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## **Background Report Reference**

**AP-42 Section Number:** 9.10.2

**Background Chapter:** 4

**Reference Number:** 9

**Title:** Determination of PM-10 Emissions  
and Volumetric Flow Rates from the  
Precleaner Baghouse and the Huller  
Baghouse located in the Central  
CALifornia Almond Growers  
Association in Kerman, California

Ecoserve, Inc.

Ecoserve, Inc.

November 1991

# ECOSERVE, Inc.

AIR QUALITY MANAGEMENT CONSULTANTS  
Since 1972

Corporate Office  
3890 Railroad Avenue  
Pittsburg, California 94565

Operations  
690-A Garcia Avenue  
Pittsburg, California 94565

AP-42 Section 9.10.2  
Reference  
Report Sect. 4  
Reference 9

- Permitting
- Consultation
- Source Testing
- Modeling
- Risk Management
- Ambient Monitoring
- Industrial Hygiene

**DETERMINATION OF PM-10 EMISSIONS  
AND VOLUMETRIC FLOW RATES FROM  
THE PRECLEANER BAGHOUSE AND THE HULLER BAGHOUSE  
LOCATED IN THE CENTRAL CALIFORNIA ALMOND GROWERS ASSOCIATION  
IN KERMAN, CALIFORNIA**

Test Dates: October 1, 2, and 3, 1991  
Report Date: November 8, 1991

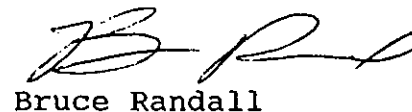
Prepared for:  
Eckley Engineering  
255 N. Fulton Street, Ste. 105  
Fresno, Ca 93701  
Attention: Mr. Robert C. Eckley, P.E.

Project # 1779

Prepared by:

  
Susan Huang

Reviewed by:

  
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## MIDWEST RESEARCH INSTITUTE

September 4, 1992

To: AP-42, Food & Agriculture Project File  
From: Lance Henning <sup>JH</sup>  
Subject: Phone Log

---

Called Wendy Eckley of Eckley Engineering to ask questions regarding the recently received Ecoserve report.

Determination of PM-10 Emissions and Volumetric Flow Rates  
from the Precleaner Baghouse and the Huller Baghouse located in  
the Central California Almond Growers Association in Kerman,  
California, Ecoserve, Inc., November 8, 1991.

I asked if process information was available for the facility including the amount of almonds processed through the facility.

Mrs. Eckley said she would get the information to me ASAP. She also mentioned the precleaner baghouse test was bad, due to a tear in the bag.

9/4/92

Eckley  
Engineering

- By Phone
- For Ecoserve Report
- Weighed trucks as they came in  
to determine FWT/NR

THIS WAS CONVERTED TO MEATS

- FAXING FACTORS FOR CONVERSION

- FAXING Ducts Flow Rate

09/08/92

1230

1 of 1

From: Wendy Eckley  
Eckley Engineering  
Phone (209) 233-1217 Fax 209.233.5756

To: Lance Henning  
MRI  
816.753.8420

Lance -

To answer your questions about the Central California Almond Growers  
October, 1991, Ecoserve source test:

1. The precleaner test was declared invalid because of a split in one bag. We have photos of the split. (The most interesting thing to me was that there was a tape from an audio cassette that had stuck in the bag.) Because of the placement of the test ports, the 60" duct airflow would represent the total airflow for the precleaner.
2. The sum of the mean airflows from the three ducts (22", 36", 72") should be used for the huller/sheller - 126,067 DSCFM. At 6.18 tons meats per hour and 0.0012 grains/DSCF, I get 0.21 lb TSP/meats ton and 0.10 lb PM<sub>10</sub>/meats ton.
3. To determine the weights entering the precleaner, we weighed the incoming product (field weight tons). Since the test was invalid, I won't send the chart; but just to give you an idea of the relative process rate between precleaner and huller, the incoming product averaged just under 25 tons/hour. Two of the problems in computing emissions factors historically were that there wasn't wide understanding that the precleaner and huller operate at different rates and that the precleaned (in-hull) product weighs some 30% (depending on variables) less than the incoming (field-weight) product.
4. Since we could not measure directly the process weight into the huller/sheller, we used the 24-hour meats production to determine the factors in meats tons. Because the facility operates at a uniform rate and had no problems necessitating shut-downs during the period, we determined that the mean hourly rate would be representative. We used another day's production as a control and found virtually no difference. (It is not often among our various types of clients that production rate is uniform enough to be able to use hourly means.)

Does that answer your questions so far? Call or FAX, if there are more. I mailed you something on cotton gins - even if it is too late - just so you'd get a hint of why I'm so frustrated with the old AP-42.

Ref. 9 (Kerman, CA)

PM-10 :

- USED M201A
- Preheater baghouse outlet data voided - torn bag.
- Sheller - 3 outlet ducts

tested only 22" duct - cyclonic flow  
cyclonic flow  
cut size 8.8  $\mu$ m

|          |   |                |       |
|----------|---|----------------|-------|
| 22" duct | - | 7,900          | dscfm |
| 36" duct | - | 16,000         | dscfm |
| 70" duct | - | 102,166        | dscfm |
|          |   | <u>126,066</u> | dscfm |

reported in-stack filterable emissions + condensable emissions

- could not measure gases rate into filter/sheller
- used 24-hr. meth reduction determined hourly avg. rate  $\Leftarrow$  can NOT avg. w/OTHER DATA

~~not used~~

Eddy estimates a PM-10 emission factor of 0.10 lb PM-10 / ton meth  
 $\div 5 \approx 0.02$  lb PM-10 / FWT  
(and, based on pub. size data = 0.013 lb PM-10 / FWT)

# ECOSERVE, Inc.

ENVIRONMENTAL SERVICES

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Pittsburg, CA 94565  
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September 1, 1992

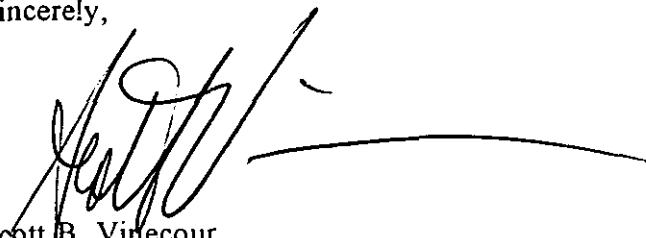
Mid-West Research Institute  
425 Volk Boulevard  
Kansas City, MO 64110  
Attn: Mr. L Henning

Dear Mr. Henning,

Enclosed please find a copy of a PM-10 source test that was performed for the Central California Almond Growers Association.

Please let me know if there is anything else we can do for you.

Sincerely,



Scott B. Vinecour  
Technical Field Rep.

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## INTRODUCTION

On October 1, 2, and 3, 1991, Ecoserve Inc. performed emission testings on the Precleaner Baghouse and the Huller Baghouse located at Central California Almond Growers Association, in Kerman, California. The purpose of the test was to comply with Fresno County APCD regulations.

On October 1, volumetric flow rates of the exhaust gas were determined on the 70-inch duct and the 36-inch duct, which led from the Huller Baghouse. Volumetric flow rates of the exhaust gas were also measured on the 60-inch duct, which led from the Precleaner Baghouse. The volumetric flow rate measurements on each of the ducts were performed in triplicate and followed CARB methods 1-4.

On October 2, triplicate PM-10 emission tests were completed on the 24-inch duct of the Precleaner Baghouse. On October 3, the same tests were performed on the 22-inch duct of the Huller Baghouse. The PM-10 tests followed EPA method 201A and were two hours in duration.

This report presents the testing results, testing methods, and the reduced data. Copies of field data sheets, lab results, and calibration sheets are included in the report.

## DISCUSSION

This section of the report provides additional explanations for the PM-10 emission testings:

When performing velocity traverse on the 22-inch duct of the Huller Baghouse, the presence of the cyclonic flow in the duct was determined. To accurately determine the volumetric flow rates, the pitot tube was rotated into the flow direction at each traverse point and the rotation angle for each traverse point was recorded. Since only the vertical velocity component contributed to the actual volumetric flow rates, this vertical velocity was used in the volumetric flow rate calculations.

Due to duct velocities and nozzle availability, particle size cut point of exactly 10  $\mu\text{m}$  couldn't be achieved. The 50% effective cut diameters for the 24-inch duct of the Precleaner Baghouse and the 22-inch duct of the Huller Baghouse were 7.1 and 8.8  $\mu\text{m}$  respectively.

The targeted particulate grain loading for both the Precleaner Baghouse and the Huller Baghouse is 0.004 grains/SDCF. The average particulate grain loadings for the Precleaner Baghouse and the Huller Baghouse are determined to be 0.031 grains /SDCF and 0.001 grains/SDCF respectively.

**SUMMARY OF RESULTS  
(PM10 TESTS)**

Client: Eckley Engineering  
 Test Unit: Precleaner Baghouse  
 Test Location: 24" Duct Outlet  
 Test Date: 10/2/91

| Time:                           | 950-1154 | 1232-1441 | 1458-1700 |
|---------------------------------|----------|-----------|-----------|
| Volumetric Flow Rates           |          |           |           |
| ACFM:                           |          | 17200     |           |
| SDCFM:                          |          | 16300     |           |
| Gaseous Concentrations          |          |           |           |
| O2 (% vol. dry):                |          | 20.9      |           |
| CO2 (% vol. dry):               |          | 0.0       |           |
| H2O (% vol.):                   | 0.98     | 1.17      | 0.29      |
| SDCF:                           | 69.83    | 67.69     | 69.87     |
| PM Weights (mg)                 |          |           |           |
| PM10:                           | 27.69    | 31.76     | 23.56     |
| Total PM:                       | 138.61   | 143.62    | 135.15    |
| PM10 (%):                       | 20.0     | 22.1      | 17.4      |
| PM Concentrations (grains/SDCF) |          |           |           |
| PM10:                           | 0.006    | 0.007     | 0.005     |
| Total PM:                       | 0.031    | 0.033     | 0.030     |
| 50% Effective Cut Diameter (um) |          |           |           |
|                                 |          | 7.1       |           |

**SUMMARY OF RESULTS  
(PM10 TESTS)**

Client: Eckley Engineering  
 Test Unit: Huller Baghouse  
 Test Location: 22" Duct Outlet  
 Test Date: 10/3/91

| Time:                           | 857-1100 | 1119-1320 | 1335-1537 |
|---------------------------------|----------|-----------|-----------|
| Volumetric Flow Rates           |          |           |           |
| ACFM:                           |          | 8400      |           |
| SDCFM:                          |          | 7900      |           |
| Gaseous Concentrations          |          |           |           |
| O2 (% vol. dry):                |          | 20.9      |           |
| CO2 (% vol. dry):               |          | 0.0       |           |
| H2O (% vol.):                   | 1.53     | 1.98      | 1.96      |
| SDCF:                           | 51.44    | 52.57     | 49.26     |
| PM Weights (mg)                 |          |           |           |
| PM10:                           | 2.51     | 2.51      | 0.92      |
| Total PM:                       | 5.34     | 2.51      | 4.31      |
| PM10 (%):                       | 47.0     | 100.0     | 21.3      |
| PM Concentrations (grains/SDCF) |          |           |           |
| PM:                             | 7.5E(-4) | 7.4E(-4)  | 2.9E(-4)  |
| Total PM:                       | 1.6E(-3) | 7.4E(-4)  | 1.3E(-3)  |
| 50% Effective Cut Diameter (um) |          |           |           |
|                                 |          | 8.8       |           |

**SUMMARY OF RESULTS  
(VOLUMETRIC FLOW RATES DETERMINATIONS)**

Client: Eckley Engineering

Test Date: 10/1/91

60" Duct Outlet from the Precleaner Baghouse:

| Run #:                 | 1     | 2     | 3     |
|------------------------|-------|-------|-------|
| Volumetric Flow Rates  |       |       |       |
| ACFM:                  | 62600 | 63200 | 64500 |
| SDCFM:                 | 57400 | 57900 | 59100 |
| Gaseous Concentrations |       |       |       |
| O2 (% vol. dry):       |       | 20.9  |       |
| CO2 (% vol. dry):      |       | 0.0   |       |
| H2O (% vol.):          |       | 1.02  |       |

36" Duct Outlet from the Huller Baghouse:

| Run #:                 | 1     | 2     | 3     |
|------------------------|-------|-------|-------|
| Volumetric Flow Rates  |       |       |       |
| ACFM:                  | 17600 | 17700 | 18000 |
| SDCFM:                 | 15800 | 16000 | 16200 |
| Gaseous Concentrations |       |       |       |
| O2 (% vol. dry):       |       | 20.9  |       |
| CO2 (% vol. dry):      |       | 0.0   |       |
| H2O (% vol.):          |       | 1.82  |       |

70" duct Outlet from the Huller Baghouse:

| Run #:                 | 1      | 2      | 3      |
|------------------------|--------|--------|--------|
| Volumetric Flow Rates: |        |        |        |
| ACFM:                  | 113600 | 112600 | 115000 |
| SDCFM:                 | 102000 | 101200 | 103300 |
| Gaseous Concentrations |        |        |        |
| O2 (% vol. dry):       |        | 20.9   |        |
| CO2 (% vol. dry):      |        | 0.0    |        |
| H2O (% vol.):          |        | 1.82   |        |

## Determination of PM-10 Emissions

REF: :EPA, Code of Federal Regulations, Title 40, Part 51,  
Appendix M, Method 201A, 1990.  
:Application Guide for Source PM-10 Measurement with  
Constant Sampling Rate, by Southern Research Institute  
Birmingham, Alabama 35255-5305

### INTRODUCTION

This method determines particulate matter (PM) emissions equal or less than an aerodynamic diameter of 10  $\mu\text{m}$  in the stack or duct. A gas sample is extracted at a constant sampling rate through an in-stack sizing device, which separates PM greater than PM-10.

The PM-10 measurement contains both in-stack filterable emissions and condensible emissions. The total PM levels are the sum of the PM-10 and the PM greater than 10  $\mu\text{m}$ .

### Sampling Apparatus

The PM-10 sizing device is a single stage cyclone with a Method 17 filter. A nozzle for which isokinetic sampling rate could be maintained is selected and attached to the PM-10 sizing device. The PM-10 sizing device is connected to a sampling probe. Connected in series are Greenburg-Smith impingers, a liquid trap, a silica gel drying tube, a vacuum pump, a dry test meter, and a calibrated restriction orifice. The impingers are charged with distilled water and immersed in an ice bath.

### SAMPLING PROCEDURE

A number of traverse points are chosen for sampling such that a constant sampling rate would provide for sampling within 20% of the isokinetic rate. The PM-10 sizing device is inserted into the duct and allowed to reach duct temperature (10-15 minutes). The nozzle is positioned directly into the duct gas stream and the pump immediately started. Isokinetic sampling rate is maintained over the period of the test by monitoring the orifice meter differential pressure. At the end of the test, the PM-10 sizing device is withdrawn from the duct, sealed from possible contamination, and transported to the laboratory for analysis.

### Sample Recovery Procedure

1. Container #1 (in-stack filter): Method 17 filter is recovered and placed in this container.

2. Container #2 (cyclone or large PM catch): acetone is used to remove large PM from the nozzle and the cyclone, excluding the "turn around" cup and the exit tube. The rinse is stored in the container.

3. Container #3 (PM-10): acetone is used to recover PM from the "turn around" cup, the exit tube, and the front half of the in-stack filter holder. This rinse is added to the container.

4. Container #4 (PM-10): distilled deionized water is used to collect PM from the back half of the in-stack filter holder, the sampling probe, and impinger contents.

The acetone and the distilled deionized water are also collected as blanks.

The filter and the rinses are placed into their tared dish, evaporated to dryness, and desiccated to constant weight.

### Calculations

PM-10 weights are the sum of the weights obtained from the Container #1, #3, and #4 less the acetone and water blanks.

Total PM weights are the sum of the PM-10 weight and the weight obtained from Container #2 less the acetone blank.

