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FERROALLOY FURNACE EMISSION FACTOR DEVELOPMENT INTERLAKE INC., ALABAMA METALLURGICAL CORPORATION, SELMA, ALABAMA

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SECTION 1

INTRODUCTION

The purpose of this program was to develop total and size specific particulate emission factors for the silicon (Si) metal furnace at Interlake Inc., Alabama Metallurgical Corporation (Alamet), Selma, Alabama. Furnace No. 2 at Alamet, an open submerged electric arc furnace rated at 17 megawatts (MW), was producing 98 percent silicon metal during the January 1981 test program. Total particulate concentration and particle size distribution of emissions captured by the canopy hood evacuation system were measured before and after the baghouse using EPA Method 1-5 procedures and Andersen cascade impactors.

Entropy Environmentalists conducted the total particulate tests under subcontract to Research Triangle Institute (RTI) as part of a Level 2 Environmental Assessment of emissions of organic species from various ferroalloy furnaces. This Level 2 characterization of organic species (as BaP) was conducted utilizing EPA Method 1-5 particulate sampling procedures modified to include an absorbent trap (XAD-2) between the third and fourth impingers. GCA/Technology Division conducted particle size distribution tests simultaneous with the total particulate (Level 2) tests by Entropy. In addition, GCA provided a process observer to document relevant furnace operations and cycle times, to assess the capture efficiency of the canopy hood control system and to ensure that testing was performed only during normal furnace operations. This observer also performed EPA Method 9 visible emission observations of the furnace building roof monitor and the baghouse outlet.

SECTION 2

SUMMARY OF RESULTS AND CONCLUSIONS

The sampling and analysis program was conducted according to the approved Test Plan. Modified EPA Method 5 and Andersen cascade impactor sampling procedures were performed at the inlet and outlet of the baghouse controlling emissions from the No. 2 furnace at Alamet. A summary of results of the combined efforts of GCA/Technology Division and Entropy Environmentalists is presented in Table 1 and Figures 1 and 2. Research Triangle Institute analyzed the total particulate data and provided results that were utilized in the size specific emission factor calculations. The report to be published by RTI should be consulted concerning sampling and analytical procedures and results for the total particulate runs. The uncontrolled particulate emission factors (inlet side tests) are considered more viable than controlled emission factors (baghouse outlet test results) since outlet testing was performed at a poor sampling location. The uncontrolled emission factors in this report represent the emissions that would occur if only the baghouse was off-line.

The field testing program was performed during the week of 26 January 1981 while the furnace was producing 98+ percent silicon metal. Production of silicon metal is very energy intensive and high temperatures in the furnace are required, e.g., tap stream temperature is about 2700°F. Approximately 12 MWH are required to produce 1 ton of metal. This furnace produces 33 tons of silicon metal per day. Sections 3 and 5 of this report describe the process and present the operating data obtained during the field testing program.

TABLE 1. SUMMARY OF TOTAL PARTICULATE AND PARTICLE SIZE DISTRIBUTION TEST RESULTS
ALAMET, SELMA, ALABAMA

		Average inlet	Average outlet
Total Particulate Emission Factors			
Mass Concentration	mg/dscm	1236.6	31.3
	gr/dscf	0.54	0.014
Mass Emission Rate	kg/MWh	32.55	1.22
	lb/hr	1250.4	43.45
Process Weight Rate	kg/Mg produced	436	16.5
	lb/ton produced	872	33
Particle Size Distribution			
Cumulative % mass	<15 μm d_{50}	86	91
	<2.5 μm d_{50}	70	56
Mass Emission Rate	lb <15 μm d_{50}/hr	1075	40
	lb <2.5 μm d_{50}/hr	875	24
Size Specific Emission Factors			
kg particulate <15 μm d_{50}/Mg produced		375	15
lb particulate <15 μm d_{50}/ton produced		750	30
kg particulate <2.5 μm d_{50}/Mg produced		305	9
lb particulate <2.5 μm d_{50}/ton produced		610	18

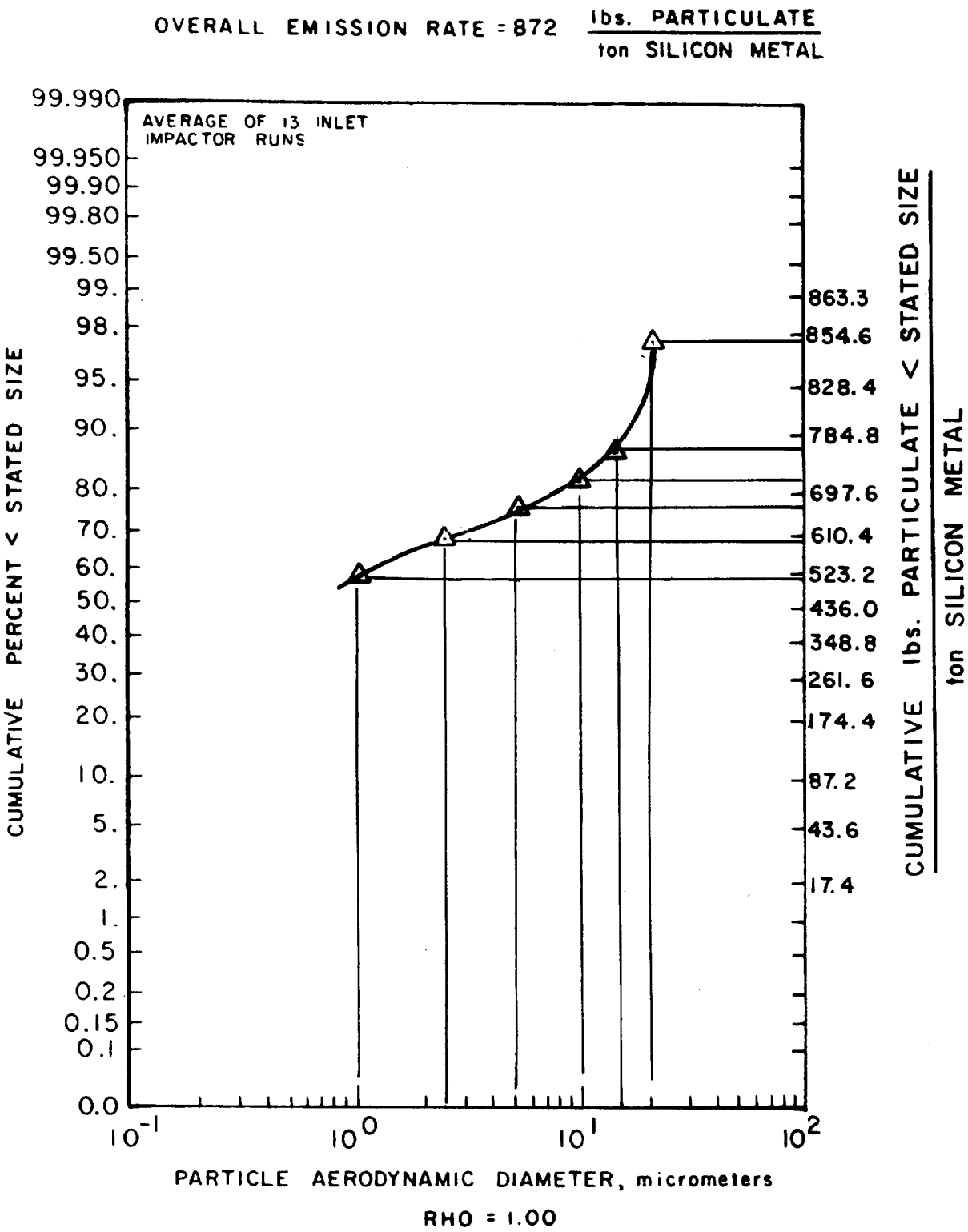


Figure 1. Average particle size distribution, uncontrolled silicon metal furnace emissions (baghouse inlet), Alamet, Selma, Alabama.

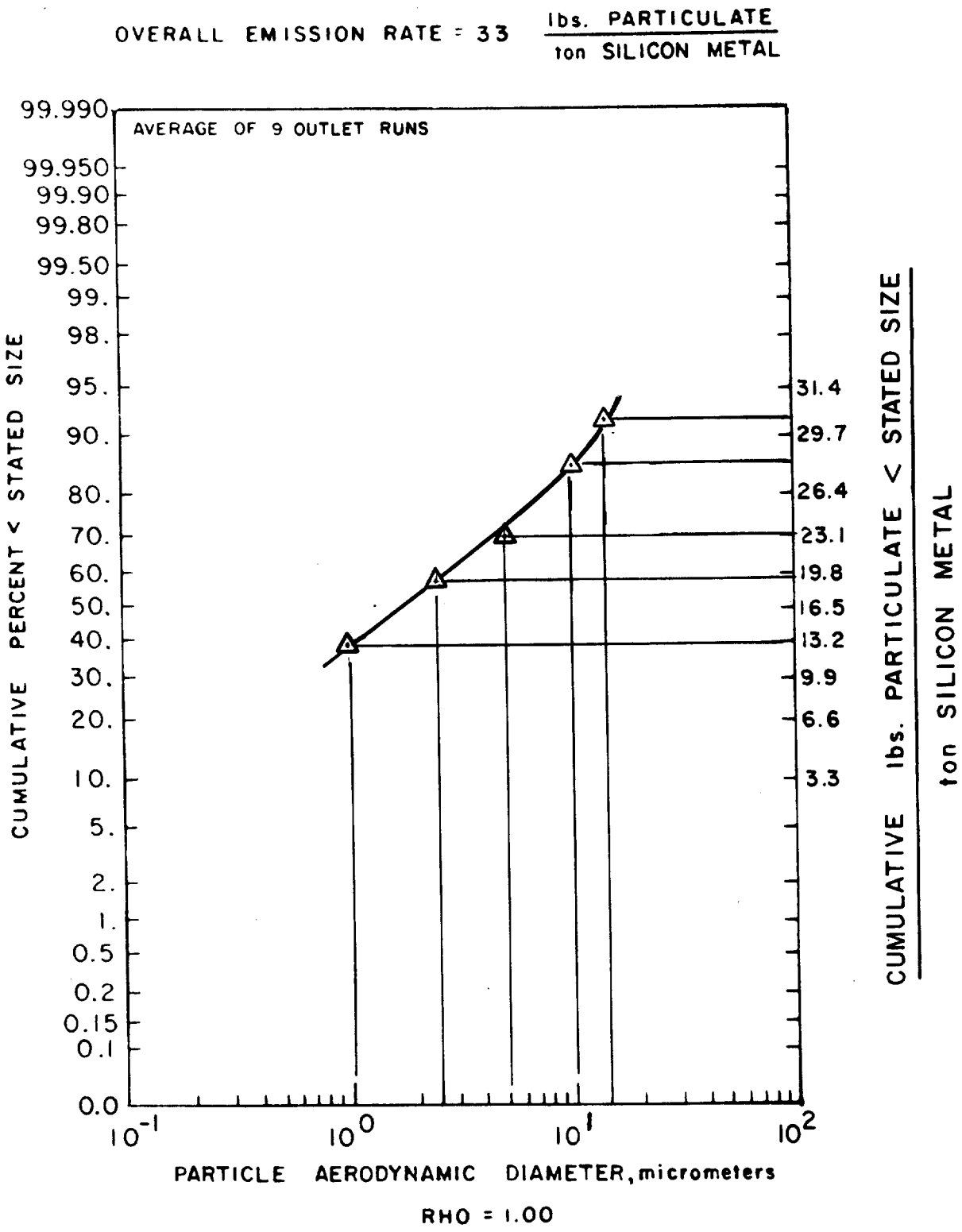


Figure 2. Average particle size distribution, controlled silicon metal furnace emissions (baghouse outlet), Alamet, Selma, Alabama.

SECTION 3

PROCESS DESCRIPTION

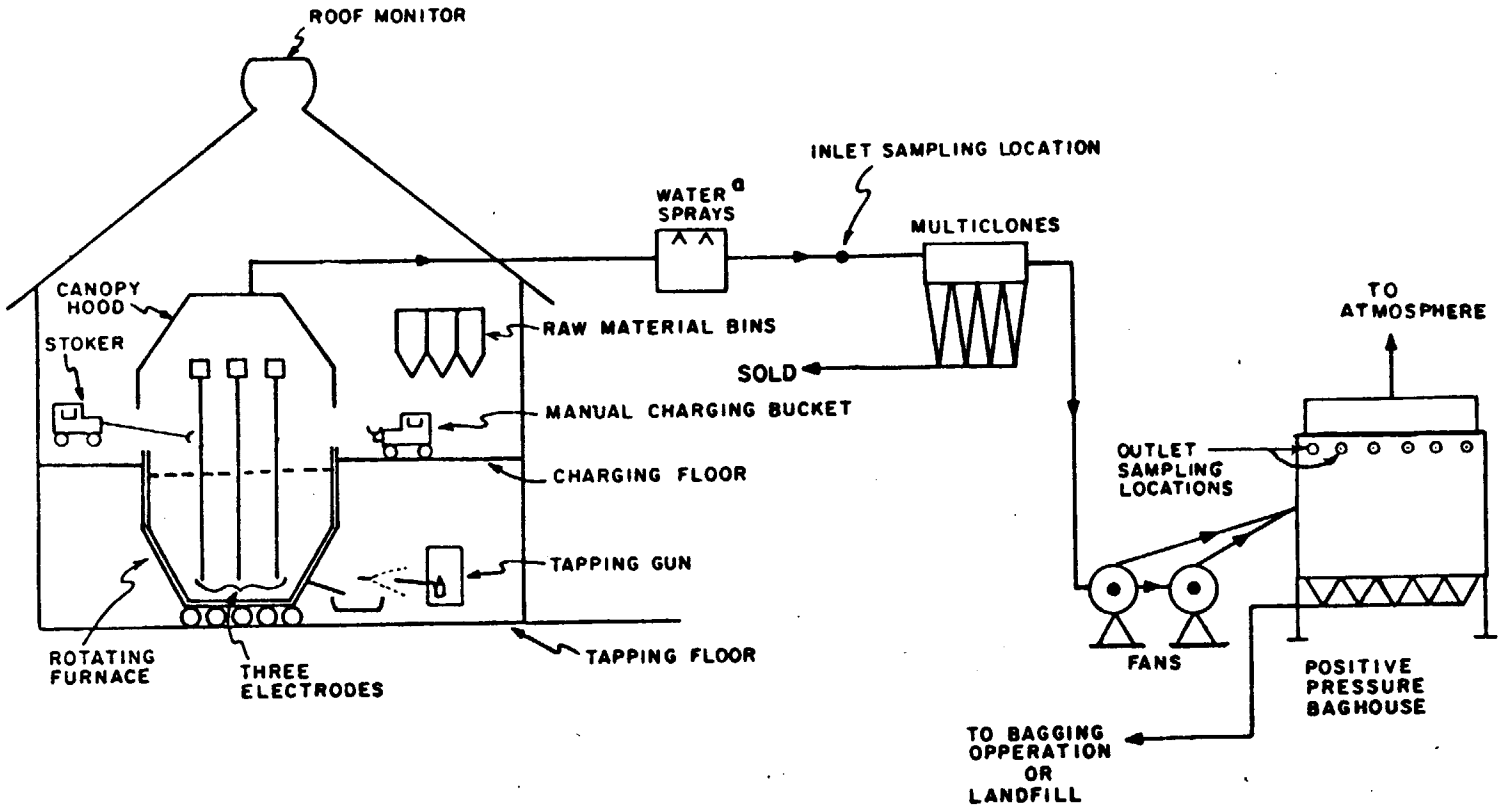
The No. 2 furnace at Alamet, Selma, Alabama is a submerged electric arc furnace rated at 17 megawatts which produces 98+ percent silicon metal. A schematic of the furnace and pollution control system is provided in Figure 3. The furnace vessel has a top diameter of 32 feet and tapers to a diameter of 22 feet at the bottom. The furnace is 14 feet deep and slowly revolves around its vertical axis. Four 7 x 12 foot panels are installed 13 feet apart between the top perimeter of the furnace and the canopy hood to provide more draft across the surface of the furnace and to help direct smoke and fumes into the canopy hood. The canopy hood is fixed 5 feet above the rotating furnace and is connected by two 7 foot diameter offtakes to a 9 foot diameter main duct. Exhaust gases are drawn through the main duct and through a Western Precipitation multiclone by two 800 horsepower fans. The gas is then forced through a positive pressure baghouse and vented to the atmosphere via a louvered roof monitor.

The furnace is charged with raw materials manually as necessary to keep the mix at a constant level near the top of the vessel. The charge mixture is composed of: 50 percent quartzite, 38 percent hardwood chips, 8 percent No. 1 coal and 4 percent No. 2 coal and petroleum coke.

The wood chips are added to the mix to provide porosity. This is necessary to allow gases to escape evenly from the charge. When gases are trapped in the mix, they sometimes escape rapidly (erupt) causing what is known as a "blow." Blows occur near the electrodes because the mix descends more rapidly and loses porosity where the refining and melting occurs.

Stoking, the mechanical leveling of the charge, is performed frequently to prevent the occurrence of blows. During stoking, the mix is pushed from the perimeter of the vessel into mounds around the electrodes; the mix is also pushed down to break up the crust formed on the surface. Stoking is usually performed before and after charging.

The prebaked carbon electrodes, arranged in a delta formation, are normally kept about 40 inches above the hearth level or 6 feet into the charge. The smelting reaction occurs about 8 feet down into the charge. The temperature of the arc can approach 6000°F.



[a]Water sprays are normally used but were not used during testing.

Figure 3. Process schematic--Alamet, Selma, Alabama.

Tapping occurs approximately once every 2 hours. This is accomplished by shooting the carbon-paste plug out of the taphole area with a special 8-gauge shotgun. If necessary, a long wooden pole is used to poke the plug out and to keep the molten metal flowing. Generally the tapping process lasts about 50 minutes. The molten metal flows into a transfer ladle for subsequent casting.

SECTION 4

SAMPLING AND ANALYSIS PROCEDURES

INTRODUCTION

Emissions generated during the silicon metal refining process are evacuated to a positive pressure baghouse. Prior to initiation of the field sampling program, facilities for traversing the horizontal duct were installed by Alamet with funds provided by EPA through Research Triangle Institute Contract No. 68-02-3152. Refer to the RTI report for details concerning the installed sampling facilities.

The baghouse inlet sampling location was approximately 25 feet above grade and sampling was performed from a platform mounted underneath the circular duct. The sampling points were located 0.9 diameters downstream and 0.7 diameter upstream of flow disturbances. Both flow disturbances were 45 degree bends in the duct. The baghouse outlet sampling ports were installed in each of the 12 baghouse compartments on the access doors. The ports were located about 5 feet above the bags.

PRESAMPLING PREPARATIONS

Glassware and Nalgene sample bottles utilized in this test program were cleaned with an Alconox solution, rinsed with tap water, distilled- deionized (DDI) water and finally rinsed with spectro grade acetone. The glassware was air-dried and capped with Parafilm. Filters were desiccated to constant tare weight ($\pm$ 0.5 mg).

Pitot tube-thermocouple-probe assemblies used for preliminary velocity traverses were calibrated by the measurement procedure as specified in 40 CFR 60, Appendix A, Method 2. Sampling nozzles were calibrated with a dial vernier micrometer. Thermocouples were calibrated against a mercury in-glass ASTM thermometer in an ice bath, at ambient temperature and in a boiling water bath. All calibrations are given in Appendix A.

Impactors were prepared for sampling by cleaning with soap and water, then rinsing with DDI water and finally with acetone. Particle sizing dry gas meters and orifices were calibrated prior to sampling according to procedures outlined in APTD 0576.

CASCADE IMPACTOR SAMPLING

Reeve Angel type 934-AH glass fiber substrates were prepared for use in the cascade impactors. Each substrate was labeled and placed in a folded aluminum foil liner. Both foil and filter were placed in labeled petri dishes and desiccated for 24 hours. The top half of each foil liner was folded back during desiccation. Initial tare weights and all subsequent weights are a combination of foil and filter weights. A minimum of 6 hours was allowed between weighings. After reaching constant weight ($\pm$ 0.5 mg) substrates were sealed in their petri dishes for transport to the field.

Sample train preparation and recovery took place in a clean environment inside the truck used to transport equipment. Once onsite, a preliminary velocity traverse was performed in order to:

1. Determine if cyclonic flow conditions exist and, if present, determine the gas flow angles.

2. Determine which sample points represent average flow and temperature for particle sizing measurements.

3. Properly size the nozzles and obtain the data necessary to perform isokinetic sampling.

Four sample points of average velocity near 0.7R (R = duct radius) were determined through use of the preliminary traverse data. The proper nozzle size and sample train flow rate was selected and single-point sampling was performed during each Level 2 test run. Only one of the four sample points was sampled per inlet test run. Total sampling time was designed to collect approximately 50 mg per impactor run through estimated grain loading values, and by visual inspection of the first run filters. Baghouse inlet test runs were performed with a cyclone precutter installed in front of the impactor to remove particles 15 μm diameter. No visible sample was recovered from the cyclone precutter during initial baghouse outlet test runs, therefore only straight nozzles were used for all subsequent outlet tests.

Prior to each sampling run the impactors were carefully loaded with tared substrates. The sample train consisting of the impactor, an unheated probe, vacuum hose, silica gel moisture trap and dry gas meter/orifice/pump assembly as shown in Figure 4, was assembled and leak checked. The impactor was then inserted into the gas stream at the appropriate sample point with the nozzle pointed away from the gas flow (inlet tests) and allowed to reach temperature equilibrium. After approximately 10 minutes, the sampling nozzle was then turned into the flow (inlet tests) and the sample flow was adjusted to the desired rate. Outlet tests were performed as above however the nozzles were perpendicular to the assumed direction of flow at all times. The flow was monitored and recorded by observing the pressure drop across a calibrated orifice and the total dry gas volume sampled was determined by a calibrated dry gas meter. The flow rate through the impactor was held constant ($\pm$ 0.05 cfm) for the duration of each run.

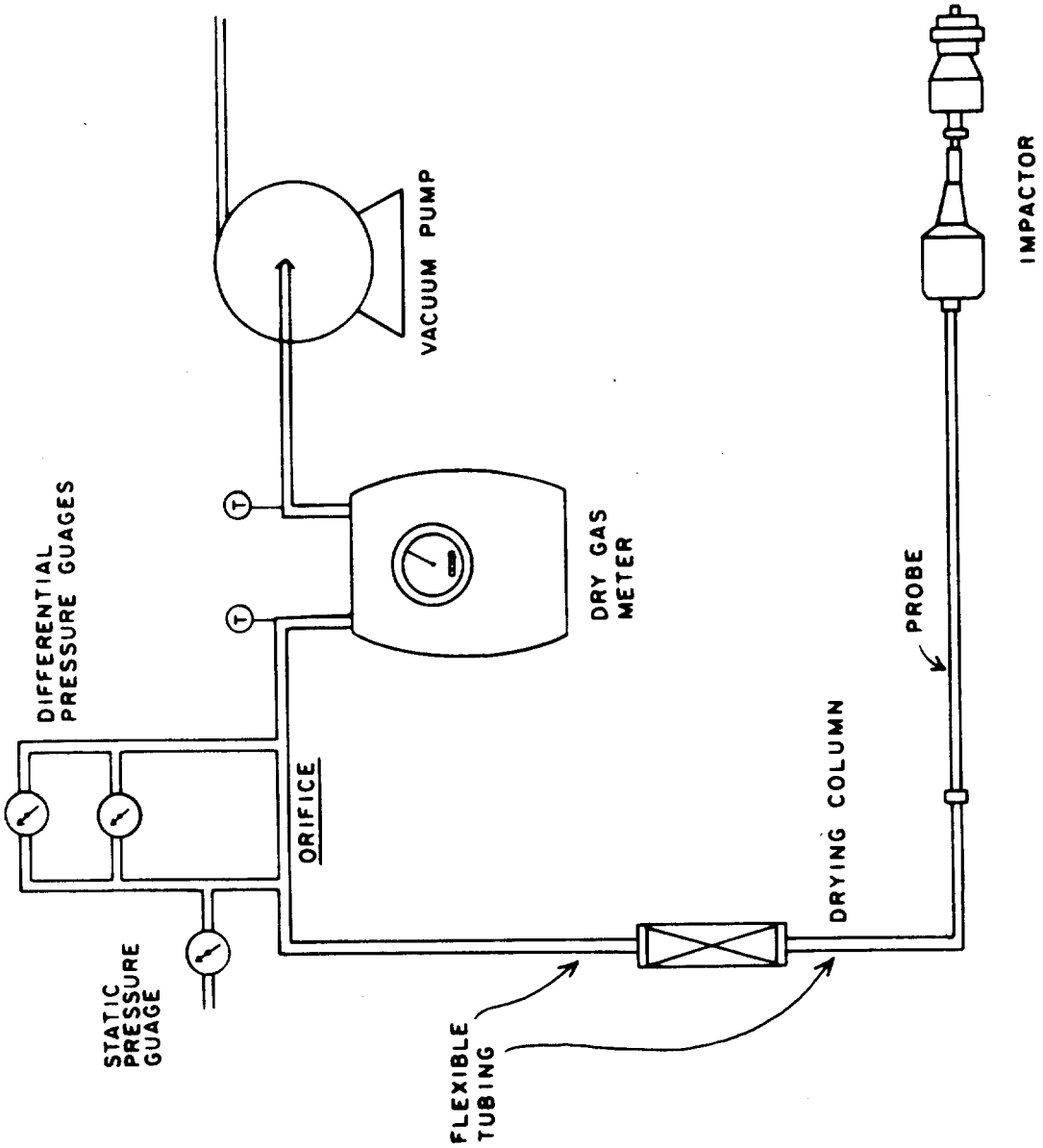


Figure 4. Andersen sampling train.

Upon completion of each sample run, the probe/impactor assembly was removed from the duct and sample train shut off. The nozzle was immediately capped with foil. The probe was disconnected and the impactor transported to the sample recovery area. No leak checks were performed at the end of a run so as not to disturb the particle distribution.

Two types of preliminary sampling runs were performed. The first involved the use of "blank" impactors loaded with pretared substrates to determine anomalous weight gain due to gaseous specie absorption. The impactors were fitted with dual prefilters to prevent particulate matter from reaching the substrates. Blank inlet and outlet runs were 28 minutes and 210 minutes long respectively.

Preliminary loading runs were conducted to obtain a visual indication of particle loading rates. Impactors equipped with cyclone precutters were operated for the length of time calculated as necessary to sample 50 mg of particulate. Upon recovery, substrates were examined and sampling times adjusted according to the degree of loading observed. Preliminary outlet runs were conducted with a cyclone precutter in order to verify the assumption that no particles greater than 15 microns were present in the outlet stream. These preliminary loading runs were performed with unweighed substrates which were discarded upon visual inspection.

ANDERSEN IMPACTOR GRAVIMETRIC ANALYSIS

At the conclusion of each test run, each impactor was carefully disassembled and the nozzle, impactor expander section and cyclone precutter (if used) was washed with acetone into a sample container. Each impactor substrate was placed into its respective petri dish and any particulate adhering to both sides of the top jet plate, the crossbar, and the gasket was brushed onto the substrate. In all cases the substrates were carefully placed in preweighed aluminum foil liners to minimize loss of particulate during subsequent handling of the substrate.

Upon completion of the sample recovery procedures, the samples were labeled, sealed, then liquid levels marked, and the samples were carefully packed for shipment to the GCA/Technology Division laboratory for analysis. A chain of custody log book that outlines the recovery procedures and documents the history of the samples was kept. Each substrate and weighing jacket, upon return to the GCA laboratory, was placed in a desiccator and dried for at least 24 hours before being weighed. A minimum of 6 hours was allowed between each subsequent weighing until constant weight ($\pm$ 0.5 mg) was achieved. After weighing, all samples were carefully stored in closed containers.

Sampling data reduction was performed by computer. A preliminary program was used to calculate inputs needed to further reduce the data after the weight gains on each impactor stage have been determined. Once the appropriate input parameters were checked they were keypunched and entered into the "Computer Based Cascade Impactor Data Reduction System" (EPA-600/7-78-042) as developed by SoRI. Example calculations used by the programmable calculator are provided in Appendix B.

PROCESS OBSERVATIONS

During critical periods of the field testing, a GCA process engineer was positioned inside the No. 2 Furnace control room. From this vantage point the process engineer performed the following duties:

- Notified the test crew by radio when to start and stop so as to test only during normal operating conditions.
- Document the origin and approximate magnitude of all emissions generated within the furnace shop. Emission magnitude was assessed for charging, stoking and tapping operations using a scale of light, moderate or heavy.

Other process data and information was given to GCA by Research Triangle Institute in the form of daily process data sheets and notes at the end of the test period.

Visible Emission Observations

The emissions escaping capture by the canopy hood system were observed in accordance with EPA Reference Method 9 in the Federal Register, 40 CFR, Part 60, Appendix A. The VE observer was certified by EPA to observe visible emissions within the previous 6 months by the certification technique specified in Method 9. The observer was positioned outside the furnace shop and observed emissions emanating from the furnace shop roof monitor.

SAMPLING AND ANALYSIS QUALITY ASSURANCE

GCA/Technology Division management is fully committed to an effective Quality Assurance/Quality Control program. The Quality Assurance Manager reports directly to the General Manager, thereby assuring the QA Manager the necessary authority and independence to find and correct any existing quality problems. The QA Manager is also chairman of the Division QA/QC Committee.

Each Technology Division department participates in the quality assurance program in the way most appropriate to divisional needs. Each department manager appoints at least one staff member to serve on the Division QA/QC Committee and report back to the department on QA/QC methods, procedures, requirements, and problems. In addition, the Analytical Laboratory, the Environmental Measurements Department, and the Instrumentation Department maintain department QC committees whose staff members implement and record internal QA activities. These committees are appointed by the department manager and report to him as well as to the QA Manager.

SECTION 5

TEST RESULTS

INTRODUCTION

The field sampling program was conducted during the week of 26 January 1981. The program objective, to develop emission factors for ferroalloy production, was met by completion of 6 total particulate (Level 2) runs and 13 cascade impactor runs at the inlet sampling location. Ten impactor runs were completed during five total particulate runs at the baghouse outlet locations. The shorter inlet impactor runs were operated at various times during the production cycle, however, the longer outlet test runs were operated for complete tap to tap cycles or more.

Major modifications to the baghouse outlet would have been required to facilitate a more accurate measurement of controlled emission rates. These modifications, which in themselves could alter the outlet emission factors, were considered too costly and since the ferroalloy industry in general uses this baghouse outlet design, EPA requested that testing be performed at this less than ideal sampling location. An industrywide comparison of outlet emission factors is still possible, by performing tests at similar sampling locations at different ferroalloy plants, however, the actual emission rates are still questionable. Each of the 12 baghouse compartments (15 feet by 30 feet) was sampled immediately (5 feet) above the top of the bags at a single sample point. The gas flow in each compartment was below detectable limits; less than 0.002 in. H_2O velocity pressure; therefore, isokinetic sampling was not performed. Each compartment was tested at least once. An emission factor based on the average of all outlet test results should be considered one complete test run and since very little confidence can be applied to the results of one test, this emission factor should only be considered an estimate.

Careful monitoring of the process insured that the test runs were conducted only during normal furnace operations. Emissions escaping capture were documented by the process engineer/visible emission observer. Detailed process data was obtained to allow possible correlations between source operations and measured emission factors.

The field samples and data were driven back to the GCA/Technology Division Laboratory for analysis. The following subsections describe the results of the sample and data analysis efforts.

TOTAL PARTICULATE RESULTS

The total particulate measurements were performed by Entropy Environmentalists and the sample analysis was performed by RTI. Tables 2 through 6 summarize the results of the total particulate measurements as provided by Dr. Wayne Westbrook of RTI. Tables 2 and 3 present sampling data and gas characteristics, Tables 4 and 5 the particulate emission rates, and Table 6 presents the baghouse total particulate removal efficiency.

PARTICLE SIZING RESULTS

Figures 1 and 2 are each curve fitted composite plots of mean cumulative percent mass concentration versus particle aerodynamic diameter as defined by the Task Group on Lung Dynamics.

Figure 1 is a composite of all 13 impactor runs performed on the inlet and Figure 2 is a composite of all 9 impactor runs completed on the baghouse outlet. Some of the impactor runs incorporated into Figures 1 and 2 had rather light substrate loading. To determine if light substrate loading (< 10 mg total particulate) affected the shape of the particle size distribution curves, the data was analyzed using only those runs with greater than 10 mg of particulate in the impactor. This included 9 of 13 inlet runs and 4 of the 9 outlet runs. This treatment of the data produced no significant change in the particle size distribution curves.

