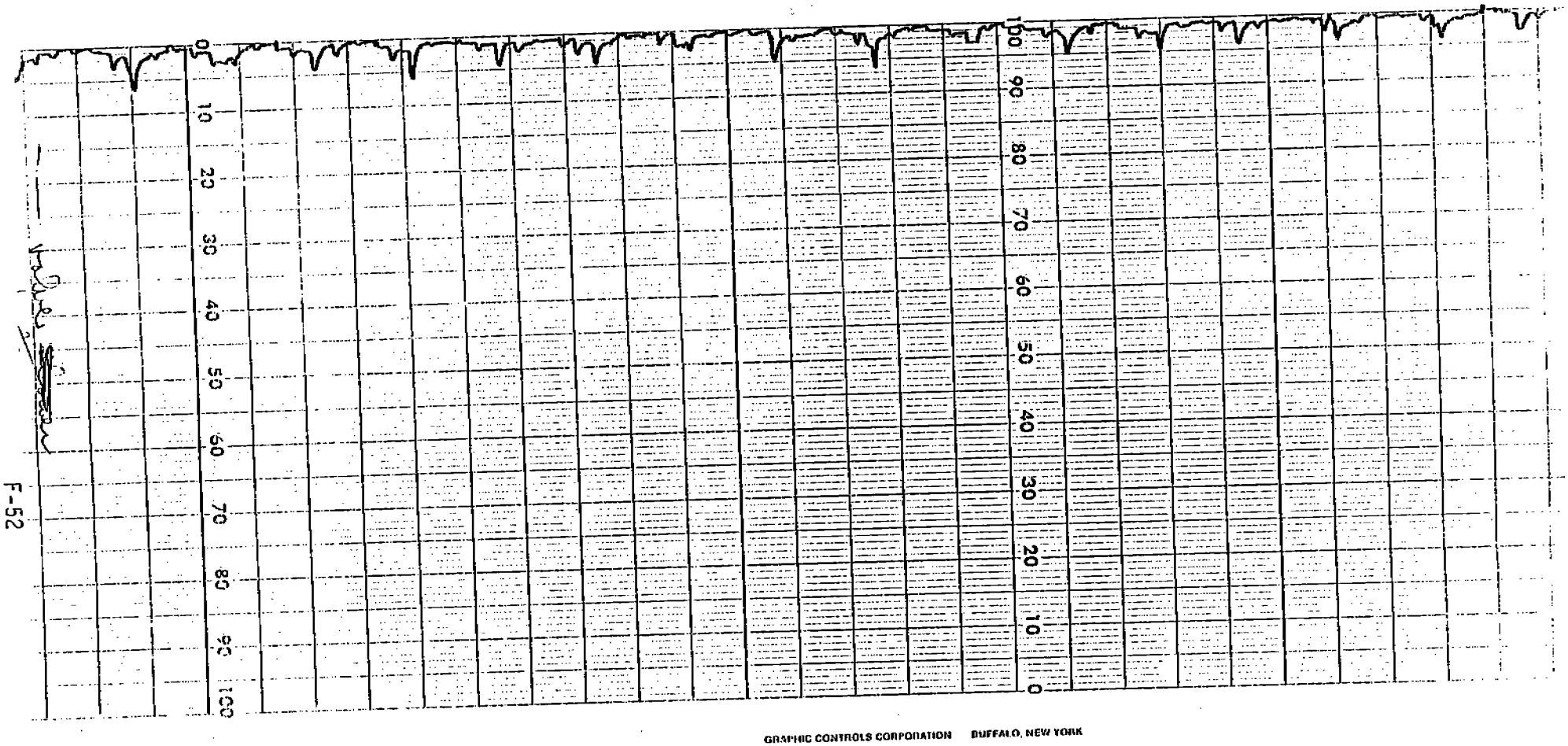

0 10 20 30 40 50 60 70 80 90 100
100 90 80 70 60 50 40 30 20 10 0
0 10 20 30 40 50 60 70 80 90 100
1840 K
SOLTEC
TEC RL1-01-5-100 E

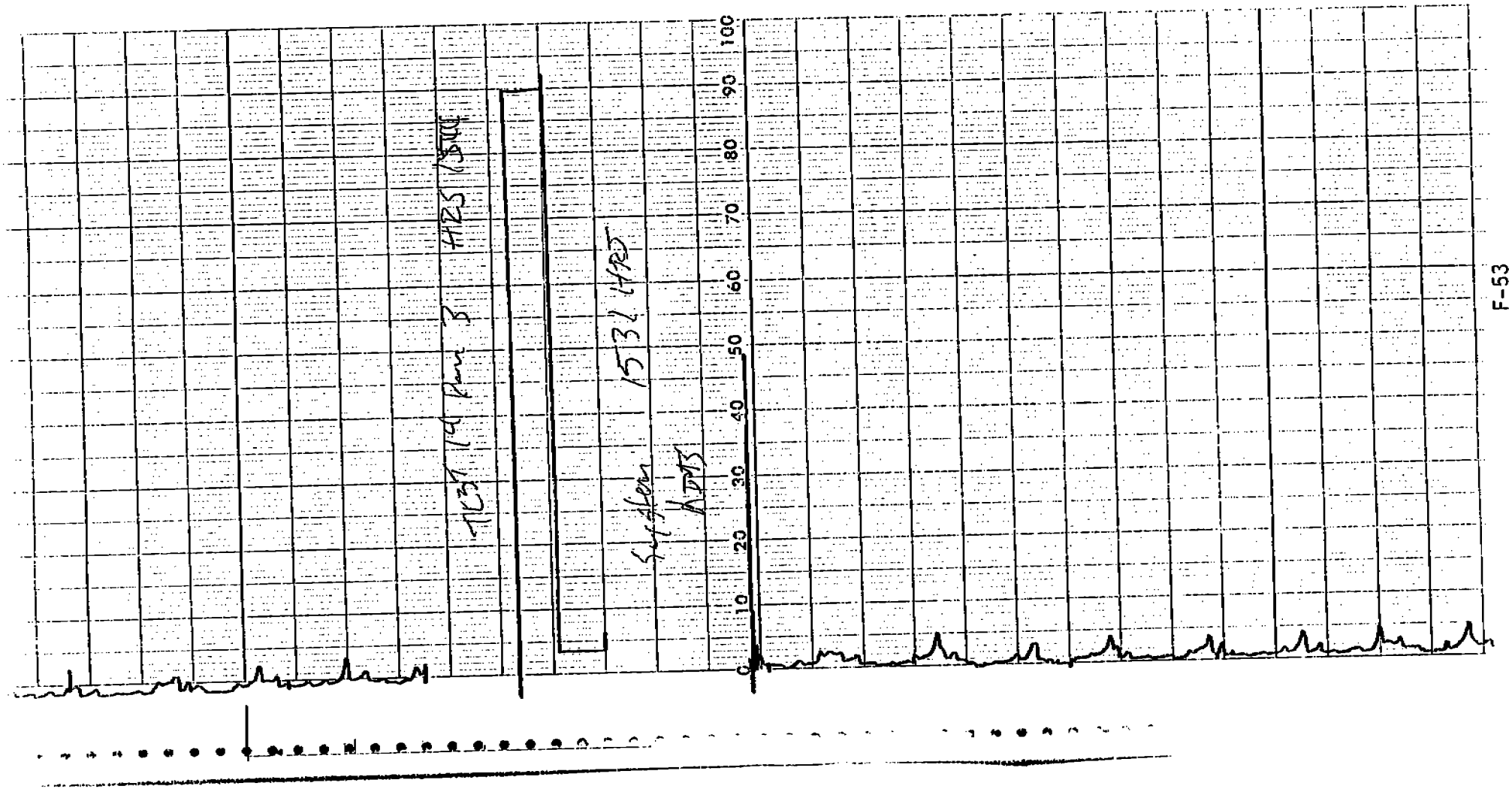

100 90 80 70 60 50 40 30 20 10 0
GRAPHIC CONTROLS CORPORATION BUFFALO, NEW YORK
TEST #1 Run 1 1233 hrs
L.P. Hayward
Line 2 Press
RTO Stack
NMC's
0 10 20 30 40 50 60 70 80 90 100

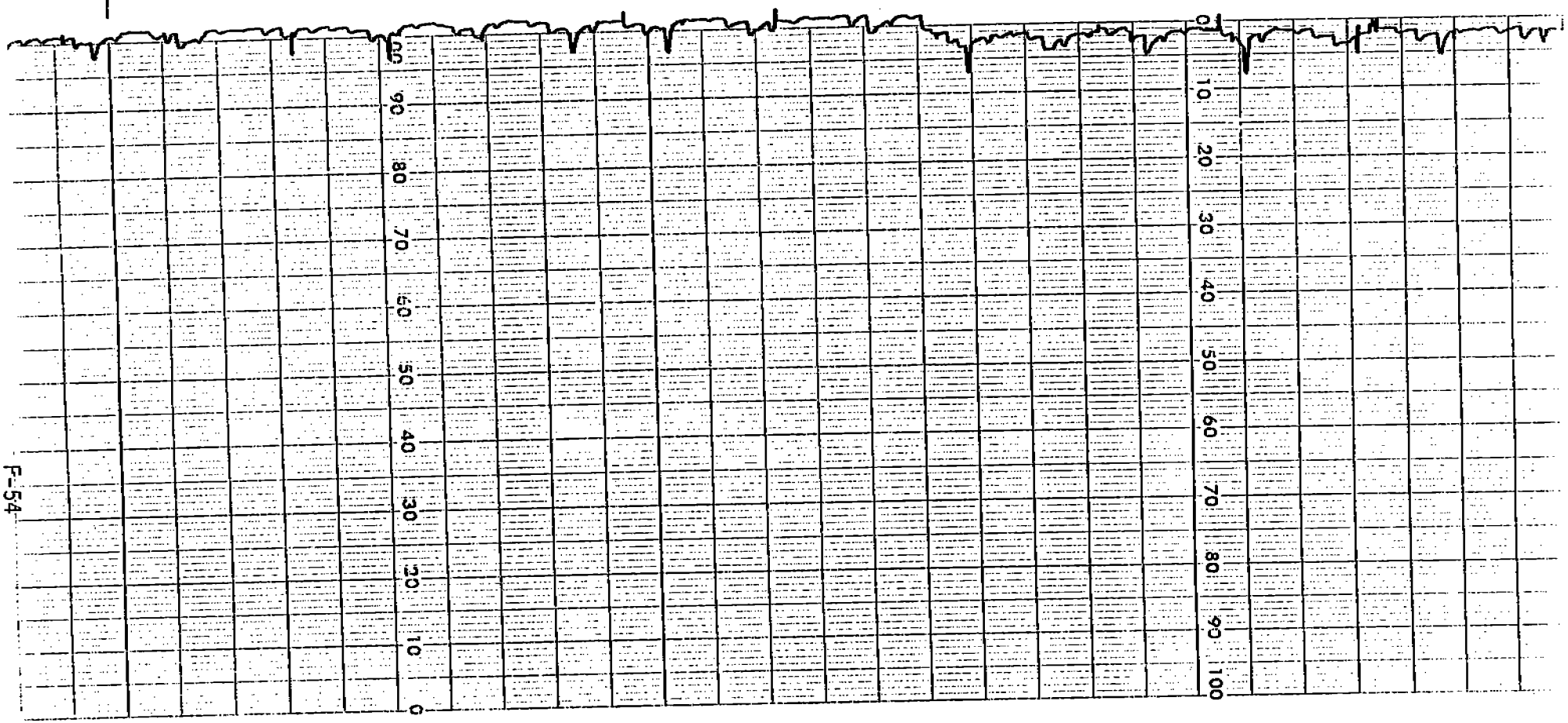
0 10 20 30 40 50 60 70 80 90 100
Bounced Diversion Values 13 20
100 90 80 70 60 50 40 30 20 10 0

DST #4 Run 2 #25 1866
ZERO
Bonneville USA Run #1
6-9-94
Bounced Diversion Valves 13:20

0
10
20
30
40
50
60
70
80
90
100
Patient
1
TEST 14 Row 12
#25 1500
TORO
50
40
30
20
10
0
RUN #1
USER #2
PRINTED IN U.S.A.


0
10
20
30
40
50
60
70
80
90
100
100
90
80
70
60
50
40
30
20
10
0
GRAPHIC CONTROLS CORPORATION BUFFALO, NEW YORK

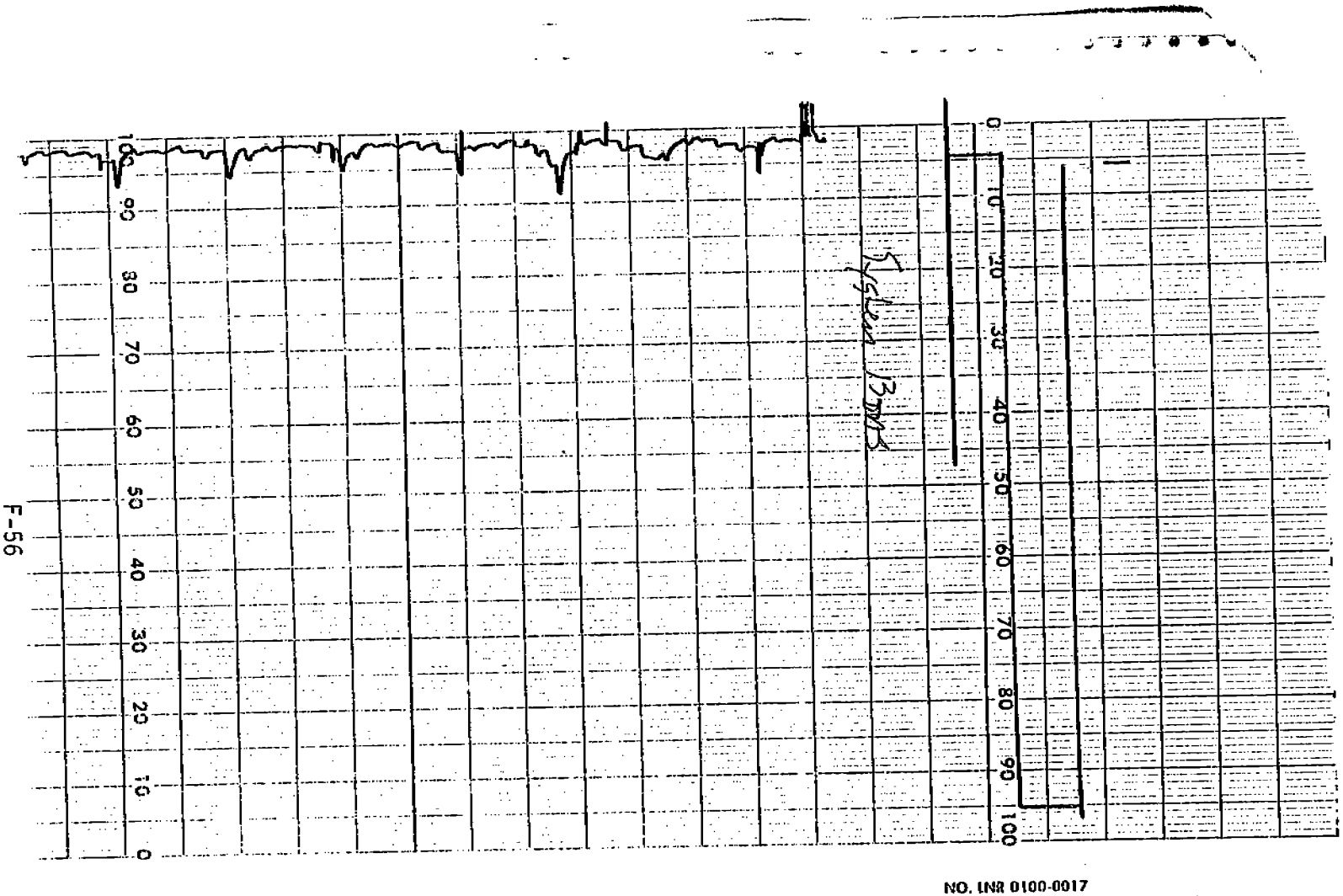

100
90
80
70
60
50
40
30
20
10
0






PRINTED IN U.S.A.

100 90 80 70 60 50 40 30 20 10 0
0 10 20 30 40 50 60 70 80 90 100
GRAPHIC CONTROLS CORPORATION BUFFALO, NEW YORK




NO. INR 0100-0017

BUFFALO, NEW YORK

# APPENDIX G

## ANALYZER SPECIFICATIONS

Ratfisch INSTRUMENTE

# TOTAL HYDROCARBON ANALYZER (FLAME IONIZATION
Model RS 55

## TECHNICAL DATES

MAINS : 115V/60H
RECORDER OUTPUT : 0 - 5 V / 4-20mA

MODEL: X Manual switching
__ Solenoid valves

HOUSING: __ Case, __ 19"-Rack

MEASURING RANGES:

| | | |
|---|---|---|
| 1 = 0 – | 10 | $C_1$ |
| 2 = 0 – | 100 | $C_1$ |
| 3 = 0 – | 1,000 | $C_1$ |
| 4 = 0 – | 10,000 | $C_1$ |

## SPECIAL OPTIONS:

Flame out alarm .....
1 Alarm .....
Sample line .....
.....

## ANALYZER CONDITIONS:

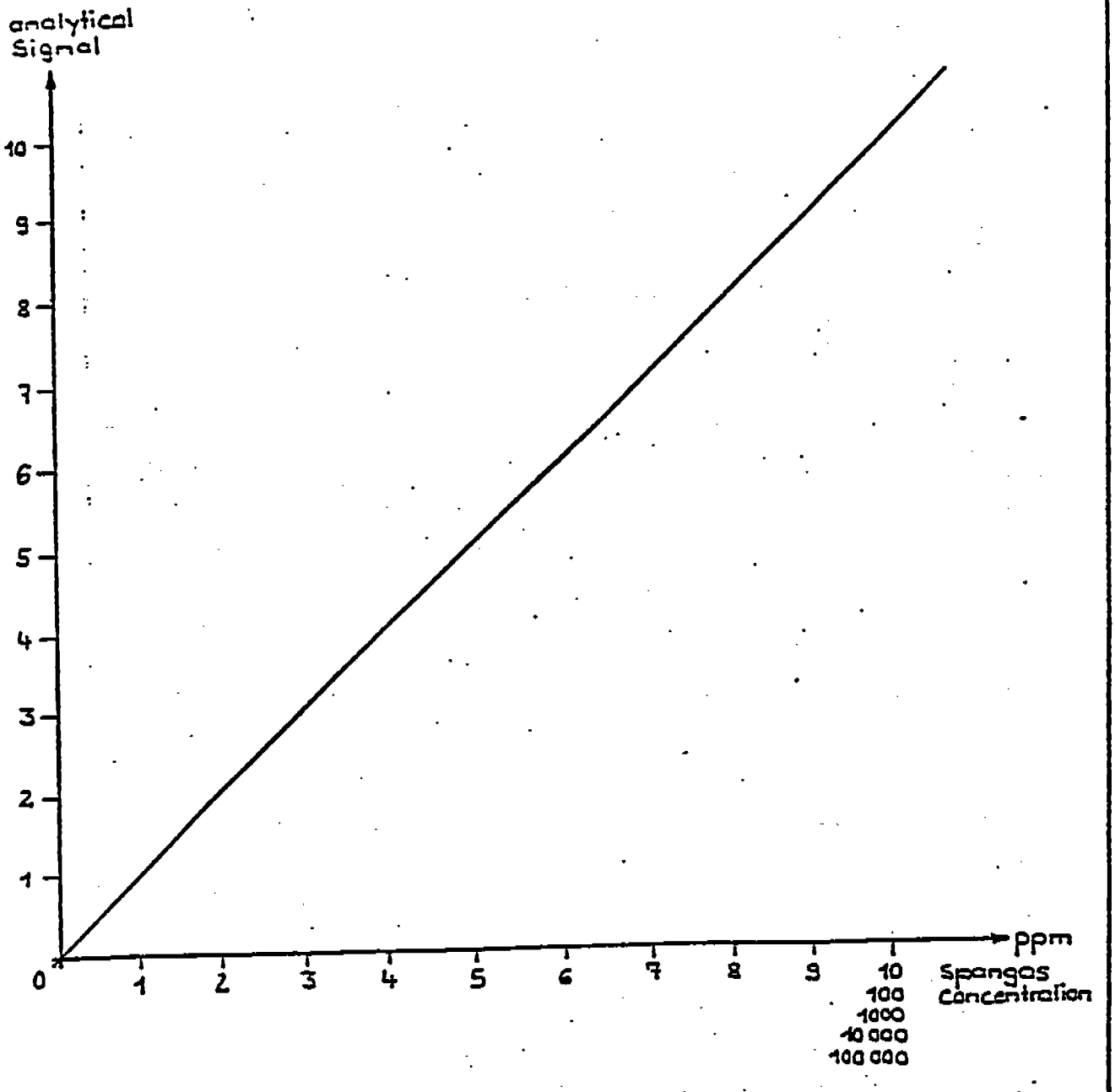
Temperature : 160 °C

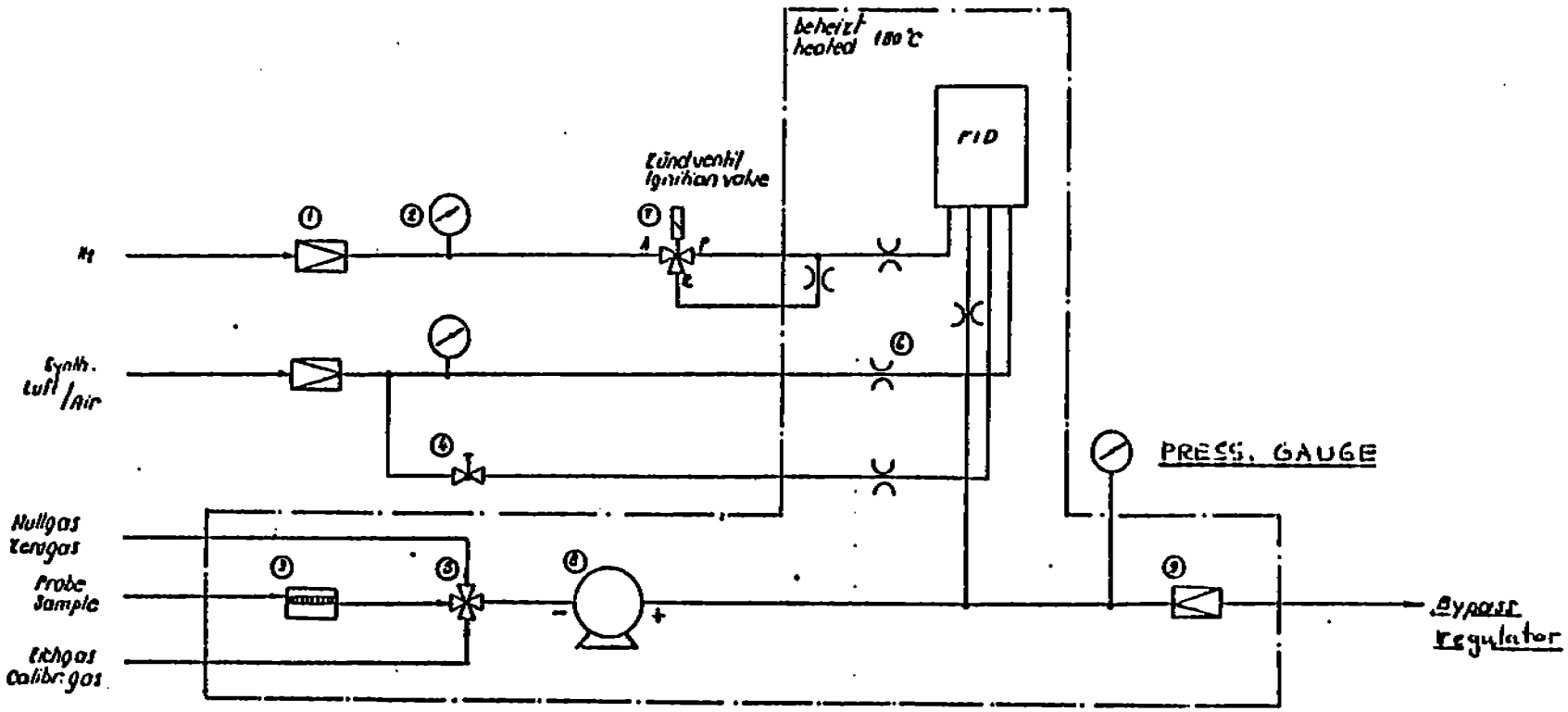
Zero Point : 3,90
Gain : 7,70

Pressure Setting : Sample/Spangas/Zerogas : 200 mbar
Fuel: Hydrogen : 0,35 bar
Combustion Air : 0,80 bar

Span Gases : 300 ppm $C_1$
24.000 ppm $C_1$

## CALIBRATION DIAGRAMM






1 Druckregler
Pressure regulator
2 Manometer
Gauge
3 Filter
4 Nadelventil
Needle valve
5 3 Wege Ventil
3 way valve
6 Kapillare
capillary
7 Magnet Ventil
Solenoid valve
8 Pumpe
pump
9 Rückdruckregler
Back pressure regulator

Zündventil
Ignition valve

P-A angezogen
energised
R-A stromlos
at rest

Handumschaltung
Manuel switching

Ratfisch INSTRUMENTE

FLAMMEN IONISATIONS DETEKTOR
Flame Ionisation Detector

Fließplan
Flowdiagram

RS 55

13.04.88

## SPECIFICATIONS FOR ACS MODEL 3300 CO NDIR

| | |
|---|---|
| Measuring principle | NDIR single beam method |
| Operating ranges | 0 - 500 ppm<br>0 - 1000 ppm |
| Reproducibility | ±0.5% of full scale |
| Stability | Zero drift; ±% of full scale/24H<br>Span drift; ±% of full scale/24H |
| Noise | 0.5% of full scale |
| Ambient temperature | -5 to 45$^0$C |
| Ambient humidity | Less than 90% RH |
| Response time<br>(90% of final reading) | Electrical system; 2 sec, 3 sec,<br>5 sec (selectable with connector)<br>Response of actual gas; Within 15<br>sec (depending on cell length) |
| Indicator | 100 linear division |
| Output signal | OUTPUT 1; DC 0 - 1 V<br>OUTPUT 2; DC 0 - 10 mV or DC 0 - 100 mV<br>or DC 0 - 1 V or DC 4 - 20 mA<br>(Allowable load resistance<br>500Ω max.) |
| Linearity | Better than ±2% of full scale (when<br>linearizer is used) |
| Power supply | AC 115 V ± 10%, 60 Hz |

| | |
|---|---|
| Power consumption | Approx. 30 VA |
| Materials of gas-contacting parts | Measuring cell; SUS304<br>Window; CaF2<br>Piping; Polyethylene |
| Sample gas flow rate | 1ℓ/min ± 0.5ℓ/min |
| Sample gas temperature | 0 to 55°C |
| Purging gas flow rate | 1ℓ/min (to be flowed as occasion demands) |
| Warmup time | Approx. 2 hours |
| External dimensions | 200 x 250 x 541 (H x W x D) mm |
| Weight | Approx. 11 kg |
| Finish Color | MUNSELL N1.5 |

Remarks: For combinations of measuring ranges for the dualcomponent analyzer, inquiry should be made to the manufacturer.

## SPECIFICATIONS FOR MODEL 10A
## ROCK MOUNTED CHEMILUMINESCENT
## NO-$NO_X$ GAS ANALYZER

| | |
|---|---|
| Sensitivity | Each instrument is equipped with the following ranges:<br>0 - 2.5 ppm<br>0 - 10 ppm<br>0 - 25 ppm<br>0 - 100 ppm<br>0 - 250 ppm<br>0 - 1000 ppm<br>0 - 2500 ppm<br>0 - 10000 ppm |
| Accuracy | Derived from the NO or $NO_2$ calibration gas, ±1% of fullscale |
| Response time (0-90%) Typical | 1.5 seconds - NO Mode<br>1.7 seconds - $NO_X$ Mode |
| Output | 0 - 10mV and 0 - 10V |
| Zero Drift | Negligible after 1/2-hour warm-up |
| Linearity | ±1% of full scale |
| Input Power Requirements | 115v/50Hz; 115v/60Hz |

INTERPOLL LABORATORIES
4500 BALL ROAD N.E.
CIRCLE PINES, MN 55014-1819
(612) 786-6020

Servomex

# 1420
# Oxygen Analyser
# Instruction Manual

**Ref : 01420/001A/0**

**Order as part No. 01420001A**

**was (7982-2842)**

INTERPOLL LABORATORIES
4500 BALL ROAD N.E.
CIRCLE PINES, MN 55014-1819
(612) 786-6020

## 1.3 Sampling System

The sampling system of the analyser includes a combination filter/automatic flow control device, designed to keep a constant flow of sample gas through the measuring cell for varying input pressures and to prevent the entrance of particulate matter into the measuring cell. Excess flow is vented to the by-pass.

## 1.4 Specification

### Performance Specification (typical)

| | |
|---|---|
| Repeatability: | Better than +/-0.2% O2 under constant conditions. |
| Drift: | Less than 0.2% O2 per week under constant conditions. (Excluding variation due to barometric pressure changes; reading is proportional to barometric pressure.) |

### Outputs

| | |
|---|---|
| Display: | 3 1/2 digit LCD reading 0.0 to 100.0% oxygen with overrange capability. |
| Output: | 0 to 1V (non-isolated) for 0 to 100% oxygen available on 'D' type connector located on the back panel of the instrument. Output impedance is less than 10 ohms. |
| Option: | 4 - 20mA isolated, Max impedance 500 ohms. |
| Flow alarm output: | Change over relay contact rated at 3A/115V ac, 1A/240V ac or 1A/28V dc. 4 sets of single pole changeover contacts. Alarm becomes active when sample gas flow through the analyser fails. |

### Sample requirements

| | |
|---|---|
| Condition: | Clean, dry gas with dew point 5 deg C below ambient temperature. |
| Inlet pressure: | 0.5 to 3psig (3.5 to 21kPa). Inlet pressure changes within this range will change the reading by less than 0.1% O2. May be operated up to 10psig (70kPa) with degraded stability. |
| Flowrate: | 1.5 to 6 litres/minute approximately depending on sample pressure. |
| Filtering: | 0.6 micron replaceable filter integral to the automatic flow control device. |

| | |
|---|---|
| Response time: | Less than 15 secs. to 90% at an inlet pressure of 3psig (21kPa). |
| Inlet/vent connections: | 1/4 inch OD tube (stainless steel) suitable for 6mm ID flexible tubing or 1/4 inch OD compression fittings. |
| Materials exposed to the sample: | Stainless steel, Pyrex glass, brass, platinum, epoxy resin, Viton, polypropylene and glass fibre filter. |

## Physical Characteristics

| | |
|---|---|
| Case: | Steel and aluminium finished in epoxy powder paint. |
| Case classification: | IP 20 (IEC 529) when fitted into the Servomex 1400 series 19 inch case. |
| Dimensions: | See Figure 2.1. |
| Weight: | 10Kg (22lb) approximately. |

## Electrical

| | |
|---|---|
| AC Supply: | 110 to 120V AC or 220 to 240V AC, +/-10%, 48 to 62Hz. Voltage selected by a voltage selector integral to the IEC supply plug. |
| Power required: | 15VA maximum. |

## Environmental Limits

| | |
|---|---|
| Operating ambient temperature: | 0 to +40 deg C (32 to 104 deg F) |
| Storage temp. range: | -20 to +70 deg C (-4 to 158 deg F) |
| Relative humidity: | 0-85%, non-condensing. |

## SPECIFICATIONS FOR ACS MODEL 3300 $CO_2$ NDIR

| | |
|---|---|
| Measuring principle | NDIR single beam method |
| Measurable gas components and measuring range | 0 - 20% |
| Reproducibility | ±0.5% of full scale |
| Stability | Zero drift; ±% of full scale/24H<br>Span drift; ±% of full scale/24H |
| Noise | 0.5% of full scale |
| Ambient temperature | -5 to 45$^0$C |
| Ambient humidity | Less than 90% RH |
| Response time (90% of final reading) | Electrical system; 2 sec, 3 sec, 5 sec (selectable with connector)<br>Response of actual gas; Within 15 sec (depending on cell length) |
| Indicator | 100 linear division |
| Output signal | OUTPUT 1; DC 0 - 1 V<br>OUTPUT 2; DC 0 - 10 mV or DC 0 - 100 mV or DC 0 - 1 V or DC 4 - 20 mA (Allowable load resistance 500Ω max.) |
| Linearity | Better than ±2% of full scale (when linearizer is used) |
| Power supply | AC 115 V ± 10%, 60 Hz |

| | |
|---|---|
| Power consumption | Approx. 30 VA |
| Materials of gas-contacting parts | Measuring cell; SUS304<br>Window; CaF2<br>Piping; Polyethylene |
| Sample gas flow rate | 1ℓ/min ± 0.5ℓ/min |
| Sample gas temperature | 0 to 55°C |
| Purging gas flow rate | 1ℓ/min (to be flowed as occasion demands) |
| Warmup time | Approx. 2 hours |
| External dimensions | 200 x 250 x 541 (H x W x D) mm |
| Weight | Approx. 11 kg |
| Finish Color | MUNSELL N1.5 |

Remarks: For combinations of measuring ranges for the dualcomponent analyzer, inquiry should be made to the manufacturer.

# APPENDIX H

## MEASUREMENT SYSTEMS PERFORMANCE SPECIFICATIONS

INTERPOLL LABORATORIES, INC
(612) 786-6020

# THC System Bias Check

Job CP/HAYWARD Source No 1 Press RTO
Test 1 Run 1-6 Date 6-7-96-10-96 Site STACK
Operator BOB

| Run | Time (HRS) | *** | Cylinder Value (PPM) | Analyzer Resp (PPM) | | Diff. CE-SB (PPM) | Span Val. (PPM) | % of Span |
|---|---|---|---|---|---|---|---|---|
| | | | | Cal. Err. | Sys. Bias | | | |
| 1 | 0721 | Zero Gas | 0 | 0 | 1 | 1 | 100 | 1 |
| | | Upscale | 30 | 30 | 31 | 1 | 100 | 1 |
| 2 | 1040 | Zero Gas | 0 | 0 | 1 | 1 | 100 | 1 |
| | | Upscale | 30 | 30 | 31 | 1 | 100 | 1 |
| 3 | 1209 | Zero Gas | 0 | 0 | 4 | 4 | 100 | 4 |
| | | Upscale | 30 | 30 | 31 | 1 | 100 | 1 |
| 4 | 1323 | Zero Gas | 0 | 0 | 0 | 0 | 100 | 0 |
| | | Upscale | 30 | 30 | 29 | 1 | 100 | 1 |
| 5 | | Zero Gas | 0 | | | | | |
| | | Upscale | | | | | | |
| 6 | 0730 | Zero Gas | 0 | 0 | 2 | 2 | 100 | 2 |
| | | Upscale | 91 | 91 | 90 | 1 | 100 | 1 |
| 7 | 1047 | Zero Gas | 0 | 0 | 3 | 3 | 100 | 3 |
| | | Upscale | 91 | 91 | 92 | 1 | 100 | 1 |
| 8 | 1207 | Zero Gas | 0 | 0 | 4 | 4 | 100 | 4 |
| | | Upscale | 91 | 91 | 92 | 1 | 100 | 1 |
| 9 | 1331 | Zero Gas | 0 | 0 | 3 | 3 | 100 | 3 |
| | | Upscale | 91 | 91 | 91 | | 100 | |
| 10 | | Zero Gas | 0 | | | | | |
| | | Upscale | | | | | | |
| 11 | | Zero Gas | 0 | | | | | |
| | | Upscale | | | | | | |
| 12 | | Zero Gas | 0 | | | | | |
| | | Upscale | | | | | | |

Must be within 5% of the span for the zero or upscale cal. gas.

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INTERPOLL LABORATORIES, INC
(612) 786-6020

# NOx System Bias Check

Job LP / HAYWARD  Source Press No 1 RTO
Test 1 Run 1 - Date 6-7-94  Site STACK
Operator BOB

| Run | Time (HRS) | *** | Cylinder Value (PPM) | Analyzer Resp (PPM) | | Diff. CE-SB (PPM) | Span Val. (PPM) | % of Span |
|---|---|---|---|---|---|---|---|---|
| | | | | Cal. Err. | Sys. Bias | | | |
| 1 | 0756 | Zero Gas | 0 | C | 0 | C | 500 | C |
| | | Upscale | 239 | 239 | 237 | 2 | 500 | .40 |
| 2 | 0919 | Zero Gas | 0 | 0 | 1 | 1 | 500 | .20 |
| | | Upscale | 239 | 239 | 241 | 2 | 500 | .40 |
| 3 | 1101 | Zero Gas | 0 | C | 0 | 0 | 500 | 0 |
| | | Upscale | 239 | 238 | 235 | 0 | 500 | 0 |
| 4 | 1229 | Zero Gas | 0 | C | 1 | 1 | 500 | .20 |
| | | Upscale | 239 | 235 | 240 | 1 | 500 | .20 |
| 5 | 0735 | Zero Gas | 0 | 0 | 1 | 1 | 100 | 1.0 |
| | | Upscale | 78 | 76 | 76 | 0 | 100 | 0 |
| 6 | 1041 | Zero Gas | 0 | 0 | 0 | 0 | 100 | 0 |
| | | Upscale | 78 | 76 | 76 | 0 | 100 | 0 |
| 7 | 1217 | Zero Gas | 0 | 0 | 1 | 1 | 100 | 1.0 |
| | | Upscale | 78 | 76 | 76 | 0 | 100 | 0 |
| 8 | 1325 | Zero Gas | 0 | C | -3 | -3 | 100 | -3 |
| | | Upscale | 78 | 76 | 79 | 3 | 100 | 3 |
| 9 | | Zero Gas | 0 | | | | | |
| | | Upscale | | | | | | |
| 10 | | Zero Gas | 0 | | | | | |
| | | Upscale | | | | | | |
| 11 | | Zero Gas | 0 | | | | | |
| | | Upscale | | | | | | |
| 12 | | Zero Gas | 0 | | | | | |
| | | Upscale | | | | | | |

Must be within 5% of the span for the zero or upscale cal. gas.

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INTERPOLL LABORATORIES, INC
(612) 786-6020

# O2 System Bias Check

Job CP/ HAYWARD  Source Dass No 1 RTO
Test 1 Run 1 - Date 6-7-96  Site STACK
Operator BCB

| Run | Time (HRS) | *** | Cylinder Value (PPM) | Analyzer Resp (PPM) | | Diff. CE-SB (PPM) | Span Val. (PPM) | % of Span |
|---|---|---|---|---|---|---|---|---|
| | | | | Cal. Err. | Sys. Bias | | | |
| 1 | 0756 | Zero Gas | 0 | 0 | .1 | .1 | 25 | .4C |
| | | Upscale | 13.5 | 13.4 | 13.5 | .1 | 25 | .40 |
| 2 | 0919 | Zero Gas | 0 | 0 | 0 | 0 | 25 | 0 |
| | | Upscale | 13.5 | 13.4 | 13.5 | .1 | 25 | .40 |
| 3 | 1101 | Zero Gas | 0 | 0 | 0 | 0 | 25 | 0 |
| | | Upscale | 13.5 | 13.4 | 13.4 | 0 | 25 | 0 |
| 4 | 1229 | Zero Gas | 0 | 0 | 0 | 0 | 25 | 0 |
| | | Upscale | 13.5 | 13.4 | 13.5 | .1 | 25 | .4C |
| 5 | 0735 | Zero Gas | 0 | 0 | 0 | 0 | 25 | 0 |
| | | Upscale | 13.5 | 13.4 | 13.4 | 0 | 25 | 0 |
| 6 | 1041 | Zero Gas | 0 | 0 | 0 | 0 | 25 | 0 |
| | | Upscale | 13.5 | 13.4 | 13.5 | -1 | 25 | .40 |
| 7 | 1217 | Zero Gas | 0 | 0 | .1 | -1 | 25 | .40 |
| | | Upscale | 13.5 | 13.4 | 13.5 | .1 | 25 | .40 |
| 8 | | Zero Gas | 0 | 0 | 0 | 0 | 25 | 0 |
| | | Upscale | 12.5 | 13 4 | 13.6 | -2 | 25 | .80 |
| 9 | | Zero Gas | 0 | | | | | |
| | | Upscale | | | | | | |
| 10 | | Zero Gas | 0 | | | | | |
| | | Upscale | | | | | | |
| 11 | | Zero Gas | 0 | | | | | |
| | | Upscale | | | | | | |
| 12 | | Zero Gas | 0 | | | | | |
| | | Upscale | | | | | | |

Must be within 5% of the span for the zero or upscale cal. gas.

Brian D Allen
11:30 PM

033194-G:\STACK\WP\FORMS\S-420-11

INTERPOLL LABORATORIES, INC
(612) 786-6020

# $CO_2$ System Bias Check

Job LP / HAYWARD Source Press No 1 RTO
Test 1 Run 1 Date 6-7-94 Site STACK
Operator BOB

| Run | Time (HRS) | *** | Cylinder Value (PPM) | Analyzer Resp (PPM) | | Diff. CE-SB (PPM) | Span Val. (PPM) | % of Span |
|---|---|---|---|---|---|---|---|---|
| | | | | Cal. Err. | Sys. Bias | | | |
| 1 | 0756 | Zero Gas | 0 | 0 | 0 | 0 | 20 | 0 |
| | | Upscale | 11.1 | 11.0 | 11.0 | 0 | 20 | 0 |
| 2 | 0919 | Zero Gas | 0 | 0 | .1 | .1 | 20 | .50 |
| | | Upscale | 11.1 | 11.0 | 11.0 | 0 | 20 | 0 |
| 3 | 1101 | Zero Gas | 0 | 0 | 0 | 0 | 20 | 0 |
| | | Upscale | 11.1 | 11.0 | 10.9 | .1 | 20 | .50 |
| 4 | 1229 | Zero Gas | 0 | 0 | 0 | 0 | 20 | 0 |
| | | Upscale | 11.1 | 11.0 | 10.9 | .1 | 20 | .50 |
| 5 | 0735 | Zero Gas | 0 | 0 | .1 | .1 | 20 | .50 |
| | | Upscale | 11.1 | 11.0 | 11.0 | 0 | 20 | 0 |
| 6 | 1041 | Zero Gas | 0 | 0 | .1 | .1 | 20 | .50 |
| | | Upscale | 11.1 | 11.0 | 11.1 | .1 | 20 | .50 |
| 7 | 1217 | Zero Gas | 0 | 0 | .1 | .1 | 20 | .50 |
| | | Upscale | 11.1 | 11.0 | 11.1 | .1 | 20 | .50 |
| 8 | | Zero Gas | 0 | 0 | 0 | 0 | 20 | 0 |
| | | Upscale | 11.1 | 11.6 | 11.1 | .1 | 20 | .50 |
| 9 | | Zero Gas | 0 | | | | | |
| | | Upscale | | | | | | |
| 10 | | Zero Gas | 0 | | | | | |
| | | Upscale | | | | | | |
| 11 | | Zero Gas | 0 | | | | | |
| | | Upscale | | | | | | |
| 12 | | Zero Gas | 0 | | | | | |
| | | Upscale | | | | | | |

Must be within 5% of the span for the zero or upscale cal. gas.

Barrie Dahl
Observer

INTERPOLL LABORATORIES, INC
(612) 786-6020

# CO System Bias Check

Job CP/HAYWARD Source PRESS No 1 RTO
Test 1 Run 1 Date 6-7-94 Site STACK
Operator BOB

| Run | Time (HRS) | *** | Cylinder Value (PPM) | Analyzer Resp (PPM) | | Diff. CE-SB (PPM) | Span Val. (PPM) | % of Span |
|---|---|---|---|---|---|---|---|---|
| | | | | Cal. Err. | Sys. Bias | | | |
| 1 | 0919 | Zero Gas | 0 | 0 | 0 | 0 | 500 | 0 |
| | | Upscale | 159 | 159 | 155 | 4 | 500 | .80 |
| 2 | 1001 | Zero Gas | 0 | 0 | 2 | 2 | 500 | .40 |
| | | Upscale | 159 | 155 | 154 | 5 | 500 | 1.00 |
| 3 | 1229 | Zero Gas | 0 | 0 | 2 | 2 | 500 | .40 |
| | | Upscale | 159 | 155 | 155 | 4 | 500 | .80 |
| 4 | | Zero Gas | 0 | | | | | |
| | | Upscale | | | | | | |
| 5 | 0735 | Zero Gas | 0 | 0 | 1 | 1 | 500 | .20 |
| | | Upscale | 159 | 159 | 158 | 1 | 500 | .20 |
| 6 | 1041 | Zero Gas | 0 | 0 | 3 | 3 | 500 | .60 |
| | | Upscale | 159 | 159 | 160 | 1 | 500 | .20 |
| 7 | 1217 | Zero Gas | 0 | 0 | 3 | 3 | 500 | .60 |
| | | Upscale | 159 | 159 | 155 | 4 | 500 | .80 |
| 8 | | Zero Gas | 0 | 0 | 4 | 4 | 500 | .80 |
| | | Upscale | 159 | 159 | 154 | 5 | 500 | 1.00 |
| 9 | | Zero Gas | 0 | | | | | |
| | | Upscale | | | | | | |
| 10 | | Zero Gas | 0 | | | | | |
| | | Upscale | | | | | | |
| 11 | | Zero Gas | 0 | | | | | |
| | | Upscale | | | | | | |
| 12 | | Zero Gas | 0 | | | | | |
| | | Upscale | | | | | | |

Must be within 5% of the span for the zero or upscale cal. gas.

Bar Data USED

033194-G:\STACK\WP\FORMS\S-120-11

INTERPOLL LABORATORIES, INC
(612) 786-6020

# EPA Method 25 A
# Calibration Error Check & Drift Determination

Job CP / HAYWARD - Line 1 RTO Inlet
Test _____ Run 0 Date 6-6-94
Operator BB

**THC Calibration (Low Range):** Time (HRS)_____

| *** | Cylinder Value (PPM) | Analyzer Response (PPM) | Difference (PPM ) | Span Value (PPM) | Percent Of Span |
|---|---|---|---|---|---|
| Zero Gas | 0 | 0 | 0 | 100 | 5 |
| Low Level | 303 91 | 91 | | 100 | |
| Mid Level | 303 910 | 910 | | 1000 | |
| High Level | 3038 9100 | | | 10000 | |

**THC Calibration (High Range):** Time (HRS)_____

| *** | Cylinder Value (PPM) | Analyzer Response (PPM) | Difference (PPM) | Span Value (PPM) | Percent Of Span |
|---|---|---|---|---|---|
| Zero Gas | 0 | | | | |
| Span | | | | | |

**$O_2$ Calibration:** Time (HRS)_____

| *** | Cylinder Value (%) | Analyzer Response (%) | Difference (%) | Span Value (%) | Percent Of Span |
|---|---|---|---|---|---|
| Zero Gas | 0 | | | | |
| Mid Level | | | | | |
| High Level | | | | | |

**$CO_2$ Calibration:** Time: (HRS)_____

| *** | Cylinder Value (%) | Analyzer Response (%) | Difference (%) | Span Value (%) | Percent Of Span |
|---|---|---|---|---|---|
| Zero Gas | 0 | | | | |
| Mid Level | | | | | |
| High Level | | | | | |

Must be within 2% of the span for each calibration gas.

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INTERPOLL LABORATORIES, INC
(612) 786-6020

# _____ System Bias Check

Job LP/HAYWARD Source _____

Test _____ Run _____ Date _____ Site _____

Operator _____

| Run | Time (HRS) | *** | Cylinder Value (PPM) | Analyzer Resp (PPM) | | Diff. CE-SB (PPM) | Span Val. (PPM) | % of Span |
|---|---|---|---|---|---|---|---|---|
| | | | | Cal. Err. | Sys. Bias | | | |
| 1 | 0730 | Zero Gas | 0 | 0 | 0 | 0 | 100 | 0 |
| | | Upscale | 30.3 | 30 | 30 | 0 | 100 | 0 |
| 2 | 0916 | Zero Gas | 0 | 0 | 0 | 0 | 100 | 0 |
| | | Upscale | 30.3 | 30 | 30 | 0 | 100 | 0 |
| 3 | 1058 | Zero Gas | 0 | 0 | 2 | 2 | 100 | |
| | | Upscale | 30.3 | 30 | 31 | 1 | 100 | |
| 4 | 1227 | Zero Gas | 0 | 0 | 2 | 2 | 100 | |
| | | Upscale | 30.3 | 30 | 32 | 2 | 100 | |
| 5 | | Zero Gas | 0 | | | | | |
| | | Upscale | | | | | | |
| 6 | | Zero Gas | 0 | | | | | |
| | | Upscale | | | | | | |
| 7 | | Zero Gas | 0 | | | | | |
| | | Upscale | | | | | | |
| 8 | | Zero Gas | 0 | | | | | |
| | | Upscale | | | | | | |
| 9 | | Zero Gas | 0 | | | | | |
| | | Upscale | | | | | | |
| 10 | | Zero Gas | 0 | | | | | |
| | | Upscale | | | | | | |
| 11 | | Zero Gas | 0 | | | | | |
| | | Upscale | | | | | | |
| 12 | | Zero Gas | 0 | | | | | |
| | | Upscale | | | | | | |

Must be within 5% of the span for the zero or upscale cal. gas.

INTERPOLL LABORATORIES, INC
(612) 786-6020

# EPA Method 25 A
# Calibration Error Check & Drift Determination

Job LD - Hayward - Unit 1 RTO Stack
Test _____ Run _____ Date _____
Operator _____

**THC Calibration (Low Range):** Time (HRS)_____

| *** | Cylinder Value (PPM) | Analyzer Response (PPM) | Difference (PPM ) | Span Value (PPM) | Percent Of Span |
|---|---|---|---|---|---|
| Zero Gas | 0 | 0 | 0 | 100 | 0 |
| Low Level | 303 | 30 | 3 | 100 | |
| Mid Level | 303 | 300 | | 1000 | |
| High Level | 3038 | 3050 | | 10000 | |

**THC Calibration (High Range):** Time (HRS)_____

| *** | Cylinder Value (PPM) | Analyzer Response (PPM) | Difference (PPM) | Span Value (PPM) | Percent Of Span |
|---|---|---|---|---|---|
| Zero Gas | 0 | | | | |
| Span | | | | | |

**$O_2$ Calibration:** Time (HRS)_____

| *** | Cylinder Value (%) | Analyzer Response (%) | Difference (%) | Span Value (%) | Percent Of Span |
|---|---|---|---|---|---|
| Zero Gas | 0 | | | | |
| Mid Level | | | | | |
| High Level | | | | | |

**$CO_2$ Calibration:** Time: (HRS)_____

| *** | Cylinder Value (%) | Analyzer Response (%) | Difference (%) | Span Value (%) | Percent Of Span |
|---|---|---|---|---|---|
| Zero Gas | 0 | | | | |
| Mid Level | | | | | |
| High Level | | | | | |

Must be within 2% of the span for each calibration gas.

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INTERPOLL LABORATORIES, INC
(612) 786-6020

# TTC System Bias Check

Job LP/HAYWARD Source _____

Test _____ Run _____ Date _____ Site _____

Operator _____

| Run | Time (HRS) | *** | Cylinder Value (PPM) | Analyzer Resp (PPM) | | Diff. CE-SB (PPM) | Span Val. (PPM) | % of Span |
|---|---|---|---|---|---|---|---|---|
| | | | | Cal. Err. | Sys. Bias | | | |
| 1 | 0735 | Zero Gas | 0 | 0 | 0 | 0 | 100 | 0 |
| | | Upscale | 90.0 | 90 | 91 | 0 | 100 | 0 |
| 2 | 0827 | Zero Gas | 0 | 0 | 0 | 0 | 100 | 0 |
| | | Upscale | 90.0 | 91.0 | 91 | 0 | 100 | 0 |
| 3 | 1055 | Zero Gas | 0 | 0 | 4 | 4 | 100 | 4.0 |
| | | Upscale | 91.0 | 91 | 94 | 3 | 100 | |
| 4 | 1237 | Zero Gas | 0 | 0 | 3 | | | |
| | | Upscale | 91.0 | 91 | 90 | | | |
| 5 | | Zero Gas | 0 | | | | | |
| | | Upscale | | | | | | |
| 6 | | Zero Gas | 0 | | | | | |
| | | Upscale | | | | | | |
| 7 | | Zero Gas | 0 | | | | | |
| | | Upscale | | | | | | |
| 8 | | Zero Gas | 0 | | | | | |
| | | Upscale | | | | | | |
| 9 | | Zero Gas | 0 | | | | | |
| | | Upscale | | | | | | |
| 10 | | Zero Gas | 0 | | | | | |
| | | Upscale | | | | | | |
| 11 | | Zero Gas | 0 | | | | | |
| | | Upscale | | | | | | |
| 12 | | Zero Gas | 0 | | | | | |
| | | Upscale | | | | | | |

Must be within 5% of the span for the zero or upscale cal. gas.

033194-C:\STACK\WP\FORMS\S-420-11

INTERPOLL LABORATORIES

Calibration Error Check

Job Wheelabrator LP/HAYWARD

Test ____ Run ____ Date ____

Operator ____

CO

~~SO~~ $_2$ Calibration: Time(HRS) ____

| *** | Cylinder Value (ppm) | Analyzer Response (ppm) | Difference (ppm) | Span Value (ppm) | Percent of Span |
|---|---|---|---|---|---|
| Zero gas | 0 | 5 | 5 | 500 | |
| Mid level | 159 | 159 | 0 | 500 | 0 |
| High level | 249 | 252 | 3 | 500 | |

CO

~~NO~~ $_x$ Calibration: Time(HRS) ____

| *** | Cylinder Value (ppm) | Analyzer Response (ppm) | Difference (ppm) | Span Value (ppm) | Percent of Span |
|---|---|---|---|---|---|
| Zero gas | 0 | 2 | 2 | 500 | |
| Mid level | 159 | 155 | 4 | 500 | |
| High level | 249 | 250 | 0 | 500 | |

$O_2$ Calibration: Time(HRS) ____

| *** | Cylinder Value (ppm) | Analyzer Response (ppm) | Difference (ppm) | Span Value (ppm) | Percent of Span |
|---|---|---|---|---|---|
| Zero gas | 0 | 1 | .1 | 25 | .46 |
| Mid level | 13.5 | 13.5 | 0 | 25 | 0 |
| High level | 21.0 | 21.1 | .1 | 25 | .46 |

$CO_2$ Calibration: Time(HRS) ____

| *** | Cylinder Value (ppm) | Analyzer Response (ppm) | Difference (ppm) | Span Value (ppm) | Percent of Span |
|---|---|---|---|---|---|
| Zero gas | 0 | .1 | .1 | 20 | .50 |
| Mid level | 11.1 | 11.0 | .1 | 20 | .50 |
| High level | 17.0 | 17.1 | .1 | 20 | .50 |

Must be within 2% of the span for each calibration gas S-420-10

INTERPOLL LABORATORIES, INC
(612) 786-6020

# EPA Method 25 A
## Calibration Error Check & Drift Determination

Job LP HAYWARD Line 2 Press RTO Stack
Test _____ Run _____ Date 6-8-94
Operator BOB

VOC

**THC Calibration (Low Range):** Time (HRS)_____

| *** | Cylinder Value (PPM) | Analyzer Response (PPM) | Difference (PPM ) | Span Value (PPM) | Percent Of Span |
|---|---|---|---|---|---|
| Zero Gas | 0 | 0 | 0 | 100 | 0 |
| Low Level | 91 | 91 | 0 | 100 | 0 |
| Mid Level | 910 | 910 | 0 | 1000 | 0 |
| High Level | 9100 | 9100 | 0 | 10000 | 0 |

**THC Calibration (High Range):** Time (HRS)_____

| *** | Cylinder Value (PPM) | Analyzer Response (PPM) | Difference (PPM) | Span Value (PPM) | Percent Of Span |
|---|---|---|---|---|---|
| Zero Gas | 0 | | | | |
| Span | | | | | |

**$O_2$ Calibration:** Time (HRS)_____

| *** | Cylinder Value (%) | Analyzer Response (%) | Difference (%) | Span Value (%) | Percent Of Span |
|---|---|---|---|---|---|
| Zero Gas | 0 | | | | |
| Mid Level | | | | | |
| High Level | | | | | |

**$CO_2$ Calibration:** Time: (HRS)_____

| *** | Cylinder Value (%) | Analyzer Response (%) | Difference (%) | Span Value (%) | Percent Of Span |
|---|---|---|---|---|---|
| Zero Gas | 0 | | | | |
| Mid Level | | | | | |
| High Level | | | | | |

Must be within 2% of the span for each calibration gas.

121593-G:\STACK\WP\FORMS\S-420-14

INTERPOLL LABORATORIES, INC
(612) 786-6020

# THC System Bias Check

Job CP/HAYWARD Source LILE 2 PRESS RTO
Test ____ Run ____ Date 6-8-94 / 6-9-94 Site STACK
Operator BOB

| Run | Time (HRS) | *** | Cylinder Value (PPM) | Analyzer Resp (PPM) | | Diff. CE-SB (PPM) | Span Val. (PPM) | % of Span |
|---|---|---|---|---|---|---|---|---|
| | | | | Cal. Err. | Sys. Bias | | | |
| 1 | | Zero Gas | 0 | 0 | 0 | 0 | 100 | 0 |
| | | Upscale | 91 | 90 | 90 | 0 | 100 | 0 |
| 2 | 1903 | Zero Gas | 0 | 0 | 0 | 0 | 100 | 0 |
| | | Upscale | 91 | 91 | 91 | 0 | 100 | 0 |
| 3 | 0723 | Zero Gas | 0 | 0 | 0 | 0 | 100 | 0 |
| | | Upscale | 91 | 91 | 91 | 0 | 100 | 0 |
| 4 | 0826 | Zero Gas | 0 | 0 | 8 | 8 | 100 | 8.0 |
| | | Upscale | 91 | 91 | 87 | 4 | 100 | 4.0 |
| 5 | 0826 | Zero Gas | 0 | 0 | 0 | 0 | 100 | 0 |
| | | Upscale | 91 | 91 | 90 | 1.0 | 100 | 1.0 |
| 6 | 1035 | Zero Gas | 0 | 0 | 2 | 2 | 100 | 2.0 |
| | | Upscale | 91 | 91 | 91 | 0 | 100 | 0 |
| 7 | 1400 | Zero Gas | 0 | 0 | 4 | 4 | 100 | 4.0 |
| | | Upscale | 91 | 91 | 94 | 3 | 100 | 3.0 |
| 8 | 1531 | Zero Gas | 0 | 0 | 4 | 4 | 100 | 4.0 |
| | | Upscale | 91 | 91 | 90 | 1 | 100 | 1.0 |
| 9 | 1936 | Zero Gas | 0 | 0 | 4 | 4 | 100 | 4.0 |
| | | Upscale | 91 | 91 | 94 | 3 | 100 | 3.0 |
| 10 | | Zero Gas | 0 | | | | | |
| | | Upscale | | | | | | |
| 11 | | Zero Gas | 0 | | | | | |
| | | Upscale | | | | | | |
| 12 | | Zero Gas | 0 | | | | | |
| | | Upscale | | | | | | |

6-8-94
6-9-94
Boeing Dulles used

Must be within 5% of the span for the zero or upscale cal. gas.

033194-G:\STACK\WP\FORMS\S-120-11

INTERPOLL LABORATORIES, INC
(612) 786-6020

# EPA Method 25 A
## Calibration Error Check & Drift Determination

Job CP / HAYWARD Lane 2 RTO Inlet
Test _____ Run _____ Date _____
Operator BOB

**THC Calibration (Low Range):** Time (HRS)_____

| *** | Cylinder Value (PPM) | Analyzer Response (PPM) | Difference (PPM ) | Span Value (PPM) | Percent Of Span |
|---|---|---|---|---|---|
| Zero Gas | 0 | 1 | 1 | 100 | 1.0 |
| Low Level | 30.3 | 30 | .3 | 100 | .3 |
| Mid Level | 303 | 300 | 3 | 1000 | .3 |
| High Level | 3038 | 3030 | 8 | 10000 | .8 |

**THC Calibration (High Range):** Time (HRS)_____

| *** | Cylinder Value (PPM) | Analyzer Response (PPM) | Difference (PPM) | Span Value (PPM) | Percent Of Span |
|---|---|---|---|---|---|
| Zero Gas | 0 | | | | |
| Span | | | | | |

**$O_2$ Calibration:** Time (HRS)_____

| *** | Cylinder Value (%) | Analyzer Response (%) | Difference (%) | Span Value (%) | Percent Of Span |
|---|---|---|---|---|---|
| Zero Gas | 0 | | | | |
| Mid Level | | | | | |
| High Level | | | | | |

**$CO_2$ Calibration:** Time: (HRS)_____

| *** | Cylinder Value (%) | Analyzer Response (%) | Difference (%) | Span Value (%) | Percent Of Span |
|---|---|---|---|---|---|
| Zero Gas | 0 | | | | |
| Mid Level | | | | | |
| High Level | | | | | |

Must be within 2% of the span for each calibration gas.

121593-G:\STACK\WP\FORMS\S-420-14

INTERPOLL LABORATORIES, INC
(612) 786-6020

# THC System Bias Check

Job _____ Source _____
Test _____ Run _____ Date _____ Site _____
Operator _____

| Run | Time (HRS) | *** | Cylinder Value (PPM) | Analyzer Resp (PPM) | | Diff. CE-SB (PPM) | Span Val. (PPM) | % of Span |
|---|---|---|---|---|---|---|---|---|
| | | | | Cal. Err. | Sys. Bias | | | |
| 1 | | Zero Gas | 0 | 0 | 1 | 1 | 100 | 1.0 |
| | | Upscale | 30.3 | 30 | 30 | 0 | 100 | 0 |
| 2 | | Zero Gas | 0 | 0 | 0 | 0 | 100 | 0 |
| | | Upscale | 30.3 | 30 | 30 | 0 | 100 | 0 |
| 3 | 6712 | Zero Gas | 0 | 0 | 0 | 0 | 100 | 0 |
| | | Upscale | 30.3 | 30 | 31 | 1 | 100 | 1.0 |
| 4 | 1355 | Zero Gas | 0 | 0 | 1 | 1 | 100 | 1.0 |
| | | Upscale | 30.3 | 30 | 30 | 0 | 100 | 0 |
| 5 | 1534 | Zero Gas | 0 | 0 | 3 | 3 | 100 | 3 |
| | | Upscale | 30.3 | 30 | 30 | 0 | 100 | 0 |
| 6 | 1718 | Zero Gas | 0 | 0 | 2 | 2 | 100 | 2.0 |
| | | Upscale | 30.3 | 30 | | | 100 | |
| 7 | | Zero Gas | 0 | | | | | |
| | | Upscale | | | | | | |
| 8 | | Zero Gas | 0 | | | | | |
| | | Upscale | | | | | | |
| 9 | | Zero Gas | 0 | | | | | |
| | | Upscale | | | | | | |
| 10 | | Zero Gas | 0 | | | | | |
| | | Upscale | | | | | | |
| 11 | | Zero Gas | 0 | | | | | |
| | | Upscale | | | | | | |
| 12 | | Zero Gas | 0 | | | | | |
| | | Upscale | | | | | | |

Must be within 5% of the span for the zero or upscale cal. gas.

6-8-94

6-9-94 Burn Bldg USEPA

INTERPOLL LABORATORIES, INC.
(612) 786-6020

# EPA Method 2 Field Data Sheet

Job LP Hayward
Source Line 2 Press RTO Stack
Test 14 Run Date
Stack Dimen. IN.
Dry Bulb °F Wet bulb °F
Manometer ☐ Reg. ☐ Exp ☐ Elec.
Barometric Pressure IN.HG
Static Pressure IN.WC
Operators
Pitot No. $C_p$
ID, 7E, 3A

Drawing of Test Site

| Cross-section View | Elevation View |
|---|---|
| | |

| Traverse Point No. | Fraction of Diameter | Distance From Stack Wall (IN.) | Distance From End of Port (IN.) | Velocity | Temp. of Gas (°F) |
|---|---|---|---|---|---|
| | | Port Length: IN. | | Time Start: HRS | |
| | | | | | |
| | | | | | |
| | | | |

INTERPOLL LABORATORIES, INC
(612) 786-6020

# NOx System Bias Check

Job CP / HAYWARD  Source Line 2 Process RTO
Test 14 Run 1 Date 6-8-94  Site STACK
Operator BOB

| Run | Time (HRS) | *** | Cylinder Value (PPM) | Analyzer Resp (PPM) | | Diff. CE-SB (PPM) | Span Val. (PPM) | % of Span |
|---|---|---|---|---|---|---|---|---|
| | | | | Cal. Err. | Sys. Bias | | | |
| 1 | 1715 | Zero Gas | 0 | 0 | 1 | 1 | 500 | .20 |
| | | Upscale | 238 | 238 | 231 | 0 | 500 | 0 |
| 2 | 1854 | Zero Gas | 0 | 0 | 0 | 0 | 500 | 0 |
| | | Upscale | 239 | 238 | 237 | 1 | 500 | .20 |
| 3 | 0731 | Zero Gas | 0 | 0 | | | 500 | |
| | | Upscale | 239 | 235 | 235 | 3 | 500 | .60 |
| 4 | 1011 | Zero Gas | 0 | 0 | 0 | 0 | 350 | 0 |
| | | Upscale | 239 | 238 | 238 | 0 | 350 | 0 |
| 5 | 1029 | Zero Gas | 0 | 0 | 0 | 0 | 100 | 0 |
| | | Upscale | 78 | 76 | 78 | 2 | 100 | 2.0 |
| 6 | 1215 | Zero Gas | 0 | 0 | 0 | 0 | 100 | 0 |
| | | Upscale | 78 | 76 | 78 | 2 | 100 | 2.0 |
| 7 | 1357 | Zero Gas | 0 | 0 | 1.0 | 1 | 100 | 1.0 |
| | | Upscale | 78 | 76 | 79 | 3 | 100 | 3.0 |
| 8 | 1537 | Zero Gas | 0 | 0 | 4 | 4 | 100 | 4.0 |
| | | Upscale | 78 | 76 | 74 | 2 | 100 | 2.0 |
| 9 | 1719 | Zero Gas | 0 | 0 | 0 | 0 | 100 | 0 |
| | | Upscale | 78 | 76 | 73 | 3 | 100 | 3.0 |
| 10 | | Zero Gas | 0 | | | | | |
| | | Upscale | | | | | | |
| 11 | | Zero Gas | 0 | | | | | |
| | | Upscale | | | | | | |
| 12 | | Zero Gas | 0 | | | | | |
| | | Upscale | | | | | | |

6-8-94

6-9-94

78 ppm

Must be within 5% of the span for the zero or upscale cal. gas.

033194-G:\STACK\WP\FORMS\S-420-11

INTERPOLL LABORATORIES, INC
(612) 786-6020

# CO System Bias Check

Job LPI HAYWARD Source _____

Test _____ Run _____ Date _____ Site _____

Operator _____

| Run | Time (HRS) | *** | Cylinder Value (PPM) | Analyzer Resp (PPM) | | Diff. CE-SB (PPM) | Span Val. (PPM) | % of Span |
|---|---|---|---|---|---|---|---|---|
| | | | | Cal. Err. | Sys. Bias | | | |
| 1 | 1715 | Zero Gas | 0 | 0 | 0 | 0 | 500 | 0 |
| | | Upscale | 159 | 157 | 157 | 0 | 500 | 0 |
| 2 | 1854 | Zero Gas | 0 | 0 | 0 | 0 | 500 | 0 |
| | | Upscale | 159 | 157 | 157 | 2 | 500 | .40 |
| 3 | 0735 | Zero Gas | 0 | 0 | 5 | 5 | 500 | 1.00 |
| | | Upscale | 159 | 157 | 158 | 1 | 500 | .20 |
| 4 | 1011 | Zero Gas | 0 | 0 | 1 | 1 | 500 | .20 |
| | | Upscale | 159 | 157 | 155 | 2 | 500 | .40 |
| 5 | 1215 | Zero Gas | 0 | 0 | 1 | 1 | 500 | .20 |
| | | Upscale | 159 | 157 | 154 | 3 | 500 | .60 |
| 6 | 1351 | Zero Gas | 0 | 0 | 3 | 3 | 500 | .60 |
| | | Upscale | 159 | 157 | 155 | 2 | 500 | .40 |
| 7 | 1537 | Zero Gas | 0 | 0 | 2 | 2 | 500 | .40 |
| | | Upscale | 159 | 157 | 154 | 3 | 500 | .60 |
| 8 | 1719 | Zero Gas | 0 | 0 | 2 | 2 | 500 | .40 |
| | | Upscale | 159 | 157 | 153 | 4 | 500 | .80 |
| 9 | | Zero Gas | 0 | | | | | |
| | | Upscale | | | | | | |
| 10 | | Zero Gas | 0 | | | | | |
| | | Upscale | | | | | | |
| 11 | | Zero Gas | 0 | | | | | |
| | | Upscale | | | | | | |
| 12 | | Zero Gas | 0 | | | | | |
| | | Upscale | | | | | | |

Must be within 5% of the span for the zero or upscale cal. gas.

INTERPOLL LABORATORIES, INC
(612) 786-6020

## _____ System Bias Check

Job LPI HAYWARD Source _____

Test _____ Run _____ Date _____ Site _____

Operator _____

| Run | Time (HRS) | *** | Cylinder Value (PPM) | Analyzer Resp (PPM) | | Diff. CE-SB (PPM) | Span Val. (PPM) | % of Span |
|---|---|---|---|---|---|---|---|---|
| | | | | Cal. Err. | Sys. Bias | | | |
| 1 | 1215 | Zero Gas | 0 | 0 | 0 | 0 | 25 | 0 |
| | | Upscale | 13.5 | 13.4 | 13.5 | .1 | 25 | .40 |
| 2 | 1854 | Zero Gas | 0 | 0 | 0 | 0 | 25 | 0 |
| | | Upscale | 13.5 | 13.4 | 13.3 | -.1 | 25 | .40 |
| 3 | 0735 | Zero Gas | 0 | 0 | 0 | 0 | 25 | 0 |
| | | Upscale | 13.5 | 13.4 | 13.5 | .1 | 25 | .40 |
| 4 | 1014 | Zero Gas | 0 | 0 | 0 | 0 | 25 | 0 |
| | | Upscale | 13.5 | 13.4 | 13.4 | 0 | 25 | 0 |
| 5 | 1215 | Zero Gas | 0 | 0 | 0 | 0 | 25 | 0 |
| | | Upscale | 13.5 | 13.4 | 13.4 | 0 | 25 | 0 |
| 6 | 1357 | Zero Gas | 0 | 0 | 0 | 0 | 25 | 0 |
| | | Upscale | 13.5 | 13.4 | 13.5 | .1 | 25 | .40 |
| 7 | 1537 | Zero Gas | 0 | 0 | 0 | 0 | 25 | 0 |
| | | Upscale | 13.5 | 13.4 | 13.6 | .2 | 25 | .80 |
| 8 | 1719 | Zero Gas | 0 | 0 | .1 | -.1 | 25 | .40 |
| | | Upscale | 13.5 | 13.4 | 13.5 | .1 | 25 | .40 |
| 9 | | Zero Gas | 0 | | | | | |
| | | Upscale | | | | | | |
| 10 | | Zero Gas | 0 | | | | | |
| | | Upscale | | | | | | |
| 11 | | Zero Gas | 0 | | | | | |
| | | Upscale | | | | | | |
| 12 | | Zero Gas | 0 | | | | | |
| | | Upscale | | | | | | |

Must be within 5% of the span for the zero or upscale cal. gas.

033194-G:\STACK\WP\FORMS\S-420-11

INTERPOLL LABORATORIES, INC
(612) 786-6020

# $CO_2$ System Bias Check

Job LP/HAWKINS Source

Test Run Date Site

Operator

| Run | Time (HRS) | *** | Cylinder Value (PPM) | Analyzer Resp (PPM) | | Diff. CE-SB (PPM) | Span Val. (PPM) | % of Span |
|---|---|---|---|---|---|---|---|---|
| | | | | Cal. Err. | Sys. Bias | | | |
| 1 | 1205 | Zero Gas | 0 | 0 | 0 | 0 | 20 | 0 |
| | | Upscale | 11.1 | 11.0 | 11.1 | .1 | 20 | .50 |
| 2 | 1854 | Zero Gas | 0 | 0 | 0 | 0 | 20 | 0 |
| | | Upscale | 11.1 | 11.0 | 11.1 | .1 | 20 | .50 |
| 3 | 0735 | Zero Gas | 0 | 0 | .1 | .1 | 20 | .50 |
| | | Upscale | 11.1 | 11.0 | 11.0 | 0 | 20 | 0 |
| 4 | 1011 | Zero Gas | 0 | 0 | .2 | .2 | 20 | 1.0 |
| | | Upscale | 11.1 | 11.0 | 11.0 | 0 | 20 | 0 |
| 5 | 1215 | Zero Gas | 0 | 0 | .1 | .1 | 20 | .50 |
| | | Upscale | 11.1 | 11.0 | 11.0 | 0 | 20 | 0 |
| 6 | 1351 | Zero Gas | 0 | 0 | 0 | 0 | 20 | 0 |
| | | Upscale | 11.1 | 11.0 | 10.9 | .1 | 20 | .50 |
| 7 | 1537 | Zero Gas | 0 | 0 | .1 | .1 | 20 | .50 |
| | | Upscale | 11.1 | 11.0 | 11.0 | 0 | 20 | 0 |
| 8 | 1719 | Zero Gas | 0 | 0 | 0 | 0 | 20 | 0 |
| | | Upscale | 11.1 | 11.0 | 10.9 | .1 | 20 | .50 |
| 9 | | Zero Gas | 0 | | | | | |
| | | Upscale | | | | | | |
| 10 | | Zero Gas | 0 | | | | | |
| | | Upscale | | | | | | |
| 11 | | Zero Gas | 0 | | | | | |
| | | Upscale | | | | | | |
| 12 | | Zero Gas | 0 | | | | | |
| | | Upscale | | | | | | |

Must be within 5% of the span for the zero or upscale cal. gas.

033194-C:\STACK\WP\FORMS\S-420-11

INTERPOLL LABORATORIES

Calibration Error Check

Job UP Hayward

Test 14 Run _____ Date _____

Operator _____

CO
~~SO~~$_2$ Calibration: Time(HRS) _____

| *** | Cylinder Value (ppm) | Analyzer Response (ppm) | Difference (ppm) | Span Value (ppm) | Percent of Span |
|---|---|---|---|---|---|
| Zero gas | 0 | 0 | 0 | 50c | 0 |
| Mid level | 159 | 157 | 2 | 50c | .40 |
| High level | 249 | 248 | | 50c | |

$NO_x$ Calibration: Time(HRS) _____

| *** | Cylinder Value (ppm) | Analyzer Response (ppm) | Difference (ppm) | Span Value (ppm) | Percent of Span |
|---|---|---|---|---|---|
| Zero gas | 0 | 0 | 0 | 50c | 0 |
| Mid level | 239 | 238 | 1 | 50c | .20 |
| High level | 476 | 473 | 3 | 50c | .60 |

$O_2$ Calibration: Time(HRS) _____

| *** | Cylinder Value (ppm) | Analyzer Response (ppm) | Difference (ppm) | Span Value (ppm) | Percent of Span |
|---|---|---|---|---|---|
| Zero gas | 0 | 0 | 0 | 25 | 0 |
| Mid level | 13.5 | 13.4 | .1 | 25 | .40 |
| High level | 21.0 | 20.8 | .2 | 25 | .80 |

$CO_2$ Calibration: Time(HRS) _____

| *** | Cylinder Value (ppm) | Analyzer Response (ppm) | Difference (ppm) | Span Value (ppm) | Percent of Span |
|---|---|---|---|---|---|
| Zero gas | 0 | 0 | 0 | 20 | 0 |
| Mid level | 11.1 | 11.0 | .1 | 20 | .50 |
| High level | 17.0 | 17.1 | .1 | 20 | .50 |

Must be within 2% of the span for each calibration gas S-420-10

INTERPOLL LABORATORIES

Calibration Error Check

Job CP / HAYWARD

Test 1 Run ____ Date 6-7-94

Operator BOB

$SO_2$ Calibration: Time(HRS) _____

| *** | Cylinder Value (ppm) | Analyzer Response (ppm) | Difference (ppm) | Span Value (ppm) | Percent of Span |
|---|---|---|---|---|---|
| Zero gas | 0 | | | | |
| Mid level | | | | | |
| High level | | | | | |

$NO_x$ Calibration: Time(HRS) 0710

| *** | Cylinder Value (ppm) | Analyzer Response (ppm) | Difference (ppm) | Span Value (ppm) | Percent of Span |
|---|---|---|---|---|---|
| Zero gas | 0 | 0 | 0 | 500 | 0 |
| Mid level | 239 | 239 | 0 | 500 | 0 |
| High level | 476 | 475 | 1 | 500 | .2 |

$O_2$ Calibration: Time(HRS) 0710

| *** | Cylinder Value (ppm) | Analyzer Response (ppm) | Difference (ppm) | Span Value (ppm) | Percent of Span |
|---|---|---|---|---|---|
| Zero gas | 0 | 0 | 0 | 25 | 0 |
| Mid level | 13.5 | 13.4 | .1 | 25 | .40 |
| High level | 21.0 | 21.0 | 0 | 25 | 0 |

$CO_2$ Calibration: Time(HRS) 0710

| *** | Cylinder Value (ppm) | Analyzer Response (ppm) | Difference (ppm) | Span Value (ppm) | Percent of Span |
|---|---|---|---|---|---|
| Zero gas | 0 | .0 | 0 | 20 | 0 |
| Mid level | 11.1 | 11.0 | .1 | 20 | .50 |
| High level | 17.0 | 17.0 | 0 | 20 | 0 |

Must be within 2% of the span for each calibration gas S-420-10

# APPENDIX I

## CALIBRATION GAS CERTIFICATION SHEETS

NATIONAL SPECIALTY GASES
630 UNITED DRIVE
DURHAM, N.C. 27713
(919) 544-3772

TO: TWIN CITY OXYGEN

## CERTIFICATE OF ANALYSIS

DATE REPORTED: 12/17/93 REFERENCE #:88-28273

MATERIAL SUBMITTED:OXYGEN AND CARBON DIOXIDE IN NITROGEN, CERTIFIED CYL. #CC92695

INFORMATION REQUESTED:RATIO ANALYSIS

METHOD OF ANALYSIS:OXYGEN AND INFRARED ANALYZERS

RESULT OF INVESTIGATION:

| COMPONENT | SPECIFICATION | CONCENTRATION |
|---|---|---|
| O2 | 13.5% | 13.5% |
| CO2 | 11% | 11.1% |
| N2 | | BALANCE |

Richard Sykes
AUTHORIZED SIGNATURE

"THIS REPORT STATED ACCURATELY THE RESULTS OF THE INVESTIGATION MADE UPON THE MATERIAL SUBMITTED TO THE ANALYTICAL LABORATORY. EVERY EFFORT HAS BEEN MADE TO DETERMINE OBJECTIVELY, THE INFORMATION REQUESTED; HOWEVER, IN CONNECTION WITH ITS RENDERING OF THIS REPORT, NATIONAL SPECIALTY GASES SHALL HAVE NO LIABILITY IN EXCESS OF ITS ESTABLISHED CHARGE FOR THE SERVICE."

RECEIVED
DEC 29 1993
INTERPOLL LABORATORIES

# Scott Specialty Gases, Inc.

1290 COMBERMERE STREET, TROY, MI 48083-0000
PHONE: 313-589-2950 FAX:313-589-2134

8/02/9

GENEX
4018 DUNCAN AVENUE

ST LOUIS MO 63110-0000

PROJECT #: 05-26600
PO #: 4970SA

CYLINDER #: ALM008828

ANALYTICAL ACCURACY: +-2%

| COMPONENT | REQUESTED CONCENTRATION | | ANALYSIS 1 ( MOLES) | U/M |
|---|---|---|---|---|
| CARBON MONOXIDE | 150.0 | PPM | 150. | PPM |
| NITROGEN | BALANCE | | | N/A |

NOTES: CERTIFIED MASTER GAS

ANALYTICAL METHOD: CMG

DATE OF ANALYSIS: 7/29/91

ANALYST: Frank P. Doran
ANALYST

APPROVED BY: L. Shapiro
SUPERVISOR

# Scott Specialty Gases, Inc.

1290 COMBERMERE STREET, TROY, MI 48083-0000
PHONE: 313-589-2950 FAX:313-589-2134

8/02/91

GENEX
4018 DUNCAN AVENUE

ST LOUIS MO 63110-0000

PROJECT #: 05-26800
PO #: 4970SA

CYLINDER #: AAL19103

ANALYTICAL ACCURACY: +-2%

| COMPONENT | REQUESTED CONCENTRATION | | ANALYSIS 1 ( MOLES) | U/M |
|---|---|---|---|---|
| CARBON MONOXIDE | 250.0 | PPM | 249. | PPM |
| NITROGEN | BALANCE | | | N/A |

NOTES: CERTIFIED MASTER GAS

ANALYTICAL METHOD: CMG

DATE OF ANALYSIS: 7/29/91

ANALYST: _____ ANALYST

APPROVED BY: _____ SUPERVISOR

NATIONAL SPECIALTY GASES
630 UNITED DRIVE
DURHAM, NC 27713
(919)544-3772

CERTIFICATE OF ANALYSIS-EPA PROTOCOL MIXTURES

REFERENCE #: 88-29868 CYLINDER #:CC100138 CYL. PRESSURE:2000PSIG
EXPIRATION DATE:3/8/97 LAST ANALYSIS DATE:3/8/94
CUSTOMER:TWIN CITY OXYGEN P.O.# 9082

METHOD: ANALYZED ACCORDING TO EPA TRACEABILITY PROTOCOL FOR ASSAY AND CERTIFICATION OF GASEOUS CALIBRATION STANDARDS-SEPTEMBER 1993:G-1

STANDARD:
SRM #: 1667B
CYL #: CLM5293
CONC.: 47.3PPM

INSTRUMENT:BECKMAN THC
MODEL #:400
SERIAL #:1003052
LAST CAL.:3/1/94

| COMPONENT:PROPANE | COMPONENT: | COMPONENT: |
|---|---|---|
| MEAN CONC:30.3PPM | MEAN CONC: | MEAN CONC: |
| REPLICATE CONC. | REPLICATE CONC. | REPLICATE CONC. |
| DATE:3/8/94 DATE: | DATE: DATE: | DATE: DATE: |
| 30.2PPM | | |
| 30.3PPM | | |
| 30.3PPM | | |

BALANCE GAS:AIR

REPLICATE DATA

COMPONENT:PROPANE

DATE: 3/8/94

| | | | | | | DATE: | | |
|---|---|---|---|---|---|---|---|---|
| Z | 0 | R | 286.3 | C | 182.8 | Z | R | C |
| R | 286.3 | Z | 0 | C | 183.4 | R | Z | C |
| Z | 0 | C | 183.4 | R | 286.3 | Z | C | R |

REPLICATE DATA

COMPONENT:

| DATE: | | | DATE: | | |
|---|---|---|---|---|---|
| Z | R | C | Z | R | C |
| R | Z | C | R | Z | C |
| Z | C | R | Z | C | R |

REPLICATE DATA

COMPONENT:

| DATE: | | | DATE: | | |
|---|---|---|---|---|---|
| Z | R | C | Z | R | C |
| R | Z | C | R | Z | C |
| Z | C | R | Z | C | R |

Z=ZERO C=CANDIDATE R=REFERENCE

ANALYST: Richard Sykes APPROVED BY:

"THIS REPORT STATED ACCURATELY THE RESULTS OF THE INVESTIGATION MADE UPON THE MATERIAL SUBMITTED TO THE ANALYTICAL LABORATORY. EVERY EFFORT HAS BEEN MADE TO DETERMINE OBJECTIVELY, THE INFORMATION REQUESTED; HOWEVER, IN CONNECTION WITH ITS RENDERING OF THIS REPORT, NATIONAL SPECIALTY GASES SHALL HAVE NO LIABILITY IN EXCESS OF ITS ESTABLISHED CHARGE FOR THE SERVICE."

NATIONAL SPECIALTY GASES
630 UNITED DRIVE
DURHAM, NC 27713
(919)544-3772

# CERTIFICATE OF ANALYSIS-EPA PROTOCOL MIXTURES

REFERENCE #: 88-29870 CYLINDER #:CC98059 CYL. PRESSURE:2000PSIG
EXPIRATION DATE:3/8/97 LAST ANALYSIS DATE:3/8/94
CUSTOMER:TWIN CITY OXYGEN P.O.# 9082

METHOD: ANALYZED ACCORDING TO EPA TRACEABILITY PROTOCOL FOR ASSAY AND CERTIFICATION OF GASEOUS CALIBRATION STANDARDS-SEPTEMBER 1993:G-1

STANDARD:
SRM #: 1669B
CYL #: CLM789
CONC.: 464PPM

INSTRUMENT:BECKMAN THC
MODEL #:400
SERIAL #:1003052
LAST CAL.:3/1/94

COMPONENT:PROPANE
MEAN CONC:303PPM
REPLICATE CONC.
DATE:3/8/94 DATE:
303PPM
303PPM
304PPM

COMPONENT:
MEAN CONC:
REPLICATE CONC.
DATE: DATE:

COMPONENT:
MEAN CONC:
REPLICATE CONC.
DATE: DATE:

BALANCE GAS:AIR

REPLICATE DATA

DATE: 3/8/94

| | | | | | |
|---|---|---|---|---|---|
| Z | 0 | R | 321.2 | C | 209.7 |
| R | 321.1 | Z | 0 | C | 209.7 |
| Z | 0 | C | 210.4 | R | 321.2 |

COMPONENT:PROPANE

DATE:

| | | |
|---|---|---|
| Z | R | C |
| R | Z | C |
| Z | C | R |

REPLICATE DATA

DATE:

| | | |
|---|---|---|
| Z | R | C |
| R | Z | C |
| Z | C | R |

COMPONENT:

DATE:

| | | |
|---|---|---|
| Z | R | C |
| R | Z | C |
| Z | C | R |

REPLICATE DATA

DATE:

| | | |
|---|---|---|
| Z | R | C |
| R | Z | C |
| Z | C | R |

COMPONENT:

DATE:

| | | |
|---|---|---|
| Z | R | C |
| R | Z | C |
| Z | C | R |

Z=ZERO C=CANDIDATE R=REFERENCE

ANALYST: Richard Sykes APPROVED BY:

"THIS REPORT STATED ACCURATELY THE RESULTS OF THE INVESTIGATION MADE UPON THE MATERIAL SUBMITTED TO THE ANALYTICAL LABORATORY. EVERY EFFORT HAS BEEN MADE TO DETERMINE OBJECTIVELY, THE INFORMATION REQUESTED; HOWEVER, IN CONNECTION WITH ITS RENDERING OF THIS REPORT, NATIONAL SPECIALTY GASES SHALL HAVE NO LIABILITY IN EXCESS OF ITS ESTABLISHED CHARGE FOR THE SERVICE."

# Scott Specialty Gases

a division of Scott Environmental Technology, Inc.

1290 COMBERMERE STREET, TROY, MICHIGAN 48084 (313) 589-2950

Shipped From : Scott Michigan

Our Project # : 533359

Your P.O. # : 6033NN

Expiration Date : 8-6-93

Cylinder Number : BLM-001645

Cylinder Pressure 1665 psig

1 OF 1 COMPONENTS

Customer :
GENEX
2455 CLEVELAND AVENUE N.
ROSEVILLE, MN. 55113

# # # # CERTIFICATE OF ANALYSIS - EPA PROTOCOL GASES # # # #

PERFORMED ACCORDING TO SECTION 2.0.7,
Procedure # G2

Certified Per Traceability
Protocol # 2

File # PO-2184

Certified Accuracy 2% ANALYTICAL UNCERTAINTY

## ANALYZED CYLINDER

| COMPONENT | CERTIFIED CONC. |
|---|---|
| PROPANE | 3038 PPM |

BALANCE GAS : AIR

## REFERENCE STD

| SRM # (CRM #) | CYLINDER NUMBER | CONC. |
|---|---|---|
| 1669B | CLM-000702 | 466.0 PPM |
| 1668B | CLM-000694 | 95.00 PPM |

## INSTRUMENTATION

| INSTR/MODEL/SERIAL # | LAST CALIBRATION DATE |
|---|---|
| BECKMAN | 1-23-92 |
| 400 | |
| 1002059 | |

ANALYTICAL PRINCIPLE

FLAME IONIZATION DETECTOR

## ANALYSIS

DATE : 2-6-92

| ZERO GAS (mV) | TEST GAS (mV) | RESULTS PPM | REFERENCE GAS CONC. | (mV) | RESULTS PPM |
|---|---|---|---|---|---|
| 0.00 | 65.60 | 303.8 | 466.0 PPM | 100.00 | 466.0 |
| 0.00 | 65.60 | 303.8 | | 100.00 | 466.0 |
| 0.00 | 65.60 | 303.8 | | 100.00 | 466.0 |

CALCULATED RESULTS: 303.8, 303.8, 303.8

AVERAGE : 303.8 PPM

SAMPLE GAS SPLIT # 10%
OF FULL CONC.
303.8 PPM DIVIDED BY
10% = 3038 PPM.

## CALIBRATION CURVE 2 nd DEGREE

| SRM # (CRM #) | CONC. PPM | SPLIT PT (%) | DVM (mV) | FITTED VALUE | PERCENT ERROR |
|---|---|---|---|---|---|
| 1669B | 466.0 | 100 | 100.00 | 466.0 | 0.00 |
| | 315.8 | 68 | 68.10 | 315.6 | -0.08 |
| | 199.9 | 43 | 43.30 | 199.7 | -0.10 |
| 1668B | 95.00 | 20 | 20.80 | 95.45 | 0.47 |
| | 0.0000 | 0 | 0.00 | 0.0000 | 0.00 |
| | | 0 | | 0.0000 | 0.00 |
| | | 0 | | 0.00 | 0.00 |
| 1668B | 95.00 | LOW | 20.80 | 95.45 | 0.47 |
| 1669B | 466.0 | HIGH | 100.00 | 466.0 | 0.00 |

Interpoll Laboratories, Inc.
(612) 786-6020

CERTIFICATE OF ANALYSIS FOR
NO STANDARD GASES FOR METHOD 7E

Vendor: Scott Specialty Gases
Cylinder No: AL#000157
Date of Preparation: 7-21-91
Label: 78.7 ppm NOx
Blend Specification:

Results Of Analyses Of Standard Gas (by Method 7A)

| Date of Analysis | Run | NO in $N_2$ (ppm) |
|---|---|---|
| 8-10-93 | 1 | 78.68 |
| " | 2 | 78.14 |
| " | 3 | 78.03 |
| | 4 | |
| | 5 | |
| | 6 | |
| | Avg | ~~78.28~~ |

Analyst: Bob Aschenbach

☒ Results are within 10% of the vendor tag value; use tag value.
☐ Results are not within 10% of the vendor tag value; conduct another set of triplicate analyses.
☐ Results of six consecutive analyses within ± 10% of the average; relabel as above.
☐ All results not within ± 10% of the average; perform another set of triplicate analyses.

Approved by,

August 16, 1993
Date

Dr. Perry Lonnes

S-431

# Interpoll Laboratories, Inc.

(612) 786-6020

Printout of ESC Model 80 DAS
for CEM Trailer No. 1
- 1993 -

File Name: CG10
Job Number: 3-3333
Client: Interpoll Laboratories Inc
Location: Circle Pines, Minnesota

ALM000157 - 78.7 ppm NOx -- Run 1 - 3

| Julian Date | Time (Hrs) | NOx (ppmv) |
|---|---|---|
| 222 | 13:52:00 | 79.0 |
| 222 | 13:52:30 | 78.7 |
| 222 | 13:53:00 | 78.7 |
| 222 | 13:53:30 | 78.4 |
| 222 | 13:54:00 | 157 |
| 222 | 13:54:30 | 226 |
| 222 | 13:55:00 | 232 |
| 222 | 13:55:30 | 233 |
| 222 | 13:56:00 | 5. |
| 222 | 13:56:30 | 1.6 |
| 222 | 13:57:00 | 26.5 |
| 222 | 13:57:30 | 77.8 |
| 222 | 13:58:00 | 78.2 |
| 222 | 13:58:30 | 78.2 |
| 222 | 13:59:00 | 78.1 |
| 222 | 13:59:30 | 78.3 |
| 222 | 14:00:00 | 78.1 |
| 222 | 14:00:30 | 78.1 |
| 222 | 14:01:00 | 27.4 |
| 222 | 14:01:30 | 1.0 |
| 222 | 14:02:00 | 148 |
| 222 | 14:02:30 | 227 |
| 222 | 14:03:00 | 232 |
| 222 | 14:03:30 | 232 |
| 222 | 14:04:00 | 80.1 |
| 222 | 14:04:30 | 78.2 |
| 222 | 14:05:00 | 78.2 |
| 222 | 14:05:30 | 78.0 |
| 222 | 14:06:00 | 78.1 |
| 222 | 14:06:30 | 77.8 |

Conc. (dry basis unless noted)

Run 1

Run 2

Run 3

# Scott Specialty Gases, Inc.

1290 COMBERMERE STREET, TROY, MI 48083-0000
PHONE: 313-589-2950 FAX:313-589-2134

8/02/91

GENEX
4018 DUNCAN AVENUE

ST LOUIS MO 63110-0000

PROJECT #: 05-26600
PO #: 4970SA

CYLINDER #: ALM000157

ANALYTICAL ACCURACY: +-2%

| COMPONENT | REQUESTED CONCENTRATION | | ANALYSIS 1 ( MOLES) | U/M |
|---|---|---|---|---|
| NITRIC OXIDE | 80.0 | PPM | 78.2 | PPM |
| NITROGEN - OXYGEN FREE | BALANCE | | | N/A |

NOTES: CERTIFIED MASTER GAS
NOX=78.7 PPM NITROGEN DIOXIDE=0.5 PPM

ANALYTICAL METHOD: CMG

DATE OF ANALYSIS: 7/29/91

ANALYST: _____ ANALYST

APPROVED BY: L. Shapiro SUPERVISOR

Interpoll Laboratories, Inc.
(612) 786-6020

CERTIFICATE OF ANALYSIS FOR
NO STANDARD GASES FOR METHOD 7E

Vendor: National Specialty Gases
Cylinder No: CC114192
Date of Preparation: 3-23-93
Label: 239 ppm NOx
Blend Specification:

Results Of Analyses Of Standard Gas (by Method 7A)

| Date of Analysis | Run | NO in $N_2$ (ppm) |
|---|---|---|
| 8-10-93 | 1 | 239.500 |
| " | 2 | 239.200 |
| " | 3 | 239.00 |
| | 4 | |
| | 5 | |
| | 6 | |
| | Avg | 239.2 |

Analyst: Bob Ascherbach

☒ Results are within 10% of the vendor tag value; use tag value.
☐ Results are not within 10% of the vendor tag value; conduct another set of triplicate analyses.
☐ Results of six consecutive analyses within ± 10% of the average; relabel as above.
☐ All results not within ± 10% of the average; perform another set of triplicate analyses.

Approved by,

August 16, 1993
Date

Dr. Perry Lonnes

S-431

# Interpoll Laboratories, Inc.

(612) 786-6020

Printout of ESC Model 80 DAS
for CEM Trailer No. 1
- 1993 -

File Name: CG3
Job Number: 3-3333
Client: Interpoll Laboratories
Location: Circle Pines, Minnesota

CC114192 - 239 ppm NOx -- Run 1 - 3

| Julian Date | Time (Hrs) | | NOx (ppmv) (dry basis unless noted) |
|---|---|---|---|
| 222 | 10:22:00 | Run 1 | 240 |
| 222 | 10:22:30 | | 240 |
| 222 | 10:23:00 | | 239 |
| 222 | 10:23:30 | | 239 |
| 222 | 10:24:00 | | 234 |
| 222 | 10:24:30 | | 233 |
| 222 | 10:25:00 | | 233 |
| 222 | 10:25:30 | | 216 |
| 222 | 10:26:00 | | 239 |
| 222 | 10:26:30 | | 239 |
| 222 | 10:27:00 | | 240 |
| 222 | 10:27:30 | Run 2 | 240 |
| 222 | 10:28:00 | | 239 |
| 222 | 10:28:30 | | 239 |
| 222 | 10:29:00 | | 237 |
| 222 | 10:29:30 | | 232 |
| 222 | 10:30:00 | | 232 |
| 222 | 10:30:30 | | 233 |
| 222 | 10:31:00 | | 230 |
| 222 | 10:31:30 | | 239 |
| 222 | 10:32:00 | | 239 |
| 222 | 10:32:30 | | 239 |
| 222 | 10:33:00 | | 239 |
| 222 | 10:33:30 | Run 3 | 239 |
| 222 | 10:34:00 | | 239 |
| 222 | 10:34:30 | | 239 |

NATIONAL SPECIALTY GASES
630 UNITED DRIVE
DURHAM, NC 27713
(919) 544-3772

CERTIFICATE OF ANALYSIS-EPA PROTOCOL MIXTURES

REFERENCE #: 88-23182 CYLINDER #: CC114192 CYL PRESSURE: 2000PSIG

EXPIRATION DATE: 3-23-95 LAST ANALYSIS DATE: 3-23-93

CUSTOMER: TWIN CITY OXYGEN P.O.#
METHOD: EPA PROTOCOL # 1 3.0.4. G-1

STANDARD:

SRM #: 1685B

CYL #: CLM-4728

CONC.: 248 PPM

INSTRUMENT:

COMPONENT: BECKMAN CHEMILUMINESCENT

MODEL #: 951A

SERIAL #: 100532

LAST CAL.: 1-2-93

COMP: NO
MEAN CONC: 239 PPM

REPLICATE CONC.

| DATE: 3-16-93 | DATE: 3-23-93 |
|---|---|
| 240 PPM | 236 PPM |
| 240 PPM | 237 PPM |
| 241 PPM | 238 PPM |

COMP: NO2
MEAN CONC: 2.99 PPM

REPLICATE CONC.

| DATE: | DATE: |
|---|---|

COMP:
MEAN CONC:

REPLICATE CONC.

| DATE: | DATE: |
|---|---|

BALANCE GAS: NITROGEN

# APPENDIX J

## PROCESS RATE INFORMATION

*Louisiana–Pacific Corporation*
Northern Division
Rt. 8, Box 8263
Hayward, Wisconsin 54843
715 634–3454

# LETTER OF TRANSMITTAL

| | |
|---|---|
| DATE: 08/04/94 | JOB NO. |
| ATTENTION: | SHERI PALCHER |
| RE: | |

TO INTERPOLL LABORATORIES, INC
CIRCLE PINES, MN 55014–1819

**WE ARE SENDING YOU**

[X] Attached [ ] Under separate cover via _____ the following items:

[ ] Shop Drwgs. [ ] Prints [ ] Plans [ ] Samples [ ] Specifications

[ ] Copy of Letter [ ] Change Order [ ] _____

| COPIES | DATE | NO. | DESCRIPTION |
|---|---|---|---|
| 1 | 07/10/94 | | Process data for testing at Hayward. |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |

THESE ARE TRANSMITTED as checked below:

[ ] For Approval [ ] Approved As Submitted [ ] Submit ____ copies for distribution

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[ ] For Review & Comment [ ] Resubmit ____ copies for approval [ ] _____

[ ] FOR BIDS DUE _____ 199 .

