NELSON INDUSTRIAL STEAM COMPANY (NISCO)
P.O. BOX 130
WESTLAKE, LOUISIANA 70669

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AIR QUALITY DIVISION

EMISSION TESTING
on UNITS 1A and 2A
NOVEMBER 4-5, 1992

Testing conducted by :

E T S
EMISSION TESTING SERVICES, INC.
P.O. BOX 15075
BATON ROUGE, LOUISIANA 70895

(504) 925-8405

File : 92131

EMISSION TEST REPORT CERTIFICATION

for

NELSON INDUSTRIAL STEAM COMPANY (NISCO)

EMISSION TESTING

on UNITS 1A and 2A

NOVEMBER 4-5, 1992

Testing conducted by :

EMISSION TESTING SERVICES, INC.

I certify that I have personally examined and am familiar with the information submitted herein, and based on my inquiries of those individuals immediately responsible for obtaining the information, I believe the submitted information is true, accurate, and complete.

Jim Schott
Gulf States Utilities
Environmental Affairs

Brad Latham
Emission Testing Services
Project Leader

Barry Gipson
Emission Testing Services
Manager

NELSON INDUSTRIAL STEAM COMPANY (NISCO)

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I. INTRODUCTION

Emission Testing Services, Inc. was contracted by Nelson Industrial Steam Company (NISCO) to conduct emission testing on Units 1A and 2A located at NISCO's facility near Westlake, Louisiana. NISCO was formed as a partnership between CITGO Petroleum Corp., Conoco, Inc., Gulf States Utilities (GSU), and Vista Chemical Co. to produce steam and electric power for use by the project participants. Gulf States Utilities has been contracted to operate, maintain, and repair Units 1A and 2A under the direction and control of NISCO.

Steam produced from the two units is used to drive two turbine generators with a portion of the steam being exported to Vista Chemical through an above ground pipeline. Electric power produced is used by the project participants or sold to GSU on an as-available basis.

In order to demonstrate compliance with NISCO's air emissions permit, emissions of the compounds listed in Table I were determined from the boilers on Units 1A and 2A. Sulfur dioxide emissions control efficiency was also determined. Emissions from the Boiler 1A, source ID 01, and Boiler 2A, source ID 02, are limited by permit numbers 0520-00157-01 and PSD-LA-557 issued by the Louisiana Department of Environmental Quality (LA DEQ).

TABLE I
COMPOUNDS DETERMINED DURING EMISSION TESTING

Particulate	EPA Method 5, modified
Metals, Beryllium, Cadmium, Chromium Mercury, Nickel, Vanadium	EPA Method 5, modified
Sulfur Dioxide	EPA Method 6C
Sulfur Dioxide Removal Efficiency	EPA Method 19
Oxides of Nitrogen	EPA Method 7E
Carbon Monoxide	EPA Method 10
Volatile Organic Compounds Benzene, Ethylbenzene, Napthalene, Toluene, Xylene	EPA Method 18
Total Hydrocarbons	EPA Method 25A

EPA Methods presented in Table I were used to determine emissions of the compounds of interest. Sulfur dioxide control efficiency was determined using EPA Method 19. EPA Methods 1-4 were used to determine the number and location of sample points, and the velocity, molecular weight, moisture, and volumetric flow rate of the stack gas.

The test team consisted of Brad Latham, Scott Lesley, Kevin Thibodeaux, and Damon Wood. Don Zierold represented NISCO and Jim Schott of GSU coordinated testing with the facility's operations. The LA DEQ was represented by Brian Smith during the tests.

On November 4, 1992, three test runs were conducted on the Unit 2A Boiler. During the tests, the boiler was firing coke at a rate of 61.80 K lb/hr and the Unit was producing 88.66 MWatt-hr of electric power.

On November 5, 1992, three test runs were conducted on the Unit 1A Boiler. During the tests, the boiler was firing coke at a rate of 65.67 K lb/hr and the Unit was producing 96.89 MWatt-hr of electric power.

During testing on each boiler, four test runs were conducted to determine benzene, ethylbenzene, toluene, xylene, and napthalene emissions. Test Run 1a was conducted over a duration of 8 hr and consisted of the collection of 3 duplicate sets of samples. Run 1a was designed to obtain the lowest detection limit and to demonstrate compliance. Runs 2a, 3a, and 4a sampling times varied with durations of 1 hr, 2 hr, and 3 hr per run. One set of samples was collected per run with no duplicates. These three test runs were conducted simultaneous with test Run 1a and were designed to have a higher detection limit than Run 1a. Samples with higher detection limits were collected in order to obtain valid samples in case of sample break-through (maximum detection limit exceeded) during test Run 1a.

II. SUMMARY

Results of emission testing on the Unit 1A Boiler are presented in Table II. All emission rates are based on measured stack gas flow rates. Emissions of all pollutants measured were within permit limits with the exception of beryllium.

Beryllium emissions averaged 0.014 lb/hr which was greater than the permit limit of 0.001 lb/hr. The test detection limit for beryllium was $\leq$0.001 lb/hr with an error of $\pm$15%.

Particulate emissions averaged 5.1 lb/hr (33.7 lb/hr limit), sulfur dioxide emissions averaged 349.4 lb/hr (928.6 lb/hr limit), oxides of nitrogen emissions averaged 127.1 lb/hr (673.0 lb/hr limit), carbon monoxide emissions averaged 10.3 lb/hr (112.2 lb/hr limit), and total hydrocarbons emissions averaged 0.8 lb/hr (11.2 lb/hr limit). Total hydrocarbons emissions included methane and ethane, whereas the VOC limit of 11.2 lb/hr excludes methane and ethane. Emission test results for the organic compounds benzene, ethylbenzene, toluene, xylene, and napthalene indicate emissions below the test detection limits. The test detection limit was $\leq$0.2 lb/hr for all compounds except xylene and napthalene which had detection limits of $\leq$0.4 lb/hr.

Sulfur dioxide removal efficiency was determined using EPA Method 19. Based on the fuel analysis, potential sulfur dioxide emissions were 5.881 lb/MM Btu. Actual emissions, based on the measured sulfur dioxide concentration and the fuel "Fd" factor, were 0.304 lb/MM Btu resulting in a control efficiency of 94.82%.

Sulfur dioxide control efficiency data, Boiler 1A operating data, and analytical results from the fuel, limestone, and ash samples are presented in Table III.