### Stack Gas Viscosity

$$u = C1 + C2 * Ts + C3 * Ts \exp(2) + C4 * Bws + C5 * fo$$

### Sample Flow Rate at Standard Conditions

$$Q_{std} = V_{mstd} / t$$

### Sample Flow Rate at the Actual Conditions

$$Q_s = 0.056 * Q_{std} * (1/(1-Bws)) * Ts/Ps$$

### Particle Size (50% effective cutoff diameter)

$$D50 = 0.15625 * ((Ts/(Mw * Ps)) \exp(0.2091) * (u/Q_s) \exp(0.7091))$$

## Symbol Identification

Bws = moisture content, percent vol.  
C1 = 160.62  
C2 = 0.42952  
C3 = 1.0483E(-4)  
C4 = -74.143  
C5 = 53.147  
D50 = 50% effective cut diameter, um  
fo = stack gas fraction O2, by volume, dry basis  
Mw = wet molecular weight of stack gas, gm/mol  
Ps = absolute stack pressure, in. Hg  
Qs = sample flow rate at the actual sampler rate, CFM  
Qstd = sample flow rate at the standard conditions, CFM  
Ts = average stack temperature, C  
Vmstd = gas volume at the standard conditions, CF  
t = total sampling time, min.  
u = viscosity of stack gas, micropoise

Reduced Data for PM10 Tests

1. 24" Duct Outlet from the Precleaner Baghouse
2. 22" Duct Outlet from the Huller Baghouse

## INITIAL MOLECULAR WEIGHT AND PERCENT WATER

CLIENT: Eckley Engineering

DATE: 10/2/91 TIME: 950-1154

UNIT: Precleaner Baghouse

SAMPLE: 24" Duct Outlet RUN #: 1

## PRESSURE

Pbar (in. Hg) 29.92  
 Pstatic (in. H2O) -11  
 Pduct (in. Hg) 29.11

## TEMPERATURE

Standard (°F) 60  
 Duct (°F) 70

## METER DATA

Initial Meter 288.443  
 Final Meter 361.307  
 Meter Temp (°F) 83  
 dH (in. H2O) 1.13  
 Avg Y 0.9980

## WATER COLLECTION

Final Wt. (g) 2281.0  
 Tare Wt. (g) 2266.1  
 Net Water (g) 14.9

## FIXED GASES (Vol. % dry)

Oxygen 20.9  
 Carbon Dioxide 0.0  
 Nitrogen 79.1

## RESULTS:

Dry M.W. 28.84

Vm std. 69.83

%H2O 0.98

Wet M.W. 28.73

## VELOCITY TRAVERSE &amp; VOLUME FLOW RATE

CLIENT: Eckley Engineering

DATE: 10/2/91  
 UNIT: Precleaner Baghouse  
 SAMPLE: 24" Duct Outlet

TIME: 950-1154

RUN #: 1

Duct Diameter (in.) 24.0  
 Area (sq.ft.) 3.14  
 Duct Press. (in.Hg.) 29.11  
 Vol. Per Cent H2O 0.98  
 Molecular Wt. (wet) 28.73  
 Standard Temp. (°F) 60  
 Std Press. (in.Hg.) 29.92  
 Pitot Coeff. 0.848

Mag Box # 374  
 Temp. Unit # 6058/6752  
 Pitot Tube # 5220

| Pt. | In.<br>From<br>Edge | Right |      |       | Left |      |       |
|-----|---------------------|-------|------|-------|------|------|-------|
|     |                     | Td    | Dp   | Vd    | Td   | Dp   | Vd    |
| 1   | 0.5                 | 70    | 0.50 | 40.8  | 70   | 2.00 | 81.6  |
| 2   | 1.6                 | 70    | 0.70 | 48.3  | 70   | 0.60 | 44.7  |
| 3   | 2.8                 | 70    | 3.50 | 108.0 | 70   | 0.50 | 40.8  |
| 4   | 4.2                 | 70    | 6.00 | 141.4 | 70   | 4.80 | 126.4 |
| 5   | 6.0                 | 70    | 3.50 | 108.0 | 70   | 3.50 | 108.0 |
| 6   | 8.5                 | 70    | 2.60 | 93.1  | 70   | 2.40 | 89.4  |
| 7   | 15.5                | 70    | 2.40 | 89.4  | 70   | 3.20 | 103.2 |
| 8   | 18.0                | 70    | 3.30 | 104.8 | 70   | 3.20 | 103.2 |
| 9   | 19.8                | 70    | 3.00 | 100.0 | 70   | 2.90 | 98.3  |
| 10  | 21.1                | 70    | 2.80 | 96.6  | 70   | 2.60 | 93.1  |
| 11  | 22.4                | 70    | 2.80 | 96.6  | 70   | 2.60 | 93.1  |
| 12  | 23.5                | 70    | 2.50 | 91.2  | 70   | 2.60 | 93.1  |

## RESULTS:

Average Velocity (Vd) 91.4 FPS @ 70 F and 29.1 in. Hg.

Volume Flow Rate Qd 17.2 X1000 ACFM  
 Qstd (wet) 16.4 X1000 SCFM  
 Qstd (dry) 16.3 X1000 SDCFM

## INITIAL MOLECULAR WEIGHT AND PERCENT WATER

CLIENT: Eckley Engineering

DATE: 10/2/91 TIME: 1232-1441

UNIT: Precleaner Baghouse

SAMPLE: 24" Duct Outlet RUN #: 2

## PRESSURE

Pbar (in. Hg) 29.92  
Pstatic (in. H2O) -11  
Pduct (in. Hg) 29.11

## TEMPERATURE

Standard (°F) 60  
Duct (°F) 70

## METER DATA

Initial Meter 361.415  
Final Meter 433.567  
Meter Temp (°F) 95  
dH (in. H2O) 1.10  
Avg Y 0.9980

## WATER COLLECTION

Final Wt. (g) 2312.6  
Tare Wt. (g) 2295.3  
Net Water (g) 17.3

## FIXED GASES (Vol. % dry)

Oxygen 20.9  
Carbon Dioxide 0.0  
Nitrogen 79.1

## RESULTS:

Dry M.W. 28.84

Vm std. 67.69

%H2O 1.17

Wet M.W. 28.71

## VELOCITY TRAVERSE &amp; VOLUME FLOW RATE

CLIENT: Eckley Engineering

DATE: 10/2/91  
 UNIT: Precleaner Baghouse  
 SAMPLE: 24" Duct Outlet

TIME: 1232-1441

RUN #: 2

Duct Diameter (in.) 24.0  
 Area (sq.ft.) 3.14  
 Duct Press. (in.Hg.) 29.11  
 Vol. Per Cent H2O 1.17  
 Molecular Wt. (wet) 28.71  
 Standard Temp. (°F) 60  
 Std Press. (in.Hg.) 29.92  
 Pitot Coeff. 0.848

Mag Box # 374  
 Temp. Unit # 6058/6752  
 Pitot Tube # 5220

| Pt. | In.<br>From<br>Edge | Right |      |       | Left |      |       |
|-----|---------------------|-------|------|-------|------|------|-------|
|     |                     | Td    | Dp   | Vd    | Td   | Dp   | Vd    |
| 1   | 0.5                 | 70    | 0.50 | 40.8  | 70   | 2.00 | 81.6  |
| 2   | 1.6                 | 70    | 0.70 | 48.3  | 70   | 0.60 | 44.7  |
| 3   | 2.8                 | 70    | 3.50 | 108.0 | 70   | 0.50 | 40.8  |
| 4   | 4.2                 | 70    | 6.00 | 141.4 | 70   | 4.80 | 126.5 |
| 5   | 6.0                 | 70    | 3.50 | 108.0 | 70   | 3.50 | 108.0 |
| 6   | 8.5                 | 70    | 2.60 | 93.1  | 70   | 2.40 | 89.4  |
| 7   | 15.5                | 70    | 2.40 | 89.4  | 70   | 3.20 | 103.3 |
| 8   | 18.0                | 70    | 3.30 | 104.9 | 70   | 3.20 | 103.3 |
| 9   | 19.8                | 70    | 3.00 | 100.0 | 70   | 2.90 | 98.3  |
| 10  | 21.1                | 70    | 2.80 | 96.6  | 70   | 2.60 | 93.1  |
| 11  | 22.4                | 70    | 2.80 | 96.6  | 70   | 2.60 | 93.1  |
| 12  | 23.5                | 70    | 2.50 | 91.3  | 70   | 2.60 | 93.1  |

## RESULTS:

Average Velocity (Vd) 91.4 FPS @ 70 F and 29.1 in. Hg.

Volume Flow Rate Qd 17.2 X1000 ACFM  
 Qstd (wet) 16.4 X1000 SCFM  
 Qstd (dry) 16.3 X1000 SDCFM

## INITIAL MOLECULAR WEIGHT AND PERCENT WATER

CLIENT: Eckley Engineering

DATE: 10/2/91  
UNIT: Precleaner Baghouse  
SAMPLE: 24" Duct Outlet

TIME: 1458-1700

RUN #: 3

## PRESSURE

Pbar (in. Hg) 29.92  
Pstatic (in. H2O) -11  
Pduct (in. Hg) 29.11

## TEMPERATURE

Standard (°F) 60  
Duct (°F) 70

## METER DATA

Initial Meter 433.782  
Final Meter 509.758  
Meter Temp (°F) 106  
dH (in. H2O) 1.24  
Avg Y 0.9980

## WATER COLLECTION

Final Wt. (g) 2277.0  
Tare Wt. (g) 2272.6  
Net Water (g) 4.4

## FIXED GASES (Vol. % dry)

Oxygen 20.9  
Carbon Dioxide 0.0  
Nitrogen 79.1

## RESULTS:

Dry M.W. 28.84

Vm std. 69.87  
%H2O 0.29  
Wet M.W. 28.80

## VELOCITY TRAVERSE &amp; VOLUME FLOW RATE

CLIENT: Eckley Engineering

DATE: 10/2/91

TIME: 1458-1700

UNIT: Precleaner Baghouse

SAMPLE: 24" Duct Outlet

RUN #: 3

Duct Diameter (in.) 24.0  
 Area (sq.ft.) 3.14  
 Duct Press. (in.Hg.) 29.11  
 Vol. Per Cent H2O 0.29  
 Molecular Wt. (wet) 28.80  
 Standard Temp. (°F) 60  
 Std Press. (in.Hg.) 29.92  
 Pitot Coeff. 0.848

Mag Box # 374  
 Temp. Unit # 6058/6752  
 Pitot Tube # 5220

| Pt. | In.<br>From<br>Edge | Right |      |       | Left |      |       |
|-----|---------------------|-------|------|-------|------|------|-------|
|     |                     | Td    | Dp   | Vd    | Td   | Dp   | Vd    |
| 1   | 0.5                 | 70    | 0.50 | 40.8  | 70   | 2.00 | 81.5  |
| 2   | 1.6                 | 70    | 0.70 | 48.2  | 70   | 0.60 | 44.6  |
| 3   | 2.8                 | 70    | 3.50 | 107.8 | 70   | 0.50 | 40.8  |
| 4   | 4.2                 | 70    | 6.00 | 141.2 | 70   | 4.80 | 126.3 |
| 5   | 6.0                 | 70    | 3.50 | 107.8 | 70   | 3.50 | 107.8 |
| 6   | 8.5                 | 70    | 2.60 | 92.9  | 70   | 2.40 | 89.3  |
| 7   | 15.5                | 70    | 2.40 | 89.3  | 70   | 3.20 | 103.1 |
| 8   | 18.0                | 70    | 3.30 | 104.7 | 70   | 3.20 | 103.1 |
| 9   | 19.8                | 70    | 3.00 | 99.8  | 70   | 2.90 | 98.1  |
| 10  | 21.1                | 70    | 2.80 | 96.4  | 70   | 2.60 | 92.9  |
| 11  | 22.4                | 70    | 2.80 | 96.4  | 70   | 2.60 | 92.9  |
| 12  | 23.5                | 70    | 2.50 | 91.1  | 70   | 2.60 | 92.9  |

## RESULTS:

Average Velocity (Vd) 91.3 FPS @ 70 F and 29.1 in. Hg.

Volume Flow Rate Qd 17.2 X1000 ACFM  
 Qstd (wet) 16.4 X1000 SCFM  
 Qstd (dry) 16.4 X1000 SDCFM

## INITIAL MOLECULAR WEIGHT AND PERCENT WATER

CLIENT: Eckley Engineering

|         |                 |        |          |
|---------|-----------------|--------|----------|
| DATE:   | 10/3/91         | TIME:  | 857-1100 |
| UNIT:   | Huller Baghouse |        |          |
| SAMPLE: | 22" Duct Outlet | RUN #: | 1        |

## PRESSURE

|                   |       |
|-------------------|-------|
| Pbar (in. Hg)     | 29.78 |
| Pstatic (in. H2O) | -10   |
| Pduct (in. Hg)    | 29.04 |

## TEMPERATURE

|               |    |
|---------------|----|
| Standard (°F) | 60 |
| Duct (°F)     | 69 |

## METER DATA

|                 |         |
|-----------------|---------|
| Initial Meter   | 510.010 |
| Final Meter     | 563.686 |
| Meter Temp (°F) | 80      |
| dH (in. H2O)    | 0.59    |
| Avg Y           | 0.9980  |

## WATER COLLECTION

|               |        |
|---------------|--------|
| Final Wt. (g) | 2325.2 |
| Tare Wt. (g)  | 2308.0 |
| Net Water (g) | 17.2   |

## FIXED GASES (Vol. % dry)

|                |      |
|----------------|------|
| Oxygen         | 20.9 |
| Carbon Dioxide | 0.0  |
| Nitrogen       | 79.1 |

## RESULTS:

|          |       |
|----------|-------|
| Dry M.W. | 28.84 |
|----------|-------|

|          |       |
|----------|-------|
| Vm std.  | 51.44 |
| %H2O     | 1.53  |
| Wet M.W. | 28.67 |

|                     |       |            |         |
|---------------------|-------|------------|---------|
| Duct Diameter (in.) | 22    |            |         |
| Area (sq.ft.)       | 2.63  | Mag Box    | 373     |
| Duct Press. ("Hg)   | 29.04 | Temp Unit  | 416,422 |
| Vol. Percent H2O    | 1.53  | Pitot Tube | 5220    |
| Molecular Wt. (wet) | 28.67 |            |         |
| Standard Temp (F)   | 60    |            |         |
| Std. Press. ("Hg)   | 29.92 |            |         |
| Pitot Coeff         | 0.848 |            |         |

**Results:**

|                  |           |                  |
|------------------|-----------|------------------|
| Volume Flow Rate | Qd        | 8.4 x 1000 ACFM  |
|                  | Qstd(wet) | 8.0 x 1000 SCFM  |
|                  | Qstd(dry) | 7.9 x 1000 SDCFM |

## INITIAL MOLECULAR WEIGHT AND PERCENT WATER

CLIENT: Eckley Engineering

DATE: 10/3/91  
UNIT: Huller Baghouse  
SAMPLE: 22" Duct Outlet

TIME: 1119-1320

RUN #: 2

## PRESSURE

Pbar (in. Hg) 29.78  
Pstatic (in. H2O) -10  
Pduct (in. Hg) 29.04

## TEMPERATURE

Standard (°F) 60  
Duct (°F) 69

## METER DATA

Initial Meter 563.839  
Final Meter 619.987  
Meter Temp (°F) 93  
dH (in. H2O) 0.59  
Avg Y 0.9980

## WATER COLLECTION

Final Wt. (g) 2254.7  
Tare Wt. (g) 2231.9  
Net Water (g) 22.8

## FIXED GASES (Vol. % dry)

Oxygen 20.9  
Carbon Dioxide 0.0  
Nitrogen 79.1

## RESULTS:

Dry M.W. 28.84

Vm std. 52.57  
%H2O 1.98  
Wet M.W. 28.62

VELOCITY TRAVERSE AND VOLUME FLOW RATE  
FOR CYCLONIC FLOW

CLIENT: Eckley Engineering      TIME: 1119-1320  
DATE: 10/3/91      RUN: 2  
UNIT: Muller Baghouse  
SITE: 22" Duct Outlet

Duct Diameter (in.) 22  
Area (sq.ft.) 2.639      Mag Box 373  
Duct Press. ("Hg) 29.04      Temp Unit 416,422  
Vol. Percent H2O 1.98      Pitot Tube 5220  
Molecular Wt. (wet) 28.62  
Standard Temp (F) 60  
Std. Press. ("Hg) 29.92  
Pitot Coeff 0.848

| Pt. | In.<br>From<br>Edge | Right Port |    |     |             |                      | Left Port |    |     |             |                      |
|-----|---------------------|------------|----|-----|-------------|----------------------|-----------|----|-----|-------------|----------------------|
|     |                     | alpha      | Td | Dp  | field<br>Dp | vertical<br>velocity | alpha     | Td | Dp  | Field<br>Dp | vertical<br>velocity |
| 1   | 0.5                 | + 5        | 67 | 2.5 | 2.48        | 90.9                 | +15       | 70 | 1.2 | 1.12        | 61.3                 |
| 2   | 1.5                 | +30        | 67 | 2.5 | 1.87        | 79.0                 | +25       | 70 | 2.2 | 1.81        | 77.8                 |
| 3   | 2.6                 | +45        | 67 | 1.5 | 0.75        | 50.0                 | +30       | 70 | 1.5 | 1.12        | 61.4                 |
| 4   | 3.9                 | +45        | 67 | 2.5 | 1.25        | 64.5                 | +45       | 70 | 1.5 | 0.75        | 50.1                 |
| 5   | 5.5                 | +45        | 67 | 0.7 | 0.35        | 34.2                 | +45       | 70 | 1.0 | 0.50        | 40.9                 |
| 6   | 7.8                 | +50        | 67 | 1.0 | 0.41        | 37.1                 | +45       | 70 | 2.8 | 1.40        | 68.5                 |
| 7   | 14.1                | -15        | 67 | 0.7 | 0.61        | 45.0                 | -15       | 70 | 0.6 | 0.56        | 43.3                 |
| 8   | 16.5                | -15        | 70 | 0.8 | 0.73        | 49.4                 | -15       | 70 | 0.7 | 0.65        | 46.8                 |
| 9   | 18.1                | -15        | 70 | 0.7 | 0.65        | 46.8                 | -10       | 70 | 0.7 | 0.66        | 47.0                 |
| 10  | 19.4                | -15        | 70 | 0.7 | 0.65        | 46.8                 | -10       | 70 | 0.6 | 0.58        | 44.2                 |
| 11  | 20.5                | -10        | 70 | 0.7 | 0.68        | 47.7                 | -10       | 70 | 0.7 | 0.68        | 47.7                 |
| 12  | 21.5                | -10        | 70 | 0.7 | 0.68        | 47.7                 | -10       | 70 | 0.6 | 0.58        | 44.2                 |