**REMARKS**

Sue Somers / L.R.

Copy To: File, Jim Ross DNR, Brad Pyle DNR Signed: Sue Somers

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Hayward Press and Thermal Oil Heater testing June 7-10, 1994
TEST SCHEDULE LINE 1

LINE 1 PRESS TESTING JUNE 7, 1994 - FORMALDEHYDE

| DATE | POLLUTANT | RUN #1 | RUN #2 | RUN #3 |
|---|---|---|---|---|
| 6-7 | HCHO | 1250-1352 | 1420-1522 | 1545-1647 |

LINE 1 PRESS TESTING JUNE 8, 1994 - MDI

| DATE | POLLUTANT | RUN #1 | RUN #2 | RUN #3 |
|---|---|---|---|---|
| 6-7 | MDI | 0815-0916 | 0945-1046 | 1115-1216 |

LINE 1 THERMAL OIL HEATER JUNE 8, - TSP, CO, NOX

| DATE | POLLUTANT | RUN #1 | RUN #2 | RUN #3 |
|---|---|---|---|---|
| 6-8 | TSP | 1538-1640 | 1708-1811 | 1835-1938 |
| 6-8 | CO | 1538-1640 | 1708-1811 | 1835-1938 |
| 6-8 | NOX | 1538-1640 | 1708-1811 | 1835-1938 |

LINE 1 THERMAL OIL HEATER - JUNE 9, - POM, PHENOL, BENZENE, FORMALDEHYDE

| DATE | POLLUTANT | RUN #1 | RUN #2 | RUN #3 |
|---|---|---|---|---|
| 6-9 | POM | 0851-1052 | 1240-1430 | 1610-1812 |
| | | | 1522-1534 | |
| 6-9 | PHENOL | 0845-0945 | 1000-1100 | 1111-1130 |
| | | | | 1236-1320 |
| 6-9 | BENZENE | 0845-0945 | 1000-1100 | 1111-1130 |
| | | | | 1236-1320 |
| 6-9 | FORMALDEHYDE | 1345-1415 | 1632-1743 | 1802-1904 |
| | | 1535-1606 | | |

LINE 1 PRESS TESTING JUNE 10, 1994 - TSP, VOC, CO, NOX

| DATE | POLLUTANT | RUN #1 | RUN #2 | RUN #3 |
|---|---|---|---|---|
| 6-10 | TSP | 0935-1036 | 1100-1205 | 1220-1322 |
| | VOC | 0935-1036 | 1100-1205 | 1220-1322 |
| | CO | 0935-1036 | 1100-1205 | 1220-1322 |
| | NOX | 0935-1036 | 1100-1205 | 1220-1322 |

Hayward Press and Thermal Oil Heater testing June 7-10, 1994
TEST SCHEDULE LINE 2

LINE 2 THERMAL OIL HEATER JUNE 7. - POM, BENZENE

| DATE | POLLUTANT | RUN #1 | RUN #2 | RUN #3 |
|---|---|---|---|---|
| 6-7 | POM | 0827-1036 | 1136-1342 | 1425-1627 |
| 6-7 | BENZENE | 0849-0951 | 1142-1242 | 1436-1536 |

LINE 2 THERMAL OIL HEATER - JUNE 8. - PHENOL, FORMALDEHYDE, PM, CO, NOx

| | | | | |
|---|---|---|---|---|
| 6-8 | PM | 0757-0858 | 0920-1021 | 1114-1215 |
| 6-8 | CO | 0757-0858 | 0920-1021 | 1114-1215 |
| 6-8 | NOX | 0757-0858 | 0920-1021 | 1114-1215 |
| 6-8 | HCHO | 1446-1553 | 1616-1718 | 1742-1843 |
| 6-8 | PHENOL | 1446-1553 | 1616-1718 | 1742-1843 |

LINE 2 PRESS TESTING JUNE 9, 1994 - MDI, PM, VOC, CO, NOX

| DATE | POLLUTANT | RUN #1 | RUN #2 | RUN #3 |
|---|---|---|---|---|
| 6-9 | PM | 1240-1342 | 1425-1527 | 1605-1719 |
| 6-9 | VOC | 1240-1342 | 1425-1527 | 1605-1719 |
| 6-9 | CO | 1240-1342 | 1425-1527 | 1605-1719 |
| 6-9 | NOX | 1240-1342 | 1425-1527 | 1605-1719 |
| 6-9 | MDI | 1325-1441 | 1518-1641 | 1712-1828 |

LINE 2 PRESS TESTING JUNE 10, 1994 - FORMALDEHYDE

| DATE | POLLUTANT | RUN #1 | RUN #2 | RUN #3 |
|---|---|---|---|---|
| 6-10 | HCHO | 0815-0918 | 0941-1043 | 1121-1200 |
| | | | | 1315--1333 |

Hayward Press and Thermal Oil Heater testing June 7-10, 1994
Line 1 process data summary

LINE 1 PRESS TESTING JUNE 7, 1994 - FORMALDEHYDE

19.64 =Plant Production rate in Tons per hour
356 =MDI resin usage in pounds per hour
0.91% =MDI resin usage as % of finished product
856 =Liquid phenolic resin usage in pounds per hour (100% solids)
2.18% =Liquid phenolic resin usage as % of finished product (100% solids)
334 =Wax usage in pounds per hour
0.85% =Wax usage as % of finished product

LINE 1 PRESS TESTING JUNE 8, 1994 - MDI

19.83 =Plant Production rate in Tons per hour
392 =MDI resin usage in pounds per hour
0.99% =MDI resin usage as % of finished product
905 =Liquid phenolic resin usage in pounds per hour (100% solids)
2.28% =Liquid phenolic resin usage as % of finished product (100% solids)
318 =Wax usage in pounds per hour
0.80% =Wax usage as % of finished product

LINE 1 PRESS TESTING JUNE 10, 1994 - TSP, VOC, CO, NOX

18.93 =Plant Production rate in Tons per hour
341 =MDI resin usage in pounds per hour
0.90% =MDI resin usage as % of finished product
816 =Liquid phenolic resin usage in pounds per hour (100% solids)
2.16% =Liquid phenolic resin usage as % of finished product (100% solids)
331 =Wax usage in pounds per hour
0.87% =Wax usage as % of finished product

NE 1 THERMAL OIL HEATER JUNE 8, - TSP, CO, NOX

20.46 =Production rate in Tons per hour
0.35 =K1 estimated Tons per hour of fuel burned based on fuel measurement
6.24 =K1 estimated mmBTU per hour input based on fuel measurement
0.39 =K2 estimated Tons per hour of fuel burned based on fuel measurement
7.03 =K2 estimated mmBTU per hour input based on fuel measurement
0.74 =Total tons of dry bark per hour input
13.27 =Total mmBTU per hour input

LINE 1 THERMAL OIL HEATER - JUNE 9, - POM

20.01 =Production rate in Tons per hour
0.31 =K1 estimated Tons per hour of fuel burned based on fuel measurement
5.58 =K1 estimated mmBTU per hour input based on fuel measurement
0.31 =K2 estimated Tons per hour of fuel burned based on fuel measurement
5.54 =K2 estimated mmBTU per hour input based on fuel measurement
0.62 =Total tons of dry bark per hour input
11.12 =Total mmBTU per hour input

LINE 1 THERMAL OIL HEATER - JUNE 9, - PHENOL, BENZENE

19.86 =Production rate in Tons per hour
0.27 =K1 estimated Tons per hour of fuel burned based on fuel measurement
4.78 =K1 estimated mmBTU per hour input based on fuel measurement
0.25 =K2 estimated Tons per hour of fuel burned based on fuel measurement
4.50 =K2 estimated mmBTU per hour input based on fuel measurement
0.52 =Total tons of dry bark per hour input
9.28 =Total mmBTU per hour input

LINE 1 TOH JUN 9 - FORMALDEHYED
0.57 = TOTAL TONS
10.31 mm BTU

Hayward Press and Thermal Oil Heater testing June 7-10, 1994
Line 2 process data summary

LINE 2 THERMAL OIL HEATER JUNE 7, - POM

17.63 =Production rate in Tons per hour
0.83 =K3 estimated Tons per hour of fuel burned based on fuel measurement
14.92 =K3 estimated mmBTU per hour input based on fuel measurement
0.20 =K4 estimated Tons per hour of fuel burned based on fuel measurement
3.66 =K4 estimated mmBTU per hour input based on fuel measurement
1.03 =Total tons of dry bark per hour input
18.58 =Total mmBTU per hour input

LINE 2 THERMAL OIL HEATER JUNE 7, BENZENE

20.40 =Production rate in Tons per hour
0.78 =K3 estimated Tons per hour of fuel burned based on fuel measurement
13.97 =K3 estimated mmBTU per hour input based on fuel measurement
0.20 =K4 estimated Tons per hour of fuel burned based on fuel measurement
3.55 =K4 estimated mmBTU per hour input based on fuel measurement
0.98 =Total tons of dry bark per hour input
17.52 =Total mmBTU per hour input

LINE 2 THERMAL OIL HEATER JUNE 8, - TSP, CO, NOX

19.23 =Production rate in Tons per hour
0.56 =K3 estimated Tons per hour of fuel burned based on fuel measurement
10.01 =K3 estimated mmBTU per hour input based on fuel measurement
0.14 =K4 estimated Tons per hour of fuel burned based on fuel measurement
2.46 =K4 estimated mmBTU per hour input based on fuel measurement
0.70 =Total tons of dry bark per hour input
12.47 =Total mmBTU per hour input

LINE 2 THERMAL OIL HEATER - JUNE 8, - PHENOL, FORMALDEHYDE

17.16 =Production rate in Tons per hour
0.45 =K3 estimated Tons per hour of fuel burned based on fuel measurement
8.02 =K3 estimated mmBTU per hour input based on fuel measurement
0.06 =K4 estimated Tons per hour of fuel burned based on fuel measurement
1.05 =K4 estimated mmBTU per hour input based on fuel measurement
0.51 =Total tons of dry bark per hour input
9.07 =Total mmBTU per hour input

LINE 2 PRESS TESTING JUNE 9, 1994 - PM, VOC, CO, NOX

19.04 =Plant Production rate in Tons per hour
316 =MDI resin usage in pounds per hour
0.83% =MDI resin usage as % of finished product
729 =Liquid phenolic resin usage in pounds per hour (100% solids)
1.92% =Liquid phenolic resin usage as % of finished product (100% solids)
308 =Wax usage in pounds per hour
0.81% =Wax usage as % of finished product

LINE 2 PRESS TESTING JUNE 9, 1994 - MDI

19.00 =Plant Production rate in Tons per hour
326 =MDI resin usage in pounds per hour
0.86% =MDI resin usage as % of finished product
719 =Liquid phenolic resin usage in pounds per hour (100% solids)
1.89% =Liquid phenolic resin usage as % of finished product (100% solids)
348 =Wax usage in pounds per hour
0.92% =Wax usage as % of finished product

LINE 2 PRESS TESTING JUNE 10, 1994 - FORMALDEHYDE

19.09 =Plant Production rate in Tons per hour
305 =MDI resin usage in pounds per hour
0.80% =MDI resin usage as % of finished product
671 =Liquid phenolic resin usage in pounds per hour (100% solids)
1.76% =Liquid phenolic resin usage as % of finished product (100% solids)
255 =Wax usage in pounds per hour
0.67% =Wax usage as % of finished product

LINE 1 PRESS TESTING JUNE 7, 1994 - FORMALDEHYDE

DATA TIME: START= 12:40 END= 17:00 HOURS= 4.33

BOARD WEIGHTS - LBS

Weights of approximately every 25th untrimmed board (from press tapes)
7/16"

| | | | |
|---|---|---|---|
| 196 | 197 | 184 | 190 |
| 193 | 194 | 186 | 195 |
| 196 | 193 | 188 | 193 |
| 196 | 191 | 188 | 194 |
| 195 | 191 | 184 | 193 |
| 195 | 185 | 191 | 196 |
| 193 | 186 | 186 | 192 |
| 194 | 189 | 187 | 195 |
| 195 | 189 | 190 | 196 |
| 193 | 186 | 189 | 194 |

191.45 lb=average untrimmed mat weight

179.58 lb=average finished board weight (untrimmed mat weight-weight of trim)

6.2% =trim %

948 * 8/16 / 4.33 = 28.034 msf/hr 7/16

PLANT PRODUCTION RATE

4.33 =hours during testing
79 =pressloads
948 =no. of 8'x16' boards produced (pressloads x 12 boards per load)
170242 =lbs of finished product (boards produced x weight of finished board)
39287 =lbs of finished product per hour (lbs of finshed product / hours)
19.64 =tons of finished product per hour (lbs of finshed product per hour / 2000 lb)

RESIN USAGE FROM TANK MEASUREMENTS

Note: common tanks supply wax and resin to both Line 1 and Line 2. Usage for one line is estimated by proportioning the total usage by the footage (3/8" basis) for each line)

MEASUREMENT SUMMARY:

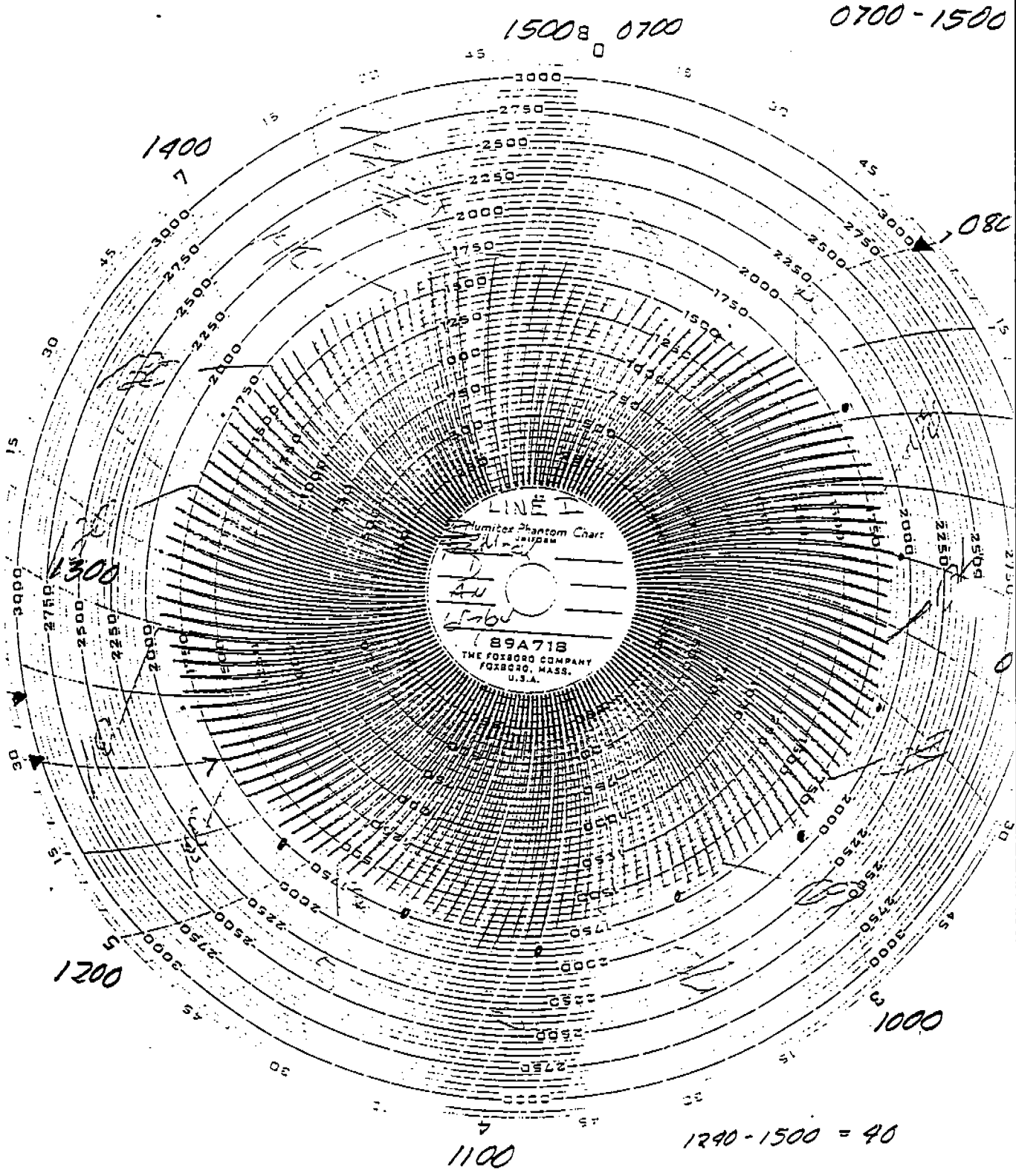
| time | line 1 footage | line 2 footage | MDI lbs | PHENOLIC 61% solids lbs | PHENOLIC 100% solids lbs | WAX 58% solids lbs | WAX 100% solids lbs |
|---|---|---|---|---|---|---|---|
| 13:00 | 34049 | 32257 | 894 | 3474 | 2119 | 763 | 465 |
| 14:00 | 34049 | 0 | 149 | 880 | 537 | 764 | 466 |
| 15:00 | 32257 | 17921 | 447 | 1931 | 1178 | 764 | 466 |
| 16:00 | 35841 | 32257 | 893 | 2497 | 1523 | 764 | 466 |
| 17:00 | 34049 | 32257 | 596 | 2958 | 1804 | 1527 | 931 |
| hourly average | 34049 | 22938.4 | 595.8 | 2348 | 1432 | 916.4 | 559 |
| Line 1 | | | 356 | | 856 | | 334 |
| Line 2 | | | 240 | | 577 | | 225 |

39287 =average lbs. per hour finished product produced during testing
356 =average lbs. per hour of MDI resin used during testing
0.91% = MDI resin used as % of finished product

856 =average lbs. per hour of phenolic resin (100% solids) used during testing
2.18% =Phenolic resin used as % of finished product

334 =average lbs. per hour of wax (100% solids) used during testing
0.85% =wax used as % of finished product

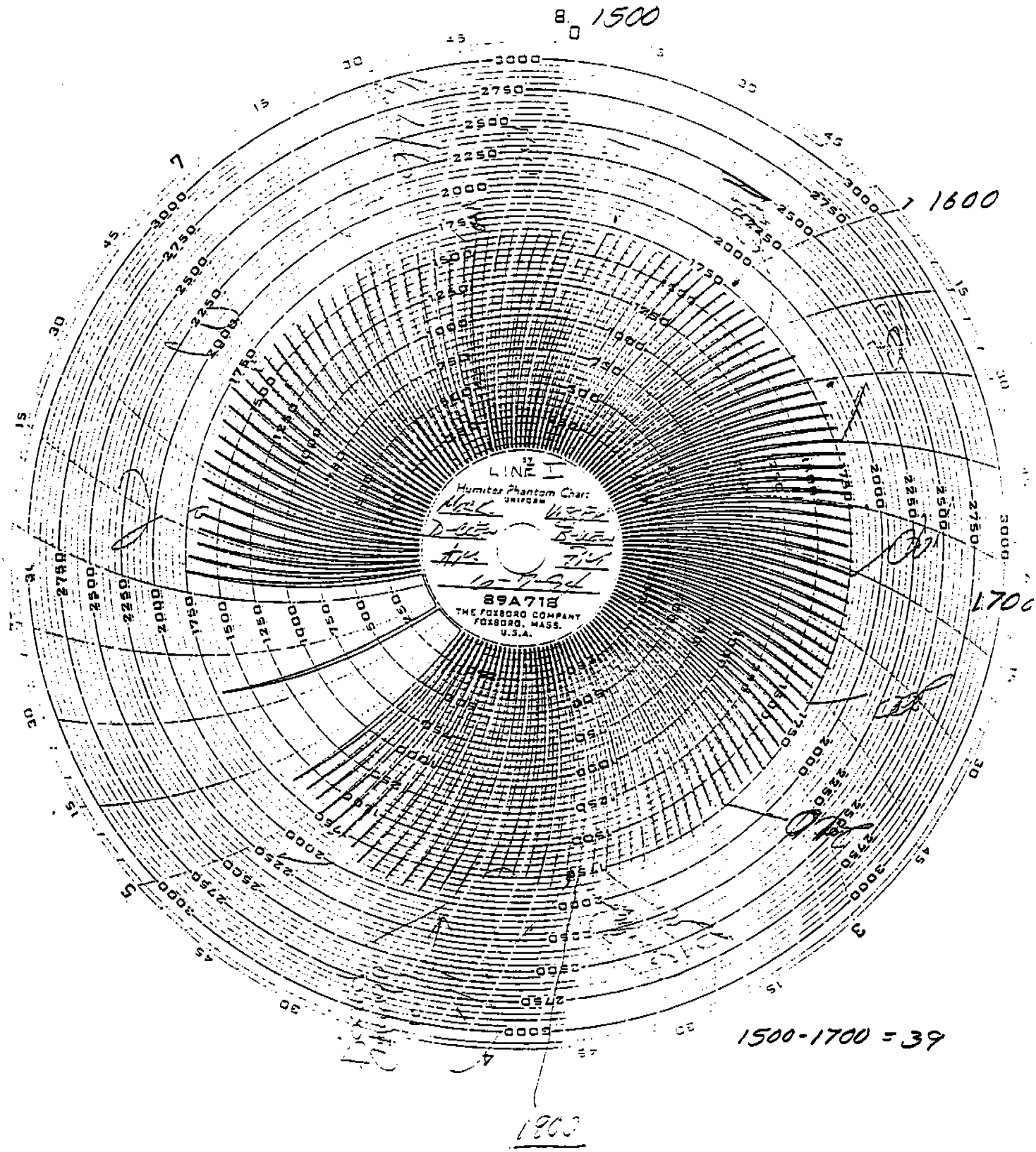
LINE I
PRESS CHAR
6-7-99
0700-1500




1240 - 1500 = 40

7

LINE I
PRESS CHART
6-7-94
1500 - 2300




1500-1700 = 39

1800

8

LOUISIANA-PACIFIC CORPORATION
HAYWARD, WI

PRESS REPORT - LINE 1

OPERATOR Mack SHIFT 4th CREW D DATE

THICKNESS: 7/16 PRESS LOADS 228 7/16

OVERALL TIMER: 200 DECOMPRESSION TIME 2015

PRESS TEMP: 210 TOTAL RECEIVED:

LOG COUNT: 8054

F.C.O.S. END RADIATOR YES

Cleaned Elevator Sprocket & Tracks YES

Cleaned Deckle Chains YES

Press Blown Down YES

Headbars Cleaned YES/NO

How Many 10

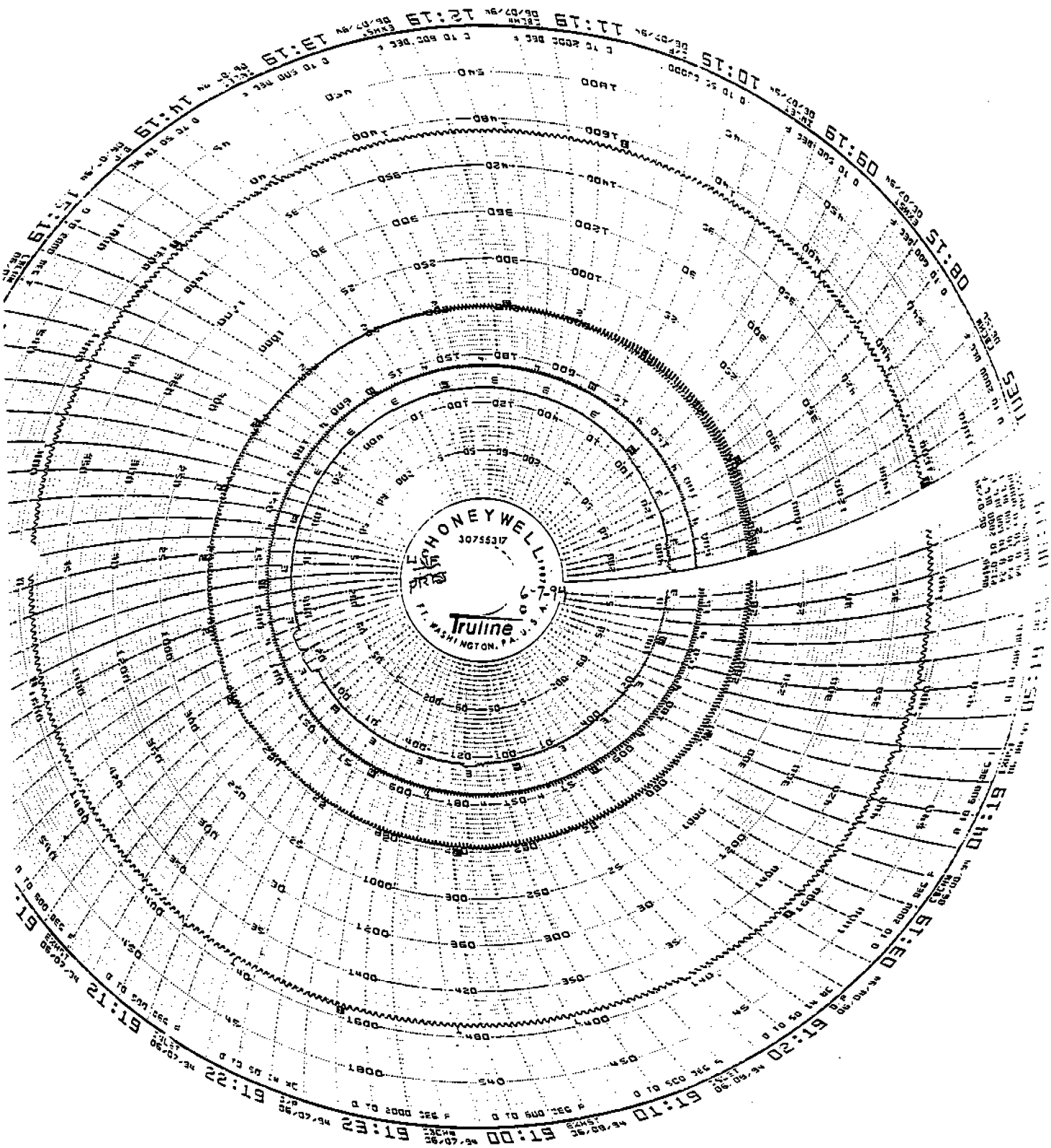
Former End Radiator YES

| LINE SPEED | FROM | TO |
|---|---|---|
| 30 | 7:00 | |
| 50 | | 7:30 |
| 60 | 8:00 | |
| 65 | 12:30 | |
| 60 | 1:30 | |

| DOWNTIME FROM | DOWNTIME TO | DOWNTIME (Mins) M | E | O | KEY | REASONS FOR DOWNTIME |
|---|---|---|---|---|---|---|
| 2:16 | 2:18 | | | | | HOME LIMIT CAME OFF #7 LOAD |
| | | | | | | LOST SEQUENCE |
| | | | | | | |
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Downtime Code: M - Mechanical E - Electrical O - Operator

LINE I
PRESS RTO
CHART
6-7-99




10

L-I PRESS 8-1-94

1 of 2

RECOVERY CHAMBER

| | #1 | #2 | #3 | #4 | #5 | INLET PRESS. | BURNERS B #1 | BURNERS B #2 | INLET TEMP. | COMBUST. CHAMBER TEMP. | EXHAUST TEMP. | AMP. | GAS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 8 a | 480 | 436 | 484 | 407 | 438 | 36 w.c. | 1612 | 1606 | 108 | 1555 | 230 | 13.6 | 017346 |
| 8:15 | 480 | 435 | 484 | 405 | 435 | 37 w.c. | 1586 | 1603 | 109 | 1540 | 232 | 137 | 017348 |
| 8:30 | 483 | 434 | 484 | 409 | 394 | 38 w.c. | 1618 | 1588 | 110 | 1565 | 239 | 136 | 017350 |
| 8:45 | 486 | 431 | 485 | 405 | 441 | 37 w.c. | 1598 | 1610 | 108 | 1545 | 232 | 136 | 017362 |
| 9 a | 484 | 435 | 480 | 409 | 389 | 3.7 w.c | 1609 | 1581 | 109 | 1552 | 244 | 13.9 | 017354 |
| 9:15 | 487 | 436 | 480 | 404 | 442 | 3.7 w.c. | 1588 | 1606 | 109 | 1538 | 232 | 13.7 | 017356 |
| 9:30 | 486 | 438 | 477 | 407 | 396 | 38 w.c. | 1617 | 1592 | 109 | 1554 | 241 | 138 | 017358 |
| 9:45 | 487 | 438 | 479 | 403 | 433 | 38 w.c. | 1583 | 1604 | 109 | 1537 | 234 | 138 | 017360 |
| 10 a | 486 | 439 | 478 | 405 | 406 | 36 w.c. | 1585 | 1592 | 110 | 1536 | 243 | 138 | 017362 |
| 10:15 | 488 | 441 | 478 | 407 | 390 | 37 w.c. | 1602 | 1579 | 112 | 1545 | 248 | 138 | 017365 |
| 10:30 | 490 | 439 | 479 | 406 | 445 | 3.6 w.c. | 1593 | 1612 | 112 | 1543 | 235 | 136 | 017367 |
| 10:45 | 490 | 441 | 480 | 406 | 446 | 36 w.c | 1594 | 1610 | 114 | 1542 | 235 | 137 | 017369 |
| 11 a | 484 | 441 | 478 | 411 | 405 | 40 w.c. | 1612 | 1587 | 112 | 1550 | 244 | 138 | 017371 |
| 11:15 | 471 | 436 | 480 | 421 | 409 | 39 w.c | 1612 | 1583 | 114 | 1554 | 244 | 139 | 017373 |
| 11:30 | 457 | 430 | 483 | 430 | 424 | 37 w.c. | 1688 | 1585 | 114 | 1536 | 242 | 139 | 017375 |
| 11:45 | 450 | 435 | 484 | 437 | 468 | 38 w.c | 1599 | 1609 | 113 | 1546 | 236 | 136 | 017377 |
| 12 P | 443 | 423 | 486 | 441 | 471 | 37 w.c. | 1583 | 1603 | 114 | 1537 | 237 | 137 | 017379 |
| 12:15 | 435 | 420 | 487 | 447 | 445 | 3.7 w.c | 1582 | 1593 | 112 | 1537 | 239 | 138 | 017381 |
| 12:30 | 432 | 418 | 486 | 454 | 437 | 3.7 w.c. | 1620 | 1603 | 114 | 1554 | 242 | 13.9 | 017383 |
| 12:45 | 428 | 416 | 489 | 454 | 452 | 36 w.c. | 1578 | 1592 | 113 | 1533 | 239 | 138 | 017385 |
| 1 P | 426 | 411 | 490 | 459 | 471 | 37 w.c. | 1609 | 1616 | 114 | 1549 | 237 | 136 | 017387 |
| 1:15 | 423 | 411 | 490 | 464 | 436 | 3.7 w.c | 1620 | 1597 | 114 | 1555 | 244 | 13.9 | 017389 |
| 1:30 | 420 | 409 | 493 | 461 | 462 | 36 w.c. | 1578 | 1597 | 113 | 1536 | 240 | 13.9 | 017391 |
| 1:45 | 416 | 409 | 491 | 467 | 432 | 3.8 WC. | 1619 | 1592 | 114 | 1554 | 243 | 14.0 | 017393 |
| 2 P | 416 | 414 | 487 | 463 | 434 | 3.9 WC. | 1591 | 1585 | 115 | 1542 | 239 | 13.8 | 017395 |
| 2:15 | 416 | 418 | 472 | 462 | 462 | 3.8 W.C. | 1617 | 1613 | 113 | 1553 | 240 | 13.9 | 017397 |

| | #1 | #2 | #3 | #4 | #5 | INLET PRESS. | BURNER #1 | BURNER #2 | INLET TEMP. | COMBUST. CHAMBER TEMP. | EXHAUST TEMP. | AMP. | GAS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2:45 | 414 | 432 | 479 | 460 | 440 | 3.9 w.c. | 1598 | 1577 | 114 | 1543 | 238 | 13.8 | 017399 |
| 3:00 | 416 | 434 | 477 | 456 | 428 | 3.7 w.c. | 1597 | 1607 | 112 | 1544 | 240 | 13.7 | 017401 |
| 3P | 413 | 432 | 473 | 460 | 432 | 3.7 w.c. | 1612 | 1581 | 113 | 1551 | 239 | 14.1 | 017403 |
| 3:15 | 413 | 428 | 474 | 453 | 489 | 3.7 w.c. | 1582 | 1603 | 113 | 1537 | 240 | 13.7 | 017405 |
| 3:30 | 413 | 430 | 471 | 458 | 446 | 3.7 w.c. | 1620 | 1599 | 112 | 1554 | 240 | 14.1 | 017407 |
| 3:45 | 412 | 431 | 471 | 454 | 466 | 3.5 w.c. | 1575 | 1596 | 113 | 1531 | 239 | 13.7 | 017409 |
| 4:00 | 413 | 432 | 469 | 456 | 471 | 3.6 w.c. | 1617 | 1614 | 112 | 1552 | 239 | 13.8 | 017411 |
| 4:15 | 411 | 435 | 467 | 457 | 435 | 3.8 w.c. | 1615 | 1584 | 112 | 1552 | 238 | 13.8 | 017413 |
| 4:30 | 412 | 434 | 469 | 453 | 489 | 3.8 w.c. | 1602 | 1614 | 113 | 1544 | 239 | 13.7 | 017415 |
| 4:45 | 411 | 436 | 468 | 455 | 432 | 3.7 w.c. | 1602 | 1579 | 113 | 1547 | 237 | 13.7 | 017417 |
| 5P | 412 | 434 | 469 | 451 | 495 | 3.5 w.c. | 1589 | 1607 | 112 | 1538 | 241 | 13.8 | 017419 |
| 5:15 | | | | | | | | | | | | | |
| 5:30 | | | | | | | | | | | | | |
| 5:45 | | | | | | | | | | | | | |
| 6:P | | | | | | | | | | | | -- | |

LINE 1 PRESS TESTING JUNE 8, 1994 - MDI

DATA TIME START= 08:00 END= 12:30 HOURS= 4.50

BOARD WEIGHTS - LBS

weights of approximately every 25th untrimmed board (from press tapes)

7/16"

| | | | |
|---|---|---|---|
| 191 | 186 | 196 | 190 |
| 191 | 192 | 194 | 192 |
| 187 | 193 | 193 | 190 |
| 191 | 193 | 197 | 186 |
| 195 | 192 | 194 | 190 |
| 191 | 185 | 193 | 191 |
| 188 | 187 | 197 | 188 |
| 186 | 187 | 193 | 189 |
| 188 | 191 | 194 | 198 |
| 183 | 194 | 192 | |

191.08 lb=average untrimmed mat weight

179.23 lb=average finished board weight (untrimmed mat weight-weight of trim)

6.2% =trim %

PLANT PRODUCTION RATE

4.50 =hours during testing

83 =pressloads

996 =no. of 8'x16' boards produced (pressloads x 12 boards per load)

178513 =lbs of finished product (boards produced x weight of finished board)

39670 =lbs of finished product per hour (lbs of finshed product / hours)

19.83 =tons of finished product per hour (lbs of finshed product per hour / 2000 lb)

RESIN USAGE FROM TANK MEASUREMENTS

Note: common tanks supply wax and resin to both Line 1 and Line 2. Usage for one line is estimated by proportioning the total usage by the footage (3/8" basis) for each line)

MEASUREMENT SUMMARY:

| time | line 1 footage | line 2 footage | MDI lbs | PHENOLIC 61% solids lbs | PHENOLIC 100% solids lbs | WAX 58% solids lbs | WAX 100% solids lbs |
|---|---|---|---|---|---|---|---|
| 09:00 | 34049 | 34049 | 596 | 2649 | 1616 | 1145 | 664 |
| 10:00 | 34049 | 32257 | 1192 | 2507 | 1529 | 764 | 443 |
| 11:00 | 35841 | 30465 | 298 | 2362 | 1441 | 382 | 222 |
| 12:00 | 28673 | 34049 | 894 | 2467 | 1505 | 1146 | 665 |
| 13:00 | 34049 | 32257 | 297 | 2436 | 1486 | 1145 | 664 |
| hourly average | 33332 | 32615 | 655 | 2484 | 1515 | 916 | 532 |
| Line 1 | | | 392 | | 905 | | 318 |
| Line 2 | | | 264 | | 610 | | 214 |

39670 =average lbs. per hour finished product produced during testing

392 =average lbs. per hour of MDI resin used during testing

0.99% = MDI resin used as % of finished product

905 =average lbs. per hour of phenolic resin (100% solids) used during testing

2.28% =Phenolic resin used as % of finished product

318 =average lbs. per hour of wax (100% solids) used during testing

0.80% =wax used as % of finished product

LINE 1 THERMAL OIL HEATER JUNE 8, - TSP, CO, NOX
DATA TIME: START= 15:30 END= 19:40 HOURS= 4.17

BOARD WEIGHTS - LBS

Weights of approximately every 25th untrimmed board (from press tapes)
16 and 1/2"

| | | | |
|---|---|---|---|
| 191 | 191 | 194 | 191 |
| 188 | 190 | 199 | 191 |
| 187 | 193 | 198 | 186 |
| 184 | 200 | 198 | 192 |
| 184 | 189 | 192 | 190 |
| 189 | 196 | 191 | 186 |
| 185 | 197 | 192 | 187 |
| 186 | 200 | 195 | 188 |
| 187 | 199 | 193 | 187 |
| 194 | 201 | 196 | |

191.72 lb=average untrimmed mat weight

179.83 lb=average finished board weight (untrimmed mat weight-weight of trim)

6.2% =trim %

PLANT PRODUCTION RATE

$\frac{948 \times 8 \times 16}{4.17} = 29.1 \frac{msf}{hr}$ 7/10

4.17 =hours during testing
79 =pressloads
948 =no. of 8'x16' boards produced (pressloads x 12 boards per load)
170479 =lbs of finished product (boards produced x weight of finished board)
40915 =lbs of finished product per hour (lbs of finshed product / hours)

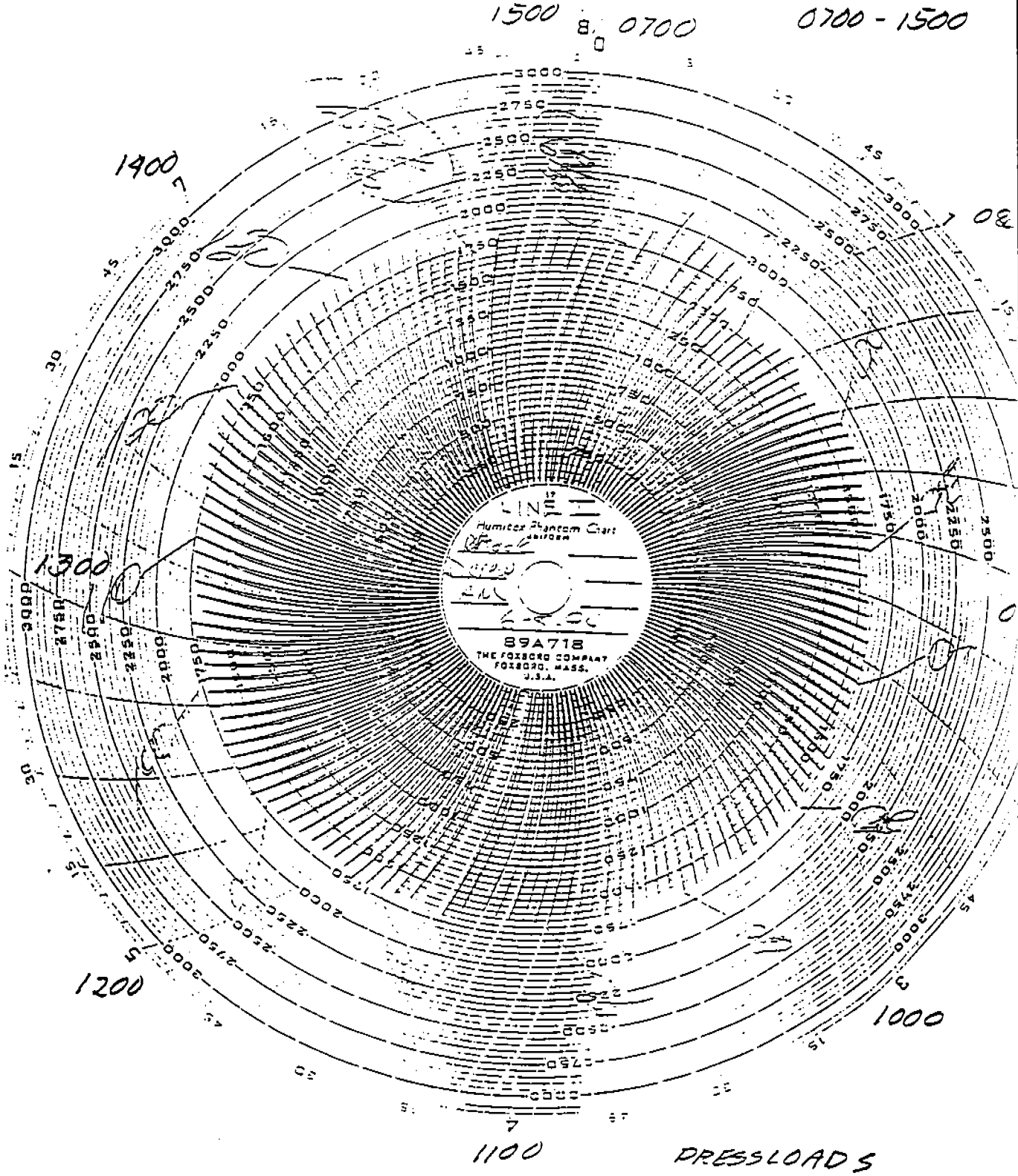
20.46 =tons of finished product per hour (lbs of finshed product per hour / 2000 lb)

EL BURNING RATE ESTIMATED BY BARK INPUT

K1
10 =K1 fuel calibration in pounds per count
479 =K1 counts during testing hours
4790 =K1 lbs of wet fuel burned during testing
4.17 =hours during testing
39.7% =average moisture content of fuel
2888 =total pounds of dry fuel burned during testing ( wet pounds x (1- moisture content))
693 =lbs of dry fuel burned per hour during testing (pounds of dry fuel / testing hours)
0.35 =tons of dry fuel burned per hour during testing (pounds of dry fuel / 2000 lbs)
9000 =estimated BTU content per pound of dry fuel,
6.24 =estimated mmbtu input per hour (lbs of dry fuel per hour x btu content)

K2
10 =K2 fuel calibration in pounds per count
540 =K2 counts during testing hours
5400 =K2 lbs of wet fuel burned during testing
4.17 =hours during testing
39.7% =average moisture content of fuel
3256 =total pounds of dry fuel burned during testing ( wet pounds x (1- moisture content))
781 =lbs of dry fuel burned per hour during testing (pounds of dry fuel / testing hours)
0.39 =tons of dry fuel burned per hour during testing (pounds of dry fuel / 2000 lbs)
9000 =estimated BTU content per pound of dry fuel,
7.03 =estimated mmbtu input per hour (lbs of dry fuel per hour x btu content)

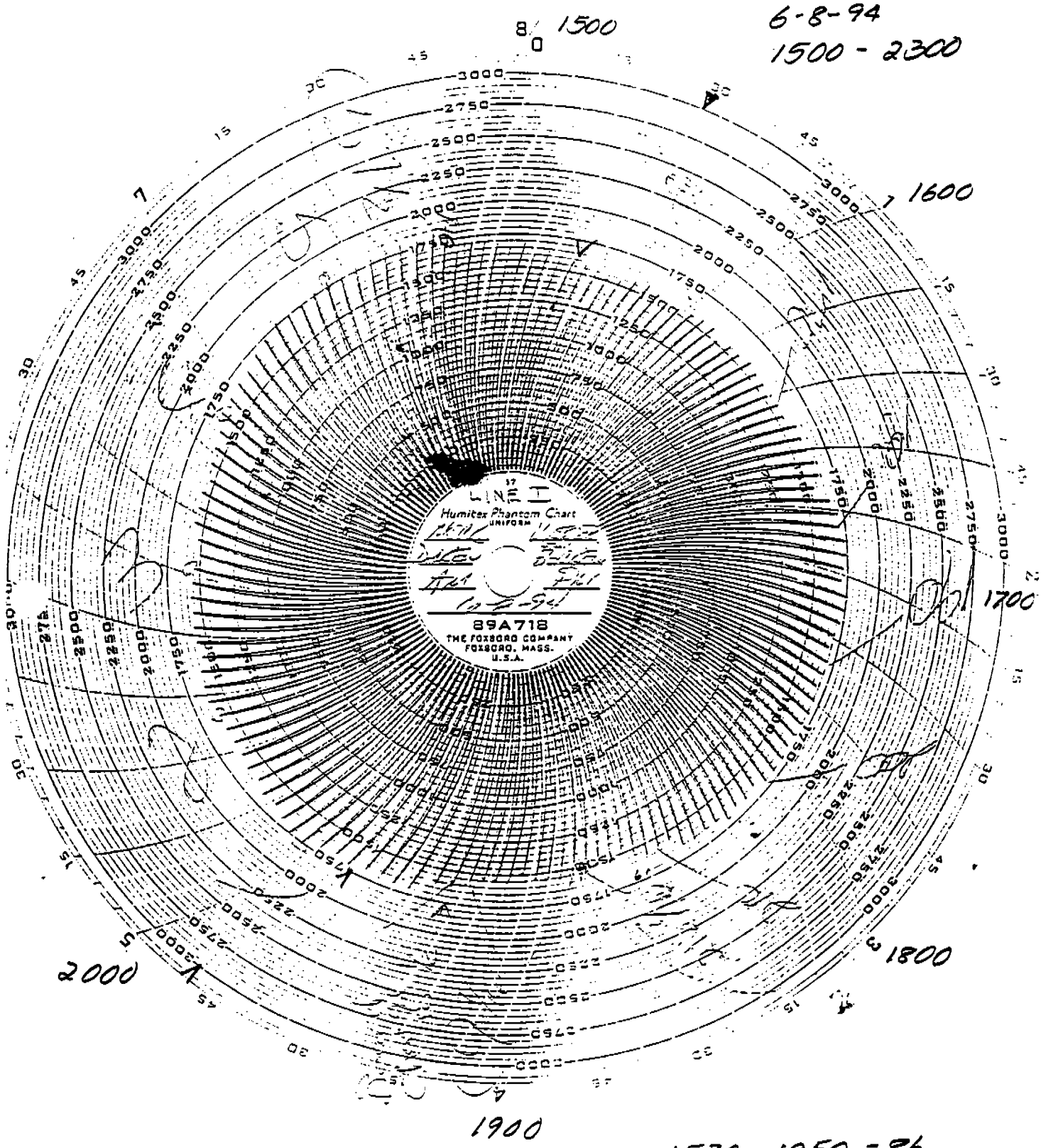
LINE I
PRESS CHAR
6-8-94
0700 - 1500




PRESSLOADS
0800 - 1230 = 83

15

LINE I
DRESS CHART
6-8-94
1500 - 2300




1530 - 1950 = 86

16

LOUISIANA-PACIFIC CORPORATION
HAYWARD, WI

PRESS REPORT - Line 2

OPERATOR Mark SHIFT AM CREW D DATE 6-9

THICKNESS: 19/32 SE PRESS LOADS 6 19/32 SE 216

OVERALL TIME: 215 DECOMPRESSION TIME 15

PRESS TEMP: 210 TOTAL PRESS:

LOG COUNT: 8830

| LINE SPEED | FROM | TO |
|---|---|---|
| 47 | 7:00 | |
| 50 | 7:20 | |
| 66 | 8:00 | |
| 67 | 9:30 | |
| 66 | 1:00 | |

F.C.O.S. EYE RADIATOR YES

Cleaned Heater Strands & Tracks YES

Cleaned Deckle Chains YES

Press Blown Down YES

Heaters Cleaned YES/NO

How Many

Former Syd Radiator YES

| DOWNTIME FROM | DOWNTIME TO | DOWNTIME (Mins) M | E | O | KEY | REASONS FOR DOWNTIME |
|---|---|---|---|---|---|---|
| 10:19 | 10:20 | | 1 | | | #16 T.O. Not Home |
| 11:29 | 11:31 | | 2 | | | Checking FCOS. Beam |
| 11:39 | 11:46 | | 7 | | | Welding on FCOS. |
| | | | | | | |
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Downtime Code: M - Mechanical E - Electrical O - Operator

17

LOUISIANA-PACIFIC CORPORATION
HAYWARD, WI

PRESS REPORT - LINE 1

OPERATOR Wisser SHIFT 7M CREW B DATE 6-8-9

THICKNESS: 7/16 PRESS LOADS 9 7/16 18 1/2 10 3/8

OVERALL TIMER: 138 DECOMPRESSION TIME 12

PRESS TEMP: 210° TOTAL HOURS:

LOG COUNT: 7469

P.C.O.S. HYD RADIATOR 1130

Cleaned Heater Strands & Tracks Yes

Cleaned Deckle Chains Yes

Press Blown Down Yes

Headbox Cleaned YES/NO

How Many

Former Hyd Radiator

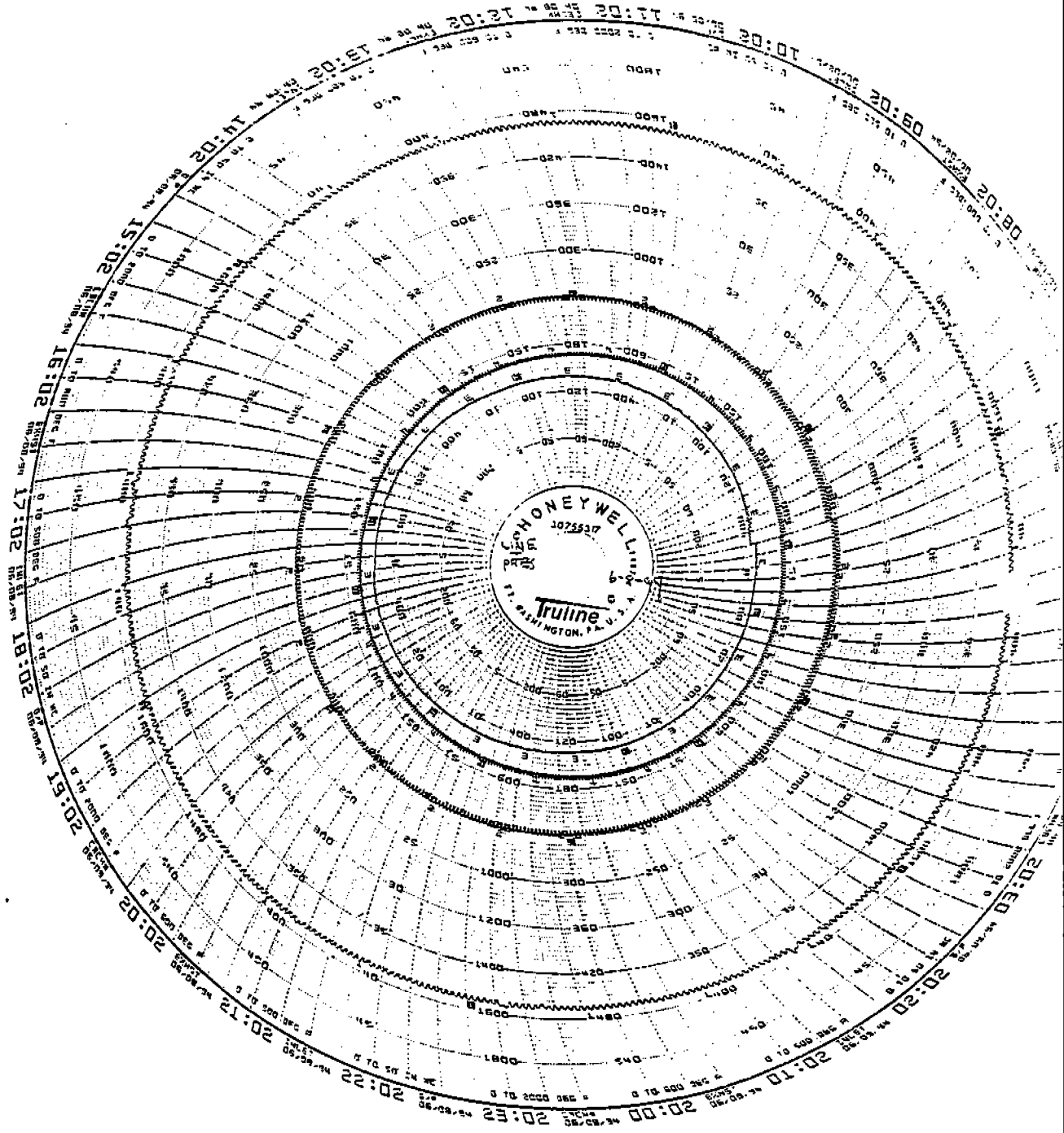
| LINE SPEED | FROM | TO |
|---|---|---|
| 66 | 7:00 | |
| 56 1/2 | 725 | |
| 57 | 1000 | |
| 60 3/8 | 625 | |
| | | |

| DOWNTIME FROM | DOWNTIME TO | DOWNTIME (Mins) M | E | O | X = Y | REASONS FOR DOWNTIME |
|---|---|---|---|---|---|---|
| 737 | 738 | 1 | | | | Delay Saws |
| | | | | | | |
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Downtime Code: M - Mechanical E - Electrical O - Operator

18

LINE I
PRESS RTO
CHART
6-8-94




19

w-8-14 I. L

1482

RECOVERY CHAMBER

| | #1 | #2 | #3 | #4 | #5 | INLET PRESS. | BURNERS B #1 | BURNERS B #2 | INLET TEMP. | COMBUST. CHAMBER TEMP. | EXHAUST TEMP. | ΔP AMPS | GAS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 7:00 | [illegible] | 421 | 475 | 441 | [illegible] | 4.0 W.C. | [illegible] | 1589 | 106 | 1552 | 235 | 14.3 | 017540 |
| 7:15 | 395 | 421 | 477 | 438 | 416 | 3.6 W.C. | 1595 | 1606 | 107 | 1538 | 235 | 13.4 | 017542 |
| 7:30 | 389 | 423 | 471 | 442 | 433 | 3.7 W.C. | 1615 | 1584 | 107 | 1552 | 234 | 14.4 | 017544 |
| 7:45 | 391 | 422 | 479 | 439 | 497 | 3.6 W.C. | 1590 | 1607 | 109 | 1541 | 235 | 13.4 | 017546 |
| 8:00 | 391 | 424 | 478 | 444 | 432 | 3.7 W.C. | 1612 | 1582 | 109 | 1553 | 234 | 14.3 | 017548 |
| 8:15 | 393 | 423 | 471 | 443 | 496 | 3.6 W.C. | 1588 | 1607 | 107 | 1540 | 237 | 13.8 | 017550 |
| 8:30 | 392 | 421 | 478 | 446 | 458 | 3.8 W.C. | 1620 | 1609 | 109 | 1552 | 238 | 14.3 | 017552 |
| 8:45 | 392 | 424 | 476 | 443 | 471 | 3.7 W.C. | 1591 | 1596 | 109 | 1541 | 234 | 13.9 | 017554 |
| 9:00 | 393 | 424 | 478 | 448 | 461 | 3.7 W.C. | 1619 | 1610 | 109 | 1554 | 239 | 14.3 | 017556 |
| 9:15 | 393 | 424 | 479 | 446 | 468 | 3.6 W.C. | 1576 | 1590 | 110 | 1532 | 234 | 13.9 | 017558 |
| 9:30 | 394 | 424 | 478 | 450 | 466 | 3.8 W.C. | 1620 | 1611 | 111 | 1552 | 239 | 14.2 | 017560 |
| 9:45 | 393 | 424 | 480 | 448 | 459 | 3.7 W.C. | 1580 | 1590 | 110 | 1534 | 234 | 13.9 | 017562 |
| 10:00 | 395 | 424 | 480 | 452 | 477 | 3.6 W.C. | 1612 | 1607 | 110 | 1552 | 239 | 13.9 | 017565 |
| 10:15 | 394 | 425 | 478 | 452 | 448 | 3.8 W.C. | 1590 | 1589 | 112 | 1539 | 234 | 13.9 | 017567 |
| 10:30 | 396 | 424 | 478 | 453 | 470 | 3.8 W.C. | 1607 | 1612 | 112 | 1548 | 239 | 13.8 | 017569 |
| 10:45 | 395 | 426 | 478 | 454 | 431 | 3.8 W.C. | 1596 | 1585 | 114 | 1547 | 235 | 14.0 | 017571 |
| 11:00 | 396 | 425 | 480 | 453 | 449 | 3.8 W.C. | 1596 | 1611 | 114 | 1544 | 240 | 13.7 | 017573 |
| 11:15 | 396 | 427 | 478 | 457 | 439 | 3.7 W.C. | 1612 | 1583 | 112 | 1552 | 238 | 14.2 | 017575 |
| 11:30 | 397 | 425 | 483 | 453 | 498 | 3.7 W.C. | 1602 | 1603 | 112 | 1542 | 241 | 13.7 | 017577 |
| 11:45 | 397 | 426 | 480 | 459 | 449 | 3.7 W.C. | 1622 | 1599 | 114 | 1557 | 242 | 14.0 | 017579 |
| 12:00 | 396 | 427 | 480 | 459 | 441 | 3.8 W.C. | 1596 | 1585 | 115 | 1545 | 235 | 13.8 | 017581 |
| 12:15 | 397 | 426 | 482 | 456 | 501 | 3.7 W.C. | 1591 | 1607 | 114 | 1540 | 241 | 13.7 | 017583 |
| 12:30 | 396 | 428 | 480 | 460 | 443 | 3.9 W.C. | 1617 | 1589 | 114 | 1554 | 241 | 14.1 | 017585 |
| 12:45 | 397 | 426 | 482 | 455 | 491 | 3.6 W.C. | 1578 | 1599 | 114 | 1536 | 241 | 13.7 | 017587 |
| 1:00 | 398 | 428 | 480 | 461 | 460 | 3.7 W.C. | 1623 | 1605 | 114 | 1556 | 242 | 14.1 | 017589 |
| 1:15 | 397 | 427 | 481 | 457 | 468 | 3.7 W.C. | 1578 | 1593 | 114 | 1534 | 238 | 13.7 | 017591 |

LINE 1 THERMAL OIL HEATER - JUNE 9, - POM

| | | | | | | |
|---|---|---|---|---|---|---|
| DATA TIME: | START= | 08:40 | END= | 11:30 | HOURS= | 2.83 |
| | START= | 12:40 | END= | 14:30 | HOURS= | 1.83 |
| | START= | 16:10 | END= | 18:20 | HOURS= | 2.17 |
| | | | | | total | 6.83 |

BOARD WEIGHTS - LBS

weights of approximately every 25th untrimmed board (from press tapes)
19/32 and15/32" thickness

| | | | | |
|---|---|---|---|---|
| 254 | 258 | 199 | 216 | 208 |
| 246 | 255 | 201 | 218 | 210 |
| 254 | 255 | 209 | 213 | 210 |
| 246 | 258 | 210 | 212 | 214 |
| 244 | 259 | 211 | 213 | 211 |
| 242 | 264 | 211 | 212 | 217 |
| 245 | 259 | 209 | 210 | 212 |
| 250 | 263 | 209 | 209 | 208 |
| 250 | 252 | 205 | 212 | 210 |
| 252 | 254 | 209 | 207 | |
| 257 | 199 | 214 | 210 | |

227.08 lb=average untrimmed mat weight

213 lb=average finished board weight (untrimmed mat weight-weight of trim)

6.2% =trim %

PLANT PRODUCTION RATE

6.83 =hours during testing
107 =pressloads
1284 =no. of 8'x16' boards produced (pressloads x12 boards per load)
273492 =lbs of finished product (boards produced x weight of finished board)
40024 =lbs of finished product per hour (lbs of finshed product / hours)

20.01 =tons of finished product per hour (lbs of finshed product per hour / 2000 lb)

FUEL BURNING RATE ESTIMATED BY BARK INPUT

K1

10 =K1 fuel calibration in pounds per count
681 =K1 counts during testing hours
6810 =K1 lbs of wet fuel burned during testing
6.83 =hours during testing
37.8% =average moisture content of fuel
4237 =total pounds of dry fuel burned during testing ( wet pounds x (1- moisture content))
620 =lbs of dry fuel burned per hour during testing (pounds of dry fuel / testing hours)
0.31 =tons of dry fuel burned per hour during testing (pounds of dry fuel / 2000 lbs)
9000 =estimated BTU content per pound of dry fuel,
5.58 =estimated mmbtu input per hour (lbs of dry fuel per hour x btu content)

K2

10 =K1 fuel calibration in pounds per count
677 =K1 counts during testing hours
6770 =K1 lbs of wet fuel burned during testing
6.83 =hours during testing
37.8% =average moisture content of fuel
4212 =total pounds of dry fuel burned during testing ( wet pounds x (1- moisture content))
616 =lbs of dry fuel burned per hour during testing (pounds of dry fuel / testing hours)
0.31 =tons of dry fuel burned per hour during testing (pounds of dry fuel / 2000 lbs)
9000 =estimated BTU content per pound of dry fuel,
5.54 =estimated mmbtu input per hour (lbs of dry fuel per hour x btu content)

LINE 1 THERMAL OIL HEATER - JUNE 9, - PHENOL, BENZENE

| | | | | | | |
|---|---|---|---|---|---|---|
| DATA TIME: | START= | 08:40 | END= | 11:30 | HOURS= | 2.83 |
| | START= | 12:30 | END= | 13:20 | HOURS= | 0.83 |
| | | | | | total= | 3.67 |

OARD WEIGHTS - LBS

weights of approximately every 25th untrimmed board (from press tapes)
7/16 and 1/2"

| | | |
|---|---|---|
| 254 | 257 | 252 |
| 246 | 258 | 254 |
| 254 | 255 | 199 |
| 246 | 255 | 199 |
| 244 | 258 | 201 |
| 242 | 259 | 209 |
| 245 | 264 | 210 |
| 250 | 259 | |
| 250 | 263 | |
| 252 | 256 | |

244.11 lb=average untrimmed mat weight

228.98 lb=average finished board weight (untrimmed mat weight-weight of trim)

6.2% =trim %

PLANT PRODUCTION RATE

3.67 =hours during testing
53 =pressloads
636 =no. of 8'x16' boards produced (pressloads x 12 boards per load)
145631 =lbs of finished product (boards produced x weight of finished board)
39718 =lbs of finished product per hour (lbs of finshed product / hours)

19.86 =tons of finished product per hour (lbs of finshed product per hour / 2000 lb)

FUEL BURNING RATE ESTIMATED BY BARK INPUT

K1

10 =K1 fuel calibration in pounds per count
314 =K1 counts during testing hours
3140 =K1 lbs of wet fuel burned during testing
3.67 =hours during testing
38.0% =average moisture content of fuel
1946 =total pounds of dry fuel burned during testing ( wet pounds x (1- moisture content))
531 =lbs of dry fuel burned per hour during testing (pounds of dry fuel / testing hours)
0.27 =tons of dry fuel burned per hour during testing (pounds of dry fuel / 2000 lbs)
9000 =estimated BTU content per pound of dry fuel,
4.78 =estimated mmbtu input per hour (lbs of dry fuel per hour x btu content)

K2

10 =K2 fuel calibration in pounds per count
296 =K2 counts during testing hours
2960 =K2 lbs of wet fuel burned during testing
3.67 =hours during testing
38.0% =average moisture content of fuel
1834 =total pounds of dry fuel burned during testing ( wet pounds x (1- moisture content))
500 =lbs of dry fuel burned per hour during testing (pounds of dry fuel / testing hours)
0.25 =tons of dry fuel burned per hour during testing (pounds of dry fuel / 2000 lbs)
9000 =estimated BTU content per pound of dry fuel,
4.5 =estimated mmbtu input per hour (lbs of dry fuel per hour x btu content)

LINE 1 THERMAL OIL HEATER - JUNE 9, - FORMALDEHYDE

| | | | | | | |
|---|---|---|---|---|---|---|
| DATA TIME: | START= | 13:40 | END= | 14:20 | HOURS= | 0.67 |
| | START= | 16:30 | END= | 19:00 | HOURS= | 2.50 |
| | | | | | total | 3.17 |

BOARD WEIGHTS - LBS

weights of approximately every 25th untrimmed board (from press tapes)

| | | |
|---|---|---|
| 211 | 209 | 212 |
| 209 | 212 | 208 |
| 209 | 207 | 210 |
| 205 | 210 | 215 |
| 209 | 208 | 215 |
| 214 | 210 | 220 |
| 216 | 210 | 216 |
| 213 | 214 | |
| 212 | 211 | |
| 210 | 217 | |

211.56 lb=average untrimmed mat weight

198.44 lb=average finished board weight (untrimmed mat weight-weight of trim)

6.2% =trim %

PLANT PRODUCTION RATE

3.17 =hours during testing
56 =pressloads
672 =no. of 8'x16' boards produced (pressloads x12boards per load)
133352 =lbs of finished product (boards produced x weight of finished board)
42111 =lbs of finished product per hour (lbs of finshed product / hours)

21.06 =tons of finished product per hour (lbs of finshed product per hour / 2000 lb)

FUEL BURNING RATE ESTIMATED BY BARK INPUT

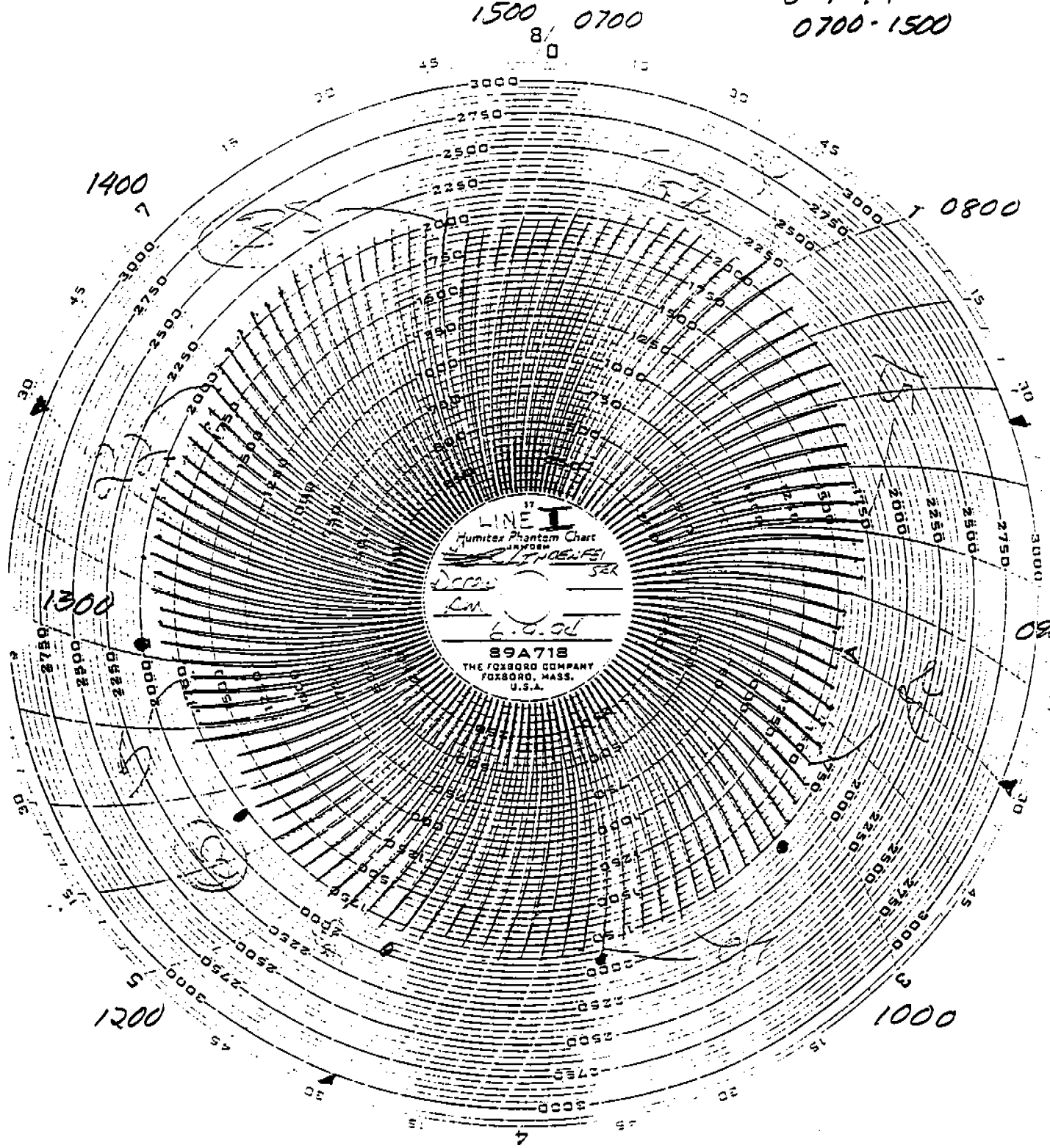
K1

10 =K1 fuel calibration in pounds per count
286 =K1 counts during testing hours
2860 =K1 lbs of wet fuel burned during testing
3.17 =hours during testing
38.3% =average moisture content of fuel
1765 =total pounds of dry fuel burned during testing ( wet pounds x (1- moisture content))
557 =lbs of dry fuel burned per hour during testing (pounds of dry fuel / testing hours)
0.28 =tons of dry fuel burned per hour during testing (pounds of dry fuel / 2000 lbs)
9000 =estimated BTU content per pound of dry fuel,
5.01 =estimated mmbtu input per hour (lbs of dry fuel per hour x btu content)

K2

10 =K1 fuel calibration in pounds per count
302 =K1 counts during testing hours
3020 =K1 lbs of wet fuel burned during testing
3.17 =hours during testing
38.3% =average moisture content of fuel
1864 =total pounds of dry fuel burned during testing ( wet pounds x (1- moisture content))
589 =lbs of dry fuel burned per hour during testing (pounds of dry fuel / testing hours)
0.29 =tons of dry fuel burned per hour during testing (pounds of dry fuel / 2000 lbs)
9000 =estimated BTU content per pound of dry fuel,
5.3 =estimated mmbtu input per hour (lbs of dry fuel per hour x btu content)

LINE I
DRESS CHART
6-9-94
0700-1500

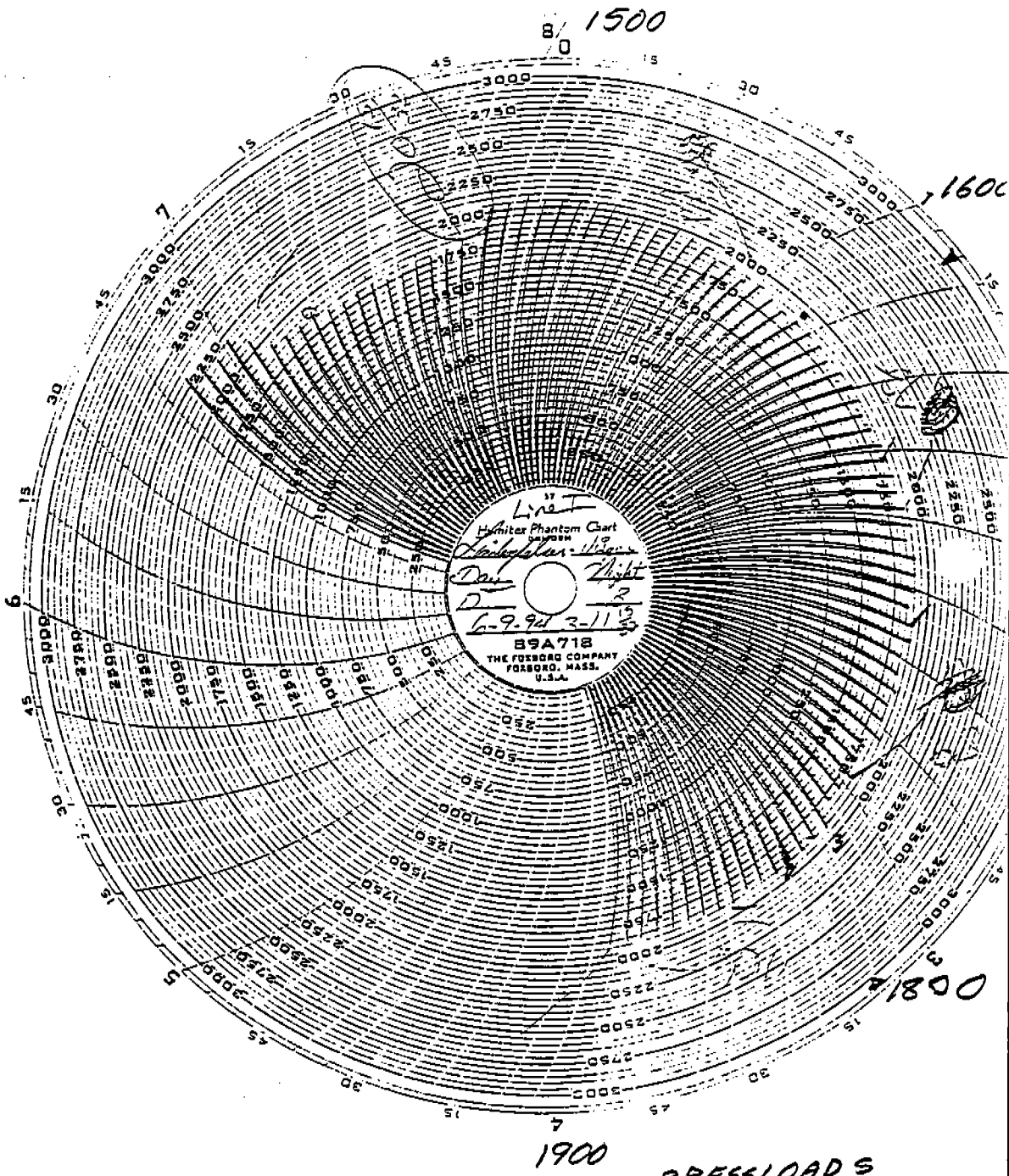



0930-1330 = 57
0840-1130 = 40
1240-1430 = 31
1230-1320 = 13

1340-1420 = 12

24.

LINE I
PRESS CHA
6-9-94
1500 - 2300




PRESSLOADS
1610 - 1820 = 36
1630 - 1900 = 43

LOUISIANA-PACIFIC CORPORATION
HAYWARD, WI

PRESS REPORT - LINE 1

OPERATOR Lindenfelser SHIFT AM CREW D DATE 6-9-94

THICKNESS: 3/8 PRESS LOADS 15 3/8 - 65 19/32 106 T

OVERALL TIMER: 152 DECOMPRESSION TIME 15

PRESS TEMP: 210 TOTAL REELS:

LOG COUNT: 8487

P.C.O.S. END RADIATOR 8:46

Cleaned Elevator Strands & Tracks

Cleaned Deckle Chains

Press Blown Down 8:55

Headers Cleaned YES/NO

How Many

Former End Radiator

| LINE SPEED | FROM | TO |
|---|---|---|
| 60 3/8 | 7:00 | 7:49 |
| 47 17/32 | 7:49 | 12:45 |
| 58' 7/32 | 12:45 | 7:00 |
| | | |
| | | |

3/8 = 384,637

| DOWNTIME FROM | DOWNTIME TO | DOWNTIME (Mins) M | E | O | KEY | REASONS FOR DOWNTIME |
|---|---|---|---|---|---|---|
| 8:06 | 8:08 | X | | | 2 | Dropped headbar at 46. |
| 8:10 | 8:11 | | X | | 1 | Loader boom tripped. |
| 8:27 | 8:28 | | X | | 1 | " " " |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |

Downtime Code: M - Mechanical E - Electrical O - Operator

26

LINE 1 PRESS TESTING JUNE 10, 1994 - TSP, VOC, CO, NOX

DATA TIME START= 09:30 END= 13:30 HOURS= 4.00

BOARD WEIGHTS - LBS

weights of approximately every 25th untrimmed board (from press tapes)

19/32&15/32

| | | | |
|---|---|---|---|
| 194 | 190 | 200 | 191 |
| 194 | 187 | 193 | 193 |
| 197 | 185 | 196 | 193 |
| 191 | 189 | 197 | 190 |
| 189 | 185 | 195 | 189 |
| 189 | 191 | 198 | 194 |
| 187 | 192 | 199 | 188 |
| 190 | 201 | 189 | |
| 189 | 197 | 192 | |
| 188 | 192 | 192 | |

192.18 lb=average untrimmed mat weight

180.26 lb=average finished board weight (untrimmed mat weight-weight of trim)

6.2% =trim %

PLANT PRODUCTION RATE

4.00 =hours during testing
70 =pressloads
840 =no. of 8'x16' boards produced (pressloads x12 boards per load)
151418 =lbs of finished product (boards produced x weight of finished board)
37855 =lbs of finished product per hour (lbs of finshed product / hours)
18.93 =tons of finished product per hour (lbs of finshed product per hour / 2000 lb)

$\frac{840 \times 8 \times 16}{4} = 26.88 \frac{msf}{hr} \; 7/10$

RESIN USAGE FROM TANK MEASUREMENTS

Note: common tanks supply wax and resin to both Line 1 and Line 2. Usage for one line is estimated by proportioning the total usage by the footage (3/8" basis) for each line)

MEASUREMENT SUMMARY:

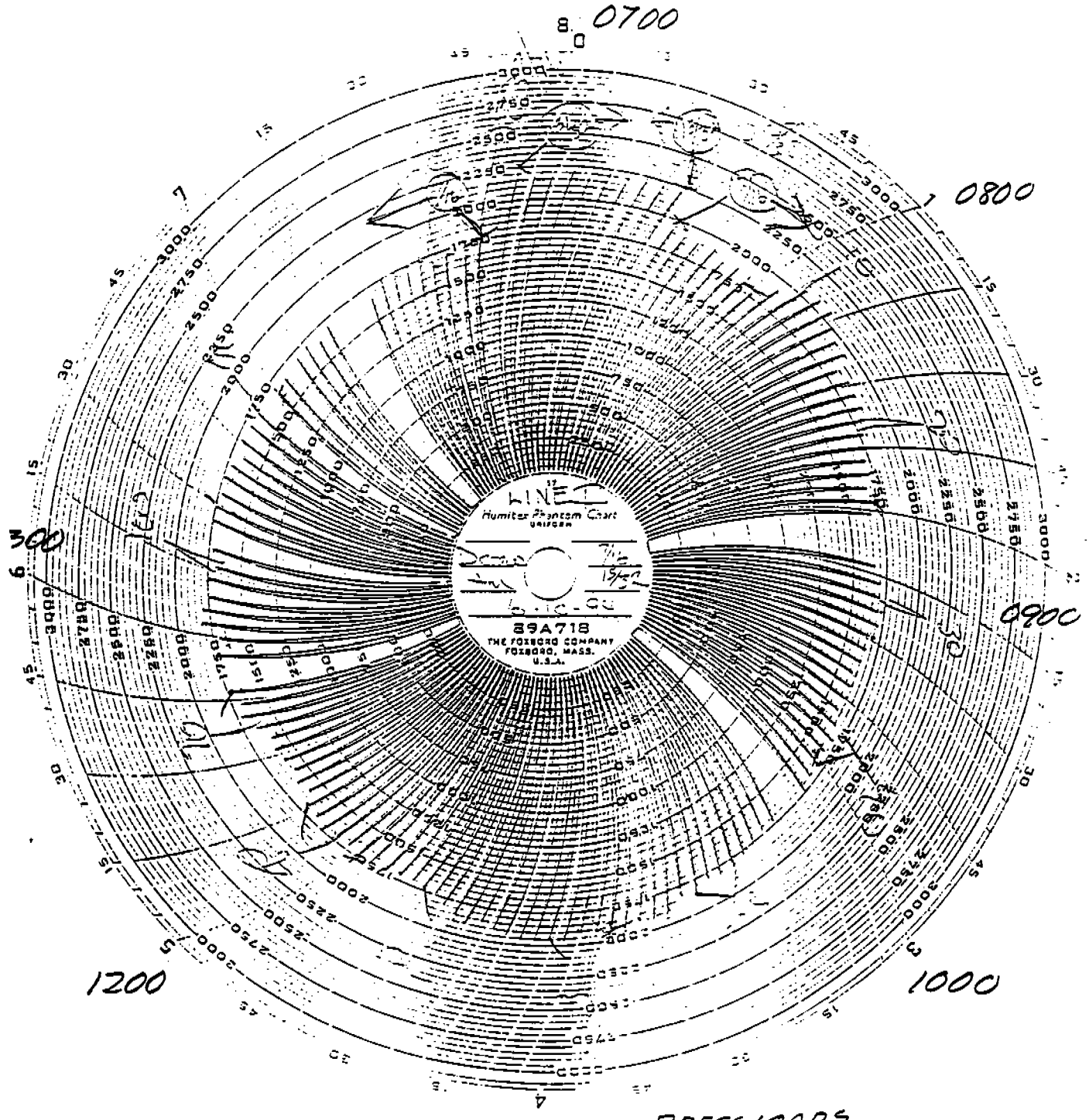
| time | line 1 footage | line 2 footage | MDI lbs | PHENOLIC 61% solids lbs | PHENOLIC 100% solids lbs | WAX 58% solids lbs | WAX 100% solids lbs |
|---|---|---|---|---|---|---|---|
| 09:00 | 32257 | 30465 | 820 | 2376 | 1449 | 1527 | 886 |
| 10:00 | 28673 | 32257 | 521 | 2497 | 1523 | 764 | 443 |
| 11:00 | 32257 | 30465 | 522 | 2508 | 1530 | 764 | 443 |
| 12:00 | 34049 | 30465 | 745 | 2285 | 1394 | 1145 | 664 |
| 13:00 | 30465 | 8960 | 149 | 1436 | 876 | 382 | 222 |
| 14:00 | 28673 | 28673 | 669 | 2335 | 1424 | 1146 | 665 |
| hourly average | 31062 | 26881 | 571 | 2240 | 1366 | 955 | 554 |
| Line 1 | | | 341 | | 816 | | 331 |
| Line 2 | | | 230 | | 550 | | 223 |

37855 =average lbs. per hour finished product produced during testing
341 =average lbs. per hour of MDI resin used during testing
0.90% = MDI resin used as % of finished product

816 =average lbs. per hour of phenolic resin (100% solids) used during testing
2.16% =Phenolic resin used as % of finished product

331 =average lbs. per hour of wax (100% solids) used during testing
0.87% =wax used as % of finished product

LINE I
PRESS CHART
6-10-94
0700 - 1500




PRESSLOADS
0930 - 1330 = 70

28

LOUISIANA-PACIFIC CORPORATION
HAYWARD, WI

PRESS REPORT - LT

OPERATOR Dan Sorer SHIFT Days CREW D DATE 6-1

THICKNESS: 15/32 7/16 PRESS LOADS 10 15/32 140 7/16 15

OVERALL TIMER: 165 - 138 DECOMPRESSION TIME 17

PRESS TEMP: 210 TOTAL RECEIPTS: =

LOG COUNT: 6717

F.C.O.S. END RADIATOR 8:10

Cleaned Blender Screens & Socks =

Cleaned Deckle Chains =

Press Blown Down 8:10

Headbars Cleaned = YES/NO =

How Many =

Former End Radiator = T

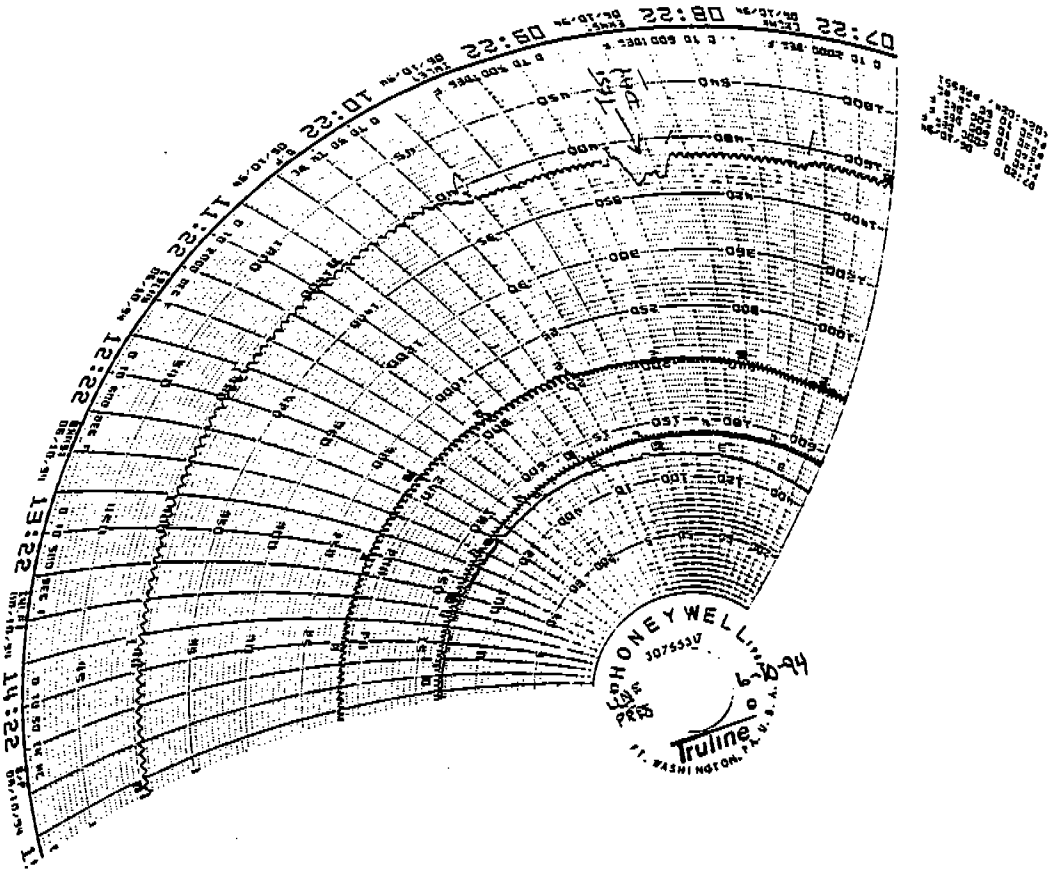
| LINE SPEED | FROM | TO |
|---|---|---|
| 58 | 7:00 | |
| 65 | 7:32 | 7/16 |
| 36 | 3:48 | 13/32 SE |
| 25 | 5:15 | |
| | | |

| DOWNTIME FROM | DOWNTIME TO | DOWNTIME (Mins) M | E | O | X E Y | REASONS FOR DOWNTIME |
|---|---|---|---|---|---|---|
| 8:04 | 8:15 | | | | 11 | BAKE AT SAWS |
| 10:15 | 10:18 | | | | 3 | LINER NOT MADE F#1, L |
| 12:50 | 12:56 | | | | 6 | LOWER LINER F#7 (ALSO N |
| 1:22 | 1:23 | | | | 1 | L.D. OVERTRAVEL |
| 1:33 | 1:34 | | | | 2 | NO AUTO INDEX |
| 1:48 | 1:49 | | | | 1 | " " " |
| 1:54 | 1:56 | | | | 2 | " " " |
| 2:04 | 2:06 | | | | 2 | ADJUST LINERS |
| 2:18 | 2:26 | | | | 8 | ADJUSTING L.D. |
| 2:28 | 2:29 | | | | 1 | F1 #7 NOT MADE... |
| 2:51 | 2:52 | | | | 1 | DROPPED H B F1 #12 Loade |
| 5:29 | 6:46 | | | | 76 | RTO DRYERS Down |
| | | | | | | |
| | | | | | | |
| | | | | | | |

Downtime Code: M - Mechanical E - Electrical O - Operator

29

LINE I
PRESS RTO
CHART
6-10-94




30

# LINE I PRESS . 6-10-94

| | #1 | #2 | #3 | #4 | #5 | INLET PRESS. | BURNERS B #1 | BURNERS B #2 | INLET TEMP. | COMBUST. CHAMBER TEMP. | EXHAUST TEMP. | AMP. | GAS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 8A | 399 | 420 | 478 | 453 | 458 | 3.7 | 1583 | 1592 | 113 | 1537 | 235 | 14.1 | 017933 |
| 8:15 | 400 | 420 | 477 | 457 | 488 | 3.7 | 1582 | 1574 | 114 | 1532 | 240 | 13.7 | 017935 |
| 8:30 | 401 | 423 | 478 | 461 | 445 | 3.8 | 1578 | 1566 | 115 | 1536 | 237 | 13.9 | 017937 |
| 8:45 | 403 | 424 | 482 | 460 | 489 | 3.7 | 1553 | 1576 | 116 | 1523 | 243 | 13.8 | 017940 |
| 9A | 405 | 425 | 482 | 467 | 444 | 3.8 | 1596 | 1566 | 116 | 1546 | 243 | 13.9 | 017942 |
| 9:15 | 406 | 427 | 483 | 468 | 462 | 3.8 | 1485 | 1501 | 117 | 1469 | 241 | 13.7 | 017943 |
| 9:30 | 408 | 428 | 481 | 475 | 461 | 3.8 | 1622 | 1596 | 116 | 1548 | 246 | 13.9 | 017946 |
| 9:45 | 409 | 430 | 481 | 477 | 445 | 3.8 | 1558 | 1541 | 117 | 1519 | 242 | 13.6 | 017947 |
| 10A | 411 | 430 | 482 | 477 | 493 | 3.7 | 1554 | 1554 | 119 | 1516 | 245 | 13.6 | 017949 |
| 10:15 | 412 | 432 | 483 | 475 | 506 | 3.6 | 1540 | 1555 | 122 | 1506 | 248 | 13.6 | 017951 |
| 10:30 | 413 | 434 | 482 | 478 | 481 | 3.5 | 1530 | 1546 | 119 | 1514 | 247 | 13.8 | 017954 |
| 10:45 | 413 | 439 | 482 | 486 | 456 | 3.7 | 1620 | 1589 | 121 | 1569 | 252 | 13.4 | 017957 |
| 11A | 412 | 444 | 482 | 484 | 485 | 3.6 | 1606 | 1592 | 120 | 1561 | 253 | 13.4 | 017959 |
| 11:16 | 413 | 441 | 484 | 476 | 8531 | 3.5 | 1668 | 1599 | 121 | 1554 | 253 | 13.4 | 017962 |
| 11:30 | 413 | 442 | 483 | 481 | 466 | 3.7 | 1581 | 1587 | 123 | 1558 | 248 | 13.7 | 017964 |
| 11:45 | 416 | 442 | 482 | 498 | 448 | 3.8 | 1618 | 1586 | 122 | 1568 | 254 | 13.3 | 017966 |
| 12P | 420 | 441 | 485 | 488 | 486 | 3.6 | 1604 | 1599 | 123 | 1564 | 255 | 13.3 | 017969 |
| 12:15 | 421 | 441 | 489 | 481 | 533 | 3.4 | 1567 | 1596 | 122 | 1554 | 257 | 13.3 | 017971 |
| 12:30 | 423 | 444 | 486 | 494 | 458 | 3.5 | 1615 | 1593 | 123 | 1568 | 257 | 13.2 | 017973 |
| 12:45 | 426 | 443 | 489 | 492 | 502 | 3.6 | 1598 | 1596 | 123 | 1561 | 257 | 13.3 | 017976 |
| 1P | 426 | 445 | 491 | 489 | 496 | 3.4 | 1566 | 1586 | 124 | 1552 | 257 | 13.5 | 017978 |
| 1:15 | 429 | 444 | 494 | 487 | 529 | 3.5 | 1562 | 1590 | 124 | 1552 | 258 | 13.2 | 017980 |
| 1:30 | 432 | 445 | 494 | 491 | 541 | 3.4 | 1570 | 1593 | 123 | 1554 | 258 | 13.2 | 017982 |
| 1:45 | | | | | | | | | | | | | |
| 2P | | | | | | | | | | | | | |
| 2:15 | | | | | | | | | | | | | |

LINE 2 THERMAL OIL HEATER JUNE 7, - POM

| | | | | | | |
|---|---|---|---|---|---|---|
| DATA TIME: | START= | 08:20 | END= | 13:40 | HOURS= | 5.33 |
| | START= | 14:25 | END= | 16:30 | HOURS= | 2.08 |
| | | | | | total | 7.42 |

BOARD WEIGHTS - LBS

weights of approximately every 25th untrimmed board (from press tapes)

7/16"

| | | | |
|---|---|---|---|
| 198 | 198 | 198 | 196 |
| 200 | 192 | 196 | 192 |
| 196 | 194 | 196 | 196 |
| 194 | 190 | 188 | 200 |
| 194 | 200 | 192 | 202 |
| 192 | 200 | 192 | 196 |
| 192 | 198 | 190 | 188 |
| 194 | 202 | 188 | 194 |
| 190 | 204 | 186 | 194 |
| 192 | 204 | 188 | 184 |
| 194 | 208 | 190 | 196 |
| 190 | 192 | 190 | 182 |
| 192 | 196 | 192 | 190 |
| 192 | 198 | 190 | |
| 190 | 196 | 194 | |

194 lb=average untrimmed mat weight

178.67 lb=average finished board weight (untrimmed mat weight-weight of trim)

7.9% =trim %

PLANT PRODUCTION RATE

7.42 =hours during testing
122 =pressloads
1464 =no. of 8'x16' boards produced (pressloads x 12boards per load)
261573 =lbs of finished product (boards produced x weight of finished board)
35269 =lbs of finished product per hour (lbs of finshed product / hours)

17.63 =tons of finished product per hour (lbs of finshed product per hour / 2000 lb)
note -press down from

FUEL BURNING RATE ESTIMATED BY BARK INPUT

K3

10 =K3 fuel calibration in pounds per count
1460 =K3 counts during testing hours
14600 =K3 lbs of wet fuel burned during testing
5.33 =hours during testing
39.4% =average moisture content of fuel
8843 =total pounds of dry fuel burned during testing ( wet pounds x (1- moisture content))
1658 =lbs of dry fuel burned per hour during testing (pounds of dry fuel / testing hours)
0.83 =tons of dry fuel burned per hour during testing (pounds of dry fuel / 2000 lbs)
9000 =estimated BTU content per pound of dry fuel,
14.92 =estimated mmbtu input per hour (lbs of dry fuel per hour x btu content)

K4

10 =K4 fuel calibration in pounds per count
358 =K4 counts during testing hours
3580 =K4 lbs of wet fuel burned during testing
5.33 =hours during testing
39.4% =average moisture content of fuel
2168 =total pounds of dry fuel burned during testing ( wet pounds x (1- moisture content))
407 =lbs of dry fuel burned per hour during testing (pounds of dry fuel / testing hours)
0.2 =tons of dry fuel burned per hour during testing (pounds of dry fuel / 2000 lbs)
9000 =estimated BTU content per pound of dry fuel,
3.66 =estimated mmbtu input per hour (lbs of dry fuel per hour x btu content)

LINE 2 THERMAL OIL HEATER JUNE 7, BENZENE

| | | | | | | |
|---|---|---|---|---|---|---|
| DATA TIME: | START= | 08:50 | END= | 12:40 | HOURS= | 3.83 |
| | START= | 14:30 | END= | 15:40 | HOURS= | 1.17 |
| | | | | | total | 5.00 |

BOARD WEIGHTS - LBS

weights of approximately every 25th untrimmed board (from press tapes)

7/16"

| | | | |
|---|---|---|---|
| 192 | 200 | 192 | 196 |
| 192 | 198 | 190 | 188 |
| 194 | 202 | 188 | |
| 190 | 204 | 186 | |
| 192 | 204 | 188 | |
| 194 | 208 | 190 | |
| 190 | 192 | 190 | |
| 192 | 196 | 192 | |
| 192 | 198 | 190 | |
| 190 | 196 | 194 | |
| 198 | 198 | 196 | |
| 192 | 196 | 192 | |
| 194 | 196 | 196 | |
| 190 | 188 | 200 | |
| 200 | 192 | 202 | |

194.26 lb=average untrimmed mat weight

178.91 lb=average finished board weight (untrimmed mat weight-weight of trim)

7.9% =trim %

PLANT PRODUCTION RATE

5.00 =hours during testing
95 =pressloads
1140 =no. of 8'x16' boards produced (pressloads x12 boards per load)
203957 =lbs of finished product (boards produced x weight of finished board)
40792 =lbs of finished product per hour (lbs of finshed product / hours)

20.40 =tons of finished product per hour (lbs of finshed product per hour / 2000 lb)
note -press down from

FUEL BURNING RATE ESTIMATED BY BARK INPUT

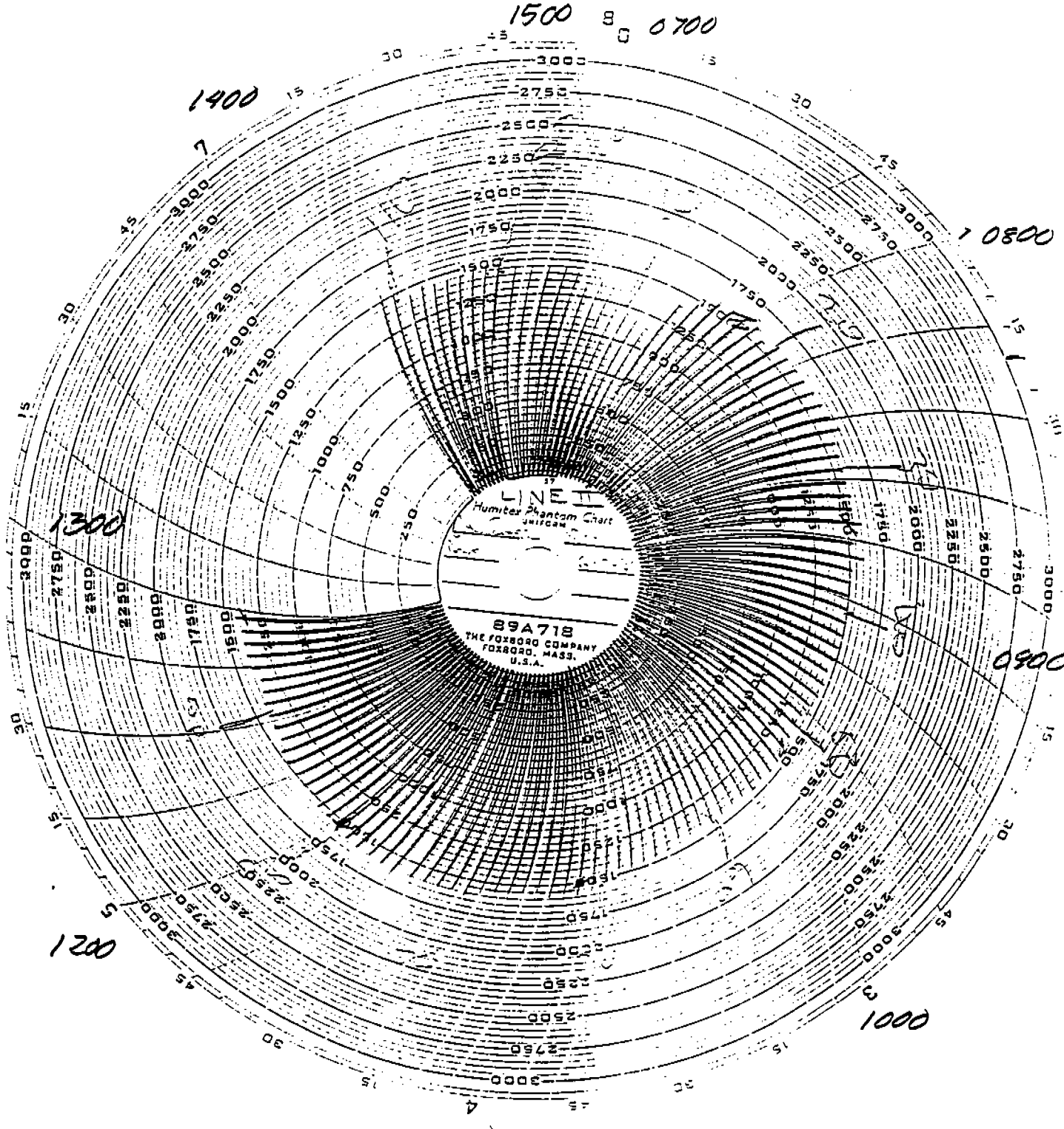
K3

10 =K3 fuel calibration in pounds per count
974 =K3 counts during testing hours
9740 =K3 lbs of wet fuel burned during testing
3.83 =hours during testing
38.9% =average moisture content of fuel
5949 =total pounds of dry fuel burned during testing ( wet pounds x (1- moisture content))
1552 =lbs of dry fuel burned per hour during testing (pounds of dry fuel / testing hours)
0.78 =tons of dry fuel burned per hour during testing (pounds of dry fuel / 2000 lbs)
9000 =estimated BTU content per pound of dry fuel,
13.97 =estimated mmbtu input per hour (lbs of dry fuel per hour x btu content)

