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PM10 EMISSION FACTORS FOR A STONE CRUSHING PLANT TERTIARY CRUSHER AND VIBRATING SCREEN

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1.0 INTRODUCTION

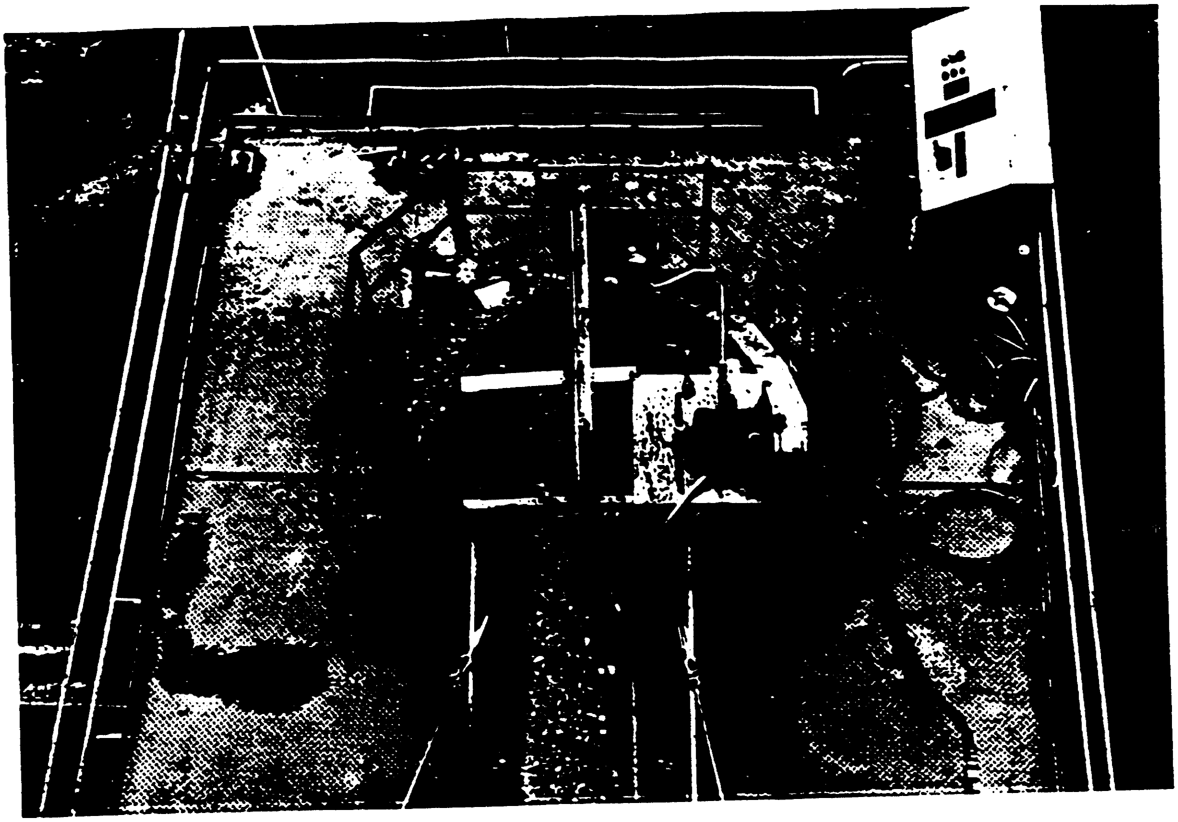
1.1 SUMMARY OF TEST PROGRAM

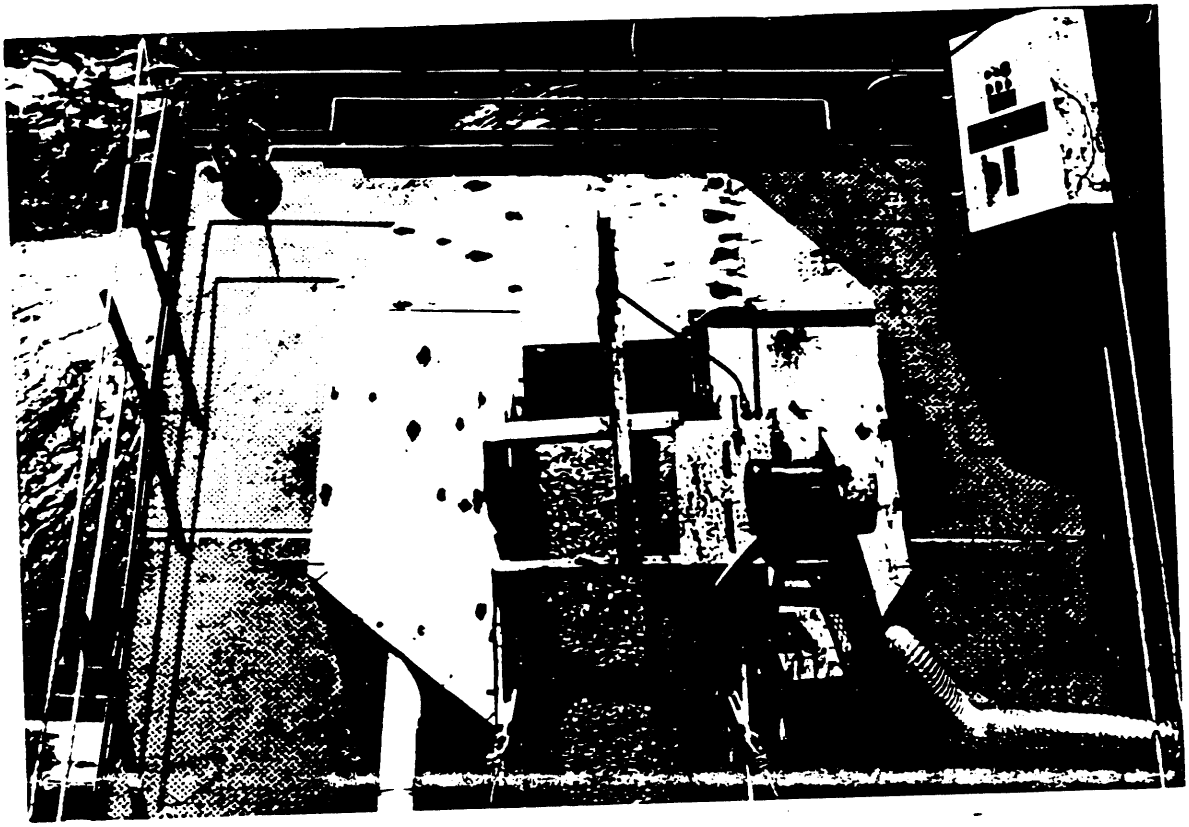
The U. S. Environmental Protection Agency (EPA), Office of Air Quality Planning and Standards (OAQPS), Emission Inventory Branch (EIB) is responsible for developing and maintaining air pollution emission factors for industrial processes. EIB is presently studying the stone crushing industry. As part of this work, EIB has sponsored PM10 particulate emissions tests at several stone crushing facilities in the Raleigh-Durham and Garner, North Carolina area. The specific sources tested at each plant were the tertiary crushers and the vibrating screens. This report presents the testing conducted at the Nello L. Teer stone crushing facility located in Raleigh, North Carolina.

The PM10 emission factor test procedures were developed and conducted by Entropy Environmentalists, Inc. (Entropy). Entropy served as a subcontractor to SAIC in this project. The Emission Measurement Branch (EMB) of the EPA supervised the test program.

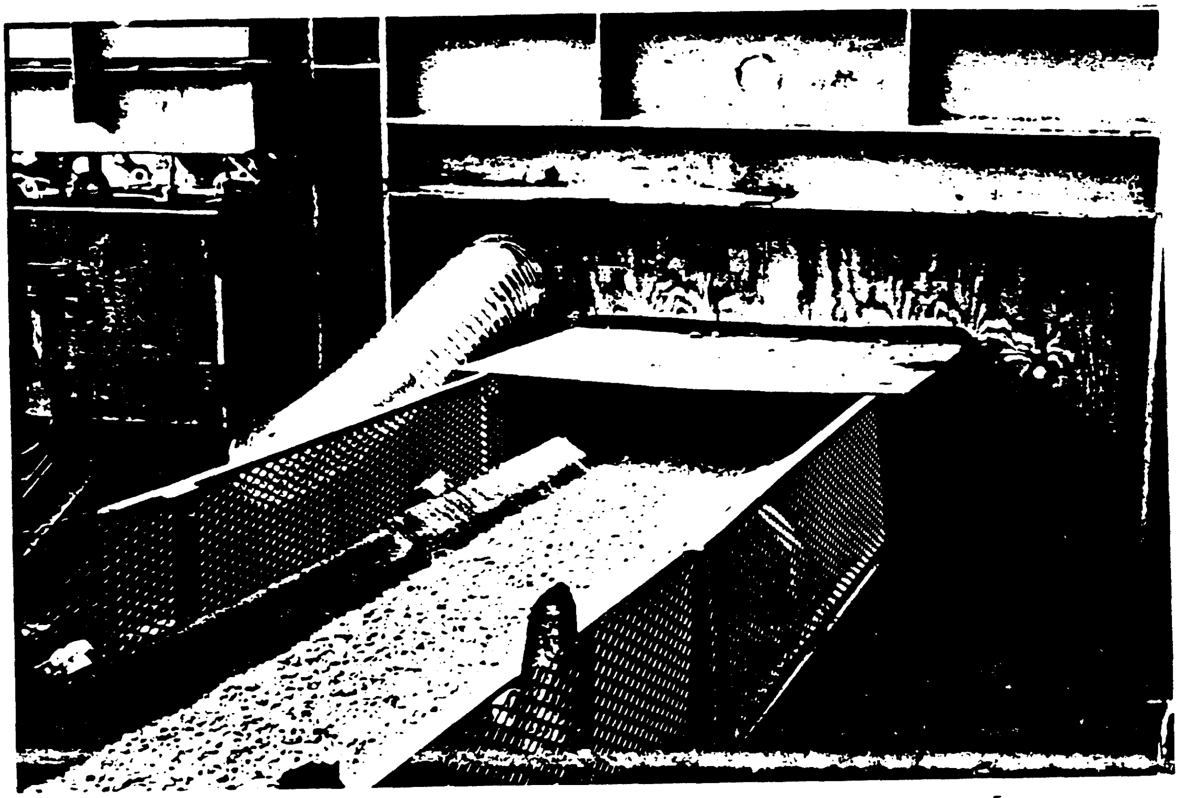
A Quasi-stack system was used to conduct the emission tests on the inlet and outlet of the tertiary crusher and the vibrating screen. For the crusher Quasi-stack system, enclosures were built. The inlet enclosure was constructed around the existing safety rail that surrounded the crusher inlet. The crusher inlet enclosure was approximately 3-feet high with a diameter of 8.5 feet. The crusher outlet enclosure was approximately 6-feet high, 8-feet wide, and 8-feet long. Both structures were constructed from plywood. The inlet stack was constructed of 12.5 inch diameter galvanized duct, horizontally mounted to a SCR controlled tube-axial fan. The outlet stack was constructed of 2 foot diameter galvanized duct, also horizontally mounted to a SCR controlled tube-axial fan. The location of both the inlet and outlet sampling ports met the criteria of EPA method 1. The inlet and outlet enclosures isolated the processes and were designed to have minimum interference with normal plant operations.

The TD Seco vibrating screen emission tests were conducted using a track-mounted hood system. The screen area was obstructed by a supporting I-beam which effectively divided the screen area into an upper and lower area. Two hoods were used to traverse the entire screen area, one for each of the sections. Both hoods had 2 feet by 2 feet openings and were suspended approximately 12 inches above the screen surface. The small scale of the apparatus and the mounting position of the hoods ensured that the normal PM10 emissions were not significantly influenced by the presence of the hood. The capture velocity in the hood was set by adjusting the variable speed DC motor of the tube-axial fan installed on the hood outlet duct. The hood capture velocity was selected based on observations of the fugitive dust capture characteristics of the hood. A constant gas flow was used throughout the test program. This testing approach is an adaptation of the conventional "roof monitoring" technique for fugitive emission testing. Figures 1-1, 2, 3, 4, and 5 show the crusher and screen locations before and after modifications for the test program were made.





Figures 1-1 and 1-2   Crusher inlet, before and after Enclosure installation



Figures 1-3 and 1-4. Crusher outlet, before and after enclosure installation

Figure 1-5. Screen before hood installation

The mounting positions of the HEPA filtered air supplies and Quasi-stack tube-axial fans ensured that the normal PM10 emissions were not significantly influenced but were directed to the outlet ducts. The capture velocity in the outlet ducts were set by adjusting the variable speed DC motors of the tube axial fans. The velocities of the fans were set so that there was a slight negative pressure within the enclosures. A constant gas flow was used throughout the test program.

The PM10 emissions were tested using EPA Method 201A. The tests were divided into two sets: stone moisture levels at normal operating conditions, and stone that was processed without any wet suppression. These tests are referred to as "wet" and "dry" respectively. There is some limited data concerning moisture requirements of wet suppression systems for fugitive dust[1,2]. Generally a moisture level above 1.5% is considered "wet", with levels below 1.5% considered "dry". A continuously recording meteorological station was located near the screen test location to record the wind speed and direction during the tests. The meteorological station was located upwind of the screen and moved as necessary to maintain that position during testing. Meteorological data is contained in Appendix C. The observed PM10 emission levels are summarized in Table 1-1.

TABLE 1-1. TERTIARY CRUSHER AND SCREEN PM10 EMISSIONS

PM10 Emissions, Pounds/Ton[1]			
Crusher Inlet,	Dry Stone (<1.5%)	0.00051	(W/O Control)
Crusher Outlet,	Dry Stone (<1.5%)	0.01395	(W/O Control)
Screen,	Dry Stone (<1.5%)	0.07041	(W/O Control)
Crusher Inlet,	Wet Stone (>1.5%)	0.00008	(With Control)
Crusher Outlet,	Wet Stone (>1.5%)	0.00195	(With Control)
Screen,	Wet Stone (>1.5%)	0.00184	(With Control)

[1] Based on total stone feedrate from the crusher outlet belt and screen feed belt.

The emission rates determined during the wet test series of both the crusher and the screen were low. The emission rates determined during the dry test series were higher by comparison with the wet test results. These data are entirely consistent with the general observations of the plant operation and with the no visible emission conditions during all of the wet stone tests. During the dry tests there were visible emissions from both the crusher outlet and the screen location. The visible emissions were high throughout the dry testing at the screen location.

1.2 KEY PERSONNEL

The U. S. EPA EIB Project Manager for this project was Mr. Dennis Shipman. Mr. Solomon Ricks served as the U. S. EPA EMB Project Manager. The SAIC Project Manager was Mr. Joe Van Gieson. The Entropy Project Director was Dr. John Richards, P.E. The Entropy Project Manager was Mr. Bill Kirk. The Assistant Entropy Project Manager was Mr. Todd Brozell. Mr. Bobby Johnson and Mr. Jim Hilton of Nello L. Teer coordinated testing schedules with the plant personnel and provided operating data. A summary of the key personnel and their phone numbers are provided in Table 1-2.

TABLE 1-2. KEY PERSONNEL

U. S. Environmental Protection Agency	
Emission Inventory Branch	
• Mr. Dennis Shipman	(919) 541-5477
Emission Measurement Branch	
• Mr. Solomon Ricks	(919) 541-5242
SAIC, Inc.	
• Mr. Joe Van Gieson	(703) 734-2530
Nello L. Teer Inc.	
• Mr. Bobby Johnson	(919) 556-4011
• Mr. Jim Hilton	(919) 556-4011
Entropy Environmentalists, Inc.	
• Mr. John Richards	(919) 781-3550
• Mr. Todd Brozell	(919) 781-3550
• Mr. Bill Kirk	(919) 781-3550

2.0 PLANT AND SAMPLING LOCATION DESCRIPTION

2.1 PROCESS DESCRIPTION AND OPERATION

The Raleigh plant produces crushed granite used for construction and road paving. Figure 2-1 is a flowchart of the portion of the Raleigh plant relevant in this project. The figure was photocopies from a drawing provided by Nello L. Teer and labelled 6011, Raleigh Quarry Stationary Plant.

Rock blasted from various locations in the quarry is trucked to a primary crusher (No. 25, Fig. 2-1). A large surge pile is used to provide a steady flow of stone to the plant processing equipment. A conveyor delivers stone to the 6' x 16' TD Telsmith Vibro-King screen deck above the secondary crusher (No's 5 & 33, Fig.2-1). Stone that passes through the screen is sent to the 6 x 16-foot TD Seco screen via a 30-inch by 159-foot Barber-Greene conveyor (No's 17 & 36, Fig. 2-1). Stone too large to pass through the screen is sent to the tertiary crusher (No. 67, Fig. 2-1). Upon exiting the tertiary crusher the stone is sent back to the TD Seco screen. Production rates ranged from 60 to 100 tons per hour during the test program. Production rates were calculated from 2-foot belt cuts taken during the test. The belt-cut sampling locations for the tertiary crusher and the TD Seco screen are shown in Figure 2-1 as points A and B respectively. The stone flow to the TD Seco screens and tertiary crusher is termed "closed circuit" since oversized material containing some fines adhering to the surface can recirculate through the TD Seco screen and tertiary crusher[3] until the stone is crushed small enough to fall through the TD Seco screen.

The tertiary crusher is a Model 1560 Omnicone, conical type crusher. Figures 1-1 & 2 show views of the tertiary crusher before the inlet and outlet enclosures were built. The crusher receives the oversize stone from the 6 x 16 -TD Seco screen downstream from the secondary crusher. The stone is fed to the tertiary crusher by means of a 24" wide, 25 foot long conveyor (No.18, Fig. 2-1). After passing through the crusher, the stone is discharged onto a 30" wide 159 foot long conveyor (No.21, Fig. 2-1). There are very limited free fall distances from the conveyor to the Omnicone inlet. The Omnicone discharges the crushed stone to a 30 inch wide, 111 foot long conveyor (NO.21, Fig. 2-1).

The inlet to the Omnicone was defined as the area just after the stone was released from the conveyor and included the circular inlet to the Omnicone vessel. This area was enclosed with plywood attached to the safety rails surrounding the Omnicone inlet. The crusher inlet enclosure was approximately 3-feet high with a diameter of 8.5 feet. HEPA filtered air was introduced on one side of the enclosure and the sampling stack was constructed on the opposite side.

The discharge point of the Omnicone tertiary crusher is a conveyor leading from the secondary crusher to the TD Seco screens (No. 21, Fig. 2-1). The discharge point is enclosed approximately 3 feet upstream and downstream of the Omnicone discharge point. A plywood enclosure was constructed around this area also. The outlet enclosure was approximately 8 feet long, 8 feet wide, and 6 feet high. HEPA filtered air was introduced at belt locations upstream and downstream of the discharge chute. The sampling stack was constructed on the opposite side.

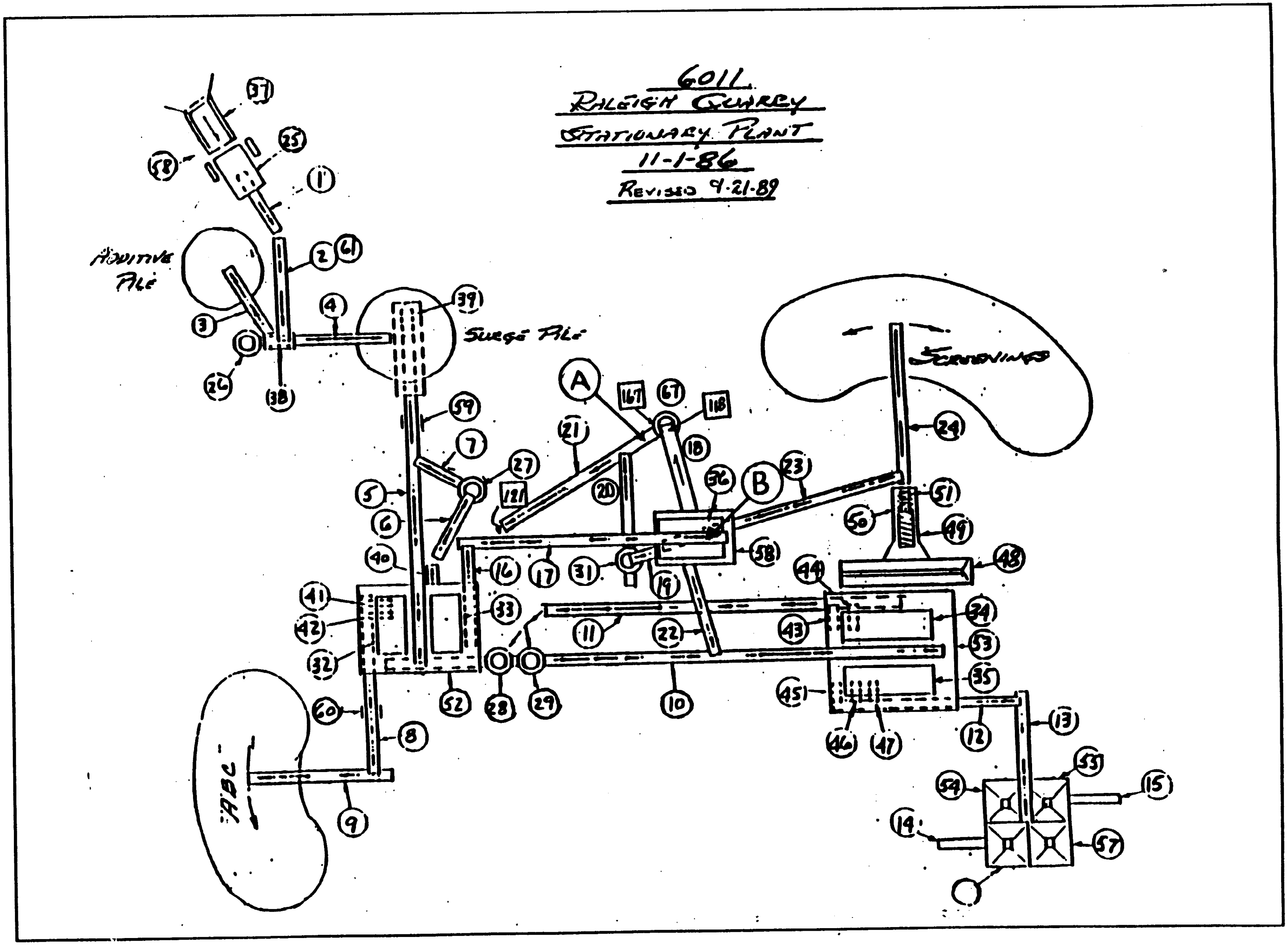


Figure 2-1 Process Flow Diagram

The TD Seco screen decks are 6 feet wide by 16 feet long and are inclined on a 20 degree slope. There are three vertically stacked decks. Fine particles passing through all three decks collect as a separate process stream. The oversized material remaining on the top screen goes to the inlet of the tertiary crusher. The TD Seco screen receives material from a 30-inch wide, 159-foot long overhead conveyor (No. 17, Fig.2-1). All of the crushed stone from the tertiary crusher is deposited on this conveyor and mixed with screened material from the TD Telsmith Vibro-King screen. Process rates were determined by a 2-foot belt cut taken from the overhead conveyor.

The TD Seco vibrating screen emission tests were conducted using a track-mounted hood system. The hood had dimensions of 2 feet by 2 feet and was mounted 12 inches above the upper screen deck of the TD Seco Screen. The small scale and the mounting position of the hood ensured that the normal PM10 emissions were not significantly influenced by the presence of the hood. The capture velocity in the hood was set by adjusting the variable speed DC motor of the tube-axial fan installed on the hood outlet duct. The hood capture velocity was selected based on observations of the fugitive dust capture characteristics of the hood. A constant gas flow was used throughout the test program. This testing approach is an adaptation of the conventional "roof monitoring" technique for fugitive emission testing.

2.2 FUGITIVE DUST CONTROL

Wet suppression is used for fugitive dust control of the tertiary crusher. There are water spray nozzles located at the discharge point of the inlet conveyor, midway in the body of the crusher, and within the discharge chute. Not all of these spray nozzles are necessary to maintain wet conditions. The screen has water spray nozzles located at the conveyor transfer point. These spray nozzles were not used during the test program. Over-wetting of the rock can cause blinding of the lower screen or blockage of the fines discharge chute underneath the screen[4,5].

2.3 SAMPLING AND EMISSION TESTING PROCEDURES

2.3.1 Fugitive Emission Capture Systems

Since there is not an air pollution control device on the inlet and outlet of the tertiary crusher or the TD Seco screen, a fugitive emission capture system is needed to capture the particulate matter. Entropy considered the criteria listed in Table 2-1 in designing the fugitive emission capture system. Entropy evaluated alternative capture systems during several site visits by Entropy and U. S. EPA personnel. The alternative capture techniques which are generally applied to fugitive dust emission sources include[6,7]:

- Roof monitor
- Upwind-downwind profiling
- Quasi-stack

Table 2-1.

- The capture system should not create higher-than-actual PM10 emission rates due to high gas velocity conditions near the upper screen, near the stone inlet chute, or near the upper screen discharge chute.

- The capture system should not create a sink for PM10 emissions due to particulate losses.

- The capture system should not create safety hazards for the hazards for plant personnel. It should not create risks to the plant process or equipment.

- The capture system should not obstruct routine access to the process equipment by plant personnel.

- The capture system and overall test procedures must be economical, practical, and readily adaptable to other plants so that these tests can be repeated by organizations wishing to confirm or challenge the emission factor data developed in this project.

Emission profiling techniques involve measurement of the increase in PM10 concentrations as a gas stream passes over or around the source being evaluated. This is usually performed using ambient PM10 monitors in upwind and downwind locations. Entropy concluded that this approach was not applicable to the test locations at the Nello L.Teer plant due to the number of sources immediately upwind and downwind of the tertiary crusher and vibrating screen. It would be impossible to isolate the tertiary crusher from these nearby sources. These included:

- Generator, heavy equipment, and truck exhausts
- Secondary crushers
- Various conveyors and stone transfer points

The emission profiling approach was not practical due to the number of potential PM10 sources and their proximity to the sampling locations.

The roof monitoring approach of fugitive emission capture involves sampling at a horizontal array of sampling points above the surface of the emission source. This approach was rejected because there was no practical means to sample in the area immediately above the crusher inlet and outlet. Also, the conveyor that delivers stone to the screen was suspended directly above the screen. Entropy and the EPA chose the traversing hood system previously developed by Entropy for the screening process. Ambient Hi-Volume monitors were used to measure the PM10 concentration upwind of the screen location.

The approach to testing the screen involved hanging the traversing hood system above the screen. The support rails were attached to the overhead conveyor superstructure. The 5-foot x 16-foot traversing hood assembly was designed to allow access to the entire functional screen area. Ropes and pulleys were used to position the hood over the desired testing area of the screen. The screen area was obstructed by a supporting I-beam which effectively divided the screen area into upper and lower sections. Two hoods were used to traverse the entire screen area, one for each of the sections. Both hoods had square openings that measured 2 feet by 2 feet. The hoods were suspended approximately 12 inches above the screen surface. The small scale of the apparatus and the mounting position of the hoods ensured that the normal PM10 emissions were not significantly influenced by the presence of the hood. The capture velocity in the hood was set by adjusting the variable speed DC motor of the tube-axial fan installed on the hood outlet duct. The hood capture velocity was selected based on observations of the fugitive dust capture characteristics of the hood. A constant gas flow was used throughout the test program. This testing approach is an adaptation of the conventional "roof monitoring" technique for fugitive emission testing.

The quasi-stack method appeared to be the most effective and practical approach for capturing the fugitive emissions at the crusher inlet and outlet locations. This approach allowed isolation of the crusher inlet and outlet emission points from the other fugitive dust sources in the immediate vicinity. The quasi-stack method required the construction of temporary enclosures around the inlet and outlet of the tertiary crusher and the installation of a duct and fan system for gas handling. Since the tertiary crusher outlet was already partially enclosed, the induced gas flow streams would not influence the rate of PM10 emissions. Low make-up air flow rates were used at the relatively exposed inlet emission point in order to minimize higher-than-actual PM10 emissions.

The make-up air to the inlet and outlet enclosures was supplied by a set of two-speed fans equipped with HEPA filters and prefilters. The HEPA filters are rated as greater than 99.97% efficient for submicron particles, therefore, adjacent dust sources could not significantly influence the measured emission rates. Prefilters were replaced when they became overloaded or blinded by large diameter particles, moist particles, or water.

The gas flow from the outlet enclosures was controlled by a Dayton Model 3C411, 24inch, 2 HP direct current (DC) driven tube-axial fan. This variable speed fan was set at the gas flow rate necessary to maintain a slightly negative static pressure within the enclosure. Negative pressures were required to ensure that there was no loss of PM10 emissions from the enclosure. Highly negative static pressures were undesirable since there could be high velocity ambient air streams entering the enclosure which could increase the PM10 emissions.

The screening operation was tested using a track-mounted hood system which consisted of two separate 2 foot by 2 foot aluminum hoods suspended 12 inches above the upper and lower portions of the TD Seco vibrating screen.

This position was close enough to ensure good emission capture but not so close that the entering air stream caused greater-than-actual emissions. A variable speed DC-driven tube-axial fan controlled the capture velocity of the air entering the hood. This velocity was set at 150 feet per minute based on the hood capture characteristics observed using smoke and lightweight strips of fabric. This velocity is higher than the 50 feet per minute minimum velocity specified in reference 9 for vibrating screens.

The TD Seco screen was divided into a 3 by 8 array of sampling locations, each of which was 2 feet by 2 feet in size. The only area not sampled was the 3-foot strip across the upper inlet side of the TD Seco screen. Traversing this area was not possible due to the presence of the inlet chute and the stone flow pattern approaching the top screen.

Entropy sized the ductwork from the hood to the sampling location for an average gas flow rate less than 1000 feet per minute. This transport velocity is well below the 3500 to 4500 feet per minute velocity used to size commercial ductwork in stone crushing plants and other facilities handling large diameter dusts[2,8]. The purpose of the high velocities in commercial ducts is to ensure that dust does not settle and accumulate in the ductwork over long time periods. Dust accumulation was not a problem during this study since the hood operating times were relatively short and the flexible duct was cleaned regularly. The 1000 feet per minute duct velocity limit is advantageous since this limits the impaction of particles less than 10 microns on the side walls of the hood elbow and the side walls of the flexible duct. Also, the low transport velocity limits any reentrainment of dust which does settle in the flexible duct.

2.3.2 PM10 Emission Testing Procedure

EPA Reference Method 201A was used to monitor the PM10 emissions from the tertiary crusher and TD Seco screen. The complete sampling train is shown in Figure 2-2. This consists of: (1) a sampling nozzle, (2) a PM10 sampler, (3) a probe and umbilical cord, (4) an impinger train, and (5) flow control system. Due to the relatively small ducts and the constant sample gas flow rates set using the DC-driven tube-axial fans, the "S"-type pitot tube was not mounted on the PM10 sampler probe. Gas velocities were determined prior to the emission tests.

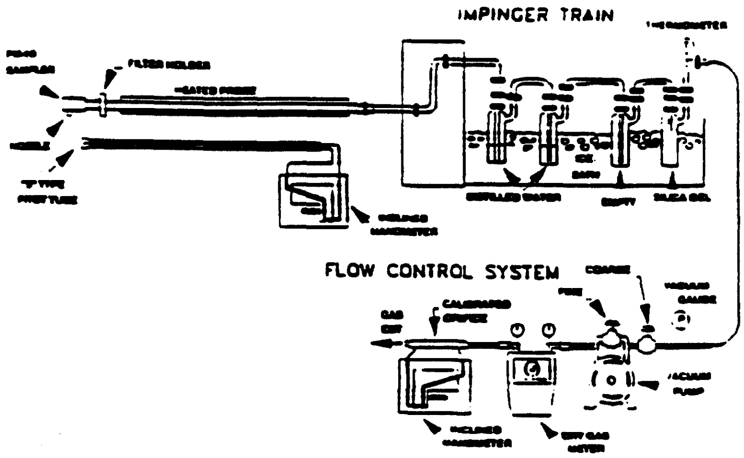


Figure 2-2 Sampling Train Configuration

Particulate matter larger than 10 microns in diameter is collected in the cyclone located immediately downstream of the sampling nozzle. Particulate smaller than 10 microns is collected on the outlet tube of the cyclone and on the downstream glass-fiber filter. A disassembled PM10 sampling head is shown in Figure 2-3.

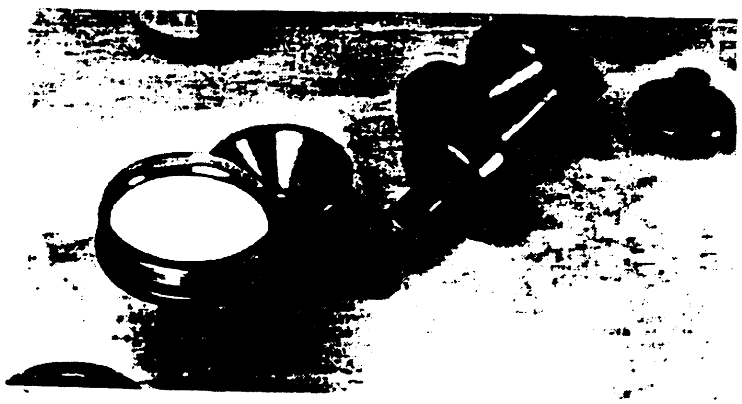


Figure 2-3 Disassembled PM10 Sampling Head

The cyclone and filter system used in this study met the design and sizing requirements of Section 5.2 of Method 201A. The gas flow rate through the cyclone was set based on the orifice pressure head equation provided in Figure 4 of Method 201A. The gas flow rate was kept constant throughout the emission test program.

PM10 sampling was performed in a 1-foot (inlet location) and 2-foot (outlet location) diameter smooth wall duct mounted directly off the enclosures of the crusher. The 4-inch diameter sampling port was located 8 duct diameters downstream of the flexible duct connection and 2 duct diameters upstream of the fan. All sampling was conducted in the horizontal plane. Sampling in the vertical direction across the ducts was not possible since dust collected in the cyclone could be resuspended and pass through to the filter. The sampling nozzles were selected to provide 80 to 120% isokinetic conditions. The cyclone and nozzle assembly were mounted within the duct during sampling.

The particulate samples were recovered using the procedures specified in Method 201A. The sample recovery scheme is illustrated in Figure 2-4. The material from the filter, cyclone outlet tube, and filter inlet housing were combined to determine the total PM10 catch weight.

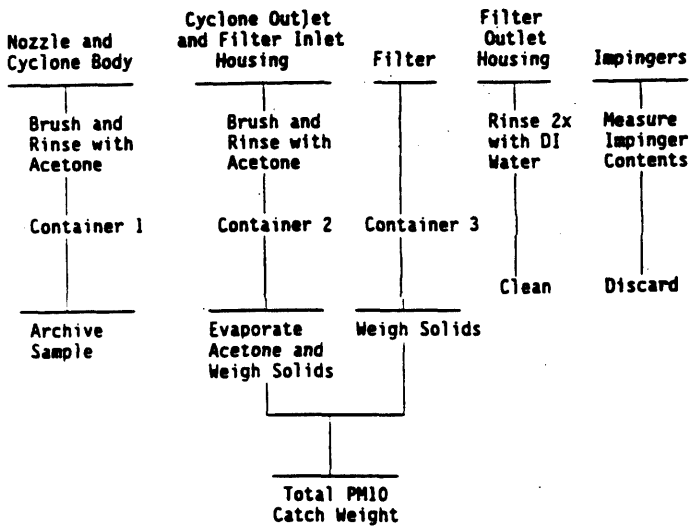


Figure 2-4 Sample Recovery Scheme

2.4 MONITORING OF PROCESS OPERATING CONDITIONS

There are a number of process variables and weather conditions which could conceivably influence PM10 emission rates from the TD Seco screen [3,1]:

- Stone moisture level
- Ambient wind speed
- Wind direction
- Stone size distribution
- Stone feed rates for the crusher and screen
- Stone type (breaking characteristics)

All of these variables with the exception of stone type were monitored using a combination of plant instruments, special monitoring equipment, and stone sample analyses. Stone type was not monitored since granite is the only type of stone processed at this plant. Samples of the stone were archived to permit future analyses if necessary.

2.4.1 Stone Moisture Level

A 2 linear foot sample of stone was taken during each of the emission tests. The conveyor serving the test site was stopped for approximately 5 minutes while the Entropy test crew placed the stone samples into sealed plastic buckets.

A sample was selected for analysis by placing the stone in a pile and dividing it into four quadrants. The quadrant randomly selected for analysis was further subdivided in quadrants until the sample quantity was less than approximately 2 pounds. This sample was then weighed and heated in an oven at a gas temperature of approximately 250 degrees Fahrenheit. The weight loss during heating was calculated and reported as the stone moisture level.

2.4.2 Wind Speed and Direction

An Entropy-supplied weather station was mounted on the platform directly outside of the control room. A dedicated microcomputer recorded data on a minute-by-minute basis.

2.4.3 Stone Size Distribution

Samples of the stone obtained during the test (see Section 2.4.1) were used to determine the size distribution. The sample was prepared as described in Section 2.4.1. Sizing was determined using ASTM sizing screens. A sample of approximately 2 pounds was loaded into the top pan. The screens used included:

- 37.5 mm screen
- 19.0 mm screen
- 4.75 mm screen
- 2.00 mm screen
- 150 micron screen
- 75 micron screen
- 38 micron screen
- pan < 38 micron

The loaded ASTM screens were placed in a Ro-TAP shaker and processed for 10 minutes. The weights of stone remaining on each of the screens were then determined by subtracting the screen tare weights from the loaded weights.

The data provided by the ASTM sizing screens provided information on the "as-sampled" stone size distribution. Following this analysis of the ASTM screens, the sample was placed into an oven and heated to 250°F until dry. Then the ASTM screens were restacked and shaken for 10 minutes. The dry weights per screen were then used as an indication of the total silt content of the stone which could conceivably be released while the stone is being processed on the TD Seco screen.

2.4.4 Stone Processing and Production Rates

The stone processing rate of the tertiary crusher has been defined by Entropy as the total volume of stone released to the outlet conveyor belt. The total volume of stone processed by the TD Seco screen is defined as the volume of stone delivered by the overhead conveyor belt. Both of these volumes were determined by taking 2-foot belt cuts of stone. The stone was weighed and along with the corresponding belt velocity, process rates were determined.

3.0 TEST RESULTS

3.1 OBJECTIVES AND TEST MATRIX

The objective of this test program was to determine the PM10 emission factors for a tertiary crusher and vibrating screen at a stone crushing plant. The test program concerned both wet and dry stone conditions. The specific objectives included the following:

- Capture the PM10 emissions from the inlet and outlet of a tertiary crusher without significantly affecting the emission rate.
- Capture the PM10 emissions from the vibrating screen of a tertiary crusher without significantly affecting the emission rate.
- Determine the PM10 emission concentrations by means of EPA Reference Method 201A.
- Calculate the total PM10 emission rates using the known outlet duct gas flow rates and the Method 201A emission concentrations.
- Measure the stone moisture content, stone feed rate, stone size distribution, wind speed, wind direction.

3.2 FIELD TEST CHANGES AND PROBLEMS

The testing program was delayed once while at the Nello L. Teer facility. Two major factors contributed to the delay. The first was a hydraulic leak in the tertiary crusher. The plant had to order and install a new hydraulic cylinder. The second factor was a period of heavy rain which created process conditions unsuitable for testing. Both of these factors contributed to the program being delayed approximately two weeks. The testing on the crusher was completed prior to the delay. The testing on the screen was completed without incident with only minor weather delays. The sampling matrix for the testing program is presented in Table 3-1.

TABLE 3-1. SAMPLING MATRIX CRUSHER RUNS

Run No.	Test Type	Date	Time	Test Method	Sampling Location
IN-WET-1	Wet	7-27-92	10:03-10:14	Method 2	In/Out Ducts
OUT-WET-1			12:33-16:33	Method 201A	Inlet Duct
			12:35-16:35	Method 201A	Outlet Duct
			13:07	Stone Sample	Conveyor 21
			12:00-17:00	Wind Conditions	Platform
IN-WET-2	Wet	7-28-92	08:00	Method 2	In/Out Ducts
OUT-WET-2			08:17-14:23	Method 201A	Inlet Duct
			08:15-14:21	Method 201A	Outlet Duct
			10:40	Stone Sample	Conveyor 21
			08:00-15:00	Wind Conditions	Platform
IN-WET-3	Wet	7-29-92	08:00	Method 2	In/Out Ducts
OUT-WET-3			08:35-14:35	Method 201A	Inlet Duct
			08:34-14:34	Method 201A	Outlet Duct
			12:00	Stone Sample	Conveyor 21
			08:00-15:00	Wind Conditions	Platform
IN-DRY-1	Dry	7-30-92	07:30	Method 2	In/Out Ducts
OUT-DRY-1			08:01-09:01	Method 201A	Inlet Duct
			08:00-09:00	Method 201A	Outlet Duct
			09:00	Stone Sample	Conveyor 21
			07:00-13:00	Wind Conditions	Platform
IN-DRY-2	DRY	7-30-92	07:30	Method 2	In/Out Ducts
OUT-DRY-2			09:54-11:03	Method 201A	Inlet Duct
			09:53-11:02	Method 201A	Outlet Duct
			11:15	Stone Sample	Conveyor 21
			07:00-13:00	Wind Conditions	Platform
IN-DRY-3	Wet	7-30-92	07:30	Method 2	In/Out Ducts
OUT-DRY-3			12:00-13:00	Method 201A	Inlet Duct
			11:59-12:59	Method 201A	Outlet Duct
			13:00	Stone Sample	Conveyor 21
			07:00-13:00	Wind Conditions	Platform

TABLE 3-1. SAMPLING MATRIX SCREEN RUNS

Run No.	Test Type	Date	Time	Test Method	Sampling Location
SR-WET-1	Wet	8-19-92	07:05-07:10	Method 2	Outlet Duct
			08:43-15:03	Method 201A	Outlet Duct
			12:00	Stone Sample	Conveyor 17
			08:00-15:30	Wind Conditions	Platform
SR-WET-2	Wet	8-23-92	07:00	Method 2	Outlet Duct
			08:32-14:32	Method 201A	Outlet Duct
			12:008	Stone Sample	Conveyor 17
			08:00-15:00	Wind Conditions	Platform
SR-WET-3	Wet	8-26-92	07:00	Method 2	Outlet Duct
			07:55-13:55	Method 201A	Outlet Duct
			12:00	Stone Sample	Conveyor 17
			07:00-14:00	Wind Conditions	Platform
SR-DRY-1	Dry	8-27-92	07:30	Method 2	Outlet Duct
			08:45-09:45	Method 201A	Outlet Duct
			09:00	Stone Sample	Conveyor 17
			08:00-15:00	Wind Conditions	Platform
SR-DRY-2	Dry	8-27-92	07:30	Method 2	Outlet Duct
			10:25-11:25	Method 201A	Outlet Duct
			09:00	Stone Sample	Conveyor 17
			08:00-15:00	Wind Conditions	Platform
SR-DRY-3	Dry	8-27-92	07:30	Method 2	Outlet Duct
			13:15-14:15	Method 201A	Outlet Duct
			14:15	Stone Sample	Conveyor 17
			08:00-15:00	Wind Conditions	Platform

3.3 TEST RESULTS

3.3.1 Stone Moisture Content

The stone moisture levels for the tertiary crusher and vibrating screen PM10 emission factor tests are presented in Table 3-2. The moisture criteria proposed in the Test Plan were: dry condition - less than 1.5%, and wet conditions - equal to or greater than 1.5%. These values are basically consistent with these criteria.

TABLE 3-2. STONE MOISTURE LEVELS

Date	Conditions	Test	Moisture Content (% weight)
Crusher Tests			
7-27-92	Wet	W1	1.13
7-28-92	Wet	W2	1.75
7-29-92	Wet	W3	2.88
7-30-92	Dry	D1	0.63
7-30-92	Dry	D2	1.30
7-30-92	Dry	D3	N.D.
Screen Tests			
8-19-92	Wet	W1	1.61
8-23-92	Wet	W2	1.66
8-26-92	Wet	W3	1.77
8-27-92	Dry	D1	N.D.
8-27-92	Dry	D2	N.D.
8-27-92	Dry	D3	N.D.

Stone moisture levels were controlled by the plant personnel operating certain water spray headers in the process. Moisture content is a strong function of the stone size distribution. Essentially all of the moisture present in a given stone sample is present in the small size ranges having high surface areas.

3.3.2 Stone Production Rates

The tertiary crusher stone processing rates were calculated following the formula given in Section 2.4.4 of this report. The vibrating feeder volumes, transport times data and the calculated stone production rates are presented in Table 3-3.

3.3.3 PM10 Emission Factors

The PM10 emission factors were calculated in accordance with the procedures illustrated in the example calculation of Appendix B. The particulate captured on the filter, in the cyclone outlet tube, and in the filter inlet housing was weighed and added to yield a total capture weight. This value is divided by the standard cubic feet of gas sampled to determine the concentration of PM10 particulate matter in the gas sampled.

TABLE 3-3. PRODUCTION RATES

Date	Conditions	Test	Production rates (Tons/Hr.)
Crusher Tests			
7-27-92	Wet	W1	63
7-28-92	Wet	W2	63
7-29-92	Wet	W3	63
7-30-92	Dry	D1	63
7-30-92	Dry	D2	63
7-30-92	Dry	D3	63
Screen Tests			
8-19-92	Wet	W1	102
8-23-92	Wet	W2	102
8-26-92	Wet	W3	102
8-27-92	Dry	D1	102
8-27-92	Dry	D2	102
8-27-92	Dry	D3	102

The data are expressed in pounds of PM10 per ton of stone processed through the tertiary crusher. The production rate was calculated as per Section 2.4.4 of this report.

The measured PM10 emission factors are presented in Table 3-4. The average values for the wet tests are substantially below the average values for the dry tests. This is consistent with general observations during the emission tests. During the dry tests, there were slight visible emissions from the outlet ducts. No visible emissions were apparent during the wet tests. The extremely low emissions occurring during the wet tests are indicated the photograph shown in Figure 3-1.

The emission factors measured during the emission test program are well below previously reported emission factors for total particulate matter[9]. This difference is reasonable since stone crushing processes can generate high concentrations of large diameter particulate when the stone is very dry or the ambient wind speed is very high. The earlier tests were mainly conducted on sources with baghouses for control. Therefore, wet suppression was not used to minimize emissions and the stone was probably very dry (data not provided). The Entropy test crew observed that the visible emissions dropped to negligible levels when the wet suppression equipment was turned on at the Garner plant.

The emission factors applicable to total emissions cannot be compared with the PM10 emission factors. The PM10 fraction of the total particulate emissions should be relatively low since very high energy levels are needed to cause stone attrition to the 10 micron range.