TABLE II
EMISSION TEST RESULTS SUMMARY

NELSON INDUSTRIAL STEAM COMPANY (NISCO)
BOILER UNIT 1A

PARAMETER	PERMIT LIMIT	RUN 1	RUN 2	RUN 3	AVG.
DATE		11-5-92	11-5-92	11-5-92	
TIME		0956-1204	1250-1454	1547-1743	
PARTICULATE[1], grain/dscf		0.00397	0.00270	0.00165	0.00277
, lb/hr	33.7	6.984	5.136	3.149	5.090
Nickel, lb/hr		0.1932	0.1842	0.2130	0.1968
Chromium, lb/hr		0.0155	0.0121	nd	0.0092
Vanadium, lb/hr		0.1959	0.2409	0.1629	0.1999
Mercury, lb/hr		nd	nd	nd	nd
Cadmium, lb/hr		0.0574	0.0711	0.0765	0.0683
Beryllium, lb/hr	0.001	0.0155	0.0101	0.0152	0.0136
SULFUR DIOXIDE, PPMv		154.1	157.7	173.0	161.6
, lb/hr	928.6	315.86	348.53	383.79	349.39
OXIDES of NITROGEN, PPMv		71.2	86.0	87.8	81.7
, lb/hr	673.0	104.86	136.57	139.96	127.13
CARBON MONOXIDE, PPMv		12.5	10.4	9.8	10.9
, lb/hr	112.2	11.206	10.053	9.509	10.256
TOTAL HYDROCARBONS, PPMv		0.4	0.6	0.6	0.5
, lb/hr	11.2	0.564	0.913	0.916	0.798
STACK GAS					
Oxygen, vol %		4.9	4.8	4.8	4.8
Carbon Dioxide, vol%		14.4	14.0	14.3	14.2
Temperature, F		308	311	314	311
Moisture, %		4.79	4.79	4.68	4.75
Velocity, ft/sec		66.44	71.93	72.35	70.24
Flow rate, acfm		313090	338953	340931	330991
dscfm		205443	221521	222356	216440

PARAMETER	RUN 1a[2] SET 1	RUN 1a[2] SET 2	RUN 1a[2] SET 3	RUN 2a[2]	RUN 3a[2]	RUN 4a[2]
DATE	11-5-92	11-5-92	11-5-92	1-5-92	11-5-92	11-5-92
TIME	0925-1725	0925-1725	0925-1725	0955-1155	0955-1255	1158-1258
Benzene, lb/hr	nd	nd	nd	nd	nd	nd
Ethyl Benzene, lb/hr	nd	nd	nd	nd	nd	nd
Toluene, lb/hr	nd	nd	nd	nd	nd	nd
Xylene, lb/hr	nd	nd	nd	nd	nd	nd
Napthalene, lb/hr	nd	nd	nd	nd	nd	nd

nd None detected.
(1) Isokinetic Sampling Rate : Run 1 - 94.68; Run 2 - 95.90; Run 3 - 96.66.
(2) Flow rate basis; Run 1a used avg. of Runs 1-3 flow data; Runs 2a - 4a used Run 1 flow data.

TABLE III
SULFUR DIOXIDE REMOVAL EFFICIENCY, BOILER OPERATING DATA, and FUEL, LIMESTONE, and ASH SAMPLE ANALYSIS

NELSON INDUSTRIAL STEAM COMPANY (NISCO)
BOILER UNIT 1A

PARAMETER	RUN 1	RUN 2	RUN 3	AVG.
DATE	11-5-92	11-5-92	11-5-92	
TIME	0956-1204	1250-1454	1547-1743	
SULFUR DIOXIDE[1]				
Potential Emissions, lb/MM Btu	---	---	---	5.88083
Actual Emissions, lb/MM Btu	0.29157	0.29653	0.32530	0.30447
SULFUR DIOXIDE REMOVAL EFFICIENCY, %	95.04	94.96	94.47	94.52
BOILER OPERATING DATA				
Coke Feed, K lb/hr	60.420	68.079	68.521	65.673
Limestone Feed, K lb/hr	16.392	15.818	16.669	16.293
Steam Production, K lb/hr	704.41	818.06	826.79	783.09
Electric Power, MWatt-hr	88.25	100.84	101.57	96.89
STACK GAS				
Oxygen, vol %	4.9	4.8	4.8	4.8
Carbon Dioxide, vol%	14.4	14.0	14.3	14.2
Temperature, F	308	311	314	311
Moisture, %	4.79	4.79	4.68	4.75
Velocity, ft/sec	66.44	71.93	72.35	70.24
Flow rate, acfm	313090	338953	340931	330991
dscfm	205443	221521	222356	216440

	Samples 1A			
	Coke	Limestone	Bottom Ash	Fly Ash
Elemental C, wt%	85.66	nc	≤0.05	3.87
Elemental H2, wt%	4.07	nc	nc	nc
Elemental O2, wt%	10.01	nc	nc	nc
Elemental N2, wt%	1.82	≤0.01	nc	nc
Elemental S, wt%	4.86	≤0.01	17.65	11.79
Ash, wt%	0.43	83.66	99.05	91.43
Moisture, wt%	0.25	≤0.01	≤0.01	≤0.01
High Heat Value, Btu/lb	15440	nc	nc	nc
Nickel, mg/kg	85.66	11.3	134.0	83.0
Chromium, mg/kg	≤0.5	9.5	9.9	11.6
Vanadium, mg/kg	287	35.7	1020.0	681.0
Cadmium, mg/kg	0.20	3.79	2.48	2.92
Beryllium, mg/kg	≤0.20	0.20	0.2	0.2
Mercury, mg/kg	0.030	0.074	0.058	0.10
Calcium, mg/kg	nc	520,000	355,000	535,000
Magnesium, mg/kg	nc	14,750	18,500	22,000
Calcium Carbonate, mg/kg[2]	nc	1,298,440	nc	nc
Calcium Oxide, mg/kg[2]	nc	nc	496,650	748,470
Calcium Sulfate, mg/kg[2]	nc	nc	1,205,940	1,817,400
Magnesium Carbonate, mg/kg[2]	nc	51,170	nc	nc
Magnesium Oxide, mg/kg[2]	nc	nc	30,670	36,480

nc Test not conducted.
(1) Calculations per EPA Method 19. Potential emissions bases on fuel sulfur analysis and fuel Gross heating value. Actual emissions based on measured SO2 concentration and flow rates calculated using the "Fd" factor.
(2) Calculated from calcium or magnesium analysis.

Results of emission testing on the Unit 2A Boiler are presented in Table IV. All emission rates are based on measured stack gas flow rates. Emissions of all pollutants measured were within permit limits with the exception of beryllium.

Beryllium emissions averaged 0.020 lb/hr which was greater than the permit limit of 0.001 lb/hr. The test detection limit for beryllium was $\leq$0.001 lb/hr with an error of $\pm$15%.

Particulate emissions averaged 18.1 lb/hr (33.7 lb/hr limit), sulfur dioxide emissions averaged 363.7 lb/hr (928.6 lb/hr limit), oxides of nitrogen emissions averaged 62.2 lb/hr (673.0 lb/hr limit), carbon monoxide emissions averaged 9.9 lb/hr (112.2 lb/hr limit), and total hydrocarbons emissions averaged 4.0 lb/hr (11.2 lb/hr limit). Total hydrocarbons emissions included methane and ethane, whereas the VOC limit of 11.2 lb/hr excludes methane and ethane. Emission test results for the organic compounds benzene, ethylbenzene, toluene, xylene,and napthalene indicate emissions below the test detection limits. The test detection limit was $\leq$0.2 lb/hr for all compounds except xylene and napthalene which had detection limits of $\leq$0.4 lb/hr.

Sulfur dioxide removal efficiency was determined using EPA Method 19. Based on the fuel analysis, potential sulfur dioxide emissions were 6.088 lb/MM Btu. Actual emissions, based on the measured sulfur dioxide concentration and the fuel "Fd" factor, were 0.337 lb/MM Btu resulting in a control efficiency of 94.46%.