K4

10 =K4 fuel calibration in pounds per count
247 =K4 counts during testing hours
2470 =K4 lbs of wet fuel burned during testing
3.83 =hours during testing
38.9% =average moisture content of fuel
1509 =total pounds of dry fuel burned during testing ( wet pounds x (1- moisture content))
394 =lbs of dry fuel burned per hour during testing (pounds of dry fuel / testing hours)
0.2 =tons of dry fuel burned per hour during testing (pounds of dry fuel / 2000 lbs)
9000 =estimated BTU content per pound of dry fuel,
3.55 =estimated mmbtu input per hour (lbs of dry fuel per hour x btu content)

LINE II
PRESS CHART
6-7-94



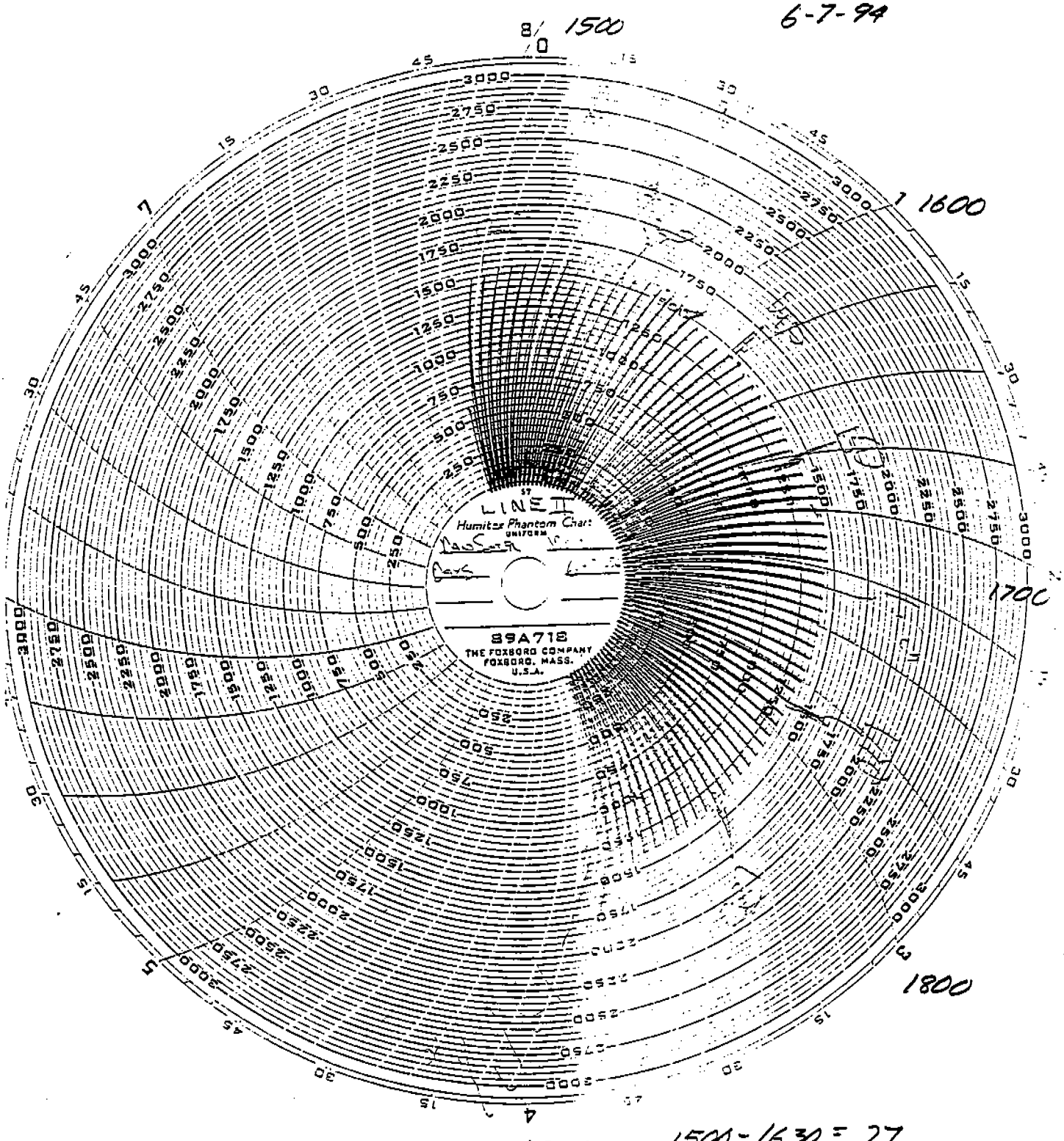

1500 0700
1400
1300
1200
1100
1000
0900
0800

1430-1500 = 9

PRESSLOADS
0820-1320 = 85
1425-1500 = 10
0850-1290 = 79

34

LINE II
PRESS CHART
6-7-94




1500
1600
1700
1800
1900

1500 - 1630 = 27
1500 - 1590 = 12

35

LOUISIANA-PACIFIC CORPORATION
HAYWARD, WI

PRESS REPORT - LINE II

OPERATOR Dan Suter SHIFT Days CREW D DATE 6-7-94

THICKNESS: 7/16 PRESS LOADS 19 4/16

OVERALL TIMER: 140 DECOMPRESSION TIME 12

PRESS TEMP: 710 TOTAL PANELS: =

LOG CODE: 7185

F.C.O.S. HOT RADIATOR 10:00

Cleaned Bleeder Screens & Tracks =

Cleaned Deckle Chains =

Press Blown Down 10:00

Members Cleaned = YES/NO =

How Many =

Former End Radiator = Time

| LINE SPEED | FROM | TO |
|---|---|---|
| 51 | 7:07 | |
| 60 | 7:45 | |
| 40 | 12:55 | |
| 69 | | |
| | | |

| DOWNTIME FROM | DOWNTIME TO | DOWNTIME (Mins) M | E | O | K E Y | REASONS FOR DOWNTIME |
|---|---|---|---|---|---|---|
| 1:00 | 2:30 | | | | 90 | OUT OF FLAKES (DRYER PROBLEMS |
| | | | | | | |
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Downtime Code: M - Mechanical E - Electrical O - Operator

36

LINE 2 THERMAL OIL HEATER - JUNE 8, - PHENOL, FORMALDEHYDE
DATA TIME: START= 14:40 END= 18:50 HOURS= 4.17

BOARD WEIGHTS - LBS
weights of approximately every 25th untrimmed board (from press tapes)
7/16"

| | | | |
|---|---|---|---|
| 196 | 192 | 192 | 190 |
| 202 | 208 | 194 | 190 |
| 206 | 198 | 198 | 188 |
| 206 | 192 | 196 | |
| 194 | 192 | 196 | |
| 198 | 196 | 198 | |
| 202 | 192 | 198 | |
| 200 | 194 | 188 | |
| 200 | 198 | 190 | |
| 200 | 194 | 190 | |

196 lb=average untrimmed mat weight

180.52 lb=average finished board weight (untrimmed mat weight-weight of trim)

7.9% =trim %

PLANT PRODUCTION RATE

4.17 =hours during testing
66 =pressloads
792 =no. of 8'x16' boards produced (pressloads x12 boards per load)
142972 =lbs of finished product (boards produced x weight of finished board)
34314 =lbs of finished product per hour (lbs of finshed product / hours)

17.16 =tons of finished product per hour (lbs of finshed product per hour / 2000 lb)
note -press down from

FUEL BURNING RATE ESTIMATED BY BARK INPUT

K3
10 =K3 fuel calibration in pounds per count
604 =K3 counts during testing hours
6040 =K3 lbs of wet fuel burned during testing
4.17 =hours during testing
38.5% =average moisture content of fuel
3713 =total pounds of dry fuel burned during testing ( wet pounds x (1- moisture content))
891 =lbs of dry fuel burned per hour during testing (pounds of dry fuel / testing hours)
0.45 =tons of dry fuel burned per hour during testing (pounds of dry fuel / 2000 lbs)
9000 =estimated BTU content per pound of dry fuel,
8.02 =estimated mmbtu input per hour (lbs of dry fuel per hour x btu content)

K4
10 =K4 fuel calibration in pounds per count
79 =K4 counts during testing hours
790 =K4 lbs of wet fuel burned during testing
4.17 =hours during testing
38.5% =average moisture content of fuel
486 =total pounds of dry fuel burned during testing ( wet pounds x (1- moisture content))
117 =lbs of dry fuel burned per hour during testing (pounds of dry fuel / testing hours)
0.06 =tons of dry fuel burned per hour during testing (pounds of dry fuel / 2000 lbs)
9000 =estimated BTU content per pound of dry fuel,
1.05 =estimated mmbtu input per hour (lbs of dry fuel per hour x btu content)

page missing in orig. report

LINE 2 THERMAL OIL HEATER JUNE 8, - TSP, CO, NOX

DATA TIME: START= 08:00 END= 12:20 HOURS= 4.33

`ARD WEIGHTS - LBS

..ights of approximately every 25th untrimmed board (from press tapes)

7/16"

| | | | |
|---|---|---|---|
| 198 | 190 | 194 | 184 |
| 194 | 188 | 196 | 190 |
| 196 | 186 | 192 | 188 |
| 200 | 188 | 190 | 188 |
| 204 | 188 | 188 | 190 |
| 204 | 188 | 188 | 198 |
| 200 | 190 | 182 | 190 |
| 192 | 192 | 182 | 186 |
| 188 | 190 | 186 | |
| 188 | 188 | 190 | |

190.89 lb=average untrimmed mat weight

175.81 lb=average finished board weight (untrimmed mat weight-weight of trim)

7.9% =trim %

PLANT PRODUCTION RATE

4.33 =hours during testing
79 =pressloads
948 =no. of 8'x16' boards produced (pressloads x 8 boards per load)
166668 =lbs of finished product (boards produced x weight of finished board)
38462 =lbs of finished product per hour (lbs of finshed product / hours)

19.23 =tons of finished product per hour (lbs of finshed product per hour / 2000 lb)
note -press down from

EL BURNING RATE ESTIMATED BY BARK INPUT

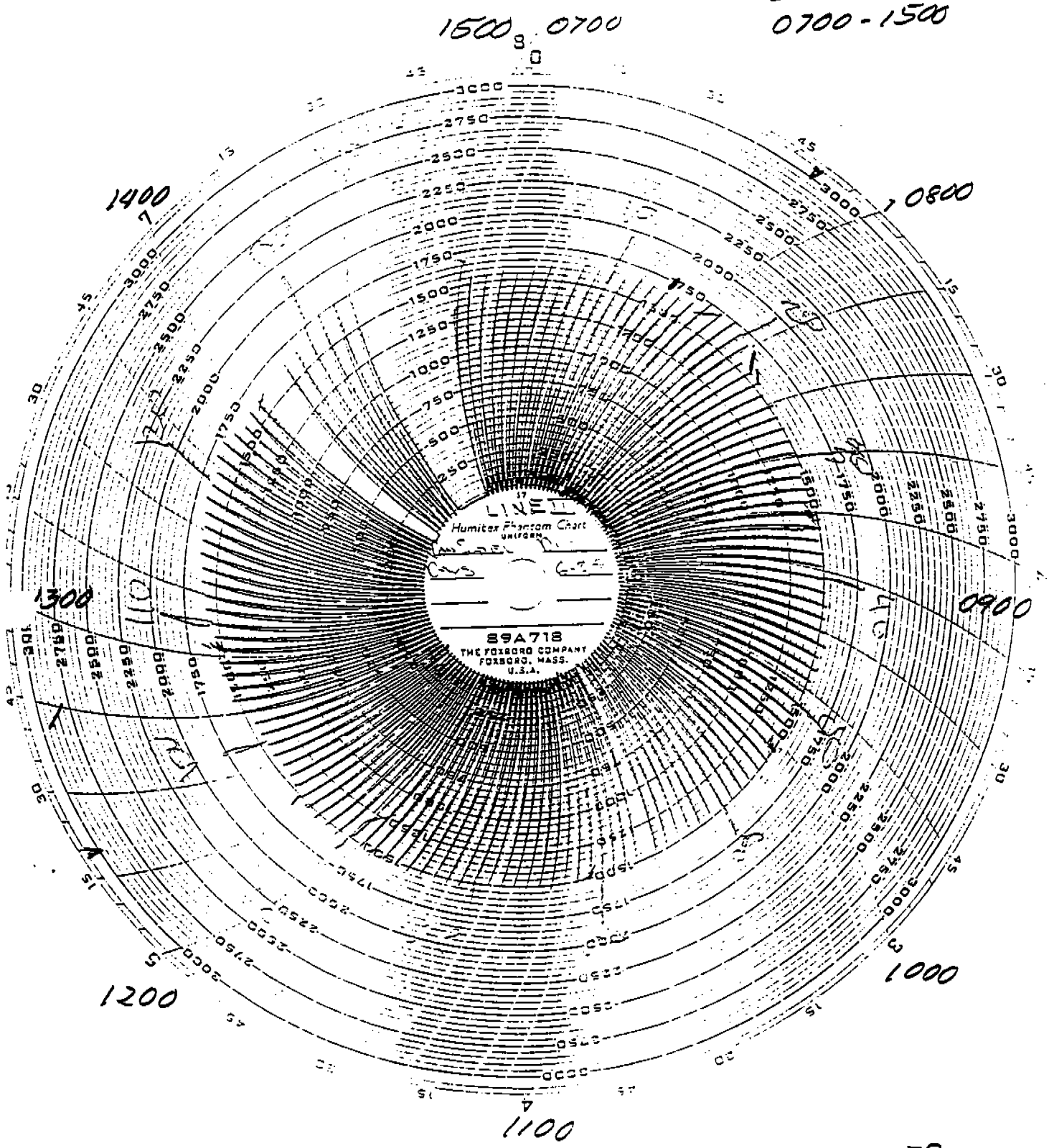
**K3**

10 =K3 fuel calibration in pounds per count
801 =K3 counts during testing hours
8010 =K3 lbs of wet fuel burned during testing
4.33 =hours during testing
39.8% =average moisture content of fuel
4819 =total pounds of dry fuel burned during testing ( wet pounds x (1- moisture content))
1112 =lbs of dry fuel burned per hour during testing (pounds of dry fuel / testing hours)
0.56 =tons of dry fuel burned per hour during testing (pounds of dry fuel / 2000 lbs)
9000 =estimated BTU content per pound of dry fuel,
**10.01** =estimated mmbtu input per hour (lbs of dry fuel per hour x btu content)

**K4**

10 =K4 fuel calibration in pounds per count
197 =K4 counts during testing hours
1970 =K4 lbs of wet fuel burned during testing
4.33 =hours during testing
39.8% =average moisture content of fuel
1185 =total pounds of dry fuel burned during testing ( wet pounds x (1- moisture content))
273 =lbs of dry fuel burned per hour during testing (pounds of dry fuel / testing hours)
0.14 =tons of dry fuel burned per hour during testing (pounds of dry fuel / 2000 lbs)
9000 =estimated BTU content per pound of dry fuel,
**2.46** =estimated mmbtu input per hour (lbs of dry fuel per hour x btu content)

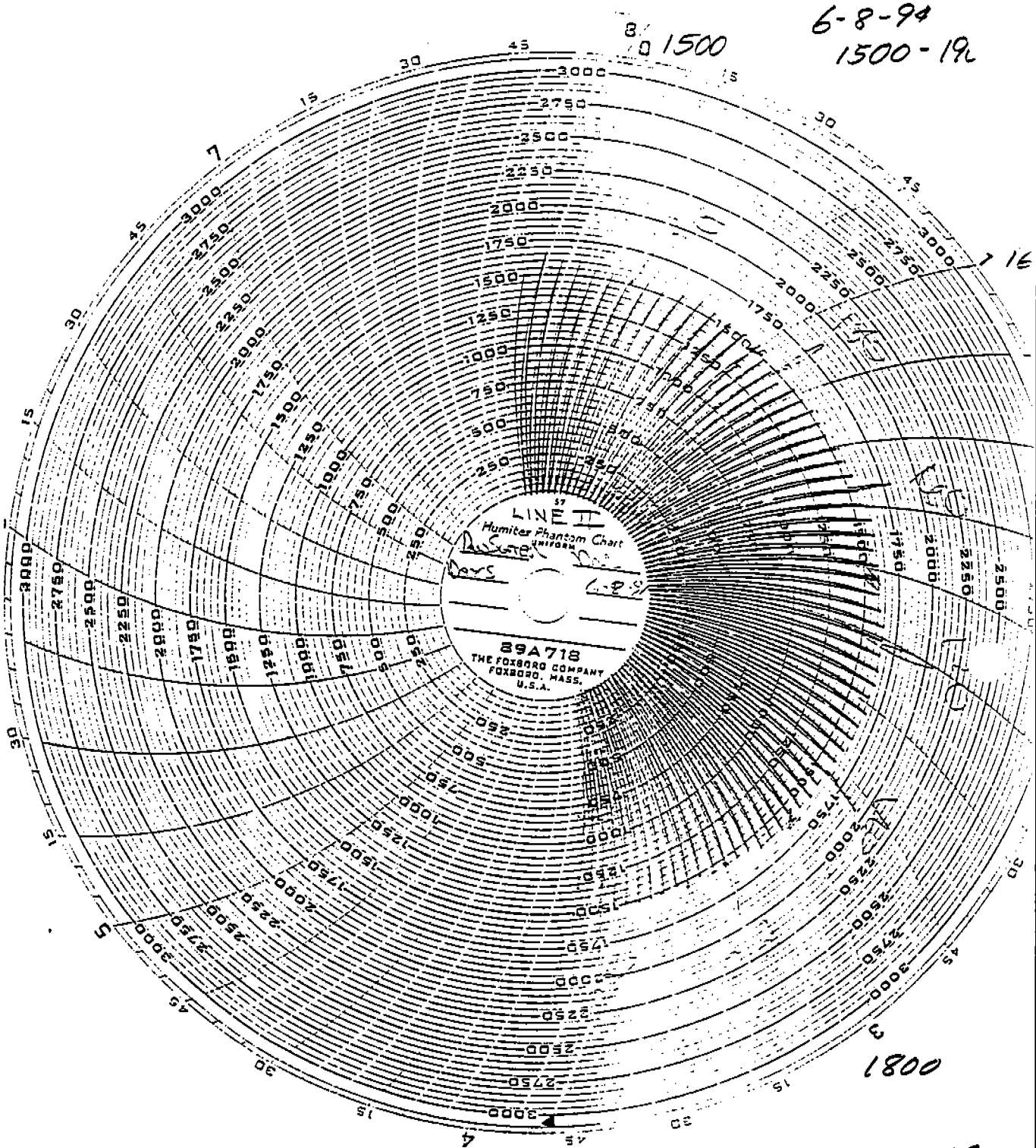
LINE II
PRESS CHART
6-8-94
0700 - 1500




0800 1220 = 79
1440 - 1500 = 0

38

LINE II
PRESS CHART
6-8-94
1500 - 19




1500 - 1850 = 66

LOUISIANA-PACIFIC CORPORATION
HAYWARD, WI

PRESS REPORT - LINE 1

OPERATOR Dan Sutter SHIFT Days CREW D DATE 6-8-94

THICKNESS: 7/16 PRESS LOADS 70 7/16

OVERALL TIMER: 100 DECOMPRESSION TIME 10

PRESS TEMP: 310 TOTAL PANELS: 72

LOG COUNT: 7099

F.C.O.S. END INDICATOR 5:30

Cleaned Bleeder Screens & Loader =

Cleaned Deckle Chains =

Press Blown Down 9:30

Headbars Cleaned = YES/NO =

How Many =

Former Syd Radiator = Time

| LINE SPEED | FROM | TO |
|---|---|---|
| 55 | 2:00 | |
| 64 | 2:30 | |
| 50 | 2:10 | |
| 64 | 3:58 | |
| | | |

| DOWNTIME FROM | DOWNTIME TO | DOWNTIME (Mins) M | E | O | X = | REASONS FOR DOWNTIME |
|---|---|---|---|---|---|---|
| 10:41 | 10:43 | | | | 2 | DELAY AT SAWS |
| 7:00 | 7:10 | | | | 10 | NO FLAKES - Scheduled Down time |
| 2:35 | 2:58 | | | | 23 | NO FLAKES |
| | | | | | | |
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Downtime Code: M - Mechanical E - Electrical O - Operator

40

LINE 2 PRESS TESTING JUNE 9, 1994 - PM, VOC, CO, NOX

DATA TIME: START= 12:40 END= 17:20 HOURS= 4.67

BOARD WEIGHTS - LBS

weights of approximately every 25th untrimmed board (from press tapes)
7/16"

| | | | |
|---|---|---|---|
| 196 | 197 | 184 | 190 |
| 193 | 194 | 186 | 195 |
| 196 | 193 | 188 | 193 |
| 196 | 191 | 188 | 194 |
| 195 | 191 | 184 | 193 |
| 195 | 185 | 191 | 196 |
| 193 | 186 | 186 | 192 |
| 194 | 189 | 187 | 195 |
| 195 | 189 | 190 | 196 |
| 193 | 186 | 189 | 194 |

191.45 lb=average untrimmed mat weight

176.33 lb=average finished board weight (untrimmed mat weight-weight of trim)

7.9% =trim %

PLANT PRODUCTION RATE

4.67 =hours during testing
84 =pressloads
1008 =no. of 8'x16' boards produced (pressloads x 12 boards per load)
177741 =lbs of finished product (boards produced x weight of finished board)
38088 =lbs of finished product per hour (lbs of finshed product / hours)
19.04 =tons of finished product per hour (lbs of finshed product per hour / 2000 lb)

RESIN USAGE FROM TANK MEASUREMENTS

Note: common tanks supply wax and resin to both Line 1 and Line 2. Usage for one line is estimated by proportioning the total usage by the footage (3/8" basis) for each line)

MEASUREMENT SUMMARY:

| time | line 1 footage | line 2 footage | MDI lbs | PHENOLIC 61% solids lbs | PHENOLIC 100% solids lbs | WAX 58% solids lbs | WAX 100% solids lbs |
|---|---|---|---|---|---|---|---|
| 12:00 | 31615 | 28673 | 521 | 2527 | 1541 | 1336 | 815 |
| 13:00 | 33919 | 21505 | 596 | 2123 | 1295 | 764 | 466 |
| 14:00 | 32640 | 34049 | 671 | 2898 | 1768 | 955 | 583 |
| 15:00 | 30720 | 32257 | 669 | 2234 | 1363 | 954 | 582 |
| 16:00 | 32640 | 32257 | 671 | 2426 | 1480 | 1337 | 816 |
| 17:00 | 32640 | 32257 | 745 | 3272 | 1996 | 763 | 465 |
| 18:00 | 32640 | 34049 | 670 | 1719 | 1049 | 1146 | 699 |
| hourly average | 32402 | 30721 | 649 | 2457 | 1499 | 1036 | 632 |
| Line 1 | | | 333 | | 769 | | 325 |
| Line 2 | | | 316 | | 729 | | 308 |

38088 =average lbs. per hour finished product produced during testing
316 =average lbs. per hour of MDI resin used during testing
0.83% = MDI resin used as % of finished product

729 =average lbs. per hour of phenolic resin (100% solids) used during testing
1.92% =Phenolic resin used as % of finished product

308 =average lbs. per hour of wax (100% solids) used during testing
0.81% =wax used as % of finished product

LINE 2 PRESS TESTING JUNE 9, 1994 - MDI

DATA TIME: START= 13:20 END= 18:30 HOURS= 5.17

BOARD WEIGHTS - LBS

weights of approximately every 25th untrimmed board (from press tapes)

7/16"

| | | |
|---|---|---|
| 192 | 190 | 200 |
| 190 | 190 | 194 |
| 190 | 188 | 188 |
| 190 | 190 | 194 |
| 194 | 188 | 194 |
| 184 | 190 | 196 |
| 192 | 186 | 188 |
| 190 | 184 | 190 |
| 190 | 194 | 196 |
| 194 | 192 | |

190.97 lb=average untrimmed mat weight

175.88 lb=average finished board weight (untrimmed mat weight-weight of trim)

7.9% =trim %

PLANT PRODUCTION RATE

5.17 =hours during testing
93 =pressloads
1116 =no. of 8'x16' boards produced (pressloads x 12boards per load)
196282 =lbs of finished product (boards produced x weight of finished board)
37990 =lbs of finished product per hour (lbs of finshed product / hours)
19.00 =tons of finished product per hour (lbs of finshed product per hour / 2000 lb)

= 37.63 MSF 7/16 inc

RESIN USAGE FROM TANK MEASUREMENTS

Note: common tanks supply wax and resin to both Line 1 and Line 2. Usage for one line is estimated by proportioning the total usage by the footage (3/8" basis) for each line)

MEASUREMENT SUMMARY:

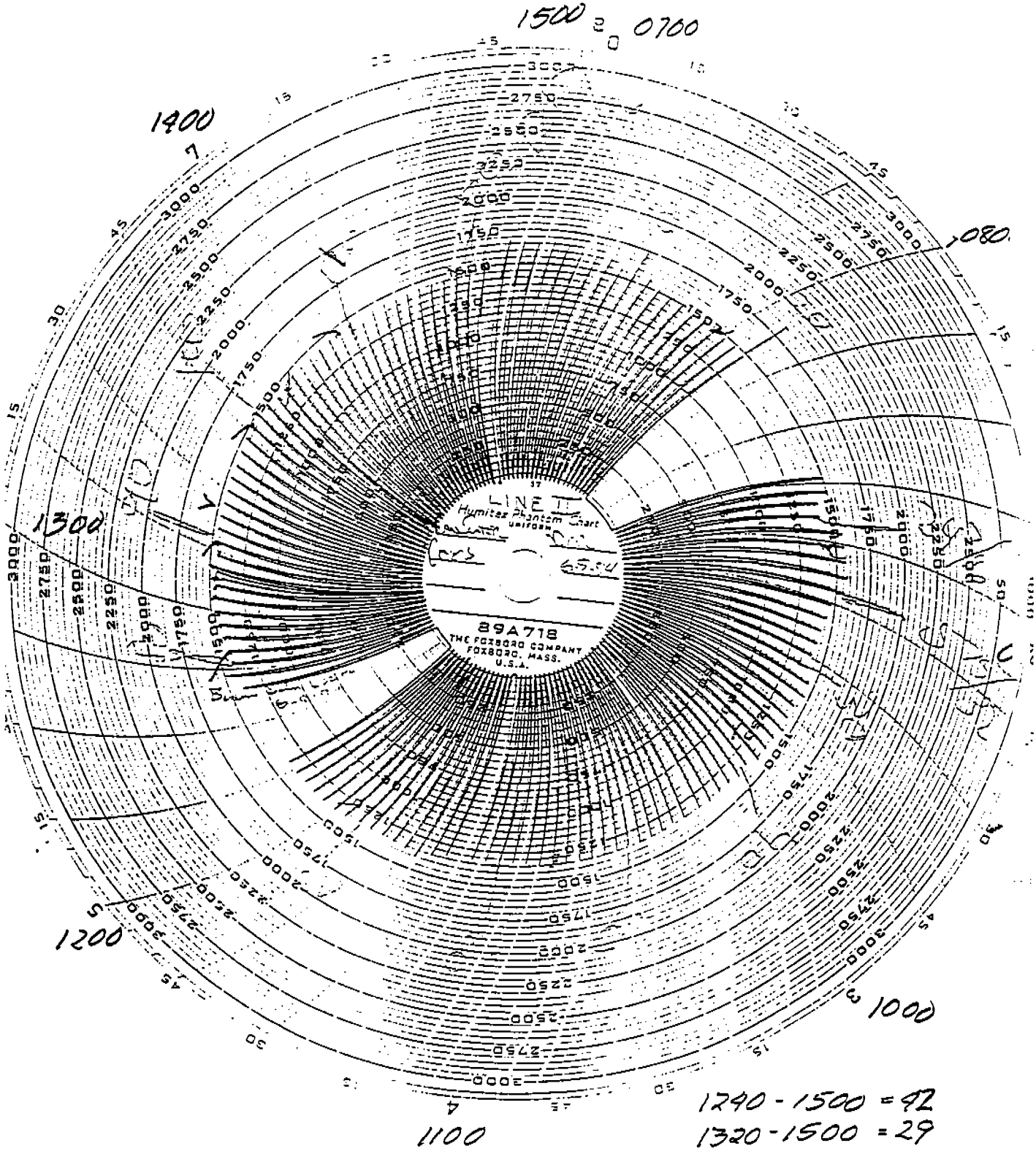
| time | line 1 footage | line 2 footage | MDI lbs | PHENOLIC 61% solids lbs | PHENOLIC 100% solids lbs | WAX 58% solids lbs | WAX 100% solids lbs |
|---|---|---|---|---|---|---|---|
| 13:00 | 33919 | 21505 | 596 | 2123 | 1295 | 764 | 466 |
| 14:00 | 32640 | 34049 | 671 | 2898 | 1768 | 955 | 583 |
| 15:00 | 30720 | 32257 | 669 | 2234 | 1363 | 954 | 582 |
| 16:00 | 32640 | 32257 | 671 | 2426 | 1480 | 1337 | 816 |
| 17:00 | 32640 | 32257 | 745 | 3272 | 1996 | 763 | 465 |
| 18:00 | 32640 | 34049 | 670 | 1719 | 1049 | 1146 | 699 |
| 19:00 | 32640 | 32257 | 671 | 2275 | 1388 | 2292 | 1398 |
| hourly average | 32548 | 31233 | 670 | 2421 | 1477 | 1173 | 716 |
| Line 1 | | | 344 | | 758 | | 367 |
| Line 2 | | | 326 | | 719 | | 348 |

37990 =average lbs. per hour finished product produced during testing
326 =average lbs. per hour of MDI resin used during testing
0.86% = MDI resin used as % of finished product

719 =average lbs. per hour of phenolic resin (100% solids) used during testing
1.89% =Phenolic resin used as % of finished product

348 =average lbs. per hour of wax (100% solids) used during testing
0.92% =wax used as % of finished product

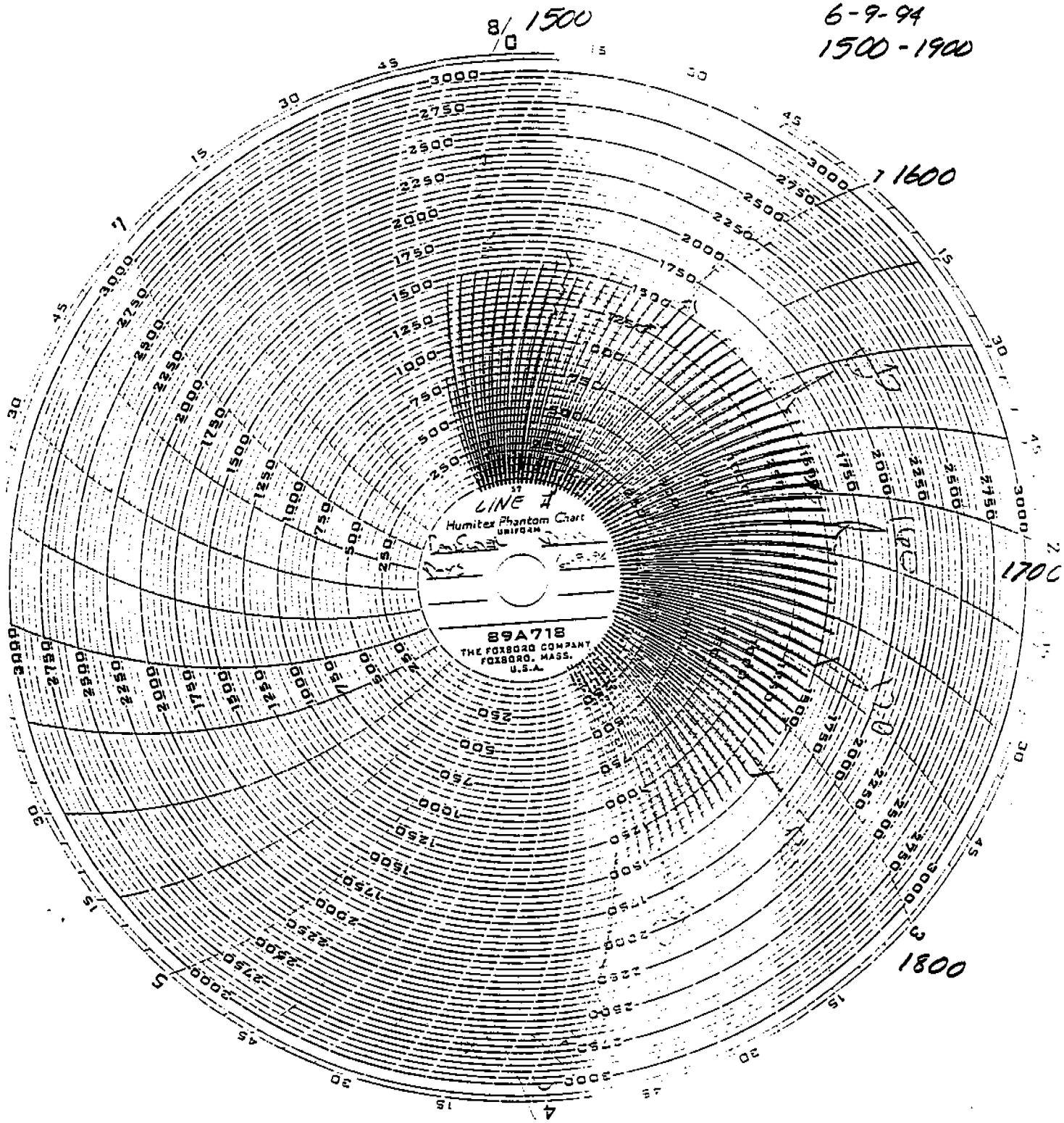
LINE II
PRESS CHA. 7
6-9-94
0700-1500




1240 - 1500 = 42
1320 - 1500 = 29

43

LINE II
DRESS CHART
6-9-94
1500 - 1900




1500 - 1720 = 42
1500 - 1830 = 64

44

LOUISIANA-PACIFIC CORPORATION
HAYWARD, WI

Basin Dahn USEPA STACK Test

PRESS REPORT - LINE 2 80

OPERATOR Dan Sutton SHIFT DAYS CREW D DATE 8-7-90

THICKNESS: 7/16 PRESS LOADS 199 7/16 5 15/32

OVERALL TIMER: 140-165 DECOMPRESSION TIME 12

PRESS TEMP: 710 TOTAL RECEIPTS: =

LOG COUNT: 7733

F.C.O.S. END RADIATOR 9:20 =

Cleaned Bleeder Strands & Tracks 2

Cleaned Deckle Chains =

Press Blown Down 9:20

Headers Cleaned = YES/NO =

How Many =

Former End Radiator = Tins

| LINE SPEED | FROM | TO |
|---|---|---|
| 61 | 7:00 | |
| 64 | 7:09 | |
| 58 | 8:50 | 15/32 |
| 64 | 9:07 | 7/16 |
| | | |

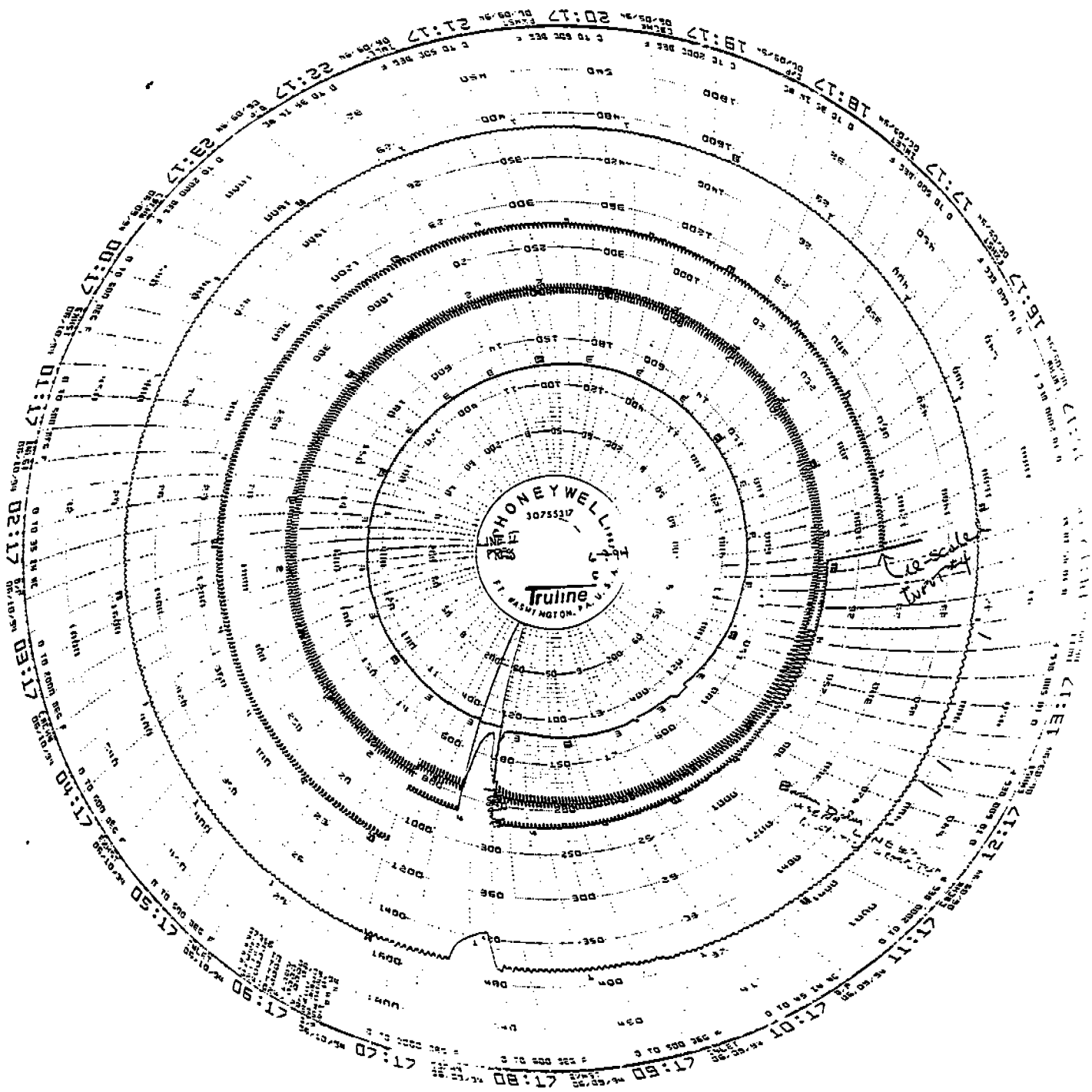
43 9 34

| DOWNTIME FROM | DOWNTIME TO | DOWNTIME (Mins) M | E | O | K E Y | REASONS FOR DOWNTIME |
|---|---|---|---|---|---|---|
| 8:09 | 8:43 | | | | 34 | RTO PROBLEMS: |
| 11:28 | 11:28 | | | | 3 | " " |
| 80 12:20 | 1239 | | - | | 19 | DRYER PROBLEMS |
| | | | | | | |
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Downtime Code: M - Mechanical E - Electrical O - Operator

45

LINE II
DRESS RTO
CHART
6-9-94




46

LINE II PRESS · 6-9-94

| | #1 | #2 | #3 | #4 | #5 | INLET PRESS. | BURNERS B #1 | BURNERS B #2 | INLET TEMP. | COMBUST. CHAMBER TEMP. | EXHAUST TEMP. | AP AMP. | GAS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 8:00 | 419 | 441 | 386 | 343 | 429 | 4.0 | 1577 | 1589 | 113 | 1522 | 224 | 19.1 | 020646 |
| 815 | LI | NE | DOWN | - | SYSTEM | | DOWN | | | | | | 020648 |
| 830 | " | | | | | | | " | | | | | |
| 845 | 440 | 431 | 411 | 342 | 436 | 3.9 | 1590 | 1593 | 116 | 1527 | 223 | 19.5 | 020650 |
| 900 | 429 | 434 | 403 | 348 | 432 | 4.0 | 1575 | 1568 | 115 | 1536 | 233 | 19.7 | 020652 |
| 915 | 428 | 436 | 400 | 345 | 431 | 4.3 | 1570 | 1586 | 116 | 1521 | 223 | 19.8 | 020654 |
| 930 | 428 | 438 | 396 | 349 | 429 | 4.1 | 1602 | 1599 | 118 | 1536 | 239 | 19.4 | 020656 |
| 945 | 423 | 440 | 394 | 348 | 430 | 4.1 | 1579 | 1575 | 117 | 1538 | 235 | 19.5 | 020658 |
| 1000 | 426 | 441 | 397 | 346 | 433 | 4.2 | 1566 | 1589 | 121 | 1532 | 226 | 19.8 | 020661 |
| 1015 | 430 | 445 | 398 | 349 | 434 | 4.3 | 1573 | 1589 | 118 | 1537 | 228 | 19.4 | 020663 |
| 1030 | 433 | 448 | 399 | 352 | 435 | 3.8 | 1579 | 1588 | 118 | 1541 | 233 | 19.2 | 020666 |
| 1045 | 430 | 452 | 399 | 357 | 436 | 4.0 | 1590 | 1584 | 120 | 1560 | 240 | 19.6 | 020668 |
| 1100 | 433 | 452 | 402 | 356 | 437 | 3.9 | 1570 | 1584 | 120 | 1546 | 232 | 19.6 | 020670 |
| 1115 | 439 | 454 | 405 | 359 | 438 | 3.9 | 1578 | 1585 | 119 | 1546 | 238 | 19.2 | 020673 |
| 1130 | 438 | 457 | 405 | 364 | 439 | 4.1 | 1595 | 1592 | 118 | 1552 | 246 | 19.6 | 020676 |
| 1145 | 438 | 459 | 406 | 366 | 442 | 4.2 | 1593 | 1586 | 117 | 1557 | 246 | 19.7 | 020678 |
| 1200 | 440 | 460 | 409 | 364 | 445 | 4.1 | 1573 | 1588 | 117 | 1547 | 231 | 19.5 | 020681 |
| 1215 | 445 | 461 | 410 | 369 | 443 | 4.0 | 1587 | 1590 | 119 | 1550 | 243 | 19.6 | 020683 |
| 1230 | 442 | 463 | 411 | 373 | 447 | 4.2 | 1592 | 1584 | 123 | 1558 | 249 | 19.6 | 020686 |
| 1245 | 446 | 465 | 414 | 375 | 449 | 4.0 | 1592 | 1572 | 117 | 1555 | 249 | 19.1 | 020688 |
| 100 | 442 | 468 | 416 | 369 | 454 | 4.3 | 1558 | 1581 | 121 | 1538 | 235 | 19.5 | 020690 |
| 115 | 450 | 468 | 417 | 372 | 450 | 3.6 | 1564 | 1581 | 120 | 1535 | 241 | 19.0 | 020693 |
| 130 | 443 | 469 | 416 | 372 | 449 | 3.7 | 1580 | 1566 | 122 | 1552 | 249 | 19.4 | 020695 |
| 145 | 451 | 467 | 419 | 373 | 448 | 3.8 | 1565 | 1581 | 121 | 1536 | 243 | 19.5 | 020697 |
| 200 | 446 | 472 | 416 | 379 | 448 | 4.0 | 1593 | 1572 | 124 | 1552 | 252 | 19.1 | 020699 |
| 215 | 450 | 470 | 421 | 373 | 450 | 4.3 | 1555 | 1576 | 122 | 1535 | 239 | 19.3 | 020702 |

LINE II PRESS 6-9-94

| | #1 | #2 | #3 | #4 | #5 | INLET PRESS. | BURNERS B #1 | BURNERS B #2 | INLET TEMP. | COMBUST. CHAMBER TEMP. | EXHAUST TEMP. | ΔP AMR. | GAS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 23 | [illegible] | 478 | 413 | 390 | 442 | 4.1 | 1572 | 1572 | 123 | 1542 | 250 | 19.1 | 020704 |
| 7[illegible] | [illegible] | 478 | 416 | 386 | 445 | 4.1 | 1551 | 1569 | 124 | 1534 | 239 | 17.1 | 020226 |
| 30 | 456 | 479 | 418 | 386 | 447 | 4.0 | 1563 | 1565 | 123 | 1537 | 247 | 19.4 | 020708 |
| 315 | 456 | 480 | 421 | 384 | 450 | 4.2 | 1556 | 1569 | 124 | 1533 | 241 | 19.3 | 020711 |
| 53 | 453 | 482 | 421 | 388 | 450 | 3.9 | 1564 | 1563 | 123 | 1544 | 250 | 19.1 | 020713 |
| 345 | 456 | 482 | 423 | 388 | 451 | 4.0 | 1572 | 1566 | 125 | 1541 | 253 | 19.4 | 020715 |
| 400 | 456 | 484 | 424 | 388 | 451 | 4.1 | 1570 | 1571 | 124 | 1541 | 253 | 19.0 | 020717 |
| 41[illegible] | 457 | 483 | 426 | 386 | 452 | 4.0 | 1564 | 1571 | 125 | 1536 | 247 | 19.4 | 020720 |
| 43 | 453 | 484 | 426 | 386 | 454 | 4.0 | 1554 | 1564 | 124 | 1541 | 246 | 19.3 | 020722 |
| 44 | 454 | 485 | 425 | 388 | 453 | 4.2 | 1570 | 1564 | 124 | 1543 | 252 | 19.3 | 020724 |
| 500 | 457 | 484 | 426 | 388 | 452 | 3.8 | 1570 | 1569 | 125 | 1538 | 252 | 19.2 | 020726 |
| 515 | 458 | 484 | 427 | 385 | 453 | 3.8 | 1559 | 1569 | 124 | 1532 | 243 | 18.9 | 020729 |
| 53 | 455 | 486 | 427 | 385 | 453 | 3.8 | 1551 | 1566 | 125 | 1535 | 243 | 19.3 | 020731 |
| 545 | 455 | 487 | 427 | 386 | 453 | 3.8 | 1559 | 1559 | 124 | 1543 | 249 | 19.3 | 020733 |
| 600 | 457 | 488 | 428 | 387 | 451 | 4.0 | 1570 | 1569 | 125 | 1541 | 255 | 19.3 | 020736 |
| 615 | 460 | 487 | 428 | 385 | 450 | 3.9 | 1564 | 1571 | 125 | 1536 | 250 | 19.3 | 020738 |
| 630 | 458 | 489 | 430 | 382 | 450 | 4.1 | 1552 | 1568 | 124 | 1531 | 241 | 19.3 | 020740 |
| 645 | | | | | | | | | | | | | |
| 700 | | | | | | | | | | | | | |

LINE 2 PRESS TESTING JUNE 10, 1994 - FORMALDEHYDE

| | | | | | | |
|---|---|---|---|---|---|---|
| DATA TIME: | START= | 08:10 | END= | 12:00 | HOURS= | 3.83 |
| | START= | 13:10 | END= | 13:40 | HOURS= | 0.50 |
| | | | | | total | 4.33 |

BOARD WEIGHTS - LBS

weights of approximately every 25th untrimmed board (from press tapes)

7/16"

| | | | |
|---|---|---|---|
| 178 | 192 | 194 | 194 |
| 180 | 186 | 198 | 198 |
| 190 | 192 | 190 | 194 |
| 184 | 194 | 190 | 190 |
| 192 | 196 | 200 | 188 |
| 192 | 190 | 202 | 194 |
| 190 | 194 | 202 | 190 |
| 196 | 190 | 194 | 192 |
| 196 | 172 | 190 | 200 |
| 190 | 196 | 196 | 194 |
| 192 | 196 | 196 | |

191.93 lb=average untrimmed mat weight

176.77 lb=average finished board weight (untrimmed mat weight-weight of trim)

7.9% =trim %

PLANT PRODUCTION RATE

4.33 =hours during testing
78 =pressloads
936 =no. of 8'x16' boards produced (pressloads x 12 boards per load)
165457 =lbs of finished product (boards produced x weight of finished board)
38183 =lbs of finished product per hour (lbs of finshed product / hours)
19.09 =tons of finished product per hour (lbs of finshed product per hour / 2000 lb)

= 27.67 msf 7/16 nl

RESIN USAGE FROM TANK MEASUREMENTS

Note: common tanks supply wax and resin to both Line 1 and Line 2. Usage for one line is estimated by proportioning the total usage by the footage (3/8" basis) for each line)

MEASUREMENT SUMMARY:

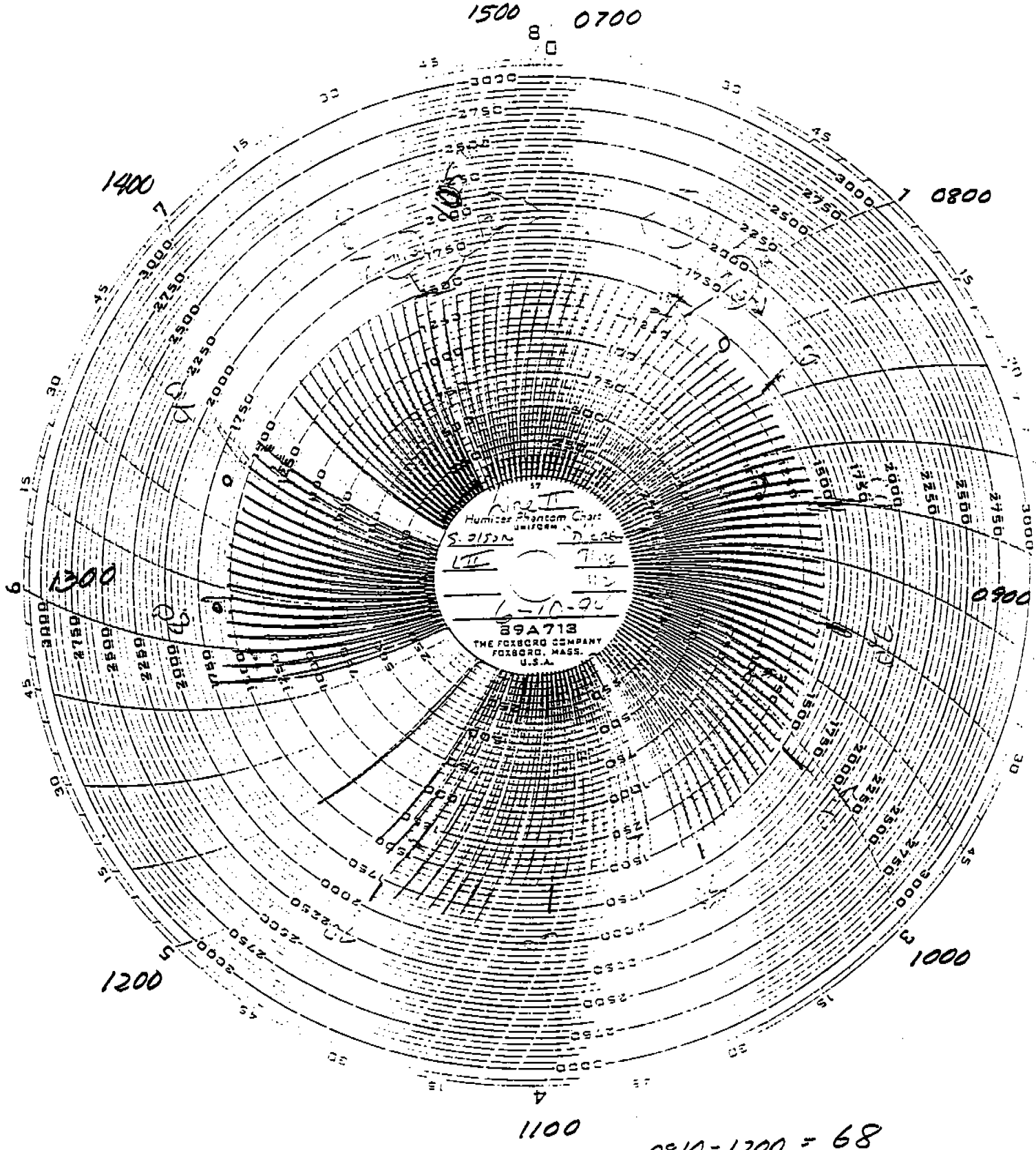
| time | line 1 footage | line 2 footage | MDI lbs | PHENOLIC 61% solids lbs | PHENOLIC 100% solids lbs | WAX 58% solids lbs | WAX 100% solids lbs |
|---|---|---|---|---|---|---|---|
| 08:00 | 33536 | 32767 | 967 | 2376 | 1449 | 590 | 342 |
| 09:00 | 32257 | 30465 | 820 | 2376 | 1449 | 1527 | 886 |
| 10:00 | 28673 | 32257 | 521 | 2497 | 1523 | 764 | 443 |
| 11:00 | 32257 | 30465 | 522 | 2508 | 1530 | 764 | 443 |
| 12:00 | 34049 | 30465 | 745 | 2285 | 1394 | 1145 | 664 |
| 13:00 | 30465 | 8960 | 149 | 1436 | 876 | 382 | 222 |
| 14:00 | 28673 | 28673 | 669 | 2335 | 1424 | 1146 | 665 |
| hourly average | 31416 | 27722 | 628 | 2259 | 1378 | 903 | 523 |
| Line 1 | | | 322 | | 707 | | 269 |
| Line 2 | | | 305 | | 671 | | 255 |

38183 =average lbs. per hour finished product produced during testing
305 =average lbs. per hour of MDI resin used during testing
0.80% = MDI resin used as % of finished product

671 =average lbs. per hour of phenolic resin (100% solids) used during testing
1.76% =Phenolic resin used as % of finished product

255 =average lbs. per hour of wax (100% solids) used during testing
0.67% =wax used as % of finished product

LINE II
PRESS CHART
6-10-94




0810 - 1200 = 68
1310 - 1340 = 10

50

LOUISIANA-PACIFIC CORPORATION
HAYWARD, WI

PRESS REPORT - LINE #1

OPERATOR S. OLSON SHIFT 1st CREW D DATE 6-10-94

THICKNESS: 1/2 7/16 PRESS LOADS 17½

OVERALL TIMER: 170 138 DECOMPRESSION TIME 10/2

PRESS TEMP: 210 TOTAL PANELS:

LOG COUNT: 7006

F.C.O.S. END RADIATOR ✓

Cleaned Bleeder Shrouds & Trucks ✓

Cleaned Deckle Chains ✓

Press Blown Down ✓

Headbars Cleaned YES/NO

How Many NONE

Former End Radiator Tins

| LINE SPEED | FROM | TO |
|---|---|---|
| 56 | 7:00 | 8:02 |
| 63 | 8:02 | |
| | | |
| | | |
| | | |

| DOWNTIME FROM | DOWNTIME TO | DOWNTIME (Mins) M | E | O | KEY | REASONS FOR DOWNTIME |
|---|---|---|---|---|---|---|
| 10:50 | 55 | 5 | | | | pulse Baghouse, check Foremcrs |
| 12:03 | 22 | 19 | | | | Replace Brushes Bottom Surface Live Bottom |
| 12:26 | 1:00 | 34 | | | | Replace Drive & motor For same |
| 2:08 | 16 | 8 | | | | Stickie Flt * 10 |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |

Downtime Code: M - Mechanical E - Electrical O - Operator

52




LINE II
PRESS RTO
CHART
6-10-94

6/10/94 AM

| | #1 | #2 | #3 | #4 | #5 | INLET PRESS. | BURNERS B #1 | BURNERS B #2 | INLET TEMP. | COMBUST. CHAMBER TEMP. | EXHAUST TEMP. | AMP. | GAS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 300 | 445 | 474 | 412 | 373 | 457 | 3.8 | 1562 | 1563 | 116 | 1542 | 240 | 19.6 | 020861 |
| 315 | 446 | 474 | 412 | 374 | 456 | 4.2 | 1569 | 1565 | 117 | 1542 | 244 | 19.5 | 020863 |
| 330 | 449 | 474 | 413 | 375 | 456 | 4.0 | 1569 | 1573 | 117 | 1539 | 248 | 19.1 | 020866 |
| 345 | 452 | 474 | 414 | 375 | 457 | 3.7 | 1571 | 1565 | 117 | 1535 | 247 | 19.2 | 020868 |
| 900 | 452 | 474 | 415 | 375 | 458 | 3.7 | 1563 | 1566 | 119 | 1531 | 239 | 19.0 | 020870 |
| 915 | 450 | 474 | 416 | 374 | 461 | 4.0 | 1553 | 1568 | 119 | 1530 | 235 | 19.4 | 020873 |
| 930 | 449 | 474 | 416 | 376 | 460 | 3.8 | 1553 | 1563 | 120 | 1537 | 240 | 19.4 | 020875 |
| 945 | 448 | 476 | 416 | 380 | 460 | 3.9 | 1564 | 1563 | 121 | 1544 | 244 | 19.2 | 020877 |
| 1000 | 452 | 475 | 417 | 382 | 458 | 4.0 | 1569 | 1568 | 121 | 1540 | 252 | 19.4 | 020879 |
| 1015 | 454 | 475 | 418 | 381 | 459 | 3.9 | 1567 | 1566 | 123 | 1537 | 247 | 18.9 | 020881 |
| 1030 | 453 | 475 | 421 | 380 | 459 | 4.1 | 1559 | 1568 | 122 | 1531 | 238 | 19.3 | 020884 |
| 1045 | 450 | 477 | 420 | 381 | 459 | 3.9 | 1552 | 1565 | 122 | 1532 | 241 | 19.4 | 020886 |
| 1100 | 455 | 477 | 421 | 385 | 457 | 3.9 | 1570 | 1566 | 122 | 1538 | 253 | 19.3 | 020888 |
| 1115 | 455 | 478 | 423 | 383 | 457 | 3.8 | 1565 | 1569 | 123 | 1534 | 246 | 19.0 | 020891 |
| 1130 | 453 | 479 | 424 | 381 | 456 | 4.0 | 1554 | 1569 | 124 | 1532 | 239 | 19.0 | 020893 |
| 1145 | 454 | 481 | 422 | 385 | 455 | 4.0 | 1568 | 1565 | 123 | 1540 | 252 | 18.9 | 020895 |
| 1200 | 453 | 482 | 423 | 385 | 454 | 4.0 | 1566 | 1566 | 124 | 1540 | 252 | 19.3 | 020897 |
| 1215 | 457 | 482 | 425 | 385 | 453 | 3.7 | 1566 | 1566 | 130 | 1535 | 253 | 19.1 | 020900 |
| 1230 | 457 | 484 | 429 | 384 | 454 | 4.0 | 1554 | 1569 | 125 | 1532 | 243 | 19.0 | 020902 |
| 1245 | 456 | 486 | 430 | 384 | 453 | 3.9 | 1551 | 1563 | 124 | 1538 | 245 | 19.3 | 020904 |
| 100 | 457 | 486 | 431 | 383 | 451 | 4.1 | 1557 | 1568 | 124 | 1531 | 241 | 19.0 | 020907 |
| 115 | 454 | 487 | 430 | 386 | 448 | 3.9 | 1560 | 1561 | 124 | 1540 | 250 | 19.5 | 020909 |
| 130 | 458 | 486 | 432 | 384 | 447 | 3.6 | 1560 | 1569 | 126 | 1535 | 244 | 19.3 | 020911 |
| 145 | 454 | 488 | 432 | 383 | 447 | 3.8 | 1552 | 1569 | 123 | 1537 | 241 | 19.3 | 020914 |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |

KONUS DATA READINGS EVERY 10 MINUTES

PLANT _____ BY _____ DATE 6-7-94 PAGE 1 OF 2

1 count = 10.0 lbs

| TIME | K1 OIL IN TEMP | K1 OIL OUT TEMP | K1 I.D. FAN W.C | K2 OIL IN TEMP | K2 OIL OUT TEMP | K2 I.D. FAN W.C | K3 OIL IN TEMP | K3 OIL OUT TEMP | K3 I.D. FAN W.C | K4 OIL IN TEMP | K4 OIL OUT TEMP | K4 I.D. FAN W.C | FUEL COUNT K1 | FUEL COUNT K2 | FUEL COUNT K3 | FUEL COUNT K4 | ONCE/HR BARK MOISTURE |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0800 | | | | | | | 239 | 256 | 7 | 239 | 252 | 4 | | | 399 | 88 | |
| 0810 | | | | | | | 252 | 260 | 7 | 249 | 260 | 4 | | | 401 | 93 | |
| 0820 | | | | | | | 236 | 260 | 7 | 253 | 265 | 4 | | | 403 | 93 | |
| 0830 | | | | | | | 230 | 250 | 6.5 | 234 | 244 | 4 | | | 460 | 99 | |
| 0840 | | | | | | | 230 | 252 | 7 | 235 | 251 | 4 | | | 499 | 110 | |
| 0850 | | | | | | | 232 | 255 | 7 | 238 | 253 | 4 | | | 543 | 120 | |
| 0900 | | | | | | | 243 | 260 | 7 | 238 | 253 | 4 | | | 592 | 131 | |
| 0910 | | | | | | | 234 | 260 | 7 | 245 | 257 | 4 | | | 601 | 133 | |
| 0920 | | | | | | | 237 | 260 | 7 | 238 | 250 | 4 | | | 645 | 140 | |
| 0930 | | | | | | | 237 | 255 | 7 | 238 | 254 | 4 | | | 696 | 152 | |
| 0940 | | | | | | | 239 | 260 | 7 | 244 | 257 | 4 | | | 719 | 153 | |
| 0960 | | | | | | | 238 | 260 | 7 | 242 | 253 | 4 | | | 729 | 160 | |
| 1000 | | | | | | | 236 | 255 | 7 | 239 | 253 | 4 | | | 773 | 172 | |
| 1010 | | | | | | | 235 | 260 | 7 | 241 | 256 | 4 | | | 804 | 180 | |
| 1020 | | | | | | | 235 | 256 | 7 | 239 | 250 | 4 | | | 857 | 185 | |
| 1030 | | | | | | | 234 | 255 | 7 | 241 | 255 | 4 | | | 894 | 197 | |
| 1040 | | | | | | | 234 | 256 | 7 | 240 | 254 | 4 | | | 943 | 208 | |
| 1060 | | | | | | | 237 | 252 | 7 | 235 | 249 | 4 | | | 990 | 222 | |
| 1100 | | | | | | | 232 | 252 | 7 | 236 | 261 | 4 | | | 1039 | 235 | |
| 1110 | | | | | | | 233 | 255 | 7 | 239 | 256 | 4 | | | 1086 | 246 | |
| 1120 | | | | | | | 231 | 257 | 6.5 | 238 | 253 | 4 | | | 1133 | 253 | |
| 1130 | | | | | | | 240 | 260 | 6.5 | 242 | 251 | 4 | | | 1146 | 259 | |
| 1140 | | | | | | | 235 | 259 | 6.5 | 239 | 252 | 4.5 | | | 1163 | 263 | |
| 1150 | | | | | | | 236 | 260 | 6.5 | 244 | 253 | 4.5 | | | 1171 | 275 | |
| 1200 | | | | | | | 235 | 260 | 6 | 240 | 257 | 4.5 | | | 1208 | 284 | |
| 1210 | | | | | | | 235 | 260 | 6.5 | 241 | 253 | 4 | | | 1233 | 293 | |
| 1220 | | | | | | | 237 | 261 | 6 | 246 | 257 | 4 | | | 1233 | 297 | |
| 1230 | | | | | | 231→ | 239 | 265 | 6.5 | 242 | 255 | 4 | | | 1233 | 298 | |
| 1240 | | | | | | | 235 | 257 | 6.5 | 241 | 252 | 4 | | | 1247 | 307 | |
| 1250 | | | | | | | 236 | 260 | 6.5 | 239 | 254 | 4 | | | 1300 | 318 | |



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KONUS DATA READINGS EVERY 10 MINUTES BY_____ DATE 6-7-91 PAGE 2 OF 2

PLANT Hayward

| TIME | K1 OIL IN TEMP | K1 OIL OUT TEMP | K1 I.D. FAN W.C | K2 OIL IN TEMP | K2 OIL OUT TEMP | K2 I.D. FAN W.C | K3 OIL IN TEMP | K3 OIL OUT TEMP | K3 I.D. FAN W.C | K4 OIL IN TEMP | K4 OIL OUT TEMP | K4 I.D. FAN W.C | FUEL COUNT K1 | K2 | K3 | K4 | ONCE/HR BARK MOISTURE |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1300 | | | | | | | 238 | 262 | 6.5 | 240 | 256 | 4 | | | 1328 | 323 | |
| 1310 | | | | | | | 253 | 265 | 6 | 242 | 250 | 4 | | | 1328 | 323 | |
| 1320 | | | | | | | 256 | 271 | 6 | 254 | 260 | 4.5 | | | 1329 | 323 | |
| 1330 | | | | | | | 241 | 270 | 6 | 246 | 258 | 4.5 | | | 1329 | 323 | |
| 1340 | | | | | | | 240 | 270 | 6 | 245 | 254 | 4.7 | | | 1329 | 327 | |
| 1350 | | | | | | | 253 | 265 | 6 | 249 | 257 | 4.5 | | | 1329 | 333 | |
| 1400 | | | | | | | 255 | 265 | 6.5 | 252 | 260 | 6 | | | 1329 | 333 | |
| 1410 | | | | | | | 260 | 270 | 6.5 | 256 | 267 | 6 | | | 1329 | 333 | |
| 1420 | | | | | | | 262 | 272 | 6.5 | 254 | 270 | 5.5 | | | 1329 | 333 | |
| 1430 | | | | | | | 260 | 270 | 6.5 | 255 | 268 | 6 | | | 1329 | 333 | |
| 1440 | | | | | | | 25[illegible] | [illegible] | 7 | 247 | 260 | 6 | | | 1331 | 333 | |
| 1450 | | | | | | | 235 | 255 | 7 | 239 | 249 | 5 | | | 1364 | 335 | |
| 1500 | | | | | | | 232 | 255 | 6 | 231 | 237 | 5 | | | 1407 | 346 | |
| 1510 | | | | | | | 226 | 245 | 7 | 234 | 242 | 5 | | | 1453 | 357 | |
| 1520 | | | | | | | 225 | 245 | 7 | 230 | 240 | 4.7 | | | 1504 | 370 | |
| 1530 | | | | | | | 225 | 245 | 7 | 234 | 242 | 5 | | | 1548 | 381 | |
| 1540 | | | | | | | 225 | 245 | 7 | 235 | 236 | 4.5 | | | 1599 | 393 | |
| 1550 | | | | | | | 226 | 245 | 7 | 234 | 246 | 4.5 | | | 1646 | 407 | |
| 1600 | | | | | | | 226 | 248 | 7 | 237 | 246 | 4.5 | | | 1709 | 421 | |
| 1610 | | | | | | | 229 | 250 | 7 | 242 | 250 | 4.5 | | | 1766 | 434 | |
| 1620 | | | | | | | 232 | 255 | 7 | 237 | 255 | 4.5 | | | 1828 | 447 | |
| 1630 | | | | | | | 235 | 260 | 7 | 244 | 255 | 4.0 | | | 1863 | 457 | |
| 1640 | | | | | | | 241 | 260 | 7 | 242 | 252 | 4.0 | | | 1901 | 468 | |
| 1650 | | | | | | | 234 | 260 | 8 | 241 | 255 | 3.6 | | | 1924 | 470 | |
| 1700 | | | | | | | 238 | 259 | 8.2 | 242 | 259 | 2.5 | | | 1950 | 478 | |
| 1710 | | | | | | | | | | | | | | | | | |
| 1720 | | | | | | | | | | | | | | | | | |
| 1730 | | | | | | | | | | | | | | | | | |
| 1740 | | | | | | | | | | | | | | | | | |
| 1750 | | | | | | | | | | | | | | | | | |

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KONUS DATA READINGS EVERY 10 MINUTES BY_____ DATE 6-8-94 PAGE 1 OF 1

PLANT Hayward

| TIME | K1 OIL IN TEMP | K1 OIL OUT TEMP | K1 I.D. FAN W.C | K2 OIL IN TEMP | K2 OIL OUT TEMP | K2 I.D. FAN W.C | K3 OIL IN TEMP | K3 OIL OUT TEMP | K3 I.D. FAN W.C | K4 OIL IN TEMP | K4 OIL OUT TEMP | K4 I.D. FAN W.C | FUEL COUNT K1 | FUEL COUNT K2 | FUEL COUNT K3 | FUEL COUNT K4 | ONCE/HR BARK MOISTURE |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0800 | 245 | 260 | -1.5 | ~~256~~ 230 | ~~230~~ 254 | -3.2 | 226 | 240 | 9 | 235 | 241 | 2 | 200 | 176 | 162 | 44 | |
| 0810 | 240 | 255 | 1.5 | 224 | 258 | -3.2 | 226 | 245 | 9 | 234 | 238 | 2 | 205 | 194 | 191 | 54 | |
| 0820 | 245 | 255 | 1.5 | 227 | 256 | 3.2 | 226 | 245 | 9 | 236 | 241 | 3 | 225 | 217 | 225 | 66 | |
| 0830 | 245 | 260 | 1.6 | 229 | 257 | 3.1 | 225 | 245 | 9 | 235 | 241 | 3 | 235 | 256 | 254 | 79 | |
| 0840 | 243 | 255 | 1.3 | 227 | 253 | 1.2 | 227 | 249 | 9 | 238 | 246 | 3.5 | 257 | 271 | 278 | 97 | |
| 0850 | 244 | 257 | 1.5 | 227 | 251 | -1.3 | 226 | 248 | 9 | 241 | 250 | 3.5 | 278 | 294 | 336 | 104 | |
| 0900 | 245 | 256 | -1.5 | 229 | 250 | -1.2 | 227 | 245 | 9 | 241 | 251 | 2.5 | 291 | 317 | 372 | 117 | |
| 0910 | 246 | 255 | -1.4 | 230 | 253 | -.09 | 229 | 247 | 9 | 243 | 253 | 3 | 299 | 326 | 407 | 130 | |
| 0920 | 241 | 254 | -1.8 | 227 | 254 | -.1 | 232 | 250 | 9 | 247 | 256 | 3 | 321 | 354 | 448 | 137 | |
| 0930 | 241 | 250 | -1.45 | 225 | 253 | -.6 | 243 | 255 | 9 | 252 | 261 | 2.5 | 340 | 396 | 472 | 138 | |
| 0940 | 239 | 246 | -1.6 | 223 | 255 | -3.2 | 238 | 260 | 9 | 252 | 260 | 3 | 362 | 443 | 506 | 138 | |
| 0950 | 239 | 249 | -1.8 | 223 | 256 | -3.2 | 236 | 259 | 9 | 257 | 261 | 3 | 386 | 476 | 517 | 138 | |
| 1000 | 238 | 245 | -1.4 | 221 | 249 | -1.1 | 241 | 260 | 9 | 248 | 255 | 3 | 405 | 510 | 550 | 140 | |
| 1010 | 237 | 246 | -1.6 | 221 | 254 | .4 | 230 | 250 | 9 | 246 | 255 | 3 | 423 | 549 | 570 | 140 | |
| 1020 | 237 | 245 | -1.4 | 221 | 256 | -3.2 | 236 | 250 | 9 | 240 | 249 | 2.5 | 449 | 582 | 613 | 151 | |
| 1030 | 237 | 244 | -1.4 | 221 | 257 | -3.1 | 232 | 252 | 9 | 241 | 249 | 2.5 | 467 | 613 | 644 | 163 | |
| 1040 | 236 | 242 | -1.4 | 221 | 257 | -3.2 | 231 | 251 | 9 | 246 | 248 | 2 | 489 | 646 | 681 | 176 | |
| 1050 | 237 | 244 | -1.4 | 226 | 250 | -1.6 | 232 | 245 | 9 | 240 | 245 | 2.5 | 514 | 673 | 725 | 192 | |
| 1100 | 239 | 249 | -1.3 | 224 | 256 | -3.2 | 231 | 255 | 9 | 242 | 251 | 2.5 | 533 | 697 | 757 | 204 | |
| 1110 | 241 | 249 | -1.5 | 225 | 249 | -.16 | 231 | 250 | 9 | 242 | 255 | 2.5 | 557 | 714 | 797 | 219 | |
| 1120 | ~~239~~ | 249 | -1.6 | 224 | 255 | -3.2 | 232 | 251 | 9 | 242 | 256 | 2.5 | 576 | 747 | 834 | 229 | |
| 1130 | 239 | 249 | -1.6 | 224 | 254 | 0 | 237 | 256 | 8.5 | 247 | 255 | 2.5 | 599 | 762 | 869 | 236 | |
| 1140 | 240 | 250 | -1.6 | 226 | 253 | .7 | 241 | 258 | 9 | 244 | 257 | 2.5 | 629 | 786 | 904 | 238 | |
| 1150 | 244 | 250 | -1.4 | 230 | 256 | -3.2 | 237 | 260 | 9 | 251 | 257 | 3 | 643 | 798 | 923 | 238 | |
| ~~1150~~ 1200 | 240 | 251 | -1.3 | 225 | 255 | 1 | 244 | 260 | 9 | 250 | 258 | 3 | 662 | 822 | 939 | 238 | |
| 1210 | 240 | 252 | -1.4 | 228 | 256 | -3.2 | 237 | 260 | 9 | 247 | 255 | 3 | 2687 | 853 | 941 | 238 | |
| 1220 | 240 | 249 | -1.5 | 225 | 256 | -3.1 | 238 | 259 | 9 | 248 | 256 | 3 | 710 | 889 | 963 | 241 | |
| 1230 | 240 | 249 | -1.3 | 225 | 253 | .5 | 238 | 260 | 8 | 244 | 254 | 2.5 | 727 | 909 | 992 | 249 | |
| 1240 | 235 | 240 | -1.8 | 218 | 234 | -1 | 236 | 260 | 8.5 | 247 | 256 | 3 | 751 | 909 | 1032 | 253 | |
| 1250 | 225 | 235 | -1.6 | 210 | 223 | -1.5 | 239 | 257 | 8.5 | 249 | 255 | 3 | 771 | 909 | 1057 | 253 | |
| | 240 | 246 | | | | | | | | | | | | | | | |

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KONUS DATA READINGS EVERY 10 MINUTES BY _____ DATE 6-8-94 PAGE 2 OF 4

PLANT Hayward

| TIME | K1 OIL IN TEMP | K1 OIL OUT TEMP | K1 I.D. FAN W.C | K2 OIL IN TEMP | K2 OIL OUT TEMP | K2 I.D. FAN W.C | K3 OIL IN TEMP | K3 OIL OUT TEMP | K3 I.D. FAN W.C | K4 OIL IN TEMP | K4 OIL OUT TEMP | K4 I.D. FAN W.C | FUEL COUNT K1 | FUEL COUNT K2 | FUEL COUNT K3 | FUEL COUNT K4 | ONCE/HR BARK MOISTURE |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1300 | 224 | 229 | -1.6 | 209 | 238 | -2.5 | 237 | 262 | 8 | 243 | 253 | 2.5 | 782 | 957 | 1081 | 20 | |
| 1310 | 226 | 229 | -1.8 | 211 | 244 | -2.1 | 240 | 259 | 8.5 | 243 | 254 | 2.5 | 906 | 1016 | 1113 | 270 | |
| 1320 | 227 | 230 | -1.8 | 212 | 242 | -2.7 | 236 | 260 | 8.5 | 243 | 253 | 3 | 825 | 1036 | 1139 | 282 | |
| 1330 | 225 | 230 | -1.6 | 210 | 228 | -3.1 | 236 | 255 | 8.5 | 237 | 252 | 2.8 | 952 | 1044 | 1161 | 259 | |
| 1340 | 225 | 226 | -1.6 | 206 | 238 | -2.4 | 231 | 257 | 8.5 | 239 | 254 | 3 | 869 | 1053 | 1184 | 305 | |
| 1350 | 225 | 227 | -1.8 | 209 | 243 | -2.2 | 234 | 257 | 9 | 241 | 253 | 2.5 | 896 | 1143 | 1301 | 321 | |
| 1400 | 229 | 235 | -1.6 | 213 | 247 | -2.8 | 235 | 260 | 9 | 244 | 255 | 2 | 918 | 1174 | 1210 | 329 | |
| 1410 | 230 | 250 | -1.5 | 214 | 230 | -3.4 | 253 | 261 | 9 | 246 | 255 | 2 | 956 | 1174 | 1239 | 337 | |
| 1420 | 230 | 247 | -1.4 | 212 | 225 | -3.2 | 239 | 265 | 8.5 | 251 | 259 | 3 | 986 | 1174 | 1239 | 337 | |
| 1430 | 232 | 251 | -1.4 | 216 | 223 | -3.2 | 244 | 265 | 9 | 243 | 255 | 2.5 | 1006 | 1178 | 1248 | 340 | |
| 1440 | 246 | 251 | -1.5 | 220 | 229 | -3.1 | 240 | 270 | 9 | 232 | 245 | 3 | 1013 | 1174 | 1252 | 341 | |
| 1450 | 237 | 250 | -1.5 | 220 | 229 | -3.1 | 237 | 266 | 9 | 235 | 242 | 3 | 1033 | 1174 | 1252 | 342 | |
| 1500 | 239 | 255 | -1.2 | 221 | 239 | -3.1 | 240 | 259 | 9 | 231 | 241 | 3 | 1050 | 1174 | 1252 | 342 | |
| 1510 | 241 | 260 | -1.3 | 226 | 240 | -3.1 | 226 | 245 | 9 | 225 | 236 | 3 | 1060 | 1197 | 1268 | 342 | |
| 1520 | 243 | 257 | -1.6 | 228 | 246 | -3.2 | 224 | 239 | 9 | 224 | 234 | 2 | 1060 | 1219 | 1303 | 356 | |
| 1530 | 246 | 252 | -1.6 | 231 | 249 | -3.1 | 224 | 240 | 9 | 227 | 238 | 2 | 1083 | 1234 | 1346 | 372 | |
| 1540 | 244 | 255 | -1.5 | 229 | 250 | -3.2 | 224 | 240 | 9 | 227 | 248 | 2 | 1100 | 1243 | 1377 | 375 | |
| 1550 | 240 | 247 | -1.6 | 223 | 241 | -3.2 | 226 | 241 | 9 | 236 | 248 | 2.5 | 1120 | 1260 | 1415 | 383 | |
| 1600 | 235 | 243 | -1.5 | 220 | 245 | -3.2 | 228 | 245 | 9 | 240 | 251 | 3 | 1135 | 1293 | 1451 | 394 | |
| 1610 | 237 | 252 | -1.5 | 221 | 245 | -3.2 | 230 | 246 | 9 | 241 | 261 | 2.5 | 1167 | 1284 | 1490 | 395 | |
| 1620 | 236 | 248 | -1.5 | 222 | 247 | -3.2 | 232 | 250 | 9 | 244 | 252 | 2.5 | 1181 | 1338 | 1529 | 395 | |
| 1630 | 235 | 245 | -1.5 | 220 | 245 | -3.1 | 232 | 250 | 9 | 245 | 253 | 3 | 1203 | 1319 | 1570 | 395 | |
| 1640 | 235 | 241 | -1.4 | 219 | 243 | -3.2 | 232 | 250 | 9 | 244 | 251 | 3 | 1217 | 1329 | 1586 | 395 | |
| 1650 | 233 | 239 | -1.6 | 217 | 242 | -3.1 | 235 | 255 | 9 | 249 | 254 | 3 | 1240 | 1345 | 1639 | 395 | |
| 1700 | 238 | 236 | -1.6 | 216 | 243 | -3.1 | 241 | 257 | 9 | 249 | 253 | 3 | 1258 | 1358 | 1673 | 395 | |
| 1710 | 231 | 240 | -1.7 | 216 | 239 | -3.1 | 240 | 260 | 9 | 250 | 256 | 3 | 1281 | 1374 | 1682 | 395 | |
| 1720 | 230 | 235 | -1.6 | 214 | 237 | -3.1 | 240 | 260 | 8 | 250 | 257 | 3 | 1301 | 1389 | 1682 | 395 | |
| 1730 | 229 | 235 | -1.7 | 212 | 234 | -3.1 | 245 | 257 | 8.5 | 250 | 254 | 3 | 1322 | 1406 | 1692 | 395 | |
| 1740 | 227 | 235 | -1.7 | 211 | 232 | -3.2 | 240 | 260 | 8 | 252 | 258 | 3 | 1342 | 1423 | 1712 | 395 | |
| 1750 | 225 | 234 | -1.7 | 209 | 228 | -3.1 | 241 | 265 | 8 | 256 | 263 | 2 | 1355 | 1443 | 1730 | 395 | |



LS

KONUS DATA READINGS EVERY 10 MINUTES BY _____ DATE 6-8-74 PAGE 3 OF 4

PLANT Hayward

| TIME | K1 OIL IN TEMP | K1 OIL OUT TEMP | K1 I.D. FAN W.C | K2 OIL IN TEMP | K2 OIL OUT TEMP | K2 I.D. FAN W.C | K3 OIL IN TEMP | K3 OIL OUT TEMP | K3 I.D. FAN W.C | K4 OIL IN TEMP | K4 OIL OUT TEMP | K4 I.D. FAN W.C | FUEL COUNT K1 | FUEL COUNT K2 | FUEL COUNT K3 | FUEL COUNT K4 | ONCE/HR BARK MOISTURE |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1800 | 221 | 227 | -1.4 | 204 | 220 | -3.1 | 216 | 268 | 8 | 254 | 261 | 2 | 1374 | 1470 | 1741 | 395 | |
| 1810 | 220 | 225 | -1.6 | 201 | 220 | -3.1 | 211 | 261 | 7 | 249 | 263 | 5.5 | 1396 | 1520 | 1753 | 395 | |
| 1820 | 227 | 227 | -1.6 | 211 | 235 | -3.1 | 225 | 251 | 7 | 241 | 254 | 6.5 | 1412 | 1566 | 1771 | 395 | |
| 1830 | 232 | 237 | -1.8 | 218 | 241 | -2.2 | 237 | 258 | 7 | 233 | 245 | 5 | 1431 | 1619 | 1811 | 401 | |
| 1840 | 239 | 241 | -1.7 | 223 | 253 | -3.2 | 229 | 248 | 7 | 229 | 240 | 5 | 1439 | 1626 | 1890 | 445 | |
| 1850 | 241 | 246 | -1.6 | 227 | 254 | -3.2 | 227 | 245 | 7 | 233 | 242 | 5 | 1459 | 1651 | 1856 | 420 | |
| 1900 | 235 | 239 | -1.4 | 219 | 242 | -3.2 | 229 | 245 | 7 | 240 | 241 | 6 | 1481 | 1674 | 1896 | 436 | |
| 1910 | 235 | 240 | -1.6 | 219 | 248 | -3.2 | 230 | 247 | 7 | 241 | 253 | 6 | 1503 | 1706 | 1929 | 438 | |
| 1920 | 239 | 246 | -1.6 | 221 | 253 | -3.1 | 232 | 250 | 7 | 245 | 254 | 6 | 1522 | 1736 | 1966 | 438 | |
| 1930 | 244 | 257 | -1.5 | 229 | 259 | -3.1 | 234 | 250 | 7 | 245 | 255 | 6 | 1542 | [illegible] | 2004 | 438 | 1765 |
| 1940 | 245 | 254 | -1.5 | 232 | 262 | -2.7 | 236 | 255 | 7 | 251 | 261 | 6 | 1562 | 1784 | 2029 | 438 | |
| 1950 | | | | | | | | | | | | | | | | | |
| 2000 | | | | | | | | | | | | | | | | | |
| 2010 | | | | | | | | | | | | | | | | | |
| 2020 | | | | | | | | | | | | | | | | | |
| 2030 | | | | | | | | | | | | | | | | | |
| 2040 | | | | | | | | | | | | | | | | | |
| 2050 | | | | | | | | | | | | | | | | | |
| 2100 | | | | | | | | | | | | | | | | | |
| 2110 | | | | | | | | | | | | | | | | | |
| 2120 | | | | | | | | | | | | | | | | | |
| 2130 | | | | | | | | | | | | | | | | | |
| 2140 | | | | | | | | | | | | | | | | | |
| 2150 | | | | | | | | | | | | | | | | | |
| 2200 | | | | | | | | | | | | | | | | | |
| 2210 | | | | | | | | | | | | | | | | | |
| 2220 | | | | | | | | | | | | | | | | | |
| 2230 | | | | | | | | | | | | | | | | | |
| 2240 | | | | | | | | | | | | | | | | | |
| 2250 | | | | | | | | | | | | | | | | | |

# KONUS DATA READINGS EVERY 10 MINUTES

PLANT _____ BY_____ DATE_____ PAGE 4 OF 4

| TIME | K1 | | | K2 | | | K3 | | | K4 | | | FUEL COUNT | | | | ONCE/HR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | OIL IN TEMP | OIL OUT TEMP | I.D. FAN W.C | OIL IN -TEMP | OIL OUT TEMP | I.D. FAN W.C | OIL IN TEMP | OIL OUT TEMP | I.D. FAN W.C | OIL IN TEMP | OIL OUT TEMP | I.D. FAN W.C | K1 | K2 | K3 | K4 | BARK MOISTURE |
| | | | | | | | | | | | | | 5 | 17 | 9 | 4 | |
| | | | | | | | | | | | | | 25 | 32 | 49 | 19 | |
| | | | | | | | | | | | | | 47 | 55 | 87 | 35 | |
| | | | | | | | | | | | | | 65 | 87 | 120 | 37 | |
| | | | | | | | | | | | | | 84 | 117 | 157 | 37 | |
| | | | | | | | | | | | | | 104 | 143 | 195 | 37 | |
| | | | | | | | | | | | | | 124 | 152 | 220 | 37 | |
| | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | |

KONUS DATA READINGS EVERY 10 MINUTES BY _____ DATE 6-9-91 PAGE 2 OF ___

PLANT Hayward

| TIME | K1 OIL IN TEMP | K1 OIL OUT TEMP | K1 I.D. FAN W.C | K2 OIL IN TEMP | K2 OIL OUT TEMP | K2 I.D. FAN W.C | K3 OIL IN TEMP | K3 OIL OUT TEMP | K3 I.D. FAN W.C | K4 OIL IN TEMP | K4 OIL OUT TEMP | K4 I.D. FAN W.C | FUEL COUNT K1 | FUEL COUNT K2 | FUEL COUNT K3 | FUEL COUNT K4 | ONCE/AIR BARK MOISTURE |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | |
| 840 | 231 | 240 | -1.5 | 216 | 240 | -3.1 | | | | | | | | | | | |
| 850 | 230 | 238 | -1.5 | 215 | 234 | -3.2 | | | | | | | 211 | 149 | | | |
| 900 | 230 | 237 | -1.6 | 214 | 233 | -3.2 | | | | | | | 236 | 160 | | | |
| 910 | 230 | 235 | -1.6 | 214 | 240 | -3.2 | | | | | | | 246 | 176 | | | |
| 920 | 230 | 236 | -1.5 | 214 | 233 | -3.2 | | | | | | | 263 | 190 | | | |
| 930 | 227 | 236 | -1.4 | 212 | 228 | -3.2 | | | | | | | 280 | 205 | | | |
| 940 | 226 | 235 | -1.5 | 210 | 238 | -3.2 | | | | | | | 300 | 220 | | | |
| 950 | 225 | 235 | -1.5 | 208 | 224 | -3.2 | | | | | | | 319 | 230 | | | |
| 1000 | 225 | 237 | -1.4 | 206 | 221 | -3.1 | | | | | | | 340 | 248 | | | |
| 1010 | 225 | 235 | -1.4 | 208 | 228 | -3.1 | | | | | | | 355 | 259 | | | |
| 1020 | 226 | 235 | -1.4 | 211 | 234 | -3.2 | | | | | | | 375 | 280 | | | |
| 1030 | 227 | 235 | -1.4 | 211 | 236 | -3.1 | | | | | | | 394 | 303 | | | |
| 1040 | 227 | 235 | -1.5 | 211 | 229 | -3.2 | | | | | | | 412 | 326 | | | |
| 1050 | 225 | 234 | -1.4 | 208 | 223 | -3.1 | | | | | | | 430 | 357 | | | |
| 1100 | 223 | 231 | -1.5 | 207 | 229 | -3.1 | | | | | | | 448 | 375 | | | |
| 1110 | 224 | 230 | -1.5 | 209 | 231 | -3.2 | | | | | | | 469 | 405 | | | |
| 1120 | 226 | 230 | -1.6 | 210 | 233 | -3.1 | | | | | | | 487 | 423 | | | |
| 1130 | 222 | 230 | -1.6 | 205 | 216 | -3.1 | | | | | | | 506 | 451 | | | |
| 1140 | 224 | 229 | -1.5 | 205 | 215 | -3.1 | | | | | | | 523 | 451 | | | |
| 1150 | 225 | 230 | -1.5 | 208 | 222 | -3.2 | | | | | | | 547 | 453 | | | |
| 1200 | 229 | 235 | -1.5 | 213 | 232 | -3.1 | | | | | | | 581 | 482 | | | |
| 1210 | 229 | 237 | -1.6 | 216 | 245 | -3.8 | | | | | | | 611 | 508 | | | |
| 1220 | 222 | 235 | -1.5 | 215 | 248 | -3.1 | | | | | | | 643 | 535 | | | |
| 1230 | 229 | 235 | -1.5 | 213 | 227 | -3.0 | | | | | | | 656 | 557 | | | |
| 1240 | 225 | 231 | -1.6 | 211 | 231 | -3.1 | | | | | | | 671 | 559 | | | |
| 1250 | 226 | 232 | -1.6 | 210 | 238 | -3.1 | | | | | | | 687 | 577 | | | |
| | | | | | | | | | | | | | 702 | 588 | | | |

KONUS DATA READINGS EVERY 10 MINUTES

PLANT Hagerman

BY _____ DATE 6/7/ PAGE 1 OF 1

| TIME | K1 OIL IN TEMP | K1 OIL OUT TEMP | K1 I.D. FAN W.C | K2 OIL IN TEMP | K2 OIL OUT TEMP | K2 I.D. FAN W.C | K3 OIL IN TEMP | K3 OIL OUT TEMP | K3 I.D. FAN W.C | K4 OIL IN TEMP | K4 OIL OUT TEMP | K4 I.D. FAN W.C | FUEL COUNT K1 | FUEL COUNT K2 | FUEL COUNT K3 | FUEL COUNT K4 | ONCE/HR BARK MOISTURE |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1300 | 224 | 231 | -1.5 | 227 | 229 | -3.1 | | | | | | | 719 | 608 | | | |
| 1310 | 224 | 231 | -1.5 | 207 | 225 | -3.1 | | | | | | | 733 | 617 | | | |
| 1320 | 225 | 232 | -1.4 | 207 | 223 | -3.2 | | | | | | | 748 | 629 | | | |
| 1330 | 225 | 238 | -1.4 | 210 | 226 | -3.0 | | | | | | | 763 | 641 | | | |
| 1340 | 227 | 235 | -1.5 | 212 | 240 | -3.0 | | | | | | | 778 | 665 | | | |
| 1350 | 230 | 235 | -1.5 | 214 | 236 | -3.2 | | | | | | | 793 | 679 | | | |
| 1400 | 227 | 239 | -1.4 | 213 | 236 | -3.2 | | | | | | | 808 | 686 | | | |
| 1410 | 228 | 240 | -1.4 | 214 | 235 | -3.0 | | | | | | | 825 | 716 | | | |
| 1420 | 228 | 240 | -1.4 | 213 | 227 | -3.2 | | | | | | | 839 | 720 | | | |
| 1430 | 231 | 241 | -1.3 | 216 | 226 | -3.2 | | | | | | | 855 | 720 | | | |
| 1440 | 232 | 244 | -1.3 | 217 | 224 | -3.2 | | | | | | | 869 | 720 | | | |
| 1450 | 231 | 244 | -1.4 | 216 | 223 | -3.1 | | | | | | | 884 | 720 | | | |
| 1500 | 234 | 249 | -1.5 | 218 | 227 | -3.1 | | | | | | | 900 | 739 | | | |
| 1510 | 231 | 245 | -1.4 | 216 | 233 | -3.2 | | | | | | | 914 | 756 | | | |
| 1520 | 225 | 235 | -1.4 | 211 | 230 | -3.1 | | | | | | | 930 | 779 | | | |
| 1530 | 226 | 235 | -1.4 | 210 | 225 | -3.1 | | | | | | | 945 | 795 | | | |
| 1540 | 225 | 235 | -1.4 | 207 | 231 | -3.2 | | | | | | | 961 | 814 | | | |
| 1550 | 225 | 233 | -1.5 | 209 | 235 | -3.2 | | | | | | | 975 | 831 | | | |
| 1600 | 225 | 234 | -1.5 | 210 | 231 | -3.2 | | | | | | | 991 | 851 | | | |
| 1610 | 225 | 232 | -1.5 | 208 | 229 | -3.2 | | | | | | | 1007 | 865 | | | |
| 1620 | 223 | 231 | -1.5 | 207 | 225 | -3.2 | | | | | | | 1021 | 886 | | | |
| 1630 | 221 | 231 | -1.4 | 205 | 221 | -3.2 | | | | | | | 1037 | 908 | | | |
| 1640 | 222 | 230 | -1.4 | 205 | 229 | -3.2 | | | | | | | 1055 | 934 | | | |
| 1650 | 222 | 229 | -1.4 | 205 | 231 | -3.2 | | | | | | | 1073 | 956 | | | |
| 1700 | 225 | 230 | -1.5 | 208 | 235 | -3.2 | | | | | | | 1095 | 982 | | | |
| 1710 | 226 | 236 | -1.4 | 211 | 238 | -3 | | | | | | | 1119 | 1001 | | | |
| 1720 | 229 | 240 | -1.4 | 214 | 242 | -3 | | | | | | | 1136 | 1026 | | | |
| 1730 | 232 | 245 | -1.4 | 218 | 245 | -3 | | | | | | | 1148 | 1036 | | | |
| 1740 | 235 | 245 | -1.3 | 221 | 250 | -3.0 | | | | | | | 1160 | 1048 | | | |
| 1750 | 232 | 245 | -1.3 | 219 | 246 | -2.9 | | | | | | | 1173 | 1060 | | | |

KONUS DATA READINGS EVERY 10 MINUTES BY _____ DATE 6/4/91 PAGE ___ OF ___

PLANT Hayward, Wisconsin

| TIME | K1 OIL IN TEMP | K1 OIL OUT TEMP | K1 I.D. FAN W.C | K2 OIL IN TEMP | K2 OIL OUT TEMP | K2 I.D. FAN W.C | K3 OIL IN TEMP | K3 OIL OUT TEMP | K3 I.D. FAN W.C | K4 OIL IN TEMP | K4 OIL OUT TEMP | K4 I.D. FAN W.C | FUEL COUNT K1 | FUEL COUNT K2 | FUEL COUNT K3 | FUEL COUNT K4 | ONCE/HR BARK MOISTURE |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1800 | 234 | 249 | -1.3 | 220 | 245 | -2.8 | | | | | | | 1185 | 1073 | | | |
| 1810 | 235 | 248 | 1.4 | 220 | 241 | -3.2 | | | | | | | 1191 | 1096 | | | |
| 1820 | 236 | 249 | -1.3 | 221 | 241 | -3.2 | | | | | | | 1205 | 1097 | | | |
| 1830 | 235 | 248 | -1.3 | 220 | 243 | -3.2 | | | | | | | 1221 | 1110 | | | |
| 1840 | 234 | 248 | -1.4 | 220 | 242 | -3.2 | | | | | | | 1233 | 1122 | | | |
| 1850 | 233 | 242 | -1.4 | 218 | 239 | -3.2 | | | | | | | 1247 | 1136 | | | |
| 1900 | 232 | 242 | 1.4 | 219 | 239 | -3.1 | | | | | | | 1262 | 1155 | | | |
| 1910 | | | | | | | | | | | | | | | | | |
| 1920 | | | | | | | | | | | | | | | | | |
| 1930 | | | | | | | | | | | | | | | | | |
| 1940 | | | | | | | | | | | | | | | | | |
| 1950 | | | | | | | | | | | | | | | | | |
| 2000 | | | | | | | | | | | | | | | | | |
| 2010 | | | | | | | | | | | | | | | | | |
| 2020 | | | | | | | | | | | | | | | | | |
| 2030 | | | | | | | | | | | | | | | | | |
| 2040 | | | | | | | | | | | | | | | | | |
| 2050 | | | | | | | | | | | | | | | | | |
| 2100 | | | | | | | | | | | | | | | | | |
| 2110 | | | | | | | | | | | | | | | | | |
| 2120 | | | | | | | | | | | | | | | | | |
| 2130 | | | | | | | | | | | | | | | | | |
| 2140 | | | | | | | | | | | | | | | | | |
| 2150 | | | | | | | | | | | | | | | | | |
| 2200 | | | | | | | | | | | | | | | | | |
| 2210 | | | | | | | | | | | | | | | | | |
| 2220 | | | | | | | | | | | | | | | | | |
| 2230 | | | | | | | | | | | | | | | | | |
| 2240 | | | | | | | | | | | | | | | | | |
| 2250 | | | | | | | | | | | | | | | | | |

# EFB READINGS

DATE 6-7-94

BY JC

PLANT: HAYWARD K3 & K4

source:

