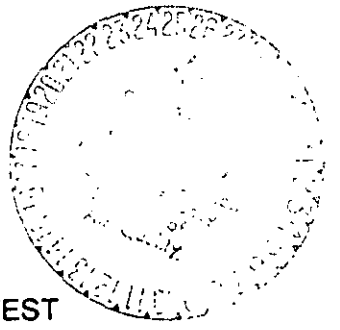
AP42 Section: 11.1

Reference Number: 65

Title: Results Of The August 29, 1994 Particulate Emission Compliance Test On The Baghouse Outlet Stack At The Northland Constructors Facility Located In Twig,

Minnesota, Pace, Inc., Golden Valley, MN,

September 21, 1994.



RESULTS OF THE AUGUST 29, 1994
PARTICULATE EMISSION COMPLIANCE TEST
ON THE BAGHOUSE OUTLET STACK
AT THE NORTHLAND CONSTRUCTORS FACILITY
LOCATED IN TWIG, MINNESOTA

Prepared For: Mr. James Oswald
Northland Constructors

Prepared By: PACE, Incorporated
1710 Douglas Drive North
Golden Valley, Minnesota 55422

PACE Project No.: 940825.401
Report Date: September 21, 1994

Field sampling was performed by me and personnel under my director supervision.

Curtis H. Stock
Supervisor, Air Sampling Section

All sampling, analysis and data reduction were performed by PACE, Incorporated under my direct supervision.

Curtis H. Stock
Supervisor, Air Sampling Section

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EXECUTIVE SUMMARY

PACE Incorporated was contracted by Northland Constructors to perform particulate emissions testing on the Baghouse Outlet Stack at the Northland Constructors facility located in Twig, Minnesota. This series of tests was performed on August 29, 1994. The results are summarized with pertinent process data in the following table:

Test Results Summary

	Run 1	Run 2	Run 3	Average
Asphalt Production (Tons/HR)	285.8	280.6	287.2	284.5
Dust Collector Pressure Drop (In, H_2O)	4.8	4.9	5.0	4.9
Fuel Input (GPH)	1050	1050	1050	1050
% Recycle	29.8	29.7	29.8	29.8
Aggregate Moisture (%)	5.6	4.9	5.2	5.2
Recycle Moisture (%)	6.2	7.0	6.3	6.5
Volumetric Flow Rate				
ACFM	51000	49600	50700	50400
DSCFM	18600	19900	17800	18800
Gas Temperature (°F)	310	306	309	308
Gas Moisture Content (% v/v)	44.2	38.9	46.2	43.1
Particulate Emission Rate (GR/DSCF)	0.010	0.001	0.012	0.011
Average Opacity (%)	0	0	0	0

INTRODUCTION

PACE, Incorporated personnel conducted particulate emission compliance testing on the Baghouse Outlet Stack at the Northland Constructors facility located in Twig, Minnesota. On-site testing was performed by a three member team consisting of C. Stock, M. McDermott and M. Wilson. Coordination between plant operations and testing activities was provided by Scott Sealey of Northland Constructors through direct contact with the test team leader. Testing was not witnessed by the Minnesota Pollution Control Agency. The test consisted of three independent one-hour samplings for particulate with concurrent integrated gas sampling for Orsat analyses. One-hour opacity observations were conducted for each particulate run.

The objectives of this project were to quantify particulate emissions and compare them to applicable air emissions regulations stipulated by Minnesota Pollution Control Agency. Special provisions for this test program include operating at 285 Tons/HR and burning butane as fuel.

Results are summarized in the next section followed by descriptions of the process under investigation and test methods. All supporting data are included in subsequent appendices.

RESULTS SUMMARY

Results of particulate determinations and gas composition are summarized in Table 1. The particulate emission rate averaged 1.7 LB/HR at an average particulate concentration of 0.011 GR/DSCF. Minnesota Pollution Control Agency emissions regulations limit sources of this type to 0.04 GR/DSCF.

Opacity observations were recorded every 15 seconds for a one-hour period during each run. These results are shown in Table 4. Within the three one-hour observation period, the highest average opacity for a consecutive six-minute time span was 0 percent. The average opacity for the three one-hour period was 0 percent.

No problems were encountered in the sampling or analyses of emissions samples. On this and after complete review of the test results, we believe that the values reported herein are an accurate representation of the source conditions at the time of the test.

SUMMARY OF THE RESULTS

Northland Constructors
Twig, Minnesota
PACE Project No. 940825.401

PACE Incorporated
September 20, 1994

TABLE 1
SUMMARY OF THE RESULTS
TEST 1

Baghouse Outlet Stack

Parameter	**Run 1**	**Run 2**	**Run 3**	**Average**
Date of Run	8/29/94	8/29/94	8/29/94	
Time of Run	923-1029	1135-1241	1304-1411	
Asphalt Production (Tons/HR)	285.8	280.6	287.2	284.5
Duct Collector Pressure Drop (In. H2O)	4.8	4.9	5.0	4.9
Fuel Input (GPH)	1050	1050	1050	1050
Volumetric Flow Rate				
ACFM	51000	49600	50700	50400
DSCFM	18600	19900	17800	18800
Gas Temperature (°F)	310	306	309	308
Gas Moisture Content (%v/v)	44.2	38.9	46.2	43.1
Gas Composition (%v/v,Dry)				
CO2	9.0	9.2	9.5	9.2
O2	6.8	6.8	6.6	6.7
N2	84.2	84.1	84.0	84.1
Isokinetic Variation (%)	104.3	96.6	109.5	
Particulate Emission Rate (LB/HR)	1.6	1.9	1.8	1.7
Particulate Concentration				
GR/ACF	0.004	0.004	0.004	0.004
GR/DSCF	0.010	0.011	0.012	0.011
GR/DSCF @ 12% CO2	0.013	0.014	0.015	0.014

RESULTS OF ORSAT AND MOISTURE DETERMINATIONS

Northland Constructors
Twig, Minnesota
PACE Project No. 940825.401

PACE Incorporated
September 20, 1994

TABLE 2
RESULTS OF ORSAT AND MOISTURE DETERMINATIONS
TEST 1

Baghouse Outlet Stack

Parameter	**Run 1**	**Run 2**	**Run 3**
Date of Run	8/29/94	8/29/94	8/29/94
Time of Run	923-1029	1135-1241	1304-1411
ORSAT (%v/v)			
Dry Basis			
Carbon Dioxide	9.00	9.20	9.45
Oxygen	6.80	6.75	6.60
Carbon Monoxide*	*	*	*
Nitrogen	84.20	84.05	83.95
WetBasis			
Carbon Dioxide	5.03	5.62	5.08
Oxygen	3.80	4.12	3.55
Carbon Monoxide*	*	*	*
Nitrogen	47.02	51.34	45.13
Portable Oxygen Monitor Result			
Time Weighted Average (%O2)	6.5	6.5	6.3
Moisture Collected (ml)	722.0	575.0	788.0
Moisture Content (%v/v)	44.15	38.92	46.24
Molecular Weight of Flue Gas (lb/lb-mole)			
Dry	29.71	29.74	29.78
Wet	24.54	25.17	24.33
Fo	1.567	1.538	1.513

*Carbon monoxide was not measured, assumed concentrations less than 0.01%.

RESULTS OF PARTICULATE LOADING DETERMINATIONS

Northland Constructors
Twig, Minnesota
PACE Project No. 940825.401

PACE Incorporated
September 20, 1994

TABLE 3
RESULTS OF PARTICULATE LOADING DETERMINATIONS
TEST 1

Baghouse Outlet Stack

Parameter	**Run 1**	**Run 2**	**Run 3**
Date of Run	8/29/94	8/29/94	8/29/94
Time of Run	923-1029	1135-1241	1304-1411
Sample Duration (Min.)	60.0	60.0	60.0
Average Flue Gas Temperature (°F)	309.5	306.5	309.2
Moisture Content of Flue Gas (%v/v)	44.15	38.92	46.24
Particulate Collected (Mg)*			
Wet Catch	2.6	1.1	1.5
Dry Catch	24.7	29.1	31.3
Total	27.3	30.2	32.8
Volumetric Flow Rate			
ACFM	51030	49570	50650
SCFM	33360	32530	33120
DSCFM	18630	19870	17810
Sample Volume (Cubic Feet)			
Meter Conditions	45.80	45.11	46.31
Dry Standard	42.98	42.47	43.13
Isokinetic Variation (%)	104.3	96.6	109.5
Particulate Concentration*			
Wet Catch, GR/DSCF	0.001	0.000	0.001
Dry Catch, GR/DSCF	0.009	0.011	0.011
Total, GR/DSCF	0.010	0.011	0.012
Particulate Emission Rate*			
Total, LB/HR	1.57	1.87	1.79

*Dry catch plus organic/residual wet catch

RESULTS OF OPACITY OBSERVATIONS

Northland Constructors
Twig, Minnesota
PACE Project No. 940825.401

PACE Incorporated
September 20, 1994

TABLE 4
RESULTS OF OPACITY OBSERVATIONS
TEST 1

Baghouse Outlet Stack

Percent Opacity	Optical Density	Relative Frequency
0	0.000	100.00
5	0.022	0.00
10	0.046	0.00
15	0.071	0.00
20	0.097	0.00
25	0.125	0.00
30	0.155	0.00
35	0.187	0.00
40	0.222	0.00
45	0.260	0.00
50	0.301	0.00
55	0.347	0.00
60	0.398	0.00
65	0.456	0.00
70	0.523	0.00
75	0.602	0.00
80	0.699	0.00
85	0.824	0.00
90	1.000	0.00
95	1.301	0.00
99	2.000	0.00
Average > 0.0	0.000	**Total >** 100

Average Opacity Per Six Minute Period:

Period	Opacity	Period	Opacity
1	0.0	6	0.0
2	0.0	7	0.0
3	0.0	8	0.0
4	0.0	9	0.0
5	0.0	10	0.0

High Six Minute Average: 0.0
Maximum reading: 0.0
Minumum reading: 0.0

Observer: C. Stock
Date of test: 8/29/94
Time of test: 930-1030

NOTE: The high six minute average opacity might not coincide with any of the 10 reported six minute periods. The high value is the maximum consecutive period possible and may overlap two of the ten consecutive six-minute periods.

Northland Constructors
Twig, Minnesota
PACE Project No. 940825.401

PACE Incorporated
September 20, 1994

TABLE 4 (Continued)
RESULTS OF OPACITY OBSERVATIONS
TEST 1

Baghouse Outlet Stack

Percent Opacity	Optical Density	Relative Frequency
0	0.000	100.00
5	0.022	0.00
10	0.046	0.00
15	0.071	0.00
20	0.097	0.00
25	0.125	0.00
30	0.155	0.00
35	0.187	0.00
40	0.222	0.00
45	0.260	0.00
50	0.301	0.00
55	0.347	0.00
60	0.398	0.00
65	0.456	0.00
70	0.523	0.00
75	0.602	0.00
80	0.699	0.00
85	0.824	0.00
90	1.000	0.00
95	1.301	0.00
99	2.000	0.00
Average > 0.0	0.000	**Total >** 100

Average Opacity Per Six Minute Period:

Period	Opacity	Period	Opacity
1	0.0	6	0.0
2	0.0	7	0.0
3	0.0	8	0.0
4	0.0	9	0.0
5	0.0	10	0.0

High Six Minute Average: 0.0
Maximum reading: 0.0
Minumum reading: 0.0

Observer: M. McDermott
Date of test: 8/29/94
Time of test: 1135-1235

NOTE: The high six minute average opacity might not coincide with any of the 10 reported six minute periods. The high value is the maximum consecutive period possible and may overlap two of the ten consecutive six-minute periods.

Northland Constructors
Twig, Minnesota
PACE Project No. 940825.401

PACE Incorporated
September 20, 1994

TABLE 4 (Continued)
RESULTS OF OPACITY OBSERVATIONS
TEST 1

Baghouse Outlet Stack

Percent Opacity	Optical Density	Relative Frequency
0	0.000	100.00
5	0.022	0.00
10	0.046	0.00
15	0.071	0.00
20	0.097	0.00
25	0.125	0.00
30	0.155	0.00
35	0.187	0.00
40	0.222	0.00
45	0.260	0.00
50	0.301	0.00
55	0.347	0.00
60	0.398	0.00
65	0.456	0.00
70	0.523	0.00
75	0.602	0.00
80	0.699	0.00
85	0.824	0.00
90	1.000	0.00
95	1.301	0.00
99	2.000	0.00
Average > 0.0	0.000	**Total >** 100

Average Opacity Per Six Minute Period:

Period	Opacity	Period	Opacity
1	0.0	6	0.0
2	0.0	7	0.0
3	0.0	8	0.0
4	0.0	9	0.0
5	0.0	10	0.0

High Six Minute Average: 0.0
Maximum reading: 0.0
Minumum reading: 0.0

Observer: M. McDermott
Date of test: 8/29/94
Time of test: 1304-1404

NOTE: The high six minute average opacity might not coincide with any of the 10 reported six minute periods. The high value is the maximum consecutive period possible and may overlap two of the ten consecutive six-minute periods.

RESULTS OF PRELIMINARY SOURCE DETERMINATIONS

TABLE 5
RESULTS OF AIR FLOW DETERMINATIONS
TEST 1

Baghouse Outlet Stack

Date of Run	8/29/94
Time of Measurement	0755
Number of Sampling Ports	6
Number of Points Sampled	24
Barometric Pressure (In. Hg)	28.56
Static Pressure (In. WC)	-0.75
Absolute Flue Gas Pressure (In. Hg)	28.50
Average Flue Gas Temperature (F)	291
Average Moisture Content (%v/v)	39
Flue Gas Average Velocity (Feet/Second)	82.25
Duct Dimension (Inches)	30x44
Duct Cross-sectional Area (Square Feet)	9.17
Volumetric Flow Rate	
ACFM	45240
SCFM°	30300
DSCFM	18480

PROCESS DESCRIPTION

The hot mix asphalt facility is a Astec model No. PDDC-835C manufactured in 19489. The plant uses a double barrel drum mix with a manufactures rated drying capacity of 325 Tons/HR at 5% moisture. Butane is the fuel used with a heat input capacity rated at 116 million BTU/HR.

An Astec PHG-50 baghouse is used for pollution control equipment. The baghouse uses a air pressure drop with a range of 0-20 inches of water to monitor the control equipment. The stack has an inside diameter that measures 30 x 45 inches and has a rated flow of 50,000 ACFM at 325°F. Flue gasses are pulled through the system with an induced draft fan and exhausted through the 20 foot stack to atmosphere. A relational flow diagram is represented by Figure 1.

