AMTB

# TENNESSEE DEPARTMENT OF HEALTH AND ENVIRONMENT


Bureau of Environment
T.E.R.R.A. BUILDING
150 NINTH AVENUE NORTH
NASHVILLE, TENNESSEE 37219-5404




Mr. Richard G. Rhoades, Director
Monitoring and Data Analysis Division
EPA - OAQPS
Research Triangle Park, NC 27711

Dear Mr. Rhoades:

Thank you for your letter of April 8, 1985 soliciting comments on the proposed revision of AP-42 Section 8.10-Concrete Batching. Although my expertise is limited in evaluating the technical changes which are proposed in this document, I will address the factors for cement unloading to elevated silos by pneumatic transfer. In 1984 the emissions from a cement storage silo equipped with wet suppression in Gallaway, Tennessee was tested by this division. This is the only particulate test on concrete batching operations performed by the division. I am enclosing a copy of this test for your information and evaluation. Unfortunately, this is the only comment I can offer at this time. If I can be of further assistance please call me at 615-741-3651.

Sincerely,

Heather M. Whitlow

Heather M. Whitlow
Air Resources Program
Tennessee Air Pollution Control Division

HMW/sh

Enclosure

STATE OF TENNESSEE

DEPARTMENT OF HEALTH AND ENVIRONMENT
Division of Air Pollution Control

# SOURCE SAMPLING REPORT

Speciality Alloys Corporation
210 Overton Street
P.O. Box 56
Gallaway, Tennessee 38036

Reference Number 24-00051-02

Particulate Emissions
from
Cement Silo Loading

Tested
June 12, 1984

Process Observation Submitted By: Eric R. Flowers
Eric Flowers
Engineering Program

Report Submitted by: Jeryl W. Stewart
Jeryl W. Stewart
Compliance Monitoring Section

Report Forwarded by:
John W. Walton, P.E.
Deputy Director

Table of Contents

## INTRODUCTION AND OBJECTIVE

Source sampling was conducted at Speciality Alloys Corporation, Gallaway, Tennessee, by the Compliance Monitoring Section of the Tennessee Division of Air Pollution Control on June 12, 1984 to determine the particulate emissions from the loading of the cement silo (Process Emission Source 02). The sampling of the unloading of two bulk cement trucks into the silo was conducted on June 12, 1984.

# SUMMARY OF RESULTS

The particulate emissions from the loading of the cement silo (PES 02) located at Speciality Alloys Corporation are regulated by Rule 1200-3-7-.03 of the Tennessee Air Pollution Control Regulations. Since this process emission source began operation after April 3, 1972 it is considered to be a new source by the Tennessee Regulations. The allowable particulate emission rate for this source is determined based on the process weight of the material through the source. However, by Rule 1200-3-7-.04 of the Regulations the maximum allowable concentration of particulate matter in the exhaust gas stream of any process emission source shall be 0.25 grains per dry standard cubic foot of stack gas irrespective of the maximum emission rate determined by any other method. For this source the grain loading standard is the over riding mass emission standard.

The visible emissions from the cement silo are regulated by Rule 1200-3-5-.01 of the Regulations. The visible emission limitation for this source is twenty (20) percent opacity utilizing a one minute time count method of data reduction.

On June 12, 1984 this cement silo was tested for particulate emissions during the unloading of two bulk cement trucks. Separate source tests were conducted on the unloading of each truck. During the first source test the top of the wet suppression system ("rain barrel") was covered with a single layer of burlap. The unloading of the first truck was conducted at a rate that was below the normal unloading rate. This was done in an effort to determine if this lower unloading might reduce the emissions from this source. During the unloading of the first truck it was noted that the reduced unloading caused a very erratic pulsing from the top of the wet suppression system and the expulsion of a considerable amount of water mist from the top of the "rain barrel". During the testing period on the unloading of the first truck the average particulate concentration measured from this source was determined to be 0.0723 grains per dry standard cubic foot of stack gas. Therefore, this source was in compliance with the applicable mass emission limitation during the testing period. Visible emissions evaluation conducted during the source testing of the unloading of the first truck indicated that the process emission source was in compliance with the applicable visible emission limitation during this time period.

Prior to the unloading of the second truck a second layer of burlap was added to the cover of the "rain barrel". The unloading of the second truck was conducted at the normal unloading rate which is higher than the unloading rate of the first truck. During the unloading of the second truck it was noted that the higher unloading rate greatly reduced the pulsations noted from the top of the "rain barrel" during the unloading of the first truck and greatly reduced the expulsion of water mist from the top of the "rain barrel". During the testing period on the unloading of the second truck the average particulate concentration measured from this source was determined to be 0.0254 grains per dry standard cubic foot of exhaust gas. Therefore, this source was in compliance with the applicable mass emission limitation during this testing period. Visible emissions evaluations conducted during the source testing of the unloading of the second truck indicated that the process emission source was again in compliance with the applicable visible emission limitation during this time period.

# DATA SUMMATION

Speciality Alloys - Gallaway - June 12, 1984

Truck 1

| Run # | 1 | 2 | 3 | Ave |
|---|---|---|---|---|
| Particulate Concentration (gr/DSCF) | 0.0876 | 0.0575 | 0.0717 | 0.0723 |
| Particulate Emissions (lb./hr.) | 0.13 | 0.08 | 0.11 | 0.11 |

Truck 2

| Run # | 1 | 2 | Ave |
|---|---|---|---|
| Particulate Concentration (gr/DSCF) | 0.0270 | 0.0237 | 0.0254 |
| Particulate Emissions (lb./hr.) | 0.04 | 0.03 | 0.04 |

## Purpose of the test

The purpose of the source test was to test the effectiveness of a wet suppression system in controlling particulate emissions during truck loading of cement to a storage silo. The wet suppression system consisted of a water hose applied to a burlap cover clamped to the top of a water filled barrel. Cement is loaded penumatically by a truck compressor through a flexible hose line to a silo. The wet suppression control system is required to satisfy the .25 gr/dscf standard specified in 1200-3-7-.04-(2) of Tennessee Air Pollution Control Regulations. Condition la. of construction permit 993234P stipulates that the source meet this level of control. Additionally, Condition 3 of the permit requires that the source meet the visible emission limits of Chapter 5 and fugitive dust limits of Chapter 8, essentially the 20% opacity standard. This source is the first cement silo wet suppression control system to be source tested for particulates by the Division.

## Division and company personnel involved

Jeryl Stewart, Carl Koontz, and Elizabeth Coder were responsible for source test measurements. Eric Flowers observed process operations and recorded process data. Mike Hale made visible emission readings. Mr. Don Vickrey the plant owner and partner with Gray McKee, Kelly Vickrey, secretary-treasurer, and Randy Hicks, plant superintendent were present during the silo loading test measurements and in charge of the operation.

## Process description and control system

A schematic of the silo and water barrel control system for loading is shown in Figure 1. Essentially, a truck with a Portland cement load of nominal weight of 26 tons is loaded pneumatically driven by a truck compressor through a 4 3/4 inch diameter hose into a silo intake chute. The truck operator normally unloads the cement at a maximum pressure between 14 and 16 psig to fill the silo at a minimum loading time. The truck loading time is usually between 20 and 40 minutes. Air is displaced through a 6 inch diameter silo outlet chute which feeds to the interior of a 55 gallon drum filled with water and capped by burlap material clamped to the barrel rim and silo outlet chute. During loading, a surge of air pressure expands the burlap bag and the displaced air exits through the burlap weave pattern openings. The silo is designed to hold between 2½ to 3 truck loads according to plant officials.

## Process observation

Two separate test loading conditions were conducted. The first test was done while a truck load of 26.48 tons was filled at a nominal pressure of 8 psig. One burlap bag was clamped over the barrel top. Initially, a water hose was used to fill the barrel and then water flow was cut off. After a few minutes of operation it was apparent that is was necessary to maintain a continuous stream of water on the bag due to the level of emissions and due to the fact that too much water was displaced out the barrel. Since the pressure was not at full (normal) loading pressure and only one bag was used, a puffing or breathing effect allowed a steady flow of saturated cement dust to the emitted from the burlap cover. Although the pressure created a fairly tight seal at the bag, the combined effects of lower pressure and one burlap cover did not prove to be an acceptable combination in maintaining visible emissions within a complying range during the first loading condition. Visible emission levels averaging approximately 30% and ranging from 5 to 80% were recorded by Mike Hale during the first truck load.

The following process data was recorded during the first truck load.

TABLE 1

| Time (A.M.) | Truck loading pressure (psig) | Comments |
|---|---|---|
| 7:50 | 7.0 | Anemometer flow rate of 60 fpm was recorded 2 feet from the burlap cover. |
| 7:56 | 9.0 | Rader sampling equipment was brought into test position. |
| 7:58 | | Started Run 1 (each run lasts 10 minutes). |
| 8:00 | 7.8 | |
| 8:06 | 7.0 | |
| 8:08 | | End Run 1 |
| 8:13:42 | 6.0 | Start Run 2 |
| 8:15 | 7.3 | |
| 8:20 | 8.5 | |
| 8:24 | 8.0 | End Run 2 |
| 8:29 | 9.0 | Start Run 3 |
| 8:31 | 8.0 | |
| 8:34 | 8.2 | |
| 8:38 | 5.0 | |
| 8:39 | 6.5 | End Run 3 |
| 8:41 | | Truck loading ended |

Silo loading was stopped between test runs to conserve sampling time. Water was continuously applied by hose to the barrel during loading. The approximate total loading time was 41 minutes for the first truck load.

The second truck load of cement weighed 26.52 tons. During this test full loading pressure was applied, above 13 psig. Because of excessive visible emissions on the first test, two burlap bags were used to cover the barrel top. The combination of full loading pressure and two bags dramatically improved control of emissions. Visible emissions were in the range of 5 to 15% opacity. Both trucks were practically identical in construction and design with the same loading technique. It is believed the combination of cross weave or overlap of burlap bag material and higher pressure provided a tight seal that minimized pulsing of dust and created sufficient back pressure on the loading lines. As in the first truck test, a steady stream of hosed water during loading was applied throughout the loading.

The following process data was recorded as shown in Table 2.

TABLE 2

| Time (A.M.) | Truck loading pressure (psig) | Comments |
|---|---|---|
| 9:09 | 8.0 | Truck began filling procedure |
| 9:12 | 5.0 | |
| 9:13 | 8.5 | Truck operator began bringing the compressor to full pressure. |
| 9:15 | 14.5 | |
| 9:16 | 15.0 | |
| 9:18:49 | | Start Run 1 |
| 9:22 | | A 1" hole leak on barrel inlet chute was noticed and sealed with duct tape. |
| 9:23 | 13.0 | |
| 9:27 | 13.0 | |
| 9:28 | | End Run 1 |
| 9:31:47 | | Truck operator resumed compressor pressure for test Run 2. |
| 9:34 | 5.0 | Truck operator began compressor loading but a problem persisted due to cement trapped in the line. Apparently stopping and restarting pressure lines can sometimes cause blockage and result in cement conveying problems. |
| 9:44 | | Truck operator was finally able to clear pneumatic line. |
| 9:45 | 16.0 | Run 2 started |
| 9:47 | 14.0 | |
| 9:48 | | Photograph taken of side view of barrel and plume. |
| 9:53 | | Photograph of sampling train equipment taken. |
| 9:54 | 14.2 | |
| 9:55 | 11.0 | Run 2 ended |
| 10:00 | 10.0 | Truck operator stated there were only a few minutes remaining so another test run could not be completed. |
| 10:01 | 7.6 | |
| 10:01:36 | | |
| 10:03 | 1.0 | Silo loading ended |

Truck loading tickets are shown in Figure 2. The loading time was **38** minutes during the second truck load.