Sulfur dioxide control efficiency data, Boiler 2A operating data, and analytical results from the fuel, limestone, and ash samples are presented in Table V.

TABLE IV
EMISSION TEST RESULTS SUMMARY

NELSON INDUSTRIAL STEAM COMPANY (NISCO)
BOILER UNIT 2A

PARAMETER	PERMIT LIMIT	RUN 1	RUN 2	RUN 3	AVG.
DATE		11- 4-92	11- 4-92	11- 4-92	
TIME		0948-1202	1322-1551	1628-1838	
PARTICULATE[1], grain/dscf		0.00642	0.01470	0.01056	0.01056
, lb/hr	33.7	11.068	25.308	17.872	18.083
Nickel, lb/hr		0.2665	0.2388	0.2299	0.2451
Chromium, lb/hr		0.0212	0.0180	0.0161	0.0184
Vanadium, lb/hr		0.3481	0.3981	0.3975	0.3812
Mercury, lb/hr		nd	nd	nd	nd
Cadmium, lb/hr		0.0949	0.0801	0.0824	0.0858
Beryllium, lb/hr	0.001	0.0186	0.0225	0.0183	0.0198
SULFUR DIOXIDE, PPMv		162.6	139.0	247.1	182.9
, lb/hr	928.6	326.01	278.42	486.57	363.67
OXIDES of NITROGEN, PPMv		29.0	35.1	66.6	43.6
, lb/hr	673.0	41.779	50.519	94.233	62.177
CARBON MONOXIDE, PPMv		9.0	9.8	15.5	11.4
, lb/hr	112.2	7.892	8.586	13.349	9.942
TOTAL HYDROCARBONS, PPMv		1.6	1.2	6.0	2.9
, lb/hr	11.2	2.208	1.655	8.133	3.999
STACK GAS					
Oxygen, vol %		4.5	4.4	4.1	4.3
Carbon Dioxide, vol%		14.6	14.2	14.4	14.4
Temperature, F		303	300	301	301
Moisture, %		4.83	5.23	5.37	5.14
Velocity, ft/sec		65.19	65.17	64.25	64.87
Flow rate, acfm		307205	307118	302779	305701
dscfm		200961	200769	197370	199700

PARAMETER	RUN 1a[2] SET 1	RUN 1a[2] SET 2	RUN 1a[2] SET 3	RUN 2a[2]	RUN 3a[2]	RUN 4a[2]
DATE	11- 4-92	11- 4-92	11- 4-92	1- 4-92	11- 4-92	11- 4-92
TIME	0949-1749	0949-1749	0949-1749	1130-1230	0952-1152	1335-1635
Benzene, lb/hr	nd	nd	nd	nd	nd	nd
Ethyl Benzene, lb/hr	nd	nd	nd	nd	nd	nd
Toluene, lb/hr	nd	nd	nd	nd	nd	nd
Xylene, lb/hr	nd	nd	nd	nd	nd	nd
Napthalene, lb/hr	nd	nd	nd	nd	nd	nd

nd None detected.
(1) Isokinetic Sampling Rate : Run 1 - 96.86; Run 2 - 100.20; Run 3 - 96.10.
(2) Flow rate basis; Run 1a used avg. of Runs 1-3 flow data; Runs 2a - 3a used Run 1 flow data; Run 4a used Run 2 flows.

TABLE V
SULFUR DIOXIDE REMOVAL EFFICIENCY, BOILER OPERATING DATA, and FUEL, LIMESTONE, and ASH SAMPLE ANALYSIS

NELSON INDUSTRIAL STEAM COMPANY (NISCO)
BOILER UNIT 2A

PARAMETER	RUN 1	RUN 2	RUN 3	AVG.
DATE	11-4-92	11-4-92	11-4-92	
TIME	0948-1202	1322-1551	1628-1838	
SULFUR DIOXIDE[1]				
Potential Emissions, lb/MM Btu	—	—	—	6.08808
Actual Emissions, lb/MM Btu	0.30361	0.25797	0.45040	0.33733
SULFUR DIOXIDE REMOVAL EFFICIENCY, %	95.01	95.76	92.60	94.46
BOILER OPERATING DATA				
Coke Feed, K lb/hr	60.846	61.814	62.744	61.801
Limestone Feed, K lb/hr	14.821	15.108	18.058	15.996
Steam Production, K lb/hr	695.84	699.91	702.50	699.42
Electric Power, MWatt-hr	88.28	88.68	89.02	88.66
STACK GAS				
Oxygen, vol %	4.5	4.4	4.1	4.3
Carbon Dioxide, vol%	14.6	14.2	14.4	14.4
Temperature, F	303	300	301	301
Moisture, %	4.83	5.23	5.37	5.14
Velocity, ft/sec	65.19	65.17	64.25	64.87
Flow rate, acfm	307205	307118	302779	305701
dscfm	200961	200769	197370	199700

	Samples 1A			
	Coke	Limestone	Bottom Ash	Fly Ash
Elemental C, wt%	87.57	nc	≤0.05	5.33
Elemental H2, wt%	3.86	nc	nc	nc
Elemental O2, wt%	6.50	nc	nc	nc
Elemental N2, wt%	1.89	≤0.01	nc	nc
Elemental S, wt%	5.11	≤0.01	16.43	13.03
Ash, wt%	0.64	81.14	99.70	92.94
Moisture, wt%	3.20	≤0.01	≤0.01	≤0.01
High Heat Value, Btu/lb	15440	nc	nc	nc
Nickel, mg/kg	38.9	11.9	133.0	104.0
Chromium, mg/kg	≤0.5	10.2	8.8	8.5
Vanadium, mg/kg	229	36.0	875.0	793.0
Cadmium, mg/kg	0.16	3.83	2.31	3.16
Beryllium, mg/kg	≤0.20	0.20	0.2	0.2
Mercury, mg/kg	0.030	0.030	0.058	0.14
Calcium, mg/kg	nc	495,000	410,000	655,000
Magnesium, mg/kg	nc	16,000	18,500	28,500
Calcium Carbonate, mg/kg[2]	nc	1,236,010	nc	nc
Calcium Oxide, mg/kg[2]	nc	nc	573,600	916,350
Calcium Sulfate, mg/kg[2]	nc	nc	1,392,700	2,225,000
Magnesium Carbonate, mg/kg[2]	nc	55,500	nc	nc
Magnesium Oxide, mg/kg[2]	nc	nc	30,670	47,250

nc Test not conducted.
(1) Calculations per EPA Method 19. Potential emissions bases on fuel sulfur analysis and fuel Gross heating value. Actual emissions based on measured SO2 concentration and flow rates calculated using the "Fd" factor.
(2) Calculated from calcium or magnesium analysis.

During testing on Units 1A and 2A, particulate samples were collected isokinetically to insure that a representative sample of particulate was collected without bias due to particle size or density. The degree at which the actual sampling rate deviated from the ideal sampling rate was calculated as a percentage of the ideal isokinetic sampling rate with 100% being ideal. The range of acceptable sampling rates is 90 - 110% of the ideal isokinetic rate. During all three test runs on both units, the particulate sampling rate was within acceptable limits.