For this series of tests, the production rate averaged 284.5 tons per hour. Butane was used for fuel and the average input was 1050 gallons per hour.

Northland Constructors
Twig, Minnesota
Baghouse Stack

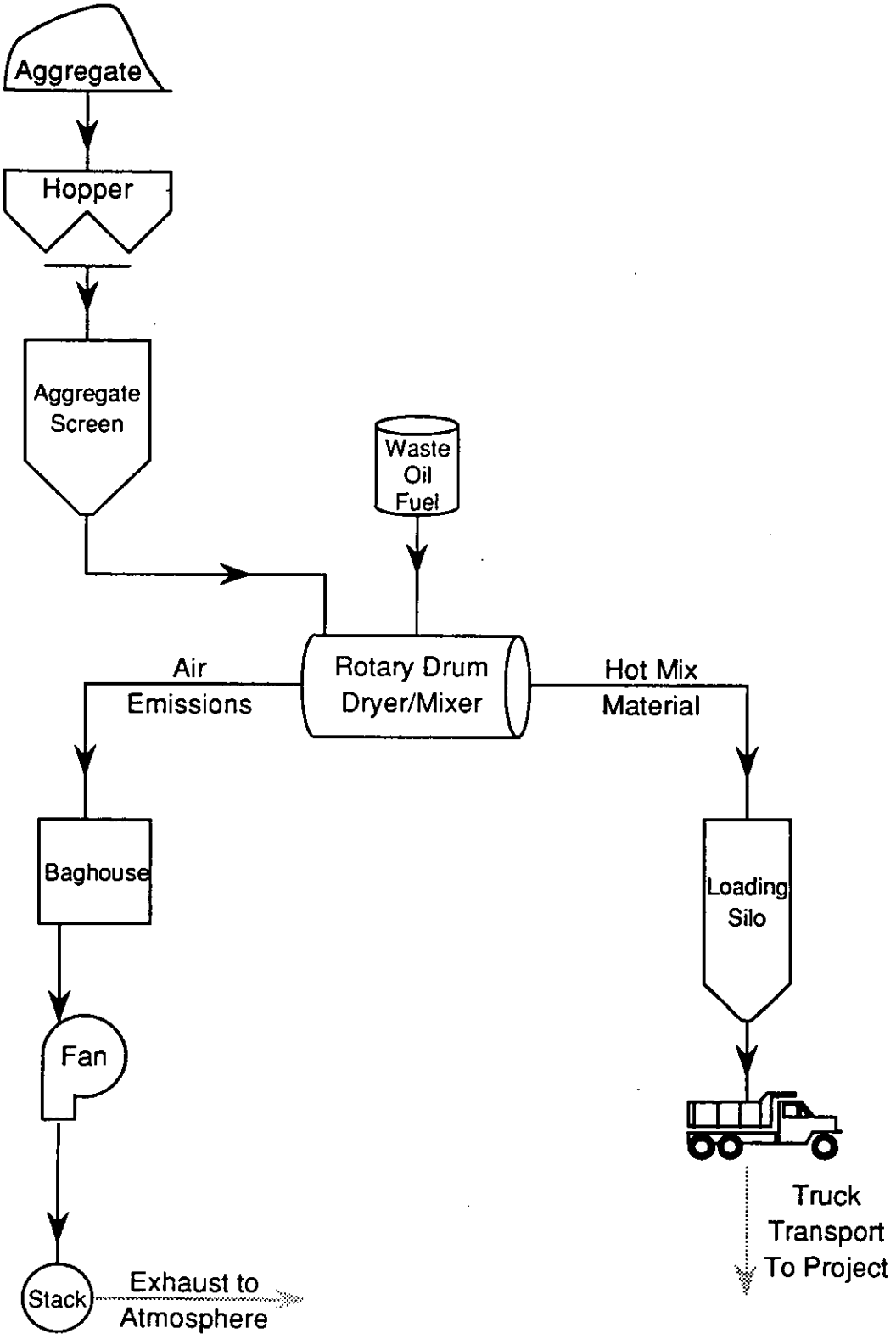


Figure 1

TEST PROCEDURES SUMMARY

Testing on the Baghouse Outlet Stack was performed from 6 test ports oriented horizontally on a vertical duct, approximately 1.25 duct diameters downstream of the nearest flow disturbance and 0.63 duct diameters upstream of the stack outlet. The duct dimension at this point was verified on-site and measures 30 x 44 inches in diameter. A 24 point traverse was used to extract representative flue gas samples. Each point was sampled 2.5 minutes for a run duration of 60 minutes. Test port and traverse point locations are displayed in Figures 2 and 3.

Particulate testing was performed in accordance with EPA Methods 1 - 5, 40 CFR 60, Appendix A. A preliminary velocity traverse and moisture estimation were conducted so that an appropriate sampling nozzle required for isokinetic sample withdrawal could be selected. A PACE sampling train that meets or exceeds the specifications outlined in the above reference was used to collect particulate samples. A temperature controlled glass-lined sampling probe was used to extract flue gas samples and transport them to an all glass filter and cyclone assembly in a temperature controlled oven. The back half of the particulate sampling train consisted of a series of three glass impingers, each of the first two prepared with 100 mls of deionized water, followed by a desiccant packed drying column. In addition, integrated gas samples were collected concurrently with the three particulate runs so that gas composition (Orsat) could be determined. Gas samples were verified in the field with a portable oxygen analyzer to ensure that no leakage occurred between the site and the laboratory. The portable oxygen analyzer was also used to monitor the oxygen content of the flue gas throughout the test.

Opacity evaluations were performed in accordance with EPA Method 9, 40 CFR 60, Appendix A. After positioning himself with respect to the sun, the source and plume (wind) direction, the certified observer proceeds to record opacity readings at 15 second intervals for one hour. A total of 240 observations is recorded in 60 minutes. The readings are integrated to calculate a one-hour average opacity and ten successive six-minute averages. In addition, computer spreadsheets are used to search the data set to find a group of 24 consecutive

readings anywhere within the one-hour evaluation for the highest possible six-minute average.

Air flow determinations were performed in accordance with EPA Method 2 using traverse point protocols specified by EPA Method 1, 40 CFR 60, Appendix A. Point velocity measurements were conducted using a S-Type pitot tube and a Neotronics Model EDM-1 Electronic Digital Manometer. Source gas moisture content was estimated using wet bulb/dry bulb temperature measurements.

Northland Constructors
Twig, Minnesota
Drum Dryer Baghouse Stack

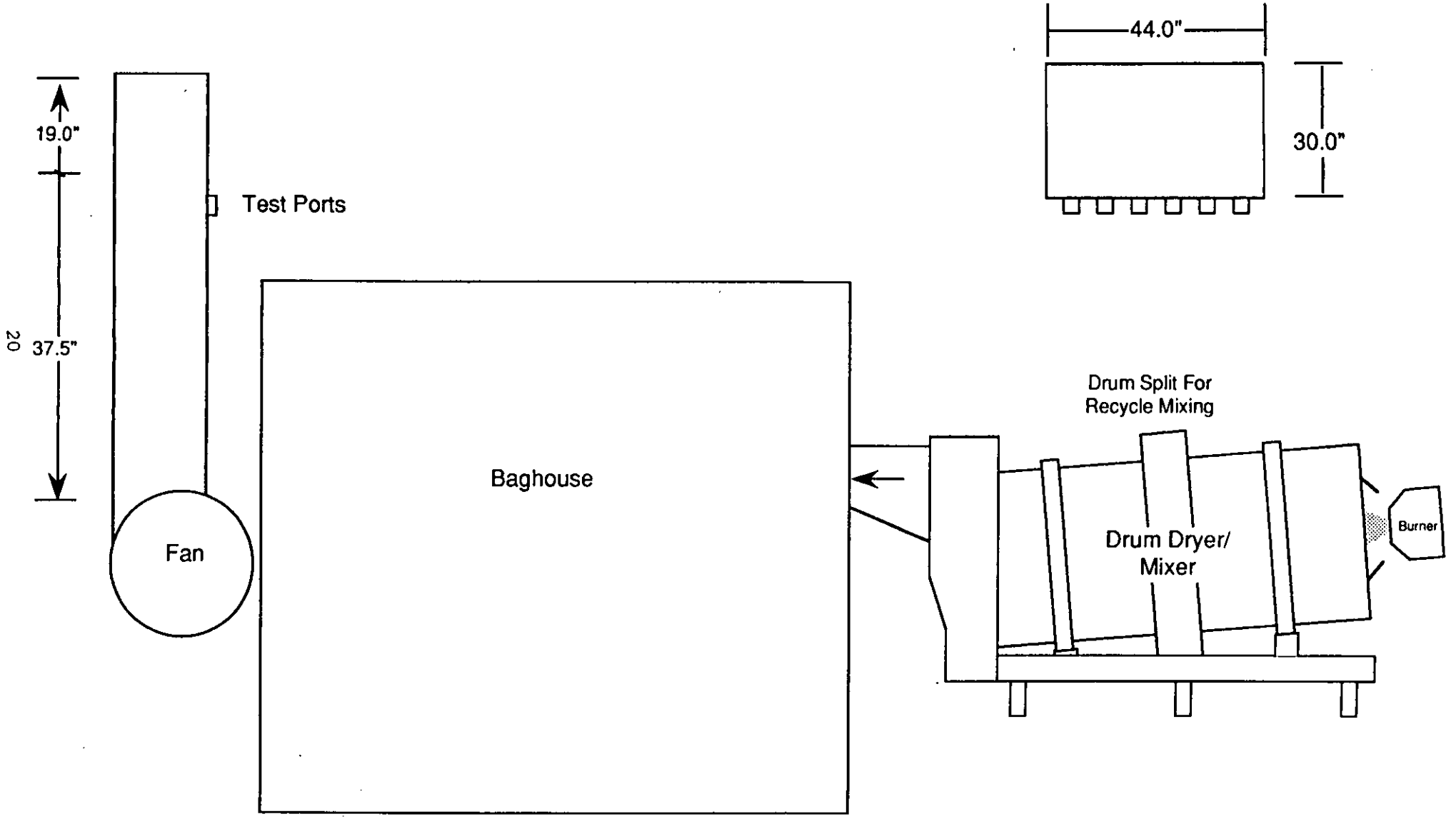


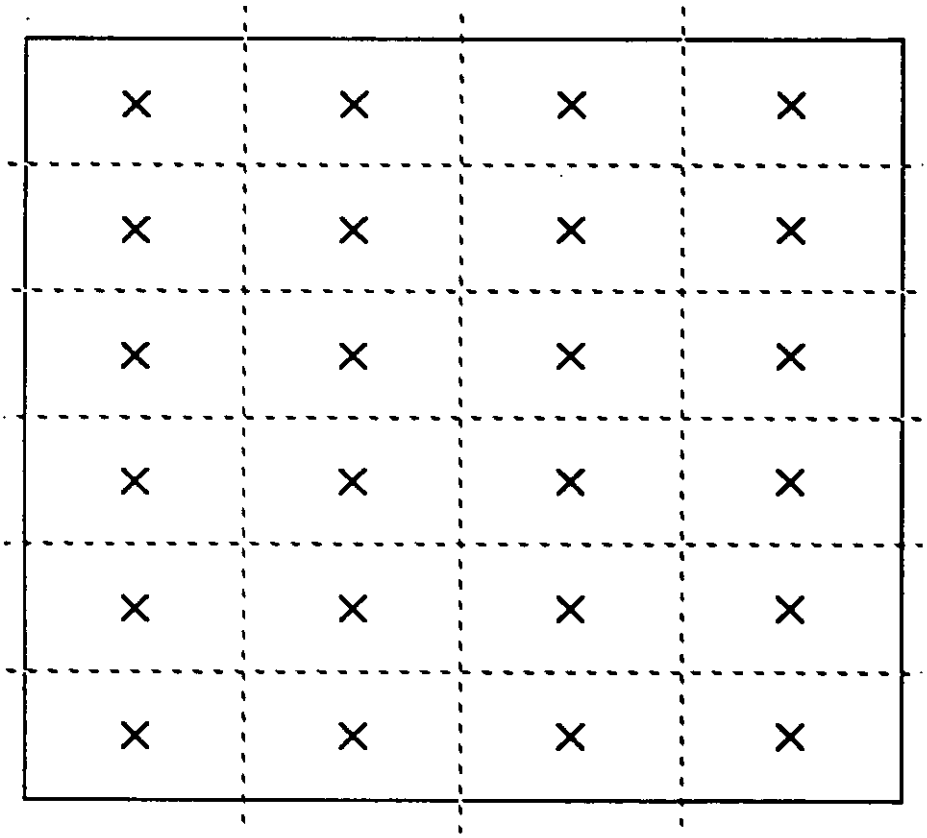
Figure 2

Northland Constructors

Twig, Minnesota

Baghouse Stack

Location of Traverse Points



Duct Dimensions (Inches)	44.0 x 30.0
Number of Sampling Ports	6
Number of Traverse Points	24

Figure 3

APPENDIX A

Field Data Sheets and Notes

EPA METHODS 2-5 FIELD DATA SHEETS

pace. INCORPORATED "THE ASSURANCE OF QUALITY"

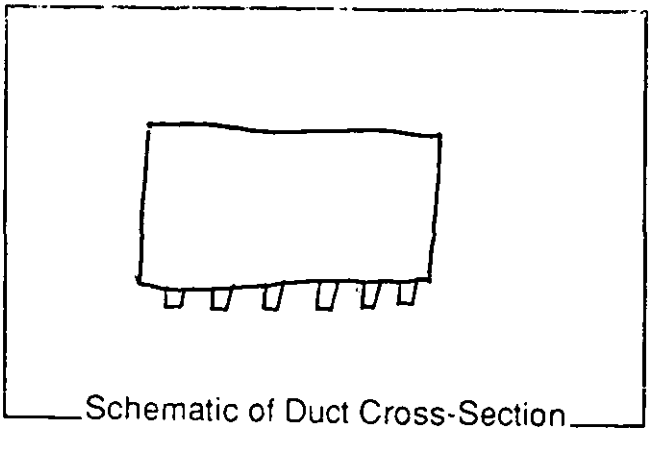
AIR SAMPLING DEPARTMENT

EPA Method 2 Field Data Sheet

Project Northland Constructors
Test Location Baghouse Outlet Stack
Date 8/29/94 Test 1 Run
Operators MEV MAM
Barometric Pressure 28.56 Inches Hg
Static Pressure -.75 Inches H_2O
Pitot Leak Check - Positive 0.0 Negative 0.0

