Note: This is a reference cited in *AP 42, Compilation of Air Pollutant Emission Factors, Volume I Stationary Point and Area Sources.* AP42 is located on the EPA web site at www.epa.gov/ttn/chief/ap42/

The file name refers to the reference number, the AP42 chapter and section. The file name "ref02_c01s02.pdf" would mean the reference is from AP42 chapter 1 section 2. The reference may be from a previous version of the section and no longer cited. The primary source should always be checked.

United States
Environmental Protection
Agency

Office of Air Quality
Planning and Standards
Research Triangle Park NC 27711

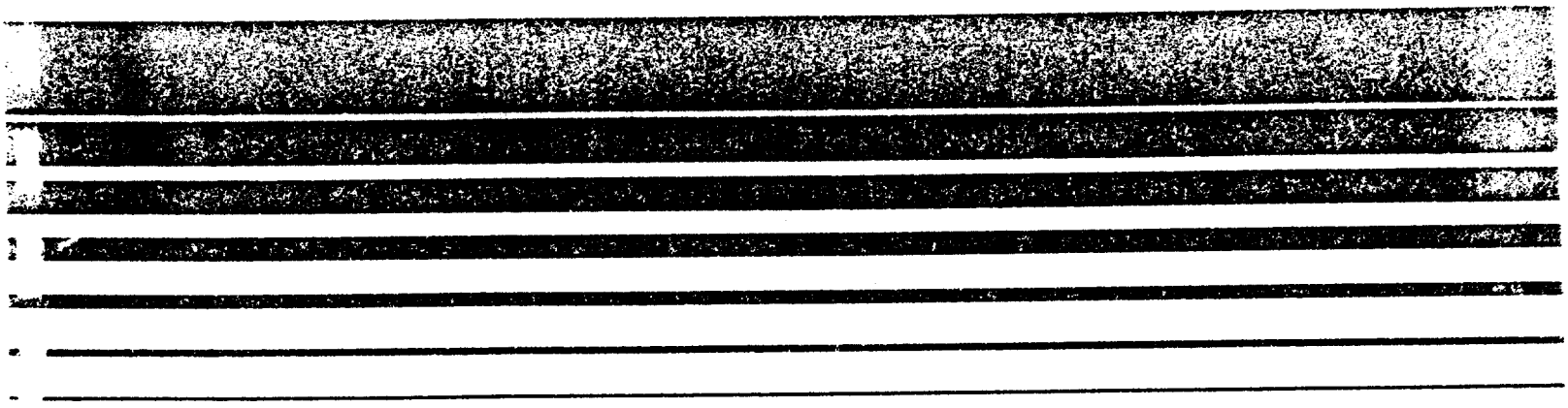
EMB Report 85-CHM-5
June 1985

Air

EPA

Chromium Screening Study Test Report

Sewage Sludge Incinerator No. 13 Detroit Water And Sewer Department Detroit, Michigan



EMISSION TEST REPORT

METHOD DEVELOPMENT AND TESTING FOR CHROMIUM SEWAGE SLUDGE INCINERATOR NO. 13 Detroit Water and Sewer Department Detroit, Michigan

ESED Project No. 85/2

by

PEI Associates, Inc.
11499 Chester Road
P.O. Box 46100
Cincinnati, Ohio 45246-0100

Contract No. 68-02-3849
Work Assignment Nos. 18 and 22
PN 3615-18
PN 3615-22

Task Manager

Mr. Frank Clay
Emission Standards and Engineering Division

U.S. ENVIRONMENTAL PROTECTION AGENCY
EMISSION MEASUREMENT BRANCH
RESEARCH TRIANGLE PARK, NORTH CAROLINA 27711

August 1986

DISCLAIMER

This report was furnished to the U.S. Environmental Protection Agency, Emission Measurement Branch, by PEI Associates, Inc., Cincinnati, Ohio, in fulfillment of Contract No. 68-02-3849, Work Assignment Nos. 18 and 22. Its contents are reproduced herein as received from PEI. The opinions, findings, and conclusions are those of the authors and not necessarily those of the EPA. Mention of company or product names does not constitute endorsement or recommendations for use.

CONTENTS

	Page
Figures	iv
Tables	v
Quality Assurance Element Finder	vii
Acknowledgment	viii
1. Introduction	1-1
2. Summary and Discussion of Test Results	2-1
2.1 Test protocol	2-1
2.2 Particulate and hexavalent chromium emissions summary	2-4
2.3 Particle size distribution test results	2-11
2.4 Process sample analytical results	2-18
2.5 Total chromium and metals analytical results	2-18
2.6 Visible emission observations	2-26
3. Project Quality Assurance	3-1
4. Sample Locations and Test Procedures	4-1
4.1 Sampling Locations	4-1
4.2 Particulate and hexavalent chromium sample extraction and analysis	4-4
4.3 Particle size distribution	4-8
4.4 Process samples	4-10
5. Process Operation	5-1
5.1 Process description	5-1
5.2 Process conditions during testing	5-2
5.3 Conclusions	5-13
Appendices	
A. Computer Printouts	A-1
B. Field Data Sheets	B-1
C. Laboratory Data	C-1
D. Sampling and Analytical Procedures	D-1
E. Calibration Procedures and Results	E-1
F. Project Participants and Field Log	F-1
G. Draft Test Method for Hexavalent Chromium Emissions From Stationary Sources	G-1
H. Draft Protocol for Determination of Total Chromium Emissions from Stationary Sources	H-1
I. Process Data	I-1

FIGURES

Number		Page
2-1	Particle Size Distribution for Scrubber Inlet Runs PSI-1, 2, and 4	2-14
2-2	Particle Size Distribution for Scrubber Outlet Runs PSO-1 through 4	2-15
4-1	No. 13 Incinerator Inlet Sample Location	4-2
4-2	No. 13 Incinerator Scrubber Outlet Test Location	4-3
5-1	No. 13 Incinerator Exhaust Gas Flow Schematic	5-2

TABLES

Number		Page
2-1	Sample and Analytical Parameters, Sludge Incinerator No. 13 - Detroit Water and Sewage Department	2-2
2-2	Process Sample and Analytical Parameters	2-3
2-3	Summary of Sample and Flue Gas Data for Particulate/Cr^{+6} Tests	2-6
2-4	Summary of Particulate and Hexavalent Chromium Emission Data	2-7
2-5	Summary of Emissions Data for Particulate, Cr^{+6}, and Semivolatile Organic Tests	2-8
2-6	Comparison of Particulate Concentrations as Measured by EPA Method 5 Versus Particle Size Distribution Impactors	2-16
2-7	Cr^{+6} Results of Process Sample Analyses	2-19
2-8	Process Sample Analytical Results - Volatile, Fixed, and Total Solids	2-20
2-9	Summary of Total Cr Emission Data	2-22
2-10	Summary of Total Chromium Data From Process Samples	2-23
2-11	Summary of Metals Analytical Data	2-24
3-1	Field Equipment Calibration	3-3
3-2	Sample Filter and Reagent Blank Analysis for Particulate	3-4
3-3	Linear Regression Data for Spectrophotometer Calibration	3-5
3-4	Results of QC Samples	3-6
3-5	QC Data for Total Chromium by NAA	3-6
5-1	Process Data From Run No. 1--Incinerator No. 13, Detroit, Michigan, June 18, 1985	5-3

TABLES (continued)

Number		Page
5-2	Process Data From Run No. 2--Incinerator No. 13, Detroit, Michigan, June 19, 1985	5-4
5-3	Process Data From Run No. 3--Incinerator No. 13, Detroit, Michigan, June 20, 1985	5-6
5-4	Process Data From Run No. 4--Incinerator No. 13, Detroit, Michigan, June 21, 1985	5-7
5-5	Process Data From Run No. 5--Incinerator No. 13, Detroit, Michigan, June 22, 1985	5-8
5-6	Process Data From Run No. 6--Incinerator No. 13, Detroit, Michigan, June 24, 1985	5-9
5-7	Process Data From Run No. 7--Incinerator No. 13, Detroit, Michigan, June 25, 1985	5-10
5-8	Process Data From Run No. 8--Incinerator No. 13, Detroit, Michigan, June 26, 1985	5-11
5-9	Process Data From Run No. 9--Incinerator No. 13, Detroit, Michigan, June 27, 1985	5-12

QUALITY ASSURANCE ELEMENT FINDER

	Location	
	Section	Page
(1) Title page	-	-
(2) Table of contents	-	iii
(3) Project description	1	1-1
(4) QA objective for measurement of data in terms of precision, accuracy, completeness, representativeness, and comparability	Section 3	3-1
(5) Sampling procedures	Appendix D Section 4	D-1 4-1
(6) Sample custody	Appendix C	C-1
(7) Calibration procedures and frequency	Appendix E Section 3	E-1 3-1
(8) Analytical procedures	Appendix D Section 4	D-1 4-1
(9) Data reduction, validation, and reporting	Appendix A Section 3	A-1 3-1
(10) Internal quality control checks and frequency	Section 3	3-1
(11) Performance and system audits and frequency	Section 3	3-1
(12) Preventive maintenance procedures and schedules	Not applicable	
(13) Specific routine procedures used ot assess data precision, accuracy, and completeness of specific measurement parameters involved	Section 3 Appendix E	3-1 E-1
(14) Corrective action	Section 3 Appendix E	3-1 E-1
(15) Quality assurance reports to management	Not applicable	

ACKNOWLEDGMENT

This test program was conducted for the Emission Standards and Engineering Division of the U.S. Environmental Protection Agency's Office of Air Quality Planning and Standards.

Mr. Frank Clay, Emission Measurement Branch Task Manager, provided overall project coordination and guidance and observed the test program. Mr. Ron Myers, Industrial Studies Branch project engineer, and Mr. Dwight Atkinson of Midwest Research Institute (an EPA contractor) monitored process operation throughout the test period. Mr. Charles Bruffey was the PEI Project Manager. Principal authors were Messrs. Charles Bruffey, Daniel Scheffel, and Thomas Wagner.

SECTION 1

INTRODUCTION

The U.S. Environmental Protection Agency (EPA) is currently evaluating several potentially toxic metals and their compounds. One of these toxic metals is chromium. Neither New Source Performance Standards (NSPS) for stationary sources nor National Emissions Standards for Hazardous Air Pollutants (NESHAPS) currently include chromium emissions. Available data on the emission of chromium and its impact on air quality are limited.

The Emission Measurement Branch (EMB) of EPA's Environmental Standards and Engineering Division (ESED) requires contractor assistance in obtaining representative chromium emissions data from several source categories so that an accurate assessment of the potential problems can be made and appropriate regulatory action can be developed.

PEI Associates, Inc. (under contract to ESED-EMB), performed a series of atmospheric emission tests on a multiple-hearth sludge incinerator operated by the Detroit Water and Sewer Department in Detroit, Michigan. All testing took place June 18 through 27, 1985.

Tests were conducted simultaneously at the inlet and outlet of an impingement scrubber to determine the concentration and mass emission rates of particulate matter; chromium [hexavalent chromium (Cr^{+6}) and total chromium (Cr)]; and other metals of interest, including cadmium, arsenic, copper, zinc, nickel, manganese, vanadium, and selenium. The EPA performed the total

chromium and other metal analyses of collected samples by neutron activation analysis (NAA). Particle size distribution measurements were also made; and process samples, including sludge feed, incinerator bottom ash, and scrubber water influent and effluent water, were collected each test day.

Project objectives were met and no major problems were encountered during the test project.

Section 2 presents a summary and discussion of the test results, Section 3 addresses quality assurance considerations specific to this project, Section 4 describes the sampling locations and test procedures, and Section 5 describes source operation. Appendix A presents sample calculations and computer printouts; Appendices B and C contain the field data sheets and laboratory analytical results, respectively; Appendix D details the sampling and analytical procedures; Appendix E summarizes equipment calibration procedures and results; Appendix F contains a list of project participants and a sampling log; Appendix G describes the draft test method for hexavalent chromium from stationary sources; and Appendix H presents the draft protocol for determining total chromium emission from stationary sources.

SECTION 2

SUMMARY AND DISCUSSION OF TEST RESULTS

This section details the results of the sampling program. Subsections are used to identify results from each test type (i.e., particulate/Cr^{+6}, particle size distribution, etc.), and results are expressed in both metric and English units where applicable.

2.1 TEST PROTOCOL

Table 2-1 presents the sampling and analytical protocol followed throughout this project, the test identification, and the sampling times for each specific test type. Table 2-2 summarizes the analytical protocol followed for process samples collected during the test series.

In summary, tests were conducted to characterize uncontrolled and controlled particulate, Cr^{+6}, and chromium emissions from this type of source. Procedures detailed in EPA Test Methods 1 through 5* were followed. Hexavalent chromium content was determined by procedures recently developed by EPA for determination of Cr^{+6} content in source emission samples. These latter procedures entail extraction of the sample fractions (probe residue and filter particulate) with an alkaline solution, followed by the diphenylcarbazide colorimetric method.**

Particle size distribution measurements were made at each site during the particulate/Cr^{+6} tests with an Andersen in-stack impactor. Four samples

---

* 40 CFR 60, Appendix A, EPA Reference Methods 1 through 5, July 1984.

** Test Methods for Evaluating Solid Waste. U.S. EPA SW-846, 2nd ed., July 1982.

TABLE 2-1. SAMPLE AND ANALYTICAL PARAMETERS, SLUDGE INCINERATOR NO. 13 - DETROIT WATER AND SEWAGE DEPARTMENT

	Sample parameters[b]				Analytical parameters	
					Method 5	Particle size
Run No.	Date (1985) and time (24 h)	Location[a] No. 13 incinerator	EPA Methods 1 through 5	Particle size distribution	Particulate Cr^{+6}, total Cr, and other metals by NAA	Gravimetric, Cr^{+6}, total Cr by NAA
PCO-1	6/18-1131-1745	Outlet	X	X	X	X
PCI-3	6/20-0845-1533	Inlet	X	X	X	X
PCO-3	6/20-0845-1452	Outlet	X	X	X	X
PCI-4	6/21-0830-1517	Inlet	X	X	X	X
PCO-4	6/21-0830-1438	Outlet	X	X	X	-
PCI-5	6/22-0830-1515	Inlet	X	X	X	-
PCO-5	6/22-0830-1440	Outlet	X	X	X	-
PCI-6	6/24-0915-1904	Inlet	X	X	X	-
PCO-6	6/24-0916-1849	Outlet	X	X	X	-
PCIO-1	6/25-0910-1210	Inlet	X	-	X	-
PCOO-1	6/25-0911-1211	Outlet	X	-	X	-
PCIO-2	6/25-1350-1650	Inlet	X	-	X	-
PCOO-2	6/25-1350-1650	Outlet	X	-	X	-

[a] All testing was performed on the No. 13 incinerator.

[b] Nine of the 13 Method 5 tests were conducted isokinetically by using cross-sectional traverse sampling techniques. In the remaining six tests, single-point isokinetic sampling techniques were used with an XAD-2 resin trap behind the sample filter. The front half (probe rinse and filter) was analyzed for particulate and CR^{+6}.

TABLE 2-2. PROCESS SAMPLE AND ANALYTICAL PARAMETERS

Sample type	Cr^{+6}	Total Cr and other metals by NAA	Volatile[a] residue	Fixed[b] residue	Total[c] residue
1) Dewatered sludge samples	-	X	X	X	X
2) Incinerator bottom ash	X	X	-	-	-
3) Scrubber water influent	X	X	X	X	X
4) Scrubber water effluent	X	X	X	X	X

[a] Volatile residue: Method 160.4.

[b] Fixed residue: Method 160.1.

[c] Total residue: Method 160.3.

were collected at the scrubber inlet and five were collected at the scrubber outlet. Particle size fractions were analyzed gravimetrically, and size distribution curves were developed for each site.

As shown in Table 2-1, a total of 13 tests were conducted to determine particulate, Cr^{+6}, and total Cr content. In nine of these tests, the cross-sectional area of the ducts was traversed by isokinetic sampling techniques. The remaining four tests were conducted isokinetically at a point of average velocity and temperature in the duct. These runs were designed to determine particulate, Cr^{+6}, and total Cr from the front half of the sampling train and semivolatile organic content from the back-half of the train using a water-cooled XAD-2 resin trap placed prior to the first impinger. These data are not presented in this test report.

Process samples, including sludge feed, incinerator bottom ash, and scrubber water influent and effluent, were collected over an 8-hour period each test day and analyzed as shown in Table 2-2.

2.2 PARTICULATE AND HEXAVALENT CHROMIUM EMISSIONS SUMMARY

Simultaneous Method 5 tests were conducted at the scrubber inlet and outlet test locations. Tests designated PCI (inlet) and PCO (outlet) were conducted by cross-sectional traverse sampling techniques. The outlet sampling train for these runs was a standard Method 5 train with five impingers. The inlet train consisted of an in-stack glass fiber thimble and heated stainless steel probe, followed by a backup filter heated to 121°C (250°F) and a series of five impingers. The thimble and backup filter catch and the probe rinse residue were used to determine particulate concentration. This sampling configuration was used to preclude breakage of glass probe liners and to account for the heavy particulate loading and high flue gas temperatures encountered at this site. Tests PCI 1 and 2 were voided because of

cracked glass liners, and outlet Test PCO 2 was voided because of an excessive post-test leak rate.

Tests designated PCIO (inlet) and PCOO (outlet) were conducted simultaneously at a single point representing the average velocity and temperature in the duct(s). These runs were designed to measure particulate and Cr^{+6} concentration in the front half of the sample train. An XAD-2 resin absorbent trap was placed between the Method 5 filter and the first impinger to determine back-half semivolatile organic content. As stated previously, the organics data from these tests are not reported here; a separate test report detailing results of the organics tests is currently being prepared.

Tables 2-3 through 2-5 summarize the sample and flue gas data for the particulate/Cr^{+6} and semivolatile organic tests and present the particulate and Cr^{+6} emissions data for these runs.

Volumetric flow rates are expressed in cubic meters per minute (m^3/min) and actual cubic feet per minute (acfm) at stack conditions. Flow rates corrected to standard conditions [20°C and 760 mmHg (68°F and 29.92 in.Hg) and zero percent moisture] are expressed as dry normal cubic meters per minute (dNm^3/min) and dry standard cubic feet per minute (dscfm).

Filterable particulate concentrations are expressed in milligrams per dry normal cubic meter and grains per dry standard cubic foot. Hexavalent chromium concentrations are expressed in micrograms per gram and micrograms per dry normal cubic meter, where applicable. Mass emission rates are reported in kilograms per hour and pounds per hour.

As reported in Tables 2-3 and 2-5, sample volumes were consistent, depending on the sample type. Sample volumes for the traverse inlet runs (PCI) ranged from 2.63 to 3.77 dNm^3, and those for the corresponding outlet runs (PCO), from 5.42 to 6.15 dNm^3. Generally, the inlet sampling rates were

TABLE 2-3. SUMMARY OF SAMPLE AND FLUE GAS DATA FOR PARTICULATE/Cr^{+6} TESTS

Run No.	Date (1985)	Sampling duration, min	Sample volume		Isokinetic sampling rate, %	Volumetric flow rate				Temperature		Moisture content, %	Composition[b], %		Gas velocity[c]	
						Actual		Standard[a]								
			dNm^3	dscf		m^3/min	acfm	dNm^3	dscfm	°C	°F		O_2	CO_2	m/s	ft/s
PCI-1[d]	6/18	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PCO-1	6/18	360	5.87	207.37	95	1475	52,100	1294	45,700	32	89	4.54	16.0	3.4	17.3	56.7
PCI-2[d]	6/19	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PCO-2[e]	6/19	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PCI-3	6/20	360	2.63	93.06	91.6	3486	123,100	988	34,900	482	900	26.40	13.0	4.8	8.9	29.3
PCO-3	6/20	360	6.15	217.25	95.4	1376	48,600	1205	42,550	33	92	5.27	13.4	4.6	16.1	52.8
PCI-4	6/21	360	3.77	133.20	108.5	3256	115,000	892	31,500	491	916	27.52	12.95	5.25	8.3	27.4
PCO-4	6/21	360	5.71	201.72	92.6	1339	47,300	1147	40,500	35	95	5.81	14.8	3.6	15.7	51.4
PCI-5	6/22	360	3.27	115.52	95.2	3166	111,800	881	31,100	496	925	25.64	13.0	4.9	8.1	26.6
PCO-5	6/22	360	5.42	191.55	90.9	1453	51,300	1249	44,100	34	94	5.55	14.8	3.6	17.0	55.8
PCI-6	6/24	360	3.27	115.38	90.4	2951	104,200	926	32,700	484	903	17.98	12.55	5.5	7.5	24.8
PCO-6	6/24	360	6.11	215.83	96.1	1337	47,200	1158	40,900	36	96	5.38	16.1	2.2	15.6	51.3
Inlet average (PCI)			3.24	114.29	96.4	3215	113,500	922	32,600	488	911	24.39	12.9	5.1	8.2	27.0
Outlet average (PCO)			5.85	206.74	94.0	1396	49,300	1211	42,750	34	93	5.30	15.0	3.5	16.3	53.6

[a] Standard conditions: 20°C (68°F), 760 mm (29.94 in.Hg) and zero percent moisture.

[b] Gas composition as determined from integrated bag samples during each test. Analysis performed with an Orsat gas analyzer.

[c] Measured flue gas velocity in meters per second and feet per second.

[d] Invalid test due to cracked probe liner.

[e] Invalid test due to excessive leakage rate.

TABLE 2-4. SUMMARY OF PARTICULATE AND HEXAVALENT CHROMIUM EMISSION DATA

Run No.	Date (1985)	Total filterable weight, mg	Filterable concentration[a]				Mass emission rate				Collection[b] efficiency, %	
			Particulate		Cr^{+6} (blank corrected)		Particulate		Cr^{+6}			
			mg/dNm³	gr/dscf	µg/g	Total Cr^{+6} in sample, µg	kg/h	lb/h	kg/h	lb/h	Particulate	Cr^{+6}
PCO-1	6/18	138.6	23.6	0.0103	NA[c]	-	1.8	4.0	-	-	-	-
PCI-3	6/20	4242.7	1613	0.7035	<0.1	<0.4	95.5	210.6	-	-		
PCO-3	6/20	114.1	18.5	0.0081	NA	-	1.4	3.0	-	-	98.8	-
PCI-4	6/21	6345.1	1683	0.7350	<0.1	<0.6	89.9	198.2	-	-		
PCO-4	6/21	133.4	23.3	0.0102	NA	-	1.6	3.5	-	-	98.6	-
PCI-5	6/22	5719.2	1749	0.7639	<0.1	<0.6	92.4	203.7	-	-		
PCO-5	6/22	78.1	14.4	0.0063	NA	-	1.1	2.4	-	-	99.2	-
PCI-6	6/24	6047.4	1849	0.8087	<0.1	<0.6	102.9	226.8	-	-		
PCO-6	6/24	93.3	15.2	0.0067	NA	-	1.0	2.3	-	-	99.2	-

[a]Standard conditions: 20°C (68°F), 760 mm (29.92 in.Hg) and zero percent moisture.

[b]Collection efficiency: $\frac{\text{Inlet concentration - Outlet concentration}}{\text{Inlet concentration}} \times 100.$

[c]NA = Not analyzed. A detection limit of 0.1 µg/g was established for the inlet samples based on a particulate weight of 5 grams and a total volume of 50 ml.

TABLE 2-5. SUMMARY OF EMISSIONS DATA FOR PARTICULATE, Cr^{+6}, AND SEMIVOLATILE ORGANIC TESTS

Run No.	Date (1985)	Sampling duration, min	Sample volume		Isokinetic sampling rate, %	Volumetric flow rate[a]				Temperature		Moisture content, %	Composition,[b] %		Total % filterable weight, mg	Filterable particulate data				
						Actual		Standard								Particulate concentration		Mass emission rate		Cr^{+6} concentration, µg/g
			dNm^3	dscf		m^3/min	acfm	dNm^3/min	dscfm	°C	°F		O_2	CO_2		mg/dNm^3	gr/dscf	kg/h	lb/h	
PCIO-1[c]	6/25	180	1.73	61.17	100.8	3226	113,900	881	31,100	497	926	27.6	11.8	5.9	3145.7	1818	0.80	96	212	<0.1
PCOO-1[c]	6/25	180	2.44	86.03	98.9	1195	42,200	1031	36,400	36	96	5.6	15.1	4.9	51.1	20.9	0.009	1.3	2.9	-
PCIO-2[c]	6/25	180	1.82	64.25	102.8	3155	111,400	906	32,000	466	870	26.7	12.25	5.75	3602.5	1979	0.86	108	238	<0.1
PCOO-2[c]	6/25	180	2.38	83.92	100.3	1147	40,500	991	35,000	36	96	5.6	15.1	4.8	55.3	23.2	0.01	1.4	3.1	-

[a] Standard conditions: 20°C (68°F), 760 mmHg (29.94 in.Hg) and zero percent moisture.

[b] Gas composition as determined from integrated bag samples collected during each test. Analysis performed with an Orsat gas analyzer.

[c] Single-point, isokinetic sampling techniques were used for these runs. The front half of the sampling train (probe rinse, sample filter) was analyzed gravimetrically for particulate matter. The back half of the sampling train (XAD-2 resin and H_2O) was analyzed by GC/MS for semivolatile organics.

kept lower than those at the outlet to prevent the filter from plugging during a 6-hour test run.

Sampling times for the PCI and PCO tests were 360 minutes. Isokinetic sampling rates ranged between 90.4 and 108.5 percent, which are within the acceptable range of 90 to 110 percent.

Sample volumes for the particulate/Cr^{+6} and semivolatile organic tests (PCIO and PCOO, Table 2-5) were consistent with sampling times of 180 minutes.

For the traverse tests (PCI), volumetric gas flow rates at the scrubber inlet ranged from 2951 to 3486 m^3/min (104,200 to 123,100 acfm) and averaged 3215 m^3/min (113,500 acfm). The average volumetric flow at standard conditions was 922 dNm^3/min (32,600 dscfm). Flue gas temperatures ranged from 482° to 496°C (900° to 925°F) and averaged 488°C (911°F). The moisture content of the gas stream averaged 24.4 percent, and the average oxygen (O_2) and carbon dioxide (CO_2) contents were 12.9 and 5.1 percent, respectively. The inlet static pressure averaged about -1.1 in.H_2O.

As shown in Table 2-4, inlet particulate concentrations ranged from 1613 to 1849 mg/dNm^3 (0.7 to 0.8 gr/dscf) and averaged 1723 mg/dNm^3 (0.75 gr/dscf). The average mass emission rate for the four tests was 95.2 kg/h (210 lb/h).

The inlet hexavalent chromium concentration was less than 0.1 µg/g, which was determined to be the analytical detection limit for these samples. The total quantity of Cr^{+6} per sample was less than 0.6 µg.

At the scrubber outlet, volumetric gas flow rates ranged from 1337 to 1475 m^3/min (47,200 to 52,100 acfm) and averaged 1396 m^3/min (49,300 acfm) for the five tests. The average gas flow rate at standard conditions was 1211 dNm^3/min (42,750 dscfm). Flue gas temperatures ranged from 32° to 36°C (89° to 96°F) and averaged 34°C (93°F). The moisture content of the gas

stream averaged 5.3 percent, and the average O_2 and CO_2 contents were 15.0 and 3.5 percent, respectively. Because the gas stream appeared saturated, two moisture determinations were made: the first involved calculations based on the water collected in the sampling trains and the second involved psychrometric calculations. In each case, the lower value was used as the correct moisture content according to procedures described in EPA Reference Method 4.* The outlet static pressure averaged about -11.8 in.H_2O during the test period.

Outlet particulate concentrations ranged between 14.4 and 23.6 mg/dNm^3 (0.006 and 0.01 gr/dscf) and averaged 19 mg/dNm^3 (0.008 gr/dscf). The average mass emission rate for the tests was 1.4 kg/h (3.0 lb/h). Based on the inlet Cr^{+6} analytical results, no attempt was made to analyze the outlet samples for Cr^{+6}.

The particulate removal efficiency of the scrubber averaged greater than 98 percent based on the test results.

As presented in Table 2-5, flue gas and particulate emissions data obtained from the single-point Modified Method 5 tests compare favorably with the average results from the traverse test trains.

Inlet flow rates averaged 3201 m^3/min (113,000 acfm) and 894 dNm^3 (31,600 dscfm) when corrected to standard conditions. Particulate concentrations for Tests PCIO-1 and PCIO-2 were 1818 and 1979 mg/dNm^3 (0.8 and 0.86 gr/dscf), respectively. Outlet flow rates averaged 1154 m^3/min (40,800 acfm) and 997 dNm^3 (35,200 dscfm) when corrected to standard conditions. Particulate concentrations for Tests PCOO-1 and PCOO-2 were 20.9 and 23.2 mg/dNm^3 (0.009 and 0.01 gr/dscf), respectively. Hexavalent chromium content of the inlet samples was less than 0.1 µg/g.

* 40 CFR 60, Appendix A, Reference Method 4, July 1984.

The particulate removal efficiency of the scrubber was greater than 98 percent for these tests. The overall comparability of the traverse and single-point test data indicates particulate stratification and/or variable gas flow patterns were not significant; thus, test results are considered to be representative of actual source conditions at the time of testing.

An analysis of the hexavalent chromium content of an inlet ash sample obtained during the February 1985 pretest survey indicated Cr^{+6} levels at or below the analytical detection limit for solid samples (0.1 µg/g).

Because the concentration of hexavalent chromium in these solid samples was extremely low, the amount of alkaline extraction solution and the final dilution volume of this extract were kept at a minimum consistent with Method 3060 from Test Methods for Evaluating Solid Waste.* This proportion is 4 ml of alkaline extraction solution per gram of solid diluted to a final volume of 10 ml. Therefore, solid samples are desirable at these levels because the sample filter and blank-correct do not have to be cut for background Cr^{+6} levels. Filters and/or thimbles require larger amounts of extraction solution to cover the volume of material being extracted. This physical requirement increases the analytical detection limit. Loose particulate collected in the in-stack thimble and probe residue particulate were combined for the Cr^{+6} analysis of individual inlet samples.

2.3 PARTICLE SIZE DISTRIBUTION TEST RESULTS

At the scrubber inlet, an Andersen HGLI with a 15-µm precutter attached was used to measure particle size distribution during each particulate/Cr^{+6} test. This in-stack impactor consists of two single-jet impaction chambers followed by a third-stage cyclone and a backup thimble. The impactor is

* U.S. EPA SW846, 2nd ed., July 1982.

designed for extracting samples from a gas stream with a heavy particulate concentration, and its use was advantageous in this case because it contains no filter media (except the backup thimble). This eliminates the need for filter blank corrections for Cr^{+6} or other metals and permits a more accurate quantification of size distribution. A total of four inlet samples (designated PSI) were collected during 90- to 120-minute periods at a single point representing the average gas velocity and temperature in the duct.

At the ESP outlet, an Andersen Mark III in-stack impactor was used to measure size distribution during the particulate/Cr^{+6} tests. The Mark III impactor consists of eight stages and a backup filter, from which eight cut-point sizes can be determined.

Five samples (designated PSO) were collected from a single point representing the average velocity head and temperature in the duct. Sampling times ranged from 20 to 60 minutes.

Each particle size test was conducted according to the procedures described in the impactor operations manuals. Isokinetic sampling rates were set initially, and constant cut-point characteristics were maintained throughout the sampling period. Specifications state that the gas flow rate through the impactor at stack conditions should be maintained between 0.3 and 0.7 acfm to avoid distortion of individual stage cut-points. This criterion was met for reported results. Isokinetic sample rates ranged from 106 to 145 percent for the inlet tests and 101 to 103 percent for the outlet tests. Tests PSI-3 and PSO-5 were not included in the plotting of size distribution curves. Both of these samples exhibited large distortions in the amount of particulate collected compared with the other tests.

Cumulative size distribution curves representing the total weight of particulate matter smaller than the indicated aerodynamic particle diameter

[in micrometers (μm)] were established for each test location. Data reductions for all runs were performed by computer programming with moisture, molecular weight, and temperature data obtained from the particulate/Cr^{+6} tests. The cut-points for the HGLI tests were determined graphically from information supplied by the manufacturer, and all particle size results are based on a particle density of 1 g/cm^3. The HGLI data reduction and intermediate calculations are presented in Appendix A of this report.

Cut-points for the Mark III impactor stages were calculated by use of a computer program contained in "A Computer-Based Cascade Impactor Data Reduction System" (CIDRS) developed for EPA by Southern Research Institute (SRI).* All particle size results are based on a particle density of 1 g/cm^3.

Figures 2-1 and 2-2 present the best-fit nominal curves for the inlet and outlet particle size distribution tests. Table 2-6 presents a comparison of particulate concentrations obtained from the particle size tests with those obtained by Method 5 tests.

For the three inlet runs (PSI-1, -2, and -4), the size distribution curve showed that about 50 percent by weight of the particles had a nominal diameter of 10 micrometers or less. The calculated average particulate concentration for these runs was 394 mg/dNm^3 (0.2 gr/dscf) compared with the corresponding two-test Method 5 average of 1681 mg/dNm^3 (0.75 gr/dscf). This indicates a significant difference in average values between the two measurements. The percentage difference between the methods is unacceptable

* Southern Research Institute. A Computer-Based Cascade Impactor Data Reduction System. Prepared for U.S. EPA under Contract No. 68-022-131, March 1978.

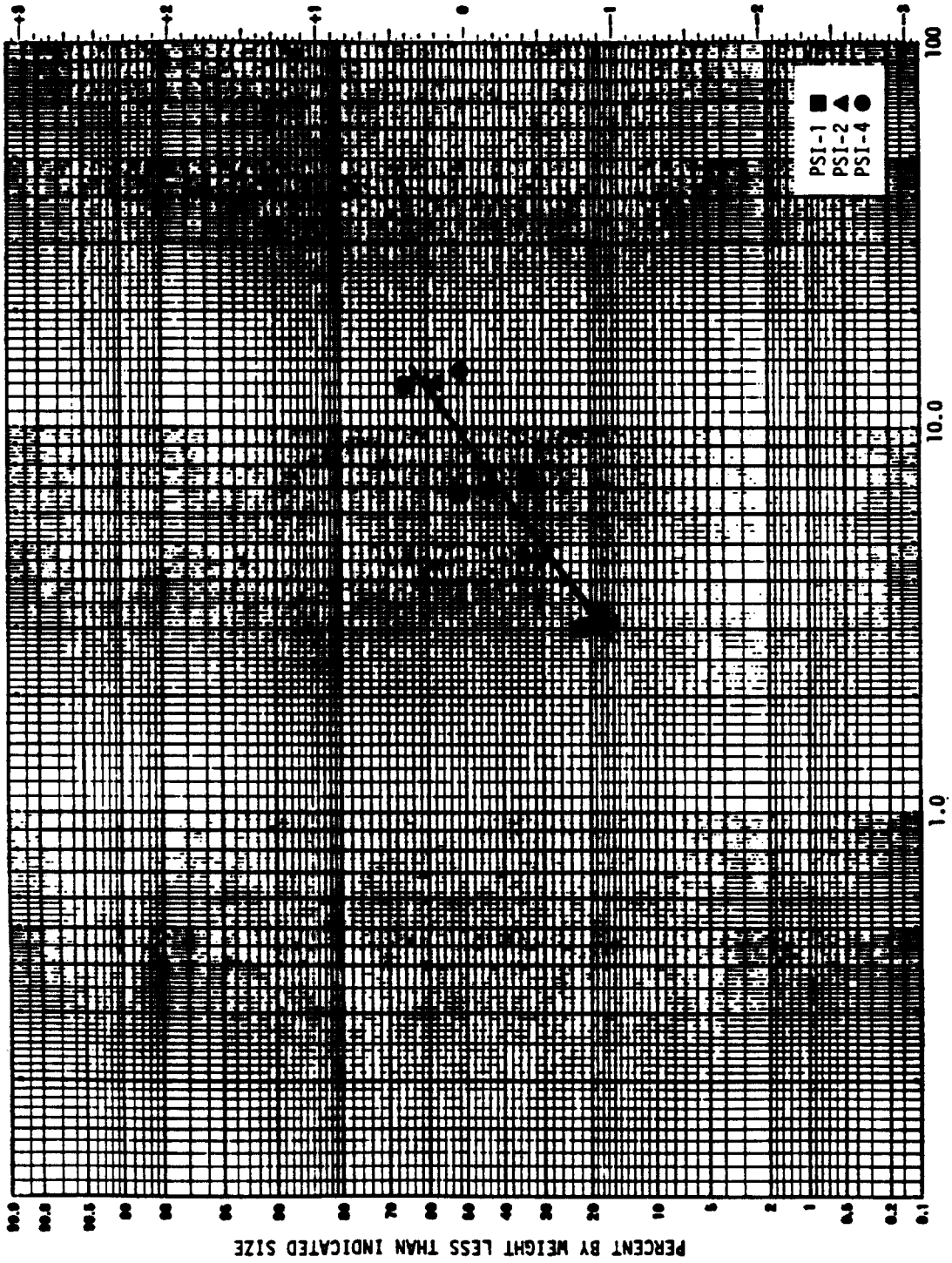


Figure 2-1. Particle size distribution for scrubber inlet Runs PSI-1, 2, and 4.

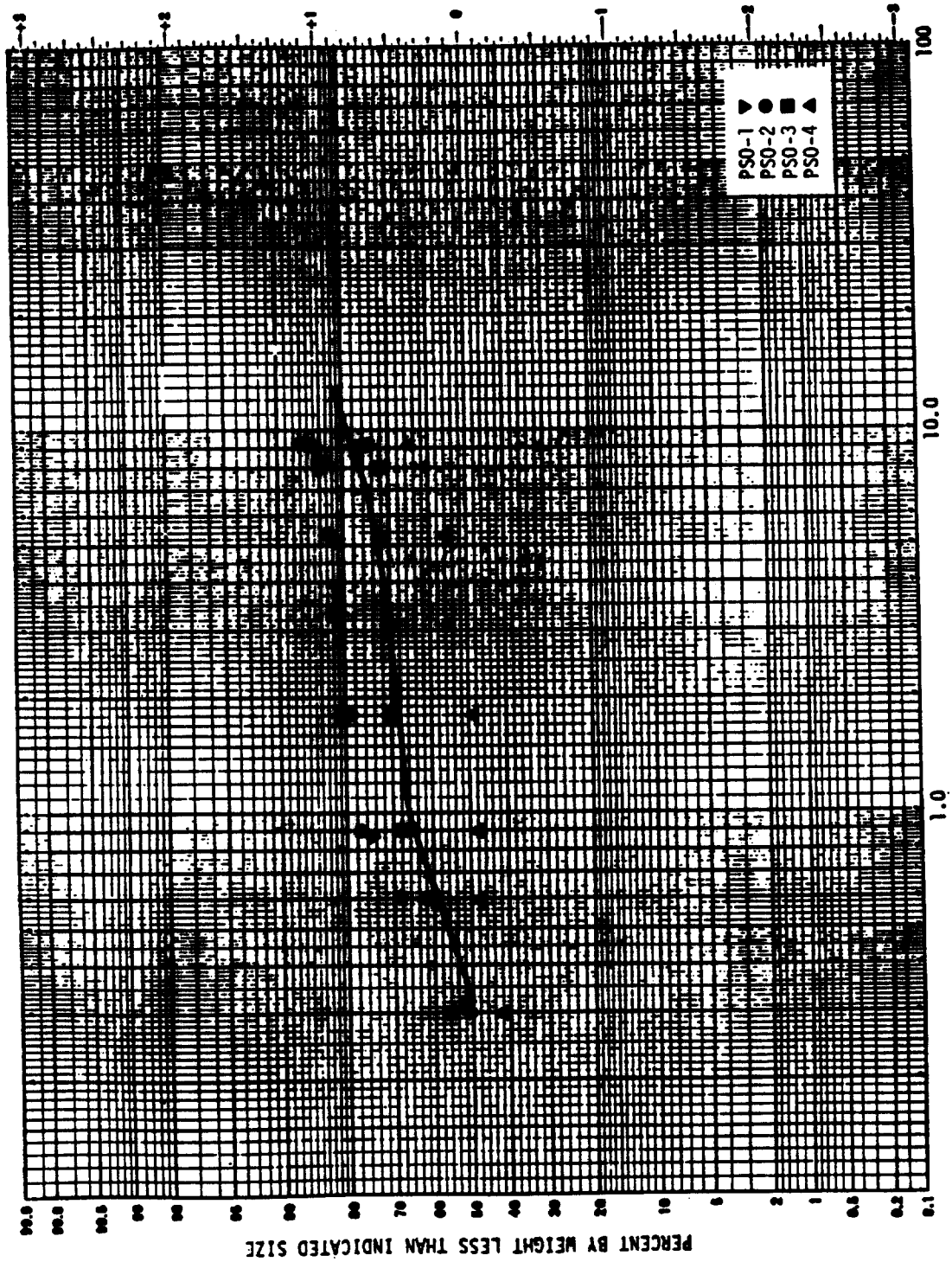


Figure 2-2. Particle size distribution for scrubber outlet Runs PSO-1 through 4.

TABLE 2-6. COMPARISON OF PARTICULATE CONCENTRATIONS AS MEASURED BY EPA METHOD 5 VERSUS PARTICLE SIZE DISTRIBUTION IMPACTORS

Run No.	Test location	Sample type	Particulate concentration	
			mg/dNm³	gr/dscf
PSI-1	Scrubber inlet	Particle size - HGLI	426	0.2
PCI-1		Method 5 - Particulate	-	-
PSI-2		Particle size - HGLI	302	0.13
PCI-3		Method 5 - Particulate	1613	0.7
PSI-4		Particle size - HGLI	454	0.2
PCI-5		Method 5 - Particulate	1749	0.8
PSO-1	Scrubber outlet	Particle size - Mark III	41.1	0.018
PCO-1		Method 5 - Particulate	23.6	0.010
PSO-2		Particle size - Mark III	62.3	0.027
PCO-2		Method 5 - Particulate	-	-
PSO-3		Particle size - Mark III	38.9	0.017
PCO-3		Method 5 - Particulate	18.5	0.008
PSO-4		Particle size	28.9	0.013
PCO-4		Method 5 - Particulate	23.3	0.01

according to the applicable criterion in the Inhalable Particulate (IP) protocol.* This protocol states that a comparison of the total mass concentrations between particle size and Method 5 sample runs should not differ from the means by more than 50 percent. Thus, the representativeness of the inlet particle size data is questionable.

The HGLI Stages 1, 2, and 3 cut-points for Test PSI-1 were 13.0, 6.8, and 3.0 μm, respectively. Sixty-five percent of the particles were less than 13.0 μm, 51 percent were less than 6.8 μm, and 22 percent were less than 3.0 μm. The stage cut-points for Test PSI-2 were 13.0, 6.8, and 3.1 μm, respectively. Fifty-seven percent of the particles were less than 13.0 μm, 45 percent were less than 6.8 μm, and 16 percent were less than 3.1 μm. The stage cut-points for Test PSI-4 were 14.3 μm, 7.5 μm, and 3.3 μm, respectively. Fifty-one percent of the particles were less than 14.3 μm, 34 percent were less than 7.5 μm, and 18 percent less than 3.3 μm.

The size distribution curve for the four outlet tests (PSO-1 through PSO-4) showed about 70 to 85 percent by weight of the particles had a nominal diameter of 9 μm or less. Between 60 and 80 percent of the particles were less than 2 μm. The average calculated mass concentration for these runs was 42.8 mg/dNm^3 (0.019 gr/dscf) compared with the corresponding Method 5 average of 22 mg/dNm^3 (0.01 gr/dscf). A comparison of outlet mass load results as measured by the impactor and Method 5 train is difficult due to the low particulate concentration at this source. Generally, the particle size data appear representative of source conditions at the time of testing. Based on the nondetectable levels of Cr^{+6} at this source, no attempt was made to quantify Cr^{+6} by size fraction.

* Procedures Manual for Inhalable Particulate Samplers Operation, prepared by Southern Research Institute for EPA, Contract No. 68-02-3118, November 1979.

2.4 PROCESS SAMPLE ANALYTICAL RESULTS

Table 2-7 summarizes Cr^{+6} results of analyses of incinerator bottom ash and scrubber water samples collected during each test day. No attempt was made to quantify Cr^{+6} in the sludge feed because of the levels of organic material present. Previous attempts to analyze this type of sample resulted in a highly discolored extract solution, which made a colorimetric determination of Cr^{+6} levels impossible.

The Cr^{+6} content of the bottom ash samples was less than 0.1 µg/g, which is the analytical detection limit of these samples. Scrubber water influent and effluent samples showed similar levels of less than 0.004 milligram per liter (mg/liter). These data correspond to inlet Cr^{+6} emission results.

Table 2-8 summarizes additional analyses performed on process samples collected during the test period. EPA Methods 160.1, 160.3, and 160.4 were used to determine the volatile, fixed, and total solids content of the process samples.* Analytical results for the solid (sludge) samples are in percent while scrubber water results are expressed in milligrams per liter (mg/liter).

2.5 TOTAL CHROMIUM AND METALS ANALYTICAL RESULTS

Tables 2-9 through 2-11 summarize results for neutron activation analyses of select emission samples and process samples. All analytical results are reported as received from EPA.

In summary, NAA is an analytical technique dependent on the measurement of the number and energy of gamma and X-rays emitted by the radioactive isotopes produced in the sample matrix by irradiation with thermal neutrons

---

* Methods of Chemical Analysis of Water and Wastes, EPA 600-4-79-020, 3rd Edition, March 1979.

TABLE 2-7. Cr^{+6} RESULTS OF PROCESS SAMPLE ANALYSES

Sample type and collection date	Laboratory I.D.	Particulate weight analyzed, g	Total Cr^{+6} in sample, µg	Cr^{+6} concentration
Bottom ash-6/18	EQ293	10.1785	<0.4	<0.1 µg/g
Bottom ash-6/19	EQ294	10.0389	<0.4	<0.1 µg/g
Bottom ash-6/20	EQ295	10.3115	<0.4	<0.1 µg/g
Bottom ash-6/21	EQ296	10.1121	<0.4	<0.1 µg/g
Bottom ash-6/22	EQ297	10.1709	<0.4	<0.1 µg/g
Bottom ash-6/24	EQ298	10.3108	<0.4	<0.1 µg/g
Bottom ash-6/25	EQ299	10.4120	<0.4	<0.1 µg/g
Bottom ash-6/26	EQ300	10.0008	<0.4	<0.1 µg/g
Scrubber influent-6/18	EQ302		NA	<0.004 mg/ℓ
Scrubber influent-6/19	EQ303		NA	<0.004 mg/ℓ
Scrubber influent-6/20	EQ304		NA	<0.004 mg/ℓ
Scrubber influent-6/21	EQ305		NA	<0.004 mg/ℓ
Scrubber influent-6/22	EQ306		NA	<0.004 mg/ℓ
Scrubber influent-6/24	EQ307		NA	<0.004 mg/ℓ
Scrubber effluent-6/18	EQ310		NA	<0.004 mg/ℓ
Scrubber effluent-6/19	EQ311		NA	<0.004 mg/ℓ
Scrubber effluent-6/20	EQ312		NA	<0.004 mg/ℓ
Scrubber effluent-6/21	EQ313		NA	<0.004 mg/ℓ
Scrubber effluent-6/22	EQ314		NA	<0.004 mg/ℓ
Scrubber effluent-6/24	EQ315		NA	<0.004 mg/ℓ

NA - Not Applicable

TABLE 2-8. PROCESS SAMPLE ANALYTICAL RESULTS - VOLATILE, FIXED, AND TOTAL SOLIDS

Sample type	Date (1985)	Volatile[a] solids, %	Fixed solids,[b] %	Total[c] solids, %
Sludge[d]	6/18	54.1	45.9	24.1
		54.5	45.5	27.5
		55.9	44.1	21.1
Sludge[d]	6/19	55.4	44.6	20.5
		55.9	44.1	20.4
		56.3	43.7	21.0
Sludge[d]	6/20	55.6	44.4	17.6
		56.5	43.5	20.9
		56.7	43.3	20.7
Sludge[d]	6/21	56.6	43.4	20.2
		55.6	44.4	18.5
		56.0	44.0	19.4
Sludge[d]	6/22	57.6	42.4	19.3
		57.6	42.2	18.2
		60.0	40.0	19.2
Sludge	6/24	53.2	46.8	23.7
Sludge	6/25	53.6	46.4	22.3
Sludge	6/26	53.1	46.9	20.2
Sludge	6/27	57.0	43.0	19.7
		57.6	42.4	19.5

[a] EPA Method 160.1

[b] EPA Method 160.3

[c] EPA Method 160.4

[d] Three 2-hour composites were collected over a 6-hour test period. Each was analyzed separately.

(continued)

TABLE 2-3 (continued)

Sample type	Date (1985)	Volatile solids, mg/liter	Fixed solids, mg/liter	Total solids, mg/liter
Scrubber-influent	6/18	82	470	552
Scrubber-influent	6/19	134	500	634
Scrubber-influent	6/20	124	446	570
Scrubber-influent	6/21	118	480	598
Scrubber-influent	6/22	108	456	564
Scrubber-influent	6/24	108	408	516
Scrubber-effluent	6/18	98	620	718
		96	630	726
Scrubber-effluent	6/19	112	620	732
Scrubber-effluent	6/20	108	760	868
Scrubber-effluent	6/21	106	652	758
Scrubber-effluent	6/22	88	644	732
Scrubber-effluent	6/24	106	606	712

TABLE 2-9. SUMMARY OF TOTAL Cr EMISSION DATA (Detroit Sludge Incinerator No. 13)

Run No.	Sample type and location	Total[a] particulate collected, g	Particulate[b] sample weight analyzed by NAA, g	Total Cr[c] results by NAA, µg	Total Cr[d] concentration by NAA, µg/g	Total Cr[e] content of emission sample, µg	Total Cr concentration,		Total Cr mass emission rate,	
							µg/dNm³	gr/dscf	kg/h	lb/h
PCI-3	Particulate - scrubber inlet	4.2427	0.3096	717	2,317	9,831	3,738	0.0016	0.22	0.48
PCI-4	Particulate - scrubber inlet	6.3451	0.2721	423	1,555	9,864	2,616	0.0011	0.14	0.31
PCI-5	Particulate - scrubber inlet	5.7192	0.2392	650	2,717	15,539	4,752	0.002	0.25	0.55
PCI-6	Particulate - scrubber inlet	6.0474	0.1571	875	5,570	33,682	10,300	0.0045	0.57	1.3
PCO-1	Particulate - scrubber outlet	0.1386	0.1386	233.6	1,685	233.6	39.8	0.00002	0.003	0.008
PCO-3	Particulate - scrubber outlet	0.1141	0.1141	201.7	1,768	201.7	32.8	0.00001	0.002	0.004
PCO-4	Particulate - scrubber outlet	0.1334	0.1334	172.6	1,294	172.6	30.2	0.00001	0.002	0.003
PCO-5	Particulate - scrubber outlet	0.0781	0.0781	240.5	3,056	240.5	44.4	0.00002	0.003	0.008
PCO-6	Particulate - scrubber outlet	0.0933	0.0933	204.6	2,193	204.6	33.5	0.00001	0.002	0.003
PSI-2	Particle size - scrubber inlet Stage 0	0.0781	0.0629	457	7,266	567	863	0.0004	0.05	0.12
PSI-2	Particle size - inlet Stage 1	0.0075	0.0035	27	7,714	58	88	0.00004	0.005	0.01
PSI-2	Particle size - inlet Stage 2	0.0246	0.0141	34	2,411	59	90	0.00004	0.005	0.01
PSI-2	Particle size - inlet Stage 3	0.0573	0.0273	76	2,784	160	244	0.0001	0.01	0.03
PSI-2	Particle size - inlet Backup thimble	0.031	0.031	74	2,387	74	113	0.00005	0.007	0.015

[a]Total particulate (acetone rinse residue and filter) collected during sample run.

[b]Particulate weight analyzed by NAA.

[c]Total Cr results by NAA. Run Nos. PC)4 (scrubber outlet) are blank corrected values (17 µg Cr for filter/acetone blank). Particle size thimble (backup) values have been blank corrected for 31 µg Cr.

[d]Total Cr(C) divided by particulate weight analyzed by NAA(b).

[e]Total Cr concentration (µg/g) multiplied by total particulate weight collected(a).

TABLE 2-10. SUMMARY OF TOTAL CHROMIUM DATA FROM PROCESS SAMPLES

Sample type	Date (1985)[a]	Total chromium by NAA (µg/g basis except as noted)
Bottom ash	6/18	178.0
	6/19	324.6
	6/20	325.9
	6/21	257.9
	6/22	267.7
	6/24	236.1
	6/25	252.7
	6/26	213.6
	6/27	222.4
Sludge	6/18	28.9, 34.4, 31.6
	6/19	51.3, 23.4, 18.9
	6/20	23.4, 30.3, 23.6
	6/21	29.8, 28.0, 28.6
	6/22	23.4, 19.9, 17.3
	6/24	21.0
	6/25	20.9
	6/26	19.2
	6/27	26.0
Scrubber water influent	6/18	1.6 µg/ml
	6/19	2.4
	6/20	No value reported
	6/21	2.5
	6/22	2.6
	6/24	1.6
Scrubber water effluent	6/18	2.9 µg/ml
	6/19	0.11
	6/20	2.7
	6/21	2.5
	6/22	No value reported
	6/24	2.8

[a] Triplicate, 2-hour composite sludge samples were collected between June 18 and 22 during each test day. The results of the triplicate analyses are presented as shown.

[b] Results for solid samples are expressed in µg/g and µg/ml for liquid samples.

TABLE 2-11. SUMMARY OF METALS ANALYTICAL DATA

Sample type and/or run No.	Date (1985)	Total particulate collected, g	Particulate analyzed by NAA, g	Metals concentration, µg/g[a]									Concentration, mg/dNm^3									Mass rate, kg/h								
				As	Cd	Cr	Cu	Mn	Ni	Se	V	Zn	As	Cd	Cr	Cu	Mn	Ni	Se	V	Zn	As	Cd	Cr	Cu	Mn	Ni	Se	V	Zn
Inlet particulate																														
PCI-3		4.2427	0.1051	66.4	928	3920	1300	1130	3150	-	77	8410	0.1	1.5	6.3	2.1	1.8	5.1	-	0.12	13.6	0.006	0.09	0.38	0.12	0.11	0.30	-	0.007	0.80
PCI-4		6.3451	0.1176	66.4	1160	1970	1300	720	1140	12.3	84	9590	0.09	1.95	3.3	2.2	1.2	1.9	0.02	0.14	16.1	0.006	0.10	0.18	0.12	0.07	0.10	0.001	0.008	0.86
PCI-5		5.7192	0.1124	61.9	1139	4020	1600	843	4600	39.4	83	9480	0.11	2.00	8.4	2.6	1.5	8.0	0.07	0.15	16.6	0.006	0.11	0.45	0.14	0.08	0.43	0.004	0.008	0.88
PCI-6		6.0474	0.1086	41.1	894	4080	1500	946	3990	33.8	86	7440	0.08	1.1	9.0	2.8	1.75	7.4	0.06	0.16	13.8	0.004	0.06	0.50	0.15	0.10	0.41	0.003	0.009	0.76
Bottom ash	6/18	-	0.3165	20.6	110	1750	1200	748	608	17.2	82	5820																		
	6/19	-	0.2669	24.0	116	1740	1100	767	635	13.3	84	6390																		
	6/20	-	0.2300	23.7	144	2240	1300	778	760	-	82	7720																		
	6/21	-	0.304	23.7	111	1890	1100	770	675	-	82	8100																		
	6/22	-	0.2441	22.8	104	1950	1300	764	580	13.8	80	8970																		
	6/24	-	0.2899	19.4	118	1580	900	744	526	-	79	6520																		
Sludge	6/18	-	0.3579	2.8	20	196	100	61	40	3.2	9.8	670																		
	6/18	-	0.3868	3.4	20	186	100	48	53	3.5	7.7	716																		
	6/18	-	0.4896	2.8	16	164	70	46	40	3.8	7.2	306																		
	6/19	-	0.6884	2.7	16	153	80	43	62	2.5	6.5	665																		
	6/19	-	0.4371	2.9	12	185	60	55	-	2.9	8.9	347																		
	6/19	-	0.3757	2.5	17	129	70	33	-	-	5.4	542																		
	6/20	-	0.384	2.7	19	167	100	62	-	3.5	8.8	737																		
	6/20	-	0.278	2.7	12	175	110	62	50	-	8.9	261																		
	6/20	-	0.3445	3.0	15	154	120	64	-	-	9.3	390																		
	6/21	-	0.3861	2.4	18	134	80	41	-	-	6.8	509																		
	6/21	-	0.4615	3.3	29	248	90	42	61	4.5	5.8	1170																		
	6/21	-	0.5439	2.2	13	201	80	36	63	-	6.3	355																		
	6/22	-	0.3687	2.6	23	208	60	39	-	-	6.3	563																		
	6/22	-	0.4315	2.2	19	125	80	43	-	1.7	5.3	545																		
	6/22	-	0.4577	2.5	27	162	80	39	48	2.5	7.3	904																		
	6/24	-	0.4966	2.9	23	141	110	61	38	-	9.9	677																		
	6/25	-	0.4340	-	28	167	130	53	46	-	9.0	804																		
	6/26	-	0.422	3.3	28	154	70	49	38	4.0	7.5	718																		
	6/27	-	0.3553	2.5	13	127	100	49	40	2.3	9.2	300																		

[a] Metals concentration in µg/g as received from EPA determined by NAA.

from a nuclear reactor. Typically, the sample matrix plus appropriate standards of the element(s) of interest are irradiated for a selected time period in the neutron flux core region of a research nuclear reactor. After irradiation and appropriate radioactive decay, a gamma-count energy spectrum is obtained by counting the sample on a nuclear detection system.

Two sets of samples were submitted to EPA for analysis. The first set included inlet and outlet Method 5 samples, one inlet particle size sample, and process samples (sludge, incinerator bottom ash, and scrubber water influent and effluent). This set of samples, which was submitted to EPA in September 1985, is summarized in Tables 2-9 and 2-10. Only total Cr results are reported. The second set of samples, submitted to EPA in January 1986, included only inlet Method 5 samples and process samples (bottom ash and sludge). These data are summarized in Table 2-11. Total chromium and metals emission data were calculated by using the total content of the element in each sample, the sample volume, and volumetric flow data from each individual test. Example calculations are presented in Appendix A.

As reported in Table 2-9, the total Cr content of the inlet emission samples (filterable particulate) ranged between 1553 and 5567 µg/g. Total Cr concentrations ranged between 2.6 and 10.3 mg/dNm^3, and corresponding mass emission rates ranged between 0.14 and 0.57 kg/h. Outlet emission samples showed total Cr concentrations ranging between 1294 and 3079 µg/g. Outlet concentrations ranged between 0.03 and 0.04 mg/dNm^3, and corresponding mass emission rates ranged between 0.002 and 0.003 kg/h. The total Cr data (mass rate basis) from simultaneous Inlet Tests PCI-3 through 6 and Outlet Tests PCO-3 through 6 indicate the scrubber system removes greater than 95 percent of the total Cr from the gas emission stream. A single particle size sample (PSI-2) from the scrubber inlet was submitted for analysis of total Cr by

size fraction. As reported in Subsection 2.3, the inlet particle size results are considered suspect; thus, these data are presented for informational purposes only. The majority of total Cr found in this sample (863 $\mu g/dNm^3$) was in Stage 0, which exhibited a 13.0-μm cut point. Impactor Stage 3, which exhibited a 3.1-μm cut point, showed the next highest level of total Cr at 190 $\mu g/dNm^3$.

Table 2-10 summarizes total Cr results from process samples collected during testing. Solid sample (bottom ash and sludge) results are expressed in micrograms per gram and liquid sample results in micrograms per milliliter. These data show a bottom ash Cr content ranging between 178 and 326 μg/g and sludge Cr content ranging between 19 and 51 μg/g.

Table 2-11 summarizes metals analytical data for the four scrubber inlet samples and bottom ash and sludge samples submitted to EPA in January 1986. The concentrations of the following metals were determined: arsenic (As), cadmium (Cd), chromium (Cr), copper (Cu), manganese (Mn), nickel (Ni), selenium (Se), vanadium (V), and zinc (Zn). In the four scrubber inlet emission samples, the metals showing concentrations greater than 1.0 mg/dNm^3 were Cd, Cr, Mn, Ni, and Zn.

2.6 VISIBLE EMISSION OBSERVATIONS

On June 20, the EPA Task Manager conducted visible emission observations on the No. 13 incinerator exit stack. Procedures detailed in EPA Method 9 were used.* Recorded opacities ranged from 0 to 15 percent. These data are included in Appendix B.

* 40 CFR, Appendix A, Reference Method 9, July 1984.

SECTION 3

PROJECT QUALITY ASSURANCE

The application of quality assurance procedures to source emission measurements ensures accurate emission-testing results. Quality assurance guidelines provide the detailed procedures and actions necessary for defining and producing acceptable data. In this project, five documents were used in the preparation of a source-specific test plan that would ensure the collection of acceptable data: 1) the EPA Quality Assurance Handbook Volume II, EPA-600/4-77-0271; 2) the PEI Emission Test Quality Assurance Plan; 3) the PEI Laboratory Quality Assurance Plan; 4) Determination of Hexavalent Chromium Emissions From Stationary Sources, December 13, 1984; and 5) EPA Protocol for Emissions Sampling for Both Hexavalent and Total Chromium, February 22, 1985. Two of these are PEI's general guideline manuals that define the standard operating procedures followed by the company's emission testing and laboratory groups.

In this specific test program, which was reviewed by EPA's Emission Measurement Branch, the following steps were taken to ensure that the testing and analytical procedures produced quality data:

- A sample of bottom ash was obtained during the February pretest survey and analyzed for Cr^{+6} content. These data were used to define sampling times and rates so that a quantifiable level of Cr^{+6} was collected.
- Calibration of all field sampling equipment.
- Checks of train configuration and calculations.

- Onsite quality assurance checks, such as leak checks of the sampling train, pitot tube, and Orsat line. Onsite quality assurance checks of all test equipment prior to its use.
- Use of designated analytical equipment and sampling reagents.
- Internal and external audits to ensure accuracy in sampling and analysis.

Table 3-1 lists the specific sampling equipment used to perform the particulate/Cr^{+6}, particle size distribution, and organic tests as well as the calibration guidelines and limits. In addition to the pre- and post-test calibrations, a field audit was performed on the metering systems and temperature-measurement devices used during sampling. These data are summarized in Table 3-1, and copies of the field audit data sheets are presented in Appendix B of this report.

The PEI project manager and EPA Task Manager performed the onsite sample calculations, and computer programming was used to validate the data upon return to PEI's Cincinnati laboratory. Minor discrepancies between the hand calculations and computer printouts are due primarily to rounding off of values. Computerized example calculations are presented in Appendix A.

The following subsections summarize the quality assurance activities performed during the analytical phase of this project. As a check of the gravimetric analytical procedure, a blank filter and a reagent (acetone) were analyzed in a fashion similar to that used for the actual field samples. Table 3-2 summarizes the blank analysis data, which indicate good gravimetric analytical technique. As an additional check, the 3-m (10-ft) stainless steel probe used for tests at the inlet site was rinsed with acetone after its initial use, and this solution was analyzed for particulate matter. A value of 34 mg was obtained, which is considered insignificant compared with the average total train catch of over 5 grams.

TABLE 3-1. FIELD EQUIPMENT CALIBRATION

Equipment	ID No.	Calibrated against	Allowable error	Actual error	Within allow limits	Comments
Meter box	FB 3	Wet-test meter	ΔH@ ±0.15 (Y ±0.05 Y post-test)	Y: -0.049	X	Y = 0.990; Audit ΔH@ = 1.89
	FB 4			Y: -0.036	X	Y = 1.018; Audit ΔH@ = 1.14
	FB10			Y: +0.008	X	Y = 0.947; Audit ΔH@ = 1.21
	FB11			Y: -0.031	X	Y = 1.050; Audit ΔH@ = 1.15
Pitot tube	247	Standard pitot tube	Cp ± 0.01	0	X	CP = 0.84 per Geometric Specifications - Method 2
	377			0	X	
	403			0	X	
Digital indicator	126	Millivolt signals	0.5%	0.2%	X	
	220			0.3%	X	
	262			0.2%	X	
Thermocouple and stack thermometer	147	ASTM-2F or 3F	1.5% (±2% saturated)	0.1%	X	
	178			0.1%	X	
	257			0.1%	X	
	I-7			0.1%	X	
Impinger thermocouple	I-1	ASTM-2F or 3F	±2%	1°F	X	
	I-9			1°F	X	
Orsat analyzer	141	Standard gas	±0.5%	-0.4%	X	CO_2
				0%	X	O_2
Trip balance	396	Type S weights	±0.5 g	0.1 g	X	
Barometer	406	NBS traceable barometer	±0.10 in.Hg. (0.20 post-test)	0.1 g	X	
				0.1 in.Hg.	X	
Dry gas	FB 3	ASTM-2F or 3F	±5°F	-1.3°F	X	Inlet
				-1.0°F	X	Outlet
	FB 4			-2.0°F	X	Inlet
				-1.0°F	X	Outlet
	FB10			-1°F	X	Inlet
				0°F	X	Outlet
	FB11			-1°F	X	Inlet
				+2°F	X	Outlet
Probe	4-108	Caliper	Dn ±0.04 in.	0.001	X	
	3-109			0.003	X	
	8-108			0.003	X	
	5-112			0.003	X	
	6-113			0.001	X	

TABLE 3-2. SAMPLE FILTER AND REAGENT BLANK ANALYSIS FOR PARTICULATE

Sample type and filter number	Original tare weight, mg	Blank weight mg	Net weight mg
Outlet particulate - 8510225 Reeve Angel 934AH	371.9	372.2	0.3
Inlet particulate - No. 29 glass-fiber thimble	2,089.6	2,099.1	9.5
Modified Method 5 - 3-7/8-in. filter - No. 5300020	565.9	566.4	0.5
Acetone[a]	91,993.8	92,006.5	12.7[b] (0.027 mg/g)
316 Stainless steel probe acetone rinse blank	90,400.4	90,434.6	34.2[c]

[a] 605 ml evaporated and desiccated before weighing.

[b] Method 5 and particle size acetone blank (0.01 mg/g used in calculations).

[c] Average blank value from inlet stainless steel probe rinse.

Emission and process samples were analyzed in four separate batches. Table 3-3 summarizes the linear regression data of the spectrophotometer calibration for these samples. The detection limit established was less than 0.004 µg/ml for an absorbance of 0.005 above the linear regression intercept.

TABLE 3-3. LINEAR REGRESSION DATA FOR SPECTROPHOTOMETER CALIBRATION

Sample description	Date (1985)	Cr^{+6} standard concentration, µg/ml	Absorbance	Y-Intercept	Slope	Correlation coefficient
Process samples PCI 4-6 PCIO 1 and 2	7/16	0.0 0.1 0.2 0.3 0.4 0.5	0.000 0.131 0.260 0.400 0.531 0.640	0.0027	1.2971	0.9995

Because the concentration of hexavalent chromium in these solid samples was extremely low, the amount of alkaline extraction solution and the final dilution volume of this extract were kept at a minimum consistent with Method 3060 from Test Methods for Evaluating Solid Waste. This proportion is 4 ml of alkaline extraction solution per gram of solid diluted to a final volume of 10 ml.

Concentrations in all reagent blanks were less than the detection limit. No other blanks were necessary because all analyses were performed on loose particulate; i.e., no filter or thimbles were extracted. A duplicate analysis (extraction and colorimetric determination) was performed on bottom ash samples. Also, the bottom ash particulate and scrubber water effluent were checked by method of addition. The results for these samples are presented in Table 3-4.

TABLE 3-4. RESULTS OF QC SAMPLES

Sample	QC type	Results
Bottom ash particulate	Duplicate	<0.4 µg; <0.1 µg/g
Bottom ash particulate	Spike	51% recovery
Scrubber water effluent	Spike	103% recovery

Table 3-5 presents QC data relative to the total Cr analysis by NAA. Blank, duplicate, and audit data are presented.

TABLE 3-5. QC DATA FOR TOTAL CHROMIUM BY NAA

Lab No.	Sample type	Results total Cr, µg (except as noted)
EQ 232/239	Filter/acetone	17.0
EQ 212	Thimble blank	31.2
Blank - reagent	Alkaline extract	0.17
EQ 246	H_2 blank	2.4 µg/ml
EQ 208/218	Duplicate - particulate acetone	480.3, 555.7
EQ 133/134	Duplicate - particulate acetone	89.4, 62.9
EQ 295	Duplicate - bottom ash	325.9, 276.7
EQ 301	Duplicate - bottom ash	222.4, 276.9
EQ 325	Duplicate - sludge	19.2, 24.8
NGS1633A	Audit - coal fly ash	195 µg/g (196 µg/g accepted value)

SECTION 4

SAMPLING LOCATIONS AND TEST PROCEDURES

This section describes the sampling sites and the test methods used to characterize particulate and chromium emissions from this source as well as the particle size distribution.

4.1 SAMPLING LOCATIONS

Samples were extracted from the inlet and outlet ducts of the scrubber at the locations shown in Figures 4-1 and 4-2.

The inlet test site has six 10-cm (4-in.) i.d. sampling ports along the vertical axis in the horizontal duct. These ports are approximately 1.0 m (3 ft 4 in.) downstream from the incinerator and approximately 2.9 m (9.5 ft) upstream from a 90-degree bend in the 2.1 m x 3.1 m (7 ft x 10 ft) rectangular duct. The inlet sampling location did not meet the minimum specifications outlined in EPA Reference Method 1* for sampling port location; however, this was the only available section of the ductwork leading to the scrubber from which samples could be extracted.

The outlet test site has two 10-cm (4-in.) i.d. sampling ports located 90 degrees off-center. These ports are approximately 3.7 m (12 ft) downstream from a flow control damper and approximately 9 m (30 ft) upstream from the induced-draft fan in the 1.3-m (4 ft, 5 in.) round duct. This location

* 40 CFR 60, Appendix A, Reference Method 1, July 1984.

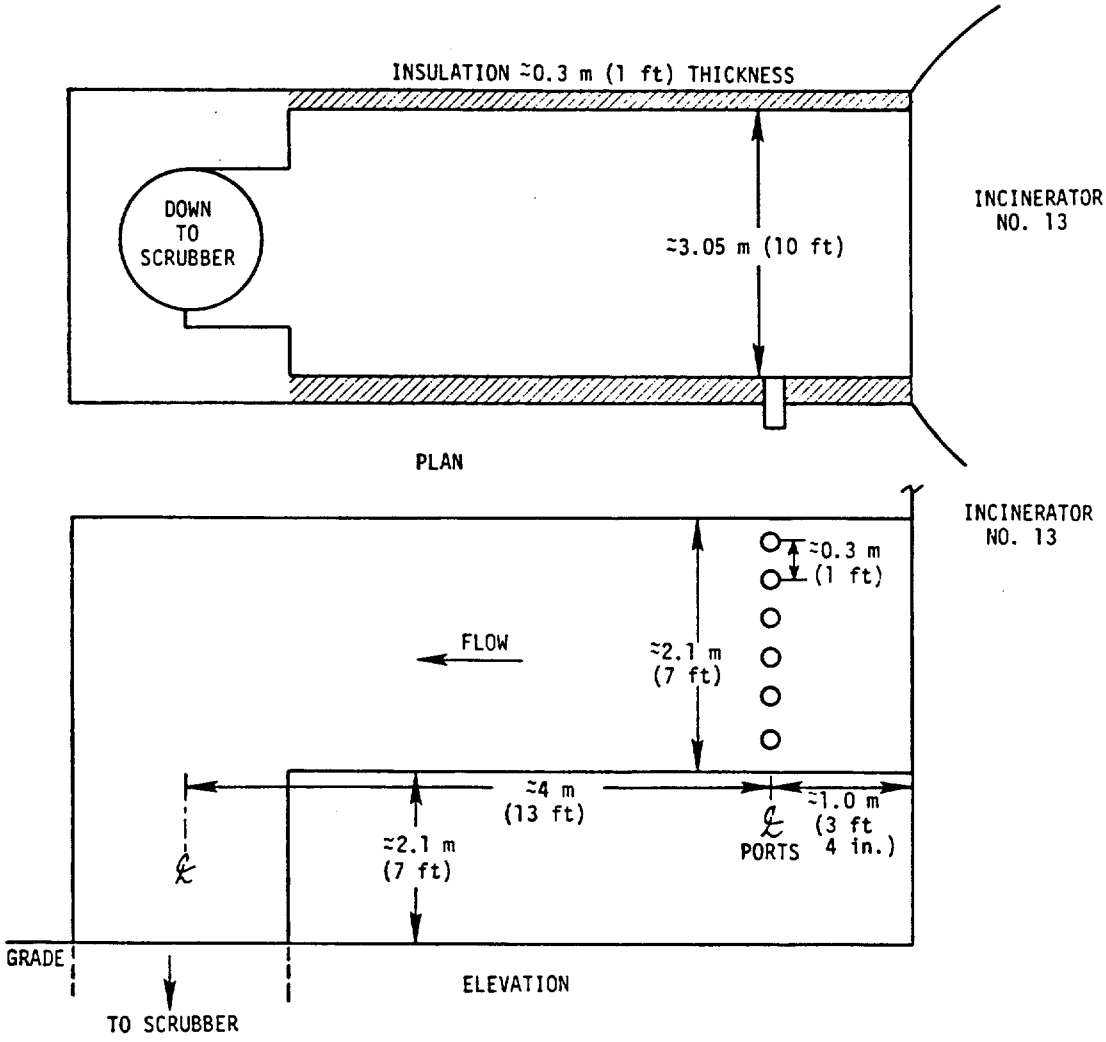


Figure 4-1. No. 13 incinerator inlet sample location.
-no scale-

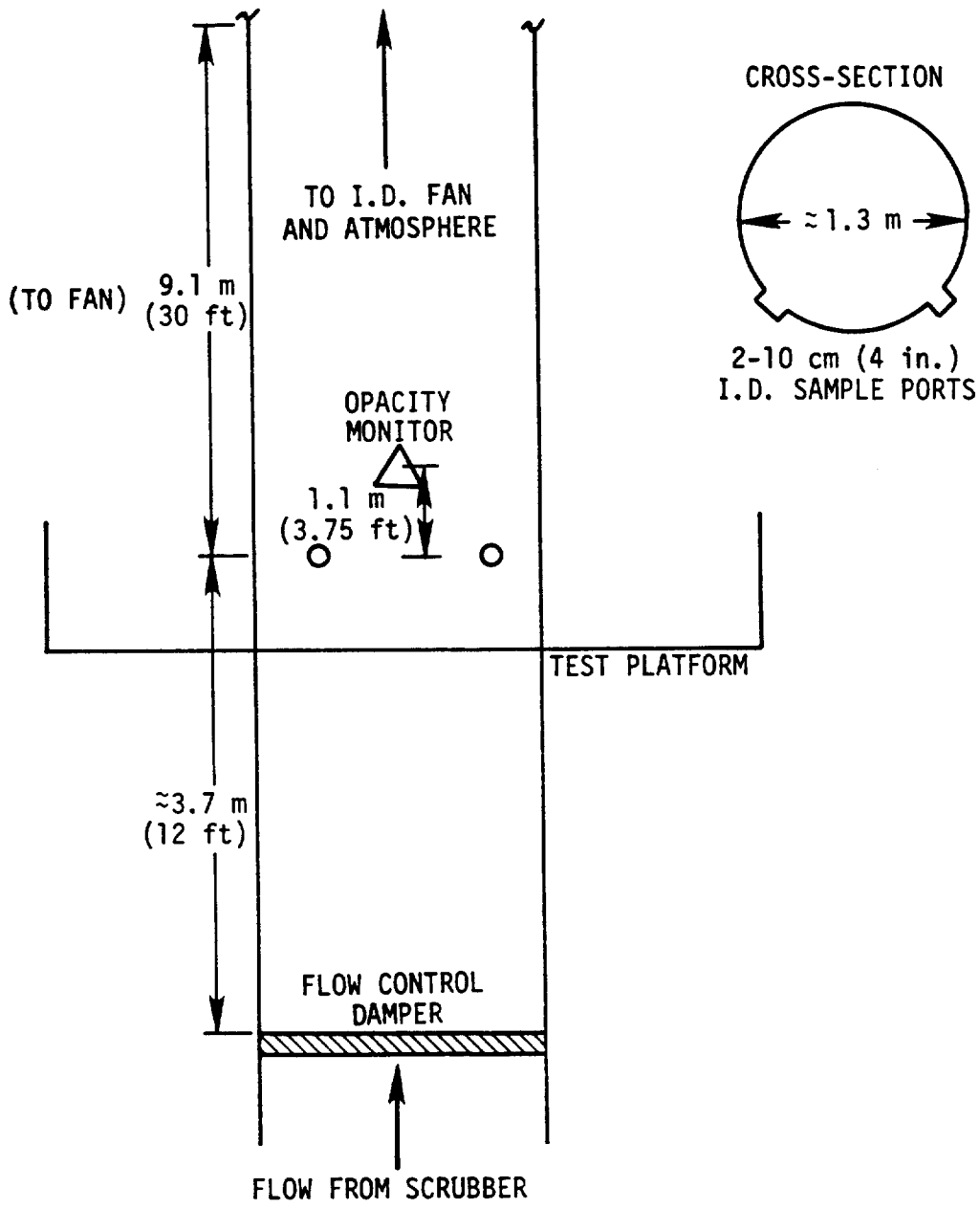


Figure 4-2. No. 13 incinerator scrubber outlet test location.

conforms with specifications detailed in EPA Reference Method 1. No site modifications were required at either location.

Before sampling began, the velocity, static pressure, molecular weight, moisture content, and temperature were measured to define sampling rates and nozzle sizes as described in EPA Reference Methods 1 through 4.* In addition, the degree of turbulent flow at each location was assessed based on procedures described in EPA Reference Method 1. In this method, the face openings of the Type-S pitot tube are aligned perpendicularly to the duct cross-sectional plane designated "0-degree reference." Null (zero) pitot readings obtained at a 0-degree reference indicate an acceptable flow condition at a given point.

If the pitot reading is not zero at 0-degree reference, the pitot is rotated (up to 90 degrees ± yaw angle) until a null reading is obtained. The value of the rotation angle (yaw) is recorded for each point and averaged across the duct. Method 2 criteria stipulate that average angular rotations greater than ±10 degrees indicate turbulent (nonaxial) flow conditions in the duct(s). This procedure was used to check several traverse points at each location. In each case, null and/or angular rotations of less than 20-degree pitot readings were observed at the 0-degree reference. These data, together with the velocity and temperature profiles established for each location, indicated generally acceptable flow patterns that would enable the extraction of representative samples at each site.

4.2 PARTICULATE AND HEXAVALENT CHROMIUM SAMPLE EXTRACTION AND ANALYSIS

Flue gas samples were simultaneously collected at the scrubber inlet and outlet test locations according to procedures outlined in EPA Reference

* 40 CFR 60, Appendix A, Reference Methods 1 through 4, July 1984.

Method 5.* The 13 tests were conducted simultaneously before and after the scrubber to determine particulate, CR^{+6}, and total Cr content. In eight of these tests (four at each location), the cross-sectional area of the ducts was traversed by isokinetic sampling techniques. The remaining four tests were conducted isokinetically at a point of average velocity and temperature. These single point runs were designed to determine both particulate, Cr^{+6}, and total Cr from the front half of the sampling train (probe residue and filter) and semivolatile organics from the back half by placing a water-cooled XAD-2 resin trap prior to the first impinger.

At the scrubber inlet, 30 sampling points were used to traverse the cross-sectional area of the duct. Each point was sampled for 12 minutes, which yielded a total test time of 360 minutes for the traverse tests. At the scrubber outlet, 24 sample points were used to traverse the cross-sectional area of the stack. Each point was sampled for 15 minutes, which yielded a total test time of 360 minutes for the traverse tests. It should be noted that for outlet tests PCO 3, 4, and 6, 3 of the 24 sample points exhibited negative or zero flow characteristics. During actual sampling, the test points were skipped and sampling times for the remaining test points were adjusted to allow for a complete 360-minute test. Sampling data were adjusted to account for this by recording zero velocity head and sample orifice pressure drop for each point. The average stack and dry gas meter temperatures were used to complete data input, and sample times were set at

* 40 CFR 60, Appendix A, Reference Method 5, July 1984.

15 minutes per point for calculation purposes. Isokinetic sampling rates for these runs were calculated separately for each traverse (Points 1-12 and 13-21), and the average was used as the isokinetic rate for a given run. See Appendix A for calculations.

The testing and analytical procedures used are described briefly here, and detailed procedures are presented in Appendix D.

4.2.1 Velocity and Gas Temperature

A Type-S pitot tube and an inclined draft gauge manometer were used to measure the gas velocity pressures at the test sites. Velocity pressures were measured at each sampling point across the duct to determine an average value. Measurements were taken in the manner prescribed in EPA Reference Method 2.* The temperature at each sampling point was measured with a thermocouple and digital readout.

4.2.2 Molecular Weight

Flue gas composition was determined in accordance with the basic procedures described in EPA Reference Method 3.* Grab samples were collected prior to the start of sampling to establish baseline contents of oxygen, carbon dioxide, and carbon monoxide. Integrated bag samples were collected during each test and were analyzed with an Orsat gas analyzer. The gas composition at each test site remained reasonably consistent throughout the test series.

4.2.3 Particulate/Cr^{+6}

Particulate and Cr^{+6} samples were collected as specified in EPA Reference Method 5.* All tests were conducted isokinetically by regulating the sample flow rate relative to the gas velocity in the duct (as measured by the pitot tube and thermocouple attached to the sample probe). At the scrubber outlet,

* 40 CFR 60, Appendix A, Reference Methods 2, 3, and 5, July 1984.

the sample train consisted of a heated glass-lined probe, a heated 7.6-cm (3-in.) diameter glass-fiber filter (Whatman Reeve Angel 934 AH), and a series of five Greenburg-Smith impingers followed by a vacuum line, vacuum gauge, leak-free vacuum pump, dry gas meter, thermometers, and a calibrated orifice. At the scrubber inlet, the sample train consisted of an instack glass-fiber thimble followed by a heated stainless steel probe, a heated Method 5 backup filter, and a series of five Greenburg-Smith impingers.

For determination of the outlet particulate concentration, the nozzle, probe, and filter holder portions were rinsed with acetone at the end of each applicable test. The acetone rinse and particulate caught on the filter media were dried at room temperature, desiccated to a constant weight, and weighed on an analytical balance. Total filterable particulate matter was determined by adding these two values. For determination of the inlet particulate concentration, the nozzle, probe, and filter holder portion of the backup Method 5 filter were rinsed with acetone at the end of each test. The acetone rinse and particulate caught in the instack thimble and on the Method 5 backup filter were dried at room temperature, desiccated to a constant weight, and weighed on an analytical balance. Total filterable particulate matter was determined by adding these three values.

Upon completion of the gravimetric analysis, the inlet sample fractions were prepared and analyzed for Cr^{+6} according to procedures recently developed by EPA. In summary, loose particulate samples were digested in an alkaline solution and analyzed by the diphenylcarbazide colorimetric method.*

* Test methods for Evaluating Solid Waste. U.S. Environmental Protection Agency, SW-846, 2nd ed., July 1982.

The volume of water collected in the impinger section of the sampling train(s) was measured at the end of each sample run to determine the moisture content of the flue gas. The contents of the impingers were transferred to a polyethylene container. The impingers and all connecting glassware, including the back half of the filter holder, were rinsed with distilled water and the rinse was added to the container. These samples are being held for further analysis.

4.3 PARTICLE SIZE DISTRIBUTION

Samples for measuring particle size distribution were collected at the scrubber inlet and outlet by instack cascade impactors of two different configurations. The Andersen Mark III multistage impactor was used at the scrubber outlet and the Andersen Heavy Grain Loading Impactor (HGLI) was used at the scrubber inlet.

The Andersen Mark III in-stack impactor consists of eight size cut-point stages and a backup filter. This impactor was assembled by alternating the stage plates, collection media, flat crossbars, and Inconel spacer rings needed to provide weight cut sizes. The collection substrates were Reeve Angel 934 AH glass-fiber filters that had been heated in a 204°C (400°F) oven for 1 or 2 hours, desiccated for 24 hours to a constant weight, and weighed to the nearest 0.1 mg on an analytical balance. A total of four samples were collected at a single point representing the average velocity and temperature in the outlet duct. Sample times ranged from 20 to 60 minutes. Isokinetic sampling rates were set initially and constant cut-point characteristics were maintained throughout the sampling period.

Each size fraction was subjected to a gravimetric analysis according to EPA Method 5 procedures. For each test, size distribution curves were established that represented the total weight percent of particulate matter smaller than the indicated aerodynamic particle diameter in micrometers.

Cut-points for the eight Mark III impactor stages were calculated by computer programs contained in "A Computer-Based Cascade Impactor Data Reduction System" (CIDRS).* All particle size results are based on a particle density of 1 g/cm^3. Data reduction and intermediate results calculations for both types of impactors were performed by the CIDRS program with moisture contents obtained from the particulate tests.

The Andersen HGLI used at the scrubber inlet consists of two single-jet impaction chambers followed by a third-stage cyclone and a backup filter. The sampled gas stream enters the system through the Stage 1 acceleration jet. Particles with sufficient inertia are impacted against the bottom of the Stage 1 impaction chamber. Smaller particles flow with the gas stream and exit the impaction chamber through three vent tubes.

Stage 2 of the HGLI is simply a scaled-down version of Stage 1 in which the jet nozzle diameter and the distance from jet exit to the impaction surface have been designed for the proper Stage 2 cut-point.

Stage 3 of the HGLI is a small cyclone designed by Southern Research Institute. A high-efficiency glass-fiber filter removes all particles remaining in the gas stream downstream of the cyclone.

---

* Southern Research Institute. A Computer-Based Cascade Impactor Data Reduction System. Prepared for U.S. Environmental Protection Agency under Contract No. 68-022-131, March 1978.

The Andersen HGLI was used at the inlet because of expected heavy particulate concentration, which would overload a standard multistage impactor. Three samples were collected at the scrubber inlet from a single point in the duct that was representative of the average velocity and temperature. Sample times ranged from 90 to 120 minutes.

At the completion of each test, the impactor samples were recovered in accordance with procedures described in the HGLI operation manuals. Each recovered fraction was then subjected to a gravimetric analysis in accordance with EPA Reference Method 5 criteria. Size distribution curves representing the total weight percent of particulate matter smaller than the indicated aerodynamic particle diameter (in micrometers) were established for each run.

The three cut-points for each Andersen HGLI test were determined graphically from information supplied by the manufacturer. All particle size results are based on a particle density of 1 g/cm^3. Data reduction and intermediate result calculations were performed by CIDRS programs with moisture contents and gas composition data obtained from the particulate/Cr^{+6} tests.*

4.4 PROCESS SAMPLES

During each test day, the following process samples were collected:

- Incinerator sludge feed
- Incinerator bottom ash
- Scrubber water influent
- Scrubber water effluent

Samples were collected by plant personnel every 15 to 30 minutes over an 8- to 10-hour period. Collection of sludge samples was begun about 30 minutes

---

* Southern Research Institute. A Computer-Based Cascade Impactor Data Reduction System. Prepared for U.S. Environmental Protection Agency under Contract No. 68-022-131. March 1978.

before the start of testing and continued for about 1 hour after testing was completed. A total of three 2-hour composite samples were collected during the Cr^{+6}/particulate tests. In the remaining tests, one composite sludge sample was collected over the day-long period.

All sludge and scrubber water samples were subjected to a volatile, fixed, and total residue analysis using EPA methods 160.1, 160.3, and 160.4.*

Incinerator bottom ash and scrubber water samples were analyzed for Cr^{+6} by procedures similar to those used for the actual emission samples.

Portions of each sample type from each test day were shipped to EPA for Neutron Activation Analysis of total chromium and other metals of interest.

* Methods for Chemical Analysis of Water and Wastes, EPA 600-4-79-020, 3rd Edition, March 1979.

SECTION 5

PROCESS OPERATION

5.1 PROCESS DESCRIPTION

Testing was conducted on the exhaust gases of the multiple-hearth sewage sludge incinerators 9 and 13 in Complex 2 at the City of Detroit Municipal Wastewater Treatment Plant. Each incinerator has 12 hearths that are used to process 12 to 14 megagrams per hour (Mg/h) (13 to 15 tons/h) of blended primary and secondary sludge at a ratio of two parts primary to one part secondary sludge. Primary sludge refers to the solid material that is removed from suspension in untreated wastewater in the initial settling basins. Secondary sludge refers to the solid material resulting from biological treatment of the wastewater that is removed from suspension by subsequent settling basins. The incinerators, which were manufactured by Nichols Engineering Company and installed in 1972, have been reworked in the last 2 years.

The incinerators have a rabble arm rotation rate of approximately one revolution per minute. The incinerators typically use combustion air from only the central shaft. They operate at 150 to 300 percent excess air and use natural gas as an auxiliary fuel. Natural gas burners are located on Hearths 2, 4, 6, 8, 10, and 12. Sludge combustion takes place primarily on Hearths 5 and 6. Each incinerator has an impingement scrubber for removal of particulate from the exhaust gases. The impingement scrubbers operate at a pressure drop of approximately 2.4 kilopascals (kPa) (10 in. H_2O).

5.2 PROCESS CONDITIONS DURING TESTING

Incinerators 9 and 13 were operating at a normal load of approximately 12 to 14 Mg/h (13 to 15 tons/h) during testing. Incinerator 13 was tested the first 8 days (June 18 through 22 and June 24 through 26). This test period included all chromium and arsenic runs and all hydrocarbon runs except one inlet run for volatile organic compounds (VOC's). This VOC test run was conducted on the last day (June 27) on Incinerator 9 rather than Incinerator 13 because a broken bearing prevented sludge feed to Incinerator 13.

The following parameters were recorded every 20 minutes during testing: sludge flow rate; percent oxygen; use of auxiliary combustion air; scrubber damper position, inlet pressure, outlet pressure, and outlet temperature; shaft revolution rate; and the temperature of 10 of 12 of the hearths (one hearth did not have a temperature monitor, and another monitor was malfunctioning during the test period). Tables 5-1 through 5-9 present results of these observations. In addition, Attachments 1 through 9 contain copies of the operator's log, scrubber water flow rates, strip charts of the percent oxygen and hearth temperatures, and 5-minute visible emission observation summaries for each run. These data were compiled by plant personnel. Delays and/or interruptions for the nine testing runs are presented below.

The start of Run 1 was delayed for approximately 2.5 hours to remove incinerator braces that were blocking access to the outlet ports. Inlet testing during Run 1 was stopped after 0.5 hour into the run because of a failed leak check. During Run 2, inlet testing was halted three times because of cracked probe liners. (As a result of this problem, an in-stack filter was used at the inlet location for the remainder of the testing.) All testing was halted during Run 2 for approximately 1.5 hours because of a faulty O_2 analyzer. No problems were encountered during Runs 3 through 5.

TABLE 5-1. PROCESS DATA FROM RUN NO. 1--INCINERATOR NO. 13, DETROIT, MICHIGAN, JUNE 18, 1985

Time	Hopper sludge flow rate, wet tons/h (6 min avg.)	Oxygen, %	Aux. combustion air, yes/no	Scrubber gas flow rate, acfm	Scrubber damper position, percent open	Scrubber inlet pressure, in. w.c.	Scrubber exhaust pressure, in. w.c.	Scrubber outlet temp., °F	Shaft, rpm	Hearth temperature, °F									
										2	3	4	5	6	7	8	10	11	12
8:30	14.7	7.0	N	41,000	47	-1.2	9.0	50	1.0	925	1050	1094	1400	1497	900	873	196	150	139
8:50	15.5	6.5	N	41,000	46	-1.2	9.2	50	1.0	964	1050	1090	1400	1492	900	882	209	150	142
	START OF TESTING DELAYED DUE TO NEED TO REMOVE BRACES BLOCKING ACCESS TO INLET PORTS																		
9:40	16.2	8.2	N	40,000	49	-1.2	9.0	50	1.0	947	1100	1110	1400	1453	600	650	187	150	136
10:40	13.9	9.0	N	40,000	49	-1.3	9.2	50	1.0	937	1050	1074	1400	1435	660	638	175	150	139
11:00	13.5	7.5	N	38,000	49	-1.2	9.2	48	1.0	950	1050	1072	1350	1352	650	619	169	150	139
11:20	16.5	8.0	N	42,000	49	-1.0	9.2	48	1.0	945	1050	1093	1400	1476	640	601	168	150	140
11:30	START RUN NO. 1																		
11:40	14.5	7.5	N	39,000	49	-1.5	9.2	50	1.0	923	1050	1084	1400	1497	720	695	166	150	140
12:00	INLET RUN (METHOD 5) STOPPED DUE TO FAILED LEAK CHECK																		
12:00	15.1	8.3	N	40,000	49	-1.5	9.2	45	1.0	921	1050	1076	1420	1488	820	810	173	150	140
12:20	15.1	8.5	N	38,000	51	-1.4	9.3	46	1.0	927	1050	1068	1420	1472	800	785	197	150	140
12:40	15.5	8.0	N	38,000	51	-1.2	9.4	48	1.0	936	1050	1077	1420	1506	780	775	206	150	140
1:00	15.5	7.7	N	38,000	51	-1.2	9.4	48	1.0	935	1050	1074	1450	1531	800	775	197	150	140
1:20	16.2	8.0	N	38,000	51	-1.2	9.4	48	1.0	888	1000	1056	1420	1480	830	788	194	150	140
1:40	15.0	5.8	N	34,000	56	-1.4	9.5	48	1.0	914	1050	1060	1400	1440	1100	1058	197	150	140
2:00	17.3	8.8	N	35,000	55	-1.2	9.5	48	1.0	914	1050	1097	1400	1473	860	849	276	150	139
2:20	13.8	8.8	N	36,000	55	-1.4	9.5	48	1.0	894	1000	1042	1350	1340	850	869	233	150	144
2:40	14.9	8.4	N	36,000	55	-1.2	9.5	50	1.0	903	1000	1028	1350	1357	920	903	209	150	143
3:00	15.0	8.0	N	36,000	55	-1.3	9.6	50	1.0	918	1000	1029	1350	1401	950	945	197	150	142
3:20	14.1	7.8	N	Disconnected	56	-1.4	9.6	50	1.0	896	1000	1025	1350	1396	900	889	237	150	145
3:40	14.4	7.6	N	--	59	-1.4	9.8	50	1.0	945	1000	1042	1320	1337	800	785	260	150	148
4:00	13.5	9.5	N	--	60	-1.4	9.8	50	1.0	922	1210	1055	1350	1408	750	722	239	150	150
4:20	14.4	9.5	N	--	60	-1.4	9.8	50	1.0	874	1220	1028	1350	1375	750	705	203	150	148
4:40	15.2	9.5	N	--	60	-1.4	9.8	55	1.0	846	980	1000	1350	1336	880	831	225	150	148
5:00	13.5	9.1	N	--	60	-1.4	9.8	55	1.0	851	950	997	1350	1343	880	856	255	150	148
5:20	15.2	9.7	N	--	60	-1.4	9.6	55	1.0	833	950	995	1350	1348	800	774	296	150	150
5:40	15.6	11.8	N	--	60	-1.4	9.6	60	1.0	783	900	964	1350	1350	800	782	257	150	146
5:45	End all testing																		

TABLE 5-2. PROCESS DATA FROM RUN NO. 2--INCINERATOR NO. 13, DETROIT, MICHIGAN, JUNE 19, 1985

Time	Hopper sludge flow rate, wet tons/h (6 min avg.)	Oxygen, %	Aux. combustion air, yes/no	Scrubber gas flow rate, acfm	Scrubber damper position, percent open	Scrubber inlet pressure, in. w.c.	Scrubber exhaust pressure, in. w.c.	Scrubber outlet temp., °F	Shaft, rpm	Hearth temperature, °F									
										2	3	4	5	6	7	8	10	11	12
8:30	14.2	9	N	Disconnected	59	-1.3	9.0	50	1.0	899	1050	1085	1380	1458	680	644	193	160	159
8:45	START RUN NO. 2 (PROCESS SAMPLING STARTED AT 8:30)																		
8:50	14.9	10.5	N	Disconnected	59	-1.1	9.6	50	1.0	918	1050	1090	1400	1467	720	689	186	160	155
9:10	10.6	8.5	N	Disconnected	62	-1.2	9.5	50	1.0	914	1050	1091	1400	1468	720	712	178	160	156
9:30	14.5	7.8	N	Disconnected	62	-1.3	9.8	50	1.0	906	1000	1052	1350	1388	720	714	175	150	154
9:50	11.3	8.8	N	Disconnected	78	-1.3	9.8	50	1.0	875	1080	1027	1350	1439	720	709	178	160	154
10:10	13.3	8.0	N	Disconnected	60	-1.2	9.8	50	1.0	890	1000	1032	1380	1455	780	773	178	160	160
10:30	12.7	9.0	N	Disconnected	60	-1.2	9.5	50	1.0	902	1000	1052	1350	1416	730	726	174	160	152
10:50	13.4	8.8	N	Disconnected	59	-1.1	9.5	50	1.0	897	1000	1048	1350	1357	720	708	170	150	150
11:00	INLET M5 STOPPED DUE TO CRACKED PROBE LINER																		
11:10	14.3	8.2	N	Disconnected	60	-1.2	9.5	50	1.0	882	1000	1028	1280	1337	820	802	166	160	147
11:30	14.3	7.7	N	Disconnected	60	-1.1	9.5	50	1.0	897	1000	1052	1300	1362	820	808	170	150	148
11:46	BEGAN SECOND INLET M5																		
11:50	14.6	8.2	N	Disconnected	60	-1.1	9.5	50	1.0	877	1000	1027	1290	1339	820	792	173	160	150
12:10	15.9	8.2	N	Disconnected	52	-1.1	9.2	50	1.0	894	1000	1048	1380	1440	880	864	185	160	159
12:30	12.3	8.0	N	Disconnected	59	-1.2	9.0	50	1.0	880	1000	1016	1400	1468	860	836	184	160	162
12:30	STOPPED INLET M5--LINER SEPARATED FROM NOZZLE																		
12:45	INLET M5 RESUMED																		
12:50	16.2	Water out	N	Disconnected	50	-1.1	9.0	50	1.0	862	1000	1013	1380	1399	860	862	181	160	163
1:05	ALL TESTING HALTED DUE TO FACULTY O_2 ANALYZER																		

(continued)

TABLE 5-2 (continued)

Time	Hopper sludge flow rate, wet tons/h (6 min avg.)	Oxygen, %	Aux. combustion air, yes/no	Scrubber gas flow rate, acfm	Scrubber damper position, percent open	Scrubber inlet pressure, in. w.c.	Scrubber exhaust pressure, in. w.c.	Scrubber outlet temp., °F	Shaft, rpm	Hearth temperature, °F									
										2	3	4	5	6	7	8	10	11	12
2:30	15.0	8.5	N	Disconnected	50	-1.2	8.0	50	1.0	897	1000	1024	1320	1432	1000	1004	420	175	180
2:37	TESTING RESUMED																		
2:50	14.6	9.5	N	Disconnected	50	-0.9	8.0	50	1.0	854	950	994	1320	1356	1280	1276	260	160	167
3:10	14.6	8.2	N	Disconnected	50	-0.8	8.2	60	1.0	863	950	956	1200	1216	1000	987	278	160	162
3:30	13.0	8.5	N	Disconnected	44	-0.8	8.5	60	1.0	885	920	965	1150	1182	980	929	263	175	163
3:50	10.4	8.5	N	Disconnected	60	-1.2	9.5	55	1.0	892	1000	1020	1320	1398	980	928	230	175	170
4:10	10.6	8.8	N	Disconnected	62	-1.2	9.5	55	1.0	894	975	1004	1300	1352	900	900	209	175	169
4:30	10.8	9.0	N	Disconnected	60	-1.2	9.5	60	1.0	896	1000	1012	1300	1331	920	887	209	175	167
4:45	END TESTING																		

(INLET TESTING STOPPED APPROXIMATELY 3:30--BROKEN LINER)

TABLE 5-3. PROCESS DATA FROM RUN NO. 3--INCINERATOR NO. 13, DETROIT, MICHIGAN, JUNE 20, 1985

Time	Hopper sludge flow rate, wet tons/h (6 min avg.)	Oxygen, %	Aux. combustion air, yes/no	Scrubber damper position, percent open	Scrubber inlet pressure, in. w.c.	Scrubber exhaust pressure, in. w.c.	Scrubber outlet temp., °F	Shaft, rpm	Hearth temperature, °F									
									2	3	4	5	6	7	8	10	11	12
8:20	15.7	10	N	38	-0.6	7.5	60	1.0	816	1000	1016	1400	1468	1200	780	252	150	150
8:40	12.8	7.5	N	50	-1.0	8.0	55	1.0	844	980	995	1400	1488	1280	1205	260	220	204
8:45	BEGIN RUN NO. 3																	
9:00	12.4	9.0	N	50	-1.1	9.0	55	1.0	879	1000	1029	1380	1478	800	788	284	175	158
9:20	12.5	9.2	N	50	-1.0	9.0	55	1.0	892	1000	1013	1400	1434	700	655	248	175	150
9:40	15.5	9.0	N	50	-1.0	9.0	50	1.0	917	1000	1041	1400	1472	700	656	225	150	146
10:00	16.2	10.5	N	50	-1.0	9.0	55	1.0	886	1000	1027	1380	1432	700	635	209	150	144
10:20	14.2	9.5	N	50	-0.5	8.0	55	1.0	871	1000	1017	1380	1410	650	604	223	150	145
10:40	14.4	6.5	N	49	-1.0	8.7	50	1.0	896	950	992	1250	1279	950	1019	304	150	153
11:00	13.1	8.0	N	60	-1.1	9.5	50	1.0	907	1000	1024	1380	1450	850	814	286	150	146
11:20	14.0	7.5	N	60	-1.0	9.5	50	1.0	928	1020	1077	1380	1446	720	714	260	150	146
11:40	14.2	8.0	N	60	-1.2	9.5	55	1.0	938	1050	1095	1400	1474	680	650	208	150	148
12:00	16.7	9.0	N	58	-1.2	9.5	60	1.0	908	1000	1066	1350	1382	720	696	189	150	148
12:20	13.4	7.5	N	58	-1.2	9.5	50	1.0	931	1020	1077	1380	1450	950	927	191	150	149
12:40	14.0	9.7	N	62	-1.1	9.5	55	1.0	879	1020	1060	1400	1450	880	850	233	150	147
1:00	11.0	6.5	N	60	-1.2	9.5	50	1.0	932	1000	1071	1300	1374	1250	1154	248	150	153
1:20	16.2	9.0	N	60	-0.8	9.0	65	1.0	910	1080	1115	1500	1527	900	896	266	150	157
1:40	11.2	9.5	N	60	-1.3	9.5	60	1.0	885	1020	1053	1400	1464	880	851	250	150	154
2:00	14.3	9.0	N	60	-1.1	9.5	60	1.0	916	1050	1074	1400	1449	1000	995	224	150	155
2:20	13.8	8.5	N	60	-1.0	9.3	65	1.0	887	1020	1064	1420	1464	880	856	238	150	153
2:40	7.8	8.0	N	60	-1.0	9.3	65	1.0	908	1020	1058	1420	1478	900	888	234	150	158
2:54	OUTLET TESTING COMPLETED																	
3:00	13.1	7.8	N	60	-1.1	9.3	65	1.0	904	1020	1082	1400	1472	880	875	284	150	159
3:15	INLET TESTING COMPLETED																	
3:20	14.7	9.2	N	60	-1.0	9.2	65	1.0	903	1020	1082	1420	1433	820	797	232	160	160

TABLE 5-4. PROCESS DATA FROM RUN NO. 4--INCINERATOR NO. 13, DETROIT, MICHIGAN, JUNE 21, 1985

Time	Hopper sludge flow rate, wet tons/h (6 min avg.)	Oxygen, %	Aux. combustion air, yes/no	Scrubber damper position, percent open	Scrubber inlet pressure, in. w.c.	Scrubber exhaust pressure, in. w.c.	Scrubber outlet temp., °F	Shaft, rpm	Hearth temperature, °F									
									2	3	4	5	6	7	8	10	11	12
8:10	13.8	6.5	N	50	-1.2	9.2	55	1.0	922	1050	1058	1380	1435	850	842	199	150	152
8:30	13.0	8.0	N	50	-1.1	9.0	60	1.0	912	1020	1055	1380	1433	775	753	207	150	145
8:30	BEGIN RUN NO. 4																	
8:50	13.9	9.3	N	50	-1.1	9.0	60	1.0	889	1020	1050	1350	1373	775	728	198	150	145
9:10	14.1	9.0	N	60	-1.2	9.5	55	1.0	917	1050	1074	1350	1407	780	745	182	150	145
9:30	15.9	9.3	N	60	-1.3	9.6	60	1.0	899	1050	1074	1380	1417	725	697	180	150	145
9:50	10.8	8.2	N	60	-1.2	9.6	58	1.0	922	1050	1086	1350	1428	780	772	178	150	146
10:10	14.3	8.5	N	60	-1.2	9.6	60	1.0	901	1050	1082	1380	1435	720	680	185	150	145
10:20	11.5	8.5	N	60	-1.2	9.6	60	1.0	903	1050	1086	1400	1443	700	656	185	150	145
10:40	14.7	10.0	N	60	-1.1	9.5	60	1.0	913	1050	1076	1380	1411	720	696	184	150	146
11:00	12.0	8.2	N	60	-1.2	9.5	60	1.0	898	1050	1081	1380	1444	760	737	186	150	145
11:20	14.7	9.8	N	60	-1.1	9.6	60	1.0	909	1050	1088	1400	1452	880	856	189	150	146
11:40	12.9	8.8	N	60	-1.4	9.5	60	1.0	915	1050	1105	1380	1452	750	726	190	150	146
12:00	12.4	9.5	N	60	-1.3	9.5	60	1.0	919	1050	1078	1400	1414	820	795	190	150	147
12:20	14.0	7.5	N	60	-1.4	9.5	60	1.0	912	1020	1096	1380	1417	850	807	198	160	148
12:40	13.1	8.0	N	60	-1.2	9.5	60	1.0	928	1080	1112	1400	1467	750	729	202	150	148
1:10	11.6	8.5	N	60	-1.3	9.5	65	1.0	906	1080	1098	1400	1434	650	620	191	150	150
1:30	15.7	8.5	N	60	-1.0	9.5	60	1.0	907	1050	1080	1380	1390	675	646	190	150	148
1:50	13.5	8.0	N	60	-1.2	9.5	65	1.0	922	1075	1113	1380	1449	720	678	191	150	152
2:10	13.5	9.0	N	60	-1.3	9.5	65	1.0	911	1050	1098	1380	1446	620	580	189	150	151
2:30	14.3	8.5	N	60	-1.2	9.5	65	1.0	902	1050	1098	1400	1456	620	573	189	150	151
2:35	OUTLET SAMPLING FINISHED																	
2:50	13.9	8.5	N	60	-1.2	9.5	60	1.0	907	1050	1092	1400	1457	620	597	186	150	152
2:55	INLET SAMPLING FINISHED																	

TABLE 5-5. PROCESS DATA FROM RUN NO. 5--INCINERATOR NO. 13, DETROIT, MICHIGAN, JUNE 22, 1985

Time	Hopper sludge flow rate, wet tons/h (6 min avg.)	Oxygen, %	Aux. combustion air, yes/no	Scrubber damper position, percent open	Scrubber inlet pressure, in. w.c.	Scrubber exhaust pressure, in. w.c.	Scrubber outlet temp., °F	Shaft, rpm	Hearth temperature, °F									
									2	3	4	5	6	7	8	10	11	12
8:20	11.7	10.2	N	69	-0.4	9.2	60	1.0	797	900	947	1350	1371	1050	1048	294	150	153
8:30	BEGIN RUN NO. 5																	
8:40	13.5	9.5	N	69	-0.4	9.2	60	1.0	846	950	989	1250	1251	800	773	285	160	163
9:00	19.1	10.0	N	69	-0.3	9.5	55	1.0	847	980	1005	1280	1311	700	675	263	160	164
9:20	18.5	9.2	N	69	-0.9	9.5	50	1.0	940	1050	1085	1320	1371	650	627	244	150	164
9:40	18.3	10.5	N	69	-0.9	9.5	55	1.0	908	1050	1088	1350	1409	560	521	209	150	160
10:00	19.7	9.5	N	69	-0.8	9.5	50	1.0	880	1000	1068	1350	1431	620	568	209	150	160
10:20	19.0	8.4	N	69	-0.8	9.5	50	1.0	875	1000	1038	1350	1392	750	709	209	160	161
10:40	15.9	8.0	N	69	-1.2	9.6	50	1.0	862	1000	1010	1350	1414	770	737	209	160	160
11:00	17.6	7.5	N	74	-1.0	9.7	50	1.0	891	1000	1015	1280	1298	720	703	208	160	161
11:20	15.8	8.2	N	80	-1.3	10.0	50	1.0	915	1000	1062	1320	1416	700	675	197	160	161
11:40	10.7	9.5	N	80	-1.0	10.0	55	1.0	889	1000	1050	1350	1408	560	530	182	160	161
12:00	12.4	8.5	N	80	-1.2	10.0	55	1.0	885	1000	1045	1350	1378	650	620	174	150	161
12:20	13.2	7.5	N	80	-1.2	10.0	50	1.0	917	1000	1032	1350	1382	720	681	174	160	160
12:50	13.4	9.2	N	80	-1.3	10.0	50	1.0	907	1000	1049	1350	1367	550	507	166	160	160
1:00	14.8	8.8	N	80	-1.3	10.0	50	1.0	918	1000	1057	1350	1391	550	510	165	160	160
1:20	13.5	10.5	N	72	-0.7	9.5	50	1.0	894	1000	1042	1350	1381	520	488	161	160	160
1:40	15.2	8.5	N	72	-1.1	9.8	50	1.0	922	1000	1054	1300	1345	600	557	163	160	160
2:00	17.2	7.0	N	73	-1.0	9.8	50	1.0	957	1000	1068	1300	1356	650	623	164	160	161
2:20	17.4	8.5	N	72	-0.9	9.7	50	1.0	926	1000	1052	1330	1382	500	472	168	160	162
2:40	20.7	8.5	N	72	-0.9	9.8	50	1.0	920	1000	1050	1330	1373	500	445	161	160	163
2:40	END OUTLET M5																	
2:50	END INLET M5																	
2:53	END INLET PARTICLE SIZE																	
3:00	20.8	8.0	N	77	-1.2	10.0	50	1.0	906	1020	1049	1350	1402	560	532	155	160	161
3:20	23.7	9.0	N	69	-1.3	10.0	50	1.0	918	1020	1042	1300	1322	590	510	153	160	160

TABLE 5-6. PROCESS DATA FROM RUN NO. 6--INCINERATOR NO. 13, DETROIT, MICHIGAN, JUNE 24, 1985

Time	Hopper sludge flow rate, wet tons/h (6 min avg.)	Oxygen, %	Aux. combustion air, yes/no	Scrubber damper position, percent open	Scrubber inlet pressure, in. w.c.	Scrubber exhaust pressure, in. w.c.	Scrubber outlet temp., °F	Shaft, rpm	Hearth temperature, °F									
									2	3	4	5	6	7	8	10	11	12
8:40	20.4	10.0	N	48	-0.4	8.5	65	1.0	873	920	940	1000	1011	725	696	298	150	160
9:00	19.3	10.0	N	63	-1.0	9.5	60	1.0	896	920	953	1320	1431	500	476	232	150	153
9:15	START RUN NO. 6--1 HOUR DELAY DUE TO CALIBRATIOON OF SLUDGE SCALE																	
9:20	23.1	9.5	N	63	-0.9	9.5	60	1.0	820	900	934	1300	1314	570	546	209	150	152
9:40	17.9	5.7	N	77	-0.9	10.0	50	1.0	912	1000	1029	1360	1427	1250	1220	209	160	153
10:00	21.0	7.0	N	80	-1.1	10.0	50	1.0	957	1000	1044	1350	1412	1200	1192	283	160	155
10:20	19.0	8.8	N	85	-1.3	10.0	55	1.0	961	1100	1105	1580	1655	850	818	265	160	158
10:40	20.7	9.5	N	74	-1.2	9.5	65	1.0	888	1020	1055	1350	1423	850	824	241	160	161
11:00	19.7	6.0	N	86	-1.1	10.0	50	1.0	912	1050	1064	1350	1363	950	954	245	160	163
11:20	18.5	7.2	N	100	-1.1	10.0	55	1.0	899	1050	1095	1500	1593	1120	1107	364	160	163
11:40	1.7	9.5	N	85	-0.6	9.5	65	1.0	802	1000	1058	1500	1546	1000	970	375	160	166
11:45	TESTING HALTED DUE TO BROKEN DRIVE CHAIN FOR SLUDGE FEED																	
1:45	DRIVE CHAIN FIXED																	
2:50	NATURAL GAS LOST TO BURNERS																	
3:00	NATURAL GAS SUPPLY RETURNED																	
3:15	RESUME TESTING																	
3:15	13.0	9.8	N	58	-0.3	7.3	70	1.0	814	950	947	1350	1404	1000	914	286	160	163
3:40	12.1	5.3	N	100	-1.2	10.0	55	1.0	921	1080	1085	1650	1698	1200	1182	273	160	161
4:00	13.2	10.5	N	60	-0.9	9.2	70	0.9	861	1000	1026	1300	1344	750	742	412	150	142
4:20	9.1	10.5	N	60	-0.9	9.2	70	0.9	868	1000	1014	1350	1410	750	715	335	150	147
4:40	11.7	9.5	N	85	-0.9	9.6	65	0.9	882	1000	1031	1380	1436	1000	964	253	150	129
5:00	9.8	10.0	N	59	-1.0	9.5	65	0.9	904	1050	1078	1350	1387	780	767	255	150	152
5:20	12.5	10.0	N	59	-0.9	9.3	65	0.9	943	1000	1028	1280	1274	630	600	263	150	155
5:40	11.6	10.0	N	59	-0.9	9.5	70	0.9	951	1000	1032	1300	1342	550	499	247	160	159
6:00	13.5	12.0	N	59	-1.0	9.5	70	0.9	915	1000	1012	1290	1244	500	475	234	150	151
6:20	12.8	9.0	N	60	-1.0	9.5	65	0.9	944	1000	1029	1250	1281	650	622	246	150	156
6:40	15.8	10.5	N	59	-1.0	9.5	65	0.9	902	1020	1071	1350	1402	650	596	234	160	156
6:45	OUTLET TESTING COMPLETED																	
7:00	15.1	9.0	N	59	-1.0	9.5	65	0.9	907	1050	1080	1350	1450	950	919	229	150	156
7:05	INLET TESTING COMPLETED																	

TABLE 5-7. PROCESS DATA FROM RUN NO. 7--INCINERATOR NO. 13, DETROIT, MICHIGAN, JUNE 25, 1985

Time	Hopper sludge flow rate, wet tons/h (6 min avg.)	Oxygen, %	Aux. combustion air, yes/no	Scrubber damper position, percent open	Scrubber inlet pressure, in. w.c.	Scrubber exhaust pressure, in. w.c.	Scrubber outlet temp., °F	Shaft, rpm	Hearth temperature, °F									
									2	3	4	5	6	7	8	10	11	12
8:40	12.4	8.5	N	77	-0.9	9.6	55	1.0	856	1000	1021	1400	1437	1050	1027	267	160	155
9:00	15.6	10.0	N	77	-1.2	10.0	55	1.0	843	950	988	1300	1382	1000	955	230	160	152
9:00	BEGIN RUN NO. 7A--HEAVY ORGANICS																	
9:20	13.9	6.0	N	77	-0.9	9.8	50	1.0	927	1000	1052	1450	1544	1080	1076	280	150	153
9:40	9.0	9.0	N	60	-0.9	9.5	60	1.0	865	1000	1019	1380	1405	850	828	287	150	153
10:00	13.2	7.0	N	72	-1.1	10.0	55	1.0	920	1000	1043	1450	1506	1150	1184	245	160	158
10:20	10.2	7.5	N	78	-1.2	10.0	55	1.0	945	1000	1029	1400	1541	900	881	263	160	158
10:40	16.0	8.5	N	78	-0.8	9.6	60	1.0	876	1000	1029	1400	1410	820	799	273	160	154
11:00	13.6	8.0	N	78	-0.8	9.6	60	1.0	880	1000	999	1400	1485	950	899	245	160	160
11:20	12.4	6.5	N	79	-0.9	9.8	55	1.0	897	1000	1000	1430	1450	1100	1075	241	160	160
11:40	13.9	7.5	N	85	-1.2	10.0	55	1.0	933	1000	1051	1450	1515	1000	992	319	160	160
12:00	13.9	7.5	N	78	-1.3	10.0	55	1.0	921	1000	1027	1480	1564	880	837	327	150	161
12:10	END RUN 7A																	
1:40	15.8	10.5	N	72	-1.5	10.0	65	1.0	893	1050	1093	1350	1394	780	761	242	160	163
1:50	BEGIN RUN 7B--HEAVY ORGANICS																	
2:00	14.6	10.5	N	72	-1.6	10.0	70	1.0	759	1000	1027	1520	1611	1130	1134	228	150	152
2:20	14.5	5.0	N	77	-1.0	9.8	50	1.0	936	1020	1065	1300	1358	800	748	372	150	162
2:40	12.4	8.7	N	59	-0.9	9.2	70	1.0	836	1020	1060	1500	1566	900	902	478	160	161
3:00	18.9	6.5	N	58	-0.9	9.4	60	1.0	863	950	962	1180	1161	1400	1278	357	170	178
3:20	14.6	9.0	N	100	-1.4	10.0	65	0.9	830	1000	1012	1400	1479	1180	1219	317	160	175
3:40	13.9	7.0	N	60	-1.0	9.5	65	0.9	898	1000	1027	1350	1360	950	928	329	180	170
4:00	7.1	6.2	N	78	-1.3	9.6	60	0.9	924	1050	1112	1580	1653	1020	1024	265	170	173
4:20	11.7	10.0	N	65	-1.3	9.6	70	0.9	872	1000	1027	1390	1333	850	816	269	170	172
4:40	12.7	9.0	N	65	-1.2	9.6	70	0.9	880	1080	1093	1250	1270	800	781	244	160	169
4:50	END RUN 7B																	

TABLE 5-8. PROCESS DATA FROM RUN NO. 8--INCINERATOR NO. 13, DETROIT, MICHIGAN, JUNE 26, 1985

Time	Hopper sludge flow rate, wet tons/h (6 min avg.)	Oxygen, %	Aux. combustion air, yes/no	Scrubber damper position, percent open	Scrubber inlet pressure, in. w.c.	Scrubber exhaust pressure, in. w.c.	Scrubber outlet temp., °F	Shaft, rpm	Hearth temperature, °F									
									2	3	4	5	6	7	8	10	11	12
8:00	14.1	9.5	N	60	-1.1	9.5	60	1.0	864	920	947	1400	1426	920	884	240	160	159
8:20	11.1	7.7	N	60	-1.2	9.5	55	1.0	868	920	953	1350	1386	900	894	231	170	159
8:30	BEGIN RUN NO. 8A--HEAVY ORGANICS																	
8:40	14.4	10.0	N	60	-1.0	9.5	55	1.0	912	950	986	1350	1369	800	792	221	170	156
9:00	14.8	8.0	N	60	-1.1	9.6	60	1.0	889	900	967	1380	1426	780	749	198	160	152
9:20	15.8	8.0	N	60	-1.0	9.5	60	1.0	888	930	960	1350	1385	800	754	193	160	152
9:40	14.7	7.5	N	69	-1.0	9.8	55	1.0	909	950	982	1380	1397	800	757	196	160	153
10:00	14.7	9.0	N	69	-1.2	9.8	60	1.0	857	950	984	1350	1359	760	725	194	160	152
10:20	14.8	8.5	N	69	-1.2	9.8	60	1.0	892	960	992	1350	1396	800	779	185	150	152
10:30	INLET SAMPLING COMPLETED (TESTING STOPPED AFTER 2 HOURS (INSTEAD OF 3) DUE TO HIGH PRESSURE BUILDUP ACROSS SAMPLING TRAIN)																	
10:40	15.0	10.5	N	69	-1.2	10.0	65	1.0	868	980	996	1350	1382	750	723	184	150	151
11:00	12.6	9.3	N	70	-1.1	10.0	65	1.0	836	920	956	1300	1288	730	702	189	160	149
11:20	12.3	5.6	N	56	-1.1	9.5	60	1.0	894	950	980	1350	1407	900	873	199	150	153
11:30	COMPLETED OUTLET SAMPLING																	
12:00	13.8	8.5	N	53	-1.0	9.3	60	1.0	833	930	942	1300	1298	840	800	240	150	154
12:20	12.3	4.9	N	53	-1.1	9.2	55	1.0	918	950	1000	1400	1470	1000	958	226	170	158
12:40	10.4	9.5	N	54	-1.2	9.2	65	1.0	907	950	960	1200	1179	820	793	245	160	158
12:42	BEGIN OUTLET VOST RUNS																	
1:00	14.1	8.3	N	54	-1.1	9.2	65	1.0	930	950	988	1280	1348	720	680	209	160	161
1:20	13.9	7.5	N	55	-0.9	9.2	65	1.0	927	980	1009	1400	1443	760	768	203	160	164
1:40	11.3	7.5	N	55	-1.0	9.2	65	1.0	930	950	994	1350	1368	730	685	199	150	164
2:00	12.5	8.7	N	55	-1.1	9.2	65	1.0	916	1000	1025	1400	1436	850	815	200	170	165
2:20	12.9	7.6	N	55	-1.1	9.3	65	1.0	931	1000	1053	1400	1452	860	842	206	175	167
2:40	11.8	7.0	N	55	-1.0	9.2	65	1.0	925	1000	1026	1400	1467	850	857	204	175	168
2:35	END OUTLET VOST RUNS WITH TENAX AND CHARCOAL--3,20 MINUTE RUNS																	
3:20	11.6	8.5	N	55	-1.1	9.2	70	1.0	924	980	1013	1400	1428	1000	970	209	180	169
3:20	BEGIN OUTLET VOST RUNS WITH CHARCOAL ONLY--2,20 MINUTE RUNS																	
3:40	9.1	7.5	N	60	-1.1	9.5	70	1.0	925	1000	1025	1400	1466	870	852	204	170	169
4:00	12.7	7.5	N	60	-1.1	9.5	70	1.0	907	1000	1028	1400	1465	850	826	205	170	169
4:20	11.7	8.5	N	68	-1.3	9.7	70	1.0	894	950	967	1320	1305	860	852	194	170	169
4:22	END OUTLET VOST RUNS WITH CHARCOAL ONLY																	

TABLE 5-9. PROCESS DATA FROM RUN NO. 9--INCINERATOR NO. 9, DETROIT, MICHIGAN, JUNE 27, 1985

Time	Hopper sludge flow rate, wet tons/h (6 min avg.)	Oxygen, %	Aux. combustion air, yes/no	Scrubber damper position, percent open	Scrubber inlet pressure, in. w.c.	Scrubber exhaust pressure, in. w.c.	Scrubber outlet temp., °F	Shaft, rpm	Hearth temperature, °F										
									2	3	4	5	6	7	8	9	10	11	12
8:00	8.4	10.0	N	69	-1.0	10.5	10	1.0	814	900	1028	1350	1336	1320	1259	300	--	180	154
8:20	9.0	8.5	N	69	-1.2	10.3	10	1.0	830	900	1024	1350	1312	1550	1550	500	--	250	175
8:40	12.7	10.0	Y	70	-1.1	10.7	10	1.0	904	900	1050	1450	1430	1400	1388	600	--	200	170
8:58	BEGIN VOST INLET RUNS																		
9:00	17.7	11.5	N	61	-1.1	9.2	10	1.0	873	900	1046	1430	1436	1170	1158	470	--	200	163
9:20	12.3	10.5	N	70	-1.1	10.8	10	1.0	876	920	1039	1450	1439	1400	1100	380	--	170	154
9:40	14.0	9.5	N	70	-1.0	11.0	10	1.0	891	950	990	1400	1331	1250	1246	400	--	170	157
10:00	13.8	8.5	N	70	-1.1	11.0	10	1.0	903	950	1096	1450	1426	1250	1224	350	338[a]	200	167
10:20	10.8	8.5	N	70	-0.9	11.0	10	1.0	927	900	1025	1400	1335	1300	1289	350	338	200	168
10:40	12.8	9.5	N	70	-1.0	11.0	10	1.0	924	970	1116	1500	1534	1600	1596	350	319	200	166
11:00	11.8	8.5	N	70	-0.9	11.0	10	1.0	930	900	1055	1400	1368	1300	1284	350	334	200	170
11:20	12.8	9.5	N	70	-1.0	11.0	10	1.0	907	900	1024	1450	1401	1600	1610	400	394	200	168
11:40	11.4	8.5	N	70	-0.9	11.0	10	1.0	942	950	1080	1450	1440	1450	1412	400	371	200	169
11:45	END VOST INLET RUNS																		

[a]Temperature probe repaired.

The start of Run 6 was delayed approximately 1 hour to calibrate the sludge feed scale. In addition, testing was halted during Run 6 for approximately 3.5 hours because of a broken sludge feed drive chain and a loss of natural gas feed. No problems were encountered during Run 7. During Run 8, the inlet heavy organics run was stopped after 2 hours, 1 hour short of scheduled completion, because of high pressure buildup across the sampling train. No problems were encountered during Run 9, which was the last run.

5.3 CONCLUSIONS

All processes operated normally during emission testing. Personnel for the city of Detroit were very cooperative.

APPENDIX A

COMPUTER PRINTOUTS

Example Calculations for Particulate Emissions

1. Volume of dry gas samples corrected to standard conditions. Note: V_m must be corrected for leakage if any leakage rates exceed L_a.

$$V_{m_{std}} = 17.65 \times V_m \times Y \left[\frac{P_{bar} + \frac{\Delta H}{13.6}}{T_m} \right] =$$

2. Volume of water vapor at standard conditions, ft^3.

$$V_{w_{std}} = 0.04707 V_{l_c} =$$

3. Moisture content in stack gas.

$$B_{ws} = \frac{V_{w_{std}}}{V_{m_{std}} + V_{w_{std}}} =$$

4. Dry molecular weight of stack gas.

$$M_d = 0.440 \ (\% \ CO_2) + 0.320 \ (\% \ O_2) + 0.280 \ (\% \ N_2 + \% \ CO) =$$

5. Molecular weight of stack gas.

$$M_s = M_d \ (1-B_{ws}) + 18 \ B_{ws} =$$

6. Stack velocity at stack conditions, fps.

$$V_s = 85.49 \ Cp \ \left(\sqrt{\Delta P} \right)_{avg.} \sqrt{\frac{T_s}{P_s \ M_s}} =$$

7. Stack gas volumetric flow rate at stack conditions, cfm.

$$Q_s = 60 \times V_s \times A_s$$

(continued)

Example Calculations for Particulate Emissions (continued)

8. Dry stack gas volumetric flow rate at standard conditions, cfm.

$$Q_{s_{std}} = 17.65\ Q_s \frac{P_s}{T_s}\left(1-B_{ws}\right) =$$

9. Concentration in gr/dscf.

$$C's = (0.01543)\frac{M_n}{V_{m_{std}}}$$

10. Particulate mass emission rate, lbs/h.

$$pmr = \frac{C_s'}{7000} Q_{s_{std}} \times 60$$

11. Isokinetic variation.

$$I = \frac{100\ T_s \left[0.002669\ V_{lc} + \frac{V_m}{T_m}\ Y\left(P_{bar} + \frac{\Delta H}{13.6}\right)\right]}{60\ \theta\ V_s\ P_s\ A_n} =$$

Nomenclature and Dimensions

A_s = cross-sectional area of stack, ft^2

A_n = area of sampling nozzle, ft^2

B_{ws} = proportional by volume of water vapor in the gas stream, dimensionless

C_p = pitot tube coefficient, dimensionless

C's = concentration of particulate matter in stack gas, g/scf, dry basis

% CO = percent of carbon monoxide by volume, dry basis

% CO_2 = percent of carbon dioxide by volume, dry basis

ΔH = average pressure drop across the orifice meter, in. of H_2O

I = percent of isokinetic sampling

L_a = maximum acceptable leakage rate for either a pretest leak or for a leak check following a component change; equal to 0.00057 m^3/min (0.02 cfm) or 4 percent of the average sampling rate, whichever is less

M_d = dry molecular weight, lb/lb-mole.

M_n = total amount of particulate matter collected, mg

M_s = molecular weight of stack gas (wet basis), lb/lb-mole

% N_2 = percent of nitrogen by volume, dry basis

% O_2 = percent of oxygen by volume, dry basis

ΔP = velocity head of stack gas, in. of H_2O

P_{bar} = barometric pressure, in.Hg

P_s = absolute stack gas pressure, in.Hg

pmr = particulate matter emission rate, lb/h

Q_s = volumetric flow rate, wet basis, stack conditions

$Q_{s_{std}}$ = volumetric flow rate, dry basis, standard conditions

(continued)

Nomenclature and Dimensions (continued)

T_m = average temperature of dry gas meter, °R

T_s = average temperature of stack gas, °R

V_{l_c} = total volume of liquid collected in impingers and silica gel, ml

V_m = volume of sample through the dry gas meter at meter conditions, ft^3

$V_{m_{std}}$ = volume of gas sample through the dry gas meter at standard conditions, ft^3

V_s = stack gas velocity at stack conditions, fps

$V_{w_{std}}$ = volume of water vapor collected in impingers and silica gel corrected to standard conditions, scf

Y = dry as meter calibration factor

θ = total sampling time, minutes

Note: Standard conditions = 68°F and 29.92 in.Hg.

Example Calculation for Total Cr and Metals Emission Data

TEST NO. PCI-3 (Table 2-9)

1) Total Cr content = 9831 µg

2) Total Cr concentration

Total Cr content (µg) ÷ sample volume (dNm^3)

$9831 \div 2.63 = 3738\ \mu g/dNm^3$

3) Mass rate

$$\text{Concentration Cr } (\mu g/dNm^3) \times \frac{1\ mg}{1000\ \mu g} \times \text{volumetric flow } \left(\frac{dNm^3}{min}\right) \times \frac{60\ min}{h} \times \frac{1\ kg}{10^6\ mg}$$

$$= \left(\frac{3738\ \mu g}{dNm^3}\right)\left(\frac{1\ mg}{1000\ \mu g}\right)\left(\frac{988\ dNm^3}{\mu m}\right) \times \left(\frac{60\ min}{h}\right) \times \frac{1\ kg}{10^6\ mg}$$

$= 0.22\ kg/h$

P E I ASSOCIATES, INC.