EPA methods were used to determine stack gas parameters and pollutant emission rates from Units 1A and 2A. Other than the modification to EPA Method 5, all testing was conducted without deviation from the methods and no unusual conditions were noted during the tests. EPA Method 5 was modified in order that metals emissions could be determined.

PROCESS DESCRIPTION

Units 1A and 2A are designed to produce electric power and steam. Combined design production of electric power is 200 MW with a maximum steam production of 80 K lb/hr. Electric power is used by NISCO's partners or is sold to GSU on an as-available basis. Steam produced in excess of that required to drive the turbine generators is exported to Vista Chemical through an 18,000-ft above ground pipeline.

Each unit's turbine generator is driven by steam produced by a circulating fluidized bed (CFB) combustion boiler. Both of the boilers are primarily fired on 100% petroleum coke; however, they are capable of firing natural gas during start-up or as an emergency backup fuel. Limestone is added to the coke fuel as a sorbent material for the removal of sulfur dioxide. Each boiler produces 825 k lb/hr high pressure steam at 1,525 psig and 1000° F reheated intermediate pressure steam.

Sulfur dioxide emissions from the boilers are controlled through the use of limestone mixed with the petroleum coke prior to combustion. Sulfur dioxide produced from combustion of the coke is removed as particulate sulfates, primarily calcium sulfate. Particulates are controlled using a cyclone located between the combustor and boiler heat exchanger. Following the heat exchanger, particulates are further controlled using a baghouse before the combustion gases are vented to atmosphere.

Presented in Figure I is a simplified flow diagram of Units 1A and 2A.

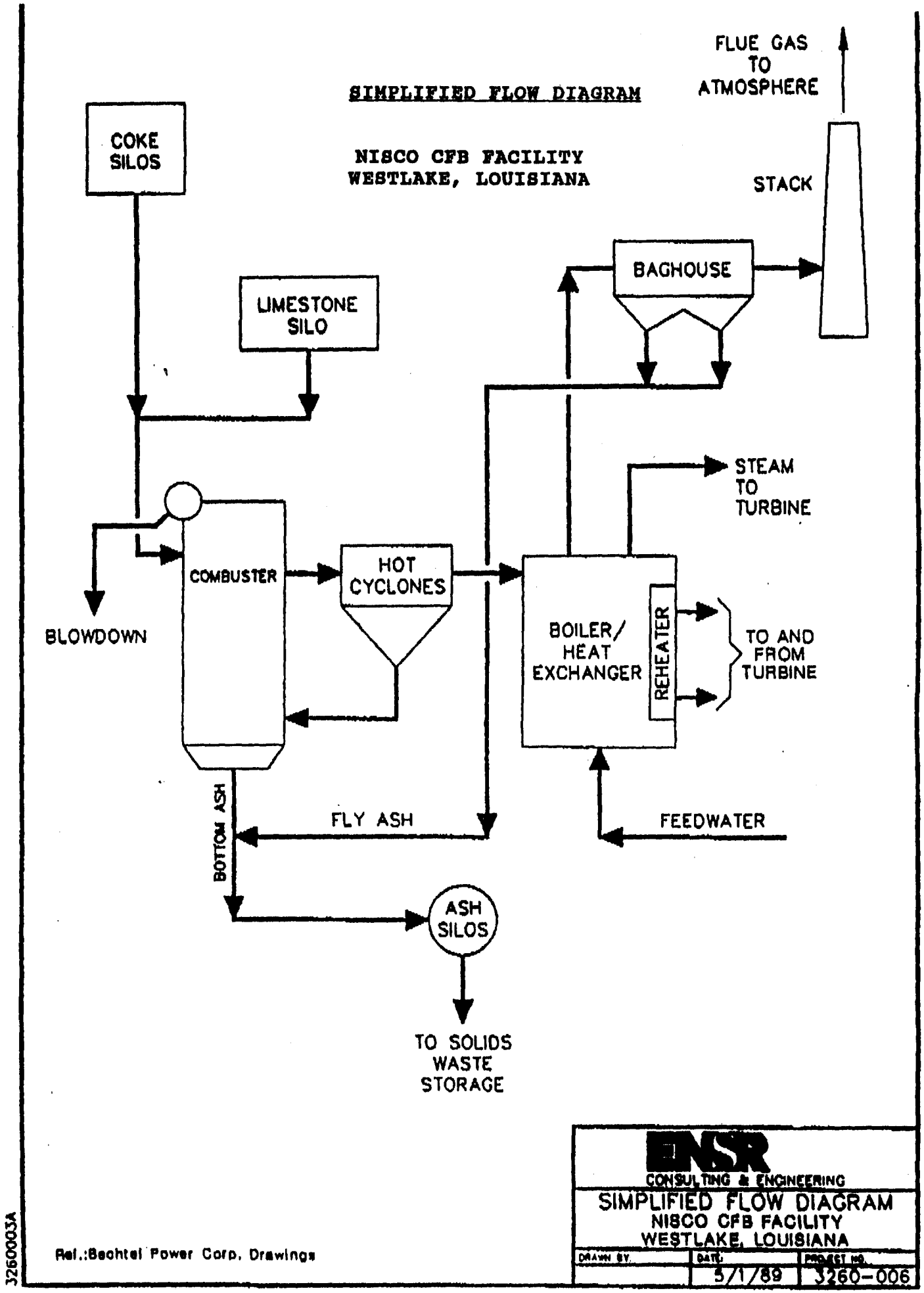

SIMPLIFIED FLOW DIAGRAM
NISCO CFB FACILITY
WESTLAKE, LOUISIANA
FLUE GAS TO ATMOSPHERE
STACK
COKE SILOS
LIMESTONE SILO
BAGHOUSE
STEAM TO TURBINE
COMBUSTER
HOT CYCLONES
BOILER/ HEAT EXCHANGER
REHEATER
TO AND FROM TURBINE
BLOWDOWN
BOTTOM ASH
FLY ASH
FEEDWATER
ASH SILOS
TO SOLIDS WASTE STORAGE
Ref.:Bechtel Power Corp. Drawings
3260003A
ENSR
CONSULTING & ENGINEERING
SIMPLIFIED FLOW DIAGRAM
NISCO CFB FACILITY
WESTLAKE, LOUISIANA
DRAWN BY
DATE
5/1/89
PROJECT NO.
3260-006

FIGURE I

III. PROCEDURE

Emissions were determined using EPA methods found in Appendix A, Part 60, Title 40 of the Code of Federal Regulations. A brief description of each method used follows.

METHOD 1: SAMPLE and VELOCITY TRAVERSES for STATIONARY SOURCES

Method 1 is applicable to stack having a diameter greater than 12 in. The method recommends that sampling points be located 8 diameters downstream and 2 diameters upstream from the nearest flow disturbances; however, any distances greater than the minimum 2 diameters downstream and 0.5 diameters upstream are acceptable. These distances help insure the collection of a representative sample in the absence of cyclonic flow. Cyclonic flow is detected by measuring the stack gas flow Yaw angle at each test point. The average yaw angle is required to be less than 20 degrees.