Pitot Tube No. ~~27~~ 11 MEV Cp .842
Pressure Measurement Device 0-1 Manometer
Duct Dimensions 30.0 x 44.0 Inches
Port Length 3.5 Inches
Temp. - Dry Bulb 291 °F, Wet Bulb 171 °F
Moisture Content 39 %
320P Oxygen Concentration 16.0 %
Time of Measurement 755 (24 Hr. Clock)

Traverse Point Identification				Cyclonic Flow Yaw Angle	Velocity Head ΔP Inches H_2O	Stack Temperature °F
Point Number	% Of Diameter	Inches From: Wall	Inches From: Port			
A 1		3.75	7.25	0°	1.10	
2		11.25	14.75	2°	2.40	
3		18.75	22.25	1°	1.50	
4		26.25	29.75	2°	2.80	
B 1				4°	1.00	
2				1°	1.00	
3				2°	1.90	Avg ΔP: 1.327
4				2°	1.10	o.d. .244
C 1				3°	.60	Vain.
2				1°	.80	
3				0°	1.60	~~2-1 = .186~~
4				6°	2.00	2-2 = .249
D 1				2°	.50	
2				4°	.80	
3				1°	1.45	
4				1°	1.90	
E 1				5°	.52	
2				3°	.70	
3				1°	1.45	
4				3°	1.90	
F 1				2°	.55	
2				1°	.63	
3				0°	1.20	
4				0°	2.45	



Schematic of Duct Cross-Section

Computer Data Summary:

Stack Pressure 28.50 Inches Hg
Duct Area 9.167 Square Feet
Molecular Weight - M_d 29.43
Molecular Weight - M_s 24.97
Avg. Duct Temperature 291 °F
Average $\sqrt{\Delta P}$ 1.1163
Flue Gas Velocity 82.54 Feet/Sec.
Volumetric Flow Rate:
ACFM 45396
DSCFM 18548

AS 102

AIR SAMPLING DEPARTMENT

Field Computer Summary

Project Name: Northland Constructors Operator ~~CHS~~ MEW
Sampling Location: Baghouse Outlet Stack
Date of Test: 8/29/94
Test Number: 1

Initialization Parameters		Run Specific Input Parameters	Run 1	Run 2	Run 3	Run 4
Meter Coef. - ∂	= .9990	V/O	856.50	902.70	949.70	
Orif. Coef. - ΔH@	= 2.141	No. Of Points	24	24	24	
Pitot Coef. - C_p	= .843	MC	39.0	44.0	39.0	
Nozzle Dia. - D_n	= .249	V/F	902.30	947.81	996.01	
Bar. Pres. - P_b	= 28.56	Grams H_2O	727	575	788	
Time/Point - ΔT	= 2.5	Run Time	60	60	60	
Moisture Content	= 39.0	1-Rnd/2-Rect	2	2	2	
% Oxygen	= 16.0	Diameter(Ins.)	—	—	—	
Meter Temp. - t_m	= 65	Length(Ins.)	30	30	30	
Static Pres. - P_g	= -.75	Width(Ins.)	44	44	44	

End Of Run Summary

	Run 1	Run 2	Run 3	Run 4
Avg. √ΔP	1.228	1.213	1.213	
Avg. ΔH	2.094	2.025	2.110	
Avg. t_s	309.50	306.46	309.21	
Avg. t_m	79.40	77.54	83.46	
Standard Vol.	42.98	42.47	43.14	
Moist. Content	44.15	38.92	46.23	
Avg. Gas Vel.	92.64	91.38	91.53	
% Isokinetic	104.47	95.31	110.17	
ACFM	50948	50254		
DSCFM	18599	20145		

EPA Method 5 Field Data Sheet

Project Northland Constructors Train No. CM-4,P-7,B-2 Pitot Tube No. 27 C_p .843
Sample Location Baghouse Outlet Stack Meter Coef. ∂ .9990 Bar. Pres. 28.56 Ins. Hg
Date 8/29/94 Test 1 Run 1 Orifice Coef. ΔH@ 2.141 Static Pres. -.75 Ins. H_2O
Operators ~~CHS~~ MEW Nozzle No. 2-2 D_n .249 Estimated MC 39.0 %
856.50

Sampling Train Leak Checks:
Pretest 0.00 @ 15 Ins. Hg
Posttest .005 @ 8.0 Ins. Hg
Pitot - Positive 0.0 Negative 0.0

Point No.	Time ΔT	Meter Vol. V_m Cubic Feet	Velocity Head - ΔP Inches WC	Orifice Meter - ΔH Inches WC	Desired ΔV_m	Desired V_m	Vacuum Inches Hg	Stack Temp. °F	Sampling Train Temperatures - °F: Filter	Probe	Impinger Outlet	Meter Inlet	Meter Outlet	320 P Oxygen Percent	
	(0923)	(~~854.10~~)													
A 4	2.5	858.53	1.80	2.67	216	866	5.2	300	228	243	63	74	70	6.5	
3	5.0	860.70	2.00	2.96	227	093	6.8	305	230	243	62	79	70	6.5	M = 43
2	7.5	863.01	2.00	2.73	219	312	7.2	305	230	245	73	80	71	6.5	
1	10.0	865.09	1.80	2.45	207	519	7.1	308	239	246	67	81	71	6.4	
B 4	12.5	866.77	1.15	1.57	166	686	4.2	305	246	247	68	79	72	6.5	301/175=
3	15.0	868.60	1.50	2.04	~~186~~ 189	875	4.9	309	250	246	65	81	72	6.6	
2	17.5	870.53	1.45	1.98	187	062	5.2	306	250	243	63	83	73	6.5	
1	20.0	872.26	1.15	1.57	166	228	4.8	308	251	245	~~862~~	84	73	6.5	
C 4	22.5	873.82	1.05	1.44	159	~~887~~	4.0	308	249	241	63	82	74	6.5	
3	25.0	875.52	1.30	1.78	177	56 387	4.8	307	250	248	58	84	74	6.6	
2	27.5	877.36	1.35	1.85	181	746	5.0	308	249	248	58	85	74	6.4	
1	30.0	879.21	1.50	2.06	191	937	5.3	306	251	244	59	86	75	6.4	306/174= 42
D 4	32.5	881.02	1.20	1.65	171	108	4.8	306	250	243	60	83	75	6.4	
3	35.0	882.71	1.40	1.92	184	292	5.0	306	249	250	59	85	75	6.4	
2	37.5	884.65	1.50	2.05	191	483	5.6	312	251	240	60	87	76	6.4	
1	40.0	886.69	1.80	2.46	209	692	6.9	313	250	243	61	87	76	6.5	
E 4	42.5	889.50	1.40	1.92	185	876	5.7	312	251	241	62	85	77	6.6	313/170 =42
3	45.0	890.39	1.40	1.91	184	060	5.8	315	250	252	63	87	77	6.5	
2	47.5	892.38	1.55	2.12	194	255	6.3	314	249	244	65	88	77	6.5	
1	50.0	894.48	1.85	2.52	212	466	7.1	317	249	242	65	88	77	6.5	
F 4	52.5	896.33	1.50	2.05	191	658	6.8	313	250	241	62	86	78	6.7	313/174=
3	55.0	898.22	1.45	1.98	188	845	6.8	314	249	251	59	88	78	6.8	
2	57.5	900.19	1.50	2.05	191	037	6.3	315	250	245	58	89	78	6.9	
1	60.0	902.30	1.85	2.53	212	249	7.8	316	250	244	58	89	79	6.8	
	(1029)														
	0-60	V_m = 4580	1.228	ΔH = 2.094				$\bar{T}_s$ = 309.50					$\bar{T}_m$ = 79.40		

Samples Recovered: Filter No. ~~3217~~ 3199 MEW ; ☑ Probe Wash; ☑ Wet Catch; ☐ Other _____ 364 + 360 + 70 = 794

Integrated Gas Sampling Data:
Box No. B-2
Bag No. 1
Bag Vol. 40 Liters
Bag Material Tedlar
Leak Checks 0.0 cc/min. @ 25"Hg
Positest O_2 Reading 6.7
320 P No. OX-3

Moisture Recovery Data:

Impinger No.	1	2	3	4	Desiccant	Total
Final Volume						
Initial Volume	100	100	0		~~1363~~ 1576	
Difference					~~79~~ 1448	722

794 - 200 = 594 + 128

EPA Method 5 Field Data Sheet

MEL
10.0

Project Northland Constructors Train No. CM-4P-7B-2 Pitot Tube No. 27 C_p .843 Sampling Train Leak Checks:
Sample Location Baghouse Outlet Stack Meter Coef. ∂ .9990 Bar. Pres. 28.56 Ins. Hg Pretest 0.00 @ 15 Ins. Hg
Date 8/29/94 Test 1 Run 2 Orifice Coef. ΔH@ 2.141 Static Pres. -.75 Ins. H_2O Posttest 0.00 @ 7.0 Ins. Hg
Operators EHS MEL Nozzle No 2-2 D_n .249 Estimated MC 44.0 % Pitot - Positive 00 Negative 0.0

Point No.	Time ΔT 1135	Meter Vol. V_m Cubic Feet	Velocity Head - ΔP Inches WC	Orifice Meter - ΔH Inches WC	Desired ΔV_m	Desired V_m	Vacuum Inches Hg	Stack Temp. °F	Sampling Train Temperatures - °F: Filter	Probe	Impinger Outlet	Meter Inlet	Meter Outlet	320 P Oxygen Percent	
	(~~1058~~)	(902.70)													
A 4	2.5	904.45	1.45	1.87	182	452	3.8	308	250	247	51	78	78	6.3	
3	5.0	906.33	1.90	2.45	208	660	4.9	305	251	246	54	72	74	6.4	
2	7.5	908.57	2.00	2.58	212	877	5.5	300	252	243	56	74	74	6.4	900/171=40
1	10.0	910.60	1.85	2.69	217	089	5.8	300	253	240	63	77	74	6.5	
B 4	12.5	912.41	1.25	1.82	179	268	4.1	300	251	235	64	77	73	6.5	
3	15.0	914.41	1.65	2.39	205	473	5.1	304	247	240	65	80	73	6.6	304/173=40
2	17.5	916.40	1.50	2.06	190	663	4.9	304	249	247	65	81	73	6.6	42
1	20.0	918.22	1.15	1.58	167	830	4.6	305	250	249	63	81	73	6.7	
C 4	22.5	919.84	1.15	1.58	167	996	3.8	305	248	243	57	79	73	6.6	
3	25.0	921.78	1.55	2.11	193	189	4.7	306	248	246	58	81	73	6.5	306/173=42
2	27.5	923.69	1.45	1.98	187	376	4.7	306	249	249	58	83	73	6.5	
1	30.0	925.41	1.20	1.65	171	547	4.3	304	251	244	58	83	73	6.4	
D 4	32.5	927.19	1.30	1.78	177	724	4.3	305	249	245	55	80	73	6.4	
3	35.0	929.03	1.45	1.99	187	911	4.8	305	248	250	55	83	73	6.5	305/172=42
2	32.5	931.01	1.55	2.12	194	105	4.9	306	250	247	56	84	73	6.5	
1	40.0	933.02	1.60	2.19	197	302	5.0	307	251	247	57	84	73	6.5	
E 4	42.5	934.71	1.30	1.77	177	479	4.3	310	250	241	58	81	74	6.5	
3	45.0	936.53	1.40	1.90	183	662	4.8	311	249	245	57	84	74	6.3	311/175=42
2	47.5	938.40	1.50	2.05	190	853	5.0	310	250	245	57	85	74	6.4	
1	50.0	940.45	1.70	2.32	203	055	5.2	311	250	246	58	86	74	6.4	
F 4	52.5	942.29	1.45	1.98	187	243	5.0	311	250	244	60	83	74	6.7	
3	55.0	944.10	1.25	1.71	174	416	5.0	310	249	245	59	85	74	6.6	310/173=42
2	57.5	945.88	1.25	1.71	174	590	4.8	310	251	246	60	86	75	6.7	
1	60.0	947.81	1.70	2.32	203	793	5.5	312	251	244	60	86	75	6.7	
(1241)	(~~1141~~)														
	θ=60	V_m 45.11	1.213	ΔH=2.029				$\bar{T}_s$=306.46					$\bar{T}_m$=77.54		

Samples Recovered: Filter No. 3220 ; ☑ Probe Wash; ☑ Wet Catch; ☐ Other _____

Integrated Gas Sampling Data:

Box No. B-2
Bag No. 2
Bag Vol. 40 Liters
Bag Material Tedlar
Leak Checks 0.0 cc/min. @ 25"Hg
Posttest O_2 Reading 6.8
320 P No. OX-3

Moisture Recovery Data:

Impinger No.	1	2	3	4	Desiccant	Total
Final Volume	336	368	56	X	1378	
Initial Volume	100	100	0	X	1363	
Difference	236	268	56	X	15	575

AS 10%

EPA Method 5 Field Data Sheet

10.0

Project Northland Constructors — Train No. CM-4 D-7 B-2 — Pitot Tube No. 27 C_p .843 — Sampling Train Leak Checks:
Sample Location Bughouse Outlet Stack — Meter Coef. ∂ .9990 — Bar. Pres. 28.56 Ins. Hg — Pretest 0.00@ 25 Ins. Hg
Date 8/29/94 Test 1 Run 3 — Orifice Coef. ΔH@ 2.141 — Static Pres. -.75 Ins. H_2O — Posttest 0.00@ 12.2° Ins. Hg
Operators CHS MEL — Nozzle No. 2-2 D_n .249 — Estimated MC 39.0 % — Pitot - Positive 0.0 Negative 0.0