TABLE 3-4. SCREEN AND CRUSHER PM10 EMISSIONS

	PM10 Emissions; Pounds/Ton
Inlet Dry Stone (< 1.5%)	
Run 1	0.000256
Run 2	0.000491
Run 3	0.000794
Average	0.000514
Inlet Wet Stone (> 1.5%)	
Run 1	0.000114
Run 2	0.000085
Run 3	0.000042
Average	0.000080
Outlet Dry Stone (< 1.5%)	
Run 1	0.00310
Run 2	0.01421
Run 3	0.02454
Average	0.01390
Outlet Wet Stone (> 1.5%)	
Run 1	0.002297
Run 2	0.002477
Run 3	0.001077
Average	0.001950
Screen Dry Stone (>1.5%)	
Run 1	0.0412
Run 2	0.0673
Run 3	0.1027
Average	0.0704
Screen Wet Stone (<1.5%)	
Run 1	0.0019
Run 2	0.0026
Run 3	0.0010
Average	0.0018

4.0 QA/QC ACTIVITIES

4.1 QC PROCEDURES

The specific internal quality assurance and quality control procedures used during this test program are described in this section. Velocity and volumetric flow rate data collection are discussed in Section 4.2. Section 4.3 discusses QA audits. QC procedures for particulate and percent isokinetics are presented in Sections 4.4 and 4.5, respectively. Manual equipment calibration is described in Section 4.6. Data validation is discussed in Section 4.7.

4.2 VELOCITY/VOLUMETRIC FLOW RATE DETERMINATION

The QC procedures for velocity/volumetric flow rate determinations follow guidelines set forth by EPA Method 2.

Flue gas moisture was determined according to EPA Method 4 sampling trains. Flue gas moisture content (B_{ws}) was determined by dividing the volume (mass) of moisture collected by the impingers by the standardized volume of gas sampled. The following QC procedures were followed in determining the volume of moisture collected:

- Preliminary reagent tare weights were measured to the nearest 0.1 g.
- The balance zero was checked and re-zeroed as necessary before each weighing.
- The balance was leveled and placed in a clean, motionless environment for weighing.
- The indicating silica gel was fresh for each run.
- The silica gel impinger gas temperature was maintained below 68°F.

The QC procedures below were followed regarding accurate sample gas volume determination:

- The dry gas meter is fully calibrated every 6 months using an EPA approved intermediate standard.
- The gas meter was read to a thousandth of a cubic foot for the initial and final readings.
- The meter thermocouples were compared with ambient prior to the test run as a check on operation.
- Readings of the dry gas meter, meter orifice pressure (ΔH), and meter temperatures were taken at every sampling point.
- Accurate barometric pressures were recorded at least once per day.
- Post-test dry gas meter checks were completed to verify the accuracy of the meter full calibration constant (Y).
- The S-type pitot tube was visually inspected before sampling.
- Both legs of the pitot tube were leak checked before and after sampling.
- Proper orientation of the S-type pitot tube was maintained while making measurements. The roll and pitch axis of the S-type pitot tube were maintained at 90° to the flow.
- The pitot tube/manometer umbilical lines were inspected before and after sampling for moisture condensate.
- Cyclonic or turbulent flow checks were performed prior to testing the source.
- An average velocity pressure reading were recorded at each point instead of recording extreme high or low values.
- Pitot tube coefficients were determined based on physical measurement techniques as delineated in Method 2.
- The stack gas temperature measuring system was checked by observing ambient temperatures prior to placement in the stack.

4.3 QA AUDITS

Meterbox calibration audits were performed according to Method 5, section 4.4. All of the equipment pre-test and post-test results are presented in Table 4-1.

4.4 PARTICULATE/CONDENSIBLES SAMPLING QC PROCEDURES

Quality control procedures for particulate sampling ensure high quality flue gas concentrations and emissions data. Flue gas concentrations are determined by dividing the mass of analyte (particulate) collected by the standardized volume of gas sampled. Sampling QC procedures which ensure that a representative amount of the analytes are collected by the sampling system include:

- The sampling rate is within 20 percent of isokinetic (100 percent).
- The probe and filter temperatures are maintained at >50°F ambient.
- Only properly prepared glassware is used.
- All sampling nozzles were be manufactured and calibrated according to EPA standards.
- Filters are weighed, handled, and stored in a manner to prevent any contamination.
- Recovery procedures are completed in a clean environment.
- Field reagent blanks are collected.

4.5 SAMPLE VOLUME AND PERCENT ISOKINETICS

All sampling runs met the results acceptability criteria as defined by Section 6.3.5 of Method 201-A. The isokinetic rates are within ±20 percent. A summary of the sample volume and percent isokinetics is presented in Table 4-1.

TABLE 4-1a.

AVERAGE DELTA H AND ISOKINETIC RESULTS

Run #	Percent Iso (%)	Delta H (Avg)
Inlet, Wet Run 1	103.7	1.86
Inlet, Wet Run 2	102.6	0.64
Inlet, Wet Run 3	102.5	0.65
Inlet, Dry Run 1	101.4	0.64
Inlet, Dry Run 2	102.5	0.64
Inlet, Dry Run 3	105.9	0.64

TABLE 4-1b.

AVERAGE DELTA H AND ISOKINETIC RESULTS

Run #	Percent Iso (%)	Delta H (Avg)
Outlet, Wet Run 1	102.8	2.1
Outlet, Wet Run 2	111.1	0.58
Outlet, Wet Run 3	104.6	0.60
Outlet, Dry Run 1	108.8	0.65
Outlet, Dry Run 2	108.5	0.65
Outlet, Dry Run 3	109.9	0.65

TABLE 4-1c.

AVERAGE DELTA H AND ISOKINETIC RESULTS

Run #	Percent Is (%)	Delta H (Avg)
Screen, Wet Run 1	103.8	.61
Screen, Wet Run 2	89.1	.58
Screen, Wet Run 3	99.4	.58
Screen, Dry Run 1	102.6	.58
Screen, Dry Run 2	98.9	.58
Screen, Dry Run 3	100.3	.58

4.6 MANUAL SAMPLING EQUIPMENT CALIBRATION PROCEDURES

4.6.1 Type-S Pitot Tube Calibration

The EPA has specified guidelines concerning the construction and geometry of an acceptable Type-S pitot tube. If the specified design and construction guidelines are met, a pitot tube coefficient of 0.84 is used. Information pertaining to the design and construction of the Type-S pitot tube is presented in detail in Section 3.1.1 of EPA Document 600/4-77-027b. Only Type-S pitot tubes meeting the required EPA specifications are used. Pitot tubes are inspected and documented as meeting EPA specifications prior to field sampling.

4.6.2 Sampling Nozzle Calibration

Calculation of the isokinetic sampling rate requires that the cross sectional area of the sampling nozzle be accurately determined. All nozzles are thoroughly cleaned, visually inspected, and calibrated according to the procedure outlined in Section 3.4.2 of EPA Document 600/4-77-027b.

4.6.3 Temperature Measuring Device Calibration

Accurate temperature measurements are required during source sampling. Bimetallic stem thermometers and thermocouple temperature sensors are calibrated using the procedure described in Section 3.4.2 of EPA Document 600/4-77-027b. Each temperature sensor is calibrated at a minimum of three points over the anticipated range of use against a NIST-traceable mercury-in-glass thermometer. All sensors are calibrated prior to field sampling.

4.6.4 Dry Gas Meter Calibration

Dry gas meters (DGM's) are used in the sample trains to monitor the sampling rate and measure the sample volume. All DGM's are fully calibrated to determine the volume correction factor prior to their use in the field. Post-test calibration checks are performed as soon as possible after the equipment has been returned as a QA check on the calibration coefficients. Pre- and post-test calibrations should agree within 5 percent. The calibration procedure is documented in Section 3.3.2 of EPA Document 600/4-77-237b.

Prior to calibration, a positive pressure leak check of the system is performed using the procedure outlined in Section 3.3.2 of EPA Document 600/4-77-237b. The system is placed under approximately 10 inches of water pressure and a gauge oil manometer is used to determine if a pressure decrease can be detected over a one-minute period. If leaks are detected, they are eliminated before actual calibrations are performed.

After the sampling console is assembled and leak checked, the pump is allowed to run for 15 minutes to allow the pump and DGM to warm-up. The valve is then adjusted to obtain the desired flow rate. For the pre-test calibrations, data are collected at orifice manometer settings (ΔH) of 0.5, 1.0, 1.5, 2.0, 3.0 and 4.0 inches H_2O. Gas volumes of 5 ft^3 are used for the two lower orifice settings, and volumes of 10 ft^3 are used for the higher settings. The individual gas meter correction factors (Y_i) are calculated for each orifice setting and averaged. The method requires that each of the individual correction factors fall within ± 2 percent of the average correction factor or the meter is cleaned, adjusted, and recalibrated. For the post-test calibration, the meter is calibrated three times at the average orifice setting and vacuum used during the actual test. The meter box calibration data is presented in Table 4-2.

Table 4-2. Meter Box Calibration Audit

Meter Box Number	Pre-Audit Value	Allowable Error	Calculated Gamma	Acceptable
N-33	0.9980	0.9476<Y<1.0265	1.0098	Yes
N-13	0.9940	0.9550<Y<1.0346	1.0066	Yes
N-7	0.9868	0.9374<Y<1.0361	0.9843	Yes

4.7 DATA VALIDATION

All data and/or calculations for flow rates, moisture content, and isokinetic rates made using a computer software program are validated by an independent check. All calculations are spot checked for accuracy and completeness.

In general, all measurement data are validated based on the following criteria:

- Process conditions during sampling or testing.
- Acceptable sample collection procedures.
- Consistency with expected other results.
- Adherence to prescribed QC procedures.

5.0 REFERENCES

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2. Determination of Emissions for the Stone Crushing Industry, JACA Corporation, Final Report for the U. S. Environmental Protection Agency, SSCD, July 1978.

3. M. White, "Crusher and screen training: a key to better operating costs," Pit & Quarry, September 1991, p. 26-32.

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6. R.E. Kenson and P.T. Bartlett, Technical Manual for the Measurement of Fugitive Emissions: Roof Monitor Sampling Method for Industrial Fugitive Emissions, EPA-600/2-76-089b, U.S. Environmental Protection Agency, Research Triangle Park, 1976.

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9. JACA Corporation, Control of Air Emissions from Process Operations in the Rock Crushing Industry," EPA Contract No. 68-01-4135, U.S. Environmental Protection Agency, Washington, D.C., February 1978.

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6.0 GLOSSARY

1. ASTM: American Society for Testing & Materials

2. Aggregate: in the case of materials of construction, essentially inert materials which, when bound together into a conglomerated mass by a matrix, form concrete, mastic, mortar or plaster; crushed rock or gravel screened to size for use in road surfaces, concrete or bituminous mixes; any of several hard materials such as sand, gravel, stone, slag, cinders or other inert materials used for mixing with a cementing material to form concrete. Aggregate, in a surface course in the building of roads is often called a "road metal".

3. Conveyor belt: a rubberized belt, usually 18" to 60" wide, used to carry aggregates.

4. Crusher (cone): a crusher that is specially designed to produce fines.

5. Crusher (primary): usually a jaw or gyratory type crusher which reduces very large rocks to a size that can be processed by a secondary crusher.

6. Crusher (secondary): any second or third stage crusher that further reduces the size of stone.

7. Fines: the smaller particles of aggregates; usually less than .25" in size.

8. Head Pulley: the driving pulley, usually at the discharge end of conveyor belt.

9. Ro-Tap screen: trade name for a type of testing screen.

10. Scalping: a screening operation, removing stone too large for the crusher.

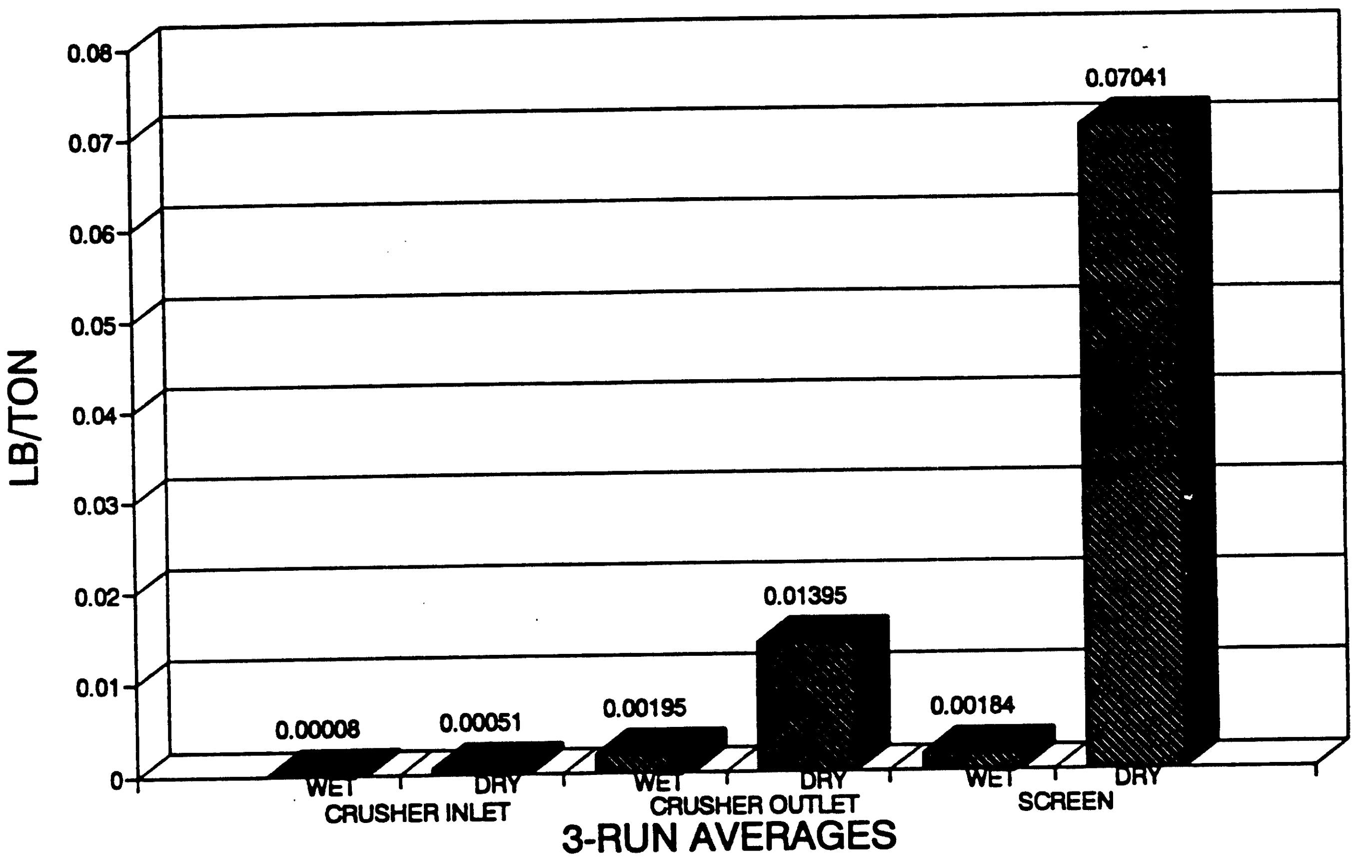
11. Scalping Screen: removes oversize material.

12. Screen (or sieve): a metallic plate or sheet, woven wire cloth or similar device, with regularly spaced apertures of uniform size mounted in a suitable frame or holder for use in separating material according to size.

APPENDIX A

AVERAGE EMISSION RATES

CRUSHER INLET/OUTLET, AND SCREEN



APPENDIX B

APPENDIX C

FIELD DATA AND RESULTS TABULATION

PLANT: Nello-Teer

SAMPLING LOCATION: Crusher Inlet

		NT-IN-WET-1	NT-IN-WET-2	NT-IN-WET-3
	Test Date	7/27/92	7/28/92	7/29/92
	Run Start Time Run Finish Time	1233 1633	817 1423	835 1435
	Net Traversing Points	1	1	1
Theta	Net Run Time, Minutes	240	360	360
Dia	Nozzle Diameter, Inches	0.337	0.252	0.252
Cp	Pitot Tube Coefficient	0.84	0.84	0.84
Y	Dry Gas Meter Calibration Factor	1.0098	1.0098	1.0098
Pbar	Barometric Pressure, Inches Hg	29.7	29.8	30.0
Delta H	Avg. Pressure Differential of Orifice Meter, Inches H2O	1.86	0.6	0.65
Vm	Volume of Metered Gas Sample, Dry ACF	190.409	160.103	164.829
tm	Dry Gas Meter Temperature, Degrees F	103	94	98
Vmstd	Volume of Metered Gas Sample, Dry SCF*	179.748	153.632	158.105
Vlc	Total Volume of Liquid Collected in Impingers & Silica Gel, mL	155.5	81	78.3
Vwstd	Volume of Water Vapor, SCF*	7.319	3.813	3.686
%H2O	Moisture Content, Percent by Volume	3.9 **	2.4 **	2.3 **
%H2OSAT	Moisture Sat. @ Flue Gas Conditions, %	4.9	3.6	6.1
Mfd	Dry Mole Fraction	0.961	0.976	0.977
%CO2	Carbon Dioxide, Percent by Volume, Dry	0	0	0
%O2	Oxygen, Percent by Volume, Dry	20.9	20.9	20.9
%CO+N2	CO + N2, Percent by Volume, Dry	79.1	79.1	79.1
Md	Gas Molecular Weight, Lb/Lb-Mole, Dry	28.84	28.84	28.84
Ms	Gas Molecular Weight, Lb/Lb-Mole, Wet	28.42	28.58	28.59
Pg	Flue Gas Static Pressure, Inches H2O	-0.24	-0.26	-0.33
Ps	Absolute Flue Gas Pressure, Inches Hg	29.68	29.78	29.98
ts	Flue Gas Temperature, Degrees F	91	81	98
Delta-p	Average Velocity Head, Inches H2O	0.1344	0.1359	0.1475
vs	Flue Gas Velocity, Feet per Second	21.28	21.11	22.25
A	Stack/Duct Area, Square Inches	113.1	113.1	113.1
Qsd	Volumetric Air Flow Rate, Dry SCFM*	916	943	971
Qmsd	Volumetric Air Flow Rate, Dry SCMM*	26	27	27
Qaw	Volumetric Air Flow Rate, Wet ACFM	1,003	995	1,049
%I	Isokinetic Sampling Rate, Percent	103.7	102.6	102.5

* 68° F (20° C) -- 29.92 Inches of Mercury (Hg).

** Moisture used in calculations.

(Continued Next Page)

FIELD DATA AND RESULTS TABULATION

PLANT: Nello-Teer

SAMPLING LOCATION: Crusher Inlet

		NT-IN-WET-1	NT-IN-WET-2	NT-IN-WET-3
	<u>PM10 Calculations</u>			
ucyc	Stack Gas Viscosity	183.2	181.8	186.0
Qs	PM10 Flow, Cyclone Conditions, ACFM	0.820	0.450	0.474
D50	Dia. of Particles in Cyclone, Micron	6.62	10.02	9.86
	Particulate Catch,			
mg<D50	≤ 10 Microns, Milligrams	10.8	6.7	3.3
mg>D50	> 10 Microns, Milligrams	55.5	10.8	5.1
mg	Total Milligrams	66.3	17.5	8.4
	Percent of Total Particulate,			
%<D50	≤ 10 Microns	16.3	38.3	39.3
%>D50	> 10 Microns	83.7	61.7	60.7
	Particulate ≤ 10 Microns			
gr/DSCF	Concentration, grains/DSCF*	0.000927	0.000673	0.000322
lb/hr	Emission Rate, lb/hr	0.00728	0.00544	0.00268

* 68° F (20° C) -- 29.92 Inches of Mercury (Hg).

FIELD DATA AND RESULTS TABULATION

PLANT: Nello-Teer

SAMPLING LOCATION: Crusher Outlet

		NT-O-WET-1	NT-O-WET-2	NT-O-WET-3
	Test Date	7/27/92	7/28/92	7/29/92
	Run Start Time Run Finish Time	1235 1635	815 1421	834 1434
	Net Traversing Points	1	1	1
Theta	Net Run Time, Minutes	240	360	360
Dia	Nozzle Diameter, Inches	0.325	0.249	0.249
Cp	Pitot Tube Coefficient	0.84	0.84	0.84
Y	Dry Gas Meter Calibration Factor	1.0066	1.0066	1.0066
Pbar	Barometric Pressure, Inches Hg	29.7	29.8	30.0
Delta H	Avg. Pressure Differential of Orifice Meter, Inches H2O	2.1	0.58	0.6
Vm	Volume of Metered Gas Sample, Dry ACF	200.367	161.343	164.764
tm	Dry Gas Meter Temperature, Degrees F	108	96	102
Vmstd	Volume of Metered Gas Sample, Dry SCF	187.000	153.769	156.402
Vlc	Total Volume of Liquid Collected in Impingers & Silica Gel, mL	119.9	78.4	76.5
Vwstd	Volume of Water Vapor, SCF*	5.644	3.690	3.601
%H2O	Moisture Content, Percent by Volume	2.9 **	2.3 **	2.3 **
%H2OSAT	Moisture Sat. @ Flue Gas Conditions,	4.9	3.5	3.7
Mfd	Dry Mole Fraction	0.971	0.977	0.977
%CO2	Carbon Dioxide, Percent by Volume, Dr	0	0	0
%O2	Oxygen, Percent by Volume, Dry	20.9	20.9	20.9
%CO+N2	CO + N2, Percent by Volume, Dry	79.1	79.1	79.1
Md	Gas Molecular Weight, Lb/Lb-Mole, Dry	28.84	28.84	28.84
Ms	Gas Molecular Weight, Lb/Lb-Mole, Wet	28.53	28.59	28.59
Pg	Flue Gas Static Pressure, Inches H2O	-0.26	-0.25	-0.22
Ps	Absolute Flue Gas Pressure, Inches Hg	29.68	29.78	29.98
ts	Flue Gas Temperature, Degrees F	91	80	82
Delta-p	Average Velocity Head, Inches H2O	0.1683	0.1214	0.1414
vs	Flue Gas Velocity, Feet per Second	23.76	19.93	21.47
A	Stack/Duct Area, Square Inches	452.4	452.4	452.4
Qsd	Volumetric Air Flow Rate, Dry SCFM*	4,134	3,572	3,860
Qmsd	Volumetric Air Flow Rate, Dry SCMM*	117	101	109
Qaw	Volumetric Air Flow Rate, Wet ACFM	4,479	3,757	4,047
%I	Isokinetic Sampling Rate, Percent	102.8	111.1	104.6

* 68° F (20° C) -- 29.92 Inches of Mercury (Hg).

** Moisture used in calculations.

(Continued Next Page)

FIELD DATA AND RESULTS TABULATION

PLANT: Nello-Teer

SAMPLING LOCATION: Crusher Outlet

		NT-O-WET-1	NT-O-WET-2	NT-O-WET-3
	PM10 Calculations			
ucyc	Stack Gas Viscosity	183.9	181.7	182.2
Qs	PM10 Flow, Cyclone Conditions, ACFM	0.845	0.450	0.456
D50	Dia. of Particles in Cyclone, Micro	6.49	10.01	9.93
	Particulate Catch,			
mg<D50	≤ 10 Microns, Milligrams	50.0	51.3	21.0
mg>D50	> 10 Microns, Milligrams	2786.9	4582.6	801.3
mg	Total Milligrams	2836.9	4633.9	822.3
	Percent of Total Particulate,			
%<D50	≤ 10 Microns	1.8	1.1	2.6
%>D50	> 10 Microns	98.2	98.9	97.4
	Particulate ≤ 10 Microns			
gr/DSCF	Concentration, grains/DSCF*	0.00413	0.00515	0.00207
lb/hr	Emission Rate, lb/hr	0.146	0.158	0.0686

* 68° F (20° C) -- 29.92 Inches of Mercury (Hg).

FIELD DATA AND RESULTS TABULATION

PLANT: Nello-Teer

SAMPLING LOCATION: Crusher Inlet

		NT-I-DRY-1	NT-I-DRY-2	NT-I-DRY-3
	Test Date	7/30/92	7/30/92	7/30/92
	Run Start Time	801	954	1200
	Run Finish Time	901	1103	1300
	Net Traversing Points	1	1	1
Theta	Net Run Time, Minutes	60	60	60
Dia	Nozzle Diameter, Inches	0.252	0.252	0.252
Cp	Pitot Tube Coefficient	0.84	0.84	0.84
Y	Dry Gas Meter Calibration Factor	1.0098	1.0098	1.0098
Pbar	Barometric Pressure, Inches Hg	29.9	29.9	29.9
Delta H	Avg. Pressure Differential of Orifice Meter, Inches H2O	0.64	0.64	0.64
Vm	Volume of Metered Gas Sample, Dry ACF	27.271	27.399	28.233
tm	Dry Gas Meter Temperature, Degrees F	85	92	94
Vmstd	Volume of Metered Gas Sample, Dry SCF*	26.693	26.478	27.185
Vlc	Total Volume of Liquid Collected in Impingers & Silica Gel, mL	10.3	17.5	14.9
Vwstd	Volume of Water Vapor, SCF*	0.485	0.824	0.701
%H2O	Moisture Content, Percent by Volume	1.8 **	3.0 **	2.5 **
%H2OSAT	Moisture Sat. @ Flue Gas Conditions, %	2.9	3.9	5.7
Mfd	Dry Mole Fraction	0.982	0.970	0.975
%CO2	Carbon Dioxide, Percent by Volume, Dry	0	0	0
%O2	Oxygen, Percent by Volume, Dry	20.9	20.9	20.9
%CO+N2	CO + N2, Percent by Volume, Dry	79.1	79.1	79.1
Md	Gas Molecular Weight, Lb/Lb-Mole, Dry	28.84	28.84	28.84
Ms	Gas Molecular Weight, Lb/Lb-Mole, Wet	28.64	28.51	28.57
Pg	Flue Gas Static Pressure, Inches H2O	-0.33	-0.33	-0.33
Ps	Absolute Flue Gas Pressure, Inches Hg	29.88	29.88	29.88
ts	Flue Gas Temperature, Degrees F	75	84	96
Delta-p	Average Velocity Head, Inches H2O	0.1475	0.1475	0.1475
vs	Flue Gas Velocity, Feet per Second	21.81	22.04	22.26
A	Stack/Duct Area, Square Inches	113.1	113.1	113.1
Qsd	Volumetric Air Flow Rate, Dry SCFM*	995	977	970
Qmsd	Volumetric Air Flow Rate, Dry SCMM*	28	28	27
Qaw	Volumetric Air Flow Rate, Wet ACFM	1,028	1,039	1,049
%I	Isokinetic Sampling Rate, Percent	101.4	102.5	105.9

* 68° F (20° C) -- 29.92 Inches of Mercury (Hg).

** Moisture used in calculations.

(Continued Next Page)

FIELD DATA AND RESULTS TABULATION

PLANT: Nello-Teer

SAMPLING LOCATION: Crusher Inlet

		NT-I-DRY-1	NT-I-DRY-2	NT-I-DRY-3
	PM10 Calculations			
ucyc	Stack Gas Viscosity	180.8	182.1	185.4
Qs	PM10 Flow, Cyclone Conditions, ACFM	0.460	0.470	0.490
D50	Dia. of Particles in Cyclone, Micron	9.79	9.74	9.61
	Particulate Catch,			
mg<D50	≤ 10 Microns, Milligrams	3.3	6.4	10.7
mg>D50	> 10 Microns, Milligrams	19.9	76.8	238.2
mg	Total Milligrams	23.2	83.2	248.9
	Percent of Total Particulate,			
%<D50	≤ 10 Microns	14.2	7.7	4.3
%>D50	> 10 Microns	85.8	92.3	95.7
	Particulate ≤ 10 Microns			
gr/DSCF	Concentration, grains/DSCF*	0.00191	0.00373	0.00607
lb/hr	Emission Rate, lb/hr	0.0163	0.0312	0.0505

* 68° F (20° C) -- 29.92 Inches of Mercury (Hg).

FIELD DATA AND RESULTS TABULATION

PLANT: Nello-Teer

SAMPLING LOCATION: Crusher Outlet

		NT-O-DRY-1	NT-O-DRY-2	NT-O-DRY-3
	Test Date	7/30/92	7/30/92	7/30/92
	Run Start Time	800	953	1159
	Run Finish Time	900	1102	1259
	Net Traversing Points	1	1	1
Theta	Net Run Time, Minutes	60	60	60
Dia	Nozzle Diameter, Inches	0.249	0.249	0.249
Cp	Pitot Tube Coefficient	0.84	0.84	0.84
Y	Dry Gas Meter Calibration Factor	1.0066	1.0066	1.0066
Pbar	Barometric Pressure, Inches Hg	29.9	29.9	29.9
Delta H	Avg. Pressure Differential of Orifice Meter, Inches H2O	0.65	0.65	0.65
Vm	Volume of Metered Gas Sample, Dry ACF	28.070	28.018	28.566
tm	Dry Gas Meter Temperature, Degrees F	87	95	97
Vmstd	Volume of Metered Gas Sample, Dry SCF	27.288	26.845	27.272
Vlc	Total Volume of Liquid Collected in Impingers & Silica Gel, mL	14.5	17.8	13.3
Vwstd	Volume of Water Vapor, SCF*	0.683	0.838	0.626
%H2O	Moisture Content, Percent by Volume	2.4 **	3.0 **	2.2 **
%H2OSAT	Moisture Sat. @ Flue Gas Conditions,	2.7	3.7	4.2
Mfd	Dry Mole Fraction	0.976	0.970	0.978
%CO2	Carbon Dioxide, Percent by Volume, Dr	0	0	0
%O2	Oxygen, Percent by Volume, Dry	20.9	20.9	20.9
%CO+N2	CO + N2, Percent by Volume, Dry	79.1	79.1	79.1
Md	Gas Molecular Weight, Lb/Lb-Mole, Dry	28.84	28.84	28.84
Ms	Gas Molecular Weight, Lb/Lb-Mole, Wet	28.58	28.51	28.60
Pg	Flue Gas Static Pressure, Inches H2O	-0.22	-0.22	-0.22
Ps	Absolute Flue Gas Pressure, Inches Hg	29.88	29.88	29.88
ts	Flue Gas Temperature, Degrees F	73	82	86
Delta-p	Average Velocity Head, Inches H2O	0.1414	0.1414	0.1414
vs	Flue Gas Velocity, Feet per Second	21.33	21.54	21.58
A	Stack/Duct Area, Square Inches	452.4	452.4	452.4
Qsd	Volumetric Air Flow Rate, Dry SCFM*	3,882	3,832	3,842
Qmsd	Volumetric Air Flow Rate, Dry SCMM*	110	109	109
Qaw	Volumetric Air Flow Rate, Wet ACFM	4,021	4,060	4,068
%I	Isokinetic Sampling Rate, Percent	108.8	108.5	109.9

* 68° F (20° C) -- 29.92 Inches of Mercury (Hg).

** Moisture used in calculations.

(Continued Next Page)

FIELD DATA AND RESULTS TABULATION

PLANT: Nello-Teer

SAMPLING LOCATION: Crusher Outlet

		NT-O-DRY-1	NT-O-DRY-2	NT-O-DRY-3
	<u>PM10 Calculations</u>			
ucyc	Stack Gas Viscosity	179.9	181.6	183.2
Qs	PM10 Flow, Cyclone Conditions, ACFM	0.471	0.474	0.482
D50	Dia. of Particles in Cyclone, Micro	9.59	9.65	9.61
	Particulate Catch,			
mg<D50	≤ 10 Microns, Milligrams	10.5	47.9	83.8
mg>D50	> 10 Microns, Milligrams	877.2	2463.1	3688.9
mg	Total Milligrams	887.7	2511.0	3772.7
	Percent of Total Particulate,			
%<D50	≤ 10 Microns	1.2	1.9	2.2
%>D50	> 10 Microns	98.8	98.1	97.8
	Particulate ≤ 10 Microns			
gr/DSCF	Concentration, grains/DSCF*	0.00594	0.0275	0.0474
lb/hr	Emission Rate, lb/hr	0.198	0.904	1.56

* 68° F (20° C) -- 29.92 Inches of Mercury (Hg).

FIELD DATA AND RESULTS TABULATION

PLANT: Nello-Teer

SAMPLING LOCATION: TD-SECO Screen

		NT-SR-WET-1	NT-SR-WET-2	NT-SR-WET-3
	Test Date	8/19/92	8/23/92	8/26/92
	Run Start Time	843	832	755
	Run Finish Time	1503	1432	1355
	Net Traversing Points	1	1	1
Theta	Net Run Time, Minutes	360	400	360
Dia	Nozzle Diameter, Inches	0.252	0.252	0.252
Cp	Pitot Tube Coefficient	0.84	0.84	0.84
Y	Dry Gas Meter Calibration Factor	0.9843	0.9843	0.9843
Pbar	Barometric Pressure, Inches Hg	29.9	29.9	29.9
Delta H	Avg. Pressure Differential of Orifice Meter, Inches H2O	0.61	0.58	0.58
Vm	Volume of Metered Gas Sample, Dry ACF	161.192	158.478	159.958
tm	Dry Gas Meter Temperature, Degrees F	92	88	87
Vmstd	Volume of Metered Gas Sample, Dry SCF*	151.828	150.350	152.032
Vlc	Total Volume of Liquid Collected in Impingers & Silica Gel, mL	91.7	67.3	46.1
Vwstd	Volume of Water Vapor, SCF*	4.316	3.168	2.170
%H2O	Moisture Content, Percent by Volume	2.8 **	2.1 **	1.4 **
%H2OSAT	Moisture Sat. @ Flue Gas Conditions, %	4.4	4.2	4.1
Mfd	Dry Mole Fraction	0.972	0.979	0.986
%CO2	Carbon Dioxide, Percent by Volume, Dry	0	0	0
%O2	Oxygen, Percent by Volume, Dry	20.9	20.9	20.9
%CO+N2	CO + N2, Percent by Volume, Dry	79.1	79.1	79.1
Md	Gas Molecular Weight, Lb/Lb-Mole, Dry	28.84	28.84	28.84
Ms	Gas Molecular Weight, Lb/Lb-Mole, Wet	28.54	28.61	28.69
Pg	Flue Gas Static Pressure, Inches H2O	-29.85	-0.29	-0.32
Ps	Absolute Flue Gas Pressure, Inches Hg	27.71	29.88	29.88
ts	Flue Gas Temperature, Degrees F	85	86	85
Delta-p	Average Velocity Head, Inches H2O	0.1413	0.14	0.14
vs	Flue Gas Velocity, Feet per Second	22.41	21.47	21.42
A	Stack/Duct Area, Square Inches	113.1	113.1	113.1
Qsd	Volumetric Air Flow Rate, Dry SCFM*	921	957	963
Qmsd	Volumetric Air Flow Rate, Dry SCMM*	26	27	27
Qaw	Volumetric Air Flow Rate, Wet ACFM	1,056	1,012	1,009
%I	Isokinetic Sampling Rate, Percent	103.8	89.1	99.4

* 68° F (20° C) -- 29.92 Inches of Mercury (Hg).

** Moisture used in calculations.

(Continued Next Page)

FIELD DATA AND RESULTS TABULATION

PLANT: Nello-Teer

SAMPLING LOCATION: TD-SECO Screen

		NT-SR-WET-1	NT-SR-WET-2	NT-SR-WET-3
	<u>PM10 Calculations</u>			
ucyc	Stack Gas Viscosity	182.5	183.3	183.6
Qs	PM10 Flow, Cyclone Conditions, ACFM	0.484	0.398	0.443
D50	Dia. of Particles in Cyclone, Micron	9.70	11.01	10.20
	Particulate Catch,			
mg<D50	≤ 10 Microns, Milligrams	10.6	15.0	6.1
mg>D50	> 10 Microns, Milligrams	18.1	2.2	3.6
mg	Total Milligrams	28.7	17.2	9.7
	Percent of Total Particulate,			
%<D50	≤ 10 Microns	36.9	87.2	62.9
%>D50	> 10 Microns	63.1	12.8	37.1
	Particulate ≤ 10 Microns			
gr/DSCF	Concentration, grains/DSCF*	0.00108	0.00154	0.000619
lb/hr	Emission Rate, lb/hr	0.00851	0.0126	0.00511

* 68° F (20° C) -- 29.92 Inches of Mercury (Hg).

FIELD DATA AND RESULTS TABULATION

PLANT: Nello-Teer

SAMPLING LOCATION: TD-SECO Screen

		NT-SR-DRY-1	NT-SR-DRY-2	NT-SR-DRY-3
	Test Date	8/27/92	8/27/92	8/27/92
	Run Start Time	845	1025	1315
	Run Finish Time	945	1125	1415
	Net Traversing Points	1	1	1
Theta	Net Run Time, Minutes	60	60	60
Dia	Nozzle Diameter, Inches	0.252	0.252	0.252
Cp	Pitot Tube Coefficient	0.84	0.84	0.84
Y	Dry Gas Meter Calibration Factor	0.9843	0.9843	0.9843
Pbar	Barometric Pressure, Inches Hg	29.9	29.9	29.9
Delta H	Avg. Pressure Differential of Orifice Meter, Inches H2O	0.58	0.58	0.58
Vm	Volume of Metered Gas Sample, Dry ACF	27.443	26.796	26.796
tm	Dry Gas Meter Temperature, Degrees F	85	89	89
Vmstd	Volume of Metered Gas Sample, Dry SCF*	26.179	25.375	25.375
Vlc	Total Volume of Liquid Collected in Impingers & Silica Gel, mL	8.9	2.5	12.0
Vwstd	Volume of Water Vapor, SCF*	0.419	0.118	0.565
%H2O	Moisture Content, Percent by Volume	1.6 **	0.5 **	2.2 **
%H2OSAT	Moisture Sat. @ Flue Gas Conditions, %	3.7	4.2	4.2
Mfd	Dry Mole Fraction	0.984	0.995	0.978
%CO2	Carbon Dioxide, Percent by Volume, Dry	0	0	0
%O2	Oxygen, Percent by Volume, Dry	20.9	20.9	20.9
%CO+N2	CO + N2, Percent by Volume, Dry	79.1	79.1	79.1
Md	Gas Molecular Weight, Lb/Lb-Mole, Dry	28.84	28.84	28.84
Ms	Gas Molecular Weight, Lb/Lb-Mole, Wet	28.67	28.79	28.60
Pg	Flue Gas Static Pressure, Inches H2O	-0.32	-0.32	-0.32
Ps	Absolute Flue Gas Pressure, Inches Hg	29.88	29.88	29.88
ts	Flue Gas Temperature, Degrees F	82	86	86
Delta-p	Average Velocity Head, Inches H2O	0.14	0.14	0.14
vs	Flue Gas Velocity, Feet per Second	21.37	21.41	21.48
A	Stack/Duct Area, Square Inches	113.1	113.1	113.1
Qsd	Volumetric Air Flow Rate, Dry SCFM*	964	970	956
Qmsd	Volumetric Air Flow Rate, Dry SCMM*	27	27	27
Qaw	Volumetric Air Flow Rate, Wet ACFM	1,007	1,009	1,012
%I	Isokinetic Sampling Rate, Percent	102.6	98.9	100.3

* 68° F (20° C) -- 29.92 Inches of Mercury (Hg).

** Moisture used in calculations.

(Continued Next Page)

FIELD DATA AND RESULTS TABULATION

PLANT: Nello-Teer

SAMPLING LOCATION: TD-SECO Screen

		NT-SR-DRY-1	NT-SR-DRY-2	NT-SR-DRY-3
	PM10 Calculations			
ucyc	Stack Gas Viscosity	182.7	184.5	183.2
Qs	PM10 Flow, Cyclone Conditions, ACFM	0.456	0.440	0.448
D50	Dia. of Particles in Cyclone, Micron	9.95	10.28	10.12
	Particulate Catch,			
mg<D50	≤ 10 Microns, Milligrams	36.5	57.1	88.0
mg>D50	> 10 Microns, Milligrams	155.1	214.4	226.1
mg	Total Milligrams	191.6	271.5	314.1
	Percent of Total Particulate,			
%<D50	≤ 10 Microns	19.1	21.0	28.0
%>D50	> 10 Microns	80.9	79.0	72.0
	Particulate ≤ 10 Microns			
gr/DSCF	Concentration, grains/DSCF*	0.0215	0.0347	0.0535
lb/hr	Emission Rate, lb/hr	0.178	0.289	0.439

* 68° F (20° C) -- 29.92 Inches of Mercury (Hg).

Sampling and Velocity Traverse Point Determination
EPA Method 1A

PLANT NAME Nello Teer

CITY, STATE Raleigh, NC

SAMPLING LOCATION Inlet

NO. OF PORTS AVAILABLE 1

NO. OF PORTS USED 1

PORT INSIDE DIAMETER 5"

DISTANCE FROM FAR WALL TO OUTSIDE OF PORT 12"

NIPPLE LENGTH AND/OR WALL THICKNESS 0"

DEPTH OF STACK OR DUCT 12"

STACK OR DUCT WIDTH (IF RECTANGULAR) N/A

EQUIVALENT DIAMETER:

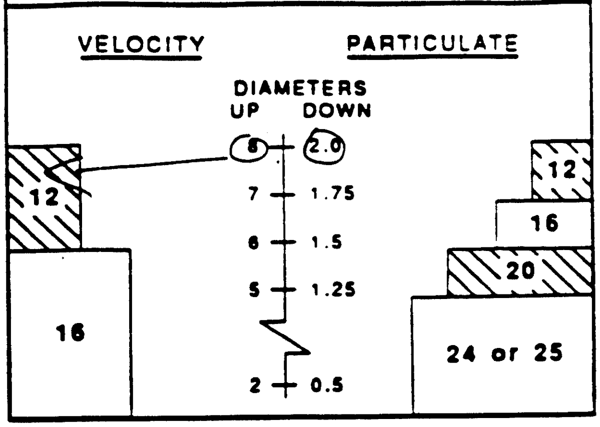
$D_E = \frac{2 \times DEPTH \times WIDTH}{DEPTH + WIDTH} = \frac{2(\quad)(\quad)}{(\quad + \quad)} =$ N/A

DISTANCE TO FLOW DISTURBANCES*

	VELOCITY PORT UPSTREAM	VELOCITY PORT DOWN		SAMPLING PORT UPSTREAM	SAMPLING PORT DOWN
DISTANCE	12'	3'	DISTANCE		
DIAMETERS	12	3'	DIAMETERS		

STACK/DUCT AREA = __________ = 113.1 IN²

DRAW HORIZONTAL LINE THROUGH DIAMETERS



USE UPSTREAM/DOWNSTREAM DIAMETERS THAT GIVE GREATEST NO. OF POINTS

POINT	% OF DUCT DEPTH	DISTANCE FROM INSIDE WALL	DISTANCE FROM OUTSIDE OF PORT
1	4.4		1/2"
2	14.6		1 3/4"
3	29.6		3 1/2"
4	70.4		8 1/2"
5	85.4		10 1/4
6	95.6		11 1/2
7			
8			
9			
10			
11			
12			
13			
14			
15			
16			
17			
18			
19			
20			
21			
22			
23			
24			

LOCATION OF POINTS IN CIRCULAR STACKS OR DUCTS

	4	6	8	10	12	14	16	18	20	22	24
1	6.7	4.4	3.2	2.6	2.1	1.8	1.6	1.4	1.3	1.1	1.1
2	25.0	14.6	10.5	8.2	6.7	5.7	4.9	4.4	3.9	3.5	3.2
3	75.0	29.6	19.4	14.6	11.8	9.9	8.5	7.5	6.7	6.0	5.5
4	93.3	70.4	32.3	22.6	17.7	14.6	12.5	10.9	9.7	8.7	7.9
5		85.4	67.7	34.2	25.0	20.1	16.9	14.6	12.9	11.6	10.5
6		95.6	80.6	65.8	35.6	26.9	22.0	18.8	16.5	14.6	13.2
7			89.5	77.4	64.4	36.6	28.3	23.6	20.4	18.0	16.1
8			96.8	85.4	75.0	63.4	37.5	29.6	25.0	21.8	19.4
9				91.8	82.3	73.1	62.5	38.2	30.6	26.2	23.0
10				97.4	88.2	79.9	71.7	61.8	38.8	31.5	27.2
11					93.3	85.4	78.0	70.4	61.2	39.3	32.3
12					97.9	90.1	83.1	76.4	69.4	60.7	39.8
13						94.3	87.5	81.2	75.0	68.5	60.2
14						98.2	91.5	85.4	79.6	73.8	67.7
15							95.1	89.1	83.5	78.2	72.8
16							98.4	92.5	87.1	82.0	77.0
17								95.6	90.3	85.4	80.6
18								98.6	93.3	88.4	83.9
19									96.1	91.3	86.8
20									98.7	94.0	89.5
21										96.5	92.1
22										98.9	94.5
23											96.8
24											98.9

LOCATION OF POINTS IN RECTANGULAR STACKS OR DUCTS

	2	3	4	5	6	7	8	9	10	11	12
1	25.0	16.7	12.5	10.0	8.3	7.1	6.3	5.6	5.0	4.5	4.2
2	75.0	50.0	37.5	30.0	25.0	21.4	18.8	16.7	15.0	13.6	12.5
3		83.3	62.5	50.0	41.7	35.7	31.3	27.8	25.0	22.7	20.8
4			87.5	70.0	58.3	50.0	43.8	38.9	35.0	31.8	29.2
5				90.0	75.0	64.3	56.3	50.0	45.0	40.9	37.5
6					91.7	78.6	68.8	61.1	55.0	50.0	45.8
7						92.9	81.3	72.2	65.0	59.1	54.2
8							93.8	83.3	75.0	68.2	62.5
9								94.4	85.0	77.3	70.8
10									95.0	86.4	79.2
11										95.5	87.5
12											95.8

*SEE REVERSE FOR FIELD USE CHECKLIST

F-0017
10-90

ENTROPY

SAMPLING EQUIPMENT AUDIT

Plant Name ______ Job No. ______

City/State ______ Auditor(s) ______

Test Loc. INLET Date ______

BAROMETER
Entropy In-House Ref. Barometer ______ "Hg vs Field Barometer ______ "Hg

Date Compared ______ Dev. ______ "Hg (Max. Allowable Dev.: ± 0.1 "Hg)

Field Barometric Pressure Corrected for Test Location Elevation? (√) ____
(Note: deduct 0.1" Hg from local NWS *STATION* pressure for each 100' of test location elevation; example: 29.6 - (300'/100 * 0.1) = 29.3" Hg.)