E M I S S I O N T E S T R E P O R T

F I E L D D A T A

Plant .....DETROIT WSD
Sampling location .....NO 13 OUTLET
Test time (start-stop) 1131-1743

Date 6/18/85
Run number PCO-1

Sample type .....PART/CR
Bar. pressure (in-HG) 29.5
Static pressure (in-H2O) .....-11.8
Filter number(s) 8510236
Stack inside dia. (in) 53
Pitot tube coeff. 84
Total H2O collected (ml) 209.6
Percent O2 by volume (dry) ...16

Leakage (cu-ft) 1.377
Meter calibration factor 1.052
Data interval (min) 15
Nozzle dia. 193
Meter box number F11
Number of traverse points 24
Percent CO2 by volume (dry) ..3.4
Percent CO by volume (dry) ...0

Sample time (min)	Gas meter reading (cu. ft.)	Velocity head (in. H2O)	Orifice drop-act. (in. H2O)	Stack temp. (deg. F)	Dry gas meter temp (deg. F) inlet	outlet
0.0	81 [illegible]					
15.0	100.000	1.300	1.29	85	88	90
30.0	105.600	0.350	0.30	85	96	90
45.0	112.690	0.700	0.60	90	100	90
60.0	120.990	0.800	0.69	88	106	90
75.0	130.120	1.000	0.87	90	110	93
90.0	139.770	1.100	0.96	91	112	94
105.0	148.570	0.850	0.74	91	113	95
120.0	158.990	1.250	1.10	90	114	96
135.0	172.260	2.100	1.84	91	114	90
150.0	187.150	2.500	2.18	94	116	100
165.0	203.150	3.000	2.62	93	116	100
180.0	218.250	2.800	2.47	88	117	100
195.0	223.425	0.200	0.17	89	112	102
210.0	227.410	0.200	0.17	91	111	102
225.0	231.370	0.200	0.17	89	110	102
240.0	234.190	0.060	0.05	91	110	102
255.0	237.650	0.150	0.13	93	110	102
270.0	242.600	0.300	0.26	91	110	102
285.0	251.440	0.950	0.83	90	111	102
300.0	261.900	1.250	1.10	87	114	102
315.0	272.390	1.250	1.10	87	116	102
330.0	282.890	1.300	1.15	90	116	102
345.0	294.000	1.300	1.15	87	116	102
360.0	303.740	1.150	1.02	85	116	102
360.0	214.555	0.931	0.94	89	111	98

Ok

P E I ASSOCIATES, INC.
E M I S S I O N T E S T R E P O R T

T E S T R E S U L T S

PLANT: DETROIT WEC
TEST: PCD-1 / NO 13 OUTLET

TEST DATE: 6/13/85
TEST TIME: 1131-1743

TT	.....	Net time of test (min)	360.0
NP	.....	Net sampling points	24
Y	.....	Meter calibration factor	1.052
DN	.....	Sampling nozzle dia (in)	0.193
CP	.....	Pitot tube coefficient	0.840
PM	.....	Average orifice pressure drop (in-H2O)	0.51
VM	.....	Volume of dry gas sampled at meter conditions (cu-ft (corrected for leakage)	213.173
TM	.....	Average gas meter temperature (deg F)	104.3
VMSTD	.....	Volume of dry gas sampled at standard conditions (scf)	207.372
VLC	.....	Total H2O collected in impingers and silica gel (ml)	206.6
VWC	.....	Volume of water vapor at standard conditions (scf)	9.866
BWO	.....	Percent moisture by volume (saturation check made	4.54
FMD	.....	Mole fraction of dry gas	0.95
PCO2	.....	Percent CO2 by volume (dry)	3.40%
PO2	.....	Percent O2 by volume (dry)	16.00%
PCO	.....	Percent CO by volume (dry)	0.00%
PN2	.....	Percent N2 by volume (dry)	80.60%
MD	.....	Molecular weight - dry stack gas	29.19

T E S T R E S U L T S

MWS	.....	Molecular weight - stack gas	28.65
PB	.....	Barometric pressure (in-HG)	29.80
PSI	.....	Static pressure of stack gas (in-H2O)	-11.800
PS	.....	Stack pressure - absolute (in-HG)	26.93
TS	.....	Average stack temperature (deg F)	89
VH	.....	Average square root of velocity head (in-H2O)	0.968
VS	.....	Average stack gas velocity, (fps)	58.7
AS	.....	Stack area (sq in)	2.206
QS	.....	Actual stack flow rate (acfm)	31.107
QSSTD	.....	Stack flow rate - DRY (scfm	45.740
IEI	.....	Percent isokinetic	95.0
MN	.....	PARTICULATE COLLECTED, MG	106.6 ✓
CS	.....	PARTICULATE COLLECTED, GR/DSCF	0.0103
EMP	.....	PARTICULATE COLLECTED Emission rate, lb/hr	4.040
MCR	.....	TOTAL CHROMIUM, MG	0.1 ✓
CR	.....	TOTAL CHROMIUM, GR/DSCF	1.74E-05
EMCR	.....	TOTAL CHROMIUM Emission rate, lb hr	6.615E-03

P E I ASSOCIATES, INC.
E M I S S I O N T E S T R E P O R T

F I E L D D A T A

Plant .....DETROIT WSD
Sampling location .....#13 INLET
Test time (start-stop) 845-

Date 6/20/85
Run number PCI-3

Sample type .....PART/CR
Bar. pressure (in-HG) 29.80
Static pressure (in-H20) .....-1.1
Filter number(s) 8510239/64
Stack dimensions (in) .....120 / 84
Pitot tube coeff. 84
Total H20 collected (ml) 709.1
Percent 02 by volume (dry) ...13.0

Leakage (cu-ft) 147
Meter calibration factor 1.033
Data interval (min) 12
Nozzle dia. 322
Meter box number FB4
Number of traverse points 30
Percent C02 by volume (dry) ..4.8
Percent CO by volume (dry) ...0

Sample time (min)	Gas meter reading (cu. ft.)	Velocity head (in. H20)	Orifice drop-act. (in. H20)	Stack temp. (deg. F)	Dry gas meter temp (deg. F) inlet	outlet
0.0	300.313					
12.0	302.590	0.050	0.09	856	92	92
24.0	305.340	0.080	0.14	922	92	92
36.0	307.375	0.040	0.07	900	94	92
48.0	308.950	0.030	0.05	930	96	94
60.0	311.237	0.060	0.10	890	96	94
72.0	314.300	0.090	0.16	890	98	94
84.0	316.940	0.070	0.12	890	100	96
96.0	319.250	0.050	0.09	870	100	96
108.0	321.620	0.040	0.09	870	100	98
120.0	324.196	0.060	0.11	800	102	98
132.0	326.750	0.060	0.11	883	102	98
144.0	329.230	0.060	0.10	903	102	100
156.0	331.935	0.070	0.12	946	102	100
168.0	335.365	0.120	0.20	945	102	100
180.0	338.943	0.130	0.22	928	104	100
192.0	342.300	0.110	0.19	920	104	100
204.0	345.240	0.080	0.14	912	104	100
216.0	348.860	0.130	0.23	900	104	100
228.0	353.820	0.200	0.35	904	104	100
240.0	358.694	0.190	0.34	880	106	100
252.0	362.060	0.110	0.20	880	106	102

((CONTINUED))

264.0	365.700	0.130	0.23	907	106	102
276.0	369.930	0.150	0.27	880	106	102
288.0	374.500	0.180	0.32	903	106	102
300.0	379.220	0.160	0.29	893	108	102
312.0	382.025	0.070	0.13	800	106	102
324.0	385.130	0.090	0.16	901	106	102
336.0	388.740	0.130	0.22	971	106	102
348.0	392.580	0.150	0.25	962	106	102
360.0	396.435	0.150	0.25	962	106	102
360.0	96.122	0.096	0.18	900	102	99

P E I ASSOCIATES, INC.
E M I S S I O N T E S T R E P O R T

T E S T R E S U L T S

PLANT: DETROIT WSD
TEST: PDI-C / #13 INLET

TEST DATE: 6/20/85
TEST TIME: 845-

TT	.....	Net time of test (min)	361.0
N	.....	Net sampling points	20
Y	.....	Meter calibration factor	1.003
DN	.....	Sampling nozzle dia (in)	0.322
CP	.....	Pitot tube coefficient	0.84
DH	.....	Average orifice pressure drop (in-H2O)	0.18
VM	.....	Volume of dry gas sampled at meter conditions (cu-ft) (corrected for leakage)	85.172
TM	.....	Average gas meter temperature (deg F)	100.3
VMSTD	.....	Volume of dry gas sampled at standard conditions (scf)	93.052
VLC	.....	Total H2O collected in impingers and silica gel (ml)	709.1
VWC	.....	Volume of water vapor at standard conditions (scf)	33.377
BWC	.....	Percent moisture by volume (assuming check mode)	26.40
FWC	.....	Mole fraction of dry gas	0.74
PCO2	.....	Percent CO2 by volume (dry)	4.830
PO2	.....	Percent O2 by volume (dry)	10.000
PCO	.....	Percent CO by volume (dry)	0.000
PN2	.....	Percent N2 by volume (dry)	82.170
MD	.....	Molecular weight of dry stack gas	29.29

TEST RESULTS

MWS	.....	Molecular weight - stack gas	26.31
PB	.....	Barometric pressure (in-HG)	29.80
PSI	.....	Static pressure of stack gas (in-H2O)	-1.100
PS	.....	Stack pressure - absolute (in-HG)	29.72
TS	.....	Average stack temperature (deg F)	900
VH	.....	Average square root of velocity head (in-H2O	0.809
VS	.....	Average stack gas velocity (fps)	29.3
AS	.....	Stack area (sq in)	10,080
QS	.....	Actual stack flow rate (acfm)	123,857
QSSTD	.....	Stack flow rate - dry (scfm)	74,709
ISO	.....	Percent isokinetic	91.6
MN	.....	PARTICULATE COLLECTED, MG	4241.7
CS	.....	PARTICULATE COLLECTED, GR/DSCF	1.7635
PNR	.....	PARTICULATE COLLECTED Emission rate, lb/hr	211.641
MC	.....	TOTAL CHROMIUM, MG	9.8 ✓
CS	.....	TOTAL CHROMIUM, GR/DSCF	1.6301E-03
PNR	.....	TOTAL CHROMIUM Emission rate, lb/hr	0.489

P E I ASSOCIATES, INC.
E M I S S I O N T E S T R E P O R T

F I E L D D A T A

Plant .....DETROIT MSD
Sampling location .....NO.13 OUTLET
Test time (start-stop) 845-1452

Date 6/20/85
Run number PCO-3

Sample type .....PART/CR
Bar. pressure (in-HG) 29.80
Static pressure (in-H20) .....-11.8
Filter number(s) 8510235
Stack inside dia. (in) 53
Pitot tube coeff. 84
Total H20 collected (ml) 259.7
Percent 02 by volume (dry) ...13.4

Leakage (cu-ft) 93
Meter calibration factor 1.052
Data interval (min) 15
Nozzle dia. 193
Meter box number F11
Number of traverse points 24
Percent C02 by volume (dry) ..4.6
Percent CO by volume (dry) ...0

Sample time (min)	Gas meter reading (cu. ft.)	Velocity head (in. H20)	Orifice drop-act. (in. H20)	Stack temp. (deg. F)	Dry gas meter temp (deg. F) inlet	outlet
0.0	497.069					
15.0	505.080	0.950	0.81	86	88	90
30.0	513.380	0.800	0.69	87	95	90
45.0	521.610	0.800	0.69	88	104	90
60.0	531.990	1.100	0.95	91	108	92
75.0	540.870	1.200	1.04	93	112	92
90.0	550.120	1.000	0.88	89	113	96
105.0	559.010	0.900	0.79	87	114	98
120.0	571.000	1.750	1.53	88	114	98
135.0	582.250	1.400	1.22	93	116	100
150.0	593.530	1.500	1.31	94	116	100
165.0	606.950	2.100	1.82	97	117	100
180.0	619.420	1.750	1.52	99	118	102
195.0	624.337	0.100	0.09	94	115	102
210.0	628.138	0.110	0.09	97	112	102
225.0	635.172	0.370	0.32	95	110	102
240.0	646.791	0.980	0.85	93	112	102
255.0	660.403	1.300	1.13	98	116	102
270.0	674.885	1.400	1.23	90	118	102
285.0	689.037	1.400	1.22	97	119	103
300.0	706.074	1.950	1.73	89	119	103
315.0	719.864	1.300	1.14	93	121	103
330.0	719.864	0.000	0.00	92	121	103
345.0	719.864	0.000	0.00	92	121	103
360.0	719.864	0.000	0.00	92	121	103
360.0	222.795	0.814	0.88	92	113	99

P E I ASSOCIATES, INC.

E M I S S I O N T E S T R E P O R T

T E S T R E S U L T S

PLANT: DETROIT WSD
TEST: FCC-C / NO.1C OUTLET

TEST DATE: 6/20/85
TEST TIME: 845-1452

TT	.....	Net time of test (min)	360.0
NP	.....	Net sampling points	24
Y	.....	Meter calibration factor	1.051
DN	.....	Sampling nozzle dia. (in)	0.193
CP	.....	Pitot tube coefficient	0.840
PM	.....	Average orifice pressure drop (in-H2O)	0.80
VM	.....	Volume of dry gas sampled at meter conditions (cu-ft) (corrected for leakage)	33.668
TM	.....	Average gas meter temperature (deg F)	106.2
VMSTD	.....	Volume of dry gas sampled at standard conditions (scf)	317.217
VLC	.....	Total H2O collected in impingers and silica gel (ml) (at saturation)	256.7
VWC	.....	Volume of water vapor at standard conditions (scf) (at saturation)	12.088
BWC	.....	Percent moisture by volume (at saturation)	5.07
FMD	.....	Mole fraction of dry gas	0.95
PCO2	.....	Percent CO2 by volume (dry)	4.60
PO2	.....	Percent O2 by volume (dry)	10.40
PCO	.....	Percent CO by volume (dry)	0.00
PN2	.....	Percent N2 by volume (dry)	80.000
MD	.....	Molecular weight of dry stack gas	29.37

TEST RESULTS

MWS	.....	Molecular weight - stack gas	28.88
PB	.....	Barometric pressure (in-HG)	29.80
PSI	.....	Static pressure of stack gas (in-H2O)	-11.800
PS	.....	Stack pressure - absolute (in-HG)	28.93
TS	.....	Average stack temperature (deg F)	92
VH	.....	Average square root of velocity head (in-H2O)	0.900
VS	.....	Average stack gas velocity (fps)	52.8
AS	.....	Stack area (sq in)	3.20e
QS	.....	Actual stack flow rate (acfm)	46,579
QSDT	.....	Stack flow rate - dry (dscfm)	40,548
ISO	.....	Percent isokinetic	107.0
MN	.....	PARTICULATE COLLECTED, MG	104.1
CS	.....	PARTICULATE COLLECTED, GR/DSCF	0.1048-01
PMR	.....	PARTICULATE COLLECTED Emission rate, lb/hr	0.42e
MC	.....	TOTAL CHROMIUM, MG	0.2 ✓
CS	.....	TOTAL CHROMIUM, GR/DSCF	1.43E-05
PMP	.....	TOTAL CHROMIUM Emission rate, lb/hr	5.224E-03

P E I ASSOCIATES, INC.
E M I S S I O N T E S T R E P O R T

F I E L D D A T A

Plant .....DETROIT
Sampling location .....#13 INLET
Test time (start-stop) 830-

Date 6/21/85
Run number PCI-4

Sample type .....PARTICULATE/CR
Bar. pressure (in-HG) 29.50
Static pressure (in-H2O) .....-1.1
Filter number(s) 8510066/26
Stack dimensions (in) .....120 / 84
Pitot tube coeff. 84
Total H2O collected (ml) 1074.6
Percent O2 by volume (dry) ...12.95

Leakage (cu-ft) 066
Meter calibration factor 1.033
Data interval (min) 12
Nozzle dia. 373
Meter box number FB4
Number of traverse points 30
Percent CO2 by volume (dry) ..5.25
Percent CO by volume (dry) ...0.00

Sample time (min)	Gas meter reading (cu. ft.)	Velocity head (in. H2O)	Orifice drop-act. (in. H2O)	Stack temp. (deg. F)	Dry gas meter temp (deg. F) inlet	outlet
0.0	396.857					
12.0	400.510	0.050	0.24	880	94	92
24.0	403.800	0.040	0.19	901	94	94
36.0	407.000	0.040	0.18	918	96	94
48.0	411.690	0.070	0.33	914	100	96
60.0	416.334	0.070	0.32	953	100	96
72.0	420.640	0.060	0.28	900	102	100
84.0	424.000	0.040	0.19	903	104	100
96.0	427.340	0.050	0.19	938	104	100
108.0	430.990	0.060	0.23	910	106	102
120.0	434.691	0.060	0.23	910	106	102
132.0	439.360	0.080	0.31	900	106	102
144.0	444.399	0.090	0.35	901	106	102
156.0	448.600	0.070	0.27	900	108	102
168.0	453.670	0.100	0.38	948	108	102
180.0	458.310	0.080	0.31	918	108	102
192.0	463.500	0.100	0.39	895	106	102
204.0	469.420	0.130	0.50	941	108	104
216.0	474.900	0.110	0.43	922	108	104
228.0	479.800	0.090	0.35	915	110	104
240.0	484.673	0.090	0.35	915	110	104
252.0	489.780	0.100	0.39	900	110	104

((CONTINUED))

264.0	496.050	0.150	0.58	919	110	104
276.0	502.170	0.140	0.54	924	110	104
288.0	507.600	0.110	0.43	902	111	105
300.0	513.000	0.110	0.43	902	111	105
312.0	517.365	0.070	0.28	901	110	106
324.0	519.940	0.030	0.11	931	110	106
336.0	525.300	0.110	0.42	931	110	106
348.0	530.930	0.120	0.46	946	110	106
360.0	536.516	0.120	0.46	946	110	106
360.0	139.659	0.082	0.34	916	106	102

P E I ASSOCIATES, INC.
E M I S S I O N T E S T R E P O R T

T E S T R E S U L T S

PLANT: DETROIT
TEST: PCI-4 / #1G INLET

TEST DATE: 6/21/85
TEST TIME: 830-

TT	.....	Net time of test (min)	361.0
NP	.....	Net sampling points	30
Y	.....	Meter calibration factor	1.003
DN	.....	Sampling nozzle dia (in)	0.375
CP	.....	Pitot tube coefficient	0.84
PM	.....	Average orifice pressure drop (in-H2O)	0.34
VM	.....	Volume of dry gas sampled at meter conditions (dcmm) (corrected for leakage)	179.855
TM	.....	Average gas meter temperature (deg F)	104.0
VMSTD	.....	Volume of dry gas sampled at standard conditions (dcf)	183.304
VLC	.....	Total H2O collected in impingers and silica gel (ml)	1074.6
VWC	.....	Volume of water vapor at standard conditions (scf)	50.581
BWO	.....	Percent moisture by volume (saturation check made)	27.51
FRC	.....	Mole fraction of dry gas	0.72
PCO2	.....	Percent CO2 by volume (dry)	5.150
PO2	.....	Percent O2 by volume (dry)	12.950
PCO	.....	Percent CO by volume (dry)	0.000
PN2	.....	Percent N2 by volume (dry)	81.900
MD	.....	Molecular weight - dry stack gas	29.08

T E S T R E S U L T S

PAGE NO: 2
RUN NO: PDI-4

MWS	.....	Molecular weight - stack gas	28.23
PB	.....	Barometric pressure (in-HG)	29.50
PSI	.....	Static pressure of stack gas (in-H2O)	-1.100
PS	.....	Stack pressure - absolute (in-HG)	29.42
TS	.....	Average stack temperature (deg F)	916
VH	.....	Average square root of velocity head (in-H2O)	0.286
VS	.....	Average stack gas velocity (fps)	27.4
AS	.....	Stack area (sq in)	10.069
QS	.....	Actual stack flow rate (acfm)	115,047
QSSTD	.....	Stack flow rate - dry (scfm)	31,457
ISO	.....	Percent isokinetic	106.5
MN	.....	PARTICULATE COLLECTED, MG	6345.1
CS	.....	PARTICULATE COLLECTED, GR/DSCF	3.7351
PMP	.....	PARTICULATE COLLECTED Emission rate, lb/hr	196.207
MN	.....	TOTAL CHROMIUM, MG	9.9 ✓
CS	.....	TOTAL CHROMIUM, GR/DSCF	1.1418E-03
PMP	.....	TOTAL CHROMIUM Emission rate, lb/hr	0.305

P E I ASSOCIATES, INC.
E M I S S I O N T E S T R E P O R T

F I E L D D A T A

Plant .....DETROIT WSO
Sampling location .....NO. 13 OUTLET
Test time (start-stop) 830-1438

Date 6/21/85
Run number PCO-4

Sample type .....PART/CR
Bar. pressure (in-HG) 29.50
Static pressure (in-H20) .....-11.8
Filter number(s) 8510023
Stack inside dia. (in) 53
Pitot tube coeff. 84
Total H20 collected (ml) 274.9
Percent 02 by volume (dry) ...14.8

Leakage (cu-ft) 321
Meter calibration factor 1.052
Data interval (min) 15
Nozzle dia. 193
Meter box number F11
Number of traverse points 24
Percent C02 by volume (dry) ..3.6
Percent CO by volume (dry) ...0

Sample time (min)	Gas meter reading (cu. ft.)	Velocity head (in. H20)	Orifice drop-act. (in. H20)	Stack temp. (deg. F)	Dry gas meter temp (deg. F) inlet	outlet
0.0	720.468					
15.0	730.043	1.200	1.03	87	91	95
30.0	738.752	0.910	0.78	91	100	96
45.0	744.663	0.430	0.37	91	108	96
60.0	751.871	0.650	0.56	95	109	96
75.0	759.982	0.730	0.63	97	112	96
90.0	767.095	0.740	0.64	96	114	96
105.0	776.680	1.200	1.04	95	115	96
120.0	787.794	1.500	1.30	96	116	96
135.0	799.569	1.650	1.44	94	118	98
150.0	810.639	1.550	1.35	95	119	100
165.0	822.903	1.850	1.61	95	119	100
180.0	833.556	1.450	1.26	98	120	100
195.0	840.436	0.350	0.31	91	116	104
210.0	844.574	0.130	0.11	96	115	104
225.0	851.292	0.340	0.29	99	114	104
240.0	862.574	0.920	0.80	97	116	104
255.0	875.945	1.300	1.14	95	119	104
270.0	890.637	1.350	1.18	97	120	104
285.0	903.697	1.450	1.27	98	121	104
300.0	917.391	1.350	1.18	98	122	104
315.0	929.703	1.100	0.97	96	122	104
330.0	929.703	0.000	0.00	95	122	109
345.0	929.703	0.000	0.00	95	122	109
360.0	929.703	0.000	0.00	95	122	109
360.0	209.235	0.755	0.80	95	116	101

P E I ASSOCIATES, INC.
E M I S S I O N T E S T R E P O R T

T E S T R E S U L T S

PLANT: DETROIT WSD
TEST: PCC-4 / NO. 15 OUTLET

TEST DATE: 6/21/85
TEST TIME: 830-1438

TT	.....	Net time of test (min)	340.0
NP	.....	Net sampling points	24
Y	.....	Meter calibration factor	1.052
DN	.....	Sampling nozzle dia (in)	0.193
CP	.....	Pitot tube coefficient	0.840
PM	.....	Average orifice pressure drop (in-H2O)	0.81
VM	.....	Volume of dry gas sampled at meter conditions (cu-ft) (corrected for leakage)	205.914
TM	.....	Average gas meter temperature (deg F)	109.3
VMSTD	.....	Volume of dry gas sampled at standard conditions (scf)	201.716
VLC	.....	Total H2O collected in impingers and silica gel (ml) (at saturation)	244.-
VWC	.....	Volume of water vapor at standard conditions (scf) (at saturation)	11.443
BWO	.....	Percent moisture by volume (at saturation)	5.8
FMO	.....	Mole fraction of dry gas	0.94
PCO2	.....	Percent CO2 by volume (dry)	3.600
PO2	.....	Percent O2 by volume (dry)	14.800
PCO	.....	Percent CO by volume (dry)	0.000
PN2	.....	Percent N2 by volume (dry)	81.600
MD	.....	Molecular weight - dry stack gas	29.17

T E S T R E S U L T S

MWS	.....	Molecular weight - stack gas	28.81
PB	.....	Barometric pressure (in-HG)	29.50
PSI	.....	Static pressure of stack gas (in-H2O)	-11.300
PS	.....	Stack pressure - absolute (in-HG)	28.63
TS	....	Average stack temperature (deg F)	95
VH	.....	Average square root of velocity head (in-H2O)	0.869
VS	.....	Average stack gas velocity (fps)	51.4
AS	.....	Stack area (sq in)	2.304
QS	.....	Actual stack flow rate (acfm)	47,234
QSDT	.. ..	Stack flow rate - dry (dscfm)	41,541
ISO	.....	Percent isokinetic	104.1
MN	.....	PARTICULATE COLLECTED, MG	100.4
CS	.....	PARTICULATE COLLECTED, GR/DSCF	0.0103
PMR	.....	PARTICULATE COLLECTED Emission rate, lb/hr	3.644
MC	.....	TOTAL CHROMIUM , MG	0.2 ✓
CS	.....	TOTAL CHROMIUM , GR/DSCF	1.32E-05
PMR	.....	TOTAL CHROMIUM Emission rate, lb/hr	4.868E-03

P E I ASSOCIATES, INC.
E M I S S I O N T E S T R E P O R T

F I E L D D A T A

Plant .....DETROIT WSD
Sampling location .....#13 INLET
Test time (start-stop) 830-

Date 6/22/85
Run number PCI-5

Sample type .....PART/CR
Bar. pressure (in-HG) 29.45
Static pressure (in-H20) .....-1.1
Filter number(s) 8510250/53
Stack dimensions (in) .....120 / 84
Pitot tube coeff. 84
Total H20 collected (ml) 846.3
Percent 02 by volume (dry) ...13.0

Leakage (cu-ft) 103
Meter calibration factor 1.033
Data interval (min) 12
Nozzle dia. 373
Meter box number FB4
Number of traverse points 30
Percent C02 by volume (dry) ..4.9
Percent CO by volume (dry) ...0

Sample time (min)	Gas meter reading (cu. ft.)	Velocity head (in. H20)	Orifice drop-act. (in. H20)	Stack temp. (deg. F)	Dry gas meter temp (deg. F) inlet	outlet
0.0	536.802					
12.0	539.170	0.030	0.10	900	96	96
24.0	541.490	0.030	0.10	893	96	96
36.0	544.355	0.040	0.14	895	98	96
48.0	548.080	0.070	0.25	900	100	98
60.0	551.791	0.070	0.24	948	102	98
72.0	555.070	0.060	0.21	900	102	100
84.0	558.250	0.050	0.18	853	102	100
96.0	561.675	0.060	0.21	890	102	100
108.0	565.115	0.060	0.21	880	104	100
120.0	568.534	0.060	0.21	880	104	100
132.0	572.300	0.070	0.25	900	104	102
144.0	576.270	0.080	0.28	902	104	102
156.0	580.550	0.080	0.28	932	106	102
168.0	585.380	0.100	0.34	963	106	102
180.0	590.033	0.090	0.31	921	106	102
192.0	595.250	0.120	0.42	900	106	102
204.0	600.990	0.140	0.49	903	106	102
216.0	606.070	0.110	0.38	930	108	102
228.0	611.150	0.110	0.38	946	108	102
240.0	616.236	0.110	0.38	940	108	102
252.0	621.800	0.130	0.46	890	108	102

((CONTINUED))

or DM

264.0	627.640	0.150	0.51	958	108	102
276.0	633.600	0.150	0.51	955	108	102
288.0	637.980	0.080	0.28	938	108	102
300.0	642.242	0.080	0.28	938	108	102
312.0	645.850	0.070	0.24	918	108	102
324.0	648.990	0.050	0.16	1000	108	102
336.0	651.540	0.060	0.12	1005	108	102
348.0	654.700	0.050	0.17	988	108	104
360.0	657.961	0.050	0.17	988	108	105
360.0	121.159	0.077	0.28	925	105	101

OK 7/12/85
DM

P E I ASSOCIATES, INC.

E M I S S I O N T E S T R E P O R T

T E S T R E S U L T S

PLANT: DETROIT WSD
TEST: PCI-5 / #13 INLET

TEST DATE: 6/22/85
TEST TIME: 930-

TT	.....	Net time of test (min)	360.0
NP	.....	Net sampling points	10
Y	.....	Meter calibration factor	1.000
DN	.....	Sampling nozzle dia (in)	0.375
CP	.....	Pitot tube coefficient	0.84
PM	.....	Average orifice pressure drop (in-H2O)	0.35
VM	.....	Volume of dry gas sampled at meter conditions (cu-ft) (corrected for leakage)	121.082
TM	.....	Average gas meter temperature (deg F)	100.0
VMSTD	.....	Volume of dry gas sampled at standard conditions (scf)	115.814
VLC	.....	Total H2O collected in impingers and silica gel (ml)	848.7
VWC	.....	Volume of water vapor at standard conditions (scf)	39.972
BWC	.....	Percent moisture by volume (saturation check made)	25.64
FRD	.....	Mole fraction of dry gas	0.74
PCO2	.....	Percent CO2 by volume (dry)	4.900
PO2	.....	Percent O2 by volume (dry)	13.000
PCO	.....	Percent CO by volume (dry)	0.000
PN2	.....	Percent N2 by volume (dry)	82.100
MD	.....	Molecular weight - dry stack gas	29.30

TEST RESULTS

PAGE NO: 2
RUN NO: FDI-5

MWS	.....	Molecular weight - stack gas	26.41
PB	.....	Barometric pressure (in-HG)	29.45
PSI	.....	Static pressure of stack gas (in-H2O)	-1.100
PS	.....	Stack pressure - absolute (in-HG)	29.37
TS	.....	Average stack temperature (deg F)	900
DP	.....	Average square root of velocity head (in-H2O)	0.377
VS	.....	Average stack gas velocity (fps)	26.6
AS	.....	Stack area (sq in)	13.060
QS	.....	Actual stack flow rate (acfm)	111.8.8
QSSTD	.....	Stack flow rate - dry (scfm)	51.11
ISO	.....	Percent iso-kinetic	95.2
MP	.....	PARTICULATE, MG	5714.2
CS	.....	PARTICULATE, GR/DSCF	0.7e0?
PMF	.....	PARTICULATE Emission rate, lb/hr	203.722
MC	.....	TOTAL CHROMIUM, MG	15.5 ✓
CS	.....	TOTAL CHROMIUM, GR/DSCF	2.075?E-03
PMS	.....	TOTAL CHROMIUM Emission rate, lb/hr	0.?2?

P E I ASSOCIATES, INC.
EMISSION TEST REPORT

FIELD DATA

Plant .....DETROIT WEI
Sampling location .....NO.13 OUTLET
Test time (start-stop) 830-1440

Date 6/22/85
Run number PCO-5

Sample type .....PART/CR
Bar. pressure (in-HG) 29.45
Static pressure (in-H2O) .....-11.8
Filter number(s) 8510249
Stack inside dia. (in) 53
Pitot tube coeff. 84
Total H2O collected (ml) 244.8
Percent O2 by volume (dry) ...14.8

Leakage (cu-ft) 438
Meter calibration factor 1.052
Data interval (min) 15
Nozzle dia. 193
Meter box number F11
Number of traverse points 24
Percent CO2 by volume (dry) ..3.6
Percent CO by volume (dry) ...0

Sample time (min)	Gas meter reading (cu. ft.)	Velocity head (in. H2O)	Orifice drop-act. (in. H2O)	Stack temp. (deg. F)	Dry gas meter temp (deg. F) inlet	outlet
0.0	930.054					
15.0	938.163	1.050	0.90	90	94	96
30.0	945.259	0.650	0.56	91	100	95
45.0	950.303	0.350	0.30	93	108	95
60.0	956.376	0.500	0.43	94	110	97
75.0	963.182	0.600	0.52	94	112	97
90.0	970.770	0.760	0.67	89	114	97
105.0	979.919	1.150	1.01	93	116	100
120.0	989.924	1.250	1.10	94	118	104
135.0	999.430	1.200	1.05	94	119	105
150.0	1008.341	1.050	0.92	97	120	106
165.0	1017.322	1.100	0.96	97	120	106
180.0	1024.663	0.700	0.61	100	120	107
195.0	1034.710	1.250	1.15	90	114	97
210.0	1041.176	0.540	0.50	92	116	106
225.0	1046.459	0.340	0.31	90	116	106
240.0	1051.773	0.420	0.39	97	116	107
255.0	1057.781	0.480	0.44	97	116	107
270.0	1064.699	0.590	0.55	93	116	107
285.0	1073.768	1.050	0.97	95	117	107
300.0	1085.576	1.700	1.58	91	119	107
315.0	1097.295	1.600	1.48	95	120	108
330.0	1108.460	1.500	1.39	95	120	108
345.0	1119.426	1.450	1.35	91	120	108
360.0	1129.500	1.200	1.11	92	120	108
360.0	199.446	0.889	0.84	94	115	103

OK DP
[illegible]

P E I ASSOCIATES, INC.
E M I S S I O N T E S T R E P O R T

T E S T R E S U L T S

PLANT: DETROIT WED
TEST: FCO-5 / NO.13 OUTLET

TEST DATE: 6/22/85
TEST TIME: 830-1440

TT	.....	Net time of test (min)	360.0
NP	.....	Net sampling points	24
Y	.....	Meter calibration factor	1.050
DN	.....	Sampling nozzle dia (in)	0.193
CP	.....	Pitot tube coefficient	0.840
PM	.....	Average orifice pressure drop (in-H2O)	0.84
VM	.....	Volume of dry gas sampled at meter conditions (cu-ft corrected for leakage)	144.003
TM	.....	Average gas meter temperature (deg F	104.2
VMSTD	.....	Volume of dry gas sampled at standard conditions (scf)	131.551
VLC	.....	Total H2O collected in impingers and silica gel (ml) (at saturation)	238.4
VWC	.....	Volume of water vapor at standard conditions (scf) (at saturation)	11.247
BWC	.....	Percent moisture by volume (at saturation)	5.55
FMC	.....	Mole fraction of dry gas	0.94
PCO2	.....	Percent CO2 by volume (dry)	3.60
PO2	.....	Percent O2 by volume (dry)	14.80
PCO	.....	Percent CO by volume (dry)	0.000
PN2	.....	Percent N2 by volume (dry)	81.600
MD	.....	Molecular weight of dry stack gas	29.17

T E S T R E S U L T S

MWS	.....	Molecular weight - stack gas	28.88
PB	.....	Barometric pressure (in-HG)	29.43
PSI	.....	Static pressure of stack gas (in-H2O)	-11.800
PS	.....	Stack pressure - absolute (in-HG)	28.58
TS	.....	Average stack temperature (deg F)	94
VH	.....	Average square root of velocity head (in-H2O)	0.947
VS	.....	Average stack gas velocity (fps)	55.8
AS	.....	Stack area (sq in)	2.206
QS	.....	Actual stack flow rate (acfm)	51,275
QSSTD	.....	Stack flow rate - dry std.	44,175
ISO	.....	Percent isokinetic	90.9
MN	.....	PARTICULATE COLLECTED, MG	78.1
CS	.....	PARTICULATE COLLECTED, GR/DSCF	0.2812E-02
PMR	.....	PARTICULATE COLLECTED Emission rate, lb/hr	1.06
MN	.....	TOTAL CHROMIUM, MG	0.2 ✓
CS	.....	TOTAL CHROMIUM, GR/DSCF	1.945E-03
PMR	.....	TOTAL CHROMIUM Emission rate, lb/hr	7.3958E-03

P E I ASSOCIATES, INC.
E M I S S I O N T E S T R E P O R T

F I E L D D A T A

Plant .....DETROIT WSD
Sampling location .....#13 INLET
Test time (start-stop) .....915-1904 ✓

Date 6/24/85
Run number PCI-6

Sample type .....PART/CR
Bar. pressure (in-HG) 29.65
Static pressure (in-H2O) .....-1.1
Filter number(s) 8510121/T-27
Stack dimensions (in) .....120 / 84
Pitot tube coeff. 84
Total H2O collected (ml) 537.2
Percent O2 by volume (dry) ...12.55

Leakage (cu-ft) 0.00
Meter calibration factor 1.033
Data interval (min) 12
Nozzle dia. 373
Meter box number FB4
Number of traverse points 30
Percent CO2 by volume (dry) ..5.5
Percent CO by volume (dry) ...0

Sample time (min)	Gas meter reading (cu. ft.)	Velocity head (in. H2O)	Orifice drop-act. (in. H2O)	Stack temp. (deg. F)	Dry gas meter temp (deg. F) inlet	outlet
0.0	658.075					
12.0	661.320	0.050	0.18	890	96	96
24.0	664.120	0.040	0.15	907	97	96
36.0	666.500	0.030	0.11	950	99	97
48.0	670.870	0.080	0.30	862	100	98
60.0	675.735	0.100	0.36	953	104	100
72.0	679.555	0.070	0.26	912	105	101
84.0	682.035	0.030	0.11	863	105	101
96.0	685.553	0.030	0.12	850	105	102
108.0	689.340	0.090	0.34	860	106	102
120.0	694.228	0.100	0.36	937	108	103
132.0	698.115	0.070	0.26	890	107	103
144.0	702.198	0.090	0.35	850	107	103
156.0	706.120	0.050	0.19	836	100	100
168.0	709.310	0.050	0.19	898	101	101
180.0	713.280	0.070	0.27	851	103	101
192.0	717.000	0.080	0.30	875	106	103
204.0	722.580	0.100	0.37	884	108	104
216.0	727.695	0.100	0.38	892	110	104
228.0	731.340	0.060	0.24	789	111	105
240.0	735.169	0.070	0.26	905	111	106
252.0	738.500	0.050	0.19	900	110	106

((CONTINUED))

OR D

264.0	742.075	0.060	0.23	845	109	106
276.0	747.500	0.120	0.43	960	110	106
288.0	751.295	0.070	0.25	981	111	107
300.0	755.037	0.070	0.25	967	112	107
312.0	760.030	0.100	0.36	960	111	107
324.0	762.870	0.040	0.14	976	111	107
336.0	767.855	0.100	0.36	970	110	107
348.0	773.340	0.120	0.44	932	112	107
360.0	778.577	0.110	0.40	942	113	108
360.0	120.502	0.071	0.27	903	107	103

ok DM

7/12/85

P E I ASSOCIATES, INC.

E M I S S I O N T E S T R E P O R T

T E S T R E S U L T S

PLANT: DETROIT WEI
TEST: PEI-6 , #1C INLET

TEST DATE: 6/24/80
TEST TIME: 815-1904

TT	.....	Net time of test (min)	360.0
AP	.....	Net sampling points	30
Y	.....	Meter calibration factor	1.000
DN	.....	Sampling nozzle dia (in)	0.370
CP	.....	Pitot tube coefficient	0.840
PT	.....	Average orifice pressure drop (in-H2O)	0.27
VM	.....	Volume of dry gas sampled at meter conditions (cu-ft)	120.702
TM	.....	Average gas meter temperature (deg F)	104.9
VMSTD	.....	Volume of dry gas sampled at standard conditions (scf	118.782
VLC	.....	Total H2O collected in impingers and silica gel (ml)	597.1
VWC	.....	Volume of water vapor at standard conditions (scf)	28.284
PMO	.....	Percent moisture by volume (saturation check made)	17.98
FMD	.....	Mole fraction of dry gas	0.82
PCO2	.....	Percent CO2 by volume (dry)	5.6%
PO2	.....	Percent O2 by volume (dry)	12.6%
PCO	.....	Percent CO by volume (dry)	0.0%
PNC	.....	Percent N2 by volume (dry)	81.8%
MD	.....	Molecular weight - dry stack gas	29.28

TEST RESULTS

MWS	.....	Molecular weight - stack gas	27.34
PB	.....	Barometric pressure (in-HG)	29.65
PSI	.....	Static pressure of stack gas (in-H2O)	-1.100
PS	.....	Stack pressure - absolute (in-HG)	29.57
TS	.....	Average stack temperature (deg F)	910
VH	.....	Average square root of velocity head (in-H2O)	0.266
VS	.....	Average stack gas velocity (fps)	24.8
AS	.....	Stack area (sq in)	10.080
QS	.....	Actual stack flow rate (acfm)	104,160
QSDTL	.....	Stack flow rate - dry (scfm)	52,711
ISO	.....	Percent isokinetic	90.4
MN	.....	PARTICULATE COLLECTED, MG	6047.4
CS	.....	PARTICULATE COLLECTED, GR/DSCF	0.8587
PMS	.....	PARTICULATE COLLECTED Emission rate, lb/hr	22.787
MN	.....	TOTAL CHROMIUM, MG	33.7 ✔
CS	.....	TOTAL CHROMIUM, GR/DSCF	4.5035E-03
PMS	.....	TOTAL CHROMIUM Emission rate, lb/hr	1.263

P E I ASSOCIATES, INC.
E M I S S I O N T E S T R E P O R T

F I E L D D A T A

Plant .....DETROIT WSD
Sampling location .....NO.13 OUTLET
Test time (start-stop) 916-1849

Date 6/24/85
Run number PCO-6

Sample type .....PART/CR
Bar. pressure (in-HG) 29.7
Static pressure (in-H2O) .....-11.8
Filter number(s) 8510232
Stack inside dia. (in) 53
Pitot tube coeff. 84
Total H2O collected (ml) 258
Percent O2 by volume (dry) ...16.1

Leakage (cu-ft) 296
Meter calibration factor 1.005
Data interval (min) 15
Nozzle dia. 193
Meter box number FB3
Number of traverse points 24
Percent CO2 by volume (dry) ..2.2
Percent CO by volume (dry) ...0

Sample time (min)	Gas meter reading (cu. ft.)	Velocity head (in. H2O)	Orifice drop-act. (in. H2O)	Stack temp. (deg. F)	Dry gas meter temp (deg. F) inlet	outlet
0.0	536.515					
15.0	548.182	1.550	2.21	94	97	95
30.0	555.851	0.630	0.90	95	103	95
45.0	562.491	0.420	0.60	102	108	97
60.0	568.873	0.420	0.59	107	109	99
75.0	576.685	0.610	0.87	102	110	100
90.0	585.801	0.800	1.16	95	110	101
105.0	596.343	1.150	1.69	89	112	102
120.0	604.284	0.620	0.88	105	112	102
135.0	611.894	0.550	0.79	103	112	103
150.0	619.511	0.580	0.84	96	112	104
165.0	632.437	3.000	4.35	92	108	102
180.0	649.293	2.900	4.20	95	108	102
195.0	659.439	1.050	1.53	94	110	103
210.0	668.238	0.180	0.26	93	113	104
225.0	676.170	0.330	0.48	92	114	106
240.0	689.799	1.100	1.61	93	115	106
255.0	705.103	1.350	1.98	93	116	106
270.0	721.096	1.450	2.13	93	116	108
285.0	737.492	1.500	2.22	89	117	108
300.0	753.544	1.450	2.14	92	117	108
315.0	768.640	1.300	1.90	98	117	108
330.0	768.640	0.000	0.00	96	117	108
345.0	768.640	0.000	0.00	96	117	108
360.0	768.640	0.000	0.00	96	117	108
360.0	232.125	0.752	1.39	96	112	103

P E I ASSOCIATES, INC.

E M I S S I O N T E S T R E P O R T

T E S T R E S U L T S

PLANT: DETROIT #60
TEST: PCC-6 / NO.13 OUTLET

TEST DATE: 6/24/93
TEST TIME: 916-1049

TT	.....	Net time of test (min)	360.0
NP	.....	Net sampling points	24
Y	.....	Meter calibration factor	1.005
DN	.....	Sampling nozzle dia (in)	0.193
CP	.....	Pitot tube coefficient	0.840
PM	.....	Average orifice pressure drop (in-H2O)	1.79
VM	.....	Volume of dry gas sampled at meter conditions (cu-ft) (corrected for leakage)	231.819
TM	.....	Average gas meter temperature (deg F)	107.7
VMSTD	.....	Volume of dry gas sampled at standard conditions (scf)	215.957
VLC	.....	Total H2O collected in impingers and silica gel (ml)	258.0
VWC	.....	Volume of water vapor at standard conditions (scf)	12.144
BWO	.....	Percent moisture by volume (saturation check made)	5.33
FMI	.....	Mole fraction of dry gas	0.95
PCO2	.....	Percent CO2 by volume (dry)	2.20
PO2	.....	Percent O2 by volume (dry)	16.100
PCO	.....	Percent CO by volume (dry)	0.000
PN2	.....	Percent N2 by volume (dry)	81.700
MD	.....	Molecular weight - dry stack gas	29.00

TEST RESULTS

MWS	.....	Molecular weight - stack gas	28.41
PB	.....	Barometric pressure (in-HG)	29.70
PSI	.....	Static pressure of stack gas (in-H2O)	-11.800
PS	.....	Stack pressure - absolute (in-HG)	28.83
TS	.....	Average stack temperature (deg F)	96
VH	.....	Average square root of velocity head (in-H2O)	0.867
VS	.....	Average stack gas velocity (fps)	81.3
AS	.....	Stack area (sq in)	2.20c
QS	.....	Actual stack flow rate (acfm)	47,163
QSSTD	.....	Stack flow rate - dry (scfm)	40,873
ISO	.....	Percent isokinetic	110.0
MN	.....	PARTICULATE COLLECTED, MG	55.0
CS	.....	PARTICULATE COLLECTED, GR/DSCF	0.00998-02
PMR	.....	PARTICULATE COLLECTED Emission rate, lb/hr	2.337
MT	.....	TOTAL CHROMIUM, MG	0.2
CS	.....	TOTAL CHROMIUM, GR/DSCF	1.46E-05
PMF	.....	TOTAL CHROMIUM Emission rate, lb/hr	5.12EE-03

PEI ASSOCIATES, INC.
EMISSION TEST REPORT

FIELD DATA

Plant .....DETROIT WSD
Sampling location .....M13 INLET
Test time (start-stop) 910-1210

Date 6/25/85
Run number PCIO-1

Sample type .....PART/ORGANICS
Bar. pressure (in-HG) 29.70
Static pressure (in-H2O) .....-1.:
Filter number(s) 5300021
Stack dimensions (in) .....120 / 84
Pitot tube coeff. 84
Total H2O collected (ml) 494.7
Percent O2 by volume (dry) ...11.8

Leakage (cu-ft) 0
Meter calibration factor 1.033
Data interval (min) 15
Nozzle dia. .....[illegible]
Meter box number PB4
Number of traverse points 12
Percent CO2 by volume (dry) ..5.9
Percent CO by volume (dry) [illegible]

Sample time (min)	Gas meter reading (cu. ft.)	Velocity head (in. H2O)	Orifice drop-act. (in. H2O)	Stack temp. (deg. F)	Dry gas meter temp (deg. F) inlet	outlet
0.0	779.643					
15.0	784.270	0.080	0.29	895	94	94
30.0	789.400	0.080	0.28	955	96	94
45.0	794.680	0.080	0.30	894	100	96
60.0	799.780	0.080	0.29	928	104	98
75.0	805.300	0.080	0.29	945	106	100
90.0	810.640	0.080	0.29	958	107	101
105.0	816.300	0.080	0.30	882	107	101
120.0	821.420	0.080	0.29	903	108	102
135.0	826.730	0.080	0.29	914	108	103
150.0	831.940	0.080	0.29	921	108	103
165.0	837.190	0.080	0.29	960	108	104
180.0	842.527	0.080	0.29	962	109	104
180.0	63.484	0.080	0.29	926	105	100

ok DM
7/12/85

P E I ASSOCIATES, INC.
E M I S S I O N T E S T R E P O R T

T E S T R E S U L T S

PLANT: DETROIT WSD
TEST: PCIO-1 / #13 INLET

TEST DATE: 6/25/85
TEST TIME: 910-1210

TT	Net time of test (min)	180.0
NP	Net sampling points	12
Y	Meter calibration factor	1.033
DN	Sampling nozzle dia (in)	0.373
CP	Pitot tube coefficient	0.840
PM	Average orifice pressure drop (in-H2O)	0.29
VM	Volume of dry gas sampled at meter conditions (cu-ft)	63.484
TM	Average gas meter temperature (deg F)	102.3
VMSTD	Volume of dry gas sampled at standard conditions (scf)	61.171
VLC	Total H2O collected in impingers and silica gel (ml)	494.7
VWC	Volume of water vapor at standard conditions (scf)	23.286
BWO	Percent moisture by volume (saturation check made)	27.57
FMD	Mole fraction of dry gas	0.72
PCO2	Percent CO2 by volume (dry)	5.900
PO2	Percent O2 by volume (dry)	11.800
PCO	Percent CO by volume (dry)	0.000
PN2	Percent N2 by volume (dry)	82.300
MD	Molecular weight - dry stack gas	29.42

TEST RESULTS

MWS	.....	Molecular weight - stack gas	26.27
PB	.....	Barometric pressure (in-HG)	29.70
PSI	.....	Static pressure of stack gas (in-H2O)	-1.100
PS	.....	Stack pressure - absolute (in-HG)	29.62
TS	.....	Average stack temperature (deg F)	926
VH	.....	Average square root of velocity head (in-H2O)	0.283
VS	.....	Average stack gas velocity (fps)	27.1
AS	.....	Stack area (sq in)	10,080
QS	.....	Actual stack flow rate (acfm)	113,859
QSSTD	.....	Stack flow rate - dry (scfm)	31,100
ISO	.....	Percent isokinetic	100.8
MN	.....	PARTICULATE COLLECTED, MG	3145.7
CS	.....	PARTICULATE COLLECTED, GR/DSCF	0.7935
PMR	.....	PARTICULATE COLLECTED Emission rate, lb/hr	211.549

P E I ASSOCIATES, INC.
E M I S S I O N T E S T R E P O R T

F I E L D D A T A

Plant .....DETROIT WSD
Sampling location .....#13 INLET
Test time (start-stop) 1350-1650

Date 6/25/85
Run number PCIO-2

Sample type .....PART./ORGANICS
Bar. pressure (in-HG) 29.70
Static pressure (in-H2O) .....-1.1
Filter number(s) 5300004/TH-40
Stack dimensions (in) .....120 / 84
Pitot tube coeff. 84
Total H2O collected (ml) 498.4
Percent O2 by volume (dry) ...12.25

Leakage (cu-ft) 4.5
Meter calibration factor 1.033
Data interval (min) 15
Nozzle dia. 373
Meter box number FB4
Number of traverse points 12
Percent CO2 by volume (dry) ..5.75
Percent CO by volume (dry) ...0

Sample time (min)	Gas meter reading (cu. ft.)	Velocity head (in. H2O)	Orifice drop-act. (in. H2O)	Stack temp. (deg. F)	Dry gas meter temp (deg. F) inlet	outlet
0.0	843.046					
15.0	849.091	0.080	0.35	860	101	100
30.0	855.030	0.080	0.35	823	101	100
45.0	861.000	0.080	0.33	918	107	102
60.0	866.930	0.080	0.36	815	110	104
75.0	872.980	0.080	0.36	841	112	106
90.0	879.100	0.080	0.34	892	113	107
105.0	885.140	0.080	0.36	819	114	108
120.0	891.120	0.080	0.35	885	114	108
135.0	896.970	0.080	0.33	934	115	109
150.0	903.020	0.080	0.34	893	117	109
165.0	908.930	0.080	0.34	886	116	110
180.0	914.968	0.080	0.34	879	115	110
180.0	71.922	0.080	0.35	870	111	106

P E I ASSOCIATES, INC.
E M I S S I O N T E S T R E P O R T

T E S T R E S U L T S

PLANT: DETROIT WSD
TEST: PCIO-2 / #13 INLET

TEST DATE: 6/25/85
TEST TIME: 1350-1650

TT	.....	Net time of test (min)	180.0
NP	.....	Net sampling points	12
Y	.....	Meter calibration factor	1.033
DN	.....	Sampling nozzle dia (in)	0.373
CP	.....	Pitot tube coefficient	0.840
PM	.....	Average orifice pressure drop (in-H2O)	0.35
VM	.....	Volume of dry gas sampled at meter conditions (cu-ft) (corrected for leakage)	67.422
TM	.....	Average gas meter temperature (deg F)	108.7
VMSTD	.....	Volume of dry gas sampled at standard conditions (scf)	64.246
VLC	.....	Total H2O collected in impingers and silica gel (ml)	498.4
VWC	.....	Volume of water vapor at standard conditions (scf)	23.460
BWO	.....	Percent moisture by volume (saturation check made)	26.75
FMD	.....	Mole fraction of dry gas	0.73
PCO2	.....	Percent CO2 by volume (dry)	5.750
PO2	.....	Percent O2 by volume (dry)	12.250
PCO	.....	Percent CO by volume (dry)	0.000
PN2	.....	Percent N2 by volume (dry)	82.000
MD	.....	Molecular weight - dry stack gas	29.41

TEST RESULTS

MWS	.....	Molecular weight - stack gas	26.36
PB	.....	Barometric pressure (in-HG)	29.70
PSI	.....	Static pressure of stack gas (in-H2O)	-1.100
PS	.....	Stack pressure - absolute (in-HG)	29.62
TS	.....	Average stack temperature (deg F)	870
VH	.....	Average square root of velocity head (in-H2O)	0.283
VS	.....	Average stack gas velocity (fps)	26.5
AS	.....	Stack area (sq in)	10,080
QS	.....	Actual stack flow rate (acfm)	111,363
QSSTD	.....	Stack flow rate - dry (scfm)	32,049
ISO	.....	Percent isokinetic	102.8
MN	.....	PARTICULATE COLLECTED, MG	3602.5
CS	.....	PARTICULATE COLLECTED, GR/DSCF	0.8652
PMR	.....	PARTICULATE COLLECTED Emission rate, lb/hr	237.713

PEI ASSOCIATES, INC.
EMISSION TEST REPORT

FIELD DATA

Plant .....DETROIT WSD
Sampling location .....#13 OUTLET
Test time (start-stop) 911-1211

Date 6/25/85
Run number PC00-1

Sample type .....PART./ORGANICS
Bar. pressure (in-HG) 29.7
Static pressure (in-H2O) .....-11.8
Filter number(s) 5300018
Stack inside dia. (in) 53
Pitot tube coeff. 84
Total H2O collerted (ml) 109
Percent O2 by volume (dry) ...20.0

Leakage (cu-ft) 0
Meter calibration factor 1.005
Data interval (min) 10
Nozzle dia. 193
Meter box number FB3
Number of traverse points 18
Percent CO2 by volume (dry) ..4.9
Percent CO by volume (dry) ...0

Sample time (min)	Gas meter reading (cu. ft.)	Velocity head (in. H2O)	Orifice drop-act. (in. H2O)	Stack temp. (deg. F)	Dry gas meter temp (deg. F) inlet	outlet
0.0	769.280					
10.0	773.870	0.650	0.93	90	92	90
20.0	779.087	0.650	0.91	99	96	90
30.0	784.313	0.650	0.93	95	100	92
40.0	788.586	0.390	0.56	93	103	93
50.0	792.698	0.390	0.56	94	104	95
60.0	796.685	0.360	0.51	98	105	96
70.0	801.683	0.650	0.93	99	106	97
80.0	806.983	0.650	0.93	99	108	98
90.0	812.248	0.650	0.93	97	109	99
100.0	817.698	0.680	0.99	93	109	100
110.0	823.282	0.700	1.01	95	110	100
120.0	828.680	0.680	0.99	93	110	100
130.0	834.161	0.680	0.99	95	110	102
140.0	839.587	0.670	0.97	97	110	102
150.0	844.916	0.650	0.94	99	111	102
160.0	850.401	0.700	1.01	101	112	102
170.0	855.604	0.690	0.84	95	112	102
180.0	860.914	0.650	0.94	97	112	102
180.0	91.634	0.613	0.88	96	107	98

P E I ASSOCIATES, INC.
E M I S S I O N T E S T R E P O R T

T E S T R E S U L T S

PLANT: DETROIT WSD
TEST: PCOO-1 / #13 OUTLET

TEST DATE: 6/25/85
TEST TIME: 911-1211

TT	.....	Net time of test (min)	180.0
NP	.....	Net sampling points	18
Y	.....	Meter calibration factor	1.005
DN	.....	Sampling nozzle dia (in)	0.193
CP	.....	Pitot tube coefficient	0.840
PM	.....	Average orifice pressure drop (in-H2O)	0.88
VM	.....	Volume of dry gas sampled at meter conditions (cu-ft)	91.634
TM	.....	Average gas meter temperature (deg F)	102.3
VMSTD	.....	Volume of dry gas sampled at standard conditions (scf)	86.033
VLC	.....	Total H2O collected in impingers and silica gel (ml)	109.0
VWC	.....	Volume of water vapor at standard conditions (scf)	5.131
BWO	.....	Percent moisture by volume (saturation check made)	5.63
FMD	.....	Mole fraction of dry gas	0.94
PCO2	.....	Percent CO2 by volume (dry)	4.900
PO2	.....	Percent O2 by volume (dry)	15.100
PCO	.....	Percent CO by volume (dry)	0.000
PN2	.....	Percent N2 by volume (dry)	80.000
MD	.....	Molecular weight - dry stack gas	29.39

TEST RESULTS

MWS	Molecular weight - stack gas	28.75
PB	Barometric pressure (in-HG)	29.70
PSI	Static pressure of stack gas (in-H2O)	-11.800
PS	Stack pressure - absolute (in-HG)	28.83
TS	Average stack temperature (deg F)	96
VH	Average square root of velocity head (in-H2O)	0.783
VS	Average stack gas velocity (fps)	46.1
AS	Stack area (sq in)	2,206
QS	Actual stack flow rate (acfm)	42,340
QSSTD	Stack flow rate - dry (scfm)	36,561
ISO	Percent isokinetic	98.6
MN	PARTICULATE COLLECTED, MG	51.1
CS	PARTICULATE COLLECTED, GR/DSCF	9.1647E-03
PMR	PARTICULATE COLLECTED Emission rate, lb/hr	2.872

P E I ASSOCIATES, INC.
E M I S S I O N T E S T R E P O R T

F I E L D D A T A

Plant .....DETROIT WSD
Sampling location .....#13 OUTLET
Test time (start-stop) 1350-1650

Date 6/25/85
Run number PC00-2

Sample type .....PART./ORGANICS
Bar. pressure (in-HG) 29.75
Static pressure (in-H2O) .....-11.8
Filter number(s) 5300024
Stack inside dia. (in) 53
Pitot tube coeff. 84
Total H2O collected (ml) 106.2
Percent O2 by volume (dry) ...15.1

Leakage (cu-ft) 0
Meter calibration factor 1.005
Data interval (min) 10
Nozzle dia. 193
Meter box number FB3
Number of traverse points 18
Percent CO2 by volume (dry) ..4.8
Percent CO by volume (dry) ...0

Sample time (min)	Gas meter reading (cu. ft.)	Velocity head (in. H2O)	Orifice drop-act. (in. H2O)	Stack temp. (deg. F)	Dry gas meter temp (deg. F) inlet	outlet
0.0	861.215					
10.0	866.290	0.650	0.92	100	100	96
20.0	871.430	0.600	0.87	90	102	98
30.0	875.940	0.450	0.66	87	106	98
40.0	880.880	0.550	0.78	105	108	100
50.0	886.190	0.700	1.00	101	112	100
60.0	890.720	0.430	0.63	93	112	100
70.0	895.230	0.450	0.66	91	114	102
80.0	899.490	0.400	0.59	92	115	104
90.0	903.790	0.400	0.58	100	116	104
100.0	909.910	0.850	1.24	96	116	106
110.0	915.870	0.770	1.13	93	118	106
120.0	920.530	0.450	0.66	96	118	107
130.0	925.110	0.450	0.66	99	118	108
140.0	930.650	0.700	1.02	100	118	108
150.0	936.217	0.700	1.03	95	120	108
160.0	941.521	0.610	0.90	95	120	109
170.0	946.475	0.530	0.77	101	120	109
180.0	951.532	0.560	0.83	92	120	109
180.0	90.317	0.562	0.83	96	114	104

P E I ASSOCIATES, INC.
E M I S S I O N T E S T R E P O R T

T E S T R E S U L T S

PLANT: DETROIT WSD
TEST: PCOO-2 / #13 OUTLET

TEST DATE: 6/25/85
TEST TIME: 1350-1650

TT	.....	Net time of test (min)	180.0
NP	.....	Net sampling points	18
Y	.....	Meter calibration factor	1.005
DN	.....	Sampling nozzle dia (in)	0.193
CP	.....	Pitot tube coefficient	0.840
PM	.....	Average orifice pressure drop (in-H2O)	0.83
VM	.....	Volume of dry gas sampled at meter conditions (cu-ft)	90.317
TM	.....	Average gas meter temperature (deg F)	109.0
VMSTD	.....	Volume of dry gas sampled at standard conditions (scf)	83.917
VLC	.....	Total H2O collected in impingers and silica gel (ml)	106.2
VWC	.....	Volume of water vapor at standard conditions (scf)	4.999
BWO	.....	Percent moisture by volume (saturation check made)	5.62
FMD	.....	Mole fraction of dry gas	0.94
PCO2	.....	Percent CO2 by volume (dry)	4.800
PO2	.....	Percent O2 by volume (dry)	15.100
PCO	.....	Percent CO by volume (dry)	0.000
PN2	.....	Percent N2 by volume (dry)	80.100
MD	.....	Molecular weight - dry stack gas	29.37

TEST RESULTS

MWS	.....	Molecular weight - stack gas	28.73
PB	.....	Barometric pressure (in-HG)	29.75
PSI	.....	Static pressure of stack gas (in-H2O)	-11.800
PS	.....	Stack pressure - absolute (in-HG)	28.88
TS	.....	Average stack temperature (deg F)	96
VH	.....	Average square root of velocity head (in-H2O)	0.750
VS	.....	Average stack gas velocity (fps)	44.1
AS	.....	Stack area (sq in)	2,206
QS	.....	Actual stack flow rate (acfm)	40,500
QSSTD	.....	Stack flow rate - dry (scfm)	35,046
ISO	.....	Percent isokinetic	100.3
MN	.....	PARTICULATE COLLECTED, MG	55.3
CS	.....	PARTICULATE COLLECTED, GR/DSCF	0.0102
PMR	.....	PARTICULATE COLLECTED Emission rate, lb/hr	3.055

ISOKINETIC CALCULATION

SITE Outlet No. 13 Incinerator **TEST NO.** PCO-3

	Traverse points	1-12	13-21	Avg.
1. Volume of dry gas sampled corrected to standard conditions. Note: V_m must be corrected for leakage if any leakage rates exceed L_a). $V_{m_{std}} = 17.65 \times V_m \times Y \left[\frac{P_{bar} + \frac{\Delta H}{13.6}}{T_m}\right]$.	V_m, ft^3	122.351	100.444	
	Y	1.052	1.052	
	P_{bar}, in.Hg	29.8	29.8	
	$\overline{\Delta H}$, $in.H_2O$	1.104	0.87	
	$\overline{T_m}$, °R	563	569	
	$V_{m_{std}}$, dscf	120.555	97.870	
2. Volume of water vapor at standard conditions, ft^3. $V_{w_{std}} = 0.04707 V_{lc}$.	V_{lc}, g Total	256.7	256.7	
	$V_{w_{std}}$, ft^3	6.705	5.443	
3. Moisture content in stack gas. $B_{ws} = \frac{V_{w_{std}}}{V_{m_{std}} + V_{w_{std}}}$.	B_{ws}	0.0527	0.0527	
	$1-B_{ws}$	0.9473	0.9473	
4. Dry molecular weight of stack gas, lb/lb-mole. $M_d = 0.440$ (% CO_2) + 0.320 (% O_2) + 0.280 (% N_2 + % CO).	% CO_2	4.6	4.6	
	% O_2	13.4	13.4	
	% N_2 + % CO	82.0	82.0	
	M_d, lb/lb-mole	29.27	29.27	
5. Molecular weight of stack gas. $M_s = M_d (1-B_{ws}) + 18 B_{ws}$.	M_s, lb/lb-mole	28.68	28.68	
6. Stack velocity at stack conditions, fps. $V_s = 85.49 Cp \left(\text{avg.}\sqrt{\Delta P}\right)\sqrt{\frac{T_s}{P_s M_s}}$.	P_{static}, $in.H_2O$	-11.8	-11.8	
	P_s, in.Hg	28.93	28.93	
	$\overline{T_s}$, °R	551	554	552
	$\overline{\sqrt{\Delta P}}$	1.113	0.921	
	Cp	0.84	0.84	
	V_s, fps	65.1	54.0	59.6
7. Isokinetic variation $\% I = \frac{V_{m_{std}} \times T_s \times 17.32}{V_s \times D_n^2 \times \theta \times P_s \times (1-B_{ws})}$	Dn, in.	0.193	0.193	
	θ, min.	180	180	
	% I	96.2	94.6	95.4

ISOKINETIC CALCULATION

SITE Outlet No. 13 Incinerator **TEST NO.** PCO-6

	Traverse points	1-12	13-21	Avg.
1. Volume of dry gas sampled corrected to standard conditions. Note: V_m must be corrected for leakage if any leakage rates exceed L_a). $V_{m_{std}} = 17.65 \times V_m \times Y \left[\frac{P_{bar} + \frac{\Delta H}{13.6}}{T_m}\right]$.	V_m, ft^3	112.778		
	Y	1.005	1.005	
	P_{bar}, in.Hg	29.7	29.7	
	$\overline{\Delta H}$, $in.H_2O$	1.59	1.58	
	$\overline{T_m}$, °R	573	571	
	$V_{m_{std}}$, dscf	104.082	110.528	
2. Volume of water vapor at standard conditions, ft^3. $V_{w_{std}} = 0.04707 V_{lc}$.	V_{lc}, g Total	258.0	258.0	
	$V_{w_{std}}$, ft^3	5.856	6.219	
3. Moisture content in stack gas. $B_{ws} = \frac{V_{w_{std}}}{V_{m_{std}} + V_{w_{std}}}$.	B_{ws}	0.0533	0.0533	
	$1-B_{ws}$	0.9467	0.9467	
4. Dry molecular weight of stack gas, lb/lb-mole. $M_d = 0.440$ (% CO_2) + 0.320 (% O_2) + 0.280 (% N_2 + % CO) =	% CO_2	2.2	2.2	
	% O_2	16.1	16.1	
	% N_2 + % CO	81.7	81.7	
	M_d, lb/lb-mole	29.9	29.9	
5. Molecular weight of stack gas. $M_s = M_d (1-B_{ws}) + 18 B_{ws}$ =	M_s, lb/lb-mole	28.41	28.41	
6. Stack velocity at stack conditions, fps. $V_s = 85.49\ Cp \left(avg.\sqrt{\Delta P}\right)\sqrt{\frac{T_s}{P_s M_s}}$.	P_{static}, $in.H_2O$	-11.8	-11.8	
	P_s, in.Hg	28.83	28.83	
	$\overline{T_s}$, °R	558	558	556
	$\overline{\sqrt{\Delta P}}$	0.984	1.001	
	Cp	0.84	0.84	
	V_s, fps	58.3	59.1	58.6
7. Isokinetic variation $\% I = \frac{V_{m_{std}} \times T_s \times 17.32}{V_s \times D_n^2 \times \theta \times P_s \times (1-B_{ws})}$	Dn, in.	0.193	0.193	
	θ, min.	180	180	
	% I	94.3	97.9	96.1

ISOKINETIC CALCULATION

SITE Outlet No. 13 Incinerator **TEST NO.** PCO-4

	Traverse points	1-12	13-21	Avg.
1. Volume of dry gas sampled corrected to standard conditions. Note: V_m must be corrected for leakage if any leakage rates exceed L_a). $V_{m_{std}} = 17.65 \times V_m \times Y \left[\frac{P_{bar} + \frac{\Delta H}{13.6}}{T_m}\right]$ =	V_m, ft^3	113.008	96.147	
	Y	1.052	1.052	
	P_{bar}, in.Hg	29.5	29.5	
	$\overline{\Delta H}$, $in.H_2O$	1.00	0.806	
	$\overline{T_m}$, °R	564	571	
	$V_{m_{std}}$, dscf	110.086	92.402	
2. Volume of water vapor at standard conditions, ft^3. $V_{w_{std}} = 0.04707 V_{lc}$ =	V_{lc}, g Total	264.4	264.4	
	$V_{w_{std}}$, ft^3	6.791	5.701	
3. Moisture content in stack gas. $B_{ws} = \frac{V_{w_{std}}}{V_{m_{std}} + V_{w_{std}}}$ =	B_{ws}	0.0581	0.0581	
	$1-B_{ws}$	0.9419	0.9419	
4. Dry molecular weight of stack gas, lb/lb-mole. $M_d = 0.440\ (\%\ CO_2) + 0.320\ (\%\ O_2) + 0.280\ (\%\ N_2 + \%\ CO)$ =	% CO_2	3.6	3.6	
	% O_2	14.8	14.8	
	% N_2 + % CO	81.6	81.6	
	M_d, lb/lb-mole	29.17	29.17	
5. Molecular weight of stack gas. $M_s = M_d\ (1-B_{ws}) + 18\ B_{ws}$ =	M_s, lb/lb-mole	28.52	29.52	
6. Stack velocity at stack conditions, fps. $V_s = 85.49\ Cp\ (\text{avg.}\sqrt{\Delta P}) \sqrt{\frac{T_s}{P_s M_s}}$ =	P_{static}, $in.H_2O$	-11.8	-11.8	
	P_s, in.Hg	28.63	28.63	
	$\overline{T_s}$, °R	554	556	555
	$\overline{\sqrt{\Delta P}}$	1.053	0.912	
	Cp	0.84	0.84	
	V_s, fps	62.3	54.0	58.2
7. Isokinetic variation $\%\ I = \frac{V_{m_{std}} \times T_s \times 17.32}{V_s \times D_n^2 \times \theta \times P_s \times (1-B_{ws})}$	Dn, in.	0.193	0.193	
	θ, min.	180	180	
	% I	93.8	91.5	92.6

PARTICLE SIZE DISTRIBUTION

FIELD DATA

PLANT	DETROIT WATER & SEWER DEPT.	DATE	06/18/85
SAMPLING LOCATION	NO. 13 INC. INLET	RUN NUMBER	PSI-1
SAMPLE TYPE	PART SIZE	PROBE LENGTH & TYPE	6 FT
OPERATOR	THRESS	NOZZLE : I.D.	.155
AMBIENT TEMP.(DEG.F)	92.	ASSUMED MOISTURE	15.0
BAR.PRESS.(IN.HG)	29.50	SAMPLE BOX NUMBER	
STATIC PRESS.(IN.H2O)	-1.10	METER BOX NUMBER	F10
FILTER NUMBER(S)	HGLI	METER HEAD DIFF.	1.81
STACK INSIDE DIM.(IN)	120.00 84.00	PROBE HEATER SETTING	0.
PITOT TUBE COEFF.	.84	HEATER BOX SETTING	0.
THERM. NO.			
LEAKAGE	.000 CFM @ .0 IN.HG	K FACTOR	272.9
METER CALIB. FACTOR	.963		
READ & RECORD DATA EVERY	.0 MINUTES		

TRAVERSE POINT NO.	SAMPLE TIME (MIN.)	CLOCK TIME (24-HR CLOCK)	GAS METER READING (CU.FT.)	VELOCITY HEAD (IN.H2O)	ORIFICE PRESSURE DIFFERENTIAL (IN.H2O)		STACK TEMP (DEG.F)	DRY GAS METER TEMP (DEG.F)		PUMP VACUUM (IN.HG)	IMPACTOR TEMP (DEG.F)	IMPINGER TEMP (DEG.F)
					DESIRED	ACTUAL		INLET	OUTLET			
INIT	0	1425	484.473									
	10.0	1435	486.530	.410	.12	.12	920.	94.	94.	.0	920.	0.
	20.0	1445	488.620	.410	.12	.12	920.	94.	94.	.0	920.	0.
	30.0	1455	490.890	.410	.12	.12	920.	95.	95.	.0	920.	0.
	40.0	1505	492.940	.410	.12	.12	920.	96.	96.	.0	920.	0.
	50.0	1515	495.160	.410	.12	.12	920.	97.	97.	.0	920.	0.
	60.0	1525	497.390	.410	.12	.12	920.	98.	97.	.0	920.	0.
	70.0	1535	499.590	.410	.12	.12	920.	99.	98.	.0	920.	0.
	80.0	1545	501.890	.410	.12	.12	920.	100.	100.	.0	920.	0.
	90.0	1555	504.281	.410	.12	.12	920.	100.	100.	.0	920.	0.
TOTALS	90.0		19.808									
AVERAGE					.12	.12	920.	97.	97.	.0	920.	0.

PERCENT ISOKINETIC 145.1

IMPACTOR FIELD DATA TABULATION

PLANT-NAME AND ADDRESS

DETROIT WATER & SEWER DEPT.

TEST TEAM LEADER

THRESS

TEST PSI-1 NO. 13 INC. INLET

		ENGLISH UNITS	METRIC UNITS
TEST DATE		06/18/85	06/18/85
TB	TIME-START	1425	1425
TF	TIME-FINISH	1555	1555
TT	NET TIME OF TEST, MIN.	90.0	90.0
Y	METER CALIBRATION FACTOR	.963	.963
DN	SAMPLING NOZZLE DIAMETER	.155 IN	3.9 MM
CP	PITOT TUBE COEFFICIENT	.84	.84
PM	AVERAGE ORIFICE PRESSURE DROP	.12 IN-H2O	3.0 MM-H2O
VM	VOLUME OF DRY GAS SAMPLED AT METER CONDITIONS	19.808 CU-FT	.561 CU-M
TM	AVERAGE GAS METER TEMP	96.9 F	36.0 C
VMSTD	VOLUME OF DRY GAS SAMPLED AT STANDARD CONDITIONS*	17.837 SCF	.505 SCM
VWC	VOLUME OF WATER VAPOR AT STANDARD CONDITIONS*	5.754 SCF	.163 SCM
BWO	PERCENT MOISTURE BY VOLUME	24.39	24.39
FMC	MOLE FRACTION DRY GAS	.756	.756
PCO2	PERCENT CO2 BY VOL., DRY	5.11	5.11
PO2	PERCENT O2 BY VOL., DRY	12.87	12.87
PCO	PERCENT CO BY VOL., DRY	.00	.00
PN2	PERCENT N2 BY VOL., DRY	82.02	82.02
MD	MOLECULAR WT-DRY STACK GAS	29.33	29.33
MAS	MOLECULAR WT-STACK GAS	26.57	26.57
PB	BAROMETRIC PRESSURE	29.50 IN-HG	749.30 MM-HG
PSI	STATIC PRES OF STACK GAS	-1.10 IN-H2O	-27.94 MM-H2O
PS	STACK PRES, ABS.	29.42 IN-HG	747.25 MM-HG

TS	AVERAGE STACK TEMP	920. F	493. C
IF	GAS SAMPLED AT STACK CONDITIONS	62.71 ACF	1.78 ACM
AS	STACK AREA	10080. SQ-IN	6.503 SQ-M
ISO	PERCENT ISOKINETIC	145.1	145.1
MT	TOTAL MASS OF PARTICLES	3.313 GR	214.700 MG
PD	PARTICLE DENSITY	.06 GR/CT	1.00 GM/CC

* 68 DEG F, 29.92 IN.HG.

PLANT & CITY	DETROIT WATER & SEWER DEPT.		
SAMPLING LOCATION	NO. 13 INC. INLET		
DATE	06/18/85		
RUN NUMBER	PSI-1		
OPERATOR	THRESS		
STACK TEMP.	920.0F	493.3C	
BAR.PRESS.(IN. HG)	29.50		
STACK PRESS.(IN. HG)	29.42		
NOZZLE:I.D.(IN.)	.155		
METER HEAD DIFF.	.120		

IMPACTOR FLOWRATE(ACFM) AT IMPACTOR CONDITIONS			.697
IMPACTOR TEMP.		920.0F	493.3C
PARTICLE DENSITY(GM/CC)			1.00
MAX.PARTICLE DIAM.MICROS			100.0
GAS COMPOSITION(PERCENT):	CO2		3.86
	CO		.00
	N2		62.02
	O2		9.73
	H2O		24.39
SAMPLING DURATION(MIN.)			90.00

FIELD DATA

PLANT	DETROIT WATER & SEWER DEPT.	DATE	06/20/85
SAMPLING LOCATION	NO. 13 INLET	RUN NUMBER	PSI-2
SAMPLE TYPE	PART SIZE	PROBE LENGTH & TYPE	6 FT
OPERATOR	THRESS	NOZZLE : I.D.	.235
AMBIENT TEMP.(DEG.F)	85.	ASSUMED MOISTURE	17.0
BAR.PRESS.(IN.HG)	29.80	SAMPLE BOX NUMBER	
STATIC PRESS.(IN.H20)	-1.10	METER BOX NUMBER	F10
FILTER NUMBER(S)	HGLI	METER HEAD DIFF.	1.81
STACK INSIDE DIM.(IN)	120.00 84.00		
PITOT TUBE COEFF.	.84	PROBE HEATER SETTING	0.
THERM. NO.		HEATER BOX SETTING	0.
LEAKAGE	.000 CFM @ .0 IN.HG		
METER CALIB. FACTOR	.963	K FACTOR	1375.0
READ & RECORD DATA EVERY	.0 MINUTES		

TRAVERSE POINT NO.	SAMPLE TIME (MIN.)	CLOCK TIME (24-HR CLOCK)	GAS METER READING (CU.FT.)	VELOCITY HEAD (IN.H20)	ORIFICE PRESSURE DIFFERENTIAL (IN.H20)		STACK TEMP (DEG.F)	DRY GAS METER TEMP (DEG.F)		PUMP VACUUM (IN.HG)	IMPACTOR TEMP (DEG.F)	IMPINGER TEMP (DEG.F)
					DESIRED	ACTUAL		INLET	OUTLET			
INIT	0	1320	504.788									
C-14	10.0	0	506.900	.120	.12	.12	920.	94.	94.	1.0	920.	0.
	20.0	0	509.045	.120	.12	.12	920.	94.	94.	1.0	920.	0.
	30.0	0	511.250	.120	.12	.12	920.	94.	94.	1.0	920.	0.
	40.0	0	513.460	.120	.12	.12	920.	94.	94.	1.0	920.	0.
	50.0	0	515.400	.120	.12	.12	920.	96.	96.	1.0	920.	0.
	60.0	0	517.320	.120	.12	.12	920.	98.	98.	1.0	920.	0.
	70.0	0	519.465	.120	.12	.12	920.	100.	100.	1.0	920.	0.
	80.0	0	521.580	.120	.12	.12	920.	100.	100.	1.0	920.	0.
	90.0	0	523.760	.120	.12	.12	920.	101.	100.	1.0	920.	0.
	100.0	0	525.990	.120	.12	.12	920.	101.	100.	1.0	920.	0.
	110.0	0	528.190	.120	.12	.12	920.	101.	100.	1.0	920.	0.
	120.0	1520	530.340	.120	.12	.12	920.	101.	100.	1.0	920.	0.
TOTALS	120.0		25.552									
AVERAGE					.12	.12	920.	98.	98.	1.0	920.	0.
	PERCENT ISOKINETIC			115.8								

IMPACTOR FIELD DATA TABULATION

PLANT-NAME AND ADDRESS — TEST TEAM LEADER

DETROIT WATER & SEWER DEPT. — THRESS

TEST PSI-2 NO. 13 INLET

		ENGLISH UNITS	METRIC UNITS
TEST DATE		06/20/85	06/20/85
Tb	TIME-START	1320	1320
TF	TIME-FINISH	1520	1520
TT	NET TIME OF TEST, MIN.	120.0	120.0
Y	METER CALIBRATION FACTOR	.963	.963
DN	SAMPLING NOZZLE DIAMETER	.235 IN	6.0 MM
CP	PITOT TUBE COEFFICIENT	.84	.84
PM	AVERAGE ORIFICE PRESSURE DROP	.12 IN-H20	3.0 MM-H20
VM	VOLUME OF DRY GAS SAMPLED AT METER CONDITIONS	25.552 CU-FT	.724 CU-M
TM	AVERAGE GAS METER TEMP	97.7 F	36.5 C
VMSTD	VOLUME OF DRY GAS SAMPLED AT STANDARD CONDITIONS*	23.211 SCF	.657 SCM
VWC	VOLUME OF WATER VAPOR AT STANDARD CONDITIONS*	8.326 SCF	.236 SCM
BWO	PERCENT MOISTURE BY VOLUME	26.40	26.40
FRO	MOLE FRACTION DRY GAS	.736	.736
PCO2	PERCENT CO2 BY VOL., DRY	4.80	4.80
PO2	PERCENT O2 BY VOL., DRY	13.00	13.00
PCO	PERCENT CO BY VOL., DRY	.00	.00
PN2	PERCENT N2 BY VOL., DRY	82.20	82.20
MD	MOLECULAR WT-DRY STACK GAS	29.29	29.29
MWS	MOLECULAR WT-STACK GAS	26.31	26.31
PB	BAROMETRIC PRESSURE	29.80 IN-HG	756.92 MM-HG
PST	STATIC PRES OF STACK GAS	-1.10 IN-H20	-27.94 MM-H20
P	ACK 5, A	29 IN	54. MM-H

TS	AVERAGE STACK TEMP	920. F	493. C
IF	GAS SAMPLED AT STACK CONDITIONS	82.98 ACF	2.35 ACM
AS	STACK AREA	10080. SQ-IN	6.503 SQ-M
ISO	PERCENT ISOKINETIC	115.8	115.8
MT	TOTAL MASS OF PARTICLES	3.063 GR	198.500 MG
PD	PARTICLE DENSITY	.06 GR/CI	1.00 GM/CC

* 68 DEG F, 29.92 IN.HG.

PLANT & CITY	DETROIT WATER & SEWER DEPT.
SAMPLING LOCATION	NO. 13 INLET
DATE	06/20/85
RUN NUMBER	PSI-2
OPERATOR	THRESS
STACK TEMP.	920.0F 493.3C
BAR.PRESS.(IN. HG)	29.80
STACK PRESS.(IN. HG)	29.72
NOZZLE:I.D.(IN.)	.235
METER HEAD DIFF.	.120

IMPACTOR FLOWRATE(ACFM) AT IMPACTOR CONDITIONS			.692
IMPACTOR TEMP.		920.0F	493.3C
PARTICLE DENSITY(GM/CC)			1.00
MAX.PARTICLE DIAM.MICROS			100.0
GAS COMPOSITION(PERCENT):	CO2		3.53
	CO		.00
	N2		60.50
	O2		9.57
	H2O		26.40
SAMPLING DURATION(MIN.)			120.00

FIELD DATA

PLANT	DETROIT WATER & SEWER DEPT.	DATE	06/21/85
SAMPLING LOCATION	NO. 13 INLET	RUN NUMBER	PSI-3
SAMPLE TYPE	PART SIZE	PROBE LENGTH & TYPE	6 FT
OPERATOR	THRESS	NOZZLE : I.D.	.235
AMBIENT TEMP.(DEG.F)	85.	ASSUMED MOISTURE	.0
BAR.PRESS.(IN.HG)	29.50	SAMPLE BOX NUMBER	
STATIC PRESS.(IN.H20)	-1.10	METER BOX NUMBER	
FILTER NUMBER(S)	HGL #57	METER HEAD DIFF.	1.23
STACK INSIDE DIM.(IN)	120.00 84.00		
PITOT TUBE COEFF.	.84	PROBE HEATER SETTING	0.
THERM. NO.		HEATER BOX SETTING	0.
LEAKAGE	.000 CFM @ .0 IN.HG		
METER CALIB. FACTOR	.963	K FACTOR	1375.0
READ & RECORD DATA EVERY	.0 MINUTES		

TRAVERSE POINT NO.	SAMPLE TIME (MIN.)	CLOCK TIME (24-HR CLOCK)	GAS METER READING (CU.FT.)	VELOCITY HEAD (IN.H20)	ORIFICE PRESSURE DIFFERENTIAL (IN.H20)		STACK TEMP (DEG.F)	DRY GAS METER TEMP (DEG.F)		PUMP VACUUM (IN.HG)	IMPACTOR TEMP (DEG.F)	IMPINGER TEMP (DEG.F)
					DESIRED	ACTUAL		INLET	OUTLET			
INIT	0	1300	530.572									
C-14	10.0	0	532.440	.100	.08	.08	920.	95.	98.	.5	920.	0.
	20.0	0	534.250	.100	.08	.08	920.	97.	98.	.5	920.	0.
	30.0	0	536.023	.100	.08	.08	920.	98.	98.	.5	920.	0.
	40.0	0	537.790	.100	.08	.08	920.	100.	100.	.5	920.	0.
	50.0	0	539.600	.100	.08	.08	920.	100.	101.	.5	920.	0.
	60.0	0	541.300	.100	.08	.08	920.	100.	101.	.5	920.	0.
	70.0	0	543.080	.100	.08	.08	920.	101.	102.	.5	920.	0.
	80.0	0	544.825	.100	.08	.08	920.	102.	102.	.5	920.	0.
	90.0	0	546.590	.100	.08	.08	920.	102.	102.	.5	920.	0.
	100.0	0	548.465	.100	.08	.08	920.	102.	102.	.5	920.	0.
	110.0	0	550.180	.100	.08	.08	920.	102.	102.	.5	920.	0.
	120.0	0	551.990	.100	.08	.08	920.	102.	102.	.5	920.	0.
TOTALS	120.0		21.418									
AVERAGE					.08	.08	920.	100.	101.	.5	920.	0.

PERCENT ISOKINETIC 106.7

IMPACTOR FIELD DATA TABULATION

PLANT-NAME AND ADDRESS

DETROIT WATER & SEWER DEPT.

TEST TEAM LEADER

THRESS

TEST PSI-3 NO. 13 INLET

		ENGLISH UNITS	METRIC UNITS
TEST DATE		06/21/85	06/21/85
TH	TIME-START	1300	1300
TF	TIME-FINISH	0	0
TT	NET TIME OF TEST, MIN.	120.0	120.0
Y	METER CALIBRATION FACTOR	.963	.963
DN	SAMPLING NOZZLE DIAMETER	.235 IN	6.0 MM
CP	PITOT TUBE COEFFICIENT	.84	.84
PM	AVERAGE ORIFICE PRESSURE DROP	.08 IN-H20	2.0 MM-H20
VM	VOLUME OF DRY GAS SAMPLED AT METER CONDITIONS	21.418 CU-FT	.606 CU-M
TM	AVERAGE GAS METER TEMP	100.4 F	38.0 C
VMSTD	VOLUME OF DRY GAS SAMPLED AT STANDARD CONDITIONS*	19.165 SCF	.543 SCM
VWC	VOLUME OF WATER VAPOR AT STANDARD CONDITIONS*	7.277 SCF	.206 SCM
PSD	PERCENT MOISTURE BY VOLUME	27.52	27.52
FMD	MOLE FRACTION DRY GAS	.725	.725
PCO2	PERCENT CO2 BY VOL., DRY	5.25	5.25
PO2	PERCENT O2 BY VOL., DRY	12.95	12.95
PCO	PERCENT CO BY VOL., DRY	.00	.00
PN2	PERCENT N2 BY VOL., DRY	81.80	81.80
MD	MOLECULAR WT-DRY STACK GAS	29.36	29.36
MWS	MOLECULAR WT-STACK GAS	26.23	26.23
PB	BAROMETRIC PRESSURE	29.50 IN-HG	749.30 MM-HG
PST	STATIC PRES OF STACK GAS	-1.10 IN-H20	-27.94 MM-H20
PS	STACK PRES, ABS.	29.42 IN-HG	747.25 MM-HG

TS	AVERAGE STACK TEMP	920. F	493. C
IF	GAS SAMPLED AT STACK CONDITIONS	70.29 ACF	1.99 ACM
AS	STACK AREA	10080. SQ-IN	6.503 SQ-M
ISO	PERCENT ISOKINETIC	106.7	106.7
MT	TOTAL MASS OF PARTICLES	10.077 GR	653.000 MG
PD	PARTICLE DENSITY	.06 GR/CI	1.00 GM/CC

* 68 DEG F, 29.92 IN.HG.

PLANT & CITY	DETROIT WATER & SEWER DEPT.
SAMPLING LOCATION	NO. 13 INLET
DATE	06/21/85
RUN NUMBER	PSI-3
OPERATOR	THRESS
STACK TEMP.	920.0F 493.3C
BAR.PRESS.(IN. HG)	29.50
STACK PRESS.(IN. HG)	29.42
NOZZLE:I.D.(IN.)	.235
METER HEAD DIFF.	.080

IMPACTOR FLOWRATE(ACFM) AT IMPACTOR CONDITIONS			.586
IMPACTOR TEMP.		920.0F	493.3C
PARTICLE DENSITY(GM/CC)			1.00
MAX.PARTICLE DIAM.MICROS			100.0
GAS COMPOSITION(PERCENT):	CO2		3.81
	CO		.00
	N2		59.29
	O2		9.39
	H2O		27.52
SAMPLING DURATION(MIN.)			120.00

FIELD DATA

PLANT	DETROIT WATER & SEWER DEPT.	DATE	06/22/85
SAMPLING LOCATION	NO. 13 INLET	RUN NUMBER	PSI-4
SAMPLE TYPE	PART SIZE	PROBE LENGTH & TYPE	6 FT
OPERATOR	THRESS	NOZZLE : I.D.	.235
AMBIENT TEMP.(DEG.F)	85.	ASSUMED MOISTURE	12.0
BAR.PRESS.(IN.HG)	29.45	SAMPLE BOX NUMBER	
STATIC PRESS.(IN.H20)	-1.10	METER BOX NUMBER	F10
FILTER NUMBER(S)	HGL #50	METER HEAD DIFF.	1.81
STACK INSIDE DIM.(IN)	120.00 84.00		
PITOT TUBE COEFF.	.84	PROBE HEATER SETTING	0.
THERM. NO.		HEATER BOX SETTING	0.
LEAKAGE	.000 CFM @ .0 IN.HG		
METER CALIB. FACTOR	.963	K FACTOR	1375.0
READ & RECORD DATA EVERY	10.0 MINUTES		

TRAVERSE POINT NO.	SAMPLE TIME (MIN.)	CLOCK TIME (24-HR CLOCK)	GAS METER READING (CU.FT.)	VELOCITY HEAD (IN.H20)	ORIFICE PRESSURE DIFFERENTIAL (IN.H20)		STACK TEMP (DEG.F)	DRY GAS METER TEMP (DEG.F)		PUMP VACUUM (IN.HG)	IMPACTOR TEMP (DEG.F)	IMPINGER TEMP (DEG.F)
					DESIRED	ACTUAL		INLET	OUTLET			
INIT	0	1350	552.334									
C-14	10.0	0	554.080	.100	.08	.08	920.	95.	96.	.5	920.	0.
	20.0	0	555.900	.100	.08	.08	920.	96.	96.	.5	920.	0.
	30.0	0	557.300	.100	.08	.08	920.	96.	96.	.5	920.	0.
	40.0	0	559.460	.100	.08	.08	920.	98.	98.	.5	920.	0.
	50.0	0	561.305	.100	.08	.08	920.	98.	98.	.5	920.	0.
	60.0	0	563.140	.100	.08	.08	920.	100.	100.	.5	920.	0.
	70.0	0	564.950	.100	.08	.08	920.	100.	100.	.5	920.	0.
	80.0	0	566.740	.100	.08	.08	920.	100.	100.	.5	920.	0.
	90.0	0	568.550	.100	.08	.08	920.	102.	102.	.5	920.	0.
	100.0	0	570.430	.100	.08	.08	920.	102.	102.	.5	920.	0.
	110.0	0	572.200	.100	.08	.08	920.	102.	102.	.5	920.	0.
	120.0	0	574.120	.100	.08	.08	920.	102.	102.	.5	920.	0.
TOTALS	120.0		21.786									
AVERAGE					.08	.08	920.	99.	99.	.5	920.	0.

PERCENT ISOKINETIC 106.3

IMPACTOR FIELD DATA TABULATION

PLANT-NAME AND ADDRESS

DETROIT WATER & SEWER DEPT.

TEST TEAM LEADER

THRESS

TEST PSI-4 NO. 13 INLET

		ENGLISH UNITS		METRIC UNITS	
TEST DATE		06/22/85		06/22/85	
TH	TIME-START	1350		1350	
TF	TIME-FINISH	0		0	
TT	NET TIME OF TEST, MIN.	120.0		120.0	
Y	METER CALIBRATION FACTOR	.963		.963	
DN	SAMPLING NOZZLE DIAMETER	.235	IN	6.0	MM
CP	PITOT TUBE COEFFICIENT	.84		.84	
DM	AVERAGE ORIFICE PRESSURE DROP	.08	IN-H2O	2.0	MM-H2O
VM	VOLUME OF DRY GAS SAMPLED AT METER CONDITIONS	21.786	CU-FT	.617	CU-M
TM	AVERAGE GAS METER TEMP	99.3	F	37.4	C
VMSTD	VOLUME OF DRY GAS SAMPLED AT STANDARD CONDITIONS*	19.499	SCF	.552	SCM
VWC	VOLUME OF WATER VAPOR AT STANDARD CONDITIONS*	6.723	SCF	.190	SCM
BWO	PERCENT MOISTURE BY VOLUME	25.64		25.64	
FMD	MOLE FRACTION DRY GAS	.744		.744	
PCO2	PERCENT CO2 BY VOL., DRY	4.90		4.90	
PO2	PERCENT O2 BY VOL., DRY	13.00		13.00	
PCO	PERCENT CO BY VOL., DRY	.00		.00	
PN2	PERCENT N2 BY VOL., DRY	82.10		82.10	
MD	MOLECULAR WT-DRY STACK GAS	29.30		29.30	
MS	MOLECULAR WT-STACK GAS	26.41		26.41	
PB	BAROMETRIC PRESSURE	29.45	IN-HG	748.03	MM-HG
PSI	STATIC PRES OF STACK GAS	-1.10	IN-H2O	-27.94	MM-H2O
PS	K P ABS	29.3	IN-H	5.98	M-HG

TS	AVERAGE STACK TEMP	920.	F	493.	C
IF	GAS SAMPLED AT STACK CONDITIONS	69.82	ACF	1.98	ACM
AS	STACK AREA	10080.	SQ-IN	6.503	SQ-M
ISO	PERCENT ISOKINETIC	106.3		106.3	
MT	TOTAL MASS OF PARTICLES	4.534	GR	293.800	MG
PD	PARTICLE DENSITY	.06	GR/CC	1.00	GM/CC

* 68 DEG F, 29.92 IN.HG.

PLANT & CITY	DETROIT WATER & SEWER DEPT.
SAMPLING LOCATION	NO. 13 INLET
DATE	06/22/85
RUN NUMBER	PSI-4
OPERATOR	THRESS
STACK TEMP.	920.0F 493.3C
BAR.PRESS.(IN. HG)	29.45
STACK PRESS.(IN. HG)	29.37
NOZZLE I.D.(IN.)	.235
METER HEAD DIFF.	.080

IMPACTOR FLOWRATE(ACFM) AT IMPACTOR CONDITIONS		.582
IMPACTOR TEMP.	920.0F	493.3C
PARTICLE DENSITY(GM/CC)		1.00
MAX.PARTICLE DIAM.MICROS		100.0
GAS COMPOSITION(PERCENT):	CO2	3.64
	CO	.00
	N2	61.05
	O2	9.67
	H2O	25.64
SAMPLING DURATION(MIN.)		120.00

FIELD DATA

PLANT	DETROIT SEWAGE INCINERATOR	DATE	06/18/85
SAMPLING LOCATION	SCRUBBER OUTLET	RUN NUMBER	PSO-1
SAMPLE TYPE	PART SIZE	PROBE LENGTH & TYPE	6 FT STAINLESS
OPERATOR	KB DM	NOZZLE : I.D.	.194
AMBIENT TEMP.(DEG.F)	90.	ASSUMED MOISTURE	5.0
BAR.PRESS.(IN.HG)	29.50	SAMPLE BOX NUMBER	
STATIC PRESS.(IN.H2O)	#####	METER BOX NUMBER	FB3
FILTER NUMBER(S)	ANDERSON MARK 3	METER HEAD DIFF.	1.90
STACK INSIDE DIM.(IN)	53.00 .00		
PITOT TUBE COEFF.	.84	PROBE HEATER SETTING	0.
THERM. NO.		HEATER BOX SETTING	0.
LEAKAGE	.020 CFM @ 3.0 IN.HG		
METER CALIB. FACTOR	1.005	K FACTOR	807.3
READ & RECORD DATA EVERY	.0 MINUTES		

TRAVERSE POINT NO.	SAMPLE TIME (MIN.)	CLOCK TIME (24-HR CLOCK)	GAS METER READING (CU.FT.)	VELOCITY HEAD (IN.H2O)	ORIFICE PRESSURE DIFFERENTIAL (IN.H2O)		STACK TEMP (DEG.F)	DRY GAS METER TEMP (DEG.F)		PUMP VACUUM (IN.HG)	IMPACTOR TEMP (DEG.F)	IMPINGER TEMP (DEG.F)
					DESIRED	ACTUAL		INLET	OUTLET			
INIT	0	1632	441.230									
PT04	15.0	1647	450.410	.800	1.17	1.17	90.	94.	90.	2.5	90.	0.
	30.0	1702	459.500	.800	1.17	1.17	89.	98.	90.	2.5	89.	0.
	45.0	1717	468.660	.800	1.17	1.17	88.	102.	91.	2.5	88.	0.
	60.0	1732	477.900	.800	1.17	1.17	86.	104.	94.	2.5	86.	0.
TOTALS	60.0		36.670									
AVERAGE					1.17	1.17	88.	100.	91.	2.5	88.	0.

PERCENT ISOKINETIC 101.5

PLANT & CITY	DETROIT SEWAGE INCINERATOR		IMPACTOR FLOWRATE(ACFM)		.656
SAMPLING LOCATION	SCRUBBER OUTLET		AT IMPACTOR CONDITIONS IMPACTOR TEMP.	88.3F	31.3C
DATE	06/18/85		PARTICLE DENSITY(GM/CC)		1.00
RUN NUMBER	PSO-1		MAX.PARTICLE DIAM.MICROS		100.0
OPERATOR	KB DM		GAS COMPOSITION(PERCENT):	CO2	3.25
STACK TEMP.	88.3F	31.3C		CO	.00
BAR.PRESS.(IN. HG)	29.50			N2	76.97
STACK PRESS.(IN. HG)	28.63			O2	15.28
NOZZLE:I.D.(IN.)	.194			H2O	4.50
METER HEAD DIFF.	1.170		SAMPLING DURATION(MIN.)		60.00

CALC. MASS LOADING = 1.5799E-02 GR/ACF 1.7952E-02 GR/DSCF 3.6155E+01 MG/ACM 4.1080E+01 MG/DSCM

IMPACTOR STAGE	S1	S2	S3	S4	S5	S6	S7	S8	FILTER
STAGE INDEX NUMBER	1	2	3	4	5	6	7	8	9
D50 (MICROMETERS)	9.11	5.03	5.19	3.31	1.79	.86	.60	.32	
MASS (MILLIGRAMS)	6.10	.20	.90	.60	.80	1.60	5.30	4.20	20.60
MG/DSCM/STAGE	6.20E+00	2.03E-01	9.14E-01	6.10E-01	8.13E-01	1.63E+00	5.38E+00	4.27E+00	2.09E+01
CUM. PERCENT OF MASS SMALLER THAN D50	84.86	84.37	82.13	80.65	78.66	74.69	61.54	51.12	
CUM. (MG/ACM) SMALLER THAN D50	3.07E+01	3.05E+01	2.97E+01	2.92E+01	2.84E+01	2.70E+01	2.22E+01	1.85E+01	
CUM. (MG/DSCM) SMALLER THAN D50	3.49E+01	3.47E+01	3.37E+01	3.31E+01	3.23E+01	3.07E+01	2.53E+01	2.10E+01	
CUM. (GR/ACF) SMALLER THAN D50	1.34E-02	1.33E-02	1.30E-02	1.27E-02	1.24E-02	1.18E-02	9.72E-03	8.08E-03	
CUM. (GR/DSCF) SMALLER THAN D50	1.52E-02	1.51E-02	1.47E-02	1.45E-02	1.41E-02	1.34E-02	1.10E-02	9.18E-03	
GEO. MEAN DIA. (MICROMETERS)	3.02E+01	8.55E+00	6.46E+00	4.14E+00	2.44E+00	1.24E+00	7.19E-01	4.41E-01	2.28E-01
DM/DLOGD (MG/DSCM)	5.95E+00	3.73E+00	4.81E+00	3.13E+00	3.05E+00	5.08E+00	3.49E+01	1.58E+01	6.95E+01
DN/DLOGD (NO. PARTICLES/DSCM)	4.14E+05	1.14E+07	3.42E+07	8.40E+07	4.03E+08	5.07E+09	1.79E+11	3.52E+11	1.12E+13

STANDARD CONDITIONS ARE 20 DEGC AND 760MM HG.

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

PLANT & CITY	DETROIT SEWAGE INCINERATOR		IMPACTOR FLOWRATE(ACFM)		.656
SAMPLING LOCATION	SCRUBBER OUTLET		AT IMPACTOR CONDITIONS		
DATE	06/18/85		IMPACTOR TEMP.	88.3F	31.3C
RUN NUMBER	PSD-1		PARTICLE DENSITY(GM/CC)		1.00
OPERATOR	KB DM		MAX.PARTICLE DIAM.MICROS		100.0
STACK TEMP.	88.3F	31.3C	GAS COMPOSITION(PERCENT):	CO2	3.25
BAR.PRESS.(IN. HG)	29.50			CO	.00
STACK PRESS.(IN. HG)	28.63			N2	76.97
NOZZLE:I.D.(IN.)	.194			O2	15.28
METER HEAD DIFF.	1.170			H2O	4.50
			SAMPLING DURATION(MIN.)		60.00

CALC. MASS LOADING = 1.5799E-02 GR/ACF 1.7952E-02 GR/DSCF 3.6155E+01 MG/ACM 4.1080E+01 MG/DSCM

IMPACTOR STAGE	S1	S2	S3	S4	S5	S6	S7	S8	FILTER
STAGE INDEX NUMBER	1	2	3	4	5	6	7	8	9
D50 (MICROMETERS)	9.19	8.12	5.27	3.40	1.88	.94	.68	.40	
MASS (MILLIGRAMS)	6.10	.20	.90	.60	.80	1.60	5.30	4.20	20.60
MG/DSCM/STAGE	6.20E+00	2.03E-01	9.14E-01	6.10E-01	8.13E-01	1.63E+00	5.38E+00	4.27E+00	2.09E+01
CUM. PERCENT OF MASS SMALLER THAN D50	84.86	84.37	82.13	80.65	78.66	74.69	61.54	51.12	
CUM. (MG/ACM) SMALLER THAN D50	3.07E+01	3.05E+01	2.97E+01	2.92E+01	2.84E+01	2.70E+01	2.22E+01	1.85E+01	
CUM. (MG/DSCM) SMALLER THAN D50	3.49E+01	3.47E+01	3.37E+01	3.31E+01	3.23E+01	3.07E+01	2.53E+01	2.10E+01	
CUM. (GR/ACF) SMALLER THAN D50	1.34E-02	1.33E-02	1.30E-02	1.27E-02	1.24E-02	1.18E-02	9.72E-03	8.08E-03	
CUM. (GR/DSCF) SMALLER THAN D50	1.52E-02	1.51E-02	1.47E-02	1.45E-02	1.41E-02	1.34E-02	1.10E-02	9.18E-03	
GEO. MEAN DIA. (MICROMETERS)	3.03E+01	8.64E+00	6.54E+00	4.23E+00	2.52E+00	1.33E+00	8.01E-01	5.25E-01	2.85E-01
DM/DLOGD (MG/DSCM)	5.98E+00	3.77E+00	4.87E+00	3.19E+00	3.16E+00	5.41E+00	3.87E+01	1.87E+01	6.95E+01
DN/DLOGD (NO. PARTICLES/DSCM)	4.10E+05	1.12E+07	3.33E+07	8.05E+07	3.75E+08	4.41E+09	1.44E+11	2.47E+11	5.71E+12

STANDARD CONDITIONS ARE 20 DEGC AND 760MM HG.

AERODYNAMIC DIAMETERS ARE CALCULATED HERE ACCORDING TO MERCER.

IMPACTOR FIELD DATA TABULATION

PLANT-NAME AND ADDRESS

DETROIT SEWAGE INCINERATOR

TEST TEAM LEADER

KR DM

TEST PSO-1 SCRUBBER OUTLET

		ENGLISH UNITS	METRIC UNITS
TEST DATE		06/18/85	06/18/85
TB	TIME-START	1632	1632
TF	TIME-FINISH	1732	1732
TT	NET TIME OF TEST, MIN.	60.0	60.0
Y	METER CALIBRATION FACTOR	1.005	1.005
DN	SAMPLING NOZZLE DIAMETER	.194 IN	4.9 MM
CP	PITOT TUBE COEFFICIENT	.84	.84
PM	AVERAGE ORIFICE PRESSURE DROP	1.17 IN-H20	29.7 MM-H20
VM	VOLUME OF DRY GAS SAMPLED AT METER CONDITIONS	36.670 CU-FT	1.038 CU-M
TM	AVERAGE GAS METER TEMP	95.4 F	35.2 C
VMSTD	VOLUME OF DRY GAS SAMPLED AT STANDARD CONDITIONS*	34.646 SCF	.981 SCM
VWC	VOLUME OF WATER VAPOR AT STANDARD CONDITIONS*	1.633 SCF	.046 SCM
BWO	PERCENT MOISTURE BY VOLUME	4.50	4.50
FMD	MOLE FRACTION DRY GAS	.955	.955
PCO2	PERCENT CO2 BY VOL., DRY	3.40	3.40
PO2	PERCENT O2 BY VOL., DRY	16.00	16.00
PCO	PERCENT CO BY VOL., DRY	.00	.00
PN2	PERCENT N2 BY VOL., DRY	80.60	80.60
MD	MOLECULAR WT-DRY STACK GAS	29.18	29.18
MWS	MOLECULAR WT-STACK GAS	28.68	28.68
PB	BAROMETRIC PRESSURE	29.50 IN-HG	749.30 MM-HG
PSI	STATIC PRES OF STACK GAS	-11.80 IN-H20	-299.72 MM-H20
PS	STACK PRES, ABS.	28.63 IN-HG	727.26 MM-HG

TS	AVERAGE STACK TEMP	88.	F	31.	C
IF	GAS SAMPLED AT STACK CONDITIONS	39.36	ACF	1.11	ACM
AS	STACK AREA	2206.	SQ-IN	1.423	SQ-M
ISO	PERCENT ISOKINETIC	101.5		101.5	
MT	TOTAL MASS OF PARTICLES	.622	GR	40.300	MG
PD	PARTICLE DENSITY	.06	GR/CI	1.00	GM/CC

* 68 DEG F, 29.92 IN.HG.

IMPACTOR RESULTS AND EXAMPLE CALCULATIONS

PLANT-NAME AND CITY	TEST TEAM LEADER	RUN NO	SAMPLE LOCATION
DETROIT SEWAGE INCINERATOR	KH DM	PSD-1	SCRUBBER OUTLET
TEST DATE 06/18/85			

CALC. MASS LOADING — TOTAL MASS OF PARTICLES DIVIDED BY A VOLUME. UNITS GIVEN ARE GRAINS PER ACTUAL* CUBIC FOOT(GR/ACF),GRAINS PER DRY STANDARD** CUBIC FOOT(GR/DSCF), MILLIGRAMS PER ACTUAL CUBIC METER(MG/ACM) AND MILLIGRAMS PER DRY STANDARD CUBIC METER(MG/DSCM.)

EXAMPLE CALCULATIONS

CML(GR/ACF) = MT(GR) / IF(ACF)

CML = .622 / 39.364 = .0158 GR/ACF

CML(GR/DSCF) = MT(GR) / VMSTD(DSCF)

CML = .622 / 34.646 = .0180 GR/DSCF

CML(MG/ACM) = MT(MG) / IF(ACM)

CML = 40.300 / 1.115 = 36.1545 MG/ACM

CML(MG/DSCM) = MT(MG) / VMSTD(DSCM)

CML = 40.300 / .981 = 41.0797 MG/DSCM

D50 (MICROMETERS) — THE SIZE OF THE PARTICLES ON EACH STAGE ASSUMING A 50 PERCENT COLLECTION EFFICIENCY DEFINITION

MASS (MILLIGRAMS) — THE MASS ON EACH STAGE COLLECTED

MG/DSCM/STAGE — THE MASS LOADING FOR EACH STAGE. UNITS GIVEN ARE MILLIGRAMS PER DRY STANDARD CUBIC METER FOR EACH STAGE(MG/DSCM/STAGE)

EXAMPLE CALCULATIONS

MG/DSCM/STAGE(1) = MASS(1) / VMSTD(DSCM)

MG/DSCM/STAGE(1) = 6.10 / .981 = 6.20

CUM. PERCENT OF MASS — THE PERCENTAGE OF THE TOTAL MASS SAMPLED SMALLER IN DIAMETER THAN THE CORRESPONDING D50 INDICATED FOR THAT STAGE

EXAMPLE CALCULATIONS

$$\text{CUM \% (6)} = \frac{\text{MASS(7)} + \text{MASS(8)} + \text{MASS(9)}}{\text{MT (MG)}} * 100 =$$

$$\text{CUM \% (6)} = \frac{5.30 + 4.20 + 20.60}{40.30 \text{ (MG)}} * 100 = 78.66$$

CUM.(MASS/VOLUME) THE CUMULATIVE MASS LOADING OF PARTICLES SMALLER IN DIAMETER THAN THE CORRESPONDING D50. MASS/VOLUME UNITS ARE MG/ACM, MG/DSCM, GR/ACF, GR/DSCF.

EXAMPLE CALCULATIONS

$$\text{CUM.(MG/ACM) (5)} = \frac{\text{MASS(6)} + \text{MASS(7)} + \text{MASS(8)} + \text{MASS(9)}}{\text{IF(ACM)}}$$

$$\text{CUM.(MG/ACM) (5)} = \frac{1.60 + 5.30 + 4.20 + 20.60}{1.11 \quad \text{(ACM)}} = 28.44$$

GEO.MEAN DIA.(MICROMETERS) THE GEOMETRIC MEAN DIAMETER IN MICROMETERS FOR A PARTICULAR STAGE.

EXAMPLE CALCULATION

$$\text{GEO.MEAN DIA.(J)} = \text{SQRT(D50(J) * D50(J-1))}$$

$$\text{GEO.MEAN DIA.(6)} = \text{SQRT(} .94 * 1.88) = 1.33$$

DM/DLOGD(MG/DSCM) DM IS MG/DSCM/STAGE(J) AND DLOGD IS LOG10(D50(J-1) / D50(J)) WHERE J IS THE CORRESPONDING STAGE NUMBER. FOR STAGE 1 THE MAXIMUM PARTICLE DIAMETER IS USED. FOR STAGE 9 (BACKUP FILTER) THE D50 IS ASSUMED AS .5 * D50 OF STAGE 8.

EXAMPLE CALCULATION

$$\text{DM/DLOGD(J)} = \frac{\text{MG/DSCM/STAGE(J)}}{\text{LOG(D50(J-1) / D50(J))}}$$

$$\text{DM/DLOGD (3)} = \frac{.91}{\text{LOG(} 8.12 / 5.27)} = 4.87$$

DN/DLOGD THE NUMBER OF PARTICLES PER UNIT VOLUME FOR A STAGE.

EXAMPLE CALCULATION

$$\text{DN/DLOGD(J)} = \frac{\text{DM/DLOGD(J)}}{5.23599E\text{-}10 * \text{PD(GM/CC)} * \text{GEO.MEAN DIA.(J)}}$$

$$\text{DN/DLOGD (3)} = \frac{4.87}{5.235999E\text{-}10 * 1.00 * 6.54} = 33251816.00$$

* CALCULATED AT STACK CONDITIONS
** CALCULATED AT STANDARD CONDITIONS
** DEG.F AND 29.92 INCHES OF HG (760 MMHG)

FIELD DATA

PLANT	DETROIT WATER & SEWAGE	DATE	06/19/85
SAMPLING LOCATION	OUTLET	RUN NUMBER	PSO-2
SAMPLE TYPE	PARTICLE SIZE	PROBE LENGTH & TYPE	6 FT STEEL
OPERATOR	D MCNEAL K BATT	NOZZLE : I.D.	.194
AMBIENT TEMP.(DEG.F)	90.	ASSUMED MOISTURE	5.0
BAR.PRESS.(IN.HG)	29.80	SAMPLE BOX NUMBER	
STATIC PRESS.(IN.H2O)	#####	METER BOX NUMBER	FB3
FILTER NUMBER(S)	ANDERSON	METER HEAD DIFF.	1.90
STACK INSIDE DIM.(IN)	53.00 .00		
PITOT TUBE COEFF.	.84	PROBE HEATER SETTING	0.
THERM. NO.		HEATER BOX SETTING	0.
LEAKAGE	.002 CFM @ 5.0 IN.HG		
METER CALIB. FACTOR	1.005	K FACTOR	807.3
READ & RECORD DATA EVERY	.0 MINUTES		

TRAVERSE POINT NO.	SAMPLE TIME (MIN.)	CLOCK TIME (24-HR CLOCK)	GAS METER READING (CU.FT.)	VELOCITY HEAD (IN.H2O)	ORIFICE PRESSURE DIFFERENTIAL (IN.H2O)		STACK TEMP (DEG.F)	DRY GAS METER TEMP (DEG.F)		PUMP VACUUM (IN.HG)	IMPACTOR TEMP (DEG.F)	IMPINGER TEMP (DEG.F)
					DESIRED	ACTUAL		INLET	OUTLET			
INIT	0	1315	478.100									
PT04	5.0	1320	480.935	.700	1.02	1.02	95.	90.	88.	2.0	95.	0.
	10.0	1453	483.940	.700	1.02	1.02	95.	90.	88.	2.0	95.	0.
	15.0	1458	486.780	.700	1.02	1.02	95.	92.	90.	2.0	95.	0.
	20.0	1503	489.610	.700	1.02	.10	95.	95.	90.	2.0	95.	0.
	25.0	1508	492.430	.700	1.02	1.02	95.	98.	90.	2.0	95.	0.
	30.0	1513	495.280	.700	1.02	1.02	95.	100.	90.	2.0	95.	0.
TOTALS	30.0		17.180									
AVERAGE					1.02	.87	95.	94.	89.	2.0	95.	0.

PERCENT ISOKINETIC 103.3

PLANT & CITY	DETROIT WATER & SEWAGE		
SAMPLING LOCATION	OUTLET		
DATE	06/19/85		
RUN NUMBER	PSO-2		
OPERATOR	D MCNEAL & BATT		
STACK TEMP.	95.0F	35.0C	
BAR.PRESS.(IN. HG)	29.80		
STACK PRESS.(IN. HG)	28.93		
NOZZLE:I.D.(IN.)	.194		
METER HEAD DIFF.	.867		

IMPACTOR FLOWRATE(ACFM) AT IMPACTOR CONDITIONS		.625	
IMPACTOR TEMP.	95.0F	35.0C	
PARTICLE DENSITY(GM/CC)		1.00	
MAX.PARTICLE DIAM.MICROS		100.0	
GAS COMPOSITION(PERCENT):	CO2	3.82	
	CO	.00	
	N2	78.38	
	O2	13.38	
	H2O	4.41	
SAMPLING DURATION(MIN.)		30.00	

CALC. MASS LOADING = 2.3946E-02 GR/ACF 2.7232E-02 GR/DSCF 5.4797E+01 MG/ACM 6.2317E+01 MG/DSCM

IMPACTOR STAGE	S1	S2	S3	S4	S5	S6	S7	S8	FILTER
STAGE INDEX NUMBER	1	2	3	4	5	6	7	8	9
D50 (MICROMETERS)	9.36	8.26	5.33	3.40	1.85	.88	.62	.33	
MASS (MILLIGRAMS)	4.30	.20	.40	.40	.40	.90	2.40	5.20	14.90
MG/DSCM/STAGE	9.18E+00	4.27E-01	8.54E-01	8.54E-01	8.54E-01	1.92E+00	5.12E+00	1.11E+01	3.18E+01
CUM. PERCENT OF MASS SMALLER THAN D50	85.22	84.54	83.16	81.79	80.41	77.32	69.07	51.20	
CUM. (MG/ACM) SMALLER THAN D50	4.67E+01	4.63E+01	4.56E+01	4.48E+01	4.41E+01	4.24E+01	3.78E+01	2.81E+01	
CUM. (MG/DSCM) SMALLER THAN D50	5.31E+01	5.27E+01	5.18E+01	5.10E+01	5.01E+01	4.82E+01	4.30E+01	3.19E+01	
CUM. (GR/ACF) SMALLER THAN D50	2.04E-02	2.02E-02	1.99E-02	1.96E-02	1.93E-02	1.85E-02	1.65E-02	1.23E-02	
CUM. (GR/DSCF) SMALLER THAN D50	2.32E-02	2.30E-02	2.26E-02	2.23E-02	2.19E-02	2.11E-02	1.88E-02	1.39E-02	
GEO. MEAN DIA. (MICROMETERS)	3.06E+01	8.79E+00	6.63E+00	4.26E+00	2.51E+00	1.28E+00	7.41E-01	4.56E-01	2.37E-01
DN/DLOGD (MG/DSCM)	8.92E+00	7.84E+00	4.49E+00	4.38E+00	3.21E+00	6.01E+00	3.33E+01	4.13E+01	1.06E+02
DN/DLOGD (NO. PARTICLES/DSCM)	5.95E+05	2.21E+07	2.94E+07	1.08E+08	3.89E+08	5.50E+09	1.56E+11	8.34E+11	1.52E+13

STANDARD CONDITIONS ARE 20 DEGC AND 760MM HG.

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

PLANT & CITY	DETROIT WATER & SEWAGE		IMPACTOR FLOWRATE(ACFM)	.625
SAMPLING LOCATION	OUTLET		AT IMPACTOR CONDITIONS	
DATE	06/19/85		IMPACTOR TEMP.	95.0F 35.0C
RUN NUMBER	PSD-2		PARTICLE DENSITY(GM/CC)	1.00
OPERATOR	D MCNEAL K BATT		MAX.PARTICLE DIAM.MICROS	100.0
STACK TEMP.	95.0F 35.0C		GAS COMPOSITION(PERCENT): CO2	3.82
BAR.PRESS.(IN. HG)	29.80		CO	.00
STACK PRESS.(IN. HG)	28.93		N2	78.38
NOZZLE:I.D.(IN.)	.194		O2	13.38
METER HEAD DIFF.	.867		H2O	4.41
			SAMPLING DURATION(MIN.)	30.00

CALC. MASS LOADING = 2.3946E-02 GR/ACF 2.7232E-02 GR/DSCF 5.4797E+01 MG/ACM 6.2317E+01 MG/DSCM

IMPACTOR STAGE	S1	S2	S3	S4	S5	S6	S7	S8	FILTER
STAGE INDEX NUMBER	1	2	3	4	5	6	7	8	9
D50 (MICROMETERS)	9.44	8.34	5.41	3.49	1.93	.97	.70	.42	
MASS (MILLIGRAMS)	4.30	.20	.40	.40	.40	.90	2.40	5.20	14.90
MG/DSCM/STAGE	9.18E+00	4.27E-01	8.54E-01	8.54E-01	8.54E-01	1.92E+00	5.12E+00	1.11E+01	3.18E+01
CUM. PERCENT OF MASS SMALLER THAN D50	85.22	84.54	83.16	81.79	80.41	77.32	69.07	51.20	
CUM. (MG/ACM) SMALLER THAN D50	4.67E+01	4.63E+01	4.56E+01	4.48E+01	4.41E+01	4.24E+01	3.78E+01	2.81E+01	
CUM. (MG/DSCM) SMALLER THAN D50	5.31E+01	5.27E+01	5.18E+01	5.10E+01	5.01E+01	4.82E+01	4.30E+01	3.19E+01	
CUM. (GR/ACF) SMALLER THAN D50	2.04E-02	2.02E-02	1.99E-02	1.96E-02	1.93E-02	1.85E-02	1.65E-02	1.23E-02	
CUM. (GR/DSCF) SMALLER THAN D50	2.32E-02	2.30E-02	2.26E-02	2.23E-02	2.19E-02	2.11E-02	1.88E-02	1.39E-02	
GEO. MEAN DIA. (MICROMETERS)	3.07E+01	8.87E+00	6.72E+00	4.35E+00	2.59E+00	1.37E+00	8.23E-01	5.40E-01	2.94E-01
DM/DLOGD (MG/DSCM)	8.95E+00	7.92E+00	4.55E+00	4.47E+00	3.32E+00	6.40E+00	3.68E+01	4.88E+01	1.06E+02
DN/DLOGD (NO. PARTICLES/DSCM)	5.89E+05	2.16E+07	2.86E+07	1.04E+08	3.63E+08	4.80E+09	1.26E+11	5.92E+11	7.97E+12

STANDARD CONDITIONS ARE 20 DEGC AND 760MM HG.

AERODYNAMIC DIAMETERS ARE CALCULATED HERE ACCORDING TO MERCER.

IMPACTOR FIELD DATA TABULATION

PLANT-NAME AND ADDRESS | TEST TEAM LEADER

DETROIT WATER & SEWAGE | D MCNEAL K HATT

TEST PSO-2 OUTLET

		ENGLISH UNITS	METRIC UNITS
TEST DATE		06/19/85	06/19/85
TB	TIME-START	1315	1315
TF	TIME-FINISH	1513	1513
TT	NET TIME OF TEST, MIN.	30.0	30.0
Y	METER CALIBRATION FACTOR	1.005	1.005
DN	SAMPLING NOZZLE DIAMETER	.194 IN	4.9 MM
CP	PITOT TUBE COEFFICIENT	.84	.84
PM	AVERAGE ORIFICE PRESSURE DROP	.87 IN-H2O	22.0 MM-H2O
VM	VOLUME OF DRY GAS SAMPLED AT METER CONDITIONS	17.180 CU-FT	.486 CU-M
TM	AVERAGE GAS METER TEMP	91.8 F	33.2 C
VMSTD	VOLUME OF DRY GAS SAMPLED AT STANDARD CONDITIONS*	16.492 SCF	.467 SCM
VWC	VOLUME OF WATER VAPOR AT STANDARD CONDITIONS*	.761 SCF	.022 SCM
BWO	PERCENT MOISTURE BY VOLUME	4.41	4.41
FMD	MOLE FRACTION DRY GAS	.956	.956
PCO2	PERCENT CO2 BY VOL., DRY	4.00	4.00
PO2	PERCENT O2 BY VOL., DRY	14.00	14.00
PCO	PERCENT CO BY VOL., DRY	.00	.00
PN2	PERCENT N2 BY VOL., DRY	82.00	82.00
MD	MOLECULAR WT-DRY STACK GAS	29.20	29.20
MWS	MOLECULAR WT-STACK GAS	28.71	28.71
PB	BAROMETRIC PRESSURE	29.80 IN-HG	756.92 MM-HG
PST	STATIC PRES OF STACK GAS	-11.80 IN-H2O	-299.72 MM-H2O
PS	STACK PRES. ABS.	28.94 IN-HG	734.88 MM-HG

TS	AVERAGE STACK TEMP	95. F	35. C
IF	GAS SAMPLED AT STACK CONDITIONS	18.75 ACF	.53 ACM
AS	STACK AREA	2206. SQ-IN	1.423 SQ-M
ISO	PERCENT ISOKINETIC	103.3	103.3
MT	TOTAL MASS OF PARTICLES	.449 GR	29.100 MG
PD	PARTICLE DENSITY	.06 GR/CI	1.00 GM/CC

* 68 DEG F, 29.92 IN.HG.

IMPACTOR RESULTS AND EXAMPLE CALCULATIONS

PLANT-NAME AND CITY	TEST TEAM LEADER	RUN NO	SAMPLE LOCATION
DETROIT WATER & SEWAGE	D MCNEAL K BATT	PSD-2	OUTLET
TEST DATE 06/19/85			

CALC. MASS LOADING — TOTAL MASS OF PARTICLES DIVIDED BY A VOLUME. UNITS GIVEN ARE GRAINS PER ACTUAL* CUBIC FOOT(GR/ACF),GRAINS PER DRY STANDARD** CUBIC FOOT(GR/DSCF), MILLIGRAMS PER ACTUAL CUBIC METER(MG/ACM) AND MILLIGRAMS PER DRY STANDARD CUBIC METER(MG/DSCM.)

EXAMPLE CALCULATIONS

CML(GR/ACF) = MT(GR) / IF(ACF)

CML. = .449 / 18.754 = .0239 GR/ACF

CML(GR/DSCF) = MT(GR) / VMSTD(DSCF)

CML. = .449 / 16.492 = .0272 GR/DSCF

CML(MG/ACM) = MT(MG) / IF(ACM)

CML. = 29.100 / .531 = 54.7971 MG/ACM

CML(MG/DSCM) = MT(MG) / VMSTD(DSCM)

CML. = 29.100 / .467 = 62.3169 MG/DSCM

D50 (MICROMETERS) — THE SIZE OF THE PARTICLES ON EACH STAGE ASSUMING A 50 PERCENT COLLECTION EFFICIENCY DEFINITION

MASS (MILLIGRAMS) — THE MASS ON EACH STAGE COLLECTED

MG/DSCM/STAGE — THE MASS LOADING FOR EACH STAGE. UNITS GIVEN ARE MILLIGRAMS PER DRY STANDARD CUBIC METER FOR EACH STAGE(MG/DSCM/STAGE)

EXAMPLE CALCULATIONS

MG/DSCM/STAGE(1) = MASS(1) / VMSTD(DSCM)

MG/DSCM/STAGE(1) = 4.30 / .467 = 9.18

CUM. PERCENT OF MASS — THE PERCENTAGE OF THE TOTAL MASS SAMPLED SMALLER IN DIAMETER THAN THE CORRESPONDING D50 INDICATED FOR THAT STAGE

EXAMPLE CALCULATIONS

$$\text{CUM \% (6)} = \frac{\text{MASS(7)} + \text{MASS(8)} + \text{MASS(9)}}{\text{MT (MG)}} * 100 =$$

$$\text{CUM \% (6)} = \frac{2.40 + 5.20 + 14.90}{29.10 \text{ (MG)}} * 100 = 80.41$$

CUM.(MASS/VOLUME) THE CUMULATIVE MASS LOADING OF PARTICLES SMALLER IN DIAMETER THAN THE CORRESPONDING D50. MASS/VOLUME UNITS ARE MG/ACM, MG/DSCM,GR/ACF,GR/DSCF.

EXAMPLE CALCULATIONS

$$\text{CUM.(MG/ACM) (5)} = \frac{\text{MASS(6)} + \text{MASS(7)} + \text{MASS(8)} + \text{MASS(9)}}{\text{IF(ACM)}}$$

$$\text{CUM.(MG/ACM) (5)} = \frac{.90 + 2.40 + 5.20 + 14.90}{.53 \ \text{(ACM)}} = 44.06$$

GEO.MEAN DIA.(MICROMETERS) THE GEOMETRIC MEAN DIAMETER IN MICROMETERS FOR A PARTICULAR STAGE.

EXAMPLE CALCULATION

$$\text{GEO.MEAN DIA.(J)} = \text{SQRT(D50(J) * D50(J-1))}$$

$$\text{GEO.MEAN DIA.(6)} = \text{SQRT(} .97 * 1.93) = 1.37$$

DM/DLOGD(MG/DSCM) DM IS MG/DSCM/STAGE(J) AND DLOGD IS LOG10(D50(J-1) / D50(J)) WHERE J IS THE CORRESPONDING STAGE NUMBER. FOR STAGE 1 THE MAXIMUM PARTICLE DIAMETER IS USED. FOR STAGE 9 (BACKUP FILTER) THE D50 IS ASSUMED AS .5 * D50 OF STAGE 8.

EXAMPLE CALCULATION

$$\text{DM/DLOGD(J)} = \frac{\text{MG/DSCM/STAGE(J)}}{\text{LOG(D50(J-1) / D50(J))}}$$

$$\text{DM/DLOGD (3)} = \frac{.85}{\text{LOG(} 8.34 / 5.41)} = 4.55$$

DN/DLOGD THE NUMBER OF PARTICLES PER UNIT VOLUME FOR A STAGE.

EXAMPLE CALCULATION

$$\text{DN/DLOGD(J)} = \frac{\text{DM/DLOGD(J)}}{\text{5.23599E-10 * PD(GM/CC) * GEO.MEAN DIA.(J)}}$$

$$\text{DN/DLOGD (3)} = \frac{4.55}{\text{5.235999E-10} * 1.00 * 6.72} = 28639712.00$$

* CALCULATED AT STACK CONDITIONS
** CALCULATED AT STANDARD CONDITIONS
68 DEG.F AND 29.92 INCHES OF HG (760 MMHG)

FIELD DATA

PLANT	DETROIT WATER & SEWAGE	DATE	06/20/85
SAMPLING LOCATION	SCRUBBER OUTLET	RUN NUMBER	P80-3
SAMPLE TYPE	PARTICLE SIZE	PROBE LENGTH & TYPE	6 FT STAINLESS
OPERATOR	DMCNEAL K BATT	NOZZLE : I.D.	.194
AMBIENT TEMP.(DEG.F)	90.	ASSUMED MOISTURE	5.0
BAR.PRESS.(IN.HG)	29.80	SAMPLE BOX NUMBER	
STATIC PRESS.(IN.H2O)	#####	METER BOX NUMBER	F83
FILTER NUMBER(S)	ANDERSON	METER HEAD DIFF.	1.90
STACK INSIDE DIM.(IN)	53.00 .00		
PITOT TUBE COEFF.	.84	PROBE HEATER SETTING	0.
THERM. NO.		HEATER BOX SETTING	0.
LEAKAGE	.000 CFM @ 4.0 IN.HG		
METER CALIB. FACTOR	1.005	K FACTOR	807.3
READ & RECORD DATA EVERY	5.0 MINUTES		

TRAVERSE POINT NO.	SAMPLE TIME (MIN.)	CLOCK TIME (24-HR CLOCK)	GAS METER READING (CU.FT.)	VELOCITY HEAD (IN.H2O)	ORIFICE PRESSURE DIFFERENTIAL (IN.H2O)		STACK TEMP (DEG.F)	DRY GAS METER TEMP (DEG.F)		PUMP VACUUM (IN.HG)	IMPACTOR TEMP (DEG.F)	IMPINGER TEMP (DEG.F)
					DESIRED	ACTUAL		INLET	OUTLET			
INIT	0	1323	495.619									
PT03	5.0	1328	498.630	.800	1.18	1.18	88.	94.	92.	.5	88.	0.
	10.0	1333	501.680	.800	1.18	1.18	88.	96.	92.	1.0	88.	0.
	15.0	1338	504.660	.800	1.18	1.18	88.	98.	92.	1.0	88.	0.
	20.0	1343	507.670	.800	1.18	1.18	88.	100.	92.	1.0	88.	0.
TOTALS	20.0		12.051									
AVERAGE					1.18	1.18	88.	97.	92.	.9	88.	0.

PERCENT ISOKINETIC 101.5

PLANT & CITY	DETROIT WATER & SEWAGE		IMPACTOR FLOWRATE(ACFM)	.653
SAMPLING LOCATION	SCRUBBER OUTLET		AT IMPACTOR CONDITIONS	
DATE	06/20/85		IMPACTOR TEMP.	88.0F 31.1C
RUN NUMBER	PSO-3		PARTICLE DENSITY(GM/CC)	1.00
OPERATOR	DMCNEAL K BATT		MAX.PARTICLE DIAM.MICROS	100.0
STACK TEMP.	88.0F	31.1C	GAS COMPOSITION(PERCENT): CO2	4.36
BAR.PRESS.(IN. HG)	29.80		CO	.00
STACK PRESS.(IN. HG)	28.93		N2	77.67
NOZZLE:I.D.(IN.)	.194		O2	12.69
METER HEAD DIFF.	1.180		H2O	5.28
			SAMPLING DURATION(MIN.)	20.00

CALC. MASS LOADING = 1.5015E-02 GR/ACF 1.7014E-02 GR/DSCF 3.4359E+01 MG/ACM 3.8935E+01 MG/DSCM

IMPACTOR STAGE	S1	S2	S3	S4	S5	S6	S7	S8	FILTER
STAGE INDEX NUMBER	1	2	3	4	5	6	7	8	9
D50 (MICROMETERS)	9.09	8.02	5.18	3.31	1.79	.86	.60	.32	
MASS (MILLIGRAMS)	3.20	.20	.10	.00	.30	.20	.90	.60	7.20
MG/DSCM/STAGE	9.78E+00	6.11E-01	3.06E-01	0.00E+00	9.17E-01	6.11E-01	2.75E+00	1.83E+00	2.20E+01
CUM. PERCENT OF MASS SMALLER THAN D50	74.80	73.23	72.44	72.44	70.08	68.50	61.42	56.69	
CUM. (MG/ACM) SMALLER THAN D50	2.57E+01	2.52E+01	2.49E+01	2.49E+01	2.41E+01	2.35E+01	2.11E+01	1.95E+01	
CUM. (MG/DSCM) SMALLER THAN D50	2.91E+01	2.85E+01	2.82E+01	2.82E+01	2.73E+01	2.67E+01	2.39E+01	2.21E+01	
CUM. (GR/ACF) SMALLER THAN D50	1.12E-02	1.10E-02	1.09E-02	1.09E-02	1.05E-02	1.03E-02	9.22E-03	8.51E-03	
CUM. (GR/DSCF) SMALLER THAN D50	1.27E-02	1.25E-02	1.23E-02	1.23E-02	1.19E-02	1.17E-02	1.04E-02	9.65E-03	
GEO. MEAN DIA. (MICROMETERS)	3.01E+01	8.54E+00	6.44E+00	4.14E+00	2.43E+00	1.24E+00	7.19E-01	4.41E-01	2.29E-01
DM/DLOGD (MG/DSCM)	9.39E+00	1.12E+01	1.61E+00	0.00E+00	3.45E+00	1.91E+00	1.78E+01	6.80E+00	7.31E+01
DN/DLOGD (NO. PARTICLES/DSCM)	6.54E+05	3.45E+07	1.15E+07	0.00E+00	4.57E+08	1.91E+09	9.17E+10	1.51E+11	1.17E+13

STANDARD CONDITIONS ARE 20 DEGC AND 760MM HG.

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

PLANT & CITY	DETROIT WATER & SEWAGE			
SAMPLING LOCATION	SCRUBBER OUTLET			
DATE	06/20/85			
RUN NUMBER	PSD-3			
OPERATOR	DMCNEAL & BATT			
STACK TEMP.	88.0F	31.1C		
BAR.PRESS.(IN. HG)	29.80			
STACK PRESS.(IN. HG)	28.93			
NOZZLE:I.D.(IN.)	.194			
METER HEAD DIFF.	1.180			

IMPACTOR FLOWRATE(ACFM) AT IMPACTOR CONDITIONS			.653	
IMPACTOR TEMP.		88.0F	31.1C	
PARTICLE DENSITY(GM/CC)			1.00	
MAX.PARTICLE DIAM.MICROS			100.0	
GAS COMPOSITION(PERCENT):	CO2		4.36	
	CO		.00	
	N2		77.67	
	O2		12.69	
	H2O		5.28	
SAMPLING DURATION(MIN.)			20.00	

CALC. MASS LOADING = 1.5015E-02 GR/ACF 1.7014E-02 GR/DSCF 3.4359E+01 MG/ACM 3.8935E+01 MG/DSCM

IMPACTOR STAGE	S1	S2	S3	S4	S5	S6	S7	S8	FILTER
STAGE INDEX NUMBER	1	2	3	4	5	6	7	8	9
D50 (MICROMETERS)	9.17	8.10	5.26	3.39	1.87	.94	.68	.40	
MASS (MILLIGRAMS)	3.20	.20	.10	.00	.30	.20	.90	.60	7.20
MG/DSCM/STAGE	9.78E+00	6.11E-01	3.06E-01	0.00E+00	9.17E-01	6.11E-01	2.75E+00	1.83E+00	2.20E+01
CUM. PERCENT OF MASS SMALLER THAN D50	74.80	73.23	72.44	72.44	70.08	68.50	61.42	56.69	
CUM. (MG/ACM) SMALLER THAN D50	2.57E+01	2.52E+01	2.49E+01	2.49E+01	2.41E+01	2.35E+01	2.11E+01	1.95E+01	
CUM. (MG/DSCM) SMALLER THAN D50	2.91E+01	2.85E+01	2.82E+01	2.82E+01	2.73E+01	2.67E+01	2.39E+01	2.21E+01	
CUM. (GR/ACF) SMALLER THAN D50	1.12E-02	1.10E-02	1.09E-02	1.09E-02	1.05E-02	1.03E-02	9.22E-03	8.51E-03	
CUM. (GR/DSCF) SMALLER THAN D50	1.27E-02	1.25E-02	1.23E-02	1.23E-02	1.19E-02	1.17E-02	1.04E-02	9.65E-03	
GEO. MEAN DIA. (MICROMETERS)	3.03E+01	8.62E+00	6.53E+00	4.22E+00	2.52E+00	1.33E+00	7.99E-01	5.24E-01	2.85E-01
DM/DLOGD (MG/DSCM)	9.42E+00	1.13E+01	1.63E+00	0.00E+00	3.56E+00	2.03E+00	1.98E+01	8.04E+00	7.31E+01
DN/DLOGD (NO. PARTICLES/DSCM)	6.48E+05	3.38E+07	1.12E+07	0.00E+00	4.26E+08	1.67E+09	7.39E+10	1.07E+11	6.04E+12

STANDARD CONDITIONS ARE 20 DEGC AND 760MM HG.

