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

**EPA CONTRACT NO. 68D00122
WORK ASSIGNMENT NO. I-35
ENTROPY SUBCONTRACT NO. 36-920021-99**

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1.0 INTRODUCTION

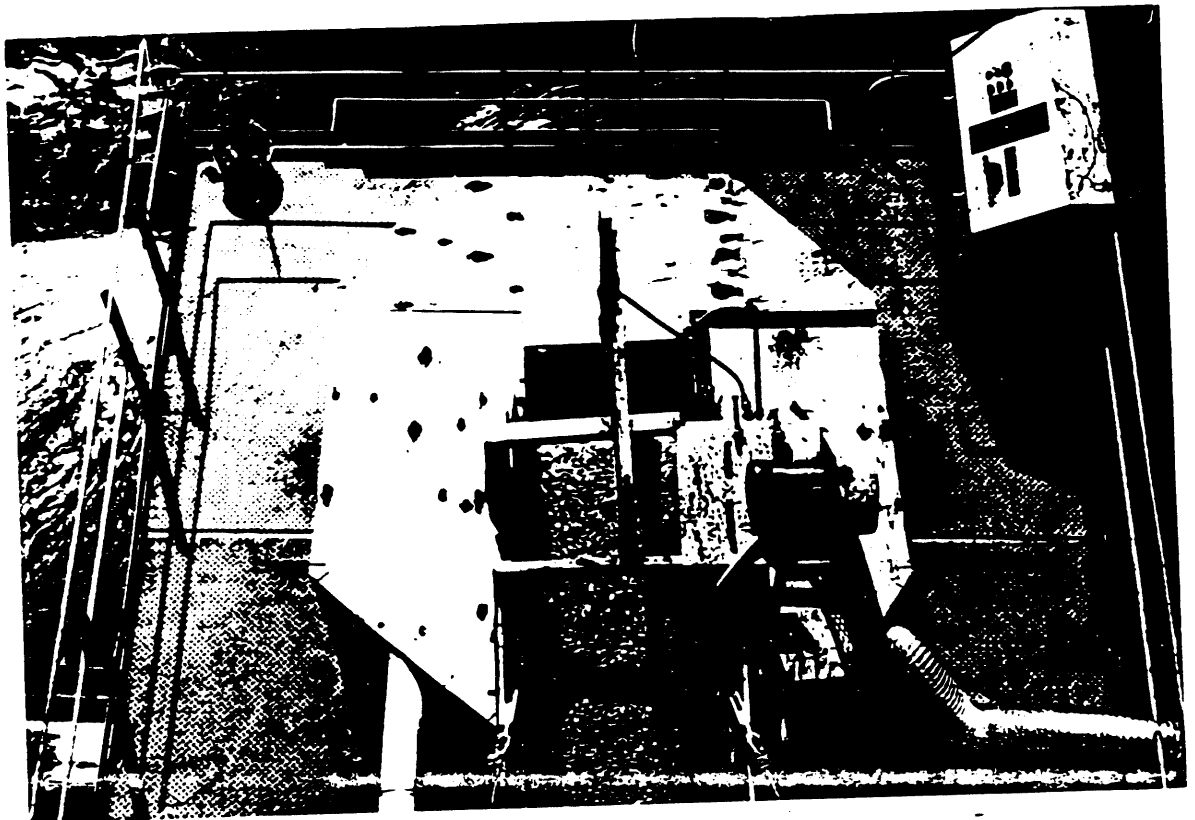
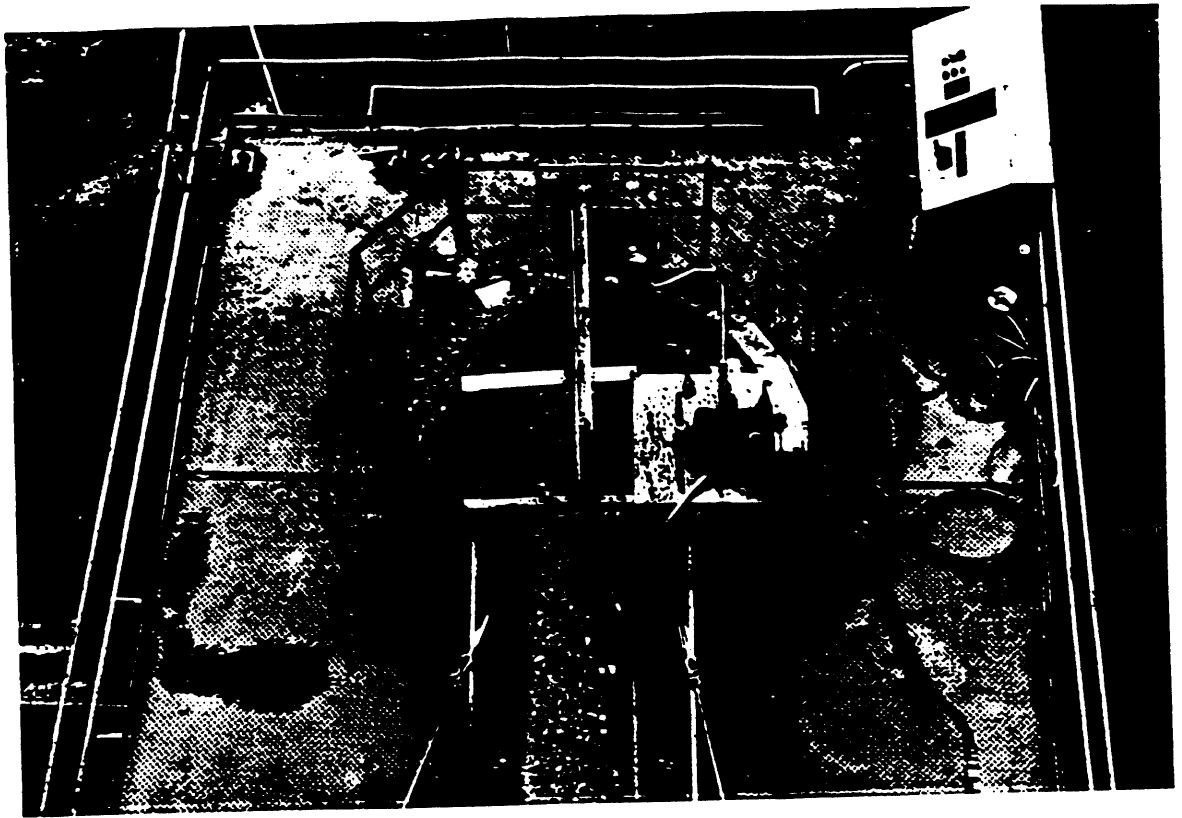
1.1 SUMMARY OF TEST PROGRAM

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.

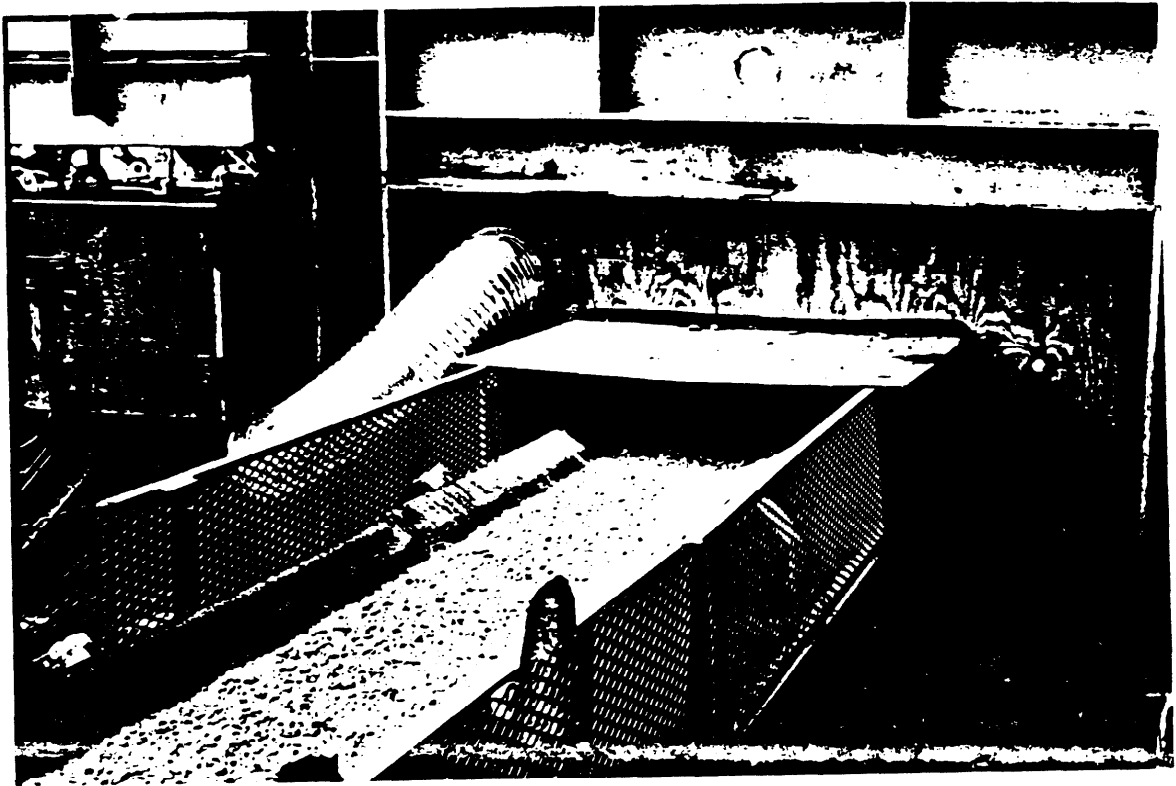
The PM10 emission factor test procedures were developed and conducted by Entropy Environmentalists, Inc. (Entropy). Entropy served as a subcontractor to SAIC in this project. The Emission Measurement Branch (EMB) of the EPA supervised the test program.

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 photocopied 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 crusher³ 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.

6011
RALEIGH GUARDY
STATIONARY PLANT
11-1-86
REVISED 9-21-89

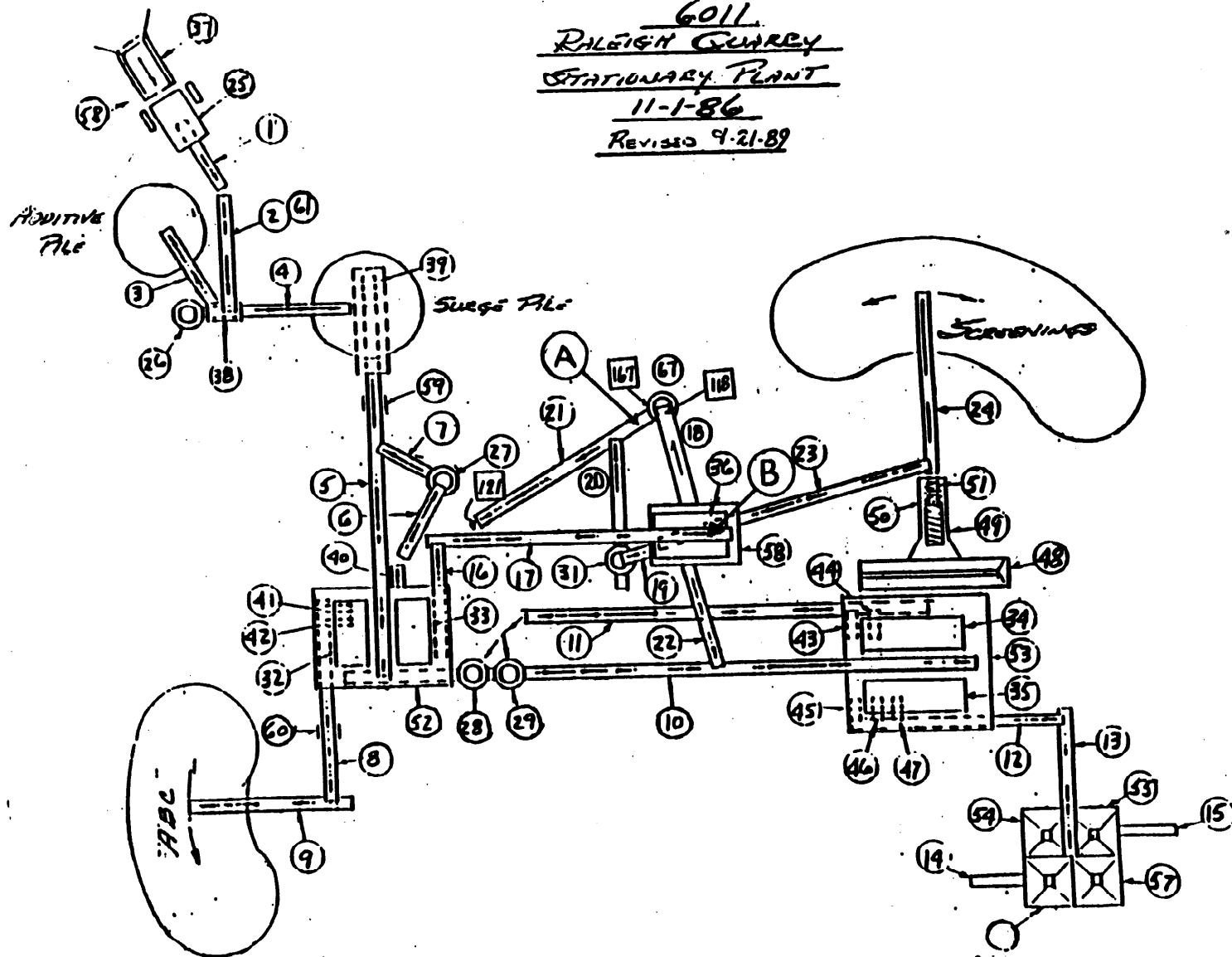


Figure 2-1 Process Flow Diagram

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.

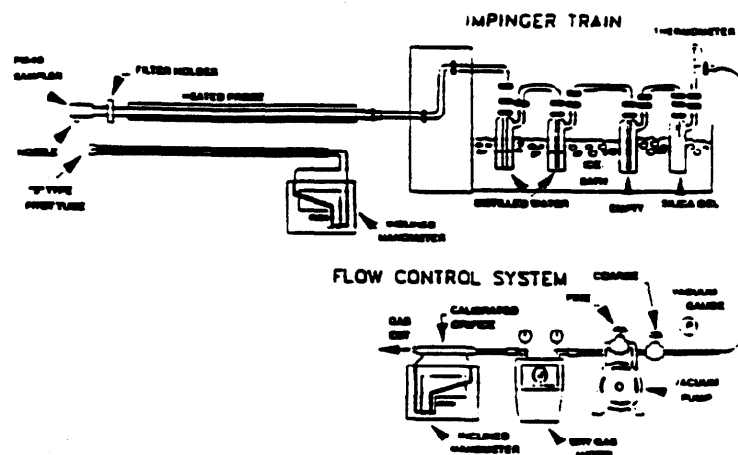


Figure 2-2 Sampling Train Configuration

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.