1963
readings every 10 minutes

| TIME | "A" SIDE BED VOLT | "A" SIDE BED CURR. | "A" SIDE ION VOLT | "A" SIDE ION CURR. | "B" SIDE K3 & K4 BED VOLT | "B" SIDE BED CURR. | "B" SIDE ION VOLT | "B" SIDE ION CURR. | EFB PRESS. | BAG H. PRESS. |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | 13 | 0.05 | 22 | 2 | 2 | 5.5 |
| 0710 | | | | | 1 | | | | | |
| 0800 | | | | | 13 | .04 | 22 | 2 | 2 | 5.7 |
| | | | | | | | | | | |
| | | | | | | | | | | |
| | | | | | | | | | | |
| 0800 | | | | | 13 | .04 | 22 | 2 | 2 | 5.7 |
| 0810 | | | | | 13 | .08 | 22 | 2 | 2.2 | 5.6 |
| 0820 | | | | | 13 | .08 | 22 | 2 | 1.8 | 5.6 |
| 0830 | | | | | 13 | .08 | 22 | 2 | 2 | 5.6 |
| 0840 | | | | | 13 | .09 | 22 | 2 | 1.8 | 5.6 |
| 0850 | | | | | 13 | .09 | 22 | 1.9 | 2.2 | 5.6 |
| 0900 | | | | | 13 | .1 | 22 | 1.9 | 2 | 5.6 |
| 0910 | | | | | 13 | .1 | 27 | 4 | 2 | 5.6 |
| 0920 | | | | | 13 | .1 | 23 | 2 | 2 | 5.6 |
| 0930 | | | | | 13 | .1 | 23 | 2 | 1.8 | 5.8 |
| 0940 | | | | | 13 | .1 | 23 | 2 | 2.2 | 5.8 |
| 0950 | | | | | 13 | .1 | 23 | 2 | 2.0 | 6.0 |
| 1000 | | | | | 13 | .1 | 25 | 2.8 | 2.2 | 6.0 |
| 1010 | | | | | 13 | .1 | 22 | 1.8 | 2 | 6 |
| 1020 | | | | | 13 | .1 | 22 | 1.8 | 2 | 6 |
| 1030 | | | | | 13 | .1 | 23 | 1.8 | 2.2 | 6.2 |
| 1040 | | | | | 12 | .1 | 22 | 1.8 | 1.8 | 6.2 |
| 1050 | | | | | 12 | .1 | 22 | 1.8 | 2.2 | 6.2 |
| 1100 | | | | | 12 | .1 | 22 | 1.8 | 1.9 | 6.2 |
| 1110 | | | | | 12 | .11 | 22 | 1.8 | 2 | 6.2 |
| 1120 | | | | | 11.5 | .11 | 22 | 1.8 | 1.8 | 6.2 |
| 1130 | | | | | 12 | .11 | 22 | 1.8 | 2 | 6.2 |
| 1140 | | | | | 12 | .1 | 22 | 1.8 | 2 | 5.7 |
| 1150 | | | | | 12 | .1 | 22 | 1.8 | 1.8 | 5.6 |

# EFB READINGS

DATE 6-7-94

BY JC

2 of 3

PLANT: Hayward K3 & K4

source:

readings every 10 minutes

| TIME | "A" SIDE BED VOLT | "A" SIDE BED CURR. | "A" SIDE ION VOLT | "A" SIDE ION CURR. | "B" SIDE BED VOLT | "B" SIDE BED CURR. | "B" SIDE ION VOLT | "B" SIDE ION CURR. | EFB PRESS. | BAG H. PRESS. |
|---|---|---|---|---|---|---|---|---|---|---|
| 1200 | | | | | 12 | ~~.12~~ .12 | 22 | 1.8 | ~~5.6~~ 2 | ~~5.6~~ 5.6 |
| 1210 | | | | | 12 | .12 | 22 | 1.8 | 1.8 | 5.8 |
| 1220 | | | | | 11.5 | .12 | 22 | 1.8 | 2 | 5.8 |
| 1230 | | | | | 12 | .12 | 22 | 1.8 | 2.2 | 5.8 |
| 1240 | | | | | 11.5 | .12 | 22 | 1.8 | 2 | 5.9 |
| 1250 | | | | | 10.5 | .10 | 22 | 1.8 | 2.2 | 5.8 |
| ~~1300~~ 1300 | | | | | 10.5 | .10 | 22 | 1.8 | 1.6 | 5.8 |
| 1310 | | | | | 11 | .10 | 22 | 1.8 | 1.9 | 6.0 |
| 1320 | | | | | 11 | .1 | 22 | 1.8 | 2.3 | 6.0 |
| 1330 | | | | | 11 | .1 | 22 | 1.8 | 2 | 6 |
| 1340 | | | | | 11 | .1 | 22 | 1.8 | 2 | 6 |
| 1350 | | | | | 11 | .1 | 21.5 | 1.6 | 1.9 | 6.0 |
| 1400 ~~1350~~ | | | | | 11.5 | .1 | 22 | 1.6 | 1.8 | 6.0 |
| 1410 ~~1357~~ | | | | | 12 | .1 | 22 | 1.6 | 1.5 | 6 |
| 1420 | | | | | 12 | .1 | 22 | 1.6 | ~~2.1~~ 2.1 | 6 |
| 1430 | | | | | 10.5 | .08 | 23.5 | 2.2 | 1.8 | 6.2 |
| 1440 | | | | | 10.5 | .08 | 24 | 2.2 | 2 | 6 |
| 1450 | | | | | 11 | .08 | 23.5 | 2.2 | 2.4 | 6.2 |
| 1500 | | | | | 10.5 | .08 | 23 | 2.2 | 2.6 | 6.2 |
| 1510 | | | | | 11 | .08 | 21 | ~~1.6~~ 1.6 | ~~2.2~~ 2.2 | 6.2 |
| 1520 | | | | | 11 | .07 | 21 | 1.6 | 2.2 | 6.1 |
| 1530 | | | | | 11 | .07 | 22 | 1.6 | 2.2 | 6.1 |
| 1540 | | | | | 11 | .08 | 22 | 1.6 | 1.7 | 6.1 |
| 1550 | | | | | 11 | .08 | 22 | 1.6 | 2 | 6 |
| 1600 | | | | | 11 | .07 | 22 | 1.6 | 1.7 | 6.1 |
| 1610 | | | | | 11 | .07 | 21.5 | 1.6 | 2 | 6.1 |
| 1620 | | | | | 10.5 | .08 | 22 | 1.6 | 2 | 6.2 |
| 1630 | | | | | 10.5 | .08 | 22 | 1.6 | 1.4 | 6.2 |
| 1640 | | | | | 10.5 | .08 | 22 | 1.6 | 1.6 | 6.2 |
| 1650 | | | | | 10.5 | .08 | 22 | 1.5 | 1 | 6.1 |

# EFB READINGS

DATE 6-7-94

BY JC

3 of 3

readings every 10 minutes

PLANT: Hayward K-3 & K-4

source:

| TIME | "A" SIDE BED VOLT | "A" SIDE BED CURR. | "A" SIDE ION VOLT | "A" SIDE ION CURR. | "B" SIDE BED VOLT | "B" SIDE BED CURR. | "B" SIDE ION VOLT | "B" SIDE ION CURR. | EFB PRESS. | BAG H. PRESS. |
|---|---|---|---|---|---|---|---|---|---|---|
| 1700 | | | | | 12 | .1 | 22 | 1.6 | 1.2 | 6.4 |
| 1710 | | | | | | | | | | |
| 1720 | | | | | | | | | | |
| 1730 | | | | | | | | | | |
| 1740 | | | | | | | | | | |
| 1750 | | | | | | | | | | |
| 1800 | | | | | | | | | | |
| 1810 | | | | | | | | | | |
| 1820 | | | | | | | | | | |
| 1830 | | | | | | | | | | |
| 1840 | | | | | | | | | | |
| 1850 | | | | | | | | | | |
| 1900 | | | | | | | | | | |
| 1910 | | | | | | | | | | |
| 1920 | | | | | | | | | | |
| 1930 | | | | | | | | | | |
| 1940 | | | | | | | | | | |
| 1950 | | | | | | | | | | |
| 2000 | | | | | | | | | | |
| 2010 | | | | | | | | | | |
| 2020 | | | | | | | | | | |
| 2030 | | | | | | | | | | |
| 2040 | | | | | | | | | | |
| 2050 | | | | | | | | | | |
| 2100 | | | | | | | | | | |
| 2110 | | | | | | | | | | |
| 2120 | | | | | | | | | | |
| 2130 | | | | | | | | | | |
| 2140 | | | | | | | | | | |
| 2150 | | | | | | | | | | |

# EFB READINGS

DATE 6-8-94

BY JC

PLANT: Hayward K1, K2, K3, K4

source:

1 of 3

readings every 10 minutes

| TIME | "A" SIDE BED VOLT | "A" SIDE BED CURR. | "A" SIDE ION VOLT | "A" SIDE ION CURR. | "B" SIDE BED VOLT | "B" SIDE BED CURR. | "B" SIDE ION VOLT | "B" SIDE ION CURR. | EFB PRESS. | BAG H. PRESS. |
|---|---|---|---|---|---|---|---|---|---|---|
| 0900 | 14 | .03 | 21 | .12 | 13 | .08 | 21 | 1.2 | 1.5/1.5 | 3.3/5 |
| 0910 | 14 | .03 | 21 | .14 | 13 | .08 | 21 | 1.2 | 1.7/1.3 | 3.2/5 |
| 0920 | 14 | .04 | 22 | .16 | 13 | .08 | 21 | 1.2 | 1.7/1.8 | 3.2/5.1 |
| 0930 | 14 | .04 | 22 | 1.7 | 13 | .08 | 21 | 1.2 | 1.7/1.4 | 6/4.9 |
| 0940 | 13.5 | .04 | 22 | 1.6 | 13 | .09 | 21.5 | 1.2 | 1.9/1.1 | 0/4.9 |
| 0950 | 13 | .04 | 22 | 1.6 | 13 | .09 | 21.0 | 1.2 | 1.8/1.2 | 2/5 |
| 0900 | 12.5 | .04 | 22 | 1.6 | 12.5 | .09 | 21 | 1.2 | 1.8/1 | 2/5 |
| 0910 | 15 | .04 | 22 | 1.8 | 12 | .09 | 21 | 1.2 | 1.6/1.4 | 2.3/5 |
| 0920 | 15.5 | .04 | 22 | 1.8 | 12.5 | .09 | 21 | 1.2 | 1.4/1 | 2/5.2 |
| 0930 | 17 | .05 | 26 | 2.8 | 12.5 | .1 | 22 | 1.7 | 1.7/1.4 | 2.5/5.1 |
| 0940 | 17 | .04 | 26 | 2.7 | 12.5 | .09 | 23 | 1.8 | 1.5/1.4 | 2.9/5 |
| 0950 | 17.2 | .04 | 26 | 2.9 | 12.5 | .09 | 24 | 1.8 | 1.8/1.2 | 2.9/5 |
| 1000 | 17.5 | .04 | 26 | 2.6 | 12.5 | .09 | 23 | 1.8 | 1.9/.9 | 2.8/5 |
| 1010 | 15.5 | .04 | 22 | 1.5 | 12 | .08 | 23 | 1.8 | 1.8/1.2 | 2.9/5.2 |
| 1020 | 15.5 | .04 | 22 | 1.4 | 12.5 | .08 | 23 | 1.8 | 1.8/1.2 | 2.9/5.1 |
| 1030 | 16.5 | .04 | 24 | .7 | 12.5 | .09 | 23 | 1.8 | .3/1.2 | 3/5.1 |
| 1040 | 17.2 | .02 | 24 | .6 | 12.5 | .09 | 23 | 1.8 | .2/1 | 3/5 |
| 1050 | 1 | .02 | 0 | 0 | 12.5 | .09 | 23 | 1.8 | .3/1.3 | 0/5.2 |
| 1100 | 14.5 | .04 | 19.5 | 1 | 12 | .1 | 23 | 1.8 | 1.5/1 | 3/5.2 |
| 1110 | 16 | .03 | 19 | 1.1 | 11.7 | .1 | 23 | 1.8 | 2/1 | 2.8/5 |
| 1120 | 15 | .04 | 19 | 1.1 | 11.7 | .1 | 23 | 1.8 | 2/.04 | 2.5/5 |
| 1130 | 14 | .04 | 19 | 1.1 | 11.5 | .1 | 23 | 1.8 | 2.2/1.8 | 3.2/5.4 |
| 1140 | 14 | .04 | 19 | 1.0 | 12 | .10 | 23 | 1.8 | 2.2/1.4 | 3.1/5.5 |
| 1150 | 13.5 | .04 | 19 | 1.0 | 12 | .10 | 23.5 | 1.8 | 2.1/.8 | 3/5.5 |
| 1200 | 13.2 | .06 | 19 | 1.1 | 11.5 | .1 | 24 | 1.8 | 2.2/1.4 | 3.2/5.5 |
| 1210 | 15.5 | .06 | 19 | 1 | 12 | .1 | 24 | 1.8 | 2.1/1.3 | 3.1/5.6 |
| 1220 | 15 | .06 | 19 | 1 | 11.6 | .1 | 24.5 | 1.8 | 2/.9 | 3/5.4 |
| 1230 | 15 | .06 | 19 | 1 | 11.5 | .1 | 23 | 1.7 | 2.5/1.6 | 2.4/5.6 |
| 1240 | 15 | .06 | 22 | 2 | 11.5 | .1 | 24 | 1.9 | 2.6/1 | 3.4/5.6 |
| 1250 | 15.5 | .07 | 23 | 2 | 12 | .1 | 24 | 2 | 2.8/1 | 3.2/5.6 |

# EFB READINGS

DATE 6-8-94

BY J.C

PLANT Hayward

source:

2 of 3

readings every 10 minutes

| TIME | "A" SIDE | | | | "B" SIDE | | | | EFB | BAG H. |
|---|---|---|---|---|---|---|---|---|---|---|
| | BED VOLT | BED CURR. | ION VOLT | ION CURR. | BED VOLT | BED CURR. | ION VOLT | ION CURR. | PRESS. | PRESS. |
| 1300 | 15 | .06 | 23 | 1.8 | 11.5 | .1 | 24 | 2 | 2.5/1.6 | 3.4/5.5 |
| 1310 | 15 | .06 | 23 | 1.9 | 12 | .1 | 24 | 2 | 2.5/1.4 | 3.6/5.5 |
| 1320 | 16 | .06 | 23 | 2 | 12 | .1 | 24 | 2 | 2.5/1.6 | 3.5/5.8 |
| 1330 | 16.5 | .06 | 22 | 2 | 12 | .1 | 24 | 2 | 2.5/1.4 | 3.3/5.8 |
| 1340 | 16 | .05 | 23 | 2 | 11.5 | .12 | 24 | 2 | 2.4/1.8 | 3.6/5.1 |
| 1350 | 16 | .05 | 23 | 1.9 | 12 | .1 | 24 | 2 | 2.5/1.1 | 3.4/5.7 |
| 1400 | 15.5 | .06 | 23 | 1.8 | 12 | .12 | 24 | 2.1 | 2.4/1.4 | 3.5/5.6 |
| 1410 | 15.5 | .06 | 23 | 1.8 | 12 | .1 | 24 | 2.1 | 2.4/1.00 | 3.4/5.7 |
| 1420 | 13.5 | .07 | 24 | 1.4 | 12 | .1 | 24 | 2 | 2.8/.9 | 3.2/5.8 |
| 1430 | 11.2 | .1 | 23 | 1.8 | 11.5 | .1 | 23 | 1.8 | 2.7/1.8 | 3.8/5.6 |
| 1440 | 13.5 | .07 | 23 | 1.9 | 12 | .1 | 24 | 2 | 2.7/1.5 | 3.6/5.6 |
| 1450 | 14 | .06 | 23 | 1.9 | 12.5 | .09 | 24 | 2 | 2.7/1.9 | 3.5/5.5 |
| ~~1500~~ 1500 | 14.5 | .06 | 23 | 1.7 | 12.5 | .1 | 24 | 2 | 2.6/1.3 | 3.6/5.5 |
| 1510 | 14.5 | .06 | 23 | 1.7 | 12 | .1 | 24.5 | 1.8 | 2.6/1.2 | 3.6/5.5 |
| 1520 | 15 | .06 | 23 | 1.8 | 12 | .1 | 24 | 1.8 | 2.5/1.2 | 3.4/5.8 |
| 1530 | 15.5 | .05 | 22 | 2.1 | 12 | .1 | 24 | 2 | 2.8/1.8 | 3.6/5.8 |
| 1540 | 16 | .04 | 22 | 2.2 | 12.5 | .09 | 24 | 2 | 2.8/.9 | 3.8/5.5 |
| 1550 | 15 | .05 | 23 | 1.8 | 12.5 | .1 | 24 | 2 | 2.6/1.4 | 3.7/5.8 |
| 1600 | 15 | .06 | 23 | 1.7 | 12 | .09 | 22 | 1.3 | 2.5/1.6 | 3.6/5.8 |
| 1610 | 15 | .06 | 24 | 1.6 | 12 | .09 | 22 | 1.3 | 2.5/1 | 3.8/5.8 |
| 1620 | 15 | .05 | 23 | 1.7 | 12.5 | .09 | 22 | 1.2 | 2.5/.9 | [illegible] 3.6/5. |
| 1630 | 15 | .06 | 23 | 1.6 | 12.2 | .09 | 22 | 1.2 | 2.5/.9 | 3.7/6.1 |
| 1640 | 15 | .06 | 23 | 1.6 | 12.2 | .08 | 22 | 1.2 | 2.6/1.1 | 3.8/5.9 |
| 1650 | 15 | .06 | 22 | 2 | 12.2 | .09 | 22 | 1.2 | 3/1.2 | 3-8/5.9 |
| 1700 | 15 | .05 | 23 | 1.8 | 12.5 | .1 | 24.5 | 1.9 | 2.6/.9 | 3.8/5.9 |
| 1710 | 15.5 | .06 | 23 | 1.8 | 12.5 | .09 | 24 | 1.9 | 2.6/1.1 | 3.9/5.9 |
| 1720 | 15.5 | .06 | 24 | 1.8 | 13 | .1 | 25 | 2 | 2.6/.8 | 4/6 |
| 1730 | 15.5 | .06 | 24 | 1.8 | 12.5 | .09 | 24.5 | 2 | 2.6/1 | 4/5.8 |
| 1740 | 15.5 | .05 | 24 | 1.7 | 12 | .1 | 24 | 2 | 2.6/1 | 4/5.9 |
| 1750 | 15.5 | .04 | 21 | 2 | 11 | .09 | 23 | 1.6 | 2.9/1 | 4/6 |

# EFB READINGS

DATE 6-8-94
BY J.C
3 & 3
readings every 10 minutes

PLANT: Hayward
source:

| TIME | "A" SIDE BED VOLT | "A" SIDE BED CURR. | "A" SIDE ION VOLT | "A" SIDE ION CURR. | "B" SIDE BED VOLT | "B" SIDE BED CURR. | "B" SIDE ION VOLT | "B" SIDE ION CURR. | EFB PRESS. | BAG H. PRESS. |
|---|---|---|---|---|---|---|---|---|---|---|
| 1800 | 16 | .05 | 22 | 2.2 | 12 | .1 | 24 | 2 | 2.7/1.7 | 4/6 |
| 1810 | 16 | .04 | 23 | 1.9 | 11.5 | .1 | 24 | 2 | 2.6/1.4 | 4/6 |
| 1820 | 15.5 | .05 | 23 | 1.9 | 12 | .1 | 24 | 2.1 | 2.6/1.8 | 4/6 |
| 1830 | 15.5 | .05 | 23 | 1.7 | 11.5 | .1 | 24 | 2.2 | 2.5/1.4 | 4/6 |
| 1840 | 15 | .04 | 23 | 1.6 | 11.5 | .12 | 24 | 2.2 | ~~2.6~~ 2.4/1.8 | 4/6 |
| 1850 | 16 | .06 | 22 | 2.2 | 12 | .14 | 24 | 2.2 | 2.6/1.6 | 4/6 |
| 1900 ~~1810~~ | 15.5 | .06 | 23 | 2 | 11.5 | .12 | 24 | 2.2 | 2.6/1.4 | 4/6 |
| 1910 | 16 | .06 | 23 | 1.8 | 11.5 | .12 | 24 | 2.1 | 2.5/1.9 | 4/6 |
| 1920 | 14.5 | .06 | 23 | 1.7 | 11.5 | .11 | 24 | 2.1 | 2.5/1.4 | 4/6.1 |
| 1930 | 15 | .06 | 23 | 1.7 | 11.5 | .11 | 24 | 2.1 | 2.5/1.9 | 4/6 |
| 1940 | 14.5 | .06 | 22 | 2 | 11.5 | .1 | 24 | 2.1 | 2.7/1.4 | 3.9/6 |
| 1950 | | | | | | | | | | |
| 2000 | | | | | | | | | | |
| 2010 | | | | | | | | | | |
| 2020 | | | | | | | | | | |
| 2030 | | | | | | | | | | |
| 2040 | | | | | | | | | | |
| 2050 | | | | | | | | | | |
| 2100 | | | | | | | | | | |
| 2110 | | | | | | | | | | |
| 2120 | | | | | | | | | | |
| 2130 | | | | | | | | | | |
| 2140 | | | | | | | | | | |
| 2150 | | | | | | | | | | |
| 2200 | | | | | | | | | | |
| 2210 | | | | | | | | | | |
| 2220 | | | | | | | | | | |
| 2230 | | | | | | | | | | |
| 2240 | | | | | | | | | | |
| 2250 | | | | | | | | | | |

# EFB READINGS

DATE 6-9-94

BY 1C3

PLANT: Hayward

source:

readings every 10 minutes

| TIME | "A" SIDE K1 & K2 | | | | "B" SIDE K3 & K4 | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | BED VOLT | BED CURR. | ION VOLT | ION CURR. | BED VOLT | BED CURR. | ION VOLT | ION CURR. | EFB PRESS. | BAG H. PRESS. |
| | | | | | | | | | | |
| | | | | | | | | | | |
| | | | | | | | | | | |
| | | | | | | | | | | |
| 0840 | 14 | .09 | 24 | 1.8 | | | | | 2.3 | ~~3.4~~ 3.5 |
| 0850 | 14.5 | .09 | 24 | 1.8 | | | | | 2.3 | ~~3.3~~ 3.4 |
| 0900 | 15 | .08 | 24 | 1.8 | | | | | 2.3 | ~~3.3~~ 3.4 |
| 0910 | 14.5 | .09 | 24.5 | 1.8 | | | | | 2.3 | 3.5 |
| 0920 | 15 | .09 | 24 | 1.8 | | | | | 2.4 | 3.5 |
| 0930 | 15 | .08 | 24 | 1.8 | | | | | 2.4 | 4 |
| 0940 | 15 | .08 | 24 | 1.8 | | | | | 2.4 | 3.6 |
| 0950 | 15 | .08 | 24 | 1.8 | | | | | 2.3 | 3.4 |
| 1000 | 15 | .08 | 24 | 1.8 | | | | | 2.3 | 3.5 |
| 1010 | 14.5 | .09 | 24 | 1.8 | | | | | 2.4 | 3.6 |
| 1020 | 14.5 | .09 | 24 | 1.7 | | | | | 2.4 | 3.9 |
| 1030 | 15 | .09 | 24 | 1.8 | | | | | 2.4 | 3.8 |
| 1040 | 14.5 | .09 | 24 | 1.8 | | | | | 2.4 | 3.6 |
| 1050 | 15 | .08 | 24 | 1.9 | | | | | 2.4 | 3.7 |
| 1100 | 14.5 | .09 | 24 | 1.8 | | | | | 2.4 | 3.9 |
| 1110 | 14.5 | .09 | 24 | 1.8 | | | | | 2.4 | 3.6 |
| 1120 | 14.7 | .09 | 24 | 1.8 | | | | | 2.4 | 3.7 |
| 1130 | 15 | .08 | 24 | 1.8 | | | | | 2.4 | 3.8 |
| 1140 | 15 | .08 | 24 | 1.9 | | | | | 2.4 | 3.6 |
| 1150 | 15 | .08 | 24 | 1.9 | | | | | 2.4 | 3.8 |
| 1200 | 15 | .08 | 24 | 1.8 | | | | | 2.3 | 3.8 |
| 1210 | 15.0 | .09 | 25 | 1.8 | | | | | 2.4 | 3.9 |
| 1220 | 14.5 | .09 | 24.5 | 1.8 | | | | | 2.3 | 4 |
| 1230 | 15 | .08 | 24 | 1.8 | | | | | 2.4 | 3.9 |
| 1240 | 14.5 | .08 | 24 | 1.8 | | | | | 2.3 | 4 |
| 1250 | 14.5 | .08 | 24 | 1.8 | | | | | 2.3 | 4 |

# EFB READINGS

DATE 6/9/94

BY 1 2 of 3

PLANT: Hayward

source:

readings every 10 minutes

| TIME | "A" SIDE BED VOLT | "A" SIDE BED CURR. | "A" SIDE ION VOLT | "A" SIDE ION CURR. | "B" SIDE BED VOLT | "B" SIDE BED CURR. | "B" SIDE ION VOLT | "B" SIDE ION CURR. | EFB PRESS. | BAG H. PRESS. |
|---|---|---|---|---|---|---|---|---|---|---|
| 1300 | 14 | .1 | 24 | 1.8 | | | | | 2.3 | 3.8 |
| 1310 | 14.5 | .1 | 24.5 | 1.8 | | | | | 2.3 | 4 |
| 1320 | 14.5 | .09 | 24 | 1.8 | | | | | 2.4 | 4.1 |
| 1330 | 13.5 | .1 | 24 | 1.7 | | | | | 2.3 | 4 |
| 1340 | 13.5 | .1 | 24 | 1.7 | | | | | 2.3 | 4 |
| 1350 | 14 | .1 | 24 | 1.8 | | | | | 2.3 | 4 |
| 1400 | 13.5 | .1 | 24 | 1.8 | | | | | 2.3 | 3.5 |
| 1410 | 13 | .11 | 24 | 1.8 | | | | | 2.3 | 4 |
| 1420 | 13.5 | .1 | 24 | 1.8 | | | | | 2.3 | 4 |
| 1430 | 13.5 | .1 | 24 | 1.8 | | | | | 2.3 | 4.1 |
| 1440 | 13.5 | .1 | 24 | 1.8 | | | | | 2 | 4.2 |
| 1450 | 14 | .09 | 24 | 2.2 | | | | | 2.3 | 4.1 |
| 1500 | 14.5 | .09 | 24 | 2 | | | | | 2.4 | 4.1 |
| 1510 | 15 | .09 | 24 | 2 | | | | | 2.3 | 4.1 |
| 1520 | 14 | .1 | 24 | 2 | | | | | 2.3 | 3.9 |
| 1530 | 14.5 | .1 | 24 | 2 | | | | | 2.3 | 4 |
| 1540 | 14.5 | .1 | 24 | 1.8 | | | | | 2.3 | 4.3 |
| 1550 | 14 | .1 | 24 | 1.9 | | | | | 2.3 | 4 |
| 1600 | 14 | .1 | 24 | 1.8 | | | | | 2.3 | 4.1 |
| 1610 | 13.5 | .1 | 24 | 1.8 | | | | | 2.3 | 4 |
| 1620 | 13.5 | .08 | 24 | 1.8 | | | | | 2.3 | 4.1 |
| 1630 | 14 | .1 | 24 | 2 | | | | | 2.3 | 4.1 |
| 1640 | 14 | .1 | 24 | 2 | | | | | 2.3 | 4.1 |
| 1650 | 13.7 | .1 | 24 | 1.9 | | | | | 2.2 | 4 |
| 1700 | 13.5 | .1 | 24 | 1.9 | | | | | 2.3 | 4.2 |
| 1710 | 13.5 | .1 | 24 | 1.8 | | | | | 2.3 | 4 |
| 1720 | 13 | .11 | 24 | 1.8 | | | | | 2.3 | 4.1 |
| 1730 | 13.5 | .12 | 24 | 1.9 | | | | | 2.3 | 4.2 |
| 1740 | 14 | .12 | 24 | 1.8 | | | | | 2.3 | 4.2 |
| 1750 | 12.5 | .14 | 24 | 1.5 | | | | | 2.4 | 4.2 |



20

# EFB READINGS

DATE 6/9/94

BY 1 3 of 3

PLANT: Hayward

source: 1

readings every 10 minutes

| TIME | "A" SIDE BED VOLT | "A" SIDE BED CURR. | "A" SIDE ION VOLT | "A" SIDE ION CURR. | "B" SIDE BED VOLT | "B" SIDE BED CURR. | "B" SIDE ION VOLT | "B" SIDE ION CURR. | EFB PRESS. | BAG H. PRESS. |
|---|---|---|---|---|---|---|---|---|---|---|
| 1800 | 12.5 | .14 | 24 | 1.9 | | | | | 2.4 | 4.2 |
| 1810 | 12.5 | .15 | 24.5 | 1.8 | | | | | 0.4 | 4.2 |
| 1820 | 12.2 | .15 | 24 | 1.8 | | | | | 2.4 | 4.2 |
| 1830 | 12.2 | .15 | 24 | 1.7 | | | | | 2.4 | 4.2 |
| 1840 | 12 | .15 | 24 | 1.8 | | | | | 2.4 | 4.2 |
| 1850 | 12.5 | .14 | 24 | 1.8 | | | | | 2.4 | 4.2 |
| 1900 | 12 | .15 | 24 | 1.8 | | | | | 2.4 | 4.2 |
| 1910 | | | | | | | | | | |
| 1920 | | | | | | | | | | |
| 1930 | | | | | | | | | | |
| 1940 | | | | | | | | | | |
| 1950 | | | | | | | | | | |
| 2000 | | | | | | | | | | |
| 2010 | | | | | | | | | | |
| 2020 | | | | | | | | | | |
| 2030 | | | | | | | | | | |
| 2040 | | | | | | | | | | |
| 2050 | | | | | | | | | | |
| 2100 | | | | | | | | | | |
| 2110 | | | | | | | | | | |
| 2120 | | | | | | | | | | |
| 2130 | | | | | | | | | | |
| 2140 | | | | | | | | | | |
| 2150 | | | | | | | | | | |
| 2200 | | | | | | | | | | |
| 2210 | | | | | | | | | | |
| 2220 | | | | | | | | | | |
| 2230 | | | | | | | | | | |
| 2240 | | | | | | | | | | |
| 2250 | | | | | | | | | | |



71

6-7-94 1D

Konus-bark moisture content

8:00am - 37.9
9:00 - 38.8
10:00 - 37.9
11:00 - 40.6
12:00 - 40.8
1:00 - 42.6
2:00 - 39.5
3:00 - 36.5
4:00 - 38.8
5:00 - 37.1

6-8-94 1D

Konus - bark moisture

8:00am 39.7

9:00 40.6

10:00 39.1

11:00 39.4

12:00 40.4

1:00 38.5

2:00 38.5

3:00 34.5

4:00 38.5

5:00 40.6

6:00 40.5

7:00 39.2 2-B

8:00

9:00

10:00

11:00

6-9-94

BARK MOISTURE % (KONUS)

8:00 A.M. - 40.7%

9 - 37.4%

10 - 35.7%

11 - 37.7%

PM 12 - 36.1%

1 - 36.0%

2 - 37.7%

3 - 38.0%

4 - 37.6%

5 - 37.4%

6 - 39.6%

7 - 38.4%

Hayward
6-7-94
Trim 0/0 7/16

194.00 +
190.00 +
194.00 +
192.00 +
190.00 +
194.00 +
192.00 +
190.00 +
194.00 +
194.00 +
196.00 +
2,312.00 *
.....
2,312.00 =

LII Before - 2313
After - 2131

194 192
190 190
194 192
192 194
190 194
194 196

7.9 %

187.000 +
190.000 +
184.000 +
187.000 +
181.000 +
186.000 +
179.000 +
189.000 +
184.000 +
186.000 +
185.000 +
2,224.000 =
.....

LI Before - 2,224
After - 2,086

187 179
190 189
184 184
187 186
181 185
186 186

6.2 %



75

# APPENDIX K

## PROCEDURES

# Particulate Loading and Emission Rates

The particulate emission rates were determined per EPA Methods 1 - 5, CFR Title 40, Part 60, Appendix A (revised July 1, 1992). In this procedure a preliminary velocity profile of the gases in the flue is obtained by means of a temperature and velocity traverse. On the basis of these values, sampling nozzles of appropriate diameter are selected to allow isokinetic sampling, a necessary prerequisite for obtaining a representative sample.

The sampling train consists of a heated glass-lined sampling probe equipped with a Type S pitot and a thermocouple. The probe is attached to a sampling module which houses the all-glass in line filter holder in a temperature controlled oven. The sampling module also houses the impinger case and a Drierite filled column. The sampling module is connected by means of an umbilical cord to the control module. The control module houses the dry test gas meter, the calibrated orifice, a leakless pump, two inclined manometers, and all controls required for operating the sampling train.

Particulate samples are collected as follows: The sample gas is drawn through the sampling probe isokinetically and passed through a 4-inch diameter Gelman Type A/E glass fiber filter where particulates are removed. The sample gas is then passed through an ice-cooled impinger train and a desiccant-packed column which absorbs remaining moisture. The sample gas then passes through a vacuum pump followed by a dry test gas meter. The gas meter integrates the sample gas flow throughout the course of the test. A calibrated orifice attached to the outlet of the gasmeter provides real time flow rate data.

A representative particulate sample was acquired by sampling for equal periods of time at the centroid of a number of equal area regions in the duct. The sampling rate is adjusted at each test point maintaining isokinetic sampling conditions. Nomographs are used for rapid determination of the sampling rate.

# Particulate Loading and Emission Rates

After sampling is complete, the filter is removed and placed in a clean container. The nozzle and inlet side of the filter holder are quantitatively washed with acetone and the washings are stored in a second container. A brush is often used in the cleaning step to help dislodge deposits. The samples are returned to the laboratory where they are logged in and analyzed. The volume of the acetone rinse ("probe wash") is noted and then the rinse is quantitatively transferred to a tared 120 cc porcelain evaporating dish and the acetone evaporated off at 97-105 °F. This temperature is used to prevent condensation of atmospheric moisture due to the cooling effect induced by the evaporation of acetone. The acetone-free sample is then transferred to an oven and dried at 105 °C for 30 minutes, cooled in a desiccator over Drierite, and then weighed to the nearest .01 mg. The filter sample is quantitatively transferred to a 6-inch watch glass and dried in an oven at 105 °C for two hours. The filter and watch glass are then cooled in a desiccator and the filter weighed to the nearest .01 mg. All weighings are performed in a balance room where the relative humidity is hydrostatted to less than 50% relative humidity. Microscopic examination of the samples is performed if any unusual characteristics are observed. The weight of the acetone rinse is corrected for the acetone blank. The Drierite column is weighed on-site and the water collected by Drierite is added to the condensate so that the total amount of absorbed water may be ascertained.

Integrated flue gas samples for Orsat analysis were collected simultaneously with each pollutant sample. The samples were collected in 15-liter gas sampling bags at a constant flow rate throughout each particulate run. The bags were at a constant flow rate throughout each particulate run. The bags were then returned to the laboratory and analyzed by Orsat analysis. Standard commercially prepared solutions were used in the Orsat analyzer (sat. KOH for carbon dioxide and reduced methylene blue for oxygen).

# Condensible Organic Compounds Analysis

## Method II-8672

*Equipment:* Separatory funnel - 500 cc with Teflon stopcock

Powder funnel - 75 mm ID with a 17 mm stem

Evaporating dish (es) - 200 cc or 250 cc beaker

*Reagents:* Diethyl ether - reagent grade

Chloroform - reagent grade

Sodium sulfate - (ACS) granular anhydrous

Toluene - (if 3% hydrogen peroxide is used to collect the samples)

Glass wool (Pyrex microfiber)

### PREPARATION

1. Place 1 kg of granular anhydrous sodium sulfate in a shallow tray and heat to 200°C for at least four hours. Store in a tightly sealed glass container.

2. Place a plug of clean glass wool in the stem of the powder funnel. The plug must be of sufficient size so that it is held snugly in place by its own pressure. Add a one-inch layer of dry sodium sulfate.

## SAMPLING

An all-glass impinger assembly is used in the back half of the EPA Method 5 sampling train when an organic wet catch is to be collected. The impinger assembly consists of a modified impinger, a Greenburg Smith impinger followed by another modified impinger. The third impinger should have a temperature measuring device at the outlet upstream of a final impinger or desiccant column to monitor the temperature of the outlet gas stream. Prior to the start of the test, each of the first two impingers should be charged with 100 g of Class I water. The method 5 train should be operated as provided for in EPA method 5. Ice should be added to the impinger batch to keep the temperature of the gas at the outlet at or less than 68°F. After the post test leak check, the impinger train is removed and impinger contents poured into a tared all-glass sample bottle and closed with a Teflon-lined cap. The sample bottle is then weighed and the total condensate calculated by subtraction of the bottle tare weight and the weight of initial water added to the impingers (200 g). A label is affixed and the sample is returned to the laboratory for analysis. The sample should be stored at 4°C if the analysis is not conducted within 48 hours.

## I. ORGANICS

Caution! Work in vented hood!!!

### A. Organic Blank Determination

1. Pour 125 ml of ethyl ether and 125 ml of chloroform into a tared beaker.

2. Evaporate solvent in hood at 70°F or less until no solvent remains.

3. Desiccate the sample in dish for two hours.

4. Weigh the sample to nearest 0.1 mg, record and report on Form LSC-03C.

## B. Organic Sample Determination

1. Test for peroxide in sample ether using KI strips. (If KI strip shows positive, contact your supervisor before proceeding.)

2. Transfer the sample solution quantitatively to a 500 ml separatory funnel. Use the first of three 25 ml chloroform aliquots to rinse the sample container.

3. Extract with three 25 ml portions of chloroform. (Shake and vent to release pressure about 4 to 5 times each.) Allow the phases to separate. (Bottom layer is chloroform.) Draw off the bottom layer, transferring the solvent with a funnel containing a plug of sodium sulfate into a tared beaker. (Do not draw off any of the aqueous layer.)

4. After the three chloroform extractions, use two 25 ml portions of chloroform to rinse the sodium sulfate, collecting the rinses in the same tared beaker as the extracts.

5. Next extract the sample three times with 25 ml aliquots of ethyl ether. (Shake and vent to release pressure about 4 to 5 times each.) Allow the phases to separate. (Top layer is ethyl ether.) Draw off the bottom layer (aqueous) into another separatory funnel taking less than 1 ml of the ethyl ether layer with. Decant the ethyl ether, passing it through sodium sulfate and collecting the ethyl ether in the same tared dish as the chloroform.

6. After the three ethyl ether extractions, take two 25 ml portions of ethyl ether and rinse the sodium sulfate collecting the rinses in the same tared beaker as the extracts.

7. Evaporate the solvents (chloroform and ethyl ether) in the tared beaker in the hood at 70°F or less until no solvent remains. (Use no heat and have no sources of ignition in the hood when doing this procedure.) Do not evaporate so quickly as to allow evaporative cooling to lower the temperature of the container below the dew point of water, otherwise, water will be condensed out in the container.

8. Desiccate to constant weight (two hours). Record and report the final weight to the nearest 0.1 mg on Form LSC-03G.

## II. INORGANICS

If inorganic residue information is required, the following procedure should be conducted:

### A. Inorganic Blank Determination

1. Vent the remaining aqueous phase from the organic extraction in the hood to remove residual organic solvents (usually overnight).

2. Decant the impinger catch into a tared evaporating dish.

3. Evaporate all of the water in the sample in an oven at 100°C. Take care not to boil to prevent bumping and loss of sample.

4. Cool the dried sample in the desiccator and desiccate until a constant weight is obtained.

5. Report the results to the nearest 0.1 mg on Form LSC-03G.

### B. Inorganic Sample Determination

Follow steps 1-5 in Section A above.

*NOTES*

1. For the organics determination, in the rare event that the impinger catch resulted from a Modified Method 6 determination ($SO_2$), whereby the solution contains dilute hydrogen peroxide ($\geq$ 3%), do <u>not</u> use ether as an extraction solvent. <u>Substitute toluene</u> for ethyl ether in Section I. (Ether in the presence of peroxide forms explosive hydroperoxide.)

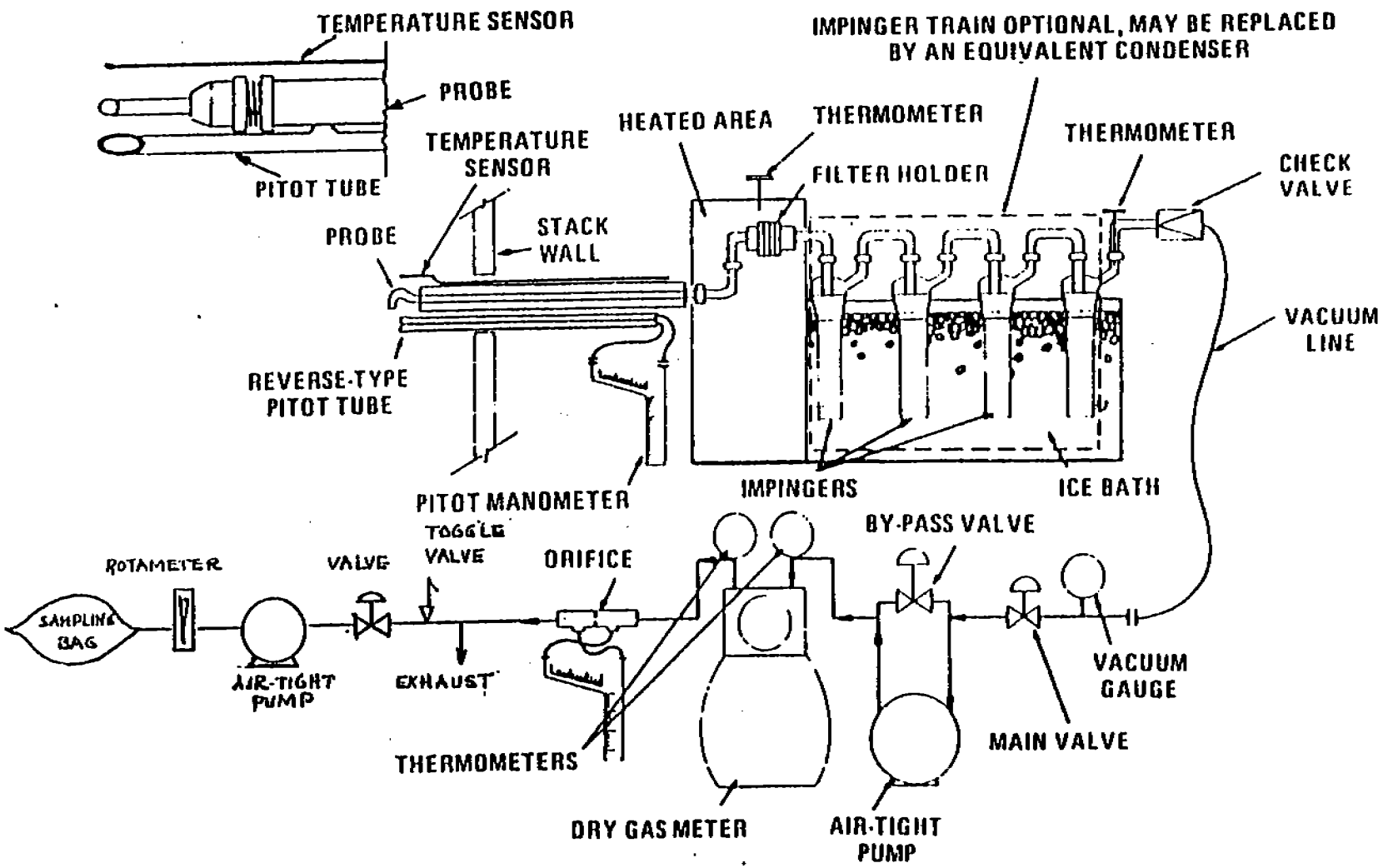
2. In the organics determination, more than three extractions may be required to extract all of the organics. Additional extractions should be performed if the aqueous phase is still cloudy.

3. Special state requirements:
   Michigan - Total sample evaporated in tared evaporating dish on steam bath.
   Iowa - Organics and inorganics separately, as required.
   Wisconsin - Use Method II-8672-WI.
   Rest of states - Organics only.

## *REFERENCES*

Proposed standards of Performance for New Stationary Sources, Federal Register 36(159) Part II, August 1, 1979.

Minnesota Pollution Control Agency, Exhibit C.




Particulate-sampling train.

Flow

Flow determinations were carried out in accordance with EPA Method 2, CFR Title 40, Part 60, Appendix A (Revised July 1, 1987). A type S pitot was used to sense velocity pressure and an inclined manometer was used to measure velocity pressures. Gas temperatures were measured using a calibrated Type K thermocouple and digital temperature meter. Gas density (i.e. molecular weight) was calculated from the composition of the gas which was determined by Orsat.

Gas Flow Density

Gas compositions were determined as per Method 3 by Orsat analysis of an integrated gas sample collected from the stack during the oxides of nitrogen determinations. Standard commercially prepared solutions were used in the Orsat analyzer (sat. KOH for carbon dioxide and reduced methylene blue for oxygen).

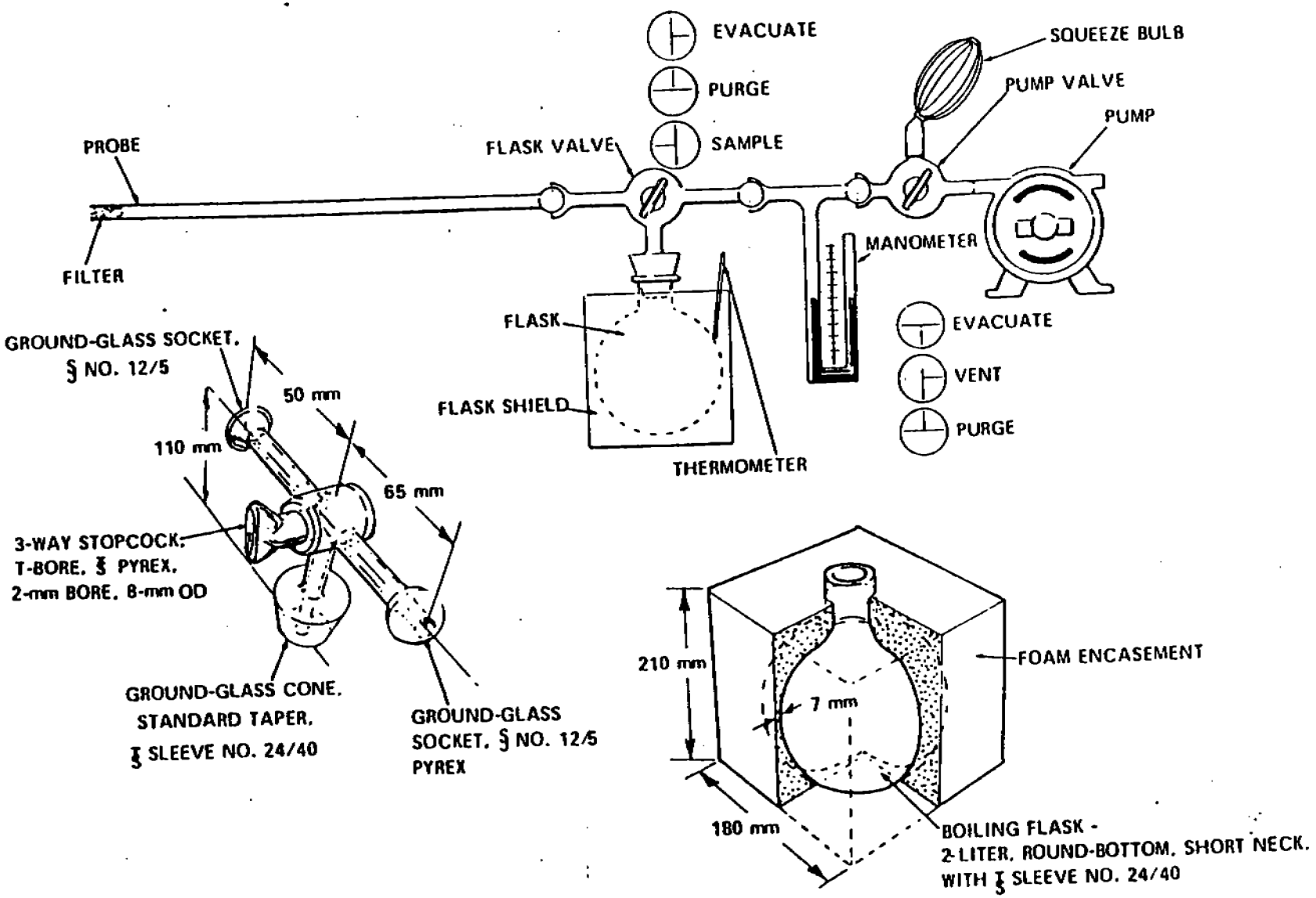
Oxides of Nitrogen

Oxides of nitrogen concentrations were collected in accordance with EPA Method 7 (see above-cited reference) with a specially designed all glass manifold and valving assembly and a heated stainless steel-lined probe. Samples were collected in two-liter evacuated insulated flasks which contained 25 cc of acidified peroxide solution (Method 7 reagent). Nine sets or more of three samples each were collected over a period of 4.5 to 5 hours.

The sampling train was leak checked through the probe at the beginning and end of the test and, in addition, the system leak checked at the time of evacuation of each flask. Before the samples were collected, the probe was purged to eliminate dead volume effects and to raise the temperature of the probe outlet and manifold assembly to minimize condensation of moisture. A plug of microfiber glass wool inserted in the probe inlet was used to prevent particulate material from entering into the flask. The temperature of the flask, vacuum in the

flask and barometric pressure at the time of sampling was recorded for each flask. After sampling was complete, as evidenced by the in-line vacuum gauge, the flask valve was closed, the flask assembly disconnected from the manifold/valve assembly and the flask shook for several minutes to promote oxidation and absorption. The recovered oxides of nitrogen samples were returned to the laboratory and analyzed immediately by ion chromatography as per EPA 7A.

The internal volume of each numbered flask assembly has been measured prior to initial use by filling with water, weighing before and after and then converting the weight of water to volume by means of the density of water at room temperature. Flask volumes are stored in the computer and recalled automatically in the computer calculation.




Sampling train, flask valve, and flask.

4.2 Performance Evaluation Tests. The owner of a lidar system shall subject such a lidar system to the performance verification tests described in Section 3, prior to first use of this method. The annual calibration shall be performed for three separate, complete runs and the results of each should be recorded. The requirements of Section 3.3.1 must be fulfilled for each of the three runs.

Once the conditions of the annual calibration are fulfilled the lidar shall be subjected to the routine verification for three separate complete runs. The requirements of Section 3.3.2 must be fulfilled for each of the three runs and the results should be recorded. The Administrator may request that the results of the performance evaluation be submitted for review.

5. *References*

5.1 The Use of Lidar for Emissions Source Opacity Determination, U.S. Environmental Protection Agency, National Enforcement Investigations Center, Denver, CO. EPA-330/1-79-003-R. Arthur W. Dybdahl, current edition [NTIS No. PB81-246662].

5.2 Field Evaluation of Mobile Lidar for the Measurement of Smoke Plume Opacity, U.S. Environmental Protection Agency, National Enforcement Investigations Center, Denver, CO. EPA/NEIC-TS-128, February 1976.

5.3 Remote Measurement of Smoke Plume Transmittance Using Lidar, C. S. Cook, G. W. Bethke, W. D. Conner (EPA/RTP). Applied Optics 11, pg 1742. August 1972.

5.4 Lidar Studies of Stack Plumes in Rural and Urban Environments, EPA-650/4-73-002, October 1973.

5.5 American National Standard for the Safe Use of Lasers ANSI Z 136.1-176, March 8, 1976.

5.6 U.S. Army Technical Manual TB MED 279, Control of Hazards to Health from Laser Radiation, February 1969.

5.7 Laser Institute of America Laser Safety Manual, 4th Edition.

5.8 U.S. Department of Health, Education and Welfare, Regulations for the Administration and Enforcement of the Radiation Control for Health and Safety Act of 1968, January 1976.

5.9 Laser Safety Handbook, Alex Mallow, Leon Chabot, Van Nostrand Reinhold Co., 1978.

## Method 10—Determination of Carbon Monoxide Emissions From Stationary Sources

1. *Principle and Applicability*

1.1 Principle. An integrated or continuous gas sample is extracted from a sampling point and analyzed for carbon monoxide (CO) content using a Luft-type nondispersive infrared analyzer (NDIR) or equivalent.

1.2 Applicability. This method is applicable for the determination of carbon monoxide emissions from stationary sources only when specified by the test procedures for determining compliance with new source performance standards. The test procedure will indicate whether a continuous or an integrated sample is to be used.

2. *Range and Sensitivity*

2.1 Range. 0 to 1,000 ppm.

2.2 Sensitivity. Minimum detectable concentration is 20 ppm for a 0 to 1,000 ppm span.

3. *Interferences*

Any substance having a strong absorption of infrared energy will interfere to some extent. For example, discrimination ratios for water ($H_2O$) and carbon dioxide ($CO_2$) are 3.5 percent $H_2O$ per 7 ppm CO and 10 percent $CO_2$ per 10 ppm CO, respectively, for devices measuring in the 1,500 to 3,000 ppm range. For devices measuring in the 0 to 100 ppm range, interference ratios can be as high as 3.5 percent $H_2O$ per 25 ppm CO and 10 percent $CO_2$ per 50 ppm CO. The use of silica gel and ascarite traps will alleviate the major interference problems. The measured gas volume must be corrected if these traps are used.

4. *Precision and Accuracy*

4.1 Precision. The precision of most NDIR analyzers is approximately ±2 percent of span.

4.2 Accuracy. The accuracy of most NDIR analyzers is approximately ±5 percent of span after calibration.

5. *Apparatus*

5.1 Continuous Sample (Figure 10-1).

5.1.1 Probe. Stainless steel or sheathed Pyrex[1] glass, equipped with a filter to remove particulate matter.

5.1.2 Air-Cooled Condenser or Equivalent. To remove any excess moisture.

5.2 Integrated Sample (Figure 10-2).

5.2.1 Probe. Stainless steel or sheathed Pyrex glass, equipped with a filter to remove particulate matter.

5.2.2 Air-Cooled Condenser or Equivalent. To remove any excess moisture.

5.2.3 Valve. Needle valve, or equivalent, to to adjust flow rate.

5.2.4 Pump. Leak-free diaphragm type, or equivalent, to transport gas.

5.2.5 Rate Meter. Rotameter, or equivalent, to measure a flow range from 0 to 1.0 liter per min (0.035 cfm).

[1] Mention of trade names or specific products does not constitute endorsement by the Environmental Protection Agency.

5.2.6 Flexible Bag. Tedlar, or equivalent, with a capacity of 60 to 90 liters (2 to 3 $ft^3$). Leak-test the bag in the laboratory before using by evacuating bag with a pump followed by a dry gas meter. When evacuation is complete, there should be no flow through the meter.

5.2.7 Pitot Tube. Type S, or equivalent, attached to the probe so that the sampling rate can be regulated proportional to the stack gas velocity when velocity is varying with the time or a sample traverse is conducted.

5.3 Analysis (Figure 10-3).

5.3.1 Carbon Monoxide Analyzer. Nondispersive infrared spectrometer, or equivalent. This instrument should be demonstrated, preferably by the manufacturer, to meet or exceed manufacturer's specifications and those described in this method.

5.3.2 Drying Tube. To contain approximately 200 g of silica gel.

5.3.3 Calibration Gas. Refer to section 6.1.

5.3.4 Filter. As recommended by NDIR manufacturer.

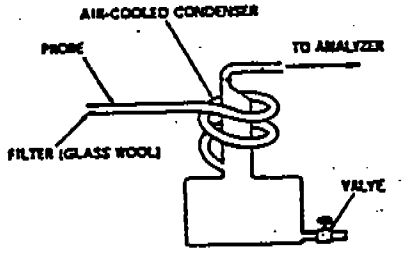



Figure 10-1. Continuous sampling train.

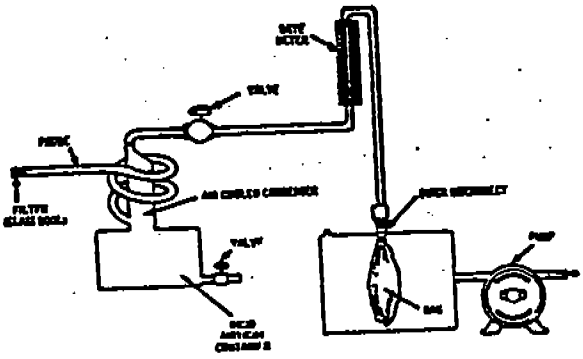


Figure 10-2. Integrated gas sampling train.

5.3.5 $CO_2$ Removal Tube. To contain approximately 500 g of ascarite.

5.3.6 Ice Water Bath. For ascarite and silica gel tubes.

5.3.7 Valve. Needle valve, or equivalent, to adjust flow rate

5.3.8 Rate Meter. Rotameter or equivalent to measure gas flow rate of 0 to 1.0 liter per min (0.035 cfm) through NDIR.

5.3.9 Recorder (*optional*). To provide permanent record of NDIR readings.

6. *Reagents*

6.1 Calibration Gases. Known concentration of CO in nitrogen ($N_2$) for instrument span, prepurified grade of $N_2$ for zero, and two additional concentrations corresponding approximately to 60 percent and 30 percent span. The span concentration shall not exceed 1.5 times the applicable source performance standard. The calibration gases shall be certified by the manufacturer to be within ±2 percent of the specified concentration.

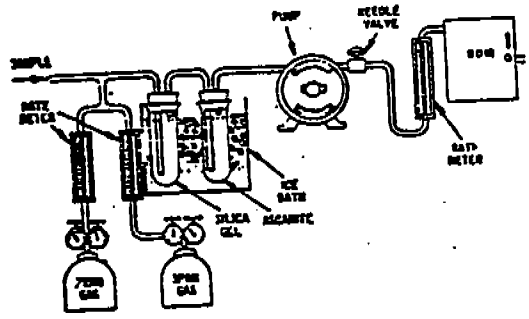


Figure 10-3. Analytical equipment.

6.2 Silica Gel. Indicating type, 6 to 16 mesh, dried at 175° C (347° F) for 2 hours.

6.3 Ascarite. Commercially available.

7. *Procedure*

7.1 Sampling.

7.1.1 Continuous Sampling. Set up the equipment as shown in Figure 10-1 making sure all connections are leak free. Place the probe in the stack at a sampling point and purge the sampling line. Connect the analyzer and begin drawing sample into the analyzer. Allow 5 minutes for the system to stabilize, then record the analyzer reading as required by the test procedure. (See section 7.2 and 8). $CO_2$ content of the gas may be determined by using the Method 3 integrated sample procedure, or by weighing the ascarite $CO_2$ removal tube and computing $CO_2$ concentration from the gas volume sampled and the weight gain of the tube.

7.1.2 Integrated Sampling. Evacuate the flexible bag. Set up the equipment as shown in Figure 10-2 with the bag disconnected. Place the probe in the stack and purge the sampling line. Connect the bag, making sure that all connections are leak free. Sample at a rate proportional to the stack velocity. $CO_2$ content of the gas may be determined by using the Method 3 integrated sample procedures, or by weighing the ascarite $CO_2$ removal tube and computing $CO_2$ concentra-

tion from the gas volume sampled and the weight gain of the tube.

7.2 CO Analysis. Assemble the apparatus as shown in Figure 10-3, calibrate the instrument, and perform other required operations as described in section 8. Purge analyzer with $N_2$ prior to introduction of each sample. Direct the sample stream through the instrument for the test period, recording the readings. Check the zero and span again after the test to assure that any drift or malfunction is detected. Record the sample data on Table 10-1.

8. *Calibration*

Assemble the apparatus according to Figure 10-3. Generally an instrument requires a warm-up period before stability is obtained. Follow the manufacturer's instructions for specific procedure. Allow a minimum time of 1 hour for warm-up. During this time check the sample conditioning apparatus, i.e., filter, condenser, drying tube, and $CO_2$ removal tube, to ensure that each component is in good operating condition. Zero and calibrate the instrument according to the manufacturer's procedures using, respectively, nitrogen and the calibration gases.

TABLE 10-1—FIELD DATA

| | Comments |
|---|---|
| Location | |
| Test | |
| Date | |
| Operator | |

| Clock time | Rotameter setting, liters per minute (cubic feet per minute) |
|---|---|
| | |
| | |
| | |

9. *Calculation*

Calculate the concentration of carbon monoxide in the stack using Equation 10-1.

$$C_{CO\ stack} = C_{CO\ NDIR}(1 - F_{CO_2})$$

Eq. 10-1

Where:

$C_{CO\ stack}$ = Concentration of CO in stack, ppm by volume (dry basis).

$C_{CO\ NDIR}$ = Concentration of CO measured by NDIR analyzer, ppm by volume (dry basis).

$F_{CO_2}$ = Volume fraction of $CO_2$ in sample, i.e., percent $CO_2$ from Orsat analysis divided by 100.

*10. Alternative Procedures*

10.1 Interference Trap. The sample conditioning system described in Method 10A sections 2.1.2 and 4.2, may be used as an alternative to the silica gel and ascarite traps.

11. *Bibliography*


1. McElroy, Frank, The Intertech NDIR-CO Analyzer, Presented at 11th Methods Conference on Air Pollution, University of California, Berkeley, CA. April 1, 1970.
2. Jacobs, M. B., et al., Continuous Determination of Carbon Monoxide and Hydrocarbons in Air by a Modified Infrared Analyzer, J. Air Pollution Control Association, 9(2): 110-114. August 1959.
3. MSA LIRA Infrared Gas and Liquid Analyzer Instruction Book, Mine Safety Appliances Co., Technical Products Division, Pittsburgh, PA.
4. Models 215A, 315A, and 415A Infrared Analyzers, Beckman Instruments, Inc., Beckman Instructions 1635-B, Fullerton, CA. October 1967.
5. Continuous CO Monitoring System, Model A5611, Intertech Corp., Princeton, NJ.
6. UNOR Infrared Gas Analyzers, Bendix Corp., Ronceverte, WV


ADDENDA

A. PERFORMANCE SPECIFICATIONS FOR NDIR CARBON MONOXIDE ANALYZERS

| | |
|---|---|
| Range (minimum) | 0-1000 ppm. |
| Output (minimum) | 0-10mV. |
| Minimum detectable sensitivity. | 20 ppm. |
| Rise time, 90 percent (maximum). | 30 seconds. |
| Fall time, 90 percent (maximum). | 30 seconds. |
| Zero drift (maximum) | 10% in 8 hours. |
| Span drift (maximum) | 10% in 8 hours. |
| Precision (minimum) | ±2% of full scale. |
| Noise (maximum) | ±1% of full scale. |
| Linearity (maximum deviation) | 2% of full scale. |
| Interference rejection ratio | $CO_2$—1000 to 1, $H_2O$—500 to 1. |

B. *Definitions of Performance Specifications.*

*Range*—The minimum and maximum measurement limits.

*Output*—Electrical signal which is proportional to the measurement; intended for connection to readout or data processing devices. Usually expressed as millivolts or milliamps full scale at a given impedance.

*Full scale*—The maximum measuring limit for a given range.

*Minimum detectable sensitivity*—The smallest amount of input concentration that can be detected as the concentration approaches zero.

## METHOD 25A—DETERMINATION OF TOTAL GASEOUS ORGANIC CONCENTRATION USING A FLAME IONIZATION ANALYZER

1. *Applicability and Principle*

1.1 Applicability. This method applies to the measurement of total gaseous organic concentration of vapors consisting primarily of alkanes, alkenes, and/or arenes (aromatic hydrocarbons). The concentration is expressed in terms of propane (or other appropriate organic calibration gas) or in terms of carbon.

1.2 Principle. A gas sample is extracted from the source through a heated sample line, if necessary, and glass fiber filter to a flame ionization analyzer (FIA). Results are reported as volume concentration equivalents of the calibration gas or as carbon equivalents.

2. *Definitions*

2.1 Measurement System. The total equipment required for the determination of the gas concentration. The system consists of the following major subsystems:

2.1.1 Sample Interface. That portion of the system that is used for one or more of the following: sample acquisition, sample transportation, sample conditioning, or protection of the analyzer from the effects of the stack effluent.

2.1.2 Organic Analyzer. That portion of the system that senses organic concentration and generates an output proportional to the gas concentration.

2.2 Span Value. The upper limit of a gas concentration measurement range that is specified for affected source categories in the applicable part of the regulations. The span value is established in the applicable regulation and is usually 1.5 to 2.5 times the applicable emission limit. If no span value is provided, use a span value equivalent to 1.5 to 2.5 times the expected concentration. For convenience, the span value should correspond to 100 percent of the recorder scale.

2.3 Calibration Gas. A known concentration of a gas in an appropriate diluent gas.

2.4 Zero Drift. The difference in the measurement system response to a zero level calibration gas before and after a stated period of operation during which no unscheduled maintenance, repair, or adjustment took place.

2.5 Calibration Drift. The difference in the measurement system response to a mid-level calibration gas before and after a stated period of operation during which no unscheduled maintenance, repair or adjustment took place.

2.6 Response Time. The time interval from a step change in pollutant concentration at the inlet to the emission measurement system to the time at which 95 percent of the corresponding final value is reached as displayed on the recorder.

2.7 Calibration Error. The difference between the gas concentration indicated by the measurement system and the known concentration of the calibration gas.

3. *Apparatus*

A schematic of an acceptable measurement system is shown in Figure 25A-1. The essential components of the measurement system are described below:

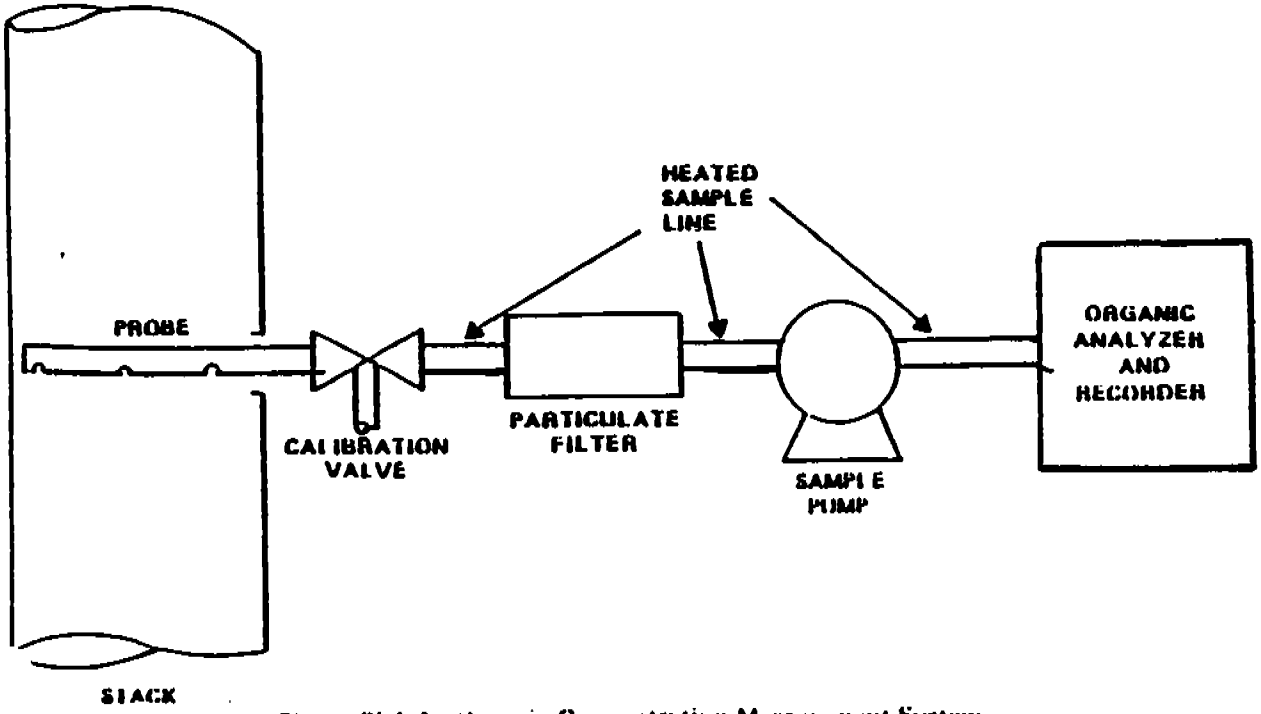



Figure 25A-1. Organic Concentration Measurement System.

3.1 Organic Concentration Analyzer. A flame ionization analyzer (FIA) capable of meeting or exceeding the specifications in this method.

3.2 Sample Probe. Stainless steel, or equivalent, three-hole rake type. Sample holes shall be 4 mm in diameter or smaller and located at 16.7, 50, and 83.3 percent of the equivalent stack diameter. Alternatively, a single opening probe may be used so that a gas sample is collected from the centrally located 10 percent area of the stack cross-section.

3.3 Sample Line. Stainless steel or Teflon* tubing to transport the sample gas to the analyzer. The sample line should be heated, if necessary, to prevent condensation in the line.

3.4 Calibration Valve Assembly. A three-way valve assembly to direct the zero and calibration gases to the analyzers is recommended. Other methods, such as quick-connect lines, to route calibration gas to the analyzers are applicable.

3.5 Particulate Filter. An in-stack or an out-of-stack glass fiber filter is recommended if exhaust gas particulate loading is significant. An out-of-stack filter should be heated to prevent any condensation.

3.6 Recorder. A strip-chart recorder, analog computer, or digital recorder for recording measurement data. The minimum data recording requirement is one measurement value per minute. Note: This method is often applied in highly explosive areas. Caution and care should be exercised in choice of equipment and installation.

4. *Calibration and Other Gases*

Gases used for calibrations, fuel, and combustion air (if required) are contained in compressed gas cylinders. Preparation of calibration gases shall be done according to the procedure in Protocol No. 1, listed in Reference 9.2. Additionally, the manufacturer of the cylinder should provide a recommended shelf life for each calibration gas cylinder over which the concentration does not change more than ±2 percent from the certified value. For calibration gas values not generally available (i.e., organics between 1 and 10 percent by volume), alternative methods for preparing calibration gas mixtures, such as dilution systems, may be used with prior approval of the Administrator.

Calibration gases usually consist of propane in air or nitrogen and are determined in terms of the span value. Organic compounds other than propane can be used following the above guidelines and making the appropriate corrections for response factor.

* Mention of trade names or specific products does not constitute endorsement by the Environmental Protection Agency.

4.1 Fuel. A 40 percent $H_2$/60 percent He or 40 percent $H_2$/60 percent $N_2$ gas mixture is recommended to avoid an oxygen synergism effect that reportedly occurs when oxygen concentration varies significantly from a mean value.

4.2 Zero Gas. High purity air with less than 0.1 parts per million by volume (p.p.m.v) of organic material (propane or carbon equivalent) or less than 0.1 percent of the span value, whichever is greater.

4.3 Low-level Calibration Gas. An organic calibration gas with a concentration equivalent to 25 to 35 percent of the applicable span value.

4.4 Mid-level Calibration Gas. An organic calibration gas with a concentration equivalent to 45 to 55 percent of the applicable span value.

4.5 High-level Calibration Gas. An organic calibration gas with a concentration equivalent to 80 to 90 percent of the applicable span value.

5. *Measurement System Performance Specifications*

5.1 Zero Drift. Less than ±3 percent of the span value.

5.2 Calibration Drift. Less than ±3 percent of span value.

5.3 Calibration Error. Less than ±5 percent of the calibration gas value.

6. *Pretest Preparations*

6.1 Selection of Sampling Site. The location of the sampling site is generally specified by the applicable regulation or purpose of the test; i.e., exhaust stack, inlet line, etc. The sample port shall be located at least 1.5 meters or 2 equivalent diameters upstream of the gas discharge to the atmosphere.

6.2 Location of Sample Probe. Install the sample probe so that the probe is centrally located in the stack, pipe, or duct and is sealed tightly at the stack port connection.

6.3 Measurement System Preparation. Prior to the emission test, assemble the measurement system following the manufacturer's written instructions in preparing the sample interface and the organic analyzer. Make the system operable.

FIA equipment can be calibrated for almost any range of total organics concentrations. For high concentrations of organics (>1.0 percent by volume as propane) modifications to most commonly available analyzers are necessary. One accepted method of equipment modification is to decrease the size of the sample to the analyzer through the use of a smaller diameter sample capillary. Direct and continuous measurement of organic concentration is a necessary consideration when determining any modification design.

6.4 Calibration Error Test. Immediately prior to the test series, (within 2 hours of the start of the test) introduce zero gas and

high-level calibration gas at the calibration valve assembly. Adjust the analyzer output to the appropriate levels, if necessary. Calculate the predicted response for the low-level and mid-level gases based on a linear response line between the zero and high-level responses. Then introduce low-level and mid-level calibration gases successively to the measurement system. Record the analyzer responses for low-level and mid-level calibration gases and determine the differences between the measurement system responses and the predicted responses. These differences must be less than 5 percent of the respective calibration gas value. If not, the measurement system is not acceptable and must be replaced or repaired prior to testing. No adjustments to the measurement system shall be conducted after the calibration and before the drift check (Section 7.3). If adjustments are necessary before the completion of the test series, perform the drift checks prior to the required adjustments and repeat the calibration following the adjustments. If multiple electronic ranges are to be used, each additional range must be checked with a mid-level calibration gas to verify the multiplication factor.

6.5 Response Time Test. Introduce zero gas into the measurement system at the calibration valve assembly. When the system output has stabilized, switch quickly to the high-level calibration gas. Record the time from the concentration change to the measurement system response equivalent to 95 percent of the step change. Repeat the test three times and average the results.

7. *Emission Measurement Test Procedure*

7.1 Organic Measurement. Begin sampling at the start of the test period, recording time and any required process information as appropriate. In particular, note on the recording chart periods of process interruption or cyclic operation.

7.2 Drift Determination. Immediately following the completion of the test period and hourly during the test period, reintroduce the zero and mid-level calibration gases, one at a time, to the measurement system at the calibration valve assembly. (Make no adjustments to the measurement system until after both the zero and calibration drift checks are made.) Record the analyzer response. If the drift values exceed the specified limits, invalidate the test results preceding the check and repeat the test following corrections to the measurement system. Alternatively, recalibrate the test measurement system as in Section 6.4 and report the results using both sets of calibration data (i.e., data determined prior to the test period and data determined following the test period).

8. *Organic Concentration Calculations*

Determine the average organic concentration in terms of ppmv as propane or other mined by the integration of the output recording over the period specified in the applicable regulation.

If results are required in terms of ppmv as carbon, adjust measured concentrations using Equation 25A-1.

$$C_c = K\,C_{meas} \qquad \text{Eq. 25A-1}$$

Where:

$C_c$ = Organic concentration as carbon, ppmv.

$C_{meas}$ = Organic concentration as measured, ppmv.

K = Carbon equivalent correction factor,

K = 2 for ethane.

K = 3 for propane.

K = 4 for butane.

K = Appropriate response factor for other organic calibration gases.

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# SAMPLING FOR FORMALDEHYDE EMISSIONS FROM STATIONARY SOURCES

## 1.0 SCOPE AND APPLICATION

1.1 This method is applicable to the determination of Destruction and Removal Efficiency (DRE) of formaldehyde, CAS Registry number 50-00-0, and possibly other aldehydes and ketones from stationary sources as specified in the regulations. The methodology has been applied specifically to formaldehyde; however, many laboratories have extended the application to other aldehydes and ketones. Compounds derivatized with 2,4-dinitrophenylhydrazine can be detected as low as $6.4 \times 10^{-8}$ lbs/cu ft (1.8 ppbv) in stack gas over a 1 h sampling period, sampling approximately 45 cu ft.

## 2.0 SUMMARY OF METHOD

2.1 Gaseous and particulate pollutants are withdrawn isokinetically from an emission source and are collected in aqueous acidic 2,4-dinitrophenylhydrazine. Formaldehyde present in the emissions reacts with the 2,4-dinitrophenylhydrazine to form the formaldehyde dinitrophenylhydrazone derivative. The dinitrophenylhydrazone derivative is extracted, solvent-exchanged, concentrated, and then analyzed by high performance liquid chromatography.

## 3.0 INTERFERENCES

3.1 A decomposition product of 2,4-dinitrophenylhydrazine, 2,4-dinitroaniline, can be an analytical interferent if concentrations are high. 2,4-dinitroaniline can coelute with the 2,4-dinitrophenylhydrazone of formaldehyde under high performance liquid chromatography conditions which may be used for the analysis. High concentrations of highly oxygenated compounds, especially acetone, that have the same retention time or nearly the same retention time as the dinitrophenylhydrazone of formaldehyde and that also absorb at 360 nm will interfere with the analysis.

Formaldehyde, acetone, and 2,4-dinitroaniline contamination of the aqueous acidic 2,4-dinitrophenylhydrazine (DNPH) reagent is frequently encountered. The reagent must be prepared within five days of use in the field and must be stored in an uncontaminated environment both before and after sampling in order to minimize blank problems. Some level of acetone contamination is unavoidable, because acetone is ubiquitous in laboratory and field operations. However, the acetone contamination must be minimized.

## 4.0 APPARATUS AND MATERIALS

4.1 A schematic of the sampling train is shown in Figure 1. This sampling train configuration is adapted from EPA Method 5 procedures. The sampling train consists of the following components: Probe Nozzle, Pitot Tube, Differential Pressure Gauge, Metering System, Barometer, and Gas Density Determination Equipment.

4.1.1 Probe Nozzle: Quartz or glass with sharp, tapered (30° angle) leading edge. The taper shall be on the outside to preserve a constant inner diameter. The nozzle shall be buttonhook or elbow design. A range of nozzle sizes suitable

for isokinetic sampling should be available in increments of 0.16 cm (1/16 in), e.g., 0.32 to 1.27 cm (1/8 to 1/2 in), or larger if higher volume sampling trains are used. Each nozzle shall be calibrated according to the procedures outlined in Section 8.1.

4.1.2 Probe Liner: Borosilicate glass or quartz shall be used for the probe liner. The tester should not allow the temperature in the probe to exceed 120 ± 14°C (248 ± 25°F).

4.1.3 Pitot Tube: The Pitot tube shall be Type S, as described in Section 2.1 of EPA Method 2, or any other appropriate device. The pitot tube shall be attached to the probe to allow constant monitoring of the stack gas velocity. The impact (high pressure) opening plane of the pitot tube shall be even with or above the nozzle entry plane (see EPA Method 2, Figure 2-6b) during sampling. The Type S pitot tube assembly shall have a known coefficient, determined as outlined in Section 4 of EPA Method 2.

4.1.4 Differential Pressure Gauge: The differential pressure gauge shall be an inclined manometer or equivalent device as described in Section 2.2 of EPA Method 2. One manometer shall be used for velocity-head readings and the other for orifice differential pressure readings.

4.1.5 Impingers: The sampling train requires a minimum of four impingers, connected as shown in Figure 1, with ground glass (or equivalent) vacuum-tight fittings. For the first, third, and fourth impingers, use the Greenburg-Smith design, modified by replacing the tip with a 1.3-cm inside diameter (1/2 in) glass tube extending to 1.3 cm (1/2 in) from the bottom of the flask. For the second impinger, use a Greenburg-Smith impinger with the standard tip. Place a thermometer capable of measuring temperature to within 1°C (2°F) at the outlet of the fourth impinger for monitoring purposes.

4.1.6 Metering System: The necessary components are a vacuum gauge, leak-free pump, thermometers capable of measuring temperature within 3°C (5.4°F), dry-gas meter capable of measuring volume to within 1%, and related equipment as shown in Figure 1. At a minimum, the pump should be capable of 4 cfm free flow, and the dry gas meter should have a recording capacity of 0-999.9 cu ft with a resolution of 0.005 cu ft. Other metering systems may be used which are capable of maintaining sampling rates within 10% of isokinetic collection and of determining sample volumes to within 2%. The metering system may be used in conjunction with a pitot tube to enable checks of isokinetic sampling rates.

4.1.7 Barometer: The barometer may be mercury, aneroid, or other barometer capable of measuring atmospheric pressure to within 2.5 mm Hg (0.1 in Hg). In many cases, the barometric reading may be obtained from a nearby National Weather Service Station, in which case the station value (which is the absolute barometric pressure) is requested and an adjustment for elevation differences between the weather station and sampling point is applied at a rate of minus 2.5 mm Hg (0.1 in Hg) per 30 m (100 ft) elevation increase (vice versa for elevation decrease).

4.1.8 Gas Density Determination Equipment: Temperature sensor and pressure gauge (as described in Sections 2.3 and 2.4 of EPA Method 2), and gas analyzer, if necessary (as described in EPA Method 3). The temperature sensor ideally should be permanently attached to the pitot tube or sampling probe in a fixed

configuration such that the tip of the sensor extends beyond the leading edge of the probe sheath and does not touch any metal. Alternatively, the sensor may be attached just prior to use in the field. Note, however, that if the temperature sensor is attached in the field, the sensor must be placed in an interference-free arrangement with respect to the Type S pitot tube openings (see EPA Method 2, Figure 2-7). As a second alternative, if a difference of no more than 1% in the average velocity measurement is to be introduced, the temperature gauge need not be attached to the probe or pitot tube.

4.2 Sample Recovery

4.2.1 Probe Liner: Probe nozzle and brushes; Teflon® bristle brushes with stainless steel wire handles are required. The probe brush shall have extensions of stainless steel, Teflon®, or inert material at least as long as the probe. The brushes shall be properly sized and shaped to brush out the probe liner, the probe nozzle, and the impingers.

4.2.2 Wash Bottles: Three wash bottles are required. Teflon® or glass wash bottles are recommended; polyethylene wash bottles should not be used because organic contaminants may be extracted by exposure to organic solvents used for sample recovery.

4.2.3 Graduated Cylinder and/or Balance: A graduated cylinder or balance is required to measure condensed water to the nearest 1 mL or 1 g. Graduated cylinders shall have divisions not >2 mL. Laboratory balances capable of weighing to ±0.5 g are required.

4.2.4 Amber Glass Storage Containers: One-liter wide-mouth amber flint glass bottles with Teflon®-lined caps are required to store impinger water samples. The bottles must be sealed with Teflon® tape.

4.2.5 Rubber Policeman and Funnel: A rubber policeman and funnel are required to aid in the transfer of materials into and out of containers in the field.

5.0 REAGENTS

Reagent grade chemicals or better grades shall be used in all tests. Unless otherwise indicated, all reagents shall conform to the specifications of the Committee on Analytical Reagents of the American Chemical Society, where such specifications are available.

5.1 Water: HPLC-grade water is used in preparation of DNPH reagent and in all other applications in the sampling train.

5.2 Silica Gel: Silica gel shall be indicating type, 6-16 mesh. If the silica gel has been used previously, dry at 175°C (350°F) for 2 h before using. New silica gel may be used as received. Alternatively, other types of desiccants (equivalent or better) may be used.

5.3 Crushed Ice: Quantities ranging from 10-50 lb may be necessary during a sampling run, depending upon ambient temperature. Samples which have been taken must be stored and shipped cold; sufficient ice for this purpose must be allowed.

5.4 2,4-Dinitrophenylhydrazine Reagent: The 2,4-dinitrophenylhydrazine reagent must be prepared in the laboratory within five days of sampling use in the field. Preparation of DNPH can also be done in the field, with consideration of appropriate procedures required for safe handling of solvent in the field. When a container of prepared DNPH reagent is opened in the field, the contents of the opened container should be used within 48 hours. All laboratory glassware must be washed with detergent and water and rinsed with water, methanol, and methylene chloride prior to use.

NOTE: The glassware must not be rinsed with acetone or unacceptable levels of acetone contamination will be introduced. If field preparation of DNPH is performed, caution must be exercised in avoiding acetone contamination.

Reagent bottles for storage of cleaned DNPH derivatizing solution must be rinsed with acetonitrile and dried before use. Baked glassware is not essential for preparation of DNPH reagent.

NOTE: DNPH crystals or DNPH solution should be handled with plastic gloves at all times, with prompt and extensive use of running water in case of skin exposure.

5.4.1 Preparation of Aqueous Acidic DNPH: The following materials and reagents are required for preparation of the reagent.

5.4.1.1 Bottles/Caps: amber 1- or 4 L bottles with Teflon®-lined caps are required for storing cleaned DNPH solution. Additional 4-L bottles are required to collect waste organic solvents.

5.4.1.2 Large Glass Container: at least one large glass container (8 to 16 L) is required for mixing the aqueous acidic DNPH solution.

5.4.1.3 Stir Plate/Large Stir Bars/Stir Bar Retriever: a magnetic stir plate and large stir bar are required for the mixing of the aqueous acidic DNPH solution. A stir bar retriever is needed for removing the stir bar from the large container holding the DNPH solution.

5.4.1.4 Buchner Filter/Filter Flask/Filter Paper: a large filter flask (2-4 L) with a buchner filter, appropriate rubber stopper, filter paper, and connecting tubing are required for filtering the aqueous acidic DNPH solution prior to cleaning.

5.4.1.5 Separatory Funnels: at least one large separatory funnel (2 L) is required for cleaning the DNPH prior to use.

5.4.1.6 Beakers: beakers (150 mL, 250 mL, and 400 mL) are useful for holding/measuring organic liquids when cleaning the aqueous acidic DNPH solution and for weighing DNPH crystals.

5.4.1.7 Funnels: at least one large funnel is needed for pouring the aqueous acidic DNPH into the separatory funnel.

5.4.1.8 Graduated Cylinders: at least one large graduated cylinder (1 to 2 L) is required for measuring HPLC-grade water and acid when preparing the DNPH solution.

5.4.1.9 Top-Loading Balance: a one-place top loading balance is needed for weighing out the DNPH crystals used to prepare the aqueous acidic DNPH solution.

5.4.1.10 Spatulas: spatulas are needed for weighing out DNPH when preparing the aqueous DNPH solution.

5.4.1.11 HPLC-Grade Water: water (HPLC-grade) is required to mix the aqueous DNPH solution.

5.4.1.12 Hydrochloric Acid: reagent grade hydrochloric acid (approximately 12N) is required for acidifying the aqueous DNPH solution.

5.4.1.13 2,4-Dinitrophenylhydrazine: a supply of moist solid 2,4-dinitrophenylhydrazine (DNPH) is required for preparation of aqueous acidic DNPH solution. The quantity of water may vary from 10 to 30%. Reagent grade or equivalent is required.

5.4.1.14 Methylene Chloride: methylene chloride (suitable for residue and pesticide analysis, GC/MS, HPLC, GC, Spectrophotometry or equivalent) is required for cleaning the aqueous acidic DNPH solution, rinsing glassware, and recovery of sample trains.

5.4.1.15 Cyclohexane: cyclohexane (HPLC grade) is required for cleaning the aqueous acidic DNPH solution.

NOTE: Do not use spectroanalyzed grades of cyclohexane if this sampling methodology is extended to aldehydes and ketones with four or more carbon atoms.

5.4.1.16 Methanol: methanol (HPLC grade or equivalent) is required for rinsing glassware.

5.4.1.17 Acetonitrile: acetonitrile (HPLC grade or equivalent) is required for rinsing glassware.

5.4.1.18 Formaldehyde: Analytical grade or equivalent formaldehyde is required for preparation of standards. If other aldehydes or ketones are used, analytical grade or equivalent is required.

5.4.2 Preparation of Aqueous Acidic DNPH Derivatizing Reagent: Each batch of DNPH reagent should be prepared and purified within five days of sampling, according to the procedure described below.

5.4.2.1 Place an 8-L container under a fume hood on a magnetic stirrer. Add a large stir bar and fill the container half full of HPLC-grade water. Save the empty bottle from HPLC-grade water. Start the stirring bar and adjust the stir rate to be as fast as possible. Using a graduated cylinder, measure 1.4 mL of concentrated hydrochloric acid. Slowly pour the acid into the stirring water. Fumes may be generated and the water may become warm. Weigh the DNPH crystals on a one-place balance (see Table 1 for approximate amounts) and add to the stirring acid solution. Fill the 8 L container to the 8 L mark with HPLC water and stir overnight. If all of the DNPH crystals have dissolved overnight, add additional DNPH and stir for two more hours. Continue the process of adding DNPH with additional stirring until a saturated solution has been formed. Filter the DNPH solution using vacuum filtration. Gravity filtration may be used, but a

much longer time is required. Store the filtered solution in an amber bottle at room temperature.

TABLE 1. APPROXIMATE AMOUNT OF CRYSTALLINE DNPH USED TO PREPARE A SATURATED SOLUTION

| Amount of Moisture in DNPH | Weight Required per 8 L of Solution |
|---|---|
| 10 weight percent | 31 g |
| 15 weight percent | 33 g |
| 30 weight percent | 40 g |

Within five days of proposed use, place about 1.6 L of the DNPH reagent in a 2 L separatory funnel. Add approximately 200 mL of methylene chloride and stopper the funnel. Wrap the stopper of the funnel with paper towels to absorb any leakage. Invert and vent the funnel. Then shake vigorously for 3 minutes. Initially, the funnel should be vented frequently (every 10 - 15 sec). After the layers have separated, discard the lower (organic) layer.

Extract the DNPH a second time with methylene chloride and finally with cyclohexane. When the cyclohexane layer has separated from the DNPH reagent, the cyclohexane layer will be the top layer in the separatory funnel. Drain the lower layer (the cleaned extracted DNPH reagent solution) into an amber bottle that has been rinsed with acetonitrile and allowed to dry.

5.4.3 Quality Control: Take two aliquots of the extracted DNPH reagent. The size of the aliquots is dependent upon the exact sampling procedure used, but 100 mL is reasonably representative. To ensure that the background in the reagent is acceptable for field use, analyze one aliquot of the reagent according to the procedure of EPA Draft Method 8315. Save the other aliquot of aqueous acidic DNPH for use as a method blank when the analysis is performed.

5.4.4 Shipment to the Field: Tightly cap the bottle containing extracted DNPH reagent using a Teflon®-lined cap. Seal the bottle with Teflon® tape. After the bottle is labeled, the bottle may be placed in a friction-top can (paint can or equivalent) containing a 1 -2 inch layer of granulated charcoal and stored at ambient temperature until use.

If the DNPH reagent has passed the Quality Control criteria, the reagent may be packaged to meet necessary shipping requirements and sent to the sampling area. If the Quality Control criteria are not met, the reagent solution may be re-extracted or the solution may be re-prepared and the extraction sequence repeated.

If the DNPH reagent is not used in the field within five days of extraction, an aliquot may be taken and analyzed as described Draft Method 8315. If the reagent meets the Quality Control requirements, the reagent may be used. If the reagent does not meet Quality Control requirements, the reagent must be discarded and new reagent must be prepared and tested.

5.4.5 Calculation of Acceptable Levels of Impurities in DNPH Reagent: The acceptable impurity level (AIL, µg/mL) is calculated from the expected analyte level in the sampled gas (EAL, ppbv), the volume of air that will be sampled at standard conditions (SVOL, L), the formula weight of the analyte (FW, g/mol), and the volume of DNPH reagent that will be used in the impingers (RVOL, mL):

$$AIL = 0.1 \times [EAL \times SVOL \times FW/22.4 \times (FW + 180)/FW]/(RVOL \times 1000).$$

where 0.1 is the acceptable contaminant level, 22.4 is a factor relating ppbv to g/L, 180 is a factor relating the underivatized analyte to the derivatized analyte, and 1000 is a unit conversion factor.

5.4.6 Disposal of Excess DNPH Reagent: Excess DNPH reagent may be returned to the laboratory and recycled or treated as aqueous waste for disposal purposes. 2,4-Dinitrophenylhydrazine is a flammable solid when dry so water should not be evaporated from the solution of the reagent.

5.5 Field Spike Standard Preparation: To prepare a formaldehyde field spiking standard at 4.01 mg/mL, use a 500µL syringe to transfer 0.5 mL of 37% by weight of formaldehyde (401 mg/mL) to a 50 mL volumetric flask containing approximately 40 mL of methanol. Dilute to 50 mL with methanol.

6.0 SAMPLE COLLECTION, PRESERVATION, AND HANDLING

6.1 Because of the complexity of this method, field personnel should be trained in and experienced with the test procedures in order to obtain reliable results.

6.2 Laboratory Preparation:

6.2.1 All the components shall be maintained and calibrated according to the procedure described in APTD-0576, unless otherwise specified.

6.2.2 Weigh several 200- to 300-g portions of silica gel in airtight containers to the nearest 0.5 g. Record on each container the total weight of the silica gel plus containers. As an alternative to preweighing the silica gel, it may instead be weighed directly in the impinger or sampling holder just prior to train assembly.

6.3 Preliminary Field Determinations:

6.3.1 Select the sampling site and the minimum number of sampling points according to EPA Method 1 or other relevant criteria. Determine the stack pressure, temperature, and range of velocity heads using EPA Method 2. A leak-check of the pitot lines according to EPA Method 2, Section 3.1, must be performed. Determine the stack gas moisture content using EPA Approximation Method 4 or its alternatives to establish estimates of isokinetic sampling-rate settings. Determine the stack gas dry molecular weight, as described in EPA Method 2, Section 3.6. If integrated EPA Method 3 sampling is used for molecular weight determination, the integrated bag sample shall be taken simultaneously with, and for the same total length of time as, the sample run.

6.3.2 Select a nozzle size based on the range of velocity heads so that it is not necessary to change the nozzle size in order to maintain isokinetic sampling rates below 28 L/min (1.0 cfm). During the run, do not change the nozzle.

Ensure that the proper differential pressure gauge is chosen for the range of velocity heads encountered (see Section 2.2 of EPA Method 2).

6.3.3 Select a suitable probe liner and probe length so that all traverse points can be sampled. For large stacks, to reduce the length of the probe, consider sampling from opposite sides of the stack.

6.3.4 A minimum of 45 $ft^3$ of sample volume is required for the determination of the Destruction and Removal Efficiency (DRE) of formaldehyde from incineration systems (45$ft^3$ is equivalent to one hour of sampling at 0.75 dscf). Additional sample volume shall be collected as ecessitated by the capacity of the DNPH reagent and analytical detection limit constraints. To determine the minimum sample volume required, refer to sample calculations in Section 10.

6.3.5 Determine the total length of sampling time needed to obtain the identified minimum volume by comparing the anticipated average sampling rate with the volume requirement. Allocate the same time to all traverse points defined by EPA Method 1. To avoid timekeeping errors, the length of time sampled at each traverse point should be an integer or an integer plus 0.5 min.

6.3.6 In some circumstances (e.g., batch cycles) it may be necessary to sample for shorter times at the traverse points and to obtain smaller gas-volume samples. In these cases, careful documentation must be maintained in order to allow accurate calculation of concentrations.

6.4 Preparation of Collection Train:

6.4.1 During preparation and assembly of the sampling train, keep all openings where contamination can occur covered with Teflon® film or aluminum foil until just prior to assembly or until sampling is about to begin.

6.4.2 Place 100 mL of cleaned DNPH solution in each of the first two impingers, and leave the third impinger empty. If additional capacity is required for high expected concentrations of formaldehyde in the stack gas, 200 mL of DNPH per impinger may be used or additional impingers may be used for sampling. Transfer approximately 200 to 300 g of pre-weighed silica gel from its container to the fourth impinger. Care should be taken to ensure that the silica gel is not entrained and carried out from the impinger during sampling. Place the silica gel container in a clean place for later use in the sample recovery. Alternatively, the weight of the silica gel plus impinger may be determined to the nearest 0.5 g and recorded.

6.4.3 With a glass or quartz liner, install the selected nozzle using a Viton-A O-ring when stack temperatures are <260°C (500°F) and a woven glass-fiber gasket when temperatures are higher. See APTD-0576 (Rom, 1972) for details. Other connecting systems utilizing either 316 stainless steel or Teflon® ferrules may be used. Mark the probe with heat-resistant tape or by some other method to denote the proper distance into the stack or duct for each sampling point.

6.4.4 Assemble the train as shown in Figure 1. During assembly, do not use any silicone grease on ground-glass joints upstream of the impingers. Use Teflon® tape, if required. A very light coating of silicone grease may be used on ground-glass joints downstream of the impingers, but the silicone grease should be limited to the outer portion (see APTD-0576) of the ground-glass joints to

minimize silicone grease contamination. If necessary, Teflon® tape may be used to seal leaks. Connect all temperature sensors to an appropriate potentiometer/display unit. Check all temperature sensors at ambient temperature.

6.4.5 Place crushed ice all around the impingers.

6.4.6 Turn on and set the probe heating system at the desired operating temperature. Allow time for the temperature to stabilize.

6.5 Leak-Check Procedures:

6.5.1 Pre-test Leak Check:

6.5.1.1 After the sampling train has been assembled, turn on and set the probe heating system at the desired operating temperature. Allow time for the temperature to stabilize. If a Viton-A O-ring or other leak-free connection is used in assembling the probe nozzle to the probe liner, leak-check the train at the sampling site by plugging the nozzle and pulling a 381-mm Hg (15 in Hg) vacuum.

NOTE: A lower vacuum may be used, provided that the lower vacuum is not exceeded during the test.

6.5.1.2 If an asbestos string is used, do not connect the probe to the train during the leak check. Instead, leak-check the train by first attaching a carbon-filled leak check impinger to the inlet and then plugging the inlet and pulling a 381-mm Hg (15 in Hg) vacuum. (A lower vacuum may be used if this lower vacuum is not exceeded during the test.) Then connect the probe to the train and leak-check at about 25 mm Hg (1 in Hg) vacuum. Alternatively, leak-check the probe with the rest of the sampling train in one step at 381 mm Hg (15 in Hg) vacuum. Leakage rates in excess of 4% of the average sampling rate or >0.00057 $m^3$/min (0.02 cfm), whichever is less, are acceptable.

6.5.1.3 The following leak check instructions for the sampling train described in APTD-0576 and APTD-0581 may be helpful. Start the pump with the fine-adjust valve fully open and coarse-adjust valve completely closed. Partially open the coarse-adjust valve and slowly close the fine-adjust valve until the desired vacuum is reached. Do not reverse direction of the fine-adjust valve, as liquid will back up into the train. If the desired vacuum is exceeded, either perform the leak check at this higher vacuum or end the leak check, as shown below, and start over.

6.5.1.4 When the leak check is completed, first slowly remove the plug from the inlet to the probe. When the vacuum drops to 127 mm (5 in) Hg or less, immediately close the coarse-adjust valve. Switch off the pumping system and reopen the fine-adjust valve. Do not reopen the fine-adjust valve until the coarse-adjust valve has been closed to prevent the liquid in the impingers from being forced backward into the sampling line and silica gel from being entrained backward into the third impinger.

6.5.2 Leak Checks During Sampling Runs:

6.5.2.1 If, during the sampling run, a component change (i.e., impinger) becomes

necessary, a leak check shall be conducted immediately after the interruption of sampling and before the change is made. The leak check shall be done according to the procedure described in Section 6.5.1, except that it shall be done at a vacuum greater than or equal to the maximum value recorded up to that point in the test. If the leakage rate is found to be no greater than 0.00057 $m^3$/min (0.02 cfm) or 4% of the average sampling rate (whichever is less), the results are acceptable. If a higher leakage rate is obtained, the tester must void the sampling run.

NOTE: Any correction of the sample volume by calculation reduces the integrity of the pollutant concentration data generated and must be avoided.

6.5.2.2 Immediately after a component change and before sampling is re-initiated, a leak check similar to a pre-test leak check must also be conducted.

6.5.3 Post-test Leak Check:

6.5.3.1 A leak check is mandatory at the conclusion of each sampling run. The leak check shall be done with the same procedures as the pre-test leak check, except that the post-test leak check shall be conducted at a vacuum greater than or equal to the maximum value reached during the sampling run. If the leakage rate is found to be no greater than 0.00057 $m^3$/min (0.02 cfm) or 4% of the average sampling rate (whichever is less), the results are acceptable. If, however, a higher leakage rate is obtained, the tester shall record the leakage rate and void the sampling run.

6.6 Sampling Train Operation:

6.6.1 During the sampling run, maintain an isokinetic sampling rate to within 10% of true isokinetic, below 28 L/min (1.0 cfm). Maintain a temperature around the probe of 120° ± 14°C (248° ± 25°F).