AERODYNAMIC DIAMETERS ARE CALCULATED HERE ACCORDING TO MERCER.

IMPACTOR FIELD DATA TABULATION

PLANT-NAME AND ADDRESS — TEST TEAM LEADER

DETROIT WATER & SEWAGE — DMCNEAL K BATT

TEST PSD-3 SCRUBBER OUTLET

		ENGLISH UNITS		METRIC UNITS	
TEST DATE		06/20/85		06/20/85	
TB	TIME-START	1323		1323	
TF	TIME-FINISH	1343		1343	
TT	NET TIME OF TEST, MIN.	20.0		20.0	
Y	METER CALIBRATION FACTOR	1.005		1.005	
DN	SAMPLING NOZZLE DIAMETER	.194	IN	4.9	MM
CP	PITOT TUBE COEFFICIENT	.84		.84	
PM	AVERAGE ORIFICE PRESSURE DROP	1.18	IN-H2O	30.0	MM-H2O
VM	VOLUME OF DRY GAS SAMPLED AT METER CONDITIONS	12.051	CU-FT	.341	CU-M
TM	AVERAGE GAS METER TEMP	94.5	F	34.7	C
VMSTD	VOLUME OF DRY GAS SAMPLED AT STANDARD CONDITIONS*	11.520	SCF	.326	SCM
VWC	VOLUME OF WATER VAPOR AT STANDARD CONDITIONS*	.642	SCF	.018	SCM
BWO	PERCENT MOISTURE BY VOLUME	5.28		5.28	
FMD	MOLE FRACTION DRY GAS	.947		.947	
PCO2	PERCENT CO2 BY VOL., DRY	4.60		4.60	
PO2	PERCENT O2 BY VOL., DRY	13.40		13.40	
PCO	PERCENT CO BY VOL., DRY	.00		.00	
PN2	PERCENT N2 BY VOL., DRY	82.00		82.00	
MD	MOLECULAR WT-DRY STACK GAS	29.27		29.27	
MWS	MOLECULAR WT-STACK GAS	28.68		28.68	
PB	BAROMETRIC PRESSURE	29.80	IN-HG	756.92	MM-HG
PSI	STATIC PRES OF STACK GAS	-11.80	IN-H2O	-299.72	MM-H2O
PS	STACK PRES, ABS.	28.93	IN-HG	734.88	MM-HG

TS	AVERAGE STACK TEMP	68.	F	31.	C
IF	GAS SAMPLED AT STACK CONDITIONS	13.05	ACF	.37	ACM
AS	STACK AREA	2206.	SQ-IN	1.423	SQ-M
TSO	PERCENT ISOKINETIC	101.5		101.5	
MT	TOTAL MASS OF PARTICLES	.196	GR	12.700	MG
PD	PARTICLE DENSITY	.06	GR/CI	1.00	GM/CC

* 68 DEG F, 29.92 IN.HG.

IMPACTOR RESULTS AND EXAMPLE CALCULATIONS

PLANT-NAME AND CITY	TEST TEAM LEADER	RUN NO	SAMPLE LOCATION
DETROIT WATER & SEWAGE	DMCNEAL K BATT	PSD-3	SCRUBBER OUTLET
TEST DATE 06/20/85			

CALC. MASS LOADING — TOTAL MASS OF PARTICLES DIVIDED BY A VOLUME. UNITS GIVEN ARE GRAINS PER ACTUAL* CUBIC FOOT(GR/ACF),GRAINS PER DRY STANDARD** CUBIC FOOT(GR/DSCF), MILLIGRAMS PER ACTUAL CUBIC METER(MG/ACM) AND MILLIGRAMS PER DRY STANDARD CUBIC METER(MG/DSCM.)

EXAMPLE CALCULATIONS

CML(GR/ACF) = MT(GR) / IF(ACF)

CML = .196 / 13.053 = .0150 GR/ACF

CML(GR/DSCF) = MT(GR) / VMSTD(DSCF)

CML = .196 / 11.520 = .0170 GR/DSCF

CML(MG/ACM) = MT(MG) / IF(ACM)

CML = 12.700 / .370 = 34.3587 MG/ACM

CML(MG/DSCM) = MT(MG) / VMSTD(DSCM)

CML = 12.700 / .326 = 38.9348 MG/DSCM

D50 (MICROMETERS) — THE SIZE OF THE PARTICLES ON EACH STAGE ASSUMING A 50 PERCENT COLLECTION EFFICIENCY DEFINITION

MASS (MILLIGRAMS) — THE MASS ON EACH STAGE COLLECTED

MG/DSCM/STAGE — THE MASS LOADING FOR EACH STAGE. UNITS GIVEN ARE MILLIGRAMS PER DRY STANDARD CUBIC METER FOR EACH STAGE(MG/DSCM/STAGE)

EXAMPLE CALCULATIONS

MG/DSCM/STAGE(1) = MASS(1) / VMSTD(DSCM)

MG/DSCM/STAGE(1) = 3.20 / .326 = 9.78

CUM. PERCENT OF MASS — THE PERCENTAGE OF THE TOTAL MASS SAMPLED SMALLER IN DIAMETER THAN THE CORRESPONDING D50 INDICATED FOR THAT STAGE

EXAMPLE CALCULATIONS

$$\text{CUM \% (6)} = \frac{\text{MASS(7)} + \text{MASS(8)} + \text{MASS(9)}}{\text{MT (MG)}} * 100 =$$

$$\text{CUM \% (6)} = \frac{.90 + .60 + 7.20}{12.70 \text{ (MG)}} * 100 = 70.08$$

CUM.(MASS/VOLUME) — THE CUMULATIVE MASS LOADING OF PARTICLES SMALLER IN DIAMETER THAN THE CORRESPONDING D50. MASS/VOLUME UNITS ARE MG/ACM, MG/DSCM, GR/ACF, GR/DSCF.

EXAMPLE CALCULATIONS

$$\text{CUM.(MG/ACM) (5)} = \frac{\text{MASS(6)} + \text{MASS(7)} + \text{MASS(8)} + \text{MASS(9)}}{\text{IF(ACM)}}$$

$$\text{CUM.(MG/ACM) (5)} = \frac{.20 + .90 + .60 + 7.20}{.37 \quad \text{(ACM)}} = 24.08$$

GEO.MEAN DIA.(MICROMETERS) — THE GEOMETRIC MEAN DIAMETER IN MICROMETERS FOR A PARTICULAR STAGE.

EXAMPLE CALCULATION

$$\text{GEO.MEAN DIA.(J)} = \text{SQRT}(\text{D50(J)} * \text{D50(J-1)})$$

$$\text{GEO.MEAN DIA.(6)} = \text{SQRT}(.94 * 1.87) = 1.33$$

DM/DLOGD(MG/DSCM) — DM IS MG/DSCM/STAGE(J) AND DLOGD IS LOG10(D50(J-1) / D50(J)) WHERE J IS THE CORRESPONDING STAGE NUMBER. FOR STAGE 1 THE MAXIMUM PARTICLE DIAMETER IS USED. FOR STAGE 9 (BACKUP FILTER) THE D50 IS ASSUMED AS .5 * D50 OF STAGE 8.

EXAMPLE CALCULATION

$$\text{DM/DLOGD(J)} = \frac{\text{MG/DSCM/STAGE(J)}}{\text{LOG(D50(J-1) / D50(J))}}$$

$$\text{DM/DLOGD (3)} = \frac{.31}{\text{LOG(} 8.10 / 5.26 \text{)}} = 1.63$$

DN/DLOGD — THE NUMBER OF PARTICLES PER UNIT VOLUME FOR A STAGE.

EXAMPLE CALCULATION

$$\text{DN/DLOGD(J)} = \frac{\text{DM/DLOGD(J)}}{5.23599E\text{-}10 * \text{PD(GM/CC)} * \text{GEO.MEAN DIA.(J)}}$$

$$\text{DN/DLOGD (3)} = \frac{1.63}{5.235999E\text{-}10 * 1.00 * 6.53} = 11191184.00$$

* CALCULATED AT STACK CONDITIONS
** CALCULATED AT STANDARD CONDITIONS
6[illegible] DEG.F AND 29.[illegible] INCHES OF HG (760 MMHG)

FIELD DATA

PLANT	DETROIT WATER & SEWAGE	DATE	06/21/85
SAMPLING LOCATION	SCRUBBER OUTLET	RUN NUMBER	PSO-4
SAMPLE TYPE	PART SIZE	PROBE LENGTH & TYPE	6 FT STAINLESS
OPERATOR	D MCNEAL K BATT	NOZZLE : I.D.	.194
AMBIENT TEMP.(DEG.F)	90.	ASSUMED MOISTURE	5.0
BAR.PRESS.(IN.HG)	29.50	SAMPLE BOX NUMBER	
STATIC PRESS.(IN.H2O)	#####	METER BOX NUMBER	F83
FILTER NUMBER(S)	ANDERSON MARK 3	METER HEAD DIFF.	1.90
STACK INSIDE DIM.(IN)	53.00 .00		
PITOT TUBE COEFF.	.84	PROBE HEATER SETTING	0.
THERM. NO.		HEATER BOX SETTING	0.
LEAKAGE	.000 CFM @ .0 IN.HG		
METER CALIB. FACTOR	1.005	K FACTOR	807.3
READ & RECORD DATA EVERY	5.0 MINUTES		

TRAVERSE POINT NO.	SAMPLE TIME (MIN.)	CLOCK TIME (24-HR CLOCK)	GAS METER READING (CU.FT.)	VELOCITY HEAD (IN.H2O)	ORIFICE PRESSURE DIFFERENTIAL (IN.H2O)		STACK TEMP (DEG.F)	DRY GAS METER TEMP (DEG.F)		PUMP VACUUM (IN.HG)	IMPACTOR TEMP (DEG.F)	IMPINGER TEMP (DEG.F)
					DESIRED	ACTUAL		INLET	OUTLET			
INIT	0	1405	508.272									
	5.0	1410	511.194	.730	1.06	1.06	97.	99.	95.	1.5	97.	0.
	10.0	1415	514.152	.730	1.06	1.06	97.	100.	95.	1.5	97.	0.
	15.0	1420	517.183	.730	1.06	1.06	97.	104.	96.	1.5	97.	0.
	20.0	1425	519.825	.730	1.06	1.06	97.	105.	96.	1.5	97.	0.
TOTALS	20.0		11.553									
AVERAGE					1.06	1.06	97.	102.	96.	1.5	97.	0.

PERCENT ISOKINETIC 101.7

PLANT & CITY	DETROIT WATER & SEWAGE	IMPACTOR FLOWRATE(ACFM)	.635
SAMPLING LOCATION	SCRUBBER OUTLET	AT IMPACTOR CONDITIONS IMPACTOR TEMP.	97.0F 36.1C
DATE	06/21/85	PARTICLE DENSITY(GM/CC)	1.00
RUN NUMBER	PSD-4	MAX.PARTICLE DIAM.MICROS	100.0
OPERATOR	D MCNEAL K BATT	GAS COMPOSITION(PERCENT): CO2	3.39
STACK TEMP.	97.0F 36.1C	CO	.00
BAR.PRESS.(IN. HG)	29.50	N2	76.86
STACK PRESS.(IN. HG)	28.63	O2	13.94
NOZZLE:I.D.(IN.)	.194	H2O	5.81
METER HEAD DIFF.	1.060	SAMPLING DURATION(MIN.)	20.00

CALC. MASS LOADING = 1.0820E-02 GR/ACF 1.2664E-02 GR/DSCF 2.4759E+01 MG/ACM 2.8979E+01 MG/DSCM

IMPACTOR STAGE	S1	S2	S3	S4	S5	S6	S7	S8	FILTER
STAGE INDEX NUMBER	1	2	3	4	5	6	7	8	9
D50 (MICROMETERS)	9.27	8.18	5.28	3.37	1.83	.88	.61	.33	
MASS (MILLIGRAMS)	3.10	.30	.50	.10	.50	.10	.10	.40	3.80
MG/DSCM/STAGE	1.01E+01	9.74E-01	1.62E+00	3.25E-01	1.62E+00	3.25E-01	3.25E-01	1.30E+00	1.23E+01
CUM. PERCENT OF MASS SMALLER THAN D50	65.17	61.80	56.18	55.06	49.44	48.31	47.19	42.70	
CUM. (MG/ACM) SMALLER THAN D50	1.61E+01	1.53E+01	1.39E+01	1.36E+01	1.22E+01	1.20E+01	1.17E+01	1.06E+01	
CUM. (MG/DSCM) SMALLER THAN D50	1.89E+01	1.79E+01	1.63E+01	1.60E+01	1.43E+01	1.40E+01	1.37E+01	1.24E+01	
CUM. (GR/ACF) SMALLER THAN D50	7.05E-03	6.69E-03	6.08E-03	5.96E-03	5.35E-03	5.23E-03	5.11E-03	4.62E-03	
CUM. (GR/DSCF) SMALLER THAN D50	8.25E-03	7.83E-03	7.11E-03	6.97E-03	6.26E-03	6.12E-03	5.98E-03	5.41E-03	
GEO. MEAN DIA. (MICROMETERS)	3.05E+01	8.71E+00	6.57E+00	4.22E+00	2.48E+00	1.26E+00	7.33E-01	4.50E-01	2.33E-01
DM/DLOGD (MG/DSCM)	9.74E+00	1.79E+01	8.54E+00	1.67E+00	6.10E+00	1.01E+00	2.10E+00	4.81E+00	4.10E+01
DN/DLOGD (NO. PARTICLES/DSCM)	6.59E+05	5.17E+07	5.74E+07	4.23E+07	7.61E+08	9.57E+08	1.02E+10	1.01E+11	6.17E+12

STANDARD CONDITIONS ARE 20 DEGC AND 760MM HG.

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

PLANT & CITY	DETROIT WATER & SEWAGE			
SAMPLING LOCATION	SCRUBBER OUTLET			
DATE	06/21/85			
RUN NUMBER	PSU-4			
OPERATOR	D MCNEAL K BATT			
STACK TEMP.	97.0F	36.1C		
BAR.PRESS.(IN. HG)	29.50			
STACK PRESS.(IN. HG)	28.63			
NOZZLE:I.D.(IN.)	.194			
METER HEAD DIFF.	1.060			
IMPACTOR FLOWRATE(ACFM) AT IMPACTOR CONDITIONS			.635	
IMPACTOR TEMP.		97.0F	36.1C	
PARTICLE DENSITY(GM/CC)			1.00	
MAX.PARTICLE DIAM.MICRONS			100.0	
GAS COMPOSITION(PERCENT):	CO2		3.39	
	CO		.00	
	N2		76.86	
	O2		13.94	
	H2O		5.81	
SAMPLING DURATION(MIN.)			20.00	

CALC. MASS LOADING = 1.0820E-02 GR/ACF 1.2664E-02 GR/DSCF 2.4759E+01 MG/ACM 2.8979E+01 MG/DSCM

IMPACTOR STAGE	S1	S2	S3	S4	S5	S6	S7	S8	FILTER
STAGE INDEX NUMBER	1	2	3	4	5	6	7	8	9
D50 (MICROMETERS)	9.36	8.27	5.37	3.46	1.91	.96	.70	.41	
MASS (MILLIGRAMS)	3.10	.30	.50	.10	.50	.10	.10	.40	3.80
MG/DSCM/STAGE	1.01E+01	9.74E-01	1.62E+00	3.25E-01	1.62E+00	3.25E-01	3.25E-01	1.30E+00	1.23E+01
CUM. PERCENT OF MASS SMALLER THAN D50	65.17	61.80	56.18	55.06	49.44	48.31	47.19	42.70	
CUM. (MG/ACM) SMALLER THAN D50	1.61E+01	1.53E+01	1.39E+01	1.36E+01	1.22E+01	1.20E+01	1.17E+01	1.06E+01	
CUM. (MG/DSCM) SMALLER THAN D50	1.89E+01	1.79E+01	1.63E+01	1.60E+01	1.43E+01	1.40E+01	1.37E+01	1.24E+01	
CUM. (GR/ACF) SMALLER THAN D50	7.05E-03	6.69E-03	6.08E-03	5.96E-03	5.35E-03	5.23E-03	5.11E-03	4.62E-03	
CUM. (GR/DSCF) SMALLER THAN D50	8.25E-03	7.83E-03	7.11E-03	6.97E-03	6.26E-03	6.12E-03	5.98E-03	5.41E-03	
GEO. MEAN DIA. (MICROMETERS)	3.06E+01	8.80E+00	6.66E+00	4.31E+00	2.57E+00	1.35E+00	8.16E-01	5.35E-01	2.91E-01
DM/DLOGD (MG/DSCM)	9.78E+00	1.81E+01	8.65E+00	1.70E+00	6.31E+00	1.08E+00	2.33E+00	5.70E+00	4.10E+01
DN/DLOGD (NO. PARTICLES/DSCM)	6.52E+05	5.07E+07	5.59E+07	4.06E+07	7.08E+08	8.33E+08	8.20E+09	7.11E+10	3.17E+12

STANDARD CONDITIONS ARE 20 DEGC AND 760MM HG.

AERODYNAMIC DIAMETERS ARE CALCULATED HERE ACCORDING TO MERCER.

IMPACTOR FIELD DATA TABULATION

PLANT-NAME AND ADDRESS — TEST TEAM LEADER

DETROIT WATER & SEWAGE — D MCNEAL K BATT

TEST PSD-4 SCRUBBER OUTLET

		ENGLISH UNITS	METRIC UNITS
TEST DATE		06/21/85	06/21/85
TB	TIME-START	1405	1405
TF	TIME-FINISH	1425	1425
TT	NET TIME OF TEST, MIN.	20.0	20.0
Y	METER CALIBRATION FACTOR	1.005	1.005
DN	SAMPLING NOZZLE DIAMETER	.194 IN	4.9 MM
CP	PITOT TUBE COEFFICIENT	.84	.84
PM	AVERAGE ORIFICE PRESSURE DROP	1.06 IN-H2O	26.9 MM-H2O
VM	VOLUME OF DRY GAS SAMPLED AT METER CONDITIONS	11.553 CU-FT	.327 CU-M
TM	AVERAGE GAS METER TEMP	98.8 F	37.1 C
VMSTD	VOLUME OF DRY GAS SAMPLED AT STANDARD CONDITIONS*	10.846 SCF	.307 SCM
VWC	VOLUME OF WATER VAPOR AT STANDARD CONDITIONS*	.669 SCF	.019 SCM
BWO	PERCENT MOISTURE BY VOLUME	5.81	5.81
FMD	MOLE FRACTION DRY GAS	.942	.942
PCO2	PERCENT CO2 BY VOL., DRY	3.60	3.60
PO2	PERCENT O2 BY VOL., DRY	14.80	14.80
PCO	PERCENT CO BY VOL., DRY	.00	.00
PN2	PERCENT N2 BY VOL., DRY	81.60	81.60
MD	MOLECULAR WT-DRY STACK GAS	29.17	29.17
MWS	MOLECULAR WT-STACK GAS	28.52	28.52
PB	BAROMETRIC PRESSURE	29.50 IN-HG	749.30 MM-HG
PSI	STATIC PRES OF STACK GAS	-11.80 IN-H2O	-299.72 MM-H2O
PS	STACK PRES, ABS.	28.03 IN-HG	727.28 MM-HG

TS	AVERAGE STACK TEMP	97. F	36. C
TF	GAS SAMPLED AT STACK CONDITIONS	12.69 ACF	.36 ACM
AS	STACK AREA	2206. SQ-IN	1.423 SQ-M
ISO	PERCENT ISOKINETIC	101.7	101.7
MT	TOTAL MASS OF PARTICLES	.137 GR	8.900 MG
PD	PARTICLE DENSITY	.06 GR/CI	1.00 GM/CC

* 68 DEG F, 29.92 IN.HG.

IMPACTOR RESULTS AND EXAMPLE CALCULATIONS

PLANT-NAME AND CITY	TEST TEAM LEADER	RUN NO	SAMPLE LOCATION
DETROIT WATER & SEWAGE	D MCNEAL K BATT	PSD-4	SCRUBBER OUTLET
TEST DATE 06/21/85			

CALC. MASS LOADING — TOTAL MASS OF PARTICLES DIVIDED BY A VOLUME. UNITS GIVEN ARE GRAINS PER ACTUAL* CUBIC FOOT(GR/ACF),GRAINS PER DRY STANDARD** CUBIC FOOT(GR/DSCF), MILLIGRAMS PER ACTUAL CUBIC METER(MG/ACM) AND MILLIGRAMS PER DRY STANDARD CUBIC METER(MG/DSCM.)

EXAMPLE CALCULATIONS

CML(GR/ACF) = MT(GR) / IF(ACF)

CML = .137 / 12.694 = .0108 GR/ACF

CML(GR/DSCF) = MT(GR) / VMSTD(DSCF)

CML = .137 / 10.846 = .0127 GR/DSCF

CML(MG/ACM) = MT(MG) / IF(ACM)

CML = 8.900 / .359 = 24.7594 MG/ACM

CML(MG/DSCM) = MT(MG) / VMSTD(DSCM)

CML = 8.900 / .307 = 28.9792 MG/DSCM

D50 (MICROMETERS) — THE SIZE OF THE PARTICLES ON EACH STAGE ASSUMING A 50 PERCENT COLLECTION EFFICIENCY DEFINITION

MASS (MILLIGRAMS) — THE MASS ON EACH STAGE COLLECTED

MG/DSCM/STAGE — THE MASS LOADING FOR EACH STAGE. UNITS GIVEN ARE MILLIGRAMS PER DRY STANDARD CUBIC METER FOR EACH STAGE(MG/DSCM/STAGE)

EXAMPLE CALCULATIONS

MG/DSCM/STAGE(1) = MASS(1) / VMSTD(DSCM)

MG/DSCM/STAGE(1) = 3.10 / .307 = 10.06

CUM. PERCENT OF MASS — THE PERCENTAGE OF THE TOTAL MASS SAMPLED SMALLER IN DIAMETER THAN THE CORRESPONDING D50 INDICATED FOR THAT STAGE

EXAMPLE CALCULATIONS

$$\text{CUM \% (6)} = \frac{\text{MASS(7)} + \text{MASS(8)} + \text{MASS(9)}}{\text{MT (MG)}} * 100 =$$

$$\text{CUM \% (6)} = \frac{.10 + .40 + 3.80}{8.90 \text{ (MG)}} * 100 = 49.44$$

CUM.(MASS/VOLUME) — THE CUMULATIVE MASS LOADING OF PARTICLES SMALLER IN DIAMETER THAN THE CORRESPONDING D50. MASS/VOLUME UNITS ARE MG/ACM, MG/DSCM, GR/ACF, GR/DSCF.

EXAMPLE CALCULATIONS

$$\text{CUM.(MG/ACM) (5)} = \frac{\text{MASS(6)} + \text{MASS(7)} + \text{MASS(8)} + \text{MASS(9)}}{\text{IF(ACM)}}$$

$$\text{CUM.(MG/ACM) (5)} = \frac{.10 + .10 + .40 + 3.80}{.36 \text{ (ACM)}} = 12.24$$

GEO.MEAN DIA.(MICROMETERS) — THE GEOMETRIC MEAN DIAMETER IN MICROMETERS FOR A PARTICULAR STAGE.

EXAMPLE CALCULATION

$$\text{GEO.MEAN DIA.(J)} = \text{SQRT}(\text{D50(J)} * \text{D50(J-1)})$$

$$\text{GEO.MEAN DIA.(6)} = \text{SQRT}(.96 * 1.91) = 1.35$$

DM/DLOGD(MG/DSCM) — DM IS MG/DSCM/STAGE(J) AND DLOGD IS LOG10(D50(J-1) / D50(J)) WHERE J IS THE CORRESPONDING STAGE NUMBER. FOR STAGE 1 THE MAXIMUM PARTICLE DIAMETER IS USED. FOR STAGE 9 (BACKUP FILTER) THE D50 IS ASSUMED AS .5 * D50 OF STAGE 8.

EXAMPLE CALCULATION

$$\text{DM/DLOGD(J)} = \frac{\text{MG/DSCM/STAGE(J)}}{\text{LOG(D50(J-1) / D50(J))}}$$

$$\text{DM/DLOGD (3)} = \frac{1.62}{\text{LOG(} 8.27 / 5.37 \text{)}} = 8.65$$

DN/DLOGD — THE NUMBER OF PARTICLES PER UNIT VOLUME FOR A STAGE.

EXAMPLE CALCULATION

$$\text{DN/DLOGD(J)} = \frac{\text{DM/DLOGD(J)}}{\text{5.23599E-10} * \text{PD(GM/CC)} * \text{GEO.MEAN DIA.(J)}}$$

$$\text{DN/DLOGD (3)} = \frac{8.65}{5.235999\text{E-}10 * 1.00 * 6.66} = 55873968.00$$

* CALCULATED AT STACK CONDITIONS
** CALCULATED AT STANDARD CONDITIONS
68 DEG.F AND 29.92 INCHES OF HG (760 MMHG)

ANDERSEN HEAVY GRAIN LOADING IMPACTOR RESULTS

Run No. PSI-3 (Vol. 2) Date 6/21/85

Impactor stage	Total	0	1	2	3	Backup
Stage 50% cut[a] diameter, μm	-	>15	14.0	7.4	3.3	-
Mass collected, mg	653.0	475.9	13.2	58.0	60.4	45.5
Percent of total mass	100	72.9	2.0	8.9	9.2	7.0
Cumulative percent of mass less than cut diameter	100	27.1	25.1	16.2	7.0	--
Particulate[b] concentration, mg/dscm		876.4	24.3	106.8	111.2	83.8
gr/dscf	0.526	0.383	0.011	0.047	0.049	0.037

Impactor flowrate[c] _____ alps 0.586 acfm

Impactor temperature 493.3 °C 920 °F

Isokinetic sampling rate 106.7 %

V_{std} = 19.165 dscf
0.543 dscm

[a]Particulate sizes are aerodynamic diameters in micrometers at unit density, 1 gm/cc. Fifty percent effective cut diameters are determined by graphical interpolation of cut size data supplied by the manufacturer. See Table A-1.

[b]Concentrations are reported in milligrams per dry standard cubic meter at 20°C and 101 kPa and in grains per dry standard cubic foot at 68°F and 29.92 in. Hg.

[c]Flow rates are reported at impactor conditions in actual liters per second and actual cubic feet per minute.

Note:

ANDERSEN HEAVY GRAIN LOADING IMPACTOR RESULTS

Run No. PSI-1 Date 6/18/85

Impactor stage	Total	0	1	2	3	Backup
Stage 50% cut[a] diameter, μm	-	>15	13.0	6.8	3.0	-
Mass collected, mg	214.9	62.0	12.6	31.3	61.4	47.6
Percent of total mass	100	28.9	5.9	14.6	28.6	22.1
Cumulative percent of mass less than cut diameter	100	71.2	65.3	50.7	22.1	--
Particulate[b] concentration, mg/dscm		122.8	24.9	62.0	121.6	94.3
gr/dscf	0.186	0.054	0.011	0.027	0.053	0.041

Impactor flowrate[c] _____ alps 0.697 acfm

Impactor temperature 493.3 °C 920 °F

Isokinetic sampling rate 145.1 %

$V_{m_{std}}$ = 17.837 scf
0.505 scm

[a]Particulate sizes are aerodynamic diameters in micrometers at unit density, 1 gm/cc. Fifty percent effective cut diameters are determined by graphical interpolation of cut size data supplied by the manufacturer. See Table A-1.

[b]Concentrations are reported in milligrams per dry standard cubic meter at 20°C and 101 kPa and in grains per dry standard cubic foot at 68°F and 29.92 in. Hg.

[c]Flow rates are reported at impactor conditions in actual liters per second and actual cubic feet per minute.

ANDERSEN HEAVY GRAIN LOADING IMPACTOR RESULTS

Run No. PSI-2 Date 6/20/85

Impactor stage	Total	0	1	2	3	Backup
Stage 50% cut[a] diameter, μm	-	>15	13.0	6.8	3.1	-
Mass collected, mg	198.5	78.1	7.5	24.6	57.3	31.0
Percent of total mass	100	39.3	3.8	12.4	28.9	15.6
Cumulative percent of mass less than cut diameter	100	60.7	56.9	44.5	15.6	--
Particulate[b] concentration, mg/dscm		118.9	11.4	37.4	87.2	47.2
gr/dscf	0.132	0.0519	0.0050	0.0164	0.0381	0.0206

Impactor flowrate[c] _____ alps 0.692 acfm

Impactor temperature 493.3 °C 920 °F

Isokinetic sampling rate 115.8 %

V_{std} = 23.211 dscf
0.657 dscm

[a]Particulate sizes are aerodynamic diameters in micrometers at unit density, 1 gm/cc. Fifty percent effective cut diameters are determined by graphical interpolation of cut size data supplied by the manufacturer. See Table A-1.

[b]Concentrations are reported in milligrams per dry standard cubic meter at 20°C and 101 kPa and in grains per dry standard cubic foot at 68°F and 29.92 in. Hg.

[c]Flow rates are reported at impactor conditions in actual liters per second and actual cubic feet per minute.

ANDERSEN HEAVY GRAIN LOADING IMPACTOR RESULTS

Run No. PSI-4 Date 6/22/85

Impactor stage	Total	0	1	2	3	Backup
Stage 50% cut[a] diameter, μm	-	>15	14.3	7.5	3.3	-
Mass collected, mg	250.5	95.3	26.4	43.3	40.9	44.6
Percent of total mass	100	38.0	10.5	17.3	16.3	17.8
Cumulative percent of mass less than cut diameter	100	61.9	51.4	34.1	17.8	--
Particulate[b] concentration, mg/dscm		172.6	47.8	78.4	74.1	80.8
gr/dscf	0.198	0.075	0.021	0.034	0.032	0.035

Impactor flowrate[c] _____ alps 0.582 acfm

Impactor temperature 493.3 °C 920 °F

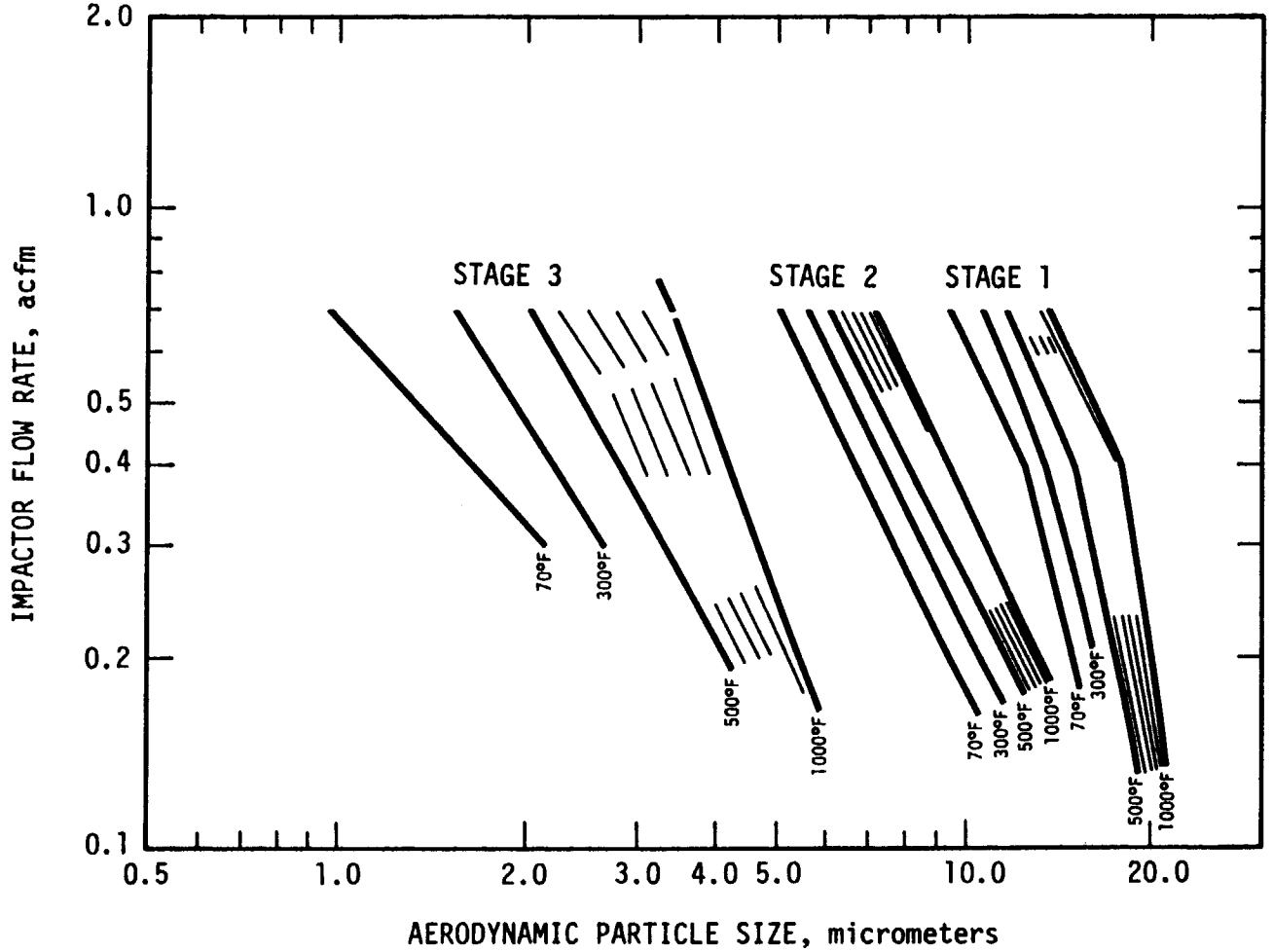
Isokinetic sampling rate 106.3 %

V_{std} = 19.499 scf
0.552 scm

[a]Particulate sizes are aerodynamic diameters in micrometers at unit density, 1 gm/cc. Fifty percent effective cut diameters are determined by graphical interpolation of cut size data supplied by the manufacturer. See Table A-1.

[b]Concentrations are reported in milligrams per dry standard cubic meter at 20°C and 101 kPa and in grains per dry standard cubic foot at 68°F and 29.92 in. Hg.

[c]Flow rates are reported at impactor conditions in actual liters per second and actual cubic feet per minute.



Graphical presentation of data supplied by the manufacturer to determine cut diameters for the Andersen Heavy Grain Loading Impactor.

50% EFFECTIVE CUT DIAMETER (MIRCOMETERS)
PARTICLE DENSITY = 1.0 g/cc[a]

Flow rate, acfm	Stage 1	Stage 2	Cyclone
	Air temperature, 70°F		
0.3	13.0	7.6	2.1
0.4	12.3	6.5	1.6
0.5	11.0	5.9	1.3
0.6	10.0	5.4	1.1
0.7	9.3	4.9	0.94
	Air temperature, 100°F		
0.3	13.1	7.6	2.1
0.4	12.4	6.6	1.6
0.5	11.1	5.9	1.3
0.6	10.1	5.4	1.1
0.7	9.4	5.0	0.98
	Air temperature, 300°F		
0.3	14.5	8.5	2.6
0.4	13.7	7.3	2.2
0.5	12.3	6.5	1.9
0.6	11.2	6.0	1.7
0.7	10.4	5.5	1.5
	Air temperature, 500°F		
0.3	15.8	9.2	3.2
0.4	15.0	8.0	2.7
0.5	13.4	7.1	2.4
0.6	12.2	6.5	2.2
0.7	11.3	6.0	2.0
	Air temperature, 1000°F		
0.3	18.6	10.8	4.5
0.4	17.6	9.3	4.0
0.5	15.8	8.3	3.7
0.6	14.4	7.6	3.5
0.7	13.3	7.0	3.3

[a]Operating Manual for Andersen Samplers, Inc., Heavy Grain Loading Impactor Particle Size Stack Samplers; January 1, 1980, Table II, p. 41.

APPENDIX B

FIELD DATA SHEETS

FIELD AUDIT REPORT: DRY GAS METER BY CRITICAL ORIFICE

DATE: 6/17/85

CLIENT: USEPA DETROIT Cr Study

BAROMETRIC PRESSURE (P_{bar}): 29.84 in.Hg

METER BOX NO. FB-3

ORIFICE NO. 8

PRETEST Y: 1.005 ΔH@ 1.90 in.H_2O

ORIFICE K FACTOR: 4.725×10^{-4}

AUDITOR: D McNeil

Orifice manometer reading ΔH, in.H_2O	Dry gas meter reading V_i/V_f, ft^3	Temperatures: Ambient T_{ai}/T_{af}, °F	Ambient Average T_a, °F	Dry gas meter Inlet T_{ii}/T_{if}, °F	Dry gas meter Outlet T_{oi}/T_{of}, °F	Dry gas meter Average T_m, °F	Duration of run Ø min.
1.85	418.000	86	87	94	84	87.95	28:59.86
	440.000	88		94	87		

Dry gas meter V_m, ft^3	$V_{m_{std}}$, ft^3	$V_{m_{act}}$, ft^3	Audit, Y	Y deviation, %	Audit ΔH@, in.H_2O	ΔH@ Deviation, in.H_2O
22.000	21.239	21.030	0.990	1.52	1.89	.01

$$V_{m_{std}} = \frac{17.647(V_m)(P_{bar} + \Delta H/13.6)}{(T_m + 460)} = \quad ft^3$$

$$V_{m_{act}} = \frac{1203(\ \emptyset\ )(\ K\ )(P_{bar})}{(T_a + 460)^{1/2}} = \quad ft^3$$

$$\text{Audit Y} = \frac{V_{m_{act}}}{V_{m_{std}}} = \qquad \text{Y deviation} = \frac{\text{Audit Y} - \text{Pre-test Y}}{\text{Audit Y}} \times 100 =$$

$$\text{Audit } \Delta H@ = (0.0317)(\Delta H)(P_{bar})(T_m + 460)\left[\frac{\emptyset}{Y\,(V_m)(P_{bar} + \Delta H/13.6)}\right]^2 = \quad \text{in.}H_2O$$

Audit Y must be in the range, pre-test Y ±0.05 Y.
Audit ΔH@ must be in the range pre-test ΔH@ ±0.15 inches H_2O.

FIELD AUDIT REPORT: DRY GAS METER BY CRITICAL ORIFICE

DATE: 6-17-85

CLIENT: USEPA-EMB

BAROMETRIC PRESSURE (P_{bar}): 29.84 in.Hg

METER BOX NO. FB-4

ORIFICE NO. #12

PRETEST Y: 1.033 ΔH@ 1.23 in.H_2O

ORIFICE K FACTOR: 2.4795x10-4

AUDITOR: [illegible]

Orifice manometer reading ΔH, in.H_2O	Dry gas meter reading V_i/V_f, ft³	Temperatures: Ambient T_{ai}/T_{af}, °F	Ambient Average T_a, °F	Dry gas meter Inlet T_{ii}/T_{if}, °F	Dry gas meter Outlet T_{oi}/T_{of}, °F	Dry gas meter Average T_m, °F	Duration of run Ø min.
1.15	211.000	85	85	90	80	86	13 2950/60
	221.100	85		92	82		

Dry gas meter V_m, ft³	$V_{m_{std}}$, ft³	$V_{m_{act}}$, ft³	Audit, Y	Y deviation, %	Audit ΔH@, in.H_2O	ΔH@ Deviation, in.H_2O
10.1	9.7685	9.946	1.018	-1.45	1.14	.04

$$V_{m_{std}} = \frac{17.647(\overset{10.1}{V_m})(\overset{29.84 + 1.15/13.6}{P_{bar} + \Delta H/13.6})}{(\underset{546}{T_m + 460})} = 9.7685 \text{ ft}^3$$

$$V_{m_{act}} = \frac{1203(\overset{13.49}{\emptyset})(K)(\overset{29.84}{P_{bar}})}{(\underset{23.3452}{T_a + 460})^{1/2}} = 9.946 \text{ ft}^3$$

$$\text{Audit Y} = \frac{V_{m_{act}}}{V_{m_{std}}} = 1.018 \qquad \text{Y deviation} = \frac{\text{Audit Y} - \text{Pre-test Y}}{\text{Audit Y}} \times 100 =$$

$$\text{Audit } \Delta H@ = (0.0317)(\overset{1.15}{\Delta H})(P_{bar})(\overset{546}{T_m + 460})\left[\frac{\overset{13.49}{\emptyset}}{\underset{307.678}{Y(V_m)(P_{bar} + \Delta H/13.6)}}\right]^2 = 1.14 \text{ in.}H_2O$$

Audit Y must be in the range, pre-test Y ±0.05 Y.
Audit ΔH@ must be in the range pre-test ΔH@ ±0.15 inches H_2O.

FIELD AUDIT REPORT: DRY GAS METER BY CRITICAL ORIFICE

DATE: 6-17-85 CLIENT: USEPA-EMB

BAROMETRIC PRESSURE (P_{bar}): 29.84 in.Hg METER BOX NO. FB-10

ORIFICE NO. 8 PRETEST Y: .963 ΔH@ 1.81 in.H_2O

ORIFICE K FACTOR: 4.725 x 10-4 AUDITOR: M Flood

Orifice manometer reading ΔH, in.H_2O	Dry gas meter reading V_i/V_f, ft³	Temperatures: Ambient T_{ai}/T_{af}, °F	Ambient Average T_a, °F	Dry gas meter Inlet T_{ii}/T_{if}, °F	Dry gas meter Outlet T_{oi}/T_{of}, °F	Dry gas meter Average T_m, °F	Duration of run Ø, min.
1.8	474.00	85	85	86	82	85	12.3002 / 60
	484.00	85		88	84		

Dry gas meter V_m, ft³	$V_{m_{std}}$, ft³	$V_{m_{act}}$, ft³	Audit, Y	Y deviation, %	Audit ΔH@, in.H_2O	ΔH@ Deviation, in.H_2O
10.0	9.691	9.176	.9467	-1.72	1.21	.11

$$V_{m_{std}} = \frac{17.647(V_m)(P_{bar} + \Delta H/13.6)}{(T_m + 460)} = \frac{17.647(10)(29.93)}{545} = 9.691 \text{ ft}^3$$

$$V_{m_{act}} = \frac{1203(\text{Ø})(K)(P_{bar})}{(T_a + 460)^{1/2}} = \frac{1203(12.63)(K)(29.93)}{(545)^{1/2}} = 23.3452 = 9.176 \text{ ft}^3$$

$$\text{Audit Y} = \frac{V_{m_{act}}}{V_{m_{std}}} = .9467 \qquad \text{Y deviation} = \frac{\text{Audit Y} - \text{Pre-test Y}}{\text{Audit Y}} \times 100 = -1.72$$

$$\text{Audit } \Delta H@ = (0.0317)(\Delta H)(P_{bar})(T_m + 460)\left[\frac{12.63}{Y\,(V_m)(P_{bar} + \Delta H/13.6)}\right]^2 = \frac{12.63}{(.9467)(10)(29.93)} = 1.21 \text{ in.}H_2O$$

Audit Y must be in the range, pre-test Y ±0.05 Y.
Audit ΔH@ must be in the range pre-test ΔH@ ±0.15 inches H_2O.

FIELD AUDIT REPORT: DRY GAS METER
BY CRITICAL ORIFICE

DATE: 6/17/85 CLIENT: USEPA Detroit Cr Study

BAROMETRIC PRESSURE (P_{bar}): 29.84 in.Hg METER BOX NO. FB-11

ORIFICE NO. 7 PRETEST Y: 1.052 ΔH@ 1.14 in.H_2O

ORIFICE K FACTOR: 4.964×10^{-4} AUDITOR: DMcNeal

Orifice manometer reading ΔH, in.H_2O	Dry gas meter reading V_i/V_f, ft^3	Temperatures: Ambient T_{ai}/T_{af}, °F	Ambient Average T_a, °F	Dry gas meter Inlet T_{ii}/T_{if}, °F	Dry gas meter Outlet T_{oi}/T_{of}, °F	Dry gas meter Average T_m, °F	Duration of run Ø min.
1.25	45.000	86	86.5	94	83	89.25	24:02.03
	63.000	87		96	84		

Dry gas meter V_m, ft^3	$V_{m_{std}}$, ft^3	$V_{m_{act}}$, ft^3	Audit, Y	Y deviation, %	Audit ΔH@, in.H_2O	ΔH@ Deviation, in.H_2O
18.000	17.287	18.295	1.058	0.57	1.15	0.01

$$V_{m_{std}} = \frac{17.647(V_m)(P_{bar} + \Delta H/13.6)}{(T_m + 460)} = 17.287\ ft^3$$

$$V_{m_{act}} = \frac{1203(\ \emptyset\ )(\ K\ )(P_{bar})}{(T_a + 460)^{1/2}} = 18.294\ ft^3$$

$$\text{Audit Y} = \frac{V_{m_{act}}}{V_{m_{std}}} = \qquad \text{Y deviation} = \frac{\text{Audit Y} - \text{Pre-test Y}}{\text{Audit Y}} \times 100 =$$

$$\text{Audit } \Delta H@ = (0.0317)(\Delta H)(P_{bar})(T_m + 460)\left[\frac{\emptyset}{Y\ (V_m)(P_{bar} + \Delta H/13.6)}\right]^2 = \qquad in.H_2O$$

Audit Y must be in the range, pre-test Y ±0.05 Y.
Audit ΔH@ must be in the range pre-test ΔH@ ±0.15 inches H_2O.

THERMOCOUPLE DIGITAL INDICATOR
AUDIT DATA SHEET

Date 6-17-95 Indicator No. 126 Operator JN

Test Point No.	Millivolt signal*	Equivalent temperature, °F*	Digital indicator temperature reading, °F	Difference, %
1		100	103	
2		400	397	
3		800	799	
4		1200	1196	

Percent difference must be less than or equal to 0.5%.

Percent difference:

$$\frac{(\text{Equivalent temperature } °R - \text{Digital indicator temperature reading } °R)(100\%)}{(\text{Equivalent temperature } °R)}$$

Where °R = °F + 460°F

* These values are to be obtained from the calibration data sheet for the calibration device.

ON-SITE AUDIT DATA SHEET

Audit Name: Detroit Sewage Incinerator Outlet Date: 6/17/85 Auditor: D McNeil

Equipment	Reference	Reference Value	Value Determined	Deviation	Max. Allowable Deviation
Meter box inlet thermo.	ASTM-3F at ambient temp.	FB-3 85 FB-11 85	84 82	1 3	5°F
Meter box outlet thermo.	ASTM-3F at ambient temp.	FB-3 85 FB-11 85	82 80	3 5	5°F
Impinger thermometer	ASTM-3F at ambient temp.	I-7 85	85	0	2°F
Stack thermometer or Thermocouple	ASTM-3F at ambient temp.	87	87	0	7°F
	ASTM-3F at stack temp.				See table
Orsat analyzer	% O_2 in ambient air	20.8%			0.7%
Trip balance	IOLM std. weight				0.5 grams
Barometer	Corrected* NWS value				0.20 in. Hg

Reference temp. °F	32-140	141-273	274-406	407-540	541-673	674-760
Max. deviation °F	7	9	11	13	15	17

* Correction factor:

NWS value (in. Hg) - [Altitude (ft)/1000(ft/in. Hg)] + 0.74 in. Hg**

** 0.74 in. Hg is the nominal correction factor for the reference barometer against which the field barometer was calibrated.

If it is not feasible to perform the audit on any piece of equipment, record "N/A" in the space provided for the data.

ON-SITE AUDIT DATA SHEET

Audit Name: FB-4 Date: 6-17-85 Auditor: [signature]

Equipment	Reference	Reference Value	Value Determined	Deviation	Max. Allowable Deviation
Meter box inlet thermo.	ASTM-3F at ambient temp.	73	72	1	5°F
Meter box outlet thermo.	ASTM-3F at ambient temp.	73	70	3	5°F
I-1 Impinger thermometer	ASTM-3F at ambient temp.	83	84	1	2°F
Stack thermometer or	ASTM-3F at ambient temp.	83			7°F
#147 Thermocouple	ASTM-3F at stack temp.	83	82	1	See table
Orsat analyzer	% O_2 in ambient air	20.8%			0.7%
Trip balance	IOLM std. weight				0.5 grams
Barometer	Corrected* NWS value				0.20 in. Hg

Reference temp. °F	32-140	141-273	274-406	407-540	541-673	674-760
Max. deviation °F	7	9	11	13	15	17

* Correction factor:

NWS value (in. Hg) - [Altitude (ft)/1000(ft/in. Hg)] + 0.74 in. Hg**

** 0.74 in. Hg is the nominal correction factor for the reference barometer against which the field barometer was calibrated.

If it is not feasible to perform the audit on any piece of equipment, record "N/A" in the space provided for the data.

ON-SITE AUDIT DATA SHEET

Audit Name: FB-10 Date: 6-17-85 Auditor: [illegible]

Equipment	Reference	Reference Value	Value Determined	Deviation	Max. Allowable Deviation
Meter box inlet thermo.	ASTM-3F at ambient temp.	73	70	3	5°F
Meter box outlet thermo.	ASTM-3F at ambient temp.	73	72	1	5°F
I-9 Impinger thermometer	ASTM-3F at ambient temp.	83	83	0	2°F
Stack thermometer or Thermocouple	ASTM-3F at ambient temp.				7°F
	ASTM-3F at stack temp.				See table
Orsat analyzer	% O_2 in ambient air	20.8%			0.7%
Trip balance	IOLM std. weight				0.5 grams
Barometer	Corrected* NWS value				0.20 in. Hg

Reference temp. °F	32-140	141-273	274-406	407-540	541-673	674-760
Max. deviation °F	7	9	11	13	15	17

* Correction factor:

NWS value (in. Hg) - [Altitude (ft)/1000(ft/in. Hg)] + 0.74 in. Hg**

** 0.74 in. Hg is the nominal correction factor for the reference barometer against which the field barometer was calibrated.

If it is not feasible to perform the audit on any piece of equipment, record "N/A" in the space provided for the data.

TRAVERSE POINT LOCATION FOR RECTANGULAR DUCTS

Plant Detroit water & Sewer Dpt

Date 6-17-85

Sampling location Inc #13 Inlet

Width _____ in.

Inside of far wall to outside of nipple 140 in.

Nipple length 9 in.

Length 126 in.

Equivalent diameter (2 LW/(L+W)

_____ in.

Nearest upstream disturbance 0 in. _____ dd

Nearest downstream disturbance 0 in. ___ dd

Calculated by _____

SCHEMATIC OF SAMPLING LOCATION

TRAVERSE POINT NO. FOR EACH PORT	FRACTION OF LENGTH	LENGTH (in.)	PRODUCT OF COLUMNS 2 AND 3 (TO NEAREST 1/8 in.)	NIPPLE LENGTH (in.)	TRAVERSE POINT LOCATION SUM OF COLUMNS 4 AND 5
1	25.2"				21.6
2					46.8
3					72
4					97.2
5					122.4

IF NO PORTS, CALCULATE CENTROID OF AREAS FOR WIDTH TO DETERMINE PORT LOCATION

NO. OF CENTROIDS (PORTS)	FRACTION OF WIDTH	WIDTH (in.)	CENTROID LOCATION = PRODUCTS OF COLUMNS 2 AND 3 (TO NEAREST 1/8 in.)

GAS VELOCITY AND VOLUMETRIC FLOW RATE

Plant and City Detroit Water & Sewer Dpt Date 6/18/85

Sampling Location Inc. #13 Inlet Clock Time 930

Run No. V-2 Operator [illegible]

Barometric Pressure, in.Hg 29.10 Static Pressure, in.H_2O -1.1

Moisture, % _____ Molecular wt., Dry _____ Pitot Tube, Cp .84

Stack Dimension, in. Diameter or Side 1 _____ Side 2 _____

walk @ 5"

FIELD DATA

TRAVERSE POINT NUMBER		VELOCITY HEAD (ΔP_s), in.H_2O	STACK TEMP., °F
A	1	.11	732
	2	.18	900
	3	.28	904
	4	.61	894
	5	.57	925
B	6	.35	850
	7	.42	900
	8	.45	900
	9	.48	895
	10	.58	895
C	11	.30	890
	12	.34	890
	13	.41	910
	14	.41	925
[illegible]	15	.43	944
D	16	.28	942
	17	.30	970
	18	.30	991
	19	.31	990
	20	.31	955
E	21	.31	930
	22	.32	960
	23	.32	980
	24	.33	985
	25	.81	951
F	26	.11	930
	27	.07	971
	28	.08	985
	29	.10	988
	30	.53	994

Avg. .34 Avg 930.5

CALCULATIONS

$M_s = Md \times (1 - \frac{H_2O}{100}) + 18 (\frac{H_2O\ \%}{100})$

$M_s = (\qquad) \times (1 - \frac{\qquad}{100}) + 18 (\frac{\qquad}{100})$

$M_s =$

$T_s =$ °F = °R = (°F + 460)

$P_s = P_b + \frac{S.P.}{13.6} = (\qquad) + \frac{\qquad}{13.6}$

$P_s =$ in.Hg

$\sqrt{\Delta P} =$

$V_s = 85.49 \times Cp \times \sqrt{\Delta P} \times \sqrt{\frac{T_s, °R}{P_s \times M_s}}$

$V_s = 85.49 \times (\qquad) \times (\qquad) \times \sqrt{\frac{\qquad}{\qquad \times \qquad}}$

$V_s =$ ft/s

$A_s =$ ft²

$Q_s = V_s \times A_s \times \frac{60\ s}{m}$

$Q_s = \qquad \times \qquad \times 60$

$Q_s =$ acfm

$Q_{s_{std}} = Q_s \times 17.647 \times \frac{P_s}{T_s} \times (1 - \frac{H_2O\ \%}{100})$

$Q_{s_{std}} = \qquad \times 17.647 \times \frac{\qquad}{\qquad} \times (1 - \frac{\qquad}{100})$

$Q_{s_{std}} =$ dscfm

GAS VELOCITY AND VOLUMETRIC FLOW RATE

Plant and City Detroit water & Sewer Dpt. Date 6-17-85

Sampling Location #13 Inlet Clock Time 1430

Run No. U-1 Operator [illegible]

Barometric Pressure, in.Hg 29.84 Static Pressure, in.H_2O _____

Moisture, % _____ Molecular wt., Dry _____ Pitot Tube, Cp .84

Stack Dimension, in. Diameter or Side 1 _____ Side 2 _____

FIELD DATA

TRAVERSE POINT NUMBER	VELOCITY HEAD (ΔP_s), in.H_2O	STACK TEMP., °F
1 1	.06	905
2	.02	900
3	.01	895
4	.03	893
5	.06	888
2 1		
2		
3		
4		
5		
3 1		
2		
3		
4		
5		

CALCULATIONS

$M_s = M_d \times (1 - \frac{H_2O}{100}) + 18 (\frac{H_2O}{100})$

$M_s = (\quad) \times (1 - \frac{\quad}{100}) + 18 (\frac{\quad}{100})$

$M_s =$

$T_s =$ °F = °R = (°F + 460)

$P_s = P_b + \frac{S.P.}{13.6} = (\quad) + \frac{\quad}{13.6}$

$P_s =$ in.Hg

$\sqrt{\Delta P} =$

$V_s = 85.49 \times Cp \times \sqrt{\Delta P} \times \sqrt{\frac{T_s, °R}{P_s \times M_s}}$

$V_s = 85.49 \times (\quad) \times (\quad) \times \sqrt{\frac{\quad}{\quad}}$

$V_s =$ ft/s

$A_s =$ ft²

$Q_s = V_s \times A_s \times \frac{60\ s}{m}$

$Q_s = \quad \times \quad \times 60$

$Q_s =$ acfm

$Q_{s_{std}} = C_s \times 17.647 \times \frac{P_s}{T_s} \times (1 - \frac{H_2O\ \%}{100})$

$Q_{s_{std}} = \quad \times 17.647 \times \frac{\quad}{\quad} \times (1 - \frac{\quad}{100})$

$Q_{s_{std}} =$ dscfm

TRAVERSE POINT LOCATION FOR CIRCULAR DUCTS

Plant Detroit Water & Sewer Dept

Date 6/17/85

Sampling location outlet #13

Inside of far wall to outside of nipple ~~52"~~ 55"

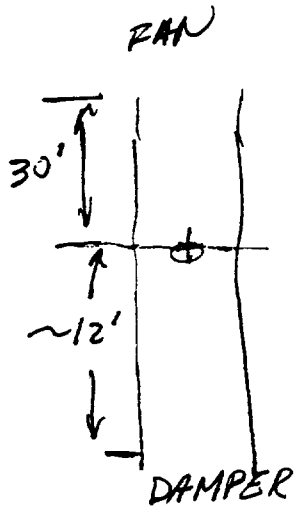
Inside of near wall to outside of nipple (nipple length) ~~55"~~ 2"

Stack I.D. ~~53"~~

Nearest upstream disturbance _____ dd

Nearest downstream disturbance _____ dd

Calculated by K. Batt



SCHEMATIC OF SAMPLING LOCATION

TRAVERSE POINT NUMBER	FRACTION OF STACK I.D.	STACK I.D.	PRODUCT OF COLUMNS 2 AND 3 (TO NEAREST 1/8 INCH)	NIPPLE LENGTH	TRAVERSE POINT LOCATION FROM OUTSIDE OF NIPPLE (SUM OF COLUMNS 4 & 5)
1	0.021	53"	1 1/8"	2"	3 1/8"
2	0.067	53"	3 1/2"	2"	5 1/2"
3	0.118	53"	6 1/4"	2"	8 1/4"
4	0.177	53"	9 3/8"	2"	11 3/8"
5	0.250	53"	13 1/4"	2"	15 1/4"
6	0.356	53"	18 7/8"	2"	20 7/8"
7	0.644	53"	34 1/8	2"	36 1/8"
8	0.750	53"	39 3/4"	2"	41 3/4"
9	0.823	53"	43 5/8"	2"	45 5/8"
10	0.882	53"	46 3/4"	2"	48 3/4"
11	0.933	53"	49 1/2"	2"	51 1/2"
12	0.979	53"	51 7/8"	2"	53 7/8"

GAS VELOCITY AND VOLUME DATA

PLANT AND CITY	RUN DATE
1. DETROIT SLUDGE INCINERATOR	6 / 17 / 85

SAMPLING LOCATION	CLOCK TIME
OUTLET - INCINERATOR # 13	1240

RUN NUMBER	OPERATOR	AMB. TEMP. (°F)	BAR. PRESS (in. Hg)	STATIC PRESS (in. H_2O)
2. PRE-TEST	DM KB	87	29.84	-11.8

MOLECULAR WT.	STACK INSIDE DIMENSION (in.) DIAM OR SIDE 1	STACK INSIDE DIMENSION (in.) SIDE 2	PITOT TUBE Cp	MOISTURE %
	53.0	53.0	84	

FIELD DATA

TRAVERSE POINT NUMBER	POSITION (in.)	VELOCITY HEAD (Δp_s), in.H_2O	STACK TEMP, °F
1		0.35	84
2		0.30	83
3		0.10	84
4		0.12	83
5		0.13	82
6		0.36	82
7		0.90	82
8		1.15	81
9		1.26	82
10		1.10	82
11		1.05	82
12		1.05 0.88	82
1		0.40	84
2		0.90	84
3		0.56	83
4		0.50	82
5		0.35	82
6		0.50	82
7		1.10	82
8		1.50	81
9		1.80	81
10		1.85	81
11		1.50	81
12		1.05	82

THERMOCOUPLE # 9

PITOT 103

$\sqrt{\Delta P}_{avg} = \frac{0.632 + 0.97}{2} = .802$

EMISSION TESTING FIELD DATA

PLANT & CITY	DATE	SAMPLING LOCATION	SAMPLE TYPE
DETROIT SEWAGE PLANT	6/17/85	SEWAGE INCINERATOR OUTLET	MOISTURE

RUN NO.	OPERATOR	AMB. TEMP (°F)	BAR. PRESS. (IN. Hg)	STATIC PRESS. (IN. H_2O)	FILTER NUMBER(S)	STACK INSIDE DIMEN. (INCHES)	PITOT TUBE Cp	THERM NO.	PAGE
[illegible]	DMCNEAL KBATT		29.84	-1.18		51			1 OF 1

PROBE LENGTH AND TYPE	NOZZLE I.D.	NOZZLE NO.	H_2O (S)	SAMPLE BOX NO.	METER BOX NO.	METER ΔH@	METER CAL. FACTOR Y	LEAK CHECK IN. Hg	LEAK CHECK CFM	K FACTOR	C FACTOR	PROBE HEAT SET	BOX HEAT SET	REF. ΔP	RECORD DATA MINS
6 FT GLASS				[illegible]	F11	1.14	1.952					250	NA		

Pre Leak Check 0.00 @ 12" Hg
POST LEAK CHECK 0.00 @ 9" Hg

TRAVERSE POINT NUMBER	SAMPLING TIME, min	CLOCK TIME (24 hr CLOCK)	GAS METER READING (V_m), ft^3	VELOCITY HEAD (Δp_s), in. H_2O	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O DESIRED	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O ACTUAL	STACK TEMPERATURE (T_s), °F	DRY GAS METER TEMPERATURE INLET ($T_{m_{in}}$), °F	DRY GAS METER TEMPERATURE OUTLET ($T_{m_{out}}$), °F	PUMP VACUUM, in. Hg	SAMPLE BOX TEMPERATURE °F	IMPINGER TEMPERATURE °F
	0	1459	67.528									
	5	1504				1.15		90	86	8.0		63
	10	1509	74.940			1.15		96	86	8.0		67
	15	1514				1.15		106	89	9.0		91
	20	1519	81.930			1.15		106	89	9.0		91
	25	1524				1.15		108	90	9.0		90
	30	1529	89.040			1.15		110	90	9.0		90

PARTICULATE SAMPLE RECOVERY AND INTEGRITY SHEET

Plant Detroit Water & Sewer Sample date 6/17/85

Sample location Outlet Recovery date _____

Run number Moisture Recovered by RB

Filter number(s) _____

Method 4 MOISTURE

Impingers				Silica gel		
Final volume (wt)	592.7	443.7	ml(g)	Final wt	780.4	g
Initial volume (wt)	587.2	437.9	ml(g)	Initial wt	767	g
Net volume (wt)	5.5	5.8	ml(g)	Net wt	13.4	g
Description of impinger water	clear					% spent

Total moisture 24.7 g

RECOVERED SAMPLE

Filter container number(s) _____ Sealed _____

Description of particulate on filter _____

Probe rinse container no. _____ Liquid level marked _____

_____ blank container no. _____ Liquid level marked _____

Impinger contents container no. _____ Liquid level marked _____

_____ blank container no. _____ Liquid level marked _____

Samples stored and locked _____

Remarks Prelim. outlet moisture sum

LABORATORY CUSTODY

Received by _____ Date _____

Remarks _____

Particulate

Cr^{+6}

Total Cr

1-IMPINGER
1-BOX
3-STACK

EMISSION TESTING FIELD DATA

PLANT & CITY	DATE	SAMPLING LOCATION	SAMPLE TYPE
DETROIT SEWAGE INCINERATOR	6/18/85	SCRUBBER OUTLET	PARTICULATE/Cr

RUN NO.	OPERATOR	AMB. TEMP (°F)	BAR. PRESS. (IN. Hg)	STATIC PRESS. (IN. H_2O)	FILTER NUMBER(S)	STACK INSIDE DIMEN. (INCHES)	PITOT TUBE Cp	NOZZLE NO.	PAGE
PC07	D. MCNEAL K. BAIT	88	29.50	-1.8	8151 02316	5	84		1 OF 1

PROBE LENGTH AND TYPE	NOZZLE I.D.	NOZZLE NO.	H_2O (%)	SAMPLE BOX NO.	METER BOX NO.	METER $\Delta H@$	METER CAL. FACTOR Y	LEAK CHECK BR. Hg	LEAK CHECK CFM	K FACTOR	C FACTOR	PROBE HEAT SET	BOX HEAT SET	REF. ΔP	RECORD DATA RUNS
6 FT GLASS	0.193	3-1.09			FILTER	1.8	0.52	1.5	0.004	0.8515		250	250		15

POST TEST 10.0 0.02

THERMOCOUPLE 178
PITOT 403

TRAVERSE POINT NUMBER	SAMPLING TIME, min	CLOCK TIME (24 hr CLOCK)	GAS METER READING (V_m), ft^3	VELOCITY HEAD (Δp_s), in. H_2O	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O DESIRED	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O ACTUAL	STACK TEMPERATURE (T_s), °F	DRY GAS METER TEMPERATURE INLET ($T_{m_{in}}$), °F	DRY GAS METER TEMPERATURE OUTLET ($T_{m_{out}}$), °F	PUMP VACUUM, in. Hg	SAMPLE BOX TEMPERATURE °F	IMPINGER TEMPERATURE °F
	0	1131	89.185									
1	15.	1146	100.	1.50	1.29	1.29	85	88	90	4.0	231	58
2	30.	1201	105.000	0.35	0.30	0.30	85	96	90	2.0	270	53
3	45.	1216	112.600	0.70	0.60	0.60	90	100	96	3.0	255	63
4	60.	1231	120.900	0.80	0.69	0.69	88	106	98	3.0	240	60
5	75.	1246	130.120	1.00	0.87	0.87	90	110	93	3.2	260	60
6	90.	1301	139.770	1.10	0.96	0.96	91	112	94	3.5	256	61
7	105.	1316	148.570	0.85	0.74	0.74	91	113	95	3.8	243	61
8	120.	1331	158.990	1.25	1.10	1.10	90	114	98	4.5	266	61
9	135.	1346	172.260	2.10	1.84	1.84	91	114	90	6.0	252	59
10	150.	1401	187.150	2.50	2.18	2.18	94	116	100	7.2	255	59
11	165.	1416	203.150	3.00	2.62	2.62	93	116	100	9.5	259	60
12	180.	1431	218.250	2.80	2.47	2.47	88	117	100	10.0	244	63
13	195.	1450	223.425	0.20	0.17	0.17	89	112	102	3.0	217	71
14	210.	1503	227.410	0.20	0.17	0.17	91	111	102	3.0	263	71
15	225.	1518	231.370	0.20	0.17	0.17	89	110	102	3.0	242	68
16	240.	1533	234.190	0.06	0.05	0.05	91	110	102	2.2	233	70
17	255.	1548	237.650	0.15	0.13	0.13	93	110	102	3.0	250	75
18	270.	1603	242.600	0.30	0.26	0.26	91	110	102	3.5	250	72
19	285.	1628	251.440	0.95	0.83	0.83	90	111	102	6.0	260	65
20	300.	1643	261.900	1.25	1.10	1.10	87	114	102	7.0	278	61
21	315.	1658	272.380	1.25	1.10	1.10	87	116	102	7.0	272	61
22	330.	1713	282.890	1.30	1.15	1.15	90	116	102	7.0	280	62
23	345.	1728	294.000	1.30	1.15	1.15	87	116	102	7.0	267	63
24	360.	1743	303.740	1.15	1.02	1.02	85	116	102	6.5	237	63

19.[illegible] 21 [illegible]0 1.3 [illegible] CFM TRA [illegible] S H)

PARTICULATE SAMPLE RECOVERY AND INTEGRITY SHEET

Plant Detroit Water & Sewer Sample date 6/18/85
Sample location Outlet Recovery date 6/19/85
Run number PCO-1 Recovered by DS
Filter number(s) 851023G

MOISTURE

Impingers
Final volume (wt) 702.9 627.8 ml(g)
Initial volume (wt) 576.9 600.1 ml(g)
Net volume (wt) 126 27.7 ml(g)
Description of impinger water Yellow

Silica gel
Final wt 507.6 484.8 g 854.4
Initial wt 499.1 481.2 g 810.6
Net wt 8.5 3.6 g 43.8
90 % spent

Total moisture 209.6 g

RECOVERED SAMPLE

Filter container number(s) 3531 B Sealed ✓
Description of particulate on filter Black

Probe rinse container no. 3531 A Liquid level marked ✓
Ace. blank container no. 3529 A Liquid level marked ✓
Impinger contents container no. 3532 A Liquid level marked ✓
H_2O blank container no. 3530 A Liquid level marked ✓
Samples stored and locked

Remarks
Filter blank cont. # 3529 B, Filter # 851022S

LABORATORY CUSTODY

Received by J. Rotell Date 6/24/85
Remarks

DRY MOLECULAR WEIGHT DETERMINATION

PLANT Detroit Water & Sewerage Dept. COMMENTS:
DATE 6/18/85 TEST NO PCO-1
SAMPLING TIME (24-hr CLOCK) 11:25-5:35
SAMPLING LOCATION No. 13 INC. Scrubber outlet
SAMPLE TYPE (BAG, INTEGRATED, CONTINUOUS)
ANALYTICAL METHOD ORSAT
AMBIENT TEMPERATURE 72°F
OPERATOR L Thum
ORSAT LEAK CHECKED ✓

RUN / GAS	1		2		3		AVERAGE NET VOLUME	MULTIPLIER	MOLECULAR WEIGHT OF STACK GAS (DRY BASIS) M_d, lb lb-mole
	ACTUAL READING	NET	ACTUAL READING	NET	ACTUAL READING	NET			
CO_2	3.4	3.4	3.4	3.4	3.4	3.4	3.4	44/100	
O_2 (NET IS ACTUAL O_2 READING MINUS ACTUAL CO_2 READING)	19.4	16.0	19.4	16.0	19.4	16.0		32/100	
CO (NET IS ACTUAL CO READING MINUS ACTUAL O_2 READING)								28/100	
N_2 (NET IS 100 MINUS ACTUAL CO READING)								28/100	
								TOTAL	

FIELD TESTING FIELD DATA

PLANT & CITY	DATE	SAMPLING LOCATION	SAMPLE TYPE
DETROIT SEWAGE INCINERATOR	6/19/85	SCRUBBER OUTLET	PART/GAS

RUN NO.	OPERATOR	AMB. TEMP (°F)	BAR. PRESS. (IN. Hg)	STATIC PRESS. (IN. H_2O)	FILTER NUMBER(S)	STACK INSIDE DIAM. (INCHES)	PITOT TUBE Cp	THERM NO.	PAGE
RUN 2	D MCNEAL / K BAST	89	29.80	-1.4	RS102310	53	84		1 OF 1

PROBE LENGTH AND TYPE	NOZZLE I.D.	NOZZLE NO.	H_2O (S)	SAMPLE BOX NO.	METER BOX NO.	METER ΔH@	METER CAL. FACTOR Y	LEAK CHECK Dr. Hg	LEAK CHECK CFM	K FACTOR	C FACTOR	PROBE HEAT SET	BOX HEAT SET	REF. ΔP	RECORD DATA SHEET
6 FT GLASS	1.93	BOILER	9.28	FIN	1.14	1.052	1.60	0.006	0.18514			250	250		15A

POST-TEST LEAK CHECKS 5.0 0.2 CFM
CORRECTION FOR PT 12 POINT/MID TEST 5.0 0.05 CFM

PITOT THERMOCOUPLE 403 178

TRAVERSE POINT NUMBER	SAMPLING TIME, min	CLOCK TIME (24 hr CLOCK)	GAS METER READING (V_m), ft^3	VELOCITY HEAD (Δp_s), in. H_2O	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O DESIRED	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O ACTUAL	STACK TEMPERATURE (T_s), °F	DRY GAS METER TEMPERATURE INLET ($T_{m_{in}}$), °F	DRY GAS METER TEMPERATURE OUTLET ($T_{m_{out}}$), °F	PUMP VACUUM, in. Hg	SAMPLE BOX TEMPERATURE °F	IMPINGER TEMPERATURE °F
	0	846	305.428									
1	15.	901	314.980	1.20	1.02	1.02	85	88	92	2.0	270	65
2	30.	916	323.000	0.75	0.64	0.64	90	95	90	2.0	273	60
3	45.	931	330.700	0.65	0.56	0.56	87	102	90	2.0	272	63
4	60.	946	338.200	0.70	0.60	0.60	95	105	90	2.0	235	65
5	75.	1001	345.430	0.60	0.52	0.52	93	109	90	2.0	229	65
6	90.	1016	353.460	0.75	0.65	0.65	93	108	91	2.0	248	69
7	105.	1031	363.330	1.20	1.04	1.04	92	110	94	2.5	250	63
8	120.	1046	373.400	1.20	1.04	1.04	91	112	95	3.0	247	60
9	135.	1101	383.420	1.20	1.04	1.04	94	112	97	3.0	247	61
10	150.	1116	394.190	1.30	1.13	1.13	94	112	98	3.2	249	61
11	165.	1131	405.470	1.50	1.30	1.30	95	114	99	3.5	248	60
12	180.	1146	414.700	0.95	0.83	0.83	95	114	99	3.5	248	60
13 (16)	200.	1240	420.380	0.10	0.09	0.09	89	114	100	2.0	231	75
14 (17)	220.	1300	423.375	0.05	0.04	0.04	91	114	100	2.0	229	72
15 (18)	240.	1437 ~~1320~~*	430.550	0.37	0.32	0.32	91	114	100	3.0	260	78
16 (19)	260.	1501 ~~1346~~	435.780	0.20	0.17	0.17	89	108	100	2.5	249	68
17 (20)	280.	1521 ~~1400~~	443.950	0.45	0.39	0.39	91	112	99	2.5	246	70
18 (21)	300.	1541 ~~1420~~	452.500	0.50	0.44	0.44	92	110	99	3.0	240	67
19 (22)	320.	1601 ~~1440~~	466.750	1.30	1.13	1.13	95	112	99	4.0	245	65
20 (23)	340.	1621 ~~1500~~	481.390	1.40	1.22	1.22	93	116	100	4.5	235	64
21 (24)	360.	1647 ~~1520~~	495.430	1.25	1.10	1.10	93	119	102	4.2	234	63
22												
23												
24												

415.810 — 414.700 EXTRA (PORT CHANGE AND LEAK CHECK) *INCINERATOR SHUT DOWN AT ~~1320~~ RESTARTED TEST AT 1438

VOLUME = .04130 = 10.11 CFM

PARTICULATE SAMPLE RECOVERY AND INTEGRITY SHEET

Plant Detroit — Sample date 6/19/85
Sample location Outlet — Recovery date 6/20/85
Run number PBD-2 — Recovered by DS
Filter number(s) 8510230

MOISTURE

Impingers

Final volume (wt)	726.8	609.6	ml(g)
Initial volume (wt)	603.5	593	ml(g)
Net volume (wt)	123.3	16.6	ml(g)

Description of impinger water Yellow

Silica gel

Final wt	518.4	490.9	g	896.8
Initial wt	514.5	489	g	868.8
Net wt	3.9	1.9	g	28

50 % spent

Total moisture 173.7 g

RECOVERED SAMPLE

Filter container number(s) 3016 B — Sealed ✓
Description of particulate on filter DARK GREY COATING

Probe rinse container no. 3016 A — Liquid level marked ✓
Acet. blank container no. 3529 A — Liquid level marked ✓
Impinger contents container no. 3017 A — Liquid level marked ✓
H_2O blank container no. 3530 A — Liquid level marked ✓
Samples stored and locked
Remarks Run Void – 2 pt. Leak Check OK 6/20

LABORATORY CUSTODY

Received by L. Rebello — Date 6/24/85
Remarks

DRY MOLECULAR WEIGHT DETERMINATION

PLANT Detroit

DATE 6/19/85 TEST NO PCO-2

SAMPLING TIME (24-hr CLOCK)

SAMPLING LOCATION outlet

SAMPLE TYPE (BAG, INTEGRATED, CONTINUOUS)

ANALYTICAL METHOD

AMBIENT TEMPERATURE 85

OPERATOR GJ

ORSAT LEAK CHECKED ✓

COMMENTS:

RUN / GAS	1		2		3		AVERAGE NET VOLUME	MULTIPLIER	MOLECULAR WEIGHT OF STACK GAS (DRY BASIS) M_d, lb lb-mole
	ACTUAL READING	NET	ACTUAL READING	NET	ACTUAL READING	NET			
CO_2	4.0	4.0	4.0	4.0			4.0	44/100	
O_2 (NET IS ACTUAL O_2 READING MINUS ACTUAL CO_2 READING)	18.0	14.0	18.0	14.0			14.0	32/100	
CO (NET IS ACTUAL CO READING MINUS ACTUAL O_2 READING)								28/100	
N_2 (NET IS 100 MINUS ACTUAL CO READING)								28/100	
								TOTAL	

EMISSION TESTING FIELD DATA

PLANT & CITY	DATE	SAMPLING LOCATION	SAMPLE TYPE
DETROIT SEWAGE INCINERATOR	6/20/85	SECD EFFECT OUTLET	PART/Gas

RUN NO.	OPERATOR	AMB. TEMP (°F)	BAR. PRESS. (IN. Hg)	STATIC PRESS. (IN. H_2O)	FILTER NUMBER(S)	STACK INSIDE DIMEN. (INCHES)	PITOT TUBE Cp	THERM NO.	PAGE
	PROF D MCNEELY K BATT	86	29.81	-1.8	8851023 5	53	.84		1 OF 1

PROBE LENGTH AND TYPE	NOZZLE I.D.	NOZZLE NO.	H_2O (%)	SAMPLE BOX NO.	METER BOX NO.	METER Δ H @	METER CAL. FACTOR Y	LEAK CHECK IN. Hg	LEAK CHECK CFM	K FACTOR	C FACTOR	PROBE HEAT SET	BOX HEAT SET	REF. ΔP	RECORD DATA RUN
6 FT GLASS	.493	3	09	A	3	1.8	1.005	7.0	0.004	0.854	A	250	350	A	1

LEAK CHECKS MID-TEST 7.0 0.004 CFM PITOT 403
POST-TEST @ 10.0" Hg 0.02 cfm THERMOCOUPLE 178

TRAVERSE POINT NUMBER	SAMPLING TIME, min	CLOCK TIME (24 hr CLOCK)	GAS METER READING (V_m), ft^3	VELOCITY HEAD (Δp_s), in. H_2O	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O DESIRED	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O ACTUAL	STACK TEMPERATURE (T_s), °F	DRY GAS METER TEMPERATURE INLET ($T_{m_{in}}$), °F	DRY GAS METER TEMPERATURE OUTLET ($T_{m_{out}}$), °F	PUMP VACUUM, in. Hg	SAMPLE BOX TEMPERATURE °F	IMPINGER TEMPERATURE °F
	0	0845	497.069									
X 1	15	0900	505.080	0.95	0.81	0.81	86	88	90	1.0	250	82
2	30	0915	513.380	0.80	0.69	0.69	87	95	90	3.0	249	58
3	45	0930	521.610	0.80	0.69	0.69	88	104	90	3.0	250	60
4	60	0945	531.990	1.10	0.95	0.95	91	109	92	3.5	250	65
5	75	1000	540.870	1.20	1.04	1.04	93	112	92	4.0	249	58
X 6	90	1015	550.120	1.00	0.88	0.88	89	113	96	4.0	245	54
X 7	105	1030	559.010	0.90	0.79	0.79	87	114	98	4.0	249	57
8	120	1045	571.000	1.75	1.53	1.53	88	114	98	6.0	247	57
9	135	1100	582.250	1.40	1.22	1.22	93	116	100	6.0	251	60
10	150	1115	593.530	1.50	1.31	1.31	94	116	100	5.5	249	64
11	165	1130	606.950	2.10	1.82	1.82	97	117	100	7.0	251	68
12	180	1145	619.420	1.75	1.52	1.52	99	118	102	7.0	249	63
13 (16)	200	1212	624.337	0.10	0.09	0.09	94	115	102	2.5	245	71
14 (17)	220	1232	628.138	0.11	0.09	0.09	97	112	102	2.5	249	71
X 15 (18)	240	1252	635.172	0.37	0.32	0.32	95	110	102	3.5	247	67
16 (19)	260	1312	646.791	0.98	0.85	0.85	93	112	102	5.5	250	56
17 (20)	280	1332	660.403	1.30	1.13	1.13	98	116	102	6.5	247	60
18 (21)	300	1352	674.885	1.40	1.23	1.23	90	118	102	7.5	248	66
19 (22)	320	1412	689.037	1.40	1.22	1.22	97	119	103	7.5	247	65
20 (23)	340	1432	706.074	1.95	1.73	1.73	89	119	103	9.5	246	67
21 (24)	360	1452	719.864	1.30	1.14	1.14	93	121	103	8.0	250	66

EXTRA VOLUME: 620.351 − 619.420 = 0.93 CPM (PORT CHANGE & LEAK CHECK

PARTICULATE SAMPLE RECOVERY AND INTEGRITY SHEET

Plant Detroit Sample date 6/20/85
Sample location Outlet Recovery date 6/21/85
Run number PCO-3 Recovered by AS
Filter number(s) 851023S

MOISTURE

Impingers				Silica gel				
Final volume (wt)	734.3	641.2	ml(g)	Final wt	504.1	485.4	g	893.2
Initial volume (wt)	572.6	608.1	ml(g)	Initial wt	500.2	482.1	g	840.5
Net volume (wt)	161.7	33.1	ml(g)	Net wt	8.9	3.3	g	52.7

Description of impinger water Yellow
90 % spent

Total moisture 259.7 g

RECOVERED SAMPLE

Filter container number(s) 3020 B Sealed ✓
Description of particulate on filter Black

Probe rinse container no. 3020 A Liquid level marked ✓
Acet. blank container no. 3529 A Liquid level marked ✓
Impinger contents container no. 3021 A Liquid level marked ✓
H_2O blank container no. 3530 A Liquid level marked ✓
Samples stored and locked
Remarks

LABORATORY CUSTODY

Received by T Rotell Date 6/24/85
Remarks

DRY MOLECULAR WEIGHT DETERMINATION

PLANT Detroit Water & Sewerage Dept.
DATE 6/20/85 TEST NO PCO-3
SAMPLING TIME (24-hr CLOCK)
SAMPLING LOCATION No. 13 Inc. - Scrubber outlet -
SAMPLE TYPE (BAG, INTEGRATED, CONTINUOUS)
ANALYTICAL METHOD ORSAT
AMBIENT TEMPERATURE 72°F
OPERATOR CD
ORSAT LEAK CHECKED ✓

COMMENTS:

RUN / GAS	1		2		3		AVERAGE NET VOLUME	MULTIPLIER	MOLECULAR WEIGHT OF STACK GAS (DRY BASIS) M_d, lb lb-mole
	ACTUAL READING	NET	ACTUAL READING	NET	ACTUAL READING	NET			
CO_2	4.6	4.6	4.6	4.6			4.6	44/100	
O_2 (NET IS ACTUAL O_2 READING MINUS ACTUAL CO_2 READING)	18.0	13.4	18.0	13.4			13.4	32/100	
CO (NET IS ACTUAL CO READING MINUS ACTUAL O_2 READING)	18.0	0					0	28/100	
N_2 (NET IS 100 MINUS ACTUAL CO READING)								28/100	
								TOTAL	

EMISSION TESTING FIELD DATA

PLANT & CITY	DATE	SAMPLING LOCATION	SAMPLE TYPE
DETROIT DIESEL ALLISON SLUDGE	6/21/85	OUTLET #13 INCINERATOR	PARTICULATE/GCS

THERMO #178
PITOT #103

1.06

RUN NO.	OPERATOR	AMB. TEMP (°F)	BAR. PRESS. (IN. Hg)	STATIC PRESS. (IN. H_2O)	FILTER NUMBER(S)	STACK INSIDE DIAM. (INCHES)		PITOT TUBE C_p	THERM NO.	PAGE
PG-04	K. BARTIT, D. MCHENRY	011	28.5	-1.18	851.0023	53.0	53.0	84		1 OF 1

PROBE LENGTH AND TYPE	NOZZLE I.D.	NOZZLE NO.	H_2O (S)	SAMPLE BOX NO.	METER BOX NO.	METER $\Delta H@$	METER CAL. FACTOR Y	LEAK CHECK (IN. Hg)	LEAK CHECK (CFM)	K FACTOR	C FACTOR	PROBE HEAT SET	BOX HEAT SET	REF. ΔP	RECORD DATA RUNS
6' FIT GLASS	0.193	3-100	4.28		1.14	1.052	7.000	0.10	0.85			250°	250°		

POST-TEST LEAK CHECKS

PRE TEST @ 15" Hg 0.00 cfm
MID TEST @ 10" Hg 0.00 cfm

TRAVERSE POINT NUMBER	SAMPLING TIME, min	CLOCK TIME (24 hr CLOCK)	GAS METER READING (V_m), ft^3	VELOCITY HEAD (Δp_s), in. H_2O	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O		STACK TEMPERATURE (T_s), °F	DRY GAS METER TEMPERATURE		PUMP VACUUM, in. Hg	SAMPLE BOX TEMPERATURE °F	IMPINGER TEMPERATURE °F
					DESIRED	ACTUAL		INLET ($T_{m_{in}}$), °F	OUTLET ($T_{m_{out}}$), °F			
	0	830	720.468									
1	15.0	845	730.043	1.20	1.03	1.03	87	91	95	3.0	232	68
2	30.0	900	738.752	0.91	0.78	0.78	91	100	96	3.0	243	58
3	45.0	915	744.663	0.43	0.37	0.37	91	108	96	2.0	245	64
4	60.0	930	751.871	0.65	0.56	0.56	95	109	96	2.5	247	61
5	75.0	945	759.982	0.73	0.63	0.63	97	112	96	3.0	248	56
6	90.0	1000	767.095	0.74	0.64	0.64	96	114	96	3.0	251	59
7	105.0	1015	776.680	1.20	1.04	1.04	95	115	96	4.0	254	53
8	120.0	1030	787.794	1.50	1.30	1.30	96	116	96	4.5	255	56
9	135.0	1045	799.569	1.65	1.44	1.44	94	118	98	5.0	257	59
10	150.0	1100	810.639	1.55	1.35	1.35	95	119	100	5.0	257	59
11	165.0	1115	822.903	1.85	1.61	1.61	95	119	100	6.0	253	59
12	180.0	1130	833.556	1.45	1.26	1.26	98	120	100	5.5	257	62
13	200.0	1158	840.436	0.35	0.31	0.31	91	116	104	3.5	260	68
14	220.0	1218	844.574	0.13	0.11	0.11	96	115	104	2.5	257	70
15	240.0	1238	851.292	0.34	0.29	0.29	99	114	104	3.5	258	69
16	260.0	1258	862.574	0.92	0.80	0.80	97	116	104	5.0	261	61
17	280.0	1318	875.945	1.30	1.14	1.14	95	119	104	6.0	255	59
18	300.0	1338	890.637	1.35	1.18	1.18	97	120	104	6.5	251	64
19	320.0	1358	903.697	1.45	1.27	1.27	98	121	104	7.0	249	64
20	340.0	1418	917.391	1.35	1.18	1.18	98	122	104	7.0	248	68
21	360.0	1438	929.703	1.10	0.91	0.97	96	122	109	6.5	247	67

PORT CHANGE (833.556 - 833.811)
AFTER FILTER 0.371 CFM

PARTICULATE SAMPLE RECOVERY AND INTEGRITY SHEET

Plant Detroit Sample date 6/21/85
Sample location Outlet Recovery date 6/22/85
Run number PCO-4 Recovered by AL
Filter number(s) 8510023

MOISTURE

Impingers				Silica gel			
Final volume (wt)	792	625.5	ml(g)	Final wt	523.5	494.4	g 920.1
Initial volume (wt)	610.0	591.3	ml(g)	Initial wt	516.1	490.3	g 874.9
Net volume (wt)	182	34.2	ml(g)	Net wt	7.4	4.1	g 47.2
Description of impinger water	Yellow				90	% spent	

Total moisture 274.9 g

RECOVERED SAMPLE

Filter container number(s) 3538 B Sealed ✓
Description of particulate on filter Grey Coating

Probe rinse container no. 3538 A Liquid level marked ✓
Ace. blank container no. 3529 A Liquid level marked ✓
Impinger contents container no. 3602 A Liquid level marked ✓
H_2O blank container no. 3530 A Liquid level marked ✓
Samples stored and locked
Remarks

LABORATORY CUSTODY

Received by L. Rotello Date 6/24/85
Remarks

DRY MOLECULAR WEIGHT DETERMINATION

PLANT BWSD

DATE 6/21/85 TEST NO PCO-4

SAMPLING TIME (24-hr CLOCK)

SAMPLING LOCATION No. 13 SCRUBBER OUTLET

SAMPLE TYPE (BAG, INTEGRATED, CONTINUOUS)

ANALYTICAL METHOD

AMBIENT TEMPERATURE

OPERATOR

ORSAT LEAK CHECKED

COMMENTS:

RUN / GAS	1		2		3		AVERAGE NET VOLUME	MULTIPLIER	MOLECULAR WEIGHT OF STACK GAS (DRY BASIS) M_d, lb lb-mole
	ACTUAL READING	NET	ACTUAL READING	NET	ACTUAL READING	NET			
CO_2	3.6	3.6	3.6	3.6				44/100	
O_2 (NET IS ACTUAL O_2 READING MINUS ACTUAL CO_2 READING)	18.4	14.8	18.4	14.8				32/100	
CO (NET IS ACTUAL CO READING MINUS ACTUAL O_2 READING)								28/100	
N_2 (NET IS 100 MINUS ACTUAL CO READING)								28/100	
								TOTAL	

EMISSION TESTING FIELD DATA

PITOT 103
THERMO 178

PLANT & CITY	DATE	SAMPLING LOCATION	SAMPLE TYPE
DETROIT SEWAGE & SLUDGE	6/22/85	OUTLET INCINERATOR #3	PARTICULATE/CR

RUN NO.	OPERATOR	AMB. TEMP (°F)	BAR. PRESS. (IN. Hg)	STATIC PRESS. (IN. H_2O)	FILTER NUMBER(S)	STACK INSIDE DIMEN. (INCHES)	PITOT TUBE C_p	THERM NO.	PAGE
P.CO-15	K. WATT / D. MCNEAL	80	29.40	-1.18	85/0249	5.30	5.30	89	1 OF 1

PROBE LENGTH AND TYPE	NOZZLE I.D.	NOZZLE NO.	H_2O (%)	SAMPLE BOX NO.	METER BOX NO.	METER $\Delta H@$	METER CAL. FACTOR Y	LEAK CHECK IN. Hg	LEAK CHECK CFM	K FACTOR	C FACTOR	PROBE HEAT SET	BOX HEAT SET	REF. ΔP	RECORD DATA USED
6FT 6/8 SS	0.193	3-1.99		42	FB11	1.49	1.952	8	0.00	0.551		250	250		

LEAK CHECK PRE TEST @ 15" Hg 0.00 cfm
MID TEST @ 4.5" Hg 0.00 cfm

TRAVERSE POINT NUMBER	SAMPLING TIME, min	CLOCK TIME (24 hr CLOCK)	GAS METER READING (V_m), ft^3	VELOCITY HEAD (Δp_s), in. H_2O	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O		STACK TEMPERATURE (T_s), °F	DRY GAS METER TEMPERATURE		PUMP VACUUM, in. Hg	SAMPLE BOX TEMPERATURE °F	IMPINGER TEMPERATURE °F
					DESIRED	ACTUAL		INLET ($T_{m_{in}}$), °F	OUTLET ($T_{m_{out}}$), °F			
	0	930	930.054									
1	15.0	945	938.163	1.05	0.90	0.90	90	94	96	3.0	238	53
2	30.0	900	945.259	0.65	0.56	0.56	91	100	95	3.0	236	56
3	45.0	915	950.303	0.35	0.30	0.30	93	108	95	2.0	237	63
4	60.0	930	956.376	0.50	0.43	0.43	94	110	97	2.5	253	59
5	75.0	945	963.182	0.60	0.52	0.52	94	112	97	3.0	255	58
6	90.0	1000	970.770	0.76	0.67	0.67	89	114	97	3.0	257	58
7	105.0	1015	979.919	1.15	1.01	1.01	93	116	100	4.0	257	60
8	120.0	1030	989.924	1.25	1.10	1.10	94	118	104	4.0	255	57
9	135.0	1045	999.430	1.20	1.05	1.05	94	119	105	4.0	255	58
10	150.0	1100	008.341	1.05	0.92	0.92	97	120	106	4.0	259	59
11	165.0	1115	017.322	1.10	0.96	0.96	97	120	106	4.0	256	59
12	180.0	1130	024.663	0.70	0.61	0.61	100	120	107	4.0	260	69
13	195.0	1145	034.710	1.25	1.15	1.15	90	114	97	5.0	253	61
14	210.0	1210	041.176	0.54	0.50	0.50	92	116	106	4.0	253	65
15	225.0	1225	046.459	0.34	0.31	0.31	90	116	106	3.0	253	62
16	240.0	1240	051.773	0.42	0.39	0.39	97	116	107	3.0	252	62
17	255.0	1255	057.781	0.48	0.44	0.44	97	116	107	3.5	251	61
18	270.0	1310	064.699	0.59	0.55	0.55	93	116	107	4.0	252	64
19	285.0	1325	073.768	1.05	0.97	0.97	95	117	107	5.5	250	61
20	300.0	1340	085.576	1.70	1.58	1.58	91	119	107	7.5	246	61
21	315.0	1355	097.295	1.60	1.48	1.48	95	120	108	7.5	246	64
22	330.0	1410	108.460	1.50	1.39	1.39	95	120	108	7.5	248	63
23	345.0	1425	119.426	1.45	1.35	1.35	91	120	108	7.5	247	63
24	360.0	1440	129.500	1.30	1.21	1.21	92	120	108	7.0	245	65

1140 LEAK CHECK -25... -(166 0.[illegible] cf
TOTAL TIME

PARTICULATE SAMPLE RECOVERY AND INTEGRITY SHEET

Plant DWSD - Detroit Sample date 6/22/85

Sample location No. 13 Inc. Outlet Recovery date 6/24/85

Run number PCO-5 Recovered by [illegible]

Filter number(s) 8510249

MOISTURE

Impingers				Silica gel			
Final volume (wt)	742.2	633.4	ml(g)	Final wt	507	485	g 881.1
Initial volume (wt)	575.4	607.3	ml(g)	Initial wt	500.4	482.2	g 838.6
Net volume (wt)			ml(g)	Net wt			g

Description of impinger water Yellow 50 % spent

Total moisture 244.8 g

RECOVERED SAMPLE

Filter container number(s) 3606 B Sealed ✓

Description of particulate on filter Black

Probe rinse container no.	3606 A	Liquid level marked	✓
Acc. blank container no.	3529 A	Liquid level marked	✓
Impinger contents container no.	3605 A	Liquid level marked	✓
H_2O blank container no.	3530 A	Liquid level marked	✓

Samples stored and locked

Remarks ~~Acetone Rinse has [illegible] Rinse Also~~

LABORATORY CUSTODY

Received by [illegible] Date 6/28/85

Remarks

DRY MOLECULAR WEIGHT DETERMINATION

PLANT DWSD - Detroit

DATE 6/22/85 TEST NO PCO-5

SAMPLING TIME (24-hr CLOCK)

SAMPLING LOCATION No. 13 Inc. Scrubber Outlet

SAMPLE TYPE (BAG, INTEGRATED, CONTINUOUS)

ANALYTICAL METHOD Orsat

AMBIENT TEMPERATURE 72°F

OPERATOR PB

ORSAT LEAK CHECKED ✓

COMMENTS:

GAS \ RUN	1		2		3		AVERAGE NET VOLUME	MULTIPLIER	MOLECULAR WEIGHT OF STACK GAS (DRY BASIS) M_d, lb/lb-mole
	ACTUAL READING	NET	ACTUAL READING	NET	ACTUAL READING	NET			
CO_2	3.6	3.6	3.6	3.6			3.6	44/100	
O_2 (NET IS ACTUAL O_2 READING MINUS ACTUAL CO_2 READING)	18.4	14.8	18.4	14.8			14.8	32/100	
CO (NET IS ACTUAL CO READING MINUS ACTUAL O_2 READING)								28/100	
N_2 (NET IS 100 MINUS ACTUAL CO READING)								28/100	
								TOTAL	

SSI TEST ING FIELD DATA

PITOT #103
THERMO #178

PLANT & CITY	DATE	SAMPLING LOCATION	SAMPLE TYPE
DETROIT SEWAGE AND SLUDGE	6/26/85	OUTLET INCINERATOR NO. 3	PART / GR

RUN NO.	OPERATOR	AMB. TEMP (°F)	BAR. PRESS. (IN. Hg)	STATIC PRESS. (IN. H_2O)	FILTER NUMBER(S)	STACK INSIDE DIMEN. (INCHES)	PITOT TUBE Cp	THERM NO.	PAGE
PG976	K. BAIRD / Dr. NEAL	92	29.71	-1.18	8510232	53.9 / 53.0	0.84		1 OF 1

PROBE LENGTH AND TYPE	NOZZLE I.D.	NOZZLE NO.	H_2O (S)	SAMPLE BOX NO.	METER BOX NO.	METER $\Delta H@$	METER CAL. FACTOR Y	LEAK CHECK RATE, Hg	LEAK CHECK CFM	K FACTOR	C FACTOR	PROBE HEAT SET	BOX HEAT SET	REF. ΔP	RECORD DATA RUNS
6 FT GLASS	0.193	3 1/1.99	4.28	FB3	1.890	1.005	1.0099	1.4223			250°F	250°F		

LEAK CHECKS PRE TEST @ 15" Hg 0.00 cfm
MID TEST @ 10" Hg 0.00 cfm

TRAVERSE POINT NUMBER	SAMPLING TIME, min	CLOCK TIME (24 hr CLOCK)	GAS METER READING (V_m), ft^3	VELOCITY HEAD (Δp_s), in. H_2O	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O DESIRED	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O ACTUAL	STACK TEMPERATURE (T_s), °F	DRY GAS METER TEMPERATURE INLET ($T_{m_{in}}$), °F	DRY GAS METER TEMPERATURE OUTLET ($T_{m_{out}}$), °F	PUMP VACUUM, in. Hg	SAMPLE BOX TEMPERATURE °F	IMPINGER TEMPERATURE °F
	0	916	536.515									
1	15.0	931	548.182	1.55	2.21	2.21	94	97	95	3.0	247	57
2	30.0	946	555.851	0.63	0.90	0.90	95	103	95	2.0	247	59
3	45.0	1001	562.491	0.42	0.60	0.60	102	108	97	1.5	246	59
4	60.0	1016	568.873	0.42	0.59	0.59	107	109	99	2.0	251	59
5	75.0	1031	576.685	0.61	0.87	0.87	102	110	100	2.5	251	57
6	90.0	1046	585.801	0.80	1.16	1.16	95	110	101	3.0	251	56
7	105.0	1101	596.343	1.15	1.69	1.69	89	112	102	3.5	252	56
8	120.0	1116	604.284	0.62	0.88	0.88	105	112	102	2.5	251	60
9	135.0	1131	611.894	0.55	0.79	0.79	103	112	103	3.0	252	60
10	150.0	1146	619.511	0.58	0.84	0.84	96	[illegible]	104	3.0	251	60
11	★153.7	1149	621.456	0.85	1.25	1.25	88	112	104	3.5	252	59
11	165.0	1526	632.437	3.70	5.36	5.36	93	106	101	11.0	252	59
12	180.0	1541	649.293	2.90	4.20	4.20	95	108	102	9.0	250	65
13	195.0	1604	659.439	1.05	1.53	1.53	94	110	103	4.0	252	63
14(17)	2200	1629	668.238	0.18	0.26	0.26	93	113	104	2.0	252	68
15(18)	240.0	1649	676.170	0.33	0.48	0.48	92	114	106	3.0	254	67
16(19)	260.0	1709	689.799	1.10	1.61	1.61	93	115	106	4.5	253	63
17(20)	280.0	1729	705.103	1.35	1.98	1.98	93	116	106	5.5	253	67
18(21)	300.0	1749	721.096	1.45	2.13	2.13	93	116	108	6.0	250	66
19(22)	320.0	1809	737.492	1.50	2.22	2.22	89	117	108	6.0	250	65
20(23)	340.0	1829	753.544	1.45	2.14	2.14	92	117	108	6.0	249	66
21(24)	360.0	1849	768.640	1.30	1.90	1.90	98	117	108	6.0	250	67

EXTRA VOLUME PORT CHANGE 649.545 − 649.293
LEAK CHECK = 0.252 ft^3

★PROCESS DOWN LEAK CHECK 621.500 − 621.456 = 0.044 ft^3

PARTICULATE SAMPLE RECOVERY AND INTEGRITY SHEET

Plant Detroit Sample date 6/24/85
Sample location Outlet Recovery date 6/25/85
Run number PCO-6 Recovered by [illegible]
Filter number(s) 8510232

MOISTURE

Impingers		Silica gel		
Final volume (wt)	777.0 620.6 ml(g)	Final wt	523.3 493 g	902.1
Initial volume (wt)	608.6 582.4 ml(g)	Initial wt	515.9 490 g	851.1
Net volume (wt)	ml(g)	Net wt	g	

Description of impinger water Yellowish tint 90 % spent

Total moisture 258.0 g

RECOVERED SAMPLE

Filter container number(s) 3666 B Sealed ✓
Description of particulate on filter Brown; Black coating

Probe rinse container no.	3665 A	Liquid level marked	✓
Acetone blank container no.	3529 A	Liquid level marked	✓
Impinger contents container no.	3667 A	Liquid level marked	✓
H_2O blank container no.	3530 A	Liquid level marked	✓

Samples stored and locked
Remarks

LABORATORY CUSTODY

Received by L Rotella Date 6/25/85
Remarks

DRY MOLECULAR WEIGHT DETERMINATION

PLANT DWSD - Detroit
DATE 6/24/85 TEST NO DC-6
SAMPLING TIME (24-hr CLOCK)
SAMPLING LOCATION No. 13 Scrubber Outlet
SAMPLE TYPE (BAG, INTEGRATED, CONTINUOUS)
ANALYTICAL METHOD ORSAT
AMBIENT TEMPERATURE 72°F
OPERATOR CB
ORSAT LEAK CHECKED ✓

COMMENTS:

RUN / GAS	1		2		3		AVERAGE NET VOLUME	MULTIPLIER	MOLECULAR WEIGHT OF STACK GAS (DRY BASIS) M_d, lb/lb-mole
	ACTUAL READING	NET	ACTUAL READING	NET	ACTUAL READING	NET			
CO_2	2.2	2.2	2.2	2.2			2.2	44/100	
O_2 (NET IS ACTUAL O_2 READING MINUS ACTUAL CO_2 READING)	18.4	16.2	18.2	16.0			16.1	32/100	
CO (NET IS ACTUAL CO READING MINUS ACTUAL O_2 READING)								28/100	
N_2 (NET IS 100 MINUS ACTUAL CO READING)								28/100	
								TOTAL	

EMISSION TESTING FIELD DATA

PLANT & CITY	DATE	SAMPLING LOCATION	SAMPLE TYPE
Detroit Water & Sewer Dept	6/20/86	#13 Inlet	Part/Cr

RUN NO.	OPERATOR	AMB. TEMP (°F)	BAR. PRESS. (IN. Hg)	STATIC PRESS. (IN. H_2O)	FILTER NUMBER(S)	STACK INSIDE DIMEN. (INCHES)	PITOT TUBE Cp	THERM NO.	PAGE
PCI-3	THRESS Mesa	85	29.90	-11	85 10237 / 64	10 7	84	257	10 of 2

#247 Pitotube

PROBE LENGTH AND TYPE	NOZZLE I.D.	NOZZLE NO.	H_2O (%)	SAMPLE BOX NO.	METER BOX NO.	METER ΔH@	METER CAL. FACTOR Y	LEAK CHECK IN. Hg	LEAK CHECK CFM	K FACTOR	C FACTOR	PROBE HEAT SET	BOX HEAT SET	REF. ΔP	RECORD DATA MINS
10 ft 35	322		158		13-11	1.23	1.033			43		250	250		12

Pre leak check 0.001 @15"

TRAVERSE POINT NUMBER	SAMPLING TIME, min	CLOCK TIME (24 hr CLOCK)	GAS METER READING (V_m), ft^3	VELOCITY HEAD (Δp_s), in. H_2O	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O DESIRED	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O ACTUAL	STACK TEMPERATURE (T_s), °F	DRY GAS METER TEMPERATURE INLET ($T_{m_{in}}$), °F	DRY GAS METER TEMPERATURE OUTLET ($T_{m_{out}}$), °F	PUMP VACUUM, in. Hg	SAMPLE BOX TEMPERATURE °F	IMPINGER TEMPERATURE °F
	0	845	300.313									
A 1	12.		302.590	.09	.09	.09	856	92	92	1.0	261	78
2	24.		305.340	.08	.14	.14	922	92	92	1.0	245	78
3	36.		307.375	.04	.07	.07	900	94	92	1.0	251	77
4	48.		308.950	.03	.05	.05	930	96	94	1.0	232	78
5	60.		311.237	.06	.09	.09	890	96	94	1.0	235	78
B 6	72.		314.300	.09	.16	.16	890	98	94	1.0	245	78
7	84.		316.940	.07	.12	.12	890	100	96	1.0	230	78
8	96.		319.250	.05	.09	.09	870	100	96	1.0	241	78
9	108.		321.620	.04	.09	.09	870	100	98	1.0	242	78
10	120.		324.196	.06	.11	.11	800	102	98	1.0	237	75
C 11	132.		326.750	.06	.11	.11	883	102	98	1.0	245	74
12	144.		329.230	.06	.10	.10	903	102	100	1.0	235	74
13	156.		331.935	.07	.12	.12	946	102	100	1.5	244	75
14	168.		335.365	.12	.20	.20	945	102	100	2.0	245	76
15	180.		338.943	.13	.22	.22	928	104	100	2.0	231	72
D 16	192.		342.300	.11	.19	.19	920	104	100	2.0	251	67
17	204.		345.240	.08	.14	.14	912	104	100	2.0	237	68
18	216.		348.860	.13	.23	.23	900	104	100	2.0	243	68
19	228.		353.820	.20	.35	.35	904	104	100	3.0	250	63
20	240.		358.694	.19	.34	.34	880	106	100	3.0	255	58
E 21	252.		362.060	.11	.20	.20	880	106	102	2.5	242	60
22	264.		365.700	.13	.23	.23	907	106	102	2.5	236	65
23	276.		369.930	.15	.27	.27	880	106	102	5.0	236	64
24	288.		374.500	.18	.32	.32	903	106	102	6.0	240	63

leak V 311.317 good

leak V 339.01 good

EXTRA VEL 311.317 − 311.237) + (339.01 − 338.943) = .147

SS: TE[illegible]NG [illegible]LD [illegible]TA

PLANT & CITY	DATE	SAMPLING LOCATION	SAMPLE TYPE
Detroit Water & Sewer Dept.	6/20/85	#13 Inlet	Part/[illegible]

RUN NO.	OPERATOR	AMB. TEMP (°F)	BAR. PRESS. (IN. Hg)	STATIC PRESS. (IN. H_2O)	FILTER NUMBER(S)	STACK INSIDE DIMEN. (INCHES)	PITOT TUBE Cp	THERM NO.	PAGE
PCI-3	THKESS Neese	85	29.80	-.11	8510238 / 6th	102	72	.8485	7	0.F2

\# 247 Pitot tube

PROBE LENGTH AND TYPE	NOZZLE I.D.	NOZZLE NO.	H_2O (%)	SAMPLE BOX NO.	METER BOX NO.	METER ΔH@	METER CAL. FACTOR Y	LEAK CHECK in. Hg	LEAK CHECK CFM	K FACTOR	C FACTOR	PROBE HEAT SET	BOX HEAT SET	REF. ΔP	RECORD DATA MINS
10' SS	.322		E8		FB	1.123	1.033	7.3	.004	4.3		250	250		12

TRAVERSE POINT NUMBER	SAMPLING TIME, min	CLOCK TIME (24 hr CLOCK)	GAS METER READING (V_m), ft^3	VELOCITY HEAD (Δp_s), in.H_2O	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in.H_2O DESIRED	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in.H_2O ACTUAL	STACK TEMPERATURE (T_s), °F	DRY GAS METER TEMPERATURE INLET ($T_{m_{in}}$), °F	DRY GAS METER TEMPERATURE OUTLET ($T_{m_{out}}$), °F	PUMP VACUUM, in.Hg	SAMPLE BOX TEMPERATURE °F	IMPINGER TEMPERATURE °F
	0		374.500									
25	300.		379.220	.16	.29	.29	893	108	102	6.0	251	65
F 26	312.		382.025	.07	.13	.13	800	106	102	3.0	241	75
27	324.		385.130	.09	.16	.16	901	106	102	3.5	239	68
28	336.		388.740	.13	.22	.22	971	106	102	4.0	235	66
29	348.		392.580	.15	.25	.25	962	106	102	5.0	245	68
30	360.		396.435	.15	.25	.25	962	106	102	5.0	253	68

T_s = 899.9 ≈ 900 .178 ≈ .18 100.5 ≈ 101

[illegible]

PARTICULATE SAMPLE RECOVERY AND INTEGRITY SHEET

Plant Detroit Sample date 6/20/85
Sample location Inlet Recovery date 6/21/85
Run number PCI-3 Recovered by DA
Filter number(s) 851 0239 (Blank) Thimble 64

MOISTURE

Impingers

Final volume (wt)	977	897.5	ml(g)
Initial volume (wt)	600.8	591.3	ml(g)
Net volume (wt)	376.2	306.2	ml(g)

Description of impinger water Slightly Yellow

Silica gel

Final wt	535.3	499.4	g	898.9
Initial wt	532	498.7	g	876.2
Net wt	3.3	0.7	g	22.7

50 % spent

Total moisture 709.1 g

Thimble Cont. # 3605B RECOVERED SAMPLE

Filter container number(s) 3019 B Sealed ✓
Description of particulate on filter Rusty color

Probe rinse container no.	3019 A	Liquid level marked	✓
Ace blank container no.	3529 A	Liquid level marked	✓
Impinger contents container no.	3003 A	Liquid level marked	✓
H_2O blank container no.	3530 A	Liquid level marked	✓

Samples stored and locked
Remarks

LABORATORY CUSTODY

Received by J. Rotella Date 6/24/85
Remarks

DRY MOLECULAR WEIGHT DETERMINATION

PLANT DWSD

DATE 6/20/55 TEST NO PCI-3

SAMPLING TIME (24-hr CLOCK)

SAMPLING LOCATION No. 13 INC. INLET

SAMPLE TYPE (BAG, INTEGRATED, CONTINUOUS)

ANALYTICAL METHOD ORSAT

AMBIENT TEMPERATURE 72°F

OPERATOR QB

ORSAT LEAK CHECKED ✓

COMMENTS:

RUN / GAS	1		2		3		AVERAGE NET VOLUME	MULTIPLIER	MOLECULAR WEIGHT OF STACK GAS (DRY BASIS) M_d, lb lb-mole
	ACTUAL READING	NET	ACTUAL READING	NET	ACTUAL READING	NET			
CO_2	4.8	4.8	4.8	4.8			4.8	44/100	
O_2 (NET IS ACTUAL O_2 READING MINUS ACTUAL CO_2 READING)	17.8	13	17.8	13			13.0	32/100	
CO (NET IS ACTUAL CO READING MINUS ACTUAL O_2 READING)							0	28/100	
N_2 (NET IS 100 MINUS ACTUAL CO READING)								28/100	
								TOTAL	

EMISSION TESTING FIELD DATA

PLANT & CITY	DATE	SAMPLING LOCATION	SAMPLE TYPE
Detroit Incinerator, Riverside Dept.	6/21/86	#13 Inlet	Part/Cat

RUN NO.	OPERATOR	AMB. TEMP (°F)	BAR. PRESS. (IN. Hg)	STATIC PRESS. (IN. H_2O)	FILTER NUMBER(S)	STACK INSIDE DIMEN. (INCHES)	PITOT TUBE Cp	THERM NO.	PAGE
Run A	THOMAS Moore	85	29.50	-1.4	8516006G / 1260	10	.84	6H1257	10 of 27

#247 Pitot Dia.

PROBE LENGTH AND TYPE	NOZZLE I.D.	NOZZLE NO.	H_2O (S)	SAMPLE BOX NO.	METER BOX NO.	METER $\Delta H@$	METER CAL. FACTOR Y	LEAK CHECK IN. Hg	LEAK CHECK CFM	K FACTOR	C FACTOR	PROBE HEAT SET	BOX HEAT SET	REF. ΔP	RECORD DATA RUNS
10 of 35	.373				#64	1.23	1.033					250	260		1 to 27

Pitot leak check ✓ Dry test leak @ 9000 @ 15" Hg

TRAVERSE POINT NUMBER	SAMPLING TIME, min (0 to 14)	CLOCK TIME (24 hr CLOCK)	GAS METER READING (V_m), ft^3	VELOCITY HEAD (Δp_s), in. H_2O	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O DESIRED	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O ACTUAL	STACK TEMPERATURE (T_s), °F	DRY GAS METER TEMPERATURE INLET ($T_{m_{in}}$), °F	DRY GAS METER TEMPERATURE OUTLET ($T_{m_{out}}$), °F	PUMP VACUUM, in. Hg	SAMPLE BOX TEMPERATURE °F	IMPINGER TEMPERATURE °F
	0	830	396.957									
A 1	12.		400.510	.05	.24	.24	880	94	92	1.0	237	80
2	24.		403.800	.04	.19	.19	901	94	94	1.0	262	68
3	36.		407.000	.04	.18	.18	918	96	94	1.0	270	71
4	48.		411.690	.07	.33	.33	914	100	96	2.0	232	69
5	60.		416.334	.07	.32	.32	953	100	96	2.0	235	68
B 6	72.		420.640	.06	.28	.28	900	102	100	2.0	237	75
7	84.		424.000	.04	.19	.19	903	104	100	1.5	230	69
8	96.		427.340	.05	.19	.19	938	104	100	1.5	263	67
9	108.		430.990	.06	.23	.23	910	106	102	2.0	262	68
10	120.		434.691	.06	.23	.23	910	106	102	2.0	270	69
C 11	132.		439.360	.08	.31	.31	900	106	102	3.0	240	73
12	144.		444.399	.09	.35	.35	901	106	102	3.5	246	63
13	156.		448.600	.07	.27	.27	900	108	102	3.5	236	61
14	168.		453.670	.10	.38	.38	948	108	102	5.0	232	67
15	180.		458.310	.08	.31	.31	918	108	102	5.0	245	69
D 16	192.		463.500	.10	.39	.39	895	106	102	5.5	247	71
17	204.		469.420	.13	.50	.50	941	108	104	6.0	230	63
18	216.		474.900	.11	.43	.43	922	108	104	6.5	259	59
19	228.		479.800	.09	.35	.35	915	110	104	6.5	249	63
20	240.		484.673	.09	.35	.35	915	110	104	6.5	255	64
E 21	252.		489.780	.10	.39	.39	900	110	104	6.5	270	72
22	264.		496.050	.15	.58	.58	919	110	104	8.0	270	59
23	276.		502.170	.14	.54	.54	924	110	104	8.5	270	59
24	288.		507.600	.11	.43	.43	902	111	105	8.0	265	63

leak ✓ 416.40 good

Change 9434

Run 1 Volume 411.690 - 396.957 = 14.733

ISSI TESTING FIELD DATA

PLANT & CITY	DATE	SAMPLING LOCATION	SAMPLE TYPE
OSTROW [illegible]	6/24/86	#13 INLET	Particulate

RUN NO.	OPERATOR	AMB. TEMP (°F)	BAR. PRESS. (IN. Hg)	STATIC PRESS. (IN. H_2O)	FILTER NUMBER(S)	STACK INSIDE DIAM. (INCHES)	PITOT TUBE C_p	THERM NO.	PAGE
RUN 4	THREES MOSS	86	29.60	-1.1	AS100651 / 26	10	7	84260	20 of 22

247 Pitot tube

PROBE LENGTH AND TYPE	NOZZLE I.D.	NOZZLE NO.	H_2O (%)	SAMPLE BOX NO.	METER BOX NO.	METER $\Delta H@$	METER CAL. FACTOR Y	LEAK CHECK RATE, Hg	LEAK CHECK CFM	K FACTOR	C FACTOR	PROBE HEAT SET	BOX HEAT SET	REF. ΔP	RECORD DATA RANGE
10/33	378		21		FB1	1.23	1.038	1.16	.903	.94		250	250	A	1/2

TRAVERSE POINT NUMBER	SAMPLING TIME, min / CLOCK TIME (24 hr CLOCK)	GAS METER READING (V_m), ft^3	VELOCITY HEAD (Δp_s), in. H_2O	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O		STACK TEMPERATURE (T_s), °F	DRY GAS METER TEMPERATURE		PUMP VACUUM, in. Hg	SAMPLE BOX TEMPERATURE °F	IMPINGER TEMPERATURE °F
				DESIRED	ACTUAL		INLET ($T_{m_{in}}$), °F	OUTLET ($T_{m_{out}}$), °F			
	0	507.600									
25	300.	513.000	.11	.43	.43	902	111	105	8.5	258	59
F 26	312.	517.365	.07	.28	.28	901	110.00	106	6.0	273	60
27	324.	519.940	.03	.11	.11	931	110	106	4.0	274	64
28	336.	525.300	.11	.42	.42	931	110	106	8.0	271	73
29	348.	530.930	.12	.46	.46	946	110	106	8.5	265	64
30	360.	536.516	.12	.46	.46	946	110	106	9.0	270	60

PARTICULATE SAMPLE RECOVERY AND INTEGRITY SHEET

Plant Detroit Sample date 6/21/85
Sample location INLET Recovery date 6/22/85
Run number PCI-4 Recovered by [illegible]
Filter number(s) 8510066 (Backup)
Thimble No. 26

MOISTURE

Impingers				Silica gel			
Final volume (wt)	926.7	909.8	ml(g)	Final wt	885.2	507.2	g 897.9
Initial volume (wt)	612.7	568	ml(g)	Initial wt	502.9	504.2	g 864.4
Net volume (wt)	314	341.8	ml(g)	Net wt	382.3	3	g 33.6

Description of impinger water Yellow 50 % spent

Total moisture 1074.6 g

~~Thimble~~

Thimble cont. # 3537 B RECOVERED SAMPLE ✓

Filter container number(s) 3536 B Sealed ✓

Description of particulate on filter Red

Probe rinse container no. 3536 A Liquid level marked ✓

Ace blank container no. 3529 A Liquid level marked ✓

Impinger contents container no. 3537 A + 3672 A Liquid level marked ✓

H_2O blank container no. 3530 A Liquid level marked ✓

Samples stored and locked

Remarks 2 Impinger Sample CONTAINERS

LABORATORY CUSTODY

Received by L. Rotell Date 6/28/85

Remarks

DRY MOLECULAR WEIGHT DETERMINATION

PLANT DWSD

DATE 6/21/85 TEST NO PCI-4

SAMPLING TIME (24-hr CLOCK) _____

SAMPLING LOCATION No. 13 Scrubber INLET

SAMPLE TYPE (BAG, INTEGRATED, CONTINUOUS) _____

ANALYTICAL METHOD Orsat

AMBIENT TEMPERATURE 70°F

OPERATOR CR

ORSAT LEAK CHECKED ✓

COMMENTS:

RUN / GAS	1		2		3		AVERAGE NET VOLUME	MULTIPLIER	MOLECULAR WEIGHT OF STACK GAS (DRY BASIS) M_d, lb lb-mole
	ACTUAL READING	NET	ACTUAL READING	NET	ACTUAL READING	NET			
CO_2	5.3	5.3	5.2	5.2			5.25	44/100	
O_2 (NET IS ACTUAL O_2 READING MINUS ACTUAL CO_2 READING)	18.2	12.9	18.2	13.0			12.95	32/100	
CO (NET IS ACTUAL CO READING MINUS ACTUAL O_2 READING)							0	28/100	
N_2 (NET IS 100 MINUS ACTUAL CO READING)								28/100	
								TOTAL	

EMISSION TESTING FIELD DATA

PLANT & CITY	DATE	SAMPLING LOCATION	SAMPLE TYPE
Detroit Water & Sewer Dept.	6/22/85	#13 Inlet	Part / CM

RUN NO.	OPERATOR	AMB. TEMP (°F)	BAR. PRESS. (IN. Hg)	STATIC PRESS. (IN. H_2O)	FILTER NUMBER(S)	STACK INSIDE DIMEN. (INCHES)	PITOT TUBE Cp	THERM NO.	PAGE
PCT-5	THRESS NEESE	85	29.45	-1.1	8510250 / 53	10 7	84	267	1 OF 2

#247 Pitotube

PROBE LENGTH AND TYPE	NOZZLE I.D.	NOZZLE NO.	H_2O (%)	SAMPLE BOX NO.	METER BOX NO.	METER ΔH@	METER CAL. FACTOR Y	LEAK CHECK IN. Hg	LEAK CHECK CFM	K FACTOR	C FACTOR	PROBE HEAT SET	BOX HEAT SET	REF. ΔP	RECORD DATA MINS
10 35	373		25.0		584	1.23	1.033			85		250	250		12

Pre leak check 0.002

TRAVERSE POINT NUMBER	SAMPLING TIME, min	CLOCK TIME (24 hr CLOCK)	GAS METER READING (V_m), ft^3	VELOCITY HEAD (Δp_s), in. H_2O	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O DESIRED	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O ACTUAL	STACK TEMPERATURE (T_s), °F	DRY GAS METER TEMPERATURE INLET ($T_{m_{in}}$), °F	DRY GAS METER TEMPERATURE OUTLET ($T_{m_{out}}$), °F	PUMP VACUUM, in. Hg	SAMPLE BOX TEMPERATURE °F	IMPINGER TEMPERATURE °F
	0	830	536.802									
A 1	12.		539.170	.03	.10	.10	900	96	96	1.0	240	75
2	24.		541.490	.03	.10	.10	893	96	96	1.0	261	69
3	36.		544.355	.04	.14	.14	895	98	96	7.0	245	69
4	48.		548.080	.07	.25	.25	900	100	98	9.0	253	69
5	60.		551.791	.07	.24	.24	948	102	98	9.0	263	71
B 6	72.		555.070	.06	.21	.21	900	102	100	6.0	243	76
7	84.		558.250	.05	.18	.18	853	102	100	3.0	243	64
8	96.		561.675	.06	.21	.21	890	102	100	4.0	240	66
9	108.		565.115	.06	.21	.21	880	104	100	4.0	241	68
10	120.		568.534	.06	.21	.21	880	104	100	4.0	250	68
C 11	132.		572.300	.07	.25	.25	900	104	102	4.0	255	78
12	144.		576.270	.08	.28	.28	902	104	102	4.0	260	71
13	156.		580.550	.08	.28	.28	932	106	102	4.5	265	69
14	168.		585.380	.10	.34	.34	963	106	102	5.0	254	69
15	180.		590.033	.09	.31	.31	921	106	102	4.5	260	64
D 16	192.		595.250	.12	.42	.42	900	106	102	4.5	245	75
17	204.		600.990	.14	.49	.49	903	106	102	5.0	246	59
18	216.		606.070	.11	.38	.38	930	108	102	4.5	253	60
19	228.		611.150	.11	.38	.38	946	108	102	5.0	250	59
20	240.		616.236	.11	.39	.38	940	108	102	5.0	260	62
E 21	252.		621.800	.13	.46	.46	890	108	102	5.0	260	71
22	264.		627.640	.15	.51	.51	958	108	102	5.5	262	63
23	276.		633.600	.15	.51	.51	955	108	102	6.0	260	62
24	288.		637.980	.08	.28	.28	938	108	102	4.5	252	67

leaky 551.94 good

EXTRA VOLUME 551.94 - 551.791 = .103

ISOKINETIC SAMPLING FIELD DATA

PLANT & CITY	DATE	SAMPLING LOCATION	SAMPLE TYPE
[illegible]	6/21/85	#13 Inlet	Part/[illegible]

RUN NO.	OPERATOR	AMB. TEMP (°F)	BAR. PRESS. (in. Hg)	STATIC PRESS. (in. H_2O)	FILTER NUMBER(S)	STACK INSIDE DIMEN. (INCHES)	PITOT TUBE Cp	THERM NO.	PAGE
PCIT5	THRESS NEESE	85	29.45	-1.1	85IP259 / .83	12	.72	84[illegible]	20.62

PROBE LENGTH AND TYPE	NOZZLE I.D.	NOZZLE NO.	H_2O (%)	SAMPLE BOX NO.	METER BOX NO.	METER ΔH@	METER CAL. FACTOR Y	LEAK CHECK in. Hg	LEAK CHECK CFM	K FACTOR	C FACTOR	PROBE HEAT SET	BOX HEAT SET	REF. ΔP	RECORD DATA MINS
10' 52	.373		25	1834		1.73	1.033			.86		250	250		1/2

Post test leak ✓ .001

TRAVERSE POINT NUMBER	SAMPLING TIME, min	CLOCK TIME (24 hr CLOCK)	GAS METER READING (V_m), ft^3	VELOCITY HEAD (Δp_s), in. H_2O	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O DESIRED	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O ACTUAL	STACK TEMPERATURE (T_s), °F	DRY GAS METER TEMPERATURE INLET ($T_{m_{in}}$), °F	DRY GAS METER TEMPERATURE OUTLET ($T_{m_{out}}$), °F	PUMP VACUUM, in. Hg	SAMPLE BOX TEMPERATURE °F	IMPINGER TEMPERATURE °F
	0		637.980									
25	300.		642.242	.08	.28	.28	938	108	102	4.5	260	65
F 26	312.		645.850	.07	.24	.24	918	108	102	4.0	236	75
27	324.		648.990	.05	.16	.16	1000	108	102	3.5	244	65
28	336.		651.540	.06	.12	.12	1005	108	102	3.0	251	66
29	348.		654.700	.05	.17	.17	988	108	104	4.0	240	71
30	360.		657.961	.05	.17	.17	988	108	104	4.0	236	71

PARTICULATE SAMPLE RECOVERY AND INTEGRITY SHEET

Plant DETROIT Sample date 6/22/85

Sample location INLET Recovery date 6/24/85

Run number PCI-5 Recovered by [illegible]

Filter number(s) 8510250

Thimble # 53

MOISTURE

Impingers				Silica gel				
Final volume (wt)	958.2	948.7	ml(g)	Final wt	635.6	500.9	g	882.9
Initial volume (wt)	589.6	605.2	ml(g)	Initial wt	532.3	499.4	g	853.5
Net volume (wt)	368.6	343.5	ml(g)	Net wt	103.3	1.5	g	29.4

Description of impinger water Yellow (Cloudy) 70 % spent

Total moisture 846.3 g

RECOVERED SAMPLE

Filter container number(s) 3607 B Sealed ✓

Description of particulate on filter Rusty Color

Probe rinse container no. 3607 A Liquid level marked ✓

Ace. blank container no. 3529 A Liquid level marked ✓

Impinger contents container no. ~~3608 A~~ 3671 A Liquid level marked ✓

H_2O blank container no. 3530 A Liquid level marked ✓

Samples stored and locked

Remarks 2 Impinger Sample Contained

LABORATORY CUSTODY

Received by L. Rotella Date 6/24/85

Remarks

DRY MOLECULAR WEIGHT DETERMINATION

PLANT DWSD - Detroit
DATE 6/22/85 TEST NO PCI-5
SAMPLING TIME (24-hr CLOCK)
SAMPLING LOCATION No. 13 INC. Scrubber Inlet
SAMPLE TYPE (BAG, INTEGRATED, CONTINUOUS)
ANALYTICAL METHOD ORSAT
AMBIENT TEMPERATURE 72°F
OPERATOR CB
.ORSAT LEAK CHECKED ✓

COMMENTS:

GAS \ RUN	1		2		3		AVERAGE NET VOLUME	MULTIPLIER	MOLECULAR WEIGHT OF STACK GAS (DRY BASIS) M_d, lb lb-mole
	ACTUAL READING	NET	ACTUAL READING	NET	ACTUAL READING	NET			
CO_2	5.0	5.0	4.8	4.8			4.9	44/100	
O_2 (NET IS ACTUAL O_2 READING MINUS ACTUAL CO_2 READING)	17.8	12.8	18.0	13.2			13.0	32/100	
CO (NET IS ACTUAL CO READING MINUS ACTUAL O_2 READING)								28/100	
N_2 (NET IS 100 MINUS ACTUAL CO READING)								28/100	
								TOTAL	

EMISSION TESTING FIELD DATA

PLANT & CITY	DATE	SAMPLING LOCATION	SAMPLE TYPE
ASTRIGHT, HUNTER	6/24/85	NO. 1/3 INLET	PARTICULATE

RUN NO.	OPERATOR	AMB. TEMP (°F)	BAR. PRESS. (IN. Hg)	STATIC PRESS. (IN. H_2O)	FILTER NUMBER(S)	STACK INSIDE DIMEN. (INCHES)	PITOT TUBE C_p	THERM NO.	PAGE
PCI-16	BRIGHT	85	29.65	-1.1	85 1013 1/0 T-37	84	1.129	98A	1 OF 2

PROBE LENGTH AND TYPE	NOZZLE I.D.	NOZZLE NO.	H_2O (S)	SAMPLE BOX NO.	METER BOX NO.	METER $\Delta H@$	METER CAL. FACTOR Y	LEAK CHECK IN. Hg	LEAK CHECK CFM	K FACTOR	C FACTOR	PROBE HEAT SET	BOX HEAT SET	REF. ΔP	RECORD DATA RUNS
1/8 x 6 SS	.373		2.5		FB4	1.23	1.033	ACCOCK		.849		NA	350		1.2

Pretest leak rate 0.000@ 15 in Hg

8.956

TRAVERSE POINT NUMBER	SAMPLING TIME, min	CLOCK TIME (24 hr CLOCK)	GAS METER READING (V_m), ft^3	VELOCITY HEAD (Δp_s), in. H_2O	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O DESIRED	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O ACTUAL	STACK TEMPERATURE (T_s), °F	DRY GAS METER TEMPERATURE INLET ($T_{m_{in}}$), °F	DRY GAS METER TEMPERATURE OUTLET ($T_{m_{out}}$), °F	PUMP VACUUM, in. Hg	SAMPLE BOX TEMPERATURE °F	IMPINGER TEMPERATURE °F
	0	915	658.075									
A-1	12.	927	661.320	0.05	0.18	0.18	890	96	96	0.0	241	66
2	24.	939	664.120	0.04	0.15	0.15	907	97	96	0.0	296	65
3	36.	951	666.500	0.03	0.11	0.11	950	99	97	0.0	258	70
4	48.	1003	670.870	0.08	0.30	0.30	862	100	98	0.5	288	73
5	60.	1015	675.735	0.10	0.36	0.36	953	104	100	1.0	243	75
B-1	72.	1031	679.555	0.07	0.26	0.26	912	105	101	0.5	225	77
2	84.	1043	682.035	0.03	0.11	0.11	863	105	101	0.0	238	72
3	96.	1055	685.553	0.03	0.12	0.12	850	105	102	0.0	280	75
4	108.	1107	689.340	0.09	0.34	0.34	860	106	102	1.5	258	77
5	120.	1119	694.228	0.16	0.36	0.36	937	108	103	1.5	248	75
C-1	132.	1136	698.115	0.07	0.26	0.26	890	107	103	1.0	240	77
2	144.	1148	702.198	0.09	0.35	0.35	850	107	103	1.5	276	73
3	156.	1517~~200~~	706.120	0.05	0.19	0.19	836	100	100	1.0	296	102
4	168.	1517~~212~~	709.310	0.05	0.19	0.19	898	101	101	1.0	251	85
5	180.	1517~~224~~	713.280	0.07	0.27	0.27	851	103	101	1.5	269	84
D-1	192.	1607	717.000	0.08	0.30	0.30	875	106	103	1.5	231	91
2	204.	1619	722.580	0.10	0.37	0.37	884	108	104	2.0	296	72
3	216.	1631	727.695	0.10	0.38	0.38	892	110	104	2.5	285	69
4	228.	1643	731.340	0.06	0.24	0.24	789	111	105	1.5	254	71
5	240.	1655	735.169	0.07	0.26	0.26	905	111	106	1.5	286	80
E-1	252.	1712	738.500	0.05	0.19	0.19	900	110	106	1.5	225	86
2	264.	1724	742.075	0.06	0.23	0.23	845	109	106	1.5	280	73
3	276.	1736	747.500	0.12	0.43	0.43	960	110	106	3.0	320	76
4	288.	1748	751.295	0.07	0.25	0.25	881	111	107	2.0	293	75

* Process problems - Belt down until ~~500~~ 1015

SSI TE[illegible]NG [illegible] LD [illegible]A

PLANT & CITY	DATE	SAMPLING LOCATION	SAMPLE TYPE
DETROIT WMTP	6/24/85	NO 13 INLET	PART

RUN NO.	OPERATOR	AMB. TEMP (°F)	BAR. PRESS. (IN. Hg)	STATIC PRESS. (IN. H_2O)	FILTER NUMBER(S)	STACK INSIDE DIMEN. (INCHES)	PITOT TUBE Cp	THERM NO.	PAGE
PCI-6	BR ST	85		-11		84 / 129	0.84		20 F 2

PROBE LENGTH AND TYPE	NOZZLE I.D.	NOZZLE NO.	H_2O (%)	SAMPLE BOX NO.	METER BOX NO.	METER ΔH@	METER CAL. FACTOR Y	LEAK CHECK IN. Hg	LEAK CHECK CFM	K FACTOR	C FACTOR	PROBE HEAT SET	BOX HEAT SET	REF. ΔP	RECORD DATA MINS
10 FT SS	0.373		25		FB4	1.23	1.033	40	4000	8.9		1.4	252		12

8.956

TRAVERSE POINT NUMBER	SAMPLING TIME, min	CLOCK TIME (24 hr CLOCK)	GAS METER READING (V_m), ft^3	VELOCITY HEAD (Δp_s), in. H_2O	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O DESIRED	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O ACTUAL	STACK TEMPERATURE (T_s), °F	DRY GAS METER TEMPERATURE INLET ($T_{m_{in}}$), °F	DRY GAS METER TEMPERATURE OUTLET ($T_{m_{out}}$), °F	PUMP VACUUM, in. Hg	SAMPLE BOX TEMPERATURE °F	IMPINGER TEMPERATURE °F
	0	—	— . —									
E-5	300.	1800	755.037	0.07	0.25	0.25	967	112	107	2.0	281	76
F-1	312.	1816	760.030	0.10	0.36	0.36	960	111	107	2.8	333	85
2	324.	1828	762.870	0.04	0.14	0.14	976	111	107	1.5	281	74
3	336.	1840	767.855	0.10	0.36	0.36	970	110	107	3.0	283	79
4	348.	1852	773.340	0.12	0.44	0.44	932	112	107	3.3	329	80
5	360.	1904	778.577	0.11	0.40	0.40	942	113	108	.	300	82

PARTICULATE SAMPLE RECOVERY AND INTEGRITY SHEET

Plant DETROIT Sample date 6/24/85

Sample location INLET Recovery date 6/ /85

Run number PLI-6 Recovered by [illegible]

Filter number(s) 8510121

Thimble # 27

MOISTURE

Impingers			Silica gel			
Final volume (wt)	946.6	747.5 ml(g)	Final wt	504.2	504.8 g	877.7
Initial volume (wt)	596	583.1 ml(g)	Initial wt	502.8	504.8 g	856.9
Net volume (wt)		ml(g)	Net wt		g	

Description of impinger water slightly yellow 40 % spent

Total moisture 537.2 g

RECOVERED SAMPLE

Thimble cont. # 3669 B

Filter container number(s) 3668 B Sealed ✓

Description of particulate on filter - large particles on backup filter may light discoloration; thimble (#10-15 gms of loose part.)