Ref. Therm. Initial Ambient Temp., °F ____	Allowable Deviation From Ambient	Ambient Temperature, °F				Audit OK (√)
THERMOMETERS *						
Dry Gas Meter	± 5.4 °F	____	(Meterbox No. ____)			____
Impinger Exit	± 2.0 °F	____	____	____	____	____
Filter Box	± 5.4 °F	____	____	____	____	____

* Adjust thermometer until acceptable. If it cannot be adjusted, use as back-up. If no backup, record ambient temperature indicated by unadjusted thermometer and label with correction factor (indicate):

THERMOCOUPLES Allowable Deviation from Ambient: ± 8.0°F* (± 2.0°F)**

TC No./ °F	√ OK	TC No./ °F	√ OK	TC No./ °F	√ OK	TC No./ °F	√ OK	TC No./ °F	√ OK
____/____	__	____/____	__	____/____	__	____/____	__	____/____	__

* ± 8.0 °F = ± 1.5% of ambient absolute temperature.
** (± 2.0 °F if used in saturated or water droplet-laden gas stream.)

ISOKINETIC METERBOX I.D. N33 Gamma (Y) 1.0098 ΔH@ 1.808

As Applicable (check): Zero Magnehelics? ____ Zero/Level Manometer? ____

Barometric Pressure (P_{bar}) 29.7 Auditor ______ Date ______

Dry Gas Meter Reading (Cubic Ft.)	Meter Temperature (°F)	Lower and Upper Limits for Audit Gamma
Final 559.851	Final 110	0.96 * Y = .969408
Initial 552.100	Initial 114	1.04 * Y = 1.050192

Dry Gas Volume Metered (Cubic Ft.)	Average Meter Temp. (°F)	Run Time (Base = 10) (Minutes)	(Seconds)
Vm = 7.751	Tm = 112	____	____

$$Y_c = \frac{[\text{Min.} + (\text{Sec.} / 60)]}{V_m} * \left[\frac{0.0319\ (T_m + 460)}{P_{bar}}\right]^{1/2}$$

1.290156109

$$Y_c = \frac{[10 + (\_\_\_\_ / 60)]}{7.751} * \left[\frac{0.0319\ (112 + 460)}{29.7}\right]^{1/2} = \frac{1.011247346}{\text{Audit Gamma}}$$

Audit Gamma Acceptable (between lower & upper limits)? (√) ✓ Yes ____ No

F-1113 rev. 1-92 ENTROPY

FIELD DATA - METHOD(S) 201A

PLANT Nello-Teer RUN NO. NT-I-201A-1

CITY/STATE RAL. NC. JOB NO. 4503 DATE 7/27/92

SAMPLING LOC. INLET TIME START 1233

BAROMETRIC PRESSURE, IN. HG 29.7 STATIC PRESSURE, IN. H_2O -.2350 TIME FINISH 1633

LEAK CHECK, VACUUM IN. HG 17 5 OPERATOR HWL

LEAK RATE, CUBIC FEET/MIN. .0025 .003 ASST(S) TJB

EQUIPMENT CHECKS*	
N/A	PITOT, PRETEST
N/A	PITOT, POSTTEST
✓	NOZZLE, PRE/POST
✓	TC 92 °F PRE
✓	TC 91 °F POST
N/A	ORSAT SYSTEM

FILTER/XAD	TARE WT.
PM-183	0.2732

EQUIPMENT I.D. NUMBERS

REAGENT BOX 0552 METER BOX 1133 Y 1.0098

PITOT NA C_p .84 NOZ'L 2006 DIA. .337

TC READOUT F53 TC PROBE R242 UMBILICAL U78

SAMPL'G BOX 62 ORSAT PUMP N/A TEDLAR BAG N/A

NOMOGRAPH DATA

DELTA HØ	1.808
METER TEMP	110
EST. %H_2O	1
C FACTOR	1.03
STACK TEMP	85
REF DELTA P	.128
K FACTOR	14.377

LEAK CHECKS

B B
E E
B B
E E
B B
E E

FYRITES

* PITOT: VISUAL INSPECTION/LEAK CHECK; NOZZLE: VISUAL INSPECTION; TC: AMBIENT TEMPS.; ORSAT SYSTEM: LEAK CHECK

LINE	SAMPLE POINT	CLOCK TIME MINUTES	DRY GAS METER READING CUBIC FEET	PITOT READING IN. H_2O	GAS METER TEMP. °F	STACK TEMP. °F	ORIFICE SETTING IN. H_2O ACTUAL	IDEAL	GAUGE VACUUM IN. HG	GAS TEMPERATURES °F FILTER *	IMPING. EXIT	PROBE OR COND EXIT**
1		0	560.451	.1344	98	92	1.86	1.86	4		80	
2		15	572.35		102	91			4		70	
3		30	584.230		104	91			4		68	
4		45	596.115		104	91			4		70	
5		60/0	608.005		105	92			4		68	
6		15	619.905		105	91			4		67	
7		30	631.825		105	92			4		62	
8		45	643.763		103	90			4		60	
9		120/0	655.685		102	91			4		62	
10		15	~~[illegible]~~ 667.60		102	91			4		62	
11		30	679.510		102	91			4		62	
12		45	691.511		103	92			4		62	
13		180/0	703.311		103	92			4		63	
14		15	715.193		104	92			4		64	
15		30	727.842		103	91			4		65	
16		45	738.898		103	91			4		65	
17		240/0	750.860									
18		15										
19		30										
20		45										
21		300/0										
22		15										
23		30										
24		45										
25		360/										

off

* FILTER EXIT for NJ Method 1. FILTER BOX for all othe

** PROBE EXIT & √ (probe & filter heat off) apply to NJ Method 1. COND EXIT applies if sampling train has a condens

240	190.409	.1344	103	91.3	1.86
Min. (θ)	Vm	$(\sqrt{\Delta p})^2$	tm	ts	ΔH

~~157.5g~~ H_2O
155.5

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ENTROPY

AIR FLOW RATE DETERMINATIONS

Plant Name Nello Teer Run No. IN/M2/1

City/State Raleigh, NC Date 7/27/92

Test Location INLET Personnel TB HWL

Barometric Pres. (Pbar) 29.7 In. Hg Static Pres. (Pg) -.2350 In. H_2O

Pitot/Orifice ID DP72-6 Pitot Coef. (Cp) .84 Pres. Gauge Set ID ADM-860

Thermocouple ID R278 Duct Length/Diameter 1' Width

--Specify inches (") or feet (')--

VELOCITY TRAVERSES
Start-Finish Times: 10:03 - 10:07

Point No.	ΔP In. H_2O	Temp. °F
1	.0601	86
2	.1023	86
3	.1414	86
4	.1582	85
5	.1344	85
6	.1092	84
	.1828	73°
	.1112	
	.1359	
	.1698	
	.1553	
	.1190	
AVG	.1444	
Avg.*	.1151	85

7-28-92
Static
-.2643

HEP
IN
.21

ORSAT DATA

Sampling Time	Analysis Time	CO_2 (A) Reading	O_2 (B) Reading	%O_2 (B-A)	%CO+N_2 (100-B)
	Average				

Bag No. _____ Pump _____

FYRITE DATA, % CO_2				

MOISTURE DATA (WET BULB/DRY BULB)

Port	Time	Dry Bulb °F	Wet Bulb °F	Diff.	% H_2O

MOISTURE DATA (STOICHIOMETRIC)

Free Water in Fuel, %		
Water from Fuel Combustion, %		
Ambient Water, %		
Relative Humidity, %		
Ambient Temperature, °F		
Total %		

VOLUMETRIC AIR FLOW RATES

Dry at Standard Conditions, Qsd = SCFM

Wet at Stack Conditions, Qaw = ACFM

ADDITIONAL DATA

* ΔP average is square of average square root. See page 2 for field flow rate calculations.

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ENTROPY

FIELD DATA - METHOD(S)

PLANT Nello Teer | RUN NO. NT/IN/WET/2
CITY/STATE Raleigh, NC | JOB NO. 4503 | DATE 7/28/92
SAMPLING LOC. Inlet To Crusher | TIME START 817
BAROMETRIC PRESSURE, IN. HG 29.8 | STATIC PRESSURE, IN. H_2O -.2643 | TIME FINISH 1423
OPERATOR TTB
LEAK CHECK, VACUUM IN. HG 17 3
LEAK RATE, CUBIC FEET/MIN. .001 .001 | ASST(S) HWL

EQUIPMENT CHECKS*
N/A PITOT, PRETEST
N/A PITOT, POSTTEST
✓ NOZZLE, PRE/POST
✓ TC 73 °F PRE
TC °F POST
N/A ORSAT SYSTEM

FILTER/XAD	TARE WT.
~~8798~~	.2954

EQUIPMENT I.D. NUMBERS
REAGENT BOX 0552 | METER BOX N-33 | Y 1.0098
PITOT N/A | C_p .84 | NOZ'L 2004 | DIA. .252
TC READOUT | TC PROBE | UMBILICAL
SAMPL'G BOX | ORSAT PUMP | TEDLAR BAG

NOMOGRAPH DATA

DELTA HG	~~1.808~~	1.808
METER TEMP	~~105~~ ~~110~~	110
EST. %H2O	~~1~~	1
C FACTOR	~~1.084~~	1.104
STACK TEMP	~~90~~	90
REF DELTA P	~~.420~~	.413
K FACTOR	~~4.579~~	4.457

LEAK CHECKS
B E
B E
B E
B E

FYRITES

* PITOT: VISUAL INSPECTION/LEAK CHECK; NOZZLE: VISUAL INSPECTION; TC: AMBIENT TEMPS.; ORSAT SYSTEM: LEAK CHECK

LINE	SAMPLE POINT	CLOCK TIME MINUTES	DRY GAS METER READING CUBIC FEET	PITOT READING IN. H2O	GAS METER TEMP. °F	STACK TEMP. °F	ORIFICE SETTING IN. H2O ACTUAL	ORIFICE SETTING IN. H2O IDEAL	GAUGE VACUUM IN. HG	FILTER *	IMPING. EXIT	PROBE OR COND EXIT**
1	A3	0	753.734	.1359	75	74	.60	.60	1	NA	58	NA
2		15	760.379		78	74			1		58	
3		30	767.080		79	75			1.5		60	
4		45	773.800		80	77			1		62	
5		60/0	780.193		82	77			1		62	
6		15	787.325		82	78			1		66	
7		30	794.060		87	78			1		66	
8		45	800.785		84	79			1		70	
9		120/0	807.510		84	80			1		70	
10 814.191		15	~~813.7~~		86	81			1		71	
11		30	820.840		89	81			1		74	
12		45	827.440		96	82			1		74	
13		180/0	834.065		98	82			1		64	
14		15	840.725		100	83			1		60	
15		30	847.400		101	82			1		60	
16		45	854.089		102	83			1		62	
17		240/0	860.780		104	83			1		62	
18		15	867.460		104	82			1		64	
19		30	874.140		104	83			1		64	
20 880.815		45	~~[illegible]~~		106	83			1		64	
21		300/0	887.495		106	84			1		66	
22		15	894.155		109	83			1		66	
23		30	900.695		106	83			1		70	
24		45	907.260		108	84					70	
25		360/0	913.837		108	84					70	

* FILTER EXIT for NJ Method 1. FILTER BOX for all other
** PROBE EXIT & √ (probe & filter heat off) apply to NJ Method 1. COND EXIT applies if sampling train has a condenser

Min. (θ)	Vm	$(\sqrt{\Delta P})^2$	tm	ts	ΔH
					.60

ENTROPY

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FIELD DATA - METHOD(S) 201A

PLANT Nello Teer RUN NO. NT/IN/WET/3
CITY/STATE Raleigh, NC JOB NO. 4503 DATE 7/29/92
SAMPLING LOC. Inlet to Crusher TIME START 0835
BAROMETRIC PRESSURE, IN. HG 30.0 STATIC PRESSURE, IN. H_2O -.3275 TIME FINISH 1435
LEAK CHECK, VACUUM IN. HG 17 3 OPERATOR TTB
LEAK RATE, CUBIC FEET/MIN. 0.00 0.0 ASST(S) HWL

EQUIPMENT CHECKS*

N/A PITOT, PRETEST
N/A PITOT, POSTTEST
NOZZLE, PRE/POST
71 TC 71 °F PRE
TC °F POST
N/A ORSAT SYSTEM

FILTER/XAD	TARE WT.
PM102	.2669

EQUIPMENT I.D. NUMBERS

REAGENT BOX 0552 METER BOX N-33 Y 1.0098
PITOT N/A C_p .84 NOZ'L 2004 DIA. .252
TC READOUT F53 TC PROBE R202 UMBILICAL U98
SAMPL'G BOX 62 ORSAT PUMP N/A TEDLAR BAG N/A

NOMOGRAPH DATA

DELTA HG	1.808
METER TEMP	100
EST. %H_2O	1
C FACTOR	1.084
STACK TEMP	85
REF DELTA P	.417
K FACTOR	4.415

LEAK CHECKS

B N/A B
E E

PYRITES

N/A

* PITOT: VISUAL INSPECTION/LEAK CHECK; NOZZLE: VISUAL INSPECTION; TC: AMBIENT TEMPS.; ORSAT SYSTEM: LEAK CHECK

LINE	SAMPLE POINT	CLOCK TIME MINUTES	DRY GAS METER READING CUBIC FEET	PITOT READING IN. H_2O	GAS METER TEMP. °F	STACK TEMP. °F	ORIFICE SETTING IN. H_2O ACTUAL	ORIFICE SETTING IN. H_2O IDEAL	GAUGE VACUUM IN. HG	GAS TEMPERATURES °F FILTER *	IMPING. EXIT	PROBE OR COND EXIT**
1	5	0	918.014	.1475	78	73	.65	.65	1	N/A	70	N/A
2		15	924.880		85	74			1		60	
3		30	931.780		91	74			1		60	
4		45	938.705		94	78			1		60	
5		60/0	945.635		96	78			1		60	
6		15	952.565		100	80			1		62	
7		30	959.485		100	80			1		64	
8		45	966.400		103	81			1		64	
9		120/0	973.300		100	82			1		64	
10		15	980.185		96	83			1		64	
11		30	987.025		96	84			1		68	
12		45	993.841		95	84			1		69	
13		180/0	1000.725		100	84			1		60	
14		15	1007.625		105	85			1		61	
15		30	1014.518		100	85			1		62	
16		45	1021.439		104	85			1		66	
17		240/0	1028.259		108	85			1		64	
18		15	1035.087		111	86			1		67	
19		30	1041.950		102	85			1		68	
20		45	1048.800		99	85			1		68	
21		300/0	1055.615		98	86			1		70	
22		15	1062.410		98	86			1		62	
23		30	1069.220		98	86					60	
24	↓	45	1076.035	↓	98	87	↓	↓			62	↓
25		360/off	1082.843									

* FILTER EXIT for NJ Method 1. FILTER BOX for all oth[er]

** PROBE EXIT & ✓ (probe & filter heat off) apply to NJ Method 1. COND EXIT applies if sampling train has a conden[ser]

360	164.829	.1475	98.1	82.5	.65
Min. (θ)	Vm	$(\sqrt{\Delta p})^2$	tm	ts	ΔH

78.3g H_2O

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ENTROPY

AIR FLOW RATE DETERMINATIONS

Plant Name: Nello Teer　　Run No. INLET

City/State: RALEIGH, N.C.　　Date 7/29/92

Test Location: INLET TO CRUSHER　　Personnel WKK/HWL

Barometric Pres. (Pbar) 30.0 In. Hg　　Static Pres. (Pg) -.3275 In. H_2O

Pitot/Orifice ID DP72-6　　Pitot Coef. (Cp) .84　　Pres. Gauge Set ID ADM-860

Thermocouple ID R278　　Duct Length/Diameter 1'　　Width ______
--Specify inches (") or feet (')--

VELOCITY TRAVERSES
Start-Finish Times: ______ - ______

Point No.	ΔP In. H_2O	Temp. °F
1	.0732	68
2	.1100	"
3	.1553	"
4	.2072	"
5	.1475	"
6	.1416	"
Avg.*	.1485	68

ORSAT DATA

Sampling Time	Analysis Time	CO_2 (A) Reading	O_2 (B) Reading	$\%O_2$ (B-A)	$\%CO+N_2$ (100-B)
	Average				

Bag No. ______　　Pump ______

FYRITE DATA, % CO_2				

MOISTURE DATA (WET BULB/DRY BULB)

Port	Time	Dry Bulb °F	Wet Bulb °F	Diff.	% H_2O

MOISTURE DATA (STOICHIOMETRIC)

Free Water in Fuel, %		
Water from Fuel Combustion, %		
Ambient Water, %		
Relative Humidity, %		
Ambient Temperature, °F		
Total %		

VOLUMETRIC AIR FLOW RATES

Dry at Standard Conditions, Qsd =	SCFM
Wet at Stack Conditions, Qaw =	ACFM

ADDITIONAL DATA

* ΔP average is square of average square root.　　See page 2 for field flow rate calculations.

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ENTROPY

FIELD DATA - METHOD(S) [illegible]

RUN NO. NT/IN/DRY/2

PLANT Nello Teer
CITY/STATE Raleigh, NC — JOB NO. 4503 — DATE 7/30/92
SAMPLING LOC. INLET TO CRUSHER — TIME START 954
BAROMETRIC PRESSURE, IN. HG 29.9 — STATIC PRESSURE, IN. H_2O -.3275 — TIME FINISH 1103
LEAK CHECK, VACUUM IN. HG 15 6 — OPERATOR TTB
LEAK RATE, CUBIC FEET/MIN. .001 .001 — ASST(S) HWL

EQUIPMENT CHECKS*	
N/A	PITOT, PRETEST
N/A	PITOT, POSTTEST
✓	NOZZLE, PRE/POST
82	TC 81 °F PRE
85	TC 86 °F POST
N/A	ORSAT SYSTEM

FILTER/XAD	TARE WT.
PM173	.2709

EQUIPMENT I.D. NUMBERS

REAGENT BOX 614 — METER BOX N-33 — Y 1.0098
PITOT N/A — C_p .84 — NOZ'L 2004 — DIA. .252
TC READOUT E53 — TC PROBE R202 — UMBILICAL U98
SAMPL'G BOX 34 — ORSAT PUMP N/A — TEDLAR BAG N/A

NOMOGRAPH DATA

DELTA H@	1.808
METER TEMP	90
EST. %H_2O	1
C FACTOR	1.0164
STACK TEMP	80
REF DELTA P	.420
K FACTOR	4.377

LEAK CHECKS

B N/A
E

FYRITES

N/A

* PITOT: VISUAL INSPECTION/LEAK CHECK; NOZZLE: VISUAL INSPECTION; TC: AMBIENT TEMPS.; ORSAT SYSTEM: LEAK CHECK

LINE	SAMPLE POINT	CLOCK TIME MINUTES	DRY GAS METER READING CUBIC FEET	PITOT READING IN. H2O	GAS METER TEMP. °F	STACK TEMP. °F	ORIFICE SETTING IN. H2O ACTUAL	ORIFICE SETTING IN. H2O IDEAL	GAUGE VACUUM IN. HG	GAS TEMPERATURES °F FILTER *	IMPING. EXIT	PROBE OR COND EXIT**
1	5	0	117.840	.1475	94	82	.64	.642	0	N/A	71	N/A
2	↓	10	122.329	↓	90	84	↓	↓	1	↓	71	↓
3		20	126.920		90	85			1		76	
4		30	131.560		92	85			1		76	
5		40	136.085		92	84			1		76	
6		50	140.660		92	85			1		77	
7		60/off	145.239									
8												
9												
10												
11												
12												
13												
14												
15												
16												
17												
18												
19												
20												
21												
22												
23												
24												
25												

* FILTER EXIT for NJ Method 1. FILTER BOX for all ot[her]

** PROBE EXIT & √ (probe & filter heat off) apply to NJ Method 1. COND EXIT applies if sampling train has a conde[nser]

Min. (Θ)	Vm	$(\sqrt{\Delta p})^2$	tm	ts	ΔH
60	27.399	.1475	91.7	84.2	.64

17.5g H_2O

ENTROPY

FIELD DATA - METHOD(S) 201A

PLANT Nello Teer
RUN NO. NJ/INDRY13
CITY/STATE Raleigh, NC
JOB NO.
DATE 7/30/92
SAMPLING LOC. ~~Outlet~~ of Crusher INLET
TIME START 1200
TIME FINISH 1300
BAROMETRIC PRESSURE, IN. HG 29.9
STATIC PRESSURE, IN. H_2O -.3275
OPERATOR TTB
LEAK CHECK, VACUUM IN. HG 15
LEAK RATE, CUBIC FEET/MIN. .02
ASST(S) HWL

EQUIPMENT CHECKS*	
N/A	PITOT, PRETEST
N/A	PITOT, POSTTEST
✓	NOZZLE, PRE/POST
88	TC 88 °F PRE
94	TC 94 °F POST
N/A	ORSAT SYSTEM

FILTER/XAD	TARE WT.
PM177	.2702

EQUIPMENT I.D. NUMBERS

REAGENT BOX 614 METER BOX N-33 Y 1.0098
PITOT N/A C_p .84 NOZ'L 2004 DIA. .252
TC READOUT F53 TC PROBE R202 UMBILICAL U98
SAMPL'G BOX 47 ORSAT PUMP N/A TEDLAR BAG N/A

NOMOGRAPH DATA

DELTA HG	1.808			
METER TEMP	90			
EST. %H2O	1			
C FACTOR	1.064			
STACK TEMP	80			
REF DELTA P	.420			
K FACTOR	4.377			

LEAK CHECKS

B N/A
E

FYRITES

N/A

* PITOT: VISUAL INSPECTION/LEAK CHECK; NOZZLE: VISUAL INSPECTION; TC: AMBIENT TEMPS.; ORSAT SYSTEM: LEAK CHECK

	LINE	SAMPLE POINT	CLOCK TIME MINUTES	DRY GAS METER READING CUBIC FEET	PITOT READING IN. H2O	GAS METER TEMP. °F	STACK TEMP. °F	ORIFICE SETTING IN. H2O ACTUAL	ORIFICE SETTING IN. H2O IDEAL	GAUGE VACUUM IN. HG	GAS TEMPERATURES °F FILTER *	IMPING. EXIT	PROBE OR COND EXIT**
	1	5	0	145.490	.1475	~~92~~	~~86~~ 98	.64	.642	1	N/A	70	N/A
1210	2	↓	10	150.770		93	95			1		65	
1220	3		20	155.365		95	98			1		68	
1230	4		30	159.955		96	97			1		65	
1240	5		40	164.539		95	94			1		65	
1250	6	↓	50	~~169~~ .132	↓	95	94	↓	↓	1	↓	67	↓
1300	7		60/off	173.713									
169.132	8												
	9												
	10												
	11												
	12												
	13												
	14												
	15												
	16												
	17												
	18												
	19												
	20												
	21												
	22												
	23												
	24												
	25												

* FILTER EXIT for NJ Method 1. FILTER BOX for all oth
** PROBE EXIT & √ (probe & filter heat off) apply to NJ Method 1. COND EXIT applies if sampling train has a conden

Min. (Θ)	Vm	$(\sqrt{\Delta p})^2$	tm	ts	ΔH
60	28.233	.1475	94.3	96	.64

14.9 g H_2O

FIELD DATA - METHOD(S) CUIT

RUN NO. NT/IN/DRY/1

PLANT Nello Teer
CITY/STATE Raleigh, NC | JOB NO. 4503 | DATE 7/30/92
SAMPLING LOC. INLET to Crusher | TIME START 801
BAROMETRIC PRESSURE, IN. HG 29.9 | STATIC PRESSURE, IN. H_2O -.3275 | TIME FINISH 901
LEAK CHECK, VACUUM IN. HG 15 15 | OPERATOR TB
LEAK RATE, CUBIC FEET/MIN. .001 .001 | ASST(S) HWL

EQUIPMENT CHECKS*
- N/A PITOT, PRETEST
- N/A PITOT, POSTTEST
- NOZZLE, PRE/POST
- 73 TC 73 °F PRE
- 76 TC 76 °F POST
- N/A ORSAT SYSTEM

FILTER/XAD	TARE WT.
PM179	.2697

EQUIPMENT I.D. NUMBERS

REAGENT BOX 614 | METER BOX N-33 | Y 1.0098
PITOT N/A | C_p .84 | NOZ'L 2004 | DIA. .252
TC READOUT F53 | TC PROBE R202 | UMBILICAL U98
SAMPL'G BOX 47 | ORSAT PUMP N/A | TEDLAR BAG N/A

NOMOGRAPH DATA

DELTA H@	1.808
METER TEMP	90
EST. %H_2O	1
C FACTOR	1.064
STACK TEMP	80
REF DELTA P	.420
K FACTOR	4.377

LEAK CHECKS

B N/A

FYRITES

N/A

* PITOT: VISUAL INSPECTION/LEAK CHECK; NOZZLE: VISUAL INSPECTION; TC: AMBIENT TEMPS.; ORSAT SYSTEM: LEAK CHECK

LINE	SAMPLE POINT	CLOCK TIME MINUTES	DRY GAS METER READING CUBIC FEET	PITOT READING IN. H_2O	GAS METER TEMP. °F	STACK TEMP. °F	ORIFICE SETTING IN. H2O ACTUAL	ORIFICE SETTING IN. H2O IDEAL	GAUGE VACUUM IN. HG	GAS TEMPERATURES °F FILTER*	IMPING. EXIT	PROBE OR COND EXIT**
1	5	0	90.257	.1475	78	74	.64	.642	0	N/A	64	N/A
2	5	10	94.673		83	74			0		60	
3	5	20	99.219		85	75			0		61	
4	5	30	103.791		84	76			0		64	
5	5	40	108.379		87	76			0		63	
6	5	50	112.950		91	76			0		64	
7		60/off	117.528									
8												
9												
10												
11												
12												
13												
14												
15												
16												
17												
18												
19												
20												
21												
22												
23												
24												
25												

* FILTER EXIT for NJ Method 1. FILTER BOX for all ot

** PROBE EXIT & √ (probe & filter heat off) apply to NJ Method 1. COND EXIT applies if sampling train has a conde

Min. (θ)	Vm	$(\sqrt{\Delta p})^2$	tm	ts	ΔH
60	27.271	.1475	84.7	75.2	.64

ENTROPY

FIELD DATA - METHOD(S) ____

PLANT Nello Teer RUN NO. NT-SR-WET-1

CITY/STATE Raleigh, NC JOB NO. 4503 DATE ____

SAMPLING LOC. SCREEN TIME START ____

BAROMETRIC PRESSURE, IN. HG 30.0 STATIC PRESSURE, IN. H2O -.2985 TIME FINISH ____

LEAK CHECK, VACUUM IN. HG ____ OPERATOR ____

LEAK RATE, CUBIC FEET/MIN. ____ ASST(S) ____

GLASS MAT 63 mm

LOT # FILTER# PM-178

TARE WT. 0.2717

EQUIPMENT CHECKS*

- N/A PITOT, PRETEST
- N/A PITOT, POSTTEST
- ✓ NOZZLE, PRE/POST
- ___ TC ___ °F PRE
- ___ TC ___ °F POST
- N/A ORSAT SYSTEM

FILTER/XAD	TARE WT.
PM178	.2717

EQUIPMENT I.D. NUMBERS

REAGENT BOX 0222 METER BOX N-13 Y 1.0066

PITOT N/A C_p .84 NOZ'L 2004 DIA. .252

TC READOUT E58 TC PROBE R221 - UMBILICAL ____

SAMPL'G BOX 34 ORSAT PUMP N/A TEDLAR BAG N/A

NOMOGRAPH DATA

DELTA HG	1.834
METER TEMP	100
EST. %H2O	2
C FACTOR	1.099
STACK TEMP	72
REF DELTA P	.401
K FACTOR	4.589

LEAK CHECKS

B N/A B ____
E ____ E ____

FYRITES

N/A

* PITOT: VISUAL INSPECTION/LEAK CHECK; NOZZLE: VISUAL INSPECTION; TC: AMBIENT TEMPS.; ORSAT SYSTEM: LEAK CHECK

LINE	SAMPLE POINT	CLOCK TIME MINUTES	DRY GAS METER READING CUBIC FEET	PITOT READING IN. H2O	GAS METER TEMP. °F	STACK TEMP. °F	ORIFICE SETTING IN. H2O ACTUAL	ORIFICE SETTING IN. H2O IDEAL	GAUGE VACUUM IN. HG	GAS TEMPERATURES °F FILTER *	IMPING. EXIT	PROBE OR COND EXIT**
1	A-4	0		.1413				.648		N/A		N/A
2		15										
3		30										
4		45										
5		60/0										
6		15										
7		30										
8		45										
9		120/0										
10		15										
11		30										
12		45										
13		180/0										
14		15										
15		30										
16		45										
17		240/0										
18		15										
19		30										
20		45										
21		300/0										
22		15										
23		30										
24		45										
25		360/off										

* FILTER EXIT for NJ Method 1. FILTER BOX for all oth...

** PROBE EXIT & ✓ (probe & filter heat off) apply to NJ Method 1. COND EXIT applies if sampling train has a condens...

Min. (θ)	Vm	$(\sqrt{\Delta p})^2$	tm	ts	ΔH
		.1413			

ΔH - .646
+50 - .540
-50 - .786

ENTROPY

F-1112 (Page 1)

SAMPLING EQUIPMENT AUDIT

Plant Name Neil Teer Job No. 4503

City/State Raleigh, NC Auditor(s) TTB

Test Loc. SCREEN Date 8/13

BAROMETER
Entropy In-House Ref. Barometer ______ "Hg vs Field Barometer ______ "Hg

Date Compared ______ Dev. ______ "Hg (Max. Allowable Dev.: ± 0.1 "Hg)

Field Barometric Pressure Corrected for Test Location Elevation? (√) ____
(Note: deduct 0.1" Hg from local NWS *STATION* pressure for each 100' of test location elevation; example: 29.6 - (300'/100 * 0.1) = 29.3" Hg.)

Ref. Therm. Initial Ambient Temp., °F ____

	Allowable Deviation From Ambient	Ambient Temperature, °F				Audit OK (√)
THERMOMETERS *						
Dry Gas Meter	± 5.4 °F	____	(Meterbox No. ____)			____
Impinger Exit	± 2.0 °F	____	____	____	____	____
Filter Box	± 5.4 °F	____	____	____	____	____

* Adjust thermometer until acceptable. If it cannot be adjusted, use as back-up. If no backup, record ambient temperature indicated by unadjusted thermometer and label with correction factor (indicate):

THERMOCOUPLES Allowable Deviation from Ambient: ± 8.0°F* (± 2.0°F)**

TC No. / °F	√ OK	TC No. / °F	√ OK	TC No. / °F	√ OK	TC No. / °F	√ OK	TC No. / °F	√ OK
/		/		/		/		/	

* ± 8.0 °F = ± 1.5% of ambient absolute temperature.
** (± 2.0 °F if used in saturated or water droplet-laden gas stream.)

ISOKINETIC METERBOX I.D. N-13 Gamma (Y) 1.0066 ΔH@ 1.834

As Applicable (check): Zero Magnehelics? ____ Zero/Level Manometer? ✓

Barometric Pressure (P_{bar}) 30 Auditor TTB Date 8/13/92

Dry Gas Meter Reading (Cubic Ft.)	Meter Temperature (°F)	Lower and Upper Limits for Audit Gamma
Final 342.571	Final 90	0.96 * Y = .966336
Initial 335.000	Initial 80	1.04 * Y = 1.046864

Dry Gas Volume Metered (Cubic Ft.)	Average Meter Temp. (°F)	Run Time (Base = 10) (Minutes)	(Seconds)
Vm = 7.571	Tm = 85	10	0

$$Y_c = \frac{[\text{Min.} + (\text{Sec.} / 60)]}{V_m} * \left[\frac{0.0319\ (T_m + 460)}{P_{bar}}\right]^{1/2}$$

$$Y_c = \frac{10 + (0 / 60)}{7.571} * \left[\frac{0.0319\ (85 + 460)}{30}\right]^{1/2} = 1.00549$$

Audit Gamma

Audit Gamma Acceptable (between lower & upper limits)? (√) ✓ Yes ____ No

F-1113 rev. 1-92 ENTROPY

AIR FLOW RATE DETERMINATIONS

Plant Name Nello Teer Run No. SR-M2-1

City/State Raleigh, NC Date 8/13/92

Test Location Screen Personnel TTB

Barometric Pres. (Pbar) 30.0 In. Hg Static Pres. (Pg) ~~.0112~~ -.2985 In. H_2O

Pitot/Orifice ID DP72-6 Pitot Coef. (Cp) .84 Pres. Gauge Set ID M91219

Thermocouple ID R278 Duct Length/Diameter ______ Width ______
--Specify inches (") or feet (')--

VELOCITY TRAVERSES
Start-Finish Times: 905 - 910

Point No.	ΔP In. H_2O	Temp. °F
A-1	.1149	73
2	.1100	73
3	.1252	73
4	.1413	73
5	.1469	73
6	.1607	73
Avg.*	.1325	73

ORSAT DATA

Sampling Time	Analysis Time	CO_2 (A) Reading	O_2 (B) Reading	%O_2 (B-A)	%CO+N_2 (100-B)
	Average				

Bag No. ______ Pump ______

FYRITE DATA, % CO_2				

MOISTURE DATA (WET BULB/DRY BULB)

Port	Time	Dry Bulb °F	Wet Bulb °F	Diff.	% H_2O

MOISTURE DATA (STOICHIOMETRIC)

Free Water in Fuel, %		
Water from Fuel Combustion, %		
Ambient Water, %		
Relative Humidity, %		
Ambient Temperature, °F		
Total %		

VOLUMETRIC AIR FLOW RATES

Dry at Standard Conditions, Qsd = SCFM

Wet at Stack Conditions, Qaw = ACFM

ADDITIONAL DATA

* ΔP average is square of average square root. See page 2 for field flow rate calculations.

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ENTROPY

FIELD DATA - METHOD(S) 201A

PLANT NELLO TEER — RUN NO. NT-SR-WET-
CITY/STATE RALEIGH, NC — JOB NO. 4503 — DATE 08-19-9
SAMPLING LOC. TD-SECO SCREEN — TIME START 0843
BAROMETRIC PRESSURE, IN. HG 29.9 — STATIC PRESSURE, IN. H_2O ~~29.9~~ -29.85 — TIME FINISH 1503
LEAK CHECK, VACUUM IN. HG 5 5 — OPERATOR DLS
LEAK RATE, CUBIC FEET/MIN. .000 .000 — ASST(S) WKK

EQUIPMENT CHECKS*	
N/A	PITOT, PRETEST
N/A	PITOT, POSTTEST
✓	NOZZLE, PRE/POST
✓	TC 72 °F PRE
✓	TC 86 °F POST
N/A	ORSAT SYSTEM

FILTER/~~RAD~~	TARE WT.
PM178	0.2717

EQUIPMENT I.D. NUMBERS

REAGENT BOX 0222 — METER BOX N7 — Y .9843
PITOT N/A — C_p N/A — NOZ'L 2004 — DIA. .252
TC READOUT E58 — TC PROBE R221 — UMBILICAL U88
SAMPL'G BOX 34 — ORSAT PUMP N/A — TEDLAR BAG N/A

NOMOGRAPH DATA

DELTA HG	1.736
METER TEMP	100
EST. $\%H_2O$	1.0
C FACTOR	1.040
STACK TEMP	85
REF DELTA P	0.434
K FACTOR	4.240

LEAK CHECKS

B
E
B
E
B
E

FYRITES

* PITOT: VISUAL INSPECTION/LEAK CHECK; NOZZLE: VISUAL INSPECTION; TC: AMBIENT TEMPS.; ORSAT SYSTEM: LEAK CHECK

	LINE	SAMPLE POINT	CLOCK TIME MINUTES	DRY GAS METER READING CUBIC FEET	PITOT READING IN. H_2O	GAS METER TEMP. °F	STACK TEMP. °F	ORIFICE SETTING IN. H_2O ACTUAL	ORIFICE SETTING IN. H_2O IDEAL	GAUGE VACUUM IN. HG	GAS TEMPERATURES °F FILTER *	IMPING. EXIT	PROBE OR COND EXIT**
	1	1	0	327.761	0.1413	84	74	0.61	0.61	1	N/A	59	N/A
	2		15	334.47		95	74	0.61		1		57	
Lg 1	3		30	341.19		105	75			1		56	
	4		45	347.83		108	78			1		55	
Lg 2	5		60/0	354.49		90	80			1		55	
	6		15	361.32		87	81			1		54	
Lg 3	7		30	368.12		87	84			1		54	
	8		45	374.93		89	85			1		54	
Sm 4	9		120/0	381.65		89	89			1		54	
	10		15	388.38		91	90			1		54	
Sm 5	11		30	395.09		90	88			1		54	
	12		45	401.79		90	91			1		54	
Lg 6	13		180/0	408.45		91	94			1		55	
	14		15	415.07		91	84			1		55	
Lg 7	15		30	421.67		91	85			1		55	
	16		45	428.29		91	86			1		55	
Sm 8	17		240/0	434.80		91	86			1		55	
	18		15	441.33		91	86			1		55	
Lg 9	19		30	447.83		91	86			1		55	
	20		45	454.336		91	86			1		55	
Lg 10	21		300/0	461.28		91	85			1		55	
	22		15	468.23		91	86			1		55	
Sm 11	23		30	475.26		91	87			1		55	
	24	↓	45	482.18	↓	93	88	↓	↓	1		55	
Lg 12	25	OFF	360	488.953									

* FILTER EXIT for NJ Method 1. FILTER BOX for all oth

** PROBE EXIT & √ (probe & filter heat off) apply to NJ Method 1. COND EXIT applies if sampling train has a conde

Min. (θ) — Vm — $(\sqrt{\Delta p})^2$ — tm — ts — ΔH

MOISTURE ANALYTICAL RESULTS

Plant Name: NELLO TEER Job No. 4503

City/State: RALEIGH, NC Sampling Loc. TEDO - SECO - SCREEN

Run Number	NT-SR-WET-1		
Sampling Date	08-19-92		
Analysis Date	08-19-92		
Analyst	DLS		

Reagent 1 (200 mLs DI H_2O)			
Final Weight, g	644.4		
Tared Weight, g	581.8		
Water Catch, g	62.6		
Reagent 2 (______)			
Final Weight, g			
Tared Weight, g			
Water Catch, g			
Reagent 3 (______)			
Final Weight, g			
Tared Weight, g			
Water Catch, g			
CONDENSED WATER, g			
Silica Gel			
Final Weight, g	239.4		
Tared Weight, g	210.3		
ADSORBED WATER, g	29.1		
TOTAL WATER COLLECTED, g	91.7		

Balance No. ______ Type (✓) Triple Beam ✓ Electronic ____ Reagent Box No. 0222

Balance located in stable, draft-free area (✓)? Yes ✓ No ____ (If "No", explain below.)

Comments ______

L-0036 12-91

ENTROPY

FIELD TEST LOG (USE REVERSE SIDE ALSO)

Plant Name NELLO TEER Job No. 4503

Sampling Location TD-SECO-SCREEN

Run No. NT-SR-WET-1

Date 08-19-92

Start	Stop	Comments/Problems
0843	1011	PROCESS DOWN
1018	1113	PROCESS DOWN
1122	1344	ADDED OIL TO METERBOX
1348	1503	NO PROBLEMS

Sampling Team Initials DLS (Team Leader) WKK (Others)

Posttest Leak Rate .000 Sample Appearance ______

Good Run (check)? ✓ YES ___ NO (if NO, explain in "Comments/Problems")

Run No. ______

Date ______

Start	Stop	Comments/Problems

Sampling Team Initials ______ (Team Leader) ______ (Others)

Posttest Leak Rate ______ Sample Appearance ______

Good Run (check)? ___ YES ___ NO (if NO, explain in "Comments/Problems")

Run No. ______

Date ______

Start	Stop	Comments/Problems

Sampling Team Initials ______ (Team Leader) ______ (Others)

Posttest Leak Rate ______ Sample Appearance ______

Good Run (check)? ___ YES ___ NO (if NO, explain in "Comments/Problems")

SAMPLING EQUIPMENT AUDIT

Plant Name NELLO TEER Job No. 4563

City/State RALEIGH, NC Auditor(s) DLS

Test Loc. TD- SECO SCREEN Date 08-19-92

BAROMETER
Entropy In-House Ref. Barometer ______ "Hg vs Field Barometer ______ "Hg

Date Compared ______ Dev. ______ "Hg (Max. Allowable Dev.: ± 0.1 "Hg)

Field Barometric Pressure Corrected for Test Location Elevation? (√) ____
(Note: deduct 0.1" Hg from local NWS *STATION* pressure for each 100' of test location elevation; example: 29.6 - (300'/100 * 0.1) = 29.3" Hg.)

Ref. Therm. Initial Ambient Temp., °F ____	Allowable Deviation From Ambient	Ambient Temperature, °F				Audit OK (√)
THERMOMETERS * Dry Gas Meter	± 5.4 °F	____	(Meterbox No. ____)			____
Impinger Exit	± 2.0 °F	____	____	____	____	____
Filter Box	± 5.4 °F	____	____	____	____	____

* Adjust thermometer until acceptable. If it cannot be adjusted, use as back-up. If no backup, record ambient temperature indicated by unadjusted thermometer and label with correction factor (indicate):

THERMOCOUPLES Allowable Deviation from Ambient: ± 8.0°F* (± 2.0°F)**

TC No. / °F	√ OK	TC No. / °F	√ OK	TC No. / °F	√ OK	TC No. / °F	√ OK	TC No. / °F	√ OK
/		/		/		/		/	

* ± 8.0 °F = ± 1.5% of ambient absolute temperature.
** (± 2.0 °F if used in saturated or water droplet-laden gas stream.)

ISOKINETIC METERBOX I.D. N-7 Gamma (Y) .9843 ΔH@ 1.736

As Applicable (check): Zero Magnehelics? ✓ Zero/Level Manometer? N/A

Barometric Pressure (P_{bar}) 29.9 Auditor DLS Date 08-19-92

Dry Gas Meter Reading (Cubic Ft.)	Meter Temperature (°F)	Lower and Upper Limits for Audit Gamma
Final 327.450	Final 80	0.96 * Y = .944928
Initial 319.841	Initial 72	1.04 * Y = 1.023672

Dry Gas Volume Metered (Cubic Ft.)	Average Meter Temp. (°F)	Run Time (Base = 10) (Minutes)	(Seconds)
Vm = 7.609	Tm = 76	10	0

0.75 = Ideal Sampling Rate

$$Y_c = \frac{[\text{Min.} + (\text{Sec.} / 60)]}{Vm} * \left[\frac{\{[(29.92) / (460 + 68) * (0.75)^2] * (Tm + 460)\}}{P_{bar}}\right]^{.5}$$

$$Y_c = \frac{[10 + (0 / 60)]}{7.609} * \left[\frac{0.0319\ (76 + 460)}{29.9}\right]^{.5} = .9938356$$

Audit Gamma

Audit Gamma Acceptable (between lower & upper limits)? (√) ✓ Yes ____ No

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ENTROPY

FIELD DATA - METHOD(S) M201A

PLANT Nello Teer RUN NO NT-SR-WET-2

CITY/STATE Raleigh N.C. JOB NO. 4503 DATE 8-23-92

SAMPLING LOC. TD SECO Screen TIME START 0832

BAROMETRIC PRESSURE, IN. HG 29.90 STATIC PRESSURE, IN. H2O -.29 TIME FINISH 1432

LEAK CHECK, VACUUM IN. HG 15" 5" OPERATOR DDH

LEAK RATE, CUBIC FEET/MIN. 0.000 0.000 ASST(S) B.I.I

EQUIPMENT CHECKS*

- ✓ PITOT, PRETEST
- ✓ PITOT, POSTTEST
- ✓ NOZZLE, PRE/POST
- ✓ TC 76 °F PRE
- ✓ TC 76 °F POST
- N/A ORSAT SYSTEM

FILTER/XAD	TARE WT.
PM-146	.2687

EQUIPMENT I.D. NUMBERS

REAGENT BOX ____ METER BOX N7 Y .9843

PITOT ____ C_p .84 NOZ'L ____ DIA. .252

TC READOUT E58 TC PROBE R202 UMBILICAL ____

SAMPL'G BOX 84 ORSAT PUMP N/A TEDLAR BAG N/A

NOMOGRAPH DATA

DELTA H@	1.736
METER TEMP	100
EST. %H2O	1
C FACTOR	1.040
STACK TEMP	85
REF DELTA P	.434
K FACTOR	4.240

LEAK CHECKS

B ____ B ____
E ____ E ____
B ____ B ____
E ____ E ____
B ____ B ____
E ____ E ____

FYRITES

* PITOT: VISUAL INSPECTION/LEAK CHECK; NOZZLE: VISUAL INSPECTION; TC: AMBIENT TEMPS.; ORSAT SYSTEM: LEAK CHECK

	LINE	SAMPLE POINT	CLOCK TIME MINUTES	DRY GAS METER READING CUBIC FEET	PITOT READING IN. H2O	GAS METER TEMP. °F	STACK TEMP. °F	ORIFICE SETTING IN. H2O ACTUAL	ORIFICE SETTING IN. H2O IDEAL	GAUGE VACUUM IN. HG	GAS TEMPERATURES °F FILTER *	IMPING. EXIT	PROBE OR COND EXIT**
0832	1	1	0	500.104	.14	76	85	.56	.56	1	N/A	48	N/A
Big Rock	2	0847	15	506.210	.14	80	75	.58	.58	1		48	
	3	0902	30	512.761	.14	81	76	.58	.58	1		48	
Small Rock 0920	4	0917	45	519.951	.14	83	75	.59	.59	1		49	
1 hr	5	0932	60	526.622	.14	84	76	.59	.59	1		48	
Big Rock 0940	6	0947	75	533.205	.14	86	88	.59	.59	1		49	
	7	1002	90	539.900	.14	86	81	.58	.58	1		55	
Small Rock 1017	8		105	546.582	.14	88	83	.58	.58	1		55	
2 hr	9		120	553.255	.14	89	84	.58	.58	1		54	
1030 Big Rock	10		135	559.600	.14	89	84	.58	.58	1		54	
	11		150	566.582	.14	88	84	.58	.58	1		54	
1057 Small	12		165	573.100	.14	90	81	.58	.58	1		53	
3 hr	13		180	579.745	.14	90	89	.58	.58	1		53	
Large Rock 1142	14		195	586.300	.14	90	89	.58	.58	1		53	
	15		210	592.945	.14	90	83	.58	.58	1		53	
	16		225	599.615	.14	93	89	.58	.58	1		53	
4 hr	17		240	606.210	.14	92	90	.58	.58	1		53	
	18		255	612.875	.14	92	94	.58	.58	1		53	
Small Rock 1304	19		270	619.500	.14	92	94	.58	.58	1		53	
	20		285	625.989	.14	92	97	.58	.58	1		53	
5 hr	21		300	632.637	.14	90	94	.58	.58	1		52	
Large Rock 1330	22		315	639.273	.14	88	92	.58	.58	1		52	
	23		330	645.845	.14	90	92	.58	.58	1		52	
	24		345	652.475	.14	90	90	.58	.58	1	✓	52	
6 hr	25		400	658.582									

Small Rock 1400

* FILTER EXIT for NJ Method 1. FILTER BOX for all oth

** PROBE EXIT & √ (probe & filter heat off) apply to NJ Method 1. COND EXIT applies if sampling train has a conder

Min. (θ) ____ Vm ____ $(\sqrt{\Delta p})^2$ ____ tm ____ ts ____ ΔH ____

ENTROPY

FIELD DATA - METHOD(S) M201A

PLANT Nello Teer RUN NO. NT-SR-WET-3

CITY/STATE Raleigh N.C JOB NO. 4503 DATE 8-26-8?