6.6.2 For each run, record the data on a data sheet such as the one shown in Figure 2. Be sure to record the initial dry-gas meter reading. Record the dry-gas meter readings at the beginning and end of each sampling time increment, when changes in flow rates are made, before and after each leak check, and when sampling is halted. Take other readings required by Figure 2 at least once at each sample point during each time increment and additional readings when significant adjustments (20% variation in velocity head readings) necessitate additional adjustments in flow rate. Level and zero the manometer. Because the manometer level and zero may drift due to vibrations and temperature changes, make periodic checks during the traverse.

6.6.3 Clean the stack access ports prior to the test run to eliminate the chance of sampling deposited material. To begin sampling, remove the nozzle cap, verify that the filter and probe heating systems are at the specified temperature, and verify that the pitot tube and probe are properly positioned. Position the nozzle at the first traverse point, with the tip pointing directly into the gas stream. Immediately start the pump and adjust the flow to isokinetic conditions. Nomographs, which aid in the rapid adjustment of the isokinetic sampling rate without excessive computations, are available. These nomographs are designed for use when the Type S pitot tube coefficient is 0.84 ± 0.02 and the stack gas equivalent density (dry molecular weight) is equal to 29 ± 4. APTD-0576 details the procedure for using the nomographs. If the stack gas molecular weight and

the pitot tube coefficient are outside the above ranges, do not use the nomographs unless appropriate steps are taken to compensate for the deviations.

6.6.4 When the stack is under significant negative pressure (equivalent to the height of the impinger stem), take care to close the coarse-adjust valve before inserting the probe into the stack in order to prevent liquid from backing up through the train. If necessary, the pump may be turned on with the coarse-adjust valve closed.

6.6.5 When the probe is in position, block off the openings around the probe and stack access port to prevent unrepresentative dilution of the gas stream.

6.6.6 Traverse the stack cross section, as required by EPA Method 1, being careful not to bump the probe nozzle into the stack walls when sampling near the walls or when removing or inserting the probe through the access port, in order to minimize the chance of extracting deposited material.

6.6.7 During the test run, make periodic adjustments to keep the temperature around the probe at the proper levels. Add more ice and, if necessary, salt, to maintain a temperature of <20°C (68°F) at the silica gel outlet. Also, periodically check the level and zero of the manometer.

6.6.8 A single train shall be used for the entire sampling run, except in cases where simultaneous sampling is required in two or more separate ducts or at two or more different locations within the same duct, or in cases where equipment failure necessitates a change of trains. An additional train or additional trains may also be used for sampling when the capacity of a single train is exceeded.

6.6.9 When two or more trains are used, separate analyses of components from each train shall be performed. If multiple trains have been used because the capacity of a single train would be exceeded, first impingers from each train may be combined, and second impingers from each train may be combined.

6.6.10 At the end of the sampling run, turn off the coarse-adjust valve, remove the probe and nozzle from the stack, turn off the pump, record the final dry gas meter reading, and conduct a post-test leak check. Also, leak check the pitot lines as described in EPA Method 2. The lines must pass this leak check in order to validate the velocity-head data.

6.6.11 Calculate percent isokineticity (see Method 2) to determine whether the run was valid or another test should be made.

7.0 SAMPLE RECOVERY

7.1 Preparation:

7.1.1 Proper cleanup procedure begins as soon as the probe is removed from the stack at the end of the sampling period. Allow the probe to cool. When the probe can be handled safely, wipe off all external particulate matter near the tip of the probe nozzle and place a cap over the tip to prevent losing or gaining particulate matter. Do not cap the probe tip tightly while the sampling train is cooling because a vacuum will be created, drawing liquid from the impingers back through the sampling train.

7.1.2 Before moving the sampling train to the cleanup site, remove the probe from the sampling train and cap the open outlet, being careful not to lose any condensate that might be present. Remove the umbilical cord from the last impinger and cap the impinger. If a flexible line is used, let any condensed water or liquid drain into the impingers. Cap off any open impinger inlets and outlets. Ground glass stoppers, Teflon® caps, or caps of other inert materials may be used to seal all openings.

7.1.3 Transfer the probe and impinger assembly to an area that is clean and protected from wind so that the chances of contaminating or losing the sample are minimized.

7.1.4 Inspect the train before and during disassembly, and note any abnormal conditions.

7.1.5 Save a portion of all washing solutions (methylene chloride, water) used for cleanup as a blank. Transfer 200 mL of each solution directly from the wash bottle being used and place each in a separate, pre-labeled sample container.

7.2 Sample Containers:

7.2.1 Container 1: Probe and Impinger Catches. Using a graduated cylinder, measure to the nearest mL, and record the volume of the solution in the first three impingers. Alternatively, the solution may be weighed to the nearest 0.5 g. Include any condensate in the probe in this determination. Transfer the impinger solution from the graduated cylinder into the amber flint glass bottle. Taking care that dust on the outside of the probe or other exterior surfaces does not get into the sample, clean all surfaces to which the sample is exposed (including the probe nozzle, probe fitting, probe liner, first impinger, and impinger connector) with methylene chloride. Use less than 500 mL for the entire wash (250 mL would be better, if possible). Add the washings to the sample container.

7.2.1.1 Carefully remove the probe nozzle and rinse the inside surface with methylene chloride from a wash bottle. Brush with a Teflon® bristle brush, and rinse until the rinse shows no visible particles or yellow color, after which make a final rinse of the inside surface. Brush and rinse the inside parts of the Swagelok® fitting with methylene chloride in a similar way.

7.2.1.2 Rinse the probe liner with methylene chloride. While squirting the methylene chloride into the upper end of the probe, tilt and rotate the probe so that all inside surfaces will be wetted with methylene chloride. Let the methylene chloride drain from the lower end into the sample container. The tester may use a funnel (glass or polyethylene) to aid in transferring the liquid washes to the container. Follow the rinse with a Teflon® brush. Hold the probe in an inclined position, and squirt methylene chloride into the upper end as the probe brush is being pushed with a twisting action through the probe. Hold the sample container underneath the lower end of the probe, and catch any methylene chloride, water, and particulate matter that is brushed from the probe. Run the brush through the probe three times or more. With stainless steel or other metal probes, run the brush through in the above prescribed manner at least six times since there may be small crevices in which particulate matter can be entrapped. Rinse the brush with methylene chloride or water, and quantitatively collect these washings in the sample container. After the brushings, make a final rinse

of the probe as described above.

NOTE: Two people should clean the probe in order to minimize sample losses. Between sampling runs, brushes must be kept clean and free from contamination.

7.2.1.3 Rinse the inside surface of each of the first three impingers (and connecting tubing) three separate times. Use a small portion of methylene chloride for each rinse, and brush each surface to which sample is exposed with a Teflon® bristle brush to ensure recovery of fine particulate matter. Water will be required for the recovery of the impingers in addition to the specified quantity of methylene chloride. There will be at least two phases in the impingers. This two-phase mixture does not pour well, and a significant amount of the impinger catch will be left on the walls. The use of water as a rinse makes the recovery quantitative. Make a final rinse of each surface and of the brush, using both methylene chloride and water.

7.2.1.4 After all methylene chloride and water washings and particulate matter have been collected in the sample container, tighten the lid so that solvent, water, and DNPH reagent will not leak out when the container is shipped to the laboratory. Mark the height of the fluid level to determine whether leakage occurs during transport. Seal the container with Teflon® tape. Label the container clearly to identify its contents.

7.2.1.5 If the first two impingers are to be analyzed separately to check for breakthrough, separate the contents and rinses of the two impingers into individual containers. Care must be taken to avoid physical carryover from the first impinger to the second. The formaldehyde hydrazone is a solid which floats and froths on top of the impinger solution. Any physical carryover of collected moisture into the second impinger will invalidate a breakthrough assessment.

7.2.2 Container 2: Sample Blank. Prepare a blank by using an amber flint glass container and adding a volume of DNPH reagent and methylene chloride equal to the total volume in Container 1. Process the blank in the same manner as Container 1.

7.2.3 Container 3: Silica Gel. Note the color of the indicating silica gel to determine whether it has been completely spent and make a notation of its condition. The impinger containing the silica gel may be used as a sample transport container with both ends sealed with tightly fitting caps or plugs. Ground-glass stoppers or Teflon® caps may be used. The silica gel impinger should then be labeled, covered with aluminum foil, and packaged on ice for transport to the laboratory. If the silica gel is removed from the impinger, the tester may use a funnel to pour the silica gel and a rubber policeman to remove the silica gel from the impinger. It is not necessary to remove the small amount of dust particles that may adhere to the impinger wall and are difficult to remove. Since the gain in weight is to be used for moisture calculations, do not use water or other liquids to transfer the silica gel. If a balance is available in the field, the spent silica gel (or silica gel plus impinger) may be weighed to the nearest 0.5 g.

7.2.4 Sample containers should be placed in a cooler, cooled by although not in contact with ice. Sample containers must be placed vertically and, since they are glass, protected from breakage curing shipment. Samples should be cooled during shipment so they will be received cold at the laboratory.

8.0 CALIBRATION

8.1 Probe Nozzle: Probe nozzles shall be calibrated before their initial use in the field. Using a micrometer, measure the inside diameter of the nozzle to the nearest 0.025 mm (0.001 in). Make measurements at three separate places across the diameter and obtain the average of the measurements. The difference between the high and low numbers shall not exceed 0.1 mm (0.004 in). When the nozzles become nicked or corroded, they shall be replaced and calibrated before use. Each nozzle must be permanently and uniquely identified.

8.2 Pitot tube: The Type S pitot tube assembly shall be calibrated according to the procedure outlined in Section 4 of EPA Method 2, or assigned a nominal coefficient of 0.84 if it is not visibly nicked or corroded and if it meets design and intercomponent spacing specifications.

8.3 Metering system:

8.3.1 Before its initial use in the field, the metering system shall be calibrated according to the procedure outlined in APTD-0576. Instead of physically adjusting the dry-gas meter dial readings to correspond to the wet-test meter readings, calibration factors may be used to correct the gas meter dial readings mathematically to the proper values. Before calibrating the metering system, it is suggested that a leak check be conducted. For metering systems having diaphragm pumps, the normal leak check procedure will not detect leakages within the pump. For these cases, the following leak check procedure will apply: make a ten-minute calibration run at 0.00057 $m^3$/min (0.02 cfm). At the end of the run, take the difference of the measured wet-test and dry-gas meter volumes and divide the difference by 10 to get the leak rate. The leak rate should not exceed 0.00057 $m^3$/min (0.02 cfm).

8.3.2 After each field use, check the calibration of the metering system by performing three calibration runs at a single intermediate orifice setting (based on the previous field test). Set the vacuum at the maximum value reached during the test series. To adjust the vacuum, insert a valve between the wet-test meter and the inlet of the metering system. Calculate the average value of the calibration factor. If the calibration has changed by more than 5%, recalibrate the meter over the full range of orifice settings, as outlined in APTD-0576.

8.3.3 Leak check of metering system: The portion of the sampling train from the pump to the orifice meter (see Figure 1) should be leak-checked prior to initial use and after each shipment. Leakage after the pump will result in less volume being recorded than is actually sampled. Use the following procedure: Close the main valve on the meter box. Insert a one-hole rubber stopper with rubber tubing attached into the orifice exhaust pipe. Disconnect and vent the low side of the orifice manometer. Close off the low side orifice tap. Pressurize the system to 13 - 18 cm (5 - 7 in) water column by blowing into the rubber tubing. Pinch off the tubing and observe the manometer for 1 min. A loss of pressure on the manometer indicates a leak in the meter box. Leaks must be corrected.

NOTE: If the dry-gas-meter coefficient values obtained before and after a test series differ by >5%, either the test series must be voided or calculations for test series must be performed using whichever meter coefficient value (i.e., before or after) gives the lower value of total sample volume.

8.4 Probe heater: The probe heating system must be calibrated before its initial use in the field according to the procedure outlined in APTD-0576. Probes constructed according to APTD-0581 need not be calibrated if the calibration curves in APTD-0576 are used.

8.5 Temperature gauges: Each thermocouple must be permanently and uniquely marked on the casting. All mercury-in-glass reference thermometers must conform to ASTM E-1 63C or 63F specifications. Thermocouples should be calibrated in the laboratory with and without the use of extension leads. If extension leads are used in the field, the thermocouple readings at ambient air temperatures, with and without the extension lead, must be noted and recorded. Correction is necessary if the use of an extension lead produces a change >1.5%.

8.5.1 Impinger and dry-gas meter thermocouples: For the thermocouples used to measure the temperature of the gas leaving the impinger train, three-point calibration at ice water, room air, and boiling water temperatures is necessary. Accept the thermocouples only if the readings at all three temperatures agree to ±2°C (3.6°F) with those of the absolute value of the reference thermometer.

8.5.2 Probe and stack thermocouple: For the thermocouples used to indicate the probe and stack temperatures, a three-point calibration at ice water, boiling water, and hot oil bath temperatures must be performed. Use of a point at room air temperature is recommended. The thermometer and thermocouple must agree to within 1.5% at each of the calibration points. A calibration curve (equation) may be constructed (calculated) and the data extrapolated to cover the entire temperature range suggested by the manufacturer.

8.6 Barometer: Adjust the barometer initially and before each test series to agree to within ±2.5 mm Hg (0.1 in Hg) of the mercury barometer or the corrected barometric pressure value reported by a nearby National Weather Service Station (same altitude above sea level).

8.7 Triple-beam balance: Calibrate the triple-beam balance before each test series, using Class S standard weights. The weights must be within ±0.5% of the standards, or the balance must be adjusted to meet these limits.

9.0 CALCULATIONS

Carry out calculations, retaining at least one extra decimal figure beyond that of the acquired data. Round off figures after final calculation.

9.1 Calculation of Total Formaldehyde:

To determine the total formaldehyde in mg, use the following equation:

Total mg formaldehyde = $C_d$ x V x DF x

([g/mole aldehyde]/[g/mole DNPH derivative]) x

$10^{-3}$ mg/µg

where:

$C_d$ = measured concentration of DNPH-formaldehyde derivative, µg/mL.

V = organic extract volume, mL

DF = dilution factor

9.2 Formaldehyde concentration in stack gas:

Determine the formaldehyde concentration in the stack gas using the following equation:

$C_f$ = K [total formaldehyde, mg] / $V_{m(std)}$

where:

K = 35.31 $ft^3/m^3$ if $V_{m(std)}$ is expressed in English units

= 1.00 $m^3/m^3$ if $V_{m(std)}$ is expressed in metric units

$V_{m(std)}$ = volume of gas sample as measured by dry gas meter, corrected to standard conditions, dscm (dscf)

9.3 Average Dry Gas Meter Temperature and Average Orifice Pressure Drop are obtained from the data sheet.

9.4 Dry Gas Volume: Calculate $V_{m(std)}$ and adjust for leakage, if necessary, using the equation in Section 6.3 of EPA Method 5.

9.5 Volume of Water Vapor and Moisture Content: Calculate the volume of water vapor and moisture content from equations 5-2 and 5-3 of EPA Method 5.

10.0 DETERMINATION OF VOLUME TO BE SAMPLED

To determine the minimum sample volume to be collected, use the following sequence of equations.

10.1 From prior analysis of the waste feed, the concentration of formaldehyde (FORM) introduced into the combustion system can be calculated. The degree of destruction and removal efficiency that is required is used to determine the maximum amount of FORM allowed to be present in the effluent. This amount may be expressed as:

Max $FORM_1$ Mass =

$$[\ (WF)\ (FORM_1\ conc)\ (100 - \%DRE)\ ]\ /\ 100$$

where:

WF = mass flow rate of waste feed per h, g/h (lb/h)

$FORM_1$ = concentration of FORM (wt %) introduced into the combustion process

DRE = percent Destruction and Removal Efficiency required

Max FORM = mass flow rate (g/h [lb/h]) of FORM emitted from the combustion source

10.2 The average discharge concentration of the FORM in the effluent gas is determined by comparing the Max FORM with the volumetric flow rate being exhausted from the source. Volumetric flow rate data are available as a result of preliminary EPA Method 1 - 4 determinations:

$$\text{Max } FORM_1 \text{ conc} = [\text{Max } FORM_1 \text{ Mass }] / DV_{eff(std)}$$

where:

$DV_{eff(std)}$ = volumetric flow rate of exhaust gas, dscm (dscf)

$FORM_1$ conc = anticipated concentration of the FORM in the exhaust gas stream, g/dscm (lb/dscf)

10.3 In making this calculation, it is recommended that a safety margin of at least ten be included.

$$[LDL_{FORM} \times 10] / [FORM_{1\ conc}] = V_{tbc}$$

where:

$LDL_{FORM}$ = detectable amount of FORM in entire sampling train

$V_{tbc}$ = minimum dry standard volume to be collected at dry-gas meter

10.4 The following analytical detection limits and DNPH Reagent Capacity (based on a total volume of 200 mL in two impingers) must also be considered in determining a volume to be sampled.

Table 2. Instrument Detection Limits and Reagent Capacity for Formaldehyde Analysis[1]

| Analyte | Detection Limit, ppbv[2] | Reagent Capacity, ppmv |
|---|---|---|
| formaldehyde | 1.8 | 66 |
| acetaldehyde | 1.7 | 70 |
| acrolein | 1.5 | 75 |
| acetone/propionaldehyde | 1.5 | 75 |
| butyraldehyde | 1.5 | 79 |
| methyl ethyl ketone | 1.5 | 79 |
| valeraldehyde | 1.5 | 84 |
| isovaleraldehyde | 1.4 | 84 |
| hexaldehyde | 1.3 | 88 |
| benzaldehyde | 1.4 | 84 |
| o-/m-/p-tolualdehyde | 1.3 | 89 |
| dimethylbenzaldehyde | 1.2 | 93 |

[1] Oxygenated compounds in addition to formaldehyde are included for comparison with formaldehyde; extension of the methodology to other compounds is possible.

[2] Detection limits are determined in solvent. These values therefore represent the optimum capability of the methodology.

## 11.0 QUALITY CONTROL

11.1 Sampling: See EPA Manual 600/4-77-027b for Method 5 quality control.

11.2 Analysis: The quality assurance program required for this method includes the analysis of field and method blanks, procedure validations, and analysis of field spikes. The assessment of combustion data and positive identification and quantitation of formaldehyde are dependent on the integrity of the samples received and the precision and accuracy of the analytical methodology. Quality Assurance procedures for this method are designed to monitor the performance of the analytical methodology and to provide the required information to take corrective action if problems are observed in laboratory operations or in field sampling activities.

11.2.1 Field Blanks: Field blanks must be submitted with the samples collected at each sampling site. The field blanks include the sample bottles containing aliquots of sample recovery solvents, methylene chloride and water, and unused DNPH reagent. At a minimum, one complete sampling train will be assembled in the field staging area, taken to the sampling area, and leak-checked at the beginning and end of the testing (or for the same total number of times as the actual sampling train). The probe of the blank train must be heated during the sample test. The train will be recovered as if it were an actual test sample. No gaseous sample will be passed through the Blank sampling train.

11.2.2 Method Blanks: A method blank must be prepared for each set of analytical operations, to evaluate contamination and artifacts that can be derived from glassware, reagents, and sample handling in the laboratory.

11.2.3 Field Spike: A field spike is performed by introducing 200 µL of the Field Spike Standard into an impinger containing 200 mL of DNPH solution. Standard impinger recovery procedures are followed and the field spike sample is returned to the laboratory for analysis. The field spike is used as a check on field handling and recovery procedures. An aliquot of the field spike standard is retained in the laboratory for derivatization and comparative analysis.

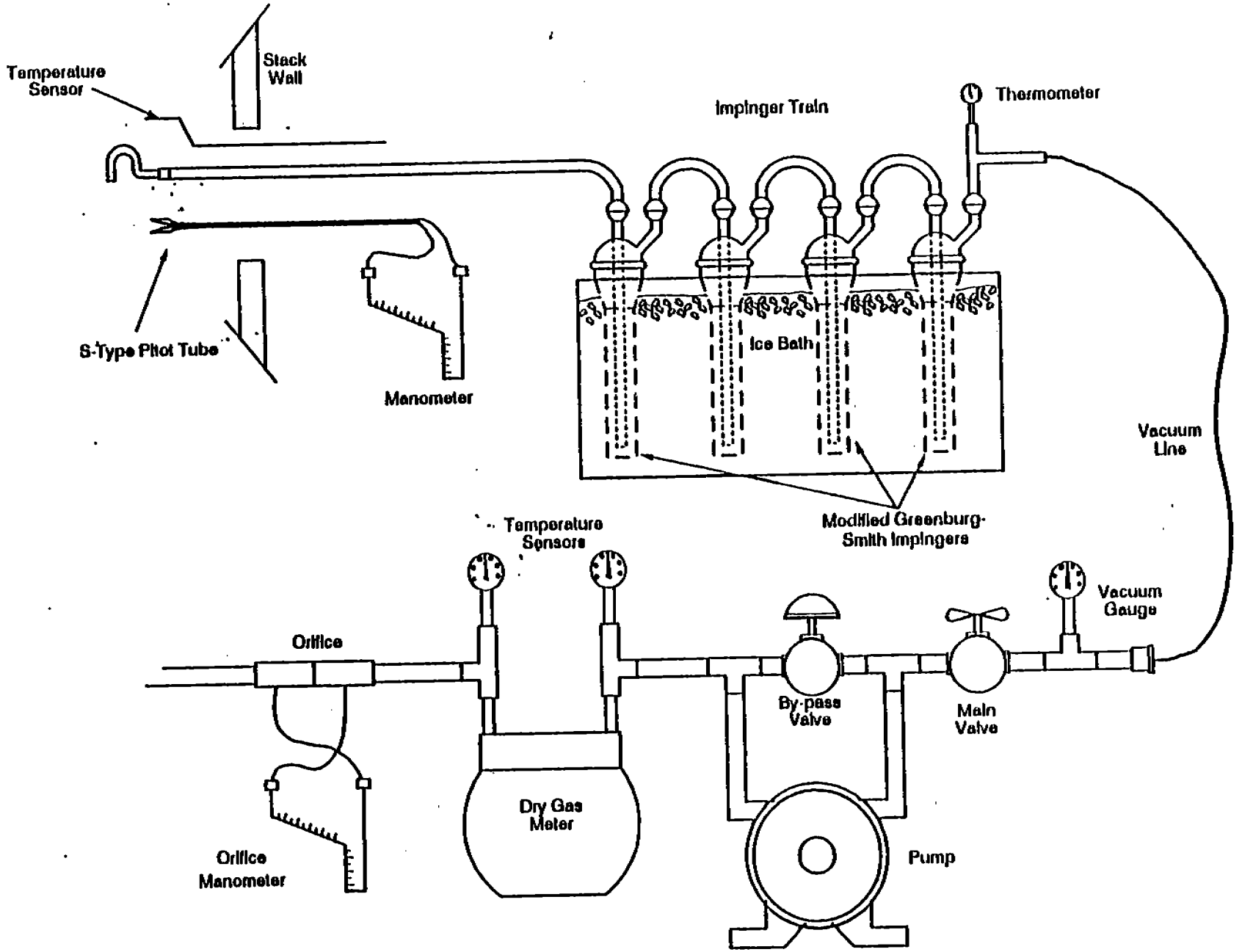
12.0 METHOD PERFORMANCE

12.1 Method performance evaluation: The following expected method performance parameters for precision, accuracy, and detection limits are provided in Table 3.

Table 3. Expected Method Performance for Formaldehyde

| Parameter | Precision | [1]Accuracy[2] | Detection Limit[3] |
|---|---|---|---|
| Matrix: Dual trains | ±15% RPD | ±20% | $1.5 \times 10^{-7}$ lb/ft$^3$ (1.8 ppbv) |

[1] Relative percent difference limit for dual trains.
[2] Limit for field spike recoveries.
[3] The lower reporting limit having less than 1% probability of false positive detection.




Formaldehyde Sampling Train

Plant _____

Location _____

Operator _____

Date _____

Run No. _____

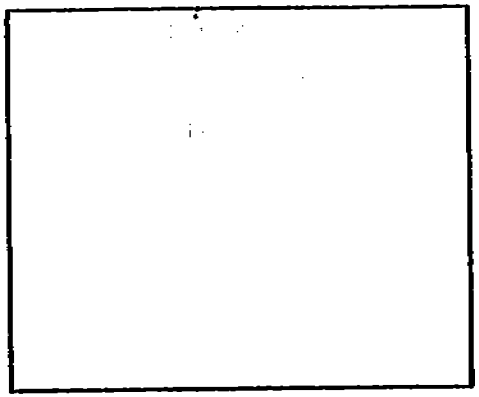
Sample Box No. _____

Meter Box No. _____

Meter H@ _____

C Factor _____

Pilot Tube Coefficient $C_p$ _____



Schematic of Stack Cross Section

Ambient Temperature _____

Barometric Pressure _____

Assumed Moisture % _____

Probe Length, m(ft) _____

Nozzle Identification No. _____

Average Calibrated Nozzle Diameter, cm (in) _____

Probe Heating Setting _____

Leak Rate, $m^3$/min. (cfm) _____

Probe Liner Material _____

Static Pressure, mm Hg (in. Hg) _____

Filter No. _____

| Traverse Point Number | Sampling Time (θ) Min. | Vacuum mm Hg (in. Hg) | Stack Temperature ($T_s$) °C (°F) | Velocity Head ($P_s$) mm (in) $H_2O$ | Pressure Differential Across Orifice Meter mm ($H_2O$) (in $H_2O$) | Gas Sample Volume $m^3$ ($ft^3$) | Gas Sample Temp. at Dry Gas Meter | | Filter Holder Temperature °C(°F) | Temperature of Gas Leaving Last Impinger °C(°F) |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | Inlet °C(°F) | Outlet °C(°F) | | |
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| Total | | | | | | | Avg. | Avg. | | |
| Average | | | | | | | | | | |

3404346R

Figure 2. Field Data Sheet

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# FIELD TEST OF A GENERIC METHOD FOR SAMPLING AND ANALYSIS OF ISOCYANATES

Interim Report
(Work Assignment 55)

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## DISCLAIMER

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# EXECUTIVE SUMMARY

Isocyanates are used extensively in the production of polyurethane materials such as flexible foam, enamel wire coatings, paint formulations and in binders for the pressed board industry. Because of their widespread use and known adverse physiological effects, several isocyanates have been listed in Title III of the Clean Air Act Amendments of 1990. The isocyanates of interest are: 2,4-toluene diisocyanate (TDI), methylene diphenyl diisocyanate (MDI), 1,6-hexamethylene diisocyanate (HDI) and methyl isocyanate (MI). Previously, no validated sampling and analytical methodology for these compounds relative to stationary sources existed.

The field validation study presented in this report is a culmination of laboratory investigations, performed under previous work assignments, which were designed to develop and evaluate a viable approach for the determination of isocyanate emissions from stationary sources. After the successful completion of the laboratory studies, the sampling and analysis approach was formulated and a field validation test was initiated. At the direction of the EPA, TDI was selected as the primary analyte.

The test site selected was a flexible foam manufacturing facility in High Point, North Carolina, which used TDI in the manufacturing process. The approximate level of TDI in the emission stream was determined by the analysis of samples collected during a presurvey. A sampling scheme was then designed to ensure the collection of sufficient samples to yield statistically valid data. Following the EPA Method 301 protocol, quadruplicate trains (QUAD) were operated simultaneously with four co-located probes. Two of the trains were spiked with TDI and two were unspiked. Samples from eight QUAD runs (minimum of six valid runs required by Method 301) were returned to the laboratory and analyzed according to the analytical procedure developed in laboratory studies. These data were statistically evaluated following Method 301 protocol to determine the performance of the method relative to bias and precision. These results are summarized in the following table. The precision for both the spiked and unspiked trains was less than 5% RSD, which is well within the precision criteria (% RSD <50)

## Method Validation Statistical Summary

| | |
|---|---|
| **Precision[a]** | |
| % RSD for Spiked Samples | 3.55[b] |
| % RSD for Unspiked Samples | 4.72[b] |
| **Accuracy[a]** | |
| Bias: | -295 $\mu$g |
| Significant? | No |
| Correction Factor | 1.0[c] |
| **Recovery[a]** | |
| Amount Spiked (as TDI) | 7828 $\mu$g |
| Average Percent Recovered | 95 |

[a]Results are based on the average of seven QUAD runs (14 spiked trains and 14 unspiked trains). TDI was present in the stack emissions and was therefore collected as background in the unspiked trains as well as in the spiked trains.

[b]EPA Method 301 requires the precision to be <50% RSD for the method to be acceptable.

[c]EPA Method 301 requires the calculated Correction Factor to be between 0.7 and 1.3 for the method to be acceptable.

for an acceptable method as tested. Using the data from all eight runs, the bias was found to be significant at the 95% level of confidence thus requiring the use of a correction factor of 1.053. Using the data from only seven runs (eliminating run number eight due to a questionable leak check for one of the trains) the bias was not significant and therefore did not require the calculation of a correction factor. In either case, the method was well within the bias acceptance criteria (correction factor between 0.7 and 1.3) for an acceptable method as tested.

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# 1.0 INTRODUCTION

Sampling and analytical methods for a particular analyte or group of analytes can be evaluated and validated by demonstrating their performance in field tests, thereby establishing the precision and bias of the methods experimentally. Few methods have been fully validated for sampling and analyzing the organic compounds listed in Title III of the Clean Air Act Amendments of 1990. For some analytes, methods have been validated for sample analysis, but not for sample collection. Full validation for both sampling and analytical methods, for both field and laboratory operations, is available for fewer than 10 percent of the analytes listed in Title III of the Clean Air Act Amendments at any source category. Field validation may be performed by side-by-side comparison of a candidate method to a validated method to establish comparable performance for the same analytes in the same matrix (same source category). Another procedure for validation of a method is to spike known quantities of analytes into the collection apparatus in the field so that the precision and bias of the method can be demonstrated from sample collection through analysis.

EPA, under the authority of Title III of the Clean Air Act Amendments (CAAA) of 1990, requires the identification and validation of sampling and analytical methods for the isocyanate compounds which are listed among the 189 hazardous air pollutants identified in Title III. These isocyanate compounds are listed in Table 1-1. Development of sampling and analytical methods for these four compounds was accomplished under Work Assignments 11, 21, and 40 on EPA Contract No. 68-D1-0010. At the direction of EPA, initial efforts were directed to the measurement of 2,4-toluene diisocyanate (TDI) emissions.

The objective of this work assignment was to validate the isocyanate sampling and analytical test method through field testing at an operating stationary source. The method was validated by collecting flue gas samples for the analysis of 2,4-TDI, and evaluating the data for bias and precision. EPA Method 301, "Field Validation of Pollutant Measurement Methods from Various Waste Media," was used as

## Table 1-1

## Isocyanates Listed in the Clean Air Act Amendments of 1990

| |
|---|
| Hexamethylene-1,6-diisocyanate (HDI) |
| 2,4-Toluene diisocyanate (TDI)[a] |
| Methylene diphenyl diiocyanate (MDI) |
| Methyl isocyanate (MI) |

[a]The 2,6 TDI isomer may also be present but is not listed in the CAAA.

a model for the validation protocol. Analyte spiking was used with quadruplicate sampling trains to generate the required data. The field validation was performed at an industrial facility which manufactures flexible foam products. Only two of the quadruplicate trains were spiked for each run. The two unspiked trains were used to establish the background level of target compound in the stack gas.

The sampling method utilizes a Method 5-type sampling train, which operates with a solution of 1-(2-pyridyl) piperazine and toluene in the impingers. Stack gas is extracted from the source through a heated probe and drawn through the impingers. TDI present in the stack gas reacts with the piperazine to form an isocyanate derivative. The quantity of isocyanate is determined by solvent exchange of the toluene solution with acetonitrile followed by high pressure liquid chromatographic (HPLC) analysis.

This report discusses the details of the field validation study. Section 2.0, Conclusions and Recommendations, summarizes the results and provides recommendations for future work. Sections 3.0 and 4.0 provide details of the sampling and analysis procedures respectively. Section 5.0 is a detailed discussion of the procedures, calculations and quality control.

# 2.0 CONCLUSIONS AND RECOMMENDATIONS

Based on the results presented in Section 6.0 of this report, the following conclusions can be made concerning the validity of the method as tested under the conditions described in this report:

- The calculated values for precision (%RSD) for both the spiked and unspiked trains, 3.55 and 4.72 respectively, are both well within the acceptance criteria of less than 50% RSD found in Section 6.3 of the EPA Method 301. Therefore, the method as tested at the source category described meets the precision requirements;

- The method bias, at the concentration levels tested, was found to be significantly different from zero at the 95% level of confidence when the data from all eight runs (minimum of six runs required) were used in the calculations. A correction factor of 1.053 would be required if all eight runs are included in the bias calculation. Good technical reasons exist for excluding one of eight QUAD runs. If this run is eliminated, no bias correction is required. In either case the correction factor is well within the acceptance criteria of 0.7 to 1.3 found in Section 1.2 of the EPA Method 301. Therefore, the method as tested at the source category described meets the bias and correction factor requirements; and

- The method as tested is sufficiently robust to allow testing at sources similar to the source tested in this study where the stack gas moisture is less than 1% by volume, the stack temperature is less than 30 degrees C and the presence of other compounds that may interfere with the analysis are minimal.

Recommendations for future testing and validation of the method for the sampling and analysis of isocyanates include the following:

- Identify a source for testing that has more than one isocyanate present in the stack gas;

- Spike as many of the four CAAA target isocyanates as possible into the train before sampling in order to gain as much information as possible from the field test; and

- Design the condenser between the first and second impinger of the train to more efficiently reduce the loss of toluene from the first impinger and minimize compound breakthrough due entrained aerosols.

## 3.0 FIELD TEST

The objective of this program was to perform a field test to establish the bias and precision of a sampling and analytical method for isocyanate compounds listed in Title III of the Clean Air Act Amendments of 1990. The method evaluation in this test series resulted from extensive literature reviews, industry consultation and laboratory development. To achieve the test objective, an industrial source with known emissions of TDI was selected as a field test site. Factors in the site selection were easy access, ample space for the quadruple sampling trains and proximity to Radian's office and laboratory in Research Triangle Park, North Carolina.

### 3.1 Site Description

The field validation test was performed at a flexible foam production plant located in High Point, North Carolina. In the manufacturing process starting materials (TDI, water, a polyether resin, methylene chloride, an amine catalyst, and coloring additives) are blended and continuously fed onto a conveyer belt. The TDI reacts with water and releases $CO_2$, which causes foaming in the resin material. Dichloromethane (DCM) can be added as a supplemental "blowing" or foaming agent. The heat from the reaction of TDI and water causes the DCM to vaporize, resulting in increased foaming. The density of the foam is controlled by the amount of TDI, water and DCM added. The foaming action continues as the material proceeds down the conveyer belt. Finished product is then allowed to cure and degas for 24 to 48 hours.

### 3.2 Sampling Location

Figure 3-1 presents a schematic view of the sampling location. Three induced draft (ID) fans are used to exhaust TDI and DCM vapors from the production process through three separate uninsulated sheet metal ducts that extend through the roof. Two of the ducts are connected by a 30-foot horizontal duct, 34 inches in diameter, which then extends vertically to a height of 25 feet above the roof top. A 6 inch

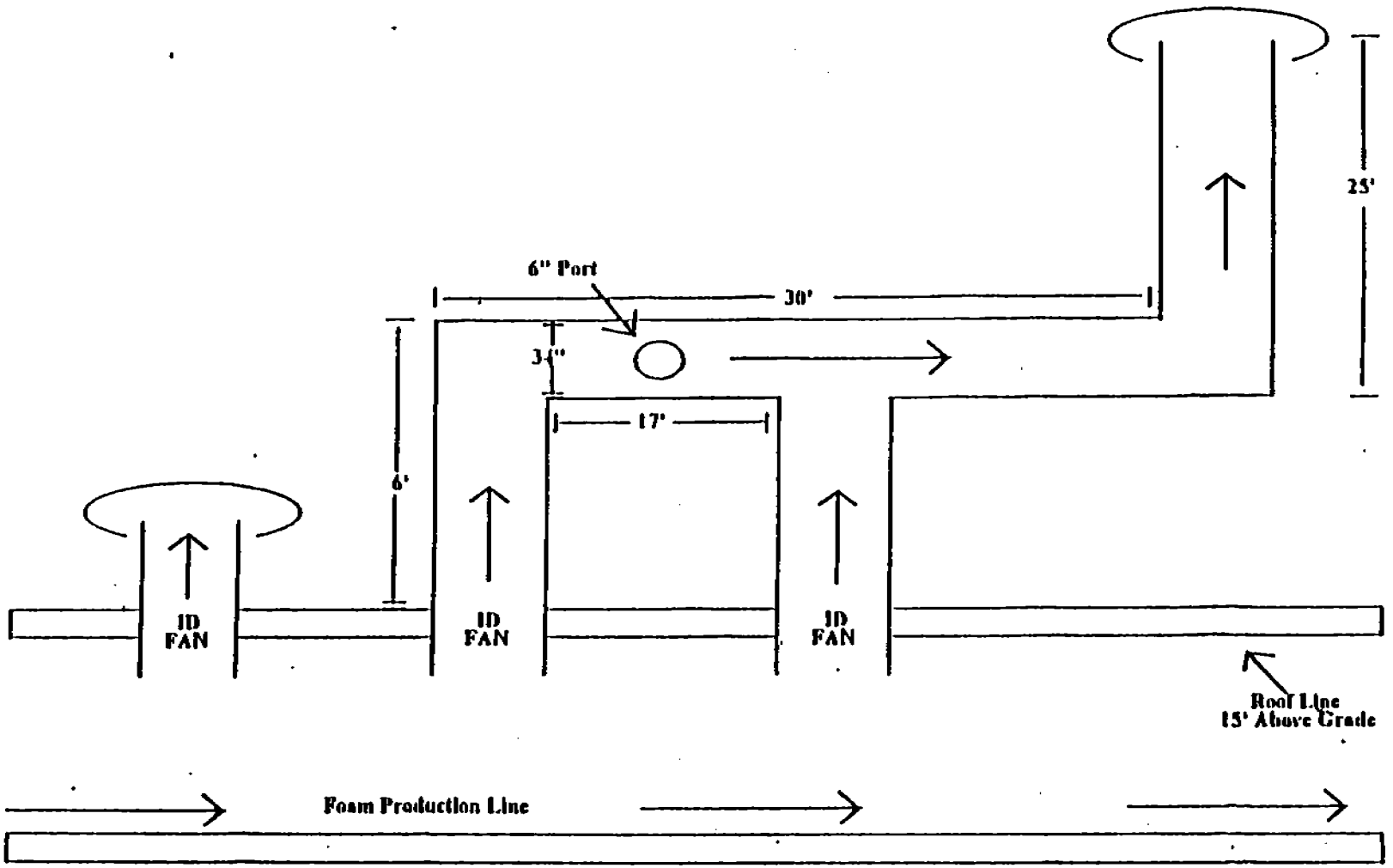



Figure 3-1. Sample Location

diameter sampling port is located in the horizontal duct midway between vertical ducts number 2 and 3, approximately 5 feet above the roof level. The roof level is approximately 15 feet above the ground.

A recovery trailer was located on the ground immediately in front of the sampling area, allowing easy communication between the sampling crew and recovery area. Two-way radio communication between the facility production personnel and the sampling crew allowed coordination between production startup and the start of each sampling run.

## 3.3 Test Schedule

The recovery trailer and test equipment were mobilized on Saturday, February 20, 1993. Equipment setup took place Saturday afternoon and Sunday, and testing began Monday morning.

The sampling schedule is shown in Table 3-1. Eight runs were completed, which included two extra runs above the required minimum of six.

## 3.4 Sample Collection

### 3.4.1 Quad Probe

Sampling was performed by withdrawing stack gas from a single port in the stack through a quad probe, then directing the sampled gas simultaneously to four independently operated sampling trains. The quad probe contains four similar heated sampling probes that were inserted into the stack as one unit, as shown in Figure 3-2. The front end of the quad probe was positioned in the center of the stack and remained

## Table 3-1

## Test Schedule

| Run | Date | Start Time | Stop Time |
|---|---|---|---|
| 1 | 2-22-93 | 1215 | 1300 |
| 2 | 2-22-93 | 1330 | 1410 |
| 3 | 2-23-93 | 0945 | 1085 |
| 4 | 2-23-93 | 1335 | 1415 |
| 5 | 2-24-93 | 1010 | 1110 |
| 6 | 2-24-93 | 1335 | 1420 |
| 7 | 2-25-93 | 1215 | 1255 |
| 8 | 2-25-93 | 1315 | 1355 |

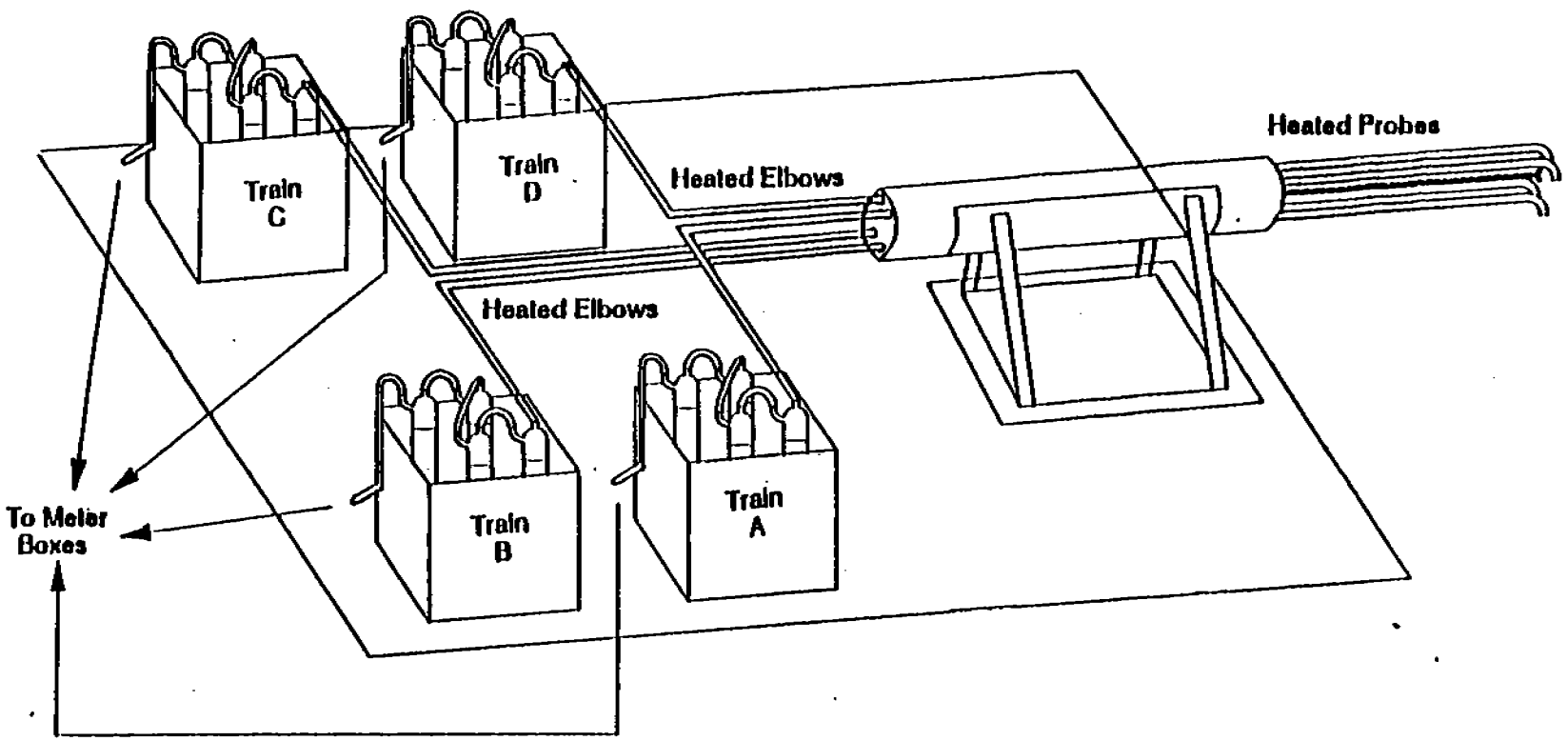



Figure 3-2. Schematic of Quad Train Setup

in that location during each test. The stack was not traversed nor were stack gas velocity measurements made, because determination of the true concentration and emission rate of the target compound in the stack gas was not required to meet the objectives of this program.

Method 301 of 40 CFR Part 63 describes field validation procedures and details the criteria for the quadruple sampling probe tip arrangement. This method requires the inside edge of sampling probe tips to be situated in a 6.0 cm x 6.0 cm square area. The area encompassed by the probe tip arrangement should occupy less than 5% of the stack cross-sectional area. The cross-sectional area of the probe tip arrangement used in this test was 5.8 square inches as measured from the probe/nozzle centerlines. This area is less than 1% of the stack cross-sectional area of 908 square inches, which satisfies the Method 301 criterion.

### 3.4.2 Quad-Train Assembly

Four independent sampling trains made up the quad-train assembly. Although four meter boxes were required, the velocity head ($\Delta P$) was determined using only one set of pitot tubes. The sampling trains were identified as Train A, B, C, and D. Two of the four trains were spiked before each run. The spiking compound was added to the first impinger of these trains in the field for bias determination. The sampling train test matrix is given in Table 3-2.

## 3.5 Sampling Preparation

### 3.5.1 Glassware Preparation

All glassware used for sampling was thoroughly cleaned prior to use. This included the probe, impingers, all sample bottles and all utensils used during sample recovery. All glassware was washed with hot soapy water, rinsed with hot tap water, rinsed with distilled water and baked in a oven at 300 °C for four hours. The glassware

## Table 3-2

## Sampling Train Test Matrix

| | Train Designation | |
|---|---|---|
| Run # | Spiked | Unspiked |
| 1 | A, B | C, D |
| 2 | C, D | A, B |
| 3 | A, B | C, D |
| 4 | C, D | A, B |
| 5 | A, B | C, D |
| 6 | C, D | A, B |
| 7 | A, B | C, D |
| 8 | C, D | A, B |

was then triple-rinsed with HPLC grade acetonitrile, followed by triple-rinsing with HPLC grade toluene. Open ends of glassware were covered with aluminum foil to minimize potential contamination during transportation and set-up.

### 3.5.2 Preparation of Impinger Absorbing Solution

Historical data available from the host test site facility and data resulting from the collection of preliminary samples by Radian indicated that the concentration of TDI in the process exhaust was 1 ppm or less, depending on the density of foam being produced on any given day. At this concentration, a 30 cubic foot sample size would result in the collection of approximately 7 mg of TDI. Using the reaction stoichiometry of two moles of 1,2-PP per mole of TDI, the piperazine in toluene solution was then prepared at a concentration level three times the calculated minimum needed, or 133 $\mu$g/mL. This would provide a total of approximately 40 mg of 1,2-PP in 300 mL of impinger solution in the first impinger available for reaction with TDI. At this concentration, approximately 22 mg of TDI could be collected in the first impinger before the reagent was exhausted. This solution was prepared in the laboratory just prior to use in the field, and was used within 10 days of preparation.

### 3.5.3 Preparation of TDI Spiking Solution

The TDI spiking solution was prepared at a concentration of 1.5 mg of the derivatized TDI per 1 mL of acetonitrile. Fifteen mL of this spiking solution was spiked into the first impinger of two of the four trains prior to each QUAD run. This spiking scheme resulted in a total spike amount of derivatized TDI of 22.5 mg, which is equivalent to 7.83 mg of underivatized TDI. This is an amount equivalent to the amount of TDI expected to be collected in the train from the stack gas based on presurvey samples. Therefore, the amount present in the two spiked trains was designed to be at least twice the amount present in the two unspiked trains.

### 3.5.4 Sampling Equipment Preparation

Final sampling train preparations included calibration and leak checking of all the train equipment, including meter boxes, thermocouples, nozzles, pitot tubes, and umbilicals. Reference calibration procedures were followed when available, and the results were properly documented and archived. If a referenced calibration technique for a particular piece of apparatus was not available, then a state-of-the-art technique was used. A discussion of the techniques used to calibrate this equipment is presented below.

#### S-Type Pitot Tube Calibration

The EPA has specified guidelines concerning the construction and geometry of an acceptable S-Type pitot tube. If the specified design and construction guidelines are met, a pitot tube coefficient of 0.84 can be used. Information pertaining to the design and construction of the Type-S pitot tube is presented in detail in Section 4.1.1 of EPA Document 600/4-77027b. Only S-Type pitot tubes meeting the required EPA specifications were used. Pitot tubes were inspected and documented as meeting EPA specifications prior to field sampling.

#### Sampling Nozzle Calibration

Glass nozzles were used for sampling. All nozzles were thoroughly cleaned, visually inspected for damage , and calibrated according to the procedure outlined in Section 4.4.2 of EPA Document 600/4-77-027b.

#### Dry Gas Meter Calibration

Dry gas meters (DGMs) were used in the sample trains to measure the sample volume and sampling rate. All DGMs were calibrated to document the volume correction factor prior to the departure of the equipment to the field. Post-test

calibration checks were performed after the equipment was returned to Radian's laboratory. Pre- and post-test calibrations agreed to within 5 percent.

Prior to calibration, a positive pressure leak check of the system was performed using the procedure outlined in Section 4.3.2 of EPA Document 600/4-77-23b. The system was placed under approximately 10 inches of water pressure and an oil manometer was used to determine if the pressure decreased over a one-minute period.

After the sampling console was assembled and leak checked, the pump was allowed to run for 15 minutes to allow the pump and DGM to warm up. The valve was then adjusted to obtain the desired flow rate. For the pre-test calibrations, data were collected at the orifice manometer settings ($\Delta H$) of 0.5, 1.0, 1.5, 2.0, 3.0, and 4.0 inches of water. Gas volumes of 5 $ft^3$ were used for the two lower orifice settings, and volumes of 10 $ft^3$ were used for the higher settings. The individual gas meter correction factors ($\gamma i$) were calculated for each orifice setting and averaged. The method requires that each of the individual correction factors fall within $\pm 2\%$ of the average correction factor or the meter must be cleaned, adjusted, and recalibrated. In addition, Radian requires that the average correction factor be $1.00 \pm 1$ percent. For the post-test calibration, the meter was calibrated three times at the average orifice setting and vacuum which were used during the actual test.

Dry gas meter calibrations were performed at Radian's laboratory using an American® wet test meter as an intermediate standard. The intermediate standard is calibrated every six months against the EPA spirometer at EPA's Emission Measurement Laboratory in Research Triangle Park (RTP), North Carolina.

### 3.5.5 Sampling Operations

Vent gas samples were collected isokinetically from a single sampling point located in the center of the duct. Preliminary information about the stack gas velocity useful in selecting nozzle size and calculating the K-factor was obtained during the

pre-site survey. Prior to testing, a leak check of pitot lines was performed according to EPA Method 2. Oxygen ($O_2$) and carbon dioxide ($CO_2$) concentrations were ambient levels as determined by EPA Method 3. The stack gas moisture data was measured by the host facility as the relative humidity.

### Preparation of Sampling Train

The four sampling trains for each QUAD run were charged and assembled in the recovery trailer. The impinger buckets were marked as Train A, B, C, or D. Tared impingers were used. Approximately 300 mL of the absorbing reagent was transferred to the first impinger and 200 mL to the second impinger. The first impinger of each train was of a Greenburg-Smith design and all remaining impingers were of the modified Greenburg-Smith design. The third impinger was empty, 200 to 300 g of silica gel was placed in the fourth impinger and 400 g of charcoal was placed in the fifth impinger. A water jacketed condenser was placed between the outlet of the first impinger and the inlet to the second impinger to promote cooling and minimize evaporative loses of toluene from the first impinger. Fifteen (15) mL of the spiking solution was pipetted into the first impinger of Trains A and B. Openings were covered with Teflon® film or aluminum foil after the assembly of the trains.

Final assembly of the sampling trains occurred at the sampling location. The complete train configuration is shown in Figure 3-3. Thermocouples were attached to measure the stack temperature and probe outlet and impinger outlet temperatures. Crushed ice was added to each impinger bucket, and the probe heaters were turned on and allowed to stabilize at 120° ± 12°C (248° ± 25°F).

The isocyanate trains were leak checked before and after each sampling run, as required in EPA Method 5. To leak check the assembled train, the nozzle end was capped off and the sampling train evacuated to a vacuum of 15 inches of Hg. After the system was evacuated and the pump isolated from the train, the volume of gas flowing through the system was timed for 60 seconds. The leak rate is required to be

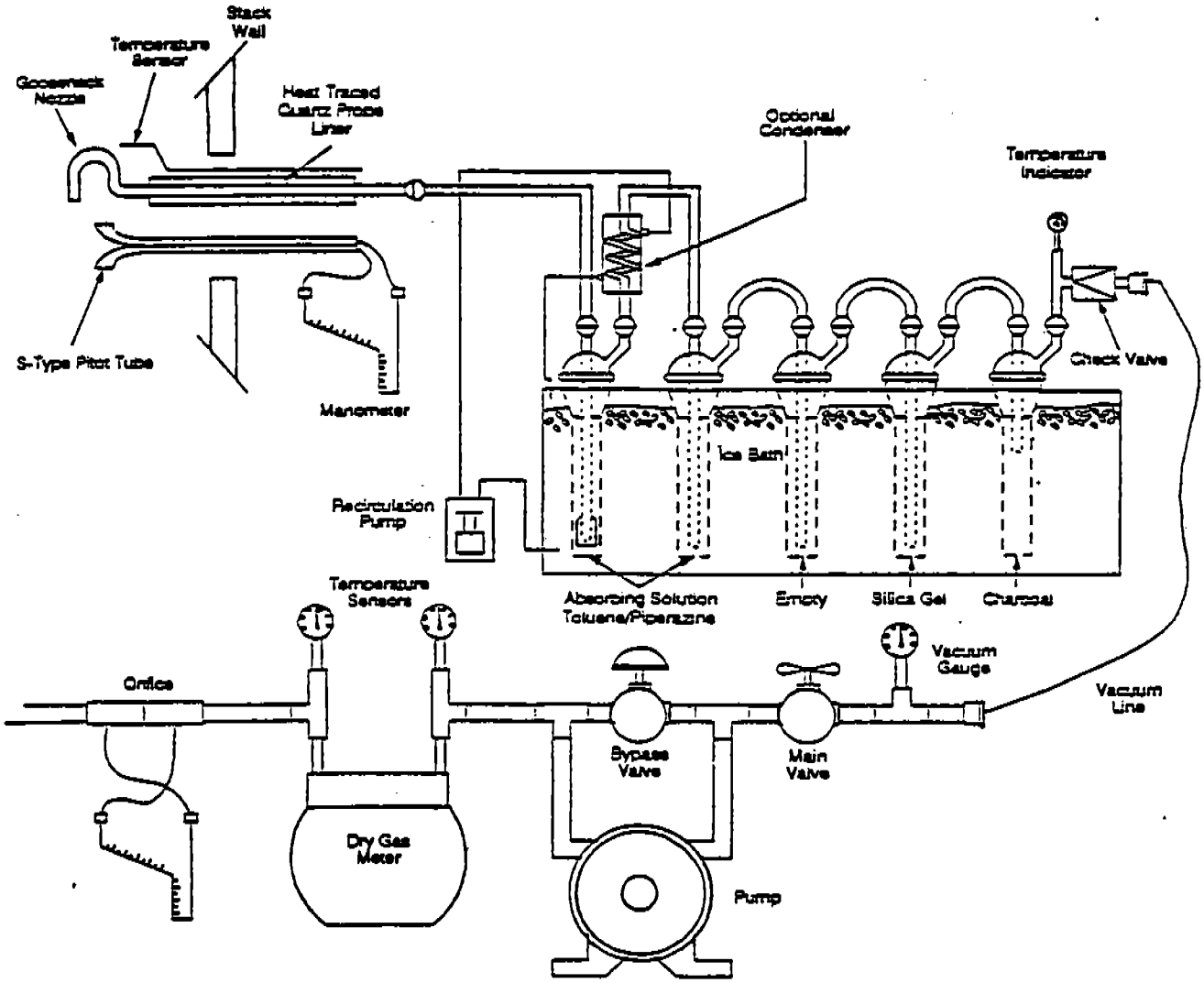



Figure 3-3. Sampling Train for Isocyanate

less than 0.02 acfm or 4% of the average sampling rate, whichever is less. After the leak rate was determined, the cap was slowly removed from the nozzle end until the vacuum in the train returned to atmospheric pressure and then the pump was turned off.

The leak rates and sampling start and stop times were recorded on the sampling task log. Also, any other events that occur during sampling were recorded on the task log (such as pitot cleaning, thermocouple malfunctions, heater malfunctions, and any other unusual occurrences). A nominal sample size of 30 cubic feet was collected in all sampling train. This was accomplished by sampling at a flowrate of 0.5 cubic feet per minute for 60 minutes. The sample volumes for each train by QUAD run are presented in Table 3-3.

### 3.5.6 Sample Recovery

The sample bottles containing the probe and nozzle washings and the impinger portion of the sampling trains were moved to the recovery trailer.

Each impinger was carefully removed from the impinger bucket, the outside was wiped dry, and the final impinger weight was determined and recorded to calculate stack moisture. The isocyanate sample was then collected in the following two fractions:

- First impinger contents, toluene rinses from the nozzle/probe liner and toluene/acetonitrile rinses of the first impinger and connecting glassware; and
- Contents and toluene/acetonitrile rinses from the second and third impingers and the condenser.

Recovery procedures are detailed in this section. All recovery bottles were wide mouth amber glass with Teflon® lined lids.

## Table 3-3.

## Quad Train Sample Volumes

| Date | Run Number | Train A Vm @ 68° ($ft^3$) | Train B Vm @ 68° ($ft^3$) | Train C Vm @ 68° ($ft^3$) | Train D Vm @ 68° ($ft^3$) |
|---|---|---|---|---|---|
| 2/22/93 | 1 | 33.42 | 33.89 | 33.02 | 33.04 |
| 2/22/93 | 2 | 29.07 | 29.65 | 28.67 | 28.40 |
| 2/23/93 | 3 | 34.24 | 35.15 | 33.75 | 33.01 |
| 2/23/93 | 4 | 30.60 | 31.17 | 30.35 | 29.54 |
| 2/24/93 | 5 | 34.14 | 34.70 | 34.46 | 32.59 |
| 2/24/93 | 6 | 35.10 | 35.17 | 34.49 | 33.78 |
| 2/25/93 | 7 | 31.11 | 31.94 | 30.14 | 29.91 |
| 2/25/93 | 8 | 30.89 | 29.73 | 30.49 | 31.95 |

### Container 1 - Probe and First Impinger Contents

The contents and rinses of each of the first impingers and first impinger connectors were combined with the corresponding probe/nozzle washing solution. The entire contents of the first impinger were recovered as a single sample, even if two phases were present. The first impinger and connecting tubing were rinsed three times with 15 mL aliquots of toluene. A final rinse of the impinger with acetonitrile was also necessary to remove any water left on the impinger wall and to recover any remaining derivatized TDI.

### Container 2 - Second and Third Impinger Contents/Condenser Rinse

The contents and toluene/acetonitrile rinses of the second and third impingers and the condenser of each train were collected in the same manner used for the first impinger described above. The contents of these impingers were analyzed separately from the contents collected in the first impinger to check for breakthrough; therefore, care was taken to avoid physical carryover from the first impinger to the second. The contents of the fourth and fifth impingers were weighed as previously described and then discarded.

### Field Blanks

Four field blanks were prepared and recovered during the test, one on each day of testing. The four field blanks were prepared using Trains A, B, C, and D from the two sets of glassware used during the testing. A sampling train was assembled in the staging area, taken to the sampling location, and leak-checked. The probe of the blank train was heated during the generation of the field blank, but no gas sample was passed through the sampling train. The sampling train for the field blank was recovered with the same procedure described for authentic source samples.

Reagent Blank(s)

Aliquots of each lot of toluene, acetonitrile and absorbing reagent were collected daily to be analyzed as reagent blanks.

Sample Storage and Shipping

Sample containers were checked to ensure that complete labels had been affixed. The labels identified Trains A, B, C, or D, as appropriate. Teflon® lids were tightened and secured with Teflon® tape. The sample bottles were stored in a cooler packed with ice and were returned to Radian's laboratory in these coolers at the end of the field test.

## 3.6 Quality Control

The following quality control measures were implemented during the field testing phase of this program:

- All dry gas meters were calibrated. Calibration procedures were followed for the pitot tube/probe assembly and all thermocouple readout devices.
- Temperatures of the sampling train were maintained at the specified setting (120± 12°C) during each sampling run at levels prescribed in the test plan.
- Sampling trains were leak-checked both prior to and after sampling.
- All glassware was washed and oven-baked following appropriate method protocol, given in the test plan.
- All recovery solvents were HPLC grade and an aliquot of each was collected daily as reagent blanks.
- One field blank was collected for every two sampling runs.

- Chain of Custody forms and log books were filled in at the completion of each day of sampling.

## 4.0 ANALYTICAL PROCEDURES

### 4.1 Sample Preparation

The samples were received in the laboratory in screw-capped glass bottles with Teflon®-lined caps, sealed with Teflon® tape and stored in coolers packed with ice. Samples were logged into the laboratory sample tracking system and stored in a secure, refrigerated (4°C) sample storage area prior to analysis. Samples were prepared for analysis within 30 days of collection and analyzed within 30 days of preparation.

All labware was washed with detergent and water and rinsed with hot tap water, rinsed with deionized water, baked at 300°C, rinsed with acetonitrile and toluene prior to use. Solvents used were HPLC grade or equivalent.

Each of the two recovered samples from each train was transferred along with rinses to separate 500 mL round bottom flasks and then evaporated to dryness under vacuum in a 65°C water bath. Each round-bottom flask was then rinsed three times with separate two (2) mL aliquots of acetonitrile (ACN) and the rinses transferred to a 10-mL volumetric flask. The sample was then brought to volume with ACN and transferred to a 15-mL vial and sealed with a Teflon®-lined lid. The vial was stored in a refrigerated sample storage area at 4°C until analysis.

### 4.2 Chromatographic Analyses

The procedures for the HPLC analyses of the samples are described in the following sections.

#### 4.2.1 Standard Preparation

A 300 $\mu$g/mL stock solution of TDI piperazine urea derivative was prepared by dissolving 7.5 mg of the purified crystals of the derivatized TDI in 25 mL of

ACN. [The derivatized TDI was previously prepared by adding 1 g of the neat TDI to a solution of 1-(2-pyridyl) piperazine in ACN, evaporating to dryness and recrystallizing the urea derivative three times from ACN.] Working standards for the calibration curve were made from this stock at six concentration levels in ACN ranging from 0 to 50 μg/mL. This concentration range covered the amount of TDI expected to be collected at the host facility. This stock solution was also used to prepare the field spiking solution. A check standard was prepared from a separately prepared stock solution. This check standard fell in the middle of the calibration curve.

4.2.2 Analysis

HPLC System

The HPLC system operating parameters for analysis of standards and samples were as follows:

| | |
|---|---|
| Instrument: | RAININ HPXL Delivery System<br>Waters 710B WISP autosampler |
| Data System: | Nelson 2600 (1 volt) |
| Column: | Zorbax ODS (4.6 mm ID x 25 cm) |
| Mobile Phase: | Acetonitrile/0.1M Ammonium Acetate Buffer |
| Gradient: | 25:75 ACN/0.1 m ammonium acetate buffer, pH 6.2, hold 2 minutes, then to 60:40 by 19.5 minutes. |
| Detector: | RAININ Dynamax Dual-Wavelength, Ultraviolet at 254 nm |
| Flow Rate: | 2 mL/min |
| Injector Volume: | 50 μL |
| Retention Time: | 2,4-TDI, 10.2 min.; 2,6-TDI 8.5 min. |

Instrument Calibration

Calibration standards were prepared at seven levels as described in Section 4.2.1. Each calibration standard was injected in duplicate. Linear regression analysis of peak area response versus concentrations of TDI was used to prepare a calibration curve. Linearity of the calibration curve was confirmed by visual inspection and verified by a correlation coefficient of 0.9995. After an initial calibration curve was obtained, the calibration check standard described in Section 4.2.1 was analyzed. This standard was injected after every 3 samples, and was used for daily calibration. This check standard consistently agreed to within 10% of the true value.

All samples were analyzed in triplicate on the HPLC. An acetonitrile blank was analyzed once per day to ensure that the system was not contaminated. A check standard was analyzed prior to sample analysis, after every 3 samples, and at the end of the sample analysis each day.

## 4.3 Qualitative Identification

Analytes were identified by retention time. The retention time for 2,4-TDI was 10.2 min and 8.5 min for 2,6-TDI. Figures 4-1 and 4-2 show chromatograms from the analysis of first impinger contents from QUAD run number 4 for the unspiked and spiked trains respectively. As seen in the chromatograms, the TDI peaks are well separated from the peak for unreacted 1-2 PP. The peak at 17.5 min. was not identified.

## 4.4 Calculations

### 4.4.1 Calculation of the Amount of Isocyanate Collected

A least squares linear regression analysis of the calibration data was used to calculate a correlation coefficient, slope, and intercept. Concentration was used as the independent or X-variable and response was used as the dependent or Y-variable.

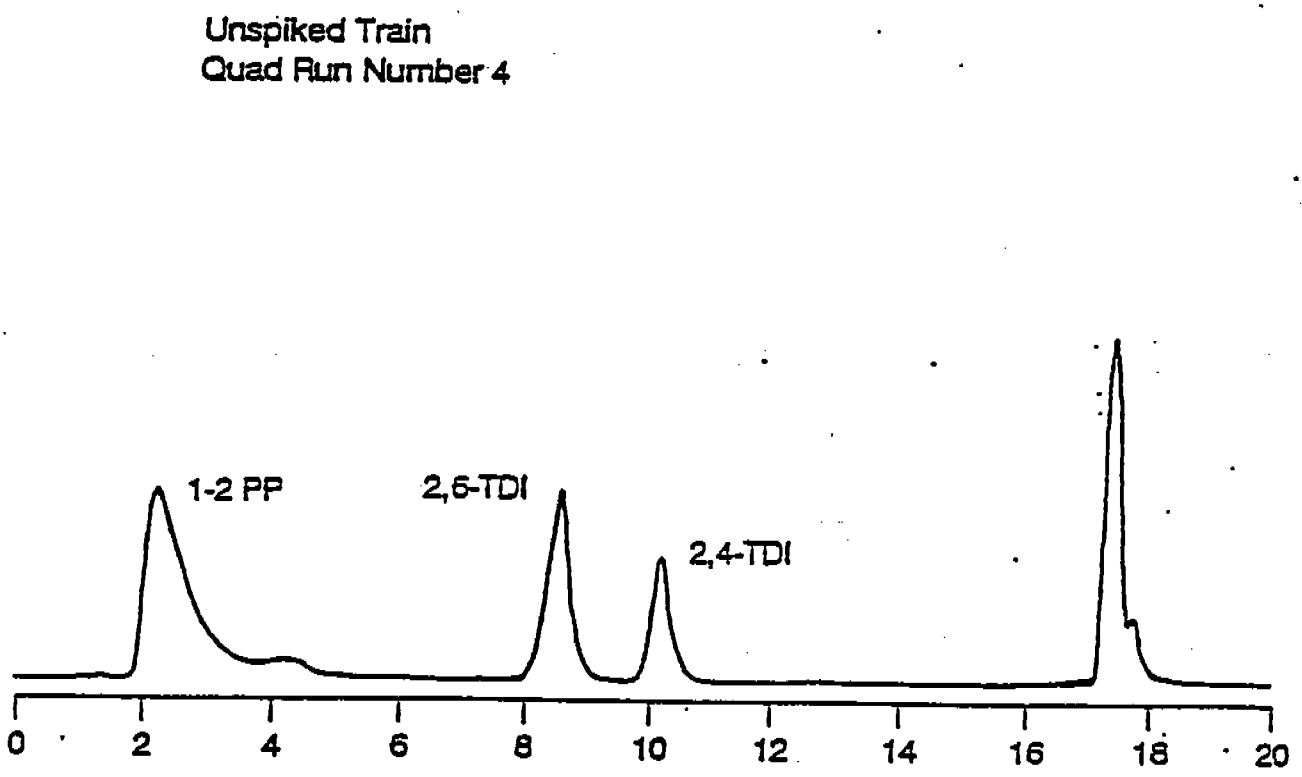



Figure 4-1. Chromatogram of Unspiked Train

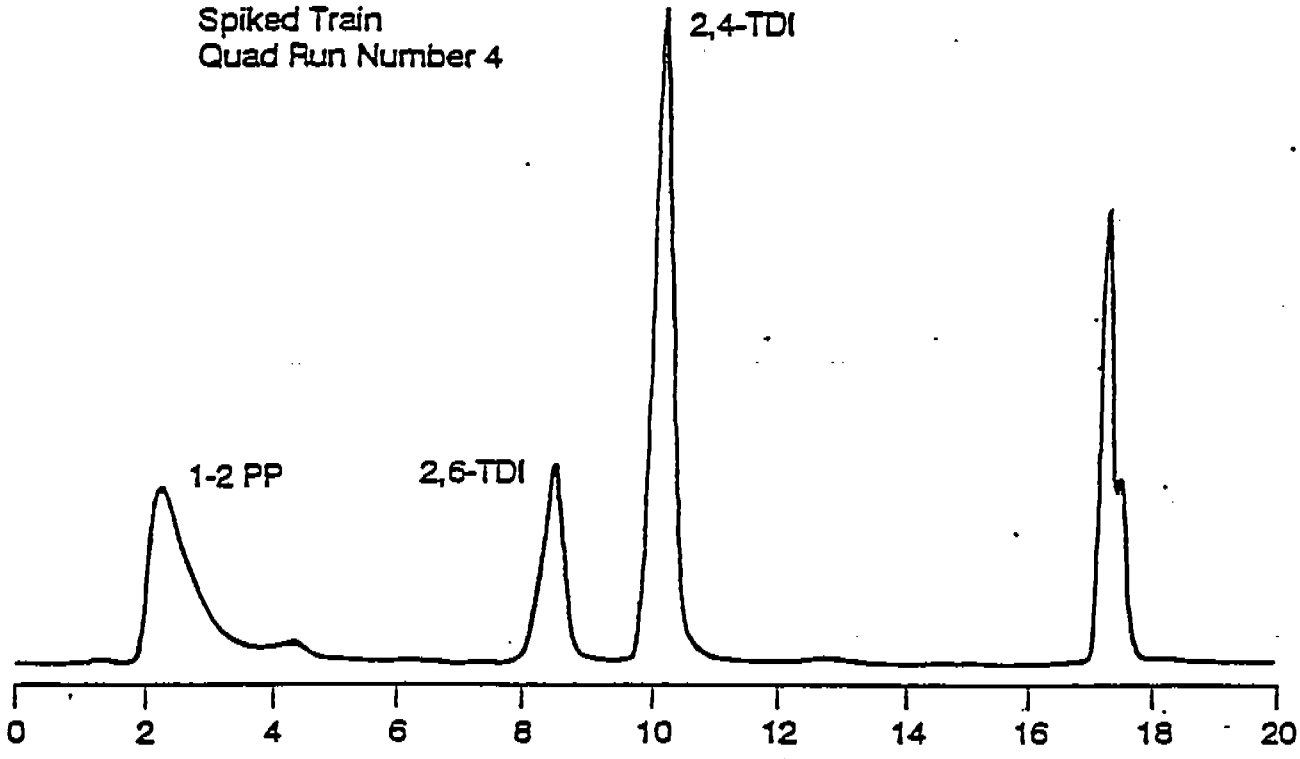



Figure 4-2. Chromatogram of Spiked Train

The concentration of isocyanate (as the derivative) in the concentrated samples was then calculated as follows:

$$\text{Concentration} = \frac{(\text{Sample Response} - \text{Intercept})}{\text{Slope}} \qquad 4\text{-}1$$

The total amount ($\mu$g) collected in a sample was then calculated by multiplying the concentration ($\mu$g/mL) times the final volume (10 mL) of ACN used to redissolve the concentrated sample.

$$\text{Amount TDI derivative} = \text{Concentration } (\mu\text{g/mL}) \times \text{Final Volume (10 mL)} \qquad 4\text{-}2$$

The equivalent amount of TDI required to generate this much derivative was calculated by multiplying the ratio of the molecular weights of TDI (174) and the TDI derivative (501) times the amount of TDI derivative (determined by using equation 4-2).

The total amount of 2,4-TDI (underivatized) collected in the unspiked and spiked trains is given in Table 4-1 and Table 4-2 respectively.

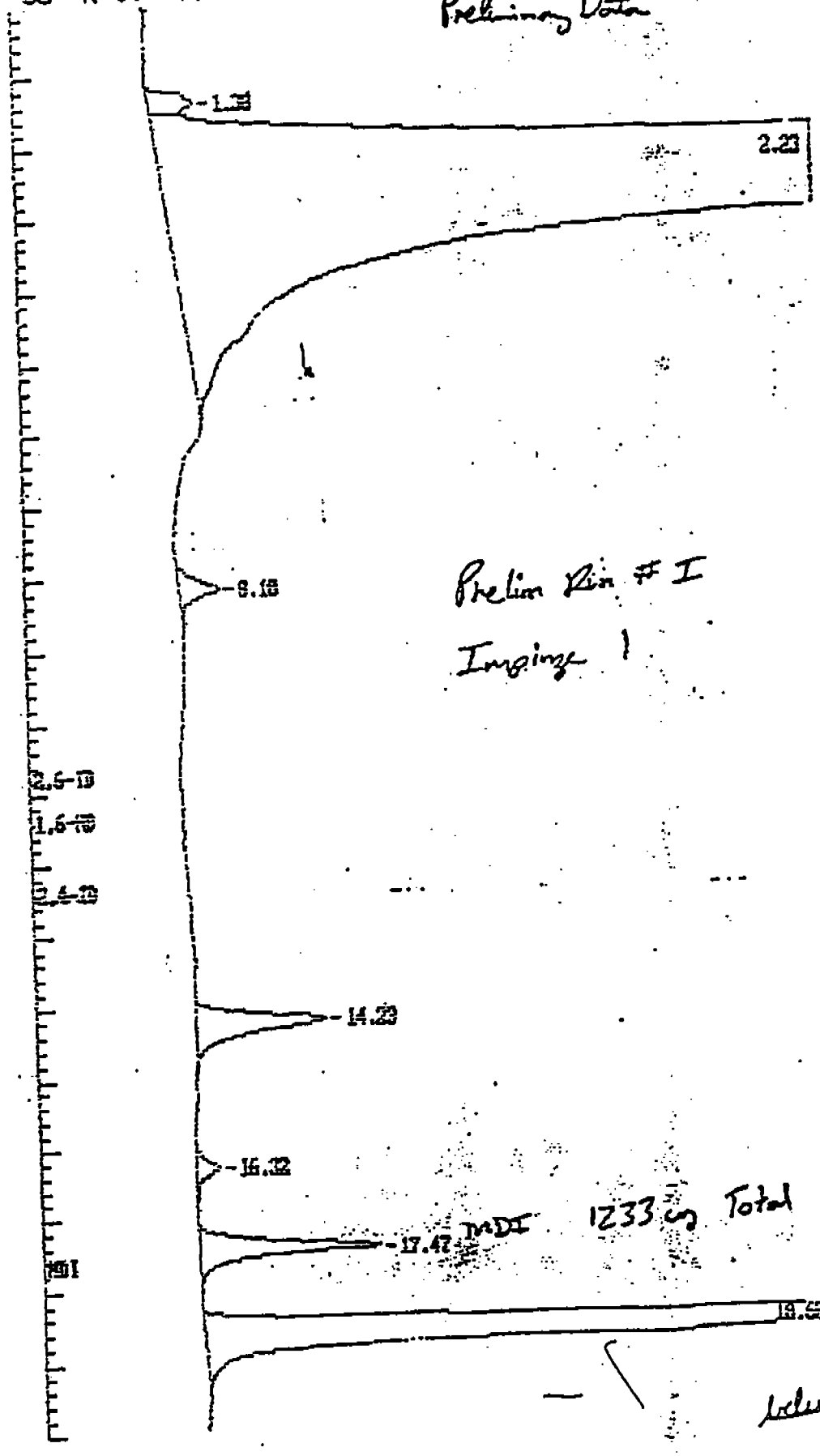
### 4.4.2 Normalization of the Amount of Isocyanate Collected

In order to simplify the comparison of the analytical results of the four trains in each QUAD run for subsequent calculations of bias and precision, the test plan called for the collected of 30 $ft^3$ of sample in each train. Due to operational variabilities inherent to each train, accurate but slightly differing sample volumes resulted as shown in Table 3-3. Therefore, it was necessary to normalize the data presented in Tables 4-1 and 4-2 to a common sample volume. The sample volume to which all data were normalized was selected to be 35.31 $ft^3$ which is equivalent to $1m^3$. The following stepwise calculations were used to normalize the data. The data from QUAD run number 1 are used as an example.

SENT BY:

Data File = E:\S3253F6.PTS Printed on 09-10-1993 at 12:29:41
Start time: 0.00 min. Stop time: 20.00 min. Offset: 0 cts
Full Range: 50 K-Counts

Preliminary Data




Prelim Run # I

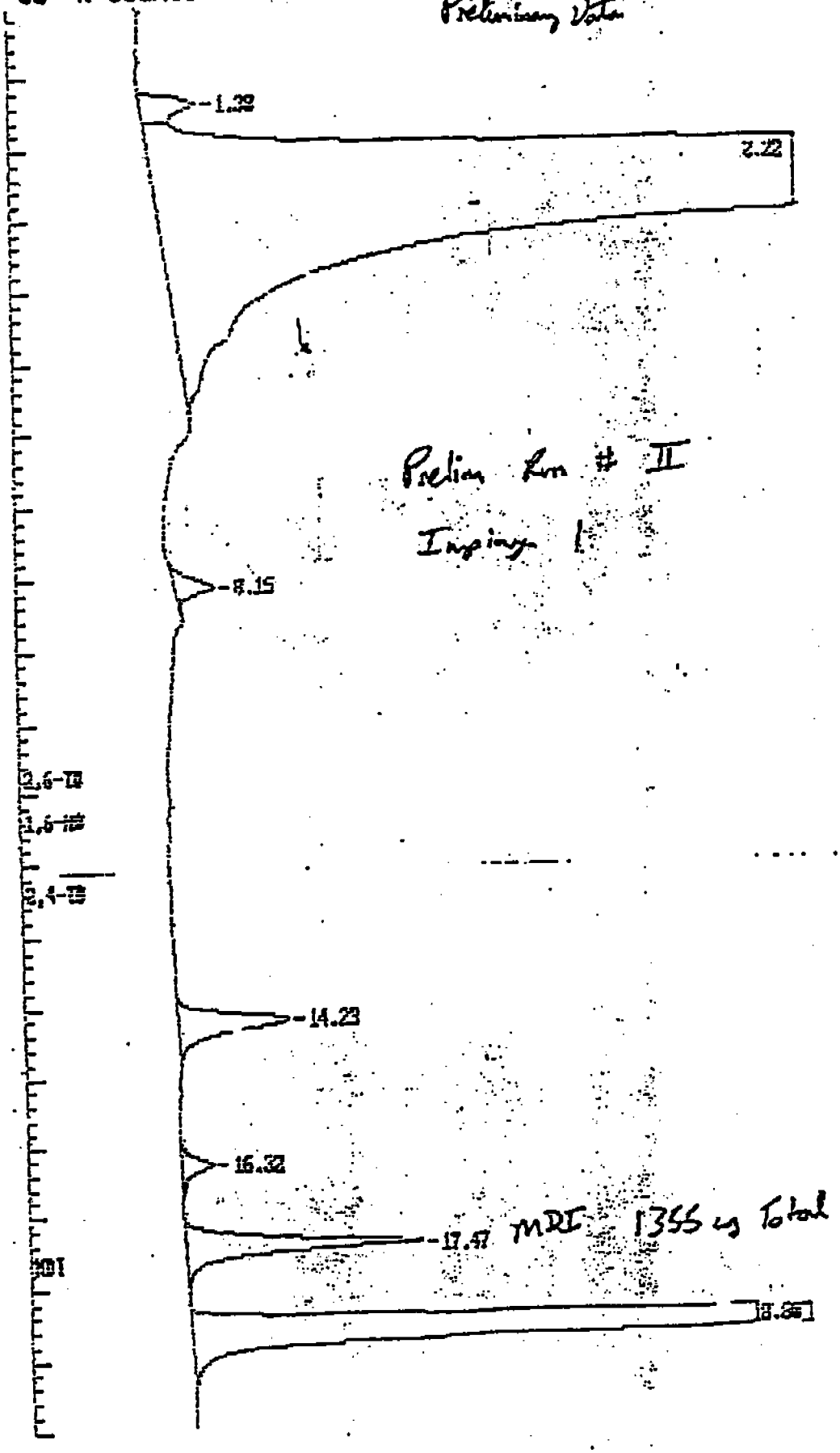
Impinger 1

1233 ug Total

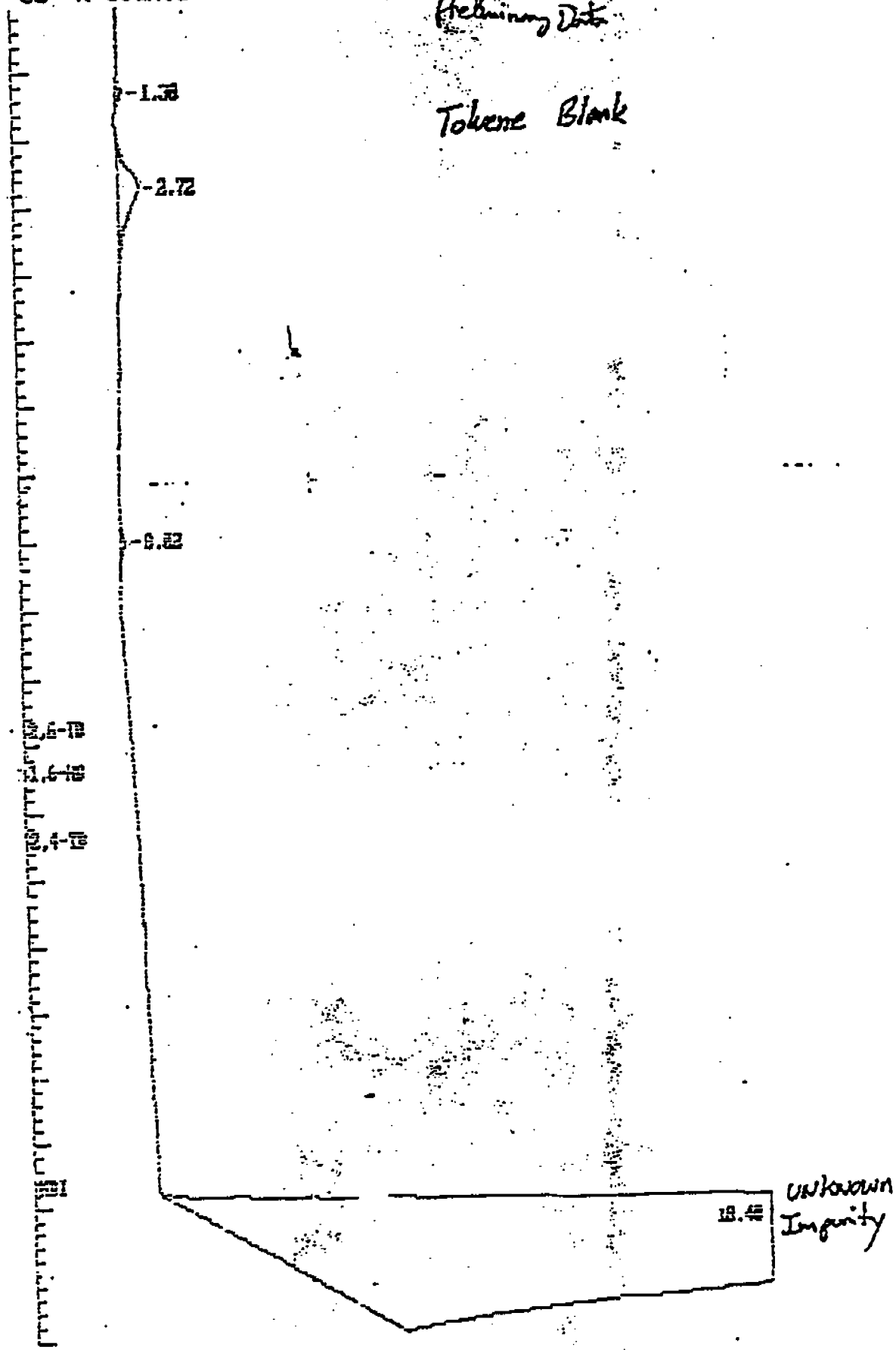
Radial is check ID

Areas, times, and heights stored in: E:\S3253F7.ATB
Data File = E:\S3253F7.PTS Printed on 09-10-1993 at 13:01:05
Start time: 0.00 min. Stop time: 20.00 min. Offset: 0 cts
Full Range: 50 K-Counts

Preliminary Data



SENT BY: [illegible] Printed on 09-13-1993 at 14:43:58
Data File = E:\S3256F7.PTS
Start time: 0.00 min. Stop time: 20.00 min. Offset: 0 cts
Full Range: 50 K-Counts

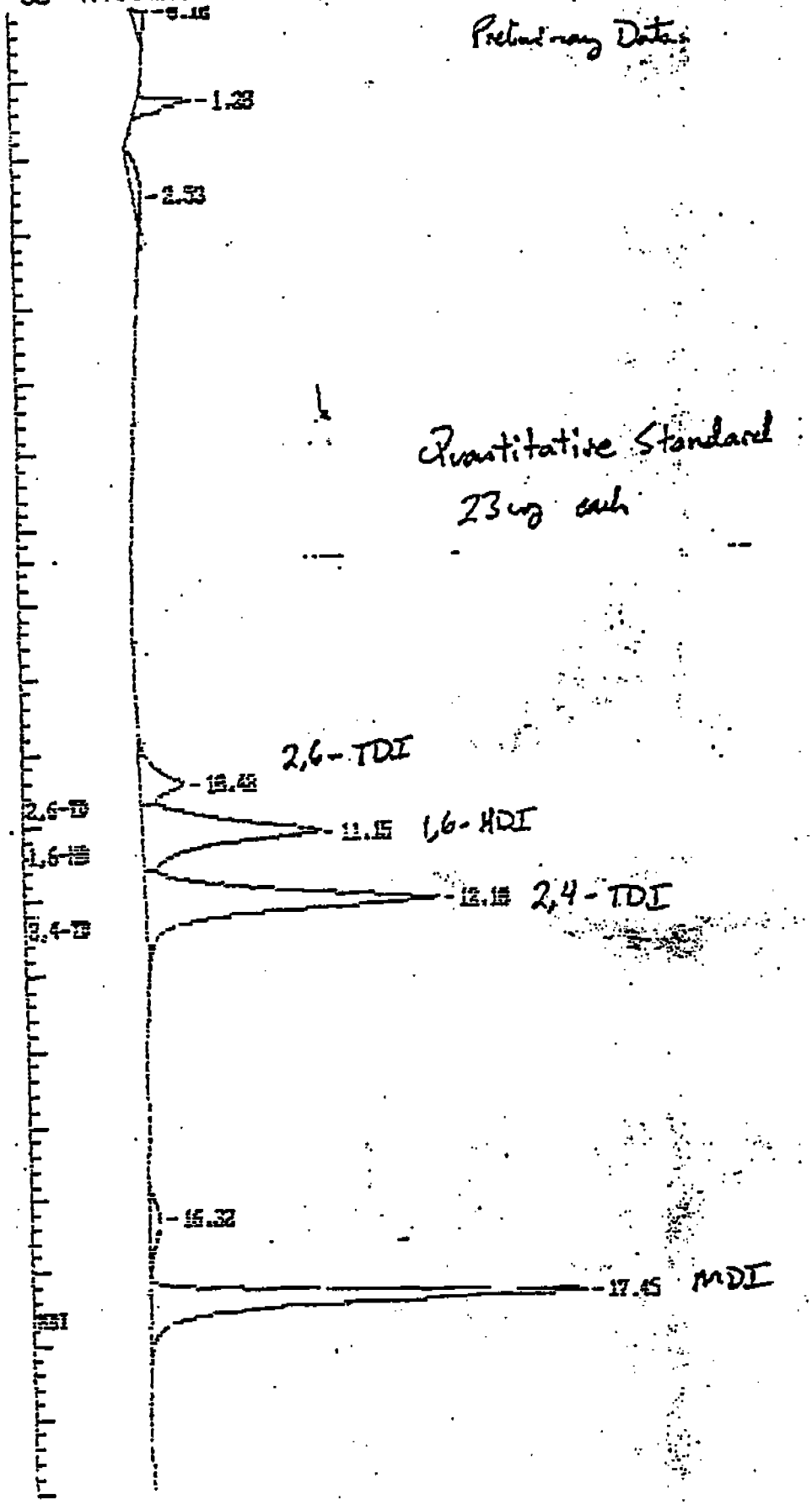


SENT BY:

Data File: E:\...

Start time: 0.00 min. Stop time: 20.00 min. Offset: 0 cts

Full Range: 50 K-Counts



## Table 4-1

### 2,4-TDI Detected in Unspiked Trains, μg

| Train[1] | QUAD Run No. | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1 | | | 2 | | | 3 | | | 4 | | |
| | Imp 1 | Imp 2 | Total | Imp 1 | Imp 2 | Total | Imp 1 | Imp 2 | Total | Imp 1 | Imp 2 | Total |
| A | -- | -- | -- | 5114 | 61 | 5175 | -- | -- | -- | 1832 | 16 | 1848 |
| B | -- | -- | -- | 5224 | 40 | 5264 | -- | -- | -- | 1864 | 24 | 1888 |
| C | 4409[2] | 18 | 4427 | -- | -- | -- | 3281 | 32 | 3313 | -- | -- | -- |
| D | 4416 | 85 | 4501 | -- | -- | -- | 2928 | 33 | 2960 | -- | -- | -- |

[1]The unspiked trains alternated from run to run, C and D then A and B.
[2]All values are in micrograms of underivatized TDI.

## Table 4-1 (Continued)

| Train[1] | QUAD Run No. | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 5 | | | 6 | | | 7 | | | 8 | | |
| | Imp 1 | Imp 2 | Total | Imp 1 | Imp 2 | Total | Imp 1 | Imp 2 | Total | Imp 1 | Imp 2 | Total |
| A | -- | -- | -- | 7880 | 105 | 7993 | -- | -- | -- | 3521 | 53 | 3574 |
| B | -- | -- | -- | 7488 | 89 | 7577 | -- | -- | -- | 3805 | 50 | 3855 |
| C | 4810 | 17 | 4827 | -- | -- | -- | 2160 | 23 | 2183 | -- | -- | -- |
| D | 5054 | 42 | 5096 | -- | -- | -- | 2180 | 36 | 2216 | -- | -- | -- |

[1]The unspiked trains alternated from run to run, C and D then A and B.
[2]All values are in micrograms of underivatized TDI.

## Table 4-2

## 2,4-TDI Detected in Spiked Trains, μg

| Train[1] | QUAD Run No. | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1 | | | 2 | | | 3 | | | 4 | | |
| | Imp 1 | Imp 2 | Total | Imp 1 | Imp 2 | Total | Imp 1 | Imp 2 | Total | Imp 1 | Imp 2 | Total |
| A | 11943[2] | 64 | 12007 | -- | -- | -- | 11488 | 36 | 11524 | -- | -- | -- |
| B | 11301 | 28 | 11329 | -- | -- | -- | 12024 | 38 | 12062 | -- | -- | -- |
| C | -- | -- | -- | 12045 | 35 | 12080 | -- | -- | -- | 9329 | 58 | 9387 |
| D | -- | -- | -- | 12454 | 49 | 12503 | -- | -- | -- | 9429 | 26 | 9455 |

[1]The spiked trains alternated from run to run, A and B then C and D.
[2]All values are in micrograms of underivatized TDI.

## Table 4-2 (Continued)

| Train[1] | QUAD Run No. | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 5 | | | 6 | | | 7 | | | 8 | | |
| | Imp 1 | Imp 2 | Total | Imp 1 | Imp 2 | Total | Imp 1 | Imp 2 | Total | Imp 1 | Imp 2 | Total |
| A | 12014 | 45 | 12059 | -- | -- | -- | 10094 | 46 | 10140 | -- | -- | -- |
| B | 12588 | 37 | 12625 | -- | -- | -- | 9003 | 40 | 9043 | -- | -- | -- |
| C | -- | -- | -- | 15201 | 88 | 15289 | -- | -- | -- | 10561 | 45 | 10606 |
| D | -- | -- | -- | 15173 | 96 | 15269 | -- | -- | -- | 10315 | 44 | 10359 |

[1]The spiked trains alternated from run to run, A and B then C and D.
[2]All values are in micrograms of underivatized TDI.

Step 1 Normalize unspiked Trains C and D first impinger amounts ($\mu g$) to the sample volume collected (cubic feet) in spiked Train A;

$$\text{Train C} \quad \frac{33.42\ ft^3}{33.02\ ft^3} X\ 4409\ \mu g = 4462\ \mu g \qquad 4\text{-}3A$$

$$\text{Train D} \quad \frac{33.42\ ft^3}{33.04\ ft^3} X\ 4416\ \mu g = 4467\ \mu g \qquad 4\text{-}3B$$

Step 2 Average the normalized, unspiked train amounts from step 1 above. Assuming the collection efficiency of all trains to be the same, this value would also be the amount of TDI that would be collected by Train A due to sampling the stack gas;

$$\frac{4462\ \mu g + 4467 \mu g}{2} = 4465\ \mu g \qquad 4\text{-}4$$

Step 3 Subtract the average value (step 2) from the uncorrected amount (sampled amount plus spike) for spiked Train A, first impinger, to get recovered spike amount;

$$11943\ \mu g - 4465\ \mu g = 7478\ \mu g \qquad 4\text{-}5$$

Step 4 Normalize the amount collected in spiked Train A, first impinger to 35.31 $ft^3$ using the sample volume for Train A and the value obtained in step 2;

$$\frac{35.31\ ft^3}{33.42\ ft^3} X\ 4465\ \mu g = 4718\ \mu g \qquad 4\text{-}6$$

Step 5 Normalize the amount collected in the second impinger of spiked Train A to 35.31 $ft^3$ using the sample volume for Train A and the amount determined by HPLC;

$$\frac{35.31\ ft^3}{33.42\ ft^3}\ X\ 63.9\ \mu g = 67.5\ \mu g \qquad 4\text{-}7$$

Step 6 Sum the values determined from steps 3, 4 and 5 to get the total amount of TDI found in spiked Train A, normalized to 35.31 $ft^3$;

$$7478\ \mu g + 4718\ \mu g + 67.5 \mu g = 12264\ \mu g \qquad 4\text{-}8$$

Steps 1-6 can be repeated for similar calculations for spiked Train B. The total amount of TDI collected in each of the unspiked trains can be determined by first normalizing the amounts found in the two impingers of each train to $1m^3$ and then summing the two values. The raw and normalized data for all analysis results are presented in Appendix A. The resulting normalized values are summarized in Tables 4-3 and 4-4.

## 4.5 Quality Control

Quality control procedures that were implemented for this program include:

- Adhering to applicable sampling and analysis protocols;
- Collecting and analyzing field blanks, trip blanks, reagent blanks, and laboratory blanks;
- Tracking samples from collection to analysis;
- Calibrating all analytical equipment prior to use:
- Maintaining accurate and complete written documentation;
- If any changes were made to the analytical system (i.e., column changed, column maintenance), a calibration check was performed to verify the validity of the calibration curve. If the calibration check did not meet acceptance criteria, the analytical system was recalibrated.

## Table 4-3

### Normalized Amount of 2,4-TDI Detected in Unspiked Trains, μg

| Train[1] | QUAD Run No. | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| A | -- | 6287 | -- | 2132 | -- | 8042 | -- | 4086 |
| B | -- | 6270 | -- | 2139 | -- | 7608 | -- | 4579 |
| C | 4735[2] | -- | 3466 | -- | 4947 | -- | 2557 | -- |
| D | 4811 | -- | 3166 | -- | 5522 | -- | 2616 | -- |

[1]The unspiked trains alternated from run to run, C and D then A and B.
[2]All values are in micrograms of underivatized TDI, normalized to a sample volume of 35.31 $ft^3$ ($1m^3$).

## Table 4-4

## Normalized Amount of 2,4-TDI Detected in Spiked Trains, μg

| Train[1] | QUAD Run No. | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| A | 12264[2] | -- | 11625 | -- | 12233 | -- | 10450 | -- |
| B | 11520 | -- | 12078 | -- | 12717 | -- | 9290 | -- |
| C | -- | 13258 | -- | 9694 | -- | 15471 | -- | 11197 |
| D | -- | 13733 | -- | 9805 | -- | 15610 | -- | 10947 |

[1]The spiked trains alternated from run to run, A and B then C and D.
[2]All values are in micrograms of underivatized TDI, normalized to a sample volume of 35.31 $ft^3$ ($1m^3$).

- Analysis of field spiked QC samples; and
- Analysis of check standards every 3 samples.

## 5.0 RESULTS AND DISCUSSION

This section presents the results of the eight sampling runs relative to the criteria for method precision and bias. Fractional results are also presented to show the amount of isocyanate breakthrough occurring in the impinger train. All sample fractions were prepared and analyzed for toluene diisocyanate at Radian's Research Triangle Park laboratory.

### 5.1 Bias and Precision

Table 5-1 is a summary table which presents the results of the statistical evaluation of the test data following the EPA Method 301 criteria showing the method precision and bias for 2-4 TDI. Method 301 requires valid data from a minimum of six QUAD runs. Table 5-1 presents data from all eight runs. Precision is shown as the percent relative standard deviation of the measured amounts of TDI in the samples. Results for precision of both the spiked and unspiked samples were less than 5 percent RSD, which is well within the limits of acceptable precision (upper limit of 50%) given in EPA Method 301.

Using the data from all eight QUAD runs, method bias was measured at -395 micrograms. This value was determined to be statistically significant at the 95% confidence level, using the t statistic calculated for the analytical data. A correction factor of 1.053 was calculated for use with the method to compensate for the bias should the method be used to measure TDI emissions from similar sources.

Using the data from only seven QUAD runs (eliminating run 8 because this run had the lowest average % recovery and the final leak check for one of the trains was questionable), the method bias was -295 micrograms. This bias was not statistically significant and therefore no correction factor was calculated. In either case, the criteria for an acceptable method were met (i.e., a correction factor between 0.7 and 1.3).

## Table 5-1

## Summary of Method 301 Statistical Calculations

| Parameter | Spiked Trains | | Unspiked Trains | |
|---|---|---|---|---|
| | 7 Runs | 8 Runs | 7 Runs | 8 Runs |
| Spiked Amount[1] | 7828 | 7828 | – | – |
| RSD, % | 3.6 | 3.4 | 4.7 | 5.2 |
| Average Bias[1] | -295 | -395 | – | – |
| Bias Significant? | No | Yes | – | – |
| Correction Factor | 1.0 | 1.053 | – | – |

[1]Values are presented as $\mu$g of underivatized TDI

## 5.2 Breakthrough and Recovery

This section presents details of the breakthrough and recovery results for the field samples, as well as recovery information for the spiked compound (2,4-TDI).