The Units 1A and 2A Boilers have stack diameters of 120 in. The sampling point was located greater than 8 stack diameters downstream and greater than 2 stack diameters upstream from the nearest flow disturbances. During testing, 12 sample points were used, divided into 6 traverse points located across 2 perpendicular diameters of the stack. Cyclonic flow was not detected.

METHOD 2: DETERMINATION of STACK GAS VELOCITY and VOLUMETRIC FLOW RATE (Type S pitot tube)

The average gas velocity in the stack was determined from the gas molecular weight, moisture content, and the average velocity head measured using a type S pitot tube. Volumetric flow rate was determined from the velocity and stack cross-sectional area.

METHOD 3: GAS ANALYSIS FOR CARBON DIOXIDE, OXYGEN, EXCESS AIR, and DRY MOLECULAR WEIGHT

The dry molecular weight of the stack gas was determined using an Orsat analyzer which measured the concentration of oxygen, carbon monoxide, and carbon dioxide. The remaining gas components were assumed to be nitrogen. A gas sample was removed from the centroid of the stack using a stainless steel probe fitted with a particulate filter. The probe, sample lines, and Orsat were purged sufficiently to obtain a representative grab sample for analysis.

METHOD 3A: DETERMINATION of OXYGEN CONCENTRATIONS in EMISSIONS from STATIONARY SOURCES (INSTRUMENTAL ANALYZER PROCEDURE)

A gas sample was continuously extracted from the stack using a heated probe and sample line. The sample was transferred to a oxygen analyzer for analysis of oxygen concentration. Analyzer output was continuously recorded by a computer data acquisition system. Results from the oxygen monitor were used for reference purposes and when required, for oxygen concentration corrections for all other parameters determined from the continuous gas sample stream. Oxygen data obtained from this method were not used to determine stack gas molecular weight.

METHOD 4: DETERMINATION of MOISTURE CONTENT in STACK GASES

A gas sample was extracted from the stack using a heated glass probe fitted with a particulate filter. Sample gas passed from the probe, through a series of four impingers immersed in an ice bath. The first two impingers contained known weights of water, the third was empty, and the fourth contained a known weight of silica gel. Any water vapor in the gas stream was condensed and trapped in the impingers.

METHOD 5: DETERMINATION of PARTICULATE EMISSIONS FROM STATIONARY SOURCES (modified to include metals emissions)

A gas sample was withdrawn isokinetically from the source using a heated probe. The gas was drawn through a heated glass fiber filter that collected particulate and any material that condensed at or above the filtration temperature. The gas then passed through an impinger train immersed in an ice bath. The train consisted of two impingers containing known weights of a nitric acid solution, one empty impinger, and one impinger packed with a known weight of silica gel.

Sample flow rate was established using a diaphragm pump and was controlled using a valve. A calibrated dry gas meter was used to determine the total gas sample volume.

After sampling, the filter was recovered from the filter holder. The front half of the filter holder and probe were washed and the washings were collected as the probe wash sample. An aliquot of nitric acid was added to the probe wash to preserve the sample. The sample was then split into two samples - one for total solids analysis and the other for metals analysis. The contents of the first three impingers were collected as one sample. The samples were labeled and sealed for shipment to the laboratory for analyses.

METHOD 6C: DETERMINATION of SULFUR DIOXIDE EMISSIONS from STATIONARY SOURCES (Instrumental Analyzer Procedure)

A gas sample was continuously extracted from the stack at a centroidal sampling point. The sample was transferred through a heated sample line to a continuous pulsed fluorescence analyzer.

METHOD 7E: DETERMINATION of NITROGEN OXIDES EMISSIONS from STATIONARY SOURCES

A gas sample was continuously extracted from the stack at a centroidal sampling point. The sample was transferred through a heated sample line to a continuous chemiluminescence analyzer.

METHOD 10: DETERMINATION of CARBON MONOXIDE EMISSIONS from STATIONARY SOURCES

A gas sample was continuously extracted from the stack at a centroidal sampling point. The sample was transferred through a heated sample line to a continuous nondispersive infrared analyzer.

METHOD 18: MEASUREMENT OF GASEOUS ORGANIC COMPOUND EMISSIONS BY GAS CHROMATOGRAPHY

ADSORPTION TUBES
A gas sample was extracted from the source and routed through a sample trap. The trap consisted of 1 adsorption tube containing silica gel and 2 adsorption tubes containing activated charcoal. Sample flow was controlled using a orifice valve and calibrated with a bubble flow meter. After sampling, the tubes were sealed an packed on ice for shipment to the laboratory.

METHOD 19: DETERMINATION of SULFUR DIOXIDE REMOVAL EFFICIENCY and PARTICULATE MATTER, SULFUR DIOXIDE, and NITROGEN OXIDES EMISSION RATES

Pollutant emission rates are determined based on measured pollutant concentration data and stack gas flow rate calculated using the fuel's "Fd" factor. The "Fd" factor relates combustion gas volume to the heat content of the fuel. The "Fd" factor is derived from fuel gas analysis data using equations presented in the method.

Sulfur dioxide removal efficiency is determined by calculating the potential uncontrolled emissions from the source (inlet emissions) using laboratory analysis of the sulfur content of the fuel being burned. Sulfur dioxide emissions at the outlet of the control device is determined by measuring the sulfur dioxide concentration in the stack gas (EPA Method 6C) and calculating the emission rate using the "Fd" factor associated with the fuel being burned. Efficiency is calculated using the difference between the inlet and outlet emissions values.

METHOD 25A DETERMINATION of TOTAL GASEOUS ORGANIC CONCENTRATION USING a FLAME IONIZATION ANALYZER

A gas sample was continuously extracted from the stack at a centroidal sampling point. The sample gas was transferred through a heated sample line to a total hydrocarbon analyzer equipped with a flame ionization detector.

IV. ANALYTICAL TECHNIQUE

All sample analyses were conducted following EPA methodology. Presented below are brief descriptions of each method used.

METHOD 5: DETERMINATION of PARTICULATE EMISSIONS FROM STATIONARY SOURCES (modified to include metals emissions)

The particulate filter was oven conditioned at 350 F and weighed before and after sampling. The filter weight gain represented the particulate catch on the filter. The probe wash sample was analyzed for total solids content by gravametric analyses. An aliquot of the sample was placed into a tared flask and evaporated to dryness. The weight of the residue, corrected for sample volume and wash blank, represented the probe wash catch.

After gravametric analysis for particulates, the filter was digested in nitric acid. The resulting filter solution, the probe wash sample, and the impinger sample were then analyzed by atomic adsorption spectroscopy.

METHOD 6C: DETERMINATION of SULFUR DIOXIDE EMISSIONS from STATIONARY SOURCES (Instrumental Analyzer Procedure)

All samples collected were analyzed in the field using a continuous pulsed fluorescence analyzer. The analyzer was calibrated using gas standards prepared by EPA protocol number 1 traceable to NBS standards.

METHOD 7E: DETERMINATION of NITROGEN OXIDES EMISSIONS from STATIONARY SOURCES

All samples collected were analyzed in the field using a continuous chemiluminescence analyzer. The analyzer was calibrated using gas standards prepared by EPA protocol number 1, traceable to NBS standards.