EF/ca/5/1

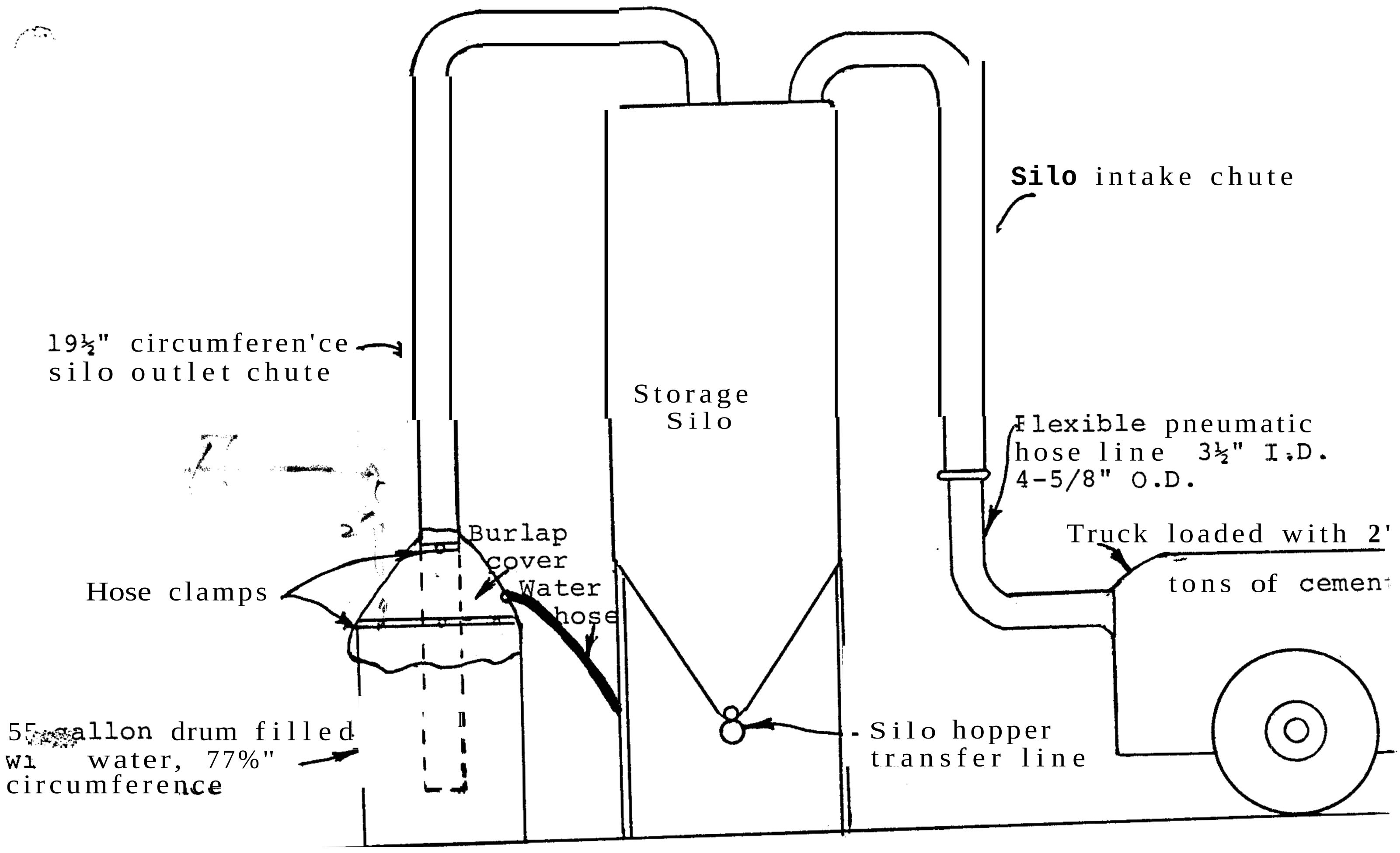

Silo intake chute
19½" circumferen'ce silo outlet chute
Storage Silo
Flexible pneumatic hose line 3½" I.D. 4-5/8" O.D.
Truck loaded with 2' tons of cemen
Burlap cover
Water hose
Hose clamps
55 gallon drum filled wi water, 77%" circumference
Silo hopper transfer line

FIGURE 1

FIGURE 2

FROM MISSOURI PORTLAND CEMENT COMPANY — Form 202 (5/83) — 50807

AT MEMPHIS

| CUSTOMER NO. | CONTRACT | TERR. NO. | SHIPPING DATE |
|---|---|---|---|
| 8165000-801 | | M-2 | 6-12-84 |

SOLD TO
SPECIALTY ALLOYS CORP
PO BOX 56
GALLAWAY TN 38036

LOC.CODE 40
SHIPPERS NO. 1-1

SHIP TO (SAME AS SOLD TO UNLESS OTHERWISE SHOWN)
SPECIALTY ALLOYS CORP
810 OVERTON
GALLAWAY TN

CARRIER NO. 9900
CARRIER Wooten
COUNTY
TEST
TRAILER NO. 155-07
PROJECT

CAUTION: MAY CAUSE EYE OR SKIN INJURY SEE NOTICE ON REVERSE SIDE

| KIND OF CEMENT | CODE | TONS | PACKAGES |
|---|---|---|---|
| PORTLAND 1 | 01 | 26.48 | |

CUSTOMER ORDER NO.

BY SIGNATURE BELOW, THE DRIVER, IF NOT REGULATED BY THE INTERSTATE COMMERCE COMMISSION OR STATE COMMISSION, HEREBY CERTIFIES THAT THE EQUIPMENT AND PERSONNEL MEET THE STATE SAFETY REQUIREMENTS AND THOSE OF THE DEPARTMENT OF TRANSPORTATION UNDER TITLE 49 U.S.C. AND FURTHER ACKNOWLEDGEMENT OF RECEIPT AND TITLE TO THE QUANTITY AND TYPE MATERIAL DESCRIBED FOR USE AT THE DESTINATION IMPRINTED ABOVE

25240 TARE — TIME 03:58 PM — BY — DRIVER Patterson
78200 GROSS
52960 LBS. NET
26.46

CONSIGNEE'S SIGNATURE — 6-12-84

FREIGHT R RATE OR A AMOUNT

7:00

Truck load 1

FROM MISSOURI PORTLAND CEMENT COMPANY — Form 202 (5/83) — 50808

AT MEMPHIS

| CUSTOMER NO. | CONTRACT | TERR. NO. | SHIPPING DATE |
|---|---|---|---|
| 8165000-801 | | M-2 | 6-12-84 |

SOLD TO
SPECIALTY ALLOYS CORP
PO BOX 56
GALLAWAY TN 58036

LOC.CODE 40
SHIPPERS NO. 1-2

SHIP TO (SAME AS SOLD TO UNLESS OTHERWISE SHOWN)
SPECIALTY ALLOYS CORP
810 OVERTON
GALLAWAY TN

CARRIER NO. 9900
CARRIER Wooten
COUNTY
TEST
TRAILER NO. 157-08
PROJECT

CAUTION: MAY CAUSE EYE OR SKIN INJURY SEE NOTICE ON REVERSE SIDE

| KIND OF CEMENT | CODE | TONS | PACKAGES |
|---|---|---|---|
| PORTLAND 1 | 01 | 26.52 | |

CUSTOMER ORDER NO.

BY SIGNATURE BELOW, THE DRIVER, IF NOT REGULATED BY THE INTERSTATE COMMERCE COMMISSION OR STATE COMMISSION, HEREBY CERTIFIES THAT THE EQUIPMENT AND PERSONNEL MEET THE STATE SAFETY REQUIREMENTS AND THOSE OF THE DEPARTMENT OF TRANSPORTATION UNDER TITLE 49 U.S.C. AND FURTHER ACKNOWLEDGEMENT OF RECEIPT AND TITLE TO THE QUANTITY AND TYPE MATERIAL DESCRIBED FOR USE AT THE DESTINATION IMPRINTED ABOVE

TIME LOADED — NECK 146 — DRIVER Scruggs
25000 07:33 AM
78040 07:
53040
26.52

CONSIGNEE'S SIGNATURE — 6-12-84

FREIGHT R RATE OR A AMOUNT

Truck load 2

# DISCUSSION OF SAMPLING PROCEDURES AND RESULTS

Speciality Alloys - "Wet Suppression System" - June 12, 1984

The purpose of this source testing was to determine the particulate emission levels from a wet suppression system utilized to control the particulate emissions from the unloading of bulk cement from trucks into a storage silo. This wet suppression system is commonly referred to as a "rain barrel".

Prior to collecting the samples the process was operated for several minutes so that the velocity and temperature of the exhaust gases could be determined. During the unloading of the first bulk cement truck the top of the "rain barrel" was covered with a single layer of burlap. When the process was operated it was noted that there was a water mist forced from the burlap by the pressure of the air being forced from the cement silo. It was anticipated that the exhaust gas velocity from this source would be quiet low and that conventional measurement techniques utilizing a pitot tube and a manometer or a magnahelic gauge would be unsuitable for measuring this flow. Both a vane type anemometer and a hot wire type anemometer were utilized to measure the exhaust gas flowrate from the exit of the "rain barrel". Since the water mist would interfere with the operation of both instruments, these velocity measurements were conducted at a height of two feet directly above the rim of the "rain barrel". This height was above the water mist so that it would not interfere with the velocity measurements. The exhaust gas temperature was taken at this same point. Because of the presence of water droplets the exhaust gas stream was assumed to be saturated for calculation purposes.

The sampling site was selected to be a single point directly above the exit of the "rain barrel" and two feet above the barrel rim, the site of the velocity measurements.

For the unloading of the first truck a velocity of 60 feet per minute was measured at the selected sampling site utilizing both the vane ~~anemometer~~ and the hot wire anemometer. After consulting the calibration charts for the hi volume sampler utilized, it was decided to conduct the sampling utilizing the largest available sampling nozzle (diameter 3.727 inches) and pulling air at the lowest practical rate (an orifice pressure drop of 0.03 inches of water). It was estimated that it would take at least a half an hour to completely unload the truck. It was decided to conduct three ten-minute sample runs on this truck unloading.

During the sampling of the unloading of the first truck some visible emissions were noted from the "rain barrel". At the conclusion of the unloading of the first truck a second layer of burlap was attached to the top of the "rain barrel".

The testing of the unloading of the second truck was conducted in a manner identical to the testing of the unloading of the first truck. It was noted that after the process was started the water mist observed during the unloading of the first truck was not as pronounced. It was decided to conduct velocity and temperature measurements at the same location utilized for the testing of the unloading of the first truck. A velocity of 60 feet per minute was measured at the selected sampling site utilizing both the vane anemometer and the hot wire anemometer. The sampling was conducted in a manner that was identical to the sampling of the unloading of the first truck with one exception. The exception was that only two sampling runs were conducted. The reason for this was the fact that the second truck was to be unloaded at a faster rate than was the first truck. Because of this it was adjudged that there would be insufficient operating time for three ten-minutes samples. It was noted that the observed visible emissions were lower during the unloading of the second truck than during the unloading of the first truck.

The concentration of the particulate matter in the exhaust gas stream of the "rain barrel" was calculated from the amount of particulate matter collected in the sampling train during each sample run and the volume of air sampled during each sample run. Following the sampling the hi volume sampler was calibrated at an orifice pressure drop of 0.03 inches of water (the rate used in the sampling) and from this data the volume of air sampled during each sample run was calculated.

In the calculation of the mass emission rate from a source the volumetric air flow from the source must be determined. For this source it was decided that the best method of calculating the air flow from the source was by multiplying the area of the source (the area of the open top of the "rain barrel" minus the area of the inlet pipe) by the velocity measured at the sampling site.

The results obtained from this source testing represents the best emissions data that can be obtained from this type of control device. The procedures used in obtaining this emissions data were designed in such a manner that any biases that might result would not be against the source.

JWS/ca/2/3

SAMPLING TRAIN COMPONENTS

1. Aluminum probe with four nozzles. One nozzle of 15/16 inch diameter, one nozzle of 1 7/8 inches diameter, one nozzle of 1 1/2 inches diameter, and one nozzle of 3 3/4 inches diameter.

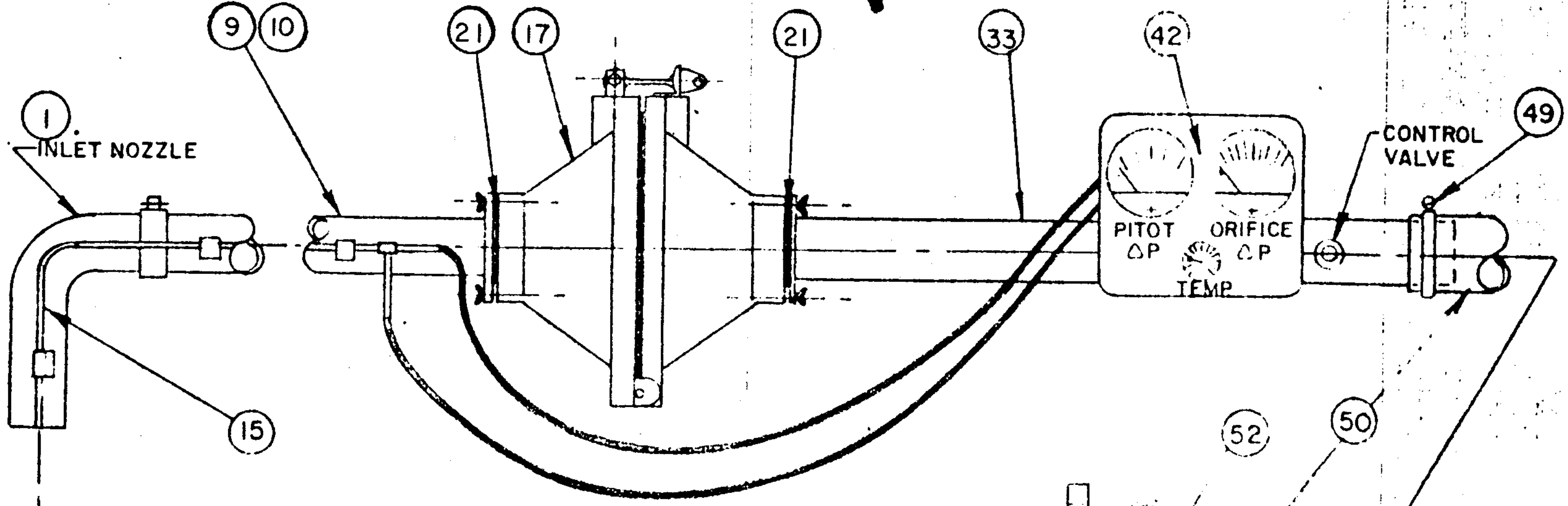
2. In-line filter of 0.3 micron porosity.