Probe rinse container no.	3668 A	Liquid level marked	
Acet. blank container no.	3529 A	Liquid level marked	✓
Impinger contents container no.	3669 A (3670 A)	Liquid level marked	
H_2O blank container no.	3530 A	Liquid level marked	✓

Samples stored and locked

Remarks Thimble #27 (May be #71 container?)
2 Impinger Containers

LABORATORY CUSTODY

Received by L. Rotella Date 6/20/85

Remarks

DRY MOLECULAR WEIGHT DETERMINATION

PLANT DETROIT WATER & SEWAGE
DATE 6/24/85 TEST NO PCI-6
SAMPLING TIME (24-hr CLOCK) 1840
SAMPLING LOCATION INLET
SAMPLE TYPE (BAG, ~~INTEGRATED~~, CONTINUOUS) BAG
ANALYTICAL METHOD ORSAT
AMBIENT TEMPERATURE 85
OPERATOR DS
ORSAT LEAK CHECKED ✓

COMMENTS:

RUN / GAS	1		2		3		AVERAGE NET VOLUME	MULTIPLIER	MOLECULAR WEIGHT OF STACK GAS (DRY BASIS) M_d, lb/lb-mole
	ACTUAL READING	NET	ACTUAL READING	NET	ACTUAL READING	NET			
CO_2	5.5	5.5	5.5	5.5			5.5	44/100	
O_2 (NET IS ACTUAL O_2 READING MINUS ACTUAL CO_2 READING)	18.0	12.5	18.1	12.6			12.55	32/100	
CO (NET IS ACTUAL CO READING MINUS ACTUAL O_2 READING)								28/100	
N_2 (NET IS 100 MINUS ACTUAL CO READING)								28/100	
								TOTAL	

Particle Size Distribution

IMPACTOR EMISSION TESTING FIELD DATA

PLANT & CITY		DATE		SAMPLE LOCATION		SAMPLE TYPE
Inter Power Ottawa, Peru, Ill.		8/15/86		No. 13 ESP Inlet		Start Point

RUN NO.	OPERATOR	AMB. TEMP (°F)	BAR. PRESS. (in. Hg)	STATIC PRESS (in. H_2O)	IMPACTOR TYPE	STACK PROBE USED (INCHES)	PROBE LINER MATL	NOZZLE NO.	NOZZLE DIA.	PAGE
PSCA-1A	Tuthill SS	82	29.56	ambient	Thimble No. GE 33-36	120.0	SS	A1	0.5	1 of 1

PROBE LENGTH AND TYPE	NOZZLE I.D.	NOZZLE NO.	H_2O (G)	SAMPLE BOX NO.	METER BOX NO.	METER ΔH@	METER CAL. FACTOR Y	LEAK CHECK RATE, mg	LEAK CHECK CFM	K FACTOR	C FACTOR	PROBE HEAT SET	BOX HEAT SET	ORIF. ΔP	RECORD DATA EVERY
N/A	N66		16		516/141	1.63				2.729				ATI	1 A

Pre-Test only

TRAVERSE POINT NUMBER	SAMPLING TIME, min	CLOCK TIME (24 hr CLOCK)	GAS METER READING (V_m), ft^3	VELOCITY HEAD (Δp_s), in. H_2O	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O		STACK TEMPERATURE (T_s), °F	DRY GAS METER TEMPERATURE		PUMP VACUUM, in. Hg	IMPACTOR TEMPERATURE °F	CONDENSER TEMPERATURE °F
					DESIRED	ACTUAL		INLET ($T_{m_{in}}$), °F	OUTLET ($T_{m_{out}}$), °F			
	0	1425	704.473									
	10.	1435	486.530	.41	.12	.12	920	94	94		920	
	20.	1445	488.620	.41	.12	.12	920	94	94		920	
	30.	1455	490.890	.41	.12	.12	920	95	95		920	
	40.	1505	492.940	.41	.12	.12	920	96	96		920	
	50.	1515	495.160	.41	.12	.12	920	97	97		920	
	60.	1525	497.390	.41	.12	.12	920	98	97		920	
	70.	1535	499.590	.41	.12	.12	920	99	98		920	
	80.	1545	501.890	.41	.12	.12	920	100	100		920	
	90.	1555	504.281	.41	.12	.12	920	100	100		920	

ANDERSEN HEAVY GRAIN LOADING IMPACTOR RECOVERY AND INTEGRITY SHEET

Plant Detroit
Sample location INLET
Run number PSI-1
Sample date 6/18/85
Recovery date 6/19/85
Recovered by DS

Backup Thimble No. -F-33-36

RECOVERED SAMPLE

Stage	Particulate container number	Container sealed comments	Rinse container number	Liquid level marked
Cyclone precutter	1A	~~EB~~ ✓	1B	✓
1			1C	✓
2	1D	✓	1E	✓
Cyclone	1F	✓	1G	✓
Backup	1H	✓	1I	✓

Samples stored and locked

Remarks → NO LOOSE PARTICULATE IN STAGE 1

LABORATORY CUSTODY

Received by L. Riddle Date 6/28/85

Remarks

IMPACTOR EMISSION TESTING FIELD DATA

PLANT & CITY	DATE	SAMPLING LOCATION	SAMPLE TYPE
Lakeland Utilities Mc Intosh Unit 3 Lakeland	6/20/83	#13 Inlet	Particulate

RUN NO.	OPERATOR	AMB. TEMP (°F)	BAR. PRESS. (in. Hg)	STATIC PRESS (in. H_2O)	IMPACTOR TYPE	STACK INSIDE DIAM. (inches)	PITOT TUBE Cp	THERM NO.	I N P	PROBE
PSTC-14	J. HICKS	85	29.80	-1.4	Wright	100	.840	84	I	6.5'

PROBE LENGTH AND TYPE	NOZZLE I.D.	NOZZLE NO.	N.O. (S)	SAMPLE BOX NO	METER BOX NO.	METER Δ H @	METER CAL. FACTOR Y	LEAK CHECK (in. Hg)	LEAK CHECK (CFM)	K FACTOR	C FACTOR	PROBE HEAT SET	BOX HEAT SET	REF. ΔP	RECORD DATA INITIALS
6 FT	.435		17		510	1.6	.9903			.13775					

TRAVERSE POINT NUMBER	SAMPLING TIME, min	CLOCK TIME (24 hr CLOCK)	GAS METER READING (V_m), ft^3	VELOCITY HEAD (Δp_s), in. H_2O	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O DESIRED	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O ACTUAL	STACK TEMPERATURE (T_s), °F	DRY GAS METER TEMPERATURE INLET ($T_{m_{in}}$), °F	DRY GAS METER TEMPERATURE OUTLET ($T_{m_{out}}$), °F	PUMP VACUUM, in. Hg	IMPACTOR TEMPERATURE °F	CONDENSER TEMPERATURE °F
	0	1320	504.788									
C 14	10.		506.900	.12	.12	.12	920	94	94	1.0		
	20.		509.045	.12	.12	.12		94	94	1.0		
	30.		511.250	.12	.12	.12		94	94	1.0		
	40.		513.460	.12	.12	.12		94	94	1.0		
	50.		515.400	.12	.12	.12		96	96	1.0		
	60.		517.320	.12	.12	.12		98	98	1.0		
	70.		519.465	.12	.12	.12		100	100	1.0		
	80.		521.580	.12	.12	.12		100	100	1.0		
	90.		523.760	.12	.12	.12		101	100	1.0		
	100.		525.990	.12	.12	.12		101	100	1.0		
	110.		528.190	.12	.12	.12		101	100	1.0		
	120.	1520	530.340	.12	.12	.12		101	100			

ANDERSEN HEAVY GRAIN LOADING IMPACTOR RECOVERY AND INTEGRITY SHEET

Plant Detroit — Sample date 6/20/85

Sample location Inlet — Recovery date 6/[illegible]/85

Run number PSI-2 — Recovered by [illegible]

RECOVERED SAMPLE

Stage	Particulate container number	Container sealed comments	Rinse container number	Liquid level marked
Cyclone precutter	2A	✓	2B	✓
1	2C	✓	2D	✓
2	2E	✓	2F	✓
Cyclone	2G	✓	2H	✓
Backup	2I	✓	2J	✓

Thimble # GF 33-42

Samples stored and locked

Remarks

LABORATORY CUSTODY

Received by J. Riella — Date 6/28/85

Remarks

IMPACTOR EMISSION TESTING FIELD DATA

PLANT & CITY	DATE	SAMPLING LOCATION	SAMPLE TYPE
Detroit Edison Co.	6/21/86	#13 Inlet	Particulate

RUN NO.	OPERATOR	AMB. TEMP (°F)	BAR. PRESS. (in. Hg)	STATIC PRESS (in. H_2O)	IMPACTOR TYPE	STACK INSIDE DIAM. (inches)	PROBE TYPE & Co	THERMO NO.	I.D.	PROBE
[illegible]	[illegible]	85	29.50	-1.4	Hoke	153	120	8	8	0.5

DSI-3

PROBE LENGTH AND TYPE	NOZZLE I.D.	NOZZLE NO.	C_p (S)	SAMPLE BOX NO.	METER BOX NO.	METER $\Delta H@$	METER CAL. FACTOR Y	LEAK CHECK In. Hg	LEAK CHECK CFM	K FACTOR	C FACTOR	PROBE HEAT SET	BOX HEAT SET	REF. ΔP	RECORD DATA INITIALS
6'	.235			8		1.23	.962			1.375					

TRAVERSE POINT NUMBER	SAMPLING TIME, min	CLOCK TIME (24 hr CLOCK)	GAS METER READING (V_m), ft^3	VELOCITY HEAD (Δp_s), in. H_2O	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O		STACK TEMPERATURE (T_s), °F	DRY GAS METER TEMPERATURE		PUMP VACUUM, in. Hg	IMPACTOR TEMPERATURE °F	CONDENSER TEMPERATURE °F
					DESIRED	ACTUAL		INLET ($T_{m_{in}}$), °F	OUTLET ($T_{m_{out}}$), °F			
	0	1300	530.572									
C-14	10		532.440	.10	.08	.08	920	95	98	.5		
	20		534.250	.10	.08	.08	920	97	98	.5		
	30		536.023	.10	.08	.08	920	98	98	.5		
	40		537.790	.10	.08	.08	920	100	100	.5		
	50		539.600	.10	.08	.08	920	100	101	.5		
	60		541.300	.10	.08	.08	920	100	101	.5		
	70		543.080	.10	.08	.08	920	101	102	.5		
	80		544.825	.10	.09	.08	920	102	102	.5		
	90		546.590	.10	.08	.08	920	102	102	.5		
	100		548.465	.10	.08	.08	920	102	102	.5		
	110		550.180	.10	.09	.08	920	102	102	.5		
	120		551.990	.10	.08	.08	920	102	102	.5		

ANDERSEN HEAVY GRAIN LOADING IMPACTOR RECOVERY AND INTEGRITY SHEET

Plant Detroit
Sample location Inlet
Run number PSI-3
Sample date 6/21/85
Recovery date 6/22/85
Recovered by DA

RECOVERED SAMPLE

Stage	Particulate container number	Container sealed comments	Rinse container number	Liquid level marked
Cyclone precutter	3A	✓	3B	✓
1	3C	✓	3D	✓
2	3E	✓	3F	✓
Cyclone	3G	✓	3H	✓
Backup	3I	✓	3J	✓

Thimble #57

Samples stored and locked _____

Remarks _____

LABORATORY CUSTODY

Received by L. Revilla Date 6/28/85

Remarks _____

IMPACTOR EMISSION TESTING FIELD DATA

PLANT & CITY	DATE	SAMPLING LOCATION	SAMPLE TYPE
Detroit Water & Sewer Dept	6/[illegible]	#13 Impactor	Part Sizes

RUN NO.	OPERATOR	AMB. TEMP (°F)	BAR. PRESS. (in. Hg)	STATIC PRESS (in. H_2O)	IMPACTOR TYPE	STACK INSIDE DIMEN. (INCHES)	PITOT TUBE Cp	THERM NO.	IMP	PAGE
1324	THRESS	85	29.15	[illegible]	Heat #50	1.200 [illegible]	.84		1	1 of 1

PROBE LENGTH AND TYPE	NOZZLE I.D.	NOZZLE NO.	H_2O (%)	SAMPLE BOX NO.	METER BOX NO.	METER ΔH@	METER CAL. FACTOR Y	LEAK CHECK IN. Hg	LEAK CHECK CFM	K FACTOR	C FACTOR	PROBE HEAT SET	BOX HEAT SET	REF. ΔP	RECORD DATA MADE
6	0.235		1.2		FB10	1.81	0.963			1.375					10

Thimble #50

TRAVERSE POINT NUMBER	SAMPLING TIME, min	CLOCK TIME (24 hr CLOCK)	GAS METER READING (V_m), ft^3	VELOCITY HEAD (Δp_s), in. H_2O	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O DESIRED	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O ACTUAL	STACK TEMPERATURE (T_s), °F	DRY GAS METER TEMPERATURE INLET ($T_{m_{in}}$), °F	DRY GAS METER TEMPERATURE OUTLET ($T_{m_{out}}$), °F	PUMP VACUUM, in. Hg	IMPACTOR TEMPERATURE °F	CONDENSER TEMPERATURE °F
	0	1350	552.334									
C 14	10.		554.080	.10	.08	.08	920	95	96	.5	920	
	20.		555.900	.10	.08	.08	920	96	96	.5		
	30.		557.300	.10	.08	.08	920	96	96	.5		
	40.		559.460	.10	.08	.08	920	98	98	.5		
	50.		561.305	.10	.08	.08	920	99	98	.5		
	60.		563.140	.10	.08	.08	920	100	100	.5		
	70.		564.950	.10	.08	.08	920	100	100	.5		
	80.		566.740	.10	.08	.08	920	100	100	.5		
	90.		568.550	.10	.08	.08	920	102	102	.5		
	100.		570.430	.10	.08	.08	920	102	102	.5		
	110.		572.200	.10	.08	.08	920	102	102	.5		
	120.		574.120	.10	.08	.08	920	102	102	.5		

ANDERSEN HEAVY GRAIN LOADING IMPACTOR RECOVERY AND INTEGRITY SHEET

Plant DETROIT
Sample location INLET
Run number PSI - 4

Sample date 6/22/45
Recovery date 6/24/45
Recovered by [illegible]

RECOVERED SAMPLE

Stage	Particulate container number	Container sealed comments	Rinse container number	Liquid level marked
Cyclone precutter	4A	✓	4B	✓
1	4C	✓	4D	✓
2	4E	✓	4F	✓
Cyclone	4G	✓	4H	✓
Backup	4I	✓	4J	✓

~~Tumble #~~ 50

Samples stored and locked _____

Remarks _____

LABORATORY CUSTODY

Received by [illegible] Date 6/28/45

Remarks _____

IMPACTOR EMISSION TESTING FIELD DATA

PLANT & CITY	DATE	SAMPLING LOCATION	SAMPLE TYPE
DETROIT SEWAGE INCINERATOR	8/18/85	SCRUBBER OUTLET	PART. SIZE

RUN NO.	OPERATOR	AMB. TEMP (°F)	BAR. PRESS. (IN. Hg)	STATIC PRESS (IN. H_2O)	IMPACTOR TYPE	STACK INSIDE DIMEN. (INCHES)	PITOT TUBE Cp	THERM NO.	IMP	PAGE
PS0-1	KB DM	90	29.90	-1.8	ANDERSON MARK 3	53	84		1	1 OF 1

PROBE LENGTH AND TYPE	NOZZLE I.D.	NOZZLE NO.	H_2O (%)	SAMPLE BOX NO.	METER BOX NO.	METER ΔH@	METER CAL. FACTOR Y	LEAK CHECK IN. Hg	LEAK CHECK CFM	K FACTOR	C FACTOR	PROBE HEAT SET	BOX HEAT SET	REF. ΔP	RECORD DATA MINS
6 FT STAINLESS	.184		6		FBS	1.90	1.905	3	.002	.6073					

TRAVERSE POINT NUMBER	SAMPLING TIME, min	CLOCK TIME (24 hr CLOCK)	GAS METER READING (V_m), ft^3	VELOCITY HEAD (Δp_s), in. H_2O	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O DESIRED	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O ACTUAL	STACK TEMPERATURE (T_s), °F	DRY GAS METER TEMPERATURE INLET ($T_{m_{in}}$), °F	DRY GAS METER TEMPERATURE OUTLET ($T_{m_{out}}$), °F	PUMP VACUUM, in. Hg	IMPACTOR TEMPERATURE °F	CONDENSER TEMPERATURE °F
	0	1632	441.230									
Pt 4	15.	1647	450.410	.8	1.17	1.17	98	94	90	2.5		
	30.	1702	459.500	.8	1.17	1.17	89	98	90	2.5		
	45.	1717	468.660	.8	1.17	1.17	88	102	91	2.5		
	60.	1732	477.900	.8	1.17	1.17	86	104	94	2.5		

ANDERSEN IMPACTOR RECOVERY AND INTEGRITY SHEET

Plant Detroit
Sample location Outlet
Run number P50-1
Sample date 6/18/85
Recovery date 6/18/85
Recovered by DL

RECOVERY SAMPLE

Cyclone particulate container number _____ Liquid level marked _____

Cyclone and nozzle rinse container number _____ Liquid level marked _____

Nozzle (or inlet chamber) rinse container number 3018 A Liquid level marked ✓ EQ157

Acetone blank container number 3529 A Liquid level marked ✓

Filters

Stage	Filter number	Container number	Container sealed	Comments
0	BM 93	3553 B		EQ 158
1	BM 96			EQ 159
2	BM 97			EQ 160
3	BM 94			EQ 161
4	BM 95			EQ 162
5	BL 86			EQ 163
6	BL 97			EQ 164
7	BM 60			EQ 165
Backup	B545			EQ 166

Samples stored and locked _____

Remarks _____

LABORATORY CUSTODY

Received by L. Ratfield Date 6/20/85

Remarks _____

IMPACTOR EMISSION TESTING FIELD DATA

PLANT & CITY	DATE	SAMPLING LOCATION	SAMPLE TYPE
Detroit Water & Sewage / Detroit	6/18/85	Outlet	Particle Size

RUN NO.	OPERATOR	AMB. TEMP (°F)	BAR. PRESS. (in. Hg)	STATIC PRESS (in. H_2O)	IMPACTOR TYPE	STACK INSIDE DIMEN. (INCHES)	PITOT TUBE Cp	THERM NO.	IMP	PAGE
PSU-2	Dwanda Blatt	90	24.80	-1.13	Anderson	53	84		1	10 of 1

PROBE LENGTH AND TYPE	NOZZLE I.D.	NOZZLE NO.	H.O. (S)	SAMPLE BOX NO.	METER BOX NO.	METER ΔH@	METER CAL. FACTOR Y	LEAK CHECK IN. Hg	LEAK CHECK CFM	K FACTOR	C FACTOR	PROBE HEAT SET	BOX HEAT SET	REF. ΔP	RECORD DATA NAME
6 FT STEEL	.194		5		FB3	1.90	1.005	5	0.002	8.073					

TRAVERSE POINT NUMBER	SAMPLING TIME, min	CLOCK TIME (24 hr CLOCK)	GAS METER READING (V_m), ft^3	VELOCITY HEAD (Δp_s), in. H_2O	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O DESIRED	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O ACTUAL	STACK TEMPERATURE (T_s), °F	DRY GAS METER TEMPERATURE INLET ($T_{m_{in}}$), °F	DRY GAS METER TEMPERATURE OUTLET ($T_{m_{out}}$), °F	PUMP VACUUM, in. Hg	IMPACTOR TEMPERATURE °F	CONDENSER TEMPERATURE °F
Pt. 4	0	1315	478.100									
	5.	1320	480.935	0.7	1.02	1.02	95	90	88	2.0		
	10.	1453*	483.940	0.7	1.02	1.02	95	90	88	2.0		
	15.	1458	486.780	0.7	1.02	1.02	95	92	90	2.0		
	20.	1503	489.610	0.7	1.02	1.02	95	95	90	2.0		
	25.	1508	492.430	0.7	1.02	1.02	95	98	90	2.0		
	30.	1513	495.280	0.7	1.02	1.02	95	100	90	2.0		

INCINERATOR SHUT DOWN AT 1320. RESTARTED IMPACTOR AT 1452

ANDERSEN IMPACTOR RECOVERY AND INTEGRITY SHEET

Plant Detroit
Sample location Outlet
Run number PSO-2

Sample date 6/19/85
Recovery date 6/28/85
Recovered by [illegible]

RECOVERY SAMPLE

Cyclone particulate container number _____ Liquid level marked _____

Cyclone and nozzle rinse container number _____ Liquid level marked _____

Nozzle (or inlet chamber) rinse container number 3535 A Liquid level marked ✓ EQ167

Acetone blank container number 3529 A Liquid level marked ✓

Filters

Stage	Filter number	Container number	Container sealed	Comments
0	BN 31	3554 B	✓	EQ168
1	BL 94		✓	EQ169
2	BN 33		✓	EQ170
3	BM 32		✓	EQ171
4	BN 39		✓	EQ172
5	BL 58		✓	EQ173
6	BN 21		✓	EQ174
7	BL 76		✓	EQ175
Backup	B 586		✓	EQ176

Samples stored and locked _____

Remarks _____

LABORATORY CUSTODY

Received by [illegible] Date 6/28/85

Remarks _____

IMPACTOR EMISSION TESTING FIELD DATA

PLANT & CITY	DATE	SAMPLING LOCATION	SAMPLE TYPE
DETROIT WATER AND SEWAGE	6/20/85	SCRUBBER OUTLET	PARTICLE SIZE

RUN NO.	OPERATOR	AMB. TEMP (°F)	BAR. PRESS. (in. Hg)	STATIC PRESS (in. H_2O)	IMPACTOR TYPE	STACK INSIDE DIMEN. (INCHES)	PITOT TUBE Cp	THERM NO.	IMP	PAGE
PS073	DMCNEAL K BATT	90	29.98	-1.18	ANDERSON	53	.84		1	1 OF 1

PROBE LENGTH AND TYPE	NOZZLE I.D.	NOZZLE NO.	H.O. (%)	SAMPLE BOX NO.	METER BOX NO.	METER ΔH@	METER CAL. FACTOR Y	LEAK CHECK in. Hg	LEAK CHECK CFM	K FACTOR	C FACTOR	PROBE HEAT SET	BOX HEAT SET	REF. ΔP	RECORD DATA NOTE
6 FT STAINLESS	.194		5		FB3	1.90	1.005	40	0.00	8.073					50

TRAVERSE POINT NUMBER	SAMPLING TIME, min	CLOCK TIME (24 hr CLOCK)	GAS METER READING (V_m), ft^3	VELOCITY HEAD (Δp_s), in. H_2O	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O DESIRED	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O ACTUAL	STACK TEMPERATURE (T_s), °F	DRY GAS METER TEMPERATURE INLET ($T_{m_{in}}$), °F	DRY GAS METER TEMPERATURE OUTLET ($T_{m_{out}}$), °F	PUMP VACUUM, in. Hg	IMPACTOR TEMPERATURE °F	CONDENSER TEMPERATURE °F
	0	1323	495.619									
PT 3	5	1328	498.630	0.80	1.18	1.18	88	94	92	0.5		
	10	1333	501.680	0.80	1.18	1.18	88	96	92	1.0		
	15	1338	504.660	0.80	1.18	1.18	88	98	92	1.0		
	20	1343	507.670	0.80	1.18	1.18	88	100	92	1.0		

ANDERSEN IMPACTOR RECOVERY AND INTEGRITY SHEET

Plant Detroit
Sample location Outlet
Run number PSO-3
Sample date 6/20/85
Recovery date 6/ /85
Recovered by DE

RECOVERY SAMPLE

Cyclone particulate container number _____ Liquid level marked _____

Cyclone and nozzle rinse container number _____ Liquid level marked _____

Nozzle (or inlet chamber) rinse container number 3603 A Liquid level marked EQ177

Acetone blank container number 3529 A Liquid level marked ✓

Filters

Stage	Filter number	Container number	Container sealed	Comments
0	BL 11	3555 B	✓	EQ178
1	BJ 70		✓	EQ179
2	BH 49		✓	EQ180
3	BH 60		✓	EQ181
4	BJ 75		✓	EQ182
5	BN 10		✓	EQ183
6	BJ 99		✓	EQ184
7	BL 96		✓	EQ185
Backup	B 639		✓	EQ186

Samples stored and locked _____

Remarks _____

LABORATORY CUSTODY

Received by _____ Date 6/28/85

Remarks _____

IMPACTOR EMISSION TESTING FIELD DATA

PLANT & CITY	DATE	SAMPLING LOCATION	SAMPLE TYPE
DETROIT WATER AND SEWAGE	6/21/85	SCRUBBER OUTLET	PART SIZE

RUN NO.	OPERATOR	AMB. TEMP (°F)	BAR. PRESS. (IN. Hg)	STATIC PRESS (IN. H_2O)	IMPACTOR TYPE	STACK INSIDE DIMEN. (INCHES)	PITOT TUBE Cp	THERM NO.	IMP	PAGE
PSO-4	D MCNEAL K PATT	90	29.50	-1.8	ANDERSON MARK 3	53	84		1	1 OF 1

PROBE LENGTH AND TYPE	NOZZLE I.D.	NOZZLE NO.	H_2O (S)	SAMPLE BOX NO.	METER BOX NO.	METER ΔH@	METER CAL. FACTOR Y	LEAK CHECK IN. Hg	LEAK CHECK CFM	K FACTOR	C FACTOR	PROBE HEAT SET	BOX HEAT SET	REF. ΔP	RECORD DATA HOUR
6 FT STAINLESS	.134		5		FB3	1.90	1.005			8073					50

LEAK CHECK @ 10" Hg 0.00 cfm

TRAVERSE POINT NUMBER	SAMPLING TIME, min	CLOCK TIME (24 hr CLOCK)	GAS METER READING (V_m), ft^3	VELOCITY HEAD (Δp_o), in. H_2O	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O DESIRED	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O ACTUAL	STACK TEMPERATURE (T_s), °F	DRY GAS METER TEMPERATURE INLET ($T_{m_{in}}$), °F	DRY GAS METER TEMPERATURE OUTLET ($T_{m_{out}}$), °F	PUMP VACUUM, in. Hg	IMPACTOR TEMPERATURE °F	CONDENSER TEMPERATURE °F
	0	1405	508.272									
5	5.	1410	511.194	0.73	1.06	1.06	97	99	95	1.5		
5	10.	1415	514.152	0.73	1.06	1.06	97	100	95	1.5		
5	15.	1420	517.183	0.73	1.06	1.06	97	104	96	1.5		
5	20.	1425	519.825	0.73	1.06	1.06	97	105	96	1.5		

ANDERSEN IMPACTOR RECOVERY AND INTEGRITY SHEET

Plant Detroit
Sample location Outlet
Run number P50-4
Sample date 6/21/85
Recovery date 6/22/85
Recovered by [illegible]

RECOVERY SAMPLE

Cyclone particulate container number _____ Liquid level marked _____

Cyclone and nozzle rinse container number _____ Liquid level marked _____

Nozzle (or inlet chamber) rinse container number 3604 A Liquid level marked ✓ EQ157

Acetone blank container number 3529 A Liquid level marked ✓

Filters

Stage	Filter number	Container number	Container sealed	Comments
0	BM 75	3650 B	✓	EQ192
1	BP 52		✓	EQ193
2	BP 30		✓	EQ190
3	Bo 98		✓	EQ191
4	Bo 57		✓	EQ142
5	Bo 30		✓	EQ143
6	BN 91		✓	EQ194
7	Bo 94		✓	EQ145
Backup	B601		✓	EQ196

Samples stored and locked _____

Remarks Light Coating

LABORATORY CUSTODY

Received by [illegible] Date 6/28/85

Remarks _____

IMPACTOR EMISSION TESTING FIELD DATA

PLANT & CITY	RUN	SAMPLING LOCATION	SAMPLE TYPE
WESTVACO MANLEY, VA	6/22/81	SCRUBBER OUTLET	PARTICLE SIZE

RUN NO.	OPERATOR	AMB. TEMP (°F)	BAR. PRESS. (in. Hg)	STATIC PRESS (in. H_2O)	IMPACTOR TYPE	STACK INSIDE DIMEN. (inches)	PITOT TUBE Cp	THERMO NO.	I/P	PROBE
1	D. MCINTIRE & R. BATTS	90	29.46	-1.26	ANDERSON MARK III	53	.84	1	I	0.5

PROBE LENGTH AND TYPE	NOZZLE I.D.	NOZZLE NO.	H.O. (I)	SAMPLE BOX NO.	METER BOX NO.	METER Δ H@	METER CAL. FACTOR Y	LEAK CHECK in. Hg	LEAK CHECK CFM	K FACTOR	C FACTOR	PROBE HEAT SET	BOX HEAT SET	REF. ΔP	RECORD DATA CORR.
6' STAINLESS	AAA		3		FB3	1.80	1.005			.8013					5.0

LEAK CHECK

TRAVERSE POINT NUMBER	SAMPLING TIME, min	CLOCK TIME (24 hr CLOCK)	GAS METER READING (V_m), ft^3	VELOCITY HEAD (Δp_s), in. H_2O	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O		STACK TEMPERATURE (T_s), °F	DRY GAS METER TEMPERATURE		PUMP VACUUM, in. Hg	IMPACTOR TEMPERATURE °F	CONDENSER TEMPERATURE °F
					DESIRED	ACTUAL		INLET ($T_{m_{in}}$), °F	OUTLET ($T_{m_{out}}$), °F			
	0	1428	521.920									
PT #6	5	1433	524.567	0.73	1.06	1.06	89	98	95	2.0		
"	10	1438	527.398	0.73	1.06	1.06	89	100	95	2.0		
"	15	1443	530.500	0.73	1.06	1.06	89	102	95	2.0		
"	20	1448	533.157	0.73	1.06	1.06	89	104	96	2.0		
"	25	1453	536.043	0.73	1.06	1.06	89	105	96	2.0		

ANDERSEN IMPACTOR RECOVERY AND INTEGRITY SHEET

Plant DETROIT
Sample location OUTLET
Run number P50-5
Sample date 6/22/85
Recovery date 6/24/85
Recovered by [illegible]

RECOVERY SAMPLE

Cyclone particulate container number _____ Liquid level marked _____

Cyclone and nozzle rinse container number _____ Liquid level marked _____

Nozzle (or inlet chamber) rinse container number 3611 A Liquid level marked ✓ EQ197

Acetone blank container number 3529 A Liquid level marked ✓

Filters

Stage	Filter number	Container number	Container sealed	Comments
0	BL 25	3651 B	✓	EQ198
1	BL 10		✓	EQ199
2	BI 89		✓	EQ200
3	BK 28		✓	EQ201
4	BH 89		✓	EQ202
5	BJ 32		✓	EQ203
6	BH 87		✓	EQ204
7	BK 60		✓	EQ205
Backup	B 653		✓	EQ206

Samples stored and locked EQ207 Thimble GF30-C

Remarks RINSE & 1ST STAGE HAS "GENERALLY" LARGE PARTICLES - VERY OILY.

LABORATORY CUSTODY

Received by J. Rotella Date 6/28/85

Remarks _____

Particulate/Cr^{+6}/Total Cr and

Semivolatile Organic Data Sheets

EMISSION TESTING FIELD DATA

PLANT & CITY	DATE	SAMPLING LOCATION	SAMPLE TYPE
DETROIT INCINERATOR	6/25/85	MOVE INLET	PARTICULATES

RUN NO.	OPERATOR	AMB. TEMP (°F)	BAR. PRESS. (IN. Hg)	STATIC PRESS. (IN. H_2O)	FILTER NUMBER(S)	STACK INSIDE DIMEN. (INCHES)	PITOT TUBE C_p	THERM NO.	PAGE
PROBE #1	PRIVATE	85	29.70	-1.1	153709231	84 x 120	.084		1 OF 1

PROBE LENGTH AND TYPE	NOZZLE I.D.	NOZZLE NO.	H_2O (%)	SAMPLE BOX NO.	METER BOX NO.	METER $\Delta H@$	METER CAL. FACTOR Y	LEAK CHECK IN. Hg	LEAK CHECK CFM	K FACTOR	C FACTOR	PROBE HEAT SET	BOX HEAT SET	REF. ΔP	RECORD DATA SIDE
1/4" STD	.333		25		1	1.23	1.013	10	.015	.89		1400	250		1 SIDE

TRAVERSE POINT NUMBER	SAMPLING TIME, min	CLOCK TIME (24 hr CLOCK)	GAS METER READING (V_m), ft^3	VELOCITY HEAD (Δp_s), in. H_2O	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O		STACK TEMPERATURE (T_s), °F	DRY GAS METER TEMPERATURE		PUMP VACUUM, in. Hg	SAMPLE BOX TEMPERATURE °F	IMPINGER TEMPERATURE °F
					DESIRED	ACTUAL		INLET ($T_{m_{in}}$), °F	OUTLET ($T_{m_{out}}$), °F			
	0	910 ~~900~~	779.043									
C-3	15.	925 ~~920~~	784.270	.08	0.29	0.29	895	94	94	4.1	249	68
	30.	940	789.400	.08	0.28	0.28	955	96	94	6.5	245	68
	45.	955	794.680	.08	0.30	0.30	994	100	96	7.1	250	70
	60.	1010	799.780	.08	0.29	0.29	923	104	98	9.5	250	70
	75.	1025	805.300	.08	0.29	0.29	945	106	100	9.0	250	70
	90.	1040	810.640	.08	0.29	0.29	958	107	101	8.5	250	73
	105.	1055	816.300	.08	0.30	0.30	882	107	101	8.5	245	75
	120.	1110	821.420	.08	0.29	0.29	903	108	102	8.5	249	70
	135.	1125	826.730	.08	0.29	0.29	914	108	103	9.0	250	70
	150.	1140	831.940	.08	0.29	0.29	921	108	103	9.5	250	71
	165.	1155	837.190	.08	0.29	0.29	960	108	104	10.0	245	72
	180.	1210	842.527	.08	0.29	0.29	962	109	104	10.0	250	72
	195.											
	210.											
	225.											
	240.											
	255.											
	270.											
	285.											
	300.											
	.											
	.											
	.											

~~8,956~~ 8,959

PARTICULATE SAMPLE RECOVERY AND INTEGRITY SHEET

Plant DETROIT — Sample date 6/25/85
Sample location INLET — Recovery date 6/25/85
Run No. PCIO-1 — Recovered by KB/CB
Filter No(s). 53000[illegible]21
XAD-2 sorbent trap No. I.O-1 Cont # 3028 B
Thimble # 11 Cont # 3025 B MOISTURE

	1st impinger	2nd impinger	3rd impinger	4th impinger	Silica gel
Final volume wt.	976.2 g	648.3 g	488.7 g	508.3 g	873.4 g
Initial volume wt.	594.6 g	554.5 g	487.4 g	504.1 g	855.6 g
Net volume wt.	381.6 g	93.8 g	1.3 g	.2 g	17.8 g
Description of impinger contents	Clear				40 % spent

Total moisture 494.7 g

RECOVERED SAMPLE

Filter container number(s) 3029 B — Sealed ✓
Description of particulate on filter Filter light TAN / Thimble - Red

Probe rinse container no.	3025 A	Liquid level marked	✓	Container sealed	✓
Acet. blank container no.	3529 A	Liquid level marked	✓	Container sealed	✓
Impinger contents container no.	3026 A	Liquid level marked	✓	Container sealed	✓
H_2O blank container no.	3023 A	Liquid level marked	✓	Container sealed	✓

Samples stored and locked: Cooler No. _____ Ice supply _____
Remarks _____

LABORATORY CUSTODY

Received by L. Rodella — Date 6/27/85
Remarks BLANK Filter Cont # 3610 B / Filter No. 53000220
Container sealed? _____ On Ice? _____
Note any signs of sample leakage or spillage: _____

F.T. BLANK Cont # 3029 B

DRY MOLECULAR WEIGHT DETERMINATION

PLANT DWSD - Detroit
DATE 6/25/85 TEST NO PCIO-1
SAMPLING TIME (24-hr CLOCK)
SAMPLING LOCATION No. 13 Scrubber Inlet
SAMPLE TYPE (BAG, INTEGRATED, CONTINUOUS)
ANALYTICAL METHOD ORSAT
AMBIENT TEMPERATURE 70°F
OPERATOR OB
ORSAT LEAK CHECKED

COMMENTS:

GAS \ RUN	1		2		3		AVERAGE NET VOLUME	MULTIPLIER	MOLECULAR WEIGHT OF STACK GAS (DRY BASIS) M_d, lb/lb-mole
	ACTUAL READING	NET	ACTUAL READING	NET	ACTUAL READING	NET			
CO_2	6.0	6.0	5.8	5.8			5.9	44/100	
O_2 (NET IS ACTUAL O_2 READING MINUS ACTUAL CO_2 READING)	17.6	11.6	17.8	12.0			11.8	32/100	
CO (NET IS ACTUAL CO READING MINUS ACTUAL O_2 READING)								28/100	
N_2 (NET IS 100 MINUS ACTUAL CO READING)								28/100	
								TOTAL	

:SS TE NG :LD TA

PLANT & CITY	DATE	SAMPLING LOCATION	SAMPLE TYPE
DETROIT WATER	6/25/85	NO. VOL. INLET	PART. EMISSIONS

RUN NO.	OPERATOR	AMB. TEMP (°F)	BAR. PRESS. (IN. Hg)	STATIC PRESS. (IN. H_2O)	FILTER NUMBER(S)	STACK INSIDE DIMEN. (INCHES)	PITOT TUBE Cp	THERM NO.	PAGE
PERIOD 2	PR KEY	85	29.72	-1.41	FH-HO 53	84 / 120	0.84		10 OF 17

PROBE LENGTH AND TYPE	NOZZLE I.D.	NOZZLE NO.	H_2O (S)	SAMPLE BOX NO.	METER BOX NO.	METER $\Delta H@$	METER CAL. FACTOR Y	LEAK CHECK Rate, Hg	LEAK CHECK CFM	K FACTOR	C FACTOR	PROBE HEAT SET	BOX HEAT SET	REF. ΔP	RECORD DATA RANGE
10 FT S	0.373		3.5 20		5A	1.23	1.0335	10	0.035	8.559 10.17		N/A	350		15

TRAVERSE POINT NUMBER	SAMPLING TIME, min	CLOCK TIME (24 hr CLOCK)	GAS METER READING (V_m), ft^3	VELOCITY HEAD (Δp_s), in. H_2O	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O DESIRED	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O ACTUAL	STACK TEMPERATURE (T_s), °F	DRY GAS METER TEMPERATURE INLET ($T_{m_{in}}$), °F	DRY GAS METER TEMPERATURE OUTLET ($T_{m_{out}}$), °F	PUMP VACUUM, in. Hg	SAMPLE BOX TEMPERATURE °F	IMPINGER TEMPERATURE °F
	0	1350	843.046									
03	15.	1405	849.091	0.08	0.35	0.35	860	101	100	2.0	250	70
	30.	1420	855.030	0.08	0.35	0.35	823	101	100	2.0	250	70
	45.	1435	861.000	0.08	0.33	0.33	918	107	102	4.0	245	70
	60.	1450	866.930	0.08	0.36	0.36	815	110	104	5.0	250	71
	75.	1505	872.980	0.08	0.36	0.36	841	112	106	5.0	240	73
	90.	1520	879.100	0.08	0.34	0.34	892	113	107	5.0	245	73
	105.	1535	885.140	0.08	0.36	0.36	819	114	108	5.5	250	73
	120.	1550	891.120	0.08	0.35	0.35	885	114	108	5.5	250	70
	135.	1605	896.970	0.08	0.33	0.33	934	115	109	5.5	250	70
	150.	1620	903.020	0.08	.34	.34	893	117	109	5.5	245	71
	165.	1635	908.930	0.08	.34	.34	886	116	110	5.5	250	71
	180.	1650	914.968	0.08	.34	.34	879	115	110	5.5	255	71

PARTICULATE SAMPLE RECOVERY AND INTEGRITY SHEET

Plant DETROIT Sample date 6/25/85

Sample location INLET Recovery date 6/26/85

Run No. PCIO-2 Recovered by [illegible]

Filter No(s). 5300004 Thimble # 40

XAD-2 sorbent trap No. IO-2

TRAP CONT. # 3616 B

MOISTURE

	1st impinger	2nd impinger	3rd impinger	4th impinger	Silica gel
Final volume wt.	981.1 g	701.5 g	506.7 g	504.2 g	843.9 g
Initial volume wt.	609.1 g	596.5 g	504.9 g	504 g	824.5 g
Net volume wt.	372 g	105 g	1.8 g	0.2 g	19.4 g
Description of impinger contents	clear				70 % spent

Total moisture 498.4 g

RECOVERED SAMPLE

Thimble cont. # 3615 B

Filter container number(s) 3614 B Sealed

Description of particulate on filter Backup - TAN / Thimble - Red

Probe rinse container no.	3614 A	Liquid level marked	✓	Container sealed	✓
Ave blank container no.	3529 A	Liquid level marked	✓	Container sealed	✓
Impinger contents container no.	3615 A	Liquid level marked	✓	Container sealed	✓
H_2O blank container no.	3023 A	Liquid level marked	✓	Container sealed	✓

Samples stored and locked: Cooler No. _____ Ice supply _____

Remarks _____

LABORATORY CUSTODY

Received by [illegible] Date 6/28/85

Remarks Type 1 H_2O BLANK Cont. # 3023 A / BLANK Filter Cont. # 3610 B

Container sealed? _____ On Ice? _____

Note any signs of sample leakage or spillage: _____

DRY MOLECULAR WEIGHT DETERMINATION

PLANT DWSR - Detroit
DATE 6/25/85 TEST NO PCIO-2
SAMPLING TIME (24-hr CLOCK)
SAMPLING LOCATION No. 13 Scrubber Inlet
SAMPLE TYPE (BAG, INTEGRATED, CONTINUOUS)
ANALYTICAL METHOD Orsat
AMBIENT TEMPERATURE 70°F
OPERATOR CB
ORSAT LEAK CHECKED ✓

COMMENTS:

RUN / GAS	1		2		3		AVERAGE NET VOLUME	MULTIPLIER	MOLECULAR WEIGHT OF STACK GAS (DRY BASIS) M_d, lb/lb-mole
	ACTUAL READING	NET	ACTUAL READING	NET	ACTUAL READING	NET			
CO_2	5.8	5.8	5.7	5.7			5.75	44/100	
O_2 (NET IS ACTUAL O_2 READING MINUS ACTUAL CO_2 READING)	18.0	12.2	18.0	12.3			12.25	32/100	
CO (NET IS ACTUAL CO READING MINUS ACTUAL O_2 READING)							0	28/100	
N_2 (NET IS 100 MINUS ACTUAL CO READING)								28/100	
								TOTAL	

EMISSION TESTING FIELD DATA

PLANT & CITY	DATE	SAMPLING LOCATION	SAMPLE TYPE
DETROIT WATER AND SEWAGE	6/25/85	UNIT 13 OUTLET	PART/ORGANIC

PITOT #103

THERMOCOUPLE #178

RUN NO.	OPERATOR	AMB. TEMP (°F)	BAR. PRESS. (IN. Hg)	STATIC PRESS. (IN. H_2O)	FILTER NUMBER(S)	STACK INSIDE DIMEN. (INCHES)	PITOT TUBE Cp	THERM NO.	PAGE
PC00-1	D MCNEAL K BATT	90	970	-118	5300018	53	54		1 OF 1

PROBE LENGTH AND TYPE	NOZZLE I.D.	NOZZLE NO.	H_2O (%)	SAMPLE BOX NO.	METER BOX NO.	METER ΔH@	METER CAL. FACTOR Y	LEAK CHECK IN. Hg	LEAK CHECK CFM	K FACTOR	C FACTOR	PROBE HEAT SET	BOX HEAT SET	REF. ΔP	RECORD DATA MINS
6 FT GLASS	193	3-109			FB3	190	1005	10	0008	1.422		250	250		10

POST TEST @ 9" Hg 0.01 cfm

TRAVERSE POINT NUMBER	SAMPLING TIME, min	CLOCK TIME (24 hr CLOCK)	GAS METER READING (V_m), ft^3	VELOCITY HEAD (Δp_s), in. H_2O	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O DESIRED	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O ACTUAL	STACK TEMPERATURE (T_s), °F	DRY GAS METER TEMPERATURE INLET ($T_{m_{in}}$), °F	DRY GAS METER TEMPERATURE OUTLET ($T_{m_{out}}$), °F	PUMP VACUUM, in. Hg	SAMPLE BOX TEMPERATURE °F	IMPINGER TEMPERATURE °F
	0	0911	769.280									
PT #6	10	0921	773.870	0.65	0.93	0.93	90	92	90	6.0	232	68
	20	0931	779.087	0.65	0.91	0.91	99	96	90	7.5	230	68
	30	0941	784.313	0.65	0.93	0.93	95	100	92	8.0	250	64
	40	0951	788.586	0.39	0.56	0.56	93	103	93	6.0	250	64
	50	1001	792.698	0.39	0.56	0.56	94	104	95	6.0	250	68
	60	1011	796.685	0.36	0.51	0.51	98	105	96	6.0	250	70
	70	1021	801.683	0.65	0.93	0.93	99	106	97	9.0	250	68
	80	1031	806.983	0.65	0.93	0.93	99	108	98	9.0	250	64
	90	1041	812.248	0.65	0.93	0.93	97	109	99	9.0	250	62
	100	1051	817.698	0.68	0.99	0.99	93	109	100	9.0	250	62
	110	1101	823.282	0.70	1.01	1.01	95	110	100	9.0	250	62
	120	1111	828.680	0.68	0.99	0.99	93	110	100	9.0	250	60
	130	1121	834.161	0.68	0.99	0.99	95	110	102	9.0	250	60
	140	1131	839.587	0.67	0.97	0.97	97	110	102	9.0	250	60
	150	1141	844.916	0.65	0.94	0.94	99	111	102	9.0	250	60
	160	1151	850.401	0.70	1.01	1.01	101	112	102	9.0	250	60
	170	1201	855.604	0.69	0.84	0.84	95	112	102	8.5	250	60
	180	1211	860.914	0.65	0.94	0.94	97	112	102	9.0	250	60

PARTICULATE SAMPLE RECOVERY AND INTEGRITY SHEET

Plant DETROIT — Sample date 6/25/85
Sample location OUTLET — Recovery date 6/25/85
Run No. PCDD-1 — Recovered by DA
Filter No(s). 53000 1B (Cat. # 3026 B)
XAD-2 sorbent trap No. 00-1

MOISTURE

	1st impinger	2nd impinger	3rd impinger	4th impinger	Silica gel
Final volume wt.	658 g	599.8 g	505.7 g	____ g	910.5 g
Initial volume wt.	567.5 g	602.5 g	504.3 g	— g	891.7 g
Net volume wt.	90.5 g	-2.7 g	1.4 g	____ g	18.8 g
Description of impinger contents	____	____	____	____	30 % spent

Total moisture 109 g

RECOVERED SAMPLE

Filter container number(s) 3027 B — Sealed ✓
Description of particulate on filter BLACK

Probe rinse container no.	3027 A	Liquid level marked	✓	Container sealed	✓
Acet. blank container no.	3029 A	Liquid level marked	✓	Container sealed	✓
Impinger contents container no.	3028 A	Liquid level marked	✓	Container sealed	✓
H_2O blank container no.	3023 A	Liquid level marked	✓	Container sealed	✓

Samples stored and locked: Cooler No. ____ Ice supply ____
Remarks ____

LABORATORY CUSTODY

Received by J. Rotell — Date 6/28/85
Remarks ____
Container sealed? ____ On Ice? ____
Note any signs of sample leakage or spillage: ____

DRY MOLECULAR WEIGHT DETERMINATION

PLANT DWSD - Detroit
DATE 6/25/85 TEST NO PCCO-1
SAMPLING TIME (24-hr CLOCK)
SAMPLING LOCATION No. 13 Scrubber Outlet
SAMPLE TYPE (~~BAG~~, INTEGRATED, CONTINUOUS)
ANALYTICAL METHOD ORSAT
AMBIENT TEMPERATURE 70°F
OPERATOR CB
.ORSAT LEAK CHECKED ✓

COMMENTS:
Leak in sample system is evident - slowly. Ambient

RUN / GAS	1		2		3		AVERAGE NET VOLUME	MULTIPLIER	MOLECULAR WEIGHT OF STACK GAS (DRY BASIS) M_d, lb/lb-mole
	ACTUAL READING	NET	ACTUAL READING	NET	ACTUAL READING	NET			
CO_2	0.2	0.2	0.2	0.2	4.9	4.9		44/100	
O_2 (NET IS ACTUAL O_2 READING MINUS ACTUAL CO_2 READING)	19.5	19.3			20.0	15.1		32/100	
CO (NET IS ACTUAL CO READING MINUS ACTUAL O_2 READING)								28/100	
N_2 (NET IS 100 MINUS ACTUAL CO READING)								28/100	
								TOTAL	

20.

SS TE NG LD TA

PITOT #103
THERMO #178

PLANT & CITY	DATE	SAMPLING LOCATION	SAMPLE TYPE
DETROIT WATER AND SEWAGE	6/25/85	OUTLET INCINERATOR NO. 1	PART. SEMI ORGANIC

RUN NO.	OPERATOR	AMB. TEMP (°F)	BAR. PRESS. (IN. Hg)	STATIC PRESS. (IN. H_2O)	FILTER NUMBER(S)	STACK INSIDE DIMEN. (INCHES)	PITOT TUBE C_p	THERM NO.	PAGE
PC10017	MCNEAL K BAT	90	29.78	-1.18	53C0029	153 153	.84		1 OF 1

PROBE LENGTH AND TYPE	NOZZLE I.D.	NOZZLE NO.	H_2O (S)	SAMPLE BOX NO.	METER BOX NO.	METER $\Delta H@$	METER CAL. FACTOR Y	LEAK CHECK IN. Hg	LEAK CHECK CFM	K FACTOR	C FACTOR	PROBE HEAT SET	BOX HEAT SET	REF. ΔP	RECORD DATA RANGE
6 GLASS	.183	B-1	3-1.09		FB3	1.90	1.005	8	0.017	1.422		250	259		10A

POST LEAK CHECK @ 8" Hg 0.01 cfm

TRAVERSE POINT NUMBER	SAMPLING TIME, min	CLOCK TIME (24 hr CLOCK)	GAS METER READING (V_m), ft^3	VELOCITY HEAD (Δp_s), in. H_2O	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O DESIRED	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O ACTUAL	STACK TEMPERATURE (T_s), °F	DRY GAS METER TEMPERATURE INLET ($T_{m_{in}}$), °F	DRY GAS METER TEMPERATURE OUTLET ($T_{m_{out}}$), °F	PUMP VACUUM, in. Hg	SAMPLE BOX TEMPERATURE °F	IMPINGER TEMPERATURE °F
	0	1350	861.215									
PT #6	10	1400	866.290	0.65	0.92	0.92	100	100	96	4.5	280	68
	20	1410	871.430	0.60	0.87	0.87	90	102	98	6.2	230	60
	30	1420	875.940	0.45	0.66	0.66	87	106	98	5.5	230	60
B-18	40	1430	880.880	0.55	0.78	0.78	105	108	100	6.2	250	62
	50	1440	886.190	0.70	1.00	1.00	101	112	100	7.0	240	62
	60	1450	890.720	0.43	0.63	0.63	93	112	100	6.0	235	62
	70	1500	895.230	0.45	0.66	0.66	91	114	102	6.0	250	62
	80	1510	899.490	0.40	0.59	0.59	92	115	104	5.5	230	62
	90	1520	903.790	0.40	0.58	0.58	100	116	104	6.0	240	60
	100	1530	909.910	0.85	1.24	1.24	96	116	106	8.0	280	60
	110	1540	915.870	0.77	1.13	1.13	93	118	106	8.0	260	60
	120	1550	920.530	0.45	0.66	0.66	96	118	107	6.0	240	60
	130	1600	925.110	0.45	0.66	0.66	99	118	108	6.0	260	60
	140	1610	930.650	0.70	1.02	1.02	100	118	108	8.0	250	60
	150	1620	936.217	0.70	1.03	1.03	95	120	108	8.0	250	60
	160	1630	941.521	0.61	0.90	0.90	95	120	109	7.5	250	60
	170	1640	946.475	0.53	0.77	0.77	101	120	109	7.0	250	60
	180	1650	951.532	0.56	0.83	0.83	92 *	120	109	7.5	250	60

* USED PUMP (11) WITH METER BOX FB-3

PARTICULATE SAMPLE RECOVERY AND INTEGRITY SHEET

Plant DETROIT Sample date 6/25/85

Sample location OUTLET Recovery date 6/26/85

Run No. PC00-2 Recovered by [illegible]

Filter No(s). 5300024

XAD-2 sorbent trap No. 002

TRAP CONT # 3613 B

MOISTURE

	1st impinger	2nd impinger	3rd impinger	4th impinger	Silica gel
Final volume wt.	685.6 g	575.8 g	498.3 g	____ g	882.1 g
Initial volume wt.	596.6 g	576.8 g	497.8 g	____ g	864.9 g
Net volume wt.	89 g	-1 g	1 g	____ g	17.2 g
Description of impinger contents	CLEAR				30 % spent

Total moisture 106.2 g

RECOVERED SAMPLE

Filter container number(s) 3612 B Sealed ✓

Description of particulate on filter BLACK

Probe rinse container no.	3612 A	Liquid level marked	✓	Container sealed	✓
ACE. blank container no.	3529 A	Liquid level marked	✓	Container sealed	✓
Impinger contents container no.	3613 A	Liquid level marked	✓	Container sealed	✓
Type 1 H_2O blank container no.	3023 A	Liquid level marked	✓	Container sealed	✓

Samples stored and locked: Cooler No. _____ Ice supply _____

Remarks _____

LABORATORY CUSTODY

Received by [illegible] Date [illegible]

Remarks _____

Container sealed? _____ On Ice? _____

Note any signs of sample leakage or spillage: _____

DRY MOLECULAR WEIGHT DETERMINATION

PLANT DWSD - DETROIT
DATE 6/25/85 TEST NO PC 002
SAMPLING TIME (24-hr CLOCK)
SAMPLING LOCATION No. 13 OUTLET
SAMPLE TYPE (BAG, INTEGRATED, CONTINUOUS) BAG
ANALYTICAL METHOD ORSAT
AMBIENT TEMPERATURE 80
OPERATOR DF
ORSAT LEAK CHECKED ✓

COMMENTS:

RUN / GAS	1		2		3		AVERAGE NET VOLUME	MULTIPLIER	MOLECULAR WEIGHT OF STACK GAS (DRY BASIS) M_d, lb/lb-mole
	ACTUAL READING	NET	ACTUAL READING	NET	ACTUAL READING	NET			
CO_2	4.9	4.9	4.7	4.7			4.8	44/100	
O_2 (NET IS ACTUAL O_2 READING MINUS ACTUAL CO_2 READING)	20.0	15.1	19.8	15.1			15.1	32/100	
CO (NET IS ACTUAL CO READING MINUS ACTUAL O_2 READING)								28/100	
N_2 (NET IS 100 MINUS ACTUAL CO READING)								28/100	
								TOTAL	

EMISSION TESTING FIELD DATA

PLANT & CITY	DATE	SAMPLING LOCATION	SAMPLE TYPE
DETROIT WATER AND SEWAGE	6/26/85	SF RUBBER OUTLET	ORGANIC

RUN NO.	OPERATOR	AMB. TEMP (°F)	BAR. PRESS. (IN. Hg)	STATIC PRESS. (IN. H_2O)	FILTER NUMBER(S)	STACK INSIDE DIMEN. (INCHES)	PITOT TUBE Cp	THERM NO.	PAGE
PG00-3D	MCNEAL K BATT	90	2962	-118	5300002	53	84		1 OF 1

PROBE LENGTH AND TYPE	NOZZLE I.D.	NOZZLE NO.	H_2O (S)	SAMPLE BOX NO.	METER BOX NO.*	METER ΔH@	METER CAL. FACTOR Y	LEAK CHECK IN. Hg	LEAK CHECK CFM	K FACTOR	C FACTOR	PROBE HEAT SET	BOX HEAT SET	REF. ΔP	RECORD DATA MINS
6 FT GLASS	193	3-109			FB3	1.90	1.005	10.0	0.015	1.422		250	250		10

POST-TEST 9.0 0.01 cfm

TRAVERSE POINT NUMBER	SAMPLING TIME, min	CLOCK TIME (24 hr CLOCK)	GAS METER READING (V_m), ft^3	VELOCITY HEAD (Δp_s), in. H_2O	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O DESIRED	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O ACTUAL	STACK TEMPERATURE (T_s), °F	DRY GAS METER TEMPERATURE INLET ($T_{m_{in}}$), °F	DRY GAS METER TEMPERATURE OUTLET ($T_{m_{out}}$), °F	PUMP VACUUM, in. Hg	SAMPLE BOX TEMPERATURE °F	IMPINGER TEMPERATURE °F
	0	0831	952.034									
Pt #6	10	0841	956.300	0.45	0.64	0.64	92	94	92	6.0	260	64
	20	0851	960.650	0.45	0.64	0.64	98	96	92	6.2	260	64
	30	0901	964.930	0.43	0.61	0.61	99	101	94	6.0	255	62
	40	0911	969.290	0.45	0.65	0.65	93	106	96	6.2	250	62
	50	0921	973.720	0.45	0.65	0.65	96	108	98	6.4	260	62
	60	0931	978.170	0.43	0.62	0.62	97	110	98	6.4	260	60
	70	0941	983.080	0.60	0.87	0.87	97	110	100	7.5	250	60
	80	0951	988.200	0.60	0.87	0.87	97	112	100	7.8	260	60
	90	1001	993.330	0.60	0.87	0.87	95	112	102	7.8	260	60
	100	1011	998.460	0.60	0.88	0.88	93	113	102	7.8	260	60
	110	1021	1003.620	0.60	0.87	0.87	94	114	102	8.0	260	60
	120	1031	1008.580	0.55	0.80	0.80	97	114	104	7.5	260	60
	130	1041	1013.710	0.60	0.88	0.88	93	114	104	8.0	245	60
	140	1051	1018.840	0.60	0.88	0.88	91	114	104	8.0	245	60
	150	1101	1024.090	0.60	0.88	0.88	89	114	104	8.0	250	62
	160	1111	1029.160	0.60	0.88	0.88	90	115	105	8.2	260	62
	170	1121	1034.280	0.60	0.88	0.88	91	116	105	8.2	245	62
	180	1131	1038.690	0.40	0.59	0.59	93	116	105	7.0	245	62

* USED PUMP (11) WITH METER BOX FB-3

PARTICULATE SAMPLE RECOVERY AND INTEGRITY SHEET

Plant DETROIT Sample date 6/26/85

Sample location OUTLET Recovery date 6/26/85

Run No. PC00-3 Recovered by DJ/CB

Filter No(s). 5300002

XAD-2 sorbent trap No. 003 Cont # 3622 B

MOISTURE

	1st impinger	2nd impinger	3rd impinger	4th impinger	Silica gel
Final volume wt.	659.8 g	596.6 g	506.2 g	____ g	686.9 g
Initial volume wt.	577 g	598.9 g	504.8 g	— g	668.1 g
Net volume wt.	82.8 g	-2.3 g	1.4 g	____ g	18.8 g
Description of impinger contents	CLEAR	____	____	____	40 % spent

Total moisture 100.7 g

RECOVERED SAMPLE

Filter container number(s) 3620 A (IW with Methylene Chloride Rinse) Sealed ✓

Description of particulate on filter BLACK

Probe rinse container no. Methanol 3621 A (Methylene Chloride 3623 A) Liquid level marked ✓ Container sealed ✓

Methanol blank container no. 3610 A Liquid level marked ✓ Container sealed ✓

Impinger contents container no. 3622 A Liquid level marked ✓ Container sealed ✓

Methylene Chloride blank container no. 3609 A Liquid level marked ✓ Container sealed ✓

Samples stored and locked: Cooler No. ____ Ice supply ____

Remarks ____

LABORATORY CUSTODY

Received by [illegible] Date 6/[illegible]

Remarks ____

Container sealed? ____ On Ice? ____

Note any signs of sample leakage or spillage: ____

DRY MOLECULAR WEIGHT DETERMINATION

PLANT DWSD - DETROIT
DATE 6/26/85 TEST NO PL00-3
SAMPLING TIME (24-hr CLOCK)
SAMPLING LOCATION OUTLET
SAMPLE TYPE (BAG, INTEGRATED, CONTINUOUS) BAG
ANALYTICAL METHOD ORSAT
AMBIENT TEMPERATURE 80
OPERATOR DS
ORSAT LEAK CHECKED —

COMMENTS:

RUN / GAS	1		2		3		AVERAGE NET VOLUME	MULTIPLIER	MOLECULAR WEIGHT OF STACK GAS (DRY BASIS) M_d, lb/lb-mole
	ACTUAL READING	NET	ACTUAL READING	NET	ACTUAL READING	NET			
CO_2	3.2	3.2	3.3	3.3			3.25	44/100	
O_2 (NET IS ACTUAL O_2 READING MINUS ACTUAL CO_2 READING)	18.2	15.0	18.2	14.9			14.95	32/100	
CO (NET IS ACTUAL CO READING MINUS ACTUAL O_2 READING)								28/100	
N_2 (NET IS 100 MINUS ACTUAL CO READING)								28/100	
								TOTAL	

VISIBLE EMISSION DATA

	00	15	30	45
01	10	5	10	10
02	5	5	10	5
03	0	10	5	10
04	0	5	0	0
05	5	5	5	5
06	0	0	5	5
07	0	0	0	0
08	0	0	0	5
09	10	5	10	10
10	5	5	10	5
11	10	5	0	5
12	10	5	0	5
13	5	5	10	5
14	5	5	5	5
15	5	5	10	5
16	10	10	10	5
17	5	5	5	0
18	5	0	0	0
19	0	0	0	0
20	5	0	5	5
21	0	0	0	0
22	5	0	5	5
23	5	0	0	0
24	10	0	0	5
25	5	0	0	0
26	0	0	0	0
27	0	0	5	5
28	0	0	0	5
29	0	5	10	5
30	5	10	10	10

Site: Scrubber Outlet
Unit # 13
Location: Detroit
Wastewater Treatment Plant
Time:
From: 2:18 P.M.
To:
Date: 20 JUL 85
Background: Clouds/sky
SKY: Broken
Wind:
Direction: West
Velocity: 10-15 mph
Remarks: 1000' from stack

Observer: Frank Clay

	00	15	30	45
31	10	10	10	10
32	15	10	10	10
33	10	10	10	10
34	5	0	0	0
35	0	0	0	0
36	0	0	0	5
37	5	10	0	0
38	0	0	5	5
39	10	5	10	5
40	0	0	0	0
41	0	0	0	0
42	0	0	0	0
43	0	0	0	0
44	0	5	5	0
45	0	0	5	0
46	0	5	0	0
47	0	0	5	5
48	5	5	0	0
49	0	0	0	0
50	5	5	5	5
51	5	0	5	5
52	10	10	15	10
53	10	10	10	5
54	5	5	5	5
55	5	5	0	0
56	5	0	0	10
57	10	5	10	10
58	10	10	10	5
59	10	10	15	10
60	5	5	10	5

APPENDIX C

LABORATORY DATA

METHOD 5 BLANK ANALYTICAL DATA

Plant U.S. EPA - EMB

Sample location Inlet & Outlet

Relative humidity of laboratory 50%

Density of acetone (ρa) .7899 g/ml

Blank type	Sample identifiable	Liquid level at mark and/or container sealed
Acetone	yes	yes
Filter	yes	yes

Acetone blank container No. 3529A Lab No. EQ239

Acetone blank volume (Va) 605 ✓ ~~ml~~

Date and time of wt 7-8-85 3:30pm Gross wt 92006.6 mg

Date and time of wt 7-9-85 9:00am Gross wt 92006.4 mg

Average Gross wt 92006.5 ✓ ~~mg~~

Tare wt 91993.8 ✓ ~~mg~~

Weight of blank (ma) 12.7 ✓ ~~mg~~

$$Ca = \frac{(ma)}{(Va)\ (\rho a)} \quad \frac{(12.7)}{(605)(.7899)} = .027\ ^{*}$$ ✓ mg/g

Note: In no case should a blank residue greater than 0.01 mg/g or 0.001% of the blank weight be subtracted form the sample weight.

Filter blank container No. 3529B Lab No. EQ232

Filter blank No. 8510225

Date and time of wt 7-8-85 8:00am Gross wt 372.2 mg

Date and time of wt 7-8-85 3:30pm Gross wt 372.2 mg

Average gross wt 372.2 ✓ ~~mg~~

Tare wt 371.9 ✓ ~~mg~~

Difference 0.3 ✓ ~~mg~~

Note: Difference must be less than ±5 mg of 2% of total sample weight, whichever is greater.

Remarks * 0.01 used in acetone Rinse calculations ✓

Signature of analyst Cheryl A. Jones

Signature of reviewer Lauren Drews 7-23-85 Ida Bennett 7/24/85

METHOD 5 BLANK ANALYTICAL DATA

Plant U.S. EPA - EMB

Sample location Inlet & Outlet Probe Blank Rinse

Relative humidity of laboratory 50%

Density of acetone (ρa) .7899 g/ml

Blank type	Sample identifiable	Liquid level at mark and/or container sealed
Acetone	yes	yes
Filter	yes	yes

Acetone blank container No. 3022A Lab No. EQ247

Acetone blank volume (Va) 205 ✓ ml

Date and time of wt 7-8-85 8:00am Gross wt 90434.8 mg

Date and time of wt 7-8-85 3:30pm Gross wt 90434.4 mg

Average Gross wt 90434.6 ✓ mg

Tare wt 90400.4 ✓ mg

Weight of blank (ma) * 34.2 ✓ mg

$$Ca = \frac{(ma)}{(Va)\ (\rho a)} \quad \frac{(\quad)}{(\quad)(\quad)} = \quad mg/g$$

Note: In no case should a blank residue greater than 0.01 mg/g or 0.001% of the blank weight be subtracted form the sample weight.

Filter blank container No. 3610B Lab No. EQ217

Filter blank No. 5300020 3 7/8" Filter ✓

Date and time of wt 7-8-85 8:00am Gross wt 566.4 mg

Date and time of wt 7-8-85 3:30pm Gross wt 566.3 mg

Average gross wt 566.4 ✓ mg

Tare wt 565.9 ✓ mg

Difference 0.5 ✓ mg

Note: Difference must be less than ±5 mg of 2% of total sample weight, whichever is greater.

Remarks * Stainless Steel Acetone Probe BLANK Rinse

Signature of analyst Cheryl A. Jones

Signature of reviewer Lawrence Jones 7-23-85 John Bennett 7/24/85

METHOD 5 BLANK ANALYTICAL DATA

Plant U.S. EPA - EMB

Sample location Inlet + Outlet

Relative humidity of laboratory 50%

Density of acetone (ρa) _____ g/ml

Blank type	Sample identifiable	Liquid level at mark and/or container sealed
Acetone		
Filter	yes	yes

Acetone blank container No. _____ Lab No. _____

Acetone blank volume (Va) _____ ml

Date and time of wt _____ Gross wt _____ mg

Date and time of wt _____ Gross wt _____ mg

Average Gross wt _____ mg

Tare wt _____ mg

Weight of blank (ma) _____ mg

$$Ca = \frac{(ma)}{(Va)\ (\rho a)} \quad \frac{(\quad)}{(\quad)(\quad)} = \_\_\_\_\_ \text{ mg/g}$$

Note: In no case should a blank residue greater than 0.01 mg/g or 0.001% of the blank weight be subtracted form the sample weight.

~~Filter~~ Thimble blank container No. —— Lab No. EQ212

~~Filter~~ Thimble blank No. #29 ✓

Date and time of wt 7-8-85 3:30pm Gross wt 2099.2 mg ✓

Date and time of wt 7-9-85 8:15am Gross wt 2099.0 mg ✓

Average gross wt 2099.1 ✓ mg ✓

Tare wt 2089.6 mg ✓

Difference 9.5 mg ✓

Note: Difference must be less than ±5 mg of 2% of total sample weight, whichever is greater.

Remarks _____

Signature of analyst Cheryl A. Jones

Signature of reviewer Lauren Dixon 7-23-85 Ida Bennett 7/24/85

METHOD 5 TRAIN ANALYTICAL PARTICULATE DATA
ACETONE RINSE AND FILTER(S)

Plant U.S. EPA - EMB Run No. PCO-1

Sample location Outlet

Relative humidity of laboratory 50%

Density of acetone (ρa) .7899 g/ml

Sample type	Sample identifiable	Liquid level at mark and/or container sealed
Acetone rinse	yes	yes
filter(s)	yes	yes

Acetone rinse container No. 3531A Lab No. EQ233

Acetone rinse volume (Vaw) 257 ✓ ✓ ml

Acetone blank residue concentration (Ca) 0.01 mg/g

Wa = Ca Vaw ρa = (0.01) (257) (.7899) = 2.0 ✓ mg

Date and time of wt 7-8-85 8:00am Gross wt 96165.9 mg

Date and time of wt 7-8-85 3:30pm Gross wt 96165.7 mg

Average gross wt 96165.8 ✓ mg

Tare wt 96133.7 ✓ mg

Less acetone blank wt (Wa) 2.0 ✓ mg

Weight of particulate in acetone rinse 30.1 ✓ mg

Filter container No(s). 3531B Lab No(s). EQ226

Filter No(s). 8510236 ✓

Date and time of wt 7-8-85 3:30pm Gross wt 478.6 mg

Date and time of wt 7-9-85 8:15am Gross wt 478.8 mg

Average gross wt 478.7 ✓ mg

Tare wt 370.2 ✓ mg

Weight of particulate on filter(s) 108.5 ✓ mg

Weight of particulate in acetone rinse 30.1 mg

Total weight of particulate 138.6 ✓ mg

Note: In no case shall a blank residue greater than (0.01 mg/g) or 0.001% of the weight of acetone used be subtracted from the sample weight.

Remarks:

Signature of analyst Cheryl A. Jones

Signature of reviewer Laurence Dean 7-23-85 Ida Bennett 7/24/85

METHOD 5 TRAIN ANALYTICAL PARTICULATE DATA
ACETONE RINSE AND FILTER(S)

Plant U.S. EPA - EMB Run No. PCO-2
Sample location Outlet
Relative humidity of laboratory 50%
Density of acetone (ρa) .7899 g/ml

Sample type	Sample identifiable	Liquid level at mark and/or container sealed
Acetone rinse	yes	yes
filter(s)	yes	yes

Acetone rinse container No. 3016A Lab No. EQ234
Acetone rinse volume (Vaw) 165 ✓ ml
Acetone blank residue concentration (Ca) 0.01 mg/g
Wa = Ca Vaw ρa = (0.01) (165) (.7899) = 1.3 ✓ mg
Date and time of wt 7-8-85 8:00am Gross wt 93223.7 mg
Date and time of wt 7-8-85 3:30pm Gross wt 93223.4 mg
Average gross wt 93223.6 ✓ mg
Tare wt 93208.6 ✓ mg
Less acetone blank wt (Wa) 1.3 mg
Weight of particulate in acetone rinse 13.7 ✓ mg
Filter container No(s). 30166 ✓ Lab No(s). EQ227
Filter No(s). 8510230 ✓
Date and time of wt 7-8-85 8:00am Gross wt 438.1 mg
Date and time of wt 7-8-85 3:30p.m Gross wt 438.2 mg
Average gross wt 438.2 ✓ mg
Tare wt 369.6 ✓ mg
Weight of particulate on filter(s) 68.6 ✓ mg
Weight of particulate in acetone rinse 13.7 mg
Total weight of particulate 82.3 ✓ mg

Note: In no case shall a blank residue greater than (0.01 mg/g) or 0.001% of the weight of acetone used be subtracted from the sample weight.
Remarks:

Signature of analyst Cheryl A. Jones
Signature of reviewer Lauren Drivas 7-23-85 Ida Bennett 7/24/85

METHOD 5 TRAIN ANALYTICAL PARTICULATE DATA
ACETONE RINSE AND FILTER(S)

Plant U.S. EPA - EMB Run No. PCO-3

Sample location Outlet

Relative humidity of laboratory 50%

Density of acetone (ρa) .7899 g/ml

Sample type	Sample identifiable	Liquid level at mark and/or container sealed
Acetone rinse	yes	yes
filter(s)	yes	yes

Acetone rinse container No. 3020A Lab No. EQ 235

Acetone rinse volume (Vaw) 134 ml

Acetone blank residue concentration (Ca) 0.01 mg/g

Wa = Ca Vaw ρa = (0.01) (134) (.7899) = 1.1 mg

Date and time of wt 7-8-85 8:00am Gross wt 95652.7 mg

Date and time of wt 7-8-85 3:30pm Gross wt 95652.7 mg

Average gross wt 95652.7 mg

Tare wt 95637.0 mg

Less acetone blank wt (Wa) 1.1 mg

Weight of particulate in acetone rinse 14.6 mg

Filter container No(s). 3020B Lab No(s). EQ228

Filter No(s). 8510235

Date and time of wt 7-8-85 3:30pm Gross wt 471.2 mg

Date and time of wt 7-9-85 8:15am Gross wt 471.4 mg

Average gross wt 471.3 mg

Tare wt 371.8 mg

Weight of particulate on filter(s) 99.5 mg

Weight of particulate in acetone rinse 14.6 mg

Total weight of particulate 114.1 mg

Note: In no case shall a blank residue greater than (0.01 mg/g) or 0.001% of the weight of acetone used be subtracted from the sample weight.

Remarks:

Signature of analyst Cheryl A. Jones

Signature of reviewer Lauren Drees 7-23-85 Jim Bennett 7/24/85

METHOD 5 TRAIN ANALYTICAL PARTICULATE DATA
ACETONE RINSE AND FILTER(S)

Plant U.S. EPA - EMB Run No. PCO-4

Sample location Outlet

Relative humidity of laboratory 50%

Density of acetone (ρa) .7899 g/ml

Sample type	Sample identifiable	Liquid level at mark and/or container sealed
Acetone rinse	yes	yes
filter(s)	yes	yes

Acetone rinse container No. 3538A Lab No. EQ236

Acetone rinse volume (Vaw) 251 ✓ ml

Acetone blank residue concentration (Ca) 0.01 mg/g

Wa = Ca Vaw ρa = (0.01) (251) (.7899) = 2.0 ✓ mg

Date and time of wt 7-8-85 8:00am Gross wt 98612.5 mg

Date and time of wt 7-8-85 3:30pm Gross wt 98612.7 mg

Average gross wt 98612.6 ✓ mg

Tare wt 98591.0 ✓ mg

Less acetone blank wt (Wa) 2.0 ✓ mg

Weight of particulate in acetone rinse 19.6 ✓ mg

Filter container No(s). 3538B Lab No(s). EQ229

Filter No(s). 8510023 ✓

Date and time of wt 7-8-85 3:30pm Gross wt 466.3 mg

Date and time of wt 7-9-85 8:15pm Gross wt 466.1 mg

Average gross wt 466.2 ✓ mg

Tare wt 352.4 ✓ mg

Weight of particulate on filter(s) 113.8 ✓ mg

Weight of particulate in acetone rinse 19.6 ✓ mg

Total weight of particulate 133.4 ✓ mg

Note: In no case shall a blank residue greater than (0.01 mg/g) or 0.001% of the weight of acetone used be subtracted from the sample weight.

Remarks: _____

Signature of analyst Cheryl A. Jones

Signature of reviewer Lauren Drees 7-23-85 Ida Bennett 7/24/85

METHOD 5 TRAIN ANALYTICAL PARTICULATE DATA
ACETONE RINSE AND FILTER(S)

Plant U.S. EPA - EMB Run No. PCO-5

Sample location Outlet

Relative humidity of laboratory 50%

Density of acetone (ρa) .7899 g/ml

Sample type	Sample identifiable	Liquid level at mark and/or container sealed
Acetone rinse	yes	yes
filter(s)	yes	yes

Acetone rinse container No. 3606A Lab No. EQ237

Acetone rinse volume (Vaw) 688 ✓ ✓ ml

Acetone blank residue concentration (Ca) 0.01 mg/g

Wa = Ca Vaw ρa = (0.01) (688) (.7899) = 5.4 mg

Date and time of wt 7-8-85 8:00am Gross wt 98261.9 mg

Date and time of wt 7-8-85 3:30 pm Gross wt 98261.5 mg

Average gross wt 98261.7 ✓ mg

Tare wt 98247.1 ✓ mg

Less acetone blank wt (Wa) 5.4 ✓ mg

Weight of particulate in acetone rinse 9.2 ✓ mg

Filter container No(s). 3606B Lab No(s). EQ230

Filter No(s). 8510249

Date and time of wt 7-8-85 3:30p.m Gross wt 436.1 mg

Date and time of wt 7-9-85 8:15am Gross wt 436.3 mg

Average gross wt 436.2 ✓ mg

Tare wt 367.3 ✓ mg

Weight of particulate on filter(s) 68.9 ✓ mg

Weight of particulate in acetone rinse 9.2 ✓ mg

Total weight of particulate 78.1 ✓ mg

Note: In no case shall a blank residue greater than (0.01 mg/g) or 0.001% of the weight of acetone used be subtracted from the sample weight.

Remarks:

Signature of analyst Cheryl A. Jones

Signature of reviewer James E. Dreen 7-23-85 Ida Bennett 7/24/85

METHOD 5 TRAIN ANALYTICAL PARTICULATE DATA
ACETONE RINSE AND FILTER(S)

Plant U.S. EPA - EMB Run No. PCO-6

Sample location Outlet

Relative humidity of laboratory 50%

Density of acetone (ρa) .7899 g/ml

Sample type	Sample identifiable	Liquid level at mark and/or container sealed
Acetone rinse	yes	yes
filter(s)	yes	yes

Acetone rinse container No. 3666A Lab No. EQ 238

Acetone rinse volume (Vaw) 239 ✓ ml

Acetone blank residue concentration (Ca) 0.01 mg/g

Wa = Ca Vaw ρa = (0.01) (239) (.7899) = 1.9 ✓ mg

Date and time of wt 7-8-85 3:30pm Gross wt 100828.5 mg

Date and time of wt 7-9-85 9:00 am Gross wt 100828.3 mg

Average gross wt 100828.4 ✓ mg

Tare wt 100810.6 ✓ mg

Less acetone blank wt (Wa) 1.9 ✓ mg

Weight of particulate in acetone rinse 15.9 ✓ mg

Filter container No(s). 3666B Lab No(s). EQ231

Filter No(s). 8510232

Date and time of wt 7-8-85 8:00 am Gross wt 447.9 mg

Date and time of wt 7-9-85 8:15 am Gross wt 447.8 mg

Average gross wt 447.8 ✓ mg

Tare wt 370.4 ✓ mg

Weight of particulate on filter(s) 77.4 ✓ mg

Weight of particulate in acetone rinse 15.9 ✓ mg

Total weight of particulate 93.3 ✓ mg

Note: In no case shall a blank residue greater than (0.01 mg/g) or 0.001% of the weight of acetone used be subtracted from the sample weight.

Remarks:

Signature of analyst Cheryl A. Jones

Signature of reviewer Lauren Drew 7-23-85 Ida Bennett 7/24/85

ANDERSON IMPACTOR ANALYTICAL DATA

Plant U.S. EPA - EMB Run No. PSO-1

Sample location Outlet

Relative humidity 50%

Density of acetone (ρa) .7899 g/ml

Sample type	Sample identifiable	Liquid level at mark and/or container sealed
Acetone rinse	yes	yes
filter(s)	yes	yes

Acetone rinse container no. 3018A Lab no. EQ 157

Acetone rinse volume (Vaw) 23 ml

Acetone blank residue concentration (Ca) 0.01 mg/g

Wa = Ca Vaw ρa = (0.01) (23) (.7899) = 0.2 mg

Date and time of wt 7-8-85 8:00 am Gross wt 99116.3 mg

Date and time of wt 7-8-85 3:30 pm Gross wt 99116.5 mg

Average gross wt 99116.4 mg

Tare wt 99110.9 mg

Less acetone blank wt (Wa) 0.2 mg

Weight of particulate in acetone rinse 5.3 mg

Filters

Stage	Filter No.	Lab No.	Gross, mg	Tare, mg	Net, mg
0	BM93	EQ158	168.4	167.6	0.8
1	BM96	EQ159	149.6	149.4	0.2
2	BM97	EQ160	167.6	166.7	0.9
3	BM94	EQ161	147.8	147.2	0.6
4	BM95	EQ162	168.2	167.4	0.8
5	BL86	EQ163	149.4	147.8	1.6
6	BL87	EQ164	172.1	166.8	5.3
7	BM60	EQ165	153.4	149.2	4.2
Backup	BB45	EQ166	241.0	220.4	20.6
					35.0
				Weight of particulate in acetone rinse	5.3
				Total	40.3

Signature of analyst Cheryl A. Jones

Signature of reviewer Laura Green 7-23-85 Ida Bennett 7/14/85

ANDERSON IMPACTOR ANALYTICAL DATA

Plant U.S. EPA - EMB Run No. PSO-2

Sample location outlet

Relative humidity 50%

Density of acetone (ρa) .7899 g/ml

Sample type	Sample identifiable	Liquid level at mark and/or container sealed
Acetone rinse	yes	yes
filter(s)	yes	yes

Acetone rinse container no. 3535A Lab no. EQ167

Acetone rinse volume (Vaw) 59 ✓ ml

Acetone blank residue concentration (Ca) 0.01 mg/g

Wa = Ca Vaw ρa = (0.01) (59) (.7899) = 0.5 ✓ mg

Date and time of wt 7-8-85 8:00 am Gross wt 9938210 mg

Date and time of wt 7-8-85 3:30 pm Gross wt 9938210 mg

Average gross wt 9938210 ✓ mg

Tare wt 9937715 ✓ mg

Less acetone blank wt (Wa) 0.5 ✓ mg

Weight of particulate in acetone rinse 4.0 ✓ mg

Filters

Stage	Filter No.	Lab No.	Gross, mg	Tare, mg	Net, mg
0	BN31 ✓	EQ168	165.7 ✓	165.4 ✓	0.3 ✓
1	BL94 ✓	EQ169	149.0 ✓	148.8 ✓	0.2 ✓
2	BN33 ✓	EQ170	166.8 ✓	166.4 ✓	0.4 ✓
3	BM32 ✓	EQ171	150.0 ✓	149.6 ✓	0.4 ✓
4	BN39 ✓	EQ172	168.2 ✓	167.8 ✓	0.4 ✓
5	BL58 ✓	EQ173	149.1 ✓	148.2 ✓	0.9 ✓
6	BN21 ✓	EQ174	167.4 ✓	165.0 ✓	2.4 ✓
7	BL76 ✓	EQ175	154.6 ✓	149.4 ✓	5.2 ✓
Backup	B586 ✓	EQ176	235.6 ✓	220.7 ✓	14.9 ✓
					25.1 ✓

Weight of particulate in acetone rinse 4.0 ✓

Total 29.1 ✓

Signature of analyst Cheryl A. Jones

Signature of reviewer Lauren Drew 7-23-85 Ida Bennett 7/24/85

ANDERSON IMPACTOR ANALYTICAL DATA

Plant U.S. EPA - EMB Run No. PSO-3

Sample location outlet

Relative humidity 50%

Density of acetone (ρa) .7899 g/ml

Sample type	Sample identifiable	Liquid level at mark and/or container sealed
Acetone rinse	yes	yes
filter(s)	yes	yes

Acetone rinse container no. 3603A Lab no. EQ177

Acetone rinse volume (Vaw) 66 ✓ ml ✓

Acetone blank residue concentration (Ca) 0.01 mg/g

Wa = Ca Vaw ρa = (0.01) (66) (.7899) = 0.5 ✓ mg ✓

Date and time of wt 7-8-85 8:00am Gross wt 100603.8 mg

Date and time of wt 7-8-85 3:30pm Gross wt 100603.8 mg

Average gross wt 100603.8 ✓ mg ✓

Tare wt 100600.6 ✓ mg ✓

Less acetone blank wt (Wa) 0.5 mg

Weight of particulate in acetone rinse 2.7 ✓ ✓ mg

Filters

Stage	Filter No.	Lab No.	Gross, mg	Tare, mg	Net, mg
0	BL11	EQ178	156.9 ✓ ✓	156.4 ✓ ✓	0.5 ✓ ✓
1	BJ70	EQ179	136.2 ✓ ✓	136.0 ✓ ✓	0.2 ✓ ✓
2	BH49	EQ180	157.4 ✓ ✓	157.3 ✓ ✓	0.1 ✓ ✓
3	BH60	EQ181	142.5 ✓ ✓	142.0 ✓ ✓	0.10 ✓ ✓
4	BJ75	EQ182	153.4 ✓ ✓	153.1 ✓ ✓	0.3 ✓ ✓
5	BN10	EQ183	147.0 ✓ ✓	146.8 ✓ ✓	0.2 ✓ ✓
6	BJ99	EQ184	162.1 ✓ ✓	161.2 ✓ ✓	0.9 ✓ ✓
7	BL96	EQ185	148.8 ✓ ✓	148.2 ✓ ✓	0.6 ✓ ✓
Backup	B639	EQ186	210.2 ✓ ✓	203.0 ✓ ✓	7.2 ✓ ✓
					10.0 ✓ ✓
				Weight of particulate in acetone rinse	2.7 ✓
				Total	12.7 ✓ ✓

Signature of analyst Cheryl A. Jones

Signature of reviewer Lauren Green 7-23-85 Ida Bennett 7/24/85

ANDERSON IMPACTOR ANALYTICAL DATA

Plant U.S. EPA - EMB Run No. PSO-4

Sample location Outlet

Relative humidity 50%

Density of acetone (pa) .7899 g/ml

Sample type	Sample identifiable	Liquid level at mark and/or container sealed
Acetone rinse	yes	yes
filter(s)	yes	yes

Acetone rinse container no. 3604A Lab no. EQ187

Acetone rinse volume (Vaw) 37 ml

Acetone blank residue concentration (Ca) 0.01 mg/g

Wa = Ca Vaw pa = (0.01) (37) (.7899) = 0.3 mg

Date and time of wt 7-8-85 8:00a~ Gross wt 97425.5 mg

Date and time of wt 7-8-85 3:30p~ Gross wt 97426.0 mg

Average gross wt 97425.8 mg

Tare wt 97422.8 mg

Less acetone blank wt (Wa) 0.3 mg

Weight of particulate in acetone rinse 2.7 mg

Filters

Stage	Filter No.	Lab No.	Gross, mg	Tare, mg	Net, mg
0	BM75	EQ188	168.2	167.8	0.4
1	BP52	EQ189	137.4	137.1	0.3
2	BP30	EQ190	154.9	154.4	0.5
3	B098	EQ191	137.8	137.7	0.1
4	B057	EQ192	154.7	154.2	0.5
5	B030	EQ193	137.3	137.2	0.1
6	BN91	EQ194	155.2	155.1	0.1
7	B094	EQ195	136.8	136.4	0.4
Backup	B601	EQ196	205.2	201.4	3.8
					6.2

Weight of particulate in acetone rinse 2.7

Total 8.9

Signature of analyst Cheryl A. Jones

Signature of reviewer James Dreen 7-23-85 Ida Bennett 7/24/85

ANDERSON IMPACTOR ANALYTICAL DATA

Plant U.S. EPA-EMB Run No. PSO-5

Sample location outlet

Relative humidity 50%

Density of acetone (ρa) .7899 g/ml

Sample type	Sample identifiable	Liquid level at mark and/or container sealed
Acetone rinse	yes	yes
filter(s)	yes	yes

Acetone rinse container no. 3611A Lab no. EQ197

Acetone rinse volume (Vaw) 147 ml

Acetone blank residue concentration (Ca) 0.01 mg/g

Wa = Ca Vaw ρa = (0.01) (147) (.7899) = 1.2 mg

Date and time of wt 7-8-85 8:00am Gross wt 98761.8 mg

Date and time of wt 7-8-85 3:30pm Gross wt 98761.4 mg

Average gross wt 98761.6 mg

Tare wt 98658.6 mg

Less acetone blank wt (Wa) 1.2 mg

Weight of particulate in acetone rinse 101.8 mg

Filters

Stage	Filter No.	Lab No.	Gross, mg	Tare, mg	Net, mg
0	BL25	EQ198	157.0	155.3	1.7
1	BL10	EQ199	140.3	140.0	0.3
2	BI89	EQ200	153.9	153.6	0.3
3	BK28	EQ201	142.8	142.8	0.0
4	BH89	EQ202	155.4	155.4	0.0
5	BJ32	EQ203	135.4	135.2	0.2
6	BH87	EQ204	159.1	158.8	0.3
7	BK60	EQ205	139.0	138.4	0.6
Backup	B653	EQ206	210.3	206.1	4.2
					7.6

Weight of particulate in acetone rinse 101.8

Total 109.4

Signature of analyst Cheryl A. Jones

Signature of reviewer Lauren Drees 7-23-85 Ida Bennett 7/24/85

PARTICULATE ANALYTICAL DATA

Plant U.S. EPA - EMB Run No. PSI-1

Sample location Inlet

Relative humidity 50%

Density of acetone (pa) .7899 g/ml

Sample type	Sample identifiable	Liquid level marked and/or container sealed
Acetone rinse	yes	yes
Particulate	yes	yes

Acetone rinse container no. 1B EQ119 Stage Cyclone Precutter

Acetone rinse volume (Vaw) 51 ml ✓ ✓

Acetone blank residue concentration (Ca) 0.01 mg/g

Wa = Ca Vaw pa = (0.01)(51)(.7899) = 0.4 ✓ mg ✓

Date and time of wt 7-8-85 8:00am Gross wt 97.8191 g

Date and time of wt 7-8-85 3:30pm Gross wt 97.8194 g

Average gross wt 97.8192 ✓ g ✓

Tare wt 97.8005 ✓ g ✓

Less acetone blank wt (Wa) 0.4 mg

Weight of particulate in acetone rinse 18.3 ✓ mg ✓

Particulate container no. 1A Cyclone Precutter

Date and time of wt 7-8-85 8:00am Gross wt 69.9328 g

Date and time of wt 7-9-85 8:15am Gross wt 69.9325 g

EQ 118 Average gross wt 69.9326 g ✓

Tare wt 69.8889 g ✓

Stage 0

Weight of particulate 43.7 ✓ mg ✓

Weight of particulate in acetone rinse 18.3 ✓ mg

Total weight of particulate stage 62.0 ✓ mg ✓

Note: In no case shall a blank residue greater than (.01 mg/g) or .001% of the weight of acetone used be subtracted from the sample weight.

Remarks: _____

Signature of analyst Cheryl A. Jones

Signature of reviewer Lauren Greer 7-23-85 Ida Bennett 7/24/85

PARTICULATE ANALYTICAL DATA

Plant U.S. EPA-EMB Run No. PSI-1

Sample location Inlet

Relative humidity 50%

Density of acetone (ρa) .7899 g/ml

Sample type	Sample identifiable	Liquid level marked and/or container sealed
Acetone rinse	yes	yes
Particulate	—	—

Acetone rinse container no. 1C ED120 Stage 1

Acetone rinse volume (Vaw) 52 ml

Acetone blank residue concentration (Ca) 0.01 mg/g

Wa = Ca Vaw ρa = (0.01)(52)(.7899) = 0.4 mg

Date and time of wt 7-8-85 8:00am Gross wt 98.4670 g

Date and time of wt 7-8-85 3:30pm Gross wt 98.4668 g

Average gross wt 98.4669 g

Tare wt 98.4539 g

Less acetone blank wt (Wa) 0.4 mg

Weight of particulate in acetone rinse 12.6 mg

Particulate container no. —

Date and time of wt _____ Gross wt — g

Date and time of wt _____ Gross wt — g

Average gross wt — g

Tare wt — g

Stage 1

Weight of particulate — mg

Weight of particulate in acetone rinse 12.6 mg

Total weight of particulate stage 12.6 mg

Note: In no case shall a blank residue greater than (.01 mg/g) or .001% of the weight of acetone used be subtracted from the sample weight.

Remarks: _____

Signature of analyst Cheryl A. Jones

Signature of reviewer Laura Green 7-23-85 Ida Bennett 7/24/85

PARTICULATE ANALYTICAL DATA

Plant U.S. EPA-EMB Run No. PSI-1

Sample location Inlet

Relative humidity 50%

Density of acetone (ρa) .7899 g/ml

Sample type	Sample identifiable	Liquid level marked and/or container sealed
Acetone rinse	yes	yes
Particulate	yes	yes

Acetone rinse container no. 1E EQ122 Stage 2

Acetone rinse volume (Vaw) 52 ml

Acetone blank residue concentration (Ca) 0.01 mg/g

Wa = Ca Vaw ρa = (0.01)(52)(.7899) = 0.4 mg

Date and time of wt 7-8-85 8:00am Gross wt 95.3763 g

Date and time of wt 7-8-85 3:30pm Gross wt 95.3762 g

Average gross wt 95.3762 g

Tare wt 95.3691 g

Less acetone blank wt (Wa) 0.4 mg

Weight of particulate in acetone rinse 6.7 mg

Particulate container no. 1D EQ121

Date and time of wt 7-8-85 8:00am Gross wt 67.9024 g

Date and time of wt 7-9-85 8:15am Gross wt 67.9020 g

Average gross wt 67.9022 g

Tare wt 67.8776 g

Stage 2

Weight of particulate 24.6 mg

Weight of particulate in acetone rinse 6.7 mg

Total weight of particulate stage 31.3 mg

Note: In no case shall a blank residue greater than (.01 mg/g) or .001% of the weight of acetone used be subtracted from the sample weight.

Remarks: _____

Signature of analyst Cheryl A. Jones

Signature of reviewer Laura Dress 7-23-85 Ida Bennett 7/24/85

PARTICULATE ANALYTICAL DATA

Plant U.S. EPA - EMB Run No. PSI-1

Sample location Inlet

Relative humidity 50%

Density of acetone (ρa) .7899 g/ml

Sample type	Sample identifiable	Liquid level marked and/or container sealed
Acetone rinse	yes	yes
Particulate	yes	yes

Acetone rinse container no. 1G EQ124 Stage Cyclone Rinse

Acetone rinse volume (Vaw) 56 ml ✓ ✓

Acetone blank residue concentration (Ca) 0.01 mg/g

Wa = Ca Vaw ρa = (0.01)(56)(.7899) = 0.4 ✓ mg ✓

Date and time of wt 7-8-85 8:00am Gross wt 101.1419 g

Date and time of wt 7-8-85 3:30pm Gross wt 101.1422 g

Average gross wt 101.1420 ✓ g ✓

Tare wt 101.1262 ✓ g ✓

Less acetone blank wt (Wa) 0.4 ✓ mg

Weight of particulate in acetone rinse 15.4 ✓ mg ✓

Particulate container no. 1F EQ123 Cyclone

Date and time of wt 7-8-85 8:00am Gross wt 71.3181 g

Date and time of wt 7-9-85 8:15am Gross wt 71.3177 g

Average gross wt 71.3179 ✓ g ✓

Tare wt 71.2719 ✓ g ✓

Stage 3

Weight of particulate 46.0 ✓ mg ✓

Weight of particulate in acetone rinse 15.4 ✓ mg

Total weight of particulate stage 61.4 ✓ mg ✓

Note: In no case shall a blank residue greater than (.01 mg/g) or .001% of the weight of acetone used be subtracted from the sample weight.

Remarks: _____

Signature of analyst Cheryl A. Jones

Signature of reviewer Lauren E. Green 7-23-85 Ida Bennett 7/24/85

HGLI PARTICULATE ANALYTICAL DATA

Plant U.S. EPA - EMB Run No. PSI-1

Sample location Inlet

Relative humidity 50%

Density of acetone (ρa) .7899 g/ml

Sample type	Sample identifiable	Liquid level marked and/or container sealed
Acetone rinse	yes	yes
Thimble	yes	yes

Acetone rinse container no. 1I EQ126 Stage Back-up Rinse

Acetone rinse volume (Vaw) 44 ml

Acetone blank residue concentration (Ca) 0.01 mg/g

Wa = Ca Vaw ρa = (0.01)(44)(.7899) = 0.3 mg

Date and time of wt 7-8-85 8:00a Gross wt 98.8190 g

Date and time of wt 7-8-85 3:30p Gross wt 98.8193 g

Average gross wt 98.8192 g

Tare wt 98.8161 g

Less acetone blank wt (Wa) 0.3 mg

Weight of particulate in acetone rinse 2.8 mg

Thimble container no. 1H #GF3336 EQ125

Date and time of wt 7-8-85 3:30p Gross wt 1.9721 g

Date and time of wt 7-9-85 8:15a Gross wt 1.9720 g

Average gross wt 1.9720 g

Tare wt 1.9272 g

Weight of particulate in Thimble 44.8 mg

Weight of particulate in acetone rinse 2.8 mg

Total weight of particulate in stage 4 47.6 mg

Cyclone Precutter = Total stage 0 62.0 mg

Stage 1 = Total stage 1 12.6 mg

Stage 2 = Total stage 2 31.3 mg

Cyclone = Total stage 3 61.4 mg

Backup = Total stage 4 47.6 mg

Total particulate 214.9 mg

Signature of analyst Cheryl A. Jones

Signature of reviewer Laura Dreen 7-23-85 Ila Bennett 7/24/85

PARTICULATE ANALYTICAL DATA

Plant U.S. EPA - EMB Run No. PSI-2

Sample location Inlet

Relative humidity 50%

Density of acetone (ρa) .7899 g/ml

Sample type	Sample identifiable	Liquid level marked and/or container sealed
Acetone rinse	yes	yes
Particulate	yes	yes

Acetone rinse container no. 2B EQ128 Stage Cyclone Precutter

Acetone rinse volume (Vaw) 60 ml

Acetone blank residue concentration (Ca) 0.01 mg/g

Wa = Ca Vaw ρa = (0.01)(60)(.7899) = 0.5 mg

Date and time of wt 7-8-85 8:00 am Gross wt 99.1590 g

Date and time of wt 7-8-85 3:30 pm Gross wt 99.1592 g

Average gross wt 99.1591 g

Tare wt 99.1478 g

Less acetone blank wt (Wa) 0.5 mg

Weight of particulate in acetone rinse 10.8 mg

Particulate container no. 2A EQ127

Date and time of wt 7-8-85 8:00 am Gross wt 72.2268 g

Date and time of wt 7-9-85 8:15 am Gross wt 72.2263 g

Average gross wt 72.2266 g

Tare wt 72.1593 g

Stage 0

Weight of particulate 67.3 mg

Weight of particulate in acetone rinse 10.8 mg

Total weight of particulate stage 78.1 mg

Note: In no case shall a blank residue greater than (.01 mg/g) or .001% of the weight of acetone used be subtracted from the sample weight.

Remarks. _____

Signature of analyst Cheryl A. Jones

Signature of reviewer Laura Green 7-23-85 Thos Bennett 7/24/85

PARTICULATE ANALYTICAL DATA

Plant U.S. EPA - EMB Run No. PSI-2

Sample location Inlet

Relative humidity 50%

Density of acetone (ρa) .7899 g/ml

Sample type	Sample identifiable	Liquid level marked and/or container sealed
Acetone rinse	yes	yes
Particulate	yes	yes

Acetone rinse container no. 2D EQ130 Stage 1

Acetone rinse volume (Vaw) 22 ml

Acetone blank residue concentration (Ca) 0.01 mg/g

Wa = Ca Vaw ρa = (0.01)(22)(.7899) = 0.2 mg

Date and time of wt 7-8-85 8:00am Gross wt 94.9922 g

Date and time of wt 7-8-85 3:30pm Gross wt 94.9926 g

Average gross wt 94.9924 g

Tare wt 94.9870 g

Less acetone blank wt (Wa) 0.2 mg

Weight of particulate in acetone rinse 5.2 mg

Particulate container no. 2C EQ129

Date and time of wt 7-8-85 8:00am Gross wt 68.3190 g

Date and time of wt 7-9-85 8:15am Gross wt 68.3190 g

Average gross wt 68.3190 g

Tare wt 68.3167 g

Stage 1

Weight of particulate 2.3 mg

Weight of particulate in acetone rinse 5.2 mg

Total weight of particulate stage 7.5 mg

Note: In no case shall a blank residue greater than (.01 mg/g) or .001% of the weight of acetone used be subtracted from the sample weight.

Remarks:

Signature of analyst Cheryl A. Jones

Signature of reviewer Laura Green 7-23-85 Ida Bennett 7/24/85

PARTICULATE ANALYTICAL DATA

Plant U.S. EPA - EMB Run No. PSI-2

Sample location Inlet

Relative humidity 50%.

Density of acetone (ρa) .7899 g/ml

Sample type	Sample identifiable	Liquid level marked and/or container sealed
Acetone rinse	yes	yes
Particulate	yes	yes

Acetone rinse container no. 2F EQ132 Stage 2

Acetone rinse volume (Vaw) 88 ✓ ml

Acetone blank residue concentration (Ca) 0.01 mg/g

Wa = Ca Vaw ρa = (0.01)(88)(.7899) = 0.7 ✓ mg

Date and time of wt 7-8-85 8:00am Gross wt 101.1317 g

Date and time of wt 7-8-85 3:30pm Gross wt 101.1319 g

Average gross wt 101.1318 ✓ g ✓

Tare wt 101.1197 ✓ g ✓

Less acetone blank wt (Wa) 0.7 mg

Weight of particulate in acetone rinse 11.4 ✓ mg ✓

Particulate container no. 2E EQ131

Date and time of wt 7-8-85 8:00am Gross wt 68.3762 g

Date and time of wt _____ Gross wt 68.3760 g

Average gross wt 68.3761 ✓ g ✓

Tare wt 68.3629 ✓ g ✓

Stage 2

Weight of particulate 13.2 ✓ mg ✓

Weight of particulate in acetone rinse 11.4 ✓ mg

Total weight of particulate stage 24.6 ✓ mg ✓

Note: In no case shall a blank residue greater than (.01 mg/g) or .001% of the weight of acetone used be subtracted from the sample weight.

Remarks: _____

Signature of analyst Cheryl A. Jones

Signature of reviewer Lauren Drees 7-23-85 Ila Bennett 7/24/85

PARTICULATE ANALYTICAL DATA

Plant U.S. EPA - EMB Run No. PSI-2

Sample location Inlet

Relative humidity 50%

Density of acetone (pa) .7899 g/ml

Sample type	Sample identifiable	Liquid level marked and/or container sealed
Acetone rinse	yes	yes
Particulate	yes	yes

Acetone rinse container no. 2H EQ 134 Stage Cyclone Rinse

Acetone rinse volume (Vaw) 94 ml

Acetone blank residue concentration (Ca) 0.01 mg/g

Wa = Ca Vaw pa = (0.01)(94)(.7899) = 0.7 mg

Date and time of wt 7-8-85 8:00am Gross wt 98.7777 g

Date and time of wt 7-8-85 3:30pm Gross wt 98.7776 g

Average gross wt 98.7776 g

Tare wt 98.7580 g

Less acetone blank wt (Wa) 0.7 mg

Weight of particulate in acetone rinse 18.9 mg

Particulate container no. 2G EQ 133

Date and time of wt 7-8-85 8:00am Gross wt 68.9270 g

Date and time of wt 7-9-85 8:15am Gross wt 68.9270 g

Average gross wt 68.9270 g

Tare wt 68.8886 g

Stage 3

Weight of particulate 38.4 mg

Weight of particulate in acetone rinse 18.9 mg

Total weight of particulate stage 57.3 mg

Note: In no case shall a blank residue greater than (.01 mg/g) or .001% of the weight of acetone used be subtracted from the sample weight.

Remarks: _____

Signature of analyst Cheryl A. Jones

Signature of reviewer Lauren Greer 7-23-85 John Bennett 7/24/85

HGLI PARTICULATE ANALYTICAL DATA

Plant U.S. EPA - EMB Run No. PSI-2

Sample location Inlet

Relative humidity 50%

Density of acetone (ρa) .7899 g/ml

Sample type	Sample identifiable	Liquid level marked and/or container sealed
Acetone rinse	yes	yes
Thimble	yes	yes

Acetone rinse container no. 2J EQ136 Stage Back up Rinse

Acetone rinse volume (Vaw) 31 ml

Acetone blank residue concentration (Ca) 0.01 mg/g

Wa = Ca Vaw ρa = (0.01)(31)(.7899) = 0.2 mg

Date and time of wt 7-8-85 8:00am Gross wt 98.9424 g

Date and time of wt 7-8-85 3:30pm Gross wt 98.9426 g

Average gross wt 98.9425 g

Tare wt 98.9375 g

Less acetone blank wt (Wa) 0.2 mg

Weight of particulate in acetone rinse 4.8 mg

Thimble container no. 2I EQ135 GF 3342

Date and time of wt 7-8-85 3:30pm Gross wt 2.0730 g

Date and time of wt 7-9-85 8:15am Gross wt 2.0728 g

Average gross wt 2.0729 g

Tare wt 2.0467 g

Weight of particulate in Thimble 26.2 mg

Weight of particulate in acetone rinse 4.8 mg

Total weight of particulate in stage 4 31.0 mg

Cyclone Precutter = Total stage 0 78.1 mg

Stage 1 = Total stage 1 7.5 mg

Stage 2 = Total stage 2 24.6 mg

Cyclone Rinse = Total stage 3 57.3 mg

Back up = Total stage 4 31.0 mg

Total particulate 198.5 mg

Signature of analyst Cheryl A. Jones

Signature of reviewer Lauren Drees 7-23-85 Ida Bennett 7/24/85

PARTICULATE ANALYTICAL DATA

Plant U.S. EPA - EMB Run No. PSI-3

Sample location Inlet

Relative humidity 50%

Density of acetone (ρa) .7899 g/ml

Sample type	Sample identifiable	Liquid level marked and/or container sealed
Acetone rinse	yes	yes
Particulate	yes	yes

Acetone rinse container no. 3B EQ138 Stage Cyclone Precutter

Acetone rinse volume (Vaw) 58 ml

Acetone blank residue concentration (Ca) 0.01 mg/g

Wa = Ca Vaw ρa = (0.01)(58)(.7899) = 0.5 mg

Date and time of wt 7-8-85 8:00am Gross wt 97.5333 g

Date and time of wt 7-8-85 3:30pm Gross wt 97.5338 g

Average gross wt 97.5336 g

Tare wt 97.5041 g

Less acetone blank wt (Wa) 0.5 mg

Weight of particulate in acetone rinse 29.0 mg

Particulate container no. 3A EQ137

Date and time of wt 7-8-85 8:00am Gross wt 68.8329 g

Date and time of wt 7-9-85 8:15pm Gross wt 68.8327 g

Average gross wt 68.8328 g

Tare wt 68.3859 g

Stage 0

Weight of particulate 446.9 mg

Weight of particulate in acetone rinse 29.0 mg

Total weight of particulate stage 475.9 mg

Note: In no case shall a blank residue greater than (.01 mg/g) or .001% of the weight of acetone used be subtracted from the sample weight.

Remarks:

Signature of analyst Cheryl A. Jones

Signature of reviewer Laura Drees 7-23-85 Ida Bennett 7/24/85

PARTICULATE ANALYTICAL DATA

Plant U.S. EPA - EMB Run No. PSI-3

Sample location Inlet

Relative humidity 50%

Density of acetone (pa) .7899 g/ml

Sample type	Sample identifiable	Liquid level marked and/or container sealed
Acetone rinse	yes	yes
Particulate	yes	yes

Acetone rinse container no. 3D EQ140 Stage 1

Acetone rinse volume (Vaw) 48 ml

Acetone blank residue concentration (Ca) 0.01 mg/g

Wa = Ca Vaw pa = (0.01)(48)(.7899) = 0.4 mg

Date and time of wt 7-8-85 8:00am Gross wt 97.2064 g

Date and time of wt 7-8-85 3:30pm Gross wt 97.2069 g

Average gross wt 97.2066 g

Tare wt 97.1945 g

Less acetone blank wt (Wa) 0.4 mg

Weight of particulate in acetone rinse 11.7 mg

Particulate container no. 3C EQ139

Date and time of wt 7-8-85 8:00am Gross wt 68.7234 g

Date and time of wt 7-9-85 8:15am Gross wt 68.7232 g

Average gross wt 68.7233 g

Tare wt 68.7218 g

Stage 1

Weight of particulate 1.5 mg

Weight of particulate in acetone rinse 11.7 mg

Total weight of particulate stage 13.2 mg

Note: In no case shall a blank residue greater than (.01 mg/g) or .001% of the weight of acetone used be subtracted from the sample weight.

Remarks: _____

Signature of analyst Cheryl A. Jones

Signature of reviewer Lauren Drees 7-23-85 John Bennett 7/24/85

PARTICULATE ANALYTICAL DATA

Plant U.S. EPA - EMB Run No. PSI-3

Sample location Inlet

Relative humidity 50%

Density of acetone (ρa) .7899 g/ml

Sample type	Sample identifiable	Liquid level marked and/or container sealed
Acetone rinse	yes	yes
Particulate	yes	yes

Acetone rinse container no. 3F EQ142 Stage 2 - Cyclone

Acetone rinse volume (Vaw) 83 ml

Acetone blank residue concentration (Ca) 0.01 mg/g

Wa = Ca Vaw ρa = (0.01)(83)(.7899) = 0.7 mg

Date and time of wt 7-8-85 8:00am Gross wt 96.0354 g

Date and time of wt 7-8-85 3:30pm Gross wt 96.0354 g

Average gross wt 96.0354 g

Tare wt 96.0236 g

Less acetone blank wt (Wa) 0.7 mg

Weight of particulate in acetone rinse 11.1 mg

Particulate container no. 3E EQ141

Date and time of wt 7-8-85 8:00am Gross wt 66.2645 g

Date and time of wt 7-9-85 8:15am Gross wt 66.2647 g

Average gross wt 66.2646 g

Tare wt 66.2177 g

Stage 2

Weight of particulate 46.9 mg

Weight of particulate in acetone rinse 11.1 mg

Total weight of particulate stage 58.0 mg

Note: In no case shall a blank residue greater than (.01 mg/g) or .001% of the weight of acetone used be subtracted from the sample weight.

Remarks: _____

Signature of analyst Cheryl A. Jones

Signature of reviewer Laura Green 7-23-85 Jill Bennett 7/24/85

PARTICULATE ANALYTICAL DATA

Plant U.S. EPA - EMB Run No. PSI-3

Sample location Inlet

Relative humidity 50%

Density of acetone (ρa) .7899 g/ml

Sample type	Sample identifiable	Liquid level marked and/or container sealed
Acetone rinse	yes	yes
Particulate	yes	yes

Acetone rinse container no. 3H EQ144 Stage Cyclone Rinse

Acetone rinse volume (Vaw) 84 ml

Acetone blank residue concentration (Ca) 0.01 mg/g

Wa = Ca Vaw ρa = (0.01)(84)(.7899) = 0.7 mg

Date and time of wt 7-8-85 8:00am Gross wt 101.0286 g

Date and time of wt 7-8-85 3:30pm Gross wt 101.0289 g

Average gross wt 101.0288 g

Tare wt 101.0175 g

Less acetone blank wt (Wa) 0.7 mg

Weight of particulate in acetone rinse 10.6 mg

Particulate container no. 3G EQ143

Date and time of wt 7-8-85 8:00am Gross wt 68.5181 g

Date and time of wt 7-9-85 8:15am Gross wt 68.5185 g

Average gross wt 68.5183 g

Tare wt 68.4685 g

Stage 3

Weight of particulate 49.8 mg

Weight of particulate in acetone rinse 10.6 mg

Total weight of particulate stage 60.4 mg

Note: In no case shall a blank residue greater than (.01 mg/g) or .001% of the weight of acetone used be subtracted from the sample weight.

Remarks: _____

Signature of analyst Cheryl A. Jones

Signature of reviewer Laura Dress 7-23-85 John Bennett 7/24/85

BGLI PARTICULATE ANALYTICAL DATA

Plant U.S. EPA - EMB Run No. PSI-3

Sample location Inlet

Relative humidity 50%

Density of acetone (ρa) .7899 g/ml

Sample type	Sample identifiable	Liquid level marked and/or container sealed
Acetone rinse	yes	yes
Thimble	yes	yes

Acetone rinse container no. 3J EQ 146 Stage Backup

Acetone rinse volume (Vaw) 38 ml

Acetone blank residue concentration (Ca) 0.01 mg/g

Wa = Ca Vaw ρa = (0.01)(38)(.7899) = 0.3 mg

Date and time of wt 7-8-85 8:00am Gross wt 97.1253 g

Date and time of wt 7-8-85 3:30pm Gross wt 97.1251 g

Average gross wt 97.1252 g

Tare wt 97.1200 g

Less acetone blank wt (Wa) 0.3 mg

Weight of particulate in acetone rinse 4.9 mg

Thimble container no. EQ 145 #57

Date and time of wt 7-8-85 3:30pm Gross wt 2.0543 g

Date and time of wt 7-9-85 8:15am Gross wt 2.0540 g

Average gross wt 2.0542 g

Tare wt 2.0136 g

Weight of particulate in Thimble 40.6 mg

Weight of particulate in acetone rinse 4.9 mg

Total weight of particulate in stage 4 45.5 mg

Cyclone Precutter Total stage 0 475.9 mg

Stage 1 = Total stage 1 13.2 mg

Stage 2 = Total stage 2 58.0 mg

Cyclone = Total stage 3 60.4 mg

Backup = Total stage 4 45.5 mg

Total particulate 653.0 mg

Signature of analyst Cheryl A. Jones

Signature of reviewer Lauren Eisen 7-23-85 Ida Bennett 7/24/85

PARTICULATE ANALYTICAL DATA

Plant U.S. EPA - EMB Run No. PSI-4

Sample location Inlet

Relative humidity 50%

Density of acetone (ρa) .7899 g/ml

Sample type	Sample identifiable	Liquid level marked and/or container sealed
Acetone rinse	yes	yes
Particulate	yes	yes

Acetone rinse container no. 4B EQ148 Stage Cyclone Precutter

Acetone rinse volume (Vaw) 64 ml

Acetone blank residue concentration (Ca) 0.01 mg/g

Wa = Ca Vaw ρa = (0.01)(64)(.7899) = 0.5 mg

Date and time of wt 7-8-85 8:00am Gross wt 97.2552 g

Date and time of wt 7-8-85 3:30pm Gross wt 97.2551 g

Average gross wt 97.2552 g

Tare wt 97.2384 g

Less acetone blank wt (Wa) 0.5 mg

Weight of particulate in acetone rinse 16.3 mg

Particulate container no. 4A EQ147

Date and time of wt 7-8-85 8:00am Gross wt 66.1016 g

Date and time of wt 7-9-85 8:15am Gross wt 66.1014 g

Average gross wt 66.1015 g

Tare wt 66.0225 g

Stage 0

Weight of particulate 79.0 mg

Weight of particulate in acetone rinse 16.3 mg

Total weight of particulate stage 95.3 mg

Note: In no case shall a blank residue greater than (.01 mg/g) or .001% of the weight of acetone used be subtracted from the sample weight.

Remarks: _____

Signature of analyst Cheryl A. Jones

Signature of reviewer Laura Dreer 7-23-85 Ida Bennett 7/24/85

PARTICULATE ANALYTICAL DATA

Plant U.S. EPA - EMB Run No. PSI-4

Sample location Inlet

Relative humidity 50%

Density of acetone (pa) .7899 g/ml

Sample type	Sample identifiable	Liquid level marked and/or container sealed
Acetone rinse	yes	yes
Particulate	yes	yes

Acetone rinse container no. 4D EQ 150 Stage 1

Acetone rinse volume (Vaw) 21 ml

Acetone blank residue concentration (Ca) 0.01 mg/g

Wa = Ca Vaw pa = (0.01)(21)(.7899) = 0.2 mg

Date and time of wt 7-8-85 8:00am Gross wt 97.1313 g

Date and time of wt 7-8-85 3:30pm Gross wt 97.1316 g

Average gross wt 97.1314 g

Tare wt 97.1209 g

Less acetone blank wt (Wa) 0.2 mg

Weight of particulate in acetone rinse 10.3 mg

Particulate container no. 4C EQ149

Date and time of wt 7-8-85 8:00am Gross wt 67.7853 g

Date and time of wt 7-9-85 8:15am Gross wt 67.7848 g

Average gross wt 67.7850 g

Tare wt 67.7690 g

Stage 1

Weight of particulate 16.0 mg

Weight of particulate in acetone rinse 10.3 mg

Total weight of particulate stage 26.3 mg

Note: In no case shall a blank residue greater than (.01 mg/g) or .001% of the weight of acetone used be subtracted from the sample weight.

Remarks:

Signature of analyst Cheryl A. Jones

Signature of reviewer Lauren Drees 7-23-85 Ila Bennett 7/24/85

PARTICULATE ANALYTICAL DATA

Plant U.S. EPA - EMB Run No. PSI-4

Sample location Inlet

Relative humidity 50%

Density of acetone (ρa) .7899 g/ml

Sample type	Sample identifiable	Liquid level marked and/or container sealed
Acetone rinse	yes	yes
Particulate	yes	yes

Acetone rinse container no. 4F EQ152 Stage 2

Acetone rinse volume (Vaw) 102 ml

Acetone blank residue concentration (Ca) 0.01 mg/g

Wa = Ca Vaw ρa = (0.01)(102)(.7899) = 0.8 mg

Date and time of wt 7-8-85 8:00am Gross wt 99.3845 g

Date and time of wt 7-8-85 3:30pm Gross wt 99.3842 g

Average gross wt 99.3844 g

Tare wt 99.3712 g

Less acetone blank wt (Wa) 0.8 mg

Weight of particulate in acetone rinse 12.4 mg

Particulate container no. 4E EQ151

Date and time of wt 7-8-85 8:00am Gross wt 66.2961 g

Date and time of wt 7-9-85 8:15am Gross wt 66.2957 g

Average gross wt 66.2959 g

Tare wt 66.2650 g

Stage 2

Weight of particulate 30.9 mg

Weight of particulate in acetone rinse 12.4 mg

Total weight of particulate stage 43.3 mg

Note: In no case shall a blank residue greater than (.01 mg/g) or .001% of the weight of acetone used be subtracted from the sample weight.

Remarks: _____

Signature of analyst Cheryl A. Jones

Signature of reviewer Louise Brown 7-23-85 Jda Bennett 7/24/85

PARTICULATE ANALYTICAL DATA

Plant U.S. EPA - EMB Run No. PSI-4

Sample location Inlet

Relative humidity 50%

Density of acetone (pa) .7899 g/ml

Sample type	Sample identifiable	Liquid level marked and/or container sealed
Acetone rinse	yes	yes
Particulate	yes	yes

Acetone rinse container no. 4H EQ 154 Stage Cyclone Rinse

Acetone rinse volume (Vaw) 116 ml

Acetone blank residue concentration (Ca) 0.01 mg/g

Wa = Ca Vaw pa = (0.01)(116)(.7899) = 0.9 mg

Date and time of wt 7-8-85 8:00am Gross wt 99.9145 g

Date and time of wt 7-8-85 3:30pm Gross wt 99.9150 g

Average gross wt 99.9148 g

Tare wt 99.8953 g

Less acetone blank wt (Wa) 0.9 mg

Weight of particulate in acetone rinse 18.6 mg

Particulate container no. 4G EQ 153

Date and time of wt 7-8-85 8:00am Gross wt 66.2480 g

Date and time of wt 7-9-85 8:15am Gross wt 66.2480 g

Average gross wt 66.2480 g

Tare wt 66.2257 g

Stage 3

Weight of particulate 22.3 mg

Weight of particulate in acetone rinse 18.6 mg

Total weight of particulate 40.9 mg

Note: In no case shall a blank residue greater than (.01 mg/g) or .001% of the weight of acetone used be subtracted from the sample weight.

Remarks: _____

Signature of analyst Cheryl A. Jones

Signature of reviewer Lauren Drew 7-23-85 John Bennett 7/24/85

MGLI PARTICULATE ANALYTICAL DATA

Plant U.S. EPA Run No. PSI-4

Sample location Inlet

Relative humidity 50%

Density of acetone (ρa) 0.01 g/ml

Sample type	Sample identifiable	Liquid level marked and/or container sealed
Acetone rinse	yes	yes
Thimble	yes	yes

Acetone rinse container no. 4J EQ 156 Stage BACK up

Acetone rinse volume (Vaw) 28 ml

Acetone blank residue concentration (Ca) 0.01 mg/g

Wa = Ca Vaw ρa = (0.01)(28)(.7899) = 0.2 mg

Date and time of wt 7-8-85 8:00am Gross wt 97.9994 g

Date and time of wt 7-8-85 3:30pm Gross wt 97.9992 g

Average gross wt 97.9993 g

Tare wt 97.9951 g

Less acetone blank wt (Wa) 0.2 mg

Weight of particulate in acetone rinse 4.0 mg

Thimble container no. 4I EQ 155 #50

Date and time of wt 7-8-85 3:30pm Gross wt 2.6778 g

Date and time of wt 7-9-85 8:15am Gross wt 2.6773 g

Average gross wt 2.6776 g

Tare wt 2.6370 g

Weight of particulate in Thimble 40.6 mg

Weight of particulate in acetone rinse 4.0 mg

Total weight of particulate in stage 4 44.6 mg

Total stage 0 95.3 mg

Total stage 1 26.3 mg

Total stage 2 43.3 mg

Total stage 3 40.9 mg

Total stage 4 44.6 mg

Total particulate 250.4 mg

Signature of analyst Cheryl A. Jones

Signature of reviewer Lauren Drees 7-23-85 John Bennett 7/24/85

page 1 of 2

METHOD 5 TRAIN ANALYTICAL PARTICULATE DATA
ACETONE RINSE AND FILTER(S)

Plant U.S. EPA - EMB Run No. PCI-3

Sample location Inlet

Relative humidity of laboratory 50%

Density of acetone (ρa) .7899 g/ml

Sample type	Sample identifiable	Liquid level at mark and/or container sealed
Acetone rinse	yes	yes
filter(s)	yes	yes

Acetone rinse container No. 3019A Lab No. EQ218

Acetone rinse volume (Vaw) 890 ✓ ✓ ml

Acetone blank residue concentration (Ca) 0.01 mg/g

Wa = Ca Vaw ρa = (0.01) (890) (.7899) = 7.0 ✓ ✓ mg

Date and time of wt 7-11-85 8:55am Gross wt 105588.5 mg

Date and time of wt 7-13-85 11:30am Gross wt 105589.0 mg

Average gross wt 105588.8 ✓ ✓ mg

Tare wt 105306.0 ✓ ✓ mg

Less acetone blank wt (Wa) 7.0 mg

Weight of particulate in acetone rinse 275.8 ✓ ✓ mg

Filter container No(s). 3019B Lab No(s). EQ213

Filter No(s). 8510239 ✓

Date and time of wt 7-8-85 8:00am Gross wt 576.0 mg

Date and time of wt 7-8-85 3:30pm Gross wt 576.0 mg

Average gross wt 576.0 ✓ ✓ mg

Tare wt 369.9 ✓ ✓ mg

Weight of particulate on filter(s) 206.1 ✓ ✓ mg

Weight of particulate in acetone rinse 275.8 ✓ mg

Total weight of particulate 481.9 ✓ ✓ mg

Note: In no case shall a blank residue greater than (0.01 mg/g) or 0.001% of the weight of acetone used be subtracted from the sample weight.

Remarks:

Signature of analyst

Signature of reviewer Lauren Green 7-23-85 [illegible] 7/24/85

ASME TRAIN PARTICULATE ANALYTICAL DATA

Plant U.S. EPA - EMB Run No. PCI-3

Sample location Inlet

Relative humidity 50%

Density of acetone (ρa) _____ g/ml

Sample type	Sample identifiable	Liquid level marked and/or container sealed
Acetone rinse		
filter(s)	yes	yes

Acetone rinse container no. _____

Acetone rinse volume (Vaw) _____ ml

Acetone blank residue concentration (Ca) _____ mg/g

Wa = Ca Vaw ρa = ( )( )( ) = _____ mg

Date and time of wt _____ Gross wt _____ mg

Date and time of wt _____ Gross wt _____ mg

Average gross wt _____ mg

Tare wt _____ mg

Less acetone blank wt (Wa) _____ mg

Weight of particulate in acetone rinse _____ mg

Thimble container no. 3605B EQ208 #64

Date and time of wt 7-8-85 3:30pm Gross wt 73732.9 mg ✓

Date and time of wt 7-9-85 8:15am Gross wt 73732.5 mg ✓

Average gross wt 73732.7 mg ✓

Tare wt *69971.9 ✓ mg

Weight of particulate in Thimble 3760.8 ✓ mg

Weight of particulate ~~in acetone rinse~~ (From PAGE 1 OF 2) 481.9 ✓ mg

Total weight of particulate 4242.7 ✓ mg

Note: In no case shall a blank residue greater than (.01 mg/g) or .001% of the weight of acetone used be subtracted from the sample weight.

Remarks: * Tare wt = tare wt. of beaker (67766.7 mg) ✓ + thimble tare wt (2205.2 mg) ✓

Signature of analyst Cheryl A. Jones

Signature of reviewer Laura Dress 7-23-85 John Bennett 7/24/85

METHOD 5 TRAIN ANALYTICAL PARTICULATE DATA
ACETONE RINSE AND FILTER(S)

Plant U.S. EPA - EMB Run No. PCI-4

Sample location Inlet

Relative humidity of laboratory 50%

Density of acetone (ρa) .7899 g/ml

Sample type	Sample identifiable	Liquid level at mark and/or container sealed
Acetone rinse	yes	yes
filter(s)	yes	yes

Acetone rinse container No. 3536A Lab No. EQ219

Acetone rinse volume (Vaw) 532 ml

Acetone blank residue concentration (Ca) 0.01 mg/g

Wa = Ca Vaw ρa = (0.01) (532) (.7899) = 4.2 mg

Date and time of wt 7-10-85 2:00pm Gross wt 105231.2 mg

Date and time of wt 7-11-85 8:55am Gross wt 105231.7 mg

Average gross wt 105231.4 mg

Tare wt 103886.9 mg

Less acetone blank wt (Wa) 4.2 mg

Weight of particulate in acetone rinse 1340.3 mg

Filter container No(s). 35360 Lab No(s). EQ214

Filter No(s). 8510066

Date and time of wt 7-8-85 8:00am Gross wt 521.0 mg

Date and time of wt 7-8-85 3:30pm Gross wt 520.8 mg

Average gross wt 520.9 mg

Tare wt 354.2 mg

Weight of particulate on filter(s) 166.7 mg

Weight of particulate in acetone rinse 1340.3 mg

Total weight of particulate 1507.0 mg

Note: In no case shall a blank residue greater than (0.01 mg/g) or 0.001% of the weight of acetone used be subtracted from the sample weight.

Remarks:

Signature of analyst Cheryl A. Jones

Signature of reviewer Laura Dress 7-23-85 Ida Bennett 7/24/85

ASME TRAIN PARTICULATE ANALYTICAL DATA

Plant U.S. EPA - EMB Run No. PCI-4

Sample location Inlet

Relative humidity 50%

Density of acetone (ρa) .7899 g/ml

Sample type	Sample identifiable	Liquid level marked and/or container sealed
Acetone rinse		
filter(s)	yes	yes

Acetone rinse container no. _____

Acetone rinse volume (Vaw) _____ ml

Acetone blank residue concentration (Ca) _____ mg/g

Wa = Ca Vaw ρa = ( )( )( ) = _____ mg

Date and time of wt _____ Gross wt _____ mg

Date and time of wt _____ Gross wt _____ mg

Average gross wt _____ mg

Tare wt _____ mg

Less acetone blank wt (Wa) _____ mg

Weight of particulate in acetone rinse _____ mg

Thimble container no. 3537B EQ209 #26 ✓

Date and time of wt 7-8-85 3:30 pm Gross wt 76837.2 mg

Date and time of wt 7-9-85 8:15 am Gross wt 76836.8 mg

Average gross wt 76837.0 ✓ mg ✓

Tare wt * 71998.9 ✓ mg ✓

Weight of particulate in Thimble 4838.1 ✓ mg ✓

Weight of particulate ~~in acetone rinse~~ FROM PAGE 1 OF 2 1507.0 ✓ mg ✓

Total weight of particulate 6345.1 ✓ mg ✓

Note: In no case shall a blank residue greater than (.01 mg/g) or .001% of the weight of acetone used be subtracted from the sample weight.

Remarks: * tare wt = Beaker tare wt 69639.9 ✓ mg + thimble tare wt 2359.0 mg ✓

Signature of analyst Cheryl A. Jones

Signature of reviewer Lauren Drews 7-23-85 Jla Bennett 7/24/85

METHOD 5 TRAIN ANALYTICAL PARTICULATE DATA
ACETONE RINSE AND FILTER(S)

Plant U.S. EPA - EMB Run No. PCI-5

Sample location Inlet

Relative humidity of laboratory 50%

Density of acetone (ρa) .7899 g/ml

Sample type	Sample identifiable	Liquid level at mark and/or container sealed
Acetone rinse	yes	yes
filter(s)	yes	yes

Acetone rinse container No. 3607 A Lab No. EQ 220

Acetone rinse volume (Vaw) 723 ✓ ✓ ml

Acetone blank residue concentration (Ca) 0.01 mg/g

Wa = Ca Vaw ρa = (0.01) (723) (.7899) = 5.7 mg

Date and time of wt 7-11-85 3:40 pm Gross wt 102054.5 mg

Date and time of wt 7-13-85 11:30 am Gross wt 102054.9 mg

Average gross wt 102054.7 ✓ mg

Tare wt 101281.7 ✓ mg

Less acetone blank wt (Wa) 5.7 mg

Weight of particulate in acetone rinse 767.3 ✓ mg

Filter container No(s). 3607 B Lab No(s). EQ 215

Filter No(s). 85,0250

Date and time of wt 7-8-85 8:00 am Gross wt 505.2 mg

Date and time of wt 7-8-85 3:30 pm Gross wt 505.0 mg

Average gross wt 505.1 ✓ mg

Tare wt 367.0 ✓ mg

Weight of particulate on filter(s) 138.1 ✓ mg

Weight of particulate in acetone rinse 767.3 ✓ mg

Total weight of particulate 905.4 ✓ mg

Note: In no case shall a blank residue greater than (0.01 mg/g) or 0.001% of the weight of acetone used be subtracted from the sample weight.

Remarks: _____

Signature of analyst Cheryl A. Jones

Signature of reviewer Laura E. Green 7-23-85 Ila Bennett 7/24/85

ASME TRAIN PARTICULATE ANALYTICAL DATA

Plant U.S. EPA - EMB Run No. PCI-5

Sample location Inlet

Relative humidity 50%

Density of acetone (ρa) .7899 g/ml

Sample type	Sample identifiable	Liquid level marked and/or container sealed
Acetone rinse		
filter(s)	yes	yes

Acetone rinse container no. _____

Acetone rinse volume (Vaw) _____ ml

Acetone blank residue concentration (Ca) _____ mg/g

Wa = Ca Vaw ρa = ( ) ( ) ( ) = _____ mg

Date and time of wt _____ Gross wt _____ mg

Date and time of wt _____ Gross wt _____ mg

Average gross wt _____ mg

Tare wt _____ mg

Less acetone blank wt (Wa) _____ mg

Weight of particulate in acetone rinse _____ mg

Thimble container no. 3608B EQ210 #53

Date and time of wt 7-8-85 3:30pm Gross wt 75601.2 mg

Date and time of wt 7-9-85 3:45pm Gross wt 75600.8 mg

Average gross wt 75601.0 mg

Tare wt 70787.2 mg

Weight of particulate in Thimble * 4813.8 mg

Weight of particulate ~~in acetone rinse~~ FROM PAGE 1 of 2 905.4 mg

Total weight of particulate 5719.2 mg

Note: In no case shall a blank residue greater than (.01 mg/g) or .001% of the weight of acetone used be subtracted from the sample weight.