## Results:

Average Vertical Velocity Component: 53.0 fps @ 69.1 F and 29.04 "Hg

Volume Flow Rate      Qd      8.4 x 1000 ACFM  
Qstd(wet)      8.0 x 1000 SCFM  
Qstd(dry)      7.9 x 1000 SDCFM

## INITIAL MOLECULAR WEIGHT AND PERCENT WATER

CLIENT: Eckley Engineering

|         |                 |        |           |
|---------|-----------------|--------|-----------|
| DATE:   | 10/3/91         | TIME:  | 1335-1537 |
| UNIT:   | Huller Baghouse |        |           |
| SAMPLE: | 22" Duct Outlet | RUN #: | 3         |

## PRESSURE

|                   |       |
|-------------------|-------|
| Pbar (in. Hg)     | 29.78 |
| Pstatic (in. H2O) | -10   |
| Pduct (in. Hg)    | 29.04 |

## TEMPERATURE

|               |    |
|---------------|----|
| Standard (°F) | 60 |
| Duct (°F)     | 69 |

## METER DATA

|                 |         |
|-----------------|---------|
| Initial Meter   | 620.024 |
| Final Meter     | 674.214 |
| Meter Temp (°F) | 109     |
| dH (in. H2O)    | 0.59    |
| Avg Y           | 0.9980  |

## WATER COLLECTION

|               |        |
|---------------|--------|
| Final Wt. (g) | 2245.9 |
| Tare Wt. (g)  | 2224.7 |
| Net Water (g) | 21.2   |

## FIXED GASES (Vol. % dry)

|                |      |
|----------------|------|
| Oxygen         | 20.9 |
| Carbon Dioxide | 0.0  |
| Nitrogen       | 79.1 |

## RESULTS:

|          |       |
|----------|-------|
| Dry M.W. | 28.84 |
|----------|-------|

|          |       |
|----------|-------|
| Vm std.  | 49.26 |
| %H2O     | 1.96  |
| Wet M.W. | 28.62 |

VELOCITY TRAVERSE AND VOLUME FLOW RATE  
FOR CYCLONIC FLOW

CLIENT: Eckley Engineering      TIME: 1335-1537  
DATE: 10/3/91      RUN: 3  
UNIT: Huller Baghouse  
SITE: 22" Duct Outlet

Duct Diameter (in.) 22  
Area (sq.ft.) 2.639      Mag Box 373  
Duct Press. ("Hg) 29.04      Temp Unit 416,422  
Vol. Percent H2O 1.96      Pitot Tube 5220  
Molecular Wt. (wet) 28.62  
Standard Temp (F) 60  
Std. Press. ("Hg) 29.92  
Pitot Coeff 0.848

| Pt. | In.<br>From<br>Edge | Right Port |    |     |             |                      | Left Port |    |     |             |                      |
|-----|---------------------|------------|----|-----|-------------|----------------------|-----------|----|-----|-------------|----------------------|
|     |                     | alpha      | Td | Dp  | field<br>Dp | vertical<br>velocity | alpha     | Td | Dp  | Field<br>Dp | vertical<br>velocity |
| 1   | 0.5                 | + 5        | 67 | 2.5 | 2.48        | 90.9                 | +15       | 70 | 1.2 | 1.12        | 61.3                 |
| 2   | 1.5                 | +30        | 67 | 2.5 | 1.87        | 79.0                 | +25       | 70 | 2.2 | 1.81        | 77.8                 |
| 3   | 2.6                 | +45        | 67 | 1.5 | 0.75        | 50.0                 | +30       | 70 | 1.5 | 1.12        | 61.4                 |
| 4   | 3.9                 | +45        | 67 | 2.5 | 1.25        | 64.5                 | +45       | 70 | 1.5 | 0.75        | 50.1                 |
| 5   | 5.5                 | +45        | 67 | 0.7 | 0.35        | 34.2                 | +45       | 70 | 1.0 | 0.50        | 40.9                 |
| 6   | 7.8                 | +50        | 67 | 1.0 | 0.41        | 37.1                 | +45       | 70 | 2.8 | 1.40        | 68.5                 |
| 7   | 14.1                | -15        | 67 | 0.7 | 0.61        | 45.0                 | -15       | 70 | 0.6 | 0.56        | 43.3                 |
| 8   | 16.5                | -15        | 70 | 0.8 | 0.73        | 49.4                 | -15       | 70 | 0.7 | 0.65        | 46.8                 |
| 9   | 18.1                | -15        | 70 | 0.7 | 0.65        | 46.8                 | -10       | 70 | 0.7 | 0.66        | 47.0                 |
| 10  | 19.4                | -15        | 70 | 0.7 | 0.65        | 46.8                 | -10       | 70 | 0.6 | 0.58        | 44.2                 |
| 11  | 20.5                | -10        | 70 | 0.7 | 0.68        | 47.7                 | -10       | 70 | 0.7 | 0.68        | 47.7                 |
| 12  | 21.5                | -10        | 70 | 0.7 | 0.68        | 47.7                 | -10       | 70 | 0.6 | 0.58        | 44.2                 |

## Results:

Average Vertical Velocity Component: 53.0 fps @ 69.1 F and 29.04 "Hg

Volume Flow Rate      Qd      8.4 x 1000 ACFM  
Qstd(wet)      8.0 x 1000 SCFM  
Qstd(dry)      7.9 x 1000 SDCFM

**DETERMINATION OF VELOCITY AND VOLUME FLOW RATE,  
MOLECULAR WEIGHT AND PERCENT MOISTURE**

REF: EPA, Code of Federal Regulations, Title 40, Part 60,  
Appendix A, Methods 1-4, 1981  
: South Coast AQMD, Source Testing Manual, Los Angeles,  
CA, April, 1981  
: State of California, Air Resources Board, Draft  
Stationary Source Test Methods, Method 1-4, June, 1979

**DETERMINATION OF MOLECULAR WEIGHT AND PERCENT MOISTURE**

**APPARATUS**

A stainless steel probe with glass wool plug or glass fiber filter was inserted into the duct. The probe was connected via a short length of Teflon tubing to the impinger train which consisted of a series of pre-weighed impinger-absorbers connected in tandem and immersed in an ice bath. The absorption train was followed in series by a diaphragm pump, a dry test meter and a calibrated restriction orifice fitted with a magnehelic differential pressure gauge.

**SAMPLING PROCEDURE**

The apparatus was leak checked, and the initial dry test meter reading recorded. The pump was started, and adjusted to sample at a rate of approximately 0.5 CFM. At five minute intervals, the pressure drop across the orifice, and the temperature of the gas entering the meter were recorded. At the end of the test period, the pump was turned off, and the final meter reading recorded.

**ANALYTICAL PROCEDURE**

Each impinger-absorber was weighed, and the net weight gain of each was determined to the nearest 0.5 gram.

## DETERMINATION OF VELOCITY AND VOLUME FLOW RATE

In order to perform the a traverse, duct dimensions were measured and suitable sampling points were selected. The duct was then traversed to determine gas temperatures and velocity heads.

Duct velocity heads were measured with either a type "S" or a standard pitot tube connected to a Magnehelic differential pressure gauge. Duct static pressure was determined by rotating the pitot tubes near the center of the duct such that a null or zero reading was obtained on the pressure gauge. The line leading to either the impact or vacuum side of the pressure gauge was disconnected to determine whether the duct static pressure was negative or positive.

Duct temperatures were measured with a type "K" thermocouple connected to a potentiometer.

### CALCULATIONS

#### METHOD 1: DETERMINATION OF TRAVERSE POINT LOCATIONS

Circular Duct:

$$t.p. (1^{st} \text{ half}) = D/2 - (D/2k) * [k(k+1-2n)]^{1/2}$$

$$t.p. (2^{nd} \text{ half}) = D/2 + (D/2k) * [k(2n-1)]^{1/2}$$

$$\text{Where } n = 1 \text{ to } k/2$$

Rectangular Duct:

$$t.p. = W/2k + (n-1) * W/k$$

$$\text{Where } k = (W/L) * (\text{number of ports})$$

$$n = 1 \text{ to } k$$

#### METHOD 2: VELOCITY AND VOLUME FLOW RATE

Duct gas velocity at any traverse point :

$$vd = 85.49 * Cp * \sqrt{Td * (dP/Pd/MW)}$$

For cyclonic flow, vertical gas velocity at any traverse point :

$$vd = 85.49 * Cp * \cos(a) * \sqrt{Td * (dp/Pd/MW)}$$

Volumetric Flow Rate:

$$Q_d = vd_{(avg)} * A_d * 60 = \text{ACFM}$$

$$Q_{std}(wet) = Q_d * (T_{std}/T_d) * (P_d/P_{std}) = \text{SCFM}$$

$$Q_{std}(dry) = Q_{std}(wet) * (1 - (\%H_2O/100)) = \text{SDCFM}$$

#### METHOD 3: DRY MOLECULAR WEIGHT

$$MW(dry) = (\%CO_2/100)*(44) + (\%O_2/100)*(32) + (\%N_2/100)*(28)$$

## CALCULATIONS (Continued)

$$MW(\text{wet}) = MW(\text{dry}) * [1 - (\%H_2O/100)] + (\%H_2O/100) * 18$$

## METHOD 4: DETERMINATION OF MOISTURE CONTENT

$$\%H_2O = (X_{H_2O} * 100) / (X_{H_2O} + X_{\text{gas}})$$

Where:

$$X_{H_2O} = W/18$$

$$X_{\text{gas}} = 1.195 * V_m (T_{\text{std}}/T_m) [ (P_{\text{bar}} + dH/13.6) / P_{\text{std}} ]$$

Particulate Concentration:

$$C_o = 0.0154 * M/V_m(\text{std})$$

$$\text{where } V_m(\text{std}) = V_m * T_{\text{std}}/T_m(\text{avg}) * [ (P_{\text{bar}} + dH(\text{avg})/13.6) ] / P_{\text{std}}$$

## Symbol Identification

Subscripts d, m and n denote duct, dry gas meter and nozzle respectively. Subscripts std, bar and avg denote standard, barometric and average

A = duct area, square feet  
 a = flow angle  
 D = duct diameter  
 C<sub>p</sub> = pitot tube correction factor, unitless  
 dH = orifice differential pressure, inches H<sub>2</sub>O  
 k = number of traverse points  
 M = mass of particulate collected, milligrams  
 MW = wet molecular weight of duct gas, g/mole  
 P = absolute pressure, inches Hg  
 dP = velocity pressure head, inches H<sub>2</sub>O  
 Q = volume flow rate, CFM  
 T = absolute temperature, R  
 V<sub>m</sub> = gas volume, CF  
 v = velocity, feet/second  
 W = water collected, grams  
 %CO<sub>2</sub> = duct CO<sub>2</sub> content, percent volume dry  
 %H<sub>2</sub>O = duct gas water content, percent volume  
 %N<sub>2</sub> = duct N<sub>2</sub> concentration, percent volume dry  
 %O<sub>2</sub> = duct O<sub>2</sub> concentration, percent volume dry

Reduced Data for Volumetric Flow Rates Tests

1. 60" Duct Outlet from the Precleaner Baghouse
2. 35" Duct Outlet from the Huller Baghouse
3. 70" Duct Outlet from the Huller Baghouse

## INITIAL MOLECULAR WEIGHT AND PERCENT WATER

CLIENT: Eckley Engineering  
DATE: 10/1/91  
UNIT: Precleaner Baghouse  
SAMPLE: 60" Duct Outlet RUN #: 1

## PRESSURE

Pbar (in. Hg) 29.92  
Pstatic (in. H2O) -9  
Pduct (in. Hg) 29.26

## TEMPERATURE

Standard (°F) 60  
Duct (°F) 89

## METER DATA

Initial Meter 482.445  
Final Meter 497.557  
Meter Temp (°F) 104  
dH (in. H2O) 0.88  
Avg Y 1.0030

## WATER COLLECTION

Final Wt. (g) 2294.2  
Tare Wt. (g) 2291.1  
Net Water (g) 3.1

## FIXED GASES (Vol. % dry)

Oxygen 20.9  
Carbon Dioxide 0.0  
Nitrogen 79.1

## RESULTS:

Dry M.W. 28.84

Vm std. 14.01

%H2O 1.02

Wet M.W. 28.73

## VELOCITY TRAVERSE &amp; VOLUME FLOW RATE

CLIENT: Eckley Engineering

DATE: 10/1/91

UNIT: Precleaner Baghouse

SAMPLE: 60" Duct Outlet

RUN #: 1

Duct Diameter (in.) 59.5  
 Area (sq.ft.) 19.31  
 Duct Press. (in.Hg.) 29.26  
 Vol. Per Cent H2O 1.02  
 Molecular Wt. (wet) 28.73  
 Standard Temp. (°F) 60  
 Std Press. (in.Hg.) 29.92  
 Pitot Coeff. 0.833

Mag Box # 374  
 Temp. Unit # 6058/6752  
 Pitot Tube # 7070

| Pt. | In.<br>From<br>Edge | Right |      |      | Left |      |      |
|-----|---------------------|-------|------|------|------|------|------|
|     |                     | Td    | Dp   | Vd   | Td   | Dp   | Vd   |
| 1   | 1.2                 | 88    | 0.50 | 40.7 | 89   | 0.30 | 31.5 |
| 2   | 4.0                 | 89    | 1.80 | 77.2 | 89   | 1.80 | 77.2 |
| 3   | 7.0                 | 89    | 0.70 | 48.2 | 89   | 0.65 | 46.4 |
| 4   | 10.5                | 89    | 0.74 | 49.5 | 89   | 0.58 | 43.8 |
| 5   | 14.9                | 89    | 0.90 | 54.6 | 89   | 0.78 | 50.8 |
| 6   | 21.2                | 89    | 1.10 | 60.4 | 89   | 0.90 | 54.6 |
| 7   | 38.3                | 89    | 0.90 | 54.6 | 89   | 1.00 | 57.6 |
| 8   | 44.6                | 89    | 0.90 | 54.6 | 89   | 1.00 | 57.6 |
| 9   | 49.0                | 89    | 0.90 | 54.6 | 89   | 0.98 | 57.0 |
| 10  | 52.5                | 89    | 0.90 | 54.6 | 89   | 0.95 | 56.1 |
| 11  | 55.5                | 89    | 0.90 | 54.6 | 89   | 0.95 | 56.1 |
| 12  | 58.3                | 89    | 0.82 | 52.1 | 89   | 0.82 | 52.1 |

## RESULTS:

Average Velocity (Vd) 54.0 FPS @ 89 F and 29.3 in. Hg.