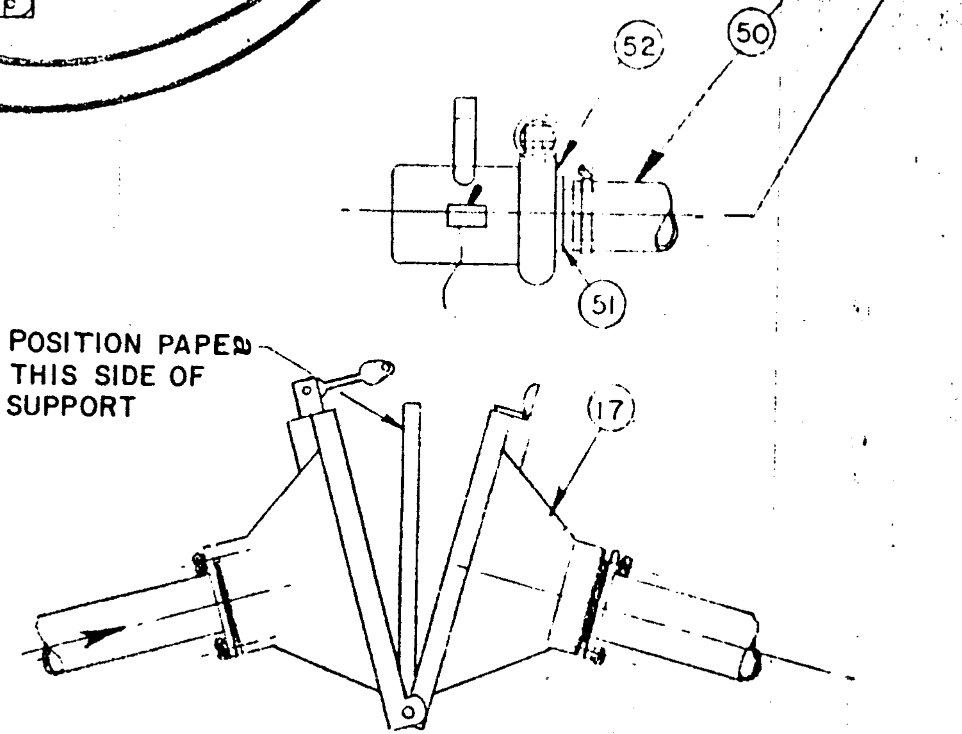
3. In-line orifice with pressure differential gauge of one inch water range and temperature gauge of appropriate scale.

4. Butterfly valve to control flow through samplin- train.

5. Flexible hose from the train to fan.

6. Centrifugal fan.




17. FILTER HOUSING ASSEMBLY
9+10. INLET SECTION (30" & 48")
33. CONTROL SECTION
42. TEST PANEL
15. PITOT TUBE
21. NEOPRENE GASKETS
50. FLEX HOSE
52. SUCTION BLOWER
1. INLET NOZZLE
51. BLOWER HOSE ADAPTOR
49. HOSE CLAMPS

RADER PNEUMATICS

| | |
|---|---|
| TITLE RADER HI-VOLUME SAMPLER | |
| SCALE ——— | DRWN. J.W. HIRSCH |
| DATE 7·30·71 | CKD. |
| A-100332A | |

Laboratory Procedure
Particulate High-Volume Source Samples

1. Filters are numbered, conditioned, and preweighed according to the standardized "Total Suspended Particulate Analysis Procedure."

2. Upon request by the Source Sampling Section team supervisor the requested quantity of filters will be issued (preferably sequentially numbered) and the chain of custody documentation (Figure 1) is initiated.

3. Throughout the testing period the filters and later the probe washes will remain in the custody of the test team supervisor and this will be noted in the chain of custody documentation.

4. Upon completion of the sampling all filters (used and unused) and the probe washings are returned to the laboratory and the chain of custody documentation is completed. All filters (used) and probe washings are to be adequately labeled with the liquid level being marked on the outside of the container. A blank of the cleanup acetone is also to be submitted.

5. The filters are treated as described in the attached lab procedure which is the standardized "Total Suspended Particulate Analysis Procedure" with unrelated data deleted.

6. When the probe washings arrive in the laboratory they are checked to see if there was any loss of liquid in transit. If there was any loss it is to be noted on the weight sheet. Then the probe washings are quantitatively transferred into previously tared beakers. The acetone blank is treated likewise.* These tared beakers have been previously dried in a desiccator for 24 hours and weighed to the nearest 0.1 mg. The beakers are desiccated for at least six additional hours and reweighed. This is repeated until two successive weights agree to within 0.5 mg. Before each weighing session the balance is checked with Class *S* weights and the results recorded.

   These beakers are placed in the evaporation chamber until all liquid has evaporated, then the beakers are desiccated for at least 24 hours and weighed to the nearest 0.1 mg. The beakers are desiccated for at least *6* additional hours and reweighed. This is repeated until two consecutive weighings of each beaker agree to within 1.0 mg.

7. All weighings and other required data are entered on the appropriate weight sheets (Figure 2).

*Note: The quantity of acetone used in both the probe washings and the blank is measured and the volume is recorded. This is accomplished by using beakers having graduations at 25 ml intervals and building up to the next graduated interval with reagent acetone.

# Total Suspended Particulate Analysis Procedure

1. Number filters in the border area of the filter using the sequential numbering machine. Number each filter twice, once on the front on the long edge and once on the back on the opposite long edge.

2. Stamp envelopes with the information stamp in the upper left corner with the opening to your left as you look at the envelope. Number the envelopes to correspond to the filter numbers, placing the number to the right of the stamp.

3. Store the filters in the desiccator, kept dry (50% or less relative humidity) with the dryerite. When the desiccator atmosphere becomes too wet, replace the desiccant with that in the oven being dried at (110-120$^{o}$C). Place the wet dryerite in the large evaporating dish in the oven. In this manner there will always be a dry batch of dryerite without having to open another jar. The desiccator pan will hold 5 lbs. of dryerite.

4. Each day, before weighing samples, record the humidity in the desiccator and the weight of a 5 gm standard weight in the book provided. The book is kept in the drawer in the table next to the balance with the standard weights.

   In weighing clean filters and also in weighing exposed filters, after weighing a batch reweigh 7%+ of the filters to check the precision of the weighings. The following table gives the number of filters to be checked.

| No of filters in batch | No. to be reweighed |
|---|---|
| up to 14 | 1 |
| 15 to 28 | 2 |
| 29 to 42 | 3 |
| 43 to 56 | 4 |
| 57 to 70 | 5 |
| 71 to 84 | 6 |
| 95 to 100 | 7 |
| and so on | |

   If any of the weights on the recheck differ by 1.0 mg or more from the original weight, reweigh the entire batch, recording the new weight to the right of the original weight on the envelope. In calculating the result always use the last weight taken.

5. In weighing the filter, both before and after the exposure, place the filters in the desiccator for at least 24 hours prior to the weighint. Record the original weight in the log book before distriburing the filters to the field personnel. Be sure that each field operator has an adequate supply of filters, but try to ensure that all filters of the lowest number are used first to facilitate recording in and reading from the log book.

6. When samples are received, write the date received in the lower right corner of the envelope. Place filters in the desiccator for 24 hours prior to weighing.

7. Before weighing each filter, make sure that the filter number matches the envelope number. In weighing the samples be sure to reweigh 7%+ for quality control as in step 4 above.

# SAMPLE DATA AND CALCULATIONS
# SPECIALITY ALLOYS - GALLAWAY - JUNE 12,1984
# "WET SUPPRESSION SYSTEM"

I. Data

Sample Identification Truck 1 Run 1
Sample Time 10 min.
Exhaust Gas Temperature 72° F
Orifice $\Delta$ H 0.03 in $H_2O$
Orifice Temperature 81° F
Exhaust Gas Velocity 60 ft./min.
(at sampling site)
Diameter of Nozzle 3.727 in.
Barometric Pressure 29.88 in. Hg
Total Particulate Catch During Sample Run 0.53 lb
Total Time Required to Unload Truck 41 min.

1. Average Sample Volume (ASV)

$$ASV = \frac{(\text{sampling rate at } 60^{\circ}F)(\text{orifice temperature})}{520}$$

sampling rate at 60°F = 9.49 ft³/min. for $\Delta$H of 0.03 in. $H_2O$
(from Rader calibrations)

$$ASV = \frac{(9.49)(81+460)}{520} = 9.87 \text{ ft3/min.}$$

2 Total Sample Volume (TSV)

TSV = (ASV) (time of sample run)
TSV = (9.87) ( 10 ) = 98.7 ft.3

3. Mole Fraction of Dry Gas (MD)

$$MD = \frac{(100) - (\text{percent moisture in exhaust gas stream})}{(100)}$$

where percent moisture in exhaust gas stream is determined from the saturation line of a psychometric chart because of the presence of liquid water in the gas stream, for an exhaust gas temperature of 72° F the percent moisture is 2.6 %.

$$MD = \frac{(100) - (2.6)}{(100)}$$

MD = 0.97

4. Volume Sampled a? Standard Conditions (Vmstd)

$$Vmstd = \frac{(17.7)(TSV \times MD)\left(\text{barometric pressure} + \frac{(\text{orifice } \Delta H)}{13.6}\right)}{(\text{orifice temperature} + 460)}$$

$$Vmstd = \frac{(17.7)(98.7 \times 0.97)\left(29.88 + \frac{(0.03)}{13.6}\right)}{(81 + 460)}$$

Vmstd = 93.6 DSCF

5. Particulate Concentration (CS)

$$CS = \frac{(15.43)\ (\text{total particulate catch during sample run})}{(\text{Vmstd})}$$

$$CS = \frac{(15.43)(0.5311)}{(93.6)}$$

CS = 0.0876 gr./DSCF

6. Source Velocity At Sampling Point = 60 ft./min.
(value determined by direct measurement with hot wire anemometer)

7. Source Flowrate (Q)

Q= (velocity) (area)

where velocity = velocity at samping site
area = the area over which that velocity occurs, for this source this area is equal to the area of the top of the barrel (24 in. diameter = 452 in.$^2$ = 3.14 ft.$^2$) minus the area of the inlet duct (6 in. diameter = 28 in.2 = 0.19 ft.$^2$) which equals 2.95 ft.$^2$.

Q = ( 60 ) (2.95)

Q = 177 ft.$^3$/min.

8. Source Flowrate at Standard Conditions (Qstd)

$$Qstd = \frac{(17.7)\ (Q \times MD)\ (\text{barometric pressure})}{(\text{exhaust gas temperature} + 460)}$$

$$Qstd = \frac{(17.7)\ (177 \times 0.97)\ (29.88)}{(72 + 460)}$$

Qstd = 171 sdcfm

9. Particulate Emissions (PMR) (in lb./hr.)

PMR = (CS)(Qstd)(0.00857)

PMR = (0.0876) ( 171 ) (0.00857)

PMR = 0.13 lb/hr.

10. Particulate Emissions (PMRL) (in lb. emissions per truck load of cement)

$$PMRL = \frac{(CS)\ (Qstd)\ (\text{time in minutes required to unload truck})}{7{,}000}$$

$$PMRL = \frac{(0.0876)\ (171)\ (41)}{7{,}000}$$

PMRL = 0.09 lb. of emissions per truck load of cement

# SAMPLE DATA AND CALCULATIONS
# SPECIALITY ALLOYS - GALLAWAY - JUNE 12, 1984
# "WET SUPPRESSION SYSTEM"

I. Data

Sample Identification Truc 1 Run 2
Sample Time 10 min.
Exhaust Gas Temperature 72 °F
Orifice $\Delta$ H 0.03 in. $H_2O$
Orifice Temperature 82
Exhaust Gas Velocity 60 ft. min.
(at sampling site)
Diameter of Nozzle 3.727 in.
Barometric Pressure 29.88 in. Hg.
Total Particulate Catch During Sample Run 0.3490
Total Time Required to Unload Truck 41 min.