Figure 5 is a plot of particle aerodynamic diameter versus the mean change in mass concentration (dM/d log D) for both the inlet and outlet. The graph is a composite of all inlet and outlet runs. The values of dM/d log D for the outlet can be divided by the inlet value corresponding to the same particle size to determine the baghouse efficiency for removing particles of that specific size. Baghouse efficiency versus particle diameter is illustrated more clearly in Figure 6 and Table 7. The intervals marked on Figure 5 correspond to the minimum and maximum values of dM/d log D.

To determine the particle size distributions presented herein, data from Entropy and GCA were combined. During each individual test run a cascade impactor data sheet was filled out. Time, impactor number, local barometric pressure, dry gas meter volume, inlet and outlet temperature, orifice pressure drop and dry gas meter static pressure were recorded at specific intervals during the run. Stack gas temperature, gas static pressure, velocity pressure and gas fraction analysis data were obtained from Entropy Environmentalists, who operated a Method 5 type sampling train concurrent with the impactor sampling.

A computer based cascade impactor data reduction system, (CIDRS) developed by Southern Research Institute for the EPA, (EPA 600/7-78-042) was initially used to analyze the field data. This reference contains a thorough discussion of the design and use of the above mentioned system. The system calculates and prints for each impactor run: the D-50 cutpoint of each stage, the cumulative percent mass less than D-50, the cumulative mass concentration

TABLE 2. BAGHOUSE INLET SAMPLING DATA, ALAMET, SELMA, ALABAMA

Run No.	1	2	3	4	5	6
Date	1/26/81	1/27/81	1/27/81	1/28/81	1/28/81	1/28/81
Start time	1335	0913	1400	0830	1120	1400
Stop time	1525	1201	1545	1017	1322	1600
Net sampling time, min	96	96	96	96	96	96
Stack Temp., °C	161	153	158	149	153	158
Stack flow rate dsm^3/min[a]	7272.9	7747.9	7478.2	7650.9	7712.1	7823.9
Stack flow rate Am^3/min[b]	11,151.6	11,563.9	11,409.1	11,256.6	11,560.7	11,753.2
Volume collected dsm^3	0.7888	1.7917	0.8153	0.8389	0.8637	0.8585
% Isokinetic	99.7	98.4	100.2	100.8	103.0	100.9

[a]Moisture free and at 20°C and 76.0 cm Hg

[b]Actual flow rate at stack conditions

TABLE 3. BAGHOUSE OUTLET SAMPLING DATA, ALAMET, SELMA, ALABAMA

Run No.	1	2	3	4	5
Date	1/26/81	1/27/81	1/27/81	1/28/81	1/28/81
Start time	1330	0935	1358	0826	1240
Stop time	1627	1236	1659	1139	1531
Net sampling time, min	160	160	160	160	160
Stack temp., °C	119	120	108	98	113
Volume collected dsm^3[a]	1.0173	1.2544	3.2559	3.3476	3.2185
Gas flow rate[b] dsm^3/min	10,670	11,380	10,980	11,230	11,400
Compartments samples	4,5,11,12	2,3,9,10	1,6,7,8	1,2,7,8	4,5,11,12

[a]Moisture free and at 20°C and 76.0 cm Hg

[b]Estimate based on inlet flow rate, ambient temperature, inlet gas temperature, and outlet gas temperature.

TABLE 4. TOTAL PARTICULATE TEST RESULTS (BY RTI) BAGHOUSE INLET SAMPLING LOCATION, ALAMET, SELMA, ALABAMA

Run No.	Particulate captured (mg)	Particulate concentration (mg/dsm^3)	Particulate generated per hour (kg/hr)	Particulate generated per MW-h (kg/MW-h)	Particulate generated per Mg feed (kg/Mg)	Particulate generated per Mg alloy (kg/Mg)
1	553.2	701.3	306.0	18.27	52.2	247
2	2267.0	1265.3	588.2	35.28	84.9	463
3	1460.6	1791.5	803.8	46.01	106.2	604
4	672.5	801.6	368.0	20.70	50.2	282
5	725.6	840.1	388.7	22.59	53.0	308
6	1734.0	2019.8	948.2	52.47	118.2	715
Average all runs		1236.6	567.2	32.55	77.5	436

TABLE 5. TOTAL PARTICULATE TEST RESULTS (BY RTI) BAGHOUSE OUTLET SAMPLING LOCATION, ALAMET, SELMA, ALABAMA

Run No.	Particulate captured (mg)	Particulate concentration (mg/dsm^3)	Particulate generated per hour (kg/hr)	Particulate generated per MW-h (kg/MW-h)	Particulate generated per Mg feed (kg/Mg)	Particulate generated per Mg alloy (kg/Mg)
1	5.3	5.2	3.3	0.18	0.49	2.5
2	16.3	13.0	8.9	0.53	1.28	7.0
3	25.5	7.8	5.1	0.29	0.64	3.8
4	252.6	75.5	50.9	2.92	6.94	39.8
5	177.7	55.2	37.2	2.17	4.99	29.6
Average all runs		31.3	21.2	1.22	2.87	16.5

TABLE 6. BAGHOUSE TOTAL PARTICULATE REMOVAL EFFICIENCIES ALAMET, SELMA, ALABAMA

Outlet Run No.	Inlet Run No. used in calculation	Baghouse particulate capture efficiency[a]
1	1	98.9
2	2	98.5
3	3	99.4
4	4	86.2
5	5,6[b]	94.3
Average all runs		96.3

[a]Calculated using kg generated and kg emitted per hour. Comparisons based on particulate concentration in the gases will overstate baghouse efficiency because of additional air drawn into baghouse through the cooling air grates.

[b]A simple average of the particulate generated in runs 5 and 6 was used. Outlet Run No. 5 overlapped both inlet runs 5 and 6.

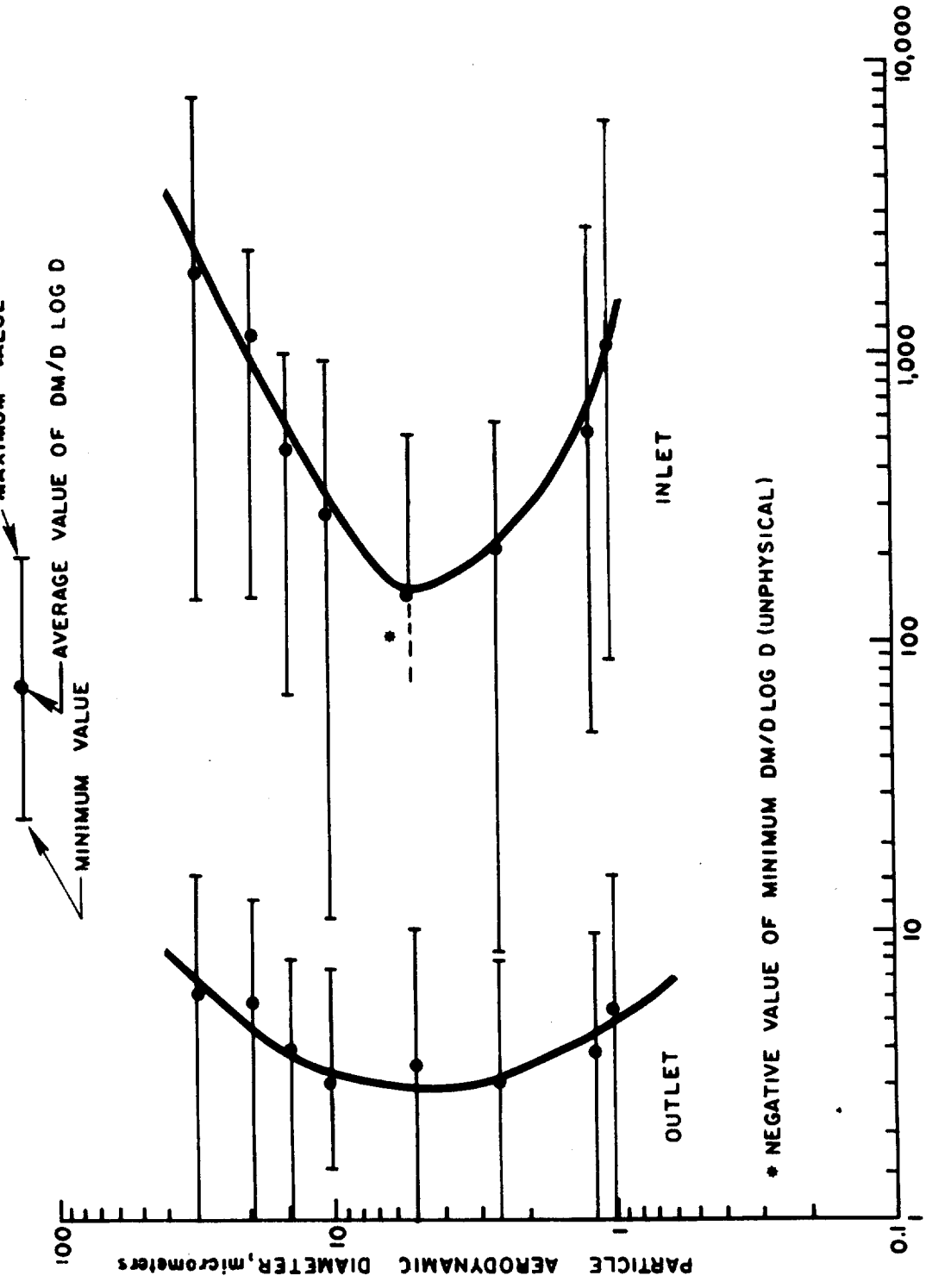


Figure 5. Average change in concentration per particle size (all runs), Alamet, Selma, Alabama.

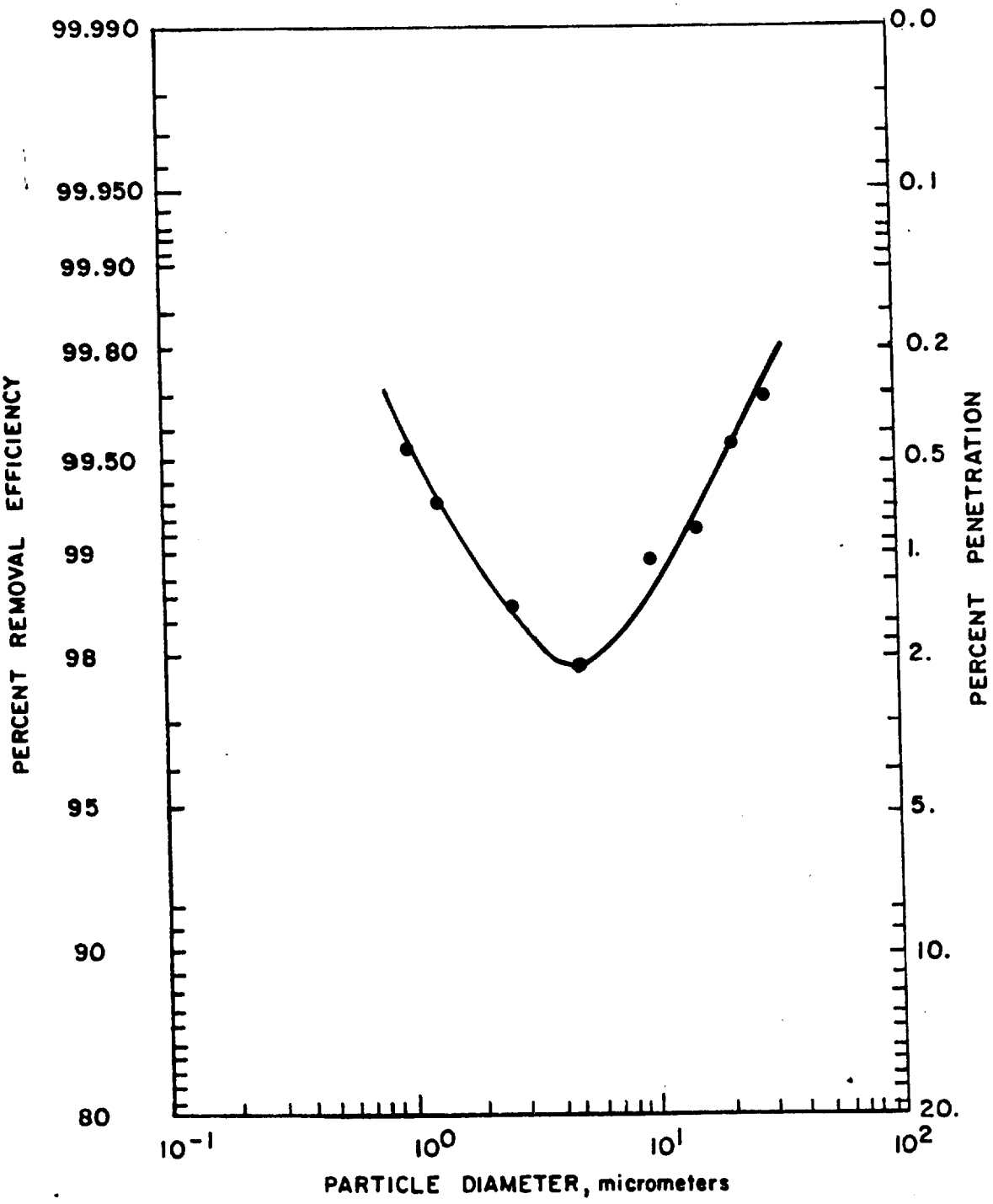


Figure 6. Baghouse efficiency per particle size, Alamet, Selma, Alabama.

TABLE 7. BAGHOUSE SIZE SPECIFIC PARTICULATE REMOVAL EFFICIENCIES ALAMET, SELMA, ALABAMA

Particle aerodynamic diameter (microns)	Inlet dM/dLOG D (mg/DNCM)	Outlet dM/dLOG D (mg/DNCM)	Percent removal (%)
30	1990	6.1	99.69
20	1280	5.8	99.55
15	476	3.9	99.18
10	280	3.2	98.86
5	160	3.4	97.87
2.5	205	3.1	98.49
1.25	541	3.7	99.32
1.0	1160	5.5	99.53

less than D-50, the geometric mean diameter of particles caught by each stage, the change in particle mass concentration with respect to log of particle size (dM/d log D), and the change in particle number concentration with respect to log of particle size (dN/d log D). The system combines the results from all individual runs made on either the inlet or outlet; screens for and removes outlying data; fits the data to a composite curve, and calculates 90 percent confidence intervals. It is the output of this curve fitting program that was used to develop the draft version of this report. Upon review by EPA, the CIDRS program was found to be deficient in the treatment of the cyclone precutter data associated with each inlet impactor run. EPA contracted Research Triangle Institute to develop an interactive computor program using CIDRS with modifications to more accurately treat the particulate catch resulting from the use of precutters.

The Particulate Data Reduction System (PADRE) prompts a user for input in an interactive mode and checks the inputted value. In CIDRS, the cyclone precutter particulate catch was added to the first stage substrate weight gain. In PADRE, the lower cutpoint of the precutter is associated with the particulate catch. Another major difference between the programs is that CIDRS screens for and eliminates outliers from the calculation of average results whereas PADRE only flags outlying data points (See Appendix D-1).

PADRE requires the user to make an assumption regarding the validity of the back-up filter weight gain. Some think that particles that should have impacted on previous substrates actually travel or are reintrained such that they end up on the back-up filter. On the other hand, fine particles may not reach the back-up filter due to diffusional, electrostatic, or other forces causing premature particulate removal. For this report, it was assumed that 50 percent of the weight gain of the back-up filter is attributable to particles less than the d_{50} of the last impactor stage. The computer printouts from the PADRE system are contained in Appendix D-1 and D-2 and the field data sheets are presented in Appendix E-1.

Table 8 summarizes isokinetic sampling rates, actual flow rate through the impactor, volumes metered at standard conditions and duration for each individual Andersen run. The inlet isokinetics ranged between 74 percent and 113 percent, the average for all runs was 97 percent. Due to the large cross-sectional area of the baghouse compartment where outlet sampling occurred, no flow could be detected by the s-type pitot tube equipped with a 0 to 0.25 in. H_2O inclined micromanometer. No attempt was made to sample isokinetically at this extremely low flow rate, and the impactor nozzles were oriented perpendicular to the assumed direction of flow for convenience when inserting and removing the impactor/probe assembly within the limited space of the outlet sampling location.

The lack of a significant flow rate and resultant superisokinetic sampling rates makes the outlet particle size distribution curve (Figure 2) and the control device efficiency plots (Figures 5 and 6) less viable than the inlet size distribution curve (Figure 1) where isokinetic sampling conditions were maintained.

TABLE 8. IMPACTOR SAMPLING DATA SUMMARY, BAGHOUSE INLET, ALAMET, SELMA, ALABAMA

Inlet Run No.	Velocity pressure (in. H_2O)	Gas temperature (°R)	Gas pressure (in. Hg)	Test duration (min)	Gas velocity (ft/min)	Volume metered (std ft^3)	Impactor flow rate (acfm)	Area of nozzle (ft^2)	Nozzle velocity (ft/min)	Isokinetic (%)
1IA16	2.09	782	29.63	2.0	5960	0.75	0.580	1.01×10^{-4}	5742	96
1IB16	2.09	782	29.63	2.0	5960	0.72	0.557	1.01×10^{-4}	5510	93
2IA90	2.29	768	29.53	3.25	6200	1.09	0.505	7.21×10^{-5}	7000	113
2IB90	2.29	768	29.53	3.0	6200	0.97	0.489	7.21×10^{-5}	6780	109
3IA16	2.19	777	29.54	1.5	6090	0.32	0.324	7.21×10^{-5}	4490	74
3IB16	2.19	777	29.54	1.5	6090	0.43	0.437	7.21×10^{-5}	6060	100
4IA90	2.20	760	29.63	1.5	6030	0.33[a]	0.405	7.21×10^{-5}	5620	93
4IB90	2.20	760	29.63	1.6	6030	0.48	0.443	7.21×10^{-5}	6140	102
5IA16	2.20	767	29.63	1.5	6060	0.43	0.435	7.21×10^{-5}	6030	100
5IB16	2.29	767	29.63	1.5	6180	0.42	0.428	7.21×10^{-5}	5940	96
5IB90-2	2.29	767	29.63	1.5	6180	0.44	0.445	7.21×10^{5}	6170	100
6IA16	2.35	777	29.62	1.0	6300	0.29	0.435	7.21×10^{-5}	6030	96
6IB16	2.35	777	29.62	1.5	6300	0.40	0.405	7.21×10^{-5}	5617	89

[a]Correction made for lack of final DGM reading.

SIZE-SPECIFIC PARTICULATE EMISSION FACTORS

Emission factors were calculated by applying the size distribution test results to the total particulate data results from the Level 2 testing. It was not possible to accurately measure flow inside the baghouse, therefore, the outlet gas flow rate is based strictly on calculations by RTI. Volumetric flow rate at the outlet of the baghouse was adjusted to by RTI include dilution air by consideration of the drop in stack gas temperature. The fume and emission factors presented in Table 9 based on tons produced were calculated by dividing the hourly emission factors by the average production rate recorded by GCA and RTI during the test period.

VISIBLE EMISSIONS DATA

All visible emissions observations were made in accordance with EPA Method 9. The field data sheets are provided in Appendix E-2. Visible emissions were recorded during the 3 days of the test program. The furnace shop roof monitor was observed for 3 hours, the baghouse outlet for 2 hours. A summary of the visible emissions data obtained is presented below.

On 26 January visible emissions from the casthouse were recorded for 124 minutes. During this time, which covered a complete tap to tap cycle, a total of four observations, or 1 minute of readings, were greater than 0 percent opacity. Operation of the floor fan was documented throughout the tap and emissions were observed blowing out the side of the building.

Visible emissions from the baghouse roof monitor were recorded on 27 January for 131 minutes. A total of 2.25 minutes of 5 percent opacity were observed, approximately 18 minutes of observations were interfered with by fugitive emissions from the raw materials handling station, and the rest of the observations were 0 percent opacity.

On 28 January, visible emissions were recorded again for the furnace shop roof monitor. A total of 55.5 minutes or 222 observations were recorded during the tapping cycle. Of these, 180 observations were between 0 to 25 percent opacity, 14 were between 30 to 50 percent opacity, 8 were between 55 to 75 percent opacity, and 20 were between 80 to 100 percent opacity. The floor fan was turned on about 20 minutes into the tap which corresponded to lower visible emissions observations since all of the readings greater than 50 percent occurred before the fan was turned on.

At no time during the testing period were visible emissions greater than 5 percent opacity observed originating from the baghouse compartments being tested. Capture efficiency of the canopy hood throughout the study, for all operations other than tapping, was close to 100 percent. Visible emissions originating from the furnace building could be attributed to mainly the tapping operation which occurs for about 50 minutes out of every 2 hours.

TABLE 9. SIZE SPECIFIC EMISSION FACTORS, ALAMET, SELMA, ALABAMA

Sampling location	Parameter	Particle aerodynamic diameter (d_{50} in μm)					
		∞[a]	15	10	5	2.5	1
Baghouse inlet	Cumulative % mass $<d_{50}$	100	86	81	74	70	57
	Cumulative lb $<d_{50}$/hr	1250	1075	1012	925	875	712
	Cumulative lb $<d_{50}$/ton silicon metal	872	750	706	645	610	497
Baghouse outlet	Cumulative % mass $<d_{50}$	100	92	84	68	56	38
	Cumulative lb $<d_{50}$/hr	43.4	39.9	36.5	29.5	24.3	16.5
	Cumulative lb $<d_{50}$/ton silicon metal	33.0	30.4	27.7	22.4	18.5	12.54

[a]Based on EPA Methods 1-5 "front half" test results.

FURNACE OPERATIONS DATA

A process observer recorded furnace operations and cycle times, as well as fluctuations in furnace fume generation. Capture efficiency of the canopy hood and tapping hood was also assessed. Tapping, stoking, charging, and blows, all cause heavier emissions than just the smelting process. During several taps the fumes escaping the tapping hood limited visibility in the furnace shop to less than 20 feet. Fumes generated by stoking were usually completely captured by the canopy hood. Occasionally the mix would spill out of the furnace and burn on the floor. Charging fumes varied in magnitude. Many times there was no noticeable increase in fume generation. Blows, (characterized by an intense white flare), resulted in a short burst of heavier fumes and more flames than normal.

The furnace was operating smoothly on 26 January 1981. On 27 and 28 January, the furnace was running rougher, however source personnel considered this operation still normal. Heavier tapping emissions were observed during this time also. Throughout the test period canopy hood capture of fumes was close to 100 percent, except on rare occasions when a heavy surge of fumes would escape the hood.

Capture efficiency of the tapping hood was estimated at about 60 percent. Sometimes a portable floor fan brought near the tap hole would be used to force emissions out the side of the building instead of letting them rise to the top of the furnace shop. The plant engineer informed the GCA process observer that the fan was primarily used to increase visibility in the taphole area. The operation of this floor fan had a direct effect on visible emissions observations as presented in the preceeding section.

On 26 January, Furnace No. 2 underwent electrode sounding from 11:30 a.m. to 12:00 p.m., in order to get an accurate measurement of the electrode lengths. This is accomplished by allowing the mix level to drop below the top of the furnace by not adding raw materials to the vessel. The electrode holders are then lifted so that the tips of the electrodes can be observed. After sounding the electrodes are lowered to their normal position and raw materials are added. Testing was not begun until after the furnace stabilized for about 2 hours.

Table 10 relates observed furnace emissions to the test runs on 28 January. The process observation data sheets notes appear in Appendix E-3 and E-4. During the test program, furnace power consumption as recorded on a chart in the control room was generally between 17 and 19.5 MW. Actual power consumption and kWh/ton is presented in Table 11. The average actual load on the furnace during the 3-day test period was 16.9 MW. Table 12 presents the daily charge composition for the 3-day test period and Table 13 presents the alloy analysis, tap weight, and tap temperature during the test period.

The product weight rate averaged about 33 ton/day with an average tap temperature of 2760°F.

TABLE 10. CORRELATION OF TEST RUNS TO FURNACE OPERATIONS AT FURNACE NO. 2, ALEMET, SELMA, ALABAMA

Date	Time	Impactor Run No.	Impactor particulate loading (mg/dscm)	Furnace operation
1/28/81	08:46	4IA90	729	Charging and tapping very heavy emissions
1/28/81	10:00	4IB90	1778	Charging--normal emissions
1/28/81	11:33	5IB16	960	Smelting--normal emissions
1/28/81	12:14	5IB90-2	1161	Smelting--normal emissions plus very light emissions from start of tapping
1/28/81	13:19	5IA16	1220	Charging--slightly heavier than normal
1/28/81	14:28	6IA16	3327	Tapping--heavy emissions
1/28/81	16:02	6IB16	1610	Smelting--normal emissions

TABLE 11. POWER CONSUMPTION OF FURNACE NO. 2 AT ALAMET

Date	Daily power consumption MWH[a]	Actual load MWH/hr[b]	Tons of product[c]	MWH/ton[c]
1/26/81	400	16.8	32.6	12.3
1/27/81	400	16.7	33.6	11.9
1/28/81	410	17.1	33.2	12.4
Average	403	16.9	33.1	12.2

[a]MWH = megawatt hours.

[b]Actual load is the daily power consumption divided by the number of hours the furnace was in operation.

[c]Based on actual production data.

TABLE 12. CHARGE COMPOSITION, NO. 2 FURNACE, ALAMET, SELMA, ALABAMA

Date	Charge materials										
	Gravel (Quartzite)		Wood chips		No. 1 coal		No. 2 coal		Petroleum coke		Total raw materials
	lbs	% comp	lbs	% comp	lbs	% comp	lbs	% comp	lbs	% comp	lbs
1/26/81	165,500	45.8	136,200	37.7	27,730	7.7	15,095	4.2	16,400	4.5	360,925
1/27/81	183,000	46.4	146,900	37.2	30,030	7.6	16,380	4.1	18,200	4.6	394,510
1/28/81	196,000	46.3	156,800	37.0	32,900	7.8	18,210	4.3	19,610	4.6	423,520
Average	181,500	46.2	146,633	37.3	30,223	7.7	16,558	4.2	18,067	4.6	392,985

TABLE 13. PRODUCTION AND METAL ANALYSIS DATA FOR FURNACE NO. 2 AT ALAMET, SELMA, ALABAMA

Date	Tap weight (lbs)[a]	Tap weight (tons)[a]	After O_2 refining				
			% Si	% Fe	% Ca	% Al	Temp °F
1/26/81	65,246	32.6	98.92	0.44	0.11	0.28	2757°
1/27/81	67,203	33.6	98.84	0.45	0.15	0.31	2760°
1/28/81	66,351	33.2	98.76	0.53	0.14	0.32	2763°
Average	66,267	33.1	98.84	0.47	0.13	0.30	2760°

[a]Data based on actual production, not on saleable product.

TABLE 14. DAILY AVERAGE OF BAGHOUSE PRESSURE, TEMPERATURE AND FAN AMPS, ALAMET, SELMA, ALABAMA

Date	Overall P (in. H_2O)	Temperature (°F)	Fan No. 1 (amps)	Fan No. 2 (amps)
1/26/81	4.3	297	179	184
1/27/81	5.5	274	185	186
1/28/81	6.1	282	182	187
Average	5.3	283	182	186

Baghouse Observations

Individual compartment pressures, overall pressure, temperature range and fan currents, were recorded in the field and are presented in Appendix E-3. Table 14 summarizes the data as follows.

On 26 January, the baghouse inlet pressure was 4.3 in. H_2O, which is less than the design pressure of 5 in. H_2O. This could be related to the electrode sounding and to the smoother operation of the furnace that day. Gas temperature to the baghouse inlet averaged 297°F which was the highest temperature observed during the test program. The average gas temperature at the baghouse on 27 January, 274°F was the lowest value, with an overall ΔP of 5.5 in. H_2O, just over design pressure. On 28 January, the average ΔP was 6.1 in. H_2O while the average temperature was 282°F.

Individual baghouse compartment pressures ranged from 0.0 during cleaning to about 6.5 in. H_2O. The cleaning cycle, actuated by a timer device, takes each compartment off line for 40 seconds every hour. Fan current did not vary much throughout the study, although the Fan No. 2 indicator read slightly higher than Fan No. 1.

On 28 January, several fabric filters broke in three baghouse compartments; Numbers 6, 8 and 9. These compartments were not being tested at this time so the sampling program continued without interruption. The compartments were isolated one at a time and repairs were completed within 2 hours.

The source provided design parameters for the baghouse and these data are presented in Table 15.

TABLE 15. BAGHOUSE CONTROL SYSTEM DESIGN PARAMETERS, ALAMET, SELMA, ALABAMA

BAGHOUSE

a. Manufacturer--Wheelabrator-Frye
b. Type or trade name--Continuous Automatic Type
c. Model No. 264, Series 8SR, Size No. 1227D
d. No. of compartments--12
e. Bags/compartment--324
f. Bag dimensions--264 in. x 8 in.
g. Total cloth area--178,860 ft^2

FAN

a. Manufacturer--U.S. Motors
b. Model No. 2, Clarage No. 21, RT Exhausters
c. Blade type--
d. Belt or direct drive--belt
e. Power rating--800 Hp each
f. Positive or negative pressure--Positive

FABRIC

a. Manufacturer--W.W. Criswell, Division of Wheelabrator-Frye
b. Material--Nomex "DUSTUBES"
c. Woven or felted--Woven
d. Weave--3:1 twill
e. Weight--
f. Permeability--
g. Operating temp. range--Max. 425°F
h. Surface treatment--None
i. Coating upon startup--Lime
j. Guaranteed life--None
k. Actual life--Approximately 18 months

CLEANING SYSTEM

a. Method--Shaker
b. Frequency--40 sec/hr/compartment
c. Actuated by--Timer
d. Anticollapse rings--None
e. Wire mesh cages--None

OPERATING PARAMETERS

a. Design volume flow rate--300,000 cfm
b. Design temperature--500°F

(continued)

TABLE 15 (continued)

c. Gross mass design efficiency--99.7 percent
d. Design inlet grain loading--1.58 gr/dscfm
e. Total power consumption--1.5 Kwh x 1000
f. Design air/cloth ratio--1.83 ft^3/ft^2 min
g. Design pressure (absolute)--20 in. W.C.
h. Design P (in. W.C.)--5 in. H_2O

MULTICLONE INFORMATION

a. Manufacturer--Western Precipitator
b. Model--12 VM 35, Size 198-11, "Multiclone" Collector with Spirocones"
c. Purpose--Spark trap

APPENDIX A

SAMPLE TRAIN CALIBRATIONS

Digimike Calibration

T. Epskm 1/13/81

	Terminal #	Hg (°F)	Digimike (°F)	Hg	Digi	Hg	Digi
Long Probe	1	32.0	24	64.0	64	164.8	158
	2	"	23	"	63	"	151
	3	"	24	"	64	"	157
	4	"	25	"	65	"	150
	5	"	26	"	65	"	163
	6	"	26	"	65	"	160
Short Probe	1	32.0	27	64.0	69	168.0	161
	2	"	"	"	69	"	162
	3	"	"	"	70	"	162
	4	"	"	"	70	"	161
	5	"	"	"	71	"	161
	6	"	"	"	70	"	161

PRECUTTER
Cyclone nozzels 1/9/81 Jelay

ID	inches	ID	inches
3.0 A	0.114	3.0 B	0.116
3.5 A	0.136	3.5 B	0.136
4.0 A	0.156	4.0 B	0.157
4.5 A	0.176	4.5 B	0.176
5.0 A	0.195	5.0 B	0.196
6.0 A	0.235	6.0 B	0.236
7.0 A	0.276	7.0 B	0.275
8.5 A	0.335	8.5 B	0.336
10.0 A	0.394	10.0 B	0.394
12.0 A	0.468	12.0 B	0.471
14.5 A	0.565	14.5 B	0.564

Cyclone nozzels 1/9/81 Joe Vay

ID	inches
3.0A	0.114
3.5A	0.136
4.0A	0.156
4.5A	0.176
6.0A	0.235
7.0A	0.276
8.5A	0.335
10.0A	0.394
12.0A	0.468
14.5A	0.565
5.0A	0.195
3.0B	0.116
3.5B	0.136
4.0B	0.157
4.5B	0.176
5.0B	0.197
6.0B	0.236
7.0B	0.275
8.5B	0.336
10.0B	0.394
12.0B	0.471
14.5B	0.564

Box - ORANGE

Measured 1/7/80 Joe Va.