Volume Flow Rate Qd 62.6 X1000 ACFM  
 Qstd (wet) 58.0 X1000 SCFM  
 Qstd (dry) 57.4 X1000 SDCFM

## INITIAL MOLECULAR WEIGHT AND PERCENT WATER

CLIENT: Eckley Engineering  
DATE: 10/1/91  
UNIT: Precleaner Baghouse  
SAMPLE: 60" Duct Outlet

RUN #: 2

## PRESSURE

Pbar (in. Hg) 29.92  
Pstatic (in. H<sub>2</sub>O) -9  
Pduct (in. Hg) 29.26

## TEMPERATURE

Standard (°F) 60  
Duct (°F) 89

## METER DATA

Initial Meter 482.445  
Final Meter 497.557  
Meter Temp (°F) 104  
dH (in. H<sub>2</sub>O) 0.88  
Avg Y 1.0030

## WATER COLLECTION

Final Wt. (g) 2294.2  
Tare Wt. (g) 2291.1  
Net Water (g) 3.1

## FIXED GASES (Vol. % dry)

Oxygen 20.9  
Carbon Dioxide 0.0  
Nitrogen 79.1

## RESULTS:

Dry M.W. 28.84

Vm std. 14.01

%H<sub>2</sub>O 1.02

Wet M.W. 28.73

## VELOCITY TRAVERSE &amp; VOLUME FLOW RATE

CLIENT: Eckley Engineering

DATE: 10/1/91

UNIT: Precleaner Baghouse

SAMPLE: 60" Duct Outlet

RUN #: 2

Duct Diameter (in.) 59.5  
 Area (sq.ft.) 19.31  
 Duct Press. (in.Hg.) 29.26  
 Vol. Per Cent H2O 1.02  
 Molecular Wt. (wet) 28.73  
 Standard Temp. (°F) 60  
 Std Press. (in.Hg.) 29.92  
 Pitot Coeff. 0.833

Mag Box # 374  
 Temp. Unit # 6058/6752  
 Pitot Tube # 7070

| Pt. | In.<br>From<br>Edge | Right |      |      | Left |      |      |
|-----|---------------------|-------|------|------|------|------|------|
|     |                     | Td    | Dp   | Vd   | Td   | Dp   | Vd   |
| 1   | 1.2                 | 89    | 0.50 | 40.7 | 89   | 0.30 | 31.5 |
| 2   | 4.0                 | 89    | 2.10 | 83.4 | 89   | 1.60 | 72.8 |
| 3   | 7.0                 | 89    | 0.60 | 44.6 | 89   | 0.85 | 53.1 |
| 4   | 10.5                | 89    | 0.79 | 51.2 | 89   | 0.55 | 42.7 |
| 5   | 14.9                | 89    | 0.90 | 54.6 | 89   | 0.78 | 50.8 |
| 6   | 21.2                | 89    | 1.10 | 60.4 | 89   | 0.90 | 54.6 |
| 7   | 38.3                | 89    | 1.00 | 57.6 | 89   | 0.92 | 55.2 |
| 8   | 44.6                | 89    | 0.90 | 54.6 | 89   | 1.00 | 57.6 |
| 9   | 49.0                | 89    | 1.00 | 57.6 | 89   | 0.98 | 57.0 |
| 10  | 52.5                | 89    | 1.00 | 57.6 | 89   | 0.91 | 54.9 |
| 11  | 55.5                | 89    | 1.00 | 57.6 | 89   | 0.95 | 56.1 |
| 12  | 58.3                | 89    | 0.80 | 51.5 | 89   | 0.78 | 50.8 |

## RESULTS:

Average Velocity (Vd) 54.5 FPS @ 89 F and 29.3 in. Hg.

Volume Flow Rate Qd 63.2 X1000 ACFM  
 Qstd (wet) 58.5 X1000 SCFM  
 Qstd (dry) 57.9 X1000 SDCFM

## INITIAL MOLECULAR WEIGHT AND PERCENT WATER

CLIENT: Eckley Engineering

DATE: 10/1/91 TIME: 1549-1619

UNIT: Precleaner Baghouse

SAMPLE: 60" Duct Outlet RUN #: 3

## PRESSURE

Pbar (in. Hg) 29.92  
 Pstatic (in. H2O) -9  
 Pduct (in. Hg) 29.26

## TEMPERATURE

Standard (°F) 60  
 Duct (°F) 89

## METER DATA

Initial Meter 482.445  
 Final Meter 497.557  
 Meter Temp (°F) 104  
 dH (in. H2O) 0.88  
 Avg Y 1.0030

## WATER COLLECTION

Final Wt. (g) 2294.2  
 Tare Wt. (g) 2291.1  
 Net Water (g) 3.1

## FIXED GASES (Vol. % dry)

Oxygen 20.9  
 Carbon Dioxide 0.0  
 Nitrogen 79.1

## RESULTS:

Dry M.W. 28.84

Vm std. 14.01

%H2O 1.02

Wet M.W. 28.73

## INITIAL MOLECULAR WEIGHT AND PERCENT WATER

CLIENT: Eckley Engineering

DATE: 10/1/91

UNIT: Huller Baghouse

SAMPLE: 36" Duct Outlet

RUN #: 1

## PRESSURE

Pbar (in. Hg) 29.92

Pstatic (in. H2O) -9

Pduct (in. Hg) 29.26

## TEMPERATURE

Standard (°F) 60

Duct (°F) 95

## METER DATA

Initial Meter 471.586

Final Meter 482.330

Meter Temp (°F) 115

dH (in. H2O) 0.88

Avg Y 1.0030

## WATER COLLECTION

Final Wt. (g) 2291.1

Tare Wt. (g) 2287.2

Net Water (g) 3.9

## FIXED GASES (Vol. % dry)

Oxygen 20.9

Carbon Dioxide 0.0

Nitrogen 79.1

## RESULTS:

Dry M.W. 28.84

Vm std. 9.77

%H2O 1.82

Wet M.W. 28.64

## VELOCITY TRAVERSE &amp; VOLUME FLOW RATE

CLIENT: Eckley Engineering

DATE: 10/1/91

UNIT: Huller Baghouse

SAMPLE: 36" Duct Outlet

RUN #: 1

Duct Diameter (in.) 35.5  
 Area (sq.ft.) 6.87  
 Duct Press. (in.Hg.) 29.26  
 Vol. Per Cent H2O 1.82  
 Molecular Wt. (wet) 28.64  
 Standard Temp. (°F) 60  
 Std Press. (in.Hg.) 29.92  
 Pitot Coeff. 0.833

Mag Box # 374  
 Temp. Unit # 6058/6752  
 Pitot Tube # 7070

| Pt. | In.<br>From<br>Edge | Right |      |      | Left |      |      |
|-----|---------------------|-------|------|------|------|------|------|
|     |                     | Td    | Dp   | Vd   | Td   | Dp   | Vd   |
| 1   | 0.7                 | 91    | 0.38 | 35.6 | 91   | 0.50 | 40.8 |
| 2   | 2.4                 | 93    | 1.00 | 57.9 | 94   | 0.68 | 47.7 |
| 3   | 4.2                 | 93    | 0.70 | 48.4 | 94   | 0.30 | 31.7 |
| 4   | 6.3                 | 94    | 0.30 | 31.7 | 95   | 0.35 | 34.3 |
| 5   | 8.9                 | 94    | 0.55 | 42.9 | 95   | 0.42 | 37.6 |
| 6   | 12.6                | 95    | 0.58 | 44.1 | 95   | 0.52 | 41.8 |
| 7   | 22.9                | 95    | 0.64 | 46.4 | 96   | 0.55 | 43.0 |
| 8   | 26.6                | 95    | 0.64 | 46.4 | 96   | 0.60 | 44.9 |
| 9   | 29.2                | 95    | 0.65 | 46.7 | 96   | 0.60 | 44.9 |
| 10  | 31.3                | 95    | 0.62 | 45.6 | 95   | 0.50 | 41.0 |
| 11  | 33.1                | 95    | 0.60 | 44.9 | 96   | 0.58 | 44.2 |
| 12  | 34.8                | 95    | 0.60 | 44.9 | 96   | 0.40 | 36.7 |

## RESULTS:

Average Velocity (Vd) 42.7 FPS @ 95 F and 29.3 in. Hg.

Volume Flow Rate Qd 17.6 X1000 ACFM  
 Qstd (wet) 16.1 X1000 SCFM  
 Qstd (dry) 15.8 X1000 SDCFM

## INITIAL MOLECULAR WEIGHT AND PERCENT WATER

CLIENT: Eckley Engineering

DATE: 10/1/91

UNIT: Huller Baghouse

SAMPLE: 36" Duct Outlet

RUN #: 2

## PRESSURE

Pbar (in. Hg) 29.92

Pstatic (in. H2O) -9

Pduct (in. Hg) 29.26

## TEMPERATURE

Standard (°F) 60

Duct (°F) 94

## METER DATA

Initial Meter 471.586

Final Meter 482.330

Meter Temp (°F) 115

dH (in. H2O) 0.88

Avg Y 1.0030

## WATER COLLECTION

Final Wt. (g) 2291.1

Tare Wt. (g) 2287.2

Net Water (g) 3.9

## FIXED GASES (Vol. % dry)

Oxygen 20.9

Carbon Dioxide 0.0

Nitrogen 79.1

## RESULTS:

Dry M.W. 28.84

Vm std. 9.77

%H2O 1.82

Wet M.W. 28.64

## VELOCITY TRAVERSE &amp; VOLUME FLOW RATE

CLIENT: Eckley Engineering

DATE: 10/1/91

UNIT: Huller Baghouse

SAMPLE: 36" Duct Outlet

RUN #: 2

Duct Diameter (in.) 35.5  
 Area (sq.ft.) 6.87  
 Duct Press. (in.Hg.) 29.26  
 Vol. Per Cent H2O 1.82  
 Molecular Wt. (wet) 28.64  
 Standard Temp. (°F) 60  
 Std Press. (in.Hg.) 29.92  
 Pitot Coeff. 0.833

Mag Box # 374  
 Temp. Unit # 6058/6752  
 Pitot Tube # 7070

| Pt. | In.<br>From<br>Edge | Right |      |      | Left |      |      |
|-----|---------------------|-------|------|------|------|------|------|
|     |                     | Td    | Dp   | Vd   | Td   | Dp   | Vd   |
| 1   | 0.7                 | 95    | 0.40 | 36.7 | 96   | 0.40 | 36.7 |
| 2   | 2.4                 | 94    | 1.00 | 57.9 | 94   | 1.00 | 57.9 |
| 3   | 4.2                 | 94    | 0.34 | 33.8 | 94   | 0.40 | 36.6 |
| 4   | 6.3                 | 94    | 0.45 | 38.8 | 94   | 0.50 | 40.9 |
| 5   | 8.9                 | 94    | 0.50 | 40.9 | 94   | 0.50 | 40.9 |
| 6   | 12.6                | 94    | 0.50 | 40.9 | 94   | 0.58 | 44.1 |
| 7   | 22.9                | 94    | 0.50 | 40.9 | 94   | 0.60 | 44.9 |
| 8   | 26.6                | 94    | 0.58 | 44.1 | 94   | 0.52 | 41.8 |
| 9   | 29.2                | 95    | 0.55 | 43.0 | 94   | 0.55 | 42.9 |
| 10  | 31.3                | 95    | 0.62 | 45.6 | 94   | 0.55 | 42.9 |
| 11  | 33.1                | 96    | 0.62 | 45.7 | 94   | 0.58 | 44.1 |
| 12  | 34.8                | 95    | 0.60 | 44.9 | 96   | 0.60 | 44.9 |

## RESULTS:

Average Velocity (Vd) 43.0 FPS @ 94 F and 29.3 in. Hg.

Volume Flow Rate Qd 17.7 X1000 ACFM  
 Qstd (wet) 16.3 X1000 SCFM  
 Qstd (dry) 16.0 X1000 SDCFM

## INITIAL MOLECULAR WEIGHT AND PERCENT WATER

CLIENT: Eckley Engineering

DATE: 10/1/91

UNIT: Huller Baghouse

SAMPLE: 36" Duct Outlet

RUN #: 3

## PRESSURE

Pbar (in. Hg) 29.92

Pstatic (in. H2O) -9

Pduct (in. Hg) 29.26

## TEMPERATURE

Standard (°F) 60

Duct (°F) 95

## METER DATA

Initial Meter 471.586

Final Meter 482.330

Meter Temp (°F) 115

dH (in. H2O) 0.88

Avg Y 1.0030

## WATER COLLECTION

Final Wt. (g) 2291.1

Tare Wt. (g) 2287.2

Net Water (g) 3.9

## FIXED GASES (Vol. % dry)

Oxygen 20.9

Carbon Dioxide 0.0

Nitrogen 79.1

## RESULTS:

Dry M.W. 28.84

Vm std. 9.77

%H2O 1.82

Wet M.W. 28.64

## VELOCITY TRAVERSE &amp; VOLUME FLOW RATE

CLIENT: Eckley Engineering

DATE: 10/1/91

UNIT: Huller Baghouse

SAMPLE: 36" Duct Outlet

RUN #: 3

Duct Diameter (in.) 35.5  
 Area (sq.ft.) 6.87  
 Duct Press. (in.Hg.) 29.26  
 Vol. Per Cent H2O 1.82  
 Molecular Wt. (wet) 28.64  
 Standard Temp. (°F) 60  
 Std Press. (in.Hg.) 29.92  
 Pitot Coeff. 0.833

Mag Box # 374  
 Temp. Unit # 6058/6752  
 Pitot Tube # 7070

| Pt. | In.<br>From<br>Edge | Right |      |      | Left |      |      |
|-----|---------------------|-------|------|------|------|------|------|
|     |                     | Td    | Dp   | Vd   | Td   | Dp   | Vd   |
| 1   | 0.7                 | 92    | 0.38 | 35.6 | 95   | 0.34 | 33.8 |
| 2   | 2.4                 | 94    | 1.10 | 60.7 | 92   | 1.10 | 60.6 |
| 3   | 4.2                 | 93    | 1.10 | 60.7 | 95   | 0.32 | 32.8 |
| 4   | 6.3                 | 93    | 0.75 | 50.1 | 95   | 0.50 | 41.0 |
| 5   | 8.9                 | 94    | 0.28 | 30.6 | 95   | 0.52 | 41.8 |
| 6   | 12.6                | 95    | 0.38 | 35.7 | 95   | 0.58 | 44.1 |
| 7   | 22.9                | 95    | 0.50 | 41.0 | 95   | 0.58 | 44.1 |
| 8   | 26.6                | 95    | 0.50 | 41.0 | 95   | 0.58 | 44.1 |
| 9   | 29.2                | 95    | 0.50 | 41.0 | 95   | 0.55 | 43.0 |
| 10  | 31.3                | 95    | 0.60 | 44.9 | 96   | 0.55 | 43.0 |
| 11  | 33.1                | 96    | 0.60 | 44.9 | 96   | 0.55 | 43.0 |
| 12  | 34.8                | 96    | 0.58 | 44.2 | 96   | 0.55 | 43.0 |

## RESULTS:

Average Velocity (Vd) 43.5 FPS @ 95 F and 29.3 in. Hg.

Volume Flow Rate Qd 18.0 X1000 ACFM  
 Qstd (wet) 16.5 X1000 SCFM  
 Qstd (dry) 16.2 X1000 SDCFM

## INITIAL MOLECULAR WEIGHT AND PERCENT WATER

CLIENT: Eckley Engineering  
DATE: 10/1/91  
UNIT: Huller Baghouse  
SAMPLE: 70" Duct Outlet RUN #: 1

## PRESSURE

Pbar (in. Hg) 29.92  
Pstatic (in. H2O) -9  
Pduct (in. Hg) 29.26

## TEMPERATURE

Standard (°F) 60  
Duct (°F) 96

## METER DATA

Initial Meter 471.586  
Final Meter 482.330  
Meter Temp (°F) 115  
dH (in. H2O) 0.88  
Avg Y 1.0030

## WATER COLLECTION

Final Wt. (g) 2291.1  
Tare Wt. (g) 2287.2  
Net Water (g) 3.9

## FIXED GASES (Vol. % dry)

Oxygen 20.9  
Carbon Dioxide 0.0  
Nitrogen 79.1

## RESULTS:

Dry M.W. 28.84

Vm std. 9.77

%H2O 1.82

Wet M.W. 28.64

## INITIAL MOLECULAR WEIGHT AND PERCENT WATER

CLIENT: Eckley Engineering

DATE: 10/1/91

UNIT: Huller Baghouse

SAMPLE: 70" Duct Outlet

RUN #: 2

## PRESSURE

Pbar (in. Hg) 29.92  
Pstatic (in. H2O) -9  
Pduct (in. Hg) 29.26

## TEMPERATURE

Standard (°F) 60  
Duct (°F) 96

## METER DATA

Initial Meter 471.586  
Final Meter 482.330  
Meter Temp (°F) 115  
dH (in. H2O) 0.88  
Avg Y 1.0030

## WATER COLLECTION

Final Wt. (g) 2291.1  
Tare Wt. (g) 2287.2  
Net Water (g) 3.9

## FIXED GASES (Vol. % dry)

Oxygen 20.9  
Carbon Dioxide 0.0  
Nitrogen 79.1

## RESULTS:

Dry M.W. 28.84

Vm std. 9.77

%H2O 1.82

Wet M.W. 28.64

## INITIAL MOLECULAR WEIGHT AND PERCENT WATER

CLIENT: Eckley Engineering

DATE: 10/1/91

UNIT: Huller Baghouse

SAMPLE: 70" Duct Outlet

RUN #: 3

## PRESSURE

Pbar (in. Hg) 29.92  
Pstatic (in. H2O) -9  
Pduct (in. Hg) 29.26

## TEMPERATURE

Standard (°F) 60  
Duct (°F) 96

## METER DATA

Initial Meter 471.586  
Final Meter 482.330  
Meter Temp (°F) 115  
dH (in. H2O) 0.88  
Avg Y 1.0030

