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PROCESS DATA

**FINAL TEST REPORT
FOR
USEPA TEST PROGRAM
CONDUCTED AT
CONCRETE READY MIXED CORPORATION
ROANOKE, VA**

**U. S. EPA CONTRACT NO. 68D20029
EMB WORK ASSIGNMENT NO. 2-17**

April, 1994

**ETS, Inc.
1401 Municipal Road, Roanoke, Virginia 24012**

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1.0 INTRODUCTION

1.1 Summary

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, in collaboration with the National Redi-Mixed Concrete Association, is currently studying the cement manufacturing industry. The purpose of this study was to develop emission factors for the operations used within typical concrete batching facilities. The Emission Measurement Branch (EMB) of OAQPS coordinated the emission measurement activities at the plant. ETS Incorporated (ETS, Inc.) conducted the ambient and source measurements. EPA personnel obtained the process materials samples and process data during the test period.

EPA/EIB and the National Redi-Mixed Concrete Association considered the Concrete Ready Mixed Corporation plant located in Roanoke, Virginia to be a representative concrete batching operation. The concrete batching operations sampled were; (1) aggregate delivery; (2) aggregate handling and storage; (3) cement silo filling; (4) fly ash silo filling; and (5) truck loading. A schematic of the facility is shown in Figure 1.1-1.

The test program was conducted from October 25, 1993 through November 1, 1993. Air sampling was conducted at: (1) upwind and downwind locations from the truck loading operation using ambient monitors; (2) cement silo filling; (4) fly ash silo filling; and (4) the inlet and outlet ducting of the central dust collector. The air sampling was conducted to determine emissions of particulate matter (PM), PM less than or equal to ten microns (PM₁₀) and targeted metals.

Process samples from the facility roadway, sand, aggregate, and cement were obtained during the test program. All process samples were analyzed for moisture and sieve size. The cement process sample additionally underwent a targeted metals analysis. The targeted metals are listed in Table 1.1-1.

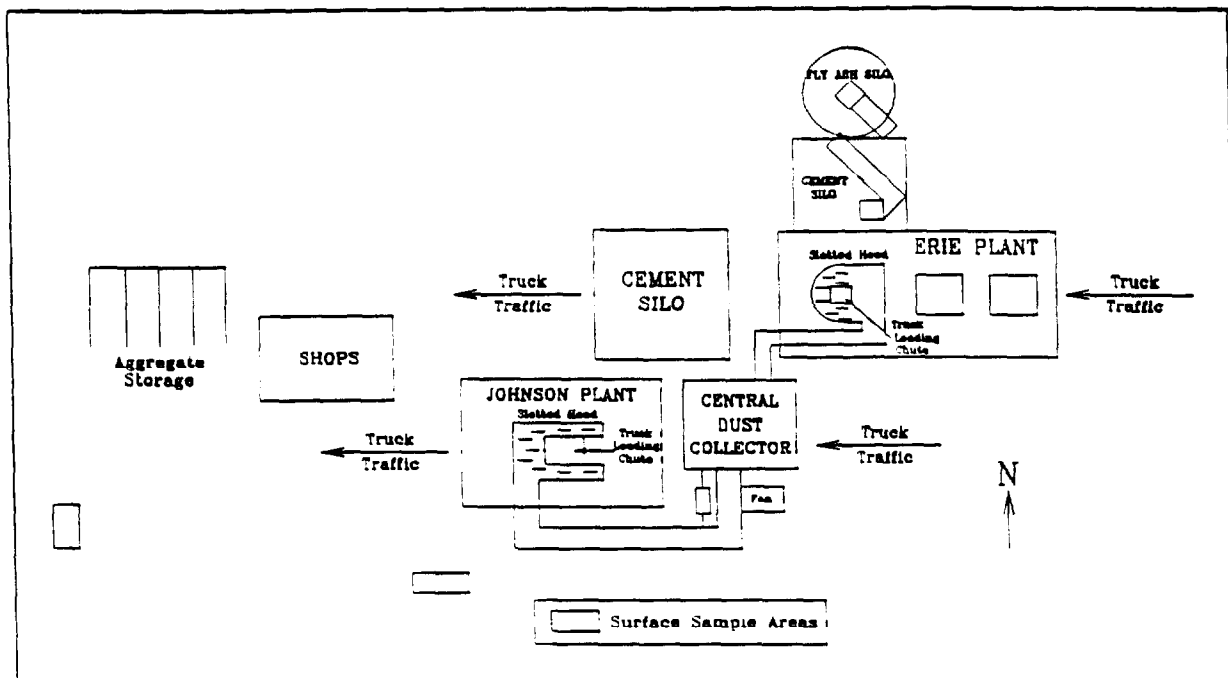


Figure 1.1-1: Schematic of the Concrete Ready Mixed Corporation Batch Plant Located in Roanoke, VA.

TABLE 1.1-1: Targeted Metals for Concrete Ready Mixed Corporation of Roanoke, Virginia.

METAL
arsenic
beryllium
cadmium
chromium
lead
manganese
mercury
nickel
phosphorus
selenium

1.2 Test Program Personnel

The key personnel who coordinated the test program and their phone numbers are:

- ETS, Inc., Project Manager, Tony Underwood 703/265-0004
- EIB Technical Coordinator, Ron Meyers 919/541-5407
- EMB Field Test Coordinator, John Brown 919/541-0200
- Concrete Ready Mixed Corporation,
Robert Lindsay 703/932-5000

2.0 PLANT AND SAMPLING LOCATION DESCRIPTION

The Concrete Ready Mixed Corporation facility located in Roanoke, Virginia is composed of two separate concrete batching plants; (1) the Erie plant; and (2) the Johnson plant. All sampling was conducted at the Erie plant.

The following typical concrete batch plant operations were sampled during the test program:

- (1) aggregate delivery;
- (2) aggregate handling and storage;
- (3) cement silo filling;
- (4) fly ash silo filling;
- (5) truck loading.

A process flow schematic for this operation is outlined in Figure 2.0-1.

2.1 Aggregate Delivery Operation

Trucks deliver the concrete precursors of sand and gravel to the batching plants located in downtown Roanoke. A plant road connects the batch loading operations of the Erie and Johnson plants with Norfolk Avenue.

2.1.1 Air Sampling: Ambient air monitoring was conducted at upwind and downwind locations from the Erie plant truck loading operation. The ambient sampling was used to determine the background PM and metals emissions generated by the truck traffic within the facility.

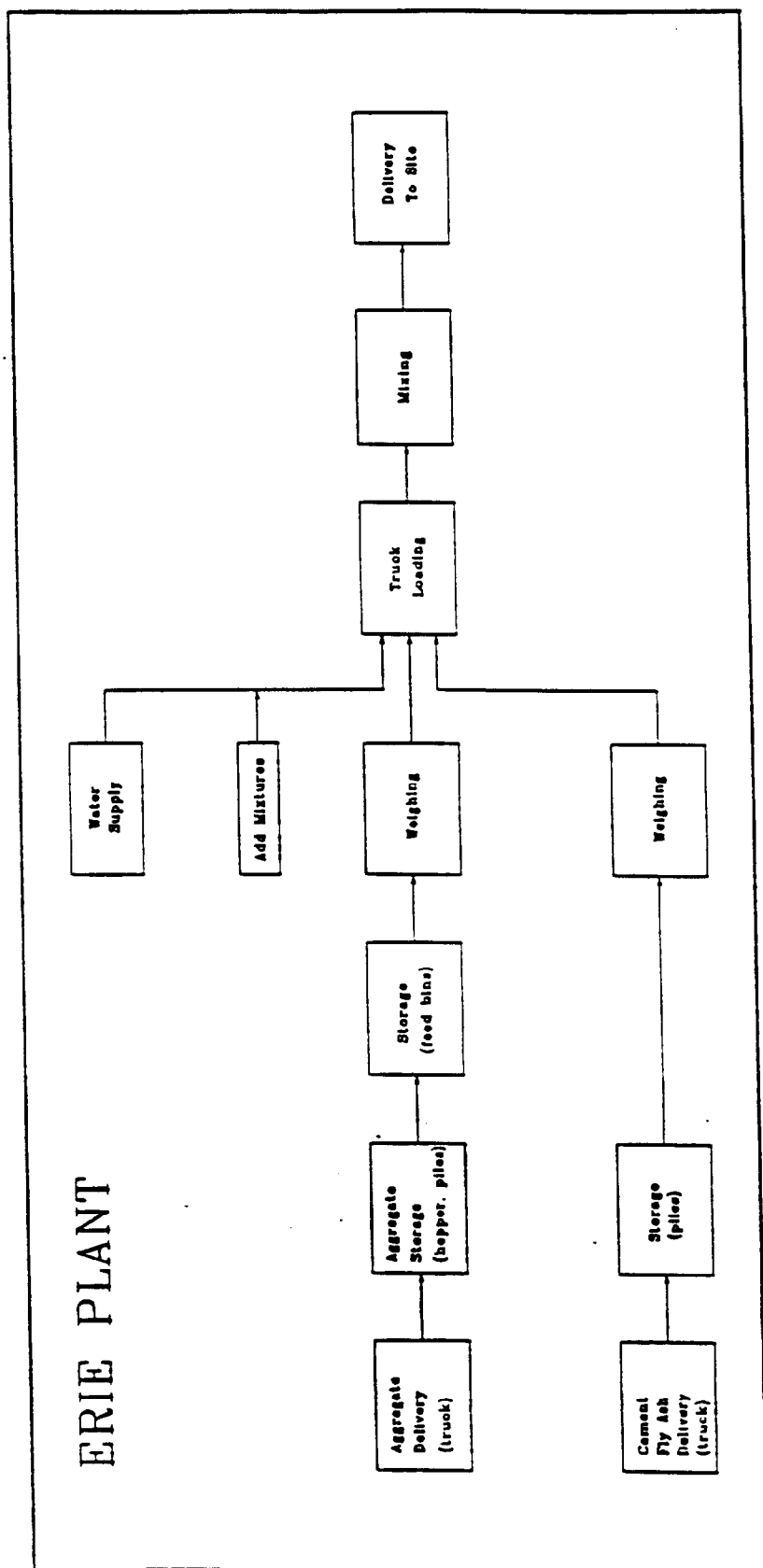
2.1.2 Process Material Samples: Two dust samples were taken from the roadway servicing the Erie Plant: (1) a 26'x27'x32' area of the roadway near the Norfolk Avenue exit; and (2) a 37'-3"x4" area of a concrete pad located adjacent to the Johnson plant. These process samples underwent a sieve and moisture analysis.

2.2 Aggregate Handling and Storage Operations

After delivery, the aggregate is stored in six open piles that are separated by concrete retaining walls. The aggregate is transported via belt conveyors to the overhead feed bins located above the truck loading operation as required. From the feed bins, the aggregate is conveyed to a mixing scale where it is quantitatively blended with fly ash.

2.2.1 Air Sampling: No air emission sampling for the aggregate handling and storage operations was conducted.

Figure 2.0-1: Process Flow Diagram for Concrete Ready Mixed Corporation



2.2.2 Process Material Samples: Four material samples were obtained from the material storage and handling areas surrounding the Erie Plant: (1) fine aggregate from west plant; (2) sand from west pit (right); (3) sand from the west pit (left); and (4) aggregate gravel. These process samples underwent a sieve and moisture analysis.

2.3 Cement Silo Filling Operation

Tanker trucks are contracted from outside sources to deliver cement to the storage silos of the Johnson and Erie batch plants. The Johnson plant has a single cement storage silo. The Erie plant has two cement storage silos designated east and west. To transport the cement from the tanker to the silo, a 4-inch flexible line is attached to the rear of the tanker truck. The cement is then pneumatically conveyed to the top of the storage silo. It takes approximately 45-minutes to unload one tanker truck.

Each storage silo has its own dust collector attached to its roof. The dust collectors vent to the atmosphere and are not equipped with any fans or blowers. The air flow out of each silo is a result of the air being displaced by the incoming cement.

2.3.1 Air Sampling: Air emission testing was conducted during cement silo filling operations at the outlet to the dust collector located on top of the silo. A detailed schematic of the cement storage silo sampling location is given in Figure 2.3.1-1. Figure 2.3.1-2 is a detailed schematic of the cement storage silo outlet sampling and traverse points.

2.3.2 Process Material Samples: A process sample of the cement contained within tanker truck #11 was obtained for sieve, moisture and targeted metals analysis.

2.4 Fly Ash Silo Filling Operation

Tanker trucks are contracted from outside sources to deliver fly ash to the Johnson and Erie batch plants. The Johnson and Erie plants use a common fly ash storage silo. A 4-inch flexible line is used to pneumatically transport the fly ash from the tanker to the top of the storage silo. It takes approximately 45-minutes to unload one tanker truck.

The fly ash storage silo has its own dust collector attached to its roof. The dust collector vents to the atmosphere and is not equipped with a fan or blower. The air flow emitted by the silo is a result of the air being displaced by the incoming fly ash.

Figure 2.3.1-1: Schematic of Cement Storage Silo, Concrete Ready Mixed Corporation

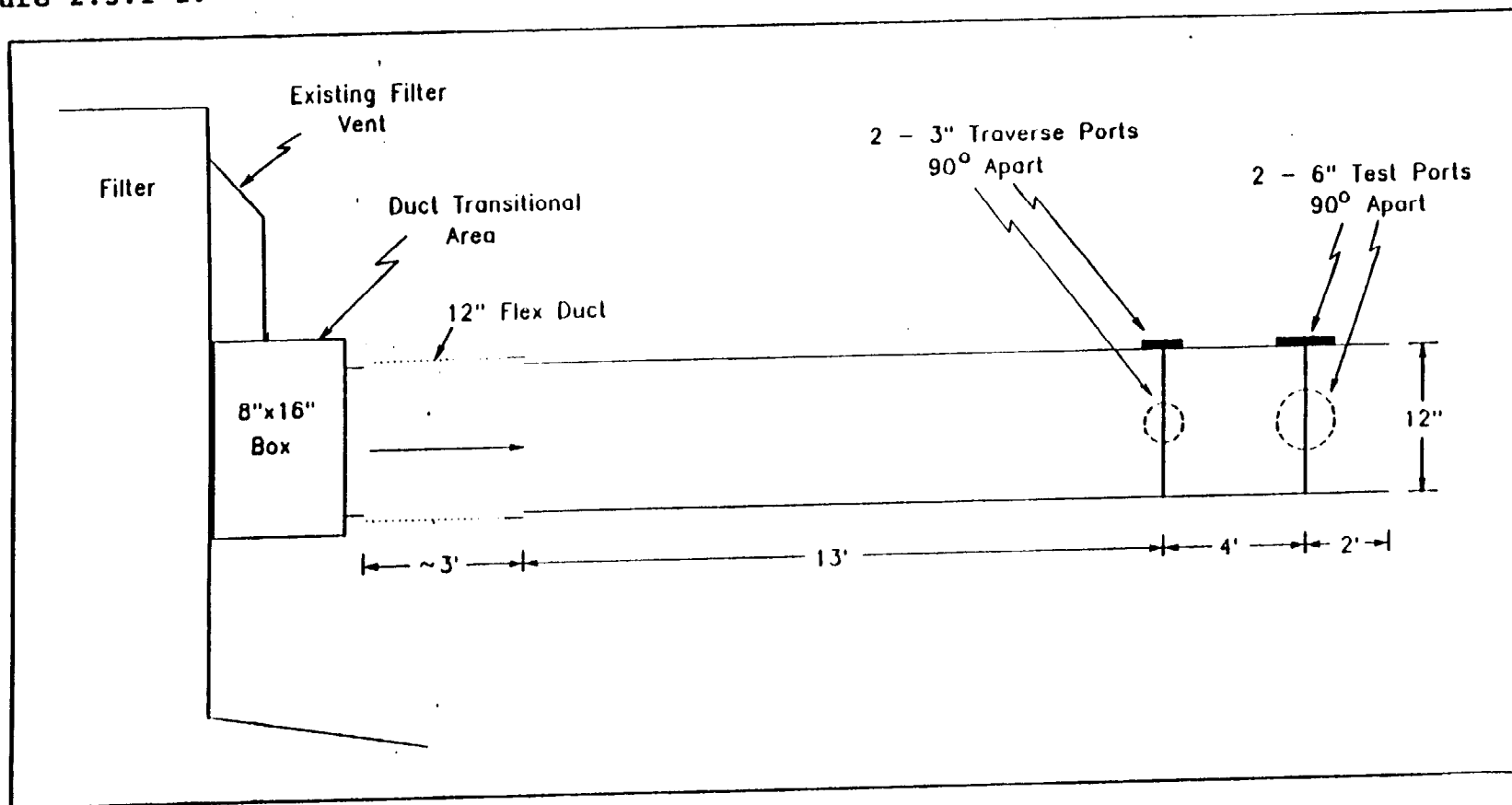
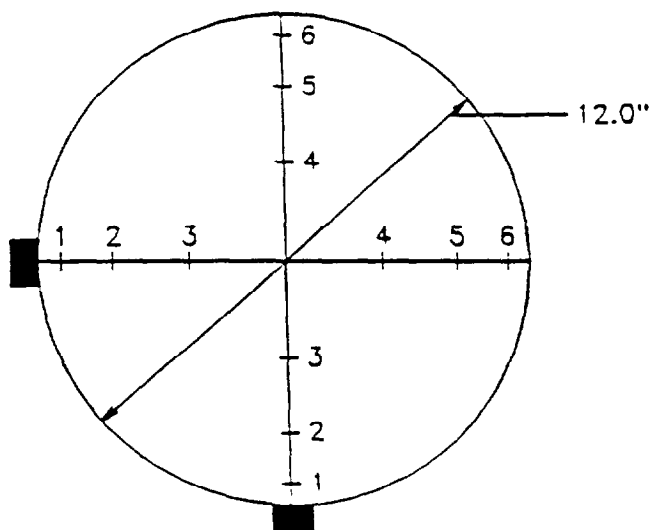


Figure 2.3.1-2: Traverse Point Locations for the Cement Storage Silo, Concrete Ready Mixed Corporation



POINT	% ID	DISTANCE FROM INSIDE OF PORT (inches)
1	4.4	0.52
2	14.6	1.76
3	29.6	3.55
4	70.4	8.45
5	85.4	10.24
6	95.6	11.48

INSIDE STACK DIAMETER	12.0 in	1.0 ft
DISTANCE UPSTREAM FROM DISTURBANCE	13.0 ft	13.0 DIA
DISTANCE DOWNSTREAM FROM DISTURBANCE	6.0 ft	6.0 DIA

Air emission testing was conducted during fly ash silo filling operation at the outlet to the dust collector located on top of the silo. A detailed schematic of the fly ash storage silo sampling location is given in Figure 2.4-1. Figure 2.4-2 is a detailed schematic of the fly ash storage silo outlet sampling and traverse points.

2.5 Truck Loading Operation

The concrete batching process combines aggregate from the overhead feed bins with cement and fly ash from the storage silos. This mixture is then transferred to the batch scale. The batch scale then gravity discharges a specific amount of this dry mixture to each truck via a loading chute. Water is also introduced into the truck at this time. Emissions from the truck loading operation are controlled by a shroud which is connected to a central dust collector. This central dust collector is common to both the Johnson and Erie batch plants.

The air sampling was conducted at the inlet and outlet of the central dust collector to determine the PM, PM₁₀ and targeted metals emissions generated during truck loading operations at the Erie batch plant. A detailed schematic of the central dust collector inlet sampling location and traverse point locations are given in Figures 2.5-1 and 2.5-2, respectively. Schematics of the sampling location and traverse point locations for the central dust collector outlet are given in Figures 2.5-3 and 2.5-4, respectively.

2.6 Pollution Control Description

The air pollution control equipment at the Concrete Ready Mixed Corporation Erie and Johnson batching plants consists of a Griffin Environmental Model JA-360DA dust collector. The dust collector services both plants truck loading operations and contains 360 bags with a total cloth area of 3219 square feet. The necessary pressure drop is obtained through the use of a 40 hp I.D. fan.

Figure 2.4-1: Fly Ash Storage Silo Schematic, Concrete Ready Mixed Corporation

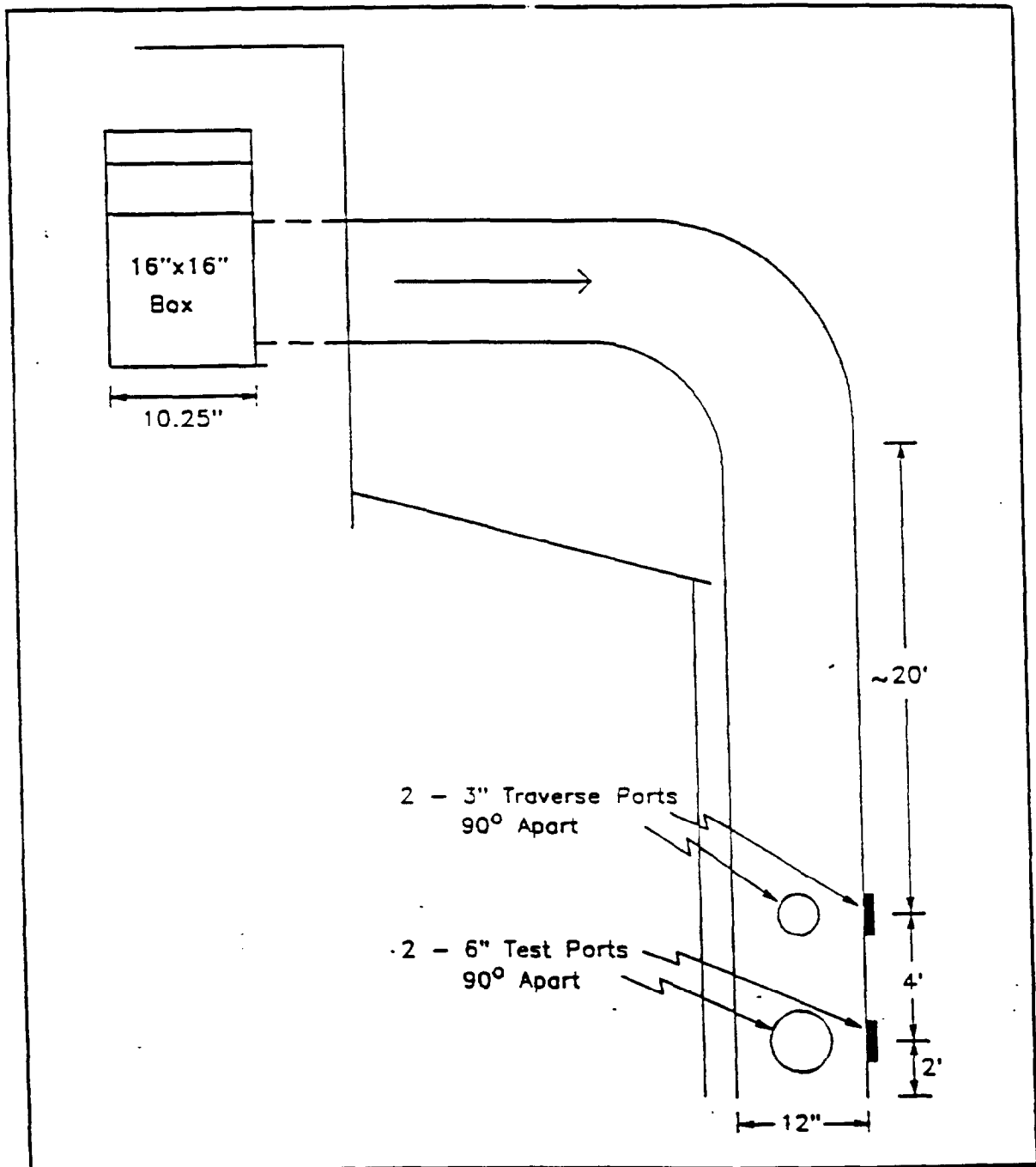
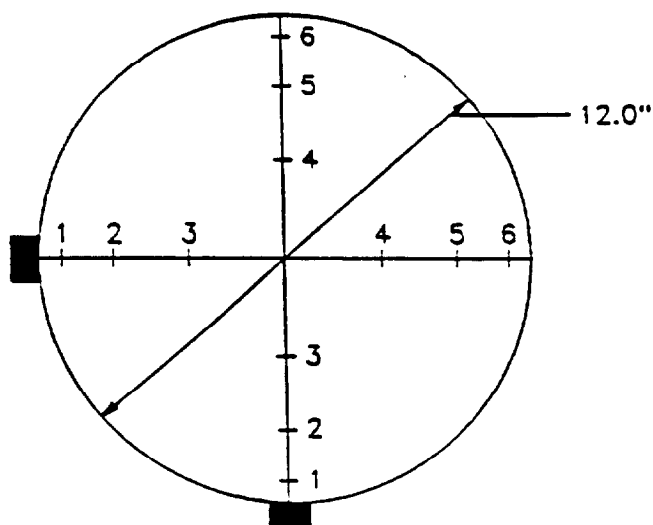


Figure 2.4-2: Travers Point Locations for the Fly Ash Storage Silo, Concrete Ready Mixed Corporation



POINT	% ID	DISTANCE FROM INSIDE OF PORT (inches)
1	4.4	0.52
2	14.6	1.76
3	29.6	3.55
4	70.4	8.45
5	85.4	10.24
6	95.6	11.48

INSIDE STACK DIAMETER	12.0 in	1.0 ft
DISTANCE UPSTREAM FROM DISTURBANCE	20 ft	20 Dia
DISTANCE DOWNSTREAM FROM DISTURBANCE	6 ft	6 Dic

Figure 2.5-1: Schematic of the Central Dust Collector Inlet,
Concrete Ready Mixed Corporation

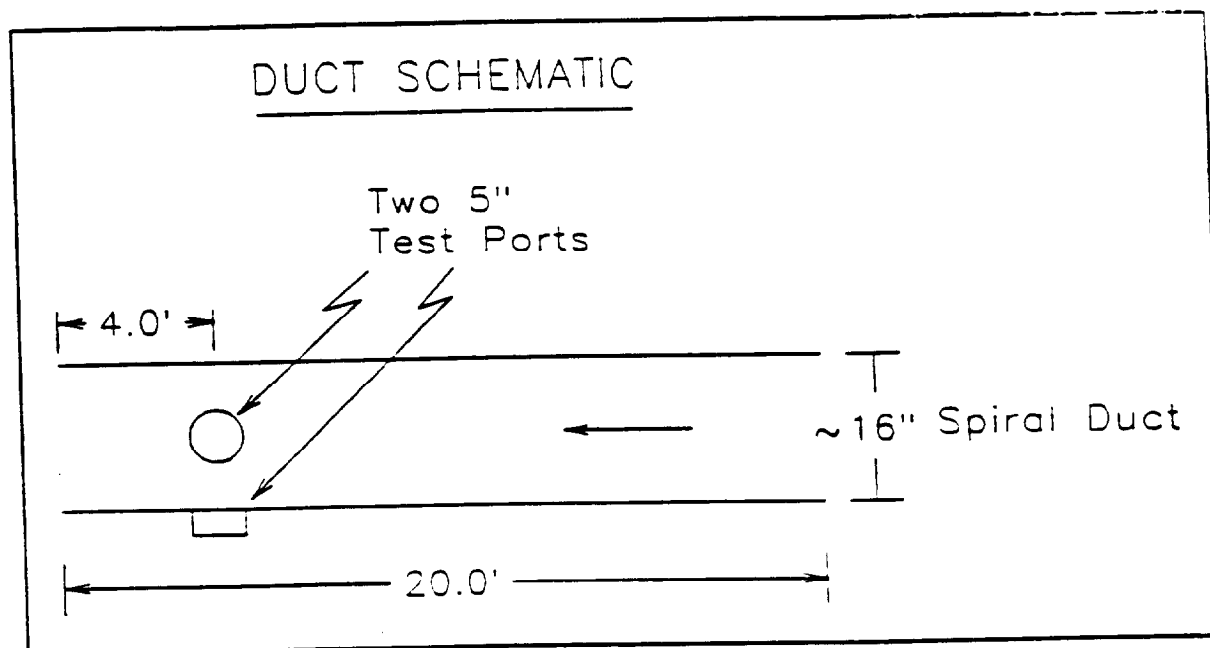
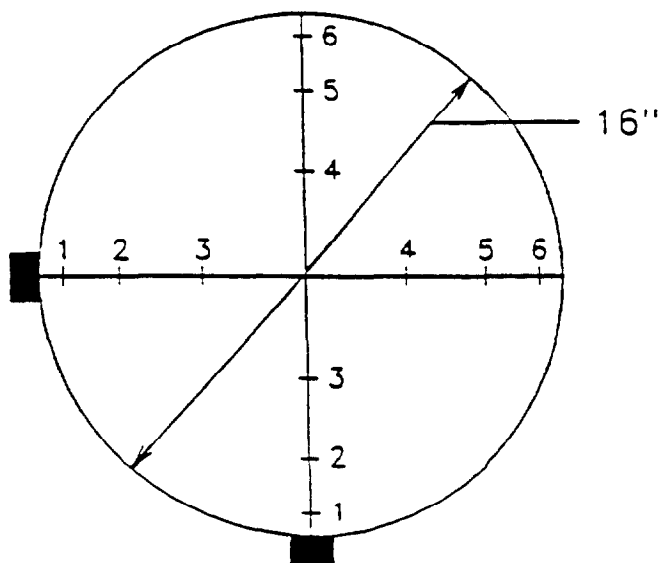


Figure 2.5-2: Sampling and Traverse Point Locations for the Central Dust Collector Inlet, Concrete Ready Mixed Corporation



POINT	% ID	DISTANCE FROM INSIDE OF PORT (inches)
1	4.4	0.70
2	14.6	2.34
3	29.6	4.73
4	70.4	11.27
5	85.4	13.66
6	95.6	15.30

INSIDE STACK DIAMETER	16.0 in	1.3 ft
DISTANCE UPSTREAM FROM DISTURBANCE	4.0 ft	3.0 DIA
DISTANCE DOWNSTREAM FROM DISTURBANCE	16.0 ft	12.0 DIA

Figure 2.5-3: Schematic of Dust Collector Outlet Test Location for Concrete Ready Mixed Corporation

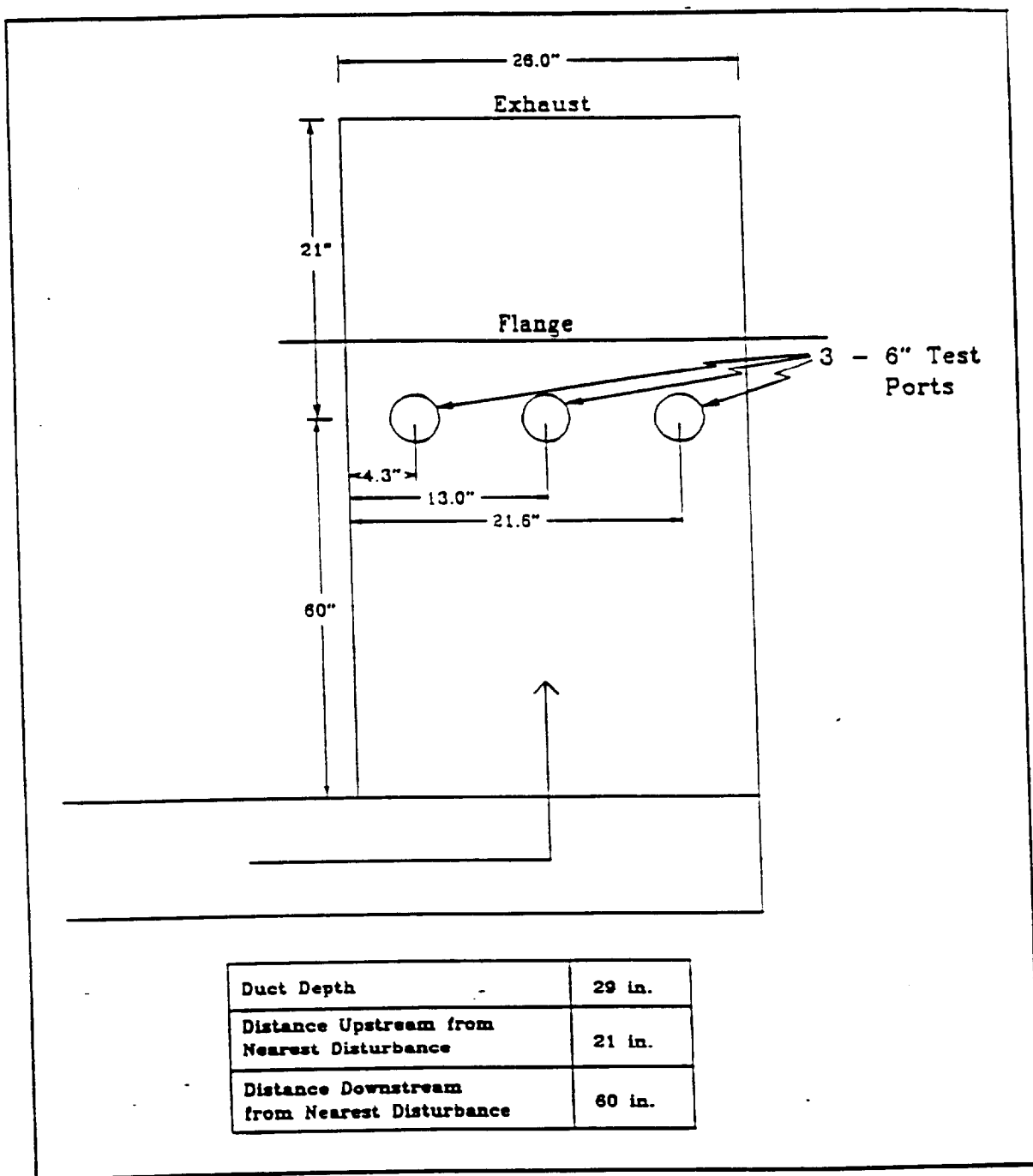
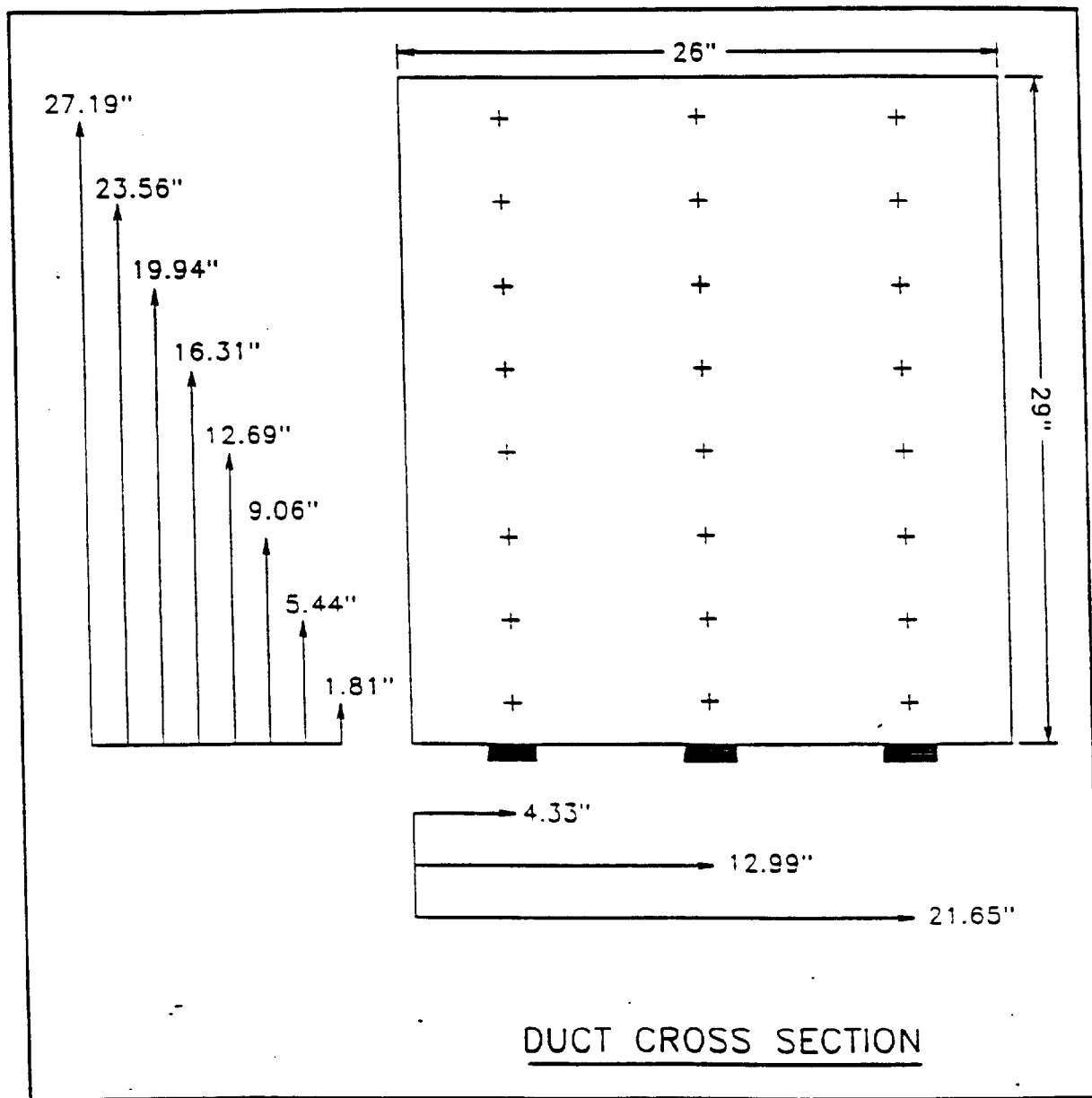


Figure 2.5-4: Sampling and Traverse Point Locations for the Dust Collector Outlet, Concrete Ready Mixed Corporation



3.0 SUMMARY AND DISCUSSION OF TEST RESULTS

3.1 Objectives and Test Matrix

The purpose of the test program was to develop emission factors for the operations used within a typical concrete batching facility.

The specific objectives of the test program for the Concrete Ready Mixed Corporation Plant were:

- (1) Obtain upwind and downwind ambient air samples to determine the following background pollutants caused by truck delivery traffic within the facility:
 - Particulate Matter
 - Targeted Metals
- (2) Obtain process material samples for aggregate storage and handling operations to determine the following:
 - Sieve Sizing
 - Moisture
- (3) Measure the following emissions from the Cement Silo filling operation:
 - Particulate Matter
 - PM_{10}
 - Targeted Metals

Obtain a cement process sample in order to determine the following:

 - Sieve Sizing
 - Moisture
 - Targeted Metals
- (4) Measure the following emissions from the Fly Ash Silo filling operation:
 - Particulate Matter
 - PM_{10}
 - Targeted Metals
- (5) Measure the following emissions from the truck loading operation:
 - Particulate Matter
 - PM_{10}
 - Targeted Metals

3.2 Test Matrix

Table 3.2-1 presents an overview of the sampling and analytical emission measurements for the Concrete Ready Mixed Corporation Erie Batching Plant. A more detailed delineation of the source test program is contained in Appendix A.

TABLE 3.2-1

**OVERVIEW OF THE TEST PROGRAM FOR THE CONCRETE READY MIXED CORPORATION
ERIE BATCHING PLANT**

<u>PROCESS DESCRIPTION</u>	<u>SAMPLE LOCATION</u>	<u>DATE</u>	<u>RUN NO.</u>	<u>ANALYSIS MODE</u>
AGGREGATE DELIVERY	UPWIND	10/26/93	U1026-AMB-R1	METALS, PM
		10/26/93	U1026-AMB-R2	METALS, PM
		10/26/93	U1026-AMB-R3	METALS, PM
		10/27/93	U1027-AMB-R1	METALS, PM
		10/27/93	U1027-AMB-R2	METALS, PM
		10/27/93	U1027-AMB-R3	METALS, PM
		10/28/93	U1028-AMB-R1	METALS, PM
		10/28/93	U1028-AMB-R2	METALS, PM
		10/28/93	U1028-AMB-R3	METALS, PM
		10/28/93	U1028-AMB-R4	METALS, PM
AGGREGATE DELIVERY	DOWNWIND	10/26/93	D1026-AMB-R1	METALS, PM
		10/26/93	D1026-AMB-R2	METALS, PM
		10/26/93	D1026-AMB-R3	METALS, PM
		10/27/93	D1027-AMB-R1	METALS, PM
		10/27/93	D1027-AMB-R2	METALS, PM
		10/27/93	D1027-AMB-R3	METALS, PM
		10/28/93	D1028-AMB-R1	METALS, PM
		10/28/93	D1028-AMB-R2	METALS, PM
		10/28/93	D1028-AMB-R3	METALS, PM
		10/28/93	D1028-AMB-R4	METALS, PM
CEMENT SILO FILLING	CEMENT SILO OUTLET	10/26/93	CSO-M201A-R1	METALS, >PM10, <=PM10
		10/27/93	CSO-M201A-R2	METALS, >PM10, <=PM10
		10/28/93	CSO-M201A-R3	METALS, >PM10, <=PM10
FLY ASH SILO FILLING	FLY ASH SILO OUTLET	10/27/93	FSO-M201A-R1	METALS, >PM10, <=PM10
		10/28/93	FSO-M201A-R2	METALS, >PM10, <=PM10
		11/01/93	FSO-M201A-R3	METALS, >PM10, <=PM10
TRUCK LOADING	DUST COLLECTOR INLET	10/26/93	DCI-M201A-R1	METALS, >PM10, <=PM10
		10/26/93	DCI-M201A-R2	METALS, >PM10, <=PM10
		10/26/93	DCI-M201A-R3	METALS, >PM10, <=PM10
		10/27/93	DCI-M201A-R4	METALS, >PM10, <=PM10
		10/27/93	DCI-M201A-R5	METALS, >PM10, <=PM10
		10/27/93	DCI-M201A-R6	METALS, >PM10, <=PM10
		10/28/93	DCI-M201A-R7	METALS, >PM10, <=PM10
		10/28/93	DCI-M201A-R8	METALS, >PM10, <=PM10
		10/28/93	DCI-M201A-R9	METALS, >PM10, <=PM10
		10/28/93	DCI-M201A-R10	METALS, >PM10, <=PM10
TRUCK LOADING	DUST COLLECTOR OUTLET	10/26/93	DCO-M201A-R1	METALS, >PM10, <=PM10
		10/26/93	DCO-M201A-R2	METALS, >PM10, <=PM10
		10/27/93	DCO-M201A-R3	METALS, >PM10, <=PM10
		10/28/93	DCO-M201A-R4	METALS, >PM10, <=PM10

3.3 Summary of Results

The results of the emissions testing conducted at the Concrete Ready Mixed Corporation Erie batch plant are summarized in Tables 3.3-1, 3.3-2 and 3.3-3.

3.3.1 Aggregate Delivery: The results of the aggregate delivery are summarized for ambient air sampling in Table 3.3-1. A summary of the process material results for sieve, moisture and targeted metals analyses are in Table 3.3-2.

3.3.1.1 Ambient Air Sampling: The ambient air sampling of the aggregate delivery process was conducted through the use of upwind and downwind ambient monitors. The upwind and downwind filter catches were analyzed for particulate loading and targeted metals. A summary of the wind speed and direction that occurred during the ambient monitoring is located in Appendix B.

3.3.1.1.1 Particulate Loading: The downwind background particulate loading from the Erie batching plant ranged from 0.00154 to 0.00658 gr/dscf at an average of 0.00332 gr/dscf over the three day test program. The upwind particulate loading due primarily from the truck traffic within the facility ranged from 5.64E-04 to 7.39E-04 gr/dscf at an average of 6.39E-04 gr/dscf for the test program.

3.3.1.1.2 Targeted Metals: The particulate catch from the ambient monitoring filters were combined with respect to upwind or downwind location for metals analysis. The resulting metal background concentrations for the upwind monitoring location ranged from 0.00 ug/dscm for selenium (Case 1) to 0.448 ug/dscm of chromium (Cases 1 and 2). The downwind ambient metals background ranged from 0.00517 ug/dscm of cadmium to 1.57 ug/dscm of manganese. The results for the ambient monitoring are summarized in Table 3.3-1, with more detailed sampling results located in Appendix B.

3.3.1.2 Process Material Sampling: The sieve analyses of the two roadway process samples resulted in 10.7% and 12.5% of dust passing through the 200 mesh U.S. standard sieve for the street exit and concrete pad samples, respectively. The results of the roadway material sampling are summarized in Table 3.3-2. A more detailed accounting of the roadway sampling results are given in Appendix C.

3.3.2 Aggregate Handling and Storage Operations: Three material samples that were obtained from the aggregate handling and storage operations at the Erie plant for sieve and moisture analyses. These samples consisted of fine aggregate, sand and aggregate gravel. The sieve and moisture results for these three samples are summarized in Table 3.3-2. Detailed laboratory results for these samples are located in Appendix C.

TABLE 3.3-1

SUMMARY OF AMBIENT MONITORING RESULTS

DATE		10/26/93	10/27/93	10/28/93	AVERAGE
<u>SAMPLING PARAMETERS</u>					
Temperature - F		59.2	58.7	51.8	56.6
Moisture - vol%		0.85	1.07	0.47	0.79
Barometric Pressure - in.Hg		30.12	29.97	29.80	29.96
Upwind Sampling Rate - acfm		10.76	10.80	10.72	10.76
Downwind Sampling Rate - acfm		10.85	10.99	10.81	10.88
<u>UPWIND PARTICULATE RESULTS</u>					
Test Duration - minutes		132.2	125.3	122.7	126.7
Sampling Rate - dscfm		10.92	10.90	10.96	10.93
Sample Volume - dscf		1443.13	1364.83	1344.64	1384.20
Filter Gain - g		0.0689	0.0500	0.0535	0.0575
Grain loading - gr/dscf		7.39E-04	5.64E-04	6.15E-04	6.39E-04
<u>DOWNWIND PARTICULATE RESULTS</u>					
Test Duration - minutes		124.0	120.6	120.6	121.8
Sampling Rate - dscfm		11.01	10.99	11.06	11.02
Sample Volume - dscf		1366.20	1325.49	1333.76	1341.82
Filter Gain - g		0.1367	0.1595	0.5706	0.2889
Grain loading - gr/dscf		1.54E-03	1.84E-03	6.58E-03	3.32E-03
<u>TARGETED METALS - ug/dscm</u>		<u>UPWIND</u>	<u>DOWNWIND</u>		
Arsenic (As)	Case 1	1.42E-01	1.81E-01		
	Case 2	1.44E-01	1.83E-01		
Beryllium (Be)	Case 1	7.81E-03	1.98E-02		
	Case 2	9.54E-03	2.15E-02		
Cadmium (Cd)	Case 1	4.60E-03	5.17E-03		
	Case 2	4.60E-03	5.17E-03		
Chromium (Cr)	Case 1	4.48E-01	7.66E-01		
	Case 2	4.48E-01	7.66E-01		
Lead (Pb)	Case 1	1.84E-01	3.25E-01		
	Case 2	1.84E-01	3.25E-01		
Manganese (Mn)	Case 1	5.34E-01	1.57E+00		
	Case 2	5.34E-01	1.57E+00		
Mercury (Hg)	Case 1	6.24E-02	8.87E-02		
	Case 2	6.42E-02	9.05E-02		
Nickel (Ni)	Case 1	1.73E-01	3.29E-01		
	Case 2	1.91E-01	3.46E-01		
Phosphorus (P)	Case 1	1.65E+01	1.98E+01		
	Case 2	1.73E+01	2.07E+01		
Selenium (Se)	Case 1	0.00E+00	1.55E-02		
	Case 2	1.73E-03	1.72E-02		

Notes:

- Case 1 results were calculated by substituting the detection limit value for all non-detect analytical results.
- Case 2 results were calculated by substituting a zero-value for all non-detect analytical results.

TABLE 3.3-2

SUMMARY OF SIEVE, MOISTURE AND METALS RESULTS FOR THE PROCESS SAMPLES

<u>GRAVIMETRICS</u>	<u>TRUCK #11 CEMENT</u>	<u>ROADWAY SAMPLE NO.1*</u>	<u>ROADWAY SAMPLE NO.2*</u>	<u>FINE AGGREGATE</u>	<u>SAND</u>	<u>AGGREGATE GRAVEL</u>
Total Sample Weight - grams	1247	8732	2722	1769	3357	27442
Moisture - Wt%	0.03	0.27	1.59	2.50	3.34	1.59
<u>SIEVE ANALYSIS (% LESS THAN)</u>						
18 Mesh (1000 Microns)	100.0000	67.3451	74.1064	35.5142	98.4267	0.1053
20 Mesh (850 Microns)	100.0000	65.0156	71.7136	29.3557	97.3921	0.0910
25 Mesh (710 Microns)	100.0000	62.5836	68.9367	23.0960	95.2380	0.0910
30 Mesh (600 Microns)	100.0000	59.9334	65.5353	18.2391	91.3478	0.0910
35 Mesh (500 Microns)	100.0000	55.6309	60.5629	13.7175	81.6109	0.0910
60 Mesh (250 Microns)	99.9678	27.8597	31.6746	4.2033	13.3042	0.0910
80 Mesh (180 Microns)	99.9678	20.6584	25.5504	2.8839	3.5049	0.0910
100 Mesh (150 Microns)	81.1229	18.6625	23.8413	2.5466	2.5724	0.0910
200 Mesh (75 Microns)	24.3879	10.7274	12.5397	1.9143	2.0230	0.0910
<u>MULTI-METALS ANALYSIS (mg/kg)</u>						
Arsenic (As)	0.85					
Beryllium (Be)	0.75					
Cadmium (Cd)	1.07					
Chromium (Cr)	67.00					
Lead (Pb)	5.13					
Manganese (Mn)	283.00					
Mercury (Hg)	<0.10					
Nickel (Ni)	19.90					
Phosphorus (P)	316.00					
Selenium (Se)	<0.14					

* Roadway samples No.1 and No.2 were taken from the street exit (331.6 ft²) and from a concrete pad adjacent to the Johnson Plant (523.6 ft²), respectively.

3.3.3 Cement Silo Filling: Results of the cement silo filling air sampling are summarized in Tables 3.3-3. The sieve, moisture and targeted metals analysis of the cement material sample from truck #11 is summarized in Table 3.3-2.

3.3.3.1 Air Sampling: The average particulate emission results from the air sampling at the cement silo dust collector outlet were 0.015 lb/hr at 0.0049 gr/dscf for PM_{10} and 0.019 lb/hr at 0.0064 gr/dscf for total particulate matter. The combined filter metals analysis ranged from 0.0 lb/hr for cadmium, mercury, phosphorus, and selenium to 3.68E-06 lb/hr for manganese. The results of these three sampling runs are summarized in Table 3.3-3. Results by individual sampling run are detailed in Appendix D.

3.3.3.2 Process Material Sampling: The sieve and moisture analysis of the cement from truck #11 yielded an average moisture content of 0.03 weight percent. Approximately 24-percent of the cement passed through the 200 (75 micron) U.S. standard sieve. The metals content of the cement ranged from less than 0.01 mg/kg of mercury to 316 mg/kg of phosphorus. The cement material sampling results are summarized in Table 3.3-2. Detailed results of the sieve and moisture analysis are located in Appendix C. Detailed metals results are located in Appendix G2.

3.3.4 Fly Ash Silo Filling: The results of the fly ash silo filling operation for were 0.14 lb/hr at 0.048 gr/dscf and 0.156 lb/hr at 0.052 gr/dscf for PM_{10} and total particulate, respectively. The metal mass emissions from the combined filter analyses ranged from 0.00 lb/hr for mercury to 8.85E-05 lb/hr for phosphorus. The results of the fly ash silo filling operation are summarized in Table 3.3-3. More detailed emission information for the fly ash silo filling process are located in Appendix E.

3.3.5 Truck Loading: The results of the truck loading operation sampled before the central dust collector were 0.713 lb/hr at 0.013 gr/dscf and 2.89 lb/hr at 0.051 gr/dscf for PM_{10} and total particulate, respectively. The metal mass emissions from the combined filter analyses ranged from 0.00 lb/hr for mercury and phosphorus to 1.59E-04 lb/hr for manganese (Case 1).

The particulate loading that was emitted by the central dust collector was 0.155 lb/hr at 9.67E-04 gr/dscf and 0.22 lb/hr at 1.38E-03 gr/dscf for PM_{10} and total particulate, respectively. The metal mass emissions from the central dust collector obtained from a combined filter analyses ranged from 0.00 lb/hr for cadmium, mercury, phosphorus, and selenium to 1.97E-05 lb/hr for manganese.

The results of the truck loading operation are summarized in Table 3.3-3. More detailed emission information for the truck loading operation are summarized chronologically in Appendix F.

TABLE 3.3-3

SUMMARY OF PARTICULATE AND METALS EMISSIONS

SAMPLE LOCATIONS:		DUST COLLECTOR INLET	DUST COLLECTOR OUTLET	CEMENT SILO OUTLET	FLY ASH SILO OUTLET
<u>GAS PARAMETERS</u>					
Gas Temperature - oF		57.9	64.7	52.3	52.5
Oxygen - %		20.9	20.9	20.9	20.9
Carbon Dioxide - %		0.0	0.0	0	0
Moisture - %		0.79	0.58	0.18	1.21
<u>GAS FLOWRATE</u>					
Velocity - ft/sec		78.10	58.50	7.36	7.31
Actual Volume - acfm		6543	18383	347	345
Standard Volume - dscfm		6519	18568	357	351
<u>PM10 EMISSIONS</u>					
Concentration - gr/dscf		1.28E-02	9.67E-04	4.87E-03	4.75E-02
Mass Rate - lb/hr		7.13E-01	1.55E-01	1.50E-02	1.42E-01
<u>PM>10 MICRONS EMISSIONS</u>					
Concentration - gr/dscf		3.86E-02	4.12E-04	1.52E-03	4.43E-03
Mass Rate - lb/hr		2.18E+00	6.60E-02	5.00E-03	1.30E-02
<u>TOTAL PM</u>					
Concentration - gr/dscf		5.14E-02	1.38E-03	6.39E-03	5.19E-02
Mass Rate - lb/hr		2.89E+00	2.20E-01	1.90E-02	1.56E-01
<u>METALS EMISSIONS - lb/hr</u>					
Arsenic:	Case 1	2.00E-05	1.25E-06	4.74E-07	2.49E-05
	Case 2	2.68E-05	1.88E-06	0.00E+00	2.51E-05
Beryllium :	Case 1	7.87E-07	6.26E-08	7.90E-09	2.25E-06
	Case 2	1.04E-06	1.25E-07	1.32E-08	2.26E-06
Cadmium:	Case 1	1.77E-07	0.00E+00	0.00E+00	4.96E-07
	Case 2	3.42E-07	0.00E+00	0.00E+00	4.96E-07
Chromium:	Case 1	3.58E-05	3.13E-06	5.53E-07	3.05E-05
	Case 2	3.58E-05	3.13E-06	5.53E-07	3.05E-05
Lead:	Case 1	2.29E-05	4.85E-06	2.58E-07	1.30E-05
	Case 2	2.29E-05	4.85E-06	2.58E-07	1.30E-05
Manganese:	Case 1	1.59E-04	1.97E-05	3.68E-06	6.40E-06
	Case 2	1.48E-04	1.97E-05	3.68E-06	6.40E-06
Mercury:	Case 1	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Case 2	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Nickel:	Case 1	2.90E-05	6.26E-06	5.26E-07	5.58E-05
	Case 2	5.20E-05	1.25E-05	1.05E-06	5.70E-05
Phosphorus:	Case 1	0.00E+00	0.00E+00	0.00E+00	2.57E-05
	Case 2	0.00E+00	0.00E+00	0.00E+00	8.85E-05
Selenium:	Case 1	3.06E-06	0.00E+00	0.00E+00	1.68E-06
	Case 2	2.86E-06	0.00E+00	0.00E+00	1.81E-06

Notes:

- Case 1 results were calculated by substituting the detection limit value for all non-detect analytical results.
- Case 2 results were calculated by substituting a zero-value for all non-detect analytical results.

4.0 SAMPLING AND ANALYTICAL PROCEDURES FOR SOURCE TESTING

Background and emissions sampling was conducted at: (1) ambient air sampling was conducted upwind and downwind of the Erie batch plant; (2) the exhaust from the dust collector located on top of the cement storage silo; (3) the fly ash silo dust collector exhaust duct inlet duct; (4) the inlet to the central dust collector; (5) the outlet from the central dust collector.

4.1 Ambient Sampling and Analytical Procedures

4.1.1 Particulate Matter (PM) - Ambient Sampling: Ambient sampling of PM was conducted in accordance with 40 CFR 50 Appendix B. This method provided a measurement of the mass concentration of total suspended particulate matter in ambient air. The sampler withdrew a measured quantity of air through a tared glass filter. The sampler collected particles ranging in size from 25 to 50 micrometers.

4.1.1.1 Sampler Setup and Calibration: The ambient high-volume (Hi-Vol) PM samplers were located at upwind and downwind locations from the Erie batch plant truck loading operation. The samplers were secured to level platforms made of construction scaffolding, two-meters above the surrounding terrain.

The Hi-Vol samplers were calibrated on-site by measuring the pressure drop across a certified calibrated orifice attached to the sampler inlet. A flow rate versus pressure drop calibration curve was subsequently generated for each sampler. Ambient temperature and barometric pressure readings were recorded in order to correct the sampled volumes to standard conditions. The wind direction and speed were also recorded. The calibration curve for both samplers is contained within Appendix B.4.

4.1.1.2 Sampler Operation and Filter Recovery: A pre-tared, numbered glass filter was attached to the inlet screen of each sampler. Using the on-site generated calibration curves, the air pumps for each sampler were adjusted to a specific flow rate. The samplers were operated during the entire length of the testing day. The wind speed and direction was recorded during the day in order to ascertain which Hi-Vol sampler was the upwind of the truck loading building at any given time. The sample times and flow rates were recorded in order to calculate the total air volume sampled. Average daily temperatures and barometric pressures were determined from the Method 201A sampling in order to convert to the sampled volume to standard conditions.

At the completion of the sampling period, the filter was recovered by carefully removing it from the inlet sampler screen and folding it, exposed side in, and placing it in a labeled envelope. The sampling data and chain-of-custody form was also completed and enclosed in the envelope

4.1.1.3 Field Blanks: One field blank was collected. The field blank consisted of a filter taken to the site and was treated as a sample.

4.2 Source Sampling Procedures

4.2.1 Sampling and Traverse Point Determination - EPA Method 1: EPA Method 1 procedures are used to determine suitability of test locations and to calculate the sampling and traverse points for each location. The results of EPA Method 1 analysis for each sampling location are provided in the following sections.

4.2.1.1 Cement Storage Silo Exhaust Sampling Location: The cement storage silo exhausted through a screen on the door of a dust collector located on top of the silo. The exhaust was modified for sampling by attaching a 12-inch round duct extension that was five-foot in length to the screen. Two five-inch sampling ports were placed within this extension. Velocity measurements were made from two three-inch ports located 4 feet downstream of the sampling ports. Figure 2.3.1-1 shows a detailed schematic of the cement storage silo sampling location. Figure 2.3.1-2 is a detailed schematic of the cement storage silo outlet sampling and traverse points.

4.2.1.2 Fly Ash Storage Silo Exhaust Sampling Location: The fly ash storage silo sampling location is identical to the cement storage silo sampling location, and similar modifications were required. Figure 2.4.1-1 shows a detailed schematic of the cement storage silo sampling location. Figure 2.4.1.-2 is a detailed schematic of the fly ash storage silo outlet sampling and traverse points.

4.2.1.3 Sampling and Traverse Points at the Central Dust Collector Inlet: The central dust collector has inlet ductwork which measured 16-inches in diameter. An undisturbed distance of approximately 20 feet existed prior to entry into the dust collector. Two 5" diameter ports (90° apart) were located two duct diameters from the nearest upstream flow disturbance, and twelve duct diameters from the nearest downstream flow disturbance. Figure 2.5.1-1 shows a schematic for the inlet ducting and sampling location used. A total of 12 sampling and traverse points were used for the all testing conducted within the central dust collector inlet. Figure 2.5.1-2 is a detailed schematic of the sampling and traverse points.

4.2.1.4 Central Dust Collector Outlet Sampling Location: The central dust collector exhausts through a 26-inch x 29-inch rectangular duct that was located on the positive pressure side of the fan. The equivalent diameter of the outlet duct was calculated to be 27.5-inches. The rectangular duct had a disturbance free length of 81-inches which allowed the placement of ports which meet the minimum disturbance free distance of 2 diameters downstream and 0.5 duct diameters upstream. Three ports were installed into the outlet duct. A total of 24 sampling and traverse points were used in all testing at the central dust collector outlet sampling location. Figure 2.5.1-3 shows a schematic of the dust collector outlet ducting and sampling location. Figure 2.5.1-4 is a detailed schematic of the outlet sampling and traverse points.

4.2.2 Volumetric Measurements - EPA Method 2: EPA Reference Method 2 was used to measure the gas velocity required to determine the volumetric flow rates of the stack gases. Stainless steel Type-S pitot tubes were used to measure the gas velocity heads. The pitot tubes were calibrated against a NIST traceable pitot tube in accordance with Method 2 procedures. Calibrated Type-K thermocouples were used to determine stack gas temperatures. Velocity and temperature measurements were made at each of the traverse points determined by EPA Method 1.

4.2.3 Molecular Weight Determination - Ambient Air: The cement batching process does not involve combustion processes. The batch process simply involves the mixing of aggregate stone and cement with water; therefore the ambient air composition of 79% N₂ and 20.9% O₂ was used for the molecular weight determination.

4.2.4 Flue Gas Moisture Content - EPA Method 4: The flue gas moisture content was measured in conjunction with each of the pollutant tests according to the sampling and analytical procedures outlined in EPA Method 4. The flue gas moisture for each test was determined by gravimetric analyses of the water collected in the impinger train. All impingers were contained in an ice bath during the testing in order to assure complete moisture condensation of the sampled flue gas. Any moisture which was not condensed in the impingers was captured in the silica gel contained in the final impinger.

4.2.5 PM and PM₁₀ Sampling - EPA Method 201A: EPA Method 201A was used for determination of PM₁₀ emissions. This procedure utilized an in-stack PM₁₀ sizing device and an in-stack filter in conjunction with an EPA Method 5 train. Gravimetric emissions analyses were performed as described by EPA Method 5.

4.2.5.1 Sampling Train Description: The Method 201A train consisted of a cyclone followed by a 47 mm diameter glass fiber (Gelman) filter. These in-stack components were attached to an unheated stainless steel probe. The Method 201A sampling train is shown in Figure 4.2.5.1-1.

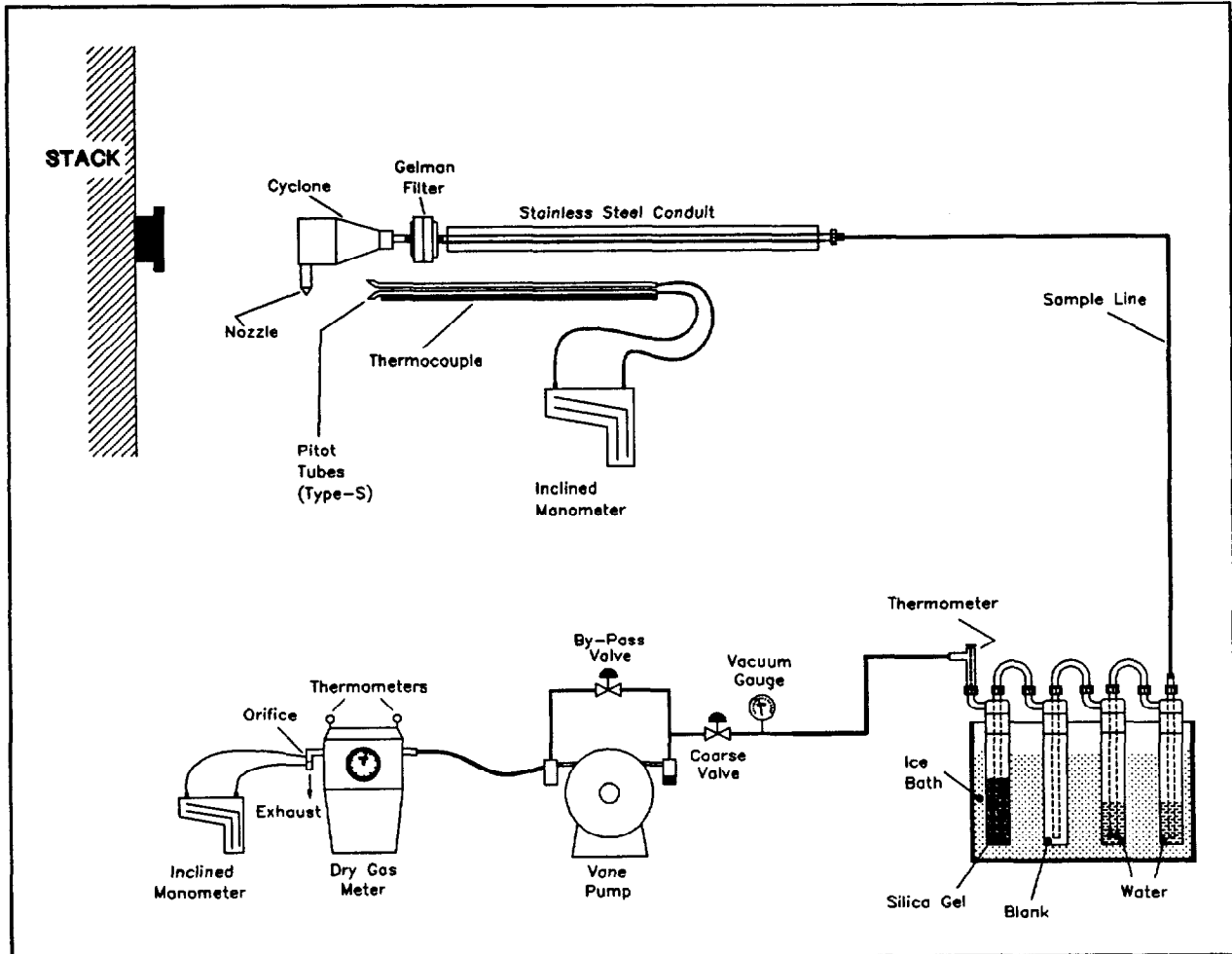


Figure 4.2.5.1-1: Method 201A Sampling Train

The stack gases were drawn through the cyclone where a portion of the airborne particulate is separated before it passes through a Gelman filter. The size fraction of the particles that have a 50 percent probability of exiting the cyclone through the Gelman filter are defined as the cyclone cut size (D_{50}). The required particle size for a valid test run ranges from 9 μm to 11 μm . After the sample gas passes through the Gelman filter, it then enters a stainless steel conduit which leads into a glass impinger train consisting of four impingers immersed in an ice bath. The first and second impingers each contained 100 milliliters of water. The third impinger was initially empty and

the fourth impinger contained approximately 200 grams of color-indicating silica gel.

4.2.5.2 Pre-Test Preparation: Before sampling, a velocity traverse of the stack was performed. This traverse, along with an ambient gas composition assumption, was used to determine the nozzle diameter(s) needed to maintain a flow rate through the cyclone to achieve a cut size of $10\mu\text{m}$. A nozzle was selected by comparing the velocity heads from the velocity traverse with the $\Delta p_{\min}$ and $\Delta p_{\max}$ calculated for each nozzle. The nozzle was chosen to bracket all the Δp 's from the velocity traverse. If one nozzle did not meet this criterion, then the nozzle was changed during the sampling run so that the velocity head at that sampling point was within the $\Delta p_{\min}$ and $\Delta p_{\max}$ for that nozzle. The details of the calculations are given in Appendix I.1.

Two additional pretest calculations were also required: (1) the orifice pressure head needed to maintain the necessary cyclone flow rate; and (2) the dwell time for the first traverse point. These calculations were based upon the pretest traverse. These calculations are also detailed in Appendix I.1.

4.2.5.3 Sampling Train Operation: Throughout the sampling run the orifice pressure head was maintained at the pretest calculated value. If the stack gas temperature varied by more than 28°F from the pretest average temperature, then the orifice pressure head was determined using the pretest average $\pm 28^{\circ}\text{F}$.

The sampling train operation was modified from the standard Method 201A technique through the use of a single sampling point of average velocity. This sampling modification was brought about by the limited work area available for the test team. It was impractical and unsafe to attempt complete traverses, since the sampling probe would extend into the cement truck traffic during batch loading operations. The total test duration was determined by the process time of the plant operation being sampled. Nozzles were changed as necessary. Filters were also changed as necessary.

4.2.5.4 Sample Train Recovery: The filters were quantitatively recovered into their original tared and labeled foil wrappers at the end of the run. At this time, the particulate matter was quantitatively recovered using acetone from all of the surfaces from the cyclone exit to the front half of the in-stack filter holder, including the "turn around" cup inside the cyclone and the interior surfaces of the exit tube. The rinsings were placed into labeled glass bottles. The filters and rinsings were transported to the ETS laboratory for gravimetric analyses as described by EPA Method 5. The impinger water and silica gel were recovered as per EPA Method 4 procedures. A schematic of the recovery procedure are given Figure 4.2.5.4-1.

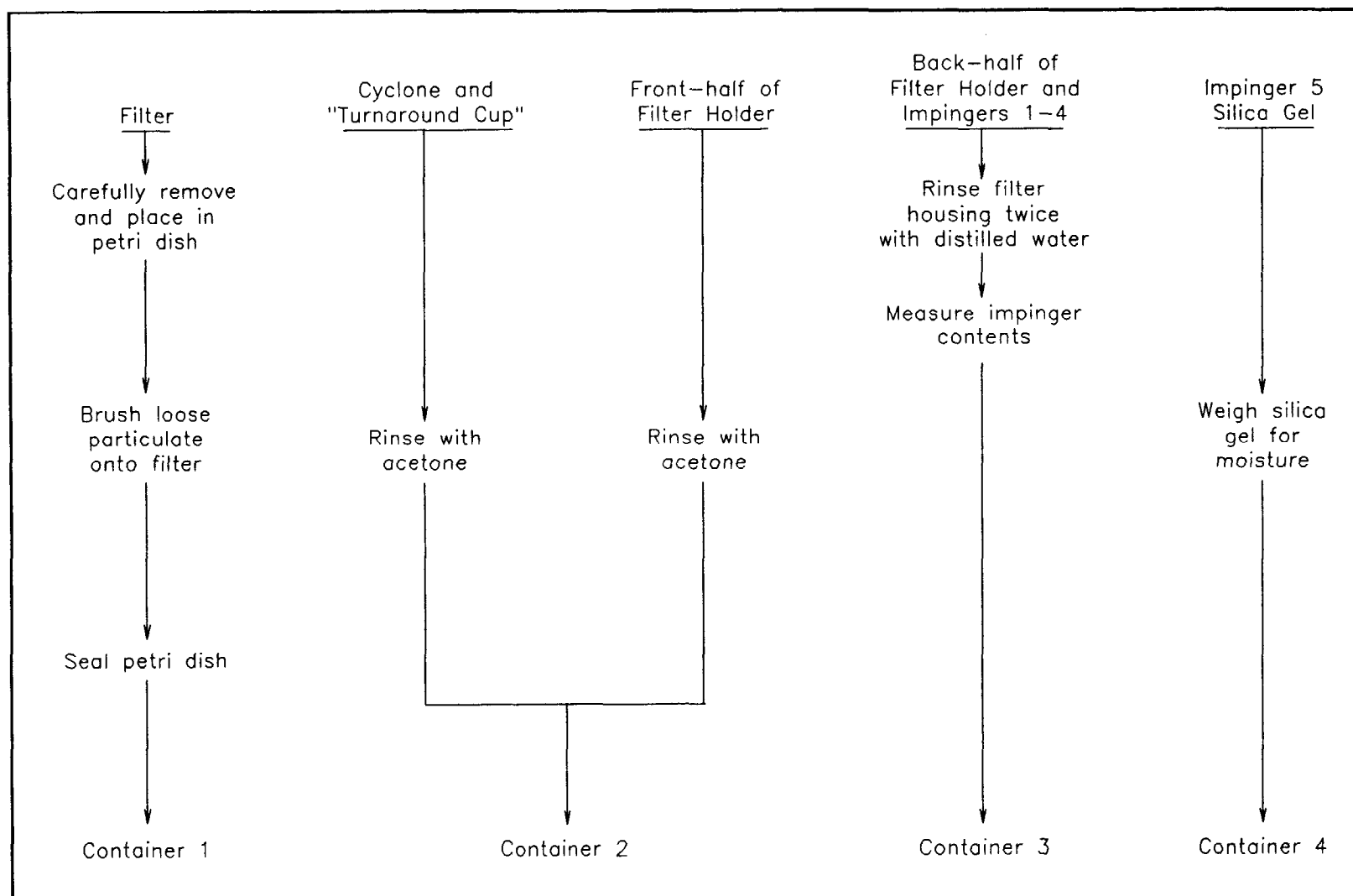


Figure 4.2.5.4-1: EPA Method 201A Recovery Procedure.

4.3 Analytical Procedures

The following are EPA approved analytical procedures. All pollutants are from the same sampling train.

4.3.1 Moisture Content - EPA Method 4: Moisture contents were determined gravimetrically in accordance with Method 4 by measuring either the volume or mass gains of each impinger in the pollutant sampling trains.

4.3.2 PM Analyses - EPA Method 5: Particulate matter was determined from the Method 201A sampling. The total particulate matter was determined in accordance with EPA Method 5 procedures. The filter was analyzed gravimetrically to a constant weight. The front half rinses were evaporated and analyzed gravimetrically to a constant weight. The total particulate catch equaled the sum of the front half rinses and the filter.

4.3.3 PM₁₀ Analyses - EPA Method 201A: Analyses of the glass fiber filters and cyclone acetone rinses from the Method 201A sampling were performed gravimetrically in accordance with EPA Method 5 procedures. The total PM₁₀ catch included the particulate collected in the acetone rinses from all of the surfaces from the cyclone exit to the front half of the in-stack filter holder, including the "turn around" cup inside the cyclone and the interior surfaces of the exit tube, as well as the particulate collected by the glass fiber filter. The Method 201A analysis procedure is schematically represented in Figure 4.3.3-1. Appendix G.1 contains the analytical data for the gravimetric PM₁₀ analyses.

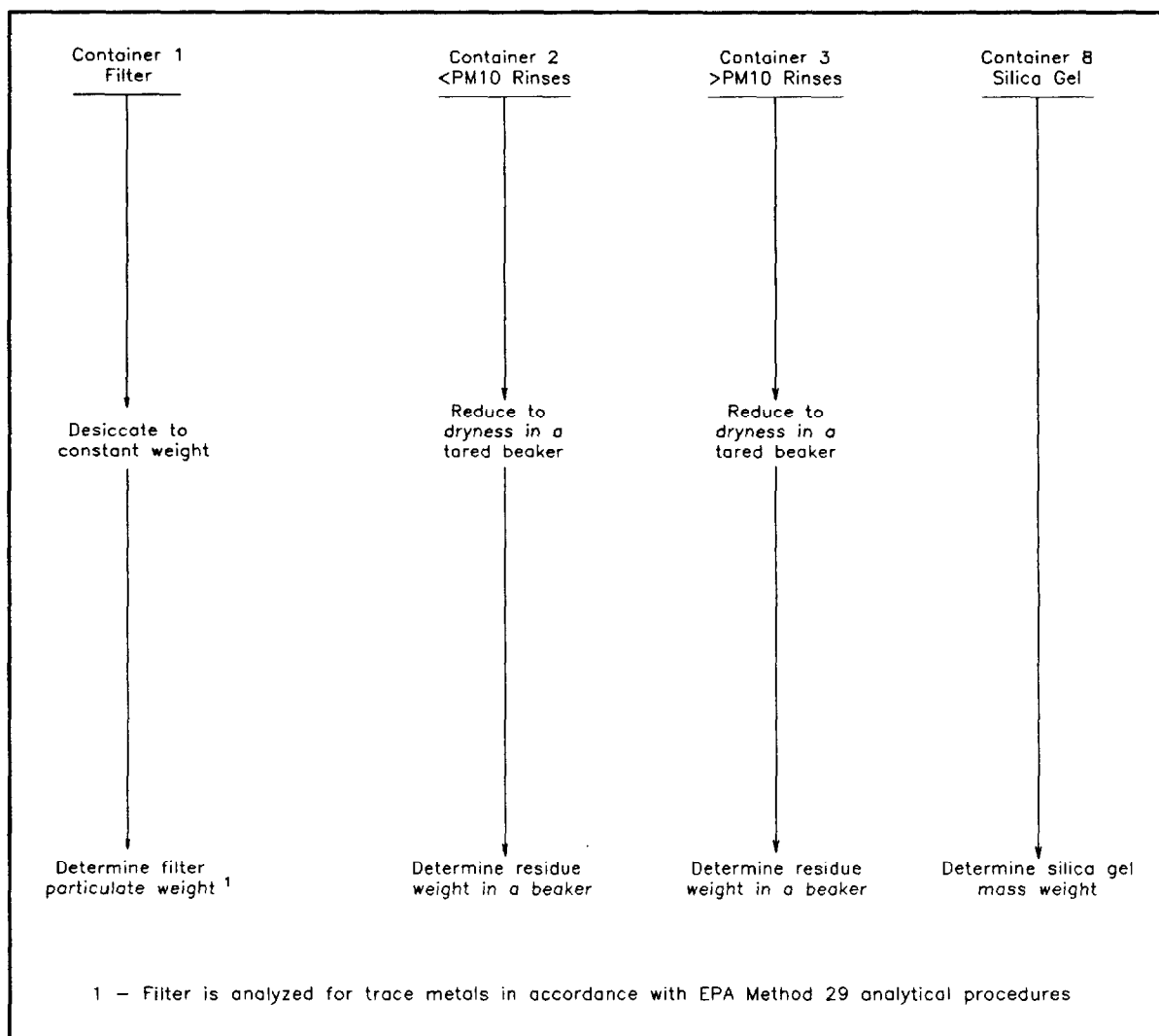


Figure 4.3.3-1: EPA Method 201A Analytical Procedure
Source: 40 CFR Part 51, Appendix M

4.3.4 Multi-Metals Analyses - EPA Multi-Metals: Only the filters from the Method 201A sampling were analyzed for arsenic, beryllium, cadmium, total chromium, lead, manganese, mercury, nickel, phosphorous, and selenium at the completion of the Method 5 gravimetrics. The filters that were used to sample similar process operations were combined into single filter samples by direction of the on-site EPA/EMB personnel. The multi-metals recovery procedure is schematically represented in Figure 4.3.4-1.

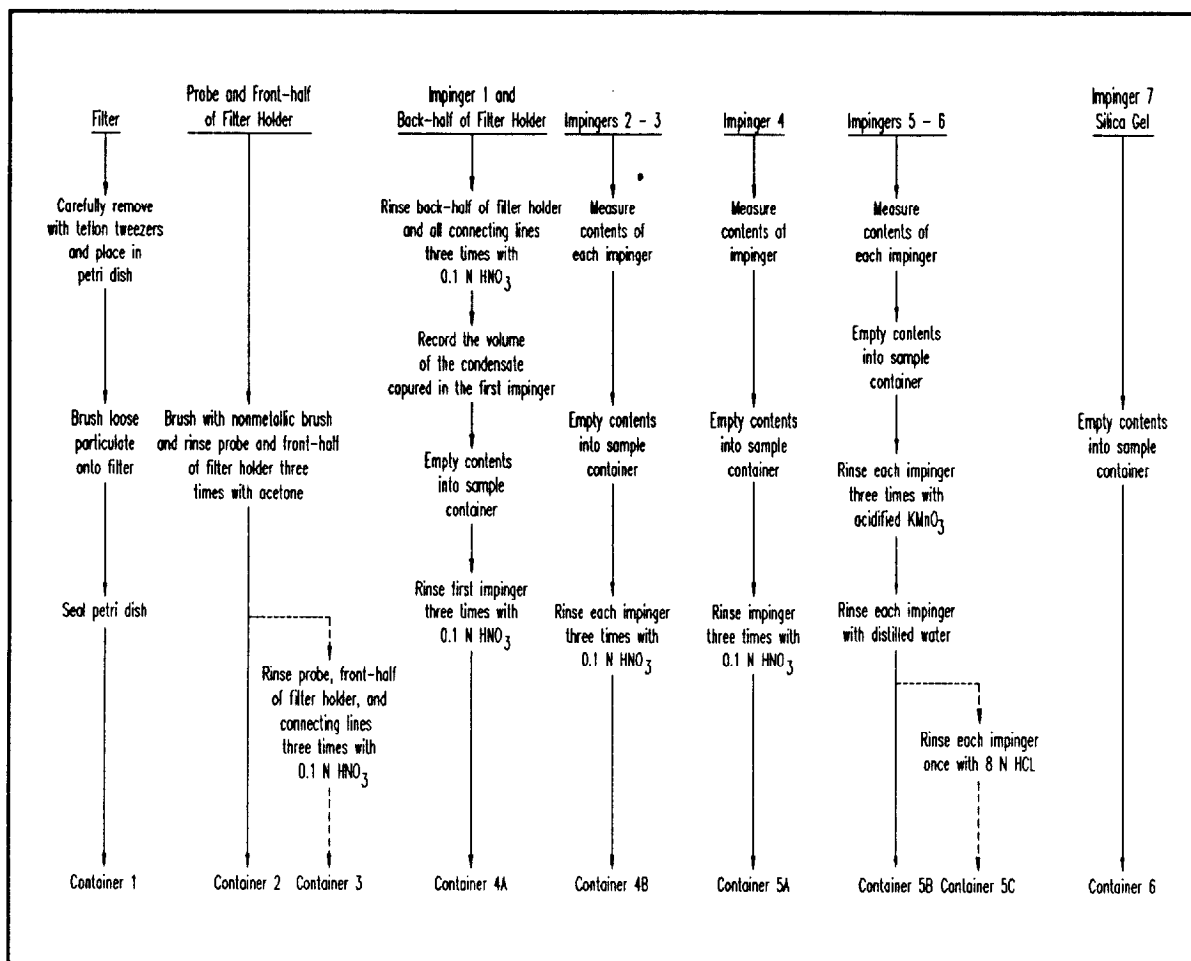


Figure 4.3.4-1: Multi-metals Recovery Procedure

The filters were prepared for analysis in accordance with the procedures given in the EPA 29 method. All digestions were performed using a 600-watt microwave digester and Teflon pressure relief vessels. After preparation, the samples were analyzed with a Perkin Elmer Plasma 2000 inductively coupled plasma (ICP) spectrometer for arsenic, beryllium, cadmium, chromium, lead, manganese, nickel, phosphorous, and selenium. A Coleman 50A cold vapor spectrometer (CVAAS) was used to analyze the samples for mercury.

Duplicate analyses were performed on all metals samples. In addition, one field blank along with its corresponding acetone probe wash was also analyzed. Spikes were added to the samples to determine the metals recovery efficiencies. Appendix G.2 contains the multi-metals laboratory data.

5.0 FACILITY PROCESS DATA

The facility process data was collected by EPA/EIB personnel and contains the truck identification numbers, composition by weight of the cement loaded, the yards of cement loaded, and a dust collection efficiency estimate for each load. The process data is located in Appendix J.

6.0 QA/QC ACTIVITIES

Specific quality control (QC) procedures were followed to ensure the continuous production of useful and valid data throughout the course of this test program. The QC checks and procedures described in this section represent an integral part of the overall sampling and analytical scheme. Strict adherence to prescribed procedures is quite often the most applicable QC check. A discussion of both the sampling and analytical QC checks that were utilized during this program are presented below.

6.1 Equipment QC Procedures

6.1.1 Equipment Inspection and Maintenance: Each item of field test equipment was assigned a unique, permanent identification number. An effective preventive maintenance program was necessary to ensure data quality. Each item of equipment returning from the field was inspected before it was returned to storage. During the course of these inspections, items were cleaned, repaired, reconditioned, and recalibrated where necessary.

Each item of equipment transported to the field was inspected again before being packed to detect equipment problems which may originate during periods of storage. This minimizes lost time on the job site due to equipment failure.

Equipment failure in the field is unavoidable despite the most rigorous inspection and maintenance procedures. For this reason, ETS routinely transported to the job site spare equipment for all critical sampling train components.

6.1.2 Equipment Calibration: New items for which calibration was required were calibrated before initial field use. Equipment whose calibration status may change with use or time was inspected in the field before testing began and again upon return from each field use. When an item of equipment was found to be out of calibration, it was repaired and recalibrated or retired from service. All equipment was periodically recalibrated in full, regardless of the outcome of these regular inspections.

Calibrations are conducted in a manner, and at a frequency, which meets or exceeds U.S. EPA specifications. ETS followed the calibration procedures outlined in the EPA Methods, and those recommended within the Quality Assurance Handbook for Air Pollution Measurement Systems: Volume III (EPA-600/4-77-027b, August, 1977). When these methods were inapplicable, ETS used methods such as those prescribed by the American Society for Testing and Materials (ASTM).

Data obtained during calibrations were recorded on standardized forms, which were checked for completeness and accuracy by the quality assurance director or the quality assurance manager. Data reduction and subsequent calculations were performed using ETS computer facilities. Calculations were checked at least twice for accuracy.

Emissions sampling equipment requiring calibration included pitot tubes, pressure gauges, thermometers, dry gas meters, and barometers. The following sections elaborate on the calibration procedures followed by ETS for these items of equipment.

6.1.2.1 Pitot Tubes: All Type-S pitot tubes used by ETS, whether separate or attached to a sampling probe, are constructed in-house. Each new pitot was calibrated in accordance with the geometric standards contained in EPA Method 2. A Type S pitot tube, constructed and positioned according to these standards, had a coefficient of 0.84 ± 0.02 . This coefficient should not change as long as the pitot tube was not damaged. The actual coefficient of each pitot tube was determined using a wind tunnel calibration against a standard NIST traceable pitot tube. These calibrations were performed in accordance with EPA Method 2 procedures.

Each pitot tube was inspected visually upon return from the field. If a cursory inspection indicated damage or raised doubt that the pitot remained true to its original calibration, the pitot tube was refurbished as needed and recalibrated.

6.1.2.2 Impinger Thermometer: Prior to the start of testing, the thermometer used to monitor the temperature of the gas leaving the last impinger was compared with a mercury-in-glass thermometer which meets ASTM E-1 No. 63F specifications. The impinger thermometer was adjusted when necessary until it agreed within 2°F of the reference thermometer. If the thermometer was not adjustable, it was labeled with a correction factor.

6.1.2.3 Dry Gas Meter Thermometer: The thermometer used to measure the temperature of the metered gas sample was checked prior to each field trip against an ASTM mercury-in-glass thermometer. The dry gas meter thermometer was acceptable if the values agree within $\pm 5.4^{\circ}\text{F}$. Thermometers not meeting this requirement were adjusted or labeled with a correction factor.

6.1.2.4 Flue Gas Temperature Sensor: All thermocouples employed for the measurement of flue gas temperatures were calibrated upon receipt. Initial calibrations were performed at three points (ice bath, boiling water, and furnace). An ASTM mercury-in-glass thermometer was used as a reference. The thermocouple was acceptable if the agreement is within 1.5 percent (absolute) at each of the three calibration points.

On-site, prior to the start of testing, the reading from the flue gas thermocouple-potentiometer combination was compared with an ASTM mercury-in-glass reference thermometer. If the two agree within ± 1.5 percent (absolute), the thermocouple and potentiometer were considered to be in proper working order for the test series. After each field use, the thermocouple-potentiometer system was compared with an ASTM mercury-in-glass reference thermometer at a temperature within ± 10 percent of the average absolute flue gas temperature data. If the absolute temperatures agree within ± 1.5 percent, the temperature data were considered valid.

6.1.2.5 Dry Gas Meter and Orifice: Two procedures were used to calibrate the dry gas meter and orifice simultaneously. The full calibration was a complete laboratory procedure used to obtain the calibration factor of the dry gas meter. Full calibrations are performed over a wide range of orifice settings. A simpler procedure, the post test calibration, was designed to check whether the calibration factor had changed. Post test calibrations were performed after each field test series at an intermediate orifice setting (based on the test data) and at the maximum vacuum reached during the test.

Each metering system received a full calibration at the time of purchase and a post test calibration after each field use. If the calibration factor Y deviated by less than five percent from the initial value, the test data were acceptable. If Y deviated by more than 5 percent, the meter was recalibrated and the meter coefficient (initial or recalibrated) that yielded the lowest sample volume for the test runs was used. EPA Method 5 requires another full calibration anytime the post test calibration check indicates that Y had changed by more than 5 percent. Standard practice at ETS is to recalibrate the dry gas meter anytime Y was found to be outside the range of 0.98 to 1.02.

An orifice calibration factor was calculated for each flow setting during a full calibration. If the range of values did not vary by more than 0.15 in. H₂O over the range of 0.4 to 4.0 in. H₂O, the arithmetic average of the values obtained during the calibration was used. A record of the field equipment calibration data is located in Appendix H.

6.2 Sampling QC Procedures

6.2.1 Pre-Test QC Checks and Procedures: The following pretest QC checks were conducted:

- All sampling equipment was thoroughly checked to ensure clean and operable components.
- Equipment was inspected for possible damage from shipment.
- The oil manometer used to measure pressure across the Type S pitot tube was leveled and zeroed.
- The number and location of the sampling traverse points were checked before taking measurements.
- The temperature measurement system was visually checked for damage and operability by measuring the ambient temperature prior to each traverse.
- All cleaned glassware and sample train components were kept sealed until train assembly.
- The sampling trains were assembled in an environment free from uncontrolled dust.
- Each sampling train was visually inspected for proper assembly.
- Pretest calculations determined the proper sampling nozzle size.

6.2.2 QC Checks and Procedures During Testing: The following checks and procedures will be conducted during testing:

- Readings of temperature and differential pressure were taken at each traverse point.
- All sampling data and calculations were recorded on preformatted data sheets.
- All calibration data forms were reviewed for completeness and accuracy.
- Any unusual occurrences were noted during each run on the appropriate data form.
- The project supervisor reviewed sampling data sheets daily during testing.

- The roll and pitch axis of the Type S pitot tube and the sampling nozzle were properly maintained.
- Leak check the train before and after any filter change.
- Conduct additional leak checks if the sampling time exceeded 4 hours.
- Maintained the probe, filter and impingers at the proper temperature.
- Maintained ice in the ice bath at all times.
- Make proper readings of the dry gas meter, delta P and delta H, temperature, and pump vacuum during sampling at each traverse point.
- Maintained isokinetic sampling within the requirements of each method.

6.2.3 QC Checks and Procedures After Testing:

- Visually inspect the sampling nozzle.
- Visually inspect the Type S pitot tube.
- Leak check each leg of the Type S pitot tube.
- Leak check the entire sampling train.

6.3 Analytical QA Procedures

All analytical QA procedures followed those given in each test method. Each test method along with the prescribed reference sections regarding auditing procedures are as follows:

<u>Test Method</u>	<u>Reference</u>
Method 29	- Method 29, Section 7 of 40 CFR 60
Method 201A	- Method 201A, Section 4 of 40 CFR 60

6.4 Analytical QC Procedures

All analyses for this program were performed using accepted laboratory procedures in accordance with the specified analytical protocols. Adherence to prescribed QC procedures ensured data of consistent and measurable quality. Analytical QC focused upon the use of control standards to provide a measure of analytical precision and accuracy. Also, specific acceptance criteria were defined for various analytical operations including calibrations, control standard analyses, drift checks, blanks, etc.. The following general QC procedures were incorporated into the analytical effort:

- The on-site project supervisor reviewed all analytical data and QC data on a daily basis for completeness and acceptability.
- Analytical QC data was tabulated using the appropriate charts and forms on a daily basis.
- Copies of the QC data tabulation were submitted to the quality assurance manager following the completion of the test program.
- All hard copy raw data (i.e., strip charts, computer printouts, etc.) were maintained in organized files.