### 5.2.1 Breakthrough

Tables 4-1 and 4-2 provide a summary of the combined total mass of 2,4-TDI collected in the probe/first impinger and second/third impinger samples for the unspiked and spiked trains, respectively. These totals are used as a basis for calculating breakthrough of the TDI from the first impinger to the second impinger. The mass of compound found in the probe/first impinger fraction and in the second impinger fraction were each divided by the total mass of TDI for that train and then multiplied by 100 to yield the percent of the total TDI found in the separate train sections. The results are presented in Table 5-2 and 5-3 for the spiked and unspiked trains respectively.

The average breakthrough for the spiked trains was 1.5% and for the unspiked trains 1.1%. More than 98% of the TDI was collected in the first impinger under the sampling conditions used in this study.

The amount of the toluene contained in the first impingers of each of the trains was reduced by approximately 25% (by weight) during the sampling run due to evaporation. The second impingers showed, on the average, a net gain of approximately 5%. The remainder was collected in the silica gel and the charcoal, both of which showed net weight gains. The total weight gained in the train components following the first impinger more than compensate for loses from the first impinger, probably due to the collection of a small amount of moisture. The loss of toluene from the first impinger was minimized by keeping the impingers in an ice bath and placing a water cooled condenser between the outlet of the first impinger and the inlet of the second impinger.

## Table 5-2

## Distribution of 2,4-TDI Within the Spiked Trains

| Train[1] | Impinger No. | QUAD Run No. | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| A | 1 | 98.5[2] | -- | 99.0 | -- | 99.0 | -- | 98.0 | -- |
| | 2 | 1.5 | -- | 1.0 | -- | 1.0 | -- | 2.0 | -- |
| B | 1 | 99.2 | -- | 99.1 | -- | 99.2 | -- | 97.0 | -- |
| | 2 | 0.8 | -- | 0.9 | -- | 0.8 | -- | 3.0 | -- |
| C | 1 | -- | 99.2 | -- | 96.4 | -- | 98.8 | -- | 98.4 |
| | 2 | -- | 0.8 | -- | 3.6 | -- | 1.2 | -- | 1.6 |
| D | 1 | -- | 99.0 | -- | 98.5 | -- | 98.7 | -- | 98.4 |
| | 2 | -- | 1.0 | -- | 1.5 | -- | 1.3 | -- | 1.6 |
| Average/ % RSD | 1 | 98.5/0.81 | | | | | | | |
| | 2 | 1.5/54.4 | | | | | | | |

[1]Spiked Trains alternate from run to run, A and B, then C and D.
[2]Values are a percentage of the total amount of 2-4 TDI determined to be in each train.

## Table 5-3

## Distribution of 2,4-TDI Within the Unspiked Trains

| Train[1] | Impinger No. | QUAD Run No. | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| A | 1 | -- | 98.8 | -- | 99.1 | -- | 98.7 | -- | 98.5 |
| | 2 | -- | 1.2 | -- | 0.9 | -- | 1.3 | -- | 1.5 |
| B | 1 | -- | 99.2 | -- | 98.8 | -- | 98.8 | -- | 98.7 |
| | 2 | -- | 0.8 | -- | 1.2 | -- | 1.2 | -- | 1.3 |
| C | 1 | 99.6[2] | -- | 99.0 | -- | 99.6 | -- | 99.0 | -- |
| | 2 | 0.4 | -- | 1.0 | -- | 0.4 | -- | 1.0 | -- |
| D | 1 | 99.1 | -- | 98.9 | -- | 99.2 | -- | 98.4 | -- |
| | 2 | 1.9 | -- | 1.1 | -- | 0.8 | -- | 1.6 | -- |
| Average/ % RSD | 1 | 98.9/0.41 | | | | | | | |
| | 2 | 1.1/37.1 | | | | | | | |

[1]Unspiked Trains alternate from run to run, C and D, then A and B.
[2]Values are a percentage of the total amount of 2,4-TDI determined to be in each train.

## 5.2.2 Recovery

One of the objectives of this test program was to obtain bias and precision data to validate the proposed test method for isocyanates. Samples from two of the four trains of each quad assembly were spiked with TDI before each sampling run. The estimation of method bias is based on the percentage of the TDI spikes recovered. Analytical results used for this calculation are the averages of the triplicate analysis results for each spiked sample. A summary of the spiked TDI recovery percentages is presented in Table 5-4.

The percent recovery was calculated for each spiked train for each run following the calculation procedures outlined in steps 1-3 of Section 5.0. The value obtained at step 3, the amount of spike recovered, is divided by the actual amount of TDI spiked, 7827 $\mu$g, multiplied by 100. An average recovery was determined by averaging the 16 individual run recoveries.

The recovery for TDI ranged between 83 and 112 percent and averaged 95 percent with a %RSD of 8.2.

## 5.3 Quality Assurance/Quality Control

As a part of the testing for Work Assignment No. 55, Radian designed and implemented a quality assurance/quality control (QA/QC) effort tailored to meet the specific needs of this project. The testing was conducted in accordance with QA/QC procedures described in the Quality Assurance Project Plan (QAPP). The results of the QA/QC effort demonstrate that the data are reliable and meet project objectives for completeness and representativeness. The data met the QA objectives for precision and accuracy and there are no data quality issues that effect conclusions regarding the objectives of this project.

## Table 5-4

## Percent Recovery of the Spiked 2,4-TDI

| Train[1] | QUAD Run No. | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| A | 96[2] | -- | 106 | -- | 89 | -- | 100 | -- |
| B | 86 | -- | 112 | -- | 96 | -- | 86 | -- |
| C | -- | 89 | -- | 97 | -- | 98 | -- | 88 |
| D | -- | 95 | -- | 98 | -- | 99 | -- | 83 |
| Average | 95 | | | | | | | |
| % RSD | 8.2 | | | | | | | |

[1]Spiked Trains alternated from run to run, A and B, then C and D.
[2]Values are a percentage based upon a spiked amount of 7827.8 $\mu$g as 2,4-TDI.

The primary objectives of the QA/QC effort were to control, assess, and document data quality. In order to accomplish these objectives, the QA/QC approach consisted of the following key elements:

- Definition of data quality objectives that reflect the overall technical objectives of the project;
- Design of a sampling, analytical, QA/QC, and data analysis system to meet these objectives; and
- Initiation of corrective action when measurement system performance did not meet the specifications.

These elements include the use of selected standard sampling and analytical procedures as components of the overall approach in addition to, specified calibration requirements, QC checks, data reduction and validation procedures, and sample tracking.

A summary of analysis results for QA/QC samples, which includes measures of precision and accuracy and limitations in the use of these data is presented in this section.

### 5.3.1 Overview of Data Quality

The QAPjP established specific QA objectives for precision (15% RSD), accuracy (±30%), and completeness (100%) for the determination of TDI emissions. The statistical results presented in Table 5-1 and the % recovery values given in Table 5-4 show that the objectives were met. The data quality acceptance criteria and the experimental results are summarized in Table 5-5. Results for spike/spike duplicates and triplicate analyses were compared with the criteria. In all cases the criteria were met. Other data quality indicators for each type of analysis are also presented throughout the remainder of Section 5.3.

There are no cases where data quality issues impair the study's conclusions with respect to the validity of the sampling and analytical test method procedures. With

## Table 5-5

## Data Quality Acceptance Criteria and Results

| Parameter | Criteria | Results |
|---|---|---|
| TDI Spike Recovery | 70 - 130% | 83 - 112% |
| TDI Analysis Results QUAD Train, % RSD | 15% | 5% |
| Individual DGM Correction Factor Agreement | ±2% of Avg | <2% |
| Analytical Balance | ≤0.1 g of Class S Weights | <0.1 g |
| HPLC Linearity Correlation Coeff. | >0.995 | 0.9995 |
| HPLC Retention Time Variation | ±15% | ±10% |
| HPLC Calibration Check | ±10% of Curve | ±9% |
| HPLC System Blank | <0.1% Analyte level | <0.1% |
| HPLC Replicate Analyses | ±10% of 1st injection | ±2% |
| HPLC Method Spikes | ±20% of theoretical | ±5% |

exception of a limited number of samples, the quality of measurement data generated for the test parameters fully meets the data quality objectives outlined in the QAPjP.

### 5.3.2 Sampling Quality Control

Quality control activities associated with the field sampling are described in the QAPjP. These activities include adherence to accepted reference method protocols, use of standardized data recording sheets, equipment calibration, and collection of field blanks.

Stack sampling QC data, including sampling rates, sample volume collected, maximum recorded leak rate, and maximum allowable leak rate, are summarized in Table 5-6 for each run. All of the data quality indicators are within acceptable limits, with the exception of a slightly high leak rate value for Train C Run 8. However, this train was leak checked at a vacuum of 7 inches of mercury which was almost twice that achieved during sampling and the leak would therefore have very little, if any, effect on the data. The leak rate criterion is <4% of the average sampling rate or 0.02 dscf, whichever is less.

### 5.3.3 Sample Storage and Holding Time

Sample hold times specified in the QAPP were met for all samples. All samples were prepared within 30 days of collection and analyzed within 30 days of preparation.

### 5.3.4 Analytical Quality Control

Results for method spikes, field spikes, field blanks, reagent blanks and method blanks are summarized in Table 5-7. These samples served the dual purpose of controlling and assessing measurement data quality, and providing the basis for precision and accuracy estimates. The QC acceptance criteria for each of these types of samples

# Table 5-6

## Sampling Train Leak Summary

| Run Number | Std. Metered Volume (dscf) | Average Sampling Rate (dscfm) | Maximum Leak Check (dscf@ in Hg) | 4% Sample Rate (dscfm) | Acceptable[a] Leak Rate? |
|---|---|---|---|---|---|
| 1A | 33.42 | 0.743 | 0.010 @ 10 | 0.030 | Yes |
| 1B | 33.89 | 0.753 | 0.010 @ 15 | 0.030 | Yes |
| 1C | 33.02 | 0.734 | 0.010 @ 8 | 0.029 | Yes |
| 1D | 33.04 | 0.734 | 0.020 @ 10 | 0.029 | Yes |
| 2A | 29.07 | 0.727 | 0.016 @ 8 | 0.029 | Yes |
| 2B | 29.65 | 0.741 | 0.009 @ 8 | 0.030 | Yes |
| 2C | 28.67 | 0.717 | 0.010 @ 7 | 0.029 | Yes |
| 2D | 28.40 | 0.710 | 0.010 @ 8 | 0.028 | Yes |
| 3A | 34.24 | 0.571 | 0.012 @ 10 | 0.023 | Yes |
| 3B | 35.15 | 0.586 | 0.010 @ 8 | 0.023 | Yes |
| 3C | 33.75 | 0.563 | 0.009 @ 8 | 0.023 | Yes |
| 3D | 33.01 | 0.550 | 0.020 @ 5 | 0.022 | Yes |
| 4A | 30.60 | 0.765 | 0.012 @ 8 | 0.031 | Yes |
| 4B | 31.17 | 0.779 | 0.012 @ 7 | 0.031 | Yes |
| 4C | 30.35 | 0.759 | 0.008 @ 7 | 0.030 | Yes |
| 4D | 29.54 | 0.739 | 0.015 @ 10 | 0.030 | Yes |
| 5A | 34.14 | 0.569 | 0.014 @ 10 | 0.023 | Yes |
| 5B | 34.70 | 0.578 | 0.012 @ 8 | 0.023 | Yes |
| 5C | 34.46 | 0.574 | 0.012 @ 8 | 0.023 | Yes |
| 5D | 32.59 | 0.543 | 0.016 @ 7 | 0.022 | Yes |
| 6A | 35.10 | 0.780 | 0.007 @ 7 | 0.031 | Yes |
| 6B | 35.17 | 0.782 | 0.010 @ 8 | 0.031 | Yes |
| 6C | 34.49 | 0.766 | 0.008 @ 7 | 0.031 | Yes |
| 6D | 33.78 | 0.751 | 0.008 @ 10 | 0.030 | Yes |
| 7A | 31.11 | 0.778 | 0.015 @ 9 | 0.031 | Yes |
| 7B | 31.94 | 0.799 | 0.011 @ 8 | 0.032 | Yes |
| 7C | 30.14 | 0.754 | 0.009 @ 7 | 0.030 | Yes |
| 7D | 29.91 | 0.748 | 0.014 @ 10 | 0.030 | Yes |
| 8A | 30.89 | 0.772 | 0.009 @ 10 | 0.031 | Yes |
| 8B | 29.73 | 0.743 | 0.011 @ 8 | 0.030 | Yes |
| 8C | 30.49 | 0.762 | 0.021 @ 7 | 0.030 | No |
| 8D | 31.95 | 0.799 | 0.018 @ 8 | 0.032 | Yes |

[a]The maximum acceptable leak rate is the lesser of 0.020 dscfm or 4% of the average sampling rate.

## Table 5-7

## Summary of Analytical Quality Control Results

| Sample ID | Total Detected µg | Theoretical µg | Percent Error % |
|---|---|---|---|
| Field Blank A | 2.5 | NA[4] | NA |
| Field Blank B | 8.3 | NA | NA |
| Field Blank C | 6.4 | NA | NA |
| Field Spike 1 | 7570 | 7828 | 96.7 |
| Field Spike 2 | 7686 | 7828 | 98.2 |
| Method Spike 1 | 8120 | 7828 | 104 |
| Method Spike 2 | 7838 | 7828 | 100 |
| Method Spike 3 | 7890 | 7828 | 101 |
| Method Spike 4 | 7945 | 7828 | 101 |
| Toluene Reagent Blank[1] | 0.5 | NA | NA |
| ACN Reagent Blank[2] | 0.4 | NA | NA |
| Method Blank[3] | 10.2 | NA | NA |

[1]Average of four, ranging from 0.1 to 1.2 µg
[2]Average of four, ranging from 0.1 to 0.8 µg
[3]Average of three, ranging from 0.3 to 20.7 µg
[4]NA, Not Applicable

were met as shown in Table 5-5. Field blanks were collected by assembling a sampling train as if to collect a sample, transporting to the sampling location, leak checking and returning the train to the onsite laboratory for recovery. Field spikes and method spikes were prepared by spiking approximately 300 mL of the toluene 1,2-PP solution with 15 mL of the field spiking solution. Method and reagent blanks were prepared by evaporating approximately 300 mL of solvent to dryness and dissolving any residue with 10 mL of ACN. All spikes and blanks met the data acceptance criteria listed in Table 5-5.

No blank contamination problems were identified during the analysis of field and laboratory blanks and no blank corrections were performed for the reported data. All blank analysis data are presented along with other QC and field sample results in Appendix A.

# APPENDIX A

## Analytical Data for Samples, Blanks, Spikes and Quality Control Samples

| Sample Name | AREA | AMOUNT ug/mL | QC Con ug/mL | QC Bias % | Dilution Factor | Amount Sample ug | Avg Amt Sample ug | Volume Sampled Cu Ft | Sampling Factor | Adjusted Avg ug | Total Train ug | Amount Spiked ug | Spike Recovery % | Train ID |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ISO-SCF-32293-4 | 1263013 | 5.90 | 5.40641 | 9% | | | | | | | | | | |
| ISO-SCF-32293-4 | 1253783 | 5.86 | 5.40641 | 8% | | | | | | | | | | |
| ISO-SCF-32293-4 | 1249399 | 5.84 | 5.40641 | 8% | | | | | | | | | | |
| ARL-1 | 1277072 | 5.97 | | | 2000 | 11931.6 | 11942.9 | 33.42 | 1.05669 | 12196.0 | 12263.5 | 7827.81 | 95.69% | I-A-1 |
| ARL-1 | 1276918 | 5.97 | | | 2000 | 11930.1 | | | | | | | | |
| ARL-1 | 1280852 | 5.98 | | | 2000 | 11966.8 | | | | | | | | |
| ARL-2 | 135291 | 0.64 | | | 100 | 64.1 | 63.9 | 33.42 | 1.05669 | 67.5 | | | | I-A-2 |
| ARL-2 | 135913 | 0.64 | | | 100 | 64.4 | | | | | | | | |
| ARL-2 | 133152 | 0.63 | | | 100 | 63.1 | | | | | | | | |
| ARL-3 | 1196354 | 5.59 | | | 2000 | 11178.7 | 11300.8 | 33.89 | 1.04204 | 11491.1 | 11520.1 | 7827.81 | 86.19% | I-B-1 |
| ARL-3 | 1214532 | 5.67 | | | 2000 | 11348.3 | | | | | | | | |
| ARL-3 | 1217429 | 5.69 | | | 2000 | 11375.3 | | | | | | | | |
| ARL-4 | 59159 | 0.29 | | | 100 | 28.6 | 27.8 | 33.89 | 1.04204 | 29.0 | | | | I-B-2 |
| ARL-4 | 57134 | 0.28 | | | 100 | 27.7 | | | | | | | | |
| ARL-4 | 56201 | 0.27 | | | 100 | 27.2 | | | | | | | | |
| ISO-SCF-32293-4 | 1255771 | 5.87 | 5.40641 | 9% | | | | | | | | | | |
| ISO-SCF-32293-4 | 1251918 | 5.85 | 5.40641 | 8% | | | | | | | | | | |
| ISO-SCF-32293-4 | 1242330 | 5.80 | 5.40641 | 7% | | | | | | | | | | |
| ARL-5 | 471546 | 2.21 | | | 2000 | 4418.4 | 4409.3 | 33.02 | 1.06949 | 4715.7 | 4735.0 | | | I-C-1 |
| ARL-5 | 470785 | 2.21 | | | 2000 | 4411.3 | | | | | | | | |
| ARL-5 | 469380 | 2.20 | | | 2000 | 4398.2 | | | | | | | | |
| ARL-6 | 35898 | 0.18 | | | 100 | 17.8 | 18.1 | 33.02 | 1.06949 | 19.3 | | | | I-C-2 |
| ARL-6 | 37029 | 0.18 | | | 100 | 18.3 | | | | | | | | |
| ARL-6 | 36906 | 0.18 | | | 100 | 18.2 | | | | | | | | |
| ARL-7 | 469526 | 2.20 | | | 2000 | 4399.5 | 4416.1 | 33.04 | 1.06885 | 4720.1 | 4811.1 | | | I-D-1 |
| ARL-7 | 461467 | 2.16 | | | 2000 | 4324.4 | | | | | | | | |
| ARL-7 | 482909 | 2.26 | | | 2000 | 4524.4 | | | | | | | | |
| ARL-8 | 180144 | 0.85 | | | 100 | 85.0 | 85.1 | 33.04 | 1.06885 | 90.9 | | | | I-D-2 |
| ARL-8 | 179633 | 0.85 | | | 100 | 84.8 | | | | | | | | |
| ARL-8 | 181047 | 0.85 | | | 100 | 85.4 | | | | | | | | |
| ISO-SCF-32293-4 | 1238919 | 5.79 | 5.40641 | 7% | | | | | | | | | | |
| ISO-SCF-32293-4 | 1245039 | 5.82 | 5.40641 | 8% | | | | | | | | | | |
| ISO-SCF-32293-4 | 1235673 | 5.77 | 5.40641 | 7% | | | | | | | | | | |

| Sample Name | AREA | AMOUNT ug/mL | QC Con ug/mL | QC Bias % | Dilution Factor | Amount Sample ug | Avg Amt Sample ug | Volume Sampled Cu Ft | Sampling Factor | Adjusted Avg ug | Total Train ug | Amount Spiked ug | Spike Recovery % | Train ID |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | | 2-A-1 |
| ARL-9 | 544346 | 2.55 | | | 2000 | 5097.4 | 5114.2 | 29.07 | 1.21481 | 6212.9 | 6287.4 | | | |
| ARL-9 | 548157 | 2.57 | | | 2000 | 5132.9 | | | | | | | | |
| ARL-9 | 545954 | 2.56 | | | 2000 | 5112.4 | | | | | | | | |
| ARL-10 | 130306 | 0.62 | | | 100 | 61.8 | 61.4 | 29.07 | 1.21481 | 74.6 | | | | 2-A-2 |
| ARL-10 | 130940 | 0.62 | | | 100 | 62.1 | | | | | | | | |
| ARL-10 | 127140 | 0.60 | | | 100 | 60.3 | | | | | | | | |
| ARL-11 | 567669 | 2.66 | | | 2000 | 5314.9 | 5224.4 | 29.65 | 1.19105 | 6222.5 | 6269.9 | | | 2-D-1 |
| ARL-11 | 563460 | 2.64 | | | 2000 | 5275.7 | | | | | | | | |
| ARL-11 | 542754 | 2.54 | | | 2000 | 5082.6 | | | | | | | | |
| ARL-12 | 83414 | 0.40 | | | 100 | 39.9 | 39.8 | 29.65 | 1.19105 | 47.4 | | | | 2-D-2 |
| ARL-12 | 83620 | 0.40 | | | 100 | 40.0 | | | | | | | | |
| ARL-12 | 82237 | 0.39 | | | 100 | 39.4 | | | | | | | | |
| ISO-SCF-32293-4 | 1220899 | 5.70 | 5.40641 | 6% | 1 | 5.7 | | | | | | | | |
| ISO-SCF-32293-4 | 1232005 | 5.76 | 5.40641 | 6% | 1 | 5.8 | | | | | | | | |
| ISO-SCF-32293-4 | 1230936 | 5.75 | 5.40641 | 6% | 1 | 5.8 | | | | | | | | |
| ARL-13 | 1287864 | 6.02 | | | 2000 | 12032.2 | 12045.3 | 28.67 | 1.23176 | 13215.1 | 13258.2 | 7827.81 | 89.16% | 2-C-1 |
| ARL-13 | 1288870 | 6.02 | | | 2000 | 12041.6 | | | | | | | | |
| ARL-13 | 1291013 | 6.03 | | | 2000 | 12061.9 | | | | | | | | |
| ARL-14 | 71522 | 0.34 | | | 100 | 34.4 | 35.0 | 28.67 | 1.23176 | 43.1 | | | | 2-C-2 |
| ARL-14 | 73423 | 0.35 | | | 100 | 35.3 | | | | | | | | |
| ARL-14 | 73513 | 0.35 | | | 100 | 35.3 | | | | | | | | |
| ARL-15 | 1335291 | 6.24 | | | 2000 | 12474.6 | 12454.1 | 28.40 | 1.24347 | 13671.5 | 13732.6 | 7827.81 | 95.22% | 2-D-1 |
| ARL-15 | 1334709 | 6.23 | | | 2000 | 12469.2 | | | | | | | | |
| ARL-15 | 1329284 | 6.21 | | | 2000 | 12418.6 | | | | | | | | |
| ARL-16 | 103190 | 0.49 | | | 100 | 49.1 | 49.1 | 28.40 | 1.24347 | 61.1 | | | | 2-D-2 |
| ARL-16 | 103848 | 0.49 | | | 100 | 49.4 | | | | | | | | |
| ARL-16 | 102349 | 0.49 | | | 100 | 48.7 | | | | | | | | |
| ISO-SCF-32293-4 | 1246426 | 5.82 | 5.40641 | 8% | 1 | 5.8 | | | | | | | | |
| ISO-SCF-32293-4 | 1237852 | 5.78 | 5.40641 | 7% | 1 | 5.8 | | | | | | | | |
| ISO-SCF-32293-4 | 1239959 | 5.79 | 5.40641 | 7% | 1 | 5.8 | | | | | | | | |

| Sample Name | AREA | AMOUNT ug/mL | QC Con ug/mL | QC Bias % | Dilution Factor | Amount Sample ug | Avg Amt Sample ug | Volume Sampled Cu Ft | Sampling Factor | Adjusted Avg ug | Total Train ug | Amount Spiked ug | Spike Recovery % | Train ID |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ARL-17 | 1229990 | 5.75 | | | 2000 | 11492.4 | 11487.9 | 34.24 | 1.03139 | 11587.8 | 11624.8 | 7827.81 | 106.14% | 3-A-1 |
| ARL-17 | 1214060 | 5.67 | | | 2000 | 11343.9 | | | | | | | | |
| ARL-17 | 1244450 | 5.81 | | | 2000 | 11627.3 | | | | | | | | |
| ARL-18 | 75825 | 0.36 | | | 100 | 36.4 | 35.9 | 34.24 | 1.03139 | 37.0 | | | | 3-A-2 |
| ARL-18 | 74917 | 0.36 | | | 100 | 36.0 | | | | | | | | |
| ARL-18 | 73672 | 0.35 | | | 100 | 35.4 | | | | | | | | |
| ARL-19 | 1282836 | 5.99 | | | 2000 | 11985.1 | 12024.4 | 35.15 | 1.00468 | 12039.7 | 12077.7 | 7827.81 | 111.93% | 3-B-1 |
| ARL-19 | 1289518 | 6.02 | | | 2000 | 12047.7 | | | | | | | | |
| ARL-19 | 1288725 | 6.02 | | | 2000 | 12040.3 | | | | | | | | |
| ARL-20 | 79007 | 0.38 | | | 100 | 37.9 | 37.8 | 35.15 | 1.00468 | 38.0 | | | | 3-B-2 |
| ARL-20 | 78713 | 0.38 | | | 100 | 37.7 | | | | | | | | |
| ARL-20 | 79021 | 0.38 | | | 100 | 37.9 | | | | | | | | |
| ISO-SCF-32293-4 | 1263449 | 5.90 | 5.40641 | 9% | 1 | 5.9 | | | | | | | | |
| ISO-SCF-32293-4 | 1253499 | 5.86 | 5.40641 | 8% | 1 | 5.9 | | | | | | | | |
| ISO-SCF-32293-4 | 1260180 | 5.89 | 5.40641 | 9% | 1 | 5.9 | | | | | | | | |
| ARL-21 | 351376 | 1.65 | | | 2000 | 3297.6 | 3281.0 | 33.75 | 1.04636 | 3433.1 | 3466.4 | | | 3-C-1 |
| ARL-21 | 343323 | 1.61 | | | 2000 | 3222.4 | | | | | | | | |
| ARL-21 | 354099 | 1.66 | | | 2000 | 3323.0 | | | | | | | | |
| ARL-22 | 65492 | 0.32 | | | 100 | 31.6 | 31.8 | 33.75 | 1.04636 | 33.3 | | | | 3-C-2 |
| ARL-22 | 66002 | 0.32 | | | 100 | 31.8 | | | | | | | | |
| ARL-22 | 66603 | 0.32 | | | 100 | 32.1 | | | | | | | | |
| ARL-23 | 319713 | 1.50 | | | 2000 | 3002.2 | 2927.6 | 33.01 | 1.06982 | 3132.0 | 3165.7 | | | 3-D-1 |
| ARL-23 | 310818 | 1.46 | | | 2000 | 2919.3 | | | | | | | | |
| ARL-23 | 304609 | 1.43 | | | 2000 | 2861.4 | | | | | | | | |
| ARL-24 | 65115 | 0.31 | | | 100 | 31.4 | 31.5 | 33.01 | 1.06982 | 33.7 | | | | 3-D-2 |
| ARL-24 | 66054 | 0.32 | | | 100 | 31.8 | | | | | | | | |
| ARL-24 | 64767 | 0.31 | | | 100 | 31.2 | | | | | | | | |
| ISO-SCF-32293-4 | 1223529 | 5.72 | 5.40641 | 6% | 1 | 5.7 | | | | | | | | |
| ISO-SCF-32293-4 | 1220297 | 5.70 | 5.40641 | 5% | 1 | 5.7 | | | | | | | | |
| ISO-SCF-32293-4 | 1183133 | 5.70 | 5.40641 | 5% | | | | | | | | | | |

| Sample Name | AREA | AMOUNT ug/mL | QC Con ug/mL | QC Bias % | Dilution Factor | Amount Sample ug | Avg Amt Sample ug | Volume Sampled Cu Ft | Sampling Factor | Adjusted Avg ug | Total Train ug | Amount Spiked ug | Spike Recovery % | Train ID |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ARL-25 | 198810 | 0.94 | | | 2000 | 1874.6 | 1831.7 | 30.60 | 1.15407 | 2113.9 | 2132.1 | | | 4-A-1 |
| ARL-25 | 195931 | 0.92 | | | 2000 | 1847.7 | | | | | | | | |
| ARL-25 | 187888 | 0.89 | | | 2000 | 1772.7 | | | | | | | | |
| ARL-26 | 33336 | 0.17 | | | 100 | 16.6 | 15.8 | 30.60 | 1.15407 | 18.3 | | | | 4-A-2 |
| ARL-26 | 32875 | 0.16 | | | 100 | 16.3 | | | | | | | | |
| ARL-26 | 29079 | 0.15 | | | 100 | 14.6 | | | | | | | | |
| ARL-27 | 200805 | 0.95 | | | 2000 | 1893.2 | 1864.2 | 31.17 | 1.13297 | 2112.1 | 2138.7 | | | 4-B-1 |
| ARL-27 | 200538 | 0.95 | | | 2000 | 1890.7 | | | | | | | | |
| ARL-27 | 191767 | 0.90 | | | 2000 | 1808.9 | | | | | | | | |
| ARL-28 | 48281 | 0.24 | | | 100 | 23.5 | 23.5 | 31.17 | 1.13297 | 26.6 | | | | 4-B-2 |
| ARL-28 | 49506 | 0.24 | | | 100 | 24.1 | | | | | | | | |
| ARL-28 | 46705 | 0.23 | | | 100 | 22.8 | | | | | | | | |
| ISO-SCF-32293-4 | 1202635 | 5.62 | 5.40641 | 4% | 1 | 5.6 | | | | | | | | |
| ISO-SCF-32293-4 | 1219147 | 5.70 | 5.40641 | 5% | 1 | 5.7 | | | | | | | | |
| ARL-29 | 1001159 | 4.68 | | | 2000 | 9358.1 | 9329.4 | 30.35 | 1.16358 | 9626.4 | 9693.9 | 7827.81 | 96.56% | 4-C-1 |
| ARL-29 | 987039 | 4.61 | | | 2000 | 9226.4 | | | | | | | | |
| ARL-29 | 1006035 | 4.70 | | | 2000 | 9403.6 | | | | | | | | |
| ARL-30 | 124507 | 0.59 | | | 100 | 59.1 | 58.0 | 30.35 | 1.16358 | 67.5 | | | | 4-C-2 |
| ARL-30 | 122754 | 0.58 | | | 100 | 58.3 | | | | | | | | |
| ARL-30 | 119182 | 0.57 | | | 100 | 56.6 | | | | | | | | |
| ARL-31 | 1004933 | 4.70 | | | 2000 | 9393.3 | 9428.7 | 29.54 | 1.19549 | 9774.2 | 9804.7 | 7827.81 | 97.97% | 4-D-1 |
| ARL-31 | 1018359 | 4.76 | | | 2000 | 9518.5 | | | | | | | | |
| ARL-31 | 1002870 | 4.69 | | | 2000 | 9374.1 | | | | | | | | |
| ARL-32 | 53598 | 0.26 | | | 100 | 26.0 | 25.5 | 29.54 | 1.19549 | 30.5 | | | | 4-D-2 |
| ARL-32 | 53113 | 0.26 | | | 100 | 25.8 | | | | | | | | |
| ARL-32 | 50832 | 0.25 | | | 100 | 24.7 | | | | | | | | |
| ISO-SCF-32293-4 | 1200453 | 5.61 | 5.40641 | 4% | 1 | 5.6 | | | | | | | | |
| ISO-SCF-32293-4 | 1204115 | 5.63 | 5.40641 | 4% | 1 | 5.6 | | | | | | | | |
| ISO-SCF-32293-4 | 1189454 | 5.56 | 5.40641 | 3% | 1 | 5.6 | | | | | | | | |

| Sample Name | AREA | AMOUNT ug/mL | QC Con ug/mL | QC Bias % | Dilution Factor | Amount Sample ug | Avg Amt Sample ug | Volume Sampled Cu Ft | Sampling Factor | Adjusted Avg ug | Total Train ug | Amount Spiked ug | Spike Recovery % | Train ID |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ARL-33 | 1309769 | 6.12 | | | 2000 | 12236.5 | 12014.2 | 34.14 | 1.03441 | 12187.3 | 12233.3 | 7827.81 | 89.41% | 5-A-1 |
| ARL-33 | 1323802 | 6.18 | | | 2000 | 12367.4 | | | | | | | | |
| ARL-33 | 1224229 | 5.72 | | | 2000 | 11438.7 | | | | | | | | |
| ARL-34 | 103486 | 0.49 | | | 100 | 49.3 | 44.5 | 34.14 | 1.03441 | 46.1 | | | | 5-B-1 |
| ARL-34 | 103836 | 0.49 | | | 100 | 49.4 | | | | | | | | |
| ARL-34 | 72585 | 0.35 | | | 100 | 34.9 | | | | | | | | |
| ARL-35 | 1369996 | 6.40 | | | 2000 | 12798.3 | 12588.1 | 34.70 | 1.01771 | 12678.6 | 12716.7 | 7827.81 | 95.59% | 5-B-1 |
| ARL-35 | 1382908 | 6.46 | | | 2000 | 12918.7 | | | | | | | | |
| ARL-35 | 1289467 | 6.02 | | | 2000 | 12047.2 | | | | | | | | |
| ARL-36 | 84360 | 0.40 | | | 100 | 40.4 | 37.4 | 34.70 | 1.01771 | 38.0 | | | | 5-B-2 |
| ARL-36 | 85164 | 0.41 | | | 100 | 40.7 | | | | | | | | |
| ARL-36 | 64462 | 0.31 | | | 100 | 31.1 | | | | | | | | |
| ISO-SCF-32293-4 | 1198549 | 5.60 | 5.40641 | 4% | 1 | 5.6 | | | | | | | | |
| ISO-SCF-32293-4 | 1178529 | 5.51 | 5.40641 | 2% | 1 | 5.5 | | | | | | | | |
| ARL-37 | 511915 | 2.40 | | | 2000 | 4794.9 | 4809.8 | 34.46 | 1.02480 | 4929.1 | 4946.9 | | | 5-C-1 |
| ARL-37 | 520667 | 2.44 | | | 2000 | 4876.5 | | | | | | | | |
| ARL-37 | 507945 | 2.38 | | | 2000 | 4757.9 | | | | | | | | |
| ARL-38 | 36452 | 0.18 | | | 100 | 18.0 | 17.4 | 34.46 | 1.02480 | 17.8 | | | | 5-C-2 |
| ARL-38 | 36462 | 0.18 | | | 100 | 18.0 | | | | | | | | |
| ARL-38 | 32321 | 0.16 | | | 100 | 16.1 | | | | | | | | |
| ARL-39 | 532851 | 2.50 | | | 2000 | 4990.2 | 5054.0 | 32.59 | 1.08360 | 5476.5 | 5521.9 | | | 5-D-1 |
| ARL-39 | 544154 | 2.55 | | | 2000 | 5095.6 | | | | | | | | |
| ARL-39 | 542066 | 2.54 | | | 2000 | 5076.1 | | | | | | | | |
| ARL-40 | 90692 | 0.43 | | | 100 | 43.3 | 41.9 | 32.59 | 1.08360 | 45.4 | | | | 5-D-2 |
| ARL-40 | 82975 | 0.40 | | | 100 | 39.7 | | | | | | | | |
| ARL-40 | 89246 | 0.43 | | | 100 | 42.6 | | | | | | | | |
| ISO-SCF-32293-4 | 1187611 | 5.55 | 5.40641 | 3% | 1 | 5.5 | | | | | | | | |
| ISO-SCF-32293-4 | 1199484 | 5.60 | 5.40641 | 4% | 1 | 5.6 | | | | | | | | |
| ISO-SCF-32293-4 | 1183133 | 5.53 | 5.40641 | 2% | 1 | 5.5 | | | | | | | | |

| Sample Name | AREA | AMOUNT ug/mL | QC Con ug/mL | QC Bias % | Dilution Factor | Amount Sample ug | Avg Amt Sample ug | Volume Sampled Cu Ft | Sampling Factor | Adjusted Avg ug | Total Train ug | Amount Spiked ug | Spike Recovery % | Train ID |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ARL-41 | 861252 | 4.03 | | | 2000 | 8051.2 | 7887.9 | 35.10 | 1.00612 | 7936.1 | 8041.6 | | | 6-A-1 |
| ARL-41 | 860232 | 4.02 | | | 2000 | 8043.7 | | | | | | | | |
| ARL-41 | 809094 | 3.78 | | | 2000 | 7566.7 | | | | | | | | |
| ARL-42 | 227095 | 1.07 | | | 100 | 106.9 | 104.8 | 35.10 | 1.00612 | 105.4 | | | | 6-A-2 |
| ARL-42 | 228142 | 1.07 | | | 100 | 107.4 | | | | | | | | |
| ARL-42 | 212430 | 1.00 | | | 100 | 100.1 | | | | | | | | |
| ARL-43 | 815730 | 3.81 | | | 2000 | 7628.6 | 7488.0 | 35.17 | 1.00411 | 7518.8 | 7607.6 | | | 6-B-1 |
| ARL-43 | 825689 | 3.86 | | | 2000 | 7721.5 | | | | | | | | |
| ARL-43 | 760533 | 3.56 | | | 2000 | 7113.8 | | | | | | | | |
| ARL-44 | 193894 | 0.91 | | | 100 | 91.4 | 88.5 | 35.17 | 1.00411 | 88.8 | | | | 6-B-2 |
| ARL-44 | 197908 | 0.93 | | | 100 | 93.3 | | | | | | | | |
| ARL-44 | 170746 | 0.81 | | | 100 | 80.6 | | | | | | | | |
| ISO-SCF-32293-4 | 1189088 | 5.56 | 5.40641 | 3% | 1 | 5.6 | | | | | | | | |
| ISO-SCF-32293-4 | 1190921 | 5.56 | 5.40641 | 3% | 1 | 5.6 | | | | | | | | |
| ARL-45 | 1656820 | 7.74 | | | 2000 | 15473.5 | 15201.1 | 34.49 | 1.02391 | 15381.5 | 15471.2 | 7827.81 | 97.69% | 6-C-1 |
| ARL-45 | 1652121 | 7.71 | | | 2000 | 15429.7 | | | | | | | | |
| ARL-45 | 1573883 | 7.35 | | | 2000 | 14700.0 | | | | | | | | |
| ARL-46 | 187832 | 0.89 | | | 100 | 88.6 | 87.6 | 34.49 | 1.02391 | 89.7 | | | | 6-C-2 |
| ARL-46 | 195647 | 0.92 | | | 100 | 92.3 | | | | | | | | |
| ARL-46 | 173379 | 0.82 | | | 100 | 81.9 | | | | | | | | |
| ARL-47 | 1649873 | 7.70 | | | 2000 | 15408.7 | 15173.2 | 33.78 | 1.04543 | 15509.0 | 15609.8 | 7827.81 | 99.46% | 6-D-1 |
| ARL-47 | 1634325 | 7.63 | | | 2000 | 15263.7 | | | | | | | | |
| ARL-47 | 1589878 | 7.42 | | | 2000 | 14847.3 | | | | | | | | |
| ARL-48 | 220417 | 1.04 | | | 100 | 103.8 | 96.3 | 33.78 | 1.04543 | 100.7 | | | | 6-D-2 |
| ARL-48 | 206802 | 0.97 | | | 100 | 97.5 | | | | | | | | |
| ARL-48 | 186023 | 0.88 | | | 100 | 87.8 | | | | | | | | |
| ISO-SCF-32293-4 | 1205054 | 5.63 | 5.40641 | 4% | 1 | 5.6 | | | | | | | | |
| ISO-SCF-32293-4 | 1195876 | 5.59 | 5.40641 | 3% | 1 | 5.6 | | | | | | | | |
| ISO-SCF-32293-4 | 1183664 | 5.53 | 5.40641 | 2% | 1 | 5.5 | | | | | | | | |

| Sample Name | AREA | AMOUNT ug/mL | QC Con ug/mL | QC Bias % | Dilution Factor | Amount Sample ug | Avg Amt Sample ug | Volume Sampled Cu Ft | Sampling Factor | Adjusted Avg ug | Total Train ug | Amount Spiked ug | Spike Recovery % | Train ID |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ARL-49 | 1081312 | 5.05 | | | 2000 | 10105.7 | 10094.4 | 31.11 | 1.13515 | 10398.3 | 10450.0 | 7827.81 | 100.45% | 7-A-1 |
| ARL-49 | 1074952 | 5.02 | | | 2000 | 10046.4 | | | | | | | | |
| ARL-49 | 1084020 | 5.07 | | | 2000 | 10131.0 | | | | | | | | |
| ARL-50 | 98427 | 0.47 | | | 100 | 46.9 | 45.6 | 31.11 | 1.13515 | 51.8 | | | | 7-A-2 |
| ARL-50 | 96270 | 0.46 | | | 100 | 45.9 | | | | | | | | |
| ARL-50 | 92145 | 0.44 | | | 100 | 44.0 | | | | | | | | |
| ARL-51 | 963252 | 4.50 | | | 2000 | 9004.6 | 9002.6 | 31.94 | 1.10566 | 9246.5 | 9290.2 | 7827.81 | 85.63% | 7-B-1 |
| ARL-51 | 970463 | 4.54 | | | 2000 | 9071.8 | | | | | | | | |
| ARL-51 | 955412 | 4.47 | | | 2000 | 8931.4 | | | | | | | | |
| ARL-52 | 83965 | 0.40 | | | 100 | 40.2 | 39.5 | 31.94 | 1.10566 | 43.6 | | | | 7-B-2 |
| ARL-52 | 83998 | 0.40 | | | 100 | 40.2 | | | | | | | | |
| ARL-52 | 79455 | 0.38 | | | 100 | 38.1 | | | | | | | | |
| ISO-SCF-32293-4 | 1194001 | 5.58 | 5.40641 | 3% | 1 | 5.6 | | | | | | | | |
| ISO-SCF-32293-4 | 1201282 | 5.61 | 5.40641 | 4% | 1 | 5.6 | | | | | | | | |
| ARL-53 | 230346 | 1.08 | | | 2000 | 2168.7 | 2159.8 | 30.14 | 1.17169 | 2530.6 | 2557.9 | | | 7-C-1 |
| ARL-53 | 232911 | 1.10 | | | 2000 | 2192.6 | | | | | | | | |
| ARL-53 | 224911 | 1.06 | | | 2000 | 2118.0 | | | | | | | | |
| ARL-54 | 49290 | 0.24 | | | 100 | 24.0 | 23.3 | 30.14 | 1.17169 | 27.3 | | | | 7-C-2 |
| ARL-54 | 49749 | 0.24 | | | 100 | 24.2 | | | | | | | | |
| ARL-54 | 44499 | 0.22 | | | 100 | 21.8 | | | | | | | | |
| ARL-55 | 237247 | 1.12 | | | 2000 | 2233.1 | 2180.2 | 29.91 | 1.18070 | 2574.2 | 2616.4 | | | 7-D-1 |
| ARL-55 | 228829 | 1.08 | | | 2000 | 2154.5 | | | | | | | | |
| ARL-55 | 226660 | 1.08 | | | 2000 | 2153.0 | | | | | | | | |
| ARL-56 | 75486 | 0.36 | | | 100 | 36.2 | 35.8 | 29.91 | 1.18070 | 42.3 | | | | 7-D-2 |
| ARL-56 | 75034 | 0.36 | | | 100 | 36.0 | | | | | | | | |
| ARL-58 | 73273 | 0.35 | | | 100 | 35.2 | | | | | | | | |
| ISO-SCF-32293-4 | 1201622 | 5.61 | 5.40641 | 4% | 1 | 5.6 | | | | | | | | |
| ISO-SCF-32293-4 | 1192039 | 5.57 | 5.40641 | 3% | 1 | 5.6 | | | | | | | | |
| ISO-SCF-32293-4 | 1184261 | 5.53 | 5.40641 | 2% | 1 | 5.5 | | | | | | | | |

| Sample Name | AREA | AMOUNT ug/mL | QC Con ug/mL | QC Bias % | Dilution Factor | Amount Sample ug | Avg Amt Sample ug | Volume Sampled Cu Ft | Sampling Factor | Adjusted Avg ug | Total Train ug | Amount Spiked ug | Spike Recovery % | Train ID |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | | 8-A-1 |
| ARL-57 | 374801 | 1.76 | | | 2000 | 3516.0 | 3520.7 | 30.89 | 1.14324 | 4025.0 | 4086.0 | | | |
| ARL-57 | 377410 | 1.77 | | | 2000 | 3540.4 | | | | | | | | |
| ARL-57 | 373681 | 1.75 | | | 2000 | 3505.6 | | | | | | | | |
| ARL-58 | 111353 | 0.53 | | | 100 | 52.9 | 53.4 | 30.89 | 1.14324 | 61.0 | | | | 8-A-2 |
| ARL-58 | 112493 | 0.53 | | | 100 | 53.5 | | | | | | | | |
| ARL-58 | 113066 | 0.54 | | | 100 | 53.7 | | | | | | | | |
| ARL-59 | 406883 | 1.91 | | | 2000 | 3815.3 | 3805.4 | 29.73 | 1.18785 | 4520.2 | 4579.2 | | | 8-D-1 |
| ARL-59 | 401024 | 1.88 | | | 2000 | 3769.0 | | | | | | | | |
| ARL-59 | 408657 | 1.92 | | | 2000 | 3831.8 | | | | | | | | |
| ARL-60 | 105005 | 0.50 | | | 100 | 50.0 | 49.7 | 29.73 | 1.18785 | 59.0 | | | | 8-D-2 |
| ARL-60 | 104950 | 0.50 | | | 100 | 50.0 | | | | | | | | |
| ARL-60 | 102971 | 0.49 | | | 100 | 49.0 | | | | | | | | |
| ISO-SCF-32293-4 | 1197542 | 5.59 | 5.40641 | 3% | 1 | 5.6 | | | | | | | | |
| ISO-SCF-32293-4 | 1200068 | 5.61 | 5.40641 | 4% | 1 | 5.6 | | | | | | | | |
| ISO-SCF-32293-4 | 1190471 | 5.56 | 5.40641 | 3% | 1 | 5.6 | | | | | | | | |
| ARL-61 | 1137017 | 5.31 | | | 2000 | 10625.3 | 10561.2 | 30.49 | 1.15824 | 11144.9 | 11197.4 | 7827.81 | 88.46% | 8-C-1 |
| ARL-61 | 1120569 | 5.24 | | | 2000 | 10471.9 | | | | | | | | |
| ARL-61 | 1132853 | 5.29 | | | 2000 | 10586.4 | | | | | | | | |
| ARL-62 | 94647 | 0.45 | | | 100 | 45.2 | 45.3 | 30.49 | 1.15824 | 52.5 | | | | 8-C-2 |
| ARL-62 | 95991 | 0.46 | | | 100 | 45.8 | | | | | | | | |
| ARL-62 | 94335 | 0.45 | | | 100 | 45.0 | | | | | | | | |
| ARL-63 | 1108755 | 5.18 | | | 2000 | 10361.7 | 10314.5 | 31.95 | 1.10531 | 10721.6 | 10770.2 | 7827.81 | 83.01% | 8-D-1 |
| ARL-63 | 1096270 | 5.12 | | | 2000 | 10245.2 | | | | | | | | |
| ARL-63 | 1106072 | 5.17 | | | 2000 | 10336.7 | | | | | | | | |
| ARL-64 | 92259 | 0.44 | | | 100 | 44.0 | 44.0 | 31.95 | 1.10531 | 48.6 | | | | 8-D-2 |
| ARL-64 | 92558 | 0.44 | | | 100 | 44.2 | | | | | | | | |
| ARL-64 | 91667 | 0.44 | | | 100 | 43.8 | | | | | | | | |
| ISO-SCF-32293-4 | 1186551 | 5.54 | 5.40641 | 3% | 1 | 5.5 | | | | | | | | |
| ISO-SCF-32293-4 | 1187157 | 5.55 | 5.40641 | 3% | 1 | 5.5 | | | | | | | | |
| ISO-SCF-32293-4 | 1196473 | 5.59 | 5.40641 | 3% | 1 | 5.6 | | | | | | | | |

K-111

| Sample Name | FILE | AREA | AMOUNT ug/mL | QC Con ug/mL | QC Bias % | Dilution Factor | Amount Sample | Avg Amt Sample | Amount Spiked | Spike Recovery | Train ID |
|---|---|---|---|---|---|---|---|---|---|---|---|
| ISO-SCF-32293-4 | S3083F4 | 1263013 | 5.90 | 5.41 | 9% | 1 | 5.9 | 5.9 | | | QC |
| ISO-SCF-32293-4 | S3083F5 | 1253783 | 5.86 | 5.41 | 8% | 1 | 5.9 | | | | |
| ISO-SCF-32293-4 | S3083F6 | 1249399 | 5.84 | 5.41 | 8% | 1 | 5.8 | | | | |
| ARL-81 | S3083F19 | 30452 | 0.15 | | | 10 | 1.5 | 1.6 | | | FBA |
| ARL-81 | S3083F20 | 31446 | 0.16 | | | 10 | 1.6 | | | | |
| ARL-81 | S3083F21 | 33523 | 0.17 | | | 10 | 1.7 | | | | |
| ARL-104 | S3083F22 | 809699 | 3.79 | | | 2000 | 7572.4 | 7569.9 | 7827.81 | 97% | FS-1 |
| ARL-104 | S3083F23 | 808659 | 3.78 | | | 2000 | 7562.7 | | | | |
| ARL-104 | S3083F24 | 809952 | 3.79 | | | 2000 | 7574.7 | | | | |
| ISO-SCF-32293-4 | S3083F25 | 1255771 | 5.87 | 5.41 | 9% | 1 | 5.9 | 5.8 | | | QC |
| ISO-SCF-32293-4 | S3083F26 | 1251918 | 5.85 | 5.41 | 8% | 1 | 5.8 | | | | |
| ISO-SCF-32293-4 | S3083F27 | 1242330 | 5.80 | 5.41 | 7% | 1 | 5.8 | | | | |
| ARL-82 | S3083F40 | 16055 | 0.08 | | | 10 | 0.8 | 0.9 | | | FBA |
| ARL-82 | S3083F41 | 16597 | 0.09 | | | 10 | 0.9 | | | | |
| ARL-82 | S3083F42 | 16113 | 0.09 | | | 10 | 0.9 | | | | |
| ARL-105 | S3083F43 | 832058 | 3.89 | | | 2000 | 7780.9 | 7686.3 | 7827.81 | 98% | FS-2 |
| ARL-105 | S3083F44 | 822507 | 3.85 | | | 2000 | 7691.8 | | | | |
| ARL-105 | S3083F45 | 811167 | 3.79 | | | 2000 | 7586.1 | | | | |
| ISO-SCF-32293-4 | S3083F46 | 1238919 | 5.79 | 5.41 | 7% | 1 | 5.8 | 5.8 | | | QC |
| ISO-SCF-32293-4 | S3083F47 | 1245039 | 5.82 | 5.41 | 8% | 1 | 5.8 | | | | |
| ISO-SCF-32293-4 | S3083F48 | 1235673 | 5.77 | 5.41 | 7% | 1 | 5.8 | | | | |
| ARL-83 | S3084F13 | 163746 | 0.77 | | | 10 | 7.7 | 7.7 | | | FBB |
| ARL-83 | S3084F14 | 162706 | 0.77 | | | 10 | 7.7 | | | | |
| ARL-83 | S3084F15 | 164806 | 0.78 | | | 10 | 7.8 | | | | |
| ARL-106 | S3084F16 | 869707 | 4.07 | | | 2000 | 8132.1 | 8120.1 | 7827.81 | 104% | MS-1 |
| ARL-106 | S3084F17 | 867360 | 4.06 | | | 2000 | 8110.2 | | | | |
| ARL-106 | S3084F18 | 868206 | 4.06 | | | 2000 | 8118.1 | | | | |
| ISO-SCF-32293-4 | S3084F19 | 1220899 | 5.70 | 5.41 | 6% | 1 | 5.7 | 5.7 | | | QC |
| ISO-SCF-32293-4 | S3084F20 | 1232005 | 5.76 | 5.41 | 6% | 1 | 5.8 | | | | |
| ISO-SCF-32293-4 | S3084F21 | 1230936 | 5.75 | 5.41 | 6% | 1 | 5.8 | | | | |
| ARL-84 | S3084F34 | 33054 | 0.16 | | | 10 | 1.6 | 1.6 | | | FBB |
| ARL-84 | S3084F35 | 32381 | 0.16 | | | 10 | 1.6 | | | | |
| ARL-84 | S3084F36 | 32300 | 0.16 | | | 10 | 1.6 | | | | |

| Sample Name | FILE | AREA | AMOUNT ug/mL | QC Con ug/mL | QC Bias % | Dilution Factor | Amount Sample | Avg Amt Sample | Amount Spiked | Spike Recovery | Train ID |
|---|---|---|---|---|---|---|---|---|---|---|---|
| ARL-107 | S3084F37 | 829745 | 3.88 | | | 2000 | 7759.3 | 7837.5 | 7827.81 | 100% | MS-2 |
| ARL-107 | S3084F38 | 838117 | 3.92 | | | 2000 | 7837.4 | | | | |
| ARL-107 | S3084F39 | 846508 | 3.96 | | | 2000 | 7915.7 | | | | |
| ISO-SCF-32293-4 | S3084F40 | 1246426 | 5.82 | 5.41 | 8% | 1 | 5.8 | 5.8 | | | QC |
| ISO-SCF-32293-4 | S3084F41 | 1237852 | 5.78 | 5.41 | 7% | 1 | 5.8 | | | | |
| ISO-SCF-32293-4 | S3084F42 | 1239959 | 5.79 | 5.41 | 7% | 1 | 5.8 | | | | |
| ARL-85 | S3085F19 | 75475 | 0.36 | | | 10 | 3.6 | 3.6 | | | FBC |
| ARL-85 | S3085F20 | 75608 | 0.36 | | | 10 | 3.6 | | | | |
| ARL-85 | S3085F21 | 72681 | 0.35 | | | 10 | 3.5 | | | | |
| ARL-108 | S3085F22 | 847084 | 3.96 | | | 2000 | 7921.1 | 7890.2 | 7827.81 | 101% | MS-3 |
| ARL-108 | S3085F23 | 836897 | 3.91 | | | 2000 | 7826.0 | | | | |
| ARL-108 | S3085F24 | 847337 | 3.96 | | | 2000 | 7923.4 | | | | |
| ISO-SCF-32293-4 | S3085F25 | 1263449 | 5.90 | 5.41 | 9% | 1 | 5.9 | 5.9 | | | QC |
| ISO-SCF-32293-4 | S3085F26 | 1253499 | 5.86 | 5.41 | 8% | 1 | 5.9 | | | | |
| ISO-SCF-32293-4 | S3085F27 | 1260480 | 5.89 | 5.41 | 9% | 1 | 5.9 | | | | |
| ARL-86 | S3085F40 | 59577 | 0.29 | | | 10 | 2.9 | 2.8 | | | FBC |
| ARL-86 | S3085F41 | 56343 | 0.27 | | | 10 | 2.7 | | | | |
| ARL-86 | S3085F42 | 59626 | 0.29 | | | 10 | 2.9 | | | | |
| ARL-109 | S3085F43 | 851309 | 3.98 | | | 2000 | 7960.5 | 7944.8 | 7827.81 | 101% | MS-4 |
| ARL-109 | S3085F44 | 850793 | 3.98 | | | 2000 | 7955.6 | | | | |
| ARL-109 | S3085F45 | 846800 | 3.96 | | | 2000 | 7918.4 | | | | |
| ISO-SCF-32293-4 | S3085F46 | 1245663 | 5.82 | 5.41 | 8% | 1 | 5.8 | 4.0 | | | QC |
| ISO-SCF-32293-4 | S3085F47 | 0 | 0.01 | 5.41 | -100% | 1 | 0.0 | | | | |
| ISO-SCF-32293-4 | S3085F48 | 1296988 | 6.06 | 5.41 | 12% | 1 | 6.1 | | | | |
| ISO-SCF-32293-4 | S3098F1 | 1158548 | 5.41 | 5.41 | 0% | 1 | 5.4 | | | | |
| ARL-89 | S3098F2 | 0 | 0.01 | | | 10 | 0.1 | 0.1 | | | T-RB1 |
| ARL-89 | S3098F3 | 0 | 0.01 | | | 10 | 0.1 | | | | |
| ARL-89 | S3098F4 | 0 | 0.01 | | | 10 | 0.1 | | | | |
| ARL-90 | S3098F5 | 0 | 0.01 | | | 10 | 0.1 | 0.3 | | | T-RB2 |
| ARL-90 | S3098F6 | 5758.5 | 0.04 | | | 10 | 0.4 | | | | |
| ARL-90 | S3098F7 | 5867.5 | 0.04 | | | 10 | 0.4 | | | | |
| ARL-91 | S3098F8 | 0 | 0.01 | | | 10 | 0.1 | 0.2 | | | T-RB3 |
| ARL-91 | S3098F9 | 3273 | 0.03 | | | 10 | 0.3 | | | | |
| ARL-91 | S3098F10 | 0 | 0.01 | | | 10 | 0.1 | | | | |

| Sample Name | FILE | AREA | AMOUNT ug/mL | QC Con ug/mL | QC Bias % | Dilution Factor | Amount Sample | Avg Amt Sample | Amount Spiked | Spike Recovery | Train ID |
|---|---|---|---|---|---|---|---|---|---|---|---|
| ARL-92 | S3098F11 | 26248 | 0.13 | | | 10 | 1.3 | 1.2 | | | T-RB4 |
| ARL-92 | S3098F12 | 22909.08 | 0.12 | | | 10 | 1.2 | | | | |
| ARL-92 | S3098F13 | 22154 | 0.11 | | | 10 | 1.1 | | | | |
| ISO-SCF-32293-4 | S3098F14 | 1202486 | 5.62 | 5.41 | 4% | 1 | 5.6 | 5.7 | | | QC |
| ISO-SCF-32293-4 | S3098F15 | 1212015 | 5.66 | 5.41 | 5% | 1 | 5.7 | | | | |
| ISO-SCF-32293-4 | S3098F16 | 1220989 | 5.70 | 5.41 | 6% | 1 | 5.7 | | | | |
| ARL-94 | S3098F17 | 0 | 0.01 | | | 10 | 0.1 | 0.2 | | | A-RB1 |
| ARL-94 | S3098F18 | 5431 | 0.04 | | | 10 | 0.4 | | | | |
| ARL-94 | S3098F19 | 0 | 0.01 | | | 10 | 0.1 | | | | |
| ARL-95 | S3098F20 | 0 | 0.01 | | | 10 | 0.1 | 0.1 | | | A-RB2 |
| ARL-95 | S3098F21 | 0 | 0.01 | | | 10 | 0.1 | | | | |
| ARL-95 | S3098F22 | 0 | 0.01 | | | 10 | 0.1 | | | | |
| ARL-96 | S3098F23 | 6352.5 | 0.04 | | | 10 | 0.4 | 0.4 | | | A-RB3 |
| ARL-96 | S3098F24 | 6436 | 0.04 | | | 10 | 0.4 | | | | |
| ARL-96 | S3098F25 | 5886 | 0.04 | | | 10 | 0.4 | | | | |
| ARL-97 | S3098F26 | 25608 | 0.13 | | | 10 | 1.3 | 0.8 | | | A-RB4 |
| ARL-97 | S3098F27 | 21934 | 0.11 | | | 10 | 1.1 | | | | |
| ARL-97 | S3098F28 | 0 | 0.01 | | | 10 | 0.1 | | | | |
| ISO-SCF-32293-4 | S3098F29 | 1164624 | 5.44 | 5.41 | 1% | 1 | 5.4 | 5.4 | | | QC |
| ISO-SCF-32293-4 | S3098F30 | 1159319 | 5.42 | 5.41 | 0% | 1 | 5.4 | | | | |
| ISO-SCF-32293-4 | S3098F31 | 1149310 | 5.37 | 5.41 | -1% | 1 | 5.4 | | | | |
| ARL-99 | S3098F32 | 0 | 0.01 | | | 10 | 0.1 | 0.1 | | | ABS-RB |
| ARL-99 | S3098F33 | 0 | 0.01 | | | 10 | 0.1 | | | | |
| ARL-99 | S3098F34 | 0 | 0.01 | | | 10 | 0.1 | | | | |
| ARL-100 | S3098F35 | 0 | 0.01 | | | 10 | 0.1 | 0.1 | | | ABS-RB |
| ARL-100 | S3098F36 | 0 | 0.01 | | | 10 | 0.1 | | | | |
| ARL-100 | S3098F37 | 0 | 0.01 | | | 10 | 0.1 | | | | |
| ARL-101 | S3098F38 | 15010.13 | 0.08 | | | 10 | 0.8 | 0.9 | | | ABS-RB |
| ARL-101 | S3098F39 | 15823 | 0.08 | | | 10 | 0.8 | | | | |
| ARL-101 | S3098F40 | 23127 | 0.12 | | | 10 | 1.2 | | | | |
| ARL-102 | S3098F41 | 0 | 0.01 | | | 10 | 0.1 | 0.1 | | | ABS-RB |
| ARL-102 | S3098F42 | 0 | 0.01 | | | 10 | 0.1 | | | | |
| ARL-102 | S3098F43 | 0 | 0.01 | | | 10 | 0.1 | | | | |

| Sample Name | FILE | AREA | AMOUNT ug/mL | QC Con ug/mL | QC Bias % | Dilution Factor | Amount Sample | Avg Amt Sample | Amount Spiked | Spike Recovery | Train ID |
|---|---|---|---|---|---|---|---|---|---|---|---|
| ISO-SCF-32293-4 | S3098F44 | 1187727 | 5.55 | 5.41 | 3% | 1 | 5.5 | 5.6 | | | QC |
| ISO-SCF-32293-4 | S3098F45 | 1199251 | 5.60 | 5.41 | 4% | 1 | 5.6 | | | | |
| ISO-SCF-32293-4 | S3098F46 | 1206006 | 5.63 | 5.41 | 4% | 1 | 5.6 | | | | |
| ARL-117 | S3098F47 | 4701 | 0.03 | | | 10 | 0.3 | 0.3 | | | MB-1 |
| ARL-117 | S3098F48 | 4880.5 | 0.03 | | | 10 | 0.3 | | | | |
| ARL-117 | S3098F49 | 5001 | 0.03 | | | 10 | 0.3 | | | | |
| ARL-118 | S3098F50 | 204900 | 0.96 | | | 10 | 9.6 | 9.7 | | | MB-2 |
| ARL-118 | S3098F51 | 207157 | 0.98 | | | 10 | 9.8 | | | | |
| ARL-118 | S3098F52 | 207481 | 0.98 | | | 10 | 9.8 | | | | |
| ARL-119 | S3098F53 | 446217.5 | 2.09 | | | 10 | 20.9 | 20.7 | | | MB-3 |
| ARL-119 | S3098F54 | 427833.1 | 2.01 | | | 10 | 20.1 | | | | |
| ARL-119 | S3098F55 | 452112 | 2.12 | | | 10 | 21.2 | | | | |
| ISO-SCF-4893-1 | S3098F56 | 1164164 | 5.44 | 5.41 | 1% | 1 | 5.4 | 5.5 | | | QC |
| ISO-SCF-4893-1 | S3098F57 | 1176245 | 5.50 | 5.41 | 2% | 1 | 5.5 | | | | |
| ISO-SCF-4893-3 | S3098F58 | 1160212 | 5.42 | 5.41 | 0% | 1 | 5.4 | | | | |

**2,4-TDI Summary Information**

**Amount of 2,4-TDI Spiked into the trains: 7827.81 ug**

**Percent Recovery for Spiked Quad Trains**

| Quad No. | 1 | | 2 | | 3 | | 4 | | 5 | | 6 | | 7 | | 8 | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Train ID | A | B | C | D | A | B | C | D | A | B | C | D | A | B | C | D | Average | RSD |
| % Recovery | 95.69% | 86.19% | 89.16% | 95.22% | 108.14% | 111.93% | 96.56% | 97.97% | 89.41% | 95.59% | 97.69% | 99.46% | 100.45% | 85.63% | 88.46% | 83.01% | 95% | 8% |
| Total ug | 12263 | 11520 | 13258 | 13733 | 11625 | 12078 | 9694 | 9805 | 12233 | 12717 | 15471 | 15610 | 10450 | 9290 | 11197 | 10770 | 11962 | 16% |

**Amount Collected in Unspiked Quad Trains**

| Quad No. | 1 | | 2 | | 3 | | 4 | | 5 | | 6 | | 7 | | 8 | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Train ID | C | D | A | B | C | D | A | B | C | D | A | B | C | D | A | B | Average | RSD |
| Total ug | 4735 | 4811 | 6267 | 6270 | 3468 | 3166 | 2132 | 2139 | 4947 | 5522 | 8042 | 7608 | 2558 | 2618 | 4086 | 4579 | 4560 | 41% |

**Percent Carry over from 1st Impinger in Spiked Quad Trains**

| Quad No. | 1 | | 2 | | 3 | | 4 | | 5 | | 6 | | 7 | | 8 | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Train ID | A | B | C | D | A | B | C | D | A | B | C | D | A | B | C | D | Average | RSD |
| 1st Impinger | 98.48% | 99.21% | 99.21% | 98.97% | 99.02% | 99.11% | 96.38% | 98.46% | 98.95% | 99.22% | 98.83% | 98.71% | 98.03% | 97.02% | 98.44% | 98.35% | 98.52% | 0.81% |
| 2nd Impinger | 1.52% | 0.79% | 0.79% | 1.03% | 0.98% | 0.89% | 3.62% | 1.54% | 1.05% | 0.78% | 1.17% | 1.29% | 1.97% | 2.98% | 1.56% | 1.65% | 1.48% | 54.38% |

**Percent Carry over from 1st Impinger in Unspiked Quad Trains**

| Quad No. | 1 | | 2 | | 3 | | 4 | | 5 | | 6 | | 7 | | 8 | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Train ID | C | D | A | B | C | D | A | B | C | D | A | B | C | D | A | B | Average | RSD |
| 1st Impinger | 99.59% | 98.11% | 98.81% | 99.24% | 99.04% | 98.94% | 99.14% | 98.76% | 99.64% | 99.18% | 98.69% | 98.83% | 98.93% | 98.38% | 98.51% | 98.71% | 98.91% | 0.41% |
| 2nd Impinger | 0.41% | 1.89% | 1.19% | 0.76% | 0.96% | 1.06% | 0.86% | 1.24% | 0.36% | 0.82% | 1.31% | 1.17% | 1.07% | 1.62% | 1.49% | 1.29% | 1.09% | 37.05% |

AREAL WA 55 -- Method 301 Results

Using Modified Data

| Run | Train | | | | Amount | Precision of UNSpiked Samples | | | |
|---|---|---|---|---|---|---|---|---|---|
| # | A | B | C | D | Spiked | Diff | STDu | STDm | RSD |
| 1 | 12263.0 | 11520.0 | 4735.0 | 4811.0 | 7827.81 | -76.00 | 216.596 | 30.942 | 4.721 |
| 2 | 6287.0 | 6270.0 | 13258.0 | 13733.0 | 7827.81 | 17.00 | | | |
| 3 | 11625.0 | 12078.0 | 3466.0 | 3166.0 | 7827.81 | 300.00 | | | |
| 4 | 2132.0 | 2139.0 | 9694.0 | 9805.0 | 7827.81 | -7.00 | | | |
| 5 | 12233.0 | 12717.0 | 4947.0 | 5522.0 | 7827.81 | -575.00 | | | |
| 6 | 8084.0 | 7608.0 | 15471.0 | 15610.0 | 7827.81 | 476.00 | | | |
| 7 | 10450.0 | 9290.0 | 2557.0 | 2616.0 | 7827.81 | -59.00 | | | |

**AREAL WA 55 -- Method 301 Results**

**Using Modified Data**

| Run | Train | | | | Amount | Precision of Spiked Samples | | | | Bias | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| # | A | B | C | D | Spiked | Diff | SDs | SDm | RSD | Run | Compound | SD | t Test | CF |
| 1 | 12263.0 | 11520.0 | 4735.0 | 4811.0 | 7827.81 | 743.00 | 430.48 | 162.71 | 3.55 | -709.31 | -295.41 | 481.90 | -1.622 | N/A |
| 2 | 6287.0 | 6270.0 | 13258.0 | 13733.0 | 7827.81 | -475.00 | | | | -610.81 | | | ^ | |
| 3 | 11625.0 | 12078.0 | 3466.0 | 3166.0 | 7827.81 | -453.00 | | | | 707.69 | | | \| | |
| 4 | 2132.0 | 2139.0 | 9694.0 | 9805.0 | 7827.81 | -111.00 | | | | -213.81 | | | critical Value | |
| 5 | 12233.0 | 12717.0 | 4947.0 | 5522.0 | 7827.81 | -484.00 | | | | -587.31 | | | is 2.160 | |
| 6 | 8084.0 | 7608.0 | 15471.0 | 15610.0 | 7827.81 | -139.00 | | | | -133.31 | | | | |
| 7 | 10450.0 | 9290.0 | 2557.0 | 2616.0 | 7827.81 | 1160.00 | | | | -544.31 | | | | |

AREAL WA 55 -- Method 301 Results

Using Modified Data

| Run | Train | | | | Amount | Precision of UNSpiked Samples | | | |
|---|---|---|---|---|---|---|---|---|---|
| # | A | B | C | D | Spiked | Diff | STDu | STDm | RSD |
| 1 | 12263.0 | 11520.0 | 4735.0 | 4811.0 | 7827.81 | -76.00 | 237.150 | 29.644 | 5.205 |
| 2 | 6287.0 | 6270.0 | 13258.0 | 13733.0 | 7827.81 | 17.00 | | | |
| 3 | 11625.0 | 12078.0 | 3466.0 | 3166.0 | 7827.81 | 300.00 | | | |
| 4 | 2132.0 | 2139.0 | 9694.0 | 9805.0 | 7827.81 | -7.00 | | | |
| 5 | 12233.0 | 12717.0 | 4947.0 | 5522.0 | 7827.81 | -575.00 | | | |
| 6 | 8084.0 | 7608.0 | 15471.0 | 15610.0 | 7827.81 | 476.00 | | | |
| 7 | 10450.0 | 9290.0 | 2557.0 | 2616.0 | 7827.81 | -59.00 | | | |
| 8 | 4086.0 | 4579.0 | 11197.0 | 10947.0 | 7827.81 | -493.00 | | | |

EAL WA 55 -- Method 301 Results
sing Modified Data

| n | Train | | | | Amount | Precision of Spiked Samples | | | | Bias | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | A | B | C | D | Spiked | Diff | SDs | SDm | RSD | Run | Compound | SD | t Test | CF |
| | 12263.0 | 11520.0 | 4735.0 | 4811.0 | 7827.81 | 743.00 | 407.50 | 144.07 | 3.40 | -709.31 | -394.53 | 471.48 | -2.367 | 1.053 |
| | 6287.0 | 6270.0 | 13258.0 | 13733.0 | 7827.81 | -475.00 | | | | -610.81 | | | ^ | |
| | 11625.0 | 12078.0 | 3466.0 | 3166.0 | 7827.81 | -453.00 | | | | 707.69 | | | \| | |
| | 2132.0 | 2139.0 | 9694.0 | 9805.0 | 7827.81 | -111.00 | | | | -213.81 | | | critical Value | |
| | 12233.0 | 12717.0 | 4947.0 | 5522.0 | 7827.81 | -484.00 | | | | -587.31 | | | is 2.131 | |
| | 8084.0 | 7608.0 | 15471.0 | 15610.0 | 7827.81 | -139.00 | | | | -133.31 | | | | |
| | 10450.0 | 9290.0 | 2557.0 | 2616.0 | 7827.81 | 1160.00 | | | | -544.31 | | | | |
| | 4086.0 | 4579.0 | 11197.0 | 10947.0 | 7827.81 | 250.00 | | | | -1088.31 | | | | |

## PHENOL

Phenol samples were collected using a Method 5 sampling train at 0.75 CFM using neutral-buffered absorbing reagent. The first impinger in each sampling was spiked with isotopically-labeled phenol (phenol-$d_5$) and 2-fluorophenol for sampling and recovery efficiency surrogates. The recovered samples were extracted and the extracts analyzed by GC/MS for phenol, phenol-$d_5$ and 2-fluorophenol as per EPA Method 8270. The recoveries of phenol-$d_5$ and 2-fluorophenol were used to adjust the measured phenol concentrations.

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# COLLECTION OF SEMIVOLATILE COMPOUNDS

## EPA METHOD 0010

(Interpoll Method II-8788 - Version 1.0)

EPA Method SW846 USEPA Office of Solid Waste and Emergency Response 3rd Ed., November 1986: Test Methods for Evaluating Solid Waste Volume 2: Field Manual Physical/Chemical Methods Method 0010.

# MODIFIED METHOD 5 SAMPLING TRAIN

## 1.0 SCOPE AND APPLICATION

1.1 This method is applicable to the determination of Destruction and Removal Efficiency (DRE) of semivolatile Principal Organic Hazardous Compounds (POHCs) from incineration systems (PHS, 1967). This method also may be used to determine particulate emission rates from stationary sources as per EPA Method 5 (see References at end of this method).

## 2.0 SUMMARY OF METHOD

2.1 Gaseous and particulate pollutants are withdrawn from an emission source at an isokinetic sampling rate and are collected in a multicomponent sampling train. Principal components of the train include a high-efficiency glass- or quartz-fiber filter and a packed bed of porous polymeric adsorbent resin. The filter is used to collect organic-laden particulate materials and the porous polymeric resin to adsorb semivolatile organic species. Semivolatile species are defined as compounds with boiling points >100°C.

2.2 Comprehensive chemical analyses of the collected sample are conducted to determine the concentration and identity of the organic materials.

## 3.0 INTERFERENCES

3.1 Oxides of nitrogen ($NO_x$) are possible interferents in the determination of certain water-soluble compounds such as dioxane, phenol, and urethane; reaction of these compounds with $NO_x$ in the presence of moisture will reduce their concentration. Other possibilities that could result in positive or negative bias are (1) stability of the compounds in methylene chloride, (2) the formation of water-soluble organic salts on the resin in the presence of moisture, and (3) the solvent extraction efficiency of water-soluble compounds from aqueous media. Use of two or more ions per compound for qualitative and quantitative analysis can overcome interference at one mass. These concerns should be addressed on a compound-by-compound basis before using this method.

## 4.0 APPARATUS AND MATERIALS

4.1 Sampling train:

4.1.1 A schematic of the sampling train used in this method is shown in Figure 1. This sampling train configuration is adapted from EPA Method 5 procedures, and, as such, the majority of the required equipment

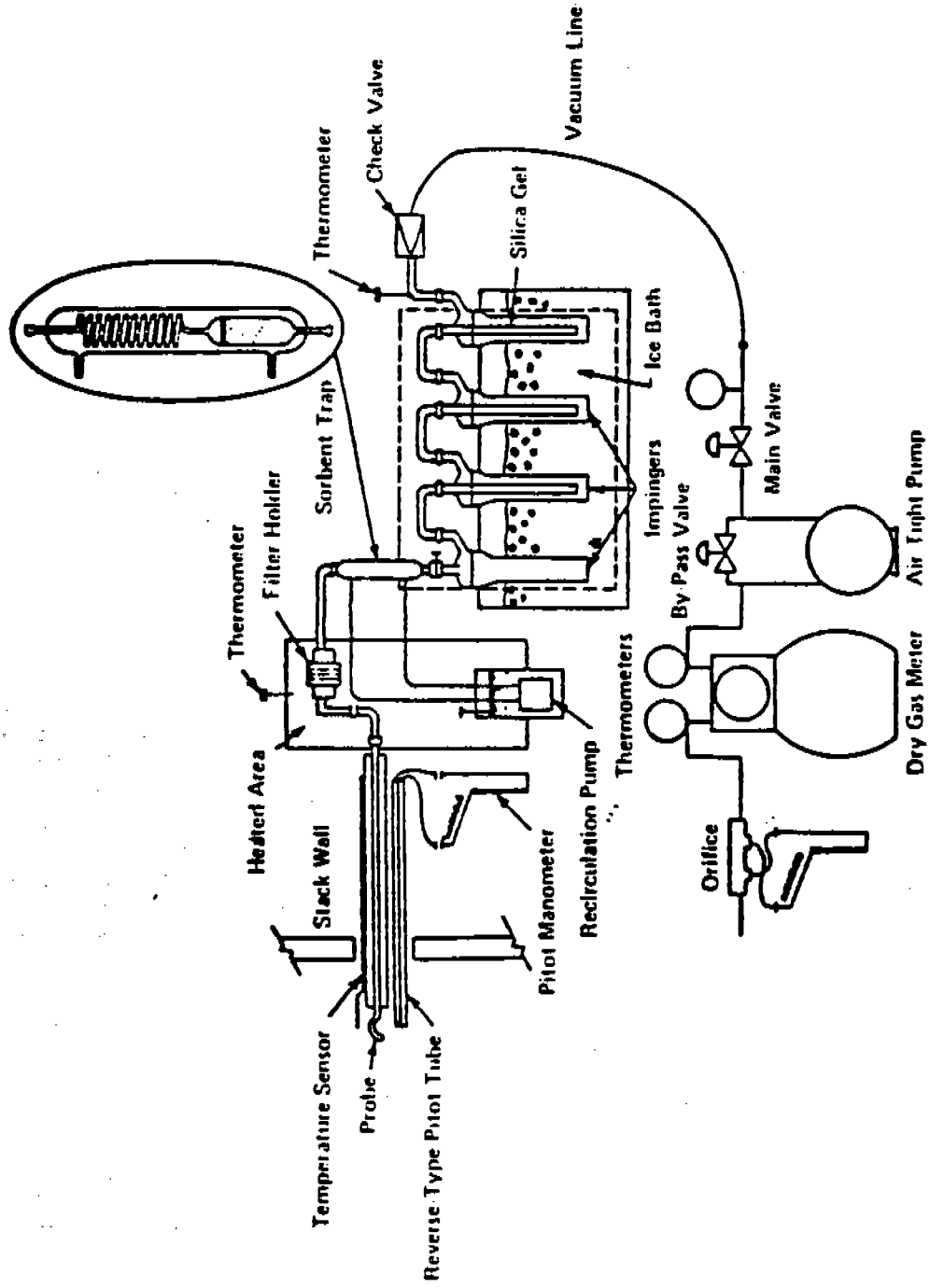



Figure 1. Modified Method 5 Sampling Train.

is identical to that used in EPA Method 5 determinations. The new components required are a condenser coil and a sorbent module, which are used to collect semivolatile organic materials that pass through the glass- or quartz-fiber filter in the gas phase.

4.1.2 Construction details for the basic train components are given in APTD-0581 (see Martin, 1971, in Section 13.0, References); commercial models of this equipment are also available. Specifications for the sorbent module are provided in the following subsections. Additionally, the following subsections list changes to APTD-0581 and identify allowable train configuration modifications.

4.1.3 Basic operating and maintenance procedures for the sampling train are described in APTD-0576 (see Rom, 1972, in Section 13.0, References). As correct usage is important in obtaining valid results, all users should refer to APTD-0576 and adopt the operating and maintenance procedures outlined therein unless otherwise specified. The sampling train consists of the components detailed below.

4.1.3.1 Probe nozzle: Stainless steel (316) or glass with sharp, tapered (30° angle) leading edge. The taper shall be on the outside to preserve a constant I.D. The nozzle shall be buttonhook or elbow design and constructed from seamless tubing (if made of stainless steel). Other construction materials may be considered for particular applications. A range of nozzle sizes suitable for isokinetic sampling should be available in increments of 0.16 cm (1/16 in.), e.g., 0.32-1.27 cm (1/8-1/2 in.), or larger if higher volume sampling trains are used. Each nozzle shall be calibrated according to the procedures outlined in Paragraph 9.1.

4.1.3.2 Probe liner: Borosilicate or quartz-glass tubing with a heating system capable of maintaining a gas temperature of 120 ± 14°C (248 ± 25°F) at the exit end during sampling. (The tester may opt to operate the equipment at a temperature lower than that specified.) Because the actual temperature at the outlet of the probe is not usually monitored during sampling, probes constructed according to APTD-0581 and utilizing the calibration curves of APTD-0576 (or calibrated according to the procedure outlined in APTD-0576) are considered acceptable. Either borosilicate or quartz-glass probe liners may be used for stack temperatures up to about 480°C (900°F). Quartz liners shall be used for temperatures between 480 and 900°C (900 and 1650°F). (The softening temperature for borosilicate is 820°C (1508°F), and for quartz 1500°C (2732°F).) Water-cooling of the stainless steel sheath will be necessary at temperatures approaching and exceeding 500°C.

4.1.3.3 Pitot tube: Type S, as described in Section 2.1 of EPA Method 2, or other appropriate devices (Vollaro, 1976). The pitot tube shall be attached to the probe to allow constant monitoring of the stack-gas velocity. The impact (high-pressure) opening plane of the pitot tube shall be even with or above the nozzle entry plane (see EPA Method 2, Figure 2-6b) during sampling. The Type S pitot tube assembly shall have a known coefficient, determined as outlined in Section 4 of EPA Method 2.

4.1.3.4 Differential pressure gauge: Inclined manometer c equivalent device as described in Section 2.2 of EPA Method 2. O manometer shall be used for velocity-head (ΔP) readings and t other for orifice differential pressure (ΔH) readings.

4.1.3.5 Filter holder: Borosilicate glass, with a glass fr filter support and a sealing gasket. The sealing gasket should b made of materials that will not introduce organic material into t gas stream at the temperature at which the filter holder will maintained. The gasket shall be constructed of Teflon or materia of equal or better characteristics. The holder design shall provi a positive seal against leakage at any point along the filt circumference. The holder shall be attached immediately to t outlet of the cyclone or cyclone bypass.

4.1.3.6 Filter heating system: Any heating system capable maintaining a temperature of 120 ± 14°C (248 ± 25°F) around t filter holder during sampling. Other temperatures may appropriate for particular applications. Alternatively, the test may opt to operate the equipment at temperatures other than th specified. A temperature gauge capable of measuring temperature within 3°C (5.4°F) shall be installed so that the temperature arou the filter holder can be regulated and monitored during samplin Heating systems other than the one shown in APTD-0581 may be used.

4.1.3.7 Organic sampling module: This unit consists of thr sections, including a gas-conditioning section, a sorbent trap, a a condensate knockout trap. The gas-conditioning system shall capable of conditioning the gas leaving the back half of the filt holder to a temperature not exceeding 20°C (68°F). The sorbent tr shall be sized to contain approximately 20 g of porous polymer resin (Rohm and Haas XAD-2 or equivalent) and shall be jacketed maintain the internal gas temperature at 17 ± 3°C (62.5 ± 5.4°F The most commonly used coolant is ice water from the impinger ic water bath, constantly circulated through the outer jacket, usi rubber or plastic tubing and a peristaltic pump. The sorbent tr should be outfitted with a glass well or depression, appropriate sized to accommodate a small thermocouple in the trap for monitori the gas entry temperature. The condensate knockout trap shall be sufficient size to collect the condensate following c conditioning. The organic module components shall be oriented direct the flow of condensate formed vertically downward from t conditioning section, through the adsorbent media, and into t condensate knockout trap. The knockout trap is usually similar appearance to an empty impinger directly underneath the sorbe module; it may be oversized but should have a shortened center st (at a minimum, one-half the length of the normal impinger stems) collect a large volume of condensate without bubbling a overflowing into the impinger train. All surfaces of the orga module wetted by the gas sample shall be fabricated of borosilic glass, Teflon, or other inert materials. Commercial versions of

complete organic module are not currently available, but may be assembled from commercially available laboratory glassware and a custom-fabricated sorbent trap. Details of two acceptable designs are shown in Figures 2 and 3 (the thermocouple well is shown in Figure 2).

4.1.3.8 Impinger train: To determine the stack-gas moisture content, four 500-mL impingers, connected in series with leak-free ground-glass joints, follow the knockout trap. The first, third, and fourth impingers shall be of the Greenburg-Smith design, modified by replacing the tip with a 1.3-cm (1/2-in.) I.D. glass tube extending about 1.3 cm (1/2 in.) from the bottom of the outer cylinder. The second impinger shall be of the Greenburg-Smith design with the standard tip. The first and second impingers shall contain known quantities of water or appropriate trapping solution. The third shall be empty or charged with a caustic solution, should the stack gas contain hydrochloric acid (HCl). The fourth shall contain a known weight of silica gel or equivalent desiccant.

4.1.3.9 Metering system: The necessary components are a vacuum gauge, leak-free pump, thermometers capable of measuring temperature to within 3°C (5.4°F), dry-gas meter capable of measuring volume to within 1%, and related equipment, as shown in Figure 1. At a minimum, the pump should be capable of 4 cfm free flow, and the dry-gas meter should have a recording capacity of 0-999.9 cu ft with a resolution of 0.005 cu ft. Other metering systems capable of maintaining sampling rates within 10% of isokineticity and of determining sample volumes to within 2% may be used. The metering system must be used in conjunction with a pitot tube to enable checks of isokinetic sampling rates. Sampling trains using metering systems designed for flow rates higher than those described in APTD-0581 and APTD-0576 may be used, provided that the specifications of this method are met.

4.1.3.10 Barometer: Mercury, aneroid, or other barometer capable of measuring atmospheric pressure to within 2.5 mm Hg (0.1 in. Hg). In many cases the barometric reading may be obtained from a nearby National Weather Service station, in which case the station value (which is the absolute barometric pressure) is requested and an adjustment for elevation differences between the weather station and sampling point is applied at a rate of minus 2.5 mm Hg (0.1 in. Hg) per 30-m (100 ft) elevation increase (vice versa for elevation decrease).

4.1.3.11 Gas density determination equipment: Temperature sensor and pressure gauge (as described in Sections 2.3 and 2.4 of EPA Method 2), and gas analyzer, if necessary (as described in EPA Method 3). The temperature sensor ideally should be permanently attached to the pitot tube or sampling probe in a fixed configuration such that the tip of the sensor extends beyond the leading edge of the probe sheath and does not touch any metal.

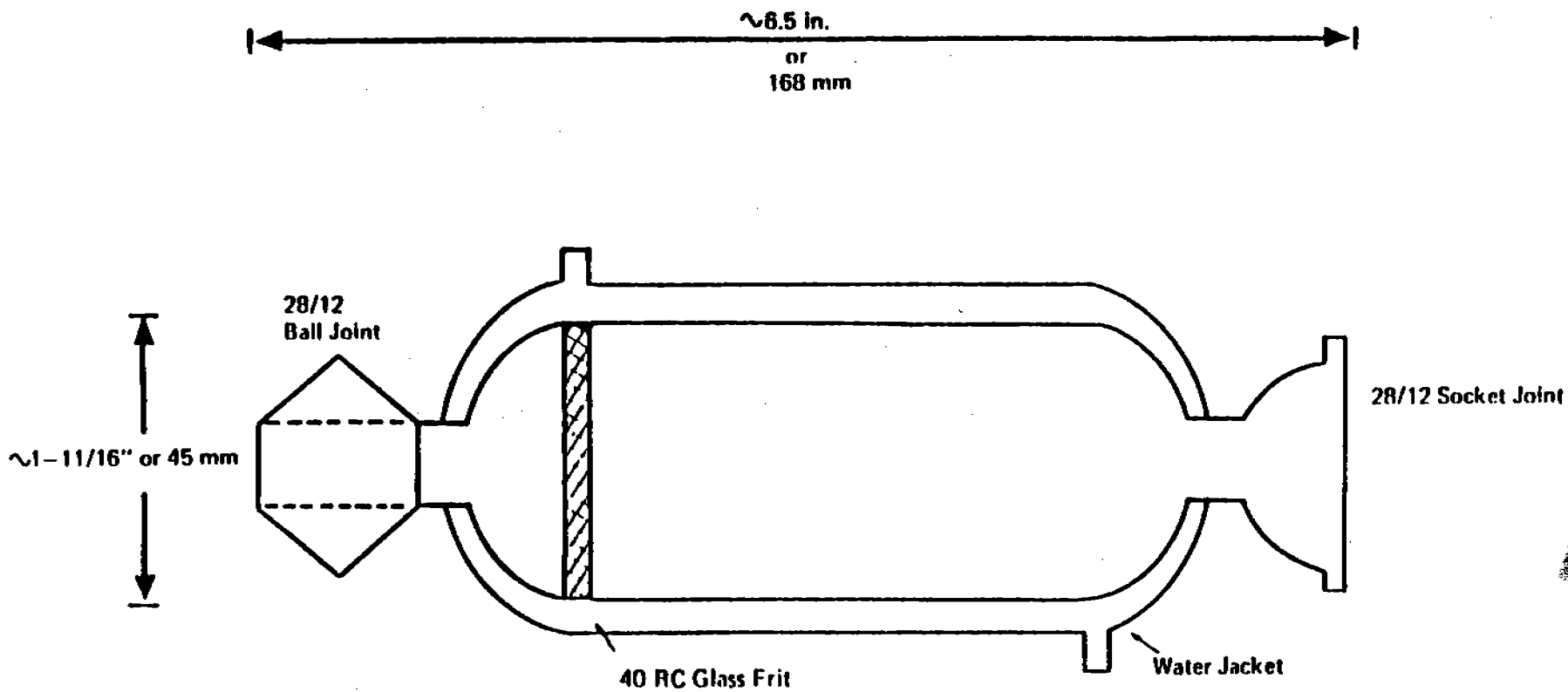



Figure 2. Adsorbent Sampling System.

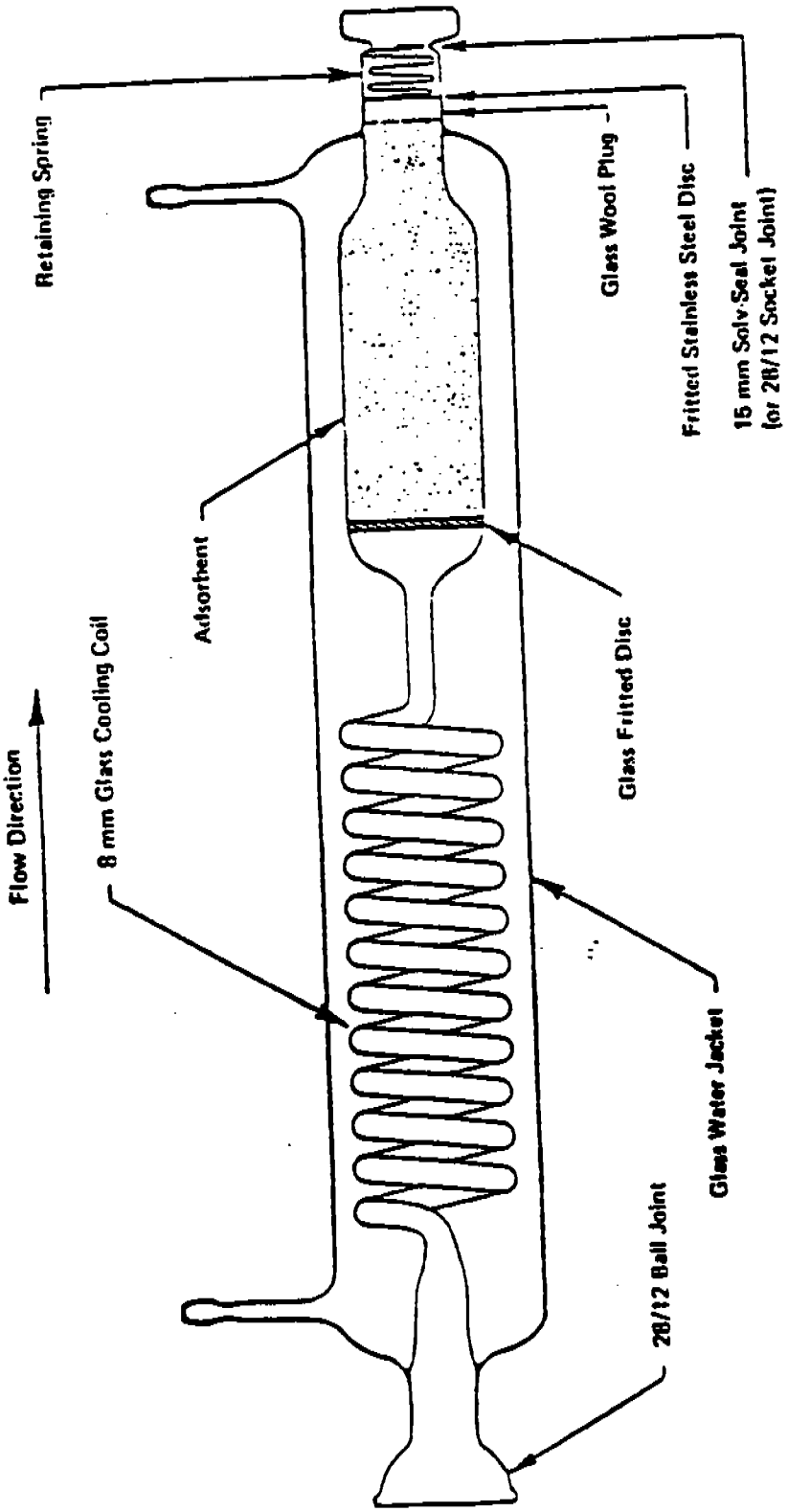



Figure 3. Adsorbent Sampling System.

Alternatively, the sensor may be attached just prior to use in th field. Note, however, that if the temperature sensor is attached i the field, the sensor must be placed in an interference-fre arrangement with respect to the Type S pitot tube openings (see EP Method 2, Figure 2-7). As a second alternative, if a difference c no more than 1% in the average velocity measurement is to b introduced, the temperature gauge need not be attached to the prob or pitot tube.

4.1.3.12 Calibration/field-preparation record: A permanentl bound laboratory notebook, in which duplicate copies of data may b made as they are being recorded, is required for documenting ar recording calibrations and preparation procedures (i.e., filter ar silica gel tare weights, clean XAD-2, quality assurance/quali control check results, dry-gas meter, and thermocouple calibration etc.). The duplicate copies should be detachable and should b stored separately in the test program archives.

4.2 Sample Recovery:

4.2.1 Probe liner: Probe nozzle and organic module conditionir section brushes; nylon bristle brushes with stainless steel wire handl are required. The probe brush shall have extensions of stainless stee Teflon, or inert material at least as long as the probe. The brush shall be properly sized and shaped to brush out the probe liner, t probe nozzle, and the organic module conditioning section.

4.2.2 Wash bottles: Three. Teflon or glass wash bottles a recommended; polyethylene wash bottles should not be used because organ contaminants may be extracted by exposure to organic solvents used f sample recovery.

4.2.3 Glass sample storage containers: Chemically resistan borosilicate amber and clear glass bottles, 500-mL or 1,000-mL. Bottl should be tinted to prevent action of light on sample. Screw-cap line shall be either Teflon or constructed so as to be leak-free and resista to chemical attack by organic recovery solvents. Narrow-mouth gla bottles have been found to exhibit less tendency toward leakage.

4.2.4 Petri dishes: Glass, sealed around the circumference wi wide (1-in.) Teflon tape, for storage and transport of filter samples.

4.2.5 Graduated cylinder and/or balances: To measure conden water to the nearest 1 mL or 1 g. Graduated cylinders shall ha subdivisions not >2 mL. Laboratory triple-beam balances capable weighing to ±0.5 g or better are required.

4.2.6 Plastic storage containers: Screw-cap polypropylene polyethylene containers to store silica gel.

4.2.7 Funnel and rubber policeman: To aid in transfer of sil gel to container (not necessary if silica gel is weighed in field).

4.2.8 Funnels: Glass, to aid in sample recovery.

4.3 Filters: Glass- or quartz-fiber filters, without organic binder, exhibiting at least 99.95% efficiency (<0.05% penetration) on 0.3-um dioctyl hthalate smoke particles. The filter efficiency test shall be conducted in accordance with ASTM standard method D2986-71. Test data from the supplier's quality control program are sufficient for this purpose. In sources containing $SO_2$ or $SO_3$, the filter material must be of a type that is unreactive to $SO_2$ or $SO_3$. Reeve Angel 934 AH or Schleicher and Schwell #3 filters work well under these conditions.

4.4 Crushed ice: Quantities ranging from 10-50 lb may be necessary during a sampling run, depending on ambient air temperature.

4.5 Stopcock grease: Solvent-insoluble, heat-stable silicone grease. Use of silicone grease upstream of the module is not permitted, and amounts used on components located downstream of the organic module shall be minimized. Silicone grease usage is not necessary if screw-on connectors and Teflon sleeves or ground-glass joints are used.

4.6 Glass wool: Used to plug the unfritted end of the sorbent module. The glass-wool fiber should be solvent-extracted with methylene chloride in a Soxhlet extractor for 12 hr and air-dried prior to use.

## 5.0 REAGENTS

5.1 Adsorbent resin: Porous polymeric resin (XAD-2 or equivalent) is recommended. These resins shall be cleaned prior to their use for sample collection. Appendix A of this method should be consulted to determine appropriate precleaning procedure. For best results, resin used should not exhibit a blank of higher than 4 mg/kg of total chromatographable organics (TCO) (see Appendix B) prior to use. Once cleaned, resin should be stored in an airtight, wide-mouth amber glass container with a Teflon-lined cap or placed in one of the glass sorbent modules tightly sealed with Teflon film and elastic bands. The resin should be used within 4 wk of the preparation.

5.2 Silica gel: Indicating type, 6-16 mesh. If previously used, dry at 175°C (350°F) for 2 hr before using. New silica gel may be used as received. Alternatively, other types of desiccants (equivalent or better) may be used, subject to the approval of the Administrator.

5.3 Impinger solutions: Distilled organic-free water (Type II) shall be used, unless sampling is intended to quantify a particular inorganic gaseous species. If sampling is intended to quantify the concentration of additional species, the impinger solution of choice shall be subject to Administrator approval. This water should be prescreened for any compounds of interest. One hundred mL will be added to the specified impinger; the third impinger in the train may be charged with a basic solution (1 N sodium hydroxide or sodium acetate) to protect the sampling pump from acidic gases. Sodium acetate should be used when large sample volumes are anticipated because sodium hydroxide will react with carbon dioxide in aqueous media to form sodium carbonate, which may possibly plug the impinger.

5.4 Sample recovery reagents:

5.4.1 Methylene chloride: Distilled-in-glass grade is required for sample recovery and cleanup (see Note to 5.4.2 below).

5.4.2 Methyl alcohol: Distilled-in-glass grade is required for sample recovery and cleanup.

NOTE: Organic solvents from metal containers may have a high residue blank and should not be used. Sometimes suppliers transfer solvents from metal to glass bottles; thus blanks shall be run prior to field use and only solvents with low blank value (<0.001%) shall be used.

5.4.3 Water: Water (Type II) shall be used for rinsing the organic module and condenser component.

## 6.0 SAMPLE COLLECTION, PRESERVATION, AND HANDLING

6.1 Because of complexity of this method, field personnel should be trained in and experienced with the test procedures in order to obtain reliable results.

6.2 Laboratory preparation:

6.2.1 All the components shall be maintained and calibrated according to the procedure described in APTD-0576, unless otherwise specified.

6.2.2 Weigh several 200- to 300-g portions of silica gel in airtight containers to the nearest 0.5 g. Record on each container the total weight of the silica gel plus containers. As an alternative to preweighing the silica gel, it may instead be weighed directly in the impinger or sampling holder just prior to train assembly.

6.2.3 Check filters visually against light for irregularities and flaws or pinhole leaks. Label the shipping containers (glass Petri dishes) and keep the filters in these containers at all times except during sampling and weighing.