## WATER COLLECTION

Final Wt. (g) 2291.1  
Tare Wt. (g) 2287.2  
Net Water (g) 3.9

## FIXED GASES (Vol. % dry)

Oxygen 20.9  
Carbon Dioxide 0.0  
Nitrogen 79.1

## RESULTS:

Dry M.W. 28.84

Vm std. 9.77

%H2O 1.82

Wet M.W. 28.64

## VELOCITY TRAVERSE &amp; VOLUME FLOW RATE

CLIENT: Eckley Engineering

DATE: 10/1/91

UNIT: Huller Baghouse

SAMPLE: 70" Duct Outlet

RUN #: 3

Duct Diameter (in.) 74.5  
 Area (sq.ft.) 30.27  
 Duct Press. (in.Hg.) 29.26  
 Vol. Per Cent H2O 1.82  
 Molecular Wt. (wet) 28.64  
 Standard Temp. (°F) 60  
 Std Press. (in.Hg.) 29.92  
 Pitot Coeff. 0.833

Mag Box # 374  
 Temp. Unit # 6058/6752  
 Pitot Tube # 7070

| Pt. | In.<br>From<br>Edge | Left |      |      | Right |      |      |
|-----|---------------------|------|------|------|-------|------|------|
|     |                     | Td   | Dp   | Vd   | Td    | Dp   | Vd   |
| 1   | 1.6                 | 95   | 2.10 | 84.0 | 96    | 2.00 | 82.0 |
| 2   | 5.0                 | 95   | 2.10 | 84.0 | 96    | 0.65 | 46.8 |
| 3   | 8.8                 | 95   | 2.10 | 84.0 | 96    | 0.80 | 51.9 |
| 4   | 13.2                | 95   | 1.40 | 68.6 | 96    | 0.80 | 51.9 |
| 5   | 18.6                | 95   | 1.30 | 66.1 | 96    | 0.90 | 55.0 |
| 6   | 26.5                | 95   | 1.20 | 63.5 | 96    | 0.90 | 55.0 |
| 7   | 48.0                | 96   | 1.00 | 58.0 | 96    | 0.90 | 55.0 |
| 8   | 55.9                | 96   | 0.94 | 56.2 | 96    | 1.10 | 60.8 |
| 9   | 61.3                | 96   | 0.90 | 55.0 | 96    | 1.10 | 60.8 |
| 10  | 65.7                | 96   | 1.20 | 63.5 | 96    | 1.10 | 60.8 |
| 11  | 69.5                | 96   | 1.30 | 66.1 | 96    | 1.20 | 63.5 |
| 12  | 72.9                | 95   | 1.10 | 60.8 | 96    | 1.30 | 66.1 |

## RESULTS:

Average Velocity (Vd) 63.3 FPS @ 96 F and 29.3 in. Hg.

Volume Flow Rate Qd 115.0 X1000 ACFM  
 Qstd (wet) 105.2 X1000 SCFM  
 Qstd (dry) 103.3 X1000 SDCFM

## **APPENDIX**

Copies of Field Data Sheets

Copies of Lab Results

Copies of Calibration Sheets

**APPENDIX**  
Copies of Field Data Sheets

## PARTICULATE EMISSIONS FIELD DATA SHEET

Date: 10/3/191 Run #: -1  
 Client: Eckley Engineering  
 Unit: Huller and house  
 Accident loc: \_\_\_\_\_  
 Barometric Press: 29.90 "Hg  
 Static Pressure: -10 "H<sub>2</sub>O  
 Ouel Pressure: \_\_\_\_\_ "Hg  
 Assumed HU(wet): 29.16 Assi

Sample Train Temp  
Probe: \_\_\_\_\_ °F  
Filter: \_\_\_\_\_ °F  
Sample Line: \_\_\_\_\_ °F

Due to Dism: 22

Nozzle & Probe Mat: SS  
 Filter Holder Mat: \_\_\_\_\_  
 Filter #: 372 O. I. C. 67  
 Nozzle #: 1 i.d.: 370 in  
 Pilot #: 5220 Cp: 0.846  
 Temp. Unit #: \_\_\_\_\_  
 Mag. #: \_\_\_\_\_ Meter #: 990  
 Orifice #: \_\_\_\_\_ Avg T: 0.990

Orifice  $t_m$ : \_\_\_\_\_ Avg  $T$ : 0.978  
1. \_\_\_\_\_ 1855

PRE LEAK CHECK = .010 @ 20 IN.

0000 0000

### Meter Data

0.45

[illegible]

## PARTICULATE EMISSIONS

### DATA & RESULTS:

Site: Hull City  
Date: 10/31/91

Run: 1  
Time:           

| Absorber Type | Contents               | Final | Tare  | Net | H2O |
|---------------|------------------------|-------|-------|-----|-----|
| 55            | condi H <sub>2</sub> O | 560.7 | 553.5 |     |     |
|               | -                      | 528.1 | 528.0 |     |     |
|               |                        |       |       |     |     |
|               |                        |       |       |     |     |
| liquid trap   | empty                  | 476.5 | 473.7 |     |     |
|               | silica gel             | 760.4 | 752.8 |     |     |
| TOTAL         |                        |       |       |     |     |

Filter Sample: Type met/17

| Sample Fraction                  | Final Wt. | Tare Wt. | Net mass | Co, grains/SDCF |
|----------------------------------|-----------|----------|----------|-----------------|
| 17ozelc cyclone/pressure         | 338.2     | 465.2    |          |                 |
| cyclone tubing/pressure          |           |          |          |                 |
| probe/rule into H <sub>2</sub> O | 272.2     | 331.6    |          |                 |
|                                  |           |          |          |                 |
|                                  |           |          |          |                 |
|                                  |           |          |          |                 |
|                                  |           |          |          |                 |

### Gas Composition:

CO<sub>2</sub> 0 % volume (dry)  
O<sub>2</sub> 20.9 % volume (dry)  
CO            % volume (dry)  
H<sub>2</sub>            % volume (dry)  
H<sub>2</sub>O 1.53 % volume

TOTAL

Wt (wet) 29.64  
Dress Air             
Sampled Volume 51.44 SDCF  
Isokinetic Rate           

### Particulate Concentration:

Co            grains/SDCF @            °F and 29.92 "Hr.  
C            grains/SDCF @           

### Emission Rate:

E.R.            lbs/hr @ Qstd(dry)            SDCFI

Alf 0.4x10<sup>3</sup>  
90cfm 7.9x10<sup>3</sup>

## ENVIRONMENTAL SERVICES

## FIELD DATA SHEET

Over Dim: 22'

Nozzle & Probe Mat: SS  
 Filter Holder Mat: \_\_\_\_\_  
 Filter #: #359 Q1227  
 Nozzle #: 1 i.d.: 3.78 mm  
 Pitot #: 5220 Cp: 0.848  
 Temp. Unit #: \_\_\_\_\_  
 Mag. #: \_\_\_\_\_ Meter #: 990  
 Orifice #: \_\_\_\_\_ Avg Y: 0.996

PRE LEAK CHECK = .008 @ 15 in.

[illegible]

## PARTICULATE EMISSIONS

### DATA & RESULTS:

Site: Huller Baghouse  
 Date: 10/31/91

Run: 2  
 Time: \_\_\_\_\_

| Absorber Type | Contents    | Final | Tare  | Net | H2O |
|---------------|-------------|-------|-------|-----|-----|
| GS            | 100ml diH2O | 569.9 | 563.7 |     |     |
|               |             | 556.1 | 554.4 |     |     |
|               |             |       |       |     |     |
|               |             |       |       |     |     |
| Liquid trap   | empty       | 464.5 | 463.1 |     |     |
|               | silica gel  | 664.2 | 650.7 |     |     |
| TOTAL         |             |       |       |     |     |

Filter Sample: Type method 17

| Sample Fraction                   | Final Wt. | Tare Wt. | Net mg | Co, grains/SCCF |
|-----------------------------------|-----------|----------|--------|-----------------|
| 1.0224 cyclone <u>232.1</u>       | 337.2     |          |        |                 |
| cyclone sub 1                     |           |          |        |                 |
| probe line HAP (H2O) <u>225.4</u> | 271.1     |          |        |                 |
|                                   |           |          |        |                 |
|                                   |           |          |        |                 |
|                                   |           |          |        |                 |
| TOTAL                             |           |          |        |                 |

### Gas Composition:

CO2 0 % volume (dry)  
 O2 20.9 % volume (dry)  
 CO \_\_\_\_\_ % volume (dry)  
 H2 \_\_\_\_\_ % volume (dry)  
 H2O 1.98 % volume

### TOTAL

Flow (vel) 2862  
 Excess Air \_\_\_\_\_  
 Sampled Volume 52.57 SCCF  
 Isokinetic Rate \_\_\_\_\_

### Particulate Concentration:

Co \_\_\_\_\_ grains/SCCF @ \_\_\_\_\_ °F and 29.92 "Pr.  
 C \_\_\_\_\_ grains/SCCF @ \_\_\_\_\_

AKFmg.  $4 \times 10^3$   
 SOCFmg.  $7.9 \times 10^3$

### Emission Rate:

E.R. \_\_\_\_\_ lbs/hr @ Qstd(dry) \_\_\_\_\_ SCCF

Date: 10/31/91 Run #: 13  
 Client: Edgely Engineering Inc  
 Unit: Hully Bagnouse  
 Assent Temp: \_\_\_\_\_ °F  
 Barometric Press: 29.70 "Hg  
 Static Pressure: -10 "H<sub>2</sub>O  
 Duct Pressure: \_\_\_\_\_ "Hg  
 Assumed MU(wet): 29.16 Assumed MU(dry): \_\_\_\_\_

Sample Line 3

Orifice t. : \_\_\_\_\_ Avg T: 0.99

Assumed HV(wet): 29.76 Assumed ZIL: 1.02

PRE LEAK CHECK = .006 @ 14" IN

[illegible]

# PARTICULATE EMISSIONS

## DATA & RESULTS:

Site: Hully Boghouse  
 Date: 10/31/91

Run: 2  
 Time: \_\_\_\_\_

| Absorber Type | Contents   | Final | Tare  | Net | H2O |
|---------------|------------|-------|-------|-----|-----|
| G.S           |            | 550.5 | 556.9 |     |     |
|               |            | 531.2 | 529.7 |     |     |
|               |            |       |       |     |     |
|               |            |       |       |     |     |
| liquid trap   | empty      | 470.2 | 473.9 |     |     |
|               | silica gel | 610.0 | 564.2 |     |     |
| TOTAL         |            |       |       |     |     |

Filter Sample: Type Methow 17

| Sample Fraction              | Final Wt. | Tare Wt. | Net mass | Co, grains/SDCF |
|------------------------------|-----------|----------|----------|-----------------|
| Nozzle cyclone (acc) 114.9   | 225.5     |          |          |                 |
| cyclone tube 1               |           |          |          |                 |
| probe. line trap / H2O 154.4 | 232.4     |          |          |                 |
|                              |           |          |          |                 |
|                              |           |          |          |                 |
|                              |           |          |          |                 |
|                              |           |          |          |                 |
| TOTAL                        |           |          |          |                 |

## Gas Composition:

CO2 0 % volume (dry)  
 O2 20.9 % volume (dry)  
 CO \_\_\_\_\_ % volume (dry)  
 H2 \_\_\_\_\_ % volume (dry)  
 H2O 1.96 % volume

TOTAL

Ex (wet) 28.62  
 Excess Air \_\_\_\_\_  
 Sampled Volume 49.26 SDCF  
 Isokinetic Rate \_\_\_\_\_

## Particulate Concentration:

Co \_\_\_\_\_ grains/SDCF @ \_\_\_\_\_ of and 29.92 "Hr.  
 C \_\_\_\_\_ grains/SDCF @ \_\_\_\_\_

Atm  $8.4 \times 10^3$   
 SDCF  $7.9 \times 10^3$

## Emission Rate:

E.R. \_\_\_\_\_ lbs/hr @ Std (dry) \_\_\_\_\_ SDCF

EPA Methods 1-4  
Field Data Sheet

Client: Eckley Engineering  
Unit: Hunter Baghouse  
Site Description: \_\_\_\_\_

Proj No: 1779  
Proj Mgr: \_\_\_\_\_

Date: 10/3/91  
Time: \_\_\_\_\_  
Run: \_\_\_\_\_

Duct Diameter 22 x \_\_\_\_\_ ft  
Pbar 29.75 in Hg  
Pstatic -10 in H<sub>2</sub>O  
Pduct \_\_\_\_\_ in Hg

Area \_\_\_\_\_ ft2

Probe Mt1 \_\_\_\_\_

Mag Box # \_\_\_\_\_

Temp Unit \_\_\_\_\_

Meter # 990

Avg. Y C. 990

Pitot Tube 5220

Cp C 848  
in Hg (Vac)

| Inches |      |      | a   |      |      | a   |      |      | b  |      |      |    |      |
|--------|------|------|-----|------|------|-----|------|------|----|------|------|----|------|
| Trav   | from | Temp | p   | Vd   | Temp | p   | Vd   | Temp | p  | Vd   | Temp | p  | Vd   |
| Pt     | Edge | F    | in  | Ft/s | F    | in  | Ft/s | F    | in | Ft/s | F    | in | Ft/s |
| 1      | 0.5  | 67   | 2.5 | 5    | 70   | 1.2 | 15   |      |    |      |      |    |      |
| 2      | 1.5  |      | 2.5 | 30   |      | 2.2 | 25   |      |    |      |      |    |      |
| 3      | 2.6  |      | 1.5 | 45   |      | 1.5 | 30   |      |    |      |      |    |      |
| 4      | 3.9  |      | 2.5 | 45   |      | 1.5 | 45   |      |    |      |      |    |      |
| 5      | 5.5  |      | 0.7 | 45   |      | 1.0 | 45   |      |    |      |      |    |      |
| 6      | 7.0  |      | 1.0 | 50   |      | 2.8 | 45   |      |    |      |      |    |      |
| 7      | 14.1 | ↓    | 0.7 | -15  |      | 0.6 | -15  |      |    |      |      |    |      |
| 8      | 16.5 | 70   | 0.8 | -15  |      | 0.7 | -15  |      |    |      |      |    |      |
| 9      | 18.1 |      | 0.7 | -15  |      | 0.7 | -10  |      |    |      |      |    |      |
| 10     | 19.4 |      | "   | -15  |      | 0.6 | -10  |      |    |      |      |    |      |
| 11     | 20.5 |      | "   | -10  |      | 0.7 | -10  |      |    |      |      |    |      |
| 12     | 21.5 | ✓    | "   | -10  | ↓    | 0.6 | -10  |      |    |      |      |    |      |

Average Conditions:

Velocity (Vd) \_\_\_\_\_ FPS      Duct Temp \_\_\_\_\_ F

Volume Flow Rates:

|              |       |                 |             |       |       |
|--------------|-------|-----------------|-------------|-------|-------|
| @ (actual)   | ----- | F & ----- in Hg | (Qd)        | ----- | ACFM  |
| @ (standard) | ----- | F & 29.92 in Hg | (Qstd(wet)) | ----- | SCFM  |
| @ (standard) | ----- | F & 29.92 in Hg | (Qstd(dry)) | ----- | SDCFM |

## Water Collection (grams)

| Time  | Meter Conditions |      |        |
|-------|------------------|------|--------|
|       | H                | Temp | Volume |
|       |                  | F    | Ft3    |
|       |                  |      |        |
|       |                  |      |        |
|       |                  |      |        |
|       |                  |      |        |
|       |                  |      |        |
|       |                  |      |        |
|       |                  |      |        |
|       |                  |      |        |
|       |                  |      |        |
|       |                  |      |        |
|       |                  |      |        |
|       |                  |      |        |
|       |                  |      |        |
|       |                  |      |        |
| Total | Average          |      | Total  |

| Sample | Final | Tare | Net |
|--------|-------|------|-----|
| 1st    |       |      |     |
| 2nd    |       |      |     |
| 3rd    |       |      |     |
| 4th    |       |      |     |
| 5th    |       |      |     |
|        |       |      |     |
| Total  |       |      |     |

## ORSAT Analysis

CO<sub>2</sub>, Vol, dry: \_\_\_\_\_ %

O2, Vol, dry: \_\_\_\_\_ %

N2, Vol, dry: \_\_\_\_\_ %

Molecular Weight, wet: \_\_\_\_\_  
Water, % Volume: \_\_\_\_\_

H<sub>2</sub>O TEAM  
(1)

Nozzle & Probe Mat: \_\_\_\_\_  
Filter Holder Mat: \_\_\_\_\_  
Filter #: \_\_\_\_\_  
Nozzle #: \_\_\_\_\_ i.d.: \_\_\_\_\_  
Pitot #: 3 Cp: \_\_\_\_\_  
Temp. Unit #: \_\_\_\_\_  
Mag. #: \_\_\_\_\_ Meter #: 95E  
Orifice  $\frac{1}{16}$  in: \_\_\_\_\_ Avg Y: 1.00

OH<sub>2</sub> 1.835

[illegible]