6.5 QA/QC Checks of Data Reduction

Calculations that were to be used in the field were checked by the QA officer prior to testing with predetermined data. The QA officer performed random checks in the field to insure data was being properly recorded. Upon completion of the testing, data was then transferred from the data sheets to the computer. This process was also reviewed and checked by the QA officer. When multiple tests were performed in one location, data from each test were compared. The calculations used in this report are given in Appendix I.

6.6 Sample Identification and Custody

Each test run was assigned a unique run identification (i.d.) which consisted of a 3 digit code for the location, the test method and the specific test run. Labels were pre-printed with the test method, the container number, a unique client/sample i.d., a space to write in the run number described above and the contents of the sample container. As each sample was recovered, its sample label was attached and the sample number and contents were recorded in the chain of custody section of the run sheet. The run identification, the sample number and

contents were then recorded in a bound field sample log that was maintained by the sample recovery person. A three way check was then made by the recovery person to insure that the sample label information, the log book information and the run sheet chain of custody all corresponded correctly.

When the samples were returned for analysis, the team leader again checked to see that the sample label information, the run sheet chain of custody and the field log book information all corresponded correctly. Any discrepancies were brought to the attention of the project manager. If any condition existed that may influence the integrity of the sample, it was noted and brought to the attention of the project manager (i.e. broken seals, leaking samples, improper storage temperature). All of the chain of custody information was entered into a database. A print out of the computerized field log was made and checked against the chain of custody on the test run sheet. A copy of the computerized chain of custody accompanied the samples to the location where they were to be analyzed. Each sample label was checked again against the computerized field log as it was sent from sample management.

APPENDIX A.0
TEST LOG

TEST LOG
EPA WORK ASSIGNMENT 17
CONCRETE READY MIXED CORPORATION

<u>LOCATION</u>	<u>TEST PARAMETER</u>	<u>TEST METHOD</u>	<u>RUN I.D.</u>	<u>DATE</u>	<u>START TIME</u>	<u>END TIME</u>
DUST COLLECTOR INLET	METALS, >PM10, <=PM10	201A/MUTLIMETALS	DCI-M201A-R1	10/26/93	08:05	10:05
DUST COLLECTOR INLET	METALS, >PM10, <=PM10	201A/MUTLIMETALS	DCI-M201A-R2	10/26/93	10:52	12:52
DUST COLLECTOR INLET	METALS, >PM10, <=PM10	201A/MUTLIMETALS	DCI-M201A-R3	10/26/93	13:30	15:29
DUST COLLECTOR INLET	METALS, >PM10, <=PM10	201A/MUTLIMETALS	DCI-M201A-R4	10/27/93	07:43	09:43
DUST COLLECTOR INLET	METALS, >PM10, <=PM10	201A/MUTLIMETALS	DCI-M201A-R5	10/27/93	10:21	12:21
DUST COLLECTOR INLET	METALS, >PM10, <=PM10	201A/MUTLIMETALS	DCI-M201A-R6	10/27/93	13:12	15:12
DUST COLLECTOR INLET	METALS, >PM10, <=PM10	201A/MUTLIMETALS	DCI-M201A-R7	10/28/93	07:03	09:03
DUST COLLECTOR INLET	METALS, >PM10, <=PM10	201A/MUTLIMETALS	DCI-M201A-R8	10/28/93	09:40	11:40
DUST COLLECTOR INLET	METALS, >PM10, <=PM10	201A/MUTLIMETALS	DCI-M201A-R9	10/28/93	12:22	14:23
DUST COLLECTOR INLET	METALS, >PM10, <=PM10	201A/MUTLIMETALS	DCI-M201A-R10	10/28/93	15:02	17:02
DUST COLLECTOR OUTLET	METALS, >PM10, <=PM10	201A/MUTLIMETALS	DCO-M201A-R1	10/26/93	07:45	11:32
DUST COLLECTOR OUTLET	METALS, >PM10, <=PM10	201A/MUTLIMETALS	DCO-M201A-R2	10/26/93	13:30	17:35
DUST COLLECTOR OUTLET	METALS, >PM10, <=PM10	201A/MUTLIMETALS	DCO-M201A-R3	10/27/93	07:20	17:13
DUST COLLECTOR OUTLET	METALS, >PM10, <=PM10	201A/MUTLIMETALS	DCO-M201A-R4	10/28/93	06:35	17:40
CEMENT SILO OUTLET	METALS, >PM10, <=PM10	201A/MUTLIMETALS	CSO-M201A-R1	10/26/93	12:45	16:39
CEMENT SILO OUTLET	METALS, >PM10, <=PM10	201A/MUTLIMETALS	CSO-M201A-R2	10/27/93	08:15	14:41
CEMENT SILO OUTLET	METALS, >PM10, <=PM10	201A/MUTLIMETALS	CSO-M201A-R3	10/28/93	08:40	15:18
FLYASH SILO OUTLET	METALS, >PM10, <=PM10	201A/MUTLIMETALS	FSO-M201A-R1	10/27/93	11:25	12:26
FLYASH SILO OUTLET	METALS, >PM10, <=PM10	201A/MUTLIMETALS	FSO-M201A-R2	10/28/93	12:50	13:50
FLYASH SILO OUTLET	METALS, >PM10, <=PM10	201A/MUTLIMETALS	FSO-M201A-R3	11/01/93	08:48	09:49
DOWNWIND	AMBIENT SAMPLING	HI-VOL SAMPLING	D1026-AMB-R1	10/26/93	08:05	10:13
DOWNWIND	AMBIENT SAMPLING	HI-VOL SAMPLING	D1026-AMB-R2	10/26/93	10:53	12:54
DOWNWIND	AMBIENT SAMPLING	HI-VOL SAMPLING	D1026-AMB-R3	10/26/93	13:30	15:32
DOWNWIND	AMBIENT SAMPLING	HI-VOL SAMPLING	D1027-AMB-R1	10/27/93	07:42	09:50
DOWNWIND	AMBIENT SAMPLING	HI-VOL SAMPLING	D1027-AMB-R2	10/27/93	10:22	12:19
DOWNWIND	AMBIENT SAMPLING	HI-VOL SAMPLING	D1027-AMB-R3	10/27/93	13:12	15:17
DOWNWIND	AMBIENT SAMPLING	HI-VOL SAMPLING	D1028-AMB-R1	10/28/93	07:03	09:02
DOWNWIND	AMBIENT SAMPLING	HI-VOL SAMPLING	D1028-AMB-R2	10/28/93	09:40	11:42
DOWNWIND	AMBIENT SAMPLING	HI-VOL SAMPLING	D1028-AMB-R3	10/28/93	12:22	14:24
DOWNWIND	AMBIENT SAMPLING	HI-VOL SAMPLING	D1028-AMB-R4	10/28/93	15:02	17:03
UPWIND	AMBIENT SAMPLING	HI-VOL SAMPLING	U1026-AMB-R1	10/26/93	08:05	10:13
UPWIND	AMBIENT SAMPLING	HI-VOL SAMPLING	U1026-AMB-R2	10/26/93	10:54	12:59
UPWIND	AMBIENT SAMPLING	HI-VOL SAMPLING	U1026-AMB-R3	10/26/93	15:37	13:32
UPWIND	AMBIENT SAMPLING	HI-VOL SAMPLING	U1027-AMB-R1	10/27/93	07:40	09:42
UPWIND	AMBIENT SAMPLING	HI-VOL SAMPLING	U1027-AMB-R2	10/27/93	10:21	12:25
UPWIND	AMBIENT SAMPLING	HI-VOL SAMPLING	U1027-AMB-R3	10/27/93	13:12	15:17
UPWIND	AMBIENT SAMPLING	HI-VOL SAMPLING	U1028-AMB-R1	10/28/93	07:06	09:06
UPWIND	AMBIENT SAMPLING	HI-VOL SAMPLING	U1028-AMB-R2	10/28/93	09:41	11:47
UPWIND	AMBIENT SAMPLING	HI-VOL SAMPLING	U1028-AMB-R3	10/28/93	12:23	14:29
UPWIND	AMBIENT SAMPLING	HI-VOL SAMPLING	U1028-AMB-R4	10/28/93	15:03	17:09

APPENDIX B.0
AMBIENT MONITORING APPENDICES

**AMBIENT
MONITOR
LOCATION**

AMBIENT MONITOR LOCATION	RUN NUMBER	DATE	TIME		TEST DURATION (min)	ANEOMETER READING (ft)			FLOW (ft/min)
			START	END		INITIAL	FINAL	ACTUAL	
UPWIND	U1026-AMB-R1	10/26/93	08:05	10:13	146.0	0	1820	1820	12.5
UPWIND	U1026-AMB-R2	10/26/93	10:54	12:59	125.8	2850	3640	790	6.3
UPWIND	U1026-AMB-R3	10/26/93	13:32	15:37	124.7	3865	4960	1095	8.8
UPWIND	U1027-AMB-R1	10/27/93	07:40	09:42	128.0	9950	9625	-325	-2.5
UPWIND	U1027-AMB-R2	10/27/93	10:21	12:25	122.4	8895	3715	-5180	-42.3
UPWIND	U1027-AMB-R3	10/27/93	13:12	15:17	125.4	3075	38210	35135	280.2
UPWIND	U1028-AMB-R1	10/28/93	07:06	09:06	119.5	125	12460	12335	103.2
UPWIND	U1028-AMB-R2	10/28/93	09:41	11:47	125.9	1010	23325	22315	177.2
UPWIND	U1028-AMB-R3	10/28/93	12:23	14:29	125.8	7390	16290	8900	70.7
UPWIND	U1028-AMB-R4	10/28/93	15:03	17:09	119.5	5750	5090	-660	-5.5
DOWNWIND	D1026-AMB-R1	10/26/93	08:05	10:13	128.5	165	1927	1762	13.7
DOWNWIND	D1026-AMB-R2	10/26/93	10:53	12:54	121.5	2780	3545	765	6.3
DOWNWIND	D1026-AMB-R3	10/26/93	13:30	15:32	122.1	3850	5015	1165	9.5
DOWNWIND	D1027-AMB-R1	10/27/93	07:42	09:50	122.0	0	-9805	-9805	-80.4
DOWNWIND	D1027-AMB-R2	10/27/93	10:22	12:19	118.0	8900	4300	-4600	-39.0
DOWNWIND	D1027-AMB-R3	10/27/93	13:12	15:17	121.8	3110	38100	34990	287.3
DOWNWIND	D1028-AMB-R1	10/28/93	07:03	09:02	118.6	0	12100	12100	102.0
DOWNWIND	D1028-AMB-21	10/28/93	09:40	11:42	121.2	730	22350	21620	178.4
DOWNWIND	D1028-AMB-R3	10/28/93	12:22	14:24	122.1	7250	16080	8830	72.3
DOWNWIND	D1028-AMB-R4	10/28/93	15:02	17:03	120.6	5665	5310	-355	-2.9

APPENDIX B.1
UPWIND AMBIENT MONITORING

APPENDIX B.1.1
UPWIND MONITORING DATA AND RESULTS

AMBIENT MONITORING
CONCRETE READY MIXED CORPORATION

RUN NUMBER LOCATION	U1026-AMB-R1 UPWIND	U1026-AMB-R2 UPWIND	U1026-AMB-R3 UPWIND	AVERAGE
DATE	10/26/93	10/26/93	10/26/93	10/26/93
START TIME	08:05	10:54	13:32	
END TIME	10:13	12:59	15:37	
TEST DURATION - minutes	146.0	125.8	124.7	132.2

SAMPLING PARAMETERS

Temperature - F	53.6	61.0	63.0	59.2
Moisture - vol%	0.83	0.86	0.86	0.85
Barometric Pressure - in.Hg	30.12	30.12	30.12	30.12
Sampling Rate - acfm	10.64	10.79	10.84	10.76

ANALYTICAL DATA

Filter ID	54-2514	54-2517	54-2512	
Initial Filter Weight - g	4.5209	4.4800	4.5132	4.5047
Final Filter Weight - g	4.5952	4.5190	4.6066	4.5736
Filter Blank Weight - g	0.0000	0.0000	0.0000	0.0000

PARTICULATE RESULTS

Sampling Rate - dscfm	10.92	10.92	10.92	10.92
Sample Volume - dscf	1594.48	1373.46	1361.45	1443.13
Filter Gain - g	0.0743	0.0390	0.0934	0.0689
Grain loading - gr/dscf	7.19E-04	4.38E-04	1.06E-03	7.39E-04

AMBIENT MONITORING
CONCRETE READY MIXED CORPORATION

RUN NUMBER LOCATION	U1027-AMB-R1 UPWIND	U1027-AMB-R2 UPWIND	U1027-AMB-R3 UPWIND	AVERAGE
DATE	10/27/93	10/27/93	10/27/93	10/27/93
START TIME	07:42	10:21	13:13	
END TIME	09:50	12:19	15:17	
TEST DURATION - minutes	128.0	122.4	125.4	125.3

SAMPLING PARAMETERS

Temperature - F	48.0	57.0	71.2	58.7
Moisture - vol%	0.70	1.14	1.36	1.07
Barometric Pressure - in.Hg	29.97	29.97	29.97	29.97
Sampling Rate - acfm	10.58	10.77	11.06	10.80

ANALYTICAL DATA

Filter ID	54-2516	54-2525	54-2533	
Initial Filter Weight - g	4.4825	4.4913	4.4659	4.4799
Final Filter Weight - g	4.5288	4.5193	4.5417	2.2650
Filter Blank Weight - g	0.0000	0.0000	0.0000	0.0000

PARTICULATE RESULTS

Sampling Rate - dscfm	10.94	10.89	10.86	10.90
Sample Volume - dscf	1399.73	1332.56	1362.18	1364.83
Filter Gain - g	0.0463	0.0280	0.0758	0.0500
Grain loading - gr/dscf	5.10E-04	3.24E-04	8.59E-04	5.64E-04

AMBIENT MONITORING
CONCRETE READY MIXED CORPORATION

RUN NUMBER LOCATION	U1028-AMB-R1 UPWIND	U1028-AMB-R2 UPWIND	U1028-AMB-R3 UPWIND	U1028-AMB-R4 UPWIND	AVERAGE
DATE	10/28/93	10/28/93	10/28/93	10/28/93	10/28/93
START TIME	07:06	09:41	12:23	07:06	
END TIME	09:06	11:47	14:29	09:06	
TEST DURATION - minutes	119.5	125.9	125.8	119.5	122.7

SAMPLING PARAMETERS

Temperature - F	46.2	48.0	53.0	59.9	51.8
Moisture - vol%	0.00	0.00	1.16	0.70	0.47
Barometric Pressure - in.Hg	29.80	29.80	29.80	29.80	29.80
Sampling Rate - acfm	10.60	10.64	10.74	10.89	10.72

ANALYTICAL DATA

Filter ID	54-2519	71-1884	71-1882	71-1880	
Initial Filter Weight - g	4.4435	4.3615	4.4659	4.2946	4.3914
Final Filter Weight - g	4.4654	4.4013	4.5417	4.3712	4.4449
Filter Blank Weight - g	0.0000	0.0000	0.0000	0.0000	0.0000

PARTICULATE RESULTS

Sampling Rate - dscfm	11.01	11.01	10.88	10.94	10.96
Sample Volume - dscf	1315.99	1386.47	1369.30	1306.78	1344.64
Filter Gain - g	0.0219	0.0398	0.0758	0.0766	0.0535
Grain loading - gr/dscf	2.57E-04	4.43E-04	8.54E-04	9.05E-04	6.15E-04

TARGETED METALS RESULTS*

	CASE 1	CASE 2
Arsenic (As)	1.42E-01	1.44E-01
Beryllium (Be)	7.81E-03	9.54E-03
Cadmium (Cd)	4.60E-03	4.60E-03
Chromium (Cr)	4.48E-01	4.48E-01
Lead (Pb)	1.84E-01	1.84E-01
Manganese (Mn)	5.34E-01	5.34E-01
Mercury (Hg)	6.24E-02	6.42E-02
Nickel (Ni)	1.73E-01	1.91E-01
Phosphorus (P)	1.65E+01	1.73E+01
Selenium (Se)	0.00E+00	1.73E-03

* Notes:

- The targeted metals were analyzed from a combined sample consisting of the filters from runs U1028-AMB-R1, 2, 3.
- Case 1 metals calculations substitute the detection limit value for all non-detected parameters.
- Case 2 metals calculations substitute a zero-value for all non-detected parameters.

APPENDIX B.1.2
UPWIND MONITORING RAW FIELD DATA

Flow Anemometer
Random Initial 0.0
Final 1820

Upw...
10-26-93 R2

PM AIR QUALITY SAMPLE RECORD

CHAIN OF CUSTODY
NAME/DATE

NETWORK: _____

SITE/ID: _____

SAMPLER NO: 2 TYPE _____

FILTER NO: 54-2517

12:59 STOP Date/Time: 69070.8

1054 START Date/Time: 68945.0

Dickson Reading for this Sample: _____

START FLOW (cfm): _____

STOP FLOW (cfm): _____

AVG FLOW (cfm): _____

4.4 Ap
15 cfm
Flowmeter/Orificie Operational Check:

DATE OF LAST CHECK: _____

F = Corr FLOW (scfm): _____

Dickson (cfm): _____

END Weight (gms): _____

START Weight (gms): _____

W-NET Weight (gms): _____

TIMER STOP: _____

TIMER START: _____

T = RUN TIME (Min): _____

_____ $\mu\text{g}/\text{m}^3 = \text{W} \cdot (10^{**6}) / (\text{F} \cdot \text{T} \cdot 0.0283)$

Note: PM10 NAAQS - 24 HR Conc Standards
Primary: 150 $\mu\text{g}/\text{m}^3$
Secondary: 150 $\mu\text{g}/\text{m}^3$

Antom... Initial 2850
Final 3640

10/27/93

Upwind ^{R1}
~~long by downwind~~

PM AIR QUALITY SAMPLE RECORD

CHAIN OF CUSTODY
NAME/DATE

NETWORK: _____

SITE/ID: _____

SAMPLER NO: 2 TYPE _____

FILTER NO: 54-2516

0950 STOP Date/Time: 69323.5

0745 START Date/Time: 69195.5

Dickson Reading for this Sample:

START FLOW (cfm): _____

STOP FLOW (cfm): _____

AVG FLOW (cfm): _____

1.4 AP Flowmeter/Orifice Operational Check:

DATE OF LAST CHECK: _____

F = Corr FLOW (scfm): _____

Dickson (cfm): _____

END Weight (gms): _____

START Weight (gms): _____

W-NET Weight (gms): _____

TIMER STOP: _____

TIMER START: _____

T = RUN TIME (Min): _____

_____ $\mu\text{g}/\text{m}^3 = \text{W} * (10^{**}6) / (\text{F} * \text{T} * 0.0283)$

Note: PM10 NAAQS - 24 HR Conc Standards

Primary: 150 $\mu\text{g}/\text{m}^3$

Secondary: 150 $\mu\text{g}/\text{m}^3$

Anemometer Flow

Initial 9950

Final 9655

(wind was
opposite of how
the anemometer
was designated
upwind $\rightarrow$ downwind)

10-21-93

Run 2

upwind

PM AIR QUALITY SAMPLE RECORD

CHAIN OF CUSTODY
NAME/DATE

NETWORK: _____

SITE/ID: _____

SAMPLER NO: 2 TYPE _____

FILTER NO: 54-2525

121 STOP Date/Time: 69446.0

102 START Date/Time: 69323.6

Dickson Reading for this Sample:

START FLOW (cfm): _____

STOP FLOW (cfm): _____

AVG FLOW (cfm): _____

Flowmeter/Orificie Operational Check:

DATE OF LAST CHECK: _____

F = Corr FLOW (scfm): _____

Dickson (cfm): _____

END Weight (gms): _____

START Weight (gms): _____

W-NET Weight (gms): _____

TIMER STOP: _____

TIMER START: _____

T = RUN TIME (Min): _____

_____ $\mu\text{g}/\text{m}^3 = \text{W} * (10^{**}6) / (\text{F} * \text{T} * 0.0283)$

Note: PM10 NAAQS - 24 HR Conc Standards
Primary: 150 $\mu\text{g}/\text{m}^3$
Secondary: 150 $\mu\text{g}/\text{m}^3$

Flow Anemometer

Initial 8895
Final 3915

Upwind
10/27/93 Run 3

PM AIR QUALITY SAMPLE RECORD

CHAIN OF CUSTODY
NAME/DATE

NETWORK: _____

SITE/ID: _____

SAMPLER NO: 2 TYPE _____

FILTER NO: 54-2533

1517 STOP Date/Time: 69571.4

131 START Date/Time: 69446.0

Dickson Reading for this Sample:

START FLOW (cfm): _____

STOP FLOW (cfm): _____

AVG FLOW (cfm): _____

Flowmeter/Orifice Operational Check:

DATE OF LAST CHECK: _____

F = Corr FLOW (scfm): _____

Dickson (cfm): _____

END Weight (gms): _____

START Weight (gms): _____

W-NET Weight (gms): _____

TIMER STOP: _____

TIMER START: _____

T = RUN TIME (Min): _____

_____ $\mu\text{g}/\text{m}^3 = \text{W} * (10^{**6}) / (\text{F} * \text{T} * 0.0283)$

Note: PM10 NAAQS - 24 HR Conc Standards
Primary: 150 $\mu\text{g}/\text{m}^3$
Secondary: 150 $\mu\text{g}/\text{m}^3$

Initial 3075
Final 38210 (3rd Revolution)

PM AIR QUALITY SAMPLE RECORD

NETWORK: _____

SITE/ID: _____

SAMPLER NO: 2 TYPE _____

FILTER NO: 54-2519

0906 STOP Date/Time: 69691.96

0706 START Date/Time: 69572.4

Dickson Reading for this Sample:

START FLOW (cfm): _____

STOP FLOW (cfm): _____

AVG FLOW (cfm): _____

Flowmeter/Orificie Operational Check:

DATE OF LAST CHECK: _____

F = Corr FLOW (scfm): _____

Dickson (cfm): _____

END Weight (gms): _____

START Weight (gms): _____

W-NET Weight (gms): _____

TIMER STOP: _____

TIMER START: _____

T = RUN TIME (Min): _____

_____ $\mu\text{g}/\text{m}^3 = W * (10^{**6}) / (F * T * 0.0283)$

CHAIN OF CUSTODY
NAME/DATE

Note: PM10 NAAQS - 24 HR Conc Standards
Primary: 150 µg/m3
Secondary: 150 µg/m3

A reminder

Initial 125

Final ~~12460~~ 12460

10/28/93

Upwind Run 2

PM AIR QUALITY SAMPLE RECORD

CHAIN OF CUSTODY
NAME/DATE

NETWORK: _____

SITE/ID: _____

SAMPLER NO: 2 TYPE _____

FILTER NO: 71-1884

1147 STOP Date/Time: 69817.9

0941 START Date/Time: 69692.0

Dickson Reading for this Sample:

START FLOW (cfm): _____

STOP FLOW (cfm): _____

AVG FLOW (cfm): _____

Flowmeter/Orificie Operational Check:

DATE OF LAST CHECK: _____

F = Corr FLOW (scfm): _____

Dickson (cfm): _____

END Weight (gms): _____

START Weight (gms): _____

W-NET Weight (gms): _____

TIMER STOP: _____

TIMER START: _____

T = RUN TIME (Min): _____

_____ $\mu\text{g}/\text{m}^3 = \text{W} * (10^{**6}) / (\text{F} * \text{T} * 0.0283)$

Note: PM10 NAAQS - 24 HR Conc Standards

Primary: 150 $\mu\text{g}/\text{m}^3$

Secondary: 150 $\mu\text{g}/\text{m}^3$

Inhal 10 10

Final 23325

PM. AIR QUALITY SAMPLE RECORD

NETWORK: _____

SITE/ID: _____

SAMPLER NO: 2 TYPE

FILTER NO: 71-1882.

1429 STOP Date/Time: 69943.8

1213 START Date/Time: 69818.0

Dickson Reading for this Sample:

START FLOW (cfm): _____

STOP FLOW (cfm): _____

AVG FLOW (cfm): _____

Flowmeter/Orificie Operational Check:

DATE OF LAST CHECK: _____

F = Corr FLOW (scfm):

Dickson (cfm): _____

END Weight (gms): _____

START Weight (gms): _____

W-NET Weight (gms): _____

TIMER STOP: _____

TIMER START: _____

T = RUN TIME (Min): _____

$$\text{_____ } \mu\text{g}/\text{m}^3 = W \cdot (10^6) / (F \cdot T \cdot 0.0283)$$

Upwind R3
10-8-93

CHAIN OF CUSTODY
NAME/DATE

Note: PM10 NAAQS - 24 HR Conc Standards
Primary: 150 µg/m³
Secondary: 150 µg/m³

Initial 7390
Final 16290

Upwind 24
10/28/93

PM AIR QUALITY SAMPLE RECORD

CHAIN OF CUSTODY
NAME/DATE

NETWORK: _____

SITE/ID: _____

SAMPLER NO: 2 TYPE _____

FILTER NO: 71-1880

¹⁰⁰ STOP Date/Time: 70069.9

¹⁰⁰ START Date/Time: 69943.8

Dickson Reading for this Sample:

START FLOW (cfm): _____

STOP FLOW (cfm): _____

AVG FLOW (cfm): _____

Flowmeter/Orificie Operational Check:

DATE OF LAST CHECK: _____

F = Corr FLOW (scfm): _____

Dickson (cfm): _____

END Weight (gms): _____

START Weight (gms): _____

W-NET Weight (gms): _____

TIMER STOP: _____

TIMER START: _____

T = RUN TIME (Min): _____

_____ $\mu\text{g}/\text{m}^3 = W * (10^{**6}) / (F * T * 0.0283)$

Note: PM10 NAAQS - 24 HR Conc Standards
Primary: 150 $\mu\text{g}/\text{m}^3$
Secondary: 150 $\mu\text{g}/\text{m}^3$

Initial 5750
Final 5090
(wind swirling)

APPENDIX B.2
DOWNWIND AMBIENT MONITORING

APPENDIX B.2.1
DOWNWIND MONITORING DATA AND RESULTS

AMBIENT MONITORING
CONCRETE READY MIXED CORPORATION

RUN NUMBER LOCATION	D1026-AMB-R1 DOWNWIND	D1026-AMB-R2 DOWNWIND	D1026-AMB-R3 DOWNWIND	AVERAGE
DATE	10/26/93	10/26/93	10/26/93	10/26/93
START TIME	08:05	10:53	13:30	
END TIME	10:13	12:54	15:32	
TEST DURATION - minutes	128.5	121.5	122.1	124.0

SAMPLING PARAMETERS

Temperature - F	53.6	61.0	63.0	59.2
Moisture - vol%	0.83	0.86	0.86	0.85
Barometric Pressure - in.Hg	30.12	30.12	30.12	30.12
Sampling Rate - acfm	10.73	10.89	10.93	10.85

ANALYTICAL DATA

Filter ID	54-2515	54-2513	54-2511	
Initial Filter Weight - g	4.5088	4.4846	4.5162	4.5032
Final Filter Weight - g	4.6849	4.6269	4.6079	4.6399
Filter Blank Weight - g	0.0000	0.0000	0.0000	0.0000

PARTICULATE RESULTS

Sampling Rate - dscfm	11.02	11.01	11.01	11.01
Sample Volume - dscf	1415.68	1338.15	1344.76	1366.20
Filter Gain - g	0.1761	0.1423	0.0917	0.1367
Grain loading - gr/dscf	1.92E-03	1.64E-03	1.05E-03	1.54E-03

AMBIENT MONITORING
CONCRETE READY MIXED CORPORATION

RUN NUMBER LOCATION	D1027-AMB-R1 DOWNWIND	D1027-AMB-R2 DOWNWIND	D1027-AMB-R3 DOWNWIND	AVERAGE
DATE	10/27/93	10/27/93	10/27/93	10/27/93
START TIME	07:40	10:22	13:11	
END TIME	09:42	12:25	15:12	
TEST DURATION - minutes	122.0	118.0	121.8	120.6

SAMPLING PARAMETERS

Temperature - F	48.0	57.0	71.2	58.7
Moisture - vol%	0.70	1.14	1.36	1.07
Barometric Pressure - in.Hg	29.97	29.97	29.97	29.97
Sampling Rate - acfm	10.67	10.86	11.16	10.90

ANALYTICAL DATA

Filter ID	54-2518	54-2523	54-2522	
Initial Filter Weight - g	4.4809	4.5057	4.5030	4.4965
Final Filter Weight - g	4.7532	4.5708	4.6440	2.3280
Filter Blank Weight - g	0.0000	0.0000	0.0000	0.0000

PARTICULATE RESULTS

Sampling Rate - dscfm	11.03	10.98	10.96	10.99
Sample Volume - dscf	1345.83	1295.94	1334.69	1325.49
Filter Gain - g	0.2723	0.0651	0.1410	0.1595
Grain loading - gr/dscf	3.12E-03	7.75E-04	1.63E-03	1.84E-03

AMBIENT MONITORING
CONCRETE READY MIXED CORPORATION

RUN NUMBER LOCATION	D1028-AMB-R1 DOWNWIND	D1028-AMB-R2 DOWNWIND	D1028-AMB-R3 DOWNWIND	D1028-AMB-R4 DOWNWIND	AVERAGE
DATE	10/28/93	10/28/93	10/28/93	10/28/93	10/28/93
START TIME	07:03	09:40	12:22	15:02	
END TIME	09:02	11:42	14:24	17:03	
TEST DURATION - minutes	118.6	121.2	122.1	120.6	120.6

SAMPLING PARAMETERS

Temperature - F	46.2	48.0	53.0	59.9	51.8
Moisture - vol%	0.00	0.00	1.16	0.70	0.47
Barometric Pressure - in.Hg	29.80	29.80	29.80	29.80	29.80
Sampling Rate - acfm	10.69	10.73	10.84	10.98	10.81

ANALYTICAL DATA

Filter ID	54-2524	71-1885	71-1883	71-1881	
Initial Filter Weight - g	4.4912	4.3472	4.3241	4.3063	4.3672
Final Filter Weight - g	4.6377	4.6846	5.6936	4.7353	4.9378
Filter Blank Weight - g	0.0000	0.0000	0.0000	0.0000	0.0000

PARTICULATE RESULTS

Sampling Rate - dscfm	11.11	11.11	10.98	11.03	11.06
Sample Volume - dscf	1317.54	1346.43	1340.69	1330.38	1333.76
Filter Gain - g	0.1465	0.3374	1.3695	0.4290	0.5706
Grain loading - gr/dscf	1.72E-03	3.87E-03	1.58E-02	4.98E-03	6.58E-03

TARGETED METALS RESULTS*	CASE 1 (ug/dscm)	CASE 2 (ug/dscm)
Arsenic (As)	1.81E-01	1.83E-01
Beryllium (Be)	1.98E-02	2.15E-02
Cadmium (Cd)	5.17E-03	5.17E-03
Chromium (Cr)	7.66E-01	7.66E-01
Lead (Pb)	3.25E-01	3.25E-01
Manganese (Mn)	1.57E+00	1.57E+00
Mercury (Hg)	8.87E-02	9.05E-02
Nickel (Ni)	3.29E-01	3.46E-01
Phosphorus (P)	1.98E+01	2.07E+01
Selenium (Se)	1.55E-02	1.72E-02

* Notes:

- The targeted metals were analyzed from a combined sample consisting of the filters from runs U1028-AMB-R1, 2, 3.
- Case 1 metals calculations substitute the detection limit value for all non-detected parameters.
- Case 2 metals calculations substitute a zero-value for all non-detected parameters.

APPENDIX B.2.2
DOWNWIND MONITORING RAW FIELD DATA

PM AIR QUALITY SAMPLE RECORD

NETWORK: _____

SITE/ID: _____

SAMPLER NO: 1 TYPE

FILTER NO: 54-2515

0805 STOP Date/Time: ~~22691.0~~ 22819.5

10.2 START Date/Time: 22691.0

Dickson Reading for this Sample:

START FLOW (cfm): _____

STOP FLOW (cfm): _____

AVG FLOW (cfm): _____

Flowmeter/Orificie Operational Check:

DATE OF LAST CHECK: _____

F = Corr FLOW (scfm): _____

Dickson (cfm):

END Weight (gms):

START Weight (gms):

W-NET Weight (gms):

TIMER STOP:

TIMER START:

T = RUN TIME (Min):

$$\text{_____ } \mu\text{g}/\text{m}^3 = W \cdot (10^6) / (F \cdot T \cdot 0.0283)$$

Downwind 10-20-43
R1

CHAIN OF CUSTODY
NAME/DATE

Note: PM10 NAAQS - 24 HR Conc Standards
Primary: 150 µg/m3
Secondary: 150 µg/m3

Vane Anemometer 165 Initial
1987 Final

Antennometer Initial 2780
F. Log 3545

PM AIR QUALITY SAMPLE RECORD

NETWORK: _____

SITE/ID: _____

SAMPLER NO: 1 TYPE

FILTER NO: 54-2511

153² STOP Date/Time: 23063.6

13:30 START Date/Time: 22941.5

Dickson Reading for this Sample:

START FLOW (cfm): _____

STOP FLOW (cfm): _____

AVG FLOW (cfm): _____

Flowmeter/Orificie Operational Check:

DATE OF LAST CHECK: _____

F = Corr FLOW (scfm): _____

Dickson (cfm): _____

END Weight (gms): _____

START Weight (gms): _____

W-NET Weight (gms): _____

TIMER STOP: _____

TIMER START: _____

T = RUN TIME (Min): _____

$$\text{_____ } \mu\text{g}/\text{m}^3 = W(10^6)/(F \cdot T \cdot 0.0283)$$

Note: PM10 NAAQS - 24 HR Conc Standards

Primary: 150 $\mu\text{g}/\text{m}^3$

Secondary: 150 $\mu\text{g}/\text{m}^3$

Downwind 13
10-26-93

CHAIN OF CUSTODY
NAME/DATE

This image shows a single sheet of white paper with horizontal blue or grey ruling lines. The lines are evenly spaced and run across the width of the page. There are approximately 20 lines visible. A small portion of a yellowed edge from another page is visible at the top left corner.

Anemometer
Initial 3850
Final 5015

10/27/93 Ann
Downwind (may be
upwind)

CHAIN OF CUSTODY
NAME/DATE

Handwriting practice lines for the letter 'l'. The page contains 20 rows of horizontal lines. Each row features a lowercase 'l' written in the center, demonstrating proper letter formation and placement within the lines.

_____ /

4.6 ~~AP~~
45 cm

_____ /

_____ /

Anemometer
 ② Initial
 9805 Final

(wind direction was
 the opposite of how
 the H-vals were
 designated
 upwind $\Rightarrow$ downwind

Armonia
 9805 Final

PM AIR QUALITY SAMPLE RECORD

NETWORK: _____

SITE/ID: _____

SAMPLER NO: 1 TYPE

FILTER NO: 54-2523

1027 STOP Date/Time: ~~11/11/14~~ 23304.0

START Date/Time: 231800

Dickson Reading for this Sample:

START FLOW (cfm): _____

STOP FLOW (cfm): _____

AVG FLOW (cfm): _____

Flowmeter/Orificie Operational Check:

DATE OF LAST CHECK: _____

F = Corr FLOW (scfm): _____

Dickson (cfm): _____

END Weight (gms): _____

START Weight (gms): _____

W-NET Weight (gms): _____

TIMER STOP: _____

TIMER START: _____

T = RUN TIME (Min): _____

$$\text{_____ } \mu\text{g}/\text{m}^3 = W * (10^6) / (F * T * 0.0283)$$

10/22/93

Ry2 2

Downwind

CHAIN OF CUSTODY
NAME/DATE

This image shows a single sheet of white paper with horizontal blue or grey ruling lines. The lines are evenly spaced and run across the width of the page. There are approximately 20 lines visible. A vertical margin line is present on the left side, creating a narrow left margin. The paper appears to be from a notebook or a standard ruled document.

Few Anomals

Initial 8900

Final 4300

Note: PM10 NAAQS - 24 HR Conc Standards
Primary: 150 µg/m3
Secondary: 150 µg/m3

downwind

10/27/93 Run 3

PM AIR QUALITY SAMPLE RECORD

CHAIN OF CUSTODY
NAME/DATE

NETWORK: _____

SITE/ID: _____

SAMPLER NO: 1 TYPE _____

FILTER NO: 54-2522

15) STOP Date/Time: 23425.8

13) START Date/Time: 23304.0

Dickson Reading for this Sample:

START FLOW (cfm): _____

STOP FLOW (cfm): _____

AVG FLOW (cfm): _____

Flowmeter/Orifice Operational Check:

DATE OF LAST CHECK: _____

F = Corr FLOW (scfm): _____

Dickson (cfm): _____

END Weight (gms): _____

START Weight (gms): _____

W-NET Weight (gms): _____

TIMER STOP: _____

TIMER START: _____

T = RUN TIME (Min): _____

_____ $\mu\text{g}/\text{m}^3 = \text{W} * (10^{**6}) / (\text{F} * \text{T} * 0.0283)$

Note: PM10 NAAQS - 24 HR Conc Standards
Primary: 150 $\mu\text{g}/\text{m}^3$
Secondary: 150 $\mu\text{g}/\text{m}^3$

Initial 3/10
Final 38100 (3rd Revolution)

Downwind All

CHAIN OF CUSTODY
NAME/DATE

SITE/ID: _____

FILTER NO: 54-2524.

0703 START Date/Time: 23476.0

START FLOW (cfm): _____

STOP FLOW (cfm): _____

AVG FLOW (cfm): _____

DATE OF LAST CHECK: _____

F = Corr FLOW (scfm): _____

Dickson (cfm): _____

END Weight (gms): _____

START Weight (gms): _____

W-NET Weight (gms):

TIMER STOP: _____

TIMER START:

T = RUN TIME (Min):

$$\text{_____ } \mu\text{g/m}^3 = W \cdot (10^6) / (F \cdot T \cdot 0.0283)$$

Initial 0

Final 12100

(1 complete Rev)

10/28/93

Downwind Run 2

PM AIR QUALITY SAMPLE RECORD

CHAIN OF CUSTODY
NAME/DATE

NETWORK: _____

SITE/ID: _____

SAMPLER NO: 1 TYPE _____

FILTER NO: 71-1885

1142 STOP Date/Time: 23666.0

0940 START Date/Time: 23544.8

Dickson Reading for this Sample:

START FLOW (cfm): _____

STOP FLOW (cfm): _____

AVG FLOW (cfm): _____

Flowmeter/Orificie Operational Check:

DATE OF LAST CHECK: _____

F = Corr FLOW (scfm): _____

Dickson (cfm): _____

END Weight (gms): _____

START Weight (gms): _____

W-NET Weight (gms): _____

TIMER STOP: _____

TIMER START: _____

T = RUN TIME (Min): _____

_____ $\mu\text{g}/\text{m}^3 = \text{W} * (10^{**6}) / (\text{F} * \text{T} * 0.0283)$

Note: PM10 NAAQS - 24 HR Conc Standards
Primary: 150 $\mu\text{g}/\text{m}^3$
Secondary: 150 $\mu\text{g}/\text{m}^3$

Initial 0730
Final 22350

Downwind R3

10/28/93

CHAIN OF CUSTODY
NAME/DATE

PM AIR QUALITY SAMPLE RECORD

NETWORK: _____

SITE/ID: _____

SAMPLER NO: 1 TYPE _____

FILTER NO: 71-1883

^{14:24} STOP Date/Time: 23788.1

^{13:22} START Date/Time: 23666.0

Dickson Reading for this Sample:

START FLOW (cfm): _____

STOP FLOW (cfm): _____

AVG FLOW (cfm): _____

Flowmeter/Orifice Operational Check:

DATE OF LAST CHECK: _____

F = Corr FLOW (scfm): _____

Dickson (cfm): _____

END Weight (gms): _____

START Weight (gms): _____

W-NET Weight (gms): _____

TIMER STOP: _____

TIMER START: _____

T = RUN TIME (Min): _____

_____ $\mu\text{g}/\text{m}^3 = \text{W} * (10^{**6}) / (\text{F} * \text{T} * 0.0283)$

Note: PM10 NAAQS - 24 HR Conc Standards

Primary: 150 $\mu\text{g}/\text{m}^3$

Secondary: 150 $\mu\text{g}/\text{m}^3$

Initial 7250

Final 16080

Downwind R4
10/28/93

PM AIR QUALITY SAMPLE RECORD

CHAIN OF CUSTODY
NAME/DATE

NETWORK: _____

SITE/ID: _____

SAMPLER NO: 1 TYPE _____

FILTER NO: 71-1881

17:3 STOP Date/Time: 23908.7

1502 START Date/Time: 23788.1

Dickson Reading for this Sample:

START FLOW (cfm): _____

STOP FLOW (cfm): _____

AVG FLOW (cfm): _____

Flowmeter/Orificie Operational Check:

DATE OF LAST CHECK: _____

F = Corr FLOW (scfm): _____

Dickson (cfm): _____

END Weight (gms): _____

START Weight (gms): _____

W-NET Weight (gms): _____

TIMER STOP: _____

TIMER START: _____

T = RUN TIME (Min): _____

_____ $\mu\text{g}/\text{m}^3 = W * (10^{**6}) / (F * T * 0.0283)$

Note: PM10 NAAQS - 24 HR Conc Standards
Primary: 150 $\mu\text{g}/\text{m}^3$
Secondary: 150 $\mu\text{g}/\text{m}^3$

Initial 5665
Final 5310 (wind opposite direction)

APPENDIX B.3
AMBIENT MONITORING
GRAVIMETRIC LAB DATA

ETS, INC.

FIELD SAMPLE LOG

Contract No. 92-65518
Job I.D.
Test Method AMBIENT

Print Date 02/10/94 Time 10:55:03
Page 1

Sample No.	Container No.	Other I.D.	Run I.D.	Sample Type	Volume, ml no Rinses	Volume, ml w/ Rinses	Analyst	Date	Comments
00300	F1	71-1882	U1028-AMB-R3	FIBERGLASS FILTER			WLO	11/02/93	
00301	F1	71-1883	D1028-AMB-R3	FIBERGLASS FILTER			WLO	11/02/93	
00302	F1	71-1881	D1028-AMB-R4	FIBERGLASS FILTER			WLO	11/02/93	
00303	F1	71-1880	U1028-AMB-R4	FIBERGLASS FILTER			WLO	11/02/93	
00304	F1	54-2525	U1027-AMB-R2	FIBERGLASS FILTER			WLO	11/02/93	
00305	F1	54-2515	D1026-AMB-R1	FIBERGLASS FILTER			WLO	11/02/93	
00306	F1	54-2514	U1026-AMB-R1	FIBERGLASS FILTER			WLO	11/02/93	
00307	F1	54-2513	D1026-AMB-R2	FIBERGLASS FILTER			WLO	11/02/93	
00308	F1	54-2517	U1026-AMB-R2	FIBERGLASS FILTER			WLO	11/02/93	
00309	F1	54-2512	U1026-AMB-R3	FIBERGLASS FILTER			WLO	11/02/93	
00310	F1	54-2511	D1026-AMB-R3	FIBERGLASS FILTER			WLO	11/02/93	
00311	F1	54-2518	D1027-AMB-R1	FIBERGLASS FILTER			WLO	11/02/93	
00312	F1	54-2533	U1027-AMB-R3	FIBERGLASS FILTER			WLO	11/02/93	
00313	F1	54-2523	D1027-AMB-R2	FIBERGLASS FILTER			WLO	11/02/93	
00314	F1	54-2519	U1028-AMB-R1	FIBERGLASS FILTER			WLO	11/02/93	
00315	F1	54-2524	D1028-AMB-R1	FIBERGLASS FILTER			WLO	11/02/93	
00316	F1	71-1884	U1028-AMB-R2	FIBERGLASS FILTER			WLO	11/02/93	
00317	F1	54-2522	D1027-AMB-R3	FIBERGLASS FILTER			WLO	11/02/93	
00318	F1	54-2516	U1027-AMB-R1	FIBERGLASS FILTER			WLO	11/02/93	
00319	F1	71-1885	D1028-AMB-R2	FIBERGLASS FILTER			WLO	11/02/93	
00320	F1	54-2508	BLA -AMB-R0	FIBERGLASS FILTER			WLO	11/02/93	

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Beaker # Filter # Sample # Run I.D. Total Vol.,ml Aliquot Vol.	Constant Tare Weight (g) Beaker Filter	Final Weight Data				Constant Final Weight (g)
		Date	Time	Weight (g)	Analyst	
10/12/93-048 71-1882 92-65518-00300 U1028-AMB-R3	70.79410 4.27390	11/02/93	14:57	75.12140	PJB	75.12340
		11/04/93	17:20	75.12300	PJB	
		11/08/93	10:39	75.12340	PJB	
10/12/93-049 71-1883 92-65518-00301 D1028-AMB-R3	70.23340 4.32410	11/02/93	14:57	75.92470	PJB	75.92700
		11/04/93	17:20	75.92690	PJB	
		11/08/93	10:39	75.92700	PJB	
10/12/93-050 71-1881 92-65518-00302 D1028-AMB-R4	70.41980 4.30630	11/02/93	14:57	75.15340	PJB	75.15510
		11/04/93	17:21	75.15540	PJB	
		11/08/93	10:39	75.15510	PJB	
10/12/93-051 71-1880 92-65518-00303 U1028-AMB-R4	71.02610 4.29460	11/02/93	14:58	75.39560	PJB	75.39730
		11/04/93	17:21	75.39740	PJB	
		11/08/93	10:40	75.39730	PJB	
10/12/93-052 54-2525 92-65518-00304 U1027-AMB-R2	67.07960 4.49130	11/02/93	14:58	71.59700	PJB	71.59890
		11/04/93	17:21	71.59870	PJB	
		11/08/93	10:40	71.59890	PJB	

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Beaker # Filter # Sample # Run I.D. Total Vol., ml Aliquot Vol.	Constant Tare Weight (g) Beaker Filter	Final Weight Data				Constant Final Weight (g)
		Date	Time	Weight (g)	Analyst	
10/12/93-053 54-2515 92-65518-00305 D1026-AMB-R1	70.97150 4.50880	11/02/93	14:58	75.65460	PJB	75.65640
		11/04/93	17:21	75.65640	PJB	
		11/08/93	10:40	75.65640	PJB	
10/12/93-054 54-2514 92-65518-00306 U1026-AMB-R1	69.96480 4.52090	11/02/93	14:58	74.55820	PJB	74.56000
		11/04/93	17:21	74.55950	PJB	
		11/08/93	10:40	74.56000	PJB	
10/12/93-055 54-2513 92-65518-00307 D1026-AMB-R2	67.01410 4.48460	11/02/93	14:58	71.63910	PJB	71.64100
		11/04/93	17:21	71.64080	PJB	
		11/08/93	10:40	71.64100	PJB	
10/12/93-056 54-2517 92-65518-00308 U1026-AMB-R2	70.62170 4.48000	11/02/93	14:58	75.13910	PJB	75.14070
		11/04/93	17:21	75.14040	PJB	
		11/08/93	10:40	75.14070	PJB	
10/12/93-057 54-2512 92-65518-00309 U1026-AMB-R3	67.89870 4.51320	11/02/93	14:59	72.50350	PJB	72.50530
		11/04/93	17:22	72.50480	PJB	
		11/08/93	10:41	72.50530	PJB	

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Beaker # Filter # Sample # Run I.D. Total Vol., ml Aliquot Vol.	Constant Tare Weight (g) Beaker Filter	Final Weight Data				Constant Final Weight (g)
		Date	Time	Weight (g)	Analyst	
10/12/93-058 54-2511 92-65518-00310 D1026-AMB-R3	67.20750 4.51620	11/02/93	14:59	71.81370	PJB	71.81540
		11/04/93	17:22	71.81550	PJB	
		11/08/93	10:41	71.81540	PJB	
10/12/93-059 54-2518 92-65518-00311 D1027-AMB-R1	70.30800 4.48090	11/02/93	14:59	75.05990	PJB	75.06120
		11/04/93	17:22	75.06080	PJB	
		11/08/93	10:41	75.06120	PJB	
10/12/93-060 54-2533 92-65518-00312 U1027-AMB-R3	70.62340 4.46590	11/02/93	14:59	75.16330	PJB	75.16510
		11/04/93	17:22	75.16470	PJB	
		11/08/93	10:41	75.16510	PJB	
10/12/93-061 54-2523 92-65518-00313 D1027-AMB-R2	67.89280 4.50570	11/02/93	14:59	72.46160	PJB	72.46360
		11/04/93	17:22	72.46320	PJB	
		11/08/93	10:41	72.46360	PJB	
10/12/93-062 54-2519 92-65518-00314 U1028-AMB-R1	69.37690 4.44350	11/02/93	14:59	73.84050	PJB	73.84230
		11/04/93	17:22	73.84220	PJB	
		11/08/93	10:41	73.84230	PJB	

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Beaker # Filter # Sample # Run I.D. Total Vol., ml Aliquot Vol.	Constant Tare Weight (g) Beaker Filter	Final Weight Data				Constant Final Weight (g)
		Date	Time	Weight (g)	Analyst	
10/12/93-063 54-2524 92-65518-00315 D1028-AMB-R1	66.81630 4.49120	11/02/93	14:59	71.45180	PJB	71.45400
		11/04/93	17:22	71.45350	PJB	
		11/08/93	10:41	71.45400	PJB	
10/12/93-064 71-1884 92-65518-00316 U1028-AMB-R2	67.06320 4.36150	11/02/93	15:00	71.46220	PJB	71.46450
		11/04/93	17:22	71.46460	PJB	
		11/08/93	10:42	71.46450	PJB	
10/12/93-065 54-2522 92-65518-00317 D1027-AMB-R3	69.61270 4.50300	11/02/93	15:00	74.25490	PJB	74.25670
		11/04/93	17:23	74.25630	PJB	
		11/08/93	10:42	74.25670	PJB	
10/12/93-066 54-2516 92-65518-00318 U1027-AMB-R1	66.95650 4.48250	11/02/93	15:00	71.48410	PJB	71.48530
		11/04/93	17:23	71.48560	PJB	
		11/08/93	10:42	71.48530	PJB	
10/12/93-067 71-1885 92-65518-00319 D1028-AMB-R2	66.60320 4.34720	11/02/93	15:00	71.28570	PJB	71.28780
		11/04/93	17:23	71.28800	PJB	
		11/08/93	10:42	71.28780	PJB	

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Beaker # Filter # Sample # Run I.D. Total Vol.,ml Aliquot Vol.	Constant Tare Weight (g) Beaker Filter	Final Weight Data				Constant Final Weight (g)
		Date	Time	Weight (g)	Analyst	
10/12/93-068	70.56920	11/02/93	15:00	75.09110	PJB	75.09350
54-2508	4.52520	11/04/93	17:23	75.09310	PJB	
92-65518-00320		11/08/93	10:42	75.09350	PJB	
BLANK-AMB-RO						

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Beaker Number	Date	Time	Weight (g)	Analyst	Constant Weight (g)
09/02/93-001	09/02/93	15:21	64.63420	RKT	64.63270
	09/03/93	14:04	64.63320	PJB	
	09/07/93	13:37	64.63270	PJB	
09/02/93-002	09/02/93	15:21	64.95860	RKT	64.95810
	09/03/93	14:04	64.95810	PJB	
09/02/93-003	09/02/93	15:21	66.87750	RKT	66.87610
	09/03/93	14:04	66.87660	PJB	
	09/07/93	13:30	66.87610	pjb	
09/02/93-004	09/02/93	15:21	67.62610	RKT	67.62580
	09/03/93	14:04	67.62580	PJB	
09/02/93-005	09/02/93	15:21	64.47010	RKT	64.46970
	09/03/93	14:05	64.46970	PJB	
09/02/93-006	09/02/93	15:22	64.59220	RKT	64.59260
	09/03/93	14:05	64.59260	PJB	
09/02/93-007	09/02/93	15:22	64.92890	RKT	64.92900
	09/03/93	14:05	64.92900	PJB	
09/02/93-008	09/02/93	15:22	67.56370	RKT	67.56390
	09/03/93	14:05	67.56390	PJB	
09/02/93-009	09/02/93	15:22	64.83100	RKT	64.83140
	09/03/93	14:05	64.83140	PJB	
09/02/93-010	09/02/93	15:22	65.09770	RKT	65.09770
	09/03/93	14:05	65.09770	PJB	
09/02/93-011	09/02/93	15:22	64.71700	RKT	64.71690
	09/03/93	14:05	64.71690	PJB	
09/02/93-012	09/02/93	15:22	67.24660	RKT	67.24700
	09/03/93	14:06	67.24700	PJB	
09/02/93-013	09/02/93	15:23	64.88460	RKT	64.88510
	09/03/93	14:06	64.88510	PJB	
09/02/93-014	09/02/93	15:23	77.15930	RKT	77.15970
	09/03/93	14:06	77.16010	PJB	
	09/07/93	13:31	77.15970	PJB	

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Beaker Number	Date	Time	Weight (g)	Analyst	Constant Weight (g)
09/02/93-015	09/02/93	15:29	66.84250	TW	66.84290
	09/03/93	14:06	66.84290	PJB	

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Beaker Number	Date	Time	Weight (g)	Analyst	Constant Weight (g)
10/21/93-001	10/22/93	10:29	64.86610	PJB	64.86630
	10/26/93	10:34	64.86630	PJB	
10/21/93-002	10/22/93	10:29	67.15030	PJB	67.15060
	10/26/93	10:34	67.15060	PJB	
10/21/93-003	10/22/93	10:30	67.51680	PJB	67.51670
	10/26/93	10:34	67.51670	PJB	
10/21/93-004	10/22/93	10:30	66.57590	PJB	66.57610
	10/26/93	10:34	66.57610	PJB	
10/21/93-005	10/22/93	10:30	67.24130	PJB	67.24150
	10/26/93	10:35	67.24150	PJB	
10/21/93-006	10/22/93	10:30	67.20400	PJB	67.20420
	10/26/93	10:35	67.20420	PJB	
10/21/93-007	10/22/93	10:30	70.44230	PJB	70.44230
	10/26/93	10:35	70.44230	PJB	

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Beaker Number	Date	Time	Weight (g)	Analyst	Constant Weight (g)
10/12/93-005	10/12/93	15:27	70.67230	TGW	70.67200
	10/13/93	10:06	70.67200	TGW	
10/12/93-006	10/12/93	15:27	67.09010	TGW	67.08990
	10/13/93	10:06	67.08990	TGW	
10/12/93-007	10/12/93	15:28	67.07080	TGW	67.07050
	10/13/93	10:07	67.07050	TGW	
10/12/93-008	10/12/93	15:28	66.99160	TGW	66.99140
	10/13/93	10:07	66.99140	TGW	
10/12/93-009	10/12/93	15:28	67.05010	TGW	67.04990
	10/13/93	10:07	67.04990	TGW	
10/12/93-010	10/12/93	15:28	67.02560	TGW	67.02560
	10/13/93	10:08	67.02560	TGW	
10/12/93-011	10/12/93	15:29	67.11440	TGW	67.11390
	10/13/93	10:08	67.11390	TGW	
10/12/93-012	10/12/93	15:29	66.72910	TGW	66.72860
	10/13/93	10:08	66.72860	TGW	
10/12/93-013	10/12/93	15:29	69.77070	TGW	69.77030
	10/13/93	10:09	69.77030	TGW	
10/12/93-014	10/12/93	15:30	70.25050	TGW	70.25000
	10/13/93	10:09	70.25000	TGW	
10/12/93-015	10/12/93	15:30	67.00370	TGW	67.00320
	10/13/93	10:09	67.00320	TGW	
10/12/93-016	10/12/93	15:30	70.33930	TGW	70.33910
	10/13/93	10:10	70.33910	TGW	
10/12/93-017	10/12/93	15:30	70.50940	TGW	70.50900
	10/13/93	10:10	70.50900	TGW	
10/12/93-018	10/12/93	15:39	69.92620	TGW	69.92590
	10/13/93	10:10	69.92590	TGW	

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Beaker Number	Date	Time	Weight (g)	Analyst	Constant Weight (g)
10/12/93-019	10/12/93	15:40	70.66610	TGW	70.66580
	10/13/93	10:11	70.66580	TGW	
10/12/93-020	10/12/93	15:40	66.92900	TGW	66.92850
	10/13/93	10:11	66.92850	TGW	
10/12/93-021	10/12/93	15:40	66.78900	TGW	66.78890
	10/13/93	10:11	66.78890	TGW	
10/12/93-022	10/12/93	15:40	67.21310	TGW	67.21310
	10/13/93	10:12	67.21310	TGW	
10/12/93-023	10/12/93	15:41	67.05800	TGW	67.05830
	10/13/93	10:19	67.05830	TGW	
10/12/93-024	10/12/93	15:41	67.11600	TGW	67.11600
	10/13/93	10:20	67.11600	TGW	
10/12/93-025	10/12/93	15:41	70.33460	TGW	70.33450
	10/13/93	10:20	70.33450	TGW	
10/12/93-026	10/12/93	15:42	70.06520	TGW	70.06510
	10/13/93	10:20	70.06510	TGW	
10/12/93-027	10/12/93	15:42	67.12170	TGW	67.12190
	10/13/93	10:21	67.12190	TGW	
10/12/93-028	10/12/93	15:42	70.18570	TGW	70.18570
	10/13/93	10:21	70.18570	TGW	
10/12/93-029	10/12/93	15:43	70.13950	TGW	70.13920
	10/13/93	10:21	70.13920	TGW	
10/12/93-030	10/12/93	15:43	70.22620	TGW	70.22600
	10/13/93	10:22	70.22600	TGW	
10/12/93-031	10/12/93	15:43	67.43260	TGW	67.43260
	10/13/93	10:22	67.43260	TGW	
10/12/93-032	10/12/93	15:43	67.00660	TGW	67.00650
	10/13/93	10:22	67.00650	TGW	

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Beaker Number	Date	Time	Weight (g)	Analyst	Constant Weight (g)
10/12/93-033	10/12/93	15:43	67.35290	TGW	67.35320
	10/13/93	10:23	67.35320	TGW	
10/12/93-034	10/12/93	15:44	66.74870	TGW	66.74890
	10/13/93	10:23	66.74890	TGW	
10/12/93-035	10/12/93	15:45	67.14890	TGW	67.14920
	10/13/93	10:23	67.14920	TGW	
10/12/93-036	10/12/93	15:45	70.48770	TGW	70.48780
	10/13/93	10:24	70.48780	TGW	
10/12/93-037	10/12/93	15:45	70.10240	TGW	70.10230
	10/13/93	10:24	70.10230	TGW	
10/12/93-038	10/12/93	15:45	67.12390	TGW	67.12390
	10/13/93	10:25	67.12390	TGW	
10/12/93-039	10/12/93	15:45	67.21970	TGW	67.21950
	10/13/93	10:25	67.21950	TGW	
10/12/93-040	10/12/93	15:46	67.08600	TGW	67.08570
	10/13/93	10:25	67.08570	TGW	
10/12/93-041	10/12/93	15:46	67.29260	TGW	67.29250
	10/13/93	10:26	67.29250	TGW	
10/12/93-042	10/12/93	15:46	70.12240	TGW	70.12250
	10/13/93	10:26	70.12250	TGW	
10/12/93-043	10/12/93	15:47	70.19490	TGW	70.19530
	10/13/93	10:26	70.19530	TGW	
10/12/93-044	10/12/93	15:47	66.67700	TGW	66.67690
	10/13/93	10:51	66.67690	TGW	
10/12/93-045	10/12/93	15:47	70.05560	TGW	70.05600
	10/13/93	10:27	70.05600	TGW	
10/12/93-046	10/12/93	15:47	67.71820	TGW	67.71840
	10/13/93	10:27	67.71840	TGW	

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Beaker Number	Date	Time	Weight (g)	Analyst	Constant Weight (g)
10/12/93-047	10/12/93	15:48	66.82710	TGW	66.82760
	10/13/93	10:28	66.82760	TGW	
10/12/93-048	10/12/93	15:48	70.79400	TGW	70.79410
	10/13/93	10:28	70.79410	TGW	
10/12/93-049	10/12/93	15:48	70.23330	TGW	70.23340
	10/13/93	10:28	70.23340	TGW	
10/12/93-050	10/12/93	15:48	70.42020	TGW	70.41980
	10/13/93	10:29	70.41980	TGW	
10/12/93-051	10/12/93	15:49	71.02620	TGW	71.02610
	10/13/93	10:29	71.02610	TGW	
10/12/93-052	10/12/93	15:49	67.07980	TGW	67.07960
	10/13/93	10:29	67.07960	TGW	
10/12/93-053	10/12/93	15:49	70.97150	TGW	70.97150
	10/13/93	10:30	70.97150	TGW	
10/12/93-054	10/12/93	15:50	69.96500	TGW	69.96480
	10/13/93	10:30	69.96480	TGW	
10/12/93-055	10/12/93	15:50	67.01460	TGW	67.01410
	10/13/93	10:30	67.01410	TGW	
10/12/93-056	10/12/93	15:50	70.62220	TGW	70.62170
	10/13/93	10:30	70.62170	TGW	
10/12/93-057	10/12/93	15:51	67.89910	TGW	67.89870
	10/13/93	10:31	67.89870	TGW	
10/12/93-058	10/12/93	15:51	67.20780	TGW	67.20750
	10/13/93	10:31	67.20750	TGW	
10/12/93-059	10/12/93	15:51	70.30840	TGW	70.30800
	10/13/93	10:32	70.30800	TGW	
10/12/93-060	10/12/93	15:52	70.62390	TGW	70.62340
	10/13/93	10:32	70.62340	TGW	

**APPENDIX B.4
AMBIENT MONITORING
CALIBRATION DATA**

CALIBRATION DATA SHEET **HIGH VOLUME AIR SAMPLER CALIBRATION**

Unit No.: #1 PRE

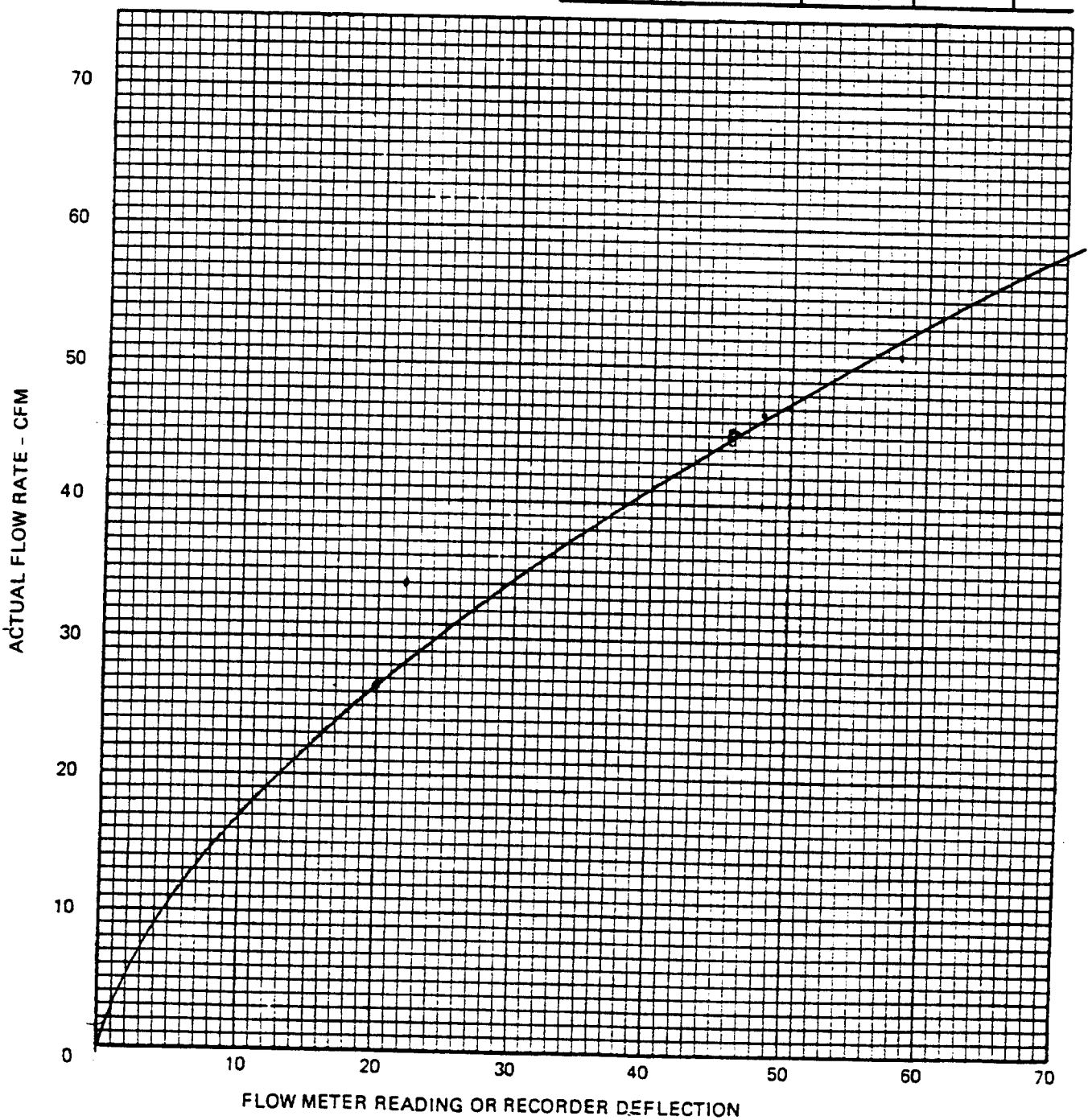
Date: 21 Oct 93

By: B. HAYES Plate

Temp.: 76°F
 Remarks:

At. Press: 28.91

	Indicated	True H ₂ O	Actual cfm
18	5.8	8.78	51
13	4.8	6.78	46.5
10	3.9	5.34	41.5
7	2.2	3.61	34
5	2.0	2.41	26.5
	8.0	11.52	



CALIBRATION DATA SHEET

HIGH VOLUME AIR SAMPLER CALIBRATION

Unit No.: # 2 PRE

Date: 21 Oct 93

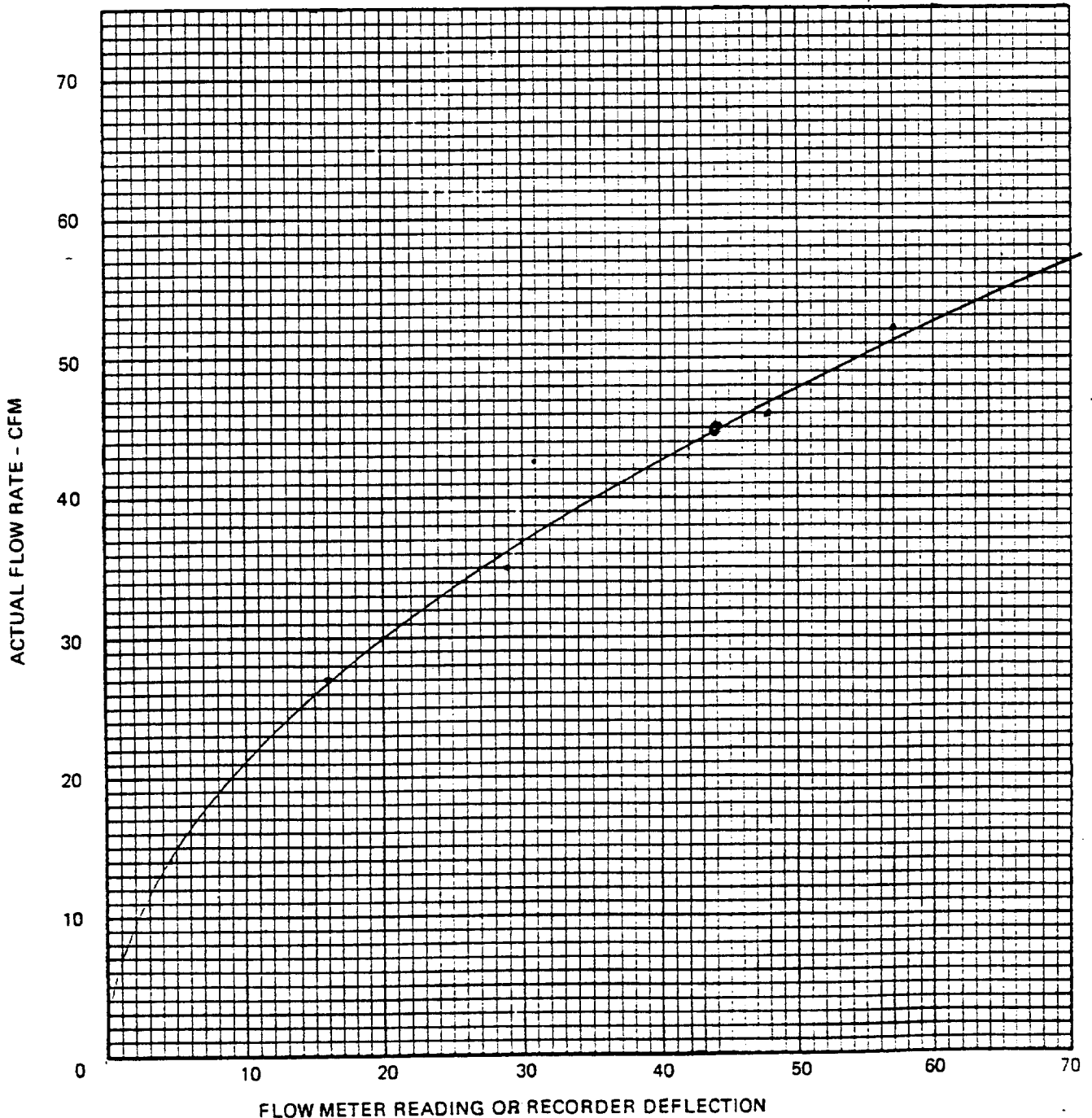
By: B. Hayes

Temp.: 76°F

At. Press: 28.91

Remarks:

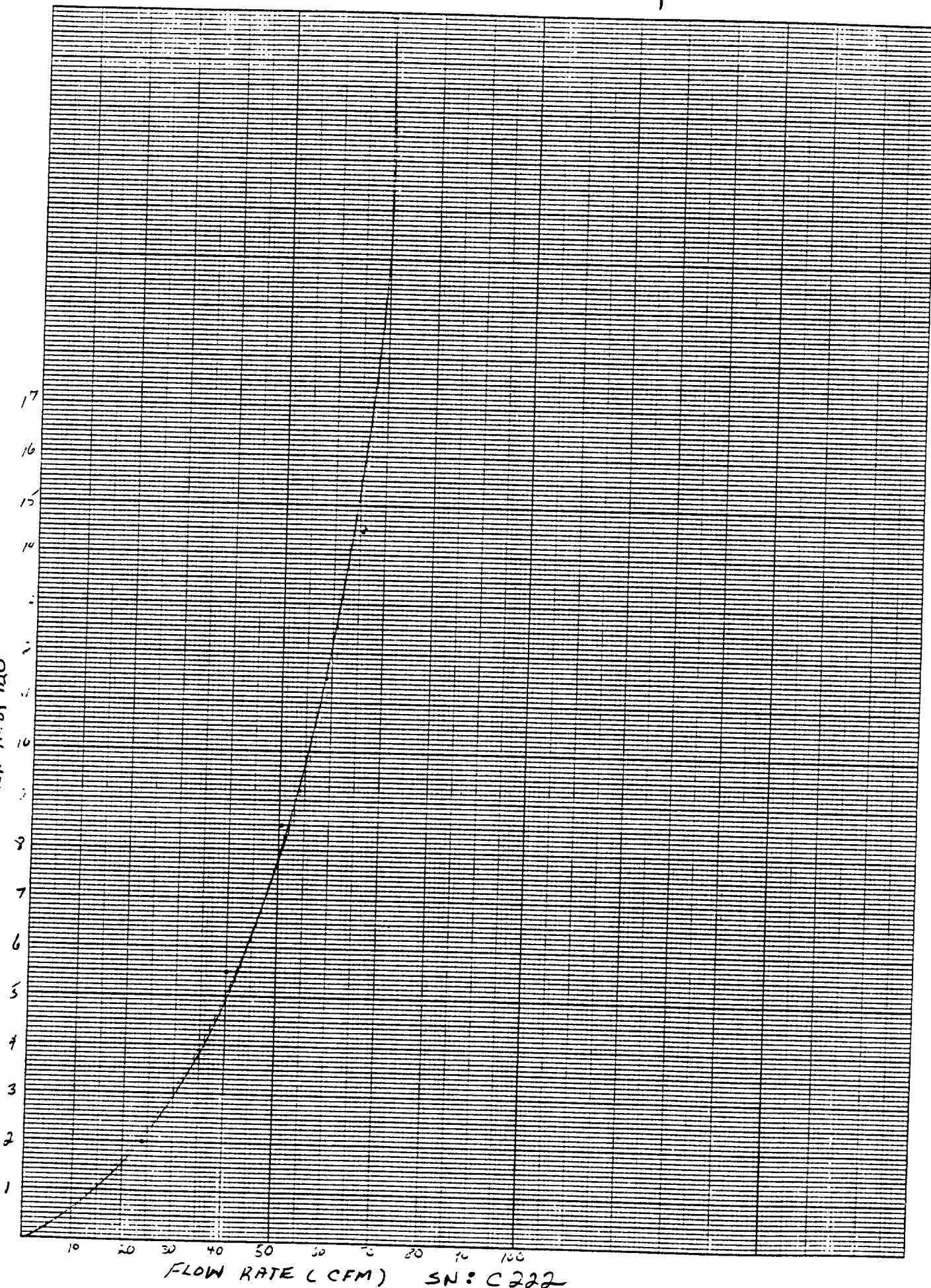
Plate	Indicated	True H ₂ O	Actual cfm
18	5.7	8.65	52.5
13	4.6	7.10	48
10	3.1	5.64	42.5
7	2.4	3.84	35
5	1.6	2.53	27
	8.0	12.49	62



DIETZGEN CORPORATION
MADE IN U.S.A.

NO. 341-M DIETZGEN GRAPH PAPER
MILLIMETER

4H 12. of H₂O



CALIBRATION DATA SHEET HIGH VOLUME AIR SAMPLER CALIBRATION

Unit No.: # / Post

Date: 1 Nov 93

By: DS

Temp.: 72

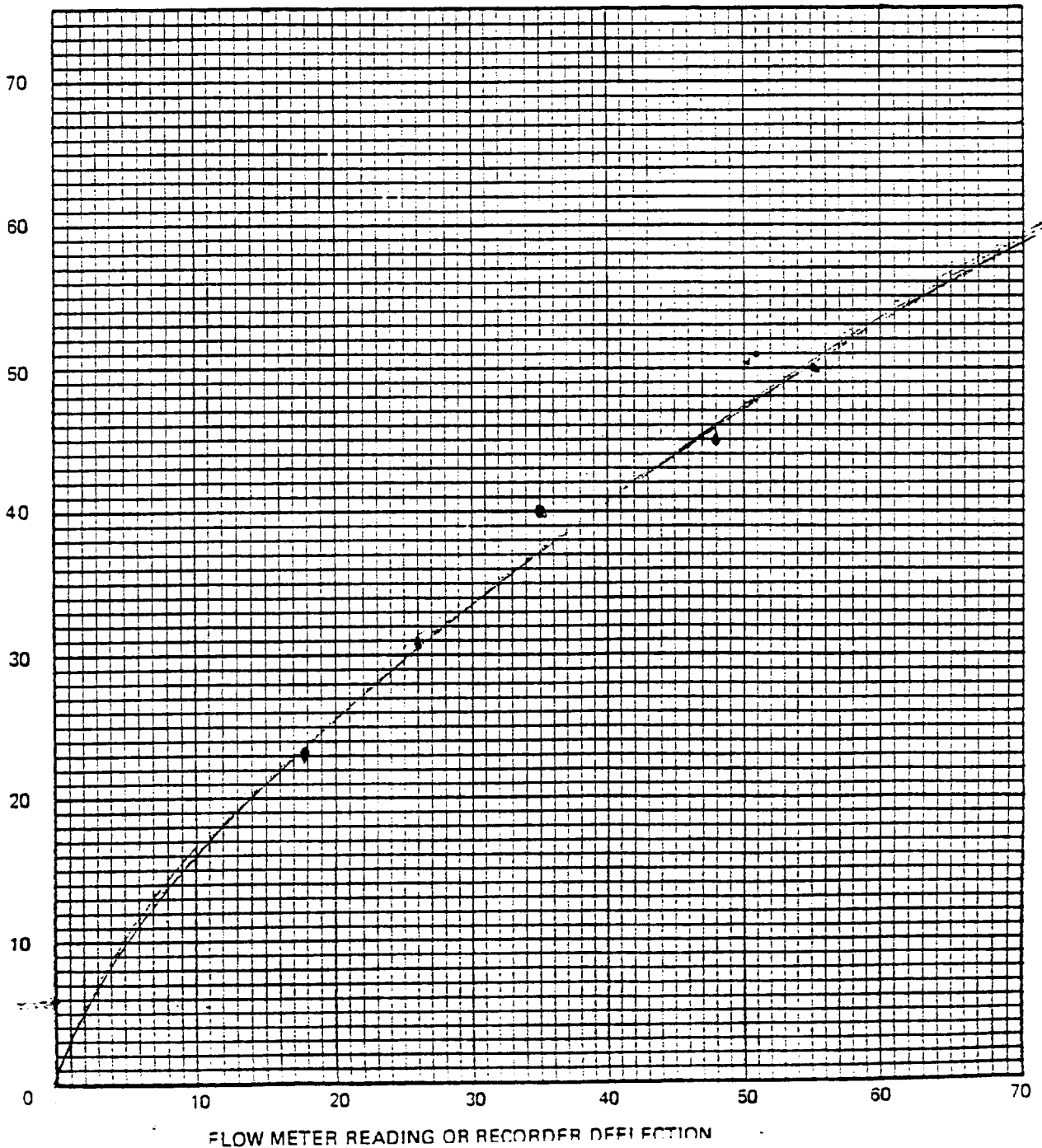
At. Press:

29.14

Remarks:

Plate	Indicated	True H ₂ O	Actual cfm
18	5.5	8.36	50.1
13	4.8-5.79	6.79	50.7 45
10	3.5	5.5	39.5
7	2.55	3.67	30.8
5	1.8	2.40	23
	8.0	12.45	

ACTUAL FLOW RATE - CFM



FLOW METER READING OR RECORDER DEFLECTION

CALIBRATION DATA SHEET HIGH VOLUME AIR SAMPLER CALIBRATION

Unit No.: #2 Post

Date: 1 Nov 93

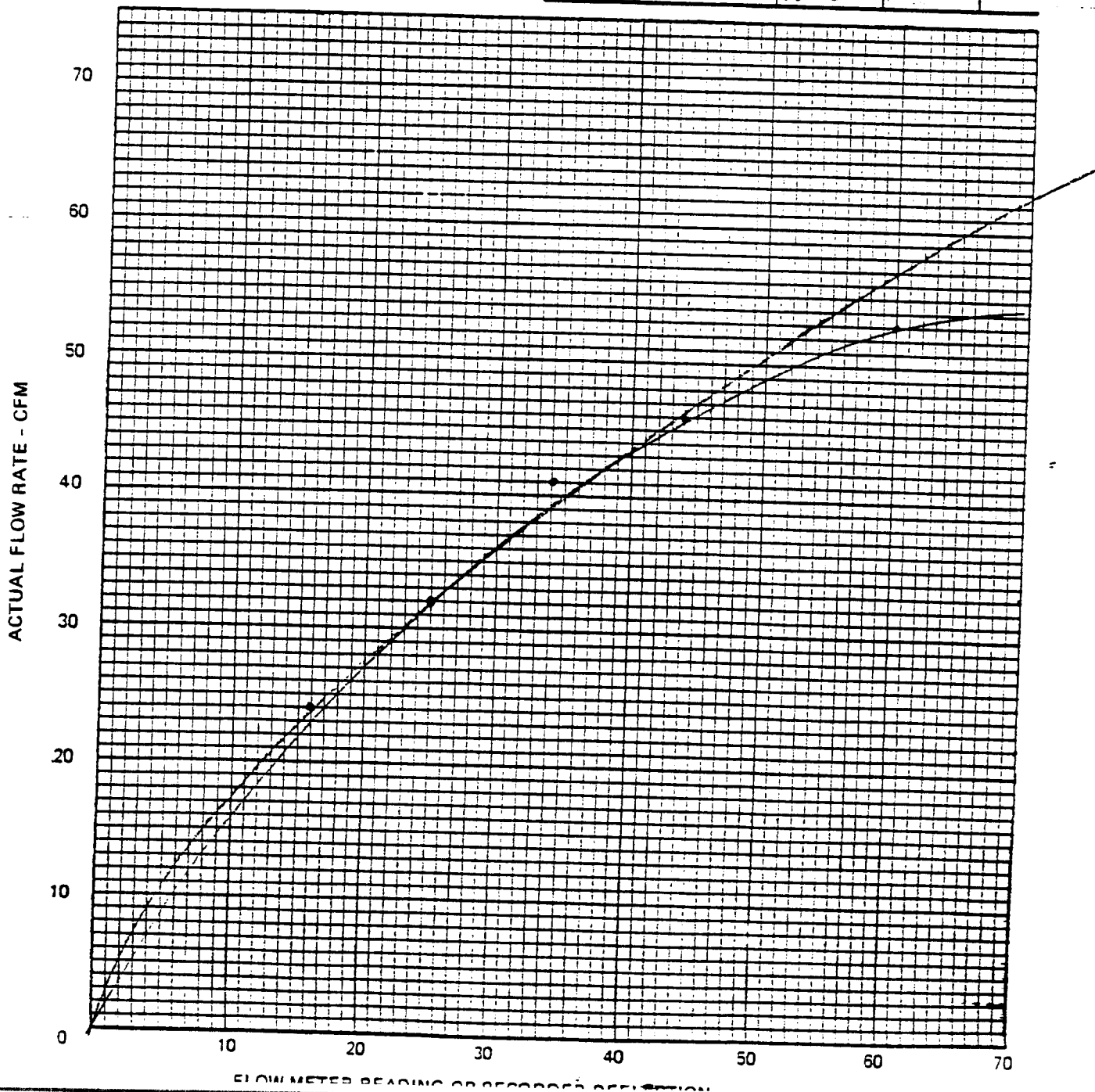
By: CH/DS

Temp.: 72

At. Press: 29.14

Remarks:

Plate	Indicated	True H ₂ O	Actual
18	6	8.72	53
13	4.4	7.30	46
10	3.4	5.76	41
7	2.5	3.91	32
5	1.7	2.65	24
	8.0	12.3	



APPENDIX C.0
PROCESS SAMPLES
GRAVIMETRIC DATA AND RESULTS

SAMPLE WEIGHTS

ETS CONTRACT: 92-655 WA 17
SITE : CONCRETE READY MIX

<u>ETS ID</u>	<u>SAMPLE TYPE</u>	<u>SAMPLE WEIGHT (grams)</u>
6264D	ROAD DUST, TRIANGLE 26'x27'x32' 30' FROM STREET EXIT 10/27/93	8732
6265D	ROAD DUST 37'-3"x14' CONCRETE PAD ADJACENT TO JOHNSON PLANT 10/27/93	2722
6266D	CEMENT FROM TRUCK #11 10/28/93	1247
6267D	FINE AGGREGATE FROM WEST PLANT 10/28/93	1769
6268D	SAND FROM WEST PIT (RIGHT) 10/28/93	1724
6269D	SAND FROM WEST PIT (LEFT) 10/28/93	1633
6270D	AGGREGATE GRAVEL	27442

DUST MOISTURE CONTENT

ETS CONTRACT: 92-655 WA 17
SITE : CONCRETE READY MIX

ETS ID	SAMPLE TYPE	CRUCIBLE INT.WT.	CRUCIBLE+DUST INT.WT.	CRUCIBLE+DUST WT.AFTER DRYING	% MOISTURE
6264D	ROAD DUST, TRIANGLE 26'x27'x32' 30' FROM STREET EXIT	76.9970 65.1363	152.7123 137.2856	152.5143 137.0804	0.26 0.28 AVG. 0.27
6265D	ROAD DUST, 37'-3"x14' CONCRETE PAD	65.3838 66.1275	129.5462 126.8796	128.4968 125.9393	1.64 1.55 AVG. 1.59
6266D	CEMENT FROM TRUCK #11	65.1364 64.0732	130.2178 115.2456	130.1979 115.2286	0.03 0.03 AVG. 0.03
6267D	FINE AGGREGATE (FROM WEST PLANT)	64.9003 65.4786	140.5853 140.8700	138.6811 138.9929	2.52 2.49 AVG. 2.50
6268D	SAND FROM WEST PIT (RIGHT)	65.0585	154.3935	151.4587	3.29
6269D	SAND FROM WEST PIT (LEFT)	76.9015	138.8049	136.7064	3.39 AVG. 3.34
6270D	AGGREGATE GRAVEL (8'x14' CONCRETE SECTION)	65.9243 66.8795	137.9725 147.1476	136.7944 145.9127	1.64 1.54 AVG. 1.59

SIEVE ANALYSIS RESULTS FOR EPA - CONCRETE READY MIX

ETS CONTRACT : 92-655 WA 17
SAMPLE TYPE : ROAD DUST, 26'x 27'x 32' (30' FROM STREET EXIT)
ETS ID : 6264D

AS-IS SAMPLE WT.(grams) :

SAMPLE A : 56.7959

SAMPLE B : 75.5937

SAMPLE C : 70.6173

	<u>SAMPLE</u>	<u>SAMPLE WEIGHT (grams)</u>	<u>PERCENT LESS THAN</u>
<u>18 MESH SAMPLE</u> :	A	19.0025	66.5425
1000 MICRONS	B	23.8097	68.5031
	C	23.3110	66.9897
	AVERAGE		67.3451
<u>20 MESH SAMPLE</u> :	A	1.4110	64.0581
850 MICRONS	B	1.8192	66.0965
	C	1.4813	64.8920
	AVERAGE		65.0156
<u>25 MESH SAMPLE</u> :	A	1.3820	61.6249
710 MICRONS	B	1.9257	63.5491
	C	1.6350	62.5767
	AVERAGE		62.5836
<u>30 MESH SAMPLE</u> :	A	1.4611	59.0523
600 MICRONS	B	2.1185	60.7466
	C	1.8187	60.0013
	AVERAGE		59.9334
<u>35 MESH SAMPLE</u> :	A	2.3333	54.9441
500 MICRONS	B	3.5280	56.0795
	C	2.9181	55.8690
	AVERAGE		55.6309
<u>60 MESH SAMPLE</u> :	A	15.6870	27.3242
250 MICRONS	B	20.9622	28.3495
	C	19.7471	27.9055
	AVERAGE		27.8597
<u>80 MESH SAMPLE</u> :	A	3.8960	20.4645
180 MICRONS	B	5.5725	20.9778
	C	5.2063	20.5329
	AVERAGE		20.6584
<u>100 MESH SAMPLE</u> :	A	1.0411	18.6315
150 MICRONS	B	1.5806	18.8869
	C	1.4574	18.4691
	AVERAGE		18.6625
<u>200 MESH SAMPLE</u> :	A	4.4895	10.7268
75 MICRONS	B	6.1605	10.7374
	C	5.4737	10.7179
	AVERAGE		10.7274

SIEVE ANALYSIS RESULTS FOR EPA - CONCRETE READY MIX

ETS CONTRACT : 92-655 WA 17
SAMPLE TYPE : ROAD DUST, 37-3"x 14' CONCRETE PAD
ETS ID : 6265D

AS-IS SAMPLE WT.(grams) :

SAMPLE A : 82.1849

SAMPLE B : 72.2063

SAMPLE C : 62.3573

	<u>SAMPLE</u>	<u>SAMPLE WEIGHT (grams)</u>	<u>PERCENT LESS THAN</u>
<u>18 MESH SAMPLE</u> :	A	21.8153	73.4558
1000 MICRONS	B	22.2539	69.1801
	C	12.6690	79.6832
	AVERAGE		74.1064
<u>20 MESH SAMPLE</u> :	A	2.1502	70.8395
850 MICRONS	B	1.4680	67.1470
	C	1.5770	77.1542
	AVERAGE		71.7136
<u>25 MESH SAMPLE</u> :	A	2.3734	67.9517
710 MICRONS	B	1.8418	64.5963
	C	1.8035	74.2620
	AVERAGE		68.9367
<u>30 MESH SAMPLE</u> :	A	2.5044	64.9044
600 MICRONS	B	2.8580	60.6382
	C	1.9947	71.0632
	AVERAGE		65.5353
<u>35 MESH SAMPLE</u> :	A	4.1323	59.8763
500 MICRONS	B	3.4920	55.8021
	C	3.1508	66.0104
	AVERAGE		60.5629
<u>60 MESH SAMPLE</u> :	A	23.9319	30.7567
250 MICRONS	B	19.0469	29.4236
	C	19.4349	34.8434
	AVERAGE		31.6746
<u>80 MESH SAMPLE</u> :	A	5.6306	23.9056
180 MICRONS	B	3.5935	24.4469
	C	4.0811	28.2987
	AVERAGE		25.5504
<u>100 MESH SAMPLE</u> :	A	1.4072	22.1934
150 MICRONS	B	1.0544	22.9866
	C	1.2190	26.3438
	AVERAGE		23.8413
<u>200 MESH SAMPLE</u> :	A	8.4801	11.8751
75 MICRONS	B	7.6354	12.4122
	C	8.1139	13.3319
	AVERAGE		12.5397

SIEVE ANALYSIS RESULTS FOR EPA - CONCRETE READY MIX

ETS CONTRACT : 92-655 WA 17
SAMPLE TYPE : CEMENT FROM TRUCK #11
ETS ID : 6266D

AS-IS SAMPLE WT.(grams) :

SAMPLE A : 59.8389
SAMPLE B : 53.2031
SAMPLE C : 54.8493

	<u>SAMPLE</u>	<u>SAMPLE WEIGHT</u> <u>(grams)</u>	<u>PERCENT</u> <u>LESS THAN</u>
<u>18 MESH SAMPLE</u> :	A	0.0000	100.0000
1000 MICRONS	B	0.0000	100.0000
	C	0.0000	100.0000
	AVERAGE		100.0000
<u>20 MESH SAMPLE</u> :	A	0.0000	100.0000
850 MICRONS	B	0.0000	100.0000
	C	0.0000	100.0000
	AVERAGE		100.0000
<u>25 MESH SAMPLE</u> :	A	0.0000	100.0000
710 MICRONS	B	0.0000	100.0000
	C	0.0000	100.0000
	AVERAGE		100.0000
<u>30 MESH SAMPLE</u> :	A	0.0000	100.0000
600 MICRONS	B	0.0000	100.0000
	C	0.0000	100.0000
	AVERAGE		100.0000
<u>35 MESH SAMPLE</u> :	A	0.0000	100.0000
500 MICRONS	B	0.0000	100.0000
	C	0.0000	100.0000
	AVERAGE		100.0000
<u>60 MESH SAMPLE</u> :	A	0.0076	99.9873
250 MICRONS	B	0.0000	100.0000
	C	0.0460	99.9161
	AVERAGE		99.9678
<u>80 MESH SAMPLE</u> :	A	0.0000	99.9873
180 MICRONS	B	0.0000	100.0000
	C	0.0000	99.9161
	AVERAGE		99.9678
<u>100 MESH SAMPLE</u> :	A	11.0501	81.5209
150 MICRONS	B	13.6612	74.3225
	C	6.7963	87.5253
	AVERAGE		81.1229
<u>200 MESH SAMPLE</u> :	A	35.6621	21.9240
75 MICRONS	B	29.0648	19.6926
	C	30.7037	31.5470
	AVERAGE		24.3879

SIEVE ANALYSIS RESULTS FOR EPA - CONCRETE READY MIX

ETS CONTRACT : 92-655 WA 17
SAMPLE TYPE : FINE AGGREGATE FROM WEST PLANT
ETS ID : 6267D

AS-IS SAMPLE WT.(grams) :

SAMPLE A : 77.5174
SAMPLE B : 66.8933
SAMPLE C : 68.0640

	<u>SAMPLE</u>	<u>SAMPLE WEIGHT (grams)</u>	<u>PERCENT LESS THAN</u>
<u>18 MESH SAMPLE</u> :	A	50.8833	34.3589
1000 MICRONS	B	42.8149	35.9952
	C	43.4327	36.1884
	AVERAGE		35.5142
<u>20 MESH SAMPLE</u> :	A	5.0689	27.8198
850 MICRONS	B	4.2186	29.6888
	C	3.8320	30.5584
	AVERAGE		29.3557
<u>25 MESH SAMPLE</u> :	A	4.7681	21.6688
710 MICRONS	B	4.0183	23.6817
	C	4.5066	23.9373
	AVERAGE		23.0960
<u>30 MESH SAMPLE</u> :	A	3.5406	17.1013
600 MICRONS	B	3.5118	18.4319
	C	3.2352	19.1842
	AVERAGE		18.2391
<u>35 MESH SAMPLE</u> :	A	3.2089	12.9617
500 MICRONS	B	3.0732	13.8377
	C	3.2882	14.3531
	AVERAGE		13.7175
<u>60 MESH SAMPLE</u> :	A	6.3524	4.7669
250 MICRONS	B	6.9437	3.4574
	C	6.7843	4.3856
	AVERAGE		4.2033
<u>80 MESH SAMPLE</u> :	A	0.9176	3.5832
180 MICRONS	B	0.9416	2.0498
	C	0.9304	3.0186
	AVERAGE		2.8839
<u>100 MESH SAMPLE</u> :	A	0.2441	3.2683
150 MICRONS	B	0.2174	1.7248
	C	0.2531	2.6468
	AVERAGE		2.5466
<u>200 MESH SAMPLE</u> :	A	0.6842	2.3857
75 MICRONS	B	0.3034	1.2713
	C	0.3818	2.0858
	AVERAGE		1.9143

SIEVE ANALYSIS RESULTS FOR EPA - CONCRETE READY MIX

ETS CONTRACT : 92-655 WA 17
SAMPLE TYPE : SAND FROM WEST PIT
ETS ID : 6268D AND 6269D

AS-IS SAMPLE WT.(grams) :

SAMPLE A : 70.6354
SAMPLE B : 63.4211
SAMPLE C : 78.1398

	<u>SAMPLE</u>	<u>SAMPLE WEIGHT (grams)</u>	<u>PERCENT LESS THAN</u>
<u>18 MESH SAMPLE</u> :	A	1.2350	98.2516
<u>1000 MICRONS</u>	B	1.1861	98.1298
	C	0.8606	98.8986
	AVERAGE		98.4267
<u>20 MESH SAMPLE</u> :	A	0.6705	97.3023
<u>850 MICRONS</u>	B	0.8005	96.8676
	C	0.6972	98.0064
	AVERAGE		97.3921
<u>25 MESH SAMPLE</u> :	A	1.4945	95.1865
<u>710 MICRONS</u>	B	1.6296	94.2981
	C	1.3886	96.2293
	AVERAGE		95.2380
<u>30 MESH SAMPLE</u> :	A	2.6822	91.3893
<u>600 MICRONS</u>	B	2.7597	89.9467
	C	2.7521	92.7073
	AVERAGE		91.3478
<u>35 MESH SAMPLE</u> :	A	6.2005	82.6111
<u>500 MICRONS</u>	B	6.8064	79.2146
	C	7.5799	83.0069
	AVERAGE		81.6109
<u>60 MESH SAMPLE</u> :	A	49.5070	12.5230
<u>250 MICRONS</u>	B	43.5150	10.6018
	C	51.7435	16.7877
	AVERAGE		13.3042
<u>80 MESH SAMPLE</u> :	A	6.6744	3.0740
<u>180 MICRONS</u>	B	5.2939	2.2546
	C	9.0655	5.1861
	AVERAGE		3.5049
<u>100 MESH SAMPLE</u> :	A	0.6283	2.1845
<u>150 MICRONS</u>	B	0.4368	1.5659
	C	0.9527	3.9669
	AVERAGE		2.5724
<u>200 MESH SAMPLE</u> :	A	0.3668	1.6652
<u>75 MICRONS</u>	B	0.2131	1.2299
	C	0.6196	3.1739
	AVERAGE		2.0230

SIEVE ANALYSIS RESULTS FOR EPA - CONCRETE READY MIX

ETS CONTRACT : 92-655 WA 17
SAMPLE TYPE : AGGREGATE GRAVEL
ETS ID : 6270D

AS-IS SAMPLE WT.(grams) :
SAMPLE A : 102.0140
SAMPLE B : 102.0612
SAMPLE C : 93.0281

	<u>SAMPLE</u>	<u>SAMPLE WEIGHT (grams)</u>	<u>PERCENT LESS THAN</u>
<u>18 MESH SAMPLE</u> :	A	101.8632	0.1478
1000 MICRONS	B	101.9908	0.0690
	C	92.9358	0.0992
	AVERAGE		0.1053
<u>20 MESH SAMPLE</u> :	A	0.0113	0.1367
850 MICRONS	B	0.0264	0.0431
	C	0.0057	0.0931
	AVERAGE		0.0910
<u>25 MESH SAMPLE</u> :	A	0.0000	0.1367
710 MICRONS	B	0.0000	0.0431
	C	0.0000	0.0931
	AVERAGE		0.0910
<u>30 MESH SAMPLE</u> :	A	0.0000	0.1367
600 MICRONS	B	0.0000	0.0431
	C	0.0000	0.0931
	AVERAGE		0.0910
<u>35 MESH SAMPLE</u> :	A	0.0000	0.1367
500 MICRONS	B	0.0000	0.0431
	C	0.0000	0.0931
	AVERAGE		0.0910
<u>60 MESH SAMPLE</u> :	A	0.0000	0.1367
250 MICRONS	B	0.0000	0.0431
	C	0.0000	0.0931
	AVERAGE		0.0910
<u>80 MESH SAMPLE</u> :	A	0.0000	0.1367
180 MICRONS	B	0.0000	0.0431
	C	0.0000	0.0931
	AVERAGE		0.0910
<u>100 MESH SAMPLE</u> :	A	0.0000	0.1367
150 MICRONS	B	0.0000	0.0431
	C	0.0000	0.0931
	AVERAGE		0.0910
<u>200 MESH SAMPLE</u> :	A	0.0000	0.1367
75 MICRONS	B	0.0000	0.0431
	C	0.0000	0.0931
	AVERAGE		0.0910

APPENDIX D
CEMENT SILO FILLING APPENDICES

APPENDIX D.1
CEMENT SILO FILLING DATA AND RESULTS

**SUMMARY OF PARTICULATE AND METALS EMISSIONS
CONCRETE READY MIXED CORPORATION
CASE 1**

CEMENT SILO OUTLET

RUN I.D.	CSO-M201A-R1	CSO-M201A-R2	CSO-M201A-R3	AVERAGE
DATE	10/26/93	10/27/93	10/28/93	
TIME STARTED	12:45	08:15	08:40	
TIME ENDED	16:39	14:41	15:18	

SAMPLING PARAMETERS

Metered Volume - dcf	49.676	46.377	78.766	64.221
Corrected Volume - dscf	49.770	48.284	79.101	64.435
Total Test Time - min	122.7	124.8	185	153.6
% Isokinetics	109.9	106.8	111.4	110.6
D50	10.64	10.82	10.22	10.43

GAS PARAMETERS

Gas Temperature - oF	57.4	57.0	47.3	52.3
Oxygen - %	20.9	20.9	20.9	20.9
Carbon Dioxide - %	0.0	0.0	0.0	0.0
Moisture - %*	0.36	1.86	0.00	0.18

GAS FLOWRATE

Velocity - ft/sec	7.25	7.26	7.47	7.36
Actual Volume - acfm	342	342	352	347
Standard Volume - dscfm	350	343	365	357

PM10 EMISSIONS

Concentration - gr/dscf	5.49E-03	5.53E-03	4.25E-03	4.87E-03
Mass Rate - lb/hr	0.016	0.016	0.013	0.015

PM>10 MICRONS EMISSIONS

Concentration - gr/dscf	2.11E-03	1.67E-03	9.28E-04	1.52E-03
Mass Rate - lb/hr	0.006	0.005	0.003	0.005

TOTAL PM

Concentration - gr/dscf	7.60E-03	7.20E-03	5.18E-03	6.39E-03
Mass Rate - lb/hr	0.023	0.021	0.016	0.019

METALS EMISSIONS - lb/hr

Arsenic				4.74E-07
Beryllium				7.90E-09
Cadmium				0.00E+00
Chromium				5.53E-07
Lead				2.58E-07
Manganese				3.68E-06
Mercury				0.00E+00
Nickel				5.26E-07
Phosphorus				0.00E+00
Selenium				0.00E+00

*%Moisture for CSO-M201A-R3 assumed to be zero due to negative volume gain in the impingers.