Inches

wks	3A	
	3B	0.288
	3C	0.252
	3D	0.309
	3E	
	3F	0.496
s. rights	3G	0.130
	3H	0.187
	3I	0.250
	3J	0.313
	3K	0.374
	3L	0.501

Box 14
Measured 1/7/81 Joe Vay

		Inches	
hooks	2 A	0.127	
	2 B	0.182	damaged
	2 C	0.250	
	2 D	0.309	
	2 E	0.372	
	2 F	0.497	
straights	2 G	0.126	
	2 H		damaged
	2 I	0.250	
	2 J	~~0.374~~ 0.312	
	2 K	0.374	
	2 L	0.503	

Box South

Measured 1/7/[illegible] Joe Ley

hooks	1 A	0.127
	1 B	0.188
	1 C	0.252
	1 D	0.
	1 E	0.372
	1 F	0.496
straights	1 G	0.127
	1 H	[illegible]
	1 I	0.251
	1 J	0.312
	1 K	0.375
	1 L	0.498

GCA TECHNOLOGY DIVISION

SHEET ___ OF ___	
BY	T Epsdem
DATE	1/16/81
CH'K BY	
DATE CH'K	
D'K CH'K BY	

1619018

Selma / Alamet

Meter # V1

ΔH = 0.40

V_u = ~~5.00~~ 4.00

V_t = ~~5.055~~ 4.055

T_u = 63.7

T_t = 68.5

ψ = 10.87

P_b = 30.00

	V_D		
0	187.635	~~66~~ 67	70
2	188.575	~~66~~ 67	70
4	189.120	67	70
6	189.870	67	70
8	190.618	67	70
10	191.365	67	70
12	191.690	67	70
14			
16			
18			
20			
22			
24			
26			
28			
30			
32			
34			
36			

Y = ~~0.997~~ 0.995

$\Delta H_@$ = ~~1.037~~ 1.620

Q_a = ~~0.465~~ 0.373

C_c = ~~0.243~~ 0.243

Static ~ 0.05" Hg

1

TECHNOLOGY DIVISION

16180018

SHEET ___ OF ___

BY TR/SKM

DATE 1/16/81

CH'K BY ___

DATE CH'K. ___

B'K. CH'K BY ___

Calibration

8+

Meter # V_1

ΔH = 2.0

V_m = ~~10.00~~ 11.00

V_o 11.123

63.5

68.5

Y = 12.50

30.00

time	V_0	T_0	
0	194.870	67	70
2	196.500	67	70
4	198.140	67	70
6	199.770	67	70
8	201.422	67	70
10	203.058	67	70
12	204.692	67	70
14	205.993	67	70
16			
18			
20			
22			
24			
26			
28			
30			
32			
34			
36			

Y = 0.994

ΔH_a = 1.415

Q_a = 0.890

C_r = 1.217

TECHNOLOGY ... BEDFORD, MASSACHUSETTS ... TELEPHONE ... 9000

1618 OLY

Dry Gas Meter Calibration

BY: T. [illegible]
DATE: 1/15/81
CH'K. BY: [illegible]
DATE CH'K.: 1/15/81
B'K. CH'K. BY:

Meter # 7800017

ΔH = 0.40

V_w = 5.10

V_d = 5.168

T_w = 63.0

T_d = 61.0

ϕ = 10.78

P_b = 30.07

time	V_D	T_D in	out
0	559.580	62	60
2	840.535	62	60
4	841.490	62	60
6	842.460	62	60
8	843.410	62	60
10	844.370	62	60
12	844.748	62	60
14			
16			
18			
20			
22			
24			
26			
28			
30			
32			
34			
36			

Y = 0.982

$\Delta H_@$ = 0.989

Q_a = 0.479

C_r = 0.739

V_γ

leak check ✓ – 0

static – 0.08 " Hg

Meter # 2800017

$\Delta H = 0.20$

$V_w = 5.00$

$V_d = 5.063$

$T_w = 63.0$

$\bar{T}_d = 61.33$

$\phi = 14.66$

$P_b = 30.08$

time	V_D	T_D in	T_D out
0	849.861	60	62.5
2	850.548	60	62.5
4	851.235	60	62.5
6	851.930	60	62.5
8	852.625	60	62.5
10	~~854.0~~	60	62.5
12	854.015	60	63.0
14	854.700	60	63.0
16	854.924	60	63.0
18			62.67
20			
22			
24			
26			
28			
30			
32			
34			
36			

$Y = 0.984$

$\Delta H_a = 0.951$

$Q_a = 0.345$

$C_c = 0.120$

V_2

leak check ✓ – 0
static ~ 0.05 " Hg

[illegible]

SHEET	
BY	
DATE	
CH'K BY	
DATE CH'K	
EX. CH'K BY	

Dry Gas Meter Calibration

Meter # V3

ΔH = .3

V_w = 5.0

V_d = 5.120

T_w = 63.5

T_d = 65.0

ψ = 12.34

P_b = 30.03

time	V_d	T_d in	T_d out
0	371.632	65	65
2	372.46	65	65
4	373.29	65	65
6	374.12	65	65
8	374.95	65	65
10	375.00	65	65
12	376.61	65	65
14	376.752		
16			
18			
20			
22			
24			
26			
28			
30			
32			
34			
36			

Y = .979

$\Delta H_@$ = 1.007

Q_m = .415

C_t = .181

GCA/TECHNOLOGY DIVISION

SHEET ___ OF ___

SUBJECT: Dry Gas Meter Calibration

Meter # V3

ΔH: .4

V_w 5.0

V_d = 5.063

T_w 63.5

T_d 65

φ = 10.66

P_b = 30.03

Time	V_D	T_D	
0	365.550	66	65
2	366.46	65	65
4	367.42	65	65
6	368.38	65	65
8	369 33	65	65
10	370 29	65	65
12	370613		
14			
16			
18			
20			
22			
24			
26			
28			
30			
32			
34			
36			

Y = .989

$\Delta H_@$ = 1.002

Q_n = .475

C_c = .242

Alameb

Dry Gas Meter Calibration

V_{w_1} = 3.0

Meter # 1517948

ΔH = 2.0

V_w = 10.01

V_D = 10.37

T_w = 63.8 / 63.5

T_d = 64.17

Ø = 9.64 min

P_b = 30.02"

time	V_D	T_D in	out
0	354.101	65	64
2	355.264	65	64
4	358.402	65	63
6	360.500	65	63
8	362.720	65	63
10	364.473	65	63
12		65	63.33
14			
16			
18			
20			
22			
24			
26			
28			
30			
32			
34			
36			

Y = 0.962

$ΔH_a$ = 1.024

Q_a = 1.076

Q_s = 1.206

364.473
354.101
10.372

1

[illegible] SHEET [illegible]

BY B. Hobbs

DATE 1/15/81

CH'K BY

DATE CH'K

BK CH'K BY

I 618 018

Alcumet

Run # 28000'

ΔH = 0.4

V_m = 5.0 ✓

V_f = ~~6~~ 5.129

T_m = ~~64°~~ 63.85

T_s = 68.79

θ = 10.59 min

V_s = 30.07

Time	V_f		
0	305.321	69	67
2	306.298	69	68
4	307.278	69	68
6	308.228	69	69
8			
10	309.~~187~~	69	69
12	310.155	69	69
14	310.450	69	70
16			
18			
20		69	
22			
24			
26			
28			
30			
32			
34			
36			

V_4

Y 0.983

ΔH_a = 0.982

Q_a = 0.484

C_c = 0.243

static = 0.04 " H_2O

Leak check - 0.001 cfm/min

1618 018

BY T Epstein

DATE 1/15/81

CH'K BY

DATE CH'K.

B'K CH'K BY

[illegible] Meter Calibration

Meter # 280001[illegible]

ΔH = 2.0

V_{w} ~~10.0~~ 11.02

V_{d} 11.445

T_{w} 63.7

T_{d} 70

θ 10.38

P_{b} = 30.07

time	V_D	T_D in	out
0	312.535	70	70
2	314.725	70	70
4	316.930	70	70
6	319.125	70	70
8	321.325	70	70
10	323.980	70	70
12			
14			
16			
18			
20			
22			
24			
26			
28			
30			
32			
34			
36			

V_4

Y = 0.970

$\Delta H_{@}$ = 0.968

Q_{a} = 1.103

C_{c} = 1.218

Static 0.2 " Hg

APPENDIX B

PARTICLE SIZE DATA REDUCTION EXAMPLE CALCULATIONS

The field sampling and laboratory analysis data is reduced by programmable calculation to provide the following input to the SORI data reduction system:

1. Impactor identification (required to call up hardware information)
2. Fractional gas composition (CO_2, CO, N_2, O_2, H_2O)
3. Impactor flow rate (ACFM at stack conditions)
4. Stack pressure (inches of mercury)
5. Stack temperature (degrees Fahrenheit)
6. Gas temperature within impactor (degrees Fahrenheit)
7. Duration of sampling (minutes)
8. True density of particles (grams per cubic centimeter)
9. Maximum particle diameter present in sample (micrometers)
10. Masses of catches by stage (milligrams)

The following field data are also entered into the calculator to obtain the above input data:

- Barometric pressure (inches of mercury)
- Molecular weight of gas stream at meter (lb/lb-mole)
- Average static pressure at meter (inches of mercury)
- Average temperature at meter (°F)
- Water collected in condenser and silica gel (grams)

- Gas volume at meter (ft^3)
- Average stack static pressure, (inches of water)
- Average stack temperature (°F)
- Particulate mass collected in probe and expander section prior to top stage (grams)
- Particulate mass collected on each impactor stage (grams)
- Particulate mass on backup filter (grams)

The following calculations are performed by the calculator as a preliminary data check, however the results reported in the Appendix are the computer printouts detailing the calculations performed by the Data Reduction System developed by SoRI (EPA-600/7-78-042).

a. Total Mass Collected:

$$M_T = M_p + \sum_{L=t}^{b} M_s + M_f$$

where: M_T = total mass collected (grams)

M_p = mass collected in probe and impactor prior to top impactor stage (grams)

M_s = mass collected on impactor stage (grams)

L=t = corresponds to the top impactor stage

L=b = corresponds to the bottom impactor stage

M_f = mass collected on backup filter (grams)

b. Volume H_2O Vapor at STP:

where: V_{H_2O} = volume of water vapor @ STP (ft^3)

W = water collected (grams)

STP = 29.92 in. Hg and 70°F

c. Meter Volume at STP:

$$V_{ms} = V_m \left(\frac{P_b - P_m}{T_m + 460} \right) \left(\frac{530}{29.92} \right)$$

where: V_{ms} = meter volume @ STP (ft^3)

V_m = meter volume (ft^3)

P_b = barometric pressure ("Hg)

P_m = average static pressure at meter (-"Hg)

T_m = average meter temperature (°F)

d. Total Volume Sampled at STP, V_T (ft^3):

(1) Outlet impactor only

$$V_T = V_{H_2O} + V_{ms}$$

(2) Inlet impactor only

$$V_T = V_{ms}/F$$

where: F = dry gas fraction.

e. Percent Moisture, H_2O (%):

$$H_2O = (V_{H_2O}/V_T)\ (100)$$

f. Mass Concentration, C_m (grains/dscf):

$$C_m = (M_T/V_{ms})\ (15.43 \text{ grains/gram})$$

g. Volume Sampled at Stack Conditions:

$$V_s = V_T \left(\frac{T_s + 460}{P_b + P_s/13.596} \right) \left(\frac{29.92}{530} \right)$$

where: V_s = volume sampled at stack conditions (ft^3)

T_s = average stack temperature (°F).

P_s = average stack static pressure (+ "H_2O)

h. Impactor Flow Rate:

$$Q_I = V_s/t$$

where: Q_I = impactor flow rate (acfm)

t = time (minutes)

i. Impactor Stage Size Cutoffs:

$$d_{pca} = \left(\frac{0.135\ \pi \mu g\ d_c^{\ 3}\ N\ K_{p50}}{Q\ (10^{-8})} \right)^{1/2}$$

with $d_{pca} = dp\ (C\ \rho p)^{1/2}\ 10^4$

and $C' = 1 + \frac{2\lambda}{dp}\ [1.257 + 0.40\ \exp\ (^{1}-1.10\ dp/2\lambda)\ ]$

where: C' = Cunningham slip correction factor

λ = mean free path of gas molecules, cm

d_p = particle diameter, cm

ρp = particle density, g/cm^3

d_{pca} = cut diameter, m $(g/cm^3)^{1/2}$

μg = gas viscosity, g/cm-sec

dc = jet diameter, cm

N = number of jets in an impaction stage

K_{p50} = inertial impaction cut parameter at 50 percent efficiency*

Q = total flow rate, l/min

j. Percent Mass Collected on Backup Filter, P_F (%)

$$P_F = (M_f/M_T)\ 100$$

k. Percent Mass Collected on Each Impactor Stage, P_I (%)

$$P_I = (M_s/M_T)\ 100$$

l. Percent Mass Collected in Probe and Impactor Prior to Top Impactor Stage, P_p (%)

$$P_p = (M_p/M_T)\ 100$$

m. Cumulative Percent Mass $\leq$ Stage Cutoff Diameter for Each Impactor Stage, C_{pn} (%)

$$C_{pn} = \sum_{L=b}^{n=1} P_I + P_F$$

where: L=b = corresponds to the bottom impactor stage

L=n = corresponds to the impactor stage of interest

n. <u>dM/d Log D (grains/dscf)</u>:

$$dM/d\ \log D = \frac{(P_I/100)\ C_m}{(\log D_{s+1}) - (\log D_s)}$$

where: P_I = percent mass collected on a particular stage s (%)

o. Geometric Mean Diameter, D_M (μm):

$$D_M = \sqrt{D_{s+1} \times D_s}$$

---

*d_{50} from manufacturers calibration curves.

APPENDIX C

TOTAL PARTICULATE EXAMPLE CALCULATIONS (BY RTI)

Alamet

Baghouse Inlet

See Table for my calculated Results

A. Concentrations in gas

My data given in mg/dsm^3 correspond to previous data given to you (multiply my number by 0.028316847 - convert m^{-3} to ft^{-3} - to get result in $mg/dscf$)

I checked these and they agree.

B. generated per hour

Calculated by:

$(1 \times 10^{-6} \frac{Kg}{mg})$ (Conc. in gas, mg/dsm^3)(gas flowrate, dscf/min)(60 min/hr)(0.028316847)

Run #1

$(1\times10^{-6})(701.3)(256,840)(60)(0.028316847) = 306.0\ Kg/hr = 674.6\ lb/hr$

Run #2 $(1\times10^{-6})(1265.3)(273,614)(60)(0.028\ldots) = 588.2\ Kg/hr = 1,296.8\ lb/hr$

Run #3 $(1\times10^{-6})(1281.5)(264,091)(60)(0.028\ldots) = 803.8\ Kg/hr = 1,772.2\ lb/hr$

Run #4 $(10^{-6})(801.6)(270,190)(60)(0.028\ldots) = 368.0\ Kg/hr = 811.3\ lb/hr$

Run #5 $(10^{-6})(840.1)(272,349)(60)(0.028\ldots) = 388.7\ Kg/hr = 857.0\ lb/hr$

Run #6 $(10^{-6})(2019.5)(276,300)(60)(0.028\ldots) = 948.2\ Kg/hr = 2090.4\ lb/hr$

Avg = 567.2 , 1,250.4

C. Avg load during test

	Meter reading at		Meter Reading at		MW-hr in hours		$\frac{MW\text{-}hr}{hr}$
Run #1	42198	1315	42241	1549	43	2.566	16.75
2	42517	0812	42612	1354	95	5.7	16.67
3	42612	1354	42658	1632	46	2.63	17.47
4	42926	0830	42958	1018	32	1.8	17.78
5	42972	1112	43009	1321	37	2.15	17.21
6	43009	1321	43052	1544	43	2.38	18.07

D. Calculate = generated / mw-hr

Divide amount generated / hr by Avg load

Example Run #1 306.0 ÷ 16.75 = 18.27 Kg / mw-hr
or 40.28 lb / mw-hr

Avg for 6 runs = 32.55 Kg / mw-hr or 71.77 lb / hr
MW

E. Calculate Kg generated / Mg feed

Method: Divide total mg fed on shift by total operating hours on shift to get rate / hour. Divide this into Kg particulate generated / hour to get result. If test run overlap two shifts: first determine mg fed / hour on each shift. Then proration this according to length of test on each shift to get average mg fed per hour during test.

Run #1 7-3 shift 39,708 Kg fed in 7 hours 46 minutes
Thus: 5112.6 Kg / operating hour
on 3-11 shift 67,447 Kg fed in 8.0 hours
Thus: 8430.9 Kg / hour
Run time was 1335 to 1525 yielding 1 hour 25 minutes
on 7-3 shift and 25 min on 7-11 shift
Mg fed from 1335 → 1500 = $1\frac{25}{60}$ × 5112.6 = 7242.85
1500 → 1525 = $\frac{25}{60}$ × 8430.9 = 3512.88
Total fed during test = 10755.73
or 10,755.23 ÷ $1\frac{50}{60}$ = 5866.76 Kg / hour = 12,934 lbs / hr = 6.467 tons / hr } during test

306.0 Kg particulate generated / hour ÷ 5.86676 Mg / hr
= 52.2 Kg / Mg
= 104.3 lbs / ton

I come up with the following mg feed rate for other runs

Run 2	6927.5 Kg / hour	=	15,272.5 lb / hr
3	7571.8 " "	=	16,692.96 " "
4	7331.25 " "	=	16,162.64 " "
5	7331.25 " "	=	16,162.64 " "
6	8023.125 " "	=	17,687.96 " "

F. Calculate Kg / Mg alloy tapped

Method: Divide total amount tapped for entire day by total MW-hrs for day to get average amount of alloy produced per mw-hr. Multiply this by average MW load during test to get alloy produced/hr during test. Divide this number into Kg of particulate generated per hour.

Run NO. 1

29,596 Kg alloy (65,246 lbs) produced on 1/26/81
power consumption 24 hours - midnight to midnight
400 mw-hrs
gives 73.99 Kg alloy / mw-hr

73.99 × 16.75 MW load = 1239.33 Kg alloy/hour during test.
306 ÷ 1.23933 Mg alloy = 246.9 Kg particulate / Mg alloy
= 493.8 lbs / ton

Run NO. 2

30,483 Kg alloy ÷ 400 mw hrs = 76.21 Kg prod / mw-hr
76.21 × 16.67 MW load = 1270.37 Kg / hour
588.2 ÷ 1.27037 = 463 Kg particulate / Mg alloy
= 926 lbs / ton

Run 3 (30,483 ÷ 400)(17.47) = 1.33139 Mg alloy / hr
803.8 ÷ 1.33... = 604 Kg / Mg
= 1207 lb / ton

4 30,096.3 ÷ 410 = 73.406 Kg / MW-hr × 17.78 mw-hr =
1305.15 Kg / hour
368 ÷ 1.30515 = 282 Kg / Mg
= 564 lb / ton

5 73.406 Kg / mw-hr × 17.21 = 1263.31 Kg alloy / hr
388.7 ÷ 1.26331 = 308 Kg / Mg
615 lb / ton

6 73.406 × 18.07 = 1326.45 Kg / hr
948.2 ÷ 1.32645 = 715 Kg / Mg
= 1430 lb / ton

Baghouse outlet Blanket

A. First determine baghouse exhaust gas flowrate

Baghouse exhaust flowrate is sum of inlet gas flow rate and air drawn into baghouse through cooling air grates in bottom of baghouse.

Method: Calculate from inlet gas temp, outlet gas temp, and ambient temp (assumes no heat loss)

(Inlet temp)(Inlet flowrate) + (Ambient temp)(ambient air drawn in) = (sum inlet and ambient flowrate) (outlet temp)

sum inlet and ambient flowrate = outlet flowrate

ie $(T_i)(F_i) + (T_A)(F_A) = (F_A + F_i)T_O$

or $\frac{(T_i - T_O)}{(T_O - T_A)} F_i = F_A$

Ambient air temp 60°F (Since using ratio don't need to convert to °R)

Run #1 $\frac{(322 - 246)}{(246 - 60)} F_i = F_A$

$0.41 F_i = F_A$, ie Ambient air drawn in equal to 41% of inlet gas flow rate

Run #2 $\frac{(308 - 248)}{(248 - 60)} F_i = F_A$

$0.32 F_i = F_A$

Run #3 $\frac{(317 - 227)}{(227 - 60)} F_i = F_A$

$0.54 F_i = F_A$

Run #4 $\frac{(300 - 209)}{(209 - 60)} F_i = F_A$

$0.61 F_i = F_A$

Run #5 $\frac{(317 - 236)}{(236 - 60)} F_i = F_A$

$0.46 F_i = F_A$

Rather than use individual data I used Avg for the 5 runs is

$0.468 F_i = F_A$

Thus, multiply inlet flow rate by 1.468 to get outlet flow rate.

Roundoffs

Run #1	1.468 ×	256,840 dscfm	=	377041	=	10,670 dscm/min
Run #2	" "	273,614 "	=	401665	=	11,340
Run #3	" "	264,091 "	=	387686	=	10,980
Run #4	" "	274,190 "	=	396639	=	11,230
Run #5	" "	272,349 "	=	399808	=	11,400

B. Cones in gas - My data (in mg/dscm) agree (within rounding error) to data given to you on previously

C. Emitted / hour

See (B) inlet for calc method
& calc. using rounded dscm/min figures above and conc in mg/dscm

D. Avg Load during Test

Run No	meter	at	meter	at	MW-hr	in hours	Avg load MW-hr/hr
1	42198	1315	42268	1707	70	3.866	18.10
2	42577	0812	42612	1354	95	5.7	16.67
3	42612	1354	42671	1716	59	3.366	17.52
4	42926	0830	42989	1207	63	3.6166	17.42
5	42989	1207	43052	1544	63	3.6166	17.42

E. Emitted / MW-hr

Divide Kg emitted by Avg load

F. Calc. same as in E for inlet

Now calc the following feedrate during test

Run 1 = 6.7426 Mg/hr
2 = 6.9275
3 = 7.91643
4 = 7.33125
5 = 7.5821

G. Use same Kg alloy/MW-hr as in F for inlet and same Calc. methods

Run #1 73.99 Kg alloy/MW-hr
2 76.21 " "
3 76.21 " "
4 73.4 " "
5 73. " "

APPENDIX D-1

CASCADE IMPACTOR DATA REDUCTION SYSTEM PRINTOUTS, BAGHOUSE INLET

"COMPARE" output for all inlet impactor runs

```
DATA COMPARISON FOR   13 INLET  RUNS BY GCA
STD. PT.     DM/DLOGD  CUMULATIVE          CUM. % MASS < D50
(MICRONS)    (MG/DNCM) MASS < D50   AVG.     STD. DEV.    MIN.       MAX.
 1   20.00   1.28E+03  1.19E+03     97.04      15.47      59.89      112.86
 2   15.00   4.76E+02  1.09E+03     86.54      16.59      45.88      102.31
 3   10.00   2.80E+02  1.03E+03     80.80      16.46      44.35       98.80
 4    5.00   1.60E+02  9.66E+02     74.36      16.31      42.97       96.82
 5    2.50   2.05E+02  9.14E+02     69.68      17.90      41.03       94.91
 6    1.25   5.41E+02  8.23E+02     62.04      19.10      37.50       90.39
 7    1.00   1.16E+03  7.43E+02     56.64      18.30      32.33       83.50
THE RUNS MARKED WITH AN ◆ APPEAR TO CONTAIN OUTLIERS

TEST SITE      ALAM       ALAM       ALAM       ALAM       ALAM       ALAM       ALAM
TFS DATE      12681      12681      12681      12681      12681      12681      12681
RUN NUMBER     1◆         2◆          3          4◆         5◆         6◆         7
RUN DATE      12681      12681      12781      12781      12781      12781      12881
START TIME     1410       1515        920        952       1552       1405        846
TOTAL MASS 2.569E+02  1.898E+02  5.482E+02  2.255E+03  4.692E+03  2.454E+03  7.920E+02

DMDLOGD IN STANDARD INTERVALS (MG/DNCM)
 1   20.00  3.19E+02◆ 1.54E+02◆ 8.23E+02  2.23E+03◆ 1.89E+03  2.30E+03◆ 7.84E+02
 2   15.00  1.43E+02◆ 6.34E+01◆ 1.86E+02  5.45E+02  3.90E+02  8.99E+02◆ 3.71E+02
 3   10.00  2.25E+01  3.24E+01  1.17E+01  1.25E+01  9.09E+02◆ 9.61E+01  2.48E+02
 4    5.00  2.21E+00  2.08E+01  2.58E+01 -5.18E+01◆ 1.54E+01  5.22E+02◆ 1.07E+02
 5    2.50  1.20E+01◆-8.41E+00◆ 3.41E+01  6.25E+01  2.89E+02  6.09E+02◆ 1.50E+02
 6    1.25  1.24E+02  4.85E+01  6.52E+01  5.98E+02  2.62E+03◆ 8.10E+02  3.91E+02
 7    1.00  2.13E+02  8.44E+01  1.11E+02  1.27E+03  5.98E+03◆ 1.39E+03  6.10E+02

TEST SITE      ALAM       ALAM       ALAM       ALAM       ALAM       ALAM
TFST DATE     12681      12681      12681      12681      12681      12681
RUN NUMBER     8◆         9◆         10◆        11         12◆        13
IUN DATE      12881      12881      12881      12881      12881      12881
START TIME     1000       1319       1133       1214       1428       1602
TOTAL MASS 1.779E+03  1.221E+03  9.651E+02  1.161E+03  3.325E+03  1.609E+03

DM/DLOGD IN STANDARD INTERVALS (MG/DNCM)
 1   20.00  1.51E+03  1.22E+03  7.28E+02  1.04E+03  2.31E+03◆ 1.34E+03
 2   15.00  1.01E+03◆ 9.71E+02◆ 6.22E+02  5.29E+02  2.90E+02  1.70E+02
 3   10.00  6.64E+02◆ 3.48E+02  4.80E+02  4.72E+02  1.36E+02  2.10E+02
 4    5.00  3.67E+02◆ 5.23E+02◆ 2.14E+02  1.25E+02  1.25E+02  8.06E+01
 5    2.50  3.28E+02  2.03E+02  4.53E+02◆ 1.52E+02  1.95E+02  1.72E+02
 6    1.25  3.37E+02  5.05E+01  4.30E+02  3.95E+02  8.15E+02  3.50E+02
 7    1.00  7.70E+02  2.61E+02  4.11E+02  4.89E+02  2.99E+03◆ 5.40E+02

THE VALUES MARKED BY AN ◆ APPEAR TO BE OUTLIERS
```

PARTICULATE DATA REDUCTION AND ENTRY SYSTEM 05/19/82 16:14:30
DATA FOR TEST BY CONTRACTOR GCA , AT SITE ALAM, ON DATE 12681, RUN NO. 1
TEST COMMENTS: IP TEST OF FERROSILICON FURNACE--ALAMET,SELMA,ALABAMA
RUN COMMENTS: 1-I-B-16

IMPACTOR DESCRIPTION AND CALIBRATION

TYPE: ANDERSEN PLATE SET ID: 7
MODEL: MARK 3 IMPACTOR DP SCALING FACTOR: 1.287

STAGE	NO.JETS	DIAM.	CUMDP	CALIB
1	264	.1640	.0000	.3808
2	264	.1250	.0000	.3808
3	264	.0950	.0000	.3808
4	264	.0760	.0000	.3808
5	264	.0670	.0000	.3808
6	264	.0360	.1760	.3808
7	264	.0260	.2940	.3808
8	156	.0250	1.0000	.3808

IMPACTOR FLOWRATE = .557 ACFM IMPACTOR TEMPERATURE = 322.0 F (161.1 C) SAMPLING DURATION = 2.00 MIN

IMPACTOR PRESSURE DROP = .431 IN. OF HG STACK TEMPERATURE = 322.0 F (161.1 C) STACK PRESSURE = 29.63 INCHES OF HG

DRY GAS COMPOSITION (PERCENT) CO2 = .30 CO = .10 N2 = 78.00 O2 = 21.00 H2O = 2.60

CALC. MASS LOADING = 7.3324-002 GR/ACF 1.1225-001 GR/DNCF 1.6779+002 MG/ACM 2.5686+002 MG/DNCM

AERODYNAMIC DIAMETERS ARE CALCULATED HERE ACCORDING TO THE TASK GROUP ON LUNG DYNAMICS.

ASSUMED PARTICLE DENSITY = 1.00GM/CU.CM. MAX. PARTICLE DIAMETER = 35.0 MICRONS

IMPACTOR STAGE STAGE INDEX NO.	CYCLONE 1	S1 2	S2 3	S3 4	S4 5	S5 6	S6 7	S7 8	S8 9	FILTER 10
D50 (MICRONS)	16.00	14.55	9.64	6.34	4.50	3.71	1.38	.80	.54	.54/2.0
MASS (MG)	1.89	.00	.18	.00	.11	.00	.27	.78	1.11	.95
MG/DNCM/STAGE	9.17+001	4.85-002	8.74+000	4.85-002	5.34+000	4.85-002	1.31+001	3.79+001	5.39+001	4.61+001
CUM. % OF MASS < D50	60.77	60.75	57.02	56.99	54.71	54.69	49.09	32.90	9.86	
CUM. MASS (MG/ACM) < D50	9.28+001	9.28+001	8.71+001	8.70+001	8.36+001	8.35+001	7.50+001	5.02+001	1.51+001	
CUM. MASS (MG/DNCM) < D50	1.42+002	1.42+002	1.33+002	1.33+002	1.28+002	1.28+002	1.15+002	7.69+001	2.31+001	
CUM. MASS (GR/ACF) < D50	4.06-002	4.05-002	3.81-002	3.80-002	3.65-002	3.65-002	3.28-002	2.20-002	6.58-003	
CUM. MASS (GR/DNCF) < D50	6.21-002	6.21-002	5.83-002	5.82-002	5.59-002	5.59-002	5.02-002	3.36-002	1.01-002	
GEO. MEAN DIA.(MICRONS)	2.37+001	1.53+001	1.18+001	7.82+000	5.35+000	4.09+000	2.26+000	1.05+000	6.61-001	3.85-001
DM/DLOGD (MG/DNCM)	2.70+002	1.18+000	4.88+001	2.67-001	3.59+001	5.73-001	3.06+001	1.60+002	3.20+002	1.53+002
DN/DLOGD (NUMBER/DNCM)	3.89+007	6.34+005	5.61+007	1.07+006	4.48+008	1.61+007	5.04+009	2.61+011	2.12+012	5.13+012

PARTICULATE DATA REDUCTION AND ENTRY SYSTEM 05/19/82 16:14:30
DATA FOR TEST BY CONTRACTOR GCA , AT SITE ALAM, ON DATE 12681, RUN NO. 2
TEST COMMENTS: IP TEST OF FERROSILICON FURNACE--ALAMET,SELMA,ALABAMA
RUN COMMENTS: 1-1-A-16

IMPACTOR DESCRIPTION AND CALIBRATION

TYPE: ANDERSEN PLATE SET ID: 7
MODEL: MARK 3 IMPACTOR DP SCALING FACTOR: 1.287

STAGE	NO.JETS	DIAM.	CUMDP	CALIB
1	264	.1640	.0000	.3808
2	264	.1250	.0000	.3808
3	264	.0950	.0000	.3808
4	264	.0760	.0000	.3808
5	264	.0670	.0000	.3808
6	264	.0360	.1760	.3808
7	264	.0260	.2940	.3808
8	156	.0250	1.0000	.3808

IMPACTOR FLOWRATE = .580 ACFM IMPACTOR TEMPERATURE = 322.0 F (161.1 C) SAMPLING DURATION = 2.00 MIN

IMPACTOR PRESSURE DROP = .467 IN. OF HG STACK TEMPERATURE = 322.0 F (161.1 C) STACK PRESSURE = 29.63 INCHES OF HG

DRY GAS COMPOSITION (PERCENT) CO2 = .30 CO = .10 N2 = 78.00 O2 = 21.00 H2O = 2.60

CALC. MASS LOADING = 5.4186-002 GR/ACF 8.2949-002 GR/DNCF 1.2400+002 MG/ACM 1.8982+002 MG/DNCM

AERODYNAMIC DIAMETERS ARE CALCULATED HERE ACCORDING TO THE TASK GROUP ON LUNG DYNAMICS.