SAMPLING LOC. TD-5600 Screen TIME START 0755

BAROMETRIC PRESSURE, IN. HG 29.90 STATIC PRESSURE, IN. H_2O -.32 TIME FINISH 1355

LEAK CHECK, VACUUM IN. HG 15" 5" OPERATOR DDH

LEAK RATE, CUBIC FEET/MIN. 0.000 .000 ASST(S) Bill Kick

EQUIPMENT CHECKS*	
N/A	PITOT, PRETEST
N/A	PITOT, POSTTEST
✓	NOZZLE, PRE/POST
✓	TC 85 °F PRE
✓	TC 85 °F POST
N/A	ORSAT SYSTEM

FILTER/XAD	TARE WT.
PM147	.2698

EQUIPMENT I.D. NUMBERS

REAGENT BOX ____ METER BOX N-7 Y .9843

PITOT N/A C_p N/A NOZ'L 2004 DIA. .252

TC READOUT F-58 TC PROBE R202 UMBILICAL U2

SAMPL'G BOX 84 ORSAT PUMP N/A TEDLAR BAG N/A

NOMOGRAPH DATA

DELTA HB	1.736
METER TEMP	100
EST. %H_2O	1
C FACTOR	1.040
STACK TEMP	86
REF DELTA P	.435
K FACTOR	4.23

LEAK CHECKS

B ____ B ____
E ____ E ____

FYRITES

-0-

* PITOT: VISUAL INSPECTION/LEAK CHECK; NOZZLE: VISUAL INSPECTION; TC: AMBIENT TEMPS.; ORSAT SYSTEM: LEAK CHECK

	LINE	SAMPLE POINT	CLOCK TIME MINUTES	DRY GAS METER READING CUBIC FEET	PITOT READING IN. H_2O	GAS METER TEMP. °F	STACK TEMP. °F	ORIFICE SETTING IN. H2O ACTUAL	ORIFICE SETTING IN. H2O IDEAL	GAUGE VACUUM IN. HG	GAS TEMPERATURES °F FILTER *	IMPING. EXIT	PROBE OR COND EXIT**
Large Rock	1	0755	0	659.160	.14	68	66	.58	.58	2	N/A	48	N/A
	2	0810	15	666.115		73	70	.58	.58	2		49	
Small Rock/0810	3	0825	30	673.000		74	73	.58	.58	2		48	
Large Rock/0820 Small Rock/0835	4	0840	45	679.561		76	75	.58	.58	2		49	
Large Rock/0840	5	1 hr.	60	686.172		78	76	.58	.58	2		49	
Small Rock/0910	6	910	75	693.140		78	76	.58	.58	2		49	
	7	925	90	700.000		83	80	.58	.58	2		50	
0955	8	940	105	708.43		88	83	.58	.58	2		50	
Large Rock	9	2 hrs.	120	715.090		90	84	.58	.58	2		50	
	10	1010	135	721.515		91	86	.58	.58	2		50	
	11	1025	150	728.435		92	87	.58	.58	2		51	
Small Rock	12	1040	165	734.965		93	89	.58	.58	2		51	
1057	13	3 hrs.	180	741.741		94	92	.58	.58	2		51	
	14	1110	195	748.926		92	90	.58	.58	2		52	
Large Rock/1120	15	1125	210	755.072		92	90	.58	.58	2		52	
Small Rock/1150	16	1140	225	761.265		90	90	.58	.58	2		52	
Large Rock/1200	17	4 hrs	240	768.191		90	89	.58	.58	2		52	
	18	1210	255	774.625		90	90	.58	.58	2		52	
	19	1225	270	781.110		92	90	.58	.58	2		52	
	20	1240	285	787.600		94	90	.58	.58	2		52	
	21	5 hrs.	300	794.000		94	90	.58	.58	2		52	
	22	1310	315	800.142		94	90	.58	.58	2		52	
Small Rock 1325	23	1325	330	806.482		93	91	.58	.58	2		51	
Big Rock 1327	24	1340	345	812.800		93	91	.58	.58	2		51	
	25	6 hrs.	360	819.118									

* FILTER EXIT for NJ Method 1. FILTER BOX for all other

** PROBE EXIT & √ (probe & filter heat off) apply to NJ Method 1. COND EXIT applies if sampling train has a conden

Min. (θ)	Vm	$(\sqrt{\Delta p})^2$	tm	ts	ΔH

ENTROPY

FIELD DATA - METHOD(S) M201A

PLANT Nello Teer RUN NO. SR-DRY-1
CITY/STATE Raleigh N.C. JOB NO. 4503 DATE 8-27-92
SAMPLING LOC. TD-3FCD Screen TIME START 0845
BAROMETRIC PRESSURE, IN. HG 29.90 STATIC PRESSURE, IN. H2O -.32 TIME FINISH 0945
LEAK CHECK, VACUUM IN. HG 15" 5" OPERATOR DDH
LEAK RATE, CUBIC FEET/MIN. 0.000 0.000 ASST(S) DDH

EQUIPMENT CHECKS*	
N/A	PITOT, PRETEST
N/A	PITOT, POSTTEST
✓	NOZZLE, PRE/POST
✓	TC 85 °F PRE
✓	TC 85 °F POST
N/A	ORSAT SYSTEM

FILTER/XAD	TARE WT.
~~PM149~~	~~.2727~~
PM172	.2702

EQUIPMENT I.D. NUMBERS

REAGENT BOX 0508 METER BOX N-7 Y .9843
PITOT N/A C_p N/A NOZ'L ~~300~~ DIA. .252
TC READOUT F58 TC PROBE R202 UMBILICAL U
SAMPL'G BOX 84 ORSAT PUMP N/A TEDLAR BAG N/A

NOMOGRAPH DATA

DELTA H@	1.736
METER TEMP	100
EST. %H2O	1
C FACTOR	1.040
STACK TEMP	86
REF DELTA P	.435
K FACTOR	4.232

LEAK CHECKS

B
E
B
E
B
E

FYRITES

* PITOT: VISUAL INSPECTION/LEAK CHECK; NOZZLE: VISUAL INSPECTION; TC: AMBIENT TEMPS.; ORSAT SYSTEM: LEAK CHECK

LINE	SAMPLE POINT	CLOCK TIME MINUTES	DRY GAS METER READING CUBIC FEET	PITOT READING IN. H2O	GAS METER TEMP. °F	STACK TEMP. °F	ORIFICE SETTING IN. H2O ACTUAL	ORIFICE SETTING IN. H2O IDEAL	GAUGE VACUUM IN. HG	GAS TEMPERATURES °F FILTER *	IMPING. EXIT	PROBE OR COND EXIT**
1	1	0	829.294	.14	76	75	.58	.58	2	N/A	48	N/A
2		5	831.532	.14	79	77	.58	.58	2		49	
3		10	833.825	.14	80	78	.58	.58	2		49	
4		15	835.990	.14	82	78	.58	.58	2		49	
5		20	838.280	.14	84	80	.58	.58	2		50	
6		25	840.280	.14	86	81	.58	.58	2		51	
7		30	843.000	.14	87	82	.58	.58	2		51	
8		35	845.273	.14	88	83	.58	.58	2		51	
9		40	847.575	.14	90	87	.58	.58	2		51	
10		45	849.830	.14	91	88	.58	.58	2		52	
11		50	852.120	.14	91	89	.58	.58	2		52	
12		55	854.340	.14	91	89	.58	.58	2		52	
13		60	856.737									
14												
15												
16												
17												
18												
19												
20												
21												
22												
23												
24												
25												

* FILTER EXIT for NJ Method 1. FILTER BOX for all r

** PROBE EXIT & √ (probe & filter heat off) apply to NJ Method 1. COND EXIT applies if sampling train has a c

Min. (θ) Vm $(\sqrt{\Delta p})^2$ tm ts ΔH

F-11

ENTROPY

FIELD DATA - METHOD(S) M201A

PLANT Nello Teer
RUN NO. SR-DRY-2
CITY/STATE Raleigh N.C.
JOB NO. 4503
DATE 8-27-92
SAMPLING LOC. TD-SECO SCREEN
TIME START 1025
BAROMETRIC PRESSURE, IN. HG 29.90
STATIC PRESSURE, IN. H_2O -.32
TIME FINISH 1125
LEAK CHECK, VACUUM IN. HG 15"
OPERATOR DDH
LEAK RATE, CUBIC FEET/MIN. 0.000
ASST(S) DDH

EQUIPMENT CHECKS*	
N/A	PITOT, PRETEST
N/A	PITOT, POSTTEST
✓	NOZZLE, PRE/POST
✓	TC 85 °F PRE
✓	TC 85 °F POST
N/A	ORSAT SYSTEM

FILTER/XAD	TARE WT.
PM159	.2619

EQUIPMENT I.D. NUMBERS

REAGENT BOX 0508 METER BOX N-7 Y .9843
PITOT N/A C_p .84 NOZ'L DIA. .252
TC READOUT E58 TC PROBE R202 UMBILICAL U2
SAMPL'G BOX 84 ORSAT PUMP N/A TEDLAR BAG N/A

NOMOGRAPH DATA

DELTA H@	1.736
METER TEMP	100
EST. %H_2O	1
C FACTOR	1.640
STACK TEMP	86
REF DELTA P	.435
K FACTOR	4.232

LEAK CHECKS

B	B
E	E
B	B
E	E
B	B
E	E

FYRITES

* PITOT: VISUAL INSPECTION/LEAK CHECK; NOZZLE: VISUAL INSPECTION; TC: AMBIENT TEMPS.; ORSAT SYSTEM: LEAK CHECK

LINE	SAMPLE POINT	CLOCK TIME MINUTES	DRY GAS METER READING CUBIC FEET	PITOT READING IN. H_2O	GAS METER TEMP. °F	STACK TEMP. °F	ORIFICE SETTING IN. H_2O ACTUAL	ORIFICE SETTING IN. H_2O IDEAL	GAUGE VACUUM IN. HG	GAS TEMPERATURES °F FILTER *	GAS TEMPERATURES °F IMPING. EXIT	GAS TEMPERATURES °F PROBE OR COND EXIT**
1	1	0	857.140	.14	86	76	.58	.58	2	N/A	49	N/A
2		5	859.300		87	82			2		48	
3		10	861.555		88	83			2		49	
4		15	863.835		88	83			2		48	
5		20	866.052		88	83			2		48	
6		25	868.300		90	83			2		48	
7		30	870.522		90	87			2		49	
8		35	872.716		91	90			2		48	
9		40	875.035		89	89			2		49	
10		45	877.260		90	90			2		49	
11		50	879.200		90	90			2		48	
12		55	881.700		90	90			2		48	
13		60	883.936									
14												
15												
16												
17												
18												
19												
20												
21												
22												
23												
24												
25												

* FILTER EXIT for NJ Method 1. FILTER BOX for all ot

** PROBE EXIT & ✓ (probe & filter heat off) apply to NJ Method 1. COND EXIT applies if sampling train has a conde

Min. (θ)	Vm	$(\sqrt{\Delta P})^2$	tm	ts	ΔH

FIELD DATA - METHOD(S) M201A

PLANT Nello Teer
RUN NO. SR-DRY-3
CITY/STATE Raleigh N.C.
JOB NO. 4503
DATE 8-27-92
SAMPLING LOC. TD-5E(C) Screen
TIME START 1:15
BAROMETRIC PRESSURE, IN. HG 29.90
STATIC PRESSURE, IN. H2O -.32
TIME FINISH 4:15
LEAK CHECK, VACUUM IN. HG 15" 5"
OPERATOR DDH
LEAK RATE, CUBIC FEET/MIN. 0.000 0.000
ASST(S) DDA

EQUIPMENT CHECKS*

- N/A PITOT, PRETEST
- N/A PITOT, POSTTEST
- ✓ NOZZLE PRE/POST
- ✓ TC 85 °F PRE
- ✓ TC 85 °F POST
- N/A ORSAT SYSTEM

FILTER/XAD	TARE WT.
8M43	.2708

EQUIPMENT I.D. NUMBERS

REAGENT BOX 0508; METER BOX N-7; Y .9843
PITOT N/A; C_p .84; NOZ'L ; DIA. .252
TC READOUT F58; TC PROBE R202; UMBILICAL U2
SAMPL'G BOX 84; ORSAT PUMP N/A; TEDLAR BAG N/A

NOMOGRAPH DATA

DELTA H@	1.736			
METER TEMP	100			
EST. %H2O	1			
C FACTOR	1.040			
STACK TEMP	86			
REF DELTA P	.435			
K FACTOR	4.232			

LEAK CHECKS

B / E (blank)

FYRITES

0

* PITOT: VISUAL INSPECTION/LEAK CHECK; NOZZLE: VISUAL INSPECTION; TC: AMBIENT TEMPS.; ORSAT SYSTEM: LEAK CHECK

LINE	SAMPLE POINT	CLOCK TIME MINUTES	DRY GAS METER READING CUBIC FEET	PITOT READING IN. H2O	GAS METER TEMP. °F	STACK TEMP. °F	ORIFICE SETTING IN. H2O ACTUAL	ORIFICE SETTING IN. H2O IDEAL	GAUGE VACUUM IN. HG	GAS TEMPERATURES °F FILTER *	IMPING. EXIT	PROBE OR COND EXIT**
1	1	0	884.644	.14	92	90	.58	.58	2	N/A	46	N/A
2		5	886.987		92	90			2		47	
3		10	889.342		94	91			2		49	
4		15	891.562		94	90			2		51	
5		20	894.000		95	92			2		52	
6		25	896.132		96	92			2		51	
7		30	898.362		98	93			2		54	
8		35	900.682		98	94			2		55	
9		40	902.813		98	94			2		55	
10		45	904.812		98	95			2		56	
11		50	907.330		98	96			2		57	
12		55	909.565		99	97			2		58	
13		60	911.824									
14												
15												
16												
17												
18												
19												
20												
21												
22												
23												
24												
25												

* FILTER EXIT for NJ Method 1. FILTER BOX for all oth

** PROBE EXIT & √ (probe & filter heat off) apply to NJ Method 1. COND EXIT applies if sampling train has a conden

Min. (θ) Vm $(\sqrt{\Delta p})^2$ tm ts ΔH

F-1112 (Page 1)

ENTROPY

Sampling and Velocity Traverse Point Determination
EPA Method 1

PLANT NAME Nello Teer

CITY, STATE Raleigh NC

SAMPLING LOCATION Outlet

NO. OF PORTS AVAILABLE 1

NO. OF PORTS USED 1

PORT INSIDE DIAMETER 5"

DISTANCE FROM FAR WALL TO OUTSIDE OF PORT 24"

NIPPLE LENGTH AND/OR WALL THICKNESS 0

DEPTH OF STACK OR DUCT 24"

STACK OR DUCT WIDTH (IF RECTANGULAR) NA

EQUIVALENT DIAMETER:

$D_E = \frac{2 \times DEPTH \times WIDTH}{DEPTH + WIDTH} = \frac{2(\quad)(\quad)}{(\quad + \quad)} =$ N/A

DISTANCE FROM PORTS TO FLOW DISTURBANCES	UPSTREAM	DOWNSTREAM
	~~20~~ 16'	4'
DIAMETERS	8	2

STACK/DUCT AREA = ______ = 452.4 IN²

LOCATION OF POINTS IN CIRCULAR STACKS OR DUCTS

	4	6	8	10	12	14	16	18	20	22	24
1	6.7	4.4	3.2	2.6	2.1	1.8	1.6	1.4	1.3	1.1	1.1
2	25.0	14.6	10.5	8.2	6.7	5.7	4.9	4.4	3.9	3.5	3.2
3	75.0	29.6	19.4	14.6	11.8	9.9	8.5	7.5	6.7	6.0	5.5
4	93.3	70.4	32.3	22.6	17.7	14.6	12.5	10.9	9.7	8.7	7.9
5		85.4	67.7	34.2	25.0	20.1	16.9	14.6	12.9	11.6	10.5
6		95.6	80.6	65.8	35.6	26.9	22.0	18.8	16.5	14.6	13.2
7			89.5	77.4	64.4	36.6	28.3	23.6	20.4	18.0	16.1
8			96.8	85.4	75.0	63.4	37.5	29.6	25.0	21.8	19.4
9				91.8	82.3	73.1	62.5	38.2	30.6	26.2	23.0
10				97.4	88.2	79.9	71.7	61.8	38.8	31.5	27.2
11					93.3	85.4	78.0	70.4	61.2	39.3	32.3
12					97.9	90.1	83.1	76.4	69.4	60.7	39.8
13						94.3	87.5	81.2	75.0	68.5	60.2
14						98.2	91.5	85.4	79.6	73.8	67.7
15							95.1	89.1	83.5	78.2	72.8
16							98.4	92.5	87.1	82.0	77.0
17								95.6	90.3	85.4	80.6
18								98.6	93.3	88.4	83.9
19									96.1	91.3	86.8
20									98.7	94.0	89.5
21										96.5	92.1
22										98.9	94.5
23											96.8
24											98.9

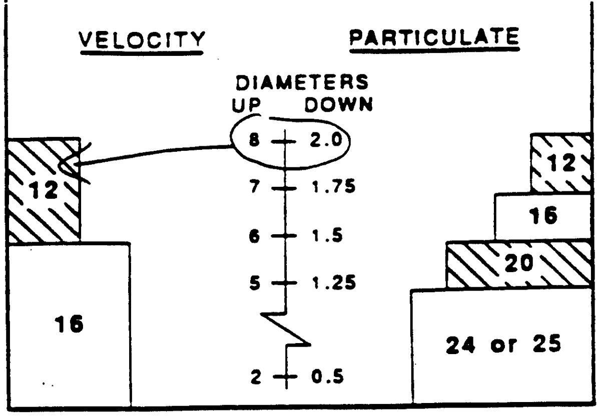
LOCATION OF POINTS IN RECTANGULAR STACKS OR DUCTS

	2	3	4	5	6	7	8	9	10	11	12
1	25.0	16.7	12.5	10.0	8.3	7.1	6.3	5.6	5.0	4.5	4.2
2	75.0	50.0	37.5	30.0	25.0	21.4	18.8	16.7	15.0	13.6	12.5
3		83.3	62.5	50.0	41.7	35.7	31.3	27.8	25.0	22.7	20.8
4			87.5	70.0	58.3	50.0	43.8	38.9	35.0	31.8	29.2
5				90.0	75.0	64.3	56.3	50.0	45.0	40.9	37.5
6					91.7	78.6	68.8	61.1	55.0	50.0	45.8
7						92.9	81.3	72.2	65.0	59.1	54.2
8							93.8	83.3	75.0	68.2	62.5
9								94.4	85.0	77.3	70.8
10									95.0	86.4	79.2
11										95.5	87.5
12											95.8

F-0016
10-90

DRAW HORIZONTAL LINE THROUGH DIAMETERS

If more than 8 and 2 diameters and if duct dia. is less than 24", use 8 or 9 points.



POINT	% OF DUCT DEPTH	DISTANCE FROM INSIDE WALL	DISTANCE FROM OUTSIDE OF PORT
1	4.4		1"
2	14.6		3½"
3	29.6		7"
4	70.4		~~6~~ 17"
5	85.4		20½"
6	95.6		23
7			
8			
9			
10			
11			
12			
13			
14			
15			
16			
17			
18			
19			
20			
21			
22			
23			
24			

SEE REVERSE FOR FIELD USE CHECKLIST

ENTROPY

SAMPLING EQUIPMENT AUDIT

Plant Name Nello Teer Job No. 4503

City/State Raleigh NC Auditor(s) HWL

Test Loc. OUTLET Date 7/27/92

BAROMETER
Entropy In-House Ref. Barometer ________ "Hg vs Field Barometer ________ "Hg

Date Compared ____________ Dev. ______ "Hg (Max. Allowable Dev.: ± 0.1 "Hg)

Field Barometric Pressure Corrected for Test Location Elevation? (√) ____
(Note: deduct 0.1" Hg from local NWS *STATION* pressure for each 100' of test location elevation; example: 29.6 - (300'/100 * 0.1) = 29.3" Hg.)

Ref. Therm. Initial Ambient Temp., °F ____	Allowable Deviation From Ambient	Ambient Temperature, °F				Audit OK (√)
THERMOMETERS *						
Dry Gas Meter	± 5.4 °F	____	(Meterbox No. ______)			____
Impinger Exit	± 2.0 °F	____	____	____	____	____
Filter Box	± 5.4 °F	____	____	____	____	____

* Adjust thermometer until acceptable. If it cannot be adjusted, use as back-up. If no backup, record ambient temperature indicated by unadjusted thermometer and label with correction factor (indicate):

THERMOCOUPLES Allowable Deviation from Ambient: ± 8.0°F* (± 2.0°F)**

TC No. / °F	√ OK	TC No. / °F	√ OK	TC No. / °F	√ OK	TC No. / °F	√ OK	TC No. / °F	√ OK
/		/		/		/		/	

* ± 8.0 °F = ± 1.5% of ambient absolute temperature.
** (± 2.0 °F if used in saturated or water droplet-laden gas stream.)

ISOKINETIC METERBOX I.D. N-13 Gamma (Y) 1.0066 ΔH@ 1.834

As Applicable (check): Zero Magnehelics? ✓ Zero/Level Manometer? ✓

Barometric Pressure (P_{bar}) 29.7 Auditor WKK Date 7-27-92

Dry Gas Meter Reading (Cubic Ft.)	Meter Temperature (°F)	Lower and Upper Limits for Audit Gamma
Final 683.735	Final 104	0.96 * Y = .9663
Initial ~~674.495~~ 676.050	Initial 98	1.04 * Y = 1.0468

Dry Gas Volume Metered (Cubic Ft.)	Average Meter Temp. (°F)	Run Time (Base = 10) (Minutes)	(Seconds)
Vm = 7.685	Tm = 101	10	____

$$Y_c = \frac{[\text{Min.} + (\text{Sec.} / 60)]}{V_m} * \left[\frac{0.0319\ (T_m + 460)}{P_{bar}}\right]^{1/2}$$

$$Y_c = \frac{[10 + (\_\_\_ / 60)]}{7.685} * \left[\frac{0.0319\ (561\ \cancel{+460})}{29.7}\right]^{1/2} = \underset{\text{Audit Gamma}}{1.0100}$$

Audit Gamma Acceptable (between lower & upper limits)? (√) ✓ Yes ____ No

F-1113 rev. 1-92 ENTROPY

AIR FLOW RATE DETERMINATIONS

Plant Name NELLO L. TEER Run No. WET 1

City/State RALEIGH, N.C. Date 7-27-92

Test Location OUTLET TO CRUSHER Personnel WKK/TTB

Barometric Pres. (Pbar) 29.7 In. Hg Static Pres. (Pg) -.2642 In. H_2O

Pitot/Orifice ID DP72-6 Pitot Coef. (Cp) .84 Pres. Gauge Set ID ADM-860

Thermocouple ID R 278 Duct Length/Diameter 2' Width

--Specify inches (") or feet (')--

VELOCITY TRAVERSES
Start-Finish Times: 10:10 - 10:14

Point No.	ΔP In. H_2O	Temp. °F
1	.1024	84
2	.1193	84
3	.1209	84
4	.1729	84
5	.1683	84
6	.1638	84
	.1162	23.2
	.0825	
	.1152	
	.1611	
	.1693	
6	.1214	
AVG	.1259	
Avg.*	.1398	84

SAMPLE PT

7-28
STATIC
-.2498

Barometric
29.7

.1398

ORSAT DATA

Sampling Time	Analysis Time	CO_2 (A) Reading	O_2 (B) Reading	%O_2 (B-A)	%CO+N_2 (100-B)
	Average				

Bag No. ________ Pump ________

FYRITE DATA, % CO_2				

MOISTURE DATA (WET BULB/DRY BULB)

Port	Time	Dry Bulb °F	Wet Bulb °F	Diff.	% H_2O

MOISTURE DATA (STOICHIOMETRIC)

Free Water in Fuel, %		
Water from Fuel Combustion, %		
Ambient Water, %		
Relative Humidity, %		
Ambient Temperature, °F		
Total %		

VOLUMETRIC AIR FLOW RATES

Dry at Standard Conditions, Qsd =		SCFM
Wet at Stack Conditions, Qaw =		ACFM

ADDITIONAL DATA

* ΔP average is square of average square root. See page 2 for field flow rate calculations.

F-1023 rev. 12-91

ENTROPY

FIELD DATA - METHOD(S) [illegible]

PLANT Nello Teer RUN NO. NT/OUT/WET[illegible]
CITY/STATE Raleigh, NC JOB NO. 4503 DATE 7/27/92
SAMPLING LOC. Outlet of Crusher TIME START 1235
BAROMETRIC PRESSURE, IN. HG 29.7 STATIC PRESSURE, IN. H_2O -2642 TIME FINISH 1635
LEAK CHECK, VACUUM IN. HG 16 6 OPERATOR CEN
LEAK RATE, CUBIC FEET/MIN. .012 .008 .005 ASST(S) TTB

EQUIPMENT CHECKS*	
N/A	PITOT, PRETEST
N/A	PITOT, POSTTEST
✓	NOZZLE, PRE/POST
✓	TC 90 °F PRE
✓	TC 92 °F POST
N/A	ORSAT SYSTEM

EQUIPMENT I.D. NUMBERS

REAGENT BOX D581 METER BOX N-13 Y 1.0066
PITOT N/A C_p .84 NOZ'L 1006 DIA. .325
TC READOUT F58 TC PROBE R221 UMBILICAL U109
SAMPL'G BOX 34 ORSAT PUMP N/A TEDLAR BAG N/A

FILTER/XAD	TARE WT.
~~37584~~ PM67	.2896

NOMOGRAPH DATA

DELTA H@	1.834
METER TEMP	110
EST. %H2O	1
C FACTOR	1.119
STACK TEMP	84
REF DELTA P	.146
K FACTOR	12.637

LEAK CHECKS

B E B E

FYRITES

* PITOT: VISUAL INSPECTION/LEAK CHECK; NOZZLE: VISUAL INSPECTION; TC: AMBIENT TEMPS.; ORSAT SYSTEM: LEAK CHECK

LINE	SAMPLE POINT	CLOCK TIME MINUTES	DRY GAS METER READING CUBIC FEET	PITOT READING IN. H2O	GAS METER TEMP. °F	STACK TEMP. °F	ORIFICE SETTING IN. H2O ACTUAL	ORIFICE SETTING IN. H2O IDEAL	GAUGE VACUUM IN. HG	FILTER *	IMPING. EXIT	PROBE OR COND EXIT**
1	0-5	0	700.700	.1683	104	90	2.1	2.122	3	N/A	70	N/A
2		15	713.20		110	91			3		67	
3		30	725.895		112	91			3		70	
4		45	738.420		112	92			3		72	
5		60/0	751.015		110	92			3		72	
6		15	763.600		110	92			3		72	
7		30	776.145		109	92			3		62	
8		45	788.786		106	90			3		60	
9		120/0	801.280		106	90			3		64	
10		15	813.780		107	91			3		64	
11		30	826.275		107	91			3		66	
12		45	838.662		106	91			3		67	
13		180/0	851.142		106	91			3		71	
14		15	863.631		106	92			3		72	
15		30	876.072		106	91			3		72	
16		45	888.524		106	92			3		71	
17		240/0	901.067									
18		15										
19		30										
20		45										
21		300/0										
22		15										
23		30										
24		45										
25		360/0										

off

* FILTER EXIT for NJ Method 1. FILTER BOX for all oth[ers]

** PROBE EXIT & √ (probe & filter heat off) apply to NJ Method 1. COND EXIT applies if sampling train has a conden[ser]

240	200.367	.1683	107.7	91.2	2.1
Min. (θ)	Vm	$(\sqrt{\Delta p})^2$	tm	ts	ΔH

119.9 g H_2O

ENTROPY

FIELD DATA - METHOD(S) 201A

PLANT Nello Teer RUN NO. NT/OUT/WET/2

CITY/STATE Raleigh, NC JOB NO. 4503 DATE 7/28/92

SAMPLING LOC. Outlet of Crusher TIME START 815

BAROMETRIC PRESSURE, IN. HG 29.8 STATIC PRESSURE, IN. H_2O -.2498 TIME FINISH 1421

LEAK CHECK, VACUUM IN. HG 17 5 OPERATOR TJB

LEAK RATE, CUBIC FEET/MIN. .002 .001 ASST(S) HWL

EQUIPMENT CHECKS*	
N/A	PITOT, PRETEST
N/A	PITOT, POSTTEST
✓	NOZZLE, PRE/POST
✓	TC 73 °F PRE
	TC ___ °F POST
N/A	ORSAT SYSTEM

FILTER/XAD	TARE WT.
PM27	.2930

EQUIPMENT I.D. NUMBERS

REAGENT BOX 0581 METER BOX N-13 Y 1.0066

PITOT N/A C_p .84 NOZ'L 1004 DIA. .249

TC READOUT F58 TC PROBE R221 UMBILICAL U109

SAMPL'G BOX 25 ORSAT PUMP N/A TEDLAR BAG N/A

NOMOGRAPH DATA

DELTA H@	1.834
METER TEMP	110
EST. %H_2O	1
C FACTOR	1.120
STACK TEMP	90
REF DELTA P	.427
K FACTOR	4.312

LEAK CHECKS

B N/A

E

FYRITES

N/A

* PITOT: VISUAL INSPECTION/LEAK CHECK; NOZZLE: VISUAL INSPECTION; TC: AMBIENT TEMPS.; ORSAT SYSTEM: LEAK CHECK

Process Down 10:15 - 10:21

929.875

LINE	SAMPLE POINT	CLOCK TIME MINUTES	DRY GAS METER READING CUBIC FEET	PITOT READING IN. H2O	GAS METER TEMP. °F	STACK TEMP. °F	ORIFICE SETTING IN. H2O ACTUAL	ORIFICE SETTING IN. H2O IDEAL	GAUGE VACUUM IN. HG	GAS TEMPERATURES °F FILTER *	IMPING. EXIT	PROBE OR COND EXIT**
1	A6	0	903.770	.1214	76	74	.58	.585	0	N/A	50	N/A
2		15	910.173		80	74			0		46	
3		30	916.730		81	79			0		50	
4		45	923.395		82	79			0		52	
5		0/60	~~929.438~~		84	81			0		52	
6		15	936.460		84	79			"		54	
7		30	943.065		86	79			"		58	
8		45	949.660		86	79			"		58	
9		120/0	956.275		87	~~93~~ 79			0		60	
10		15	962.999		89	79			0		60	
11		30	969.755		91	80			"		62	
12		45	976.595		96	81			"		64	
13		180/0	983.255		100	81			"		58	
14		15	990.100		102	82			0		~~49~~ 49	
15		30	996.832		104	81			0		51	
16		45	1003.648		105	82			0		53	
17		240/0	1010.460		106	82			"		55	
18		15	1017.395		107	82			"		60	
19		30	1024.110		108	83			"		60	
20		45	1031.035		110	83			"		66	
21		300/0	1037.760		110	83			"		60	
22		15	1044.575		110	83			"		60	
23		30	1051.315		109	82					62	
24		45	1058.210		110	84					62	
25		360/0	1065.113		110	84					62	

* FILTER EXIT for NJ Method 1. FILTER BOX for all ot

** PROBE EXIT & √ (probe & filter heat off) apply to NJ Method 1. COND EXIT applies if sampling train has a conde

Min. (θ)	Vm	$(\sqrt{\Delta p})^2$	tm	ts	ΔH
		.1214			.58

78.4g H_2O

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ENTROPY

AIR FLOW RATE DETERMINATIONS

Plant Name NELLO L. TEER Run No. outlet

City/State Raleigh, N.C. Date 7-29-92

Test Location outlet to crusher Personnel WKK

Barometric Pres. (Pbar) 30.0 In. Hg Static Pres. (Pg) -.2242 In. H_2O

Pitot/Orifice ID DP72-6 Pitot Coef. (Cp) .84 Pres. Gauge Set ID ADM-860

Thermocouple ID R278 Duct Length/Diameter ____ Width ____

--Specify inches (") or feet (')--

VELOCITY TRAVERSES
Start-Finish Times: ____ - ____

Point No.	ΔP In. H_2O	Temp. °F
1	.1006	67.8
2	.0937	
3	.1414	
4	.1572	
5	.1604	
6	.1586	
Avg.*	.1338	68

ORSAT DATA

Sampling Time	Analysis Time	CO_2 (A) Reading	O_2 (B) Reading	%O_2 (B-A)	%CO+N_2 (100-B)
	Average				

Bag No. ____ Pump ____

FYRITE DATA, % CO_2				

MOISTURE DATA (WET BULB/DRY BULB)

Port	Time	Dry Bulb °F	Wet Bulb °F	Diff.	% H_2O

MOISTURE DATA (STOICHIOMETRIC)

Free Water in Fuel, %		
Water from Fuel Combustion, %		
Ambient Water, %		
Relative Humidity, %		
Ambient Temperature, °F		
Total %		

VOLUMETRIC AIR FLOW RATES

Dry at Standard Conditions, Qsd =	SCFM
Wet at Stack Conditions, Qaw =	ACFM

ADDITIONAL DATA

* ΔP average is square of average square root. See page 2 for field flow rate calculations.

FIELD DATA - METHOD(S) 201A

RUN NO. NT/OUT/WET/3

PLANT Nello Teer

CITY/STATE Raleigh, NC   JOB NO. 4503   DATE 7/29/92

SAMPLING LOC. Outlet to Crusher   TIME START 0834

BAROMETRIC PRESSURE, IN. HG 30.0   STATIC PRESSURE, IN. H_2O -.2242   TIME FINISH 1434

OPERATOR TJB

LEAK CHECK, VACUUM IN. HG 17   5

LEAK RATE, CUBIC FEET/MIN. .01   .01   ASST(S) HWL

EQUIPMENT CHECKS*	
N/A	PITOT, PRETEST
N/A	PITOT, POSTTEST
✓	NOZZLE, PRE/POST
71	TC 71 °F PRE
	TC °F POST
N/A	ORSAT SYSTEM

FILTER/XAD	TARE WT.
PM162	.2643

EQUIPMENT I.D. NUMBERS

REAGENT BOX 0581   METER BOX N-13   Y 1.0066

PITOT N/A C_p .84   NOZ'L 1004   DIA. ~~.385~~ .249

TC READOUT F58   TC PROBE R221   UMBILICAL U109

SAMPL'G BOX 334   ORSAT PUMP N/A   TEDLAR BAG N/A

NOMOGRAPH DATA

DELTA H@	1.834
METER TEMP	100
EST. %H_2O	1
C FACTOR	1.099
STACK TEMP	85
REF DELTA P	.431
K FACTOR	4.270

LEAK CHECKS

B N/A

FYRITES

N/A

* PITOT: VISUAL INSPECTION/LEAK CHECK; NOZZLE: VISUAL INSPECTION; TC: AMBIENT TEMPS.; ORSAT SYSTEM: LEAK CHECK

	LINE	SAMPLE POINT	CLOCK TIME MINUTES	DRY GAS METER READING CUBIC FEET	PITOT READING IN. H2O	GAS METER TEMP. °F	STACK TEMP. °F	ORIFICE SETTING IN. H2O ACTUAL	ORIFICE SETTING IN. H2O IDEAL	GAUGE VACUUM IN. HG	GAS TEMPERATURES °F FILTER *	IMPING. EXIT	PROBE OR COND EXIT**
	1	3	0	74.028	.1414	81	72	.60	.60	0	N/A	68	N/A
	2		15	80.671		88	74			0		65	
	3		30	87.325		93	76			0		66	
	4		45	94.005		96	77			0		68	
	5		60/0	100.240		99	78			0		69	
	6		15	107.385		100	79			0		70	
114.050	7		30	~~[illegible]~~		100	78			0		70	
	8		45	120.725		104	80			0		70	
127.400	9		120/0	~~[illegible]~~		104	81			0		70	
	10		15	134.075		102	82			0		71	
	11		30	140.745		101	83			0		74	
	12		45	147.391		100	84			0		75	
	13		180/0	154.338		104	84			0		67	
	14		15	161.336		108	84			0		70	
	15		30	168.369		104	85			0		70	
	16		45	175.389		108	86			0		74	
	17		240/0	182.428		110	85			0		73	
	18		15	189.468		113	86			0		75	
	19		30	196.510		106	85			0		72	
	20		45	203.545		104	86			0		74	
	21		300/0	210.600		103	86			0		76	
	22		15	217.630		102	86			0		70	
	23		30	224.660		103	87			0		70	
	24		45	231.675		104	87			0		70	
	25		360/0 P	238.792									

* FILTER EXIT for NJ Method 1. FILTER BOX for all other methods.

** PROBE EXIT & ✓ (probe & filter heat off) apply to NJ Method 1. COND EXIT applies if sampling train has a condenser.

360	164.764	.1414	101.5	82.1	.60
Min. (Θ)	Vm	$(\sqrt{\Delta p})^2$	tm	ts	ΔH

16.5g H_2O

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ENTROPY

SAMPLING EQUIPMENT AUDIT

Plant Name ____________ Job No. ________

City/State ____________ Auditor(s) ________

Test Loc. OUTLET Date ________

BAROMETER
Entropy In-House Ref. Barometer ______ "Hg vs Field Barometer ______ "Hg

Date Compared ________ Dev. ______ "Hg (Max. Allowable Dev.: ± 0.1 "Hg)

Field Barometric Pressure Corrected for Test Location Elevation? (√) ____
(Note: deduct 0.1" Hg from local NWS *STATION* pressure for each 100' of test location elevation; example: 29.6 - (300'/100 * 0.1) = 29.3" Hg.)

Ref. Therm. Initial Ambient Temp., °F ____	Allowable Deviation From Ambient	Ambient Temperature, °F				Audit OK (√)
THERMOMETERS *						
Dry Gas Meter	± 5.4 °F	____	(Meterbox No. ______)			____
Impinger Exit	± 2.0 °F	____	____	____	____	____
Filter Box	± 5.4 °F	____	____	____	____	____

* Adjust thermometer until acceptable. If it cannot be adjusted, use as back-up. If no backup, record ambient temperature indicated by unadjusted thermometer and label with correction factor (indicate):

THERMOCOUPLES Allowable Deviation from Ambient: ± 8.0°F* (± 2.0°F)**

TC No./ °F	√ OK	TC No./ °F	√ OK	TC No./ °F	√ OK	TC No./ °F	√ OK	TC No./ °F	√ OK
/		/		/		/		/	

* ± 8.0 °F = ± 1.5% of ambient absolute temperature.
** (± 2.0 °F if used in saturated or water droplet-laden gas stream.)

ISOKINETIC METERBOX I.D. N13 Gamma (Y) 1.0066 ΔH@ 1.834

As Applicable (check): Zero Magnehelics? ✓ Zero/Level Manometer? ____

Barometric Pressure (P_{bar}) 29.7 Auditor ______ Date 7-27-92

Dry Gas Meter Reading (Cubic Ft.)	Meter Temperature (°F)	Lower and Upper Limits for Audit Gamma
Final 700.461	Final 106	0.96 * Y = .966336
Initial 692.700	Initial 110	1.04 * Y = 1.046864

Dry Gas Volume Metered (Cubic Ft.)	Average Meter Temp. (°F)	Run Time (Base = 10)	
		(Minutes)	(Seconds)
Vm = 7.761	Tm = ____	____	____

$$Y_c = \frac{[\text{Min.} + (\text{Sec.} / 60)]}{V_m} * \left[\frac{0.0319\ (T_m + 460)}{P_{bar}}\right]^{1/2}$$

1.288493751 .781072387

$$Y_c = \frac{[10 + (\_\_\_\_ / 60)]}{7.761} * \left[\frac{0.0319\ (108 + 460)}{29.7}\right]^{1/2} = \underset{\text{Audit Gamma}}{1.00640689}$$

Audit Gamma Acceptable (between lower & upper limits)? (√) ✓ Yes ____ No

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ENTROPY

FIELD DATA - METHOD(S) 201A

PLANT Nello Teer RUN NO. NT/OUT/DRY/2
CITY/STATE Raleigh, NC JOB NO. 4503 DATE 7/30/92
SAMPLING LOC. Outlet to Crusher TIME START 953
BAROMETRIC PRESSURE, IN. HG 29.9 STATIC PRESSURE, IN. H_2O -.2242 TIME FINISH 1102
LEAK CHECK, VACUUM IN. HG 15 8 OPERATOR TJB
LEAK RATE, CUBIC FEET/MIN. ~~.002~~ .01 .003 ASST(S) HWL

EQUIPMENT CHECKS*

N/A PITOT, PRETEST
N/A PITOT, POSTTEST
NOZZLE, PRE/POST
79 TC 78 °F PRE
86 TC 86 °F POST
N/A ORSAT SYSTEM

FILTER/XAD	TARE WT.
PM175	.2717

EQUIPMENT I.D. NUMBERS

REAGENT BOX 0211 METER BOX N-13 Y 1.00606
PITOT N/A C_p .84 NOZ'L 1004 DIA. .249
TC READOUT F58 TC PROBE R221 UMBILICAL U109
SAMPL'G BOX 62 ORSAT PUMP N/A TEDLAR BAG N/A

NOMOGRAPH DATA

DELTA H@ 1.834
METER TEMP 90
EST. %H_2O 1
C FACTOR 1.080
STACK TEMP 80
REF DELTA P .435
K FACTOR 4.233

LEAK CHECKS

B N/A

FYRITES

N/A

* PITOT: VISUAL INSPECTION/LEAK CHECK; NOZZLE: VISUAL INSPECTION; TC: AMBIENT TEMPS.; ORSAT SYSTEM: LEAK CHECK

off 954.40
1003 START

LINE	SAMPLE POINT	CLOCK TIME MINUTES	DRY GAS METER READING CUBIC FEET	PITOT READING IN. H_2O	GAS METER TEMP. °F	STACK TEMP. °F	ORIFICE SETTING IN. H2O ACTUAL	ORIFICE SETTING IN. H2O IDEAL	GAUGE VACUUM IN. HG	GAS TEMPERATURES °F FILTER *	IMPING. EXIT	PROBE OR COND EXIT**
1	3	0	275.607	.1414	94	79	.65	.651	0	N/A	63	N/A
2		~~15~~ 10	280.307		92	81			0		62	
3		~~30~~ 20	284.865		94	81			0		64	
4		~~45~~ 30	289.625		97	81			0		68	
5		40	294.265		95	82			0		69	
6		50	298.930		96	86			0		66	
7		60/off	303.625									
8												
9												
10												
11												
12												
13												
14												
15												
16												
17												
18												
19												
20												
21												
22												
23												
24												
25												

* FILTER EXIT for NJ Method 1. FILTER BOX for all oth
** PROBE EXIT & √ (probe & filter heat off) apply to NJ Method 1. COND EXIT applies if sampling train has a conde

60	28.018	.1414	94.7	81.7	.65
Min. (θ)	Vm	$(\sqrt{\Delta p})^2$	tm	ts	ΔH

17.8g H_2O

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ENTROPY

FIELD DATA - METHOD(S) 5/A

RUN NO. NT/OUT/DRY/1

PLANT Nello Teer

CITY/STATE Raleigh, NC   JOB NO. 4503   DATE 7/30/92

SAMPLING LOC. Outlet to Crusher   TIME START 800

BAROMETRIC PRESSURE, IN. HG 29.9   STATIC PRESSURE, IN. H_2O -.2242   TIME FINISH 900

LEAK CHECK, VACUUM IN. HG 15   6   OPERATOR JTD

LEAK RATE, CUBIC FEET/MIN. .01   .00   ASST(S) HWL

EQUIPMENT CHECKS*	
N/A	PITOT, PRETEST
N/A	PITOT, POSTTEST
✓	NOZZLE, PRE/POST
72	TC 73 °F PRE
75	TC 76 °F POST
N/A	ORSAT SYSTEM

EQUIPMENT I.D. NUMBERS

REAGENT BOX 0211   METER BOX N-13   Y 1.0066

PITOT N/A C_p .84   NOZ'L 1004   DIA. .249

TC READOUT F58   TC PROBE R221   UMBILICAL U409

SAMPL'G BOX 25   ORSAT PUMP N/A   TEDLAR BAG N/A

FILTER/XAD	TARE WT.
PM115	.2690

NOMOGRAPH DATA

DELTA H@	1.834
METER TEMP	90
EST. %H_2O	1
C FACTOR	1.080
STACK TEMP	80
REF DELTA P	.435
K FACTOR	4.233

LEAK CHECKS

B N/A   B

E   E

FYRITES

N/A

* PITOT: VISUAL INSPECTION/LEAK CHECK; NOZZLE: VISUAL INSPECTION; TC: AMBIENT TEMPS.; ORSAT SYSTEM: LEAK CHECK

LINE	SAMPLE POINT	CLOCK TIME MINUTES	DRY GAS METER READING CUBIC FEET	PITOT READING IN. H_2O	GAS METER TEMP. °F	STACK TEMP. °F	ORIFICE SETTING IN. H_2O ACTUAL	ORIFICE SETTING IN. H_2O IDEAL	GAUGE VACUUM IN. HG	GAS TEMPERATURES °F FILTER *	IMPING. EXIT	PROBE OR COND EXIT**
1	3	0	247.178	.1414	81	72	.65	.651	0	N/A	52	N/A
2	3	10	251.764	↓	85	73	↓	↓	0	↓	51	↓
3	3	20	256.439		89	73			0		51	
4	3	30	261.129		88	74			0		54	
5	3	40	265.832		89	74			0		57	
6	3	50	270.546		92	74			0		57	
7		60/0	275.248									
8												
9												
10												
11												
12												
13												
14												
15												
16												
17												
18												
19												
20												
21												
22												
23												
24												
25												

* FILTER EXIT for NJ Method 1. FILTER BOX for all ot

** PROBE EXIT & √ (probe & filter heat off) apply to NJ Method 1. COND EXIT applies if sampling train has a conde

Min. (θ)	Vm	$(\sqrt{\Delta p})^2$	tm	ts	ΔH
60	28.070	.1414	87.3	73.3	.65

ENTROPY

FIELD DATA - METHOD(S) 201A

PLANT Nello Teer — RUN NO. NT/OUT/DRY 13

CITY/STATE Raleigh, NC — JOB NO. 4503 — DATE 7/30/92

SAMPLING LOC. Outlet to Crusher — TIME START 1159

BAROMETRIC PRESSURE, IN. HG 29.9 — STATIC PRESSURE, IN. H_2O -.2242 — TIME FINISH 1259

LEAK CHECK, VACUUM IN. HG 15 — OPERATOR TTB

LEAK RATE, CUBIC FEET/MIN. .017 — ASST(S) HWL

EQUIPMENT CHECKS*

N/A	PITOT, PRETEST
N/A	PITOT, POSTTEST
✓	NOZZLE, PRE/POST
88	TC 88 °F PRE
86	TC 86 °F POST
N/A	ORSAT SYSTEM

FILTER/XAD	TARE WT.
PM113	.2680

EQUIPMENT I.D. NUMBERS

REAGENT BOX 0211 — METER BOX N-13 — Y 1.0066

PITOT N/A — C_p .84 — NOZ'L 1004 — DIA. .249

TC READOUT F58 — TC PROBE R221 — UMBILICAL U109

SAMPL'G BOX 25 — ORSAT PUMP N/A — TEDLAR BAG N/A

NOMOGRAPH DATA

DELTA H@	1.834
METER TEMP	90
EST. %H_2O	1
C FACTOR	1.080
STACK TEMP	80
REF DELTA P	.435
K FACTOR	4.233

LEAK CHECKS

B N/A

E

FYRITES

N/A

Stop watch 1st pt fell stopped

Ran by clock time

* PITOT: VISUAL INSPECTION/LEAK CHECK; NOZZLE: VISUAL INSPECTION; TC: AMBIENT TEMPS.; ORSAT SYSTEM: LEAK CHECK

	LINE	SAMPLE POINT	CLOCK TIME MINUTES	DRY GAS METER READING CUBIC FEET	PITOT READING IN. H_2O	GAS METER TEMP. °F	STACK TEMP. °F	ORIFICE SETTING IN. H_2O ACTUAL	ORIFICE SETTING IN. H_2O IDEAL	GAUGE VACUUM IN. HG	GAS TEMPERATURES °F FILTER-*	IMPING. EXIT	PROBE OR COND EXIT**
	1	3	0	303.853	.1414	92	85	.65	.651	0	N/A	70	N/A
1209	2	↓	10	309.248	↓	96	87	↓	↓	0	↓	60	↓
1219	3		20	313.901		98	86			0		61	
1229	4		30	318.545		98	86			0		60	
1239	5		40	323.146		98	87			0		60	
1249	6		50	327.817		98	86			0		61	
1259	7		60 off	332.419									
	8												
	9												
	10												
	11												
	12												
	13												
	14												
	15												
	16												
	17												
	18												
	19												
	20												
	21												
	22												
	23												
	24												
	25												

* FILTER EXIT for NJ Method 1. FILTER BOX for all oth

** PROBE EXIT & √ (probe & filter heat off) apply to NJ Method 1. COND EXIT applies if sampling train has a conden

60	28.566	.1414	96.7	86.2	.65
Min. (θ)	Vm	$(\sqrt{\Delta p})^2$	tm	ts	ΔH

13.3g H_2O

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ENTROPY

SAMPLING EQUIPMENT AUDIT

Plant Name Nello Tees Job No. 4503

City/State Raleigh N.C. Auditor(s) DDH

Test Loc. TD-SECO Screen Date 8-23-92

BAROMETER
Entropy In-House Ref. Barometer ______ "Hg vs Field Barometer ______ "Hg

Date Compared ______ Dev. ______ "Hg (Max. Allowable Dev.: ± 0.1 "Hg)

Field Barometric Pressure Corrected for Test Location Elevation? (√) ______
(Note: deduct 0.1" Hg from local NWS *STATION* pressure for each 100' of test location elevation; example: 29.6 - (300'/100 * 0.1) = 29.3" Hg.)