Point No.	Time ΔT	Meter Vol. V_m Cubic Feet	Velocity Head - ΔP Inches WC	Orifice Meter - ΔH Inches WC	Desired ΔVm	Desired V_m	Vacuum Inches Hg	Stack Temp. °F	Sampling Train Temperatures - °F: Filter	Probe	Impinger Outlet	Meter Inlet	Meter Outlet	320 P Oxygen Percent	
	(1304)	(949.70)													
A 4	2.5	951.72	1.75	2.60	214	184	7.1	310	229	234	59	78	75	6.5	173/330
3	5.0	954.01	1.95	2.92	227	411	8.8	303	229	247	58	83	75	6.5	172/333=34
2	7.5	956.22	2.00	3.00	230	641	9.6	305	230	253	59	85	75	6.5	
1	10.0	958.48	1.90	2.86	225	866	9.8	304	242	244	64	86	76	6.5	
B 4	12.5	960.36	1.20	1.81	179	046	7.9	305	250	249	66	83	76	6.6	174/308=4
3	15.0	962.37	1.50	2.24	199	245	7.6	308	248	245	64	86	76	6.5	
2	17.5	964.35	1.40	2.10	193	438	7.5	309	250	242	61	88	76	6.5	
1	20.0	966.21	1.25	1.89	183	620	7.2	309	250	245	60	88	77	6.4	
C 4	22.5	967.94	1.15	1.58	169	788	6.5	310	250	246	61	86	77	6.3	
3	25.0	969.78	1.45	1.98	188	976	6.4	312	248	247	58	89	77	6.2	175/310=42
2	27.5	971.60	1.45	2.00	184	1765	6.4	310	250	242	57	90	77	6.2	
1	30.0	973.38	1.40	1.93	185	350	6.5	310	250	249	57	90	78	6.1	
D 4	32.5	975.11	1.20	1.66	172	522	6.2	308	250	247	56	88	78	6.4	174/308=4
3	35.0	977.01	1.40	1.93	185	708	6.7	309	243	245	55	90	78	6.3	
2	37.5	979.03	1.50	2.07	192	900	7.8	310	249	243	55	91	79	6.3	
1	40.0	981.00	1.65	2.28	202	102	8.1	311	250	245	57	92	79	6.2	
E 4	42.5	982.72	1.20	1.66	172	274	6.6	310	250	245	59	89	80	6.2	
3	45.0	984.43	1.25	1.72	175	449	6.5	312	249	246	58	92	80	6.3	174/312=4
2	47.5	986.38	1.50	2.07	193	642	8.0	312	250	249	58	92	86	6.2	
1	50.0	988.50	1.85	2.56	214	856	9.2	311	250	248	59	93	81	6.2	
F 4	52.5	990.34	1.40	1.94	186	042	7.5	312	250	243	59	91	81	6.2	174/311=42
3	55.0	992.11	1.15	1.59	169	211	6.8	311	249	249	58	93	81	6.2	
2	57.5	993.90	1.30	1.80	180	391	6.9	310	249	244	57	93	82	6.4	
1	60.0	996.01	1.80	2.50	212	603	8.8	310	250	246	56	94	82	6.4	
	(1411)														
	Θ=60	V_m = 46.31	1.213	ΔH= 2.110				$\bar{T}_s$ = 309.21					$\bar{T}_m$ = 83.46		

Samples Recovered: Filter No. 3232 ; ☑ Probe Wash; ☑ Wet Catch; ☐ Other _____

Integrated Gas Sampling Data:

Box No. B-2 — Bag Material Tedlar
Bag No. 3 — Leak Checks 0.0 cc/min. @ 25"Hg
Bag Vol. 40 Liters — Positest O_2 Reading 6.5
320 P No. OX-3

Moisture Recovery Data:

Impinger No.	1	2	3-2	4	Desiccant	Total
Final Volume	376	365	62		1705	
Initial Volume	100	100	0		1520	
Difference	276	265	62		185	788

EPA METHOD 9 FIELD DATA SHEETS

pace

AIR SAMPLING DEPARTMENT

EPA Method 9 Field Data Sheet

Project Northland Constructors
Source No. 1 I.D. Baghouse Stack
Source No. 2 I.D. _____
Test No. 1

Evaluation Date 8-29-94
Observer Curt Stock : Matt McDermott
Certification Date April 7, 1994

Source No. 1

Type of Source Hot Mix Control Device Baghouse
Fuel Type Butane Load _____

Source No. 2

Type of Source _____ Control Device _____
Fuel Type _____ Load _____

Source Height(s) 20' Outlet Dimensions 30x44

Plume Description:

Type ☐ Coning ☐ Fanning ☐ Looping ☒ Lofting ☐ Fumigating
Color Wisp White Steam Length 200'
Steam Plume ☐ Attached ☒ Detached ☐ No Visible Steam

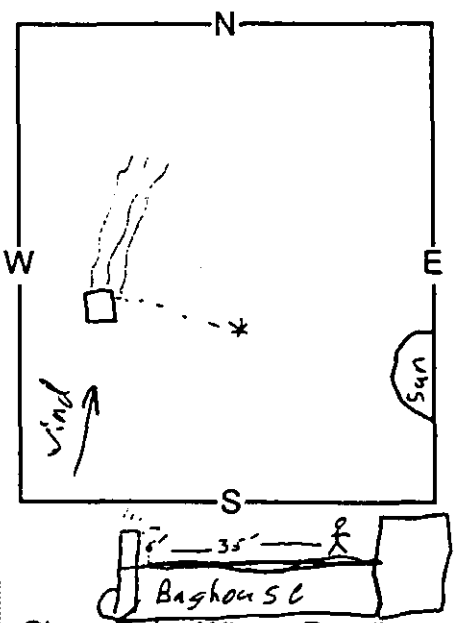
Background Description (Type, color) Green Trees

Meteorological Conditions (clear, % cloudy, etc.) Overcast
2nd Run was partly Cloudy
Wind Direction South Speed 2-7 mph
Ambient Temp. 65 °F

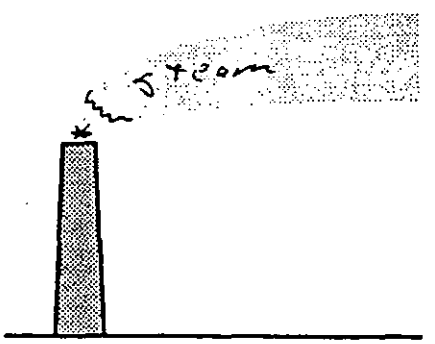
Location of Observer (direction and distance)
35' East of Stack

Personnel Present During Observation
Matt McDermott

Show Observer's Position In Relation to the Source, Plume and Lighting



Show Point Where Readings Were Evaluated In Relation to the Source Outlet and the Steam Plume



Comments (include any changes to the above during evaluation) Curt Stock observed 1st Run. Matt McDermott observed Runs 2 & 3

EPA Method 9 Field Data Sheet

Page 2

Source No. 1

Time Start 0930 Time Stop 1030

Run 1

Sec / Min.	0	15	30	45	Sec / Min.	0	15	30	45
0	0	0	0	0	30	0	0	0	0
1	0	0	0	0	31	0	0	0	0
2	0	0	0	0	32	0	0	0	0
3	0	0	0	0	33	0	0	0	0
4	0	0	0	0	34	0	0	0	0
5	0	0	0	0	35	0	0	0	0
6	0	0	0	0	36	0	0	0	0
7	0	0	0	0	37	0	0	0	0
8	0	0	0	0	38	0	0	0	0
9	0	0	0	0	39	0	0	0	0
10	0	0	0	0	40	0	0	0	0
11	0	0	0	0	41	0	0	0	0
12	0	0	0	0	42	0	0	0	0
13	0	0	0	0	43	0	0	0	0
14	0	0	0	0	44	0	0	0	0
15	0	0	0	0	45	0	0	0	0
16	0	0	0	0	46	0	0	0	0
17	0	0	0	0	47	0	0	0	0
18	0	0	0	0	48	0	0	0	0
19	0	0	0	0	49	0	0	0	0
20	0	0	0	0	50	0	0	0	0
21	0	0	0	0	51	0	0	0	0
22	0	0	0	0	52	0	0	0	0
23	0	0	0	0	53	0	0	0	0
24	0	0	0	0	54	0	0	0	0
25	0	0	0	0	55	0	0	0	0
26	0	0	0	0	56	0	0	0	0
27	0	0	0	0	57	0	0	0	0
28	0	0	0	0	58	0	0	0	0
29	0	0	0	0	59	0	0	0	0

Source No. 1

Time Start 1135 Time Stop 1235

Run 2

Sec / Min.	0	15	30	45	Sec / Min.	0	15	30	45
0	0	0	0	0	30	0	0	0	0
1	0	0	0	0	31	0	0	0	0
2	0	0	0	0	32	0	0	0	0
3	0	0	0	0	33	0	0	0	0
4	0	0	0	0	34	0	0	0	0
5	0	0	0	0	35	0	0	0	0
6	0	0	0	0	36	0	0	0	0
7	0	0	0	0	37	0	0	0	0
8	0	0	0	0	38	0	0	0	0
9	0	0	0	0	39	0	0	0	0
10	0	0	0	0	40	0	0	0	0
11	0	0	0	0	41	0	0	0	0
12	0	0	0	0	42	0	0	0	0
13	0	0	0	0	43	0	0	0	0
14	0	0	0	0	44	0	0	0	0
15	0	0	0	0	45	0	0	0	0
16	0	0	0	0	46	0	0	0	0
17	0	0	0	0	47	0	0	0	0
18	0	0	0	0	48	0	0	0	0
19	0	0	0	0	49	0	0	0	0
20	0	0	0	0	50	0	0	0	0
21	0	0	0	0	51	0	0	0	0
22	0	0	0	0	52	0	0	0	0
23	0	0	0	0	53	0	0	0	0
24	0	0	0	0	54	0	0	0	0
25	0	0	0	0	55	0	0	0	0
26	0	0	0	0	56	0	0	0	0
27	0	0	0	0	57	0	0	0	0
28	0	0	0	0	58	0	0	0	0
29	0	0	0	0	59	0	0	0	0

Observer Signature

AIR SAMPLING DEPARTMENT

EPA Method 9 Field Data Sheet

Project Northland Constructors
Source No. 1 I.D. Baghouse Stack
Source No. 2 I.D. _____
Test No. 1 Run 3

Evaluation Date 8-29-94
Observer Curt Stock - Matt McDermott
Certification Date April 7, 1994

Source No. 1

Type of Source Hot Mix Control Device Baghouse
Fuel Type Butane Load _____

Source No. 2

Type of Source _____ Control Device _____
Fuel Type _____ Load _____

Source Height(s) 20' Outlet Dimensions 30"x44"

Plume Description:

Type ☐ Coning ☐ Fanning ☐ Looping ☑ Lofting ☐ Fumigating
Color white steam Length 200'
Steam Plume ☐ Attached ☒ Detached ☐ No Visible Steam

Background Description (Type, color) Green Trees & Blue Sky

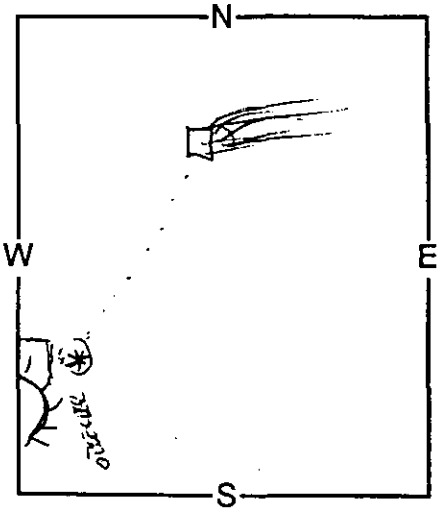
Meteorological Conditions (clear, % cloudy, etc.) Overcast
3rd Run with partly cloudy

Wind Direction South Speed 2-7 mph
Ambient Temp. ~~68~~ 80 °F
1pm

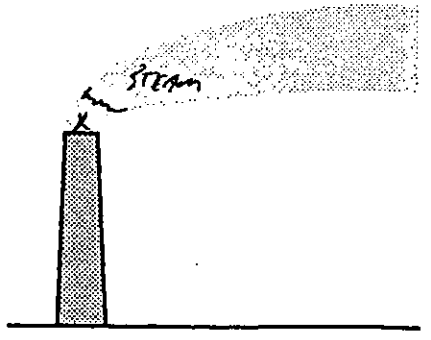
Location of Observer (direction and distance) 35' East of Stack Southwest of stack 90' for 3rd Run.

Personnel Present During Observation
Matt McDermott Curt Stock

Show Observer's Position In Relation to the Source, Plume and Lighting



Show Point Where Readings Were Evaluated In Relation to the Source Outlet and the Steam Plume



Comments (include any changes to the above during evaluation) _____

AIR SAMPLING DEPARTMENT

EPA Method 9 Field Data Sheet

Page 2

Source No. 1

Time Start 1304 Time Stop 1404

Run # 3

Sec / Min.	0	15	30	45	Sec / Min.	0	15	30	45
0	0	0	0	0	30	0	0	0	0
1	0	0	0	0	31	0	0	0	0
2	0	0	0	0	32	0	0	0	0
3	0	0	0	0	33	0	0	0	0
4	0	0	0	0	34	0	0	0	0
5	0	0	0	0	35	0	0	0	0
6	0	0	0	0	36	0	0	0	0
7	0	0	0	0	37	0	0	0	0
8	0	0	0	0	38	0	0	0	0
9	0	0	0	0	39	0	0	0	0
10	0	0	0	0	40	0	0	0	0
11	0	0	0	0	41	0	0	0	0
12	0	0	0	0	42	0	0	0	0
13	0	0	0	0	43	0	0	0	0
14	0	0	0	0	44	0	0	0	0
15	0	0	0	0	45	0	0	0	0
16	0	0	0	0	46	0	0	0	0
17	0	0	0	0	47	0	0	0	0
18	0	0	0	0	48	0	0	0	0
19	0	0	0	0	49	0	0	0	0
20	0	0	0	0	50	0	0	0	0
21	0	0	0	0	51	0	0	0	0
22	0	0	0	0	52	0	0	0	0
23	0	0	0	0	53	0	0	0	0
24	0	0	0	0	54	0	0	0	0
25	0	0	0	0	55	0	0	0	0
26	0	0	0	0	56	0	0	0	0
27	0	0	0	0	57	0	0	0	0
28	0	0	0	0	58	0	0	0	0
29	0	0	0	0	59	0	0	0	0

~~Source No. 2.~~

Time Start _____ Time Stop _____

Sec / Min.	0	15	30	45	Sec / Min.	0	15	30	45
0					30				
1					31				
2					32				
3					33				
4					34				
5					35				
6					36				
7					37				
8					38				
9					39				
10					40				
11					41				
12					42				
13					43				
14					44				
15					45				
16					46				
17					47				
18					48				
19					49				
20					50				
21					51				
22					52				
23					53				
24					54				
25					55				
26					56				
27					57				
28					58				
29					59				

Observer Signature [signature]

VISIBLE EMISSION EVALUATOR CERTIFICATION

VISIBLE EMISSIONS EVALUATOR

This is to certify that

Matthew A. McDermott

met the specifications of Federal Reference Method 9 and qualified as a visible emissions evaluator. Maximum deviation on white and black smoke did not exceed 7.5% opacity and no single error exceeding 15% opacity was incurred during the certification test conducted by Eastern Technical Associates of Raleigh, North Carolina. This certificate is valid for six months from date of issue.