METHOD 10: DETERMINATION of CARBON MONOXIDE EMISSIONS from STATIONARY SOURCES

All samples collected were analyzed in the field using a continuous nondispersive infrared analyzer. The analyzer was calibrated using gas standards prepared by EPA protocol number 1, traceable to NBS standards.

METHOD 18: MEASUREMENT OF GASEOUS ORGANIC COMPOUND EMISSIONS BY GAS CHROMATOGRAPHY

Organic concentrations were analyzed using a gas chromatograph equipped with a flame ionization detector. The compounds of interest were separated from the sample gas using a capillary column. Retention times of each separated component were compared with those of known standards, analyzed at identical conditions.

METHOD 25A: DETERMINATION of TOTAL GASEOUS ORGANIC CONCENTRATION USING a FLAME IONIZATION ANALYZER

Total hydrocarbons concentration was determined in the field using a flame ionization analyzer. The analyzer was calibrated using propane standards prepared by EPA protocol number 1, traceable to NBS standards.

V. CHAIN of CUSTODY

For all samples transported to the laboratory for analyses, a Chain of Custody form was prepared during the sample recovery process. The sample ID, number of samples, liquid level when applicable, name of the sample recovery supervisor, name of the person responsible for sample recovery, and the signature of the sample trustee were recorded on the form.

During all subsequent handling, the custody form accompanied the samples. As personnel relinquished responsibility for the samples, the receiving sample trustee verified the number and integrity of the samples and signed the custody form.

Upon receipt at the analytical laboratory, the lab sample trustee verified the number, type, and integrity of the samples. These data were recorded on the custody form along with the date of receipt and lab sample trustees signature.

At the time of analyses, the laboratory analyst recorded the analyses date and the laboratory supervisors name on the custody form. The analyst signed the custody form and attached it to the analytical results.

Chain of Custody forms for samples collected during testing are presented on the following pages along with the Analytical Request forms.

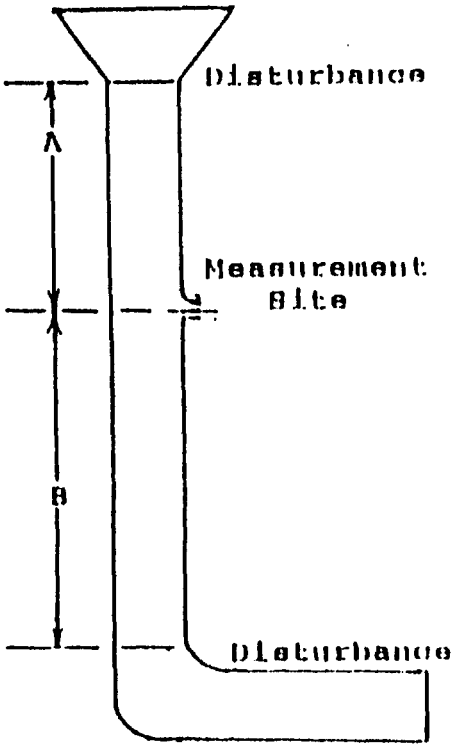
VI. TEST DATA and CALCULATIONS

All emission test field data, unit operations data, and laboratory data are presented in this section along with the associated data reduction calculations.

Data from the field data forms were manually input into a computer for data processing and calculations. Integrity of data input is maintained by using a double entry system. The computer performed all calculations and produced the calculations and results summary pages. Input data accuracy were further verified by comparison of raw field data to the computer data printed on the summary pages. Computer program integrity and calculations verification are validated by processing a known set of data. Further controls on the computer program are conducted by comparison of manual spot calculations of the raw data input to computer calculations results.

ETS

EMISSION TESTING SERVICES, INC.
Traverse Point Layout



Client NISCO

Date 11-5-92

Unit Tested Boiler #7

Location West Lake, La.

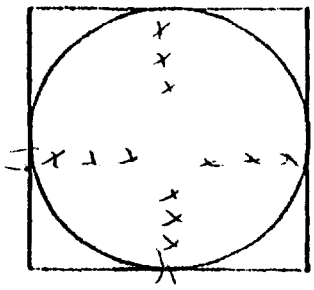
Upstream Distance (A) Greater than 8d.a

Downstream Distance (B) Greater than 2d.a

Inside Diameter 120.0"

Coupling Length 15.0"

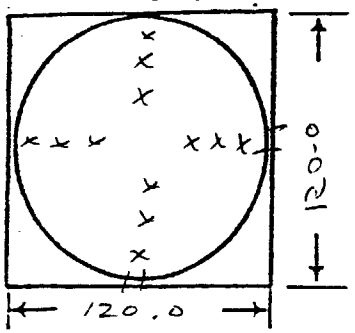
Coupling Type 8 Bolt 4"

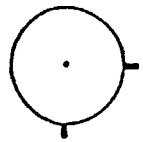


Cross Section Schematic of Stack

Traverse Point	Distance % of Diameter		Stack Diameter		Coupling Length		Traverse Points
1	04.4	X	120.0	+	15.0	=	20.28
2	14.6						32.52
3	29.6						50.52
4	70.4						99.48
5	85.4						117.48
6	95.6		120.0		15.0		129.72
7							
8							
9							
10							
11							
12							

CROSS SECTIONAL SCHEMATIC OF STACK TRAVERSE POINT LAYOUT





DRAW ARROW NORTH

E T S FIELD DATA, METHOD(S) 1-5

PLANT NISCO
DATE 11 5 92
LOCATION West Lake La.
OPERATOR DAMON WOOD
STACK NO. Boiler #1
RUN NO. 1

SAMPLE BOX NO. BL
METER BOX NO. 792
AMBIENT TEMPERATURE 58°
BAROMETRIC PRESSURE 30.09
FILTER TARE wt mg 1906
NOZZLE DIAMETER, in. 0.2130

STACK DIAMETER, in. 120.0
PITOT TUBE NO. ~~0.813~~ P-10-3
PITOT FACTOR 0.813
METER Δ Hₒ ~~0.9768~~ 1.6805
D.G.M.C. FACTOR ~~1.6805~~ 0.9768
K FACTOR 1.2978

T = 917.8262 ~~T = 989.9284~~

TRAVERSE POINT NUMBER	SAMPLING TIME (θ), min.	STATIC PRESSURE (in. H₂O)	STACK TEMP (Ts), °F	VELOCITY HEAD (ΔPs)	(√ΔPs)	PRESSURE DIFFERENTIAL ACROSS ORIFICE METER (ΔH) in. H₂O ACTUAL	DESIRED	GAS SAMPLE VOLUME (Vm), ft³	GAS SAMPLE TEMPERATURE AT DRY GAS METER INLET (Tmin), °F	OUTLET (Tmout), °F	SAMPLE BOX TEMPERATURE °F	TEMPERATURE OF GAS LEAVING CONDENSER OR LAST IMPINGER F	PUMP VACUUM in. Hg gauge
1	1000	on @	306.0	0.930	0.964	1.200	1.201	927.981	60	58	317	41	5.5
2	1010	-1.25	308	0.925	0.961	1.100	1.105	933.900	66	62	323	40	5.5
3	1020		309	0.950	0.974	1.150	1.133	939.609	69	64	315	40	5.5
4	1030		309	1.100	1.048	1.300	1.312	945.373	71	67	317	40	6.0
5	1040		308	1.100	1.048	1.300	1.314	951.601	73	69	312	40	6.0
6	1050		307	0.985	0.992	1.200	1.178	957.875	75	71	314	42	5.5
—	1100	off @	—	—	—	—	—	964.002	—	—	—	—	—
7	1104	on @	307	1.100	1.040	1.300	1.316	964.002	73	71	313	44	6.0
8	1114		308	1.150	1.072	1.350	1.374	970.395	76	73	317	42	6.0
9	1124		309	1.100	1.048	1.300	1.312	976.796	77	73	317	41	6.0
10	1134		309	1.200	1.095	1.450	1.432	983.125	77	74	317	40	6.0
11	1144		309	1.200	1.095	1.450	1.432	989.832	79	75	316	41	6.0
12	1154		308	1.100	1.048	1.300	1.314	996.550	79	75	314	42	6.0
	1204	off @						003.054					
AVERAGE	120.0	-1.25	308.09		1.022	1.283		75.073		71.13			