Ref. Therm. Initial Ambient Temp., °F ______

	Allowable Deviation From Ambient	Ambient Temperature, °F				Audit OK (√)
THERMOMETERS *						
Dry Gas Meter	± 5.4 °F	______	(Meterbox No. ______)			______
Impinger Exit	± 2.0 °F	______	______	______	______	______
Filter Box	± 5.4 °F	______	______	______	______	______

* Adjust thermometer until acceptable. If it cannot be adjusted, use as back-up. If no backup, record ambient temperature indicated by unadjusted thermometer and label with correction factor (indicate):

THERMOCOUPLES Allowable Deviation from Ambient: ± 8.0°F* (± 2.0°F)**

TC No. / °F	√ OK	TC No. / °F	√ OK	TC No. / °F	√ OK	TC No. / °F	√ OK	TC No. / °F	√ OK
/		/		/		/		/	

* ± 8.0 °F = ± 1.5% of ambient absolute temperature.
** (± 2.0 °F if used in saturated or water droplet-laden gas stream.)

ISOKINETIC METERBOX I.D. N-7 Gamma (Y) .9843 ΔH@ 1.736

As Applicable (check): Zero Magnehelics? ✓ Zero/Level Manometer? ______

Barometric Pressure (P_{bar}) 29.90 Auditor DDH Date 8-23-92

Dry Gas Meter Reading (Cubic Ft.)	Meter Temperature (°F)	Lower and Upper Limits for Audit Gamma
Final 500.000	Final 74	0.96 * Y = .94492
Initial 492.312	Initial 70	1.04 * Y = 1.02367

Dry Gas Volume Metered (Cubic Ft.)	Average Meter Temp. (°F)	Run Time (Base = 10) (Minutes)	(Seconds)
Vm = 7.688	Tm = 72	10	0

$$Y_c = \frac{[\text{Min.} + (\text{Sec.} / 60)]}{Vm} * \left[\frac{0.0319\ (Tm + 460)}{P_{bar}}\right]^{1/2}$$

$$Y_c = \frac{[\ 10 + (\ 0\ / 60)]}{7.688} * \left[\frac{0.0319\ (\ 72 + 460)}{29.90}\right]^{1/2} = .9799$$

Audit Gamma

Audit Gamma Acceptable (between lower & upper limits)? (√) ✓ Yes ______ No

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ENTROPY

MOISTURE ANALYTICAL RESULTS

Plant Name Nello Tees Job No. 4503

City/State Raleigh N.C. Sampling Loc. TD-SECO screen

Run Number	SR-DRY-1	SR-Dry-2	SR-DRy-3
Sampling Date	8-26	8-26	8-26
Analysis Date			
Analyst			
Reagent 1 (DI)			
Final Weight, g	573.7	578.5	590.3
Tared Weight, g	573.7	582.0	583.6
Water Catch, g	-0-	-3.5	6.7
Reagent 2 ( )			
Final Weight, g			
Tared Weight, g			
Water Catch, g			
Reagent 3 ( )			
Final Weight, g			
Tared Weight, g			
Water Catch, g			
CONDENSED WATER, g			
Silica Gel			
Final Weight, g	238.0	218.6	206.6
Tared Weight, g	229.1	212.6	201.3
ADSORBED WATER, g	8.9	6.0	5.3
TOTAL WATER COLLECTED, g	8.9	2.5	12.0

Balance No. #1 Type (✓) Triple Beam ✓ Electronic ___ Reagent Box No. 0508

Balance located in stable, draft-free area (✓)? Yes ✓ No ___ (If "No", explain below.)

Comments ______________________________

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ENTROPY

MOISTURE ANALYTICAL RESULTS

Plant Name Nello Teer Job No. 4503

City/State Raleigh N.C. Sampling Loc. TD - SECO Screen

Run Number	NT-SR-WET-1	NT-SR-WET-2	NT-SR-WET-3
Sampling Date	8-19-92	8-25-92	8-25-92
Analysis Date			
Analyst			

Reagent 1 (DI)			
Final Weight, g	644.4	620.5	604.5
Tared Weight, g	581.8	586.3	588.4
Water Catch, g	62.6	34.2	16.1
Reagent 2 ( )			
Final Weight, g			
Tared Weight, g			
Water Catch, g			
Reagent 3 ( )			
Final Weight, g			
Tared Weight, g			
Water Catch, g			
CONDENSED WATER, g			
Silica Gel			
Final Weight, g	239.4	239.5	240.0
Tared Weight, g	210.3	206.4	210.0
ADSORBED WATER, g	29.1	33.1	30.0
TOTAL WATER COLLECTED, g	91.7	67.3	46.1

Balance No. #1 Type (✓) Triple Beam ✓ Electronic ___ Reagent Box No. 0222

Balance located in stable, draft-free area (✓)? Yes ✓ No ___ (If "No", explain below.)

Comments ______

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ENTROPY

APPENDIX D

ENTROPY
Environmentalists, Inc.

P.O. Box 12291
Research Triangle Park
North Carolina 27709-2291
919-781-3550 FAX 919-787-8442

REQUEST FOR ANALYSIS

PO#: 2737- 4503
Rev#:
Laboratory: EEI

Customer Name: Nello Teer
Raleigh, NC

Date Transmitted: 9/10/92

Results Due By: 9/24/92

Sample Matrix: Method 201A

PM: WKK

Analysis: Analyze for PM10 particulate. See STI's for specifics.

Sample #	Sample ID	Components/Comments
1	SR-DRY-1	Nozzle and cyclone acetone rinse
2	SR-DRY-1	2" filter F½ rinse w/ acetone
3	SR-DRY-1	2" filter
4	SR-DRY-2	Nozzle and cyclone acetone rinse
5	SR-DRY-2	2" filter F½ rinse w/ acetone
6	SR-DRY-2	2" filter
7	SR-DRY-3	Nozzle and cyclone acetone rinse
8	SR-DRY-3	2" filter F½ rinse w/ acetone
9	SR-DRY-3	2" filter
10	NT-SR-WET-1	Nozzle and cyclone acetone rinse
11	NT-SR-WET-1	2" filter F½ rinse w/ acetone
12	NT-SR-WET-1	2" filter
13	NT-SR-WET-2	Nozzle and cyclone acetone rinse
14	NT-SR-WET-2	2" filter F½ rinse w/ acetone
15	NT-SR-WET-2	2" filter
16	NT-SR-WET-3	Nozzle and cyclone acetone rinse
17	NT-SR-WET-3	2" filter F½ rinse w/ acetone
18	NT-SR-WET-3	2" filter
19	NT-OUT-DRY-1	Nozzle and cyclone acetone rinse
20	NT-OUT-DRY-1	2" filter F½ rinse w/ acetone
21	NT-OUT-DRY-1	2" filter
22	NT-OUT-DRY-2	Nozzle and cyclone acetone rinse (resuspend
23	NT-OUT-DRY-2	2" filter F½ rinse w/ acetone
24	NT-OUT-DRY-2	2" filter
25	NT-OUT-DRY-3	Nozzle and cyclone acetone rinse
26	NT-OUT-DRY-3	2" filter F½ rinse w/ acetone
27	NT-OUT-DRY-3	2" filter
28	NT-IN-DRY-1	Nozzle and cyclone acetone rinse
29	NT-IN-DRY-1	2" filter F½ rinse w/ acetone
30	NT-IN-DRY-1	2" filter
31	NT-IN-DRY-2	Nozzle and cyclone acetone rinse

Submitted By: John V. Starke

ENTROPY
Environmentalists, Inc.

P.O. Box 12291
Research Triangle Park
North Carolina 27709-2291
919-781-3550 FAX 919-787-8442

REQUEST FOR ANALYSIS

PO#: 2737- 4503
Rev#:
Laboratory: EEI

Customer Name: Nello Teer
Raleigh, NC

Date Transmitted: 9/10/92

Results Due By: 9/24/92

Sample Matrix: Method 201A

PM: WKK

Analysis: Analyze for PM10 particulate. See STI's for specifics.

Sample #	Sample ID	Components/Comments
32	NT-IN-DRY-2	2" filter F½ rinse w/ acetone
33	NT-IN-DRY-2	2" filter
34	NT-IN-DRY-3	Nozzle and cyclone acetone rinse
35	NT-IN-DRY-3	2" filter F½ rinse w/ acetone
36	NT-IN-DRY-3	2" filter
37	NT-IN-WET-1	Nozzle and cyclone acetone rinse
38	NT-IN-WET-1	2" filter F½ rinse w/ acetone (resuspend)
39	NT-IN-WET-1	2" filter
40	NT-IN-WET-2	Nozzle and cyclone acetone rinse
41	NT-IN-WET-2	2" filter F½ rinse w/ acetone
42	NT-IN-WET-2	2" filter
43	NT-IN-WET-3	Nozzle and cyclone acetone rinse
44	NT-IN-WET-3	2" filter F½ rinse w/ acetone
45	NT-IN-WET-3	2" filter
46	NT-OUT-WET-1	Nozzle and cyclone acetone rinse
47	NT-OUT-WET-1	2" filter F½ rinse w/ acetone
48	NT-OUT-WET-1	2" filter
49	NT-OUT-WET-2	Nozzle and cyclone acetone rinse
50	NT-OUT-WET-2	2" filter F½ rinse w/ acetone
51	NT-OUT-WET-2	2" filter
52	NT-OUT-WET-3	Nozzle and cyclone acetone rinse
53	NT-OUT-WET-3	2" filter F½ rinse w/ acetone
54	NT-OUT-WET-3	2" filter

Submitted By: [signature]

SAMPLE TRANSFER RECORD OF CUSTODY

Please include this form with the final (typed) results, and whenever the final results are faxed to Entropy.

The samples referenced in Entropy Environmentalists Inc. RFA or purchase order No. 2740-4503 were shipped by Entropy on 9-11-92 (date) via hand (mode) to EEI (laboratory) by John V. [signature] (signature)

The samples were received for analysis on 9/11/92 (date) at EEI (laboratory) by D. Kincheloe (signature)

As applicable, note any broken seals, leakage, spillage, or damage to samples. If discrepancy, specify seal No., jar No., sample No., etc.

ENTROPY
Environmentalists, Inc.

P.O. Box 12291
Research Triangle Park
North Carolina 27709-2291
919-781-3550 FAX 919-787-8442

REQUEST FOR ANALYSIS

PO#: 2740- 4503
Rev#:
Laboratory: EEI

Customer Name: Nello Teer
Raleigh, NC

Date Transmitted: 9/11/92

Results Due By: 9/25/92

Sample Matrix: Hi-vol filters

PM: WKK

Analysis: Analyze for particulate.

Sample #	Sample ID	Components/Comments
1	Screen-wet-1	hi-vol filter
2	Screen-wet-2	hi-vol filter
3	Screen-wet-3	hi-vol filter
4	Screen-dry-1,2,3	hi-vol filter (composite)

Submitted By: John V. Stanton

ENTROPY
Environmentalists, Inc.

P.O. Box 12291
Research Triangle Park
North Carolina 27709-2291
919-781-3550 FAX 919-787-8442

REQUEST FOR ANALYSIS

PO#: 2740- 4503
Rev#:
Laboratory: EEI

Customer Name: Nello Teer
Raleigh, NC

Date Transmitted: 9/11/92

Results Due By: 9/25/92

Sample Matrix: Hi-vol filters

PM: WKK

Analysis: Analyze for particulate.

Sample #	Sample ID	Components/Comments
1	Screen-wet-1	hi-vol filter
2	Screen-wet-2	hi-vol filter
3	Screen-wet-3	hi-vol filter
4	Screen-dry-1,2,3	hi-vol filter (composite)

Submitted By: John V. Stanton

VALIDATION DOCUMENTATION - PAGE 1

A	
PROCESS / CONDITION	
WET	
LOCATION / TRAIN	
SCREEN	
Inputs	
Calibrations	
Filters	
ts	
%CO2	AMB
%O2	AMB
%H2O	DAL
Qsd	DAL
Fo	—
Vmstd	DAL
%I	DAL
%IB	—
COMPOUND/PARAMETER	
PM10	DAL
	—

B	
PROCESS / CONDITION	
DRY	
LOCATION / TRAIN	
SCREEN	
Inputs	
Calibrations	
Filters	
ts	
%CO2	AMB
%O2	AMB
%H2O	
Qsd	DAL
Fo	—
Vmstd	DAL
%I	DAL
%IB	—
COMPOUND/PARAMETER	
PM10	DAL

C	
PROCESS / CONDITION	
LOCATION / TRAIN	
Inputs	
Calibrations	
Filters	
ts	
%CO2	
%O2	
%H2O	
Qsd	
Fo	
Vmstd	
%I	
%IB	
COMPOUND/PARAMETER	

D	
PROCESS / CONDITION	
LOCATION / TRAIN	
Inputs	
Calibrations	
Filters	
ts	
%CO2	
%O2	
%H2O	
Qsd	
Fo	
Vmstd	
%I	
%IB	
COMPOUND/PARAMETER	

E	
PROCESS / CONDITION	
LOCATION / TRAIN	
Inputs	
Calibrations	
Filters	
ts	
%CO2	
%O2	
%H2O	
Qsd	
Fo	
Vmstd	
%I	
%IB	
COMPOUND/PARAMETER	

F	
PROCESS / CONDITION	
LOCATION / TRAIN	
Inputs	
Calibrations	
Filters	
ts	
%CO2	
%O2	
%H2O	
Qsd	
Fo	
Vmstd	
%I	
%IB	
COMPOUND/PARAMETER	

A Bill Kirk said use crusher stack area

B

C

D

E

F

ENTROPY
Environmentalists, Inc.

P.O. Box 12291
Research Triangle Park
North Carolina 27709-2291
919-781-3550 FAX 919-787-8442

REQUEST FOR ANALYSIS

PO#: 2740- 4503
Rev#:
Laboratory: EEI

Customer Name: Nello Teer
Raleigh, NC

Date Transmitted: 9/11/92

Results Due By: 9/25/92

Sample Matrix: Hi-vol filters

PM: WKK

Analysis: Analyze for particulate.

Sample #	Sample ID	Components/Comments
1	Screen-wet-1	hi-vol filter
2	Screen-wet-2	hi-vol filter
3	Screen-wet-3	hi-vol filter
4	Screen-dry-1,2,3	hi-vol filter (composite)

Submitted By: John V. Stanton

ANALYTICAL NARRATIVE

RFA No. 2740-4503

Plant Name Nello Teer

Analyst D. Kincheloe

Date Rec'd in Lab 9/11/92

Lab Proj. Mgr. ES

Analysis Date 9/17/92

Analysis Method & Analytes Hi-Vol Filters

Sample Matrix & Components Hi-Vol Filters

Summary of Sample Prep (added rinse in lab, final volumed, pH adjusted, etc.)
Transfer filters to desiccator, desiccate 24 hrs., weigh until final.

Summary of Instrumentation Sartorius Analytical Balance

Minimum Detectable Limit 0.1 mg

Summary of QA/QC Sample Analysis N/A

Spikes (describe spikes and % recovery) N/A

Specific Comments Regarding Sample Analysis (Note unusual catch weights, interferences, odd sample behavior, and steps taken to confirm unusual results. Also note any deviations from standard analytical procedures, together with justification and possible affect on results. Specify run number(s) when applicable.)

No problems

USE PAGE 2 IF ADDITIONAL SPACE NEEDED FOR ANY ITEM

Confirmation of Data Review

Lab Project Manager Signature Eddie Smith Date 9/17/92

Lab QA Officer Signature [signature] Date 9/17/92

ENTROPY

SAMPLE TRANSFER RECORD OF CUSTODY

Please include this form with the final (typed) results, and whenever the final results are faxed to Entropy.

The samples referenced in Entropy Environmentalists Inc. RFA or purchase order No. 2740-4503 were shipped by Entropy on 9-11-92 (date) via hand (mode) to EEI (laboratory) by John V. Staes (signature)

The samples were received for analysis on 9/11/92 (date) at EEI (laboratory) by D. Kincheloe (signature)

As applicable, note any broken seals, leakage, spillage, or damage to samples. If discrepancy, specify seal No., jar No., sample No., etc.

L-0012 rev. 8-92

ENTROPY

RECORD OF CUSTODY, CONTAINER NO. 0508

Container Type (check) ✓ Reagent Box ___ Cooler ___ Other ___

Plant Name/Address Nello Pet.

Job No. #4503 Sampling Method PM10 (EPA, NIOSH, etc.)

Seal ID	Date	Time	*	Full Signature	Reason for Breaking Seal**
622	7/15	3:40	S	Mary Mullins	
	8/26	340	B	Todd Buzzell	Chg Teams
1772	9/8	1030	S	Todd Buzzell	
			B		
			S		
			B		
			S		
			B		
			S		
			B		
			S		
			B		
			S		
			B		
			S		
			B		

* S = Sealed By; B = Broken By ** Use "REMARKS" Section if more space needed.

Received by Sample Custodian

DHPutz 9-10-92 11:10

Signature Date Time

**Seal Intact? ✓ Yes ___ No

As Applicable:
All liquid levels at mark (check)? ___ YES ___ NO (Estimate loss if not at mark; describe in "REMARKS")

As Applicable:
TUBE SAMPLES put in freezer by ___ Date ___ Time ___

CONDENSATE SAMPLES put in refrige. by ___ Date ___ Time ___

REMARKS Boxes remained in locked Entropy trailer, over the duration of the test.

L-0023 rev. 10-91

ENTROPY

FIELD SAMPLE RECOVERY QUALITY CONTROL

Box No. 0508 Assembly Date 7/15/92 Assembled By mm JW

Plant Name/address Nello Tees Job No. 4503

Sampling Loc. TD SECO Screen Method M201A

Individual Tare Of Reagent 200 (Ml)(gm) Of DI

Individual Tare Of Reagent ______ (Ml)(gm) Of ______

Individual Tare Of Reagent ______ (Ml)(gm) Of ______

Individual Tare Of Sil. Gel ~200 Gm ______ other (specify)

Run Number	Run Date	Filter or XAD Number	Filter or XAD Tare, grams	Liquid Tare at Mark? @	Init.	Sample Recov. Date	%Sil. Gel Spent	Liquid Level Marked?	Init.
SR-DRY-1	8-26	PM172	.2702	✓	DDH	8-26	25%	✓	DDH
				Filter Appearance* Gray					
				Reagents Appearance* Cloudy					
SR-DRY-2	8-26	PM159	.2619	✓	DDH	8-26	25%	✓	DDH
				Filter Appearance* Gray					
				Reagents Appearance* Cloudy					
SR-DRY-3	8-26	PM143	.2208	✓	DDH	8-26	25%	✓	DDH
				Filter Appearance* Gray					
				Reagents Appearance* Cloudy					
				Filter Appearance*					
				Reagents Appearance*					

* Use "REMARKS" section if needed.

@ All liquid levels at mark? (check) YES ___ NO ___ (estimate loss if not at mark; use "REMARKS" section).

REMARKS ______

Custodian ______ Date ______ Time ______

Q-1002 rev. 10-91

ENTROPY

RECORD OF CUSTODY, CONTAINER NO. 0581

Container Type (check) ✓ Reagent Box ___ Cooler ___ Other ______

Plant Name/Address Nello Teer / Raleigh N.C

Job No. 4503 Sampling Method M201 A (EPA, NIOSH, etc.)

Seal ID	Date	Time	*	Full Signature	Reason for Breaking Seal**
1400	7/15	3:40	S	Mary Mullins	
	7/27	9:00	B	Harold W. Ltt	Chg Trains
1983	7/29	1536	S	Todd Beezel	
			B		
			S		
			B		
			S		
			B		
			S		
			B		
			S		
			B		
			S		
			B		
			S		
			B		

* S = Sealed By; B = Broken By ** Use "REMARKS" Section if more space needed.

Received by Sample Custodian **Seal Intact?

[signature] 9-10-92 11:30 ✓ Yes ___ No

Signature Date Time

As Applicable:
All liquid levels at mark (check)? ___ YES ___ NO (Estimate loss if not at mark; describe in "REMARKS")

As Applicable:
TUBE SAMPLES put in freezer by ______ Date ______ Time ______

CONDENSATE SAMPLES put in refrige. by ______ Date ______ Time ______

REMARKS ______

L-0023 rev. 10-91

ENTROPY

FIELD SAMPLE RECOVERY QUALITY CONTROL

Box No. 0581 Assembly Date 7/15/92 Assembled By JW. mm

Plant Name/address Nello Teer / Raleigh NC Job No. 4503

Sampling Loc. Outlet of Crusher Method 201A

Individual Tare Of Reagent 200 (Ml)(gm) Of DI

Individual Tare Of Reagent ____ (Ml)(gm) Of ____

Individual Tare Of Reagent ____ (Ml)(gm) Of ____

Individual Tare Of Sil. Gel ~200 Gm ____ other (specify)

Run Number	Run Date	Filter or XAD Number	Filter or XAD Tare, grams	Liquid Tare at Mark? @	Init.	Sample Recov. Date	%Sil. Gel Spent	Liquid Level Marked?	Init.
NT/OUT/WeT/1	7/27	PM67	.2896	✓	TTB	7/27	90	✓	TTB
NT/OUT/WET/2	7/28	PM37	.2930	✓	TTB	7/28	40	✓	TTB
NT/OUT/WET/3	7/29	PM62	.2643	✓	TTB				

Run NT/OUT/WeT/1:
Filter Appearance* Heavy loading
Reagents Appearance* clear

Run NT/OUT/WET/2:
Filter Appearance* Heavy gray
Reagents Appearance* clear

Run NT/OUT/WET/3:
Filter Appearance* Medium Gray
Reagents Appearance* clear

Run 4:
Filter Appearance* ____
Reagents Appearance* ____

* Use "REMARKS" section if needed.

@ All liquid levels at mark? (check) YES ___ NO ___ (estimate loss if not at mark; use "REMARKS" section).

REMARKS ____

Custodian ____ Date ____ Time ____

Q-1002 rev. 10-91

ENTROPY

RECORD OF CUSTODY, CONTAINER NO. 614

Container Type (check) ✓ Reagent Box ___Cooler ___Other

Plant Name/Address Nello Teer

Job No. 4503 Sampling Method M201A (EPA, NIOSH, etc.)

Seal ID	Date	Time	*	Full Signature	Reason for Breaking Seal**
1473	7/15	3:45	S	Mary Mullins	
	7/29	16:30	B	Todd Bezell	Chg trains
513	8/11	12:10	S	Todd Bezell	
			B		
			S		
			B		
			S		
			B		
			S		
			B		
			S		
			B		
			S		
			B		
			S		
			B		

* S = Sealed By; B = Broken By ** Use "REMARKS" Section if more space needed.

Received by Sample Custodian **Seal Intact?

DPfert 9-10-96 11:30 ✓ Yes ___No

Signature Date Time

As Applicable:
All liquid levels at mark (check)? ___ YES ___ NO (Estimate loss if not at mark; describe in "REMARKS")

As Applicable:
TUBE SAMPLES put in freezer by ____________ Date ______ Time ______

CONDENSATE SAMPLES put in refrige. by ____________ Date ______ Time ______

REMARKS Custody of Boxes. Boxes remained in locked Entropy trailer. TM

L-0023 rev. 10-91

ENTROPY

FIELD SAMPLE RECOVERY QUALITY CONTROL

Box No. 614 Assembly Date 7/15/92 Assembled By J.W. mm

Plant Name/address Nello Teer / Raleigh, NC Job No. 4503

Sampling Loc. INLET To Crusher Method 201A

Individual Tare Of Reagent 200 (Ml)(gm) Of DI

Individual Tare Of Reagent ________ (Ml)(gm) Of ________

Individual Tare Of Reagent ________ (Ml)(gm) Of ________

Individual Tare Of Sil. Gel ~200 Gm ________ other (specify)

Run Number	Run Date	Filter or XAD Number	Filter or XAD Tare, grams	Liquid Tare at Mark? @	Init.	Sample Recov. Date	%Sil. Gel Spent	Liquid Level Marked?	Init.
NT/IN/DRY/1	7/30	PM179	.2697	✓	TTB	7/30	5	✓	TTB

Filter Appearance* Very Light

Reagents Appearance* Clear

Run Number	Run Date	Filter or XAD Number	Filter or XAD Tare, grams	Liquid Tare at Mark? @	Init.	Sample Recov. Date	%Sil. Gel Spent	Liquid Level Marked?	Init.
NT/IN/DRY/2	7/30	PM173	.2709	✓	TTB	7/30	5	✓	TTB

Filter Appearance* Very Light

Reagents Appearance* Clear

Run Number	Run Date	Filter or XAD Number	Filter or XAD Tare, grams	Liquid Tare at Mark? @	Init.	Sample Recov. Date	%Sil. Gel Spent	Liquid Level Marked?	Init.
NT/IN/DRY/3	7/30	PM177	.2702	✓	TTB	7/30	5	✓	TTB

Filter Appearance* Light

Reagents Appearance* Clear

Run Number	Run Date	Filter or XAD Number	Filter or XAD Tare, grams	Liquid Tare at Mark? @	Init.	Sample Recov. Date	%Sil. Gel Spent	Liquid Level Marked?	Init.

Filter Appearance* ________

Reagents Appearance* ________

* Use "REMARKS" section if needed.

@ All liquid levels at mark? (check) YES ___ NO ___ (estimate loss if not at mark; use "REMARKS" section).

REMARKS ________

Custodian ________ Date ________ Time ________

Q-1002 rev. 10-91

ENTROPY

RECORD OF CUSTODY, CONTAINER NO. 0552

Container Type (check) ✓ Reagent Box ___Cooler ___Other___________

Plant Name/Address Nello Teer / Raleigh NC

Job No. 4503 Sampling Method M201A (EPA, NIOSH, etc.)

Seal ID	Date	Time	*	Full Signature	Reason for Breaking Seal**
560	7/15	3:40	S	Mary Mullins	
	7/27	8:45	B	Todd Brozell	Chg Trains
600	7/29	1538	S	Todd Brozell	
			B		
			S		
			B		
			S		
			B		
			S		
			B		
			S		
			B		
			S		
			B		
			S		
			B		

* S = Sealed By; B = Broken By ** Use "REMARKS" Section if more space needed.

Received by Sample Custodian **Seal Intact?

DPPutt 9-10-92 11:30 ✓ Yes ___No

Signature Date Time

As Applicable:
All liquid levels at mark (check)? ___ YES ___ NO (Estimate loss if not at mark; describe in "REMARKS")

As Applicable:
TUBE SAMPLES put in freezer by ______________ Date ________ Time ________

CONDENSATE SAMPLES put in refrige. by ______________ Date ________ Time ________

REMARKS ________________________________

L-0023 rev. 10-91

ENTROPY

FIELD SAMPLE RECOVERY QUALITY CONTROL

Box No. 0552 Assembly Date 7/15/92 Assembled By M.M. J.W.

Plant Name/address Nello Teer / Raleigh NC Job No. 4503

Sampling Loc. Inlet of Crusher Method M201A

Individual Tare Of Reagent 200 (Ml)(gm) of DI

Individual Tare Of Reagent ________ (Ml)(gm) of ________

Individual Tare Of Reagent ________ (Ml)(gm) of ________

Individual Tare Of Sil. Gel ~200 Gm ________
other (specify)

Run Number	Run Date	Filter or XAD Number	Filter or XAD Tare, grams	Liquid Tare at Mark? @	Init.	Sample Recov. Date	%Sil. Gel Spent	Liquid Level Marked?	Init.
NT/IN/~~DRY~~WET/1	7/27	PM183	.2732	✓	TTB	7/27	90	✓	TTB
NT/IN/WET/2	7/28	PM46	.2954	✓	TTB	7/28	20	✓	TTB
NT/IN/WET/3	7/29	PM102	.2669	✓	TTB	7/29	20	✓	TTB

Run 1 — Filter Appearance*: Light gray
Reagents Appearance*: clear

Run 2 — Filter Appearance*: Light gray
Reagents Appearance*: Clear

Run 3 — Filter Appearance*: Light Gray
Reagents Appearance*: Clear

Run 4 — Filter Appearance*: ________
Reagents Appearance*: ________

* Use "REMARKS" section if needed.

@ All liquid levels at mark? (check) YES ___ NO ___ (estimate loss if not at mark; use "REMARKS" section).

REMARKS ____

Custodian ________________ Date ____________ Time ________

Q-1002 rev. 10-91

ENTROPY

RECORD OF CUSTODY, CONTAINER NO. 0211

Container Type (check) ✓ Reagent Box ___Cooler ___Other ___________

Plant Name/Address Nello Teer / Raleigh NC

Job No. 4503 Sampling Method 201A (EPA, NIOSH, etc.)

Seal ID	Date	Time	*	Full Signature	Reason for Breaking Seal**
1326	7/15	3:45	S	Mary Mullins	
	7/29	4:30	B	Todd Brozell	Chg Trains
826	8/11	12:14	S	Todd Brozell	
			B		
			S		
			B		
			S		
			B		
			S		
			B		
			S		
			B		
			S		
			B		
			S		
			B		

* S = Sealed By; B = Broken By ** Use "REMARKS" Section if more space needed.

Received by Sample Custodian **Seal Intact?

DPeute 9-10-92 11:20 ✓ Yes ___ No

Signature Date Time

As Applicable:
All liquid levels at mark (check)? ___ YES ___ NO (Estimate loss if not at mark; describe in "REMARKS")

As Applicable:
TUBE SAMPLES put in freezer by ______________ Date ________ Time ________

CONDENSATE SAMPLES put in refrige. by ______________ Date ________ Time ________

REMARKS Boxes remained in Entropy locked trailer. TTB

L-0023 rev. 10-91

ENTROPY

FIELD SAMPLE RECOVERY QUALITY CONTROL

Box No. 0211 Assembly Date 7/15/92 Assembled By J.W. mm

Plant Name/address Nello Teer / Raleigh, NC Job No. 4503

Sampling Loc. Outlet of Crusher Method 201A

Individual Tare Of Reagent 200 (Ml)(gm) Of DI

Individual Tare Of Reagent ________ (Ml)(gm) Of ________

Individual Tare Of Reagent ________ (Ml)(gm) Of ________

Individual Tare Of Sil. Gel ~200 Gm ________ other (specify)

Run Number	Run Date	Filter or XAD Number	Filter or XAD Tare, grams	Liquid Tare at Mark? @	Init.	Sample Recov. Date	%Sil. Gel Spent	Liquid Level Marked?	Init.
NT/OUT/DRY/1	7/30	PM115	.2690	✓	TTB	7/30	5	✓	TTB

Filter Appearance* light spoty Gray

Reagents Appearance* Clear

Run Number	Run Date	Filter or XAD Number	Filter or XAD Tare, grams	Liquid Tare at Mark? @	Init.	Sample Recov. Date	%Sil. Gel Spent	Liquid Level Marked?	Init.
NT/OUT/DRY/2	7/30	PM175	.2717	✓	TTB	7/30	5	✓	TTB

Filter Appearance* Heavy Gray

Reagents Appearance* clear

Run Number	Run Date	Filter or XAD Number	Filter or XAD Tare, grams	Liquid Tare at Mark? @	Init.	Sample Recov. Date	%Sil. Gel Spent	Liquid Level Marked?	Init.
NT/OUT/DRY/3	7/30	PM113	.2680	✓	TTB	7/30	5	✓	TTB

Filter Appearance* Heavy Gray

Reagents Appearance* clear

Run Number	Run Date	Filter or XAD Number	Filter or XAD Tare, grams	Liquid Tare at Mark? @	Init.	Sample Recov. Date	%Sil. Gel Spent	Liquid Level Marked?	Init.

Filter Appearance*

Reagents Appearance*

* Use "REMARKS" section if needed.

@ All liquid levels at mark? (check) YES ___ NO ___ (estimate loss if not at mark; use "REMARKS" section).

REMARKS ________

Custodian ________ Date ________ Time ________

Q-1002 rev. 10-91

ENTROPY

RECORD OF CUSTODY, CONTAINER NO. 0222

Container Type (check) ✓ Reagent Box ___ Cooler ___ Other ________

Plant Name/Address Nello Teer Raleigh, NC

Job No. 4503 Sampling Method M201A (EPA, NIOSH, etc.)

Seal ID	Date	Time	*	Full Signature	Reason for Breaking Seal**
1477	7/15	3:35	S	Mary Mullins	
	8/11	12:43	B	Todd Brozell	Chg Trains
188	9/8	10:51	S	Todd Brozell	
			B		
			S		
			B		
			S		
			B		
			S		
			B		
			S		
			B		
			S		
			B		
			S		
			B		

* S = Sealed By; B = Broken By ** Use "REMARKS" Section if more space needed.

Received by Sample Custodian **Seal Intact?

DPflunt Signature 9-10-92 Date 11:15 Time / Yes ___ No

As Applicable:
All liquid levels at mark (check)? ___ YES ___ NO (Estimate loss if not at mark; describe in "REMARKS")

As Applicable:
TUBE SAMPLES put in freezer by ________ Date ________ Time ________

CONDENSATE SAMPLES put in refrige. by ________ Date ________ Time ________

REMARKS Boxes Remained in locked trailer in Bill Wicks custody.

L-0023 rev. 10-91

ENTROPY

FIELD SAMPLE RECOVERY QUALITY CONTROL

Box No. 0222 Assembly Date 7/15/92 Assembled By mm JW

Plant Name/address Nello Teer Job No. 4503

Sampling Loc. TD-Seco Screen Method M201A

Individual Tare Of Reagent 200 (Ml)(gm) of DI

Individual Tare Of Reagent ______ (Ml)(gm) of ______

Individual Tare Of Reagent ______ (Ml)(gm) of ______

Individual Tare Of Sil. Gel ~200 Gm ______ other (specify)

Run Number	Run Date	Filter or XAD Number	Filter or XAD Tare, grams	Liquid Tare at Mark? @	Init.	Sample Recov. Date	%Sil. Gel Spent	Liquid Level Marked?	Init.
NT-SR-WET-1	8/19/92	PM178	.2717	✓	WKK	8/19/92	80	✓	DLS

Filter Appearance* light gray

Reagents Appearance* CLEAR

Run Number	Run Date	Filter or XAD Number	Filter or XAD Tare, grams	Liquid Tare at Mark? @	Init.	Sample Recov. Date	%Sil. Gel Spent	Liquid Level Marked?	Init.
NT-SR-WET-2	8/23	PM146	.2687	✓	WKK	8/23	80	✓	WKK

Filter Appearance* Light gray

Reagents Appearance* clear

Run Number	Run Date	Filter or XAD Number	Filter or XAD Tare, grams	Liquid Tare at Mark? @	Init.	Sample Recov. Date	%Sil. Gel Spent	Liquid Level Marked?	Init.
NT-SR-WET-3	8/26	PM147	.2698	✓	WKK	8/26	80	✓	WKK

Filter Appearance* Light gray

Reagents Appearance* Clear

Run Number	Run Date	Filter or XAD Number	Filter or XAD Tare, grams	Liquid Tare at Mark? @	Init.	Sample Recov. Date	%Sil. Gel Spent	Liquid Level Marked?	Init.

Filter Appearance* ______

Reagents Appearance* ______

* Use "REMARKS" section if needed.

@ All liquid levels at mark? (check) YES ___ NO ___ (estimate loss if not at mark; use "REMARKS" section).

REMARKS ______

Custodian ______ Date ______ Time ______

Q-1002 rev. 10-91

ENTROPY

ENTROPY
Environmentalists, Inc.

P.O. Box 12291
Research Triangle Park
North Carolina 27709-2291
919-781-3550 FAX 919-787-8442

REQUEST FOR ANALYSIS

PO#: 2737- 4503
Rev#:
Laboratory: EEI

Customer Name: Nello Teer
Raleigh, NC

Date Transmitted: 9/10/92

Results Due By: 9/24/92

Sample Matrix: Method 201A

PM: WKK

Analysis: Analyze for PM10 particulate. See STI's for specifics.

Sample #	Sample ID	Components/Comments
1	SR-DRY-1	Nozzle and cyclone acetone rinse
2	SR-DRY-1	2" filter F½ rinse w/ acetone
3	SR-DRY-1	2" filter
4	SR-DRY-2	Nozzle and cyclone acetone rinse
5	SR-DRY-2	2" filter F½ rinse w/ acetone
6	SR-DRY-2	2" filter
7	SR-DRY-3	Nozzle and cyclone acetone rinse
8	SR-DRY-3	2" filter F½ rinse w/ acetone
9	SR-DRY-3	2" filter
10	NT-SR-WET-1	Nozzle and cyclone acetone rinse
11	NT-SR-WET-1	2" filter F½ rinse w/ acetone
12	NT-SR-WET-1	2" filter
13	NT-SR-WET-2	Nozzle and cyclone acetone rinse
14	NT-SR-WET-2	2" filter F½ rinse w/ acetone
15	NT-SR-WET-2	2" filter
16	NT-SR-WET-3	Nozzle and cyclone acetone rinse
17	NT-SR-WET-3	2" filter F½ rinse w/ acetone
18	NT-SR-WET-3	2" filter
19	NT-OUT-DRY-1	Nozzle and cyclone acetone rinse
20	NT-OUT-DRY-1	2" filter F½ rinse w/ acetone
21	NT-OUT-DRY-1	2" filter
22	NT-OUT-DRY-2	Nozzle and cyclone acetone rinse (resuspend)
23	NT-OUT-DRY-2	2" filter F½ rinse w/ acetone
24	NT-OUT-DRY-2	2" filter
25	NT-OUT-DRY-3	Nozzle and cyclone acetone rinse
26	NT-OUT-DRY-3	2" filter F½ rinse w/ acetone
27	NT-OUT-DRY-3	2" filter
28	NT-IN-DRY-1	Nozzle and cyclone acetone rinse
29	NT-IN-DRY-1	2" filter F½ rinse w/ acetone
30	NT-IN-DRY-1	2" filter
31	NT-IN-DRY-2	Nozzle and cyclone acetone rinse

Submitted By: John V. Starke

ENTROPY
Environmentalists, Inc.

P.O. Box 12291
Research Triangle Park
North Carolina 27709-2291
919-781-3550 FAX 919-787-8442

REQUEST FOR ANALYSIS

PO#: 2737- 4503
Rev#:
Laboratory: EEI

Customer Name: Nello Teer
Raleigh, NC

Date Transmitted: 9/10/92

Results Due By: 9/24/92

Sample Matrix: Method 201A

PM: WKK

Analysis: Analyze for PM10 particulate. See STI's for specifics.

Sample #	Sample ID	Components/Comments
32	NT-IN-DRY-2	2" filter F½ rinse w/ acetone
33	NT-IN-DRY-2	2" filter
34	NT-IN-DRY-3	Nozzle and cyclone acetone rinse
35	NT-IN-DRY-3	2" filter F½ rinse w/ acetone
36	NT-IN-DRY-3	2" filter
37	NT-IN-WET-1	Nozzle and cyclone acetone rinse
38	NT-IN-WET-1	2" filter F½ rinse w/ acetone (resuspend)
39	NT-IN-WET-1	2" filter
40	NT-IN-WET-2	Nozzle and cyclone acetone rinse
41	NT-IN-WET-2	2" filter F½ rinse w/ acetone
42	NT-IN-WET-2	2" filter
43	NT-IN-WET-3	Nozzle and cyclone acetone rinse
44	NT-IN-WET-3	2" filter F½ rinse w/ acetone
45	NT-IN-WET-3	2" filter
46	NT-OUT-WET-1	Nozzle and cyclone acetone rinse
47	NT-OUT-WET-1	2" filter F½ rinse w/ acetone
48	NT-OUT-WET-1	2" filter
49	NT-OUT-WET-2	Nozzle and cyclone acetone rinse
50	NT-OUT-WET-2	2" filter F½ rinse w/ acetone
51	NT-OUT-WET-2	2" filter
52	NT-OUT-WET-3	Nozzle and cyclone acetone rinse
53	NT-OUT-WET-3	2" filter F½ rinse w/ acetone
54	NT-OUT-WET-3	2" filter

Submitted By: [signature]

ANALYTICAL NARRATIVE

RFA No. 2737-4503

Plant Name Nello Teer

Analyst LDG — Date Rec'd in Lab 9/11/92

Lab Proj. Mgr. ES — Analysis Date 9/23/92

Analysis Method & Analytes M201A for PM10 particulate

Sample Matrix & Components filter + acetone rinses

Summary of Sample Prep (added rinse in lab, final volumed, pH adjusted, etc.)

Transfer filters w/ particulate individually to tared teflon baggies, desiccate 24 hrs, weigh until final. Transfer acetone rinses w/ particulate and nozzle and cyclone rinses w/ particulate each individually to tared teflon baggies, evaporate under a fume hood, desiccate 24 hrs., weigh until final.

Summary of Instrumentation Mettler AT 1000 Analytical Balance

Minimum Detectable Limit 0.1 mg

Summary of QA/QC Sample Analysis

N/A

Spikes (describe spikes and % recovery)

N/A

Specific Comments Regarding Sample Analysis (Note unusual catch weights, interferences, odd sample behavior, and steps taken to confirm unusual results. Also note any deviations from standard analytical procedures, together with justification and possible affect on results. Specify run number(s) when applicable.)

No problems

USE PAGE 2 IF ADDITIONAL SPACE NEEDED FOR ANY ITEM

Confirmation of Data Review

Lab Project Manager Signature Eddie Smith — Date 9/24/92

Lab QA Officer Signature [signature] — Date 9/24/92

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ENTROPY

SAMPLE TRANSFER RECORD OF CUSTODY

Please include this form with the final (typed) results, and whenever the final results are faxed to Entropy.

The samples referenced in Entropy Environmentalists Inc. RFA or purchase order No. 2737-4503 were shipped by Entropy on 9-10-92 (date) via hand (mode) to EEI (laboratory) by John V. Alcock (signature)

The samples were received for analysis on 9/11/92 (date) at EEI (laboratory) by Laura Grimsley (signature)

As applicable, note any broken seals, leakage, spillage, or damage to samples. If discrepancy, specify seal No., jar No., sample No., etc.