1. Average Sample Volume (ASV)

$$ASV = \frac{(\text{sampling rate at } 60^oF)(\text{orifice temperature})}{520}$$

sampling rate at $60^oF$ = 9.49 ft.³/min. for $\Delta$H of 0.03 in. $H_2O$
(from Rader calibrations)

$$ASV = \frac{(9.49)(82+460)}{520} = 9.89 \text{ ft3/min.}$$

2. Total Sample Volume (TSV)

TSV = (ASV) (time of sample run)

TSV = (9.89) (10) = 98.9 ft.3

3. Mole Fraction of Dry Gas (MD)

$$MD = \frac{(100) - (\text{percent moisture in exhaust gas stream})}{(100)}$$

where percent moisture in exhaust gas stream is determined from the saturation line of a psychometric chart because of the presence of liquid water in the gas stream, for an exhaust gas temperature of 72 °F the percent moisture is 2.6%

$$MD = \frac{(100) - (2.6)}{(100)}$$

MD = 0.97

4. Volume Sampled at Standard Conditions (Vmstd)

$$Vmstd = \frac{(17.7)(TSV \times MD)\left(\text{barometric pressure} + \frac{(\text{orifice } \Delta H)}{13.6}\right)}{(\text{orifice temperature} + 460)}$$

$$Vmstd = \frac{(17.7)(98.9 \times 0.97)\left(29.88 + \frac{(0.03)}{13.6}\right)}{(82 + 460)}$$

Vmstd = 93.6 DSCF

5. Particulate Concentration (CS)

$$CS = \frac{(15.43)\ (\text{total particulate catch during sample run})}{(Vmstd)}$$

$$CS = \frac{(15.43)\ (0.3490)}{(93.6)}$$

CS = 0.0575 gr./DSCF

6. Source Velocity At Sampling Point = 60 ft./min.
(value determined by direct measurement with hot wire anemometer)

7. Source Flowrate (Q)

Q= (velocity) (area)

where velocity = velocity at samping site
area = the area over which that velocity occurs, for this source this area is equal to the area of the top of the barrel (24 in. diameter = 452 in.$^2$ = 3.14 ft.$^2$) minus the area of the inlet duct (6 in. diameter = 28 in.2 = 0.19 ft.$^2$) which equals 2.95 ft.$^2$.

Q = ( 60 ) (2.95)

Q = 177 ft.$^3$/min.

8. Source Fiowrate at Standard Conditions (Qstd)

$$Qstd = \frac{(17.7)\ (Q \times MD)\ (\text{barometric pressure})}{(\text{exhaust gas temperature} + 460)}$$

$$Qstd = \frac{(17.7)\ (177 \times 0.97)\ (29.88)}{(72 + 460)}$$

Qstd = 171 sdcfm

9. Particulate Emissions (PMR) (in lb./hr.)

PMR = (CS)(Qstd)(0.00857)

PMR = (0.0575) ( 171 ) (0.00857)

PMR = 0.08 lb/hr.

10. Particulate Emissions (PMRL) (in lb. ernissions per truck load of cement)

$$PMRL = \frac{(CS)\ (Qstd)\ (\text{time in minutes required to unload truck})}{7{,}000}$$

$$PMRL = \frac{(0.0575)\ (171)\ (41)}{7{,}000}$$

PMRL = 0.06 lb. of emissions per truck load of cement

# SAMPLE DATA AND CALCULATIONS
# SPECIALITY ALLOYS - GALLAWAY - JUNE 12, 1984
# "WET SUPPRESSION SYSTEM"

I. Data

Sample Identification Truck 1 Run 3
Sample Time 10 min.
Exhaust Gas Temperature °
Orifice $\Delta$ H 0.03 in. $H_2O$
Orifice Temperature 82°
Exhaust Gas Velocity 60 ft./min.
(at sampling site)
Diameter of Nozzle 3.727 in.
Barometric Pressure 29.88 in Hg
Total Particulate Catch During Sample Run 0.4353
Total Time Required to Unload Truck 41 min.

1. Average Sample Volume (ASV)

$$ASV = \frac{(\text{sampling rate at } 60^oF)\ (\text{orifice temperature})}{520}$$

sampling rate at $60^oF$ = 9.49 ft³/min. for $\Delta$H of 0.03 in. $H_2O$
(from Rader calibrations)

$$ASV = \frac{(9.49)(82+460)}{520} = 9.89 \text{ ft3/min.}$$

2. Total Sample Volume (TSV)

TSV = (ASV) (time of sample run)
TSV = (9.89) (10) = 98.9 ft.3

3. Mole Fraction of Dry Gas (MD)

$$MD = \frac{(100) - (\text{percent moisture in exhaust gas stream})}{(100)}$$

where percent moisture in exhaust gas stream is determined from the saturation line of a psychometric chart because of the presence of liquid water in the gas stream, for an exhaust gas temperature of 72°F the percent moisture is 2.6%.

$$MD = \frac{(100) - (2.6)}{(100)}$$

MD = 0.97

4. Volume Sampled at Standard Conditions (Vmstd)

$$Vmstd = \frac{(17.7)\ (TSV \times MD)\ (\text{barometric pressure} + \frac{(\text{orifice}\ \Delta H)}{13.6})}{(\text{orifice temperature} + 460)}$$

$$Vmstd = \frac{(17.7)\ (98.9 \times 0.97)\ (29.88 + \frac{(0.03)}{13.6})}{(82 + 460)}$$

Vmstd = 93.6 DSCF

5. Particulate Concentration (CS)

$$CS = \frac{(15.43)\ (\text{total particulate catch during sample run})}{(Vmstd)}$$

$$CS = \frac{(15.43)\ (0.4353)}{(93.6)}$$

CS = 0.0717 gr./DSCF

6. Source Velocity At Sampling Point = 60 ft./min.
(value determined by direct measurement with hot wire anemometer)

7. Source Flowrate (Q)

Q= (velocity) (area)

where velocity = velocity at samping site
area = the area over which that velocity occurs, for this source this area is equal to the area of the top of the barrel (24 in. diameter = 452 in.$^2$ = **3.14** ft.$^2$) minus the area of the inlet duct *(6* in. diameter = 28 in.2 = 0.19 ft.$^2$) which equals 2.95 ft.$^2$.

***Q*** = ( 60 ) (2.95)

Q = 177 ft.$^3$/min.

8. Source Flowrate at Standard Conditions (Qstd)

$$Qstd = \frac{(17.7)\ (Q \times MD)\ (\text{barometric pressure})}{(\text{exhaust gas temperature} + 460)}$$

$$Qstd = \frac{(17.7)\ (177 \times 0.97)\ (29.88)}{(72 + 460)}$$

Qstd = 171 sdcfm

9. Particulate Emissions (PMR) (in lb./hr.)

PMR = (CS)(Qstd)(0.00857)

PMR = (0.0717) ( 171) (0.00857)

PMR = 0.11 lb/hr.

10. Particulate Emissions (PMRL) (in lb. emissions per truck load of cement)

$$PMRL = \frac{(CS)\ (Qstd)\ (\text{time in minutes required to unload truck})}{7{,}000}$$

$$PMRL = \frac{(0.0717)\ (171)\ (41)}{7{,}000}$$

PMRL = 0.07 lb. of emissions per truck load of cement

# SAMPLE DATA AND CALCULATIONS
# SPECIALITY ALLOYS - GALLAWAY - JUNE 12, 1984
# "WET SUPPRESSION SYSTEM"

I. Data

Sample Identification: Truck 2 Run 1
Sample Time: 10 min.
Exhaust Gas Temperature: 9
Orifice $\Delta$H: 0.03 in. $H_2O$
Orifice Temperature: 86 °F
Exhaust Gas Velocity (at sampling site): 60 ft./min
Diameter of Nozzle: 3.727 in.
Barometric Pressure: 29.88
Total Particulate Catch During Sample Run: 0.1619
Total Time Reauired to Unload Truck: 38 min.

1. Average Sample Volume (ASV)

$$ASV = \frac{(\text{sampling rate at } 60^{o}F)\ (\text{orifice temperature})}{520}$$

sampling rate at $60^{o}F$ = 9.49 ft.³/min. for $\Delta$H of 0.03 in $H_2O$
(from Rader calibrations)

$$ASV = \frac{(9.49\ \ )(86+460)}{520} = 9.96 \text{ ft3/min.}$$

2. Total Sample Volume (TSV)

TSV = (ASV) (time of sample run)
**TSV** = ( 9.96 ) ( 10 ) = 99.6 ft.3

3. Mole Fraction of Dry Gas (MD)

$$MD = \frac{(100) - (\text{percent moisture in exhaust gas stream})}{(100)}$$

where percent moisture in exhaust gas stream is determined from the saturation line of a psychometric chart because of the presence of liquid water in the gas stream, for an exhaust gas temperature of 82°F the percent moisture is 3.6%

$$MD = \frac{(100) - (3.6\ )}{(100)}$$

MD = 0.96

4. Volume Sampled at Standard Conditions (Vmstd)

$$Vmstd = \frac{(17.7)\ (TSV \times MD)\ (\text{barometric pressure} + \frac{(\text{orifice}\Delta H)}{13.6}}{(\text{orifice temperature} + 460}$$

$$Vmstd = \frac{(17.7)\ (99.6 \times 0.96)\ (29.88 + \frac{(0.03)}{13.6}}{(\ \ \ + \ \ 460)}$$

Vmstd = 92.6 DSCF

Truck 2 Run 1



5. Particulate Concentration (CS)

$$CS = \frac{(15.43)\ (\text{total particulate catch during sample run})}{(Vmstd)}$$

$$CS = \frac{(15.43)\ (0.1619)}{(92.6)}$$

CS = 0.0270 gr./DSCF

6. Source Velocity At Sampling Point = 60 ft./min.
(value determined by direct measurement with hot wire anemometer)

7. Source Flowrate (Q)

Q= (velocity) (area)

where velocity = velocity at samping site
area = the area over which that velocity occurs, for this source this area is equal to the area of the top of the barrel (24 in. diameter = 452 in.$^2$ = 3.14 ft.$^2$) minus the area of the inlet duct (6 in. diameter = 28 in.$^2$ = 0.19 ft.$^2$) which equals 2.95 ft.$^2$.

Q = ( 60 ) (2.95)

Q = 177 ft.$^3$/min.

8. Source Flowrate at Standard Conditions (Qstd)

$$Qstd = \frac{(17.7)\ (Q \times MD)\ (\text{barometric pressure})}{(\text{exhaust gas temperature} + 460)}$$

$$Qstd = \frac{(17.7)\ (177 \times 0.96)\ (29.88)}{(82 + 460)}$$

Qstd = 166 sdcfm

9. Particulate Emissions (PMR) (in lb./hr.)

PMR = (CS)(Qstd)(0.00857)

PMR = (0.0270) ( 166 ) (0.00857)

PMR = 0.04 lb/hr.

10. Particulate Emissions (PMRL) (in lb. emissions per truck load of cement)

$$PMRL = \frac{(CS)\ (Qstd)\ (\text{time in minutes required to unload truck})}{7{,}000}$$

$$PMRL = \frac{(0.0270)\ (166)\ (38)}{7{,}000}$$

PMRL = 0.02 lb. of emissions per truck load of cement

# SAMPLE DATA AND CALCULATIONS
# SPECIALITY ALLOYS - GALLAWAY - JUNE 12, 1984
# "WET SUPPRESSION SYSTEM"

I. Data

Sample Identification Truck 2 Run 2
Sample Time 10 min.
Exhaust Gas Temperature 82°F
Orifice $\Delta$ H 0.03 in. $H_2O$
Orifice Temperature
Exhaust Gas Velocity 60 ft./min.
(at sampling site)
Diameter of Nozzle 3.727
Barometric Pressure 29.88
Total Particulate Catch During Sample Run 0.1424
Total Time Required to Unload Truck 38 min.

1. Average Sample Volume (ASV)

$$ASV = \frac{\text{(sampling rate at } 60^oF\text{) (orifice temperature)}}{520}$$

sampling rate at $60^oF$ = 9.49 ft.³/min. for $\Delta$H of 0.03 in. $H_2O$
(from Rader calibrations)

$$ASV = \frac{(9.49)(86+460)}{520} = 9.96 \text{ ft3/min.}$$

2. Total Sample Volume (TSV)

TSV = (ASV) (time of sample run)
TSV = (9.96) (10) = 99.6 ft.3

3. Mole Fraction of Dry Gas (MD)

$$MD = \frac{(100) - \text{(percent moisture in exhaust gas stream)}}{(100)}$$

where percent moisture in exhaust gas stream is determined from the saturation line of a psychometric chart because of the presence of liquid water in the gas stream, for an exhaust gas temperature of 82°F the percent moisture is 3.6% .

$$MD = \frac{(100) - (3.6)}{(100)}$$

MD = 0.96

4. Volume Sampled at Standard Conditions (Vmstd)

$$Vmstd = \frac{(17.7)\,(TSV \times MD)}{\text{(orifice temperature} + 460)} \left(\text{barometric pressure} + \frac{(\text{orifice}\,\Delta H)}{13.6}\right)$$

$$Vmstd = \frac{(17.7)(99.6 \times 0.96)}{(86 + 460)} \left(29.88 + \frac{(0.03)}{13.6}\right)$$

Vmstd = 92.6 DSCF

Truck 2 Run 2



5. Particulate Concentration (CS)

$$CS = \frac{(15.43)\ (\text{total particulate catch during sample run})}{(Vmstd)}$$

$$CS = \frac{(15.43)\ (0.1424)}{(92.6)}$$

CS = 0.0237 gr./DSCF

6. Source Velocity At Sampling Point = 60 ft./min.
(value determined by direct measurement with hot wire anemometer)

7. Source Flowrate (Q)

Q= (velocity) (area)

where velocity = velocity at samping site
area = the area over which that velocity occurs, for this source this area is equal to the area of the top of the barrel (24 in. diameter = 452 $in.^2$ = 3.14 $ft.^2$) minus the area of the inlet duct (6 in. diameter = 28 $in.^2$ = 0.19 $ft.^2$) which equals 2.95 $ft.^2$.