Remarks: * tare wt = Beaker tare wt 68689.4 mg + thimble tare wt 2097.8 mg

Signature of analyst Cheryl A. Jones

Signature of reviewer Lauren Green 7-23-85 Ida Bennett 7/24/85

METHOD 5 TRAIN ANALYTICAL PARTICULATE DATA
ACETONE RINSE AND FILTER(S)

Plant U.S. EPA - EMB Run No. PCI-6

Sample location Inlet

Relative humidity of laboratory 50%

Density of acetone (ρa) .7899 g/ml

Sample type	Sample identifiable	Liquid level at mark and/or container sealed
Acetone rinse	yes	yes
filter(s)	yes	yes

Acetone rinse container No. 3668A Lab No. EQ221

Acetone rinse volume (Vaw) 780 ✓ ✓ ml

Acetone blank residue concentration (Ca) 0.01 mg/g

Wa = Ca Vaw ρa = (0.01) (780) (.7899) = 6.2 ✓ mg

Date and time of wt 7-11-85 3:45 pm Gross wt 103951.6 mg

Date and time of wt 7-13-85 11:30 am Gross wt 103951.6 mg

Average gross wt 103951.6 ✓ mg

Tare wt 103292.6 ✓ mg

Less acetone blank wt (Wa) 6.2 mg

Weight of particulate in acetone rinse 652.8 ✓ mg

Filter container No(s). 36688 Lab No(s). EQ216

Filter No(s). 8510121

Date and time of wt 7-8-85 3:30 pm Gross wt 419.6 ✓ mg

Date and time of wt 7-9-85 8:15 am Gross wt 419.6 mg

Average gross wt 419.6 ✓ mg

Tare wt 364.6 ✓ mg

Weight of particulate on filter(s) 55.0 ✓ mg

Weight of particulate in acetone rinse 652.8 ✓ mg

Total weight of particulate 707.8 ✓ mg

Note: In no case shall a blank residue greater than (0.01 mg/g) or 0.001% of the weight of acetone used be subtracted from the sample weight.

Remarks:

Signature of analyst Cheryl A. Jones

Signature of reviewer Lauren Drees 7-23-85 John Bennett 7/24/85

ASME TRAIN PARTICULATE ANALYTICAL DATA

Plant U.S. EPA - EMB Run No. PCI-6

Sample location Inlet

Relative humidity 50%

Density of acetone (ρa) .7899 g/ml

Sample type	Sample identifiable	Liquid level marked and/or container sealed
Acetone rinse	yes	yes
filter(s)	yes	yes

Acetone rinse container no. _____

Acetone rinse volume (Vaw) _____ ml

Acetone blank residue concentration (Ca) _____ mg/g

Wa = Ca Vaw ρa = ( )( )( ) = _____ mg

Date and time of wt _____ Gross wt _____ mg

Date and time of wt _____ Gross wt _____ mg

Average gross wt _____ mg

Tare wt _____ mg

Less acetone blank wt (Wa) _____ mg

Weight of particulate in acetone rinse _____ mg

Thimble container no. 3669B EQ211 #27

Date and time of wt 7-8-85 3:30pm Gross wt 7612.6 mg

Date and time of wt 7-9-85 8:15am Gross wt 7612.2 mg

Average gross wt 7612.4 mg

Tare wt 2272.8 mg

Weight of particulate in Thimble 5339.6 mg

Weight of particulate ~~in acetone rinse~~ FROM PAGE 1 of 2 707.8 mg

Total weight of particulate 6047.4 mg

Note: In no case shall a blank residue greater than (.01 mg/g) or .001% of the weight of acetone used be subtracted from the sample weight.

Remarks: _____

Signature of analyst Cheryl A. Jones

Signature of reviewer Lauren Green 7-23-85 Ida Bennett 7/24/85

METHOD 5 TRAIN ANALYTICAL PARTICULATE DATA
ACETONE RINSE AND FILTER(S)

Plant U.S. EPA - EMB Run No. PCIO-1

Sample location Inlet

Relative humidity of laboratory 50%

Density of acetone (ρa) .7899 g/ml

Sample type	Sample identifiable	Liquid level at mark and/or container sealed
Acetone rinse	yes	yes
filter(s)	yes	yes

Acetone rinse container No. 3025A Lab No. EQ254

Acetone rinse volume (Vaw) 807 ✓ ✓ ml

Acetone blank residue concentration (Ca) 0.01 mg/g

Wa = Ca Vaw ρa = (0.01) (807) (.7899) = 6.4 ✓mg

Date and time of wt 7-11-85 8:55am Gross wt 102180.2 mg

Date and time of wt 7-13-85 11:30pm Gross wt 102180.0 mg

Average gross wt 102180.1 ✓ mg ✓

Tare wt 101888.1 ✓ mg ✓

Less acetone blank wt (Wa) 6.4 mg

Weight of particulate in acetone rinse 285.6 ✓ mg ✓

Filter container No(s). 3029B Lab No(s). EQ250

Filter No(s). 5300021

Date and time of wt 7-8-85 3:30pm Gross wt 709.7 mg

Date and time of wt 7-9-85 8:15am Gross wt 709.4 mg

Average gross wt 709.6 ✓ mg ✓

Tare wt 552.3 ✓ mg ✓

Weight of particulate on filter(s) 157.3 ✓ mg ✓

Weight of particulate in acetone rinse 285.6 mg

Total weight of particulate 442.9 mg ✓

Note: In no case shall a blank residue greater than (0.01 mg/g) or 0.001% of the weight of acetone used be subtracted from the sample weight.

Remarks:

Signature of analyst Cheryl A. Jones

Signature of reviewer [illegible] 7-23-85 [illegible] Bennett 7/25/85

ASME TRAIN PARTICULATE ANALYTICAL DATA

Plant U.S. EPA - EMB Run No. PCIO-1

Sample location Inlet

Relative humidity 50%

Density of acetone (ρa) .7899 g/ml

Sample type	Sample identifiable	Liquid level marked and/or container sealed
Acetone rinse		
filter(s)	yes	yes

Acetone rinse container no. _____

Acetone rinse volume (Vaw) _____ ml

Acetone blank residue concentration (Ca) _____ mg/g

Wa = Ca Vaw ρa = ( )( )( ) = _____ mg

Date and time of wt _____ Gross wt _____ mg

Date and time of wt _____ Gross wt _____ mg

Average gross wt _____ mg

Tare wt _____ mg

Less acetone blank wt (Wa) _____ mg

Weight of particulate in acetone rinse _____ mg

Thimble container no. 3025B EQ248 #11

Date and time of wt 7-8-85 3:30pm Gross wt 72805.1 mg

Date and time of wt 7-9-85 8:15am Gross wt 72804.7 mg

Average gross wt 72804.9 mg

Tare wt * 70102.1 mg

Weight of particulate in Thimble 2702.8 mg

Weight of particulate ~~in acetone rinse~~ FROM PAGE 1OF2 442.9 mg

Total weight of particulate 3145.7 mg

Note: In no case shall a blank residue greater than (.01 mg/g) or .001% of the weight of acetone used be subtracted from the sample weight.

Remarks: * tare wt = Beaker tare wt 67427.3 mg + thimble tare wt 2674.8 mg

Signature of analyst Cheryl A. Jones

Signature of reviewer Lawrence Dreen 7-23-85 Ella Bennett 7/24/85

METHOD 5 TRAIN ANALYTICAL PARTICULATE DATA
ACETONE RINSE AND FILTER(S)

Plant U.S. EPA - EMB Run No. PC IO-2

Sample location Inlet

Relative humidity of laboratory 50%

Density of acetone (ρa) .7899 g/ml

Sample type	Sample identifiable	Liquid level at mark and/or container sealed
Acetone rinse	yes	yes
filter(s)	yes	yes

Acetone rinse container No. 3614A Lab No. EQ 255

Acetone rinse volume (Vaw) 618 ✓ ✓ ml

Acetone blank residue concentration (Ca) 0.01 mg/g

Wa = Ca Vaw ρa = (0.01) (618) (.7899) = 4.9 mg

Date and time of wt 7-11-85 3:40 pm Gross wt 101736.9 mg

Date and time of wt 7-13-85 11:30 am Gross wt 101736.7 mg

Average gross wt 101736.8 mg

Tare wt 101397.6 mg

Less acetone blank wt (Wa) 4.9 mg

Weight of particulate in acetone rinse 334.3 mg

Filter container No(s). 3614B Lab No(s). EQ 251

Filter No(s). 5300004

Date and time of wt 7-8-85 3:30 pm Gross wt 631.2 mg

Date and time of wt 7-9-85 8:15 am Gross wt 630.9 mg

Average gross wt 631.0 ✓ mg

Tare wt 546.6 ✓ mg

Weight of particulate on filter(s) 84.4 ✓ mg

Weight of particulate in acetone rinse 334.3 ✓ mg

Total weight of particulate 418.7 ✓ mg

Note: In no case shall a blank residue greater than (0.01 mg/g) or 0.001% of the weight of acetone used be subtracted from the sample weight.

Remarks: _____

Signature of analyst Cheryl A. Jones

Signature of reviewer Lauren Tinnea 7-23-85 John Bennett 7/24/85

ASME TRAIN PARTICULATE ANALYTICAL DATA

Plant U.S. EPA-EMB Run No. PCIO-2

Sample location Inlet

Relative humidity 50%

Density of acetone (ρa) .7899 g/ml

Sample type	Sample identifiable	Liquid level marked and/or container sealed
Acetone rinse		
filter(s)	yes	yes

Acetone rinse container no. _____

Acetone rinse volume (Vaw) _____ ml

Acetone blank residue concentration (Ca) _____ mg/g

Wa = Ca Vaw ρa = ( )( )( ) = _____ mg

Date and time of wt _____ Gross wt _____ mg

Date and time of wt _____ Gross wt _____ mg

Average gross wt _____ mg

Tare wt _____ mg

Less acetone blank wt (Wa) _____ mg

Weight of particulate in acetone rinse _____ mg

Thimble container no. 3615 EQ 249 #40

Date and time of wt 7-9-85 8:15 am Gross wt 74128.5 mg

Date and time of wt 7-9-85 3:45 pm Gross wt 74128.1 mg

Average gross wt 74128.3 mg

Tare wt *70944.5 mg

Weight of particulate in Thimble 3183.8 mg

Weight of particulate ~~in acetone rinse~~ FROM PAGE 1 OF 2 418.7 mg

Total weight of particulate 3602.5 mg

Note: In no case shall a blank residue greater than (.01 mg/g) or .001% of the weight of acetone used be subtracted from the sample weight.

Remarks: * tare wt = Beaker tare wt 68775.5 mg + thimble tare wt 2168.8 mg

Signature of analyst Cheryl A. Jones

Signature of reviewer Laura Eisen 7-23-85 Jan Bennett 7/24/85

METHOD 5 TRAIN ANALYTICAL PARTICULATE DATA
ACETONE RINSE AND FILTER(S)

Plant U.S. EPA - EMB Run No. PC00-1

Sample location outlet

Relative humidity of laboratory 50%

Density of acetone (ρa) .7899 g/ml

Sample type	Sample identifiable	Liquid level at mark and/or container sealed
Acetone rinse	yes	yes
filter(s)	yes	yes

Acetone rinse container No. 30274 Lab No. EQ256

Acetone rinse volume (Vaw) 206 ml

Acetone blank residue concentration (Ca) 0.01 mg/g

Wa = Ca Vaw ρa = (0.01) (206) (.7899) = 1.6 mg

Date and time of wt 7-10-85 2:00pm Gross wt 103924.5 mg

Date and time of wt 7-11-85 8:55am Gross wt 103924.0 mg

Average gross wt 103924.2 mg

Tare wt 103903.8 mg

Less acetone blank wt (Wa) 1.6 mg

Weight of particulate in acetone rinse 18.8 mg

Filter container No(s). 30278 Lab No(s). EQ 252

Filter No(s). 5300018

Date and time of wt 7-8-85 8:00am Gross wt 575.6 mg

Date and time of wt 7-8-85 3:30pm Gross wt 575.3 mg

Average gross wt 575.4 mg

Tare wt 543.1 mg

Weight of particulate on filter(s) 32.3 mg

Weight of particulate in acetone rinse 18.8 mg

Total weight of particulate 51.1 mg

Note: In no case shall a blank residue greater than (0.01 mg/g) or 0.001% of the weight of acetone used be subtracted from the sample weight.

Remarks:

Signature of analyst Cheryl A. Jones

Signature of reviewer Laura Green 7-23-85 Jia Bennett 7/24/85

METHOD 5 TRAIN ANALYTICAL PARTICULATE DATA
ACETONE RINSE AND FILTER(S)

Plant U.S. EPA-EMB Run No. PC00-2
Sample location Outlet
Relative humidity of laboratory 50%
Density of acetone (ρa) .7899 g/ml

Sample type	Sample identifiable	Liquid level at mark and/or container sealed
Acetone rinse	yes	yes
filter(s)	yes	yes

Acetone rinse container No. 3612A Lab No. EQ257
Acetone rinse volume (Vaw) 689 ml
Acetone blank residue concentration (Ca) 0.01 mg/g
Wa = Ca Vaw ρa = (0.01) (689) (.7899) = 5.4 mg
Date and time of wt 7-10-85 2:00pm Gross wt 98793.0 mg
Date and time of wt 7-11-85 8:55am Gross wt 98792.6 mg
Average gross wt 98792.8 mg
Tare wt 98771.6 mg
Less acetone blank wt (Wa) 5.4 mg
Weight of particulate in acetone rinse 15.8 mg
Filter container No(s). 3612B Lab No(s). EQ253
Filter No(s). 5300024
Date and time of wt 7-8-85 3:30pm Gross wt 590.8 mg
Date and time of wt 7-9-85 8:15 am Gross wt 591.0 mg
Average gross wt 590.9 mg
Tare wt 551.4 mg
Weight of particulate on filter(s) 39.5 mg
Weight of particulate in acetone rinse 15.8 mg
Total weight of particulate 55.3 mg

Note: In no case shall a blank residue greater than (0.01 mg/g) or 0.001% of the weight of acetone used be subtracted from the sample weight.

Remarks:

Signature of analyst Cheryl A. Jones
Signature of reviewer Laura Brock 7-23-85 John Bennett 7/24/85

PEI Associates, Inc.

LABORATORY ANALYSIS REPORT

SAMPLE TYPE: CHROMIUM VI DATA
SOLID SAMPLES

CLIENT: US EPA EMB
DETROIT

PROJECT NO: 3615-18
REQUISITION: 7180
RECEIVED: 6/30/85
SAMPLED BY: PEI
REPORTED: 7/19/85

ATTN:

LAB NO.	RUN NO	DESCRIPTION	PARTICULATE WT. ANALYZED, G	CHROMIUM, VI, UG	PARTICULATE CHROMIUM VI, UG/G
E0208/ 218	PCI-3	PARTICULATE/ACETONE	2.5074	0.2	<0.1
E0209/ 219	PCI-4	PARTICULATE/ACETONE	2.5183	0.3	0.1
E0210/ 220	PCI-5	PARTICULATE/ACETONE	2.5032	<0.2	<0.1
E0211/ 221	PCI-6	PARTICULATE/ACETONE	2.5158	<0.2	<0.1
E0248/ 254	PCI0-1	PARTICULATE/ACETONE	2.0177	<0.2	<0.1
E0249/ 255	PCI0-2	PARTICULATE/ACETONE	2.3698	<0.2	<0.1
E0239	-	ACETONE BLANK	-	<0.2	-

SUBMITTED BY: Ida Bennett

PEI ASSOCIATES, INC.
11499 CHESTER ROAD
CINCINNATI, OHIO 45246
(513) 782-4700

PEI Associates, Inc.

LABORATORY ANALYSIS REPORT

SAMPLE TYPE: CHROMIUM VI DATA
SOLID SAMPLES

CLIENT: US EPA EMB
DETROIT

ATTN:

PROJECT NO: 3615-18
REQUISITION: 7184
RECEIVED: 6/30/85
SAMPLED BY: PEI
REPORTED: 7/19/85

LAB NO.	RUN NO	DESCRIPTION	PARTICULATE WT. ANALYZED, G	CHROMIUM, VI, UG	PARTICULATE CHROMIUM VI, UG/G
E0293*	--	BOTTOM ASH 6/18	10.1785	<0.4	<0.1
E0294	--	BOTTOM ASH 6/19	10.0389	<0.4	<0.1
E0295	--	BOTTOM ASH 6/20	10.3115	<0.4	<0.1
E0296	--	BOTTOM ASH 6/21	10.1121	<0.4	<0.1
E0297	--	BOTTOM ASH 6/22	10.1709	<0.4	<0.1
E0298	--	BOTTOM ASH 6/24	10.3108	<0.4	<0.1
E0298	--	BOTTOM ASH 6/24	10.3296	<0.4	<0.1
E0299	--	BOTTOM ASH 6/25	10.4120	<0.4	<0.1
E0300	--	BOTTOM ASH 6/26	10.0008	<0.4	<0.1

* SPIKE RECOVERY 51%

SUBMITTED BY: Ida Bennett

PEI ASSOCIATES, INC.
11499 CHESTER ROAD
CINCINNATI, OHIO 45246
(513) 782-4700

PN 3615-18

EMB LIQUID SAMPLES

DETROIT

LAB NO.	DESCRIPTION			CONCENTRATION Cr VI, mg/l
EQ302	Scrubber	Effluent	6/18	<0.004
EQ 303	"	"	6/19	<0.004
EQ 304	"	"	6/20	"
EQ 305	"	"	6/21	"
EQ 306	"	"	6/22	"
EQ 307	"	"	6/24	"
EQ 308	"	"	6/24	"
EQ 310	Scrubber	Effluent	6/18	<0.004
EQ 311	"	"	6/19	"
EQ 312*	"	"	6/20	"
EQ 313	"	"	6/21	"
EQ 314	"	"	6/22	"
EQ 315	"	"	6/24	"

* SPIKE Recovery 103%

PEI Associates, Inc.

LABORATORY REPORT FORM

Sample Type: scrubber influent
scrubber effluent

Client: US EPA EMB
Detroit

Project no: 3615-14
Requisition: 7184
Received: 6/30/85
Sampled by: PEI
Reported: 9/6/85

attn:

Sample ID	PEI No.	Total Solids	Volatile Solids	Fixed Solids
influent 6/18	EQ 302	552	82	470
influent 6/19	EQ 303	634	134	500
influent 6/20	EQ 304	570	124	446
influent 6/21	EQ 305	598	118	480
influent 6/22	EQ 306	564	108	456
influent 6/24	EQ 307	516	108	408
effluent 6/18	EQ 310	718	98	620
		726	96	630
effluent 6/19	EQ 311	732	112	620
effluent 6/20	EQ 312	868	108	760
effluent 6/21	EQ 313	758	106	652
effluent 6/22	EQ 314	732	88	644
effluent 6/24	EQ 315	712	106	606

all values are in mg/l

Submitted by: Ida Bennett

PEI Associates, Inc.
11499 Chester Road
Cincinnati, Ohio 44256
(513) 782-4700

PEI Associates, Inc.

LABORATORY REPORT FORM

Sample Type: sludge

Client: U.S. EPA -EMB
Detroit

attn:

Project no: 3615-14
Requisition: 7184
Received: 6/30/85
Sampled by: PEI
Reported: 9/6/85

Sample ID	PEI No.	Total Solids	Volatile Solids	Fixed Solids
sludge 6/18	EQ 318	24.1	54.1	45.9
		27.5	54.5	45.5
		21.1	55.9	44.1
sludge 6/19	EQ 319	20.5	55.4	44.6
		20.4	55.9	44.1
		21.0	56.3	43.7
sludge 6/20	EQ 320	17.6	55.6	44.4
		20.9	56.5	43.5
		20.7	56.7	43.3
sludge 6/21	EQ 321	20.2	56.6	43.4
		18.5	55.6	44.4
		19.4	56.0	44.0
sludge 6/22	EQ 322	19.3	57.6	42.4
		18.2	57.6	42.2
		19.2	60.0	40.0
sludge 6/24	EQ 323	23.7	53.2	46.8
sludge 6/25	EQ 324	22.3	53.6	46.4
sludge 6/26	EQ 325	20.2	53.1	46.9
sludge 6/27	EQ 326	19.7	57.0	43.0
		19.5	57.6	42.4

all values are in percentages

Submitted by: Ida Bennett

PEI Associates, Inc.
11499 Chester Road
Cincinnati, Ohio 44256
(513) 782-4700

Total Cr and Metals Data
(as received from EPA)

SAMPLE PREPARATION AND ANALYSIS DATA FORM (FILTER COLLECTED PARTICULATE SAMPLES)
DETROIT SLUDGE INCINERATOR NO. 13

Vial No.	Lab No.	Run No.	Filter tare weight, mg	Total particulate collected, mg	Total Cr^{+6} not blank corrected, µg	NAA results, µg		
						Total Cr	Ni	Cd
D-1	EQ226/233	PCO-1	370.2	138.6	N.A.	233.6	140	1641
D-2	EQ228/235	PCO-3	371.8	114.1	N.A.	201.7	-	2279
D-3	EQ229/236	PCO-4	352.4	133.4	N.A.	172.6	-	3397
D-4	EQ230/237	PCO-5	367.3	78.1	N.A.	240.5	-	2355
D-5	EQ231/238	PCO-6	370.4	93.3	N.A.	204.6	-	1912
D-6	EQ232/239	Blank (filter acetone)	371.9	13.0	N.A.	17.0	-	-
D-7A	EQ135/136	PSI-2 Stage 4	2046.7	31.0	N.A.	39.1	248	186
D-7B	Same as D-7A	PSI-2 Stage 4	2046.7	31.0	N.A.	45.6	170	276
D-7C	Same as D-7A	PSI-2 Stage 4	2046.7	31.0	N.A.	20.0	-	116
D-8A	EQ212	Blank Thimble	2089.6	9.5	N.A.	6.5	-	-
D-8B	Same as D-8A	Blank Thimble	2089.6	9.5	N.A.	6.1	-	-

(continued)

SAMPLE PREPARATION AND ANALYSIS DATA FORM (FILTER COLLECTED PARTICULATE SAMPLES continued)

Vial No.	Lab No.	Run No.	Filter tare weight, mg	Total particulate collected, mg	Total Cr^{+6} not blank corrected, µg	NAA results, µg		
						Total Cr	Ni	Cd
D-8C	Same as D-8A	Blank Thimble	2089.6	9.5	N.A.	6.4	-	-
D-8D	Same as D-8A	Blank Thimble	2089.6	9.5	N.A.	12.2	-	-
D-9	EQ213	PCI-3	369.9	206.1	N.A.	199.4	558	355
D-10	EQ214	PCI-4	354.2	166.7	N.A.	188.5	168	791
D-11	EQ215	PCI-5	367.0	138.1	N.A.	25.8	230	-
D-12	EQ216	PCI-6	364.6	55.0	N.A.	289.1	904	-

SAMPLE PREPARATION AND ANALYSIS DATA FORM (LOOSE PARTICULATE SAMPLES)
DETROIT SLUDGE INCINERATOR NO. 13

Vial No.	Lab No.	Run No.	Sample type	Total particulate collected, mg	Aliquot, mg	Concentration Cr^{+6}, µg/g	NAA results, µg		
							Total Cr	Ni	Cd
D-13	EQ208/218	PCI-3	Particulate/Acetone	4036.6	103.5	<0.1	480.3	399	165
D-14	EQ208/218	PCI-3	Particulate/Acetone	4036.6	101.9	<0.1	555.7	513	134
D-15	EQ209/219	PCI-4	Particulate/Acetone	6178.4	105.4	0.1	234.2	173	123
D-16	EQ210/220	PCI-5	Particulate/Acetone	5581.1	101.1	<0.1	624.2	633	200
D-17	EQ211/221	PCI-6	Particulate/Acetone	5992.4	102.1	<0.1	585.5	635	97
D-18	EQ127/128	PSI-2 Stage 0	Particulate/Acetone	78.1	62.9		456.8	288	150
D-19	EQ129/130	PSI-2 Stage 1	Particulate/Acetone	7.5	3.5		27.4	214	-
D-20	EQ131-132	PSI-2	Particulate/Acetone	24.6	14.1		33.7	677	-
D-21	EQ133/134	PSI-2 Stage 3	Particulate/Acetone	57.3	27.3		89.4	972	130
D-22	EQ133/134R	PSI-2 Stage 3	Particulate/Acetone	57.3	19.2		62.9	207	96
D-23	EQ293		Bottom Ash 6/18		93.8	<0.1	178.0	80	-
D-24	EQ294		Bottom Ash 6/19		121.2	<0.1	324.6	121	170
D-25	EQ295		Bottom Ash 6/20		103.4	<0.1	325.9	110	151
D-26	EQ295R		Bottom Ash 6/20		102.2	<0.1	276.7	88	-

SAMPLE PREPARATION AND ANALYSIS DATA FORM (LOOSE PARTICULATE SAMPLES) (continued)

Vial No.	Lab No.	Run No.	Sample type	Total particulate collected, mg	Aliquot, mg	Concentration Cr^{+6}, µg/g	NAA results, µg		
							Total Cr	Ni	Cd
D-27	EQ296		Bottom Ash 6/21		99.8	<0.1	257.9	81	-
D-28	EQ297		Bottom Ash 6/22		104.0	<0.1	267.7	108	112
D-29	EQ298		Bottom Ash 6/24		106.7	<0.1	236.1	115	40
D-30	EQ299		Bottom Ash 6/25		128.6	<0.1	252.7	118	-
D-31	EQ300		Bottom Ash 6/26		112.8	<0.1	213.6	96	96
D-32	EQ301		Bottom Ash 6/27		107.2	N.A.	222.4	80	100
D-33	EQ301R		Bottom Ash 6/27		103.7	N.A.	276.9	102	-
D-34	EQ318A		Sludge 6/18		136.1	N.A.	28.9	-	-
D-35	EQ318B		Sludge 6/18		171.1	N.A.	34.4	23	-

SAMPLE PREPARATION AND ANALYSIS DATA FORM (LOOSE PARTICULATE SAMPLES)
DETROIT SLUDGE INCINERATOR NO. 13

Vial No.	Lab No.	Run No.	Sample type	Total particulate collected, mg	Aliquot, mg	Concentration Cr^{+6}, µg/g	NAA results, µg		
							Total Cr	Ni	Cd
D-36	EQ318C		Sludge 6/18		173.0	N.A.	31.6	-	-
D-37	EQ319A		Sludge 6/19		209.8	N.A.	51.3	16	-
D-38	EQ319B		Sludge 6/19		118.9	N.A.	23.4	-	-
D-39	EQ319C		Sludge 6/19		133.9	N.A.	18.9	-	-
D-40	EQ320A		Sludge 6/20		108.9	N.A.	23.4	-	-
D-41	EQ320B		Sludge 6/20		211.7	N.A.	30.3	-	-
D-42	EQ320C		Sludge 6/20		112.0	N.A.	23.6	-	-
D-43	EQ321A		Sludge 6/21		186.9	N.A.	29.8	-	15
D-44	EQ321B		Sludge 6/21		156.5	N.A.	28.0	20	-
D-45	EQ321		Sludge 6/21		174.6	N.A.	28.6	17	-
D-46	EQ322A		Sludge 6/22		143.1	N.A.	23.4	-	-
D-47	EQ322B		Sludge 6/22		142.6	N.A.	19.9	-	-
D-48	EQ322C		Sludge 6/22		119.2	N.A.	17.3	-	-
D-49	EQ323		Sludge 6/24		115.6	N.A.	21.0	-	-
D-50	EQ324		Sludge 6/25		119.7	N.A.	20.8	-	-
D-51	EQ325		Sludge 6/26		113.8	N.A.	19.2	-	-

SAMPLE PREPARATION AND ANALYSIS DATA FORM (LOOSE PARTICULATE SAMPLES)(continued)

Vial No.	Lab No.	Run No.	Sample type	Total particulate collected, mg	Aliquot, mg	Concentration Cr^{+6}, µg/g	NAA results, µg		
							Total Cr	Ni	Cd
D-52	EQ325R		Sludge 6/26		148.0	N.A.	24.8	-	-
D-53	EQ326		Sludge 6/27		146.4	N.A.	26.0	-	-
D-54	NBS1632A	Audit 1	Coal sample		105.7	N.A.	3.7	-	-
D-55	NBS1633A	Audit 2	Coal flyash		118.8	N.A.	23.2	-	-
D-56	EQ208, 218 extract	PCI-3	Alkaline extract residue	2375.2	103.9	<.1	678.4	580	187

SAMPLE PREPARATION AND ANALYSIS DATA FORM (FOR LIQUID SAMPLES)
DETROIT INCINERATOR NO. 13

Bottle No.	Lab No.	Run No.	Sample type	Total volume collected, ml	Concentration factor	Concentration Cr^{+6}, µg/ml	Aliquot analyzed by NAA, ml	NAA results, µg/ml		
								Total Cr	Ni	Cd
D-57	EQ222	PCI-3	Backhalf H_2O	1010		N.A.	1	-	-	-
D-58	EQ242	PCO-3	Backhalf H_2O	618		N.A.	1	LOST		
D-59	EQ242R	PCO-3	Backhalf H_2O	618		N.A.	1	2.7	-	-
D-60	EQ208,218	PCI-3	Alkaline Extract	50		0.0046	1	-	-	-
D-61	Blank	Reagent BIK	Alkaline Extract Blank	100		<0.004	1	0.2	-	-
D-62	EQ246	Blank H_2O	H_2O Blank	580		N.A.	1	LOST		
D-63	EQ302		Influent 6/18			<0.004	1	1.6	-	-
D-64	303		Influent 6/19			<0.004	1	2.4	-	-
D-65	304		Influent 6/20			<0.004	1	-	-	-
D-66	305		Influent 6/21			<0.004	1	-	-	-
D-67	305R		Influent 6/21			<0.004	1	2.5	-	-
D-68	306		Influent 6/22			<0.004	1	2.6	-	-
D-69	307		Influent 6/24			<0.004	1	1.6	-	-
D-70	310		Influent 6/18			<0.004	1	2.9	-	-

SAMPLE PREPARATION AND ANALYSIS DATA FORM (FOR LIQUID SAMPLES) (continued)

Bottle No.	Lab No.	Run No.	Sample type	Total volume collected, ml	Concentration factor	Concentration Cr^{+6}, µg/ml	Aliquot analyzed by NAA, ml	NAA results, µg/ml		
								Total Cr	Ni	Cd
D-71	311		Effluent 6/19			<0.004	1	0.1	-	-
D-72	312		Effluent 6/20			<0.004	1	2.7	-	-
D-73	313		Effluent 6/21			<0.004	1	2.5	-	-
D-74	314		Effluent 6/22			<0.004	1	-	-	-
D-75	315		Effluent 6/24			<0.004	1	2.8	-	-

Report Listing by Sample - For JPL

Listing Date: 22-NOV-85 @ 14:29:54

Select / Process Criteria

Data: Processed
Instrument: NAA
Date: 85/11/ 1
Tray: None
Session: All
Constituent: All
Project: CR5
Project Descriptor: -CHROMIUM SCREENING STUDY NAA FOR TOTAL AND CR(VI) ANALYSIS..
Parameter Code: NAA002
Type report units: Parameter Code units * Multiplier / Project Code units
Blank Name: None

Job Number: 13
Total Samples: 80

Report contains: NO Duplicate analysis
Out-of-Range value(s)
NO Nonreportable constituent(s)

Sample(s) / Sample Range(s)

All sample(s) in specified Range(s)

Warning: Possible report unit differences may exist between different parameter codes !!

Legend: (- Below Minimum Detectable limit > - Over Instrument analytical range * - Nonreportable constituent
'No value' - No data value present 'Fit fail' - Curve fit failure

Value	Constituent	Value	Constituent	Value	Constituent	Value	Constituent	Value	Constituent
CR5 # 601 D1		85/11/ 1 @ 13:44: 8 by NAA002 (JPL)				Multiplier:	1.442E+00		< 1 >
1.641E+03 Cd		2.506E+02 Cr		1.398E+02 Ni					
CR5 # 602 D2		85/11/ 1 @ 13:45:48 by NAA002 (JPL)				Multiplier:	1.038E+00		< 2 >
2.279E+03 Cd		2.187E+02 Cr		No Value Ni					
CR5 # 603 D3		85/11/ 1 @ 13:44:18 by NAA002 (JPL)				Multiplier:	1.442E+00		< 3 >
3.397E+03 Cd		1.896E+02 Cr		No Value Ni					
CR5 # 604 D4		85/11/ 1 @ 13:44:28 by NAA002 (JPL)				Multiplier:	1.442E+00		< 4 >
2.355E+03 Cd		2.575E+02 Cr		No Value Ni					
CR5 # 605 D5		85/11/ 1 @ 13:44:38 by NAA002 (JPL)				Multiplier:	1.442E+00		< 5 >
1.912E+03 Cd		2.216E+02 Cr		No Value Ni					
CR5 # 606 D6		85/11/ 1 @ 13:39:48 by NAA002 (JPL)				Multiplier:	1.444E+00		< 6 >
No Value Cd		1.701E+01 Cr		No Value Ni					
CR5 # 607 D7A		85/11/ 1 @ 13:40:18 by NAA002 (JPL)				Multiplier:	1.209E+00		< 7 >
1.861E+02 Cd		3.906E+01 Cr		2.483E+02 Ni					
CR5 # 608 D7B		85/11/ 1 @ 13:41:38 by NAA002 (JPL)				Multiplier:	1.284E+00		< 8 >
2.759E+02 Cd		4.558E+01 Cr		1.696E+02 Ni					
CR5 # 609 D7C		85/11/ 1 @ 13:41:48 by NAA002 (JPL)				Multiplier:	1.284E+00		< 9 >
1.165E+02 Cd		1.999E+01 Cr		No Value Ni					
CR5 # 610 D8A		85/11/ 1 @ 13:40:28 by NAA002 (JPL)				Multiplier:	1.209E+00		< 10 >
No Value Cd		6.512E+00 Cr		No Value Ni					
CR5 # 611 D8B		85/11/ 1 @ 13:39:38 by NAA002 (JPL)				Multiplier:	1.444E+00		< 11 >
No Value Cd		6.121E+00 Cr		No Value Ni					
CR5 # 612 D8C		85/11/ 1 @ 13:39:28 by NAA002 (JPL)				Multiplier:	1.444E+00		< 12 >
No Value Cd		6.368E+00 Cr		No Value Ni					
CR5 # 613 D8D		85/11/ 1 @ 13:42:58 by NAA002 (JPL)				Multiplier:	1.855E+00		< 13 >
No Value Cd		1.225E+01 Cr		No Value Ni					
CR5 # 619 D9		85/11/ 1 @ 13:40:38 by NAA002 (JPL)				Multiplier:	1.209E+00		< 14 >
3.550E+02 Cd		2.164E+02 Cr		5.583E+02 Ni					
CR5 # 620 D10		85/11/ 1 @ 13:44:48 by NAA002 (JPL)				Multiplier:	1.446E+00		< 15 >
7.911E+02 Cd		2.055E+02 Cr		1.682E+02 Ni					
CR5 # 621 D11		85/11/ 1 @ 13:43: 8 by NAA002 (JPL)				Multiplier:	1.855E+00		< 16 >
No Value Cd		4.278E+01 Cr		2.295E+02 Ni					

Value	Constituent		Value	Constituent		Value	Constituent	Value	Constituent	Value	Constituent		
CR5	# 622	D12	85/11/ 1	@ 13:43:18	by NAA002	(JPL)	Multiplier:	1.855E+00				< 17 >
No Value	Cd		3.061E+02	Cr		9.039E+02	Ni						
CR5	# 623	D13	85/11/ 1	@ 13:45:58	by NAA002	(JPL)	Multiplier:	1.038E+00				< 18 >
1.652E+02	Cd		4.803E+02	Cr		3.990E+02	Ni						
CR5	# 624	D14	85/11/ 1	@ 13:37:28	by NAA002	(JPL)	Multiplier:	2.093E+00				< 19 >
1.339E+02	Cd		5.557E+02	Cr		5.126E+02	Ni						
CR5	# 625	D15	85/11/ 1	@ 13:49:48	by NAA002	(JPL)	Multiplier:	1.099E+00				< 20 >
1.234E+02	Cd		2.342E+02	Cr		1.728E+02	Ni						
CR5	# 626	D16	85/11/ 1	@ 13:41:58	by NAA002	(JPL)	Multiplier:	1.284E+00				< 21 >
1.997E+02	Cd		6.242E+02	Cr		6.326E+02	Ni						
CR5	# 627	D17	85/11/ 1	@ 13:38:58	by NAA002	(JPL)	Multiplier:	1.444E+00				< 22 >
9.747E+01	Cd		5.855E+02	Cr		6.346E+02	Ni						
CR5	# 628	D18	85/11/ 1	@ 13:46: 8	by NAA002	(JPL)	Multiplier:	1.038E+00				< 23 >
1.495E+02	Cd		4.568E+02	Cr		2.877E+02	Ni						
CR5	# 629	D19	85/11/ 1	@ 13:43:28	by NAA002	(JPL)	Multiplier:	1.855E+00				< 24 >
No Value	Cd		2.742E+01	Cr		2.139E+02	Ni						
CR5	# 630	D20	85/11/ 1	@ 13:49:58	by NAA002	(JPL)	Multiplier:	1.099E+00				< 25 >
No Value	Cd		3.373E+01	Cr		6.770E+02	Ni						
CR5	# 631	D21	85/11/ 1	@ 13:50: 8	by NAA002	(JPL)	Multiplier:	1.099E+00				< 26 >
1.300E+02	Cd		8.938E+01	Cr		9.724E+02	Ni						
CR5	# 632	D22	85/11/ 1	@ 13:48:18	by NAA002	(JPL)	Multiplier:	1.372E+00				< 27 >
9.612E+01	Cd		6.287E+01	Cr		2.066E+02	Ni						
CR5	# 633	D23	85/11/ 1	@ 13:50:18	by NAA002	(JPL)	Multiplier:	1.099E+00				< 28 >
No Value	Cd		1.780E+02	Cr		8.029E+01	Ni						
CR5	# 634	D24	85/11/ 1	@ 13:48:28	by NAA002	(JPL)	Multiplier:	1.372E+00				< 29 >
1.703E+02	Cd		3.246E+02	Cr		1.211E+02	Ni						
CR5	# 635	D25	85/11/ 1	@ 13:50:28	by NAA002	(JPL)	Multiplier:	1.099E+00				< 30 >
1.511E+02	Cd		3.259E+02	Cr		1.098E+02	Ni						
CR5	# 636	D26	85/11/ 1	@ 13:46:18	by NAA002	(JPL)	Multiplier:	1.038E+00				< 31 >
No Value	Cd		2.767E+02	Cr		8.821E+01	Ni						
CR5	# 637	D27	85/11/ 1	@ 13:37:38	by NAA002	(JPL)	Multiplier:	2.093E+00				< 32 >
No Value	Cd		2.579E+02	Cr		8.089E+01	Ni						
CR5	# 638	D28	85/11/ 1	@ 13:48:38	by NAA002	(JPL)	Multiplier:	1.372E+00				< 33 >
1.124E+02	Cd		2.677E+02	Cr		1.079E+02	Ni						

Value	Constituent	Value	Constituent	Value	Constituent	Value	Constituent	Value	Constituent
CR5 # 639 D29		85/11/ 1 @ 13:33: 8 by NAA002 (JPL)				Multiplier: 1.000E+00			< 34 >
4.007E+01 Cd		2.361E+02 Cr		1.146E+02 Ni					
CR5 # 640 D30		85/11/ 1 @ 13:48:48 by NAA002 (JPL)				Multiplier: 1.372E+00			< 35 >
No Value Cd		2.527E+02 Cr		1.177E+02 Ni					
CR5 # 641 D31		85/11/ 1 @ 13:48:58 by NAA002 (JPL)				Multiplier: 1.372E+00			< 36 >
9.612E+01 Cd		2.136E+02 Cr		9.618E+01 Ni					
CR5 # 642 D32		85/11/ 1 @ 13:46:48 by NAA002 (JPL)				Multiplier: 1.151E+00			< 37 >
1.004E+02 Cd		2.224E+02 Cr		8.047E+01 Ni					
CR5 # 643 D33		85/11/ 1 @ 13:46:58 by NAA002 (JPL)				Multiplier: 1.151E+00			< 38 >
No Value Cd		2.769E+02 Cr		1.021E+02 Ni					
CR5 # 644 D34		85/11/ 1 @ 13:47: 8 by NAA002 (JPL)				Multiplier: 1.151E+00			< 39 >
No Value Cd		2.888E+01 Cr		No Value Ni					
CR5 # 645 D35		85/11/ 1 @ 13:42: 8 by NAA002 (JPL)				Multiplier: 1.284E+00			< 40 >
No Value Cd		3.437E+01 Cr		2.338E+01 Ni					
CR5 # 646 D36		85/11/ 1 @ 13:34:18 by NAA002 (JPL)				Multiplier: 1.041E+00			< 41 >
No Value Cd		3.164E+01 Cr		No Value Ni					
CR5 # 647 D37		85/11/ 1 @ 13:46:28 by NAA002 (JPL)				Multiplier: 1.038E+00			< 42 >
No Value Cd		5.134E+01 Cr		1.583E+01 Ni					
CR5 # 648 D38		85/11/ 1 @ 13:47:18 by NAA002 (JPL)				Multiplier: 1.151E+00			< 43 >
No Value Cd		2.340E+01 Cr		No Value Ni					
CR5 # 649 D39		85/11/ 1 @ 13:49: 8 by NAA002 (JPL)				Multiplier: 1.372E+00			< 44 >
No Value Cd		1.886E+01 Cr		No Value Ni					
CR5 # 650 D40		85/11/ 1 @ 13:34:28 by NAA002 (JPL)				Multiplier: 1.041E+00			< 45 >
No Value Cd		2.336E+01 Cr		No Value Ni					
CR5 # 651 D41		85/11/ 1 @ 13:47:28 by NAA002 (JPL)				Multiplier: 1.151E+00			< 46 >
No Value Cd		3.034E+01 Cr		No Value Ni					
CR5 # 652 D42		85/11/ 1 @ 13:47:38 by NAA002 (JPL)				Multiplier: 1.151E+00			< 47 >
No Value Cd		2.357E+01 Cr		No Value Ni					
CR5 # 653 D43		85/11/ 1 @ 13:47:48 by NAA002 (JPL)				Multiplier: 1.151E+00			< 48 >
1.456E+01 Cd		2.978E+01 Cr		No Value Ni					
CR5 # 654 D44		85/11/ 1 @ 13:34:38 by NAA002 (JPL)				Multiplier: 1.041E+00			< 49 >
No Value Cd		2.803E+01 Cr		1.958E+01 Ni					
CR5 # 655 D45		85/11/ 1 @ 13:34:48 by NAA002 (JPL)				Multiplier: 1.041E+00			< 50 >
No Value Cd		2.855E+01 Cr		1.720E+01 Ni					

Value	Constituent	Value	Constituent	Value	Constituent	Value	Constituent	Value	Constituent
CR5 # 656 D46		85/11/ 1 @ 13:34:58 by NAA002 (JPL)		Multiplier:	1.041E+00				(51)
No Value Cd		2.344E+01 Cr	No Value Ni						
CR5 # 657 D47		85/11/ 1 @ 13:35:48 by NAA002 (JPL)		Multiplier:	1.387E+00				(52)
No Value Cd		1.989E+01 Cr	No Value Ni						
CR5 # 658 D48		85/11/ 1 @ 13:35: 8 by NAA002 (JPL)		Multiplier:	1.041E+00				(53)
No Value Cd		1.733E+01 Cr	No Value Ni						
CR5 # 659 D49		85/11/ 1 @ 13:35:28 by NAA002 (JPL)		Multiplier:	1.041E+00				(54)
No Value Cd		2.097E+01 Cr	No Value Ni						
CR5 # 670 D50		85/11/ 1 @ 13:35:58 by NAA002 (JPL)		Multiplier:	1.387E+00				(55)
No Value Cd		2.085E+01 Cr	No Value Ni						
CR5 # 671 D51		85/11/ 1 @ 13:36: 8 by NAA002 (JPL)		Multiplier:	1.387E+00				(56)
No Value Cd		1.917E+01 Cr	No Value Ni						
CR5 # 672 D52		85/11/ 1 @ 13:33:18 by NAA002 (JPL)		Multiplier:	1.000E+00				(57)
No Value Cd		2.480E+01 Cr	No Value Ni						
CR5 # 673 D53		85/11/ 1 @ 13:33:28 by NAA002 (JPL)		Multiplier:	1.000E+00				(58)
No Value Cd		2.602E+01 Cr	No Value Ni						
CR5 # 674 D54		85/11/ 1 @ 13:43:38 by NAA002 (JPL)		Multiplier:	1.855E+00				(59)
No Value Cd		3.730E+00 Cr	No Value Ni						
CR5 # 675 D55		85/11/ 1 @ 13:33:38 by NAA002 (JPL)		Multiplier:	1.000E+00				(60)
No Value Cd		2.319E+01 Cr	No Value Ni						
CR5 # 676 D56		85/11/ 1 @ 13:36:18 by NAA002 (JPL)		Multiplier:	1.387E+00				(61)
1.866E+02 Cd		6.784E+02 Cr	5.802E+02 Ni						
CR5 # 677 D57		85/11/ 1 @ 13:37:48 by NAA002 (JPL)		Multiplier:	1.047E+00				(62)
No Value Cd		No Value Cr	No Value Ni						
CR5 # 678 D58		85/11/ 1 @ 13:37:58 by NAA002 (JPL)		Multiplier:	1.047E+00				(63)
No Value Cd		2.834E+00 Cr	No Value Ni						
CR5 # 679 D59		85/11/ 1 @ 13:42:18 by NAA002 (JPL)		Multiplier:	6.420E-01				(64)
No Value Cd		2.726E+00 Cr	No Value Ni						
CR5 # 680 D60		85/11/ 1 @ 13:35:18 by NAA002 (JPL)		Multiplier:	5.000E-01				(65)
No Value Cd		No Value Cr	No Value Ni						
CR5 # 681 D61		85/11/ 1 @ 13:44:58 by NAA002 (JPL)		Multiplier:	7.208E-01				(66)
No Value Cd		1.690E-01 Cr	No Value Ni						
CR5 # 682 D62		85/11/ 1 @ 13:40:58 by NAA002 (JPL)		Multiplier:	6.048E-01				(67)
No Value Cd		2.362E+00 Cr	No Value Ni						

Value	Constituent	Value	Constituent	Value	Constituent	Value	Constituent	Value	Constituent
CR5 # 683 D63		85/11/ 1 @ 13:38: 8 by NAA002 (JPL)				Multiplier: 1.047E+00			< 68 >
No Value Cd		1.554E+00 Cr		No Value Ni					
CR5 # 684 D64		85/11/ 1 @ 13:36:48 by NAA002 (JPL)				Multiplier: 6.933E-01			< 69 >
No Value Cd		2.362E+00 Cr		No Value Ni					
CR5 # 685 D65		85/11/ 1 @ 13:38:18 by NAA002 (JPL)				Multiplier: 1.047E+00			< 70 >
No Value Cd		No Value Cr		No Value Ni					
CR5 # 686 D66		85/11/ 1 @ 13:43:48 by NAA002 (JPL)				Multiplier: 9.276E-01			< 71 >
No Value Cd		No Value Cr		No Value Ni					
CR5 # 687 D67		85/11/ 1 @ 13:45:18 by NAA002 (JPL)				Multiplier: 7.208E-01			< 72 >
No Value Cd		2.518E+00 Cr		No Value Ni					
CR5 # 688 D68		85/11/ 1 @ 13:33:58 by NAA002 (JPL)				Multiplier: 5.000E-01			< 73 >
No Value Cd		2.634E+00 Cr		No Value Ni					
CR5 # 689 D69		85/11/ 1 @ 13:38:28 by NAA002 (JPL)				Multiplier: 1.047E+00			< 74 >
No Value Cd		1.627E+00 Cr		No Value Ni					
CR5 # 690 D70		85/11/ 1 @ 13:39:18 by NAA002 (JPL)				Multiplier: 7.218E-01			< 75 >
No Value Cd		2.894E+00 Cr		No Value Ni					
CR5 # 691 D71		85/11/ 1 @ 13:41:18 by NAA002 (JPL)				Multiplier: 6.048E-01			< 76 >
No Value Cd		1.067E-01 Cr		No Value Ni					
CR5 # 692 D72		85/11/ 1 @ 13:41: 8 by NAA002 (JPL)				Multiplier: 6.048E-01			< 77 >
No Value Cd		2.667E+00 Cr		No Value Ni					
CR5 # 693 D73		85/11/ 1 @ 13:42:28 by NAA002 (JPL)				Multiplier: 6.420E-01			< 78 >
No Value Cd		2.547E+00 Cr		No Value Ni					
CR5 # 694 D74		85/11/ 1 @ 13:42:38 by NAA002 (JPL)				Multiplier: 6.420E-01			< 79 >
No Value Cd		No Value Cr		No Value Ni					
CR5 # 695 D75		85/11/ 1 @ 13:45: 8 by NAA002 (JPL)				Multiplier: 7.208E-01			< 80 >
No Value Cd		2.842E+00 Cr		No Value Ni					

DATA SHEET (RESULTS)

PROCESS SAMPLES – DETROIT SLUDGE INCINERATOR

SAMPLE Results (µg/gram) Comments

ID	As	Cd	CR	CU	MN	Ni	SE	V	ZN	TYPE
PCF-3 D76	66.4	928.	3920.	1300.	1130.	3150.	ND	77.	8410.	Acetone / Food Part
PCF-4 D77	56.4	1160.	1970.	1300.	720.	1140.	12.3	84.	9590.	
PCF-5 D78	61.9	1139.	4820.	1500.	843.	4600.	39.4	83.	9480.	
PCF-6 D79	41.1	594.	4880.	1500.	946.	3990.	33.8	86.	7440.	
D80	20.6	118.	1750.	1200.	748.	608.	17.2	82.	5820.	Bott Ash
D81	24.0	116.	1740.	1100.	767.	635.	13.3	84.	6390.	
D82	23.7	144.	2240.	1300.	778.	760.	ND	82.	7720.	
D83	23.7	111.	1890.	1100.	770.	675.	ND	82.	8100.	
D84	22.8	104.	1950.	1300.	764.	580.	13.8	80.	8920.	
D85	19.4	118.	1580.	900.	744.	526.	ND	79.	6520.	
D86	2.8	20.	196.	100.	61.	40.0	3.15	9.8	670.	Sludge
D87	3.4	20.	186.	108.	48.	53.3	3.48	7.7	716.	
D88	2.8	16.	164.	70.	46.	39.8	3.85	7.2	306.	
D89	2.7	16.	153.	80.	43.	62.4	2.47	6.5	665.	
D90	2.9	12.	185.	60.	55.	ND	2.86	8.9	347.	
D91	2.5	17.	129.	70.	33.	ND	ND	5.4	542.	
D92	2.7	19.	167.	100.	62.	ND	3.54	8.8	737.	
D93	2.7	12.	175.	110.	62.	49.7	ND	8.9	261.	
D94	3.0	15.	154.	120.	64.	ND	ND	9.3	390.	
D95	2.4	18.	134.	80.	41.	ND	ND	6.8	509.	
D96	3.3	29.	248.	90.	42.	61.0	4.51	5.8	1170.	
D97	2.2	13.	201.	80.	36.	63.2	ND	6.3	355.	
D98	2.6	23.	208.	60.	39.	ND	ND	6.3	563.	
D99	2.2	19.	125.	80.	43.	ND	1.73	5.3	545.	
D100	2.5	27.	162.	80.	39.	48.3	2.50	7.3	904.	
D101	2.9	23.	141.	110.	61.	37.9	ND	9.9	677.	
D102	ND	28.	167.	130.	53.	46.3	ND	9.0	804.	
D103	3.3	28.	154.	70.	49.	38.4	3.96	7.5	718.	
D104	2.5	13.	127.	100.	49.	39.8	2.30	9.2	300.	
PCF-2 D105	31.5	808.	4640.	1200.	1108.	3690.	12.4	68.	9400.	Residue

ND = NO DATA, PEAK AREA NOT DEFINED.

TPI [redacted]

APPENDIX D

SAMPLING AND ANALYTICAL PROCEDURES

APPENDIX D

SAMPLING AND ANALYTICAL PROCEDURES

DETERMINATION OF HEXAVALENT CHROMIUM EMISSIONS FROM A STATIONARY SOURCE

Sampling Procedures

An EPA Reference Method 5* train was used for sampling at the scrubber outlet. The train consisted of the following items:

Nozzle - Stainless steel (316) with sharp, tapered, leading edge and accurately measured round opening.

Probe - Borosilicate glass with a heating system capable of maintaining a gas temperature of approximately 121°C (250°F) at the exit end during sampling.

Pitot tube - Type-S pitot tube that meets all geometric standards. It was attached to the probe to monitor stack gas velocity.

Thermocouple - Type-K thermocouple capable of measuring stack gas temperatures within 2 percent. It was attached to the probe.

Filter holder - Pyrex glass with heating system capable of maintaining a filter temperature of approximately 121°C (250°F).

Draft gauge - An inclined manometer (made by Dwyer) with a range of 0 to 10 in.H_2O.

Impingers - Five impingers connected in series with glass ball joints. The second impinger was of the Greenburg-Smith design. The first, third, fourth, and fifth impingers were of the Greenburg-Smith design, but modified by replacing the tip with a ½-in.-i.d. glass tube extending to ½ in. from the bottom of the flask.

Metering system - Vacuum gauge, leak-free pump, thermometers capable of measuring temperature to within 5°F, dry gas meter with 2 percent accuracy, and related equipment to maintain isokinetic sampling rate and to determine sample volume. The dry gas meter is made by Rockwell and the fiber vane pump is made by Gast.

Barometer - NBS-traceable mercury-in-glass barometer.

---

* 40 CFR 60, Appendix A, Reference Method 5, July 1984.

Glass-fiber filters* (3-in. diameter) were desiccated for at least 24 hours and weighed to the nearest 0.1 mg on an analytical balance. One hundred milliliters of distilled water was placed in each of the first two impingers; the third and fourth impingers were initially empty; and the fifth impinger, containing approximately 300 to 400 g of silica gel, was placed next in series. Prior to testing, each impinger and its contents were weighed. The outlet train was set up with the probe as shown in Figure D-1. The sampling train was leak-checked at the sampling site prior to each test run by plugging the inlet to the nozzle and pulling a 15-in.Hg vacuum, and at the conclusion of the test by plugging the inlet to the nozzle and pulling a vacuum equal to the highest vacuum reached during the test run.

A Modified EPA Reference Method 5* sampling train was used to collect samples for particulate/chromium analysis at the scrubber inlet. This train, which was assembled by PEI personnel, consisted of the following items:

Nozzle - Stainless steel (316) with sharp, tapered, leading edge and accurately measured round opening.

Probe - Stainless steel (316) with heating system capable of maintaining a temperature of 121°C (250°F).

Primary filter holder - In-stack alundum filter holder modified to use a 30 mm x 80 mm glass-fiber thimble filter.

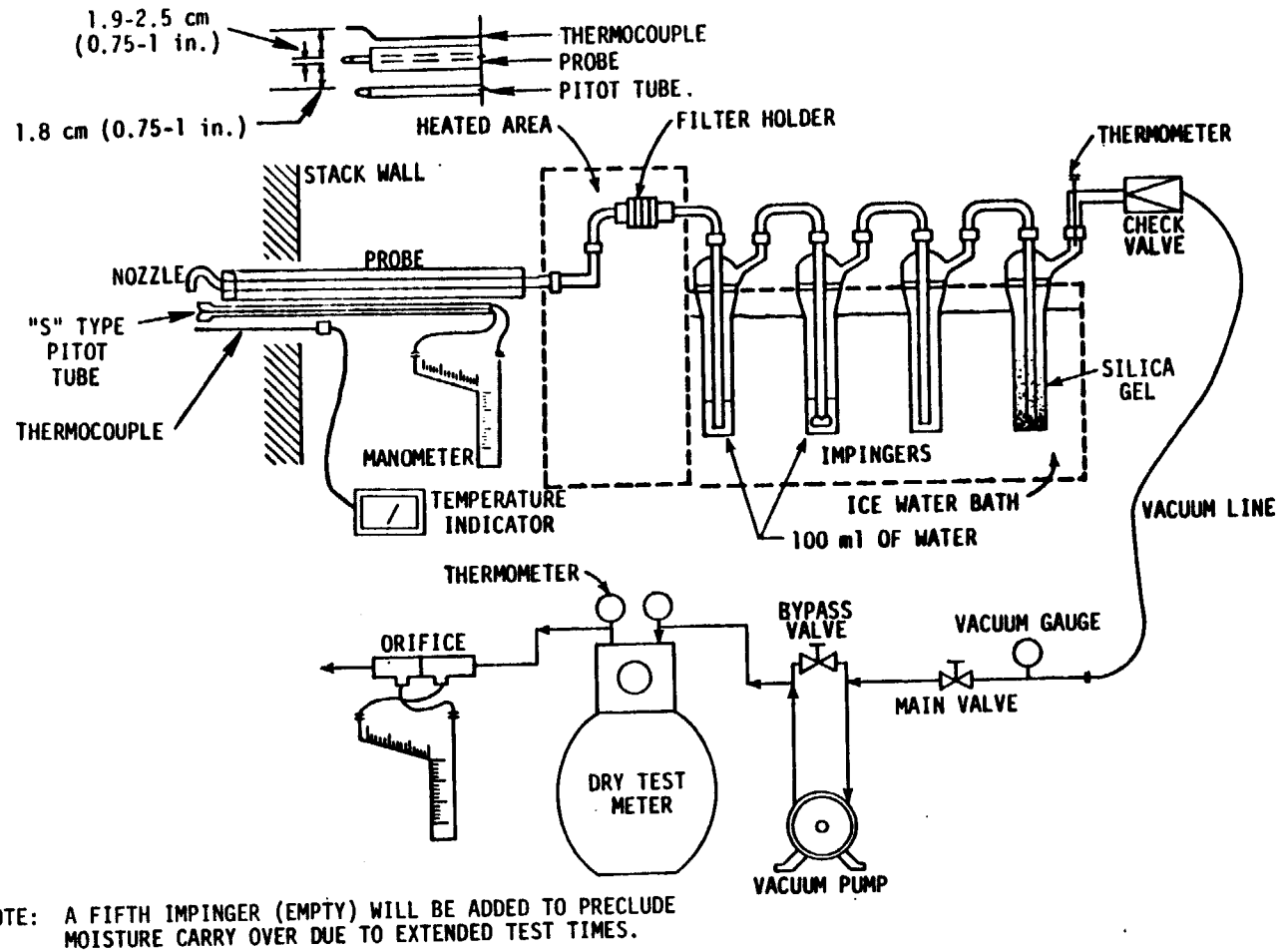
Backup filter holder - Pyrex glass with a heating system capable of maintaining a filter temperture of approximately 121°C (250°F).

Pitot tube - Type-S pitot tube that meets all geometric standards. It was attached to the probe to monitor stack gas velocity.

Thermocouple - Type-K thermocouple capable of measuring stack gas temperatures within 2 percent. It was attached to the probe.

Draft gauge - An inclined manometer (made by Dwyer) with a range of 0 to 10 in.H_2O.

* 40 CFR 60, Appendix A, Reference Method 5, July 1984.



NOTE: A FIFTH IMPINGER (EMPTY) WILL BE ADDED TO PRECLUDE MOISTURE CARRY OVER DUE TO EXTENDED TEST TIMES.

Figure D-1. Particulate/chromium sampling train at scrubber outlet.

Impingers - Five impingers connected in series with glass ball joints. The second impinger was of the Greenburg-Smith design. The first, third, fourth, and fifth impingers were of the Greenburg-Smith design, but modified by replacing the tip with a ½-in.-i.d. glass tube extending to ½ in. from the bottom of the flask.

Metering system - Vacuum gauge, leak-free pump, thermometers capable of measuring temperature to within 5°F, dry gas meter with 2 percent accuracy, and related equipment to maintain isokinetic sampling rate and to determine sample volume. The dry gas meter is made by Rockwell and the fiber vane pump is made by Gast.

Barometer - NBS traceable mercury-in-glass barometer.

The inlet sample train was set up with the probe as shown in Figure D-2. The pitot tube and lines were leak-checked at each test site prior to and at the conclusion of each test run. The check was made by blowing into the impact opening of the pitot tube until 3 or more inches of water was recorded on the manometer and then capping the impact opening and holding it for 15 seconds to assure that it was leak-free. The static pressure side of the pitot tube was leak-checked by the same procedure, except suction was used to obtain the 3-in.H_2O manometer reading. An ice water bath was placed around the impingers to keep the temperature of the gases leaving the last impinger at 20°C (68°F) or less.

Flue gas samples were collected simultaneously from the inlet duct and outlet stack of the scrubber by traversing the cross-sectional area of the duct and stack and using the isokinetic sampling techniques outlined in EPA Reference Method 5.*

Before sampling began, velocity, static pressure, molecular weight, moisture content, and temperature were measured to define sampling rates and nozzle sizes as prescribed in EPA Reference Methods 1 through 4.** In addition, the degree of turbulent flow at each location was assessed according to

* 40 CFR 60, Appendix A, Reference Method 5, July 1984.

** 40 CFR 60, Appendix A, Reference Methods 1 through 4, July 1984.

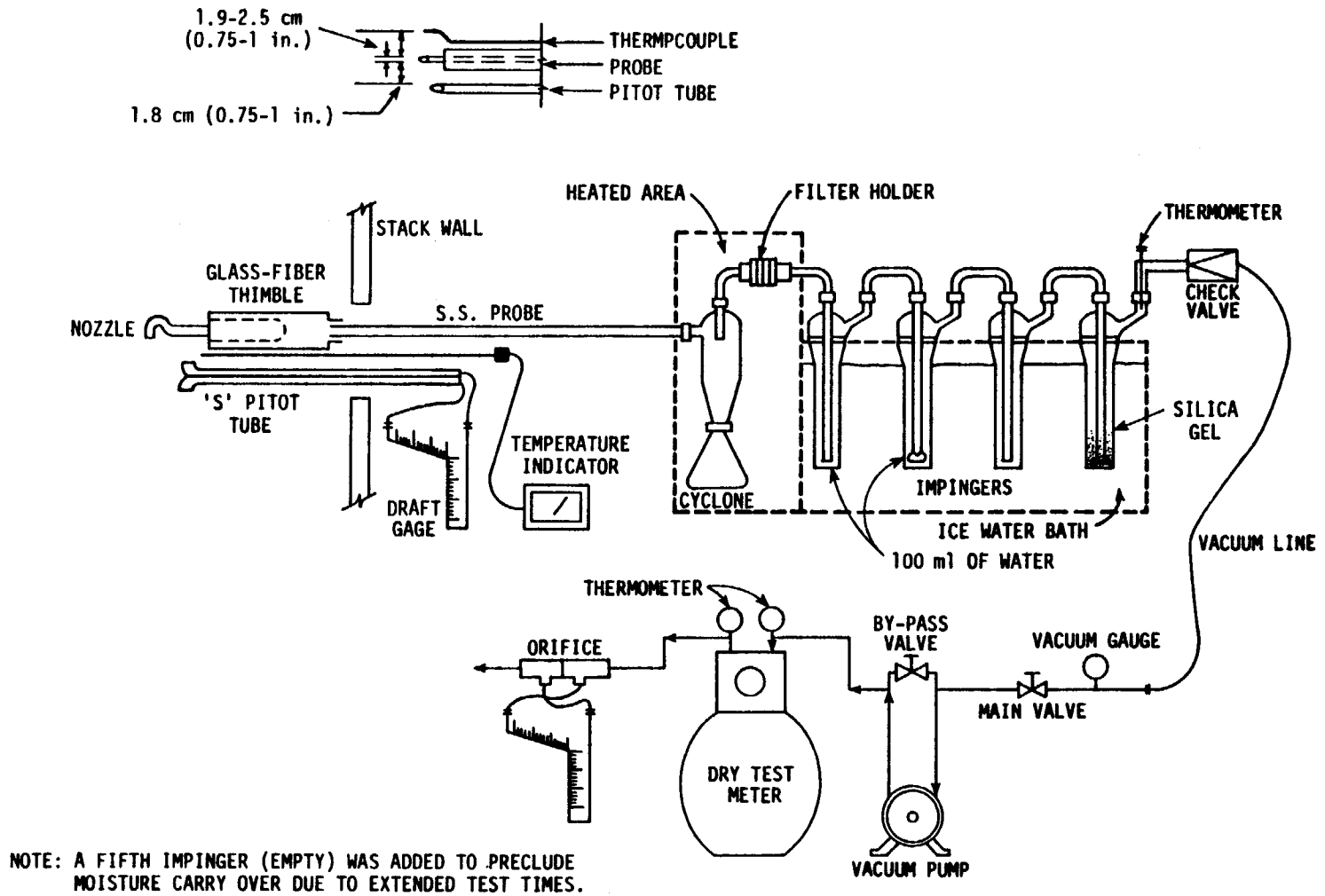


Figure D-2. Particulate/chromium sampling train at scrubber inlet.

procedures in EPA Reference Method 1, which stipulate that the face openings of the Type-S pitot tube be aligned perpendicularly to the duct cross-sectional plane, designated "0-degree reference." Null (zero) pitot readings obtained at 0-degree reference indicated an acceptable flow condition at a given point.

If the pitot reading was not zero at 0-degree reference, the pitot was rotated (up to 90 degrees ± yaw angle) until a null reading was obtained. The value of the rotation angle (yaw) was recorded for each point and averaged across the duct. Method 2 criteria stipulate that average angular rotations greater than ± 10 degrees indicate turbulent (nonaxial) flow conditions in the duct(s). Because of the general insensitivity of the Type-S pitot tube in measuring yaw and pitch angles, these data were used only to characterize gas flow patterns relative to potential biases in emission measurements. No major disturbances in overall gas flow patterns were observed at either test location.

During sampling, stack gas and sampling train data were recorded at each sampling point and when significant changes in stack flow conditions occurred. Isokinetic sampling rates were set throughout the sampling period with the aid of a programmable calculator. All sampling data were recorded on the Particulate Field Data Sheet.

In addition, flue gas grab samples were collected in Tedlar bags and analyzed for CO_2 and O_2 content by an Orsat gas analyzer to facilitate the calculation of the stack gas molecular weight. Procedures detailed in EPA Reference Method 3 were used.

Sample Recovery Procedures

The sampling trains were carefully moved from the test sites to the sample recovery area. Each impinger was weighed after each test to determine the amount of moisture present. Sample fractions were recovered as follows:

Container No. 1 - The filter was removed from its holder and placed in a petri dish, sealed, and labeled.

Container No. 2 - An unused filter was taken as a blank.

Container No. 3 - Loose particulate and acetone washings from all sample-exposed surfaces prior to the filter were placed in a polyethylene container, which was then sealed and labeled. The inlet sample train consisted of two filters and a probe rinse. Particulate was removed from the probe with the aid of a brush and acetone rinsing. The liquid level was marked after the container was sealed.

Container No. 4 - A minimum of 200 ml of acetone was taken for the blank analysis. The blank was obtained and treated in a manner similar to that used for the acetone rinse.

Container No. 5 - Distilled water in the impinger section of the sampling train was placed in a polyethylene container. The impingers and connecting glassware were rinsed with distilled water, and this rinse was added to the container. The container was then sealed and labeled, and the liquid level was marked.

Container No. 6 - A minimum of 200 ml of distilled water was taken for the blank analysis. The blank was obtained and treated in a manner similar to that used for the water rinse.

All pertinent data (such as initial and final weights) were recorded on Sample Recovery and Integrity Data Sheets.

All of the recovered sample fractions and blanks were stored on site in a secure area and transported to PEI's Cincinnati laboratory in one batch at the completion of the test series.

Particulate Analytical Procedures

The following procedures were used for particulate analysis. Where possible, they represent the methods described in EPA Method 5.*

* 40 CFR 60, Appendix A, Reference Method 5, July 1984.

Container No. 1 - The filter and any loose particulate matter from this sample container were placed in a tared glass weighing dish, desiccated for 24 hours to a constant weight, and weighed to the nearest 0.1 mg.

Container No. 2 - The filter from this sample container was placed in a tared glass weighing dish, desiccated for 24 hours to a constant weight, and weighed to the nearest 0.1 mg.

Container No. 3 - The acetone washings were transferred to a tared beaker and evaporated to dryness at ambient temperature and pressure, desiccated for 24 hours to a constant weight, and weighed to the nearest 0.1 mg.

Container No. 4 - The acetone blank was transferred to a tared beaker and evaporated to dryness at ambient temperature and pressure. The blank was then desiccated for 24 hours to a constant weight and weighed to the nearest 0.1 mg.

Container No. 5 - The impinger contents (including rinse) were retained for future analysis, if desired.

Container No. 6 - The distilled water blank was retained for future analysis, if desired.

Throughout this appendix, the term "constant weight" means a difference of no more than 0.5 mg or 1 percent of the total weight less tare weight, whichever is greater, between two consecutive readings, with no less than 6 hours of desiccation between weighings.

After the particulate analysis, the inlet samples were analyzed for hexavalent chromium (Cr^{+6}) by use of a methodology recently developed by the EPA. A copy of the draft method, entitled "Determination of Hexavalent Chromium Emissions From Stationary Sources," is contained in Appendix G of this report.

Considering the extremely low levels of Cr^{+6} indicated by the pretest survey sample analysis (<0.5 µg/g), the filters were not cut up and extracted as specified in the method. This precluded the need for a filter blank correction for Cr^{+6}. Rather, the loose particulate from the thimble and probe

rinse residue was thoroughly mixed with a Teflon spatula, and approximately 2 to 5 grams of the particulate was transferred to the beaker containing the probe rinse particulate residue. As a means of increasing the analytical sensitivity to 0.1 µg/g, the amount of alkaline extraction solution and the final dilution volume were kept at a minimum consistent with Method 3060 from Test Methods for Evaluating Solid Waste.* This proportion is 4 ml of extraction solution per gram of solids diluted to a final volume of 10 ml.

Approximately 20 milliliters of $NaOH/Na_2CO_3$ digestion solution was added to the beaker containing the loose particulate and probe rinse residue. The beaker was covered with a watch glass and heated to near boiling on a hot plate. The solution was stirred constantly for 30 minutes and was not allowed to evaporate to dryness.

The solution was then cooled and filtered through a 47-mm Teflon filter. The beaker was rinsed with deionized, distilled water, which was then filtered. The filtrate was transferred quantitatively from the filter flask to a 50-ml volumetric flask, the pH was adjusted to 2 ± 0.5 with 10 percent H_2SO_4, and the flask was then filled to the mark with deionized, distilled water. The blank samples were digested and prepared in a similar manner.

A 50-ml or smaller aliquot of the prepared sample was transferred to an Erlenmeyer flask. A 2 percent volume-to-volume ratio of diphenylcarbizide solution was added, and the solution was allowed to stand for about 10 minutes for color development. A portion of the sample was transferred to a 1-cm absorption cell, which was placed in a Bausch and Lomb 100 spectrophotometer. The absorbance was then measured at the optimum wavelength by using the blank solution as a zero reference.

*U.S. EPA SW846, 2nd ed., July 1982.

DETERMINATION OF PARTICLE SIZE AT THE SCRUBBER INLET

Sample Extraction

The source sampling trains used for the tests at the scrubber inlet met design specifications established by the EPA and were assembled by PEI personnel. They consisted of:

Nozzle - Stainless steel (316) with sharp, tapered, leading edge and accurately measured round opening.

Metering system - Vacuum gauge, leak-free pump, thermometers capable of measuring temperature to within 5°F, dry gas meter with 2 percent accuracy, and related equipment to maintain isokinetic sampling rate and to determine sample volume. The dry gas meter was made by Rockwell and the fiber vane pump was made by Gast.

Condenser - Moisture-removal device capable of maintaining a temperature less than 20°C (68°F), with an attached thermometer to monitor temperature.

Impactor - A 15-μm precutter attached to an Andersen Heavy Grain Loading Impactor (HGLI) with three stages plus a backup filter.

Barometer - NBS traceable mercury-in-glass barometer.

Sampling Procedures

Samples for particle-size distribution measurements were collected at the scrubber inlet by an Andersen HGLI. This in-stack impactor consists of two single-jet impaction chambers followed by a third-stage cyclone and a backup filter. The sampled gas stream enters the system through the Stage 1 acceleration jet. Particles with sufficient inerita are impacted against the bottom of the Stage 1 impaction chamber. Smaller particles flow with the gas stream and exit the impaction chamber through three vent tubes.

Stage 2 of the HGLI is simply a scaled-down version of Stage 1 in which the jet nozzle diameter and the distance from jet exit to the impaction surface have been designed for the proper Stage 2 cut-point.

Stage 3 of the HGLI is a small cyclone of the Southern Research Institute design, in which a high-efficiency glass-fiber filter removes all particles remaining in the gas stream downstream of the cyclone.

The use of the Andersen HGLI was desirable at the inlet because of expected heavy particulate concentration, which would overload a standard multistage impactor. A single point representing the average gas velocity in each duct was selected as the sampling point.

The impactor was assembled as instructed in the appropriate operations manual. The Andersen HGLI was assembled by threading together the various parts of the third-stage cyclone and first and second jet-impaction chambers. A 33 mm x 80 mm glass-fiber thimble was used as a backup filter.

The sampling train was assembled as shown in Figure D-3. The sampling train was leak-checked at the sampling site prior to each test run by plugging the inlet to the impactor and pulling a 10-in.Hg vacuum. When the desired vacuum was reached, the leakage rate was checked at the dry gas meter for 1 minute. If the leak rate was less than 0.02 ft^3/min, the sampling train was used to obtain the samples. Excessive leaks were corrected prior to sampling. The impactor was then placed at the selected sampling point and allowed to preheat for several minutes before sampling was begun. During the preheating of the impactor, the nozzle was capped or pointed away from the gas flow. A post-test leak check was not performed to avoid the possibility of dislodging the particles on individual stages.

Sample Recovery Procedures

Following the completion of each test, the impactor was removed from the probe and carefully moved to the designated cleanup area with the impactor maintained in an upright position. The impactor was recovered as follows.

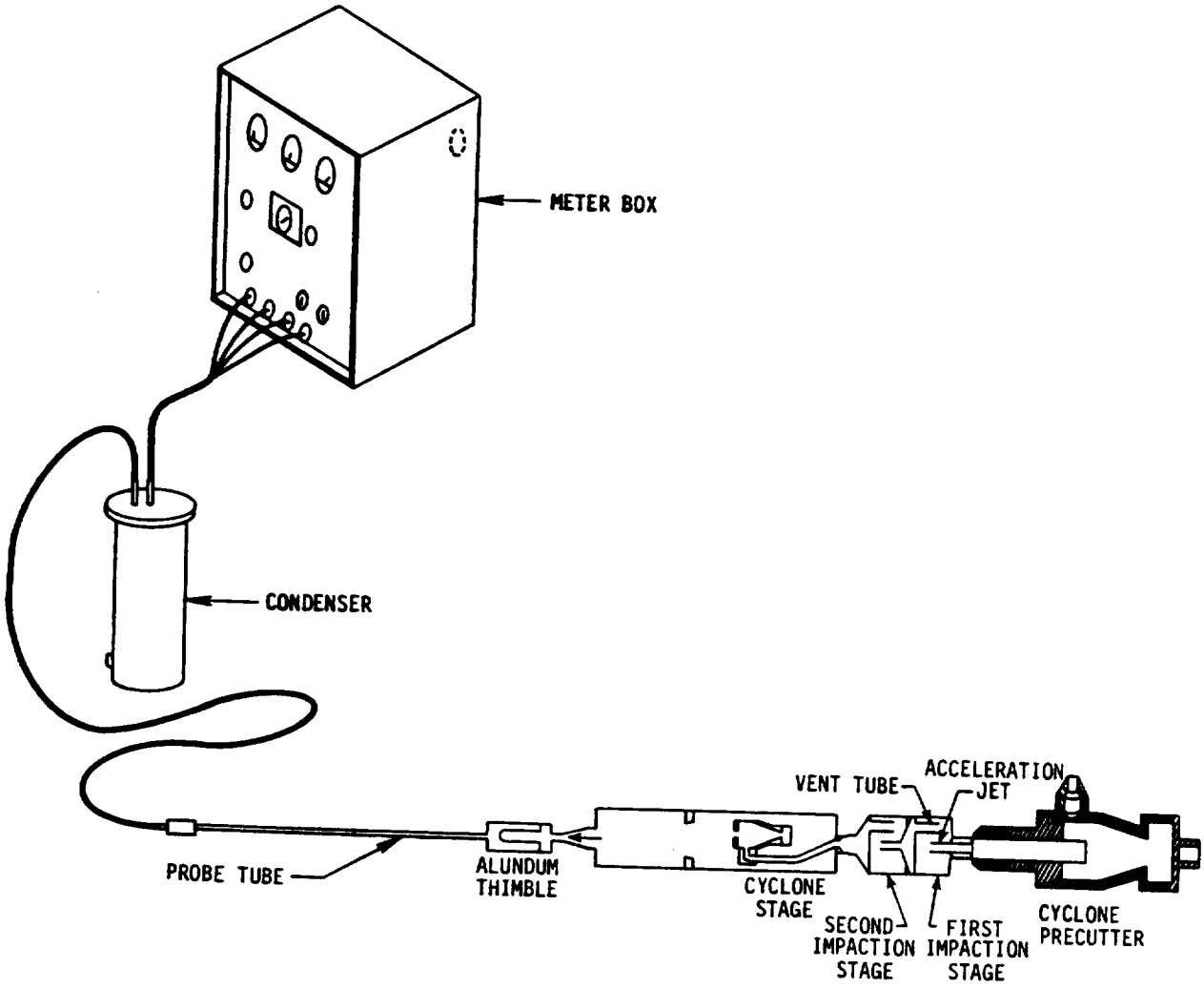


Figure D-3. Andersen Heavy Grain Loading Impactor sampling train shown with cyclone precutter.

After the test was completed, the impactor assembly was removed from the probe and carefully moved to the designated cleanup area in an upright position. The cyclone precutter was removed from the impactor and all loose particulate matter caught in the cyclone precutter was brushed into a polyethylene container. The cyclone precutter was then rinsed with acetone into a separate polyethylene container. Figure D-4 shows the containers in which each portion of the sample collected in the Andersen HCSS was recovered. A total of nine containers were used to recover the sample collected in the Andersen HGLI. In each collection stage, loose particulate matter from all sample-exposed surfaces was brushed into its respective container. After the brushing, each stage was acetone-rinsed into a separate container. The particulate and acetone portions of each collection stage were separated to facilitate the analysis of the samples. After the sample was recovered, each sample container was sealed and labeled.

Gravimetric Analysis Procedures

Gravimetric analysis was performed in the following manner:

Filters and/or loose particulate - Each thimble and any loose particulate matter were desiccated in their respective sample container for 24 hours to a constant weight and weighed to the nearest 0.1 mg on an analytical balance.

Acetone rinse - The volume of each acetone rinse was measured and transferred to a tared beaker. The sample was evaporated to dryness at ambient temperature and pressure, desiccated for 24 hours to a constant weight, and weighed to the nearest 0.1 mg.

During sampling, stack gas and sampling train data were recorded at designated intervals, depending on the length of the run. The isokinetic sampling rate was set initially, and constant cut-point characteristics were maintained throughout the sampling period. Three samples were collected at

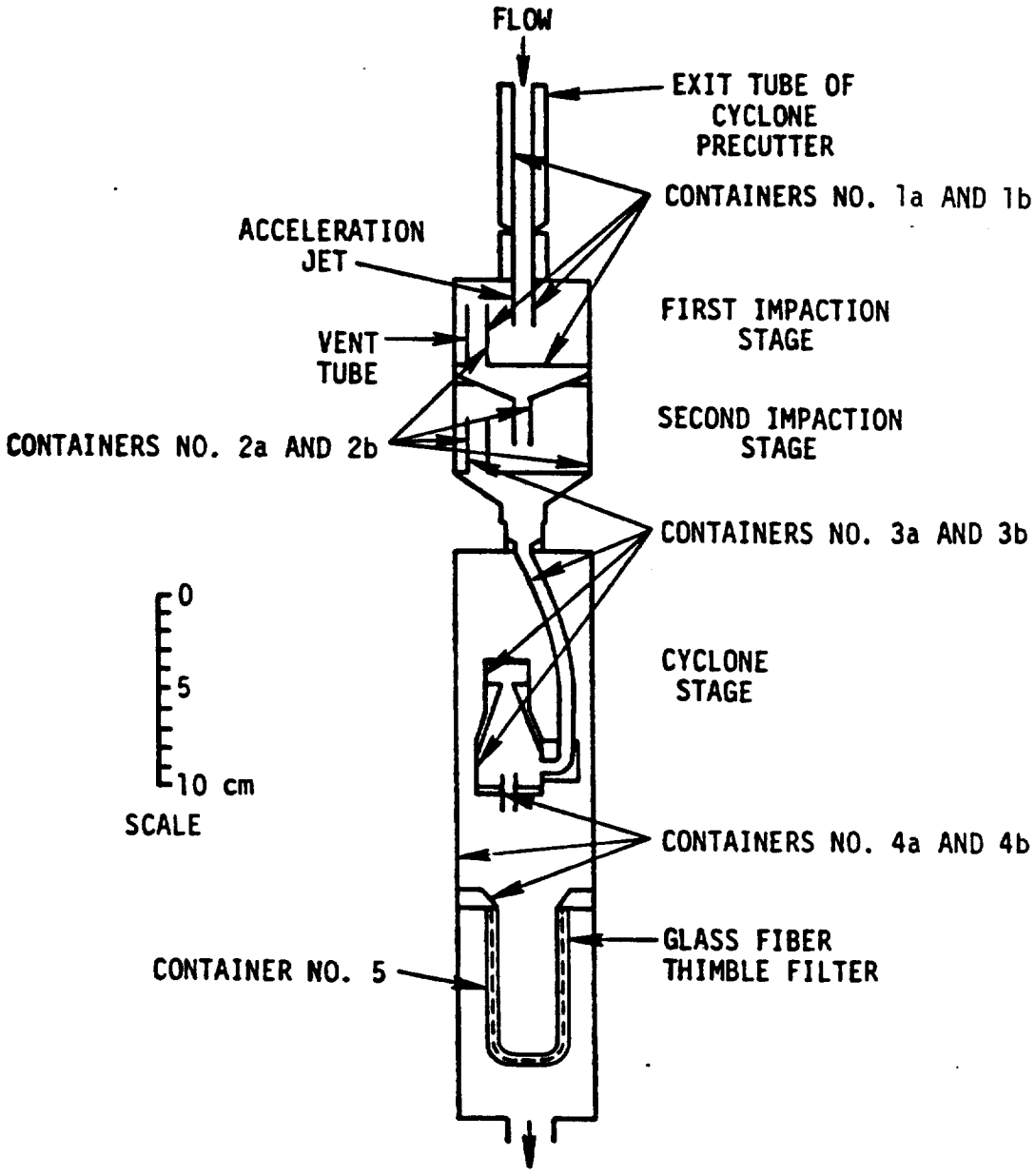


Figure D-4. Recovery containers for the different portions of the sample collected in the Andersen HGLI.

the inlet test location. These samples were collected during the particulate/chromium tests at this location. All sampling data were recorded on the Impactor Field Data Sheet.

Data Reduction

The three cut-points for each Andersen HGLI test were determined graphically from information supplied by the manufacturer. All particle size results were based on a particle density of 1 g/cm^3. Data reduction and intermediate result calculations were performed by CIDRS programs with moisture contents obtained from the particulate tests.*

DETERMINATION OF PARTICLE SIZE AT THE SCRUBBER OUTLET

Sample Extraction

The source sampling trains used for the tests at the scrubber outlet met design specifications established by the EPA and were assembled by PEI personnel. They consisted of:

Nozzle - Stainless steel (316) with sharp, tapered, leading edge and accurately measured round opening.

Metering system - Vacuum gauge, leak-free pump, thermometers capable of measuring temperature to within 5°F, dry gas meter with 2 percent accuracy, and related equipment to maintain isokinetic sampling rate and to determine sample volume. The dry gas meter was made by Rockwell and the fiber vane pump was made by Gast.

Condenser - Moisture-removal device capable of maintaining a temperature less than 20°C (68°F), with an attached thermometer to monitor temperature.

Impactor - An Andersen Mark III impactor with eight stages and a backup filter.

Barometer - Aneroid type to measure atmospheric pressures to ± 0.1 in.Hg.

*Southern Research Institute. A Computer-Based Cascade Impactor Data Reduction System. Prepared for U.S. Environmental Protection Agency under Contract No. 68-022-131. March 1978.

Sampling procedures were as follows. A single point representing the average gas velocity and temperature in each duct was selected as the sampling point.

The Andersen Mark III impactor was assembled by alternating the stage plates, collection media, flat crossbars, and Inconel spacer rings needed to provide eight cut sizes. The collection substrates were Reeve Angel 934 AH glass-fiber filters that had been heated in a 204°C (400°F) oven for 1 or 2 hours, desiccated for 24 hours to a constant weight, and weighed to the nearest 0.1 mg on an analytical balance.

The sampling train, which was assembled as shown in Figure D-5, was leak-checked at the sampling site prior to each test run by plugging the inlet to the impactor and pulling a 10-in.Hg vacuum. When the desired vacuum was reached, the leakage rate was checked at the dry gas meter for 1 minute. If the leak rate was less than 0.02 ft^3/min, the sampling train was used to obtain the samples. Excessive leaks were corrected prior to sampling. The impactor was then placed at the selected sampling point and allowed to preheat for several minutes before sampling was begun. During the preheating of the impactor, the nozzle was capped or pointed away from the gas flow. A post-test leak check was not be performed to avoid the possibility of dislodging the particles on individual stages.

During sampling, stack gas and sampling train data were recorded at designated intervals, depending on the length of the run. The isokinetic sampling rate was set initially, and constant cut-point characteristics were maintained throughout the sampling period. Five samples were collected at the outlet test location, all during the particulate/chromium tets. All sampling data were recorded on the Impactor Field Data Sheet.

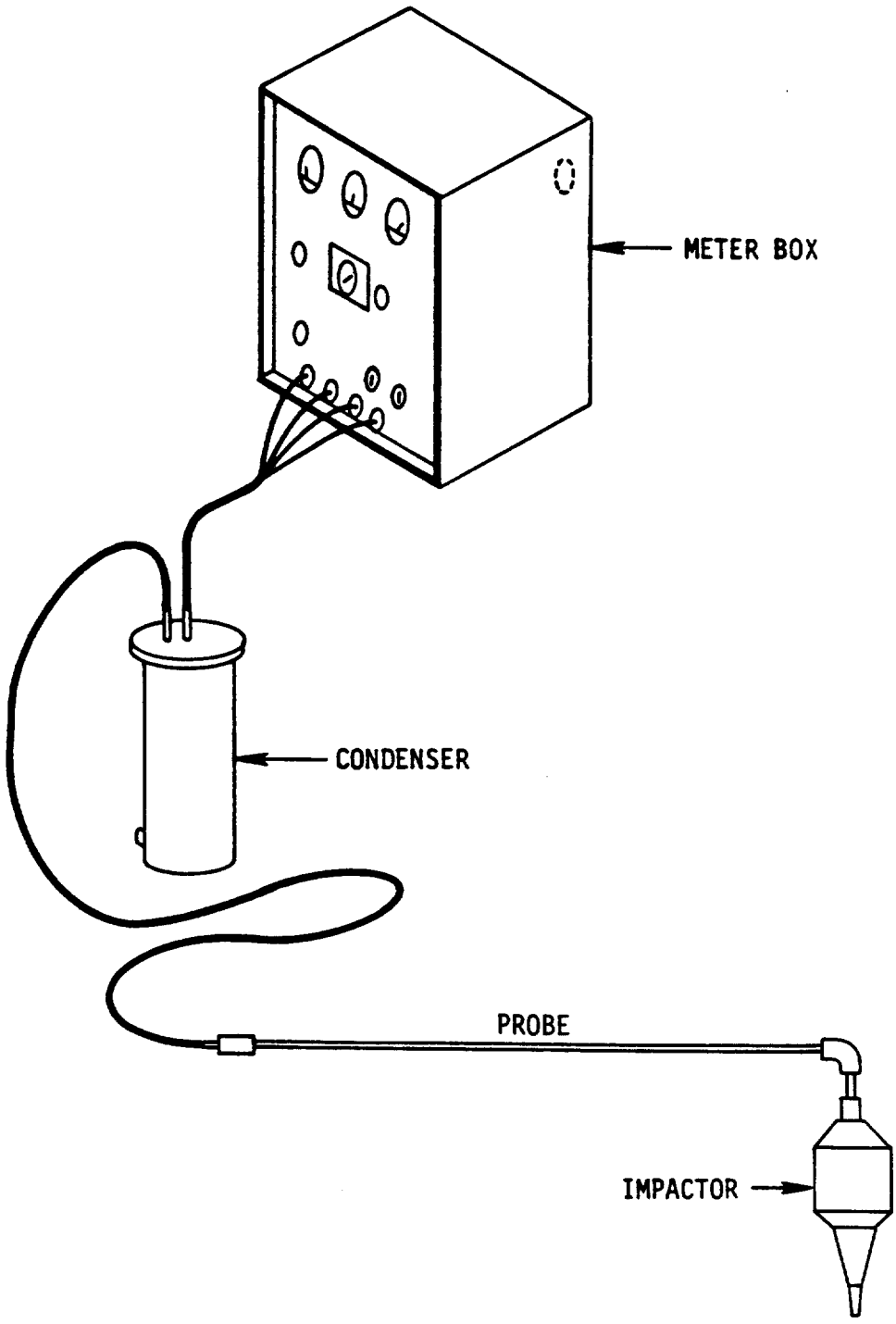


Figure D-5. Scrubber outlet particle size distribution sampling train.

Sample Recovery Procedures

After each test was completed, the impactor was removed from the probes and carefully moved (in an upright position) to the designated cleanup area. All data were recorded on the Impactor Recovery and Integrity Data Sheets. The impactor was recovered as follows:

Container No. 1 - The nozzle and inlet chamber were brushed and rinsed with acetone to remove particulate into a polyethylene container. After the container was sealed and labeled, the liquid level was marked.

Container Nos. 2 through 10 - Each filter was removed from its stage and carefully placed in a petri dish. Loose particulate from the bottom side of the previous stage plate, the Inconel spacer, the flat crossbar, and the top side of the plate directly under the filter was brushed into the same petri dish as the respective filter. Each petri dish was sealed and labeled.

Gravimetric Analysis Procedures

Gravimetric analysis was performed in the following manner:

Container No. 1 - The volume of the acetone rinse was measured and the rinse was transferred to a tared beaker. The sample was evaporated to dryness at ambient temperature and pressure, desiccated for 24 hours to a constant weight, and weighed to the nearest 0.1 mg.

Container No. 2 - Each glass-fiber filter was desiccated in its respective sample container for 24 hours to a constant weight and weighed to the nearest 0.1 mg on an analytical balance.

Data Reduction

Size distribution curves representing the total weight percentage of particulate matter smaller than the indicated aerodynamic particle diameter (in micrometers) were established for each run. Cumulative distribution curves representing the best-fit manual curve through test data points were depicted. Each data point was plotted by computer and indicates both the 50 percent effective cut-size of each impactor stage and the cumulative weight percentage of material collected in subsequent stages. All particle size results are based on a particle density of 1 g/cm^3. Data reduction and

intermediate result calculations were performed by CIDRS programs* with moisture contents and gas composition data obtained from the particulate/Cr^{+6} tests.

PROCESS SAMPLES

Grab samples of incinerator sludge feed, bottom ash, and scrubber water influent and effluent were collected during each test day. Samples were collected approximately every 30 minutes starting 1 hour prior to testing and continuing for 1 hour after testing was completed. Overall, samples were collected over an 8- to 10-hour period. Samples were placed in polyethylene containers (except for the sludge feed samples collected during the volatile and semivolatile tests, which were placed in amber glass jars).

Bottom ash samples were analyzed for Cr^{+6} by procedures similar to those used on the inlet particulate samples. Scrubber water samples were analyzed directly for Cr^{+6}. Any solids present in the water were filtered, and this solid fraction was extracted and analyzed for Cr^{+6}. Samples from each test day were analyzed for volatile, fixed, and total solids residue in accordance with procedures described in Methods 160.1, 160.3, and 160.4.*

Total Cr and metals content of select emission and process samples were determined by Neutron Activation Analysis.

---

* Methods of Chemical Analysis of Water and Wastes. EPA 600/4-79-020, March 1979.

APPENDIX E

CALIBRATION PROCEDURES AND RESULTS

APPENDIX E

CALIBRATION PROCEDURES AND RESULTS

All of the equipment used for these tests was calibrated according to the procedures outlined in Maintenance, Calibration, and Operation of Isokinetic Source-Sampling Equipment.*

NOZZLE DIAMETER

The nozzles were calibrated by making three separate measurements with different inside diameters and calculating the average. If a deviation of more than 0.002 inch was found, the nozzle was either discarded or reamed out and remeasured. A micrometer was used for measuring. These calibration data are shown in Figure E-1.

PITOT TUBE CALIBRATION

The pitot tubes used in sampling were constructed by PEI Associates, Inc., and met all requirements of EPA Method 2.** Therefore, a baseline coefficient of 0.84 was assigned to each pitot tube. Figures E-2 and E-3 present the alignment requirements of Method 2, and Figures E-4 through E-6 present actual calibration and inspection data of the pitot tubes used during the test program.

---

*Office of Air Programs Publication No. APTD-0576.

**40 CFR 60, Appendix A, Reference Method 2, July 1984.

NOZZLE CALIBRATION

Date 6/17/85 Calibrated by D Sakuyama

Nozzle identification number	D_1, in.	D_2, in.	D_3, in.	ΔD, in.	D_{avg}
4-108	.253	.252	.252	.001	.252
3-109 (outlet)	.194	.191	.193	.003	.193
8-108	.533	.530	.532	.003	.532
5-112 (inlet)	.320	.323	.322	.003	.322
inlet impacter	.155				
outlet "	.194				
6-113 (inlet)	.373	.374	.373	.001	.373

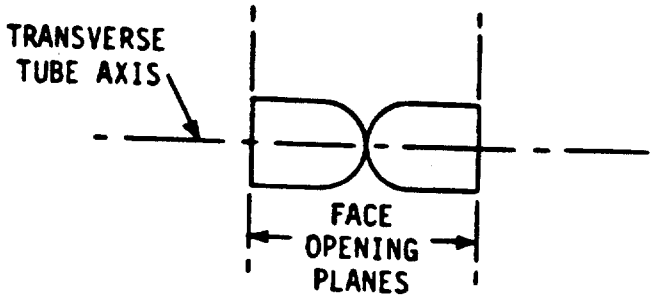
where:

$D_{1,2,3,}$ = nozzle diameter measured on a different diameter, in.
Tolerance = measure within 0.001 in.

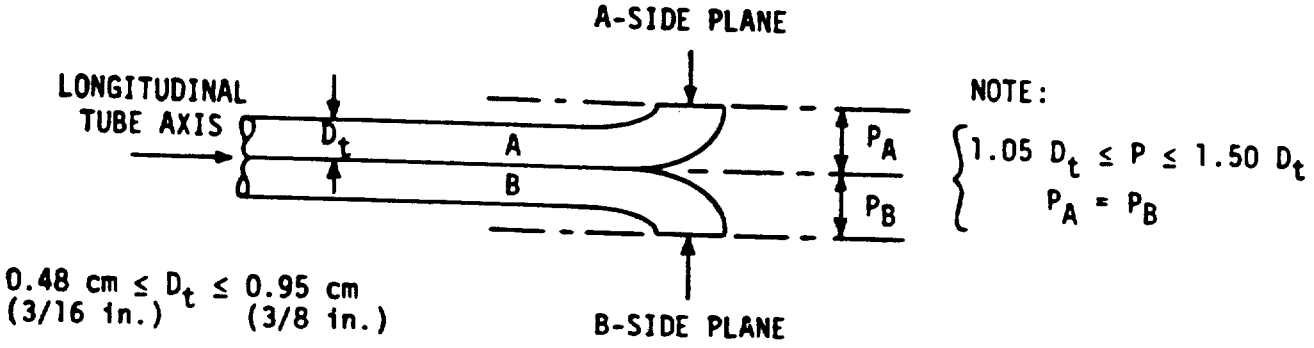
ΔD = maximum difference in any two measurements, in.
Tolerance = 0.004 in.

D_{avg} = average of D_1, D_2, and D_3.

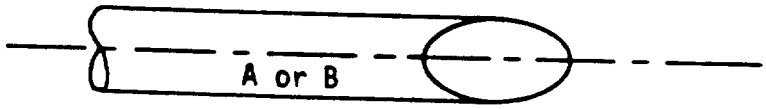
Figure E-1. Nozzle calibration data.



(a) ENDVIEW



(b)



(c)

Figure E-2. Properly constructed Type S pitot tube, shown in: (a) end view; face opening planes perpendicular to transverse axis; (b) top view; face opening planes parallel to longitudinal axis; (c) side view; both legs of equal length and centerlines coincident, when viewed from both sides. Baseline coefficient values of 0.84 may be assigned to pitot tubes constructed this way.

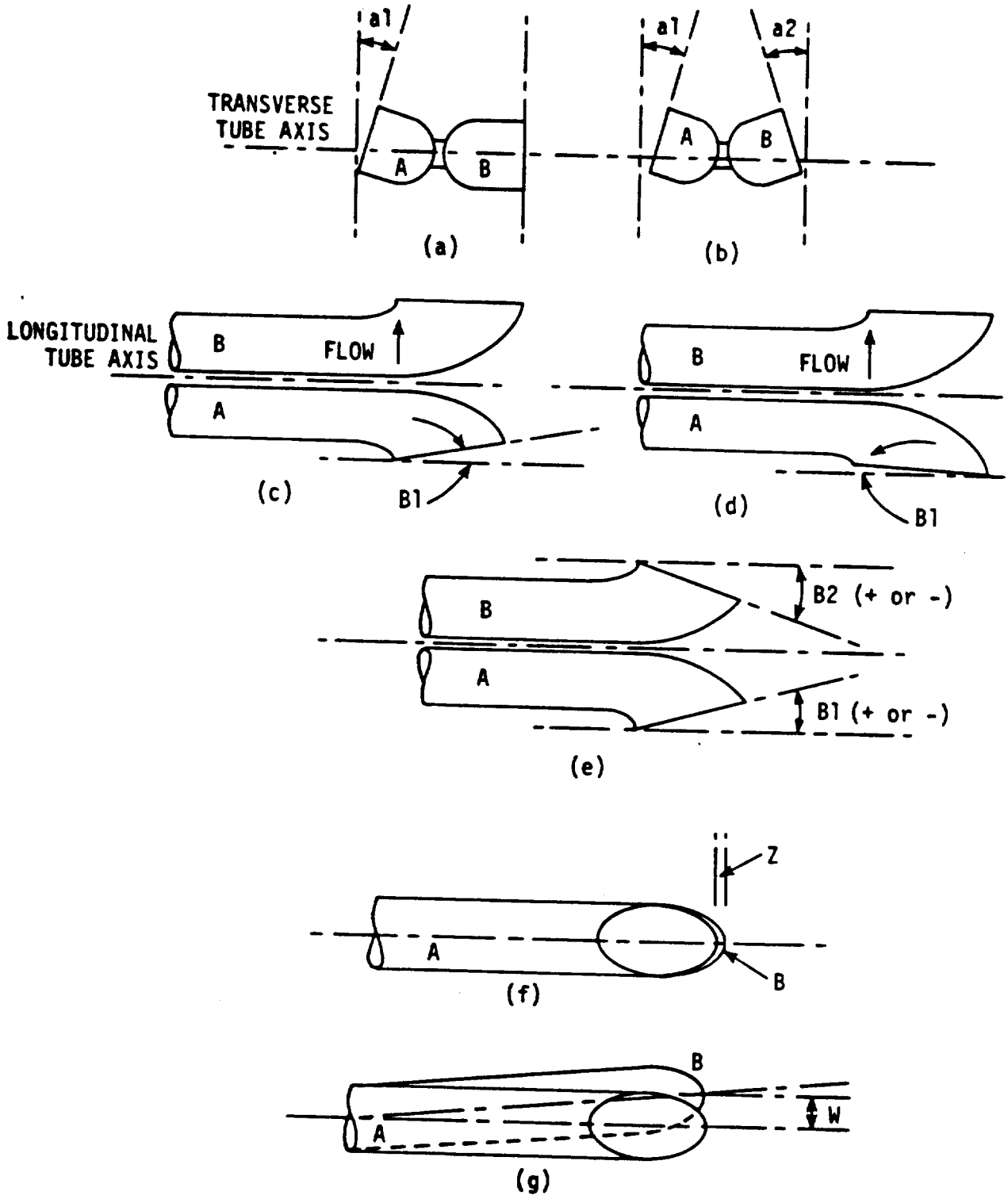


Figure E-3. Types of face-opening misalignment that can result from field use or improper construction of Type S pitot tubes. These will not affect Cp so long as a_1 and a_2 <10°, B_1 and B_2 <5°, z <0.32 (1/8 in.) and w <0.08 cm (1/32 in.).

PITOT TUBE INSPECTION DATA SHEET

Pitot Tube No. 247 (10 Root) Date 1-15-84 Inspector G. Thomas

α_1 Degrees	α_2 Degrees	β_1 Degrees	β_2 Degrees
0°	5°	0°	4°
<10°	<10°	<5°	<5°

D_t Inches	P Inches	1.05 D_t Inches	1.50 D_t Inches
.375	.827	.394	.563
$0.185 \leq P_t < 0.380$	-	-	-

γ Degrees	ϕ Degrees	P_{sin} (γ) Inches	P_{sin} (ϕ) Inches
2°	0°	.0239	0.000
-	-	<0.125	<0.03125

P_1 Inches	P_2 Inches	$\lvert P_1 - P_2 \rvert$ Inches	Meet specifications
.415	.412	.003	✓
1.05 D_t <P_1 <1.50 D_t	1.05 D_t <P_2 <1.50 D_t	$\leq$0.010	

Lower line in each table is limits for meeting specifications.

Figure E-4. Pitot Tube Inspection Sheet.

PITOT TUBE INSPECTION DATA SHEET

Pitot Tube No. 377 5 Feet Date 1-8-85 Inspector G Thrase

α_1 Degrees	α_2 Degrees	β_1 Degrees	β_2 Degrees
4°	2°	1°	1°
<10°	<10°	<5°	<5°

D_t Inches	P Inches	1.05 D_t Inches	1.50 D_t Inches
.377	1.63	.396	.565
$0.185 \leq P_t < 0.380$	-	-	-

γ Degrees	ϕ Degrees	P_{sin} (γ) Inches	P_{sin} (ϕ) Inches
1°	0°		0.000
-	-	<0.125	<0.03125

P_1 Inches	P_2 Inches	$\lvert P_1 - P_2 \rvert$ Inches	Meet specifications
.817	.813	.004	✓
$1.05\ D_t < P_1 < 1.50\ D_t$	$1.05\ D_t < P_2 < 1.50\ D_t$	≤ 0.010	

Lower line in each table is limits for meeting specifications.

Figure E-5. Pitot Tube Inspection Sheet.

PITOT TUBE INSPECTION DATA SHEET

Pitot Tube No. 403 6 Foot Date 1-8-85 Inspector G Thress

α_1 Degrees	α_2 Degrees	β_1 Degrees	β_2 Degrees
1°	1°	2°	1°
<10°	<10°	<5°	<5°

D_t Inches	P Inches	1.05 D_t Inches	1.50 D_t Inches
.375	1.001	.394	.563
$0.185 \leq P_t < 0.380$	-	-	-

γ Degrees	ϕ Degrees	P_{sin} (γ) Inches	P_{sin} (ϕ) Inches
0	0°	.0175	0.000
-	-	<0.125	<0.03125

P_1 Inches	P_2 Inches	$\lvert P_1 - P_2 \rvert$ Inches	Meet specifications
.501	.500	.001	✓
$1.05\ D_t < P_1 < 1.50\ D_t$	$1.05\ D_t < P_2 < 1.50\ D_t$	≤ 0.010	

Lower line in each table is limits for meeting specifications.

Figure E-6. Pitot Tube Inspection Sheet.

DRY GAS METER AND ORIFICE METER

Figure E-7 shows the setup used for the initial and post-test calibration. A wet-test meter with a 2-cubic-feet-per-minute capacity and ± 1 percent accuracy was used. The pump was run for approximately 15 minutes at an orifice manometer setting of 0.5 in.H_2O to heat up the pump and wet the interior surface of the wet-test meter. The information on Figure E-8 (example calculation sheet) was gathered for the initial calibration, after which the ratio of accuracy of the wet-test meter to the dry-test meter and the ΔH@ were calculated.

POST-TEST METER CALIBRATION CHECK

A post-test meter calibration check was made on the meter box used during the test to check its accuracy against its last calibration check. This post-test calibration must be within ± 5 percent of the initial calibration. The initial calibration was performed as described in APTD-0576. The same method was used for the post-test calibration as was used for the initial calibration. Three calibration runs were made with the average orifice setting obtained during the test series and with the vacuum set at the average value obtained during the test run. The post-test calibration check showed that all three runs were within the ± 5 percent range allowed by the EPA Method 5.*

The initial and post-test meter box calibration data are presented in Figures E-9 through E-16.

*40 CFR 60, Appendix A, Reference Method 5, July 1984.

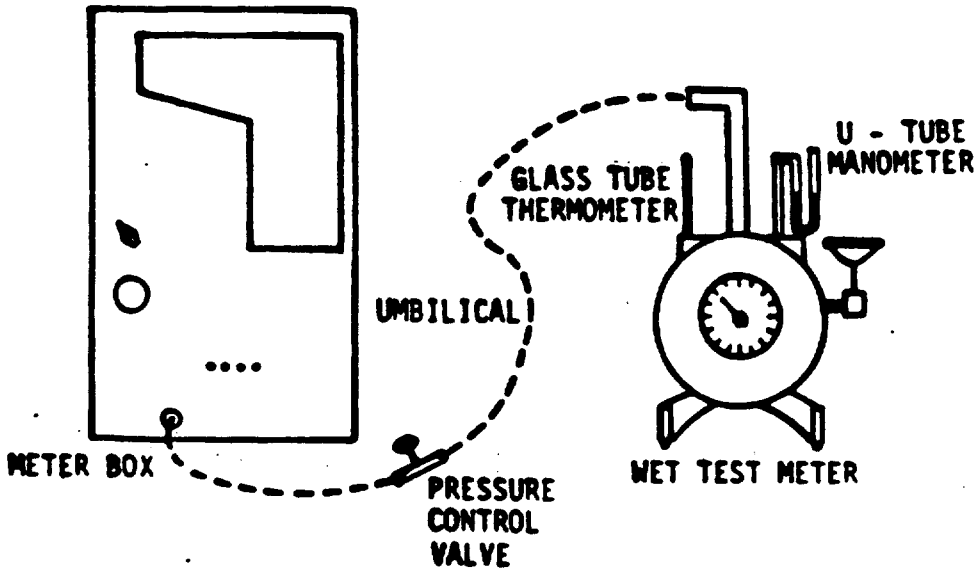


Figure E-7. Calibration setup.

DATE _____ METER BOX NO. _____

BAROMETRIC PRESSURE, P_b = _____ in. Hg. DRY GAS METER NO. _____

Orifice manometer setting ΔH in. H_2O	Gas volume wet test meter V_w, ft^3	Gas volume dry gas meter V_d, ft^3	Wet test meter t_w, °F	Dry gas meter Inlet t_{di}, °F	Dry gas meter outlet t_{do}, °F	Dry gas meter Average t_d, °F	Time θ, min	Y	ΔHθ
0.5	5								
1.0	5								
1.5	10								
2.0	10								
3.0	10								
4.0	10								

Average _____

ΔH	$\frac{\Delta H}{13.6}$	Y: $\frac{V_w P_b (t_d + 460)}{V_d (P_b + \frac{\Delta H}{13.6}) (t_w + 460)}$	ΔHθ: $\frac{0.0317\ \Delta H}{P_b (t_d + 460)} \left[\frac{(t_w + 460)\ \theta}{V_w}\right]^2$
0.5	0.0368		
1.0	0.0737		
1.5	0.110		
2.0	0.147		
3.0	0.221		
4.0	0.294		

Y = Ratio of accuracy of wet test meter to dry test meter. Tolerance = ± 0.01
ΔHθ = Orifice of pressure differential that gives 0.75 cfm of air at 70°F and 29.92 inches of mercury, in H_2). Tolerance = ±0.15.

Figure E-8. Calibration data sheet.

PARTICULATE SAMPLING METER BOX INITIAL CALIBRATION

DATE: 4-19-85 METER BOX NO. FB-3

CALIBRATOR: [signature] BAROMETRIC PRESSURE (P_b) 29.59 in. Hg

Leak Checks:

Positive (minimum 5 in. H_2O): ✓

Negative (within 3 in. Hg of absolute): .001 cfm* 26.5 in. Hg

*Not to exceed 0.005 cfm.

Orifice manometer setting ΔH in H_2O	Volume wet test meter V_w ft^3	Volume dry gas meter V_d ft^3	Temperatures: Wet test meter T_w °F	Dry gas meter: Inlet T_i °F	Dry gas meter: Outlet T_o °F	Dry gas meter: Average T_d °F	Duration of test θ min	Vacuum setting in Hg	Y	ΔH@ in H_2O
0.5	5	913.501	68.5	78	72	75.5	12:49/60	10	1.009	1.84
		918.516	68.5	79	73					
1.0	10	919.131	68.5	79	73	76.5	18:24/60	10	1.006	1.89
		929.197	68.5	80	74					
1.5	10	929.536	68.5	80	74	77.25	15:01/60	10	1.005	1.88
		939.614	68.5	81	74					
2.0	10	940.113	68.5	81	74	77.75	13:07/60	10	1.003	1.92
		950.803	68.5	82	74					
3.0	11	951.466	68.5	82	74	78.5	11:47/60	10	1.004	1.91
		962.596	68.5	83	75					
4.0	11	962.965	68.5	83	75	79	10:19/60	10	1.005	1.95
		974.020	68.5	83	75					
								Average	1.005	1.90

Y must not deviate by more than ±0.02 Y.
ΔH@ must not deviate by more than 0.15 in H_2O.

ΔH	Y: $\frac{(V_w)(P_b)(T_d + 460)}{(V_d)(P_b + \Delta H/13.6)(T_w + 460)}$	ΔH@: $\frac{(0.0317)(\Delta H)}{(P_b)(T_d + 460)}\left[\frac{(T_w + 460)(\theta)}{(V_w)}\right]^2$
0.5	$\frac{(5)(29.59)(535.5)}{(5.015)(29.63)(528.5)}$	$\frac{(.0317)(0.5)}{(29.59)(535.5)}\left[\frac{(528.5)(12.82)}{(5)}\right]^2$
1.0	$\frac{(10)(29.59)(536.5)}{(10.066)(29.66)(528.5)}$	$\frac{(.0317)(1.0)}{(29.59)(536.5)}\left[\frac{(528.5)(18.4)}{(10)}\right]^2$
1.5	$\frac{(10)(29.59)(537.25)}{(10.078)(29.70)(528.5)}$	$\frac{(.0317)(1.5)}{(29.59)(537.25)}\left[\frac{(528.5)(15.02)}{(10)}\right]^2$
2.0	$\frac{(10)(29.59)(537.75)}{(10.090)(29.74)(528.5)}$	$\frac{(.0317)(2.0)}{(29.59)(537.75)}\left[\frac{(528.5)(13.12)}{(10)}\right]^2$
3.0	$\frac{(11)(29.59)(538.5)}{(11.080)(29.81)(528.5)}$	$\frac{(.0317)(3.0)}{(29.59)(638.5)}\left[\frac{(528.5)(11.78)}{(11)}\right]^2$
4.0	$\frac{(11)(29.59)(539)}{(11.055)(29.88)(528.5)}$	$\frac{(.0317)(4.0)}{(29.59)(539)}\left[\frac{(528.5)(10.32)}{(11)}\right]^2$

Figure E-9. Meter box initial calibration.

PARTICULATE SAMPLING METER BOX INITIAL CALIBRATION

DATE: 12-27-84 METER BOX NO. FB-4

CALIBRATOR: JTW N BAROMETRIC PRESSURE (P_b) 25.50 in. Hg

Leak Checks:

Positive (minimum 5 in. H_2O): ✓

Negative (within 3 in. Hg of absolute): [illegible] cfm* [illegible] in. Hg

*Not to exceed 0.005 cfm.

Orifice manometer setting ΔH in H_2O	Volume wet test meter V_w ft^3	Volume dry gas meter V_d ft^3	Temperatures: Wet test meter T_w °F	Temperatures: Dry gas meter Inlet T_i °F	Temperatures: Dry gas meter Outlet T_o °F	Temperatures: Dry gas meter Average T_d °F	Duration of test θ min	Vacuum setting in Hg	Y	ΔHθ in H_2O
0.5	5.5	536.647	70.5	96	95	105	11.25	2	1.039	1.93
		542.150	70.5	96	95		20			
1.0	10	542.647	70.5	96	95	90.5	14.54	3	1.035	1.96
		552.150	70.5	96	85		20			
1.5	10	552.647	70.5	96	95	90.75	11.18	5	1.020	1.99
		562.770	70.5	96	86		20			
2.0	10	563.147	70.5	96	86	91	10.22	8	1.031	1.91
		573.156	70.5	96	86		20			
3.0	10	634.503	70.5	96	86	91.5	8.34	13	1.031	1.95
		644.516	70.5	97	86		20			
4.0	10	645.154	70.5	97	86	91.5	7.26	13	1.029	1.96
		655.156	70.5	97	87		20			

Y must not deviate by more than ±0.02 Y.
ΔHθ must not deviate by more than 0.15 in H_2O.

Average [illegible] 1.93

ΔH	Y: $\frac{(V_w)(P_b)(T_d + 460)}{(V_d)(P_b + \Delta H/13.6)(T_w + 460)}$	ΔHθ: $\frac{(0.0317)(\Delta H)}{(P_b)(T_d + 460)}\left[\frac{(T_w + 460)(\theta)}{(V_w)}\right]^2$
0.5	[illegible]	[illegible]
1.0	[illegible]	[illegible]
1.5	[illegible]	[illegible]
2.0	[illegible]	[illegible]
3.0	[illegible]	[illegible]
4.0	[illegible]	[illegible]

Figure E-10. Meter box initial calibration.

PARTICULATE SAMPLING METER BOX INITIAL CALIBRATION

DATE: 6-8-85 METER BOX NO. FB-10

CALIBRATOR: QJM BAROMETRIC PRESSURE (P_b) 29.34 in. Hg

Leak Checks:

_ Positive (minimum 5 in. H_2O): ✓

Negative (within 3 in. Hg of absolute): .005 cfm* 28.0 in. Hg

*Not to exceed 0.005 cfm.

Orifice manometer setting ΔH in H_2O	Volume wet test meter V_w ft^3	Volume dry gas meter V_d ft^3	Temperatures: Wet test meter T_w °F	Dry gas meter: Inlet T_i °F	Dry gas meter: Outlet T_o °F	Dry gas meter: Average T_d °F	Duration of test θ min	Vacuum setting in Hg	Y	ΔH@ in H_2O
0.5	5	117.467	71	84	79	81.75	12:31/60	10	.968	1.76
		122.732	71	84	80					
1.0	10	123.118	71	84	80	82.5	17:47/60	10	.965	1.78
		133.676	71	86	80					
1.5	10	134.104	71	86	80	83.75	14:26/60	10	.964	1.75
		144.686	71	87	82					
2.0	10	145.004	71	87	82	85.25	12:50/60	10	.962	1.84
		155.624	71	89	83					
3.0	10	156.319	71	89	83	86.5	10:24/60	10	.961	1.84
		166.949	71	90	84					
4.0	10	167.326	71	90	84	87	9:10/60	10	.959	1.87
		177.962	71	90	84					
								Average	.963	1.81

Y must not deviate by more than ±0.02 Y.

ΔH@ must not deviate by more than 0.15 in H_2O.

ΔH	Y: $\frac{(V_w)(P_b)(T_d+460)}{(V_d)(P_b+\Delta H/13.6)(T_w+460)}$	ΔH@: $\frac{(0.0317)(\Delta H)}{(P_b)(T_d+460)}\left[\frac{(T_w+460)(\theta)}{(V_w)}\right]^2$
0.5	$\frac{(5)(29.34)(541.75)}{(5.265)(29.38)(531)}$	$\frac{(.0317)(0.5)}{(29.34)(541.75)}\left[\frac{(531)(12.52)}{(5)}\right]^2$
1.0	$\frac{(10)(29.34)(542.5)}{(10.558)(29.41)(531)}$	$\frac{(.0317)(1.0)}{(29.34)(542.5)}\left[\frac{(531)(17.78)}{(10)}\right]^2$
1.5	$\frac{(10)(29.34)(543.75)}{(10.582)(29.45)(531)}$	$\frac{(.0317)(1.5)}{(29.34)(543.75)}\left[\frac{(531)(14.43)}{(10)}\right]^2$
2.0	$\frac{(10)(29.34)(545.25)}{(10.600)(29.49)(531)}$	$\frac{(.0317)(2.0)}{(29.34)(545.25)}\left[\frac{(531)(12.53)}{(10)}\right]^2$
3.0	$\frac{(10)(29.34)(546.5)}{(10.630)(29.56)(531)}$	$\frac{(.0317)(3.0)}{(29.34)(546.5)}\left[\frac{(531)(10.48)}{(10)}\right]^2$
4.0	$\frac{(10)(29.34)(547)}{(10.636)(29.63)(531)}$	$\frac{(.0317)(4.0)}{(29.34)(547)}\left[\frac{(531)(9.17)}{(10)}\right]^2$

Figure E-11. Meter box initial calibration.

PARTICULATE SAMPLING METER BOX INITIAL CALIBRATION

DATE: 5-4-85 METER BOX NO. FB-11

CALIBRATOR: [signature] BAROMETRIC PRESSURE (P_b) 29.66 in. Hg

Leak Checks:

Positive (minimum 5 in. H_2O):

Negative (within 3 in. Hg of absolute): .000 cfm* 27.0 in. Hg

*Not to exceed 0.005 cfm.

Orifice manometer setting ΔH in H_2O	Volume wet test meter V_w ft^3	Volume dry gas meter V_d ft^3	Temperatures: Wet test meter T_w °F	Dry gas meter: Inlet T_i °F	Dry gas meter: Outlet T_o °F	Dry gas meter: Average T_d °F	Duration of test θ min	Vacuum setting in Hg	Y	ΔH@ in H_2O
0.5	5	488.003 492.814	71 71	90 90	74 75	82.25	10:09/60	10	1.060	1.15
1.0	10	493.538 503.179	71 71	90 91	75 75	82.75	14:25/60	10	1.057	1.15
1.5	10	503.835 513.521	71 70.5	91 92	75 76	83.5	11:26/60	10	1.053	1.09
2.0	10	513.935 523.634	70.5 70.5	92 94	76 76	84.5	10:09/60	10	1.053	1.14
3.0	10	524.221 533.974	70.5 70.5	94 96	76 78	86	8:20/60	10	1.048	1.15
4.0	10	534.566 544.357	70.5 70.5	96 96	78 78	87	7:18/60	10	1.043	1.17
								Average	1.052	1.14

Y must not deviate by more than ±0.02 Y.
ΔH@ must not deviate by more than 0.15 in H_2O.

ΔH	$Y = \frac{(V_w)(P_b)(T_d + 460)}{(V_d)(P_b + \Delta H/13.6)(T_w + 460)}$	$\Delta H@ = \frac{(0.0317)(\Delta H)}{(P_b)(T_d + 460)}\left[\frac{(T_w + 460)(\theta)}{(V_w)}\right]^2$
0.5	$\frac{(5)(29.66)(542.25)}{(4.811)(29.70)(531)}$	$\frac{(.0317)(0.5)}{(29.66)(542.25)}\left[\frac{(531)(10.15)}{(5)}\right]^2$
1.0	$\frac{(10)(29.66)(542.75)}{(9.651)(29.73)(531)}$	$\frac{(.0317)(1.0)}{(29.66)(542.75)}\left[\frac{(531)(14.42)}{(10)}\right]^2$
1.5	$\frac{(10)(29.66)(543.5)}{(9.686)(29.77)(530.75)}$	$\frac{(.0317)(1.5)}{(29.66)(543.5)}\left[\frac{(530.75)(11.43)}{(10)}\right]^2$
2.0	$\frac{(10)(29.66)(544.5)}{(9.699)(29.81)(530.5)}$	$\frac{(.0317)(2.0)}{(29.66)(544.5)}\left[\frac{(530.5)(10.15)}{(10)}\right]^2$
3.0	$\frac{(10)(29.66)(546)}{(9.753)(29.98)(530.5)}$	$\frac{(.0317)(3.0)}{(29.66)(546)}\left[\frac{(530.5)(8.33)}{(10)}\right]^2$
4.0	$\frac{(10)(29.66)(547)}{(9.791)(29.95)(530.5)}$	$\frac{(.0317)(4.0)}{(29.66)(547)}\left[\frac{(530.5)(7.30)}{(10)}\right]^2$

Figure E-12. Meter box initial calibration.

PARTICULATE SAMPLING METER BOX
POST-TEST CALIBRATION

DATE: 7-2-85

METER BOX NO. FB-3

BAROMETRIC PRESSURE (P_{bar}): 29.49 in. Hg

PRETEST Y: 1.005 ΔH@: 1.90

PLANT: Detroit Water & Sewer Dept.

PROJECT NO. 3615-14

PROJECT MANAGER: C. Bruffey

CALIBRATOR: JWM

Orifice manometer setting * ΔH in. H_2O	Wet test meter volume V_w ft^3	Dry gas meter volume V_d ft^3	Temperatures: Wet test meter T_w °F	Temperatures: Dry gas meter Inlet T_{di} °F	Temperatures: Dry gas meter Outlet T_{di} °F	Temperatures: Dry gas meter Average T_d °F	Vacuum setting ** in. Hg	Duration of run Ø min	Y	ΔH@
1.2	10	118.904	68	82	73	77.75	10	16:15/60	1.053	1.77
		128.549	68	82	74					
1.2	10	128.549	68	82	74	78.5	10	16:16/60	1.055	1.77
		138.189	68	83	75					
1.2	10	138.189	68	83	75	79	10	16:19/60	1.055	1.78
		147.834	68	83	75					
								Post-test average***	1.054	1.77

Y	ΔH@
$\frac{(V_w)(P_{bar})(T_d + 460)}{(V_d)(P_{bar} + \Delta H/13.6)(T_w + 460)}$	$\frac{(0.0317)(\Delta H)}{(P_{bar})(T_d + 460)}\left[\frac{(T_w + 460)(\text{Ø})}{(V_w)}\right]^2$
$\frac{(10)(29.49)(537.75)}{(9.645)(29.58)(528)}$	$\frac{(.0317)(1.2)}{(29.49)(537.75)}\left[\frac{(528)(16.25)}{10}\right]^2$
$\frac{(10)(29.49)(538.5)}{(9.640)(29.58)(528)}$	$\frac{(.0317)(1.2)}{(29.49)(538.5)}\left[\frac{(528)(16.27)}{10}\right]^2$
$\frac{(10)(29.49)(539)}{(9.645)(29.58)(528)}$	$\frac{(.0317)(1.2)}{(29.49)(539)}\left[\frac{(528)(16.32)}{10}\right]^2$

*To be the average ΔH used during the test series.
**To be the highest vacuum used during the test series.
***Post-test γ must be within the range, pre-test γ ±0.05γ
Post-test ΔH@ must be within the range, pre-test ΔH@ ±0.15

Figure E-13. Meter box post-test calibration.

PARTICULATE SAMPLING METER BOX
POST-TEST CALIBRATION

DATE: 7-1-85

METER BOX NO. FB-4

BAROMETRIC PRESSURE (P_{bar}): 29.56 in. Hg

PRETEST Y: 1.033 ΔH@: 1.23

PLANT: Detroit Water + Sewer Dept.

PROJECT NO. 3615-14

PROJECT MANAGER: C. Bruffey

CALIBRATOR: JWA

Orifice manometer setting * ΔH in. H_2O	Wet test meter volume V_w ft^3	Dry gas meter volume V_d ft^3	Temperatures: Wet test meter T_w °F	Temperatures: Dry gas meter Inlet T_{di} °F	Temperatures: Dry gas meter Outlet T_{di} °F	Temperatures: Dry gas meter Average T_d °F	Vacuum setting ** in. Hg	Duration of run θ min	Y	ΔH@
0.35	5	10.046	68	86	80	83.25	5	12:$\frac{18}{60}$	1.069	1.17
		14.852	68	87	80					
0.35	5	14.852	68	87	80	83.75	5	12:$\frac{17}{60}$	1.068	1.16
		19.668	68	88	80					
0.35	5	19.668	68	88	80	84.25	5	12:$\frac{18}{60}$	1.069	1.16
		24.485	68	88	81					
								Post-test average***	1.069	1.16

Y	ΔH@
$\frac{(V_w)(P_{bar})(T_d + 460)}{(V_d)(P_{bar} + \Delta H/13.6)(T_w + 460)}$	$\frac{(0.0317)(\Delta H)}{(P_{bar})(T_d + 460)}\left[\frac{(T_w + 460)(\theta)}{(V_w)}\right]^2$
$\frac{(5)(29.56)(543.25)}{(4.806)(29.59)(528)}$	$\frac{(0317)(0.35)}{(29.56)(543.25)}\left[\frac{(528)(12.30)}{(5)}\right]^2$
$\frac{(5)(29.56)(543.75)}{(4.816)(29.59)(528)}$	$\frac{(0317)(0.35)}{(29.56)(543.75)}\left[\frac{(528)(12.28)}{(5)}\right]^2$
$\frac{(5)(29.56)(544.25)}{(4.817)(29.59)(528)}$	$\frac{(.0317)(0.35)}{(29.56)(544.25)}\left[\frac{(528)(12.30)}{(5)}\right]^2$

*To be the average ΔH used during the test series.
**To be the highest vacuum used during the test series.
***Post-test Y must be within the range, pre-test Y ±0.05Y
Post-test ΔH@ must be within the range, pre-test ΔH@ ±0.15

Figure E-14. Meter box post-test calibration.

PARTICULATE SAMPLING METER BOX
POST-TEST CALIBRATION

DATE: 7-1-85

BAROMETRIC PRESSURE (P_{bar}): 29.56 in. Hg

PLANT: Detroit Water + Sewer Dept.

PROJECT MANAGER: C. Bruffey

METER BOX NO. FB-10

PRETEST Y: .963 ΔH@: 1.81

PROJECT NO. 3615.14

CALIBRATOR: Gum

Orifice manometer setting * ΔH in. H_2O	Wet test meter volume V_w ft^3	Dry gas meter volume V_d ft^3	Temperatures: Wet test meter T_w °F	Temperatures: Dry gas meter Inlet T_{di} °F	Temperatures: Dry gas meter Outlet T_{di} °F	Temperatures: Dry gas meter Average T_d °F	Vacuum setting ** in. Hg	Duration of run Ø min	Y	ΔH@
0.08	5	636.974	68	80	76	78.5	1	33:02/60	.954	1.94
		642.316	68	80	78					
0.08	5	642.316	68	80	78	79	1	33:19/60	.955	1.97
		647.660	68	80	78					
0.08	5	647.660	68	80	78	79.5	1	33:26/60	.956	1.98
		653.002	68	80	80					
								Post-test average***	.955	1.96

Y	ΔH@
$\frac{(V_w)(P_{bar})(T_d + 460)}{(V_d)(P_{bar} + \Delta H/13.6)(T_w + 460)}$	$\frac{(0.0317)(\Delta H)}{(P_{bar})(T_d + 460)}\left[\frac{(T_w + 460)(\text{Ø})}{(V_w)}\right]^2$
$\frac{(5)(29.56)(538.5)}{(5.342)(29.57)(528)}$	$\frac{(.0317)(0.08)}{(29.56)(538.5)}\left[\frac{(528)(33.03)}{(5)}\right]^2$
$\frac{(5)(29.56)(539)}{(5.344)(29.57)(528)}$	$\frac{(.0317)(0.08)}{(29.56)(539)}\left[\frac{(528)(33.32)}{(5)}\right]^2$
$\frac{(5)(29.56)(539.5)}{(5.342)(29.57)(528)}$	$\frac{(.0317)(0.08)}{(29.56)(539.5)}\left[\frac{(528)(33.43)}{(5)}\right]^2$

*To be the average ΔH used during the test series.
**To be the highest vacuum used during the test series.
***Post-test Y must be within the range, pre-test Y ±0.05Y
Post-test ΔH@ must be within the range, pre-test ΔH@ ±0.15

Figure E-15. Meter box post-test calibration.

PARTICULATE SAMPLING METER BOX
POST-TEST CALIBRATION

DATE: 7-1-85
METER BOX NO. FB-11
BAROMETRIC PRESSURE (P_{bar}): 29.56 in. Hg
PRETEST Y: 1.052 ΔH@: 1.14
PLANT: Detroit Water & Sewer Dept.
PROJECT NO. 3615-14
PROJECT MANAGER: C. Bruffey
CALIBRATOR: [illegible]

Orifice manometer setting * ΔH in. H_2O	Wet test meter volume V_w ft^3	Dry gas meter volume V_d ft^3	Temperatures: Wet test meter T_w °F	Temperatures: Dry gas meter Inlet T_{di} °F	Temperatures: Dry gas meter Outlet T_{di} °F	Temperatures: Dry gas meter Average T_d °F	Vacuum setting ** in. Hg	Duration of run Ø min	Y	ΔH@
1.2	10	166.873	68	80	70	77.25	10	13.08/60	1.078	1.15
		176.283	68	86	73					
1.2	10	176.283	68	86	73	80.25	10	13.08/60	1.084	1.14
		185.694	68	88	74					
1.2	10	185.694	68	88	74	81.5	10	13.09/60	1.088	1.15
		195.089	68	90	74					
								Post-test average***	1.083	1.15

Y	ΔH@
$\frac{(V_w)(P_{bar})(T_d + 460)}{(V_d)(P_{bar} + \Delta H/13.6)(T_w + 460)}$	$\frac{(0.0317)(\Delta H)}{(P_{bar})(T_d + 460)}\left[\frac{(T_w + 460)(\text{Ø})}{(V_w)}\right]^2$
$\frac{(10)(29.56)(537.25)}{(9.410)(29.65)(528)}$	$\frac{(.0317)(1.2)}{(29.56)(537.25)}\left[\frac{(528)(13.13)}{(10)}\right]^2$
$\frac{(10)(29.56)(540.25)}{(9.411)(29.65)(528)}$	$\frac{(.0317)(1.2)}{(29.56)(540.25)}\left[\frac{(528)(13.13)}{(10)}\right]^2$
$\frac{(10)(29.56)(541.5)}{(9.395)(29.65)(528)}$	$\frac{(.0317)(1.2)}{(29.56)(541.5)}\left[\frac{(528)(13.15)}{(10)}\right]^2$

*To be the average ΔH used during the test series.
**To be the highest vacuum used during the test series.
***Post-test Y must be within the range, pre-test Y ±0.05Y
Post-test ΔH@ must be within the range, pre-test ΔH@ ±0.15

Figure E-16. Meter box post-test calibration.

THERMOCOUPLES

Thermocouples were calibrated by comparison against an ASTM-2F thermometer at approximately 32°F, ambient temperature, 100°F, and 500°F. The thermocouples read within 1.5 percent of the reference thermometer throughout the entire range when expressed in degrees Rankine. If the thermocouple did not read within 1.5 percent, a correction formula based on a least-squares analysis of the data was utilized. The thermocouple was checked at ambient temperature at the test site to verify the calibration. Calibration data are presented in Figures E-17 through E-20.

IMPINGER THERMOCOUPLES

These thermocouples were calibrated against an ASTM-3F thermometer at ambient temperature and approximately 32°F. All impinger thermocouples were within the required limit of a difference of no more than ± 2°F at both points. The calibration data are presented in Figures E-21 and E-22.

DIGITAL INDICATOR FOR THERMOCOUPLE READOUT

The digital indicator was calibrated by feeding a series of millivolt signals to the input and comparing the indicator reading with the reading the signal should have generated. Error did not exceed 0.5 percent when the temperatures were expressed in degrees Rankine. Calibration data are shown in Figures E-23 through E-25.

DRY GAS THERMOMETERS

The dry gas thermometers were calibrated by comparison against an ASTM-2F thermometer at approximately 32°F, at ambient temperature, and at approximately 110°F. The thermometers agreed within 5°F of the reference thermometer. Prior to the test series, the thermometers were checked at ambient

THERMOCOUPLE CALIBRATION DATA SHEET

Date: 1-9-85 Thermocouple No.: 147

Calibrator: QWN Reference: ASTM-3F

Range:

Reference point No.	Source,*	Reference thermometer temperature, °F	Thermocouple temperature, °F	Difference, %**
1	2	73	73	0
2	1	32	32	0
3	3	200	201	0.15
4	4	476	476	0

*Source: 1) Ice Bath
2) Ambient
3) Water Bath
4) Oil Bath

**Percent difference

$$\frac{\text{Reference temp. °R - thermocouple temp. °R}}{\text{(Reference temp. °R)}} \times 100\%$$

where °R = °F + 460

Each percent difference must be less than or equal to 1.5%.

Figure E-17. Thermocouple Calibration Sheet.