# PARTICULATE EMISSIONS

*H<sub>2</sub>O TRAIN*  
①

## DATA & RESULTS:

Site: Eckley Engineering  
Date: 10/1/91

Run: only  
Time: \_\_\_\_\_

| Absorber Type | Contents                    | Final  | Tare   | Net | H <sub>2</sub> O |
|---------------|-----------------------------|--------|--------|-----|------------------|
| G. S.         | 100 ml H <sub>2</sub> O etc | 550.9  | 560.1  |     |                  |
| ✓             | ✓                           | 534.2  | 533.9  |     |                  |
|               |                             |        |        |     |                  |
|               |                             |        |        |     |                  |
| liquid trap   | empty                       | 473.2  | 472.2  |     |                  |
|               | silica gel                  | 725.0  | 721.0  |     |                  |
|               |                             | 2291.1 | 2287.2 |     |                  |
|               |                             |        | TOTAL  |     |                  |

Filter Sample: Type \_\_\_\_\_

| Sample Fraction | Final Wt. | Tare Wt. | Net mgas | Co, grains/SDCF |
|-----------------|-----------|----------|----------|-----------------|
|                 |           |          |          |                 |
|                 |           |          |          |                 |
|                 |           |          |          |                 |
|                 |           |          |          |                 |
|                 |           |          |          |                 |
|                 |           |          |          |                 |
|                 |           |          |          |                 |
|                 |           |          | TOTAL    |                 |

## Gas Composition:

CO<sub>2</sub> 0 % volume (dry)  
O<sub>2</sub> 20.9 % volume (dry)  
CO \_\_\_\_\_ % volume (dry)  
N<sub>2</sub> \_\_\_\_\_ % volume (dry)  
H<sub>2</sub>O 1.827 volume

TOTAL

Ex (vel) \_\_\_\_\_  
Excess Air \_\_\_\_\_  
Sampled Volume \_\_\_\_\_ SDCF  
Isokinetic Rate \_\_\_\_\_

## Particulate Concentration:

Co \_\_\_\_\_ grains/SDCF @ \_\_\_\_\_ °F and 29.92 "Hg  
C \_\_\_\_\_ grains/SDCF @ \_\_\_\_\_

## Emission Rate:

E.R. \_\_\_\_\_ lbs/hr @ Q<sub>std</sub>(dry) \_\_\_\_\_ SDCF

## 43

Date: 10/1/91  
Time: \_\_\_\_\_  
Run: 1

```

Probe Mtl  -----
Temp Unit  -----
Avg. Y     0.83
Cp
e          in Hc (Vac)

```

Molecular Weight, wet:

(i)

Date: \_\_\_\_\_  
Time: \_\_\_\_\_  
Run: 2

Probe Mod \_\_\_\_\_  
Temp Unit \_\_\_\_\_  
Avg. \_\_\_\_\_  
Cp *0833* \_\_\_\_\_  
\_\_\_\_\_ Hz/Vol \_\_\_\_\_

Average Conditions: 62  
 Velocity (Vd) 59.7 FPS      Duct Temp 96 °F  
 Volume Flow Rates:  
 @ (actual)      ----- F & ----- in Hg      (Qd)  
 @ (standard)      ----- F & 29.92 in Hg      (Qstd)  
 @ (standard)      ----- F & 29.92 in Hg      (Qstd)

Water Collection (grams)

## ORSAT Analysis

CO<sub>2</sub>, Vol, dry: 0 %  
O<sub>2</sub>, Vol, dry: 20.9 %  
N<sub>2</sub>, Vol, dry: \_\_\_\_\_ %

Molecular Weight, wet:

Client: Eckley Engineering Proj No: 1779 Date: 10/1/91  
Unit: ADLly Bagnouse Proj Mgr: \_\_\_\_\_ Time: \_\_\_\_\_  
Site Description: \_\_\_\_\_ Run: 3

|               |       |    |                  |    |             |       |                 |           |             |
|---------------|-------|----|------------------|----|-------------|-------|-----------------|-----------|-------------|
| Duct Diameter | 79.5  | X  | _____            | ft | Area        | _____ | ft <sup>2</sup> | Probe Mt  | _____       |
| Fbar          | _____ | in | Hg               |    | Mag Box #   | _____ |                 | Temp Unit | _____       |
| Pstatic       | _____ | in | H <sub>2</sub> O |    | Meter #     | _____ |                 | Avg. Y    | _____       |
| Pduct         | _____ | in | Hg               |    | Pilot Tube  | 7070  |                 | Cp        | 0.833       |
|               |       |    |                  |    | Leak Check: | _____ | CFM @           | _____     | in Hg (Vac) |

| Inches |      |      |      | V    |      |      |      | K    |    |      |      |    |      |      |    |      |  |  |  |
|--------|------|------|------|------|------|------|------|------|----|------|------|----|------|------|----|------|--|--|--|
| Trav   | from | Temp | p    | Vd   | Temp | p    | Vd   | Temp | p  | Vd   | Temp | p  | Vd   | Temp | p  | Vd   |  |  |  |
| ft     | Edge | F    | in   | ft/s | F    | in   | ft/s | F    | in | ft/s | F    | in | ft/s | F    | in | ft/s |  |  |  |
| 1      |      | 95   | 2.1  |      | 96   | 2.0  |      |      |    |      |      |    |      |      |    |      |  |  |  |
| 2      |      |      |      |      |      | 0.65 |      |      |    |      |      |    |      |      |    |      |  |  |  |
| 3      |      |      |      |      |      | 0.80 |      |      |    |      |      |    |      |      |    |      |  |  |  |
| 4      |      |      | 1.4  |      |      |      |      |      |    |      |      |    |      |      |    |      |  |  |  |
| 5      |      | 95   | 1.3  |      |      | 0.90 |      |      |    |      |      |    |      |      |    |      |  |  |  |
| 6      |      |      | 1.2  |      |      |      |      |      |    |      |      |    |      |      |    |      |  |  |  |
| 7      |      | 96   | 1.0  |      |      |      |      |      |    |      |      |    |      |      |    |      |  |  |  |
| 8      |      |      | 0.99 |      |      | 1.1  |      |      |    |      |      |    |      |      |    |      |  |  |  |
| 9      |      |      | 0.9  |      |      |      |      |      |    |      |      |    |      |      |    |      |  |  |  |
| 10     |      |      | 1.2  |      |      |      |      |      |    |      |      |    |      |      |    |      |  |  |  |
| 11     |      |      | 1.3  |      |      | 1.2  |      |      |    |      |      |    |      |      |    |      |  |  |  |
| 12     |      | 95   | 1.1  |      | 96   | 1.3  |      |      |    |      |      |    |      |      |    |      |  |  |  |

Velocity (Vd) 63.7 FPS Duct Temp 96 F

|              |       |           |       |             |                                               |       |
|--------------|-------|-----------|-------|-------------|-----------------------------------------------|-------|
| @ (actual)   | ----- | F & ----- | in Hg | (Qd)        | $\frac{115 \times 10^3}{103.2 \times 10^3}$   | ACFM  |
| @ (standard) | ----- | F & 29.92 | in Hg | (Qstd(wet)) | $\frac{103.2 \times 10^3}{103.7 \times 10^3}$ | SCFM  |
| @ (standard) | ----- | F & 29.92 | in Hg | (Qstd(dry)) | $\frac{103.7 \times 10^3}{103.7 \times 10^3}$ | SDCFM |

| Time  | Meter Conditions |           |               |
|-------|------------------|-----------|---------------|
|       | H                | Temp<br>F | Volume<br>Ft3 |
|       |                  |           |               |
|       |                  |           |               |
|       |                  |           |               |
|       |                  |           |               |
|       |                  |           |               |
|       |                  |           |               |
|       |                  |           |               |
|       |                  |           |               |
|       |                  |           |               |
|       |                  |           |               |
|       |                  |           |               |
|       |                  |           |               |
|       |                  |           |               |
|       |                  |           |               |
| Total | Average          |           | Total         |

| Sample | Final | Tare | Net |
|--------|-------|------|-----|
| 1st    |       |      |     |
| 2nd    |       |      |     |
| 3rd    |       |      |     |
| 4th    |       |      |     |
| 5th    |       |      |     |
|        |       |      |     |
| Total  |       |      |     |

CO<sub>2</sub>, Vol, dry: 0 %  
O<sub>2</sub>, Vol, dry: 20.9 %  
N<sub>2</sub>, Vol, dry: \_\_\_\_\_ %

Molecular Weight. wpt:

EPA Methods 1-4  
Field Data Sheet

Client: Eckley Engineering  
Unit: Huller Baghouse  
Site Description:

Proj No: 1779  
Proj Mgr: \_\_\_\_\_

Date: 10/1/91  
Time: 13:57-1407  
Run: 1

Duct Diameter 355 x          ft  
Fbar          in Hg  
Pstatic 9 in H<sub>2</sub>O  
Pduct          in Hg

Area \_\_\_\_\_ 112  
Mag Box # \_\_\_\_\_  
Meter # \_\_\_\_\_  
Pitot Tube 7270  
Leak Check: \_\_\_\_\_ 0

Probe Mtl -----  
Temp Unit -----  
Avg. Y -----  
Cp 0.833 -----  
e ----- in Hg (Vac)

| post #/pt |      | Inches: R |      |      | L    |      |      |      |    |      |      |    |      |
|-----------|------|-----------|------|------|------|------|------|------|----|------|------|----|------|
| Trav      | from | Temp      | p    | Vd   | Temp | p    | Vd   | Temp | p  | Vd   | Temp | p  | Vd   |
| Pt        | Edge | F         | in   | Ft/s | F    | in   | Ft/s | F    | in | Ft/s | F    | in | Ft/s |
| 1         | 0.7  | 91        | 0.38 |      | 91   | 0.50 |      |      |    |      |      |    |      |
| 2         | 2.4  | 93        | 1.0  |      | 94   | 0.66 |      |      |    |      |      |    |      |
| 3         | 4.2  | 93        | 0.70 |      |      | 0.30 |      |      |    |      |      |    |      |
| 4         | 6.3  | 94        | 0.30 |      | 95   | 0.35 |      |      |    |      |      |    |      |
| 5         | 8.9  | 94        | 0.55 |      |      | 0.43 |      |      |    |      |      |    |      |
| 6         | 12.6 | 95        | 0.58 |      |      | 0.52 |      |      |    |      |      |    |      |
| 7         | 22.9 | 95        | 0.64 |      | 96   | 0.55 |      |      |    |      |      |    |      |
| 8         | 26.6 |           |      |      | 96   | 0.60 |      |      |    |      |      |    |      |
| 9         | 29.2 | 95        | 0.65 |      |      |      |      |      |    |      |      |    |      |
| 10        | 31.3 |           | 0.62 |      | 95   | 0.50 |      |      |    |      |      |    |      |
| 11        | 33.1 | 95        | 0.60 |      | 96   | 0.50 |      |      |    |      |      |    |      |
| 12        | 34.0 | 95        |      |      |      | 0.40 |      |      |    |      |      |    |      |

Average Conditions:

Velocity (Vd) 427 FPS      Duct Temp        F

Volume Flow Rates:

|              |       |                 |              |                    |       |
|--------------|-------|-----------------|--------------|--------------------|-------|
| @ (actual)   | ----- | F & ----- in Hg | (Qd)         | $17.6 \times 10^3$ | ACFM  |
| @ (standard) | ----- | F & 29.92 in Hg | (Qstd (wet)) | $16.1 \times 10^3$ | SCFM  |
| @ (standard) | ----- | F & 29.92 in Hg | (Qstd (dry)) | $15.8 \times 10^3$ | SDCFM |

Water Collection (grams)

|       | <u>Meter Conditions</u> |       |                 |
|-------|-------------------------|-------|-----------------|
| Time  | H                       | Temp  | Volume          |
|       |                         | F     | Ft <sup>3</sup> |
|       |                         |       |                 |
|       |                         |       |                 |
|       |                         |       |                 |
|       |                         |       |                 |
|       |                         |       |                 |
|       |                         |       |                 |
|       |                         |       |                 |
|       |                         |       |                 |
|       |                         |       |                 |
|       |                         |       |                 |
|       |                         |       |                 |
|       |                         |       |                 |
|       |                         |       |                 |
|       |                         |       |                 |
|       |                         |       |                 |
|       |                         |       |                 |
|       |                         |       |                 |
| Total | Average                 | Total |                 |
|       |                         |       |                 |

| Sample | Final | Tare | Net |
|--------|-------|------|-----|
| 1st    |       |      |     |
| 2nd    |       |      |     |
| 3rd    |       |      |     |
| 4th    |       |      |     |
| 5th    |       |      |     |
|        |       |      |     |
| Total  |       |      |     |

## ORSAT Analysis

CO<sub>2</sub>, Vol, dry: 0 %  
 O<sub>2</sub>, Vol, dry: 20.9 %  
 N<sub>2</sub>, Vol, dry: 79.1 %

Molecular Weight. wet: 7200.

٢١

Date: 10/1  
Time:   
Run: 2

Leak Check: \_\_\_\_\_ CFM @ \_\_\_\_\_ in Hg (Vac)

Molecular Weight, wet: \_\_\_\_\_  
Water, % Volume: \_\_\_\_\_

3

Date: 10/1/94  
Time: 3:00  
Run: 3

Leak Check: \_\_\_\_\_ CFM @ \_\_\_\_\_ in Hg (Vac)

|              |       |                 |             |                            |       |
|--------------|-------|-----------------|-------------|----------------------------|-------|
| @ (actual)   | ----- | F & ----- in Hg | (Qd)        | <u>180x10<sup>-3</sup></u> | ACFM  |
| @ (standard) | ----- | F & 29.92 in Hg | (Qstd(wet)) | <u>165x10<sup>-3</sup></u> | SCFM  |
| @ (standard) | ----- | F & 29.92 in Hg | (Qstd(dry)) | <u>162x10<sup>-3</sup></u> | SDCFM |

Molecular Weight, wet: \_\_\_\_\_  
Water, % Volume: \_\_\_\_\_

H<sub>2</sub>O TRAN  
(2)

Nozzle & Probe Mat: SS  
 Filter Holder Mat: ---  
 Filter #: 361  
 Nozzle #: I i.d.: 378<sup>mm</sup>  
 Pitot #: 522U Cp: 6846  
 Temp. Unit #: ---  
 Mag. #: 3-369 Meter #: 990  
 Orifice Y<sub>in</sub>: --- Avg Y: 1.996

PRE LEAK CHECK = .004 @ 25 in.