L-0012 rev. 8-92

ENTROPY

APPENDIX E

PARTICULATE SAMPLING LABORATORY RESULTS (Version 04.28.92)

Plant Name:	NELLO TEER	**EEI Ref#**	4503
		Filename:	HIVOL
Sampling Location:	Screening Operation		**Page**
Date Received:	09/11/92	**File Pathway:** H:\JOBS\4503\LAB\HIVOL.WQ1	**of**

	init.	date			date			date	
Run Number				SR-WET-3			SR-WET-1,2,3		SR-Dry-1,2,3
Sample ID/Container #				F/			F/		F/
	DK	09/16	@	3.0650	09/16	@	3.1833		
	DK	09/15		3.0651	09/15		3.1837		
Baggie Tare Wt., g.									
Filter Tare Wt., g.				2.9830			2.9916		
FILTER SAMPLE WT., g.				0.0820			0.1917		
Sample ID/Container #				R/			R/		R/
Tare Wt., g.		(ml)			(ml)			(ml)	
RINSE SAMPLE WT., g.									
Filter Catch, mg.				82.0			191.7		
Rinse Catch, mg.									
Rinse Blank Residue, mg.									
Net Rinse Catch, mg.				0.0			0.0		
FILTERABLE PARTICULATE, mg.				82.0			191.7		

Blank Beaker #	B/	
Final wt., mg.		
Tare wt., mg.		
Residue, mg.		
Volume, ml.		
Density, mg/ml	785.0	
Conc., mg/mg		<--
Upper Limit, mg/mg	1.000E-05	

—Legend—
@ = Final Weight
F = Filter R = Rinse
1 = Light
2 = Medium
3 = Heavy or Dark

Sample Description

Run #	Color	Loading
-3	1 2 3	1 2 3
-1,2,3	1 2 3	1 2 3

Predominate color of samples is: MEDIUM GRAY
Date of full balance span 09/14/92
Notes and comments:

PARTICULATE SAMPLING LABORATORY RESULTS (Version 04.28.92)

Plant Name:	NELLO TEER		**EEI Ref#**	4503
			Filename:	HIVOL
Sampling Location:	Screening Operation			**Page**
Date Received:	09/11/92	**File Pathway:** H:\JOBS\4503\LAB\HIVOL.WQ1		**of**

Run Number	init.	date		SR-WET-1	date		SR-WET-2	date	
Sample ID/Container #				F/			F/		F/
	DK	09/16	@	3.0228	09/16	@	3.1688		
	DK	09/15		3.0232	09/15		3.1691		
Baggie Tare Wt., g.									
Filter Tare Wt., g.				2.9717			2.9681		
FILTER SAMPLE WT., g.				0.0511			0.2007		

	init.	date			date			date	
Sample ID/Container #				R/			R/		R/
Tare Wt., g.		(	ml)		(	ml)		(	ml)
RINSE SAMPLE WT., g.									

	SR-WET-1	SR-WET-2
Filter Catch, mg.	51.1	200.7
Rinse Catch, mg.		
Rinse Blank Residue, mg.		
Net Rinse Catch, mg.	0.0	0.0
FILTERABLE PARTICULATE, mg.	51.1	200.7

Blank Beaker #	B/
Final wt., mg.	
Tare wt., mg.	
Residue, mg.	
Volume, ml.	
Density, mg/ml	785.0
Conc., mg/mg	<–
Upper Limit, mg/mg	1.000E-05

—Legend—

@ = Final Weight

F = Filter R = Rinse

1 = Light
2 = Medium
3 = Heavy or Dark

Sample Description

Run #	Color	Loading
-1	1 2 3	1 2 3
-2	1 2 3	1 2 3

Predominate color of samples is: MEDIUM GRAY

Date of full balance span 09/14/92

Notes and comments:

Printing Date: 17-Sep-92 Printing Time: 11:09 AM

PARTICULATE SAMPLING LABORATORY RESULTS (Version 04.28.92)

Plant Name:	NELLO TEER		EEI Ref#	4503
			Filename:	HIVOL
Sampling Location:	Screening Operation			
			Page	2
Date Received:	09/11/92	File Pathway: H:\JOBS\4503\LAB\HIVOL.WQ1	of	2

	init.	date			date			date		
Run Number				SR-WET-3			SR-WET-1,2,3	SR-Dry-1,2,3		
Sample ID/Container #				F /			F /			F /
	DK	09/16	@	3.0650	09/16	@	3.1833			
	DK	09/15		3.0651	09/15		3.1837			
Baggie Tare Wt., g.										
Filter Tare Wt., g.				2.9830			2.9916			
FILTER SAMPLE WT., g.				0.0820			0.1917			
Sample ID/Container #				R /			R /			R /
Tare Wt., g.	(	ml)			(ml)			(ml)		
RINSE SAMPLE WT., g.										

	SR-WET-3	SR-WET-1,2,3
Filter Catch, mg.	82.0	191.7
Rinse Catch, mg.		
Rinse Blank Residue, mg.		
Net Rinse Catch, mg.	0.0	0.0
FILTERABLE PARTICULATE, mg.	82.0	191.7

Blank Beaker #	B /	
Final wt., mg.		
Tare wt., mg.		
Residue, mg.		
Volume, ml.		
Density, mg/ml	785.0	
Conc., mg/mg		<--
Upper Limit, mg/mg	1.000E-05	

—Legend—
@ = Final Weight
F = Filter R = Rinse

1 = Light
2 = Medium
3 = Heavy or Dark

Sample Description

Run #	Color	Loading
-3	1 2 3	1 2 3
-1,2,3	1 2 3	1 2 3

Predominate color of samples is: MEDIUM GRAY
Date of full balance span 09/14/92
Notes and comments:

PARTICULATE SAMPLING LABORATORY RESULTS (Version 04.28.92)

Plant Name:	NELLO TEER	EEI Ref#	4503
Sampling Location:	Screening Operation	Filename:	HIVOL
Date Received:	09/11/92	File Pathway:	H:\JOBS\4503\LAB\HIVOL.WQ1

Run Number	init.	date	SR-WET-1	date	SR-WET-2	date	
Sample ID/Container #			F /		F /		F /
	DK	09/16	@ 3.0228	09/16	@ 3.1688		
	DK	09/15	3.0232	09/15	3.1691		
Baggie Tare Wt., g.							
Filter Tare Wt., g.			2.9717		2.9681		
FILTER SAMPLE WT., g.			0.0511		0.2007		

	init.	date		date		date	
Sample ID/Container #			R /		R /		R /
Tare Wt., g.		(ml)		(ml)		(ml)	
RINSE SAMPLE WT., g.							

	SR-WET-1	SR-WET-2
Filter Catch, mg.	51.1	200.7
Rinse Catch, mg.		
Rinse Blank Residue, mg.		
Net Rinse Catch, mg.	0.0	0.0
FILTERABLE PARTICULATE, mg.	51.1	200.7

Blank Beaker #	B /
Final wt., mg.	
Tare wt., mg.	
Residue, mg.	
Volume, ml.	
Density, mg/ml	785.0
Conc., mg/mg	<--
Upper Limit, mg/mg	1.000E-05

—Legend—
@ = Final Weight
F = Filter R = Rinse

1 = Light
2 = Medium
3 = Heavy or Dark

Sample Description

Run #	Color	Loading
-1	1 2 3	1 2 3
-2	1 2 3	1 2 3

Predominate color of samples is: MEDIUM GRAY
Date of full balance span 09/14/92
Notes and comments:

REAGENT BLANK LABORATORY RESULTS (Version 04.28.92)

Plant Name:	NELLO TEER	EEI Ref#	4503
		File:	PM10
Sampling Location:	NA		
Date Received:	09/11/92	File Pathway:	H:\JOBS\4503\LAB\PM10.WQ1

Run Number — ACETONE BLANK

	init.	date		
Sample ID/Container #				B / 579
	DK	09/16		3.7197
	DK	09/15	@	3.7196
Tare Wt., g.		(75	ml)	3.7187
SAMPLE WT., g.				0.0009

Date of full balance span: 09/14/92

Notes and comments:

PARTICULATE SAMPLING LABORATORY RESULTS (Version 04.28.92)

Plant Name:	NELLO TEER	EEI Ref#	4503
		File:	PM10
Sampling Location:	Screen Run, Dry		
Date Received:	09/11/92		
		File Pathway:	H:\JOBS\4503\LAB\PM10.WQ1

Run Number				SR-DRY-1						
Sample I.D.				in stack filter / 525						
Container #				< = 10 ug						
	init.	date								
	DK	09/16		3.9759						
	DK	09/15	@	3.9754						
	DK	09/14		3.9771						
Baggie Tare Wt., g.				3.6733						
Filter Tare Wt., g.				0.2702						
FILTER SAMPLE WT., g.				0.0319						
Sample I.D.				in stack filter						nozzle & cyclone
Container #				rinse / 526						rinse / 527
				< = 10 ug						>10ug
	init.	date			date					
	DK	09/16		3.6942	09/16					4.0913
	DK	09/15	@	3.6941	09/15			@		4.0911
Tare Wt., g.		(50	ml)	3.6891	(	70		ml)		3.9355
RINSE SAMPLE WT., g.				0.0050						0.1556
Filter Catch, mg.				31.9						NA
Rinse Catch, mg.				5.0						155.6
Blank Residue, mg.				0.4						0.5
Net Rinse Catch, mg.				4.6						155.1
FILTERABLE PARTICULATE, mg.				36.5						155.1

Blank Beaker #	B / 579		—Legend—			
Final wt., mg.	3.7196		@ = Final Weight			
Tare wt., mg.	3.7187		F = Filter R = Rinse	Sample Description		
Residue, mg.	0.9					
Volume, ml.	75		1 = Light	Run #	Color	Loading
Density, mg/ml	785.0		2 = Medium			
Conc., mg/mg	1.529E-05		3 = Heavy or Dark	-1	1 2 3	1 2 3
Upper Limit, mg/mg	1.000E-05	<--				

Predominate color of samples is: VERY LIGHT TAN.

Date of full balance span: 09/14/92

Notes and comments:

PARTICULATE SAMPLING LABORATORY RESULTS (Version 04.28.92)

Plant Name:	NELLO TEER	EEI Ref#	4503
		File:	PM10
Sampling Location:	Screen Run, Dry		
			Page 2 of 12
Date Received:	09/11/92		
		File Pathway:	H:\JOBS\4503\LAB\PM10.WQ1

Run Number SR-DRY-2

	init.	date		in stack filter / 528 < = 10 ug
Sample I.D. / Container #				
	DK	09/17		4.0263
	DK	09/16	@	4.0262
	DK	09/15		4.0251
	DK	09/14		4.0266
Baggie Tare Wt., g.				3.7142
Filter Tare Wt., g.				0.2619
FILTER SAMPLE WT., g.				0.0501

	init.	date			in stack filter rinse / 529 < = 10 ug	date			nozzle & cyclone rinse / 530 >10ug
Sample I.D. / Container #									
	DK	09/16		@	3.6906	09/16		@	3.9667
	DK	09/15			3.6909	09/15			3.9671
Tare Wt., g.		(	25	ml)	3.6834	(	75	ml)	3.7517
RINSE SAMPLE WT., g.					0.0072				0.2150

Filter Catch, mg.	50.1	NA
Rinse Catch, mg.	7.2	215.0
Blank Residue, mg.	0.2	0.6
Net Rinse Catch, mg.	7.0	214.4
FILTERABLE PARTICULATE, mg.	57.1	214.4

Blank Beaker #	B / 579		—Legend—			
Final wt., mg.	3.7196		@ = Final Weight			
Tare wt., mg.	3.7187		F = Filter R = Rinse	Sample Description		
Residue, mg.	0.9					
Volume, ml.	75		1 = Light	Run #	Color	Loading
Density, mg/ml	785.0		2 = Medium			
Conc., mg/mg	1.529E-05		3 = Heavy or Dark	-2	1 2 3	1 2 3
Upper Limit, mg/mg	1.000E-05	<--				

Predominate color of samples is: LIGHT BEIGE.
Date of full balance span: 09/14/92
Notes and comments:

PARTICULATE SAMPLING LABORATORY RESULTS (Version 04.28.92)

Plant Name:	NELLO TEER	EEI Ref#	4503
		File:	PM10
Sampling Location:	Screen Run, Dry		

Date Received: 09/11/92

File Pathway: H:\JOBS\4503\LAB\PM10.WQ1

Run Number: SR-DRY-3

Sample I.D. / Container #	init.	date		in stack filter / 531 < = 10 ug
	DK	09/16		4.1351
	DK	09/15	@	4.1349
	DK	09/14		4.1362
Baggie Tare Wt., g.				3.7872
Filter Tare Wt., g.				0.2727
FILTER SAMPLE WT., g.				0.0750

Sample I.D. / Container #	init.	date			in stack filter rinse / 532 < = 10 ug	date			nozzle & cyclone rinse / 533 >10ug
	DK	09/16			3.6228	09/16	@		4.0334
	DK	09/15	@		3.6227	09/15			4.0337
Tare Wt., g.		(30	ml)		3.6095	(50	ml)		3.8069
RINSE SAMPLE WT., g.					0.0132				0.2265

Filter Catch, mg.	75.0	NA
Rinse Catch, mg.	13.2	226.5
Blank Residue, mg.	0.2	0.4
Net Rinse Catch, mg.	13.0	226.1
FILTERABLE PARTICULATE, mg.	88.0	226.1

Blank Beaker #	B / 579
Final wt., mg.	3.7196
Tare wt., mg.	3.7187
Residue, mg.	0.9
Volume, ml.	75
Density, mg/ml	785.0
Conc., mg/mg	1.529E-05
Upper Limit, mg/mg	1.000E-05 <--

—Legend—
@ = Final Weight
F = Filter R = Rinse

1 = Light
2 = Medium
3 = Heavy or Dark

Sample Description

Run #	Color	Loading
-3	1 2 3	1 2 3

Predominate color of samples is: LIGHT BEIGE.
Date of full balance span: 09/14/92
Notes and comments:

PARTICULATE SAMPLING LABORATORY RESULTS (Version 04.28.92)

Plant Name:	NELLO TEER	EEI Ref#	4503
		File:	PM10
Sampling Location:	Screen Run, Wet		

Date Received: 09/11/92

File Pathway: H:\JOBS\4503\LAB\PM10.WQ1

Run Number NT-SR-WET-1

Sample I.D. / Container #	init.	date		in stack filter / 534 < = 10 ug
	DK	09/17	@	3.9133
	DK	09/16		3.9134
	DK	09/15		3.9122
	DK	09/14		3.9138
Baggie Tare Wt., g.				3.6320
Filter Tare Wt., g.				0.2717
FILTER SAMPLE WT., g.				0.0096

Sample I.D. / Container #	init.	date		in stack filter rinse / 535 < = 10 ug	date		nozzle & cyclone rinse / 536 >10ug
	DK	09/16		3.7519	09/16	@	3.5748
	DK	09/15	@	3.7517	09/15		3.5749
Tare Wt., g.		(25	ml)	3.7505	(50	ml)	3.5563
RINSE SAMPLE WT., g.				0.0012			0.0185

Filter Catch, mg.	9.6	NA
Rinse Catch, mg.	1.2	18.5
Blank Residue, mg.	0.2	0.4
Net Rinse Catch, mg.	1.0	18.1
FILTERABLE PARTICULATE, mg.	10.6	18.1

Blank Beaker #	B / 579
Final wt., mg.	3.7196
Tare wt., mg.	3.7187
Residue, mg.	0.9
Volume, ml.	75
Density, mg/ml	785.0
Conc., mg/mg	1.529E-05
Upper Limit, mg/mg	1.000E-05 <–

—Legend—
@ = Final Weight
F = Filter R = Rinse

1 = Light
2 = Medium
3 = Heavy or Dark

Sample Description

Run #	Color	Loading
-1	1 2 3	1 2 3

Predominate color of samples is: LIGHT BEIGE.
Date of full balance span: 09/14/92
Notes and comments:

PARTICULATE SAMPLING LABORATORY RESULTS (Version 04.28.92)

Plant Name:	NELLO TEER	EEI Ref#	4503
		File:	PM10
Sampling Location:	Screen Run, Wet		
Date Received:	09/11/92	File Pathway:	H:\JOBS\4503\LAB\PM10.WQ1

Run Number: NT-SR-WET-2

Sample I.D. / Container #	init.	date		in stack filter / 537 < = 10 ug
	DK	09/17	@	3.8794
	DK	09/16		3.8796
	DK	09/15		3.8789
	DK	09/14		3.8802
Baggie Tare Wt., g.				3.6066
Filter Tare Wt., g.				0.2687
FILTER SAMPLE WT., g.				0.0041

Sample I.D. / Container #	init.	date		in stack filter rinse / 538 < = 10 ug	date		nozzle & cyclone rinse / 538 >10ug
	DK	09/16	@	3.7616	09/16	@	3.8025
	DK	09/15		3.7619	09/15	@	3.8025
Tare Wt., g.		(50	ml)	3.7503	(35	ml)	3.8000
RINSE SAMPLE WT., g.				0.0113			0.0025

Filter Catch, mg.	4.1	NA
Rinse Catch, mg.	11.3	2.5
Blank Residue, mg.	0.4	0.3
Net Rinse Catch, mg.	10.9	2.2
FILTERABLE PARTICULATE, mg.	15.0	2.2

Blank Beaker #	B / 579
Final wt., mg.	3.7196
Tare wt., mg.	3.7187
Residue, mg.	0.9
Volume, ml.	75
Density, mg/ml	785.0
Conc., mg/mg	1.529E-05
Upper Limit, mg/mg	1.000E-05 <--

—Legend—
@ = Final Weight
F = Filter R = Rinse

1 = Light
2 = Medium
3 = Heavy or Dark

Sample Description

Run #	Color	Loading
-2	1 2 3	1 2 3

Predominate color of samples is: VERY LIGHT BEIGE.
Date of full balance span: 09/14/92
Notes and comments:

PARTICULATE SAMPLING LABORATORY RESULTS (Version 04.28.92)

Plant Name:	NELLO TEER	EEI Ref# 4503
		File: PM10
Sampling Location:	Screen Run, Wet	Page 6 of 12
Date Received:	09/11/92	File Pathway: H:\JOBS\4503\LAB\PM10.WQ1

Run Number: NT-SR-WET-3

	init.	date		in stack filter / 540 < = 10 ug
Sample I.D. / Container #				
	DK	09/16		3.8781
	DK	09/15	@	3.8778
	DK	09/14		3.8787
Baggie Tare Wt., g.				3.6028
Filter Tare Wt., g.				0.2698
FILTER SAMPLE WT., g.				0.0052

	init.	date			in stack filter rinse / 541 < = 10 ug	date			nozzle & cyclone rinse / 542 >10ug
Sample I.D. / Container #									
	DK	09/16	@		3.6843	09/16	@		3.7195
	DK	09/15			3.6848	09/15			3.7196
Tare Wt., g.		(	40	ml)	3.6831	(	50	ml)	3.7155
RINSE SAMPLE WT., g.					0.0012				0.0040

Filter Catch, mg.	5.2	NA
Rinse Catch, mg.	1.2	4.0
Blank Residue, mg.	0.3	0.4
Net Rinse Catch, mg.	0.9	3.6
FILTERABLE PARTICULATE, mg.	6.1	3.6

Blank Beaker #	B / 579	
Final wt., mg.	3.7196	
Tare wt., mg.	3.7187	
Residue, mg.	0.9	
Volume, ml.	75	
Density, mg/ml	785.0	
Conc., mg/mg	1.529E-05	
Upper Limit, mg/mg	1.000E-05	<--

—Legend—
@ = Final Weight
F = Filter R = Rinse

1 = Light
2 = Medium
3 = Heavy or Dark

Sample Description

Run #	Color	Loading
-3	1 2 3	1 2 3

Predominate color of samples is: LIGHT BEIGE.
Date of full balance span: 09/14/92
Notes and comments:

PARTICULATE SAMPLING LABORATORY RESULTS (Version 04.28.92)

Plant Name:	NELLO TEER	EEI Ref#	4503
		File:	PM10
Sampling Location:	Crusher Outlet, Dry		
		Page	7
Date Received:	09/11/92	of	12
		File Pathway:	H:\JOBS\4503\LAB\PM10.WQ1

Run Number: NT-OUT-DRY-1

Sample I.D. / Container #	init.	date		in stack filter / 543 < = 10 ug
	DK	09/16		3.9538
	DK	09/15	@	3.9537
	DK	09/14		3.9543
Baggie Tare Wt., g.				3.6786
Filter Tare Wt., g.				0.2690
FILTER SAMPLE WT., g.				0.0061

Sample I.D. / Container #	init.	date			in stack filter rinse / 544 < = 10 ug	date			nozzle & cyclone rinse / 545 >10ug
	DK	09/16			3.9078	09/16			4.6975
	DK	09/15		@	3.9073	09/15		@	4.6974
Tare Wt., g.		(	45	ml)	3.9025	(	70	ml)	3.8197
RINSE SAMPLE WT., g.					0.0048				0.8777

Filter Catch, mg.	6.1	NA
Rinse Catch, mg.	4.8	877.7
Blank Residue, mg.	0.4	0.5
Net Rinse Catch, mg.	4.4	877.2
FILTERABLE PARTICULATE, mg.	10.5	877.2

Blank Beaker #	B / 579	
Final wt., mg.	3.7196	
Tare wt., mg.	3.7187	
Residue, mg.	0.9	
Volume, ml.	75	
Density, mg/ml	785.0	
Conc., mg/mg	1.529E-05	
Upper Limit, mg/mg	1.000E-05	<–

—Legend—
@ = Final Weight
F = Filter R = Rinse

1 = Light
2 = Medium
3 = Heavy or Dark

Sample Description

Run #	Color	Loading
-1	1 2 3	1 2 3

Predominate color of samples is: LIGHT CREAMY GRAY.
Date of full balance span: 09/14/92
Notes and comments:

Printing Date: 23-Sep-92 Printing Time: 04:56 PM

PARTICULATE SAMPLING LABORATORY RESULTS (Version 04.28.92)

Plant Name:	NELLO TEER	EEI Ref#	4503
		File:	PM10
Sampling Location:	Crusher Outlet, Dry	Page	8 of 12
Date Received:	09/11/92	File Pathway:	H:\JOBS\4503\LAB\PM10.WQ1

Run Number				NT-OUT-DRY-2
Sample I.D.				in stack filter / 546
Container #				< = 10 ug
	init.	date		
	DK	09/15	@	4.0250
	DK	09/14		4.0255
Baggie Tare Wt., g.				3.7139
Filter Tare Wt., g.				0.2717
FILTER SAMPLE WT., g.				0.0394

Sample I.D.					in stack filter					nozzle & cyclone
Container #					rinse / 547					rinse / 548
					< = 10 ug					>10ug
	init.	date				date				
	DK	09/16		@	3.6339	09/16		@		6.2034
	DK	09/15		@	3.6339	09/15				6.2036
Tare Wt., g.		(	50	ml)	3.6250	(	100	ml)		3.7395
RINSE SAMPLE WT., g.					0.0089					2.4639

Filter Catch, mg.	39.4	NA
Rinse Catch, mg.	8.9	2463.9
Blank Residue, mg.	0.4	0.8
Net Rinse Catch, mg.	8.5	2463.1
FILTERABLE PARTICULATE, mg.	47.9	2463.1

Blank Beaker #	B / 579	
Final wt., mg.	3.7196	
Tare wt., mg.	3.7187	
Residue, mg.	0.9	
Volume, ml.	75	
Density, mg/ml	785.0	
Conc., mg/mg	1.529E-05	
Upper Limit, mg/mg	1.000E-05	<--

—Legend—
@ = Final Weight
F = Filter R = Rinse

1 = Light
2 = Medium
3 = Heavy or Dark

Sample Description

Run #	Color	Loading
-2	1 2 3	1 2 3

Prèdominate color of samples is: LIGHT CREAMY GRAY.
Date of full balance span: 09/14/92
Notes and comments:

PARTICULATE SAMPLING LABORATORY RESULTS (Version 04.28.92)

Plant Name:	NELLO TEER	EEI Ref#	4503
		File:	PM10
Sampling Location:	Crusher Outlet, Dry		
Date Received:	09/11/92	File Pathway:	H:\JOBS\4503\LAB\PM10.WQ1

Run Number: NT-OUT-DRY-3

Sample I.D. / Container #	init.	date		in stack filter / 549 <= 10 ug
	DK	09/15	@	4.0988
	DK	09/14		4.0995
Baggie Tare Wt., g.				3.7600
Filter Tare Wt., g.				0.2680
FILTER SAMPLE WT., g.				0.0708

Sample I.D. / Container #	init.	date			in stack filter rinse / 550 <= 10 ug	date			nozzle & cyclone rinse / 551 >10ug
	DK	09/16		@	3.8609	09/16		@	7.4283
	DK	09/15			3.8611	09/15			7.4285
Tare Wt., g.		(	50	ml)	3.8475	(	75	ml)	3.7388
RINSE SAMPLE WT., g.					0.0134				3.6895

Filter Catch, mg.	70.8	NA
Rinse Catch, mg.	13.4	3689.5
Blank Residue, mg.	0.4	0.6
Net Rinse Catch, mg.	13.0	3688.9
FILTERABLE PARTICULATE, mg.	83.8	3688.9

Blank Beaker #	B / 579
Final wt., mg.	3.7196
Tare wt., mg.	3.7187
Residue, mg.	0.9
Volume, ml.	75
Density, mg/ml	785.0
Conc., mg/mg	1.529E-05
Upper Limit, mg/mg	1.000E-05 <--

—Legend—
@ = Final Weight
F = Filter R = Rinse

1 = Light
2 = Medium
3 = Heavy or Dark

Sample Description

Run #	Color	Loading
-3	1 2 3	1 2 3

Predominate color of samples is: MEDIUM LIGHT CREAMY GRAY.
Date of full balance span: 09/14/92
Notes and comments:

PARTICULATE SAMPLING LABORATORY RESULTS (Version 04.28.92)

Plant Name:	NELLO TEER	EEI Ref#	4503
		File:	PM10
Sampling Location:	Crusher Inlet, Dry		
Date Received:	09/11/92	File Pathway:	H:\JOBS\4503\LAB\PM10.WQ1

Run Number NT-IN-DRY-1

Sample I.D. / Container #	init.	date		in stack filter / 552 < = 10 ug
	DK	09/16		3.9760
	DK	09/15	@	3.9759
	DK	09/14		3.9765
Baggie Tare Wt., g.				3.7044
Filter Tare Wt., g.				0.2697
FILTER SAMPLE WT., g.				0.0018

Sample I.D. / Container #	init.	date		in stack filter rinse / 553 < = 10 ug	date		nozzle & cyclone rinse / 554 >10ug
	DK	09/16	@	3.7796	09/16	@	3.6825
	DK	09/15	@	3.7796	09/15		3.6828
Tare Wt., g.		(25	ml)	3.7779	(75	ml)	3.6620
RINSE SAMPLE WT., g.				0.0017			0.0205

Filter Catch, mg.	1.8	NA
Rinse Catch, mg.	1.7	20.5
Blank Residue, mg.	0.2	0.6
Net Rinse Catch, mg.	1.5	19.9
FILTERABLE PARTICULATE, mg.	3.3	19.9

Blank Beaker #	B / 579
Final wt., mg.	3.7196
Tare wt., mg.	3.7187
Residue, mg.	0.9
Volume, ml.	75
Density, mg/ml	785.0
Conc., mg/mg	1.529E-05
Upper Limit, mg/mg	1.000E-05 <-

—Legend—
@ = Final Weight
F = Filter R = Rinse

1 = Light
2 = Medium
3 = Heavy or Dark

Sample Description

Run #	Color	Loading
-1	1 2 3	1 2 3

Predominate color of samples is: VERY LIGHT CREAMY GRAY.
Date of full balance span: 09/14/92
Notes and comments:

PARTICULATE SAMPLING LABORATORY RESULTS (Version 04.28.92)

Plant Name:	NELLO TEER	EEI Ref# 4503
		File: PM10
Sampling Location:	Crusher Inlet, Dry	

Date Received:	09/11/92	
	File Pathway:	H:\JOBS\4503\LAB\PM10.WQ1

Run Number: NT-IN-DRY-2

Sample I.D. / Container #	init.	date		in stack filter / 555 < = 10 ug
	DK	09/15	@	4.1616
	DK	09/14		4.1621
Baggie Tare Wt., g.				3.8860
Filter Tare Wt., g.				0.2709
FILTER SAMPLE WT., g.				0.0047

Sample I.D. / Container #	init.	date			in stack filter rinse / 556 < = 10 ug		date		nozzle & cyclone rinse / 557 >10ug
	DK	09/16			3.7931		09/16	@	3.8708
	DK	09/15		@	3.7930		09/15	@	3.8708
Tare Wt., g.		(	25	ml)	3.7911	(	80	ml)	3.7934
RINSE SAMPLE WT., g.					0.0019				0.0774

Filter Catch, mg.	4.7	NA
Rinse Catch, mg.	1.9	77.4
Blank Residue, mg.	0.2	0.6
Net Rinse Catch, mg.	1.7	76.8
FILTERABLE PARTICULATE, mg.	6.4	76.8

Blank Beaker #	B / 579	
Final wt., mg.	3.7196	
Tare wt., mg.	3.7187	
Residue, mg.	0.9	
Volume, ml.	75	
Density, mg/ml	785.0	
Conc., mg/mg	1.529E-05	
Upper Limit, mg/mg	1.000E-05	<--

—Legend—
@ = Final Weight
F = Filter R = Rinse

1 = Light
2 = Medium
3 = Heavy or Dark

Sample Description

Run #	Color	Loading
-2	1 2 3	1 2 3

Predominate color of samples is: VERY LIGHT CREAMY GRAY.
Date of full balance span: 09/14/92
Notes and comments:

Printing Date: 23-Sep-92 Printing Time: 03:57 PM

PARTICULATE SAMPLING LABORATORY RESULTS (Version 04.28.92)

Plant Name:	NELLO TEER	EEI Ref#	4503
		File:	PM10
Sampling Location:	Crusher Inlet, Dry		
		Page	12
Date Received:	09/11/92	of	12
		File Pathway:	H:\JOBS\4503\LAB\PM10.WQ1

Run Number NT-IN-DRY-3

	init.	date		in stack filter / 558 <= 10 ug
Sample I.D. / Container #				
	DK	09/16		3.9571
	DK	09/15	@	3.9568
	DK	09/14		3.9574
Baggie Tare Wt., g.				3.6790
Filter Tare Wt., g.				0.2702
FILTER SAMPLE WT., g.				0.0076

	init.	date			in stack filter rinse / 559 <= 10 ug	date			nozzle & cyclone rinse / 560 >10ug
Sample I.D. / Container #									
	DK	09/16		@	3.8601	09/16		@	3.9203
	DK	09/15			3.8606	09/15			3.9206
Tare Wt., g.		(	35	ml)	3.8567	(	50	ml)	3.6817
RINSE SAMPLE WT., g.					0.0034				0.2386

Filter Catch, mg.	7.6	NA
Rinse Catch, mg.	3.4	238.6
Blank Residue, mg.	0.3	0.4
Net Rinse Catch, mg.	3.1	238.2
FILTERABLE PARTICULATE, mg.	10.7	238.2

Blank Beaker #	B / 579		—Legend—
Final wt., mg.	3.7196		@ = Final Weight
Tare wt., mg.	3.7187		F = Filter R = Rinse
Residue, mg.	0.9		
Volume, ml.	75		1 = Light
Density, mg/ml	785.0		2 = Medium
Conc., mg/mg	1.529E-05		3 = Heavy or Dark
Upper Limit, mg/mg	1.000E-05	<--	

Sample Description

Run #	Color	Loading
-3	1 2 3	1 2 3

Predominate color of samples is: VERY LIGHT CREAMY GRAY.
Date of full balance span: 09/14/92
Notes and comments:

Printing Date: 23-Sep-92 Printing Time: 03:57 PM

PARTICULATE SAMPLING LABORATORY RESULTS (Version 04.28.92)

Plant Name:	NELLO TEER	EEI Ref# 4503
		File: PM10II
Sampling Location:	Crusher Inlet, Wet	Page 1 of 6
Date Received:	09/11/92	
File Pathway:	H:\JOBS\4503\LAB\PM10II.WQ1	

Run Number: NT-IN-WET-1

Sample I.D. / Container #	init.	date		in stack filter / 561 <= 10 ug
	DK	09/16		4.0853
	DK	09/15	@	4.0852
	DK	09/14		4.0860
Baggie Tare Wt., g.				3.8030
Filter Tare Wt., g.				0.2732
FILTER SAMPLE WT., g.				0.0090

Sample I.D. / Container #	init.	date			in stack filter rinse / 562 <= 10 ug	date			nozzle & cyclone rinse / 563 >10ug
	DK	09/16			3.7188	09/16	@		3.8880
	DK	09/15	@		3.7186	09/15	@		3.8880
Tare Wt., g.		(50	ml)		3.7164	(75	ml)		3.8319
RINSE SAMPLE WT., g.					0.0022				0.0561

Filter Catch, mg.	9.0	NA
Rinse Catch, mg.	2.2	56.1
Blank Residue, mg.	0.4	0.6
Net Rinse Catch, mg.	1.8	55.5
FILTERABLE PARTICULATE, mg.	10.8	55.5

Blank Beaker #	B / 579	
Final wt., mg.	3.7196	
Tare wt., mg.	3.7187	
Residue, mg.	0.9	
Volume, ml.	75	
Density, mg/ml	785.0	
Conc., mg/mg	1.529E-05	
Upper Limit, mg/mg	1.000E-05	<--

—Legend—
@ = Final Weight
F = Filter R = Rinse

1 = Light
2 = Medium
3 = Heavy or Dark

Sample Description

Run #	Color	Loading
-1	1 2 3	1 2 3

Predominate color of samples is: LIGHT CREAMY GRAY.
Date of full balance span: 09/14/92
Notes and comments:

PARTICULATE SAMPLING LABORATORY RESULTS (Version 04.28.92)

Plant Name:	NELLO TEER	EEI Ref#	4503
		File:	PM10II
Sampling Location:	Crusher Inlet, Wet		
Date Received:	09/11/92		
	File Pathway:	H:\JOBS\4503\LAB\PM10II.WQ1	

Run Number: NT-IN-WET-2

Sample I.D.	init.	date		in stack filter / 564
Container #				< = 10 ug
	DK	09/15	@	4.0825
	DK	09/14		4.0829
Baggie Tare Wt., g.				3.7815
Filter Tare Wt., g.				0.2954
FILTER SAMPLE WT., g.				0.0056

Sample I.D. / Container #	init.	date			in stack filter rinse / 565 < = 10 ug	date			nozzle & cyclone rinse / 566 >10ug
	DK	09/16		@	3.5759	09/16		@	3.7261
	DK	09/15			3.5760	09/15		@	3.7261
Tare Wt., g.		(	40	ml)	3.5745	(	40	ml)	3.7150
RINSE SAMPLE WT., g.					0.0014				0.0111

Filter Catch, mg.	5.6	NA
Rinse Catch, mg.	1.4	11.1
Blank Residue, mg.	0.3	0.3
Net Rinse Catch, mg.	1.1	10.8
FILTERABLE PARTICULATE, mg.	6.7	10.8

Blank Beaker #	B / 579	
Final wt., mg.	3.7196	
Tare wt., mg.	3.7187	
Residue, mg.	0.9	
Volume, ml.	75	
Density, mg/ml	785.0	
Conc., mg/mg	1.529E-05	
Upper Limit, mg/mg	1.000E-05	<--

—Legend—
@ = Final Weight
F = Filter R = Rinse

1 = Light
2 = Medium
3 = Heavy or Dark

Sample Description

Run #	Color	Loading
-2	1 2 3	1 2 3

Predominate color of samples is: VERY LIGHT CREAMY GRAY.
Date of full balance span: 09/14/92
Notes and comments:

PARTICULATE SAMPLING LABORATORY RESULTS (Version 04.28.92)

Plant Name:	NELLO TEER	EEI Ref#	4503
		File:	PM10II
Sampling Location:	Crusher Inlet, Wet		
Date Received:	09/11/92	File Pathway:	H:\JOBS\4503\LAB\PM10II.WQ1

Run Number: NT-IN-WET-3

	init.	date		in stack filter / 567 < = 10 ug
Sample I.D. / Container #				
	DK	09/16		3.7873
	DK	09/15	@	3.7872
	DK	09/14		3.7878
Baggie Tare Wt., g.				3.5181
Filter Tare Wt., g.				0.2669
FILTER SAMPLE WT., g.				0.0022

	init.	date			in stack filter rinse / 568 < = 10 ug	date			nozzle & cyclone rinse / 569 >10ug
Sample I.D. / Container #									
	DK	09/16			3.7977	09/16			3.7532
	DK	09/15		@	3.7974	09/15		@	3.7528
Tare Wt., g.		(	30	ml)	3.7961	(	50	ml)	3.7473
RINSE SAMPLE WT., g.					0.0013				0.0055

Filter Catch, mg.	2.2	NA
Rinse Catch, mg.	1.3	5.5
Blank Residue, mg.	0.2	0.4
Net Rinse Catch, mg.	1.1	5.1
FILTERABLE PARTICULATE, mg.	3.3	5.1

Blank Beaker #	B / 579	
Final wt., mg.	3.7196	
Tare wt., mg.	3.7187	
Residue, mg.	0.9	
Volume, ml.	75	
Density, mg/ml	785.0	
Conc., mg/mg	1.529E-05	
Upper Limit, mg/mg	1.000E-05	<--

—Legend—
@ = Final Weight
F = Filter R = Rinse
1 = Light
2 = Medium
3 = Heavy or Dark

Sample Description

Run #	Color	Loading
-3	1 2 3	1 2 3

Predominate color of samples is: LIGHT GRAY.
Date of full balance span: 09/14/92
Notes and comments:

PARTICULATE SAMPLING LABORATORY RESULTS (Version 04.28.92)

Plant Name:	NELLO TEER	EEI Ref#	4503
		File:	PM10II
Sampling Location:	Crusher Outlet, Wet		
		Page	4
Date Received:	09/11/92	of	6
		File Pathway:	H:\JOBS\4503\LAB\PM10II.WQ1

Run Number: NT-OUT-WET-1

Sample I.D. / Container #	init.	date		in stack filter / 570 <= 10 ug
	DK	09/16		3.9305
	DK	09/15	@	3.9302
	DK	09/14		3.9309
Baggie Tare Wt., g.				3.6052
Filter Tare Wt., g.				0.2896
FILTER SAMPLE WT., g.				0.0354

Sample I.D. / Container #	init.	date		in stack filter rinse / 571 <= 10 ug	date		nozzle & cyclone rinse / 572 >10ug
	DK	09/16		3.6805	09/16		6.5671
	DK	09/15	@	3.6801	09/15	@	6.5670
Tare Wt., g.		(30	ml)	3.6653	(70	ml)	3.7796
RINSE SAMPLE WT., g.				0.0148			2.7874

Filter Catch, mg.	35.4	NA
Rinse Catch, mg.	14.8	2787.4
Blank Residue, mg.	0.2	0.5
Net Rinse Catch, mg.	14.6	2786.9
FILTERABLE PARTICULATE, mg.	50.0	2786.9

Blank Beaker #	B / 579		—Legend—			
Final wt., mg.	3.7196		@ = Final Weight			
Tare wt., mg.	3.7187		F = Filter R = Rinse	Sample Description		
Residue, mg.	0.9					
Volume, ml.	75		1 = Light	Run #	Color	Loading
Density, mg/ml	785.0		2 = Medium			
Conc., mg/mg	1.529E-05		3 = Heavy or Dark	-1	1 2 3	1 2 3
Upper Limit, mg/mg	1.000E-05	<--				

Predominate color of samples is: MEDIUM GRAY.
Date of full balance span: 09/14/92
Notes and comments:

PARTICULATE SAMPLING LABORATORY RESULTS (Version 04.28.92)

Plant Name:	NELLO TEER	EEI Ref# 4503
		File: PM10II
Sampling Location:	Crusher Outlet, Wet	

Date Received: 09/11/92

File Pathway: H:\JOBS\4503\LAB\PM10II.WQ1

Run Number: NT-OUT-WET-2

	init.	date		in stack filter / 573 < = 10 ug
Sample I.D. / Container #				
	DK	09/15	@	4.1863
	DK	09/14	@	4.1863
Baggie Tare Wt., g.				3.8518
Filter Tare Wt., g.				0.2930
FILTER SAMPLE WT., g.				0.0415

	init.	date			in stack filter rinse / 574 < = 10 ug	date			nozzle & cyclone rinse / 575 >10ug
Sample I.D. / Container #									
	DK	09/16		@	3.8264	09/16			8.2445
	DK	09/15		@	3.8264	09/15		@	8.2443
Tare Wt., g.		(	25	ml)	3.8164	(	65	ml)	3.6612
RINSE SAMPLE WT., g.					0.0100				4.5831

Filter Catch, mg.	41.5	NA
Rinse Catch, mg.	10.0	4583.1
Blank Residue, mg.	0.2	0.5
Net Rinse Catch, mg.	9.8	4582.6
FILTERABLE PARTICULATE, mg.	51.3	4582.6

Blank Beaker #	B / 579
Final wt., mg.	3.7196
Tare wt., mg.	3.7187
Residue, mg.	0.9
Volume, ml.	75
Density, mg/ml	785.0
Conc., mg/mg	1.529E-05
Upper Limit, mg/mg	1.000E-05 <--

—Legend—
@ = Final Weight
F = Filter R = Rinse

1 = Light
2 = Medium
3 = Heavy or Dark

Sample Description

Run #	Color	Loading
-2	1 2 3	1 2 3

Predominate color of samples is: MEDIUM GRAY.
Date of full balance span: 09/14/92
Notes and comments:

PARTICULATE SAMPLING LABORATORY RESULTS (Version 04.28.92)

Plant Name:	NELLO TEER	EEI Ref#	4503
		File:	PM10II
Sampling Location:	Crusher Outlet, Wet		
		Page	6
Date Received:	09/11/92	of	6
		File Pathway:	H:\JOBS\4503\LAB\PM10II.WQ1

Run Number: NT-OUT-WET-3

Sample I.D. / Container #	init.	date		in stack filter / 576 <= 10 ug
	DK	09/15	@	3.9726
	DK	09/14		3.9728
Baggie Tare Wt., g.				3.6928
Filter Tare Wt., g.				0.2643
FILTER SAMPLE WT., g.				0.0155

Sample I.D. / Container #	init.	date		in stack filter rinse / 577 <= 10 ug	date		nozzle & cyclone rinse / 578 >10ug
	DK	09/16	@	3.8142	09/16	@	4.6307
	DK	09/15		3.8144	09/15		4.6308
Tare Wt., g.		(40	ml)	3.8084	(85	ml)	3.8287
RINSE SAMPLE WT., g.				0.0058			0.8020

Filter Catch, mg.	15.5	NA
Rinse Catch, mg.	5.8	802.0
Blank Residue, mg.	0.3	0.7
Net Rinse Catch, mg.	5.5	801.3
FILTERABLE PARTICULATE, mg.	21.0	801.3

Blank Beaker #	B / 579
Final wt., mg.	3.7196
Tare wt., mg.	3.7187
Residue, mg.	0.9
Volume, ml.	75
Density, mg/ml	785.0
Conc., mg/mg	1.529E-05
Upper Limit, mg/mg	1.000E-05 <--

—Legend—
@ = Final Weight
F = Filter R = Rinse

1 = Light
2 = Medium
3 = Heavy or Dark

Sample Description

Run #	Color	Loading
-3	1 2 3	1 2 3

Predominate color of samples is: MEDIUM GRAY.
Date of full balance span: 09/14/92
Notes and comments:

APPENDIX F

ISOKINETIC METERBOX FULLTEST CALIBRATION

Meterbox No. N33 Calibrated By PJ

Date 6-10-92 Barometric Pressure (P_b) 29.45 (In. Hg)

Standard Meter No. 6838323 Standard Meter Coefficient .9980

STANDARD METER			METERBOX METERING SYSTEM				
Gas Volume (V_{ds}) cf	Temp. (t_{ds}) °F	Time (Θ) Min.	Orifice Setting (ΔH) In. H2O	Gas Volume (V_d) cf	Temp. (t_d) °F	Coeff. (Y_d)	ΔH@ In. H_2O
5.073	75	13	0.5	5.241	90	.9919	1.857
5.090	↓	13	0.5	5.260	91.5	.9943	1.839
5.543	↓	7	2.0	5.732	95	.9962	1.788
5.541	↓	7	2.0	5.733	97.5	1.0001	1.781
6.087	↓	5	4.8	6.234	101	1.0097	1.796
6.085	↓	5	4.8	6.235	103.5	1.0137	1.789
					Average	1.0098	1.808

1. Coefficient range: 0.97-1.03.
2. Coefficient tolerance: for individual runs, ± 0.02 from average.
3. ΔH@ range: 1.6-2.0.
4. ΔH@ tolerance: ≤ 0.15 In. H_2O over ΔH range of 0.4 In.-4.0 In.

$$Y_d = \frac{Y_{ds} * V_{ds} * (t_d + 460) * P_b}{V_d * (t_{ds} + 460) * (P_b + \{\Delta H / 13.6\})}$$

$$\Delta H@ = \frac{0.0319 * \Delta H}{P_b * (t_d + 460)} * \left[\frac{(t_{ds} + 460) * \Theta}{Y_{ds} * V_{ds}}\right]^2$$

R-0030 rev. 10-91

ENTROPY

ISOKINETIC METERBOX POSTTEST CALIBRATION

METERBOX NO. N33

Date 8-11-92 Calibrated By MBC Job Number 4503

Barometric Pressure (P_b) 29.5 (In. Hg) Meterbox Vacuum 15 (In. Hg)

Standard Meter No. 6838323 Standard Meter Coeff. (Y_{ds}) .9980

STANDARD METER			METERBOX METERING SYSTEM				
Gas Volume (V_{ds}) cf	Temp. (t_{ds}) °F	Time (Θ) Min.	Orifice Setting (ΔH) In. H_2O	Gas Volume (V_d) cf	Temp. (t_d) °F	Coeff. (Y_d)	ΔH@ In. H_2O
7.603	75	16	0.75	7.835	90.5	.9946	1.873
5.699	↓	12	↓	5.883	93	.9974	1.867
5.654	↓	12	↓	5.888	95.5	.9932	1.888
					Average	.9951	1.876

Fulltest Y_d 1.0098 Date 6-10-92 % Dev. 1.5 Allowed Dev.: ± 5%

$$Y_d = \frac{Y_{ds} * V_{ds} * (t_d + 460) * P_b}{V_d * (t_{ds} + 460) * (P_b + \{\Delta H / 13.6\})}$$

$$\Delta H@ = \frac{0.0319 * \Delta H}{P_b * (t_d + 460)} * \left[\frac{(t_{ds} + 460) * \Theta}{Y_{ds} * V_{ds}}\right]^2$$

STANDARD DRY GAS METER CALIBRATION

Meter Number 6838323

Date 2-12-92 Auditor(s) MBC/PJ Barometric Press. (P_{bar}) 30.11

Spirometer Gas Volume Cubic Feet (V_s)	Spirometer Temp. °F (t_s)	Dry Gas Meter Gas Volume Cubic Feet (V_{ds})	Dry Gas Meter Temp. °F (t_{ds})	Pressure In. H_2O (ΔP)	Time Min. (Θ)	Test Flow Rate cfm	Calc'd Flow Rate cfm (Q)	Meter Coeff. Gamma (Y_{ds})
2.723	73.4	2.736	72	-.30	10	0.23	.2711	.9925
2.732	73.4	2.705	72	-.30		0.23	.2720	1.0081
2.796	73.4	2.759	72	-.31		0.23	.2784	1.0115
4.199	73.4	4.186	73	-.57		0.55	.4181	1.0010
4.190	73.4	4.201	73	-.58		0.55	.4175	.9980
4.217	74.3	4.172	73	-.58		0.55	.4199	1.0115
4.982	75.2	5.008	73	-.75		0.80	.4944	.9925
5.018	75.2	5.001	73	-.76		0.80	.4980	1.0011
4.973	75.2	5.006	74	-.76		0.80	.4935	.9930
7.814	75.2	7.838	74	-1.60		2.10	.7755	.9987
7.823	75.2	7.818	74	-1.62		2.10	.7764	1.0024
7.787	75.2	7.864	74	-1.62		2.10	.7728	.9919
10.064	75.2	10.134	74	-2.56		3.45	.9988	.9970
10.073	75.2	10.073	74	-2.60		3.45	.9997	.9962
10.055	75.2	10.114	74	-2.61		3.45	.9979	.9983
11.831	75.2	11.929	74	-3.50		4.70	1.174	.9981
11.767	76.1	11.914	74	-3.50		4.70	1.166	.9923
11.790	77.0	11.905	74	-3.50		4.70	1.166	.9933
13.179	77.0	13.311	74	-4.32		5.80	1.304	.9950
13.133	77.0	13.282	74	-4.32		5.80	1.299	.9938
13.069	77.0	13.259	74	-4.32		5.80	1.293	.9907
							Average	.9980

$$Y_{ds} = \frac{(V_s)\ (t_{ds} + 460)\ (P_{bar})}{(V_{ds})\ (t_s + 460)\ [P_{bar} + (\Delta P / 13.6)]}$$

$$Q = (17.64)\ \left[\frac{(P_b)\ (V_s)}{(t_s + 460)\ (\Theta)}\right]$$

R-0047 rev. 9-91

ENTROPY

ISOKINETIC METERBOX FULLTEST CALIBRATION

Meterbox No. N13 Calibrated By FGM

Date 5-7-92 Barometric Pressure (P_b) 29.7 (In. Hg)

Standard Meter No. 1054682 Standard Meter Coefficient .9940

STANDARD METER			METERBOX METERING SYSTEM				
Gas Volume (V_{ds}) cf	Temp. (t_{ds}) °F	Time (Θ) Min.	Orifice Setting (ΔH) In. H2O	Gas Volume (V_d) cf	Temp. (t_d) °F	Coeff. (Y_d)	ΔH@ In. H_2O
5.071	68	13	0.5	5.204	88	1.0040	1.816
5.021		13	0.5	5.257	97	1.0003	1.812
5.386		7	2.0	5.684	106	1.0047	1.807
5.344		7	2.0	5.606	104	1.0072	1.842
5.919	69	5	4.8	6.075	98.5	1.0105	1.864
5.925	69	5	4.8	6.068	98.5	1.0127	1.860
					Average	1.0066	1.834

1. Coefficient range: 0.97-1.03.
2. Coefficient tolerance: for individual runs, ± 0.02 from average.
3. ΔH@ range: 1.6-2.0.
4. ΔH@ tolerance: ≤ 0.15 In. H_2O over ΔH range of 0.4 In.-4.0 In.

$$Y_d = \frac{Y_{ds} * V_{ds} * (t_d + 460) * P_b}{V_d * (t_{ds} + 460) * (P_b + \{\Delta H / 13.6\})}$$

$$\Delta H@ = \frac{0.0319 * \Delta H}{P_b * (t_d + 460)} * \left[\frac{(t_{ds} + 460) * \Theta}{Y_{ds} * V_{ds}}\right]^2$$

R-0030 rev. 10-91

ENTROPY

ISOKINETIC METERBOX POSTTEST CALIBRATION

METERBOX NO. N13

Date 8-21-92 Calibrated By PJ Job Number 4503

Barometric Pressure (P_b) 29.74 (In. Hg) Meterbox Vacuum 10 (In. Hg)

Standard Meter No. 6838323 Standard Meter Coeff. (Y_{ds}) .9980

STANDARD METER			METERBOX METERING SYSTEM				
Gas Volume (V_{ds}) cf	Temp. (t_{ds}) °F	Time (Θ) Min.	Orifice Setting (ΔH) In. H_2O	Gas Volume (V_d) cf	Temp. (t_d) °F	Coeff. (Y_d)	ΔH@ In. H_2O
5.684	71	13	0.6	5.742	86.5	1.0039	1.782
5.638	↓	↓	↓	5.746	90.5	1.0023	1.798
5.671				5.809	93.5	1.0027	1.768
					Average	1.0020	1.783

Fulltest Y_d 1.0066 Date 5-7-92 % Dev. 0.5 Allowed Dev.: ± 5%

$$Y_d = \frac{Y_{ds} * V_{ds} * (t_d + 460) * P_b}{V_d * (t_{ds} + 460) * (P_b + \{\Delta H / 13.6\})}$$

$$\Delta H@ = \frac{0.0319 * \Delta H}{P_b * (t_d + 460)} * \left[\frac{(t_{ds} + 460) * \Theta}{Y_{ds} * V_{ds}} \right]^2$$

R-0031 rev. 7-92

ENTROPY

Dry Gas Meter Identification: 1054682 Calibration by: WLS

PAGE 1 OF 2

Date: 8-14-91 Barometric Pressure (P_b): 29.82 in. Hg

ENTROPY ENVIRONMENTALISTS, INC.