Thomas Hoare
President

243061
Certificate Number

Vice President

Minneapolis
Location

David B. Savage, Jr.
Program Manager

April 7, 1994
Date of Issue

VISIBLE EMISSIONS EVALUATOR

This is to certify that

Curtis N. Stock

met the specifications of Federal Reference Method 9 and qualified as a visible emissions evaluator. Maximum deviation on white and black smoke did not exceed 7.5% opacity and no single error exceeding 15% opacity was incurred during the certification test conducted by Eastern Technical Associates of Raleigh, North Carolina. This certificate is valid for six months from date of issue.

Thomas Rose
President

043064
Certificate Number

Vice President

Minneapolis
Location

David B. Savage, Jr.
Program Manager

April 6, 1994
Date of Issue

APPENDIX B

Laboratory Data and Reports

ORSAT ANALYTICAL DATA

EPA Method 3 Laboratory Summary Sheet

Project Northland Constructors
Sampling Location Baghouse Outlet Stack
Sampling Date 8/29/94
Project Number 940825.401

Analyst M Wilson
Analysis Date 8/30/94
Apparatus Leak Check - Pos. 0.0 Neg. 0.0
Apparatus Identification OB-01
Sample Type ☑ Integrated ☐ Grab

Test No.	Run No.	Orsat Analyzer Results			F_o	O_2 Analyzer Results		Sample Container
		% CO_2	% O_2	% CO		Field	Lab	
1	0	0.00	20.90		—	N/A	N/A	☑ Tedlar™ Bag ☐ Glass Bulb
1	1	9.00	~~14.1~~ 6.80 MR		1.567	6.7	6.7	☑ Tedlar™ Bag ☐ Glass Bulb
1	2	9.20	6.75		1.538	6.6	6.7	☑ Tedlar™ Bag ☐ Glass Bulb
1	3	9.45	6.60		1.513	6.5	6.5	☑ Tedlar™ Bag ☐ Glass Bulb
								☐ Tedlar™ Bag ☐ Glass Bulb
								☐ Tedlar™ Bag ☐ Glass Bulb
								☐ Tedlar™ Bag ☐ Glass Bulb
								☐ Tedlar™ Bag ☐ Glass Bulb
								☐ Tedlar™ Bag ☐ Glass Bulb
								☐ Tedlar™ Bag ☐ Glass Bulb

Calculate F_o before evacuating any samples. Compare F_o to expected fuel values. If discrepancies exist, reanalyze samples. Calculate F_o as follows:

$$F_o = \frac{20.9 - \%\,O_2}{\%\,CO_2}$$

Comments _____

F_o Ranges For Common Fuels	
Anthracite Coal & Lignite	1.016 - 1.130
Bituminous Coal	1.083 - 1.230
Distillate Oil	1.260 - 1.413
Residual Oil	1.210 - 1.370
Wood	1.000 - 1.120
Wood Bark	1.003 - 1.130
Natural Gas	1.600 - 1.836
Propane	1.434 - 1.586
Butane	1.405 - 1.553

EPA Method 3 Laboratory Data Sheet

Project Northland Constructors
Sampling Location Baghouse Outlet Stack
Sampling Date 8/29/94
Project Number 940825.401

Analyst M. Wilson
Analysis Date 8/30/94
Apparatus Leak Check - Pos. 0.0 Neg. 0.0
Apparatus Identification OB-01

	Aliquot Volume	CO_2	O_2
Test 1 Run 0	Zero Point 0.00 ml Sample Volume 100.00 ml	Initial Reading 0.00 ml Final Reading 0.00 ml Volume CO_2 0.00 ml % CO_2 0.00 %	Initial Reading 0.00 ml Final Reading 20.90 ml Volume O_2 20.90 ml % O_2 20.90 %
Duplicate	Zero Point ____ ml Sample Volume ____ ml	Initial Reading ____ ml Final Reading ____ ml Volume CO_2 ____ ml % CO_2 ____ %	Initial Reading ____ ml Final Reading ____ ml Volume O_2 ____ ml % O_2 ____ %
Average		% CO_2 0.00 %	% O_2 20.90 %
Test 1 Run 1	Zero Point 0.00 ml Sample Volume 100.00 ml	Initial Reading 0.00 ml Final Reading 9.00 ml Volume CO_2 9.00 ml % CO_2 9.00 %	Initial Reading 9.00 ml Final Reading 15.80 ml Volume O_2 6.80 ml % O_2 6.80 %
Duplicate	Zero Point 0.00 ml Sample Volume 100.00 ml	Initial Reading 0.00 ml Final Reading 9.00 ml Volume CO_2 9.00 ml % CO_2 9.00 %	Initial Reading 9.00 ml Final Reading 15.80 ml Volume O_2 6.80 ml % O_2 6.80 %
Average		% CO_2 9.00 %	% O_2 6.80 %

Comments: _____

EPA Method 3 Laboratory Data Sheet

Project Northland Constructors
Sampling Location Baghouse Outlet Stack
Sampling Date 8/29/94
Project Number 940825.401

Analyst M. Wilson
Analysis Date 8/30/94
Apparatus Leak Check - Pos. 0.0 Neg. 0.0
Apparatus Identification OR-01

	Aliquot Volume	CO_2	O_2
Test 1 Run 2	Zero Point 0.00 ml Sample Volume 100.00 ml	Initial Reading 0.00 ml Final Reading 9.10 ml Volume CO_2 9.10 ml % CO_2 9.10 %	Initial Reading 9.10 ml Final Reading 15.90 ml Volume O_2 6.80 ml % O_2 6.80 %
Duplicate	Zero Point 0.00 ml Sample Volume 100.00 ml	Initial Reading 0.00 ml Final Reading 9.30 ml Volume CO_2 9.30 ml % CO_2 9.30 %	Initial Reading 9.30 ml Final Reading 16.00 ml Volume O_2 6.70 ml % O_2 6.70 %
Average		% CO_2 9.20 %	% O_2 6.75 %
Test 1 Run 3	Zero Point 0.00 ml Sample Volume 100.00 ml	Initial Reading 0.00 ml Final Reading 9.50 ml Volume CO_2 9.50 ml % CO_2 9.50 %	Initial Reading 9.50 ml Final Reading 16.10 ml Volume O_2 6.60 ml % O_2 6.60 %
Duplicate	Zero Point 0.00 ml Sample Volume 100.00 ml	Initial Reading 0.00 ml Final Reading 9.40 ml Volume CO_2 9.40 ml % CO_2 9.40 %	Initial Reading 9.40 ml Final Reading 16.00 ml Volume O_2 6.60 ml % O_2 6.60 %
Average		% CO_2 9.45 %	% O_2 6.60 %

Comments:

PARTICULATE ANALYTICAL DATA

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REPORT OF LABORATORY ANALYSIS

Northland Constructors
4843 Rice Lake Road
Duluth, MN 55803

September 08, 1994
PACE Project Number: 940830503

Attn: Mr. James Oswald

Client Reference: Northland Constructors.

PACE Sample Number:			10 0198978	10 0198986	10 0198994
Date Collected:			08/29/94	08/29/94	08/29/94
Time Collected:			10:45	13:00	14:30
Date Received:			08/30/94	08/30/94	08/30/94
Client Sample ID:			T1R1 Stack Baghouse Outlet	T1R2 Stack Baghouse Outlet	T1R3 Stack Baghouse Outlet
Parameter	Units	MDL			
INORGANIC ANALYSIS					
EPA 5: ORGANIC CONDENSIBLES					
Particulates, filter	g	0.0001	0.00574	0.00559	0.00560
Particulates, probe wash	g	0.0001	0.0190	0.0235	0.0257
Particulates, Organic Condensibles	g	0.0001	0.0026	0.0011	0.0015
Particulates, total-EPA 5	g	0.0001	0.02734	0.03019	0.03280

These data have been reviewed and are approved for release.

Mary Jo Connolly
Project Manager

1710 Douglas Drive N
Minneapolis, MN 55422
TEL: 612-544-5543
FAX: 612-525-3366

Client Reference: Northland Constructors.

MDL Method Detection Limit

1710 Douglas Drive N
Minneapolis, MN 55422
TEL: 612-544-5543
FAX: 612-525-3366

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INORGANIC LABORATORY

EPA Method 5 Particulate Gravimetric Sheet
Organic Condensibles

Batch 58070

Project Northland Constructors
Sampling Location stack baghouse outlet
Sampling Date 8-29-94
Test Number 1
Project Number 940830-503

Analyst IM
Analysis Date(s) 9-1-94
Sampling Reagent DI H2O
LDMS Entry 9-6-94 Initials IM
LDMS Validation 9-7-94 Initials jmc

Sample No. 19897-8	Sample No. 19898-6	Sample No. 19899-4
Run Number 1	Run Number 2	Run Number 3
Dish Number B1 820	Dish Number DON 800	Dish Number TDS 800
Date/Time 9-2-94 | 9:05	Date/Time 9-2-94 | 9:05	Date/Time 9-2-94 | 9:05
Gross Weight 102.9773 g	Gross Weight 102.3474 g	Gross Weight 97.0501 g
Date/Time 9-2-94 | 16:00	Date/Time 9-2-94 | 16:00	Date/Time 9-2-94 | 16:00
Gross Weight 102.9766 g	Gross Weight 102.3469 g	Gross Weight 97.0495 g
Avg. Gross Wt. 102.9770 g	Avg. Gross Wt. 102.3472 g	Avg. Gross Wt. 97.0498 g
Dish Tare Wt. 102.9744 g	Dish Tare Wt. 102.3461 g	Dish Tare Wt. 97.0483 g
Difference 0.0026 g	Difference 0.0011 g	Difference 0.0015 g
Blank Weight 0.0000 g	Blank Weight 0.0000 g	Blank Weight 0.0000 g
Condensible Organic Wt. 0.0026 g	Condensible Organic Wt. 0.0011 g	Condensible Organic Wt. 0.0015 g
Transfer "Condensible Organic Wt." to Box Number 1.	Transfer "Condensible Organic Wt." to Box Number 2.	Transfer "Condensible Organic Wt." to Box Number 3.
WC 1 [0.0026] g	WC 2 [0.0011] g	WC 3 [0.0015] g

AS 106A

EPA Method 5 Particulate Gravimetric Sheet

Particulate In Probe Wash

Project: Northland Constructors
Analyst: IM
Sampling Location: Stack baghouse outlet
Analysis Date(s): 9-1-94
Sampling Date: 8-29-94
Cleanup Reagent(s): Acetone
Test Number: 1
LDMS Entry: _____ Initials: _____
Project Number: 940830-503
LDMS Validation: 9-7-94 Initials: JMC

Sample No. 19897-8	Sample No. 19898-6	Sample No. 19899-4
Run Number 1	Run Number 2	Run Number 3
Dish Number LCS	Dish Number Carol	Dish Number B10
Reagent Vol. 115 ml	Reagent Vol. 80 ml	Reagent Vol. 80 ml
Date/Time 9-2-94 | 9:05	Date/Time 9-2-94 | 9:05	Date/Time 9-2-94 | 9:05
Gross Weight 114.3392 g	Gross Weight 100.6389 g	Gross Weight 103.2085 g
Date/Time 9-2-94 | 16:00	Date/Time 9-2-94 | 16:00	Date/Time 9/2/94 | 16:00
Gross Weight 114.3389 g	Gross Weight 100.6385 g	Gross Weight 103.2080 g
Avg. Gross Wt. 114.3390 g	Avg. Gross Wt. 100.6387 g	Avg. Gross Wt. 103.2082 g
Dish Tare Wt. 114.3197 g	Dish Tare Wt. 100.6149 g	Dish Tare Wt. 103.1822 g
Difference 0.0193 g	Difference 0.0238 g	Difference 0.0260 g
Blank Weight 0.0003 g	Blank Weight 0.0003 g	Blank Weight 0.0003 g
Particulate In Rinse Weight 0.0190 g	Particulate In Rinse Weight 0.0235 g	Particulate In Rinse Weight 0.0257 g
Transfer "Particulate In Rinse Weight" to Box Number 1.	Transfer "Particulate In Rinse Weight" to Box Number 2.	Transfer "Particulate In Rinse Weight" to Box Number 3.
PW 1 [0.0190] g	PW 2 [0.0235] g	PW 3 [0.0257] g

AS 106 A

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INORGANIC LABORATORY

EPA Method 5 Particulate Gravimetric Sheet

Particulate On Filter

Project: Northland Constructors
Analyst: IM
Sampling Location: Stack baghouse, outlet
Analysis Date(s): 9-1-94
Sampling Date: 8-29-94
Filter Type: Fiberglass
Test Number: 1
LDMS Entry: _____ Initials: _____
Project Number: 940830.503
LDMS Validation: 9-7-94 Initials: JAE

Sample No. 19897.8	Sample No. 19898-6	Sample No. 19899.9
Run Number 1	Run Number 2	Run Number 3
Filter Number 3199	Filter Number 3226	Filter Number 3232
Date/Time 9-2-94 / 9:05	Date/Time 9-2-94 / 9:05	Date/Time 9/2/94 / 9:05
Gross Weight 0.6763 g	Gross Weight 0.6710 g	Gross Weight 0.6714 g
Date/Time 9-2-94 / 16:00	Date/Time 9-2-94 / 16:00	Date/Time 9-2-94 / 16:00
Gross Weight 0.6762 g	Gross Weight 0.6710 g	Gross Weight 0.6714 g
Avg. Gross Wt. 0.67625 g	Avg. Gross Wt. 0.6710 g	Avg. Gross Wt. 0.6714 g
Filter Tare Wt. 0.67051 g	Filter Tare Wt. ~~0.66811~~ 0.66591 g	Filter Tare Wt. 0.6658 g
Difference 0.00574 g	Difference 0.00559 g	Difference 0.00560 g
Particulate On Filter Weight 0.00574 g	Particulate On Filter Weight 0.00559 g	Particulate On Filter Weight 0.00560 g
Transfer "Particulate On Filter Weight" to Box Number 1.	Transfer "Particulate On Filter Weight" to Box Number 2.	Particulate On Filter Weight" to Box Number 3.
Sum particulate weights from each box labeled "1" and record in box labeled "T1."	Sum particulate weights from each box labeled "2" and record in box labeled "T2."	Sum particulate weights from each box labeled "3" and record in box labeled "T3."
AF 1 0.00574 g	AF 2 0.00559 g	AF 3 0.00560 g
Total T1 0.02734 g	Total T2 0.03019 g	Total T3 0.03280 g

AS 105 A

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INORGANIC LABORATORY

EPA Method 5 Particulate Gravimetric Sheet

Reagent Blanks

Project Northland Constructors
Sampling Location Stack baghouse outlet
Sampling Date 8-29-94
Test Number 1
Project Number 940830.503

Analyst JM
Analysis Date(s) 9-1-94

DMC 9-7-94

Wet Catch

Type:
- ☐ Organic Condensibles (Extract.)
- ☐ Inorganic (Residual)
- ☐ Other
- ☐ Retain For Further Analyses

Reagent A7 DI H2O
Volume ml

Date/Time 9-2-94 | 9.05
Gross Weight 103.7183 g

Date/Time 9-2-94 | 16:00
Gross Weight 103.7182 g

Avg. Gross Wt. 103.7182 g
Dish Tare Wt. 103.7182 g
Difference 0.0000 g

Blank Weight 0.0000 g

Probe Wash

Type:
- ☒ Gravimetric
- ☐ Other
- ☐ Retain For Further Analyses

Reagent 10 Acetone
Volume 100 ml

Date/Time 9-2-94 | 9.05
Gross Weight 106.3203 g

Date/Time 9-2-94 | 16:00
Gross Weight 106.3198 g

Avg. Gross Wt. 106.3200 g
Dish Tare Wt. 106.3197 g
Difference 0.0003 g

Blank Weight 0.0003 g

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REPORT OF LABORATORY ANALYSIS

September 13, 1994

Mr. James Oswald
Northland Constructors
4843 Rice Lake Road
Duluth, MN 55803

RE: PACE Project No. 940830.502
Client Reference: Northland Constructors.