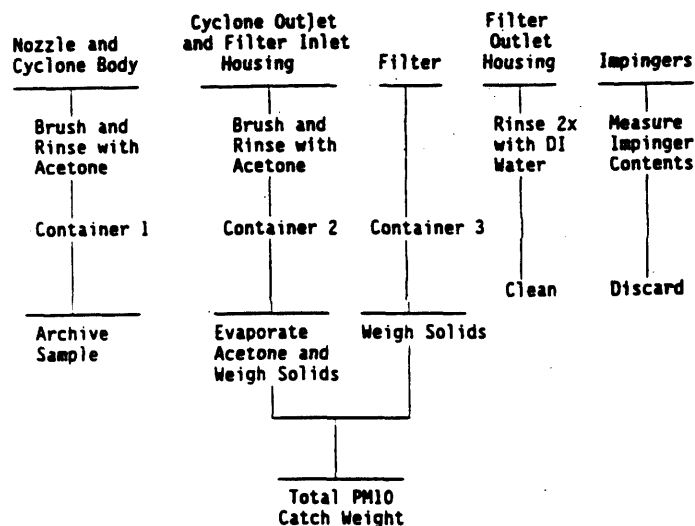


Figure 2-4 Sample Recovery Scheme

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 OUT-WET-1	Wet	7-27-92	10:03-10:14 12:33-16:33 12:35-16:35 13:07 12:00-17:00	Method 2 Method 201A Method 201A Stone Sample Wind Conditions	In/Out Ducts Inlet Duct Outlet Duct Conveyor 21 Platform
IN-WET-2 OUT-WET-2	Wet	7-28-92	08:00 08:17-14:23 08:15-14:21 10:40 08:00-15:00	Method 2 Method 201A Method 201A Stone Sample Wind Conditions	In/Out Ducts Inlet Duct Outlet Duct Conveyor 21 Platform
IN-WET-3 OUT-WET-3	Wet	7-29-92	08:00 08:35-14:35 08:34-14:34 12:00 08:00-15:00	Method 2 Method 201A Method 201A Stone Sample Wind Conditions	In/Out Ducts Inlet Duct Outlet Duct Conveyor 21 Platform
IN-DRY-1 OUT-DRY-1	Dry	7-30-92	07:30 08:01-09:01 08:00-09:00 09:00 07:00-13:00	Method 2 Method 201A Method 201A Stone Sample Wind Conditions	In/Out Ducts Inlet Duct Outlet Duct Conveyor 21 Platform
IN-DRY-2 OUT-DRY-2	DRY	7-30-92	07:30 09:54-11:03 09:53-11:02 11:15 07:00-13:00	Method 2 Method 201A Method 201A Stone Sample Wind Conditions	In/Out Ducts Inlet Duct Outlet Duct Conveyor 21 Platform
IN-DRY-3 OUT-DRY-3	Wet	7-30-92	07:30 12:00-13:00 11:59-12:59 13:00 07:00-13:00	Method 2 Method 201A Method 201A Stone Sample Wind Conditions	In/Out Ducts Inlet Duct Outlet Duct Conveyor 21 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 08:43-15:03 12:00 08:00-15:30	Method 2 Method 201A Stone Sample Wind Conditions	Outlet Duct Outlet Duct Conveyor 17 Platform
SR-WET-2	Wet	8-23-92	07:00 08:32-14:32 12:008 08:00-15:00	Method 2 Method 201A Stone Sample Wind Conditions	Outlet Duct Outlet Duct Conveyor 17 Platform
SR-WET-3	Wet	8-26-92	07:00 07:55-13:55 12:00 07:00-14:00	Method 2 Method 201A Stone Sample Wind Conditions	Outlet Duct Outlet Duct Conveyor 17 Platform
SR-DRY-1	Dry	8-27-92	07:30 08:45-09:45 09:00 08:00-15:00	Method 2 Method 201A Stone Sample Wind Conditions	Outlet Duct Outlet Duct Conveyor 17 Platform
SR-DRY-2	Dry	8-27-92	07:30 10:25-11:25 09:00 08:00-15:00	Method 2 Method 201A Stone Sample Wind Conditions	Outlet Duct Outlet Duct Conveyor 17 Platform
SR-DRY-3	Dry	8-27-92	07:30 13:15-14:15 14:15 08:00-15:00	Method 2 Method 201A Stone Sample Wind Conditions	Outlet Duct Outlet Duct Conveyor 17 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 matter⁹. 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_{wg}) 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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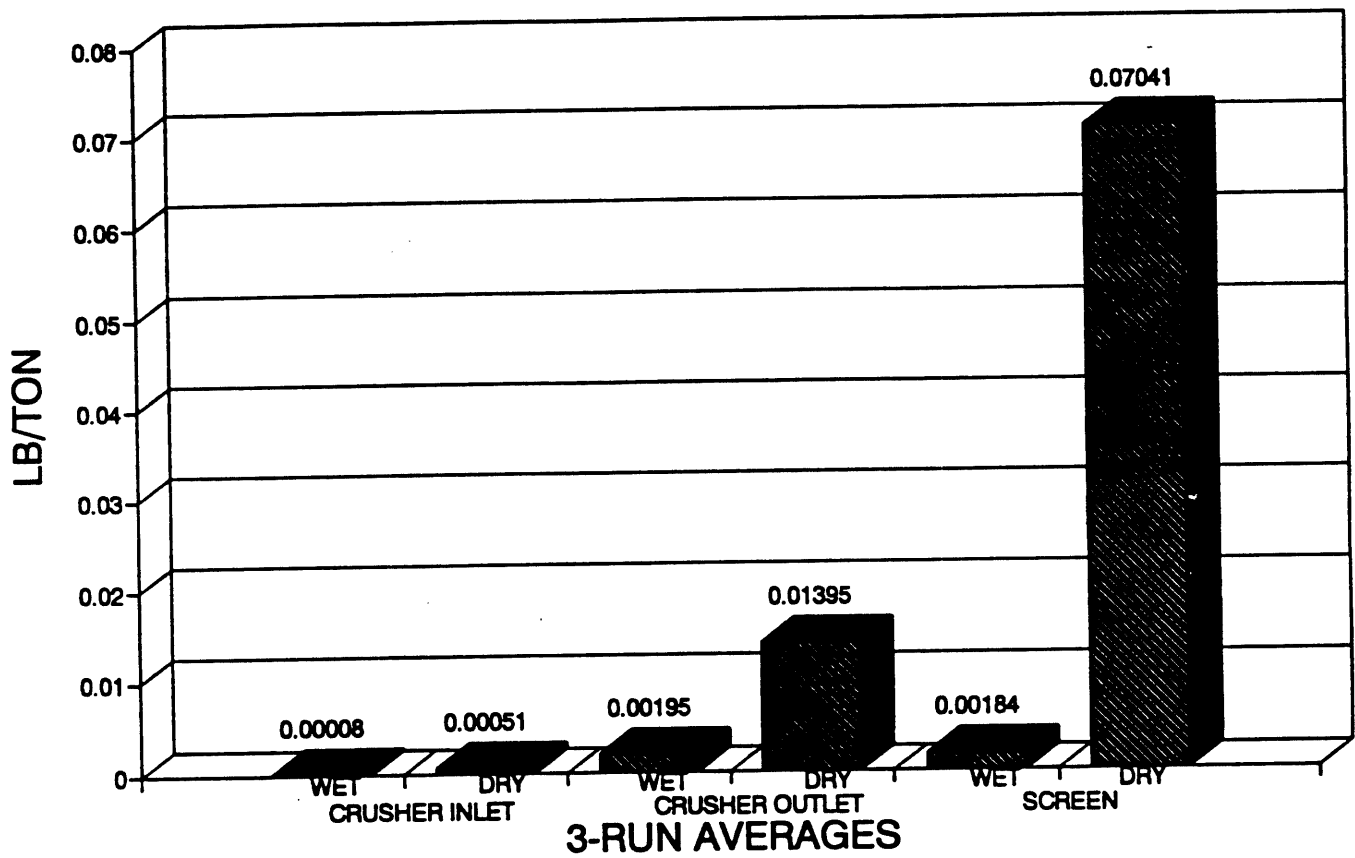
6.0 GLOSSARY

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
		7/27/92	7/28/92	7/29/92
	Test Date			
	Run Start Time	1233	817	835
	Run Finish Time	1633	1423	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 H ₂ O	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
%H ₂ O	Moisture Content, Percent by Volume	3.9 **	2.4 **	2.3 *
%H ₂ OSAT	Moisture Sat. @ Flue Gas Conditions, %	4.9	3.6	6.1
Mfd	Dry Mole Fraction	0.961	0.976	0.977
%CO ₂	Carbon Dioxide, Percent by Volume, Dry	0	0	0
%O ₂	Oxygen, Percent by Volume, Dry	20.9	20.9	20.9
%CO+N ₂	CO + N ₂ , 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 H ₂ O	-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 H ₂ O	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)

ENTROPY

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
		7/27/92	7/28/92	7/29/92
	Test Date			
	Run Start Time	1235	815	834
	Run Finish Time	1635	1421	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 H ₂ O	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
%H ₂ O	Moisture Content, Percent by Volume	2.9 **	2.3 **	2.3 **
%H ₂ OSAT	Moisture Sat. @ Flue Gas Conditions,	4.9	3.5	3.7
Mfd	Dry Mole Fraction	0.971	0.977	0.977
%CO ₂	Carbon Dioxide, Percent by Volume, Dr	0	0	0
%O ₂	Oxygen, Percent by Volume, Dry	20.9	20.9	20.9
%CO+N ₂	CO + N ₂ , 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 H ₂ O	-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 H ₂ O	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)

ENTROPY

FIELD DATA AND RESULTS TABULATION

PLANT: Nello-Teer

SAMPLING LOCATION: Crusher Outlet

		NT-O-WET-1 -----	NT-O-WET-2 -----	NT-O-WET-3 -----
<u>PM10 Calculations</u>				
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).

ENTROPY

FIELD DATA AND RESULTS TABULATION

PLANT: Nello-Teer

SAMPLING LOCATION: Crusher Inlet

		NT-I-DRY-1	NT-I-DRY-2	NT-I-DRY-3
		7/30/92	7/30/92	7/30/92
	Test Date			
	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 H ₂ O	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
%H ₂ O	Moisture Content, Percent by Volume	1.8 **	3.0 **	2.5 **
%H ₂ OSAT	Moisture Sat. @ Flue Gas Conditions, %	2.9	3.9	5.7
Mfd	Dry Mole Fraction	0.982	0.970	0.975
%CO ₂	Carbon Dioxide, Percent by Volume, Dry	0	0	0
%O ₂	Oxygen, Percent by Volume, Dry	20.9	20.9	20.9
%CO+N ₂	CO + N ₂ , 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 H ₂ O	-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 H ₂ O	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 SCFM*	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)

ENTROPY

FIELD DATA AND RESULTS TABULATION

PLANT: Nello-Teer

SAMPLING LOCATION: Crusher Inlet

		NT-I-DRY-1	NT-I-DRY-2	NT-I-DRY-3
		-----	-----	-----
<u>PM10 Calculations</u>				
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
		7/30/92	7/30/92	7/30/92
	Test Date			
	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).

ENTROPY

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
		8/19/92	8/23/92	8/26/92
	Test Date			
	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 H ₂ O	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
%H ₂ O	Moisture Content, Percent by Volume	2.8 **	2.1 **	1.4 **
%H ₂ OSAT	Moisture Sat. @ Flue Gas Conditions, %	4.4	4.2	4.1
Mfd	Dry Mole Fraction	0.972	0.979	0.986
%CO ₂	Carbon Dioxide, Percent by Volume, Dry	0	0	0
%O ₂	Oxygen, Percent by Volume, Dry	20.9	20.9	20.9
%CO+N ₂	CO + N ₂ , 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 H ₂ O	-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 H ₂ O	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
		8/27/92	8/27/92	8/27/92
	Test Date			
	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 -----
	<u>PM10 Calculations</u>			
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

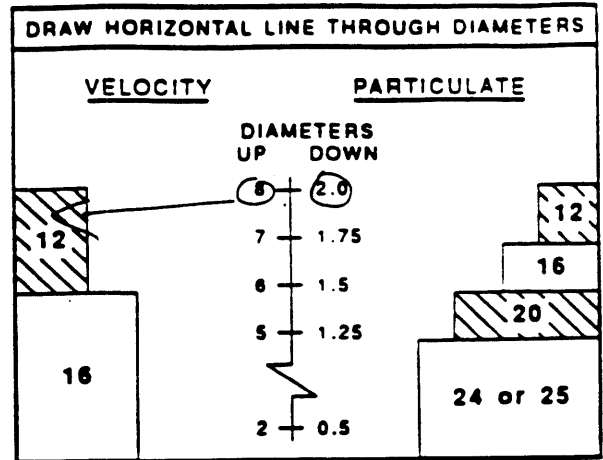
PLANT NAME <u>New Teer</u>	
CITY, STATE <u>Raleigh, NC</u>	
SAMPLING LOCATION <u>Inlet</u>	
NO. OF PORTS AVAILABLE <u>1</u>	
NO. OF PORTS USED <u>1</u>	
PORT INSIDE DIAMETER <u>5"</u>	
DISTANCE FROM FAR WALL TO OUTSIDE OF PORT <u>12"</u>	
NIPPLE LENGTH AND/OR WALL THICKNESS <u>0"</u>	
DEPTH OF STACK OR DUCT <u>12"</u>	
STACK OR DUCT WIDTH (IF RECTANGULAR) <u>N/A</u>	
EQUIVALENT DIAMETER: $D_E = \frac{2 \times \text{DEPTH} \times \text{WIDTH}}{\text{DEPTH} + \text{WIDTH}} = \frac{2() ()}{() + ()} = \underline{N/A}$	
DISTANCE TO FLOW DISTURBANCES*	
VELOCITY PORT	SAMPLING PORT
UPSTREAM DOWN	UPSTREAM DOWN
DISTANCE <u>18'</u> <u>3'</u>	DISTANCE _____
DIAMETERS <u>18</u> <u>3</u>	DIAMETERS _____
STACK/DUCT AREA = _____ = <u>113.1</u> IN ²	

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	29.8	19.4	14.6	11.8	9.9	8.5	7.5	6.7	6.0	5.5
4	93.3	70.4	42.3	22.6	17.7	14.6	12.5	10.9	9.7	8.7	7.9
5		85.4	57.7	34.2	25.0	20.1	16.9	14.6	12.9	11.6	10.5
6		95.6	68.6	45.8	35.6	28.9	22.0	18.8	16.5	14.6	13.2
7			89.5	77.4	64.4	53.6	43.3	35.6	29.4	24.8	21.1
8			96.8	86.4	75.0	63.4	57.5	47.8	39.6	32.8	27.4
9				91.8	82.3	73.1	62.5	58.2	50.6	42.2	35.0
10				97.4	88.2	79.9	71.7	61.8	58.8	51.5	42.2
11					93.3	85.4	78.0	70.4	61.2	59.3	52.3
12					97.9	90.1	83.1	76.4	69.4	60.7	53.8
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											96.9
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				89.6	75.0	64.3	56.3	49.0	43.3	39.3	35.5
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



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			

*SEE REVERSE FOR FIELD USE CHECKLIST

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 = $\pm 1.5\%$ 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 AHe 1.208
 As Applicable (check): Zero Magnehelics? _____ Zero/Level Manometer? _____
 Barometric Pressure (Pbar) 29.7 Auditor _____ Date _____

Dry Gas Meter Reading (Cubic Ft.)	Meter Temperature (°F)	Lower and Upper Limits for Audit Gamma
Final <u>559.851</u>	Final <u>110</u>	$0.96 * Y = \underline{.969408}$
Initial <u>552.100</u>	Initial <u>114</u>	$1.04 * Y = \underline{1.050192}$

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

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

$$Y_c = \frac{(10 + (290156109 / 60))}{7.751} * \left[\frac{0.0319 (112 + 460)}{29.7} \right]^{1/2} = \underline{1.011247346}$$

Audit Gamma

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

FIELD DATA - METHOD(S) 201A

PLANT NELLO-TEER RUN NO. NT-I-201A-1

CITY/STATE RAL. NC. JOB NO. 4508 DATE 7/27/92

SAMPLING LOC. INLIST TIME START 1233

BAROMETRIC PRESSURE, IN. HG 29.7 STATIC PRESSURE, IN. H₂O 2350 TIME FINISH 1633

LEAK CHECK, VACUUM IN. HG 17 5 OPERATOR HWL

LEAK RATE, CUBIC FEET/MIN. 0.025 0.003 ASST(S) TJB

EQUIPMENT CHECKS*		EQUIPMENT I.D. NUMBERS		LEAK CHECKS	
☒ N/A	PITOT, PRETEST	REAGENT BOX <u>0552</u>	METER BOX <u>1133</u>	Y <u>1.0098</u>	B <u> </u>
☒ N/A	PITOT, POSTTEST	PITOT <u>NA</u>	Cp <u>1.84</u>	NOZ <u>2006</u>	DIA. <u>1.337</u>
☒ N/A	NOZZLE, PRE/POST	TC READOUT <u>E53</u>	TC PROBE <u>R202</u>	UMBILICAL <u>698</u>	B <u> </u>
☒ N/A	TC <u>92</u> °F PRE	SAMPL'G BOX <u>62</u>	ORSAT PUMP <u>N/A</u>	TEDLAR BAG <u>N/A</u>	E <u> </u>
☒ N/A	TC <u>91</u> °F POST				B <u> </u>
☒ N/A	ORSAT SYSTEM				E <u> </u>
FILTER/XAD		TARE WT.		NOMOGRAPH DATA	
<u>PM-183</u>	<u>0.2732</u>	DELTA H ₂	<u>1.808</u>		
		METER TEMP	<u>110</u>		
		EST. XH ₂ O	<u>1</u>		
		C FACTOR	<u>1.03</u>		
		STACK TEMP	<u>85</u>		
		REF DELTA P	<u>128</u>		
		K FACTOR	<u>14.371</u>		
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 ₂ O	GAS METER TEMP. °F	STACK TEMP. °F	ORIFICE SETTING IN. H ₂ O		GAUGE VACUUM IN. HG	GAS TEMPERATURES °F		
							ACTUAL	IDEAL		FILTER *	IMPING. EXIT	PROBE OR COND. EXIT**
1		0	560.451	0.1344	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	667.601		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	738.878		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 other

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

240 190.409 0.1344 103 91.3 1.86

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

ENTROPY

757.5g H₂O
155.5

AIR FLOW RATE DETERMINATIONS

Plant Name Nelb 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. H₂O
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

7-28-92
Static
- .2643

AVG	1444
-----	------

Avg. *	115	25
--------	-----	----

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 _____			

HEP
IN
.210

FYRITE DATA, & CO₂

MOISTURE DATA (WET BULB/DRY BULB)

Port	Time	Dry Bulb °F	Wet Bulb °F	Diff.	% H ₂ O

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.

CITY/STATE Raleigh, NC

JOB NO. 4503

DATE 7/28/92

CITY/STATE RAILROADS, MO
SAMPLING LOC. Inlet To Crusher

TIME START 817

BAROMETRIC PRESSURE, IN. HG 29.8

STATIC PRESSURE, IN. H₂O -.2643

TIME FINISH 1423

LEAK CHECK, VACUUM IN. HG

OPERATOR TTB

LEAK RATE, CUBIC FEET/MIN.

ASST(S) HWL

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

* 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. (0)

Ver
$$(\sqrt{\Delta p})^2$$

Two

18

 ΔH

ENTROPY

FIELD DATA - METHOD(S) 201A

PLANT Nello Teer

CITY/STATE Raleigh, NC

SAMPLING LOC. Inlet to Crusher

BAROMETRIC PRESSURE, IN. HG. 30.0

LEAK CHECK, VACUUM IN. HG

LEAK RATE, CUBIC FEET/MIN.

FIELD DATA - METHOD(S) 201A

RUN NO. N1/IN/WE1/3

JOB NO. 4503

DATE 7/29/92

TIME START 0835

TIME FINISH 1435

OPERATOR III

ASST(S) HWL

EQUIPMENT CHECKS*		EQUIPMENT I.D. NUMBERS		LEAK CHECKS	
N/A PITOT, PRETEST	REAGENT BOX 0552	METER BOX N-33	y 1.0098	B N/A	B
N/A PITOT, POSTTEST	PITOT N/A	Cp .84	NOZ'L 2004	E	E
NOZZLE, PRE/POST	TC READOUT F53	TC PROBE R202	UMBILICAL 698	B	B
71 TC 71 °F PRE	SAMPL'G BOX 62	ORSAT PUMP N/A	TEDLAR BAG N/A	E	E
TC °F POST				B	B
N/A ORSAT SYSTEM				E	E
		<u>NOMOGRAPH DATA</u>			
FILTER/XAD	TARE WT.	DELTA HD			
PM102	.2669	METER TEMP	100		
		EST. XH ₂ O	1		
		C FACTOR	1.084		
		STACK TEMP	85		
		REF DELTA P	417		
		K FACTOR	4.415		
				<u>FYRITES</u>	
				N/A	

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

[illegible]

* 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 condenser.