SUMMARY OF PARTICULATE AND METALS EMISSIONS
CONCRETE READY MIXED CORPORATION
CASE 2

CEMENT SILO OUTLET

RUN I.D.	CSO-M201A-R1	CSO-M201A-R2	CSO-M201A-R3	AVERAGE
DATE	10/26/93	10/27/93	10/28/93	
TIME STARTED	12:45	08:15	08:40	
TIME ENDED	16:39	14:41	15:18	

SAMPLING PARAMETERS

Metered Volume - dcf	49.676	46.377	78.766	64.221
Corrected Volume - dscf	49.770	48.284	79.101	64.435
Total Test Time - min	122.7	124.8	184.5	153.6
% Isokinetics	109.9	106.8	111.4	110.6
D50	10.64	10.82	10.22	10.43

GAS PARAMETERS

Gas Temperature - oF	57.4	57.0	47.3	52.3
Oxygen - %	20.9	20.9	20.9	20.9
Carbon Dioxide - %	0.0	0.0	0.0	0.0
Moisture - %	0.36	1.86	0.00	0.18

GAS FLOWRATE

Velocity - ft/sec	7.25	7.26	7.47	7.36
Actual Volume - acfm	342	342	352	347
Standard Volume - dscfm	350	343	365	357

PM10 EMISSIONS

Concentration - gr/dscf	5.49E-03	5.53E-03	4.25E-03	4.87E-03
Mass Rate - lb/hr	0.016	0.016	0.013	0.015

PM>10 MICRONS EMISSIONS

Concentration - gr/dscf	2.11E-03	1.67E-03	9.28E-04	1.52E-03
Mass Rate - lb/hr	0.006	0.005	0.003	0.005

TOTAL PM

Concentration - gr/dscf	7.60E-03	7.20E-03	5.18E-03	6.39E-03
Mass Rate - lb/hr	0.023	0.021	0.016	0.019

METALS EMISSIONS - lb/hr

Arsenic	_____	_____	_____	0.00E+00
Beryllium	_____	_____	_____	1.32E-08
Cadmium	_____	_____	_____	0.00E+00
Chromium	_____	_____	_____	5.53E-07
Lead	_____	_____	_____	2.58E-07
Manganese	_____	_____	_____	3.68E-06
Mercury	_____	_____	_____	0.00E+00
Nickel	_____	_____	_____	1.05E-06
Phosphorus	_____	_____	_____	0.00E+00
Selenium	_____	_____	_____	0.00E+00

*%Moisture for CSO-M201A-R3 assumed to be zero due to negative volume gain in the impingers.

RUN NUMBER

CSO-M201A-R1

DATE 10/26/93
 START TIME 12:45
 END TIME 16:39
 STACK DIAM. 12 inches
 NOZZLE I.D. 0.390 inches
 METER BOX GAMMA 0.9848
 METER BOX dH@ 1.8515
 BAROMETRIC 30.12 in.Hg
 Cp 0.84
 TEST DURATION 123 minutes

METHOD 4 DATA

	INIT. (ml)	FINAL (ml)	NET (ml)
IMP.1	100.0	90.0	-10.0
IMP.2	100.0	100.0	0.0
IMP.3	0.0	0.0	0.0
IMP.4			0.0
IMP.5			0.0
IMP.6			0.0
IMP.7			0.0
TOTAL	200.0	190.0	-10.0
S.G.	200.0	213.8	13.8

SAMPLING RESULTS

Metered Volume 49.676 dcf
 Metered Volume 1.407 dcm
 Volume @ Std.Cond. 49.770 dscf
 Volume @ Std.Cond. 1.409 dscm
 % Water 0.36 %
 % Isokinetics 109.9 %

METHOD 3 DATA

		Md	
%O2	20.9		28.84
%CO2	0.0	Ms	28.80
%CO	0.0	Ps	30.12
%N2	79.1		
O2+CO2	10.0		

VOLUMETRIC RESULTS - USENG

Velocity 7.25 ft/sec
 Actual Flow 342 acfm
 Std. Flow 351 scfm
 Dry Std. Flow 350 dscfm

VOLUMETRIC RESULTS - SI

Velocity 2.21 m/sec
 Actual Flow 581 am3/hr
 Std. Flow 596 sm3/hr
 Dry Std. Flow 594 dsm3/hr

POINT	STACK TEMP	STATIC (in.WC)	DP (in.WC)	DH (in.WC)	METER VOLUME (dcf)	METER TEMPERATURE	
	(DegF)					INLET (DegF)	OUTLET (DegF)
1	57	0.018	0.024	0.63	452.413	62	61
2	58	0.020	0.018	0.63		66	65
3	58		0.021	0.63		68	65
4	57		0.015	0.63		71	67
5	57		0.009	0.63		69	65
6	58		0.011	0.63		72	66
7	57		0.022	0.63		71	67
8	57		0.024	0.63		57	57
9	58		0.022	0.63		57	57
10	58		0.014	0.63		57	56
11	57		0.011	0.63		61	55
12	57		0.019	0.63		63	58
13						502.089	
AVG.	57	0.019	0.018	0.63	49.676	63	

EPA METHOD 201A ANALYSES

RUN I.D.

CSO-M201A-R1

SUMMARY

<u>COMPONENT</u>	<u>NET</u> <u>(grams)</u>	<u>CORRECTED</u> <u>FOR BLANK</u> <u>(grams)</u>
PM10:		
Probe Wash <= 10 microns	0.00370	0.00272
Filter	0.01498	0.01498
TOTAL PM10	0.01868	0.01770
PM (>10 Microns):		
Probe Wash > 10 microns	0.00780	0.00682
TOTAL PM	0.02648	0.02452

ANALYTICAL DATA**METHOD 201A COMPONENTS:**

	<u>TARE</u> <u>(grams)</u>	<u>FINAL</u> <u>(grams)</u>	<u>NET</u> <u>(grams)</u>	<u>VOLUME</u> <u>(ml)</u>
Filter	0.53412	0.54910	0.01498	NA
Probe Wash Residue <= PM10	70.33450	70.33820	0.00370	125.0
Acetone Blank Residue	66.82760	66.83100	0.00340	125.0
Applicable Acetone Blank			0.00340	125.0
Max. Allowable Blank			0.00098	NA
Probe Wash Residue > PM10	67.11600	67.12380	0.00780	125.0
Acetone Blank Residue	67.71840	67.72150	0.00310	125.0
Applicable Acetone Blank			0.00310	125
Max. Allowable Blank			0.00098	NA

PARTICULATE EMISSIONS:

	<u>PM10</u>	<u>PM>10 microns</u>	<u>TOTAL PM</u>
Actual Grain Loading (gr/dscf)	0.00549	0.00211	0.00760
Mass Rate (lb/hr)	0.016	0.006	0.023

D50 Calculations

RUN I.D. CSO-M201A-R1

Stack Gas Viscosity (micropoise)	177.6728
Cyclone Flow Rate (dscf/min)	0.405622
Cyclone Flow Rate (acfm)	0.396405
D50	10.64305

dPmin and dPmax Calculations

Stack Gas Viscosity (micropoise)	178.0208
Cyclone Flow Rate (acfm)	0.433669

Dn	vn	vmin	vmax	dPmin	dPmax
0.136	71.65288	60.44804	88.32392	1.188146	2.536659
0.15	58.90185	50.52782	73.24517	0.933790	1.962212
0.164	49.27468	43.09207	61.90839	0.679177	1.401803
0.18	40.90406	36.68012	52.10107	0.492096	0.992844
0.197	34.14908	31.55440	44.23525	0.364173	0.715690
0.215	28.67045	27.43827	37.90034	0.275360	0.525381
0.233	24.41179	24.26939	33.01312	0.215430	0.398622
0.264	19.01532	20.29726	26.88189	0.150682	0.264306
0.3	14.72546	17.17214	22.07062	0.107854	0.178163
0.342	11.33077	14.70705	18.30800	0.079111	0.122594
0.39	8.71329	12.78981	15.42806	0.059830	0.087058

RUN NUMBER
CSO-M201A-R2

DATE 10/27/93
START TIME 08:15
END TIME 14:41
STACK DIAM. 12 inches
NOZZLE I.D. 0.390 inches
METER BOX GAMMA 0.9848
METER BOX dH@ 1.8515
BAROMETRIC 29.97 in.Hg
Cp 0.84
TEST DURATION 125 minutes

METHOD 4 DATA

	INIT. (ml)	FINAL (ml)	NET (ml)
IMP.1	100.0	108.0	8.0
IMP.2	100.0	98.0	-2.0
IMP.3	0.0	0.0	0.0
IMP.4			0.0
IMP.5			0.0
IMP.6			0.0
IMP.7			0.0
TOTAL	200.0	206.0	6.0
S.G.	200.0	213.5	13.4

SAMPLING RESULTS

Metered Volume 46.377 dcf
Metered Volume 1.313 dcm
Volume @ Std.Cond. 48.284 dscf
Volume @ Std.Cond. 1.367 dscm
% Water 1.86 %
% Isokinetics 106.85 %

METHOD 3 DATA

%O2	20.9	Md	28.84
%CO2	0.0	Ms	28.63
%CO	0.0	Ps	29.97
%N2	79.1		
O2+CO2	20.9		

VOLUMETRIC RESULTS - USENG

Velocity	7.26	ft/sec	
Actual Flow	342	acfm	
Std. Flow	350	scfm	
Dry Std. Flow	343	dscfm	

VOLUMETRIC RESULTS - SI

Velocity	2.21	m/sec
Actual Flow	581	am3/hr
Std. Flow	594	sm3/hr
Dry Std. Flow	583	dsm3/hr

POINT	STACK TEMP	STATIC (in.WC)	DP (in.WC)	DH (in.WC)	METER	METER TEMPERATURE	
	VOLUME (dcf)				INLET (DegF)	OUTLET (DegF)	
1	57	0.021	0.022	0.63	502.909	43	43
2	57		0.016	0.63		43	43
3	57		0.013	0.63		50	45
4	57		0.017	0.63		55	47
5	58		0.014	0.63		58	50
6	58		0.016	0.63		88	79
7	57		0.024	0.63		87	79
8	57		0.021	0.63		88	82
9	58		0.016	0.63			
10	58		0.017	0.63			
11	57		0.015	0.63			
12	58		0.014	0.63			
13					549.286		
AVG.	57	0.021	0.017	0.63	46.377		41

EPA METHOD 201A ANALYSES

RUN I.D.

CSO-M201A-R2

SUMMARY

<u>COMPONENT</u>	<u>NET</u> <u>(grams)</u>	<u>CORRECTED</u> <u>FOR BLANK</u> <u>(grams)</u>
PM10:		
Probe Wash <= 10 microns	0.00450	0.00360
Filter	0.01371	0.01371
TOTAL PM10	0.01821	0.01731
PM (>10 Microns):		
Probe Wash > 10 microns	0.00610	0.00524
TOTAL PM	0.02431	0.02254

ANALYTICAL DATA**METHOD 201A COMPONENTS:**

	<u>TARE</u> <u>(grams)</u>	<u>FINAL</u> <u>(grams)</u>	<u>NET</u> <u>(grams)</u>	<u>VOLUME</u> <u>(ml)</u>
Filter	0.53569	0.54940	0.01371	NA
Probe Wash Residue <= PM10	67.12190	67.12640	0.00450	115.0
Acetone Blank Residue	66.82760	66.83100	0.00340	125.0
Applicable Acetone Blank			0.00313	115.0
Max. Allowable Blank			0.00090	NA
Probe Wash Residue > PM10	70.06510	70.07120	0.00610	110.0
Acetone Blank Residue	67.71840	67.72150	0.00310	125.0
Applicable Acetone Blank			0.00273	110
Max. Allowable Blank			0.00086	NA

PARTICULATE EMISSIONS:

	<u>PM10</u>	<u>PM>10 microns</u>	<u>TOTAL PM</u>
Actual Grain Loading (gr/dscf)	0.00553	0.00167	0.00720
Mass Rate (lb/hr)	0.016	0.005	0.021

D50 Calculations

RUN I.D. CSO-M201A-R2

Stack Gas Viscosity (micropoise)	176.5558
Cyclone Flow Rate (dscf/min)	0.386888
Cyclone Flow Rate (acfm)	0.385821
D50	10.82500

dPmin and dPmax Calculations

Stack Gas Viscosity (micropoise)	176.9022
Cyclone Flow Rate (acfm)	0.432302

Dn	vn	vmin	vmax	dPmin	dPmax
0.136	71.42712	60.24813	88.03846	1.167771	2.493535
0.15	58.71627	50.35845	73.00658	0.815859	1.714726
0.164	49.11942	42.94547	61.70494	0.593342	1.224928
0.18	40.77519	36.55307	51.92788	0.429851	0.867505
0.197	34.04149	31.44292	44.08625	0.318065	0.625283
0.215	28.58012	27.33927	37.77074	0.240461	0.458967
0.233	24.33487	24.17999	32.89844	0.188097	0.348194
0.264	18.95541	20.21996	26.78587	0.131532	0.230825
0.3	14.67907	17.10450	21.98925	0.094122	0.155558
0.342	11.29507	14.64721	18.23818	0.069021	0.107012
0.39	8.68584	12.73626	15.36722	0.052186	0.075973

RUN NUMBER

CSO-M201A-R3

DATE 10/28/93
 START TIME 08:40
 END TIME 15:18
 STACK DIAM. 12 inches
 NOZZLE I.D. 0.390 inches
 METER BOX GAMMA 0.9848
 METER BOX dH@ 1.8517
 BAROMETRIC 29.80 in.Hg
 Cp 0.84
 TEST DURATION 185 minutes

METHOD 4 DATA

	INIT. (ml)	FINAL (ml)	NET (ml)
IMP.1	100.0	86.0	-14.0
IMP.2	100.0	92.0	-8.0
IMP.3	0.0	0.0	0.0
IMP.4			0.0
IMP.5			0.0
IMP.6			0.0
IMP.7			0.0
TOTAL	200.0	178.0	-22.0
S.G.	200.0	220.9	20.9

SAMPLING RESULTS

Metered Volume 78.766 dcf
 Metered Volume 2.230 dcm
 Volume @ Std.Cond. 79.101 dscf
 Volume @ Std.Cond. 2.240 dscm
 % Water* 0.00 %
 % Isokinetics 111.4 %

METHOD 3 DATA

%O2	20.9	Md	28.84
%CO2	0.0	Ms	28.84
%CO	0.0	Ps	29.80
%N2	79.1		
O2+CO2	20.9		

VOLUMETRIC RESULTS - USENG

Velocity 7.47 ft/sec
 Actual Flow 352 acfm
 365 scfm
 Dry Std. Flow 365 dscfm

VOLUMETRIC RESULTS - SI

Velocity 2.28 m/sec
 Actual Flow 598 am3/hr
 Std. Flow 620 sm3/hr
 Dry Std. Flow 620 dsm3/hr

POINT	STACK TEMP	STATIC (in.WC)	DP (in.WC)	DH (in.WC)	METER VOLUME (dcf)	METER TEMPERATURE	
	(DegF)					INLET (DegF)	OUTLET (DegF)
1	46	0.017	0.022	0.61	558.421	42	42
2	47	0.018	0.024	0.61		48	47
3	47		0.020	0.61		50	48
4	48		0.015	0.61		49	46
5	47		0.017	0.61		56	50
6	48		0.013	0.61		60	52
7	48		0.024	0.61		62	54
8	48		0.023	0.61		66	62
9	48		0.017	0.61		76	68
10	47		0.017	0.61		79	68
11	47		0.014	0.61			
12	46		0.016	0.61			
13						637.187	
AVG.	47	0.018	0.019	0.61	78.766	56	

*%Moisture assumed to be zero due to negative volume gain in the impingers.

EPA METHOD 201A ANALYSES

RUN I.D.

CSO-M201A-R3

SUMMARY

<u>COMPONENT</u>	<u>NET</u> <u>(grams)</u>	<u>CORRECTED</u> <u>FOR BLANK</u> <u>(grams)</u>
PM10:		
Probe Wash <= 10 microns	0.00230	0.00136
Filter	0.02045	0.02045
TOTAL PM10	0.02275	0.02181
PM (>10 Microns):		
Probe Wash > 10 microns	0.00570	0.00476
TOTAL PM	0.02845	0.02657

ANALYTICAL DATA**METHOD 201A COMPONENTS:**

	<u>TARE</u> <u>(grams)</u>	<u>FINAL</u> <u>(grams)</u>	<u>NET</u> <u>(grams)</u>	<u>VOLUME</u> <u>(ml)</u>
Filter	0.53665	0.55710	0.02045	NA
Probe Wash Residue <= PM10	70.13920	70.14150	0.00230	120.0
Acetone Blank Residue	66.82760	66.83100	0.00340	125.0
Applicable Acetone Blank			0.00326	120.0
Max. Allowable Blank			0.00094	NA
Probe Wash Residue > PM10	70.18570	70.19140	0.00570	120.0
Acetone Blank Residue	67.71840	67.72150	0.00310	125.0
Applicable Acetone Blank			0.00298	120
Max. Allowable Blank			0.00094	NA

PARTICULATE EMISSIONS:

	<u>PM10</u>	<u>PM>10 microns</u>	<u>TOTAL PM</u>
Actual Grain Loading (gr/dscf)	0.00425	0.00093	0.00518
Mass Rate (lb/hr)	0.013	0.003	0.016

D50 Calculations

RUN I.D. CSO-M201A-R3

Stack Gas Viscosity (micropoise)	175.4951
Cyclone Flow Rate (dscf/min)	0.428731
Cyclone Flow Rate (acfm)	0.413424
D50	10.21807

dPmin and dPmax Calculations

Stack Gas Viscosity (micropoise)	175.6562
Cyclone Flow Rate (acfm)	0.426585

Dn	vn	vmin	vmax	dPmin	dPmax
0.136	70.48253	59.46990	86.88826	1.162145	2.480779
0.15	57.93977	49.71243	72.05641	0.812075	1.706126
0.164	48.46984	42.39876	60.90538	0.590707	1.218926
0.18	40.23595	36.09218	51.25886	0.428048	0.863384
0.197	33.59130	31.05075	43.52210	0.316818	0.622423
0.215	28.20216	27.00232	37.29121	0.239590	0.456961
0.233	24.01306	23.88556	32.48429	0.187472	0.346747
0.264	18.70473	19.97872	26.45384	0.131160	0.229955
0.3	14.48494	16.90483	21.72164	0.093905	0.155043
0.342	11.14569	14.47997	18.02078	0.068897	0.106712
0.39	8.57097	12.59380	15.18796	0.052117	0.075799

SUMMARY OF METALS EMISSIONS
CASE 1 CALCULATIONS (1)

CONCRETE READY MIXED CORPORATION
CEMENT SILO OUTLET

RUN NUMBER (2): **CSO-M201A-R1,2,3**
 COMBINED VOLUME (3) 177.154 dscf
 AVG. GAS FLOWRATE: 353 dscfm

<u>COMPONENT</u>		LABORATORY DATA			METAL EMISSIONS	
		SAMPLE CATCH - micrograms			CONC.	MASS RATE
		<u>SAMPLE</u>	<u>BLANK</u>	<u>TOTAL</u>	<u>ug/dscm</u>	<u>lb/hr</u>
Arsenic	As	* 2.00	* 0.20	1.8	0.3588	4.74E-07
Beryllium	Be	0.05	* 0.02	0.03	0.0060	7.90E-09
Cadmium	Cd	* 0.01	0.01	0	0.0000	0.00E+00
Chromium	Cr	4.00	1.90	2.1	0.4186	5.53E-07
Lead	Pb	1.68	0.70	0.98	0.1954	2.58E-07
Manganese	Mn	14.60	0.60	14	2.7908	3.69E-06
Mercury	Hg	* 0.20	* 0.20	0.00	0.0000	0.00E+00
Nickel	Ni	4.00	* 2.00	2	0.3987	5.27E-07
Phosphorus	P	* 100.00	* 100.00	0	0.0000	0.00E+00
Selenium	Se	* 0.20	* 0.20	0.00	0.0000	0.00E+00

Notes:

- (1) Case 1 calculations substitute the detection limit value for all of the non-detected parameters.
 The detection limit values are indicated with an "**".
- (2) The sample is comprised of filters from the identified test runs.
- (3) The volume of air sampled represents the combined total of the sample volumes of the individual test runs.

SUMMARY OF METALS EMISSIONS
CASE 2 CALCULATIONS (1)

CONCRETE READY MIXED CORPORATION
CEMENT SILO OUTLET

RUN NUMBER (2): CSO-M201A-R1,2,3
 COMBINED VOLUME (3) 177.154 dscf
 AVG. GAS FLOWRATE: 353 dscfm

<u>COMPONENT</u>		LABORATORY DATA			METAL EMISSIONS	
		SAMPLE CATCH - micrograms			CONC.	MASS RATE
		<u>SAMPLE</u>	<u>BLANK</u>	<u>TOTAL</u>	<u>ug/dscm</u>	<u>lb/hr</u>
Arsenic	As	* 0.00	* 0.00	0	0.0000	0.00E+00
Beryllium	Be	0.05	* 0.00	0.05	0.0100	1.32E-08
Cadmium	Cd	* 0.00	0.01	0	0.0000	0.00E+00
Chromium	Cr	4.00	1.90	2.1	0.4186	5.53E-07
Lead	Pb	1.68	0.70	0.98	0.1954	2.58E-07
Manganese	Mn	14.60	0.60	14	2.7908	3.68E-06
Mercury	Hg	* 0.00	* 0.00	0.00	0.0000	0.00E+00
Nickel	Ni	4.00	* 0.00	4	0.7974	1.05E-06
Phosphorus	P	* 0.00	* 0.00	0	0.0000	0.00E+00
Selenium	Se	* 0.00	* 0.00	0.00	0.0000	0.00E+00

Notes:

- (1) Case 2 calculations substitute a value of zero for all of the non-detected parameters.
 The instances where a zero value is used are indicated with an "*".
- (2) The sample is comprised of filters from the identified test runs.
- (3) The volume of air sampled represents the combined total of the sample volumes of the individual test runs.
- (4) If Blank > Sample, then Total = 0.

APPENDIX D.2
CEMENT SILO FILLING RAW FIELD DATA

PAGE 1

DATE 10/25/93

TEST LOCATION Cement Silo Ducts

RUN NUMBER **CE**/M2014-R1

Diagnosic

METER BOX I.D.	#10
GAMMA	0.98477
DELTA H ₂ O	1.85152
OPERATOR	W. King
BAR. PRESS.	30.09
FILTER I.D.	E-92-91

PAGE 1

DATE 10/26/93

TEST LOCATION Cement Silo Outlet

RUN NUMBER CSD-M201A-R1

CHAIN OF CUSTODY INFORMATION

LEAK CHECK

IMPINGER VOLUMES

Dwell Time
for Point 1 = 11.99

$$t_1 / \sqrt{P_1} = \underline{77.4}$$

METER BOX I.D.	#10
GAMMA	0.99477
DELTA H ₂	1.85158
OPERATOR	W. Laine
BAR. PRESS.	30.12
FILTER I.D.	992.97

PAGE 1

DATE 10/17/93

TEST LOCATION Cement S.I. Outlet

RUN NUMBER CSD-M24A-BJ

Run was
scheduled
for 3
cement
deliveries.
Plant ran
out of
orders to
fill, so
there wasn't
a 3rd
delivery

Container Number	Sample I.D.	Description
	166	Filter
	167	7 pm10
	168	2 pm10
	170	S. Label

Vacuum	5				
Rste	.004				

	Initial	Final
#1	100	108
#2	100	98
#3	0	0
#4		
#5		

$$t_1/\sqrt{P_1} = 117.24$$

METER BOX I.D.	210
GAMMA	0.99477
DELTA H ₂	1.55153
OPERATOR	W. PARKS
BAR. PRESS.	29.94
FILTER I.D.	1392-162

APPENDIX E
FLY ASH SILO FILLING

APPENDIX E.1
FLY ASH SILO FILLING DATA AND RESULTS

SUMMARY OF PARTICULATE AND METALS EMISSIONS
CONCRETE READY MIXED CORPORATION
CASE 1

FLYASH SILO OUTLET

RUN I.D.	FSO-M201A-R1	FSO-M201A-R2	FSO-M201A-R3	AVERAGE
DATE	10/27/93	10/28/93	11/01/93	
TIME STARTED	11:25	12:50	08:48	
TIME ENDED	12:26	13:50	09:49	

SAMPLING PARAMETERS

Metered Volume - dcf	23.769	24.230	22.493	23.131
Corrected Volume - dscf	24.061	24.840	25.904	24.982
Total Test Time - min	61.8	59.5	61	61.3
% Isokinetics	106.2	109.2	113.7	109.9
D50	10.89	10.52	10.11	10.50

GAS PARAMETERS

Gas Temperature - oF	61.2	52.0	43.8	52.5
Oxygen - %	20.9	20.9	20.9	20.9
Carbon Dioxide - %	0.0	0.0	0.0	0.0
Moisture - %	0.70	-1.12	1.71	1.21

GAS FLOWRATE

Velocity - ft/sec	7.31	7.41	7.31	7.31
Actual Volume - acfm	345	349	345	345
Standard Volume - dscfm	347	362	356	351

PM10 EMISSIONS

Concentration - gr/dscf	6.84E-02	2.50E-02	2.66E-02	4.75E-02
Mass Rate - lb/hr	0.204	0.078	0.081	0.142

PM>10 MICRONS EMISSIONS

Concentration - gr/dscf	5.62E-03	2.61E-01	3.25E-03	4.43E-03
Mass Rate - lb/hr	0.017	0.810	0.010	0.013

TOTAL PM

Concentration - gr/dscf	7.41E-02	2.86E-01	2.98E-02	5.19E-02
Mass Rate - lb/hr	0.221	0.887	0.091	0.156

METALS EMISSIONS - lb/hr

Arsenic	_____	_____	_____	2.49E-05
Beryllium	_____	_____	_____	2.25E-06
Cadmium	_____	_____	_____	4.96E-07
Chromium	_____	_____	_____	3.05E-05
Lead	_____	_____	_____	1.30E-05
Manganese	_____	_____	_____	6.40E-06
Mercury	_____	_____	_____	0.00E+00
Nickel	_____	_____	_____	5.58E-05
Phosphorus	_____	_____	_____	2.57E-05
Selenium	_____	_____	_____	1.68E-06

SUMMARY OF PARTICULATE AND METALS EMISSIONS
 CONCRETE READY MIXED CORPORATION
 CASE 2

FLYASH SILO OUTLET

RUN I.D.	FSO-M201A-R1	FSO-M201A-R2	FSO-M201A-R3	AVERAGE
DATE	10/27/93	10/28/93	11/01/93	
TIME STARTED	11:25	12:50	08:48	
TIME ENDED	12:26	13:50	09:49	

SAMPLING PARAMETERS

Metered Volume - dcf	23.769	24.23	22.493	23.131
Corrected Volume - dscf	24.061	24.840	25.904	24.982
Total Test Time - min	61.8	59.5	60.7	61.3
% Isokinetics	106.2	109.2	113.7	109.9
D50	10.89	10.52	10.11	10.50

GAS PARAMETERS

Gas Temperature - oF	61.2	52.0	43.8	52.5
Oxygen - %	20.9	20.9	20.9	20.9
Carbon Dioxide - %	0.0	0.0	0.0	0.0
Moisture - %	0.70	-1.12	1.71	1.21

GAS FLOWRATE

Velocity - ft/sec	7.31	7.41	7.31	7.31
Actual Volume - acfm	345	349	345	345
Standard Volume - dscfm	347	362	356	351

PM10 EMISSIONS

Concentration - gr/dscf	6.84E-02	2.50E-02	2.66E-02	4.75E-02
Mass Rate - lb/hr	0.204	0.078	0.081	0.142

PM>10 MICRONS EMISSIONS

Concentration - gr/dscf	5.62E-03	2.61E-01	3.25E-03	4.43E-03
Mass Rate - lb/hr	0.017	0.810	0.010	0.013

TOTAL PM

Concentration - gr/dscf	7.41E-02	2.86E-01	2.98E-02	5.19E-02
Mass Rate - lb/hr	0.221	0.887	0.091	0.156

METALS EMISSIONS - lb/hr

Arsenic	_____	_____	_____	2.51E-05
Beryllium	_____	_____	_____	2.26E-06
Cadmium	_____	_____	_____	4.96E-07
Chromium	_____	_____	_____	3.05E-05
Lead	_____	_____	_____	1.30E-05
Manganese	_____	_____	_____	6.40E-06
Mercury	_____	_____	_____	0.00E+00
Nickel	_____	_____	_____	5.70E-05
Phosphorus	_____	_____	_____	8.85E-05
Selenium	_____	_____	_____	1.81E-06

RUN NUMBER
FSO-M201A-R1
DATE
10/27/93
METHOD 4 DATA
START TIME
11:25
INIT.
FINAL
NET
END TIME
12:26
(ml)
(ml)
(ml)
STACK DIAM.
12 inches
IMP.1
100.0
96.0
-4.0
NOZZLE I.D.
0.390 inches
IMP.2
100.0
98.0
-2.0
METER BOX GAMMA
1.0010
IMP.3
0.0
0.0
0.0
METER BOX dH@
1.7438
IMP.4
0.0
0.0
0.0
BAROMETRIC
29.97 in.Hg
IMP.5
0.0
0.0
0.0
Cp
0.84
IMP.6
0.0
0.0
0.0
TEST DURATION
62 minutes
IMP.7
0.0
0.0
0.0
TOTAL
200.0
194.0
-6.0
S.G.
200.0
209.6
9.6
SAMPLING RESULTS
Metered Volume
23.769
dcf
METHOD 3 DATA
%O2
20.9
Md
28.84
Metered Volume
0.673
dcm
%CO2
0.0
Ms
28.76
Volume @ Std.Cond.
24.061
dscf
%CO
0.0
Ps
29.97
Volume @ Std.Cond.
0.681
dscm
%N2
79.1
% Water
0.70
%
O2+CO2
10.0
% Isokinetics
106.176
%
VOLUMETRIC RESULTS - USENG
Velocity
7.31
ft/sec
VOLUMETRIC RESULTS - SI
Velocity
2.23 m/sec
Actual Flow
345
acfm
Actual Flow
586 am3/hr
Std. Flow
350
scfm
Std. Flow
594 sm3/hr
Dry Std. Flow
347
dscfm
Dry Std. Flow
590 dsm3/hr

	STACK				
	TEMP	STATIC	DP	DH	
POINT	(DegF)	(in.WC)	(in.WC)	(in.WC)	
1	61	0.020	0.021	0.59	
2	60	0.016	0.016	0.59	
3	61		0.019	0.59	
4	61		0.020	0.59	
5	62		0.015	0.59	
6	62		0.019	0.59	
7	60		0.017	0.59	
8	61		0.017	0.59	
9	61		0.013	0.59	
10	61		0.020	0.59	
11	62		0.014	0.59	
12	62		0.016	0.59	
13					
AVG.	61	0.02	0.017	0.59	

	METER VOLUME	METER TEMPERATURE	
	(dcf)	INLET (DegF)	OUTLET (DegF)
	456.905	57	57
		59	57
		59	57
		64	59
		64	59
		67	60
		69	61
		69	61
		69	61
		72	64
		75	65
		75	65
	480.674		
	23.769		64

EPA METHOD 201A ANALYSES

RUN I.D.

FSO-M201A-R1

SUMMARY

<u>COMPONENT</u>	<u>NET</u> <u>(grams)</u>	<u>CORRECTED</u> <u>FOR BLANK</u> <u>(grams)</u>
PM10:		
Probe Wash <= 10 microns	0.00830	0.00740
Filter	0.09933	0.09933
TOTAL PM10	0.10763	0.10673
PM (>10 Microns):		
Probe Wash > 10 microns	0.00970	0.00876
TOTAL PM	0.11733	0.11549

ANALYTICAL DATA**METHOD 201A COMPONENTS:**

	<u>TARE</u> <u>(grams)</u>	<u>FINAL</u> <u>(grams)</u>	<u>NET</u> <u>(grams)</u>	<u>VOLUME</u> <u>(ml)</u>
Filter	0.53337	0.63270	0.09933	NA
Probe Wash Residue <= PM10	67.21950	67.22780	0.00830	115.0
Acetone Blank Residue	66.82760	66.83100	0.00340	125.0
Applicable Acetone Blank			0.00313	115.0
Max. Allowable Blank			0.00090	NA
Probe Wash Residue > PM10	67.12390	67.13360	0.00970	120.0
Acetone Blank Residue	67.71840	67.72150	0.00310	125.0
Applicable Acetone Blank			0.00298	120
Max. Allowable Blank			0.00094	NA

PARTICULATE EMISSIONS:

	<u>PM10</u>	<u>PM>10 microns</u>	<u>TOTAL PM</u>
Actual Grain Loading (gr/dscf)	0.06844	0.00562	0.07406
Mass Rate (lb/hr)	0.204	0.017	0.221

D50 Calculations

RUN I.D. FSO-M201A-R1

Stack Gas Viscosity (micropoise)	178.3173
Cyclone Flow Rate (dscf/min)	0.389331
Cyclone Flow Rate (acfm)	0.38651
D50	10.89417

dPmin and dPmax Calculations

Stack Gas Viscosity (micropoise)	178.7342
Cyclone Flow Rate (acfm)	0.437147

Dn	vn	vmin	vmax	dPmin	dPmax
0.136	72.22757	60.92076	89.02313	1.190589	2.542359
0.15	59.37427	50.92004	73.82262	0.942383	1.980746
0.164	49.66988	43.42381	62.39416	0.685340	1.414940
0.18	41.23213	36.95961	52.50738	0.496483	1.002053
0.197	34.42297	31.79203	44.57770	0.367355	0.722246
0.215	28.90040	27.64225	38.19127	0.277713	0.530125
0.233	24.60758	24.44747	33.26423	0.217229	0.402166
0.264	19.16783	20.44296	27.08299	0.151893	0.266589
0.3	14.84357	17.29252	22.23248	0.108684	0.179649
0.342	11.42164	14.80771	18.43929	0.079694	0.123577
0.39	8.78318	12.87541	15.53613	0.060252	0.087728

RUN NUMBER

FSO-M201A-R2

DATE

10/28/93

METHOD 4 DATA

START TIME

12:50

INIT.

FINAL

NET

END TIME

13:50

(ml)

(ml)

(ml)

STACK DIAM.

12 inches

IMP.1

100.0

94.0

-6.0

NOZZLE I.D.

0.390 inches

IMP.2

100.0

100.0

0.0

METER BOX GAMMA

1.0010

IMP.3

0.0

0.0

0.0

METER BOX dH@

1.7438

IMP.4

0.0

BAROMETRIC

29.80 in.Hg

IMP.5

0.0

Cp

0.84

IMP.6

0.0

TEST DURATION

60 minutes

IMP.7

0.0

TOTAL

200.0

194.0

-6.0

S.G.

200.0

200.1

0.1

SAMPLING RESULTS

METHOD 3 DATA

Metered Volume

24.230

dcf

%O2

20.9

Md

28.84

Metered Volume

0.686

dcfm

%CO2

0.0

Ms

28.96

Volume @ Std.Cond.

24.840

dscf

%CO

0.0

Ps

29.80

Volume @ Std.Cond.

0.703

dscfm

%N2

79.1

% Water

-1.12

%

O2+CO2

20.9

% Isokinetics

109.18

%

VOLUMETRIC RESULTS - USENG

VOLUMETRIC RESULTS - SI

Velocity

7.41

ft/sec

Velocity

2.26 m/sec

Actual Flow

349

acfm

Actual Flow

593 am3/hr

Std. Flow

358

scfm

Std. Flow

609 sm3/hr

Dry Std. Flow

362

dscfm

Dry Std. Flow

615 dsm3/hr

STACK

STATIC

DP

DH

METER

METER TEMPERATURE

POINT

TEMP

(in.WC)

(in.WC)

(in.WC)

VOLUME

INLET

OUTLET

1

53

0.017

0.026

0.58

483.193

49

48

2

53

0.016

0.021

0.58

53

49

3

53

0.017

0.58

55

50

4

53

0.015

0.58

53

50

5

53

0.015

0.58

55

50

6

54

0.013

0.58

57

51

7

52

0.023

0.58

58

51

8

52

0.023

0.58

59

52

9

53

0.020

0.58

60

53

10

52

0.016

0.58

60

53

11

52

0.017

0.58

61

53

12

53

0.012

0.58

62

54

13

507.423

AVG.

53

0.017

0.018

0.58

24.230

54

EPA METHOD 201A ANALYSES

RUN I.D.

FSO-M201A-R2

SUMMARY

<u>COMPONENT</u>	<u>NET</u> <u>(grams)</u>	<u>CORRECTED</u> <u>FOR BLANK</u> <u>(grams)</u>
PM10:		
Probe Wash <= 10 microns	0.01900	0.01806
Filter	0.02218	0.02218
TOTAL PM10	0.04118	0.04024
PM (>10 Microns):		
Probe Wash > 10 microns	0.42090	0.41992
TOTAL PM	0.46208	0.46016

ANALYTICAL DATA**METHOD 201A COMPONENTS:**

	<u>TARE</u> <u>(grams)</u>	<u>FINAL</u> <u>(grams)</u>	<u>NET</u> <u>(grams)</u>	<u>VOLUME</u> <u>(ml)</u>
Filter	0.53522	0.55740	0.02218	NA
Probe Wash Residue <= PM10	67.29250	67.31150	0.01900	120.0
Acetone Blank Residue	66.82760	66.83100	0.00340	125.0
Applicable Acetone Blank			0.00326	120.0
Max. Allowable Blank			0.00094	NA
Probe Wash Residue > PM10	67.08570	67.50660	0.42090	125.0
Acetone Blank Residue	67.71840	67.72150	0.00310	125.0
Applicable Acetone Blank			0.00310	125
Max. Allowable Blank			0.00098	NA

PARTICULATE EMISSIONS:

	<u>PM10</u>	<u>PM>10 microns</u>	<u>TOTAL PM</u>
Actual Grain Loading (gr/dscf)	0.02499	0.26084	0.28583
Mass Rate (lb/hr)	0.078	0.810	0.887

D50 Calculations

RUN I.D. FSO-M201A-R2

Stack Gas Viscosity (micropoise)	177.6478
Cyclone Flow Rate (dscf/min)	0.417487
Cyclone Flow Rate (acfm)	0.402687
D50	10.51538

dPmin and dPmax Calculations

Stack Gas Viscosity (micropoise)	177.9076
Cyclone Flow Rate (acfm)	0.432892

Dn	vn	vmin	vmax	dPmin	dPmax
0.136	71.52449	60.34321	88.16830	1.188685	2.537668
0.15	58.79631	50.44104	73.11680	0.830573	1.745196
0.164	49.18638	43.01885	61.80056	0.604126	1.246794
0.18	40.83077	36.61863	52.01104	0.437738	0.883082
0.197	34.08789	31.50231	44.15954	0.323962	0.636589
0.215	28.61908	27.39373	37.83619	0.244970	0.467331
0.233	24.36805	24.23067	32.95791	0.191664	0.354592
0.264	18.98125	20.26581	26.83790	0.134072	0.235129
0.3	14.69908	17.14636	22.03544	0.095974	0.158509
0.342	11.31046	14.68568	18.27968	0.070404	0.109080
0.39	8.69768	12.77178	15.40492	0.053249	0.077469

RUN NUMBER

FSO-M201A-R3

DATE

11/01/93

METHOD 4 DATA

START TIME

08:48

INIT.

FINAL

NET

END TIME

09:49

(ml)

(ml)

(ml)

STACK DIAM.

12 inches

IMP.1

100.0

104.0

4.0

NOZZLE I.D.

0.390 inches

IMP.2

100.0

100.0

0.0

METER BOX GAMMA

1.0010

IMP.3

0.0

0.0

0.0

METER BOX dH@

1.7438

IMP.4

0.0

BAROMETRIC

29.96 in.Hg

IMP.5

0.0

Cp

0.84

IMP.6

0.0

TEST DURATION

61 minutes

IMP.7

0.0

TOTAL

200.0

204.0

4.0

S.G.

200.0

205.6

5.6

SAMPLING RESULTS

Metered Volume

22.493

dcf

METHOD 3 DATA

%O2

20.9

Md

28.84

Metered Volume

0.637

dcm

%CO2

0.0

Ms

28.65

Volume @ Std.Cond.

25.904

dscf

%CO

0.0

Ps

29.96

Volume @ Std.Cond.

0.734

dscm

%N2

79.1

% Water

1.71

%

O2+CO2

20.9

% Isokinetics

113.7

%

VOLUMETRIC RESULTS - USENG

Velocity

7.31

ft/sec

VOLUMETRIC RESULTS - SI

Velocity

2.23 m/sec

Actual Flow

345

acfm

Actual Flow

586 am3/hr

Std. Flow

362

scfm

Std. Flow

615 sm3/hr

Dry Std. Flow

356

dscfm

Dry Std. Flow

604 dsm3/hr

	STACK TEMP	STATIC	DP	DH
POINT	(DegF)	(in.WC)	(in.WC)	(in.WC)
1	43	0.017	0.021	0.57
2	44	0.021	0.019	0.57
3	43		0.015	0.57
4	44		0.015	0.57
5	44		0.017	0.57
6	45		0.012	0.57
7	43		0.023	0.57
8	44		0.023	0.57
9	44		0.020	0.57
10	43		0.017	0.57
11	44		0.017	0.57
12	44		0.015	0.57
13				
AVG.	44	0.019	0.018	0.570

METER VOLUME	METER TEMPERATURE INLET	OUTLET
(dcf)	(DegF)	(DegF)
507.665	38	37
	39	37
	40	38
	41	38
	42	38
	42	38
	42	38
	42	38
	43	39
	43	39
	43	39
530.158	43	39
22.493	40	

EPA METHOD 201A ANALYSES

RUN I.D.

FSO-M201A-R3

SUMMARY

<u>COMPONENT</u>	<u>NET</u> <u>(grams)</u>	<u>CORRECTED</u> <u>FOR BLANK</u> <u>(grams)</u>
PM10:		
Probe Wash <= 10 microns	0.00610	0.00520
Filter	0.03942	0.03942
TOTAL PM10	0.04552	0.04462
PM (>10 Microns):		
Probe Wash > 10 microns	0.00640	0.00546
TOTAL PM	0.05192	0.05008

ANALYTICAL DATA**METHOD 201A COMPONENTS:**

	<u>TARE</u> <u>(grams)</u>	<u>FINAL</u> <u>(grams)</u>	<u>NET</u> <u>(grams)</u>	<u>VOLUME</u> <u>(ml)</u>
Filter	0.53258	0.57200	0.03942	NA
Probe Wash Residue <= PM10	70.19530	70.20140	0.00610	115.0
Acetone Blank Residue	66.82760	66.83100	0.00340	125.0
Applicable Acetone Blank			0.00313	115.0
Max. Allowable Blank			0.00090	NA
Probe Wash Residue > PM10	70.12250	70.12890	0.00640	120.0
Acetone Blank Residue	67.71840	67.72150	0.00310	125.0
Applicable Acetone Blank			0.00298	120
Max. Allowable Blank			0.00094	NA

PARTICULATE EMISSIONS:

	<u>PM10</u>	<u>PM>10 microns</u>	<u>TOTAL PM</u>
Actual Grain Loading (gr/dscf)	0.02658	0.00325	0.02983
Mass Rate (lb/hr)	0.081	0.010	0.091

D50 Calculations

RUN I.D. FSO-M201A-R3

Stack Gas Viscosity (micropoise)	173.3874
Cyclone Flow Rate (dscf/min)	0.426759
Cyclone Flow Rate (acfm)	0.413839
D50	10.11136

dPmin and dPmax Calculations

Stack Gas Viscosity (micropoise)	173.4841
Cyclone Flow Rate (acfm)	0.420586

Dn	vn	vmin	vmax	dPmin	dPmax
0.136	69.49136	58.63864	85.67022	1.136493	2.425820
0.15	57.12499	49.01878	71.04728	0.794189	1.668375
0.164	47.78823	41.80831	60.05338	0.577729	1.191993
0.18	39.67013	35.59076	50.54284	0.418672	0.844342
0.197	33.11892	30.62053	42.91521	0.309902	0.608725
0.215	27.80556	26.62930	36.77224	0.234379	0.446930
0.233	23.67537	23.55657	32.03317	0.183410	0.339155
0.264	18.44169	19.70489	26.08788	0.128335	0.224945
0.3	14.28125	16.67433	21.42249	0.091896	0.151684
0.342	10.98896	14.28354	17.77384	0.067433	0.104415
0.39	8.45044	12.42377	14.98090	0.051016	0.074178

SUMMARY OF METALS EMISSIONS
CASE 1 CALCULATIONS (1)

CONCRETE READY MIXED CORPORATION
FLYASH SILO OUTLET

RUN NUMBER (2): **FSO-M201A-R1,2,3**
 COMBINED VOLUME (3) **74.805 dscf**
 AVG. GAS FLOWRATE: **355 dscfm**

<u>COMPONENT</u>		LABORATORY DATA			METAL EMISSIONS	
		SAMPLE CATCH - micrograms			CONC.	MASS RATE
		<u>SAMPLE</u>	<u>BLANK</u>	<u>TOTAL</u>	<u>ug/dscm</u>	<u>lb/hr</u>
Arsenic	As	39.90	* 0.20	39.7	18.7418	2.49E-05
Beryllium	Be	3.60	* 0.02	3.58	1.6901	2.25E-06
Cadmium	Cd	0.80	0.01	0.79	0.3729	4.96E-07
Chromium	Cr	50.50	1.90	48.6	22.9433	3.05E-05
Lead	Pb	21.40	0.70	20.7	9.7722	1.30E-05
Manganese	Mn	10.80	0.60	10.2	4.8153	6.40E-06
Mercury	Hg	* 0.20	* 0.20	0.00	0.0000	0.00E+00
Nickel	Ni	90.80	* 2.00	88.8	41.9211	5.58E-05
Phosphorus	P	141.00	* 100.00	41	19.3555	2.57E-05
Selenium	Se	2.88	* 0.20	2.68	1.2652	1.68E-06

Notes:

- (1) Case 1 calculations substitute the detection limit value for all of the non-detected parameters.
 The detection limit values are indicated with an "***".
- (2) The sample is comprised of filters from the identified test runs.
- (3) The volume of air sampled represents the combined total of the sample volumes of the individual test runs.

SUMMARY OF METALS EMISSIONS
CASE 2 CALCULATIONS (1)

CONCRETE READY MIXED CORPORATION
FLYASH SILO OUTLET

RUN NUMBER (2): **FSO-M201A-R1,2,3**
 COMBINED VOLUME (3) **74.805 dscf**
 AVG. GAS FLOWRATE: **355 dscfm**

<u>COMPONENT</u>		LABORATORY DATA			METAL EMISSIONS	
		SAMPLE CATCH - micrograms			CONC.	MASS RATE
		<u>SAMPLE</u>	<u>BLANK</u>	<u>TOTAL</u>	<u>ug/dscm</u>	<u>lb/hr</u>
Arsenic	As	39.90	* 0.00	39.9	18.8362	2.51E-05
Beryllium	Be	3.60	* 0.00	3.6	1.6995	2.26E-06
Cadmium	Cd	0.80	0.01	0.79	0.3729	4.96E-07
Chromium	Cr	50.50	1.90	48.6	22.9433	3.05E-05
Lead	Pb	21.40	0.70	20.7	9.7722	1.30E-05
Manganese	Mn	10.80	0.60	10.2	4.8153	6.40E-06
Mercury	Hg	* 0.00	* 0.00	0.00	0.0000	0.00E+00
Nickel	Ni	90.80	* 0.00	90.8	42.8653	5.70E-05
Phosphorus	P	141.00	* 0.00	141	66.5640	8.85E-05
Selenium	Se	2.88	* 0.00	2.88	1.3596	1.81E-06

Notes:

- (1) Case 2 calculations substitute a value of zero for all of the non-detected parameters.
 The instances where a zero value is used are indicated with an "*".
- (2) The sample is comprised of filters from the identified test runs.
- (3) The volume of air sampled represents the combined total of the sample volumes of the individual test runs.

APPENDIX E.2
FLY ASH SILO FILLING RAW FIELD DATA

PAGE 1

DATE 10/27/93

TEST LOCATION Flycatch Silo Outlet

RUN NUMBER *FS0-17201A-RD*

CHAIN OF CUSTODY INFORMATION

LEAK CHECK

IMPINGER VOLUMES

Dwell Time
for Point 1 = 5.69

$$t_1 / \sqrt{P_1} = \underline{39.26}$$

METER BOX I.D.	#4
GAMMA	1.0010
DELTA H ₂ O	1.7438
OPERATOR	W. LARSEN
BAR. PRESS.	29.97
FILTER I.D.	G 92-101

PAGE 1

DATE 10/28/93

TEST LOCATION F. Lash S. to Outlet

RUN NUMBER FSD-M201A-R2

[illegible]

CHAIN OF CUSTODY INFORMATION

Container Number	Sample I.D.	Description
	190	Filter
	191	7 pm10
	192	c pm10
	194	Silica Gel

LEAK CHECK

Vacuum	10				
Rate	0.10				

IMPINGER VOLUMES

	Initial	Final
#1	100	94
#2	100	100
#3	0	
#4	56	
#5		

Dwell Time
for Point 1 = 5.99

$$t_{1/\sqrt{P_1}} = 37.15$$

METER BOX I.D.	#4
GAMMA	1.0610
DELTA H ₂ O	1.7438
OPERATOR	W. E. King
BAR. PRESS.	29.80"
FILTER I.D.	G92-141

As 221e # 11

PAGE 1

DATE 11/01/93

TEST LOCATION Avash Silo Outlet

RUN NUMBER F50-M2017-R3

CHAIN OF CUSTODY INFORMATION

LEAK CHECK

Dwell Time
for Point 1 = 5.45

$$t_1 / \sqrt{P_1} = 37.61$$

IMPINGER VOLUMES

METER BOX I.D.	4
GAMMA	1.0010
DELTA H ₂	1.7438
OPERATOR	T. Underwood
BAR. PRESS.	29.96
FILTER I.D.	792-137

APPENDIX F
CENTRAL DUST COLLECTOR APPENDICES

APPENDIX F.1
CENTRAL DUST COLLECTOR INLET

APPENDIX F.1.1
CENTRAL DUST COLLECTOR INLET
DATA AND RESULTS

APPENDIX F.1.1.1
CENTRAL DUST COLLECTOR
INLET DATA AND RESULTS FOR 10/25/93

TABLE xx

SUMMARY OF PARTICULATE AND METALS EMISSIONS
CONCRETE READY MIXED CORPORATION
CASE 1

DUST COLLECTOR INLET

DIAGNOSTIC

RUN I.D.

DCI-M201A-R1

DATE

10/25/93

TIME STARTED

15:29

TIME ENDED

17:29

SAMPLING PARAMETERS

Metered Volume - dcf	55.062
Corrected Volume - dscf	53.523
Total Test Time - min	120.1
% Isokinetics	93.5
D50	9.76

GAS PARAMETERS

Gas Temperature - oF	75.5
Oxygen - %	20.9
Carbon Dioxide - %	0.0
Moisture - %	1.09

GAS FLOWRATE

Velocity - ft/sec	82.39
Actual Volume - acfm	6902
Standard Volume - dscfm	6601

METALS EMISSIONS - lb/hr

Arsenic	1.63E-05
Beryllium	1.79E-06
Cadmium	0.00E+00
Chromium	3.92E-05
Lead	2.74E-05
Manganese	1.16E-04
Mercury	0.00E+00
Nickel	2.45E-05
Phosphorus	0.00E+00
Selenium	0.00E+00

TABLE xx

SUMMARY OF PARTICULATE AND METALS EMISSIONS
CONCRETE READY MIXED CORPORATION
CASE 2

DUST COLLECTOR INLET

DIAGNOSTIC

RUN I.D.	DCI-M201A-R1
DATE	10/25/93
TIME STARTED	15:29
TIME ENDED	17:29

SAMPLING PARAMETERS

Metered Volume - dcf	55.062
Corrected Volume - dscf	53.523
Total Test Time - min	120.1
% Isokinetics	93.5
D50	9.76

GAS PARAMETERS

Gas Temperature - oF	75.5
Oxygen - %	20.9
Carbon Dioxide - %	0.0
Moisture - %	1.09

GAS FLOWRATE

Velocity - ft/sec	82.39
Actual Volume - acfm	6902
Standard Volume - dscfm	6601

METALS EMISSIONS - lb/hr

Arsenic	1.96E-05
Beryllium	2.12E-06
Cadmium	0.00E+00
Chromium	3.92E-05
Lead	2.74E-05
Manganese	1.16E-04
Mercury	0.00E+00
Nickel	5.71E-05
Phosphorus	0.00E+00
Selenium	0.00E+00

RUN NUMBER

DCI-M201A-R1
DIAGNOSTIC

DATE

10/25/93

METHOD 4 DATA

START TIME

15:29

INIT.

FINAL

NET

END TIME

17:29

(ml)

(ml)

(ml)

STACK DIAM.

16 inches

IMP.1

100.0

100.0

0.0

NOZZLE I.D.

0.136 inches

IMP.2

100.0

100.0

0.0

METER BOX GAMMA

0.9866

IMP.3

0.0

0.0

0.0

METER BOX dH@

1.6884

IMP.4

0.0

BAROMETRIC

30.04 in.Hg

IMP.5

0.0

Cp

0.84

IMP.6

0.0

TEST DURATION

120 minutes

IMP.7

0.0

TOTAL

200.0

200.0

0.0

S.G.

200.0

212.5

12.5

SAMPLING RESULTS

Metered Volume

55.062

dcf

METHOD 3 DATA

%O2

20.9

Md

28.84

Metered Volume

1.559

dcm

%CO2

0.0

Ms

28.72

Volume @ Std.Cond.

53.523

dscf

%CO

0.0

Ps

29.34

Volume @ Std.Cond.

1.516

dscm

%N2

79.1

% Water

1.09

%

O2+CO2

10.0

% Isokinetics

93.5

%

VOLUMETRIC RESULTS - USENG

Velocity

82.39

ft/sec

VOLUMETRIC RESULTS - SI

Velocity

25.11 m/sec

Actual Flow

6902

acfm

Actual Flow

11727 am3/hr

Std. Flow

6674

scfm

Std. Flow

11339 sm3/hr

Dry Std. Flow

6601

dscfm

Dry Std. Flow

11216 dsm3/hr

STACK

POINT

TEMP

STATIC

DP

DH

METER

METER TEMPERATURE

(DegF)

(in.WC)

(in.WC)

(in.WC)

VOLUME

INLET

OUTLET

1

75

-9.30

2.00

0.57

327.725

84

81

2

76

-9.70

2.20

0.57

83

80

3

76

2.20

0.57

82

79

4

77

1.80

0.57

82

79

5

76

2.20

0.57

81

77

6

75

1.80

0.57

81

77

7

75

2.20

0.57

80

76

8

76

2.30

0.57

79

75

9

76

2.20

0.57

79

75

10

75

2.10

0.57

79

74

11

75

2.10

0.57

78

74

12

74

1.80

0.57

78

73

13

382.787

AVG.

76

-9.50

2.08

0.57

55.062

79

D50 Calculations

RUN I.D. DCI-M201A-R1

DIAGNOSTIC

Stack Gas Viscosity (micropoise)	181.4897
Cyclone Flow Rate (dscf/min)	0.445657
Cyclone Flow Rate (acfm)	0.466161
D50	9.759916

dPmin and dPmax Calculations

Stack Gas Viscosity (micropoise)	182.1702
Cyclone Flow Rate (acfm)	0.452145

Dn	vn	vmin	vmax	dPmin	dPmax
0.136	74.70563	62.96520	92.04272	1.210028	2.585670
0.15	61.41135	52.61783	76.31765	0.983698	2.069407
0.164	51.37401	44.86123	64.49421	0.715053	1.477874
0.18	42.64677	38.17207	54.26518	0.517711	1.046257
0.197	35.60399	32.82438	46.06052	0.382815	0.753796
0.215	29.89195	28.52983	39.45225	0.289197	0.553018
0.233	25.45185	25.22360	34.35382	0.226053	0.419320
0.264	19.82546	21.07964	27.95731	0.157878	0.277707
0.3	15.35284	17.82015	22.93791	0.112828	0.186941
0.342	11.81351	15.25024	19.01306	0.082632	0.128440
0.39	9.08452	13.25281	16.00985	0.062404	0.091069

SUMMARY OF METALS EMISSIONS
CASE 1 CALCULATIONS (1)

CONCRETE READY MIXED CORPORATION
DUST COLLECTOR INLET
DIAGNOSTIC

RUN NUMBER (2): **DCI-M201A-R1**
 COMBINED VOLUME (3) 53.523 dscf
 AVG. GAS FLOWRATE: 6601 dscfm

<u>COMPONENT</u>		LABORATORY DATA			METAL EMISSIONS	
		SAMPLE CATCH - micrograms			CONC.	MASS RATE
		<u>SAMPLE</u>	<u>BLANK</u>	<u>TOTAL</u>	<u>ug/dscm</u>	<u>lb/hr</u>
Arsenic	As	1.20	* 0.20	1	0.6598	1.63E-05
Beryllium	Be	0.13	* 0.02	0.11	0.0726	1.79E-06
Cadmium	Cd	* 0.01	0.01	0	0.0000	0.00E+00
Chromium	Cr	4.30	1.90	2.4	1.5835	3.92E-05
Lead	Pb	2.38	0.70	1.68	1.1085	2.74E-05
Manganese	Mn	7.70	0.60	7.1	4.6845	1.16E-04
Mercury	Hg	* 0.20	* 0.20	0.00	0.0000	0.00E+00
Nickel	Ni	3.50	* 2.00	1.5	0.9897	2.45E-05
Phosphorus	P	* 100	* 100.00	0	0.0000	0.00E+00
Selenium	Se	* 0.20	* 0.20	0.00	0.0000	0.00E+00

Notes:

- (1) Case 1 calculations substitute the detection limit value for all of the non-detected parameters.
 The detection limit values are indicated with an "****".
- (2) The sample is comprised of filters from the identified test runs.
- (3) The volume of air sampled represents the combined total of the sample volumes of the individual test runs.

SUMMARY OF METALS EMISSIONS
CASE 2 CALCULATIONS (1)

CONCRETE READY MIXED CORPORATION
DUST COLLECTOR INLET

RUN NUMBER (2): **DCI-M201A-R1**
 COMBINED VOLUME (3) 53.523 dscf
 AVG. GAS FLOWRATE: 6601.3 dscfm

		LABORATORY DATA				METAL EMISSIONS	
		SAMPLE CATCH - micrograms				CONC.	MASS RATE
<u>COMPONENT</u>		<u>SAMPLE</u>		<u>BLANK</u>	<u>TOTAL</u>	<u>ug/dscm</u>	<u>lb/hr</u>
Arsenic	As	1.20	*	0.00	1.2	0.7918	1.96E-05
Beryllium	Be	0.13	*	0.00	0.13	0.0858	2.12E-06
Cadmium	Cd	* 0.00		0.01	0	0.0000	0.00E+00
Chromium	Cr	4.30		1.90	2.4	1.5835	3.92E-05
Lead	Pb	2.38		0.70	1.68	1.1085	2.74E-05
Manganese	Mn	7.70		0.60	7.1	4.6845	1.16E-04
Mercury	Hg	* 0.00	*	0.00	0.00	0.0000	0.00E+00
Nickel	Ni	3.50	*	0.00	3.5	2.3093	5.71E-05
Phosphorus	P	* 0.00	*	0.00	0	0.0000	0.00E+00
Selenium	Se	* 0.00	*	0.00	0.00	0.0000	0.00E+00

Notes:

- (1) Case 2 calculations substitute a value of zero for all of the non-detected parameters.
 The instances where a zero value is used are indicated with an "***".
- (2) The sample is comprised of filters from the identified test runs.
- (3) The volume of air sampled represents the combined total of the sample volumes of the individual test runs.
- (4) If Blank>Sample, then Total = 0.

APPENDIX F.1.1.2
CENTRAL DUST COLLECTOR INLET
DATA AND RESULTS FOR 10/26/93

SUMMARY OF PARTICULATE AND METALS EMISSIONS
 CONCRETE READY MIXED CORPORATION
 CASE 1

DUST COLLECTOR INLET

RUN I.D.	DCI-M201A-R1	DCI-M201A-R2	DCI-M201A-R3	AVERAGE
DATE	10/26/93	10/26/93	10/26/93	
TIME STARTED	08:05	10:52	13:30	
TIME ENDED	10:05	12:52	15:29	

SAMPLING PARAMETERS

Metered Volume - dcf	53.662	54.389	53.586	53.624
Corrected Volume - dscf	54.479	53.935	52.580	53.529
Total Test Time - min	120.1	119.9	119	119.6
% Isokinetics	93.8	90.5	95.0	94.4
D50	9.72	9.76	9.90	9.81

GAS PARAMETERS

Gas Temperature - oF	53.6	61.0	63.1	58.3
Oxygen - %	20.9	20.9	20.9	20.9
Carbon Dioxide - %	0.0	0.0	0.0	0.0
Moisture - %	0.83	0.86	0.86	0.85

GAS FLOWRATE

Velocity - ft/sec	79.08	82.61	77.42	78.25
Actual Volume - acfm	6625	6921	6486	6555
Standard Volume - dscfm	6698	6887	6433	6566

PM10 EMISSIONS

Concentration - gr/dscf	1.53E-02	2.44E-02	2.08E-02	1.80E-02
Mass Rate - lb/hr	0.878	1.440	1.146	1.012

PM>10 MICRONS EMISSIONS

Concentration - gr/dscf	4.57E-02	9.55E-02	7.22E-02	5.89E-02
Mass Rate - lb/hr	2.622	5.640	3.979	3.301

TOTAL PM

Concentration - gr/dscf	6.10E-02	1.20E-01	9.29E-02	7.69E-02
Mass Rate - lb/hr	3.500	7.079	5.124	4.312

METALS EMISSIONS - lb/hr

Arsenic	_____	_____	_____	2.70E-05
Beryllium	_____	_____	_____	6.58E-07
Cadmium	_____	_____	_____	4.93E-07
Chromium	_____	_____	_____	3.45E-05
Lead	_____	_____	_____	2.04E-05
Manganese	_____	_____	_____	2.13E-04
Mercury	_____	_____	_____	0.00E+00
Nickel	_____	_____	_____	5.48E-05
Phosphorus	_____	_____	_____	0.00E+00
Selenium	_____	_____	_____	1.64E-06

SUMMARY OF PARTICULATE AND METALS EMISSIONS
CONCRETE READY MIXED CORPORATION
CASE 2

DUST COLLECTOR INLET

RUN I.D.	DCI-M201A-R1	DCI-M201A-R2	DCI-M201A-R3	AVERAGE
DATE	10/26/93	10/26/93	10/26/93	
TIME STARTED	08:05	10:52	13:30	
TIME ENDED	10:05	12:52	15:29	

SAMPLING PARAMETERS

Metered Volume - dcf	53.662	54.389	53.586	53.624
Corrected Volume - dscf	54.479	53.935	52.580	53.529
Total Test Time - min	120.1	119.9	119.1	119.6
% Isokinetics	93.8	90.5	95.0	94.4
D50	9.72	9.76	9.90	9.81

GAS PARAMETERS

Gas Temperature - oF	53.6	61.0	63.1	58.3
Oxygen - %	20.9	20.9	20.9	20.9
Carbon Dioxide - %	0.0	0.0	0.0	0.0
Moisture - %	0.83	0.86	0.86	0.85

GAS FLOWRATE

Velocity - ft/sec	79.08	82.61	77.42	78.25
Actual Volume - acfm	6625	6921	6486	6555
Standard Volume - dscfm	6698	6887	6433	6566

PM10 EMISSIONS

Concentration - gr/dscf	1.53E-02	2.44E-02	2.08E-02	1.80E-02
Mass Rate - lb/hr	0.878	1.440	1.146	1.012

PM>10 MICRONS EMISSIONS

Concentration - gr/dscf	4.57E-02	9.55E-02	7.22E-02	5.89E-02
Mass Rate - lb/hr	2.622	5.640	3.979	3.301

TOTAL PM

Concentration - gr/dscf	6.10E-02	1.20E-01	9.29E-02	7.69E-02
Mass Rate - lb/hr	3.500	7.079	5.124	4.312

METALS EMISSIONS - lb/hr

Arsenic	_____	_____	_____	2.81E-05
Beryllium	_____	_____	_____	7.68E-07
Cadmium	_____	_____	_____	4.93E-07
Chromium	_____	_____	_____	3.45E-05
Lead	_____	_____	_____	2.04E-05
Manganese	_____	_____	_____	2.13E-04
Mercury	_____	_____	_____	0.00E+00
Nickel	_____	_____	_____	6.58E-05
Phosphorus	_____	_____	_____	0.00E+00
Selenium	_____	_____	_____	2.74E-06

RUN NUMBER

DCI-M201A-R1

DATE 10/26/93
 START TIME 08:05
 END TIME 10:05
 STACK DIAM. 16 inches
 NOZZLE I.D. 0.136 inches
 METER BOX GAMMA 0.9866
 METER BOX dH@ 1.6884
 BAROMETRIC 30.12 in.Hg
 Cp 0.84
 TEST DURATION 120 minutes

METHOD 4 DATA

	INIT. (ml)	FINAL (ml)	NET (ml)
IMP.1	100.0	96.0	-4.0
IMP.2	100.0	100.0	0.0
IMP.3	0.0	0.0	0.0
IMP.4			0.0
IMP.5			0.0
IMP.6			0.0
IMP.7			0.0
TOTAL	200.0	196.0	-4.0
S.G.	200.0	213.6	13.6

SAMPLING RESULTS

Metered Volume 53.662 dcf
 Metered Volume 1.520 dcm
 Volume @ Std.Cond. 54.479 dscf
 Volume @ Std.Cond. 1.543 dscm
 % Water 0.83 %
 % Isokinetics 93.8 %

METHOD 3 DATA

%O2	20.90	Md	28.84
%CO2	0.00	Ms	28.75
%CO	0.0	Ps	29.67
%N2	79.1		
O2+CO2	10.0		

VOLUMETRIC RESULTS - USENG

Velocity 79.08 ft/sec
 Actual Flow 6625 acfm
 Std. Flow 6754 scfm
 Dry Std. Flow 6698 dscfm

VOLUMETRIC RESULTS - SI

Velocity 24.10 m/sec
 Actual Flow 11256 am3/hr
 Std. Flow 11476 sm3/hr
 Dry Std. Flow 11381 dsm3/hr

POINT	STACK TEMP (DegF)	STATIC (in.WC)	DP (in.WC)	DH (in.WC)
1	52	-6.10	2.30	0.56
2	53	-6.10	2.00	0.56
3	53		2.10	0.56
4	53		1.90	0.56
5	53		2.10	0.56
6	53		1.80	0.56
7	53		2.30	0.56
8	54		2.00	0.56
9	54		2.00	0.56
10	55		1.90	0.56
11	55		1.90	0.56
12	55		1.90	0.56
13				
AVG.	54	-6.10	2.02	0.56

METER METER TEMPERATURE

VOLUME (dcf)	INLET (DegF)	OUTLET (DegF)
384.275	45	49
	52	50
	55	51
	56	52
	57	52
	58	54
	60	55
	61	56
	63	58
	65	60
	67	61
	69	63
437.937		
53.662		57

EPA METHOD 201A ANALYSES

RUN I.D.

DCI-M201A-R1

SUMMARY

<u>COMPONENT</u>	<u>NET</u> <u>(grams)</u>	<u>CORRECTED</u> <u>FOR BLANK</u> <u>(grams)</u>
PM10:		
Probe Wash <= 10 microns	0.00960	0.00870
Filter	0.04528	0.04528
TOTAL PM10	0.05488	0.05398
PM (>10 Microns):		
Probe Wash > 10 microns	0.16220	0.16126
TOTAL PM	0.21708	0.21524

ANALYTICAL DATA**METHOD 201A COMPONENTS:**

	<u>TARE</u> <u>(grams)</u>	<u>FINAL</u> <u>(grams)</u>	<u>NET</u> <u>(grams)</u>	<u>VOLUME</u> <u>(ml)</u>
Filter	0.53462	0.57990	0.04528	NA
Probe Wash Residue <= PM10	67.08990	67.09950	0.00960	115.0
Acetone Blank Residue	66.82760	66.83100	0.00340	125.0
Applicable Acetone Blank			0.00313	115.0
Max. Allowable Blank			0.00090	NA
Probe Wash Residue > PM10	70.67200	70.83420	0.16220	120.0
Acetone Blank Residue	67.71840	67.72150	0.00310	125.0
Applicable Acetone Blank			0.00298	120
Max. Allowable Blank			0.00094	NA

PARTICULATE EMISSIONS:

	<u>PM10</u>	<u>PM>10 microns</u>	<u>TOTAL PM</u>
Actual Grain Loading (gr/dscf)	0.01529	0.04567	0.06096
Mass Rate (lb/hr)	0.878	2.622	3.500

D50 Calculations

RUN I.D. DCI-M201A-R1

Stack Gas Viscosity (micropoise)	176.4017
Cyclone Flow Rate (dscf/min)	0.453614
Cyclone Flow Rate (acfm)	0.448818
D50	9.7155

dPmin and dPmax Calculations

Stack Gas Viscosity (micropoise)	176.6792
Cyclone Flow Rate (acfm)	0.431594

Dn	vn	vmin	vmax	dPmin	dPmax
0.136	71.31007	60.15053	87.89504	1.165485	2.488608
0.15	58.62004	50.27714	72.88787	0.909122	1.910695
0.164	49.03893	42.87639	61.60482	0.661176	1.364930
0.18	40.70836	36.49455	51.84387	0.479001	0.966664
0.197	33.98570	31.39284	44.01515	0.354439	0.696763
0.215	28.53328	27.29597	37.71006	0.267965	0.511441
0.233	24.29499	24.14192	32.84580	0.209616	0.388008
0.264	18.92434	20.18843	26.74333	0.146584	0.257224
0.3	14.65501	17.07809	21.95463	0.104896	0.173354
0.342	11.27655	14.62483	18.20975	0.076924	0.119258
0.39	8.67160	12.71698	15.34351	0.058163	0.084670

RUN NUMBER
DCI-M201A-R2
DATE
10/26/93
METHOD 4 DATA
START TIME
10:52
INIT.
FINAL
NET
END TIME
12:52
(ml)
(ml)
(ml)
STACK DIAM.
16 inches
IMP.1
100.0
99.0
-1.0
NOZZLE I.D.
0.136 inches
IMP.2
100.0
99.0
-1.0
METER BOX GAMMA
0.9866
IMP.3
0.0
0.0
0.0
METER BOX dH@
1.6884
IMP.4
0.0
BAROMETRIC
30.12 in.Hg
IMP.5
0.0
Cp
0.84
IMP.6
0.0
TEST DURATION
120 minutes
IMP.7
0.0
TOTAL
200.0
198.0
-2.0
S.G.
200.0
211.9
11.9
SAMPLING RESULTS
Metered Volume
54.389
dcf
METHOD 3 DATA
%O2 20.90
Md
28.84
Metered Volume
1.540
dcm
%CO2 0.00
Ms
28.74
Volume @ Std.Cond.
53.935
dscf
%CO 0.0
Ps
29.63
Volume @ Std.Cond.
1.527
dscm
%N2 79.1
% Water
0.86
%
O2+CO2 20.9
% Isokinetics
90.46
%
VOLUMETRIC RESULTS - USENG
Velocity
82.61
ft/sec
VOLUMETRIC RESULTS - SI
Velocity
25.18 m/sec
Actual Flow
6921
acfm
Actual Flow
11758 am3/hr
Std. Flow
6947
scfm
Std. Flow
11803 sm3/hr
Dry Std. Flow
6887
dscfm
Dry Std. Flow
11701 dsm3/hr
STACK
POINT
TEMP
STATIC
DP
DH
METER
METER TEMPERATURE
(DegF)
(in.WC)
(in.WC)
(in.WC)
VOLUME
INLET
OUTLET
1
61
-6.60
2.20
0.56
438.382
61
61
2
61
2.40
0.56
66
62
3
61
2.40
0.56
68
64
4
61
2.30
0.56
70
65
5
61
2.30
0.56
71
66
6
61
2.10
0.56
72
67
7
61
1.90
0.56
74
68
8
61
2.00
0.56
75
69
9
61
2.10
0.56
76
68
10
61
1.90
0.56
76
69
11
61
2.20
0.56
77
70
12
61
2.20
0.56
78
71
13
492.771
AVG.
61
-6.60
2.17
0.56
54.389
69

EPA METHOD 201A ANALYSES

RUN I.D.

DCI-M201A-R2

SUMMARY

<u>COMPONENT</u>	<u>NET</u> <u>(grams)</u>	<u>CORRECTED</u> <u>FOR BLANK</u> <u>(grams)</u>
PM10:		
Probe Wash <= 10 microns	0.00850	0.00756
Filter	0.07768	0.07768
TOTAL PM10	0.08618	0.08524
PM (>10 Microns):		
Probe Wash > 10 microns	0.33490	0.33396
TOTAL PM	0.42108	0.41920

ANALYTICAL DATA

METHOD 201A COMPONENTS:

	<u>TARE</u> <u>(grams)</u>	<u>FINAL</u> <u>(grams)</u>	<u>NET</u> <u>(grams)</u>	<u>VOLUME</u> <u>(ml)</u>
Filter	0.53452	0.61220	0.07768	NA
Probe Wash Residue <= PM10	66.99140	66.99990	0.00850	120.0
Acetone Blank Residue	66.82760	66.83100	0.00340	125.0
Applicable Acetone Blank			0.00326	120.0
Max. Allowable Blank			0.00094	NA
Probe Wash Residue > PM10	67.07050	67.40540	0.33490	120.0
Acetone Blank Residue	67.71840	67.72150	0.00310	125.0
Applicable Acetone Blank			0.00298	120
Max. Allowable Blank			0.00094	NA

PARTICULATE EMISSIONS:

	<u>PM10</u>	<u>PM>10 microns</u>	<u>TOTAL PM</u>
Actual Grain Loading (gr/dscf)	0.02439	0.09554	0.11993
Mass Rate (lb/hr)	1.440	5.640	7.079

D50 Calculations

RUN I.D. DCI-M201A-R2

Stack Gas Viscosity (micropoise)	178.163
Cyclone Flow Rate (dscf/min)	0.449832
Cyclone Flow Rate (acfm)	0.452202
D50	9.76419

dPmin and dPmax Calculations

Stack Gas Viscosity (micropoise)	178.5769
Cyclone Flow Rate (acfm)	0.438253

Dn	vn	vmin	vmax	dPmin	dPmax
0.136	72.41032	61.06458	89.24053	1.182474	2.525441
0.15	59.52451	51.03776	74.00088	0.826030	1.736547
0.164	49.79556	43.52184	62.54286	0.600658	1.240419
0.18	41.33646	37.04057	52.63037	0.435079	0.878386
0.197	34.51007	31.85928	44.67997	0.321873	0.633051
0.215	28.97353	27.69846	38.27676	0.243290	0.464604
0.233	24.66985	24.49519	33.33673	0.190272	0.352419
0.264	19.21633	20.48008	27.13912	0.133007	0.233563
0.3	14.88113	17.32146	22.27579	0.095144	0.157354
0.342	11.45054	14.83040	18.47266	0.069746	0.108211
0.39	8.80540	12.89347	15.56206	0.052717	0.076797

RUN NUMBER

DCI-M201A-R3

DATE

10/26/93

METHOD 4 DATA

START TIME

13:30

END TIME

15:29

STACK DIAM.

16 inches

NOZZLE I.D.

0.136 inches

METER BOX GAMMA

0.9866

METER BOX dH@

1.6884

BAROMETRIC

30.12 in.Hg

Cp

0.84

TEST DURATION

119 minutes

INIT.

(ml)

FINAL

(ml)

NET

(ml)

IMP.1

100.0

99.0

-1.0

IMP.2

100.0

99.0

-1.0

IMP.3

0.0

0.0

0.0

IMP.4

0.0

IMP.5

0.0

IMP.6

0.0

IMP.7

0.0

TOTAL

200.0

198.0

-2.0

S.G.

200.0

211.7

11.7

SAMPLING RESULTS

Metered Volume

53.586

dcf

Metered Volume

1.517

dcm

Volume @ Std.Cond.

52.580

dscf

Volume @ Std.Cond.

1.489

dscm

% Water

0.86

%

% Isokinetics

95.0

%

METHOD 3 DATA

%O2

20.90

Md

28.84

%CO2

0.00

Ms

28.74

%CO

0.0

Ps

29.66

%N2

79.1

O2+CO2

20.9

VOLUMETRIC RESULTS - USENG

Velocity

77.42

ft/sec

Actual Flow

6486

acfm

Std. Flow

6489

scfm

Dry Std. Flow

6433

dscfm

VOLUMETRIC RESULTS - SI

Velocity

23.60

m/sec

Actual Flow

11020

am3/hr

Std. Flow

11025

sm3/hr

Dry Std. Flow

10930

dsm3/hr

POINT	STACK TEMP (DegF)	STATIC (in.WC)	DP (in.WC)	DH (in.WC)
1	62	-6.30	2.20	0.56
2	62		2.30	0.56
3	62		2.20	0.56
4	63		1.80	0.56
5	63		1.80	0.56
6	63		1.70	0.56
7	65		1.80	0.56
8	64		1.80	0.56
9	64		2.00	0.56
10	63		1.60	0.56
11	63		1.90	0.56
12	63		1.70	0.56
13				
AVG.	63	-6.30	1.90	0.56

METER VOLUME (dcf)	METER TEMPERATURE INLET (DegF)	OUTLET (DegF)
493.216	80	77
	79	76
	79	76
	79	74
	78	73
	78	73
	77	70
	77	71
	76	71
	76	70
	75	70
	75	69
546.802		
53.586	75	

EPA METHOD 201A ANALYSES

RUN I.D.

DCI-M201A-R3

SUMMARY

<u>COMPONENT</u>	<u>NET</u> <u>(grams)</u>	<u>CORRECTED</u> <u>FOR BLANK</u> <u>(grams)</u>
PM10:		
Probe Wash <= 10 microns	0.01050	0.00956
Filter	0.06124	0.06124
TOTAL PM10	0.07174	0.07080
PM (>10 Microns):		
Probe Wash > 10 microns	0.24690	0.24588
TOTAL PM	0.31864	0.31668

ANALYTICAL DATA**METHOD 201A COMPONENTS:**

	<u>TARE</u> <u>(grams)</u>	<u>FINAL</u> <u>(grams)</u>	<u>NET</u> <u>(grams)</u>	<u>VOLUME</u> <u>(ml)</u>
Filter	0.53176	0.59300	0.06124	NA
Probe Wash Residue <= PM10	67.02560	67.03610	0.01050	120.0
Acetone Blank Residue	66.82760	66.83100	0.00340	125.0
Applicable Acetone Blank			0.00326	120.0
Max. Allowable Blank			0.00094	NA
Probe Wash Residue > PM10	67.04990	67.29680	0.24690	130.0
Acetone Blank Residue	67.71840	67.72150	0.00310	125.0
Applicable Acetone Blank			0.00322	130
Max. Allowable Blank			0.00102	NA

PARTICULATE EMISSIONS:

	<u>PM10</u>	<u>PM>10 microns</u>	<u>TOTAL PM</u>
Actual Grain Loading (gr/dscf)	0.02078	0.07216	0.09293
Mass Rate (lb/hr)	1.146	3.979	5.124

D50 Calculations

RUN I.D. DCI-M201A-R3

Stack Gas Viscosity (micropoise)	178.6616
Cyclone Flow Rate (dscf/min)	0.441476
Cyclone Flow Rate (acfm)	0.445265
D50	9.898156

dPmin and dPmax Calculations

Stack Gas Viscosity (micropoise)	179.1137
Cyclone Flow Rate (acfm)	0.439994

Dn	vn	vmin	vmax	dPmin	dPmax
0.136	72.69792	61.30419	89.59276	1.187890	2.537124
0.15	59.76092	51.23732	74.29238	0.829791	1.744554
0.164	49.99334	43.69135	62.78867	0.603374	1.246115
0.18	41.50064	37.18413	52.83661	0.437030	0.882400
0.197	34.64714	31.98209	44.85445	0.323303	0.635926
0.215	29.08861	27.80459	38.42563	0.244359	0.466700
0.233	24.76783	24.58847	33.46583	0.191099	0.353997
0.264	19.29265	20.55729	27.24341	0.133576	0.234595
0.3	14.94023	17.38606	22.36060	0.095543	0.158038
0.342	11.49602	14.88512	18.54227	0.070033	0.108673
0.39	8.84037	12.94057	15.62008	0.052930	0.077119

SUMMARY OF METALS EMISSIONS
CASE 1 CALCULATIONS (1)

CONCRETE READY MIXED CORPORATION
DUST COLLECTOR INLET

RUN NUMBER (2): DCI-M201A-R1,2,3
 COMBINED VOLUME (3) 160.994 dscf
 AVG. GAS FLOWRATE: 6673 dscfm

<u>COMPONENT</u>		LABORATORY DATA			METAL EMISSIONS	
		SAMPLE CATCH - micrograms			CONC.	MASS RATE
		<u>SAMPLE</u>	<u>BLANK</u>	<u>TOTAL</u>	<u>ug/dscm</u>	<u>lb/hr</u>
Arsenic	As	5.12	* 0.20	4.92	1.0792	2.70E-05
Beryllium	Be	0.14	* 0.02	0.12	0.0263	6.58E-07
Cadmium	Cd	0.10	0.01	0.09	0.0197	4.93E-07
Chromium	Cr	8.20	1.90	6.3	1.3819	3.45E-05
Lead	Pb	4.42	0.70	3.72	0.8160	2.04E-05
Manganese	Mn	39.50	0.60	38.9	8.5328	2.13E-04
Mercury	Hg	* 0.20	* 0.20	0.00	0.0000	0.00E+00
Nickel	Ni	12.00	* 2.00	10	2.1935	5.48E-05
Phosphorus	P	* 100	* 100.00	0	0.0000	0.00E+00
Selenium	Se	0.50	* 0.20	0.30	0.0658	1.64E-06

Notes:

- (1) Case 1 calculations substitute the detection limit value for all of the non-detected parameters.
 The detection limit values are indicated with an "**".
- (2) The sample is comprised of filters from the identified test runs.
- (3) The volume of air sampled represents the combined total of the sample volumes of the individual test runs.