Dear Mr. Oswald:

Enclosed is the report of laboratory analyses for samples received August 30, 1994.

Footnotes are given at the end of the report.

If you have any questions concerning this report, please feel free to contact us.

Sincerely,

Mary Jo Connolly
Project Manager

Enclosures

1710 Douglas Drive N
Minneapolis, MN 55422
TEL: 612-544-5543
FAX: 612-525-3366

Mr. James Oswald
Page 5

FOOTNOTES
for page 4

September 13, 1994
PACE Project Number: 940830502

Client Reference: Northland Constructors.

MDL	Method Detection Limit
ND	Not detected at or above the MDL.
RPD	Relative Percent Difference

1710 Douglas Drive N
Minneapolis, MN 55422
TEL: 612-544-5543
FAX: 612-525-3366

Mr. James Oswald
Page 4

QUALITY CONTROL DATA

September 13, 1994
PACE Project Number: 940830502

Client Reference: Northland Constructors.

Moisture content
Batch: 10 58259
Samples: 10 0198919, 10 0198927, 10 0198935, 10 0198943, 10 0198951
10 0198960

METHOD BLANK AND SAMPLE DUPLICATE:

Parameter	Units	MDL	Method Blank	100198919 T1R1 Aggregate	Duplicate of 10 0198919	RPD
Moisture content	%	0.1	ND	5.6	5.7	2%

1710 Douglas Drive N
Minneapolis, MN 55422
TEL: 612-544-5543
FAX: 612-525-3366

Mr. James Oswald
Page 3

FOOTNOTES
for pages 1 through 2

September 13, 1994
PACE Project Number: 940830502

Client Reference: Northland Constructors.

MDL Method Detection Limit

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Minneapolis, MN 55422
TEL: 612-544-5543
FAX: 612-525-3366

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REPORT OF LABORATORY ANALYSIS

September 13, 1994
PACE Project Number: 940830502

Client Reference: Northland Constructors.

Parameter	Units	MDL	10 0198943 08/29/94 10:45 08/30/94 T1R1 Recycle	10 0198951 08/29/94 13:00 08/30/94 T1R2 Recycle	10 0198960 08/29/94 14:30 08/30/94 T1R3 Recycle
PACE Sample Number:					
Date Collected:					
Time Collected:					
Date Received:					
Client Sample ID:					
INORGANIC ANALYSIS					
INDIVIDUAL PARAMETERS					
Moisture content	%	0.1	6.2	7.0	6.3

The analyses of soil samples were performed 'as received' and do not reflect analyses on a dry weight basis unless indicated.

These data have been reviewed and are approved for release.

Mary Jo Connolly
Project Manager

1710 Douglas Drive N
Minneapolis, MN 55422
TEL: 612-544-5543
FAX: 612-525-3366

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THE ASSURANCE OF QUALITY

REPORT OF LABORATORY ANALYSIS

Northland Constructors
4843 Rice Lake Road
Duluth, MN 55803

September 13, 1994
PACE Project Number: 940830502

Attn: Mr. James Oswald

Client Reference: Northland Constructors.

Parameter	Units	MDL	10 0198919 08/29/94 10:45 08/30/94 T1R1 Aggregate	10 0198927 08/29/94 13:00 08/30/94 T1R2 Aggregate	10 0198935 08/29/94 14:30 08/30/94 T1R3 Aggregate
PACE Sample Number:					
Date Collected:					
Time Collected:					
Date Received:					
Client Sample ID:					
INORGANIC ANALYSIS					
INDIVIDUAL PARAMETERS					
Moisture content	%	0.1	5.6	4.9	5.2

1710 Douglas Drive N
Minneapolis, MN 55422
TEL: 612-544-5543
FAX: 612-525-3366

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18[illegible]38

CHAIN-OF-CUSTODY RECORD
Analytical Request

Client: Northland Constructors
Address:
Phone:

Report To:
Bill To:
P.O. # / Billing Reference:
Project Name / No.: Northland Constructors

Pace Client No.: 123899
Pace Project Manager: ~~EHS~~ MJC
Pace Project No.: P0830.502
*Requested Due Date: 9/12/94

Sampled By (PRINT): Mark E. Wilson
Sampler Signature: Mark E. Wilson
Date Sampled: 8/29/94

ITEM NO.	SAMPLE DESCRIPTION	TIME	MATRIX	PACE NO.	NO. OF CONTAINERS	PRESERVATIVES: UNPRESERVED	H_2SO_4	HNO_3	VOA	ANALYSES REQUEST: Metals 0/0	REMARKS
1	Baghouse Outlet Stack T1 R1 Aggregate	1045	Air	19891.9	1					✓	
2	" " " T1 R2 Aggregate	1300		19892.7	1					✓	
3	" " " T1 R3 Aggregate	1430		19895.5	1					✓	
4	" " " T1 R1 Recycle	1045		19894.3	1					✓	
5	" " " T1 R2 Recycle	1300		19895.1	1					✓	
6	" " " T1 R3 Recycle	1430	↓	19896.0	1					✓	
7											
8											

COOLER NOS.	BAILERS	SHIPMENT METHOD OUT / DATE	SHIPMENT METHOD RETURNED / DATE

ITEM NUMBER	RELINQUISHED BY / AFFILIATION	ACCEPTED BY / AFFILIATION	DATE	TIME
1-6	Mark E Wilson / PACE	[illegible] / Pace	8/30/94	0900

Additional Comments

Field Pro. #- 940825.401

SEE REVERSE SIDE FOR INSTRUCTIONS

APPENDIX C

Calculation Equations and Report Nomenclature

Northland Constructors
Twig, Minnesota
PACE Project No. 940825.401

PACE Incorporated
September 20, 1994

APPENDIX C
METHOD 5 CALCULATION SUMMARY
TEST 1

Baghouse Outlet Stack

Parameter	**Run 1**	**Run 2**	**Run 3**
Date of Run	8/29/94	8/29/94	8/29/94
Sample Duration (Minutes)	60	60	60
Barometric Pressure (inches Hg)	28.56	28.56	28.56
Static Pressure Of Duct (Inches H2O)	-0.75	-0.75	-0.75
Absolute Pressure Of Duct (Inches Hg)	28.50	28.50	28.50
Meter Coefficient	0.999	0.999	0.999
Pitot Tube Coefficient	0.843	0.843	0.843
Nozzle Diameter (Inches)	0.249	0.249	0.249
Area Of Nozzle Opening (Square Feet)	0.000338	0.000338	0.000338
Average $\sqrt{\Delta P}$	1.2274	1.2099	1.2134
Average ΔH	2.09	2.02	2.11
Average Stack Temperature (°R)	769.50	766.46	769.21
Average Meter Temperature (°R)	539.40	537.54	543.58
Meter Volume (Cubic Feet)	45.8	45.11	46.31
Dry Standard Sample Volume (Cubic Feet)	42.98	42.47	43.13
Collected Condensate Volume (mls)	722.0	575.0	788.0
Volume Of Water Vapor (Standard Cubic Feet)	33.98	27.07	37.09
Moisture Content Of Flue Gas (% v/v)	44.15	38.92	46.24
Weight Of Particulate (mg)	27.3	30.2	32.8
Particulate Concentration (GR/DSCF)	0.00981597	0.01096913	0.01173649
Source Gas Velocity (Feet Per Second)	92.8	90.1	92.1
Isokinetic Variation (%)	104.3	96.6	109.5

Calculation Equations

EPA Method 2 Calculations

Flue Gas Linear Velocity

$$V_s = 85.49 \times C_p \times \overline{\sqrt{\Delta P}} \times \sqrt{\frac{\overline{T_s}}{P_s \times M_s}}$$

Volumetric Flow Rates - ACFM, SCFM & DSCFM

$$Q = 60 \times v_s \times A$$

$$Q_s = Q \times \left(\frac{528}{T_s}\right) \times \left(\frac{P_s}{29.92}\right) = Q \times 17.647 \times \left(\frac{P_s}{T_s}\right)$$

$$Q_{sd} = Q_s \times (1 - B_{ws})$$

Mass Flow Rate of Wet Flue Gas

$$m_g = \frac{4.995 \times Q_{sd} \times G_d}{1 - B_{ws}}$$

Actual Gas Density

$$\rho = \frac{0.04585 \times P_s \times M_s}{\overline{T_s}}$$

Where:

A	=	Cross-sectional area of duct at sample point (sq. ft.).
B_{ws}	=	Water vapor in gas stream (proportion by volume).
C_p	=	Pitot tube calibration coefficient.
G_d	=	Flue gas specific gravity relative to air, dimensionless.
m_g	=	Mass flow rate of wet flue gas (LB/HR).
M_s	=	Molecular weight of wet flue gas (LB/LB-mole).
P_s	=	Absolute gas pressure of duct (Inches Hg).
ΔP	=	Velocity pressure measured by pitot tube (Inches WC).
Q	=	Actual flue gas volumetric flow rate (ACFM).
Q_s	=	Volumetric gas flow at standard conditions (SCFM).
Q_{sd}	=	Dry standard volumetric gas flow rate (DSCFM).
T_s	=	Flue gas temperature (°R).
V_s	=	Flue gas linear velocity (feet per second).
ρ	=	Actual flue gas density (LB/CF).

Calculation Equations

EPA Method 3 Calculations

Dry Molecular Weight of Flue Gas

$$M_d = (0.44 \times \%CO_2) + (0.32 \times \%O_2) + (0.28 \times (\%N_2 + \%CO))$$

Wet Molecular Weight of Flue Gas

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

Percent Excess Air

$$\%EA = 100 \times \left(\frac{\%O_2 - (0.05 \times \%CO)}{(0.264 \times \%N_2) - \%O_2 + (0.5 \times \%CO)} \right)$$

Fuel F-factor (for comparison)

$$F_o = \frac{20.9 - \%O_2}{\%CO_2}$$

Where:

B_{ws}	=	Water vapor in gas stream (proportion by volume).
%CO	=	Carbon monoxide in gas stream (percent).
$\%CO_2$	=	Carbon dioxide in gas stream (percent).
%EA	=	Excess air for combustion (percent).
F_o	=	Fuel F-factor for results comparison.
M_d	=	Molecular weight of dry flue gas (LB/LB-mole).
M_s	=	Molecular weight of wet flue gas (LB/LB-mole).
$\%N_2$	=	Nitrogen in gas stream (percent).
$\%O_2$	=	Oxygen in gas stream (percent).

Calculation Equations

EPA Method 4 Calculations

Sample Volume, Standard Conditions

$$V_{std} = 17.647 \times V_m \times Y \times \left(\frac{P_b + \frac{\overline{\Delta H}}{13.6}}{\overline{T_m}} \right)$$

Volume of Water Vapor Sampled

$$V_w = 0.047070 \times V_{lc}$$

Proportion of Water Vapor in Sampled Gas

$$B_{ws} = \frac{V_w}{V_w + V_{std}}$$

Where:

B_{ws}	=	Water vapor in gas stream (proportion by volume).
ΔH	=	Orifice meter differential pressure (Inches WC).
P_b	=	Barometric pressure (Inches Hg).
T_m	=	Sampling train meter temperature (°R).
V_{lc}	=	Total volume of liquid collected in sampling train (mls).
V_m	=	Volume of gas sample measured by gas meter (CF).
V_{std}	=	Gas volume corrected to standard conditions (DSCF).
V_w	=	Volume of water vapor in gas sample (SCF).
Y	=	Dry gas meter calibration coefficient.

Calculation Equations

EPA Method 5 Calculations

Sample Volume, Standard Conditions

$$V_{std} = 17.647 \times V_m \times Y \times \left(\frac{P_b + \frac{\overline{\Delta H}}{13.6}}{\overline{T_m}} \right)$$

Isokinetic Variation

$$I = 0.09450 \times \left(\frac{\overline{T_s} \times V_m}{P_s \times V_s \times A_n \times \theta \times (1 - B_{ws})} \right)$$

Particulate Concentration

$$C_s = 15.432 \times \left(\frac{m_n}{V_{std}} \right)$$

Particulate Mass Rate

$$m_p = 0.008571 \times C_s \times Q_{sd}$$

Where:

A_n	=	Cross-sectional area of nozzle opening (square feet).
B_{ws}	=	Water vapor in gas stream (proportion by volume).
C_s	=	Particulate concentration of gas stream (GR/DSCF).
ΔH	=	Orifice meter differential pressure (Inches WC).
I	=	Isokinetic variation of sampling rate (percent).
m_n	=	Total particulate collected in sampling train (grams).
m_p	=	Particulate mass flow rate (LB/HR).
P_b	=	Barometric pressure (Inches Hg).
P_s	=	Absolute gas pressure of duct (Inches Hg).
Q_{sd}	=	Dry standard volumetric gas flow rate (DSCFM).
T_m	=	Sampling train meter temperature (°R).
T_s	=	Flue gas temperature (°R).
V_m	=	Volume of gas sample measured by gas meter (CF).
V_{std}	=	Gas volume corrected to standard conditions (DSCF).
V_s	=	Flue gas linear velocity (feet per second).
Y	=	Dry gas meter calibration coefficient.
θ	=	Total sampling time of run (minutes).