*Date: ______ *Barometric Pressure (P_b): ______ in. Hg

	Spirometer Gas Volume (V_s) ft^3	Spirometer Temp. (t_s) °F	Dry Gas Meter Gas Volume (V_{ds}) ft^3	Dry Gas Meter Temp. (t_{ds}) °F	Pressure (Δp) in. H_2O	Time (O) min.	Flow Rate (Q)	Meter Meter Coeff. (Y_{ds})	Avg. Meter Coeff. ($\bar{Y}_{ds}$)
	2.76	75	2.808	74	-.26	10	.23	.9874	NA
	2.75		2.783	74	-.26		.23	.9869	
	2.76		2.788	74	-.26		.23	.9845	
	4.098		4.172	76	-.74		.55	.9859	
	4.089		4.149	76	-.74		.55	.9892	
	4.089		4.139	76	-.74		.55	.9916	
	4.927		4.988	76	-.60		.80	.9911	
	5.009		5.039	76	-.60		.80	.9974	
	4.964		5.024	76	-.60		.80	.9914	
	8.097		8.161	77	-1.4		2.10	1.0040	
	8.078		8.183	77	-1.4		2.10	.9970	
	7.987		8.110	77	-1.4		2.10	.9919	
	10.383		10.507	77	-2.1		3.45	.9971	
	10.300		10.423	77	-2.1		3.45	.9971	
	10.300		10.426	77	-2.1		3.45	.9968	
	12.523		12.685	78	-3.2		4.70	1.0007	

$$Y_{ds} = \frac{(V_s)(t_{ds} + 460)(P_b)}{(V_{ds})(t_s + 460)(P_b + (\Delta p / 13.6))}$$

Dry Gas Meter Identification: 1054682 Calibration by: WLS

Date: 8-14-91 Barometric Pressure (P_b): 29.82 in. Hg

ENTROPY ENVIRONMENTALISTS, INC.

*Date: ____ *Barometric Pressure (P_b): ____ in. Hg

	Spirometer Gas Volume (V_s) ft³	Spirometer Temp. (t_s) °F	Dry Gas Meter Gas Volume (V_{ds}) ft³	Dry Gas Meter Temp. (t_{ds}) °F	Pressure (Δp) in. H_2O	Time (O) min.	Flow Rate (Q)	Meter Meter Coeff. (Y_{ds})	Avg. Meter Coeff. ($\bar{Y}_{ds}$)
	12.259	75	12.456	78	-2.9	10	4.70	.9968	NA
	12.077	↓	12.277	78	-2.9	↓	4.70	.9964	↓
	13.661	↓	13.895	78	-3.6	↓	5.80	.9975	↓
	13.652	↓	13.894	78	-3.6	↓	5.80	.9969	↓
	13.452	↓	13.712	78	-3.6	↓	5.80	.9954	↓

Yds = .9940

$$Y_{ds} = \frac{(V_s)(t_{ds} + 460)(P_b)}{(V_{ds})(t_s + 460)(P_b + (\Delta p / 13.6))}$$

STANDARD DRY GAS METER CALIBRATION

Meter Number 6838323

Date 2-12-92 Auditor(s) MBC/PJ Barometric Press. (P_{bar}) 30.11

Spirometer Gas Volume Cubic Feet (V_s)	Spirometer Temp. °F (t_s)	Dry Gas Meter Gas Volume Cubic Feet (V_{ds})	Dry Gas Meter Temp. °F (t_{ds})	Pressure In. H_2O (ΔP)	Time Min. (Θ)	Test Flow Rate cfm	Calc'd Flow Rate cfm (Q)	Meter Coeff. Gamma (Y_{ds})
2.723	73.4	2.736	72	-.30	10	0.23	.2711	.9925
2.732	73.4	2.705	72	-.30		0.23	.2720	1.0081
2.796	73.4	2.759	72	-.31		0.23	.2784	1.0115
4.199	73.4	4.186	73	-.57		0.55	.4181	1.0010
4.190	73.4	4.201	73	-.58		0.55	.4175	.9980
4.217	74.3	4.172	73	-.58		0.55	.4199	1.0115
4.982	75.2	5.008	73	-.75		0.80	.4944	.9925
5.018	75.2	5.001	73	-.76		0.80	.4980	1.0011
4.973	75.2	5.006	74	-.76		0.80	.4935	.9930
7.814	75.2	7.838	74	-1.60		2.10	.7755	.9987
7.823	75.2	7.818	74	-1.62		2.10	.7764	1.0024
7.787	75.2	7.864	74	-1.62		2.10	.7728	.9919
10.064	75.2	10.134	74	-2.56		3.45	.9988	.9970
10.073	75.2	10.073	74	-2.60		3.45	.9997	.9962
10.055	75.2	10.114	74	-2.61		3.45	.9979	.9983
11.831	75.2	11.929	74	-3.50		4.70	1.174	.9981
11.767	76.1	11.914	74	-3.50		4.70	1.166	.9923
11.790	77.0	11.905	74	-3.50		4.70	1.166	.9933
13.179	77.0	13.311	74	-4.32		5.80	1.304	.9950
13.133	77.0	13.282	74	-4.32		5.80	1.299	.9938
13.069	77.0	13.259	74	-4.32		5.80	1.293	.9907
							Average	.9980

$$Y_{ds} = \frac{(V_s)\,(t_{ds} + 460)\,(P_{bar})}{(V_{ds})\,(t_s + 460)\,[P_{bar} + (\Delta P / 13.6)]}$$

$$Q = (17.64)\left[\frac{(P_b)\,(V_s)}{(t_s + 460)\,(\Theta)}\right]$$

R-0047 rev. 9-91

ENTROPY

ISOKINETIC METERBOX FULLTEST CALIBRATION

Meterbox No. N7

Calibrated By PJ

Date 7-6-92

Barometric Pressure (P_b) 29.42 (In. Hg)

Standard Meter No. 1017057

Standard Meter Coefficient .9868

STANDARD METER			METERBOX METERING SYSTEM				
Gas Volume (V_{ds}) cf	Temp. (t_{ds}) °F	Time (Θ) Min.	Orifice Setting (ΔH) In. H2O	Gas Volume (V_d) cf	Temp. (t_d) °F	Coeff. (Y_d)	ΔH@ In. H_2O
5.397	75	13	0.5	5.559	85.5	.9756	1.694
5.342		13	0.5	5.510	87.5	.9778	1.722
5.668		7	2.0	5.824	92	.9860	1.760
5.650		7	2.0	5.831	94.5	.9861	1.763
6.281		5	4.8	6.465	98.5	.9890	1.734
6.257		5	4.8	6.453	101	.9914	1.740
					Average	.9843	1.736

1. Coefficient range: 0.97-1.03.
2. Coefficient tolerance: for individual runs, ± 0.02 from average.
3. ΔH@ range: 1.6-2.0.
4. ΔH@ tolerance: ≤ 0.15 In. H_2O over ΔH range of 0.4 In.-4.0 In.

$$Y_d = \frac{Y_{ds} * V_{ds} * (t_d + 460) * P_b}{V_d * (t_{ds} + 460) * (P_b + \{\Delta H / 13.6\})}$$

$$\Delta H@ = \frac{0.0319 * \Delta H}{P_b * (t_d + 460)} * \left[\frac{(t_{ds} + 460) * \Theta}{Y_{ds} * V_{ds}}\right]^2$$

R-0030 rev. 10-91

ENTROPY

ISOKINETIC METERBOX POSTTEST CALIBRATION

METERBOX NO. N7

Date 8-28-92 Calibrated By FGM Job Number 4503

Barometric Pressure (P_b) 29.34 (In. Hg) Meterbox Vacuum 2 (In. Hg)

Standard Meter No. 1017057 Standard Meter Coeff. (Y_{ds}) .9868

STANDARD METER			METERBOX METERING SYSTEM				
Gas Volume (V_{ds}) cf	Temp. (t_{ds}) °F	Time (Θ) Min.	Orifice Setting (ΔH) In. H_2O	Gas Volume (V_d) cf	Temp. (t_d) °F	Coeff. (Y_d)	ΔH@ In. H_2O
6.040	75	13	0.6	6.245	87.5	.9752	1.678
6.021	↓	↓	↓	6.252	89	.9757	1.684
6.025	↓	↓	↓	6.262	91	.9763	1.676
					Average	.9757	1.679

Fulltest Y_d .9843 Date 7-6-92 % Dev. 0.9 Allowed Dev.: ± 5%

$$Y_d = \frac{Y_{ds} * V_{ds} * (t_d + 460) * P_b}{V_d * (t_{ds} + 460) * (P_b + \{\Delta H / 13.6\})}$$

$$\Delta H@ = \frac{0.0319 * \Delta H}{P_b * (t_d + 460)} * \left[\frac{(t_{ds} + 460) * \Theta}{Y_{ds} * V_{ds}}\right]^2$$

STANDARD DRY GAS METER CALIBRATION

Meter Number 1017057

Date 2-11-92 Auditor(s) MBC/PJ Barometric Press. (P_{bar}) 30.1

Spirometer Gas Volume Cubic Feet (V_s)	Spirometer Temp. °F (t_s)	Dry Gas Meter Gas Volume Cubic Feet (V_{ds})	Dry Gas Meter Temp. °F (t_{ds})	Pressure In. H_2O (ΔP)	Time Min. (Θ)	Test Flow Rate cfm	Calc'd Flow Rate cfm (Q)	Meter Coeff. Gamma (Y_{ds})
2.641	73.4	2.655	70	-.29	10	0.23	.2629	.9891
2.587	73.4	2.593	70	-.29		0.23	.2575	.9920
2.668	75.2	2.644	71	-.30		0.23	.2647	1.0019
3.934	75.2	3.978	72	-.53		0.55	.3903	.9843
3.907	75.2	3.935	72	-.53		0.55	.3876	.9882
3.944	75.2	3.971	72	-.54		0.55	.3913	.9886
4.663	75.2	4.749	73	-.69		0.80	.4626	.9795
4.690	75.2	4.738	73	-.70		0.80	.4653	.9875
4.699	75.2	4.731	73	-.71		0.80	.4662	.9909
7.614	75.2	7.764	73	-1.60		2.10	.7554	.9805
7.687	75.2	7.858	73	-1.61		2.10	.7626	.9781
7.769	75.2	7.883	73	-1.62		2.10	.7708	.9854
9.954	73.4	10.193	73	-2.60		3.45	.9909	.9821
10.000	73.4	10.220	73	-2.62		3.45	.9954	.9840
10.046	73.4	10.260	73	-2.61		3.45	1.000	.9847
11.876	73.4	12.082	73	-3.60		4.70	1.182	.9909
11.894	73.4	12.069	72	-3.60		4.70	1.184	.9916
11.858	73.4	12.098	72	-3.60		4.70	1.180	.9863
13.115	73.4	13.377	72	-4.32		5.80	1.306	.9883
13.097	75.2	13.368	72	-4.36		5.80	1.299	.9844
13.097	75.2	13.370	72	-4.40		5.80	1.299	.9843
							Average	.9868

$$Y_{ds} = \frac{(V_s)\ (t_{ds} + 460)\ (P_{bar})}{(V_{ds})\ (t_s + 460)\ [P_{bar} + (\Delta P / 13.6)]}$$

$$Q = (17.64) \left[\frac{(P_b)\ (V_s)}{(t_s + 460)\ (\Theta)}\right]$$

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ENTROPY

APPENDIX G

APPENDIX H

Method 201A—Determination of PM_{10} Emissions (Constant Sampling Rate Procedure)

1. Applicability and Principle

1.1 Applicability. This method applies to the in-stack measurement of particulate matter (PM) emissions equal to or less than an aerodynamic diameter of nominally 10 (PM_{10}) from stationary sources. The EPA recognizes that condensible emissions not collected by an in-stack method are also PM_{10}, and that emissions that contribute to ambient PM_{10} levels are the sum of condensible emissions and emissions measured by an in-stack PM_{10} method, such as this method or Method 201. Therefore, for establishing source contributions to ambient levels of PM_{10}, such as for emission inventory purposes, EPA suggests that source PM_{10} measurement include both in-stack PM_{10} and condensible emissions. Condensible emissions may be measured by an impinger analysis in combination with this method.

1.2 Principle. A gas sample is extracted at a constant flow rate through an in-stack sizing device, which separates PM greater than PM_{10}. Variations from isokinetic sampling conditions are maintained within well-defined limits. The particulate mass is determined gravimetrically after removal of uncombined water.

2. Apparatus

Note: Methods cited in this method are part of 40 CFR part 60, appendix A.

2.1 Sampling Train. A schematic of the Method 201A sampling train is shown in Figure 1 of this method. With the exception of the PM_{10} sizing device and in-stack filter, this train is the same as an EPA Method 17 train.

2.1.1 Nozzle. Stainless steel (316 or equivalent) with a sharp tapered leading edge. Eleven nozzles that meet the design specification in Figure 2 of this method are recommended. A larger number of nozzles with small nozzle increments increase the likelihood that a single nozzle can be used for the entire traverse. If the nozzles do not meet the design specifications in Figure 2 of this method, then the nozzles must meet the criteria in Section 5.2 of this method.

2.1.2 PM_{10} Sizer. Stainless steel (316 or equivalent), capable of determining the PM_{10} fraction. The sizing device shall be either a cyclone that meets the specifications in Section 5.2 of this method or a cascade impactor that has been calibrated using the procedure in Section 5.4 of this method.

2.1.3 Filter Holder. 63-mm, stainless steel. An Andersen filter, part number SE274, has been found to be acceptable for the in-stack filter. Note: Mention of trade names or specific products does not constitute endorsement by the Environmental Protection Agency.

2.1.4 Pitot Tube. Same as in Method 5, Section 2.1.3. The pitot lines shall be made of heat resistant tubing and attached to the probe with stainless steel fittings.

2.1.5 Probe Liner. Optional, same as in Method 5, Section 2.1.2.

2.1.6 Differential Pressure Gauge, Condenser, Metering System, Barometer, and Gas Density Determination Equipment. Same as in Method 5, Sections 2.1.4, and 2.1.7 through 2.1.10, respectively.

2.2 Sample Recovery.

2.2.1 Nozzle, Sizing Device, Probe, and Filter Holder Brushes. Nylon bristle brushes with stainless steel wire shafts and handles, properly sized and shaped for cleaning the nozzle, sizing dedvice, probe or probe liner, and filter holders.

2.2.2 Wash Bottles, Glass Sample Storage Containers, Petri Dishes, Graduated Cylinder and Balance, Plastic Storage Containers, Funnel and Rubber Policeman, and Funnel. Same as in Method 5, Sections 2.2.2 through 2.2.8, respectively.

2.3 Analysis. Same as in Method 5, Section 2.3.

3. Reagents

The reagents for sampling, sample recovery, and analysis are the same as that specified in Method 5, Sections 3.1, 3.2, and 3.3, respectively.

4. Procedure

4.1 Sampling. The complexity of this method is such that, in order to obtain reliable results, testers should be trained and experienced with the test procedures.

4.1.1 Pretest Preparation. Same as in Method 5, Section 4.1.1.

4.1.2 Preliminary Determinations. Same as in Method 5, Section 4.1.2, except use the directions on nozzle size selection and sampling time in this method. Use of any nozzle greater than 0.16 in. in diameter require a sampling port diameter of 6 inches. Also, the required maximum number of traverse points at any location shall be 12.

4.1.2.1 The sizing device must be in-stack or maintained at stack temperature during sampling. The blockage effect of the CSR sampling assembly will be minimal if the cross-sectional area of the sampling assembly is 3 percent or less of the cross-sectional area of the duct. If the cross-sectional area of the assembly is greater than 3 percent of the cross-sectional area of the duct, then either determine the pitot coefficient at sampling conditions or use a standard pitot with a known coefficient in a configuration with the CSR sampling assembly such that flow disturbances are minimized.

4.1.2.2 The setup calculations can be performed by using the following procedures.

4.1.2.2.1 In order to maintain a cut size of 10 μm in the sizing device, the flow rate through the sizing device must be maintained at a constant, discrete value during the run. If the sizing device is a cyclone that meets the design specifications in Figure 3 of this method, use the equations in Figure 4 of this method to calculate three orifice heads (ΔH): one at the average stack temperature, and the other two at temperatures ±28 °C (±50 °F) of the average stack temperature. Use ΔH calculated at the average stack temperature as the pressure head for the sample flow rate as long as the stack temperature during the run is within 28 °C (50 °F) of the average stack temperature. If the stack temperature varies by more than 28 °C (50 °F), then use the appropriate ΔH.

4.1.2.2.2 If the sizing device is a cyclone that does not meet the design specifications in Figure 3 of this method, use the equations in Figure 4 of this method, except use the procedures in Section 5.3 of this method to determine Q_s, the correct cyclone flow rate for a 10 μm size.

4.1.2.2.3 To select a nozzle, use the equations in Figure 5 of this method to calculate Δp_{min} and Δp_{max} for each nozzle at all three temperatures. If the sizing device is a cyclone that does not meet the design specifications in Figure 3 of this method, the example worksheets can be used.

4.1.2.2.4 Correct the Method 2 pitot readings to Method 201A pitot readings by multiplying the Method 2 pitot readings by the square of a ratio of the Method 201A pitot coefficient to the Method 2 pitot coefficient. Select the nozzle for which Δp_{min} and Δp_{max} bracket all of the corrected Method 2 pitot readings. If more than one nozzle meets this requirement, select the nozzle giving the greatest symmetry. Note that if the expected pitot reading for one or more points is near a limit for a chosen nozzle, it may be outside the limits at the time of the run.

4.1.2.2.5 Vary the dwell time, or sampling time, at each traverse point proportionately with the point velocity. Use the equations in Figure 6 of this method to calculate the dwell time at the first point and at each subsequent point. It is recommended that the number of minutes sampled at each point be rounded to the nearest 15 seconds.

4.1.3 Preparation of Collection Train. Same as in Method 5, Section 4.1.3, except omit directions about a glass cyclone.

4.1.4 Leak-Check Procedure. The sizing device is removed before the post-test leak-check to prevent any disturbance of the collected sample prior to analysis.

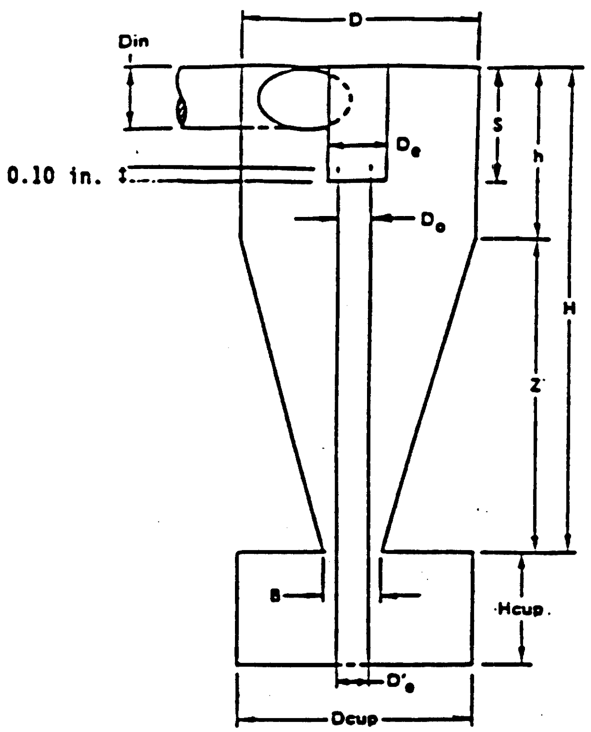
4.1.4.1 Pretest Leak-Check. A pretest leak-check of the entire sampling train, including the sizing device, is required. Use the leak-check procedure in Method 5, Section 4.1.4.1 to conduct a pretest leak-check.

4.1.4.2 Leak-Checks During Sample Run. Same as in Method 5, Section 4.1.4.1.

4.1.4.3 Post-Test Leak-Check. A leak-check is required at the conclusion of each sampling run. Remove the cyclone before the leak-check to prevent the vacuum created by the cooling of the probe from disturbing the collected sample and use the procedure in Method 5, Section 4.1.4.3 to conduct a post-test leak-check.

4.1.5 Method 201A Train Operation. Same as in Method 5, Section 4.1.5, except use the procedures in this section for isokinetic sampling and flow rate adjustment. Maintain the flow rate calculated in Section 4.1.2.2.1 of this method throughout the run provided the stack temperature is within 28 °C (50 °F) of the temperature used to calculate ΔH. If stack temperatures vary by more than 28 °C (50 °F), use the appropriate ΔH value calculated in Section 4.1.2.2.1 of this method. Calculate the dwell time at each traverse point as in Figure 6 of this method.

Cyclone Interior Dimensions



	Dimensions (±0.02 cm, ±0.01 in.)											
	Din	D	De	B	H	h	Z	S	Hcup	Dcup	D'_e	D_o
cm	1.27	4.47	1.50	1.88	6.95	2.24	4.71	1.57	2.25	4.45	1.02	1.24
inches	0.50	1.76	0.59	0.74	2.74	0.88	1.85	0.62	0.89	1.75	0.40	0.49

Figure 3. Cyclone design specifications.

Barometric pressure.
P_{bar}, in. Hg = ________
Stack static pressure.
P_g, in. H_2O = ________
Average stack temperature.
t_s, °F = ________
Meter temperature, t_m, °F = ________
Orifice $\Delta H_@$, in. H_2O = ________
Gas analysis:
$\%CO_2$ = ________
$\%O_2$ = ________
$\%N_2 + \%CO$ = ________
Fraction moisture content.
B_{ws} = ________
Molecular weight of stack gas, dry basis:
$M_d = 0.44\ (\%CO_2) + 0.32\ (\%O_2) + 0.28\ (\%N_2 + \%CO)$ = ________ lb/lb mole
Molecular weight of stack gas, wet basis:
$M_w = M_d\ (1-B_{ws}) + 18\ (B_{ws})$ = ________ lb/lb mole
Absolute stack pressure:

$$P_s = P_{bar} + \frac{P_g}{13.6} = \text{\_\_\_\_\_\_\_\_ in. Hg}$$

Viscosity of stack gas:
$\mu_s = 152.418 + 0.2552\ t_s + 3.2355 \times 10^{-5}\ t_s^2 + 0.53147\ (\%O_2) - 74.143\ B_{ws}$ = ________ micropoise
Cyclone flow rate:

$$Q_s = 0.002837\ \mu_s \left[\frac{(t_s+460)}{M_w P_s}\right]^{0.2949} = \text{\_\_\_\_\_\_\_\_ ft}^3\text{/min}$$

Figure 4. Example worksheet 1, cyclone flow rate and ΔH.

Orifice pressure head (ΔH) needed for cyclone flow rate:

$$\Delta H = \left[\frac{Q_s\ (1-B_{ws})\ P_s}{t_s+460}\right]^2 \frac{(t_m+460) M_d\ 1.083\ \Delta H_@}{P_{bar}} = \text{\_\_\_\_\_\_\_\_ in. } H_2O$$

$$\Delta p_{max} = 1.3686 \times 10^{-4} \frac{P_s M_w (v_{max})^2}{(t_s + 460) C_p^2} = \text{\_\_\_\_\_\_\_\_} \text{ in. } H_2O$$

Nozzle No.				
D_n, in.				
v_n, ft/sec				
v_{min}, ft/sec				
v_{max}, ft/sec				
Δp_{min}, in. H_2O				
Δp_{max}, in. H_2O				

Velocity traverse data:

$$\Delta p(\text{Method 201A}) = \Delta p(\text{Method 2}) \left[\frac{C_p}{C_p'} \right]^2$$

Total run time, minutes = ________
Number of traverse points = ________

$$t_1 = \left[\frac{\Delta p'_1}{\Delta p'_{avg}} \right]^{1/2} \frac{(\text{Total run time})}{(\text{Number of points})}$$

where:

t_1 = dwell time at first traverse point, minutes.

$\Delta p'_1$ = the velocity head at the first traverse point (from a previous traverse), in. H_2O.

$\Delta p'_{avg}$ = the square of the average square root of the Δp's (from a previous velocity traverse), in. H_2O.

At subsequent traverse points, measure the velocity Δp and calculate the dwell time by using the following equation:

$$t_n = \frac{t_1}{(\Delta p_1)^{1/2}} (\Delta p_n)^{1/2}, \quad n = 2, 3, \ldots \text{ total number of sampling points}$$

TABLE 2.—PARTICLE SIZES AND NOMINAL GAS VELOCITIES FOR EFFICIENCY

Particle size (μm)[a]	Target gas velocities (m/sec)		
	7 ± 1.0	15 ± 1.5	25 ± 2.5
5 ± 0.5			
7 ± 0.5			
10 ± 0.5			
14 ± 1.0			
20 ± 1.0			

[a] Mass median aerodynamic diameter.

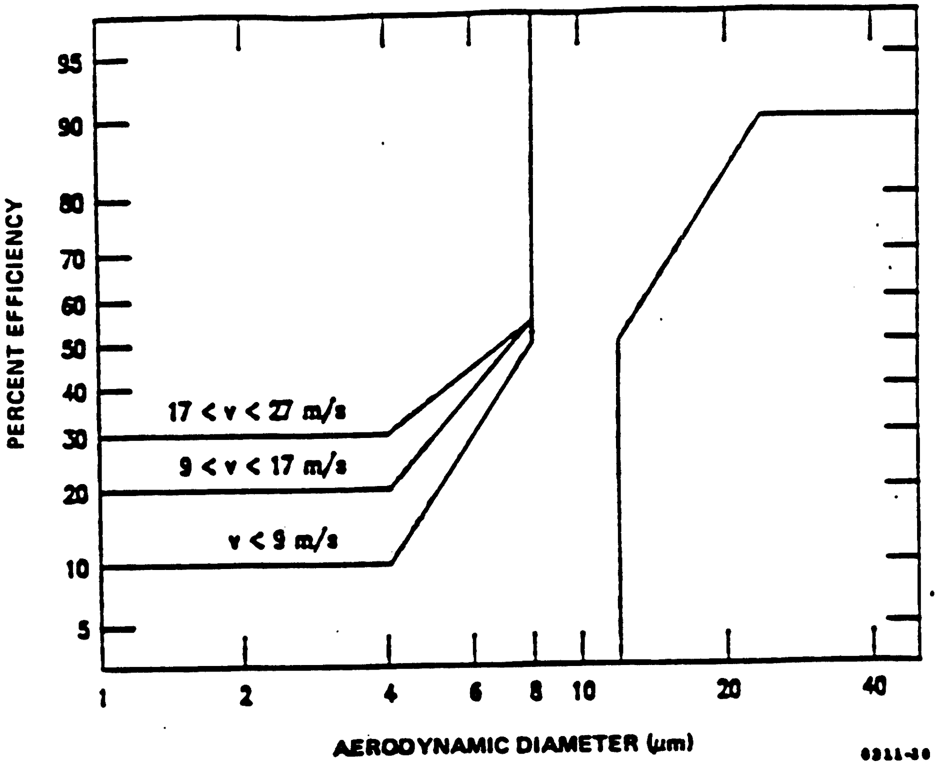


Figure 8. Efficiency envelope for the PM_{10} cyclone.

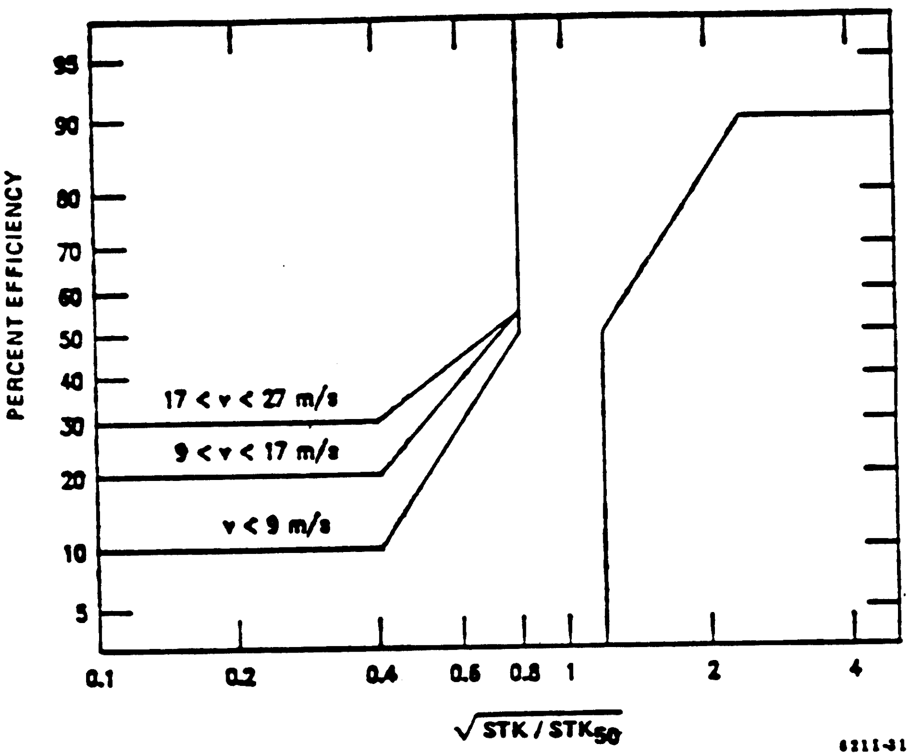


Figure 9. Efficiency envelope for first calibration stage.

APPENDIX I

08-19-1992

TIME	CH1 SCREEN N-E-S-W DEGREES	CH2 SCREEN VELOCITY MPH	CH3	CH4	CH5	CH6	CH7	CH8	V
10:22:59	261.64	0.87	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10:27:59	296.99	0.43	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10:32:59	278.82	0.82	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10:38:02	257.31	0.81	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10:42:59	291.76	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10:47:59	32.95	-0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10:52:59	256.40	0.06	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10:57:59	276.74	-0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00
11:03:02	290.63	-0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00
11:07:59	228.72	-0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00
11:12:59	248.71	0.80	0.00	0.00	0.00	0.00	0.00	0.00	0.00
11:17:59	257.84	-0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
11:23:02	262.13	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00
11:27:59	301.75	-0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
11:32:59	213.32	0.43	0.00	0.00	0.00	0.00	0.00	0.00	0.00
11:37:59	291.58	0.75	0.00	0.00	0.00	0.00	0.00	0.00	0.00
11:42:59	269.77	0.71	0.00	0.00	0.00	0.00	0.00	0.00	0.00
11:48:02	279.13	0.39	0.00	0.00	0.00	0.00	0.00	0.00	0.00
11:52:59	246.12	1.79	0.00	0.00	0.00	0.00	0.00	0.00	0.00
11:57:59	285.30	1.99	0.00	0.00	0.00	0.00	0.00	0.00	0.00
12:02:59	250.36	1.47	0.00	0.00	0.00	0.00	0.00	0.00	0.00
12:08:02	274.49	2.12	0.00	0.00	0.00	0.00	0.00	0.00	0.00
12:12:59	250.40	1.26	0.00	0.00	0.00	0.00	0.00	0.00	0.00

AVERAGES for	07:18:23	TO	12:17:59
1		160.9269	
2		.323318	
3		0	
4		0	
5		0	
6		0	
7		0	
8		0	

12:18:00	245.75	0.91	0.00	0.00	0.00	0.00	0.00	0.00	0.00
12:22:59	266.83	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00
12:28:02	210.53	1.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00
12:32:59	233.53	2.55	0.00	0.00	0.00	0.00	0.00	0.00	0.00
12:37:59	261.88	1.20	0.00	0.00	0.00	0.00	0.00	0.00	0.00
12:42:59	258.29	1.18	0.00	0.00	0.00	0.00	0.00	0.00	0.00
12:47:59	234.63	3.68	0.00	0.00	0.00	0.00	0.00	0.00	0.00
12:53:02	247.83	4.24	0.00	0.00	0.00	0.00	0.00	0.00	0.00
12:57:59	270.80	1.67	0.00	0.00	0.00	0.00	0.00	0.00	0.00
13:02:59	248.99	2.58	0.00	0.00	0.00	0.00	0.00	0.00	0.00
13:07:59	233.37	2.31	0.00	0.00	0.00	0.00	0.00	0.00	0.00
13:12:59	239.87	3.99	0.00	0.00	0.00	0.00	0.00	0.00	0.00
.3:18:02	250.41	1.43	0.00	0.00	0.00	0.00	0.00	0.00	0.00
13:22:59	298.11	0.15	0.00	0.00	0.00	0.00	0.00	0.00	0.00
13:27:59	237.30	1.56	0.00	0.00	0.00	0.00	0.00	0.00	0.00
13:32:59	269.67	2.46	0.00	0.00	0.00	0.00	0.00	0.00	0.00
13:38:02	262.14	1.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00
13:42:59	155.04	1.14	0.00	0.00	0.00	0.00	0.00	0.00	0.00
13:47:59	299.67	0.30	0.00	0.00	0.00	0.00	0.00	0.00	0.00

08-24-1992

TIME	CH1	CH2	CH3	CH4	CH5	CH6	CH7	CH8
	screen direction degrees	screen velocity mph						
07:53:59	91.25	-0.03	0.00	0.00	0.00	0.00	0.00	0.00
07:55:59	46.07	-0.00	0.00	0.00	0.00	0.00	0.00	0.00
07:57:59	100.41	-0.04	0.00	0.00	0.00	0.00	0.00	0.00
07:59:59	91.93	-0.07	0.00	0.00	0.00	0.00	0.00	0.00
08:01:59	92.57	0.15	0.00	0.00	0.00	0.00	0.00	0.00
08:03:59	81.13	-0.10	0.00	0.00	0.00	0.00	0.00	0.00
08:05:59	105.66	-0.10	0.00	0.00	0.00	0.00	0.00	0.00
08:07:59	110.93	-0.06	0.00	0.00	0.00	0.00	0.00	0.00
08:09:59	75.80	-0.10	0.00	0.00	0.00	0.00	0.00	0.00
08:12:02	63.01	-0.10	0.00	0.00	0.00	0.00	0.00	0.00
08:13:59	96.83	0.17	0.00	0.00	0.00	0.00	0.00	0.00
08:15:59	119.16	-0.08	0.00	0.00	0.00	0.00	0.00	0.00
08:17:59	80.87	-0.10	0.00	0.00	0.00	0.00	0.00	0.00
08:19:59	104.05	0.05	0.00	0.00	0.00	0.00	0.00	0.00
08:21:59	103.66	-0.06	0.00	0.00	0.00	0.00	0.00	0.00
08:23:59	111.66	0.05	0.00	0.00	0.00	0.00	0.00	0.00
08:25:59	114.06	0.33	0.00	0.00	0.00	0.00	0.00	0.00
08:27:59	119.70	0.19	0.00	0.00	0.00	0.00	0.00	0.00
08:29:59	109.78	0.20	0.00	0.00	0.00	0.00	0.00	0.00
08:31:59	102.70	0.09	0.00	0.00	0.00	0.00	0.00	0.00
08:34:02	65.43	0.16	0.00	0.00	0.00	0.00	0.00	0.00
08:35:59	88.27	0.63	0.00	0.00	0.00	0.00	0.00	0.00
08:37:59	80.21	1.15	0.00	0.00	0.00	0.00	0.00	0.00
08:39:59	94.71	0.53	0.00	0.00	0.00	0.00	0.00	0.00
08:41:59	88.38	-0.07	0.00	0.00	0.00	0.00	0.00	0.00
08:43:59	77.65	-0.05	0.00	0.00	0.00	0.00	0.00	0.00
08:45:59	58.05	0.02	0.00	0.00	0.00	0.00	0.00	0.00
08:47:59	93.76	0.54	0.00	0.00	0.00	0.00	0.00	0.00
08:49:59	75.06	0.42	0.00	0.00	0.00	0.00	0.00	0.00
08:51:59	103.76	0.48	0.00	0.00	0.00	0.00	0.00	0.00
08:53:59	90.66	2.13	0.00	0.00	0.00	0.00	0.00	0.00
08:56:02	74.65	1.01	0.00	0.00	0.00	0.00	0.00	0.00
08:57:59	66.11	0.92	0.00	0.00	0.00	0.00	0.00	0.00
08:59:59	72.86	0.61	0.00	0.00	0.00	0.00	0.00	0.00
09:01:59	71.25	0.60	0.00	0.00	0.00	0.00	0.00	0.00
09:03:59	99.21	0.14	0.00	0.00	0.00	0.00	0.00	0.00
09:05:59	82.38	1.05	0.00	0.00	0.00	0.00	0.00	0.00
09:07:59	89.78	1.69	0.00	0.00	0.00	0.00	0.00	0.00
09:09:59	78.46	0.87	0.00	0.00	0.00	0.00	0.00	0.00
09:11:59	91.31	2.32	0.00	0.00	0.00	0.00	0.00	0.00
09:13:59	87.62	1.44	0.00	0.00	0.00	0.00	0.00	0.00
09:16:02	87.28	2.54	0.00	0.00	0.00	0.00	0.00	0.00
09:17:59	84.86	1.98	0.00	0.00	0.00	0.00	0.00	0.00
09:19:59	86.99	1.53	0.00	0.00	0.00	0.00	0.00	0.00
09:21:59	85.72	1.40	0.00	0.00	0.00	0.00	0.00	0.00
09:23:59	88.48	0.24	0.00	0.00	0.00	0.00	0.00	0.00
09:25:59	70.78	0.65	0.00	0.00	0.00	0.00	0.00	0.00
09:27:59	55.05	1.54	0.00	0.00	0.00	0.00	0.00	0.00
09:29:59	81.59	0.08	0.00	0.00	0.00	0.00	0.00	0.00
09:31:59	76.19	1.39	0.00	0.00	0.00	0.00	0.00	0.00
09:33:59	64.01	0.45	0.00	0.00	0.00	0.00	0.00	0.00
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

09:41:59	56.55	0.10	0.00	0.00	0.00	0.00	0.00	0.00	0.00
09:43:59	73.24	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00
09:45:59	63.09	0.26	0.00	0.00	0.00	0.00	0.00	0.00	0.00
09:47:59	90.99	0.21	0.00	0.00	0.00	0.00	0.00	0.00	0.00
09:49:59	73.57	0.15	0.00	0.00	0.00	0.00	0.00	0.00	0.00

AVERAGES for	07:52:16	TO	09:51:59
1		83.44863	
2		.5410793	
3		0	
4		0	
5		0	
6		0	
7		0	
8		0	

09:51:59	40.77	0.42	0.00	0.00	0.00	0.00	0.00	0.00	0.00
09:53:59	45.86	0.06	0.00	0.00	0.00	0.00	0.00	0.00	0.00
09:55:59	77.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00
09:57:59	66.48	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10:00:02	85.03	0.14	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10:01:59	34.78	0.13	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10:03:59	67.93	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10:05:59	111.91	0.11	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10:07:59	73.24	0.06	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10:09:59	57.11	1.07	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10:11:59	76.32	1.32	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0:13:59	99.25	0.57	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10:15:59	69.73	1.16	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10:17:59	70.09	0.70	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10:19:59	90.04	1.57	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10:22:02	89.47	1.17	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10:23:59	93.48	1.76	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10:25:59	55.74	1.08	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10:27:59	70.36	0.67	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10:29:59	101.65	0.33	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10:31:59	106.47	0.55	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10:33:59	76.95	0.17	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10:35:59	151.28	0.12	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10:37:59	96.68	1.11	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10:39:59	99.54	1.67	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10:42:02	110.25	0.54	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10:43:59	76.16	0.11	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10:45:59	76.23	0.68	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10:47:59	99.79	0.17	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10:49:59	122.08	0.43	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10:51:59	146.93	0.72	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10:53:59	139.31	0.44	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10:55:59	125.44	0.58	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10:57:59	99.97	1.27	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10:59:59	138.52	0.34	0.00	0.00	0.00	0.00	0.00	0.00	0.00
11:01:59	176.05	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00
11:04:02	144.40	0.12	0.00	0.00	0.00	0.00	0.00	0.00	0.00
11:05:59	63.03	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00
[illegible]	[illegible]	[illegible]	0.00	0.00	0.00	0.00	0.00	0.00	0.00
[illegible]	[illegible]	[illegible]	0.00	0.00	0.00	0.00	0.00	0.00	0.00
[illegible]	[illegible]	[illegible]	0.00	0.00	0.00	0.00	0.00	0.00	0.00
[illegible]	[illegible]	[illegible]	0.00	0.00	0.00	0.00	0.00	0.00	0.00
[illegible]	[illegible]	[illegible]	0.00	0.00	0.00	0.00	0.00	0.00	0.00
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

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[illegible]	[illegible]	0.45	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
11:43:59	155.46	0.51	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
11:46:02	67.71	0.60	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
11:47:59	72.16	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
11:49:59	[illegible]	0.76	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
11:51:59	176.[illegible]	0.24	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
11:53:59	126.27	0.26	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
11:55:59	163.10	0.17	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
11:57:59	92.05	0.49	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
11:59:59	106.62	0.40	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
12:01:59	91.21	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
12:03:59	81.06	0.81	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
12:05:59	60.31	1.09	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
12:08:02	186.87	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
12:09:59	147.17	0.39	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
12:11:59	93.47	0.58	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
12:13:59	171.30	0.09	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
12:15:59	121.04	0.35	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
12:17:59	98.15	0.80	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
12:19:59	93.14	0.69	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
12:21:59	150.88	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
12:23:59	132.23	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
12:25:59	154.78	0.88	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
12:28:02	103.50	0.12	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
12:29:59	72.71	1.37	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
12:31:59	71.41	2.73	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
12:33:59	81.59	2.32	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
12:35:59	62.84	1.88	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
12:37:59	64.10	0.69	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
12:39:59	56.57	1.06	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

	direction degrees	velocity mph							
12:41:59	138.48	0.47	0.00	0.00	0.00	0.00	0.00	0.00	0.00