1.855

NORTH

# PARTICULATE EMISSIONS

H<sub>2</sub>O Train

(2)

## DATA & RESULTS:

Site: precleaner  
Date: \_\_\_\_\_

Run: 1  
Time: \_\_\_\_\_

| Absorber Type | Contents                   | Final | Tare  | Net | H <sub>2</sub> O |
|---------------|----------------------------|-------|-------|-----|------------------|
| G. S.         | 100ml H <sub>2</sub> O 1/2 | 563.5 | 564.4 |     |                  |
| ✓             | ✓                          | 461.3 | 569.6 |     |                  |
|               |                            |       |       |     |                  |
|               |                            |       |       |     |                  |
| liquid trap   | empty                      | 464.7 | 462.2 |     |                  |
|               | silica gel                 | 691.5 | 669.9 |     |                  |
|               |                            | 2204  | 2266  |     |                  |
|               |                            |       | TOTAL |     |                  |

Filter Sample: Type 361

| Sample Fraction        | Final Wt. | Tare Wt.  | Net mg | Co, grains/SCF |
|------------------------|-----------|-----------|--------|----------------|
| nozzle cyclone acetone | 2455      | 4328      |        |                |
| turning 1/110          | 5000      | 561.2     |        |                |
| line probe imp/110     | 461.6     | 561.25000 |        |                |
|                        |           |           |        |                |
|                        |           |           |        |                |
|                        |           |           |        |                |
|                        |           |           |        |                |
|                        |           |           |        |                |

## Gas Composition:

CO<sub>2</sub> 20 % volume (dry)  
O<sub>2</sub> 20.9 % volume (dry)  
CO \_\_\_\_\_ % volume (dry)  
N<sub>2</sub> \_\_\_\_\_ % volume (dry)  
H<sub>2</sub>O 0.99 % volume

TOTAL

W<sub>2</sub> (vel) 20.73  
Dilution Air \_\_\_\_\_  
Sampled Volume 69.85 SCF  
Isokinetic Rate \_\_\_\_\_

Acfm 172x10<sup>3</sup>  
SCFM 163x10<sup>3</sup>

## Particulate Concentration:

Co \_\_\_\_\_ grains/SCF @ \_\_\_\_\_ °F and 29.92 "Hg  
C \_\_\_\_\_ grains/SCF @ \_\_\_\_\_

## Emission Rate:

E.R. \_\_\_\_\_ lbs/hr @ Q<sub>std</sub>(dry) \_\_\_\_\_ SCFH

Date: 10/2/91 Run #: 2  
 Client: Fokley Engineering  
 Unit: precleaner  
 Assent Temp: \_\_\_\_\_ of \_\_\_\_\_  
 Barometric Press: 29.92 "Hg  
 Static Pressure: -11 "H<sub>2</sub>O  
 Duct Pressure: \_\_\_\_\_ "Hg  
 Assumed MU(wet): \_\_\_\_\_ Assumed Z \_\_\_\_\_

Sample Train Temp  
Probe: \_\_\_\_\_ of  
Filter: \_\_\_\_\_ of  
Sample Line: \_\_\_\_\_ of

Duct Dism: 24'

Nozzle & Probe Mat: S.S.  
Filter Holder Mat: \_\_\_\_\_  
Filter #: 366 C.1402  
Nozzle #: 1 i.d.: 3.78 in  
Pitot #: 5220 Cp: 0.848  
Temp. Unit #: H7-A  
Mag. #: 368 Meter #: 990  
Orifice k<sub>m</sub>: \_\_\_\_\_ Avg Y: 0.998

PRE LEAK CHECK = .002 @ 12 IN

[illegible]

# PARTICULATE EMISSIONS

## DATA & RESULTS:

Site: 10/1/91  
 Date: \_\_\_\_\_

Run: 2  
 Time: \_\_\_\_\_

| Absorber Type | Contents                  | Final  | Tare   | Net | H2O |
|---------------|---------------------------|--------|--------|-----|-----|
| CS            | 100ml di H <sub>2</sub> O | 5561   | 561.5  |     |     |
|               |                           | 5241   | 532.8  |     |     |
|               |                           |        |        |     |     |
|               |                           |        |        |     |     |
| liquid trap   | empty                     | 476.7  | 472.2  |     |     |
|               | silica gel                | 755.7  | 729.6  |     |     |
|               |                           | 2392.6 | 2195.3 |     |     |
|               |                           |        | TOTAL  |     |     |

Filter Sample: Type method 17

| Sample Fraction        | Final Wt. | Tare Wt. | Net mass | Co, grains/SDCF |
|------------------------|-----------|----------|----------|-----------------|
| probe cyclone/bottle   | 130.9     | 306.6    |          |                 |
| probe, line imp filter |           | 448.6    |          |                 |
| cyclone fabric filter  |           |          |          |                 |
|                        |           |          |          |                 |
|                        |           |          |          |                 |
|                        |           |          |          |                 |
|                        |           |          |          |                 |

## Gas Composition:

CO<sub>2</sub> 0 % volume (dry)  
 O<sub>2</sub> 20.9 % volume (dry)  
 CO \_\_\_\_\_ % volume (dry)  
 H<sub>2</sub> \_\_\_\_\_ % volume (dry)  
 H<sub>2</sub>O 1.17 % volume

TOTAL

Ex. (wet) 2871  
 Excess Air \_\_\_\_\_  
 Sampled Volume 67.69 SDCF  
 Isokinetic Rate \_\_\_\_\_

## Particulate Concentration:

Co \_\_\_\_\_ grains/SDCF @ \_\_\_\_\_ °F and 29.92 "Hr.  
 C \_\_\_\_\_ grains/SDCF @ \_\_\_\_\_

ACFM 17.2 x 10<sup>3</sup>  
 SDCFM 16.3 x 10<sup>3</sup>

## Emission Rate:

E.R. \_\_\_\_\_ lbs/hr @ Qstd(dry) \_\_\_\_\_ SDCFM

Date: 10/21/91 Run #: 3  
 Client: Ecide, Engineering  
 Unit: precleaner Bag house  
 Assent temp: \_\_\_\_\_ °F  
 Barometric Press: 29.92 "Hg  
 Static Pressure: -1.8 "H<sub>2</sub>O  
 Duct Pressure: \_\_\_\_\_ "Hg  
 Assumed HU(wet): 29.02 Assumed :

Sample Line:                     

Dues Dism: 24

: 102

Orifice T: \_\_\_\_\_ Avg T: 0.978

PRE LEAK CHECK = .005 @ 25 IN

1.855

[illegible]

# PARTICULATE EMISSIONS

## DATA & RESULTS:

Site: precleaner Baghouse 24" Run: 3  
 Date: 10/2/91 Time: \_\_\_\_\_

| Absorber Type | Contents     | Final | Tare   | Net   | H2O |
|---------------|--------------|-------|--------|-------|-----|
| GS            | 100ml di H2O | 559.0 | 566.3  |       |     |
|               | -            | 552.1 | 559.3  |       |     |
|               |              |       |        |       |     |
|               |              |       |        |       |     |
| liquid trap   | empty        | 465.7 | 462.4  |       |     |
|               | silica gel   | 699.4 | 684.6  |       |     |
|               |              | 2277  | 2278.6 | TOTAL |     |

Filter Sample: Type method 17

| Sample Fraction              | Final Wt. | Tare Wt. | Net mass | Co, grains/SCF |
|------------------------------|-----------|----------|----------|----------------|
| nozzle cyclone/acetone 302.9 |           | 468.7    |          |                |
| cyclone tubing acetone       |           |          |          |                |
| line probe imp H2O 344.5     |           | 396.4    |          |                |
|                              |           |          |          |                |
|                              |           |          |          |                |
|                              |           |          |          |                |
|                              |           |          |          |                |

## Gas Composition:

CO2 0 % volume (dry)  
 O2 20.9 % volume (dry)  
 CO \_\_\_\_\_ % volume (dry)  
 N2 \_\_\_\_\_ % volume (dry)  
 H2O 0.29 % volume

TOTAL

Excess Air \_\_\_\_\_  
 Sampled Volume 69.87 SCF  
 Isokinetic Rate \_\_\_\_\_

## Particulate Concentration:

Co \_\_\_\_\_ grains/SCF @ \_\_\_\_\_ of and 29.92 "Hr.  
 C \_\_\_\_\_ grains/SCF @ \_\_\_\_\_

Alt  $16.4 \times 10^3$   
 $17.8 \times 10^3$

## Emission Rate:

E.R. \_\_\_\_\_ lbs/hr @ Qstd(dry) \_\_\_\_\_ SCFH

## Field Data Sheet

Site Description:

Proj Mgr: \_\_\_\_\_

Run: /

Pduct \_\_\_\_\_ in Hg

Leak Check: \_\_\_\_\_ CFM @ \_\_\_\_\_ in Hg (Vac)

[illegible]

Average Conditions:

Velocity (Vd) 57.4 FPS

Duct Temp 70 F

**Volume Flow Rates:**

@ (actual)                  F &                  in Hq (Qd)

@ (standard) ----- F & 29.92 in Hg (Qstd(wet))

@ (standard) \_\_\_\_\_ F & 29.92 in Hg (Qstd(dry))

372 x 10<sup>3</sup> SDCFM 142 3

|       | Meter Conditions |      |                 |
|-------|------------------|------|-----------------|
| Time  | H                | Temp | Volume          |
|       |                  | F    | Ft <sup>3</sup> |
| 1549  | 0.88             | 103  | 82945           |
| 1553  |                  | 103  |                 |
| 1557  |                  | 104  |                 |
| 1604  |                  | 105  |                 |
| 1609  |                  | "    |                 |
| 1613  |                  | "    |                 |
| 1619  | ✓                |      | 499.557         |
|       |                  |      |                 |
|       |                  |      |                 |
|       |                  |      |                 |
|       |                  |      |                 |
| Total | Average          |      | Total           |

## Water Collection (grams)

| Sample | Final | Tare  | Net |
|--------|-------|-------|-----|
| 1st    | 558.0 | 558.7 |     |
| 2nd    | 533.2 | 534.2 |     |
| 3rd    | 477.6 | 473.2 |     |
| 4th    | 732.9 | 725.0 |     |
| 5th    |       |       |     |
| Total  |       |       |     |

## ORSAT Analysis

CO2, Vol, dry: 0 x

O2, Vol, dry: 20.9 %

N<sub>2</sub>, Vol, dry: 7 %

Water, % Volume: 102

EPA Methods 1-4  
Field Data Sheet

Client: Eckley ENGINEERING  
Unit: pre cleaner Bag house  
Site Description:

Proj No: 1779  
Proj Mgr: \_\_\_\_\_

Date: 10/1/191  
Time: ---  
Run: 7

59.5.

|               |               |     |                  |    |             |                 |                 |           |             |
|---------------|---------------|-----|------------------|----|-------------|-----------------|-----------------|-----------|-------------|
| Duct Diameter | <del>60</del> | X   | _____            | ft | Area        | _____           | ft <sup>2</sup> | Probe M1  | _____       |
| Fbar          | _____         | in  | Hg               |    | Mag Box #   | _____           |                 | Temp Unit | _____       |
| Pstatic       | <del>-9</del> | in  | H <sub>2</sub> O |    | Meter #     | _____           |                 | Avg. Y    | _____       |
| Pduct         | _____         | in  | Hg               |    | Pitot Tube  | <del>7070</del> |                 | Cp        | 0.833       |
| 36            | 444           | air |                  |    | Leak Check: | _____           | CFM @           | _____     | in Hg (Vac) |

30 2.5 scale die down

| Inches: 2 |      |      |       | 2    |      |     |      |      |    |      |      |    |      |  |  |
|-----------|------|------|-------|------|------|-----|------|------|----|------|------|----|------|--|--|
| Trav      | from | Temp | p     | Vd   | Temp | p   | Vd   | Temp | p  | Vd   | Temp | p  | Vd   |  |  |
| Pt        | Edge | F    | in    | Ft/s | F    | in  | Ft/s | F    | in | Ft/s | F    | in | Ft/s |  |  |
| 1         | 1.2  | 88   | 1.205 |      | 89   | 0.3 |      |      |    |      |      |    |      |  |  |
| 2         | 4.0  | 89   | 1.8   |      | 1.0  |     |      |      |    |      |      |    |      |  |  |
| 3         | 7.0  | 89   | 0.3   |      | 0.65 |     |      |      |    |      |      |    |      |  |  |
| 4         | 10.5 | 89   | 0.74  |      | 0.50 |     |      |      |    |      |      |    |      |  |  |
| 5         | 14.9 | 89   | 0.9   |      | 0.70 |     |      |      |    |      |      |    |      |  |  |
| 6         | 21.2 | 89   | 1.1   |      | 0.90 |     |      |      |    |      |      |    |      |  |  |
| 7         | 38.3 | 89   | 0.9   |      | 1.0  |     |      |      |    |      |      |    |      |  |  |
| 8         | 44.6 | 85   | 0.9   |      |      |     |      |      |    |      |      |    |      |  |  |
| 9         | 49.0 | 89   |       |      | 0.90 |     |      |      |    |      |      |    |      |  |  |
| 10        | 52.5 |      |       |      | 0.95 |     |      |      |    |      |      |    |      |  |  |
| 11        | 55.5 |      |       |      | 0.95 |     |      |      |    |      |      |    |      |  |  |
| 12        | 58.3 |      | 0.84  |      | 0.80 |     |      |      |    |      |      |    |      |  |  |

Average Conditions:

Velocity (Vd) 54 FPS      Duct Temp 89 F

Volume Flow Rates:

|              |       |                 |             |                                                   |
|--------------|-------|-----------------|-------------|---------------------------------------------------|
| @ (actual)   | ----- | F & ----- in Hg | (Qd)        | $\frac{626 \times 10^3}{52.8 \times 10^3}$ ACFM   |
| @ (standard) | ----- | F & 29.92 in Hg | (Qstd(wet)) | SCFM                                              |
| @ (standard) | ----- | F & 29.92 in Hg | (Qstd(dry)) | $\frac{57.4 \times 10^3}{52.8 \times 10^3}$ SDCFM |

|       | Meter Conditions |       |                 |
|-------|------------------|-------|-----------------|
| Time  | H                | Temp  | Volume          |
|       |                  | F     | Ft <sup>3</sup> |
|       |                  |       | .               |
|       |                  |       |                 |
|       |                  |       |                 |
|       |                  |       |                 |
|       |                  |       |                 |
|       |                  |       |                 |
|       |                  |       |                 |
|       |                  |       |                 |
|       |                  |       |                 |
|       |                  |       |                 |
|       |                  |       |                 |
|       |                  |       |                 |
|       |                  |       |                 |
| Total | Average          | Total |                 |

## Water Collection (grams)

| Sample | Final | Tare | Net |
|--------|-------|------|-----|
| 1st    |       |      |     |
| 2nd    |       |      |     |
| 3rd    |       |      |     |
| 4th    |       |      |     |
| 5th    |       |      |     |
| Total  |       |      |     |

## ORSAT Analysis

CO<sub>2</sub>, Vol, dry: 0 %  
 O<sub>2</sub>, Vol, dry: 20.9 %  
 N<sub>2</sub>, Vol, dry: 79.1 %  
 H<sub>2</sub>O 1.02

Holden - " " " "

EPA Methods 1-4  
Field Data Sheet

Client: Eckley Engineering  
Unit: Section 1 Baghouse  
Site Description:

Proj No: 1779  
Proj Mgr: \_\_\_\_\_

Date: 10/1/91  
Time: \_\_\_\_\_  
Run: 2

Duct Diameter 59.5 x          ft  
Fbar          in Hg  
Pstatic          in H<sub>2</sub>O  
Pduct          in Hg

Area \_\_\_\_\_ 112

Fröbe M(1)

Mag Box #1

Temp Unit

Meter # \_\_\_\_\_

Avg. Y  $\theta$  -----

Pitot Tube ~~7070~~

Ср 0.33

Leak Check: \_\_\_\_\_ CFM @ \_\_\_\_\_ in Hg (Vac)

| Inches: $\frac{1}{2}$ |      |      |     | Inches: $\frac{1}{2}$ |      |      |      | Inches: $\frac{1}{2}$ |    |      |      | Inches: $\frac{1}{2}$ |      |  |  |
|-----------------------|------|------|-----|-----------------------|------|------|------|-----------------------|----|------|------|-----------------------|------|--|--|
| Trav                  | from | Temp | p   | Vd                    | Temp | p    | Vd   | Temp                  | p  | Vd   | Temp | p                     | Vd   |  |  |
| Pt                    | Edge | F    | in  | Ft/s                  | F    | in   | Ft/s | F                     | in | Ft/s | F    | in                    | Ft/s |  |  |
| 1                     | :    | 89   | 05  | :                     | 89   | 030  | :    | :                     | :  | :    | :    | :                     | :    |  |  |
| 2                     | :    | 89   | 21  | :                     | -    | 1.6  | :    | :                     | :  | :    | :    | :                     | :    |  |  |
| 3                     | :    | :    | 06  | :                     | :    | 0.85 | :    | :                     | :  | :    | :    | :                     | :    |  |  |
| 4                     | :    | :    | 079 | :                     | :    | 0.55 | :    | :                     | :  | :    | :    | :                     | :    |  |  |
| 5                     | :    | :    | 09  | :                     | :    | 0.70 | :    | :                     | :  | :    | :    | :                     | :    |  |  |
| 6                     | :    | :    | 1.1 | :                     | :    | 0.90 | :    | :                     | :  | :    | :    | :                     | :    |  |  |
| 7                     | :    | :    | 1.0 | :                     | :    | 0.92 | :    | :                     | :  | :    | :    | :                     | :    |  |  |
| 8                     | :    | :    | 09  | :                     | :    | 1.0  | :    | :                     | :  | :    | :    | :                     | :    |  |  |
| 9                     | :    | :    | 1.0 | :                     | :    | 0.90 | :    | :                     | :  | :    | :    | :                     | :    |  |  |
| 10                    | :    | :    | 1.0 | :                     | :    | 0.91 | :    | :                     | :  | :    | :    | :                     | :    |  |  |
| 11                    | :    | :    | :   | :                     | ✓    | 0.55 | :    | :                     | :  | :    | :    | :                     | :    |  |  |
| 12                    | :    | :    | 0.8 | :                     | ✓    | 0.70 | :    | :                     | :  | :    | :    | :                     | :    |  |  |

Average Conditions:

Velocity (Vd) 54.1 FPS      Duct Temp        F

Volume Flow Rates:

e (actual) \_\_\_\_\_ F & \_\_\_\_\_ in Hg (Qd)

@ (standard) ----- F & 29.92 in Hg (Qstd(wet))

@ (standard) \_\_\_\_\_ F & 29.92 in Hg (Std(dry))

~~62.6 x 10<sup>3</sup>~~      ACFM 63.2  
 58.9 x 10<sup>3</sup>      SCFM 58.5  
 58.3 x 10<sup>3</sup>      SDCFM 57.9

[illegible]

## Water Collection (grams)

| Sample | Final | Tare | Net |
|--------|-------|------|-----|
| 1st    |       |      |     |
| 2nd    |       |      |     |
| 3rd    |       |      |     |
| 4th    |       |      |     |
| 5th    |       |      |     |
|        |       |      |     |
| Total  |       |      |     |

## ORSAT Analysis

CO<sub>2</sub>, Vol, dry: 0 x

O<sub>2</sub>, Vol, dry: 20.9 %

N<sub>2</sub>, Vol, dry: \_\_\_\_\_ %.