Q = ( 60 ) (2.95)

Q = 177 $ft.^3$/min.

8. Source Flowrate at Standard Conditions (Qstd)

$$Qstd = \frac{(17.7)\ (Q \times MD)\ (\text{barometric pressure})}{(\text{exhaust gas temperature} + 460)}$$

$$Qstd = \frac{(17.7)\ (177 \times 0.96)\ (29.88)}{(82 + 460)}$$

Qstd = 166 sdcfm

9. Particulate Emissions (PMR) (in lb./hr.)

PMR = (CS)(Qstd)(0.00857)

PMR = (0.0237) ( 166 ) (0.00857)

PMR = 0.03 lb/hr.

10. Particulate Emissions (PMRL) (in Ib. emissions per truck load of cement)

$$PMRL = \frac{(CS)\ (Qstd)\ (\text{time in rninutes required to unload truck})}{7{,}000}$$

$$PMRL = \frac{(0.0237)\ (166)\ (38)}{7{,}000}$$

PMRL = 0.02 lb. of emissions per truck load of cement

PERSONNEL DATA

DATE OF STUDY: June 12, 1984

LOCATION OF STUDY: Speciality Alloys Corporation
Gallaway, Tennessee

SOURCE TESTED: Cement Silo Loading'

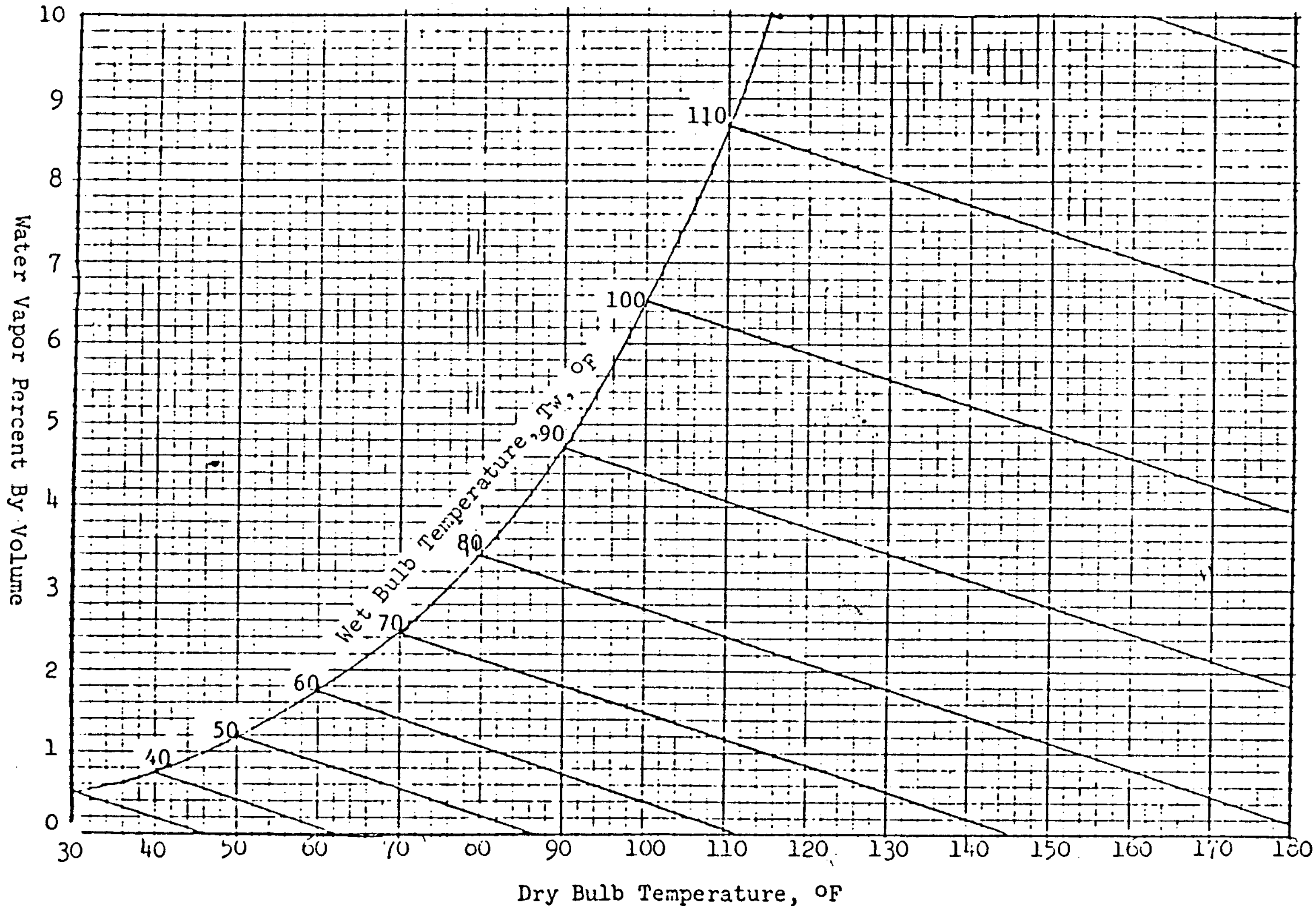
PERSON IN CHARGE: Jeryl W. Stewart

PERSONNEL CONDUCTING THE TESTING: Jeryl Stewart, Carl Koontz, **Liz** Coder

PERSON OBSERVING OPERATION OF THE PROCESS DURING THE TESTING:
Eric Flowers, Engineering Program

PERSON CONDUCTING VISIBLE EMISSIONS EVALUATION DURING THE TESTING:
Mike Hale, Enforcement Program

(Certification Number **892** , Recertification Date May 9, 1984)




PSYCHROMETRIC CHART EXPRESSING VOLUME OF WATER VAPOR BY PERCENT

Figure 8

# CALCULATION OF TOTAL. PARTICULATE CATCH DURING SAMPLE RUN (TP)

$$TP = FW - FB + \frac{AW - AB}{N}$$

U'here:

**FU' =** gain in weight of filter during a run (g.)

**FB =** gain in weight of blank filter (to compensate for filter handling) (g.)

**A'S' =** gain in weight from acetone wash of sampler at end of each series of runs (complete test) (g.)

**AB =** gain in weight of blank volume of acetone (to compensate for impurities in acetone) (g.)

**N =** number of runs in each test over which only a single probe wash occurs

| Sample Identification | Truck 1 Run 1 | Truck 1 Run 2 | Truck 1 Run3 | Truck 2 Run 1 | Truck 2 Run2 |
|---|---|---|---|---|---|
| **FW** | 0.4862 | 0.3041 | 0.3904 | 0.1554 | 0.1359 |
| FB | 0.0043 | 0.0043 | 0.0043 | 0.0043 | 0.0043 |
| AW | 0.1526 | 0.1526 | 0.1526 | 0.0263 | 0.0263 |
| **AB** | 0.0050 | 0.0050 | 0.0050 | 0.0047 | 0.0047 |
| N | 3 | 3 | 3 | 2 | 2 |
| TP | 0.5311 | 0.3490 | 0.4353 | 0.1619 | 0.1424 |

JS/bjs/APCholdI

SOURCE SAMPLING PARTICULATE LAB DATA (Method 5), Sheet 1

Company SPECIALTY ALLOYS Company No. ____

Process CEMENT UNLOADING Test Date JUNE ~~12, 1984~~

FILTER

| | | | | |
|---|---|---|---|---|
| Run No. | BLANK | TK1, RUN1 | TK1, RUN2 | TK1, RUN3 |
| Filter No. | 015875 | 015876 | 015886 | 015877 |
| Beaker No. | | | | |
| Beaker tare wt., g. | | | | |
| Filter tare wt., g. | 4.3201 | 4.2861 | 4.5195 | 4.2685 |
| Beaker + Filter final wt., g. | 4.3244 | 4.7723 | 4.8236 | 4.6589 |
| Beaker + filter tare wt., g. | | | | |
| Net filter part wt., g. | 0.0043 | 0.4862 | 0.3041 | 0.3904 |

TOTAL PARTICULATE

| | | | |
|---|---|---|---|
| Front half acetone wash, g. | 0.1476 | | |
| Filters(s), g | 0.4819 + | 0.2998 + | 0.3861 |
| Total particulate gain, g | 1.3154 | | |

SOURCE SAMPLING PARTICULATE LAB DATA (Method 5), Sheet 2

Company SPECIALTY ALLOYS Company No. ____________

Process CEMENT UNLOADING Test Date JUNE 12, 1984

FILTER

| | | | |
|---|---|---|---|
| Run No, | BLANK | TK2, RUN 1 | TK2, RUN 2 |
| Filter No. | 015875 | 015878 | 015879 |
| Beaker No. | | | |
| Beaker tare wt., g. | | | |
| Filter tare *wt.*, g. | 4.3201 | 4.2530 | 4.2982 |
| Beaker + Filter final wt., g. | 4.3244 | 4.4084 | 4.4341 |
| Reaker + filter tare wt., g. | | | |
| Net filter part wt., g. | 0.0043 | 0.1554 | 0.1359 |

TOTAL PARTICULATE

| | | | |
|---|---|---|---|
| Front half acetone **wash,** g. | 0.0216 | | |
| Filters(s), g | 0.1511 + | 0.1316 | |
| Total particulate gain, g | 0.3043 | | |

SOURCE SAMPLING PARTICULATE LAB DATA (Method 5). Sheet 3 **3j.**

Company SPECIALTY ALLOYS Company No.. 3

Process CEMENT UNLOADING Test Date JU - 1984

ACETONE BLANK

| | | | |
|---|---|---|---|
| Run No. | 1-2 | | |
| Beaker No. | C + D | | |
| Acetone Volume, ml | 325 | | |
| Beaker+Acetone Residue Wt.,g | 86.8177 | 87.8886 | |
| Beaker tare weight,g | 8 in. 8147 | 87.8872 | |
| Net weight,g | 0.0030 | 0.0014 | |
| Residue factor (R.f.),g/ml ($\frac{\text{net wt}}{\text{acetone vol.}}$) | 0.0000135 | | |

PROBE WASH + FRONT HALF GLASSWARE WASH

| | | | | |
|---|---|---|---|---|
| Run No. | TK1, RUN 1,2,3 | TK1, RUN 1,2,3 | TK2, RUN 1+2 | TK2, RUN 1+ |
| Beaker No. | 1 | 78 | 22 | 33 |
| Wash vol., ml | 200 | 170 | 200 | 150 |
| Gross residue wt., g. | 0.0609 | 0.0917 | 0.0147 | 0.0111 |
| Blank wt.,g (R.f. x wash vol.) | 0.0027 | 0.0023 | 0.0027 | 0.0020 |
| Net wt., g | 0.0582 | 0.0894 | 0.0120 | 0.0091 |

SOURCE SAMPLING PARTICULATE LAB DATA (METHOD 5), SHEET 4

Company SPECIALTY ALLOYS JUNE 12, 1984 Process CEMENT UNLOADING

Company No. ______ Run No. 1-3 Item Weighed PREWEIGHTED AND POST-WEIGHTED FILTERS

FILTER TARE WEIGHT

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Date | | MARCH 23, 1984 | | | | | |
| Temp (°F) | | 24°C | | | | | |
| Std. Wt. | | 5.0000 (g) | | | | | |
| Analyst | | JAD | | | | | |
| Filter Number | Field Sample Identification | 1st Wt. | 2nd Wt. | 3rd Wt. | 4th Wt. | 5th Wt. | Final Tare (g) |
| 015876 | TRUCK 1, RUN 1 | 4.2861 | | | | | |
| 015886 | TRUCK 1, RUN 2 | 4.5195 | | | | | |
| 015877 | TRUCK 1, RUN 3 | 4.2685 | | | | | |
| | | | | | | | |
| 015878 | TRUCK 2, RUN 1 | 4.2530 | | | | | |
| 015879 | TRUCK 2, RUN 2 | 4.2982 | | | | | |
| | | | | | | | |
| 015875 | BLANK | 4.3201 | | | | | |
| | | | | | | | |
| | | | | | | | |