SUMMARY OF METALS EMISSIONS
CASE 2 CALCULATIONS (1)

CONCRETE READY MIXED CORPORATION
DUST COLLECTOR INLET

RUN NUMBER (2): **DCI-M201A-R1,2,3**
 COMBINED VOLUME (3) 160.994 dscf
 AVG. GAS FLOWRATE: 6672.867 dscfm

		LABORATORY DATA			METAL EMISSIONS	
		SAMPLE CATCH - micrograms			CONC.	MASS RATE
<u>COMPONENT</u>		<u>SAMPLE</u>	<u>BLANK</u>	<u>TOTAL</u>	<u>ug/dscm</u>	<u>lb/hr</u>
Arsenic	As	5.12	* 0.00	5.12	1.1231	2.81E-05
Beryllium	Be	0.14	* 0.00	0.14	0.0307	7.68E-07
Cadmium	Cd	0.10	0.01	0.09	0.0197	4.93E-07
Chromium	Cr	8.20	1.90	6.3	1.3819	3.45E-05
Lead	Pb	4.42	0.70	3.72	0.8160	2.04E-05
Manganese	Mn	39.50	0.60	38.9	8.5328	2.13E-04
Mercury	Hg	* 0.00	* 0.00	0.00	0.0000	0.00E+00
Nickel	Ni	12.00	* 0.00	12	2.6322	6.58E-05
Phosphorus	P	* 0.00	* 0.00	0	0.0000	0.00E+00
Selenium	Se	0.50	* 0.00	0.50	0.1097	2.74E-06

Notes:

- (1) Case 2 calculations substitute a value of zero for all of the non-detected parameters.
 The instances where a zero value is used are indicated with an "***".
- (2) The sample is comprised of filters from the identified test runs.
- (3) The volume of air sampled represents the combined total of the sample volumes of the individual test runs.

APPENDIX F.1.1.3
CENTRAL DUST COLLECTOR INLET
DATA AND RESULTS FOR 10/27/93

SUMMARY OF PARTICULATE AND METALS EMISSIONS
CONCRETE READY MIXED CORPORATION
CASE 1

DUST COLLECTOR INLET

RUN I.D.	DCI-M201A-R4	DCI-M201A-R5	DCI-M201A-R6	AVERAGE
DATE	10/27/93	10/27/93	10/27/93	
TIME STARTED	07:43	10:21	13:12	
TIME ENDED	09:43	12:21	15:12	

SAMPLING PARAMETERS

Metered Volume - dcf	54.099	56.300	57.36	55.730
Corrected Volume - dscf	54.610	54.447	54.500	54.555
Total Test Time - min	120.2	119.9	120	120.0
% Isokinetics	93.4	97.8	99.4	96.4
D50	9.69	9.65	9.61	9.65

GAS PARAMETERS

Gas Temperature - oF	48.0	57.0	71.2	59.6
Oxygen - %	20.9	20.9	20.9	20.9
Carbon Dioxide - %	0.0	0.0	0.0	0.0
Moisture - %	0.70	1.14	1.36	1.03

GAS FLOWRATE

Velocity - ft/sec	79.04	76.93	78.35	78.69
Actual Volume - acfm	6622	6445	6564	6593
Standard Volume - dscfm	6738	6430	6345	6542

PM10 EMISSIONS

Concentration - gr/dscf	1.09E-02	1.10E-02	2.35E-02	1.72E-02
Mass Rate - lb/hr	0.628	0.604	1.275	0.952

PM>10 MICRONS EMISSIONS

Concentration - gr/dscf	4.66E-02	3.38E-02	8.99E-02	6.83E-02
Mass Rate - lb/hr	2.694	1.864	4.887	3.791

TOTAL PM

Concentration - gr/dscf	5.75E-02	4.48E-02	1.13E-01	8.54E-02
Mass Rate - lb/hr	3.322	2.468	6.163	4.742

METALS EMISSIONS - lb/hr

Arsenic	_____	_____	_____	2.53E-05
Beryllium	_____	_____	_____	1.21E-06
Cadmium	_____	_____	_____	1.05E-07
Chromium	_____	_____	_____	2.37E-05
Lead	_____	_____	_____	2.00E-05
Manganese	_____	_____	_____	6.79E-05
Mercury	_____	_____	_____	0.00E+00
Nickel	_____	_____	_____	4.05E-05
Phosphorus	_____	_____	_____	0.00E+00
Selenium	_____	_____	_____	3.68E-06

SUMMARY OF PARTICULATE AND METALS EMISSIONS
 CONCRETE READY MIXED CORPORATION
 CASE 2

DUST COLLECTOR INLET

RUN I.D.	DCI-M201A-R4	DCI-M201A-R5	DCI-M201A-R6	AVERAGE
DATE	10/27/93	10/27/93	10/27/93	
TIME STARTED	07:43	10:21	13:12	
TIME ENDED	09:43	12:21	15:12	

SAMPLING PARAMETERS

Metered Volume - dcf	54.099	56.3	57.36	55.730
Corrected Volume - dscf	54.610	54.447	54.500	54.555
Total Test Time - min	120.2	119.9	119.7	120.0
% Isokinetics	93.4	97.8	99.4	96.4
D50	9.69	9.65	9.61	9.65

GAS PARAMETERS

Gas Temperature - oF	48.0	57.0	71.2	59.6
Oxygen - %	20.9	20.9	20.9	20.9
Carbon Dioxide - %	0.0	0.0	0.0	0.0
Moisture - %	0.70	1.14	1.36	1.03

GAS FLOWRATE

Velocity - ft/sec	79.04	76.93	78.35	78.69
Actual Volume - acfm	6622	6445	6564	6593
Standard Volume - dscfm	6738	6430	6345	6542

PM10 EMISSIONS

Concentration - gr/dscf	1.09E-02	1.10E-02	2.35E-02	1.72E-02
Mass Rate - lb/hr	0.628	0.604	1.275	0.952

PM>10 MICRONS EMISSIONS

Concentration - gr/dscf	4.66E-02	3.38E-02	8.99E-02	6.83E-02
Mass Rate - lb/hr	2.694	1.864	4.887	3.791

TOTAL PM

Concentration - gr/dscf	5.75E-02	4.48E-02	1.13E-01	8.54E-02
Mass Rate - lb/hr	3.322	2.468	6.163	4.742

METALS EMISSIONS - lb/hr

Arsenic	_____	_____	_____	2.63E-05
Beryllium	_____	_____	_____	1.32E-06
Cadmium	_____	_____	_____	1.05E-07
Chromium	_____	_____	_____	2.37E-05
Lead	_____	_____	_____	2.00E-05
Manganese	_____	_____	_____	6.79E-05
Mercury	_____	_____	_____	0.00E+00
Nickel	_____	_____	_____	5.10E-05
Phosphorus	_____	_____	_____	0.00E+00
Selenium	_____	_____	_____	4.73E-06

RUN NUMBER

DCI-M201A-R4

DATE 10/27/93
 START TIME 07:43
 END TIME 09:43
 STACK DIAM. 16 inches
 NOZZLE I.D. 0.136 inches
 METER BOX GAMMA 0.9866
 METER BOX dH@ 1.6884
 BAROMETRIC 29.97 in.Hg
 Cp 0.84
 TEST DURATION 120 minutes

METHOD 4 DATA

	INIT. (ml)	FINAL (ml)	NET (ml)
IMP.1	100.0	100.0	0.0
IMP.2	100.0	100.0	0.0
IMP.3	0.0	0.0	0.0
IMP.4			0.0
IMP.5			0.0
IMP.6			0.0
IMP.7			0.0
TOTAL	200.0	200.0	0.0
S.G.	200.0	208.2	8.2

SAMPLING RESULTS

Metered Volume 54.099 dcf
 Metered Volume 1.532 dcm
 Volume @ Std.Cond. 54.610 dscf
 Volume @ Std.Cond. 1.546 dscm
 % Water 0.70 %
 % Isokinetics 93.4 %

METHOD 3 DATA

%O2	20.9	Md	28.84
%CO2	0.0	Ms	28.76
%CO	0.0	Ps	29.50
%N2	79.1		
O2+CO2	10.0		

VOLUMETRIC RESULTS - USENG

Velocity 79.04 ft/sec
 Actual Flow 6622 acfm
 Std. Flow 6786 scfm
 Dry Std. Flow 6738 dscfm

VOLUMETRIC RESULTS - SI

Velocity 24.09 m/sec
 Actual Flow 11251 am3/hr
 Std. Flow 11529 sm3/hr
 Dry Std. Flow 11448 dsm3/hr

POINT	STACK TEMP (DegF)	STATIC (in.WC)	DP (in.WC)	DH (in.WC)
1	47	-6.40	2.10	0.56
2	48		2.40	0.56
3	48		2.40	0.56
4	48		1.90	0.56
5	49		2.30	0.56
6	48		2.30	0.56
7	48		2.10	0.56
8	48		2.10	0.56
9	48		1.90	0.56
10	48		1.70	0.56
11	48		1.60	0.56
12	48		1.60	0.56
13				
AVG.	48	-6.40	2.03	0.56

METER VOLUME (dcf)	METER TEMPERATURE INLET (DegF)	METER TEMPERATURE OUTLET (DegF)
546.876	44	45
	47	48
	50	49
	54	50
	57	51
	61	54
	63	54
	66	55
	64	57
	72	60
	74	63
	75	65
600.975		
54.099		57

EPA METHOD 201A ANALYSES

RUN I.D.

DCI-M201A-R4

SUMMARY

<u>COMPONENT</u>	<u>NET</u> <u>(grams)</u>	<u>CORRECTED</u> <u>FOR BLANK</u> <u>(grams)</u>
PM10:		
Probe Wash <= 10 microns	0.01180	0.01086
Filter	0.02762	0.02762
TOTAL PM10	0.03942	0.03848
PM (>10 Microns):		
Probe Wash > 10 microns	0.16600	0.16509
TOTAL PM	0.20542	0.20357

ANALYTICAL DATA**METHOD 201A COMPONENTS:**

	<u>TARE</u> <u>(grams)</u>	<u>FINAL</u> <u>(grams)</u>	<u>NET</u> <u>(grams)</u>	<u>VOLUME</u> <u>(ml)</u>
Filter	0.53648	0.56410	0.02762	NA
Probe Wash Residue <= PM10	66.72860	66.74040	0.01180	120.0
Acetone Blank Residue	66.82760	66.83100	0.00340	125.0
Applicable Acetone Blank			0.00326	120.0
Max. Allowable Blank			0.00094	NA
Probe Wash Residue > PM10	67.11390	67.27990	0.16600	116.0
Acetone Blank Residue	67.71840	67.72150	0.00310	125.0
Applicable Acetone Blank			0.00288	116
Max. Allowable Blank			0.00091	NA

PARTICULATE EMISSIONS:

	<u>PM10</u>	<u>PM>10 microns</u>	<u>TOTAL PM</u>
Actual Grain Loading (gr/dscf)	0.01087	0.04665	0.05752
Mass Rate (lb/hr)	0.628	2.694	3.322

D50 Calculations

RUN I.D. DCI-M201A-R4

Stack Gas Viscosity (micropoise)	175.1557
Cyclone Flow Rate (dscf/min)	0.454325
Cyclone Flow Rate (acfm)	0.446654
D50	9.688629

dPmin and dPmax Calculations

Stack Gas Viscosity (micropoise)	175.3305
Cyclone Flow Rate (acfm)	0.427593

Dn	vn	vmin	vmax	dPmin	dPmax
0.136	70.64905	59.59786	87.08401	1.150586	2.456602
0.15	58.07666	49.81637	72.21628	0.887785	1.865667
0.164	48.58435	42.48455	61.03812	0.645693	1.332804
0.18	40.33101	36.16221	51.36797	0.467815	0.943949
0.197	33.67066	31.10809	43.61214	0.346187	0.680422
0.215	28.26879	27.04945	37.36579	0.261746	0.499473
0.233	24.06979	23.92483	32.54687	0.204768	0.378950
0.264	18.74892	20.00821	26.50130	0.143212	0.251245
0.3	14.51916	16.92680	21.75725	0.102498	0.169345
0.342	11.17203	14.49626	18.04724	0.075175	0.116516
0.39	8.59122	12.60597	15.20762	0.056848	0.082734

RUN NUMBER

DCI-M201A-R5

DATE

10/27/93

METHOD 4 DATA

START TIME

10:21

INIT.

FINAL

NET

END TIME

12:21

(ml)

(ml)

(ml)

STACK DIAM.

16 inches

IMP.1

100.0

100.0

0.0

NOZZLE I.D.

0.136 inches

IMP.2

100.0

100.0

0.0

METER BOX GAMMA

0.9866

IMP.3

0.0

0.0

0.0

METER BOX dH@

1.6884

IMP.4

0.0

BAROMETRIC

29.97 in.Hg

IMP.5

0.0

Cp

0.84

IMP.6

0.0

TEST DURATION

120 minutes

IMP.7

0.0

TOTAL

200.0

200.0

0.0

S.G.

200.0

213.3

13.3

SAMPLING RESULTS

Metered Volume

56.300

dcf

METHOD 3 DATA

%O2

20.9

Md

28.84

Metered Volume

1.594

dcm

%CO2

0.0

Ms

28.71

Volume @ Std.Cond.

54.447

dscf

%CO

0.0

Ps

29.51

Volume @ Std.Cond.

1.542

dscm

%N2

79.1

% Water

1.14

%

O2+CO2

20.9

% Isokinetics

97.81

%

VOLUMETRIC RESULTS - USENG

Velocity

76.93

ft/sec

VOLUMETRIC RESULTS - SI

Velocity

23.45

m/sec

Actual Flow

6445

acfm

Actual Flow

10949

am3/hr

Std. Flow

6504

scfm

Std. Flow

11050

sm3/hr

Dry Std. Flow

6430

dscfm

Dry Std. Flow

10924

dsm3/hr

POINT	STACK TEMP (DegF)	STATIC (in.WC)	DP (in.WC)	DH (in.WC)
1	55	-6.20	2.10	0.56
2	55		2.20	0.56
3	55		2.10	0.56
4	56		1.70	0.56
5	56		1.60	0.56
6	56		1.60	0.56
7	57		1.60	0.56
8	57		2.10	0.56
9	56		2.20	0.56
10	56		2.00	0.56
11	57		1.70	0.56
12	57		1.80	0.56
13				
AVG.	56	-6.20	1.89	0.56

METER VOLUME (dcf)	METER TEMPERATURE INLET (DegF)	OUTLET (DegF)
601.222	73	71
	77	72
	79	73
	80	74
	82	76
	84	79
	86	80
	89	81
	92	84
	95	88
	97	90
	100	93
657.522		
56.300		80

EPA METHOD 201A ANALYSES

RUN I.D.

DCI-M201A-R5

SUMMARY

<u>COMPONENT</u>	<u>NET</u> <u>(grams)</u>	<u>CORRECTED</u> <u>FOR BLANK</u> <u>(grams)</u>
PM10:		
Probe Wash <= 10 microns	0.00990	0.00896
Filter	0.02969	0.02969
TOTAL PM10	0.03959	0.03865
PM (>10 Microns):		
Probe Wash > 10 microns	0.12020	0.11934
TOTAL PM	0.15979	0.15799

ANALYTICAL DATA

METHOD 201A COMPONENTS:

	<u>TARE</u> <u>(grams)</u>	<u>FINAL</u> <u>(grams)</u>	<u>NET</u> <u>(grams)</u>	<u>VOLUME</u> <u>(ml)</u>
Filter	0.53461	0.56430	0.02969	NA
Probe Wash Residue <= PM10	70.25000	70.25990	0.00990	120.0
Acetone Blank Residue	66.82760	66.83100	0.00340	125.0
Applicable Acetone Blank			0.00326	120.0
Max. Allowable Blank			0.00094	NA
Probe Wash Residue > PM10	69.77030	69.89050	0.12020	110.0
Acetone Blank Residue	67.71840	67.72150	0.00310	125.0
Applicable Acetone Blank			0.00273	110
Max. Allowable Blank			0.00086	NA

PARTICULATE EMISSIONS:

	<u>PM10</u>	<u>PM>10 microns</u>	<u>TOTAL PM</u>
Actual Grain Loading (gr/dscf)	0.01095	0.03382	0.04477
Mass Rate (lb/hr)	0.604	1.864	2.468

D50 Calculations

RUN I.D. DCI-M201A-R5

Stack Gas Viscosity (micropoise)	176.7729
Cyclone Flow Rate (dscf/min)	0.4541
Cyclone Flow Rate (acfm)	0.455315
D50	9.65420

dPmin and dPmax Calculations

Stack Gas Viscosity (micropoise)	177.0997
Cyclone Flow Rate (acfm)	0.434071

Dn	vn	vmin	vmax	dPmin	dPmax
0.136	71.71927	60.48564	88.39178	1.165217	2.488432
0.15	58.95642	50.55482	73.29782	0.814005	1.711135
0.164	49.32033	43.11090	61.94939	0.591938	1.222295
0.18	40.94196	36.69174	52.13176	0.428784	0.865579
0.197	34.18072	31.56014	44.25748	0.317234	0.623843
0.215	28.69702	27.43924	37.91561	0.239798	0.457866
0.233	24.43441	24.26668	33.02292	0.187553	0.347323
0.264	19.03294	20.29007	26.88473	0.131120	0.230204
0.3	14.73911	17.16167	22.06802	0.093804	0.155106
0.342	11.34126	14.69437	18.30131	0.068771	0.106676
0.39	8.72136	12.77583	15.41853	0.051985	0.075716

RUN NUMBER

DCI-M201A-R6

DATE

10/27/93

METHOD 4 DATA

START TIME

13:12

INIT.

FINAL

NET

END TIME

15:12

(ml)

(ml)

(ml)

STACK DIAM.

16 inches

IMP.1

100.0

100.0

0.0

NOZZLE I.D.

0.136 inches

IMP.2

100.0

94.0

-6.0

METER BOX GAMMA

0.9866

IMP.3

0.0

0.0

0.0

METER BOX dH@

1.6884

IMP.4

0.0

BAROMETRIC

29.97 in.Hg

IMP.5

0.0

Cp

0.84

IMP.6

0.0

TEST DURATION

120 minutes

IMP.7

0.0

TOTAL

200.0

194.0

-6.0

S.G.

200.0

221.9

21.9

SAMPLING RESULTS

Metered Volume

57.360

dcf

METHOD 3 DATA

%O2

20.9

Md

28.84

Metered Volume

1.624

dcm

%CO2

0.0

Ms

28.69

Volume @ Std.Cond.

54.500

dscf

%CO

0.0

Ps

29.50

Volume @ Std.Cond.

1.543

dscm

%N2

79.1

% Water

1.36

%

O2+CO2

20.9

% Isokinetics

99.4

%

VOLUMETRIC RESULTS - USENG

Velocity

78.35

ft/sec

VOLUMETRIC RESULTS - SI

Velocity

23.88 m/sec

Actual Flow

6564

acfm

Actual Flow

11152 am3/hr

Std. Flow

6433

scfm

Std. Flow

10929 sm3/hr

Dry Std. Flow

6345

dscfm

Dry Std. Flow

10781 dsm3/hr

STACK

POINT

TEMP

STATIC

DP

DH

METER VOLUME

METER TEMPERATURE

INLET

OUTLET

(DegF)

(in.WC)

(in.WC)

(in.WC)

(dcf)

(DegF)

(DegF)

1

75

-6.40

2.10

0.59

657.658

82

81

2

75

2.20

0.59

85

82

3

72

2.10

0.59

86

82

4

72

1.90

0.59

88

83

5

71

1.80

0.59

89

83

6

71

1.80

0.59

90

84

7

70

1.90

0.59

91

84

8

70

1.90

0.59

92

84

9

70

1.90

0.59

93

86

10

70

1.90

0.59

93

88

11

69

1.70

0.59

93

88

12

69

1.60

0.59

95

90

13

715.018

AVG.

71

-6.40

1.90

0.59

57.360

90

EPA METHOD 201A ANALYSES

RUN I.D.

DCI-M201A-R6

SUMMARY

<u>COMPONENT</u>	<u>NET</u> <u>(grams)</u>	<u>CORRECTED</u> <u>FOR BLANK</u> <u>(grams)</u>
PM10:		
Probe Wash <= 10 microns	0.01310	0.01216
Filter	0.07067	0.07067
TOTAL PM10	0.08377	0.08283
PM (>10 Microns):		
Probe Wash > 10 microns	0.31830	0.31738
TOTAL PM	0.40207	0.40021

ANALYTICAL DATA**METHOD 201A COMPONENTS:**

	<u>TARE</u> <u>(grams)</u>	<u>FINAL</u> <u>(grams)</u>	<u>NET</u> <u>(grams)</u>	<u>VOLUME</u> <u>(ml)</u>
Filter	0.53063	0.60130	0.07067	NA
Probe Wash Residue <= PM10	70.33910	70.35220	0.01310	120.0
Acetone Blank Residue	66.82760	66.83100	0.00340	125.0
Applicable Acetone Blank			0.00326	120.0
Max. Allowable Blank			0.00094	NA
Probe Wash Residue > PM10	67.00320	67.32150	0.31830	117.0
Acetone Blank Residue	67.71840	67.72150	0.00310	125.0
Applicable Acetone Blank			0.00290	117
Max. Allowable Blank			0.00092	NA

PARTICULATE EMISSIONS:

	<u>PM10</u>	<u>PM>10 microns</u>	<u>TOTAL PM</u>
Actual Grain Loading (gr/dscf)	0.02345	0.08986	0.11331
Mass Rate (lb/hr)	1.275	4.887	6.163

D50 Calculations

RUN I.D. DCI-M201A-R6

Stack Gas Viscosity (micropoise)	180.2451
Cyclone Flow Rate (dscf/min)	0.455307
Cyclone Flow Rate (acfm)	0.471143
D50	9.614337

dPmin and dPmax Calculations

Stack Gas Viscosity (micropoise)	180.8458
Cyclone Flow Rate (acfm)	0.447208

Dn	vn	vmin	vmax	dPmin	dPmax
0.136	73.88997	62.28899	91.04632	1.199056	2.561779
0.15	60.74084	52.05547	75.49370	0.837432	1.761319
0.164	50.81309	44.38435	63.80006	0.608802	1.257937
0.18	42.18114	37.76901	53.68346	0.440847	0.890631
0.197	35.21525	32.48040	45.56911	0.326032	0.641738
0.215	29.56558	28.23333	39.03366	0.246343	0.470864
0.233	25.17395	24.96366	33.99148	0.192590	0.357073
0.264	19.60900	20.86546	27.66560	0.134547	0.236536
0.3	15.18521	17.64180	22.70162	0.096184	0.159269
0.342	11.68453	15.09992	18.82000	0.070464	0.109460
0.39	8.98533	13.12400	15.84970	0.053229	0.077635

SUMMARY OF METALS EMISSIONS
CASE 1 CALCULATIONS (1)

CONCRETE READY MIXED CORPORATION
DUST COLLECTOR INLET

RUN NUMBER (2): DCI-M201A-R4,5,6
 COMBINED VOLUME (3) 163.557 dscf
 AVG. GAS FLOWRATE: 6505 dscfm

<u>COMPONENT</u>		LABORATORY DATA			METAL EMISSIONS	
		SAMPLE CATCH - micrograms			CONC.	MASS RATE
		<u>SAMPLE</u>	<u>BLANK</u>	<u>TOTAL</u>	<u>ug/dscm</u>	<u>lb/hr</u>
Arsenic	As	5.00	* 0.20	4.8	1.0364	2.53E-05
Beryllium	Be	0.25	* 0.02	0.23	0.0497	1.21E-06
Cadmium	Cd	0.03	0.01	0.02	0.0043	1.05E-07
Chromium	Cr	6.40	1.90	4.5	0.9716	2.37E-05
Lead	Pb	4.50	0.70	3.8	0.8205	2.00E-05
Manganese	Mn	13.50	0.60	12.9	2.7853	6.79E-05
Mercury	Hg	* 0.20	* 0.20	0.00	0.0000	0.00E+00
Nickel	Ni	9.70	* 2.00	7.7	1.6626	4.05E-05
Phosphorus	P	* 100	* 100.00	0	0.0000	0.00E+00
Selenium	Se	0.90	* 0.20	0.70	0.1511	3.68E-06

Notes:

- (1) Case 1 calculations substitute the detection limit value for all of the non-detected parameters.
 The detection limit values are indicated with an "*".
- (2) The sample is comprised of filters from the identified test runs.
- (3) The volume of air sampled represents the combined total of the sample volumes of the individual test runs.

SUMMARY OF METALS EMISSIONS
CASE 2 CALCULATIONS (1)

CONCRETE READY MIXED CORPORATION
DUST COLLECTOR INLET

RUN NUMBER (2): **DCI-M201A-R4,5,6**
 COMBINED VOLUME (3) 163.557 dscf
 AVG. GAS FLOWRATE: 6504.552 dscfm

<u>COMPONENT</u>		LABORATORY DATA			METAL EMISSIONS	
		SAMPLE CATCH - micrograms			CONC.	MASS RATE
		<u>SAMPLE</u>	<u>BLANK</u>	<u>TOTAL</u>	<u>ug/dscm</u>	<u>lb/hr</u>
Arsenic	As	5.00	* 0.00	5	1.0796	2.63E-05
Beryllium	Be	0.25	* 0.00	0.25	0.0540	1.32E-06
Cadmium	Cd	0.03	0.01	0.02	0.0043	1.05E-07
Chromium	Cr	6.40	1.90	4.5	0.9716	2.37E-05
Lead	Pb	4.50	0.70	3.8	0.8205	2.00E-05
Manganese	Mn	13.50	0.60	12.9	2.7853	6.79E-05
Mercury	Hg	* 0.00	* 0.00	0.00	0.0000	0.00E+00
Nickel	Ni	9.70	* 0.00	9.7	2.0944	5.10E-05
Phosphorus	P	* 0.00	* 0.00	0	0.0000	0.00E+00
Selenium	Se	0.90	* 0.00	0.90	0.1943	4.73E-06

Notes:

- (1) Case 2 calculations substitute a value of zero for all of the non-detected parameters.
 The instances where a zero value is used are indicated with an "***".
- (2) The sample is comprised of filters from the identified test runs.
- (3) The volume of air sampled represents the combined total of the sample volumes of the individual test runs.

APPENDIX F.1.1.4
CENTRAL DUST COLLECTOR INLET
DATA AND RESULTS FOR 10/28/93

TABLE xx

SUMMARY OF PARTICULATE AND METALS EMISSIONS
CONCRETE READY MIXED CORPORATION
CASE 1

DUST COLLECTOR INLET

RUN I.D.	DCI-M201A-R7	DCI-M201A-R8	DCI-M201A-R9	DCI-M201A-R10	AVERAGE
DATE	10/28/93	10/28/93	10/28/93	10/28/93	
TIME STARTED	07:03	09:40	12:22	15:02	
TIME ENDED	09:03	11:40	14:23	17:02	

SAMPLING PARAMETERS

Metered Volume - dcf	52.005	53.452	55.986	55.486	53.745
Corrected Volume - dscf	52.556	53.275	54.739	53.930	53.243
Total Test Time - min	120.0	119.9	121.7	119.9	120.0
% Isokinetics	99.3	93.0	95.6	98.3	98.8
D50	10.00	9.94	9.69	9.73	9.86

GAS PARAMETERS

Gas Temperature - oF	46.2	48.0	53.0	59.9	53.0
Oxygen - %	20.9	20.9	20.9	20.9	20.9
Carbon Dioxide - %	0.0	0.0	0.0	0.0	0.0
Moisture - %*	0.00	0.00	1.16	0.70	0.35

GAS FLOWRATE

Velocity - ft/sec	71.24	77.64	77.92	76.46	73.85
Actual Volume - acfm	5968	6505	6528	6406	6187
Standard Volume - dscfm	6108	6616	6514	6334	6221

PM10 EMISSIONS

Concentration - gr/dscf	1.91E-02	9.18E-04	8.99E-04	9.13E-04	1.00E-02
Mass Rate - lb/hr	1.002	0.052	0.050	0.050	0.526

PM>10 MICRONS EMISSIONS

Concentration - gr/dscf	5.12E-04	1.86E-04	9.03E-04	9.16E-04	7.14E-04
Mass Rate - lb/hr	0.027	0.011	0.050	0.050	0.038

TOTAL PM

Concentration - gr/dscf	1.97E-02	1.10E-03	1.80E-03	1.83E-03	1.07E-02
Mass Rate - lb/hr	1.029	0.063	0.101	0.099	0.564

METALS EMISSIONS - lb/hr

Arsenic					1.17E-05
Beryllium					3.15E-07
Cadmium					3.94E-08
Chromium					4.49E-05
Lead					2.56E-05
Manganese					1.97E-04
Mercury					0.00E+00
Nickel					3.31E-05
Phosphorus					0.00E+00
Selenium					1.58E-06

*%Moisture for DCI-M201A-R7 and DCI-M201A-R8 assumed to be zero due to negative volume gain in the impingers.

TABLE xx

SUMMARY OF PARTICULATE AND METALS EMISSIONS
 CONCRETE READY MIXED CORPORATION
 CASE 2

DUST COLLECTOR INLET

RUN I.D.	DCI-M201A-R7	DCI-M201A-R8	DCI-M201A-R9	DCI-M201A-R10	AVERAGE
DATE	10/28/93	10/28/93	10/28/93	10/28/93	
TIME STARTED	07:03	09:40	12:22	15:02	
TIME ENDED	09:03	11:40	14:23	17:02	

SAMPLING PARAMETERS

Metered Volume - dcf	52.005	53.452	55.986	55.486	53.745
Corrected Volume - dscf	52.556	53.275	54.739	53.930	53.243
Total Test Time - min	120	119.9	121.7	119.9	120.0
% Isokinetics	99.3	93.0	95.6	98.3	98.8
D50	10.00	9.94	9.69	9.73	9.86
				0	

GAS PARAMETERS

Gas Temperature - oF	46.2	48.0	53.0	59.9	53.0
Oxygen - %	20.9	20.9	20.9	20.9	20.9
Carbon Dioxide - %	0.0	0.0	0.0	0.0	0.0
Moisture - %*	0.00	0.00	1.16	0.70	0.35

GAS FLOWRATE

Velocity - ft/sec	71.24	77.64	77.92	76.46	73.85
Actual Volume - acfm	5968	6505	6528	6406	6187
Standard Volume - dscfm	6108	6616	6514	6334	6221

PM10 EMISSIONS

Concentration - gr/dscf	1.91E-02	9.18E-04	8.99E-04	9.13E-04	1.00E-02
Mass Rate - lb/hr	1.002	0.052	0.050	0.050	0.526

PM>10 MICRONS EMISSIONS

Concentration - gr/dscf	5.12E-04	1.86E-04	9.03E-04	9.16E-04	7.14E-04
Mass Rate - lb/hr	0.027	0.011	0.050	0.050	0.038

TOTAL PM

Concentration - gr/dscf	1.97E-02	1.10E-03	1.80E-03	1.83E-03	1.07E-02
Mass Rate - lb/hr	1.029	0.063	0.101	0.099	0.564

METALS EMISSIONS - lb/hr

Arsenic	_____	_____	_____	_____	1.25E-05
Beryllium	_____	_____	_____	_____	3.94E-07
Cadmium	_____	_____	_____	_____	3.94E-08
Chromium	_____	_____	_____	_____	4.49E-05
Lead	_____	_____	_____	_____	2.56E-05
Manganese	_____	_____	_____	_____	1.97E-04
Mercury	_____	_____	_____	_____	0.00E+00
Nickel	_____	_____	_____	_____	4.10E-05
Phosphorus	_____	_____	_____	_____	0.00E+00
Selenium	_____	_____	_____	_____	2.37E-06

*%Moisture for DCI-M201A-R7 and DCI-M201A-R8 assumed to be zero due to negative volume gain in the impingers.

RUN NUMBER

DCI-M201A-R7

DATE

10/28/93

METHOD 4 DATA

START TIME

07:03

INIT.

FINAL

NET

END TIME

09:03

(ml)

(ml)

(ml)

STACK DIAM.

16 inches

IMP.1

100.0

128.0

28.0

NOZZLE I.D.

0.136 inches

IMP.2

100.0

52.0

-48.0

METER BOX GAMMA

0.9866

IMP.3

0.0

0.0

0.0

METER BOX dH@

1.6884

IMP.4

0.0

BAROMETRIC

29.80 in.Hg

IMP.5

0.0

Cp

0.84

IMP.6

0.0

TEST DURATION

120 minutes

IMP.7

0.0

TOTAL

200.0

180.0

-20.0

S.G.

200.0

218.3

18.3

SAMPLING RESULTS

Metered Volume

52.005

dcf

METHOD 3 DATA

%O2

20.9

Md

28.84

Metered Volume

1.473

dcm

%CO2

0.0

Ms

28.84

Volume @ Std.Cond.

52.556

dscf

%CO

0.0

Ps

29.36

Volume @ Std.Cond.

1.488

dscm

%N2

79.1

% Water*

0.00

%

O2+CO2

10.0

% Isokinetics

99.3

%

VOLUMETRIC RESULTS - USENG

Velocity

71.24

ft/sec

VOLUMETRIC RESULTS - SI

Velocity

21.71 m/sec

Actual Flow

5968

acfm

Actual Flow

10139 am3/hr

Std. Flow

6108

scfm

Std. Flow

10378 sm3/hr

Dry Std. Flow

6108

dscfm

Dry Std. Flow

10378 dsm3/hr

POINT	STACK	STATIC	DP	DH	METER	METER TEMPERATURE	
	TEMP				VOLUME	INLET	OUTLET
	(DegF)	(in.WC)	(in.WC)	(in.WC)	(dcf)	(DegF)	(DegF)
1	44	-6.00	0.95	0.54	716.612	45	45
2	45		0.95	0.54		48	48
3	45		0.95	0.54		50	49
4	46		1.80	0.54		52	49
5	45		2.00	0.54		54	49
6	46		2.10	0.54		57	50
7	47		1.70	0.54		58	52
8	47		2.10	0.54		60	53
9	47		2.00	0.54		61	54
10	48		1.90	0.54		63	55
11	47		1.80	0.54		64	56
12	47		1.90	0.54		64	57
13					768.617		
AVG.	46	-6.00	1.68	0.54	52.005		54

*%Moisture assumed to be zero due to negative volume gain in the impingers.

EPA METHOD 201A ANALYSES

RUN I.D.

DCI-M201A-R7

SUMMARY

<u>COMPONENT</u>	<u>NET</u> <u>(grams)</u>	<u>CORRECTED</u> <u>FOR BLANK</u> <u>(grams)</u>
PM10:		
Probe Wash <= 10 microns	0.00260	0.00260
Filter	0.06260	0.06260
TOTAL PM10	0.06520	0.06520
PM (>10 Microns):		
Probe Wash > 10 microns	0.00270	0.00174
TOTAL PM	0.0679	0.06694

ANALYTICAL DATA**METHOD 201A COMPONENTS:**

	<u>TARE</u> <u>(grams)</u>	<u>FINAL</u> <u>(grams)</u>	<u>NET</u> <u>(grams)</u>	<u>VOLUME</u> <u>(ml)</u>
Filter	0.53550	0.59810	0.06260	NA
Probe Wash Residue <= PM10	66.35430	66.35690	0.00260	124.0
Acetone Blank Residue	67.18690	67.18690	0.00000	125.0
Applicable Acetone Blank			0.00000	124.0
Max. Allowable Blank			0.00097	NA
Probe Wash Residue > PM10	64.90430	64.90700	0.00270	122.0
Acetone Blank Residue	67.28290	67.28440	0.00150	125.0
Applicable Acetone Blank			0.00146	122
Max. Allowable Blank			0.00096	NA

PARTICULATE EMISSIONS:

	<u>PM10</u>	<u>PM>10 microns</u>	<u>TOTAL PM</u>
Actual Grain Loading (gr/dscf)	0.01914	0.00051	0.01965
Mass Rate (lb/hr)	1.002	0.027	1.029

D50 Calculations

RUN I.D. DCI-M201A-R7

Stack Gas Viscosity (micropoise)	175.2353
Cyclone Flow Rate (dscf/min)	0.437966
Cyclone Flow Rate (acfm)	0.427397
D50	9.996328

dPmin and dPmax Calculations

Stack Gas Viscosity (micropoise)	175.3764
Cyclone Flow Rate (acfm)	0.427519

Dn	vn	vmin	vmax	dPmin	dPmax
0.136	70.63684	59.58885	87.06994	1.151935	2.459431
0.15	58.06662	49.80915	72.20487	0.885629	1.861087
0.164	48.57596	42.47869	61.02872	0.644134	1.329543
0.18	40.32404	36.15753	51.36033	0.466693	0.941650
0.197	33.66485	31.10437	43.60592	0.345364	0.678773
0.215	28.26390	27.04649	37.36072	0.261129	0.498270
0.233	24.06563	23.92246	32.54270	0.204289	0.378043
0.264	18.74568	20.00657	26.49827	0.142883	0.250651
0.3	14.51666	16.92572	21.75511	0.102265	0.168949
0.342	11.17010	14.49560	18.04578	0.075008	0.116248
0.39	8.58974	12.60560	15.20666	0.056723	0.082547

RUN NUMBER
DCI-M201A-R8
DATE
10/28/93
METHOD 4 DATA
START TIME
09:40
INIT.
FINAL
NET
END TIME
11:40
(ml)
(ml)
(ml)
STACK DIAM.
16 inches
IMP.1
100.0
88.0
-12.0
NOZZLE I.D.
0.136 inches
IMP.2
100.0
88.0
-12.0
METER BOX GAMMA
0.9866
IMP.3
0.0
0.0
0.0
METER BOX dH@
1.6884
IMP.4
0.0
BAROMETRIC
29.80 in.Hg
IMP.5
0.0
Cp
0.84
IMP.6
0.0
TEST DURATION
120 minutes
IMP.7
0.0
TOTAL
200.0
176.0
-24.0
S.G.
200.0
214.5
14.5
SAMPLING RESULTS
Metered Volume
53.452
dcf
METHOD 3 DATA
%O2
20.9
Md
28.84
Metered Volume
1.514
dcm
%CO2
0.0
Ms
28.84
Volume @ Std.Cond.
53.275
dscf
%CO
0.0
Ps
29.34
Volume @ Std.Cond.
1.509
dscm
%N2
79.1
% Water*
0.00
%
O2+CO2
20.9
% Isokinetics
93.01
%
VOLUMETRIC RESULTS - USENG
Velocity
77.64
ft/sec
VOLUMETRIC RESULTS - SI
Velocity
23.67 m/sec
Actual Flow
6505
acfm
Actual Flow
11052 am3/hr
Std. Flow
6616
scfm
Std. Flow
11241 sm3/hr
Dry Std. Flow
6616
dscfm
Dry Std. Flow
11241 dsm3/hr
STACK
POINT
TEMP
STATIC
DP
DH
METER
METER TEMPERATURE
(DegF)
(in.WC)
(in.WC)
(in.WC)
(in.WC)
VOLUME
INLET
OUTLET
1
51
-6.30
2.30
0.54
768.696
58
56
2
52
2.40
0.54
60
57
3
50
2.10
0.54
62
57
4
49
2.00
0.54
63
57
5
49
1.80
0.54
64
57
6
49
1.80
0.54
64
58
7
48
2.00
0.54
65
58
8
48
1.90
0.54
66
59
9
48
2.10
0.54
65
59
10
48
1.70
0.54
66
60
11
48
1.70
0.54
66
61
12
48
1.60
0.54
66
61
13
822.148
AVG.
49
-6.30
1.95
0.54
53.452
61

*%Moisture assumed to be zero due to negative volume gain in the impingers.

EPA METHOD 201A ANALYSES

RUN I.D.

DCI-M201A-R8

SUMMARY

<u>COMPONENT</u>	<u>NET</u> <u>(grams)</u>	<u>CORRECTED</u> <u>FOR BLANK</u> <u>(grams)</u>
PM10:		
Probe Wash <= 10 microns	0.00190	0.00190
Filter	0.00127	0.00127
TOTAL PM10	0.00317	0.00317
PM (>10 Microns):		
Probe Wash > 10 microns	0.00160	0.00064
TOTAL PM	0.00477	0.00381

ANALYTICAL DATA**METHOD 201A COMPONENTS:**

	<u>TARE</u> <u>(grams)</u>	<u>FINAL</u> <u>(grams)</u>	<u>NET</u> <u>(grams)</u>	<u>VOLUME</u> <u>(ml)</u>
Filter	0.53753	0.53880	0.00127	NA
Probe Wash Residue <= PM10	67.19910	67.20100	0.00190	110.0
Acetone Blank Residue	67.18690	67.18690	0.00000	125.0
Applicable Acetone Blank			0.00000	110.0
Max. Allowable Blank			0.00086	NA
Probe Wash Residue > PM10	66.23130	66.23290	0.00160	122.0
Acetone Blank Residue	67.28290	67.28440	0.00150	125.0
Applicable Acetone Blank			0.00146	122
Max. Allowable Blank			0.00096	NA

PARTICULATE EMISSIONS:

	<u>PM10</u>	<u>PM>10 microns</u>	<u>TOTAL PM</u>
Actual Grain Loading (gr/dscf)	0.00092	0.00019	0.00110
Mass Rate (lb/hr)	0.052	0.011	0.063

D50 Calculations

RUN I.D. DCI-M201A-R8

Stack Gas Viscosity (micropoise)	175.9149
Cyclone Flow Rate (dscf/min)	0.444331
Cyclone Flow Rate (acfm)	0.433389
D50	9.93849

dPmin and dPmax Calculations

Stack Gas Viscosity (micropoise)	176.1051
Cyclone Flow Rate (acfm)	0.430098

Dn	vn	vmin	vmax	dPmin	dPmax
0.136	71.06293	59.94272	87.59092	1.158298	2.473236
0.15	58.41689	50.10360	72.63581	0.809255	1.700783
0.164	48.86897	42.72853	61.39189	0.588550	1.214981
0.18	40.56728	36.36886	51.66481	0.426390	0.860473
0.197	33.86792	31.28487	43.86327	0.315512	0.620225
0.215	28.43440	27.20223	37.58007	0.238537	0.455263
0.233	24.21080	24.05913	32.73270	0.186598	0.345391
0.264	18.85876	20.11938	26.65142	0.130490	0.228975
0.3	14.60422	17.01983	21.87935	0.093381	0.154318
0.342	11.23747	14.57507	18.14747	0.068481	0.106165
0.39	8.64155	12.67381	15.29117	0.051780	0.075375

RUN NUMBER

DCI-M201A-R9

DATE

10/28/93

METHOD 4 DATA

START TIME

12:22

INIT.

FINAL

NET

END TIME

14:23

(ml)

(ml)

(ml)

STACK DIAM.

16 inches

IMP.1

100.0

108.0

8.0

NOZZLE I.D.

0.136 inches

IMP.2

100.0

88.0

-12.0

METER BOX GAMMA

0.9866

IMP.3

0.0

0.0

0.0

METER BOX dH@

1.6884

IMP.4

0.0

0.0

0.0

BAROMETRIC

29.80 in.Hg

IMP.5

0.0

0.0

0.0

Cp

0.84

IMP.6

0.0

0.0

0.0

TEST DURATION

122 minutes

IMP.7

0.0

0.0

0.0

TOTAL

200.0

196.0

-4.0

S.G.

200.0

217.6

17.6

SAMPLING RESULTS

Metered Volume

55.986

dcf

METHOD 3 DATA

%O2

20.9

Md

28.84

Metered Volume

1.585

dcm

%CO2

0.0

Ms

28.71

Volume @ Std.Cond.

54.739

dscf

%CO

0.0

Ps

29.34

Volume @ Std.Cond.

1.550

dscm

%N2

79.1

% Water

1.16

%

O2+CO2

20.9

% Isokinetics

95.6

%

VOLUMETRIC RESULTS - USENG

Velocity

77.92

ft/sec

VOLUMETRIC RESULTS - SI

Velocity

23.75

m/sec

Actual Flow

6528

acfm

Actual Flow

11092

am3/hr

Std. Flow

6590

scfm

Std. Flow

11196

sm3/hr

Dry Std. Flow

6514

dscfm

Dry Std. Flow

11067

dsm3/hr

POINT	STACK	STATIC	DP	DH	METER	METER TEMPERATURE	
	TEMP					INLET	OUTLET
	(DegF)	(in.WC)	(in.WC)	(in.WC)	VOLUME	(DegF)	(DegF)
					(dcf)		
1	53	-6.20	2.30	0.55	822.235	65	63
2	53		2.30	0.55		69	65
3	53		2.20	0.55		70	66
4	53		1.70	0.55		72	67
5	53		2.10	0.55		73	68
6	53		1.60	0.55		74	69
7	53		1.60	0.55		74	69
8	53		2.00	0.55		75	70
9	53		2.00	0.55		76	71
10	53		1.70	0.55		78	71
11	53		1.80	0.55		79	72
12	53		2.00	0.55		79	73
13					878.221		
AVG.	53	-6.20	1.94	0.55	55.986	71	

EPA METHOD 201A ANALYSES

RUN I.D.

DCI-M201A-R9

SUMMARY

<u>COMPONENT</u>	<u>NET</u> <u>(grams)</u>	<u>CORRECTED</u> <u>FOR BLANK</u> <u>(grams)</u>
PM10:		
Probe Wash <= 10 microns	0.00200	0.00200
Filter	0.00119	0.00119
TOTAL PM10	0.00319	0.00319
PM (>10 Microns):		
Probe Wash > 10 microns	0.00390	0.00320
TOTAL PM	0.00709	0.00639

ANALYTICAL DATA**METHOD 201A COMPONENTS:**

	<u>TARE</u> <u>(grams)</u>	<u>FINAL</u> <u>(grams)</u>	<u>NET</u> <u>(grams)</u>	<u>VOLUME</u> <u>(ml)</u>
Filter	0.53611	0.53730	0.00119	NA
Probe Wash Residue <= PM10	66.36540	66.36740	0.00200	120.0
Acetone Blank Residue	67.18690	67.18690	0.00000	120.0
Applicable Acetone Blank			0.00000	120.0
Max. Allowable Blank			0.00094	NA
Probe Wash Residue > PM10	65.57020	65.57410	0.00390	89.0
Acetone Blank Residue	67.28290	67.28440	0.00150	125.0
Applicable Acetone Blank			0.00107	89
Max. Allowable Blank			0.00070	NA

PARTICULATE EMISSIONS:

	<u>PM10</u>	<u>PM>10 microns</u>	<u>TOTAL PM</u>
Actual Grain Loading (gr/dscf)	0.00090	0.00090	0.00180
Mass Rate (lb/hr)	0.050	0.050	0.101

D50 Calculations

RUN I.D. DCI-M201A-R9

Stack Gas Viscosity (micropoise)	176.0183
Cyclone Flow Rate (dscf/min)	0.449783
Cyclone Flow Rate (acfm)	0.450973
D50	9.690297

dPmin and dPmax Calculations

Stack Gas Viscosity (micropoise)	176.2851
Cyclone Flow Rate (acfm)	0.432055

Dn	vn	vmin	vmax	dPmin	dPmax
0.136	71.38630	60.20496	87.98150	1.154598	2.465749
0.15	58.68271	50.32025	72.95763	0.806588	1.695538
0.164	49.09135	42.91090	61.66190	0.586545	1.211155
0.18	40.75188	36.52155	51.88985	0.424878	0.857691
0.197	34.02203	31.41379	44.05214	0.314345	0.618159
0.215	28.56378	27.31202	37.73972	0.237615	0.453694
0.233	24.32097	24.15420	32.86975	0.185845	0.344159
0.264	18.94457	20.19605	26.76007	0.129927	0.228108
0.3	14.67068	17.08218	21.96572	0.092951	0.153694
0.342	11.28861	14.62633	18.21651	0.068145	0.105705
0.39	8.68087	12.71670	15.34711	0.051513	0.075027

RUN NUMBER

DCI-M201A-R10

DATE

10/28/93

METHOD 4 DATA

START TIME

15:02

INIT.

FINAL

NET

END TIME

17:02

(ml)

(ml)

(ml)

STACK DIAM.

16 inches

IMP.1

100.0

90.0

-10.0

NOZZLE I.D.

0.136 inches

IMP.2

100.0

98.0

-2.0

METER BOX GAMMA

0.9866

IMP.3

0.0

0.0

0.0

METER BOX dH@

1.6884

IMP.4

0.0

BAROMETRIC

29.80 in.Hg

IMP.5

0.0

Cp

0.84

IMP.6

0.0

TEST DURATION

120 minutes

IMP.7

0.0

TOTAL

200.0

188.0

-12.0

S.G.

200.0

220.0

20.0

SAMPLING RESULTS

METHOD 3 DATA

Metered Volume

55.486

dcf

%O2

20.9

Md

28.84

Metered Volume

1.571

dcm

%CO2

0.0

Ms

28.76

Volume @ Std.Cond.

53.930

dscf

%CO

0.0

Ps

29.34

Volume @ Std.Cond.

1.527

dscm

%N2

79.1

% Water

0.70

%

O2+CO2

20.9

% Isokinetics

98.3

%

VOLUMETRIC RESULTS - USENG

VOLUMETRIC RESULTS - SI

Velocity

76.46

ft/sec

Velocity

23.31 m/sec

Actual Flow

6406

acfm

Actual Flow

10883 am3/hr

Std. Flow

6378

scfm

Std. Flow

10837 sm3/hr

Dry Std. Flow

6334

dscfm

Dry Std. Flow

10761 dsm3/hr

POINT	STACK	STATIC	DP	DH	METER	METER TEMPERATURE	
	TEMP				VOLUME	INLET	OUTLET
	(DegF)	(in.WC)	(in.WC)	(in.WC)	(dcf)	(DegF)	(DegF)
1	61	-6.30	2.20	0.56	878.254	74	72
2	61		2.20	0.56		75	72
3	60		1.50	0.56		75	71
4	60		1.90	0.56		75	72
5	61		1.70	0.56		76	72
6	60		1.70	0.56		76	73
7	60		2.10	0.56		76	72
8	60		2.10	0.56		77	73
9	59		2.10	0.56		77	73
10	59		1.70	0.56		78	73
11	59		1.40	0.56		78	73
12	59		1.60	0.56		78	73
13					933.740		
AVG.	60	-6.30	1.85	0.56	55.486		74

EPA METHOD 201A ANALYSES

RUN I.D.

DCI-M201A-R10

SUMMARY

<u>COMPONENT</u>	<u>NET</u> <u>(grams)</u>	<u>CORRECTED</u> <u>FOR BLANK</u> <u>(grams)</u>
PM10:		
Probe Wash <= 10 microns	0.00200	0.00200
Filter	0.00119	0.00119
TOTAL PM10	0.00319	0.00319
PM (>10 Microns):		
Probe Wash > 10 microns	0.00390	0.00320
TOTAL PM	0.00709	0.00639

ANALYTICAL DATA**METHOD 201A COMPONENTS:**

	<u>TARE</u> <u>(grams)</u>	<u>FINAL</u> <u>(grams)</u>	<u>NET</u> <u>(grams)</u>	<u>VOLUME</u> <u>(ml)</u>
Filter	0.53611	0.53730	0.00119	NA
Probe Wash Residue <= PM10	66.36540	66.36740	0.00200	120.0
Acetone Blank Residue	67.18690	67.18690	0.00000	120.0
Applicable Acetone Blank			0.00000	120.0
Max. Allowable Blank			0.00094	NA
Probe Wash Residue > PM10	65.57020	65.57410	0.00390	89.0
Acetone Blank Residue	67.28290	67.28440	0.00150	125.0
Applicable Acetone Blank			0.00107	89
Max. Allowable Blank			0.00070	NA

PARTICULATE EMISSIONS:

	<u>PM10</u>	<u>PM>10 microns</u>	<u>TOTAL PM</u>
Actual Grain Loading (gr/dscf)	0.00091	0.00092	0.00183
Mass Rate (lb/hr)	0.050	0.050	0.099

D50 Calculations

RUN I.D. DCI-M201A-R10

Stack Gas Viscosity (micropoise)	178.0211
Cyclone Flow Rate (dscf/min)	0.449788
Cyclone Flow Rate (acfm)	0.455064
D50	9.730202

dPmin and dPmax Calculations

Stack Gas Viscosity (micropoise)	178.415
Cyclone Flow Rate (acfm)	0.438815

Dn	vn	vmin	vmax	dPmin	dPmax
0.136	72.50315	61.13623	89.34990	1.176490	2.512921
0.15	59.60081	51.09605	74.09027	0.821799	1.727878
0.164	49.85939	43.57004	62.61714	0.597540	1.234176
0.18	41.38945	37.08000	52.69150	0.432783	0.873920
0.197	34.55431	31.89166	44.73049	0.320144	0.629793
0.215	29.01067	27.72516	38.31868	0.241957	0.462181
0.233	24.70147	24.51751	33.37197	0.189210	0.350554
0.264	19.24096	20.49696	27.16596	0.132242	0.232296
0.3	14.90020	17.33415	22.29604	0.094579	0.156475
0.342	11.46522	14.83992	18.48781	0.069319	0.107587
0.39	8.81669	12.90068	15.57342	0.052386	0.076341

SUMMARY OF METALS EMISSIONS
CASE 1 CALCULATIONS (1)

CONCRETE READY MIXED CORPORATION
DUST COLLECTOR INLET

RUN NUMBER (2): **DCI-M201A-R7,8,9,10**
 COMBINED VOLUME (3) **214.499 dscf**
 AVG. GAS FLOWRATE: **6393 dscfm**

		LABORATORY DATA			METAL EMISSIONS	
		SAMPLE CATCH - micrograms			CONC.	MASS RATE
<u>COMPONENT</u>		<u>SAMPLE</u>	<u>BLANK</u>	<u>TOTAL</u>	<u>ug/dscm</u>	<u>lb/hr</u>
Arsenic	As	3.18	* 0.20	2.98	0.4906	1.17E-05
Beryllium	Be	0.10	* 0.02	0.08	0.0132	3.15E-07
Cadmium	Cd	0.02	0.01	0.01	0.0016	3.94E-08
Chromium	Cr	13.30	1.90	11.4	1.8769	4.49E-05
Lead	Pb	7.20	0.70	6.5	1.0701	2.56E-05
Manganese	Mn	50.50	0.60	49.9	8.2154	1.97E-04
Mercury	Hg	* 0.20	* 0.20	0.00	0.0000	0.00E+00
Nickel	Ni	10.40	* 2.00	8.4	1.3829	3.31E-05
Phosphorus	P	* 100	* 100.00	0	0.0000	0.00E+00
Selenium	Se	0.60	* 0.20	0.40	0.0659	1.58E-06

Notes:

- (1) Case 1 calculations substitute the detection limit value for all of the non-detected parameters.
 The detection limit values are indicated with an "nd".
- (2) The sample is comprised of filters from the identified test runs.
- (3) The volume of air sampled represents the combined total of the sample volumes of the individual test runs.

SUMMARY OF METALS EMISSIONS
CASE 2 CALCULATIONS (1)

CONCRETE READY MIXED CORPORATION
DUST COLLECTOR INLET

RUN NUMBER (2): **DCI-M201A-R7,8,9,10**
 COMBINED VOLUME (3) 214.499 dscf
 AVG. GAS FLOWRATE: 6393 dscfm

		LABORATORY DATA			METAL EMISSIONS	
		SAMPLE CATCH - micrograms			CONC.	MASS RATE
<u>COMPONENT</u>		<u>SAMPLE</u>	<u>BLANK</u>	<u>TOTAL</u>	<u>ug/dscm</u>	<u>lb/hr</u>
Arsenic	As	3.18	* 0.00	3.18	0.5235	1.25E-05
Beryllium	Be	0.10	* 0.00	0.1	0.0165	3.94E-07
Cadmium	Cd	0.02	0.01	0.01	0.0016	3.94E-08
Chromium	Cr	13.30	1.90	11.4	1.8769	4.49E-05
Lead	Pb	7.20	0.70	6.5	1.0701	2.56E-05
Manganese	Mn	50.50	0.60	49.9	8.2154	1.97E-04
Mercury	Hg	* 0.00	* 0.00	0.00	0.0000	0.00E+00
Nickel	Ni	10.40	* 0.00	10.4	1.7122	4.10E-05
Phosphorus	P	* 0.00	* 0.00	0	0.0000	0.00E+00
Selenium	Se	0.60	* 0.00	0.60	0.0988	2.37E-06

Notes:

- (1) Case 2 calculations substitute a value of zero for all of the non-detected parameters.
 The instances where a zero value is used are indicated with an "*".
- (2) The sample is comprised of filters from the identified test runs.
- (3) The volume of air sampled represents the combined total of the sample volumes of the individual test runs.

APPENDIX F.1.2
CENTRAL DUST COLLECTOR INLET
RAW FIELD DATA

APPENDIX F.1.2.1
CENTRAL DUST COLLECTOR
INLET RAW FIELD DATA FOR 10/25/93

FIELD DATA SHEET FOR METHOD 201A

PAGE 1

FACILITY EPA Redi-Mix

B-7

and Collector Inlet

DATE 10/25/88

START TIME 15:25

TEST LOCATION Fly Ash Silo Outlet

RUN NUMBER W0226-001A-01

Point	Sample Time	Clock Time	Static	Stack Temp.	Stack dP	Dwell Time	Meter dH	Meter Volume cu.ft.	Meter Temp.		Imp. Temp.	Meter Vac.
									Inlet	Outlet		
1	0	15:25		75	2.0	9.8	.57	327.725	84	81	45	2
2	9.8			76	2.2	10.3	.57	332.27	83	80	47	2
3	20.1		-9.3	76	2.2	10.3	.57	337.25	82	79	47	3
4	30.4			77	1.8	9.3	.57	341.43	82	79	44	3
5	39.7			76	2.2	10.3	.57	346.14	71	72	48	3
6	50.0			75	1.8	9.3	.57	350.92	81	77	45	3
131	59.3			75	2.2	10.3	.57	355.23	80	76	50	3
2	69.6			76	2.3	10.5	.57	359.45	79	75	51	3
3	80.1			76	2.2	10.3	.57	364.67	79	75	51	3
4	90.4		-9.7	75	2.1	10.1	.57	369.30	79	74	53	3
5	100.5			75	2.1	10.1	.57	373.93	78	74	53	3
6	110.4			74	1.8	9.3	.57	378.56	78	73	54	3
	119.9	17:28						382.787				

Diagnose

CHAIN OF CUSTODY INFORMATION

Container Number	Sample I.D.	Description

LEAK CHECK

Vacuum					
Rate					

Dwell Time for Point 1 = 9.83

$t_1/\sqrt{P_1} = \underline{6.950860}$

IMPINGER VOLUMES

	Initial	Final
#1	100	100
#2	100	100
#3	0	0
#4	200 gm	212.5
#5		

METER BOX I.D.	<u>6</u>
GAMMA	<u>0.5866</u>
DELTA H ₀	<u>1.6384</u>
OPERATOR	<u>TMP/10</u>
BAR. PRESS.	<u>70.04</u>
FILTER I.D.	<u>692-90</u>

W0226 #1

APPENDIX F.1.2.2
CENTRAL DUST COLLECTOR INLET
RAW FIELD DATA FOR 10/26/93

FIELD DATA SHEET FOR METHOD 201A

PAGE 1

FACILITY Reedy Mv (EPA)START TIME 8:05TEST LOCATION Dust Collector InletDATE 10/26/97RUN NUMBER 005-M201A-R1

Point	Sample Time	Clock Time	Static	Stack Temp.	Stack dP	Dwell Time	Meter dH	Meter Volume cu.ft.	Meter Temp.		Imp. Temp.	Meter Vac.
									Inlet	Outlet		
A1	0	8:05		52	2.3	10.7	0.56	384.225	45	45	47	2
2	10.7			53	2.0	10.0	0.56	385.05	52	50	48	2
3	20.7			53	2.1	10.2	0.56	393.51	55	51	50	2
4	30.9		-6.1	53	1.9	9.7	0.56	398.66	56	52	51	2
5	40.6			53	2.1	10.2	0.56	402.39	57	52	52	2
6	50.8			53	1.8	9.5	0.56	406.63	58	54	52	2
B1	60.8			53	2.3	10.7	0.56	411.40	60	55	54	2
2	71.0			54	2.0	10.0	0.56	415.86	61	56	56	2
3	81.0			54	2.0	10.0	0.56	420.32	63	58	55	3
4	91.0		-6.1	55	1.9	9.7	0.56	424.65	65	60	54	3
5	100.7			55	1.9	9.7	0.56	428.98	67	61	54	3
6	110.4			55	1.9	9.7	0.56	433.31	69	63	57	3
	120.1	10:05						437.937				

CHAIN OF CUSTODY INFORMATION

Container Number	Sample I.D.	Description
	106	F.I.H.
	107	7 P.M.10
	108	6 P.M.10
	110	5 P.M.611

LEAK CHECK

Vacuum	7				
Rate	8002				

IMPINGER VOLUMES

	Initial	Final
#1	100	96
#2	100	106
#3	0	0
#4	200 gm	
#5		

METER BOX I.D.	#6
GAMMA	0.9866
DELTA H ₂ O	1.6884
OPERATOR	TRAUS
BAR. PRESS.	30.12
FILTER I.D.	62-95

Dwell Time for Point 1 = 10.69t_{1/2} = 7.05

N:22/1 #1

FIELD DATA SHEET FOR METHOD 201A

PAGE 1

FACILITY Reddy-mvDATE 10/25/93START TIME 12:52TEST LOCATION DUST InletRUN NUMBER Final 58

Point	Sample Time	Clock Time	Static	Stack Temp.	Stack dP	Dwell Time	Meter dH	Meter Volume cu.ft.	Meter Temp.		Imp. Temp.	Meter Vac.
									Inlet	Outlet		
A 1	0	10:52		61	2.2	~~10.1~~	0.56	438.382	61	61	54	2
2	10.1			67	2.4	10.5	0.56	442.94	66	62	52	2
3	20.6			61	2.4	10.5	0.56	447.68	68	64	50	2
4	31.1			61	2.3	10.3	0.56	452.42	70	65	44	3
5	41.4			61	2.3	10.3	0.56	457.07	71	66	50	3
6	51.7			61	2.1	9.8	0.56	461.72	72	67	52	3
B 1	61.5			61	1.9	9.4	0.56	466.15	74	68	52	3
2	70.9			61	2.0	9.6	0.56	470.39	75	65	53	4
3	80.5			61	2.1	9.8	0.56	474.73	76	68	54	4
4	90.3			61	1.9	9.4	0.56	479.16	76	65	51	4
5	99.7			61	2.2	10.1	0.56	483.40	77	70	53	4
6	109.8			61	2.2	10.1	0.56	487.96	78	71	52	4
	119.9	12:52						492.771				

CHAIN OF CUSTODY INFORMATION

Container Number	Sample I.D.	Description
	118	Filter
	119	2 PM10
	120	2 PM10
	122	Silica 6x1

LEAK CHECK

Vacuum	8"				
Rate	0.005				

Dwell Time for Point 1 = 10.08t₁ - t_{P1} = 6.80

IMPINGER VOLUMES

	Initial	Final
#1	100	99
#2	100	99
#3	0	0
#4	200.50	
#5		

METER BOX I.D.	6
GAMMA	5.9866
DELTA H ₂ O	1.6484
OPERATOR	TRAVIS
BAR. PRESS.	30.10
FILTER I.D.	652-98

PAGE 1

DATE 10/26/53

RUN NUMBER *UDEL-175014-R3*

CHAIN OF CUSTODY INFORMATION

LEAK CHECK

IMPINGER VOLUMES

Dwell Time
for Point 1 = 10.78

$$t_1 / \sqrt{P_1} = 7.87$$

METER BOX I.D.	6
GAMMA	0.5866
DELTA Hg	1.6844
OPERATOR	TRAVIS
BAR. PRESS.	30.12
FILTER I.D.	G92-100

№ 2210 #1

APPENDIX F.1.2.3
CENTRAL DUST COLLECTOR INLET
RAW FIELD DATA FOR 10/27/93

PAGE 1

DATE 10/27/53

RUN NUMBER DCI-M201A-R4

CHAIN OF CUSTODY INFORMATION

LEAK CHECK

Dwell Time
for Point 1 = 10-19

$$t_1/\sqrt{P_1} = \underline{7.0317}$$

IMPINGER VOLUMES

METER BOX I.D.	6
GAMMA	0.5866
DELTA H ₂	1.6844
OPERATOR	TRAVIS
BAR. PRESS.	20.27 29.9
FILTER I.D.	G92-102

PAGE 1

DATE 11/22/63

TEST LOCATION Dust Collector Tank

RUN NUMBER DCI-M2301A-725

[illegible]

CHAIN OF CUSTODY INFORMATION

Container Number	Sample I.D.	Description
	154	Filter
	155	7 PM10
	156	2 PM10
	158	S.1.14641

LEAK CHECK

Vacuum	10				
Rate	2.55/lb				

IMPINGER VOLUMES

	Initial	Final
#1	100	100
#2	100	100
#3	0	0
#4	200	
#5		

Dwell Time
for Point 1 = 10.56

$$t_1 / \sqrt{P_1} = 7.28$$

METER BOX I.D.	6
GAMMA	D. 7866
DELTA H ₂	1. 4844
OPERATOR	TRAVIS
BAR. PRESS.	35.57
FILTER I.D.	GSJ-446

FIELD DATA SHEET FOR METHOD 201A

PAGE 1

FACILITY Ready Mix

DATE 10/27/53

START TIME 13:12

TEST LOCATION Dust Collector ~~Drift~~

RUN NUMBER DCI-M201A-R6

TEST LOCATION <u>UNIT COLLECTOR - WATER</u>								RUN NUMBER <u>DCT-M20</u>				
Point	Sample Time	Clock Time	Static	Stack Temp.	Stack dP	Dwell Time	Meter dH	Meter Volume cu.ft.	Meter Temp.		Imp. Temp.	Meter Vac.
									Inlet	Outlet		
A1	0	13:12		75	2.1	10.5	0.59	657.658	82	81	50	2
2	10.5			75	2.2	10.7	0.55	662.68	85	82	52	2
3	21.2			72	2.1	10.5	0.55	667.80	86	82	52	2
4	31.7			72	1.9	10.0	0.55	672.53	84	83	53	2
5	41.7			71	1.8	9.7	0.55	677.63	85	83	53	2
6	51.4			71	1.8	9.7	0.55	682.27	90	84	54	2
B1	61.1		-6.4	70	1.9	10.0	0.55	686.92	91	84	54	2
2	71.2			70	1.9	10.0	0.55	691.71	92	84	56	2
3	81.1			70	1.9	10.0	0.55	696.51	93	86	56	3
4	91.1			70	1.9	10.0	0.55	701.30	93	88	57	3
5	101.1			69	1.7	9.4	0.55	706.00	93	88	58	3
6	110.5			69	1.6	9.2	0.55	710.818	95	90	58	3
	115.7	15:12						715.014				
					</							

CHAIN OF CUSTODY INFORMATION

Container Number	Sample I.D.	Description
	160	F. Iter
	161	> pm 10
	162	< pm 10
	164	Silica gel

LEAK CHECK

Vacuum	11				
Rste	0.004				

IMPINGER VOLUMES

	Initial	Final
#1	100	100
#2	100	94
#3	0	0
#4		
#5		

Dwell Time
for Point 1 = 10.52

$$t_1 / \sqrt{P_1} = 7.246$$

METER BOX I.D.	6
GAMMA	8.5866
DELTA H ₂	1.6884
OPERATOR	TRAVIS
BAR. PRESS.	25.57
FILTER I.D.	651.47

Nozzle #1

APPENDIX F.1.2.4
CENTRAL DUST COLLECTOR INLET
RAW FIELD DATA FOR 10/28/93

PAGE 1

DATE 10/28/93

TEST LOCATION Dust Collector-Inter

RUN NUMBER PCI-M201A-R7

Point	Sample Time	Clock Time	Static	Stack Temp.	Stack dP	Dwell Time	Meter dH	Meter Volume cu.ft.	Meter Temp.		Imp. Temp.	Meter Vac.
									Inlet	Outlet		
41	0	7:03		44	2.95	7.6	0.54	716.6/2	45	45	42	2
2	7.6			45	2.95	7.6	0.54		48	48	42	2
3	15.2			45	2.95	7.6	0.54		50	48	44	2
4	22.8			46	1.8	10.5	0.54		52	48	45	2
5	33.3		6.0	45	2.0	11.0	0.54		54	48	45	2
6	44.3			46	2.1	11.3	0.54		57	50	44	2
131	55.6			47	1.7	10.2	0.54		58	52	46	2
2	65.8			47	2.1	11.3	0.54		60	53	47	3
3	72.1			47	2.0	11.0	0.54		61	54	47	3
4	88.1			45	1.9	10.7	0.54		63	55	47	3
5	98.8			47	1.8	10.5	0.54		64	56	48	3
6	105.3			47	1.9	10.7	0.54		64	57	48	3
	120.0	9:03						768.6/7				

CHAIN OF CUSTODY INFORMATION

[illegible]

LEAK CHECK

Vacuum	11				
Rste	0.003				

IMPINGER VOLUMES

	Initial	Final
#1	100	128
#2	100	52
#3	0	
#4	220 gm	
#5		

METER BOX I.D.	C
GAMMA	0.9246
DELTA H ₂	1.6884
OPERATOR	TRAVIS
BAR. PRESS.	27.80
FILTER I.D.	G-92-143

Dwell Time for Point 1 = 760

$$t_1/\sqrt{P_1} = 2.80$$
$$N_c = 2/2 \quad 1 \pm 1$$

RUN NUMBER ~~DCI~~-MA01A-E

METER BOX I.D.	6
GAMMA	0.5866
DELTA H ₂	1.6884
OPERATOR	Traverse P.
BAR. PRESS.	29.40
FILTER I.D.	G-32-134

RUN NUMBER DCI-M201A-RS

[illegible]

CHAIN OF CUSTODY INFORMATION

Container Number	Sample I.D.	Description
196	196	Filter
197	197	7 PM 10
198	198	2 PM 12
200	200	5.116. 621

LEAK CHECK

Vacuum	10			
Rate	2.007			

IMPINGER VOLUMES

	Initial	Final
#1	100	103
#2	100	88
#3	0	0
#4	200	
#5		

Dwell Time
for Point 1 = 11.68

$$t_1/\sqrt{P_1} = 2.3055$$

METER BOX I.D.	6
GAMMA	1.6884
DELTA H ₂ O	0.9866
OPERATOR	TRAVIS
BAR. PRESS.	25.50
FILTER I.D.	15-92-48

PAGE 1

DATE 10/28/53

TEST LOCATION Dust Collector Tail

RUN NUMBER 001 - MAJOM - N 12

CHAIN OF CUSTODY INFORMATIONLEAK CHECKIMPINGER VOLUMES

Dwell Time
for Point 1 = 10.54

$$1/\sqrt{P_1} = 7.35$$

METER BOX I.D.	6
GAMMA	0.5466
DELTA H ₂	1.6884
OPERATOR	Travis
BAR. PRESS.	25.80
FILTER I.D.	652-140

APPENDIX F.2
CENTRAL DUST COLLECTOR OUTLET

APPENDIX F.2.1
CENTRAL DUST COLLECTOR OUTLET
DATA AND RESULTS

**SUMMARY OF PARTICULATE AND METALS EMISSIONS
CONCRETE READY MIXED CORPORATION
CASE 1**

DUST COLLECTOR OUTLET

RUN I.D.	DCO-M201A-R1	DCO-M201A-R2	DCO-M201A-R3	DCO-M201A-R4	AVERAGE
DATE	10/26/93	10/26/93	10/27/93	10/28/93	
TIME STARTED	07:45	13:30	07:20	06:35	
TIME ENDED	11:32	17:35	17:13	17:40	

SAMPLING PARAMETERS

Metered Volume - dcf	104.561	113.176	274.519	303.520	204.040
Corrected Volume - dscf	105.380	113.977	273.146	307.978	206.679
Total Test Time - min	227.4	245.4	592.8	681.5	454.5
% Isokinetics	105.6	104.4	100.4	104.9	105.2
D50	9.65	9.70	9.74	9.89	9.77

GAS PARAMETERS

Gas Temperature - oF	55.8	65.0	51.7	73.6	64.7
Oxygen - %	20.9	20.9	20.9	20.9	20.9
Carbon Dioxide - %	0.0	0.0	0.0	0.0	0.0
Moisture - %*	1.15	0.50	0.36	0.00	0.58

GAS FLOWRATE

Velocity - ft/sec	58.12	59.55	60.06	58.91	58.51
Actual Volume - acfm	18258	18710	18868	18507	18383
Standard Volume - dscfm	18738	18990	19591	18398	18568

PM10 EMISSIONS

Concentration - gr/dscf	1.36E-03	7.02E-04	3.97E-04	5.72E-04	9.67E-04
Mass Rate - lb/hr	0.219	0.114	0.067	0.090	0.155

PM>10 MICRONS EMISSIONS

Concentration - gr/dscf	5.80E-04	2.22E-04	2.41E-04	2.43E-04	4.12E-04
Mass Rate - lb/hr	0.093	0.036	0.040	0.038	0.066

TOTAL PM

Concentration - gr/dscf	1.94E-03	9.24E-04	6.38E-04	8.15E-04	1.38E-03
Mass Rate - lb/hr	0.312	0.150	0.107	0.129	0.220

METALS EMISSIONS - lb/hr

Arsenic	_____	_____	_____	_____	1.25E-06
Beryllium	_____	_____	_____	_____	6.26E-08
Cadmium	_____	_____	_____	_____	0.00E+00
Chromium	_____	_____	_____	_____	3.13E-06
Lead	_____	_____	_____	_____	4.85E-06
Manganese	_____	_____	_____	_____	1.97E-05
Mercury	_____	_____	_____	_____	0.00E+00
Nickel	_____	_____	_____	_____	6.26E-06
Phosphorus	_____	_____	_____	_____	0.00E+00
Selenium	_____	_____	_____	_____	0.00E+00

*%Moisture for DCO-M201A-R4 assumed to be zero due to negative volume gain in the impingers.

SUMMARY OF PARTICULATE AND METALS EMISSIONS
CONCRETE READY MIXED CORPORATION
CASE 2

DUST COLLECTOR OUTLET

RUN I.D.	DCO-M201A-R1	DCO-M201A-R2	DCO-M201A-R3	DCO-M201A-R4	AVERAGE
DATE	10/26/93	10/26/93	10/27/93	10/27/93	
TIME STARTED	07:45	13:30	07:20	06:35	
TIME ENDED	11:32	17:35	17:13	17:40	

SAMPLING PARAMETERS

Metered Volume - dcf	104.561	113.176	274.519	303.520	204.040
Corrected Volume - dscf	105.380	113.977	273.146	307.978	206.679
Total Test Time - min	227.4	245.4	592.8	681.5	454.5
% Isokinetics	105.6	104.4	100.4	104.9	105.2
D50	9.65	9.70	9.74	9.89	9.77

GAS PARAMETERS

Gas Temperature - oF	55.8	65.0	51.7	73.6	64.7
Oxygen - %	20.9	20.9	20.9	20.9	20.9
Carbon Dioxide - %	0.0	0.0	0.0	0.0	0.0
Moisture - %*	1.15	0.50	0.36	0.00	0.58

GAS FLOWRATE

Velocity - ft/sec	58.12	59.55	60.06	58.91	58.51
Actual Volume - acfm	18258	18710	18868	18507	18383
Standard Volume - dscfm	18738	18990	19591	18398	18568

PM10 EMISSIONS

Concentration - gr/dscf	1.36E-03	7.02E-04	3.97E-04	5.72E-04	9.67E-04
Mass Rate - lb/hr	0.219	0.114	0.067	0.090	0.155

PM>10 MICRONS EMISSIONS

Concentration - gr/dscf	5.80E-04	2.22E-04	2.41E-04	2.43E-04	4.12E-04
Mass Rate - lb/hr	0.093	0.036	0.040	0.038	0.066

TOTAL PM

Concentration - gr/dscf	1.94E-03	9.24E-04	6.38E-04	8.15E-04	1.38E-03
Mass Rate - lb/hr	0.312	0.150	0.107	0.129	0.220

METALS EMISSIONS - lb/hr

Arsenic	_____	_____	_____	_____	1.88E-06
Beryllium	_____	_____	_____	_____	1.25E-07
Cadmium	_____	_____	_____	_____	0.00E+00
Chromium	_____	_____	_____	_____	3.13E-06
Lead	_____	_____	_____	_____	4.85E-06
Manganese	_____	_____	_____	_____	1.97E-05
Mercury	_____	_____	_____	_____	0.00E+00
Nickel	_____	_____	_____	_____	1.25E-05
Phosphorus	_____	_____	_____	_____	0.00E+00
Selenium	_____	_____	_____	_____	0.00E+00

*%Moisture for DCO-M201A-R4 assumed to be zero due to negative volume gain in the impingers.

RUN NUMBER

DCO-M201A-R1

DATE 10/26/93
 START TIME 07:45
 END TIME 11:32
 STACK DIAM. 26 X 29 inches
 NOZZLE I.D. 0.150 inches
 METER BOX GAMMA 0.9967
 METER BOX dH@ 1.8817
 BAROMETRIC 30.12 in.Hg
 Cp 0.84
 TEST DURATION 227 minutes

METHOD 4 DATA

	INIT. (ml)	FINAL (ml)	NET (ml)
IMP.1	100.0	100.0	0.0
IMP.2	100.0	100.0	0.0
IMP.3	0.0	0.0	0.0
IMP.4			0.0
IMP.5			0.0
IMP.6			0.0
IMP.7			0.0
TOTAL	200.0	200.0	0.0
S.G.	200.0	226.1	26.1

SAMPLING RESULTS

Metered Volume 104.561 dcf
 Metered Volume 2.961 dcm
 Volume @ Std.Cond. 105.380 dscf
 Volume @ Std.Cond. 2.984 dscm
 % Water 1.15 %
 % Isokinetics 105.6 %

METHOD 3 DATA

%O2	20.9	Md	28.84
%CO2	0.0	Ms	28.71
%CO	0.0	Ps	30.34
%N2	79.1		
O2+CO2	10.0		

VOLUMETRIC RESULTS - USENG

Velocity 58.12 ft/sec
 Actual Flow 18258 acfm
 Std. Flow 18957 scfm
 Dry Std. Flow 18738 dscfm

VOLUMETRIC RESULTS - SI

Velocity 17.71 m/sec
 Actual Flow 31021 am3/hr
 Std. Flow 32209 sm3/hr
 Dry Std. Flow 31837 dsm3/hr

POINT	STACK TEMP (DegF)	STATIC (in.WC)	DP (in.WC)	DH (in.WC)	METER VOLUME (dcf)	METER TEMPERATURE INLET (DegF)	OUTLET (DegF)
1	57	3.00	1.70	0.65	242.876	53	53
2	57	3.10	1.60	0.65		57	53
3	56		1.40	0.65		61	54
4	57		0.91	0.65		63	56
5	56		0.86	0.65		65	57
6	56		0.91	0.65		68	62
7	56		1.20	0.65		68	59
8	56		1.20	0.65		68	60
9	55		1.30	0.65		71	61
10	55		1.30	0.65		69	61
11	56		1.10	0.65		72	63
12	55		0.90	0.65		71	62
13	56		0.70	0.65		74	64
14	56		0.74	0.65		72	64
15	56		0.89	0.65		75	66
16	56		1.40	0.65		73	65
17	55		1.30	0.65		76	67
18	55		0.85	0.65		73	66
19	55		0.65	0.65		77	68
20	55		0.79	0.65		74	67
21	55		0.89	0.65		76	68
22	55		1.20	0.65		75	68
23	56		1.70	0.65		76	68
24	56		1.60	0.65		76	67
25					347.437		
AVG.	56	3.05	1.13	0.65	104.561	66	

EPA METHOD 201A ANALYSES

RUN I.D.

DCO-M201A-R1

SUMMARY

<u>COMPONENT</u>	<u>NET</u> <u>(grams)</u>	<u>CORRECTED</u> <u>FOR BLANK</u> <u>(grams)</u>
PM10:		
Probe Wash <= 10 microns	0.00610	0.00516
Filter	0.00415	0.00415
TOTAL PM10	0.01025	0.00931
PM (>10 Microns):		
Probe Wash > 10 microns	0.00490	0.00396
TOTAL PM	0.01515	0.01327

ANALYTICAL DATA**METHOD 201A COMPONENTS:**

	<u>TARE</u> <u>(grams)</u>	<u>FINAL</u> <u>(grams)</u>	<u>NET</u> <u>(grams)</u>	<u>VOLUME</u> <u>(ml)</u>
Filter	0.53335	0.53750	0.00415	NA
Probe Wash Residue <= PM10	67.43260	67.43870	0.00610	120.0
Acetone Blank Residue	66.82760	66.83100	0.00340	125.0
Applicable Acetone Blank			0.00326	120.0
Max. Allowable Blank			0.00094	NA
Probe Wash Residue > PM10	70.22600	70.23090	0.00490	120.0
Acetone Blank Residue	67.71840	67.72150	0.00310	125.0
Applicable Acetone Blank			0.00298	120
Max. Allowable Blank			0.00094	NA

PARTICULATE EMISSIONS:

	<u>PM10</u>	<u>PM>10 microns</u>	<u>TOTAL PM</u>
Actual Grain Loading (gr/dscf)	0.00136	0.00058	0.00194
Mass Rate (lb/hr)	0.219	0.093	0.312

D50 Calculations

RUN I.D. DCO-M201A-R1

Stack Gas Viscosity (micropoise)	176.6805
Cyclone Flow Rate (dscf/min)	0.463413
Cyclone Flow Rate (acfm)	0.451725
D50	9.647642

dPmin and dPmax Calculations

Stack Gas Viscosity (micropoise)	176.9978
Cyclone Flow Rate (acfm)	0.430213

Dn	vn	vmin	vmax	dPmin	dPmax
0.136	71.08183	59.97298	87.62510	1.178457	2.515704
0.15	58.43242	50.13235	72.66696	0.823453	1.730121
0.164	48.88197	42.75632	61.42096	0.598967	1.236049
0.18	40.57807	36.39594	51.69224	0.434019	0.875494
0.197	33.87692	31.31148	43.88954	0.321225	0.631138
0.215	28.44196	27.22850	37.60552	0.242912	0.463346
0.233	24.21724	24.08514	32.75759	0.190064	0.351582
0.264	18.86377	20.14496	26.67569	0.132964	0.233149
0.3	14.60811	17.04488	21.90311	0.095190	0.157186
0.342	11.24046	14.59941	18.17070	0.069835	0.108180
0.39	8.64385	12.69728	15.31377	0.052823	0.076836

RUN NUMBER
DCO-M201A-R2

DATE	10/26/93	METHOD 4 DATA			
START TIME	13:30		INIT.	FINAL	NET
END TIME	17:35		(ml)	(ml)	(ml)
STACK DIAM.	26 X 29 inches	IMP.1	100.0	90.0	-10.0
NOZZLE I.D.	0.150 inches	IMP.2	100.0	96.0	-4.0
METER BOX GAMMA	0.9967	IMP.3	0.0	0.0	0.0
METER BOX dH@	1.8817	IMP.4			0.0
BAROMETRIC	30.12 in.Hg	IMP.5			0.0
Cp	0.84	IMP.6			0.0
TEST DURATION	245 minutes	IMP.7			0.0
		TOTAL	200.0	186.0	-14.0
		S.G.	200.0	226.0	26.0

SAMPLING RESULTS

Metered Volume	113.176	dcf	%O2	20.9	Md	28.84
Metered Volume	3.205	dcm	%CO2	0.0	Ms	28.78
Volume @ Std.Cond.	113.977	dscf	%CO	0.0	Ps	30.38
Volume @ Std.Cond.	3.227	dscm	%N2	79.1		
% Water	0.50	%	O2+CO2	20.9		
% Isokinetics	104.4	%				

METHOD 3 DATA
VOLUMETRIC RESULTS - USENG

Velocity	59.55	ft/sec
Actual Flow	18710	acfm
Std. Flow	19085	scfm
Dry Std. Flow	18990	dscfm

VOLUMETRIC RESULTS - SI

Velocity	18.15	m/sec
Actual Flow	31788	am3/hr
Std. Flow	32425	sm3/hr
Dry Std. Flow	32264	dsm3/hr

POINT	STACK	STATIC	DP	DH	METER VOLUME	METER TEMPERATURE	
	TEMP (DegF)					INLET (DegF)	OUTLET (DegF)
1	69	3.40	1.60	0.65	347.515	65	63
2	66	3.60	1.40	0.65		66	64
3	67		1.20	0.65		72	65
4	67		1.10	0.65		71	65
5	66		1.10	0.65		73	66
6	66		1.10	0.65		69	63
7	66		1.10	0.65		70	63
8	66		1.10	0.65		69	62
9	64		1.80	0.65		71	65
10	65		1.20	0.65		70	63
11	65		0.98	0.65		71	63
12	65		0.65	0.65		70	63
13	65		0.65	0.65		74	65
14	65		0.65	0.65		71	64
15	65		0.95	0.65		70	64
16	66		1.30	0.65		70	64
17	65		1.10	0.65		68	64
18	65		0.97	0.65		69	64
19	65		0.83	0.65		68	63
20	65		1.20	0.65		69	64
21	65		1.30	0.65		68	63
22	65		1.30	0.65		71	64
23	65		1.50	0.65		67	63
24	65		1.90	0.65		69	63
25					460.691		
AVG.	66	3.50	1.17	0.65	113.176	67	

EPA METHOD 201A ANALYSES

RUN I.D.

DCO-M201A-R2

SUMMARY

<u>COMPONENT</u>	<u>NET</u> <u>(grams)</u>	<u>CORRECTED</u> <u>FOR BLANK</u> <u>(grams)</u>
PM10:		
Probe Wash <= 10 microns	0.00400	0.00300
Filter	0.00218	0.00218
TOTAL PM10	0.00618	0.00518
PM (>10 Microns):		
Probe Wash > 10 microns	0.00260	0.00164
TOTAL PM	0.00878	0.00683

ANALYTICAL DATA**METHOD 201A COMPONENTS:**

	<u>TARE</u> <u>(grams)</u>	<u>FINAL</u> <u>(grams)</u>	<u>NET</u> <u>(grams)</u>	<u>VOLUME</u> <u>(ml)</u>
Filter	0.53662	0.53880	0.00218	NA
Probe Wash Residue <= PM10	67.35320	67.35720	0.00400	127.0
Acetone Blank Residue	66.82760	66.83100	0.00340	125.0
Applicable Acetone Blank			0.00345	127.0
Max. Allowable Blank			0.00100	NA
Probe Wash Residue > PM10	67.00650	67.00910	0.00260	122.0
Acetone Blank Residue	67.71840	67.72150	0.00310	125.0
Applicable Acetone Blank			0.00303	122
Max. Allowable Blank			0.00096	NA

PARTICULATE EMISSIONS:

	<u>PM10</u>	<u>PM>10 microns</u>	<u>TOTAL PM</u>
Actual Grain Loading (gr/dscf)	0.00070	0.00022	0.00092
Mass Rate (lb/hr)	0.114	0.036	0.150

D50 Calculations

RUN I.D. DCO-M201A-R2

Stack Gas Viscosity (micropoise)	179.5254
Cyclone Flow Rate (dscf/min)	0.464453
Cyclone Flow Rate (acfm)	0.457786
D50	9.696604

dPmin and dPmax Calculations

Stack Gas Viscosity (micropoise)	180.0227
Cyclone Flow Rate (acfm)	0.439536

Dn	vn	vmin	vmax	dPmin	dPmax
0.136	72.62225	61.25894	89.51360	1.210942	2.585608
0.15	59.69872	51.20399	74.23039	0.846042	1.778067
0.164	49.94130	43.66716	62.73981	0.615311	1.270197
0.18	41.45744	37.16799	52.79935	0.445782	0.899584
0.197	34.61107	31.97251	44.82668	0.329866	0.648422
0.215	29.05833	27.80033	38.40566	0.249393	0.475965
0.233	24.74205	24.58830	33.45197	0.195093	0.361100
0.264	19.27257	20.56213	27.23732	0.136433	0.239394
0.3	14.92468	17.39459	22.36058	0.097637	0.161343
0.342	11.48406	14.89618	18.54684	0.071604	0.111000
0.39	8.83117	12.95318	15.62787	0.054142	0.078811

RUN NUMBER

DCO-M201A-R3

DATE 10/27/93
 START TIME 07:20
 END TIME 17:13
 STACK DIAM. 26 X 29 inches
 NOZZLE I.D. 0.150 inches
 METER BOX GAMMA 0.9967
 METER BOX dH@ 1.8817
 BAROMETRIC 29.97 in.Hg
 Cp 0.84
 TEST DURATION 593 minutes

METHOD 4 DATA

	INIT. (ml)	FINAL (ml)	NET (ml)
IMP.1	100.0	80.0	-20.0
IMP.2	100.0	94.0	-6.0
IMP.3	0.0	0.0	0.0
IMP.4			0.0
IMP.5			0.0
IMP.6			0.0
IMP.7			0.0
TOTAL	200.0	174.0	-26.0
S.G.	200.0	246.8	46.8

SAMPLING RESULTS

Metered Volume 274.519 dcf
 Metered Volume 7.774 dcm
 Volume @ Std.Cond. 273.146 dscf
 Volume @ Std.Cond. 7.735 dscm
 % Water 0.36 %
 % Isokinetics 100.4 %

METHOD 3 DATA

%O2	20.9	Md	28.84
%CO2	0.0	Ms	28.80
%CO	0.0	Ps	30.21
%N2	79.1		
O2+CO2	20.9		

VOLUMETRIC RESULTS - USENG

Velocity 60.06 ft/sec
 Actual Flow 18868 acfm
 Std. Flow 19661 scfm
 Dry Std. Flow 19591 dscfm

VOLUMETRIC RESULTS - SI

Velocity 18.31 m/sec
 Actual Flow 32058 am3/hr
 Std. Flow 33405 sm3/hr
 Dry Std. Flow 33285 dsm3/hr

POINT	STACK TEMP (DegF)	STATIC (in.WC)	DP (in.WC)	DH (in.WC)	METER VOLUME (dcf)	METER TEMPERATURE INLET (DegF)	OUTLET (DegF)
1	48	3.30	1.70	0.64	461.026	49	48
2	50		1.70	0.64		58	51
3	50		1.30	0.64		62	55
4	52		1.10	0.64		49	57
5	51		0.88	0.64		65	59
6	52		0.76	0.64		68	61
7	52		0.91	0.64		70	64
8	52		0.98	0.64		71	65
9	52		1.90	0.64		72	66
10	52		1.40	0.64		76	70
11	52		1.40	0.64		75	70
12	52		0.86	0.64		76	70
13	52		0.71	0.64		77	71
14	52		0.65	0.64		78	72
15	52		0.77	0.64		80	74
16	52		1.50	0.64		81	74
17	52		1.10	0.64		81	75
18	53		1.00	0.64		80	76
19	52		1.10	0.64		79	75
20	52		1.20	0.64		81	76
21	52		1.20	0.64		80	75
22	52		1.70	0.64		79	76
23	52		1.70	0.64		79	79
24	52		1.70	0.64		80	75
25					735.545		
AVG.	52	3.30	1.22	0.64	274.519	70	

EPA METHOD 201A ANALYSES

RUN I.D.