THERMOCOUPLE CALIBRATION DATA SHEET

Date: 1-4-85 Thermocouple No.: 178

Calibrator: [illegible] Reference: ASTM-3F

Range:

Reference point No.	Source,*	Reference thermometer temperature, °F	Thermocouple temperature, °F	Difference, %**
1	2	76	75	0.19
2	1	33	33	0
3	3	200	200	0
4	4	470	472	-0.22

*Source: 1) Ice Bath
2) Ambient
3) Water Bath
4) Oil Bath

**Percent difference

$$\frac{\text{Reference temp. °R - thermocouple temp. °R}}{\text{(Reference temp. °R)}} \times 100\%$$

where °R = °F + 460

Each percent difference must be less than or equal to 1.5%.

Figure E-18. Thermocouple Calibration Sheet.

THERMOCOUPLE CALIBRATION DATA SHEET

Date: 1-9-85 Thermocouple No.: 257

Calibrator: GWN Reference: ASTM-3F

Range:

Reference point No.	Source,*	Reference thermometer temperature, °F	Thermocouple temperature, °F	Difference, %**
1	2	72	71	0.19
2	1	32	32	0
3	3	200	200	0
4	4	480	479	0.11

*Source: 1) Ice Bath
2) Ambient
3) Water Bath
4) Oil Bath

**Percent difference

$$\frac{\text{Reference temp. °R - thermocouple temp. °R}}{\text{(Reference temp. °R)}} \times 100\%$$

where °R = °F + 460

Each percent difference must be less than or equal to 1.5%.

Figure E-19. Thermocouple Calibration Sheet.

THERMOCOUPLE CALIBRATION DATA SHEET

Date: 12-27-84 Thermocouple No.: I-7

Calibrator: [illegible] Reference: ASTM-3F

Range: _____

Reference point No.	Source,*	Reference thermometer temperature, °F	Thermocouple temperature, °F	Difference, %**
1	2	72	72	0
2	1	32	33	-0.20
3	3	190	192	-0.31
4	4	470	473	-0.32

*Source: 1) Ice Bath
2) Ambient
3) Water Bath
4) Oil Bath

**Percent difference

$$\frac{\text{Reference temp. °R} - \text{thermocouple temp. °R}}{(\text{Reference temp. °R})} \times 100\%$$

where °R = °F + 460

Each percent difference must be less than or equal to 1.5%.

Figure E-20. Thermocouple Calibration Sheet.

IMPINGER THERMOCOUPLE

CALIBRATION DATA SHEET

Date: 8-26-84 Thermocouple No: I-1

Calibrator: Daniel E. Fitzgerald Reference: ASTM-3F

Reference point No.	Source*	Reference thermometer temperature F	Thermocouple temperature F	Difference F**
1	1	72	72	0
2	2	32	33	1

*Source: 1) Ambient
2) Ice bath

**Difference must be less than ±2 F at both points

Figure E-21. Impinger Thermocouple Calibration Sheet.

THERMOCOUPLE CALIBRATION DATA SHEET

Date: 12-27-84 Thermocouple No.: I-9

Calibrator: Quinn Reference: ASTM-3F

Range:

Reference point No.	Source,*	Reference thermometer temperature, °F	Thermocouple temperature, °F	Difference, %**
1	2	72	72	0
2	1	32	33	-0.20
3	3	190	192	-0.31
4	4	470	473	-0.32

*Source: 1) Ice Bath
2) Ambient
3) Water Bath
4) Oil Bath

**Percent difference

$$\frac{\text{Reference temp. °R} - \text{thermocouple temp. °R}}{(\text{Reference temp. °R})} \times 100\%$$

where °R = °F + 460

Each percent difference must be less than or equal to 1.5%.

Figure E-22. Impinger Thermocouple Calibration Sheet.

THERMOCOUPLE DIGITAL INDICATOR
CALABRATION DATA SHEET

Date 5/1/84 Indicator No. 126 Operator J Meese

Mfg. Name Newport Serial No. 9450241-10 Cal. device No. 103

Test Point No.	Millivolt signal*	Equivalent temperature, °F*	Digital indicator temperature reading, °F	Difference, %
1	0.000	32°	30°	.41
2	3.819	200°	200°	.00
3	11.472	540°	538°	.20
4	26.834	1194°	1195°	-.06

Percent difference must be less than or equal to 0.5%.

Percent difference:

$$\frac{(\text{Equivalent temperature °R} - \text{Digital indicator temperature reading °R})(100\%)}{(\text{Equivalent temperature °R})}$$

Where °R = °F + 460°F

* These values are to be obtained from the calibration data sheet for the calibration device.

Figure E-23. Digital Indicator Calibration Sheet.

THERMOCOUPLE DIGITAL INDICATOR
CALABRATION DATA SHEET

Date 8-22-84 Indicator No. 220 Operator [signature]

Mfg. Name Newport Serial No. 8393464-10 Cal. device No. 103

Test Point No.	Millivolt signal*	Equivalent temperature, °F*	Digital indicator temperature reading, °F	Difference, %
1	0.000	32	34	-0.43
2	3.819	200	203	-0.45
3	11.472	540	538	0.20
4	26.834	1194	1192	0.12

Percent difference must be less than or equal to 0.5%.

Percent difference:

$$\frac{(\text{Equivalent temperature } °R - \text{Digital indicator temperature reading } °R)(100\%)}{(\text{Equivalent temperature } °R)}$$

Where °R = °F + 460°F

* **These values are to be obtained from the calibration data sheet for the calibration device.**

Figure E-24. Digital Indicator Calibration Sheet.

THERMOCOUPLE DIGITAL INDICATOR
CALABRATION DATA SHEET

Date 12-29-83 Indicator No. 262 Operator Daniel E. Fitzgerald

Mfg. Name NEWPORT Serial No. 1130666-43 Cal. device No. 103

Test Point No.	Millivolt signal*	Equivalent temperature, °F*	Digital indicator temperature reading, °F	Difference, %
1	0.000	32	30	0.41
2	3.819	200	201	-0.15
3	11.472	540	539	0.10
4	26.834	1194	1195	-0.06

Percent difference must be less than or equal to 0.5%.

Percent difference:

$$\frac{(\text{Equivalent temperature } °R - \text{Digital indicator temperature reading } °R)(100\%)}{(\text{Equivalent temperature } °R)}$$

Where °R = °F + 460°F

* These values are to be obtained from the calibration data sheet for the calibration device.

Figure E-25. Digital Indicator Calibration Sheet.

temperature to verify calibration. Calibration data are included in Figures E-26 through E-29.

TRIP BALANCE

The trip balance was calibrated by comparison with Class-S standard weight and agreed within 0.5 g. Calibration data are shown in Figure E-30.

BAROMETER

The field barometer was calibrated to within 0.1 in.Hg of an NBS traceable mercury-in-glass barometer before each test series. The field barometer was checked against the mercury-in-glass barometer after the test series to determine if it read within 0.2 in.Hg. If it did not, a correction factor was determined for the last test series. Calibration data are shown in Figure E-31.

ORSAT ANALYZER

The Orsat analyzer was calibrated before the test series by determining the percentages of carbon dioxide and oxygen in a calibration gas containing known percentages of each. The analyzer read within 0.5 percent of the known value for each gas. Calibration data are shown in Figures E-32 and E-33.

DRY GAS THERMOMETER CALIBRATION DATA SHEET

Date: 8-26-84 Meter Box No.: FB# 3

Calibrator: David F. Fitzgerald Reference: ASTM-3F

Inlet

Reference point No.	Source *	Reference thermometer temperature, °F	Dry gas thermometer temperature, °F	Difference, °F**
1	2	71	70	1
2	1	34	32	2
3	3	114	115	1

Outlet

Reference point No.	Source *	Reference thermometer temperature, °F	Dry gas thermometer temperature, °F	Difference, °F**
1	2	71	70	1
2	1	34	32	2
3	3	114	114	0

*Source: 1) Ice bath
2) Ambient
3) Water bath

**Difference must be less than or equal to ±5°F.

Figure E-26. Dry Gas Thermometer Calibration Sheet.

DRY GAS THERMOMETER CALIBRATION DATA SHEET

Date: 8-26-84 Meter Box No.: FB4

Calibrator: [signature] Reference: ASTM-3F

Inlet

Reference point No.	Source*	Reference thermometer temperature, °F	Dry gas thermometer temperature, °F	Difference, °F**
1	2	68	67	1
2	1	32	31	1
3	3	116	113	3

Outlet

Reference point No.	Source*	Reference thermometer temperature, °F	Dry gas thermometer temperature, °F	Difference, °F**
1	2	68	67	1
2	1	32	32	0
3	3	116	115	1

*Source: 1) Ice bath
2) Ambient
3) Water bath

**Difference must be less than or equal to ±5°F.

Figure E-27. Dry Gas Thermometer Calibration Sheet.

DRY GAS THERMOMETER CALIBRATION DATA SHEET

Date: 1-2-84 Meter Box No.: FB-10

Calibrator: JWN Reference: ASTM-3F

Inlet

Reference point No.	Source*	Reference thermometer temperature, °F	Dry gas thermometer temperature, °F	Difference, °F**
1	2	75	74	-1
2	1	32	32	0
3	3	196	196	0

Outlet

Reference point No.	Source*	Reference thermometer temperature, °F	Dry gas thermometer temperature, °F	Difference, °F**
1	2	75	75	0
2	1	32	32	0
3	3	196	196	0

*Source: 1) Ice bath
2) Ambient
3) Water bath

**Difference must be less than or equal to ±5°F.

Figure E-28. Dry Gas Thermometer Calibration Sheet.

DRY GAS THERMOMETER CALIBRATION DATA SHEET

Date: 12-28-84 Meter Box No.: FB-11

Calibrator: JWN Reference: ASTM-3F

Inlet

Reference point No.	Source *	Reference thermometer temperature, °F	Dry gas thermometer temperature, °F	Difference, °F**
1	2	75	74	1
2	1	34	33	1
3	3	178	177	1

Outlet

Reference point No.	Source *	Reference thermometer temperature, °F	Dry gas thermometer temperature, °F	Difference, °F**
1	2	75	77	2
2	1	34	35	1
3	3	178	174	4

*Source: 1) Ice bath
2) Ambient
3) Water bath

**Difference must be less than or equal to ±5°F.

Figure E-29. Dry Gas Thermometer Calibration Sheet.

TRIP BALANCE CALIBRATION DATA SHEET

Balance No.	Date	Calibrator	Mass determined for					
			5 g	Error	50 g	Error	100 g	Error
418	4/2/84	D Thress	4.98	.02	50.00	.00	100.05	.05
Mettler 743985	7-2-84	D Thress	4.99	-.01	50.01	.01	100.00	.00
194	11-26-84	Joe Frisa	5.00	0.00	49.72	0.28	99.55	0.45
196	11-26-84	Joe Frisa	5.00	0.00	49.85	0.15	99.90	0.10
396	11-26-84	Joe Frisa	5.13	0.10	50.22	0.22	100.00	0.00

Error must not exceed 0.5 grams at each point.

Figure E-30. Trip Balance Calibration Sheet.

BAROMETER CALIBRATION LOG

BAROMETER NO.	408	406	406	406	406	227	407
PRETEST	Vost 3655-12	Vally Mt. 5374	Venner 5302	Detroit 7615-14	MGD 5386	3M 5388	BF Goodrich 5359
BAROMETER READING	29.32	29.25	29.48	29.41	29.48	29.42	29.37
REFERENCE BAROMETER READING	29.32	29.27	29.46	29.43	29.49	29.44	29.37
DIFFERENCE*	.00	.02	.02	.02	.01	.02	.00
DATE	5-2-85	5-17-85	6-7-85	6-15-85	7-2-85	7-3-85	7-9-85
CALIBRATOR	JF	GJ	GJ	Jwn	GJ	GJ	Jwn

POST-TEST

BAROMETER READING	29.54	29.42	29.41	29.48	29.50		
REFERENCE BAROMETER READING	29.55	29.45	29.43	29.49	29.51		
DIFFERENCE**	0.01	0.03	.02	.01	0.01		
DATE	6-21-85	6-5-85	6-15-85	7-2-85	7/12/85		
CALIBRATOR	[illegible]	[illegible]	Jwn	GJ	KB		

*Barometer is adjusted so that difference does not exceed 0.05 in. Hg.
**Barometer is not adjusted. If difference exceed 0.10 in. Hg, inform project manager immediately.

Figure E-31. Barometer Calibration Sheet.

Reference Gas: AGA Burdox
Cylinder No. 112704
Invoice No. 0382088
Lab Ref. No. VII:46-23

ORSAT CALIBRATION DATA SHEET

Orsat No.: #141 · Gas (circle one): (O₂) CO_2 CO

Calibrator	Date	Value Det.
D. Schuffel	8/24/83	5.0
[illegible]	10/27/83	4.9
D. Schuffel	1/6/84	4.8
G. Kress	1/18/84	5.1
Meese	3/3/84	5.0
Meese	7-5-84	5.0
Meese	7-20-84	5.0
Meese	8-14-84	5.0
[illegible]	9-10-84	5.2
Meese	11-5-84	5.0
G. Kress	11-30-84	5.0
G. Kress	12-31-84	5.0
Meese	2-11-85	5.0
D. Schuffel	5/1/85	5.2

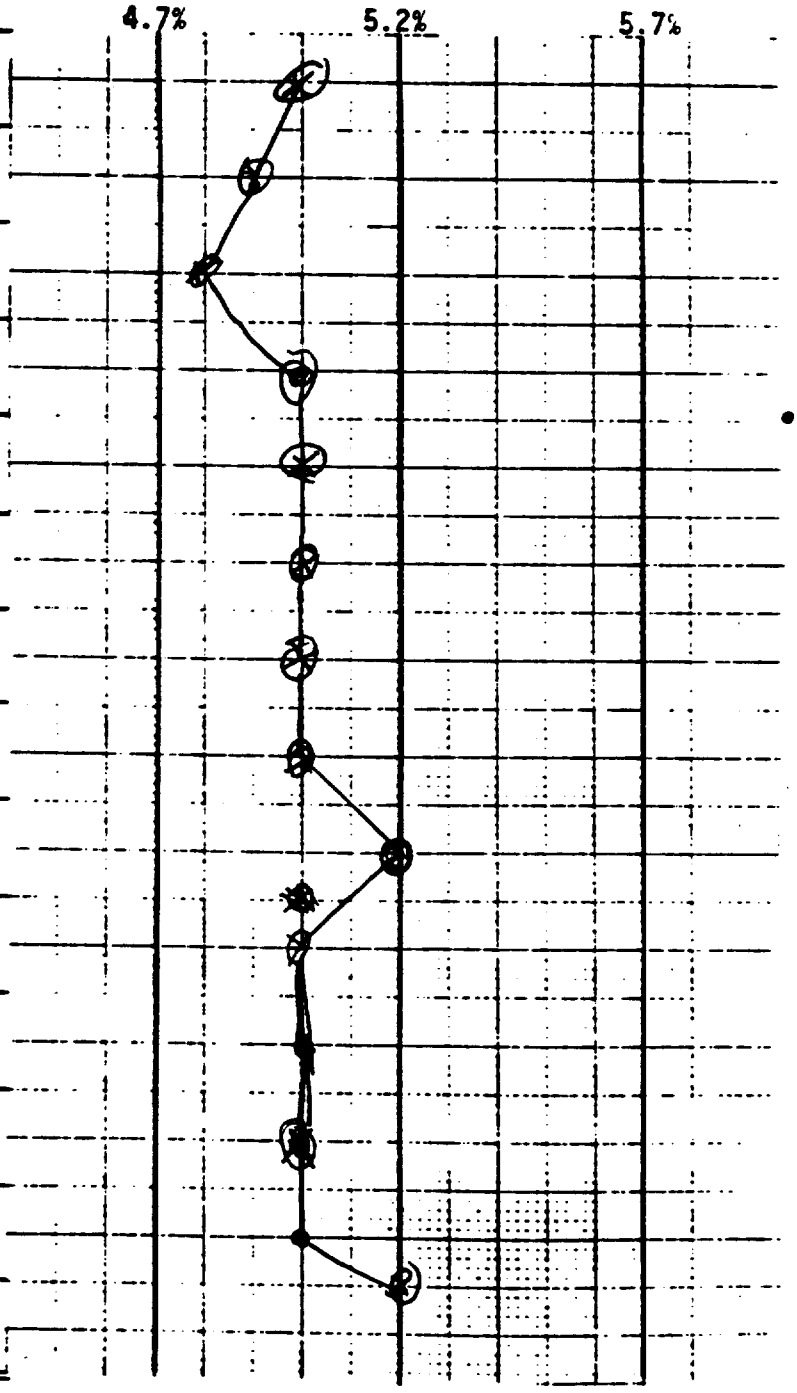


Figure E-32. O_2 Calibration Sheet.

Reference Gas: AGA Burdox
Cylinder No. 112704
Invoice No. 0382088
Lab Ref. No. VII:46-23

ORSAT CALIBRATION DATA SHEET

Orsat No.: # 141 Gas (circle one): O_2 (CO_2) CO

Calibrator	Date	Value Det.
D. Schiffel	8/24/83	5.0
[illegible]	10/27/83	5.2
D. Schiffel	1/6/84	5.0
J. Thress	1/18/84	5.0
J Meese	5-3-84	5.2
J Meese	7-5-84	4.8
J Meese	7-30-84	4.8
J Meese	8-14-84	5.0
[illegible]	9-10-84	5.0
J Meese	11-5-84	5.0
J. Thress	11-30-84	5.2
J. Thress	12-31-84	4.9
J Meese	3-11-85	5.0
D. Schiffel	5/1/85	4.8

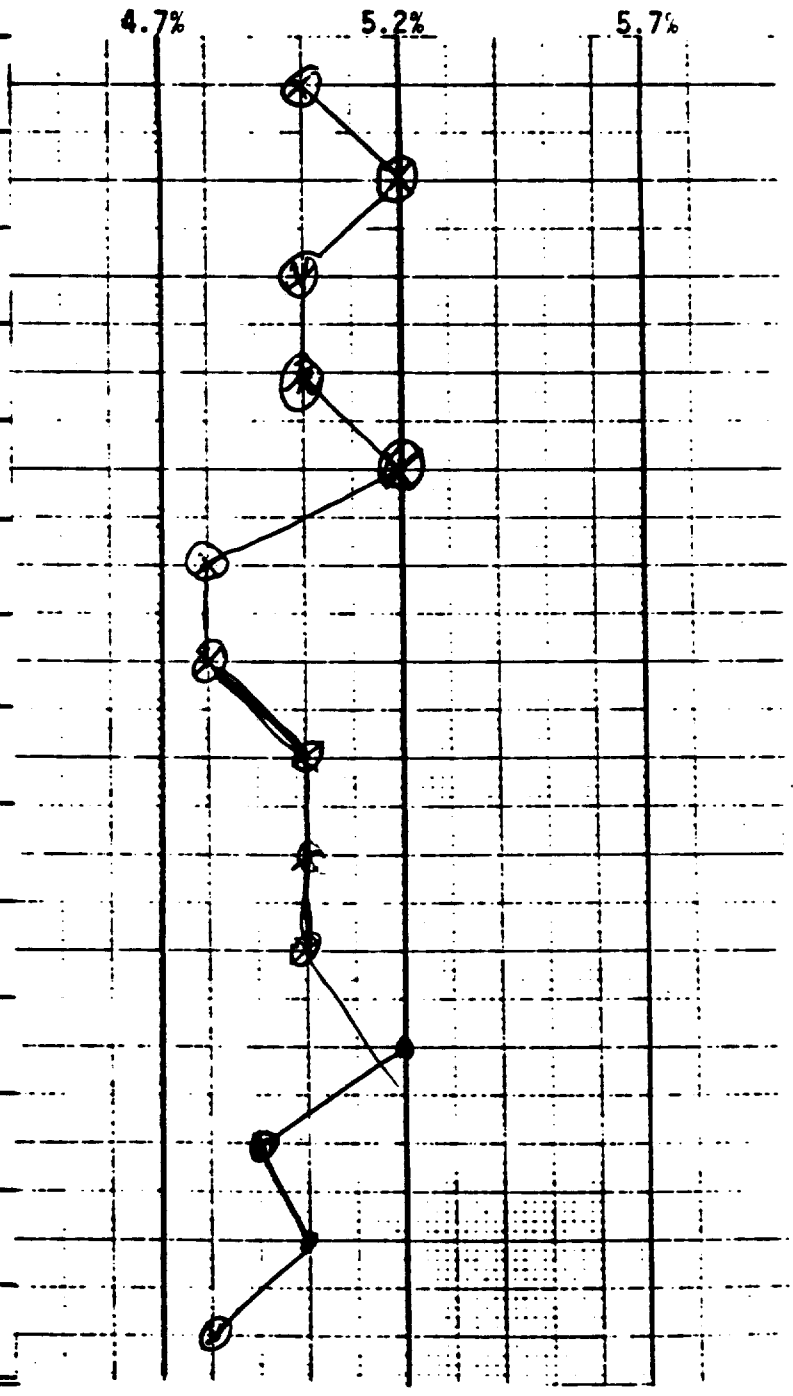


Figure E-33. CO_2 Calibration Sheet.

APPENDIX F

PROJECT PARTICIPANTS AND FIELD LOG

TABLE F-1. PROJECT PARTICIPANTS

Name	Title	Responsibility
C. Bruffey	Project Manager	Coordinated test activity; liaison with EPA, MRI, and plant personnel; calculations; particulate/Cr^{+6} recovery; process sample collection.
D. McNeal	Test Engineer	Site Leader of scrubber outlet tests; conducted particulate/Cr^{+6}, particle size distribution, and modified Method 5 tests. Assisted with CEM data reduction.
K. Batt	Technician	Assisted with tests at scrubber outlet. Assisted with sample cleanup and recovery.
G. Thress	Technician	Site Leader of scrubber inlet tests; conducted particulate/Cr^{+6}, particle size, and modified Method 5 tests. Assisted with sample cleanup/recovery.
J. Neese	Technician	Assisted with tests at scrubber inlet. Assisted with sample cleanup recovery.
D. Scheffel	Environmental Scientist	Coordinated and performed sample recovery and test preparation activities. Operated hydrocarbon CEM at scrubber outlet; calculations.
P. Reinermann	Test Engineer	Assisted with modified Method 5 tests at scrubber inlet. Conducted VOST tests at each location.
F. Clay	Task Manager USEPA-EMB	Coordinated test activity; observed all phases of test program; onsite data reduction and calculations.
R. Myer	Lead Engineer USEPA-ISB	Provided overall project coordination and guidance. Assisted in monitoring process data.
D. Atkinson	MRI-NSPS contractor	Monitored incinerator and scrubber operation during test period. Author of process description section of report.

TABLE F-2. FIELD ACTIVITY LOG

Date (1985)	Activity
Friday, June 14	Project Manager traveled to Detroit to supervise installation of scaffolding and temporary lab trailer.
Sunday, June 16	Remaining test crew and equipment traveled to Detroit.
Monday, June 17	Site setup and test preparation; conducted all preliminary measurements and onsite quality assurance checks.
Tuesday, June 18	Test PCO-1 conducted; test PCI-1 (inlet) attempted but terminated due to cracked probe liner. Particle size tests PSI-1 and PSO-1 conducted. Process samples collected.
Wednesday, June 19	Test PCO-2 conducted and subsequently voided due to excessive post-test leak rate. Test PCI-2 attempted but voided due to cracked probe liner. Particle size test PSO-2 conducted. Hydrocarbon CEM on line. Process samples collected.
Thursday, June 20	Tests PCO-3 and PCI-3 conducted. Particle size tests PSO-3 and PSI-2 conducted. CEM on line. Process samples collected.
Friday, June 21	Tests PCO-4 and PCI-4 conducted. Particle size tests PSO-4 and PSI-3 conducted. CEM on line. Process samples collected.
Saturday, June 22	Tests PCO-5 and PCI-5 conducted. Particle size tests PSO-5 and PSI-4 conducted. CEM on line. Process samples collected.
Sunday, June 23	Off day.
Monday, June 24	Conducted tests PCO-6 and PCI-6. CEM on line. Collected process samples.
Tuesday, June 25	Conducted tests PCOI and PCOO 1 and 2. Collected process samples. CEM on line.
Wednesday, June 26	Conducted test PCOI and PCOO 3. Conducted VOST tests at scrubber outlet. CEM on line. Process samples collected.
Thursday, June 27	Completed VOST tests at scrubber inlet. Process samples collected. Packed test equipment and departed Detroit.

APPENDIX G

DRAFT TEST METHOD FOR HEXAVALENT CHROMIUM EMISSIONS FROM STATIONARY SOURCES

METHOD - DETERMINATION OF HEXAVALENT CHROMIUM EMISSIONS FROM STATIONARY SOURCES

1. Applicability and Principle.

1.1 Applicability. This method applies to the determination of hexavalent chromium (Cr^{+6}) emissions from specified stationary sources only.

1.2 Principle. Particulate emissions are collected from the source by use of Method 5 (Appendix A, 40 CFR Part 60). The collected samples are digested in an alkaline solution and analyzed by the diphenylcarbazide colorimetric method.

2. Range, Sensitivity, Precision, and Interferences.

2.1 Range. A straight line response curve was obtained in the range 5 to 250 µg Cr^{+6}/100 ml. For a minimum analytical accuracy of ± 10 percent, the lower limit of the range is 50 µg/100 ml. The upper limit can be extended by appropriate dilution.

2.2 Sensitivity. A minimum detection limit of 1 µg Cr^{+6}/100 ml has been observed.

2.3 Precision. The overall precision for sample collection and analysis for Cr^{+6} was tested at a ferrochrome smelter, a chemical plant, and a refractory brick plant. Replicate Method 5 filters with both high and low particulate loadings were analyzed. The relative standard deviation was 4.4, 8.3, and 13.3 percent, respectively.

2.4 Interference. Very large quantities of iron, molybdenum, vanadium, and mercury can interfere with the analysis. No interference was observed at the sources listed in Subsection 2.3.

3. Apparatus.

3.1 Sampling Train. Same as Method 5.

3.2 Sample Recovery. Same as Method 5.

3.3 Analysis. The following equipment is needed.

3.3.1 Beakers. Borosilicate, 250-ml, with watchglass covers.

3.3.2 Filtration Apparatus. Vacuum unit with 47-mm diameter, 3.0 μ pore size Teflon filters.

3.3.3 Volumetric Flasks. 100 ml and other appropriate volumes.

3.3.4 Hot Plate.

3.3.5 Pipettes. Assorted sizes, as needed.

3.3.6 Spectrophotometer. To measure absorbance at 540 nm.

4. Reagents.

4.1 Sampling. Same as Method 5.

4.2 Sample Recovery. Same as Method 5.

4.3 Analysis. The following reagents are required.

4.3.1 Sodium Carbonate. Na_2CO_3, anhydrous, analytical reagent grade.

4.3.2 Sodium Hydroxide. NaOH, analytical reagent grade.

4.3.3 Potassium Dichromate. $K_2Cr_2O_7$, analytical reagent grade.

4.3.4 Water. Deionized distilled, meeting American Society for Testing and Materials (ASTM) specification for Type 3 reagent - ASTM Test Method D1193-77 (incorporated by reference - see §61.18). If high concentrations of organic matter are not expected to be present, the analyst may eliminate the $KMnO_4$ tests for oxidizable organic matter.

4.3.5 Digestion Solution. Dissolve 20.0 g NaOH and 30.0 g Na_2CO_3 in deionized distilled water in a 1-liter volumetric flask and dilute to the mark. Store the solution in a tightly capped polyethylene bottle and prepare fresh monthly.

4.3.6 Potassium Dichromate Stock Solution. Dissolve 141.4 mg of dried $K_2Cr_2O_7$ in deionized, distilled water and dilute to 1 liter (1 ml = 50 µg Cr^{+6}).

4.3.7 Potassium Dichromate Standard Solution. Dilute 10.00 ml $K_2Cr_2O_7$ stock solution to 100 ml (1 ml = 5 µg Cr^{+6}) with deionized, distilled water.

4.3.8 Sulfuric Acid, 10% (v/v). Dilute 10 ml of reagent grade H_2SO_4 to 100 ml in deionized, distilled water.

4.3.9 Diphenylcarbazide Solution. Dissolve 250 mg of 1,5-diphenylcarbizide in 50 ml acetone. Store in a brown bottle. Discard when the solution becomes discolored.

4.3.10 Acetone. Same as Method 5.

5. Procedure.

5.1 Sampling. Same as Method 5.

5.2 Sample Recovery. Same as Method 5.

5.3 Preservation. Tests have demonstrated that Cr^{+6} is stable in particulate form. Nevertheless, all samples should be protected from extreme heat, and should be analyzed within 1 month of collection.

5.4 Sample Digestion and Preparation. Place the contents of Container No. 1 (the filter) and Container No. 2 (the acetone probe rinse) in a 250-ml beaker. Evaporate to dryness. Add 40 ml of digestion solution. Cover the beaker with the watchglass and heat to near boiling on a hot plate with constant stirring for 30 minutes. Do not allow the solution to evaporate to dryness.

Cool the solution and transfer it quantitatively to the filtration apparatus with deionized, distilled water. Filter the solution through the

47-mm Teflon filter. Transfer the filtrate from the filter flask quantitatively to a 100-ml volumetric flask. Fill to the mark with deionized, distilled water.

5.5 Reagent Blank Preparation. Place a 47-mm diameter filter in a 100-ml beaker. Proceed as in Subsection 5.4.

5.6 Silica Gel Weighing. Weigh the spent silica gel (Container No. 3) or silica gel plus impinger to the nearest 0.5 g using a balance. This step may be conducted in the field.

5.7 Analysis.

5.7.1 Color Development and Measurement. Transfer 50-ml aliquot of the prepared sample to a 100-ml volumetric flask. Add 2.0 ml of diphenylcarbizide solution. Adjust the pH to 2 ± 0.5 with 10 percent H_2SO_4 and dilute to volume with deionized, distilled water. Allow the solution to stand about 10 minutes for color development. Transfer a portion of the sample to a 1-cm absorption cell and measure the absorbance at the optimum wavelength using the blank solution as a zero reference. Dilute the sample and the blank with equal volumes of deionized, distilled water if the absorbance exceeds A_4, the absorbance of the 250 µg Cr^{+6} standard. Use deionized, distilled water to zero the instrument.

5.7.2 Check for Matrix Effects on the Cr^{+6} Results. Since the analysis for Cr^{+6} by colorimetry is sensitive to the chemical composition of the sample (matrix effects), the analyst shall check at least one sample from each source using the method of additions as follows:

Add or spike an equal volume of standard solution to an aliquot of the sample solution, then measure the absorbance of the resulting solution and the absorbance of an aliquot of unspiked sample.

Next, calculate the Cr^{+6} concentration, C_s, in µg/ml of the sample solution by using the following equation:

$$C_s = C_a \frac{A_s}{A_t - A_s} \qquad \text{Eq. G-1}$$

where C_a = Cr^{+6} concentration of the standard solution, g/ml

A_s = absorbance of the sample solution.

A_t = absorbance of the spiked sample solution.

Volume corrections will not be required if the solutions as analyzed have been made to the same final volume. Therefore, C_s and C_a represent Cr^{+6} concentrations before dilutions. If the results of the method of additions procedure used on the single source sample do not agree to within 5 percent of the value obtained by the routine spectrophotometric analysis, then reanalyze all samples from the source using this method of additions procedure.

6. Calibration.

6.1 Sampling Train. Perform all of the calibrations described in Method 5.

6.2 Spectrophotometer Calibration.

6.2.1 Optimum Wavelength Determination. Calibrate the wavelength scale of the spectrophotometer every 6 months. The calibration may be accomplished by using an energy source with an intense line emission such as a mercury lamp, or by using a series of glass filters spanning the measuring range of the spectrophotometer. Calibration materials are available commercially and from the National Bureau of Standards. Specific details on the use of such materials should be supplied by the vendor; general information about calibration techniques can be obtained from general reference books on analytical

chemistry. The wavelength scale of the spectrophotometer must read correctly within ± 5 nm at all calibration points; otherwise, the spectrophotometer shall be repaired and recalibrated. Once the wavelength scale of the spectrophotometer is in proper calibration, use 540 nm as the optimum wavelength for the measurement of the absorbance of the standards and samples.

Alternatively, a scanning procedure may be employed to determine the proper measuring wavelength. If the instrument is a double-beam spectrophotometer, scan the spectrum between 530 and 550 nm using a 250 µg Cr^{+6} standard solution in the sample cell and a blank solution in the reference cell. If a peak does not occur, the spectrophotometer is malfunctioning and should be repaired. When a peak is obtained within the 530 to 550 nm range, the wavelength at which this peak occurs shall be the optimum wavelength for the measurements of absorbance of both the standards and the samples. For a single-beam spectrophotometer, follow the scanning procedure described above, except that the blank and standard solutions shall be scanned separately. The optimum wavelength shall be the wavelength at which the maximum difference in absorbance between the standard and the blank occurs.

6.2.2 Determination of Spectrophotometer Calibration Factor K_c. Add 0.0, 10, 20, 30, and 50 ml of the working standard solution (1 ml = 5 µg Cr^{+6}) to a series of five 100-ml volumetric flasks. This calibration procedure must be repeated on each day that samples are analyzed. Calculate the spectrophotometer calibration factor as follows:

$$K_c = 100 \quad \frac{A_1 + 2A_2 + 3A_3 + 4A_4}{A_1^2 + A_2^2 + A_3^2 + A_4^2} \qquad \text{Eq. G-2}$$

where K_c = calibration factor

A_1 = absorbance of the 50 Cr^{+6} standard

A_2 = absorbance of the 100 Cr^{+6} standard

A_3 = absorbance of the 150 Cr^{+6} standard

A_4 = absorbance of the 250 Cr^{+6} standard

7. Emission Calculations.

Carry out the calculations, retaining at least one extra decimal figure beyond that of the acquired data. Round off figures after final calculations.

7.1 Total Cr^{+6} in Sample. Calculate m, the total µg Cr^{+6} in each sample, as follows:

$$m = K_c\ 2AF \qquad \text{Eq. G-3}$$

where: 2 = factor to correct 50 ml aliquot analyzed to 100 ml total sample

A = absorbance of sample

F = dilution factor (required only if sample dilution was needed to reduce the absorbance into the range of calibration)

7.2 Average Dry Gas Meter Temperature and Average Orifice Pressure Drop. Same as Method 5.

7.3 Dry Gas Volume, Volume of Water Vapor, Moisture Content. Same as Method 5.

7.4 Cr^{+6} Emission Concentration. Calculate C_s (g/dscm), the Cr^{+6} concentration in the stack gas, dry basis, corrected to standard conditions, as follows:

$$C_s = (0.001\ g/mg)(m/V_{m(std)}) \qquad \text{Eq. G-4}$$

7.5 Isokinetic Variation, Acceptable Results. Same as Method 5.

8. Bibliography.

1. Test Methods for Evaluating Solid Waste. U.S. Environmental Protection Agency. SW-846, 2nd ed. July 1982.

2. Cox, X.B., R.W. Linton, F.E. Butler. Determination of Chromium Speciation in Environmental Particles - A Multitechnique Study of Ferrochrome Smelter Dust. Accepted for publication in Environmental Science and Technology.

3. Same as Method 5, Citations 2 through 5 and 7 of Section 7.

APPENDIX H

DRAFT PROTOCOL FOR DETERMINATION OF TOTAL CHROMIUM EMISSIONS FROM STATIONARY SOURCES

11 FEB 1985

Method - Determination of Total Chromium Emissions from Stationary Sources

DRAFT

1. Applicability and Principle

1.1 Applicability. This method applies to the determination of total chromium (Cr) emissions from specified stationary sources only.

1.2 Principle. Total chromium emissions are collected from the sources by use of EPA Method 5 (Appendix A, 40 CFR, Part 60). The recovered sample is quantitatively transferred to a polyethylene sample vial and then analyzed by Neutron Activation Analysis (NAA). [Note: Due to the small number of Neutron Activation Analysis facilities, only the sampling, sample recovery, and sample preparation procedures are described in this method. It is estimated that the additional cost of having the three sample runs and a quality assurance sample analyzed for total chromium by NAA will be between $150 to $350.] Two sample handling and preparation procedures are described in this method. The first procedure includes techniques to allow for the initial determination of hexavalent chromium (Cr^{+6}) content and the second procedure is designed for total chromium analysis only.

2. Range, Sensitivity, Precision, and Interferences

2.1 Range. A straight line response is expected for any sample containing greater than 0.1 µg of total chromium. The sample range can be controlled both by the time and strength of irradiation, and the distance at which the sample is placed from the detector during analysis. Therefore, there is no upper limit to the method.

2.2 Sensitivity. A minimum quantifiable limit of 0.1 µg of Cr has been established for this method.

2.3 Precision. The overall precision for sample collection and analysis for Cr was determined at a ferrochrome smelter, a chemical plant, and a refractory brick plant. Replicate Method 5 filters with both high and low particulate loading were analyzed. In addition, nine different concentrations of audit samples containing hexavalent and/or trivalent chromium were analyzed. The average bias for the audit samples was less than 3 percent with an average standard deviation of less than 8 percent. Based on this study (Reference 1), the method for determination of total chromium has about the same sample and analytical precision as that of EPA Method 5: approximately ± 10 percent.

2.4 Interferences. Sodium and cobalt are interferents for sample analysis. However, if the sample is allowed to radiate for a minimum of 10 days prior to analysis, the interference from both sodium and cobalt will be eliminated due to their short half-life.

3. Apparatus

3.1 Sampling Train. Same as Method 5, Section 2.1. The alternative use of a stainless steel probe liner or stainless steel filter holders shall not be allowed. No stainless steel or chrome-plated equipment may be used, with the exception of the sample nozzle.

3.2 Sample Recovery. Same as Method 5, Section 2.2. No chrome-plated or stainless steel equipment may be used. The tweezers must be Teflon-coated, and the spatula must be Teflon. The sample recovery container must be glass or polyethylene.

3.3 Sample Handling and Preparation Procedures. No procedures are given for the actual Neutron Activation Analysis. The accuracy of analysis will be assessed by a quality assurance audit sample. The following equipment is needed for preparation of the samples for NAA.

3.3.1 If analysis for hexavalent chromium (Cr^{+6}) is to be performed prior to the NAA, the same apparatus will be needed as described in the EPA Method ____ "Determination of Hexavalent Chromium."

3.3.2 Beakers. Borosilicate, 250-ml, with watch glass covers.

3.3.3 Analytical Balance. To measure to within 0.1 mg.

3.3.4 Sample Vials. Polyethylene sample vials, 25-ml (24 mm OD x 72 mm length) or smaller to hold samples for NAA. (Larger sample vials may be used with the permission of the NAA facility.)

3.3.5 Teflon Spatula. To assist in transfer of sample.

4. Reagents

Unless otherwise indicated, all reagents must conform to the specifications established by the Committee on Analytical Reagents of the American Chemical Society. Where such specifications are not available, use the best available grade.

4.1 Sampling. Same as Method 5, Section 3.1.

4.2 Sample Recovery. Same as Method 5, Section 3.2.

4.3 Sample Preparation. The following reagents are required.

4.3.1 Water. Deionized distilled, meeting American Society for Testing and Materials (ASTM) specifications for type 2 reagent - ASTM Test Method D 1193-77 (incorporated by reference - see § 61.18).

4.3.2 Rinse Solution. A solution of 1 to 1 (v/v) deionized distilled water and concentrated nitric acid is needed to clean sample vials and any protective covers.

5. Procedure

5.1 Sampling. Same as Method 5, Section 4.1. No stainless steel or chrome sampling apparatus components, with the exception of the sample nozzle may be used.

5.2 Sample Recovery. Same as Method 5, Section 4.2. Ensure that all equipment and containers are glass, polyethylene, Teflon and/or Teflon-coated.

5.3 Preservation. Tests with the source samples described in Section 2.3 demonstrated that Cr and Cr^{+6} are stable in particulate form. Nevertheless, all samples should be kept dry, protected from extreme heat, and analyzed within 1 month of collection.

5.4 Preparation of Sample Vials. Polyethylene sample vials suitable for NAA typically are available in sizes ranging from 2.5 ml to 25 ml. Any of these may be used for this method. A size for the sample vial has been recommended for each of the procedures described below. A different size may be used as long as it does not exceed the size of the 25 ml vial or the size recommended by the NAA facility used to perform the total chromium analysis.

The sample vials shall be properly cleaned in the following manner prior to the addition of the sample. Wash each vial with soap and water. Rinse with tap water. Perform the final rinse in a solution of 1 to 1 (v/v) solution of deionized distilled water and concentrated nitric acid.

Let vials dry and then mark the sample identification number on both sides of the vial with a permanent pen (water insoluble). Record all sample numbers, volumes, and weights on Figure 1 or a similar form. If plastic bags or other containers are used to protect the vials from contamination, they should also be cleaned in the same manner.

5.5 Sample Preparation and Analysis for Cr^{+6} and Cr in Method 5 Samples. Initially, follow the procedures for preparation and analysis in the method "Determination of Hexavalent Chromium" (Section 5.4 through Section 6.2.2.1). These steps will result in three sample fractions, a sample residue (Method 5 filter, Teflon filter, and insoluble materials), the sample filtrate

Figure 1. Sample Preparation and Analysis Data Form

Sample No.[a]	Method 5[b]		Solid Process Sample		Liquid Process Samples		Results of NAA µg of Cr[g]
	Filter/Rinse	Impinger	Weight of Solid, mg[c]	Weight of Portion, mg[d]	Total Volume of Sample, ml[e]	Aliquot of Sample, ml[f]	

[a] Sample number marked on sample vial.
[b] Indicate whether the Method 5 sample is a filter/rinse sample or impinger contents sample.
[c] Record total weight of solid sample. This will be the weight of the sample to be analyzed for solid process sample and the total weight of the solids when separated from the liquid phase with the liquid sample.
[d] Record weight of the portion of sample to be analyzed by NAA. This will be the same as the total weight for solid process samples.
[e] Record total volume of liquid process samples.
[f] If an aliquot of the sample is taken for analysis record the aliquot volume. If the total volume of sample was concentrated for analysis, the sample volume will be the same as the total volume.
[g] This is the analytical results of the NAA and will be given in terms of µg of chromium for the total sample.

(soluble chromium), and a portion of the sample in a cuvette for spectrophotometric analysis. Quantitatively add the sample from the cuvette back to the filtrate sample and rinse the cuvette with deionized distilled water adding this to the filtrate.

Then quantitatively transfer the filtrate sample into a 250-ml beaker. Rinse the filtrate container with deionized distilled water and add to the beaker. Concentrate the filtrate to approximately 10 ml by heating at a temperature of 110°C (230°F) with a watch glass covering the beaker. Do not heat sample to dryness. After concentrating to proper volume, remove from heat and cool. Quantitatively transfer the sample residue (Method 5 filter, Teflon filter, and insoluble solids) to a cleaned and marked 25-ml sample vial. Quantitatively add the concentrated filtrate to the same vial. The total sample including the rinse from the beaker and watch glass must not exceed the volume of the vial. If volume is exceeded, perform additional concentration. The sample in the sample vial is then ready for NAA. The outside of the vial must be protected from contamination; it may be placed in a cleaned plastic bag for protection.

The sample blank must include the residue from the acetone blank (the volume of the acetone blank should be approximately equal to the average of the acetone rinse volumes), a blank Method 5 filter, a Teflon filter, 40 ml of digestion solution, and 60 ml of deionized distilled water. The blank shall be concentrated in the same manner as the field samples and then quantitatively transferred to a separate marked/cleaned sample vial. This vial should be protected in the same manner as the field sample vial.

The sample vial should be submitted for total chromium analysis by NAA. The analytical results of the NAA will be in the terms of µg of total chromium (Cr) for each field sample and for the blank sample. An audit sample must also

be submitted for analysis with each set of field samples for an assessment of accuracy. The quality assurance audit procedures are described in Section 6.0.

5.6 Sample Preparation and Analysis for Cr^{+6} and Cr for Impinger Contents Samples. For impinger contents samples, transfer approximately 50 ml at a time into a 250-ml beaker and concentrate contents and rinsings to about 10 ml by heating at 110°C (230°F). Do not take to dryness. Add 40 ml of digestion solution to the beaker as described in Section 5.4 of the method "Determination of Hexavalent Chromium" and complete the analysis for Cr^{+6} (Section 5.4 through Section 6.2.2.1 of the same method). The analysis will result in the same sample portions as described previously (Section 5.5); follow the same concentrating steps and sample transfers described through placing the sample in the 25-ml sample vial. The sample blank will include deionized distilled water (volume equal to the volume initially added to the impingers and used to rinse the impinger), a Teflon filter, 40-ml digestion solution, and 60-ml deionized distilled water. The blank should be concentrated and transferred to a separate marked/cleaned sample vial in the same manner as the field sample. The analytical procedures and results by NAA for total chromium will be the same as described above (Section 5.5).

5.7 Sample Preparation and Analysis for Cr^{+6} and Cr for Liquid Process Samples. For liquid process samples, two techniques may be followed depending on the volume of liquid and the amount of solids in the sample. The two procedures are described below.

Small liquid volume and/or small amount of solids. If the laboratory desires to concentrate the total liquid volume and if the amount of solids present is less than about 100 grams, the laboratory should initially measure the total sample volume with an accuracy of $\pm$ 1 percent of total volume or to the nearest ml (whichever is less) and then concentrate the entire sample to

about 10 ml using the procedure described in Section 5.6. The concentrated sample should be quantitatively transferred to a marked/clean 25-ml sample vial (or larger if the NAA facility will allow it). The analysis and results by NAA will be the same as described in Section 5.5.

The sample blank will include 40 ml of digestion solution, 60 ml of deionized distilled water, and a Teflon filter. The sample blank should be concentrated and handled in the same manner as the field sample and then transferred to a separate marked/cleaned sample vial. The analytical procedures and results by NAA for total chromium will be the same as Section 5.5.

Large volume and/or large amounts of solids. When a large volume of liquid and/or large amount of solids (greater than approximately 100 grams) are present, the solid and liquid phases should be separated.

Initially measure the total volume of liquid sample to within $\pm$ 1 percent of total volume or to the nearest ml, whichever is smaller. Separate the solid and liquid phases with a tared Teflon filter. Take the solid phase to dryness and then weigh to the nearest 0.1 mg. A portion (about 50 grams) of the solid should be taken quantitatively and weighed to the nearest 0.1 mg. This portion of the solid would then be analyzed using the method "Determination of Hexavalent Chromium" to determine the Cr^{+6} concentration. The resulting sample fraction is then prepared for NAA as described above (Section 5.5) and the analysis and results by NAA will also be the same as Section 5.5.

The liquid phase may either be concentrated, or an aliquot taken for analysis if the aliquot contains the minimum quantifiable amount of Cr^{+6}. The concentrated sample or aliquot should be prepared as described in Section 5.6 above.

A single sample blank will be prepared for the phase separation technique; however, the blank value will be subtracted from both the solid phase and the liquid phase. The sample blank will include 40 ml of digestion solution, 60 ml of deionized distilled water, and a Teflon filter. The blank should be prepared in the same manner as the field sample and then transferred to a separate marked/cleaned sample vial. The analytical procedures and results by NAA for total chromium will be the same as Section 5.5.

5.8 Sample Preparation and Analysis for Cr^{+6} and Cr for Solid Process Samples. For solid process sample preparation, two techniques may be followed at the option of the laboratory. The first technique is to weigh a representative portion of the process sample to the nearest 0.1 mg and to analyze that portion for Cr^{+6} using the method "Determination of Hexavalent Chromium". The resulting sample fractions are then prepared for NAA using the techniques described in Section 5.5. For samples containing materials that will all pass through a 200-mesh screen, a representative portion can be obtained by thoroughly mixing the entire sample. For samples containing some materials greater than 200-mesh, initially screen the sample and then grind all materials that will not pass through the screen. After all material passes through the 200-mesh screen, mix the sample thoroughly and take a portion of the sample.

The sample blank will include 40 ml of digestion solution, 60 ml of deionized distilled water, and a Teflon filter. The blank should be handled as described above. The analytical procedures and results by NAA for total chromium will be the same as described in Section 5.5.

Alternatively, the second technique that may be followed is to take one representative sample (exact weight determined to 0.1 mg) and analyze it for Cr^{+6} content; and take a second representative sample (exact weight determined to nearest 0.1 mg) for determination of total chromium content

by NAA. The second sample can be quantitatively transferred to a 25-ml or smaller sample vial (deionized distilled water may be used for the transfer). No sample blank is required for this technique. The analytical procedures and results by NAA will be the same as described in Section 5.5.

5.9 Sample Preparation and Analysis for Cr in Method 5 Samples. For Method 5 samples requiring analysis for total chromium content only, the following procedures should be followed. Evaporate the acetone rinse and filter to dryness. These samples may be weighed for particulate at this time if desired. Quantitatively transfer the filter and rinse residue to a 25-ml sample vial using deionized distilled water. Acetone cannot be used, since the heat from the irradiation may cause the vial to rupture. The same precautions of using only glass, polyethylene, and Teflon still apply. The sample blank will include the acetone blank residue (the acetone volume should be approximately equivalent to the average volume of acetone rinses) and a Method 5 blank filter. Quantitatively transfer the blanks to a separate sample vial to determine the blank value. The analytical procedures and results by NAA for field samples and blanks will be the same as described in Section 5.5. A quality assurance performance audit sample must be analyzed with every set of field samples, as described in Section 6.0.

5.10 Sample Preparation and Analysis for Cr for Impinger Contents Samples. For impinger contents analysis for total chromium, concentrate the impinger contents to a volume (i.e., 10 ml) that can be quantitatively transferred to a sample vial. The sample blank should include deionized distilled water (approximately the same volume as the average volume added to the impingers plus the volume of rinse to recover the sample from the impingers). The blank should be concentrated and quantitatively transferred to a separate sample vial. The analytical procedures and results by NAA for chromium will be the same as described in Section 5.5.

5.11 Sample Preparation and Analysis for Cr for Liquid Process Samples. For liquid process samples two techniques may be followed, depending on the volume of liquid and the amount of solids present. The two procedures are described below.

Small volume and/or small amount of solids. If the laboratory desires to concentrate the total liquid volume and if the total amount of solids present is less than about 200 grams, the total volume of the liquid sample should be measured with an accuracy of ± 1 percent of total volume or to the nearest ml, (whichever is smaller) and then the sample concentrated to about 20 ml as described in Section 5.6. The concentrated sample should be quantitatively transferred to a 25-ml sample vial (or larger if the NAA facility will allow it). The sample analysis and results by NAA will be the same as described in Section 5.5. No sample blank is required for this procedure.

Large volumes and/or large amounts of solids. When large volumes of liquids and/or large amounts of solids (greater than 200 grams) are present, the solid and liquid phases should be separated. Initially measure the total volume of the liquid sample to within 1 percent of the total volume or to the nearest ml, whichever is smaller. Then separate the solid and liquid phases with a tared Teflon filter. Take the solid phase to dryness and then weigh to the nearest 0.1 mg. A portion (about 50 grams) of the solids should be taken quantitatively and weighed to the nearest 0.1 mg. Transfer this portion of solids to a 25-ml sample vial. Deionized distilled water may be used to assist in the transfer. The sample analysis and results by NAA will be the same as described in Section 5.5. No sample blank is required.

The liquid phase may either be concentrated to approximately 20 ml, or an aliquot taken for analysis if the aliquot contains the minimum quantifiable amount of Cr. The concentrated sample or aliquot should be quantitatively

transferred to a 25-ml sample vial. The analysis and results by NAA will be the same as described in Section 5.5. No sample blank is required.

5.12 Sample Preparation and Analysis for Cr for Solid Process Samples. For solid process samples, take a representative portion of the sample (about 50 grams) and weigh to the nearest 0.1 mg. Quantitatively transfer the sample to a 25-ml sample vial. A smaller vial may be used. Deionized distilled water may be used to assist in the transfer. For samples containing materials that will all pass through a 200-mesh screen, a representative portion can be obtained by thoroughly mixing the entire sample. For samples containing some materials greater than 200-mesh, initially screen the sample and then grind all materials that will not pass through the screen. After all material passes through the 200-mesh screen, mix the sample thoroughly and take a portion of the sample. The sample analysis and results by NAA will be the same as described in Section 5.5.

6. Quality Assurance

A quality assurance performance audit sample should be analyzed with each set of Method 5 field samples to assess the relative error of sample analysis. No acceptable relative error has been established for this method. The results of the audit should be reported in the emission test report. However, since NAA is a nondestructive analytical technique, when any audit sample analytical results have a relative error greater than 25%, it is recommended that both the field and audit samples be reanalyzed as a result of suspected poor technique.

7. Emission Calculations

Carry out the calculations, retaining at least one extra decimal figure beyond that of the acquired data. Round off figures after final calculations.

7.1 Analysis by NAA will give results expressed in total μg of chromium

for each sample vial. This total mass of chromium for each sample vial minus the corresponding blank value will be used to determine the total concentration of chromium for each sample.

7.2 Average Dry Gas Meter Temperature and Average Orifice Pressure Drop. Same as Method 5, Section 6.2.

7.3 Dry Gas Volume, Volume of Water Vapor, Moisture Content. Same as Method 5, Sections 6.3, 6.4, and 6.5, respectively.

7.4 Isokinetic Variation, Acceptable Results. Same as Method 5, Sections 6.11 and 6.12, respectively.

7.5 Cr Emission Concentration. Calculate C_s (g/dscm), the Cr concentration in the stack gas, dry basis, corrected to standard conditions, as follows:

$$C_s = (10^{-6}\ g/\mu g)\ \left[(m_s - m_b)/V_{m(std)}\right] \qquad \text{Eq. 7.1}$$

Where:

C_s = Stack gas concentration, g/dscm

10^{-6} g/µg = Conversion from µg to g

m_s = Mass of Cr in each field sample, µg

m_b = Mass of Cr in each field blank, µg

$V_{m(std)}$ = Volume of gas sampled, corrected to standard conditons, dscm

Note: The mass of Cr can be calculated separately, for the filter/rinse sample and impinger contents sample or the masses of both samples and both blanks can be added to get the total concentration.

7.6 Cr Concentration in Solid Process Sample. Calculate C_o (µg/g), the Cr concentration in the solid process sample, as follows:

$$C_o = (m_s - m_b)/wt \qquad \text{Eq. 7.2}$$

Where:

C_o = Concentration of process sample, µg/g

m_s = Mass of Cr in process sample, µg

m_b = Mass of Cr in blank sample (if applicable), µg

wt = Weight of sample analyzed, g

7.7 Cr Concentration in Liquid Process Sample. Calculate C_{lp} (µg/ml) concentration of liquid phase and C_{sp} (µg/ml) concentration of solid phase for liquid samples that have had a phase separation and add the concentration to determine the total concentration or calculate the total concentration using Equation 7.3 for liquid sample that did not have a phase separation.

For liquid phase or no phase separation:

$$C_{lp} = (m_s - m_b)/V_l \qquad \text{Eq. 7.3}$$

Where:

C_{lp} = Concentration of liquid phase of sample, µg/ml

m_s = Mass of Cr in liquid process sample, µg

m_b = Mass of Cr in liquid blank (if applicable), µg

V_l = Volume of liquid of sample analyzed, ml

Note: If a liquid volume is concentrated for analysis (V_l) is the volume of the sample prior to its concentration.

For solid phase:

$$C_{sp} = \left[(m_s - m_b)/wt_f\right] (wt_i/V_t) \qquad \text{Eq. 7.4}$$

Where:

C_{sp} = Concentration of solid phase of sample, µg/ml

m_s = Mass of Cr in solid phase analyzed, µg

m_b = Mass of Cr in blank analyzed, µg

wt_f = Weight of sample analyzed, g

wt_i = Total weight of solids in sample, g

V_t = Total volume of liquid process sample, ml

For total concentration of liquid samples with phase separation:

$$C_l = C_{lp} + C_{sp} \qquad \text{Eq. 7.5}$$

8. Bibliography

1. F.E. Butler and J.E. Knoll. Chromium Speciation Laboratory Evaluation and Field Test Program (to be published in ES&T).

2. Same as Bibliography of Method 5, Citations 2 to 5 and 7.

3. B. Keisch. The Atomic Fingerprint: Neutron Activation Analysis. U. S. Energy Research and Development Administration, Office of Public Affairs, Washington, D.C. 20545.

4. U. S. Environmental Protection Agency. Neutron Activation Analysis, Standard Operating Procedure (reference to be added).

APPENDIX I

PROCESS DATA

ATTACHMENT 1

SUPPLEMENTARY PROCESS DATA FOR RUN NO. 1

6-18-85

#13 INC. WATER Flows (Scrubber)

	G.P.M.											
	11:00	11:30	12:00	12:30	1:00	1:30	2:00	2:30	3:00	3:30	4:00	4:30
Pre Cooler WEIR –	237	237	237	237	237	237		237	237	237		237
Pre Cooler Nozzles –	165	165	165	165	165	165		165	165	165		165
Imp. Tray –	1453	1453	1453	1453	1453	1453		1453	1453	1453		1453
Imp. Tray Sprayer –	175 ~~237~~	175 ~~237~~	175 ~~237~~	175 ~~237~~	175 ~~237~~	175 ~~237~~		175 ~~237~~	175 ~~237~~	175 ~~237~~		175 ~~237~~

	GPM 5:00	5:30	6:45
Precooler Weir	237	237	237
Pre cooler Nozzles	165	165	165
Imp Tray	1453	1453	1453
Imp Tray sprayer	175 ~~237~~	175 ~~237~~	175

Starting original Readings

17 Monday June 1985

11 AM		
7:00		165
7:30		175
8:00		237
8:30		1453
9:00	11:30 AM	
9:30	DCW-	
10:00	UTSN-	
10:30	PCW-	
11:00	IT-	
11:30	12:00pm	
12:00	PCW-	76
1:00	UTSN-	
1:30	PCW-	
2:00	IT-	
2:30		
3:00		
3:30		
4:00		
4:30		
5:00		

Imp Tray sprayers reading was miscopied from original. Reading corrected with the permission and approval of Ron Meyer.

R. Dawson

FLOW CHART FOR INCINERATION COMPLEXES

COMPLEX I

P-C WEIR DESIGN

D-P 44 :	4	9	13	18	22	27	31	36	40	44	49	53	58	62	67	71
GPM 200 :	63	89	110	126	141	155	167	179	190	200	210	219	228	237	245	253

P-C NOZZLES DESIGN

D-P 25 :	3	5	8	10	13	15	18	20	23	25	28	30	33	35	38	40
GPM 150 :	47	67	82	95	106	116	126	134	142	150	157	164	171	178	184	190

VENTURI DESIGN

D-P 29 :	3	6	9	12	15	17	20	23	26	29	32	35	38	41	44	47
GPM 300 :	95	134	164	190	212	232	251	268	285	300	315	329	342	355	367	379
:																

IMP. TRAY DESIGN

D-P 10 :	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
GPM1400 :	443	626	767	885	990	1085	1171	1252	1328	1400	1468	1534	1596	1657	1715	1771	1825	1878	1930

IMP. TRAY SPRAYS

D-P 11 :	1	2	3	4	6	7	8	9	10	11	12	13	14	15	17	18
GPM 100 :	31	45	55	63	70	77	83	89	94	100	104	109	114	118	122	126

COMPL II

P-C WEIR DESIGN

D-P 13 :	1	3	4	5	7	8	9	10	12	13	14	16	17	18	20	21
GPM 200 :	63	90	110	127	142	155	168	179	190	200	210	219	228	237	245	253

P-C NOZZLES DESIGN

D-P 63 :	6	13	19	25	32	38	44	50	57	63	69	76	82	88	95	101
GPM 150 :	47	67	82	95	106	116	125	134	142	150	157	164	171	177	183	189

IMP. TRAY DESIGN

D-P 9 :	1	2	3	4	5	6	8	9	10	11	12	13	14	15	13	14	15	16	16	17
GPM1300 :	460	650	796	919	1028	1126	1216	1300	1379	1453	1524	1592	1657	1720	1592	1644	1695	1744	1792	1838

IMP. TRAY SPRAYS

D-P 72 :	7	14	22	29	36	43	50	58	65	72	79	86	94	101	108	115
GPM 160 :	51	72	88	101	113	124	134	143	152	160	168	175	183	189	196	202

CIRCLE
SHIFT: M (D) A

Crew III

FIFTEEN MINUTE WEIGHTOMETER
READINGS COMPLEX II LOWER LEVEL

Sludge [illegible]

DATE: June 18, 1985

Time	K-1	Tons	K-2	Tons	P-7&8	Tons	P-9&10	Tons	L-1	Tons	L-2	Tons	P11&12	Tons	P13&14	Tons	X-9	Tons
7:00	5730.6	[illegible]	3016.0	[illegible]	3240.1	[illegible]	1829.2	[illegible]	13.5	[illegible]	12.6	[illegible]	37.9	[illegible]	11.6	[illegible]	488.0	[illegible]
:15	40.4	11.8	21.7	5.7	62.3	2.2	25.4	3.2	20.6	7.1	17.1	4.5	/	0	15.2	3.6	/	0
:30	54.1	11.7	27.3	5.6	64.6	2.3	28.6	3.2	27.6	7.0	21.3	4.2	/	0	18.8	3.6	/	0
:45	65.8	11.7	32.9	5.6	66.8	2.2	31.8	3.2	34.6	7.0	25.5	4.2	/	0	20.4	3.6	/	0
8:00	5792.5	11.7	3037.1	6.2	3269.1	2.3	1835.0	3.2	41.6	7.0	29.7	4.2	38.0	0	25.4	3.6	488.0	0
:15	88.6	11.1	45.3	6.2	72.1	3.0	37.5	2.5	47.4	5.8	32.8	3.1	/	0	29.1	3.7	/	0
:30	99.7	11.1	51.6	6.3	75.0	2.9	40.1	2.6	52.2	5.8	35.9	3.1	/	0	32.1	3.0	/	0
:45	813.4	12.4	59.2	7.6	77.5	2.5	42.0	2.0	57.2	5.0	39.5	3.6	/	0	34.8	2.7	/	0
9:00	5826.5	13.1	3066.8	7.6	3280.0	2.5	1844.2	2.1	63.7	6.5	43.0	3.5	/	0	36.6	2.8	488.0	0
:15	39.4	13.4	74.5	7.7	83.4	3.9	47.6	3.4	68.0	4.3	46.9	3.9	/	0	40.1	3.5	/	0
:30	52.3	12.4	80.5	6.0	87.9	4.0	51.1	3.5	72.3	4.3	50.8	3.9	/	0	43.7	3.6	/	0
:45	65.3	13.0	87.4	6.9	91.0	3.1	54.0	2.9	76.5	4.2	54.7	3.9	/	0	47.0	3.3	/	0
10:00	5878.4	13.1	3094.3	6.8	3294.1	3.1	1857.0	3.0	80.7	4.2	58.6	3.9	/	0	50.3	3.3	488.0	0
:15	5892.6	14.2	3100.8	6.6	3298.0	3.9	1859.9	2.9	84.9	4.2	62.7	4.1	/	0	54.0	3.7	/	0
:30	5905.6	13.0	3107.8	7.0	3300.0	4.0	1863.9	4.0	89.1	4.3	66.8	4.1	/	0	57.7	3.7	/	/
:45	5926.2	10.6	3117.7	8.9	3307.1	5.1	1869.2	5.3	95.2	6.1	72.8	6.0	38.5	0	62.4	4.7	/	/
11:00	5935.7	9.5	3122.4	4.7	3308.9	1.8	1871.8	2.6	98.0	2.8	75.2	2.4	/	0	64.1	2.7	488.0	/
:15	45.7	10.0	26.6	4.2	3312.5	3.6	75.8	4.0	101.1	3.1	78.5	3.3	38.5	0	67.1	3.0	/	/
:30	61.8	16.1	34.5	7.9	3315.7	3.2	80.2	4.4	106.7	5.6	83.5	5.0	/	0	70.7	3.6	/	0
:45	77.9	16.1	42.3	7.8	3318.9	3.2	85.9	5.7	112.3	5.6	88.5	5.0	/	0	74.4	3.7	/	0
12:00	5956.7	9.8	3147.4	5.1	3323.1	4.2	1887.1	1.9	116.0	3.7	92.5	4.0	38.5	0	78.6	4.2	488.0	0
:15	5994.7	8.0	3155.2	7.8	26.9	3.8	189.32	2.1	125.0	9.0	99.4	6.9	/	0	82.6	4.0	/	0
:30	6020.7	8.0	3160.9	7.7	30.7	3.8	1896.4	4.2	130.1	7.1	106.3	6.9	/	0	86.5	3.7	/	0
:45	6019.7	9.8	3168.8	6.0	3333.7	3.0	1900.3	3.9	138.1	6.0	113.8	6.5	/	/	90.0	3.5	/	/
1:00	6039.4	9.4	3172.4	3.5	3335.1	2.0	1903.1	2.9	140.3	4.2	116.5	3.7	/	/	92.8	2.8	488.0	/
:15	6051.2	12.1	3180.5	8.1	3339.6	3.9	1908.2	5.1	146.2	5.9	122.6	6.1	/	/	96.7	3.9	/	/
:30	6064.9	13.7	3187.7	7.2	3343.8	4.2	1909.8	3.6	153.9	7.7	130.1	7.5	/	/	101.2	4.5	/	/
:45	6081.5	14.6	3194.5	7.0	3347.3	3.5	1915.2	5.4	158.9	5.0	135.1	5.0	/	0	105.4	4.2	/	0
2:00	6096.2	14.7	3201.5	6.8	3350.8	3.5	1916.6	3.4	163.9	5.0	139.9	4.8	38.5	0	109.4	4.2	488.0	0
:15	109.4	13.2	3208.1	6.6	53.8	3.0	20.6	4.0	167.4	3.5	143.4	3.5	/	0	112.8	3.4	/	0
:30	122.6	13.2	3213.1	6.0	56.8	3.0	1924.6	4.0	170.9	3.5	146.4	3.0	/	0	116.0	3.2	/	0
:45	133.8	13.2	3219.1	6.0	59.8	3.0	1928.6	4.0	174.9	4.0	146.9	3.5	/	0	119.2	3.2	/	0
3:00	6147.8	12.0	3224.4	5.3	3363.8	4.0	1931.6	3.0	177.3	2.4	152.9	6.0	38.5	0	125.6	4.4	488.0	0

OPERATOR: Jessie Mitchell

A.W.S.P.O.: C. Robinson

Form I-11

DETROIT WASTEWATER TREATMENT PLANT

INCINERATOR LOADING RATE SHIFT REPORT

DATE: 6/18/85 CREW: Three

SHIFTS M	D	A	K1 WEIGHTOMETER READINGS	K1 TOTAL	K2 WEIGHTOMETER READINGS	K2 TOTAL	P7 WEIGHTOMETER READINGS	P7 TOTAL	P9 WEIGHTOMETER READINGS	P9 TOTAL	M1 WEIGHTOMETER READINGS	M1 TOTAL	M2 WEIGHTOMETER READINGS	M2 TOTAL	Q8 WEIGHTOMETER READINGS	Q8 TOTAL	Q10 WEIGHTOMETER READINGS	TO
11PM	7AM	3PM	5730.6	XXXX	3016.0	XXXX	3260.1	XXXX	1822.2	XXXX		XXXX		XXXX	0	XXXX	0	X
MID	8	4	5777.5	46.9	3039.1	23.1	3269.1	9.0	1835.0	12.8		0		0	0	0	0	
1AM	9	5	5826.5	49.0	3066.8	27.7	3280.0	10.9	1844.2	9.2		0		0	0	0	0	
2	10	6	5878.4	51.9	3094.2	27.4	3294.1	14.1	1857.0	12.8		0		0	0	0	0	
3	11	7	5935.7	57.3	3122.4	28.2	3308.9	14.8	1871.8	14.8		0		0	0	0	0	
4	NOON	8	5986.7	51.0	3147.4	25.0	3323.1	14.4	1888.1	16.3		0		0	0	0	0	
5	1PM	9	6039.1	52.4	3172.4	25.0	3335.7	12.6	1903.1	15.0		0		0		0		
6	2	10	6096.2	52.1	3201.5	29.1	3350.8	15.1	1916.6	13.5		0		0		0		
7	3	11	6147.8	51.6	3224.4	22.9	3363.8	13.0	1931.6	15.0		0		0		0		

SHIFTS M	D	A	L1 WEIGHTOMETER READINGS	L1 TOTAL	L2 WEIGHTOMETER READINGS	L2 TOTAL	P11 WEIGHTOMETER READINGS	P11 TOTAL	P13 WEIGHTOMETER READINGS	P13 TOTAL	N1 WEIGHTOMETER READINGS	N1 TOTAL	N2 WEIGHTOMETER READINGS	N2 TOTAL	Q12 WEIGHTOMETER READINGS	Q12 TOTAL	Q14 WEIGHTOMETER READINGS	TO
11PM	7AM	3PM	13.5	XXXX	12.6	XXXX	37.9	XXXX	11.6	XXXX		XXXX	1375.2	XXXX		XXXX	667	X
MID	8	4	41.6	28.1	29.7	17.1		0	25.4	13.8		0		0		0		
1AM	9	5	63.7	22.1	43.0	13.3		0	36.6	11.2		0		0		0		
2	10	6	80.7	17.0	58.6	15.6		0	50.3	13.7		0		0		0		
3	11	7	98.0	17.3	75.8	17.2		0	64.1	13.8		0		0		0		
4	NOON	8	116.0	18.0	92.5	16.7		0	78.6	14.5		0		0		0		
5	1PM	9	140.3	24.3	116.5	24.0		0	92.8	14.2		0		0		0		
6	2	10	1639	23.6	139.9	23.4		0	109.6	16.8		0		0		0		
7	3	11	177.3	13.4	152.9	13.0	38.5	0	123.6	14.0		0		0		0		

SHIFT M	D	A	K1+L1	M1+N1	X-9 WEIGHTOMETER READINGS	X-9 TONS	TONS TO CII INC.
11PM	7AM	3PM	XXXX	XXXX	488.0	XXXX	XXXX
MID	8	4	75.0	0	0	0	75.0
1AM	9	5	71.1	0	0	0	71.1
2	10	6	68.9	0	0	0	68.9
3	11	7	74.6	0	0	0	74.6
4	NOON	8	69.0	0	0	0	69.0
5	1PM	9	76.7	0	0	0	76.7
6	2	10	80.7	0	0	0	80.7
7	3	11	65.0	0		0	65.0

RUNNING TIME 7	8	9	10	11	12	13
				X		
60	60	60	60	X	45	60
60	60	60	60	X	60	60
60	60	60	60	X		60
60	60	60	60	X		60
60	60	60	60	X		60
60	60	60	45	X		60
60	60	60	60	X		60
60	60	60	60	X		60

C. Robinson

S160

I-6

DETROIT WASTEWATER TREATMENT DIVISION

SOLIDS HANDLING INCINERATION COMPLEX II

OPERATORS 24 HOUR REPORT

REVISED

PART 6 OF 1

DATE 6 / 18 / 1985

INCINERATOR # 13

TIME	HIGHEST HEARTH TEMP. HEARTH #	HIGHEST HEARTH TEMP. TEMPERATURE	CENTER SHAFT SPEED	% O_2	SCRUBBER TEMP CONTROL	DRAFT PRESS IN W.C.	I.D. FAN DAMPER	SCRUBBER DIFF IN W.C.	GAS METER READING	OPACITY READING	REMARKS
12 am	4	890	1.0	15.0	70	-.3	30	24			
1	6	1011	1.0	15.0	70	-.4	28	24			
2	6	1064	1.0	15.0	65	-.3	29	20			
3	6	1079	1.0	15.0	60	-.3	29	20			
4	6	1083	1.0	15.5	60	-.3	29	20			
5	6	1086	1.0	15.5	60	-.3	30	20			
6	6	1086	1.0	15.5	60	-.3	30	22			
7	6	1089	1.0	15.5	60	-.3	30	22			
8	6	1200	1.0	15.0	60	-.8	35	22			
9	6	1188	1.0	12.0	50	-1.0	48	38			
10	6	1260	1.0	12.0	50	-1.0	48	38			
11	6	1471	1.0	8.0	50	-1.1	50	40			
12 pm	6	1471	1.0	9.0	50	-1.2	50	40			
1	6	1470	1.0	8.5	50	-1.1	50	40			
2	6	1405	1.0	8.5	50	-1.2	50	40			
3	6	1395	1.0	8.0	50	-1.2	50	40			
4	6	1400	1.0	9.0	50	-1.5	60	005			
5	6	1380	1.0	9.5	55	-1.3	60	005			
6	6	1350	1.0	10.5	60	-1.2	60	005			
7	6	1350	1.0	10.0	70	-1.2	66	005			
8	6	1200	1.0	10.5	65	-1.1	86	005			
9	6	1250	1.0	10.0	65	-1.0	72	005			
10	6	1450	1.0	005	65	-.5	45	005			
11	6	1350	1.0	005	65	-.5	45	005			
12 am	4	1076	1.0	20	70	-.5	44	26			

PROCESS & EQUIPMENT EXCEPTION

SHIFT	OPERATOR	CREW
M	JACKSON/LANE	1
D		
A		
M	BUSHOR	2

INCINERATOR OPACITY DEVIATION SUMMARY FOR JUNE 18, 1985
DATE

OBSERVER U. FREEMAN — LOCATION MB-ROOF

TIME \ INC	1	2	3	4	5	6	7	8	9	10	11	12	13	14
10 00 AM	5				5		5	5	5	5			5	
05	5				15		5	5	5	5			5	
10	5				10		5	5	5	5			5	
15	5				10		5	5	5	5			5	
20	5				10		5	5	5	5			5	
25	5				10		5	5	5	5			5	
30	5				10		5	5	5	5			5	
35	5				10		5	5	5	5			5	
40	5				10		5	5	5	5			5	
45	5				10		5	5	5	5			5	
50	5				10		5	5	5	5			5	
55	5				10		5	5	5	5			5	
11 00	5				10		5	5	5	5			5	
05	5				10		5	5	5	5			5	
10	5				10		5	5	5	5			5	
15	5				10		5	5	5	5			5	
20	5				10		5	5	5	5			5	
25	5				10		5	5	5	5			5	
30	5				10		5	5	5	5			5	
35	5				10		5	5	5	5			5	
40	5				10		5	5	5	5			5	
45	5				10		5	5	5	5			5	
50	5				10		5	5	5	5			5	
55	5				10		5	5	5	5			5	
TOTAL OPAC	120				240		120	120	120	120			120	
TOTAL RDS	24				24		24	24	24	24			24	

WIND SP & DIR 8-12MPH SUN S.E. WEATHER SCATTERED

BLUE BACKGROUND

TEST ON INC. #13 STARTED @ 11:30AM

GCMMER54

INCINERATOR OPACITY DEVIATION SUMMARY FOR JUNE 16, 1985
DATE

OBSERVER U. FREEMAN — LOCATION MB-ROOF

TIME \ INC	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1200 PM	5				5		5	5	5	5			5	
05	5				5		5	5	10	5			5	
10	5				5		5	5	10	5			5	
15	5				5		5	5	15	5			5	
20	5				5		5	5	10	5			5	
25	5				5		5	5	10	5			5	
30	5				5		5	5	5	5			5	
35	5				5		5	5	5	5			5	
40	5				5		5	5	5	5			5	
45	5				5		5	5	5	5			5	
50	5				5		5	5	5	5			5	
55	5				5		5	5	5	5			5	
100	5				5		5	5	5	5			5	
05	5				5		5	5	5	5			5	
10	5				5		5	5	5	5			5	
15	5				5		5	5	5	5			5	
20	5				5		5	5	5	5			5	
25	5				5		5	5	5	5			5	
30	5				5		5	5	5	5			5	
35	5				5		5	5	5	5			5	
40	5				5		5	5	5	5			5	
45	5				5		5	5	5	5			5	
50	5				5		5	5	5	5			5	
55	5				5		5	5	5	5			5	
TOTAL OPAC	120				120		120	120	150	120			120	
TOTAL RDS	24				24		24	24	24	24			24	

WIND SP & DIR 19-25MPH SUN SOUTH WEATHER SCATTERED

BLUE-WHITE BACKGROUND

COMMER84

INCINERATOR OPACITY DEVIATION SUMMARY FOR JUNE 18, 1985 (DATE)

OBSERVER E. McCLURE LOCATION MB-ROOF

TIME \ INC	1	2	3	4	5	6	7	8	9	10	11	12	13	14
2 00 PM	5	5			5		5	5	5	5		5	5	5
05	5	5			5		5	5	5	5		5	5	5
10	5	5			15		5	5	5	5		5	5	5
15	5	5			10		10	10	10	10		5	5	5
20	5	5			5		10	10	10	10		5	5	5
25	5	5			5		10	10	10	10		5	5	5
30	5	5			5		10	10	10	10		5	5	5
35	5	5			5		10	10	10	10		5	5	5
40	5	5			5		5	10	15	10		5	5	5
45	5	5			5		5	10	30*	10		5	5	5
50	5	5			5		5	5	15	10		5	5	5
55	5	5			5		5	5	10	10		5	5	5
3 00 PM	5	5			5		5	5	10	10		5	5	5
05	5	5			5		5	5	10	10		5	5	5
10	5	5			5		10	10	10	10		5	5	5
15	5	5			5		10	10	10	10		5	5	5
20	5	5			5		10	10	10	10		5	5	5
25	5	5			5		10	10	10	15		5	5	5
30	5	5			5		10	10	15	15		5	5	5
35	5	5			5		5	10	10	15		5	5	5
40	5	5			5		5	15*	10	20*		5	5	5
45	5	5			5		5	10	10	15		5	5	5
50	5	5			5		5	15	15	10		5	5	5
55	5	5			5		5	15	15	10		5	5	5
TOTAL OPAC	120	120			135		170	220	270	255		120	120	120
TOTAL RDS	24	24			24		24	24	24	24		24	24	24

WIND SP & DIR 10-15 MPH SUN SOUTH WEATHER CLEAR
BLUE BACKGROUND

2:00PM CI INC. #5 ON STANDBY AND INC. #2 IN SERVICE

4:00PM CII INC. #14 IN SERVICE

GZIMMER84

INCINERATOR OPACITY DEVIATION SUMMARY FOR JUNE 18, 1985 (DATE)

OBSERVER E. McCLURE LOCATION MB-ROOF

TIME \ INC	1	2	3	4	5	6	7	8	9	10	11	12	13	14
4 00 PM	5	5			5		5	15	15	15		5	5	5
05	5	5			5		5	15	15	15		5	5	5
10	5	5			5		5	15	15	15		5	5	5
15	5	5			5		5	15	15	15		5	5	5
20	5	5			5		5	15	15	15		5	5	5
25	5	5			5		5	15	15	15		5	5	5
30	5	5			5		5	15	15	15		5	5	5
35	5	5			5		5	10	10	15		5	5	5
40	5	5			5		5	10	10	10		5	5	5
45	5	5			5		5	5	10	15		5	5	5
50	5	5			5		5	5	10	15		5	5	5
55	5	5			5		5	5	10	10		5	5	5
5 00 PM							5	5	10	10		5	5	5
05							5	5	10	15		5	5	5
10							5	5	10	15		5	5	5
15							5	5	10	10		5	5	5
20							5	5	10	10		5	5	5
25							5	5	10	15		5	5	5
30							5	5	10	15		5	5	5
35							5	5	10	15		5	5	5
40							5	5	10	10		5	5	5
45							5	5	10	10		5	5	5
50							5	5	10	10		5	5	5
55							5	5	10	10		5	5	5
TOTAL OPAC	60	60			60		120	200	275	315		120	120	120
TOTAL RDS	12	12			12		24	24	24	24		24	24	24

WIND SP & DIR 10-15 MPH SUN SOUTH WEATHER CLEAR
BLUE BACK GROUND

4:00PM MAINSTACK EVENT ON INC. #6 [redacted]

4:30PM CI ON STANDBY DUE TO LACK OF FEED

GZIMMER54

Detroit Wastewater Treatment Division
Solids Handling - Complex II
Sr. SPO Shift Report
Incineration

Date JUNE 18, 1985 Shift AFTERNOON

Sr. SPO Donald S. Wesley Crew# 4

Inc.	S.O.S.	INC. STATUS	E.O.S.
#7.	✓		✓
#8.	✓		✓
#9.	✓	O_2 METER	X
#10.	✓		✓
#11.	X	BRICKWORK	X
#12.	/	Low Sludge Inventory	✓
#13.	✓	O_2 METER	X
#14.	/	Low Sludge Inventory	✓

Weightometer	7th Hour Reading	1st Hour Reading	Ton
K-1	6462.5	6206.8	255.7
L-1	396.0	192.9	203.1
M-1			
N-1			
X-9			

Main Gas Readings

	7th Hour	1st Hour	Factor	Gas Used
#1.	25650	24481	202.39	236593
#2.	24202	23119	202.39	219188
Total Gas Used	455781			Cu.Ft.

Gas Used/Ton Burned 993.41 Cu.Ft.

	BFP	LL	UL
% Dry Solids Cake	20.4	25.3	N/A
% Volitiles Cake	62.8	58.1	N/A

Tons Cake Lower Level = 458.8 Tons
Tons Cake Upper Level = 0 Tons
Total Tonnage = 458.8 Tons
Tons to Complex I = 0 Tons
Total Complex II = 458.8 Tons
Incinerator Hours = 33.7 Hour
Wet Tons/Inc. Hour = 13.6 Tons/Hc

Central Shaft Speeds

Inc.	#7.	#8.	#9.	#10.	#11.	#12.	#13.	#14.
S.O.S.	60	60	65	60	X	60	60	60
E.O.S	60	60	65	60	X	60	60	60

Comments: INCINERATOR'S #7-8-9-10-13 IN SERVICE @ S.O.S @ 12 BFP'S AND EMISSION'S TEST BEING RUN ON #13 INC. @ SOS, #12 & 14 INC'S OSB. 4:15 #14 INC. IN SERVICE TO EQAULIZE FEED TO ALL INC'S 5:45 TESTING ON #13 INC. FINISHED FOR THE DAY. 6:15 #12 INC IN SERVICE #10 ON STANDBY. 9:00 #9 INC. O.O.S O_2 ANALYZER MALFUNCTION. 10:00 #13 INC. O.O.S O_2 ANALYZER STUCK ON PURGE AS #9.

E.O.S. #7, 8, 10, 12, + 14 IN SERVICE WITH 12 BFP'S AND 4 LLVF'S

MO# 8502627 #14 SHAFT COOLING AIR RETURN DAMPER, #9 O_2 METER #8502637 #13 O_2 METER #8502638

[illegible] Complex [illegible]
[illegible]
Incinerator [illegible]

Date 6-18-86 Shift DAY

Sr. SPO W. Hutcherson Crew # III

Inc. S.			
#7.	✓		✓
#8.	✓		✓
#9.	✓		✓
#10.	✓		✓
#11.	X		X
#12.	✓	← Low Sludge Inventory →	✓
#13.	✓		✓
#14.	✓	← Low Sludge Inventory →	✓

Weightometer	7th Hour Reading	1st Hour Reading	Tons
K-1	6096.2	5777.5	318.7
L-1	163.9	41.6	122.3
M-1	Ø	Ø	Ø
N-1	Ø	Ø	Ø
X-9	Ø	Ø	Ø

Tons Cake Lower Level = 441.0 Tons
Tons Cake Upper Level = Ø Tons
Total Tonnage = 441.0 Tons
Tons to Complex I = Ø Tons
Total Complex II = 441.0 Tons
Incinerator Hours = 35.15 Hours
Wet Tons/Inc. Hour = 12.5 Tons/Ho

Main Gas Readings

	7th Hour	1st Hour	Factor	Gas Used
#1.	0024199	0023010	202.39	240641.71
#2.	0022857	0021758	202.39	222426.61
Total Gas Used 463068.32 Cu.Ft.				

Gas Used/Ton Burned 1050.04 Cu.Ft.

	BFP	LL	UL
% Dry Solids Cake	23.2	28.1	N/A
% Volitiles Cake	60.6	58.8	N/A

Central Shaft Speeds

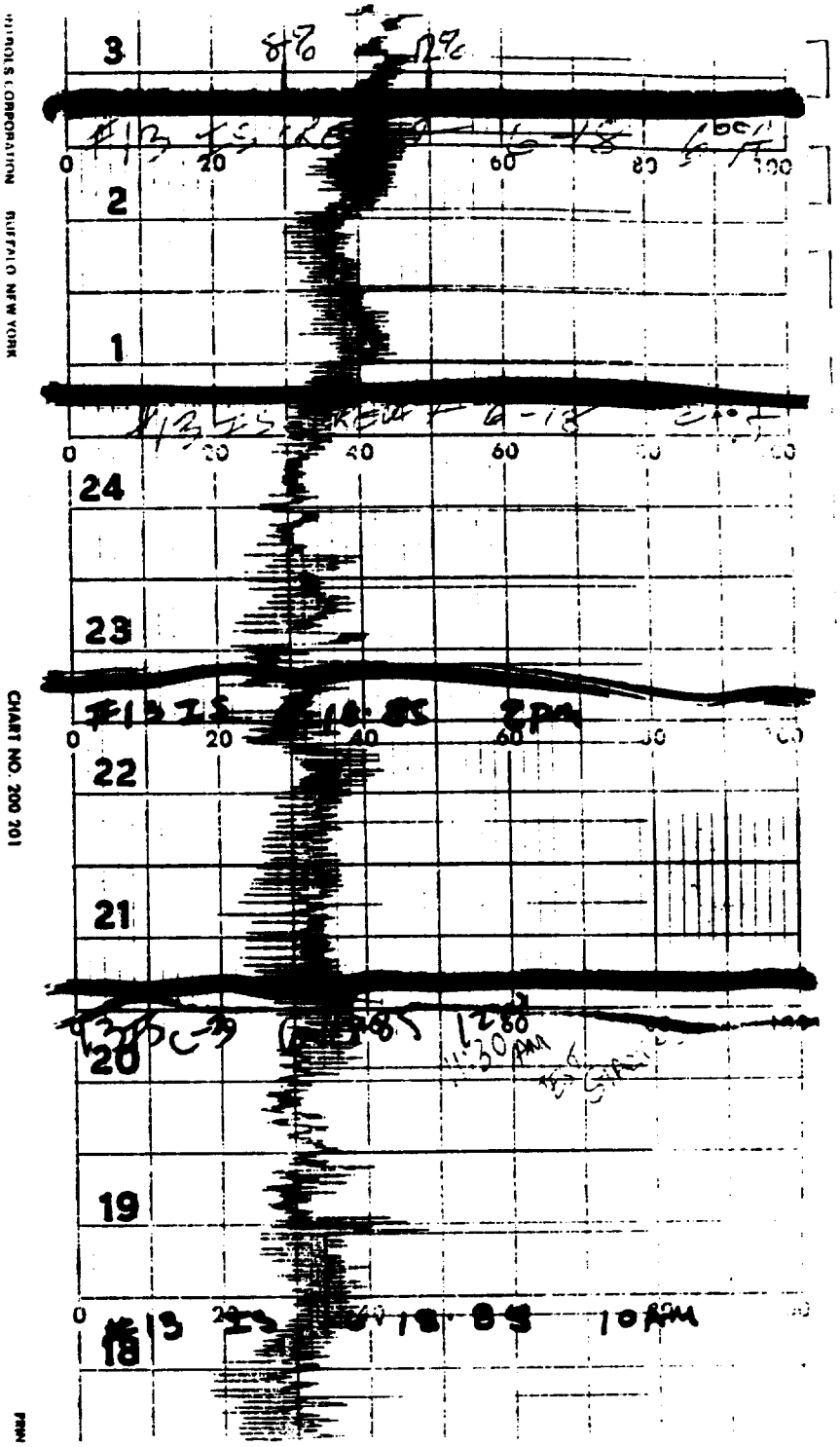
Inc.	#7.	#8.	#9.	#10.	#11.	#12.	#13.	#14.
S.O.S.	60	64	60	60	X	62	62	60
E.O.S	60	60	75	60	X	60	60	60

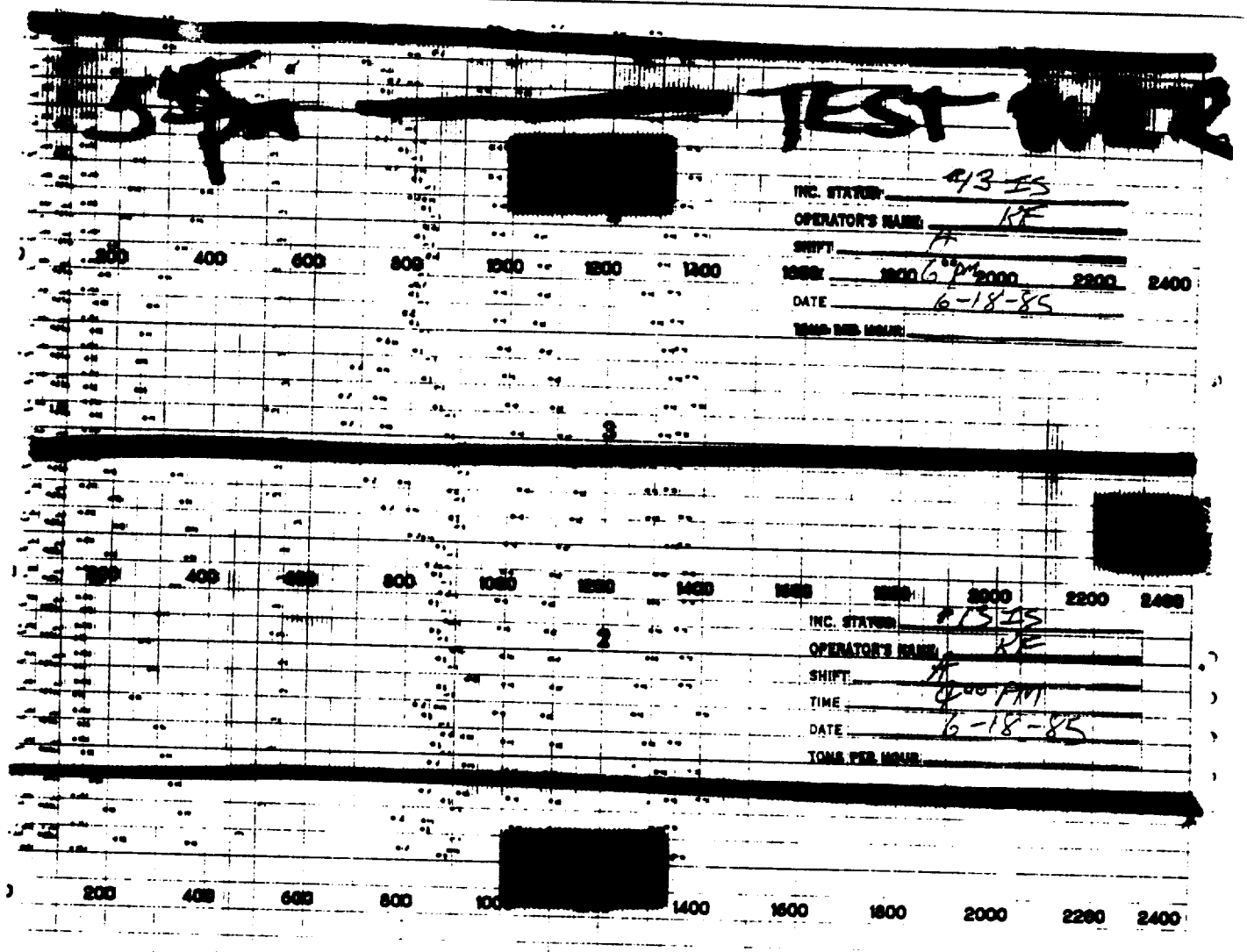
Comments: S.O.S. 14 - B.P. 4 - LLVF I.S. ULVF - O.S.B NO FEED TO Complex ONE, LOW SLUDGE INVENTORY #14 INC O.S.B. 7:15 Am - INC #12 I.S. 8:00 Am - M KICKED OUT P 13/14 BELT (RESET) 8:45 Am - LOST (1) LLVF TOTAL (3) I.S. 9:00 Am - INC #12 O.S.B (LOW SLUDGE INVENTORY) LOST (1) LLVF. 9:00 Am - FUEL AIR FAN KICKED OUT INC #14 GAS KICKED OUT (RESET) 10:30 Am - ADDED 1-LLVF TOTAL (4) I.S. INC. #14 - I.S. 11:30 Am - EPA STARTED TESTING EMMISSIONS INC #13 12:30 pm. LOST (1) B.P. TOTAL (13) B.P. I.S. FEED REDUCTION BY B.P. INC #10 O.S.B AT 12:45 pm 1:00 pm INC #10 BACK IN SERVICE, LOST 1-LLVF TOTAL (3) I.S. 1:05 pm. (1) B.P. O.O.S 1:45 pm #14 INC O.O.S LOW SLUDGE INVENTORY 2:00 pm. LOST 1-B.P. GRAVITY BELT TOTAL (12) I.S. #13 INC BEING TESTED BY EPA FOR EMMISSIO AT E.O.S.

[signature] / C.B. / C.R.

[redacted]

[redacted]




TEST
INC. STATUS: #3 IS
OPERATOR'S NAME: RE
SHIFT: A
TIME: 6 PM
DATE: 6-18-85
TONS PER HOUR:
200 400 600 800 1000 1200 1400 1600 1800 2000 2200 2400
3
2
INC. STATUS: #2 IS
OPERATOR'S NAME: RE
SHIFT: A
TIME: 4:00 PM
DATE: 6-18-85
TONS PER HOUR:
200 400 600 800 1000 1200 1400 1600 1800 2000 2200 2400
12
INC. STATUS: IS #3
OPERATOR'S NAME: JJ
SHIFT: D
TIME: 2 pm
DATE: 6.18.85
TONS PER HOUR:
200 400 600 800 1000 1200 1400 1600 1800 °F 2000 2200 2400
11
Points 1–12 = Temperatures 1–12
Point 20 = North Breech
Point 21 = Main Exhaust
Point 22 = Scrubber Inlet
Point 23 = Scrubber outlet
Point 24 = Central s/e ft
10
200 400 600 800 1000 1200 1400 1600 1800 2000 2200 2400
11:30 AM
TEST START
INC. STATUS: #1 INC 13 IS
OPERATOR'S NAME: JJ
SHIFT: DAY
TIME: 12N
DATE: 6-18-85
TONS PER HOUR:
9

ATTACHMENT 2

SUPPLEMENTARY PROCESS DATA FOR RUN NO. 2

June 19 ...

6-19-85

Minnesota #13 Scrubber Water Flows

	Precooler Sprayers	Under Tray Sprayers	Parcoola Weir	Impingement Trays
12:30AM	77 - 165 gpm	83 - 172 gpm	13 - 200 gpm	9 - 1300 gpm
1:00AM	77 - 165 gpm	84 - 173 gpm	13.5 205 gpm	9.5 1350 gpm
1:30 AM	78 - 166 gpm	84 - 173 gpm	13.5 - 205 gpm	9.5 1350 gpm
2:00 AM	77 - 165 gpm	84 - 173 gpm	13.5 - 205 gpm	9.2 1332 gpm
2:30 AM	78 - 166 gpm	84 - 173 gpm	13.5 205 gpm	9.2 1332 gpm
3:00 AM	78 - 166 gpm	84 - 173 gpm	13.5 205 gpm	9.2 1332 gpm
3:30 AM	77 - 165 gpm	84 - 173 gpm	13.5 205 gpm	9.2 1332 gpm
4:00	78 - 166 gpm	84 - 173 gpm	13.5 205 gpm	9.2 1332 gpm
Test stopped at ~~12:45~~ 1:00 pm				
12:00 pm	78 - 166 gpm	84 - 173 gpm	13.5 - 205 gpm	9.2 - 1332 gpm
12:30 pm	76 - 164 gpm	84 - 173 gpm	13.5 - 205 gpm	9.2 - 1332 gpm
1:00 pm	76 - 164 gpm	84 - 172 gpm	13.5 - 205 gpm	9.2 - 1332 gpm
1:30 pm	77 - 165 gpm	84 - 172 gpm	13.5 - 205 gpm	9.2 - 1332 gpm
2:00 pm	76 - 164 GPM	84 - 172 gpm	13.5 - 205 gpm	9.4 - 1344 gpm
2:30 pm	76 - 164 GPM	84 - 172 gpm	13.5 - 205 gpm	9.2 - 1332 gpm
3:00 pm	76 - 164 GPM	84 - 172 GPM	13.5 - 205 gpm	9.2 - 1332 GPM
3:30 pm	76 - 164 GPM	84 - 172 GPM	13.5 - 205 GPM	9.2 - 1332 GPM

INCINERATOR OPACITY DEVIATION SUMMARY FOR JUNE 19, 1985 (DATE)

OBSERVER V. FREEMAN | LOCATION MB-ROOF.

TIME \ INC	1	2	3	4	5	6	7	8	9	10	11	12	13	14
4 00 PM	5				5		5	5		5		5	5	5
05	5				5		5	5		5		5	5	5
10	5				5		5	5		5		5	5	5
15	5				5		5	5	5	5		5	5	5
20	5				5		5	5	5	5		5	5	5
25	5				5		5	5	5	5		5	5	5
30	5				5		5	5	5	5		5	5	5
35	5				5		5	5	5	5		5	5	5
40	5				5		5	5	5	5		5	5	5
45	5				5		5	5	5	5		5	5	5
50	5				5		5	5	5	5		5	5	5
55	5				5		5	5	5	5		5	5	5
5 00	5				5		5	5	5	5		5	5	5
05	5				5		5	5	5	5		5	5	5
10	5				5		5	5	5	5		5	5	5
15	5				5		5	5	5	5		5	5	5
20	5				5		5	5	5	5		5	5	5
25	5				5		5	5	5	5		5	5	5
30	5				5		5	5	5	5		5	5	5
35	5				5		5	5	5	5		5	5	5
40	5				5		5	5	5	5		5	5	5
45	5				5		5	5	5	5		5	5	5
50	5				5		5	5	5	5		5	5	5
55	5				5		5	5	5	5		5	5	5
TOTAL OPAC	120				120		120	120	105	120		120	120	120
TOTAL RDS	24				24		24	24	21	24		24	24	24

WIND SP & DIR 8-12 MPH SUN S.W WEATHER SCATTERED

BLUE-WHITE BACKGROUND

INC # 9-15 @ 3:20PM / [redacted]

INC. # 12-005 : @ 3:20PM

EPA - TEST ENDED @ 4:45PM

GZIMMER84

INCINERATOR OPACITY DEVIATION SUMMARY FOR June 19, 1985 (DATE)

OBSERVER E. McClure

LOCATION MB-Roof

TIME \ INC	1	2	3	4	5	6	7	8	9	10	11	12	13	14
12 00 PM	5	5			5		5	5		15		5	5	5
05	5	5			5		5	5		15		5	5	5
10	5	5			5		5	5		15		5	5	5
15	5	5			5		5	5		10		5	5	5
20	5	5			5		5	5		10		5	5	5
25	5	5			5		5	5		5		5	5	5
30	5	5			5		5	5		5		5	5	5
35	5	5			5		5	5		10		5	5	5
40	5	5			5		5	5		10		5	5	5
45	5	5			5		5	5		5		5	5	5
50	5	5			5		5	5		5		5	5	5
55	5	5			5		5	5		5		5	5	5
1 00 PM	5	5			5		5	5		5		5	15	5
05	5	5			5		5	5		10		5	50[W]	5
10	5	5			5		5	5		15		5	40[W]	5
15	5	5			5		5	5		10		5	20[W]	5
20	5	5			5		5	5		10		5	15	5
25	5	5			5		5	5		10		5	10	5
30	5	5			5		5	5		10		5	10	5
35	5	5			5		5	5		10		5	10	5
40	5	5			5		5	5		10		5	10	5
45	5	5			5		5	5		10		5	10	5
50	5	5			5		5	5		10		5	10	5
55	5	5			5		5	5		10		5	10	5
TOTAL OPAC	120	120			120		120	120		230		120	240	120
TOTAL RDS	24	24			24		24	24		24		24	24	24

WIND SP & DIR 5-10 MPH SUN SOUTH WEATHER CLEAR

BLUE BACKGROUND

1:00PM-CII GAS KICKED OUT OF SERVICE AND O_2 METER MALFUNCTIONING ON INC #13 TAKEN OUT OF SERVICE IMMEDIATELY. @ 1:00PM

1:00PM-CI ON STANDBY BECAUSE OF BELT PROBLEM

GZIMMERB4

INCINERATOR OPACITY DEVIATION SUMMARY FOR June 19, 1985 (DATE)

OBSERVER E. McCLURE LOCATION MB-ROOF.

TIME \ INC	1	2	3	4	5	6	7	8	9	10	11	12	13	14
8 00 AM	5	5			5		5	5		5		5	5	5
05	10	5			5		5	5		5		5	5	5
10	10	5			5		5	15		10		5	5	5
15	10	5			5		5	20*		10		5	5	5
20	10	5			10		5	10		10		5	5	5
25	10	5			10		5	15		10		5	5	5
30	10	5			5		5	10		10		5	5	5
35	10	5			5		5	5		10		5	5	5
40	10	5			5		5	5		15		5	5	5
45	10	5			5		5	5		15		5	5	5
50	10	5			5		5	10		10		5	5	5
55	5	5			5		5	10		10		5	5	5
9 00 AM	5	5			5		5	5		10		5	5	5
05	10	5			5		5	5		15		5	5	5
10	10	5			5		5	10		10		10	5	5
15	10	5			15		5	10		10		10	5	5
20	10	5			10		5	5		10		5	5	10
25	10	5			10		5	5		15		5	5	10
30	10	5			10		5	10		10		10	5	5
35	10	5			15		5	10		10		10	10	5
40	5	5			15		5	5		10		5	10	5
45	5	5			15		5	5		10		10	10	5
50	10	5			10		5	5		10		10	10	5
55	5	5			10		5	5		10		10	10	5
TOTAL OPAC	210	120			200		120	195		250		155	145	130
TOTAL RDS	24	24			24		24	24		24		24	24	24

WIND SP & DIR 10-12 MPH SUN ——— WEATHER OVERCAST
GREY BACKGROUND

8:15AM C II INC. #9 NOT IN SERVICE BUT Shaft is RUNNING.

GZIMMER84

INCINERATOR OPACITY DEVIATION SUMMARY FOR June 19, 1985
DATE

OBSERVER E. McClure — LOCATION MB-ROOF

TIME \ INC	1	2	3	4	5	6	7	8	9	10	11	12	13	14
6 00 AM	5	5	X	X	5	X	5	5	X	5	X	5	5	5
05	5	5			5		5	5		5		5	5	5
10	5	5			5		5	5		5		5	5	5
15	5	5			5		5	5		5		5	5	5
20	5	5			5		5	5		5		5	5	5
25	5	5			5		5	5		5		5	5	5
30	5	5			5		5	5		10		5	5	5
35	5	5			5		5	5		10		5	5	5
40	5	5			5		5	5		10		5	5	5
45	15	5			5		5	15		15		5	5	5
50	10	5			5		5	10		15		5	5	5
55	5	5			5		5	15*		15*		5	5	5
7 00 AM	5	5			5		5	15*		15		5	5	5
05	10	5			5		5	10		10		5	5	5
10	15	5			5		5	5		5		5	5	5
15	10	5			5		5	5		5		5	5	5
20	10	5			5		5	5		5		5	5	5
25	5	5			5		5	5		5		5	5	5
30	15	5			5		5	5		5		5	5	5
35	10	5			5		5	5		5		5	5	5
40	5	5			5		5	5		5		5	5	5
45	5	5			5		5	5		5		5	5	5
50	5	5			5		5	5		5		5	5	5
55	5	5			5		5	5		5		5	5	5
TOTAL OPAC	175	120			120		120	160		180		120	120	120
TOTAL RDS	24	24			24		24	24		24		24	24	24

WIND SP & DIR 10-15 MPH SUN ——— WEATHER OVERCAST
GREY BACKGROUND

CI INC. #6 ON MAIN STACK

GCMMER84

INCINERATOR OPACITY DEVIATION SUMMARY FOR JUNE 19, 1985 (DATE)

OBSERVER E. McCLURE — LOCATION MB-ROOF

TIME \ INC	1	2	3	4	5	6	7	8	9	10	11	12	13	14
10 00 AM	5	5			5		5	10		10		10	10	10
05	5	5			10		5	10		10		10	10	10
10	5	5			15		5	10		10		10	10	10
15	5	5			15		5	10		10		10	10	10
20	5	5			15		5	10		10		10	10	10
25	5	5			10		5	10		10		10	10	10
30	5	5			5		5	10		10		10	10	10
35	5	5			5		5	10		10		10	10	10
40	5	5			5		5	10		10		10	10	10
45	5	5			5		5	10		10		10	10	10
50	5	5			5		5	10		10		10	10	10
55	5	5			5		5	10		10		10	10	10
11 00 AM	5	5			5		5	10		10		10	10	10
05	5	5			5		5	10		10		10	10	10
10	5	5			5		5	10		15		10	10	10
15	5	5			5		5	10		10		10	10	10
20	5	5			5		5	10		10		10	10	10
25	5	5			5		5	10		15		10	10	10
30	5	5			5		5	10		15		10	10	10
35	5	5			5		5	10		15		10	10	10
40	5	5			5		5	10		15		10	10	10
45	5	5			5		5	10		20		10	10	10
50	5	5			5		5	10		15		15	10	10
55	5	5			5		5	10		15		10	10	10
TOTAL OPAC	120	120			160		120	240		285		245	240	240
TOTAL RDS	24	24			24		24	24		24		24	24	24

WIND SP & DIR 10-15 MPH SUN ——— WEATHER OVERCAST
GREY BACKGROUND

INCINERATOR OPACITY DEVIATION SUMMARY FOR JUNE 19, 1985 (DATE)

OBSERVER U. FREEMAN LOCATION MB-ROOF

TIME \ INC	1	2	3	4	5	6	7	8	9	10	11	12	13	14
2 00 PM	5	5			5		5	5		15		5	5	5
05	5	5			5		5	5		15		5	5	5
10	5	5			5		5	5		15		5	5	5
15	5	5			5		5	5		15		5	5	5
20	5	5			5		5	5		15		5	5	5
25	5	5			5		5	5		10		5	5	5
30	5	5			5		5	5		10		5	5	5
35	5	5			5		5	5		10		5	5	5
40	5	5			5		5	5		10		5	5	5
45	5	5			5		5	5		5		5	5	5
50	5	5			5		5	5		5		5	5	5
55	5	5			5		5	5		5		5	5	5
3 00	5	5			5		5	5		5		5	5	5
05	5	5			5		5	5		5		5	5	5
10	5	5			5		5	5		5		5	5	5
15	5	5			5		5	5		5		5	5	5
20	5	5			5		5	5		5		5	5	5
25	5	5			5		5	5		5		5	5	5
30	5	5			5		5	5		5		5	5	5
35	5	5			5		5	5		5		5	5	5
40	5	5			5		5	5		5		5	5	5
45	5	5			5		5	5		5		5	5	5
50	5	5			5		5	5		5		5	5	5
55	5	5			5		5	5		5		5	5	5
TOTAL OPAC	120	120			120		120	120		190		120	120	120
TOTAL RDS	24	24			24		24	24		24		24	24	24

WIND SP & DIR 8-12MPH SUN S.W. WEATHER SCATTERED

INC #5 ON START UP @ 2:00PM

INC #1 ON START UP @ 2:15PM

GZIMMER84

Solids Handling - Complex II
Sr. SPO Shift Report
Incineration

Inc.	S.O.S.		E.O.S.
#7.	✓		✓
#8.	✓		✓
#9.	X	O_2 meter	/
#10.	✓		✓
#11.	X	Brickwork →	X
#12.	✓		✓
#13.	✓		✓
#14.	✓		✓

Date 6-19-85 Shift DAY

Sr. SPO W. Hutcherson Crew # III

Weightometer	7th Hour Reading	1st Hour Reading	Tons
K-1	7098.9	6853.7	245.
L-1	308.8	84.4	224.4
M-1	∅	∅	∅
N-1	∅	∅	∅
X-9	∅	∅	∅

Main Gas Readings

	7th Hour	1st Hour	Factor	Gas Used
#1.	0029278	0027976	202.39	263511.78
#2.	0021571	0026363	202.39	244487.12

Total Gas Used 507998.90 Cu.Ft.

Gas Used/Ton Burned 1081.76 Cu.Ft.

	BFP	LL	UL
% Dry Solids Cake	30.9	26.1	N/A
% Volitiles Cake	62.7	61.3	N/A

Tons Cake Lower Level = 469.6 Tons
Tons Cake Upper Level = ∅ Tons
Total Tonnage = 469.6 Tons
Tons to Complex I = ∅ Tons
Total Complex II = 469.6 Tons
Incinerator Hours = 35.45 Hours
Wet Tons/Inc. Hour = 13.24 Tons

Central Shaft Speeds

Inc.	#7.	#8.	#9.	#10.	#11	#12.	#13.	#14.
S.O.S.	65	63	X	67	X	60	60	60
E.O.S	65	63	63	61	X	60	60	60

Comments: S.O.S. 13-B.P. 5-LLVF I.S. ULVF OSB NO FEED TO Complex ONE. 7 45 Am- ADDED 1-B.P. TOTAL (14) 7 46 Am- lost (1) B.P. TOTAL (13) 7 45 Am lost (1) B.P. TOTAL (12) 8 00 Am- ROTATED STRAINERS ON Scrubber WATER. 7 55 Am- ADDED (1) B.P TOTAL (13) 8 50 Am los (1) B.P. TOTAL (12) 9 00 Am- Check Scrubber FANS ON Roof All check OK 9 30 Am- Deslagged hearth #5 INC # 9 10 05 Am- ADD (1) B.P. TOTAL (13). 11 40 Am- LOST (1) B.P. TOTAL (12) 12 45 Pm- O2 ANALIZER INC #13 MALFUNCTIONING 1 00 Pm- REQUEST (3) LLVF OSB INC #13 OOS Scrubber KICKED OUT 1 05 Pm- INC #9 O2 ANALIZER OK FOR SERVICE #13 INC Scrubber Reset 1 10 Pm- REQUEST 3-LLVF. 1 15 Pm INC #9 I.S. GA Reset ON INC #13- DEVIATION INC #13-30-60 % White-Scrubb System Shut Down- GAS KICKED OUT 1 34 Pm- INC #9 BACK OUT of Service AND INC #13 BACK IN service 1 35 Pm- LOST 1-B.P. TOTAL (11) I 2 00 Pm- ADDED 1-B.P. TOTAL (12) I.S.

C. Hutcherson / C.B.

Detroit Wastewater Treatment Division
Solids Handling - Complex II
Sr. SPO Shift Report
Incineration

Date JUNE 19, 1985 Shift AFTERNOON

Sr. SPO Howard L. Healy Crew # 4

Inc.	S.O.S.	INC. STATUS	E.O.S.	
#7.	✓	"G" BELT →	✓	✓
#8.	✓	→	✓	✓
#9.	/	→	✓	✓
#10.	✓	→	✓	✓
#11.	X	BRICKWORK	X	
#12.	✓	→	✓	✓
#13.	✓	→	✓	✓
#14.	✓	→	✓	✓

Weightometer	7th Hour Reading	1st Hour Reading	Tons
K-1	7262.5	7173.2	89.3
L-1	436.5	382.4	54.1
M-1			
N-1			
X-9			

Main Gas Readings

	7th Hour	1st Hour	Factor	Gas Used
#1.	31270	29735	202.39	310668
#2.	29373	27994	202.39	279095
Total Gas Used				589763 Cu. Ft.

Gas Used/Ton Burned 4112 Cu. Ft.

	BFP	LL	UL
% Dry Solids Cake	18.9	22.0	N/A
% Volitiles Cake	62.8	61.2	N/A

Tons Cake Lower Level = 143.4 Tons
Tons Cake Upper Level = 0 Tons
Total Tonnage = 143.4 Tons
Tons to Complex I = 0 Tons
Total Complex II = 143.4 Tons
Incinerator Hours = 13.2 Hours
Wet Tons/Inc. Hour = 10.8 Tons/Hr

Central Shaft Speeds

Inc.	#7.	#8.	#9.	#10.	#11	#12.	#13.	#14.
S.O.S.	65	63	63	61	X	60	60	60
E.O.S	65	63	63	61	X	60	60	60

Comments: INCINERATORS #7-8-10-12-13-14 IN SERVICE S.O.S @ 12 BEP'S AND 6 LLVF'S; 3:15 #9 INC. IN SERVICE to TEST OR METER #10 STILL IN SERV. 3:20 P7/8 BELT TRIPPED DUE to Slipping. 3:25 P7/8 BELT O.O.S #7-8 INC'S O.O.S UNTIL BELT IS CLEANED UP, REQUESTED 3 LLVF'S ON Hold. 3:40 REQUESTED ANOTHER LLVF ON Hold T= 12 BEP'S AND 2 LL 4:00 / LLVF B.I.S. 4:20 #12 INC - Sheared Central Shaft Drive Pin, #7, 8 T. B.I.S. - 6:0 - All Remaining Inc's O.O.S "G" BELT to be CLEANED. 6:15 All BELTS Shut down. 6:40 #12 INC SHEAR PIN REPAIRED. 10:45 ALL LL BELTS BACK IN SERVICE. 10:30 FEED STARTING BACK To INC'S 7-8-9-10-12-13-14.

E.O.S. #7, 8, 9, 10, 12, 13, + 14 ON START-UP WITH 14 BFP'S

M.D. # 8502710 Submitted For # 12 central shaft shear Pin M.D. Complete

DETROIT WASTEWATER TREATMENT PLANT

INCINERATOR LOADING RATE SHIFT REPORT

DATE: 6-19-85 CREW: 3

SHIFTS M	D	A	K1 WEIGHTOMETER READINGS	K1 TOTAL	K2 WEIGHTOMETER READINGS	K2 TOTAL	P7 WEIGHTOMETER READINGS	P7 TOTAL	P9 WEIGHTOMETER READINGS	P9 TOTAL	M1 WEIGHTOMETER READINGS	M1 TOTAL	M2 WEIGHTOMETER READINGS	M2 TOTAL	Q8 WEIGHTOMETER READINGS	Q8 TOTAL	Q10 WEIGHTOMETER READINGS	Q10 TOTAL
11PM	7AM	3PM	68154	XXXX	36356	XXXX	35537	XXXX	2014.6	XXXX		XXXX		XXXX		XXXX		XXXX
MID	8	4	6853.1	38.5	3654.3	18.7	3564.5	10.8										
1AM	9	5	6894.8	41.1	3684.6	30.3	3575.4	10.9										
2	10	6	6933.5	38.2	3710.6	25.0	3585.5	10.1										
3	11	7	6972.9	39.4	3734.0	24.4	3596.2	10.7										
4	MIDN	8	7013.2	40.3	3758.4	24.4	3607.8	11.6										
5	1PM	9	7057.1	41.9	3786.9	28.0	3619.2	11.4										
6	2	10	7098.9	41.8	3811.9	25.0	3627.5	8.3										
7	3	11	7142.1	43.2	3840.7	28.8	3642.8	15.3										

SHIFTS M	D	A	L1 WEIGHTOMETER READINGS	L1 TOTAL	I2 WEIGHTOMETER READINGS	I2 TOTAL	P11 WEIGHTOMETER READINGS	P11 TOTAL	P13 WEIGHTOMETER READINGS	P13 TOTAL	N1 WEIGHTOMETER READINGS	N1 TOTAL	N2 WEIGHTOMETER READINGS	N2 TOTAL	Q12 WEIGHTOMETER READINGS	Q12 TOTAL	Q14 WEIGHTOMETER READINGS	Q14 TOTAL
11PM	7AM	3PM	41.1	XXXX	19.5	XXXX		XXXX	8.0	XXXX		XXXX		XXXX		XXXX		XXXX
MID	8	4	84.4	43.3	48.3	28.8			23.8	15.8								
1AM	9	5	126.2	41.8	77.6	29.3			36.8	13.0								
1	10	6	163.8	37.6	102.8	25.2			49.9	13.1								
2	11	7	201.0	37.2	126.5	23.7			63.2	13.3								
3	MIDN	8	237.5	36.5	148.9	22.4			76.5	13.3								
4	1PM	9	276.9	39.4	172.8	23.9			89.3	12.8								
5	2	10	308.8	31.9	192.5	19.7			94.0	4.7								
6	3	11	342.6	33.8	217.4	24.9			102.1									

SHIFT M	D	A	K1+L1	M1+N1	X-9 WEIGHTOMETER READINGS	X-9 TONS	TONS TO CH INC.
11PM	7AM	3PM	XXXX	XXXX	488.1	XXXX	XXXX
MID	8	4	81.6				81.6
1AM	9	5	82.4				82.9
2	10	6	76.3				76.1
3	11	7	76.6				76.6
4	MIDN	8	77.3				77.3
5	1PM	9	82.8				82.8
6	2	10	73.7				73.7
7	3	11	82.0				82.0
TOTALS			633.2				633.2

551.2

RUNNING TIME 7	8	9	10	11	12	13	14	
60	60	X	60	X	60	60	60	13.6
60	60	X	60	X	60	60	60	13.8
60	60	X	60	X	60	60	60	12.7
60	60	X	60	X	60	60	60	12.7
60	60	X	60	X	60	60	60	12.3
60	60	DUMP	60	X	60	60	60	13.8
60	60	15	60	X	60	30	60	12.5
60	60		60	X	60	60	60	
480	480	15	480	X	480	450	480	

SUPV. C. Robertson

CIRCLE
SHIFT: M (D) A

FIFTEEN MINUTE WEIGHTOMETER

READINGS COMPLEX II LOWER LEVEL

DATE: 6-19-85

Time	K-1	Tons	K-2	Tons	P-7&8	Tons	P-9&10	Tons	L-1	Tons	L-2	Tons	P11&12	Tons	P13&14	Tons	X-1	Tons
7:00	6815.4		3635.6		3553.7		2009.1		41.1		19.5				8.0		488.1	
:15	6834.5	9.4	3641.3	5.7	3556.1	2.4		Ø	51.5	10.4	26.5	7.0		Ø	11.4	3.4		Ø
:30	6934.1	9.6	3647.2	5.9	3558.9	2.8		Ø	62.8	11.3	33.3	6.8		Ø	15.2	3.8		Ø
:45	6844.7	10.3	3653.3	6.1	3561.9	3.0		Ø	73.7	10.9	40.9	7.6		Ø	20.0	4.8		Ø
8:00	6853.7	9.0	3659.3	6.0	3564.5	2.6		Ø	84.4	10.7	48.3	7.4		Ø	23.8	3.8		Ø
:15	6863.2	9.5	3665.2	5.9	3566.8	2.3		Ø	96.2	11.8	55.8	7.5		Ø	27.5	3.7		Ø
:30	6874.6	11.4	3672.1	6.9	3570.4	3.6		Ø	106.6	10.4	63.9	8.1		Ø	30.5	3.0		Ø
:45	6884.6	10.0	3678.3	6.2	3572.8	2.4		Ø	116.3	9.7	70.7	6.8		Ø	33.6	3.1		Ø
9:00	6894.8	10.2	3684.6	6.3	3575.4	2.6		Ø	126.2	9.9	77.6	6.9		Ø	36.8	3.2		Ø
:15	6905.0	10.2	3691.3	6.7	3577.9	2.5		Ø	135.9	9.7	83.9	6.3		Ø	39.9	3.1		Ø
:30	6916.3	11.3	3698.1	6.8	3580.6	2.7		Ø	145.8	9.9	90.4	6.5		Ø	43.2	3.3		Ø
:45	6923.3	9.0	3703.8	5.7	3583.0	2.4		Ø	154.7	8.9	96.5	6.1		Ø	46.5	3.3		Ø
10:00	6933.5	9.2	3709.6	5.8	3585.5	2.5		Ø	163.8	9.1	102.8	6.3		Ø	49.9	3.4		Ø
:15	6943.0	9.5	3715.5	5.9	3588.0	2.5		Ø	173.1	9.3	108.8	6.0		Ø	53.2	3.3		Ø
:30	6952.6	9.6	3721.5	6.0	3590.7	2.7		Ø	182.5	9.4	115.0	6.2		Ø	56.7	3.5		Ø
:45	6962.7	10.1	3727.7	6.2	3593.4	2.7		Ø	191.7	9.2	120.7	5.7		Ø	59.9	3.2		Ø
11:00	6972.9	10.2	3734.0	6.3	3596.2	2.8		Ø	201.0	9.3	126.5	5.8		Ø	63.2	3.3		Ø
:15	6983.5	10.6	3740.3	6.3	3598.9	2.7		Ø	210.5	9.5	132.2	5.7		Ø	66.6	3.4		Ø
:30	6994.2	10.7	3746.7	6.4	3601.8	2.9		Ø	220.1	9.6	137.0	5.8		Ø	70.1	3.5		Ø
:45	7003.9	9.7	3752.7	6.0	3604.7	2.9			228.7	8.6	143.4	5.4		Ø	73.2	3.1		Ø
12:00	7013.7	9.8	3758.9	6.2	3607.8	3.1		Ø	237.5	8.8	148.9	5.5		Ø	76.5	3.3		Ø
:15	7024.4	10.7	3765.7	6.8	3611.0	3.2		Ø	247.0	9.5	154.2	5.3		Ø	79.2	2.7		Ø
:30	7035.7	11.3	3772.8	7.1	3613.9	2.9		Ø	256.7	9.7	159.0	4.8		Ø	81.8	2.6		Ø
:45	7046.3	10.6	3779.8	7.0	3616.5	3.6		Ø	266.7	10.0	165.8	6.8		Ø	85.5	3.7		Ø
1:00	7057.1	10.8	3786.9	7.1	3619.2	2.7		Ø	276.9	10.2	172.8	7.0		Ø	89.3	3.8		Ø
:15	7067.1	10.0	3792.7	5.8	3620.7	1.5		Ø	284.3	7.4	177.9	4.6		Ø	89.7	.4		Ø
:30	7077.2	10.1	3798.6	5.9	3622.4	1.7		Ø	291.9	7.6	182.1	4.7		Ø	90.2	.5		Ø
:45	7088.0	10.8	3805.2	6.6	3624.9	2.5		Ø	300.3	8.4	187.2	5.1		Ø	92.3	2.1		Ø
2:00	7098.9	10.9	3811.9	6.7	3627.5	2.6		Ø	308.5	8.2	192.5	5.3		Ø	94.0	2.2		Ø
:15	7109.7	10.8	3819.3	7.4	3631.4	3.9		Ø	318.6	9.8	199.1	6.6		Ø	97.5	3.5		Ø
:30	7120.6	10.9	3826.9	7.6	3635.4	4.0		Ø	328.6	10.0	205.8	6.7		Ø	101.2	3.7		Ø
:45	7131.2	10.6	3833.7	6.8	3639.0	3.6		Ø	338.2	9.6	211.8	6.0		Ø	104.1	2.9		Ø
3:00	7148.1	10.9	3840.7	7.0	3642.8	3.8		Ø	347.6	9.4	217.4	5.6		Ø	107.1	3.0		Ø

OPERATOR: Bishop, TURNER, SNYDER

A.H.S.P.O.: C. Robertson

Form I-11

DETROIT WASTEWATER TREATMENT PLANT

INCINERATOR LOADING RA[illegible] SHIFT REPORT

DATE: 6-19-85 CREW: 4 - AFTERNOONS

SHIFTS M	SHIFTS D	SHIFTS A	K1 WEIGHTOMETER READINGS	K1 TOTAL	K2 WEIGHTOMETER READINGS	K2 TOTAL	P7 WEIGHTOMETER READINGS	P7 TOTAL	P9 WEIGHTOMETER READINGS	P9 TOTAL	M1 WEIGHTOMETER READINGS	M1 TOTAL	M2 WEIGHTOMETER READINGS	M2 TOTAL	Q8 WEIGHTOMETER READINGS	Q8 TOTAL	Q10 WEIGHTOMETER READINGS	Q10 TOTAL
11PM	7AM	3PM	7142.1	XXXX	3840.7	XXXX	3692.8	XXXX	1991.5	XXXX								
MID	8	4	7173.2	31.1	3856.4	15.7	3650.8	8.0	1997.8	6.3								
1AM	9	5	7211.1	37.9	3870.1	13.7	3655.2	4.9	2009.2	11.4								
2	10	6	7261.9	50.8	3893.3	23.2	3664.9	9.7	2020.6	11.4								
3	11	7	7262.5	1.1	3894.8	1.5	3665.0	.1	2020.6	Ø								
NOON	8																	
1PM	9																	
2	10																	
3	11	7278.8	16.3	3904.4	9.6	3668.2	3.2	2022.6	2.0	O.O.S.	Ø	O.O.S.	Ø	O.S.B.	Ø	O.S.B.	Ø	

SHIFTS D	SHIFTS A	L1 WEIGHTOMETER READINGS	L1 TOTAL	L2 WEIGHTOMETER READINGS	L2 TOTAL	P11 WEIGHTOMETER READINGS	P11 TOTAL	P13 WEIGHTOMETER READINGS	P13 TOTAL	N1 WEIGHTOMETER READINGS	N1 TOTAL	N2 WEIGHTOMETER READINGS	N2 TOTAL	Q12 WEIGHTOMETER READINGS	Q12 TOTAL	Q14 WEIGHTOMETER READINGS	Q14 TOTAL
7AM	3PM	347.6	XXXX	217.4	XXXX		XXXX	107.1	XXXX								
8	4	382.4	34.8	243.8	26.4			119.0	11.9								
9	5	410.4	28.0	265.6	21.8			131.4	12.4								
10	6	434.4	24.0	287.1	21.5			142.2	10.8								
11	7	436.5	2.1	288.7	1.6			143.7	1.5								
NOON	8																
1PM	9																
2	10																
3	11	446.1	9.6	297.5	8.8			146.1	2.4	O.O.S.	Ø	O.S.B.	Ø	O.S.B.	Ø	O.S.B.	Ø

SHIFT M	SHIFT D	SHIFT A	K1+L1	M1+N1	X-9 WEIGHTOMETER READINGS	X-9 TONS	TONS TO CII INC.
11PM	7AM	3PM	XXXX	XXXX	488.1	XXXX	XXXX
MID	8	4	65.9				65.9
1AM	9	5	65.9				65.9
2	10	6	74.3				74.3
3	11	7	3.2				3.2
4	NOON	8					
5	1PM	9					
6	2	10					
7	3	11	[illegible].9				[illegible].9

12.6
11.6
12.3
3.2

RUNNING TIME 7	8	9	10	11	12	13	14
✓	✓	✓		✓	✓	✓	✓
15	15	45	60	Ø	60	60	60
40	40	60	60	Ø	20	60	60
60	60	60	60	Ø	Ø	60	60
15	15	15	15	Ø	Ø	15	15
Ø	Ø	Ø	Ø	Ø	Ø	Ø	Ø
Ø	Ø	Ø	Ø	Ø	Ø	Ø	Ø
Ø	Ø	Ø	Ø	Ø	Ø	Ø	Ø
[illegible]	[illegible]	45	[illegible]	[illegible]	[illegible]	35	[illegible]

I-28

CIRCLE
SHIFT: M D A

FIFTEEN MINUTE WEIGHTOMETER

READINGS COMPLEX II LOWER LEVEL

DATE: 6-19-85

Time	K-1	Tons	K-2	Tons	P-7&8	Tons	P-9&10	Tons	L-1	Tons	L-2	Tons	P11&12	Tons	P13&14	Tons	X-9	Tons
3:00	7142.1		3840.7		3640.8		1991.5		347.6		217.4				107.1			
:15	7154.7	12.1	3852.1	11.4	3649.2	6.4	1990.9	—	359.8	2.2	229.7	12.3	11		111.7	4.6		
:30	7160.5	5.8	3853.2	1.1	3650.1	.9	1992.8	1.9	365.8	6.0	233.5	3.8	11		113.7	2.0	11	
:45	7166.7	6.2	3856.4	3.2	3650.8	.7	1995.0	2.2	372.6	6.8	239.0	6.5	11		116.3	2.6		
4:00	7173.2	7.6					1997.8	2.8	382.4	9.8	243.8	5.8	11		119.0	2.7	11	
:15	7180.4	7.2					2000.1	2.3	390.5	8.1	249.7	5.9	11		121.9	2.9		
:30	7188.0	8.2	3860.0		3650.5	—	2003.2	3.1	398.6	8.1	255.1	5.4	11		124.4	2.5	11	
:45	1199.8	11.2	3865.1	5.1	3652.5	2.0	2006.3	3.1	403.3	5.1	270.3	6.2	11		127.8	3.4	11	
5:00	1211.1	11.3	3870.1	5.0	3655.2	2.7	2009.2	2.9	410.4	6.1	265.6	5.3	11		131.4	3.6		
:15	1224.3	13.2	3875.8	5.7	3657.7	2.6	2011.8	2.6	416.6	6.2	270.9	5.3	11		135.9	3.9		
:30	1238.5	14.2	3882.7	6.9	3659.9	2.2	2014.7	2.9	423.2	7.6	276.9	6.0	11		137.5	2.2		
:45	1250.5	12.0	3887.5	4.8	3662.8	2.9	2017.0	3.3	429.3	6.1	281.3	4.5	11		140.0	2.5	11	
6:00	1261.4	10.9	3893.3	5.8	3664.9	2.1	2020.6	3.6	434.4	5.1	287.1	5.8	4		142.2	2.2		
:15	1262.5	1.1	3894.8	1.5	3665.0	.1	2020.6	—	436.5	2.1	288.7	.6			143.7	1.5		
:30	BELTS DOWN						FOR		MAIN.									
:45	〃		〃		〃		〃		〃		〃		〃		〃		〃	
7:00																		
:15																		
:30	〃		〃		〃		〃		〃		〃		〃		〃		〃	
:45																		
8:00																		
:15																		
:30	〃		〃		〃		〃		〃		〃		〃		〃		〃	
:45																		
9:00																		
:15																		
:30	〃		〃		〃		〃		〃		〃		〃		〃		〃	
:45																		
10:00	1264.7	—	3895.2	—	3664.8	—	2020.7	—	436.8	—	288.7	—			143.7	—		
:15	1264.0	1.3	3896.3	1.1	3665.4	.6	2020.9	.3	437.9	1.1	291.0	2.3			144.8	1.1		
:30	1271.8	7.8	3900.4	4.1	3666.8	1.4	2021.6	.7	443.0	5.1	297.5	6.6			146.1	2.3		
:45	1278.8	7.0	3904.4	4.0	3668.2	1.4	2022.6	1.0	446.1	3.1			576.0					

SPA: H. PIERCE. B. HART J. BALOGH.