FINAL WEIGHT

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Date | | JUNE 16, 1984 | JUNE 16, 1984 | | | | | |
| Temp (°F) | | 26°C | 26°C | | | | | |
| Std. Wt. | | 5.0000 (g) | 5.0000 (g) | | | | | |
| Analyst | | JAD/CLS | JAD/CLS | | | | | |
| Beaker # | Filter # | 1st Wt. | 2nd Wt. | 3rd Wt. | 4th Wt. | Final Sample Weight, (g) | Tare Wt. (g) Filter + Beaker | Difference (g) |
| | 015876 | 4.7723 | 4.7723 | | | 4.7723 | 4.2861 | 0.4862 |
| | 015886 | 4.8240 | 4.8236 | | | 4.8236 | 4.5195 | 0.3041 |
| | 015877 | 4.6594 | 4.6589 | | | 4.6589 | 4.2685 | 0.3904 |
| | | | | | | | | |
| | 015878 | 4.4087 | 4.4084 | | | 4.4084 | 4.2530 | 0.1554 |
| | 015879 | 4.4341 | 4.4341 | | | 4.4341 | 4.2982 | 0.1359 |
| | | | | | | | | |
| | 015875 | 4.3249 | 4.3244 | | | 4.3244 | 4.3201 | 0.0043 |
| | | | | | | | | |
| | | | | | | | | |

FIGURE 1

SOURCE SAMPLING PARTICULATE LAB DATA (METHOD 5), SHEET 5

Company SPECIALT ALLOYS JUN- 1984 Process CEMENT UNLOADING
Company No. ____ Run No. 1-3 Item Weighed PROBE AND ACETONE

TARE WEIGHT

WASH IN 250ML BEAKERS

| | | | | | | |
|---|---|---|---|---|---|---|
| Date | | JUNE 13, 1984 | | | | |
| Temp (°F) | | 28.5°C | | | | |
| Std. Wt. | | 5.0000(g) | | | | |
| Analyst | | JAD / CLS | | | | |
| Number | Field Sample Identification and Sample Volume, if Applicable | 1st Wt. | 2nd Wt. | 3rd Wt. | 4th Wt. | Final Tare (g) |
| 1 | TRUCK 1, RUN 1,2,3 VOL= 200ML | 87.4458 | | | | |
| 78 | TRUCK 1, RUN 1,2,3 VOL= 170ML | 88.9990 | | | | |
| 22 | TRUCK 2, RUN 1+2 VOL= 200ML | 84.2660 | | | | |
| 33 | TRUCK 2, RUN 1+2 VOL= 150ML | 89.9684 | | | | |
| C | ACETONE BLANK VOL=200ML | 86.8147 | | | | |
| D | ACETONE BLANK VOL=125ML | 87.8872 | | | | |

FINAL WEIGHT

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Date | JUN [illegible] 84 | JUNE 16, 1984 | | | | | |
| Temp. (°F) | 26.0°C | 26.0°C | | | | | |
| Std. Wt. | 5.0000(g) | 5.0000(g) | | | | | |
| Analyst | JAD / | JAD / CLS | | | | | |
| **Number** | 1st Wt. | 2nd Wt. | 3rd Wt. | 4th Wt. | Final Sample Weight (g) | Tare Wt. (g) | Differences (g) |
| 1 | 87.5068 | 87.5067 | | | 87.5067 | 87.4458 | 0.0609 |
| 78 | 89.0909 | 89.0907 | | | 89.0907 | 88.9990 | 0.0917 |
| 22 | 84.2812 | 84.2807 | | | 84.2807 | 84.2660 | 0.0147 |
| 33 | 89.9800 | 89.9800 | | | 89.9800 | 89.9684 | 0.0116 |
| C | 86.8177 | 86.8177 | | | 86.8177 | 86.8147 | 0.0030 |
| D | 87.8888 | 87.8886 | | | 87.8886 | 87.8872 | 0.0014 |

63

High-Volume Source Sampling
Chain of Custody Documentation

Laboratory Issuance

Hi-Vol filters Nos. 015875 — 015881 issued to Source Sampling Section on June 1984 (date) by James Drake (laboratory supervisor). These were received by Jerry Stewart (Source Sampling Section team supervisor) on June 1984 (date).

Field Usage

These filters remained in my possession or in a secure area during the entire testing period both before and after sample collection and until the filters were returned to the laboratory. The probe washings were recovered in the field under my supervision and these remained in my possession or in a secure area until they were returned to the laboratory. These items were used in the source testing of cement unloading (sources tested) at Speciality Alloys (plant) on June 12, 1984 (test dates)

Signed Jerry W. Stewart
Date June 12, 1984

Laboratory Receipt of Samples

Hi-Vol filters Nos. 015875 — 015879, 015886 (used) and hi-vol filters Nos. 015880 — 015885 (unused) and probe washings from Speciality Alloys ?identification of source tested) received by James Drake (laboratory supervisor) on 6-13-84 (date)

Figure 1

DATE 6-2-84

35

REFERENCE: 24-0051-B-3

ROUTE TO: ~~JRS 6/20~~

~~DGC 6/25/84~~

ECK

File

**TENNESSEE** AIR POLLUTION CONTROL DIVISION
-Inspection Report-

FULL BUSINESS NAME: Specialty Alloys

SOURCE ADDRESS-LOCATION:

MAILING ADDRESS: Galloway

PREMISES USED FOR: Alloy processing

FINDINGS: Observed stack test on a water barrel control device for a cement silo. During the first couple of tests the system was not functioning properly. After several adjustments the system worked surprisingly well, opacities

PERSON CONTACTED AT PREMISES: TITLE:

STATEMENT OF PERSON CONTACTED: on the later tests were well within the 20% opacity limit.

RECOMMENDATION: I think that this control stategy can work efficiently enough to be permitted with our division.

ELAPSED TIME ON INSPECTION & REPORT: 3 hrs.

REASON FOR REPORT: Stack test observation

SIGNATURE: Charles M. Hale REGIONAL OFFICE: Jackson

TDPH-APT
PH-0138 (1/77)

Specialty Alloys

ADDRESS

Galloway

[C]OUNTY ZIP PHONE

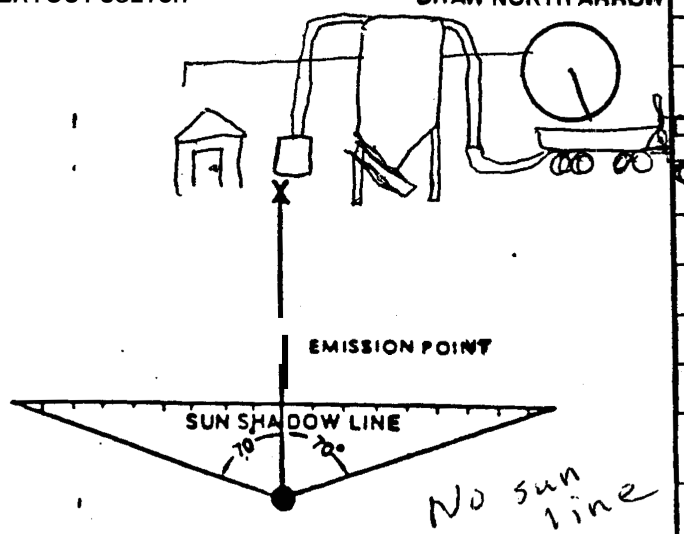
Fayette

| | |
|---|---|
| SOURCE REFERENCE NUMBER: 24-0051-02-A4 | OBSERVATION DATE: 6-12-84 |
| PROCESS EQUIPMENT: Cement silo | OPERATING MODE: Normal |
| CONTROL EQUIPMENT: rain barrel | OPERATING MODE: Normal |
| DESCRIBE EMISSION POINT: barrel mouth | |
| HEIGHT ABOVE GROUND LEVEL: 30" | HEIGHT RELATIVE TO OBSERVER: 0'/0' |
| DISTANCE FROM OBSERVER: 15'/15' | DIRECTION FROM OBSERVER: S/S |
| DESCRIBE EMISSIONS: Dust | |
| EMISSION COLOR: Gray | PLUME TYPE: CONTINUOUS ☑ FUGITIVE ☐ INTERMITTENT ☐ |
| WATER DROPLETS PRESENT: NO ☑ YES ☐ | IF YES, IS PLUME: ATTACHED ☐ DETACHED ☐ |
| AT WHAT POINT WAS OPACITY DETERMINED: barrel exit/same | |
| DESCRIBE BACKGROUND: Metal building/same | |
| [B]ACKGROUND COLOR: grey/green | SKY CONDITIONS: Clear/clear |
| WIND SPEED: 0-5 /0-5 | WIND DIRECTION: SW/SW |
| AMBIENT TEMP: 70° REL. HUMIDITY | HRS. SINCE LAST PRECIP. |

COMMENTS

— plume coming at me

SOURCE LAYOUT SKETCH DRAW NORTH ARROW




OBSERVER'S SIGNATURE: Charles M. Hale

WAS NOTICE OF VIOLATION ISSUED YES [ ] NO [✓]

FOR OFFICIAL USE ONLY APPLICABLE STANDARD

OBSERVER: Mike Hale

ORGANIZATION: TAPC

CERTIFICATION DATE: 5-9-84

PAGE 1 OF 1

START TIME: 7:58 Am

STOP TIME: 8:08 Am

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

HIGHEST ____ MINUTE OPACITY AVERAGE ____ %

NUMBER OF READINGS ABOVE 20 % WERE 13

RANGE OF OPACITY READINGS FROM 20 TO 50

TIME EMISSIONS CROSSED PROPERTY LINE

I HAVE RECEIVED A COPY OF THESE OPACITY OBSERVATIONS.

SIGNATURE

TITLE DATE

Specialty Alloys

ADDRESS

Calloway

COUNTY ZIP PHONE

Fayette

SOURCE REFERENCE NUMBER: 24-0051-02-A4

OBSERVATION DATE: 6-12-84

PROCESS EQUIPMENT: Cement silo

OPERATING MODE: Normal

CONTROL EQUIPMENT: Rain barrel

OPERATING MODE: Normal

DESCRIBE EMISSION POINT: barrel mouth

HEIGHT ABOVE GROUND LEVEL: 30"

HEIGHT RELATIVE TO OBSERVER: 0'

DISTANCE FROM OBSERVER: 15'/15'

DIRECTION FROM OBSERVER: SSE

DESCRIBE EMISSIONS: Dust

EMISSION COLOR: grey

PLUME TYPE: CONTINUOUS ☐ FUGITIVE ☐ INTERMITTENT ☐

WATER DROPLETS PRESENT: NO ☒ YES ☐

IF YES, IS PLUME: ATTACHED ☐ DETACHED ☐

AT WHAT POINT WAS OPACITY DETERMINED: barrel exit/same

DESCRIBE BACKGROUND: building/same

BACKGROUND COLOR: grey/green/same

SKY CONDITIONS: clear/clear

WIND SPEED: 0-5/0-5

WIND DIRECTION: SW/SW

AMBIENT TEMP: 80°

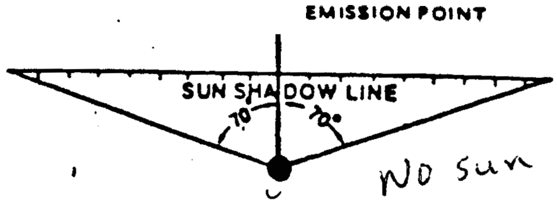
REL. HUMIDITY:

HRS. SINCE LAST PRECIP.: 772

COMMENTS: plume swirling

SOURCE LAYOUT SKETCH DRAW NORTH ARROW

EMISSION POINT




No sun line

OBSERVER'S SIGNATURE: Charles M. Hale

WAS NOTICE OF VIOLATION ISSUED: YES [ ] NO [✓]

FOR OFFICIAL USE ONLY APPLICABLE STANDARD

Mike Hale

ORGANIZATION: TAPC

CERTIFICATION DATE: 5-9-84

PAGE 1 OF 1

START TIME: 8:14 AM

STOP TIME: 8:24 AM

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

HIGHEST ____ MINUTE OPACITY AVERAGE ____ %

RANGE OF OPACITY READINGS FROM 10 TO 40

NUMBER OF READINGS ABOVE 20 % WERE 11

TIME EMISSIONS CROSSED PROPERTY LINE

I HAVE RECEIVED A COPY OF THESE OPACITY OBSERVATIONS.