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	direction degrees	velocity mph							
12:43:59	77.68	0.33	0.00	0.00	0.00	0.00	0.00	0.00	0.00
12:45:59	122.44	0.61	0.00	0.00	0.00	0.00	0.00	0.00	0.00
12:47:59	126.36	1.07	0.00	0.00	0.00	0.00	0.00	0.00	0.00
12:50:02	146.66	0.23	0.00	0.00	0.00	0.00	0.00	0.00	0.00
7:51:59	211.16	1.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00
.2:53:59	222.55	2.44	0.00	0.00	0.00	0.00	0.00	0.00	0.00
12:55:59	186.47	0.16	0.00	0.00	0.00	0.00	0.00	0.00	0.00
12:57:59	138.37	1.40	0.00	0.00	0.00	0.00	0.00	0.00	0.00
12:59:59	119.86	1.21	0.00	0.00	0.00	0.00	0.00	0.00	0.00
13:01:59	201.87	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00
13:03:59	174.48	0.09	0.00	0.00	0.00	0.00	0.00	0.00	0.00
13:05:59	201.47	0.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00
13:07:59	160.23	0.07	0.00	0.00	0.00	0.00	0.00	0.00	0.00
13:09:59	99.22	0.41	0.00	0.00	0.00	0.00	0.00	0.00	0.00
13:12:02	78.28	0.24	0.00	0.00	0.00	0.00	0.00	0.00	0.00
13:13:59	60.15	0.38	0.00	0.00	0.00	0.00	0.00	0.00	0.00
13:15:59	89.39	0.79	0.00	0.00	0.00	0.00	0.00	0.00	0.00
13:17:59	230.88	0.61	0.00	0.00	0.00	0.00	0.00	0.00	0.00
13:19:59	212.16	1.42	0.00	0.00	0.00	0.00	0.00	0.00	0.00
13:21:59	244.53	0.26	0.00	0.00	0.00	0.00	0.00	0.00	0.00
13:23:59	220.55	0.39	0.00	0.00	0.00	0.00	0.00	0.00	0.00
13:25:59	198.43	0.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00
13:27:59	158.71	1.20	0.00	0.00	0.00	0.00	0.00	0.00	0.00
13:29:59	116.03	0.17	0.00	0.00	0.00	0.00	0.00	0.00	0.00
13:32:02	91.47	0.09	0.00	0.00	0.00	0.00	0.00	0.00	0.00
13:33:59	216.44	0.17	0.00	0.00	0.00	0.00	0.00	0.00	0.00
13:35:59	213.08	0.09	0.00	0.00	0.00	0.00	0.00	0.00	0.00
13:37:59	239.06	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00
13:39:59	233.41	1.43	0.00	0.00	0.00	0.00	0.00	0.00	0.00
7:41:59	224.91	0.83	0.00	0.00	0.00	0.00	0.00	0.00	0.00
.3:43:59	197.46	0.56	0.00	0.00	0.00	0.00	0.00	0.00	0.00
13:45:59	171.37	-0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
13:47:59	78.57	0.48	0.00	0.00	0.00	0.00	0.00	0.00	0.00
13:49:59	92.94	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
13:52:02	202.44	0.09	0.00	0.00	0.00	0.00	0.00	0.00	0.00
13:53:59	125.96	0.29	0.00	0.00	0.00	0.00	0.00	0.00	0.00
13:55:59	194.30	0.54	0.00	0.00	0.00	0.00	0.00	0.00	0.00
13:57:59	188.44	0.11	0.00	0.00	0.00	0.00	0.00	0.00	0.00
13:59:59	198.29	0.24	0.00	0.00	0.00	0.00	0.00	0.00	0.00
14:01:59	193.97	0.07	0.00	0.00	0.00	0.00	0.00	0.00	0.00
14:03:59	180.83	0.53	0.00	0.00	0.00	0.00	0.00	0.00	0.00
14:05:59	164.75	0.07	0.00	0.00	0.00	0.00	0.00	0.00	0.00
14:07:59	200.75	0.16	0.00	0.00	0.00	0.00	0.00	0.00	0.00
14:09:59	211.50	0.36	0.00	0.00	0.00	0.00	0.00	0.00	0.00
14:11:59	209.08	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
14:14:02	87.54	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
14:15:59	273.06	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00
14:17:59	202.69	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00
14:19:59	201.84	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00
14:21:59	189.62	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00
14:23:59	151.96	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
14:25:59	150.56	0.09	0.00	0.00	0.00	0.00	0.00	0.00	0.00
14:27:59	149.47	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00
14:29:59	160.21	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00
14:31:59	226.16	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4:33:59	221.82	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00
14:36:02	186.80	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00
14:37:59	194.53	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00
14:39:59	222.94	0.31	0.00	0.00	0.00	0.00	0.00	0.00	0.00
14:41:59	232.73	0.74	0.00	0.00	0.00	0.00	0.00	0.00	0.00
14:43:59	225.56	0.77	0.00	0.00	0.00	0.00	0.00	0.00	0.00
14:45:59	212.79	0.15	0.00	0.00	0.00	0.00	0.00	0.00	0.00

14:51:59	213.07	0.39	0.00	0.00	0.00	0.00	0.00	0.00	0.00
14:53:59	190.41	0.16	0.00	0.00	0.00	0.00	0.00	0.00	0.00
14:55:59	223.91	0.15	0.00	0.00	0.00	0.00	0.00	0.00	0.00

08-25-1991

TIME	CH1 Screen Direction Degrees	CH2 Screen Velocity MPH	CH3	CH4	CH5	CH6	CH7	CH8	V
08:11:59	267.46	-0.15	0.00	0.00	0.00	0.00	0.00	0.00	0.00
08:13:59	268.06	-0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00
08:15:59	268.62	-0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00
08:17:59	270.47	-0.06	0.00	0.00	0.00	0.00	0.00	0.00	0.00
08:19:59	271.85	-0.07	0.00	0.00	0.00	0.00	0.00	0.00	0.00
08:21:59	277.49	-0.08	0.00	0.00	0.00	0.00	0.00	0.00	0.00
08:23:59	278.60	-0.09	0.00	0.00	0.00	0.00	0.00	0.00	0.00
08:25:59	278.91	-0.09	0.00	0.00	0.00	0.00	0.00	0.00	0.00
08:27:59	278.59	-0.10	0.00	0.00	0.00	0.00	0.00	0.00	-0.00
08:30:02	278.59	-0.10	0.00	0.00	0.00	0.00	0.00	0.00	0.00
08:31:59	273.83	-0.10	0.00	0.00	0.00	0.00	0.00	0.00	0.00
08:33:59	274.51	-0.10	0.00	0.00	0.00	0.00	0.00	0.00	0.00
08:35:59	275.35	-0.10	0.00	0.00	0.00	0.00	0.00	0.00	0.00
08:37:59	276.09	-0.10	0.00	0.00	0.00	0.00	0.00	0.00	0.00
08:39:59	273.95	-0.10	0.00	0.00	0.00	0.00	0.00	0.00	0.00
08:41:59	266.55	-0.10	0.00	0.00	0.00	0.00	0.00	0.00	0.00
08:43:59	264.25	-0.10	0.00	0.00	0.00	0.00	0.00	0.00	0.00
08:45:59	266.63	-0.11	0.00	0.00	0.00	0.00	0.00	0.00	0.00
08:47:59	233.49	-0.11	0.00	0.00	0.00	0.00	0.00	0.00	0.00
08:50:02	286.18	-0.11	0.00	0.00	0.00	0.00	0.00	0.00	0.00
08:51:59	318.35	-0.11	0.00	0.00	0.00	0.00	0.00	0.00	0.00
08:53:59	328.08	-0.11	0.00	0.00	0.00	0.00	0.00	0.00	0.00
08:55:59	303.72	-0.11	0.00	0.00	0.00	0.00	0.00	0.00	0.00
08:57:59	301.16	-0.11	0.00	0.00	0.00	0.00	0.00	0.00	0.00
08:59:59	273.99	-0.11	0.00	0.00	0.00	0.00	0.00	0.00	0.00
09:01:59	282.68	-0.11	0.00	0.00	0.00	0.00	0.00	0.00	0.00
09:03:59	303.34	-0.11	0.00	0.00	0.00	0.00	0.00	0.00	0.00
09:05:59	340.20	-0.11	0.00	0.00	0.00	0.00	0.00	0.00	0.00
09:07:59	295.62	-0.11	0.00	0.00	0.00	0.00	0.00	0.00	0.00
09:09:59	293.42	-0.11	0.00	0.00	0.00	0.00	0.00	0.00	0.00
09:12:02	281.33	-0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
09:13:59	282.38	-0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
09:15:59	275.03	-0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
09:17:59	242.95	-0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
09:19:59	166.98	-0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
09:21:59	134.16	-0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
09:23:59	215.66	-0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
09:25:59	274.97	-0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00
09:27:59	229.31	-0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00
09:29:59	261.47	-0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00
09:32:02	239.14	0.31	0.00	0.00	0.00	0.00	0.00	0.00	0.00
09:33:59	231.62	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00
09:35:59	215.37	-0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00
09:37:59	193.82	-0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00
09:39:59	255.11	0.83	0.00	0.00	0.00	0.00	0.00	0.00	0.00
09:41:59	232.91	1.29	0.00	0.00	0.00	0.00	0.00	0.00	0.00
09:43:59	241.66	0.21	0.00	0.00	0.00	0.00	0.00	0.00	0.00
09:45:59	234.58	-0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00
09:47:59	229.35	0.14	0.00	0.00	0.00	0.00	0.00	0.00	0.00

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[illegible]	[illegible]	[illegible]	-0.0[illegible]	0.00	0.00	0.00	0.00	0.00	0.00	[illegible]
09:55:59	[illegible]	[illegible]	-0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00
09:57:59	[illegible]	24[illegible]	-0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00
09:59:59	[illegible]	250.0[illegible]	-0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00

AVERAGES for 08:10:08 TO 10:09:59

1	258.7706
2	5.022527E-03
3	0
4	0
5	0
6	0
7	0
8	0

10:09:59	131.46	-0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10:11:59	174.44	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10:14:02	193.20	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10:15:59	228.35	1.77	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10:17:59	235.03	2.68	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10:19:59	259.26	2.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10:21:59	252.18	1.67	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10:23:59	243.63	1.63	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10:25:59	229.88	1.90	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10:27:59	251.16	1.49	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10:29:59	240.30	1.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10:31:59	218.39	1.56	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10:34:02	225.73	1.48	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10:35:59	228.72	1.48	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10:37:59	230.94	1.71	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10:39:59	245.28	2.21	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10:41:59	231.63	2.16	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10:43:59	246.06	1.62	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10:45:59	317.63	1.32	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10:47:59	283.28	0.88	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10:49:59	232.44	1.97	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10:51:59	228.97	1.22	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10:53:59	224.22	1.73	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10:56:02	212.16	0.22	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10:57:59	263.24	-0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10:59:59	243.00	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00
11:01:59	199.49	0.18	0.00	0.00	0.00	0.00	0.00	0.00	0.00
11:03:59	215.13	0.94	0.00	0.00	0.00	0.00	0.00	0.00	0.00
11:05:59	261.35	0.79	0.00	0.00	0.00	0.00	0.00	0.00	0.00
11:07:59	280.08	0.45	0.00	0.00	0.00	0.00	0.00	0.00	0.00
11:09:59	305.63	0.42	0.00	0.00	0.00	0.00	0.00	0.00	0.00
11:11:59	272.76	0.31	0.00	0.00	0.00	0.00	0.00	0.00	0.00
11:13:59	248.55	0.37	0.00	0.00	0.00	0.00	0.00	0.00	0.00
11:15:59	297.42	0.32	0.00	0.00	0.00	0.00	0.00	0.00	0.00
11:18:02	305.98	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00
11:19:59	270.91	0.14	0.00	0.00	0.00	0.00	0.00	0.00	0.00
11:21:59	242.68	1.28	0.00	0.00	0.00	0.00	0.00	0.00	0.00
11:23:59	269.28	0.56	0.00	0.00	0.00	0.00	0.00	0.00	0.00
11:25:59	291.60	-0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
11:27:59	288.62	0.18	0.00	0.00	0.00	0.00	0.00	0.00	0.00
11:29:59	263.75	0.25	0.00	0.00	0.00	0.00	0.00	0.00	0.00
11:31:59	263.81	0.76	0.00	0.00	0.00	0.00	0.00	0.00	0.00
11:33:59	277.68	1.47	0.00	0.00	0.00	0.00	0.00	0.00	0.00
11:35:59	260.01	1.38	0.00	0.00	0.00	0.00	0.00	0.00	0.00
11:37:59	258.75	2.39	0.00	0.00	0.00	0.00	0.00	0.00	0.00
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

11:43:59	270.22	1.71	0.00	0.00	0.00	0.00	0.00	0.00	0.00
11:45:59	249.65	2.47	0.00	0.00	0.00	0.00	0.00	0.00	0.00
11:47:59	228.24	0.62	0.00	0.00	0.00	0.00	0.00	0.00	0.00
11:49:59	-703.66	0.59	0.00	0.00	0.00	0.00	0.00	0.00	0.00
11:51:59	-646.85	0.70	0.00	0.00	0.00	0.00	0.00	0.00	0.00
11:53:59	-703.66	4.08	0.00	0.00	0.00	0.00	0.00	0.00	0.00
11:55:59	-703.66	2.26	0.00	0.00	0.00	0.00	0.00	0.00	0.00
11:57:59	-696.25	0.51	0.00	0.00	0.00	0.00	0.00	0.00	0.00
12:00:02	-483.47	0.12	0.00	0.00	0.00	0.00	0.00	0.00	0.00
12:01:59	154.53	-0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00
12:03:59	-505.94	-0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00
12:05:59	-537.04	0.19	0.00	0.00	0.00	0.00	0.00	0.00	0.00
12:07:59	-142.55	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00
12:09:59	381.21	-0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00
12:11:59	-114.87	0.11	0.00	0.00	0.00	0.00	0.00	0.00	0.00
12:13:59	-703.41	0.20	0.00	0.00	0.00	0.00	0.00	0.00	0.00
12:15:59	-703.41	0.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00
12:17:59	-703.41	0.74	0.00	0.00	0.00	0.00	0.00	0.00	0.00
12:19:59	-703.41	0.09	0.00	0.00	0.00	0.00	0.00	0.00	0.00
12:22:02	-687.40	0.11	0.00	0.00	0.00	0.00	0.00	0.00	0.00
12:23:59	80.05	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00
12:25:59	-108.21	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00
12:27:59	-703.41	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00
12:29:59	-331.99	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
12:31:59	-211.29	0.07	0.00	0.00	0.00	0.00	0.00	0.00	0.00
12:33:59	-598.49	0.44	0.00	0.00	0.00	0.00	0.00	0.00	0.00
12:35:59	-703.41	2.36	0.00	0.00	0.00	0.00	0.00	0.00	0.00
12:37:59	-703.41	2.49	0.00	0.00	0.00	0.00	0.00	0.00	0.00
12:39:59	-695.15	1.14	0.00	0.00	0.00	0.00	0.00	0.00	0.00
12:41:59	-703.41	0.30	0.00	0.00	0.00	0.00	0.00	0.00	0.00
12:44:02	-703.41	0.86	0.00	0.00	0.00	0.00	0.00	0.00	0.00
12:45:59	-703.41	0.48	0.00	0.00	0.00	0.00	0.00	0.00	0.00
12:47:59	-703.41	0.96	0.00	0.00	0.00	0.00	0.00	0.00	0.00
12:49:59	-703.41	1.38	0.00	0.00	0.00	0.00	0.00	0.00	0.00
12:51:59	-703.41	1.10	0.00	0.00	0.00	0.00	0.00	0.00	0.00
12:53:59	-703.41	0.20	0.00	0.00	0.00	0.00	0.00	0.00	0.00
12:55:59	-596.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
12:57:59	-691.63	0.58	0.00	0.00	0.00	0.00	0.00	0.00	0.00
12:59:59	-703.41	3.32	0.00	0.00	0.00	0.00	0.00	0.00	0.00
13:01:59	-703.41	2.17	0.00	0.00	0.00	0.00	0.00	0.00	0.00
13:04:02	-703.41	2.11	0.00	0.00	0.00	0.00	0.00	0.00	0.00
13:05:59	-703.41	1.75	0.00	0.00	0.00	0.00	0.00	0.00	0.00
13:07:59	-703.41	1.68	0.00	0.00	0.00	0.00	0.00	0.00	0.00
13:09:59	-703.41	0.56	0.00	0.00	0.00	0.00	0.00	0.00	0.00
13:11:59	-703.27	0.96	0.00	0.00	0.00	0.00	0.00	0.00	0.00
13:13:59	-703.27	0.23	0.00	0.00	0.00	0.00	0.00	0.00	0.00
13:15:59	-703.27	0.79	0.00	0.00	0.00	0.00	0.00	0.00	0.00
13:17:59	-703.27	0.17	0.00	0.00	0.00	0.00	0.00	0.00	0.00
13:19:59	-703.27	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00
13:21:59	-703.27	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00
13:24:02	-703.27	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00
13:25:59	-703.27	0.17	0.00	0.00	0.00	0.00	0.00	0.00	0.00
13:27:59	-703.27	0.12	0.00	0.00	0.00	0.00	0.00	0.00	0.00
13:29:59	-703.27	-0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
13:31:59	-204.98	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00
13:33:59	321.95	0.10	0.00	0.00	0.00	0.00	0.00	0.00	0.00
13:35:59	277.74	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00
13:37:59	-437.28	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00
13:39:59	-703.27	0.09	0.00	0.00	0.00	0.00	0.00	0.00	0.00
13:41:59	-674.42	0.27	0.00	0.00	0.00	0.00	0.00	0.00	0.00
13:43:59	-320.48	0.12	0.00	0.00	0.00	0.00	0.00	0.00	0.00
13:46:02	164.93	0.09	0.00	0.00	0.00	0.00	0.00	0.00	0.00
13:47:59	-233.56	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00
13:49:59	-622.16	2.29	0.00	0.00	0.00	0.00	0.00	0.00	0.00

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13:55:59	-703.27	0.01	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
13:57:59	-703.27	0.01	0.00	0.00	0.00	0.00	0.00	0.00	[illegible]
13:59:59	-227.97	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00
14:01:59	[illegible]	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00
14:03:59	[illegible]	0.07	0.00	0.00	0.00	0.00	0.00	0.00	0.00
14:05:59	-703.27	0.49	0.00	0.00	0.00	0.00	0.00	0.00	0.00
14:08:00	-703.27	3.22	0.00	0.00	0.00	0.00	0.00	0.00	0.00
14:09:59	-703.27	2.15	0.00	0.00	0.00	0.00	0.00	0.00	0.00
14:11:59	-703.22	0.72	0.00	0.00	0.00	0.00	0.00	0.00	0.00
14:13:59	-703.22	2.46	0.00	0.00	0.00	0.00	0.00	0.00	0.00
14:15:59	-703.22	0.10	0.00	0.00	0.00	0.00	0.00	0.00	0.00
14:17:59	-703.22	0.11	0.00	0.00	0.00	0.00	0.00	0.00	0.00

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08-2[illegible]-199[illegible]

TIME	CH1 screen Direction Degrees	CH2 Screen Velocity MPH	CH3	CH4	CH5	CH6	CH7	CH8	V
07:34:59	-707.85	-0.23	0.00	0.00	0.00	0.00	0.00	0.00	0.00
07:36:59	-705.88	-0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00
07:38:59	-522.97	-0.06	0.00	0.00	0.00	0.00	0.00	0.00	0.00
07:40:59	273.97	-0.09	0.00	0.00	0.00	0.00	0.00	0.00	0.00
07:42:59	272.75	-0.09	0.00	0.00	0.00	0.00	0.00	0.00	0.00
07:44:59	272.53	-0.09	0.00	0.00	0.00	0.00	0.00	0.00	0.00
07:46:59	303.13	-0.10	0.00	0.00	0.00	0.00	0.00	0.00	0.00
07:48:59	359.61	-0.11	0.00	0.00	0.00	0.00	0.00	0.00	0.00
07:50:59	283.13	-0.11	0.00	0.00	0.00	0.00	0.00	0.00	-0.00
07:53:02	58.14	-0.11	0.00	0.00	0.00	0.00	0.00	0.00	0.00
07:54:59	59.87	-0.11	0.00	0.00	0.00	0.00	0.00	0.00	0.00
07:56:59	71.49	-0.11	0.00	0.00	0.00	0.00	0.00	0.00	0.00
07:58:59	67.96	-0.11	0.00	0.00	0.00	0.00	0.00	0.00	0.00
08:00:59	60.98	-0.11	0.00	0.00	0.00	0.00	0.00	0.00	0.00
08:02:59	248.16	-0.11	0.00	0.00	0.00	0.00	0.00	0.00	0.00
08:04:59	209.48	-0.11	0.00	0.00	0.00	0.00	0.00	0.00	0.00
08:06:59	257.55	-0.11	0.00	0.00	0.00	0.00	0.00	0.00	0.00
08:08:59	253.85	-0.11	0.00	0.00	0.00	0.00	0.00	0.00	0.00
08:10:59	255.23	-0.11	0.00	0.00	0.00	0.00	0.00	0.00	0.00
08:12:59	249.04	-0.11	0.00	0.00	0.00	0.00	0.00	0.00	0.00
08:15:02	239.37	-0.11	0.00	0.00	0.00	0.00	0.00	0.00	0.00
08:16:59	249.37	-0.11	0.00	0.00	0.00	0.00	0.00	0.00	0.00
08:18:59	265.15	-0.10	0.00	0.00	0.00	0.00	0.00	0.00	0.00
08:20:59	263.40	-0.10	0.00	0.00	0.00	0.00	0.00	0.00	0.00
08:22:59	242.69	-0.10	0.00	0.00	0.00	0.00	0.00	0.00	0.00
08:24:59	217.18	-0.10	0.00	0.00	0.00	0.00	0.00	0.00	0.00
08:26:59	256.37	-0.10	0.00	0.00	0.00	0.00	0.00	0.00	0.00
08:28:59	274.60	-0.10	0.00	0.00	0.00	0.00	0.00	0.00	0.00
08:30:59	252.60	-0.10	0.00	0.00	0.00	0.00	0.00	0.00	0.00
08:32:59	260.84	-0.10	0.00	0.00	0.00	0.00	0.00	0.00	0.00
08:35:02	238.28	-0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
08:36:59	218.90	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
08:38:59	243.98	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
08:40:59	246.70	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
08:42:59	250.30	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
08:44:59	269.33	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
08:46:59	255.34	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00
08:48:59	253.39	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00
08:50:59	262.34	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00
08:52:59	265.23	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00
08:54:59	267.79	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00
08:57:02	208.07	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00
08:58:59	149.37	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00
09:00:59	197.79	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00
09:02:59	154.07	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
09:04:59	233.14	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
09:06:59	193.32	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
09;08:59	242.90	-0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
09:10:59	235.40	-0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

09:16:59	253.88	-0.00	0.00	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
09:19:02	252.85	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
09:20:59	260.64	-0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
09:22:59	260.27	-0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
09:24:59	268.69	-0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
09:26:59	272.27	-0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
9:28:59	261.58	-0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
09:30:59	248.34	-0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00

AVERAGES for	07:33:02	TO	09:32:59
1		189.2025	
2		-.0512226	
3		0	
4		0	
5		0	
6		0	
7		0	
8		0	

09:32:59	264.19	-0.02	0.00	0.00	0.00	0.00	0.00	0.00	-0.00
09:34:59	284.42	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
09:36:59	288.88	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
09:38:59	290.52	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
09:41:02	263.43	-0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
09:42:59	246.24	-0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
09:44:59	243.52	-0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
09:46:59	272.63	-0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
09:48:59	291.90	-0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
09:50:59	263.95	-0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
09:52:59	190.68	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
09:54:59	177.02	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00
09:56:59	184.66	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00
09:58:59	235.70	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10:00:59	273.28	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10:03:02	213.52	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10:04:59	248.25	0.15	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10:06:59	247.61	1.27	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10:08:59	294.87	0.10	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10:10:59	289.87	0.30	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10:12:59	283.19	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10:14:59	270.59	0.07	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10:16:59	256.55	0.18	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10:18:59	255.52	0.58	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10:20:59	263.55	1.60	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10:22:59	260.13	0.80	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10:25:02	258.97	0.68	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10:26:59	263.88	0.09	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10:28:59	286.31	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10:30:59	272.98	0.25	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10:32:59	278.77	0.30	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10:34:59	257.80	0.38	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10:36:59	275.90	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10:38:59	272.82	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00
.0:40:59	277.54	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10:42:59	245.89	0.06	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10:44:59	261.52	0.29	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10:47:02	305.88	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10:48:59	319.33	0.14	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10:50:59	332.66	0.16	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10:52:59	331.61	0.13	0.00	0.00	0.00	0.00	0.00	0.00	0.00

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[illegible]	[illegible]	[illegible]	0.00	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
11:00:59	286.86	0.33	0.00	0.00	0.00	0.00	0.00	0.00	0.00
11:02:59	283.43	0.31	0.00	0.00	0.00	0.00	0.00	0.00	0.00
11:04:59	291.70	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00

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08-26-1992

TIME	CH1 screen Direction Degrees	CH2 Screen Velocity MPH	CH3	CH4	CH5	CH6	CH7	CH8	V
11:10:59	283.79	0.09	0.00	0.00	0.00	0.00	0.00	0.00	0.00
11:12:59	296.54	0.16	0.00	0.00	0.00	0.00	0.00	0.00	0.00
11:14:59	296.30	-0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00
11:16:59	254.61	0.19	0.00	0.00	0.00	0.00	0.00	0.00	0.00
11:18:59	205.91	-0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
11:20:59	284.11	0.43	0.00	0.00	0.00	0.00	0.00	0.00	0.00
11:22:59	308.68	0.74	0.00	0.00	0.00	0.00	0.00	0.00	0.00
11:24:59	292.88	0.29	0.00	0.00	0.00	0.00	0.00	0.00	0.00
11:26:59	285.47	0.58	0.00	0.00	0.00	0.00	0.00	0.00	0.00
11:28:59	227.91	1.28	0.00	0.00	0.00	0.00	0.00	0.00	0.00
11:31:02	254.21	2.21	0.00	0.00	0.00	0.00	0.00	0.00	0.00

AVERAGES for 09:34:51 TO 11:32:59

1	268.9861
2	.2886735
3	0
4	0
5	0
6	0
7	0
8	0

11:33:00	307.13	1.22	0.00	0.00	0.00	0.00	0.00	0.00	0.00
11:34:59	321.98	1.89	0.00	0.00	0.00	0.00	0.00	0.00	0.00
11:36:59	316.41	1.37	0.00	0.00	0.00	0.00	0.00	0.00	0.00
11:38:59	319.75	1.63	0.00	0.00	0.00	0.00	0.00	0.00	0.00
11:40:59	261.26	1.78	0.00	0.00	0.00	0.00	0.00	0.00	0.00
11:42:59	285.26	0.53	0.00	0.00	0.00	0.00	0.00	0.00	0.00
11:44:59	284.95	0.14	0.00	0.00	0.00	0.00	0.00	0.00	0.00
11:46:59	316.09	0.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00
11:48:59	308.03	0.64	0.00	0.00	0.00	0.00	0.00	0.00	0.00
11:50:59	297.08	0.71	0.00	0.00	0.00	0.00	0.00	0.00	0.00
11:53:02	242.44	3.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00
11:54:59	284.22	1.93	0.00	0.00	0.00	0.00	0.00	0.00	0.00
11:56:59	286.61	2.33	0.00	0.00	0.00	0.00	0.00	0.00	0.00
[illegible]	[illegible]	[illegible]	0.00	0.00	0.00	0.00	0.00	0.00	0.00

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[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
12:04:59	286.86	2.22	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
12:06:59	279.58	2.25	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
12:08:59	290.20	1.69	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
12:10:59	289.78	0.89	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
12:12:59	286.52	1.24	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
12:15:02	287.22	0.96	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2:16:59	291.98	1.19	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
12:18:59	287.19	1.08	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
12:20:59	297.15	1.66	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
12:22:59	276.49	0.86	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
12:24:59	300.25	1.23	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
12:26:59	310.22	3.45	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
12:28:59	246.36	4.23	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
12:30:59	273.12	1.81	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
12:32:59	242.76	2.51	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
12:35:02	256.27	3.71	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
12:36:59	255.48	3.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
12:38:59	282.02	1.22	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
12:40:59	255.21	3.49	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
12:42:59	253.64	3.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
12:44:59	257.93	2.55	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
12:46:59	258.83	2.86	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
12:48:59	264.67	2.27	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
12:50:59	269.20	1.96	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
12:52:59	295.37	0.24	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
12:54:59	250.29	1.49	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
12:57:02	261.39	1.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
12:58:59	264.67	0.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
13:00:59	190.06	1.77	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
13:02:59	246.59	0.31	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
13:04:59	290.04	1.89	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3:06:59	298.84	0.59	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
13:08:59	314.46	0.94	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
13:10:59	334.47	0.64	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
13:12:59	236.22	0.36	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
13:14:59	191.92	0.16	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
13:17:02	268.09	0.97	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
13:18:59	309.78	1.15	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
13:20:59	115.16	1.25	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
13:22:59	269.18	1.66	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
13:24:59	275.30	1.65	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
13:26:59	298.61	0.07	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
13:28:59	288.59	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
13:30:59	320.70	0.69	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
13:32:59	298.29	0.19	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
13:34:59	286.39	0.20	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
13:37:02	116.01	1.67	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
13:38:59	148.64	0.84	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
13:40:59	306.74	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
13:42:59	225.23	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
13:44:59	163.40	0.15	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
13:46:59	154.12	1.13	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
13:48:59	286.22	0.09	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
13:50:59	278.65	0.98	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
13:52:59	303.45	0.22	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
13:54:59	321.13	0.13	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
13:57:02	293.95	0.26	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
13:58:59	304.98	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
14:00:59	319.76	0.06	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
14:02:59	332.23	0.30	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
14:04:59	316.98	0.13	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
14:06:59	299.65	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
14:08:59	326.95	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

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14:17:03	200.50	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00
14:18:59	299.73	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00
14:20:59	253.97	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00
14:22:59	107.73	0.08	0.00	0.00	0.00	0.00	0.00	0.00	0.00
14:24:59	226.33	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00
14:26:59	33.98	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00
14:28:59	147.73	0.14	0.00	0.00	0.00	0.00	0.00	0.00	0.00
14:30:59	133.49	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00
14:32:59	198.68	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00
14:34:59	63.27	0.21	0.00	0.00	0.00	0.00	0.00	0.00	0.00
14:36:59	289.80	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00
14:39:03	286.26	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
14:40:59	278.24	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

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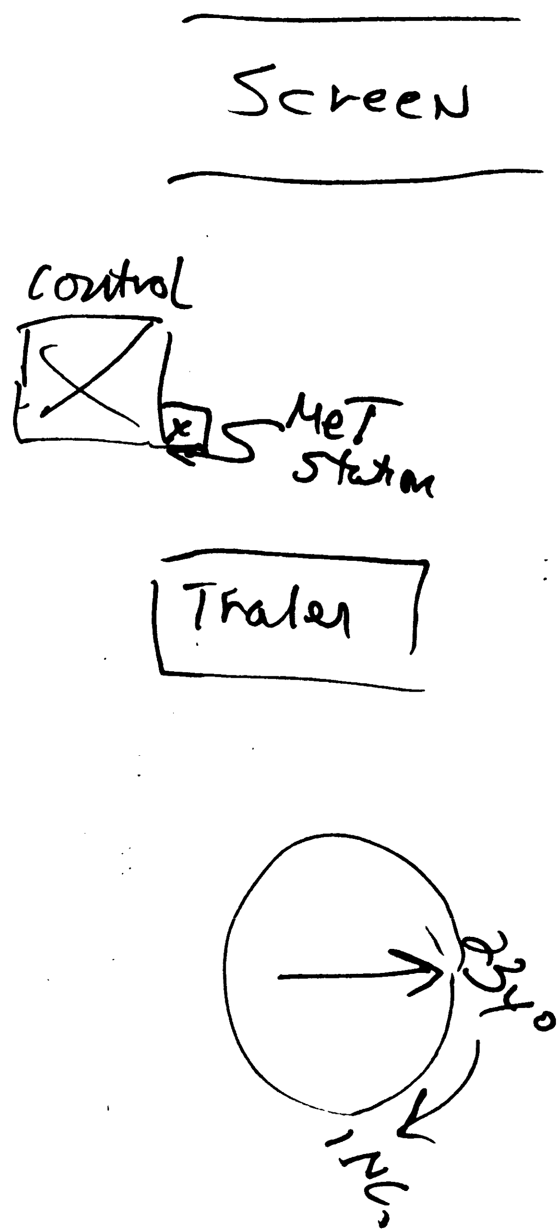
08-11-1992

TIME	CH1 SCREEN N-E-S-W DEGREES	CH2 SCREEN VELOCITY MPH	CH3	CH4	CH5	CH6	CH7	CH8	V
13:48:29	283.62	3.94	0.00	0.00	0.00	0.00	0.00	0.00	0.00
13:48:34	275.60	4.25	0.00	0.00	0.00	0.00	0.00	0.00	0.00
13:48:39	277.56	4.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00
13:48:44	269.26	4.08	0.00	0.00	0.00	0.00	0.00	0.00	0.00
13:48:49	262.32	3.91	0.00	0.00	0.00	0.00	0.00	0.00	0.00
13:48:54	265.36	3.34	0.00	0.00	0.00	0.00	0.00	0.00	0.00
13:48:59	266.36	3.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00
13:49:04	277.52	3.20	0.00	0.00	0.00	0.00	0.00	0.00	0.00
13:49:09	266.59	2.74	0.00	0.00	0.00	0.00	0.00	0.00	0.00
13:49:14	284.07	2.80	0.00	0.00	0.00	0.00	0.00	0.00	0.00
13:49:19	265.84	3.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00
13:49:24	269.01	3.38	0.00	0.00	0.00	0.00	0.00	0.00	0.00
13:49:29	274.06	3.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00
13:49:34	279.09	3.79	0.00	0.00	0.00	0.00	0.00	0.00	0.00
13:49:39	269.43	4.88	0.00	0.00	0.00	0.00	0.00	0.00	0.00
13:49:44	263.53	4.90	0.00	0.00	0.00	0.00	0.00	0.00	0.00
13:49:49	251.29	6.54	0.00	0.00	0.00	0.00	0.00	0.00	0.00
13:49:54	249.07	9.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00
13:49:59	270.75	6.67	0.00	0.00	0.00	0.00	0.00	0.00	0.00
13:50:04	264.64	4.80	0.00	0.00	0.00	0.00	0.00	0.00	0.00
13:50:09	255.44	3.98	0.00	0.00	0.00	0.00	0.00	0.00	0.00
13:50:14	243.93	4.13	0.00	0.00	0.00	0.00	0.00	0.00	0.00
13:50:19	260.41	4.13	0.00	0.00	0.00	0.00	0.00	0.00	0.00
13:50:24	260.37	3.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3:50:29	250.88	4.72	0.00	0.00	0.00	0.00	0.00	0.00	0.00
13:50:34	253.87	5.19	0.00	0.00	0.00	0.00	0.00	0.00	0.00
13:50:39	242.75	4.45	0.00	0.00	0.00	0.00	0.00	0.00	0.00
13:50:44	233.87	4.41	0.00	0.00	0.00	0.00	0.00	0.00	0.00
13:50:49	264.79	3.38	0.00	0.00	0.00	0.00	0.00	0.00	0.00
13:50:54	241.69	2.78	0.00	0.00	0.00	0.00	0.00	0.00	0.00
13:50:59	252.44	3.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00
13:51:04	260.63	4.51	0.00	0.00	0.00	0.00	0.00	0.00	0.00
13:51:09	279.46	2.40	0.00	0.00	0.00	0.00	0.00	0.00	0.00
13:51:14	255.29	2.15	0.00	0.00	0.00	0.00	0.00	0.00	0.00
13:51:19	257.01	2.46	0.00	0.00	0.00	0.00	0.00	0.00	0.00
13:51:24	247.08	4.36	0.00	0.00	0.00	0.00	0.00	0.00	0.00
13:51:29	250.25	4.16	0.00	0.00	0.00	0.00	0.00	0.00	0.00
13:51:34	260.85	3.58	0.00	0.00	0.00	0.00	0.00	0.00	0.00
13:51:39	276.54	2.47	0.00	0.00	0.00	0.00	0.00	0.00	0.00
13:51:44	308.01	4.56	0.00	0.00	0.00	0.00	0.00	0.00	0.00

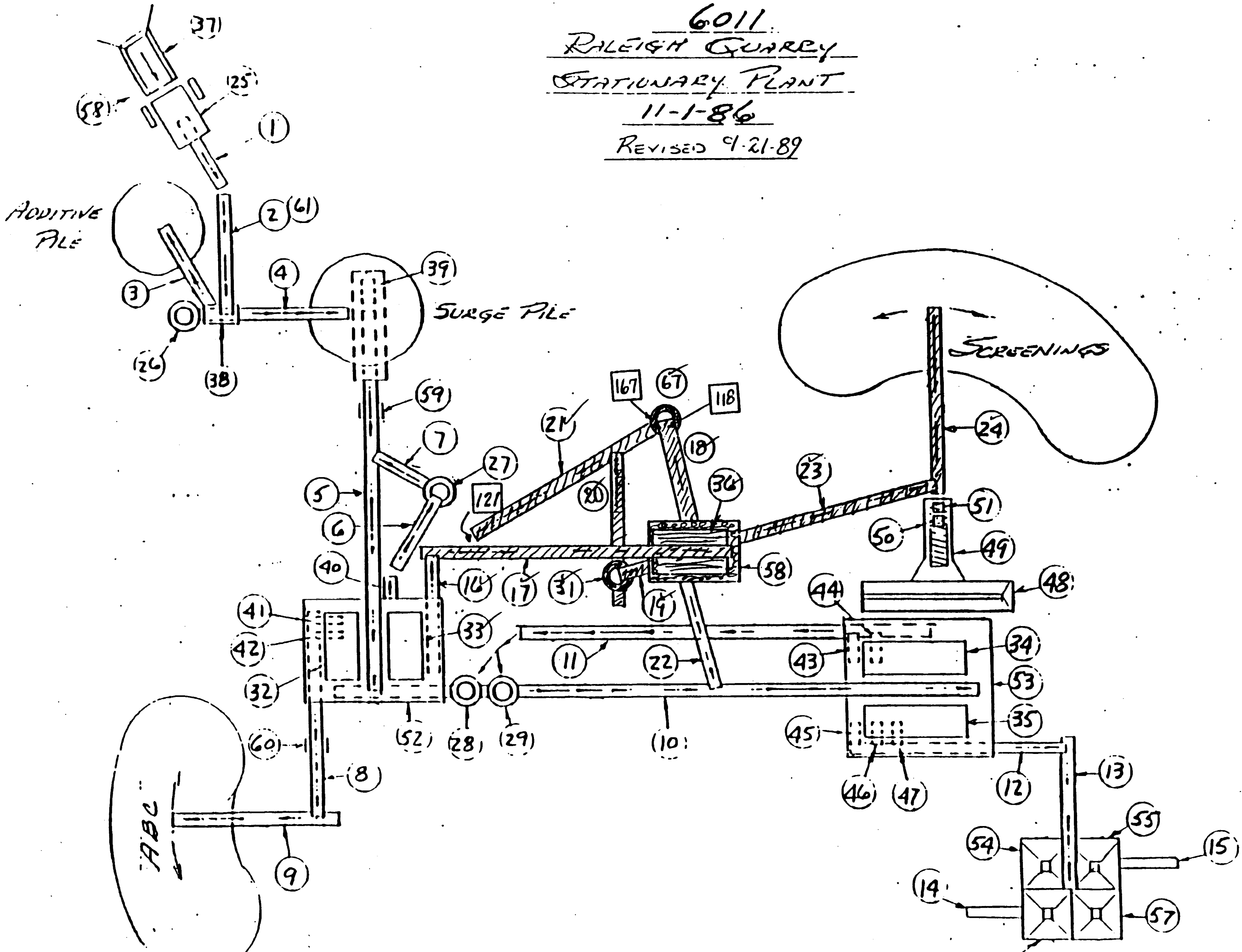
)7:22:59	380.93	-0.04	0.00	0.00	0.00	0.0(
0.00	0.00	0.00				
07:27:59	397.31	-0.00	0.00	0.00	0.00	0.0(
0.00	0.00	0.00				
07:32:59	360.22	-0.01	0.00	0.00	0.00	0.0(
0.00	0.00	0.00				
)7:38:02	315.45	-0.00	0.00	0.00	0.00	0.00

07:47:59	288.37	0.01	0.00	0.00	[illegible]	[illegible]
0.00	0.00	0.00				
07:52:59	296.38	0.01	0.00	0.00	0.00	0.00
0.00	0.00	0.00				
07:57:59	262.17	0.01	0.00	0.00	0.00	[illegible]
0.00	0.00	0.00				
08:03:02	170.64	0.02	0.00	0.00	0.00	0.00
0.00	0.00	0.00				
08:07:59	157.85	0.02	0.00	0.00	0.00	0.00
0.00	0.00	0.00				
08:12:59	197.88	0.03	0.00	0.00	0.00	0.00
0.00	0.00	0.00				
08:17:59	221.93	0.03	0.00	0.00	0.00	0.00
0.00	0.00	0.00				
08:23:02	194.69	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00				
08:27:59	211.26	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00				
08:32:59	277.27	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00				
08:37:59	259.91	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00				
08:42:59	284.46	0.01	0.00	0.00	0.00	0.00
0.00	0.00	0.00				
08:48:02	286.32	0.01	0.00	0.00	0.00	0.00
0.00	0.00	0.00				
08:52:59	273.38	0.01	0.00	0.00	0.00	0.00
0.00	0.00	0.00				
08:57:59	219.00	0.01	0.00	0.00	0.00	0.00
0.00	0.00	0.00				
09:02:59	225.13	0.01	0.00	0.00	0.00	0.00
0.00	0.00	0.00				
09:08:02	228.67	0.01	0.00	0.00	0.00	0.00
0.00	0.00	0.00				
09:12:59	-583.33	0.01	0.00	0.00	0.00	0.00
0.00	0.00	0.00				
09:17:59	-704.81	0.29	0.00	0.00	0.00	0.00
0.00	0.00	0.00				
09:22:59	-704.52	0.05	0.00	0.00	0.00	0.00
0.00	0.00	0.00				
09:28:02	-390.73	-0.01	0.00	0.00	0.00	0.00
0.00	0.00	0.00				
09:32:59	556.67	0.01	0.00	0.00	0.00	0.00
0.00	0.00	0.00				
09:37:59	-540.23	0.02	0.00	0.00	0.00	0.00
0.00	0.00	0.00				
09:42:59	-115.59	-0.01	0.00	0.00	0.00	0.00
0.00	0.00	0.00				
09:47:59	-75.12	-0.01	0.00	0.00	0.00	0.00
0.00	0.00	0.00				
09:53:02	-314.61	0.04	0.00	0.00	0.00	0.00
0.00	0.00	0.00				
09:57:59	-511.30	0.57	0.00	0.00	0.00	0.00
0.00	0.00	0.00				
10:02:59	307.24	0.44	0.00	0.00	0.00	0.00
0.00	0.00	0.00				
10:07:59	268.63	0.10	0.00	0.00	0.00	0.00
0.00	0.00	0.00				
10:13:02	248.58	1.24	0.00	0.00	0.00	0.00
0.00	0.00	0.00				
10:17:59	262.20	0.87	0.00	0.00	0.00	0.00
0.00	0.00	0.00				

2


Screen
control
MeT Station
Trailer
234°
INC.

6011
RALEIGH QUARRY
STATIONARY PLANT
11-1-86
REVISED 9-21-89



6011
RALEIGH STATIONARY PLANT (Continued)

REF #	NLT EQ.#	DESCRIPTION	MFG. S/N
		CONVEYORS	
*21	3005	30" x 111' Barber-Greene	88043-2
22	3759	30" x 25' Teerco	6011-502D
23	2544	24" x 52' Teerco	
24	2477	24" x 81' Barber-Greene	PA 80x241
		CRUSHERS	
25	2417	42" x 48" Telsmith Jaw	7066
26	2818	6614-S Telsmith Cone	7812
27	6371	66FC Telsmith Cone	7616
28	2767	48FC Telsmith Cone	8028
29	2667	48FC Telsmith Cone	7991
31	2990	48VFC Telsmith Cone	8089
32	2671	6' x 16' TD Telsmith Vibro-King	5513
33	2670	6' x 16' TD Telsmith Vibro-King	5512
34	2668	6' x 16' TD Telsmith Pulsator II	15042
35	2669	6' x 16' TD Telsmith Pulsator II	15043
36	2988	6' x 16' TD Seco	TB-855
*67		1560 Omnicone	
		FEEDERS	
37	2467	60" x 20' Telsmith VGF	5146
38	2727	48" x 16' Telsmith VGF	5150
39	2655	48" x 72" Syntron F-55	292037
40	2216	36" x 84" Syntron F-66 BDT	153194
41	2465	36" x 60" Syntron F-45G	246390
42	2466	36" x 60" Syntron F-45G	246391

* Denotes revision 9/21/89

6011
RALEIGH STATIONARY PLANT

REF #	NLT EQ. #	DESCRIPTION	MFG. S/N
		CONVEYORS	
1	2723	48" x 36' Teerco	NLT-127
2	2724	42" x 171' Barber-Greene	87261-1
3	2083	24" x 81' Barber-Greene	PA 80x189
4	2469	36" x 157' Barber-Greene	87261-2
5	2470	36" x 174' Barber-Greene	87261-C3
6	3001	42" x 55' Kolman	69443-3542
7	2473	30" x 51' Barber-Greene	87261-7
8	2725	30" x 139' Barber-Greene	87261-C4
9	2471	30" x 119' Barber-Greene	PW 80-119
10	2474	30" x 225' Barber-Greene	87261-C8
11	2475	24" x 182' Barber-Greene	87261-9
12	2476	30" x 156' Barber-Greene	87261-C10
13	2726	30" x 156' Barber-Greene	87261-11
14	4389	36" x 44' Teerco	6011-518A
15	4390	36" x 44' Teerco	6011-581B
16	3757	30" x 29' Teerco	6011-502B
17	3004	30" x 159' Barber-Greene	88043-1
*18	3756	24" x 25' Teerco	6011-502A
19	3755	24" x 22' Teerco 110' Crusher	6011-502
20	3758	30" x 30' Teerco	6011-502C

* Denotes revision 9/21/89 & new item numbers & description