ASSUMED PARTICLE DENSITY = 1.00GM/CU.CM. MAX. PARTICLE DIAMETER = 35.0 MICRONS

IMPACTOR STAGE	CYCLONE	S1	S2	S3	S4	S5	S6	S7	S8	FILTER
STAGE INDEX NO.	1	2	3	4	5	6	7	8	9	10
D50 (MICRONS)	16.00	14.26	9.45	6.21	4.41	3.63	1.35	.78	.53	.53/2.0
MASS (MG)	.00	.02	.00	.29	.13	.00	.15	.36	.74	2.38
MG/DNCM/STAGE	4.66-002	9.32-001	4.66-002	1.35+001	6.06+000	4.66-002	6.99+000	1.68+001	3.45+001	1.11+002
CUM. % OF MASS < D50	99.97	99.27	99.24	89.18	84.67	84.63	79.43	66.94	41.28	
CUM. MASS (MG/ACM) < D50	8.77+001	8.71+001	8.71+001	7.83+001	7.43+001	7.43+001	6.97+001	5.88+001	3.62+001	
CUM. MASS (MG/DNCM) < D50	1.34+002	1.33+002	1.33+002	1.20+002	1.14+002	1.14+002	1.07+002	8.99+001	5.55+001	
CUM. MASS (GR/ACF) < D50	3.83-002	3.81-002	3.81-002	3.42-002	3.25-002	3.25-002	3.05-002	2.57-002	1.58-002	
CUM. MASS (GR/DNCF) < D50	5.87-002	5.83-002	5.83-002	5.24-002	4.97-002	4.97-002	4.66-002	3.93-002	2.42-002	
GEO. MEAN DIA.(MICRONS)	2.37+001	1.51+001	1.16+001	7.66+000	5.24+000	4.00+000	2.22+000	1.03+000	6.45-001	3.75-001
DM/DLOGD (MG/DNCM)	1.37-001	1.86+001	2.61-001	7.44+001	4.07+001	5.50-001	1.63+001	7.07+001	2.04+002	3.68+002
DN/DLOGD (NUMBER/DNCM)	1.98+004	1.03+007	3.18+005	3.16+008	5.41+008	1.64+007	2.86+009	1.24+011	1.45+012	1.33+013

PARTICULATE DATA REDUCTION AND ENTRY SYSTEM 05/19/82 16:14:30
DATA FOR TEST BY CONTRACTOR GCA , AT SITE ALAM, ON DATE 12681, RUN NO. 3
TEST COMMENTS: IP TEST OF FERROSILICON FURNACE--ALAMET,SELMA,ALABAMA
RUN COMMENTS: 2-1-A 90

IMPACTOR DESCRIPTION AND CALIBRATION

TYPE: ANDERSEN PLATE SET ID: 7
MODEL: MARK 3 IMPACTOR DP SCALING FACTOR: 1.287

STAGE	NO.JETS	DIAM.	CUMDP	CALIB
1	264	.1640	.0000	.3808
2	264	.1250	.0000	.3808
3	264	.0950	.0000	.3808
4	264	.0760	.0000	.3808
5	264	.0670	.0000	.3808
6	264	.0360	.1760	.3808
7	264	.0260	.2940	.3808
8	156	.0250	1.0000	.3808

IMPACTOR FLOWRATE = .505 ACFM IMPACTOR TEMPERATURE = 308.0 F (153.3 C) SAMPLING DURATION = 3.30 MIN

IMPACTOR PRESSURE DROP = .359 IN. OF HG STACK TEMPERATURE = 308.0 F (153.3 C) STACK PRESSURE = 29.53 INCHES OF HG

DRY GAS COMPOSITION (PERCENT) CO2 = .30 CO = .10 N2 = 78.00 O2 = 21.00 H2O = 2.60

CALC. MASS LOADING = 1.5882-001 GR/ACF 2.3958-001 GR/DNCF 3.6344+002 MG/ACM 5.4825+002 MG/DNCM

AERODYNAMIC DIAMETERS ARE CALCULATED HERE ACCORDING TO THE TASK GROUP ON LUNG DYNAMICS.

ASSUMED PARTICLE DENSITY = 1.00GM/CU.CM. MAX. PARTICLE DIAMETER = 35.0 MICRONS

IMPACTOR STAGE STAGE INDEX NO.	CYCLONE 1	S1 2	S2 3	S3 4	S4 5	S5 6	S6 7	S7 8	S8 9	FILTER 10
D50 (MICRONS)	17.00	15.19	10.07	6.63	4.71	3.88	1.45	.84	.58	.58/2.0
MASS (MG)	7.62	.00	.06	.09	.15	.32	.31	.55	1.36	6.69
MG/DNCM/STAGE	2.44+002	3.20-002	1.92+000	2.88+000	4.79+000	1.02+001	9.91+000	1.76+001	4.35+001	2.14+002
CUM. % OF MASS < D50	44.81	44.80	44.36	43.71	42.63	40.31	38.06	34.08	24.23	
CUM. MASS (MG/ACM) < D50	1.31+002	1.31+002	1.30+002	1.28+002	1.25+002	1.18+002	1.11+002	9.97+001	7.09+001	
CUM. MASS (MG/DNCM) < D50	1.98+002	1.98+002	1.96+002	1.93+002	1.88+002	1.78+002	1.68+002	1.50+002	1.07+002	
CUM. MASS (GR/ACF) < D50	5.73-002	5.73-002	5.67-002	5.59-002	5.45-002	5.15-002	4.87-002	4.36-002	3.10-002	
CUM. MASS (GR/DNCF) < D50	8.64-002	8.64-002	8.56-002	8.43-002	8.22-002	7.77-002	7.34-002	6.57-002	4.67-002	
GEO. MEAN DIA.(MICRONS)	2.44+001	1.61+001	1.24+001	8.17+000	5.59+000	4.27+000	2.37+000	1.11+000	6.98-001	4.08-001
DM/DLOGD (MG/DNCM)	7.77+002	6.55-001	1.07+001	1.58+001	3.23+001	1.21+002	2.32+001	7.48+001	2.62+002	7.10+002
DN/DLOGD (NUMBER/DNCM)	1.02+008	3.01+005	1.08+007	5.55+007	3.54+008	2.97+009	3.33+009	1.05+011	1.47+012	2.00+013

PARTICULATE DATA REDUCTION AND ENTRY SYSTEM 05/19/82 16:14:30
DATA FOR TEST BY CONTRACTOR GCA , AT SITE ALAM, ON DATE 12681, RUN NO. 4
TEST COMMENTS: IP TEST OF FERROSILICON FURNACE--ALAMET,SELMA,ALABAMA
RUN COMMENTS: 2-I-B-90

IMPACTOR DESCRIPTION AND CALIBRATION

TYPE: ANDERSEN PLATE SET ID: 7
MODEL: MARK 3 IMPACTOR DP SCALING FACTOR: 1.287

STAGE	NO.JETS	DIAM.	CUMDP	CALIB
1	264	.1640	.0000	.3808
2	264	.1250	.0000	.3808
3	264	.0950	.0000	.3808
4	264	.0760	.0000	.3808
5	264	.0670	.0000	.3808
6	264	.0360	.1760	.3808
7	264	.0260	.2940	.3808
8	156	.0250	1.0000	.3808

IMPACTOR FLOWRATE = .489 ACFM IMPACTOR TEMPERATURE = 308.0 F (153.3 C) SAMPLING DURATION = 3.00 MIN

IMPACTOR PRESSURE DROP = .339 IN. OF HG STACK TEMPERATURE = 308.0 F (153.3 C) STACK PRESSURE = 29.53 INCHES OF HG

DRY GAS COMPOSITION (PERCENT) CO2 = .30 CO = .10 N2 = 78.00 O2 = 21.00 H2O = 1.20

CALC. MASS LOADING = 6.6276-001 GR/ACF 9.8559-001 GR/DNCF 1.5166+003 MG/ACM 2.2554+003 MG/DNCM

AERODYNAMIC DIAMETERS ARE CALCULATED HERE ACCORDING TO THE TASK GROUP ON LUNG DYNAMICS.

ASSUMED PARTICLE DENSITY = 1.00GM/CU.CM. MAX. PARTICLE DIAMETER = 35.0 MICRONS

IMPACTOR STAGE / STAGE INDEX NO.	CYCLONE 1	S1 2	S2 3	S3 4	S4 5	S5 6	S6 7	S7 8	S8 9	FILTER 10
D50 (MICRONS)	17.00	15.48	10.26	6.76	4.80	3.95	1.48	.86	.59	.59/2.0
MASS (MG)	2.60	.00	.00	.08	.31	.60	1.19	4.66	13.56	40.00
MG/DNCM/STAGE	9.31+001	3.58-002	3.58-002	2.86+000	1.11+001	2.15+001	4.26+001	1.67+002	4.85+002	1.43+003
CUM. % OF MASS < D50	93.95	93.95	93.95	93.76	93.04	91.65	88.88	78.04	46.51	
CUM. MASS (MG/ACM) < D50	9.73+002	9.73+002	9.73+002	9.71+002	9.63+002	9.49+002	9.20+002	8.08+002	4.81+002	
CUM. MASS (MG/DNCM) < D50	1.45+003	1.45+003	1.45+003	1.44+003	1.43+003	1.41+003	1.37+003	1.20+003	7.16+002	
CUM. MASS (GR/ACF) < D50	4.25-001	4.25-001	4.25-001	4.24-001	4.21-001	4.15-001	4.02-001	3.53-001	2.10-001	
CUM. MASS (GR/DNCF) < D50	6.32-001	6.32-001	6.32-001	6.31-001	6.26-001	6.17-001	5.98-001	5.25-001	3.13-001	
GEO. MEAN DIA.(MICRONS)	2.44+001	1.62+001	1.26+001	8.33+000	5.69+000	4.35+000	2.42+000	1.13+000	7.13-001	4.17-001
DM/DLOGD (MG/DNCM)	2.97+002	8.81-001	2.00-001	1.58+001	7.47+001	2.54+002	1.00+002	7.11+002	2.94+003	4.76+003
DN/DLOGD (NUMBER/DNCM)	3.91+007	3.94+005	1.91+005	5.22+007	7.73+008	5.89+009	1.35+010	9.40+011	1.54+013	1.25+014

PARTICULATE DATA REDUCTION AND ENTRY SYSTEM 05/19/82 16:14:30
DATA FOR TEST BY CONTRACTOR GCA , AT SITE ALAM, ON DATE 12681, RUN NO. 5
TEST COMMENTS: IP TEST OF FERROSILICON FURNACE--ALAMET,SELMA,ALABAMA
RUN COMMENTS: 3 I A 16-2

IMPACTOR DESCRIPTION AND CALIBRATION

TYPE: ANDERSEN PLATE SET ID: 7
MODEL: MARK 3 IMPACTOR DP SCALING FACTOR: 1.287

STAGE	NO.JETS	DIAM.	CUMDP	CALIB
1	264	.1640	.0000	.3808
2	264	.1250	.0000	.3808
3	264	.0950	.0000	.3808
4	264	.0760	.0000	.3808
5	264	.0670	.0000	.3808
6	264	.0360	.1760	.3808
7	264	.0260	.2940	.3808
8	156	.0250	1.0000	.3808

IMPACTOR FLOWRATE = .324 ACFM IMPACTOR TEMPERATURE = 317.0 F (158.3 C) SAMPLING DURATION = 1.50 MIN

IMPACTOR PRESSURE DROP = .146 IN. OF HG STACK TEMPERATURE = 317.0 F (158.3 C) STACK PRESSURE = 29.54 INCHES OF HG

DRY GAS COMPOSITION (PERCENT) CO2 = .30 CO = .10 N2 = 78.00 O2 = 21.00 H2O = 2.20

CALC. MASS LOADING = 1.3496+000 GR/ACF 2.0506+000 GR/DNCF 3.0883+003 MG/ACM 4.6924+003 MG/DNCM

AERODYNAMIC DIAMETERS ARE CALCULATED HERE ACCORDING TO THE TASK GROUP ON LUNG DYNAMICS.

ASSUMED PARTICLE DENSITY = 1.00GM/CU.CM. MAX. PARTICLE DIAMETER = 35.0 MICRONS

IMPACTOR STAGE / STAGE INDEX NO.	CYCLONE 1	S1 2	S2 3	S3 4	S4 5	S5 6	S6 7	S7 8	S8 9	FILTER 10
D50 (MICRONS)	22.00	19.09	12.66	8.35	5.94	4.89	1.85	1.09	.76	.76/2.0
MASS (MG)	1.83	.00	.43	1.68	.14	.92	.96	2.23	10.14	24.17
MG/DNCM/STAGE	2.02+002	1.10-001	4.75+001	1.85+002	1.55+001	1.02+002	1.06+002	2.46+002	1.12+003	2.67+003
CUM. % OF MASS < D50	93.98	93.98	92.57	87.04	86.58	83.56	80.40	73.07	39.73	
CUM. MASS (MG/ACM) < D50	2.08+003	2.08+003	2.05+003	1.92+003	1.91+003	1.85+003	1.78+003	1.61+003	8.78+002	
CUM. MASS (MG/DNCM) < D50	3.16+003	3.16+003	3.11+003	2.92+003	2.91+003	2.81+003	2.70+003	2.45+003	1.33+003	
CUM. MASS (GR/ACF) < D50	9.08-001	9.08-001	8.94-001	8.41-001	8.36-001	8.07-001	7.77-001	7.06-001	3.84-001	
CUM. MASS (GR/DNCF) < D50	1.38+000	1.38+000	1.36+000	1.28+000	1.27+000	1.23+000	1.18+000	1.07+000	5.83-001	
GEO. MEAN DIA.(MICRONS)	2.77+001	2.05+001	1.55+001	1.03+001	7.04+000	5.39+000	3.01+000	1.42+000	9.07-001	5.34-001
DM/DLOGD (MG/DNCM)	1.00+003	1.79+000	2.66+002	1.02+003	1.04+002	1.21+003	2.51+002	1.07+003	7.04+003	8.86+003
DN/DLOGD (NUMBER/DNCM)	8.96+007	3.98+005	1.35+008	1.80+009	5.72+008	1.48+010	1.76+010	7.14+011	1.80+013	1.11+014

PARTICULATE DATA REDUCTION AND ENTRY SYSTEM 05/19/82 16:14:30
DATA FOR TEST BY CONTRACTOR GCA , AT SITE ALAM, ON DATE 12681, RUN NO. 6
TEST COMMENTS: IP TEST OF FERROSILICON FURNACE--ALAMET,SELMA,ALABAMA
RUN COMMENTS: 3 I B 16

IMPACTOR DESCRIPTION AND CALIBRATION

TYPE: ANDERSEN PLATE SET ID: 7
MODEL: MARK 3 IMPACTOR DP SCALING FACTOR: 1.287

STAGE	NO.JETS	DIAM.	CUMDP	CALIB
1	264	.1640	.0000	.3808
2	264	.1250	.0000	.3808
3	264	.0950	.0000	.3808
4	264	.0760	.0000	.3808
5	264	.0670	.0000	.3808
6	264	.0360	.1760	.3808
7	264	.0260	.2940	.3808
8	156	.0250	1.0000	.3808

IMPACTOR FLOWRATE = .437 ACFM IMPACTOR TEMPERATURE = 317.0 F (158.3 C) SAMPLING DURATION = 1.50 MIN

IMPACTOR PRESSURE DROP = .268 IN. OF HG STACK TEMPERATURE = 317.0 F (158.3 C) STACK PRESSURE = 29.54 INCHES OF HG

DRY GAS COMPOSITION (PERCENT) CO2 = .30 CO = .10 N2 = 78.00 O2 = 21.00 H2O = 1.00

CALC. MASS LOADING = 7.1452-001 GR/ACF 1.0725+000 GR/DNCF 1.6351+003 MG/ACM 2.4543+003 MG/DNCM

AERODYNAMIC DIAMETERS ARE CALCULATED HERE ACCORDING TO THE TASK GROUP ON LUNG DYNAMICS.

ASSUMED PARTICLE DENSITY = 1.00GM/CU.CM. MAX. PARTICLE DIAMETER = 35.0 MICRONS

IMPACTOR STAGE	CYCLONE	S1	S2	S3	S4	S5	S6	S7	S8	FILTER
STAGE INDEX NO.	1	2	3	4	5	6	7	8	9	10
D50 (MICRONS)	19.00	16.46	10.91	7.18	5.10	4.20	1.58	.92	.63	.63/2.0
MASS (MG)	2.16	.49	1.92	.03	.88	1.95	2.18	2.19	4.66	13.89
MG/DNCM/STAGE	1.75+002	3.96+001	1.55+002	2.43+000	7.12+001	1.58+002	1.76+002	1.77+002	3.77+002	1.12+003
CUM. % OF MASS < D50	90.77	88.68	80.47	80.35	76.59	68.25	58.94	49.58	29.67	
CUM. MASS (MG/ACM) < D50	1.14+003	1.12+003	1.01+003	1.01+003	9.66+002	8.61+002	7.43+002	6.25+002	3.74+002	
CUM. MASS (MG/DNCM) < D50	1.72+003	1.68+003	1.52+003	1.52+003	1.45+003	1.29+003	1.12+003	9.38+002	5.62+002	
CUM. MASS (GR/ACF) < D50	5.00-001	4.89-001	4.43-001	4.43-001	4.22-001	3.76-001	3.25-001	2.73-001	1.64-001	
CUM. MASS (GR/DNCF) < D50	7.51-001	7.33-001	6.66-001	6.65-001	6.33-001	5.65-001	4.87-001	4.10-001	2.45-001	
GEO. MEAN DIA.(MICRONS)	2.58+001	1.77+001	1.34+001	8.85+000	6.06+000	4.63+000	2.58+000	1.21+000	7.65-001	4.48-001
DM/DLOGD (MG/DNCM)	6.58+002	6.35+002	8.69+002	1.34+001	4.79+002	1.87+003	4.15+002	7.59+002	2.30+003	3.73+003
DN/DLOGD (NUMBER/DNCM)	7.33+007	2.19+008	6.90+008	3.68+007	4.12+009	3.59+010	4.63+010	8.23+011	9.85+012	7.93+013

PARTICULATE DATA REDUCTION AND ENTRY SYSTEM 05/19/82 16:14:30
DATA FOR TEST BY CONTRACTOR GCA , AT SITE ALAM, ON DATE 12681, RUN NO. 7
TEST COMMENTS: IP TEST OF FERROSILICON FURNACE--ALAMET,SELMA,ALABAMA
RUN COMMENTS: 4 I A 90

IMPACTOR DESCRIPTION AND CALIBRATION

TYPE: ANDERSEN PLATE SET ID: 7
MODEL: MARK 3 IMPACTOR DP SCALING FACTOR: 1.287

STAGE	NO.JETS	DIAM.	CUMDP	CALIB
1	264	.1640	.0000	.3808
2	264	.1250	.0000	.3808
3	264	.0950	.0000	.3808
4	264	.0760	.0000	.3808
5	264	.0670	.0000	.3808
6	264	.0360	.1760	.3808
7	264	.0260	.2940	.3808
8	156	.0250	1.0000	.3808

IMPACTOR FLOWRATE = .405 ACFM IMPACTOR TEMPERATURE = 300.0 F (148.9 C) SAMPLING DURATION = 1.50 MIN

IMPACTOR PRESSURE DROP = .235 IN. OF HG STACK TEMPERATURE = 300.0 F (148.9 C) STACK PRESSURE = 29.63 INCHES OF HG

DRY GAS COMPOSITION (PERCENT) CO2 = .30 CO = .10 N2 = 78.00 O2 = 21.00 H2O = 1.20

CALC. MASS LOADING = 2.3599-001 GR/ACF 3.4612-001 GR/DNCF 5.4004+002 MG/ACM 7.9204+002 MG/DNCM

AERODYNAMIC DIAMETERS ARE CALCULATED HERE ACCORDING TO THE TASK GROUP ON LUNG DYNAMICS.

ASSUMED PARTICLE DENSITY = 1.00GM/CU.CM. MAX. PARTICLE DIAMETER = 35.0 MICRONS

IMPACTOR STAGE	CYCLONE	S1	S2	S3	S4	S5	S6	S7	S8	FILTER
STAGE INDEX NO.	1	2	3	4	5	6	7	8	9	10
D50 (MICRONS)	19.00	16.96	11.25	7.41	5.27	4.34	1.63	.96	.66	.66/2.0
MASS (MG)	1.66	.47	.44	.53	.36	.41	.48	.96	1.45	2.53
MG/DNCM/STAGE	1.42+002	4.01+001	3.75+001	4.52+001	3.07+001	3.50+001	4.09+001	8.18+001	1.24+002	2.16+002
CUM. % OF MASS < D50	79.31	73.46	67.98	61.37	56.88	51.78	45.79	33.83	15.76	
CUM. MASS (MG/ACM) < D50	3.70+002	3.43+002	3.17+002	2.86+002	2.65+002	2.42+002	2.14+002	1.58+002	7.35+001	
CUM. MASS (MG/DNCM) < D50	5.43+002	5.03+002	4.65+002	4.20+002	3.89+002	3.54+002	3.13+002	2.31+002	1.08+002	
CUM. MASS (GR/ACF) < D50	1.62-001	1.50-001	1.39-001	1.25-001	1.16-001	1.06-001	9.34-002	6.90-002	3.21-002	
CUM. MASS (GR/DNCF) < D50	2.37-001	2.20-001	2.03-001	1.83-001	1.70-001	1.55-001	1.37-001	1.01-001	4.71-002	
GEO. MEAN DIA.(MICRONS)	2.58+001	1.80+001	1.38+001	9.13+000	6.25+000	4.78+000	2.66+000	1.25+000	7.95-001	4.67-001
DM/DLOGD (MG/DNCM)	5.33+002	8.13+002	2.10+002	2.49+002	2.07+002	4.15+002	9.66+001	3.53+002	7.64+002	7.17+002
DN/DLOGD (NUMBER/DNCM)	5.94+007	2.68+008	1.52+008	6.26+008	1.62+009	7.26+009	9.76+009	3.44+011	2.90+012	1.35+013

PARTICULATE DATA REDUCTION AND ENTRY SYSTEM 05/19/82 16:14:30
DATA FOR TEST BY CONTRACTOR GCA , AT SITE ALAM, CN DATE 12681, RUN NO. 8
TEST COMMENTS: IP TEST OF FERROSILICON FURNACE--ALAMET,SELMA,ALABAMA
RUN COMMENTS: 4 I B 90

IMPACTOR DESCRIPTION AND CALIBRATION

TYPE: ANDERSEN PLATE SET ID: 7
MODEL: MARK 3 IMPACTOR DP SCALING FACTOR: 1.287

STAGE	NO.JETS	DIAM.	CUMDP	CALIB
1	264	.1640	.0000	.3808
2	264	.1250	.0000	.3808
3	264	.0950	.0000	.3808
4	264	.0760	.0000	.3808
5	264	.0670	.0000	.3808
6	264	.0360	.1760	.3808
7	264	.0260	.2940	.3808
8	156	.0250	1.0000	.3808

IMPACTOR FLOWRATE = .443 ACFM IMPACTOR TEMPERATURE = 300.0 F (148.9 C) SAMPLING DURATION = 1.60 MIN

IMPACTOR PRESSURE DROP = .284 IN. OF HG STACK TEMPERATURE = 300.0 F (148.9 C) STACK PRESSURE = 29.63 INCHES OF HG

DRY GAS COMPOSITION (PERCENT) CO2 = .30 CO = .10 N2 = 79.00 O2 = 21.00 H2O = 1.20

CALC. MASS LOADING = 5.3018-001 GR/ACF 7.7758-001 GR/DNCF 1.2132+003 MG/ACM 1.7794+003 MG/DNCM

AERODYNAMIC DIAMETERS ARE CALCULATED HERE ACCORDING TO THE TASK GROUP ON LUNG DYNAMICS.

ASSUMED PARTICLE DENSITY = 1.00GM/CU.CM. MAX. PARTICLE DIAMETER = 35.0 MICRONS

IMPACTOR STAGE STAGE INDEX NO.	CYCLONE 1	S1 2	S2 3	S3 4	S4 5	S5 6	S6 7	S7 8	S8 9	FILTER 10
D50 (MICRONS)	18.00	16.21	10.75	7.08	5.03	4.14	1.56	.91	.63	.63/2.0
MASS (MG)	.00	1.14	1.61	1.47	.77	1.12	1.66	.97	3.73	11.88
MG/DNCM/STAGE	7.31-002	8.33+001	1.18+002	1.07+002	5.63+001	8.18+001	1.21+002	7.09+001	2.73+002	8.68+002
CUM. % OF MASS < D50	99.99	93.80	85.06	77.07	72.89	66.81	57.79	52.52	32.26	
CUM. MASS (MG/ACM) < D50	9.17+002	8.60+002	7.80+002	7.07+002	6.69+002	6.13+002	5.30+002	4.82+002	2.96+002	
CUM. MASS (MG/DNCM) < D50	1.35+003	1.26+003	1.14+003	1.04+003	9.81+002	8.99+002	7.77+002	7.07+002	4.34+002	
CUM. MASS (GR/ACF) < D50	4.01-001	3.76-001	3.41-001	3.09-001	2.92-001	2.68-001	2.32-001	2.11-001	1.29-001	
CUM. MASS (GR/DNCF) < D50	5.88-001	5.51-001	5.00-001	4.53-001	4.29-001	3.93-001	3.40-001	3.09-001	1.90-001	
GEO. MEAN DIA.(MICRONS)	2.51+001	1.71+001	1.32+001	8.72+000	5.97+000	4.56+000	2.54+000	1.19+000	7.55-001	4.43-001
DM/DLOGD (MG/DNCM)	2.53-001	1.83+003	6.59+002	5.92+002	3.79+002	9.71+002	2.86+002	3.04+002	1.67+003	2.88+003
DN/DLOGD (NUMBER/DNCM)	3.06+004	7.02+008	5.47+008	1.71+009	3.41+009	1.95+010	3.33+010	3.43+011	7.41+012	6.35+013

PARTICULATE DATA REDUCTION AND ENTRY SYSTEM 05/19/82 16:14:30
DATA FOR TEST BY CONTRACTOR GCA , AT SITE ALAM, ON DATE 12681, RUN NO. 9
TEST COMMENTS: IP TEST OF FERROSILICON FURNACE--ALAMET,SELMA,ALABAMA
RUN COMMENTS: 5-I-A 16

IMPACTOR DESCRIPTION AND CALIBRATION

TYPE: ANDERSEN PLATE SET ID: 7
MODEL: MARK 3 IMPACTOR DP SCALING FACTOR: 1.287

STAGE	NO.JETS	DIAM.	CUMDP	CALIB
1	264	.1640	.0000	.3808
2	264	.1250	.0000	.3808
3	264	.0950	.0000	.3808
4	264	.0760	.0000	.3808
5	264	.0670	.0000	.3808
6	264	.0360	.1760	.3808
7	264	.0260	.2940	.3808
8	156	.0250	1.0000	.3808

IMPACTOR FLOWRATE = .435 ACFM IMPACTOR TEMPERATURE = 307.0 F (152.8 C) SAMPLING DURATION = 1.70 MIN

IMPACTOR PRESSURE DROP = .271 IN. OF HG STACK TEMPERATURE = 307.0 F (152.8 C) STACK PRESSURE = 29.63 INCHES OF HG

DRY GAS COMPOSITION (PERCENT) CO2 = .30 CO = .10 N2 = 79.00 O2 = 21.00 H2O = 2.10

CALC. MASS LOADING = 3.5708-001 GR/ACF 5.3340-001 GR/DNCF 8.1713+002 MG/ACM 1.2206+003 MG/DNCM

AERODYNAMIC DIAMETERS ARE CALCULATED HERE ACCORDING TO THE TASK GROUP ON LUNG DYNAMICS.

ASSUMED PARTICLE DENSITY = 1.00GM/CU.CM. MAX. PARTICLE DIAMETER = 35.0 MICRONS

IMPACTOR STAGE / STAGE INDEX NO.	CYCLONE 1	S1 2	S2 3	S3 4	S4 5	S5 6	S6 7	S7 8	S8 9	FILTER 10
D50 (MICRONS)	18.00	16.39	10.86	7.15	5.08	4.19	1.58	.92	.63	.63/2.0
MASS (MG)	.00	1.29	1.74	.32	1.20	.27	1.77	.11	1.67	8.74
MG/DNCM/STAGE	7.13-002	9.20+001	1.24+002	2.28+001	8.56+001	1.93+001	1.26+002	7.85+000	1.19+002	6.23+002
CUM. % OF MASS < D50	99.99	89.87	76.21	73.70	64.28	62.16	48.27	47.41	34.30	
CUM. MASS (MG/ACM) < D50	6.08+002	5.47+002	4.64+002	4.48+002	3.91+002	3.78+002	2.94+002	2.88+002	2.09+002	
CUM. MASS (MG/DNCM) < D50	9.09+002	8.17+002	6.93+002	6.70+002	5.84+002	5.65+002	4.39+002	4.31+002	3.12+002	
CUM. MASS (GR/ACF) < D50	2.66-001	2.39-001	2.03-001	1.96-001	1.71-001	1.65-001	1.28-001	1.26-001	9.12-002	
CUM. MASS (GR/DNCF) < D50	3.97-001	3.57-001	3.03-001	2.93-001	2.55-001	2.47-001	1.92-001	1.88-001	1.36-001	
GEO. MEAN DIA.(MICRONS)	2.51+001	1.72+001	1.33+001	8.82+000	6.03+000	4.61+000	2.57+000	1.20+000	7.64-001	4.48-001
DM/DLOGD (MG/DNCM)	2.47-001	2.26+003	6.95+002	1.26+002	5.77+002	2.28+002	2.97+002	3.37+001	7.31+002	2.07+003
DN/DLOGD (NUMBER/DNCM)	2.98+004	8.50+008	5.59+008	3.51+008	5.02+009	4.44+009	3.35+010	3.68+010	3.13+012	4.41+013

PARTICULATE DATA REDUCTION AND ENTRY SYSTEM 05/19/82 16:14:30
DATA FOR TEST BY CONTRACTOR GCA , AT SITE ALAM, ON DATE 12681, RUN NO. 10
TEST COMMENTS: IP TEST OF FERROSILICON FURNACE--ALAMET,SELMA,ALABAMA
RUN COMMENTS: 5-I-B-16

IMPACTOR DESCRIPTION AND CALIBRATION

TYPE: ANDERSEN PLATE SET ID: 7
MODEL: MARK 3 IMPACTOR DP SCALING FACTOR: 1.287

STAGE	NO.JETS	DIAM.	CUMDP	CALIB
1	264	.1640	.0000	.3808
2	264	.1250	.0000	.3808
3	264	.0950	.0000	.3808
4	264	.0760	.0000	.3808
5	264	.0670	.0000	.3808
6	264	.0360	.1760	.3808
7	264	.0260	.2940	.3808
8	156	.0250	1.0000	.3808

IMPACTOR FLOWRATE = .426 ACFM IMPACTOR TEMPERATURE = 307.0 F (152.8 C) SAMPLING DURATION = 1.50 MIN

IMPACTOR PRESSURE DROP = .260 IN. OF HG STACK TEMPERATURE = 307.0 F (152.8 C) STACK PRESSURE = 29.63 INCHES OF HG

DRY GAS COMPOSITION (PERCENT) CO2 = .30 CO = .20 N2 = 79.00 O2 = 21.00 H2O = 2.10

CALC. MASS LOADING = 2.8235-001 GR/ACF 4.2176-001 GR/DNCF 6.4611+002 MG/ACM 9.6513+002 MG/DNCM

AERODYNAMIC DIAMETERS ARE CALCULATED HERE ACCORDING TO THE TASK GROUP ON LUNG DYNAMICS.