DCO-M201A-R3

SUMMARY

<u>COMPONENT</u>	<u>NET</u> <u>(grams)</u>	<u>CORRECTED</u> <u>FOR BLANK</u> <u>(grams)</u>
PM10:		
Probe Wash <= 10 microns	0.00330	0.00238
Filter	0.00465	0.00465
TOTAL PM10	0.00795	0.00703
PM (>10 Microns):		
Probe Wash > 10 microns	0.00520	0.00426
TOTAL PM	0.01315	0.01129

ANALYTICAL DATA**METHOD 201A COMPONENTS:**

	<u>TARE</u> <u>(grams)</u>	<u>FINAL</u> <u>(grams)</u>	<u>NET</u> <u>(grams)</u>	<u>VOLUME</u> <u>(ml)</u>
Filter	0.53145	0.53610	0.00465	NA
Probe Wash Residue <= PM10	67.14920	67.15250	0.00330	117.0
Acetone Blank Residue	66.82760	66.83100	0.00340	125.0
Applicable Acetone Blank			0.00318	117.0
Max. Allowable Blank			0.00092	NA
Probe Wash Residue > PM10	66.74890	66.75410	0.00520	120.0
Acetone Blank Residue	67.71840	67.72150	0.00310	125.0
Applicable Acetone Blank			0.00298	120
Max. Allowable Blank			0.00094	NA

PARTICULATE EMISSIONS:

	<u>PM10</u>	<u>PM>10 microns</u>	<u>TOTAL PM</u>
Actual Grain Loading (gr/dscf)	0.00040	0.00024	0.00064
Mass Rate (lb/hr)	0.067	0.040	0.107

D50 Calculations

RUN I.D. DCO-M201A-R3

Stack Gas Viscosity (micropoise)	176.2898
Cyclone Flow Rate (dscf/min)	0.460773
Cyclone Flow Rate (acfm)	0.44396
D50	9.738229

dPmin and dPmax Calculations

Stack Gas Viscosity (micropoise)	176.5321
Cyclone Flow Rate (acfm)	0.428246

Dn	vn	vmin	vmax	dPmin	dPmax
0.136	70.75688	59.70464	87.22894	1.175673	2.509525
0.15	58.16530	49.90944	72.33958	0.821553	1.725926
0.164	48.65851	42.56753	61.14535	0.597623	1.233097
0.18	40.39257	36.23663	51.46149	0.433078	0.873444
0.197	33.72206	31.17577	43.69483	0.320556	0.629695
0.215	28.31194	27.11175	37.43988	0.242429	0.462316
0.233	24.10653	23.98299	32.61441	0.189704	0.350824
0.264	18.77754	20.06108	26.56071	0.132733	0.232675
0.3	14.54133	16.97529	21.81026	0.095040	0.156889
0.342	11.18908	14.54098	18.09511	0.069736	0.107992
0.39	8.60433	12.64739	15.25129	0.052756	0.076716

RUN NUMBER DCO-M201A-R4

DATE	10/28/93	METHOD 4 DATA			
START TIME	06:35		INIT.	FINAL	NET
END TIME	17:40		(ml)	(ml)	(ml)
STACK DIAM.	26 X 29 inches	IMP.1	100.0	50.0	-50.0
NOZZLE I.D.	0.150 inches	IMP.2	100.0	90.0	-10.0
METER BOX GAMMA	0.9967	IMP.3	0.0	0.0	0.0
METER BOX dH@	1.8817	IMP.4	0.0	0.0	0.0
BAROMETRIC	29.80 in.Hg	IMP.5			0.0
Cp	0.84	IMP.6			0.0
TEST DURATION	682 minutes	IMP.7			0.0
		TOTAL	200.0	140.0	-60.0
		S.G.	200.0	247.8	47.8

SAMPLING RESULTS

Metered Volume	303.520	dcf
Metered Volume	8.595	dcm
Volume @ Std.Cond.	307.978	dscf
Volume @ Std.Cond.	8.721	dscm
% Water*	0.00	%
% Isokinetics	104.9	%

METHOD 3 DATA

%O2	20.9	Md	28.84
%CO2	0.0	Ms	28.84
%CO	0.0	Ps	30.06
%N2	79.1		
O2+CO2	20.9		

VOLUMETRIC RESULTS - USENG

Velocity	58.91	ft/sec
Actual Flow	18507	acfm
Std. Flow	18398	scfm
Dry Std. Flow	18398	dscfm

VOLUMETRIC RESULTS - SI

Velocity	17.96	m/sec
Actual Flow	31444	am3/hr
Std. Flow	31258	sm3/hr
Dry Std. Flow	31258	dsm3/hr

POINT	STACK	STATIC	DP	DH	METER	METER TEMPERATURE	
	TEMP				VOLUME	INLET	OUTLET
	(DegF)	(in.WC)	(in.WC)	(in.WC)	(dcf)	(DegF)	(DegF)
1	74	3.50	1.30	0.63	735.667	43	43
2	74		1.20	0.63		54	48
3	74		1.20	0.63		53	48
4	74		1.10	0.63		54	48
5	74		1.10	0.63		55	50
6	74		1.00	0.63		53	50
7	74		1.10	0.63		55	50
8	74		0.96	0.63		58	51
9	74		1.70	0.63		60	53
10	74		1.00	0.63		57	53
11	74		0.98	0.63		58	53
12	74		0.75	0.63		57	52
13	74		0.65	0.63		58	53
14	74		0.65	0.63		58	53
15	73		0.65	0.63		58	56
16	73		0.65	0.63		61	58
17	73		1.60	0.63		64	58
18	73		1.20	0.63		66	59
19	73		0.85	0.63		63	58
20	73		1.10	0.63		67	62
21	73		1.10	0.63		68	62
22	73		1.50	0.63		71	64
23	73		1.80	0.63		70	65
24	73		1.70	0.63		70	66
25					1039.187		
AVG.	74	3.50	1.12	0.63	303.520		57

*%Moisture assumed to be zero due to negative volume gain in the impingers.

EPA METHOD 201A ANALYSES

RUN I.D.

DCO-M201A-R4

SUMMARY

<u>COMPONENT</u>	<u>NET</u> <u>(grams)</u>	<u>CORRECTED</u> <u>FOR BLANK</u> <u>(grams)</u>
PM10:		
Probe Wash <= 10 microns	0.00410	0.00312
Filter	0.00829	0.00829
TOTAL PM10	0.01239	0.01141
PM (>10 Microns):		
Probe Wash > 10 microns	0.00580	0.00486
TOTAL PM	0.01819	0.01627

ANALYTICAL DATA**METHOD 201A COMPONENTS:**

	<u>TARE</u> <u>(grams)</u>	<u>FINAL</u> <u>(grams)</u>	<u>NET</u> <u>(grams)</u>	<u>VOLUME</u> <u>(ml)</u>
Filter	0.65461	0.66290	0.00829	NA
Probe Wash Residue <= PM10	70.10230	70.10640	0.00410	125.0
Acetone Blank Residue	66.82760	66.83100	0.00340	125.0
Applicable Acetone Blank			0.00340	125.0
Max. Allowable Blank			0.00098	NA
Probe Wash Residue > PM10	70.48780	70.49360	0.00580	120.0
Acetone Blank Residue	67.71840	67.72150	0.00310	125.0
Applicable Acetone Blank			0.00298	120
Max. Allowable Blank			0.00094	NA

PARTICULATE EMISSIONS:

	<u>PM10</u>	<u>PM>10 microns</u>	<u>TOTAL PM</u>
Actual Grain Loading (gr/dscf)	0.00057	0.00024	0.00082
Mass Rate (lb/hr)	0.090	0.038	0.129

D50 Calculations

RUN I.D. DCO-M201A-R4

Stack Gas Viscosity (micropoise)	181.8341
Cyclone Flow Rate (dscf/min)	0.451912
Cyclone Flow Rate (acfm)	0.453942
D50	9.89288

dPmin and dPmax Calculations

Stack Gas Viscosity (micropoise)	182.4794
Cyclone Flow Rate (acfm)	0.448686

Dn	vn	vmin	vmax	dPmin	dPmax
0.136	74.13411	62.51236	91.36049	1.231213	2.629773
0.15	60.94154	52.24639	75.75765	0.860031	1.808233
0.164	50.98098	44.55114	64.02649	0.625344	1.291578
0.18	42.32051	37.91516	53.87763	0.452926	0.914573
0.197	35.33161	32.61017	45.73759	0.335048	0.659095
0.215	29.66327	28.34999	39.18159	0.253225	0.483688
0.233	25.25713	25.07022	34.12365	0.198024	0.366870
0.264	19.67379	20.95927	27.77810	0.138406	0.243112
0.3	15.23538	17.72533	22.79867	0.098990	0.163765
0.342	11.72313	15.17499	18.90481	0.072553	0.112602
0.39	9.01502	13.19210	15.92487	0.054831	0.079901

SUMMARY OF METALS EMISSIONS
CASE 1 CALCULATIONS (1)

CONCRETE READY MIXED CORPORATION
DUST COLLECTOR OUTLET

RUN NUMBER (2): **DCO-M201A-R1,2,3,4**
COMBINED VOLUME (3) **800.481 dscf**
AVG. GAS FLOWRATE: **18929 dscfm**

		LABORATORY DATA			METAL EMISSIONS	
		SAMPLE CATCH - micrograms			CONC.	MASS RATE
<u>COMPONENT</u>		<u>SAMPLE</u>	<u>BLANK</u>	<u>TOTAL</u>	<u>ug/dscm</u>	<u>lb/hr</u>
Arsenic	As	0.60	* 0.20	0.4	0.0176	1.25E-06
Beryllium	Be	0.04	* 0.02	0.02	0.0009	6.26E-08
Cadmium	Cd	* 0.01	0.01	0	0.0000	0.00E+00
Chromium	Cr	2.90	1.90	1	0.0441	3.13E-06
Lead	Pb	2.25	0.70	1.55	0.0684	4.85E-06
Manganese	Mn	6.90	0.60	6.3	0.2779	1.97E-05
Mercury	Hg	* 0.20	* 0.20	0.00	0.0000	0.00E+00
Nickel	Ni	4.00	* 2.00	2	0.0882	6.26E-06
Phosphorus	P	* 100	* 100.00	0	0.0000	0.00E+00
Selenium	Se	* 0.20	* 0.20	0.00	0.0000	0.00E+00

Notes:

- (1) Case 1 calculations substitute the detection limit value for all of the non-detected parameters.
The detection limit values are indicated with an "**".
- (2) The sample is comprised of filters from the identified test runs.
- (3) The volume of air sampled represents the combined total of the sample volumes of the individual test runs.

SUMMARY OF METALS EMISSIONS
CASE 2 CALCULATIONS (1)

CONCRETE READY MIXED CORPORATION
DUST COLLECTOR OUTLET

RUN NUMBER (2): DCO-M201A-R1,2,3,4
 COMBINED VOLUME (3) 800.481 dscf
 AVG. GAS FLOWRATE: 18929 dscfm

COMPONENT		LABORATORY DATA				METAL EMISSIONS	
		SAMPLE CATCH - micrograms			TOTAL	CONC.	MASS RATE
		SAMPLE		BLANK		ug/dscm	lb/hr
Arsenic	As	0.60	*	0.00	0.6	0.0265	1.88E-06
Beryllium	Be	0.04	*	0.00	0.04	0.0018	1.25E-07
Cadmium	Cd	*	0.00	0.01	0	0.0000	0.00E+00
Chromium	Cr	2.90		1.90	1	0.0441	3.13E-06
Lead	Pb	2.25		0.70	1.55	0.0684	4.85E-06
Manganese	Mn	6.90		0.60	6.3	0.2779	1.97E-05
Mercury	Hg	*	0.00	*	0.00	0.0000	0.00E+00
Nickel	Ni	4.00	*	0.00	4	0.1765	1.25E-05
Phosphorus	P	*	0.00	*	0.00	0.0000	0.00E+00
Selenium	Se	*	0.00	*	0.00	0.0000	0.00E+00

Notes:

- (1) Case 2 calculations substitute a value of zero for all of the non-detected parameters.
 The instances where a zero value is used are indicated with an "***".
- (2) The sample is comprised of filters from the identified test runs.
- (3) The volume of air sampled represents the combined total of the sample volumes of the individual test runs.
- (4) If Blank>Sample, then Total = 0.

APPENDIX F.2.2
CENTRAL DUST COLLECTOR OUTLET
RAW FIELD DATA

FIELD DATA SHEET FOR METHOD 201A

PAGE 1

FACILITY Reedy millDATE 10-26-93START TIME 7:45TEST LOCATION Dust Collector OutletRUN NUMBER DC-M201A-R1

Point	Sample Time	Clock Time	Static	Stack Temp.	Stack dP	Dwell Time	Meter dH	Meter Volume cu.ft.	Meter Temp.		Imp. Temp.	Meter Vac.
									Inlet	Outlet		
A1	0	7:45		57	1.7	12.40	0.65	242.876	53	53	48	2
2	12.4			57	1.6	12.0	.65	248.423	57	53	48	2
3	24.4			56	1.4	11.3	.65	253.725	61	54	48	2
4	35.7			57	.91	9.1	.65	258.732	63	56	48	2
5	44.8			56	.86	8.8	.65	262.768	65	57	49	2
6	53.6		+3.0	56	.91	9.1	.65	266.675	68	62	46	2
7	62.7			56	1.2	10.4	.65	270.945	68	59	44	2
8	73.1			56	1.2	10.4	.65	275.831	68	60	47	2
B1	83.5			55	1.3	10.8	.65	280.725	71	61	46	2
2	94.3			55	1.3	10.8	.65	285.773	69	61	48	2
3	105.1			56	1.1	10.0	.65	290.863	72	63	47	2
4	115.1			55	.90	9.0	.65	295.543	71	62	48	2
5	124.1			56	.70	7.5	.65	299.764	74	64	48	2
6	131.3			56	.74	8.2	.65	303.065	72	64	50	2
7	139.5			56	.89	9.0	.65	306.844	75	66	48	2
8	148.5			56	1.4	11.3	.65	311.013	73	65	49	2
C1	159.8			55	1.3	10.8	.65	316.235	76	67	49	2
2	170.6			55	.85	8.8	.65	321.249	73	66	52	2
3	179.4		+3.1	55	.65	7.7	.65	325.277	77	68	50	2
4	187.1			55	.79	8.5	.65	328.838	74	67	53	2
5	195.6			55	.89	9.0	.65	332.763	76	68	51	2
6	204.6			55	1.2	10.4	.65	336.929	75	68	51	2
7	215			56	1.7	12.4	.65	341.751	76	68	50	2
8	227.4	11:32		56	1.6	12.0	.65	347.437	76	67	52	2
							.65					

CHAIN OF CUSTODY INFORMATION

Container Number	Sample I.D.	Description
	112	Filter
	113	7 PM 10
	114	4 PM 10
	116	s.l.a gel

LEAK CHECK

Vacuum	4				
Rate	.007				

IMPINGER VOLUMES

	Initial	Final
#1	100	100
#2	100	100
#3	0	0
#4	56	
#5		

Dwell Time for Point 1 = 12.10 $t_1/\sqrt{P_1}$ = 9.51

METER BOX I.D.	9
GAMMA	.99672
DELTA H ₂ O	1.98172
OPERATOR	Billy
BAR. PRESS.	30.12
FILTER I.D.	692-96

Nozzle # 2

FIELD DATA SHEET FOR METHOD 201A

PAGE 1

FACILITY Ready mixDATE 10-26-93START TIME 1330TEST LOCATION dust collector outletRUN NUMBER UCCO-m201A

Point	Sample Time	Clock Time	Static	Stack Temp.	Stack dP	Dwell Time	Meter dH	Meter Volume cu.ft.	Meter Temp.		Imp. Temp.	Meter Vac.
									Inlet	Outlet		
A1	0	1330	~~1330~~	69	1.6	12.1	0.65	347.515	65	63	62	2
2	12.1		+3.6	66	1.4	11.4	.65	352.625	66	64	66	2
3	23.5			67	1.2	10.5	.65	358.257	72	65	61	2
4	34			67	1.1	10.1	.65	363.008	71	65	65	2
5	44.1			66	1.1	10.1	.65	367.523	73	66	59	2
6	54.2			66	1.1	10.1	.65	372.133	69	63	59	2
7	64.3			66	1.1	10.1	.65	376.779	70	63	56	2
8	74.4			66	1.1	10.1	.65	381.495	69	62	57	2
B1	84.5			64	1.8	12.9	.65	386.211	71	65	57	2
2	97.4			65	1.2	10.5	.65	392.215	70	63	58	2
3	106.9			65	.98	9.5	.65	396.634	71	63	58	2
4	116.4			65	.65	7.7	.65	401.045	70	63	57	2
5	124.1			65	.65	7.7	.65	404.630	74	65	57	2
6	131.8			65	.65	7.7	.65	408.215	71	64	56	2
7	139.5			65	.95	9.4	.65	411.845	70	64	60	2
8	148.9			66	1.3	10.9	.65	416.235	70	64	55	2
C1	159.8			65	1.1	10.1	.65	421.347	68	64	59	2
2	169.9			65	.97	9.5	.65	426.091	69	64	55	2
3	179.4			65	.83	8.7	.65	430.430	68	63	56	2
4	188.1			65	1.2	10.5	.65	434.425	69	64	56	2
5	198.6		+3.4	65	1.3	10.9	.65	439.261	68	63	57	2
6	209.5			65	1.3	10.9	.65	444.221	71	64	56	2
7	220.4			65	1.5	11.8	.65	449.225	67	63	61	2
8	232.2			65	1.9	13.2	.65	454.627	69	63	60	2
	245.4	1735					.65	460.691	68	64	59	2

CHAIN OF CUSTODY INFORMATION

Container Number	Sample I.D.	Description
	136	Filter
	137	PM10
	138	PM10
	140	Silica Gel

LEAK CHECK

Vacuum					
Rate					

Dwell Time for Point 1 = 12.14t1/tP1 = 9.60

IMPINGER VOLUMES

	Initial	Final
#1	100	90
#2	100	96
#3	0	0
#4	200g	
#5	0	

METER BOX I.D.	9
GAMMA	.99672
DELTA H ₂ O	1.88172
OPERATOR	Billy
BAR. PRESS.	30.12
FILTER I.D.	G92-99

Nozzle #2

FIELD DATA SHEET FOR METHOD 201.1

PAGE 1

FACILITY Ready mixDATE 10-27-93START TIME 7:20TEST LOCATION dust collector outlet RUN NUMBER DCO-m201A-R3

Point	Sample Time	Clock Time	Static	Stack Temp.	Stack dP	Dwell Time	Meter dH	Meter Volume cu.ft.	Meter Temp.		Imp. Temp.	Meter Vac.
									Inlet	Outlet		
1	7:20	7:20		48	1.7	29.7	0.64	461.026	49	48	49	3
2	29.7			50	1.7	29.7	.64	474.621	58	51	50	3
3	59.4			50	1.3	26	.64	489.045	62	55	49	2.5
4	85.4			52	1.1	24	.64	499.785	49	57	64	2.5
5	109.4			51	.88	21.3	.64	510.662	65	59	50	2.5
6	130.7			52	.76	19.9	.64	520.435	68	61	60	2.5
7	150.6			52	.91	21.7	.64	529.563	70	64	55	2.5
8	172.3			52	.98	22.6	.64	539.548	71	65	54	2.5
1	194.9			52	1.9	31.4	.64	549.772	72	66	59	2.5
2	226.3		43.3	52	1.4	27	.64	564.664	76	70	59	2.5
3	253.3			52	1.4	27	.64	576.812	75	70	62	2.5
4	280.3			52	.86	21.1	.64	589.177	76	70	63	2.5
5	301.4			52	.71	19.2	.64	598.843	77	71	69	2.5
6	320.6			52	.65	18.3	.64	607.770	78	72	67	2.5
7	338.9			52	.77	20	.64	615.433	80	74	75	2.5
8	358.9			52	1.5	30	.64	625.840	81	74	71	2.5
1	382.9			52	1.1	24	.64	635.981	81	75	74	2.5
2	406.9			53	1.0	22.8	.64	648.265	80	76	75	2.5
3	429.7			52	1.1	24	.64	659.253	79	75	75	2.5
4	453.7			52	1.2	25	.64	670.369	81	76	76	2.5
5	478.7			52	1.2	25	.64	682.015	80	75	76	2.5
6	503.7			52	1.9	24.7	.64	693.726	79	76	70	2.5
7	533.4			52	1.9	24.7	.64	707.646	79	79	77	2.5
8	563.1			52	1.7	24.7	.64	721.48	80	75	70	2.5
	592.8	17:13						735.545				

CHAIN OF CUSTODY INFORMATION

Container Number	Sample I.D.	Description
	172	Filter
	173	7 PM 10
	174	2 PM 10
	176	5.1.6.6.1

LEAK CHECK

Vacuum	4				
Rate	.003				

IMPINGER VOLUMES

	Initial	Final
#1	100	50
#2	100	94
#3	0	0
#4	200	
#5	0	

Dwell Time for Point 1 = 29.72 $t_1/\sqrt{F_1} = \underline{22.79}$

METER BOX I.D.	#
GAMMA	0.99672
DELTA H ₀	1.28172
OPERATOR	B. Stolt
BAR. PRESS.	29.57
FILTER I.D.	G-92-L15

Note 2

FIELD DATA SHEET FOR METHOD 201A

PAGE 1

FACILITY Redi-MixDATE 10/24/93START TIME 6:35TEST LOCATION Dust Collector Outlet RUN NUMBER DCR-M201A-R4

Point	Sample Time	Clock Time	Static	Stack Temp.	Stack dP	Dwell Time	Meter dH	Meter Volume cu.ft.	Meter Temp.		Imp. Temp.	Meter Vac.
									Inlet	Outlet		
A1	0	6:35		74	1.3	32.7	6.67	735.667	43	43	47	3
2	32.7			74	1.2	31.4	6.63	750.290	54	48	52	3
3	64.1			74	1.2	31.4	6.63	764.332	53	48	51	3
4	95.5			74	1.1	30	6.63	778.379	54	48	52	3
5	125.5			74	1.1	30	6.63	791.795	55	50	50	3
6	155.5			74	1.0	28.7	6.63	805.211	53	50	51	3
7	184.2			74	1.1	30	6.63	818.043	55	50	52	3
8	214.2			74	.96	28.1	6.63	831.467	58	51	50	3
31	242.3			74	1.9	37.4	6.63	844.023	60	53	52	3
2	279.7			74	1.0	28.7	6.63	860.755	57	53	54	3
3	308.4			74	.98	28.4	6.63	873.256	58	53	53	3
4	336.8		+3.5	74	.75	24.8	6.63	885.517	57	52	52	3
5	361.6			74	.65	23.1	6.63	896.228	58	53	53	3
6	384.7			74	.65	23.1	6.63	906.372	58	53	54	3
7	407.8			74	.65	23.1	6.63	916.522	58	56	56	3
8	430.9			73	.65	23.1	6.63	926.699	61	58	55	3
21	454			73	1.6	36.2	6.63	936.816	64	58	57	3
2	490.2			73	1.2	31.4	6.63	950.995	66	59	59	3
3	521.6			73	.85	26.4	6.63	965.335	63	58	60	3
4	548			73	1.1	30	6.63	977.460	67	62	59	3
5	578			73	1.1	30	6.63	991.682	68	62	65	3
6	608			73	1.5	35.1	6.63	1005.831	71	64	61	3
7	643.1	17:40		73	1.8	38.4	6.63	1022.147	70	65	63	3
8	681.5	681.5		73	1.9	37.4	6.63	1039.187	70	66	59	3
	713.9	681.0						1040.541				

CHAIN OF CUSTODY INFORMATION

Container Number	Sample I.D.	Description
	214	F. I.L.R
	215	7PM10
	216	4PM10
	218	S. I. in 6cl

LEAK CHECK

Vacuum	10				
Rate	0.025				

IMPINGER VOLUMES

	Initial	Final
#1	100	50
#2	100	90
#3	0	
#4	200 g	
#5		

Dwell Time for Point 1 = 32.72t₁ / √P₁ = 28.68

METER BOX I.D.	4
GAMMA	2.99672
DELTA H ₂ O	1.57172
OPERATOR	B. H. S
BAR. PRESS.	29.80
FILTER I.D.	G95-145

in 201A 112

APPENDIX G
LABORATORY DATA

APPENDIX G.1
GRAVIMETRIC LAB DATA AND RESULTS

ETS, INC.

FIELD SAMPLE LOG

Contract No. 92-65518
Job I.D.
Test Method 201A

Print Date 11/02/93 Time 12:44:48
Page 1

Sample No.	Container No.	Other I.D.	Run I.D.	Sample Type	Volume, ml no Rinses	Volume, ml w/ Rinses	Analyst	Date	Comments
00106	F1		DCI -201-R1	Gelman Filter			PJB	11/01/93	
00107	F2		DCI -201-R1	>PM10 Acetone Rinse			PJB	11/01/93	
00108	F3	G92-0095	DCI -201-R1	<=PM10 Acetone Rinse			PJB	11/01/93	
00109	F4		DCI -201-R1	Impinger Liquids			PJB	11/01/93	
00110	F5		DCI -201-R1	Imp. 4 Silica Gel			PJB	11/01/93	
00111	F6		DCI -201-R1	TEDLAR BAG			PJB	11/01/93	
00112	F1		DCO -201-R1	Gelman Filter			PJB	11/01/93	
00113	F2		DCO -201-R1	>PM10 Acetone Rinse			PJB	11/01/93	
00114	F3	G92-0096	DCO -201-R1	<=PM10 Acetone Rinse			PJB	11/01/93	
00115	F4		DCO -201-R1	Impinger Liquids			PJB	11/01/93	
00116	F5		DCO -201-R1	Imp. 4 Silica Gel			PJB	11/01/93	
00117	F6		DCO -201-R1	TEDLAR BAG			PJB	11/01/93	
00118	F1		DCI -201-R2	Gelman Filter			PJB	11/01/93	
00119	F2		DCI -201-R2	>PM10 Acetone Rinse			PJB	11/01/93	
00120	F3	G92-0098	DCI -201-R2	<=PM10 Acetone Rinse			PJB	11/01/93	
00121	F4		DCI -201-R2	Impinger Liquids			PJB	11/01/93	
00122	F5		DCI -201-R2	Imp. 4 Silica Gel			PJB	11/01/93	
00123	F6		DCI -201-R2	TEDLAR BAG			PJB	11/01/93	
00124	F1		DCI -201-R3	Gelman Filter			PJB	11/01/93	
00125	F2		DCI -201-R3	>PM10 Acetone Rinse			PJB	11/01/93	
00126	F3	G92-0100	DCI -201-R3	<=PM10 Acetone Rinse			PJB	11/01/93	
00127	F4		DCI -201-R3	Impinger Liquids			PJB	11/01/93	
00128	F5		DCI -201-R3	Imp. 4 Silica Gel			PJB	11/01/93	
00129	F6		DCI -201-R3	TEDLAR BAG			PJB	11/01/93	
00130	F1		CSO -201-R1	Gelman Filter			PJB	11/01/93	
00131	F2		CSO -201-R1	>PM10 Acetone Rinse			PJB	11/01/93	
00132	F3	G92-0097	CSO -201-R1	<=PM10 Acetone Rinse			PJB	11/01/93	

E T S , I N C .

F I E L D S A M P L E L O G

Print Date 11/02/93
Page 2

Contract No. 92-65518
Job I.D.
Test Method 201A

Sample No.	Container No.	Other I.D.	Run I.D.	Sample Type	Volume,ml no Rinses	Volume,ml w/ Rinses	Analyst	Date	Comments
00133	F4		CSO -201-R1	Impinger Liquids			PJB	11/01/93	
00134	F5		CSO -201-R1	Imp. 4 Silica Gel			PJB	11/01/93	
00135	F6		CSO -201-R1	TEDLAR BAG			PJB	11/01/93	
00136	F1		DCO -201-R2	Gelman Filter			PJB	11/01/93	
00137	F2		DCO -201-R2	>PM10 Acetone Rinse			PJB	11/01/93	
00138	F3	G92-0099	DCO -201-R2	<=PM10 Acetone Rinse			PJB	11/01/93	
00139	F4		DCO -201-R2	Impinger Liquids			PJB	11/01/93	
00140	F5		DCO -201-R2	Imp. 4 Silica Gel			PJB	11/01/93	
00141	F6		DCO -201-R2	TEDLAR BAG			PJB	11/01/93	
00142	F1		DCI -201-R4	Gelman Filter			PJB	11/01/93	
00143	F2		DCI -201-R4	>PM10 Acetone Rinse			PJB	11/01/93	
00144	F3	G92-0102	DCI -201-R4	<=PM10 Acetone Rinse			PJB	11/01/93	
00145	F4		DCI -201-R4	Impinger Liquids			PJB	11/01/93	
00146	F5		DCI -201-R4	Imp. 4 Silica Gel			PJB	11/01/93	
00147	F6		DCI -201-R4	TEDLAR BAG			PJB	11/01/93	
00148	F1		FSO -201-R1	Gelman Filter			PJB	11/01/93	
00149	F2		FSO -201-R1	>PM10 Acetone Rinse			PJB	11/01/93	
00150	F3	G92-0101	FSO -201-R1	<=PM10 Acetone Rinse			PJB	11/01/93	
00151	F4		FSO -201-R1	Impinger Liquids			PJB	11/01/93	
00152	F5		FSO -201-R1	Imp. 4 Silica Gel			PJB	11/01/93	
00153	F6		FSO -201-R1	TEDLAR BAG			PJB	11/01/93	
00154	F1		DCI -201-R5	Gelman Filter			PJB	11/01/93	
00155	F2		DCI -201-R5	>PM10 Acetone Rinse			PJB	11/01/93	
00156	F3	G92-0046	DCI -201-R5	<=PM10 Acetone Rinse			PJB	11/01/93	
00157	F4		DCI -201-R5	Impinger Liquids			PJB	11/01/93	
00158	F5		DCI -201-R5	Imp. 4 Silica Gel			PJB	11/01/93	
00159	F6		DCI -201-R5	TEDLAR BAG			PJB	11/01/93	

ETS, INC.

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Sample No.	Container No.	Other I.D.	Run I.D.	Sample Type	Volume, ml no Rinses	Volume, ml w/ Rinses	Analyst	Date	Comments
00160	F1		DCI -201-R6	Gelman Filter			PJB	11/01/93	
00161	F2		DCI -201-R6	>PM10 Acetone Rinse			PJB	11/01/93	
00162	F3	G92-0047	DCI -201-R6	<=PM10 Acetone Rinse			PJB	11/01/93	
00163	F4		DCI -201-R6	Impinger Liquids			PJB	11/01/93	
00164	F5		DCI -201-R6	Imp. 4 Silica Gel			PJB	11/01/93	
00165	F6		DCI -201-R6	TEDLAR BAG			PJB	11/01/93	
00166	F1		CSO -201-R2	Gelman Filter			PJB	11/01/93	
00167	F2		CSO -201-R2	>PM10 Acetone Rinse			PJB	11/01/93	
00168	F3	G92-0103	CSO -201-R2	<=PM10 Acetone Rinse			PJB	11/01/93	
00169	F4		CSO -201-R2	Impinger Liquids			PJB	11/01/93	
00170	F5		CSO -201-R2	Imp. 4 Silica Gel			PJB	11/01/93	
00171	F6		CSO -201-R2	TEDLAR BAG			PJB	11/01/93	
00172	F1		DCO -201-R3	Gelman Filter			PJB	11/01/93	
00173	F2		DCO -201-R3	>PM10 Acetone Rinse			PJB	11/01/93	
00174	F3	G92-0045	DCO -201-R3	<=PM10 Acetone Rinse			PJB	11/01/93	
00175	F4		DCO -201-R3	Impinger Liquids			PJB	11/01/93	
00176	F5		DCO -201-R3	Imp. 4 Silica Gel			PJB	11/01/93	
00177	F6		DCO -201-R3	TEDLAR BAG			PJB	11/01/93	
00178	F1		DCI -201-R7	Gelman Filter			PJB	11/01/93	
00179	F2		DCI -201-R7	>PM10 Acetone Rinse			PJB	11/01/93	
00180	F3	G92-0143	DCI -201-R7	<=PM10 Acetone Rinse			PJB	11/01/93	
00181	F4		DCI -201-R7	Impinger Liquids			PJB	11/01/93	
00182	F5		DCI -201-R7	Imp. 4 Silica Gel			PJB	11/01/93	
00183	F6		DCI -201-R7	TEDLAR BAG			PJB	11/01/93	
00184	F1		DCI -201-R8	Gelman Filter			PJB	11/01/93	
00185	F2		DCI -201-R8	>PM10 Acetone Rinse			PJB	11/01/93	
00186	F3	G92-0136	DCI -201-R8	<=PM10 Acetone Rinse			PJB	11/01/93	

ETS, INC.

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Sample No.	Container No.	Other I.D.	Run I.D.	Sample Type	Volume, ml no Rinses	Volume, ml w/ Rinses	Analyst	Date	Comments
00187	F4		DCI -201-R8	Impinger Liquids			PJB	11/01/93	
00188	F5		DCI -201-R8	Imp. 4 Silica Gel			PJB	11/01/93	
00189	F6		DCI -201-R8	TEDLAR BAG			PJB	11/01/93	
00190	F1		FSO -201-R2	Gelman Filter			PJB	11/01/93	
00191	F2		FSO -201-R2	>PM10 Acetone Rinse			PJB	11/01/93	
00192	F3	G92-0141	FSO -201-R2	<=PM10 Acetone Rinse			PJB	11/01/93	
00193	F4		FSO -201-R2	Impinger Liquids			PJB	11/01/93	
00194	F5		FSO -201-R2	Imp. 4 Silica Gel			PJB	11/01/93	
00195	F6		FSO -201-R2	TEDLAR BAG			PJB	11/01/93	
00196	F1		DCI -201-R9	Gelman Filter			PJB	11/01/93	
00197	F2		DCI -201-R9	>PM10 Acetone Rinse			PJB	11/01/93	
00198	F3	G92-0048	DCI -201-R9	<=PM10 Acetone Rinse			PJB	11/01/93	
00199	F4		DCI -201-R9	Impinger Liquids			PJB	11/01/93	
00200	F5		DCI -201-R9	Imp. 4 Silica Gel			PJB	11/01/93	
00201	F6		DCI -201-R9	TEDLAR BAG			PJB	11/01/93	
00202	F1		CSO -201-R3	Gelman Filter			PJB	11/01/93	
00203	F2		CSO -201-R3	>PM10 Acetone Rinse			PJB	11/01/93	
00204	F3	G92-0144	CSO -201-R3	<=PM10 Acetone Rinse			PJB	11/01/93	
00205	F4		CSO -201-R3	Impinger Liquids			PJB	11/01/93	
00206	F5		CSO -201-R3	Imp. 4 Silica Gel			PJB	11/01/93	
00207	F6		CSO -201-R3	TEDLAR BAG			PJB	11/01/93	
00208	F1		DCI -201-R10	Gelman Filter			PJB	11/01/93	
00209	F2		DCI -201-R10	>PM10 Acetone Rinse			PJB	11/01/93	
00210	F3	G92-0140	DCI -201-R10	<=PM10 Acetone Rinse			PJB	11/01/93	
00211	F4		DCI -201-R10	Impinger Liquids			PJB	11/01/93	
00212	F5		DCI -201-R10	Imp. 4 Silica Gel			PJB	11/01/93	
00213	F6		DCI -201-R10	TEDLAR BAG			PJB	11/01/93	

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Sample No.	Container No.	Other I.D.	Run I.D.	Sample Type	Volume,ml no Rinses	Volume,ml w/ Rinses	Analyst	Date	Comments
00214	F1		DCO -201-R4	Gelman Filter			PJB	11/01/93	
00215	F2		DCO -201-R4	>PM10 Acetone Rinse			PJB	11/01/93	
00216	F3	G92-0145	DCO -201-R4	<=PM10 Acetone Rinse			PJB	11/01/93	
00217	F4		DCO -201-R4	Impinger Liquids			PJB	11/01/93	
00218	F5		DCO -201-R4	Imp. 4 Silica Gel			PJB	11/01/93	
00219	F6		DCO -201-R4	TEDLAR BAG			PJB	11/01/93	
00220	F1		FSO -201-R3	Gelman Filter			PJB	11/01/93	
00221	F2		FSO -201-R3	>PM10 Acetone Rinse			PJB	11/01/93	
00222	F3	G92-0137	FSO -201-R3	<=PM10 Acetone Rinse			PJB	11/01/93	
00223	F4		FSO -201-R3	Impinger Liquids			PJB	11/01/93	
00224	F5		FSO -201-R3	Imp. 4 Silica Gel			PJB	11/01/93	
00225	F6		FSO -201-R3	TEDLAR BAG			PJB	11/01/93	
00226	F1		BLANK-201-R0	Gelman Filter			PJB	11/01/93	
00227	F2		BLANK-201-R0	>PM10 Acetone Rinse			PJB	11/01/93	
00228	F3	G92-0068	BLANK-201-R0	<=PM10 Acetone Rinse			PJB	11/01/93	
00229	F4		BLANK-201-R0	Impinger Liquids			PJB	11/01/93	
00230	F5		BLANK-201-R0	Imp. 4 Silica Gel			PJB	11/01/93	
00231	F6		BLANK-201-R0	TEDLAR BAG			PJB	11/01/93	
00232	F1		INMIX-201-R1	Gelman Filter			PJB	11/01/93	
00233	F2		INMIX-201-R1	>PM10 Acetone Rinse			PJB	11/01/93	
00234	F3	G92-0090	INMIX-201-R1	<=PM10 Acetone Rinse			PJB	11/01/93	
00235	F4		INMIX-201-R1	Impinger Liquids			PJB	11/01/93	
00236	F5		INMIX-201-R1	Imp. 4 Silica Gel			PJB	11/01/93	
00237	F6		INMIX-201-R1	TEDLAR BAG			PJB	11/01/93	

ETS, Inc.
GRAVIMETRIC LABORATORY DATA
Silica Gel Weights

Report Prepared on: 10/26/93

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Sample Number	Tare Weight (g)	Final Weight (g)	Description
93-956-00104	200.0000	205.7000	BLUE
93-956-00110	200.0000	211.5200	ORANGE
93-956-00116	200.0000	203.5200	ORANGE/BLUE
93-956-00122	200.0000	200.0100	blue

ETS, Inc.
GRAVIMETRIC LABORATORY DATA
Silica Gel Weights

Report Prepared on: 11/01/93

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Sample Number	Tare Weight (g)	Final Weight (g)	Description
92-65518-00110	200.0000	213.6400	PURPLE/PEACH
92-65518-00116	200.0000	226.1000	LIGHT PURPLE
92-65518-00122	200.0000	211.9000	PINK/ORANGE
92-65518-00128	200.0000	211.7000	PEACH
92-65518-00134	200.0000	213.7600	LIGHT BLUE/PURPLE
92-65518-00140	200.0000	226.0400	AMBER/BLUE
92-65518-00146	200.0000	208.1700	AMBER
92-65518-00152	200.0000	209.6100	ROYAL BLUE
92-65518-00158	200.0000	213.2900	AMBER/BLUE
92-65518-00164	200.0000	221.8800	AMBER/BLUE
92-65518-00170	200.0000	213.4500	ORANGE
92-65518-00176	200.0000	246.7600	LIGHT PINK

ETS, Inc.
GRAVIMETRIC LABORATORY DATA
Silica Gel Weights

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Sample Number	Tare Weight (g)	Final Weight (g)	Description
92-65518-00182	200.0000	218.2600	PEACH/LIGHT PURPLE
92-65518-00188	200.0000	214.5400	PEACH/LIGHT PURPLE
92-65518-00194	200.0000	200.1400	ROYAL BLUE
92-65518-00200	200.0000	217.5700	LIGHT PURPLE
92-65518-00206	200.0000	220.8900	ORANGE
92-65518-00212	200.0000	220.0200	LIGHT ORANGE
92-65518-00218	200.0000	247.7900	PUMPKIN/AMBER
92-65518-00224	200.0000	205.5700	ORANGE
92-65518-00230	200.0000	200.0000	DARK BLUE
92-65518-00236	200.0000	205.5000	LIGHT PURPLE/BLUE

APPENDIX G.2
TARGETED METALS
LABORATORY DATA AND RESULTS

ETS Analytical Services, Inc.



Proudly serving industry and government since 1973.

A USEPA Contract Laboratory

A subsidiary of ETS International, Inc.

ETS, Inc.
1401 Municipal Road N.W.
Roanoke, VA 24012
ATTN: Dr. Ted Handel

Re: Laboratory Analysis
ETSAS Client No. 6593

REPORT DATE/NUMBER: December 9, 1993 / 232

ANALYSIS FOR: Arsenic, Beryllium, Cadmium, Chromium, Lead, Manganese,
Mercury, Nickel, Phosphorous, Selenium

METHOD OF ANALYSIS: ICP, GFAAS, CVAAS

SAMPLE ANALYSIS DATA

Lab ID: 149401 Client ID: A Matrix: FILTER
Other ID: 92-655 Collected by: ETS, INC.
Collection Date: / / Time: Received at ETSAS: 11/05/93
Description: EPA/ROANOKE READY-MIX PLANT
METALS/ELEMENTS RESULTS:

Arsenic	39.90 ug, Total
↳ Analysis Date: 12/02/93 by: JW Run ID: 149401	
↳ Method: GFAAS; Det Limit= 0.20 ug, Total	
Beryllium	3.60 ug, Total
↳ Analysis Date: 12/01/93 by: KO Run ID: 149401	
↳ Method: ICP; Det Limit= 0.50 ug, Total	
Cadmium	0.80 ug, Total
↳ Analysis Date: 12/01/93 by: KO Run ID: 149401	
↳ Method: ICP; Det Limit= 0.50 ug, Total	
Chromium	50.50 ug, Total
↳ Analysis Date: 12/01/93 by: KO Run ID: 149401	
↳ Method: ICP; Det Limit= 1.0 ug, Total	
Lead	21.40 ug, Total
↳ Analysis Date: 12/01/93 by: KO Run ID: 149401	
↳ Method: ICP; Det Limit= 5.0 ug, Total	
Manganese	10.80 ug, Total
↳ Analysis Date: 12/01/93 by: KO Run ID: 149401	
↳ Method: ICP; Det Limit= 1.50 ug, Total	
Mercury	< 0.20 ug, Total
↳ Analysis Date: 12/03/93 by: MG Run ID: 149410	
↳ Method: CVAAS; Det Limit= 0.20 ug, Total	

REPORT CONTINUED ON NEXT PAGE



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SAMPLE ANALYSIS DATA

Lab ID: 149401 (continued)

Nickel	90.80 ug, Total
↳Analysis Date: 12/01/93 by: KO Run ID: 149401	
↳Method: ICP; Det Limit= 2.0 ug, Total	
Phosphorus	141.00 ug, Total
↳Analysis Date: 12/01/93 by: KO Run ID: 149401	
↳Method: ICP; Det Limit= 100 ug, Total	
Selenium	2.88 ug, Total
↳Analysis Date: 12/03/93 by: BA Run ID: 149401	
↳Method: GFAAS; Det Limit= 0.20 ug, Total	

Lab ID: 149402 Client ID: B Matrix: FILTER
Other ID: 92-655 Collected by: ETS, INC.
Collection Date: / / Time: Received at ETSAS: 11/05/93
Description: EPA/ROANOKE READY-MIX PLANT

Arsenic	< 2.0 ug, Total
↳Analysis Date: 12/02/93 by: JW Run ID: 149401	
↳Method: GFAAS; Det Limit= 2.00 ug, Total	
Beryllium	0.05 ug, Total
↳Analysis Date: 12/04/93 by: JW Run ID: 149401	
↳Method: GFAAS; Det Limit= 0.02 ug, Total	
Cadmium	< 0.01 ug, Total
↳Analysis Date: 12/02/93 by: JW Run ID: 149401	
↳Method: GFAAS; Det Limit= 0.01 ug, Total	
Chromium	4.00 ug, Total
↳Analysis Date: 12/01/93 by: KO Run ID: 149401	
↳Method: ICP; Det Limit= 1.0 ug, Total	
Lead	1.68 ug, Total
↳Analysis Date: 12/03/93 by: JW Run ID: 149401	
↳Method: GFAAS; Det Limit= 0.10 ug, Total	
Manganese	14.60 ug, Total
↳Analysis Date: 12/01/93 by: KO Run ID: 149401	
↳Method: ICP; Det Limit= 1.50 ug, Total	
Mercury	< 0.20 ug, Total
↳Analysis Date: 12/03/93 by: MG Run ID: 149410	
↳Method: CVAAS; Det Limit= 0.20 ug, Total	
Nickel	4.00 ug, Total
↳Analysis Date: 12/01/93 by: KO Run ID: 149401	
↳Method: ICP; Det Limit= 2.0 ug, Total	
Phosphorus	< 100 ug, Total
↳Analysis Date: 12/01/93 by: KO Run ID: 149401	
↳Method: ICP; Det Limit= 100 ug, Total	

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SAMPLE ANALYSIS DATA

Lab ID: 149402 (continued)

Selenium < 0.20 ug, Total

↳Analysis Date: 12/03/93 by: BA Run ID: 149401

↳Method: GFAAS; Det Limit= 0.20 ug, Total

Lab ID: 149403 Client ID: C

Matrix: FILTER

Other ID: 92-655

Collected by: ETS, INC.

Collection Date: / /

Time:

Received at ETSAS: 11/05/93

Description: EPA/ROANOKE READY-MIX PLANT

Arsenic 0.60 ug, Total

↳Analysis Date: 12/01/93 by: BA Run ID: 149401

↳Method: GFAAS; Det Limit= 0.20 ug, Total

Beryllium 0.04 ug, Total

↳Analysis Date: 12/04/93 by: JW Run ID: 149401

↳Method: GFAAS; Det Limit= 0.02 ug, Total

Cadmium < 0.01 ug, Total

↳Analysis Date: 12/02/93 by: JW Run ID: 149401

↳Method: GFAAS; Det Limit= 0.01 ug, Total

Chromium 2.90 ug, Total

↳Analysis Date: 12/01/93 by: KO Run ID: 149401

↳Method: ICP; Det Limit= 1.0 ug, Total

Lead 2.25 ug, Total

↳Analysis Date: 12/03/93 by: JW Run ID: 149401

↳Method: GFAAS; Det Limit= 0.10 ug, Total

Manganese 6.90 ug, Total

↳Analysis Date: 12/01/93 by: KO Run ID: 149401

↳Method: ICP; Det Limit= 1.50 ug, Total

Mercury < 0.20 ug, Total

↳Analysis Date: 12/03/93 by: MG Run ID: 149410

↳Method: CVAAS; Det Limit= 0.20 ug, Total

Nickel 4.00 ug, Total

↳Analysis Date: 12/01/93 by: KO Run ID: 149401

↳Method: ICP; Det Limit= 2.0 ug, Total

Phosphorus < 100 ug, Total

↳Analysis Date: 12/01/93 by: KO Run ID: 149401

↳Method: ICP; Det Limit= 100 ug, Total

Selenium < 0.20 ug, Total

↳Analysis Date: 12/03/93 by: BA Run ID: 149401

↳Method: GFAAS; Det Limit= 0.20 ug, Total

Lab ID: 149404 Client ID: D1

Matrix: FILTER

Other ID: 92-655

Collected by: ETS, INC.

Collection Date: / /

Time:

Received at ETSAS: 11/05/93

Description: EPA/ROANOKE READY-MIX PLANT

Arsenic 5.12 ug, Total

↳Analysis Date: 12/01/93 by: BA Run ID: 149401

↳Method: GFAAS; Det Limit= 0.20 ug, Total

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SAMPLE ANALYSIS DATA

Lab ID: 149404 (continued)

Beryllium	0.14 ug, Total
↳ Analysis Date: 12/04/93 by: JW Run ID: 149401	
↳ Method: GFAAS; Det Limit= 0.02 ug, Total	
Cadmium	0.10 ug, Total
↳ Analysis Date: 12/02/93 by: JW Run ID: 149401	
↳ Method: GFAAS; Det Limit= 0.01 ug, Total	
Chromium	8.20 ug, Total
↳ Analysis Date: 12/01/93 by: KO Run ID: 149401	
↳ Method: ICP; Det Limit= 1.0 ug, Total	
Lead	4.42 ug, Total
↳ Analysis Date: 12/03/93 by: JW Run ID: 149401	
↳ Method: GFAAS; Det Limit= 0.10 ug, Total	
Manganese	39.50 ug, Total
↳ Analysis Date: 12/01/93 by: KO Run ID: 149401	
↳ Method: ICP; Det Limit= 1.50 ug, Total	
Mercury	< 0.20 ug, Total
↳ Analysis Date: 12/03/93 by: MG Run ID: 149410	
↳ Method: CVAAS; Det Limit= 0.20 ug, Total	
Nickel	12.00 ug, Total
↳ Analysis Date: 12/01/93 by: KO Run ID: 149401	
↳ Method: ICP; Det Limit= 2.0 ug, Total	
Phosphorus	< 100 ug, Total
↳ Analysis Date: 12/01/93 by: KO Run ID: 149401	
↳ Method: ICP; Det Limit= 100 ug, Total	
Selenium	0.50 ug, Total
↳ Analysis Date: 12/03/93 by: BA Run ID: 149401	
↳ Method: GFAAS; Det Limit= 0.20 ug, Total	

Lab ID: 149405 Client ID: D2 Matrix: FILTER
Other ID: 92-655 Collected by: ETS, INC.
Collection Date: / / Time: Received at ETSAS: 11/05/93
Description: EPA/ROANOKE READY-MIX PLANT

Arsenic	5.00 ug, Total
↳ Analysis Date: 12/01/93 by: BA Run ID: 149401	
↳ Method: GFAAS; Det Limit= 0.20 ug, Total	
Beryllium	0.25 ug, Total
↳ Analysis Date: 12/04/93 by: JW Run ID: 149401	
↳ Method: GFAAS; Det Limit= 0.02 ug, Total	
Cadmium	0.03 ug, Total
↳ Analysis Date: 12/02/93 by: JW Run ID: 149401	
↳ Method: GFAAS; Det Limit= 0.01 ug, Total	

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SAMPLE ANALYSIS DATA

Lab ID: 149405 (continued)

Chromium	6.40 ug, Total
↳ Analysis Date: 12/01/93 by: KO Run ID: 149401	
↳ Method: ICP; Det Limit= 1.0 ug, Total	
Lead	4.50 ug, Total
↳ Analysis Date: 12/03/93 by: JW Run ID: 149401	
↳ Method: GFAAS; Det Limit= 0.10 ug, Total	
Manganese	13.50 ug, Total
↳ Analysis Date: 12/01/93 by: KO Run ID: 149401	
↳ Method: ICP; Det Limit= 1.50 ug, Total	
Mercury	< 0.20 ug, Total
↳ Analysis Date: 12/03/93 by: MG Run ID: 149410	
↳ Method: CVAAS; Det Limit= 0.20 ug, Total	
Nickel	9.70 ug, Total
↳ Analysis Date: 12/01/93 by: KO Run ID: 149401	
↳ Method: ICP; Det Limit= 2.0 ug, Total	
Phosphorus	< 100 ug, Total
↳ Analysis Date: 12/01/93 by: KO Run ID: 149401	
↳ Method: ICP; Det Limit= 100 ug, Total	
Selenium	0.90 ug, Total
↳ Analysis Date: 12/03/93 by: BA Run ID: 149401	
↳ Method: GFAAS; Det Limit= 0.20 ug, Total	

Lab ID: 149406 Client ID: D3 Matrix: FILTER
Other ID: 92-655 Collected by: ETS, INC.
Collection Date: / / Time: Received at ETSAS: 11/05/93
Description: EPA/ROANOKE READY-MIX PLANT

Arsenic	3.18 ug, Total
↳ Analysis Date: 12/01/93 by: BA Run ID: 149401	
↳ Method: GFAAS; Det Limit= 0.20 ug, Total	
Beryllium	0.10 ug, Total
↳ Analysis Date: 12/01/93 by: KO Run ID: 149401	
↳ Method: ICP; Det Limit= 0.50 ug, Total	
Cadmium	0.02 ug, Total
↳ Analysis Date: 12/02/93 by: JW Run ID: 149401	
↳ Method: GFAAS; Det Limit= 0.01 ug, Total	
Chromium	13.30 ug, Total
↳ Analysis Date: 12/01/93 by: KO Run ID: 149401	
↳ Method: ICP; Det Limit= 1.0 ug, Total	
Lead	7.20 ug, Total
↳ Analysis Date: 12/01/93 by: KO Run ID: 149401	
↳ Method: ICP; Det Limit= 5.0 ug, Total	

REPORT CONTINUED ON NEXT PAGE



ETS, Inc.
Report of 12/09/93
Page No. 6

SAMPLE ANALYSIS DATA

Lab ID: 149406 (continued)

Manganese	50.50 ug, Total
L>Analysis Date: 12/01/93 by: KO Run ID: 149401	
L>Method: ICP; Det Limit= 1.50 ug, Total	
Mercury	< 0.20 ug, Total
L>Analysis Date: 12/03/93 by: MG Run ID: 149410	
L>Method: CVAAS; Det Limit= 0.20 ug, Total	
Nickel	10.40 ug, Total
L>Analysis Date: 12/01/93 by: KO Run ID: 149401	
L>Method: ICP; Det Limit= 2.0 ug, Total	
Phosphorus	< 100 ug, Total
L>Analysis Date: 12/01/93 by: KO Run ID: 149401	
L>Method: ICP; Det Limit= 100 ug, Total	
Selenium	0.60 ug, Total
L>Analysis Date: 12/03/93 by: BA Run ID: 149401	
L>Method: GFAAS; Det Limit= 0.20 ug, Total	

Lab ID: 149407 Client ID: E Matrix: FILTER
Other ID: 92-655 Collected by: ETS, INC.
Collection Date: / / Time: Received at ETSAS: 11/05/93
Description: EPA/ROANOKE READY-MIX PLANT

Arsenic	1.20 ug, Total
L>Analysis Date: 12/01/93 by: BA Run ID: 149401	
L>Method: GFAAS; Det Limit= 0.20 ug, Total	
Beryllium	0.13 ug, Total
L>Analysis Date: 12/04/93 by: JW Run ID: 149401	
L>Method: GFAAS; Det Limit= 0.02 ug, Total	
Cadmium	< 0.01 ug, Total
L>Analysis Date: 12/02/93 by: JW Run ID: 149401	
L>Method: GFAAS; Det Limit= 0.01 ug, Total	
Chromium	4.30 ug, Total
L>Analysis Date: 12/01/93 by: KO Run ID: 149401	
L>Method: ICP; Det Limit= 1.0 ug, Total	
Lead	2.38 ug, Total
L>Analysis Date: 12/03/93 by: JW Run ID: 149401	
L>Method: GFAAS; Det Limit= 0.10 ug, Total	
Manganese	7.70 ug, Total
L>Analysis Date: 12/01/93 by: KO Run ID: 149401	
L>Method: ICP; Det Limit= 1.50 ug, Total	
Mercury	< 0.20 ug, Total
L>Analysis Date: 12/03/93 by: MG Run ID: 149410	
L>Method: CVAAS; Det Limit= 0.20 ug, Total	

REPORT CONTINUED ON NEXT PAGE



ETS, Inc.
Report of 12/09/93
Page No. 7

SAMPLE ANALYSIS DATA

Lab ID: 149407 (continued)

Nickel 3.50 ug, Total
 ↳Analysis Date: 12/01/93 by: KO Run ID: 149401
 ↳Method: ICP; Det Limit= 2.0 ug, Total
Phosphorus < 100 ug, Total
 ↳Analysis Date: 12/01/93 by: KO Run ID: 149401
 ↳Method: ICP; Det Limit= 100 ug, Total
Selenium < 0.20 ug, Total
 ↳Analysis Date: 12/03/93 by: BA Run ID: 149401
 ↳Method: GFAAS; Det Limit= 0.20 ug, Total

Lab ID: 149408 Client ID: F Matrix: FILTERS
Other ID: 92-655 Collected by: ETS, INC.
Collection Date: / / Time: Received at ETSAS: 11/05/93
Description: EPA/ROANOKE READY-MIX PLANT

Arsenic 16.60 ug, Total
 ↳Analysis Date: 12/02/93 by: JW Run ID: 149401
 ↳Method: GFAAS; Det Limit= 0.20 ug, Total
Beryllium 1.10 ug, Total
 ↳Analysis Date: 12/01/93 by: KO Run ID: 149401
 ↳Method: ICP; Det Limit= 0.50 ug, Total
Cadmium 0.54 ug, Total
 ↳Analysis Date: 12/02/93 by: JW Run ID: 149401
 ↳Method: GFAAS; Det Limit= 0.01 ug, Total
Chromium 51.90 ug, Total
 ↳Analysis Date: 12/01/93 by: KO Run ID: 149401
 ↳Method: ICP; Det Limit= 1.0 ug, Total
Lead 21.90 ug, Total
 ↳Analysis Date: 12/01/93 by: KO Run ID: 149401
 ↳Method: ICP; Det Limit= 5.0 ug, Total
Manganese 62.20 ug, Total
 ↳Analysis Date: 12/01/93 by: KO Run ID: 149401
 ↳Method: ICP; Det Limit= 1.50 ug, Total
Mercury 7.40 ug, Total
 ↳Analysis Date: 12/03/93 by: MG Run ID: 149410
 ↳Method: CVAAS; Det Limit= 0.20 ug, Total
Nickel 22.00 ug, Total
 ↳Analysis Date: 12/01/93 by: KO Run ID: 149401
 ↳Method: ICP; Det Limit= 2.0 ug, Total
Phosphorus 2000 ug, Total
 ↳Analysis Date: 12/01/93 by: KO Run ID: 149401
 ↳Method: ICP; Det Limit= 100 ug, Total

REPORT CONTINUED ON NEXT PAGE



ETS, Inc.
Report of 12/09/93
Page No. 8

SAMPLE ANALYSIS DATA

Lab ID: 149408 (continued)

Selenium 0.20 ug, Total

↳Analysis Date: 12/03/93 by: BA Run ID: 149401

↳Method: GFAAS; Det Limit= 0.20 ug, Total

Lab ID: 149409 Client ID: G Matrix: FILTERS

Other ID: 92-655 Collected by: ETS, INC.

Collection Date: / / Time: Received at ETSAS: 11/05/93

Description: EPA/ROANOKE READY-MIX PLANT

Arsenic 21.20 ug, Total

↳Analysis Date: 12/02/93 by: JW Run ID: 149401

↳Method: GFAAS; Det Limit= 0.20 ug, Total

Beryllium 2.50 ug, Total

↳Analysis Date: 12/01/93 by: KO Run ID: 149401

↳Method: ICP; Det Limit= 0.50 ug, Total

Cadmium 0.61 ug, Total

↳Analysis Date: 12/02/93 by: JW Run ID: 149401

↳Method: GFAAS; Det Limit= 0.01 ug, Total

Chromium 89.10 ug, Total

↳Analysis Date: 12/01/93 by: KO Run ID: 149401

↳Method: ICP; Det Limit= 1.0 ug, Total

Lead 38.40 ug, Total

↳Analysis Date: 12/01/93 by: KO Run ID: 149401

↳Method: ICP; Det Limit= 5.0 ug, Total

Manganese 183.00 ug, Total

↳Analysis Date: 12/01/93 by: KO Run ID: 149401

↳Method: ICP; Det Limit= 1.50 ug, Total

Mercury 10.50 ug, Total

↳Analysis Date: 12/03/93 by: MG Run ID: 149410

↳Method: CVAAS; Det Limit= 0.20 ug, Total

Nickel 40.20 ug, Total

↳Analysis Date: 12/01/93 by: KO Run ID: 149401

↳Method: ICP; Det Limit= 2.0 ug, Total

Phosphorus 2400 ug, Total

↳Analysis Date: 12/01/93 by: KO Run ID: 149401

↳Method: ICP; Det Limit= 100 ug, Total

Selenium 2.00 ug, Total

↳Analysis Date: 12/03/93 by: BA Run ID: 149401

↳Method: GFAAS; Det Limit= 0.20 ug, Total

Lab ID: 149410 Client ID: J Matrix: FILTERS

Other ID: 92-655 Collected by: ETS, INC.

Collection Date: / / Time: Received at ETSAS: 11/05/93

Description: EPA/ROANOKE READY-MIX PLANT

Arsenic 11.90 ug, Total

↳Analysis Date: 12/02/93 by: JW Run ID: 149401

↳Method: GFAAS; Det Limit= 0.20 ug, Total

REPORT CONTINUED ON NEXT PAGE



ETS, Inc.
Report of 12/09/93
Page No. 9

SAMPLE ANALYSIS DATA

Lab ID: 149410 (continued)

Beryllium	0.70 ug, Total
↳Analysis Date: 12/01/93 by: KO Run ID: 149401	
↳Method: ICP; Det Limit= 0.50 ug, Total	
Cadmium	0.11 ug, Total
↳Analysis Date: 12/02/93 by: JW Run ID: 149401	
↳Method: GFAAS; Det Limit= 0.01 ug, Total	
Chromium	50.30 ug, Total
↳Analysis Date: 12/01/93 by: KO Run ID: 149401	
↳Method: ICP; Det Limit= 1.0 ug, Total	
Lead	34.70 ug, Total
↳Analysis Date: 12/01/93 by: KO Run ID: 149401	
↳Method: ICP; Det Limit= 5.0 ug, Total	
Manganese	29.90 ug, Total
↳Analysis Date: 12/01/93 by: KO Run ID: 149401	
↳Method: ICP; Det Limit= 1.50 ug, Total	
Mercury	5.10 ug, Total
↳Analysis Date: 12/03/93 by: MG Run ID: 149410	
↳Method: CVAAS; Det Limit= 0.20 ug, Total	
Nickel	6.80 ug, Total
↳Analysis Date: 12/01/93 by: KO Run ID: 149401	
↳Method: ICP; Det Limit= 2.0 ug, Total	
Phosphorus	< 100 ug, Total
↳Analysis Date: 12/01/93 by: KO Run ID: 149401	
↳Method: ICP; Det Limit= 100 ug, Total	
Selenium	< 0.20 ug, Total
↳Analysis Date: 12/03/93 by: BA Run ID: 149401	
↳Method: GFAAS; Det Limit= 0.20 ug, Total	

Lab ID: 149411 Client ID: H Matrix: FILTER/AQ
Other ID: 92-655 Collected by: ETS, INC.
Collection Date: / / Time: Received at ETSAS: 11/05/93
Description: EPA/ROANOKE READY-MIX PLANT

Arsenic	< 0.20 ug, Total
↳Analysis Date: 12/01/93 by: BA Run ID: 149401	
↳Method: GFAAS; Det Limit= 0.20 ug, Total	
Beryllium	< 0.02 ug, Total
↳Analysis Date: 12/04/93 by: JW Run ID: 149401	
↳Method: GFAAS; Det Limit= 0.02 ug, Total	
Cadmium	0.01 ug, Total
↳Analysis Date: 12/02/93 by: JW Run ID: 149401	
↳Method: GFAAS; Det Limit= 0.01 ug, Total	

REPORT CONTINUED ON NEXT PAGE



ETS, Inc.
Report of 12/09/93
Page No. 10

SAMPLE ANALYSIS DATA

Lab ID: 149411 (continued)

Chromium	1.90 ug, Total
↳Analysis Date: 12/01/93 by: KO Run ID: 149401	
↳Method: ICP; Det Limit= 1.0 ug, Total	
Lead	0.70 ug, Total
↳Analysis Date: 12/03/93 by: JW Run ID: 149401	
↳Method: GFAAS; Det Limit= 0.10 ug, Total	
Manganese	0.60 ug, Total
↳Analysis Date: 12/01/93 by: KO Run ID: 149401	
↳Method: ICP; Det Limit= 1.50 ug, Total	
Mercury	< 0.20 ug, Total
↳Analysis Date: 12/03/93 by: MG Run ID: 149410	
↳Method: CVAAS; Det Limit= 0.20 ug, Total	
Nickel	< 2.00 ug, Total
↳Analysis Date: 12/01/93 by: KO Run ID: 149401	
↳Method: ICP; Det Limit= 2.0 ug, Total	
Phosphorus	< 100 ug, Total
↳Analysis Date: 12/01/93 by: KO Run ID: 149401	
↳Method: ICP; Det Limit= 100 ug, Total	
Selenium	< 0.20 ug, Total
↳Analysis Date: 12/03/93 by: BA Run ID: 149401	
↳Method: GFAAS; Det Limit= 0.20 ug, Total	

Lab ID: 149412 Client ID: I Matrix: POWDER
Other ID: 92-655 Collected by: ETS, INC.
Collection Date: / / Time: Received at ETSAS: 11/05/93
Description: EPA/ROANOKE READY-MIX PLANT

Arsenic	0.85 mg/kg
↳Analysis Date: 12/02/93 by: JW Run ID: 149401	
↳Method: GFAAS; Det Limit= 0.14 mg/kg	
↳Comments: Result Reported on Dry Wt. Basis	
Beryllium	0.75 mg/kg
↳Analysis Date: 12/01/93 by: KO Run ID: 149401	
↳Method: ICP; Det Limit= 0.38 mg/kg	
↳Comments: Result Reported on Dry Wt. Basis	
Cadmium	1.07 mg/kg
↳Analysis Date: 12/01/93 by: KO Run ID: 149401	
↳Method: ICP; Det Limit= 0.38 mg/kg	
↳Comments: Result Reported on Dry Wt. Basis	
Chromium	67.00 mg/kg
↳Analysis Date: 12/01/93 by: KO Run ID: 149401	
↳Method: ICP; Det Limit= 0.76 mg/kg	
↳Comments: Result Reported on Dry Wt. Basis	

REPORT CONTINUED ON NEXT PAGE



ETS, Inc.
Report of 12/09/93
Page No. 11

SAMPLE ANALYSIS DATA

Lab ID: 149412 (continued)

Lead	5.13 mg/kg
↳Analysis Date: 12/01/93 by: KO Run ID: 149401	
↳Method: ICP; Det Limit= 3.80 mg/kg	
↳Comments: Result Reported on Dry Wt. Basis	
Manganese	283.00 mg/kg
↳Analysis Date: 12/01/93 by: KO Run ID: 149401	
↳Method: ICP; Det Limit= 1.14 mg/kg	
↳Comments: Result Reported on Dry Wt. Basis	
Mercury	< 0.10 mg/kg
↳Analysis Date: 12/03/93 by: MG Run ID: 149410	
↳Method: CVAAS; Det Limit= 0.10 mg/kg	
↳Comments: Result Reported on Dry Wt. Basis	
Nickel	19.90 mg/kg
↳Analysis Date: 12/01/93 by: KO Run ID: 149401	
↳Method: ICP; Det Limit= 1.52 mg/kg	
↳Comments: Result Reported on Dry Wt. Basis	
Phosphorus	316.00 mg/kg
↳Analysis Date: 12/01/93 by: KO Run ID: 149401	
↳Method: ICP; Det Limit= 76.0 mg/kg	
↳Comments: Result Reported on Dry Wt. Basis	
Selenium	< 0.14 mg/kg
↳Analysis Date: 12/03/93 by: BA Run ID: 149401	
↳Method: GFAAS; Det Limit= 0.14 mg/kg	
↳Comments: Result Reported on Dry Wt. Basis	

Quality Assurance performed on the above data is presented on the following page(s).

If we may be of further assistance, please contact us at any time.

Sincerely,

ETS ANALYTICAL SERVICES, INC.

Susanne H. Deegan
Susanne H. Deegan, Project Manager

APPENDIX H
FIELD EQUIPMENT CALIBRATIONS

R

E.T.S. INC.
METER CONSOLE CALIBRATION FORM
THERMOCOUPLE CALIBRATION FORM

Meter Box No..... 4 REFERENCE CALIBRATOR MH71 CAL-K
THERMOCOUPLE NUMBER 1 Date 11-May-93

	Reference Temperature	Thermocouple Temperature	Difference %
1	1	1	0.000
2	32	30	6.250
3	101	99	1.980
4	201	201	0.000
5	300	301	-0.333
6	401	400	0.249
7	500	498	0.400
8	600	601	-0.167
9	700	701	-0.143
10	801	801	0.000
11	900	901	-0.111

0.739 AVERAGE DIFF

Calibration Performed By R. RICHARDS

Post Test Calibration-Contract #\- _____

Pre-Test Calibration-Contract #- _____

Comments:

E.T.S. INC.
METER CONSOLE CALIBRATION FORM
THERMOCOUPLE CALIBRATION FORM

Meter Box No..... 4 REFERENCE CALIBRATOR HH71 CAL-K
THERMOCOUPLE NUMBER 2 Date 11-May-93

	Reference Temperature	Thermocouple Temperature	Difference %
1	1	1	0.000
2	32	29	9.375
3	100	97	3.000
4	199	198	0.503
5	299	299	0.000
6	400	398	0.500
7	499	497	0.401
8	600	600	0.000
9	701	700	0.143
10	800	799	0.125
11	900	900	0.000

1.277 AVERAGE DIFF

Calibration Performed By R. RICHARDS

Post Test Calibration-Contract #- _____

Pre-Test Calibration-Contract #- _____

Comments:

R

E.T.S. INC.
METER CONSOLE CALIBRATION FORM
THERMOCOUPLE CALIBRATION FORM

Meter Box No..... 4 REFERENCE CALIBRATOR H71 CAL-K
THERMOCOUPLE NUMBER 3 Date 11-May-93

	Reference Temperature	Thermocouple Temperature	Difference %
1	1	1	0.000
2	32	29	9.375
3	99	99	0.000
4	200	202	-1.000
5	300	302	-0.667
6	401	401	0.000
7	500	500	0.000
8	599	601	-0.334
9	700	702	-0.286
10	800	802	-0.250
11	899	900	-0.111

0.612 AVERAGE DIFF

Calibration Performed By R. RICHARDS

Post Test Calibration-Contract #- _____

Pre-Test Calibration-Contract #- _____

Comments:

E.T.S. INC.
METER CONSOLE CALIBRATION FORM
THERMOCOUPLE CALIBRATION FORM

Meter Box No..... 4 REFERENCE CALIBRATOR MH71 CAL-K
THERMOCOUPLE NUMBER 4 Date 11-May-93

	Reference Temperature	Thermocouple Temperature	Difference %

1	1	1	0.000
2	31	31	0.000
3	100	99	1.000
4	200	201	-0.500
5	300	302	-0.667
6	400	401	-0.250
7	500	500	0.000
8	600	603	-0.500
9	700	701	-0.143
10	800	801	-0.125
11	900	902	-0.222

-0.128 AVERAGE DIFF

Calibration Performed By R. RICHARDS

Post Test Calibration-Contract #- _____

Pre-Test Calibration-Contract #- _____

Comments:

R

E.T.S. INC.
METER CONSOLE CALIBRATION FORM
THERMOCOUPLE CALIBRATION FORM

Meter Box No..... 4 REFERENCE CALIBRATOR HH71 CAL-K
THERMOCOUPLE NUMBER 5 Date 11-May-93

	Reference Temperature	Thermocouple Temperature	Difference %
1	1	1	0.000
2	31	31	0.000
3	99	99	0.000
4	200	202	-1.000
5	300	302	-0.667
6	401	402	-0.249
7	500	500	0.000
8	600	603	-0.500
9	701	703	-0.285
10	800	802	-0.250
11	901	903	-0.222
			-0.288 AVERAGE DIFF

Calibration Performed By R. RICHARDS

Post Test Calibration-Contract #- _____

Pre-Test Calibration-Contract #- _____

Comments:

E.T.S. INC.
METER CONSOLE CALIBRATION FORM
THERMOCOUPLE CALIBRATION FORM

Meter Box No..... 4 REFERENCE CALIBRATOR HH71 CAL-K
THERMOCOUPLE NUMBER 6 Date 11-May-93

	Reference Temperature	Thermocouple Temperature	Difference %
1	1	1	0.000
2	33	33	0.000
3	100	100	0.000
4	202	204	-0.990
5	300	302	-0.667
6	400	400	0.000
7	500	500	0.000
8	600	603	-0.500
9	701	703	-0.285
10	800	801	-0.125
11	900	901	-0.111

-0.243 AVERAGE DIFF

Calibration Performed By R. RICHARDS

1st Test Calibration-Contract #- _____

Pre-Test Calibration-Contract #- _____

Comments:

R

E.T.S. INC.
METER CONSOLE CALIBRATION FORM
THERMOCOUPLE CALIBRATION FORM

Meter Box No..... 4 REFERENCE CALIBRATOR HW71 CAL-K
THERMOCOUPLE NUMBER 7 Date 11-May-93

	Reference Temperature	Thermocouple Temperature	Difference %

1	1	1	0.000
2	30	30	0.000
3	100	100	0.000
4	200	201	-0.500
5	300	302	-0.667
6	399	400	-0.251
7	500	500	0.000
8	600	602	-0.333
9	701	703	-0.285
10	801	802	-0.125
11	900	902	-0.222

-0.217 AVERAGE DIFF

Calibration Performed By R. RICHARDS

Post Test Calibration-Contract #- _____

Pre-Test Calibration-Contract #- _____

Comments:

E T S , I N C .

METER CONSOLE CALIBRATION FORM

Contract No. 92-65518
Job I.D.

Print Date 11/09/93

Meter Box No.: 4
Delta H: 1.7415
Gamma: 1.0650

Analyst: wch
Calibration Date: 11/05/93
Test Meter No. 9548
Barometric Pressure 28.63

Run	Orf Set	Initial Test	Final Test	Volume Test	Init Temp	Finl Temp	Test Temp	Initial Box	Final Box	Volume Box	I-I Temp	I-O Temp	F-I Temp	F-O Temp	Temp	Time	Delta H	Gamma
1	0.5	757.950	769.200	11.250	71.0	74.0	72.50	558.295	569.041	10.746	71.0	71.0	75.0	80.0	74.25	27.0	1.69249	1.04899
2	1.0	769.533	780.326	10.793	74.0	74.0	74.00	569.337	579.531	10.194	80.0	75.0	77.0	84.0	79.00	18.5	1.72104	1.06594
3	1.5	780.514	792.103	11.589	74.0	74.0	74.00	579.685	590.630	10.945	84.0	78.0	79.0	87.0	82.00	16.5	1.77128	1.07058
4	2.0	792.361	803.336	10.975	74.0	74.0	74.00	590.871	601.244	10.373	86.0	79.0	80.0	88.0	83.25	13.5	1.75877	1.07086
5	2.5	803.646	823.604	19.958	74.0	75.0	74.50	601.531	620.454	18.923	87.0	81.0	82.0	89.0	84.75	22.0	1.76395	1.06806
6	3.0	823.934	834.929	10.995	74.0	75.0	74.50	620.763	631.216	10.453	88.0	82.0	82.0	90.0	85.50	11.0	1.74122	1.06529

E T S , I N C .

METER CONSOLE CALIBRATION FORM

Contract No. 93-983
Job I.D.

Meter Box No.: 4
Delta H: 1.7348
Gamma: 1.0010

Analyst: wch
Calibration Date: 10/22/93
Test Meter No. 9548
Barometric Pressure 29.09

Print Date 10/22/93

Run	Orf Set	Initial Test	Final Test	Volume Test	Init Temp	Finl Temp	Test Temp	Initial Box	Final Box	Volume Box	I-I Temp	I-O Temp	F-I Temp	F-O Temp	Temp	Time	Delta H	Gamma
1	0.5	431.691	446.350	14.659	74.0	75.0	74.50	266.662	281.271	14.609	77.0	75.0	79.0	83.0	78.50	35.5	1.62748	1.00971
2	1.0	446.551	459.297	12.746	75.0	75.0	75.00	281.451	294.295	12.844	83.0	79.0	81.0	87.0	82.50	22.0	1.71286	1.00374
3	1.5	459.471	472.310	12.839	75.0	75.0	75.00	294.479	307.471	12.992	86.0	81.0	82.0	89.0	84.50	18.5	1.78401	1.00197
4	2.0	472.520	492.209	19.689	75.0	76.0	75.50	307.682	327.707	20.025	88.0	82.0	84.0	91.0	86.25	24.5	1.77157	0.99791
5	2.5	492.451	504.200	11.749	75.0	76.0	75.50	327.951	339.922	11.971	90.0	83.0	84.0	92.0	87.25	13.0	1.74773	0.99669
6	3.0	504.364	515.194	10.830	76.0	75.0	75.50	340.081	351.125	11.044	91.0	84.0	84.0	93.0	88.00	11.0	1.76483	0.99596

R

E.T.S. INC.
METER CONSOLE CALIBRATION FORM

Meter Box No.....
THERMOCOUPLE NUMBER

6 REFERENCE CALIBRATOR
1 Date

HH71 CAK-K
11-May-93

RUN NUMBER	REFERENCE TEMPERATURE	THERMOCOUPLE TEMPERATURE	DIFFERENCE %
1	1	1	0.000
2	33	33	0.000
3	102	101	0.980
4	200	201	-0.500
5	297	298	-0.337
6	400	400	0.000
7	502	502	0.000
8	601	602	-0.166
9	704	704	0.000
10	800	800	0.000
11	900	900	0.000

-0.0021 AVERAGE DIFF

CALIBRATION PERFORMED BY..... R. RICHARDS

Comments:

R

E.T.S. INC.
METER CONSOLE CALIBRATION FORM

Meter Box No.....
THERMOCOUPLE NUMBER

6 REFERENCE CALIBRATOR
2 Date

HH71 CAK-K
11-May-93

RUN NUMBER	REFERENCE TEMPERATURE	THERMOCOUPLE TEMPERATURE	DIFFERENCE %
1	1	1	0.000
2	32	32	0.000
3	102	101	0.980
4	195	196	-0.513
5	301	302	-0.332
6	398	397	0.251
7	497	495	0.402
8	604	605	-0.166
9	700	700	0.000
10	801	800	0.125
11	898	896	0.223

0.0883 AVERAGE DIFF

CALIBRATION PERFORMED BY..... R. RICHARDS

Comments:

R

E.T.S. INC.
METER CONSOLE CALIBRATION FORM

Meter Box No.....
THERMOCOUPLE NUMBER

6 REFERENCE CALIBRATOR
3 Date

HH71 CAK-K
11-May-93

RUN NUMBER	REFERENCE TEMPERATURE	THERMOCOUPLE TEMPERATURE	DIFFERENCE %
1	1	1	0.000
2	34	34	0.000
3	98	97	1.020
4	196	196	0.000
5	300	302	-0.667
6	401	401	0.000
7	504	502	0.397
8	603	603	0.000
9	701	701	0.000
10	799	798	0.125
11	898	897	0.111

CALIBRATION PERFORMED BY..... R. RICHARDS

0.0897 AVERAGE DIFF

Comments:

R

E.T.S. INC.
METER CONSOLE CALIBRATION FORM

Meter Box No.....
THERMOCOUPLE NUMBER

6 REFERENCE CALIBRATOR
4 Date

HH71 CAK-K
11-May-93

RUN NUMBER	REFERENCE TEMPERATURE	THERMOCOUPLE TEMPERATURE	DIFFERENCE %
1	1	1	0.000
2	31	31	0.000
3	102	104	-1.961
4	204	202	0.980
5	299	296	1.003
6	399	399	0.000
7	503	501	0.398
8	597	597	0.000
9	698	701	-0.430
10	801	800	0.125
11	898	898	0.000

0.0105 AVERAGE DIFF

CALIBRATION PERFORMED BY..... R. RICHARDS

Comments:

R

E.T.S. INC.
METER CONSOLE CALIBRATION FORM

Meter Box No.....
THERMOCOUPLE NUMBER

6 REFERENCE CALIBRATOR
5 Date

HH71 CAK-K
11-May-93

RUN NUMBER	REFERENCE TEMPERATURE	THERMOCOUPLE TEMPERATURE	DIFFERENCE %
1	1	1	0.000
2	31	31	0.000
3	104	104	0.000
4	202	202	0.000
5	295	296	-0.339
6	399	399	0.000
7	502	501	0.199
8	596	597	-0.168
9	701	701	0.000
10	800	800	0.000
11	899	898	0.111

-0.0178 AVERAGE DIFF

CALIBRATION PERFORMED BY..... R. RICHARDS

Comments:

R

E.T.S. INC.
METER CONSOLE CALIBRATION FORM

Meter Box No..... 6 REFERENCE CALIBRATOR HH71 CAK-K
THERMOCOUPLE NUMBER 6 Date 11-May-93

RUN NUMBER	REFERENCE TEMPERATURE	THERMOCOUPLE TEMPERATURE	DIFFERENCE %
1	1	1	0.000
2	36	36	0.000
3	98	98	0.000
4	197	198	-0.508
5	304	306	-0.658
6	402	402	0.000
7	500	500	0.000
8	599	601	-0.334
9	703	703	0.000
10	804	804	0.000
11	897	897	0.000

-0.1363 AVERAGE DIFF

CALIBRATION PERFORMED BY..... R. RICHARDS

Comments:

R

E.T.S. INC.
METER CONSOLE CALIBRATION FORM

Meter Box No..... 6 REFERENCE CALIBRATOR HH71 CAK-K
7 Date 11-May-93

RUN NUMBER	REFERENCE TEMPERATURE	THERMOCOUPLE TEMPERATURE	DIFFERENCE %
1	1	1	0.000
2	35	35	0.000
3	99	99	0.000
4	205	206	-0.488
5	299	301	-0.669
6	398	398	0.000
7	504	503	0.198
8	597	599	-0.335
9	697	697	0.000
10	800	799	0.125
11	898	898	0.000

-0.1062 AVERAGE DIFF

CALIBRATION PERFORMED BY..... R. RICHARDS

Comments:

E T S , I N C .

METER CONSOLE CALIBRATION FORM

Contract No. 92-65518
Job I.D.

Print Date 11/08/93

Meter Box No. 6
Delta H: 1.7201
Gamma: 0.9774

Analyst: wch
Calibration Date: 11/08/93
Test Meter No. 9548
Barometric Pressure 29.28

Run	Orf Set	Initial Test	Final Test	Volume Test	Init Temp	Finl Temp	Test Temp	Initial Box	Final Box	Volume Box	I-I Temp	I-O Temp	F-I Temp	F-O Temp	Temp	Time	Delta H	Gamma
1	0.5	850.879	860.932	10.053	69.0	71.0	70.00	935.825	946.155	10.330	70.0	68.0	72.0	77.0	71.75	25.0	1.66234	0.97525
2	1.0	861.130	871.676	10.546	71.0	72.0	71.50	946.360	957.230	10.870	77.0	72.0	75.0	81.0	76.25	18.5	1.75507	0.97641
3	1.5	871.815	883.301	11.486	72.0	72.0	72.00	957.372	969.238	11.866	81.0	75.0	77.0	84.0	79.25	16.5	1.75891	0.97749
4	2.0	883.450	894.375	10.925	72.0	72.0	72.00	969.387	980.674	11.287	83.0	77.0	78.0	86.0	81.00	13.5	1.72969	0.97938
5	2.5	894.544	905.899	11.355	72.0	72.0	72.00	980.844	992.570	11.726	85.0	78.0	78.0	81.0	80.50	12.5	1.71752	0.97769
6	3.0	906.074	917.078	11.004	72.0	72.0	72.00	992.751	1004.11	11.361	81.0	78.0	79.0	87.0	81.25	11.0	1.69713	0.97803

E T S , I N C .

METER CONSOLE CALIBRATION FORM

Contract No. 93-983
Job I.D.

Print Date 10/21/93

Meter Box No. 6
Delta H: 1.6884
Gamma: 0.9866

Analyst: wch
Calibration Date: 10/21/93
Test Meter No. 9548
Barometric Pressure 28.91

Run	Orf Set	Initial Test	Final Test	Volume Test	Init Temp	Finl Temp	Test Temp	Initial Box	Final Box	Volume Box	I-I Temp	I-O Temp	F-I Temp	F-O Temp	Temp	Time	Delta H	Gamma
1	0.5	325.229	335.046	9.817	76.0	77.0	76.50	264.220	274.347	10.127	78.0	77.0	79.0	82.0	79.00	23.0	1.60705	0.97267
2	1.0	335.273	345.294	10.021	77.0	77.0	77.00	274.576	284.743	10.167	82.0	79.0	84.0	80.0	81.25	17.0	1.68127	0.99092
3	1.5	346.203	356.179	9.976	77.0	78.0	77.50	285.683	295.845	10.162	84.0	80.0	88.0	82.0	83.50	14.0	1.72188	0.98888
4	2.0	356.349	366.251	9.902	77.0	77.0	77.00	296.020	306.119	10.099	86.0	82.0	90.0	83.0	85.25	12.0	1.70338	0.99052
5	2.5	366.460	376.621	10.161	77.0	77.0	77.00	306.346	316.720	10.374	89.0	83.0	91.0	83.0	86.50	11.0	1.69520	0.99050
6	3.0	376.921	386.971	10.050	77.0	78.0	77.50	317.008	327.289	10.281	89.0	83.0	91.0	83.0	86.50	10.0	1.72188	0.99050

THERMOCOUPLE CALIBRATION DATA SHEET

Date: 03-31-93 Thermocouple No.: #7 Rev 9
 Ambient Temperature: _____ °F Barometric pressure: _____ "Hg
 Calibrator: C. Ferguson Reference: Mercury-in-glass: _____
 Other: HN7-2.1K

Reference point No. ^a	Source* (specify)	Reference thermometer temperature, °F	Thermocouple potentiometer temperature, °F	Difference, ^b %
		0	0	0
		32	31	3.125
		100	99	1
		200	200	0
		300	300	0
		400	399	.25
		500	499	.2
		600	600	0
		701	701	0
		800	800	0
		901	901	0
			Average % difference	.416

^a Every 100°F for each reference point when using furnace up to 500°F.

- Source: 1) Ice bath
2) Furnace

^b Percent difference $\leq 1.5\%$

$$\frac{\text{Ref. temp. } ^\circ\text{F} - \text{thermocouple temp. } ^\circ\text{F}}{\text{Ref. temp. } ^\circ\text{F}} \times 100$$

ITS, INC.

THERMOCOUPLE CALIBRATION DATA SHEET

Date: 03-31-93 Thermocouple No.: #6 - Box 9
 Ambient Temperature: _____ °F Barometric pressure: _____ "Hg
 Calibrator: C. Ferguson Reference: Mercury-in-glass: _____
 Other: H H 71-CAL-K

Reference point No. ^a	Source* (specify)	Reference thermometer temperature, °F	Thermocouple potentiometer temperature, °F	Difference, % ^b
		0	0	0
		32	31	3.125
		100	98	2.0
		200	200	0
		300	300	0
		400	399	.25
		500	499	.2
		600	600	0
		700	700	0
		800	800	0
		900	900	0
			Average % difference	.507

^a Every 100°F for each reference point when using furnace up to 500°F.

- * Source: 1) Ice bath
- 2) Furnace

^b Percent difference $\leq 1.5\%$

$$\frac{\text{Ref. temp. } ^\circ\text{F} - \text{thermocouple temp. } ^\circ\text{F}}{\text{Ref. temp. } ^\circ\text{F}} \times 100$$

OTS, INC.

THERMOCOUPLE CALIBRATION DATA SHEET

Date: 03-31-93 Thermocouple No.: #5 R2-A
 Ambient Temperature: _____ °F Barometric pressure: _____ "Hg
 Calibrator: C. F. Jones Reference: Mercury-in-glass: _____
 Other: HA7-661-K

Reference point No. ^a	Source* (specify)	Reference thermometer temperature, °F	Thermocouple potentiometer temperature, °F	Difference, ^b %
		0	0	0
		32	30	6.25
		100	98	2
		200	199	.5
		300	300	0
		400	399	.25
		500	499	.2
		600	600	0
		700	700	0
		800	800	0
		900	900	0
			Average % difference	.836

^a Every 100°F for each reference point when using furnace up to 500°F.

* Source: 1) Ice bath
 2) Furnace

^b Percent difference $\leq 1.5\%$

$$\frac{\text{Ref. temp. } ^\circ\text{F} - \text{thermocouple temp. } ^\circ\text{F}}{\text{Ref. temp. } ^\circ\text{F}} \times 100$$

ESS, INC.

THERMOCOUPLE CALIBRATION DATA SHEET

Date: 03-31-93 Thermocouple No.: #4 P-9
 Ambient Temperature: _____ °F Barometric pressure: _____ "Hg
 Calibrator: C. Felgner Reference: Mercury-in-glass: _____
 Other: H-71-Cal-K

Reference point No. ^a	Source* (specify)	Reference thermometer temperature, °F	Thermocouple potentiometer temperature, °F	Difference, ^b %
		0	0	0
		32	30	6.25
		100	98	2
		200	199	.5
		300	300	0
		400	400	0
		500	499	.2
		600	601	-1.67
		700	700	0
		800	800	0
		900	900	0
			Average % difference	.798

^a Every 100°F for each reference point when using furnace up to 500°F.

- * Source: 1) Ice bath
- 2) Furnace

^b Percent difference $\leq 1.5\%$

$$\frac{\text{Ref. temp. } ^\circ\text{F} - \text{thermocouple temp. } ^\circ\text{F}}{\text{Ref. temp. } ^\circ\text{F}} \times 100$$

THERMOCOUPLE CALIBRATION DATA SHEET

Date: 03-31-93 Thermocouple No.: #3 Box 9

Ambient Temperature: _____ °F Barometric pressure: _____ "Hg

Calibrator: C. E. Eason Reference: Mercury-in-glass: _____

Other: HH71-CAL

Reference point No. ^a	Source* (specify)	Reference thermometer temperature, °F	Thermocouple potentiometer temperature, °F	Difference, ^b %
		0	0	0
		32	30	6.25
		100	98	2.0
		200	199	.5
		300	300	0
		400	399	.25
		500	499	.2
		600	500	0
		700	700	0
		800	800	0
		900	900	0
			Average % difference	.836

^a Every 100°F for each reference point when using furnace up to 500°F.

* Source: 1) Ice bath
2) Furnace

^b Percent difference $\leq 1.5\%$

$$\frac{\text{Ref. temp. } ^\circ\text{F} - \text{thermocouple temp. } ^\circ\text{F}}{\text{Ref. temp. } ^\circ\text{F}} \times 100$$

ITS, INC.

THERMOCOUPLE CALIBRATION DATA SHEET

Date: 03-30-93 Thermocouple No.: #2 Box 9
 Ambient Temperature: _____ °F Barometric pressure: _____ "Hg
 Calibrator: C Ferguson Reference: Mercury-in-glass: _____
 Other: HH71-Cal-K

Reference point No. ^a	Source* (specify)	Reference thermometer temperature, °F	Thermocouple potentiometer temperature, °F	Difference, % ^b
		0	0	0
		32	32	6.25
		100	98	2.0
		200	199	.5
		300	300	0
		400	399	.25
		500	498	.4
		600	600	.7
		700	700	.7
		800	800	.7
		900	900	.7
			Average % difference	.855

^a Every 100°F for each reference point when using furnace up to 500°F.