VOLUME OF LIQUID WATER COLLECTED (total wt 18.7)

	IMPINGER WEIGHTS			
FINAL	581.8	583.4	461.6	683.2
INITIAL	537.7	569.9	457.0	666.9
WEIGHT COLLECTED	44.1	13.5	4.6	16.3
TOTAL WEIGHT		78.5		

ORSAT MEASUREMENT

	CO_2	O_2	CO	N_2
1	14.4	5.2		
2				
3				
4				

COMMENTS:

PRE-LEAK CHECK GOOD @ 10 in/Hg at .001 CFM for 1 min
POST-LEAK CHECK GOOD @ 10 in/Hg at .001 CFM for 1 min

E T S

Emission Testing Services, Inc.

Client : NISCO
Source : BOILER 1A
Test Date : 11- 5-92
Run No. : 1

DETERMINATION of STACK GAS MOISTURE, MOLECULAR WEIGHT, VELOCITY, and VOLUMETRIC FLOW RATE

A - Cross-sectional area of the stack, ft3
Acf - Stack gas flow rate, actual, acfm
Bws - Stack gas moisture fraction, %/100
Cp - Pitot tube coefficient
dH - Meter orifice pressure differential, in. H2O
dP - Stack gas velocity head, in. H2O
F1 - Conversion factor, 13.6 in. H2O/ in. Hg
Kp - Pitot tube constant, 85.49
MCO2 - Molecular weight of CO2, 44.01 lb/ lb mole
Md - Stack gas molecular weight, dry lb/lb mole
MH2O - Molecular weight of water, 18.02 lb/lb mole
MN2 - Molecular weight of N2, 28.01 lb/lb mole
MO2 - Molecular weight of O2, 32.00 lb/lb mole
Ms - Stack gas molecular weight, wet lb/lb mole
Pbar - Barometric pressure, in. Hg
Ps - Stack gas static pressure, in. H2O
Ps - Stack gas absolute pressure, in. Hg
Pstd Standard absolute pressure, 29.92 in. Hg
Qsd - Stack gas volumetric flow rate, dry scfm
R - Ideal gas constant, 21.85
Tm - Meter temperature, R
Ts - Stack gas temperature, R
Tstd - Standard temperature, 528 R
Vi - Water vapor condensed, impinger 1, g
Vii - Water vapor condensed, impinger 2, g
Viii - Water vapor condensed, impinger 3, g
Viv - Water vapor condensed, impinger 4, g
Vm - Gas meter sample volume, dry ft3
Vmstd - Gas meter sample volume, dry std. ft3
Vs - Stack gas velocity, ft/sec
Vm - Total water vapor condensed, ft3
Y - Dry gas meter calibration factor
%CO2 - Stack gas CO concentration, %/100
%N2 Stack gas N2 concentration, %/100
O2 - Stack gas O2 concentration, %/100

$$Vw = \left\{ \frac{(Vi + Vii + Viii + Viv)\ R\ Tstd}{(453.6\ g/lb)\ Pstd\ MH2O} \right\} = \left\{ \frac{(44.1 + 13.5 + 4.6 + 16.3)(21.85)(528)}{(453.6)(29.92)(18.02)} \right\} = 3.70310$$

$$Vmstd = Vm\ Y \left\{ \frac{(Pb + dH/F1)\ Tstd}{Pstd\ \ Tm} \right\} = (75.073)(.9768) \left\{ \frac{(30.090 + 1.2833/13.6)(528)}{(29.92)\ (531)} \right\} = 73.54396$$

$$Bws = \left\{ \frac{Vw}{Vw + Vmstd} \right\} = \left\{ \frac{(3.70310)}{(3.70310 + 73.54396)} \right\} = .0479$$

$$Md = (MCO2)(\%CO2) + (MO2)(\%O2) + (MN2)(\%N2)$$
$$= (44.01)(.144) + (32.00)(.052) + (28.01)(.804) = 30.521$$

$$Ms = Md\ (1 - Bws) + (MH2O\ Bws) = (30.521)(1 - .0479) + (18.02)(.0479) = 29.922$$

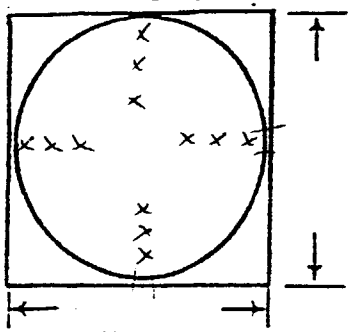
$$Vs = Kp\ Cp\ (dP)^{1/2} \left\{ \frac{Ts}{Ps\ Ms} \right\}^{1/2} = (85.49)(.8130)(1.0334) \left\{ \frac{(768)}{(29.998)(29.922)} \right\}^{1/2} = 66.4398$$

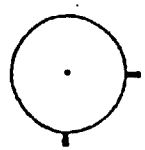
$$Acf = (60\ sec/min)(Vs\ \ A) = (60)(66.4398)(78.5398) = 313089.7$$

$$Qsd = (3600\ sec/hr)(1 - Bws)(Vs\ A) \left\{ \frac{Tstd\ Ps}{Ts\ Pstd} \right\}$$

$$= (3600)(1 - .0479)(66.4398)(78.5398) \left\{ \frac{(528)(29.998)}{(768)(29.92)} \right\} = 12326583.0\ dscf/hr$$
$$= 205443.0\ dscf/min$$

CROSS SECTIONAL SCHEMATIC OF STACK TRAVERSE POINT LAYOUT





DRAW ARROW NORTH

ETS FIELD DATA, METHOD(S) 1-5

PLANT NISCO
DATE 11 5 92
LOCATION West lake La.
OPERATOR DAMON WOOD
STACK NO. Boiler #1
RUN NO. 2

SAMPLE BOX NO. SL
METER BOX NO. 792
AMBIENT TEMPERATURE 58°
BAROMETRIC PRESSURE 30.09
FILTER TARE wt mg 1907
NOZZLE DIAMETER, in. 0.2130

STACK DIAMETER, in. 120.0
PITOT TUBE NO. P-10-3
PITOT FACTOR 0.813
METER Δ Hₒ ~~1.9768~~ 1.6805
D.G.M.C. FACTOR 0.9768
K FACTOR 1.2421
T = 954.0898