ASSUMED PARTICLE DENSITY = 1.00GM/CU.CM. MAX. PARTICLE DIAMETER = 35.0 MICRONS

IMPACTOR STAGE STAGE INDEX NO.	CYCLONE 1	S1 2	S2 3	S3 4	S4 5	S5 6	S6 7	S7 8	S8 9	FILTER 10
D50 (MICRONS)	19.00	16.56	10.98	7.23	5.14	4.23	1.59	.93	.64	.64/2.0
MASS (MG)	.00	.91	.82	.99	.15	1.25	1.28	1.19	.76	4.34
MG/DNCM/STAGE	8.26-002	7.51+001	6.77+001	8.17+001	1.24+001	1.03+002	1.06+002	9.82+001	6.27+001	3.58+002
CUM. % OF MASS < D50	99.99	90.43	81.82	71.42	69.85	56.72	43.27	30.77	22.79	
CUM. MASS (MG/ACM) < D50	5.26+002	4.76+002	4.31+002	3.76+002	3.68+002	2.98+002	2.28+002	1.62+002	1.20+002	
CUM. MASS (MG/DNCM) < D50	7.86+002	7.11+002	6.43+002	5.61+002	5.49+002	4.46+002	3.40+002	2.42+002	1.79+002	
CUM. MASS (GR/ACF) < D50	2.30-001	2.08-001	1.88-001	1.64-001	1.61-001	1.30-001	9.95-002	7.08-002	5.24-002	
CUM. MASS (GR/DNCF) < D50	3.43-001	3.11-001	2.81-001	2.45-001	2.40-001	1.95-001	1.49-001	1.06-001	7.83-002	
GEO. MEAN DIA.(MICRONS)	2.58+001	1.77+001	1.35+001	8.91+000	6.10+000	4.66+000	2.60+000	1.22+000	7.73-001	4.53-001
DM/DLOGD (MG/DNCM)	3.11-001	1.26+003	3.79+002	4.51+002	8.35+001	1.22+003	2.49+002	4.22+002	3.86+002	1.19+003
DN/DLOGD (NUMBER/DNCM)	3.47+004	4.31+008	2.95+008	1.22+009	7.04+008	2.31+010	2.72+010	4.46+011	1.59+012	2.44+013

PARTICULATE DATA REDUCTION AND ENTRY SYSTEM 05/19/82 16:14:30
DATA FOR TEST BY CONTRACTOR GCA , AT SITE ALAM, ON DATE 12681, RUN NO. 11
TEST COMMENTS: IP TEST OF FERROSILICON FURNACE--ALAMET,SELMA,ALABAMA
RUN COMMENTS: 5-I-B-2-90

IMPACTOR DESCRIPTION AND CALIBRATION

TYPE: ANDERSEN PLATE SET ID: 7
MODEL: MARK 3 IMPACTOR DP SCALING FACTOR: 1.287

STAGE	NO.JETS	DIAM.	CUMDP	CALIB
1	264	.1640	.0000	.3808
2	264	.1250	.0000	.3808
3	264	.0950	.0000	.3808
4	264	.0760	.0000	.3808
5	264	.0670	.0000	.3808
6	264	.0360	.1760	.3808
7	264	.0260	.2940	.3808
8	156	.0250	1.0000	.3808

IMPACTOR FLOWRATE = .445 ACFM IMPACTOR TEMPERATURE = 307.0 F (152.8 C) SAMPLING DURATION = 1.50 MIN

IMPACTOR PRESSURE DROP = .283 IN. OF HG STACK TEMPERATURE = 307.0 F (152.8 C) STACK PRESSURE = 29.63 INCHES OF HG

DRY GAS COMPOSITION (PERCENT) CO2 = .30 CO = .10 N2 = 79.00 O2 = 21.00 H2O = 2.10

CALC. MASS LOADING = 3.3965-001 GR/ACF 5.0736-001 GR/DNCF 7.7724+002 MG/ACM 1.1610+003 MG/DNCM

AERODYNAMIC DIAMETERS ARE CALCULATED HERE ACCORDING TO THE TASK GROUP ON LUNG DYNAMICS.

ASSUMED PARTICLE DENSITY = 1.00GM/CU.CM. MAX. PARTICLE DIAMETER = 35.0 MICRONS

IMPACTOR STAGE / STAGE INDEX NO.	CYCLONE 1	S1 2	S2 3	S3 4	S4 5	S5 6	S6 7	S7 8	S8 9	FILTER 10
D50 (MICRONS)	18.00	16.20	10.74	7.07	5.03	4.14	1.56	.91	.62	.62/2.0
MASS (MG)	.00	.77	.37	1.27	.64	.12	.70	1.22	1.23	8.37
MG/DNCM/STAGE	7.90-002	6.09+001	2.92+001	1.00+002	5.06+001	9.48+000	5.53+001	9.64+001	9.72+001	6.61+002
CUM. % OF MASS < D50	99.99	92.66	89.14	77.05	70.96	69.82	63.15	51.54	39.83	
CUM. MASS (MG/ACM) < D50	5.56+002	5.15+002	4.95+002	4.28+002	3.94+002	3.88+002	3.51+002	2.86+002	2.21+002	
CUM. MASS (MG/DNCM) < D50	8.30+002	7.69+002	7.40+002	6.40+002	5.89+002	5.80+002	5.24+002	4.28+002	3.31+002	
CUM. MASS (GR/ACF) < D50	2.43-001	2.25-001	2.17-001	1.87-001	1.72-001	1.70-001	1.53-001	1.25-001	9.68-002	
CUM. MASS (GR/DNCF) < D50	3.63-001	3.36-001	3.23-001	2.80-001	2.57-001	2.53-001	2.29-001	1.87-001	1.45-001	
GEO. MEAN DIA.(MICRONS)	2.51+001	1.71+001	1.32+001	8.71+000	5.96+000	4.56+000	2.54+000	1.19+000	7.54-001	4.41-001
DM/DLOGD (MG/DNCM)	2.74-001	1.33+003	1.64+002	5.53+002	3.41+002	1.12+002	1.30+002	4.13+002	5.95+002	2.20+003
DN/DLOGD (NUMBER/DNCM)	3.31+004	5.10+008	1.36+008	1.60+009	3.07+009	2.26+009	1.52+010	4.69+011	2.66+012	4.88+013

PARTICULATE DATA REDUCTION AND ENTRY SYSTEM 05/19/82 16:14:30
DATA FOR TEST BY CONTRACTOR GCA , AT SITE ALAM, ON DATE 12681, RUN NO. 12
TEST COMMENTS: IP TEST OF FERROSILICON FURNACE--ALAMET,SELMA,ALABAMA
RUN COMMENTS: 6 I A 16

IMPACTOR DESCRIPTION AND CALIBRATION

TYPE: ANDERSEN PLATE SET ID: 7
MODEL: MARK 3 IMPACTOR DP SCALING FACTOR: 1.287

STAGE	NO.JETS	DIAM.	CUMDP	CALIB
1	264	.1640	.0000	.3808
2	264	.1250	.0000	.3808
3	264	.0950	.0000	.3808
4	264	.0760	.0000	.3808
5	264	.0670	.0000	.3808
6	264	.0360	.1760	.3808
7	264	.0260	.2940	.3808
8	156	.0250	1.0000	.3808

IMPACTOR FLOWRATE = .435 ACFM IMPACTOR TEMPERATURE = 317.0 F (158.3 C) SAMPLING DURATION = 1.00 MIN

IMPACTOR PRESSURE DROP = .268 IN. OF HG STACK TEMPERATURE = 317.0 F (158.3 C) STACK PRESSURE = 29.63 INCHES OF HG

DRY GAS COMPOSITION (PERCENT) CO2 = .30 CO = .10 N2 = 79.00 O2 = 21.00 H2O = 1.00

CALC. MASS LOADING = 9.7103-001 GR/ACF 1.4531+000 GR/DNCF 2.2221+003 MG/ACM 3.3252+003 MG/DNCM

AERODYNAMIC DIAMETERS ARE CALCULATED HERE ACCORDING TO THE TASK GROUP ON LUNG DYNAMICS.

ASSUMED PARTICLE DENSITY = 1.00GM/CU.CM. MAX. PARTICLE DIAMETER = 35.0 MICRONS

IMPACTOR STAGE STAGE INDEX NO.	CYCLONE 1	S1 2	S2 3	S3 4	S4 5	S5 6	S6 7	S7 8	S8 9	FILTER 10
D50 (MICRONS)	19.00	16.49	10.93	7.20	5.12	4.21	1.58	.93	.64	.64/2.0
MASS (MG)	.00	.07	.14	.22	.23	.33	1.42	1.33	8.14	15.49
MG/DNCM/STAGE	1.21-001	8.50+000	1.70+001	2.67+001	2.79+001	4.01+001	1.73+002	1.62+002	9.89+002	1.88+003
CUM. % OF MASS < D50	99.99	99.64	98.92	97.80	96.63	94.95	87.72	80.94	39.46	
CUM. MASS (MG/ACM) < D50	1.59+003	1.59+003	1.58+003	1.56+003	1.54+003	1.51+003	1.40+003	1.29+003	6.29+002	
CUM. MASS (MG/DNCM) < D50	2.38+003	2.38+003	2.36+003	2.33+003	2.30+003	2.26+003	2.09+003	1.93+003	9.41+002	
CUM. MASS (GR/ACF) < D50	6.96-001	6.94-001	6.89-001	6.81-001	6.73-001	6.61-001	6.11-001	5.64-001	2.75-001	
CUM. MASS (GR/DNCF) < D50	1.04+000	1.04+000	1.03+000	1.02+000	1.01+000	9.89-001	9.14-001	8.43-001	4.11-001	
GEO. MEAN DIA.(MICRONS)	2.58+001	1.77+001	1.34+001	8.87+000	6.07+000	4.64+000	2.58+000	1.21+000	7.67-001	4.50-001
DM/DLOGD (MG/DNCM)	4.58-001	1.38+002	9.52+001	1.47+002	1.88+002	4.75+002	4.06+002	6.93+002	6.06+003	6.25+003
DN/DLOGD (NUMBER/DNCM)	5.10+004	4.77+007	7.51+007	4.03+008	1.61+009	9.07+009	4.50+010	7.45+011	2.56+013	1.31+014

PARTICULATE DATA REDUCTION AND ENTRY SYSTEM 05/19/82 16:14:30
DATA FOR TEST BY CONTRACTOR GCA , AT SITE ALAM, ON DATE 12681, RUN NO. 13
TEST COMMENTS: IP TEST OF FERROSILICON FURNACE--ALAMET,SELMA,ALABAMA
RUN COMMENTS: 6 I B 16

IMPACTOR DESCRIPTION AND CALIBRATION

TYPE: ANDERSEN PLATE SET ID: 7
MODEL: MARK 3 IMPACTOR DP SCALING FACTOR: 1.287

STAGE	NO.JETS	DIAM.	CUMDP	CALIB
1	264	.1640	.0000	.3808
2	264	.1250	.0000	.3808
3	264	.0950	.0000	.3808
4	264	.0760	.0000	.3808
5	264	.0670	.0000	.3808
6	264	.0360	.1760	.3808
7	264	.0260	.2940	.3808
8	156	.0250	1.0000	.3808

IMPACTOR FLOWRATE = .405 ACFM IMPACTOR TEMPERATURE = 317.0 F (158.3 C) SAMPLING DURATION = 1.50 MIN

IMPACTOR PRESSURE DROP = .233 IN. OF HG STACK TEMPERATURE = 317.0 F (158.3 C) STACK PRESSURE = 29.62 INCHES OF HG

DRY GAS COMPOSITION (PERCENT) CO2 = .30 CO = .10 N2 = 79.00 O2 = 21.00 H2O = 1.00

CALC. MASS LOADING = 4.6973-001 GR/ACF 7.0316-001 GR/DNCF 1.0749+003 MG/ACM 1.6091+003 MG/DNCM

AERODYNAMIC DIAMETERS ARE CALCULATED HERE ACCORDING TO THE TASK GROUP ON LUNG DYNAMICS.

ASSUMED PARTICLE DENSITY = 1.00GM/CU.CM. MAX. PARTICLE DIAMETER = 35.0 MICRONS

IMPACTOR STAGE / STAGE INDEX NO.	CYCLONE 1	S1 2	S2 3	S3 4	S4 5	S5 6	S6 7	S7 8	S8 9	FILTER 10
D50 (MICRONS)	19.55	17.10	11.34	7.47	5.31	4.37	1.65	.96	.66	.66/2.0
MASS (MG)	.00	.25	.13	.48	.18	.47	.47	.88	1.51	14.12
MG/DNCM/STAGE	8.70-002	2.18+001	1.13+001	4.18+001	1.57+001	4.09+001	4.09+001	7.66+001	1.31+002	1.23+003
CUM. % OF MASS < D50	99.99	97.80	96.67	92.47	90.89	86.78	82.67	74.97	61.76	
CUM. MASS (MG/ACM) < D50	6.64+002	6.50+002	6.42+002	6.14+002	6.04+002	5.77+002	5.49+002	4.98+002	4.10+002	
CUM. MASS (MG/DNCM) < D50	9.95+002	9.73+002	9.62+002	9.20+002	9.04+002	8.63+002	8.22+002	7.46+002	6.14+002	
CUM. MASS (GR/ACF) < D50	2.90-001	2.84-001	2.81-001	2.69-001	2.64-001	2.52-001	2.40-001	2.18-001	1.79-001	
CUM. MASS (GR/DNCF) < D50	4.35-001	4.25-001	4.20-001	4.02-001	3.95-001	3.77-001	3.59-001	3.26-001	2.68-001	
GEO. MEAN DIA.(MICRONS)	2.62+001	1.83+001	1.39+001	9.20+000	6.30+000	4.82+000	2.68+000	1.26+000	8.00-001	4.69-001
DM/DLOGD (MG/DNCM)	3.44-001	3.74+002	6.34+001	2.30+002	1.06+002	4.86+002	9.64+001	3.30+002	8.11+002	4.08+003
DN/DLOGD (NUMBER/DNCM)	3.67+004	1.17+008	4.49+007	5.65+008	8.09+008	8.30+009	9.54+009	3.15+011	3.02+012	7.53+013

APPENDIX D-2

CASCADE IMPACTOR DATA REDUCTION SYSTEM PRINTOUTS, BAGHOUSE OUTLET

"COMPARE" output for all outlet impactor runs

DATA COMPARISON FOR 9 OUTLET RUNS BY GCA

STD. PT. (MICRON)		DM/DLOGD (MG/DNCM)	CUMULATIVE MASS < D50	CUM. % MASS < D50 AVG.	STD. DEV.	MIN.	MAX.
1	20.00	5.84E+00	7.65E+00	100.16	6.82	88.99	109.65
2	15.00	3.93E+00	7.04E+00	91.91	7.37	79.56	100.54
3	10.00	3.17E+00	6.49E+00	84.37	8.07	71.41	94.60
4	5.00	3.38E+00	5.33E+00	68.58	10.26	55.50	85.44
5	2.50	3.13E+00	4.37E+00	55.44	16.86	28.44	83.07
6	1.25	3.75E+00	3.41E+00	43.96	19.80	9.64	70:99
7	1.00	5.46E+00	2.97E+00	38.43	18.49	7.81	63.44

THE RUN MARKED WITH AN ◆ APPEAR TO CONTAIN OUTLIERS

TEST SITE	ALAM	ALAM	ALAM	ALAM	ALAM	ALAM	ALAM
TEST DATE	12781	12781	12681	12681	12681	12681	12681
RUN NUMBER	2◆	4	14	15◆	16◆	17	18◆
RUN DATE	12881	12881	12681	12681	12781	12781	12781
START TIME	810	1310	1325	1325	945	1200	1400
TOTAL MASS	4.417E+00	9.327E+00	8.139E+00	4.743E+00	1.861E+01	8.317E+00	4.876E+00

DM/DLOGD IN STANDARD INTERVALS (MG/DNCM)

1	20.00	2.10E-01◆	5.99E+00	7.04E+00	4.36E+00	1.21E+01◆	8.15E+00	3.76E+00
2	15.00	2.43E-01◆	4.05E+00	4.64E+00	1.04E+00◆	8.19E+00◆	5.32E+00	2.98E+00
3	10.00	2.95E+00	1.72E+00	2.22E+00	2.29E+00	4.86E+00	2.69E+00	1.54E+00
4	5.00	1.57E+00	3.71E+00	2.27E+00	8.34E-01	2.24E-01	9.66E-01	3.65E+00
5	2.50	2.49E-01◆	4.42E+00	2.84E+00	5.39E-01◆	2.94E+00	1.43E+00	3.90E+00
6	1.25	3.44E+00	4.11E+00	2.96E+00	4.53E-01◆	9.91E+00◆	2.42E+00	1.37E+00
7	1.00	6.21E+00	5.05E+00	5.79E+00	2.00E+00	1.55E+01◆	3.84E+00	4.10E-01◆

TEST SITE	ALAM	ALAM
TEST DATE	12681	12881
RUN NUMBER	19◆	20◆
RUN DATE	12881	12781
START TIME	815	1324
TOTAL MASS	1.001E+01	1.407E+01

DM/DLOGD IN STANDARD INTERVALS (MG/DNCM)

1	20.00	4.34E+00	6.18E+00
2	15.00	5.55E+00	2.56E+00
3	10.00	2.32E+00◆	2.91E+00
4	5.00	6.94E+00◆	1.02E+01◆
5	2.50	3.80E+00	2.09E+00◆
6	1.25	3.62E+00	5.43E+00
7	1.00	4.42E+00	5.43E+00

PARTICULATE DATA REDUCTION AND ENTRY SYSTEM 05/19/82 16:14:30
DATA FOR TEST BY CONTRACTOR GCA , AT SITE ALAM, ON DATE 12681, RUN NO. 14
TEST COMMENTS: IP TEST OF FERROSILICON FURNACE--ALAMET,SELMA,ALABAMA
RUN COMMENTS: 1-O-A

IMPACTOR DESCRIPTION AND CALIBRATION

TYPE: ANDERSEN PLATE SET ID: 7
MODEL: MARK 3 IMPACTOR DP SCALING FACTOR: 1.287

STAGE	NO.JETS	DIAM.	CUMDP	CALIB
1	264	.1640	.0000	.3808
2	264	.1250	.0000	.3808
3	264	.0950	.0000	.3808
4	264	.0760	.0000	.3808
5	264	.0670	.0000	.3808
6	264	.0360	.1760	.3808
7	264	.0260	.2940	.3808
8	156	.0250	1.0000	.3808

IMPACTOR FLOWRATE = .322 ACFM IMPACTOR TEMPERATURE = 246.0 F (118.9 C) SAMPLING DURATION = 192.00 MIN

IMPACTOR PRESSURE DROP = .162 IN. OF HG STACK TEMPERATURE = 246.0 F (118.9 C) STACK PRESSURE = 29.96 INCHES OF HG

DRY GAS COMPOSITION (PERCENT) CO2 = .30 CO = .10 N2 = 78.00 O2 = 21.00 H2O = 2.00

CALC. MASS LOADING = 2.6185-003 GR/ACF 3.5568-003 GR/DNCF 5.9920+000 MG/ACM 8.1392+000 MG/DNCM

AERODYNAMIC DIAMETERS ARE CALCULATED HERE ACCORDING TO THE TASK GROUP ON LUNG DYNAMICS.

ASSUMED PARTICLE DENSITY = 1.00GM/CU.CM. MAX. PARTICLE DIAMETER = 35.0 MICRONS

IMPACTOR STAGE STAGE INDEX NO.	S1 1	S2 2	S3 3	S4 4	S5 5	S6 6	S7 7	S8 8	FILTER 9
D50 (MICRONS)	18.52	12.29	8.10	5.77	4.75	1.81	1.07	.74	.74/2.0
MASS (MG)	.21	1.10	.54	.17	.76	1.26	.55	1.45	4.45
MG/DNCM/STAGE	1.63-001	8.53-001	4.19-001	1.32-001	5.90-001	9.78-001	4.27-001	1.13+000	3.45+000
CUM. % OF MASS < D50	97.46	84.15	77.62	75.56	66.36	51.12	44.46	26.92	
CUM. MASS (MG/ACM) < D50	4.60+000	3.97+000	3.66+000	3.57+000	3.13+000	2.41+000	2.10+000	1.27+000	
CUM. MASS (MG/DNCM) < D50	6.25+000	5.40+000	4.98+000	4.85+000	4.26+000	3.28+000	2.85+000	1.73+000	
CUM. MASS (GR/ACF) < D50	2.01-003	1.74-003	1.60-003	1.56-003	1.37-003	1.05-003	9.17-004	5.55-004	
CUM. (GR/DNCF) < D50	2.73-003	2.36-003	2.18-003	2.12-003	1.86-003	1.43-003	1.25-003	7.54-004	
GEO. MEAN DIA.(MICRONS)	2.55+001	1.51+001	9.98+000	6.84+000	5.24+000	2.93+000	1.39+000	8.90-001	5.25-001
DM/DLOGD (MG/DNCM)	5.89-001	4.79+000	2.32+000	8.93-001	7.03+000	2.33+000	1.87+000	7.16+000	1.15+001
DN/DLOGD (NUMBER/DNCM)	6.82+004	2.66+006	4.46+006	5.34+006	9.36+007	1.77+008	1.33+009	1.94+010	1.51+011

PARTICULATE DATA REDUCTION AND ENTRY SYSTEM 05/19/82 16:14:30
DATA FOR TEST BY CONTRACTOR GCA , AT SITE ALAM, ON DATE 12681, RUN NO. 15
TEST COMMENTS: IP TEST OF FERROSILICON FURNACE--ALAMET,SELMA,ALABAMA
RUN COMMENTS: 1-O-B

IMPACTOR DESCRIPTION AND CALIBRATION

TYPE: ANDERSEN PLATE SET ID: 7
MODEL: MARK 3 IMPACTOR DP SCALING FACTOR: 1.287

STAGE	NO.JETS	DIAM.	CUMDP	CALIB
1	264	.1640	.0000	.3808
2	264	.1250	.0000	.3808
3	264	.0950	.0000	.3808
4	264	.0760	.0000	.3808
5	264	.0670	.0000	.3808
6	264	.0360	.1760	.3808
7	264	.0260	.2940	.3808
8	156	.0250	1.0000	.3808

IMPACTOR FLOWRATE = .333 ACFM IMPACTOR TEMPERATURE = 246.0 F (118.9 C) SAMPLING DURATION = 192.00 MIN

IMPACTOR PRESSURE DROP = .173 IN. OF HG STACK TEMPERATURE = 246.0 F (118.9 C) STACK PRESSURE = 29.96 INCHES OF HG

DRY GAS COMPOSITION (PERCENT) CO2 = .30 CO = .10 N2 = 78.00 O2 = 21.00 H2O = 2.00

CALC. MASS LOADING = 1.5259-003 GR/ACF 2.0728-003 GR/DNCF 3.4919+000 MG/ACM 4.7432+000 MG/DNCM

AERODYNAMIC DIAMETERS ARE CALCULATED HERE ACCORDING TO THE TASK GROUP ON LUNG DYNAMICS.

ASSUMED PARTICLE DENSITY = 1.00GM/CU.CM. MAX. PARTICLE DIAMETER = 35.0 MICRONS

IMPACTOR STAGE / STAGE INDEX NO.	S1 1	S2 2	S3 3	S4 4	S5 5	S6 6	S7 7	S8 8	FILTER 9
D50 (MICRONS)	18.21	12.08	7.97	5.67	4.67	1.77	1.05	.73	.73/2.0
MASS (MG)	.00	.17	.61	.13	.33	.22	.00	.67	4.19
MG/DNCM/STAGE	7.50-004	1.28-001	4.58-001	9.75-002	2.48-001	1.65-001	7.50-004	5.03-001	3.14+000
CUM. % OF MASS < D50	99.98	95.95	81.52	78.45	70.64	65.44	65.41	49.56	
CUM. MASS (MG/ACM) < D50	2.33+000	2.24+000	1.90+000	1.83+000	1.65+000	1.53+000	1.53+000	1.16+000	
CUM. MASS (MG/DNCM) < D50	3.17+000	3.04+000	2.59+000	2.49+000	2.24+000	2.08+000	2.07+000	1.57+000	
CUM. MASS (GR/ACF) < D50	1.02-003	9.79-004	8.32-004	8.00-004	7.21-004	6.68-004	6.67-004	5.06-004	
CUM. (GR/DNCF) < D50	1.39-003	1.33-003	1.13-003	1.09-003	9.79-004	9.07-004	9.07-004	6.87-004	
GEO. MEAN DIA.(MICRONS)	2.52+001	1.48+001	9.81+000	6.72+000	5.15+000	2.88+000	1.36+000	8.74-001	5.15-001
DM/DLOGD (MG/DNCM)	2.64-003	7.16-001	2.53+000	6.60-001	2.95+000	3.92-001	3.28-003	3.19+000	1.04+001
DN/DLOGD (NUMBER/DNCM)	3.14+002	4.19+005	5.12+006	4.15+006	4.14+007	3.14+007	2.47+006	9.14+009	1.46+011

PARTICULATE DATA REDUCTION AND ENTRY SYSTEM 05/19/82 16:14:30
DATA FOR TEST BY CONTRACTOR GCA , AT SITE ALAM, ON DATE 12681, RUN NO. 16
TEST COMMENTS: IP TEST OF FERROSILICON FURNACE--ALAMET,SELMA,ALABAMA
RUN COMMENTS: 2-O-A

IMPACTOR DESCRIPTION AND CALIBRATION

TYPE: ANDERSEN PLATE SET ID: 7
MODEL: MARK 3 IMPACTOR DP SCALING FACTOR: 1.287

STAGE	NO.JETS	DIAM.	CUMDP	CALIB
1	264	.1640	.0000	.3809
2	264	.1250	.0000	.3808
3	264	.0950	.0000	.3808
4	264	.0760	.0000	.3808
5	264	.0670	.0000	.3808
6	264	.0360	.1760	.3808
7	264	.0260	.2940	.3808
8	156	.0250	1.0000	.3808

IMPACTOR FLOWRATE = .484 ACFM IMPACTOR TEMPERATURE = 248.0 F (120.0 C) SAMPLING DURATION = 96.00 MIN

IMPACTOR PRESSURE DROP = .366 IN. OF HG STACK TEMPERATURE = 248.0 F (120.0 C) STACK PRESSURE = 29.91 INCHES OF HG

DRY GAS COMPOSITION (PERCENT) CO2 = .30 CO = .10 N2 = 78.00 O2 = 21.00 H2O = .10

CALC. MASS LOADING = 6.0747-003 GR/ACF 8.1312-003 GR/DNCF 1.3901+001 MG/ACM 1.8607+001 MG/DNCM

AERODYNAMIC DIAMETERS ARE CALCULATED HERE ACCORDING TO THE TASK GROUP ON LUNG DYNAMICS.

ASSUMED PARTICLE DENSITY = 1.00GM/CU.CM. MAX. PARTICLE DIAMETER = 35.0 MICRONS

IMPACTOR STAGE STAGE INDEX NO.	S1 1	S2 2	S3 3	S4 4	S5 5	S6 6	S7 7	S8 8	FILTER 9
D50 (MICRONS)	15.16	10.05	6.62	4.70	3.88	1.46	.85	.59	.59/2.0
MASS (MG)	.11	.50	1.36	.28	.48	1.14	2.55	3.98	7.89
MG/DNCM/STAGE	1.12-001	5.09-001	1.38+000	2.85-001	4.88-001	1.16+000	2.59+000	4.05+000	8.03+000
CUM. % OF MASS < D50	99.23	95.75	86.27	84.32	80.97	73.02	55.25	27.50	
CUM. MASS (MG/ACM) < D50	1.08+001	1.04+001	9.41+000	9.19+000	8.83+000	7.96+000	6.02+000	3.00+000	
CUM. MASS (MG/DNCM) < D50	1.45+001	1.40+001	1.26+001	1.23+001	1.18+001	1.07+001	8.06+000	4.01+000	
CUM. MASS (GR/ACF) < D50	4.73-003	4.56-003	4.11-003	4.02-003	3.86-003	3.48-003	2.63-003	1.31-003	
CUM. (GR/DNCF) < D50	6.33-003	6.11-003	5.50-003	5.38-003	5.16-003	4.66-003	3.52-003	1.75-003	
GEO. MEAN DIA.(MICRONS)	2.30+001	1.23+001	8.16+000	5.58+000	4.27+000	2.38+000	1.12+000	7.07-001	4.14-001
DM/DLOGD (MG/DNCM)	3.08-001	2.85+000	7.63+000	1.92+000	5.80+000	2.73+000	1.12+001	2.48+001	2.67+001
DN/DLOGD (NUMBER/DNCM)	4.81+004	2.89+006	2.69+007	2.11+007	1.42+008	3.88+008	1.53+010	1.34+011	7.15+011

PARTICULATE DATA REDUCTION AND ENTRY SYSTEM 05/19/82 16:14:30
DATA FOR TEST BY CONTRACTOR GCA , AT SITE ALAM, ON DATE 12681, RUN NO. 17
TEST COMMENTS: IP TEST OF FERROSILICON FURNACE--ALAMET,SELMA,ALABAMA
RUN COMMENTS: 2-O-B-2

IMPACTOR DESCRIPTION AND CALIBRATION

TYPE: ANDERSEN PLATE SET ID: 7
MODEL: MARK 3 IMPACTOR DP SCALING FACTOR: 1.287

STAGE	NO.JETS	DIAM.	CUMDP	CALIB
1	264	.1640	.0000	.3808
2	264	.1250	.0000	.3808
3	264	.0950	.0000	.3808
4	264	.0760	.0000	.3808
5	264	.0670	.0000	.3808
6	264	.0360	.1760	.3808
7	264	.0260	.2940	.3808
8	156	.0250	1.0000	.3808

IMPACTOR FLOWRATE = .489 ACFM IMPACTOR TEMPERATURE = 248.0 F (120.0 C) SAMPLING DURATION = 96.00 MIN

IMPACTOR PRESSURE DROP = .373 IN. OF HG STACK TEMPERATURE = 248.0 F (120.0 C) STACK PRESSURE = 29.91 INCHES OF HG

DRY GAS COMPOSITION (PERCENT) CO2 = .30 CO = .10 N2 = 78.00 O2 = 21.00 H2O = .10

CALC. MASS LOADING = 2.7154-003 GR/ACF 3.6346-003 GR/DNCF 6.2137+000 MG/ACM 8.3172+000 MG/DNCM

AERODYNAMIC DIAMETERS ARE CALCULATED HERE ACCORDING TO THE TASK GROUP ON LUNG DYNAMICS.

ASSUMED PARTICLE DENSITY = 1.00GM/CU.CM. MAX. PARTICLE DIAMETER = 35.0 MICRONS

IMPACTOR STAGE STAGE INDEX NO.	S1 1	S2 2	S3 3	S4 4	S5 5	S6 6	S7 7	S8 8	FILTER 9
D50 (MICRONS)	15.08	10.00	6.59	4.68	3.85	1.45	.85	.58	.58/2.0
MASS (MG)	1.30	.33	.73	.20	.34	.47	.61	1.22	3.06
MG/DNCM/STAGE	1.31+000	3.32-001	7.35-001	2.01-001	3.42-001	4.73-001	6.14-001	1.23+000	3.08+000
CUM. % OF MASS < D50	80.68	75.78	64.93	61.96	56.91	49.93	40.86	22.73	
CUM. MASS (MG/ACM) < D50	4.08+000	3.84+000	3.29+000	3.14+000	2.88+000	2.53+000	2.07+000	1.15+000	
CUM. MASS (MG/DNCM) < D50	5.47+000	5.14+000	4.40+000	4.20+000	3.86+000	3.38+000	2.77+000	1.54+000	
CUM. MASS (GR/ACF) < D50	1.79-003	1.68-003	1.44-003	1.37-003	1.26-003	1.10-003	9.04-004	5.03-004	
CUM. (GR/DNCF) < D50	2.39-003	2.24-003	1.92-003	1.83-003	1.69-003	1.48-003	1.21-003	6.73-004	
GEO. MEAN DIA.(MICRONS)	2.30+001	1.23+001	8.11+000	5.55+000	4.25+000	2.36+000	1.11+000	7.03-001	4.12-001
DM/DLOGD (MG/DNCM)	3.58+000	1.86+000	4.05+000	1.36+000	4.06+000	1.11+000	2.64+000	7.51+000	1.02+001
DN/DLOGD (NUMBER/DNCM)	5.64+005	1.92+006	1.45+007	1.52+007	1.01+008	1.61+008	3.69+009	4.13+010	2.80+011

PARTICULATE DATA REDUCTION AND ENTRY SYSTEM 05/19/82 16:14:30
DATA FOR TEST BY CONTRACTOR GCA , AT SITE ALAM, ON DATE 12681, RUN NO. 18
TEST COMMENTS: IP TEST OF FERROSILICON FURNACE--ALAMET,SELMA,ALABAMA
RUN COMMENTS: 3-0-B

IMPACTOR DESCRIPTION AND CALIBRATION

TYPE: ANDERSEN PLATE SET ID: 7
MODEL: MARK 3 IMPACTOR DP SCALING FACTOR: 1.287

STAGE	NO.JETS	DIAM.	CUMDP	CALIB
1	264	.1640	.0000	.3808
2	264	.1050	.0000	.3808
3	264	.0950	.0000	.3808
4	264	.0760	.0000	.3808
5	264	.0670	.0000	.3808
6	264	.0360	.1760	.3808
7	264	.0260	.2940	.3808
8	156	.0250	1.0000	.3808

IMPACTOR FLOWRATE = .243 ACFM IMPACTOR TEMPERATURE = 227.0 F (108.3 C) SAMPLING DURATION = 192.00 MIN

IMPACTOR PRESSURE DROP = .095 IN. OF HG STACK TEMPERATURE = 227.0 F (108.3 C) STACK PRESSURE = 29.91 INCHES OF HG

DRY GAS COMPOSITION (PERCENT) CO2 = .30 CO = .10 N2 = 78.00 O2 = 21.00 H2O = 1.50

CALC. MASS LOADING = 1.6175-003 GR/ACF 2.1306-003 GR/DNCF 3.7013+000 MG/ACM 4.8755+000 MG/DNCM

AERODYNAMIC DIAMETERS ARE CALCULATED HERE ACCORDING TO THE TASK GROUP ON LUNG DYNAMICS.