OPERATOR: K. FRANK / L. WALTER

A.H.S.P.O.: B. ZIMMERMAN

B. Zimmerman

Form I-11

DETROIT WASTEWATER TREATMENT DIVISION
SOLIDS HANDLING INCINERATION COMPLEX II
OPERATORS 24 HOUR REPORT

FORM #
PART 6 OF 7
DATE 6 / 19 / 1985

REVISED

INCINERATOR # 13

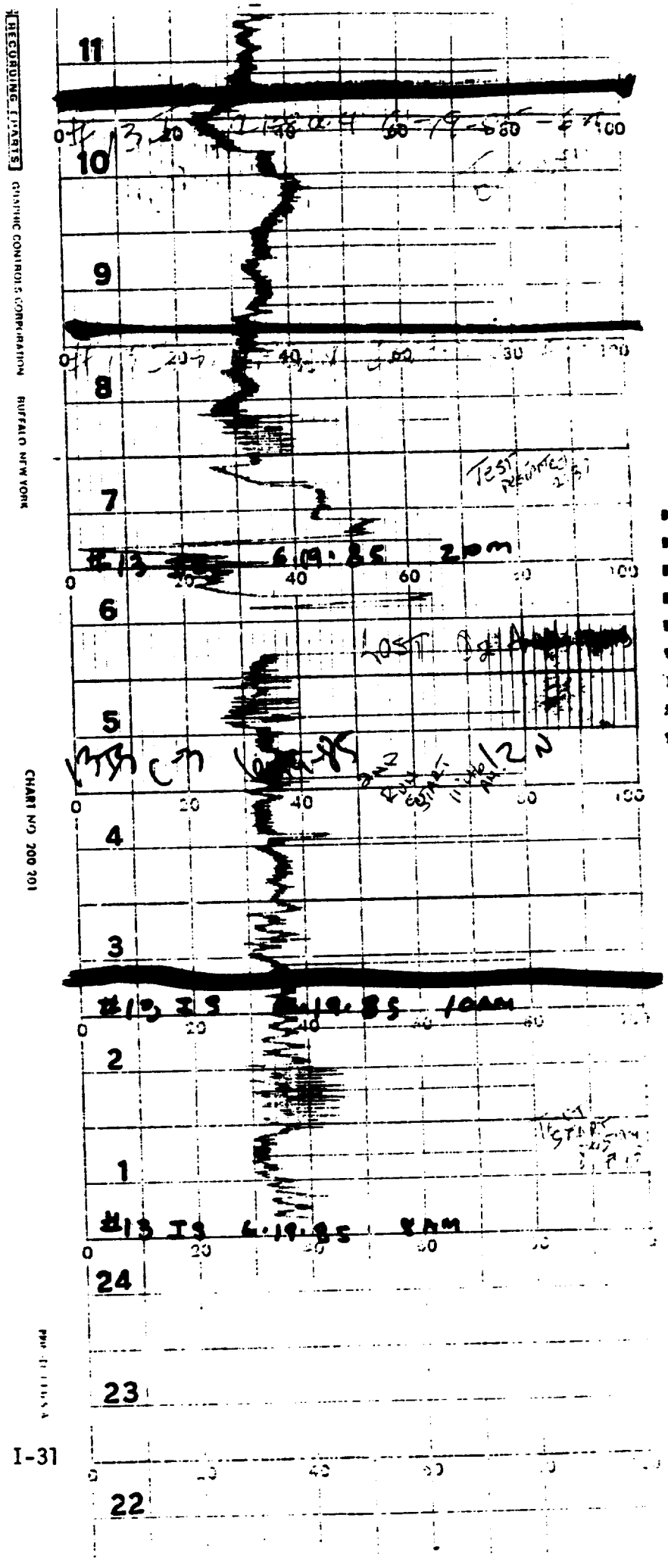
TIME	HIGHEST HEARTH TEMP: HEARTH #	HIGHEST HEARTH TEMP: TEMPERATURE	CENTER SHAFT SPEED	% O_2	SCRUBBER TEMP CONTROL	DRAFT PRESS IN W.C.	ID FAN DAMPER	SCRUBBER DIFF IN W.C.	GAS METER READING	OPACITY READING	REMARKS
12 am	4	1076	1.0	20	70	-.5	44	26			
1	4	1014	1.0	16	65	-.5	44	76			
2	4	1086	1.0	14.5	65	[illegible]	34	76			
3	4	1033	1.0	10.0	55	[illegible]	34	76			
4	6	1364	1.0	9.5	50	-.7	40	76			
5	6	1481	1.0	10.5	50	-1.1	50	76			
6	4	1132	.9	14.5	60	-.5	40	76			
7	6	1229	1.0	14.5	60	-1.5	48	76			
8	6	1367	1.0	8.5	50	-1.1	45	100			
9	6	1430	1.0	9.0	50	-1.0	62	100			
10	6	1449	1.0	8.0	50	-1.1	60	100			
11	6	1291	1.0	9.5	50	-1.1	60	100			
12 pm	6	1320	1.0	9.5	50	-1.2	60	100			
1											
2	6	1434	1.0	11.0	60	-1.0	40	100			
3	6	1352	1.0	8.0	55	-.6	40	100			
4	6	1343	1.0	9.0	55	-1.4	60	100			
5	6	1148	1.0	9.0	55	-1.0	60	100			
6	6	1298	1.0	8.0	55	-1.4	60	100			
7	6	1285	1.0	11.0	55	-1.4	60	100			
8	4	990	1.0	15.5	55	-.5	40	100			
9	4	989	1.0	15.5	55	-.5	40	100			
10	4	938	1.0	15.5	55	-.5	40	100			
11	6	1066	1.0	12.5	70	-.5	40	100			
12 am	6	1298	1.0	14.5	70	-.5	40	100			

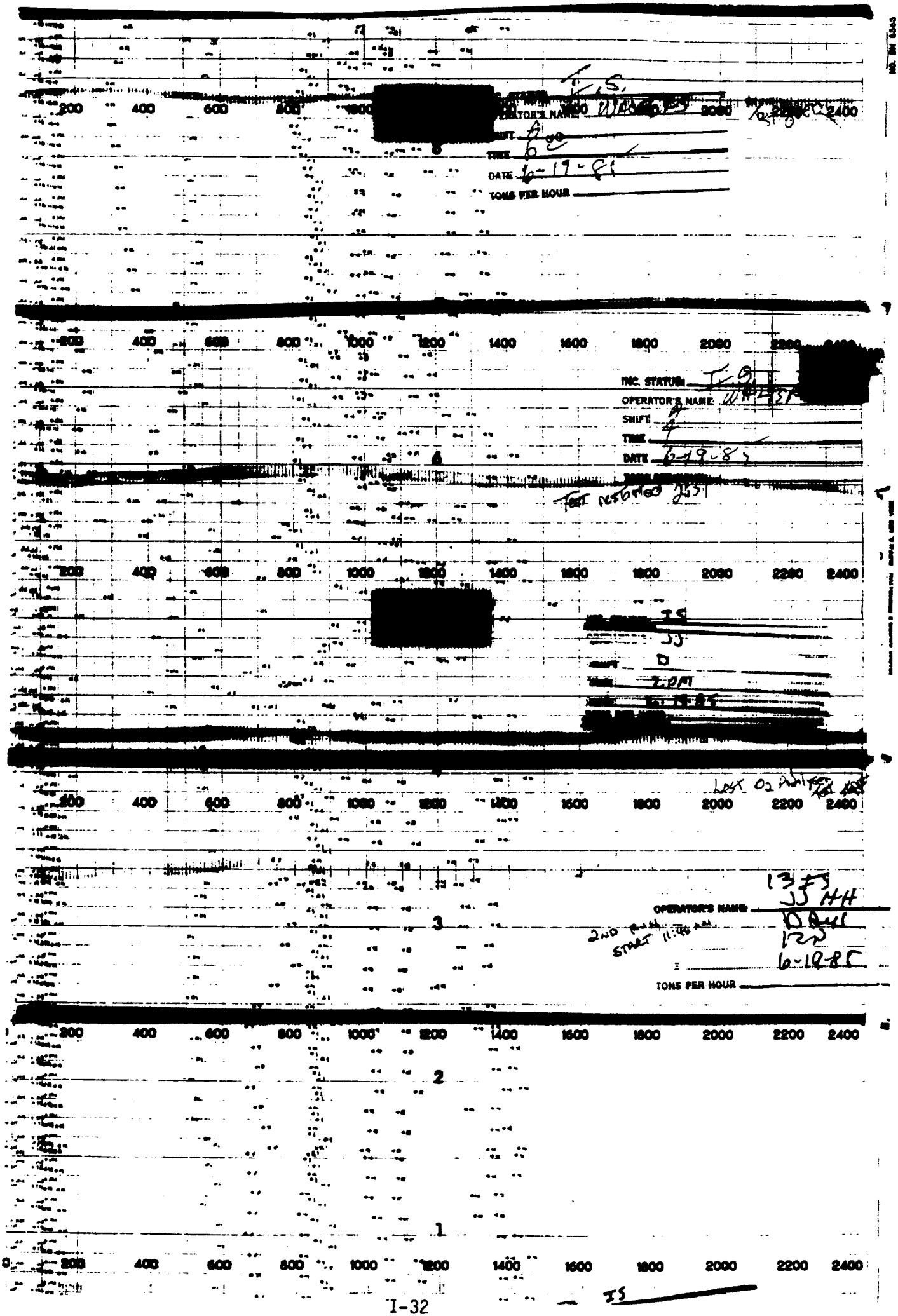
PROCESS EQUIPMENT EXCEPTION -

SHIFT OPERATOR CREW

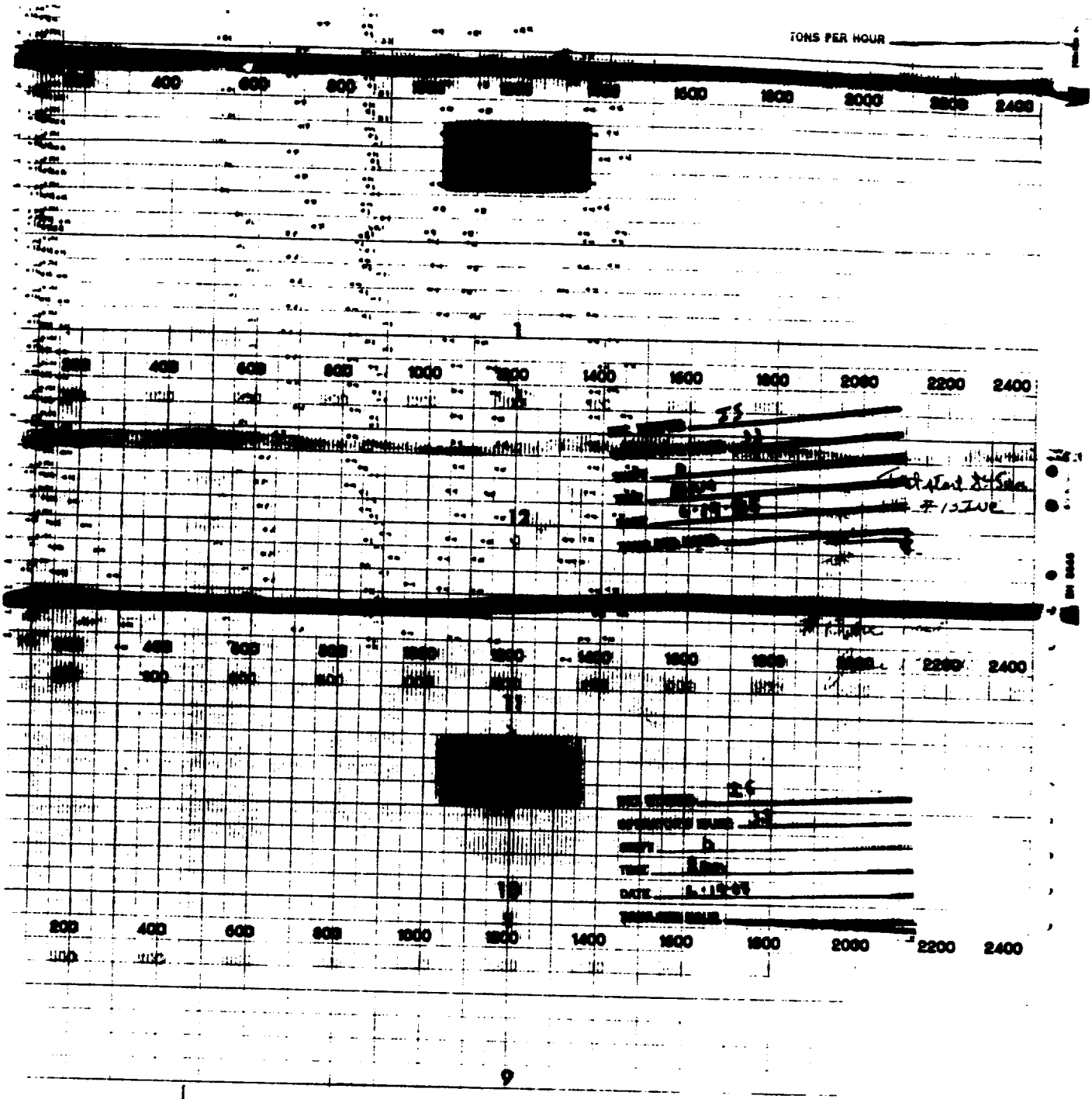
[redacted]

[redacted]





200 400 600 800 1000 1200 1400 1600 1800 2000 2200 2400
[redacted]
INC. STATUS: T.S.
OPERATOR'S NAME: WHALEY
SHIFT: A
TIME: 6
DATE: 6-19-85
TONS PER HOUR
INC. STATUS: T.S.
OPERATOR'S NAME: WHALEY
SHIFT: A
TIME: 4
DATE: 6-19-85
Test restored 2351
[redacted]
IS
JJ
D
2 PM
Lost O2 Analyzer
OPERATOR'S NAME: 13 FS JJ HH
2ND RUN START 11:44 AM
D Aul
12N
6-19-85
TONS PER HOUR
IS


TONS PER HOUR
200
400
600
800
1000
1200
1400
1600
1800
2000
2200
2400

ATTACHMENT 3

SUPPLEMENTARY PROCESS DATA FOR RUN NO. 3

1979126

13 Incinerator

June 20, 1985

Scrubber Water Flows

	Pre Cooler Nozzles	Under Tray Nozzles	Pre Cooler Weir	Impingement Trays
8:30AM	78 - 166 gpm	84 - 173 gpm	13 - 200 gpm	9 - 1300 gpm
9:00AM	76 - 164 gpm	84 - 173 gpm	13 - 200 gpm	9 - 1300 gpm
9:30AM	76 - 164 gpm	84 - 173 gpm	13 - 200 gpm	9 - 1300 gpm
10:00AM	76 - 164 gpm	84 - 173 gpm	13 - 200 gpm	9.4 - 1332 gpm
10:30AM	76 - 164 gpm	84 - 173 gpm	13 - 200 gpm	9.2 - 1316 gpm
11:00AM	76 - 164 gpm	84 - 173 gpm	13 - 200 gpm	9.0 - 1300 gpm
11:30AM	76 - 164 gpm	84 - 173 gpm	13 - 200 gpm	9.0 - 1300 gpm
12:00	76 - 164 gpm	84 - 173 gpm	13 - 200 gpm	9.2 - 1316 gpm
12:30pm	76 - 164 gpm	84 - 173 gpm	13 - 200 gpm	9.0 - 1300 gpm
1:00 pm	76 - 164 gpm	84 - 173 gpm	13 - 200 gpm	9.0 - 1300 gpm
1:40 pm	76 - 164 gpm	84 - 173 gpm	13 - 200 gpm	9.2 - 1316 gpm
2:00 pm	76 - 164 gpm	84 - 173 gpm	13 - 200 gpm	9.0 - 1300 gpm
2:30pm	76 - 164 gpm	84 - 173 gpm	13 - 200 gpm	9.0 - 1300 gpm
3:00pm	76 - 164 gpm	84 - 173 gpm	13 - 200 gpm	9.2 - 1316

INCINERATOR OPACITY DEVIATION SUMMARY FOR 6/20/85
DATE

OBSERVER Richard Lewandowski LOCATION Stack Shaik

TIME \ INC	1	2	3	4	5	6	7	8	9	10	11	12	13	14
6 00 AM	5	/	X	X	5	X	5	5	5	5	X	5	5	5
05	5				5		5	5	5	5		5	5	5
10	5				5		5	5	5	5		5	5	5
15	5				5		5	5	5	5		5	5	5
20	5				5		5	5	5	5		5	5	5
25	5				5		5	5	5	5		5	5	5
30	5				5		5	5	5	5		5	5	5
35	5				5		5	5	5	5		5	5	5
40	5				5		5	5	5	5		5	5	5
45	5				5		5	5	5	5		5	5	5
50	5				5		5	5	5	5		5	5	5
55	5				5		5	5	5	5		5	5	5
7 00	5				5		5	5	5	5		5	5	5
05	5				5		5	5	5	5		5	5	5
10	5				5		5	5	5	5		5	5	5
15	5				5		5	5	5	5		5	5	5
20	5				5		5	5	5	5		5	5	5
25	5				5		5	5	5	5		5	5	5
30	5				5		5	5	5	5		5	5	5
35	5				5		5	5	5	5		5	5	5
40	5				5		5	5	5	5		5	5	5
45	5				5		5	5	5	5		5	5	5
50	5				5		5	5	5	5		5	5	5
55	5				5		5	5	5	5		5	5	5
	-													
TOTAL OPAC	24				24		24	24	24	24		24	24	24
TOTAL RDS	120				120		120	120	120	120		120	120	120

#14 [illegible] 40%

WIND SP & DIR SSW 0-5 SUN none WEATHER Partly Cloudy
#10 ~~50~~ 0.5. @ 6:30 Light Gray, Gray Bright

GZIMMER84

INCINERATOR OPACITY DEVIATION SUMMARY FOR 6/20/85
DATE

OBSERVER Richard Lewandowski LOCATION Stack shack

TIME \ INC	1	2	3	4	5	6	7	8	9	10	11	12	13	14	
10 00 AM	5	5	X	X	5	X	10	10	X	X	X	10	10	10	#7 00 50G
05	5	5			5		10	10	5			10	10	10	#8 Po 35W
10	5	5			10		5	5	5			10	10	10	#5
15	5	5			10		5	5	5			10	10	10	Pot 45%
20	5	5			5		5	5	5			10	10	10	
25	5	5			5		5	5	5			5	5	5	
30	5	5			5		5	5	5			5	5	5	
35	5	5			5		5	5	5			5	5	5	#9
40	5	5			5		5	5	5			5	5	5	45%
45	5	5			5		5	5	5			10	10	10	
50	5	5			5		5	5	5			5	5	5	
55	5	5			5		5	5	5			5	5	5	#12
11 00	5	5			5		5	5	5			5	5	5	60%
05	5	5			5		5	5	5			5	5	5	
10	5	5			5		5	5	5			5	5	5	
15	5	5			5		15	15	5			15	15	5	
20	5	5			5		10	5	5			5	5	5	
25	5	5			5		10	5	5			5	5	5	
30	5	5			5		10	5	5			5	5	5	
35	5	5			5		5	5	5			5	5	5	
40	5	5			5		5	5	5			5	5	5	
45	5	5			5		5	5	5			5	5	5	
50	5	5			20		5	5	5			5	5	5	#5 Pot
55	5	5			5		5	5	5			5	5	5	#7 50%
TOTAL OPAC	120	120			145		155	140	115			160	160	160	
TOTAL RDS	24	24			24		24	24	23			24	24	24	

WIND SP & DIR WSW 0-5 SUN Sunny E.S.E. WEATHER Clear
#6 on main stack (Light Blue, Blue Bleeded)

GZIMMER84

INCINERATOR OPACITY DEVIATION SUMMARY FOR JUNE 20, 1985 (DATE)

OBSERVER E. McCLURE — LOCATION MB-ROOF

TIME \ INC	1	2	3	4	5	6	7	8	9	10	11	12	13	14
2 00 PM	5	5			5		5	15	15	5		15	5	5
05	5	5			5		5	10	10	5		10	5	5
10	5	5			5		5	5	5	5		5	5	5
15	5	5			5		5	5	5	5		5	5	5
20	5	5			5		5	5	5	5		5	5	5
25	5	5			5		5	5	5	5		5	5	5
30	5	5			5		5	5	5	5		5	5	5
35	5	5			5		5	10	5	5		10	5	5
40	5	5			5		5	15	5	5		10	5	5
45	10	5			5		10	5	5	5		10	5	5
50	5	5			5		5	10	10	5		10	5	5
55	5	5			5		5	10	10	5		10	5	5
3 00 PM	5	5			5		5	5	5	5		5	5	5
05	5	5			5		5	10	5	5		5	5	5
10	5	5			5		15	5	5	5		10	5	5
15	5	5			5		10	5	5	5		15	5	5
20	5	5			5		20 W#	5	5	5		10	5	5
25	5	5			5		25 W	5	5	5		5	5	5
30	5	5			5		10	5	5	5		5	5	5
35	5	5			5		5	5	5	5		5	5	5
40	5	5			5		5	5	5	5		5	5	5
45	5	5			5		5	5	5	5		5	5	5
50	5	5			5		5	5	5	5		5	5	5
55	5	5			5		5	5	5	5		5	5	5
TOTAL OPAC	V25	V20			V20		180	165	145	120		180	120	V20
TOTAL RDS	24	24			24		24	24	24	24		24	24	24

WIND SP & DIR 5-10MPH SUN SOUTH WEATHER CLEAR
BLUE BACKGROUND

2:50 PM - CII INC. #7 & 8 TAKEN OUT OF SERVICE AND INC. #9 & 10 IN SERVICE.

4th 2:50
6th 3:15

3:20 PM - CII INC. #7 PUFFING 30% W- 30% Dr 3:20PM-3:30PM O2 METER MALFUNCTIONING

EPA TESTING ENDED ON 4TH FLOOR AT 2:50PM

EPA TESTING ENDED ON 6TH FLOOR AT 3:15PM

GZIMMER84

INCINERATOR OPACITY DEVIATION SUMMARY FOR JUNE 20, 1985 (DATE)

OBSERVER E. McCLURE

LOCATION MB-ROOF

TIME \ INC	1	2	3	4	5	6	7	8	9	10	11	12	13	14
8 00 PM	5	5			5			5	15	15		5	5	5
05	5	5			5			5	10	15		5	5	5
10	5	5			5			5	10	10		5	5	5
15	5	5			5			5	10	10		5	5	5
20	5	5			5			5	15	15		5	5	5
25	5	5			5			5	20*	15		5	5	5
30	5	5			5			5	15	15		5	5	5
35	5	5			5			5	15	15		5	5	5
40	5	5			5			5	20**	20**		5	5	5
45	5	5			5			5	10	10		5	5	5
50	5	5			5			5	10	10		5	5	5
55	5	5			5			5	10	10		5	5	5
9 00 PM														
05														
10														
15														
20														
25														
30														
35														
40														
45														
50														
55														
TOTAL OPAC	60	60			60			60	160	160		60	60	60
TOTAL RDS	12	12		1-	12			12	12	12		12	12	12

WIND SP & DIR 5-10MPH SUN ——— WEATHER CLEAR

BLUE BACK GROUND

GZIMMER54

INCINERATOR OPACITY DEVIATION SUMMARY FOR JUNE 20, 1985 (DATE)

OBSERVER E. McCLURE — LOCATION MB-ROOF

TIME \ INC	1	2	3	4	5	6	7	8	9	10	11	12	13	14
4 00 PM	5	5			5		5	5	5	5		5	5	5
05	5	5			5		5	5	5	5		5	5	5
10	5	5			5		5	5	5	5		5	5	5
15	5	5			5		5	5	5	5		5	5	5
20	5	5			5		5	5	5	5		5	5	5
25	5	5			5		5	5	5	5		5	5	5
30	5	5			5		5	5	5	5		5	5	5
35	5	5			5		5	5	5	5		5	5	5
40	5	5			5		5	5	5	5		5	5	5
45	5	5			5		5	5	5	5		5	5	5
50	5	5			5		5	10	5	5		5	5	5
55	5	5			5		5	5	5	5		5	5	5
5 00 PM	5	5			5		5	5	5	5		5	5	5
05	5	5			5		5	5	5	5		5	5	5
10	5	5			5		15	15	15	15		10	5	5
15	5	5			5		15	15	15	15		10	5	5
20	5	5			5		15	10	10	10		5	5	5
25	5	5			5		5	5	5	5		5	5	5
30	5	5			5		5	5	5	5		5	5	5
35	5	5			5		5	5	5	5		5	5	5
40	5	5			5		5	5	5	5		5	5	5
45	5	5			5		5	5	5	5		5	5	5
50	5	5			5		5	5	5	5		5	5	5
55	5	5			5		5	5	5	10		5	5	5
TOTAL OPAC	120	120			120		150	150	145	150		130	120	120
TOTAL RDS	24	24			24		24	24	24	24		24	24	24

WIND SP & DIR 5-10MPH SUN SOUTH WEATHER CLEAR
BLUE BACKGROUND

INCINERATOR OPACITY DEVIATION SUMMARY FOR 6/20/85
DATE

OBSERVER Richard Lewandowski | LOCATION Stack shack

TIME \ INC	1	2	3	4	5	6	7	8	9	10	11	12	13	14	
12 00 PM	5	5			5		5	5	5			10	15	20	#7 Pu 60%
05	5	5			5		5	5	5			10	15	20	
10	5	5			5		20	50W	5			10	15	15	#8 Pu 50%
15	5	5			5		10	20	5			10	15	15	
20	5	5			5		10	10	5			10	10	10	#8 P WHT
25	5	5			5		10	10	5			10	10	10	#8 Pu 45%
30	5	5			5		10	10	5			10	10	10	
35	5	5			5		5	5	5			5	5	5	
40	5	5			5		5	5	5			5	5	5	
45	5	5			5		5	5	5			5	5	5	
50	5	5			5		5	5	5			5	5	20	
55	5	5			5		5	5	5			5	5	10	
1 00	5	5			5		5	5	5			5	5	5	
05	5	5			5		5	5	5			5	5	5	
10	5	5			5		5	5	20			5	5	5	#9 45%
15	5	5			5		5	5	5			5	5	5	
20	5	5			5		5	5	5			5	5	5	#9 45%
25	5	5			5		5	5	5			5	5	5	
30	5	5			5		5	5	5			5	5	5	Pu W 4
35	5	5			5		5	5	5			5	5	5	#7
40	5	5			5		5	5	5			5	5	5	
45	5	5			5		5	5	5			5	5	5	
50	5	5			5		5	5	15			5	5	5	
55	5	5			5		5	5	10			15	5	5	
TOTAL OPAC	120	120			120		175	215	150			165	175	205	
TOTAL RDS	24	24			24		24	24	24			24	24	24	

WIND SP & DIR _____ SUN SSW Sunny WEATHER Partly Cloudy (White, Blue Bkgrd)

#8 12:06 50% D.G. 50% W.

12:11 Robinson insuff. upper Heath Burners

#9 OOS @ 12:15

#10 OOS @ 1:00PM

GZIMMER84

INCINERATOR OPACITY DEVIATION SUMMARY FOR 6/20/85 (DATE)

OBSERVER Richard Lewandowski — LOCATION Stack shack

TIME \ INC	1	2	3	4	5	6	7	8	9	10	11	12	13	14
8 00 H M	5	X	X	X	5	X	5	5	5	5	X	5	5	5
05	5				5		5	5	5	5		5	5	5
10	5				5		5	5	5	5		5	5	5
15	5				5		5	5	5	5		5	5	5
20	5				5		5	5	5	5		5	5	5
25	5				5		5	5	5	5		5	5	5
30	5				5		5	5	5	5		5	5	5
35	5				5		5	5	5	5		5	5	5
40	5				5		5	5	5	5		5	5	5
45	5				5		5	5	5	5		5	5	5
50	5				5		5	5	5	-		5	5	5
55	5				5		5	5	5			5	5	5
9 00	5				5		5	5	5			5	5	5
05	5				5		5	5	5			5	5	5
10	10				5		10	10	5			10	10	10
15	5				5		5	5	-			10	10	10
20	5				5		5	5				10	10	10
25	10				5		10	10				10	10	10
30	10				5		10	10				15	15	15
35	10				5		10	10				15	15	15
40	10	-			5		10	10				10	10	10
45	10	10			5		10	10				10	10	10
50	10	10			5		10	10				10	10	10
55	10	10			5		10	10				10	10	10
TOTAL OPAC	24	3			24		24	24	15	10		24	24	24
TOTAL RDS	160	30			120		160	160	75	50		150	150	120

WIND SP & DIR 0-5 S.S.W. SUN Sunny, East WEATHER Clear / Light Blue Bkgnd

#2 O.O.S. @ 7:20

#2 IN @ 9:45

SUMMER84

C K
SHIFT: M (D) A

FIFTEEN MINUTE WEIGHTOMETER
READINGS COMPLEX II LOWER LEVEL

DATE: 6-20-85

Time	K-1	Tons	K-2	Tons	P-7&8	Tons	P-9&10	Tons	L-1	Tons	L-2	Tons	P11&12	Tons	P13&14	Tons	X-9	Tons
7:00	7403.2	[illegible]	4081.6	[illegible]	3736.5	[illegible]	2097.3	[illegible]	37.5	[illegible]	22.1	[illegible]	/	[illegible]	12.1	[illegible]	458.1	[illegible]
:15	7607.1	3.9	4085.0	3.4	3737.4	.9	2100.4	3.1	44.4	6.9	26.5	4.4	/	0	15.5	3.4	/	0
:30	7611.1	4.0	4088.5	3.5	3737.4	1.0	2103.6	3.2	51.4	7.0	31.1	4.6	/	0	19.1	3.6	/	0
:45	/	0	4088.5	0	3738.4	0	2103.6	0	63.4	12.0	39.1	8.0	/	0	22.5	3.4	/	0
8:00	7613.1	2.0	4090.9	2.4	3739.4	0	2103.6	0	75.6	12.2	47.2	8.1	/	0	26.0	3.5	/	0
:15	7616.3	3.2	4093.6	2.7	3741.4	2.0	/	0	84.6	9.0	53.7	6.5	/	0	29.4	3.4	/	0
:30	7619.6	3.3	4096.5	2.9	3743.6	2.2	/	0	93.8	9.2	60.3	6.6	/	0	32.9	3.5	/	0
:45	7625.4	5.8	4101.3	4.8	3745.7	3.1	/	0	103.6	9.8	66.4	6.1	/	0	36.1	3.2	/	0
9:00	7634.4	6.0	4106.3	5.0	3748.9	3.2	/	0	113.6	10.0	72.7	6.3	/	0	39.5	3.4	/	0
:15	7638.9	7.5	4111.2	5.9	3751.9	3.0	/	0	124.3	10.7	78.7	6.0	/	0	42.4	2.9	/	0
:30	7646.6	7.7	4118.3	6.1	3755.0	3.1	2107.6	0	135.2	10.9	84.8	6.1	/	0	45.5	3.1	/	0
:45	7657.0	10.4	4125.3	7.0	3758.4	3.4	2110.5	3.9	144.7	9.5	90.9	6.1	/	0	49.1	3.6	/	0
10:00	7667.6	10.6	4133.4	7.1	3761.9	3.4	2112.5	4.0	154.4	9.7	97.2	6.3	/	0	52.9	3.8	/	0
:15	7673.6	6.0	4139.5	6.1	3764.3	2.5	/	0	163.4	9.0	101.4	5.2	/	0	55.9	3.0	/	0
:30	7679.7	6.1	4144.8	6.3	3767.0	2.7	/	0	172.5	9.1	107.8	5.4	/	0	59.0	3.1	/	0
:45	7686.8	7.1	4151.5	6.7	3770.7	3.7	/	0	182.9	10.4	114.0	6.2	/	0	62.4	3.4	/	0
11:00	7694.4	7.6	4158.4	6.9	3774.5	3.8	/	0	193.4	10.5	120.4	6.4	/	0	65.9	4.5	/	0
:15	7702.3	7.9	4167.2	6.8	3777.4	2.9	/	0	203.4	10.0	126.3	5.9	/	0	69.7	3.8	/	0
:30	7710.1	7.8	4173.8	6.6	3780.8	3.4	/	0	213.3	9.9	131.7	5.4	/	0	73.7	4.0	/	0
:45	7717.9	7.8	4179.7	5.9	3783.9	3.1	/	0	224.2	10.9	139.0	7.3	/	0	76.3	2.6	/	0
12:00	7725.9	8.0	4185.7	6.0	3787.2	3.3	2113.9	1.4	235.2	11.0	146.4	7.4	/	0	79.1	2.8	/	0
:15	7735.4	9.5	4193.0	6.3	3789.8	2.6	2117.3	3.4	244.9	9.7	152.7	6.3	/	0	82.5	3.4	/	0
:30	7745.1	9.7	4198.5	6.5	3792.5	2.7	2120.9	3.6	254.7	9.8	159.2	6.5	/	0	86.0	3.5	/	0
:45	7753.9	8.8	4203.4	3.9	3794.8	2.3	2123.5	2.6	263.9	9.2	165.2	6.5	/	0	89.7	3.7	/	0
1:00	7763.1	9.2	4206.4	4.0	3796.8	2.0	2125.5	2.0	272.7	8.8	170.4	4.7	/	0	92.3	2.6	/	0
:15	7772.1	[illegible]	[illegible]	5.3	3799.2	2.4	2128.2	2.7	281.7	9.0	176.3	5.9	/	0	95.2	[illegible]	/	0
:30	7781.0	8.9	4217.3	5.6	3801.3	2.1	2130.6	2.4	290.8	9.1	182.1	5.8	/	0	98.3	3.1	/	0
:45	7790.4	9.4	4223.9	6.6	3803.7	3.4	2135.8	5.2	302.3	11.5	190.1	8.0	/	0	102.6	4.3	/	0
2:00	7800.0	9.6	4230.7	6.8	3806.5	3.8	2141.2	5.4	314.0	11.7	198.3	8.2	/	0	107.1	4.5	/	0
:15	7807.2	7.2	4237.1	6.4	3812.2	3.7	2143.2	2.0	323.4	9.4	204.7	6.4	/	0	110.4	3.3	/	0
:30	7814.5	7.3	4243.7	6.6	3815.9	3.7	2143.5	.3	332.9	9.5	211.3	6.6	/	0	113.9	3.5	/	0
:45	7822.1	7.6	4249.8	6.1	3818.3	2.4	/	0	343.0	10.1	217.4	6.1	/	0	117.5	3.6	/	0
3:00	7830.1	8.0	4256.6	6.8	3820.4	2.1	/	0	352.9	9.9	224.3	6.9	/	0	121.5	4.0	/	0

OPERATOR: Bishop, Turner, Snyder

A.M.S.P.O.: C. Robertson

Form I-11

INCINERATOR LOADING [illegible] SHIFT REPORT

DATE: 6-2085 CREW: 3

SHIFTS (D)	A	K1 WEIGHTOMETER READINGS	K1 TOTAL	K2 WEIGHTOMETER READINGS	K2 TOTAL	P7 WEIGHTOMETER READINGS	P7 TOTAL	P9 WEIGHTOMETER READINGS	P9 TOTAL	M1 WEIGHTOMETER READINGS	M1 TOTAL	M2 WEIGHTOMETER READINGS	M2 TOTAL	Q8 WEIGHTOMETER READINGS	Q8 TOTAL	Q10 WEIGHTOMETER READINGS	Q10
7AM	3PM	7603.2	XXXX	4081.6	XXXX	3736.5	XXXX	2097.3	XXXX		XXXX		XXXX	0.0	XXXX	0.0	X
8	4	7613.1	9.9	4090.9	9.3	3738.4	1.9	2104.1	6.8								
9	5	7631.4	18.3	4106.3	15.4	3748.9	10.5										
10	6	7667.6	36.2	4132.4	26.1	3761.8	12.9	2112.5	8.4								
11	7	7694.4	26.8	4158.4	26.0	3774.5	12.7										
MIDN	8	7725.9	31.5	4185.7	27.3	3787.2	12.7	2113.9									
1PM	9	7763.1	37.2	4206.4	20.7	3796.8	9.6	2125.5	11.6								
2	10	7800.0	36.9	4230.7	24.3	3808.5	11.7	2141.2	15.7								
3	11	7830.1	30.1	4256.6	25.9	3820.4	11.9	2143.5	2.3								

SHIFTS (D)	A	I1 WEIGHTOMETER READINGS	I1 TOTAL	I2 WEIGHTOMETER READINGS	I2 TOTAL	P11 WEIGHTOMETER READINGS	P11 TOTAL	P13 WEIGHTOMETER READINGS	P13 TOTAL	N1 WEIGHTOMETER READINGS	N1 TOTAL	N2 WEIGHTOMETER READINGS	N2 TOTAL	Q12 WEIGHTOMETER READINGS	Q12 TOTAL	Q14 WEIGHTOMETER READINGS	Q14
7AM	3PM	37.5	XXXX	22.1	XXXX		XXXX	12.1	XXXX		XXXX		XXXX	0.0	XXXX		X
8	4	75.6	38.1	47.2	25.1			26.0	13.9								
9	5	113.6	38.0	72.7	25.5			39.5	13.5								
10	6	154.4	40.8	97.2	24.5			52.9	13.4								
11	7	193.4	39.0	120.4	23.2			65.9	13.0								
MIDN	8	235.2	41.8	146.4	26.0			79.1	13.2								
1PM	9	272.7	37.5	170.4	24.0			92.3	13.2								
2	10	314.0	41.3	198.3	27.9			107.1	14.8								
3	11	352.9	38.9	224.3	26.0			121.5	14.4								

SHIFT M	(D)	A	K1+L1	M1+N1	X-9 WEIGHTOMETER READINGS	X-9 TONS	TONS TO CH INC.
11PM	7AM	3PM	XXXX	XXXX	488.1	XXXX	XXXX
MID	8	4	48.0				48.0
1AM	9	5	56.3				56.3
2	10	6	77.0				77.0
3	11	7	65.8				65.8
4	NOON	8	73.3				73.3
5	1PM	9	74.7				74.7
6	2	10	78.2				78.2
7	3	11	69.0				69.0

4733

RUNNING TIME

7	8	9	10	11	12	13	
15	15	15			60	60	6
60	15				60	60	6
60	60	60			60	60	6
60	60				60	60	6
60	60				60	60	6
60	15	60	45		60	60	6
60	60	60			60	60	6
50	50	10	10		50	50	5
						47	4

C. Robertson

Solids Handling - Complex II
Sr. SPO Shift Report
Incineration

Date 6-20-86 Shift DAY

Sr. SPO W. Hutcherson Crew# III

Inc.	S.O.S.		E.O.S.
#7.	✓		✓
#8.	✓		✓
#9.	✓	L.O.F →	/
#10.	/	LOW SLUDGE INVERTERY ↔	/
#11.	X	Brickwork	X
#12.	✓		✓
#13.	✓		✓
#14.	✓		✓

Weightometer	7th Hour Reading	1st Hour Reading	Tons
K-1	7800.0	7613.1	186.9
L-1	314.0	75.6	238.4
M-1	Ø	Ø	Ø
N-1	Ø	Ø	Ø
X-9	Ø	Ø	Ø

Main Gas Readings

	7th Hour	1st Hour	Factor	Gas Used
#1.	36093	34620	202.39	298120.47
#2.	34201	32794	202.39	284762.73
Total Gas Used 582883.20 Cu.Ft.				

Gas Used/Ton Burned 1370.52 Cu.Ft.

	BFP	LL	UL
% Dry Solids Cake	19.3	26.5	N/A
% Volitiles Cake	62.8	62.0	N/A

Tons Cake Lower Level = 425.3 Tons
Tons Cake Upper Level = Ø Tons
Total Tonnage = 425.3 Tons
Tons to Complex I = Ø Tons
Total Complex II = 425.3 Tons
Incinerator Hours = 32.45 Hours
Wet Tons/Inc. Hour = 13.1 Tons/Ho

Central Shaft Speeds

Inc.	#7.	#8.	#9.	#10.	#11.	#12.	#13.	#14.
S.O.S.	60	63	55	80	X	60	60	60
E.O.S	60	60	55	60	X	60	60	60

Comments: S.O.S. 7-B.P. I.S. 3-LLVF I.S. NO FEED TO Complex ONE "B" Belt Slipping. 7 15 Am - INC #7-8-9-OSB L.O.F 7 45 Am - ADDING (2) B.P. TOTAL (9) 8 00 Am - INC #7 - I.S. 8 20 Am - lost All B.P. (Air pressure) 8 25 Am - 9-B.P. B.I.S ADDED (2) B.P. TOTAL (11) I.S. 9 00 Am MADE Rounds Check Scrubber FANS 5th floor FEED All Check (OK) #9 INC IN SERVICE AT 9 34 Am - 10 00 Am #9 INC OSB L.O.F 10 45 Am - ADDED (1) B.P. TOTAL (12) I.S. 11 15 Am - ADDED (1) B.P. TOTAL (13) I.S. 11 40 Am - ADDED (1) B.P. TOTAL (14) 12 06 Pm - Deviation #8 INC 50% - White (AHSPO OPER) 12 15 Am - INC # 8 OOS TO REPAIR Burners 1 & 3 HEARTH #2 M.O.# 8502797 #1 Burner M.O.# 8502796 #3 - Burner, INC #10 I.S. INC. #7 - AUX AIR INDICATOR MALfunctioning M.O.# 910801. 1 00 Pm - Burners Repair INC #8 - INC #8 I.S., INC #10 - OSB 1 40 Pm - LOST (1) B.P. TOTAL (13) I.S. 2 00 Pm - INC #9 OSB (LACK of feed)
E.O.S. 13 - B.P. 3-LLVF

(1) Hutcherson / L.B.

DETROIT WASTEWATER TREATMENT DIVISION
SOLIDS HANDLING INCINERATION COMPLEX II
OPERATORS 24 HOUR REPORT

REVISED

FORM #
PART ___ OF ___
DATE 6 / 20 / 1985

INCINERATOR # 13

TIME	HIGHEST HEARTH TEMP: HEARTH #	HIGHEST HEARTH TEMP: TEMPERATURE	CENTER SHAFT SPEED	% O_2	SCRUBBER TEMP CONTROL	DRAFT PRESS IN W.C.	TO FAN DAMPER	SCRUBBER DIFF IN W.C.	GAS METER READING	OPACITY READING	REMARKS
12 am	6	1298	1.0	14.5	70	-.5	40	100			
1	6	13	1.0	14.5	70	-.5	40	100			
2	6	1279	1.0	15.0	70	-.5	40	100			
3	6	1288	1.0	15.0	70	-.5	40	100			
4	6	1291	1.0	15.0	70	-.5	40	100			
5	6	1340	1.0	15.0	70	-.5	40	100			
6	6	1309	1.0	14.5	70	-.5	40	100			
7	6	1108	1.0	13.0	65	-1.2	40	100			
8	6	1435	1.0	10.0	60	-.6	40	100			
9	6	1471	1.0	11.0	60	-.8	50	100			
10	6	1366	1.0	10.5	60	-.7	40	100			
11	6	1418	1.0	9.0	60	-1.1	60	100			
12 pm	6	1404	1.0	8.0	50	-1.1	60	100			
1	6	1489	1.0	8.0	55	-1.3	60	100			
2	6	1435	1.0	8.0	60	-1.0	60	100			
3	6	1475	1.0	9.0	60	-1.0	60	100			
4	6	1429	1.0	9.5	65	-1.2	60	100			
5	6	1432	1.0	10.0	65	-1.2	60	100			
6	6	1453	1.0	10.5	65	-1.2	60	100			
7	6	1437	1.0	10.0	70	-1.4	60	100			
8	6	1082	1.0	10.0	70	-1.2	60	100			
9	6	1401	1.0	10.5	65	-1.4	60	100			
10	6	1485	1.0	10.0	65	-1.3	60	100			
11	6	1445	1.0	10.0	70	-1.2	60	100			
12 am	6	1430	1.0	8.5	65	-1.3	64	70			

PROCESS & EQUIPMENT EXCEPTION _____

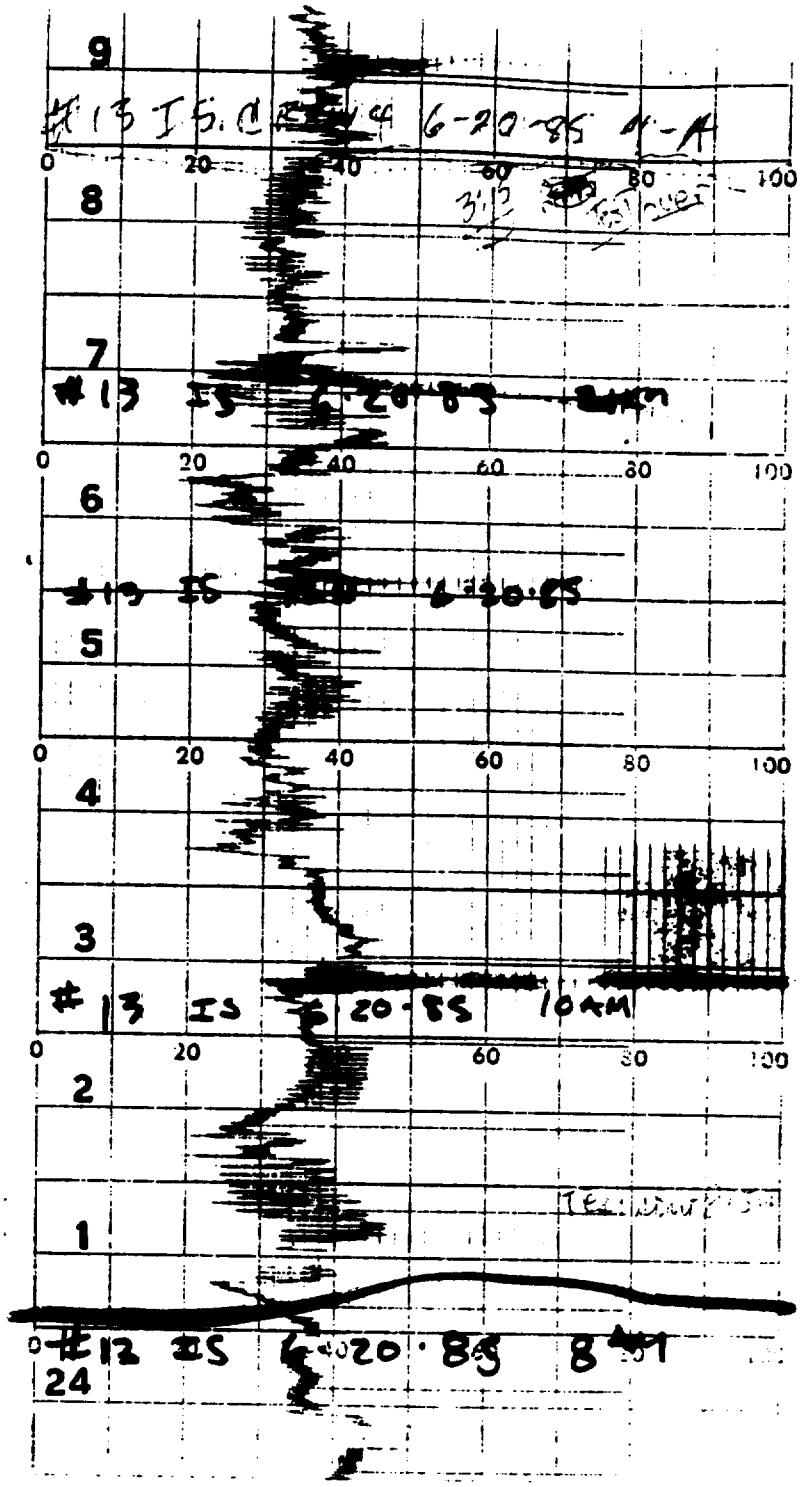
SHIFT	OPERATOR	CREW
M	BUSHOR/WALTERS	2
D	Jones	3
A	K.F./C.W.	4
M	[illegible]	1

13 Incinerator — June 20, 1985

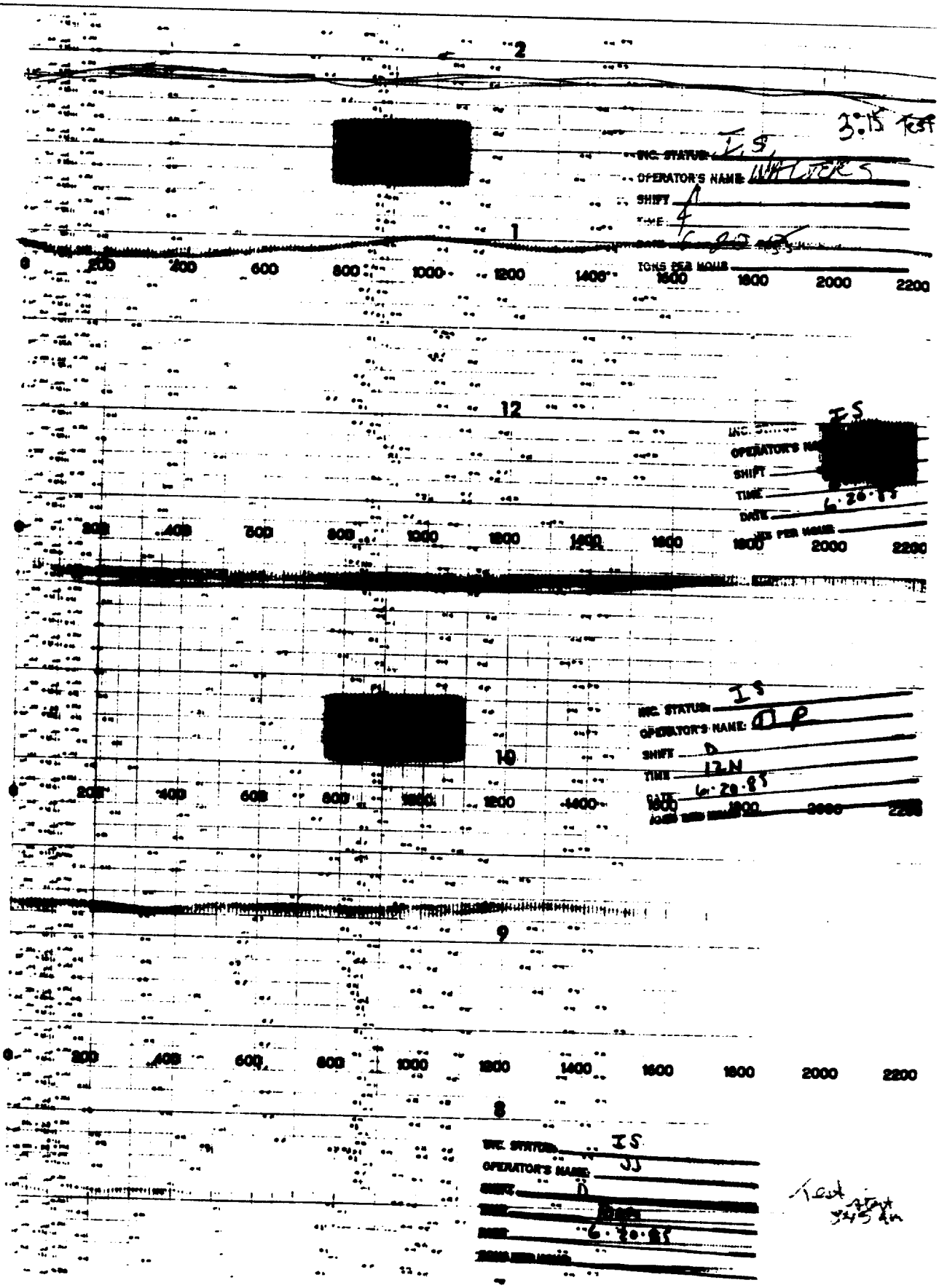
Scrubber Water Flows

	Pre Cooler Nozzles	Under Tray Nozzels	Precooler Weir	Impingment Trays
8:30AM	78 - 166 gpm	84 - 173 gpm	13 - 200 gpm	9 - 1300 gpm
9:00AM	76 - 164 gpm	84 - 173 gpm	13 - 200 gpm	9 - 1300 gpm
9:30AM	76 - 164 gpm	84 - 173 gpm	13 - 200 gpm	9 - 1300 gpm
10:00AM	76 - 164 gpm	84 - 173 gpm	13 - 200 gpm	9.4 - 1332 gpm
10:30AM	76 - 164 gpm	84 - 173 gpm	13 - 200 gpm	9.2 - 1316 gpm
11:00AM	76 - 164 gpm	84 - 173 gpm	13 - 200 gpm	9.0 - 1300 gpm
11:30AM	76 - 164 gpm	84 - 173 gpm	13 - 200 gpm	9.0 - 1300 gpm
12:00	76 - 164 gpm	84 - 173 gpm	13 - 200 gpm	9.2 - 1316 gpm
12:30pm	76 - 164 gpm	84 - 173 gpm	13 - 200 gpm	9.0 - 1300 gpm
1:00 pm	76 - 164 gpm	84 - 173 gpm	13 - 200 gpm	9.0 - 1300 gpm
1:40 pm	76 - 164 gpm	84 - 173 gpm	13 - 200 gpm	9.2 - 1316 gpm
2:00 pm	76 - 164 gpm	84 - 173 gpm	13 - 200 gpm	9.0 - 1300 gpm
2:30 pm	76 - 164 gpm	84 - 173 gpm	13 - 200 gpm	9.0 - 1300 gpm
3:00 pm	76 - 164 gpm	84 - 173 gpm	13 - 200 gpm	9.2 - 1316

[redacted]



[redacted]


2
3:15 Test
INC. STATUS: I.S.
OPERATOR'S NAME: WALTERS
SHIFT
TIME 4
DATE 6-20-85
TONS PER HOUR
1
0 200 400 600 800 1000 1200 1400 1600 1800 2000 2200
12
INC. STATUS: I.S.
OPERATOR'S NAME: [redacted]
SHIFT
TIME
DATE 6-20-85
TONS PER HOUR
0 200 400 600 800 1000 1200 1400 1600 1800 2000 2200
INC. STATUS: I.S.
OPERATOR'S NAME: D P
SHIFT D
TIME 12N
DATE 6-20-85
10
0 200 400 600 800 1000 1200 1400 1600 1800 2000 2200
9
0 200 400 600 800 1000 1200 1400 1600 1800 2000 2200
8
INC. STATUS: I.S.
OPERATOR'S NAME: JJ
SHIFT D
DATE 6-20-85
Test start 3:45 am

ATTACHMENT 4

SUPPLEMENTARY PROCESS DATA FOR RUN NO. 4

June 21, 1985

#13 Incinerator Scrubber
Water Flow Readings

	Precooler Nozzles	Under Tray Nozzles	Precooler Vein	Impingment Tray
8:30 AM	76 - 164 gpm	84 - 173 gpm	13 - 200 gpm	9.0 - 1300 gpm
9:00 AM	76 - 164 gpm	84 - 173 gpm	13 - 200 gpm	9.0 - 1300 gpm
9:30 AM	76 - 164 gpm	84 - 173 gpm	13.5 - 205 gpm	9.2 - 1316 gpm
10:00 AM	76 - 164 gpm	84 - 173 gpm	13.5 - 205 gpm	9.2 - 1316 gpm
10:30 AM	76 - 164 gpm	84 - 173 gpm	13.5 - 205 gpm	9.2 - 1316 gpm
11:00 AM	76 - 164 gpm	84 - 173 gpm	13.5 - 205 gpm	9.6 - 1348 gpm
11:30 AM	76 - 164 gpm	84 - 173 gpm	13.5 - 205 gpm	9.2 1316 gpm
12:00 PM	76 - 164 gpm	84 - 173 gpm	13 - 200 gpm	9.0 - 1300 gp
12:30 PM	77 - 166 gpm	84 - 173 gpm	13 - 200 gpm	9.1 - 1308
1:00 PM	77 - 166 gpm	84 - 173 gpm	13.0 - 200 gpm	9.0 - 1308 gpm
1:30 PM	77 - 166 gpm	84 - 173 gpm	13.0 - 200 gpm	9.0 - 1300 gpm
2:00 PM	76 - 164 gpm	84 - 173 gpm	12.5 - 195 gpm	8.8 - 1284 gpm
3:30 PM	77 - 166 gpm	84 - 173 gpm	12.5 - 195 gpm	9.0 - 1300 gpm
3:60 PM	76 - 164 gpm	82 - 171 gpm	13.0 - 200 gpm	9.0 - 1300 gpm
3:30 PM	____ gpm	____ gpm	____ gpm	____ gpm

SHIFT: M (11) A

FIFTEEN MINUTE WEIGHTOMETER

READINGS COMPLEX II LOWER LEVEL

DATE: 6/21/85

Time	K-1	Tons	K-2	Tons	P-7&8	Tons	P-9&10	Tons	L-1	Tons	L-2	Tons	P11&12	Tons	P13&14	Tons	X-9	Tons
7:00	8420.4	[illegible]	4550.0	[illegible]	3943.8	[illegible]	2325.9	[illegible]	20.6	[illegible]	15.8	[illegible]		[illegible]	15.1	[illegible]	488.1	[illegible]
:15	4430.8	10.4	4553.0	3.0	3946.1	2.3	2334.1	4.2	25.9	5.3	19.1	3.3		0	18.5	3.4		
:30	8441.7	10.7	4556.1	3.1	3948.7	2.6	2338.7	4.6	31.5	5.6	22.7	3.6		0	22.1	3.6		
:45	8451.7	10.0	4559.5	3.4	3951.9	2.2	2342.0	3.3	[illegible]	[illegible]	25.7	3.0		0	25.2	3.1		
8:00	8459.8	9.1	4562.1	2.6	3953.1	1.1	2345.0	3.0	42.9	6.5	28.5	2.8		0	28.1	2.9		
:15	8469.4	9.6	4565.4	3.3	3954.6	1.5	2348.4	3.4	48.8	[illegible]	31.4	2.9		0	30.9	2.8		
:30	8480.2	10.8	4569.1	3.7	3956.8	2.2	2353.0	3.6	[illegible]	6.0	34.[illegible]	3.0		0	33.5	3.4		
:45	8490.7	10.5	4573.3	4.2	3960.7	3.9	2355.8	3.8	62.6	8.0	38.7	4.3		0	36.6	3.1		
9:00	8501.5	10.8	4576.9	5.6	3965.5	4.8	2359.5	3.7	71.9	9.1	44.1	5.4		0	40.8	4.2		
:15	8507.6	6.1	4583.0	4.1	3969.5	4.0	2363.9	3.4	82.5	[illegible]	49.3	5.2			44.5	3.7		
:30	8511.9	4.3	4585.7	2.7	3972.3	2.7	2365.8	2.9	88.9	6.4	53.8	4.5			46.5	2.0		
:45	8518.7	6.8	4588.7	4.0	3974.0	1.8	2368.5	2.7	97.9	9.0	58.8	5.0		0	48.9	2.4		
10:00	8523.3	5.2	4593.5	3.8	3975.5	1.5	2371.0	2.5	109.5	11.6	65.[illegible]	6.6		0	52.8	3.9		
:15	8528.6	4.7	4595.9	2.9	3977.6	2.7	2374.1	3.1	119.[illegible]	10.[illegible]	72.2	6.8		0	55.9	3.1		
:30	8532.1	4.3	4599.5	3.6	3980.0	2.2	2376.3	2.2	130.1	10.2	78.7	6.5		0	58.8	2.9		
:45	8538.3	5.4	4602.[illegible]	3.[illegible]	3982.3	2.3	2378.6	2.3	140.2	10.1	86.7	6.6		0	[illegible]1.8	3.0		
11:00	8543.8	5.5	4606.2	3.7	3984.9	2.6	2381.6	3.0	150.4	10.3	91.5	6.2		6	65.7	2.9		
:15	8549.6	5.8	4609.5	3.3	3987.1	2.2	2384.9	3.3	160.9	10.5	97.9	6.4		0	[illegible]	3.2		
:30	8555.3	5.7	4612.5	3.0	3989.4	2.3	2388.6	3.7	172.2	11.3	104.7	6.8		0	[illegible]2.2	3.3		
:45	8560.9	5.6	4615.6	3.1	3991.6	2.4	2392.1	3.5	182.7	10.5	111.7	7.0		0	75.3	3.1		
12:00	8565.2	4.3	4618.3	2.7	3993.1	1.3	2394.9	2.8	192.8	10.1	118.9	7.2		0	77.9	2.6		
:15	8570.1	4.9	4621.2	2.9	3995.2	2.1	2398.5	3.6	198.9	6.1	120.7	11.8			81.8	3.9		
:30	8575.2	5.1	4624.0	2.8	3997.6	2.4	2402.2	3.7	214.1	5.2	134.2	13.5	79.2		86.3	4.5		
:45	8579.9	4.7	4626.9	2.9	3999.6	2.0	2405.2	3.0	223.2	9.1	139.9	4.0	89.3		90.1	8.3		
1:00	8585.2	5.4	4630.8	3.9	4002.0	1.9	2408.4	3.2	233.2	10.0	144.6	6.3			93.2	3.1		
:15	8590.1	5.5	4633.6	2.8	4004.4	2.4	2412.3	3.9	243.2	10.0	150.9	5.8			96.3	3.1		
:30	8596.4	5.7	4636.6	3.0	4006.7	2.3	2415.6	3.3	253.4	10.2	156.9	6.5			99.4	3.1		
:45	8602.6	6.2	4640.0	3.4	4009.6	2.9	2419.5	3.9	263.4	10.0	163.4	6.5			102.7	3.3		
2:00	8609.1	6.5	4643.7	3.7	4012.6	3.0	2423.6	4.1	272.0	8.6	169.9	6.5			106.2	3.5		
:15	8615.2	6.1	4646.9	3.2	4015.5	2.9	2427.6	4.0	283.0	11.0	176.8	6.9			109.8	3.6		
:30	8621.3	6.1	4650.8	3.9	4018.6	3.1	2431.6	4.0	291.7	9.7	[illegible]	6.8			113.0	3.2		
:45	8626.5	5.2	4657.9	3.1	4021.6	3.0	2435.2	3.6	300.9	9.2	189.9	6.3			117.4	3.9		
3:00	8631.3	4.8	4657.2	3.3	4024.8	3.2	2439.0	3.8	309.4	9.0	196.6	6.7			121.1	3.7		

OPERATOR: Tussea

A.M.S.P.O.: C Bolen Sr

Form I-11

Detroit Wastewater Treatment Division
Solids Handling - Complex II
Sr. SPO Shift Report
Incineration

Date 6-26-85 Shift DAY

Sr. SPO W. Hutcherson Crew # III

Inc.	S.O.S.		E.O.S.
#7.	✓		✓
#8.	X	Lof →	/
#9.	✓		✓
#10.	✓	Lof →	/
#11.	X	Brickwork	X
#12.	✓		✓
#13.	✓		✓
#14.	/		✓

Weightometer	7th Hour Reading	1st Hour Reading	Tons
K-1	8609.1	8459.8	149.3
L-1	272.0	42.9	229.1
M-1	Ø	Ø	Ø
N-1	Ø	Ø	Ø
X-9	Ø	Ø	Ø

Main Gas Readings

	7th Hour	1st Hour	Factor	Gas Used
#1.	42349	40744	202.39	324835.95
#2.	40107	38591	202.39	306823.24
Total Gas Used	631659.19			Cu.Ft.

Gas Used/Ton Burned 1669.28 Cu.Ft.

	BFP	LL	UL
% Dry Solids Cake	18.3	27.3	N/A
% Volitiles Cake	63.1	61.3	N/A

Tons Cake Lower Level = 378.4 Tons
Tons Cake Upper Level = Ø Tons
Total Tonnage = 378.4 Tons
Tons to Complex I = Ø Tons
Total Complex II = 378.4 Tons
Incinerator Hours = 30.0 Hours
Wet Tons/Inc. Hour = 12.61 Tons/Ho

Central Shaft Speeds

Inc.	#7.	#8.	#9.	#10.	#11.	#12.	#13.	#14.
S.O.S.	60	64	57	60	X	62	60	60
E.O.S	60	62	57	65	X	61	60	60

Comments: 13-B.P. 3-LLVF ULVF OSB No Feed to Complex one #8 INC O.O.S Due to Ash System Lift gate not working, INC #9 & 12-Scrubber FAN Belts loose M.O. Requested, #10 INC O.O.S AT 9:00 AM HEARTH #4 & #6 T.C.I. Malfunction. M.O.# 8502845 - ID FAN Belts #9 IN M.O.# 8502846 #12 INC ID FAN Belts. M.O.# 8502847 #10 INC hearth #4 Temp Controller, M.O. 8502848 INC #10 hearth #6 T.C.I. MAINTS Working on #7 & 12 PZ ANALIZER (FINISHED AT 1:00 pm) MAINTS WORKING ON #10 INC TCI HEARTH #4 & 6 STILL WORKING AT 1:45 pm, #13 INC Being Tested AT 1:45 pm
E.O.S. 13-B.P. 4-LLVF #13 INC STILL being Tested

DETROIT WASTEWATER TREATMENT DIVISION
SOLIDS HANDLING INCINERATION COMPLEX II
OPERATORS 24 HOUR REPORT

REVISED

FORM #
PART ___ OF ___
DATE 6 / 21 / 1985

INCINERATOR # 13

TIME	HIGHEST HEARTH TEMP. HEARTH #	HIGHEST HEARTH TEMP. TEMPERATURE	CENTER SHAFT SPEED	% O_2	SCRUBBER TEMP CONTROL	DRAFT PRESS IN W.C.	TO FAN DAMPER	SCRUBBER DIFF IN W.C.	GAS METER READING	OPACITY READING	REMARKS
12 pm	6	1430	1.0	8.5	65	1.3	64	70			
1	6	1449	1.0	8.5	62	1.3	64	70			
2	6	1452	1.0	12.0	65	-1.4	60	70			
3	6	1427	1.0	9.0	60	-1.4	59	76			
4	6	1422	1.0	10.0	55	-1.3	59	76			
5	6	1239	1.0	10.0	55	-1.2	58	76			
6	6	1108	1.0	14.5	55	-1.2	58	76			
7	6	1192	1.0	15.0	55	-1.3	58	76			
8	6	1428	1.0	10.0	60	-1.0	50	100			
9	6	1385	1.0	8.5	60	-1.0	60	100			
10	6	1408	1.0	8.5	60	-1.2	60	100			
11	6	1433	1.0	8.0	60	-1.1	60	100			
12 pm	6	1452	1.0	10.0	60	-1.1	60	100			
1	6	1453	1.0	9.0	65	-1.2	60	100			
2	6	1446	1.0	9.0	65	-1.2	60	100			
3	6	1428	1.0	9.0	65	-1.2	60	100			
4	6	1430	1.0	10.0	65	-1.2	60	100			
5	6	1353	1.0	9.0	65	-1.1	60	100			
6	6	1435	1.0	10.0	65	-1.1	60	100			
7	6	1457	1.0	9.0	70	-1.3	62	100			
8	6	1438	1.0	10.0	62	-1.3	62	100			
9	6	1435	1.0	10.0	68	-1.3	62	100			
10	6	1430	1.0	10.0	68	-1.3	62	100			
11	6	1435	1.0	8.0	60	-1.3	62	100			
12 am	6	1398	1.0	9.5	60	-1.2	60	70			

PROCESS & EQUIPMENT EXCEPTION _____

SHIFT	OPERATOR	CREW
M	Lane/Jackson	1
D	[illegible]	[illegible]
A	[illegible]	[illegible]
M		

DETROIT WASTEWATER TREATMENT PLANT

INCINERATOR LOADING RATE SHIFT REPORT

DATE: 6/21/85 CREW: 3

SHIFTS M	(D)	A	K1 WEIGHTOMETER READINGS	K1 TOTAL	K2 WEIGHTOMETER READINGS	K2 TOTAL	P7 WEIGHTOMETER READINGS	P7 TOTAL	P9 WEIGHTOMETER READINGS	P9 TOTAL	M1 WEIGHTOMETER READINGS	M1 TOTAL	M2 WEIGHTOMETER READINGS	M2 TOTAL	Q8 WEIGHTOMETER READINGS	Q8 TOTAL	Q10 WEIGHTOMETER READINGS	Q10 TOTAL
11PM	7AM	3PM	8420.4	XXXX	4550.0	XXXX	3943.8	XXXX	2325.9	XXXX								
MID	8	4	8459.8	39.4	4562.1	12.1	3953.1	9.3	2345.0	15.1		XXXX		XXXX		XXXX		XXXX
1AM	9	5	8501.5	41.7	4578.9	16.8	3965.5	12.4	2359.5	14.5								
2	10	6	8523.9	22.4	4593.5	14.6	3975.5	10.0	2371.0	11.5								
3	11	7	8543.8	19.9	4606.2	12.7	3984.9	9.4	2381.6	10.6								
4	NOON	8	8565.2	21.4	4618.3	12.1	3993.1	8.2	2394.9	13.3								
5	1PM	9	8585.2	20.0	4630.8	12.5	4002.0	8.9	2408.4	13.5								
6	2	10	8609.1	23.9	4643.7	12.9	4012.6	10.6	2423.6	15.2								
7	3	11	8631.3	22.2	4657.2	13.5	4024.8	12.2	2439.0	15.4								

SHIFTS M	(D)	A	L1 WEIGHTOMETER READINGS	L1 TOTAL	L2 WEIGHTOMETER READINGS	L2 TOTAL	P11 WEIGHTOMETER READINGS	P11 TOTAL	P13 WEIGHTOMETER READINGS	P13 TOTAL	N1 WEIGHTOMETER READINGS	N1 TOTAL	N2 WEIGHTOMETER READINGS	N2 TOTAL	Q12 WEIGHTOMETER READINGS	Q12 TOTAL	Q14 WEIGHTOMETER READINGS	Q14 TOTAL
11PM	7AM	3PM	20.6	XXXX	15.8	XXXX		XXXX	15.1	XXXX								
MID	8	4	92.9	22.3	28.5	12.7			28.1	13.0		XXXX		XXXX		XXXX		XXXX
1AM	9	5	71.9	29.0	44.1	15.6			40.8	12.7								
2	10	6	109.5	37.6	65.4	21.3			52.8	12.0								
3	11	7	150.4	40.9	91.5	26.1			65.7	12.9								
4	NOON	8	192.8	42.4	118.9	27.4			77.9	12.2								
5	1PM	9	233.2	40.4	144.6	25.7			93.2	15.3								
6	2	10	272.0	38.8	169.9	25.3			106.2	13.0								
7	3	11	309.9	37.9	196.6	26.7			121.1	14.9								

SHIFT M	(D)	A	K1+L1	M1+N1	X-9 WEIGHTOMETER READINGS	X-9 TONS	TONS TO CII INC.
11PM	7AM	3PM	XXXX	XXXX	488.1	XXXX	XXXX
MID	8	4	61.7				61.7
1AM	9	5	70.7				70.7
2	10	6	60.0				60.0
3	11	7	60.8				60.8
4	NOON	8	63.8				63.8
5	1PM	9	60.4				60.4
6	2	10	62.7				62.7
7	3	11	60.1				60.1

440.1

RUNNING TIME 7	8	9	10	11	12	13	14	
✓	✗	✓	✓	✗	✓	✓	✓	
60	✗	60	60	✗	60	60	/	12.3
60	✗	60	45	✗	60	60	15	14.1
60	/	60	/	✗	60	60	60	12.0
60	/	60	/	✗	60	60	60	12.1
60	/	60	/	✗	60	60	60	12.7
60	/	60	/	✗	60	60	60	12.1
60	/	60	/	✗	60	60	60	12.5
60	/	60	/	✗	60	60	60	

I-55

IISEO C. Richardson

INCINERATOR OPACITY DEVIATION SUMMARY FOR 6/21/85
DATE

OBSERVER Richard Lewandowski LOCATION Stack shack

TIME \ INC	1	2	3	4	5	6	7	8	9	10	11	12	13	14
6 00 AM	5	5	X	X	5	X	5	5	5	5	X		5	
05	5	5			5		5	5	5	5			5	
10	5	5			5		5	5	5	5			5	
15	5	5			5		5	5	5	5			5	
20	5	5			5		5	5	5	5			5	
25	5	5			5		5	5	5	5			5	
30	5	5			5		5	5	5	5			5	
35	5	5			5		5	5	5	5			5	
40	5	5			5		5	5	5	5			5	
45	5	5			5		5	5	5	5		5	5	
50	5	5			5		5	5	5	5		5	5	
55	5	5			5		5	5	5	5		5	5	
7 00	5	5			5		5	5	5	5		5	5	
05	5	5			5		5	5	5	5		5	5	
10	5	5			5		5	5	5	5		5	5	
15	5	5			5		5	5	5	5		5	5	
20	5	5			5		5	5	5	5		5	5	
25	5	5			5		5	5	5	5		5	5	
30	5	5			5		5	5	5	5		5	5	
35	5	5			5		5	5	5	5		5	5	
40	5	5			5		5	5	5	5		5	5	
45	5	5			5		5	5	5	5		5	5	
50	5	5			5		5	5	5	5		5	5	
55	5	5			5		5	5	5	5		5	5	
TOTAL OPAC	120	120			120		120	120	120	120		75	120	
TOTAL RDS	24	24			24		24	24	24	24		15	24	

P.F. #12 4 2

WIND SP & DIR none SUN EAST WEATHER Cloudy.
#8 out #12 in @ 6:37, Lane (Gray, white Blegrd)

GZIMMER84

INCINERATOR OPACITY DEVIATION SUMMARY FOR 6/21/85
DATE

OBSERVER Richard Lewandowski LOCATION Stackshack.

TIME \ INC	1	2	3	4	5	6	7	8	9	10	11	12	13	14	
1000 AM	20	5			5		5		5	5		5	5	5	#1 Puf 40%
05	5	5			5		5		5	5		5	5	5	
10	20	5			5		5		5	5		5	5	5	
15	20	5			5		5		5	–		5	5	5	
20	20	5			5		5		5			5	5	5	
25	20	5			5		5		5			5	5	5	
30	10	5			20W		5		5			5	5	5	
*A.J. 35	10	5			35W		5		5			5	5	5	
40	5	5			5		5		5			5	5	5	
45	5	5			5		5		5			5	5	5	
50	5	5			5		5		5			5	5	5	
55	5	5			5		5		5			5	5	5	
11 00	5	5			5		5		5			5	5	5	
05	5	5			5		5		5			5	5	5	#14 Puf. 40% gra
10	5	5			5		5		5			5	5	5	
15	5	5			5		5		5			5	5	5	
20	5	5			5		5		5			5	5	5	
25	5	5			5		5		5			5	5	5	
30	5	5			5		5		5			5	5	5	
35	5	5			5		5		5			5	5	5	
40	5	5			5		5		5			5	5	5	
45	5	5			5		5		5			5	5	5	
50	5	5			5		5		5			5	5	5	
55	5	5			5		5		5			5	5	5	
TOTAL OPAC	205	120			165		120		120	15		120	120	120	
TOTAL RDS	24	24			24		24		24	3		24	24	24	

WIND SP & DIR 0-5 S.W. SUN Sunny S.E. WEATHER Clear
#5 35%W 10:31 → 10:38, S. NICOLSN (White, Light Blue Bkgrd)

GZMMER84

INCINERATOR OPACITY DEVIATION SUMMARY FOR June 21, 1985
DATE

OBSERVER E. McClure — LOCATION MB-ROOF

TIME \ INC	1	2	3	4	5	6	7	8	9	10	11	12	13	14
2 00 PM	5	5			5		10		10			10	10	10
05	5	5			5		10		10			10	10	10
10	5	5			5		10		10			10	10	10
15	10	5			5		10		10			10	10	10
20	15	5			5		10		10			10	10	10
25	10	5			5		10		10			10	10	10
30	5	5			5		5		10			10	10	10
35	5	5			5		5		5			10	10	10
40	15	5			5		5		5			10	10	10
45	10	5			5		5		5			10	10	10
50	15	5			5		5		5			10	10	10
55	10	5			5		5		5			10	10	10
3 00 PM	10	5			5		5		5			10	10	10
05	5	5			5		5		5			10	10	10
10	5	5			5		5		5			10	10	10
15	10	5			5		5		5			10	10	10
20	15	5			5		5		5			10	10	10
25	10	5			5		5		5			10	10	10
30	20	5			5		5		5			10	10	10
35	10	5			5		5		5			10	10	10
40	5	5			5		5		5			10	10	10
45	5	5			5		5		5			10	10	10
50	5	5			5		5		5			10	10	10
55	5	5			5		5		5			10	10	10
TOTAL OPAC	215	120			120		150		155			240	240	240
TOTAL RDS	24	24			24		24		24			24	24	24

WIND SP & DIR 0-5MPH SUN SOUTH WEATHER SCAHERED
BLUE BACKGROUND

GZIMMER84

INCINERATOR OPACITY DEVIATION SUMMARY FOR JUNE 21, 1985 (DATE)

OBSERVER E. McCLURE LOCATION MB-ROOF.

TIME \ INC	1	2	3	4	5	6	7	8	9	10	11	12	13	14
8 00 PM	5	5			5		5	5	5	15		5	10	5
05	5	5			5		5	5	5	20M		5	10	5
10	5	5			5		5	5	5	15		5	10	5
15	5	5			5		5	5	5	10		5	10	5
20	5	5			5		5	5	5	10		5	10	5
25	5	5			5		5	5	5	5		5	10	5
30	5	5			5		5	5	5	5		5	10	5
35	5	5			5		5	5	5	10		5	10	5
40	15	5			5		5	5	5	10		5	10	5
45	5	5			5		5	5	5	10		5	10	5
50	5	5			5		5	5	15	10		5	10	5
55	5	5			5		5	5	20M	10		5	10	5
9 00 PM														
05														
10														
15														
20														
25														
30														
35														
40														
45														
50														
55														
TOTAL OPAC	70	60			60		60	60	65	130		60	120	60
TOTAL RDS	12	12			12		12	12	12	12		12	12	12

WIND SP & DIR 5-11MPH SUN ——— WEATHER CLOUDY

8:00PM - CII INC. #10 TAKENOUT OF SERVICE AND INC. #12 PUT IN SERVICE.

GZIMMER84

INCINERATOR OPACITY DEVIATION SUMMARY FOR JUNE 21, 1985 (DATE)

OBSERVER E. McCLURE

LOCATION MB-ROOF

TIME \ INC	1	2	3	4	5	6	7	8	9	10	11	12	13	14
4 00 PM	5	5			5		5		5			5	10	10
05	10	5			5		5		5			5	10	10
10	5	5			5		5		5			5	10	10
15	5	5			5		5		5			5	10	10
20	5	5			5		5		5			5	10	10
25	5	5			15		5		5			5	10	10
30	5	5			15		5		5			5	10	10
35	5	5			15		5		5			5	10	10
40	10	5			10		5		5			5	10	10
45	10	5			10		5		5			5	10	10
50	5	5			5		5		10			5	10	5
55	5	5			5		5		10			5	10	5
5 00 PM	5	5			5		5		10			10	10	5
05	5	5			5		5		10			10	10	5
10	5	5			5		5		15			5	5	5
15	5	5			5		5		15			5	5	5
20	5	5			5		5		10			5	5	5
25	10	5			5		5		15			5	5	5
30	5	5			5		5		10			5	5	5
35	10	5			10		5		10			5	5	5
40	15	5			10		5		10			5	5	5
45	10	5			5		5		15			5	5	5
50	10	5			10		5		10			5	5	5
55	5	5			10		5		15			5	5	5
TOTAL OPAC	165	120			180		120		215			130	190	170
TOTAL RDS	24	24			24		24		24			24	24	24

WIND SP & DIR 0-5MPH SUN SOUTH WEATHER SCATTERED/HAZY

LIGHT BLUE BACKGROUND

INCINERATOR OPACITY DEVIATION SUMMARY FOR 6/21/85 (DATE)

OBSERVER Richard Lewandowski LOCATION stockshack

TIME \ INC	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1200 M	5	5			5		5		5			5	5	5
05	5	5			5		5		5			5	5	5
10	5	5			5		5		5			5	5	5
15			calls of nature.											
20														
25	5	25			5		5		5			5	5	5
30	5	5			5		5		5			5	5	5
35	5	5			5		5		5			5	5	5
40	5	5			5		5		5			5	5	5
45	5	5			5		5		5			5	5	5
50	5	5			5		5		5			5	5	5
55	5	5			5		5		5			5	5	5
100	5	5			5		5		5			5	5	5
05	5	5			5		5		5			5	5	5
10	5	5			5		5		5			5	5	5
15	5	5			5		5		5			5	5	5
20	5	5			5		5		5			5	5	5
25	5	5			5		5		5			5	5	5
30	5	5			5		5		5			5	5	5
35	5	10			5		5		5			5	5	5
40	5	5			5		5		5			5	5	5
45	5	5			5		5		5			5	5	5
50	5	5			5		5		5			5	5	5
55	15	5			5		5		5			5	5	5
TOTAL OPAC	130	145			110		110		110			110	110	110
TOTAL RDS	22	22			22		22		22			22	22	22

WIND SP & DIR ESE 0-5 SUN Some WEATHER Clouds (white, light blue)

#2 45% 0.6. → 25% 6 RAY 12:21 → 12:25

GZIMMER84

INCINERATOR OPACITY DEVIATION SUMMARY FOR 6/21/85 (DATE)

OBSERVER Richard Lewandowski LOCATION stack stack

TIME \ INC	1	2	3	4	5	6	7	8	9	10	11	12	13	14
8 00 AM	5	5			5		5	5	5	5		5	5	
05	5	5			5		5	5	5	5		5	5	
10	5	5			5		5	5	5	5		5	5	
15	5	5			5		5	5	5	5		5	5	
20	5	5			5		5	5	5	5		5	5	
25	5	5			5		5	5	5	5		5	5	
30	5	5			5		5	5	5	5		5	5	
35	5	15			5		5	5	5	5		5	5	
40	5	15			5		5	5	5	5		5	5	
45	5	20			5		5	5	5	5		5	5	
50	5	5			5		5	—	5	15		5	5	
55	5	5			5		5		5	20		5	5	
9 00	20	5			5		5		5	5		5	5	
05	5	5			5		5		5	5		5	5	
10	5	5			5		5		5	5		5	5	
15	5	20W			5		5		5	5		5	5	
20	5	35W			5		5		5	5		5	5	
25	5	10			5		5		5	5		5	5	
30	15	10			5		5		5	5		5	5	
35	10	10			5		5		5	5		5	5	
40	10	10			5		5		5	5		5	5	
45	10	20			5		5		5	5		5	5	
50	20	20			5		5		5	5		5	5	
55	20	20			5		5		5	5		5	5	
TOTAL OPAC	190	265			120		120	50	120	145		120	120	
TOTAL RDS	24	24			24		24	10	24	24		24	24	

WIND SP & DIR SSW 0-5 SUN Sunny EAST WEATHER over cast

Inc #2 9:16 → 9:22 Sue nicholson, (White, Light Blue Bldg

Inc #5 min stack · 9:53 apx 4 min.

GZIMMER84

INCINERATOR OPACITY DEVIATION SUMMARY FOR JUNE 21, 1985 (DATE)

OBSERVER E. McCLURE — LOCATION MB-ROOF

TIME \ INC	1	2	3	4	5	6	7	8	9	10	11	12	13	14
6 00 PM	5	5			5		5		10	5		5	5	5
05	5	5			5		5		10	5		5	5	5
10	5	5			5		5		15	5		15*	5	5
15	5	5			5		5		20*	5		10	5	5
20	5	5			5		5	5	20*	5		5	5	5
25	5	5			5		5	5	15	5		5	5	5
30	10	10			5		5	5	10	5		5	5	5
35	5	5			5		15	5	5	5		5	5	5
40	5	5			5		5	5	5	5		5	5	5
45	5	5			5		5	5	5	5		5	5	5
50	5	5			5		5	5	5	5		5	5	5
55	5	5			5		5	5	10	5		5	5	5
7 00 PM	5	5			5		5	5	10	10		5	5	5
05	5	5			5		5	5	5	15		5	5	5
10	5	5			5		5	5	10	15		5	5	5
15	5	5			5		5	5	10	15		5	5	5
20	5	5			5		5	5	10	15		5	5	5
25	5	5			5		5	5	10	15		5	5	5
30	5	5			5		5	5	10	10		5	5	5
35	5	5			5		5	5	10	15		5	5	5
40	5	5			5		5	5	10	20*		5	5	5
45	5	5			5		5	5	10	15		5	5	5
50	5	5			5		5	5	10	20*		5	5	5
55	5	5			5		5	5	10	15		5	5	5
TOTAL OPAC	125	125			120		130	100	245	240		135	120	120
TOTAL RDS	24	24			24		24	20	24	24		24	24	24

WIND SP & DIR 0-5 MPH SUN SOUTH WEATHER SCATTERED

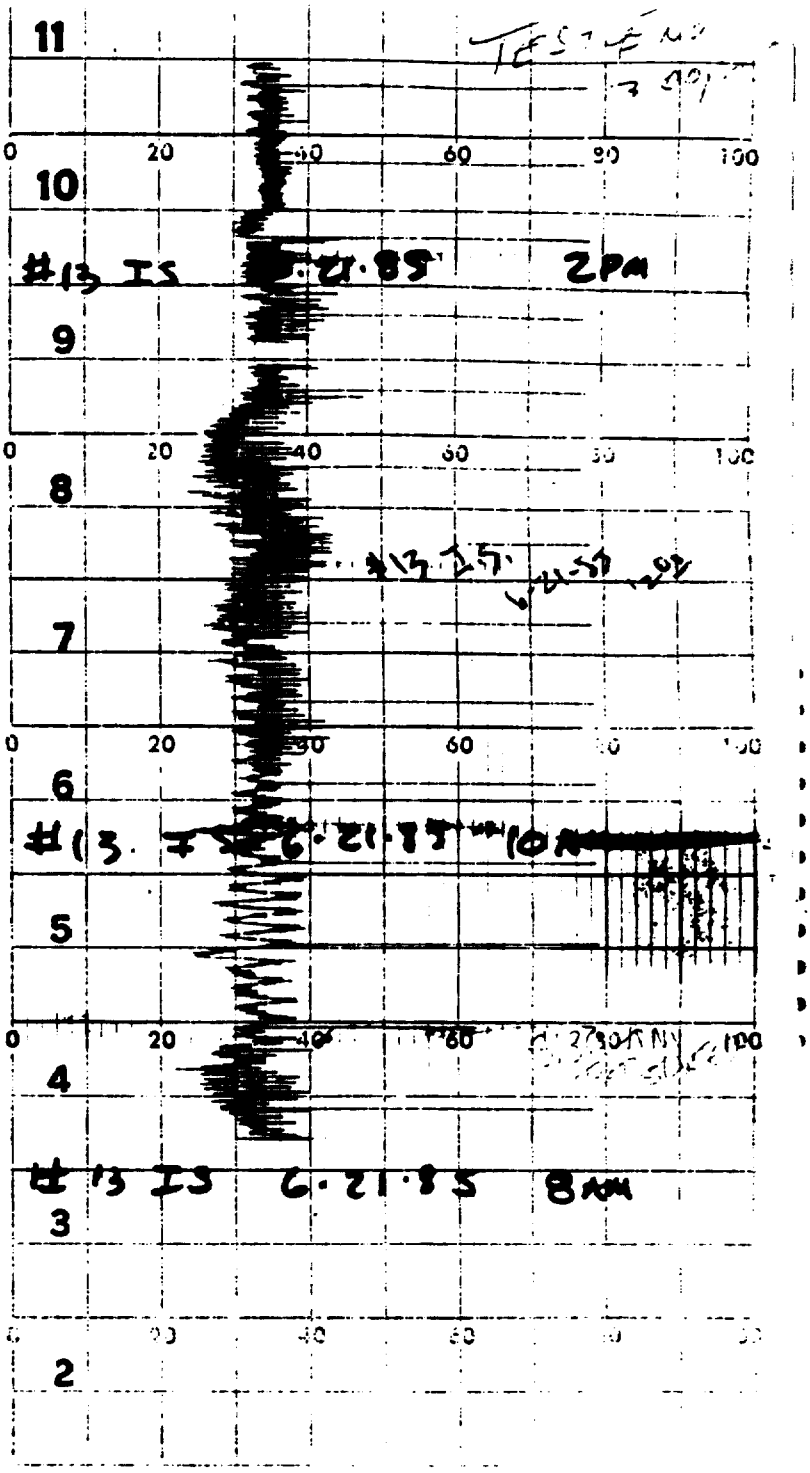
Light BLUE BACKGROUND

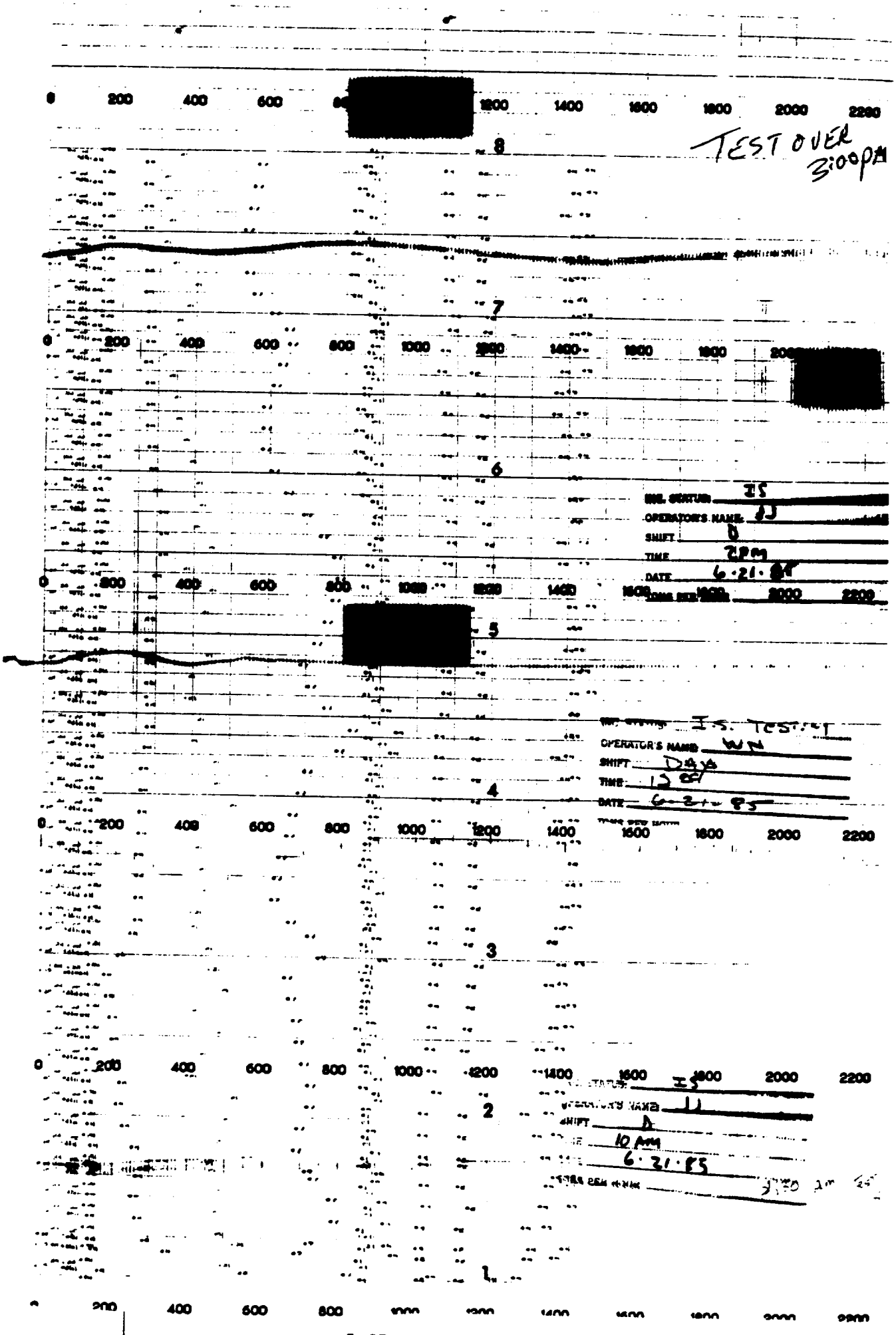
6:00 PM - CII INC. #12 TAKEN OUT OF SERVICE BECAUSE OF BROKEN SHEAR PIN.

6:05 PM - CII INC. #10 IN SERVICE.

6:10 PM - CII INC. #8 IN SERVICE

GRIMMER84


11
10
#13 I5 6·21·85 2PM
9
8
7
6
#13 I5 6·21·85 10AM
5
4
#13 I5 6·21·85 8AM
3
2
0
20
40
60
80
100


TEST OVER
3:00PM
OPERATOR'S NAME
SHIFT
TIME
DATE
OPERATOR'S NAME
SHIFT
TIME
DATE
OPERATOR'S NAME
SHIFT
TIME
DATE

ATTACHMENT 5

SUPPLEMENTARY PROCESS DATA FOR RUN NO. 5

June 22, 85

F13 Incinerator Scrubber Water Flow Readings

	Precooler	Under Tray Nozzles	Pre Cooler Weir	Imp Tray
8:30 AM	76 - 164 gpm	84 - 173 gpm	13 - 200 gpm	9.0 - 1300 gpm
9:00 AM	76 - 164 gpm	84 - 173 gpm	13 - 200 gpm	9.0 - 1300 gpm
9:30 AM	76 - 164 gpm	84 - 173 gpm	13 - 200 gpm	9.0 - 1300 gpm
10:00 AM	76 - 164 gpm	84 - 173 gpm	13 - 200 gpm	9.0 - 1300 gpm
10:30 AM	76 - 164 gpm	84 - 173 gpm	13 - 200 gpm	9.0 - 1300 gpm
11:00 AM	76 - 164 gpm	84 - 173 gpm	13 - 200 gpm	9.2 - 1316 gpm
11:30 AM	76 - 164 gpm	84 - 173 gpm	13 - 200 gpm	9.0 - 1300 gpm
12:00 PM	76 - 164 gpm	82 - 171 gpm	16 - 219 gpm	10.0 - 1379 gpm
12:30 PM	76 - 164 gpm	82 - 171 gpm	16.5 - 224 gpm	9.8 - 1364 gpm
1:00 PM	76 - 164 gpm	83 - 172 gpm	16.5 - 224 gpm	9.8 - 1364 gpm
1:30 PM	76 - 164 gpm	83 - 172 gpm	16.5 - 224 gpm	9.8 - 1364 gpm
2:00 PM	76 - 164 gpm	83 - 172 gpm	16.5 - 224 gpm	9.6 - 1348 gpm
2:30 PM	76 - 164 gpm	84 - 173 gpm	16.5 - 224 gpm	9.8 - 1364 gpm
3:00 PM	76 - 164 gpm	84 - 173 gpm	16.5 - 224 gpm	9.8 - 1364 gpm
	76 - 164 gpm	84 - 173 gpm	16.5 - 224 gpm	9.8 - 1364 gpm

DETROIT WASTEWATER TREATMENT DIVISION
SOLIDS HANDLING INCINERATION COMPLEX II
OPERATORS 24 HOUR REPORT

FORM #
PART ___ OF ___
DATE 6/22/1985

REVISED

INCINERATOR # 13

TIME	HIGHEST HEARTH TEMP. HEARTH #	HIGHEST HEARTH TEMP. TEMPERATURE	CENTER SHAFT SPEED	% O_2	SCRUBBER TEMP EXHAUST	DRAFT PRESS IN WC	ID FAN DAMPER	SCRUBBER DIFF PRESS IN WC	GAS METER READING	OPACITY READING	REMARKS
12 mn	6	1398	1.0	9.5	60	-1.2	60	70			
1	6	1271	1.0	10.0	60	-1.3	60	70			
2	6	1352	1.0	10.0	60	-1.2	60	70			
3	6	1434	1.0	10.0	65	-1.1	48	76			
4	6	1424	1.0	9.5	60	-1.0	52	76			
5	6	1424	1.0	9.5	60	-1.0	52	76			
6	6	1621	1.0	6.5	30	-.7	100	76			
7	6	1501	1.0	12.5	55	-1.2	70*	80			
8	6	1317	1.0	12.0	55	-.8	70	80*			
9	6	1315	1.0	11.0	55	-.9	70	80*			
10	6	1424	1.0	10.5	50	-1.0	70	80			
11	6	1350	1.0	8.5	50	-1.1	70	80			
12 pm	6	1382	1.0	9.0	55	-1.2	80	80			
1	6	1404	1.0	9.5	30	-1.3	80	80			
2	6	1204	1.0	8.0	50	-1.0	72	80			
3	6	1324	1.0	7.0	50	-1.0	76	80			
4	6	1388	1.0	8.0	50	-1.1	52	76			
5	6	1386	1.0	8.5	60	-1.3	80	80			
6	6	1438	1.0	10.5	60	-1.5	86	80			
7	6	1313	1.0	8.0	60	-1.2	50	80			
8	6	1139	1.0	8.5	60	-1.3	52	80			
9	6	1156	.9	8.0	55	-1.4	60	80			
10	6	1300	.9	6.0	55	-1.3	60	80			
11	6	1251	.9	10.5	70	-1.3	52	80			
12 mn	6	1515	1.0	10.0	60	-1.1	50	70			

PROCESS & EQUIPMENT EXCEPTION

SHIFT	OPERATOR	CREW
M	Jackson/Lane	1
D	[illegible]	5
A	Murray	2
11		

I-88

Detroit Wastewater Treatment Division
Solids Handling - Complex II
Sr. SPO Shift Report
Incineration

Date 6-22-85 Shift Days

Sr. SPO Lisa Elwood Crew# 5

Inc.	S.O.S.		E.O.S.
#7.	✓	Belt slipping L.O.F	✓
#8.	✓	Belt Slipping L.O.F	✓
#9.	✓	L.O.F	✓
#10.	✓	L.O.F	✓
#11.	X	Cold	X
#12.	✓		✓
#13.	✓		✓
#14.	✓		✓

Weightometer	7th Hour Reading	1st Hour Reading	Tons
K-1	9367.2	9223.2	144.0
L-1	237.8	32.5	205.3
M-1	—	—	0
N-1	—	—	0
X-9	—	488.1	0

Main Gas Readings

	7th Hour	1st Hour	Factor	Gas Used
#1.	49091	47488	202.39	324431.1
#2.	46530	45019	202.39	305811.3
Total Gas Used				630242.4 Cu.Ft.

Gas Used/Ton Burned 1804.3 Cu.Ft.

Tons Cake Lower Level = 349.3 Tons
Tons Cake Upper Level = 0 Tons
Total Tonnage = 349.3 Tons
Tons to Complex I = 0 Tons
Total Complex II = 349.3 Tons
Incinerator Hours = 31.75 Hours
Wet Tons/Inc. Hour = 11.0 Tons/Hou

	BFP	LL	UL
% Dry Solids Cake	19.2	23.7	NA
% Volitiles Cake	61.7	62.2	NA

Central Shaft Speeds

Inc.	#7.	#8.	#9.	#10.	#11	#12.	#13.	#14.
S.O.S.	60	60	60	60	X	60	60	60
E.O.S	1.0	1.0	1.0	1.0	X	1.0	1.0	1.0

Comments: S.O.S. 13 FP + 3 LLVF to CII
@ 800 Lost F.P. feed due to Air Compressor problem
@ 820 Called for 1 LLVF I.S. Total of 4
@ 840 F.P. B.T.B. @ 845 Lost F.P. due to air compressor
@ 850 F.P. B.T.S.
@ 1000 Inst. Shop working on #4 N Belt Weightometer
@ 1105 Cut Belts due to high hoppers @ 10th Put #8 loc to Belts B.T.S.
@ 1145 #10 C.S. K.O. Put #7 I.S. @ 1210 repaired + O.S.
@ 1230 Lost 1 F.P. Total of 12 I.S.
@ 1245 #9 Inc O.S.B - L.O.F
@ 150 Called ULVF for 5 VF + Put #9 + 10 I.S. @ 2

CIRCLE
SHIFT: M (D) A

FIFTEEN MINUTE WEIGHTOMETER

READINGS COMPLEX II LOWER LEVEL

DATE: 6/22/85

Time	K-1	Tons	K-2	Tons	P-7&8	Tons	P-9&10	Tons	L-1	Tons	L-2	Tons	P11&12	Tons	P13&14	Tons	X-2	Tons
7:00	9201.4	[illegible]	4975.5	[illegible]	4191.4	[illegible]	2615.4	[illegible]	.7	[illegible]	2.1	[illegible]	83.3	[illegible]	9999.8	[illegible]	488.1	[illegible]
:15	9210.2	2.9	4976.4	1.3	4191.7	.3	2616.3	0.9	6.5	5.8	5.5	3.4			3.1	2.3		
:30	9213.1	2.9	4978.2	1.4	4192.0	.3	2617.3	1.0	12.3	5.8	9.0	3.5			1.5	1.4		
:45	9218.1	5.0	4979.6	1.4		—	2619.0	1.7	22.4	10.1	15.3	6.3			9.5	5.0		
8:00	9223.2	5.1	4981.1	1.5		—	2620.8	1.8	32.5	10.1	21.6	6.3			14.5	5.0		
:15	9226.0	2.8		—		—	2622.1	1.3	40.0	7.5	26.0	4.4			17.9	3.4		
:30	9229.1	3.1		—		—	2623.0	.9	46.6	6.6	30.2	4.2			20.1	2.2		
:45	9233.3	5.2		—		—	2625.1	2.1	56.9	10.3	36.8	6.6			23.3	3.2		
9:00	9238.1	5.1		—		—	2627.2	2.1	67.1	10.2	43.5	6.7			26.6	3.3		
:15	9243.9	5.0		—		—	2629.6	2.4	77.1	10.0	49.3	5.8			31.7	5.1		
:30	9250.2	7.0		—		—	2632.0	2.4	88.9	11.8	56.8	7.5			36.3	4.6		
:45	9255.7	5.3		—		—	2634.3	2.3	98.9	10.0	63.1	6.3			41.1	4.8		
10:00	9263.8	8.1		—		—	2636.6	2.2	113.4	14.5	71.9	8.8			47.4	6.3		
:15	9269.2	5.4		—		—	2639.0	2.5	123.3	9.9	77.4	5.5			50.9	3.5		
:30	9274.2	4.9		—		—	2641.8	2.8	131.9	8.6	82.9	5.5			54.9	4.0		
:45	9277.6	3.5		—		—	2644.1	2.3	139.9	8.0	88.5	5.6			57.8	2.9		
11:00	9286.9	9.3		—		—	2648.0	3.9	150.7	10.8	91.3	7.8			61.8	4.0		
:15	9294.1	7.2	4979.39	11.8		—	2652.5	4.5	156.3	5.6	100.2	3.9			65.6	3.8		
:30	9301.9	7.8	5004.7	11.8		—	2657.0	4.5	162.0	5.7	104.0	3.8			69.4	3.8		
:45	9307.4	6.0	5008.7	4.0		—	2657.4	0.4	167.4	5.4	107.8	3.8			72.0	2.6		
12:00	9313.4	6.0	5012.0	3.3	4198.3	0	2657.9	0.5	173.4	6.0	111.6	3.8			74.5	2.5		
:15	9320.9	7.5	5017.0	5.0	4200.3	2.0	2661.0	3.1	180.5	7.1	116.2	4.6			77.7	3.2		
:30	9328.8	7.9	5022.0	5.0	4202.3	2.0	2664.1	3.1	188.1	7.6	121.4	5.2			80.9	3.2		
:45	9336.0	7.2	5028.1	6.1	4204.4	2.1	2666.3	2.2	196.4	8.3	125.8	4.4			84.7	3.8		
1:00	9342.3	6.3	5033.3	5.2	4206.3	1.9	2668.6	2.3	204.4	8.0	130.3	5.5			88.2	3.5		
:15	9350.1	6.8	5040.3	7.0	4209.4	3.1	2668.9	0.3	214.8	10.4	138.8	7.5			93.0	4.8		
:30	9355.3	5.2	5045.4	5.1	4212.0	2.6		—	222.2	7.4	144.3	5.5			96.2	3.2		
:45	9361.6	5.3	5050.6	5.2	4214.6	2.6		—	229.6	7.4	149.8	5.5			99.5	3.3		
:00	9367.2	5.6	5054.3	3.7	4217.6	3.0	2668.9	—	237.8	8.2	155.7	5.9			103.5	4.0		
:15	9372.9	5.7	5058.2	3.9	4220.6	3.0	2673.0	4.0	246.1	8.3	161.6	5.9			107.5	4.0		
:30	9378.4	5.5	5061.3	3.3	4222.9	2.3	2676.5	3.5	254.4	8.3	167.6	6.0			112.0	4.5		
:45	9383.9	5.5	5064.6	3.3	4225.7	2.2	2680.0	3.5	262.7	8.3	173.7	6.0			116.5	4.5		
:00	9389.4	5.5	5067.9	3.3	4227.4	2.3	2683.5	3.5	270.0	6.3	179.7	6.0			121.0	4.5		

OPERATOR: C. Dawson - Granite Cd, C

A.M.S.P.O.: [illegible]

Form I-11

I-70

INCINERATOR LOADING [illegible] SHIFT REPORT

DATE: 6/22/85 CREW: V

SHIFT (D)	A	K1 WEIGHTOMETER READINGS	K1 TOTAL	K2 WEIGHTOMETER READINGS	K2 TOTAL	P7 WEIGHTOMETER READINGS	P7 TOTAL	P9 WEIGHTOMETER READINGS	P9 TOTAL	M1 WEIGHTOMETER READINGS	M1 TOTAL	M2 WEIGHTOMETER READINGS	M2 TOTAL	Q8 WEIGHTOMETER READINGS	Q8 TOTAL	Q10 WEIGHTOMETER READINGS	Q10 TOTAL
	3PM	9207.4	XXXX	4975.5	XXXX	4191.4	XXXX	2615.4	XXXX		XXXX		XXXX	12.7	XXXX	17.6	XXX
	4	9223.2	15.8	4981.1	5.6	4192.0	0.6	2620.8	5.4								
	5	9238.4	15.2			4		2627.2	6.4								
	6	9263.8	25.4					2636.5	9.3								
	7	9286.9	23.1	4992.7	10.8			2648.0	12.5								
	8	9313.4	26.5	5012.0	11.1	4198.0	6.0	2657.9	9.9								
	9	9343.3	29.9	5033.3	21.3	4206.3	8.3	2668.6	10.7								
	10	9367.2	23.9	5054.3	21.0	4220.6	14.3	2673.0	4.4					14.4		18.2	
	11	9389.4	22.2	5067.9	13.6	4227.4	6.8	2683.5	10.5					12.7	1.7	17.6	6

SHIFT (D)	A	L1 WEIGHTOMETER READINGS	L1 TOTAL	L2 WEIGHTOMETER READINGS	L2 TOTAL	P11 WEIGHTOMETER READINGS	P11 TOTAL	P13 WEIGHTOMETER READINGS	P13 TOTAL	N1 WEIGHTOMETER READINGS	N1 TOTAL	N2 WEIGHTOMETER READINGS	N2 TOTAL	Q12 WEIGHTOMETER READINGS	Q12 TOTAL	Q14 WEIGHTOMETER READINGS	Q14 TOTAL
	3PM	.7	XXXX	2.1	XXXX	83.3	XXXX	99999.8	XXXX		XXXX		XXXX		XXXX	85.8	XXX
	4	32.5	31.8	21.6	19.5			14.5	14.7								
	5	67.1	34.6	43.5	21.9			26.6	12.1								
	6	125.9	46.8	71.9	28.4			47.4	20.8								
	7	150.7	37.8	96.3	24.4			61.8	14.4								
	8	173.4	23.7	111.6	15.3			74.5	12.7								
	9	204.4	31.0	131.3	19.7			88.2	11.7								
	10	246.1	41.7	161.6	30.3			107.5	19.3								
	11	270.0	23.9	179.7	18.1			121.0	13.5							85.8	

SHIFT M	(D)	A	K1+L1	~~M1+N1~~ Q8+10	X-9 WEIGHTOMETER READINGS	X-9 TONS	TONS TO CII INC.	RUNNING TIME 7	8	9	10	11	12	13	14
11PM	7AM	3PM	XXXX	XXXX	488.1	XXXX	XXXX								
MID	8	4	47.6				47.6			60	60		15	60	60
1AM	9	5	49.8				49.8			60	60		60	60	60
2	10	6	72.2				72.2			60	60		60	60	60
3	11	7	60.9				60.9			60	60		60	60	60
4	NOON	8	50.2				50.2	15	60	60	45		60	60	60
5	1PM	9	60.9				60.9	60	60	45			60	60	60
6	2	10	65.6				65.6	60	60				60	60	60
7	3	11	46.1	2.3			48.4	60	60	45	45		60	60	60
TOTAL			[illegible]	2.3		0	[illegible]	195	240	390	330	0	465	480	480

[illegible signature]

INCINERATOR OPACITY DEVIATION SUMMARY FOR 6-22-85
DATE

OBSERVER [illegible] LOCATION Shark

TIME \ INC	1	2	3	4	5	6	7	8	9	10	11	12	13	14
8 00 P M	5	5			5		5	5	5	5		5	5	5
05	5	5			5		5	5	5	10		5	5	5
10	5	5			5		5	5	5	20		5	5	5
15	5	5			5		5	5	5	10		5	5	5
20	5	5			5		5	5	5	5		5	5	5
25	5	5			5		5	5	5	5		5	5	5
30	5	5			5		5	5	5	5		5	5	5
35	5	5			5		5	5	5	5		5	5	5
40	5	5			5		5	5	15	5		5	5	5
45	5	5			5		5	5	15	10		5	5	10
50	5	5			5		5	5	15	10		5	10	10
55	5	5			5		5	5	[illegible]	5		5	5	5
00														
05														
10														
15														
20														
25														
30														
35														
40														
45														
50														
55														
TOTAL OPAC	60	60			60		60	60	175	95		60	65	70
TOTAL RDS	12	12			12		12	12	12	12		12	12	12

WIND SP & DIR SW 5-10 SUN left & behind WEATHER clear sunny

GZIMMER84

INCINERATOR OPACITY DEVIATION SUMMARY FOR 6-22-81
DATE

OBSERVER Rotike

LOCATION Stockstock

TIME / INC	1	2	3	4	5	6	7	8	9	10	11	12	13	14
4:00 M	5	5			5		5	5	5	5		5	5	5
05	5	5			5		5	5	5	5		5	5	5
10	5	5			5		5	5	5	5		5	5	5
15	5	5			5		5	5	10	5		5	5	5
20	5	5			5		5	5	10	5		5	5	5
25	5	5			5		5	5	5	5		5	5	5
30	5	5			5		5	5	5	5		5	5	5
35	5	5			5		5	5	10	5		5	5	5
40	5	5			5		5	5	5	10		5	5	5
45	5	5			5		5	5	5	10		5	5	5
50	5	5			5		5	5	5	5		5	5	5
55	5	5			5		5	5	5	5		5	5	5
5:00 pm	5	5			5		5	5	5	10		5	5	5
05	5	5			5		5	5	5	10		5	5	5
10	5	5			5		5	5	5	5		5	5	5
15	5	5			5		5	5	5	5		5	5	5
20	5	5			5		5	5	5	5		5	5	5
25	5	5			5		5	5	5	5		5	5	5
30	5	5			5		5	5	5	5		5	5	5
35	5	5			5		5	5	5	5		5	5	5
40	5	5			5		5	5	5	5		5	5	5
45	5	5			5		5	5	5	5		5	5	5
50	5	5			5		5	5	10	5		5	5	5
55	5	15			5		5	5	15	5		5	5	5
TOTAL OPAC	120	120			120		120	120	150	140		120	120	120
TOTAL RDS	24	24			24		24	24	24	24		24	24	24

WIND SP & DIR Se 5-10 SUN Left & behind WEATHER 75% clear

SZIMMER84

INCINERATOR OPACITY DEVIATION SUMMARY FOR 6/24/85
DATE

OBSERVER Richard Kim-Arabi LOCATION Stackshack

TIME \ INC	1	2	3	4	5	6	7	8	9	10	11	12	13	14
12 00 M	5	5			5		5	5	5	5		5	5	5
05	5	5			5		5	5	5	5		5	5	5
10	5	5			5		5	5	5	5		5	5	5
15	5	5			5		5	5	5	5		5	5	5
20	5	5			5		5	5	5	5		5	5	5
25	5	5			5		5	5	5	5		5	5	5
30	5	5			5		5	5	5	5		5	5	5
35	5	5			5		5	5	5	5		5	5	5
40	5	5			5		5	5	5	5		5	5	5
45	5	5			5		5	5	5	5		5	5	5
50	5	5			5		5	5	5	5		5	5	5
55	5	5			5		5	5	5	5		5	5	5
1 00	5	5			5		5	5	5	5		5	5	5
05	5	5			5		5	5	5	5		5	5	5
10	5	5			5		5	5	5	5		5	5	5
15	5	5			5		5	5	5	5		5	5	5
20	5	5			5		5	5	5	5		5	5	5
25	5	5			5		5	5	5	5		5	5	5
30	5	5			5		5	5	5	5		5	5	5
35	5	5			5		5	5	5	5		5	5	5
40	5	5			5		5	5	5	5		5	5	5
45	5	5			5		5	5	5	5		5	5	5
50	5	5			5		5	5	5	5		5	5	5
55	5	5			5		5	5	5	5		5	5	5
TOTAL OPAC	120	120			120		120	120	120	120		130	120	120
TOTAL RDS	24	24			24		24	24	24	24		24	24	24

WIND SP & DIR WSW 0-10 SUN none WEATHER Rain.
(Light Gray w/ White Bldg).
ER 205 @ 11:45
#9 OSB at 1245 #10 OSB at 130

GOMMER84

INCINERATOR OPACITY DEVIATION SUMMARY FOR 6/22/85 (DATE)

OBSERVER Richard Lewandoski LOCATION Stack deck

TIME \ INC	1	2	3	4	5	6	7	8	9	10	11	12	13	14
8 00 H M	5	5			5		5	5	5	5			5	5
05	5	5			5		5	5	5	5			5	5
10	5	5			5		5	5	5	5			5	5
15	5	5			5		5	5	5	5			5	5
20	5	5			5		5	5	5	5			5	5
25	5	5			5		5	5	5	5			5	5
30	5	5			5		5	5	5	5			5	5
35	5	5			5		5	5	5	5			5	5
40	5	5			5		5	5	5	5			5	5
45	5	5			5		5	5	5	5			5	5
50	5	5			5		5	5	5	5			5	5
55	5	5			5		5	5	5	5			5	5
9 00	5	5			5		5	5	5	5			5	5
05	5	5			5		5	5	5	5			5	5
10	5	5			5		5	5	5	5			5	5
15	5	5			5		5	5	5	5			5	5
20	5	5			5		5	5	5	5			5	5
25	5	5			5		5	5	5	5			5	5
30	5	5			5		5	5	5	5			5	5
35	5	5			5		5	5	5	5			5	5
40	5	5			5		5	5	5	5			5	5
45	5	5			5		5	5	5	5			5	5
50	5	5			5		5	5	5	5			5	5
55	5	5			5		5	5	5	5			5	5
TOTAL OPAC	120	120			120		120	120	120	120			120	120
TOTAL RDS	24	24			24		24	24	24	24			24	24

#5 Pitt 3580

WIND SP & DIR (1) 0-5 SUN none WEATHER Cloudy (Dreary, white Bkgrd)

INCINERATOR OPACITY DEVIATION SUMMARY FOR 6/22/85
DATE

OBSERVER R Lewandowski LOCATION Stack shack

TIME \ INC	1	2	3	4	5	6	7	8	9	10	11	12	13	14
6 00 AM	5	5	X	X	5	X	5	5	5	5	X	/	5	5
05	5	5			5		5	5	5	5			5	5
10	5	5			5		5	5	5	5			5	5
15	5	5			5		5	5	5	5			5	5
20	5	5			5		5	5	5	5			5	5
25	5	5			5		5	5	5	5			5	5
30	5	5			5		5	5	5	5			5	5
35	5	5			5		5	5	5	5			5	5
40	5	5			5		5	5	5	5			5	5
45	5	5			5		5	5	5	5			5	5
50	5	5			5		5	5	5	5			5	5
55	5	5			5		5	5	5	5			5	5
7 00	5	5			5		5	5	5	5			5	5
05	5	5			5		5	5	5	5			5	5
10	5	5			5		5	5	5	5			5	5
15	5	5			5		5	5	5	5			5	5
20	5	5			5		5	5	5	5			5	5
25	5	5			5		5	5	5	5			5	5
30	5	5			5		5	5	5	5			5	5
35	5	5			5		5	5	5	5			5	5
40	5	5			5		5	5	5	5			5	5
45	5	5			5		5	5	5	5			5	5
50	5	5			5		5	5	5	5			5	5
55	5	5			5		5	5	5	5			5	5
TOTAL OPAC	120	120			120		120	120	120	120			120	120
TOTAL RDS	24	24			24		24	24	24	24			24	24

WIND SP & DIR S. 0-5 SUN none WEATHER Cloudy
6:15 # 13 main stack
#7 & #8 C.O.S. 7 AM
(White, GRAY Blue)

GZIMMER84

INCINERATOR OPACITY DEVIATION SUMMARY FOR 6/22/85
DATE

OBSERVER Richard Lowandowski LOCATION Stackshack

TIME \ INC	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1000 AM	5	5			5		5	5	5	5			5	5
05	5	5			5		5	5	5	5			5	5
10	5	5			5		5	5	5	5			5	5
15	5	5			5		5	5	5	5			5	5
20	5	5			5		5	5	5	5			5	5
25	5	5			5		5	5	5	5			5	5
30	5	5			5		5	5	5	5			5	5
35	5	5			5		5	5	5	5			5	5
40	5	5			5		5	5	5	5			5	5
45	5	5			5		5	5	5	5			5	5
50	5	5			5		5	5	5	5			5	5
55	5	5			5		5	5	5	5			5	5
11.00	5	5			5		5	5	5	5			5	5
05	5	5			5		5	5	5	5			5	5
10	5	5			5		5	5	5	5			5	5
15	5	5			5		5	5	5	5			5	5
20	5	5			5		5	5	5	5			5	5
25	5	5			5		5	5	5	5			5	5
30	5	5			5		5	5	5	5			5	5
35	5	5			5		5	5	5	5			5	5
40	5	5			5		5	5	5	5			5	5
45	5	5			5		5	5	5	5			5	5
50	5	5			5		5	5	5	5			5	5
55	5	5			5		5	5	5	5			5	5
TOTAL OPAC	120	120			120		120	120	120	120			120	120
TOTAL RDS	24	24			24		24	24	24	24			24	24

#1 Ref.

Lig Ra

WIND SP & DIR 0-5 W SUN none WEATHER Cloudy (Tchtt, Gray background)

#10 ccs @ 11:45

#7 in @ 11:45

INCINERATOR OPACITY DEVIATION SUMMARY FOR 6-22-85
DATE

OBSERVER Roethe LOCATION Stack shack

TIME \ INC	1	2	3	4	5	6	7	8	9	10	11	12	13	14
2:00 pM	5	5			5		5	5	5	0		5	5	5
05	5	0			5		5	5	5	0		5	5	5
10	5	5			5		5	5	5	0		5	5	5
15	5	5			5		5	5	5	0		5	5	5
20	5	5			5		5	5	5	0		5	5	5
25	5	5			5		5	5	5	0		5	5	5
30	5	0			5		5	5	5	0		5	5	5
35	5	5			5		5	5	5	0		5	5	5
40	5	5			5		5	5	5	0		5	5	5
45	5	0			5		10	5	5	0		5	5	5
50	5	5			5		5	5	5	5		5	5	5
55	5	30			5		5	5	5	5		5	5	5
3:00	5	5			5		5	5	5	5		5	5	5
05	5	5			5		5	5	5	5		5	5	5
10	5	5			5		5	5	5	5		5	5	5
15	5	5			5		5	5	5	5		5	5	5
20	5	5			5		5	5	5	5		5	5	5
25	5	5			5		5	5	5	5		5	5	5
30	5	5			5		5	5	5	5		5	5	5
35	5	5			5		5	5	5	5		5	5	5
40	5	5			5		5	5	5	5		5	5	5
45	5	5			5		5	5	5	5		5	5	5
50	5	5			5		5	5	5	5		5	5	5
55	5	5			5		5	5	5	5		5	5	5
TOTAL OPAC	120	130			120		125	120	120	70		120	110	120
TOTAL RDS	24	24			24		24	24	24	24		24	24	24

WIND SP & DIR SE 5-10 SUN behind & left of observer WEATHER Overcast 75%

1 start at 2:00 2 osb at 1:30

9:10 in at 2:15 #2 on main stack to allow maintenance to repair scrubber (3:52)

GZIMMER84

INCINERATOR OPACITY DEVIATION SUMMARY FOR 6-22-85
DATE

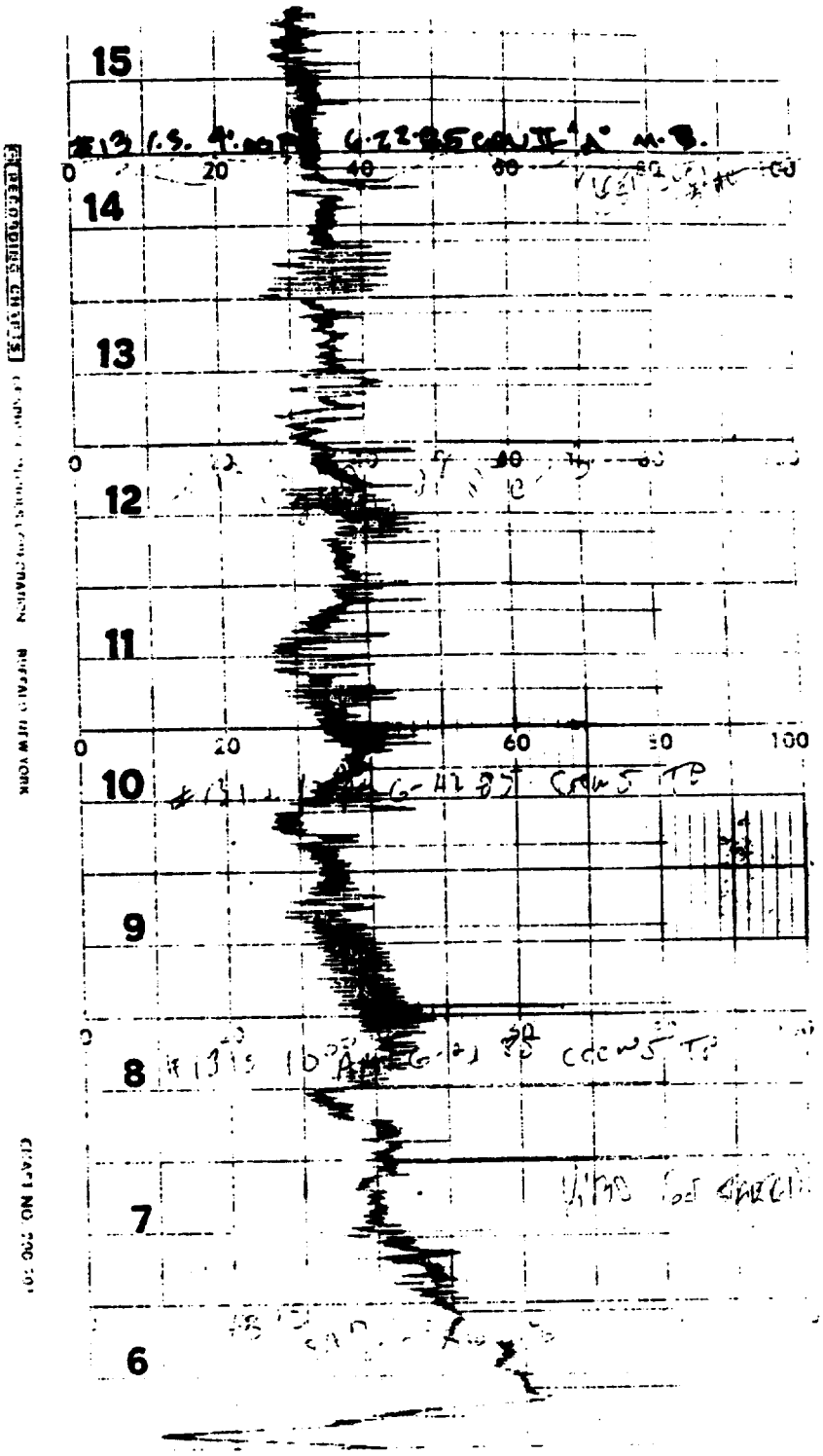
OBSERVER Rattke | LOCATION Stack Stack

TIME \ INC	1	2	3	4	5	6	7	8	9	10	11	12	13	14
6:00 pM	5	5			5		5	5	5	5		5	5	5
05	5	5			5		5	5	5	5		5	5	5
10	5	5			5		5	5	5	5		5	5	5
15	5	5			5		5	5	5	5		5	5	5
20	5	5			5		5	5	5	5		5	5	5
25	5	5			5		5	5	5	5		5	5	5
30	5	5			5		5	5	5	5		5	5	5
35	5	5			5		5	5	5	5		5	5	5
40	5	5			5		5	5	5	5		5	5	5
45	5	5			5		5	5	5	5		5	5	5
50	5	5			20		5	5	5	5		5	5	5
55	5	5			5		5	5	5	5		5	5	5
7:00 pm	5	5			5		5	5	5	5		5	5	5
05	5	5			5		5	5	5	5		5	5	5
10	5	5			5		5	5	5	5		5	5	5
15	5	5			5		5	5	5	5		5	5	5
20	5	5			5		5	5	5	5		5	5	5
25	5	5			5		5	5	5	5		5	5	5
30	5	5			5		5	5	5	5		5	5	5
35	5	5			5		5	5	5	5		5	5	5
40	5	5			15		5	5	5	5		5	5	5
45	5	5			30		5	5	5	5		5	5	5
50	5	10			15		5	5	5	5		5	5	5
55	5	10			5		5	5	5	5		5	5	15
TOTAL OPAC	120	130			180		120	120	130	120		120	120	130
TOTAL RDS	24	24			24		24	24	24	24		24	24	24

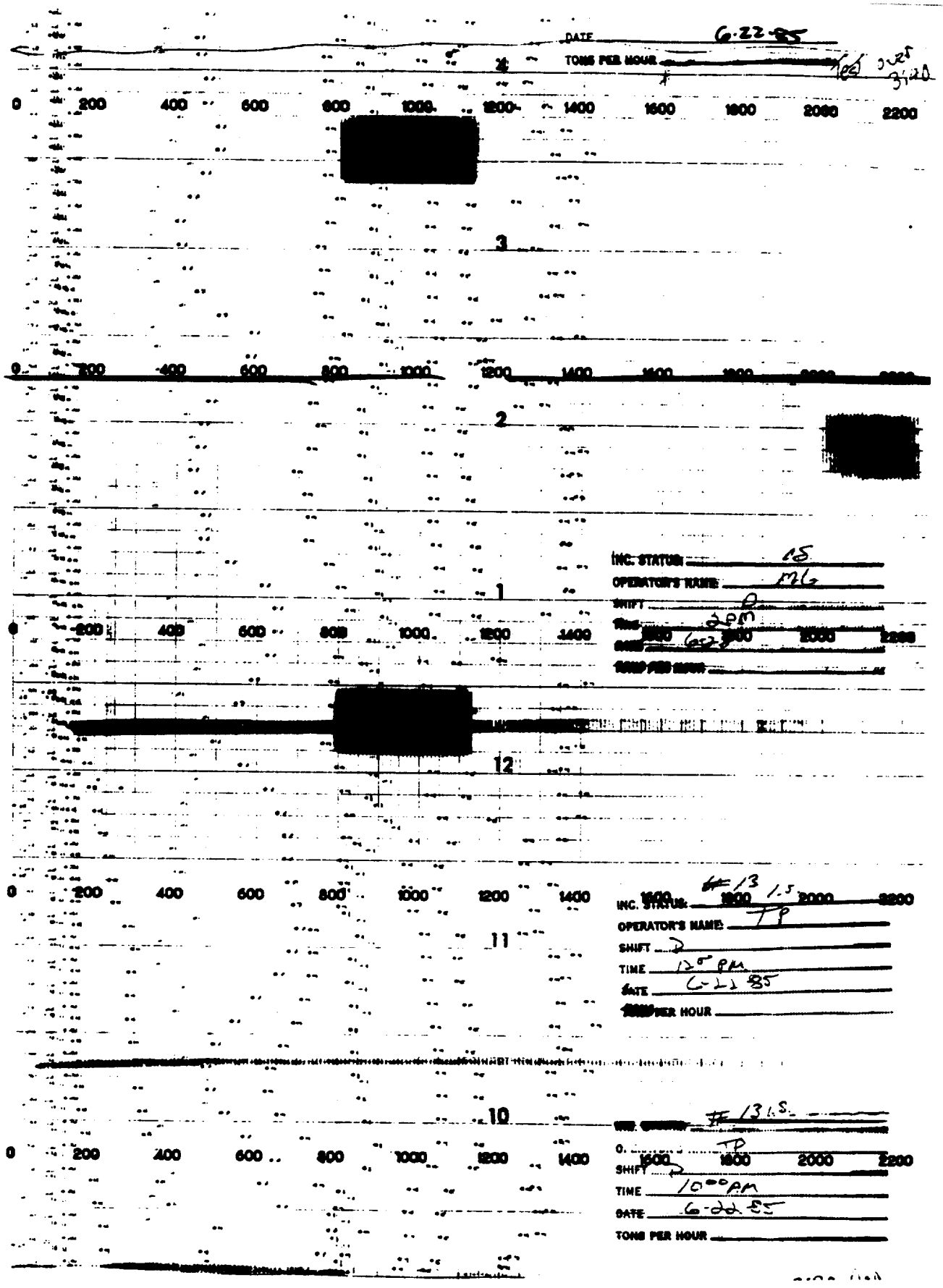
WIND SP & DIR SW 5-10 SUN Left the land WEATHER Sunny 5% clouds

GZIMMER84

[redacted]



[redacted]


DATE 6-22-85
TONS PER HOUR
0 200 400 600 800 1000 1200 1400 1600 1800 2000 2200
3
2
1
12
11
10
INC. STATUS AS
OPERATOR'S NAME ML
SHIFT D
TIME 2PM
INC. STATUS #13 1.5
OPERATOR'S NAME TP
SHIFT D
TIME 12:00 PM
DATE 6-22-85
INC. STATUS #13 1.5
OPERATOR'S NAME TP
SHIFT D
TIME 10:00 AM
DATE 6-22-85
TONS PER HOUR

ATTACHMENT 6

SUPPLEMENTARY PROCESS DATA FOR RUN NO. 6

6.24.85

#13 Incinerator Scrubber
Water Flow Readings

	Precooler Nozzles	Under Tray Nozzles	Pre Cooler Weirs	dmp. Trays
9:00 AM	76 - 164 gpm	84 - 173 gpm	13 - 200 gpm	9.8 - 1347 gpm
9:30 AM	76 - 164 gpm	84 - 173 gpm	13 - 200 gpm	9.8 - 1347 gpm
10:00 AM	76 - 164 gpm	84 - 173 gpm	13 - 200 gpm	9.8 - 1347 gpm
10:30 AM	76 - 164 gpm	84 - 173 gpm	13 - 200 gpm	9.8 - 1347 gpm
11:00 AM	76 - 164 gpm	82 - 171 gpm	13 - 200 gpm	9.8 - 1347 gpm
11:30 AM	76 - 164 gpm	82 - 171 gpm	13 - 200 gpm	9.0 - 1300 gpm
12:00 N	Test Stopped 11:45 - "L" Belt drive chain Brake			
12:30 PM				
1:00 PM				
1:30 PM				
2:00 PM				
2:30 PM				
3:00 PM	3:15 Test Restarted			
3:30 PM	76 - 164 gpm	82 - 171 gpm	13 - 200 gpm	9.4 - 1332 gpm
4:00 PM	76 - 164 gpm	82 - 171 gpm	13 - 200 gpm	9.2 - 1316 gpm
4:30 PM	76 - 164 gpm	82 - 171 gpm	13 - 200 gpm	9.0 - 1300 gpm
5:00 PM	76 - 164 gpm	80 - 170 gpm	13 - 200 gpm	9.2 - 1316 gpm
5:30 PM	76 - 164 gpm	80 - 170 gpm	13 - 200 gpm	9.0 - 1300 gpm
6:00 PM	76 - 164 gpm	80 - 170 gpm	13 - 200 gpm	9.4 - 1332 gpm
6:30 PM	76 - 164 gpm	80 - 170 gpm	13 - 200 gpm	9.0 - 1300 gpm
7:00 PM	76 - 164 gpm	80 - 170 gpm	13 - 200 gpm	9.2 - 1316 gpm

SHIFT: M D

FIFTEEN MINUTE WEIGHTOMETER

READINGS COMPLEX II LOWER LEVEL

DATE: 6-24-85

Time	K-1	Tons	K-2	Tons	P-7&8	Tons	P-9&10	Tons	L-1	Tons	L-2	Tons	P11&12	Tons	P13&14	Tons	X-9	Tons
3:00	10831.7	[illegible]	5475.0	[illegible]	4770.6	[illegible]	2965.2	[illegible]	169.4	[illegible]	101.5	[illegible]	104.9	[illegible]	77.4	[illegible]	488.1	[illegible]
:15	10836.1	5.5	5480.2	5.2	4773.9	3.3			171.3	7.9	105.2	3.7			80.3	2.9		
:30	10842.1	5.4	5485.4	5.2	4777.2	3.3			185.3	8.0	108.9	3.7			83.3	3.0		
:45	10847.3	5.2	5490.2	4.8	4780.3	3.1			192.6	7.3	112.5	3.6			86.0	2.7		
4:00	10856.1	8.8	5499.0	6.3	4784.8	4.5	2965.7	0.4	202.6	10.0	118.0	5.5			90.0	4.0		
:15	10865.6	9.7	6004.2	7.2	4789.4	4.6	2968.6	2.9	211.8	9.2	121.5	3.5			92.7	2.7		
:30	10875.2	9.7	6011.4	7.2	4794.0	4.6	2971.5	2.9	221.1	9.3	125.1	3.6			95.4	2.7		
:45	10885.3	9.8	6018.7	7.3	4798.7	4.7	2974.5	3.0	230.3	9.2	128.7	3.6			98.3	2.9		
5:00	10895.2	9.9	6026.0	7.3	4803.4	4.7	2977.3	2.8	239.4	9.1	132.2	3.5			100.8	2.5		
:15	10906.0	10.8	6033.5	7.5	4807.5	4.1	2981.2	3.9	249.0	9.6	137.2	5.0			103.7	2.9		
:30	10916.1	10.7	6041.1	7.6	4811.5	4.0	2985.3	4.1	258.5	9.5	142.3	5.1			106.7	3.0		
:45	10927.5	10.9	6048.6	7.5	4815.5	4.0	2989.3	4.0	268.2	9.7	147.3	5.0			109.5	2.8		
6:00	10938.7	11.2	6056.1	7.5	4819.7	4.2	2992.9	3.6	277.8	9.6	152.3	5.0			112.6	3.1		
:15	10948.5	9.8	6062.6	6.5	4823.3	3.6	2997.3	4.4	288.0	10.2	158.5	6.2			116.1	3.5		
:30	10958.2	9.7	6069.2	6.6	4826.8	3.5	3001.8	4.5	298.3	10.3	164.8	6.3			119.4	3.4		
:45	10968.0	9.8	6075.7	6.5	4830.4	3.6	3006.4	4.6	308.4	10.1	170.9	6.1			122.8	3.4		
7:00	10977.7	9.7	6082.4	6.7	4834.0	3.6	3010.8	4.4	318.6	10.2	177.3	6.4			126.3	3.5		
:15	10987.6	9.9	6088.7	6.3	4837.6	3.6	3015.1	4.3	328.8	10.2	183.4	6.1			129.9	3.6		
:30	10995.1	8.3	6094.3	5.6	4840.6	3.0	3018.1	3.0	338.4	9.6	189.0	5.6			[illegible]	2.9		
:45	11004.3	8.4	6099.8	5.5	4843.5	2.9	3021.2	3.1	347.9	9.5	194.7	5.7			[illegible]	3.0		
8:00	11012.6	8.3	6105.4	5.6	4846.5	3.0	3024.2	3.0	357.6	9.7	200.3	5.6			138.6	2.8		
:15	11025.2	12.6	6112.1	6.7	4850.0	3.5	3027.1	2.9	367.1	9.5	206.1	5.8			141.7	3.1		
:30	11037.7	12.5	6118.9	6.8	4853.6	3.6	3030.1	3.0	376.5	9.4	211.8	5.7			145.0	3.3		
:45	11050.4	12.7	6125.5	6.6	4857.3	3.7	3032.9	2.8	386.1	9.6	217.6	5.8			148.2	3.2		
9:00	11062.8	12.4	6132.2	6.7	4860.7	3.4	3035.6	2.7	395.5	9.4	223.2	5.6			151.6	3.4		
:15	11075.3	12.5	6138.8	6.6	4864.2	3.5	3038.4	2.8	405.0	9.5	229.0	5.8			154.8	3.2		
:30	11088.1	12.8	6145.6	6.8	4867.7	3.5	3041.4	3.0	414.3	9.3	234.8	5.8			157.9	3.1		
:45	11099.1	9.0	6150.7	5.1	4870.4	2.7	3043.7	2.3	421.5	7.2	239.2	4.4			160.1	2.2		
10:00	11105.9	8.8	6155.7	5.0	4872.9	2.5	3046.2	2.5	428.5	7.0	243.5	4.3			162.2	2.1		
:15	11116.5	10.6	6162.0	6.3	4876.1	3.2	3048.9	2.7	436.2	7.7	248.6	5.1			165.0	2.8		
:30	11127.0	10.5	6168.4	6.4	4879.5	3.4	3051.5	2.6	444.0	7.8	253.6	5.0			167.7	2.7		
:45	11137.8	10.8	6174.7	6.3	4882.9	3.3	3054.2	2.7	451.7	7.7	258.6	5.0			170.7	3.0		
11:00	11146.2	8.4	6180.0	5.7	4886.2	3.4	3056.3	2.1	457.9	6.2	262.3	3.7	111.0		173.3	2.6		

OPERATOR: L. Nicholson til 5:45pm A.M.S.P.O.: Capt

R. McCallum from 6pm–11:00pm

Form I-11

I-84

METRO WASTEWATER RECLAMATION PLANT

INCINERATOR LOADING RATE SHIFT REPORT

DATE: 6-24-85 CREW: II - AFTERNOON

SHIFTS M	SHIFTS D	SHIFTS A	K1 WEIGHTOMETER READINGS	K1 TOTAL	K2 WEIGHTOMETER READINGS	K2 TOTAL	P7 WEIGHTOMETER READINGS	P7 TOTAL	P9 WEIGHTOMETER READINGS	P9 TOTAL	M1 WEIGHTOMETER READINGS	M1 TOTAL	M2 WEIGHTOMETER READINGS	M2 TOTAL	Q8 WEIGHTOMETER READINGS	Q8 TOTAL	Q10 WEIGHTOMETER READINGS	Q10 TOTAL
11PM	7AM	3PM	10831.2	XXXX	5975.0	XXXX	4770.6	XXXX	2965.3	XXXX	0.0.S.	XXXX	0.0.S.	XXXX	209.4	XXXX	274.5	XXXX
MID	8	4	10856.1	24.9	59970	22.0	47848	14.2	2965.7	0.4					208.8		274.7	
1AM	9	5	10895.2	39.1	6024.0	29.0	4803.4	18.6	2977.3	11.6								
2	10	6	10938.7	43.5	6056.1	30.1	4819.7	16.3	2992.9	15.6								
3	11	7	10977.7	39.0	6082.4	26.3	4834.0	14.3	3010.8	17.9								
4	NOON	8	11012.6	34.9	6105.4	23.0	4846.5	12.5	3024.2	13.4								
5	1PM	9	11062.8	50.2	6132.2	26.8	4860.7	14.2	3035.6	11.4								
6	2	10	11105.9	43.1	6155.7	23.5	4872.9	12.2	3046.2	10.6								
7	3	11	11146.2	40.3	6180.0	24.3	4886.2	13.3	3056.3	10.1								

SHIFTS M	SHIFTS D	SHIFTS A	L1 WEIGHTOMETER READINGS	L1 TOTAL	L2 WEIGHTOMETER READINGS	L2 TOTAL	P11 WEIGHTOMETER READINGS	P11 TOTAL	P13 WEIGHTOMETER READINGS	P13 TOTAL	N1 WEIGHTOMETER READINGS	N1 TOTAL	N2 WEIGHTOMETER READINGS	N2 TOTAL	Q12 WEIGHTOMETER READINGS	Q12 TOTAL	Q14 WEIGHTOMETER READINGS	Q14 TOTAL
11PM	7AM	3PM	169.4	XXXX	101.5	XXXX	104.9	XXXX	77.4	XXXX	0.N.T.	XXXX	1312.5	XXXX	-0-	XXXX	86.1	XXXX
MID	8	4	202.6	33.2	118.0	16.5			90.0	12.6							86.0	
1AM	9	5	239.4	36.8	132.2	14.2			100.8	10.8								
1	10	6	277.8	38.4	152.3	20.1			112.6	11.8								
1	11	7	318.6	40.8	177.3	25.0			126.3	13.7								
1	NOON	8	357.6	39.0	200.3	23.0			138.6	12.3								
2	1PM	9	395.5	37.9	223.2	22.9			151.6	13.0								
4	2	10	428.5	33.0	243.5	20.3			162.2	10.6								
7	3	11	457.9	29.4	262.3	18.8			173.3	11.1								

SHIFT M	SHIFT D	SHIFT A	K1+L1	M1+N1	X-9 WEIGHTOMETER READINGS	X-9 TONS	TONS TO CII INC.
11PM	7AM	3PM	XXXX	XXXX	488.1	XXXX	XXXX
MID	8	4	58.1				58.1
1AM	9	5	75.9				75.9
2	10	6	81.9				81.9
3	11	7	79.8				79.8
4	NOON	8	73.9				73.9
5	1PM	9	88.1				88.1
6	2	10	76.1				76.1
7	3	11	69.7				69.7
TOTALS			603.5	0		0	603.5

RUNNING TIME	7	8	9	10	11	12	13	14
11.6	60	60				60	60	60
12.6	60	60	60			60	60	60
13.6	60	60	60			60	60	60
13.3	60	60	60			60	60	60
11.8	60	60	60	15		60	60	60
12.5	60	60	60	60		60	60	60
10.8	60	60	60	60		60	60	60
	60	60	60	60		60	60	60
TOTALS	480	480	420	195	0	480	480	480

SIGNED: Rapp

I-85

533.8

DETROIT WASTEWATER TREATMENT PLANT

INCINERATOR LOADING RATE SHIFT REPORT

DATE: 6-24-85 CREW: 5

SHIFTS	K1 WEIGHTOMETER READINGS	K1 TOTAL	K2 WEIGHTOMETER READINGS	K2 TOTAL	P7 WEIGHTOMETER READINGS	P7 TOTAL	P9 WEIGHTOMETER READINGS	P9 TOTAL	M1 WEIGHTOMETER READINGS	M1 TOTAL	M2 WEIGHTOMETER READINGS	M2 TOTAL	Q8 WEIGHTOMETER READINGS	Q8 TOTAL	Q10 WEIGHTOMETER READINGS	Q10 TOTAL
M	10591.5	XXXX	5821.2	XXXX	4675.2	XXXX	2955.9	XXXX		XXXX		XXXX	210.4	XXXX	273.8	XXXX
1	10651.9	60.4	5850.7	29.5	4689.9	14.7	2971.3	15.4								
2	10681.2	30.3	5867.5	16.8	4701.9	12.0	2973.7									
3	10703.2	22.0	5880.9	13.4	4711.6	10.3										
4	10724.7	21.5	5894.6	13.7	4723.3	10.7										
5	10747.3	22.6	5908.5	13.9	4733.3	10.0										
6	10785.8	38.5	5933.6	25.1	4745.7	12.4										
7	10811.8	26.0	5954.4	20.8	4758.0	12.3										
8	10831.2	19.4	5975.0	20.6	4770.6	12.6							210.4		273.8	

SHIFTS	L1 WEIGHTOMETER READINGS	L1 TOTAL	L2 WEIGHTOMETER READINGS	L2 TOTAL	P11 WEIGHTOMETER READINGS	P11 TOTAL	P13 WEIGHTOMETER READINGS	P13 TOTAL	N1 WEIGHTOMETER READINGS	N1 TOTAL	N2 WEIGHTOMETER READINGS	N2 TOTAL	Q12 WEIGHTOMETER READINGS	Q12 TOTAL	Q14 WEIGHTOMETER READINGS	Q14 TOTAL
M	1416.7	XXXX	986.8	XXXX		XXXX	645.1	XXXX		XXXX		XXXX		XXXX	85.8	XXXX
1	5.7		3.4				1.5									
2	34.2	28.5	17.9	14.5			15.1	13.6								
3	71.6	37.4	38.9	21.0			34.0	18.9								
4	111.6	40.0	66.7	27.8			53.2	19.2								
5	129.2	17.6	78.8	12.1			62.8	9.6								
6		0		0				0								
7	138.5	11.3	83.9	5.1			65.4	2.6								
8	169.4	30.9	101.5	17.6			72.4	12.8							85.8	

SHIFT	K1+L1	M1+N1	X-9 WEIGHTOMETER READINGS	X-9 TONS	TONS TO CII INC.
M	XXXX	XXXX	488.1	XXXX	XXXX
1	60.4				60.4
2	58.8				58.8
3	59.4				59.4
4	61.5				61.5
5	40.2				40.2
6	38.5				38.5
7	37.3				37.3
8	50.3				50.3
TOTALS	406.4	0		0	406.4

RUNNING TIME

7	8	9	10	11	12	13	14
60	60	60	60				
60	15	15	60		45	45	45
60			60		60	60	60
60			60		60	60	60
45	15		45		30	30	30
60	60		60				
45	45		30		15	15	15
60	60		30		60	60	60
450	255	75	375	0	270	270	270

I-86

CIH

SHIFT: M (D) A

...BEN ...UTE ...SWITC...ER

DATE: 6/24/85

READINGS COMPLEX II LOWER LEVEL

Time	K-1	Tons	K-2	Tons	P-7&8	Tons	P-9&10	Tons	L-1	Tons	L-2	Tons	P11&12	Tons	P13&14	Tons	X-9	Tons
7:00	10591.5		5821.2		4675.2		2955.9		1416.7		986.8				645.1		488.1	
:15	10611.0	19.5	5831.5	10.3	4680.9	5.7	2960.8	4.9										
:30	10624.7	13.7	5838.1	6.6	4684.0	3.1	2964.2	4.0										
:45	10636.6	11.9	5844.0	5.9	4687.0	3.0	2968.1	3.3										
8:00	10651.9	15.3	5850.7	6.7	4689.9	2.9	2971.3	3.2										
:15	10662.8	10.9	5857.1	6.3	4693.7	3.8	2973.7	2.4	5.7		3.4				1.5			
:30	10668.4	5.8	5860.3	3.2	4696.1	2.4			14.7	9.0	8.6	5.2			5.7	4.2		
:45	10675.2	6.6	5863.7	3.4	4698.8	2.7			24.5	9.8	13.7	5.1			10.5	4.8		
9:00	10681.2	6.0	5867.5	3.8	4701.9	3.1			34.2	9.7	17.9	4.2			15.1	4.7		
:15	10687.1	5.9	5871.0	3.5	4704.3	2.4			45.0	10.8	23.0	5.1			21.1	6.0		
:30	10691.8	4.7	5874.9	3.9	4707.1	2.8			52.5	7.5	27.2	4.2			25.5	4.4		
:45	10697.4	5.4	5877.4	3.4	4709.7	2.6			61.6	9.1	32.3	5.1			29.9	4.4		
10:00	10703.2	6.0	5880.9	3.5	4712.6	2.9			71.6	10	38.9	6.6			34.0	4.1		
:15	10708.7	5.5	5884.4	3.5	4715.3	2.7			81.6	10	45.2	6.3			38.7	4.7		
:30	10714.0	5.3	5887.8	3.4	4717.9	2.6			91.9	10.3	52.6	7.4			43.6	4.9		
:45	10719.2	5.2	5891.1	3.3	4720.6	2.7			101.5	9.6	59.6	7.0			48.2	4.6		
11:00	10724.7	5.7	5894.6	3.5	4723.3	2.7			111.6	10.1	66.7	7.1			53.2	5.0		
:15	10729.5	4.8	5897.9	3.3	4725.9	2.6			121.3	9.7	73.4	6.7			57.7	4.5		
:30	10734.9	5.4	5901.6	3.7	4728.7	2.8			129.2	7.9	78.8	5.4			62.1	4.4		
:45	10740.9	6.0	5904.8	3.2	4730.9	2.2									62.4	.3		
12:00	10747.3	6.4	5908.5	3.7	4733.7	2.4			139.2		78.8				62.8	.4		
:15	10753.8	10.5	5915.0	6.5	4735.7	2.4												
:30	10768.4	10.6	5921.7	6.7	4738.9	3.2												
:45	10777.0	8.6	5927.4	5.7	4741.9	3.0												
1:00	10785.8	8.8	5933.6	6.2	4745.7	3.8												
:15	10794.6	8.8	5940.0	6.4	4750.3	4.6												
:30	10802.7	8.1	5945.7	5.7	4753.7	3.4												
:45	10806.0	3.3	5948.6	2.9	4754.9	1.2			139.3									
2:00	10811.8	5.8	5954.4	5.8	4758.0	3.1			138.5		83.9				65.4			
1.15	10816.3	4.5	5959.2	4.8	4761.2	3.2			145.8	7.3	88.4	4.5			67.8	2.4		
:30	10821.6	5.3	5964.4	5.2	4764.6	3.4			153.6	7.8	92.7	4.3			70.8	3.0		
:45	10827.1	5.7	5970.6	6.2	4766.6	3			161.1	7.5	97.0	4.3			74.1	2.3		
3:00	10832.2	3.9	5975.0	4.4	4770.6	4	2965.3		169.4	7.3	101.5	4.5	104.9		77.4	3.3		

OPERATOR: D. Gutierrez

A.M.S.P.O.: V. Hill

I-87

Form I-11

DETROIT WASTEWATER TREATMENT DIVISION
SOLIDS HANDLING INCINERATION COMPLEX II
OPERATORS 24 HOUR REPORT

REVISED

FORM #
PART ___ OF ___
DATE 6 / 24 / 1985

INCINERATOR # 13

TIME	HIGHEST HEARTH TEMP. HEARTH #	HIGHEST HEARTH TEMP. TEMPERATURE	CENTER SHAFT SPEED	% O_2	SCRUBBER TEMP CONTROL	DRAFT PRESS IN W.C.	I.D. FAN DAMPER	SCRUBBER DIFF IN W.C.	GAS METER READING	OPACITY READING	REMARKS
12 am	6	1303	1.0	10.0	70	-.7	44	76			
1	6	1230	1.0	10.0	70	-.7	44	76			
2	6	1168	1.0	10.0	70	-.5	38	76			
3	6	1467	1.0	8.0	65	-1.0	50	76+			
4	6	1009	1.0	10.0	65	-.9	50	76			
5	6	862	1.0	15.5	75	-.5	46	76			
6	4	817	1.0	17.5	76	-.4	46	76			
7	4	891	1.0	16.0	75	-.4	46	70			
8	6	1045	1.0	16.0	75	-.4	46	80			
9	6	1372	1.0	10.0	60	-1.0	62	80			
10	6	1166	1.0	7.0	55	-1.0	80	80			
11	6	1187	1.0	7.5	60	-1.2	76	80			
12 pm	6	1409	1.0	7.0	60	-.7	80	80			
1	6	1307	1.0	15.0	75	-.7	62	80			
2	6	1182	1.0	15.0	75	-.7	62	80			
3	4	820	1.0	15.0	75	-.5	30	80			
4	6	1428	.9	10.5	70	-.9	60	76			
5	6	1348	.9	10.5	70	-.9	60	76			
6	6	1400	.9	10.0	70	-1.0	60	76			
7	6	1505	.9	9.5	65	-1.0	60	76			
8	6	1424	.9	10.5	70	-.8	62	76			
9	6	1370	.9	8.0	60	-1.2	70	76			
10	6	1318	.9	11.0	70	-1.0	60	76			
11	6	1423	.9	13.0	70	-.9	60	76			
12 am	6	1418	.9	10.0	65	-1.2	67	75			

PROCESS & EQUIPMENT EXCEPTION

SHIFT	OPERATOR	CREW
M	Jackson	1
D	MC/TP	5
A	BUSHOR	2
M		

Wastewater Treatment Division
Solids Handling - Complex II
SPO Shift Report
Incineration

Date 6-24-84 Shift Days

Sr. SPO Les Wood Crew # 5

	S.O.	Inc. S.	
#7.	✓		✓
#8.	✓		✓
#9.	✓	deslag	X
#10.	✓	deslag	X
#11.	X	Cold	X
#12.	/	Belt Calibration	✓
#13.	/	" "	✓
#14.	/	" "	✓

Weightometer	7th Hour Reading	1st Hour Reading	Tons
K-1	10811.8	10651.9	159.9
L-1	138.5	5.7	132.8
M-1	—	—	0
N-1	—	—	0
X-9	—	488.1	0

Main Gas Readings

	7th Hour	1st Hour	Factor	Gas Used
#1.	57350	56179	202.39	236999.0
#2.	54194	53101	202.39	221212.3

Total Gas Used 458211.3 Cu. Ft.