SIGNATURE

TITLE

DATE

ADDRESS: Specialty Alloys

ORGANIZATION: Mike Hale TAPC

COUNTY: Galloway Fayette ZIP PHONE

CERTIFICATION DATE: 5-9-84

PAGE 1 OF 1

START TIME: 8:29 Am

STOP TIME: 8:39 AM 8:30 am CMH 6-12-84

SOURCE REFERENCE NUMBER: 24-0051-02-A4

OBSERVATION DATE: 6-12-84

PROCESS EQUIPMENT: cement silo

OPERATING MODE: Normal

CONTROL EQUIPMENT: rain barrel

OPERATING MODE: Normal

DESCRIBE EMISSION POINT: barrel mouth

HEIGHT ABOVE GROUND LEVEL: 30"

HEIGHT RELATIVE TO OBSERVER: 0'

DISTANCE FROM OBSERVER: 10'

DIRECTION FROM OBSERVER: SE

DESCRIBE EMISSIONS: dust

EMISSION COLOR: grey

PLUME TYPE: CONTINUOUS☐ FUGITIVE☐ INTERMITTENT☐

WATER DROPLETS PRESENT: NO☐ YES☐

IF YES, IS PLUME: ATTACHED☐ DETACHED☐

AT WHAT POINT WAS OPACITY DETERMINED: barrel exit

DESCRIBE BACKGROUND: metal building

BACKGROUND COLOR: grey-green/same

SKY CONDITIONS: clear/same

WIND SPEED: 0-5/0-5

WIND DIRECTION: SW/SW

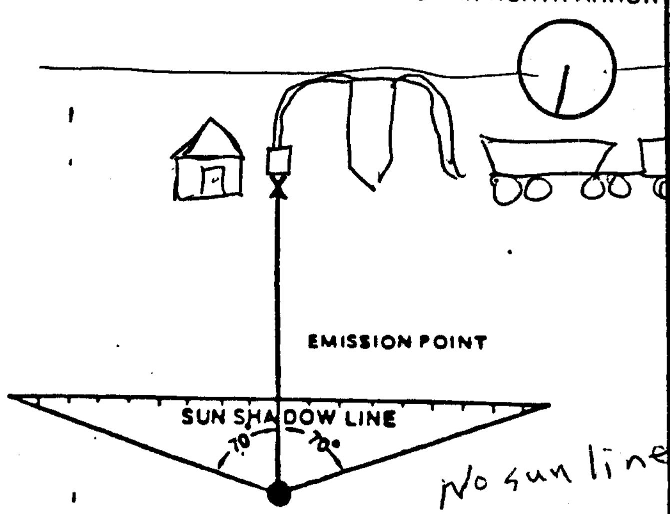
AMBIENT TEMP: 80°

REL. HUMIDITY:

HRS. SINCE LAST PRECIP.: ??2

COMMENTS: — plume swirling in enclosed area
* testers shut down during these 30 seconds

SOURCE LAYOUT SKETCH — DRAW NORTH ARROW




| | 0 | 15 | 30 | 45 | | 0 | 15 | 30 | 45 |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 10 | 10 | 20 | 5 | 31 | | | | |
| 2 | 25 | 25 | 20 | 15 | 32 | | | | |
| 3 | 25 | 30 | 25 | 10 | 33 | | | | |
| 4 | 25 | 20 | 25 | 35 | 34 | | | | |
| 5 | 40 | 25 | 40 | 30 | 35 | | | | |
| 6 | 35 | 45 | — | — | 36 | | | | |
| 7 | 40 | 30 | — | 20 | 37 | | | | |
| 8 | 25 | 30 | 40 | 45 | 38 | | | | |
| 9 | 20 | 20 | 80 | 40 | 39 | | | | |
| 10 | 5 | 5 | * | * | 40 | | | | |
| 11 | 15 | 20 | | | 41 | | | | |
| 12 | | | | | 42 | | | | |
| 13 | | | | | 43 | | | | |
| 14 | | | | | 44 | | | | |
| 15 | | | | | 45 | | | | |
| 16 | | | | | 46 | | | | |
| 17 | | | | | 47 | | | | |
| 18 | | | | | 48 | | | | |
| 19 | | | | | 49 | | | | |
| 20 | | | | | 50 | | | | |
| 21 | | | | | 51 | | | | |
| 22 | | | | | 52 | | | | |
| 23 | | | | | 53 | | | | |
| 24 | | | | | 54 | | | | |
| 25 | | | | | 55 | | | | |
| 26 | | | | | 56 | | | | |
| 27 | | | | | 57 | | | | |
| 28 | | | | | 58 | | | | |
| 29 | | | | | 59 | | | | |
| 30 | | | | | 60 | | | | |

HIGHEST ____ MINUTE OPACITY AVERAGE ____ %

NUMBER OF READINGS ABOVE 20 % WERE 7

RANGE OF OPACITY READINGS FROM 5 TO 80

TIME EMISSIONS CROSSED PROPERTY LINE

OBSERVER'S SIGNATURE: Charles M. Hale

WAS NOTICE OF VIOLATION ISSUED: YES [ ] NO [✓]

I HAVE RECEIVED A COPY OF THESE OPACITY OBSERVATIONS.

SIGNATURE

TITLE

DATE

FOR OFFICIAL USE ONLY

APPLICABLE STANDARD

Specialty Alloys
ADDRESS

Mike Hale
ORGANIZATION

Fayette
SOURCE REFERENCE NUMBER
24-0051-02-A4 | 6-12-84

PROCESS EQUIPMENT: Cement Silo
OPERATING MODE: Normal

CONTROL EQUIPMENT: rain barrel
OPERATING MODE: Normal

DESCRIBE EMISSION POINT: barrel mouth

HEIGHT ABOVE GROUND LEVEL: 30"
HEIGHT RELATIVE TO OBSERVER: 0'

DISTANCE FROM OBSERVER: 10'
DIRECTION FROM OBSERVER: SE

DESCRIBE EMISSIONS: dust

EMISSION COLOR: grey
PLUME TYPE: CONTINUOUS ☒ FUGITIVE ☐ INTERMITTENT ☐

WATER DROPLETS PRESENT: NO ☒ YES ☐
ATTACHED ☐ DETACHED ☐

AT WHAT POINT WAS OPACITY DETERMINED: barrel exit

DESCRIBE BACKGROUND: building

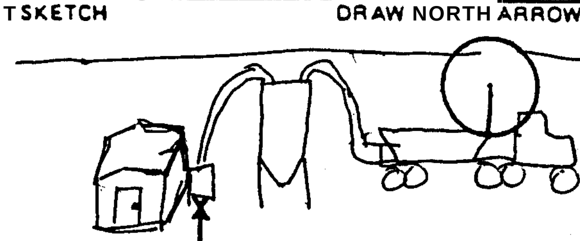
BACKGROUND COLOR: grey-green / same
SKY CONDITIONS: clear / clear

WIND SPEED: 0-5 / 0-5
WIND DIRECTION: SW / SW

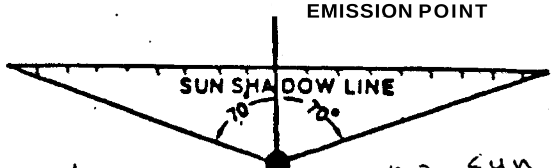
AMBIENT TEMP: 83°
REL. HUMIDITY:
HRS. SINCE LAST PRECIP.: ???

COMMENTS

SOURCE LAYOUT SKETCH
DRAW NORTH ARROW



EMISSION POINT




no sun line

OBSERVER'S SIGNATURE: Charles M. Hale
WAS NOTICE OF VIOLATION ISSUED: YES [ ] NO [✓]

FOR OFFICIAL USE ONLY
APPLICABLE STANDARD

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

SIGNATURE
TITLE
DATE

Specialty Alloys
ADDRESS

Hollo

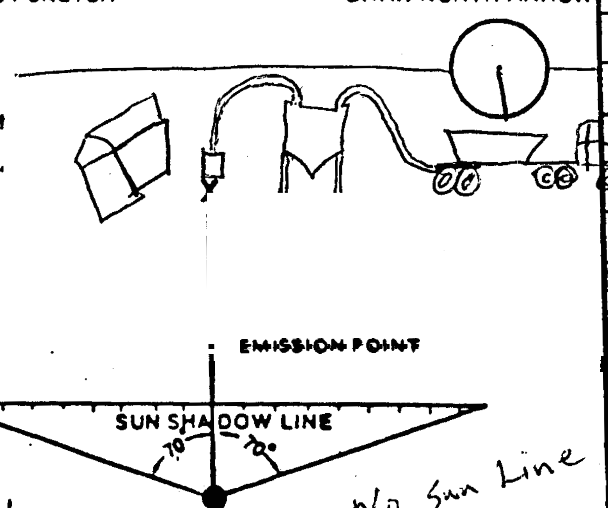
F H

24-0051-02-A4 | 6-12-84

| | |
|---|---|
| PROCESS EQUIPMENT Cement silo | OPERATING MODE Normal |
| CONTROL EQUIPMENT Rain barrel | OPERATING MODE Normal |
| DESCRIBE EMISSION POINT barrel mouth | |
| HEIGHT ABOVE GROUND LEVEL 30" | HEIGHT RELATIVE TO OBSERVER 0' |
| DISTANCE FROM OBSERVER 10' | DIRECTION FROM OBSERVER SE |
| DESCRIBE EMISSIONS dust | |
| EMISSION COLOR grey | PLUME TYPE: CONTINUOUS ☑ FUGITIVE ☐ INTERMITTENT ☐ |
| WATER DROPLETS PRESENT NO ☑ YES ☐ | IF YES, IS PLUME: ATTACHED ☐ DETACHED ☐ |
| AT WHAT POINT WAS OPACITY DETERMINED barrel exit | |
| DESCRIBE BACKGROUND building | |
| BACKGROUND COLOR grey-green/same | SKY CONDITIONS Clear/same |
| WIND SPEED 0-5/0-5 | WIND DIRECTION SW/SW |
| AMBIENT TEMP 85° REL. HUMIDITY | HRS. SINCE LAST PRECIP. >72 |

COMMENTS

SOURCE LAYOUT SKETCH — DRAW NORTH ARROW



EMISSION POINT

SUN SHADOW LINE

No Sun Line

Mike Hale
ORGANIZATION
TAPC

START TIME 9:45 cmt 9:34 Am — STOP TIME 9:55

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

HIGHEST ____ MINUTE OPACITY
AVERAGE ____ %
RANGE OF OPACITY READINGS FROM 5 TO 15

NUMBER OF READINGS ABOVE 20 % WERE 0
TIME EMISSIONS CROSSED PROPERTY LINE

OBSERVER'S SIGNATURE Charles M. Hale
WAS NOTICE OF VIOLATION ISSUED YES [ ] NO [✓]
FOR OFFICIAL USE ONLY — APPLICABLE STANDARD

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

B. RADER HI VOLUME SAMPLER

1. Velocity Pressure Meter and Orifice Pressure Meter Accuracy Check

Hi Vol Serial NO. ____________ Set No. ________ Date ________

Signature ______________ Name of Company tested ____________

a. Velocity Pressure Meter Check

| | | | | | |
|---|---|---|---|---|---|
| Inclined Manometer Reading | .5 | 1.0 | 1.5 | 2.0 | 2.5 |
| Velocity Pressure Meter Reading | ____ | ____ | ____ | ____ | ____ |

b. Orifice Pressure Meter Check

| | | | | |
|---|---|---|---|---|
| Inclined Manometer Reading | .5 | 1.0 | 1.5 | 2.0 |
| Orifice Pressure Meter Reading | ____ | ____ | ____ | ____ |

2. Thermometer

a. Compared with mercury-in-glass ____________________

3. Orifice Meter Calibration

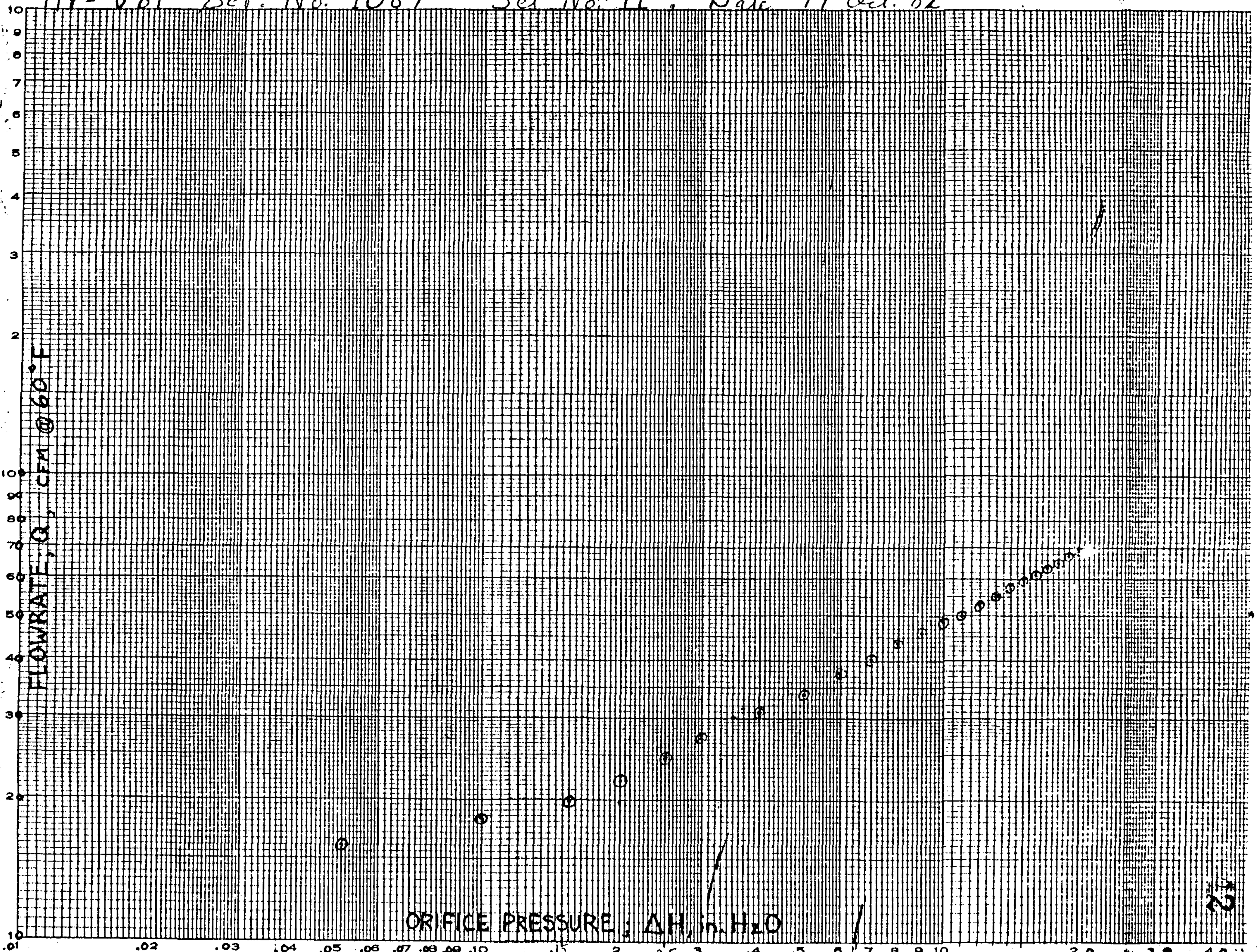
Hi Vol Serial No. 1087 Set No. II Date 10/14/82