Calculation Equations

Nomenclature

- A = Cross-sectional area of duct
- A_n = Cross-sectional area of nozzle
- B_{ws} = Water vapor in gas stream, proportion by volume
- C_a = Particulate concentration, actual, wet basis - GR/ACF
- C_p = Pitot tube calibration coefficient
- C_s = Particulate concentration at dry standard conditions - GR/DSCF
- %EA = Excess air, percent by volume
- F_o = Fuel factor
- G_d = Specific gravity relative to air, dimensionless
- I = Isokinetic variation, percent by volume
- M_d = Molecular weight of flue gas, dry, lb/lb-mole
- m_g = Mass flow of wet flue gas, LB/HR
- m_n = Total particulate collected, grams
- m_p = Particulate mass flow, LB/HR
- M_s = Molecular weight of flue gas, wet, lb/lb-mole
- P_b = Barometric pressure, uncompensated, inches of mercury
- P_g = Static pressure of duct, inches of water
- P_s = Absolute gas pressure of duct, inches of mercury
- Q = Actual flue gas volumetric flow rate, ACFM
- Q_{sd} = Dry flue gas volumetric flow rate corrected to standard conditions, DSCFM
- $\overline{T_m}$ = Average dry gas meter temperature, °R
- $\overline{T_s}$ = Average stack gas temperature, °R
- $\emptyset$ = Total sampling time, minutes
- V_{lc} = Total volume of liquid collected in impingers and desiccant, ml
- V_m = Volume of gas sample measured by gas meter, cubic feet
- V_{std} = Volume of gas sample corrected to standard conditions, dry standard cubic feet
- V_w = Volume of water vapor in gas sample, corrected to standard conditions
- V_s = Linear velocity of flue gas, feet per second
- Y = Dry gas meter calibration factor
- ΔH = Orifice meter differential pressure, inches of water
- ΔP = Velocity pressure of flue gas, inches of water
- β = Actual gas density, pounds per cubic foot

APPENDIX D

Test Procedures

OXYGEN AND CARBON DIOXIDE CONCENTRATION (ORSAT)

Integrated gas samples are collected in 40 liter Tedlar™ bags and ultimately transferred to an Orsat gas analyzer for oxygen and carbon dioxide analyses. A PACE sampling train which meets or exceeds the specifications of EPA Method 3, 40 CFR 60, Appendix A is used to collect gas samples. Normally, gas samples are collected at the exhaust of an EPA Method 4 or 5 sampling train since this gas stream is moisture conditioned. Method 4 and 5 sampling equipment is maintained and checked to assure no leaks occur between the flue and the integrated gas sampler.

Gas samples are collected by drawing a portion of the stream through a chemically resistant diaphragm pump and delivering it to the Tedlar™ bag at a constant, settable rate depending on expected sampling time. At the conclusion of sampling, the bag and associated hardware is sealed and labeled. When multiple tests are to be performed, gas samples are often transferred to glass gas collection tubes for storage. A portable oxygen analyzer is used for this to ensure sample integrity.

Samples are analyzed by chemical absorption using an Orsat gas analyzer. Following positive and negative leak checks of the gas analyzer, the system is purged with the gas to be analyzed. The burret is filled with approximately 100 mls of sample gas and the exact volume recorded. The sample line stopcock is closed and the stopcock for the first bubbler containing carbon dioxide absorbent is opened. Several passes are made, bubbling the sample gas through the reagent and the absorbent is returned to the initial mark. The new volume of the burret is recorded and an additional 1-2 passes are made to verify total absorption. Similar procedures are used to quantify oxygen with the same gas aliquot and oxygen absorbent.

PARTICULATE LOADINGS AND EMISSION RATES

Particulate emission rates were determined in accordance with EPA Methods 1-5, 40 CFR 60, Appendix A. Using traverse points determined with EPA Method 1, a preliminary velocity profile was obtained with respect to the velocity traverse, gas temperature, gas pressure and estimated moisture content. From this data sampling nozzles of the appropriate diameter to ensure isokinetic sampling were selected.

The particulate sampling train consists of a temperature controlled ¤ lined sampling probe equipped with a S-type pitot tube and Type K thermocouples to monitor stack temperature and probe liner temperature. The sampling probe is attached to a sample module which houses an all glass in-line filter and cyclone assembly in a temperature controlled oven. The back half of the sampling train consists of a series of three glass impingers followed by a tared desiccant-packed drying column. The sample train is connected by means of a control and sampling umbilical cord to the control module. The control module houses a temperature monitored dry test gas meter, a calibrated orifice, dual inclined manometers, temperature controllers, and necessary flow rate control devices.

Particulate samples are collected by isokinetically extracting a sample gas stream from the flue by means of the sampling probe and passing the stream through the cyclone which collects larger, heavier particles. The sample gas stream then passes through a 4 inch diameter Gelman Type A/E glass fiber filter to collect finer particulates. The filter is followed by an ice-cooled impinger train and a desiccant packed drying column which quantitatively collects all moisture from the sample gas stream. The gas then passes through a leak proof rotary vane sampling pump and a dry test gas meter which integrates the sample volume throughout the course of the test. A calibrated orifice is connected to the gas meter outlet to facilitate sample flow rate adjustment.

Representative particulate samples are collected by sampling the centroid of equal area sections of the duct for equal time periods. The sampling rate is adjusted at each traverse point to ensure isokinetic sampling. Pre-programmed

field computers are used to facilitate rapid determination of the correct sampling rate.

Integrated gas samples are collected concurrently with particulate samples to determine a representative gas composition of the flue gas. Gas samples are collected in Tedlar™ bags throughout the course of the particulate run and analyzed with an Orsat gas analyzer.

At the end of each particulate run, the sampling train is disassembled and the samples recovered. The sampling filter is transferred from the filter holder to its dedicated petri dish. The probe nozzle is acetone rinsed, brushed, rinsed again and the washings placed in a uniquely labeled polyethylene container. The probe is similarly cleaned; acetone rinsed, brushed several times, rinsed again and the washing transferred to the same polyethylene container. The filter holder and cyclone are wiped free of silicone grease, acetone rinsed, brushed, rinsed and these washings added to the probe wash container. The container is tightly capped and the liquid level marked for transport. The impinger catch volume is determined to the nearest milliliter using a graduated cylinder. If the impinger catch is to be analyzed it is transferred to a separate polyethylene container, capped, and the liquid level marked. The desiccant-packed drying column is weighed in the field to the nearest 0.5 g and the weight of absorbed moisture added to the condensate for moisture calculations.

Particulate samples are transported back to the laboratory, logged in, and prepared for analyses. Filters are desiccated for 24 hours and weighed to a constant weight and the results recorded to the nearest 0.1 mg. Probe wash samples are evaporated at ambient temperatures to dryness in tared evaporating dishes. They are then desiccated for 24 hours and weighed to a constant weight. Results are reported to the nearest 0.1 mg.

WET CATCH ANALYSIS - ORGANIC CONDENSIBLES

Particulate concentrations reported in this document include gravimetric results of both the dry catch and the organic wet catch. Organic condensibles were collected in a series of three ice-cooled all-glass impingers in the back half of the Method 5 sampling train. The first two impingers were initially prepared with 100 mls of deionized water in each and the third impinger was dry. After sampling, the volume of condensate in the impingers was determined and the contents transferred to an air-tight polyethylene sample container.

The wet catch was analyzed for condensible organic particulate with the chloroform/diethyl ether extraction. Three 25 ml portions of chloroform and three 25 ml portions of diethyl ether were used to extract condensed organics from the impinger catches (wet catch). The extractions were evaporated at room temperature and desiccated to a constant weight. Gravimetric results were then added to dry catch results to calculate particulate concentrations.

APPENDIX E

Quality Assurance Data

SAMPLING TRAIN CALIBRATION DATA

Northland Constructors
Twig, Minnesota
PACE Project No. 940825.401

PACE Incorporated
September 21, 1994

Air Sampling Department Calibration Report

Sampling Nozzle Calibration Data

Nozzle Number : 2-2

Date of Calibration : 7/6/94

Calibration Technician: M. Wilson

Measurement Position	Diameter Inches
1	0.248
2	0.249
3	0.248
4	0.248
5	0.250
Average	0.249

The sampling nozzle is rotated and measured at 36 degree Increments. Diameters are measured to the nearest 0.001". All measurements must be within a range of 0.004".

Northland Constuctors
Twig, Minnesota
PACE Project No. 940825.401

PACE Incorporated
September 21, 1994

Air Sampling Section Calibration Report

Dry Test Meter and Orifice Calibration Data

Control Module Number : C-4

Calibration Technician: K.Lattery

Date of Calibration : 7/6/94

Barometric Pressure : 28.94

Orifice Diff. Press., ΔH Inches WC	Dry Test Meter Vol. Cubic Ft.	Wet Test Meter Vol. Cubic Ft.	Dry Test Meter Temperatures, °F		Wet Test Meter Temp., °F	Elapsed Time Minutes	Gas Meter Coefficient ∂	Orifice Coefficient ΔH@
			Inlet	Outlet				
0.50	5.140	5.000	99.5	87.5	79.5	13.415	0.9967	2.096
1.00	5.135	5.000	101.5	85.5	79.5	9.528	0.9964	2.122
1.75	5.035	5.000	93.5	77.0	79.5	7.213	0.9992	2.162
2.50	10.135	10.000	101.5	79.5	79.5	12.057	1.0004	2.148
3.50	10.150	10.000	104.0	83.5	79.5	10.294	1.0023	2.176

Average Meter Coefficient 0.9990

Average Orifice Coefficient 2.141

Northland Constructors
Twig, Minnesota
PACE Project No. 940825.401

PACE Incorporated
September 21, 1994

Air Sampling Department Calibration Report

Pitot Tube Calibration Data

Pitot Tube Number : 11

Date of Calibration : 3/19/94

Calibration Technician: M. McDermott

A Side Calibration

Calibration Trial No.	ΔP(standard) Inches WC	ΔP(S-type) Inches WC	Pitot Coefficient
1	0.495	0.680	0.845
2	0.800	1.105	0.842
3	1.110	1.540	0.840
4	1.330	1.845	0.841
		A Side Average	0.842

B Side Calibration

Calibration Trial No.	ΔP(standard) Inches WC	ΔP(S-type) Inches WC	Pitot Coefficient
1	0.495	0.680	0.845
2	0.805	1.110	0.843
3	1.110	1.535	0.842
4	1.335	1.850	0.841
		B Side Average	0.843
		Pitot Tube Coefficient	**0.842**

APPENDIX F

Process/Source Information

PROCESS INFORMATION SHEET

Asphalt Plant Information Sheet

Company/Facility Name Northland Constructors Inc.

Address (Headquarters) 4843 Rice Lake Rd Duluth Mn. 55803

Source Description/Identification Asphalt Plant

Location at Time of Test (City, State) Duluth Mn. Time at This Site 2 weeks

Plant Manufacturer Astec Model No. PKRC 8350

Year Built 1989 Date of Last Inspection Sept-15-1990

Dryer Fuel Type: ☐ Natural Gas ☐ Propane ☐ No. ___ Fuel Oil
☐ Waste (Drain) Oil ☒ Other Butane

Normal Fuel Usage Rate 1050 ~~gals~~ per hr Gallons/Ton, _____ LB/HR

Asphalt Plant Rated Capacity 376 TPH at an Aggregate Moisture of 5 % w/w
334 TPH at an Aggregate Moisture of 6 % w/w
296 TPH at an Aggregate Moisture of 7 % w/w
Normal Asphalt Production Rate 285 TPH at an Aggregate Moisture of 7½ % w/w
Use of Recycled Asphalt Material: ☒ Yes ☐ No Normal Proportion 30 % w/w

Attach manufacturers information pertaining to production rate as a function of aggregate moisture content

---

☐ Scrubber
☐ Spray Chamber ☐ Cyclonic ☐ Packed Tower
☐ Venturi ☐ Other _____
Manufacturer _____
Recycle of Scrubber Water _____ %
Liquid Flow Rate _____ GPM
Rated Efficiency _____
Pressure Drop: Design ~~6~~ Normal ~~5~~

☒ Baghouse/Fabric Filter
Manufacturer Astec PEH-50
No. of Sections 18
No. of Bags 1155
Cloth Area Per Bag 6:1
Cleaning Mechanism Pulse Jet
Pressure Drop: Design 6 Normal 5

Stack Type Steel Height 20 ft Diameter 3x4 Foot Airflow _____

Data Supplier Signature Scott Bailey Title Plant Oper. Date 8-29-94

SOURCE OPERATIONAL DATA

ASPHALT PLANT OPERATING CONDITIONS DURING STACK TESTING

05/27/94

Test Date(s) _____

Plant Mfr. & Model Astec PDDC 835C Type(circle one): (Drum Mix) Conventional
This plant is (circle one): (portable) stationary Other: _____

Pollution Control Equipment(circle one): (Baghouse) Venturi Scrubber Wet Scrubber Cyclone Multiclone
If wet scrubbing: ____%scrubber water recycled

List Model: Astec CBH 50

Normal pressure drop across control equipment is 5 inches water

Was control equipment operating normally during test? Yes

Date & procedure of last maintenance/cleaning of control equipment: All new bags spring of 94 5-5-94
Checked Each Air Valve on pulse jets

Fuel:

Itemize all fuels and materials added to the combustion process during the test period. List fuel type used during testing (if oil, specify type) Butane. If other units of measure are used, specify and calculate appropriate heat input.

Test No.___	Fuel Input (Gal/hr)	Btu/gal(As Received)	Heat Input (Btu/hr)
Run 1	1050 GPH	102,000 per gal	107,100,000 hr
Run 2	1050 GPH	102,000 per gal	107,100,000 hr
Run 3	1050 GPH	102000 per gal	107,100,000 hr

Is the above fuel substantially the highest sulfur containing fuel normally burned? Yes per Ton
Production specific fuel usage: (circle one) measured or (calculated) ____ cubic foot/ton hot mix 3.68 gal/ton hot mix
No. of burners: 1 Burner(s) rating: 116 million MMBTU/HR=100% setting

Test No.___	% Recycle %R=Recycle ÷ (Aggregate + Recycle+Asphalt)	Estimated % moisture of aggregate (or aggregate & recycle)
Run 1	30% Rap 70% Agg 5.4% AC	5% Rap 7% Agg
Run 2	30% Rap 70% Agg 5.4% AC	5% Rap 7% Agg
Run 3	30% Rap 70% Agg 5.4% AC	5% Rap 7% Agg

Other Control Equipment Parameters	Design	During Testing
Cleaning Cycles	15 off .2 On	15 Sec off Time .2 Sec on Time
Air to Cloth Ratios	6 to 1	6 to 1
No. of spray bars including delivery pressure		

Describe the location of the thermocouples reading exiting dryer temperature: Main Stack Duct
between drum and baghouse

Plant Operator's Certification: I certify that the information submitted herein is accurate and correct and that no information requested was withheld from the Division Manager.