Gas Used/Ton Burned 1563.8 Cu. Ft.

	BFP	LL	UL
% Dry Solids Cake	24.7	28.5	NA
% Volities Cake	[illegible]	[illegible]	NA

Tons Cake Lower Level = 292.7 Tons

Tons Cake Upper Level = 0 Tons

Total Tonnage = 292.7 Tons

Tons to Complex I = 0 Tons

Total Complex II = 292.7 Tons

Incinerator Hours = 23.75 Hours

Wet Tons/Inc. Hour = 12.3 Tons/Ho

Central Shaft Speeds

Inc.	#7.	#8.	#9.	#10.	#11.	#12.	#13	#14.
S.O.S.	60	60	60	60	X	60	60	60
E.O.S	60	60	60	60	X	60	60	60

Comments: S.O.S. 10 FP 3 LVF & CT
@ 745 Lost #1 MP Total of 9 I.S. 1 FP Bt S. 745
@ 815 Put 12 in RDF S. Took 8 + 9 O.O.S for deslag
@ 830 Put #8 Inc. Main gas on by passes Maint. Rotated SFE Screws 3 LVF to hold @ 815
@ 1130 Drive Chain on L belt missing Inc 12-13-14
0.8 B Inc 7-8-9-10 I.S. @ 1145 with 10 F.P. Feed
@ 1145 #8 Deslagged
@ 145 Belt repaired. Started Feeding Inc 7-8-9-10-12-13-14 Called for 3 LVF B.I.S.
Inc 10 O.S. Bypassed & E.O.S. 4 to deslag
Inc 10 O.O.S for deslag
1 LVF I.S. Total of 4

Detroit Wastewater Treatment Division
Solids Handling Complex
Sr. SPO Shift Report
Incineration

Date 6-24-85 Shift AFTERNOONS

Sr. SPO DUSSEAU Crew# II

Inc.	S.O.S.		E.O.S.
#7.	✓		✓
#8.	✓		✓
#9.	/		✓
#10.	X		✓
#11.	X	BRICKWORK	X
#12.	✓		✓
#13.	✓		✓
#14.	✓		✓

Weightometer	7th Hour Reading	1st Hour Reading	Ton
K-1	11105.9	10856.1	249.8
L-1	428.5	202.6	225
M-1	O.O.S.	O.O.S.	Ø
N-1	17.7	17.7	Ø
X-9	488.1	488.1	Ø

Tons Cake Lower Level = 475.7 Tons
Tons Cake Upper Level = Ø Tons
Total Tonnage = 475.7 Tons
Tons to Complex I = Ø Tons
Total Complex II = 475.7 Tons
Incinerator Hours = 38.25 Hour
Wet Tons/Inc. Hour = 12.4 Tons/H

Main Gas Readings

	7th Hour	1st Hour	Factor	Gas Used
#1.	59478	58112	202.39	276464.7
#2.	56188	54913	202.39	258047.3
Total Gas Used	534512.0			Cu.Ft.

Gas Used/Ton Burned 1123.6 Cu.Ft.

	BFP	LL	UL
% Dry Solids Cake	23.2	27.6	OSB.
% Volitiles Cake	60.2	57.1	

Central Shaft Speeds

Inc.	#7.	#8.	#9.	#10.	#11.	#12.	#13.	#14.
S.O.S.	65	60	60	60	X	60	65	65
E.O.S	60	65	65	65	X	60	65	65

Comments: S.O.S. 10 BFP'S 4 LLVF'S I.S. x9 BELT OSB ULVF'S OSB. INC #9 OSB
INC. #10 OOS. FOR DESLAGGING
3:10 LOST ALL BFP'S AIR COMPRESSOR
3:20 10 BFP'S B.I.S.
3:25 1 BFP I.S. TOTAL 11 I.S.
3:30 ALL BFP'S OSB. LOST AIR COMPRESSOR
3:40 #2 AIR COMPRESSOR IS ALL BFP'S B.I.S. TOTAL 11 I.S.
3:45 2 BFP'S I.S. TOTAL 13 I.S.; LOST 1 LLVF TOTAL 3 I.S.
4:00 INC. #9 I.S.
5:30 INC. #10 DESLAGGED; HEATING UP
5:40 1 BFP I.S. TOTAL 13 I.S.
7:45 1 LLVF I.S. TOTAL 4 I.S.; INC. #10 I.S.
8:30 1 LLVF I.S. TOTAL 5 I.S.
9:10 1 BFP O.O.S.
9:40 1 BFP B.I.S. TOTAL 13 I.S. ALL LLVF'S ON HOLD LOST VAC PUMP.
10:45 LLVFS b.I.S.

INCINERATOR OPACITY DEVIATION SUMMARY FOR JUNE 24, 1985
DATE

OBSERVER E. McCLURE LOCATION MB-ROOF

TIME \ INC	1	2	3	4	5	6	7	8	9	10	11	12	13	14
8 00 PM	5	5			5		5	5	5	5		5	5	5
05	5	5			5		5	5	5	5		5	5	5
10	5	5			5		5	5	5	5		5	5	5
15	5	5			5		5	5	5	5		5	5	5
20	5	5			5		5	5	5	5		5	5	5
25	5	5			5		5	5	5	5		5	5	5
30	5	5			5		5	5	5	5		5	5	5
35	5	5			5		5	5	5	5		5	5	5
40	5	5			5		5	5	5	5		5	5	5
45	5	5			5		5	5	5	5		5	5	5
50	5	5			5		5	5	5	5		5	5	5
55	5	5			5		5	5	5	5		5	5	5
9 00 PM														
05														
10														
15														
20														
25														
30														
35														
40														
45														
50														
55														
TOTAL OPAC	60	60			60		60	60	60	60		60	60	60
TOTAL RDS	12	12			12		12	12	12	12		12	12	12

WIND SP & DIR 0-5MPH SUN SOUTH WEATHER HAZY/CLOUDY
Light BLUE

INCINERATOR OPACITY DEVIATION SUMMARY FOR JUNE 24, 1985 (DATE)

OBSERVER E. McCLURE LOCATION MB-RCCF.

TIME \ INC	1	2	3	4	5	6	7	8	9	10	11	12	13	14
4 00 PM	5	5			5		5	10		5		5	5	10
05	5	5			5		5	5		5		5	5	5
10	5	5			5		5	5		5		5	5	5
15	5	5			5		5	5		5		5	5	5
20	5	5			5		5	5		5		5	5	5
25	5	5			5		5	5		5		5	5	5
30	5	5			5		5	5		5		5	5	5
35	5	5			5		5	5		5		5	5	5
40	5	5			5		5	5		5		5	5	5
45	5	5			5		15	5		5		5	5	5
50	5	5			5		15	5		5		5	5	5
55	5	5			5		5	5		5		5	5	5
5 00 PM	5	5			5		5	5	15	5		5	5	5
05	5	5			5		15	5	15	5		5	5	5
10	5	5			5		10	5	15	5		5	5	5
15	5	5			5		10	5	15	5		5	5	5
20	5	5			5		15	5	15	5		5	5	5
25	5	5			5		10	10	15	5		5	5	5
30	5	5			5		5	10	15	5		5	5	5
35	5	5			5		5	5	10	5		5	5	5
40	5	5			5		5	5	10	5		5	5	5
45	5	5			5		5	5	10	5		5	5	5
50	5	5			5		5	5	10	5		5	5	5
55	5	5			5		5	5	10	5		5	5	5
TOTAL OPAC	120	120			120		165	135	155	120		120	120	125
TOTAL RDS	24	24			24		24	24	12	24		24	24	24

WIND SP & DIR 0-5 MPH SUN SOUTH WEATHER CLEAR

BLUE BACKGROUND

4:00 PM - CII INC. #9 IN SERVICE

GZIMMER84

INCINERATOR OPACITY DEVIATION SUMMARY FOR 5-24-85
DATE

OBSERVER Rodeke | LOCATION Stack

TIME \ INC	1	2	3	4	5	6	7	8	9	10	11	12	13	14
12 00 PM	5	5			5		5			5		5	5	5
05	5	5			5		5			5		5	5	5
10	5	5			5		5			5		5	5	5
15	5	5			5		5			5		5	5	5
20	5	5			5		5			5		5	5	5
25	5	5			5		5			5		5	5	5
30	5	5			5		5			5		5	5	5
35	5	5			5		5			5		5	5	5
40	5	5			5		5			5		5	5	5
45	5	5			5		5			5		5	5	5
50	5	5			5		5			5		5	5	5
55	5	5			5		5			5		5	5	5
1 00 PM	5	5			5		5			5		5	5	5
05	5	5			5		5	5		10		5	5	5
10	5	5			5		5	5		5		5	5	5
15	5	5			5		5	5		5		5	5	5
20	5	5			5		5	5		5		5	5	5
25	5	5			5		5	5		5		osb	osb	osb
30	5	5			5		5	5		5				
35	5	5			5		5	5		5				
40	5	5			5		5	5		5				
45	5	5			5		5	5		5				
50	5	5			5		5	5		5				
55	5	5			5		5	5		5				
TOTAL OPAC	120	120			120		120	55		125		85	85	85
TOTAL RDS	24	24			24		24	11		24		17	17	17

WIND SP & DIR SE 0-5 SUN [illegible] WEATHER Clear

12 13 14 osb at 11 45

11:45 PM - CII INC. #8 IN SERVICE

2:00 PM - CII INC. #12, 13, & 14 IN SERVICE.

2:00 PM - CII INC. #10 ON STAND BY

GZIMMER84

INCINERATOR OPACITY DEVIATION SUMMARY FOR 6-24-85
DATE

OBSERVER Rudolph | LOCATION Shack

TIME \ INC	1	2	3	4	5	6	7	8	9	10	11	12	13	14
8 00 AM	5	5			5		5	5	5	5				
05	5	5			5		5	5	5	5				
10	5	5			5		5	5	5	5				
15	5	5			5		5	5	15	5				
20	5	5			20		5	5	10	20				
25	5	5			15		5	10	5	15				
30	5	5			15		5	10	5	15				
35	5	5			15		5	5	15	10				
40	5	5			15		5	5	5	5		5	5	5
45	5	5			15		5	5	5	5		5	5	5
50	5	5			15		5	5	5	5		5	5	5
55	5	5			15		5	5	5	5		5	5	5
9 00	5	5			10		5	5	5	5		5	5	5
05	5	5			10		5	5	5	5		5	5	5
10	5	5			10		5	5	5	5		5	5	5
15		Call off Hatch break												
20	15	5			5		5	5	5	5		5	5	5
25	5	5			5		5	5	5	5		5	5	5
30	5	5			5		5	05	05	5		5	5	5
35	5	5			5		5			5		5	5	5
40	5	5			5		5			5		5	5	5
45	5	5			5		5			5		5	5	5
50	5	5			5		5			5		5	5	5
55	5	5			5		5			5		5	5	5
TOTAL OPAC	125	115			200		115	95	110	155		75	75	75
TOTAL RDS	23	23			23		23	17	17	23		15	15	15

WIND SP & DIR 0-5 SW SUN Right 2 near WEATHER 80% clear
8 & 9 OOS at 810 for deslagging
#5 OOS for deslagging at 8 12 13 14 in at 815
#9 puffin 60% dark 823

GZMMER84

INCINERATOR OPACITY DEVIATION SUMMARY FOR 6-24-85
DATE

OBSERVER Radtke LOCATION Shack

TIME \ INC	1	2	3	4	5	6	7	8	9	10	11	12	13	14
600 AM	5	5			5		5	5	5	5				
05	5	5			5		5	5	5	5				
10	5	5			5		5	5	5	5				
15	5	5			5		5	5	5	5				
20	5	5			5		5	5	5	5				
25	5	5			5		5	5	5	5				
30	5	5			5		5	5	5	5				
35	5	5			5		5	5	20	5				
40	5	5			5		5	5	5	5				
45	5	5			5		5	5	5	5				
50	5	5			5		5	5	5	5				
55	5	5			5		5	5	5	5				
700 Am	5	5			5		5	5	5	5				
05	5	5			5		5	5	5	5				
10	5	5			5		5	5	5	5				
15	5	5			5		5	5	5	5				
20	5	5			5		5	5	5	5				
25	5	5			5		5	5	5	5				
30	5	5			5		5	5	5	5				
35	5	5			5		5	5	5	5				
40	5	5			5		5	5	5	5				
45	5	5			5		5	5	5	5				
50	5	5			5		5	5	5	5				
55	5	5			5		5	5	5	5				
TOTAL OPAC	120	120			120		120	120	135	120				
TOTAL RDS	24	24			24		24	24	24	24				

WIND SP & DIR 0-5 NE SUN Right rear WEATHER 50% cloudy
steam from # 9 at 630

GZIMMER84

INCINERATOR OPACITY DEVIATION SUMMARY FOR 6-24-85

DATE

OBSERVER Radtke

LOCATION Shack

TIME \ INC	1	2	3	4	5	6	7	8	9	10	11	12	13	14
10 00 AM	5	5			5		5			5		5	5	5
05	5	5			5		5			5		5	5	5
10	5	5			5		5			5		5	5	5
15	5	5			5		5			5		5	5	5
20	5	5			5		5			5		5	5	5
25	5	5			5		5			5		5	5	5
30	5	5			5		5			5		5	5	5
35	5	5			5		5			5		5	5	5
40	5	5			5		5			5		5	5	5
45	5	5			5		5			5		5	5	5
50	5	5			5		5			5		5	5	5
55	5	5			5		5			5		5	5	5
11 00 Am	5	5			5		5			5		5	5	5
05	5	5			5		5			5		5	5	5
10	5	5			5		5			5		5	5	5
15	5	5			5		5			5		5	5	5
20	5	5			5		5			5		5	5	5
25	5	5			5		5			5		5	5	5
30	5	5			5		5			5		5	10	15
35	5	5			5		5			5		5	5	5
40	5	5			5		5			5		5	5	5
45	5	5			5		5			5		5	10	10
50	5	5			5		5			5		5	10	10
55	5	5			5		5			5		5	10	10
TOTAL OPAC	120	120			120		120			120		120	140	145
TOTAL RDS	24	24			24		24			24		24	24	24

WIND SP & DIR S.O-5 SUN Pt Cloudy WEATHER Clear blue

GZIMMER84

INCINERATOR OPACITY DEVIATION SUMMARY FOR JUNE 24, 1985 (DATE)

OBSERVER E. McCLURE — LOCATION MB-ROOF

TIME \ INC	1	2	3	4	5	6	7	8	9	10	11	12	13	14
2 00 PM	5	5			5		5	5		5		5	5	5
05	5	5			5		5	5		5		5	5	5
10	5	5			5		5	5		5		5	5	5
15	5	5			5		5	5		5		5	5	5
20	5	5			5		5	5		5		5	5	5
25	5	5			5		5	5		5		5	5	5
30	5	5			5		5	5		5		5	5	5
35	5	5			5		5	5		5		5	5	5
40	5	5			5		5	5		15		5	5	5
45	5	5			5		5	5		15		5	20W	5
50	5	5			5		5	5		15		5	10W	5
55	5	5			5		5	5		10		5	80W	5
3 00 PM	5	5			5		5	5		5		5	15	5
05	5	5			5		5	5		5		5	5	5
10	5	5			5		5	5		5		5	5	5
15	5	5			5		5	5		5		5	5	5
20	5	5			15		10	5		5		5	5	5
25	5	5			5		5	5		5		5	5	5
30	5	5			5		15	15		5		5	5	5
35	5	5			5		15	5		5		5	5	5
40	5	5			5		5	5		5		5	10	5
45	5	5			5		15	15		5		5	5	5
50	5	5			5		10	10		5		5	5	15
55	5	5			5		5	5		5		5	5	5
TOTAL OPAC	120	120			130		160	145		155		120	280	130
TOTAL RDS	24	24			24		24	24		24		24	24	24

WIND SP & DIR 0-5MPH SUN SOUTH WEATHER CLEAR
BLUE BACKGROUND)
2:55PM CII LOST GAS TO INC #13 2:55PM - 3:05PM 80%W

GZIMMER84

INCINERATOR OPACITY DEVIATION SUMMARY FOR JUNE 24, 1985 (DATE)

OBSERVER E. McCLURE — LOCATION MB ROOF

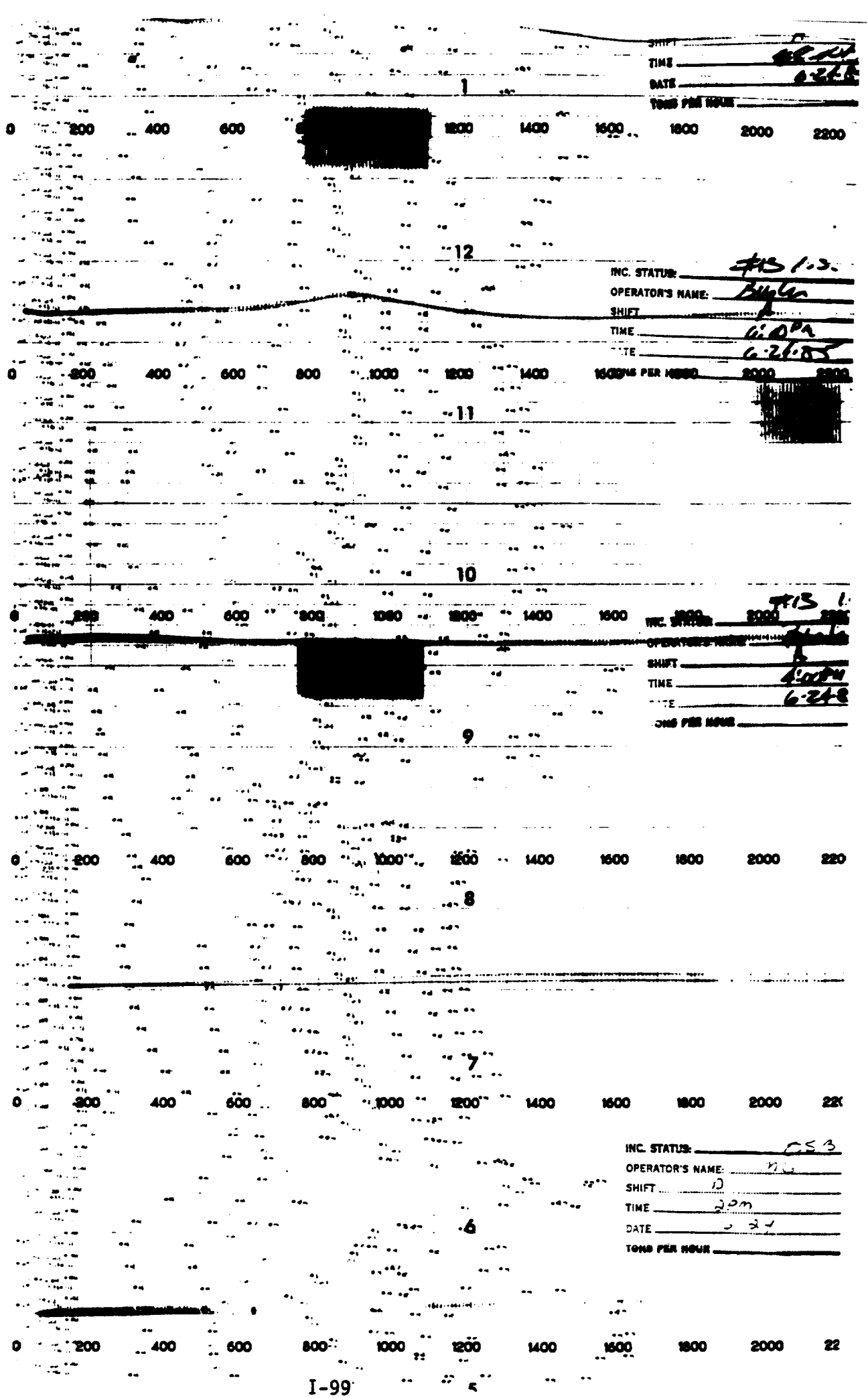
TIME \ INC	1	2	3	4	5	6	7	8	9	10	11	12	13	14
6 00 PM	5	5			5		5	5	5			10	5	5
05	5	5			5		5	5	5			10	5	5
10	5	5			5		5	5	5			5	5	5
15	5	5			5		5	5	5			5	5	5
20	15	5			5		5	5	5			5	5	5
25	15	5			5		5	5	5			5	5	5
30	10	5			5		5	5	5			5	5	5
35	10	5			5		5	5	5			5	5	5
40	15	5			5		5	5	5			5	5	5
45	10	5			5		5	5	5			5	5	5
50	10	5			5		5	5	5			5	5	5
55	10	5			5		5	5	5			5	5	5
7 00 PM	15	5			5		5	5	5			5	5	5
05	15	5			5		5	5	5			5	5	5
10	10	5			5		5	5	5			5	5	5
15	10	5			5		5	5	5			5	5	5
20	10	5			5		5	5	5			5	5	5
25	10	5			5		5	5	5			5	5	5
30	20	5			5		5	5	5			5	5	5
35	10	5			5		5	5	5			5	5	5
40	5	5			5		5	5	5			5	5	5
45	5	5			5		5	5	5			5	5	5
50	5	5			5		5	5	5			5	5	5
55	5	5			5		5	5	5			5	5	5
TOTAL OPAC	235	120			120		120	120	120			130	120	120
TOTAL RDS	24	24			24		24	24	24			24	24	24

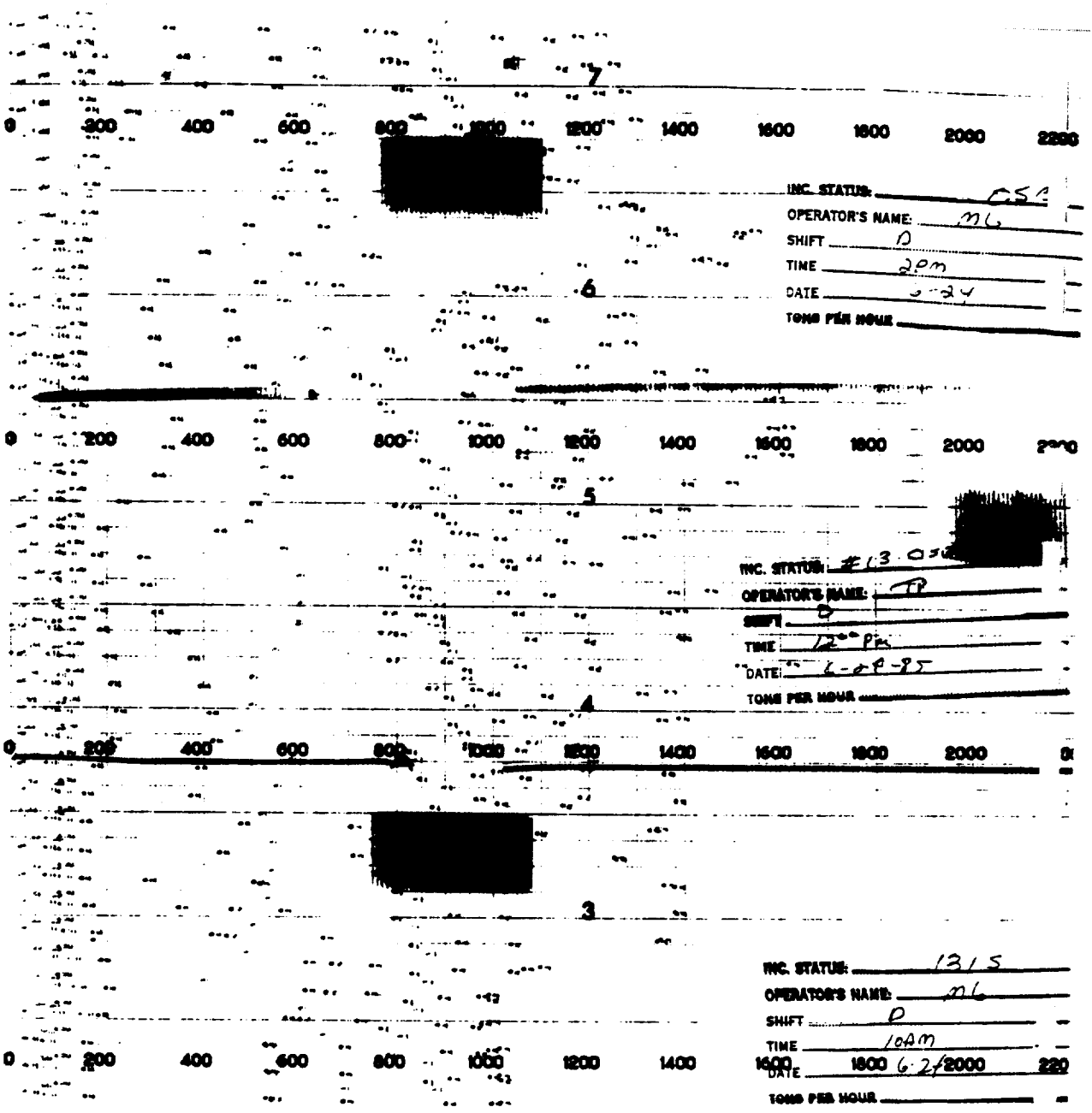
WIND SP & DIR 0-5MPH SUN SOUTH WEATHER CLEAR

BLUE BACKGROUND

7:45 PM CII INC. #10 IN SERVICE.

GZIMMER84


1
0 200 400 600 800 1000 1200 1400 1600 1800 2000 2200
SHIFT
TIME
DATE
TONS PER HOUR
12
0 200 400 600 800 1000 1200 1400 1600 1800 2000 2200
INC. STATUS: #13 I.S.
OPERATOR'S NAME: Butler
SHIFT
TIME 6:00PM
DATE 6-26-85
TONS PER HOUR
11
10
0 200 400 600 800 1000 1200 1400 1600 1800 2000 2200
INC. STATUS: #13 I.S.
SHIFT
TIME 4:00PM
DATE 6-24-85
TONS PER HOUR
9
0 200 400 600 800 1000 1200 1400 1600 1800 2000 220
8
7
0 200 400 600 800 1000 1200 1400 1600 1800 2000 22
INC. STATUS: CS3
OPERATOR'S NAME: Mc
SHIFT D
TIME 2pm
DATE 6-24
TONS PER HOUR
6
0 200 400 600 800 1000 1200 1400 1600 1800 2000 22


7
0 200 400 600 800 1000 1200 1400 1600 1800 2000
INC. STATUS: CSA
OPERATOR'S NAME: ML
SHIFT D
TIME 2pm
DATE 6-24
TONS PER HOUR
6
0 200 400 600 800 1000 1200 1400 1600 1800 2000
5
INC. STATUS: #13.05
OPERATOR'S NAME: TP
SHIFT D
TIME 12 pm
DATE 6-28-95
TONS PER HOUR
4
0 200 400 600 800 1000 1200 1400 1600 1800 2000
3
INC. STATUS: 13/5
OPERATOR'S NAME: ML
SHIFT D
TIME 10AM
DATE 6-27-2000
TONS PER HOUR
0 200 400 600 800 1000 1200 1400 1600 1800 2000

[redacted]

[redacted]

ATTACHMENT 7

SUPPLEMENTARY PROCESS DATA FOR RUN NO. 7

June 25, 1985

#13 Incinerator Scrubber
Water flow Readings

	PreCooler Nozzles	Under Tray Nozzles	PreCooler Weir	Comp. Trays
9:00 AM	76-164 gpm	84-173 gpm	13-200 gpm	9.2-1316 gpm
9:30 AM	76-164 gpm	84-173 gpm	13-200 gpm	9.4-1332 gpm
10:00 AM	76-164 gpm	84-173 gpm	13-200 gpm	9.2-1316 gpm
10:30 AM	76-164 gpm	84-173 gpm	13-200 gpm	9.2-1316 gpm
11:00 AM	76-164 gpm	84-173 gpm	13-200 gpm	9.2-1316 gpm
11:30 AM	76-164 gpm	84-173 gpm	13-200 gpm	9.4-1332 gpm
12:00 Test over	76-164 gpm	82-171 gpm	13 200 gpm	9.4-1332 gpm
TEST START 2:00 pm	76-164 gpm	84-173 gpm	13-200 gpm	9.2-1316 gpm
2:30 pm	76-164 gpm	82-171 gpm	13.5-205 gpm	9.2-1316 gpm
3:00 pm	76-164 gpm	84-173 gpm	13-200 gpm	9.2-1316 gpm
3:30 pm	76-164 gpm	84-173 gpm	13.5-205 gpm	9.2-1316 gpm
4:00 pm	76-164 gpm	82-171 gpm	13-200 gpm	9.0-1300 gpm
4:30 pm	76-164 gpm	82-171 gpm	13-200 gpm	9.0-1300 gpm
5:00 pm	76-164 gpm	82-171 gpm	13-200 gpm	9.0-1300 gpm

Test over 4:50 pm

CIRCLE
SHIFT: M (D) A

FIFTEEN MINUTE WEIGHTOMETER

READINGS COMPLEX II LOWER LEVEL

DATE: 6/25/85

Time	K-1	Tons	K-2	Tons	P-7&8	Tons	P-9&10	Tons	L-1	Tons	L-2	Tons	P11&12	Tons	P13&14	Tons	X-4	Tons
9:00	11522.1		6370.3		4994.3		3155.2		56.7		36.6				15.6		488.1	
:15	11539.8	12.7	6380.0	9.7	4999.5	5.2	3159.1	3.2	67.8	11.1	42.5	5.9			19.6			
:30	11557.6	12.8	6396.8	6.8	5003.4	3.9	3161.9	2.8	78.3	10.5	49.0	6.5			23.0	3.4		
:45	11546.5	13.9	6403.3	6.5	5007.0	3.6	3166.0	4.1	89.7	11.4	58.5	9.5			27.4	4.4		
8:00	11578.0	11.5	6408.6	5.3	5009.7	2.7	3169.3	3.3	99.0	9.3	65.7	7.2			31.0	3.6		
:15	11589.1	11.1	6413.8	5.2	5012.4	2.7	3172.6	3.3	108.3	9.3	72.3	6.6			34.4	3.4		
:30	11601.1	12.0	6419.2	5.4	5015.2	2.8	3175.9	3.3	118.4	10.1	80.6	8.3			38.0	3.6		
:45	11617.4	11.3	6424.8	5.6	5017.8	2.6	3179.6	3.7	128.6	10.2	88.9	8.3			41.0	3.0		
9:00	11623.1	10.7	6429.8	5.0	5020.0	2.2	3182.7	3.1	138.0	9.4	94.6	5.7			44.4	3.4		
:15	11635.4	12.3	6435.4	5.6	5022.5	2.5	3186.2	3.5	148.4	10.4	102.2	7.6			48.5	4.1		
:30	11647.3	11.9	6440.8	5.4	5024.9	2.4	3189.5	3.3	157.9	9.5	108.9	6.7			51.9	3.4		
:45	11658.1	10.8	6445.7	4.9	5027.0	2.1	3192.5	3.0	166.7	8.8	112.8	3.9			54.3	2.4		
10:00	11670.2	12.1	6451.1	5.4	5029.4	2.4	3195.9	3.4	176.2	9.5	118.2	5.4			57.7	3.4		
:15	11682.8	12.2	6456.7	5.6	5032.9	2.5	3199.4	3.5	186.3	10.1	123.3	5.1			60.7	3.0		
:30	11695.6	11.2	6461.7	5.0	5034.4	2.3	3202.6	3.2	194.9	8.6	128.8	5.5			63.8	3.1		
:45	11707.2	13.6	6466.7	5.0	5036.2	1.8	3204.6	2.0	204.7	9.8	136.8	8.0			68.6	4.8		
11:00	11717.0	9.8	6472.0	5.3	5039.1	3.1	3207.8	3.2	213.6	8.9	142.9	6.1			71.0	2.4		
:15	11729.9	12.9	6477.0	5.0	5041.2	2.1	3210.9	3.1	223.6	10.0	150.4	7.5			75.0	4.0		
:30	11740.0	11.7	6481.8	4.8	5043.5	2.3	3213.1	2.2	232.0	8.4	155.8	3.4			77.3	2.8		
:45	11752	12.6	6487.2	4.4	5046.2	2.7	32154	2.3	2414	9.4	161.8	8.0			81.1	3.3		
12:00	11764.3	11.1	6492.0	4.8	5048.6	2.4	3217.7	2.3	250.5	9.1	167.6	5.8			84.7	3.6		
:15	11779.3	15.0	6498.0	6.0	5052.3	3.7	3222.9	5.2	261.1	10.6	179.0	7.4			89.9	4.8		
:30	11792.2	12.9	6503.0	5.0	5054.9	2.6	3227.9	5.0	271.3	10.2	184.6	6.6			93.1	3.6		
:45	11803.2	11.0	6508.7	5.7	5058.4	3.5	3231.2	3.3	280.0	8.7	187.7	6.1			95.6	2.5		
1:00 PM	11815.6	12.6	6515.4	6.7	5062.1	3.7	3234.6	3.4	290.6	10.6	194.3	6.6			98.6	3.0		
:15	11827.4	11.8	6521.6	6.2	5065.4	3.3	32376	3.0	301.4	10.8	201.4	7.1			101.1	2.5		
:30	11837.5	10.1	6527.6	6.0	5068.9	3.5	32404	2.8	3123	10.9	2086	7.2			1050	3.3		
:45	11850.7	13.2	6535.3	7.6	5073.1	4.2	32437	3.3	3231	10.8	215.4	6.8			1077	2.7		
2:00 PM	11861.8	11.1	6542.2	7.0	5076.6	3.5	32467	3.0	3332	10.1	222.8	7.4			1105	2.8		
:15	11862.6	10.8	6548.7	6.5	5080.6	4.0	32495	2.8	3438	10.6	229.4	6.6			1130	2.5		
:30	11872.1	10.1	6555.6	5.9	5084.9	3.8	32520	2.5	3545	10.7	236.2	6.8			1158	2.8		
:45	11883.9	11.2	6562.1	6.3	5088.9	4.5	32545	2.5	3646	10.1	2432	7.0			1183	2.5		
3:00 PM	11911.4	16.6	6568.8	6.8	5093.5	3.5	32555	2.5	3758	11.2	2494	5.2			1208	2.5	488.1	

OPERATOR: D. Peterson

A.H.S.P.O.: K. Hill

I-104

CIRCLE
SHIFT: M (D) A

FIFTEEN MINUTE WEIGHTOMETER
READINGS COMPLEX 11 UPPER LEVEL

DATE : 6/25/85

Time	N-1	Tons	M-2	Tons	O-7&8	Tons	O-9&10	Tons	N-1	Tons	N-2	Tons	O11&12	Tons	O13&14	Tons	X-9	Tons
7 :00	X		X		208.8		274.7		12.7		1312.5		0		86.0		188.1	
:15																		
:30																		
:45																		
8 :00																		
:15																		
:30																		
:45																		
9 :00																		
:15																		
:30																		
:45																		
10 :00																		
:15																		
:30																		
:45																		
11 :00																		
:15																		
:30																		
:45																		
12 :00	X		X										0					
:15																		
:30																		
:45																		
1 :00																		
:15																		
:30																		
:45																		
2 :00																		
:15																		
:30																		
:45																		
3 :00	X		X		208.8		274.7		12.7		1312.5		0		86.0		188.1	

I-105

OPERATOR: D. Gallegos

A.H.S.P.O.: V. Hill CA

Form 1-12

DETROIT WASTEWATER TREATMENT PLANT

INCINERATOR LOADING RATE SHIFT REPORT

DATE: 6/25/85 CREW: Five

SHIFTS M	(D)	A	K1 WEIGHTOMETER READINGS	K1 TOTAL	K2 WEIGHTOMETER READINGS	K2 TOTAL	P7 WEIGHTOMETER READINGS	P7 TOTAL	P9 WEIGHTOMETER READINGS	P9 TOTAL	M1 WEIGHTOMETER READINGS	M1 TOTAL	M2 WEIGHTOMETER READINGS	M2 TOTAL	Q8 WEIGHTOMETER READINGS	Q8 TOTAL	Q10 WEIGHTOMETER READINGS	Q10 TOTAL
11PM	7AM	3PM	11527.1	XXXX	6370.3	XXXX	4994.3	XXXX	3155.9	XXXX		XXXX		XXXX	208.8	XXXX	274.7	XXXX
MID	8	4	11578.0	50.9	6408.6	38.3	5009.7	15.4	3169.3	13.4								
1AM	9	5	11623.1	45.1	6429.8	21.2	5020.0	11.3	3182.7	13.4								
2	10	6	11670.2	47.1	6451.1	21.3	5029.4	9.4	3195.9	13.2								
3	11	7	11717.0	46.8	6472.0	20.9	5039.1	9.7	3207.8	11.9								
4	NOON	8	11764.3	47.3	6492.0	20.0	5048.6	9.5	3217.7	9.9								
5	1PM	9	11815.6	51.3	6515.4	23.4	5062.1	13.5	3234.6	16.9								
6	2	10	11866.8	51.2	6542.2	26.8	5076.6	14.5	3246.7	12.1								
7	3	11	11911.6	44.8	6568.9	26.7	5091.5	14.9	3255.2	8.5								

334.7

SHIFTS M	(D)	A	L1 WEIGHTOMETER READINGS	L1 TOTAL	L2 WEIGHTOMETER READINGS	L2 TOTAL	P11 WEIGHTOMETER READINGS	P11 TOTAL	P13 WEIGHTOMETER READINGS	P13 TOTAL	N1 WEIGHTOMETER READINGS	N1 TOTAL	N2 WEIGHTOMETER READINGS	N2 TOTAL	Q12 WEIGHTOMETER READINGS	Q12 TOTAL	Q14 WEIGHTOMETER READINGS	Q14 TOTAL
11PM	7AM	3PM	56.7	XXXX	36.6	XXXX		XXXX	1540	XXXX	17.7	XXXX	1312.5	XXXX	0	XXXX	86.0	XXXX
MID	8	4	99.0	42.3	65.7	29.1			31.0	15.6								
1AM	9	5	138.0	39.0	94.6	28.9			44.4	13.4								
2	10	6	176.2	38.2	118.2	23.6			57.7	13.3								
3	11	7	213.6	37.4	142.9	24.7			71.0	13.3								
4	NOON	8	250.5	36.9	167.6	24.7			84.7	13.7								
5	1PM	9	290.6	40.1	194.3	26.7			98.6	13.9								
6	2	10	333.2	42.6	222.8	28.5			110.5	11.9								
7	3	11	375.8	42.6	249.4	26.6			120.8	10.3								

276.5

SHIFT M	(D)	A	K1+L1	M1+N1	X-9 WEIGHTOMETER READINGS	X-9 TONS	TONS TO CII INC.
11PM	7AM	3PM	XXXX	XXXX	488.1	XXXX	XXXX
MID	8	4	93.2				93.2
1AM	9	5	84.1				84.1
2	10	6	85.3				85.3
3	11	7	84.2				84.2
4	NOON	8	84.2				84.2
5	1PM	9	91.4				91.4
6	2	10	88.8				88.8
7		11	92.4				92.4

1331
1201
12.19
1203
12.03
13.65
12.69

RUNNING TIME 7	8	9	10	11	12	13	14
60	60	60	60	X	60	60	60
60	60	60	60	X	60	60	60
60	60	60	60	X	60	60	60
60	60	60	60	X	60	60	60
60	60	60	60	X	60	60	60
60	60	60	60	X	60	60	60
60	60	60	60	X	60	60	60
60	60	60	60	X	60	60	60

480 480

Detroit Wastewater Treatment Division
Solids Handling - Complex II
Sr. SPO Shift Report
Incineration

Date 6/25/85 Shift Days

Sr. SPO Arthur J St. Peter Crew# Five

Inc.	S.O.S.		E.O.S.
#7.	✓		✓
#8.	✓		✓
#9.	✓		✓
#10.	✓		✓
#11.	X	Brickwork	X
#12.	✓		✓
#13.	✓		✓
#14.	✓		✓

Weightometer	7th Hour Reading	1st Hour Reading	Tons
K-1	11861.8	11578.0	283.8
L-1	333.2	99.0	234.2
M-1	X	X	0
N-1	17.7	17.7	0
X-9	488.1	488.1	0

Main Gas Readings

	7th Hour	1st Hour	Factor	Gas Used
#1.	62990	61940	202.39	212509.5
#2.	59490	58520	202.39	196318.3
Total Gas Used			408827.8	Cu.Ft.

Gas Used/Ton Burned 789.24 Cu.Ft.

	BFP	LL	UL
% Dry Solids Cake	21.4	26.9	OSB
% Volitiles Cake	57.6	56.7	OSB

Tons Cake Lower Level = 518.0 Tons
Tons Cake Upper Level = 0 Tons
Total Tonnage = 518.0 Tons
Tons to Complex I = 0 Tons
Total Complex II = 518.0 Tons
Incinerator Hours = 42.0 Hours
Wet Tons/Inc. Hour = 12.33 Tons/Hour

Central Shaft Speeds

Inc.	#7.	#8.	#9.	#10.	#11.	#12.	#13.	#14.
S.O.S.	60	60	60	60	X	60	60	60
E.O.S	60	60	60	60	X	60	60	60

Comments: SOS IS 7-10, 12-14 OOS-11 13-FPs, 5-LLVFs, UL-OSB
8:30 A. Lost 1-BFP(12) Rotated strainers
10:35 1-BFP OOS (11)
11:00 1-BFP IS (12)
12:30 1-BFP IS (13) called back 1-FP OOS (12)
1:20 1-BFP IS (13) #13 Scrubber Damper closed down in Auto mode can only be operated in MANUAL (Found out EPA was using the Auto mode to Run their tes next time please advise operation personnel of such a change)

Arthur J St Peter
[illegible]

Detroit Wastewater Treatment Division
Solids Handling - Complex II
Sr. SPO Shift Report
Incineration

Inc.	S.O.S.		E.O.S.
#7.	✓		✓
#8.	✓		✓
#9.	✓		✓
#10.	✓		✓
#11.	X	BRICKWORK	X
#12.	✓		✓
#13.	✓		✓
#14.	✓		✓

Date 6-25-85 Shift AFTERNOONS

Sr. SPO DUSSEAU Crew# II

Weightometer	7th Hour Reading	1st Hour Reading	Ton
K-1	12236.2	11959.8	276.4
L-1	647.9	421.2	226.7
M-1	O.O.S.	O.O.S.	Ø
N-1	17.7	17.7	Ø
X-9	488.1	488.1	Ø

Tons Cake Lower Level = 503.1 Tons
Tons Cake Upper Level = Ø Tons
Total Tonnage = 503.1 Tons
Tons to Complex I = Ø Tons
Total Complex II = 503.1 Tons
Incinerator Hours = 40.1 Hour
Wet Tons/Inc. Hour = 12.5 Tons/H

Main Gas Readings

	7th Hour	1st Hour	Factor	Gas Used
#1.	64727	63344	202.39	290024.8
#2.	61164	59816	202.39	272821.7
Total Gas Used				562846.5 Cu.Ft.

Gas Used/Ton Burned 1118.7 Cu.Ft.

	BFP	LL	UL
% Dry Solids Cake	20.4	23.7	O.S.B.
% Volitiles Cake	61.2	58.6	

Central Shaft Speeds

Inc.	#7.	#8.	#9.	#10.	#11.	#12.	#13.	#14.
S.O.S.	60	60	60	60	X	60	60	60
E.O.S	65	60	65	65	X	60	65	60

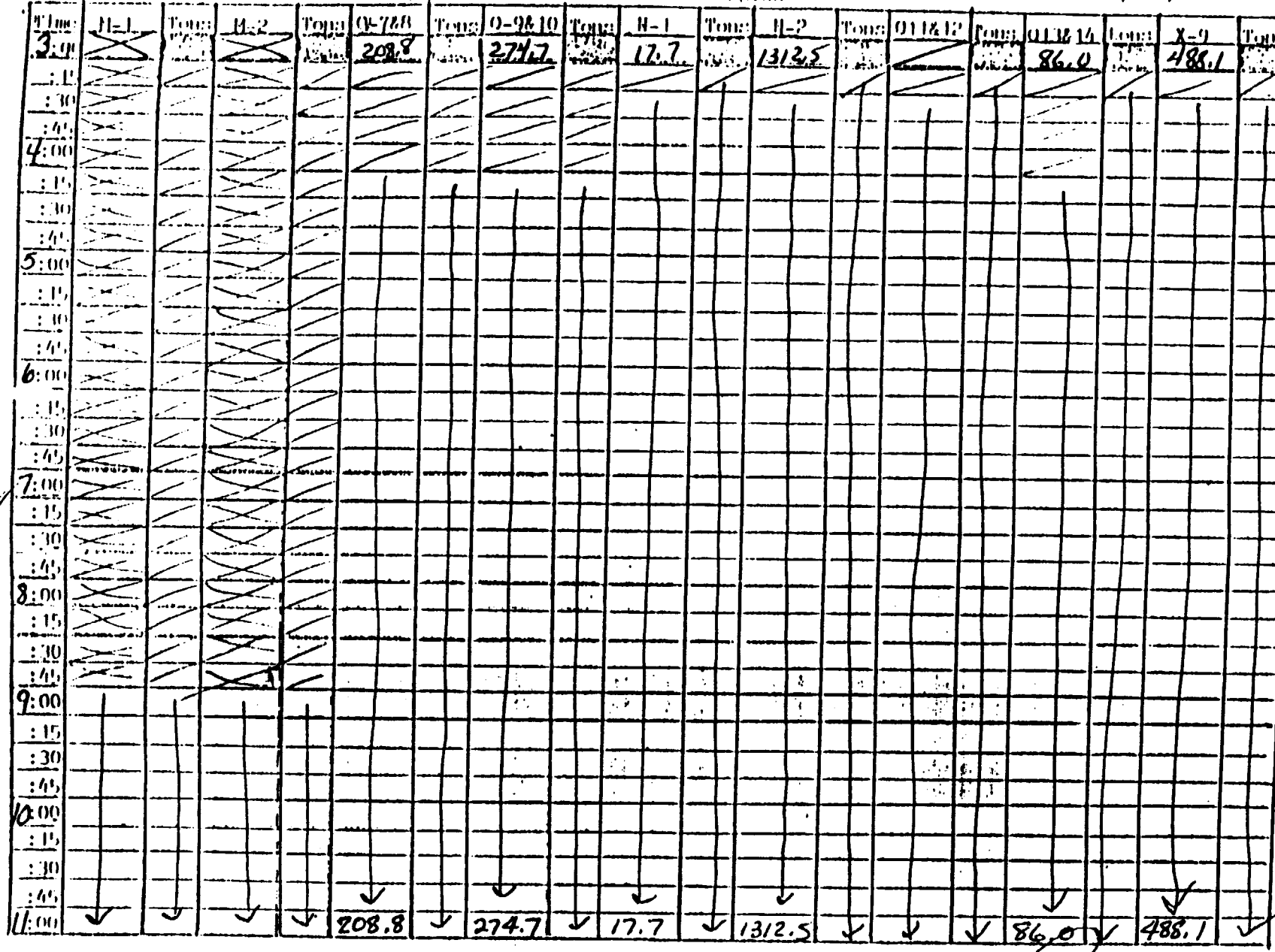
Comments: S.O.S. 14 BFP'S SLUFF'S I.S. TO C II x 9 BELT O.S.B.; MIXING FD O.S.B.
4:00 1 BFP OOS. TOTAL 13 I.S.
4:30 M.O. WRITTEN INC#13 I.D. FAN BEARINGS REPLACE #8503018 2C
M.O WRITTEN INC#9 I.D. FAN BELTS-REPLACE #8503019 2C
4:30 INC#7 OOS DESLAGGING
4:50 INC#7 B.I.S. TONNAGE PICKING UP
5:25 1 BFP OOS. TOTAL 12 I.S.
5:30 INC#7 OOS. TO DESLAG
6:30 1 BFP I.S. TOTAL 13 I.S.
6:50 INC#7 DESLAGGED
7:00 INC#7 B.I.S.
9:00 L BELT TRIPPED BY ACCIDENT; RESTARTED.
9:45 1 BFP OOS. TOTAL 12 I.S.

SHIFT: H D (A)

FIFT MIN WET MET
READINGS COMPLEX IT UPPER LEVEL

D[illegible]: 5/5

Time	M-1	Tons	M-2	Tons	Q-7&8	Tons	Q-9&10	Tons	N-1	Tons	N-2	Tons	Q11&12	Tons	Q13&14	Tons	X-9	Tons
3:00					208.8		274.7		17.7		1312.5				86.0		488.1	
:15																		
:30																		
:45																		
4:00																		
:15																		
:30																		
:45																		
5:00																		
:15																		
:30																		
:45																		
6:00																		
:15																		
:30																		
:45																		
7:00																		
:15																		
:30																		
:45																		
8:00																		
:15																		
:30																		
:45																		
9:00																		
:15																		
:30																		
:45																		
10:00																		
:15																		
:30																		
:45																		
11:00					208.8		274.7		17.7		1312.5				86.0		488.1	



OPERATOR: Rick McCall

A.H.S.P.O.: Craft

Form I-12

CIRCLE
SHIFT: M D (A)

FIFTEEN MINUTE WEIGHTOMETER

READINGS COMPLEX II LOWER LEVEL

DATE: 6/25/85

Time	K-1	Tons	K-2	Tons	P-7&8	Tons	P-9&10	Tons	L-1	Tons	L-2	Tons	P11&12	Tons	P13&14	Tons	X-1	Tons
3:00	11916	[redacted]	65 68.9	[redacted]	5091.8	[redacted]	32552	[redacted]	375.8	[redacted]	249.4	[redacted]	140.12	[redacted]	120.8	[redacted]	488.1	[redacted]
:15	11923.7	12.1	6575.5	6.6	5093.9	2.1	3256.8	1.6	387.2	11.4	256.7	7.3			125.9	5.1		
:30	11935.7	12.0	6582.2	6.7	5096.1	2.2	3258.5	1.7	398.5	11.3	264.0	7.3			131.1	5.2		
:45	11947.7	12.0	6588.8	6.6	5100.1	4.0	3261.3	2.8	409.9	11.4	271.2	7.2			135.0	3.9		
4:00	11959.8	12.1	6595.4	6.6	5104.3	4.2	3264.0	2.7	421.2	11.3	278.5	7.3			138.8	3.8		
:15	11971.6	11.8	6601.4	6.0	5107.5	3.2	3266.9	2.9	430.1	8.9	284.5	6.0			141.5	2.7		
:30	11983.3	11.7	6607.3	5.9	5110.7	3.2	3269.8	2.9	439.1	9.0	290.4	5.9			144.3	2.8		
:45	11995.1	11.8	6613.2	5.9	5113.8	3.1	3272.6	2.8	347.9	8.8	296.5	6.1			147.0	2.7		
5:00	12006.9	11.8	6619.2	6.0	5117.0	3.2	3275.7	3.1	456.9	9.0	302.5	6.0			149.7	2.7		
:15	12018.1	11.2	6624.5	5.3	5119.1	2.1	3278.7	3.0	465.6	8.7	308.8	6.3			152.5	2.8		
:30	12029.4	11.3	6629.9	5.4	5121.3	2.2	3281.9	3.2	474.2	8.6	315.0	6.2			155.4	2.9		
:45	12040.9	11.5	6635.1	5.2	5123.4	2.1	3285.0	3.1	482.7	8.5	321.2	6.2			158.3	2.9		
6:00	12052.5	11.6	6640.4	5.3	5125.4	2.0	3288.0	3.0	491.3	8.6	327.3	6.1			161.0	2.7		
:15	12063.6	11.1	6645.8	5.4	5127.6	2.2	3291.1	3.1	500.1	8.8	333.8	6.5			164.0	3.0		
:30	12074.6	10.8	6650.2	4.4			3295.1	4.0	510.4	10.3	340.4	6.6			166.9	2.9		
:45	12085.3	10.7	6654.7	4.5			3299.2	4.1	520.6	10.2	344.9	6.5			169.7	2.8		
7:00	12095.9	10.6	6659.1	4.4			3303.2	4.0	530.8	10.2	353.6	6.7			172.6	2.9		
:15	12107.3	11.4	6664.7	5.6	5131.6	4.0	3306.9	3.7	541.6	10.8	359.9	6.3			175.5	2.9		
:30	12118.6	11.3	6670.4	5.7	5135.6	4.0	3310.5	3.6	552.7	11.1	366.1	6.2			178.5	3.0		
:45	12129.8	11.2	6676.0	5.6	5139.7	4.1	3314.1	3.6	563.7	11.0	372.3	6.2			181.3	2.8		
8:00	12141.4	11.6	6681.6	5.0	5143.8	4.1	3317.8	3.7	574.8	11.1	378.5	6.2			184.2	2.9		
:15	12152.7	11.3	6687.6	6.0	5146.8	3.0	3319.8	2.0	584.1	9.3	384.2	5.7			187.0	2.8		
:30	12163.9	11.2	6693.5	5.9	5149.9	3.1	3321.7	1.9	593.5	9.4	390.0	5.8			189.9	2.9		
:45	12175.2	11.3	6699.5	6.0	5152.9	3.0	3323.7	2.0	602.7	9.2	395.6	5.6			192.7	2.8		
9:00	12186.5	11.3	6705.3	5.8	5155.9	3.0	3325.8	2.1	612.0	9.3	401.2	5.6			195.5	2.8		
:15	12199.0	12.5	6711.9	6.6	5159.0	3.1	3327.8	2.0	620.9	8.9	406.6	5.4			197.9	2.4		
:30	12211.6	12.6	6718.4	6.5	5162.0	3.0	3329.9	2.1	629.9	9.0	411.9	5.3			200.4	2.5		
:45	12224.1	12.5	6725.0	6.6	5165.2	3.2	3332.1	2.2	638.8	8.9	417.3	5.4			203.0	2.6		
10:00	12236.2	12.1	6731.6	6.6	5168.3	3.1	3334.2	2.1	647.9	9.1	422.6	5.3			205.2	2.2		
:15	12249.9	13.7	6738.5	6.9	5172.0	3.7	3338.7	4.5	658.0	10.1	428.1	5.5			207.9	2.7		
:30	12263.8	13.9	6745.6	7.1	5175.6	3.6	3342.8	4.1	668.3	10.3	433.8	5.7			210.4	2.5		
:45	12275.1	11.4	6751.1	5.5	5178.4	2.8	3346.4	3.6	676.7	8.4	438.7	4.9			212.9	2.5		
11:00	12286.7	11.5	6756.6	5.5	5180.8	1.6	3350.0	3.6	684.8	8.1	443.0	4.3	136.7		215.1	2.2	488.1	

OPERATOR: Rick McCall

A.M.S.P.O.: [signature]

DETROIT WASTEWATER TREATMENT PLANT

INCINERATOR LOADING RATE SHIFT REPORT

DATE: 6/25/85 CREW: II

SHIFTS M	D	(A)	K1 WEIGHTOMETER READINGS	K1 TOTAL	K2 WEIGHTOMETER READINGS	K2 TOTAL	P7 WEIGHTOMETER READINGS	P7 TOTAL	P9 WEIGHTOMETER READINGS	P9 TOTAL	M1 WEIGHTOMETER READINGS	M1 TOTAL	M2 WEIGHTOMETER READINGS	M2 TOTAL	Q8 WEIGHTOMETER READINGS	Q8 TOTAL	Q10 WEIGHTOMETER READINGS	Q10 TOTAL
11PM	7AM	3PM	11911.6	XXXX	6568.9	XXXX	5091.8	XXXX	3252	XXXX								
MID	8	4	11959.8	48.2	6595.4	26.5	5104.3	12.5	3264.0	8.8		XXXX		XXXX	208.8	XXXX	274.7	XXXX
1AM	9	5	12006.9	47.1	6619.2	23.8	5117.0	12.7	3275.7	11.7								
2	10	6	12052.5	45.6	6640.4	21.2	5125.4	8.4	3288.0	12.3								
3	11	7	12095.9	43.4	6659.1	18.7	5127.6	2.2	3291.1	3.1								
4	NOON	8	12141.4	45.5	6681.6	22.5	5143.6	16.0	3317.8	26.7								
5	1PM	9	12186.5	45.1	6705.3	23.7	5155.9	12.3	3325.8	8.0								
6	2	10	12236.2	49.7	6731.6	26.3	5168.3	12.4	3334.2	8.4								
7	3	11	12286.7	50.5	6756.6	25.0	5180.8	12.5	3350.0	15.8								

SHIFTS M	D	(A)	L1 WEIGHTOMETER READINGS	L1 TOTAL	L2 WEIGHTOMETER READINGS	L2 TOTAL	P11 WEIGHTOMETER READINGS	P11 TOTAL	P13 WEIGHTOMETER READINGS	P13 TOTAL	N1 WEIGHTOMETER READINGS	N1 TOTAL	N2 WEIGHTOMETER READINGS	N2 TOTAL	Q12 WEIGHTOMETER READINGS	Q12 TOTAL	Q14 WEIGHTOMETER READINGS	Q14 TOTAL
11PM	7AM	3PM	375.8	XXXX	249.4	XXXX		XXXX	120.8	XXXX	17.7	XXXX	1312.5	XXXX		XXXX	86.0	XXXX
MID	8	4	421.2	45.4	278.5	29.1			138.8	18.0								
1AM	9	5	456.9	35.7	302.5	24.0			149.7	10.9								
2	10	6	491.3	34.4	327.3	24.8			164.0	14.3								
3	11	7	530.8	39.5	353.6	26.3			172.6	8.6								
4	NOON	8	574.8	44.0	378.5	24.9			184.2	11.6								
5	1PM	9	612.0	37.2	401.2	22.7			195.5	11.3								
6	2	10	647.9	35.9	422.6	21.4			205.2	9.7								
7	3	11	684.8	36.9	443.0	20.4			215.1	9.9								

2,068,425.8

SHIFT M	D	(A)	K1+L1	M1+N1	X-9 WEIGHTOMETER READINGS	X-9 TONS	TONS TO CII INC.	RUNNING TIME 7	8	9	10	11	12	13	14
11PM	7AM	3PM	XXXX	XXXX	488.1	XXXX	XXXX	X	X	X	X	X	X	X	X
13.3 MID	8	4	93.6				93.6	60	60	60	60	X	60	60	60
12.5 1AM	9	5	82.8				82.8	40	60	60	60	X	60	60	60
13.3 2	10	6	80.0				80.0	30	60	60	60	X	60	60	60
13.8 3	11	7	82.9				82.9	X	60	60	60	X	60	60	60
12.7 4	NOON	8	89.5				89.5	60	60	60	60	X	60	60	60
11.7 5	1PM	9	82.3				82.3	60	60	60	60	X	60	60	60
12.2 6	2	10	85.6				85.6	60	60	60	60	X	60	60	60
7	3	11	87.4				87.4	60	60	60	60	X	60	60	60
							[illegible]	420	480	480	480	0	480	480	480

1111

USPO

DETROIT WASTEWATER TREATMENT DIVISION
SOLIDS HANDLING INCINERATION COMPLEX II
OPERATORS 24 HOUR REPORT

REVISED

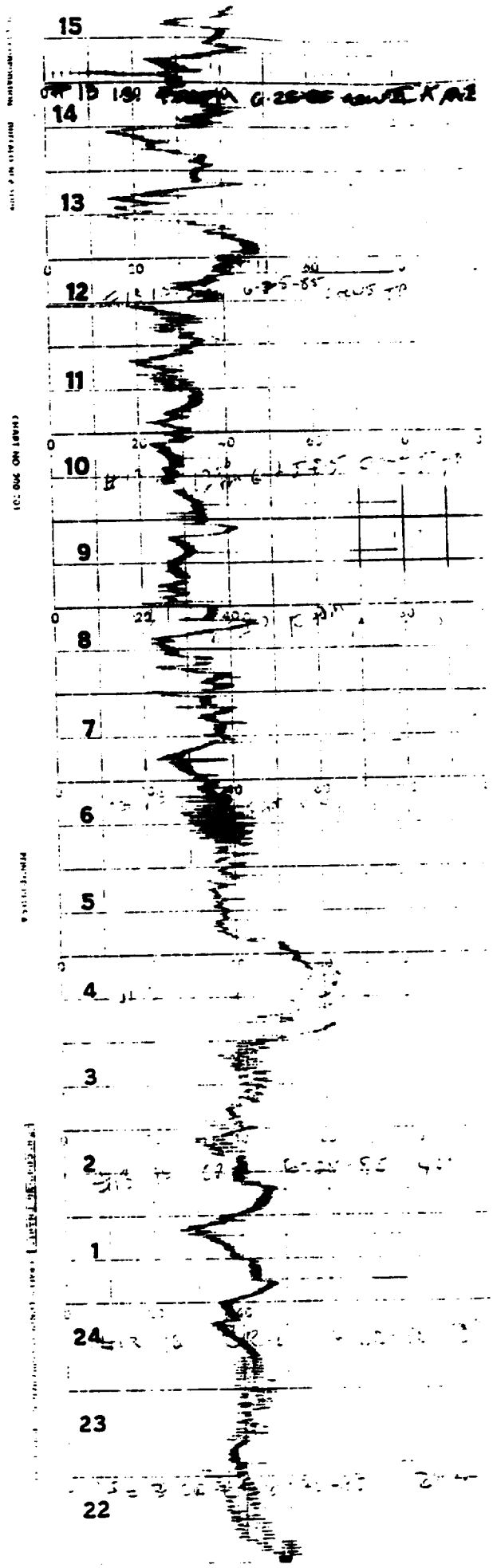
FORM # [redacted]
PART ___ OF ___
DATE 6 / 25 / 1985

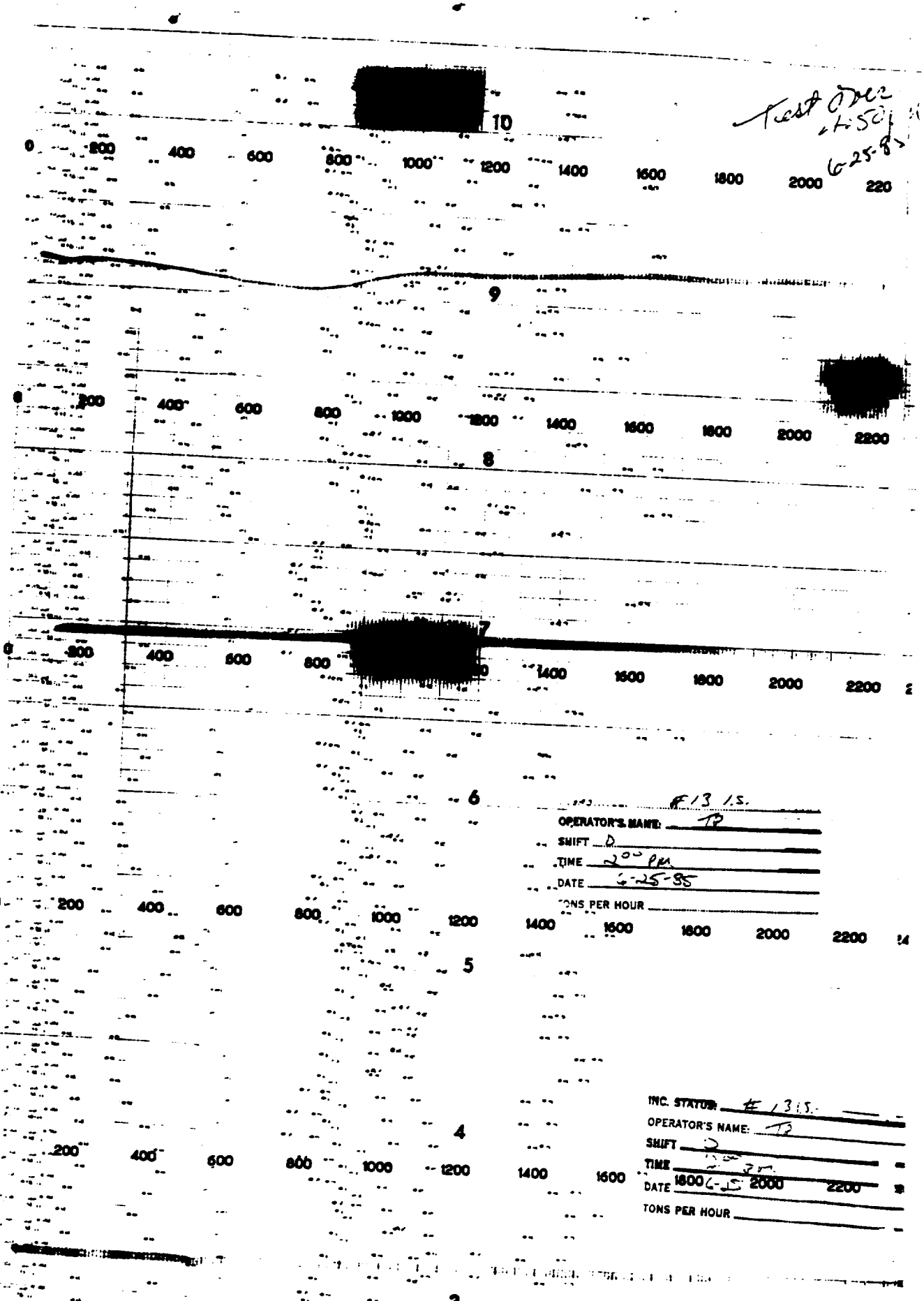
INCINERATOR # 13

TIME	HIGHEST HEARTH TEMP. HEARTH #	HIGHEST HEARTH TEMP. TEMPERATURE	CENTER SHAFT SPEED	% O_2	SCRUBBER TEMP CONTROL	DRAFT PRESS IN W.C.	I.D. FAN DAMPER	SCRUBBER DIFF IN W.C.	GAS METER READING	OPACITY READING	REMARKS
12 am	6	1418	.9	10	65	-1.2	67	75+			
1	6	1416	1.0	10.0	60	-1.0	55	76			
2	6	1436	1.0	10.0	65	-1.1	52	76			
3	6	1416	1.0	9.5	65	-1.1	64	76			
4	6	1416	1.0	10.0	65	-1.1	64	76			
5	4	1047	1.0	15.0	70	-.4	40	70			
6	4	1056	1.0	15.0	70	-.4	40	70			
7	6	1406	1.0	10.0	55	-.9	58	76			
8	6	1513	1.0	8.0	55	-.8	62	80			
9	6	1426	1.0	8.0	55	-.7	76	80			
10	6	1493	1.0	8.0	55	-1.1	60	80			
11	6	1407	1.0	8.5	60	-.9	78	80			
12 pm	6	1456	1.0	7.0	60	-1.3	78	76+			
1	6	1415	1.0	8.0	60	-1.4	78	80			
2	6	1466	1.0	11.5	60	-1.6	72	80			
3	6	1628	1.0	9.0	70	-.9	60	80			
4	6	1690	.9	9.0	65	-1.3	80	76			
5	6	1497	.9	9.5	65	-1.4	60	76			
6	6	1440	.9	9.5	65	-1.2	60	76			
7	6	1447	.9	10.0	65	-1.2	60	76			
8	6	1420	.9	9.0	65	-1.2	60	76			
9	6	1396	.9	8.0	70	-1.0	60	76			
10	6	1456	.9	9.0	65	-1.0	60	76			
11	6	1432	.8	8.5	70	-1.2	70	76			
12 am	6	1540	1.0	9.0	60	-1.3	78	76+			

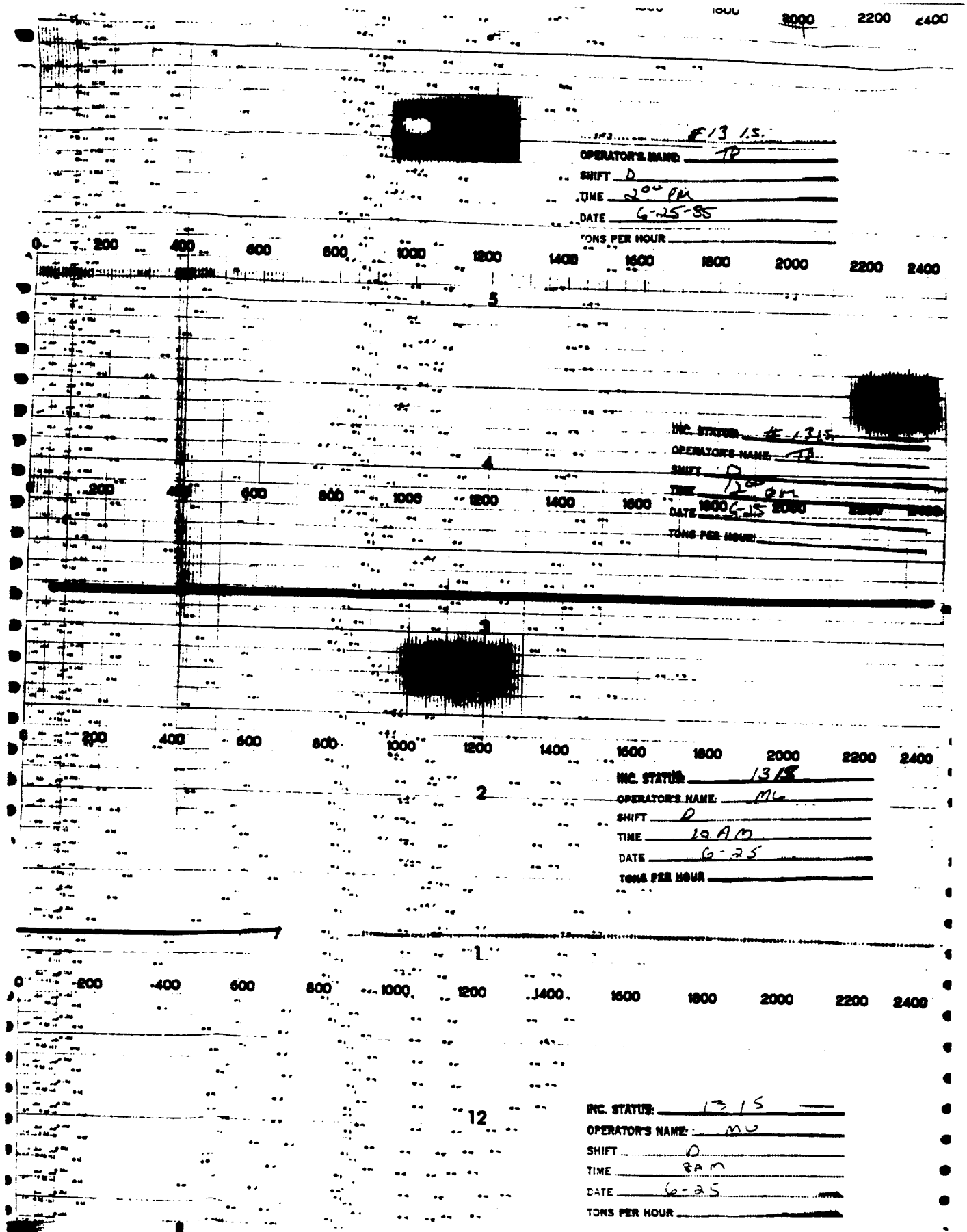
PROCESS & EQUIPMENT EXCEPTION

SHIFT	OPERATOR	CREW
M	JACKSON / LANE	1
D	[illegible]	5
A	BUSHOR	2
M		


15
14
13
12
11
10
9
8
7
6
5
4
3
2
1
24
23
22



Test Over
6-25-85
10
9
8
7
6
5
4
3
0
200
400
600
800
1000
1200
1400
1600
1800
2000
2200
#13 I.S.
OPERATOR'S NAME: TB
SHIFT D
TIME 2:00 PM
DATE 6-25-85
TONS PER HOUR
INC. STATUS: #13 I.S.
OPERATOR'S NAME: TB
SHIFT D
TIME
DATE 6-25
TONS PER HOUR


INC. STATUS: E/3 1.5.
OPERATOR'S NAME: TP
SHIFT: D
TIME: 2:00 PM
DATE: 6-25-95
TONS PER HOUR:
0 200 400 600 800 1000 1200 1400 1600 1800 2000 2200 2400
5
INC. STATUS: E 1.3 5
OPERATOR'S NAME: TP
SHIFT: D
TIME: 12 PM
DATE: 6-25
TONS PER HOUR:
4
3
INC. STATUS: 13/5
OPERATOR'S NAME: MC
SHIFT: D
TIME: 10 AM
DATE: 6-25
TONS PER HOUR:
2
1
INC. STATUS: 13 1 5
OPERATOR'S NAME: MC
SHIFT: D
TIME: 8 AM
DATE: 6-25
TONS PER HOUR:
12

ATTACHMENT 8

SUPPLEMENTARY PROCESS DATA FOR RUN NO. 8

June 26, 1985

[redacted] #3 Incinerator Scrubber

Water Flow Readings

Time	Pre Cooler Nozzles	Under Tray Nozzles	Pre Cooler Weir	Impingement Trays
8:30AM	76-164 gpm	78-167 gpm	13-200 gpm	8.6-1256 gpm
9:00AM	76-164 gpm	80-170 gpm	13-200 gpm	9.8-1364 gpm
9:30AM	76-164 gpm	80-170 gpm	13-200 gpm	9.8-1364 gpm
10:00AM	76-164 gpm	80-170 gpm	13-200 gpm	9.6-1348 gpm
10:30	76-164 gpm	86-175 gpm	15-215 gpm	9.8-1364 gpm
11:00	76-164 gpm	86-175 gpm	15-215 gpm	10.0-1376 gpm
11:30	76-164 gpm	86-175 gpm	14.5-212 gpm	10.0-1379 gpm
12:00	76-164 gpm	86-175 gpm	13-200 gpm	9.8-1364 gpm
12:30pm	76-164 gpm	86-175 gpm	13-200 gpm	9.4-1332 gpm
1:00pm	76-164 gpm	86-175 gpm	13-200 gpm	9.4-1332 gpm
1:30pm	76-164 gpm	86-175 gpm	13-200 gpm	9.6 1348 gpm
2:00pm	76-164 gpm	86-175 gpm	13-200 gpm	9.4-1332 gpm
2:30pm	76-164 gpm	86-175 gpm	13-200 gpm	9.2-1316 gpm
3:00pm	76-164 gpm	86-175 gpm	13-200 gpm	9.2-1316 gpm
3:30pm	76-164 gpm	86-175 gpm	13-200 gpm	9.6-1348 gpm
4:00pm	76-164 gpm	86-175 gpm	13-200 gpm	9.4-1332 gpm

Solids Handling - Complex II
SPO Shift Report
Incineration

Date 6-26-85 Shift DAY

Sr. SPO W. Hutcherson Crew# III

Inc.	S.O.S.		E.O.S.
#7.	✓		✓
#8.	/	L.O.f →	/
#9.	✓		✓
#10.	✓	L.O.f →	/
#11.	X		X
#12.	✓		✓
#13.	✓		✓
#14.	✓		✓

Weightometer	7th Hour Reading	1st Hour Reading	Ton
K-1	12888.8	12708.3	180.5
L-1	1141.9	922.5	219.4
M-1	Ø	Ø	Ø
N-1	Ø	Ø	Ø
X-9	Ø	Ø	Ø

Main Gas Readings

	7th Hour	1st Hour	Factor	Gas Used
#1.	68810	67083	202.39	34952753
#2.	64959	63325	202.39	33070526
Total Gas Used 1080232.79 Cu.Ft.				

Gas Used/Ton Burned 9704.0 [redacted] Cu.Ft.

	BFP	LL	UL
% Dry Solids Cake	21.9	20.8	25.9
% Volitiles Cake	60.6	57.1	58.0

Tons Cake Lower Level = 399.9 Tons
Tons Cake Upper Level = Ø Tons
Total Tonnage = 399.9 Tons
Tons to Complex I = Ø Tons
Total Complex II = 399.9 Tons
Incinerator Hours = 32.0 Hours
Wet Tons/Inc. Hour = 12.49 Tons H

Central Shaft Speeds

Inc.	#7.	#8.	#9.	#10.	#11.	#12.	#13.	#14.
S.O.S.	60	60	54	60	~~64~~	60	64	60
E.O.S	60	60	55	60	~~64~~	60	60	60

Comments: S.O.S. 5-LLVF [redacted] B.P. I.S. No Feed To Complex One, #8 INC S.O.S. hearth #4 slagge [redacted] INC OSB. AT 8 30 Am. lost 2-B.P. AT 9 35 Am TOTAL (10) I.S. [redacted] INC OSB AT 10 00 Am L.O.f (1)-B.P. OOS AT 10 00 Am TOTAL (9) I.S. [redacted] ADDED 1-B.P. TOTAL (10) I.S. 10 30 Am - MA[illegible] ROUNDS CHECK [redacted] ALL OK 11 05 Am - ADDED 1BP TOTAL (11) I.S. 11 20 Am [redacted] TOTAL (11) I.S. 11 30 Am - ADDED 1-B.P TO[illegible] (12) I.S. 12 15 Pm [redacted] B.P. TOTAL (11) I.S. 12 45 Pm - LOST (2) B.P. TOT[illegible] (9) I.S. 1 10 Pm - 1-B.P. BACK I.S. TOTAL (10).
E.O.S. 5-LLVF 10-B.P. I.S.

 (Hutcherson) / C.B.

DETROIT WASTEWATER TREATMENT DIVISION

SOLIDS HANDLING INCINERATION COMPLEX II

OPERATORS 24 HOUR REPORT

REVISED

FORM

PART ___ OF ___

DATE 6 / 26 / 1985

INCINERATOR # 13

TIME	HIGHEST HEARTH TEMP. HEARTH #	HIGHEST HEARTH TEMP. TEMPERATURE	CENTER SHAFT SPEED	% O_2	SCRUBBER TEMP CONTROL	DRAFT PRESS IN W.C.	ID FAN DAMPER	SCRUBBER DIFF IN W.C.	GAS METER READING	OPACITY READING	REMARKS
12 pm	6	1540	1.0	9.0	60	1-3	78	105			
1	6	1485	1.0	9.5	[illegible]	-1.1	78	—			
2	6	1493	1.0	9.0	[illegible]	[illegible]	[illegible]	—			
3	6	1526	1.0	9.0	60	[illegible]	[illegible]	—			
4	6	1344	1.0	10.5	54	-1.0	54	—			
5	6	1250	1.0	15.0	75	-.4	40	—			
6	6	1274	1.0	11.0	70	-.4	40	—			
7	6	1405	1.0	10.0	60	-1.1	60	—			
8	6	1496	1.0	10.0	60	-1.1	60				
9	6	1428	1.0	10.0	60	-1.2	60	—			
10	6	1348	1.0	9.5	60	-1.2	70	—			
11	6	1380	1.0	10.0	60	-1.2	70	—			
12 pm	6	1282	1.0	9.5	60	-1.1	50	—			
1	6	1404	1	8	65	-1.1	55	70			
2	6	1478	1.0	8.5	65	-1.1	56	—			
3	6	1448	1.0	8.0	65	1-1	56	0			
4	6	1446	1.0	9.0	70	-1.1	60	0			
5	6	1302	1.0	9.0	70	-1.3	68	0			
6	6	1154	1.0	9.0	70	-1.3	60				
7	6	1185	1.0	7.0	70	-1.1	52	0			
8	6	1025	1.0	12.0	70	-1.0	52	0			
9	6	827	1.0	18.0	70	-.4	35	0			
10	6	1010	1.0	13.0	80	-.4	35	0			
11	6	952	1.0	14.0	70	-.4	35	0			
12 am	6	927	1.0	15.0	15	-.4	35	0			

PROCESS & EQUIPMENT EXCEPTION

SHIFT	OPERATOR	CREW
M	Hill / McCollins	1
D	Jones / [illegible]	3
A	LW / RF	4
M		

DETROIT WASTEWATER TREATMENT PLANT

INCINERATOR LOADING RATE SHIFT REPORT

DATE: 6-26-85 CREW: 3

SHIFTS M	D	A	K1 WEIGHTOMETER READINGS	K1 TOTAL	K2 WEIGHTOMETER READINGS	K2 TOTAL	P7 WEIGHTOMETER READINGS	P7 TOTAL	P9 WEIGHTOMETER READINGS	P9 TOTAL	M1 WEIGHTOMETER READINGS	M1 TOTAL	M2 WEIGHTOMETER READINGS	M2 TOTAL	Q8 WEIGHTOMETER READINGS	Q8 TOTAL	Q10 WEIGHTOMETER READINGS	Q10 TOTAL
11PM	7AM	3PM	12672.5	XXXX	6951.3	XXXX	5292.3	XXXX	3466.5	XXXX		XXXX		XXXX	208.7	XXXX	274.7	XXXX
MID	8	4	12708.3	35.8	6966.1	14.8	5300.3	10.0	3477.9	11.4		—		—		—		—
1AM	9	5	12746.9	38.6	6980.8	14.7	5313.1	10.8	3489.7	11.8								
2	10	6	12775.2	28.3	6993.0	12.8	5321.1	8.0	3502.5	12.8								
3	11	7	12802.8	27.6	7006.4	13.4	[redacted]	10.6	3516.1	13.6								
4	NOON	8	12832.9	30.1	7022.5	16.1	[redacted]	14.1	3533.5	17.4								
5	1PM	9	12856.2	23.3	7039.5	17.0	[redacted]	9.5	3543.2	9.7								
6	2	10	12883.8	32.6	7053.1	13.6	5365.1	9.2	3553.5	10.3								
7	3	11	12913.8	25.0	7066.4	13.3	5373.9	8.8	3566.9	13.4								

SHIFTS M	D	A	L1 WEIGHTOMETER READINGS	L1 TOTAL	L2 WEIGHTOMETER READINGS	L2 TOTAL	P11 WEIGHTOMETER READINGS	P11 TOTAL	P13 WEIGHTOMETER READINGS	P13 TOTAL	N1 WEIGHTOMETER READINGS	N1 TOTAL	N2 WEIGHTOMETER READINGS	N2 TOTAL	Q12 WEIGHTOMETER READINGS	Q12 TOTAL	Q14 WEIGHTOMETER READINGS	Q14 TOTAL
11PM	7AM	3PM	883.8	XXXX	574.8	XXXX		XXXX	291.0	XXXX	17.7	XXXX	1312.4	XXXX		XXXX	86.0	XXXX
MID	8	4	922.5	38.7	598.8	24.0			301.4	10.4								
1AM	9	5	964.7	42.2	626.3	27.5			314.9	13.5								
2	10	6	1000.2	35.5	651.2	24.9			329.1	14.2								
3	11	7	1033.8	33.6	675.2	24.0			342.4	13.3								
4	NOON	8	1069.7	35.9	701.0	25.8			354.8	12.4								
5	1PM	9	1108.7	39.0	727.2	26.2			368.2	13.4								
6	2	10	1141.9	33.2	751.4	24.2			382.3	14.1								
7	3	11	1187.8	45.9	781.1	29.7	161.6		393.3	11.0								

SHIFT M	D	A	K1+L1	M1+N1	X-9 WEIGHTOMETER READINGS	X-9 TONS	TONS TO CII INC.
11PM	7AM	3PM	XXXX	XXXX	488.1	XXXX	XXXX
MID	8	4	74.5				74.5
1AM	9	5	80.8				80.8
2	10	6	63.8				63.8
3	11	7	61.2				61.2
4	NOON	8	66.0				66.0
5	1PM	9	62.3				62.3
6	2	10	65.8				65.8
7	3	11	70.9				70.9
TOTALS			545.3				545.3

RUNNING TIME 7	8	9	10	11	12	13	14	
60		60	60		60	60	60	12.
60		60	60		60	60	60	13.
60		60	60		60	60	60	10.
60		60			60	60	60	12.
60		60			60	60	60	
60		60			60	60	60	
60		60			60	60	60	
60		60			60	60	60	
480		480	180		480	480	480	

I-120

AIISPO C. Robinson

...FTE... ...INU... ...EIO... ...ETE...

READINGS COMPLEX II LOWER LEVEL

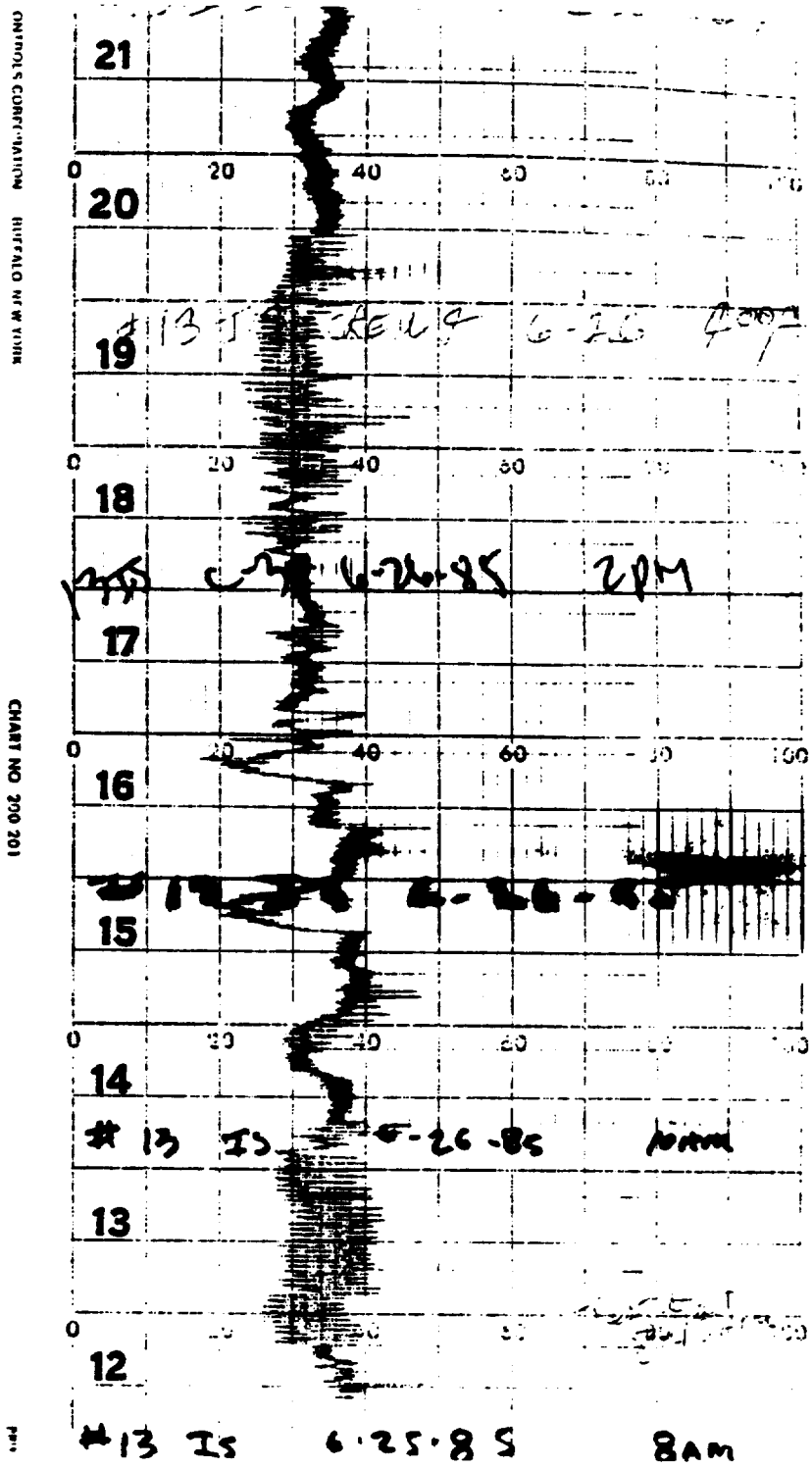
DATE: 10-26-05

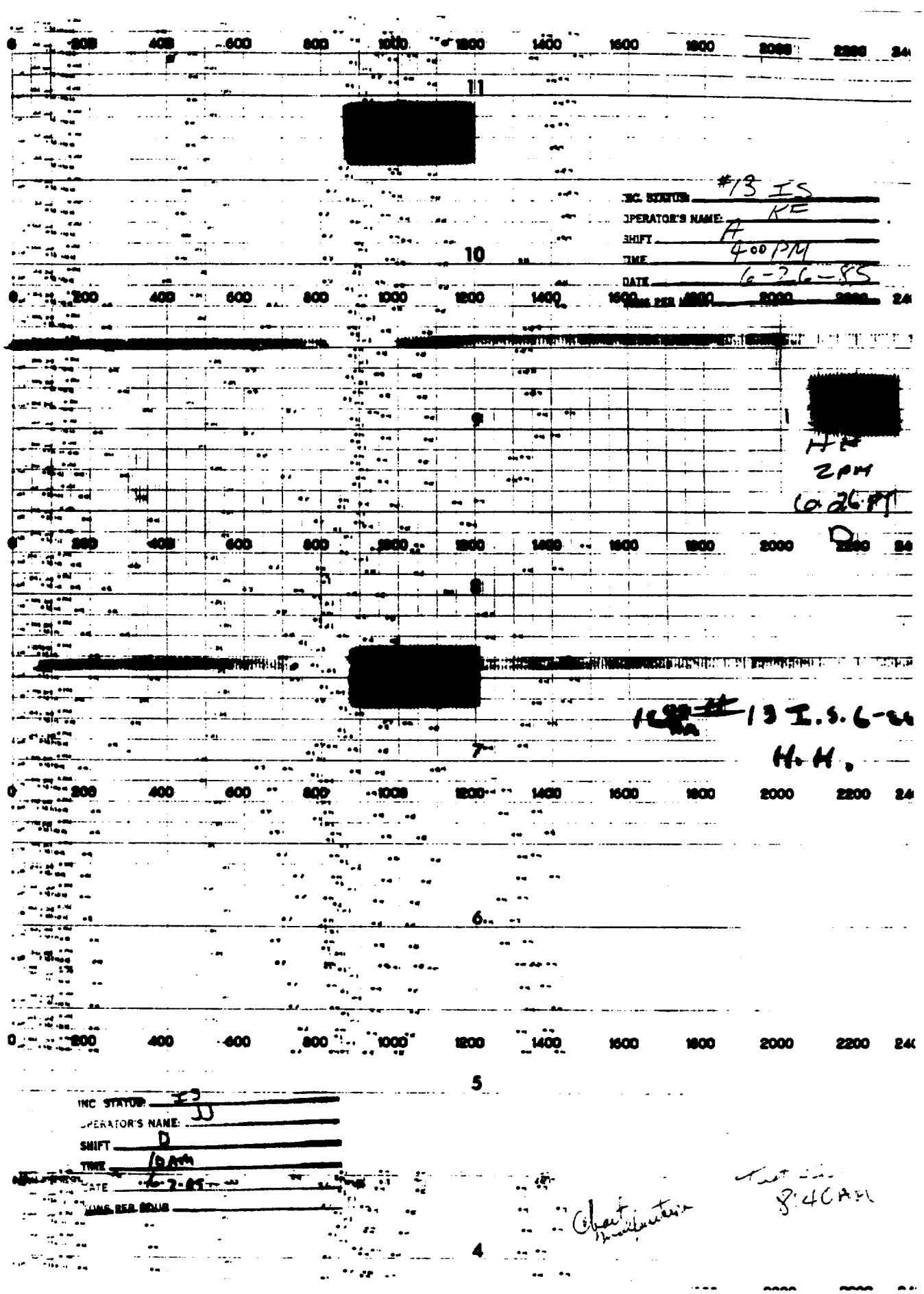
Time	K-1	Temp	K-2	Temp	P-7&8	Temp	P-9&10	Temp	L-1	Temp	L-2	Temp	P11&12	Temp	P13&14	Temp	X-2	Temp
7:00	12672.5	[illegible]	6951.3	[illegible]	5392.3	[illegible]	3466.5	[illegible]	883.8	[illegible]	574.8	[illegible]	143.1	[illegible]	291.0	[illegible]	488.1	[illegible]
:15	12681.5	9.0	6954.1	3.4	5394.9	2.6	3469.5	3.3	893.8	10.0	581.4	6.6		0	293.6	2.6		0
:30	12690.6	9.1	6958.3	3.6	5397.7	2.8	3473.2	3.4	903.9	10.1	588.2	6.8		0	296.4	2.8		0
:45	12699.5	8.9	6962.2	3.9	5399.0	2.3	78.5	3.3	913.2	9.3	593.2	5.0		0	298.9	2.5		0
8:00	12708.3	8.8	6966.1	3.9	5402.3	3.3	3477.9	3.4	923.5	9.3	598.8	5.6	143.3	0	301.4	2.5	488.1	0
:15	12718.3	10.0	6969.9	3.8	5405.4	3.1	3481.2	3.3	933.0	10.5	605.7	6.9		0	304.4	3.0		0
:30	12727.0	8.7	6973.7	3.8	5408.6	3.2	3484.6	3.4	943.0	10.0	612.2	7.0		0	307.9	3.5		0
:45	12737.0	10.0	6977.3	3.6	5410.6	2.0	3486.6	2.0	953.8	10.8	619.5	6.8		0	311.4	3.5		0
9:00	12746.9	9.9	6980.8	3.5	5413.4	2.8	3489.9	3.3	964.7	10.9	626.3	6.8	144.7	0	314.9	3.5		0
:15	12754.2	7.3	6984.0	3.2	5415.4	2.0	3492.9	3.2	973.8	9.1	632.6	6.3		0	318.4	3.5		0
:30	12761.2	7.0	6987.2	3.9	5417.4	2.0	3496.3	3.4	982.6	8.8	638.8	6.2		0	322.0	3.6		0
:45	12768.2	7.0	6990.1	2.9	5419.4	2.0	3499.4	3.1	991.4	8.8	645.0	6.2		0	325.6	3.6		0
10:00	12775.2	7.0	6993.0	2.9	5421.4	2.0	3502.5	3.1	1000.2	8.8	651.2	6.2		0	329.1	3.5		0
:15	12782.8	7.0	6995.9	2.9	5423.4	2.0	3505.6	3.1	1009.0	8.8	657.4	6.2		0	332.7	3.6		0
:30	12789.2	7.0	6998.7	2.8	5425.4	2.0	3508.8	3.2	1017.8	8.8	663.7	6.2		0	336.2	3.5		0
:45	12796.0	6.8	7002.5	3.8	5428.4	3.3	3512.3	3.5	1025.8	8.0	669.7	6.0		0	339.3	3.1		0
11:00	12802.8	6.8	7004.4	3.9	5431.7	3.3	3516.1	3.8	1033.8	8.0	675.2	5.5		0	342.4	3.1		0
:15	12811.3	9.5	7011.4	5.0	5436.0	4.3	3521.5	5.4	1044.6	10.8	682.6	7.4		0	345.7	3.3		0
:30	12821.3	9.0	7016.5	5.1	5440.0	4.0	3525.0	3.5	1055.5	10.9	690.1	7.5		0	348.7	3.0		0
:45	12827.3	6.0	7019.5	3.0	5443.2	3.2	3529.5	4.0	1062.6	7.1	696.1	6.0		0	351.8	3.1		0
12:00	12833.9	5.6	7022.5	3.0	5446.4	3.2	3533.5	4.0	1068.7	7.1	701.0	5.9		0	354.8	3.0		0
:15	12843.4	10.3	7027.4	6.9	5451.4	2.2	3536.9	3.3	1079.9	10.7	707.8	6.8		0	357.9	3.1		0
:30	12852.3	9.1	7032.6	5.0	5456.2	2.6	3541.2	1.3	1090.5	10.6	714.9	7.1		0	361.6	3.7		0
:45	12860.2	7.9	7035.9	3.3	5463.4	2.4	3544.8	2.6	1099.9	8.4	720.9	6.0		0	365.2	3.6		0
1:00	12866.2	6.0	7039.5	3.4	5456.9	2.3	3547.2	2.4	1108.7	8.9	727.2	6.3		0	368.8	3.6		0
:15	12872.2	6.0	7042.9	3.4	5469.3	2.4	3550.5	2.3	1117.0	8.3	733.6	6.4		0	372.3	3.5		0
:30	12878.1	5.9	7046.3	3.4	5460.8	2.5	3547.9	2.4	1125.0	8.0	740.1	6.5		0	375.8	3.5		0
:45	12883.3	5.2	7049.7	3.4	5462.9	2.1	3550.7	2.8	1133.0	8.0	745.0	5.6		0	378.8	3.0		0
2:00	12888.8	5.5	7053.1	3.4	5465.1	2.2	3553.5	2.8	1141.9	8.9	751.4	5.7		0	382.3	3.5		0
1:15	12895.1	6.3	7056.5	3.4	5467.2	2.2	3556.8	3.3	1153.6	11.7	758.8	7.4		0	385.9	3.6		0
:30	12901.4	6.3	7059.9	3.4	5469.5	2.3	3560.1	3.3	1165.2	11.6	766.3	7.5		0	389.5	3.6		0
:45	12907.4	6.0	7063.3	3.4	5471.8	2.3	3563.4	3.3	1176.8	11.6	773.1	6.8		0	393.0	3.5		0
3:00	12913.8	6.4	7066.9	3.6	5473.9	2.1	3566.9	3.5	1187.8	11.0	780.1	7.0	161.6	0	396.5	3.5	488.1	0

I-121

OPERATOR: [signature]

A.M.S.P.O.: C. Bolinger


CONTROLS CORPORATION BUFFALO NEW YORK
CHART NO. 200 201
21
20
19
18
17
16
15
14
13
12
#13 I5 6-25-85 8AM



INC. STATUS: #13 IS
OPERATOR'S NAME: KE
SHIFT A
TIME 4:00 PM
DATE 6-26-85
HE
2PM
6.26 PM
D
13 I.S. 6-
H.H.
INC STATUS: IS
OPERATOR'S NAME: JJ
SHIFT D
TIME 10 AM
DATE 6-2-85
8:40 AM

ATTACHMENT 9

SUPPLEMENTARY PROCESS DATA FOR RUN NO. 9

[redacted] Wastewater Treatment [redacted]
[redacted] Complex
[redacted] Report
Incineration

Date 6-27-85 Shift DAY

Sr. SPO W. Hutcherson Crew # III

Inc.	S.O.S.	E.O.S.
#7.	✓	✓
#8.	✓	✓
#9.	✓	✓
#10.	✓	✓
#11.	X	X
#12.	✓	✓
#13.	✓	✓
#14.	✓	✓

Weightometer	7th Hour Reading	1st Hour Reading	Tons
K-1	13936.6	13635.5	301.1
L-1	1350.4	1335.8	14.6
M-1	Ø	Ø	Ø
N-1	Ø	Ø	Ø
X-9	[redacted]	[redacted]	Ø

Tons Cake Lower Level = 315.7 Tons
Tons Cake Upper Level = [redacted] Ø Tons
Total Tonnage = 315.7 Tons
Tons to Complex I = [redacted] Ø Tons
Total Complex II = 315.7 Tons
Incinerator Hours = 14.0 Hours
Net Tons/Inc. Hour = [redacted] 8.1 Tons/Ho

Main Gas Readings

	7th Hour	1st Hour	Factor	Gas Used
#1	76048	74394	202.39	334,713.26
#2	[redacted]	[redacted]	202.39	[redacted]

Total Gas Used = [redacted] Cu. Ft.
Gas Used/Ton Burned = [redacted] Cu. Ft.

	BP	[redacted]	#5 [redacted]
% Dry Solids Cake	19	[redacted]	NF
% Volatiles Cake	70	[redacted]	[redacted]

Central Shaft Speeds

Inc.	#7	#8	#9	#10	#11	#12	#13	#14
S.O.S.	60	62	57	60	63	60	60	60
E.O.S	60	60	60	60	60	60	X	60

Comments: S.O.S. 11-B.P. [redacted] NO Feed To Complex One Inc #12-13-14
0558 START #0[redacted] MAINS Work On 9 Onn L. Belt
M.O. Written On [redacted] Height To Temp. Indicator M.O. #503099
8:30 Am 2 INF On [redacted] Hopper Level 9 Am MADE Clean
Check Scrub[redacted] Hopper Check O.K.
1:30 Pm E[redacted] Rod[redacted] ON #9 Inc Rubber [redacted]
(Organic Discharge Test) Test Completed At 12:00 pm. #13 Inc
Also Finished [redacted] 11:45 Am #13 Sheared P.O.N M.O. # 8503129-
Requested 1 pm [redacted] Inc. O.S. High Hopper Level [redacted] 2 Inc. Is
At Same Time, #10 Inc Hopper Level Down Inc. B.I.S. At
2 pm #12 Inc O.S. At Same Time.
E.O.S. 11-B.P. Shelve In Service

DETROIT WASTEWATER TREATMENT DIVISION

SOLIDS HANDLING INCINERATION COMPLEX II

OPERATORS 24 HOUR REPORT

PART ___ OF ___

DATE 6/27/1985

REVISED

INCINERATOR # 9

TIME	HIGHEST HEARTH TEMP. HEARTH #	HIGHEST HEARTH TEMP. TEMPERATURE	CENTER SHAFT SPEED	% O_2	SCRUBBER TEMP CONTROL	DRAFT PRESS IN W.C.	TO FAN DAMPER	SCRUBBER DIFF IN W.C.	GAS METER READING	OPACITY READING	REMARKS
12 pm	6	1455	1.0	10.0	10	-.8	60	26			
1	6	1485	1.0	10.0	10	-.8	60	26			
2	6	1375	1.0	9.5	10	[illegible]	60	25			
3	6	1400	1.0	9.0	10	[illegible]	[illegible]	22			
4	6	1390	1.0	8.0	10	-.9	57	27K			
5	6	1407	1.0	10.0	10	-1.2	60	27			
6	6	1410	1.0	7.0	10	-1.1	60	28			
7	6	1440	1.0	10.0	10	-1.2	70	22			
8	6	1357	1.0	9.0	10	-1.0	70	27			
9	6	1410	1.0	8.0	10	-.9	62	26			
10	6	1457	1.0	8.0	10	-1.0	70	28			
11	6	1404	1.0	7.0	10	-.9	70	26			
12 pm	6	1389	1.0	9.0	10	-.9	70	26			
1	6	1300	1.0	10.1	10	-1.0	70	25			
2	6	1266	1.0	11.0	10	-1.0	70	29			
3	6	1442	1.0	10.0	10	-1.0	70	30			
4	6	1321	1.0	8.5	10	-.7	58	30			
5	6	1426	1.0	10.0	10	-1.0	58	30			
6	6	1299	1.0	17.5	5	-.4	46	18K			
7	6	1221	1.0	17.0	5	-.5	46	18			
8	6	1172	1.0	17.0	5	-.5	46	18			
9	6	1146	1.0	18.5	5	-.5	44	15			
10	6	1124	1.0	18.5	5	-.5	44	15			
11	6	1108	1.0	17.5	5	-.5	44	15			
12 pm	6	1091	1.0	17.5	5	-.5	44	15			

PROCESS & EQUIPMENT EXCEPTION

SHIFT	OPERATOR	CREW
M		
D	Hill/Stockey	3
A	RF-LW	4
M		

DETROIT WASTEWATER TREATMENT PLANT

INCINERATOR LOADING RATE SHIFT REPORT

DATE: 6/27/85 CREW: 3

SHIFTS M	(D)	A	K1 WEIGHTOMETER READINGS	K1 TOTAL	K2 WEIGHTOMETER READINGS	K2 TOTAL	P7 WEIGHTOMETER READINGS	P7 TOTAL	P9 WEIGHTOMETER READINGS	P9 TOTAL	M1 WEIGHTOMETER READINGS	M1 TOTAL	M2 WEIGHTOMETER READINGS	M2 TOTAL	Q8 WEIGHTOMETER READINGS	Q8 TOTAL	Q10 WEIGHTOMETER READINGS	Q10 TOTAL
11PM	7AM	3PM	13578.0	XXXX	7416.1	XXXX	5550.3	XXXX	7757.8	XXXX		XXXX		XXXX	208.7	XXXX	274.7	XXXX
MID	8	4	13635.5	57.5	7444.0	27.9	5564.5	14.2	3770.3	12.5		0		0	208.7	0	274.7	0
1AM	9	5	13684.0	48.5	7470.2	26.2	5574.0	9.5	3779.8	9.5		0		0	208.7	0	274.7	0
2	10	6	13737.5	53.5	7494.7	24.5	5585.6	11.6	3791.4	11.6		0		0	208.7	0	274.7	0
3	11	7	13781.2	43.7	7517.5	22.8	5596.9	11.3	3802.1	10.7		0		0	208.7	0	274.7	0
4	NOON	8	13837.0	55.8	7541.9	24.4	5608.5	11.6	3815.8	13.7		0		0	208.7	0	274.7	0
5	1PM	9	13894.2	57.2	7590.4	28.5	5621.7	13.2	3834.5	13.7								
6	2	10	13936.6	42.4	7594.2	23.8	5634.3	12.6	3845.6	9.1								
7	3	11	13992.0	55.6	7621.0	26.8	5646.7	12.4	3856.8	11.2								

SHIFTS M	(D)	A	L1 WEIGHTOMETER READINGS	L1 TOTAL	L2 WEIGHTOMETER READINGS	L2 TOTAL	P11 WEIGHTOMETER READINGS	P11 TOTAL	P13 WEIGHTOMETER READINGS	P13 TOTAL	N1 WEIGHTOMETER READINGS	N1 TOTAL	N2 WEIGHTOMETER READINGS	N2 TOTAL	Q12 WEIGHTOMETER READINGS	Q12 TOTAL	Q14 WEIGHTOMETER READINGS	Q14 TOTAL
11PM	7AM	3PM	1335.8	XXXX	875.4	XXXX		XXXX	442.0	XXXX	17.7	XXXX	130.4	XXXX		XXXX	86.0	XXXX
MID	8	4	1335.8	0	875.4	0	155.5	0	440.6	0	17.7	0	130.4	0		0	86.0	0
1AM	9	5									17.7	0	130.4	0		0	86.0	0
2	10	6									17.7	0	130.4	0		0	86.0	0
3	11	7									17.7	0	130.4	0		0	86.0	0
4	NOON	8									17.7	0	130.4	0		0	86.0	0
5	1PM	9	1337.0	1.2														
6	2	10	1350.4	13.4														
7	3	11	1359.4	9.0	877.4		1562		440.6									

SHIFT M	(D)	A	K1+L1	M1+N1	X-9 WEIGHTOMETER READINGS	X-9 TONS	TONS TO CH. INC.
11PM	7AM	3PM	XXXX	XXXX	488.1	XXXX	XXXX
MID	8	4	57.5				57.5
1AM	9	5	48.5				48.5
2	10	6	53.5				53.5
3	11	7	43.7				43.7
4	NOON	8	55.8				55.8
5	1PM	9	58.4				58.4
6	2	10	55.8				55.8
7	3	11	44.6				44.6
TOTALS			417.8				417.8

RUNNING TIME	7	8	9	10	11	12	13	14
	60	60	60	60	X			
	60	60	60	60	X			
	60	60	60	60	X			
	60	60	60	60	X			
	60	60	60	60	X			
	60	60	60	60	X			
	60	60	60		X	60		
	60	60	60		X			
	480	480	480	360	X	60		

ARSPO C. Robinson

CIRCLE
SHIFT: H O A

Crew 7

FIFTEEN MINUTE WEIGHTOMETER
READINGS COMPLEX II LOWER LEVEL

DATE: June 27, 1985

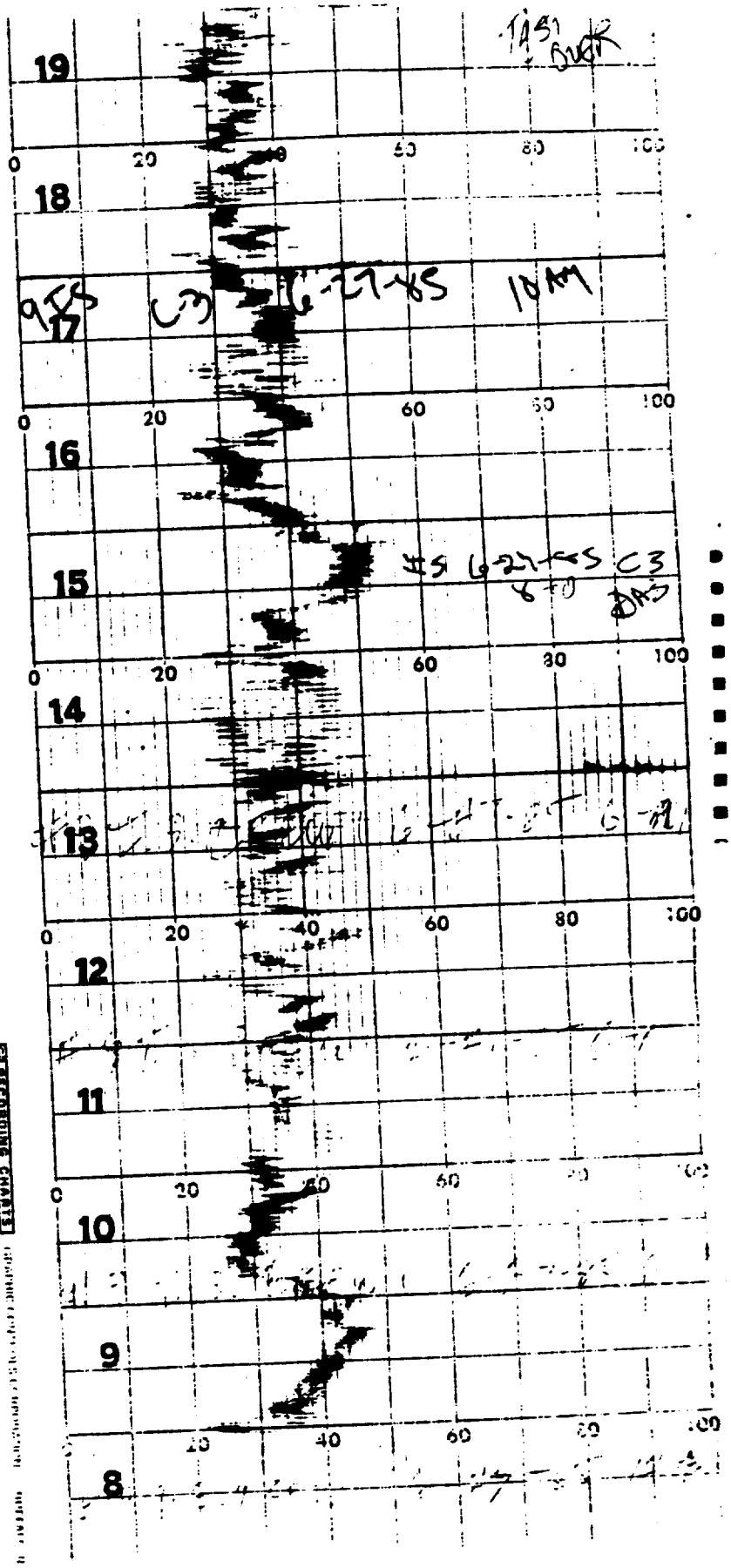
Time	R-1	Temp	R-2	Temp	R-7&8	Temp	R-9&10	Temp	I-1	Temp	I-2	Temp	P11&12	Temp	P13&14	Temp	X-4	Temp
7:00	13558.0		7416.1		5530.3		3752.8				875.4		155.5		440		488.1	
:15	5924	14.6	7423.2	7.2	5537.5	5.3	3760.9	8.1										
:30	6069	14.3	7430.1	6.9	5544.4	3.6	3767.8	6.9										
:45	6121.2	14.3	7437.0	6.9	5550.9	3.6	3774.2	6.4										
8:00	13635.5	14.3	7444.0	6.9	5557.5	3.6	3780.8	6.6										
:15	13647.8	12.3	7450.4	6.4	5564.0	2.5	3787.4	6.6										
:30	13660.5	12.9	7456.7	6.3	5570.4	2.4	3793.8	6.4										
:45	13672.2	12.0	7463.7	7.0	5577.4	2.3	3800.8	7.0										
9:00	13684.0	11.8	7470.6	6.9	5584.4	2.2	3807.8	6.5										
:15	13698.1	14.2	7476.1	5.5	5589.9	2.1	3813.3	5.5										
:30	13711.9	13.8	7482.5	6.4	5596.3	2.4	3819.8	6.5										
:45	13724.6	12.7	7488.9	6.4	5602.8	2.5	3826.3	6.5										
10:00	13737.5	12.9	7495.4	6.5	5609.3	2.5	3832.8	6.5	1336.1		874.9		155.5		440.6		0	
:15	48.4	10.9	7500.4	5.0	5614.4	2.1	3838.1	5.3										
:30	59.4	11.0	7506.1	5.7	5620.2	2.8	3843.8	5.7										
:45	70.3	10.9	7511.8	5.7	5625.9	2.8	3849.6	5.8										
11:00	13781.2	10.9	7517.5	5.7	5631.6	2.8	3855.5	5.9										
:15	7961	13.9	7523.6	6.1	5637.8	2.9	3861.8	6.3										
:30	8150	14.0	7529.7	6.1	5643.9	2.9	3867.1	5.3										
:45	8323.1	14.0	7535.8	6.1	5650.6	2.9	3873.5	6.4	1332.0		874.7		155.5		440.6		488.1	
12:00	13837.0	13.9	7541.9	6.1	5656.5	2.9	3879.8	6.3										
:15	8561	14.1	7552.1	10.2	5668.7	4.2	3886.0	6.2										
:30	8746	14.7	7557.1	5.0	5674.1	5.4	3894.2	8.2										
:45	8932	13.9	7564.0	6.9	5680.0	3.6	3900.6	6.4										
1:00	13998.2	11.3	7570.4	6.4	5686.7	2.7	3906.8	6.2	1337.0									
:15	9184	12.6	7577.8	7.4	5692.2	5.5	3913.6	6.8	1331.4	2.4								
:30	9368	12.0	7584.2	6.4	5698.2	3.0	3920.1	6.5	1342.2	2.4								
:45	9527	8.5	7589.3	5.0	5703.2	2.0	3926.1	6.0	1346.3	2.4								
2:00	9736.9	8.5	7594.3	4.9	5708.3	2.1	3932.4	6.3	1350.4	2.1	874.4							
:15	9942.6	11.0	7600.7	6.4	5714.4	3.1	3938.7	6.3	1354.4	2.0								
:30	10152.8	11.0	7607.1	6.4	5720.5	3.1	3945.1	6.4	1358.4	2.0								
:45	10360.8	11.6	7613.5	6.4	5726.6	3.1	3951.0	5.9	1362.9	2.1								
3:00	13772.2	12.0	7621.0	6.7	5733.7	3.1	3958.4	7.4	1367.4	2.1	874.4		156.2		440.6		488.1	

I-128

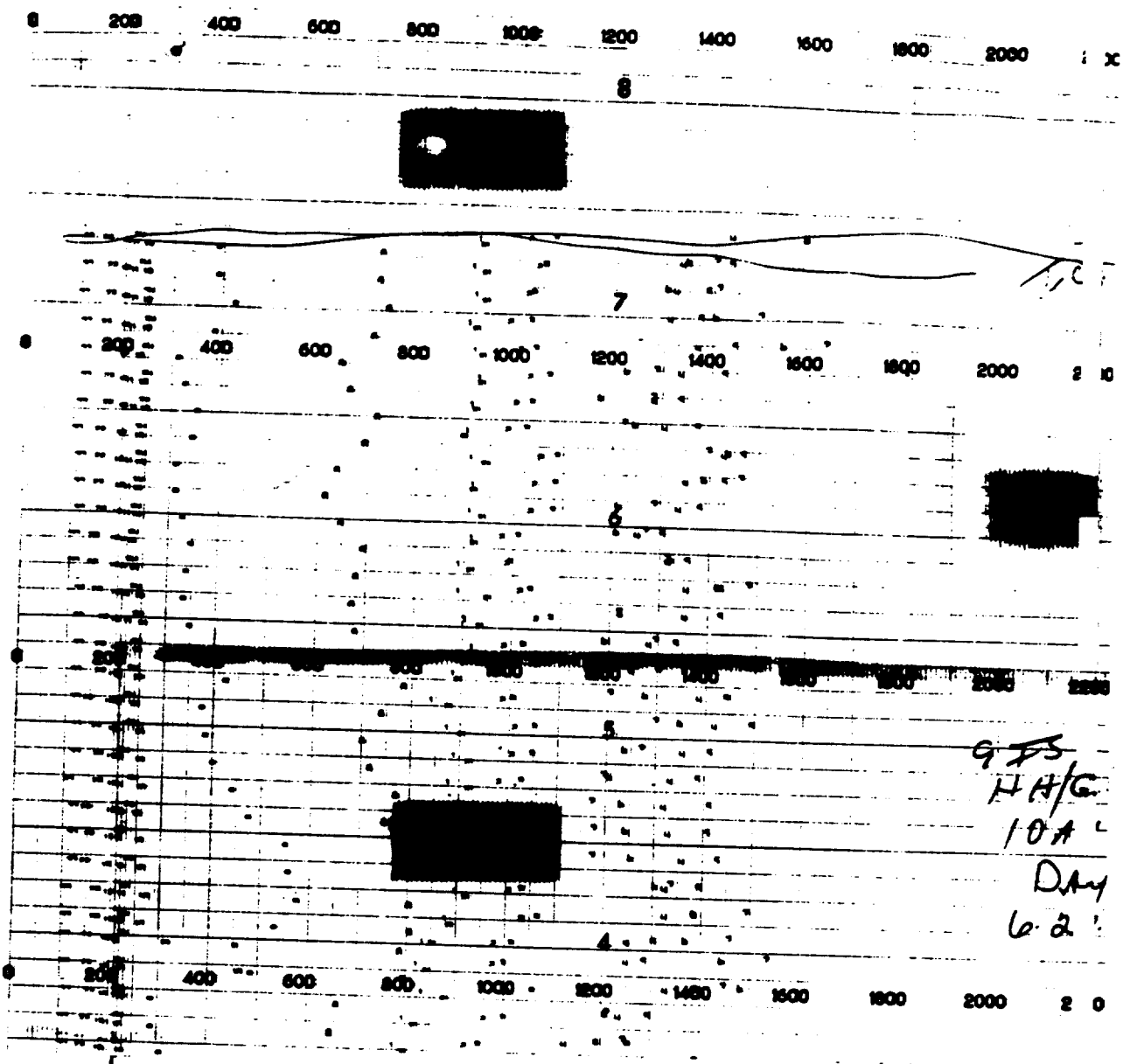
PLANT OPERATOR: [redacted]

A.H.S.P.O.: C. Robertson

[redacted]



[redacted]


8
7
6
5
4
200
400
600
800
1000
1200
1400
1600
1800
2000