ASSUMED PARTICLE DENSITY = 1.00GM/CU.CM. MAX. PARTICLE DIAMETER = 35.0 MICRONS

IMPACTOR STAGE	S1	S2	S3	S4	S5	S6	S7	S8	FILTER
STAGE INDEX NO.	1	2	3	4	5	6	7	8	9
D50 (MICRONS)	21.15	14.04	9.26	6.60	5.44	2.08	1.24	.87	.87/2.0
MASS (MG)	.40	.64	.31	.30	.18	1.66	.64	.08	.68
MG/DNCM/STAGE	3.99-001	6.38-001	3.09-001	2.99-001	1.79-001	1.66+000	6.38-001	7.98-002	6.78-001
CUM. % OF MASS < D50	91.21	77.14	70.33	63.74	59.78	23.30	9.23	7.47	
CUM. MASS (MG/ACM) < D50	3.14+000	2.66+000	2.42+000	2.20+000	2.06+000	8.02-001	3.18-001	2.57-001	
CUM. MASS (MG/DNCM) < D50	4.14+000	3.50+000	3.19+000	2.89+000	2.71+000	1.06+000	4.19-001	3.39-001	
CUM. MASS (GR/ACF) < D50	1.37-003	1.16-003	1.06-003	9.59-004	9.00-004	3.51-004	1.39-004	1.12-004	
CUM. (GR/DNCF) < D50	1.81-003	1.53-003	1.39-003	1.26-003	1.19-003	4.62-004	1.83-004	1.48-004	
GEO. MEAN DIA.(MICRONS)	2.72+001	1.72+001	1.14+001	7.82+000	5.99+000	3.36+000	1.60+000	1.03+000	6.13-001
DM/DLOGD (MG/DNCM)	1.82+000	3.58+000	1.71+000	2.03+000	2.15+000	3.96+000	2.83+000	5.18-001	2.25+000
DN/DLOGD (NUMBER/DNCM)	1.73+005	1.34+006	2.20+006	8.11+006	1.90+007	1.99+008	1.31+009	8.92+008	1.87+010

PARTICULATE DATA REDUCTION AND ENTRY SYSTEM 05/19/82 16:14:30
DATA FOR TEST BY CONTRACTOR GCA , AT SITE ALAM, CN DATE 12681, RUN NO. 19
TEST COMMENTS: IP TEST OF FERROSILICON FURNACE--ALAMET,SELMA,ALABAMA
RUN COMMENTS: 4-O-A

IMPACTOR DESCRIPTION AND CALIBRATION

TYPE: ANDERSEN PLATE SET ID: 7
MODEL: MARK 3 IMPACTOR DP SCALING FACTOR: 1.287

STAGE	NO.JETS	DIAM.	CUMDP	CALIB
1	264	.1640	.0000	.3808
2	264	.1250	.0000	.3808
3	264	.0950	.0000	.3808
4	264	.0760	.0000	.3808
5	264	.0670	.0000	.3808
6	264	.0360	.1760	.3808
7	264	.0260	.2940	.3808
8	156	.0250	1.0000	.3808

IMPACTOR FLOWRATE = .462 ACFM IMPACTOR TEMPERATURE = 209.0 F (98.3 C) SAMPLING DURATION = 192.00 MIN

IMPACTOR PRESSURE DROP = .352 IN. OF HG STACK TEMPERATURE = 209.0 F (98.3 C) STACK PRESSURE = 30.00 INCHES OF HG

DRY GAS COMPOSITION (PERCENT) CO2 = .30 CO = .10 N2 = 78.00 O2 = 21.00 H2O = 1.50

CALC. MASS LOADING = 3.4204-003 GR/ACF 4.3741-003 GR/DNCF 7.8270+000 MG/ACM 1.0010+001 MG/DNCM

AERODYNAMIC DIAMETERS ARE CALCULATED HERE ACCORDING TO THE TASK GROUP ON LUNG DYNAMICS.

ASSUMED PARTICLE DENSITY = 1.00GM/CU.CM. MAX. PARTICLE DIAMETER = 35.0 MICRONS

IMPACTOR STAGE	S1	S2	S3	S4	S5	S6	S7	S8	FILTER
STAGE INDEX NO.	1	2	3	4	5	6	7	8	9
D50 (MICRONS)	15.17	10.06	6.63	4.71	3.88	1.47	.86	.59	.59/2.0
MASS (MG)	.99	2.40	2.63	2.52	1.96	2.14	1.67	1.81	3.54
MG/DNCM/STAGE	5.04-001	1.22+000	1.34+000	1.28+000	9.98-001	1.09+000	8.50-001	9.22-001	1.80+000
CUM. % OF MASS < D50	94.47	81.05	66.35	52.26	41.31	29.35	20.01	9.89	
CUM. MASS (MG/ACM) < D50	6.73+000	5.77+000	4.73+000	3.72+000	2.94+000	2.09+000	1.43+000	7.05-001	
CUM. MASS (MG/DNCM) < D50	8.60+000	7.38+000	6.04+000	4.76+000	3.76+000	2.67+000	1.82+000	9.01-001	
CUM. MASS (GR/ACF) < D50	2.94-003	2.52-003	2.07-003	1.63-003	1.29-003	9.13-004	6.23-004	3.08-004	
CUM. (GR/DNCF) < D50	3.76-003	3.23-003	2.64-003	2.08-003	1.64-003	1.17-003	7.97-004	3.94-004	
GEO. MEAN DIA.(MICRONS)	2.30+001	1.24+001	8.17+000	5.59+000	4.28+000	2.39+000	1.12+000	7.15-001	4.20-001
DM/DLOGD (MG/DNCM)	1.39+000	6.85+000	7.39+000	8.66+000	1.19+001	2.58+000	3.68+000	5.71+000	5.99+000
DN/DLOGD (NUMBER/DNCM)	2.17+005	6.94+006	2.59+007	9.48+007	2.89+008	3.62+008	4.95+009	2.98+010	1.54+011

PARTICULATE DATA REDUCTION AND ENTRY SYSTEM 05/19/82 16:14:30
DATA FOR TEST BY CONTRACTOR GCA , AT SITE ALAM, ON DATE 12681, RUN NO. 20
TEST COMMENTS: IP TEST OF FERROSILICON FURNACE--ALAMET,SELMA,ALABAMA
RUN COMMENTS: 3-0-A

IMPACTOR DESCRIPTION AND CALIBRATION

TYPE: ANDERSEN PLATE SET ID: 7
MODEL: MARK 3 IMPACTOR DP SCALING FACTOR: 1.287

STAGE	NO.JETS	DIAM.	CUMDP	CALIB
1	264	.1640	.0000	.3808
2	264	.1250	.0000	.3808
3	264	.0950	.0000	.3808
4	264	.0760	.0000	.3808
5	264	.0670	.0000	.3808
6	264	.0360	.1760	.3808
7	264	.0260	.2940	.3808
8	156	.0250	1.0000	.3808

IMPACTOR FLOWRATE = .229 ACFM IMPACTOR TEMPERATURE = 227.0 F (108.3 C) SAMPLING DURATION = 96.00 MIN

IMPACTOR PRESSURE DROP = .084 IN. OF HG STACK TEMPERATURE = 227.0 F (108.3 C) STACK PRESSURE = 29.91 INCHES OF HG

DRY GAS COMPOSITION (PERCENT) CO2 = .30 CO = .10 N2 = 78.00 O2 = 21.00 H2O = 1.50

CALC. MASS LOADING = 4.6541-003 GR/ACF 6.1306-003 GR/DNCF 1.0650+001 MG/ACM 1.4029+001 MG/DNCM

AERODYNAMIC DIAMETERS ARE CALCULATED HERE ACCORDING TO THE TASK GROUP ON LUNG DYNAMICS.

ASSUMED PARTICLE DENSITY = 1.00GM/CU.CM. MAX. PARTICLE DIAMETER = 35.0 MICRONS

IMPACTOR STAGE	S1	S2	S3	S4	S5	S6	S7	S8	FILTER
STAGE INDEX NO.	1	2	3	4	5	6	7	8	9
D50 (MICRONS)	21.79	14.46	9.55	6.80	5.61	2.14	1.28	.90	.90/2.0
MASS (MG)	.38	.29	.17	.33	.52	1.85	.53	.43	2.13
MG/DNCM/STAGE	8.04-001	6.14-001	3.60-001	6.98-001	1.10+000	3.91+000	1.12+000	9.10-001	4.51+000
CUM. % OF MASS < D50	93.17	87.96	84.91	78.98	69.63	36.39	26.86	19.14	
CUM. MASS (MG/ACM) < D50	8.33+000	7.86+000	7.59+000	7.06+000	6.22+000	3.25+000	2.40+000	1.71+000	
CUM. MASS (MG/DNCM) < D50	1.10+001	1.04+001	1.00+001	9.30+000	8.20+000	4.28+000	3.16+000	2.25+000	
CUM. MASS (GR/ACF) < D50	3.64-003	3.44-003	3.32-003	3.09-003	2.72-003	1.42-003	1.05-003	7.48-004	
CUM. (GR/DNCF) < D50	4.79-003	4.53-003	4.37-003	4.06-003	3.58-003	1.87-003	1.38-003	9.85-004	
GEO. MEAN DIA.(MICRONS)	2.76+001	1.78+001	1.18+001	8.06+000	6.18+000	3.47+000	1.65+000	1.07+000	6.34-001
DM/DLOGD (MG/DNCM)	3.91+000	3.45+000	1.99+000	4.74+000	1.32+001	9.37+000	4.97+000	5.92+000	1.50+001
DN/DLOGD (NUMBER/DNCM)	3.54+005	1.18+006	2.35+006	1.73+007	1.07+008	4.29+008	2.10+009	9.25+009	1.12+011

PARTICULATE DATA REDUCTION AND ENTRY SYSTEM 05/19/82 16:14:30
DATA FOR TEST BY CONTRACTOR GCA , AT SITE ALAM, ON DATE 12781, RUN NO. 3
TEST COMMENTS: IP TEST FERROSILICON FCE DAY 2
RUN COMMENTS: 4-0-A

IMPACTOR DESCRIPTION AND CALIBRATION

TYPE: ANDERSEN PLATE SET ID: 7
MODEL: MARK 3 IMPACTOR DP SCALING FACTOR: 1.287

STAGE	NO.JETS	DIAM.	CUMDP	CALIB
1	264	.1640	.0000	.3808
2	264	.1250	.0000	.3808
3	264	.0950	.0000	.3808
4	264	.0760	.0000	.3808
5	264	.0670	.0000	.3808
6	264	.0360	.1760	.3808
7	264	.0260	.2940	.3808
8	156	.0250	1.0000	.3808

IMPACTOR FLOWRATE = .459 ACFM IMPACTOR TEMPERATURE = 209.0 F (98.3 C) SAMPLING DURATION = 192.00 MIN

IMPACTOR PRESSURE DROP = .347 IN. OF HG STACK TEMPERATURE = 209.0 F (98.3 C) STACK PRESSURE = 30.00 INCHES OF HG

DRY GAS COMPOSITION (PERCENT) CO2 = .30 CO = .10 N2 = 78.00 O2 = 21.00 H2O = 1.60

CALC. MASS LOADING = 1.5077-003 GR/ACF 1.9301-003 GR/DNCF 3.4502+000 MG/ACM 4.4168+000 MG/DNCM

AERODYNAMIC DIAMETERS ARE CALCULATED HERE ACCORDING TO THE TASK GROUP ON LUNG DYNAMICS.

ASSUMED PARTICLE DENSITY = 1.00GM/CU.CM. MAX. PARTICLE DIAMETER = 35.0 MICRONS

IMPACTOR STAGE	S1	S2	S3	S4	S5	S6	S7	S8	FILTER
STAGE INDEX NO.	1	2	3	4	5	6	7	8	9
D50 (MICRONS)	15.21	10.09	6.65	4.73	3.90	1.47	.86	.60	.60/2.0
MASS (MG)	.11	.29	1.65	1.29	.39	.21	1.61	2.19	.87
MG/DNCM/STAGE	5.64-002	1.49-001	8.46-001	6.62-001	2.00-001	1.08-001	8.26-001	1.12+000	4.46-001
CUM. % OF MASS < D50	98.65	95.11	74.92	59.14	54.37	51.80	32.11	5.32	
CUM. MASS (MG/ACM) < D50	3.23+000	3.12+000	2.45+000	1.94+000	1.78+000	1.70+000	1.05+000	1.74-001	
CUM. MASS (MG/DNCM) < D50	4.14+000	3.99+000	3.14+000	2.48+000	2.28+000	2.17+000	1.35+000	2.23-001	
CUM. MASS (GR/ACF) < D50	1.41-003	1.36-003	1.07-003	8.47-004	7.78-004	7.42-004	4.60-004	7.62-005	
CUM. (GR/DNCF) < D50	1.81-003	1.74-003	1.37-003	1.08-003	9.96-004	9.49-004	5.88-004	9.75-005	
GEO. MEAN DIA.(MICRONS)	2.31+001	1.24+001	8.19+000	5.61+000	4.29+000	2.39+000	1.13+000	7.18-001	4.22-001
DM/DLOGD (MG/DNCM)	1.56-001	8.34-001	4.67+000	4.47+000	2.38+000	2.55-001	3.58+000	6.97+000	1.48+000
DN/DLOGD (NUMBER/DNCM)	2.42+004	8.37+005	1.62+007	4.84+007	5.75+007	3.55+007	4.76+009	3.60+010	3.78+010

PARTICULATE DATA REDUCTION AND ENTRY SYSTEM 05/19/82 16:14:30
DATA FOR TEST BY CONTRACTOR GCA , AT SITE ALAM, ON DATE 12781, RUN NO. 4
TEST COMMENTS: IP TEST FERROSILICON FCE DAY 2
RUN COMMENTS: 5-O-B

IMPACTOR DESCRIPTION AND CALIBRATION

TYPE: ANDERSEN PLATE SET ID: 7
MODEL: MARK 3 IMPACTOR DP SCALING FACTOR: 1.287

STAGE	NO.JETS	DIAM.	CUMDP	CALIB
1	264	.1640	.0000	.3808
2	264	.1250	.0000	.3808
3	264	.0950	.0000	.3808
4	264	.0760	.0000	.3808
5	264	.0670	.0000	.3808
6	264	.0360	.1760	.3808
7	264	.0260	.2940	.3808
8	156	.0250	1.0000	.3808

IMPACTOR FLOWRATE = .476 ACFM IMPACTOR TEMPERATURE = 236.0 F (113.3 C) SAMPLING DURATION = 192.00 MIN

IMPACTOR PRESSURE DROP = .359 IN. OF HG STACK TEMPERATURE = 236.0 F (113.3 C) STACK PRESSURE = 30.00 INCHES OF HG

DRY GAS COMPOSITION (PERCENT) CO2 = .30 CO = .10 N2 = 78.00 O2 = 21.00 H2O = 1.40

CALC. MASS LOADING = 3.0665-003 GR/ACF 4.0758-003 GR/DNCF 7.0171+000 MG/ACM 9.3269+000 MG/DNCM

AERODYNAMIC DIAMETERS ARE CALCULATED HERE ACCORDING TO THE TASK GROUP ON LUNG DYNAMICS.

ASSUMED PARTICLE DENSITY = 1.00GM/CU.CM. MAX. PARTICLE DIAMETER = 35.0 MICRONS

IMPACTOR STAGE	S1	S2	S3	S4	S5	S6	S7	S8	FILTER
STAGE INDEX NO.	1	2	3	4	5	6	7	8	9
D50 (MICRONS)	15.16	10.05	6.62	4.71	3.88	1.46	.86	.59	.59/2.0
MASS (MG)	1.08	.52	.97	.94	1.41	3.18	1.73	2.59	5.74
MG/DNCM/STAGE	5.55-001	2.67-001	4.98-001	4.83-001	7.24-001	1.63+000	8.89-001	1.33+000	2.95+000
CUM. % OF MASS < D50	92.94	89.54	83.19	77.04	67.82	47.02	35.71	18.77	
CUM. MASS (MG/ACM) < D50	5.49+000	5.29+000	4.92+000	4.55+000	4.01+000	2.78+000	2.11+000	1.11+000	
CUM. MASS (MG/DNCM) < D50	7.30+000	7.03+000	6.53+000	6.05+000	5.33+000	3.69+000	2.80+000	1.47+000	
CUM. MASS (GR/ACF) < D50	2.40-003	2.31-003	2.15-003	1.99-003	1.75-003	1.21-003	9.22-004	4.85-004	
CUM. (GR/DNCF) < D50	3.19-003	3.07-003	2.85-003	2.64-003	2.33-003	1.61-003	1.23-003	6.44-004	
GEO. MEAN DIA.(MICRONS)	2.30+001	1.23+001	8.16+000	5.58+000	4.27+000	2.38+000	1.12+000	7.10-001	4.16-001
DM/DLOGD (MG/DNCM)	1.53+000	1.50+000	2.75+000	3.26+000	8.60+000	3.85+000	3.83+000	8.18+000	9.79+000
DN/DLOGD (NUMBER/DNCM)	2.39+005	1.52+006	9.68+006	3.58+007	2.11+008	5.46+008	5.23+009	4.37+010	2.59+011

APPENDIX E-1

CASCADE IMPACTOR FIELD DATA SHEETS

1-618-018

ANDERSEN IMPACTOR FIELD DATA

Plant Alamet   Time 1515   Nozzle Dia. 3.5 B

Location Selma   Run No. 1 IA 16"   Avg. ΔP 2.3

Operator Epstein/Mesure   Impactor Location A, 16"   Traverse Pt.

Date 1/26/81   D.G.M. No. V2   Pb 30.02

Andersen Imp No. 1 I   D.G.M. Y   Static "Hg -4.75/13.6

Stage No.	0	1	2	3	4	5	6	7	F	T
Substrate No.	870	871	872	873	894	875	896	877	B98	

Dry Gas Meter Reading	Elapsed Time	Orifice Δh "H_2O	Meter Temperature Inlet	Meter Temperature Outlet	Orifice S.P. - "Hg	Impactor Temp	Traverse Point
868.193	0:00	0.29	69	73	1.3		
868.370	0:30	0.29	70	73	1.3		
868.580	1:00	0.27	70	72	1.4		
868.760	1:30	0.29	70	72	1.4		
868.989	2:00	0.29	71	72	1.4		

Initial leak check 0.02   Si-Gel initial —

Final leak check n Done   Si-Gel final —

Total H_2O Collected in Flask —   Net —

Total H_2O Collected —

$T_s = 320$

$Q_c = 0.529$

$C_c = 0.302$

1-618-018

ANDERSEN IMPACTOR FIELD DATA

Plant Alamet | Time 1410 | Nozzle Dia. ~~0.50~~ 3.54

Location [illegible] | Run No. IIB 16" | Avg. ΔP 2.3

Operator Epstein/Meserve | Impactor Location INLET | Traverse Pt. —

Date 1/26/91 | D.G.M. No. V2 | Pb 30.02

Andersen Imp No. 2I | D.G.M. Y 0.986 | Static "Hg -4.75/3.6

Stage No.	0	1	2	3	4	5	6	7	F	T
Substrate No.	886	887	888	889	890	891	892	893	~~[illegible]~~ B-100	

sub down fiber up

Dry Gas Meter Reading	Elapsed Time	Orifice Δh "H_2O	Meter Temperature Inlet	Meter Temperature Outlet	Orifice S.P. - "Hg	Impactor Temp	Traverse Point
867.205	0:00	0.25	64	68	1.55		
867.405	0:30	0.25	64	68	1.55		
867.590	1:00	0.25	64	68	1.55		
867.775	1:30	0.25	64	68	1.55		
867.966	2:00	0.25	64	64	1.55		

Initial leak check 0.01 | T_s=320 | Si-Gel initial —

Final leak check no probe | Si-Gel final —

Total H_2O Collected in Flask — | Q_c = 0.529 | Net —

Total H_2O Collected — | C_c = 0.302

ANDERSEN IMPACTOR FIELD DATA

Plant ALAMET Time 9:20 Nozzle Dia. =3.0 0.1 mm B

Location SELMA Run No. 2-I-A90 Avg. ΔP 2.3 TS=320°F

Operator Hobbs/Voy Impactor Location Inlet A90 Traverse Pt. ____

Date 1/27/81 D.G.M. No. V2 Pb 29.91

Andersen Imp No. 1I D.G.M. Y ____ Static "Hg -4.75"

Stage No.	0	1	2	3	4	5	6	7	F	T
Substrate No.	822	823	824	825	826	827	828	829	B-92	

Dry Gas Meter Reading	Elapsed Time	Orifice Δh "H_2O	Meter Temperature Inlet	Meter Temperature Outlet	Orifice S.P. - "Hg	Impactor Temp	Traverse Point
869.043	0	0.15	60	56	1.4		1
869.38	0.30	0.15	61	56	1.4		
869.42	1:00	0.15	61	56	1.4		
869.59	1:30	0.15	61	56	1.4		
869.74	2:00	0.15	61	56	1.4		
869.90	2:30	0.15	61	57	1.5		
870.07	3:00	0.15	61	57	1.5		
870.179	3:15	0.15	6			* End of run	▽

Initial leak check 0.001 ft^3/min @ 5" Hg

Final leak check ____

Total H_2O Collected in Flask ____

Total H_2O Collected ____

Si-Gel initial ____

Si-Gel final ____

Net ____

* Inserted nozzle for warm up @ ~9.02

ANDERSEN IMPACTOR FIELD DATA

Plant Alaneet Time 9:52 Nozzle Dia. 3.5A

Location Selma Run No. 2-I-B-90 Avg. ΔP 2.3 *Ts = 320 °F

Operator VAY/HOBBS Impactor Location Inlet-B-90 Traverse Pt. ____

Date 1/27/81 D.G.M. No. V2 Pb 29.91

Andersen Imp No. 2I D.G.M. Y ____ Static "Hg 4.75

Stage No.	0	1	2	3	4	5	6	7	F	T
Substrate No.	806	807	808	809	810	811	812	813	B-90	

Dry Gas Meter Reading	Elapsed Time	Orifice Δh "H_2O	Meter Temperature Inlet	Meter Temperature Outlet	Orifice S.P. - "Hg	Impactor Temp	Traverse Point
870.602	0	0.15	60	60	1.5		1
870.82	0:30	0.15	61	61	1.6		
871.03	1:00	0.15	60	61	1.9		
871.17	1:30	0.15	60	61	2.0		
871.33	2:00	0.15	60	61	2.1		
871.47	2:30	0.15	60	61	2.4		
871.641	3:00	0.15	60	61	2.5		

Initial leak check 0.016 ft³/mn @ 5" Hg

Final leak check ____

Total H_2O Collected in Flask ____

Total H_2O Collected ____

Si-Gel initial ____

Si-Gel final ____

Net ____

ANDERSEN IMPACTOR FIELD DATA

Plant Alamet | Time 14:05 | Nozzle Dia. 0.1 mm

Location Selma | Run No. 3I - B - 16 | Avg. ΔP 2.3 TS = ____

Operator Vay/Hobb | Impactor Location B-16 | Traverse Pt. 16 B

Date 1/27/81 | D.G.M. No. V2 | Pb 29.91

Andersen Imp No. 1I | D.G.M. Y ____ | Static "Hg - 4.5" H_2O

Stage No.	0	1	2	3	4	5	6	7	F	T
Substrate No.										

Dry Gas Meter Reading	Elapsed Time	Orifice Δh "H_2O	Meter Temperature Inlet	Meter Temperature Outlet	Orifice S.P. - "Hg	Impactor Temp	Traverse Point
871.952	0	0.15	62	62	1.40		
872.10	0:30	0.15	62	62	1.50		
872.25	1:00	0.15	62	62	1.52		
872.40	1:30	0.15	62	62	1.52		

Initial leak check 0.018 ft^3/mn @ 5" Hg | Si-Gel initial ____

Final leak check ____ | Si-Gel final ____

Total H_2O Collected in Flask ____ | Net ____

Total H_2O Collected ____

ANDERSEN IMPACTOR FIELD DATA

Plant Alamet | Time 15:26 | Nozzle Dia. 0.1 mm

Location Selma | Run No. 3I-A-1b | Avg. ΔP 2.3 TS=

Operator Vay/Hobb | Impactor Location A-1b | Traverse Pt. 16"

Date 1/27/81 | D.G.M. No. V2 | Pb 29.91

Andersen Imp No. 2F | D.G.M. Y ____ | Static "Hg -4.5 " H_2O

Stage No.	0	1	2	3	4	5	6	7	F	T
Substrate No.	974	975	976	977	978	979	980	981	B-111	

Dry Gas Meter Reading	Elapsed Time	Orifice Δh "H_2O	Meter Temperature Inlet	Meter Temperature Outlet	Orifice S.P. - "Hg	Impactor Temp	Traverse Point
872.741	0	0.15	Ran about 25 secs total !				
	0:30	0.15	Removed for leak.				
	1:00	0.15	Ran another imp to cover.				
	1:30	STOP					
	F.U. id run due to not starting stopwatch.						
	Spaces missing between 4th & 5th substrates - plugged holes evident on #4 plate						

Initial leak check 0.01 ~~"Hg~~ cfm @ 5" Hg | Si-Gel initial ____

Final leak check ____ | Si-Gel final ____

Total H_2O Collected in Flask ____ | Net ____

Total H_2O Collected ____

ANDERSEN IMPACTOR FIELD DATA

Plant Alamet | Time 15:52 | Nozzle Dia. 0.1 mm

Location Selma | Run No. 3I-A-16-Z | Avg. ΔP 2.3 TS=

Operator Vay/Hobbs | Impactor Location A-16 | Traverse Pt. 16"

Date 1/27/81 | D.G.M. No. V2 | Pb 29.91

Andersen Imp No. 1I | D.G.M. Y ____ | Static "Hg -4.5" H_2O

Stage No.	0	1	2	3	4	5	6	7	F	T
Substrate No.	926	927	928	929	930	931	932	933	B105	

Dry Gas Meter Reading	Elapsed Time	Orifice Δh "H_2O	Meter Temperature Inlet	Meter Temperature Outlet	Orifice S.P. - "Hg	Impactor Temp	Traverse Point
873.009	0	0.15	—	—	~~1.~~		
873.14	0:30	0.15	60	60	1.39		
873.29	1:00	0.15	60	60	1.70		
873.34	1:30	0.15	STOP	60	—		

Init ____ k check 0.018 ft^3/min @ 5" Hg | Si-Gel initial ____

Fina ____ check | Si-Gel final ____

Tot. H_2O Collected in Flask ____ | Net ____

Tot. H_2O Collected ____

ANDERSEN IMPACTOR FIELD DATA

Plant Alcoa — Time 1000 — Nozzle Dia. 0.1 mm

Location Selma — Run No. 41-B-90 — Avg. ΔP 2.3

Operator Epps / Hobbs — Impactor Location B-90 — Traverse Pt. B-90"

Date 1/28/81 — D.G.M. No. V2 — Pb 30.00

Andersen Imp No. 2I — D.G.M. Y ____ — Static "Hg -4.75" H_2O

Stage No.	0	1	2	3	4	5	6	7	F	T
Substrate No.	838	839	840	841	842	843	844	845	B-99	

Dry Gas Meter Reading	Elapsed Time	Orifice Δh "H_2O	Meter Temperature Inlet	Meter Temperature Outlet	Orifice S.P. - "Hg	Impactor Temp	Traverse Point
873.907	0	0.15	-	-	-	Change to B	
874.[illegible]	0:30	0.15	49	52	1.8		
874.22[illegible]	1:00	0.15	50	52	1.9		
874.36[illegible]	1:30	0.15	-	-	-		
874.408	1:37						
Filter Nos. IN BACKWARDS							

Initial leak check 0.02 ft^3/min @ 5" Hg — Si-Gel initial —

Final leak check 0 Dam — Si-Gel final —

Total H_2O Collected in Flask — — T_s = 290°F — Net —

Total H_2O Collected —

ANDERSEN IMPACTOR FIELD DATA

Plant Alamet Time 0846 Nozzle Dia. 0.1 m~

Location Selma Run No. 41-A-90 Avg. ΔP 2.3 ST =

Operator Epsten/Hobbs Impactor Location A-90 Traverse Pt. A-90"

Date 1/26/81 D.G.M. No. V2 Pb 30.00

Andersen Imp No. I-1 D.G.M. Y ____ Static "Hg -4.75 " H.O

Stage No.	0	1	2	3	4	5	6	7	F	T
Substrate No.	966	967	968	969	970	971	972	973	B-110	

Dry Gas Meter Reading	Elapsed Time	Orifice Δh "H_2O	Meter Temperature Inlet	Meter Temperature Outlet	Orifice S.P. - "Hg	Impactor Temp	Traverse Point
873.535	0	0.15	—	—	—	process – charging & stabilizing	
873655	0:30	0.15	49	47	1.4		
873812	1:00	0.15	49	47	1.4		
	1:30						

Initial leak check 0.002 ft³/min @ 5" Hg

Final leak check —

Total H_2O Collected in Flask —

Total H_2O Collected —

Si-Gel initial —

Si-Gel final —

Net —

ANDERSEN IMPACTOR FIELD DATA

Plant ALAMET Time 1214 Nozzle Dia. 0.1 mm

Location SELMA Run No. 5-I-B-2-90 Avg. ΔP Ts=290 ΔP=2.3

Operator EPSTEIN/HOOBS Impactor Location B-90" Traverse Pt. 90"

Date 1/28/81 D.G.M. No. V2 Pb 30.00

Andersen Imp No. 2I D.G.M. Y _____ Static "Hg -4.75

Stage No.	0	1	2	3	4	5	6	7	F	T
Substrate No.	998	999	000	001	002	003	004	005	B-114	

Dry Gas Meter Reading	Elapsed Time	Orifice Δh "H_2O	Meter Temperature Inlet	Meter Temperature Outlet	Orifice S.P. - "Hg	Impactor Temp	Traverse Point
875.220	0	0.15	-	-			
875.38	0:30	0.15	52	57	0.8		
875.53	1:00	0.15	53	57	0.8		
875.665	1:30	0.15	-	-	-		
					Begun before tap hole was		
					shut by ~ 2 min		
					Preheated 7 min.		
					Repeat of earlier backwards		
					run.		
					Last 2 filters cut.		

Initial leak check 0.01 cfm @ 5" Hg.