360	164.829	.1475	98.1	82.5	.65
Min. (θ)	V _m	(√A _p) ²	t _m	t _s	Δ

78.3g H₂O

F-1112 (Page 1)

ENTROPY

AIR FLOW RATE DETERMINATIONS

Plant Name NEIBTEER 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) -32.75 In. H₂O
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 (')--

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

FYRITE DATA, % CO ₂				
--------------------------------	--	--	--	--

MOISTURE DATA (STOICHIOMETRIC)		
Free Water in Fuel, %		
Water from Fuel Combustion, %		
Ambient Water, %		
Relative Humidity, %		
Ambient Temperature, °F		
Total %		

ADDITIONAL DATA

F-1023 rev. 12-91

ENTROPY

PLANT Nello TeerRUN NO. NT/IN/DRY/2CITY/STATE Raleigh, NCJOB NO. 4503DATE 7/30/92SAMPLING LOC. Inlet to CrusherTIME START 954BAROMETRIC PRESSURE, IN. HG 29.9STATIC PRESSURE, IN. H₂O -.3275TIME FINISH 1103LEAK CHECK, VACUUM IN. HG 15 6OPERATOR TTBLEAK RATE, CUBIC FEET/MIN. .001 .001ASST(S) HWL

EQUIPMENT CHECKS*		EQUIPMENT I.D. NUMBERS				LEAK CHECKS	
N/A	PITOT, PRETEST	REAGENT BOX <u>614</u>	METER BOX <u>N-33</u>	Y <u>1.0098</u>	B <u>N/A</u>	B	
N/A	PITOT, POSTTEST	PITOT <u>N/A</u>	Cp <u>.84</u>	NOZ'L <u>2004</u>	DIA. <u>.252</u>	E	
✓	NOZZLE, PRE/POST	TC READOUT <u>F53</u>	TC PROBE <u>R202</u>	UMBILICAL <u>U98</u>	B	B	
82	TC <u>81</u> °F PRE	SAMPL'G BOX <u>34</u>	ORSAT PUMP <u>N/A</u>	TEDLAR BAG <u>N/A</u>	E	E	
85	TC <u>86</u> °F POST					B	B
N/A	ORSAT SYSTEM					E	E
FILTER/XAD		NOMOGRAPH DATA				FYRITES	
PM173	TARE WT. <u>.2709</u>	DELTA H ₂	<u>1.808</u>			N/A	
		METER TEMP	<u>90</u>				
		EST. XH ₂ O	<u>1</u>				
		C FACTOR	<u>1.0164</u>				
		STACK TEMP	<u>80</u>				
		REF DELTA P	<u>.420</u>				
		K FACTOR	<u>4.377</u>				

* 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 ₂ O	GAS METER TEMP. °F	STACK TEMP. °F	ORIFICE SETTING IN. H ₂ O		GAUGE VACUUM IN. HG	GAS TEMPERATURES °F		
							ACTUAL	IDEAL		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		60/05	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

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

60 27.379 .1475 91.7 84.2 .64
 Min. (θ) Vm (√ΔP)² tm ts ΔH

17.5g H₂O

ENTROPY

FIELD DATA - METHOD(S)

PLANT Nelb Teer

RUN NO. N/INIDRY13

CITY/STATE Raleigh, NC

JOB NO. _____

DATE 7/30/92

SAMPLING LOC. Outlet of Crusher INLET

TIME START 1200

BAROMETRIC PRESSURE, IN. HG 29.9

STATIC PRESSURE, IN. H₂O -0.3275

TIME FINISH 1300

LEAK CHECK, VACUUM IN. HG 15

OPERATOR TJB

LEAK RATE, CUBIC FEET/MIN. 02

ASST(S) HWL

EQUIPMENT CHECKS*		EQUIPMENT I.D. NUMBERS			LEAK CHECKS	
N/A	PITOT, PRETEST	REAGENT BOX <u>614</u>	METER BOX <u>N-33</u>	Y <u>1.0098</u>	B <u>N/A</u>	B _____
N/A	PITOT, POSTTEST	PITOT <u>N/A</u>	NOZ'L <u>2004</u>	DIA. <u>252</u>	E _____	E _____
88	NOZZLE, PRE/POST	TC READOUT <u>F53</u>	TC PROBE <u>R202</u>	UMBILICAL <u>U98</u>	B _____	B _____
94	TC <u>88</u> °F PRE	SAMPL'G BOX <u>47</u>	ORSAT PUMP <u>N/A</u>	TEDLAR BAG <u>N/A</u>	E _____	E _____
94	TC <u>94</u> °F POST				B _____	B _____
N/A	ORSAT SYSTEM				E _____	E _____
FILTER/XAD		NOMOGRAPH DATA			FYRITES	
PM177	TARE WT. <u>2.702</u>	DELTA H ₂ O <u>1.808</u>			N/A	
		METER TEMP <u>90</u>				
		EST. XH ₂ O <u>1</u>				
		C FACTOR <u>1.064</u>				
		STACK TEMP <u>80</u>				
		REF DELTA P <u>4.20</u>				
		K FACTOR <u>4.377</u>				

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

1210
1220
1230
1240
1250
1300

(69) 132

LINE	SAMPLE POINT	CLOCK TIME MINUTES	DRY GAS METER READING CUBIC FEET	PITOT READING IN. H ₂ O	GAS METER TEMP. °F	STACK TEMP. °F	ORIFICE SETTING IN. H ₂ O		GAUGE VACUUM IN. HG	GAS TEMPERATURES °F		
							ACTUAL	IDEAL		FILTER	INP. EXIT	PROBE OR COND. EXIT**
1	5	0	145.490	.1475	92	98	.64	.642	1	N/A	70	N/A
2		10	150.770		93	95			1		65	
3		20	155.365		95	98			1		68	
4		30	159.955		96	97			1		65	
5		40	164.539		95	94			1		65	
6	↓	50	168.132	↓	95	94	↓	↓	1	↓	67	↓
7		60	173.713									
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 other

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

160 28.233 .1475 943 96 64
Min. (θ) Vm (ΔP)² tm ts ΔH

ENTROPY

14.9 g H₂O

4417

CITY/STATE Raleigh, NC

JOB NO. 4503

RUN NO. NT/INV DRY/1

DATE 7/30/92

SAMPLING LOC. Inlet to Crusher

BAROMETRIC PRESSURE, IN. HG 29.9

STATIC PRESSURE, IN. H₂O -.3275

TIME START 801

TIME FINISH 901

LEAK CHECK, VACUUM IN. HG 15 15

OPERATOR TJB
ASST(S) HWL

LEAK RATE, CUBIC FEET/MIN. .001 .001

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

* 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 condenser.

XIT & $\sqrt{\text{(probe \& filter heat off)}}$ apply to NJ method 1. CUMUL

Min. (°)	V_m	$(\sqrt{AP})^2$	t_m	t_s	ΔH
60	27.271	.1475	84.7	75.2	.64

F-1112 (Page 1)

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) _____

EQUIPMENT CHECKS*		EQUIPMENT I.D. NUMBERS				LEAK CHECKS	
N/A	PITOT, PRETEST	REAGENT BOX	<u>D222</u>	METER BOX	<u>N-13</u>	Y	<u>1.0066</u>
N/A	PITOT, POSTTEST	PITOT	<u>N/A</u>	C _p	<u>84</u>	NOZ'L	<u>2004</u>
✓	NOZZLE, PRE/POST	TC READOUT	<u>F58</u>	TC PROBE	<u>R221</u>	UNBILICAL	
	TC _____ °F PRE	SAMPL'G BOX	<u>34</u>	ORSAT PUMP	<u>N/A</u>	TEDLAR BAG	<u>N/A</u>
	TC _____ °F POST						
N/A	ORSAT SYSTEM						
FILTER/XAD		TARE WT.					
<u>PM178</u>		<u>.2717</u>					
		METER TEMP					
		<u>100</u>					
		EST. XH ₂ O					
		<u>2</u>					
		C FACTOR					
		<u>1.099</u>					
		STACK TEMP					
		<u>72</u>					
		REF DELTA P					
		<u>.401</u>					
		K FACTOR					
		<u>4.589</u>					

* 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 ₂ O	GAS METER TEMP. °F	STACK TEMP. °F	ORIFICE SETTING IN. H ₂ O		GAUGE VACUUM IN. HG	GAS TEMPERATURES °F		
							ACTUAL	IDEAL		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	✓	Back off										

* 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

ΔH ~ .646
 +50 ~ .540
 -50 ~ .786

ENTROPY

GLASS MAT 63
 LOT # FILTER# PM-178
 TARE WT. 0.2717

SAMPLING EQUIPMENT AUDIT

Plant Name Nelb 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? (V) _____
 (Note: deduct 0.1" Hg from local NWS STATION pressure for each 100' of test location elevation; example: $29.6 - (300/100 \times 0.1) = 29.3$ "Hg.)

Ref. Therm. Initial Ambient Temp., °F	Allowable Deviation From Ambient	Ambient Temperature, °F	Audit OK (V)
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 backup. 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 = $\pm 1.5\%$ 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_e 1.834
 As Applicable (check): Zero Magnehelics? _____ Zero/Level Manometer? 2
 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 <u>342.571</u>	Final <u>90</u>	$0.96 \times Y = \underline{.966336}$
Initial <u>335.000</u>	Initial <u>80</u>	$1.04 \times Y = \underline{1.046864}$

Dry Gas Volume Metered (Cubic Ft.)	Average Meter Temp. (°F)	Run Time (Base = 10)	
		(Minutes)	(Seconds)
V _m = <u>7.571</u>	T _m = <u>85</u>	<u>10</u>	<u>0</u>

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

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

Audit Gamma

Audit Gamma Acceptable (between lower & upper limits)? (V) ✓ Yes _____ No

AIR FLOW RATE DETERMINATIONS

Plant Name Nelb Teer Run No. SR-M2-1
City/State Raleigh, NC Date 8/13/92
Test Location Screen Personnel TJB
Barometric Pres. (Pbar) 30.0 In. Hg Static Pres. (Pg) 29.85 In. H₂O
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 (')--

[illegible]

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 ₂ O

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, Q _{sd} =	SCFM
Wet at Stack Conditions, Q _{aw} =	ACFM

ADDITIONAL DATA

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

FIELD DATA - METHOD(S) 201A

PLANT NELLO TFER RUN NO. NT-SR-WET-
 CITY/STATE KALEIGH, NC JOB NO. 4503 DATE 08-19-9
 SAMPLING LOC. ID-SECO SCREEN TIME START 0843
 BAROMETRIC PRESSURE, IN. HG 29.9 STATIC PRESSURE, IN. H₂O 29.9 - 29.85 TIME FINISH 1503
 LEAK CHECK, VACUUM IN. HG 5 3 OPERATOR DLS
 LEAK RATE, CUBIC FEET/MIN. .000 .000 ASST(S) WKK

EQUIPMENT CHECKS*		EQUIPMENT I.D. NUMBERS		LEAK CHECKS	
☒ N/A	PITOT, PRETEST	REAGENT BOX <u>0222</u>	METER BOX <u>N7</u>	Y <u>.9843</u>	B <u> </u>
☒ N/A	PITOT, POSTTEST	PITOT <u>N/A</u>	NOZ'L <u>2004</u>	DIA. <u>.252</u>	E <u> </u>
☒	NOZZLE, PRE/POST	TC READOUT <u>F58</u>	TC PROBE <u>R221</u>	UMBILICAL <u>U88</u>	B <u> </u>
☒	TC <u>72</u> °F PRE	SAMPL'G BOX <u>34</u>	ORSAT PUMP <u>N/A</u>	TEDLAR BAG <u>N/A</u>	E <u> </u>
☒	TC <u>86</u> °F POST				B <u> </u>
☒ N/A	ORSAT SYSTEM				E <u> </u>
FILTER/NOZ		TARE WT.		NOMOGRAPH DATA	
<u>PM178</u>	<u>0.2717</u>	DELTA H ₂	<u>1.736</u>		
		METER TEMP	<u>100</u>		
		EST. %H ₂ O	<u>1.0</u>		
		C FACTOR	<u>1.040</u>		
		STACK TEMP	<u>85</u>		
		REF DELTA P	<u>0.434</u>		
		K FACTOR	<u>4.240</u>		

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

L I N E	SAMPLE POINT	CLOCK TIME MINUTES	DRY GAS METER READING CUBIC FEET	PITOT READING IN. H ₂ O	GAS METER TEMP. °F	STACK TEMP. °F	ORIFICE SETTING IN. H ₂ O		GAUGE VACUUM IN. HG	GAS TEMPERATURES °F		
							ACTUAL	IDEAL		FILTER *	INPING. EXIT	PROBE OR COND EXIT**
1	1	0	327.76	0.1413	84	74	0.61	0.61	1	N/A	59	N/A
2	1	15	334.47		95	74	0.61		1		57	
3	1	30	341.19		105	75			1		56	
4	1	45	347.83		108	78			1		55	
5	1	60	354.49		90	80			1		55	
6	1	15	361.32		87	81			1		54	
7	1	30	368.12		87	84			1		54	
8	1	45	374.93		89	85			1		54	
9	1	120	381.65		89	89			1		54	
10	1	15	388.38		91	90			1		54	
11	1	30	395.09		90	88			1		54	
12	1	45	401.79		90	91			1		54	
13	1	180	408.45		91	94			1		55	
14	1	15	415.07		91	84			1		55	
15	1	30	421.67		91	85			1		55	
16	1	45	428.29		91	86			1		55	
17	1	240	434.80		91	86			1		55	
18	1	15	441.33		91	86			1		55	
19	1	30	447.83		91	86			1		55	
20	1	45	454.336		91	86			1		55	
21	1	300	461.28		91	85			1		55	
22	1	15	468.23		91	86			1		55	
23	1	30	475.26		91	87			1		55	
24	1	45	482.18		93	88			1		55	
25	OFF	360	488.953									

* 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

ENTROPY

MOISTURE ANALYTICAL RESULTS

Plant Name NELLO TEER Job No. 4503
 City/State RALEIGH, NC Sampling Loc. TEBO-SECO-SCREEN

Run Number

NT-SR-WET-1

Sampling Date

08-19-92

Analysis Date

08-19-92

Analyst

DLS

<u>Reagent 1 (200 mL D₂O)</u>			
Final Weight, g	<u>644.4</u>		
Tared Weight, g	<u>581.8</u>		
Water Catch, g	<u>62.6</u>		
<u>Reagent 2 ()</u>			
Final Weight, g			
Tared Weight, g			
Water Catch, g			
<u>Reagent 3 ()</u>			
Final Weight, g			
Tared Weight, g			
Water Catch, g			
CONDENSED WATER, g			

<u>Silica Gel</u>			
Final Weight, g	<u>239.4</u>		
Tared Weight, g	<u>210.3</u>		
ADSORBED WATER, g	<u>29.1</u>		

TOTAL WATER COLLECTED, g	<u>91.7</u>		
--------------------------	-------------	--	--

Balance No. _____ Type (✓) Triple Beam ☒ Electronic _____ Reagent Box No. 0222

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

Comments _____

FIELD TEST LOG (USE REVERSE SIDE ALSO)

Plant Name NELLO TEE

Job No. 4503

Sampling Location TD-SECO-SCREEN

Start	Stop	Comments/Problems	Run No.	Date
<u>0843</u>	<u>1011</u>	<u>PROCESS DOWN</u>	<u>NT-SR-WET-1</u>	<u>08-19-92</u>
<u>1018</u>	<u>1113</u>	<u>PROCESS DOWN</u>		
<u>1122</u>	<u>1344</u>	<u>ADDED OIL TO METERBOX</u>		
<u>1348</u>	<u>1503</u>	<u>NO PROBLEMS</u>		

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

Posttest Leak Rate .000 Sample Appearance _____

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

Start	Stop	Comments/Problems	Run No.	Date

Sampling Team Initials _____ (Team Leader) _____ (Others)

Posttest Leak Rate _____ Sample Appearance _____

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

Start	Stop	Comments/Problems	Run No.	Date

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. 4503
 City/State RALEIGH, NC Auditor(s) DL5
 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 backup. 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 = $\pm 1.5\%$ 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_e 1.736
 As Applicable (check): Zero Magnehelics? ☒ Zero/Level Manometer? N/A
 Barometric Pressure (P_{bar}) 29.9 Auditor DL5 Date 08-19-92

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

Dry Gas Volume Metered (Cubic Ft.)	Average Meter Temp. (°F)	Run Time (Base = 10)	
		(Minutes)	(Seconds)
V _m = <u>7.609</u>	T _m = <u>76</u>	<u>10</u>	<u>0</u>

0.75 = Ideal Sampling Rate

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

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

Audit Gamma

Audit Gamma Acceptable (between lower & upper limits)? (✓) ☒ Yes ☐ No

FIELD DATA - METHOD(S)

M201A

PLANT Nella Teer RUN NO. NT-SR-WET-2
 CITY/STATE Raleigh N.C. JOB NO. 4503 DATE 8-23-92
 SAMPLING LOC. TD 5610 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*		EQUIPMENT I.D. NUMBERS				LEAK CHECKS		
☒ PITOT, PRETEST	REAGENT BOX	METER BOX	<u>N7</u>	Y	<u>9843</u>	B	B	
☒ PITOT, POSTTEST	PITOT	Cp	<u>84</u>	NOZ'L	<u>.252</u>	E	E	
☒ NOZZLE, PRE/POST	TC READOUT	<u>E58</u>	TC PROBE	<u>R202</u>	UMBILICAL	B	B	
☒ TC <u>76</u> °F PRE	SAMPL'G BOX	<u>84</u>	ORSAT PUMP	<u>N/A</u>	TEDLAR BAG	E	E	
☒ TC <u>76</u> °F POST	MONOGRAPH DATA						B	B
<u>N/A</u> ORSAT SYSTEM							DELTA Hg	<u>1.736</u>
FILTER/XAD	TARE WT.	METER TEMP	<u>100</u>					
<u>PM-146</u>	<u>.2687</u>	EST. XH ₂ O	<u>1</u>					
		C FACTOR	<u>1.040</u>					
		STACK TEMP	<u>85</u>					
		REF DELTA P	<u>.434</u>					
		K FACTOR	<u>4.240</u>					

* 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 ₂ O	GAS METER TEMP. °F	STACK TEMP. °F	ORIFICE SETTING IN. H ₂ O		GAUGE VACUUM IN. HG	GAS TEMPERATURES °F		PROBE OR COND EXIT**
							ACTUAL	IDEAL		FILTER *	IMPING. EXIT	
0832	1	0	500.104	.14	76	85	.56	.56	1	N/A	48	N/A
Big Rock	2	0847	506.210	.14	80	75	.58	.58	1		48	
	3	0902	512.761	.14	81	76	.58	.58	1		48	
Small Rock	4	0917	519.951	.14	83	75	.59	.59	1		49	
1 hr	5	0932	526.622	.14	84	76	.59	.59	1		48	
Big Rock	6	0947	533.205	.14	86	88	.59	.59	1		49	
0940	7	1002	539.900	.14	86	81	.58	.58	1		55	
Small Rock	8	1005	546.582	.14	88	83	.58	.58	1		55	
2 hr	9	1200	553.255	.14	89	84	.58	.58	1		54	
1030	10	135	559.600	.14	89	84	.58	.58	1		54	
Big Rock	11	150	566.582	.14	88	84	.58	.58	1		54	
1057	12	165	573.100	.14	90	81	.58	.58	1		53	
Small Rock	13	1800	579.745	.14	90	89	.58	.58	1		53	
3 hr	14	195	586.300	.14	90	89	.58	.58	1		53	
Large Rock	15	210	592.945	.14	90	83	.58	.58	1		53	
1142	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	19	270	619.500	.14	92	94	.58	.58	1		53	
1304	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	22	315	639.273	.14	88	92	.58	.58	1		52	
1330	23	330	645.845	.14	90	92	.58	.58	1		52	
6 hr	24	345	652.475	.14	90	90	.58	.58	1	✓	52	✓
	25	400	658.582									

* 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. (°)

V_m $(\sqrt{\Delta P})^2$ t_mt_s

ΔH

ENTROPY

FIELD DATA - METHOD(S) M2019PLANT Nello TreeRUN NO. NT-SR-WET-3CITY/STATE Raleigh N.C.JOB NO. 4503DATE 8-26-82SAMPLING LOC. ID-5600 ScreenTIME START 0755BAROMETRIC PRESSURE, IN. HG 29.90STATIC PRESSURE, IN. H₂O -0.32TIME FINISH 1355LEAK CHECK, VACUUM IN. HG 15" 5"OPERATOR DDHLEAK RATE, CUBIC FEET/MIN. 0.000 0.000ASST(S) Bill Kick