Signature Robert E Brown Name of Company tested ____________

a. Flow Data Worksheet

| ORIFICE DELTA p $H_2O$ | X 100 METER START | X 100 METER STOP | TOTAL CU. FT. AT 60°F | TOTAL TIME | ORIFICE TEMP. F. | BAROMETER | CFM @ 60°F |
|---|---|---|---|---|---|---|---|
| 2.0 | 2954 | 4001 | 1047 1000 | 15.257 | 69 | 29.66 | 68.626 |
| 1.9 | 4159 | 5165 | 1006 1000 | 14.985 | 69 | 29.66 | 67.134 |
| 1.8 | 5303 | 6304 | 1001 1000 | 15.463 | 69.5 | 29.66 | 64.734 |
| 1.7 | 6486 | 7491 | 1005 1000 | 15.893 | 69.5 | 29.66 | 63.234 |
| 1.6 | 7609 | 8614 | 1005 1000 | 16.467 | 69.5 | 29.66 | 61.032 |
| 1.5 | 8723 | 9728 | 1005 1000 | 16.890 | 69.5 | 29.66 | 59.503 |
| 1.4 | 9826 | 10831 | 1005 1000 | 17.462 | 69.5 | 29.66 | 57.555 |
| 1.3 | 0940 | 1944 | 1004 1000 | 18.167 | 69.5 | 29.66 | 55.266 |
| 1.2 | 2052 | 3057 | 1005 1000 | 19.133 | 69.5 | 29.66 | 52.526 |
| 1.1 | 3176 | 4181 | 1005 1000 | 20.133 | 69.5 | 29.66 | 49.917 |
| 1.0 | 4269 | 5274 | 1005 1000 | 20.688 | 69.5 | 29.66 | 48.578 |
| .9 | 5402 | 5904 | 502 500 | 10.953 | 69.5 | 29.66 | 45.531 |
| .8 | 5983 | 6485 | 502 500 | 11.515 | 69.5 | 29.66 | 43.595 |
| .7 | 6574 | 7076 | 502 500 | 12.412 | 69.5 | 29.66 | 40.446 |
| .6 | 7185 | 7687 | 502 500 | 13.343 | 69 | 29.66 | 37.622 |
| .5 | 7766 | 8268 | 502 500 | 14.828 | 69 | 29.65 | 33.854 |
| .4 | 8308 | 8810 | 502 500 | 16.290 | 69 | 29.65 | 30.816 |
| .3 | 8839 | 9341 | 502 500 | 18.470 | 68.5 | 29.65 | 27.179 |
| .25 | 9391 | 9696 | 305 300 | 12.487 | 68.5 | 29.65 | 24.426 |
| .2 | 9735 | 10041 | 306 300 | 13.85 | 68.5 | 29.64 | 22.094 |
| .15 | 0070 | 0376 | 306 300 | 15.757 | 68.5 | 29.64 | 19.420 |
| .1 | 0405 | 0720 | 315 300 | 19.068 | 68.5 | 29.64 | 16.520 |
| .05 | 0760 | 1075 | 315 300 | 26.443 | 68.5 | 29.64 | 11.912 |

Hi-Vol Ser. No. 1087 Set No. II, Date 14 Oct. 82




NO. 340-L22 DIETZGEN GRAPH PAPER
LOGARITHMIC
2 CYCLES X 2 CYCLES

EUGENE DIETZGEN CO.
MADE IN U. S. A.

B. **RADER** HI VOLUME **SAMPLER**

1. Velocity Pressure Meter and Orifice Pressure Meter Accuracy Check

Hi Vol Serial No. ____________ Set No. __________ Date ____________

Signature ________________ Name of Company tested ____________

a. Velocity Pressure Meter Check

| Inclined Manometer Reading | .1 | .2 | .3 | .4 | .5 |
|---|---|---|---|---|---|
| Velocity Pressure Meter Reading | ___ | ___ | ___ | ___ | ___ |

b. Orifice Pressure Meter Check

| Inclined Manometer Reading | .5 | 1.0 | 1.5 | 2.0 |
|---|---|---|---|---|
| Orifice Pressure Meter Reading | ___ | ___ | ___ | ___ |

2. Thermometer

a. Compared with mercury-in-glass ____________________

3. Orifice Meter Calibration

Hi Vol Serial No. 1087 Set No. II Date 7/20/84

Signature Katherine E. Cole Name of Company tested ____________

a. Flow Data Worksheet

KEC 7/20/84

~~.03~~

.03

.03

| ORIFICE DELTA p $H_2O$ | X 100 METER START | X 100 METER START | TOTAL CU. FT. AT 60°F | TOTAL TIME | ORIFICE TEMP. F. | BAROMETER | CFM @ 60°F |
|---|---|---|---|---|---|---|---|
| ~~2.0~~ | ~~6337~~ | | ~~1000~~ 500 | | | | |
| 1.9 | 7094 | 7396 | ~~1000~~ 300 | 31'50.4 | 73°F | 29.64 | |
| 1.8 | 7406 | 7708 | ~~1000~~ 300 | 31'24.6 | 75°F | 29.64 | |
| 1.7 | | | 1000 | | | | |
| 1.6 | | | 1000 | | | | |
| 1.5 | | | 1000 | | | | |
| 1.4 | | | 1000 | | | | |
| 1.3 | | | 1000 | | | | |
| 1.2 | | | 1000 | | | | |
| 1.1 | | | 1000 | | | | |
| 1.0 | | | 1000 | | | | |
| .9 | | | 500 | | | | |
| .8 | | | 500 | | | | |
| .7 | | | 500 | | | | |
| .6 | | | 500 | | | | |
| .5 | | | 500 | | | | |
| .4 | | | 500 | | | | |
| .3 | | | 500 | | | | |
| .25 | | | 300 | | | | |
| .2 | | | 300 | | | | |
| .15 | | | 300 | | | | |
| .1 | | | 300 | | | | |
| .05 | | | 300 | | | | |

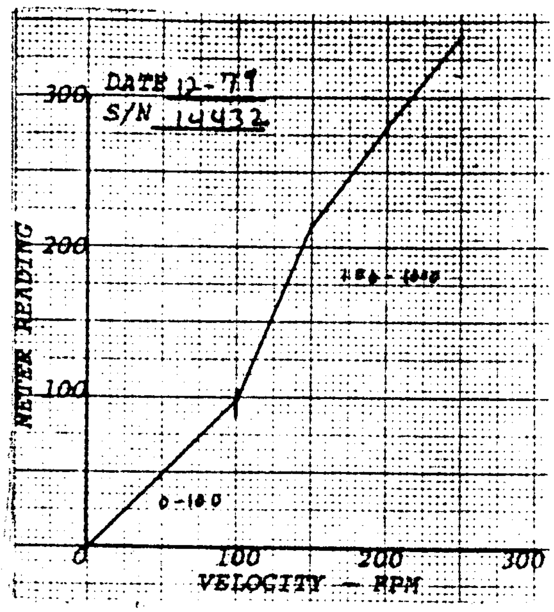
ANEMOMETER CALIBRATION GRAPHS

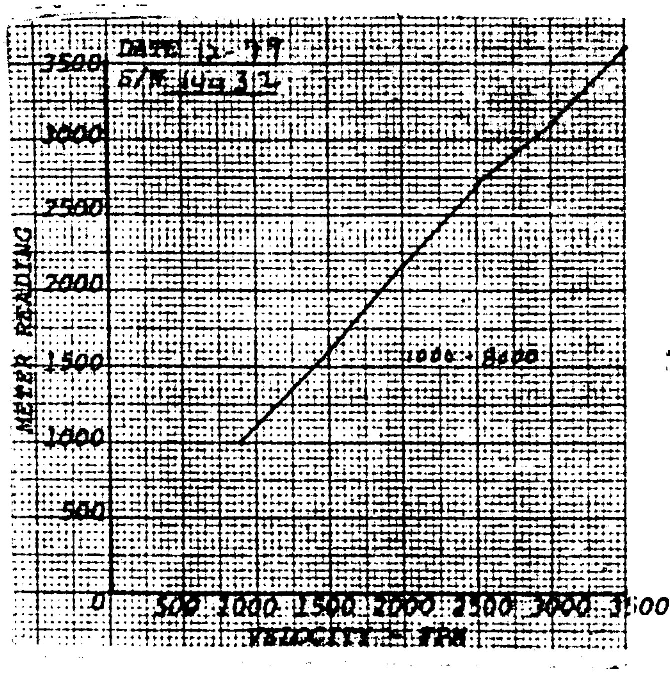
# MODEL 60 ANEMOTHERM® AIR METER

**ANEMOTHERM®** trademark of ANEMOSTAT PRODUCTS DIVISION

. SCRANTON. PENNSYLVANIA

DYNAMICS CORPORATION OF AMERICA




| DATE | THERMOMETER I.D. | TEST BY | TEST MEDIUM | REF. TEMP | THERM. TEMP. | TEMP DIFF |
|---|---|---|---|---|---|---|
| 6/28/83 | WESTON SS-012 | KEC | AMBIENT | 76° | 76°F | 0.[illegible] |
| | 50°F-400°F (BY 2's) | | BOILING | 209° | 212°F | 3.[illegible] |
| | (MED. FRONT FACE/ 5" STEM) | | OVEN TOP | TOP 292° | 298°F | 6.[illegible] |
| | | | OIL | 295° | 302°F | 7.[illegible] |
| 7/8/83 | ASHCROFT SS-013 | KEC | | | | |
| | 50°F-300°F (BY 2's) | | | | | |
| | (SMALL FACE / 2½" STEM) | | | | | |
| | RADER HI VOL | | | | | |
| | BROKEN - DISCARDED | | | | | |
| 7/8/83 | WESTON SS-014 | KEC | ICE | 32° | 32°F | 0.[illegible] |
| | 0°F-250°F (BY 2's) | | WARM | 110° | 108°F | 2.[illegible] |
| | (SMALL FACE /2½" STEM) | | OIL | 224.9° | 216°F | 8.[illegible] |
| | RADER HI VOL | | | | | |
| 6/27-28/83 | PTC INSTRUMENTS SS-015 | KEC | AMBIENT | 75° | 73°F | 2.[illegible] |
| | 50°F-500°F (BY 5's) | | BOILING | 209.5° | 212°F | 2.[illegible] |
| | (SMALL FACE /3" STEM) | | OVEN TOP | TOP 289° | 260°F | 29.[illegible] |
| | | | OIL | 294° | 298°F | 4.[illegible] |
| 7/8/83 | WESTON SS-016 | KEC | ICE | 32° | ~~32°F~~ 26°F TAPPED | ~~0.0~~ 6. |
| | 25°F-125°F (BY 1's) | | AMBIENT | 71° | 67°F | 4.[illegible] |
| | (MED. FACE / 6½" STEM) | | WARM | 115° | 110°F | 5.[illegible] |
| 7/8/83 | WESTON SS-017 | KEC | ICE | 32° | 32°F | [illegible] |
| | 25°F-125°F (BY 1's) | | AMBIENT | 71° | 70°F | 1. |
| | (MED. FACE / 6½" STEM) | | WARM | 110° | 110° | [illegible] |
| 6/27-28/83 | WESTON SS-018 | KEC | ICE | 32° | 34.2°F | 2. |
| | 25°F-125°F (BY 1's) | | AMBIENT | 76° | 77°F | 1. |
| | (MIRROR-SMALL FACE / 8" STEM) | | WARM | 120° | 121°F | 1. |
| | ECK | | | | | |