6.2.4 Desiccate the filters at 20 ± 5.6°C (68 ± 10°F) and ambient pressure for at least 24 hr, and weigh at intervals of at least 6 hr to a constant weight (i.e., <0.5-mg change from previous weighing), recording results to the nearest 0.1 mg. During each weighing the filter must not be exposed for more than a 2-min period to the laboratory atmosphere and relative humidity above 50%. Alternatively (unless otherwise specified by the Administrator), the filters may be oven-dried at 105°C (220°F) for 2-3 hr, desiccated for 2 hr, and weighed.

6.3 Preliminary field determinations:

6.3.1 Select the sampling site and the minimum number of sampling points according to EPA Method 1 or as specified by the Administrator. Determine the stack pressure, temperature, and range of velocity heads using EPA Method 2. It is recommended that a leak-check of the pitot lines (see EPA Method 2, Section 3.1) be performed. Determine the stack-gas moisture content using EPA Approximation Method 4 or its alternatives to establish estimates of isokinetic sampling-rate settings. Determine the stack-gas dry molecular weight, as described in EPA Method 2, Section 3.6. If integrated EPA Method 3 sampling is used for molecular weight determination, the integrated bag sample shall be taken simultaneously with, and for the same total length of time as, the sample run.

6.3.2 Select a nozzle size based on the range of velocity heads so that it is not necessary to change the nozzle size in order to maintain isokinetic sampling rates. During the run, do not change the nozzle. Ensure that the proper differential pressure gauge is chosen for the range of velocity heads encountered (see Section 2.2 of EPA Method 2).

6.3.3 Select a suitable probe liner and probe length so that all traverse points can be sampled. For large stacks, to reduce the length of the probe, consider sampling from opposite sides of the stack.

6.3.4 A minimum of 3 dscm (105.9 dscf) of sample volume is required for the determination of the Destruction and Removal Efficiency (DRE) of POHCs from incineration systems. Additional sample volume shall be collected as necessitated by analytical detection limit constraints. To determine the minimum sample volume required, refer to sample calculations in Section 10.0.

6.3.5 Determine the total length of sampling time needed to obtain the identified minimum volume by comparing the anticipated average sampling rate with the volume requirement. Allocate the same time to all traverse points defined by EPA Method 1. To avoid timekeeping errors, the length of time sampled at each traverse point should be an integer or an integer plus one-half min.

6.3.6 In some circumstances (e.g., batch cycles) it may be necessary to sample for shorter times at the traverse points and to obtain smaller gas-sample volumes. In these cases, the Administrator's approval must first be obtained.

6.4 Preparation of collection train:

6.4.1 During preparation and assembly of the sampling train, keep all openings where contamination can occur covered with Teflon film or aluminum foil until just prior to assembly or until sampling is about to begin.

6.4.2 Fill the sorbent trap section of the organic module with approximately 20 g of clean adsorbent resin. While filling, ensure that the trap packs uniformly, to eliminate the possibility of channeling. When freshly cleaned, many adsorbent resins carry a static charge, which will cause clinging to trap walls. This may be minimized by filling the trap in the presence of an antistatic device. Commercial antistatic devices include Model-204 and Model-210 manufactured by the 3M Company, St. Paul, Minnesota.

6.4.3 If an impinger train is used to collect moisture, place 100 mL of water in each of the first two impingers, leave the third impinger empty (or charge with caustic solution, as necessary), and transfer approximately 200-300 g of preweighed silica gel from its container to the fourth impinger. More silica gel may be used, but care should be taken to ensure that it is not entrained and carried out from the impinger during sampling. Place the container in a clean place for later use in the sample recovery. Alternatively, the weight of the silica gel plus impinger may be determined to the nearest 0.5 g and recorded.

6.4.4 Using a tweezer or clean disposable surgical gloves, place a labeled (identified) and weighed filter in the filter holder. Be sure that the filter is properly centered and the gasket properly placed to prevent the sample gas stream from circumventing the filter. Check the filter for tears after assembly is completed.

6.4.5 When glass liners are used, install the selected nozzle using a Viton-A O-ring when stack temperatures are <260°C (500°F) and a woven glass-fiber gasket when temperatures are higher. See APTD-0576 (Rom, 1972) for details. Other connecting systems utilizing either 316 stainless steel or Teflon ferrules may be used. When metal liners are used, install the nozzle as above, or by a leak-free direct mechanical connection. Mark the probe with heat-resistant tape or by some other method to denote the proper distance into the stack or duct for each sampling point.

6.4.6 Set up the train as in Figure 1. During assembly, do not use any silicone grease on ground-glass joints that are located upstream of the organic module. A very light coating of silicone grease may be used on all ground-glass joints that are located downstream of the organic module, but it should be limited to the outer portion (see APTD-0576) of the ground-glass joints to minimize silicone-grease contamination. Subject to the approval of the Administrator, a glass cyclone may be used between the probe and the filter holder when the total particulate catch is expected to exceed 100 mg or when water droplets are present in the stack. The organic module condenser must be maintained at a temperature of 17 ± 3°C. Connect all temperature sensors to an appropriate potentiometer/display unit. Check all temperature sensors at ambient temperature.

6.4.7 Place crushed ice around the impingers and the organic module condensate knockout.

6.4.8 Turn on the sorbent module and condenser coil coolant recirculating pump and begin monitoring the sorbent module gas entry temperature. Ensure proper sorbent module gas entry temperature before proceeding and again before any sampling is initiated. It is extremely important that the XAD-2 resin temperature never exceed 50°C (122°F), because thermal decomposition will occur. During testing, the XAD-2 temperature must not exceed 20°C (68°F) for efficient capture of the semivolatile species of interest.

6.4.9 Turn on and set the filter and probe heating systems at the desired operating temperatures. Allow time for the temperatures to stabilize.

## 6.5 Leak-check procedures

### 6.5.1 Pre-test leak-check:

6.5.1.1 Because the number of additional intercomponent connections in the Semi-VOST train (over the M5 Train) increases the possibility of leakage, a pre-test leak-check is required.

6.5.1.2 After the sampling train has been assembled, turn on and set the filter and probe heating systems at the desired operating temperatures. Allow time for the temperatures to stabilize. If a Viton A O-ring or other leak-free connection is used in assembling the probe nozzle to the probe liner, leak-check the train at the sampling site by plugging the nozzle and pulling a 381-mm Hg (15-in. Hg) vacuum.
(NOTE: A lower vacuum may be used, provided that it is not exceeded during the test.)

6.5.1.3 If an asbestos string is used, do not connect the probe to the train during the leak-check. Instead, leak-check the train by first attaching a carbon-filled leak-check impinger (shown in Figure 4) to the inlet of the filter holder (cyclone, if applicable) and then plugging the inlet and pulling a 381-mm Hg (15-in. Hg) vacuum. (Again, a lower vacuum may be used, provided that it is not exceeded during the test.) Then, connect the probe to the train and leak-check at about 25-mm Hg (1-in. Hg) vacuum; alternatively, leak-check the probe with the rest of the sampling train in one step at 381-mm Hg (15-in. Hg) vacuum. Leakage rates in excess of 4% of the average sampling rate or $>0.00057$ $m^3$/min (0.02 cfm), whichever is less, are unacceptable.

6.5.1.4 The following leak-check instructions for the sampling train described in APTD-0576 and APTD-0581 may be helpful. Start the pump with fine-adjust valve fully open and coarse-adjust valve completely closed. Partially open the coarse-adjust valve and slowly close the fine-adjust valve until the desired vacuum is reached. Do not reverse direction of the fine-adjust valve; this will cause water to back up into the organic module. If the desired vacuum is exceeded, either leak-check at this higher vacuum or end the leak-check, as shown below, and start over.

CROSS SECTIONAL VIEW

Leak Testing Apparatus

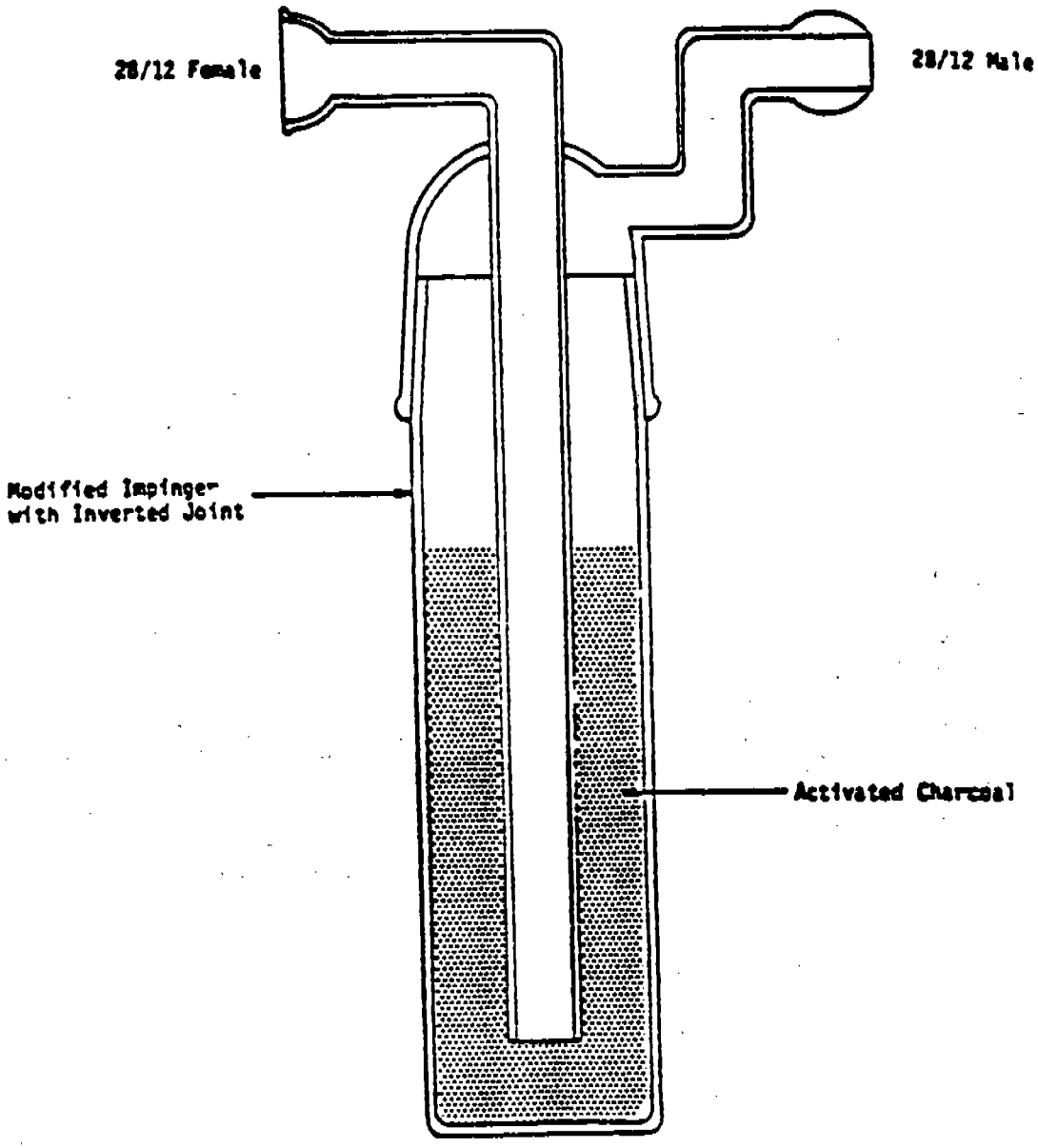



Figure 4. Leak-check impinger.

6.5.1.5 When the leak-check is completed, first slowly remove the plug from the inlet to the probe, filter holder, or cyclone (if applicable). When the vacuum drops to 127 mm (5 in.) Hg or less, immediately close the coarse-adjust valve. Switch off the pumping system and reopen the fine-adjust valve. Do not reopen the fine-adjust valve until the coarse-adjust valve has been closed. This prevents the water in the impingers from being forced backward into the organic module and silica gel from being entrained backward into the third impinger.

6.5.2 Leak-checks during sampling run:

6.5.2.1 If, during the sampling run, a component (e.g., filter assembly, impinger, or sorbent trap) change becomes necessary, a leak-check shall be conducted immediately after the interruption of sampling and before the change is made. The leak-check shall be done according to the procedure outlined in Paragraph 6.5.1, except that it shall be done at a vacuum greater than or equal to the maximum value recorded up to that point in the test. If the leakage rate is found to be no greater than 0.00057 $m^3$/min (0.02 cfm) or 4% of the average sampling rate (whichever is less), the results are acceptable, and no correction will need to be applied to the total volume of dry gas metered. If a higher leakage rate is obtained, the tester shall void the sampling run. (It should be noted that any "correction" of the sample volume by calculation by calculation reduces the integrity of the pollutant concentrations data generated and must be avoided.)

6.5.2.2 Immediately after a component change, and before sampling is reinitiated, a leak-check similar to a pre-test leak-check must also be conducted.

6.5.3 Post-test leak-check:

6.5.3.1 A leak-check is mandatory at the conclusion of each sampling run. The leak-check shall be done with the same procedures as those with the pre-test leak-check, except that it shall be conducted at a vacuum greater than or equal to the maximum value reached during the sampling run. If the leakage rate is found to be no greater than 0.00057 $m^3$/min (0.02 cfm) or 4% of the average sampling rate (whichever is less), the results are acceptable, and no correction need be applied to the total volume of dry gas metered. If, however, a higher leakage rate is obtained, the tester shall either record the leakage rate, correct the sample volume (as shown in the calculation section of this method), and consider the data obtained of questionable reliability, or void the sampling run.

6.6 Sampling-train operation:

6.6.1 During the sampling run, maintain an isokinetic sampling rate to within 10% of true isokinetic, unless otherwise specified by the Administrator. Maintain a temperature around the filter of 120 ± 14°C (248 ± 25°F) and a gas temperature entering the sorbent trap at a maximum of 20°C (68°F).

6.6.2 For each run, record the data required on a data sheet such as the one shown in Figure 5. Be sure to record the initial dry-gas meter reading. Record the dry-gas meter readings at the beginning and end of each sampling time increment, when changes in flow rates are made before and after each leak-check, and when sampling is halted. Take other readings required by Figure 5 at least once at each sample poi during each time increment and additional readings when significant changes (20% variation in velocity-head readings) necessitate additional adjustments in flow rate. Level and zero the manometer. Because the manometer level and zero may drift due to vibrations and temperature changes, make periodic checks during the traverse.

6.6.3 Clean the stack access ports prior to the test run to eliminate the chance of sampling deposited material. To begin sampling, remove the nozzle cap, verify that the filter and probe heating systems are at the specified temperature, and verify that the pitot tube and probe are properly positioned. Position the nozzle at the first traverse point, with the tip pointing directly into the gas stream. Immediately start the pump and adjust the flow to isokinetic conditions. Nomographs, which aid in the rapid adjustment of the isokinetic sampling rate without excessive computations, are available. These nomographs are designed for use when the Type S pitot-tube coefficient is 0.84 $\pm$ 0.02 and the stack-gas equivalent density (dry molecular weight) is equal to 29 $\pm$ 4. APTD-0576 details the procedure for using the nomographs. If the stack-gas molecular weight and the pitot-tube coefficient are outside the above ranges, do not use the nomographs unless appropriate steps (Shigehara, 1974) are taken to compensate for the deviations.

6.6.4 When the stack is under significant negative pressure (equivalent to the height of the impinger stem), take care to close the coarse-adjust valve before inserting the probe into the stack, to prevent water from backing into the organic module. If necessary, the pump may be turned on with the coarse-adjust valve closed.

6.6.5 When the probe is in position, block off the openings around the probe and stack access port to prevent unrepresentative dilution of the gas stream.

6.6.6 Traverse the stack cross section, as required by EPA Method 1 or as specified by the Administrator, being careful not to bump the probe nozzle into the stack walls when sampling near the walls or when removing or inserting the probe through the access port, in order to minimize the chance of extracting deposited material.

6.6.7 During the test run, make periodic adjustments to keep the temperature around the filter holder and the organic module at the proper levels; add more ice and, if necessary, salt to maintain a temperature of <20°C (68°F) at the condenser/silica gel outlet. Also, periodically check the level and zero of the manometer.

Plant _____

Location _____

Operator _____

Date _____

Run No. _____

Sample Box No. _____

Meter Box No. _____

Meter ΔH@ _____

C Factor _____

Pitot Tube Coefficient $C_p$ _____

Schematic of Stack Cross Section

Ambient Temperature _____

Barometric Pressure _____

Assumed Moisture % _____

Probe Length, m (ft) _____

Nozzle Identification No. _____

Average Calibrated Nozzle Diameter, cm (in) _____

Probe Heater Setting _____

Leak Rate, $m^3$/min, (cfm) _____

Probe Liner Material _____

Static Pressure, mm Hg (in. Hg) _____

Filter No. _____

| Traverse Point Number | Sampling Time (θ) min. | Vacuum mm Hg (in. Hg) | Stack Temperature ($t_s$) °C(°F) | Velocity Head ($\sqrt{P_s}$) mm (in) $H_2O$ | Pressure Differential Across Orifice Meter mm ($H_2O$) (in $H_2O$) | Gas Sample Volume $m_3$ ($ft_3$) | Gas Sample Temp. at Dry Gas Meter Inlet °C(°F) | Gas Sample Temp. at Dry Gas Meter Outlet °C(°F) | Filter Holder Temperature °C(F°) | Temperature of Gas Entering Sorbet Trap °C(F°) | Temperature of Gas Leaving Condenser or Last Impinger |
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| Total | | | | | | | Avg. | Avg. | | | |
| Average | | | | | | | | | | | |

Figure 5. Particulate field data.

6.6.8 If the pressure drop across the filter or sorbent trap becomes too high, making isokinetic sampling difficult to maintain, the filter/sorbent trap may be replaced in the midst of a sample run. Using another complete filter holder/sorbent trap assembly is recommended, rather than attempting to change the filter and resin themselves. After a new filter/sorbent trap assembly is installed, conduct a leak-check The total particulate weight shall include the summation of all filter assembly catches.

6.6.9 A single train shall be used for the entire sample run, except in cases where simultaneous sampling is required in two or more separate ducts or at two or more different locations within the same duct, or in cases where equipment failure necessitates a change of trains. In all other situations, the use of two or more trains will be subject to the approval of the Administrator.

6.6.10 Note that when two or more trains are used, separate analysis of the front-half (if applicable) organic-module and impinger (if applicable) catches from each train shall be performed, unless identical nozzle sizes were used on all trains. In that case, the front-half catches from the individual trains may be combined (as may the impinger catches), and one analysis of front-half catch and one analysis of impinger catch may be performed.

6.6.11 At the end of the sample run, turn off the coarse-adjust valve, remove the probe and nozzle from the stack, turn off the pump, record the final dry-gas meter reading, and conduct a post-test leak-check. Also, leak-check the pitot lines as described in EPA Method 2. The lines must pass this leak-check in order to validate the velocity-head data.

6.6.12 Calculate percent isokineticity (see Section 10.8) determine whether the run was valid or another test run should be made.

## 7.0 SAMPLE RECOVERY

### 7.1 Preparation:

7.1.1 Proper cleanup procedure begins as soon as the probe is removed from the stack at the end of the sampling period. Allow the probe to cool. When the probe can be safely handled, wipe off all external particulate matter near the tip of the probe nozzle and place a cap over the tip to prevent losing or gaining particulate matter. Do not cap the probe tip tightly while the sampling train is cooling down because this will create a vacuum in the filter holder, drawing water from the impingers into the sorbent module.

7.1.2 Before moving the sample train to the cleanup site, remove the probe from the sample train and cap the open outlet, being careful not to lose any condensate that might be present. Cap the filter inlet.

Remove the umbilical cord from the last impinger and cap the impinger. If a flexible line is used between the organic module and the filter holder, disconnect the line at the filter holder and let any condensed water or liquid drain into the organic module.

7.1.3 Cap the filter-holder outlet and the inlet to the organic module. Separate the sorbent trap section of the organic module from the condensate knockout trap and the gas-conditioning section. Cap all organic module openings. Disconnect the organic-module knockout trap from the impinger train inlet and cap both of these openings. Ground-glass stoppers, Teflon caps, or caps of other inert materials may be used to seal all openings.

7.1.4 Transfer the probe, the filter, the organic-module components, and the impinger/condenser assembly to the cleanup area. This area should be clean and protected from the weather to minimize sample contamination or loss.

7.1.5 Save a portion of all washing solutions (methanol/methylene chloride, Type II water) used for cleanup as a blank. Transfer 200 mL of each solution directly from the wash bottle being used and place each in a separate, prelabeled glass sample container.

7.1.6 Inspect the train prior to and during disassembly and note any abnormal conditions.

7.2 Sample containers:

7.2.1 **Container no. 1:** Carefully remove the filter from the filter holder and place it in its identified Petri dish container. Use a pair or pairs of tweezers to handle the filter. If it is necessary to fold the filter, ensure that the particulate cake is inside the fold. Carefully transfer to the Petri dish any particulate matter or filter fibers that adhere to the filter-holder gasket, using a dry nylon bristle brush or sharp-edged blade, or both. Label the container and seal with 1-in.-wide Teflon tape around the circumference of the lid.

7.2.2 **Container no. 2:** Taking care that dust on the outside of the probe or other exterior surfaces does not get into the sample, quantitatively recover particulate matter or any condensate from the probe nozzle, probe fitting, probe liner, and front half of the filter holder by washing these components first with methanol/methylene chloride (1:1 v/v) into a glass container. Distilled water may also be used. Retain a water and solvent blank and analyze in the same manner as with the samples. Perform rinses as follows:

7.2.2.1 Carefully remove the probe nozzle and clean the inside surface by rinsing with the solvent mixture (1:1 v/v methanol/-methylene chloride) from a wash bottle and brushing with a nylon bristle brush. Brush until the rinse shows no visible particles; then make a final rinse of the inside surface with the solvent mix. Brush and rinse the inside parts of the Swagelok fitting with the solvent mix in a similar way until no visible particles remain.

7.2.2.2 Have two people rinse the probe liner with the solvent mix by tilting and rotating the probe while squirting solvent into its upper end so that all inside surfaces will be wetted with solvent. Let the solvent drain from the lower end into the sample container. A glass funnel may be used to aid in transferring liqui washes to the container.

7.2.2.3 Follow the solvent rinse with a probe brush. Hold the probe in an inclined position and squirt solvent into the upper end while pushing the probe brush through the probe with a twisting action; place a sample container underneath the lower end of the probe and catch any solvent and particulate matter that is brushed from the probe. Run the brush through the probe three times or more until no visible particulate matter is carried out with the solvent or until none remains in the probe liner on visual inspection. With stainless steel or other metal probes, run the brush through in the above-prescribed manner at least six times (metal probes have small crevices in which particulate matter can be entrapped). Rinse the brush with solvent and quantitatively collect these washings in the sample container. After the brushing, make a final solvent rinse of the probe as described above.

7.2.2.4 It is recommended that two people work together to clean the probe to minimize sample losses. Between sampling runs, keep brushes clean and protected from contamination.

7.2.2.5 Clean the inside of the front half of the filter holder and cyclone/cyclone flask, if used, by rubbing the surfaces with a nylon bristle brush and rinsing with methanol/methylene chloride (1:1 v/v) mixture. Rinse each surface three times or mor if needed to remove visible particulate. Make a final rinse of t brush and filter holder. Carefully rinse out the glass cyclone and cyclone flask (if applicable). Brush and rinse any particulate material adhering to the inner surfaces of these components into the front-half rinse sample. After all solvent washings and particulate matter have been collected in the sample container, tighten the lid on the sample container so that solvent will not leak out when it is shipped to the laboratory. Mark the height of the fluid level to determine whether leakage occurs during transport. Label the container to identify its contents.

7.2.3 **Container no. 3:** The sorbent trap section of the organic module may be used as a sample transport container, or the spent resin may be transferred to a separate glass bottle for shipment. If the sorbent trap itself is used as the transport container, both ends should be sealed with tightly fitting caps or plugs. Ground-glass stoppers or Teflon caps may be used. The sorbent trap should then be labeled, covered with aluminum foil, and packaged on ice for transport to the laboratory. If a separate bottle is used, the spent resin should be quantitatively transferred from the trap into the clean bottle. Resin that adheres to the walls of the trap should be recovered using a rubber policeman or spatula and added to this bottle.

7.2.4 Container no. 4: Measure the volume of condensate collected in the condensate knockout section of the organic module to within ±1 mL by using a graduated cylinder or by weighing to within ±0.5 g using a triple-beam balance. Record the volume or weight of liquid present and note any discoloration or film in the liquid catch. Transfer this liquid to a prelabeled glass sample container. Inspect the back half of the filter housing and the gas-conditioning section of the organic module. If condensate is observed, transfer it to a graduated or weighing bottle and measure the volume, as described above. Add this material to the condensate knockout-trap catch.

7.2.5 Container no. 5: All sampling train components located between the high-efficiency glass- or quartz-fiber filter and the first wet impinger or the final condenser system (including the heated Teflon line connecting the filter outlet to the condenser) should be thoroughly rinsed with methanol/methylene chloride (1:1 v/v) and the rinsings combined. This rinse shall be separated from the condensate. If the spent resin is transferred from the sorbent trap to a separate sample container for transport, the sorbent trap shall be thoroughly rinsed until all sample-wetted surfaces appear clean. Visible films should be removed by brushing. Whenever train components are brushed, the brush should be subsequently rinsed with solvent mixture and the rinsings added to this container.

7.2.6 Container no. 6: Note the color of the indicating silica gel to determine if it has been completely spent and make a notation of its condition. Transfer the silica gel from the fourth impinger to its original container and seal. A funnel may make it easier to pour the silica gel without spilling. A rubber policeman may be used as an aid in removing the silica gel from the impinger. It is not necessary to remove the small amount of dust particles that may adhere strongly to the impinger wall. Because the gain in weight is to be used for moisture calculations, do not use any water or other liquids to transfer the silica gel. If a balance is available in the field, weigh the container and its contents to 0.5 g or better.

7.3 Impinger water:

7.3.1 Make a notation of any color or film in the liquid catch. Measure the liquid in the first three impingers to within ±1 mL by using a graduated cylinder or by weighing it to within ±0.5 g by using a balance (if one is available). Record the volume or weight of liquid present. This information is required to calculate the moisture content of the effluent gas.

7.3.2 Discard the liquid after measuring and recording the volume or weight, unless analysis of the impinger catch is required (see Paragraph 4.1.3.7). Amber glass containers should be used for storage of impinger catch, if required.

7.3.3 If a different type of condenser is used, measure the amount of moisture condensed either volumetrically or gravimetrically.

7.4 Sample preparation for shipment: Prior to shipment, recheck all sample containers to ensure that the caps are well secured. Seal the lids of all containers around the circumference with Teflon tape. Ship all liquid samples upright on ice and all particulate filters with the particulate catch facing upward. The particulate filters should be shipped unrefrigerated.

## 8.0 ANALYSIS

### 8.1 Sample preparation:

8.1.1 General: The preparation steps for all samples will result in a finite volume of concentrated solvent. The final sample volume (usually in the 1- to 10-mL range) is then subjected to analysis by GC/MS. All samples should be inspected and the appearance documented. All samples are to be spiked with surrogate standards as received from the field prior to any sample manipulations. The spike should be at a level equivalent to 10 times the MDL when the solvent is reduced in volume to the desired level (i.e., 10 mL). The spiking compounds should be the stable isotopically labeled analog of the compounds of interest or a compound that would exhibit properties similar to the compounds of interest, be easily chromatographed, and not interfere with the analysis of the compounds of interest. Suggested surrogate spiking compounds are: deuterated naphthalene, chrysene, phenol, nitrobenzene, chlorobenzene, toluene, and carbon-13-labeled pentachlorophenol.

8.1.2 Condensate: The "condensate" is the moisture collected in the first impinger following the XAD-2 module. Spike the condensate with the surrogate standards. The volume is measured and recorded and then transferred to a separatory funnel. The pH is to be adjusted to pH 2 with 6 N sulfuric acid, if necessary. The sample container and graduated cylinder are sequentially rinsed with three successive 10-mL aliquots of the extraction solvent and added to the separatory funnel. The ratio of solvent to aqueous sample should be maintained at 1:3. Extract the sample by vigorously shaking the separatory funnel for 5 min. After complete separation of the phases, remove the solvent and transfer to a Kuderna-Danish concentrator (K-D), filtering through a bed of precleaned, dry sodium sulfate. Repeat the extraction step two additional times. Adjust the pH to 11 with 6 N sodium hydroxide and reextract combining the acid and base extracts. Rinse the sodium sulfate into the K-D with fresh solvent and discard the desiccant. Add Teflon boiling chips and concentrate to 10 mL by reducing the volume to slightly less than 10 mL and then bringing to volume with fresh solvent. In order to achieve the necessary detection limit, the sample volume can be further reduced to 1 mL by using a micro column K-D or nitrogen blow-down. Should the sample start to exhibit precipitation, the concentration step should be stopped and the sample redissolved with fresh solvent taking the volume to some finite amount. After adding a standard (for the purpose of quantitation by GC/MS), the sample is ready for analysis, as discussed in Paragraph 8.2.

8.1.3 **Impinger:** Spike the sample with the surrogate standards; measure and record the volume and transfer to a separatory funnel. Proceed as described in Paragraph 8.1.2.

8.1.4 **XAD-2:** Spike the resin directly with the surrogate standards. Transfer the resin to the all-glass thimbles by the following procedure (care should be taken so as not to contaminate the thimble by touching it with anything other than tweezers or other solvent-rinsed mechanical holding devices). Suspend the XAD-2 module directly over the thimble. The glass frit of the module (see Figure 2) should be in the up position. The thimble is contained in a clean beaker, which will serve to catch the solvent rinses. Using a Teflon squeeze bottle, flush the XAD-2 into the thimble. Thoroughly rinse the glass module with solvent into the beaker containing the thimble. Add the XAD-2 glass-wool plug to the thimble. Cover the XAD-2 in the thimble with a precleaned glass-wool plug sufficient to prevent the resin from floating into the solvent reservoir of the extractor. If the resin is wet, effective extraction can be accomplished by loosely packing the resin in the thimble. If a question arises concerning the completeness of the extraction, a second extraction, without a spike, is advised. The thimble is placed in the extractor and the rinse solvent contained in the beaker is added to the solvent reservoir. Additional solvent is added to make the reservoir approximately two-thirds full. Add Teflon boiling chips and assemble the apparatus. Adjust the heat source to cause the extractor to cycle 5-6 times per hr. Extract the resin for 16 hr. Transfer the solvent and three 10-mL rinses of the reservoir to a K-D and concentrate as described in Paragraph 8.1.2.

8.1.5 **Particulate filter** (and cyclone catch): If particulate loading is to be determined, weigh the filter (and cyclone catch, if applicable). The particulate filter (and cyclone catch, if applicable) is transferred to the glass thimble and extracted simultaneously with the XAD-2 resin.

8.1.6 **Train solvent rinses:** All train rinses (i.e., probe, impinger, filter housing) using the extraction solvent and methanol are returned to the laboratory as a single sample. If the rinses are contained in more than one container, the intended spike is divided equally among the containers proportioned from a single syringe volume. Transfer the rinse to a separatory funnel and add a sufficient amount of organic-free water so that the methylene chloride becomes immiscible and its volume no longer increases with the addition of more water. The extraction and concentration steps are then performed as described in Paragraph 8.1.2.

8.2 Sample analysis:

8.2.1 The primary analytical tool for the measurement of emissions from hazardous waste incinerators is GC/MS using fused-silica capillary GC columns, as described in Method 8270 in Chapter Four of this manual. Because of the nature of GC/MS instrumentation and the cost associated

with sample analysis, prescreening of the sample extracts by gas chromatography/flame ionization detection (GC/FID) or with electron capture (GC/ECD) is encouraged. Information regarding the complexity and concentration level of a sample prior to GC/MS analysis can be of enormous help. This information can be obtained by using either capillary columns or less expensive packed columns. However, the FID screen should be performed with a column similar to that used with the GC/MS. Keep in mind that GC/FID has a slightly lower detection limit than GC/MS and, therefore, that the concentration of the sample can be adjusted either up or down prior to analysis by GC/MS.

8.2.2 The mass spectrometer will be operated in a full scan (40-450) mode for most of the analyses. The range for which data are acquired in a GC/MS run will be sufficiently broad to encompass the major ions, as listed in Chapter Four, Method 8270, for each of the designated POHCs in an incinerator effluent analysis.

8.2.3 For most purposes, electron ionization (EI) spectra will be collected because a majority of the POHCs give reasonable EI spectra. Also, EI spectra are compatible with the NBS Library of Mass Spectra and other mass spectral references, which aid in the identification process for other components in the incinerator process streams.

8.2.4 To clarify some identifications, chemical ionization (CI) spectra using either positive ions or negative ions will be used to elucidate molecular-weight information and simplify the fragmentation patterns of some compounds. In no case, however, should CI spectra alone be used for compound identification. Refer to Chapter Four, Method 8270, for complete descriptions of GC conditions, MS conditions, and quantitative and quantitative identification.

## 9.0 CALIBRATION

9.1 Probe nozzle: Probe nozzles shall be calibrated before their initial use in the field. Using a micrometer, measure the inside diameter of the nozzle to the nearest 0.025 mm (0.001 in.). Make measurements at three separate places across the diameter and obtain the average of the measurements. The difference between the high and low numbers shall not exceed 0.1 mm (0.004 in.). When nozzles become nicked, dented, or corroded, they shall be reshaped, sharpened, and recalibrated before use. Each nozzle shall be permanently and uniquely identified.

9.2 Pitot tube: The Type S pitot tube assembly shall be calibrated according to the procedure outlined in Section 4 of EPA Method 2, or assigned a nominal coefficient of 0.84 if it is not visibly nicked, dented, or corroded and if it meets design and intercomponent spacing specifications.

9.3 Metering system:

9.3.1 Before its initial use in the field, the metering system shall be calibrated according to the procedure outlined in APTD-0576. Instead of physically adjusting the dry-gas meter dial readings to correspond to the wet-test meter readings, calibration factors may be used to correct the gas meter dial readings mathematically to the proper values. Before calibrating the metering system, it is suggested that a leak-check be conducted. For metering systems having diaphragm pumps, the normal leak-check procedure will not detect leakages within the pump. For these cases the following leak-check procedure is suggested: Make a 10-min calibration run at 0.00057 $m^3$/min (0.02 cfm); at the end of the run, take the difference of the measured wet-test and dry-gas meter volumes and divide the difference by 10 to get the leak rate. The leak rate should not exceed 0.00057 $m^3$/min (0.02 cfm).

9.3.2 After each field use, the calibration of the metering system shall be checked by performing three calibration runs at a single intermediate orifice setting (based on the previous field test). The vacuum shall be set at the maximum value reached during the test series. To adjust the vacuum, insert a valve between the wet-test meter and the inlet of the metering system. Calculate the average value of the calibration factor. If the calibration has changed by more than 5%, recalibrate the meter over the full range of orifice settings, as outlined in APTD-0576.

9.3.3 Leak-check of metering system: That portion of the sampling train from the pump to the orifice meter (see Figure 1) should be leak-checked prior to initial use and after each shipment. Leakage after the pump will result in less volume being recorded than is actually sampled. The following procedure is suggested (see Figure 6): Close the main valve on the meter box. Insert a one-hole rubber stopper with rubber tubing attached into the orifice exhaust pipe. Disconnect and vent the low side of the orifice manometer. Close off the low side orifice tap. Pressurize the system to 13-18 cm (5-7 in.) water column by blowing into the rubber tubing. Pinch off the tubing and observe the manometer for 1 min. A loss of pressure on the manometer indicates a leak in the meter box. Leaks, if present, must be corrected.

NOTE: If the dry-gas-meter coefficient values obtained before and after a test series differ by >5%, either the test series shall be voided or calculations for test series shall be performed using whichever meter coefficient value (i.e., before or after) gives the lower value of total sample volume.

9.4 Probe heater: The probe-heating system shall be calibrated before its initial use in the field according to the procedure outlined in APTD-0576. Probes constructed according to APTD-0581 need not be calibrated if the calibration curves in APTD-0576 are used.

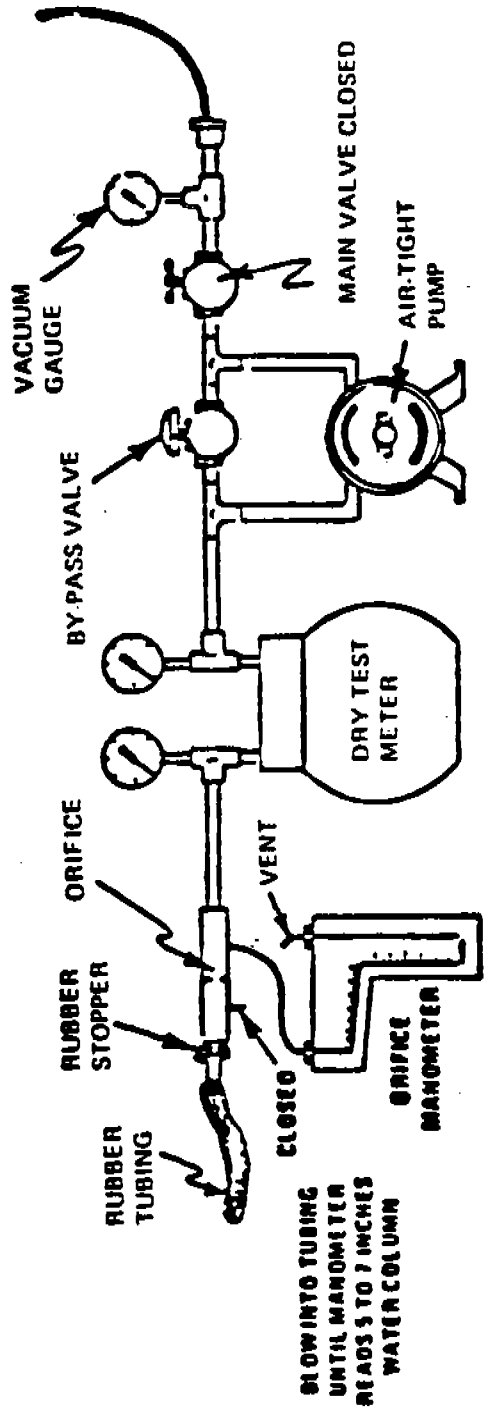



Figure 6. Leak-check of meter box.

9.5 Temperature gauges: Each thermocouple must be permanently and uniquely marked on the casting; all mercury-in-glass reference thermometers must conform to ASTM E-1 63C or 63F specifications. Thermocouples should be calibrated in the laboratory with and without the use of extension leads. If extension leads are used in the field, the thermocouple readings at ambient air temperatures, with and without the extension lead, must be noted and recorded. Correction is necessary if the use of an extension lead produces a change >1.5%.

9.5.1 Impinger, organic module, and dry-gas meter thermocouples: For the thermocouples used to measure the temperature of the gas leaving the impinger train and the XAD-2 resin bed, three-point calibration at ice-water, room-air, and boiling-water temperatures is necessary. Accept the thermocouples only if the readings at all three temperatures agree to ±2°C (3.6°F) with those of the absolute value of the reference thermometer.

9.5.2 Probe and stack thermocouple: For the thermocouples used to indicate the probe and stack temperatures, a three-point calibration at ice-water, boiling-water, and hot-oil-bath temperatures must be performed; it is recommended that room-air temperature be added, and that the thermometer and the thermocouple agree to within 1.5% at each of the calibration points. A calibration curve (equation) may be constructed (calculated) and the data extrapolated to cover the entire temperature range suggested by the manufacturer.

9.6 Barometer: Adjust the barometer initially and before each test series to agree to within ±25 mm Hg (0.1 in. Hg) of the mercury barometer or the corrected barometric pressure value reported by a nearby National Weather Service Station (same altitude above sea level).

9.7 Triple-beam balance: Calibrate the triple-beam balance before each test series, using Class-S standard weights; the weights must be within ±0.5% of the standards, or the balance must be adjusted to meet these limits.

## 10.0 CALCULATIONS

10.1 Carry out calculations. Round off figures after the final calculation to the correct number of significant figures.

10.2 Nomenclature:

$A_n$ = Cross-sectional area of nozzle, $m^2$ ($ft^2$).

$B_{ws}$ = Water vapor in the gas stream, proportion by volume.

$C_d$ = Type S pitot tube coefficient (nominally 0.84 ± 0.02), dimensionless.

I = Percent of isokinetic sampling.

$L_a$ = Maximum acceptable leakage rate for a leak-check, either pre-test or following a component change; equal to 0.00057 $m^3$/min (0.02 cfm) or 4% of the average sampling rate, whichever is less.

$L_i$ = Individual leakage rate observed during the leak-check conducted prior to the "$i^{th}$" component change (i = 1, 2, 3...n) $m^3$/min (cfm).

$L_p$ = Leakage rate observed during the post-test leak-check, $m^3$/min (cfm).

$M_d$ = Stack-gas dry molecular weight, g/g-mole (lb/lb-mole).

$M_w$ = Molecular weight of water, 18.0 g/g-mole (18.0 lb/lb-mole).

$P_{bar}$ = Barometric pressure at the sampling site, mm Hg (in. Hg).

$P_s$ = Absolute stack-gas pressure, mm Hg (in. Hg).

$P_{std}$ = Standard absolute pressure, 760 mm Hg (29.92 in. Hg).

R = Ideal gas constant, 0.06236 mm Hg-$m^3$/K-g-mole (21.85 in. Hg-$ft^3$/°R-lb-mole).

$T_m$ = Absolute average dry-gas meter temperature (see Figure 6), K (°R).

$T_s$ = Absolute average stack-gas temperature (see Figure 6), K (°R).

$T_{std}$ = Standard absolute temperature, 293K (528°R).

$V_{lc}$ = Total volume of liquid collected in the organic module condensate knockout trap, the impingers, and silica gel, mL.

$V_m$ = Volume of gas sample as measured by dry-gas meter, dscm (dscf).

$V_{m(std)}$ = Volume of gas sample measured by the dry-gas meter, corrected to standard conditions, dscm (dscf).

$V_{w(std)}$ = Volume of water vapor in the gas sample, corrected to standard conditions, scm (scf).

$V_s$ = Stack-gas velocity, calculated by Method 2, Equation 2-9, using data obtained from Method 5, m/sec (ft/sec).

$W_a$ = Weight of residue in acetone wash, mg.

$\gamma$ = Dry-gas-meter calibration factor, dimensionless.

$\Delta H$ = Average pressure differential across the orifice meter (see Figure 2), mm $H_2O$ (in. $H_2O$).

$\rho_w$ = Density of water, 0.9982 g/mL (0.002201 lb/mL).

$\theta$ = Total sampling time, min.

$\theta_1$ = Sampling time interval from the beginning of a run until the first component change, min.

$\theta_i$ = Sampling time interval between two successive component changes, beginning with the interval between the first and second changes, min.

$\theta_p$ = Sampling time interval from the final ($n^{th}$) component change until the end of the sampling run, min.

13.6 = Specific gravity of mercury.

60 = sec/min.

100 = Conversion to percent.

10.3 Average dry-gas-meter temperature and average orifice pressure drop: See data sheet (Figure 5, above).

10.4 Dry-gas volume: Correct the sample measured by the dry-gas meter to standard conditions (20°C, 760 mm Hg [68°F, 29.92 in. Hg]) by using Equation 1:

$$V_{m(std)} = V_m \gamma \frac{T_{std}}{T_m} \frac{P_{bar} + \Delta H/13.6}{P_{std}} = K_1 V_m \gamma \frac{P_{bar} + \Delta H/13.6}{T_m} \qquad (1)$$

where:

$K_1$ = 0.3858 K/mm Hg for metric units, or
$K_1$ = 17.64°R/in. Hg for English units.

It should be noted that Equation 1 can be used as written, unless the leakage rate observed during any of the mandatory leak-checks (i.e., the post-test leak-check or leak-checks conducted prior to component changes) exceeds $L_a$. If $L_p$ or $L_i$ exceeds $L_a$, Equation 1 must be modified as follows:

a. Case I (no component changes made during sampling run): Replace $V_m$ in Equation 1 with the expression:

$$V_m - (L_p - L_a)$$

b. Case II (one or more component changes made during the sampling run): Replace $V_m$ in Equation 1 by the expression:

$$V_m - (L_1 - L_a)\theta_1 - \sum_{i=2}^{n} (L_i - L_a)\theta_1 - (L_p - L_a)\theta_p$$

and substitute only for those leakage rates ($L_1$ or $L_p$) that exceed $L_a$.

10.5 Volume of water vapor:

$$V_{w(std)} = V_{lc} \frac{P_w}{M_w} \frac{RT_{std}}{P_{std}} = K_2 V_{lc} \quad (2)$$

where:

$K_2 = 0.001333$ m³/mL for metric units, or
$K_2 = 0.04707$ ft³/mL for English units.

10.6 Moisture content:

$$B_{ws} = \frac{V_{w(std)}}{V_{m(std)} + V_{w(std)}} \quad (3)$$

NOTE: In saturated or water-droplet-laden gas streams, two calculations of the moisture content of the stack gas shall be made, one from the impinger analysis (Equation 3) and a second from the assumption of saturated conditions. The lower of the two values of $B_w$ shall be considered correct. The procedure for determining the moisture content based upon assumption of saturated conditions is given in the Note to Section 1.2 of Method 4. For the purposes of this method, the average stack-gas temperature from Figure 6 may be used to make this determination, provided that the accuracy of the in-stack temperature sensor is ±1°C (2°F).

10.7 Conversion factors:

| From | To | Multiply by |
|---|---|---|
| scf | m³ | 0.02832 |
| g/ft³ | gr/ft³ | 15.43 |
| g/ft³ | lb/ft³ | $2.205 \times 10^{-3}$ |
| g/ft³ | g/m³ | 35.31 |

10.8 Isokinetic variation:

10.8.1 Calculation from raw data:

$$I = \frac{100\ T_s[K_3 F_{1c} + (V_m/T_m)\ (P_{bar} + \Delta H/13.6)]}{60\theta V_s P_s A_n} \qquad (4)$$

where:

$K_3$ = 0.003454 mm Hg-$m^3$/mL-K for metric units, or
$K_3$ = 0.002669 in. Hg-$ft^3$/mL-°R for English units.

10.8.2 Calculation for intermediate values:

$$I = \frac{T_s V_{m(std)} P_{std} 100}{T_{std} V_s \theta A_n P_s 60(1-B_{ws})} \qquad (5)$$

$$= K_4 \frac{T_s V_{m(std)}}{P_s V_s A_n \theta (1-B_{ws})}$$

where:

$K_4$ = 4.320 for metric units, or
$K_4$ = 0.09450 for English units.

10.8.3 Acceptable results: If 90% $\leq$ I $\leq$ 110%, the results are acceptable. If the results are low in comparison with the standard and I is beyond the acceptable range, or if I is less than 90%, the Administrator may opt to accept the results.

10.9 To determine the minimum sample volume that shall be collected, the following sequence of calculations shall be used.

10.9.1 From prior analysis of the waste feed, the concentration of POHCs introduced into the combustion system can be calculated. The degree of destruction and removal efficiency that is required is used to determine the maximum amount of POHC allowed to be present in the effluent. This may be expressed as:

$$\frac{(WF)\ (POHC_i\ conc)}{100}\ \frac{(100-\%DRE)}{100} = \text{Max } POHC_i \text{ Mass} \qquad (6)$$

where:

WF = mass flow rate of waste feed per hr, g/hr (lb/hr).

$POHC_i$ = concentration of Principal Organic Hazardous Compound (wt %) introduced into the combustion process.

DRE = percent Destruction and Removal Efficiency required.

Max POHC = mass flow rate (g/hr [lb/hr]) of POHC emitted from the combustion source.

10.9.2 The average discharge concentration of the POHC in the effluent gas is determined by comparing the Max POHC with the volumetric flow rate being exhausted from the source. Volumetric flow rate data are available as a result of preliminary Method 1-4 determinations:

$$\frac{\text{Max POHC}_i \text{ Mass}}{DV_{eff(std)}} = \text{Max POHC}_i \text{ conc} \qquad (7)$$

where:

$DV_{eff(std)}$ = volumetric flow rate of exhaust gas, dscm (dscf).

$POHC_i$ conc = anticipated concentration of the POHC in the exhaust gas stream, g/dscm (lb/dscf).

10.9.3 In making this calculation, it is recommended that a safety margin of at least ten be included:

$$\frac{LDL_{POHC} \times 10}{POHC_i \text{ conc}} = V_{TBC} \qquad (8)$$

where:

$LDL_{POHC}$ = detectable amount of POHC in entire sampling train.
NOTE: The whole extract from an XAD-2 cartridge is seldom if ever, injected at once. Therefore, if aliquoting factors are involved, the $LDL_{POHC}$ is not the same as the analytical (or column) detection limit.

$V_{TBC}$ = minimum dry standard volume to be collected at dry-gas meter.

10.10 Concentration of any given POHC in the gaseous emissions of a combustion process:

1) Multiply the concentration of the POHC as determined in Method 8270 by the final concentration volume, typically 10 mL.

$C_{POHC}$ (ug/mL) x sample volume (mL) = amount (ug) of POHC in sample (9)

where:

$C_{POHC}$ = concentration of POHC as analyzed by Method 8270.

2) Sum the amount of POHC found in all samples associated with a single train.

Total (ug) = XAD-2 (ug) + condensate (ug) + rinses (ug) + impinger (ug) (10)

3) Divide the total ug found by the volume of stack gas sampled ($m^3$).

(Total ug)/(train sample volume) = concentration of POHC ($ug/m^3$) (11)

## 11.0 QUALITY CONTROL

11.1 Sampling: See EPA Manual 600/4-77-027b for Method 5 quality control.

11.2 Analysis: The quality assurance program required for this study includes the analysis of field and method blanks, procedure validations, incorporation of stable labeled surrogate compounds, quantitation versus stable labeled internal standards, capillary column performance checks, and external performance tests. The surrogate spiking compounds selected for a particular analysis are used as primary indicators of the quality of the analytical data for a wide range of compounds and a variety of sample matrices. The assessment of combustion data, positive identification, and quantitation of the selected compounds are dependent on the integrity of the samples received and the precision and accuracy of the analytical methods employed. The quality assurance procedures for this method are designed to monitor the performance of the analytical method and to provide the required information to take corrective action if problems are observed in laboratory operations or in field sampling activities.

11.2.1 Field Blanks: Field blanks must be submitted with the samples collected at each sampling site. The field blanks include the sample bottles containing aliquots of sample recovery solvents, unused filters, and resin cartridges. At a minimum, one complete sampling train will be assembled in the field staging area, taken to the sampling area, and leak-checked at the beginning and end of the testing (or for the same total number of times as the actual test train). The filter housing and probe of the blank train will be heated during the sample test. The train will be recovered as if it were an actual test sample. No gaseous sample will be passed through the sampling train.

11.2.2 Method blanks: A method blank must be prepared for each set of analytical operations, to evaluate contamination and artifacts that can be derived from glassware, reagents, and sample handling in the laboratory.

11.2.3 Refer to Method 8270 for additional quality control considerations.

## 12.0 METHOD PERFORMANCE

12.1 Method performance evaluation: Evaluation of analytical procedures for a selected series of compounds must include the sample-preparation procedures and each associated analytical determination. The analytical procedures should be challenged by the test compounds spiked at appropriate levels and carried through the procedures.

12.2 Method detection limit: The overall method detection limits (lower and upper) must be determined on a compound-by-compound basis because different compounds may exhibit different collection, retention, and extraction efficiencies as well as instrumental minimum detection limit (MDL). The method detection limit must be quoted relative to a given sample volume. The upper limits for the method must be determined relative to compound retention volumes (breakthrough).

12.3 Method precision and bias: The overall method precision and bias must be determined on a compound-by-compound basis at a given concentration level. The method precision value would include a combined variability due to sampling, sample preparation, and instrumental analysis. The method bias would be dependent upon the collection, retention, and extraction efficiency of the train components. From evaluation studies to date using a dynamic spiking system, method biases of -13% and -16% have been determined for toluene and 1,1,2,2-tetrachloroethane, respectively. A precision of 19.9% was calculated from a field test data set representing seven degrees of freedom which resulted from a series of paired, unspiked Semivolatile Organic Sampling trains (Semi-VOST) sampling emissions from a hazardous waste incinerator.

## 13.0 REFERENCES

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# PREPARATION OF XAD-2 SORBENT RESIN

## 1.0 SCOPE AND APPLICATION

1.1 XAD-2 resin as supplied by the manufacturer is impregnated with a bicarbonate solution to inhibit microbial growth during storage. Both the salt solution and any residual extractable monomer and polymer species must be removed before use. The resin is prepared by a series of water and organic extractions, followed by careful drying.

## 2.0 EXTRACTION

2.1 Method 1: The procedure may be carried out in a giant Soxhlet extractor. An all-glass thimble containing an extra-coarse frit is used for extraction of XAD-2. The frit is recessed 10-15 mm above a crenellated ring at the bottom of the thimble to facilitate drainage. The resin must be carefully retained in the extractor cup with a glass-wool plug and stainless steel screen because it floats on methylene chloride. This process involves sequential extraction in the following order.

| Solvent | Procedure |
|---|---|
| Water | Initial rinse: Place resin in a beaker, rinse once with Type II water, and discard. Fill with water a second time, let stand overnight, and discard. |
| Water | Extract with $H_2O$ for 8 hr. |
| Methyl alcohol | Extract for 22 hr. |
| Methylene chloride | Extract for 22 hr. |
| Methylene chloride (fresh) | Extract for 22 hr. |

2.2 Method 2:

2.2.1 As an alternative to Soxhlet extraction, a continuous extractor has been fabricated for the extraction sequence. This extractor has been found to be acceptable. The particular canister used for the apparatus shown in Figure A-1 contains about 500 g of finished XAD-2. Any size may be constructed; the choice is dependent on the needs of the sampling programs. The XAD-2 is held under light spring tension between a pair of coarse and fine screens. Spacers under the bottom screen allow for even distribution of clean solvent. The three-necked flask should be of sufficient size (3-liter in this case) to hold solvent

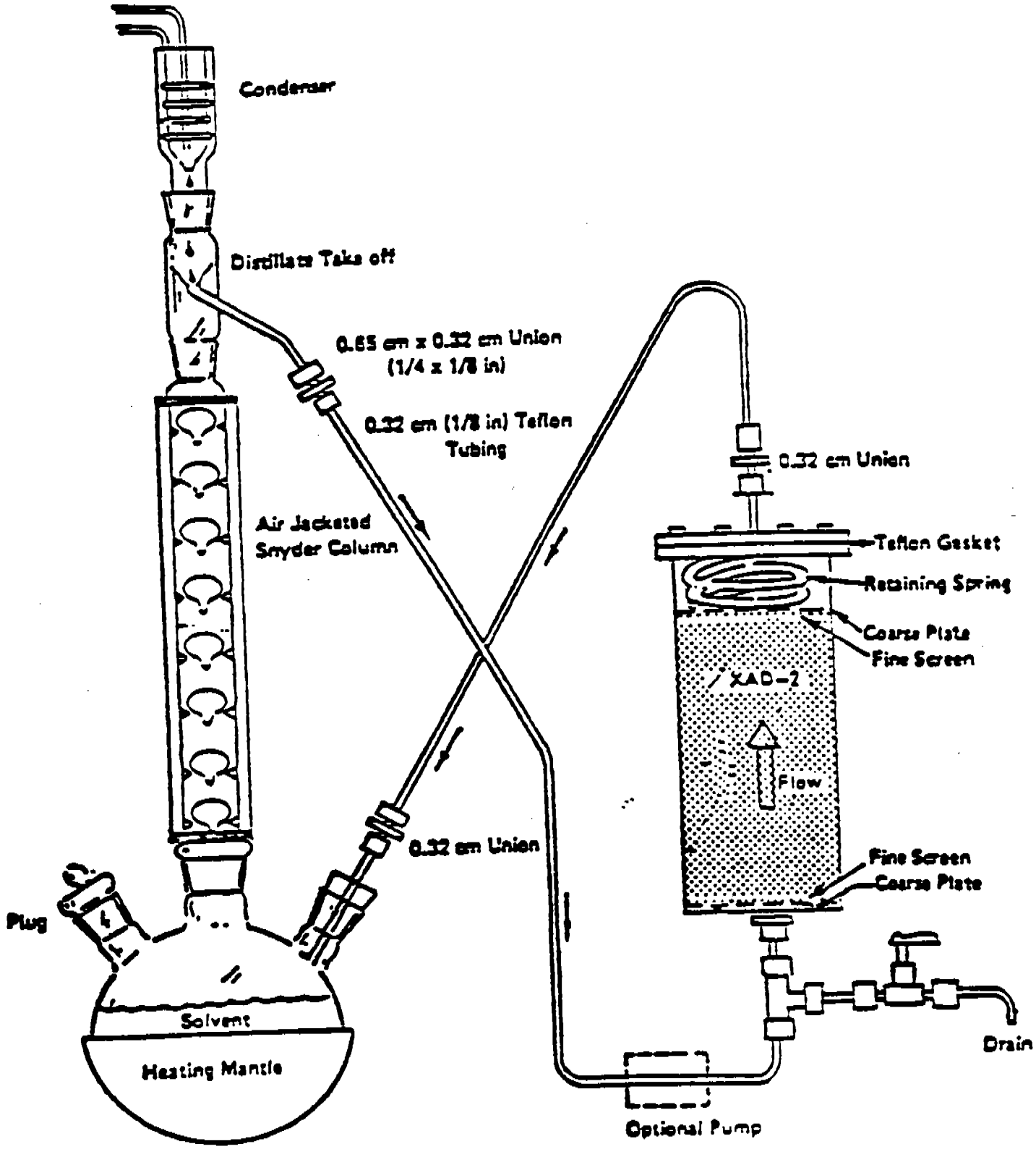



Figure A-1. XAD-2 cleanup extraction apparatus.

equal to twice the dead volume of the XAD-2 canister. Solvent is refluxed through the Snyder column, and the distillate is continuously cycled up through the XAD-2 for extraction and returned to the flask. The flow is maintained upward through the XAD-2 to allow maximum solvent contact and prevent channeling. A valve at the bottom of the canister allows removal of solvent from the canister between changes.

2.2.2 Experience has shown that it is very difficult to cycle sufficient water in this mode. Therefore the aqueous rinse is accomplished by simply flushing the canister with about 20 liters of distilled water. A small pump may be useful for pumping the water through the canister. The water extraction should be carried out at the rate of about 20-40 mL/min.

2.2.3 After draining the water, subsequent methyl alcohol and methylene chloride extractions are carried out using the refluxing apparatus. An overnight or 10- to 20-hr period is normally sufficient for each extraction.

2.2.4 All materials of construction are glass, Teflon, or stainless steel. Pumps, if used, should not contain extractable materials. Pumps are not used with methanol and methylene chloride.

## 3.0 DRYING

3.1 After evaluation of several methods of removing residual solvent, a fluidized-bed technique has proved to be the fastest and most reliable drying method.

3.2 A simple column with suitable retainers, as shown in Figure A-2, will serve as a satisfactory column. A 10.2-cm (4-in.) Pyrex pipe 0.6 m (2 ft) long will hold all of the XAD-2 from the extractor shown in Figure A-1 or the Soxhlet extractor, with sufficient space for fluidizing the bed while generating a minimum resin load at the exit of the column.

3.3 Method 1: The gas used to remove the solvent is the key to preserving the cleanliness of the XAD-2. Liquid nitrogen from a standard commercial liquid nitrogen cylinder has routinely proved to be a reliable source of large volumes of gas free from organic contaminants. The liquid nitrogen cylinder is connected to the column by a length of precleaned 0.95-cm (3/8-in.) copper tubing, coiled to pass through a heat source. As nitrogen is bled from the cylinder, it is vaporized in the heat source and passes through the column. A convenient heat source is a water bath heated from a steam line. The final nitrogen temperature should only be warm to the touch and not over 40°C. Experience has shown that about 500 g of XAD-2 may be dried overnight by consuming a full 160-liter cylinder of liquid nitrogen.

3.4 Method 2: As a second choice, high-purity tank nitrogen may be used to dry the XAD-2. The high-purity nitrogen must first be passed through a bed

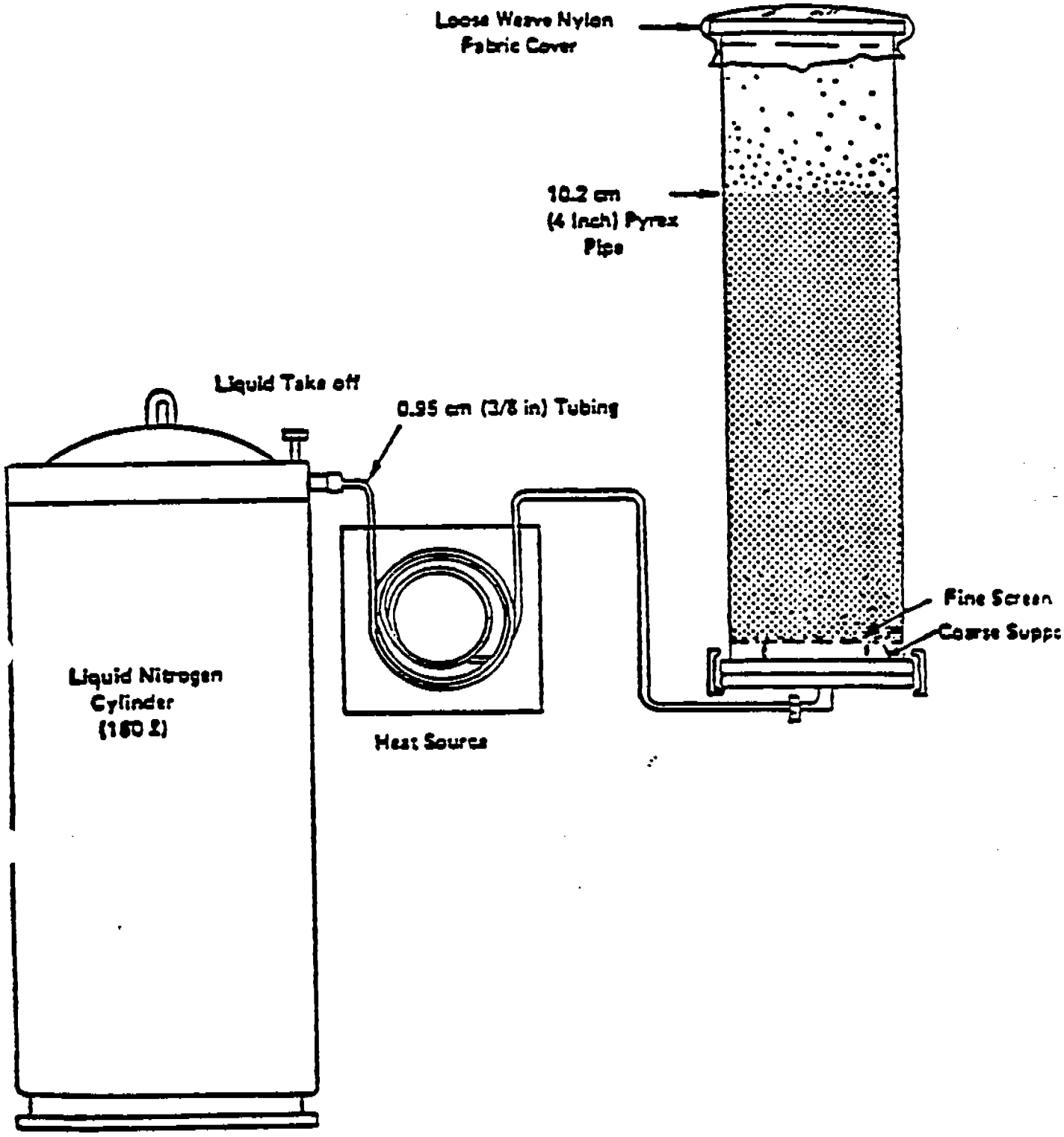



Figure A-2. XAD-2 fluidized-bed drying apparatus.

of activated charcoal approximately 150 mL in volume. With either type of drying method, the rate of flow should gently agitate the bed. Excessive fluidization may cause the particles to break up.

## 4.0 QUALITY CONTROL PROCEDURES

4.1 For both Methods 1 and 2, the quality control results must be reported for the batch. The batch must be reextracted if the residual extractable organics are >20 ug/mL by TCO analysis or the gravimetric residue is >0.5 mg/20 g XAD-2 extracted. (See also section 5.1, Method 0010.)

4.2 Four control procedures are used with the final XAD-2 to check for (1) residual methylene chloride, (2) extractable organics (TCO), (3) specific compounds of interest as determined by GC/MS, as described in Section 4.5 below, and (4) residue (GRAV).

4.3 Procedure for residual methylene chloride:

4.3.1 Description: A 1±0.1-g sample of dried resin is weighed into a small vial, 3 mL of toluene are added, and the vial is capped and well shaken. Five uL of toluene (now containing extracted methylene chloride) are injected into a gas chromatograph, and the resulting integrated area is compared with a reference standard. The reference solution consists of 2.5 uL of methylene chloride in 100 mL of toluene, simulating 100 ug of residual methylene chloride on the resin. The acceptable maximum content is 1,000 ug/g resin.

4.3.2 Experimental: The gas chromatograph conditions are as follows:

6-ft x 1/8-in. stainless steel column containing 10% OV-101 on 100/120 Supelcoport;

Helium carrier at 30 mL/min;

FID operated on 4 x $10^{-11}$ A/mV;

Injection port temperature: 250°C;

Detector temperature: 305°C;

Program: 30°C(4 min) 40°C/min 250°C (hold); and

Program terminated at 1,000 sec.

4.4 Procedure for residual extractable organics:

4.4.1 Description: A 20±0.1-g sample of cleaned, dried resin is weighed into a precleaned alundum or cellulose thimble which is plugged with cleaned glass wool. (Note that 20 g of resin will fill a thimble, and the

# TOTAL CHROMATOGRAPHABLE ORGANIC MATERIAL ANALYSIS

## 1.0 SCOPE AND APPLICATION

1.1 In this procedure, gas chromatography is used to determine the quantity of lower boiling hydrocarbons (boiling points between 90° and 300°C) in the concentrates of all organic solvent rinses, XAD-2 resin and LC fractions - when Method 1 is used (see References, Method 0010) - encountered in Level 1 environmental sample analyses. Data obtained using this procedure serve a twofold purpose. First, the total quantity of the lower boiling hydrocarbons in the sample is determined. Then whenever the hydrocarbon concentrations in the original concentrates exceed 75 $ug/m^3$, the chromatography results are reexamined to determine the amounts of individual species.

The extent of compound identification is limited to representing all materials as normal alkanes based upon comparison of boiling points. Thus the method is not qualitative. In a similar manner, the analysis is semiquantitative; calibrations are prepared using only one hydrocarbon. They are replicated but samples routinely are not.

1.2 Application: This procedure applies solely to the Level 1 C7-C16 gas chromatographic analysis of concentrates of organic extracts, neat liquids, and of LC fractions. Throughout the procedure, it is assumed the analyst has been given a properly prepared sample.

1.3 Sensitivity: The sensitivity of this procedure, defined as the slope of a plot of response versus concentration, is dependent on the instrument and must be verified regularly. TRW experience indicates the nominal range is of the order of 77 uV·V·sec·uL/ng of n-heptane and 79 uV·sec·ul/ng of n-hexadecane. The instrument is capable of perhaps one hundredfold greater sensitivity. The level specified here is sufficient for Level 1 analysis.

1.4 Detection limit: The detection limit of this procedure as written is 1.3 ng/uL for a 1 uL injection of n-decane. This limit is arbitrarily based on defining the minimum detectable response as 100 uv·sec. This is an easier operational definition than defining the minimum detection limit to be that amount of material which yields a signal twice the noise level.

1.5 Range: The range of the procedure will be concentrations of 1.3 ng/uL and greater.

1.6 Limitations

1.6.1 Reporting limitations: It should be noted that a typical environmental sample will contain compounds which: (a) will not elute in the specified boiling ranges and thus will not be reported, and/or (b)

resin will float out unless well plugged.) The thimble containing the resin is extracted for 24 hr with 200-mL of pesticide- grade methylene chloride (Burdick and Jackson pesticide-grade or equivalent purity). The 200-mL extract is reduced in volume to 10-mL using a Kuderna-Danish concentrator and/or a nitrogen evaporation stream. Five uL of that solution are analyzed by gas chromatography using the TCO analysis procedure. The concentrated solution should not contain >20 ug/mL of TCO extracted from the XAD-2. This is equivalent to 10 ug/g of TCO in the XAD-2 and would correspond to 1.3 mg of TCO in the extract of the 130-g XAD-2 module. Care should be taken to correct the TCO data for a solvent blank prepared (200 mL reduced to 10 mL) in a similar manner.

4.4.2 Experimental: Use the TCO analysis conditions described in the revised Level 1 manual (EPA 600/7-78-201).

4.5 GC/MS Screen: The extract, as prepared in paragraph 4.4.1, is subjected to GC/MS analysis for each of the individual compounds of interest. The GC/MS procedure is described in Chapter Four, Method 8270. The extract is screened at the MDL of each compound. The presence of any compound at a concentration >25 ug/mL in the concentrated extract will require the XAD-2 to be recleaned by repeating the methylene chloride step.

4.6 Methodology for residual gravimetric determination: After the TCO value and GC/MS data are obtained for the resin batch by the above procedures, dry the remainder of the extract in a tared vessel. There must be <0.5 mg residue registered or the batch of resin will have to be extracted with fresh methylene chloride again until it meets this criterion. This level corresponds to 25 ug/g in the XAD-2, or about 3.25 mg in a resin charge of 130 g.

will not elute from the column at all and thus will not be reported. Consequently, the organic content of the sample as reported is a lower bound and should be regarded as such.

1.6.2 **Calibration limitations:** Quantitation is based on calibration with n-decane. Data should therefore be reported as, e.g., mg C8/$m^3$ as n-decane. Since response varies linearly with carbon number (over a wide range the assumption may involve a 20% error), it is clear that heptane (C7) detected in a sample and quantitated as decane will be overestimated. Likewise, hexadecane (C16) quantitated as decane will be underestimated. From previous data, it is estimated the error involved is on the order of 6-7%.

1.6.3 **Detection limitations:** The sensitivity of the flame ionization detector varies from compound to compound. However, n-alkanes have a greater response than other classes. Consequently, using an n-alkane as a calibrant and assuming equal responses of all other compounds tends to give low reported values.

## 2.0 SUMMARY OF METHOD

2.1 A mL aliquot of all 10-mL concentrates is disbursed for GC-TCO analysis. With boiling point-retention time and response-amount calibration curves, the data (peak retention times and peak areas) are interpreted by first summing peak areas in the ranges obtained from the boiling point-retention time calibration. Then, with the response-amount calibration curve, the area sums are converted to amounts of material in the reported boiling point ranges.

2.2 After the instrument is set up, the boiling point-retention time calibration is effected by injecting a mixture of n-C7 through n-C16 hydrocarbons and operating the standard temperature program. Response-quantity calibrations are accomplished by injecting n-decane in n-pentane standards and performing the standard temperature program.

2.3 Definitions

2.3.1 **GC:** Gas chromatography or gas chromatograph.

2.3.2 **C7-C16 n-alkanes:** Heptane through hexadecane.

2.3.3 **GCA temperature program:** 4 min isothermal at 60°C, 10°C/min from 60° to 220°C.

2.3.4 **TRW temperature program:** 5 min isothermal at room temperature, then program from 30°C to 250°C at 15°C/min.

## 3.0 INTERFERENCES

Not applicable.

## 4.0 APPARATUS AND MATERIALS

4.1 Gas chromatograph: This procedure is intended for use on a Varian 1860 gas chromatograph, equipped with dual flame ionization detectors and a linear temperature programmer. Any equivalent instrument can be used provided that electrometer settings, etc., be changed appropriately.

4.2 Gases:

4.2.1 Helium: Minimum quality is reactor grade. A 4A or 13X molecular sieve drying tube is required. A filter must be placed between the trap and the instrument. The trap should be recharged after every third tank of helium.

4.2.2 Air: Zero grade is satisfactory.

4.2.3 Hydrogen: Zero grade.

4.3 Syringe: Syringes are Hamilton 701N, 10 uL, or equivalent.

4.4 Septa: Septa will be of such quality as to produce very low bleed during the temperature program. An appropriate septum is Supelco Microsep 138, which is Teflon-backed. If septum bleed cannot be reduced to a negligible level, it will be necessary to install septum swingers on the instrument.

4.5 Recorder: The recorder of this procedure must be capable of not less than 1 mV full-scale display, a 1-sec time constant and 0.5 in. per min chart rate.

4.6 Integrator: An integrator is required. Peak area measurement by hand is satisfactory but too time-consuming. If manual integration is required, the method of "height times width at half height" is used.

4.7 Columns:

4.7.1 Preferred column: 6 ft x 1/8 in. O.D. stainless steel column of 10% OV-101 on 100/120 mesh Supelcoport.

4.7.2 Alternate column: 6 ft x 1/8 in. O.D. stainless steel column of 10% OV-1 (or other silicon phase) on 100/120 mesh Supelcoport.

4.8 Syringe cleaner: Hamilton syringe cleaner or equivalent connected to a suitable vacuum source.

## 5.0 REAGENTS

5.1 Pentane: "Distilled-in-Glass" (reg. trademark) or "Nanograde" (reg. trademark) for standards and for syringe cleaning.

5.2 Methylene chloride: "Distilled-in-Glass" (reg. trademark) or "Nanograde" (reg. trademark) for syringe cleaning.

## 6.0 SAMPLING HANDLING AND PRESERVATION

6.1 The extracts are concentrated in a Kuderna-Danish evaporator to a volume less than 10 mL. The concentrate is then quantitatively transferred to a 10-mL volumetric flask and diluted to volume. A 1-mL aliquot is taken for both this analysis and possible subsequent GC/MS analysis and set aside in the sample bank. For each GC-TCO analysis, obtain the sample sufficiently in advance to allow it to warm to room temperature. For example, after one analysis is started, return that sample to the sample bank and take the next sample.

## 7.0 PROCEDURES

7.1 Setup and checkout: Each day, the operator will verify the following:

7.1.1 That supplies of carrier gas, air and hydrogen are sufficient, i.e., that each tank contains > 100 psig.

7.1.2 That, after replacement of any gas cylinder, all connections leading to the chromatograph have been leak-checked.

7.1.3 That the carrier gas flow rate is 30 ± 2 mL/min, the hydrogen flow rate is 30 ± 2 mL/min, and the air flow rate is 300 ± 20 mL/min.

7.1.4 That the electrometer is functioning properly.

7.1.5 That the recorder and integrator are functioning properly.

7.1.6 That the septa have been leak-checked (leak-checking is effected by placing the soap bubble flow meter inlet tube over the injection port adaptors), and that no septum will be used for more than 20 injections.

7.1.7 That the list of samples to be run is ready.

7.2 Retention time calibration:

7.2.1 To obtain the temperature ranges for reporting the results of the analyses, the chromatograph is given a normal boiling point-retention time calibration. The n-alkanes, their boiling points, and data reporting ranges are given in the table below:

| | NBP, °C | Reporting Range, °C | Report As |
|---|---|---|---|
| n-heptane | 98 | 90-110 | C7 |
| n-octane | 126 | 110-140 | C8 |
| n-nonane | 151 | 140-160 | C9 |
| n-decane | 174 | 160-180 | C10 |
| n-undecane | 194 | 180-200 | C11 |
| n-dodecane | 214 | 200-220 | C12 |
| n-tridecane | 234 | 220-240 | C13 |
| n-tetradecane | 252 | 240-260 | C14 |
| n-pentadecane | 270 | 260-280 | C15 |
| n-hexadecane | 288 | 280-300 | C16 |

7.2.2 Preparation of standards: Preparing a mixture of the C7-C16 alkanes is required. There are two approaches: (1) use of a standards kit (e.g., Polyscience Kit) containing bottles of mixtures of selected n-alkanes which may be combined to produce a C7-C16 standard; or (2) use of bottles of the individual C7-C16 alkanes from which accurately known volumes may be taken and combined to give a C7-C16 mixture.

7.2.3 Procedure for retention time calibration: This calibration is performed at the start of an analytical program; the mixture is chromatographed at the start of each day. To attain the required retention time precision, both the carrier gas flow rate and the temperature program specifications must be observed. Details of the procedure depend on the instrument being used. The general procedure is as follows:

7.2.3.1 Set the programmer upper limit at 250°C. If this setting does not produce a column temperature of 250°C, find the correct setting.

7.2.3.2 Set the programmer lower limit at 30°C.

7.2.3.3 Verify that the instrument and samples are at room temperature.

7.2.3.4 Inject 1 uL of the n-alkane mixture.

7.2.3.5 Start the integrator and recorder.

7.2.3.6 Allow the instrument to run isothermally at room temperature for five min.

7.2.3.7 Shut the oven door.

7.2.3.8 Change the mode to Automatic and start the temperature program.

7.2.3.9 Repeat Steps 1-9 a sufficient number of times so that the relative standard deviation of the retention times for each peak is <5%.

7.3 Response calibration:

7.3.1 For the purposes of a Level 1 analysis, response-quantity calibration with n-decane is adequate. A 10-uL volume of n-decane is injected into a tared 10 mL volumetric flask. The weight injected is obtained and the flask is diluted to the mark with n-pentane. This standard contains about 730 ng n-decane per uL n-pentane. The exact concentration depends on temperature, so that a weight is required. Two serial tenfold dilutions are made from this standard, giving standards at about 730, 73, and 7.3 ng n-decane per uL n-pentane, respectively.

7.3.2 Procedure for response calibration: This calibration is performed at the start of an analytical program and monthly thereafter. The most concentrated standard is injected once each day. Any change in calibration necessitates a full calibration with new standards. Standards are stored in the refrigerator locker and are made up monthly.

7.3.2.1 Verify that the instrument is set up properly.

7.3.2.2 Set electrometer at $1 \times 10^{-10}$ A/mV.

7.3.2.3 Inject 1 uL of the highest concentration standard.

7.3.2.4 Run standard temperature program as specified above.

7.3.2.5 Clean syringe.

7.3.2.6 Make repeated injections of all three standards until the relative standard deviations of the areas of each standard are ≤5%.

7.4 Sample analysis procedure:

7.4.1 The following apparatus is required:

7.4.1.1 Gas chromatograph set up and working.

7.4.1.2 Recorder, integrator working.

7.4.1.3 Syringe and syringe cleaning apparatus.

7.4.1.4 Parameters: Electrometer setting is $1 \times 10^{-10}$ A/mV; recorder is set at 0.5 in./min and 1 mV full-scale.

7.4.2 Steps in the procedure are:

7.4.2.1 Label chromatogram with the data, sample number, etc.

7.4.2.2 Inject sample.

7.4.2.3 Start integrator and recorder.

7.4.2.4 After isothermal operation for 5 min, begin temperature program.

7.4.2.5 Clean syringe.

7.4.2.6 Return sample; obtain new sample.

7.4.2.7 When analysis is finished, allow instrument to cool. Turn chromatogram and integrator output and data sheet over to data analyst.

7.5 Syringe cleaning procedure:

7.5.1 Remove plunger from syringe.

7.5.2 Insert syringe into cleaner; turn on aspirator.

7.5.3 Fill pipet with pentane; run pentane through syringe.

7.5.4 Repeat with methylene chloride from a separate pipet.

7.5.5 Flush plunger with pentane followed by methylene chloride.

7.5.6 Repeat with methylene chloride.

7.6 Sample analysis decision criterion: The data from the TCO analyses of organic extract and rinse concentrates are first used to calculate the total concentration of C7-C16 hydrocarbon-equivalents (Paragraph 7.7.3) in the sample with respect to the volume of air actually sampled, i.e., ug/$m^3$. On this basis, a decision is made both on whether to calculate the quantity of each n-alkane equivalent present and on which analytical procedural pathway will be followed. If the total organic content is great enough to warrant continuing the analysis -- >500 ug/$m^3$ -- a TCO of less than 75 ug/$m^3$ will require only LC fractionation and gravimetric determinations and IR spectra to be obtained on each fraction. If the TCO is greater than 75 ug/$m^3$, then the first seven LC fractions of each sample will be reanalyzed using this same gas chromatographic technique.

7.7 Calculations:

7.7.1 Boiling Point - Retention Time Calibration: The required data for this calibration are on the chromatogram and on the data sheet. The data reduction is performed as follows:

7.7.1.1 Average the retention times and calculate relative standard deviations for each n-hydrocarbon.

7.7.1.2 Plot average retention times as abscissae versus normal boiling points as ordinates.

7.7.1.3 Draw in calibration curve.

7.7.1.4 Locate and record retention times corresonding to boiling ranges 90-100, 110-140, 140-160, 160-180, 180-200, 200-220, 220-240, 240-260, 260-280, 280-300°C.

7.7.2 **Response-amount calibration:** The required data for this calibration are on the chromatogram and on the data sheet. The data reduction is performed as follows:

7.7.2.1 Average the area responses of each standard and calculate relative standard deviations.

7.7.2.2 Plot response (uv·sec) as ordinate versus ng/uL as abscissa.

7.7.2.3 Draw in the curve. Perform least squares regression and obtain slope (uV·sec·uL/ng).

7.7.3 **Total C7-C16 hydrocarbons analysis:** The required data for this calculation are on the chromatogram and on the data sheet. The data reduction is performed as follows:

7.7.3.1 Sum the areas of all peaks within the retention time range of interest.

7.7.3.2 Convert this area (uV·sec) to ng/uL by dividing by the weight response for n-decane (uV·sec.uL/ng).

7.7.3.3 Multiply this weight by the total concentrate volume (10 mL) to get the weight of the C7-C16 hydrocarbons in the sample.

7.7.3.4 Using the volume of gas sampled or the total weight of sample acquired, convert the result of Step 7.7.3.3 above to ug/$m^3$.

7.7.3.5 If the value of total C7-C16 hydrocarbons from Step 7.7.3.4 above exceeds 75 ug/$m^3$, calculate individual hydrocarbon concentrations in accordance with the instructions in Paragraph 7.7.5.5 below.

7.7.4 **Individual C7-C16 n-Alkane Equivalent Analysis:** The required data from the analyses are on the chromatogram and on the data sheet. The data reduction is performed as follows:

7.7.4.1 Sum the areas of peaks in the proper retention time ranges.

7.7.4.2 Convert areas (uV·sec) to ng/uL by dividing by the proper weight response (uV·sec·uL/ng).

7.7.4.3 Multiply each weight by total concentrate volume (10 mL) to get weight of species in each range of the sample.

7.7.4.4 Using the volume of gas sampled on the total weight of sample acquired, convert the result of Step 7.7.4.3 above to $ug/m^3$.

## 8.0 QUALITY CONTROL

8.1 Appropriate QC is found in the pertinent procedures throughout the method.

## 9.0 METHOD PERFORMANCE

9.1 Even relatively comprehensive error propagation analysis is beyond the scope of this procedure. With reasonable care, peak area reproducibility of a standard should be of the order of 1% RSD. The relative standard deviation of the sum of all peaks in a fairly complex waste might be of the order of 5-10%. Accuracy is more difficult to assess. With good analytical technique, accuracy and precision should be of the order of 10-20%.

## 10.0 REFERENCES

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7.4 Adsorption Tube Procedure (Alternative Procedure). It is suggested that the tester refer to the National Institute of Occupational Safety and Health (NIOSH) method for the particular organics to be sampled. The principal interferent will be water vapor. If water vapor is present at concentrations above 3 percent, silica gel should be used in front of the charcoal. Where more than one compound is present in the emissions, then develop relative adsorptive capacity information.

7.4.1 Additional Apparatus. In addition to the equipment listed in the NIOSH method for the particular organic(s) to be sampled, the following items (or equivalent) are suggested.

7.4.1.1 Probe (Optional). Borosilicate glass or stainless steel, approximately 6-mm ID, with a heating system if water condensation is a problem, and a filter (either in-stack or out-stack heated to stack temperature) to remove particulate matter. In most instances, a plug of glass wool is a satisfactory filter.

7.4.1.2 Flexible Tubing. To connect probe to adsorption tubes. Use a material that exhibits minimal sample adsorption.

7.4.1.3 Leakless Sample Pump. Flow controlled, constant rate pump, with a set of limiting (sonic) orifices to provide pumping rates from approximately 10 to 100 cc/min.

7.4.1.4 Bubble-Tube Flowmeter. Volume accuracy within ± 1 percent, to calibrate pump.

7.4.1.5 Stopwatch. To time sampling and pump rate calibration.

7.4.1.6 Adsorption Tubes. Similar to ones specified by NIOSH, except the amounts of adsorbent per primary/backup sections are 800/200 mg for charcoal tubes and 1040/260 mg for silica gel tubes. As an alternative, the tubes may contain a porous polymer adsorbent such as Tenax GC or XAD-2.

7.4.1.7 Barometer. Accurate to 5 mm Hg, to measure atmospheric pressure during sampling and pump calibration.

7.4.1.8 Rotameter. 0 to 100 cc/min, to detect changes in flow rate during sampling.

7.4.2 Sampling and Analysis. It is suggested that the tester follow the sampling and analysis portion of the respective NIOSH method section entitled "Procedure." Calibrate the pump and limiting orifice flow rate through adsorption tubes with the bubble tube flowmeter before sampling. The sample system can be operated as a "recirculating loop" for this operation. Record the ambient temperature and barometric pressure. Then, during sampling, use the ro-

METHOD 18—MEASUREMENT OF GASEOUS ORGANIC COMPOUND EMISSIONS BY GAS CHROMATOGRAPHY

tameter to verify that the pump and orifice sampling rate remains constant.

Use a sample probe, if required, to obtain the sample at the centroid of the duct, or at a point no closer to the walls than 1 m. Minimize the length of flexible tubing between the probe and adsorption tubes. Several adsorption tubes can be connected in series, if the extra adsorptive capacity is needed. Provide the gas sample to the sample system at a pressure sufficient for the limiting orifice to function as a sonic orifice. Record the total time and sample flow rate (or the number of pump strokes), the barometric pressure, and ambient temperature. Obtain a total sample volume commensurate with the expected concentration(s) of the volatile organic(s) present, and recommended sample loading factors (weight sample per weight adsorption media). Laboratory tests prior to actual sampling may be necessary to predetermine this volume. When more than one organic is present in the emissions, then develop relative adsorptive capacity information. If water vapor is present in the sample at concentrations above 2 to 3 percent, the adsorptive capacity may be severely reduced. Operate the gas chromatograph according to the manufacture's instructions. After establishing optimum conditions, verify and document these conditions during all operations. Analyze the audit samples (see Section 7.4.4.3), then the emission samples. Repeat the analysis of each sample until the relative deviation of two consecutive injections does not exceed 5 percent.

7.4.3 Standards and Calibration. The standards can be prepared according to the respective NIOSH method. Use a minimum of three different standards; select the concentrations to bracket the expected average sample concentration. Perform the calibration before and after each day's sample analyses. Prepare the calibration curve by using the least squares method.

7.4.4 Quality Assurance.

7.4.4.1 Determination of Desorption Efficiency. During the testing program, determine the desorption efficiency in the expected sample concentration range for each batch of adsorption media to be used. Use an internal standard. A minimum desorption efficiency of 50 percent shall be obtained. Repeat the desorption determination until the relative deviation of two consecutive determinations does not exceed 5 percent. Use the average desorption efficiency of these two consecutive determinations for the correction specified in Section 7.4.4.5. If the desorption efficiency of the compound(s) of interest is questionable under actual sampling conditions, use of the Method of Standard Additions may be helpful to determine this value.

7.4.4.2 Determination of Sample Collection Efficiency. For the source samples, analyze the primary and backup portions of the adsorption tubes separately. If the backup portion exceeds 10 percent of the total amount (primary and backup), repeat the sampling with a larger sampling portion.

7.4.4.3 Analysis Audit. Immediately before the sample analyses, analyze the two audits in accordance with Section 7.4.2. The analysis audit shall agree with the audit concentration within 10 percent.

7.4.4.4 Pump Leak Checks and Volume Flow Rate Checks. Perform both of these checks immediately after sampling with all sampling train components in place. Perform all leak checks according to the manufacturer's instructions, and record the results. Use the bubble-tube flowmeter to measure the pump volume flow rate with the orifice used in the test sampling, and the result. If it has changed by more than 5 but less than 20 percent, calculate an average flow rate for the test. If the flow rate has changed by more than 20 percent, recalibrate the pump and repeat the sampling.

7.4.4.5 Calculations. All calculations can be performed according to the respective NIOSH method. Correct all sample volumes to standard conditions. If a sample dilution system has been used, multiply the results by the appropriate dilution ratio. Correct all results by dividing by the desorption efficiency (decimal value). Report results as ppm by volume, dry basis.

7.5 Reporting of Results. At the completion of the field analysis portion of the study, ensure that the data sheets shown in Figure 18-11 have been completed. Summarize this data on the data sheets shown in Figure 18-15.

8. *Bibliography*

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## Method 18—Measurement of Gaseous Organic Compound Emissions by Gas Chromatography

*Introduction*

This method should not be attempted by persons unfamiliar with the performance characteristics of gas chromatography, nor by those persons who are unfamiliar with source sampling. Particular care should be exercised in the area of safety concerning choice of equipment and operation in potentially explosive atmospheres.

1. *Applicability and Principle*

1.1 Applicability. This method applies to the analysis of approximately 90 percent of the total gaseous organics emitted from an industrial source. It does not include techniques to identify and measure trace amounts of organic compounds, such as those found in building air and fugitive emission sources.

This method will not determine compounds that (1) are polymeric (high molecular weight), (2) can polymerize before analysis, or (3) have very low vapor pressures at stack or instrument conditions.

1.2 Principle.

The major organic components of a gas mixture are separated by gas chromatography (GC) and individually quantified by flame ionization, photoionization, electron capture, or other appropriate detection principles.

The retention times of each separated component are compared with those of known compounds under identical conditions. Therefore, the analyst confirms the identity and approximate concentrations of the organic emission components beforehand. With this information, the analyst then prepares or purchases commercially available standard mixtures to calibrate the GC under conditions identical to those of the samples. The analyst also determines the need for sample dilution to avoid detector saturation, gas stream filtration to eliminate particulate matter, and prevention of moisture condensation.

2. *Range and Sensitivity*

2.1 Range. The range of this method is from about 1 part per million (ppm) to the upper limit governed by GC detector saturation or column overloading. The upper limit can be extended by diluting the stack gases with an inert gas or by using smaller gas sampling loops.

2.2 Sensitivity. The sensitivity limit for a compound is defined as the minimum detectable concentration of that compound, or the concentration that produces a signal-to-noise ratio of three to one. The minimum detectable concentration is determined during the presurvey calibration for each compound.

3. *Precision and Accuracy*

Gas chromatographic techniques typically provide a precision of 5 to 10 percent relative standard deviation (RSD), but an experienced GC operator with a reliable instrument can readily achieve 5 percent RSD. For this method, the following combined GC/operator values are required.

(a) Precision. Duplicate analyses are within 5 percent of their mean value.

(b) Accuracy. Analysis results of prepared audit samples are within 10 percent of preparation values.

4. *Interferences*

Resolution interferences that may occur can be eliminated by appropriate GC column and detector choice or by shifting the retention times through changes in the column flow rate and the use of temperature programming.

The analytical system is demonstrated to be essentially free from contaminants by periodically analyzing blanks that consist of hydrocarbon-free air or nitrogen.

Sample cross-contamination that occurs when high-level and low-level samples or standards are analyzed alternately, is best

# APPENDIX L

## CALCULATION EQUATIONS

# METHOD 2
# CALCULATION EQUATIONS

$$\overline{V_s} = 85.49\ C_p\ (\sqrt{\Delta p})_{avg}\ \sqrt{\frac{T_{s(avg)}}{P_s\ M_s}}$$

$$Q_{s,\,d} = 60\ (1\ -B_{ws})\ \overline{V_s}\ A\ (\frac{528}{T_{s\ (avg)}})\ (\frac{P_s}{29.92})$$

$$Q_a = 60\ \overline{V_s}\ A$$

$$\dot{m}_g = \frac{4.995\ Q_{s,\,d}\ G_d}{1\ -\ B_{ws}}$$

$$RH^* = 100\ (vp_{twb}\ -\ 0.0003641\ P_s\ (T_{db}\ -\ T_{wb}))/vp_{tdb}$$

$$B^*_{ws} = RH(vp_{tdb})/P_s$$

$$\rho = \frac{4.585\ x\ 10^{-2}\ P_s M_s}{T_s\ (avg)}$$

*Alternate equations for calculating moisture content from wet bulb and dry bulb data.

## SYMBOLS

| | | |
|---|---|---|
| $A$ | = | Cross Sectional area of stack, SQ. FT. |
| $A_n$ | = | Cross sectional area of nozzle, SQ. FT. |
| $B_{ws}$ | = | Water vapor in gas stream, proportion by volume |
| $C_p$ | = | Pitot tube coefficient, dimensionless |
| $C_a$ | = | Concentration of particulate matter in stack gas, wet basis, GR/ACF |
| $C_s$ | = | Concentration of particulate matter in stack gas, dry basis, corrected to standard conditions, GR/DSCF |
| $EA$ | = | Excess air, percent by volume |
| $\gamma$ | = | Dry test meter correction factor, dimensionless |
| $G_d$ | = | Specific gravity (relative to air), dimensionless |
| $I$ | = | Isokinetic variation, percent by volume |
| $M_d$ | = | Molecular weight of stack gas, dry basis, g/g - mole. |
| $\dot{m}_g$ | = | Mass flow of wet flue gas, LB/HR |
| $\dot{m}_p$ | = | Particulate mass flow, LB/HR |
| $M_s$ | = | Molecular weight of stack gas, wet basis, g/g mole. |
| $M_p$ | = | Total amount of particulate matter collected, g |
| $P_{bar}$ | = | Atmospheric pressure, IN. HG. (uncompensated) |
| $P_g$ | = | Stack static gas pressure, IN. WC. |
| $P_s$ | = | Absolute pressure of stack gas, IN. HG. |
| $P_{std}$ | = | Standard absolute pressure, 29.92 IN. HG. |
| $A_n$ | = | Actual volumetric stack gas flow rate, ACFM |
| $Q_{s,d}$ | = | Dry volumetric stack gas flow rate corrected to standard conditions, DSCFM |
| $RH$ | = | Relative humidity, % |

| | | |
|---|---|---|
| $T_{db}$ | = | Dry bulb temperature of stack gas, °F |
| $T_{wb}$ | = | Wet bulb temperature of stack gas, °F |
| $T_{m(avg)}$ | = | Absolute average dry gas meter temperature, °R |
| $T_{s(avg)}$ | = | Absolute average stack temperature, °R |
| $T_{std}$ | = | Standard absolute temperature, 528 °R (68 °F) |
| $\theta$ | = | Total sampling time, min. |
| $V_{lc}$ | = | Total volume of liquid collected in impingers and silica gel, ml |
| $V_m$ | = | Volume of gas sample as measured by dry gas meter, CF |
| $V_{m(std)}$ | = | Volume of gas sample measured by the dry gas meter corrected to standard conditions, DSCF |
| $V_{w(std)}$ | = | Volume of water vapor in the gas sample corrected to standard conditions, SCF |
| $\bar{V}_s$ | = | Average actual stack gas velocity, FT/SEC |
| $vp_{tdb}$ | = | Vapor pressure at $T_{db}$, IN. HG. |
| $vp_{twb}$ | = | Vapor pressure at $T_{wb}$, IN. HG. |
| $\overline{\Delta H}$ | = | Average pressure differential across the orifice meter, IN. WC. |
| $\Delta P$ | = | Velocity pressure of stack gas, IN. WC. |
| $\gamma$ | = | Dry test meter correction coefficient, dimensionless |
| $\rho$ | = | Actual gas density, LB/ACF |

## METHOD 3
## CALCULATION EQUATIONS

$$\%EA = \frac{100(\%O_2 - 0.5\%\ CO)}{0.264\%\ N_2 - \%O_2 + 0.5\%\ CO}$$

$$M_d = 0.44(\%CO_2) + 0.32\ (\%O_2) + 0.28\ (\%N_2 + \%CO)$$

$$M_s = M_d\ (I - B_{ws}) + 0.18\ B_{ws}$$

$$B_{ws} = \frac{V_{w(std)}}{V_{w(std)} + V_{m(std)}}$$

## METHOD 5
## CALCULATION EQUATIONS

$$V_{m(std)} = 17.65\ V_m\ \gamma\ \left(\frac{P_{bar} + \overline{\Delta H}/13.6}{T_{m(avg)}}\right)$$

$$V_{w(std)} = 0.0472\ V_{lc}$$

$$B_{ws} = \frac{V_{w(std)}}{V_{w(std)} + V_{m(std)}}$$

$$I = 0.0944\ \left(\frac{T_{s(avg)}\ V_{m(std)}}{P_s\ V_s\ A_n\ \theta\ (I - B_{ws})}\right)$$

$$C_s = \frac{15.43\ M_p}{V_{m(std)}}$$

$$C_a = \frac{272.3\ M_p\ P_s}{T_{s(avg)}\ (V_{w(std)} + V_{m(std)})}$$

$$(\dot{m}_p)_1 = 8.5714\ x\ 10^{-3}\ C_s\ Q_{s,d}$$

$$(\dot{m}_p)_2 = \frac{1.3228 \times 10^{-1} M_p A}{\theta A_n}$$

$$\dot{m}_p = \frac{(\dot{m}_p)_1 + (\dot{m}_p)_2}{2}$$

## CALCULATION EQUATIONS

METHOD 7

$$V_{m(std)} = 17.64\ (V_f - 25)\ [\frac{p_f}{T_f} - \frac{P_i}{T_i}]$$

$$C_s = 6.243 \times 10^{-5}\ \frac{M}{V_{m(std)}}$$

$$E = \frac{2090\ C_s F}{20.9 - \overline{B}\ _{O_2}}$$

$$C_s\ (GR/DSCF) = 7000\ C_s$$

$$C_s\ (MG/DSCM) = 1.60186 \times 10^7\ C_s$$

$$C_s\ (ppm\text{-}dry) = 8.37552 \times 10^6\ C_s$$

$$C_s\ (ppm\text{-}3\%\ O_2) = 8.37552 \times 10^6\ C_s\ \{1 + [\frac{\overline{B'}\ _{O_2} - 3}{20.9 - B'\ _{O_2}}]\}$$

$$C_s\ (ppm\text{-}wet) = 8.37552 \times 10^6\ C_s\ (1 - \frac{MC}{100})$$

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## SYMBOLS

| | | |
|---|---|---|
| $\bar{B}\ O_2$ | = | Average oxygen content in flue gas, % v/v |
| $C_s$ | = | Concentration of nitrogen oxides in flue gas, dry basis, corrected to standard conditions, LB/DSCF |
| $C_s$ (GR/DSCF) | = | Concentration of nitrogen oxides in flue gas, dry basis, corrected to standard conditions, GR/DSCF |
| $C_s$ (MG/DSCM) | = | Concentration of nitrogen oxides in flue gas, dry basis, corrected to standard conditions, MG/DSCM |
| E | = | Emission factor, LB/$10^6$BTU |
| F | = | F-Factor for given fuel type, DSCF/$10^6$BTU |
| M | = | Mass of nitrogen oxides as nitrogen dioxide in gas sample, ug |
| MC | = | Moisture content of flue gas, % |
| $P_f$ | = | Final absolute pressure in flask, IN. HG |
| $P_i$ | = | Initial absolute pressure in flask, IN. HG |
| $C_s$ (ppm-dry) | = | Concentration of nitrogen oxides in flue gas, dry basis, (v/v), ppm |
| $C_s$ (ppm-3% $O_2$) | = | Concentration of nitrogen oxides in flue gas, dry basis, corrected to 3% $O_2$, (v/v) ppm |
| $C_s$ (ppm-wet) | = | Concentration of nitrogen oxides in flue gas, wet basis, (v/v), ppm |
| $T_f$ | = | Final absolute temperature in flask, °R |
| $T_i$ | = | Initial absolute temperature in flask, °R |
| $V_f$ | = | Volume of flask and valve, cc |
| $V_{m(std)}$ | = | Sample volume at standard conditions, dry basis, cc |

## CALCULATION EQUATIONS

METHOD 10

$$CO\cdot PPM\cdot DRY = CO_{CO_2} - free, dry, avg\ (1 - CO_2, d/100)$$

$$CO\cdot PPM\cdot WET = CO\cdot PPM\cdot DRY\ (1 - MC/100)$$

$$GR/DSCF = 5.0885\ X\ 10^{-4}\ (CO\cdot PPM\cdot DRY)$$

$$mg/dscm = 1.165\ (CO\cdot PPM\cdot DRY)$$

$$\dot{m} = 8.5714\ x\ 10^{-3}\ (GR/DSCF)\ (Q_{s,d})$$

$$E = \frac{2.9857\ x\ 10^{-3}\ F_d\ (GR/DSCF)}{20.9 - O_{2,d}}$$

where:

$CO_{CO_2}$ - *free, dry, avg*

= average of two determinations of carbon monoxide on a dry, $CO_2$ - free integrated flue gas sample reported in ppm by volume

$CO_{2,d}$ = carbon dioxide concentration of flue gas on a dry percent by volume basis

$O_{2,d}$ = oxygen concentration of flue gas on a dry percent by volume basis

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| | | |
|---|---|---|
| MC | = | moisture content of flue gas on a percent by volume basis |
| CO·PPM·DRY | = | carbon monoxide concentration in ppm by volume on a dry basis |
| CO·PPM·WET | = | carbon monoxide concentration in ppm by volume on a wet or actual basis |
| GR/DSCF | = | concentration of carbon monoxide in flue gas on a grains per dry standard cubic foot basis (68 °F, 29.92 IN. HG.) |
| mg/dscm | = | concentration of carbon monoxide in flue gas on a milligrams per dry standard cubic meter basis (60 °F, 29.92 IN. HG.) |
| $\dot{m}$ | = | emissions or mass rate of carbon monoxide on a LB/HR basis |
| $Q_{s,d}$ | = | volumetric flow rate of flue gas in dry standard cubic feet per minute |
| E | = | emission factor of carbon monoxide in pounds of carbon monoxide emitted per million BTU heat input (LB/MMBTU) |
| $F_d$ | = | F-Factor of respective fuel in dry standard cubic feet of exhaust gas at 0% oxygen per million BTU of heat input (DSCF/MMBTU) |

# METHOD 25A

## Total Gaseous Organics Calculation Equation

GR C/SCF = $2.180 \times 10^{-4}$ (ppm, w)

GR C/DSCF = $2.180 \times 10^{-4}$ (ppm, w)/(1-MC/100)

LB C/HR = $8.5714 \times 10^{-3}$ (GR/DSCF) (DSCFM)

where:

GR C/SCF = grains of total gaseous organics as carbon per actual (wet) standard cubic foot

GR C/DSCF = grains of total gaseous organics as carbon per dry standard cubic foot

LB C/HR = pounds of total gaseous organics as carbon emitted per hour

Note 1: The Ratfisch Model RS 55 Heated FID Analyzer as normally operated with a heated filter, sample line and heated detector oven gives ppm, w.