EQUIPMENT CHECKS*		EQUIPMENT I.D. NUMBERS		LEAK CHECKS	
<u>N/A</u> PITOT, PRETEST	REAGENT BOX	METER BOX <u>N-7 Y 9843</u>	B	B	
<u>N/A</u> PITOT, POSTTEST	PITOT <u>N/A</u> ^{CP} <u>N/A</u> NOZ'L <u>2004</u> DIA. <u>.252</u>		E	E	
<u>✓</u> NOZZLE, PRE/POST	TC READOUT <u>F58</u>	TC PROBE <u>R202</u> UMBILICAL <u>42</u>	B	B	
<u>✓</u> TC <u>35</u> °F PRE	SAMPL'G BOX <u>84</u>	ORSAT PUMP <u>N/A</u> TEDLAR BAG <u>N/A</u>	E	E	
<u>✓</u> TC <u>35</u> °F POST			B	B	
<u>N/A</u> ORSAT SYSTEM			E	E	
				FYRITES	
				-0-	

NOMOGRAPH DATA	
DELTA H ₂	<u>1.736</u>
METER TEMP	<u>100</u>
EST. XH ₂ O	<u>1</u>
C FACTOR	<u>1.040</u>
STACK TEMP	<u>86</u>
REF DELTA P	<u>.435</u>
K FACTOR	<u>4.23</u>

FILTER/XAD	TARE WT.
<u>PM147</u>	<u>.2698</u>

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

Large Rock
 ↓
Small Rock/0810
 ↓
Large Rock/0830
Small Rock/0835
 ↓
Large Rock/0840
Small Rock/0910
 ↓
0955
Large Rock/0955
 ↓
Small Rock/1057
 ↓
Large Rock/1120
Small Rock/1150
Large Rock/1200
 ↓
Small Rock/1325
Big Rock/1327

LINE	SAMPLE POINT	CLOCK TIME MINUTES	DRY GAS METER READING CUBIC FEET	PITOT READING IN. H ₂ O	GAS METER TEMP. °F	STACK TEMP. °F	ORIFICE SETTING IN. H ₂ O		GAUGE VACUUM IN. HG	GAS TEMPERATURES °F		
							ACTUAL	IDEAL		FILTER *	IMPING. EXIT	PROBE OR COND. EXIT**
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	
3	0825	30	673.000		74	73	.58	.58	2		48	
4	0840	45	679.561		76	75	.58	.58	2		49	
5	1 hr.	60	686.172		78	76	.58	.58	2		49	
6	910	75	693.190		78	76	.58	.58	2		49	
7	925	90	700.000		83	80	.58	.58	2		50	
8	940	105	708.43		88	83	.58	.58	2		50	
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	
12	1040	165	734.965		93	89	.58	.58	2		51	
13	3 hrs.	180	741.741		94	92	.58	.58	2		51	
14	1110	195	748.926		92	90	.58	.58	2		52	
15	1125	210	755.072		92	90	.58	.58	2		52	
16	1140	225	761.265		90	90	.58	.58	2		52	
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	
23	1325	330	806.482		93	91	.58	.58	2		51	
24	1340	345	812.800		93	91	.58	.58	2	✓	51	✓
25	10 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 condenser

Min. (θ)

V_m(√ΔP)²t_mt_s

ΔH

ENTROPY

FIELD DATA - METHOD(S) M2017

PLANT Nellis Test RUN NO. SR-DR4-1
 CITY/STATE Raleigh N.C. JOB NO. 4503 DATE 8-27-92
 SAMPLING LOC. ID-3610 Screen TIME START 0845
 BAROMETRIC PRESSURE, IN. HG 29.50 STATIC PRESSURE, IN. H₂O -.32 TIME FINISH 0915
 LEAK CHECK, VACUUM IN. HG 15" 5" OPERATOR DDH
 LEAK RATE, CUBIC FEET/MIN. 0.000 0.000 ASST(S) DDH

EQUIPMENT CHECKS*		EQUIPMENT I.D. NUMBERS		LEAK CHECKS	
☒ PITOT, PRETEST	REAGENT BOX <u>0508</u>	METER BOX <u>147</u>	Y <u>.9843</u>	B	B
☒ PITOT, POSTTEST	PITOT <u>N/A</u>	NOZ'L <u>N/A</u>	DIA. <u>.252</u>	E	E
☒ NOZZLE, PRE/POST	TC READOUT <u>F58</u>	TC PROBE <u>R202</u>	UMBILICAL <u>14</u>	B	B
☒ TC <u>85</u> °F PRE	SAMPL'G BOX <u>84</u>	ORSAT PUMP <u>N/A</u>	TEDLAR BAG <u>N/A</u>	E	E
☒ TC <u>85</u> °F POST				B	B
☒ ORSAT SYSTEM				E	E
		NOMOGRAPH DATA			
FILTER/XAD	TARE WT.	DELTA H ₂			
<u>PM149</u>	<u>.2727</u>	METER TEMP	<u>100</u>		
<u>PM170</u>	<u>.2701</u>	EST. XH ₂ O	<u>1</u>		
		C FACTOR	<u>1.040</u>		
		STACK TEMP	<u>86</u>		
		REF DELTA P	<u>.435</u>		
		K FACTOR	<u>4.232</u>		
				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 ₂ O	GAS METER TEMP. °F	STACK TEMP. °F	ORIFICE SETTING IN. H ₂ O		GAUGE VACUUM IN. HG	GAS TEMPERATURES °F			
							ACTUAL	IDEAL		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	835.890	.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 r

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

ENTROPY

FIELD DATA - METHOD(S) M201H

PLANT Nello Tarr RUN NO. SR-DRY-2
 CITY/STATE Raleigh N.C. JOB NO. 4503 DATE 8-27-92
 SAMPLING LOC. ID-SECO GREEN TIME START 1025
 BAROMETRIC PRESSURE, IN. HG 29.90 STATIC PRESSURE, IN. H₂O -1.32 TIME FINISH 1125
 LEAK CHECK, VACUUM IN. HG 15" OPERATOR DDH
 LEAK RATE, CUBIC FEET/MIN. 0.000 ASST(S) DDH

EQUIPMENT CHECKS*		EQUIPMENT I.D. NUMBERS		LEAK CHECKS	
☒ PITOT, PRETEST	REAGENT BOX <u>0508</u>	METER BOX <u>N-2 Y .9843</u>	B <u> </u>	B <u> </u>	
☒ PITOT, POSTTEST	PITOT <u>N/A</u> C _p <u>81</u>	NOZ'L DIA. <u>.250</u>	E <u> </u>	E <u> </u>	
☒ NOZZLE, PRE/POST	TC READOUT <u>58</u>	TC PROBE <u>R202</u> UMBILICAL <u>U2</u>	B <u> </u>	B <u> </u>	
☒ TC <u>85</u> °F PRE	SAMPL'G BOX <u>81</u>	ORSAT PUMP <u>N/A</u> TEDLAR BAG <u>N/A</u>	E <u> </u>	E <u> </u>	
☒ TC <u>85</u> °F POST			B <u> </u>	B <u> </u>	
☒ ORSAT SYSTEM			E <u> </u>	E <u> </u>	
NOMOGRAPH DATA		FYRITES			
FILTER/XAD	TARE WT.	DELTA H ₂	METER TEMP		
<u>PM159</u>	<u>.2619</u>	<u>1.736</u>	<u>100</u>		
		EST. XH ₂ O	<u>1</u>		
		C FACTOR	<u>1.640</u>		
		STACK TEMP	<u>86</u>		
		REF DELTA P	<u>.435</u>		
		K FACTOR	<u>4.23</u>		

* 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 ₂ O	GAS METER TEMP. °F	STACK TEMP. °F	ORIFICE SETTING IN. H ₂ O		GAUGE VACUUM IN. HG	GAS TEMPERATURES °F		
							ACTUAL	IDEAL		FILTER *	IMPING. EXIT	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	866.062		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	878.200		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 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

ENTROPY

PLANT Nellis Test RUN NO. SK-DRY-3
CITY/STATE Raleigh N.C. JOB NO. 9508 DATE 8-27-92
SAMPLING LOC. TD-SF(1) Screen TIME START 1215
BAROMETRIC PRESSURE, IN. HG 29.90 STATIC PRESSURE, IN. H₂O -.32 TIME FINISH 415
LEAK CHECK, VACUUM IN. HG 15" 5" OPERATOR DDH
LEAK RATE, CUBIC FEET/MIN. 0.000 0.000 ASST(S) DDH

EQUIPMENT CHECKS*		EQUIPMENT I.D. NUMBERS				LEAK CHECKS		
<u>N/A</u> PITOT, PRETEST	REAGENT BOX <u>0508</u>	METER BOX	<u>N-7</u>	Y	<u>.9843</u>	B	B	
<u>N/A</u> PITOT, POSTTEST	PITOT <u>N/A</u> C _p	<u>.84</u>	NOZ'L		DIA. <u>.252</u>	E	E	
<u>✓</u> NOZZLE, PRE/POST	TC READOUT <u>F58</u>	TC PROBE	<u>R202</u>	UMBILICAL	<u>U2</u>	B	B	
<u>✓</u> TC <u>85</u> °F PRE	SAMPL'G BOX <u>84</u>	ORSAT PUMP	<u>N/A</u>	TEDLAR BAG	<u>N/A</u>	E	E	
<u>✓</u> TC <u>85</u> °F POST	NOMOGRAPH DATA						B	B
<u>N/A</u> ORSAT SYSTEM							DELTA H ₂	<u>1.736</u>
FILTER/XAD	TARE WT.	METER TEMP	<u>100</u>			B	B	
<u>PMH3</u>	<u>.2708</u>	EST. %H ₂ O	<u>1</u>			E	E	
		C FACTOR	<u>1.040</u>			FYRITES		
		STACK TEMP	<u>86</u>					
		REF DELTA P	<u>.435</u>					
		K FACTOR	<u>4.23</u>					

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

[illegible]

* 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.

 ΔH

F-1112 (Page 1)

Sampling and Velocity Traverse Point Determination EPA Method 1

PLANT NAME Nelb Teer
 CITY, STATE Raleigh NC
 SAMPLING LOCATION Ductlet
 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:
 $D_e = \frac{2 \times \text{DEPTH} \times \text{WIDTH}}{\text{DEPTH} + \text{WIDTH}} = \frac{2() ()}{() + ()} = \underline{N/A}$
 DISTANCE FROM PORTS TO FLOW DISTURBANCES
 UPSTREAM 20' 16" DOWNSTREAM 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	2.8	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	29.8	19.4	14.6	11.8	9.9	8.5	7.5	6.7	6.0	5.5
4	93.3	70.4	42.3	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	38.6	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										96.6	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	36.7	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	40.8	37.5
6					91.7	78.8	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

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.

VELOCITY PARTICULATE

DIAMETERS UP DOWN

8 + 2.0
 7 + 1.75
 6 + 1.5
 5 + 1.25
 2 + 0.5

12 16 20 24 or 25

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

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? (V) _____
 (Note: deduct 0.1" Hg from local NWS STATION pressure for each 100' of test location elevation; example: $29.6 - (300/100 \times 0.1) = 29.3$ "Hg.)

Ref. Therm. Initial Ambient Temp., °F	Allowable Deviation From Ambient	Ambient Temperature, °F	Audit OK (V)
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 backup. 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 = $\pm 1.5\%$ 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_e 1.834
 As Applicable (check): Zero Magnehelics? ☒ Zero/Level Manometer? ☒
 Barometric Pressure (Pbar) 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 <u>683.735</u>	Final <u>104</u>	$0.96 \times Y = .9663$
Initial <u>676.050</u> <u>674.495</u>	Initial <u>98</u>	$1.04 \times Y = 1.0468$

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

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

$$Y_c = \frac{[10 + (0 / 60)]}{7.685} \cdot \left[\frac{0.0319 (101 + 460)}{29.7} \right]^{1/2} = \frac{10.00}{\text{Audit Gamma}}$$

Audit Gamma Acceptable (between lower & upper limits)? (V) ☒ Yes ☐ No

AIR FLOW RATE DETERMINATIONS

Plant Name NELLO L. TOER 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) 2.2642 In. H₂O
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 (')--

[illegible]

SAMPLE
PT —

7-28
STATIC
- .2498

Barometric
29.7

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				
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MOISTURE DATA (WET BULB/DRY BULB)					
Port	Time	Dry Bulb °F	Wet Bulb °F	Diff.	% H ₂ O

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, Q _{sd} =	SCFM
Wet at Stack Conditions, Q _{aw} =	ACFM

ADDITIONAL DATA

.1398
• ΔP average is square of average square root. See page 2 for field flow rate calculations.

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

* 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 condenser.

Min. (θ)	V _m	($\sqrt{AP}$) ²	t _m	t _s	ΔH
240	200.367	1683	107.7	91.2	2.1

119.9g H₂O

PLANT Nello TeerRUN NO. NT/OUT/WET/2CITY/STATE Raleigh, NCJOB NO. 4503DATE 7/28/92SAMPLING LOC. Outlet of CrusherTIME START 815BAROMETRIC PRESSURE, IN. HG 29.8STATIC PRESSURE, IN. H₂O -.2498TIME FINISH 1421LEAK CHECK, VACUUM IN. HG 7 5OPERATOR TJBLEAK RATE, CUBIC FEET/MIN. .002 .001ASST(S) HWL

EQUIPMENT CHECKS*		EQUIPMENT I.D. NUMBERS		LEAK CHECKS	
<u>N/A</u> PITOT, PRETEST	REAGENT BOX <u>0581</u>	METER BOX <u>N-13</u>	<u>Y</u> <u>1.0006</u>	B <u>N/A</u>	B
<u>N/A</u> PITOT, POSTTEST	PITOT <u>N/A</u>	<u>Cp</u> <u>.84</u>	NOZ'L <u>1004</u>	E	E
<u>✓</u> NOZZLE, PRE/POST	TC READOUT <u>F58</u>	TC PROBE <u>R221</u>	UMBILICAL <u>W09</u>	B	B
<u>✓</u> TC <u>73</u> °F PRE	SAMPL'G BOX <u>25</u>	ORSAT PUMP <u>N/A</u>	TEDLAR BAG <u>N/A</u>	E	E
TC °F POST	NOMOGRAPH DATA			B	B
<u>N/A</u> ORSAT SYSTEM	DELTA H ₂	<u>1.834</u>		E	E
FILTER/XAD	METER TEMP	<u>110</u>		B	B
TARE WT.	EST. XH ₂ O	<u>1</u>		E	E
<u>PM27</u>	C FACTOR	<u>1.120</u>		FYRITES	
	STACK TEMP	<u>90</u>		<u>N/A</u>	
	REF DELTA P	<u>.427</u>			
	K FACTOR	<u>4.312</u>			

* 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 ₂ O	GAS METER TEMP. °F	STACK TEMP. °F	ORIFICE SETTING IN. H ₂ O		GAUGE VACUUM IN. HG	GAS TEMPERATURES °F		
							ACTUAL	IDEAL		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	71			0		50	
4		45	923.395		82	79			0		52	
5		01:00	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		12:00	956.275		87	9379			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		18:00	983.255		100	81			"		58	
14		15	990.100		102	82			0		49.49	
15		30	996.832		104	81			0		51	
16		45	1003.1618		105	82			0		53	
17		24:00	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			"		60	
21		30:00	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		30:00	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 cond

Min. (θ)

Vm

 $(\sqrt{\Delta P})^2$

tm

ts

ΔH

ENTROPY

78.4g H₂O

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) -22.42 In. H₂O
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 (')--

[illegible]

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				
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MOISTURE DATA (WET BULB/DRY BULB)					
Port	Time	Dry Bulb °F	Wet Bulb °F	Diff.	% H ₂ O

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, Q _{sd} =	SCFM
Wet at Stack Conditions, Q _{aw} =	ACFM

ADDITIONAL DATA

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

PLANT Nello Teer RUN NO. NT/OUT/WET/3
 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. H₂O -2242 TIME FINISH 1434
 LEAK CHECK, VACUUM IN. HG 17 5 OPERATOR TJB
 LEAK RATE, CUBIC FEET/MIN. .01 .01 ASST(S) HWL

EQUIPMENT CHECKS*		EQUIPMENT I.D. NUMBERS				LEAK CHECKS	
<u>N/A</u> PITOT, PRETEST	REAGENT BOX <u>0581</u>	METER BOX <u>N-13</u>	Y <u>1.0066</u>	B <u>N/A</u>	B		
<u>N/A</u> PITOT, POSTTEST	PITOT <u>N/A</u>	CP <u>84</u>	NOZ'L <u>1004</u>	DIA. <u>385.279</u>	E		
<u>71</u> NOZZLE, PRE/POST	TC READOUT <u>F58</u>	TC PROBE <u>R221</u>	UMBILICAL <u>W09</u>	B	B		
<u>71</u> TC <u>71</u> °F PRE	SAMPL'G BOX <u>334</u>	ORSAT PUMP <u>N/A</u>	TEDLAR BAG <u>N/A</u>	E	E		
TC °F POST					B	B	
<u>1/A</u> ORSAT SYSTEM					E	E	
		NOMOGRAPH DATA					
		DELTA H ₂	<u>1.834</u>			B	B
FILTER/XAD	TARE WT.	METER TEMP	<u>100</u>			E	E
<u>PM 162</u>	<u>.2643</u>	EST. XH ₂ O	<u>1</u>				
		C FACTOR	<u>1.099</u>				
		STACK TEMP	<u>85</u>				
		REF DELTA P	<u>.431</u>				
		K FACTOR	<u>4.270</u>				
						FYRITES	
						<u>N/A</u>	

* 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 ₂ O	GAS METER TEMP. °F	STACK TEMP. °F	ORIFICE SETTING IN. H ₂ O		GAUGE VACUUM IN. HG	GAS TEMPERATURES °F		
							ACTUAL	IDEAL		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	
7		30	113.600		100	78			0		70	
8		45	120.725		104	80			0		70	
9		60/0	126.850		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		60/0	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		60/0	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		60/0	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		60/0	238.792									

* 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

360 164.764 .1414 101.5 82.1 .60
 Min. (θ) Vm (ΔP)² ts ΔH

ENTROPY

76.59 H₂O

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? (V) _____
 (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 (V)
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 = $\pm 1.5\%$ 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_e 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 <u>700.461</u>	Final <u>106</u>	$0.96 * Y = .966336$
Initial <u>692.700</u>	Initial <u>110</u>	$1.04 * Y = 1.046864$

Dry Gas Volume Metered (Cubic Ft.)	Average Meter Temp. (°F)	Run Time (Base = 10)	
		(Minutes)	(Seconds)
V _m = <u>7.761</u>	T _m = _____	_____	_____