- * Source: 1) Ice bath
2) Furnace

^b Percent difference $\leq 1.5\%$

$$\frac{\text{Ref. temp. } ^\circ\text{F} - \text{thermocouple temp. } ^\circ\text{F}}{\text{Ref. temp. } ^\circ\text{F}} \times 100$$

THERMOCOUPLE CALIBRATION DATA SHEET

Date: 03-30-93 Thermocouple No.: #1 Box 9

Ambient Temperature: _____ °F Barometric pressure: _____ "Hg

Calibrator: CK Ferguson Reference: Mercury-in-glass: _____Other: HH71-CHE

Reference point No. ^a	Source* (specify)	Reference thermometer temperature, °F	Thermocouple potentiometer temperature, °F	Difference, ^b %
		0	0	0
		32	30	6.25
		100	98	2.0
		200	200	0
		300	300	0
		400	401	-0.25
		500	501	-0.2
		600	600	0
		700	700	0
		800	800	0
		900	900	0
			Average % difference	.709

^a Every 100°F for each reference point when using furnace up to 500°F.

- * Source: 1) Ice bath
- 2) Furnace

^b Percent difference ≤ 1.5%

$$\frac{\text{Ref. temp. } ^\circ\text{F} - \text{thermocouple temp. } ^\circ\text{F}}{\text{Ref. temp. } ^\circ\text{F}} \times 100$$

E T S , I N C .

METER CONSOLE CALIBRATION FORM

Contract No. 92-65518
Job I.D.

Print Date 11/10/93

Meter Box No.: 9
Delta H: 1.8379
Gamma: 0.9973

Analyst: DV
Calibration Date: 11/08/93
Test Meter No. 9548
Barometric Pressure 29.21

Run	Orf Set	Initial Test	Final Test	Volume Test	Init Temp	Finl Temp	Test Temp	Initial Box	Final Box	Volume Box	I-I Temp	I-O Temp	F-I Temp	F-O Temp	Temp	Time	Delta H	Gamma
1	0.5	919.427	929.819	10.392	63.0	76.0	69.50	44.836	55.318	10.482	63.0	61.0	78.0	82.0	71.00	26.0	1.79343	0.99297
2	1.0	930.046	940.160	10.114	76.0	77.0	76.50	55.538	65.764	10.226	78.0	81.0	86.0	80.0	81.25	18.0	1.82797	0.99530
3	1.5	940.322	953.671	13.349	77.0	76.0	76.50	65.930	79.432	13.502	80.0	85.0	81.0	88.0	83.50	19.5	1.83963	0.99780
4	2.0	953.826	965.199	11.373	76.0	76.0	76.00	79.608	91.130	11.522	87.0	81.0	82.0	86.0	84.00	14.5	1.86326	0.99678
5	2.5	965.456	977.752	12.296	75.0	76.0	75.50	91.387	103.843	12.456	85.0	81.0	92.0	83.0	85.25	14.0	1.84978	0.99884
6	3.0	978.039	988.581	10.542	74.0	76.0	75.00	104.130	114.813	10.683	89.0	84.0	93.0	84.0	87.50	11.0	1.85216	1.00229

E T S , I N C .

METER CONSOLE CALIBRATION FORM

Contract No. 93-983
Job I.D.

Print Date 10/13/93

Meter Box No. 19
Delta H: 1.8817
Gamma: 0.9967

Analyst: wch
Calibration Date: 10/13/93
Test Meter No. 9548
Barometric Pressure 28.93

Run	Orf Set	Initial Test	Final Test	Volume Test	Init Temp	Finl Temp	Test Temp	Initial Box	Final Box	Volume Box	I-I Temp	I-O Temp	F-I Temp	F-O Temp	Temp	Time	Delta H	Gamma
1	0.5	74.992	86.315	11.323	72.0	78.0	75.00	68.150	79.610	11.460	77.0	75.0	80.0	84.0	79.00	28.5	1.84317	0.99417
2	1.0	86.513	99.830	13.317	77.0	78.0	77.50	79.799	93.280	13.481	83.0	80.0	82.0	88.0	83.25	24.0	1.89268	0.99587
3	1.5	99.959	111.859	11.900	78.0	78.0	78.00	93.413	105.474	12.061	87.0	83.0	84.0	91.0	86.25	17.5	1.88346	0.99798
4	2.0	112.043	135.063	23.020	79.0	79.0	79.00	105.643	129.004	23.361	90.0	84.0	86.0	93.0	88.25	29.6	1.92005	0.99724
5	2.5	135.228	148.351	13.123	78.0	78.0	78.00	129.167	142.502	13.335	91.0	85.0	85.0	93.0	88.50	15.0	1.88867	0.99697
6	3.0	148.583	159.197	10.614	78.0	78.0	78.00	142.737	153.502	10.765	92.0	85.0	85.0	93.0	88.75	11.0	1.86230	0.99806

R

E.T.S. INC.
METER CONSOLE CALIBRATION FORM

Meter Box No..... 10 REFERENCE CALIBRATOR HH71 CAK-K
THERMOCOUPLE NUMBER 7 Date 14-Jul-93

RUN NUMBER	REFERENCE TEMPERATURE	THERMOCOUPLE TEMPERATURE	DIFFERENCE %
1	1	1	0.000
2	37	37	0.000
3	105	104	0.952
4	196	196	0.000
5	293	293	0.000
6	398	397	0.251
7	499	498	0.200
8	603	603	0.000
9	703	703	0.000
10	797	796	0.125
11	901	900	0.111

0.1491 AVERAGE DIFF

CALIBRATION PERFORMED BY..... R. RICHARDS

Comments:

R

R

E.T.S. INC.
METER CONSOLE CALIBRATION FORM

Meter Box No..... 10 REFERENCE CALIBRATOR HH71 CAK-K
THERMOCOUPLE NUMBER 6 Date 14-Jul-93

RUN NUMBER	REFERENCE TEMPERATURE	THERMOCOUPLE TEMPERATURE	DIFFERENCE %
1	2	2	0.000
2	36	36	0.000
3	103	102	0.971
4	197	197	0.000
5	300	301	-0.333
6	399	398	0.251
7	498	496	0.402
8	610	610	0.000
9	701	700	0.143
10	809	808	0.124
11	894	894	0.000

0.1415 AVERAGE DIFF

CALIBRATION PERFORMED BY..... R. RICHARDS

Comments:

R

R

E.T.S. INC.
METER CONSOLE CALIBRATION FORM

Meter Box No..... 10 REFERENCE CALIBRATOR HH71 CAK-K
THERMOCOUPLE NUMBER 5 Date 14-Jul-93

RUN NUMBER	REFERENCE TEMPERATURE	THERMOCOUPLE TEMPERATURE	DIFFERENCE %
1	1	1	0.000
2	27	27	0.000
3	94	93	1.064
4	204	204	0.000
5	300	300	0.000
6	400	399	0.250
7	497	496	0.201
8	605	605	0.000
9	700	700	0.000
10	804	803	0.124
11	902	901	0.111

0.1591 AVERAGE DIFF

CALIBRATION PERFORMED BY..... R. RICHARDS

Comments:

R

E.T.S. INC.
METER CONSOLE CALIBRATION FORM

Meter Box No..... 10 REFERENCE CALIBRATOR HH71 CAK-K
THERMOCOUPLE NUMBER 4 Date 14-Jul-93

RUN NUMBER	REFERENCE TEMPERATURE	THERMOCOUPLE TEMPERATURE	DIFFERENCE %
1	1	1	0.000
2	30	29	3.333
3	100	100	0.000
4	203	203	0.000
5	303	304	-0.330
6	402	401	0.249
7	500	498	0.400
8	598	597	0.167
9	702	701	0.142
10	804	803	0.124
11	898	897	0.111

0.3816 AVERAGE DIFF

CALIBRATION PERFORMED BY..... R. RICHARDS

Comments:

R

E.T.S. INC.
METER CONSOLE CALIBRATION FORM

Meter Box No..... 10 REFERENCE CALIBRATOR HH71 CAK-K
THERMOCOUPLE NUMBER 3 Date 14-Jul-93

RUN NUMBER	REFERENCE TEMPERATURE	THERMOCOUPLE TEMPERATURE	DIFFERENCE %
1	1	1	0.000
2	33	34	-3.030
3	100	99	1.000
4	199	199	0.000
5	304	304	0.000
6	405	405	0.000
7	500	500	0.000
8	603	603	0.000
9	700	700	0.000
10	795	795	0.000
11	898	898	0.000

-0.1846 AVERAGE DIFF

CALIBRATION PERFORMED BY..... R. RICHARDS

Comments:

R

E.T.S. INC.
METER CONSOLE CALIBRATION FORM

Meter Box No..... 10 REFERENCE CALIBRATOR HH71 C&K-K
THERMOCOUPLE NUMBER 2 Date 14-Jul-93

RUN NUMBER	REFERENCE TEMPERATURE	THERMOCOUPLE TEMPERATURE	DIFFERENCE %
1	3	3	0.000
2	54	54	0.000
3	97	97	0.000
4	200	200	0.000
5	299	299	0.000
6	401	400	0.249
7	501	500	0.200
8	599	599	0.000
9	699	699	0.000
10	802	801	0.125
11	900	900	0.000

0.0522 AVERAGE DIFF

CALIBRATION PERFORMED BY..... R. RICHARDS

Comments:

R

E.T.S. INC.
METER CONSOLE CALIBRATION FORM

Meter Box No..... 10 REFERENCE CALIBRATOR HH71 CAK-K
THERMOCOUPLE NUMBER 1 Date 14-Jul-93

RUN NUMBER	REFERENCE TEMPERATURE	THERMOCOUPLE TEMPERATURE	DIFFERENCE %
1	1	1	0.000
2	35	35	0.000
3	105	104	0.952
4	197	197	0.000
5	301	301	0.000
6	403	402	0.248
7	500	499	0.200
8	601	601	0.000
9	699	698	0.143
10	799	798	0.125
11	898	897	0.111

0.1618 AVERAGE DIFF

CALIBRATION PERFORMED BY..... R. RICHARDS

Comments:

ETS, INC.

METER CONSOLE CALIBRATION FORM

Contract No. 93-972
Job I.D.

Print Date 09/28/93

Meter Box No.: 10
Delta H: 1.8515
Gamma: 0.9848

Analyst: wch
Calibration Date: 09/28/93
Test Meter No. 9548
Barometric Pressure 28.83

Run	Orf Set	Initial Test	Final Test	Volume Test	Init Temp	Finl Temp	Test Temp	Initial Box	Final Box	Volume Box	I-I Temp	I-O Temp	F-I Temp	F-O Temp	Temp	Time	Delta H	Gamma
1	0.5	448.389	458.571	10.182	71.0	72.0	71.50	264.815	275.210	10.395	70.0	71.0	73.0	77.0	72.75	25.0	1.75744	0.98056
2	1.0	458.905	472.309	13.404	72.0	71.0	71.50	275.552	289.292	13.740	77.0	73.0	76.0	81.0	76.75	23.5	1.77875	0.98268
3	1.5	472.466	486.953	14.487	72.0	72.0	72.00	289.455	304.321	14.866	81.0	75.0	77.0	83.0	79.00	21.5	1.90748	0.98357
4	2.0	487.535	500.310	12.775	72.0	72.0	72.00	304.918	318.013	13.095	83.0	77.0	78.0	85.0	80.75	16.5	1.92007	0.98658
5	2.5	500.478	510.563	10.085	71.0	72.0	71.50	318.189	328.533	10.344	84.0	78.0	78.0	86.0	81.50	11.5	1.86469	0.98701
6	3.0	510.921	521.426	10.505	71.0	71.0	71.00	328.896	339.669	10.773	85.0	78.0	79.0	87.0	82.25	11.0	1.88070	0.98822

E T S , I N C .

METER CONSOLE CALIBRATION FORM

Contract No. 93-998
Job I.D.

Meter Box No.: 10
Delta H: 1.8636
Gamma: 0.9866

Analyst: wch
Calibration Date: 11/15/93
Test Meter No. 9548
Barometric Pressure 28.96

Print Date 11/15/93

Run	Orf Set	Initial Test	Final Test	Volume Test	Init Temp	Final Temp	Test Temp	Initial Box	Final Box	Volume Box	I-I Temp	I-O Temp	F-I Temp	F-O Temp	Temp	Time	Delta H	Gamma
1	0.5	107.850	121.385	13.535	76.0	76.0	76.00	655.783	669.560	13.777	75.0	75.0	78.0	80.0	77.00	33.0	1.74059	0.98302
2	1.0	121.638	131.863	10.225	76.0	77.0	76.50	669.815	680.223	10.408	77.0	79.0	84.0	80.0	80.00	18.0	1.80811	0.98632
3	1.5	132.015	142.793	10.778	77.0	77.0	77.00	680.374	691.380	11.006	84.0	79.0	80.0	86.0	82.25	16.0	1.92426	0.98511
4	2.0	142.935	153.034	10.099	77.0	78.0	77.50	691.522	701.820	10.298	85.0	80.0	81.0	86.0	83.00	13.0	1.93009	0.98571
5	2.5	153.223	163.323	10.100	77.0	77.0	77.00	702.032	712.306	10.274	87.0	81.0	82.0	88.0	84.50	11.5	1.87890	0.99051
6	3.0	163.530	173.577	10.047	77.0	78.0	77.50	712.510	722.742	10.232	88.0	82.0	82.0	90.0	85.50	10.5	1.89955	0.98900

APPENDIX I
CALCULATIONS

APPENDIX I.1
EPA METHOD 201A CALCULATIONS

CALCULATIONS FOR EPA METHOD 201A

Determination of cyclone flow rate and orifice pressure head:

Molecular weight of stack gas, dry basis, M_d :

$$M_d = 0.44 (\%CO_2) + 0.32 (\%O_2) + 0.28 (\%N_2 + \%CO)$$

where $M_d = \text{lb/lbmol}$.

Molecular weight of stack gas, wet basis, M_w :

$$M_w = M_d(1 - B_{ws}) + 18(B_{ws})$$

where B_{ws} = moisture fraction of the stack gas;
 $M_w = \text{lb/lbmol}$.

Absolute stack pressure, P_s :

$$P_s = P_{bar} + \frac{P_g}{13.6}$$

where P_{bar} = barometric pressure ("Hg);
 P_g = stack static pressure ("H₂O);
 P_s = "Hg.

Viscosity of stack gas, μ_s :

$$\mu_s = 152.418 + 0.2552 t_s + 3.2355 \times 10^{-5} t_s^2 + 0.53147 (\%O_2) - 74.143 B_{ws}$$

where t_s = average stack temperature (°F);
 μ_s = micropoise.

Cyclone flow rate, Q_s :

$$Q_s = 0.002837 \mu_s \left[\frac{(t_s + 460)}{M_w P_s} \right]^{0.2949}$$

where $Q_s = \text{ft}^3/\text{min}$.

CALCULATIONS FOR EPA METHOD 201A (continued)

Orifice pressure head, ΔH , needed for cyclone flow rate:

$$\Delta H = \left[\frac{Q_s(1-B_{ws})P_s}{t_s+460} \right]^2 \frac{(t_m+460)M_d 1.083 \Delta H_o}{P_{bar}}$$

where t_m = meter temperature ($^{\circ}\text{F}$);
 ΔH_o = "H₂O.

Equations for Nozzle Selection:

Nozzle velocity, v_n :

$$v_n = \frac{3.056 Q_s}{D_n^2}$$

where D_n = nozzle diameter (in.);
 v_n = ft/sec.

Minimum and maximum velocities, v_{min} and v_{max} , in ft/sec:

Calculate R_{min} :

$$R_{min} = 0.2457 + \sqrt{0.3072 - \frac{0.2603 \sqrt{Q_s} \mu_s}{v_n^{1.5}}}$$

If R_{min} is less than 0.5 or imaginary then:

$$v_{min} = 0.5 v_n$$

Otherwise use:

$$v_{min} = v_n R_{min}$$

CALCULATIONS FOR EPA METHOD 201A (continued)

Calculate $R_{\max}$:

$$R_{\max} = 0.4457 + \sqrt{0.5690 + \frac{0.2603 \sqrt{Q_s} \mu_s}{V_n^{1.5}}}$$

If $R_{\max}$ is greater than 1.5 then:

$$V_{\max} = 1.5 V_n$$

Otherwise use:

$$V_{\max} = V_n R_{\max}$$

Minimum and maximum velocity head values, $\Delta p_{\min}$ and $\Delta p_{\max}$:

$$\Delta p_{\min} = 1.3686 \times 10^{-4} \frac{P_s M_w V_{\min}^2}{(t_s + 460) C_p^2}$$

$$\Delta p_{\max} = 1.3686 \times 10^{-4} \frac{P_s M_w V_{\max}^2}{(t_s + 460) C_p^2}$$

where C_p = pitot coefficient
 $\Delta p_{\min}$ and $\Delta p_{\max}$ = "H₂O.

Dwell time:

Dwell time at first traverse point, t_1 :

$$t_1 = \frac{\theta}{N} \sqrt{\frac{\Delta p'_1}{\Delta p'_{\text{avg}}}}$$

where θ = total run time (min);

N = total number of traverse points;

$\Delta p'_1$ = velocity head at the first traverse point
(from a previous traverse) ("H₂O);

$\Delta p'_{\text{avg}}$ = the square of the average square root of the
 Δp 's (from a previous traverse) ("H₂O);

t_1 = min.

CALCULATIONS FOR EPA METHOD 201A (continued)

Dwell time at subsequent traverse points, t_n :

$$t_n = \frac{t_1}{\sqrt{\Delta p_1}} \sqrt{\Delta p_n} \quad , n=2, 3, \dots, N$$

Δp_n = measured velocity head at point n ("H₂O);

Δp_1 = measured velocity head at point 1 ("H₂O);

t_n = min.

Determination of D_{50} :

Stack gas viscosity, μ_{cyc} :

$$\mu_{cyc} = C_1 + C_2 T_s + C_3 T_s^2 + C_4 f_{O_2} - C_5 B_{ws}$$

where C_1 = 51.05 micropoise;

C_2 = 0.207 micropoise/R;

C_3 = 3.24×10^{-5} micropoise/R²;

C_4 = 53.147 micropoise/fraction O₂;

C_5 = 74.143 micropoise/fraction H₂O;

T_s = average absolute stack gas temperature (R);

f_{O_2} = stack gas O₂ volume fraction, dry basis;

B_{ws} = stack gas moisture volume fraction;

μ_{cyc} = micropoise.

Total cyclone flow rate at standard conditions, $Q_{s(std)}$:

$$Q_{s(std)} = \frac{V_{m(std)}}{\theta}$$

where $V_{m(std)}$ = volume of gas measured by DGM corrected to standard conditions (dscf);

θ = total sampling time (min);

$Q_{s(std)}$ = dscf/min.

PM₁₀ flow rate, at actual cyclone conditions, Q_s :

$$Q_s = \frac{T_s}{K_1 P_s} \left[Q_{s(std)} + \frac{V_{w(std)}}{\theta} \right]$$

CALCULATIONS FOR EPA METHOD 201A (continued)

where $K_1 = 17.64 \text{ R/"Hg}$;

$V_{w(\text{std})}$ = volume of water vapor in gas sample at
standard conditions (scf);

$Q_s = \text{ft}_3/\text{min.}$

Diameter of particles having a 50% probability of
penetration, D_{50} :

$$D_{50} = \beta_1 \left[\frac{T_s}{M_w P_s} \right]^{0.2091} \left[\frac{\mu_{cyc}}{Q_s} \right]^{0.7091}$$

where $\beta_1 = 0.15625$

$D_{50} = \mu\text{m.}$

APPENDIX I.2
EPA MULTIPLE METALS CALCULATIONS

METALS CALCULATIONS

1. Total sample weight - W_i (micrograms)

$$W_i = [m_{\text{filter}} - mb_{\text{filter}}]$$

where m_{filter} = total sample weight collected in the filters (micrograms)
 mb_{filter} = filter blank correction (micrograms)

2. Gas Concentration - Cm_i (mg/dscm)

$$Cm_i = \frac{W_i \times 35.3145}{1000 \times V_{m(\text{std})}}$$

where W_i = total sample weight of (i) (micrograms)
 $V_{m(\text{std})}$ = the volume of gas sampled at STP (dscf)
35.3145 = cubic feet per cubic meter
1000 = micrograms per mg

3. The mass flow rate of substance (i), G_i (lb/hr), is:

$$G_i = \frac{W_i \times Q_{sd} \times 60}{V_{m(\text{std})} \times 10^6 \times 453.593}$$

where W_i = total sample weight of (i) (micrograms)
 $V_{m(\text{std})}$ = the volume of gas sampled at STP (dscf)
 Q_{sd} = stack gas flow rate (dscfm)
60 = min/hr
 10^6 = micrograms per gram
453.593 = grams/lb

APPENDIX J
PROCESS DATA

PROCESS MONITORING REPORT

during

**EMISSION TESTING PERFORMED AT
THE CONCRETE BATCHING PLANT**

**owned by
CONCRETE READY MIX CORP.
ROANOKE, VA**

**process monitoring
information collected
from 10/25/93 to 10/29/93
by**

**Ronald E. Myers
U. S. Environmental Protection Agency
Office of Air Quality Planning and Standards
Technical Support Division
Emission Inventory Branch**

The following process monitoring information was collected during the emission testing of the "Erie" concrete batching plant owned by the Concrete Ready Mix Corporation of Roanoke, VA. The individual responsible for monitoring and recording the process information was Ronald E. Myers of the U. S. Environmental Protection Agencies Emission Inventory Branch. The emission testing was performed by ETS Inc. of Roanoke, VA at the direction of John Brown of the U. S. Environmental Protection Agencies Emission Measurement Branch. The inclusive dates of testing were from October 25, 1993 to October 30, 1993.

During the emission testing, estimates of the capture efficiency were made by comparing the relative amount of dust collected by the hood which surrounded the delivery chute to the amount of dust which escaped collection. The point of observation was approximately ten feet above the floor of the alley the trucks used to receive the concrete raw materials. This point was about two feet below the level of the delivery chute and hood duct. The observation point was approximately 20 feet from the delivery chute at a 30° angle from the rear of the trucks.

Plastic sheeting was draped on both sides of the alley way to shield the process area from air movement as much as possible. With the plastic sheeting in place the air movement was generally parallel with the alley way. However air movement was observed to vary by about 30° from parallel to the alley way. This variation occurred because access points were required for the truck drivers to exit their trucks, control the rotation speed of the drum on their truck, obtain delivery order forms and monitor the delivery.

In general, emissions were not observed unless and until portland cement and/or fly ash were delivered. Specialty aggregates (sand and gravels) were delivered at separate chutes which were located in the alley way prior to the concrete raw material delivery chute. Little or no emissions were visible from the delivery of these specialty aggregates in spite of sometimes longer drop heights (because of delivery into pickup trucks) and less protection from the wind. In addition, when only aggregate was delivered to the ready mix trucks from the concrete raw material delivery chute no visible emissions were observed.

The capture efficiency tended to decrease with increasing wind speed. When there was no perceptible wind the larger clumps of dust which did escape the trucks funnel and began falling to the ground were eventually captured by the dust hood when the clumps broke up into smaller sizes. At times, this dust was collected from as far away as six feet. When the wind speed increased the effective capture distance of the hood decreased significantly. In addition, when the wind speed approached or exceeded about ten miles per hour and the wind was from the rear of trucks dust that would have normally fallen into the truck drum was carried out of area between the concrete raw material delivery chute (hood bottom) and the entrance to the drum of the truck.



Direction of Truck Travel

**Clamshell Opening
for Dry materials delivery**

36 in.

18 in.

**All slots in bottom of hood
are approximately six
inches long by one half
inch wide.**

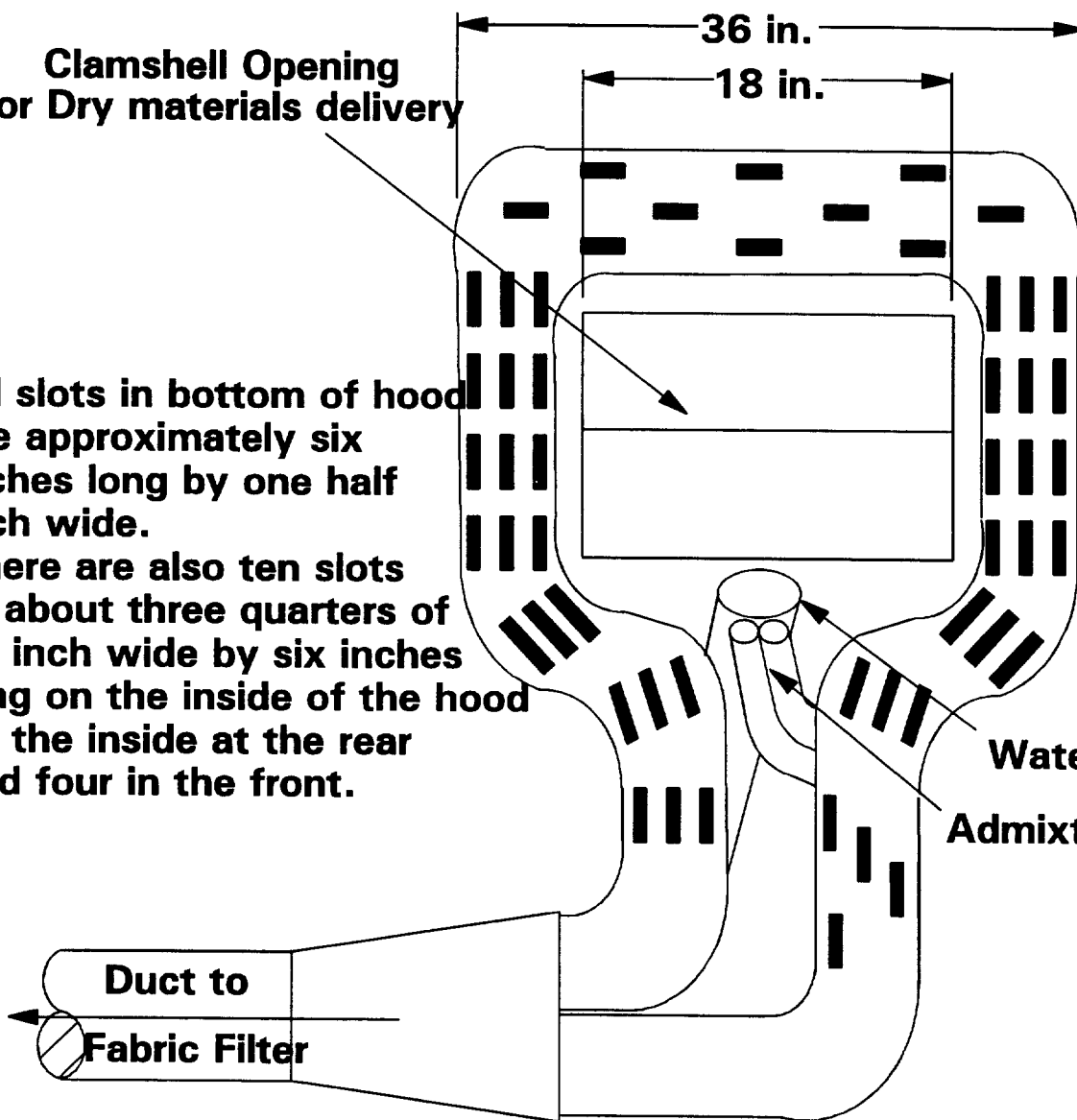
**There are also ten slots
of about three quarters of
an inch wide by six inches
long on the inside of the hood
on the inside at the rear
and four in the front.**

Water Hose

Admixture hoses

Duct to

Fabric Filter



OCTOBER 25, 1993

PRELIMINARY TEST RUNS

Emission Testing of Concrete Batch Plant owned by Concrete Ready Mix Corp. Roanoke, Va

Testing of the "Eric" plant from
10/25/93 to about 10/30/93.

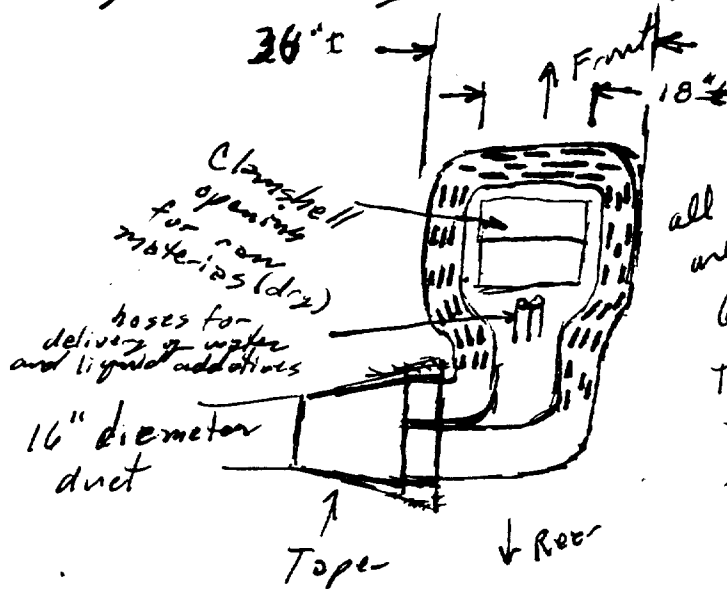
Testing consisted of samples at the
exits of the FF on the Cement and Fly Ash
silos, and the dust from the truck loading
station and the "upwind" and downwind locations
of the truck loading station.

The dust collection hood at the truck loading
station is a stationary multiple slot hood
that is at the same elevation as the clamshell
doors of the loading station. There are no
"rubber drop sleeves" or skirts surrounding the
hood or drop point.

When trucks are parked under the
loading station the clamshell and hooding system
are approximately 12 to 18 inches above
the loading spout of the drum of the truck.
The loading spout of the truck is about 2' wide

by 2' long and is shaped somewhat like a straight sided horse shoe.

In Plan View (looking up)
the loading station and hood
are approximately as follows



all slots on bottom
are approximately
6" long by $\frac{1}{2}$ " wide
there are also
ten slots of about
 $\frac{3}{4}$ " by 6" long on the
inside side of the duct
at the rear and
four on the front

In Plan view looking down the loading spout

10/25

(1)

Truck 56 @ 15:30 about 30% capture
efficiency for food
and @ 15:35

Truck 33 @ 15:45 about 80% capture
and @ 15:47

Truck 54 @ 15:50 about 60% capture
and @ 16:00

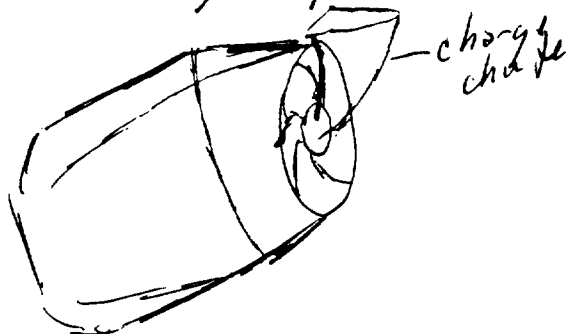
Truck 41 @ 16:01 about 80% capture
and @ 16:04

Truck 36 @ 16:16 about 60% capture

Cement was "spitting" out of charge chute
on about 3 or four occasions

Emissions from drum on Truck appeared
less than other loads. The drum drum had
a separate pipe of about 12" in diam that charge chute emptied
into.
and 16:27

Diagram of above.



Truck 53 @ 16:30 about 30% capture
a large amount of cement "spit" from charging
chute.
and 16:34

Plant contacts

Plant Manager - Alvin Gillespie

~~Plant Engineer~~ Robert Lindsey
President

10/25 { 25.41 tons of flyash delivered
24.50 tons of cement delivered
24.60 tons " " "

10/24 24.42 tons of cement delivered to
Erie silo

10/25

(2)

Truck 33 @ 16:33

no dry material
loaded only
water

end 16:35

Truck 67 @ 16:54

no dry material

Truck 69 @ 16:56

no dry material

Truck 56 @ 16:58

no dry material

Truck 67 @ 17:06

about 80% capture

end 17:10

Truck 54 @ 17:30

no dry material

Truck ~~77~~₄₁ @ 17:40

about 70% capture

Truck 75 @ 17:50

no dry material

Truck 53 @ 17:54

no dry material

Truck 52 @ 17:56

10/25/93

Inlet Preliminary Run

Concrete Ready Mixed Corp., Roanoke, VA

Truck Number	Batch Number	Batch Size Yards	Ticket Time H:M:S A/P	Estimated Actual Time H:M A/P	Precharged Material				Course Aggregate #5 & 7 lbs	Limestone Sand lbs	Castle Sand lbs	Portland Cement lbs	Fly Ash lbs	Addmix OZ	Water		Estimated Capture Efficiency percent
					Chute One Material lbs	Chute Two Material lbs	Indicated Requested Gal	Indicated Delivered Gal									
56	46	6	02:54:23 PM	03:33 PM				11,070	4,350	2,910	3,072	666		18	181	0	30%
33	47	0.75	03:09:15 PM	03:48 PM				1,350	660	450	264	90	20	16		0	80%
54	48	8	03:18:43 PM	03:57 PM				14,760	6,780	4,380	2,940	1,020	209	1,206		10	60%
41	49	2	03:26:01 PM	04:05 PM				3,600	2,970	360	936	0	63	202		0	80%
36	50	3.75	03:44:17 PM	04:23 PM				7,020	3,300	2,130	1,062	462	101	70		67	80%
53	51	1.25	03:55:34 PM	04:34 PM				2,220	1,140	840	408	180	33	23		14	30%
67	52	0.5	04:32:03 PM	05:11 PM				1,080	750	150	300	0	15	90		11	80%
41	53	1.75	05:04:47 PM	05:43 PM				3,300	1,590	1,050	504	276	32	47		20	70%
TOTALS		24						44,400	21,540	12,270	9,486	2,694	1,657	669		122	
															Unweighted Average		61%
															Weighted Average (concrete)		54%
															Weighted Average (cement & Fly Ash)		53%

ROANOKE, VA.

Truck no.: 68

Batch no.: 45

Ticket no.: 4025

Batch size: 2.75 Yds.

Mix name:

66

Collected *delivered*
 Zero
 #7 STONE 0.0 2035 5070 Lbs M
 LIMESTON 2.0 2219 2190 Lbs M
 CASTLE 4.0 1423 1440 Lbs M

Zero
 TYPE 1/2 1237 1236 Lbs C
 FLY ASH 357 366 Lbs C

Total weight: 8729 8700 Lbs

1594 1602 Lbs

Status: OK/Man

OK/Auto

8490 Lbs

1578 Lbs

Zero
 DARAVAIR 100 5 5 Oz C
 WRDA 63 63 Oz C
 DARACCEL 0.00 0 0 Oz
 Not Zero

WATER 75 0 Gal U

Total: 75 0 Gal

Time 2:36:57 PM

Date 25 Oct, 1993

TICKET NUMBER: 000193

CONCRETE-READY-MIXED-CORP.

ROANOKE, VA.

Truck no.: 56

Batch no.: 46

Ticket no.: 4026

Batch size: 6.00 Yds.

Mix name:

52

Zero
 #7 STONE 0.0 4998 5040 Lbs C
 LIMESTON 2.0 4426 4350 Lbs C
 CASTLE 4.0 2837 2910 Lbs C
 #5 STONE 0.0 6000 6030 Lbs C

Zero
 TYPE 1/2 3000 3072 Lbs
 FLY ASH 720 666 Lbs M

Total weight: 18261 18330 Lbs

3720 3738 Lbs

Status: OK/Auto

OK/Man

18240 Lbs

3720 Lbs

Zero
 DARAVAIR 100 18 18 Oz C

WATER 181 0 Gal U

Total: 181 0 Gal

Zero

Time 2:54:23 PM

Date 25 Oct, 1993

TICKET NUMBER: 000192

CONCRETE-READY-MIXED-CORP.
ROANOKE, VA.

Truck no.: 33 Batch no.: 47 Ticket no.: 4027
Batch size: .75 Yds. Mix name: 65

			Zero			Zero
#7 STONE	0.0	555	1350 Lbs M	TYPE 1/2	277	264 Lbs M
LIMESTON	2.0	638	660 Lbs M	FLY ASH	97	90 Lbs M
CASTLE	4.0	409	450 Lbs M			
		=====			=====	
Total weight:		2434	2460 Lbs		374	354 Lbs
Status: OK/Man			2460 Lbs	OK/Man		360 Lbs

			Zero			
DARAVAIR	100	1	1 Oz C	WATER	20	0 Gal U
WRDA		15	15 Oz C		=====	=====
DARACCEL	0.00	0	0 Oz	Total:	20	0 Gal
			Not Zero			

Time 3:09:15 PM Date 25 Oct, 1993 TICKET NUMBER: 000195

CONCRETE-READY-MIXED-CORP.
ROANOKE, VA.

Truck no.: 54 Batch no.: 48 Ticket no.: 4028
Batch size: 8.00 Yds. Mix name: 65

			Zero			Zero
#7 STONE	0.0	5920	5910 Lbs C	TYPE 1/2	2960	2940 Lbs C
LIMESTON	2.0	6808	6780 Lbs C	FLY ASH	1040	1020 Lbs C
CASTLE	4.0	4366	4380 Lbs C			
#5 STONE	0.0	8880	8850 Lbs C			
		=====			=====	
Total weight:		25974	25920 Lbs		4000	3960 Lbs
Status: OK/Auto			25890 Lbs	OK/Auto		3954 Lbs

			Zero			
DARAVAIR	100	16	16 Oz	WATER	209	10 Gal U
WRDA		160	160 Oz		=====	=====
DARACCEL	2.00	1024	1030 Oz	Total:	209	10 Gal
			Not Zero			

Time 3:18:43 PM Date 25 Oct, 1993 TICKET NUMBER: 000

CONCRETE-READY-MIXED-CORP.
ROANOKE, VA.

Truck no.: 41 Batch no.: 49
Batch size: 2.00 Yds. Mix name:

Ticket no.: 4029
39

			Zero	
#7 STONE	0.0	1400	3600 Lbs M	
LIMESTON	2.0	2959	2970 Lbs M	
CASTLE	4.0	364	360 Lbs M	
		=====	=====	
Total weight:		6943	6930 Lbs	
Status: OK/Man			690 Lbs	

		Zero	
TYPE 1/2	940	936 Lbs C	
		=====	=====
	940	936 Lbs	
OK/Auto		Zero	

			Zero	
DARAVAIR	100	2	2 Oz C	
DARACCEL	1.00	176	200 Oz C	
			Not Zero	

WATER	63	0 Gal U	
	=====	=====	
Total:	63	0 Gal	

Time 3:26:01 PM Date 25 Oct, 1993

TICKET NUMBER: 000205

Total weight:	0	0 Lbs	
Status: OK/Man		150 Lbs	

OK/Man	0	0 Lbs	
		Zero	

			Zero	
			Not Zero	

Total:	0	0 Gal	

Time 3:26:11 PM Date 25 Oct, 1993

TICKET NUMBER: 000205

CONCRETE-READY-MIXED-CORP.
ROANOKE, VA.

Truck no.: 36 Batch no.: 50
Batch size: 3.75 Yds. Mix name:

Ticket no.: 4030
64

			Zero	
#7 STONE	0.0	2775	2760 Lbs C	
LIMESTON	2.0	3352	3300 Lbs C	
CASTLE	4.0	2148	2130 Lbs C	
#5 STONE	0.0	4182	4260 Lbs M	
		=====	=====	
Total weight:		12437	12450 Lbs	
Status: OK/Man			Zero	

		Zero	
TYPE 1/2	1087	1062 Lbs C	
FLY ASH	487	462 Lbs C	
		=====	=====
	1574	1524 Lbs	
OK/Auto		Zero	

Status: OK/Man

Zero

OK/Man

Zero

Zero

DARAVAIR	100	7	7 Oz	C
WRDA		63	63 Oz	C
DARACCEL	0.00	0	0 Oz	

Not Zero

WATER	101	67 Gal	U
	=====	=====	
Total:	101	67 Gal	

Time 3:44:17 PM

Date 25 Oct, 1993

TICKET NUMBER: 000201

CONCRETE-READY-MIXED-CORP.

ROANOKE, VA.

Truck no.: 53

Batch no.: 51

Ticket no.: 4031

Batch size: 1.25 Yds.

Mix name:

64

Zero

#7 STONE	0.0	925	900 Lbs	M
LIMESTON	2.0	1117	1140 Lbs	M
CASTLE	4.0	716	840 Lbs	M
#5 STONE	0.0	1387	1320 Lbs	M
		=====	=====	
Total weight:		4145	4200 Lbs	

Status: OK/Man

Zero

TYPE 1/2	362	408 Lbs	M
FLY ASH	162	160 Lbs	M
		=====	=====
		524	588 Lbs

OK/Man

Zero

DARAVAIR	100	2	2 Oz	C
WRDA		21	21 Oz	C
DARACCEL	0.00	0	0 Oz	

Not Zero

Zero

WATER	33	14 Gal	U
	=====	=====	
Total:	33	14 Gal	

Time 3:55:34 PM

Date 25 Oct, 1993

TICKET NUMBER: 000202R

CONCRETE-READY-MIXED-CORP.

ROANOKE, VA.

Truck no.: 67

Batch no.: 52

Ticket no.: 4032

Batch size: .50 Yds.

Mix name:

39

Zero

#7 STONE	0.0	350	1080 Lbs	M
LIMESTON	2.0	739	750 Lbs	M

Zero

TYPE 1/2	235	300 Lbs	M

#7 STONE	0.0	350	Zero	1080 Lbs M
LIMESTON	2.0	739		750 Lbs M
CASTLE	4.0	91		150 Lbs M
		=====	=====	

TYPE 1/2	235	Zero	300 Lbs M

Total weight:	1735	1980 Lbs
Status: OK/Man		Zero

OK/Man	235	300 Lbs
		Zero

DARAVAIR	100	0	Zero	0 Oz
DARACCEL	2.00	88		90 Oz C
			Zero	

WATER	15	11 Gal U
Total:	15	11 Gal

Time 4:32:03 PM Date 25 Oct, 1993

TICKET NUMBER: 000206R

#7 STONE	0.0	1295	Zero	3300 Lbs M
LIMESTON	2.0	1564		1590 Lbs M
CASTLE	4.0	1002		1050 Lbs M
		=====	=====	

Total weight:	5803	5940 Lbs
Status: OK/Man		Zero

TYPE 1/2	507	Zero	504 Lbs C
FLY ASH	227		276 Lbs M

OK/Man	734	780 Lbs
		Zero

DARAVAIR	100	3	Zero	3 Oz C
WRDA		29		29 Oz C
DARACCEL	0.00	0		0 Oz
			Not Zero	

WATER	47	20 Gal U
Total:	47	20 Gal

Time 5:04:47 PM Date 25 Oct, 1993

TICKET NUMBER: 000207R

*Truck # 41
about 1.35 yd
of concrete*

OCTOBER 26, 1993

INLET RUNS 1, 2 & 3

OUTLET RUN 1 & 2

10/26

①

Ambient samples started at ~~0757~~ 0805

Inlet samples started at 0807
for Run #2

Truck #53 @ 08:26

1st water @ 08:27.30

Gravel & cement @ 8:30 15 thousand

anemometer not turning, barely perceptible
wind.

visible emissions stopped @ 0832 45

estimated capture 90%

end @ 8:32, 30

Truck 38 @ 8:33

~~anemometer~~ anemometer - turning slowly
wind picked up

8:36 30 1st water

some cement splashed out of the charge chute

last water 8:40. 55 sec

estimated capture 80%

Time sync in plant

805 plant time
vs 8:44 my time

Truck 36 @ 8:51

no perceptible to barely perceptible wind
1st water 8:55.20

estimated capture 90%

859 53 last water start end @ 9:00 20

escaped emissions from above trucks rise vertically

10/26/93 (2)

Truck #74 @ 9:02

1st water @ 9:03 37

wind is barely perceptible to slight
estimated capture 80%

907.51 last water

Truck #35 @ 9:09

1st water @ 9:10 35

no wind
except emissions are carried vertically
above batch system charging tunnels by thermal(?)
bozany or air currents
estimated capture 90%

last water @ 9:13 35

Truck #67 @ 9:20

1st water @ 9:20 25

barely perceptible wind
estimated capture 90%

last water @ 9:33 50

Truck 41 @ 9:43

1st water @ 9:46 15

large amount of cement spit out of Truck
charging chute. Dust obscured vision for about
ten seconds. Otherwise emissions were well
captured. Estimated capture 70%

last water 9:51 40

10/26/93 (3)

Truck #70 @ 9:53 at specialty gravel 8250 #
chute - two batches delivered

moved to concrete loading station at #7
9:57 30 Stone

1st water @ 10:01 05

only sand & cement loaded

(will not
show on
computer
form)

sand cement was splashed out of truck changed
chute

estimated capture 70%

Inlet run stopped @ 10:06

Truck #55 @ 10:06

1st water @ 10:09 50

not observed

Inlet sampling at "Eric" Truck loading facility
started @ 10:53

Ambient sampler started @ 10:53 03

Truck #31 @ 10:52

began loading dry material just prior
to samplers started

estimated capture 90-90%

Truck #74 @ 10:56

1st water @ 11:01 or

estimated capture 80%

last water @ 11:03 40

10/26/93

(4)

Truck 69 @ 10:05

Wind is from rear of trucks at barely perceptible velocity

1st water @ 11:09 20 & 11:15 10
 sun liquid water

barely perceptible wind, anemometer not moving

some cement spit out of truck charge chute
estimated capture 90%

last water 11:22 30

Truck #33 @ 11:23 30 @ specialty gravel location

8250 pounds of #9 stone loaded manually
and will not show on computer forms

moved to concrete loading station @ 11:26

1st water @ 11:30 45

barely perceptible wind from front of truck

some cement splashed out of truck loading
chute.

estimated capture 80%

last water @ 11:34 36

Truck #73 @ 11:35

1st water @ 11:47 50

estimated capture 80%

last water @ 11:52 55

10/26/93

(5)

Truck #36 @ 11:54

barely perceptible wind from rear of truck

1st water 11:57 06

estimated capture 90%

last water @ 12:05 35

Truck #68 @ 12:06

1st water @ 12:09 26

estimated capture 80%

last water @ 12:16 01

Truck #52 @ 12:17

1st water @ 12:24 44

estimated capture 90%

last water @ 12:33 00

~~Truck #56~~

Truck #74 @ 12:42

1st water 12:45 26

estimated capture 90%

last water @ 12:48 50

Truck #55 @ 12:49

1st water @ 12:50 45

estimated capture 90%

last water 12:54 10

Inlet sampling stopped @ 12:54
Ambient sample stopped 11

10/26/93

(6)

Inlet sample started @ 13:29

Truck # 69 @

1st water 13:29 15

Estimated capture 80%

last water @ 13:32 or

Truck # 33 @ 13 49

1st water @ 13:51 24

Estimated capture 90%

last water 13:54 10

Truck # 68 @ 13:56

1st water 13:58 13

Estimated capture 90%

last water 14:04 25

Truck # 73 @ 14:05

first water 14:09 43

Estimated capture 80%

last water 14:11 55

Wind velocity increased but was highly variable in direction - anemometer was indicating mostly negative direction

loaded 5500 lb
of #1 stone
from ~~separate~~
silo (manual)

10/26/93 ⑦

Truck #55 @ 14:15

1st water 14:20 08

Estimated capture 90%

last water 14:23 40

Truck #30 @ 14:33

1st water @ 14:38 20

Estimated capture 80%

last water @ 14:40 14

Truck #52 @ 14:41

1st water 14:44 35

Estimated capture 70%

last water 14:49 06

loading hopper of truck
was over-filled and cement
and sand fell to ground.

Truck #71 @ 14:51:

loaded with ^{wk} sand at 1st 4250 #
special (manual) loading hopper

14:52 moved to 2nd manual loading
hopper to receive #9 stone 7075 #

14:53 moved to concrete loading station
sand & cement only

1st water 14:56 29

estimated capture 70%

last water 14:58 15

loading hopper
of truck over-filled
and cement & sand were
thrown out

10/26/93

(8)

Truck # 31 @ 14:54

first water

Estimated capture 80%

last water 15:03 15

Truck # 41 @ 15:03

first water 15:07 05

Estimated capture 90%

last water 15:09 20

Truck # 38 @ 15:10

1st water 15:11 10

Estimated capture 90%

last water 15:14 20

Truck # 53 @ 15:16

1st water 15:20 55

Estimated capture 90%

last water 15:24 10

~~Truck # 33 @ 15:25~~

~~1st water~~

Inlet sampling
stopped @ 15:30

Concrete Ready Mixed Corp, Roanoke, VA

Concrete Ready Mixed Corp, Roanoke, VA

[illegible][illegible]

Concrete Ready Mixed Corp, Roanoke, VA

Truck Number	Batch Number	Batch Size Yards	Indicated on Batch Log H:M:S A/P	Time		Precharged Material			Course Aggregate #5 & 7		Limestone Sand lbs	Castle Sand lbs	Portland Cement lbs	Fly Ash lbs	Addmix OZ	Water		Estimated Capture Efficiency percent
				Estimated Actual H:M A/P		Chute One Material lbs	Chute Two Material lbs	lbs	lbs	Indicated Requested Gal						Delivered Gal		
Johnson Plant Totals for day, 159																		
Erie Plant Totals prior to start of Outlet Run #1																		
1 - 12 78																		
Outlet Run 1																		
73	13	8	07:16:13 AM	07:55 AM					14,430	11,370	1,230	4,194	0	8	262	184	--	
53	14	8	07:53:21 AM	08:32 AM					14,040	7,230	5,100	3,785	0	8	222	157	90%	
38	15	8	07:58:35 AM	08:37 AM					14,850	6,870	4,470	2,994	1,032	16	217	149	80%	
36	16	8	08:16:31 AM	08:55 AM					14,480	6,270	3,600	4,902	606	26	230	169	90%	
74	17	8	08:24:48 AM	09:03 AM					14,070	7,320	5,100	3,760	0	8	222	159	80%	
35	18	6.5	08:31:43 AM	09:10 AM					11,280	8,460	2,310	3,072	0	0	202	2	90%	
67	19	8	08:50:20 AM	09:29 AM					14,480	6,300	3,510	4,895	600	28	230	168	90%	
41	20	8	09:06:47 AM	09:45 AM					14,760	6,810	4,350	2,970	1,056	16	217	147	70%	
70	21	6	09:22:32 AM	10:01 AM					0	5,760	3,780	2,406	1,638	0	238	153	70%	
55	22	7	09:29:59 AM	10:08 AM					12,960	5,280	3,270	3,510	816	21	211	134		
33	23	2	09:40:05 AM	10:19 AM					3,690	1,590	1,080	882	294	220	53	26		
36	24	8	09:48:58 AM	10:27 AM					14,310	6,180	3,800	4,890	582	26	230	160		
38	25	6	09:59:42 AM	10:38 AM					0	6,550	5,940	4,506	900	0	197	162		
31	26	6.5	10:15:47 AM	10:54 AM			??	??	12,270	5,100	3,450	3,006	774	169	177	118	75%	
74	27	8	10:20:56 AM	10:59 AM					7,320	3,150	1,980	1,800	534	100	109	69	80%	
69	28	7.5	10:36:57 AM	11:15 AM					13,650	6,360	4,080	2,766	960	1,125	196	139	90%	
33	29	6	10:52:30 AM	11:31 AM					0	5,850	3,737	2,400	1,620	0	238	171	80%	
73	30	8	11:09:33 AM	11:48 AM					14,460	6,360	3,570	4,902	576	26	230	138	80%	
36	31	6	11:18:48 AM	11:57 AM			?	?	0	8,580	5,940	4,530	882	0	197	162	90%	
68	32	8	11:30:33 AM	12:09 PM					12,900	5,870	3,630	3,132	888	176	191	127	80%	
52	33	6.5	11:45:55 AM	12:24 PM					11,370	5,940	4,140	3,060	0	13	180	128	90%	
74	34	7	12:06:31 PM	12:45 PM					13,020	5,700	3,660	3,144	912	176	191	0	90%	
55	35	8	12:11:49 PM	12:50 PM					14,940	6,450	4,110	3,684	978	201	219	29	90%	
TOTALS		163.0				16,500		0	243,240	147,150	85,637	79,192	15,648	2,363	4,659	2,851		
Assumed Unweighted Average.																		
Assumed Concrete Weighted Average.																		
Assumed Cement & Fly Ash Weighted Average.																		
Outlet Run #1.																		
76.3																		
Assumed Johnson Plant Totals for Outlet Run #1.																		
76.3																		
Estimated Facility Totals during Outlet Run #1.																		
239.3																		
116,494 22,689																		

10/26/93 Concrete Ready Mixed Corp. Roanoke, VA

Truck Number	Batch Number	Batch Size Yards	Indicated on Batch Log H:M:S:AP	Time		Precharged Material			Course Aggregate #5 & 7 lbs	Limestone Sand lbs	Castle Sand lbs	Portland Cement lbs	Fly Ash lbs	Admix OZ	Water		Estimated Capture Efficiency percent
				Estimated Actual H:M:A:P		Chute One Material	Chute Two Material	Indicated Requested Gal							Indicated Delivered Gal		
Batches between Outlet Run #1 and Run #2																	
35	36	7	12:16:37 PM	12:55 PM				12,870	6,240	4,110	2,010	894	131	188	120		
38	37	6.5	12:28:42 PM	01:07 PM				11,310	5,850	4,080	3,054	0	13	180	0		
Outlet Run 2																	
69	38	4	12:50:22 PM	01:29 PM	#7 stone		5,500	0	3,840	2,460	1,590	1,060	0	158	126	80%	
33	39	7	01:13:33 PM	01:52 PM				12,930	6,270	4,110	2,010	888	131	188	0	90%	
68	40	8	01:19:52 PM	01:58 PM				14,640	6,450	4,170	3,600	1,008	201	219	0	90%	
73	41	7	01:28:06 PM	02:07 PM				13,170	6,330	4,020	2,028	906	131	188	0	80%	
55	42	6	01:40:47 PM	02:19 PM				11,100	4,770	3,060	2,742	768	1,101	157	91	90%	
36	43	4	01:58:47 PM	02:37 PM				7,110	3,150	1,800	2,448	306	12	115	0	80%	
52	44	6.5	02:05:11 PM	02:44 PM	#7 stone		7,075	11,670	5,910	4,170	3,048	0	13	180	122	70%	
71	45	5	02:17:29 PM	02:56 PM		Pete Sand	4,250	0	0	4,470	2,340	558	15	128	0	70%	
31	46	6.5	02:21:31 PM	03:00 PM				12,150	5,820	3,750	1,872	864	122	175	109	80%	
41	47	5	02:28:03 PM	03:07 PM				9,240	4,020	2,610	2,244	642	126	136	0	90%	
38	48	6.5	02:32:13 PM	03:11 PM				11,940	4,860	3,120	3,426	0	19	196	126	90%	
53	49	5	02:41:35 PM	03:20 PM				9,150	4,020	2,540	2,226	624	126	136	84	90%	
33	50	6.5	02:53:46 PM	03:32 PM				12,090	4,770	3,150	3,282	774	19	196	90	90%	
74	51	6.5	03:03:59 PM	03:42 PM				4,980	0	0	12	0	122	175	70		
41	52	1.5	03:54:22 PM	04:33 PM				2,850	1,170	780	666	180	37	41	22		
TOTALS		85				12,575	4,250	133,020	61,380	44,210	33,534	8,598	2,175	2,388	840		
Assumed Johnson Plant Totals for Outlet Run #2.																	
Assumed Concrete Weighted Average.																	
Assumed Cement & Fly Ash Weighted Average.																	
Assumed Johnson Plant Totals for Outlet Run #2.																	
Estimated Facility Total for Outlet Run #2.		39.8									15,796	3,869					
Estimated Facility Total for Outlet Run #2.		124.8									49,330	12,467					
Erie Plant Totals for the Day.																	
		339.5				29,075	4,250	552,570	305,010	184,537	159,436	28,446	5,576	9,933	4,908		

10/26/83

Johnson Plant

159 yards of Concrete

37.55 tons of Cement

6.4 tons of Fly ash

UNIFORM STRAIGHT BILL OF LADING — SHORT FORM

MEMORANDUM

NOTE:

The carrier, named herein, has received, subject to the conditions and terms in effect on the date of issue of this Bill of Lading, the property described below. The carrier, named herein, is not responsible for any loss or damage to the property described below, except as noted on this Bill of Lading, and the carrier, named herein, is not responsible for any loss or damage to the property described below, except as noted on this Bill of Lading, and the carrier, named herein, is not responsible for any loss or damage to the property described below, except as noted on this Bill of Lading.

Roanoke
Roanoke Cement Company

24580

28040

SHIPPERS B/L: 10/26/93

DATE	SHIPPED FROM	AGENTS NUMBER
10/26/93	ROANOKE, VA	10/26/93 11:52
CONSIGNEE:	CARRIER/ROUTE	
DESTINATION:		
BULK ACCT		
PO BOX 1		
RATE	TEST	SPECIAL INSTRUCTIONS
	3460	1.7300 10/26/93 11:52

QTY.	DESCRIPTION	WEIGHT			CAR INITIAL AND NUMBER	WAYBILL NUMBER	BIN NO.
		GROSS	TARE	NET			
	1.7300						34

TRUCK ARRIVED	UNLOADING COMPLETE	RECEIVED FOR CONSIGNEE BY
AM	AM	
PM	PM	

EXPLAIN BELOW REASON FOR DELAY OR EXCEPTIONS

TIME USED BY CONSIGNEE FOR UNLOADING TRUCK, IN EXCESS OF TIME ALLOWED IN TARIFF, WILL BE ASSESSED AT THE APPLICABLE TARIFF RATES AND CHARGED TO CONSIGNEE. PRIOR TO SIGNING DELIVERY RECEIPT, VERIFY CONDITION OF SHIPMENT, TRUCK ARRIVAL, AND UNLOADING COMPLETED TIME. NO LOSS OR DAMAGE CLAIMS CONSIDERED UNLESS EXCEPTION IS NOTED ON BILL OF LADING BY CONSIGNEE AT TIME OF DELIVERY.

CAUTION
MAY CAUSE SKIN IRRITATION OR INJURY TO EYES
CONTAINS PORTLAND CEMENT, FRESHLY MIXED CEMENT, MORTAR, CONCRETE OR GROUT. MAY CAUSE SKIN IRRITATION. AVOID CONTACT WITH SKIN WHERE POSSIBLE AND WASH EXPOSED SKIN AREAS PROMPTLY WITH WATER.
IF ANY CEMENT OR CEMENT MIXTURES GET INTO THE EYE, RINSE IMMEDIATELY AND REPEATEDLY WITH WATER AND GET PROMPT MEDICAL ATTENTION.
KEEP OUT OF REACH OF CHILDREN.

CUSTOMER PICKUP

RECEIPT OF THE PRODUCT AND QUANTITY DESIGNATED HEREON IS ACKNOWLEDGED, FOB ORIGIN PLANT SITE, BY CUSTOMER OR AGENT FOR CUSTOMER FOR DELIVERY TO THE CUSTOMER AND DESTINATION IDENTIFIED HEREON.

COMPANY

AGENT

TRACTOR LIC. NO.

SEAL NO(S).

Subject to Section 7 of conditions, if this shipment is to be delivered to the consignee without receipt on the consignee's course on the consignee, the consignor shall sign the following statement:

The carrier shall not make delivery of this shipment without payment of freight and all other lawful charges.

(Signature of consignor.)

If charges are to be prepaid, write or stamp here "To Be Prepaid."

TO BE PREPAID

ROANOKE CEMENT COMPANY	CARRIER'S AGENT	TRACTOR NO.	TRAILER NO.
PER: m. O'Leary	PER:	11	
NAME AND PERMANENT POST OFFICE ADDRESS OF SHIPPER			

Shipper certifies that weight and description indicated on this bill of lading are correct, subject to correction by railroad weighing and inspection bureau.

76880

28040

48840

• LBS. GROSS

• LBS. TARE

24.4280 NET

10/26/93

11:58

76880

042975

REFERENCES

[illegible]

043167

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[illegible]

043166

ROANOKE, VA.

Truck no.: 35 Batch no.: 2 Ticket no.: 4034
 Batch size: 7.00 Yds. Mix name: 34

#7 STONE	0.0	4900	12330 Lbs M	Zero	TYPE 1/2	3290	Zero	3288 Lbs C
LIMESTON	2.0	9142	9150 Lbs M					
CASTLE	4.0	2552	2520 Lbs M					
#5 STONE	0.0	7420	0 Lbs					
		=====	=====			=====	=====	
Total weight:		24014	24000 Lbs			3290		3288 Lbs
Status: OK/Man			24000 Lbs		OK/Auto			3210 Lbs

DARACCEL	0.00	0	0 Oz	Zero	WATER	217	0 Gal U
						=====	=====
				Zero	Total:	217	0 Gal

Time 6:00:36 AM Date 26 Oct, 1993 TICKET NUMBER: 000212

CONCRETE-READY-MIXED-CORP.

ROANOKE, VA.

Truck no.: 33 Batch no.: 3 Ticket no.: 4030
 Batch size: 6.00 yds. Mix name: 2

#7 STONE	0.0	5600	5550 Lbs C	Zero	TYPE 1/2	3760	Zero	3744 Lbs C
LIMESTON	2.0	7232	7290 Lbs C					
CASTLE	4.0	5058	5070 Lbs C					
#5 STONE	0.0	8480	8580 Lbs C					
		=====	=====			=====	=====	
Total weight:		26370	26450 Lbs			3760		3744 Lbs
Status: OK/Auto			26450 Lbs		OK/Auto			3720 Lbs

DARACCEL	50	8	8 Oz C	Zero	WATER	222	154 Gal U
DARACCEL	0.00	0	0 Oz			=====	=====
				Zero	Total:	222	154 Gal

Time 6:06:38 AM Date 26 Oct, 1993 TICKET NUMBER: 000208

Ticket no.: 03 Batch no.: 3
Batch size: 8.00 Yds. Mix name:

Ticket no.: 000208
E

Zero
STONE 0.0 5600 5550 Lbs C
LIMESTON 2.0 7232 7290 Lbs C
CASTLE 4.0 5058 5070 Lbs C
STONE 0.0 8480 8580 Lbs C

Zero
TYPE 1/2 3760 3744 Lbs C

=====
Total weight: 26370 26490 Lbs

=====
3760 3744 Lbs

Status: OK/Auto

OK/Auto

26460 Lbs

3720 Lbs

Zero
WRAVAIR 50 8 8 Oz C
ARACCEL 0.00 0 0 Oz

WATER 222 154 Gal U

=====
Total: 222 154 Gal

Zero

Time 6:06:38 AM

Date 26 Oct, 1993

TICKET NUMBER: 000208

CONCRETE-READY-MIXED-CORP.
ROANOKE, VA.

Ticket no.: 41 Batch no.: 4
Batch size: 8.00 Yds. Mix name:

Ticket no.: 4036
65

Zero
STONE 0.0 5920 5850 Lbs C
LIMESTON 2.0 6808 6840 Lbs C
CASTLE 4.0 4366 4410 Lbs C
STONE 0.0 8880 8880 Lbs C

Zero
TYPE 1/2 2960 2958 Lbs C
FLY ASH 1040 1014 Lbs C

=====
Total weight: 25974 25980 Lbs

=====
4000 3972 Lbs

Status: OK/Auto

OK/Auto

25950 Lbs

3966 Lbs

Zero
WRAVAIR 100 16 16 Oz
ARDA 160 0 Oz
ARACCEL 0.00 0 0 Oz

WATER 217 150 Gal U

=====
Total: 217 150 Gal

Zero

Time 6:13:03 AM

Date 26 Oct, 1993

TICKET NUMBER: 000216

Truck no.: 68 Batch no.: 5 Ticket no.: 4037
 Batch size: 8.00 Yds. Mix name: 38

			Zero			Zero
#7 STONE	0.0	5600	5670 Lbs C	TYPE 1/2	4136	4134 Lbs C
LIMESTON	2.0	11428	11370 Lbs C			
CASTLE	4.0	1291	1200 Lbs C			
#5 STONE	0.0	8880	9000 Lbs C			
		=====	=====		=====	=====
Total weight:	27199		27240 Lbs		4136	4134 Lbs
Status: OK/Auto				OK/Auto		
			27210 Lbs			4122 Lbs

			Zero			
DARAVAIR	100	8	8 Oz C	WATER	262	1 Gal U
DARACCEL	0.00	0	0 Oz		=====	=====
			Zero	Total:	262	1 Gal

Time 6:19:49 AM Date 26 Oct, 1993 TICKET NUMBER: 000218

CONCRETE-READY-MIXED-CORP.
 ROANOKE, VA.

Truck no.: 38 Batch no.: 6 Ticket no.: 4038
 Batch size: 2.00 Yds. Mix name: 50

			Zero			Zero
LIMESTON	2.0	3571	3510 Lbs C	TYPE 1/2	1692	1722 Lbs C
CASTLE	4.0	2416	2340 Lbs C			
		=====	=====		=====	=====
Total weight:	5987		5850 Lbs		1692	1722 Lbs
Status: OK/Auto				OT/Auto		
			3000 Lbs			1710 Lbs

			Zero			
				WATER	89	49 Gal U
					=====	=====
			Zero	Total:	89	49 Gal

Time 6:30:08 AM Date 26 Oct, 1993 TICKET NUMBER: 000227

CONCRETE-READY-MIXED-CORP.

DANOK, VA.

Truck no.: 55 Batch no.: 7 Ticket no.: 4035
Batch size: 8.00 Yds. Mix name: 8

Zero				Zero			
7 STONE	0.0	5920	5970 Lbs C	TYPE 1/2	3760	3732 Lbs C	
IMESTON	2.0	7542	7590 Lbs C				
PORTLAND CEMENT	4.0	5133	5280 Lbs C				
5 STONE	0.0	8880	8730 Lbs C				
		=====	=====			=====	=====
Total weight:		27475	27570 Lbs			3760	3732 Lbs
Tus: DT/Auto				OK/Auto			
			27510 Lbs				3684 Lbs
Zero				Zero			
ARACCEL	0.00	0	0 Oz	WATER	245	190 Gal U	
						=====	=====
			Zero	Total:	245	190 Gal	

Time 6:34:07 AM Date 26 Oct, 1993 TICKET NUMBER: 000224

CONCRETE-READY-MIXED-CORP.

DANOK, VA.

Truck no.: 36 Batch no.: 8 Ticket no.: 4040
Batch size: 8.00 Yds. Mix name: 106

Zero				Zero			
7 STONE	0.0	6000	6000 Lbs C	TYPE 1/2	4912	4908 Lbs M	
IMESTON	2.0	6302	6270 Lbs C	FLY ASH	600	600 Lbs M	
PORTLAND CEMENT	4.0	3566	3660 Lbs C				
5 STONE	0.0	8376	8400 Lbs C				
		=====	=====			=====	=====
Total weight:		24244	24330 Lbs			5512	5508 Lbs
Tus: DT/Auto				OK/Man			
			24210 Lbs				5496 Lbs
Zero				Zero			
ARAVAIR	100	24	26 Oz	WATER	230	167 Gal U	
RAA		180	0 Oz			=====	=====
			Zero	Total:	230	167 Gal	

Time 6:45:05 AM Date 26 Oct, 1993 TICKET NUMBER: 000221

CONCRETE-READY-MIXED-CORP.

ROANOKE, VA.

Truck no.: 31 Batch no.: 9
Batch size: 7.00 Yds. Mix name:

Ticket no.: 4041
8

Zero				Zero		
#7 STONE	0.0	5180	5160 Lbs C	TYPE 1/2	3290	3282 Lbs C
LIMESTON	2.0	6599	6630 Lbs C			
CASTLE	4.0	4491	4440 Lbs C			
#5 STONE	0.0	7770	7830 Lbs C			
=====				=====		
Total weight:	24040	24060	Lbs		3290	3282 Lbs
Status: OK/Auto				OK/Auto		
23970 Lbs				3234 Lbs		

Zero				Zero		
DARACCEL	0.00	0	0 Oz	WATER	214	41 Gal U
					=====	=====
Zero				Total:	214	41 Gal

Time 6:50:56 AM Date 26 Oct, 1993

TICKET NUMBER: 000234

CONCRETE-READY-MIXED-CORP.

ROANOKE, VA.

Truck no.: 74 Batch no.: 10
Batch size: 8.00 Yds. Mix name:

Ticket no.: 4042
2

Zero				Zero		
#7 STONE	0.0	5600	5610 Lbs C	TYPE 1/2	3760	3768 Lbs C
LIMESTON	2.0	7232	7260 Lbs C			
CASTLE	4.0	5053	5040 Lbs C			
#5 STONE	0.0	8430	8400 Lbs C			
=====				=====		
Total weight:	26370	26310	Lbs		3760	3768 Lbs
Status: OK/Auto				OK/Auto		
26340 Lbs				3726 Lbs		

Zero				Zero		
DARAVAIR	50	8	8 Oz C	WATER	222	50 Gal U
DARACCEL	0.00	0	0 Oz		=====	=====
Zero				Total:	222	50 Gal

Time 6:57:04 AM Date 26 Oct, 1993

TICKET NUMBER: 000209

CRETE-READY-MIXED-CORP.

NKE, VA.

Job no.: 33 Batch no.: 11
 Job size: 6.00 Yds. Mix name:

Ticket no.: 4043
 66

			Zero
STONE	0.0	4440	4470 Lbs C
ESTON	2.0	4842	4920 Lbs C
ST E	4.0	3106	3090 Lbs C
S. ONE	0.0	6660	6600 Lbs C

		Zero
TYPE 1/2	2700	2682 Lbs C
FLY ASH	780	774 Lbs C

=====	=====
Net weight:	19048 19080 Lbs
at s: OK/Auto	
	19110 Lbs

=====	=====
	3480 3436 Lbs
OK/Auto	
	3450 Lbs

		Zero
AVAIR	100	12 12 Oz
A		139 139 Oz
A DEL	1.00	462 460 Oz
		Not Zero

WATER	160	0 Gal U
=====	=====	
Total:	160	0 Gal

Time 7:03:47 AM

Date 26 Oct, 1993

TICKET NUMBER: 000228

CRETE-READY-MIXED-CORP.

NKE, VA.

Job no.: 69 Batch no.: 12
 Job size: 8.00 Yds. Mix name:

Ticket no.: 4044
 115

			Zero
STONE	0.0	6800	6870 Lbs C
ESTON	2.0	6318	6270 Lbs C
ST E	4.0	4300	4380 Lbs C
S. ONE	0.0	8000	8100 Lbs C

		Zero
TYPE 1/2	3712	3684 Lbs C
FLY ASH	928	918 Lbs C

=====	=====
Net weight:	25418 25620 Lbs
at s: OK/Auto	
	25620 Lbs

=====	=====
	4640 4602 Lbs
OK/Auto	
	4590 Lbs

		Zero
AVAIR	100	24 24 Oz C
DA		185 185 Oz C
		Not Zero

WATER	218	141 Gal U
=====	=====	
Total:	218	141 Gal

Time 7:10:11 AM

Date 26 Oct, 1993

TICKET NUMBER: 000239

CONCRETE-READY-MIXED-CORP.
ROANOKE, VA.

Truck no.: 73 Batch no.: 13 Ticket no.: 4045
Batch size: 8.00 Yds. Mix name: 38

			Zero				Zero
#7 STONE	0.0	5600	5490 Lbs	C	TYPE 1/2	4136	4194 Lbs
LIMESTON	2.0	11428	11370 Lbs	C			
CASTLE	4.0	1291	1230 Lbs	C			
#5 STONE	0.0	8880	8940 Lbs	C			
		=====	=====			=====	=====
Total weight:	27199		27030 Lbs			4136	4194 Lbs
Status: OK/Auto					OT/Auto		
			26970 Lbs				4176 Lbs

			Zero				
DARAVAIR	100	8	8 Oz	C	WATER	262	184 Gal
DARACCEL	0.00	0	0 Oz			=====	=====
			Zero		Total:	262	184 Gal

Time 7:16:13 AM Date 26 Oct, 1993 TICKET NUMBER: 000215

Start Run #1

CONCRETE-READY-MIXED-CORP.
ROANOKE, VA.

Truck no.: 53 Batch no.: 14 Ticket no.: 4046
Batch size: 8.00 Yds. Mix name: 2

			Zero				42 Lbs
#7 STONE	0.0	5600	5640 Lbs	C	TYPE 1/2	3760	3786 Lbs
LIMESTON	2.0	7233	7230 Lbs	C			
CASTLE	4.0	5058	5100 Lbs	C			
#5 STONE	0.0	8480	8400 Lbs	C			
		=====	=====			=====	=====
Total weight:	26370		26370 Lbs			3760	3786 Lbs
Status: OK/Auto					OK/Auto		
			5490 Lbs				36 Lbs

			Zero				
DARAVAIR	50	8	8 Oz	C	WATER	222	157 Gal
DARACCEL	0.00	0	0 Oz			=====	=====
			Zero		Total:	222	157 Gal

Time 7:53:21 AM Date 26 Oct, 1993 TICKET NUMBER: 000210

total weight:	=====	=====	0	0 Lbs	=====	=====	0	0 Lbs
status: OK/Man					OK/Man			
				3540 Lbs				Zero
				Zero				
				Zero	Total:	=====	=====	0 0 Gal

Time 7:53:32 AM Date 26 Oct, 1993 TICKET NUMBER: 000210

CONCRETE-READY-MIXED-CORP.

DRYDOKE, VA.

truck no.: 38 Batch no.: 15 Ticket no.: 4047
 batch size: 8.00 Yds. Mix name: 65

			Zero				Zero
7 STONE	0.0	5920	6030 Lbs C	TYPE 1/2	2960	2994 Lbs C	
IMESTON	2.0	6808	6870 Lbs C	FLY ASH	1040	1032 Lbs C	
AGGREGATE	4.0	4366	4470 Lbs C				
5 STONE	0.0	8880	8820 Lbs C				
		=====	=====		=====	=====	
total weight:		25974	26190 Lbs		4000	4026 Lbs	
status: OK/Auto				DT/Auto			
			26250 Lbs			4014 Lbs	

			Zero				
GRAVEL	100	16	16 Oz	WATER	217	149 Gal U	
RTA		160	0 Oz		=====	=====	
ACCEL	0.00	0	0 Oz	Total:	217	149 Gal	
			Zero				

Time 7:58:35 AM Date 26 Oct, 1993 TICKET NUMBER: 000217

Partial batch:

		Zero		Zero

Zero		Total: 0 0 Gal	
Zero			
Time 8:05:09 AM	Date 26 Oct, 1993	TICKET NUMBER: 000217	

CONCRETE-READY-MIXED-CORP.
ROANOKE, VA.

Truck no.: 36 Batch no.: 16 Ticket no.: 4048
Batch size: 8.00 Yds. Mix name: 106

		Zero		Zero	
#7 STONE	0.0	6000	6090 Lbs C	TYPE 1/2	4912 4902 Lbs C
LIMESTON	2.0	6302	6270 Lbs C	FLY ASH	600 606 Lbs C
CASTLE	4.0	3566	3600 Lbs C		
#5 STONE	0.0	8376	8370 Lbs C		
		=====	=====		
Total weight:	24244	24330 Lbs		5512	5508 Lbs
Status: OK/Auto				OK/Auto	
		24330 Lbs			5496 Lbs
		Zero			
DARAVAIR	100	24	26 Oz	WATER	230 169 Gal U
WRDA		180	0 Oz		=====
		Zero		Total:	230 169 Gal

Time 8:16:31 AM Date 26 Oct, 1993 TICKET NUMBER: 000242

CONCRETE-READY-MIXED-CORP.
ROANOKE, VA.

Truck no.: 74 Batch no.: 17 Ticket no.: 4049
Batch size: 8.00 Yds. Mix name: 2

Zero		Zero	

CONCRETE-READY-MIXED-CORP.

ROANOKE, VA.

Truck no.: 74 Batch no.: 17 Ticket no.: 4049
Batch size: 8.00 Yds. Mix name: 2

			Zero			Zero
#7 STONE	0.0	5600	5490 Lbs C	TYPE 1/2	3760	3762 Lbs C
LIMESTON	2.0	7232	7320 Lbs C			
CASTLE	4.0	5058	5100 Lbs C			
#5 STONE	0.0	8480	8580 Lbs C			
		=====	=====		=====	=====
Total weight:		26370	26490 Lbs		3760	3762 Lbs
Status: OK/Auto				OK/Auto		
			26520 Lbs			3768 Lbs

			Zero			Zero
DARAVAIR	50	8	8 Oz C	WATER	222	159 Gal U
DARACCEL	0.00	0	0 Oz		=====	=====
				Total:	222	159 Gal
			Zero			

Time 8:24:48 AM Date 26 Oct, 1993 TICKET NUMBER: 000211

CONCRETE-READY-MIXED-CORP.

ROANOKE, VA.

Truck no.: 35 Batch no.: 18 Ticket no.: 4050
Batch size: 6.50 Yds. Mix name: 34

			Zero			Zero
#7 STONE	0.0	4550	4470 Lbs C	TYPE 1/2	3055	3072 Lbs C
LIMESTON	2.0	8489	8460 Lbs C			
CASTLE	4.0	2369	2310 Lbs C			
#5 STONE	0.0	6890	6810 Lbs C			
		=====	=====		=====	=====
Total weight:		22298	22050 Lbs		3055	3072 Lbs
Status: OK/Auto				OK/Auto		
			22140 Lbs			3066 Lbs

			Zero			Zero
DARACCEL	0.00	0	0 Oz	WATER	202	2 Gal U
					=====	=====
				Total:	202	2 Gal
			Zero			

Time 8:31:43 AM Date 26 Oct, 1993 TICKET NUMBER: 000215

CONCRETE-READY-MIXED-CORP.

ROANOKE, VA.

Truck no.: 67 Batch no.: 19
Batch size: 8.00 Yds. Mix name:

Ticket no.: 4051
106

Zero
#7 STONE 0.0 6000 6060 Lbs C
LIMESTON 2.0 6302 6300 Lbs C
CASTLE 4.0 3566 3510 Lbs C
#5 STONE 0.0 8376 8400 Lbs C
=====
Total weight: 24244 24270 Lbs
Status: OK/Auto
24330 Lbs

Zero
TYPE 1/2 4912 4896 Lbs C
FLY ASH 600 600 Lbs C
=====
5512 5496 Lbs
OK/Auto
5484 Lbs

Zero
DARAVAIR 100 24 28 Oz
WRDA 180 0 Oz
Zero

WATER 230 168 Gal U
=====
Total: 230 168 Gal

Time 8:50:20 AM Date 26 Oct, 1993

TICKET NUMBER: 000244

CONCRETE-READY-MIXED-CORP.

ROANOKE, VA.

Truck no.: 41 Batch no.: 20
Batch size: 5.00 Yds. Mix name:

Ticket no.: 4052
65

Zero
#7 STONE 0.0 5920 5940 Lbs C
LIMESTON 2.0 6808 6810 Lbs C
CASTLE 4.0 4366 4350 Lbs C
#5 STONE 0.0 8880 8820 Lbs C
=====
Total weight: 25974 25920 Lbs
Status: OK/Auto
25890 Lbs

Zero
TYPE 1/2 2960 2970 Lbs C
FLY ASH 1040 1056 Lbs C
=====
4000 4026 Lbs
OK/Auto
4008 Lbs

Zero
DARAVAIR 100 16 16 Oz
WRDA 160 0 Oz
DARACCEL 0.00 0 0 Oz
Not Zero

WATER 217 147 Gal U
=====
Total: 217 147 Gal

Time 9:06:47 AM Date 26 Oct, 1993

TICKET NUMBER: 000256

CONCRETE-READY-MIXED-CORP.
ROANOKE, VA.

Truck no.: 41 Batch no.: 20
Batch size: 8.00 Yds. Mix name:

Ticket no.: 4052
65

			Zero	
#7 STONE	0.0	5920	5940 Lbs C	
LIMESTON	2.0	6808	6810 Lbs C	
CASTLE	4.0	4366	4350 Lbs C	
#5 STONE	0.0	8880	8820 Lbs C	
		=====		
Total weight:		25974	25920 Lbs	
Status: OK/Auto				
			25890 Lbs	

			Zero	
TYPE 1/2		2960	2970 Lbs C	
FLY ASH		1040	1056 Lbs C	
		=====		
		4000	4026 Lbs	
OK/Auto				
			4008 Lbs	

			Zero	
DARAVAIR	100	16	16 Oz	
WRDA		160	0 Oz	
DARACCEL	0.00	0	0 Oz	
			Not Zero	

WATER		217	147 Gal U
		=====	
Total:		217	147 Gal

Time 9:06:47 AM Date 26 Oct, 1993

TICKET NUMBER: 000256

CONCRETE-READY-MIXED-CORP.
ROANOKE, VA.

Truck no.: 70 Batch no.: 21
Batch size: 8.00 Yds. Mix name:

Ticket no.: 4053
40

			Zero	
LIMESTON	2.0	5822	5760 Lbs C	
CASTLE	4.0	3737	3750 Lbs C	
		=====		
Total weight:		9559	9540 Lbs	
Status: OK/Auto				
			6960 Lbs	

			Zero	
TYPE 1/2		2400	2406 Lbs C	
FLY ASH		1650	1638 Lbs C	
		=====		
		4050	4044 Lbs	
OK/Auto				
			4020 Lbs	

Zero

WATER		238	153 Gal U
		=====	
Total:		238	153 Gal

Zero

Time 9:22:32 AM Date 26 Oct, 1993

TICKET NUMBER: 000230

CONCRETE-READY-MIXED-CORP.
ROANOKE, VA.

Truck no.: 70 Batch no.: 21 Ticket no.: 4053

Batch size: 6.00 Yds. Mix name: 40

Zero				Zero			
LIMESTON	2.0	5822	5760 Lbs C	TYPE 1/2	2400	2406 Lbs C	
ASTLE	4.0	3737	3780 Lbs C	FLY ASH	1650	1638 Lbs C	
=====				=====			
Total weight:		9559	9540 Lbs			4050	4044 Lbs
Status: OK/Auto				OK/Auto			
		6960 Lbs				4020 Lbs	
-----				-----			
Zero				WATER			
						238	153 Gal U
						=====	=====
Zero				Total:		238	153 Gal

Time 9:22:32 AM

Date 26 Oct, 1993

TICKET NUMBER: 000230

End Run #1

CONCRETE-READY-MIXED-CORP.
ROANOKE, VA.

Truck no.: 55 Batch no.: 22 Ticket no.: 4054

Batch size: 7.00 Yds. Mix name: 52

Zero				Zero			
7 STONE	0.0	5831	5910 Lbs C	TYPE 1/2	3500	3510 Lbs C	
LIMESTON	2.0	5164	5280 Lbs C	FLY ASH	840	816 Lbs C	
ASTLE	4.0	3310	3270 Lbs C				
5 STONE	0.0	7000	7050 Lbs C				
		=====	=====			=====	=====
Total weight:		21305	21510 Lbs			4340	4326 Lbs
Status: OT/Auto				OK/Auto			
		21510 Lbs				4302 Lbs	

Zero				Zero			
ARAVAIR	100	21	21 Oz C	WATER	211	134 Gal U	
						=====	=====
				Total:		211	134 Gal
Not Zero							

Time 9:29:55 AM

Date 26 Oct, 1993

TICKET NUMBER: 000248

CONCRETE-READY-MIXED-CORP.

ANOKE, VA.

Batch no.: 23
Batch size: 2.00 Yds. Mix name:

Ticket no.: 4055
66

			Zero
STONE	0.0	1480	3690 Lbs M
STONE	2.0	1614	1590 Lbs M
STONE	4.0	1035	1080 Lbs M
		=====	=====
Total weight:		6349	6360 Lbs
Status:			OK/Man
			5420 Lbs

			Zero
TYPE 1/2	900		882 Lbs C
FLY ASH	260		294 Lbs C
		=====	=====
		1160	1176 Lbs
OT/Auto			1152 Lbs

			Zero
FAIR	100	4	4 Oz
		46	46 Oz
ACCEL	1.00	154	170 Oz
			Not Zero

WATER	53		26 Gal U
		=====	=====
Total:	53		26 Gal

Time 9:40:05 AM Date 26 Oct, 1993

TICKET NUMBER: 000252

CONCRETE-READY-MIXED-CORP.

ANOKE, VA.

Batch no.: 24
Batch size: 8.00 Yds. Mix name:

Ticket no.: 4056
106

			Zero
STONE	0.0	6000	5940 Lbs C
STONE	2.0	6302	6180 Lbs C
STONE	4.0	3566	3600 Lbs C
STONE	0.0	8376	8370 Lbs C
		=====	=====
Total weight:		24244	24090 Lbs
Status:			OK/Auto
			24120 Lbs

			Zero
TYPE 1/2	4912		4890 Lbs C
FLY ASH	600		582 Lbs C
		=====	=====
		5512	5472 Lbs
OK/Auto			5454 Lbs

			Zero
FAIR	100	24	26 Oz M
ADA		180	0 Oz M
			Zero

WATER	230		168 Gal U
		=====	=====
Total:	230		168 Gal

Time 9:48:58 AM Date 26 Oct, 1993

TICKET NUMBER: 000245

CONCRETE-READY-MIXED-CORP.
ROANOKE, VA.

Truck no.: 38 Batch no.: 25
Batch size: 6.00 Yds. Mix name:

Ticket no.: 4057
36

			Zero
LIMESTON	2.0	8632	8550 Lbs C
CASTLE	4.0	5875	5940 Lbs C
		=====	=====
Total weight:	14507		14490 Lbs
Status: OK/Auto			14430 Lbs

		Zero
TYPE 1/2	4500	4506 Lbs M
FLY ASH	900	900 Lbs M
	=====	=====
	5400	5406 Lbs
OK/Man		5400 Lbs

Zero

WATER	197	162 Gal U
	=====	=====
Total:	197	162 Gal

Zero

Time 9:59:42 AM Date 26 Oct, 1993

TICKET NUMBER: 000237

*Inlet Run 2
Started*

CONCRETE-READY-MIXED-CORP.
ROANOKE, VA.

Truck no.: 31 Batch no.: 26
Batch size: 6.50 Yds. Mix name:

Ticket no.: 4058
115

			Zero
#7 STONE	0.0	5525	5670 Lbs D
LIMESTON	2.0	5133	5100 Lbs C
CASTLE	4.0	3493	3450 Lbs C
#5 STONE	0.0	6500	6600 Lbs C
		=====	=====
Total weight:	20651		20820 Lbs
Status: DT/Auto			3060 Lbs

		Zero
TYPE 1/2	3016	3006 Lbs M
FLY ASH	754	774 Lbs M
	=====	=====
	3770	3780 Lbs
OK/Man		54 Lbs

Zero

DARAVAIR	100	19	19 Oz C
WRDA		150	150 Oz C

WATER	177	118 Gal U
	=====	=====
Total:	177	118 Gal

Not Zero

Time 10:15:47 AM Date 26 Oct, 1993

TICKET NUMBER: 000267

===== Total weight: 0 0 Lbs Status: OK/Man 2010 Lbs	===== OK/Man Zero
Zero Not Zero	===== Total: 0 0 Gal
Time 10:15:54 AM Date 26 Oct, 1993	TICKET NUMBER: 000267

CONCRETE-READY-MIXED-CORP.

ROANOKE, VA.

Truck no.: 74 Batch no.: 27 Ticket no.: 4059
Batch size: 8.00 Yds. Mix name: 66

Zero #7 STONE 0.0 2960 2880 Lbs C LIMESTON 2.0 3228 3150 Lbs C PORTLE 4.0 2070 1980 Lbs C #5 STONE 0.0 4440 4440 Lbs C ===== Total weight: 12698 12450 Lbs Status: OK/Auto 12390 Lbs	Zero TYPE 1/2 1800 1800 Lbs C FLY ASH 520 534 Lbs C ===== 2320 2334 Lbs OK/Auto 2328 Lbs

Zero BARVAIR 100 8 8 Oz C WFOA 92 92 Oz C WACCEL 0.00 0 0 Oz Not Zero	WATER 109 69 Gal U ===== Total: 109 69 Gal

Time 10:20:56 AM Date 26 Oct, 1993 TICKET NUMBER: 000257

CONCRETE-READY-MIXED-CORP.

ROANOKE, VA.

Truck no.: 69 Batch no.: 28 Ticket no.: 4060
Batch size: 7.50 Yds. Mix name: 65

Zero #7 STONE 0.0 5550 5520 Lbs C LIMESTON 2.0 6382 6360 Lbs C PORTLE 4.0 4093 4080 Lbs C #5 STONE 0.0 8325 8430 Lbs C ===== Total weight: 24350 24390 Lbs Status: OK/Auto 21570 Lbs	Zero TYPE 1/2 2775 2766 Lbs C FLY ASH 975 960 Lbs C ===== 3750 3726 Lbs OK/Auto 3744 Lbs

CONCRETE-READY-MIXED-CORP.

ROANOKE, VA.

Truck no.: 69 Batch no.: 28
Batch size: 7.50 Yds. Mix name:

Ticket no.: 4060
65

			Zero
#7 STONE	0.0	5550	5520 Lbs C
LIMESTON	2.0	6382	6360 Lbs C
CASTLE	4.0	4093	4080 Lbs C
#5 STONE	0.0	8325	8430 Lbs C
		=====	=====
Total weight:		24350	24390 Lbs
Status: OK/Auto			21570 Lbs

		Zero
TYPE 1/2	2775	2766 Lbs C
FLY ASH	975	960 Lbs C
	=====	=====
	3750	3726 Lbs
OK/Auto		3744 Lbs

		Zero
DARAVAIR	100	15
WRDA		150
DARACCEL	2.00	960
		Not Zero

WATER	196	139 Gal U
	=====	=====
Total:	196	139 Gal

Time 10:36:57 AM

Date 26 Oct, 1993

TICKET NUMBER: 000233

CONCRETE-READY-MIXED-CORP.

ROANOKE, VA.

Truck no.: 33 Batch no.: 29
Batch size: 6.00 Yds. Mix name:

Ticket no.: 4061
40

			Zero
LIMESTON	2.0	5822	5850 Lbs C
CASTLE	4.0	3737	3750 Lbs C
		=====	=====
Total weight:		9559	9600 Lbs
Status: OK/Auto			9510 Lbs

		Zero
TYPE 1/2	2400	2400 Lbs C
FLY ASH	1650	1620 Lbs C
	=====	=====
	4050	4020 Lbs
OK/Auto		3990 Lbs

Zero

WATER	238	171 Gal U
	=====	=====
Total:	238	171 Gal

Zero

Time 10:52:30 AM

Date 26 Oct, 1993

TICKET NUMBER: 000231

CONCRETE-READY-MIXED-CORP.

ROANOKE, VA.