Final leak check _____

Total H_2O Collected in Flask _____

Total H_2O Collected _____

Si-Gel initial _____

Si-Gel final _____

Net _____

ANDERSEN IMPACTOR FIELD DATA

Plant Almet | Time 1134 3 | Nozzle Dia. 0.1 mm

Location Selma | Run No. SI-B-16 | Avg. ΔP 2.3

Operator Epstein/Hobbs | Impactor Location SIB16 | Traverse Pt. B-16

Date 1/28/81 | D.G.M. No. V2 | Pb 30.00

Andersen Imp No. I | D.G.M. Y ____ | Static "Hg ____

Stage No.	0	1	2	3	4	5	6	7	F	T
Substrate No.	006	007	008	009	010	011	012	013	B-115	

Dry Gas Meter Reading	Elapsed Time	Orifice Δh "H_2O	Meter Temperature Inlet	Meter Temperature Outlet	Orifice S.P. - "Hg	Impactor Temp	Traverse Point
874.476	0.0	~~0.15~~ 0.15	52	55	1.2		
874.620	~~30.0~~	0.15	52	55	~~1.25~~ 1.25		
874.770	~~60.0~~ 60.0	0.15	52	55	1.3		
874.910	90.0	0.15	52	55	1.3		

Initial leak check 0.005 cfm @ 5" Hg

Final leak check ____

Total H_2O Collected in Flask ____

Total H_2O Collected ____

Si-Gel initial ____

Si-Gel final ____

Net ____

ANDERSEN IMPACTOR FIELD DATA

Plant Alamet | Time 1319 | Nozzle Dia. 0.1 mm

Location Selma | Run No. SI-A-16 | Avg. ΔP 2.3 290°F

Operator Epstein/Hobbs | Impactor Location INLET A, 16" | Traverse Pt. 16"

Date 1/28/91 | D.G.M. No. V2 | Pb ~~4.~~ 30.00

Andersen Imp No. 2T | D.G.M. Y ____ | Static "Hg -4.75

Stage No.	0	1	2	3	4	5	6	7	F	T
Substrate No.	798	799	800	801	802	803	804	805	B-89	

Dry Gas Meter Reading	Elapsed Time	Orifice Δh "H_2O	Meter Temperature Inlet	Meter Temperature Outlet	Orifice S.P. - "Hg	Impactor Temp	Traverse Point
875.732	0	0.15	–	–	1.1	charging - light emissions	
875.895	30.0	0.15	53	57	1.2		
876.030	60.0	0.15	53	57	1.3		
876.174	90.0	0.15	53	57	1.3		

Initial leak check 0.01 ft³/min @ 5" Hg | Si-Gel initial –

Final leak check – | Si-Gel final –

Total H_2O Collected in Flask – | Net –

Total H_2O Collected –

ANDERSEN IMPACTOR FIELD DATA

Plant Alamet | Time ~~1530~~ 1602 | Nozzle Dia. 0.1 in

Location Selma | Run No. GI-B-~~15~~ 16 | Avg. ΔP ____ | T_s = 290°F

Operator Epstein / Hobbs | Impactor Location GI B ~~15~~ 16 | Traverse Pt. B-16"

Date 1/28/81 | D.G.M. No. V2 | Pb 30.00

Andersen Imp No. II | D.G.M. Y ____ | Static "Hg ____

Stage No.	0	1	2	3	4	5	6	7	F	T
Substrate No.	790	791	792	793	794	795	796	797	B-88	

Dry Gas Meter Reading	Elapsed Time	Orifice Δh "H_2O	Meter Temperature Inlet	Meter Temperature Outlet	Orifice S.P. - "Hg	Impactor Temp	Traverse Point
876.687	0	0.15	-	-	1.2		
876.830	0:30	0.15	60	61	1.25		
876.970	1:00	0.15	60	61	1.30		
877.102	1:30	0.15	60	61	1.35		

Initial leak check 0.005 ft^3/min @ 5" Hg | Si-Gel initial —

Final leak check — preheated for 30 min. | Si-Gel final ____

Total H_2O Collected in Flask — | Net ____

Total H_2O Collected — method 5 ended ~~after~~ before end of our run.

1.0

ANDERSEN IMPACTOR FIELD DATA

Plant Alabama Time 14:26 Nozzle Dia. 0.1 mm

Location Selma Run No. 6IA16 Avg. ΔP 2.3 T. ≈ 290°F

Operator Eastern/Hobbs Impactor Location Inlet A, 16' Traverse Pt. 16"

Date 1/29/91 D.G.M. No. V2 Pb 30.00

Andersen Imp No. 2I D.G.M. Y ____ Static "Hg -4.75

Stage No.	0	1	2	3	4	5	6	7	F	T
Substrate No.	846	847	848	849	850	851	852	853	B-95	

Dry Gas Meter Reading	Elapsed Time	Orifice Δh "H_2O	Meter Temperature Inlet	Meter Temperature Outlet	Orifice S.P. - "Hg	Impactor Temp	Traverse Point
876.240	0	0.15	-	-			
876.390	0:30	↓	54	57	1.8		
876.54	1:00	↓	-	-			

Initial leak check I = 0.018 F = 0.022 @ 3.5" Si-Gel initial ____

Final leak check ____ @ ____ Si-Gel final ____

Total H_2O Collected in Flask ____ Net ____

Total H_2O Collected ____

ANDERSEN IMPACTOR FIELD DATA

Plant Alamet | Time 13:25 | Nozzle Dia. .2L

Location Selma Alabama | Run No. 1-O-A | Avg. ΔP 0.002

Operator Joe Vay | Impactor Location OUT A | Traverse Pt. Comp 7, 8

Date 1/26/81 | D.G.M. No. V3 | Pb 30.02

Andersen Imp No. 4B OUT A | D.G.M. Y ____ | Static "Hg +

Stage No.	0	1	2	3	4	5	6	7	F	T
Substrate No.	918	919	920	921	922	923	924	925	B104	

Dry Gas Meter Reading	Elapsed Time	Orifice Δh "H_2O	Meter Temperature Inlet	Meter Temperature Outlet	Orifice S.P. - "Hg	Impactor Temp	Traverse Point
439.538	0	0.1	83	74	0.4		7
443.23	15	0.1	83	75	0.5		7
446.94	30	0.1	83	74	0.5		7
450.67	45	0.1	83	74	0.5		7
454.42	60	0.1	79	78	0.5		7
458.30	75.5	0.1	79	73	0.5		7
461.94	90	0.1	79	73	0.5		7
463.455	96	0.1	79	73	0.5	*Stop #7	7
463.458	96	0.1	79	81	0.5	*Start #8	8
465.70	105	0.1	82	82	0.5		8
469.39	120	0.1	84	83	0.5		8
473.07	135	0.1	84	86	0.6		8
476.74	150	0.1	90	90	0.55		8
480.40	165	0.1	90	91	0.6		8
484.07	180	0.1	100	98	0.6		8
486.980	192	0.1	101	103	0.6	*Stop	8

Initial leak check 0.0000 cfm @ 5 inch Hg

Final leak check ____

Total H_2O Collected in Flask ____

Total H_2O Collected ____

Si-Gel initial End Time - 1712

Si-Gel final ____

Net ____

ANDERSEN IMPACTOR FIELD DATA

Plant FLAMET Time 13.25 → 17.10 Nozzle Dia. 1L

Location Selma Run No. 10B Avg. ΔP .002

Operator Hobbs Impactor Location OUTLET B Traverse Pt. Comp 1, 2

Date 1/26/81 D.G.M. No. V4 Pb 30.02

Andersen Imp No. 4601A D.G.M. Y _____ Static "Hg _____

Stage No.	0	1	2	3	4	5	6	7	F	T
Substrate No.	934	935	936	937	938	939	940	941	B-106	

13 1/2 min.

w/ SEP BACK-UP FILTER

Dry Gas Meter Reading	Elapsed Time	Orifice Δh "H_2O	Meter Temperature °F Inlet	Meter Temperature °F Outlet	Orifice S.P. - "Hg	Impactor Temp	Traverse Point
375.587	31 0	0.1	86	86	0.45		1
380.500	46 18.7	0.1	89	89	0.48		↓
383.455	30.0	0.1	87	87	0.51		"
387.32	45.0	0.1	89	89	0.50		"
391.23	60.0	0.1	90	91	0.51		1½
395.16	75.0	0.1	87	90	0.50		"
399.06	90.0	0.1	85	88	0.51		"
→ 402.99	105.0	0.1	100	99	0.51		"
406.97	120.0	0.1	96	100	0.51		
411.49	137.1	0.1	101	103	0.51		
414.82	150.0	0.1	106	109	0.51		
418.77	165.0	0.1	108	112	0.49		
422.76	180.0	0.1	114	120	0.50		
425.97	192.0	0.1	120	124	0.50		

Initial leak check @5" Hg: pulled 0.004 ft^3/min Si-Gel initial _____

Final leak check _____ Si-Gel final _____

Total H_2O Collected in Flask _____ Net _____

Total H_2O Collected _____

104 2 min 45 sec per shaking cycle

ANDERSEN IMPACTOR FIELD DATA

Plant Alamet | Time 12:00 20-B-II | Nozzle Dia. 0.500

Location Selma ALA. | Run No. 20 -AB | Avg. ΔP 0.002

Operator K. Meserve | Impactor Location 12-outlet | Traverse Pt. Comp 12

Date 1-27-81 | D.G.M. No. V3 | Pb 29.91

Andersen Imp No. 48 | D.G.M. Y ____ | Static "Hg +

Stage No.	0	1	2	3	4	5	6	7	F	T
Substrate No.	958	959	960	961	962	963	964	965	B-109	

w/o Sep Backup Filter

Dry Gas Meter Reading	Elapsed Time	Orifice Δh "H_2O	Meter Temperature Inlet	Meter Temperature Outlet	Orifice S.P. - "Hg	Impactor Temp	Traverse Point
524.741	0	0.23	98	96	.7"		
529.942	13.45	0.23	99	95	.8" [stop due to SHAKER]		
530.580	15	0.23	99	95	.8"		
536.500	30	0.23	99	96	.9"		
540.076	39.5	0.23	99	96	.9 [stop - shaker]		
542.240	45	0.23	96	94	1.0		
548.100	60	0.23	92	90	1.0		
550.285	65.5	0.23	92	90	1.0 [stop - shaker]		
554.150	75	0.23	90	84	1.0		
559.900	90	0.23	90	84	1.0		
560.468	91.6	0.23	90	84	1.0 [stop - shaker]		
562.205	96						
"the End"							

Initial leak check 0.004

Final leak check ____

Total H_2O Collected in Flask ____

Total H_2O Collected ____

Si-Gel initial ____

Si-Gel final ____

Net ____

ANDERSEN IMPACTOR FIELD DATA

Plant Alamet — Time 0950 — Nozzle Dia. 0.500"

Location Selma ALA — Run No. 2-O-B — Avg. ΔP 0.002

Operator Moore — Impactor Location outlet — Traverse Pt. 12 comp

Date 1-27-81 — D.G.M. No. V4 — Pb 29.91

Andersen Imp No. 4B — D.G.M. Y ____ — Static "Hg +

Stage No.	0	1	2	3	4	5	6	7	F	T
Substrate No.	950	951	952	953	954	955	956	957	B-108	

w/o sep Backup Filter

Dry Gas Meter Reading	Elapsed Time	Orifice Δh "H_2O	Meter Temperature Inlet	Meter Temperature Outlet	Orifice S.P. - "Hg	Impactor Temp	Traverse Point
426.213	0	0.23	98	96	4" Hg		
429.550	~~5~~	0.23	96	94	[Stop at 8 min into Run due to shakedown]		
432.020	~~10~~ 15	0.23			5"		
434.500	~~15~~ ~~20~~ 21				(stop at 21 min due to VAC build up could NOT pull flow)		
	~~20~~						
	~~30~~						

Plugged @ 21 - probably in flex hose since substrates look clean.

Initial leak check .005

Final leak check ____

Total H_2O Collected in Flask ____

Total H_2O Collected ____

Si-Gel initial ____

Si-Gel final ____

Net ____

106

*(stop the meter 1.225 after 11 sec. goes for 28 sec. start up 1 min after it stop)

ANDERSEN IMPACTOR FIELD DATA

Plant Alamet Time 0945 Nozzle Dia. 1L

Location Selma Run No. 20A Avg. ΔP 0.002

Operator Epstein Impactor Location Outlet #6 Traverse Pt. ____

Date 1/27/81 D.G.M. No. V3 1517948 Pb 29.91

Andersen Imp No. outlet A(4601A) D.G.M. Y ____ Static "Hg 4.5/13.6

Stage No.	0	1	2	3	4	5	6	7	F	T
Substrate No.	014	015	016	017	018	019	020	021	B-16	

Dry Gas Meter Reading	Elapsed Time	Orifice Δh "H_2O	Meter Temperature Inlet	Meter Temperature Outlet	Orifice S.P. - "Hg	Impactor Temp	Traverse Point
487.038	0.0	0.23	98	98	0.8		
493.050	15.8	0.23	98	101	0.8		
498.655	30.0	0.23	97	102	0.9		
504.550	45.0	0.23	97	102	1.0		
510.460	60.0	0.23	99	105	1.0		
516.360	75.0	0.23	99	103	1.0		
522.270	90.0	0.23	101	105	1.0		
524.646	96.0	0.23	101	105	1.05		

Initial leak check 0.005 after train 1:22 after end of previous shaker cycle. Si-Gel initial ____

Final leak check N Run start 3:20 after. Si-Gel final ____

Total H_2O Collected in Flask ____ Net ____

Total H_2O Collected ____

ANDERSEN IMPACTOR FIELD DATA

Plant Alamo Time 1534 1324 Nozzle Dia. 1L

Location [illegible] Run No. 3-0-[illegible]A (SG) Avg. ΔP 0.002

Operator [illegible] Impactor Location outlet #11 4 Traverse Pt. ____

Date 1/27/81 D.G.M. No. V4 2900014 Pb 29.91

Andersen Imp No. 4601 A D.G.M. Y ____ Static "Hg 4.5/13.6

Stage No.	0	1	2	3	4	5	6	7	F	T
Substrate No.	982	983	984	985	986	987	988	989	B-112	

Dry Gas Meter Reading	Elapsed Time	Orifice Δh "H_2O	Temperature Inlet	Temperature Outlet	Orifice S.P. - "Hg	Impactor Temp	Traverse Point
510.562	0.0	0.047/0.05	78	74	0.28		
513.280	15.0	0.05	82	77	0.28		
516.000	30.0	0.05	86	82	0.28	Comp. #11	
518.750	45.0	0.05	86	84	0.30		
521.490	60.0	0.05	87	85	0.30		
524.205	75.0	0.05	89	87	0.29		
526.892	90	0.05	86	84	0.30		
527.961	96	0.05	85	83	0.30	switch	
15M / 527.961	96.0	0.05	85	82	0.30	Comp #4	
529.605	105.0	0.05	86	84	0.30		
532.240	120.0	0.05	88	85	0.30		
534.920	135.0	0.05	91	88	0.30		
537.760	150.0	0.05	87	87	0.30		
540.355	165.25	0.05	86	86	0.30		
542.990	180.0	0.05	92	92	0.32		
545.210	192.0	0.05	84	82	0.33		

Initial leak check 0.005 compartment #11 for 96 min Si-Gel initial —

Final leak check — compartment #4 for 96 min. Si-Gel final —

Total H_2O Collected in Flask — Net —

Total H_2O Collected —

ANDERSEN IMPACTOR FIELD DATA

Plant ALAMET Time 1400 Nozzle Dia. 0.500

Location Selma Ala Run No. 3-0 B Avg. ΔP 0.002

Operator Meserve Impactor Location outlet 5 Traverse Pt. Comp 5

Date 1-27-81 D.G.M. No. V4 Pb 29.91

Andersen Imp No. 4B D.G.M. Y Static "Hg +

Stage No.	0	1	2	3	4	5	6	7	F	T
Substrate No.	910	911	912	913	914	915	916	917	B-103	

Dry Gas Meter Reading	Elapsed Time	Orifice Δh "H_2O	Meter Temperature Inlet	Meter Temperature Outlet	Orifice S.P. - "Hg	Impactor Temp	Traverse Point
562.272	0	.05	92	90	0		
565.18	15	.05	90	88	0		
567.428	26.25	.05	90	88	stop -	SHAKER	
568.10	30	.05	92	89	0		
570.90	45	.05	92	89	0		
572.337	52.4	.05	92	89	stop -	SHAKER	
573.81	60	.05	94	90	0		
576.85	75	.05	94	90	0		
577.53	79	.05	94	90	stop -	SHAKER	* sampled for ≈ 3 sec during shake
579.540	90	.05	94	90	0		
580.712	96	.05	94	90	0		
	the End						

leak check .005

Leak check

Total H_2O Collected in Flask

Total H_2O Collected

Si-Gel initial

Si-Gel final

Net

5 & 10

ANDERSEN IMPACTOR F LD DATA

Plant Alamet Time 8:15 Nozzle Dia. ____

Location Selma Run No. 4-0-A Avg. ΔP ____

Operator Vay Impactor Location Outlet 9 Traverse Pt. 9 & 3

Date 1-28-81 D.G.M. No. V4 Pb ____

Andersen Imp No. 4601 D.G.M. Y ____ Static "Hg ____

Stage No.	0	1	2	3	4	5	6	7	F	T
Substrate No.	830	831	832	833	834	835	836	837	B93	

Dry Gas Meter Reading	Elapsed Time	Orifice Δh "H_2O	Meter Temperature Inlet	Meter Temperature Outlet	Orifice S.P. - "Hg	Impactor Temp	Traverse Point
545.240	0	0.21	60	56	0.65		9
550.72	15	0.21	60	57	0.7		9
556.30	30	0.21	60	58	0.8		9
561.82	45	0.21	62	60	0.8		9
567.41	60	0.21	64	62	0.8		9
572.98	75	0.21	64	64	0.8		9
578.55	90	0.21	65	64	0.8		9
580.769	96	0.21	65	64	0.8		9
580.769	0	0.21	68	64	0.8		3
586.64	16	0.21	72	70	0.8		3
591.79	30	0.21	74	73	0.8		3
597.31	45	0.21	78	74	0.8		3
602.80	60	0.21	82	78	0.8		3
608.30	75	0.21	82	80	0.8		3
613.79	90	0.21	86	82	0.8		3
615.969	96	0.21	86	82	0.8		3

Initial leak check 0.003 ft^3 @ >5" Hg 1 min Si-Gel initial ____

Final leak check ____ Si-Gel final ____

Total H_2O Collected in Flask ____ Net ____

Total H_2O Collected ____

ANDERSEN IMPACTOR FIELD DATA

Plant ALAMET   Time 8:10   Nozzle Dia. 2 L

Location SELMA Ala   Run No. 4-O-B   Avg. ΔP

Operator K MESERVE   Impactor Location Outlet-5   Traverse Pt.

Date 1-28-81   D.G.M. No. V3   Pb

Andersen Imp No. 4B   D.G.M. Y   Static "Hg

Stage No.	0	1	2	3	4	5	6	7	F	T
Substrate No.	894	895	896	897	898	899	900	901	B101	

Dry Gas Meter Reading	Elapsed Time	Orifice Δh "H_2O	Meter Temperature Inlet	Meter Temperature Outlet	Orifice S.P. - "Hg	Impactor Temp	Traverse Point
581.696	0	.21	72	73	.7"		
587.290	15	.21	73	74	.8		
588.940	19.5	.21	73	74	[Stop -	SHAKER]	
593.20	30	.21	73	74	.8		
598.400	45	.21	73	74			
598.672	45.6	.21	73	74	[Stop -	SHAKER]	
604.08	60	.21	73	73	.8		
608.440	71.7	.21	73	73	[Stop -	SHAKER]	
609.34	75	.21	74	74	.8		
615.265	90	.21	74	74	.8		
617.487	96	.21	74	74	.8	stop	Port 5
617.487	0	.21	74	72		start	Port 10
620.286	7.5	.21	74	72	.8	(stop -	SHAKER)
623.01	15	.21	74	72	.8		
628.490	30	.21	72	70	.9		
629.758	33.5	.21	72	70	.9	[Stop -	SHAKER]

Initial leak check 0.004   Si-Gel initial

Final leak check   Si-Gel final

Total H_2O Collected in Flask   Net

Total H_2O Collected

1 min after it stop (22 sec) than 3 min

ANDERSEN IMPACTOR FIELD DATA

Plant ALAMET Time _____ Nozzle Dia. _____

Location SELMA, Ala Run No. 4A Avg. ΔP _____

Operator R.MESERVE Impactor Location outlet 10 Traverse Pt. _____

Date 1-28-81 D.G.M. No. V3 Pb _____

Andersen Imp No. _____ D.G.M. Y _____ Static "Hg _____

Stage No.	0	1	2	3	4	5	6	7	F	T
Substrate No.	894	895	896	897	898	899	900	901	8101	

Dry Gas Meter Reading	Elapsed Time	Orifice Δh "H_2O	Meter Temperature Inlet	Meter Temperature Outlet	Orifice S.P. - "Hg	Impactor Temp	Traverse Point
635.00	45	.21	72	70	.9		
639.320	59.7	.21	72	70	.9	(Stop- SHAKER)	
639.430	60	.21	72	70	.9		
644.950	75	.21	73	72	.9		
648.896	85.7	.21	73	72	.9	(Stop- SHAKER)	
650.500	90	.21	73	72	.9		
652.727	96	.21	73	72	.9		
	"the End"						

Initial leak check _____ Si-Gel initial _____

Final leak check _____ Si-Gel final _____

Total H_2O Collected in Flask _____ Net _____

Total H_2O Collected _____

ANDERSEN IMPACTOR FIELD DATA

Plant KAMET Time 1:01 Nozzle Dia .2L

Location SELMA Ala. Run No. 5-0-0 Avg. ΔP

Operator K.MESERVE Impactor Location 10 at Traverse Pt. 10

Date 1-28-81 D.G.M. No. V3 Pb 30.00

Andersen Imp No. 4B D.G.M. Y Static "Hg +

Stage No.	0	1	2	3	4	5	6	7	F	T
Substrate No.	814	815	816	817	818	819	820	821	B-91	

Dry Gas Meter Reading	Elapsed Time	Orifice Δh "H_2O	Meter Temperature Inlet	Meter Temperature Outlet	Orifice S.P. - "Hg	Impactor Temp	Traverse Point
652.865	0	.21	74	74	0.7"		
658.38	15	.21	74	76	0.7		
659.624	18.4	.21	74	76		stop - SHAKER	
663.900	30	0.21	74	76	0.8"		
669.225	44.6	0.21	70	74	0.8"	stop -	shAKer
669.400	45	0.21	70	74	0.8"		
674.850	60	0.21	74	74	0.8"		
678.045	68.8	0.21	74	74	0.8"	stop - SHAKer	
680,300	75	0.21	74	74	0.8"		
685,700	90	0.21	74	74	0.8"		
686.774	92.8	0.21	74	74	0.8"	stop - SHAKer	
687.944	96	0.21	74	74	0.8"	stop	port 10 2-11
688.055	0	0.21	74	74	0.8"		
693.770	15	0.21	77	76	0.8"		
698.148	26.6	0.21	77	76	0.8"	stop - SHAKER	
699.440	30	0.21	77	76	0.8"		

Initial leak check 0.005 Si-Gel initial

Final leak check Si-Gel final

H_2O Collected in Flask Net

H_2O Collected

ANDERSEN IMPACTOR FIELD DATA

Plant ALAMET Time _____ Nozzle Dia. _____

Location SELMA Ala Run No. 5-0-1 Avg. ΔP _____

Operator KMESERVE Impactor Location outlet 12 Traverse Pt. _____

Date 1-28-81 D.G.M. No. V3 Pb _____

Andersen Imp No. _____ D.G.M. Y _____ Static "Hg _____

Stage No.	0	1	2	3	4	5	6	7	F	T
Substrate No.	814	815	816	817	818	819	820	821	B-9	

Dry Gas Meter Reading	Elapsed Time	Orifice Δh "H_2O	Meter Temperature Inlet	Meter Temperature Outlet	Orifice S.P. - "Hg	Impactor Temp	Traverse Point
705,100	45	0.21	78	80	0.8		
709.21	53.3	0.21	78	80	0.8	stop - shaker	
710.740	60	0.21	81	81	0.8		
716.350	75	0.21	82	81	0.9		
718.115	79.7	0.21	82	81	0.9	(STOP - SHAKER)	
721.960	90	0.21	80	80	0.9		
724.193	96	0.21	80	80	0.9		
	the End						

Initial leak check _____ Si-Gel initial _____

Final leak check _____ Si-Gel final _____

Total H_2O Collected in Flask _____ Net _____

Total H_2O Collected _____

ANDERSEN IMPACTOR FIELD DATA

Plant Alginet Time 1400 Nozzle Dia. 1L

Location Selma Run No. 5-0-A (3e9) Avg. ΔP 0.007

Operator Vicky Impactor Location #3 of 5 Traverse Pt. Comp 3 & 5

Date 1/22/81 D.G.M. No. V4 Pb 30.00

Andersen Imp No. 460 D.G.M. Y ____ Static "Hg +

Stage No.	0	1	2	3	4	5	6	7	F	T
Substrate No.	942	943	944	945	946	947	948	949	B-107	

Dry Gas Meter Reading	Elapsed Time	Orifice Δh "H_2O	Meter Temperature Inlet	Meter Temperature Outlet	Orifice S.P. - "Hg	Impactor Temp	Traverse Point
616.566	0	0.21	76	74	0.7		#3
627.09	15	0.21	82	78	0.8		#3
627.67	30	0.21	76	76	0.9		3
633.20	45	0.21	77	78	0.9		3
638.79	60	0.21	76	78	0.9		3
644.33	75	0.21	80	80	0.9		3
649.91	90	0.21	80	82	0.9		3
652.096	96	0.21	80	82	0.9		3
652.096	0	0.21	85	84	0.9		5
657.86	15	0.21	86	84	0.9		5
663.47	30	0.21	83	82	0.9		5
669.07	45	0.21	82	80	0.9		5
674.68	60	0.21	82	80	0.9		5
680.29	75	0.21	84	80	0.9		5
685.87	90	0.21	86	85	0.9		5
688.115	96	0.21	88	86	0.9		5

Initial leak check 0.014 ft^3 @ 5" Hg 1 min Si-Gel initial ____

Final leak check ____ Si-Gel final ____

Total H_2O Collected in Flask ____ Net ____

Total H_2O Collected ____

(40) Pg. 1 of ____

ANDERSEN IMPACTOR FIELD DATA

Plant Intlalake/Alumet Time 0840 1-B-O Nozzle Dia. .215

Location OUTLET Run No. 1 OUT BLANK Avg. ΔP <.005

Operator GRONBERG Impactor Location COMP#2 Traverse Pt. 5' in

Date 1/24/81 D.G.M. No. V-3 Pb ____

Andersen Imp No. 413 D.G.M. Y ____ Static "Hg +

Stage No.	0	1	2	3	4	5	6	7	F	T
Substrate No.	862	863	864	865	866	867	868	869	B-97	

Dry Gas Meter Reading	Elapsed Time (mm)	Orifice Δh "H_2O	Meter Temperature Inlet	Meter Temperature Outlet	Orifice S.P. - "Hg	Impactor Temp	Traverse Point
386.703	0 (0841)	0.100	50	44	1.0"	~260	#2 COMP
388.0	50	0.100	50	44	1.0	(guess)	
389.28	100	0.10	50	44	1.2		
390.565	150	0.10	50	44	1.2		
392.075	20.7	0.10	50	44	1.2		
393.8	27.7	0.10	50	48	1.3		
395.8	35.7	0.10	50	48	1.3		
399	48.8	0.10	50	50	1.3		
401.38	57.6	0.10	51	51	1.4		
404.15	68.7	0.10	50	52	1.4		
407.400	81.9	0.10	50	54	1.4		
413.01	104.5	0.10	50	56	1.4		
418.05	125.0	0.10	50	60	1.55		
424.83	151.5	0.10	50	58	1.60		
439.485	210.0	0.10	54	62	1.80	end @	12:10

Initial leak check 1/15/80 - 5" Hg - 0.002 ft3 J.V. Si-Gel initial ____

Final leak check 1/24 4.2" Hg - 0.006 cfm Si-Gel final ____

Total H_2O Collected in Flask ____ Net ____

Total H_2O Collected ____ 116

Note - Run during shaking cycle!

(5)

ANDERSEN IMPACTOR FIELD DATA

Plant: Imperial [illegible] / Ala[illegible] ST
START Time: 12:41 pm
Nozzle Dia.: .830
Location: INLET
Run No.: 1 ~~[illegible]~~ VIS
Avg. ΔP: 2.35
Operator: J Epstein
Impactor Location: B-?
Traverse Pt.: ?
Date: 1/23/81
D.G.M. No.: 280017
Pb: 30.11
Andersen Imp No.: 1
D.G.M. Y: [illegible]
Static "Hg: -4.75

Stage No.	0	1	2	3	4	5	6	7	F	T
Substrate No.	704	203	202	201	200	199	198	205	B139	

UNWEIGHED SUBSTRATES Blank B/1

Dry Gas Meter Reading	Elapsed Time	Orifice Δh "H_2O	Meter Temperature Inlet	Meter Temperature Outlet	Orifice S.P. - "Hg	Impactor Temp	Traverse Point
856.502	0:00	0.133 [illegible]	38	46	1.95		
857.105	2:00		38.5	47	2.00		
857.697	4:00		38.5	47.5	2.00		
858.285	6:00		38.5	47.5	2.05		
858.895	8:00		39	47	2.4		
859.490	10:00		39	47	2.75		
860.095	12:00		39	47	3.2		
860.715	14:00		39	47	3.65		
861.335	16:00		39	47	4.0		
861.950	18:00		39	47	4.3		
862.580	20:00		39	47	4.9		
863.153	~~22:00~~ 21:55		39	47	5.0+		
	24:00		EQUIPPED W/ CYCLONE PRECUT				
	26:00	Recovery Note - Overloaded - last 4 stages visible					
	28:00	load - much overload on last 2 - high towers					3/16"
	30:00						

Initial leak check: 0.01
Si-Gel initial: X
Final leak check: N DONE
Si-Gel final: X
Total H_2O Collected in Flask: X
Net: X
Total H_2O Collected: X

ANDERSEN IMPACTOR FIELD DATA

Plant Alamet | Start Time ~2:45 | 1-B-I | Nozzle Dia. 0.374 (6.3K)

Location Selma Ala | Run No. Inlet blank #1 | Avg. ΔP 2.35

Operator T Epstein | Impactor Location inlet | Traverse Pt. —

Date 1/23/81 | D.G.M. No. 260017 | Pb 30.13

Andersen Imp No. #2 | D.G.M. Y | Static "Hg -4.75 H_2O

Stage No.	0	1	2	3	4	5	6	7	F	T
Substrate No.	878	879	880	881	882	883	884	885	B-99	

Pre weighed w/ 2 unweighed prefilters

Dry Gas Meter Reading	Elapsed Time	Orifice Δh "H_2O	Meter Temperature Inlet	Meter Temperature Outlet	Orifice S.P. - "Hg	Impactor Temp	Traverse Point
863.533	0	0.133	42	48	4.4		
864.354	5	0.018	42	48	4.35		
864.832	10	0.015	42	48	4.35		
865.290	15	0.018	42	48	4.65		
865.738	20	0.014	42	48	4.9		
866.215	25 26	0.011	42	48	5.0		
866.348	30 30.5	0.010	42	48	5.0+		
	35	⌊ ?? is it really .01 or is it 0.1					
	40	C_F = 2.815 sd			4.13 ft³/60 min = .07 cfm. meter		
	45	Time = 28 min, 5 sec			~~?Δ H 0.031 = 4 cfh~~		
	50	$\overline{\Delta H}$ = .031			~~Δ H = 0.75 cfh~~		
	55						
	60						

Initial leak check 1/16 - @ 5" Hg: pulled 0.0015 $\frac{ft^3}{min}$ | Si-Gel initial —

Final leak check None | Si-Gel final —

Total H_2O Collected in Flask — | Net —

Total H_2O Collected —

after shutoff heard particles in duct

ANDERSEN IMPACTOR FIELD DATA

Plant Particulate / Rewmet start Time 0905 Nozzle Dia. B10.0

Location Selma Run No. loading V15 Avg. ΔP 0.00

Operator T Epstein Impactor Location Outlet 4 Traverse Pt. COMP # 4

Date 1/24/91 D.G.M. No. V4 V-4 Pb

Andersen Imp No. unweighted D.G.M. Y Static "Hg See data sheet

Stage No.	0	1	2	3	4	5	6	7	F	T
Substrate No.	190	191	192	193	194	195	196	197	B/38	

EQUIPPED w/ CYCLONE PRECUTTER Blank B/3 !