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

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

Audit Gamma

Audit Gamma Acceptable (between lower & upper limits)? (V) ☒ Yes ☐ No



FIELD DATA - METHOD(S) COIA

PLANT Nello Teer

CITY/STATE Raleigh, NC

SAMPLING LOC. Outlet to Crusher

BAROMETRIC PRESSURE, IN. HG 29.9

LEAK CHECK, VACUUM IN. HG 15

LEAK RATE, CUBIC FEET/MIN. .003

JOB NO. 4503

RUN NO. NT/OUT/DRY/2

DATE 7/30/92

TIME START 953

TIME FINISH 1102

OPERATOR TJB

ASST(S) Hux

STATIC PRESSURE, IN. H₂O -2242

EQUIPMENT CHECKS*		EQUIPMENT I.D. NUMBERS				LEAK CHECKS	
N/A	PITOT, PRETEST	REAGENT BOX	0211	METER BOX	N-13	Y	1.0066
N/A	PITOT, POSTTEST	PITOT	N/A	CP	84	NOZ'L	1004
79	NOZZLE, PRE/POST	TC READOUT	F58	TC PROBE	R221	UMBILICAL	W109
86	TC 79 °F PRE	SAMPL'G BOX	62	ORSAT PUMP	N/A	TEDLAR BAG	N/A
86	TC 86 °F POST						
N/A	ORSAT SYSTEM						
		NOMOGRAPH DATA					
FILTER/XAD		TARE WT.					
PM175		2717					
		DELTA H ₂					
		1.834					
		METER TEMP					
		90					
		EST. XH ₂ O					
		1					
		C FACTOR					
		1.080					
		STACK TEMP					
		80					
		REF DELTA P					
		.435					
		K FACTOR					
		4.233					

* 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 ₂ O	GAS METER TEMP. °F	STACK TEMP. °F	ORIFICE SETTING IN. H ₂ O		GAUGE VACUUM IN. HG	GAS TEMPERATURES °F		
							ACTUAL	IDEAL		FILTER*	IMPING. EXIT	PROBE OR COND EXIT**
1	3	0	275.607	.1414	94	79	.65	.651	0	N/A	63	N/A
2		150	280.307		92	81			0		62	
3		300	284.865		94	81			0		64	
4		450	289.625		97	81			0		68	
5		40	294.265		95	82			0		68	
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 other

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

$\frac{60}{\text{Min. } (\theta)}$
 $\frac{28.018}{V_m}$
 $\frac{.1414}{(\Delta P)^2}$
 $\frac{94.7}{t_m}$
 $\frac{81.7}{t_s}$
 $\frac{.65}{\Delta H}$

17.8g H₂O

off
954.40
100351

FIELD DATA - METHOD(S)

PLANT Nello Teer

CITY/STATE Raleigh, NC

SAMPLING LOC. Outlet to Crusher

BAROMETRIC PRESSURE, IN. HG 29.9

LEAK CHECK, VACUUM IN. HG 15

LEAK RATE, CUBIC FEET/MIN. .01

STATIC PRESSURE, IN. H₂O -2242

JOB NO. 4523

RUN NO. NT/OUT/DRY11

DATE 7/32/92

TIME START 800

TIME FINISH 900

OPERATOR JTD

ASST(S) HSL

EQUIPMENT CHECKS*		EQUIPMENT I.D. NUMBERS				LEAK CHECKS	
N/A	PITOT, PRETEST	REAGENT BOX	0211	METER BOX	N-13	Y	1.0066
N/A	PITOT, POSTTEST	PITOT	N/A	CP	84	NOZ'L	1004
72	NOZZLE, PRE/POST	TC READOUT	F58	TC PROBE	R221	UMBILICAL	W109
75	TC 73 °F PRE	SAMPL'G BOX	25	ORSAT PUMP	N/A	TEDLAR BAG	N/A
75	TC 76 °F POST						
N/A	ORSAT SYSTEM						
FILTER/XAD		TARE WT.		MONOGRAPH DATA			
Dm115			.2690	DELTA Hg	1.834		
				METER TEMP	90		
				EST. %H ₂ O	1		
				C FACTOR	1.080		
				STACK TEMP	80		
				REF DELTA P	.435		
				K FACTOR	4.233		

* 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 ₂ O	GAS METER TEMP. °F	STACK TEMP. °F	ORIFICE SETTING IN. H ₂ O		GAUGE VACUUM IN. HG	GAS TEMPERATURES °F		
							ACTUAL	IDEAL		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	275.248									
8												
9												
10												
11												
12												
13												
14												
15												
16												
17												
18												
19												
20												
21												
22												
23												
24												
25												

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

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

60 28.070 .1414 87.3 73.3 .65
Min. (θ) Vm (√ΔP)² tm ts ΔH

ENTROPY

FIELD DATA - METHOD(S) 2014

PLANT Nello Teer

CITY/STATE Raleigh, NC

SAMPLING LOC. Outlet to Crusher

BAROMETRIC PRESSURE, IN. HG 29.9

LEAK CHECK, VACUUM IN. HG 15

LEAK RATE, CUBIC FEET/MIN. 0.17

JOB NO. 4503

RUN NO. NT/ONT/DR13

DATE 7/30/92

TIME START 1159

TIME FINISH 1254

OPERATOR TJB

ASST(S) HDL

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.

PMU3 .2680

EQUIPMENT I.D. NUMBERS

REAGENT BOX 0211

PITOT N/A

TC READOUT F58

SAMPL'G BOX 25

METER BOX N-13

NOZ'L 1004

TC PROBE R221

ORSAT PUMP N/A

Y 1.0066

DIA. .249

UMBILICAL W109

TEDLAR BAG N/A

NOMOGRAPH DATA

DELTA H₂ 1.834

METER TEMP 90

EST. XH₂O 1

C FACTOR 1.080

STACK TEMP 80

REF DELTA P .435

K FACTOR 4.233

LEAK CHECKS

N/A

B

E

E

B

B

E

E

B

B

E

E

B

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 ₂ O	GAS METER TEMP. °F	STACK TEMP. °F	ORIFICE SETTING IN. H ₂ O		GAUGE VACUUM IN. HG	GAS TEMPERATURES °F		
							ACTUAL	IDEAL		FILTER*	IMPING. EXIT	PROBE OR COND EXIT**
1	3	0	303.853	.1414	92	85	.65	.651	0	N/A	70	N/A
2		10	309.248		96	87			0		60	
3		20	313.901		98	86			0		61	
4		30	318.545		94	86			0		60	
5		40	323.146		98	87			0		60	
6	✓	50	327.817	✓	98	86	✓	✓	0	✓	61	✓
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 other

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

60 28.566 .1414 96.7 86.2 65
Min. (θ) Vm (√ΔP)² tm ts ΔH

13.3g H₂O

ENTROPY

1st stop
1st pit watch
fell stopped
Ran by
clock time

1209
1219
1229
1239
1249
1259

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? (v) _____
 (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 (v)
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 backup. 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 = $\pm 1.5\%$ 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 (Pbar) 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 <u>500.000</u>	Final <u>74</u>	$0.96 * Y =$ <u>.94492</u>
Initial <u>492.312</u>	Initial <u>70</u>	$1.04 * Y =$ <u>1.02367</u>

Dry Gas Volume Metered (Cubic Ft.)	Average Meter Temp. (°F)	Run Time (Base = 10)	
		(Minutes)	(Seconds)
$V_m =$ <u>7.688</u>	$T_m =$ <u>72</u>	<u>10</u>	<u>0</u>

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

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

Audit Gamma Acceptable (between lower & upper limits)? (v) ☒ Yes ☐ No

MOISTURE ANALYTICAL RESULTS

Plant Name Nello Tees Job No. 4503
 City/State Raleigh N.C. Sampling Loc. ID-SECO screen

Run Number

SR-DRY-1

SR-Dry-2

SR-DRY-3

Sampling Date

8-26

8-26

8-26

Analysis Date

Analyst

<u>Reagent 1 (<u>DF</u>)</u>			
Final Weight, g	<u>573.7</u>	<u>578.5</u>	<u>590.3</u>
Tared Weight, g	<u>573.7</u>	<u>582.0</u>	<u>583.6</u>
Water Catch, g	<u>-0-</u>	<u>-3.5</u>	<u>6.7</u>
<u>Reagent 2 ()</u>			
Final Weight, g			
Tared Weight, g			
Water Catch, g			
<u>Reagent 3 ()</u>			
Final Weight, g			
Tared Weight, g			
Water Catch, g			
<u>CONDENSED WATER, g</u>			

<u>Silica Gel</u>			
Final Weight, g	<u>238.0</u>	<u>218.6</u>	<u>206.6</u>
Tared Weight, g	<u>229.1</u>	<u>212.6</u>	<u>201.3</u>
<u>ADSORBED WATER, g</u>	<u>8.9</u>	<u>6.0</u>	<u>5.3</u>

<u>TOTAL WATER COLLECTED, g</u>	<u>8.9</u>	<u>2.5</u>	<u>12.0</u>
---------------------------------	------------	------------	-------------

Balance No. #1 Type (✓) Triple Beam ☒ Electronic ☐

Reagent Box No. 0502

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

Comments

MOISTURE ANALYTICAL RESULTS

Plant Name Nello Tees 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

<u>Reagent 1 (DI)</u>			
Final Weight, g	<u>644.4</u>	<u>620.5</u>	<u>604.5</u>
Tared Weight, g	<u>581.8</u>	<u>586.3</u>	<u>588.4</u>
Water Catch, g	<u>62.6</u>	<u>34.2</u>	<u>16.1</u>
<u>Reagent 2 ()</u>			
Final Weight, g			
Tared Weight, g			
Water Catch, g			
<u>Reagent 3 ()</u>			
Final Weight, g			
Tared Weight, g			
Water Catch, g			
<u>CONDENSED WATER, g</u>			

<u>Silica Gel</u>			
Final Weight, g	<u>239.4</u>	<u>239.5</u>	<u>240.0</u>
Tared Weight, g	<u>210.3</u>	<u>206.4</u>	<u>210.0</u>
<u>ADSORBED WATER, g</u>	<u>29.1</u>	<u>33.1</u>	<u>30.0</u>

<u>TOTAL WATER COLLECTED, g</u>	<u>91.7</u>	<u>67.3</u>	<u>46.1</u>
---------------------------------	-------------	-------------	-------------

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 _____

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

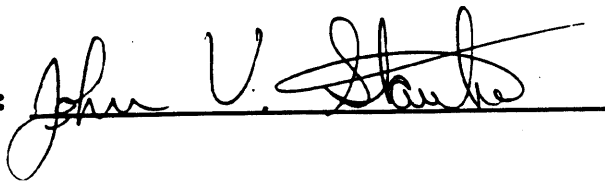
Sample Matrix: Method 201A

PM: WKK

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

Page 1 of 2

Sample #	Sample ID	Components/Comments
1	SR-DRY-1	Nozzle and cyclone acetone rinse
2	SR-DRY-1	2" filter F $\frac{1}{2}$ rinse w/ acetone
3	SR-DRY-1	2" filter
4	SR-DRY-2	Nozzle and cyclone acetone rinse
5	SR-DRY-2	2" filter F $\frac{1}{2}$ rinse w/ acetone
6	SR-DRY-2	2" filter
7	SR-DRY-3	Nozzle and cyclone acetone rinse
8	SR-DRY-3	2" filter F $\frac{1}{2}$ 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 F $\frac{1}{2}$ 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 F $\frac{1}{2}$ 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 F $\frac{1}{2}$ 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 F $\frac{1}{2}$ 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 F $\frac{1}{2}$ 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 F $\frac{1}{2}$ 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 F $\frac{1}{2}$ rinse w/ acetone
30	NT-IN-DRY-1	2" filter
31	NT-IN-DRY-2	Nozzle and cyclone acetone rinse

Submitted By: 

PAGE 1

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

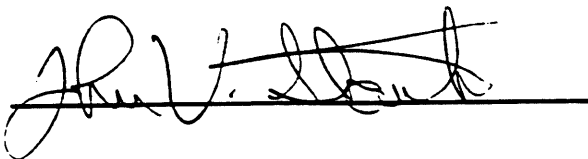
PM: WKK

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

Page 2 of 2

Sample #	Sample ID	Components/Comments
32	NT-IN-DRY-2	2" filter F $\frac{1}{2}$ 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 F $\frac{1}{2}$ 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 F $\frac{1}{2}$ 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 F $\frac{1}{2}$ 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 F $\frac{1}{2}$ 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 F $\frac{1}{2}$ 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 F $\frac{1}{2}$ 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 F $\frac{1}{2}$ rinse w/ acetone
54	NT-OUT-WET-3	2" filter

PAGE 2

Submitted By: 

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. Stave (signature)

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

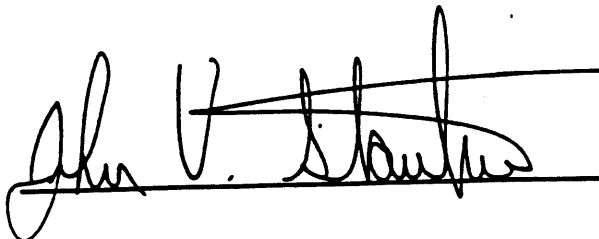
Sample Matrix: Hi-vol filters

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:



REQUEST FOR ANALYSIS

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

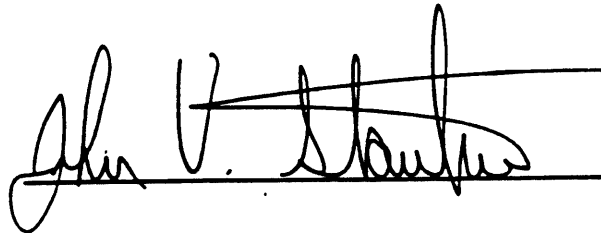
Customer Name: Nello Teer
Raleigh, NC

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: 

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 Shusher stack area

B

C

D

E

F

REQUEST FOR ANALYSIS

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

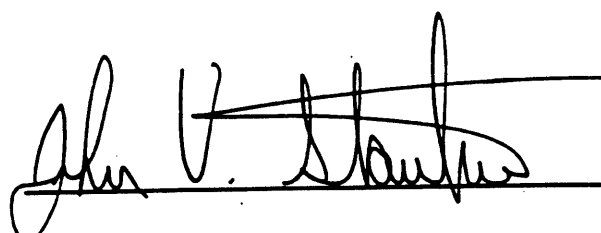
Customer Name: Nello Teer
Raleigh, NC

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: 

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-Val Filters
Sample Matrix & Components Hi-Val 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

J. J. [Signature]

Date 9/17/92

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. Stace (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.

RECORD OF CUSTODY, CONTAINER NO. 0508

Container Type (check) ☒ Reagent Box ☐ Cooler ☐ Other _____

Plant Name/Address Nello Per.

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 Muelens	
	8/26	3:40	B	John Bazzell	Chg. Term.
1772	9/8	10:30	S	John Bazzell	
			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?

D. H. Pate
Signature

8-10-92
Date

11:00
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 the Red Entropy Trailer, since the duration of the test.

FIELD SAMPLE RECOVERY QUALITY CONTROL

Box No. 0508 Assembly Date 7/15/92 Assembled By mm JW
 Plant Name/address Nella 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		Liquid Tare at Mark? @	Init.	Sample Recov. Date	%Sil. Gel Spent	Liquid Level Marked?	Init.
		Number	Tare, grams						
SR-DRY-1	8-26	PM172	.2702	✓	DDH	8-26	25%	✓	DDH
				Filter Appearance*					
				<u>Gray</u>					
				Reagents Appearance*					
				<u>Cloudy</u>					
SR-DRY-2	8-26	PM159	.2619	✓	DDH	8-26	25%	✓	DDH
				Filter Appearance*					
				<u>Gray</u>					
				Reagents Appearance*					
				<u>Cloudy</u>					
SR-DRY-3	8-26	PM143	.2208	✓	DDH	8-26	25%	✓	DDH
				Filter Appearance*					
				<u>Gray</u>					
				Reagents Appearance*					
				<u>Cloudy</u>					
				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 Nelle Teer / Raleigh NC

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. L. Jr.	Chg Trains
A83	7/29	1536	S	Todd Beards	
			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?

DAR
Signature

8-10-02
Date

11:30
Time

1 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 _____

FIELD SAMPLE RECOVERY QUALITY CONTROL

Box No. 0581 Assembly Date 7/15/92 Assembled By J.W. m m
 Plant Name/address Nello Teer / Raleigh NC Job No. 4503
 Sampling Loc. Outlet of Crusher Method 2014
 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		Liquid Tare at Mark? @	Init.	Sample Recov. Date	%Sil. Gel Spent	Liquid Level Marked?	Init.
		Number	Tare, grams						
NT/OUT/WET/1	7/27	PM67	.2896	✓	TTB	7/27	90	✓	TTB
				Filter Appearance*					
				<u>Heavy loading</u>					
				Reagents Appearance*					
				<u>clear</u>					
NT/OUT/WET/2	7/28	PM37	.2936	✓	TTB	7/28	40	✓	TTB
				Filter Appearance*					
				<u>Heavy gray</u>					
				Reagents Appearance*					
				<u>clear</u>					
NT/OUT/WET/3	7/29	PM62	.2643	✓	TTB				
				Filter Appearance*					
				<u>Medium gray</u>					
				Reagents Appearance*					
				<u>clear</u>					
				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 Begehl	Chains
513	8/11	12:10	S	Todd Begehl	
			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?

D. Dub
Signature

9-10-94
Date

11:30
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 Custody of Boxes. Boxes remained in locked Entropy trailer. M

FIELD SAMPLE RECOVERY QUALITY CONTROL

Box No. 614 Assembly Date 7/15/92 Assembled By J.W. m m
 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	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* <u>Very Light</u>					
				Reagents Appearance* <u>Clear</u>					
NT/IN/DRY/2	7/30	PM173	2709	✓	TTB	7/30	5	✓	TTB
				Filter Appearance* <u>Very Light</u>					
				Reagents Appearance* <u>Clear</u>					
NT/IN/DRY/3	7/30	PM177	2702	✓	TTB	7/30	5	✓	TTB
				Filter Appearance* <u>Light</u>					
				Reagents Appearance* <u>Clear</u>					
				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 M... ..	
	7/27	8:45	B	Todd Br... ..	Phg Trains
600	7/29	1538	S	Todd Br... ..	
			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]
Signature

9-10-92
Date

11:30
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 _____

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		Liquid Tare at Mark? @	Init.	Sample Recov. Date	%Sil. Gel Spent	Liquid Level Marked?	Init.
		Number	Tare, grams						
NT/IN/WET/1	7/27	PM183	.2732	✓	TIB	7/27	90	✓	TIB
				Filter Appearance*					
				<u>Light gray</u>					
				Reagents Appearance*					
				<u>clear</u>					
NT/IN/WET/2	7/28	PM46	.2954	✓	TIB	7/28	100	✓	TIB
				Filter Appearance*					
				<u>Light gray</u>					
				Reagents Appearance*					
				<u>clear</u>					
NT/IN/WET/3	7/29	PM102	.2669	✓	TIB	7/29	20	✓	TIB
				Filter Appearance*					
				<u>Light Gray</u>					
				Reagents Appearance*					
				<u>Clear</u>					
				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 Brongel	chg Train
826	8/11	12:14	S	Todd Brongel	
			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]
Signature

9-10-92
Date

11:20
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 Entropy locked trailers 77B

FIELD SAMPLE RECOVERY QUALITY CONTROL

Box No. 0211 Assembly Date 7/15/92 Assembled By JW. mm
 Plant Name/address Nello Beer / 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		Liquid Tare at Mark? @	Init.	Sample Recov. Date	%Sil. Gel Spent	Liquid Level Marked?	Init.
		Number	Tare, grams						
NT/OUT/DRY/1	7/30	PM115	.2698	✓	TB	7/30	5	✓	TB
				Filter Appearance* <u>light spoty gray</u>					
				Reagents Appearance* <u>clear</u>					
NT/OUT/DRY/2	7/30	PM175	.2717	✓	TB	7/30	5	✓	TB
				Filter Appearance* <u>Heavy gray</u>					
				Reagents Appearance* <u>clear</u>					
NT/OUT/DRY/3	7/30	PM113	.2680	✓	TB	7/30	5	✓	TB
				Filter Appearance* <u>Heavy gray</u>					
				Reagents Appearance* <u>clear</u>					
				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 _____

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ENTROPY

RECORD OF CUSTODY, CONTAINER NO. 0222

Container Type (check) ☒ Reagent Box ☐ Cooler ☐ Other _____

Plant Name/Address Nelb 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 Mullen	
	8/11	12:43	B	Todd Borell	Chg Trains
188	9/8	10:51	S	Todd Borell	
			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?