Molecular Weight: 100000

٤١

Date: 10/1/1  
Time: ---  
Run: 3

Leak Check: \_\_\_\_\_ CFM @ \_\_\_\_\_ in Hg (Vac)

Molecular Weight, wet: \_\_\_\_\_  
Water, % Volume: \_\_\_\_\_

**APPENDIX**  
Copies of Lab Results

PROJECT: 1779 LOG DATE: 10/3/91  
 CLIENT: Eckley Engineering  
 Precleaner Baghouse  
 PROJ MGR: SH ANALYST: RRR

I Filters  
 II Probe/Nozzle  
 III Aqueous Condensibles  
 IV Organic Condensibles

| DISH #               | DISH WEIGHINGS IN GRAMS                               |         |         |         |          | STATISTICS |         | CONFIDENCE LIMITS |      | NET MG | SAMPLE ID/AMOUNT |     |                |
|----------------------|-------------------------------------------------------|---------|---------|---------|----------|------------|---------|-------------------|------|--------|------------------|-----|----------------|
|                      | TARE                                                  | FIRST   | SECOND  | THIRD   | AVERAGE  | AVG DEV    | STD DEV | 95%               | 90%  |        |                  |     |                |
| I                    | Filters                                               |         |         |         |          |            |         |                   |      | Filter | mg Run           |     |                |
| 360                  | 0.12093                                               | 0.1358  | 0.1368  | 0.1364  | 0.13633  | 0.36       | 0.41    | 1.25              | 0.85 | 360    | 15.40            | R1  | outlet         |
| 366                  | 0.14020                                               | 0.1560  | 0.1568  | 0.1565  | 0.15643  | 0.29       | 0.33    | 1.00              | 0.68 | 366    | 16.23            | R2  | outlet         |
| 374                  | 0.14210                                               | 0.1572  | 0.1579  | 0.1577  | 0.15760  | 0.27       | 0.29    | 0.90              | 0.61 | 374    | 15.50            | R3  | outlet         |
| II                   | Probe/Nozzle - ACETONE                                |         |         |         |          |            |         |                   |      | Dish # | mg Run           |     |                |
| From Nozzle Cyclone: |                                                       |         |         |         |          |            |         |                   |      |        |                  |     |                |
| 44                   | 64.27330                                              | 64.3848 | 64.3846 | 64.3853 | 64.38490 | 0.27       | 0.29    | 0.90              | 0.61 | 44     | 111.60           | R1  | out/165.8g     |
| 119                  | 68.15473                                              | 68.2664 | 68.2671 | 68.2677 | 68.26707 | 0.44       | 0.53    | 1.62              | 1.10 | 119    | 112.34           | R2  | out/132.7g     |
| 705                  | 73.85267                                              | 73.9646 | 73.9643 | 73.9651 | 73.96467 | 0.29       | 0.33    | 1.00              | 0.68 | 705    | 112.00           | R3  | out/121.2g     |
| From Cyclone Tube:   |                                                       |         |         |         |          |            |         |                   |      |        |                  |     |                |
| 61                   | 65.80940                                              | 65.8190 | 65.8189 | 65.8199 | 65.81927 | 0.42       | 0.45    | 1.37              | 0.93 | 61     | 9.87             | R1  | out/29.6g      |
| 106                  | 60.45943                                              | 60.4721 | 60.4723 | 60.4723 | 60.47223 | 0.09       | 0.09    | 0.29              | 0.19 | 106    | 12.80            | R2  | out/32.0g      |
| 203                  | 64.25017                                              | 64.2556 | 64.2557 | 64.2566 | 64.25597 | 0.42       | 0.45    | 1.37              | 0.93 | 203    | 5.80             | R3  | out/34.8g      |
| 18                   | 66.52450                                              | 66.5247 | 66.5248 | 66.5251 | 66.52487 | 0.16       | 0.17    | 0.52              | 0.35 | 18     | 0.37             | BLK | Acetone/101.6g |
| III                  | Aqueous Condensible - WATER (Half of the sample only) |         |         |         |          |            |         |                   |      | Dish # | mg Run           |     |                |
| 108                  | 67.36343                                              | 67.3644 | 67.3648 | 67.3650 | 67.36473 | 0.22       | 0.25    | 0.76              | 0.52 | 108    | 1.30             | R1  | out/220ml      |
| 117                  | 62.99647                                              | 62.9978 | 62.9980 | 62.9982 | 62.99800 | 0.13       | 0.16    | 0.50              | 0.34 | 117    | 1.53             | R2  | out/114ml      |
| 700                  | 73.51030                                              | 73.5120 | 73.5118 | 73.5115 | 73.51177 | 0.18       | 0.21    | 0.63              | 0.42 | 700    | 1.47             | R3  | out/107.75ml   |
| 26                   | 79.43880                                              | 79.4388 | 79.4389 | 79.4391 | 79.43893 | 0.11       | 0.12    | 0.38              | 0.26 | 26     | 0.13             | BLK | out/72ml       |

PROJECT: 1779 LOG DATE: 10/3/91  
 CLIENT: Eckley Engineering  
 Huller Baghouse  
 PROJ MGR: SH ANALYST: RRR

I Filters  
 II Probe/Nozzle  
 III Aqueous Condensibles  
 IV Organic Condensibles

| DISH #               | DISH WEIGHINGS IN GRAMS                               |         |         |         |          | STATISTICS |         | CONFIDENCE LIMITS |      | NET MG | SAMPLE ID/AMOUNT |                |
|----------------------|-------------------------------------------------------|---------|---------|---------|----------|------------|---------|-------------------|------|--------|------------------|----------------|
|                      | TARE                                                  | FIRST   | SECOND  | THIRD   | AVERAGE  | AVG DEV    | STD DEV | 95%               | 90%  |        |                  |                |
| I                    | Filters                                               |         |         |         |          |            |         |                   |      |        | Filter           | mg Run         |
| 372                  | 0.14067                                               | 0.1406  | 0.1414  | 0.1413  | 0.14110  | 0.33       | 0.36    | 1.08              | 0.73 | 372    | 0.43 R1          | outlet         |
| 359                  | 0.12227                                               | 0.1223  | 0.1225  | 0.1228  | 0.12253  | 0.18       | 0.21    | 0.63              | 0.42 | 359    | 0.26 R2          | outlet         |
| 377                  | 0.14047                                               | 0.1404  | 0.1412  | 0.1410  | 0.14087  | 0.31       | 0.34    | 1.03              | 0.70 | 377    | 0.40 R3          | outlet         |
| II                   | Probe/Nozzle - ACETONE                                |         |         |         |          |            |         |                   |      |        | Dish #           | mg Run         |
| From Nozzle Cyclone: |                                                       |         |         |         |          |            |         |                   |      |        |                  |                |
| 13                   | 80.95720                                              | 80.9602 | 80.9600 | 80.9609 | 80.96037 | 0.36       | 0.39    | 1.17              | 0.80 | 13     | 3.17 R1          | out/92.6g      |
| 30                   | 97.19483                                              | 97.1936 | 97.1943 | 97.1950 | 97.19430 | 0.47       | 0.57    | 1.74              | 1.18 | 30     | -0.53 R2         | out/65.6g      |
| 701                  | 77.08327                                              | 77.0864 | 77.0869 | 77.0876 | 77.08697 | 0.42       | 0.49    | 1.50              | 1.02 | 701    | 3.70 R3          | out/85.7g      |
| From Cyclone Tube:   |                                                       |         |         |         |          |            |         |                   |      |        |                  |                |
| 10                   | 72.89250                                              | 72.8931 | 72.8928 | 72.8930 | 72.89297 | 0.11       | 0.12    | 0.38              | 0.26 | 10     | 0.47 R1          | out/27.0g      |
| 103                  | 68.90067                                              | 68.9013 | 68.9013 | 68.9019 | 68.90150 | 0.27       | 0.28    | 0.86              | 0.58 | 103    | 0.83 R2          | out/30.3g      |
| 303                  | 67.33673                                              | 67.3361 | 67.3364 | 67.3367 | 67.33640 | 0.20       | 0.24    | 0.75              | 0.51 | 303    | -0.33 R3         | out/26.5g      |
| 18                   | 66.52450                                              | 66.5247 | 66.5248 | 66.5251 | 66.52487 | 0.16       | 0.17    | 0.52              | 0.35 | 18     | 0.37 BLK         | Acetone/101.6g |
| III                  | Aqueous Condensible - WATER (Half of the sample only) |         |         |         |          |            |         |                   |      |        | Dish #           | mg Run         |
| 8                    | 63.56520                                              | 63.5662 | 63.5663 | 63.5660 | 63.56617 | 0.11       | 0.12    | 0.38              | 0.26 | 8      | 0.97 R1          | out/126.5ml    |
| 45                   | 71.58683                                              | 71.5877 | 71.5876 | 71.5878 | 71.58770 | 0.07       | 0.08    | 0.25              | 0.17 | 45     | 0.87 R2          | out/117ml      |
| 113                  | 71.96167                                              | 71.9623 | 71.9618 | 71.9620 | 71.96203 | 0.18       | 0.21    | 0.63              | 0.42 | 113    | 0.36 R3          | out/112ml      |
| 26                   | 79.43880                                              | 79.4388 | 79.4389 | 79.4391 | 79.43893 | 0.11       | 0.12    | 0.38              | 0.26 | 26     | 0.13 BLK         | out/72ml       |

**APPENDIX**  
Copies of Calibration Sheets

'R

Pitot Tube ID#: 7070  
Pitot Tube Type: 6 FT INT  
Calibrated By: ML/RW  
Date: 8/6/91

| A side Calibration |

| del P (std)             | del P (s) | Cp (s) | Dev.                               |
|-------------------------|-----------|--------|------------------------------------|
| 0.55                    | 0.80      | 0.821  | 0.008                              |
| 0.56                    | 0.80      | 0.828  | 0.001                              |
| 0.56                    | 0.78      | 0.839  | 0.010                              |
|                         |           | Avg:   | Avg:                               |
|                         |           | 0.829  | 0.006 Acceptable<br>(Must be <.01) |
| Std. Dev. of Avg. Dev.: |           | 0.004  | Acceptable<br>(Must be <.02)       |

| B side Calibration |

| del P (std)             | del P (s) | Cp (s) | Dev.                               |
|-------------------------|-----------|--------|------------------------------------|
| 0.54                    | 0.76      | 0.834  | 0.003                              |
| 0.54                    | 0.77      | 0.829  | 0.008                              |
| 0.55                    | 0.75      | 0.847  | 0.011                              |
|                         |           | Avg:   | Avg:                               |
|                         |           | 0.837  | 0.007 Acceptable<br>(Must be <.01) |
| Std. Dev. of Avg. Dev.: |           | 0.004  | Acceptable<br>(Must be <.02)       |

```
*****
*
*           Results:
*
*           Cp A:      0.829
*           Cp B:      0.837
*           Cp A - Cp B: 0.007 (Must be <.01)
*           Avg. Cp:    0.833
*
*****
```

Pitot Tube ID#: 5220  
Pitot Tube Type: 3ft. INT  
Calibrated By: RW,ML  
Date: 7/25/91

| A side Calibration |

| del P (std)             | del P (s) | Cp (s) | Dev.                               |
|-------------------------|-----------|--------|------------------------------------|
| 0.54                    | 0.73      | 0.851  | 0.001                              |
| 0.55                    | 0.74      | 0.853  | 0.001                              |
| 0.55                    | 0.74      | 0.853  | 0.001                              |
|                         |           | Avg:   | Avg:                               |
|                         |           | 0.852  | 0.001 Acceptable<br>(Must be <.01) |
| Std. Dev. of Avg. Dev.: |           | 0.000  | Acceptable<br>(Must be <.02)       |

| B side Calibration |

| del P (std)             | del P (s) | Cp (s) | Dev.                               |
|-------------------------|-----------|--------|------------------------------------|
| 0.55                    | 0.76      | 0.842  | 0.001                              |
| 0.55                    | 0.75      | 0.847  | 0.004                              |
| 0.54                    | 0.75      | 0.840  | 0.003                              |
|                         |           | Avg:   | Avg:                               |
|                         |           | 0.843  | 0.003 Acceptable<br>(Must be <.01) |
| Std. Dev. of Avg. Dev.: |           | 0.001  | Acceptable<br>(Must be <.02)       |

```

*****
*
*           Results:
*
*           Cp A:      0.853
*           Cp B:      0.843
*           Cp A - Cp B: 0.009 (Must be <.01)
*           Avg. Cp:    0.848
*
*****

```

# DRY GAS METER CALIBRATIONS

DATE: 8/8/91

Meter box: 958

Barometric press: 30.01

Calibrated by EA

| Orifice<br>Manometer<br>setting<br>(DH)<br>in. H2O | Gas volume                                   |                                             | Temperatures                              |                                          | Time<br>min. | Yi    | DH@i<br>in. H2O |
|----------------------------------------------------|----------------------------------------------|---------------------------------------------|-------------------------------------------|------------------------------------------|--------------|-------|-----------------|
|                                                    | Wet test<br>meter<br>(Vw)<br>ft <sup>3</sup> | Dry gas<br>meter<br>(Vd)<br>ft <sup>3</sup> | Wet test<br>meter<br>average<br>(tw)<br>F | Dry gas<br>meter<br>average<br>(td)<br>F |              |       |                 |
| 0.5                                                | 6.385                                        | 6.428                                       | 93.2                                      | 99                                       | 15.0         | 1.002 | 1.60            |
| 1                                                  | 8.882                                        | 8.990                                       | 93.2                                      | 105                                      | 15.0         | 1.007 | 1.63            |
| 1.5                                                | 10.391                                       | 10.608                                      | 93.2                                      | 108                                      | 15.0         | 1.008 | 1.78            |
| 2                                                  | 12.064                                       | 12.369                                      | 93.2                                      | 111                                      | 15.0         | 1.008 | 1.75            |
| 3                                                  | 13.005                                       | 13.416                                      | 93.2                                      | 116                                      | 15.0         | 1.002 | 2.24            |
| 4                                                  | 15.801                                       | 16.289                                      | 93.2                                      | 119                                      | 15.0         | 1.005 | 2.01            |

Average: 1.003 1.835  
Deviation: 0.003 0.405

Meter Yi must be  $\pm .01$  of Yavg and  $.98 < Yavg < 1.02$  for each run.  
The Yavg of this meter is acceptable.

Meter DH@ should be  $\pm 0.15$  of DH@avg for each run.  
Recommended range of DH@avg is  $1.69 < DH@avg < 2.09$  (not required).  
The DH@avg of this meter is unacceptable.

# DRY GAS METER CALIBRATIONS

DATE: 8/14/91

Meter box: 990

Barometric press: 29.65

Calibrated by RW

| Orifice<br>Manometer<br>setting<br>(DH)<br>in. H2O | Gas volume                                   |                                             | Temperatures                              |                                          | Time<br><br>min. | Yi    | DH@i<br>in. H2O |
|----------------------------------------------------|----------------------------------------------|---------------------------------------------|-------------------------------------------|------------------------------------------|------------------|-------|-----------------|
|                                                    | Wet test<br>meter<br>(Vw)<br>ft <sup>3</sup> | Dry gas<br>meter<br>(Vd)<br>ft <sup>3</sup> | Wet test<br>meter<br>average<br>(tw)<br>F | Dry gas<br>meter<br>average<br>(td)<br>F |                  |       |                 |
| 0.5                                                | 6.013                                        | 6.018                                       | 88.0                                      | 89                                       | 15.0             | 1.000 | 1.82            |
| 1                                                  | 8.394                                        | 8.436                                       | 88.0                                      | 93                                       | 15.0             | 1.002 | 1.85            |
| 1.5                                                | 10.325                                       | 10.443                                      | 88.0                                      | 97                                       | 15.0             | 1.001 | 1.82            |
| 2                                                  | 11.845                                       | 12.022                                      | 88.0                                      | 99                                       | 15.0             | 1.000 | 1.84            |
| 3                                                  | 14.310                                       | 14.649                                      | 88.0                                      | 101                                      | 15.0             | 0.993 | 1.89            |
| 4                                                  | 16.433                                       | 16.859                                      | 88.0                                      | 103                                      | 15.0             | 0.992 | 1.90            |

Average: 0.998 1.855  
Deviation: 0.006 0.046

Meter Yi must be  $\pm .01$  of Yavg and  $.98 < Yavg < 1.02$  for each run.  
The Yavg of this meter is acceptable.

Meter DH@ should be  $\pm 0.15$  of DH@avg for each run.  
Recommended range of DH@avg is  $1.69 < DH@avg < 2.09$  (not required).  
The DH@avg of this meter is acceptable.