By: [signature], Phone: (218) 722-8170

Note: All information required must be completed and submitted as part of the performance test. Failure to submit the required information will result in an incomplete performance test report.

Time ... 15 min. intervals	Burner Setting %	Aggregate Material TPH	Recycle Material TPH	Asphalt Material TPH	Total Material TPH (Aggregate+Recycle+Asphalt)	Temperature of Gases Exiting Dryer deg F	Dust Collector Pressure Drop inches water	Scrubber Water Flow Rate GPM	Water Supply Pressure psi	Other (list)	Other (list)
9:25	82%	194	87	16.2	299	360°	5				
9:40	85%	186	85	15.7	285	350°	4.5				
9:55	85%	177	82	14.7	274	350°	5				
10:10	82%	183	85	15.3	283	355°	4.5				
10:25	81%	188	85	15.4	288	340°	5				
10:40	81%	195	89	16	300	365°	5				
10:55	85	194	90	16	300	370	5				
11:10		Rain Shut down									
11:35	85%	180	79	14.7	274	355°	5				
11:50	80%	180	81	14.7	276	345°	5				
12:05	82%	181	84	15.0	280	350°	5				
12:20	82%	185	87	15.5	287	360°	5				
12:35	82%	185	86	15.4	286	350°	4.5				
12:50	80%	189	87	15.8	291	350°	4.5				
1:05	82%	195	88	16.2	299	355°	5				
1:20	82%	190	85	16	291	350°	5				
1:35	85%	180	83	15.3	278	360°	5				
1:50	82%	182	82	15.4	280	360°	5				
2:05	80%	181	87	15.6	283	365°	5				
2:12	75%	188	88	16	292	355	5				
End											

Plant Operator's Certification: I certify that the information submitted herein is accurate and correct and that no information requested was withheld from the Division Manager.

By: Scott Feeley, Position Plant Operator, Phone: (218) 722-8170

FUEL MSDS SHEETS

MATERIAL SAFETY
DATA SHEET

BUTANE; N-BUTANE
(CANADA-ENGLISH)

MSDS NO: 04006834

MANUFACTURER/SUPPLIER:
Amoco Canada
Petroleum Company Ltd.
240 - 4 Avenue S.W.
P. O. Box 200, Station M
Calgary, Alberta T2P 2H8

EMERGENCY HEALTH INFORMATION: 1 (312) 856-8371 (U.S.A.)
EMERGENCY SPILL INFORMATION: 1 (613) 996-6666 CANUTEC (Canada)
OTHER PRODUCT SAFETY INFORMATION: 1 (312) 856-5430 (U.S.A.)

IMPORTANT COMPONENTS:	COMPONENT	WT%	CAS No.	ACGIH TLV
	Butane	100	106-97-8	TWA 800 ppm

WARNING STATEMENT: Extremely flammable. Compressed gas. High vapor concentrations can cause headaches, dizziness, drowsiness and nausea. Contact with liquid causes frostbite.

APPEARANCE AND ODOR: Colorless gas; natural gas odor.

HEALTH HAZARD INFORMATION

EYE

EFFECT: Liquid can cause burns similar to frostbite.

FIRST AID: Contact with liquid: Immediately flush eyes with plenty of water for at least 15 minutes, then get immediate medical attention.

PROTECTION: Wear chemical goggles.

SKIN

EFFECT: Liquid can cause burns similar to frostbite.

FIRST AID: Contact with liquid: immediately flush with plenty of tepid water (105-115°F; 41-46°C). DO NOT USE HOT WATER. Get prompt medical attention.

PROTECTION: As needed to prevent contact with liquid - wear gloves, impervious clothing and face shield.

INHALATION

EFFECT: High vapor concentrations can cause headaches, dizziness, drowsiness and nausea. Asphyxiant in high concentrations. See Toxicology Section.

FIRST AID: If adverse effects occur, remove to uncontaminated area. Give oxygen if breathing is difficult. Get immediate medical attention.

PROTECTION: If ventilation is inadequate, use supplied-air respirator.

INGESTION

EFFECT: Not applicable.

FIRST AID: Not applicable.

BUTANE; N-BUTANE
MSDS NO: 04006534

FIRE AND EXPLOSION INFORMATION

FLASHPOINT: -60°C, (-76°F), (cc)

FLAMMABLE LIMITS: UPPER: 8.4% LOWER: 1.8%

AUTOIGNITION TEMPERATURE: 430°C, (806°F)

EXTINGUISHING MEDIA: Stop flow of gas if possible; if not, allow to burn. Do not direct water into liquid spill. Dry chemical can be used.

UNUSUAL FIRE AND EXPLOSION HAZARDS: Product gives off vapors that are heavier than air which can travel considerable distances to a source of ignition and flashback. Extinguishment of fire before source of vapor is shut off can create an explosive mixture in air. Extremely flammable vapor/air mixtures form.

PRECAUTIONS: Keep away from ignition sources (e.g., heat, sparks and open flames). Use with adequate ventilation. Ground and bond all lines and equipment.

REACTIVITY INFORMATION

DANGEROUS REACTIONS: Avoid chlorine, fluorine, and other strong oxidizers.

STABILITY: Stable.

CHEMICAL AND PHYSICAL PROPERTIES

BOILING POINT: -0.5°C (31°F)

MELTING POINT: -138°C, (-217°F)

SPECIFIC GRAVITY (WATER = 1): 0.6

VAPOR PRESSURE: 213.7 kPa (2.1atm) @ 21.1°C.

VAPOR DENSITY (AIR = 1): 2.11

SOLUBILITY IN WATER: Slight (3.15 Cm3 gas/100 Cm3 water at 0°C).

STORAGE AND ENVIRONMENTAL PROTECTION

STORAGE REQUIREMENTS: Outside storage is recommended. Store in cool, dry, well-ventilated area. Do not store in areas containing flammable or combustible products. Do not store at or above 120°F (49°C).

SPILLS AND LEAKS: Remove or shut off all sources of ignition. Water spray can be used to absorb vapors.

WASTE DISPOSAL: Vent vapor at a safe location. Insure dissipation of gas below the lower explosive limit. Consult local ordinances for compliance.

SPECIAL PRECAUTIONS: Avoid strong oxidizers.

APPENDIX G

Test Plan

Notification Of Intent To Test

For Sampling To Be Performed At:

Northland Constructors
4843 Rice Lake Road
Duluth, Minnesota
During The Week Of August 1, 1994

Submitted By:

PACE Incorporated
Air Sampling Department
1710 Douglas Drive North
Golden Valley Minnesota 55422

Submitted on July 6, 1994

Source Emissions Test Plan

Date Submitted:	July 6, 1994
Date Revised:	July 8, 1994
Scheduled Test Dates:	Week Of August 1, 1994 (Rice Lake Road Plant/Source No. 1)

General Information

Emissions Facility:	Northland Constructors Of Duluth, Inc. 4843 Rice Lake Road Duluth, Minnesota 55803 Hot Mix Asphalt Plant And Air Pollution Control Equipment
Test Contact: Phone Number:	James Oswald (218)-722-0995
Facility Contact: Phone Number:	Scott Seely (218)-343-1925
Permit File No.:	2086A-89-OT-1
Reason(s) For Test:	Emissions Compliance Requirement (Rice Lake Road Plant/Source No. 1)

Testing Firm:	PACE Incorporated 1710 Douglas Drive North Minneapolis, Minnesota 55422
Project Contact: Phone Number:	Curt Stock 612-525-3349

Testing Requirements

Source No.	Source Identification	Test Constituent	Test Methods	Emission Limit	Applicable Rule or Reg.
1	Baghouse Stack	Vol. Airflow	EPA Method 2		
1	Baghouse Stack	O_2, CO_2, N_2	EPA Method 3B		
1	Baghouse Stack	Moisture	EPA Method 4		
1	Baghouse Stack	Particulate Matter	EPA Method 5	0.04 GR/DSCF	Minn. Rules part 7005.2020, Subp. A. & 40 CFR 60, Subp I.
1	Baghouse Stack	Opacity	EPA Method 9	20%	Minn. Rules part 7005.2020, Subp. B. & 40 CFR 60, Subp I.

Process Description and Operating Conditions

Operating Information:

The objectives of this project are to quantify particulate emissions and compare them to applicable air emissions regulations stipulated by Minnesota Rules. During operation of the emission facility and air pollution control equipment, Northland Constructors operators shall maintain the pressure drop across the baghouse at a minimum of six inches water and a maximum of 10 inches water.

Process Description:

The hot mix asphalt facility is a Astec model No. PDDC-835C manufactured in 1989. The plant uses a double barrel drum mix with a manufactures rated drying capacity of 325 Tons/HR. at 5% moisture. Propane is the fuel used with a heat input capacity rated at 116 million BTU/HR.

An Astec PBH-50 baghouse is used for pollution control equipment. The baghouse uses a air pressure drop with a range of 0-20 inches of water to monitor the control equipment. The stack has an inside diameter that measures 3 x 4 feet and has a rated flow of 50,000 ACFM at 325°F. Flue gases are pulled through the system with an induced draft fan and exhausted through the 20 foot stack to atmosphere.

Sampling Location Information:

Hot Mix Asphalt Plant Stack

Stack Type:	Steel (vertical)
Duct Dimensions:	45 x 30 Inches (Rectangular)
Distance To:	
Upstream Disturbance:	75 Inches (2.08 Duct Diameters)
Downstream Disturbance:	19 Inches (0.53 Duct Diameters)
Approx. Flue Gas Temp.:	325 °F
Approx. Flue Gas Moisture:	5 % v/v
Approx. Volume Gas Flow Rate:	50,000 ACFM
Approx. Gas Composition:	16 % O_2, 4 % CO_2 80 % N_2
Presence of Cyclonic Flow:	Not Expected

Process Monitoring Parameters			
Source No.	**Process Parameter**	**Monitoring Method**	**Normal Range**
1	Baghouse	Pressure drop in water	Min. 6 inches Max. 10 inches
1	Heat Input	Million BTU/HR	116 million BTU/HR
1	Dryer Mix	Tons/HR	210 Tons/HR

Testing Methods

Parameter	Test Method	Reference	No. of Runs	Length of Run	Minimum Vol./Rate	Report Units	Detection Limit
Locate Test Ports & Trvs Point	EPA Method 1	40 CFR 60, Appendix A	1	NA	NA	NA	NA
Volumetric Airflow	EPA Method 2	40 CFR 60, Appendix A	3	NA	NA	ACFM SCFM DSCFM	4 Ft./Sec.
Gas Composition Orsat	EPA Method 3B	40 CFR 60, Appendix A	3	1 Hour	30 Liters	% v/v Mole. Wt: %EA	0.1 % v/v
Moisture Content	EPA Method 4	40 CFR 60, Appendix A	3	1 Hour	0.5 CFM	% v/v Mole. Wt.	0.3 % v/v
Total Particulate	EPA Method 5	40 CFR 60, Appendix A	3	1 Hour	30 DSCF	GR/DSCF LB/HR	0.0001 GR/DSCF
Opacity	EPA Method 9	40 CFR 60, Appendix A	1	1 Hour	Every 15 Seconds. 240 Total Readings	Percent	0 Min. 100 Max.

Sampling Information:

EPA Method 1:

Port Location:	Meets Criteria
No. Of Test Ports:	6
No. of Traverse Points:	24

EPA Method 2:

Pitot Tube Type:	S-Type
Pressure Device:	U-Tube
Temp. Measurement:	Type K Thermocouple

EPA Method 3:

Sampling Method:	Integrated
Gas Analyses:	Orsat

EPA Method 4:

Sampling Method:	Impinger

EPA Method 5:

Probe Material:	Glass
Filter Media:	Gelman Type A/E Glass Fiber Filter
Impinger Reagent:	Deionized Water
Clean-up Reagents:	Acetone and Deionized Water
Sampling Equipment:	PACE Manufactured Trains Designed In Accordance With APTD 0581
Sample Time Per Run:	60 Minutes
Number Of Runs:	Three
Back-half Analyses:	Organic Condensibles

EPA Method 9:

Opacity	One One-Hour Observation For Source No. 1

Fuel And Aggregate Samples :

Fuel and aggregate samples will be gathered during each run in the proper percentages and sent to Galbraith Laboratories for analyses.

APPENDIX H

Certifications

CERTIFICATIONS REQUIRED FOR PERFORMANCE TEST REPORTS

NOTE: All performance test reports must contain a certification by the responsible parties that the test results have been reported accurately, that the field data is a true representation of the sampling procedures, and that the process data is a true indicator of the operating parameters of the emissions unit at the time of the performance test. (Ref. Minn. Rules pt. 7017.2040). Performance test results will not be accepted without certification of the report..

1. Certification of sampling procedures by the team leader of the personnel conducting the sampling procedures:

"I certify under penalty of law that the sampling procedures were performed in accordance with the approved test plan and that the data presented in this test report are, to the best of my knowledge and belief, true, accurate, and complete. All exceptions are listed and explained below."

Signature: Curtis H. Stock
Printed Name of Person Signing: Curtis H. Stock
Title: Supervisor Air Sampling
Date: 9-21-94

2. Certification of analytical procedures by the person responsible for the laboratory analysis of field samples:

"I certify under penalty of law that the analytical procedures were performed in accordance with the requirements of the test methods and that the data presented for use in the test report were, to the best of my knowledge and belief, true, accurate, and complete. All exceptions are listed and explained below."

Signature: Timothy J. Parsons
Printed Name of Person Signing: Timothy J. Parsons
Title: Metals Dept. Supervisor
Date: 9/21/94

3. Certification of test report by the senior staff person at the testing company who is responsible for compiling and checking the test report:

"I certify under penalty of law that this test report and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the test information submitted. Based on my inquiry of the person or persons who performed sampling and analysis relating to the performance test, the information submitted in this test report is, to the best of my knowledge and belief, true, accurate, and complete. All exceptions are listed and explained below."

Signature: Curtis H. Stock
Printed Name of Person Signing: Curtis H. Stock
Title: Supervisor Air Sampling
Date: 9-21-94

4. Certification of test report by owner or operator of the emission facility:

"I certify under penalty of law that the information submitted in this test report accurately reflects the operating conditions at the emission facility during this performance test and describes the date and nature of all operational and maintenance activities that were performed on process and control equipment during the month prior to the performance test. Based on my inquiry of the person or persons who performed the operational and maintenance activities, the information submitted in this test report is, to the best of my knowledge and belief, true, accurate, and complete. All exceptions are listed and explained below."

Signature:
Printed Name of Person Signing: JAMES L HOLMGREN
Title: PRES.
Date: 9/22/94