D. Hunt
Signature

9-10-92
Date

11:15
Time

1 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 Bick's custody.

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. ID-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	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	✓	DL5

Filter Appearance*

light gray

Reagents Appearance*

CLEAR

NT-SR-WET-2	8/23	PM146	.2687	✓	WKK	8/23	80	✓	WKK
-------------	------	-------	-------	---	-----	------	----	---	-----

Filter Appearance*

Light gray

Reagents Appearance*

clear

NT-SR-WET-3	8/26	PM147	.2698	✓	WKK	8/26	80	✓	WKK
-------------	------	-------	-------	---	-----	------	----	---	-----

Filter Appearance*

Light gray

Reagents Appearance*

Clear

--	--	--	--	--	--	--	--	--	--

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

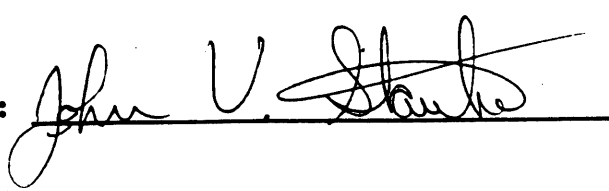
Sample Matrix: Method 201A

PM: WKK

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

Page 1 of 2

Sample #	Sample ID	Components/Comments
1	SR-DRY-1	Nozzle and cyclone acetone rinse
2	SR-DRY-1	2" filter F $\frac{1}{2}$ rinse w/ acetone
3	SR-DRY-1	2" filter
4	SR-DRY-2	Nozzle and cyclone acetone rinse
5	SR-DRY-2	2" filter F $\frac{1}{2}$ rinse w/ acetone
6	SR-DRY-2	2" filter
7	SR-DRY-3	Nozzle and cyclone acetone rinse
8	SR-DRY-3	2" filter F $\frac{1}{2}$ 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 F $\frac{1}{2}$ 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 F $\frac{1}{2}$ 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 F $\frac{1}{2}$ 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 F $\frac{1}{2}$ 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 F $\frac{1}{2}$ 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 F $\frac{1}{2}$ 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 F $\frac{1}{2}$ rinse w/ acetone
30	NT-IN-DRY-1	2" filter
31	NT-IN-DRY-2	Nozzle and cyclone acetone rinse

Submitted By: 

PAGE 1

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

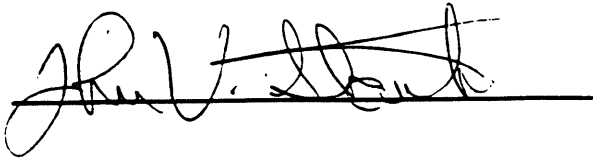
PM: WKK

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

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Sample #	Sample ID	Components/Comments
32	NT-IN-DRY-2	2" filter F $\frac{1}{2}$ 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 F $\frac{1}{2}$ 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 F $\frac{1}{2}$ 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 F $\frac{1}{2}$ 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 F $\frac{1}{2}$ 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 F $\frac{1}{2}$ 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 F $\frac{1}{2}$ 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 F $\frac{1}{2}$ rinse w/ acetone
54	NT-OUT-WET-3	2" filter

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Submitted By: 

ANALYTICAL NARRATIVE

RFA No. 2737-4503Plant Name Nello TeerAnalyst LDGDate Rec'd in Lab 9/11/92Lab Proj. Mgr. ESAnalysis Date 9/23/92Analysis Method & Analytes M201A for PM10 particulateSample 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 BalanceMinimum 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

J. J. [Signature]

Date

9/24/92

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 7-10-92 (date) via hand (mode) to EEI (laboratory) by *John V. Haul* (signature)

The samples were received for analysis on 9/10/92 (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.

APPENDIX E

PARTICULATE SAMPLING LABORATORY RESULTS (Version 04.28.92)

Plant Name: NELLO TEER

EEI Ref# 4503

Filename: HIVOL

Sampling Location: Screening Operation

Date Received: 09/11/92

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

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of

Run Number

SR-WET-3

SR-WET-1,2,3

SR - Dry - 1, 2, 3

Sample ID/Container #

init.

date

F /

date

F /

date

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.

FILTER SAMPLE WT., g.

2.9830

0.0820

2.9916

0.1917

Sample ID/Container #

init.

date

R /

date

R /

date

R /

Tare Wt., g.

RINSE SAMPLE WT., g.

(

ml)

(

ml)

(

ml)

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 /

—Legend—

Sample Description

Final wt., mg.

@ = Final Weight

Tare wt., mg.

F = Filter R = Rinse

Residue, mg.

Volume, ml.

1 = Light

Run #

Color

Loading

Density, mg/ml

785.0

2 = Medium

-3

1 2 3

1 2 3

Conc., mg/mg

< -

3 = Heavy or Dark

-1,2,3

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
Sampling Location:	Screening Operation	Filename:	HIVOL
Date Received:	09/11/92	File Pathway:	H:\JOBS\4503\LAB\HIVOL.WQ1

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of

Run Number	SR-WET-1				SR-WET-2			
Sample ID/Container #	init.	date	F /	date	F /	date	F /	
				</				

Sample ID/Container #	init.	date	R /	date	R /	date	R /
-----------------------	-------	------	-----	------	-----	------	-----

Tare Wt., g.	(	ml)		(	ml)		(	ml)	
RINSE SAMPLE WT., g.									

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

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		
Date Received:	09/11/92	File Pathway:	H:\JOBS\4503\LAB\HIVOL.WQ1
		Page	2
		of	2

Run Number	SR-WET-3	SR-WET-1,2,3	SR-Dry-1,2,3
------------	----------	--------------	--------------

Sample ID/Container #	init.	date	F /	date	F /	date	F /
-----------------------	-------	------	-----	------	-----	------	-----

DK	09/16	@	3.0650	09/16	@	3.1833	
DK	09/15		3.0651	09/15		3.1837	
Baggie Tare Wt., g.			2.9830			2.9916	
Filter Tare Wt., g.			0.0820			0.1917	
FILTER SAMPLE WT., g.							

Sample ID/Container #	init.	date	R /	date	R /	date	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 /	—Legend—	Sample Description
Final wt., mg.		@ = Final Weight	
Tare wt., mg.		F = Filter R = Rinse	
Residue, mg.			
Volume, ml.		1 = Light	
Density, mg/ml	785.0	2 = Medium	
Conc., mg/mg		3 = Heavy or Dark	
Upper Limit, mg/mg	1.000E-05		
		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

EEl Ref# 4503

Filename: HIVOL

Sampling Location: Screening Operation

Date Received: 09/11/92

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

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Run Number

SR-WET-1

SR-WET-2

Sample ID/Container #

init.

date

F /

date

F /

date

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.

FILTER SAMPLE WT., g.

2.9717

0.0511

2.9681

0.2007

Sample ID/Container #

init.

date

R /

date

R /

date

R /

Tare Wt., g.

(

ml)

(

ml)

(

ml)

RINSE SAMPLE WT., g.

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**Sampling Location:** NA**File:** PM10**Date Received:** 09/11/92**File Pathway:** H:\JOBS\4503\LAB\PM10.WQ1**Run Number**

ACETONE BLANK

Sample ID/Container #

init.

date

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
 Sampling Location: Screen Run, Dry
 Date Received: 09/11/92

EEI Ref# 4503
 File: PM10

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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
Density, mg/ml	785.0	2 = Medium		
Conc., mg/mg	1.529E-05	3 = Heavy or Dark	-1	① 2 3
Upper Limit, mg/mg	1.000E-05 <-			① ② 3

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
 Sampling Location: Screen Run, Dry
 Date Received: 09/11/92

EEI Ref# 4503
 File: PM10

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

Run Number SR-DRY-2

Sample I.D. in stack filter / 528
 Container # < = 10 ug

init.	date	
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
-------	------	---	------	---

DK	09/16	@	3.6906	09/16	@	3.9667
DK	09/15		3.6909	09/15		3.9671
	(25 ml)		3.6834	(75 ml)		3.7517
			0.0072			0.2150

Tare Wt., g.
 RINSE SAMPLE WT., g.

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

Prédominate 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
 Sampling Location: Screen Run, Dry
 Date Received: 09/11/92

EEI Ref# 4503
 File: PM10

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

Run Number SR-DRY-3

Sample I.D. in stack filter / 531
 Container # < = 10 ug

init.	date	
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.	in stack filter	nozzle & cyclone
Container #	rinse / 532	rinse / 533
	< = 10 ug	> 10ug
init.	date	date

DK	09/16	3.6228	09/16	@	4.0334
DK	09/15	@ 3.6227	09/15		4.0337
	(30 ml)	3.6095	(50 ml)		3.8069
		0.0132			0.2265

Tare Wt., g.
 RINSE SAMPLE WT., g.

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	—Legend—	
Final wt., mg.	3.7196	@ = Final Weight	
Tare wt., mg.	3.7187	F = Filter R = Rinse	Sample Description
Residue, mg.	0.9		Run #
Volume, ml.	75	1 = Light	Color
Density, mg/ml	785.0	2 = Medium	Loading
Conc., mg/mg	1.529E-05	3 = Heavy or Dark	
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
 Sampling Location: Screen Run, Wet
 Date Received: 09/11/92

EEI Ref# 4503
 File: PM10

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

Run Number NT-SR-WET-1

Sample I.D. in stack filter / 534
 Container # < = 10 ug

	init.	date	
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.	in stack filter	nozzle & cyclone
Container #	rinse / 535	rinse / 536
	< = 10 ug	> 10ug
	init.	date

DK	09/16	@ 3.7519	09/16	@ 3.5748
DK	09/15	@ 3.7517	09/15	3.5749
	(25 ml)	3.7505	(50 ml)	3.5563
		0.0012		0.0185

Tare Wt., g.
 RINSE SAMPLE WT., g.

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

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
 Sampling Location: Screen Run, Wet
 Date Received: 09/11/92

EEI Ref# 4503
 File: PM10

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

Run Number NT-SR-WET-2

Sample I.D. in stack filter / 537
 Container # < = 10 ug

	init.	date	
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.	in stack filter	nozzle & cyclone
Container #	rinse / 538	rinse / 538
	< = 10 ug	> 10ug
	init.	date

DK	09/16	@	3.7616	09/16	@	3.8025
DK	09/15		3.7619	09/15	@	3.8025
	(50 ml)		3.7503	(35 ml)		3.8000
			0.0113			0.0025

Tare Wt., g.
 RINSE SAMPLE WT., g.

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

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
 Sampling Location: Screen Run, Wet
 Date Received: 09/11/92

EEI Ref# 4503
 File: PM10

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 of 12

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

Run Number NT-SR-WET-3

Sample I.D. in stack filter / 540
 Container # < = 10 ug

init. date

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

Sample I.D. in stack filter nozzle & cyclone
 Container # rinse / 541 rinse / 542
 < = 10 ug > 10ug

init. date date

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

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

Sample Description

Density, mg/ml 785.0
 Conc., mg/mg 1.529E-05
 Upper Limit, mg/mg 1.000E-05 <—

1 = Light
 2 = Medium
 3 = Heavy or Dark

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

Date Received: 09/11/92

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

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Run Number

NT-OUT-DRY-1

Sample I.D.

in stack filter / 543

Container #

< = 10 ug

init. date

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.

in stack filter

nozzle & cyclone

Container #

rinse / 544

rinse / 545

init. date

< = 10 ug

date

> 10ug

DK	09/16		3.9078	09/16		4.6975
DK	09/15	@	3.9073	09/15	@	4.6974
	(45 ml)		3.9025	(70 ml)		3.8197
			0.0048			0.8777

Tare Wt., g.

RINSE SAMPLE WT., g.

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

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

Sample Description

Density, mg/ml

785.0

Conc., mg/mg

1.529E-05

Upper Limit, mg/mg

1.000E-05 <—

1 = Light
2 = Medium
3 = Heavy or Dark

Run # Color Loading

-1 ①2 3 1 2③

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
 Sampling Location: Crusher Outlet, Dry
 Date Received: 09/11/92

EEL Ref# 4503
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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.				<u>0.2717</u>
FILTER SAMPLE WT., g.				<u>0.0394</u>

Sample I.D.			in stack filter		nozzle & cyclone
Container #			rinse / 547		rinse / 548
			<u>< = 10 ug</u>		<u>> 10ug</u>
	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.				<u>0.0089</u>			<u>2.4639</u>

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

Prédominate 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
 Sampling Location: Crusher Outlet, Dry
 Date Received: 09/11/92

EEI Ref# 4503
 File: PM10

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Run Number NT-OUT-DRY-3

Sample I.D. in stack filter / 549
 Container # < = 10 ug
 init. date

	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.		in stack filter		nozzle & cyclone
Container #		rinse / 550		rinse / 551
		< = 10 ug		> 10ug
	init.	date		date

	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	—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 #
Density, mg/ml	785.0	2 = Medium		Color
Conc., mg/mg	1.529E-05	3 = Heavy or Dark		Loading
Upper Limit, mg/mg	1.000E-05 <—			

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
 Sampling Location: Crusher Inlet, Dry
 Date Received: 09/11/92

EEI Ref# 4503
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Run Number NT-IN-DRY-1

Sample I.D. in stack filter / 552
 Container # < = 10 ug

init. date

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. in stack filter nozzle & cyclone
 Container # rinse / 553 rinse / 554
 < = 10 ug > 10ug

init. date date

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	—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
Density, mg/ml	785.0	2 = Medium		
Conc., mg/mg	1.529E-05	3 = Heavy or Dark	-1	①2 3
Upper Limit, mg/mg	1.000E-05 <--			①2 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
 Sampling Location: Crusher Inlet, Dry
 Date Received: 09/11/92

EEI Ref# 4503
 File: PM10

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Run Number NT-IN-DRY-2

Sample I.D. in stack filter / 555
 Container # < = 10 ug

init. date

DK	09/15	@	4.1616
DK	09/14		4.1621
			3.8860
			<u>0.2709</u>
			0.0047

Baggie Tare Wt., g.
 Filter Tare Wt., g.
 FILTER SAMPLE WT., g.

Sample I.D.	in stack filter	nozzle & cyclone
Container #	rinse / 556	rinse / 557
	<u>< = 10 ug</u>	<u>> 10ug</u>
init.	date	date

DK	09/16		3.7931	09/16	@	3.8708
DK	09/15	@	3.7930	09/15	@	3.8708
	(25 ml)		3.7911	(80 ml)		3.7934
			<u>0.0019</u>			0.0774

Tare Wt., g.
 RINSE SAMPLE WT., g.

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	—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
Density, mg/ml	785.0	2 = Medium		
Conc., mg/mg	1.529E-05	3 = Heavy or Dark	-2	① 2 3
Upper Limit, mg/mg	1.000E-05 <—			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
 Sampling Location: Crusher Inlet, Dry
 Date Received: 09/11/92

EEI Ref# 4503
 File: PM10

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Run Number NT-IN-DRY-3

Sample I.D. in stack filter / 558
 Container # < = 10 ug

init. date

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

Sample I.D. in stack filter nozzle & cyclone
 Container # rinse / 559 rinse / 560
 < = 10 ug > 10ug

init. date date

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	Sample Description
Residue, mg.	0.9			
Volume, ml.	75	1 = Light		Run #
Density, mg/ml	785.0	2 = Medium		Color
Conc., mg/mg	1.529E-05	3 = Heavy or Dark		Loading
Upper Limit, mg/mg	1.000E-05 <—			

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
 Sampling Location: Crusher Inlet, Wet
 Date Received: 09/11/92

EEI Ref# 4503
 File: PM10II

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Run Number NT-IN-WET-1

Sample I.D. in stack filter / 561
 Container # < = 10 ug

init. date

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. in stack filter nozzle & cyclone
 Container # rinse / 562 rinse / 563
< = 10 ug > 10ug

init. date date

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	--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
Density, mg/ml	785.0	2 = Medium		
Conc., mg/mg	1.529E-05	3 = Heavy or Dark	-1	①2 3
Upper Limit, mg/mg	1.000E-05 <-			①2 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
 Sampling Location: Crusher Inlet, Wet
 Date Received: 09/11/92

EEL Ref# 4503
 File: PM10II

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Run Number NT-IN-WET-2

Sample I.D. in stack filter / 564
 Container # < = 10 ug
 init. date

	DK	09/15	@	4.0825
	DK	09/14		4.0829
Baggie Tare Wt., g.				3.7815
Filter Tare Wt., g.				<u>0.2954</u>
FILTER SAMPLE WT., g.				<u>0.0056</u>

Sample I.D.			in stack filter			nozzle & cyclone
Container #			rinse / 565			rinse / 566
			<u>< = 10 ug</u>			<u>> 10ug</u>
	init.	date		date		

	DK	09/16	@	3.5759	09/16	@	3.7261
	DK	09/15		3.5760	09/15	@	3.7261
Tare Wt., g.		(40 ml)		<u>3.5745</u>	(40 ml)		<u>3.7150</u>
RINSE SAMPLE WT., g.				<u>0.0014</u>			<u>0.0111</u>

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	—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 #
Density, mg/ml	785.0	2 = Medium		Color
Conc., mg/mg	1.529E-05	3 = Heavy or Dark		Loading
Upper Limit, mg/mg	1.000E-05 <--			

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
 Sampling Location: Crusher Inlet, Wet
 Date Received: 09/11/92

EEI Ref# 4503
 File: PM10II

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File Pathway: H:\JOBS\4503\LAB\PM10II.WQ1

Run Number

NT-IN-WET-3

Sample I.D.
 Container #

in stack filter / 567
< = 10 ug

init. date

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

Sample I.D.
 Container #

in stack filter
 rinse / 568
< = 10 ug

nozzle & cyclone
 rinse / 569
> 10ug

init. date date

DK	09/16		3.7977	09/16		3.7532
DK	09/15	@	3.7974	09/15	@	3.7528
	(30 ml)		3.7961	(50 ml)		3.7473
			0.0013			0.0055

Tare Wt., g.