Truck no.: 73 Batch no.: 30 Ticket no.: 4062
Batch size: 8.00 Yds. Mix name: 106

Zero				Zero			
#7 STONE	0.0	6000	6180 Lbs D	TYPE 1/2	4912	4502 Lbs M	
LIMESTON	2.0	6302	6360 Lbs C	FLY ASH	600	576 Lbs M	
CASTLE	4.0	3566	3570 Lbs C				
#5 STONE	0.0	8376	8280 Lbs C				
		=====	=====			=====	=====
Total weight:		24244	24390 Lbs			5512	5478 Lbs
Status: OT/Auto				OK/Man			
			24360 Lbs				5484 Lbs

Zero				Zero			
DARAVAIR	100	24	26 Oz	WATER	230	138 Gal U	
WRDA		180	0 Oz		=====	=====	
				Total:	230	138 Gal	
			Zero				

Time 11:09:33 AM Date 26 Oct, 1993 TICKET NUMBER: 000263

CONCRETE-READY-MIXED-CORP.

ROANOKE, VA.

Truck no.: 36 Batch no.: 31 Ticket no.: 4063
Batch size: 6.00 Yds. Mix name: 36

Zero				Zero			
LIMESTON	2.0	5632	5560 Lbs C	TYPE 1/2	4500	4530 Lbs C	
CASTLE	4.0	5875	5940 Lbs C	FLY ASH	900	882 Lbs C	
		=====	=====			=====	=====
Total weight:		14507	14520 Lbs			5400	5412 Lbs
Status: OK/Auto				OK/Auto			
			11460 Lbs				5394 Lbs

Zero				Zero			
				WATER	197	162 Gal U	
					=====	=====	
				Total:	197	162 Gal	
				Zero			

Time 11:18:48 AM Date 26 Oct, 1993 TICKET NUMBER: 000238

CONCRETE-READY-MIXED-CORP.

ROANOKE, VA.

Truck no.: 68 Batch no.: 32
Batch size: 8.00 Yds. Mix name:Ticket no.: 4064
66

			Zero	
#7 STONE	0.0	5180	5070 Lbs C	
LIMESTON	2.0	5649	5670 Lbs C	
CASTLE	4.0	3623	3630 Lbs C	
#5 STONE	0.0	7770	7830 Lbs C	

		Zero	
TYPE 1/2	3150	3132 Lbs C	
FLY ASH	910	888 Lbs C	

	=====	=====	
Total weight:	22222	22200 Lbs	

	=====	=====	
	4060	4020 Lbs	

Status: OK/Auto

22170 Lbs

OK/Auto

4014 Lbs

			Zero	
DARAVAIR	100	14	14 Oz C	
WRDA		162	162 Oz C	
DARACCEL	0.00	0	0 Oz	
			Not Zero	

WATER	191	127 Gal U	
	=====	=====	
Total:	191	127 Gal	

Time 11:30:33 AM

Date 26 Oct, 1993

TICKET NUMBER: 000258

CONCRETE-READY-MIXED-CORP.

ROANOKE, VA.

Truck no.: 52 Batch no.: 33
Batch size: 6.50 Yds. Mix name:Ticket no.: 4065
2

			Zero	
#7 STONE	0.0	4550	4470 Lbs C	
LIMESTON	2.0	5876	5940 Lbs C	
CASTLE	4.0	4105	4140 Lbs C	
#5 STONE	0.0	6890	6900 Lbs C	

		Zero	
TYPE 1/2	3055	3060 Lbs M	

	=====	=====	
Total weight:	21425	21450 Lbs	

	=====	=====	
	3055	3060 Lbs	

Status: OK/Auto

21450 Lbs

OK/Man

3054 Lbs

			Zero	
DARAVAIR	100	13	13 Oz C	
DARACCEL	0.00	0	0 Oz	

WATER	180	128 Gal U	
	=====	=====	
Total:	180	128 Gal	

Zero

Time 11:45:35 AM

Date 26 Oct, 1993

TICKET NUMBER: 000277

CONCRETE-READY-MIXED-CORP.
ROANOKE, VA.

Truck no.: 74 Batch no.: 34
Batch size: 7.00 Yds. Mix name:

Ticket no.: 4066
66

Zero
#7 STONE 0.0 5180 5250 Lbs C
LIMESTON 2.0 5649 5700 Lbs C
CASTLE 4.0 3623 3660 Lbs C
#5 STONE 0.0 7770 7770 Lbs C

Zero
TYPE 1/2 3150 3144 Lbs C
FLY ASH 910 912 Lbs C

=====
Total weight: 22222 22380 Lbs
Status: OK/Auto
22290 Lbs

=====
OK/Auto 4060 4056 Lbs
4062 Lbs

Zero
DARAVAIR 100 14 14 Oz C
WRDA 162 162 Oz C
DARACCEL 0.00 0 0 Oz
Not Zero

WATER 191 0 Gal U
=====
Total: 191 0 Gal

Time 12:06:31 PM Date 26 Oct, 1993

TICKET NUMBER: 000259

CONCRETE-READY-MIXED-CORP.
ROANOKE, VA.

Truck no.: 55 Batch no.: 35
Batch size: 8.00 Yds. Mix name:

Ticket no.: 4067
66

Zero
#7 STONE 0.0 5920 5970 Lbs C
LIMESTON 2.0 6457 6450 Lbs C
CASTLE 4.0 4141 4110 Lbs C
#5 STONE 0.0 2880 2970 Lbs C

Zero
TYPE 1/2 3600 3684 Lbs
FLY ASH 1040 978 Lbs M

=====
Total weight: 25398 25500 Lbs
Status: OK/Auto
25530 Lbs

=====
OK/Man 4640 4662 Lbs
4644 Lbs

Zero
DARAVAIR 100 16 16 Oz C
WRDA 185 185 Oz C
DARACCEL 0.00 0 0 Oz
Not Zero

WATER 219 29 Gal U
=====
Total: 219 29 Gal

Time 12:11:49 PM Date 26 Oct, 1993

TICKET NUMBER: 000250

Inlet Run 2

DARAVAIR	100	16	16 Oz	C	WATER	219	29 Gal	U
WRDA		185	185 Oz	C		=====	=====	
DARACCEL	0.00	0	0 Oz		Total:	219	29 Gal	
			Not Zero					

Time 12:11:49 PM

Date 26 Oct, 1993

TICKET NUMBER: 000250

*Inlet Run 2
stopped*

CONCRETE-READY-MIXED-CORP.
ROANOKE, VA.

Truck no.: 35 Batch no.: 36 Ticket no.: 4068
Batch size: 7.00 Yds. Mix name: 64

#7 STONE	0.0	5180	5100 Lbs	C	TYPE 1/2	2030	2010 Lbs	C
LIMESTON	2.0	6257	6240 Lbs	C	FLY ASH	910	894 Lbs	C
CASTLE	4.0	4010	4110 Lbs	C				
#5 STONE	0.0	7770	7770 Lbs	C				
		=====	=====			=====	=====	
Total weight:		23217	23280 Lbs			2940	2904 Lbs	
Status: OK/Auto					OK/Auto			
			23280 Lbs				2892 Lbs	

DARAVAIR	100	14	14 Oz	C	WATER	188	120 Gal	U
WRDA		117	117 Oz	C		=====	=====	
DARACCEL	0.00	0	0 Oz		Total:	188	120 Gal	
			Not Zero					

Time 12:16:37 PM

Date 26 Oct, 1993

TICKET NUMBER: 000274

CONCRETE-READY-MIXED-CORP.
ROANOKE, VA.

Truck no.: 38 Batch no.: 37 Ticket no.: 4069
Batch size: 6.50 Yds. Mix name: 2

#7 STONE	0.0	4550	4440 Lbs	C	TYPE 1/2	3055	3054 Lbs	C
LIMESTON	2.0	5876	5850 Lbs	C				
CASTLE	4.0	4109	4080 Lbs	C				
#5 STONE	0.0	6890	6870 Lbs	C				
		=====	=====			=====	=====	
Total weight:		21425	21240 Lbs			3055	3054 Lbs	
Status: OK/Auto					OK/Auto			

NOKE, VA.

ck no.: 38 Batch no.: 37
ch size: 6.50 Yds. Mix name:

Ticket no.: 4069
2

Zero
STONE 0.0 4550 4440 Lbs C
ESTON 2.0 5876 5850 Lbs C
ELE 4.0 4109 4080 Lbs C
STONE 0.0 6890 6870 Lbs C

=====
al weight: 21425 21240 Lbs
us: OK/Auto
21120 Lbs

Zero
TYPE 1/2 3055 3054 Lbs C
=====
3055 3054 Lbs
OK/Auto
3036 Lbs

Zero
VAIR 100 13 13 Oz C
ACCEL 0.00 0 0 Oz

Zero

WATER 180 0 Gal U
=====
Total: 180 0 Gal

12:28:42 PM

Date 26 Oct, 1993

TICKET NUMBER: 000278

*Inlet Run 3
Started*

CRETE-READY-MIXED-CORP.

NOKE, VA.

ck no.: 39 Batch no.: 38
ch size: 4.00 Yds. Mix name:

Ticket no.: 4070
40

Zero
ESTON 2.0 3881 3840 Lbs C
ELE 4.0 2497 2460 Lbs C
=====

al weight: 6372 6300 Lbs
us: OK/Auto
6270 Lbs

Zero
TYPE 1/2 1600 1590 Lbs C
FLY ASH 1100 1080 Lbs C
=====
2700 2670 Lbs
OK/Auto
2652 Lbs

Zero

WATER 158 126 Gal U
=====
Total: 158 126 Gal

Zero

12:50:22 PM

Date 26 Oct, 1993

TICKET NUMBER: 000289

CONCRETE-READY-MIXED-CORP.
ROANOKE, VA.

Truck no.: 33 Batch no.: 39
Batch size: 7.00 Yds. Mix name:

Ticket no.: 4071
64

			Zero	
#7 STONE	0.0	5180	12930 Lbs M	
LIMESTON	2.0	6257	6270 Lbs C	
CASTLE	4.0	4010	4110 Lbs M	
#5 STONE	0.0	7770	0 Lbs	
		=====	=====	
Total weight:		23217	23310 Lbs	
Status: OT/Man			18870 Lbs	

			Zero	
TYPE 1/2	2030		2010 Lbs C	
FLY ASH	910		888 Lbs C	
		=====	=====	
		2940	2898 Lbs	
OK/Auto			2898 Lbs	

			Zero	
DARAVAIR	100	14	14 Oz C	
WRDA		117	117 Oz C	
DARACCEL	0.00	0	0 Oz	
			Not Zero	

			Zero	
WATER	188		0 Gal U	
		=====	=====	
Total:	188		0 Gal	

Time 1:13:33 PM Date 26 Oct, 1993

TICKET NUMBER: 000275

1/26 Run 3 started

CONCRETE-READY-MIXED-CORP.
ROANOKE, VA.

Truck no.: 29 Batch no.: 40
Batch size: 8.00 Yds. Mix name:

Ticket no.: 4072
64

			Zero	
#7 STONE	0.0	5920	5850 Lbs C	
LIMESTON	2.0	6457	6450 Lbs C	
CASTLE	4.0	4141	4170 Lbs C	
#5 STONE	0.0	3880	8750 Lbs C	
		=====	=====	
Total weight:		25398	25260 Lbs	
Status: OK/Auto			25200 Lbs	

			Zero	
TYPE 1/2	3600		3600 Lbs C	
FLY ASH	1040		1008 Lbs C	
		=====	=====	
		4640	4608 Lbs	
OK/Auto			4578 Lbs	

			Zero	
DARAVAIR	100	16	16 Oz C	
WRDA		185	185 Oz C	
DARACCEL	0.00	0	0 Oz	
			Not Zero	

			Zero	
WATER	219		0 Gal U	
		=====	=====	
Total:	219		0 Gal	

Time 1:19:52 PM Date 26 Oct, 1993

TICKET NUMBER: 000251

CONCRETE-READY-MIXED-CORP.
ROANOKE, VA.

Truck no.: 73 Batch no.: 41 Ticket no.: 4073
Batch size: 7.00 Yds. Mix name: 54

Zero
#7 STONE 0.0 5180 5400 Lbs O
LIMESTON 2.0 6257 6330 Lbs C
CASTLE 4.0 4010 4020 Lbs C
#5 STONE 0.0 7770 7770 Lbs C

=====
Total weight: 23217 23520 Lbs
Status: OT/Auto
23490 Lbs

Zero
TYPE 1/2 2030 2028 Lbs C
FLY ASH 910 906 Lbs C

=====
2940 2934 Lbs
OK/Auto
2898 Lbs

Zero
DARAVAIR 100 14 14 Oz C
WRDA 117 117 Oz C
DARACCEL 0.00 0 0 Oz
Not Zero

WATER 188 0 Gal U
=====
Total: 188 0 Gal

Time 1:28:06 PM Date 26 Oct, 1993 TICKET NUMBER: 000276

CONCRETE-READY-MIXED-CORP.
ROANOKE, VA.

Truck no.: 35 Batch no.: 42 Ticket no.: 4074
Batch size: 6.00 Yds. Mix name: 56

Zero
#7 STONE 0.0 4440 4470 Lbs C
LIMESTON 2.0 4842 4770 Lbs C
CASTLE 4.0 3106 3060 Lbs C
#5 STONE 0.0 6660 6630 Lbs C

=====
Total weight: 19048 18930 Lbs
Status: OK/Auto
18930 Lbs

Zero
TYPE 1/2 2700 2742 Lbs O
FLY ASH 780 768 Lbs C

=====
3480 3510 Lbs
OT/Auto
3498 Lbs

Zero
DARAVAIR 100 12 12 Oz
WRDA 139 139 Oz
DARACCEL 2.00 924 950 Oz
Not Zero

WATER 157 91 Gal U
=====
Total: 157 91 Gal

Time 1:40:47 PM Date 26 Oct, 1993 TICKET NUMBER: 000283

CONCRETE-READY-MIXED-CORP.
ROANOKE, VA.

Truck no.: 36 Batch no.: 43
Batch size: 4.00 Yds. Mix name:

Ticket no.: 4075
106

Zero
#7 STONE 0.0 3000 2910 Lbs C
LIMESTON 2.0 3151 3150 Lbs C
CASTLE 4.0 1783 1800 Lbs C
#5 STONE 0.0 4188 4200 Lbs C
=====

Total weight: 12122 12060 Lbs
Status: OK/Auto
12000 Lbs

Zero
TYPE 1/2 2456 2448 Lbs C
FLY ASH 300 306 Lbs C
=====

2756 2754 Lbs
OK/Auto
2730 Lbs

Zero
DARAVAIR 100 12 12 Oz
WRDA 90 0 Oz
Not Zero

WATER 115 0 Gal U
=====

Total: 115 0 Gal

Time 1:58:47 PM Date 26 Oct, 1993

TICKET NUMBER: 000295

CONCRETE-READY-MIXED-CORP.
ROANOKE, VA.

Truck no.: 52 Batch no.: 44
Batch size: 6.50 Yds. Mix name:

Ticket no.: 4076
2

Zero
#7 STONE 0.0 3550 4710 Lbs C
LIMESTON 2.0 5870 5910 Lbs C
CASTLE 4.0 4109 4170 Lbs C
#5 STONE 0.0 6850 6950 Lbs C
=====

Total weight: 21428 21750 Lbs
Status: BT/Auto
21690 Lbs

Zero
TYPE 1/2 3055 3048 Lbs M
=====

3055 3048 Lbs
OK/Man
3048 Lbs

Zero
DARAVAIR 100 13 13 Oz C
DARACCEL 0.00 0 0 Oz
Not Zero

WATER 180 122 Gal U
=====

Total: 180 122 Gal

Time 2:05:11 PM Date 26 Oct, 1993

TICKET NUMBER: 000280

1992nd 8
1/5

TE-READY-MIXED-CORP.
E, VA.

no.: 71 Batch no.: 45
size: 5.00 Yds. Mix name:

Ticket no.: 4077
96

Zero
4.0 4494 4470 Lbs C
=====
weight: 4494 4470 Lbs
: OK/Auto
4470 Lbs

Zero
TYPE 1/2 2100 2340 Lbs M
FLY ASH 550 558 Lbs M
=====
2650 2898 Lbs
OK/Man
2928 Lbs

Zero
IR 100 10 15 Oz
EL 0.00 0 0 Oz
Zero

WATER 128 0 Gal U
=====
Total: 128 0 Gal

2:17:29 PM

Date 26 Oct, 1993

TICKET NUMBER: 000286

TE-READY-MIXED-CORP.
E, VA.

no.: 31 Batch no.: 46
size: 6.50 Yds. Mix name:

Ticket no.: 4078
84

Zero
ONE 0.0 4610 4660 Lbs C
ON 2.0 5810 5820 Lbs C
4.0 3723 3750 Lbs C
ONE 0.0 7215 7290 Lbs C
=====
weight: 21556 21720 Lbs
: OK/Auto
21570 Lbs

Zero
TYPE 1/2 1885 1872 Lbs C
FLY ASH 845 864 Lbs C
=====
2730 2736 Lbs
OK/Auto
2748 Lbs

Zero
AIR 100 13 13 Oz C
109 109 Oz C
DEL 0.00 0 0 Oz
Not Zero

WATER 175 109 Gal U
=====
Total: 175 109 Gal

*Manually added
4250 lb petekburg sand
7075 lb #7 stone
prior to materials
shown
no VE from
either
station*

CONCRETE-READY-MIXED-CORP.

ROANOKE, VA.

Truck no.: 31 Batch no.: 46

Ticket no.: 4078

Batch size: 6.50 Yds. Mix name:

64

			Zero
#7 STONE	0.0	4810	4860 Lbs C
LIMESTON	2.0	5810	5820 Lbs C
CASTLE	4.0	3723	3750 Lbs C
#5 STONE	0.0	7215	7290 Lbs C

		=====	=====
Total weight:	21558	21720	Lbs

Status: OK/Auto

21570 Lbs

		Zero
TYPE 1/2	1885	1872 Lbs C
FLY ASH	845	864 Lbs C

	=====	=====
	2730	2736 Lbs

OK/Auto

2748 Lbs

			Zero
DARAVAIR	100	13	13 Oz C
WRDA		109	109 Oz C
DARACCEL	0.00	0	0 Oz

Not Zero

WATER	175	109 Gal U

	=====	=====
Total:	175	109 Gal

Time 2:21:31 PM

Date 26 Oct, 1993

TICKET NUMBER: 000297

CONCRETE-READY-MIXED-CORP.

ROANOKE, VA.

Truck no.: 41 Batch no.: 47

Ticket no.: 4079

Batch size: 5.00 Yds. Mix name:

66

			Zero
#7 STONE	0.0	3700	9240 Lbs M
LIMESTON	2.0	4035	4020 Lbs M
CASTLE	4.0	2588	2610 Lbs M
#5 STONE	0.0	5550	0 Lbs

		=====	=====
Total weight:	15873	15870	Lbs

Status: OK/Man

15810 Lbs

		Zero
TYPE 1/2	2250	2244 Lbs C
FLY ASH	650	642 Lbs C

	=====	=====
	2900	2886 Lbs

OK/Auto

2856 Lbs

			Zero
DARAVAIR	100	10	10 Oz C
WRDA		116	116 Oz C
DARACCEL	0.00	0	0 Oz

Not Zero

WATER	136	0 Gal U

	=====	=====
Total:	136	0 Gal

Time 2:28:03 PM

Date 26 Oct, 1993

TICKET NUMBER: 000293

CONCRETE-READY-MIXED-CORP.

ROANOKE, VA.

Truck no.: 38 Batch no.: 48

Batch size: 6.50 Yds. Mix name:

Ticket no.: 4080

52

			Zero	
#7 STONE	0.0	5414	5550 Lbs	0
LIMESTON	2.0	4795	4860 Lbs	C
CASTLE	4.0	3073	3120 Lbs	C
#5 STONE	0.0	6500	6390 Lbs	C

Total weight: 19782 19920 Lbs
Status: OT/Auto

19890 Lbs

		Zero
TYPE 1/2	3250	3426 Lbs
FLY ASH	780	0 Lbs

OT/Man 4030 3426 Lbs
4038 Lbs

			Zero	
DARAVAIR	100	19	19 Oz	C

Zero

WATER	196	126 Gal
	=====	=====
Total:	196	126 Gal

Time 2:32:13 PM

Date 26 Oct, 1993

TICKET NUMBER: 000302

CONCRETE-READY-MIXED-CORP.

ROANOKE, VA.

Truck no.: 53 Batch no.: 49

Batch size: 5.00 Yds. Mix name:

Ticket no.: 4081

56

			Zero	
#7 STONE	0.0	3700	3660 Lbs	C
LIMESTON	2.0	4035	4020 Lbs	C
CASTLE	4.0	2568	2640 Lbs	C
#5 STONE	0.0	5550	5490 Lbs	C

Total weight: 15873 15810 Lbs
Status: OK/Auto

15900 Lbs

		Zero
TYPE 1/2	2250	2226 Lbs
FLY ASH	650	624 Lbs

OK/Auto 2900 2850 Lbs
2844 Lbs

			Zero	
DARAVAIR	100	10	10 Oz	C
WRDA		116	116 Oz	C
DARACCEL	0.00	0	0 Oz	

Not Zero

WATER	136	84 Gal
	=====	=====
Total:	136	84 Gal

Time 2:41:35 PM

Date 26 Oct, 1993

TICKET NUMBER: 000294

Inlet Run #3 stopped

CONCRETE-READY-MIXED-CORP.

ROANOKE, VA.

Truck no.: 33 Batch no.: 50

Ticket no.: 4082

Batch size: 6.50 Yds. Mix name:

52

#7 STONE	0.0	5414	Zero	5520 Lbs C
LIMESTON	2.0	4795		4770 Lbs C
CASTLE	4.0	3073		3150 Lbs C
#5 STONE	0.0	6500		6570 Lbs C

Total weight: 19782 20010 Lbs

Status: OT/Auto

19950 Lbs

TYPE 1/2	3250	Zero	3282 Lbs M
FLY ASH	780		774 Lbs M

=====	=====
4030	4056 Lbs

OK/Man

4062 Lbs

DARAVAIR	100	19	Zero	19 Oz C

Zero

WATER	196		90 Gal U

Total:	196		90 Gal

Time 2:53:46 PM

Date 26 Oct, 1993

TICKET NUMBER: 000303

CONCRETE-READY-MIXED-CORP.

ROANOKE, VA.

Truck no.: 74 Batch no.: 51

Ticket no.: 4083

Batch size: 6.50 Yds. Mix name:

64

#7 STONE	0.0	4810	Zero	4580 Lbs M
LIMESTON	2.0	5810		0 Lbs
CASTLE	4.0	3723		0 Lbs
#5 STONE	0.0	7215		0 Lbs

Total weight: 21558 4980 Lbs

Status: OK/Man

4980 Lbs

TYPE 1/2	1885	Zero	12 Lbs
FLY ASH	845		0 Lbs

=====	=====
2730	12 Lbs

OK/Man

Zero

DARAVAIR	100	13	Zero	13 Oz C
WRDA		109		109 Oz C
DARACCEL	0.00	0		0 Oz

Not Zero

WATER	175		70 Gal U

Total:	175		70 Gal

Time 3:03:59 PM

Date 26 Oct, 1993

TICKET NUMBER: 000300

IN RETE-READY-MIXED-CORP.

DANOKRE, VA.

Truck no.: 41 Batch no.: 52
Batch size: 1.50 Yds. Mix name:

Ticket no.: 4084
66

Zero
TONE 0.0 1110 2850 Lbs M
MLSTON 2.0 1210 1170 Lbs M
STLE 4.0 776 780 Lbs M
=====

Total weight: 4761 4800 Lbs
Status: OK/Man
4860 Lbs

Zero
TYPE 1/2 675 666 Lbs C
FLY ASH 195 180 Lbs C
=====

870 846 Lbs
OK/Auto
822 Lbs

Zero
AIR VAIR 100 3 3 Oz C
ED 34 34 Oz C
RACCEL 0.00 0 0 Oz
Not Zero

WATER 41 22 Gal U
=====
Total: 41 22 Gal

Time 3:54:22 PM Date 26 Oct, 1993

TICKET NUMBER: 000306

IN RETE-READY-MIXED-CORP.

DANOKRE, VA.

Truck no.: 41 Batch no.: 53
Batch size: .25 Yds. Mix name:

Ticket no.: 4085
65

Zero
Total weight: 810 0 Lbs
Status: OK/Man
Zero

Zero
===== 124 0 Lbs
OK/Man
Zero

Zero
AIR VAIR 100 0 0 Oz
RDA 5 0 Oz
RACCEL 0.00 0 0 Oz
Zero

WATER 6 9 Gal U
=====
Total: 6 9 Gal

Time 3:58:28 PM Date 26 Oct, 1993

TICKET NUMBER:

OCTOBER 27, 1993
INLET RUNS 4, 5 & 6
OUTLET RUN 3

10/27/93

① Outlet run started at 7:30±
Inlet sampling run started at 7:45

Truck # 56

first water @ 7:45 10

collection eff 90%

last water 7:49 30

Truck 69

7:50

1st water @ 7:53 30

collection efficiency 90%

last water 7:57 15

wind is very
light from left side
of alley. dust
was carried to right front of
truck

Truck # 31

7:57 stopped at spout for #7 stone

loaded 8718 lbs of stone

4368 lb of #20 sand
Isburg

② 7:59 moved to concrete loading station

1st water @ 8:01 10

capture efficiency 85%

last water 8:03 50

no perceptible
wind but dust
carried to front of
truck

Truck 55 @ 8:04

1st water 8:06 45

capture efficiency 80-90%

last water 8:10 45

10/27/93

(2)

Cement truck arrived to deliver to Erie plant

Truck #23 @ 8:11

1st water @ 8:14 02

capture efficiency 70%

last water 8:16 15

no perceptible
wind - dust splashed
from truck drifted
very slowly to left
rear of truck
anemometer not turning

Truck #74 @ 8:16

1st water @ 8:18 40

capture efficiency 80%

last water 8:20 25

Truck hopper filled
to overflowing at start
of load, material spilled
on ground

Truck #69 @ 9:08

1st water 9:13 55

capture efficiency 95%

last water 9:18 10

wind very light
to the East (rear of
truck) anemometer
turning some 100' during
load

Truck #41 @ 9:18 stopped @ #7 stone delivery
point

received 5660 lbs of #7 stone

received 3400 lbs of ~~per~~ stone petersburgs

@ 9:19 moved to concrete delivery point

1st water @ 9:23 43

capture efficiency 90%

last water 9:26 10

10/27/93

③

Truck 71 @ 9:24 stopped at pea gravel
load point
received 4368 16 g ^{Petersburg sand} ~~gravel~~
moved to #9 stone load point at 9:27
received 8718 16 g #9 stone
moved to concrete load point @ 9:28

1st water @ 9:29 25 some splashing
capture efficiency 80% ^{of cement from} truck loading point
last water 9:31 50 no perceptible wind
dust hung in air but
firmly moved toward
front of truck (west)

Truck #68

9:32 stopped @ pea gravel location

at 9:33 received 4368 16s g ^{Petersburg sand} ~~gravel~~
moved to #9 stone location
received 8718 16s g #9 stone

at 9:35 moved to concrete loading location

1st water @ 9:36 55
capture efficiency 80%
last water 9:38 50

wind is blowing
very light to the
west (front of truck)
anemometer is moving
slightly before 1st water
did not move any during
dry batching

Truck #56 @ 9:40

1st water 9:41 05
collection efficiency 70%
last water 9:43 30

dust splashed out of truck
loading hopper and was
carried away very slowly
to the east

10/27/93

(4)

Inlet sampling stopped @ 9:44

Inlet sampling began @ 10:21

Truck 35 @ 9:20

loaded 4368

165 of petersburg sand and

8718

165 of #7 stone

1st water 9:21 20

capture efficiency 90%

last water 9:24 50

dust which was spit
out of truck loading spout
was carried east by very
light winds anemometer
was not moving
at end of dry batch
wind carried dust west

Truck #31 @ 10:30

1st water @ 10:35 23

capture efficiency 80%

last water 9:37 10

dust splattered out
of loading spout of truck
and out of drum. wind
carried it east northeast
anemometer was
turning at end of load
about 50 ft of air movement
recorded (west wind)

Truck #69 @ 10:39

1st water 10:41 17

capture efficiency 90%

last water 9:44 40

10/27/83

(5)

Truck #56 @ 10:45

1st water

capture efficiency 90%

1st water

dry material delivered
before 1st water -
no water delivered
brownish orange liquid
from small (1") hoses was
released at end of load miss
truck loading spout

Truck #54 @ 10:50

1st water - 10:52 30

capture efficiency 90%

next to 1st water ~~10:55 42~~
last → 10:56.22

wind was perceptible
blowing to the west
anemometer indicator
a 200' difference during
change

Truck #68 @ 11:09

1st water 11:13 13

capture efficiency 80%

1st water 11:16 40

wind speed was
light during dry loading
dust blown from truck
loading hopper and drum
carried to front of truck

Truck #41 @ 11:17

1st water 11:21 02

capture efficiency 80%

1st water 11:25 25

10/27/93

⑥

Truck #36 @ 11:26

1st water 11:33 26

capture efficiency 90%

1st water 11:36 30

wind velocity
during dry loading,
was light but turned
the anemometer about
300 ft during dry
matl xfer.

Truck #74 @ 11:37

1st water 11:37 37

capture efficiency

no dry material

1st water

Truck #33 @ 11:40

1st water @

capture efficiency 95% dry material first

1st water @ 11:42 45

Truck #73 @ 11:45

1st water 11:47 38

capture efficiency 80%

1st water 11:51 or

Truck #74 @ 11:53

1st water @ 11:54 42

capture efficiency 90%

1st water @ 11:55 45

10/27/93

⑦

Fly ash delivery truck began loading
into silo @ 11:55 ±

Cement delivery truck @ Erie silo @
12:22

End inlet run at 12:24

At 12:30 two rectangles of paved roadway
on the plant site where mixer trucks travel were
swept clean of accumulated road dust. This area
was washed clean the previous evening using clean
water from one of the trucks.

one of the rectangles measured
17' 5" X 14' 0"
the other rectangle measured
19' 10" X 14' 0"

it was estimated that 5 pounds of predominantly
fine material was swept up

Inlet run started @ 13:12

Truck # 60

estimated capture 70%
last water @ 1:17 13

wind velocity increased
to moderate - flag across
street is at 45° at top and
almost horizontal at bottom
dust from drums was
carried away from hood
system toward front of truck

10/27/93

(8)

③ 13:24

wind velocity was measured at

100 ft / 28.87 sec

flag was flying free

Truck #3 @ 1330

1st water @ 13:32 40

wind velocity during
dry transfer makes flag
fly free and is from west

capture efficiency 40%

last water 13:36 20

much of the dust from the
truck drum is carried away
by the wind gusts

Truck #54 @ 13:38 - backed up for other sand &
gravel

1st water 13:44 07

capture efficiency 40%

last water 13:46 48

small dust from drum
is carried away
by wind

↑
6000 16 ~~petersburg sand~~ ?
16 #7 ~~stone~~ dark castle
Truck #36 13:47 @ 1st station

2975

16 petersburg sand

4953

16 #7 stone

1st water @ 13:53 45

estimated capture 30%

last water 13:56 30

wind 100' in 41.11 sec

200' in 1' 29.24 sec

400' in 1' 39.29 sec

Truck #33 @ 14:02

1st water none

estimated capture 70%

last water 14:06 or

anemometer went past
zero @ 14:03

Truck #56 @

6000 # dark castle

1st water 14:17 02

estimated capture 30%

last water 14:21 10

7/27/93

(9)

Truck 41 @ 14:22

218.4 # of Petersburg^{2nd} @ station 1
4404 # of #1 @ station 2

1st water @ 14:25 20

estimated capture 50%

last water 14:27 25

Truck #84 @ 14:35

1st water @ 14:38 or

estimated capture 70%

last water 14:42 30

wind from west

A at 6300 @ t=0

7200 5:42 00

Truck #68 @ 14:47

1st water @ 14:49 39

estimated capture 70%

last water 14:53 or

Ann @ 8400 @ t=0

8715 @ t=2:12 71

393 ft m 2'12" 71

dust carried down center of drive

noticed cement truck unloading @ Erie silo @ 14:45

finished unloading @ 14:55 (tunnel blower off)

Truck #31 @ 15:00

Ann @ 0275 @ t=0

0450 t=49.02

185 ft m 49.02

1st water @ 15:03 47

estimated capture 80%

last water at 15:04 50

Anemometer passed zero @ 15:02 04 2nd time

Truck #36 @ 15:08

1st water 15:13 40

estimated capture

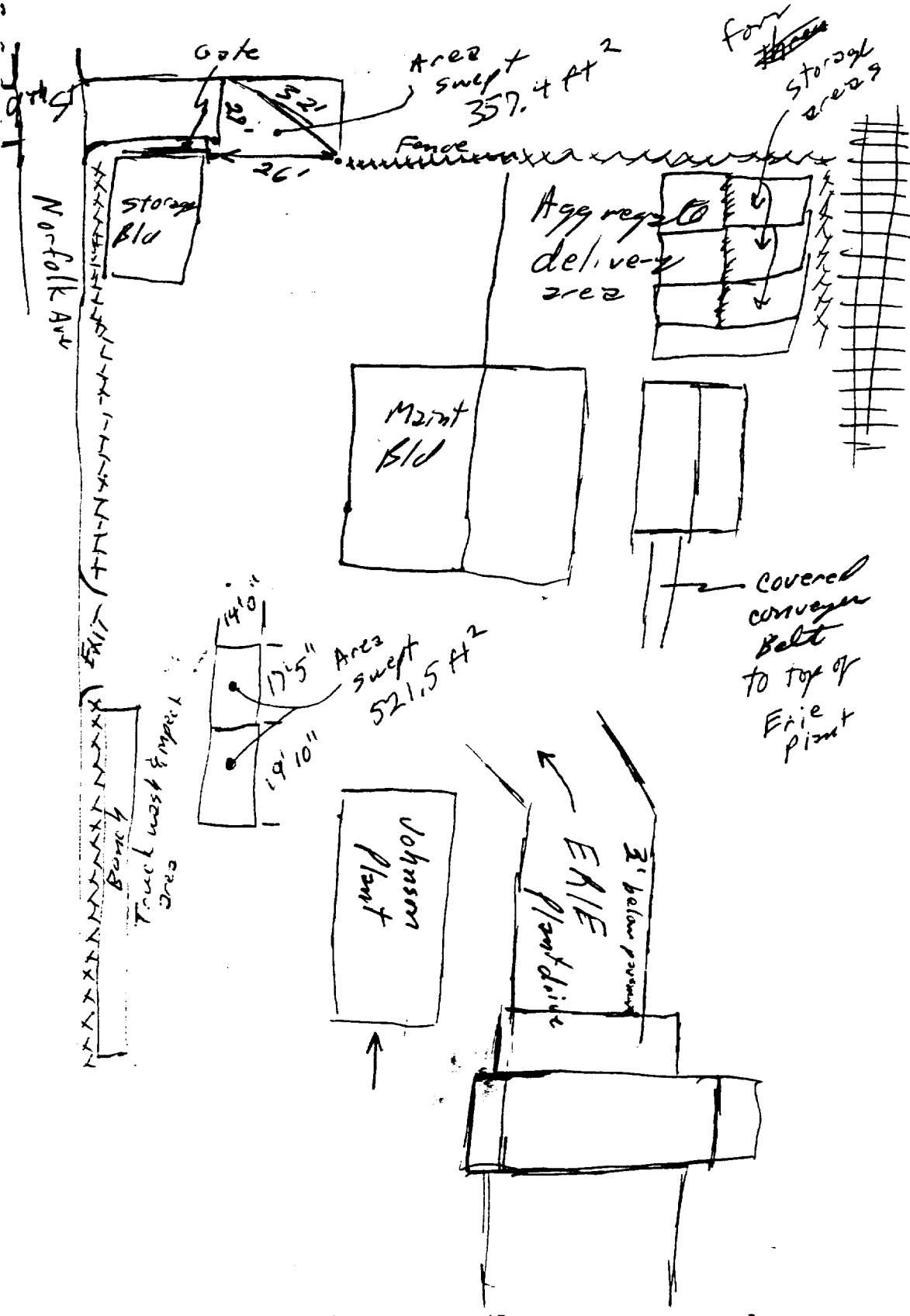
last water

sampling stopped
prior to dry material
loading

inlet spl stopped at 15:14

At 1530 on 10/21/90

A 26' x 29' x 32' sided triangle of pavement
at exit of plant site
was swept clean of accumulated dust



concrete ready mixed corp., fuarlike, va

Inlet Run 4

Truck Number	Batch Number	Batch Size Yards	Ticket Time H:M:S A/P	Estimated Actual Time H:M:A/P	Chute One Material	Precharged Material		Course Aggregate #5 & 7 lbs	Limestone Sand lbs	Castle Sand lbs	Portland Cement lbs	Fly Ash lbs	Addmix OZ	Water Indicated Requested Gal	Indicated Delivered Gal	Estimated Capture Efficiency percent
						lbs	Chute Two Material									
56	6	8	07:04:22 AM	07:43 AM				14,800	6,808	4,366	3,066	960	176	217	2	90%
69	7	8	07:13:10 AM	07:52 AM				14,800	6,808	4,366	2,960	1,040	1,200	209	152	90%
31	8	6	07:20:37 AM	07:59 AM	#7 stone	Pete Sand	4,368	0	0	4,612	3,078	720	18	157	0	75%
55	9	7	07:28:44 AM	08:07 AM				12,950	6,599	4,491	3,290	0	0	214	167	85%
73	10	3.25	07:34:47 AM	08:13 AM				6,012	2,765	1,773	1,182	420	71	88	61	70%
74	11	2	07:39:09 AM	08:18 AM				0	3,570	2,400	1,728	0	0	89	52	80%
69	12	6	08:34:19 AM	09:13 AM				11,250	5,280	3,360	2,292	702	912	156	117	95%
41	13	4	08:43:10 AM	09:22 AM	#7 stone	Pete Sand	3,400	0	0	3,660	1,860	438	12	102	64	90%
71	14	6	08:49:10 AM	09:28 AM	#7 stone	Pete Sand	4,368	0	0	4,680	3,084	666	18	157	99	80%
68	15	6	08:56:25 AM	09:35 AM	#7 stone	Pete Sand	4,368	0	0	4,680	3,030	708	18	157	0	80%
56	16	5.25	09:00:37 AM	09:39 AM				9,600	4,410	2,790	2,028	594	115	142	0	70%
TOTALS		61.5					31,814	69,412	36,240	41,178	27,598	6,248	2,540	1,688	714	
												Unweighted Average				82%
												Weighted Average (concrete)				83%
												Weighted Average (cement & Fly Ash)				83%

Inlet Run 5

[illegible]

Inlet Run 6

[illegible]

10/27/93

Concrete Ready Mixed Corp., Roanoke, VA

Truck Number	Batch Number	Batch Size Yards	Time		Precharged Material			Course Aggregate #5 & 7 lbs	Limestone Sand lbs	Castle Sand lbs	Portland Cement lbs	Fly Ash lbs	Addmix OZ	Water		Estimated Capture Efficiency percent
			Indicated on Batch Log H:M:S A/P	Estimated Actual H:M A/P	Chute One Material	Chute Two Material	Indicated Requested Gal							Delivered Gal		
Johnson Plant Totals for the day.																
77																
Erie Plant Production prior to Outlet Run #3 start																
41	1	5	06:25:04 AM	07:04 AM	#7 stone	Pete Sand	4,250 ±	0	0	4,650	2,322	570	15	128	0	
71	2	6	06:35:52 AM	07:14 AM	#7 stone	Pete Sand	4,368 ±	0	0	4,590	3,030	714	18	157	98	
68	3	6	06:43:36 AM	07:22 AM	#7 stone	Pete Sand	4,368 ±	0	0	4,590	3,126	618	18	157	0	
35	4	6	06:50:28 AM	07:29 AM	#7 stone	Pete Sand	4,368 ±	0	0	4,620	3,090	642	18	157	0	
56	5	7	06:58:37 AM	07:37 AM				12,960	6,660	4,470	3,378	0	0	214	153	
56	6	8	07:04:22 AM	07:43 AM				14,800	6,808	4,366	3,066	960	176	217	2	90%
Outlet Run 3																
69	7	8	07:13:10 AM	07:52 AM	#7 stone	Pete Sand	4,368	14,800	6,808	4,366	2,960	1,040	1,200	209	152	90%
31	8	6	07:20:37 AM	07:59 AM	#7 stone	Pete Sand	4,368	0	0	4,612	3,078	720	18	157	0	75%
55	9	7	07:28:44 AM	08:07 AM	#7 stone	Pete Sand	4,368	12,950	6,599	4,491	3,290	0	0	214	167	85%
73	10	3.25	07:34:47 AM	08:13 AM	#7 stone	Pete Sand	4,368	6,012	2,765	1,773	1,182	420	71	88	61	70%
74	11	2	07:39:09 AM	08:18 AM	#7 stone	Pete Sand	4,368	0	3,570	2,400	1,728	0	0	89	52	80%
69	12	6	08:34:19 AM	09:13 AM	#7 stone	Pete Sand	3,400	11,250	5,280	3,360	2,292	702	912	156	117	95%
41	13	4	08:43:10 AM	09:22 AM	#7 stone	Pete Sand	4,368	0	0	4,680	3,084	666	18	157	99	90%
71	14	6	08:49:10 AM	09:28 AM	#7 stone	Pete Sand	4,368	0	0	4,680	3,030	708	18	157	0	80%
68	15	6	08:56:25 AM	09:35 AM	#7 stone	Pete Sand	4,368	0	0	4,680	3,030	708	18	157	0	70%
56	16	5.25	09:00:37 AM	09:39 AM	#7 stone	Pete Sand	4,368	9,600	4,410	2,790	2,028	594	115	142	0	
73	17	7.5	09:12:13 AM	09:51 AM	#7 stone	Pete Sand	4,368	13,920	6,690	4,260	2,184	954	141	202	146	
55	18	6	09:20:05 AM	09:59 AM	#7 stone	Pete Sand	4,368	11,160	5,040	3,270	2,226	786	132	162	102	
38	19	5	09:29:02 AM	10:08 AM	#7 stone	Pete Sand	4,368	9,300	3,630	2,340	2,634	744	15	151	108	
35	20	6	09:42:10 AM	10:21 AM	#7 stone	Pete Sand	4,368	0	0	4,680	2,976	708	18	157	0	90%
31	21	2.5	09:55:01 AM	10:34 AM	#7 stone	Pete Sand	4,368	4,620	2,190	1,560	810	282	47	67	28	80%
69	22	8.5	10:00:49 AM	10:39 AM	#7 stone	Pete Sand	4,368	14,250	6,600	4,170	2,856	1,002	170	210	140	90%
56	23	0.5	10:07:37 AM	10:46 AM	#7 stone	Pete Sand	4,368	870	390	270	186	72	11	13	0	90%
54	24	7.5	10:12:00 AM	10:51 AM	#7 stone	Pete Sand	4,368	13,830	6,720	4,230	2,142	960	141	202	146	90%
68	25	4.25	10:33:24 AM	11:12 AM	#7 stone	Pete Sand	4,368	7,830	3,330	2,310	1,758	456	93	115	77	80%
41	26	6	10:42:08 AM	11:21 AM	#7 stone	Pete Sand	4,368	11,190	5,130	3,240	2,214	780	893	156	107	80%
36	27	4	10:52:59 AM	11:31 AM	#7 stone	Pete Sand	4,368	7,650	3,300	2,070	1,788	546	100	109	0	90%
33	28	1	11:01:25 AM	11:40 AM	#7 stone	Pete Sand	4,368	1,800	810	630	366	138	22	27	0	95%
73	29	6	11:07:13 AM	11:46 AM	#7 stone	Pete Sand	4,368	10,950	5,100	3,210	2,202	762	902	156	0	80%
74	30	1.25	11:14:13 AM	11:53 AM	#7 stone	Pete Sand	4,368	2,280	1,050	690	444	216	27	33	16	90%
41	31	6	12:50:15 PM	01:29 PM	#7 stone	Pete Sand	4,368	0	0	4,500	2,994	708	18	157	0	
31	32	6	01:03:45 PM	01:42 PM	#7 stone	Pete Sand	4,368	0	0	4,560	3,078	666	18	157	3	
68	33	4.5	01:12:58 PM	01:51 PM	#7 stone	Pete Sand	4,368	8,130	3,600	2,010	2,748	336	114	128	0	70%
73	34	4.5	01:31:10 PM	02:10 PM	#7 stone	Pete Sand	4,368	7,350	3,510	2,220	1,188	498	75	107	36	40%
54	35	6	01:42:47 PM	02:21 PM		Dirk Cstle	6,000	0	0	4,440	588	2,100	0	161	61	40%
36	36	3.5	01:52:25 PM	02:31 PM	#7 stone	Pete Sand	2,975	0	0	3,090	1,632	396	11	89	0	30%
33	37	3.5	02:03:36 PM	02:42 PM	#7 stone	Pete Sand	2,975	900	480	300	144	66	9	13	0	70%
56	38	6	02:15:58 PM	02:54 PM	#7 stone	Dirk Cstle	6,000	0	0	7,380	612	2,112	0	161	0	30%
41	39	3	02:23:25 PM	03:02 PM	#7 stone	Pete Sand	2,184	0	0	2,280	1,488	342	9	78	21	50%
54	40	7	02:36:20 PM	03:15 PM	#7 stone	Pete Sand	2,184	12,900	5,880	3,960	2,598	912	154	190	0	70%
68	41	7	02:48:04 PM	03:27 PM	#7 stone	Pete Sand	2,184	13,020	6,240	4,140	1,998	888	131	188	0	70%
31	42	2	03:02:02 PM	03:41 PM	#7 stone	Pete Sand	2,184	3,690	1,770	1,140	576	240	37	53	0	80%
36	43	2	03:11:55 PM	03:50 PM	#7 stone	Pete Sand	2,184	3,660	1,650	1,110	744	288	44	54	0	
56	44	6	03:20:04 PM	03:59 PM	#7 stone	Dirk Cstle	6,000 ±	0	0	4,440	594	2,118	0	161	0	
67	45	8	03:54:01 PM	04:33 PM	#7 stone	Dirk Cstle	6,000 ±	14,790	7,170	4,950	2,352	1,020	150	215	1	
TOTALS for test period.																
192																
Erie Plant Production prior to Outlet Run #3 start																
41	1	5	06:25:04 AM	07:04 AM	#7 stone	Pete Sand	4,250 ±	0	0	4,650	2,322	570	15	128	0	
71	2	6	06:35:52 AM	07:14 AM	#7 stone	Pete Sand	4,368 ±	0	0	4,590	3,030	714	18	157	98	
68	3	6	06:43:36 AM	07:22 AM	#7 stone	Pete Sand	4,368 ±	0	0	4,590	3,126	618	18	157	0	
35	4	6	06:50:28 AM	07:29 AM	#7 stone	Pete Sand	4,368 ±	0	0	4,620	3,090	642	18	157	0	
56	5	7	06:58:37 AM	07:37 AM				12,960	6,660	4,470	3,378	0	0	214	153	
56	6	8	07:04:22 AM	07:43 AM				14,800	6,808	4,366	3,066	960	176	217	2	90%
Outlet Run 3																
69	7	8	07:13:10 AM	07:52 AM	#7 stone	Pete Sand	4,368	14,800	6,808	4,366	2,960	1,040	1,200	209	152	90%
31	8	6	07:20:37 AM	07:59 AM	#7 stone	Pete Sand	4,368	0	0	4,612	3,078	720	18	157	0	75%
55	9	7	07:28:44 AM	08:07 AM	#7 stone	Pete Sand	4,368	12,950	6,599	4,491	3,290	0	0	214	167	85%
73	10	3.25	07:34:47 AM	08:13 AM	#7 stone	Pete Sand	4,368	6,012	2,765	1,773	1,182	420	71	88	61	70%
74	11	2	07:39:09 AM	08:18 AM	#7 stone	Pete Sand	4,368	0	3,570	2,400	1,728	0	0	89	52	80%
69	12	6	08:34:19 AM	09:13 AM	#7 stone	Pete Sand	3,400	11,250	5,280	3,360	2,292	702	912	156	117	95%
41	13	4	08:43:10 AM	09:22 AM	#7 stone	Pete Sand	4,368	0	0	4,680	3,084	666	18	157	99	90%
71	14	6	08:49:10 AM	09:28 AM	#7 stone	Pete Sand	4,368	0	0	4,680	3,030	708	18	157	0	80%
68	15	6	08:56:25 AM	09:35 AM	#7 stone	Pete Sand	4,368	0	0	4,680	3,030	708	18	157	0	70%
56	16	5.25	09:00:37 AM	09:39 AM	#7 stone	Pete Sand	4,368	9,600	4,410	2,790	2,028	594	115	142	0	
73	17	7.5	09:12:13 AM	09:51 AM	#7 stone	Pete Sand	4,368	13,920	6,690	4,260	2,184	954	141	202	146	
55	18	6	09:20:05 AM	09:59 AM	#7 stone	Pete Sand	4,368	11,160	5,040	3,270	2,226	786	132	162	102	
38	19	5	09:29:02 AM	10:08 AM	#7 stone	Pete Sand	4,368	9,300	3,630	2,340	2,634	744	15	151	108	
35	20	6	09:42:10 AM	10:21 AM	#7 stone	Pete Sand	4,368	0	0	4,680	2,976	708	18	157	0	90%
31	21	2.5	09:55:01 AM	10:34 AM	#7 stone	Pete Sand	4,368	4,620	2,190	1,560	810	282	47	67	28	80%
69	22	8.5	10:00:49 AM	10:39 AM	#7 stone	Pete Sand	4,368	14,250	6,600	4,170	2,856	1,002	170	210	140	90%
56	23	0.5	10:07:37 AM	10:46 AM	#7 stone	Pete Sand	4,368	870	390	270	186	72	11	13	0	90%
54	24	7.5	10:12:00 AM	10:51 AM	#7 stone	Pete Sand	4,368	13,830	6,720	4,230	2,142	960	141	202	146	90%
68	25	4.25	10:33:24 AM	11:12 AM	#7 stone	Pete Sand	4,368	7,830	3,330	2,310	1,758	456	93	115	77	80%
41	26	6	10:42:08 AM	11:21 AM	#7 stone	Pete Sand	4,368	11,190	5,130	3,240	2,214	780	893	156	107	80%
36	27	4	10:52:59 AM	11:31 AM	#7 stone	Pete Sand	4,368	7,650	3,300	2,070	1,788	546	100	109	0	90%

Johnson Bin

77 yds.

17.1 Ton cement

3.5 " Fly Ash

10/27/93 production

MEMORANDUM

UNIFORM STRAIGHT BILL OF LADING — SHORT FORM

NOTE:

The Carrier named herein has received, subject to the classification and tariffs in effect on the date of issue of this Bill of Lading, the property described below in apparent good order, except as noted hereon, and conditions of delivery at destination, and delivered as indicated herein, which said carrier, its agents, servants and employees, shall be deemed to have received from the shipper in conformity with the conditions of the Uniform Rules of Lading. It is hereby agreed, as to each parcel of goods or any portion thereof, that every parcel to be delivered hereunder shall be subject to the terms and conditions of the Uniform Rules of Lading. This Bill of Lading is subject to the classification and tariffs in effect on the date of issue of this Bill of Lading, and the said terms and conditions are hereby agreed to by the shipper and accepted for shipment and delivery.



SHIPPERS B/L: 1000000000

DATE	SHIPPED FROM	AGENTS NUMBER
10/27/93	ROANOKE CEMENT CO.	
CONSIGNEE:		CARRIER/ROUTE
CONCRETE REPAIR CO.		1000 1000 1000
DESTINATION:		RWC NO.:
1000 1000 1000		

RATE		TEST	SPECIAL INSTRUCTIONS				
QTY.	DESCRIPTION	WEIGHT			CAR INITIAL AND NUMBER	WAYBILL NUMBER	BI NO
		GROSS	TARE	NET			
							35

TRUCK ARRIVED	UNLOADING COMPLETE	RECEIVED FOR CONSIGNEE BY
AM	AM	
PM	PM	

EXPLAIN BELOW REASON FOR DELAY OR EXCEPTIONS

TIME USED BY CONSIGNEE FOR UNLOADING TRUCK, IN EXCESS OF TIME ALLOWED IN TARIFF, WILL BE ASSESSED AT THE APPLICABLE TARIFF RATES AND CHARGED TO CONSIGNEE. PRIOR TO SIGNING DELIVERY RECEIPT, VERIFY CONDITION OF SHIPMENT, TRUCK ARRIVAL, AND UNLOADING COMPLETED TIME. NO LOSS OR DAMAGE CLAIMS CONSIDERED UNLESS EXCEPTION IS NOTED ON BILL OF LADING BY CONSIGNEE AT TIME OF DELIVERY.

CAUTION
MAY CAUSE SKIN IRRITATION OR INJURY TO EYES.
CONTAINS PORTLAND CEMENT, FRESHLY MIXED CEMENT, MORTAR, CONCRETE OR GROUT MAY CAUSE SKIN IRRITATION. AVOID CONTACT WITH SKIN WHERE POSSIBLE AND WASH EXPOSED SKIN AREAS PROMPTLY WITH WATER.
IF ANY CEMENT OR CEMENT MIXTURES GET INTO THE EYE, RINSE IMMEDIATELY AND REPEATEDLY WITH WATER AND GET PROMPT MEDICAL ATTENTION.
KEEP OUT OF REACH OF CHILDREN.

CUSTOMER PICKUP

RECEIPT OF THE PRODUCT AND QUANTITY DESIGNATED HEREON IS ACKNOWLEDGED, FOB ORIGIN PLANT SITE, BY CUSTOMER OR AGENT FOR CUSTOMER FOR DELIVERY TO THE CUSTOMER AND DESTINATION IDENTIFIED HEREON.

COMPANY

AGENT

TRACTOR LIC. NO.

SEAL NO(S).

Subject to Section 7 conditions, if this shipment is to be delivered to the consignee without recourse on the consignee the consignor shall sign the following statement:

The carrier shall not make delivery of this shipment without payment freight and all other law charges.

(Signature of consignor.)

If charges are to be prepaid, write or stamp here "To Be Prepaid."

TO BE PREPAID

Shipper certifies that weight and description indicated on this bill of lading are correct, subject to correction by railroad weight and inspection bureau.

ROANOKE CEMENT COMPANY	CARRIER'S AGENT	TRACTOR NO.	TRAILER NO.
PER: m Debe	PER:	11	
NAME AND PERMANENT POST OFFICE ADDRESS OF SHIPPER			
1000 1000 1000			

73260

24640

48620

• LBS. GROSS

• LBS. TARE

• LBS. NET

24.3100

10/27/93

7:16

043165

JI FORM STRAIGHT BILL OF LADING — SHORT FORM

MEMORANDUM

NOTE: The carrier named herein has received payment for the transportation and storage of the property described herein, in accordance with the terms and conditions of the bill of lading, and the carrier's liability is limited to the amount of the freight and storage charges paid by the shipper. The carrier's liability is not limited by the amount of the freight and storage charges paid by the shipper. The carrier's liability is not limited by the amount of the freight and storage charges paid by the shipper. The carrier's liability is not limited by the amount of the freight and storage charges paid by the shipper.



SHIPPERS B/L:

DATE	SHIPPED FROM	AGENTS NUMBER
10/27/93	Roanoke Plant	
CONSIGNEE:		CARRIER/ROUTE
CONCRETE PLANT		
DESTINATION:		RWC NO.
CONCRETE PLANT		
TEST	SPECIAL INSTRUCTIONS	

QTY.	DESCRIPTION	WEIGHT			CAR INITIAL AND NUMBER	WAYBILL NUMBER	BIN NO.
		GROSS	TARE	NET			
							57

TRUCK ARRIVED	UNLOADING COMPLETE	RECEIVED FOR CONSIGNEE BY
AM	AM	
PM	PM	

CAUTION
MAY CAUSE SKIN IRRITATION OR INJURY TO EYES.
CONTAINS PORTLAND CEMENT, FRESHLY MIXED CEMENT, MORTAR, CONCRETE OR GROUT MAY CAUSE SKIN IRRITATION. AVOID CONTACT WITH SKIN WHERE POSSIBLE AND WASH EXPOSED SKIN AREAS PROMPTLY WITH WATER.
IF ANY CEMENT OR CEMENT MIXTURES GET INTO THE EYE, RINSE IMMEDIATELY AND REPEATEDLY WITH WATER AND GET PROMPT MEDICAL ATTENTION.
KEEP OUT OF REACH OF CHILDREN.

Subject to Section 7 of conditions, if this shipment is to be delivered to the consignee without recourse on the consignor, the consignor shall sign the following statement:
The carrier shall not make delivery of this shipment without payment of freight and all other lawful charges.

EXPLAIN BELOW REASON FOR DELAY OR EXCEPTIONS

TIME USED BY CONSIGNEE FOR UNLOADING TRUCK, IN EXCESS OF TIME ALLOWED IN TARIFF, WILL BE ASSESSED AT THE APPLICABLE TARIFF RATES AND CHARGED TO CONSIGNEE. PRIOR TO SIGNING DELIVERY RECEIPT, VERIFY CONDITION OF SHIPMENT, TRUCK ARRIVAL, AND UNLOADING COMPLETED TIME. NO LOSS OR DAMAGE CLAIMS CONSIDERED UNLESS EXCEPTION IS NOTED ON BILL OF LADING BY CONSIGNEE AT TIME OF DELIVERY.

CUSTOMER PICKUP

RECEIPT OF THE PRODUCT AND QUANTITY DESIGNATED HEREON IS ACKNOWLEDGED. FOB ORIGIN PLANT SITE. BY CUSTOMER OR AGENT FOR CUSTOMER FOR DELIVERY TO THE CUSTOMER AND DESTINATION IDENTIFIED HEREON.

COMPANY _____

AGENT Ben Vynell

TRACTOR LIC. NO. _____

SEAL NO(S). _____

(Signature of consignor.)

If charges are to be prepaid, write or stamp here. "To Be Prepaid."

TO BE PREPAID

ROANOKE CEMENT COMPANY	CARRIER'S AGENT	TRACTOR NO.	TRAILER NO.
PER: <u>11</u>	PER: <u>11</u>		
NAME AND PERMANENT POST OFFICE ADDRESS OF SHIPPER			

Shipper certifies that weight and description indicated on this bill of lading are correct, subject to correction by railroad weighing and inspection bureau.

73720	• LBS. GROSS	
24680	• LBS. TARE	
49040	• LBS. NET	24.5290

10/27/93 10:37

043342

Fly Ash deliv 2
25.06 Tons
5012016

CONCRETE-READY-MIXED-CORP.

ROANOKE, VA.

Truck no.: 41 Batch no.: 1
Batch size: 5.00 Yds. Mix name:Ticket no.: 4086
96

			Zero	
CASTLE	4.0	4494	4650 Lbs	0
		=====	=====	
Total weight:		4494	4650 Lbs	
Status:		DT/Auto		
			4620 Lbs	

			42 Lbs
TYPE 1/2	2100	2322 Lbs	M
FLY ASH	550	570 Lbs	M
		=====	=====
		2650	2892 Lbs
OK/Man			2940 Lbs

			Zero	
DARAVAIR	100	10	15 Oz	
DARACCEL	0.00	0	0 Oz	
			Zero	

WATER	128	0 Gal	U
	=====	=====	
Total:	128	0 Gal	

Time 5:25:04 AM Date 27 Oct, 1993

TICKET NUMBER: 000307

CONCRETE-READY-MIXED-CORP.

ROANOKE, VA.

Truck no.: 71 Batch no.: 2
Batch size: 6.00 Yds. Mix name:Ticket no.: 4087
42

			Zero	
CASTLE	4.0	4612	4550 Lbs	0
		=====	=====	
Total weight:		4612	4550 Lbs	
Status:		OK/Auto		
			4620 Lbs	

			Zero
TYPE 1/2	3000	3030 Lbs	0
FLY ASH	720	714 Lbs	0
		=====	=====
		3720	3744 Lbs
OK/Auto			3726 Lbs

			Zero	
DARAVAIR	100	18	18 Oz	0

WATER	157	98 Gal	U
	=====	=====	
Total:	157	98 Gal	

Time 6:35:52 AM Date 27 Oct, 1993

TICKET NUMBER: 000308

CONCRETE-READY-MIXED-CORP.

ROANOKE, VA.

Truck no.: 68 Batch no.: 3
Batch size: 6.00 Yds. Mix name:

Ticket no.: 4088

42

Zero				Zero			
CASTLE	4.0	4612	4590 Lbs C	TYPE 1/2	3000	3128 Lbs	
				FLY ASH	720	618 Lbs M	
=====				=====			
Total weight:		4612	4590 Lbs		3720	3744 Lbs	
Status: OK/Auto			4590 Lbs	OK/Man		3720 Lbs	
Zero				Zero			
DARAVAIR	100	18	18 Oz C	WATER	157	0 Gal U	
Zero				Total:	157	0 Gal	

Time 6:43:36 AM Date 27 Oct, 1993

TICKET NUMBER: 000309

CONCRETE-READY-MIXED-CORP.

ROANOKE, VA.

Truck no.: 68 Batch no.: 4
Batch size: 6.00 yds. Mix name:

Ticket no.: 4089

42

Zero				Zero			
CASTLE	4.0	4612	4620 Lbs C	TYPE 1/2	3000	3090 Lbs	
				FLY ASH	720	642 Lbs M	
=====				=====			
Total weight:		4612	4620 Lbs		3720	3732 Lbs	
Status: OK/Auto			4620 Lbs	OK/Man		3714 Lbs	
Zero				Zero			
DARAVAIR	100	18	18 Oz C	WATER	157	0 Gal U	
Zero				Total:	157	0 Gal	

Time 6:50:28 AM Date 27 Oct, 1993

TICKET NUMBER: 000310

CONCRETE-READY-MIXED-CORP.

ROANOKE, VA.

Truck no.: 68 Batch no.: 5
Batch size: 8.00 Yds. Mix name:

Ticket no.: 4037
38

Zero
#7 STONE 0.0 5600 5670 Lbs C
LIMESTON 2.0 11428 11370 Lbs C
CASTLE 4.0 1291 1200 Lbs C
#5 STONE 0.0 8880 9000 Lbs C

=====
Total weight: 27199 27240 Lbs

Status: OK/Auto

27210 Lbs

Zero
TYPE 1/2 4136 4134 Lbs C

=====
4136 4134 Lbs

OK/Auto

4122 Lbs

Zero
DARAVAIR 100 8 8 Oz C
DARACCEL 0.00 0 0 Oz

Zero

WATER 262 1 Gal U

=====
Total: 262 1 Gal

Time 6:19:49 AM

Date 26 Oct, 1993

TICKET NUMBER: 000218

CONCRETE-READY-MIXED-CORP.

ROANOKE, VA.

Truck no.: 38 Batch no.: 6
Batch size: 2.00 Yds. Mix name:

Ticket no.: 4038
50

Zero
LIMESTON 2.0 3571 3510 Lbs C
CASTLE 4.0 2416 2340 Lbs C

=====
Total weight: 5987 5850 Lbs

Status: OK/Auto

3000 Lbs

Zero
TYPE 1/2 1692 1722 Lbs C

=====
1692 1722 Lbs

OT/Auto

1710 Lbs

Zero

WATER 89 49 Gal

=====
Total: 89 49 Gal

Zero

Time 6:30:08 AM

Date 26 Oct, 1993

TICKET NUMBER: 000227

CONCRETE-READY-MIXED-CORP.

ROANOKE, VA.

Truck no.: 56 Batch no.: 6 Ticket no.: 4091
Batch size: 8.00 Yds. Mix name: 65

Zero
#7 STONE 0.0 5920 6090 Lbs O
LIMESTON 2.0 6808 6720 Lbs C
CASTLE 4.0 4366 4290 Lbs C
#5 STONE 0.0 8880 8910 Lbs C
=====

Total weight: 25974 26010 Lbs
Status: OT/Auto
26010 Lbs

Zero
TYPE 1/2 2960 3066 Lbs
FLY ASH 1040 960 Lbs M
=====

4000 4026 Lbs
OK/Man
4014 Lbs

Zero
DARAVAIR 100 16 16 Oz C
WRDA 160 160 Oz C
DARACCEL 0.00 0 0 Oz
Not Zero

WATER 217 2 Gal U
=====

Total: 217 2 Gal

Time 7:04:22 AM Date 27 Oct, 1993

TICKET NUMBER: 000322

CONCRETE-READY-MIXED-CORP.

ROANOKE, VA.

Truck no.: 59 Batch no.: 7 Ticket no.: 4092
Batch size: 8.00 Yds. Mix name: 65

Zero
#7 STONE 0.0 5920 6000 Lbs C
LIMESTON 2.0 6808 6810 Lbs C
CASTLE 4.0 4366 4350 Lbs C
#5 STONE 0.0 8880 8790 Lbs C
=====

Total weight: 25974 25950 Lbs
Status: OK/Auto
25890 Lbs

Zero
TYPE 1/2 2960 2946 Lbs M
FLY ASH 1040 1038 Lbs M
=====

4000 3984 Lbs
OK/Man
3984 Lbs

Zero
DARAVAIR 100 16 16 Oz
WRDA 160 160 Oz
DARACCEL 2.00 1024 1020 Oz
Not Zero

WATER 209 152 Gal U
=====

Total: 209 152 Gal

Time 7:13:10 AM Date 27 Oct, 1993

TICKET NUMBER: 000321

CONCRETE-READY-MIXED-CORP.

ROANOKE, VA.

Truck no.: 31 Batch no.: 8 Ticket no.: 4093
Batch size: 6.00 Yds. Mix name: 42

Zero
CASTLE 4.0 4612 4560 Lbs C
=====
Total weight: 4612 4560 Lbs
Status: OK/Auto
4680 Lbs

Zero
TYPE 1/2 3000 3078 Lbs
FLY ASH 720 660 Lbs M
=====
3720 3738 Lbs
OK/Man
3720 Lbs

Zero
DARAVAJE 100 18 18 Oz C
Zero

WATER 157 0 Gal U
=====
Total: 157 0 Gal

Time 7:20:37 AM Date 27 Oct, 1993 TICKET NUMBER: 000311

CONCRETE-READY-MIXED-CORP.

ROANOKE, VA.

Truck no.: 55 Batch no.: 9 Ticket no.: 4094
Batch size: 7.00 Yds. Mix name: 8

Zero
#7 STONE 0.0 5160 5100 Lbs C
LIMESTON 2.0 6599 6630 Lbs C
CASTLE 4.0 4491 4440 Lbs C
#5 STONE 0.0 7770 7890 Lbs C
=====
Total weight: 24040 24060 Lbs
Status: OK/Auto
6600 Lbs

Zero
TYPE 1/2 3290 3270 Lbs C
=====
3290 3270 Lbs
OK/Auto
486 Lbs

Zero
DARACCEL 0.00 0 0 Oz
Zero

WATER 214 167 Gal U
=====
Total: 214 167 Gal

Time 7:28:44 AM Date 27 Oct, 1993 TICKET NUMBER: 000313

CONCRETE-READY-MIXED-CORP.
ROANOKE, VA.

Truck no.: 73 Batch no.: 10 Ticket no.: 4055
Batch size: 3.25 Yds. Mix name: 65

#7 STONE	0.0	2405	Zero	2370 Lbs C	TYPE 1/2	1202	Zero	1182 Lbs C
LIMESTON	2.0	2765		2700 Lbs C	FLY ASH	422		420 Lbs C
CASTLE	4.0	1773		1740 Lbs C				
#5 STONE	0.0	3607		3570 Lbs C				

Total weight:	10550	10380 Lbs		1624	1602 Lbs
Status:	OK/Auto			OK/Auto	
		1950 Lbs			192 Lbs

DARAVAIR	100	6	Zero	6 Oz C	WATER	88	61 Gal U
WRDA		65		65 Oz C		=====	=====
DARACCEL	0.00	0		0 Oz	Total:	58	61 Gal
			Not Zero				

Time 7:34:47 AM Date 27 Oct. 1993 TICKET NUMBER: 000326

CONCRETE-READY-MIXED-CORP.
ROANOKE, VA.

Truck no.: 74 Batch no.: 11 Ticket no.: 4056
Batch size: 2.00 Yds. Mix name: 50

LIMESTON	3.0	3571	Zero	3570 Lbs C	TYPE 1/2	1692	Zero	1728 Lbs C
CASTLE	4.0	2416		2400 Lbs C				

Total weight:	5987	5970 Lbs		1692	1728 Lbs
Status:	OK/Auto			OT/Auto	

		Zero			300 Lbs

		Zero		WATER	89	52 Gal U
					=====	=====
		Zero		Total:	89	52 Gal

Time 7:39:09 AM Date 27 Oct. 1993 TICKET NUMBER: 000330

CONCRETE-READY-MIXED-CORP.
ROANOKE, VA.

Truck no.: 69 Batch no.: 12 Ticket no.: 4057
Batch size: 6.00 Yds. Mix name: 65

			Zero			Zero
#7 STONE	0.0	4440	4530 Lbs C	TYPE 1/2	2220	2292 Lbs D
LIMESTON	2.0	5106	5280 Lbs D	FLY ASH	780	702 Lbs M
~~CASTLE~~	~~4.0~~	~~3273~~	~~3350 Lbs C~~			
#5 STONE	0.0	6660	6720 Lbs C			
		=====			=====	
Total weight:	19481		19890 Lbs		3000	2994 Lbs
Status: OT/Auto				OT/Man		
			16290 Lbs			3000 Lbs

			Zero			
DARAVAIR	100	12	12 Oz	WATER	156	117 Gal U
WRDA		120	120 Oz		=====	=====
DARACCEL	2.00	768	780 Oz	Total:	156	117 Gal
			Not Zero			

Time 8:34:19 AM Date 27 Oct, 1993 TICKET NUMBER: 000337

CONCRETE-READY-MIXED-CORP.
ROANOKE, VA.

Truck no.: 41 Batch no.: 13 Ticket no.: 4058
Batch size: 4.00 Yds. Mix name: 95

			Zero			- 36 Lbs
CASTLE	4.0	3595	3660 Lbs C	TYPE 1/2	1680	1860 Lbs M
				FLY ASH	440	438 Lbs M
		=====			=====	
Total weight:	3595		3660 Lbs		2120	2298 Lbs
Status: OK/Auto				OK/Man		
			3690 Lbs			2340 Lbs

			Zero			
DARAVAIR	100	8	12 Oz	WATER	102	64 Gal U
DARACCEL	0.00	0	0 Oz		=====	=====
			Not Zero	Total:	102	64 Gal

Time 8:43:10 AM Date 27 Oct, 1993 TICKET NUMBER: 000339

CONCRETE-READY-MIXED-CORP.
ROANOKE, VA.

Truck no.: 71 Batch no.: 14
Batch size: 6.00 Yds. Mix name:

Ticket no.: 4099
42

CASTLE 4.0 4612 4680 Lbs C

TYPE 1/2 3000 3030 Lbs C
FLY ASH 720 686 Lbs M

Total weight: 4612 4680 Lbs
Status: OK/Auto
4770 Lbs

OK/Man
3720 3750 Lbs
3720 Lbs

DARAVAIR 100 18 18 Oz C

WATER 157 99 Gal U
Total: 157 99 Gal

Time 8:49:10 AM Date 27 Oct, 1993

TICKET NUMBER: 000338

CONCRETE-READY-MIXED-CORP.
ROANOKE, VA.

Truck no.: 66 Batch no.: 15
Batch size: 6.00 Yds. Mix name:

Ticket no.: 4100
42

CASTLE 4.0 4612 4680 Lbs C

TYPE 1/2 3000 3030 Lbs C
FLY ASH 720 708 Lbs C

Total weight: 4612 4680 Lbs
Status: OK/Auto
4630 Lbs

OK/Auto
3720 3738 Lbs
3684 Lbs

DARAVAIR 100 18 18 Oz C

WATER 157 0 Gal U
Total: 157 0 Gal

Time 8:56:25 AM Date 27 Oct, 1993

TICKET NUMBER: 000345

CONCRETE-READY-MIXED-CORP.

MANOKE, VA.

Truck no.: 56 Batch no.: 16 Ticket no.: 4101
 Batch size: 5.25 Yds. Mix name: 65

			Zero			Zero
STONE	0.0	3885	3840 Lbs C	TYPE 1/2	1942	2028 Lbs
MESTON	2.0	4457	4410 Lbs C	FLY ASH	682	594 Lbs M
STLE	4.0	2865	2790 Lbs C			
STONE	0.0	5827	5760 Lbs C			
		=====	=====		=====	=====
Total weight:		17044	16800 Lbs		2624	2622 Lbs
Status:				OK/Man		
			16770 Lbs			2610 Lbs

			Zero			
RAVAIR	100	10	10 Oz C	WATER	142	0 Gal U
DA		105	105 Oz C		=====	=====
RACCEL	0.00	0	0 Oz	Total:	142	0 Gal
			Not Zero			

Time 9:00:37 AM Date 27 Oct, 1993 TICKET NUMBER: 000318

CONCRETE-READY-MIXED-CORP.

MANOKE, VA.

Truck no.: 73 Batch no.: 17 Ticket no.: 4102
 Batch size: 7.50 Yds. Mix name: 64

			Zero			Zero
STONE	0.0	5550	5550 Lbs C	TYPE 1/2	2175	2184 Lbs C
MESTON	2.0	6704	6690 Lbs C	FLY ASH	975	954 Lbs C
STLE	4.0	4296	4260 Lbs C			
STONE	0.0	8325	8370 Lbs C			
		=====	=====		=====	=====
Total weight:		24875	24870 Lbs		3150	3138 Lbs
Status:				OK/Auto		
			15570 Lbs			1698 Lbs

			Zero			
RAVAIR	100	15	15 Oz C	WATER	202	146 Gal U
DA		126	126 Oz C		=====	=====
RACCEL	0.00	0	0 Oz	Total:	202	146 Gal
			Not Zero			

Time 9:12:13 AM Date 27 Oct, 1993 TICKET NUMBER: 000332

CONCRETE-READY-MIXED-CORP.
ROANOKE, VA.

Truck no.: 35 Batch no.: 18 Ticket no.: 4103

Batch size: 6.00 Yds. Mix name: 65

			Zero				Zero
#7 STONE	0.0	4440	4500 Lbs C	TYPE 1/2	2220	2226 Lbs C	
LIMESTON	2.0	5106	5040 Lbs C	FLY ASH	780	786 Lbs C	
CASTLE	4.0	3275	3270 Lbs C				
#5 STONE	0.0	6660	6660 Lbs C				
			=====		=====	=====	
Total weight:	19481	19470 Lbs			3000	3012 Lbs	
Status: OK/Auto				OK/Auto			
			12390 Lbs			2736 Lbs	

			Zero				
DARAVAIR	100	12	12 Oz C	WATER	162	102 Gal U	
WRDA		120	120 Oz C		=====	=====	
DARACCEL	0.00	0	0 Oz	Total:	162	102 Gal	
			Not Zero				

Time 9:20:05 AM Date 27 Oct, 1993 TICKET NUMBER: 000331

CONCRETE-READY-MIXED-CORP.
ROANOKE, VA.

Truck no.: 38 Batch no.: 19 Ticket no.: 4104
Batch size: 5.00 Yds. Mix name: 52

			Zero				Zero
#7 STONE	0.0	4185	4230 Lbs C	TYPE 1/2	2500	2634 Lbs	
LIMESTON	3.0	3688	3630 Lbs C	FLY ASH	600	744 Lbs M	
CASTLE	4.0	2364	2340 Lbs C				
#5 STONE	0.0	5000	5070 Lbs C				
			=====		=====	=====	
Total weight:	15217	15270 Lbs			3100	3378 Lbs	
Status: OK/Auto				OK/Man			
			11610 Lbs			2238 Lbs	

			Zero				
DARAVAIR	100	15	15 Oz C	WATER	151	108 Gal U	
					=====	=====	
			Zero	Total:	151	108 Gal	

Time 9:29:02 AM Date 27 Oct, 1993 TICKET NUMBER: 000327

CONCRETE-READY-MIXED-CORP.
ROANOKE, VA.

Truck no.: 35 Batch no.: 20
Batch size: 6.00 Yds. Mix name:

Ticket no.: 4105
42

CASTLE 4.0 4612 Zero
4680 Lbs C

TYPE 1/2 3000 Zero
FLY ASH 720 2976 Lbs C
708 Lbs C

=====
Total weight: 4612 4680 Lbs

Status: OK/Auto

=====
3720 3684 Lbs

OK/Auto

660 Lbs

2742 Lbs

DARAVAIR 100 18 Zero
18 Oz C

WATER 157 0 Gal U

=====
Total: 157 0 Gal

Zero

Time 9:42:10 AM

Date 27 Oct, 1993

TICKET NUMBER: 000346

CONCRETE-READY-MIXED-CORP.
ROANOKE, VA.

Truck no.: 31 Batch no.: 21
Batch size: 2.50 Yds. Mix name:

Ticket no.: 4106
64

#7 STONE 0.0 1850 Zero
LIMESTON 2.0 2234 4620 Lbs M
CASTLE 4.0 1432 2190 Lbs M
#5 STONE 0.0 2775 1560 Lbs M
0 Lbs

TYPE 1/2 725 Zero
FLY ASH 325 810 Lbs U
262 Lbs M

=====
Total weight: 8291 8370 Lbs

Status: OK/Man

=====
1050 1092 Lbs

OT/Man

3400 Lbs

1062 Lbs

DARAVAIR 100 5 Zero
WRDA 42 5 Oz C
42 Oz C

WATER 67 28 Gal U

DARACCEL 0.00 0 0 Oz
Not Zero

=====
Total: 67 28 Gal

Time 9:55:01 AM

Date 27 Oct, 1993

TICKET NUMBER: 000319

CONCRETE-READY-MIXED-CORP.

ROANOKE, VA.

Truck no.: 69 Batch no.: 22
Batch size: 8.50 Yds. Mix name:

Ticket no.: 4107
65

Zero
#7 STONE 0.0 5735 5700 Lbs C
LIMESTON 2.0 6595 6600 Lbs C
CASTLE 4.0 4230 4170 Lbs C
#5 STONE 0.0 8602 8550 Lbs C

=====
Total weight: 25162 25020 Lbs
Status: OK/Auto
24960 Lbs

36 Lbs
TYPE 1/2 2867 2856 Lbs C
FLY ASH 1007 1002 Lbs C

=====
3874 3858 Lbs
OK/Auto
3822 Lbs

Zero
DARAVAIR 100 15 15 Oz C
WRDA 155 155 Oz C
DARACCEL 0.00 0 0 Oz
Not Zero

WATER 210 140 Gal U
=====
Total: 210 140 Gal

Time 10:00:49 AM Date 27 Oct, 1993

TICKET NUMBER: 000348

CONCRETE-READY-MIXED-CORP.

ROANOKE, VA.

Truck no.: 56 Batch no.: 23
Batch size: 1.50 Yds. Mix name:

Ticket no.: 4108
65

Zero
#7 STONE 0.0 370 870 Lbs M
LIMESTON 2.0 425 390 Lbs M
CASTLE 4.0 372 270 Lbs M

=====
Total weight: 1622 1530 Lbs
Status: OK/Man
1560 Lbs

Zero
TYPE 1/2 185 186 Lbs M
FLY ASH 65 72 Lbs M

=====
250 258 Lbs
OK/Man
270 Lbs

Zero
DARAVAIR 100 1 1 Oz C
WRDA 10 10 Oz C
DARACCEL 0.00 0 0 Oz
Not Zero

WATER 13 0 Gal U
=====
Total: 13 0 Gal

Time 10:07:37 AM Date 27 Oct, 1993

TICKET NUMBER: 000354

CONCRETE-READY-MIXED-CORP.
ROANOKE, VA.

Truck no.: 54 Batch no.: 24
Batch size: 7.50 Yds. Mix name:

Ticket no.: 4109
64

Zero
#7 STONE 0.0 5550 5490 Lbs C
LIMESTON 2.0 6704 6720 Lbs C
CASTLE 4.0 4296 4230 Lbs C
#5 STONE 0.0 8325 8340 Lbs C

=====
Total weight: 24875 24780 Lbs
Status: OK/Auto
24870 Lbs

Zero
TYPE 1/2 2175 2142 Lbs C
FLY ASH 975 960 Lbs C

=====
3150 3102 Lbs
OK/Auto
3072 Lbs

Zero
DARAVAIR 100 15 15 Oz C
WRDA 126 126 Oz C
DARACCEL 0.00 0 0 Oz
Not Zero

WATER 202 146 Gal U
=====
Total: 202 146 Gal

Time 10:12:00 AM Date 27 Oct, 1993

TICKET NUMBER: 000333

CONCRETE-READY-MIXED-CORP.
ROANOKE, VA.

Truck no.: 88 Batch no.: 25
Batch size: 4.25 Yds. Mix name:

Ticket no.: 4110
86

Zero
#7 STONE 0.0 3612 3600 Lbs C
LIMESTON 2.0 3417 3330 Lbs C
CASTLE 4.0 3328 3310 Lbs C
#5 STONE 0.0 4250 4230 Lbs C

=====
Total weight: 13607 13470 Lbs
Status: OK/Auto
10680 Lbs

Zero
TYPE 1/2 1755 1758 Lbs M
FLY ASH 442 456 Lbs M

=====
2197 2214 Lbs
OK/Man
2214 Lbs

Zero
DARAVAIR 100 8 8 Oz C
WRDA 65 65 Oz C
Not Zero

WATER 115 77 Gal U
=====
Total: 115 77 Gal

Time 10:33:24 AM Date 27 Oct, 1993

TICKET NUMBER: 000350

CONCRETE-READY-MIXED-CORP.

ROANOKE, VA.

Truck no.: 41 Batch no.: 26 Ticket no.: 4111
Batch size: 6.00 Yds. Mix name: 65

			Zero			Zero
#7 STONE	0.0	4440	4470 Lbs C	TYPE 1/2	2220	2214 Lbs C
LIMESTON	2.0	5106	5130 Lbs C	FLY ASH	780	780 Lbs C
CASTLE	4.0	3275	3240 Lbs C			
#5 STONE	0.0	6660	6720 Lbs C			
		=====	=====		=====	=====
Total weight:	19481		19560 Lbs		3000	2994 Lbs
Status:	OK/Auto			OK/Auto		
			12780 Lbs			2748 Lbs

			Zero			
DARAVAIR	100	12	13 Oz	WATER	156	107 Gal U
WRDA		120	120 Oz		=====	=====
DARACCEL	2.00	768	760 Oz	Total:	156	107 Gal
			Not Zero			

Time 10:42:08 AM Date 27 Oct, 1993 TICKET NUMBER: 000336

CONCRETE-READY-MIXED-CORP.

ROANOKE, VA.

Truck no.: 36 Batch no.: 27 Ticket no.: 4112
Batch size: 4.00 Yds. Mix name: 66

			Zero			- 30 Lbs
#7 STONE	0.0	2960	3120 Lbs C	TYPE 1/2	1800	1788 Lbs M
LIMESTON	2.0	3228	3300 Lbs C	FLY ASH	520	546 Lbs M
CASTLE	4.0	2070	2070 Lbs C			
#5 STONE	0.0	4440	4530 Lbs C			
		=====	=====		=====	=====
Total weight:	12698		13020 Lbs		2320	2334 Lbs
Status:	OT/Auto			OK/Man		
			13050 Lbs			2334 Lbs

			Zero			
DARAVAIR	100	8	8 Oz C	WATER	109	0 Gal U
WRDA		92	92 Oz C		=====	=====
DARACCEL	0.00	0	0 Oz	Total:	109	0 Gal
			Not Zero			

Time 10:52:59 AM Date 27 Oct, 1993 TICKET NUMBER: 000347

CONCRETE-READY-MIXED-CORP.

ROANOKE, VA.

Truck no.: 33 Batch no.: 28
Batch size: 1.00 Yds. Mix name:

Ticket no.: 4113
65

Zero
#7 STONE 0.0 740 1800 Lbs M
LIMESTON 2.0 851 810 Lbs M
CASTLE 4.0 545 630 Lbs M

=====
Total weight: 3246 3240 Lbs

Status: OK/Man

3270 Lbs

Zero
TYPE 1/2 370 366 Lbs M
FLY ASH 130 138 Lbs M

OK/Man

=====
500 504 Lbs

510 Lbs

Zero
DARAVAIR 100 2 2 Oz C
WRDA 20 20 Oz C
DARACCEL 0.00 0 0 Oz
Not Zero

WATER 27 0 Gal U

=====
Total: 27 0 Gal

Time 11:01:25 AM

Date 27 Oct, 1993

TICKET NUMBER: 000341

CONCRETE-READY-MIXED-CORP.

ROANOKE, VA.

Truck no.: 73 Batch no.: 29
Batch size: 6.00 Yds. Mix name:

Ticket no.: 4114
65

90 Lbs
#7 STONE 0.0 4440 4380 Lbs C
LIMESTON 2.0 5106 5100 Lbs C
CASTLE 4.0 3275 3210 Lbs C
#5 STONE 0.0 6660 6570 Lbs C

=====
Total weight: 19481 19260 Lbs

Status: OK/Auto

19320 Lbs

Zero
TYPE 1/2 2220 2202 Lbs M
FLY ASH 780 762 Lbs M

OK/Man

=====
3000 2964 Lbs

2976 Lbs

Zero
DARAVAIR 100 12 12 Oz
WRDA 120 120 Oz
DARACCEL 2.00 768 770 Oz
Not Zero

WATER 156 0 Gal U

=====
Total: 156 0 Gal

Time 11:07:13 AM

Date 27 Oct, 1993

TICKET NUMBER: 000340

CONCRETE-READY-MIXED-CORP.
ROANOKE, VA.

Truck no.: 74 Batch no.: 30
Batch size: 1.25 Yds. Mix name:

Ticket no.: 4115
65

			Zero	
#7 STONE	0.0	925	2280 Lbs M	
LIMESTON	2.0	1063	1050 Lbs M	
CASTLE	4.0	682	690 Lbs M	
		=====	=====	
Total weight:		4057	4020 Lbs	
Status: OK/Man			4080 Lbs	

		Zero	
TYPE 1/2	462	444 Lbs C	
FLY ASH	162	216 Lbs O	
		=====	=====
		624	660 Lbs
OT/Auto			642 Lbs

		Zero	
DARAVAIR	100	2	2 Oz C
WRDA		25	25 Oz C
DARACDEL	0.00	0	0 Oz
			Not Zero

WATER	33	16 Gal U
	=====	=====
Total:	33	16 Gal

Time 11:14:13 AM

Date 27 Oct, 1993

TICKET NUMBER: 000352

CONCRETE-READY-MIXED-CORP.
ROANOKE, VA.

Truck no.: 41 Batch no.: 31
Batch size: 6.00 Yds. Mix name:

Ticket no.: 4116
42

			Zero	
CASTLE	4.0	4612	4500 Lbs C	
		=====	=====	
Total weight:		4612	4500 Lbs	
Status: OK/Auto			4620 Lbs	

		Zero	
TYPE 1/2	3000	2994 Lbs M	
FLY ASH	720	706 Lbs M	
		=====	=====
		3720	3702 Lbs
OK/Man			3714 Lbs

		Zero	
DARAVAIR	100	18	18 Oz C
			Zero

WATER	157	0 Gal U
	=====	=====
Total:	157	0 Gal

Time 12:50:15 PM

Date 27 Oct, 1993

TICKET NUMBER: 000355

CONCRETE-READY-MIXED-CORP.

ROANOKE, VA.

Truck no.: 31 Batch no.: 32
Batch size: 6.00 Yds. Mix name:

Ticket no.: 4117
42

CASTLE 4.0 4612 120 Lbs
4560 Lbs C
=====

Total weight: 4612 4560 Lbs
Status: OK/Auto
4590 Lbs

TYPE 1/2 3000 Zero
FLY ASH 720 3078 Lbs
===== 666 Lbs M
3720 3744 Lbs
OK/Man
3732 Lbs

DARAVAIR 100 18 Zero
18 Oz C
Not Zero

WATER 157 3 Gal U
=====

Total: 157 3 Gal

Time 1:03:45 PM Date 27 Oct, 1993

TICKET NUMBER: 000367

CONCRETE-READY-MIXED-CORP.

ROANOKE, VA.

Truck no.: 68 Batch no.: 33
Batch size: 4.50 Yds. Mix name:

Ticket no.: 4118
106

#7 STONE 0.0 3375 Zero
3450 Lbs C
LIMESTON 2.0 3544 3600 Lbs C
CASTLE 4.0 2006 2010 Lbs C
#5 STONE 0.0 4711 4680 Lbs C
=====

Total weight: 13636 13740 Lbs
Status: OK/Auto
13710 Lbs

TYPE 1/2 2753 Zero
FLY ASH 337 2748 Lbs C
336 Lbs C
=====

3100 3084 Lbs
OK/Auto
3048 Lbs

DARAVAIR 100 13 Zero
13 Oz C
WRDA 101 101 Oz C

WATER 128 0 Gal U
=====

Total: 128 0 Gal

Time 1:12:58 PM Date 27 Oct, 1993

TICKET NUMBER: 000359

CONCRETE-READY-MIXED-CORP.

ROANOKE, VA.

Truck no.: 73 Batch no.: 34
Batch size: 4.50 Yds. Mix name:

Ticket no.: 4119
64

			Zero	
#7 STONE	0.0	2960	2910 Lbs C	
LIMESTON	2.0	3575	3510 Lbs C	
CASTLE	4.0	2291	2220 Lbs C	
#5 STONE	0.0	4440	4440 Lbs C	
		=====	=====	
Total weight:		13266	13080 Lbs	
Status: OK/Auto			13080 Lbs	

			Zero	
TYPE 1/2	1160	1188 Lbs C		
FLY ASH	520	498 Lbs C		
		=====	=====	
		1680	1686 Lbs	
OK/Man			1674 Lbs	

			Zero	
DARAVAIR	100	8	8 Oz C	
WRDA		67	67 Oz C	
DARACCEL	0.00	0	0 Oz	
			Not Zero	

WATER	107	36 Gal U		
		=====	=====	
Total:	107	36 Gal		

Time 1:31:10 PM Date 27 Oct, 1993

TICKET NUMBER: 000372

CONCRETE-READY-MIXED-CORP.

ROANOKE, VA.

Truck no.: 54 Batch no.: 35
Batch size: 6.00 Yds. Mix name:

Ticket no.: 4120
64

			Zero	
CASTLE	4.0	4440	7140 Lbs M	
		=====	=====	
Total weight:		19900	7140 Lbs	
Status: OK/Man			7170 Lbs	

			Zero	
TYPE 1/2	1740	598 Lbs M		
FLY ASH	780	2100 Lbs M		
		=====	=====	
		2520	2688 Lbs	
OK/Man			2724 Lbs	

			Zero	
DARAVAIR	100	12	0 Oz	
WRDA		100	0 Oz	
DARACCEL	0.00	0	0 Oz	
			Zero	

WATER	161	61 Gal U		
		=====	=====	
Total:	161	61 Gal		

Time 1:42:47 PM Date 27 Oct, 1993

TICKET NUMBER: 000362

ROANOKE, VA.

Truck no.: 36 Batch no.: 36
Batch size: 3.50 Yds. Mix name:

Ticket no.: 4121
96

CASTLE 4.0 3146 Zero 3090 Lbs C

TYPE 1/2 1470 Zero 1632 Lbs M
FLY ASH 385 396 Lbs M

=====
Total weight: 3146 3090 Lbs
Status: OK/Auto
3150 Lbs

=====
1855 2028 Lbs
OK/Man
2076 Lbs

DARAVAIR 100 7 Zero 11 Oz
DARACCEL 0.00 0 0 Oz

WATER 89 0 Gal U
=====
Total: 89 0 Gal

Time 1:52:25 PM Date 27 Oct, 1993

TICKET NUMBER: 000361

CONCRETE-READY-MIXED-CORP.
ROANOKE, VA.