Dry Gas Meter Reading	Elapsed Time	Orifice Δh "H_2O	Meter Temperature Inlet	Meter Temperature Outlet	Orifice S.P. - "Hg	Impactor Temp	Traverse Point
328.040	0	0.10	60	57	0.4		
329.425	5.0	0.10	62	58	0.4		
330.685	10.0	0.10	63	59	0.4		
331.920	15.0	0.10	65	61	0.4		
334.455	25.2	0.10	66	64	0.4		
335.58	30.0	0.10	66	66	0.4		
337.97	40.0	0.10	68	69	0.45		
345.765	71.8	0.10	61	74	0.45		
349.530	~~[illegible]~~ 87.6	0.10	76	79	0.45		
352.73	100.0	0.10	72	78	0.45		
358.6	124.0	0.10	68	72	0.47	11:11 am	
373.1	182.2	0.10	77	81	0.48	1210	
375.515	192.0	0.10	76	81	0.48	end	

Recovery notes - perfect loading - grey white - slightly heavy, cut back to 120-150 min? Q on 1-5, 6, 7 heavy all of a sudden. None on Back-up.

Initial leak check 0.01

Final leak check –

Total H_2O Collected in Flask –

Total H_2O Collected

Si-Gel initial –

Si-Gel final –

Net –

APPENDIX E-2

VISIBLE EMISSION OBSERVER DATA SHEETS

GCA Technology Division
213 Burlington Road
Bedford, Massachusetts 01730
(617) 275-5444

VISIBLE EMISSION OBSERVATION FORM

Page 1 of 4

Date 1/26/81

Observer Sandra Beaton

U.S. EPA Region

Company Name ALAMET

Location Selma, AL.

Source: 3 stacks left end of Cast house

Source Height:	175 ft
Distance from Source:	~ 300 ft
Direction from Source:	S
Wind Direction: West	Speed: 0-5 mph
Background(s) Used: (1)	
(2)	(3)
Colors of Background(s): (1)	
(2)	(3)
Color of Emissions: (1)	
(2)	(3)
Ambient Temperature:	70 °F
Relative Humidity: <50% ☒	>50% ☐
Reading Conditions: EX ☒ GD ☐ FR ☐ PR ☐	

Comments: (Include Contacts)

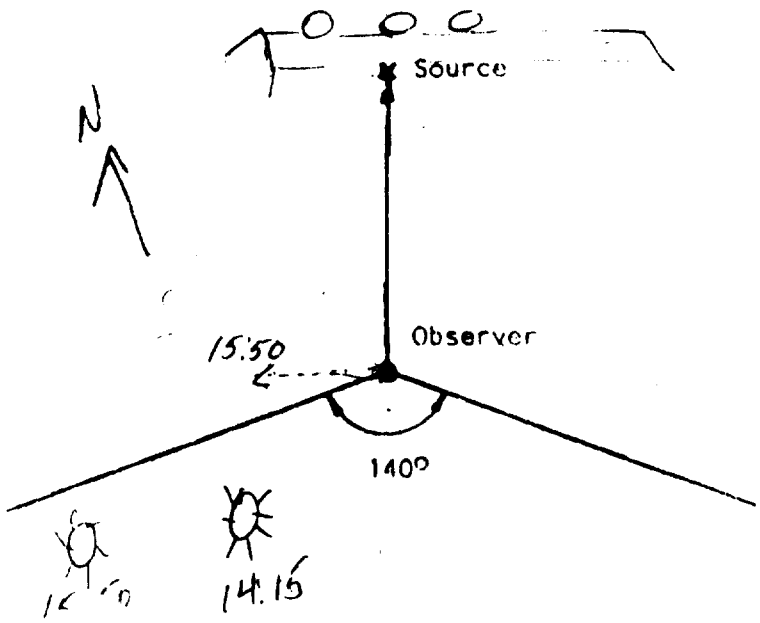
partly cloudy

Observation Point: ON GROUND

Signature: Sandra Beaton

Date Last Certified: 10/28/80

Show: Sun, Wind, and North Arrow



COMPANY: ALAMET

LOCATION: Selma, AL

OBSERVER: S. Beaton 2/4

DATE: 1/26/81

CAST:

Time (M)	0	15	30	45	Proc.	Loca.	Color
0							
1							
2							
3							
4							
5							
6							
7							
8							
9							
10							
11							
12							
13							
14	O	O	O	O	SHOOTING TAPHOLE		
15	O	O	O	O	No 2.		END
16	O	O	O	O			
17	O	O	O	O			
18	O	O	O	O			
19	O	O	O	O			
20	O	O	O	O			
21	O	O	O	O			
22	O	O	O	O			
23	O	O	O	O			
24	O	O	O	O			
25	O	O	O	O			
26	O	O	O	O			
27	O	O	O	O			
28	O	O	O	O			
29	O	O	O	O			

Time (M	0	15	30	45	Proc.	Loca.	Color
30	O	O	O	O			
31	O	O	O	O			
32	O	O	O	O			
33	O	O	O	O			
34	O	O	O	O			
35	O	O	O	O			
36	O	O	O	O			
37	O	O	O	O			
38	O	O	O	O			
39	O	O	O	O			
40	O	O	O	O			
41	O	O	O	O			
42	O	O	O	O			
43	O	O	O	O			
44	O	O	O	O			
45	O	O	O	O			
46	O	O	O	O			
47	O	O	O	O			
48	O	O	O	O			
49	O	O	O	O			
50	O	O	O	O			
51	O	O	O	O			
52	O	O	O	O			
53	O	O	O	O			
54	O	O	O	O			
55	O	O	O	O			
56	O	O	O	O			
57	O	O	O	O			
58	O	O	O	O			
59	O	O	O	O			

COMMENTS:

a) See legend for abbreviated words.

b) Location of emissions applicable to a roof monitor: (E) East. (C) Center. (W) West.

c) Color of emissions: (Bl) Black, (Br) Brown. (R) Red. (O) Orange. (W) White. (G) Gray.

COMPANY: ALAMET

LOCATION: Selma, AL

OBSERVER: S. Beaton 3/4

DATE: 1/26/81

(CA)

Time (M)	0	15	30	45	Proc.	Loca.	Color
15 0	0	0	0	0			
1	0	0	0	0			
2	0	0	0	0			
3	0	0	0	0			
4	0	0	0	0			
5	0	0	0	0			
6	0	0	0	0			
7	0	0	0	0			
8	0	0	0	0			
9	0	0	0	0			
10	0	0	0	0			
11	0	0	0	0			
12	0	0	0	0			
13	0	0	0	0			
14	0	0	0	0			
15	0	0	0	0			
16	0	0	0	0			
17	0	0	0	0			
18	0	0	0	0			
19	0	0	0	0			
20	0	0	0	0			
21	0	0	0	0			
22	0	0	0	0			
23	0	0	0	0			
24	0	0	0	0			
25	0	0	0	0			
26	0	0	0	0			
27	0	0	0	0			
28	0	0	0	0			
29	0	0	0	0			

Time (M)	0	15	30	45	Proc.	Loca.	Color
30	0	0	0	0			
31	0	0	0	0			
32	0	0	0	0			
33	0	0	0	0	SHOOTING THE HOE		
34	0	0	0	0	No 1		
35	0	0	0	0			
36	0	0	0	0			
37	0	0	0	0			
38	0	0	0	0			
39	0	0	0	0			
40	0	0	0	0			
41	0	0	0	0			
42	0	0	0	0			
43	0	0	0	0			
44	0	0	0	0			
45	0	0	0	0			
46	0	0	0	0			
47	0	0	0	0			
48	0	0	0	0			
49	0	0	0	0			
50	0	0	0	0			
51	0	0	0	0			
52	0	0	0	0			
53	0	0	0	0			
54	0	0	0	0			
55	0	0	0	0			
56	0	0	0	0			
57	0	0	0	0			
58	0	0	0	0			
59	0	0	0	0			

COMMENTS: At 15:50 moved 30 ft to the west

partly cloudy

a) See legend for abbreviated words.

b) Location of emissions applicable to a roof monitor: (E) East. (C) Center. (W) West.

c) Color of emissions: (Bl) Black, (Br) Brown. (R) Red. (O) Orange. (W) White. (G) Gray.

COMPANY: ALAMET

LOCATION: Selma, AL

OBSERVER: S. Beaton

DATE: 1/26/81

414

~~EAST~~

Time (M)	0	15	30	45	Proc.	Loca.	Color
16 0	0	0	0	0			
1	0	0	0	0			
2	0	0	0	0			
3	0	0	0	0			
4	0	0	0	0			→ GRAY
5	0	5	5	5	SMOOTHING		TAPHOLE
6	5	0	0	0			
7	0	0	0	0			
8	0	0	0	0			
9	0	0	0	0			
10	0	0	0	0			
11	0	0	0	0			
12	0	0	0	0			
13	0	0	0	0			
14	0	0	0	0			
15	0	0	0	0			
16	0	0	0	0			
17	0	0	0	0			
18							
19							
20							
21							
22							
23							
24							
25							
26							
27							
28							
29							

Time (M	0	15	30	45	Proc.	Loca.	Color
30							
31							
32							
33							
34							
35							
36							
37							
38							
39							
40							
41							
42							
43							
44							
45							
46							
47							
48							
49							
50							
51							
52							
53							
54							
55							
56							
57							
58							
59							

COMMENTS:

a) See legend for abbreviated words.

b) Location of emissions applicable to a roof monitor: (E) East. (C) Center. (W) West.

c) Color of emissions: (Bl) Black, (Br) Brown. (R) Red. (O) Orange. (W) White. (G) Gray.

GCA Technology Division
213 Burlington Road
Bedford, Massachusetts 01730
(617) 275-5444

VISIBLE EMISSION OBSERVATION FORM

Date 4/29/81
Company Name ALAMET
Observer Sandra Gaston
Location Selma, AL
U.S. EPA Region

Source: BAGHOUSE ROOF MONITOR

Source Height:	150 ft
Distance from Source:	1500 ft
Direction from Source:	SSW
Wind Direction: VARIABLE Speed:	0-5 mph
Background(s) Used: (1)	Roof Monitor
(2) (3)	
Colors of Background(s): (1)	GRAY
(2) (3)	
Color of Emissions: (1)	White
(2) (3)	
Ambient Temperature:	65 °F
Relative Humidity: <50% ☒	>50% ☐
Reading Conditions: EX ☐ GD ☒ FR ☐ PR ☐	

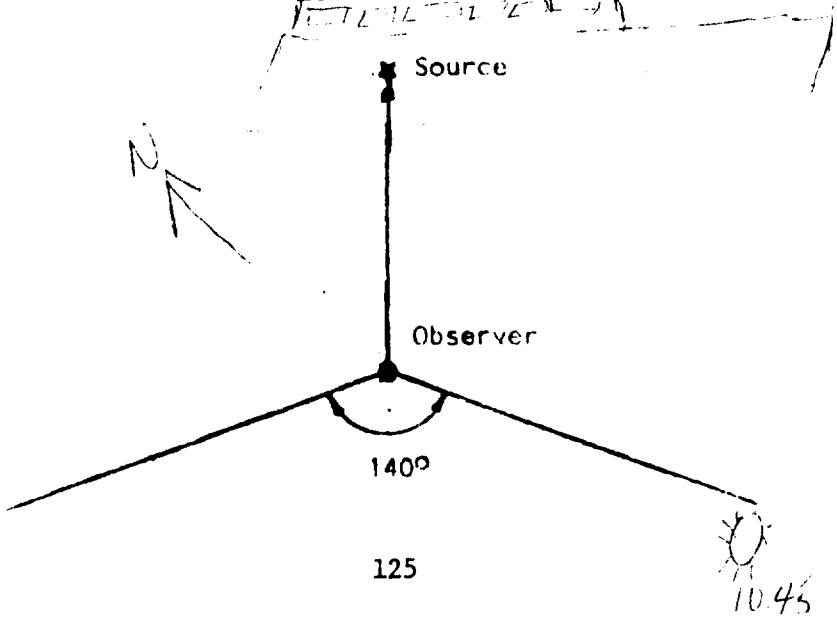
Comments: (Include Contacts)
mostly cloudy, reading against a white sky.

Observation Point: On ground in front of a parking lot.

Signature: Sandra Gaston
Date Last Certified: 10/28/81

Show: Sun, Wind, and North Arrow

Roof Monitor



COMPANY: ALAMET

LOCATION: Selma, AL

~~CAST~~:

OBSERVER: S Burton

DATE: 1/27/81

Time (M)		0	15	30	45	Proc.	Loca.	Color
9	0							
	1							
	2							
	3							
	4							
	5							
	6							
	7							
	8							
	9							
	10							
	11							
	12							
	13							
	14							
	15							
	16							
	17							
	18							
	19							
	20							
	21							
	22							
	23							
	24							
	25							
	26							
	27							
	28							
	29							

Time (M)		0	15	30	45	Proc.	Loca.	Color
	30							
	31							
	32							
	33							
	34							
	35							
	36							
	37							
	38							
	39							
	40							
	41							
	42							
	43							
	44							
	45							
	46							
	47							
	48							
	49							
9	50	0	0	0	0			
	51	0	0	0	0			
	52	0	0	0	0			
	53	0	0	0	0			
	54	0	0	0	0			
	55	0	0	0	0			
	56	0	0	0	0			
	57	0	0	0	0			
	58	0	0	0	0			
	59	0	0	0	0			

COMMENTS:

a) See legend for abbreviated words.

b) Location of emissions applicable to a roof monitor: (E) East. (C) Center. (W) West.

c) Color of emissions: (Bl) Black, (Br) Brown. (R) Red. (O) Orange. (W) White. (G) Gray.

COMPANY: [illegible]

LOCATION: [illegible]

CAST:

OBSERVER: Sandra Gaston

DATE: 1/27/81

Time(M)	0	15	30	45	Proc.	Loca.	Color	Time(M)	0	15	30	45	Proc.	Loca.	Color
10 0	O	O	O	O				30	X	X	X	X			
1	O	O	O	O				31	X	X	X	X			
2	O	O	O	O				32	X	X	X	X			
3	O	O	O	O				33	X	X	X	O			
4	O	O	O	O				34	O	O	O	O			
5	O	O	O	O				35	O	O	O	O			
6	O	O	O	O				36	O	O	O	O			
7	O	O	O	O				37	O	O	O	O			
8	O	O	O	O				38	O	O	O	O			
9	O	O	O	O				39	O	O	O	O			
10	O	O	O	O				40	O	O	X	X			
11	O	O	O	O				41	O	O	O	O			
12	O	O	O	O				42	O	O	O	O			
13	O	O	O	O				43	O	O	O	O			
14	O	O	O	O				44	O	O	O	O			
15	O	O	O	O				45	X	X	X	X			
16	O	O	O	O				46	X	X	X	X			
17	O	O	O	O				47	X	X	X	X			
18	O	O	O	O				48	O	O	O	O			
19	O	O	O	X	out from sizing station			49	O	O	O	O			
20	X	X	X	X				50	O	O	O	O			
21	X	X	X	X				51	O	O	O	O			
22	X	X	X	X				52	O	O	X	X			
23	X	X	X	X				53	X	X	X	X			
24	X	X	X	O				54	X	X	X	X			
25	O	O	O	X				55	X	X	X	X			
26	X	X	X	X				56	X	X	X	X			
27	O	O	O	O				57	O	O	O	O			
28	O	O	O	O				58	O	O	O	O			
29	O	O	O	O				59	O	O	O	O			

COMMENTS: 10:19 WIND FROM SE, 10:28 WIND FROM SW
10:31 WIND FROM SE.

a) See legend for abbreviated words.

b) Location of emissions applicable to a roof monitor: (E) East. (C) Center. (W) West.

c) Color of emissions: (Bl) Black, (Br) Brown. (R) Red. (O) Orange. (W) White. (G) Gray.

4/5

COMPANY: ALAULT

LOCATION: Sellers, AK

OBSERVER: S. Beaton

DATE: 1/27/81

EAST:

Time (M)	0	15	30	45	Proc.	Loca.	Color
0	0	0	0	0			
1	0	0	0	0			
2	0	0	0	0			
3	0	0	0	0			
4	0	0	0	0			
5	0	0	0	0			
6	0	0	0	0			
7	0	0	0	0			
8	0	0	0	0			
9	0	0	0	0			
10	0	0	0	0			
11	0	0	0	0			
12	0	0	0	0			
13	0	0	0	0			
14	0	0	0	0			
15	0	0	0	0			
16	0	0	0	0			
17	0	0	0	0			
18	0	0	0	0			
19	0	0	0	0			
20	0	0	0	0			
21	0	0	0	0			
22	0	0	0	0			
23	0	0	0	0			
24	0	0	0	0			
25	0	0	0	0			
26	0	0	0	0			
27	0	0	0	0			
28	5	5	5	5	W	Far right cor	
29	0	0	0	0			

Time (M	0	15	30	45	Proc.	Loca.	Color
30	0	0	0	0			
31	0	0	0	0			
32	0	0	0	0			
33	0	0	0	0			
34	0	0	0	0			
35	0	0	0	0			
36	0	0	0	0			
37	0	0	0	0			
38	0	0	0	0			
39	0	0	0	0			
40	0	0	0	0			
41	0	0	0	0			
42	0	0	0	0			
43	0	0	0	0			
44	0	0	0	0			
45	0	0	0	0			
46	0	0	0	0			
47	0	0	0	0			
48	0	0	0	0			
49	0	0	0	0			
50	0	0	0	0			
51	0	0	0	0			
52	0	0	0	0			
53	0	0	0	0			
54	0	0	0	0			
55	0	0	0	0			
56	5	5	0	0	Far right corn	W	Wht
57	0	0	0	0			
58	0	0	0	5			
59	5	5	5	5	far right		Wht

COMMENTS: Compartment

a) See legend for abbreviated words.

b) Location of emissions applicable to a roof monitor: (E) East. (C) Center. (W) West.

c) Color of emissions: (Bl) Black, (Br) Brown. (R) Red. (O) Orange. (W) White. (G) Gray.

COMPANY: ALLIED

LOCATION: Sprgs, FL

OBSERVER: S. Beaton

DATE: 4/27/81

~~CAST:~~

Time (M)	0	15	30	45	Proc.	Loca.	Color
0	5	5	0	0			
1	0	0	0	0			
2							
3							
4							
5							
6							
7							
8							
9							
10							
11							
12							
13							
14							
15							
16							
17							
18							
19							
20							
21							
22							
23							
24							
25							
26							
27							
28							
29							

Time (M	0	15	30	45	Proc.	Loca.	Color
30							
31							
32							
33							
34							
35							
36							
37							
38							
39							
40							
41							
42							
43							
44							
45							
46							
47							
48							
49							
50							
51							
52							
53							
54							
55							
56							
57							
58							
59							

COMMENTS:

a) See legend for abbreviated words.

b) Location of emissions applicable to a roof monitor: (E) East. (C) Center. (W) West.

c) Color of emissions: (Bl) Black, (Br) Brown. (R) Red. (O) Orange. (W) White. (G) Gray.

Technology Division
213 Burlington Road
Bedford, Massachusetts 01730
(617) 275-5444

VISIBLE EMISSION OBSERVATION FORM

Date 1/28/81

Company Name ALAMET

Observer Sandra Beaton

Location Selma, AL

U.S. EPA Region

Source: CAST HOUSE
3 Stacks for No. 2 FCE.

Source Height:	~200 ft
Distance from Source:	~500 ~~WSW~~ ft
Direction from Source:	WSW
Wind Direction: NW	Speed: 0-5 mph
Background(s) Used: (1)	Sky
(2)	(3)
Colors of Background(s): (1)	Blue
(2)	(3)
Color of Emissions: (1)	light brown-red.
(2)	(3)
Ambient Temperature:	65 °F
Relative Humidity: <50% ☒	>50% ☐
Reading Conditions: EX ☒	GD ☐ FR ☐ PR ☐

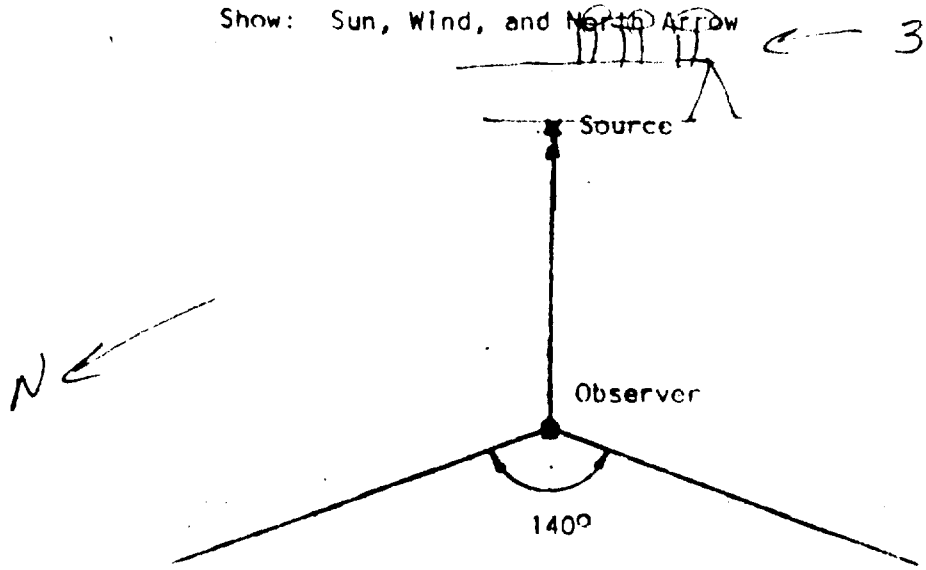
Comments: (Include Contacts)

Observation Point: on ground

Signature: Sandra A. Beaton

Date Last Certified: 10/28/80

Show: Sun, Wind, and North Arrow



16:00

COMPANY: ALAMET

LOCATION: Selma, AL.

OBSERVER: Sandra Beaton

DATE: 1/28/81

EAST

Time (M)	0	15	30	45	Proc.	Loca.	Color
0							
1							
2							
3							
4							
5							
6							
7							
8							
9							
10							
11							
12							
13							
14							
15	0	0	0	0			
16	0	0	0	0			
17	0	0	0	0			
18	0	0	0	0			
19	0	0	0	0			
20	0	0	0	0			
21	0	0	0	0			
22	0	0	0	0			
23	0	0	0	0			
24	0	0	0	0	SHOOTING STAR HOLE		
25	0	0	20	50	2 for stack	H. brown	
26	60	75	100	100	(1)	lite Red.	
27	100	100	100	100			
28	100	100	100	100			
29	100	100	75	75			
30	75	75	75	100			
31	100	100	100	100			
32	100	100	100	70			
33	50	50	50	40			
34	30	25	25	50	(2)		
35	50	30	30	25			
36	25	25	25	25			
37	25	25	25	35			
38	40	30	35	25			
39	25	25	25	15			
40	20	15	15	25			
41	20	20	25	25			
42	25	25	20	20			
43	15	15	10	20			
44	20	15	15	20			
45	10	10	10	10			
46	5	5	5	5			
47	5	5	5	5			
48	5	5	5	5			
49	5	5	5	5			
50	5	5	2.5	2.0			
51	15	15	15	10			
52	15	10	10	10			
53	10	10	10	15			
54	10	10	10	5			
55	5	5	5	5			
56	5	5	5	5			
57	5	5	0	0			
58	0	0	0	0			
59	0	0	0	0			

COMMENTS: (1) plume dispersing at about 2 100 ft.

(2) Heavy white emissions escaping from the bottom floor of the Bldg near the Fce. No. 2 tapping side. It was verified that the floor fan was turned on about 4:30.

a) See legend for abbreviated words.

b) Location of emissions applicable to a roof monitor: (E) East. (C) Center. (W) West.

c) Color of emissions: (Bl) Black, (Br) Brown. (R) Red. (O) Orange. (W) White. (G) Gray.

COMPANY: ALAMET

LOCATION: SELMA, AL.

OBSERVER: S. Beaton

DATE: 1/28/81

CAST:

Time (M)	0	15	30	45	Proc.	Loca.	Color
17 0	0	0	0	0			
1	0	5	0	0			
2	5	0	0	0			
3	0	0	0	0			
4	0	5	0	0			
5	0	0	0	0			
6	0	0	0	0			
7	0	0	0	0			
8	0	5	5	5	Plugging		
9	0	0	0	0			
10	0	0			END PLUGGING		
11							
12							
13							
14							
15							
16							
17							
18							
19							
20							
21							
22							
23							
24							
25							
26							
27							
28							
29							

Time (M	0	15	30	45	Proc.	Loca.	Color
30							
31							
32							
33							
34							
35							
36							
37							
38							
39							
40							
41							
42							
43							
44							
45							
46							
47							
48							
49							
50							
51							
52							
53							
54							
55							
56							
57							
58							
59							

COMMENTS:

a) See legend for abbreviated words.

b) Location of emissions applicable to a roof monitor: (E) East. (C) Center. (W) West.

c) Color of emissions: (Bl) Black, (Br) Brown. (R) Red. (O) Orange. (W) White. (G) Gray.

APPENDIX E-3

PROCESS OBSERVER DATA SHEETS

INHALABLE PARTICULATE FIELD SAMPLING PROGRAM
Interlake Inc. Alamet, Selma, AL
EPA CONTRACT No. 68-02-3157, Technical Directive 008

OBSERVER: S. Beaton
DATE: 1/28/81

PROCESS DATA

Time	Process	Magnitude of Emissions	Percent Capture By Hood	Comments
8:46	Charging	V HE		Tapping in progress — emissions heavier than normal
				Tapping emissions come up from below and most are sucked into the hood.
8:49	smelting			
9:02	Stoking			
9:07:31				very high flames
9:09:27	end Stoking.			
	↳ continued			
9:10	→ tapping emissions			whole floor has cleared up. subsided.
			100%	during Stoking.
9:12	end of Stoking			
9:13:40	Charging			1 bucket dumped in ≈ 6 sec.

LE = Light emissions; 5 to 25 percent opacity

ME = Moderate emissions; 30 to 60 percent opacity

HE = Heavy emissions; 65 to 100 percent opacity

INHALABLE PARTICULATE FIELD SAMPLING PROGRAM
Interlake Inc. Alamet, Selma, AL
EPA CONTRACT No. 68-02-3157, Technical Directive 008

OBSERVER: S. Beaton
DATE: 1/28/81

PROCESS DATA

Time	Process	Magnitude of Emissions	Percent Capture By Hood	Comments
9:14:28	Charged 1 Bucket	No real increase	100%	each Charge only takes a Couple seconds.
9:15:10	" "	"	100%	
9:15:55	" "	"		
9:16:50	" "	"		
9:17:48	" "	"		
9:18:40	" "	"	100%	
9:19:30	" "	"		
9:20:25	" "	"		
9:21:05	" "	"		
9:42:40			80%	heavy surge of emissions escaped Charge is burning on floor
9:44.20	Stoking.	Heavier than normal.	80%	Capture at one section of furnace.

LE = Light emissions; 5 to 25 percent opacity

ME = Moderate emissions; 30 to 60 percent opacity

HE = Heavy emissions; 65 to 100 percent opacity

INHALABLE PARTICULATE FIELD SAMPLING PROGRAM
Interlake Inc. Alamet, Selma, AL
EPA CONTRACT No. 68-02-3157, Technical Directive 008

OBSERVER: S. Beaton
DATE: 1/28/81

PROCESS DATA

Time	Process	Magnitude of Emissions	Percent Capture By Hood	Comments
9:47	END STOKING	very turbulent flames	99%	
9:49	Stoking		99%	
9:50	Stoker spilled charge on floor	HBC Burst	0%	only lasted for a couple seconds.
9:52	END STOKING		100%	
9:53	Charging		100%	~~HH HH~~ No. buckets charged.
10:01	end charging		100%	
10:02	Stoking.	very turbulent flames.	100%	
10:03	silicon flare	very bright white light	100%	lasted 30 secs.
10:04	END STOKING	died down	100%	
10:10	Smelting	H smoke left side of fce		
10:15	Stoking	left side of fce where there were heaviest emission.		
		very high flames	100%	

LE = Light emissions; 5 to 25 percent opacity

ME = Moderate emissions; 30 to 60 percent opacity

HE = Heavy emissions; 65 to 100 percent opacity

INHALABLE PARTICULATE FIELD SAMPLING PROGRAM
Interlake Inc. Alamet, Selma, AL
EPA CONTRACT No. 68-02-3157, Technical Directive 008

OBSERVER: S. Beaton
DATE: 1/28/81

PROCESS DATA

Time	Process	Magnitude of Emissions	Percent Capture By Hood	Comments
10:18	END STOKING		100	
10:19	STOKING RIGHT SIDE		100	
10:20	END STOKING			ALSO SHOOTING THE TAPHOLE No. 2.
10:20	CHARGING	VHE in whole fce. area from TAPPING.		TAPPING EMISSIONS FLOWING OD THE GRATES, AND OVER THE RAILINGS.
		Smoke so thick can't see through it.		
		emissions coming up the side of fce. can be seen in.		
		there is a general flow of emissions to the fce.		
10:25	- UPON EXITING THE BLDG. I observed at			
	the	Stacks on the No. 2 Fce. and VE's were		
		100% (NOT IN METHOD 9 POSITION)		
		FAN IS NOT ON.		

LE = Light emissions; 5 to 25 percent opacity

ME = Moderate emissions; 30 to 60 percent opacity

HE = Heavy emissions; 65 to 100 percent opacity

INHALABLE PARTICULATE FIELD SAMPLING PROGRAM
Interlake Inc. Alamet, Selma, AL
EPA CONTRACT No. 68-02-3157, Technical Directive 008

OBSERVER: Sandra Beaton
DATE: 1/28/81

PROCESS DATA

Time	Process	Magnitude of Emissions	Percent Capture By Hood	Comments
11:29	Stoking in progress			
11:31	Smelting	Smooth operation	100	
11:36	"	Starting to flare up on	backside	
11:43	Stoking		100	~ 1.0 minute duration.
11:44	Smelting			
11:52	charging	heavier flames + emissions	100%	"
12:00	Cleaning floor			appears to be using an air blower. directs dust into furnace.
12:06	Finished cleaning.			
	Smelting			
12:12	were burning the slag from the taphole - LE			
12:16	Smelting	heavier than usual		
12:17:40		HE	80%-90%	Some mix was shot out of ffe. Stoker said the fee. just broke open

LE = Light emissions; 5 to 25 percent opacity
ME = Moderate emissions; 30 to 60 percent opacity
HE = Heavy emissions; 65 to 100 percent opacity

INHALABLE PARTICULATE FIELD SAMPLING PROGRAM
Interlake Inc. Alamet, Selma, AL
EPA CONTRACT No. 68-02-3157, Technical Directive 008

OBSERVER:
DATE:

PROCESS DATA

Time	Process	Magnitude of Emissions	Percent Capture By Hood	Comments
12:20	SHOOTING TAPHOLE	VVHE	80-90	emissions from tapping coming up through gratings & along side furnace.
12:21	Stoking			≈ 1.0 min.
12:23	Charging			Charging where he just stoked. MUST HAVE FAN ON TAPPING EMISSION Because the cast house is not bad.
12:20	↓			
		operator opened		bypass stack to the baghouse. at 12:20 due to some problem on BH. No. 1.
12:30	-	emissions increasing	throughout	cast house floor.
		BREAK		
13:15	charging	in progress		
13:19	Charging	somewhat heavier than normal	100%	emissions heavier than during smelting. Some may shut from face.
13:21	Stoking	increased emissions		
13:23	charging			

LE = Light emissions; 5 to 25 percent opacity

ME = Moderate emissions; 30 to 60 percent opacity

HE = Heavy emissions; 65 to 100 percent opacity

INHALABLE PARTICULATE FIEL[illegible] [illegible]ING PROGRAM
Interlake Inc. Alame[illegible] [illegible]elma, AL
EPA CONTRACT No. 68-02-3157, Te[illegible]hnical Directive 008

PROCESS DATA

OBSERVER: GRONBERG
DATE: 1/28/81

Time	Process	Magnitude of Emissions	Percent Capture By Hood	Comments
1420	Shooting	heavy	~	[illegible]
1427	Tapping	heavy	med	~80% - Smoke in op floor
				area Vis 18' 25' Start
				[illegible] @ 1429 Smoke from floorboards being drawn into hood from 6' away at least
1430	Stoking Started		testing	done 1433 Stopped
1433	Charging started 1,1 (only 2)			1434

LE = Light emissions; 5 to 25 percent opacity
ME = Moderate emissions; 30 to 60 percent opacity
HE = Heavy emissions; 65 to 100 percent opacity