Note 2: ppm, C = ppm as carbon = 3(ppm propane)

## CALCULATION EQUATIONS

### Gas Chromatographic Method for Phenol in Air

PPM·DRY $= \frac{9.03 \times 10^{-3}\ \dot{m}_r}{V_{std}}$

PP·WET = PPM·DRY (1-MC/100)

GR/DSCF $= 1.709 \times 10^{-3}$ (PPM·DRY)

mg/dscm = 3.913 (PPM·DRY)

$\dot{m}$ $= 8.5714 \times 10^{-3}$ (GR/DSCF) ($Q_{s,d}$)

where:

PPM·DRY = concentration of phenol in gas in parts per million by volume on a dry basis

PPM·WET = concentration of phenol in gas in parts per million by volume on an actual or wet basis

MC = moisture content of gas on a percent by volume basis

GR/DSCF = concentration of phenol in gas on a grains per dry standard cubic foot basis (68 °F, 29.92 IN. HG.)

$\dot{m}$ = emission or mass rate of phenol in pounds per hour (LB/HR)

$Q_{s,d}$ = volumetric flow rate of stack gas in dry standard cubic feet per minute (DSCFM)

## CALCULATION EQUATIONS

### Chromotropic Acid Method for Formaldehyde

$$m_t = \frac{m_a \, V_{soln}}{V_{aliq}}$$

where:

| | | |
|---|---|---|
| $m_t$ | = | mass of formaldehyde in total sample in ug |
| $m_a$ | = | mass of formaldehyde in aliquot in ug |
| $V_{soln}$ | = | volume of total sample in cc (500 cc normally) |
| $V_{aliq}$ | = | volume of aliquot taken for analysis in cc |
| PPM·DRY | = | $\frac{0.0283 \, m_t}{V_{std}}$ |
| PPM·WET | = | PPM.DRY (1-MC/100) |
| GR/DSCF | = | $5.45 \times 10^{-4}$ (PPM·DRY) |
| mg/dscm | = | 1.249 (PPM·DRY) |
| $\dot{m}$ | = | $8.5714 \times 10^{-3}$ (GR/DSCF) ($Q_{s,d}$) |

where:

| | | |
|---|---|---|
| PPM·DRY | = | concentration of formaldehyde in parts per million by volume on a dry basis |
| PPM·WET | = | concentration of formaldehyde in parts per million by volume on an actual or wet basis |
| MC | = | moisture content of gas on a percent by volume basis |
| GR/DSCF | = | concentration of formaldehyde in gas on a grains per dry standard cubic foot basis (68 °F, 29.92 IN. HG.) |
| $\dot{m}$ | = | emission or mass rate of formaldehyde in pounds per hour (LB/HR) |
| $V_{std}$ | = | dry gas volume as measured by the dry gas meter, corrected to standard conditions (at 68 °F and 1 atmosphere) DSCF |

INTERPOLL LABORATORIES, INC

Concentration Calculation Equations for Benzene

1. **Structure:**



$C_6H_6$

2. **Molecular weight:**

78.11 g/g-mole

3. **Mass/volume Concentration:**

$$Cug/Nm3 = \frac{35.314\ m}{Vstd}$$

where m = Total mass of Benzene in sample in micrograms (ug), and

Vstd = Total volume of exhaust gas or air sampled in dry standard cubic feet (DSCF).

4. **Volume/volume Concentration:**

$$C_6H_6\ Cppmv = \left(\frac{mg}{Nm^3}\right) \times \left(\frac{24{,}054\ mL}{78.11\ mg}\right) = ppmV$$

$$C_6H_6\ Cppmv = 0.3080 \left(C_6H_6\ Cmg/Nm3\right)$$

5. **Notes:**

Derived by: D. DESPEN

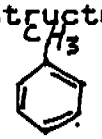
Date: 9-10-90

Form S-511

INTERPOLL LABORATORIES, INC

Concentration Calculation Equations for TOLUENE

1. Structure:



$C_7H_8$

2. Molecular weight:

92.14 g/g-mole

3. Mass/volume Concentration:

$$Cug/Nm3 = \frac{35.314\ m}{Vstd}$$

where $\frac{m}{Rd}$ = Total mass of toluene in sample in micrograms (ug), and

Vstd = Total volume of exhaust gas or air sampled in dry standard cubic feet (DSCF).

Rd = Percent by weight recovery of toluene by solvent desorption from charcoal.

4. Volume/volume Concentration:

$$C_7H_8\ Cppmv = \frac{24.054\ mL}{92.14\ mg} \cdot \frac{ug}{Nm^3}$$

$$C_7H_8\ Cppmv = 0.2611 \cdot Cug/Nm3$$

5. Notes:

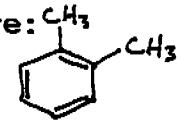
Derived by: P.L.

Date: 5-7-90

Form S-511

INTERPOLL LABORATORIES, INC

**Concentration Calculation Equations for** XYLENE(S)

**1. Structure:**  $C_8H_{10}$

**2. Molecular weight:**

106.17 g/g-mole

**3. Mass/volume Concentration:**

$$Cug/Nm3 = \frac{35.314\ m}{Vstd}$$

where $\frac{m}{Rd}$ = Total mass of xylene(s) in sample in micrograms (ug), and

Vstd = Total volume of exhaust gas or air sampled in dry standard cubic feet (DSCF).

Rd = Percent by weight recovery of n-butanol by solvent desorption from charcoal.

**4. Volume/volume Concentration:**

$$C_8H_{10}\ Cppmv = \frac{ug}{Nm^3} \cdot \frac{24.054\ ml}{106.17\ mg}$$

$$C_8H_{10}\ Cppmv = 0.2266 \cdot Cug/Nm3$$

**5. Notes:**

Derived by: P.L.

Date: 5-7-90

Form S-511

| | LP - Hayward | | | | |
|---|---|---|---|---|---|
| | | | Report No. 4-3097 | | |
| | OXIDES OF NITROGEN | | | | |
| | LB/HR CALCULATIONS | | | | |
| Line 1 Press RTO Stack | | | | | |
| RUN | NOx ppm | Flow | LB/DSCF | LB/HR | |
| 1 | 25 | 68420 | 2.98E-06 | 12.25361 | |
| 2 | 16.8 | 65960 | 2.01E-06 | 7.93836 | |
| 3 | 14.5 | 66160 | 1.73E-06 | 6.872335 | |
| Line 2 Press RTO Stack | | | | | |
| RUN | NOx ppm | Flow | LB/DSCF | LB/HR | |
| 1 | 14.2 | 81740 | 1.7E-06 | 8.31503 | |
| 2 | 12 | 80990 | 1.43E-06 | 6.962312 | |
| 3 | 8.4 | 79770 | 1E-06 | 4.800204 | |
| | CARBON MONOXIDE | | | | |
| | LB/HR CALCULATIONS | | | | |
| Line 1 Press RTO Stack | | | | | |
| RUN | CO ppm | Flow | LB/DSCF | LB/HR | |
| 1 | 17.2 | 68420 | 1.25E-06 | 5.130482 | |
| 2 | 9.7 | 65960 | 7.05E-07 | 2.789324 | |
| 3 | 8.7 | 66160 | 6.32E-07 | 2.509351 | |
| Line 2 Press RTO Stack | | | | | |
| RUN | CO ppm | Flow | LB/DSCF | LB/HR | |
| 1 | 9 | 81740 | 6.54E-07 | 3.207183 | |
| 2 | 12.6 | 80990 | 9.16E-07 | 4.448858 | |
| 3 | 11.5 | 79770 | 8.36E-07 | 3.999301 | |

Report No. 4-3097

# LOUISIANA-PACIFIC CORPORATION - Hayward

***Line 1 Konus Stack*** — Benzene Calculations

| BENZENE | | | Mass | Vstd | | Concentration | | | Flow | | Mass Rate |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Test/Run | | (ug) | (DSCF) | | (ppm,d) | | LB/DSCF | DSCFM | | (LB/HR) |
| | 9/1 | < | 2.1 | 1.981 | < | 0.011545 | < | 2.34E-09 | 10890 | < | 0.001527 |
| | 9/2 | < | 2.1 | 2.061 | < | 0.011097 | < | 2.25E-09 | 10670 | < | 0.001438 |
| | 9/3 | < | 2.1 | 1.991 | < | 0.011487 | < | 2.33E-09 | 10885 | < | 0.001519 |

***Line 2 Konus Stack***

| BENZENE | | | Mass | Vstd | | Concentration | | | Flow | | Mass Rate |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Test/Run | | (ug) | (DSCF) | | (ppm,d) | | LB/DSCF | DSCFM | | (LB/HR) |
| | 20/1 | < | 2.1 | 2.163 | < | 0.010574 | < | 2.14E-09 | 17895 | < | 0.002298 |
| | 20/2 | < | 2.1 | 2.048 | < | 0.011167 | < | 2.26E-09 | 17920 | < | 0.002431 |
| | 20/3 | < | 2.1 | 2.031 | < | 0.011261 | < | 2.28E-09 | 18140 | < | 0.002481 |

Report No. 4-3097

# LOUISIANA-PACIFIC - Hayward

***Line 1 Press RTO Outlet Stack***

| TEST # | RUN | MC% | CONC (ppmC,w) | GASFLOW (DSCFM) | MASSRATE (LB/HR) | AVERAGE (ppmC,w) | AVERAGE (LB/HR) | (GR/DSCF) |
|---|---|---|---|---|---|---|---|---|
| 3 | 1 | 2.45 | 3.03 | 68420 | 0.40 | | | 0.0006771 |
| | 2 | 3.06 | 2.92 | 65960 | 0.37 | | | 0.0006567 |
| | 3 | 2.93 | 2.41 | 66160 | 0.31 | | | 0.0005412 |
| | | | | | | 2.7866667 | 0.358429 | |

***Line 1 Press RTO Inlet***

| TEST # | RUN | MC% | CONC (ppmC,w) | GASFLOW (DSCFM) | MASSRATE (LB/HR) | AVERAGE (ppmC,w) | AVERAGE (LB/HR) | (GR/DSCF) |
|---|---|---|---|---|---|---|---|---|
| 5 | 1 | 1.92 | 95.6 | 61210 | 11.15 | | | 0.0212488 |
| | 2 | 2.46 | 54.5 | 61735 | 6.45 | | | 0.0121806 |
| | 3 | 2.3 | 42.1 | 61230 | 4.93 | | | 0.0093939 |
| | | | | | | 64.066667 | 7.507962 | |

***Line 2 Press RTO Stack***

| TEST # | RUN | MC% | CONC (ppmC,w) | GASFLOW (DSCFM) | MASSRATE (LB/HR) | AVERAGE (ppmC,w) | AVERAGE (LB/HR) | (GR/DSCF) |
|---|---|---|---|---|---|---|---|---|
| 14 | 1 | 2.35 | 1.71 | 81740 | 0.27 | | | 0.0003818 |
| | 2 | 2.55 | 1.53 | 80990 | 0.24 | | | 0.0003423 |
| | 3 | 2.05 | 1.59 | 79770 | 0.24 | | | 0.0003539 |
| | | | | | | 1.61 | 0.249008 | |

***Line 2 Press RTO Inlet***

| TEST # | RUN | MC% | CONC (ppmC,w) | GASFLOW (DSCFM) | MASSRATE (LB/HR) | AVERAGE (ppmC,w) | AVERAGE (LB/HR) | (GR/DSCF) |
|---|---|---|---|---|---|---|---|---|
| 21 | 1 | 2.46 | 88.6 | 82700 | 14.04 | | | 0.0198019 |
| | 2 | 2.37 | 52 | 85690 | 8.53 | | | 0.0116112 |
| | 3 | 2.58 | 53.6 | 88250 | 9.07 | | | 0.0119943 |
| | | | | | | 64.733333 | 10.54589 | |

| | | | | | | |
|---|---|---|---|---|---|---|
| | | **LP - HAYWARD** | | | Report No. 4-3097 | |
| | | Hayward, Wisconsin | | | | |
| | | ***EMISSION FACTOR CALCULATIONS*** | | | | |
| | | | **(F-Factor Method)** | | | |
| **Line 1 Konus Stack** | | | **NOx** | | | **Emission** |
| | | **F-Factor** | | **Concentr** | **Oxygen** | **Factor** |
| | Run # | DSCF/MMBTU | M | (ppm,d) | (%v/v,d) | LB/MMBTU |
| | 1 | 9600 | 46.01 | 78 | 14.5 | 0.2920 |
| | 2 | 9600 | 46.01 | 80 | 15.5 | 0.3549 |
| | 3 | 9600 | 46.01 | 70 | 13.5 | 0.2266 |
| | **AVG** | | | **76** | | **0.2912** |
| **Line 2 Konus Stack** | | | | | | **Emission** |
| | | **F-Factor** | | **Concentr** | **Oxygen** | **Factor** |
| | Run # | DSCF/MMBTU | M | (ppm,d) | (%v/v,d) | LB/MMBTU |
| | 1 | 9600 | 46.01 | 57 | 16.4 | 0.3035 |
| | 2 | 9600 | 46.01 | 58 | 16.5 | 0.3158 |
| | 3 | 9600 | 46.01 | 73 | 15.9 | 0.3498 |
| | **AVG** | | | **62.667** | | **0.3230** |
| **Line 1 Konus Stack** | | | **CO** | | | **Emission** |
| 6/8/94 | | **F-Factor** | | **Concentr** | **Oxygen** | **Factor** |
| Time | Run # | DSCF/MMBTU | M | (ppm,d) | (%v/v,d) | LB/MMBTU |
| 1538-1640 | 1 | 9600 | 28 | 92 | 14.5 | 0.2096 |
| 1708-1811 | 2 | 9600 | 28 | 90 | 15.5 | 0.2430 |
| 1835-1935 | 3 | 9600 | 28 | 704 | 13.5 | 1.3870 |
| | **AVG** | | | **295.33** | | **0.6132** |
| 6/9/94 | | | | | | |
| 1345-1606 | 1 | 9600 | 28 | 61 | 14.5 | 0.1390 |
| 1632-1743 | 2 | 9600 | 28 | 179 | 13.5 | 0.3527 |
| 1802-1904 | 3 | 9600 | 28 | 53 | 14.2 | 0.1153 |
| | **AVG** | | | **97.667** | | **0.2023** |
| | | | | | | |
| 0851-1052 | 1 | 9600 | 28 | 105 | 15.4 | 0.2783 |
| 1240-1534 | 2 | 9600 | 28 | 104 | 14.9 | 0.2527 |
| 1610-1812 | 3 | 9600 | 28 | 135 | 13.8 | 0.2772 |
| | **AVG** | | | **114.67** | | **0.2694** |
| **Line 2 Konus Stack** | | | | | | **Emission** |
| | | **F-Factor** | | **Concentr** | **Oxygen** | **Factor** |
| | Run # | DSCF/MMBTU | M | (ppm,d) | (%v/v,d) | LB/MMBTU |
| | 1 | 9600 | 28 | 73 | 16.4 | 0.2365 |
| | 2 | 9600 | 28 | 67 | 16.5 | 0.2220 |
| | 3 | 9600 | 28 | 62 | 15.9 | 0.1808 |
| | **AVG** | | | **67.333** | | **0.2131** |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | | | | | Report No. 4-3097 | |
| | | | | **LP - Hayward** | | | | |
| | | | | **Hayward, Wisconsin** | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| **Line 1 Press RTO Stack** | | | | | **MDI CALCULATIONS** | | | |
| 6/8/94 | | | | | | | | |
| | **TIME** | **Vstd** | | **Mass** | **Flow** | **Conc** | **Conc** | **Mass Rate** |
| RUN # | (HRS) | (DSCF) | | (ug) | DSCFM | (mg/Nm3) | ppm | (LB/HR) |
| 1 | 0815-0916 | 36.45 | | 5.2 | 68445 | 0.00504 | 0.000484 | 0.001292 |
| 2 | 0945-1046 | 36.62 | < | 2.5 | 68680 | 0.00241 | 0.000232 | 0.00062 |
| 3 | 1115-1216 | 37.05 | | 5.4 | 69700 | 0.00515 | 0.000495 | 0.001344 |
| **Avg** | | | | | | | **0.000403** | **0.001085** |
| | | | | | | | | |
| **Line 2 Press RTO Stack** | | | | | | | | |
| 6/9/94 | | | | | | | | |
| | **TIME** | **Vstd** | | **Mass** | **Flow** | **Conc** | **Conc** | **Mass Rate** |
| RUN # | (HRS) | (DSCF) | | (ug) | DSCFM | (mg/Nm3) | ppm | (LB/HR) |
| 1 | 1325-1440 | 56.78 | | 12.2 | 79900 | 0.00759 | 0.000729 | 0.002271 |
| 2 | 1518-1641 | 34.34 | < | 2.5 | 77760 | < 0.00257 | < 0.000247 | < 0.000749 |
| 3 | 1712-1828 | 36.12 | | 6.5 | 81990 | 0.00635 | 0.000611 | 0.001952 |
| **Avg** | | | | | | | **0.000529** | **0.001657** |

# APPENDIX M

## SAMPLING TRAIN CALIBRATION DATA

**INTERPOLL LABORATORIES**
EPA Method 5 Gas Metering System
Quality Control Check Data Sheet

Job L.P Hayward Date 6/10/91

Operator Dick Module No. 6

Instructions: Operate the control module at a flow rate equal to ^H@ for 10 minutes before attaching the umbilical. Record the following data:

Bar press 28.76 in. Hg. $Y$ = .9947 ^H@ 1.97 in. W.C.

| Time (min) | Volume (CF) | Meter Temp. (°F) | |
|---|---|---|---|
| | | Inlet | Outlet |
| [redacted] | (892.60) | [redacted] | |
| 2.5 | 894.49 | 66 | 63 |
| 5.0 | 896.40 | 70 | 63 |
| 7.5 | 898.39 | 74 | 64 |
| 10 | 900.29 | 77 | 64 |
| [redacted] | $V_m$= 7.69 | Avg($t_m$)= 67.62 °F | |

Calculate $Y_{cn}$ as follows:

$$Y_{cn} = \frac{1.786}{Y V_m}\left[\frac{(t_m + 460)}{P_b}\right]^{0.5}$$

$$Y_{cn} = \frac{1.786}{(.9947)(7.69)}\left[\frac{(67.62) + 460}{(28.76)}\right]^{0.5}$$

$Y_{cn}$ = 1.0000

If $Y_{cn}$ is not within the range of 0.97 to 1.03, "the volume metering system should be investigated before beginning."

CFR Title 40, Part 60, Appendix A, Method 5, Section 4.4.1

S-432

Interpoll Laboratories. Inc.
(612) 786-6060

## EPA Method 5 Gas Metering System Quality Control Check Data Sheet

Job L.P. / Hayward, WI  Date 6-10-94

Operator M. Kaeble  Module No. 9

Instructions: Operate the control module at a flow rate equal to ^H@ for 10 minutes before attaching the umbilical. Record the following data:

Bar press 28.93 in. Hg. $\gamma$ = .9961 ^H@ 1.78 in. W.C.

| Time (min) | Volume (CF) | Meter Temp. (°F) | |
|---|---|---|---|
| | | Inlet | Outlet |
| [redacted] | (954.00) | [redacted] | |
| 2.5 | 955.94 | 61 | 60 |
| 5.0 | 957.89 | 62 | 60 |
| 7.5 | 959.84 | 65 | 61 |
| 10 | 961.78 | 67 | 61 |
| [redacted] | $V_m$ = 7.78 | Avg($t_m$) = 62.13 | °F |

Calculate $Y_{en}$ as follows:

$$Y_{en} = \frac{1.786}{\gamma\ V_m}\left[\frac{(t_m + 460)}{P_b}\right]^{0.5}$$

$$Y_{en} = \frac{1.786}{(.9961)(7.78)}\left[\frac{(62.13) + 460}{(28.93)}\right]^{0.5}$$

$$Y_{en} = 1.979$$

If $Y_{en}$ is not within the range of 0.97 to 1.03, "the volume metering system should be investigated before beginning."

CFR Title 40, Part 60, Appendix A, Method 5, Section 4.4.1

S-432R

**INTERPOLL LABORATORIES**
EPA Method 5 Gas Metering System
Quality Control Check Data Sheet

Job L.P. / Hayward, CA Date 6-9-94

Operator M. Kaehler Module No. 9

Instructions: Operate the control module at a flow rate equal to ^H@ for 10 minutes before attaching the umbilical. Record the following data:

Bar press 29.90 in. Hg. $_T$ = .9961 ^H@ 1.78 in. W.C.

| Time (min) | Volume (CF) | Meter Temp. (°F) | |
|---|---|---|---|
| | | Inlet | Outlet |
| [redacted] | (668.90) | [redacted] | |
| 2.5 | 670.92 | 56 | 55 |
| 5.0 | 672.78 | 57 | 56 |
| 7.5 | 674.68 | 59 | 56 |
| 10 | 676.62 | 60 | 57 |
| [redacted] | $V_m$= 7.72 | Avg($t_m$)= 57.00 | °F |

Calculate $Y_{cn}$ as follows:

$$Y_{cn} = \frac{1.786}{T\ V_m}\left[\frac{(t_m + 460)}{P_b}\right]^{0.5}$$

$$Y_{cn} = \frac{1.786}{(.9961)(7.72)}\left[\frac{(57.00) + 460}{(28.90)}\right]^{0.5}$$

$$Y_{cn} = .982$$

If $Y_{cn}$ is not within the range of 0.97 to 1.03, "the volume metering system should be investigated before beginning."

CFR Title 40, Part 60, Appendix A, Method 5, Section 4.4.1

S-432

**INTERPOLL LABORATORIES**
EPA Method 5 Gas Metering System
Quality Control Check Data Sheet

Job L.P. / Hayward, WI — Date 6-8-94

Operator M. Kaubler — Module No. 9

Instructions: Operate the control module at a flow rate equal to ^H@ for 10 minutes before attaching the umbilical. Record the following data:

Bar press 29.98 in. Hg. $\tau$ = .9961 ^H@ 1.78 in. W.C.

| Time (min) | Volume (CF) | Meter Temp. (°F) | |
|---|---|---|---|
| | | Inlet | Outlet |
| [redacted] | (343.40) | [redacted] | |
| 2.5 | 345.35 | 48 | 48 |
| 5.0 | 347.25 | 49 | 48 |
| 7.5 | 349.16 | 50 | 49 |
| 10 | 351.09 | 52 | 49 |
| [redacted] | $V_m$ = 7.69 | Avg($t_m$) = 49.125 | °F |

Calculate $Y_{cn}$ as follows:

$$Y_{cn} = \frac{1.786}{\tau\, V_m}\left[\frac{(t_m + 460)}{P_b}\right]^{0.5}$$

$$Y_{cn} = \frac{1.786}{(.9961)(7.69)}\left[\frac{(49.125) + 460}{(29.98)}\right]^{0.5}$$

$Y_{cn}$ = .977

If $Y_{cn}$ is not within the range of 0.97 to 1.03, "the volume metering system should be investigated before beginning."

CFR Title 40, Part 60, Appendix A, Method 5, Section 4.4.1

S-432

Interpoll Laboratories, Inc.
(612) 786-6060

## EPA Method 5 Gas Metering System Quality Control Check Data Sheet

Job L.P. / Hayward, WI Date 6-8-94

Operator M. Kaehler Module No. 10

**Instructions:** Operate the control module at a flow rate equal to ^H@ for 10 minutes before attaching the umbilical. Record the following data:

Bar press 28.98 in. Hg. $\gamma$ = .9930 ^H@ 1.77 in. W.C.

| Time (min) | Volume (CF) | Meter Temp. (°F) | |
|---|---|---|---|
| | | Inlet | Outlet |
| [redacted] | (571.00) | [redacted] | |
| 2.5 | 572.90 | 71 | 67 |
| 5.0 | 574.80 | 73 | 67 |
| 7.5 | 576.69 | 76 | 68 |
| 10 | 578.58 | 79 | 68 |
| [redacted] | $V_m$=7.58 | Avg($t_m$)=47.42 | °F |

Calculate $Y_{en}$ as follows:

$$Y_{en} = \frac{1.786}{\gamma V_m}\left[\frac{(t_m + 460)}{P_b}\right]^{0.5}$$

$$Y_{en} = \frac{1.786}{(.9930)(7.58)}\left[\frac{(47.42) + 460}{(28.98)}\right]^{0.5}$$

$$Y_{en} = .993$$

If $Y_{en}$ is not within the range of 0.97 to 1.03, "the volume metering system should be investigated before beginning."

CFR Title 40, Part 60, Appendix A, Method 5, Section 4.4.1

S-432R

**INTERPOLL LABORATORIES**
EPA Method 5 Gas Metering System
Quality Control Check Data Sheet

Job LP – HAYWARD Date 6-7-94

Operator SLB Module No. 19

Instructions: Operate the control module at a flow rate equal to ^H@ for 10 minutes before attaching the umbilical. Record the following data:

Bar press 28.59 in. Hg. $Y_T$ = 1.0066 ^H@ 1.85 in. W.C.

| Time (min) | Volume (CF) | Meter Temp. (°F) | |
|---|---|---|---|
| | | Inlet | Outlet |
| [redacted] | (531.00) | [redacted] | |
| 2.5 | 532.94 | 78 | 77 |
| 5.0 | 534.84 | 79 | 76 |
| 7.5 | 536.75 | 81 | 76 |
| 10 | 538.74 | 83 | 77 |
| [redacted] | $V_m$=7.74 | Avg($t_m$)=79.38 | °F |

Calculate $Y_{cn}$ as follows:

$$Y_{cn} = \frac{1.786}{Y_T V_m}\left[\frac{(t_m + 460)}{P_b}\right]^{0.5}$$

$$Y_{cn} = \frac{1.786}{(1.0066)(7.74)}\left[\frac{(78-34) + 460}{28.59}\right]^{0.5}$$

$Y_{cn}$ = 0.9948

If $Y_{cn}$ is not within the range of 0.97 to 1.03, "the volume metering system should be investigated before beginning."

CFR Title 40, Part 60, Appendix A, Method 5, Section 4.4.1

S-432

**INTERPOLL LABORATORIES**
EPA Method 5 Gas Metering System
Quality Control Check Data Sheet

Job L.P. / Hayward, wi. Date 6-7-94

Operator M. Kaehler Module No. ____

Instructions: Operate the control module at a flow rate equal to ^H@ for 10 minutes before attaching the umbilical. Record the following data:

Bar press 28.73 in. Hg. $_T$ = .9961 ^H@ 1.75 in. W.C.

| Time (min) | Volume (CF) | Meter Temp. (°F) | |
|---|---|---|---|
| | | Inlet | Outlet |
| [redacted] | (990.30) | [redacted] | |
| 2.5 | 992.23 | 64 | 64 |
| 5.0 | 994.15 | 65 | 64 |
| 7.5 | 996.10 | 65 | 64 |
| 10 | 999.02 | 69 | 60 |
| [redacted] | $V_m$= 7.72 | Avg($t_m$)= 65.25 | °F |

Calculate $Y_{cn}$ as follows:

$$Y_{cn} = \frac{1.786}{T \cdot V_m}\left[\frac{(t_m + 460)}{P_b}\right]^{0.5}$$

$$Y_{cn} = \frac{1.786}{(.9961)(7.72)}\left[\frac{(65.25) + 460}{(28.73)}\right]^{0.5}$$

$Y_{cn}$ = .993

If $Y_{cn}$ is not within the range of 0.97 to 1.03, "the volume metering system should be investigated before beginning."

CFR Title 40, Part 60, Appendix A, Method 5, Section 4.4.1

S-432

Interpoll Laboratories, Inc.
(612) 786-6020

Meter Box Calibration and Usage Status

Date of Report: July 20, 1994

Meter Box No. : 2 (Rockwell Dry Test Meter Serial No. 964551)

Date of Last Calibration: March 24, 1994
Calibration Technician: E. Trowbridge
Wet Test Meter No.: American Meter AL-20

| Date of Use | Report No. | Initial Meter Reading | Final Meter Reading | Volume/Job (cu. ft.) | Total Volume* (cu. ft.) |
|---|---|---|---|---|---|
| March 30, 1994 | 4-2559 | 994.50 | 1149.99 | 155.49 | 155.49 |
| April 6, 1994 | 4-2598 | 1160.80 | 1592.09 | 431.29 | 586.78 |
| June 8, 1994 | 4-3097 | 1781.90 | 2184.95 | 403.05 | 989.83 |

* Total volume through meter since last calibration.

Interpoll Laboratories, Inc.
(612) 786-6020

Meter Box Calibration and Usage Status

Date of Report: July 20, 1994

Meter Box No. : 3 (Rockwell Dry Test Meter Serial No. 949231)

Date of Last Calibration: April 21, 1994
Calibration Technician: E. Trowbridge
Wet Test Meter No.: American Meter AL-20

| Date of Use | Report No. | Initial Meter Reading | Final Meter Reading | Volume/Job (cu. ft.) | Total Volume* (cu. ft.) |
|---|---|---|---|---|---|
| April 26, 1994 | 4-2738 | 322.70 | 421.10 | 98.4 | 98.4 |
| May 24, 1994 | 4-2971 | 458.20 | 933.28 | 475.08 | 573.48 |
| June 02, 1994 | 4-3022 | 941.81 | 1216.25 | 274.44 | 847.92 |
| June 09, 1994 | 4-3097 | 1216.62 | 1354.67 | 138.05 | 985.97 |

* Total volume through meter since last calibration.

Interpoll Laboratories, Inc.
(612) 786-6020

Meter Box Calibration and Usage Status

Date of Report: July 21, 1994

Meter Box No. : 6 (Rockwell Dry Test Meter Serial No. 964548)

Date of Last Calibration: May 31, 1994
Calibration Technician: E. Trowbridge
Wet Test Meter No.: American Meter AL-20

| Date of Use | Report No. | Initial Meter Reading | Final Meter Reading | Volume/Job (cu. ft.) | Total Volume* (cu. ft.) |
|---|---|---|---|---|---|
| June 08, 1994 | 4-3097 | 394.96 | 1054.55 | 659.59 | 659.59 |

* Total volume through meter since last calibration.

Interpoll Laboratories, Inc.
(612) 786-6020

Meter Box Calibration and Usage Status

Date of Report: July 21, 1994

Meter Box No. : 9 (Rockwell Dry Test Meter Serial No. 964549)

Date of Last Calibration: March 24, 1994
Calibration Technician: E. Trowbridge
Wet Test Meter No.: American Meter AL-20

| Date of Use | Report No. | Initial Meter Reading | Final Meter Reading | Volume/Job (cu. ft.) | Total Volume* (cu. ft.) |
|---|---|---|---|---|---|
| April 06, 1994 | 4-2597 | 261.00 | 391.84 | 130.84 | 130.84 |
| April 12, 1994 | 4-2649 | 400.30 | 612.20 | 211.90 | 342.74 |
| May 10, 1994 | 4-2837 | 624.20 | 1606.81 | 982.61 | 1325.35 |
| May 17, 1994 | 4-2893 | 1615.60 | 1826.77 | 211.17 | 1536.52 |
| June 02, 1994 | 4-3068 | 1842.90 | 1989.75 | 146.85 | 1683.37 |
| June 09, 1994 | 4-3097 | 1998.20 | 3111.64 | 1113.44 | 2796.81 |

* Total volume through meter since last calibration.

Interpoll Laboratories, Inc.
(612) 786-6020

Meter Box Calibration and Usage Status

Date of Report: July 20, 1994

Meter Box No. : 14 (Rockwell Dry Test Meter Serial No. 1334119)

Date of Last Calibration: April 25, 1994
Calibration Technician: E. Trowbridge
Wet Test Meter No.: American Meter AL-20

| Date of Use | Report No. | Initial Meter Reading | Final Meter Reading | Volume/Job (cu. ft.) | Total Volume* (cu. ft.) |
|---|---|---|---|---|---|
| April 29, 1994 | 4-2743 | 373.45 | 477.56 | 104.11 | 104.11 |
| May 03, 1994 | 4-2801 | 486.40 | 703.12 | 216.72 | 320.83 |
| May 05, 1994 | 4-2800 | 711.35 | 953.51 | 242.16 | 562.99 |
| May 24, 1994 | 4-2971 | 953.75 | 1291.90 | 338.15 | 901.14 |
| June 01, 1994 | 4-3026 | 1301.15 | 1530.75 | 229.60 | 1130.74 |
| June 07, 1994 | 4-3097 | 1538.90 | 2301.98 | 763.08 | 1893.82 |

* Total volume through meter since last calibration.

Interpoll Laboratories, Inc.
(612) 786-6020

# Meter Box Calibration and Usage Status

Date of Report: July 20, 1994

Meter Box No. : 10 (Rockwell Dry Test Meter Serial No. 1334112)

Date of Last Calibration: May 31, 1994
Calibration Technician: E. Trowbridge
Wet Test Meter No.: American Meter AL-20

| Date of Use | Report No. | Initial Meter Reading | Final Meter Reading | Volume/Job (cu. ft.) | Total Volume* (cu. ft.) |
|---|---|---|---|---|---|
| June 01, 1994 | 4-3020 | 104.50 | 570.30 | 465.80 | 465.80 |
| June 09, 1994 | 4-3097 | 578.60 | 717.65 | 139.05 | 604.85 |

* Total volume through meter since last calibration.

Interpoll Laboratories, Inc.
(612) 786-6020

Meter Box Calibration and Usage Status

Date of Report: July 20, 1994

Meter Box No. : 2-S (Rockwell Dry Test Meter Serial No. 69185)

Date of Last Calibration: January 13, 1994
Calibration Technician: S. Bainville
Wet Test Meter No.: American Meter AL-17 (0.05 CF/REV)

| Date of Use | Report No. | Initial Meter Reading | Final Meter Reading | Volume/Job (cu. ft.) | Total Volume* (cu. ft.) |
|---|---|---|---|---|---|
| January 20, 1994 | 4-2118 | 396.000 | 398.532 | 2.532 | 2.532 |
| March 04, 1994 | 4-2384 | 406.300 | 433.333 | 27.033 | 29.565 |
| May 11, 1994 | 4-2839 | 434.450 | 436.850 | 2.400 | 31.965 |
| June 09, 1994 | 4-3097 | 436.910 | 443.688 | 6.778 | 38.743 |

* Total volume through meter since last calibration.

Interpoll Laboratories, Inc.
(612) 786-6020

Meter Box Calibration and Usage Status

Date of Report: July 25, 1994

Meter Box No. : 5-S (Rockwell Dry Test Meter Serial No. 64711)
Date of Last Calibration: January 21, 1994
Calibration Technician: S. Bainville

Wet Test Meter No.: American Meter AL-17 (0.05 CF/REV)

| Date of Use | Report No. | Initial Meter Reading | Final Meter Reading | Volume/Job (cu. ft.) | Total Volume* (cu. ft.) |
|---|---|---|---|---|---|
| March 08, 1994 | 4-2410 | 905.624 | 911.374 | 5.750 | 5.750 |
| March 22, 1994 | 4-2518 | 911.400 | 915.157 | 3.757 | 9.507 |
| April 12, 1994 | 4-2117 | 915.426 | 921.422 | 5.996 | 15.503 |
| June 07, 1994 | 4-3097 | 921.500 | 929.139 | 7.639 | 23.142 |

* Total volume through meter since last calibration.

Date 3-24-94

Bar. Press. 29.00 in. Hg

INTERPOLL LABORATORIES, INC.
METER CALIBRATION SHEET
EPA METHOD 5

Control Module No. 2
Serial No. DTM 964551
Wet Test Meter No. AL-20
Technician [signature]

| ΔH (in. WC) | | Gas Volume Wet Test Meter ($ft^3$) | * Cal. Index θ (%) | * Diff. Wet Test Meter $\Delta P_w$ (in. WC) | Gas Volume Dry test meter ($ft^3$) | | Gas temperatures | | | Time θ (min/sec) | Meter Coeff. Y | Orifice Const. ΔH@ | $C_f$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | Wet Test | Dry Test | | | | | |
| nominal | actual | | | | $V_{di}$ | $V_{df}$ | $t_w$ (°F) | $t_{di}$ (°F) | $t_{do}$ (°F) | | | | |
| 0.6 | .5 | 2 | 99.85 | 0.01 | 965.500 | 967.525 | 66 | 83 | 68 | 4/58 | 1.002 | 1.75 | |
| 1.2 | 1.2 | 3 | 99.91 | 0.025 | 962.000 | 965.056 | 66 | 80 | 67 | 4/46 | .9936 | 1.72 | |
| 2.0 | 2.0 | 3 | 99.93 | 0.055 | 965.000 | 971.061 | 66 | 90 | 70 | 3/46 | 1.0002 | 1.77 | |
| 3.3 | 3.3 | 5 | 100.00 | 0.09 | 971.500 | 976.642 | 66 | 96 | 72 | 4/56 | .9976 | 1.79 | |
| 4.7 | 4.7 | 5 | 100.02 | 0.12 | 979.000 | 982.161 | 66 | 99 | 73 | 4/10 | .9937 | 1.81 | |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | .9974 | 1.77 | |

Positive leak check performed by [signature]
Meter was in tolerance ☒
Meter was not in tolerance ☐; readjusted linkage
Meter was not in tolerance ☐; changed dry test meters

Approved by [signature] Date 4/4/94

* Based on AL-20 wet test meter calibration in Nov. 1991 against Bell Prover (NBS Traceable) - Carl Poe Co.

Date 4-21-94

Bar. Press. 29.32 in. Hg

INTERPOLL LABORATORIES, INC.
METER CALIBRATION SHEET
EPA METHOD 6

Control Module No. 3
Serial No. DTM 949231
Wet Test Meter No. AL-20
Technician [signature]

| ΔH (in. WC) | | Gas Volume Wet Test Meter ($ft^3$) | * Cal. Index θ (X) | * Diff. Wet Test Meter $\Delta P_w$ (in.WC) | Gas Volume Dry test meter ($ft^3$) | | Gas temperatures | | | Time θ | Meter Coeff. | Orifice Const. | $C_f$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | Wet Test | Dry Test | | | | | |
| nominal | actual | | | | $V_{d1}$ | $V_{df}$ | $t_w$ (°F) | $t_{d1}$ (°F) | $t_{df}$ (°F) | min/sec | Y | ΔH@ | |
| 0.5 | .5 | 2 | 99.85 | 0.01 | 290.000 | 292.029 | 66.5 | 79 | 73 | 4/56 | .9969 | 1.72 | |
| 1.2 | 1.2 | 3 | 99.91 | 0.025 | 286.500 | 289.533 | 68.5 | 77 | 71 | 4/50 | .9954 | 1.76 | |
| 2.0 | 2.0 | 3 | 99.93 | 0.055 | 292.500 | 295.541 | 68.5 | 84 | 74 | 3/49 | 1.0002 | 1.82 | |
| 3.3 | 3.3 | 5 | 100.00 | 0.09 | 296.000 | 301.081 | 68.5 | 88 | 76 | 4/56 | 1.0006 | 1.79 | |
| 4.7 | 4.7 | 6 | 100.02 | 0.12 | 301.500 | 306.594 | 68.5 | 91 | 78 | 4/16 | .9984 | 1.89 | |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | | | | | | | | | | 11/15 | .9983 | 1.80 | |

Positive leak check performed by [initials]

Meter was in tolerance ☒

Meter was not in tolerance ☐; readjusted linkage

Meter was not in tolerance ☐; changed dry test meters

Approved by [signature] Date 4/22/94

M-17

1001 Wet Test Bell Prover (NBS Traceable) - Carl Poe Co.

Date 5-31-94

Bar. Press. 29.12 in. Hg

# INTERPOLL LABORATORIES, INC.
## METER CALIBRATION SHEET
## EPA METHOD 5

Control Module No. 6

Serial No. DTM 964548

Wet Test Meter No. AL-20

Technician E. Trevathan

| ΔH (in. WC) | | Gas Volume Wet Test Meter ($ft^3$) | * Cal. Index θ (%) | * Diff. Wet Test Meter $\Delta P_w$ (in. WC) | Gas Volume Dry test meter ($ft^3$) | | Gas temperatures | | | Time θ min/sec | Meter Coeff. Y | Orifice Const. ΔHθ | $C_f$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| nominal | actual | | | | $V_{di}$ | $V_{df}$ | Wet Test $t_w$ (°F) | Dry Test $t_{di}$ (°F) | Dry Test $t_{do}$ (°F) | | | | |
| 0.5 | .5 | 2 | 99.85 | 0.01 | 356.000 | 358.037 | 69 | 81 | 69 | 5/10 | .9902 | 1.91 | |
| 1.2 | 1.2 | 3 | 99.91 | 0.025 | 358.500 | 361.575 | 69 | 86 | 71 | 5/02 | .9924 | 1.91 | |
| 2.0 | 2.0 | 3 | 99.93 | 0.055 | 362.000 | 365.077 | 69 | 92 | 72 | 4/00 | .9924 | 2.00 | |
| 3.3 | 3.3 | 6 | 100.00 | 0.09 | 365.500 | 370.635 | 69 | 97 | 74 | 6/15 | .9999 | 2.00 | |
| 4.7 | 4.7 | 5 | 100.02 | 0.12 | 372.000 | 377.125 | 69 | 100 | 76 | 4/25 | .9986 | 2.04 | |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | .9947 | 1.97 | |

Positive leak check performed by ET

Meter was in tolerance ☒

Meter was not in tolerance ☐; readjusted linkage

Meter was not in tolerance ☐; changed dry test meters

Approved by [signature] Date 6/6/94

* Based on AL-20 wet test meter calibration in Nov. 1991 against Bell Prover (NBS Traceable) - Carl Poe Co.

Date 3-24-94

Bar. Press. 29.00 in. Hg

INTERPOLL LABORATORIES, INC.
METER CALIBRATION SHEET
EPA METHOD 6

Control Module No. 9
Serial No. DTM 964549
Wet Test Meter No. AL-20
Technician [signature]

| ΔH (in. WC) | | Gas Volume Wet Test Meter ($ft^3$) | * Cal. Index θ (%) | * Diff. Wet Test Meter $\Delta P_w$ (in. WC) | Gas Volume Dry test meter ($ft^3$) | | Gas temperatures | | | Time θ min/sec | Meter Coeff. Y | Orifice Const. ΔH@ | $C_f$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | Wet Test | Dry Test | | | | | |
| nominal | actual | | | | $V_{d1}$ | $V_{df}$ | $t_w$ (°F) | $t_{d1}$ (°F) | $t_{df}$ (°F) | | | | |
| 0.6 | .5 | 2 | 99.85 | 0.01 | 118,000 | 110,026 | 66 | 77 | 72 | 5/00 | .9993 | 1.77 | |
| 1.2 | 1.2 | 3 | 99.91 | 0.025 | 104,550 | 107,530 | 66 | 74 | 70 | 4/49 | .9993 | 1.76 | |
| 2.0 | 2.0 | 3 | 99.93 | 0.055 | 110,500 | 113,552 | 66 | 80 | 73 | 3/46 | .9986 | 1.75 | |
| 3.3 | 3.3 | 5 | 100.00 | 0.09 | 114,000 | 119,116 | 66 | 84 | 75 | 4/55 | .9934 | 1.74 | |
| 4.7 | 4.7 | 5 | 100.02 | 0.12 | 119,500 | 124,627 | 66 | 88 | 76 | 4/07 | .9939 | 1.75 | |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | .9961 | 1.78 | |

Positive leak check performed by [signature]
Meter was in tolerance ☒
Meter was not in tolerance ☐; readjusted linkage
Meter was not in tolerance ☐; changed dry test meters

Approved by [signature] Date 4/4/94

M-19

1991 against Bell Prover (NBS Traceable) - Carl Poe Co.

Date 5-31-94

Bar. Press. 29.12 in. Hg

INTERPOLL LABORATORIES, INC.
METER CALIBRATION SHEET
EPA METHOD 6

Control Module No. 10
Serial No. DTM 1534/12
Wet Test Meter No. AL-20
Technician [signature]

| ΔH (in. WC) | | Gas Volume Wet Test Meter ($ft^3$) | * Cal. Index θ (s) | * Diff. Wet Test Meter $\Delta P_w$ (in. WC) | Gas Volume Dry test meter ($ft^3$) | | Gas temperatures | | | Time θ (min/sec) | Meter Coeff. Y | Orifice Const. ΔH@ | $C_f$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | Wet Test | Dry Test | | | | | |
| nominal | actual | | | | $V_{di}$ | $V_{df}$ | $t_w$ (°F) | $t_{di}$ (°F) | $t_{do}$ (°F) | | | | |
| 0.6 | .5 | 2 | 99.85 | 0.01 | 91.000 | 93.059 | 69 | 89 | 73 | 4/56 | .9906 | 1.72 | |
| 1.2 | 1.2 | 3 | 99.91 | 0.025 | 87.000 | 89.073 | 69 | 88 | 74 | 4/52 | .9916 | 1.79 | |
| 2.0 | 2.0 | 3 | 99.93 | 0.055 | 87.500 | 90.556 | 69 | 92 | 72 | 3/46 | .9919 | 1.77 | |
| 3.3 | 3.3 | 5 | 100.00 | 0.09 | 93.500 | 98.640 | 69 | 95 | 74 | 4/55 | .9927 | 1.74 | |
| 4.7 | 4.7 | 6 | 100.02 | 0.12 | 99.000 | 104.164 | 69 | 99 | 76 | 4/09 | .9902 | 1.80 | |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | | | | | | | | | | 11/11 | .9930 | 1.77 | |

Positive leak check performed by [signature]
Meter was in tolerance ☒
Meter was not in tolerance ☐; readjusted linkage
Meter was not in tolerance ☐; changed dry test meters

Approved by [signature] Date 6/6/94

* Based on AL-20 wet test meter calibration in Nov. 1991 against Bell Prover (NBS Traceable) - Carl Poe Co.

S0102RA 11/91

Date 4-25-94

Bar. Press. 28.66 in. Hg

INTERPOLL LABORATORIES, INC.
METER CALIBRATION SHEET
EPA METHOD 5

Control Module No. 14
Serial No. DTM 1334/119
Wet Test Meter No. AL-20
Technician [signature]

| ΔH (in. WC) | | Gas Volume Wet Test Meter ($ft^3$) | * Cal. Index θ (X) | * Diff. Wet Test Meter $\Delta P_w$ (in.WC) | Gas Volume Dry test meter ($ft^3$) | | Gas temperatures | | | Time θ | Meter Coeff. | Orifice Const. | $C_f$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | Wet Test | Dry Test | | | | | |
| nominal | actual | | | | $V_{di}$ | $V_{df}$ | $t_w$ (°F) | $t_{di}$ (°F) | $t_{do}$ (°F) | min/sec | Y | ΔH@ | |
| 0.6 | 1.5 | 2 | 99.85 | 0.01 | 352.000 | 354.023 | 71 | 89 | 75 | 4/54 | 1.0062 | 1.72 | |
| 1.2 | 1.2 | 3 | 99.91 | 0.025 | 345.500 | 348.528 | 71 | 86 | 74 | 4/55 | 1.0034 | 1.86 | |
| 2.0 | 2.0 | 3 | 99.93 | 0.055 | 348.000 | 351.028 | 71 | 91 | 74 | 3/49 | 1.0061 | 1.86 | |
| 3.3 | 3.3 | 5 | 100.00 | 0.09 | 354.500 | 359.546 | 71 | 96 | 75 | 5/00 | 1.0087 | 1.89 | |
| 4.7 | 4.7 | 5 | 100.02 | 0.12 | 360.000 | 365.050 | 71 | 99 | 76 | 4/14 | 1.0085 | 1.92 | |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | | 5 | | | | 7 | | | | 11/13 | 1.0066 | 1.85 | |

Positive leak check performed by ET
Meter was in tolerance ☒
Meter was not in tolerance ☐; readjusted linkage
Meter was not in tolerance ☐; changed dry test meters

Approved by [signature] Date 5/2/94

Date 1-13-94

Bar. Press. 29.14 in. Hg

INTERPOLL LABORATORIES
MINIMODULE CALIBRATION SHEET
Flow Rate Range 0-0.13 CFM
(0-4 LPM)

Meter Box No. 2 S
Serial No. DTM 69185
Wet Test Meter No. AL-17 (.05 CF/REV)
Technician- S. BAINUCCI

| Rotameter Reading (cc/min) | $\Delta P_d$ (IN/WC) | Gas Volume Wet Test Meter ($ft^3$) | ** Cal. Index ♦ (%) | Diff. Wet Test Meter $\Delta P_w$ (in.WC) | Gas Volume Dry test meter ($ft^3$) $V_{dI}$ | $V_{df}$ | Gas temperatures Wet Test $t_w$ (°F) | Dry Test $t_{dI}$ (°F) | | Time ♦ (min/sec) | Meter Coeff. Y | Rotameter Coeff. Z |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1000 | .001 | .3 | 99.55 | 0.04 | 394.800 | 395.108 | 67 | 84 | | | 1.0081 | |
| 1000 | .001 | .3 | 99.55 | 0.04 | 395.200 | 395.510 | 67 | 90 | | | 1.0089 | |
| 1000 | .001 | .3 | 99.55 | 0.04 | 395.600 | 395.913 | 67 | 94 | | | 1.0065 | |
| | | | | | | | | | | | | |
| | | | | | | | | | | | | |
| | | | | | | | | | | | | |
| | | | | | | | | | | | | |
| | | | | | | | | | | | | |
| | | | | | | | | | | | | |
| | | | | | | | | | | | | |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | | 10/11 Average: | 1.0078 | |

Meter was in tolerance ☒
Meter was not in tolerance ☐; readjusted linkage
Meter was not in tolerance ☐; changed dry test meters

Gas Meter Bimetallic Therm. Calibration/Verification*

☐ ≥ ± 5°F (Out of control) ☐ Recalibrated
☒ ≤ ± 5°F (In control) ☐ No action required

Approved by [signature] Date 1/14/94

* Verified against mercury in glass thermometer or calibrated platinum resistance thermometer.

** Based on AL-17 wet test meter calibration in August 1989 against Bell Prover (NBS Traceable) - Carl Poe Co.

S0102R 8/89

M-22

Date 1-13-94

Bar. Press. 29.14 in. Hg

INTERPOLL LABORATORIES
MINIMODULE CALIBRATION SHEET
Flow Rate Range 0-0.13 CFM
(0-4 LPM)

Meter Box No. 5 S
Serial No. DTM 64711
Wet Test Meter No. AL-17 (.05 CF/REV)
Technician- S. BAINVILLE

| Rotameter Reading (cc/min) | $\Delta P_d$ (IN/WC) | Gas Volume Wet Test Meter (ft³) | ** Cal. Index ϕ (%) | Diff. Wet Test Meter $\Delta P_w$ (in.WC) | Gas Volume Dry test meter (ft³) $V_{d1}$ | $V_{df}$ | Gas temperatures Wet Test $t_w$ (°F) | Dry Test $t_{d1}$ (°F) | | Time θ (min/sec) | Meter Coeff. Y | Rotameter Coeff. Z |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1000 | .001 | .3 | 99.55 | 0.04 | 904.300 | 904.608 | 65 | 80 | | | 1.0008 | |
| 1000 | .001 | .3 | 99.55 | 0.04 | 904.700 | 905.012 | 66 | 87 | | | .9989 | |
| 1000 | .001 | .3 | 99.55 | 0.04 | 905.100 | 905.413 | 66 | 92 | | | 1.0048 | |
| | | | | | | | | | | | | |
| | | | | | | | | | | | | |
| | | | | | | | | | | | | |
| | | | | | | | | | | | | |
| | | | | | | | | | | | | |
| | | | | | | | | | | | | |
| | | | | | | | | | | 16/11 Average: | 1.0015 | |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | | | | |

Meter was in tolerance ☒
Meter was not in tolerance ☐; readjusted linkage
Meter was not in tolerance ☐; changed dry test meters

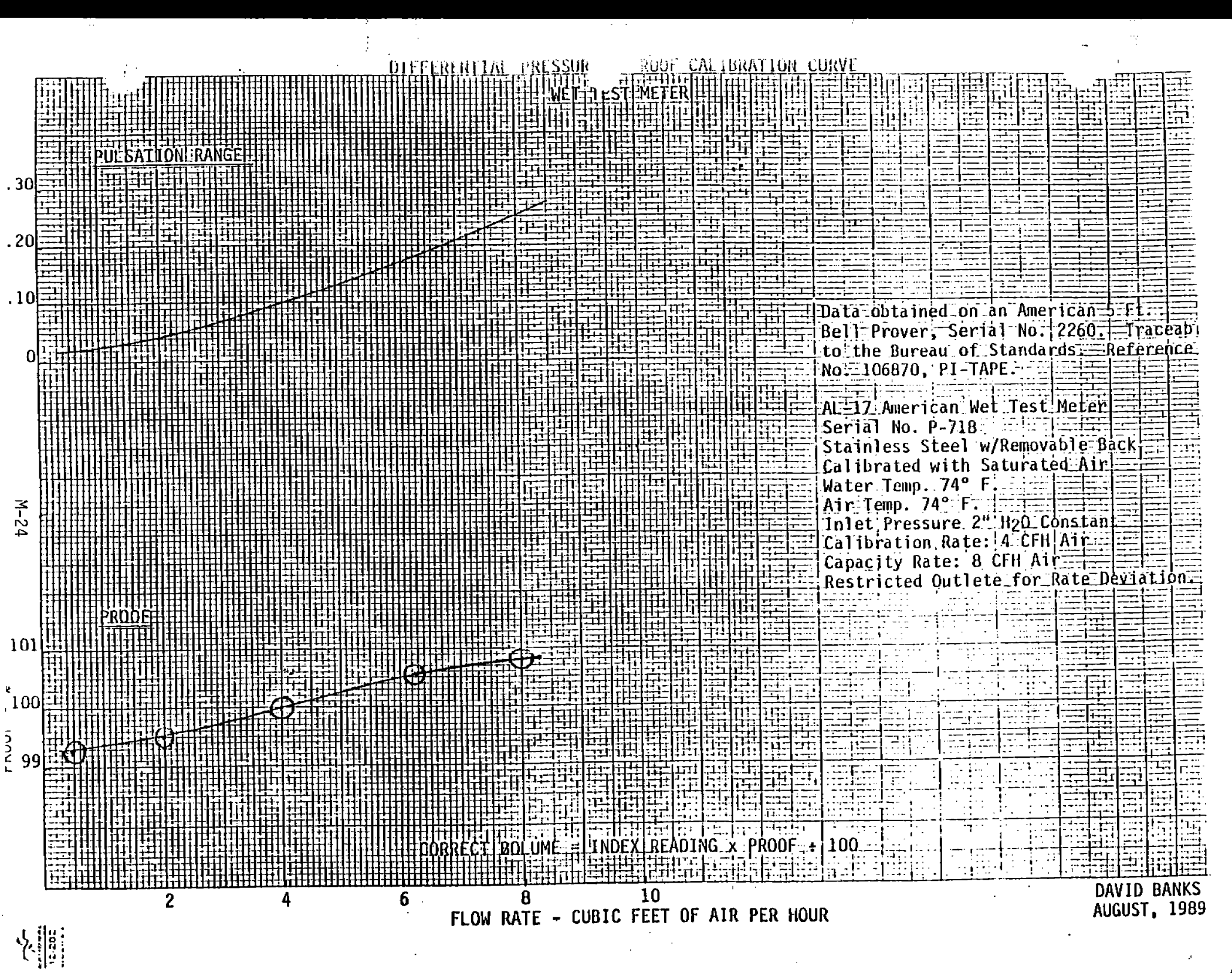
Gas Meter Bimetallic Therm. Calibration/Verification*
☐ ≥ ± 5°F (Out of control) ☐ Recalibrated
☒ ≤ ± 5°F (in control) ☒ No action required

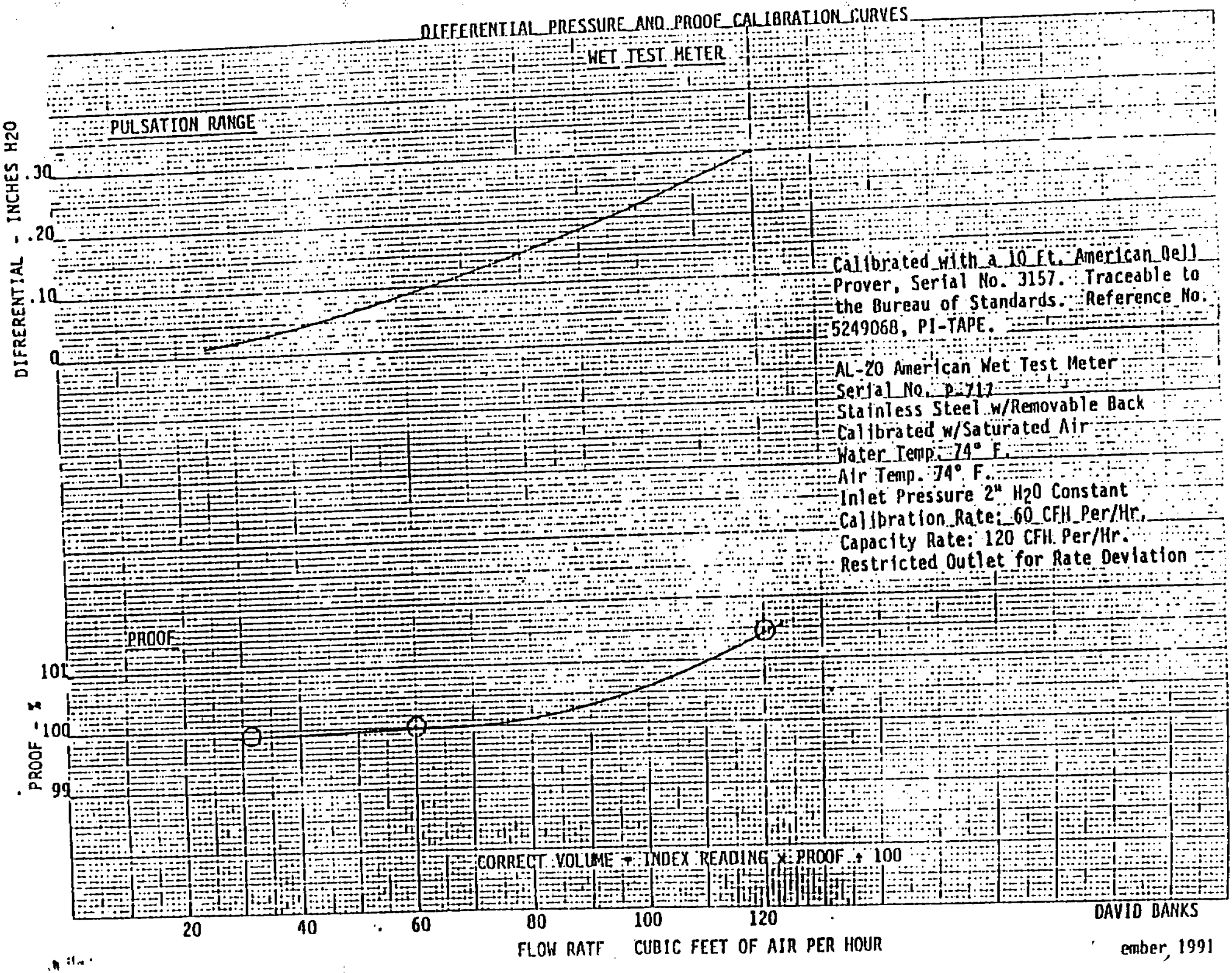
Approved By [signature] Date 1/14/94

* Verified against mercury in glass thermometer or calibrated platinum resistance thermometer.

...calibration in August 1989 against Bell Prover (NBS Traceable) - Carl Poe Co.

M-23


DIFFERENTIAL PRESSUR ROOF CALIBRATION CURVE
WET TEST METER
PULSATION RANGE
.30
.20
.10
0
M-24
PROOF
101
100
99
Data obtained on an American 5 Ft. Bell Prover, Serial No. 2260. Traceab to the Bureau of Standards. Reference No. 106870, PI-TAPE.
AL-17 American Wet Test Meter
Serial No. P-718
Stainless Steel w/Removable Back
Calibrated with Saturated Air
Water Temp. 74° F.
Air Temp. 74° F.
Inlet Pressure 2" H2O Constant
Calibration Rate: 4 CFH Air
Capacity Rate: 8 CFH Air
Restricted Outlete for Rate Deviation.
CORRECT BOLUME = INDEX READING x PROOF ÷ 100
2
4
6
8
10
FLOW RATE - CUBIC FEET OF AIR PER HOUR
DAVID BANKS
AUGUST, 1989


DIFFERENTIAL PRESSURE AND PROOF CALIBRATION CURVES
WET TEST METER
PULSATION RANGE
DIFFERENTIAL - INCHES H20
.30
.20
.10
0
Calibrated with a 10 Ft. American Bell Prover, Serial No. 3157. Traceable to the Bureau of Standards. Reference No. 5249068, PI-TAPE.
AL-20 American Wet Test Meter
Serial No. P-717
Stainless Steel w/Removable Back
Calibrated w/Saturated Air
Water Temp. 74° F.
Air Temp. 74° F.
Inlet Pressure 2" H2O Constant
Calibration Rate: 60 CFH Per/Hr.
Capacity Rate: 120 CFH Per/Hr.
Restricted Outlet for Rate Deviation
PROOF
101
100
99
PROOF - %
CORRECT VOLUME = INDEX READING X PROOF ÷ 100
20
40
60
80
100
120
FLOW RATE CUBIC FEET OF AIR PER HOUR
DAVID BANKS
ember, 1991

Interpoll Laboratories, Inc.
(612) 786-6020

**Nozzle Calibration**
**Data Sheet**

Date of Calibration: 06-07-94 Nozzle Number 4-4
Technician: Scott Bainville

The nozzle is rotated in 60 degree increments and the diameter at each point is measured to the nearest 0.001 inch. The observed readings and average are shown below.

| Position | Diameter (inches) |
|---|---|
| 1 | .251 |
| 2 | .251 |
| 3 | .251 |
| Average: | .251 |

Interpoll Laboratories, Inc.
(612) 786-6020

**Nozzle Calibration**
**Data Sheet**

Date of Calibration: 06-07-94 Nozzle Number Glass
Technician: Scott Bainville

The nozzle is rotated in 60 degree increments and the diameter at each point is measured to the nearest 0.001 inch. The observed readings and average are shown below.

| Position | Diameter (inches) |
|---|---|
| 1 | .270 |
| 2 | .269 |
| 3 | .270 |
| Average: | .270 |

Interpoll Laboratories, Inc.
(612) 786-6020

## Nozzle Calibration
## Data Sheet

Date of Calibration: 06-07-94 Nozzle Number MM5-6
Technician: Mark Kaehler

The nozzle is rotated in 60 degree increments and the diameter at each point is measured to the nearest 0.001 inch. The observed readings and average are shown below.

| Position | Diameter (inches) |
|---|---|
| 1 | .365 |
| 2 | .363 |
| 3 | .363 |
| Average: | .364 |

Interpoll Laboratories, Inc.
(612) 786-6020

**Nozzle Calibration**
**Data Sheet**

Date of Calibration: 06-08-94 Nozzle Number 1-6
Technician: Ed Trowbridge

The nozzle is rotated in 60 degree increments and the diameter at each point is measured to the nearest 0.001 inch. The observed readings and average are shown below.

| Position | Diameter (inches) |
|---|---|
| 1 | .354 |
| 2 | .356 |
| 3 | .355 |
| Average: | .355 |

Interpoll Laboratories, Inc.
(612) 786-6020

**Nozzle Calibration**
**Data Sheet**

Date of Calibration: 06-08-94 Nozzle Number 8-6
Technician: Mark Kaehler

The nozzle is rotated in 60 degree increments and the diameter at each point is measured to the nearest 0.001 inch. The observed readings and average are shown below.

| Position | Diameter (inches) |
|---|---|
| 1 | .364 |
| 2 | .363 |
| 3 | .363 |
| Average: | .363 |

Interpoll Laboratories, Inc.
(612) 786-6020

**Nozzle Calibration**
**Data Sheet**

Date of Calibration: 06-08-94 Nozzle Number G-4
Technician: Scott Bainville

The nozzle is rotated in 60 degree increments and the diameter at each point is measured to the nearest 0.001 inch. The observed readings and average are shown below.

| Position | Diameter (inches) |
|---|---|
| 1 | .225 |
| 2 | .225 |
| 3 | .225 |
| Average: | .225 |

Interpoll Laboratories, Inc.
(612) 786-6020

## Nozzle Calibration
## Data Sheet

Date of Calibration: 06-08-94 Nozzle Number Glass
Technician: Duane Van Hoever

The nozzle is rotated in 60 degree increments and the diameter at each point is measured to the nearest 0.001 inch. The observed readings and average are shown below.

| Position | Diameter (inches) |
|---|---|
| 1 | .245 |
| 2 | .246 |
| 3 | .247 |
| Average: | .246 |

Interpoll Laboratories, Inc.
(612) 786-6020

## Nozzle Calibration
## Data Sheet

Date of Calibration: 06-08-94 Nozzle Number
Glass-6
Technician: Mark Kaehler

The nozzle is rotated in 60 degree increments and the diameter at each point is measured to the nearest 0.001 inch. The observed readings and average are shown below.

| Position | Diameter (inches) |
|---|---|
| 1 | .369 |
| 2 | .368 |
| 3 | .367 |
| Average: | .368 |

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(612) 786-6020

## Nozzle Calibration
## Data Sheet

Date of Calibration: 06-09-94 Nozzle Number 4-3

Technician: Scott Bainville

The nozzle is rotated in 60 degree increments and the diameter at each point is measured to the nearest 0.001 inch. The observed readings and average are shown below.

| Position | Diameter (inches) |
|---|---|
| 1 | .177 |
| 2 | .177 |
| 3 | .177 |
| Average: | .177 |

Interpoll Laboratories, Inc.
(612) 786-6020

## Nozzle Calibration
## Data Sheet

Date of Calibration: 06-09-94 Nozzle Number Glass
Technician: Duane Van Hoever

The nozzle is rotated in 60 degree increments and the diameter at each point is measured to the nearest 0.001 inch. The observed readings and average are shown below.

| Position | Diameter (inches) |
|---|---|
| 1 | .189 |
| 2 | .189 |
| 3 | .188 |
| Average: | .189 |

Interpoll Laboratories, Inc.
(612) 786-6020

## Nozzle Calibration
## Data Sheet

Date of Calibration: 06-09-94 Nozzle Number Glass
Technician: Ed Trowbridge

The nozzle is rotated in 60 degree increments and the diameter at each point is measured to the nearest 0.001 inch. The observed readings and average are shown below.

| Position | Diameter (inches) |
|---|---|
| 1 | .446 |
| 2 | .446 |
| 3 | .445 |
| Average: | .446 |

Interpoll Laboratories, Inc.
(612) 786-6020

## Nozzle Calibration
## Data Sheet

Date of Calibration: 06-09-94
Technician: Mark Kaehler

Nozzle Number MM5-7

The nozzle is rotated in 60 degree increments and the diameter at each point is measured to the nearest 0.001 inch. The observed readings and average are shown below.

| Position | Diameter (inches) |
|---|---|
| 1 | .422 |
| 2 | .423 |
| 3 | .421 |
| Average: | .422 |

Interpoll Laboratories, Inc.
(612) 786-6020

## Nozzle Calibration
## Data Sheet

Date of Calibration: 06-10-94 Nozzle Number 24-3
Technician: Mark Kaehler

The nozzle is rotated in 60 degree increments and the diameter at each point is measured to the nearest 0.001 inch. The observed readings and average are shown below.

| Position | Diameter (inches) |
|---|---|
| 1 | .189 |
| 2 | .188 |
| 3 | .187 |
| Average: | .188 |

Interpoll Laboratories, Inc.
(612) 786-6020

## Nozzle Calibration
## Data Sheet

Date of Calibration: 06-10-94 Nozzle Number Glass
Technician: Duane Van Hoever

The nozzle is rotated in 60 degree increments and the diameter at each point is measured to the nearest 0.001 inch. The observed readings and average are shown below.

| Position | Diameter (inches) |
|---|---|
| 1 | .240 |
| 2 | .240 |
| 3 | .240 |
| Average: | .240 |

Interboll Laboratories. Inc.

## Temperature Measurement Device Calibration Sheet

Unit under test: PDT-29

Vendor Omega — Serial Number T-97106

Model HH21 — Thermocouple Type K

Range 0-2100 °F — Technician SLB

Date of Calibration 10-14-93

Method of Calibration:

☐ Comparison against ASTM mercury in glass thermometer using a thermostatted and insulated aluminum block designed to provide uniform temperature. The temperature is adjusted by adjusting the voltage on the block heater cartridge.

☑ Omega Model CL-300 Type K Thermocouple Simulator which provides 22 precise temperature equivalent millivolt signals. The CL-300 is cold junction compensated. Calibration accuracy is ± 0.1% of span (2100 °F) ± 1 degree (for negative temperatures add ± 2 degrees. The CL-300 simulates exactly the millivoltage of a Type K thermocouple at the indicated temperature.

| Desired Temp (°F) Nominal | Temperature of Standard or Simulated Temp (°F) | Response of Unit Under Test (°F) | Deviation Δt (°F) | Deviation (%) |
|---|---|---|---|---|
| 0 | 0 | -0.7 | 0.7 | 0.00 |
| 100 | 100 | 98.6 | 1.4 | 0.35 |
| 200 | 200 | 200.6 | 0.6 | 0.09 |
| 300 | 300 | 298.8 | 1.2 | 0.14 |
| 400 | 400 | 398.1 | 1.9 | 0.19 |
| 500 | 500 | 498.8 | 1.2 | 0.13 |
| 600 | 600 | 600.7 | 0.7 | 0.07 |
| 700 | 700 | 698.9 | 1.1 | 0.09 |
| 800 | 800 | 800.9 | 0.9 | 0.07 |
| 900 | 900 | 898.9 | 1.1 | 0.09 |
| 1000 | 1000 | 999.9 | 0.1 | 0.01 |
| 1100 | 1100 | 1098.6 | 1.4 | 0.09 |
| 1200 | 1200 | 1201.0 | 1.0 | 0.06 |
| 1300 | 1300 | 1298.7 | 1.3 | 0.07 |
| 1400 | 1400 | 1401.1 | 1.1 | 0.05 |
| 1500 | 1500 | 1498.4 | 1.6 | 0.09 |
| 1600 | 1600 | 1599.8 | 0.2 | 0.01 |
| 1700 | 1700 | 1697.8 | 2.2 | 0.10 |
| 1800 | 1800 | 1799.7 | 0.3 | 0.01 |
| 1900 | 1900 | 1897.0 | 3.0 | 0.13 |
| 2000 | 2000 | 1998.6 | 1.4 | 0.06 |
| 2100 | 2100 | 2097.0 | 3.0 | 0.12 |
| | | Averages: | 1.22 | 0.09 |

OF = off scale response by unit under test (°F)

% dev = 100 Δt / (460 + t)

☐ Unit in tolerance

☐ Unit was not in tolerance: recalibrated - See new calibration sheet.

S-433

Interpoll Laboratories, Inc.

## Temperature Measurement Device Calibration Sheet

Unit under test:

Vendor Omega
Model HH 81
Range 0 - 2100 °F
Date of Calibration 4-8-94

Serial Number 73JX1495
Thermocouple Type K
Technician Mark Gaebler

Method of Calibration:

☐ Comparison against ASTM mercury in glass thermometer using a thermostatted and insulated aluminum block d
to provide uniform temperature. The temperature is adjusted by adjusting the voltage on the block h
cartridge.

☑ Omega Model CL-300 Type K Thermocouple Simulator which provides 22 precise temperature equivalent mi
signals. The CL-300 is cold junction compensated. Calibration accuracy is ± 0.1% of span (2100 °F) ± 1
(for negative temperatures add ± 2 degrees. The CL-300 simulates exactly the millivoltage of a T
thermocouple at the indicated temperature.

| Desired Temp (°F) Nominal | Temperature of Standard or Simulated Temp (°F) | Response of Unit Under Test (°F) | Deviation Δt (°F) | Deviation (%) |
|---|---|---|---|---|
| 0 | 0 | -1 | 1 | .2 |
| 100 | 100 | 100 | 0 | 0 |
| 200 | 200 | 201 | 1 | .1 |
| 300 | 300 | 300 | 0 | C |
| 400 | 400 | 399 | 1 | .1 |
| 500 | 500 | 499 | 1 | .1 |
| 600 | 600 | 601 | 1 | .1 |
| 700 | 700 | 700 | 0 | C |
| 800 | 800 | 802 | 2 | .2 |
| 900 | 900 | 901 | 1 | .1 |
| 1000 | 1000 | 1001 | 1 | .1 |
| 1100 | 1100 | 1100 | 0 | C |
| 1200 | 1200 | 1202 | 2 | .2 |
| 1300 | 1300 | 1300 | 0 | C |
| 1400 | 1400 | 1402 | 2 | .1 |
| 1500 | 1500 | 1500 | 0 | C |
| 1600 | 1600 | 1603 | 3 | .2 |
| 1700 | 1700 | 1701 | 1 | .1 |
| 1800 | 1800 | 1803 | 3 | .2 |
| 1900 | 1900 | 1901 | 1 | .1 |
| 2000 | 2000 | 2001 | 1 | .1 |
| 2100 | 2100 | 2099 | 1 | .1 |
| | | Averages: | 1.05 | .1 |

OF = off scale response by unit under test (°F)
% dev = 100 Δt / (460 + t)

☑ Unit in tolerance
☐ Unit was not in tolerance: recalibrated - See new calibration sheet.

Interpoll Laboratories, Inc.

## Temperature Measurement Device Calibration Sheet

Unit under test:

Vendor OMEGA
Model HH81
Range -160 -1372 C °F
Date of Calibration 4-18-94

Serial Number 74JX0223 #33
Thermocouple Type K
Technician BoB

Method of Calibration:

☐ Comparison against ASTM mercury in glass thermometer using a thermostatted and insulated aluminum block designed to provide uniform temperature. The temperature is adjusted by adjusting the voltage on the block heater cartridge.

☒ Omega Model CL-300 Type K Thermocouple Simulator which provides 22 precise temperature equivalent millivolt signals. The CL-300 is cold junction compensated. Calibration accuracy is ± 0.1% of span (2100 °F) ± 1 degree (for negative temperatures add ± 2 degrees. The CL-300 simulates exactly the millivoltage of a Type K thermocouple at the indicated temperature.

| Desired Temp (°F) Nominal | Temperature of Standard or Simulated Temp (°F) | Response of Unit Under Test (°F) | Deviation Δt (°F) | Deviation (%) |
|---|---|---|---|---|
| 0 | 0 | -1.0 | -1.0 | -.21 |
| 100 | 100 | 98.5 | 1.5 | .26 |
| 200 | 200 | 200.3 | .3 | .04 |
| 300 | 300 | 298.6 | 1.4 | .18 |
| 400 | 400 | 398 | 2 | .23 |
| 500 | 500 | 499 | 1 | .10 |
| 600 | 600 | 600 | 0 | 0 |
| 700 | 700 | 699 | 1 | .08 |
| 800 | 800 | 801 | 1 | .07 |
| 900 | 900 | 900 | 0 | 0 |
| 1000 | 1000 | 1001 | 1 | .06 |
| 1100 | 1100 | 1099 | 1 | .06 |
| 1200 | 1200 | 1201 | 1 | .06 |
| 1300 | 1300 | 1299 | 1 | .65 |
| 1400 | 1400 | 1402 | 2 | .01 |
| 1500 | 1500 | 1500 | 0 | 0 |
| 1600 | 1600 | 1603 | 3 | .14 |
| 1700 | 1700 | 1701 | 1 | .04 |
| 1800 | 1800 | 1803 | 3 | .13 |
| 1900 | 1900 | 1901 | 1 | .04 |
| 2000 | 2000 | 2001 | 1 | .04 |
| 2100 | 2100 | 2099 | 1 | .03 |
| | | Averages: | 1.05 | .064 |

OF = off scale response by unit under test (°F)
% dev = 100 Δt / (460 + t)

☒ Unit in tolerance
☐ Unit was not in tolerance: recalibrated - See new calibration sheet.

S-433

Interpoll Laboratories, Inc.

E.T.'s

## Temperature Measurement Device Calibration Sheet

Unit under test: #34

Vendor Omega

Model HH81

Range 0-2000 °F

Date of Calibration 4-21-94

Serial Number 744X0343

Thermocouple Type K

Technician E TROWBRIDGE

Method of Calibration:

☐ Comparison against ASTM mercury in glass thermometer using a thermostatted and insulated aluminum block to provide uniform temperature. The temperature is adjusted by adjusting the voltage on the block cartridge.

☒ Omega Model CL-300 Type K Thermocouple Simulator which provides 22 precise temperature equivalent signals. The CL-300 is cold junction compensated. Calibration accuracy is ± 0.1% of span (2100 °F) ± (for negative temperatures add ± 2 degrees. The CL-300 simulates exactly the millivoltage of a thermocouple at the indicated temperature.

| Desired Temp (°F) Nominal | Temperature of Standard or Simulated Temp (°F) | Response of Unit Under Test (°F) | Deviation Δt (°F) | ( |
|---|---|---|---|---|
| 0 | 0 | -1.9 | -1.9 | |
| 100 | 100 | -97.5 | -2.5 | |
| 200 | 200 | 199.7 | -.3 | |
| 300 | 300 | 297.5 | -2.5 | |
| 400 | 400 | 397 | -3 | |
| 500 | 500 | 498 | -2 | |
| 600 | 600 | 600 | — | |
| 700 | 700 | 699 | -1 | |
| 800 | 800 | 801 | +1 | |
| 900 | 900 | 900 | — | |
| 1000 | 1000 | 1001 | +1 | |
| 1100 | 1100 | 1098 | -2 | |
| 1200 | 1200 | 1201 | +1 | |
| 1300 | 1300 | 1299 | -1 | |
| 1400 | 1400 | 1402 | +2 | |
| 1500 | 1500 | 1500 | — | |
| 1600 | 1600 | 1603 | +3 | |
| 1700 | 1700 | 1701 | +1 | |
| 1800 | 1800 | 1804 | +4 | |
| 1900 | 1900 | 1901 | +1 | |
| 2000 | 2000 | 2001 | +1 | |
| 2100 | 2100 | 2099 | -1 | |
| | | Averages: | 1.46 | |

OF = off scale response by unit under test (°F)

% dev = 100 Δt / (460 + t)

☒ Unit in tolerance

☐ Unit was not in tolerance; recalibrated - See new calibration sheet.

Interpoll Laboratories, Inc.



## Temperature Measurement Device Calibration Sheet

Unit under test:

Vendor: Omega — #35

Model: HH81 — Serial Number: 74JX0332

Range: 0 – 2000 °F — Thermocouple Type: K

Date of Calibration: 4-21-94 — Technician: E TROWBRIDGE

Method of Calibration:

☐ Comparison against ASTM mercury in glass thermometer using a thermostatted and insulated aluminum block designed to provide uniform temperature. The temperature is adjusted by adjusting the voltage on the block heater cartridge.

☒ Omega Model CL-300 Type K Thermocouple Simulator which provides 22 precise temperature equivalent millivolt signals. The CL-300 is cold junction compensated. Calibration accuracy is ± 0.1% of span (2100 °F) ± 1 degree (for negative temperatures add ± 2 degrees. The CL-300 simulates exactly the millivoltage of a Type K thermocouple at the indicated temperature.

| Desired Temp (°F) Nominal | Temperature of Standard or Simulated Temp (°F) | Response of Unit Under Test (°F) | Deviation Δt (°F) | Deviation (%) |
|---|---|---|---|---|
| 0 | 0 | -3 | -3 | .65 |
| 100 | 100 | 98 | -2 | .35 |
| 200 | 200 | 200 | 0 | 0 |
| 300 | 300 | 298 | -2 | .30 |
| 400 | 400 | 398 | -2 | .23 |
| 500 | 500 | 499 | -1 | .10 |
| 600 | 600 | 601 | +1 | .09 |
| 700 | 700 | 699 | -1 | .09 |
| 800 | 800 | 801 | +1 | .08 |
| 900 | 900 | 900 | 0 | 0 |
| 1000 | 1000 | 1001 | +1 | .07 |
| 1100 | 1100 | 1100 | 0 | 0 |
| 1200 | 1200 | 1201 | +1 | .06 |
| 1300 | 1300 | 1299 | -1 | .05 |
| 1400 | 1400 | 1402 | +2 | .11 |
| 1500 | 1500 | 1501 | +1 | .05 |
| 1600 | 1600 | 1604 | +4 | .19 |
| 1700 | 1700 | 1701 | +1 | .05 |
| 1800 | 1800 | 1804 | +4 | .18 |
| 1900 | 1900 | 1901 | +1 | .04 |
| 2000 | 2000 | 2001 | +1 | .04 |
| 2100 | 2100 | 2099 | -1 | .04 |
| | | Averages: | 1.40 | .123 |

OF = off scale response by unit under test (°F)

% dev = 100 Δt / (460 + t)

☒ Unit in tolerance

☐ Unit was not in tolerance: recalibrated – See new calibration sheet.

Interpoll Laboratories, Inc.
(612) 786-6020

## S-Type Pitot Tube Inspection Sheet

Pitot Tube No. 22-5

Pitot tube dimensions:

1. External tubing diameter ($D_t$) .316 IN.
2. Base to Side A opening plane ($P_A$) .460 IN.
3. Base to Side B opening plane ($P_B$) .460 IN.

Alignment:

4. $\alpha_1$ < 10° 0
5. $\alpha_2$ < 10° 0

6. $B_1$ < 5° 0
7. $B_2$ < 5° 0

8. Z <.125" .02
9. W <.0625" .02

Distance from Pitot to Probe Components:

10. Pitot to 0.500 IN. nozzle .750 IN.
11. Pitot to probe sheath 3.0 IN.
12. Pitot to thermocouple (parallel to probe) 3.0 IN.
13. Pitot to thermocouple (perpendicular to probe) .760 IN.

☒ Meets all EPA design criteria thus $C_p$ = 0.84
☐ Does not meet EPA design criteria - thus calibrate in wind tunnel.
$C_p$ = _____

Date of Inspection:

4-8-94

Inspected by:

CFR Title 40 Part 60 Appenidix A Method 2

S-348

Interpoll Laboratories, Inc.
(612) 786-6020

## S-Type Pitot Tube Inspection Sheet

Pitot Tube No. 22-6

Pitot tube dimensions:

1. External tubing diameter ($D_t$) .316 IN.
2. Base to Side A opening plane ($P_A$) .460 IN.
3. Base to Side B opening plane ($P_B$) .460 IN.

Alignment:

4. $\alpha_1$ < 10° 0
5. $\alpha_2$ < 10° 0

6. $B_1$ < 5° 0
7. $B_2$ < 5° 0

8. Z <.125" .02
9. W <.0625" .02

Distance from Pitot to Probe Components:

10. Pitot to 0.500 IN. nozzle .750 IN.
11. Pitot to probe sheath 3.0 IN.
12. Pitot to thermocouple (parallel to probe) 3.0 IN.
13. Pitot to thermocouple (perpendicular to probe) .760 IN.

☒ Meets all EPA design criteria thus $C_p$ = 0.84
☐ Does not meet EPA design criteria - thus calibrate in wind tunnel.
$C_p$ = _____

Date of Inspection:

4-8-94

Inspected by:

E Crawford

*CFR Title 40 Part 60 Appenidix A Method 2*

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Interpoll Laboratories, Inc.
(612) 786-6020

## S-Type Pitot Tube Inspection Sheet

Pitot Tube No. 22-8

Pitot tube dimensions:

1. External tubing diameter ($D_t$) .316 IN.
2. Base to Side A opening plane ($P_A$) .460 IN.
3. Base to Side B opening plane ($P_B$) .460 IN.

Alignment:

4. $\alpha_1$ < 10° 0
5. $\alpha_2$ < 10° 0

6. $B_1$ < 5° 0
7. $B_2$ < 5° 0

8. Z <.125" .0
9. W <.0625" .01

Distance from Pitot to Probe Components:

10. Pitot to 0.500 IN. nozzle .760 IN.
11. Pitot to probe sheath 3.0 IN.
12. Pitot to thermocouple (parallel to probe) 3.0 IN.
13. Pitot to thermocouple (perpendicular to probe) .760 IN.

☒ Meets all EPA design criteria thus $C_p$ = 0.84
☐ Does not meet EPA design criteria - thus calibrate in wind tunnel.
$C_p$ = _____

Date of Inspection:

1-8-94

Inspected by:

*CFR Title 40 Part 60 Appenidix A Method 2*

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**Interpoll Laboratories, Inc.**
**(612) 786-6020**

## S-Type Pitot Tube Inspection Sheet

Pitot Tube No 24-5

Pitot tube dimensions:

1. External tubing diameter ($D_t$) .316 IN.
2. Base to Side A opening plane ($P_A$) .460 IN.
3. Base to Side B opening plane ($P_B$) .460 IN.

Alignment:

4. $\alpha_1$ < 10° 0
5. $\alpha_2$ < 10° 0

6. $B_1$ < 5° 0
7. $B_2$ < 5° 0

8. Z <.125" .02
9. W <.0625" 0

Distance from Pitot to Probe Components:

10. Pitot to 0.500 IN. nozzle .760 IN.
11. Pitot to probe sheath 3.0 IN.
12. Pitot to thermocouple (parallel to probe) 3.0 IN.
13. Pitot to thermocouple (perpendicular to probe) .750 IN.

☒ Meets all EPA design criteria thus $C_p$ = 0.84
☐ Does not meet EPA design criteria - thus calibrate in wind tunnel.
$C_p$ = _____

Date of Inspection:

4-8-92

Inspected by:

*CFR Title 40 Part 60 Appenidix A Method 2*

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**Interpoll Laboratories, Inc.**
**(612) 786-6020**

## S-Type Pitot Tube Inspection Sheet

Pitot Tube No. 24-8

Pitot tube dimensions:

1. External tubing diameter ($D_t$) .316 IN.
2. Base to Side A opening plane ($P_A$) .460 IN.
3. Base to Side B opening plane ($P_B$) .460 IN.

Alignment:

4. $\alpha_1$ < 10° 0
5. $\alpha_2$ < 10° 0

6. $B_1$ < 5° 0
7. $B_2$ < 5° 0

8. Z <.125" 0
9. W <.0625" .025

Distance from Pitot to Probe Components:

10. Pitot to 0.500 IN. nozzle .760 IN.
11. Pitot to probe sheath 3.0 IN.
12. Pitot to thermocouple (parallel to probe) 3.0 IN.
13. Pitot to thermocouple (perpendicular to probe) .752 IN.

☒ Meets all EPA design criteria thus $C_p$ = 0.84
☐ Does not meet EPA design criteria - thus calibrate in wind tunnel.
$C_p$ = _____

Date of Inspection: 4-8-84

Inspected by: [signature]

*CFR Title 40 Part 60 Appenidix A Method 2*

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**Interpoll Laboratories, Inc.**
**(612) 786-6020**

## S-Type Pitot Tube Inspection Sheet

Pitot Tube No. 29-6

Pitot tube dimensions:

1. External tubing diameter ($D_t$) .316 IN.
2. Base to Side A opening plane ($P_A$) .460 IN.
3. Base to Side B opening plane ($P_B$) .460 IN.

Alignment:

4. $\alpha_1$ < 10° 0
5. $\alpha_2$ < 10° 0

6. $B_1$ < 5° 0
7. $B_2$ < 5° 0

8. Z <.125" .02
9. W <.0625" .02

Distance from Pitot to Probe Components:

10. Pitot to 0.500 IN. nozzle .750 IN.
11. Pitot to probe sheath 3.0 IN.
12. Pitot to thermocouple (parallel to probe) 3.0 IN.
13. Pitot to thermocouple (perpendicular to probe) .760 IN.

☒ Meets all EPA design criteria thus $C_p$ = 0.84
☐ Does not meet EPA design criteria - thus calibrate in wind tunnel.
$C_p$ = _____

Date of Inspection: 4-7-94

Inspected by: [signature]

*CFR Title 40 Part 60 Appenidix A Method 2*

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**Interpoll Laboratories, Inc.**
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## S-Type Pitot Tube Inspection Sheet

Pitot Tube No. MM-6

Pitot tube dimensions:

1. External tubing diameter ($D_t$) .316 IN.
2. Base to Side A opening plane ($P_A$) .460 IN.
3. Base to Side B opening plane ($P_B$) .460 IN.

Alignment:

4. $\alpha_1$ < 10° 0
5. $\alpha_2$ < 10° 0

6. $B_1$ < 5° 0
7. $B_2$ < 5° 0

8. Z <.125" .03
9. W <.0625" .025

Distance from Pitot to Probe Components:

10. Pitot to 0.500 IN. nozzle .750 IN.
11. Pitot to probe sheath 3.0 IN.
12. Pitot to thermocouple (parallel to probe) 3.0 IN.
13. Pitot to thermocouple (perpendicular to probe) .760 IN.

☒ Meets all EPA design criteria thus $C_p$ = 0.84
☐ Does not meet EPA design criteria - thus calibrate in wind tunnel.
$C_p$ = _____

Date of Inspection: 4-8-94

Inspected by: [signature]

*CFR Title 40 Part 60 Appenidix A Method 2*

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**Interpoll Laboratories, Inc.**
**(612) 786-6020**

## S-Type Pitot Tube Inspection Sheet

Pitot Tube No. MM5-S

Pitot tube dimensions:

1. External tubing diameter ($D_t$) .316 IN.
2. Base to Side A opening plane ($P_A$) .460 IN.
3. Base to Side B opening plane ($P_B$) .460 IN.

Alignment:

4. $\alpha_1$ < 10° 0
5. $\alpha_2$ < 10° 0

6. $B_1$ < 5° 2
7. $B_2$ < 5° 2

8. Z <.125" .02
9. W <.0625" .02

Distance from Pitot to Probe Components:

10. Pitot to 0.500 IN. nozzle .750 IN.
11. Pitot to probe sheath 3.0 IN.
12. Pitot to thermocouple (parallel to probe) 3.0 IN.
13. Pitot to thermocouple (perpendicular to probe) .760 IN.

☒ Meets all EPA design criteria thus $C_p$ = 0.84
☐ Does not meet EPA design criteria - thus calibrate in wind tunnel.
$C_p$ = _____

Date of Inspection:

4-7-93

Inspected by:

*CFR Title 40 Part 60 Appenidix A Method 2*

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4-7-93 C:\STACK\WP\FORMS\S-348

INTERPOLL LABORATORIES
(612)786-6020

Stack Sampling Department - QA
Aneroid Barometer Calibration Sheet

Date 2-18-94

Technician Bob

Mercury Column Barometer No. LAB 1

Aneroid Barometer No. 10723029

| Actual Mercury Barometer Read | Ambient Temp. | Temperature Correction Factor | Adjsted Mercury Barometer Read | Initial Aneriod Barometer Read | Difference ($P_{ba}$-$P_{bm}$) |
|---|---|---|---|---|---|
| 29.01 | 76 | .125 | 28.885 | 28.83 | .055 |
| | | | | | |

Has this barometer shown any consistent problems with calibration? Yes/No.

yes, explain. NO

Has problem been alleviated? Yes/No. How?

*Note

Aneroid barometers will be calibrated periodically against a mercury column barometer. The aneroid barometer to be calibrated should be placed in close proximity to the mercury barometer and left to equilibrate for 20-30 minutes before calibrating. Aneriod barometer will be calibrated to the adjusted mercury barometer readings.

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INTERPOLL LABORATORIES
(612)786-6020

Stack Sampling Department - QA
Aneroid Barometer Calibration Sheet

Date 10-15-93
Technician SCOTT L BAINVILLE
Mercury Column Barometer No. 1
Aneroid Barometer No. 560209

| Actual Mercury Barometer Read | Ambient Temp. | Temperature Correction Factor | Adjsted Mercury Barometer Read | Initial Aneriod Barometer Read | Difference ($P_{ba}$-$P_{bm}$) |
|---|---|---|---|---|---|
| 29.10 | 76 | .134 | 28.97 | 29.16 | 0.19 |
| 29.13 | 73 | .124 | 29.01 | 29.19 | 0.18 |

Has this barometer shown any consistent problems with calibration? Yes/No. If yes, explain. NO

Has problem been alleviated? Yes/No. How? N/A

*Note

Aneroid barometers will be calibrated periodically against a mercury column barometer. The aneroid barometer to be calibrated should be placed in close proximity to the mercury barometer and left to equilibrate for 20-30 minutes before calibrating. Aneriod barometer will be calibrated to the adjusted mercury barometer readings.

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INTERPOLL LABORATORIES
(612)786-6020

Stack Sampling Department - QA
Aneroid Barometer Calibration Sheet

Date 9-13-93

Technician Mark Koehler

Mercury Column Barometer No. LAB-1

Aneroid Barometer No. 560815

| Actual Mercury Barometer Read | Ambient Temp. | Temperature Correction Factor | Adjsted Mercury Barometer Read | Initial Aneriod Barometer Read | Difference ($P_{ba}-P_{bm}$) |
|---|---|---|---|---|---|
| 28.770 | 72 | .114 | 28.656 | 28.760 | .104 |
| | | | | | |

Has this barometer shown any consistent problems with calibration? Yes/(No) If yes, explain. _____

Has problem been alleviated? Yes/No. How? _____

*Note

Aneroid barometers will be calibrated periodically against a mercury column barometer. The aneroid barometer to be calibrated should be placed in close proximity to the mercury barometer and left to equilibrate for 20-30 minutes before calibrating. Aneriod barometer will be calibrated to the adjusted mercury barometer readings.

S-312

INTERPOLL LABORATORIES
(612)786-6020

Stack Sampling Department - QA
Aneroid Barometer Calibration Sheet

ET's

Date 5-31-94

Technician E Tourtellotte

Mercury Column Barometer No. LAB 1

Aneroid Barometer No. ultrometer model 12 SN-01003-08K

| Actual Mercury Barometer Read | Ambient Temp. | Temperature Correction Factor | Adjsted Mercury Barometer Read | Initial Aneriod Barometer Read | Difference ($P_{ba}$-$P_{bm}$) |
|---|---|---|---|---|---|
| 29.230 | 72 | .115 | 29.115 | 29.12 | .005 |
| | | | | | |

Has this barometer shown any consistent problems with calibration? Yes/No. If yes, explain. no

Has problem been alleviated? Yes/No. How?

*Note

Aneroid barometers will be calibrated periodically against a mercury column barometer. The aneroid barometer to be calibrated should be placed in close proximity to the mercury barometer and left to equilibrate for 20-30 minutes before calibrating. Aneriod barometer will be calibrated to the adjusted mercury barometer readings.

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INTERPOLL LABORATORIES
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Stack Sampling Department - QA
Aneroid Barometer Calibration Sheet

Date 2/16/94

Technician D. Van Hoeven

Mercury Column Barometer No. 1

Aneroid Barometer No. _____

| Actual Mercury Barometer Read | Ambient Temp. | Temperature Correction Factor | Adjsted Mercury Barometer Read | Initial Aneriod Barometer Read | Difference ($P_{ba}$-$P_{bm}$) |
|---|---|---|---|---|---|
| 29.23 | 76 | .124 | 29.11 | 29.10 | .01 |
| | | | | | |

Has this barometer shown any consistent problems with calibration? Yes/(No.) If yes, explain. _____

Has problem been alleviated? Yes/No. How? _____

*Note

Aneroid barometers will be calibrated periodically against a mercury column barometer. The aneroid barometer to be calibrated should be placed in close proximity to the mercury barometer and left to equilibrate for 20-30 minutes before calibrating. Aneriod barometer will be calibrated to the adjusted mercury barometer readings.

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