RINSE SAMPLE WT., g.

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

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

Sample Description

Density, mg/ml

785.0

Conc., mg/mg

1.529E-05

Upper Limit, mg/mg

1.000E-05 <—

1 = Light
 2 = Medium
 3 = Heavy or Dark

Run #	Color	Loading
-3	①2 3	①2 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		
Date Received:	09/11/92		Page 4
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	File Pathway:	H:\JOBS\4503\LAB\PM10II.WQ1	

Run Number NT-OUT-WET-1

Sample I.D.		in stack filter / 570
Container #		<u>< = 10 ug</u>
	init.	date

	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.				<u>0.2896</u>	
FILTER SAMPLE WT., g.				<u>0.0354</u>	

Sample I.D.		in stack filter	nozzle & cyclone
Container #		rinse / 571	rinse / 572
		<u>< = 10 ug</u>	<u>> 10ug</u>
	init.	date	date

	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.				<u>0.0148</u>			<u>2.7874</u>

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	
Residue, mg.	0.9		
Volume, ml.	75		
Density, mg/ml	785.0	1 = Light	Run #
Conc., mg/mg	1.529E-05	2 = Medium	Color
Upper Limit, mg/mg	1.000E-05 <—	3 = Heavy or Dark	Loading

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

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Run Number NT-OUT-WET-2

Sample I.D.		in stack filter / 573
Container #		<u>< = 10 ug</u>
	init.	date

	DK	09/15	@	4.1863
	DK	09/14	@	4.1863
Baggie Tare Wt., g.				3.8518
Filter Tare Wt., g.				<u>0.2930</u>
FILTER SAMPLE WT., g.				<u>0.0415</u>

Sample I.D.		in stack filter	nozzle & cyclone
Container #		rinse / 574	rinse / 575
		<u>< = 10 ug</u>	<u>> 10ug</u>
	init.	date	date

	DK	09/16	@	3.8264	09/16	8.2445
	DK	09/15	@	3.8264	09/15	8.2443
Tare Wt., g.		(25 ml)		<u>3.8164</u>	(65 ml)	<u>3.6612</u>
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	—Legend—	
Final wt., mg.	3.7196	@ = Final Weight	
Tare wt., mg.	3.7187	F = Filter R = Rinse	
Residue, mg.	0.9		
Volume, ml.	75		
Density, mg/ml	785.0	1 = Light	Run #
Conc., mg/mg	1.529E-05	2 = Medium	Color
Upper Limit, mg/mg	1.000E-05 <—	3 = Heavy or Dark	Loading

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
 Sampling Location: Crusher Outlet, Wet
 Date Received: 09/11/92

EEI Ref# 4503
 File: PM10II

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File Pathway: H:\JOBS\4503\LAB\PM10II.WQ1

Run Number NT-OUT-WET-3

Sample I.D. in stack filter / 576
 Container # < = 10 ug

init. date

	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.		in stack filter		nozzle & cyclone
Container #		rinse / 577		rinse / 578
		< = 10 ug		> 10ug
	init.	date		date

	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	—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 #
Density, mg/ml	785.0	2 = Medium		Color
Conc., mg/mg	1.529E-05	3 = Heavy or Dark		Loading
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:

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. H ₂ O	Gas Volume (V_d) cf	Temp. (t_d) °F	Coeff. (Y_d)	$\Delta H\theta$ In. H ₂ O
5.073	75	13	0.5	5.241	90	.9919	1.857
5.090	1	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. $\Delta H\theta$ range: 1.6-2.0.
4. $\Delta H\theta$ tolerance: ≤ 0.15 In. H₂O over ΔH range of 0.4 In.-4.0 In.

$$Y_d = \frac{Y_{ds} * V_{ds} * (t_d + 460) * P_b}{V_d * (t_{ds} + 460) * (P_b + \{\Delta H / 13.6\})}$$

$$\Delta H\theta = \frac{0.0319 * \Delta H}{P_b * (t_d + 460)} * \left[\frac{(t_{ds} + 460) * \theta}{Y_{ds} * V_{ds}} \right]^2$$

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 ₂ O	Gas Volume (V_d) cf	Temp. (t_d) °F	Coeff. (Y_d)	ΔH_e In. H ₂ O
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%

$$Y_d = \frac{Y_{ds} * V_{ds} * (t_d + 460) * P_b}{V_d * (t_{ds} + 460) * (P_b + (\Delta H / 13.6))}$$

$$\Delta H_e = \frac{0.0319 * \Delta H}{P_b * (t_d + 460)} * \left[\frac{(t_{ds} + 460) * \theta}{Y_{ds} * V_{ds}} \right]^2$$

STANDARD DRY GAS METER CALIBRATION

Meter Number 6838323

Date 2-12-92

Auditor(s) MBC/PJ

Barometric Press. (P_{bar}) 30.11

Spirometer		Dry Gas Meter		Pressure In. H ₂ O (ΔP)	Time Min. (θ)	Test Flow Rate cfm	Calc'd Flow Rate cfm (Q)	Meter Coeff. Gamma (Y_{ds})
Gas Volume Cubic Feet (V_s)	Temp. °F (t_s)	Gas Volume Cubic Feet (V_{ds})	Temp. °F (t_{ds})					
2.723	73.4	2.736	72	-.30	10	0.23	.2711	.9925
2.732	73.4	2.705	72	-.30	1	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

$$Y_{ds} = \frac{(V_s) (t_{ds} + 460) (P_{bar})}{(V_{ds}) (t_s + 460) [P_{bar} + (\Delta P / 13.6)]}$$

$$Q = (17.64) \left[\frac{(P_b) (V_s)}{(t_s + 460) (\theta)} \right]$$

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. H ₂ O	Gas Volume (V_d) cf	Temp. (t_d) °F	Coeff. (Y_d)	$\Delta H\theta$ In. H ₂ O
5.071	68	13	0.5	5.204	88	1.0040	1.816
5.021	1	13	0.5	5.257	97	1.0003	1.812
5.386	1	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. $\Delta H\theta$ range: 1.6-2.0.
4. $\Delta H\theta$ tolerance: ≤ 0.15 In. H₂O over ΔH range of 0.4 In.-4.0 In.

$$Y_d = \frac{Y_{ds} * V_{ds} * (t_d + 460) * P_b}{V_d * (t_{ds} + 460) * (P_b + \{\Delta H / 13.6\})}$$

$$\Delta H\theta = \frac{0.0319 * \Delta H}{P_b * (t_d + 460)} * \left[\frac{(t_{ds} + 460) * \Theta}{Y_{ds} * V_{ds}} \right]^2$$

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 ₂ O	Gas Volume (V_d) cf	Temp. (t_d) °F	Coeff. (Y_d)	$\Delta H\theta$ In. H ₂ O
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.: $\pm 5\%$

$$Y_d = \frac{Y_{ds} * V_{ds} * (t_d + 460) * P_b}{V_d * (t_{ds} + 460) * (P_b + \{\Delta H / 13.6\})}$$

$$\Delta H\theta = \frac{0.0319 * \Delta H}{P_b * (t_d + 460)} * \left[\frac{(t_{ds} + 460) * \theta}{Y_{ds} * V_{ds}} \right]^2$$

Dry Gas Meter Identification: 1054682

Calibration by: WLS

Date: 8-14-91

Barometric Pressure (P_b): 29.82 in. Hg

PAGE 1 OF 2

ENTROPY
ENVIRONMENTALISTS, INC.

Date: _____

Barometric Pressure (P_b): _____ in. Hg

	Spirometer		Dry Gas Meter		Pressure (Δp) in. H ₂ O	Time (t) min.	Flow Rate (Q)	Meter Meter Coeff. (Y_{ds})	Avg. Meter Coeff. ($\bar{Y}_{ds}$)
	Gas Volume (V_g) ft ³	Temp. (t_g) °F	Gas Volume (V_{ds}) ft ³	Temp. (t_{ds}) °F					
	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	✓

$$Y_{ds} = \frac{(V_g) (t_{ds} + 460) (P_b)}{(V_{ds}) (t_g + 460) (P_g)}$$

$$Y_{ds} = \frac{(V_g) (t_{ds} + 460) (P_b)}{(V_{ds}) (t_g + 460) (P_g)}$$

STANDARD DRY GAS METER CALIBRATION

Meter Number 6838323

Date 2-12-92

Auditor(s) MBC/PJ

Barometric Press. (P_{bar}) 30.11

Spirometer		Dry Gas Meter		Pressure In. H ₂ O (ΔP)	Time Min. (θ)	Test Flow Rate cfm	Calc'd Flow Rate cfm (Q)	Meter Coeff. Gamma (Y _{ds})
Gas Volume Cubic Feet (V _s)	Temp. °F (t _s)	Gas Volume Cubic Feet (V _{ds})	Temp. °F (t _{ds})					
2.723	73.4	2.736	72	-.30	10	0.23	.2711	.9925
2.732	73.4	2.705	72	-.30	1	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

$$Y_{ds} = \frac{(V_s) (t_{ds} + 460) (P_{bar})}{(V_{ds}) (t_s + 460) [P_{bar} + (\Delta P / 13.6)]}$$

$$Q = (17.64) \left[\frac{(P_b) (V_s)}{(t_s + 460) (\theta)} \right]$$

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. H ₂ O	Gas Volume (V_d) cf	Temp. (t_d) °F	Coeff. (Y_d)	$\Delta H\Theta$ In. H ₂ O
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. $\Delta H\Theta$ range: 1.6-2.0.
4. $\Delta H\Theta$ tolerance: ≤ 0.15 In. H₂O over ΔH range of 0.4 In.-4.0 In.

$$Y_d = \frac{Y_{ds} * V_{ds} * (t_d + 460) * P_b}{V_d * (t_{ds} + 460) * (P_b + \{\Delta H / 13.6\})}$$

$$\Delta H\Theta = \frac{0.0319 * \Delta H}{P_b * (t_d + 460)} * \left[\frac{(t_{ds} + 460) * \Theta}{Y_{ds} * V_{ds}} \right]^2$$

ISOKINETIC METERBOX POSTTEST CALIBRATION

METERBOX NO. N7

Date 8-28-92 Calibrated By FCM 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 ₂ O	Gas Volume (V_d) cf	Temp. (t_d) °F	Coeff. (Y_d)	$\Delta H\Theta$ In. H ₂ O
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%

$$Y_d = \frac{Y_{ds} * V_{ds} * (t_d + 460) * P_b}{V_d * (t_{ds} + 460) * (P_b + (\Delta H / 13.6))}$$

$$\Delta H\Theta = \frac{0.0319 * \Delta H}{P_b * (t_d + 460)} * \left[\frac{(t_{ds} + 460) * \Theta}{Y_{ds} * V_{ds}} \right]^2$$

STANDARD DRY GAS METER CALIBRATION

Meter Number 1017057

Date 2-11-92

Auditor(s) MBC/PJ

Barometric Press. (P_{bar}) 30.1

Spirometer		Dry Gas Meter		Pressure	Time	Test	Calc'd	Meter
Gas Volume	Temp.	Gas Volume	Temp.	In. H ₂ O	Min.	Flow	Flow	Coeff.
Cubic Feet	°F	Cubic Feet	°F	(ΔP)	(θ)	Rate	Rate cfm	Gamma
(V _s)	(t _s)	(V _{ds})	(t _{ds})			cfm	(Q)	(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

$$Y_{ds} = \frac{(V_s) (t_{ds} + 460) (P_{bar})}{(V_{ds}) (t_s + 460) [P_{bar} + (\Delta P / 13.6)]}$$

$$Q = (17.64) \left[\frac{(P_b) (V_s)}{(t_s + 460) (\theta)} \right]$$

APPENDIX G

APPENDIX H

Method 201A—Determination of PM₁₀ 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 (PM₁₀) from stationary sources. The EPA recognizes that condensable emissions not collected by an in-stack method are also PM₁₀ and that emissions that contribute to ambient PM₁₀ levels are the sum of condensable emissions and emissions measured by an in-stack PM₁₀ method, such as this method or Method 201. Therefore, for establishing source contributions to ambient levels of PM₁₀, such as for emission inventory purposes, EPA suggests that source PM₁₀ measurement include both in-stack PM₁₀ and condensable emissions. Condensable 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 PM₁₀. 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 PM₁₀ 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 PM₁₀ Sizer. Stainless steel (316 or equivalent), capable of determining the PM₁₀ 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 device, 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 μ m 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_c , the correct cyclone flow rate for a 10 μ m 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.

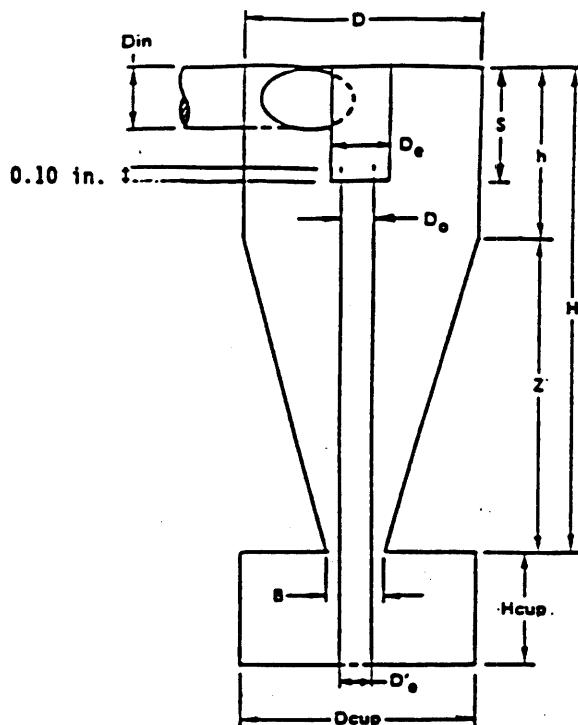
4.1.4.1 Pretest Leak-Check. A pretest leak-check of the entire sampling train, including the sizing device, is required. Use the leak-check procedure in Method 5, Section 4.1.4.1 to conduct a pretest leak-check.

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'	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_s , in. H₂O = _____

Average stack temperature.

 t_s , °F = _____Meter temperature, t_m , °F = _____Orifice ΔH_o , in. H₂O = _____

Gas analysis:

%CO₂ = _____%O₂ = _____%N₂ + %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:

$$P_s = P_{bar} + \frac{P_s}{13.6} = \text{_____ in. Hg}$$

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:

$$Q_s = 0.002837 \mu_s \left[\frac{(t_s + 460)}{M_w P_s} \right]^{0.2549} = \text{_____ ft}^3/\text{min}$$

Figure 4. Example worksheet 1. cyclone flow rate and ΔH .Orifice pressure head (ΔH) needed for cyclone flow rate:

$$\Delta H = \left[\frac{Q_s (1 - B_{ws}) P_s}{t_s + 460} \right] \frac{(t_s + 460) M_d 1.083 \Delta H_o}{P_{bar}} = \text{_____ in. H}_2\text{O}$$

$$\Delta p_{max} = 1.3686 \times 10^{-4} \frac{P_s M_w (v_{max})^2}{(L + 400) C_p^2} = \text{in. H}_2\text{O}$$

Nozzle No.				
D _n , in.				
v _n , ft/sec				
v _{min} , ft/sec				
v _{max} , ft/sec				
Δp _{min} , in. H ₂ O				
Δp _{max} , in. H ₂ O				

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 = _____

$$t_1 = \left[\frac{\Delta p'_1}{\Delta p'_{avg}} \right] \frac{1}{2} \frac{(\text{Total run time})}{(\text{Number of points})}$$

where:

t₁ = dwell time at first traverse point
 minutes.

Δp'₁ = the velocity head at the first traverse
 point (from a previous traverse), in. H₂O.

Δp'_{avg} = the square of the average square
 root of the Δp's (from a previous velocity
 traverse), in. H₂O.

At subsequent traverse points, measure the
 velocity Δp and calculate the dwell time
 by using the following equation:

$$t_n = \frac{t_1}{(\Delta p_n)^{1/4}} \quad (\Delta p_1)^{1/4}, n = 2, 3, \dots \text{total number of sampling points}$$

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.

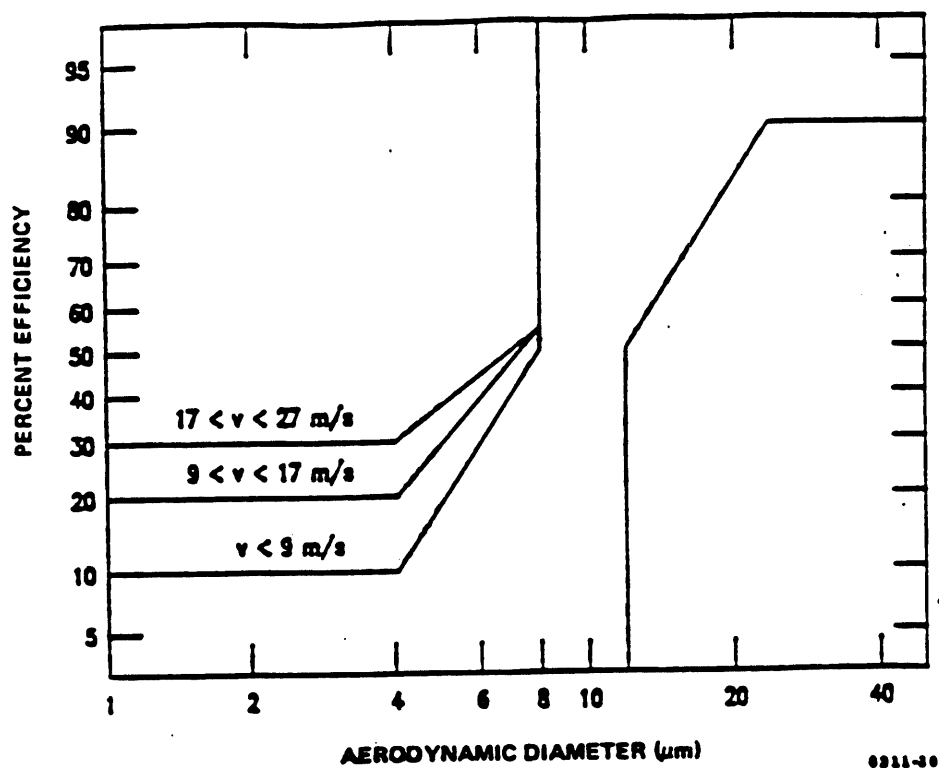
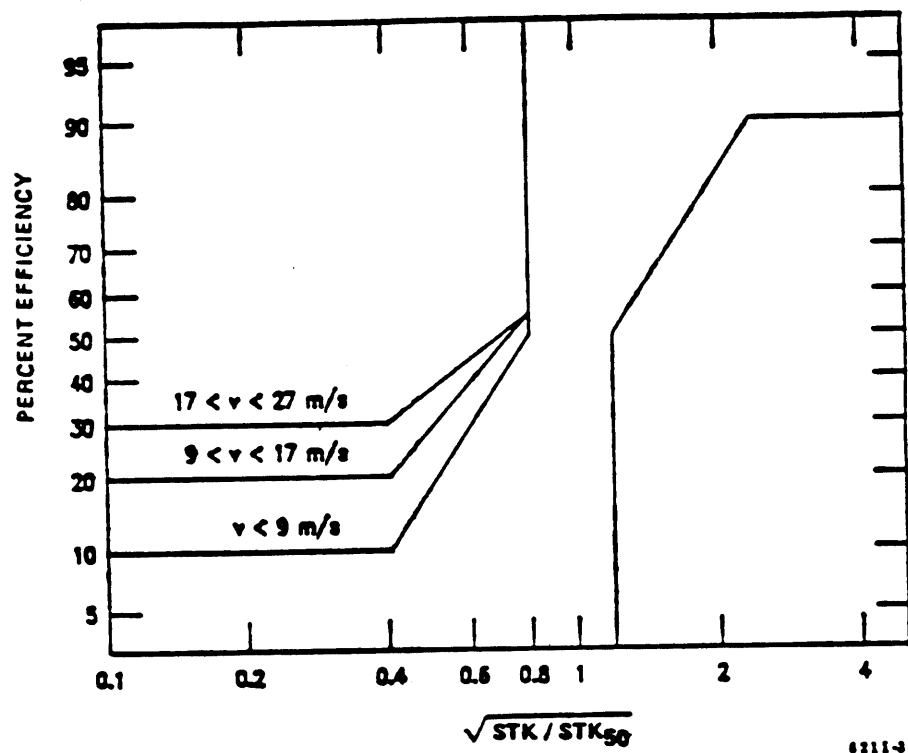
Figure 8. Efficiency envelope for the PM₁₀ cyclone.