Truck no.: 33 Batch no.: 37
Batch size: 1.00 Yds. Mix name:

Ticket no.: 4122
64

#7 STONE 0.0 370 150 Lbs
LIMESTON 2.0 446 900 Lbs M
CASTLE 4.0 266 480 Lbs M
300 Lbs M

TYPE 1/2 145 Zero 144 Lbs M
FLY ASH 65 66 Lbs M

=====
Total weight: 1657 1680 Lbs
Status: OK/Man
1800 Lbs

=====
210 210 Lbs
OK/Man
216 Lbs

=====
Zero
DARAVAIR 100 1 1 Oz
NRDA 8 8 Oz
DARACCEL 0.00 0 0 Oz
Not Zero

WATER 13 0 Gal U
=====
Total: 13 0 Gal

Time 2:03:36 PM Date 27 Oct, 1993

TICKET NUMBER: 000365

CONCRETE-READY-MIXED-CORP.

ROANOKE, VA.

Truck no.: 56 Batch no.: 38
Batch size: 6.00 Yds. Mix name:

Ticket no.: 4123
64

CASTLE	4.0	4440	Zero	7380 Lbs M
		=====	=====	
Total weight:		19900		7380 Lbs
Status:		OK/Man		7440 Lbs

		Zero	
TYPE 1/2	1740	612 Lbs M	
FLY ASH	780	2112 Lbs M	
	=====	=====	
	2520	2724 Lbs	
OK/Man		2760 Lbs	

DARAVAIR	100	12	Zero	0 Oz
WRDA		100		0 Oz
DARACCEL	0.00	0		0 Oz
			Zero	

WATER	161	0 Gal U
	=====	=====
Total:	161	0 Gal

Time 2:15:58 PM Date 27 Oct, 1993

TICKET NUMBER: 000363

CONCRETE-READY-MIXED-CORP.

ROANOKE, VA.

Truck no.: 41 Batch no.: 39
Batch size: 3.00 Yds. Mix name:

Ticket no.: 4124
42

CASTLE	4.0	2306	Zero	2280 Lbs C
		=====	=====	
Total weight:		2306		2280 Lbs
Status:		OK/Auto		2280 Lbs

		Zero	
TYPE 1/2	1500	1488 Lbs C	
FLY ASH	360	342 Lbs C	
	=====	=====	
	1860	1830 Lbs	
OK/Auto		1848 Lbs	

DARAVAIR	100	9	Zero	9 Oz C
			Not Zero	

WATER	78	21 Gal U
	=====	=====
Total:	78	21 Gal

Time 2:23:25 PM Date 27 Oct, 1993

TICKET NUMBER: 000379

CONCRETE-READY-MIXED-CORP.
ROANOKE, VA.

Truck no.: 54 Batch no.: 40 Ticket no.: 4125
Batch size: 7.00 Yds. Mix name: 65

#7 STONE	0.0	5180	Zero	5160 Lbs C	TYPE 1/2	2590	Zero	2598 Lbs C
LIMESTON	2.0	5957		5880 Lbs C	FLY ASH	910		912 Lbs C
CASTLE	4.0	3820		3960 Lbs O				
#5 STONE	0.0	7770		7740 Lbs C				
		=====	=====			=====	=====	
Total weight:		22727		22740 Lbs		3500		3510 Lbs
Status: OT/Auto					OK/Auto			
				22740 Lbs				3468 Lbs

DARAVAIR	100	14	Zero	14 Oz C	WATER	190		0 Gal U
WRDA		140		140 Oz C		=====	=====	
DARACCEL	0.00	0		0 Oz	Total:	190		0 Gal
				Not Zero				

Time 2:36:20 PM Date 27 Oct, 1993 TICKET NUMBER: 000374

CONCRETE-READY-MIXED-CORP.
ROANOKE, VA.

Truck no.: 68 Batch no.: 41 Ticket no.: 4126
Batch size: 7.00 Yds. Mix name: 64

#7 STONE	0.0	5180	Zero	5190 Lbs C	TYPE 1/2	2030	Zero	1998 Lbs C
LIMESTON	2.0	6257		6240 Lbs C	FLY ASH	910		888 Lbs C
CASTLE	4.0	4010		4140 Lbs O				
#5 STONE	0.0	7770		7830 Lbs C				
		=====	=====			=====	=====	
Total weight:		23217		23400 Lbs		2940		2886 Lbs
~~Status: OT/Auto~~					~~OK/Auto~~			
				23400 Lbs				2862 Lbs

DARAVAIR	100	14	Zero	14 Oz C	WATER	188		0 Gal U
WRDA		117		117 Oz C		=====	=====	
DARACCEL	0.00	0		0 Oz	Total:	188		0 Gal
				Not Zero				

Time 2:48:04 PM Date 27 Oct, 1993 TICKET NUMBER: 000378

CONCRETE-READY-MIXED-CORP.

ROANOKE, VA.

Truck no.: 31 Batch no.: 42

Ticket no.: 4127

Batch size: 2.00 Yds. Mix name:

64

			Zero	
#5 STONE	0.0	1480	3690 Lbs M	
LIMESTON	2.0	1787	1770 Lbs M	
CASTLE	4.0	1145	1140 Lbs M	

	=====	=====	
Total weight:	6632	6600 Lbs	

Status: OK/Man

6690 Lbs

		Zero	
TYPE 1/2	580	575 Lbs C	
FLY ASH	260	240 Lbs C	

	=====	=====	
	840	816 Lbs	

OK/Auto

804 Lbs

			Zero	
DARAVAIR	100	4	4 Oz C	
WRDA		33	33 Oz C	
DARACCEL	0.00	0	0 Oz	

Not Zero

WATER	53	0 Gal U

	=====	=====
Total:	53	0 Gal

Time 3:02:02 PM

Date 27 Oct, 1993

TICKET NUMBER: 000380

CONCRETE-READY-MIXED-CORP.

ROANOKE, VA.

Truck no.: 36 Batch no.: 43

Ticket no.: 4128

Batch size: 2.00 Yds. Mix name:

65

			Zero	
#5 STONE	0.0	1480	1410 Lbs M	
LIMESTON	2.0	1702	1630 Lbs M	
CASTLE	4.0	1091	1110 Lbs M	
#7 STONE	0.0	2220	2250 Lbs M	

Total weight:	6453	6420 Lbs

Status: OK/Man

6480 Lbs

		Zero	
TYPE 1/2	740	744 Lbs C	
FLY ASH	260	288 Lbs C	

	1000	1032 Lbs

OK/Auto

1002 Lbs

			Zero	
DARAVAIR	100	4	4 Oz C	
WRDA		40	40 Oz C	
DARACCEL	0.00	0	0 Oz	

Not Zero

WATER	54	0 Gal U

	=====	=====
Total:	54	0 Gal

Time 3:11:55 PM

Date 27 Oct, 1993

TICKET NUMBER: 000381

CONCRETE-READY-MIXED-CORP.
ROANOKE, VA.

Truck no.: 56 Batch no.: 44 Ticket no.: 4129
Batch size: 6.00 Yds. Mix name: 64

CASTLE	4.0	4440	Zero	7170 Lbs M	TYPE 1/2	1740	Zero	594 Lbs M
					FLY ASH	780		2118 Lbs M
		=====	=====			=====	=====	
Total weight:		19900		7170 Lbs		2520		2712 Lbs
Status: OK/Man				7200 Lbs	OK/Man			2736 Lbs

DARAVAIR	100	12	Zero	0 Oz	WATER	161		0 Gal U
WRDA		100		0 Oz		=====	=====	
DARACCEL	0.00	0		0 Oz	Total:	161		0 Gal
			Zero					

Time 3:20:04 PM Date 27 Oct, 1993 TICKET NUMBER: 000364

CONCRETE-READY-MIXED-CORP.
ROANOKE, VA.

Truck no.: 57 Batch no.: 45 Ticket no.: 4130
Batch size: 8.00 Yds. Mix name: 64

#7 STONE	0.0	5920	Zero	5880 Lbs C	TYPE 1/2	2320	Zero	2352 Lbs C
LIMESTON	2.0	7151		7170 Lbs C	FLY ASH	1040		1020 Lbs C
~~CASTLE~~	~~4.0~~	~~4565~~		~~4630 Lbs C~~				
#5 STONE	0.0	8880		8910 Lbs C		=====	=====	
		=====	=====			3360		3372 Lbs
Total weight:		26534		26610 Lbs	OK/Auto			
Status: OK/Auto				Zero				Zero

DARAVAIR	100	16	Zero	16 Oz C	WATER	215		1 Gal U
WRDA		134		134 Oz C		=====	=====	
DARACCEL	0.00	0		0 Oz	Total:	215		1 Gal
			Not Zero					

Time 3:54:01 PM Date 27 Oct, 1993 TICKET NUMBER: 000376

OCTOBER 28, 1993

INLET RUNS 7, 8, 9 & 10

OUTLET RUN 4

10/28/93

①

Inlet run started @ 07:02

Truck #54 @ 07:03

1st water 7:04 50
estimated capture 90%
last water 7:08 48

Truck #31 @ 7:10

1st water 7:11 05
estimated capture 75
last water 7:15 02

7:11 55 → 7:14 46

~~26~~ 260 ft

winds light
from west

Truck #33 @ 7:15

1st water 7:17 20
estimated capture 90%
last water 7:21 46

wind perceptible
anemometer not
turning

Truck #74 @ 7:23

1st water 7:24 40
estimated capture 80%
last water 7:29 33

7:25 57 → 7:29 54

150 ft

Truck #56 @ 7:30

1st water 7:32 04
estimated capture 70%
last water 7:35 45

Truck #69 7:37

1st water 7:41 04
estimated capture 70%
last water 7:45 05

7:42 05 → 7:44 50

111 350 ft

Cement splashing out of
Truck loading point

Truck #73 @ 7:47

1st water 7:50 53
estimated capture 70%
last water 7:54 57

10/28/93

(2)

Truck # 62 @ 7:56 @ 2nd loading moved @ 8:00

1st water 8:03 02

estimated capture 30%

last water 8:05 30

received 5950 lbs ^{1.94% dust}

large amounts of dust
obscured hood system
at beginning of X for

Truck # 52 @ 8:06

1st water 8:09 17

estimated capture 60%

last water 8:13 34

large amount of cement
splashed out of truck hopper

Truck # 70 @ 8:14

1st water 8:17 36

estimated capture 80%

last water 8:22 13

some cement splashed
out of loading hopper

Truck # 35 @ 8:22

1st water 8:39 16

estimated capture 70

last water 8:42 52

Truck # 68 @ 8:43

1st water 8:

estimated capture 30%

last water 8:48 15

did not see any
1st water

large splash of
cement
small load

Truck # 77 @ 8:49

1st water 8:51 24

estimated capture 70%

last water 8:54 37

Truck # 38 @ 8:55

1st water 8:58 49

estimated capture 80%

last water 9:02 08

inlet sample stopped @ 9:02

10/28/93

(3)

Inlet run started

Truck #73

1st water 9:43 17
estimated capture 70%
last water 9:46 56

Truck #55 @ 9:47

1st water none

estimated capture 60%

last water none

small
load

Truck #56 @ 9:50

1st water none

estimated capture 60%

last water none

small
load

Truck #35 @ 9:53

1st water 9:56 18

estimated capture 50%

last water 9:59 45

Truck #37 @ 10:00

1st water 10:04 17

estimated capture 50%

last water 10:08 38

Truck #52 @ 10:09

1st water 10:13 07

estimated capture 50%

last water 10:14 49

Truck #70 @ 10:15

1st water 10:22 54

estimated capture 40%

last water 10:25 23

some big
splashes
of cement
during handling

10/28/93

(4)

Annemometer
passed 300

Truck #74 @ 10:26
1st water 10:28 33
estimated capture 60%
last water 10:30 35

Truck #53 @ 10:31
1st water 10:34 00
estimated capture 60%
last water ~~10:36 40~~ 10:37 03

Truck #62 @ 2nd station loaded 1500 lbs of ~~tr~~
@ concrete loading @ 10:40
1st water none just admixture
estimated capture 70%
last water 10:42 22

Truck #68 @ 1st station @ 10:43 loaded 3111 lbs of petesburg sand
@ 2nd station @ 10:44 loaded 4953 lbs of ~~tr~~ stone
@ concrete loading @ 10:45
1st water @ 10:47 34
estimated capture 90%
last water 10:49 35
~~2215 white ash~~

Truck #69 @ 10:50
1st water @ 10:57 46
estimated capture 60%
last water 11:01 26

Truck #56 @ 11:05
1st water 11:06 53
estimated capture 40%
last water 11:08 40

Truck #73 @ 11:09
1st water 11:11 27
estimated capture 60%
last water 11:15 06

Cement truck
arrived at Erie silo
load point @ 11:10

Annemometer passed 300
11:17

10/28/93

(5)

Truck #36 @ 11:22
1st water @ 11:29 12
estimated capture 80%
last water 11:30 57

Truck #37 @ 11:34
1st water @ 11:36 24
estimated capture 80%
last water 11:40 55

Inlet run stopped 11:40

Inlet Run started 12:22

Truck #73 not observed
Truck #68 not observed

Truck #75 12:42
1st water 12:44 18
collection efficiency 80%
last water 12:47 33

Truck #56 12:49
1st water 12:50 22
collection efficiency 30%
last water 12:54 17

large amounts of cement
tossed out of truck loading
hopper creating large
area of dust that filled
the bay

Fly ash delivery truck arrived

Truck #70 @ 12:59
1st water @ 13:01 40
collection efficiency 60%
last water 13:04 22

10/28/93

(6)

Truck #40 @ 13:08
1st water 13:10 37
capture efficiency 15
last water 13:13 39

Truck #36 @ 13:14
1st water 13:18 37
capture efficiency 80%
last water 13:21 10

Truck #37 @ 13:23
1st water @ 13:25 16
capture efficiency 80%
last water 13:28 16

Truck #38 @ 13:34
1st water @ 13:36 20
estimated capture efficiency 80%
last water 13:39 10

wind has calmed
barely perceptible
anemometer turns
periodically

Truck #55 @ 14:03
1st water @ 14:06 21
estimated capture efficiency 70%
last water @ 14:08 28

wind calm

~~Truck #73 @ 14:23~~
~~1st water~~
~~estimated capture efficiency~~
Inlet run stopped @ 14:24

Wind direction
changed from out of
the west to out of
the E to NE
Calm for truck 73

10/28/93

(7)

~~Process samples of~~
~~concrete aggregate (5 gal)~~

Inlet run started @ 15:03

Truck #38 @ 15:02

1st water @ 15:04 57

capture efficiency 80%

Last water 15:08 13

wind was barely
perceptible @ load station
flag across street barely
(15° angle) lifted toward SW
^{light}
indicating @ NE wind

Truck #31 @ 1st load station @ 15:12

received 4380

2nd station received 8820

concrete batch station @ 15:16

1st water @ 15:17 23

capture efficiency 40%

Last water 15:20 10

lbs of petersburg sand moved to
lbs of #1 stone @ 15:14 moved to

wind light but dust
carried to L rear of truck
obscuring vision of truck
loading chute

Truck #74 @ 15:22

Only received water

flag across street parallel
flying full (bottom ~ parallel
w/ ground, top @ 45° angle to
ground)

Truck #74 @ 15:29

1st water 15:32 01

capture efficiency 90%

12th water 15:35 53

wind is barely perceptible
but blowing from rear
of truck

Truck #52 @ 15:41

Only received water

Truck #37 @ 15:55

Only received water

Truck #56 @ 16:16 end of load

not observed

rec only water

10/28/93

(8)

35

Truck # 16:16

received 4380 lbs of petersburg ^{sand} at 1st station
received 8820 lbs of #7 stone at 2nd station

moved to concrete station @ 16:19

1st water 16:21 32

capture efficiency 75%

last water 16:23 47

wind from
rear of truck

cement coming out of drum
and onto drive - dusting
during fall

Truck # 41 @ 16:24 @ 1st station

received 4380 lbs of petersburg sand moved to
second station @ 16:25

received 8820 lbs of #7 stone moved to

concrete loading station @ 16:26

1st water @ 16:27 25

capture efficiency 80%

last water @ 16:29 36

wind barely perceptible
to light out of the ENE
anemometer not moving

Truck # 67 @ 16:30

1st water 16:30 28

capture efficiency

last water 16:31 15

No dry material
transferred

Truck # 75 @ 16:34

No dry material

Truck # 54 @ 16:41

1st water 16:41 30

capture efficiency

last water 16:42 20

No dry material
transferred

Truck # 36 @ 16:43

1st water 16:45 25

capture efficiency 90%

last water 16:49 22

wind barely perceptible
from W
but changed to E
during dry mtl xfr

9

1st water @ 16:53 42

wind in alley
from W

last water ②

no dry material

mind is only barely perceptible

1st water 10:59 29

from E

capture efficiency 90%

from E
any number turning periodically

last water 17:04 06

dry material of Truck 33 had
VE at run stop time

no VE at run stop time

Process samples collected @ the
Roanoke, VA plant of Concrete Ready Mixed Corp.

- 1 5 gallon pail ($\approx 75\%$) of #57 stone from conveyor belt ~~storage~~ ^{supply} site
- 1 one liter container of limestone sand fine aggregate from conveyor belt ~~storage~~ ^{supply} site
- 2 one liter containers of red sand called castle sand from conveyor belt supply site
- 1 one liter container of cement delivered to plant

one bag of about 6" diameter x 6" tall of road
dust swept from paved area beside Johnson plant
where trucks drive through
one bag of about 6" diameter x 12" tall of road dust
swept from plant exit.

Concrete Ready Mixed Corp., Roanoke, VA

10/28/93

Concrete ready mixed Corp., Inland Empire																
Truck Number	Batch Number	Batch Size Yards	Ticket Time H:M:S A/P	Estimated Actual Time H:M A/P	Precharged Material			Course		Portland Cement lbs	Fly Ash lbs	Addmix OZ	Water		Estimated Capture Efficiency percent	
					Chute One Material lbs	Chute Two Material lbs	Aggregate #5 & 7 lbs	Limestone Sand lbs	Castle Sand lbs				Indicated Requested Gal	Indicated Delivered Gal		
Inlet Run 7																
54	6	8	07:05:24 AM	07:44 AM			14,670	6,420	5,220	4,488	0	10	223	28	90%	
31	7	7	07:12:10 AM	07:51 AM			12,360	9,180	2,550	3,312	0	15	217	157	75%	
33	8	8	07:18:41 AM	07:57 AM			14,880	6,360	5,310	4,470	0	10	223	30	90%	
74	9	8	07:26:10 AM	08:05 AM			13,920	12,000	0	4,296	0	10	267	192	80%	
56	10	7	07:32:59 AM	08:11 AM			12,420	9,180	2,520	3,306	0	8	217	160	70%	
69	11	8	07:42:21 AM	08:21 AM			14,310	6,270	3,990	4,908	582	25	230	176	70%	
73	12	8	07:52:10 AM	08:31 AM			14,310	6,300	3,840	4,956	582	26	230	177	70%	
62	13	7	08:02:25 AM	08:41 AM		5,950	0	5,880	3,990	3,276	822	660	217	156	30%	
52	14	8	08:10:33 AM	08:49 AM			14,730	6,480	5,250	4,536	0	10	223	164	60%	
70	15	6.75	08:19:23 AM	08:58 AM			11,910	8,790	2,810	3,216	0	7	210	0	80%	
35	16	8	08:40:03 AM	09:19 AM			14,340	6,210	3,810	4,920	576	25	230	169	70%	
68	17	0.5	08:45:08 AM	09:24 AM			1,110	450	270	264	0	0	13	0	30%	
77	18	8	08:53:42 AM	09:32 AM			14,700	6,900	4,350	2,946	1,038	176	217	124	70%	
38	19	8	08:59:05 AM	09:38 AM			14,280	6,270	3,990	4,896	600	26	230	137	80%	
TOTALS		100.2			5,950	0	167,940	96,690	47,100	53,790	4,200	1,008	2,947	1,670	69%	
											Unweighted Average					69%
											Weighted Average (concrete)					72%
											Weighted Average (cement & Fly Ash)					72%

Inlet Run 8

73	22	8	09:44:08 AM	10:23 AM			14,340	6,270	3,600	4,866	570	25	230	100	70%
55	23	1	09:47:39 AM	10:26 AM			1,890	1,440	0	588	0	0	0	0	60%
56	24	0.5	09:50:43 AM	10:29 AM			840	660	270	258	0	0	15	0	60%
35	25	8	09:56:54 AM	10:35 AM			14,310	6,270	3,540	4,878	576	25	230	170	50%
37	26	8	10:05:49 AM	10:44 AM			14,400	7,170	2,730	4,902	588	25	230	174	50%
52	27	3.5	10:11:55 AM	10:50 AM			6,420	4,050	1,590	1,886	0	0	107	81	50%
70	28	4	10:22:00 AM	11:01 AM			7,260	3,210	2,130	1,782	504	100	109	78	40%
74	29	5.5	10:27:51 AM	11:06 AM			9,840	4,890	3,030	2,022	720	121	120	0	60%
53	30	7	10:33:36 AM	11:12 AM			13,110	5,910	3,970	2,610	894	154	190	137	0.6
62	31	1	10:39:35 AM	11:18 AM	#7 stone	1,500	0	1,080	570	414	132	192	27	0	70%
68	--	3.5	10:46:39 AM	11:25 AM	#7 stone	4,953	0	0	3,060	1,656	390	14	0	0	40%
69	32	8	10:58:29 AM	11:37 AM			14,790	6,030	3,600	4,872	588	25	230	99	60%
56	33	2.5	11:05:35 AM	11:44 AM			4,680	1,860	1,230	1,236	306	7	50	25	40%
73	34	8	11:12:17 AM	11:51 AM			14,490	6,270	3,630	4,920	618	24	230	178	60%
36	35	8	11:27:40 AM	12:06 PM			14,970	6,360	5,280	4,482	0	20	223	155	80%
37	36	8	11:37:52 AM	12:16 PM			14,340	6,330	3,600	4,944	588	25	230	174	80%
TOTALS		84.5			6,453		3,111	145,680	67,800	46,116	6,474	757	2,221	1,371	58%
														Unweighted Average	
														Weighted Average (concrete)	
														Weighted Average (cement & Fly Ash)	
														55%	
														56%	

10/28/93

[illegible]

nlet Run 10

38	53
31	54
74	55
35	56
41	57
36	58
33	59
TOTALS	

10/28/93

Concrete Ready Mixed Corp., Roanoke, VA

10/26/93															
Truck Number	Batch Number	Batch Size Yards	Ticket Time H:M:S.A.P	Estimated Actual Time H:M:A/P	Concrete ready mixed Corp. Elements				Portland Cement lbs	Fly Ash lbs	Addmix OZ	Water		Estimated Capture Efficiency percent	
					Chute One Material	lbs	Chute Two Material	lbs				Indicated Requested Gal	Delivered Gal		
Johnson Plant Totals for the day.															
214.5															
97,600 13,000															
Erie Plant production prior to Outlet Run #4 start.															
41	1	8	06:26:36 AM	07:05 AM			14,850	6,480	5,250	4,488	0	20	223	150	
53	2	1	06:32:39 AM	07:11 AM			0 ±	0	1,290	822	0	0	44	0	
77	3	7	06:42:44 AM	07:21 AM			12,120	9,210	2,840	3,318	0	8	217	53	
35	4	8	06:51:37 AM	07:30 AM			14,400	6,300	3,660	4,878	642	24	230	117	
55	5	8	06:59:16 AM	07:38 AM			14,250	12,120	0	4,236	0	10	267	72	
Outlet Run 4															
54	6	8	07:05:24 AM	07:44 AM			14,870	6,420	5,220	4,488	0	10	223	28	90%
31	7	7	07:12:10 AM	07:51 AM			12,360	9,180	2,550	3,312	0	15	217	157	75%
33	8	8	07:18:41 AM	07:57 AM			14,880	6,360	5,310	4,470	0	10	223	30	90%
74	9	8	07:26:10 AM	08:05 AM			13,920	12,000	0	4,298	0	10	267	192	80%
56	10	7	07:32:59 AM	08:11 AM			12,420	9,180	2,520	3,306	0	8	217	180	70%
69	11	8	07:42:21 AM	08:21 AM			14,310	6,270	3,690	4,908	582	25	230	176	70%
73	12	8	07:52:10 AM	08:31 AM			14,310	6,300	3,840	4,956	582	26	230	177	70%
62	13	7	08:02:25 AM	08:41 AM			0	5,880	3,990	3,276	822	660	217	156	30%
52	14	8	08:10:33 AM	08:49 AM			14,730	6,480	5,250	4,536	0	10	223	164	60%
70	15	6.75	08:19:23 AM	08:58 AM			11,910	8,790	2,610	3,216	0	7	210	0	80%
35	16	8	08:40:03 AM	09:19 AM			14,340	6,210	3,810	4,920	576	25	230	169	70%
68	17	0.5	08:45:08 AM	09:24 AM			1,110	450	270	264	0	0	13	0	30%
77	18	8	08:53:42 AM	09:32 AM			14,700	6,900	4,350	2,946	1,038	176	217	124	70%
38	19	8	08:59:05 AM	09:38 AM			14,280	6,270	3,690	4,896	600	26	230	137	80%
31	20	3.5	09:24:15 AM	10:03 AM			0	2970	2190	1674	432	417	80	2	
69	21	8	09:32:40 AM	10:11 AM			14,400	6,270	3,510	4,896	588	25	230	164	
73	22	8	09:44:08 AM	10:23 AM			14,340	6,270	3,600	4,866	570	25	230	100	70%
55	23	1	09:47:39 AM	10:26 AM			1,890	1,440	0	588	0	0	0	0	60%
56	24	0.5	09:50:43 AM	10:29 AM			840	660	270	258	0	0	15	0	60%
35	25	8	09:56:54 AM	10:35 AM			14,310	6,270	3,540	4,878	576	25	230	170	50%
37	26	8	10:05:49 AM	10:44 AM			14,400	7,170	2,730	4,902	588	25	230	174	50%
52	27	3.5	10:11:55 AM	10:50 AM			6,420	4,050	1,590	1,686	0	0	107	81	50%
70	28	4	10:22:00 AM	11:01 AM			7,260	3,210	2,130	1,782	504	100	109	78	40%
74	29	5.5	10:27:51 AM	11:06 AM			9,840	4,890	3,030	2,022	720	121	120	0	60%
53	30	7	10:33:36 AM	11:12 AM			13,110	5,910	3,870	2,610	894	154	190	137	0.6
62	31	1	10:39:35 AM	11:18 AM			1,500	1,080	570	414	132	192	27	0	70%
68	32	3.5	10:46:39 AM	11:25 AM			4,953	0	3,060	1,656	390	14	0	0	40%
69	33	8	10:58:29 AM	11:37 AM			14,790	6,030	3,600	4,872	588	25	230	99	60%
56	34	2.5	11:05:35 AM	11:44 AM			4,680	1,860	1,230	1,236	306	7	50	25	40%
73	35	8	11:12:17 AM	11:51 AM			14,490	6,270	3,630	4,920	618	24	230	178	60%
36	36	8	11:27:40 AM	12:06 PM			14,970	6,360	5,280	4,482	0	20	223	155	80%
37	37	8	11:37:52 AM	12:16 PM			14,340	6,330	3,600	4,944	588	25	230	174	80%
55	38	7.5	11:45:16 AM	12:24 PM			13,830	6,660	4,350	2,178	966	141	202	119	
52	39	1	12:00:54 PM	12:39 PM			0	930	780	438	108	0	26	0	
31	40	5	12:08:38 PM	12:47 PM			9,150	4,740	3,180	2,466	0	400	150	54	
38	41	1	12:15:47 PM	12:54 PM			0 ±	0	2,490	1,734	0	0	44	40	
73	42	6.5	12:21:35 PM	01:00 PM			11,970	5,850	3,750	1,890	852	122	175	113	
68	43	5	12:30:10 PM	01:09 PM			9,030	3,750	2,310	2,544	594	15	125	78	
75	44	6.5	12:44:12 PM	01:23 PM			12,090	5,850	3,750	1,884	822	122	175	121	80%
56	45	6	12:50:22 PM	01:29 PM			11,070	5,280	3,450	1,830	774	112	161	116	30%
74	46	6	01:01:17 PM	01:40 PM			11,160	5,370	3,450	1,830	786	112	161	104	60%
36	47	8	01:10:46 PM	01:49 PM			15,180	5,880	3,810	3,984	948	24	20	150	75%
37	48	8	01:18:43 PM	01:57 PM			14,700	6,510	5,250	4,488	0	20	223	68	80%
38	49	8	01:25:25 PM	02:04 PM			14,580	6,240	3,570	4,884	576	27	230	176	80%
		8	01:36:38 PM	02:15 PM			14,400	6,300	3,450	4,938	582	26	230	107	80%

10/28/93

Concrete Ready Mixed Corp., Roanoke, VA

Truck Number	Batch Number	Batch Size Yards	Ticket Time H:M:S A/P	Estimated Actual Time H:M A/P	Precharged Material			Course Aggregate #5 & 7 lbs	Limestone Sand lbs	Castle Sand lbs	Portland Cement lbs	Fly Ash lbs	Addmix OZ	Water		Estimated Capture Efficiency percent
					Chute One Material lbs	Chute Two Material lbs	Indicated Requested Gal							Indicated Delivered Gal		
55	50	5.25	02:05:20 PM	02:44 PM				9,750	4,200	2,730	2,346	666	131	143	98	70%
73	51	3	02:24:47 PM	03:03 PM				5,670	2,640	1,530	1,404	426	66	81	15	
35	52	6	02:37:02 PM	03:16 PM	#7 stone	8,820 ±Pete Sand	4,380 ±	0	0	4,650	3,000	738	18	157	73	
Manual Batch.																
		4 ±	02:57:46 PM	03:36 PM		??	??	0	0	4,230	2,352	588	21	0	0	
38	53	8	03:05:02 PM	03:44 PM				14,280	6,330	3,660	4,890	576	26	230	143	80%
31	54	6	03:16:25 PM	03:55 PM	#7 stone	8,820 Pete Sand	4,380	0	0	4,590	2,976	726	18	157	67	40%
74	55	8	03:32:25 PM	04:11 PM				14,580	6,270	3,510	4,908	600	25	230	172	90%
35	56	6	04:18:51 PM	04:57 PM	#7 stone	8,820 Pete Sand	4,380	0	0	4,590	3,000	726	18	157	101	75%
41	57	6	04:24:47 PM	05:03 PM	#7 stone	8,820 Pete Sand	4,380	0	0	4,800	3,006	720	18	157	102	80%
36	58	8	04:42:33 PM	05:21 PM				14,430	6,300	3,510	4,884	600	26	230	0	90%
33	59	8	04:56:14 PM	05:35 PM				14,400	6,360	3,540	4,890	606	26	230	142	90%
ERIE PLANT TOTALS for test period.																
		341.0			50,658	20,631	538,290		272,730	179,460	179,220	25,674	3,721	9,172	5,366	
Total for batches with est. off.																
		290.5														
Estimated Johnson Plant totals for test period.																
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Johnson BIN 10-28-93

214.5 yds.

48.8 TONS CEMENT

6.5 TONS Fly Ash

MEMORANDUM

NOTE:



Roanoke
Roanoke Cement Company

PAGE 1 OF 1
US 04501

SHIPPERS B/L: 0000000000

MAGLANN

50293

DATE	SHIPPED FROM	AGENTS NUMBER
10/26/93	ROANOKE PLANT	
CONSIGNEE:		CARRIER/ROUTE F.O.B.
CONCRETE READY MIX		HILL TEST PLEASE
DESTINATION:		
BULK ACCT		
ROANOKE	VA	RWC NO.:

RATE		TEST	SPECIAL INSTRUCTIONS				
QTY.	DESCRIPTION	GROSS	WEIGHT TARE	NET	CAR INITIAL AND NUMBER	WAYBILL NUMBER	BIN NO.
	TYPE 1/11 FOB						35

TRUCK ARRIVED		UNLOADING COMPLETE	RECEIVED FOR CONSIGNEE BY
AM	PM	AM	PM

EXPLAIN BELOW REASON FOR DELAY OR EXCEPTIONS

TIME USED BY CONSIGNEE FOR UNLOADING TRUCK, IN EXCESS OF TIME ALLOWED IN TARIFF, WILL BE ASSESSED AT THE APPLICABLE TARIFF RATES AND CHARGED TO CONSIGNEE. PRIOR TO SIGNING DELIVERY RECEIPT, VERIFY CONDITION OF SHIPMENT, TRUCK ARRIVAL, AND UNLOADING COMPLETED TIME. NO LOSS OR DAMAGE CLAIMS CONSIDERED UNLESS EXCEPTION IS NOTED ON BILL OF LADING BY CONSIGNEE AT TIME OF DELIVERY.

CAUTION
MAY CAUSE SKIN IRRITATION
OR INJURY TO EYES
CONTAINS PORTLAND CEMENT, FRESHLY MIXED CEMENT,
OR FRESH CONCRETE OR GROUT MAY CAUSE SKIN IRRITATION.
AVOID CONTACT WITH EYES, SKIN, CLOTHING, DISHABLE AND WASH
EXPOSED SKIN AREAS PROMPTLY WITH WATER.
IF ANY CEMENT OR CEMENT MIXTURES GET INTO THE EYES,
RINSE IMMEDIATELY AND REPEATEDLY WITH WATER AND GET
PROMPT MEDICAL ATTENTION
KEEP OUT OF REACH OF CHILDREN.

CUSTOMER PICKUP

RECEIPT OF THE PRODUCT AND QUANTITY DESIGNATED
HEREON IS ACKNOWLEDGED. FOB ORIGIN PLANT SITE,
BY CUSTOMER OR AGENT FOR CUSTOMER FOR DELIVERY
TO THE CUSTOMER AND DESTINATION IDENTIFIED
HEREON

COMPANY

AGENT

TRACTOR LIC. NO.

SEAL NO(S).

Subject to Section 7 of conditions, if this shipment is to be delivered to the consignee without recourse on the consignor, the consignor shall sign the following statement:

The carrier shall not make delivery of this shipment without payment of freight and all other lawful charges.

(Signature of consignor.)

If charges are to be prepaid, write or stamp here, "To Be Prepaid."

TO BE PREPAID

ROANOKE CEMENT COMPANY	CARRIER'S AGENT	TRACTOR NO.	TRAILER NO.
PER: <i>R. Delo</i>	PER:	<i>11</i>	<i>11</i>

NAME AND PERMANENT POST OFFICE ADDRESS OF SHIPPER

ROBERT E. SMITH, JR.
PH. 100-2416 BOSTON, MA 02601

Shipper certifies that weight and description indicated on this bill of lading are correct, subject to correction by railroad weighing and inspection bureau.

73400

- LBS. GROSS

24560

- LBS. TARE

18840

- LBS.NET

24.4200

10/28/93

7:51

043344

NOTE:



Roanoke
Roanoke Cement Company

SHIPPERS B/L: 1907045.

PAGE 1 OF 1

MARILYNNE

244

06. 04591

4,6703

DATE	SHIPPED FROM	AGENTS NUMBER
10/26/00	BOAHOLE PLANT	
CONSIGNEE: CONCRETE READY MIX		CARRIER/ROUTE I.O.P. MILL TEST PLEASE
DESTINATION: BULK ACCT BOAHOLE VA		RWC NO.:

RATE	TEST	SPECIAL INSTRUCTIONS

QTY.	DESCRIPTION	GROSS	WEIGHT		CAR INITIAL AND NUMBER	WAYBILL NUMBER	BIN N
			TARE	NET			
	TYPE 1:11 FOR						35

TRUCK ARRIVED	UNLOADING COMPLETE	RECEIVED FOR CONSIGNEE BY
AM PM	AM PM	

EXPLAIN BELOW REASON FOR DELAY OR EXCEPTIONS

TIME USED BY CONSIGNEE FOR UNLOADING TRUCK, IN EXCESS OF TIME ALLOWED IN TARIFF, WILL BE ASSESSED AT THE APPLICABLE TARIFF RATES AND CHARGED TO CONSIGNEE. PRIOR TO SIGNING DELIVERY RECEIPT, VERIFY CONDITION OF SHIPMENT, TRUCK ARRIVAL, AND UNLOADING COMPLETED TIME. NO LOSS OR DAMAGE CLAIMS CONSIDERED UNLESS EXCEPTION IS NOTED ON BILL OF LADING BY CONSIGNEE AT TIME OF DELIVERY.

CAUTION
MAY CAUSE SKIN IRRITATION
OR INJURY TO EYES
CONTAINS PORTLAND CEMENT FRESHLY MIXED CEMENT,
PORTLAND CONCRETE OR GROUT MAY CAUSE SKIN IRRITATION
AND CONTACT WITH SKIN WHERE POSSIBLE AND WASH
EXPOSED SKIN AREAS PROMPTLY WITH WATER
IF ANY CEMENT OR CEMENT MIXTURES GET INTO THE EYE,
RINSE IMMEDIATELY AND REPEATEDLY WITH WATER AND GET
PROMPT MEDICAL ATTENTION.
KEEP OUT OF REACH OF CHILDREN.

CUSTOMER PICKUP

RECEIPT OF THE PRODUCT AND QUANTITY DESIGNATED
HEREON IS ACKNOWLEDGED, FOB ORIGIN PLANT SITE,
BY CUSTOMER OR AGENT FOR CUSTOMER FOR DELIVERY
TO THE CUSTOMER AND DESTINATION IDENTIFIED
HEREON.

COMPANY

AGENT

TRACTOR LIC. NO.

SEAL NO(S).

ROANOKE CEMENT COMPANY	CARRIER'S AGENT	TRACTOR NO.	TRAILER NO.
PER: <i>R Dep</i>	PER:	<i>11</i>	
NAME AND PERMANENT POST OFFICE ADDRESS OF SHIPPER			
ROANOKE CEMENT COMPANY P.O. BOX 2016, NORFOLK, VA 23501			

Subject to Section 7 conditions, if this shipment is to be delivered to the consignee without recourse on the consignor the consignor shall sign the following statement:

The carrier shall not make delivery of this shipment without payment of freight and all other law charges.

(Signature of consignor.)

If charges are to be prepaid, write or stamp here
"To Be Prepaid."

TO BE PREPAID

Shipper certifies that weight and description indicated on this bill of lading are correct, subject to correction by railroad weigh and inspection bureau.

73520

24500

49020

• LBS. GROSS

- LBS. TARE

- LBS. NET

24.5100

10/28/93

10:24

043345

CONCRETE-READY-MIXED-CORP.
ROANOKE, VA.

Truck no.: 41 Batch no.: 1 Ticket no.: 4131
Batch size: 8.00 Yds. Mix name: 4

Zero				- 48 Lbs		
#7 STONE	0.0	5920	5850 Lbs C	TYPE 1/2	4512	4488 Lbs C
LIMESTON	2.0	6432	6480 Lbs C			
CASTLE	4.0	5208	5250 Lbs C			
#5 STONE	0.0	8880	9000 Lbs C			
=====				=====	=====	
Total weight:	26440	26580	Lbs		4512	4488 Lbs
Status:	OK/Auto			OK/Auto		
Zero				- 36 Lbs		
Zero						
DARAVAIR	100	20	20 Oz C	WATER	223	150 Gal U
DARACCEL	0.00	0	0 Oz		=====	=====
Zero				Total:	223	150 Gal

Time 6:26:06 AM

Date 28 Oct, 1993

TICKET NUMBER: 000395R

CONCRETE-READY-MIXED-CORP.
ROANOKE, VA.

Truck no.: 53 Batch no.: 2 Ticket no.: 4132
Batch size: 1.00 Yds. Mix name: 50

Zero				- 30 Lbs		
LIMESTON	2.0	1785	1800 Lbs M	TYPE 1/2	846	822 Lbs M
CASTLE	4.0	1208	1290 Lbs M			
=====				=====	=====	
Total weight:	2993	3090	Lbs		846	822 Lbs
Status:	OK/Man			OK/Man		
Zero				- 30 Lbs		
Zero						
Zero				WATER	44	0 Gal U
					=====	=====

ROANOKE, VA.

Batch size: 1.00 Yds. My name:

~~made~~ CASTLE 4.0 1208 1250 CDS 14

Statues: OK/Man

2500

TYPE : 11 045 863 10 10

DE. 10-11-1990

Zero

648-650

Time 0:32:39 AM Date 23 Oct. 1993

TICKET NUMBER: _____

ROANOKE, VA.

Batch size: 7.00 Yds. Mix name:

CASTLE	4.0	2552	2640	Lbs	C

#5 STONE	0.0	7420	7080	1	bs	M

=====

Status: OT/Mari

Zero

TYPE 1/2 3290 3318 Lbs C

OK/Auto

Zero

PARAVALL	100	0	0	02	M
PARAVAIR	100	0	8	07	M

Zero

WATER 217 53 Gal U

Total: 217 53 Gal

Time 6:42:44 AM Date 28 Oct, 1993

TICKET NUMBER: 000393R

CONCRETE-READY-MIXED-CORP.

ROANOKE, VA.

Truck no.: 35 Batch no.: 4 Ticket no.: 4134
Batch size: 8.00 Yds. Mix name: 106

#7 STONE	0.0	6000	Zero	6000 Lbs C	TYPE 1/2	4912	Zero	4878 Lbs C
LIMESTON	2.0	6302		6300 Lbs C	FLY ASH	800		642 Lbs M
CASTLE	4.0	3566		3560 Lbs M				
#5 STONE	0.0	8376		8400 Lbs M				
		=====				=====		=====
Total weight:		24244		24360 Lbs		5512		5520 Lbs
Status:		OK/Man			OK/Man			
				Zero				Zero

DARAVAIR	100	24	Zero	24 Oz	WATER	230		117 Gal U
WRDA		180		0 Oz		=====		=====
				Zero	Total:	230		117 Gal

Time 6:51:37 AM Date 28 Oct, 1993 TICKET NUMBER: 000305

CONCRETE-READY-MIXED-CORP.

ROANOKE, VA.

Truck no.: 55 Batch no.: 5 Ticket no.: 4135
Batch size: 8.00 Yds. Mix name: 15

#7 STONE	0.0	5600	Zero	5670 Lbs C	TYPE 1/2	4135	Zero	4236 Lbs M
LIMESTON	2.0	12040		12120 Lbs C				
#5 STONE	0.0	8480		8580 Lbs C				
		=====				=====		=====
Total weight:		26120		26370 Lbs		4136		4236 Lbs
Status:		OK/Auto			OK/Man			
				Zero				42 Lbs

DARAVAIR	50	10	Zero	10 Oz C	WATER	267		72 Gal U
DARACCEL	0.00	0		0 Oz		=====		=====
				Zero	Total:	267		72 Gal

Time 6:59:16 AM Date 28 Oct, 1993 TICKET NUMBER: 000401

CONCRETE-READY-MIXED-CORP.

ROANOKE, VA.

Truck no.: 54 Batch no.: 6 Ticket no.: 4136
 Batch size: 8.00 Yds. Mix name: 4

			Zero			36 Lbs
#1 STONE	0.0	5920	5790 Lbs C	TYPE 1/2	4512	4488 Lbs C
LIMESTON	2.0	6432	6420 Lbs C			
CASTLE	4.0	5208	5230 Lbs C			
#1 STONE	0.0	8880	8880 Lbs C			
		=====	=====			
Total weight:		26440	26310 Lbs		4512	4488 Lbs
Status:			OK/Auto			

			Zero			
DARAVAIR	50	10	10 Oz C	WATER	223	28 Gal U
DARACCEL	0.00	0	0 Oz		=====	=====
			Zero	Total:	223	28 Gal

Time 7:05:24 AM Date 28 Oct, 1993 TICKET NUMBER: 000358R

CONCRETE-READY-MIXED-CORP.

ROANOKE, VA.

Truck no.: 31 Batch no.: 7 Ticket no.: 4137
 Batch size: 7.00 Yds. Mix name: 34

			Zero			Zero
#7 STONE	0.0	4900	4950 Lbs C	TYPE 1/2	3290	3312 Lbs C
LIMESTON	2.0	9142	9180 Lbs C			
CASTLE	4.0	2552	2550 Lbs C			
#3 STONE	0.0	7420	7410 Lbs C			
		=====	=====			
Total weight:		24014	24090 Lbs		3290	3312 Lbs
Status:			OK/Auto			
			Zero			Zero

			Zero			
DARACCEL	0.00	0	0 Oz	WATER	217	157 Gal U
DARAVAIR	100	0	15 Oz M		=====	=====
			Zero	Total:	217	157 Gal

Time 7:12:10 AM Date 28 Oct, 1993 TICKET NUMBER: 000394R

CONCRETE-READY-MIXED-CORP.

ROANOKE, VA.

Truck no.: 33 Batch no.: 8 Ticket no.: 4138
 Batch size: 8.00 Yds. Mix name: 4

#7 STONE	0.0	5620	5600 Lbs C	Zero	Zero
LIMESTON	2.0	8432	8360 Lbs C	TYPE 1/2	4512 4470 Lbs C
CASTLE	4.0	5208	5310 Lbs C		
#5 STONE	0.0	8880	8860 Lbs C		
		=====			

Status: OT/Auto

OK/Auto

DARAVAIR	50	10	10 Oz C	Zero	Zero
DARACCEL	0.00	0	0 Oz		

Time 7:18:41 AM

Date 28 Oct, 1993

TICKET NUMBER: 000403R

CONCRETE-READY-MIXED-CORP.

ROANOKE, VA.

Truck no.: 74 Batch no.: 9 Ticket no.: 4139
 Batch size: 8.00 Yds. Mix name: 15

#7 STONE	0.0	5600	5610 Lbs C	Zero	Zero
LIMESTON	2.0	12040	12000 Lbs C	TYPE 1/2	4136 4296 Lbs C
#5 STONE	0.0	8480	8310 Lbs C		
		=====			

Total weight: 26120 25920 Lbs

Status: OK/Auto

OT/Auto

DARAVAIR	50	10	10 Oz C	Zero	Zero
DARACCEL	0.00	0	0 Oz		

Time 7:26:10 AM

Date 28 Oct, 1993

TICKET NUMBER: 000402R

CONCRETE-READY-MIXED-CORP.
ROANOKE, VA.

Truck no.: 56 Batch no.: 10 Ticket no.: 4140
Batch size: 7.00 Yds. Mix name: 34

Zero				48 Lbs		
#	STONE	0.0	4900	12390 Lbs M	TYPE 1/2	3290 3306 Lbs C
	LIMESTON	2.0	9142	9180 Lbs C		
	CASTLE	4.0	2552	2520 Lbs C		
=====				=====		
Total weight:					3290	3306 Lbs
Status: OK/Man				OK/Auto		
Zero				Zero		
Zero						
	D RACCEL	0.00	0	0 Oz	WATER	217 160 Gal U
	DARAVAIR	100	0	8 Oz M		=====
Zero				Total:	217	160 Gal

Time 7:32:59 AM Date 28 Oct, 1993 TICKET NUMBER: 000411

CONCRETE-READY-MIXED-CORP.
ROANOKE, VA.

Truck no.: 69 Batch no.: 11 Ticket no.: 4141
Batch size: 8.00 Yds. Mix name: 106

Zero				Zero		
#	STONE	0.0	6000	14310 Lbs M	TYPE 1/2	4912 4908 Lbs C
	LIMESTON	2.0	6302	6270 Lbs M	FLY ASH	600 582 Lbs C
	CASTLE	4.0	3566	3690 Lbs M		
=====				=====		
Total weight:					5512	5490 Lbs
Status: OK/Man				OK/Auto		
Zero				Zero		
Zero						
	D RAVAIR	100	24	25 Oz	WATER	230 176 Gal U
	W.DA		180	0 Oz		=====
Zero				Total:	230	176 Gal

Time 7:42:21 AM Date 28 Oct, 1993 TICKET NUMBER: 000391R

CONCRETE-READY-MIXED-CORP.

ROANOKE, VA.

Truck no.: 73 Batch no.: 12 Ticket no.: 4142
Batch size: 8.00 Yds. Mix name: 106

#7 STONE	0.0	5000	14310 Lbs M	TYPE 1/2	4912	4956 Lbs C
~~LIMESTON~~	~~2.0~~	~~5835~~	~~5880 Lbs C~~	~~FLY ASH~~	~~840~~	~~822 Lbs C~~
CASTLE	4.0	3566	3840 Lbs M			
		=====	=====		=====	=====
Total weight:		24244	24450 Lbs		5512	5538 Lbs
Status: OK/Man			90 Lbs	OK/Auto		Zero

DARAVAIR	100	24	26 Oz	WATER	230	177 Gal U
WRDA		180	0 Oz		=====	=====
			Zero	Total:	230	177 Gal

Time 7:52:10 AM Date 28 Oct, 1993 TICKET NUMBER: 000392R

CONCRETE-READY-MIXED-CORP.

ROANOKE, VA.

Truck no.: 62 Batch no.: 13 Ticket no.: 4143
Batch size: 7.00 Yds. Mix name: 113

LIMESTON	2.0	5835	5880 Lbs C	TYPE 1/2	3290	3276 Lbs C
CASTLE	4.0	3973	3990 Lbs C	FLY ASH	840	822 Lbs C
		=====	=====		=====	=====
Total weight:		9808	9870 Lbs		4130	4098 Lbs
Status: OK/Auto			Zero	OK/Auto		Zero

WRDA		165	0 Oz	WATER	217	156 Gal U
DARAVAIR	100	30	30 Oz		=====	=====
DARACCEL	0.00	0	630 Oz M	Total:	217	156 Gal
			Not Zero			

Time 8:02:25 AM Date 28 Oct, 1993 TICKET NUMBER: 000406R

CONCRETE-READY-MIXED-CORP.

DANOK, VA.

Truck no.: 52 Batch no.: 14 Ticket no.: 4144
 Batch size: 8.00 Yds. Mix name: 4

#7 STONE	0.0	5920	14610 Lbs M	TYPE 1/2	4512	4536 Lbs M
IMESTON	2.0	6432	6480 Lbs C			
ASTLE	4.0	5208	5250 Lbs C			
#5 STONE	0.0	8880	120 Lbs M			
		=====	=====		=====	=====
Total weight:		26440	26460 Lbs		4512	4536 Lbs
Status:	OK/Man			OK/Man		
		Zero			Zero	

ARAVAIR	50	10	10 Oz C	WATER	223	164 Gal U
ARACCEL	0.00	0	0 Oz		=====	=====
		Zero		Total:	223	164 Gal

Time 8:10:33 AM Date 28 Oct, 1993 TICKET NUMBER: 000410R

CONCRETE-READY-MIXED-CORP.

DANOK, VA.

Truck no.: 70 Batch no.: 15 Ticket no.: 4145
 Batch size: 6.75 Yds. Mix name: 34

#7 STONE	0.0	4725	11910 Lbs M	TYPE 1/2	3172	3216 Lbs U
IMESTON	2.0	8816	8790 Lbs M			
CASTLE	4.0	2460	2610 Lbs M			
		=====	=====		=====	=====
Total weight:		23156	23310 Lbs		3172	3216 Lbs
Status:	OK/Man			OT/Auto		
		Zero			Zero	

ARACCEL	0.00	0	0 Oz M	WATER	210	0 Gal U
ARAVAIR	100	0	7 Oz M		=====	=====
		Zero		Total:	210	0 Gal

Time 8:19:23 AM Date 28 Oct, 1993 TICKET NUMBER: 000412

CONCRETE-READY-MIXED-CORP.

ROANOKE, VA.

Truck no.: 35 Batch no.: 16

Ticket no.: 4146

~~Batch size: 0.50 Yds. Mix name:~~

			Zero
#7 STONE	0.0	6000	14340 Lbs M
LIMESTON	2.0	6302	6210 Lbs M
CASTLE	4.0	3566	3810 Lbs M

	=====	=====
Total weight:	24244	24360 Lbs

Status: OK/Man

Zero

		Zero
TYPE 1/2	4912	4920 Lbs M
FLY ASH	600	576 Lbs M

=====	=====
5312	5496 Lbs

OK/Man

Zero

		Zero
DARAVAIR	100	24 25 Oz
WRDA	180	0 Oz

Zero

WATER	230	169 Gal U

=====	=====
Total:	230 169 Gal

Time 3:40:03 AM Date 28 Oct. 1993

TICKET NUMBER: 0004146

CONCRETE-READY-MIXED-CORP.

ROANOKE, VA.

Truck no.: 58 Batch no.: 17

Ticket no.: 4147

Batch size: .50 Yds. Mix name:

2

			Zero
#7 STONE	0.0	350	1110 Lbs M
LIMESTON	2.0	452	450 Lbs M
CASTLE	4.0	316	270 Lbs M

	=====	=====
Total weight:	1648	1830 Lbs

Status: OK/Man

Zero

		Zero
TYPE 1/2	235	264 Lbs M

=====	=====
235	264 Lbs

OK/Man

Zero

		Zero
DARAVAIR	100	1 0 Oz
DARACCEL	0.00	0 0 Oz

Zero

WATER	13	0 Gal U

=====	=====
Total:	13 0 Gal

Time 8:45:08 AM Date 28 Oct. 1993

TICKET NUMBER: 000400

CONCRETE-READY-MIXED-CORP.

ROANOKE, VA.

Truck no.: 77 Batch no.: 18 Ticket no.: 4148
Batch size: 8.00 Yds. Mix name: 65

Zero				Zero			
#	STONE	0.0	5920	14700 Lbs M	TYPE 1/2	2960	2946 Lbs C
	LIMESTON	2.0	6808	6900 Lbs M	FLY ASH	1040	1038 Lbs C
	CASTLE	4.0	4366	4350 Lbs M			
=====				=====			
Total weight:				25974	25950 Lbs	4000	3984 Lbs
Status: OK/Man				OK/Auto			
Zero				Zero			
Zero				Zero			
Zero				Zero			
D	RAVAIR	100	16	16 Oz C	WATER	217	124 Gal U
	WRDA		160	160 Oz C		=====	=====
	DARACCEL	0.00	0	0 Oz	Total:	217	124 Gal
Zero				Zero			

Time 8:53:42 AM Date 28 Oct, 1993 TICKET NUMBER: 000417

CONCRETE-READY-MIXED-CORP.

ROANOKE, VA.

Truck no.: 38 Batch no.: 19 Ticket no.: 4149
Batch size: 8.00 Yds. Mix name: 106

Zero				Zero			
#	STONE	0.0	6000	8220 Lbs M	TYPE 1/2	4912	4896 Lbs C
#5	STONE	0.0	6302	6060 Lbs M	FLY ASH	600	600 Lbs C
	LIMESTON	2.0	3566	6270 Lbs M			
	C STLE	4.0	8376	3690 Lbs M			
=====				=====			
Total weight:				24244	24240 Lbs	5512	5496 Lbs
Status: OK/Man				OK/Auto			
Zero				Zero			
Zero				Zero			
Zero				Zero			
D	RAVAIR	100	24	26 Oz	WATER	230	137 Gal U
	WRDA		180	0 Oz		=====	=====
					Total:	230	137 Gal
Zero				Zero			

Time 8:59:05 AM Date 28 Oct, 1993 TICKET NUMBER: 000417

CONCRETE-READY-MIXED-CORP.

ROANOKE, VA.

Truck no.: 31 Batch no.: 20 Ticket no.: 4150
Batch size: 3.50 Yds. Mix name: 113

			Zero			Zero
LIMESTON	2.0	2917	2970 Lbs M	TYPE 1/2	1645	1674 Lbs M
CASTLE	4.0	1986	2190 Lbs M	FLY ASH	420	432 Lbs M
		=====	=====		=====	=====
Total weight:		4903	5160 Lbs		2065	2106 Lbs
Status:			OK/Man			OK/Man

			Zero			Zero
WRDA		82	82 Oz C	WATER	80	2 Gal U
DARAVAIR	100	15	15 Oz C		=====	=====
DARACCEL	0.00	0	320 Oz M	Total:	80	2 Gal
			Not Zero			

Time 9:24:15 AM Date 28 Oct, 1993 TICKET NUMBER: 000407

CONCRETE-READY-MIXED-CORP.

ROANOKE, VA.

Truck no.: 69 Batch no.: 21 Ticket no.: 4151
Batch size: 8.00 Yds. Mix name: 106

			Zero			Zero
#7 STONE	0.0	6000	5910 Lbs C	TYPE 1/2	4912	4896 Lbs C
LIMESTON	2.0	6302	6270 Lbs C	FLY ASH	600	588 Lbs C
CASTLE	4.0	3566	3510 Lbs C			
#5 STONE	0.0	8376	8490 Lbs C		=====	=====
		=====	=====		5512	5484 Lbs
Total weight:		24244	24180 Lbs			
Status:			OK/Auto			OK/Auto

			Zero			Zero
DARAVAIR	100	24	25 Oz	WATER	230	164 Gal U
WRDA		180	0 Oz		=====	=====
			Zero	Total:	230	164 Gal

Time 9:32:40 AM Date 28 Oct, 1993 TICKET NUMBER: 000419

CONCRETE-READY-MIXED-CORP.

ROANOKE, VA.

Truck no.: 73 Batch no.: 22
 Batch size: 8.00 Yds. Mix name:

Ticket no.: 4152
 108

STONE 0.0 6000 5940 Lbs C
 LIMESTON 2.0 6302 6270 Lbs C
 CASTLE 4.0 3566 3600 Lbs C
 # STONE 0.0 8376 8400 Lbs C

TYPE 1/2 4912 4866 Lbs C
 FLY ASH 600 570 Lbs C

Total weight: 24244 24210 Lbs
 Status: OK/Auto

5512 5436 Lbs
 OK/Auto

DRAVAIR 100 24 25 Oz
 WRDA 180 0 Oz

WATER 230 100 Gal U
 Total: 230 100 Gal

Time 9:44:08 AM Date 28 Oct, 1993

TICKET NUMBER: 000430

CONCRETE-READY-MIXED-CORP.

ROANOKE, VA.

Truck no.: 55 Batch no.: 23
 Batch size: 1.00 Yds. Mix name:

Ticket no.: 4153
 15

STONE 0.0 700 1890 Lbs M
 LIMESTON 2.0 1505 1440 Lbs M

TYPE 1/2 517 588 Lbs M

Total weight: 3265 3330 Lbs
 Status: OK/Man

517 588 Lbs
 OK/Man

DRAVAIR 100 2 0 Oz
 D RACCEL 0.00 0 0 Oz

WATER 0 0 Gal
 Total: 0 0 Gal

Time 9:47:39 AM Date 28 Oct, 1993

TICKET NUMBER: 000439R

CONCRETE-READY-MIXED-CORP.
ROANOKE, VA.

Truck no.: 56 Batch no.: 24
Batch size: .50 Yds. Mix name:

Ticket no.: 4154
34

Zero
#7 STONE 0.0 350 840 Lbs M
LIMESTON 2.0 653 660 Lbs M
CASTLE 4.0 182 270 Lbs M
=====
Total weight: 1715 1770 Lbs
Status: OK/Man

Zero
TYPE 1/2 235 238 Lbs M
=====
235 238 Lbs
OK/Man
Zero

Zero
DARACCEL 0.00 0 0 Oz
Zero

WATER 15 0 Gal U
=====
Total: 15 0 Gal

Time 9:50:43 AM Date 28 Oct, 1993

TICKET NUMBER: 000443

CONCRETE-READY-MIXED-CORP.
ROANOKE, VA.

Truck no.: 35 Batch no.: 25
Batch size: 8.00 Yds. Mix name:

Ticket no.: 4155
106

Zero
#7 STONE 0.0 6000 6030 Lbs C
LIMESTON 2.0 6302 6270 Lbs C
CASTLE 4.0 3566 3540 Lbs C
#5 STONE 0.0 8376 8280 Lbs C
=====
Total weight: 24244 24120 Lbs
Status: OK/Auto
Zero

Zero
TYPE 1/2 4912 4878 Lbs C
FLY ASH 600 576 Lbs C
=====
5512 5454 Lbs
OK/Auto
Zero

Zero
DARAVAIR 100 24 25 Oz
WRDA 180 0 Oz
Zero

WATER 230 170 Gal U
=====
Total: 230 170 Gal

Time 9:56:54 AM Date 28 Oct, 1993

TICKET NUMBER: 000424

CONCRETE-READY-MIXED-CORP.

ROANOKE, VA.

Truck no.: 37 Batch no.: 26
Batch size: 8.00 Yds. Mix name:

Ticket no.: 4156
106

Zero
#7 STONE 0.0 6000 6030 Lbs C
LIMESTON 2.0 6302 7170 Lbs M
CASTLE 4.0 3566 2730 Lbs M
#5 STONE 0.0 8376 8370 Lbs M

Zero
TYPE 1/2 4912 4902 Lbs C
FLY ASH 600 588 Lbs C

=====
Total weight: 24244 24300 Lbs
Status: OK/Man

=====
5512 5490 Lbs

Zero

Zero

Zero

DARAVAIR 100 24 25 Oz
WRDA 180 0 Oz

WATER 130 174 Gal U

=====
Total: 230 174 Gal

Zero

Time 10:05:49 AM Date 28 Oct, 1993

TICKET NUMBER: 000423

CONCRETE-READY-MIXED-CORP.

ROANOKE, VA.

Truck no.: 52 Batch no.: 27
Batch size: 3.50 Yds. Mix name:

Ticket no.: 4157
8

Zero
#7 STONE 0.0 2590 2550 Lbs C
LIMESTON 2.0 3299 4050 Lbs M
CASTLE 4.0 2245 1590 Lbs M
#5 STONE 0.0 3885 3870 Lbs M

Zero
TYPE 1/2 1645 1686 Lbs M

=====
Total weight: 12019 12060 Lbs
Status: OK/Man

=====
1645 1686 Lbs

Zero

Zero

Zero

DARACCEL 0.00 0 0 Oz

WATER 107 81 Gal U

=====
Total: 107 81 Gal

Zero

Time 10:11:55 AM Date 28 Oct, 1993

TICKET NUMBER: 000444

CONCRETE-READY-MIXED-CORP.
ROANOKE, VA.

Truck no.: 70 Batch no.: 28
Batch size: 4.00 Yds. Mix name:

Ticket no.: 4158
68

			Zero
#7 STONE	0.0	2960	2960 Lbs C
LIMESTON	2.0	3228	3210 Lbs C
CASTLE	4.0	2070	2130 Lbs C
#5 STONE	0.0	4440	4380 Lbs C
	=====	=====	
Total weight:	13698	12600	Lbs
Status:	OK/Auto		
		120	Lbs

		Zero
TYPE 1/2	1000	1782 Lbs C
FLY ASH	320	304 Lbs C
	=====	=====
	2320	2286 Lbs
OK/Auto		
		Zero

		Zero	
DARAVAIR	100	8	8 Oz C
WRDA		92	92 Oz C
DARACCEL	0.00	0	0 Oz
			Not Zero

WATER	109	78 Gal U
	=====	=====
Total:	109	78 Gal

Time 10:22:00 AM Date 28 Oct, 1993

TICKET NUMBER: 000430

CONCRETE-READY-MIXED-CORP.
ROANOKE, VA.

Truck no.: 74 Batch no.: 29
Batch size: 5.50 Yds. Mix name:

Ticket no.: 4159
65

			Zero
#7 STONE	0.0	4070	4230 Lbs C
LIMESTON	2.0	4680	4890 Lbs C
CASTLE	4.0	3002	3030 Lbs C
#5 STONE	0.0	6105	5610 Lbs M
	=====	=====	
Total weight:	17857	17760	Lbs
Status:	OT/Man		
		Zero	

		Zero
TYPE 1/2	2035	2022 Lbs C
FLY ASH	715	720 Lbs C
	=====	=====
	2750	2742 Lbs
OK/Auto		
		Zero

		Zero	
DARAVAIR	100	11	11 Oz C
WRDA		110	110 Oz C
DARACCEL	0.00	0	0 Oz
			Not Zero

WATER	120	0 Gal U
	=====	=====
Total:	120	0 Gal

Time 10:27:51 AM Date 28 Oct, 1993

TICKET NUMBER: 000434

CONCRETE-READY-MIXED-CORP.
RINOKE, VA.

Truck no.: 53 Batch no.: 30
Batch size: 7.00 Yds. Mix name:

Ticket no.: 4160
65

#7 STONE	0.0	5180	Zero	5400 Lbs O
IMESTON	2.0	5957		5910 Lbs C
STLE	4.0	3820		3870 Lbs C
#5 STONE	0.0	7770		7710 Lbs M
		=====	=====	
Total weight:		22727		22890 Lbs
Status:	OT/Man			
			Zero	

		Zero	
TYPE 1/2	2590		2610 Lbs C
FLY ASH	910		894 Lbs C
		=====	=====
	3500		3504 Lbs
			Zero

GRAVAIR	100	14	Zero	14 Oz C
FOA		140		140 Oz C
ARACCEL	0.00	0		0 Oz
			Not Zero	

WATER	190		137 Gal U
		=====	=====
Total:	190		137 Gal

Time 10:33:36 AM Date 28 Oct, 1993

TICKET NUMBER: 000446R

CONCRETE-READY-MIXED-CORP.
CINOKE, VA.

Truck no.: 62 Batch no.: 31
Batch size: 1.00 Yds. Mix name:

Ticket no.: 4161
91

IMESTON	2.0	1014	Zero	1080 Lbs M
STLE	4.0	648		570 Lbs M
		=====	=====	
Total weight:		1662		1650 Lbs
Status:	OK/Man			
			Zero	

		Zero	
TYPE 1/2	400		414 Lbs M
FLY ASH	130		132 Lbs M
		=====	=====
	530		546 Lbs
			Zero

GRAVAIR	100	2	Zero	2 Oz
ARACCEL	2.00	160		190 Oz
			Zero	

WATER	27		0 Gal U
		=====	=====
Total:	27		0 Gal

Time 10:39:35 AM Date 28 Oct, 1993

TICKET NUMBER: 000435R

Manual batch:

CASTLE 4.0 0 Zero 3060 Lbs M

=====
Total weight: 0 3060 Lbs
Status: OK/Man

Zero

DARAVAIR 100 0 Zero 14 Oz M

Zero

Time 10:46:39 AM Date 28 Oct, 1993

TYPE 1/2 0 Zero 1886 Lbs M
FLY ASH 0 390 Lbs M

=====
0 2046 Lbs
OK/Man

Zero

=====
Total: 0 0 Gal

CONCRETE-READY-MIXED-CORP.
ROANOKE, VA.

Truck no.: 69 Batch no.: 32
Batch size: 8.00 Yds. Mix name:

Ticket no.: 4162
106

#7 STONE 0.0 6000 Zero 6270 Lbs M
LIMESTON 2.0 6302 6030 Lbs M
CASTLE 4.0 3566 3600 Lbs M
#5 STONE 0.0 8376 8520 Lbs M

=====
Total weight: 24244 24420 Lbs
Status: OK/Man

Zero

DARAVAIR 100 24 Zero 25 Oz
WRDA 180 0 Oz

Zero

Time 10:58:29 AM Date 28 Oct, 1993

TYPE 1/2 4912 Zero 4872 Lbs C
FLY ASH 600 588 Lbs C

=====
5512 5460 Lbs
OK/Auto

Zero

WATER 230 99 Gal U
=====
Total: 230 99 Gal

TICKET NUMBER: 000427

CONCRETE-READY-MIXED-CORP.
ROANOKE, VA.

Truck no.: 56 Batch no.: 33 Ticket no.: 4153
Batch size: 2.50 Yds. Mix name: 52

			Zero			Zero
#7 STONE	0.0	2082	2040 Lbs M	TYPE 1/2	1250	1236 Lbs C
LIMESTON	2.0	1844	1860 Lbs M	FLY ASH	300	306 Lbs C
CASTLE	4.0	1182	1230 Lbs M			
#5 STONE	0.0	2500	2640 Lbs M			
		=====	=====		=====	=====
Total weight:		7608	7770 Lbs		1550	1542 Lbs
Status: OK/Man				OK/Auto		
			Zero			Zero

			Zero			
DARAVAIR	100	7	7 Oz C	WATER	50	25 Gal C
					=====	=====
				Total:	50	25 Gal
			Zero			

Time 11:05:35 AM Date 28 Oct, 1993 TICKET NUMBER: 000436R

CONCRETE-READY-MIXED-CORP.
ROANOKE, VA.

Truck no.: 73 Batch no.: 34 Ticket no.: 4164
Batch size: 8.00 Yds. Mix name: 105

			Zero			Zero
#7 STONE	0.0	6000	6090 Lbs C	TYPE 1/2	4912	4920 Lbs C
LIMESTON	2.0	6302	6270 Lbs C	FLY ASH	600	618 Lbs C
CASTLE	4.0	3566	3630 Lbs C			
#5 STONE	0.0	8376	8400 Lbs C			
		=====	=====		=====	=====
Total weight:		24244	24390 Lbs		5512	5538 Lbs
Status: OK/Auto				OK/Auto		
			Zero			Zero

			Zero			
~~DARAVAIR~~	~~100~~	~~24~~	~~24 Oz M~~	~~WATER~~	~~250~~	~~178 Gal C~~
WRDA		180	0 Oz M		=====	=====
				Total:	230	178 Gal
			Zero			

Time 11:12:17 AM Date 28 Oct, 1993 TICKET NUMBER: 000428

CONCRETE-READY-MIXED-CORP.

ROANOKE, VA.

Truck no.: 35 Batch no.: 35
Batch size: 8.00 Yds. Mix name:

Ticket no.: 4165
4

Zero
#7 STONE 0.0 5920 5000 Lbs C
LIMESTON 2.0 6432 6360 Lbs C
CASTLE 4.0 5208 5280 Lbs C
#5 STONE 0.0 8880 8970 Lbs C
=====

Total weight: 26440 26610 Lbs
Status: OK/Auto

Zero

Zero
TYPE 1/2 4512 4482 Lbs C

=====

OK/Auto

Zero

Zero
DARAVAIR 100 20 20 Oz C
DARACCEL 0.00 0 0 Oz

Zero

WATER 223 155 Gal U

Total: 223 155 Gal

Time 11:27:40 AM

Date 28 Oct, 1993

TICKET NUMBER: 000455

CONCRETE-READY-MIXED-CORP.

ROANOKE, VA.

Truck no.: 37 Batch no.: 36
Batch size: 8.00 Yds. Mix name:

Ticket no.: 4166
106

Zero
#7 STONE 0.0 6000 6000 Lbs C
LIMESTON 2.0 6302 6330 Lbs C
CASTLE 4.0 3566 3600 Lbs C
#5 STONE 0.0 8376 8340 Lbs C
=====

Total weight: 24244 24270 Lbs
Status: OK/Auto

Zero

Zero
TYPE 1/2 4912 4944 Lbs C
FLY ASH 600 588 Lbs C

=====

OK/Auto

Zero

Zero
DARAVAIR 100 24 25 Oz
WRDA 180 0 Oz

Zero

WATER 230 174 Gal U

Total: 230 174 Gal

Time 11:37:52 AM

Date 28 Oct, 1993

TICKET NUMBER: 000462R

CONCRETE-READY-MIXED-CORP.

ROANOKE, VA.

Truck no.: 55 Batch no.: 37 Ticket no.: 4167
Batch size: 7.50 Yds. Mix name: 64

#7 STONE	0.0	5550	Zero	8280 Lbs M	TYPE 1/2	2175	Zero	2178 Lbs C
LIMESTON	2.0	6704		6660 Lbs C	FLY ASH	975		966 Lbs C
CASTLE	4.0	4296		4350 Lbs C				
#5 STONE	0.0	8325		5550 Lbs M				
		=====				=====		=====
Total weight:		24875		24840 Lbs		3150		3144 Lbs
Status:		OK/Man			OK/Auto			Zero
				Zero				Zero

DARAVAIR	100	15	Zero	15 Oz C	WATER	202		119 Gal U
WRDA		126		126 Oz C		=====		=====
DARACCEL	0.00	0		0 Oz	Total:	202		119 Gal
				Not Zero				

Time 11:45:16 AM Date 28 Oct, 1993 TICKET NUMBER: 000449R

CONCRETE-READY-MIXED-CORP.

ROANOKE, VA.

Truck no.: 52 Batch no.: 38 Ticket no.: 4168
Batch size: 1.00 Yds. Mix name: 92

LIMESTON	2.0	987	Zero	930 Lbs M	TYPE 1/2	450	Zero	438 Lbs M
CASTLE	4.0	631		780 Lbs M	FLY ASH	130		108 Lbs M
		=====				=====		=====
Total weight:		1618		1710 Lbs		580		546 Lbs
Status:		OK/Man			OK/Man			Zero
				Zero				Zero

DARAVAIR	100	2	Zero	0 Oz	WATER	26		0 Gal U
DARACCEL	0.00	0		0 Oz		=====		=====
				Zero	Total:	26		0 Gal

Time 12:00:54 PM Date 28 Oct, 1993 TICKET NUMBER: 000457

CONCRETE-READY-MIXED-CORP.

ROANOKE, VA.

Truck no.: 31 Batch no.: 39
Batch size: 5.00 Yds. Mix name:

Ticket no.: 4169

8

#7 STONE	0.0	3700	Zero	4200 Lbs M
LIMESTON	2.0	4714		4740 Lbs C
CASTLE	4.0	3208		3180 Lbs C
#5 STONE	0.0	5550		4950 Lbs M

Total weight: 17172 17070 Lbs

Status: OK/Man

Zero

TYPE 1/2	2350	Zero	2466 Lbs O

=====	=====
2350	2466 Lbs

OT/Auto

Zero

DARACCEL	1.00	400	Zero	400 Dz C

WATER	150		54 Gal U

Total:	150		54 Gal

Zero

Time 12:08:38 PM

Date 28 Oct, 1993

TICKET NUMBER: 000458

CONCRETE-READY-MIXED-CORP.

ROANOKE, VA.

Truck no.: 38 Batch no.: 40
Batch size: 1.00 Yds. Mix name:

Ticket no.: 4170

50

LIMESTON	2.0	1785	Zero	3540 Lbs M
CASTLE	4.0	1208		2490 Lbs M

Total weight: 2993 6030 Lbs

Status: OK/Man

Zero

TYPE 1/2	846	Zero	1734 Lbs M

=====	=====
846	1734 Lbs

OK/Man

Zero

Zero

WATER	44		40 Gal U

Total:	44		40 Gal

Zero

Time 12:15:47 PM

Date 28 Oct, 1993

TICKET NUMBER: 000461R

CONCRETE-READY-MIXED-CORP.

ROANOKE, VA.

Truck no.: 73 Batch no.: 41 Ticket no.: 4171
 Batch size: 6.50 Yds. Mix name: 64

Zero
 7 STONE 0.0 4810 4770 Lbs C
 LIMESTON 2.0 5810 5850 Lbs C
 CASTLE 4.0 3723 3750 Lbs C
 5 STONE 0.0 7215 7200 Lbs C

=====
 Total weight: 21558 21570 Lbs
 Status: OK/Auto

Zero

Zero
 TYPE 1/2 1885 1890 Lbs C
 FLY ASH 845 852 Lbs C

=====
 2730 2742 Lbs
 OK/Auto

Zero

Zero
 DARAVAIR 100 13 13 Oz C
 WRDA 109 109 Oz C
 PARACCEL 0.00 0 0 Oz
 Not Zero

WATER 175 113 Gal U
 Total: 175 113 Gal

Time 12:21:35 PM

Date 25 Oct, 1993

TICKET NUMBER: 000452R

CONCRETE-READY-MIXED-CORP.

ROANOKE, VA.

Truck no.: 68 Batch no.: 42 Ticket no.: 4172
 Batch size: 5.00 Yds. Mix name: 52

Zero
 7 STONE 0.0 4165 4110 Lbs C
 LIMESTON 2.0 3688 3750 Lbs C
 CASTLE 4.0 2364 2310 Lbs C
 5 STONE 0.0 5000 4950 Lbs C

=====
 Total weight: 15217 15150 Lbs
 Status: OK/Auto

Zero

Zero
 TYPE 1/2 2500 2544 Lbs C
 FLY ASH 600 594 Lbs C

=====
 3100 3138 Lbs
 OT/Auto

Zero

Zero
 DARAVAIR 100 15 15 Oz C
 Zero

WATER 125 78 Gal U
 Total: 125 78 Gal

Time 12:30:54 PM

Date 28 Oct, 1993

TICKET NUMBER: 000475R

CONCRETE-READY-MIXED-CORP.

ROANOKE, VA.

Truck no.: 75 Batch no.: 43
Batch size: 6.50 Yds. Mix name:

Ticket no.: 4173
64

			Zero	
7 STONE	0.0	4810	5010 Lbs	0
IMESTON	2.0	5810	5850 Lbs	0
CASTLE	4.0	3723	3750 Lbs	0
5 STONE	0.0	7215	7080 Lbs	M
		=====	=====	
Total weight:		21558	21650 Lbs	
Status:	DT/Man		Zero	

		Zero
TYPE 1/2	1885	1884 Lbs
FLY ASH	345	322 Lbs
		=====
	3730	3706 Lbs
OK/Auto		Zero

		Zero
DARAVAIR	100	13 13 Oz
WRDA	109	109 Oz
DARACCEL	0.00	0 0 Oz
		Not Zero

WATER	175	121 Gal
		=====
Total:	175	121 Gal

Time 12:44:12 PM

Date 25 Oct, 1993

TICKET NUMBER: 000453R

CONCRETE-READY-MIXED-CORP.

ROANOKE, VA.

Truck no.: 56 Batch no.: 44
Batch size: 6.00 Yds. Mix name:

Ticket no.: 4174
64

			Zero	
#7 STONE	0.0	4440	4440 Lbs	0
IMESTON	2.0	5365	5250 Lbs	0
CASTLE	4.0	3437	3450 Lbs	0
#5 STONE	0.0	6660	6630 Lbs	0
		=====	=====	
Total weight:		19900	19800 Lbs	
Status:	OK/Auto		Zero	

		Zero
TYPE 1/2	1740	1830 Lbs
FLY ASH	750	771 Lbs
		=====
	2520	2604 Lbs
OK/Auto		Zero

		Zero
DARAVAIR	100	12 12 Oz
WRDA	100	100 Oz
DARACCEL	0.00	0 0 Oz
		Not Zero

WATER	161	116 Gal
		=====
Total:	161	116 Gal

Time 12:50:22 PM

Date 28 Oct, 1993

TICKET NUMBER: 000454R

CONCRETE-READY-MIXED-CORP.
ROANOKE, VA.

Truck no.: 70 Batch no.: 45 Ticket no.: 4175
Batch size: 6.00 Yds. Mix name: 64

7 STONE	0.0	4440	Zero	4470 Lbs C	TYPE 1/2	1740	Zero	1830 Lbs C
LIMESTON	2.0	5363		5370 Lbs C	FLY ASH	780		786 Lbs C
CASTLE	4.0	3437		3450 Lbs C				
5 STONE	0.0	6660		6690 Lbs C				
		=====				=====		=====
Total weight:		19900		19980 Lbs		2520		2616 Lbs
Status:		OK/Auto		Zero		OT/Auto		Zero

DARAVAIR	100	12	Zero	12 Oz C	WATER	161		104 Gal U
WRDA		100		100 Oz C		=====		=====
ARACCEL	0.00	0		0 Oz	Total:	161		104 Gal
				Not Zero				

Time 1:01:17 PM Date 28 Oct, 1993

TICKET NUMBER: 0004532

CONCRETE-READY-MIXED-CORP.
ROANOKE, VA.

Truck no.: 74 Batch no.: 46 Ticket no.: 4176
Batch size: 8.00 Yds. Mix name: 52

7 STONE	0.0	6664	Zero	7620 Lbs M	TYPE 1/2	4000	Zero	3984 Lbs C
LIMESTON	2.0	5902		5880 Lbs C	FLY ASH	960		948 Lbs C
CASTLE	4.0	3783		3810 Lbs C				
7 STONE	0.0	8000		7560 Lbs M				
		=====				=====		=====
Total weight:		24349		24870 Lbs		4960		4932 Lbs
Status:		OK/Man		Zero		OK/Auto		Zero

DARAVAIR	100	24	Zero	24 Oz C	WATER	20		150 Gal U
						=====		=====
				Zero	Total:	20		150 Gal

Time 1:10:46 PM Date 28 Oct, 1993

TICKET NUMBER: 000472R

CONCRETE-READY-MIXED-CORP.

ROANOKE, VA.

Truck no.: 36 Batch no.: 47 Ticket no.: 4177
Batch size: 8.00 Yds. Mix name: 4

			Zero			Zero
#7 STONE	0.0	5920	14700 Lbs M	TYPE 1/2	4512	4488 Lbs C
LIMESTON	2.0	6432	6510 Lbs C			
CASTLE	4.0	5208	5250 Lbs C			
#5 STONE	0.0	8880	0 Lbs M			
		=====			=====	
Total weight:		26440	26460 Lbs		4512	4488 Lbs
Status:	OK/Man			OK/Auto		
			Zero			Zero

			Zero			
DARAVAIR	100	20	20 Oz C	WATER	222	38 Gal U
DARACCEL	0.00	0	0 Oz		=====	=====
				Total:	223	68 Gal
			Zero			

Time 1:18:43 PM Date 28 Oct. 1993 TICKET NUMBER: 000476R

CONCRETE-READY-MIXED-CORP.

ROANOKE, VA.

Truck no.: 37 Batch no.: 48 Ticket no.: 4178
Batch size: 8.00 Yds. Mix name: 105

			Zero			Zero
#7 STONE	0.0	6000	14580 Lbs M	TYPE 1/2	4912	4884 Lbs C
LIMESTON	2.0	6302	6240 Lbs C	FLY ASH	600	576 Lbs C
CASTLE	4.0	3566	3570 Lbs C			
#5 STONE	0.0	8376	0 Lbs M			
		=====			=====	
Total weight:		24244	24390 Lbs		5512	5460 Lbs
Status:	OK/Man			OK/Auto		
			Zero			Zero

			Zero			
DARAVAIR	100	24	27 Oz	WATER	230	176 Gal U
WRDA		180	0 Oz		=====	=====
				Total:	230	176 Gal
			Zero			

Time 1:25:25 PM Date 28 Oct. 1993 TICKET NUMBER: 000466

CONCRETE-READY-MIXED-CORP.

ROANOKE, VA.

Truck no.: 38 Batch no.: 49

Ticket no.: 4175

Batch size: 8.00 Yds. Mix name:

106

Zero				Zero		
#7 STONE	0.0	6000	8430 Lbs M	TYPE 1/2	4912	4938 Lbs C
-LIMESTON	2.0	6302	6300 Lbs C	FLY ASH	600	582 Lbs C
CASTLE	4.0	3566	3540 Lbs C			
#5 STONE	0.0	8376	5970 Lbs M			
		=====	=====	=====		=====
Total weight:	24244	24240	Lbs		5512	5520 Lbs
Status: OK/Man				OK/Auto		
Zero				Zero		
-----				-----		
-----				-----		
Zero						
-DARAVAIR	100	24	26 Oz	WATER	230	107 Gal U
WRDA		180	0 Oz		=====	=====
Zero				Total:	230	107 Gal
Zero						

Time 1:36:38 PM

Date 28 Oct, 1993

TICKET NUMBER: 000467

CONCRETE-READY-MIXED-CORP.

ROANOKE, VA.

Truck no.: 55 Batch no.: 50

Ticket no.: 4180

Batch size: 5.25 Yds. Mix name:

66

Zero				Zero		
#7 STONE	0.0	3885	3900 Lbs C	TYPE 1/2	2362	2346 Lbs C
LIMESTON	2.0	4237	4200 Lbs C	FLY ASH	682	666 Lbs C
CASTLE	4.0	2717	2730 Lbs C			
#5 STONE	0.0	5827	5850 Lbs M			
		=====	=====			=====
Total weight:	16666	16680	Lbs		3044	3012 Lbs
Status: OK/Man				OK/Auto		
		Zero				Zero
-----				-----		
-----				-----		
Zero						
DARAVAIR	100	10	10 Oz C	WATER	143	98 Gal U
WRDA		121	121 Oz C		=====	=====
DARACCEL	0.00	0	0 Oz	Total:	143	98 Gal
Not Zero						

Time 2:05:20 PM

Date 28 Oct, 1993

TICKET NUMBER: 000451

CONCRETE-READY-MIXED-CORP.
ROANOKE, VA.

Truck no.: 73 Batch no.: 51 Ticket no.: 4181
Batch size: 3.00 Yds. Mix name: 65

Zero
#7 STONE 0.0 2220 2310 Lbs C
LIMESTON 2.0 2553 2640 Lbs C
CASTLE 4.0 1637 1530 Lbs C
#5 STONE 0.0 3330 3360 Lbs C

=====
Total weight: 9740 9840 Lbs
Status: OK/Auto

Zero

Zero
TYPE 1/2 1110 1404 Lbs M
FLY ASH 350 426 Lbs M

=====
1500 1830 Lbs

OK/Man

Zero

Zero
DARAVAIR 100 6 6 Oz C
WRDA 50 50 Oz C
DARACCEL 0.00 0 0 Oz
Not Zero

WATER 81 15 Gal U
=====
Total: 81 15 Gal

Time 2:24:47 PM Date 28 Oct, 1993

TICKET NUMBER: 000478

CONCRETE-READY-MIXED-CORP.
ROANOKE, VA.

Truck no.: 35 Batch no.: 52 Ticket no.: 4182
Batch size: 6.00 Yds. Mix name: 42

Zero
CASTLE 4.0 4612 4650 Lbs C

=====
Total weight: 4612 4650 Lbs
Status: OK/Auto

Zero

Zero
TYPE 1/2 3000 3000 Lbs C
FLY ASH 720 738 Lbs C
=====
3720 3738 Lbs

OK/Auto

Zero

Zero
DARAVAIR 100 18 18 Oz C

Zero

WATER 157 73 Gal U
=====
Total: 157 73 Gal

Time 2:37:02 PM Date 28 Oct, 1993

TICKET NUMBER: 000480

Manual batch:

CASTLE	4.0	0	90 Lbs 4230 Lbs M	TYPE 1/2	0	Zero 2352 Lbs M	
				FLY ASH	0	588 Lbs M	

CONCRETE-READY-MIXED-CORP.

ROANOKE, VA.

Truck no.: 31 Batch no.: 54 Ticket no.: 4184
Batch size: 5.00 Yds. Mix name: 42

			Zero				Zero
CASTLE	4.0	4612	4590 Lbs M	TYPE 1/2	3000	2976 Lbs C	
				FLY ASH	720	736 Lbs C	
		=====	=====			=====	
Total weight:		4612	4590 Lbs			3700	
Status: OK/Man				OK/Auto		3702 Lbs	
			Zero				Zero

			Zero				
DARAVAIR	100	18	18 Oz C	WATER	157	67 Gal U	
						=====	
						=====	
				Total:	157	67 Gal	
			Zero				

Time 3:16:25 PM Date 28 Oct, 1993 TICKET NUMBER: 000481

CONCRETE-READY-MIXED-CORP.

ROANOKE, VA.

Truck no.: 74 Batch no.: 55 Ticket no.: 4185
Batch size: 8.00 Yds. Mix name: 106

Zero				Zero			
#7 STONE	0.0	6000	6060 Lbs C	TYPE 1/2	4912	4908 Lbs C	
LIMESTON	2.0	6302	6270 Lbs C	FLY ASH	600	600 Lbs C	
CASTLE	4.0	3566	3510 Lbs C				
#5 STONE	0.0	8376	8520 Lbs C				
=====				=====			
Total weight:	24244		24360 Lbs		5512	5508 Lbs	
Status: OK/Auto				OK/Auto			
Zero				Zero			

Zero							
DARAVAIR	100	24	25 Oz	WATER	230	172 Gal U	
WRDA		180	0 Oz				
Zero				Total:	230	172 Gal	

3:25 PM

CONCRETE-READY-MIXED-CORP.
ROANOKE, VA.

Truck no.: 35 Batch no.: 56 Ticket no.: 4186
Batch size: 6.00 Yds. Mix name: 42

			Zero			Zero		
CASTLE	4.0	4612	4590 Lbs	C	TYPE 1/2	3000	3000 Lbs	C
					FLY ASH	720	720 Lbs	C
			=====	=====		=====	=====	
Total weight:			4612	4590 Lbs		3720	3720 Lbs	
Status: OK/Auto					OK/Auto			
				4560 Lbs			3696 Lbs	
			Zero					
GRAVAIR	100	18	18 Oz	C	WATER	157	101 Gal	U
						=====	=====	
			Zero		Total:	157	101 Gal	

Time 4:18:31 PM Date 29 Oct, 1993 TICKET NUMBER: 000483

CONCRETE-READY-MIXED-CORP.
ROANOKE, VA.

Truck no.: 41 Batch no.: 57 Ticket no.: 4187
Batch size: 6.00 Yds. Mix name: 42

			Zero			Zero		
CASTLE	4.0	4612	4800 Lbs	C	TYPE 1/2	3000	3006 Lbs	C
					FLY ASH	720	720 Lbs	C
			=====	=====		=====	=====	
Total weight:			4612	4800 Lbs		3720	3726 Lbs	
Status: OT/Auto					OK/Auto			
				4830 Lbs			3714 Lbs	
			Zero					
GRAVAIR	100	18	18 Oz	C	WATER	157	102 Gal	U
						=====	=====	
			Zero		Total:	157	102 Gal	

Time 4:24:47 PM Date 28 Oct, 1993 TICKET NUMBER: 000482

CONCRETE-READY-MIXED-CORP.
ROANOKE, VA.

Truck no.: 36 Batch no.: 58
Batch size: 8.00 Yds. Mix name:

Ticket no.: 4188
106

Zero
#7 STONE 0.0 6000 6090 Lbs C
LIMESTON 2.0 6302 6300 Lbs C
CASTLE 4.0 3566 3510 Lbs C
#5 STONE 0.0 8376 8340 Lbs C

=====
Total weight: 24244 24240 Lbs
Status: OK/Auto
24210 Lbs

Zero
TYPE 1/2 4912 4864 Lbs C
FLY ASH 600 600 Lbs C

=====
5512 5484 Lbs
OK/Auto
5478 Lbs

Zero
DARAVAIR 100 24 26 Oz
WRDA 180 0 Oz

Zero

WATER 230 0 Gal U
=====
Total: 230 0 Gal

Time 4:42:33 PM Date 28 Oct, 1993

TICKET NUMBER: 000491

CONCRETE-READY-MIXED-CORP.
ROANOKE, VA.

Truck no.: 33 Batch no.: 59
Batch size: 8.00 Yds. Mix name:

Ticket no.: 4189
106

Zero
#7 STONE 0.0 6000 5940 Lbs C
LIMESTON 2.0 6302 6360 Lbs C
CASTLE 4.0 3566 3540 Lbs C
#5 STONE 0.0 8376 8460 Lbs C

=====
Total weight: 24244 24300 Lbs
Status: OK/Auto
24300 Lbs

Zero
TYPE 1/2 4912 4890 Lbs C
FLY ASH 600 606 Lbs C

=====
5512 5496 Lbs
OK/Auto
5502 Lbs

Zero
DARAVAIR 100 24 26 Oz
WRDA 180 0 Oz

Not Zero

WATER 230 142 Gal U
=====
Total: 230 142 Gal

Time 4:55:14 PM Date 28 Oct, 1993

TICKET NUMBER: 000492