Figure 9. Efficiency envelope for first calibration stage.

APPENDIX I

03-24-1991

TIME	CH1	CH2	CH3	CH4	CH5	CH6	CH7	CH8	CH9
FT	CH1	CH2	CH3	CH4	CH5	CH6	CH7	CH8	CH9
	screen	screen							
	direction	velocity							
	degrees	mph							
07:53:59	91.25	-0.03	0.00	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	0.00
07:57:59	100.41	-0.04	0.00	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	0.00
08:01:59	92.57	0.15	0.00	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	0.00
08:05:59	105.66	-0.10	0.00	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	0.00
08:09:59	75.80	-0.10	0.00	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	0.00
08:13:59	96.82	0.17	0.00	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	0.00
08:17:59	80.37	-0.10	0.00	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	0.00
08:21:59	103.66	-0.06	0.00	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	0.00
08:25:59	114.06	0.33	0.00	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	0.00
08:29:59	109.75	0.20	0.00	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	0.00
08:34:02	69.42	0.16	0.00	0.00	0.00	0.00	0.00	0.00	0.00
08:35:59	39.27	0.63	0.00	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	0.00
08:39:59	94.71	0.53	0.00	0.00	0.00	0.00	0.00	0.00	0.00
08:41:59	35.38	-0.07	0.00	0.00	0.00	0.00	0.00	0.00	0.00
08:43:59	77.65	-0.06	0.00	0.00	0.00	0.00	0.00	0.00	0.00
08:45:59	55.05	0.02	0.00	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	0.00
08:49:59	75.06	0.42	0.00	0.00	0.00	0.00	0.00	0.00	0.00
08:51:59	102.76	0.45	0.00	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	0.00
08:55:02	74.65	1.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00
08:57:59	65.11	0.92	0.00	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	0.00
09:01:59	71.25	0.60	0.00	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	0.00
09:05:59	82.38	1.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00
09:07:59	89.72	1.69	0.00	0.00	0.00	0.00	0.00	0.00	0.00
09:09:59	78.48	0.87	0.00	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	0.00
09:13:59	57.62	1.44	0.00	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	0.00
09:17:59	84.86	1.98	0.00	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	0.00
09:21:59	85.72	1.40	0.00	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	0.00
09:25:59	70.75	0.65	0.00	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	0.00
09:29:59	81.59	0.08	0.00	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	0.00
09:33:59	64.01	0.45	0.00	0.00	0.00	0.00	0.00	0.00	0.00
09:35:59	75.71	0.57	0.00	0.00	0.00	0.00	0.00	0.00	0.00

09:41:59	58.53	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	0.25	0.00	0.00	0.00	0.00	0.00	0.00	0.00
09:47:59	80.89	0.21	0.00	0.00	0.00	0.00	0.00	0.00	0.00
09:49:59	73.37	0.15	0.00	0.00	0.00	0.00	0.00	0.00	0.00

AVERAGES for	07:52:16	TD	09:51:59
1		53.44863	
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	34.73	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
10:13:59	89.35	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	0.32	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	75.16	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
11:07:59	203.35	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00
11:09:59	195.37	0.06	0.00	0.00	0.00	0.00	0.00	0.00	0.00
11:11:59	123.46	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
11:13:59	242.98	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00
11:15:59	95.62	0.20	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
11:46:02	67.71	0.60	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
11:49:59	77.57	0.75	0.00	0.00	0.00	0.00	0.00	0.00	0.00
11:51:59	175.32	0.22	0.00	0.00	0.00	0.00	0.00	0.00	0.00
11:53:59	125.27	0.26	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
11:57:59	92.05	0.49	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
12:01:59	91.21	0.01	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
12:05:59	60.31	1.09	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
12:09:59	147.17	0.39	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
12:13:59	171.30	0.09	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
12:17:59	98.15	0.80	0.00	0.00	0.00	0.00	0.00	0.00	0.00
12:19:59	93.14	0.65	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
12:23:59	132.23	0.02	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
12:28:02	103.50	0.12	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
12:31:59	71.41	2.73	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
12:35:59	62.84	1.88	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
12:39:59	55.57	1.06	0.00	0.00	0.00	0.00	0.00	0.00	0.00

	direction	velocity							
	degrees	mph							
12:41:59	138.48	0.47	0.00	0.00	0.00	0.00	0.00	0.00	

	direction	velocity								
	degrees	mph								
12:43:59	77.68	0.33	0.00	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	0.00
12:47:59	125.35	1.07	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
12:50:02	145.66	0.21	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
12:51:59	211.15	1.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
12:53:59	222.55	2.44	0.00	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	0.00
12:57:59	138.37	1.40	0.00	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	0.00
13:01:59	201.87	0.05	0.00	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	0.00
13:05:59	201.47	0.50	0.00	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	0.00
13:09:59	99.22	0.41	0.00	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	0.00
13:13:59	60.15	0.38	0.00	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	0.00
13:17:59	230.88	0.61	0.00	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	0.00
13:21:59	244.53	0.26	0.00	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	0.00
13:25:59	198.43	0.50	0.00	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	0.00
13:29:59	116.03	0.17	0.00	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	0.00
13:33:59	216.44	0.17	0.00	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	0.00
13:37:59	239.06	0.01	0.00	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	0.00
13:41:59	224.91	0.83	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
13:43:59	197.46	0.56	0.00	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	0.00
13:47:59	76.57	0.48	0.00	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	0.00
13:52:02	202.44	0.09	0.00	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	0.00
13:55:59	194.30	0.54	0.00	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	0.00
13:59:59	198.29	0.24	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
14:01:59	192.97	0.07	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
14:03:59	180.85	0.53	0.00	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	0.00
14:07:59	200.75	0.16	0.00	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	0.00
14:11:59	209.08	0.00	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	0.00
14:15:59	273.06	0.01	0.00	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	0.00
14:19:59	201.84	0.03	0.00	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	0.00
14:23:59	151.96	0.00	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	0.00
14:27:59	149.47	0.01	0.00	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	0.00
14:31:59	226.16	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
14:33:59	221.82	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
14:35:02	186.80	0.01	0.00	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	0.00
14:39:59	222.94	0.31	0.00	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	0.00
14:43:59	225.56	0.77	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
14:45:59	212.78	0.15	0.00	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	CH2	CH3	CH4	CH5	CH6	C		
H7	CH2	V							
	Screen	Screen							
	Direction	Velocity							
	Degrees	MPH							
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	278.83	-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	276.95	-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	263.49	-0.11	0.00	0.00	0.00	0.00	0.00	0.00	0.00
08:50:02	266.12	-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	328.03	-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	282.39	-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

09:54:59	1000.55	255.22	-0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00
09:55:59	1000.55	205.92	-0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00
09:57:59	1000.55	245.05	-0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00
09:59:59	1000.55	250.04	-0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00

AVERAGED for	08:10:08	TD	10:09:59
1		258.770e	
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	229.98	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	245.29	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

11:43:59	270.22	2.71	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	-587.40	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</					

13:55:59	-703.27	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00
13:57:59	-703.27	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00
13:59:59	-227.97	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00
14:01:59	337.78	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00
14:03:59	-375.43	0.07	0.00	0.00	0.00	0.00	0.00	0.00	0.00
14:05:59	-703.27	0.48	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

02-24-1992

TIME	CH1	CH2	CH3	CH4	CH5	CH6	C
H7	CH8	V					
	screen	Screen					
	Direction	Velocity					
	Degrees	MPH					
07:34:59	-707.85	-0.23	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
07:38:59	-522.97	-0.06	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
07:42:59	272.75	-0.09	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
07:46:59	303.13	-0.10	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
07:50:59	282.13	-0.11	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
07:54:59	59.87	-0.11	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
07:58:59	67.96	-0.11	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
08:02:59	248.16	-0.11	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
08:06:59	257.55	-0.11	0.00	0.00	0.00	0.00	0.00
08:08:59	259.85	-0.11	0.00	0.00	0.00	0.00	0.00
08:10:59	255.22	-0.11	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
08:15:02	239.37	-0.11	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
08:18:59	265.15	-0.10	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
08:22:59	242.69	-0.10	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
08:26:59	256.37	-0.10	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
08:30:59	252.60	-0.10	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
08:35:02	238.28	-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
08:38:59	243.98	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
08:42:59	250.30	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
08:46:59	255.34	0.01	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
08:50:59	262.34	0.01	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
08:54:59	267.79	0.01	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
08:58:59	149.37	0.01	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
09:02:59	154.07	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
09:06:59	193.32	0.00					

09:18:59	250.88	-0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
09:19:02	252.89	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	262.69	-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	261.59	-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		-0.0512226	
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	289.88	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	262.93	-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
10:02:02	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	287.87	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
10:40:59	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

10:55:59	289.27	0.22	0.00	0.00	0.00	0.00	0.00	0.00	0.00
11:00:59	288.88	0.27	0.00	0.00	0.00	0.00	0.00	0.00	0.00
11:02:59	287.43	0.31	0.00	0.00	0.00	0.00	0.00	0.00	0.00
11:04:59	281.70	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00

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	306.68	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
11:58:59	277.12	1.75	0.00	0.00	0.00	0.00	0.00	0.00	0.00

12:04:59	288.88	2.22	0.00	0.00	0.00	0.00	0.00	0.00	0.00
12:06:59	279.59	2.23	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
12:10:59	289.78	0.89	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
12:15:02	287.27	0.98	0.00	0.00	0.00	0.00	0.00	0.00	0.00
12:16:59	291.98	1.19	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
12:20:59	297.15	1.66	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
12:24:59	300.25	1.23	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
12:28:59	246.36	4.23	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
12:32:59	242.76	2.51	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
12:36:59	255.48	3.50	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
12:40:59	255.21	3.49	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
12:44:59	257.93	2.55	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
12:48:59	264.67	2.27	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
12:52:59	295.37	0.24	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
12:57:02	261.39	1.04	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
13:00:59	190.06	1.77	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
13:04:59	290.04	1.89	0.00	0.00	0.00	0.00	0.00	0.00	0.00
13:06:59	292.84	0.59	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
13:10:59	334.47	0.64	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
13:14:59	191.92	0.16	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
13:18:59	309.78	1.15	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
13:22:59	269.18	1.66	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
13:26:59	292.61	0.07	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
13:30:59	320.70	0.69	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
13:34:59	286.39	0.20	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
13:38:59	148.64	0.84	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
13:42:59	225.23	0.01	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
13:46:59	154.12	1.13	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
13:50:59	278.65	0.98	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
13:54:59	321.13	0.13	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
13:58:59	304.98	0.01	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
14:02:59	332.23	0.30	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
14:06:59	299.65	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
14:10:59	331.71	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

14:17:02	200.50	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00
14:18:59	299.72	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00
14:20:59	252.97	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00
14:22:59	197.73	0.08	0.00	0.00	0.00	0.00	0.00	0.00	0.00
14:24:59	216.07	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00
14:26:59	33.99	0.02	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	198.65	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
14:39:02	286.26	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
14:40:59	279.24	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

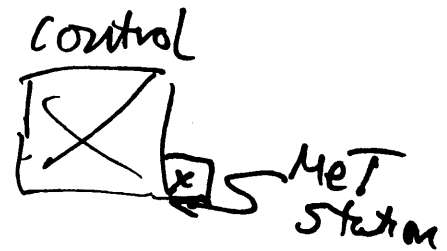
08-11-1992

TIME	CH1	CH2	CH3	CH4	CH5	CH6	CH7	CH8	V
	SCREEN N-E-S-W DEGREES	SCREEN VELOCITY MPH							
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	250.41	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
13:50:29	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

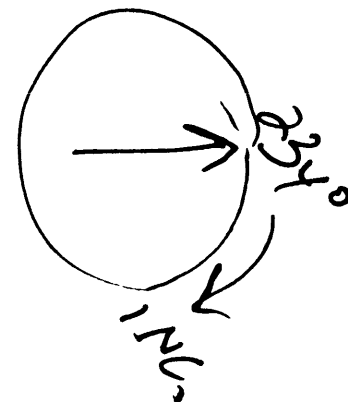
07:22:59	380.93	-0.04	0.00	0.00	0.00	0.00
0.00	0.00	0.00				
07:27:59	397.31	-0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00				
07:32:59	360.22	-0.01	0.00	0.00	0.00	0.00
0.00	0.00	0.00				
07:38:02	315.45	-0.00	0.00	0.00	0.00	0.00

07:47:59	288.37	0.01	0.00	0.00	0.00	0.00
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	283.17	0.01	0.00	0.00	0.00	0.00
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				

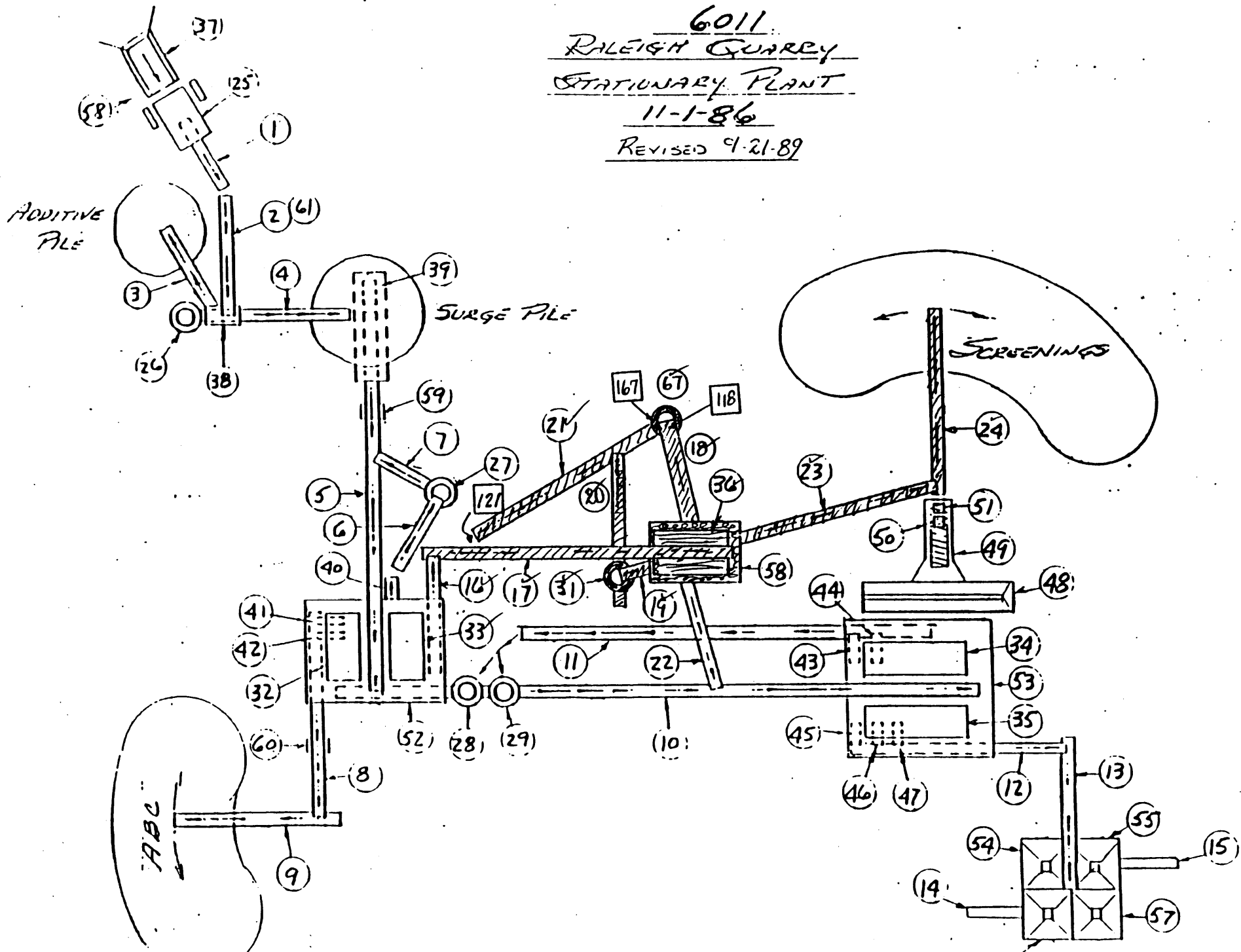
Screen



Traler



6011
RALEIGH QUARRY
STATIONARY PLANT
11-1-86
REVISED 9-21-89



6011
RALEIGH STATIONARY PLANT (Continued)

REF #	NLT EQ.#	DESCRIPTION	MFG. S/N
<u>CONVEYORS</u>			
*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
<u>CRUSHERS</u>			
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 ✓	
<u>FEEDERS</u>			
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
<u>CONVEYORS</u>			
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	6011-502
20 ✓	3758	30" x 30' Teerco	6011-502C

* Denotes revision 9/21/89 & new item numbers & description