TRAVERSE POINT NUMBER	SAMPLING TIME (θ), min.	STATIC PRESSURE (in. H₂O)	STACK TEMP (Ts), °F	VELOCITY HEAD (ΔPs)	(√ΔPs)	PRESSURE DIFFERENTIAL ACROSS ORIFICE METER (ΔH) in. H₂O ACTUAL	DESIRED	GAS SAMPLE VOLUME (Vm), ft³	GAS SAMPLE TEMPERATURE AT DRY GAS METER INLET (Tmin), °F	OUTLET (Tmout), °F	SAMPLE BOX TEMPERATURE °F	TEMPERATURE OF GAS LEAVING CONDENSER OR LAST IMPINGER F	PUMP VACUUM in. Hg gauge
1	1250	on Q	306.0	1.200	1.095	1.500	1.494	003.220	71	71	321	45	5.0
2	1300	-1.20	307	1.300	1.145	1.600	1.617	009.976	78	75	332	43	5.0
3	1310		308	1.250	1.118	1.550	1.552	016.942	79	75	321	42	5.0
4	1320		308	1.450	1.204	1.800	1.801	023.896	80	75	319	41	5.5
5	1330		311	1.360	1.140	1.600	1.608	031.389	80	76	320	40	5.0
6	1340		311	1.100	1.048	1.350	1.361	038.621	81	76	320	40	5.0
1350	~~off~~	off Q	—	—	—	—	—	044.979	—	—	—	—	—
7	1354	on Q	311	1.150	1.072	1.400	1.423	044.979	79	77	320	41	5.0
8	1404		315	1.150	1.072	1.400	1.415	051.543	81	77	317	40	5.0
9	1414		315	1.150	1.072	1.400	1.415	058.131	82	78	322	40	5.0
10	1424		315	1.350	1.161	1.650	1.661	064.737	82	78	321	40	5.0
11	1434		315	1.350	1.161	1.650	1.661	071.999	83	78	321	41	5.0
12	1444		314	1.200	1.095	1.500	1.479	079.303	83	79	318	42	5.0
	1454							086.235					
AVERAGE	120.0	-1.20	311.33		1.113	1.533		~~40~~ 83.0.5		78.082			

VOLUME OF LIQUID WATER COLLECTED (Total 85.6)	IMPINGER WEIGHTS			
FINAL	588.2	586.7	463.3	687.7
INITIAL	542.4	570.8	458.6	668.5
WEIGHT COLLECTED	45.8	15.9	4.7	19.2
TOTAL WEIGHT		85.6		

ORSAT MEASUREMENT

	CO_2	O_2	CO	N_2
1	14.0	5.1		
2				
3				
4				

COMMENTS:

PRE-LEAK CHECK GOOD @ 10 in Hg ~~at~~ .001 cfm for 1 min
POST-LEAK CHECK GOOD @ 10 in Hg at .001 cfm for 1 min

6.1.4

E T S

Emission Testing Services, Inc.

Client : NISCO
Source : BOILER 1A
Test Date : 11- 5-92
Run No. : 2

DETERMINATION of STACK GAS MOISTURE, MOLECULAR WEIGHT, VELOCITY, and VOLUMETRIC FLOW RATE

A - Cross-sectional area of the stack, ft3
Acf - Stack gas flow rate, actual, acfm
Bws - Stack gas moisture fraction, %/100
Cp - Pitot tube coefficient
dH - Meter orifice pressure differential, in. H2O
dP - Stack gas velocity head, in. H2O
F1 - Conversion factor, 13.6 in. H2O/ in. Hg
Kp - Pitot tube constant, 85.49
MCO2 - Molecular weight of CO2, 44.01 lb/ lb mole
Md - Stack gas molecular weight, dry lb/lb mole
MH2O - Molecular weight of water, 18.02 lb/lb mole
MN2 - Molecular weight of N2, 28.01 lb/lb mole
MO2 - Molecular weight of O2, 32.00 lb/lb mole
Ms - Stack gas molecular weight, wet lb/lb mole
Pbar - Barometric pressure, in. Hg
Ps - Stack gas static pressure, in. H2O
Ps - Stack gas absolute pressure, in. Hg
Pstd Standard absolute pressure, 29.92 in. Hg
Qsd - Stack gas volumetric flow rate, dry scfm
R - Ideal gas constant, 21.85
Tm - Meter temperature, R
Ts - Stack gas temperature, R
Tstd - Standard temperature, 528 R
Vi - Water vapor condensed, impinger 1, g
Vii - Water vapor condensed, impinger 2, g
Viii - Water vapor condensed, impinger 3, g
Viv - Water vapor condensed, impinger 4, g
Vm - Gas meter sample volume, dry ft3
Vmstd - Gas meter sample volume, dry std. ft3
Vs - Stack gas velocity, ft/sec
Vm - Total water vapor condensed, ft3
Y - Dry gas meter calibration factor
%CO2 - Stack gas CO concentration, %/100
%N2 Stack gas N2 concentration, %/100
O2 - Stack gas O2 concentration, %/100

$$Vw = \left\{ \frac{(Vi + Vii + Viii + Viv)\ R\ Tstd}{(453.6\ g/lb)\ Pstd\ MH2O} \right\} = \left\{ \frac{(45.8 + 15.9 + 4.7 + 19.2)(21.85)(528)}{(453.6)(29.92)(18.02)} \right\} = 4.03803$$

$$Vmstd = Vm\ Y \left\{ \frac{(Pb + dH/F1)\ Tstd}{Pstd\ \ Tm} \right\} = (83.015)(.9768) \left\{ \frac{(30.090 + 1.5333/13.6)(528)}{(29.92)\ (538)} \right\} = 80.32144$$

$$Bws = \left\{ \frac{Vw}{Vw + Vmstd} \right\} = \left\{ \frac{(4.03803)}{(4.03803 + 80.32144)} \right\} = .0479$$

$$Md = (MCO2)(\%CO2) + (MO2)(\%O2) + (MN2)(\%N2)$$
$$= (44.01)(.140) + (32.00)(.051) + (28.01)(.809) = 30.453$$

$$Ms = Md\ (1 - Bws) + (MH2O\ Bws) = (30.453)(1 - .0479) + (18.02)(.0479) = 29.858$$

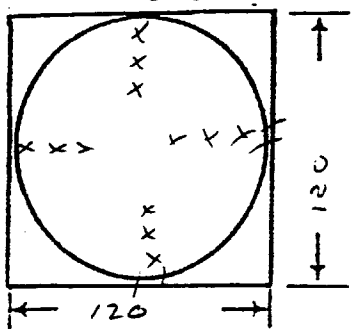
$$Vs = Kp\ Cp\ (dP)^{1/2} \left\{ \frac{Ts}{Ps\ Ms} \right\}^{1/2} = (85.49)(.8130)(1.1153) \left\{ \frac{(771)}{(30.002)(29.858)} \right\}^{1/2} = 71.9281$$

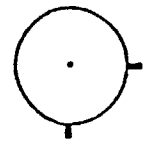
$$Acf = (60\ sec/min)(Vs\ \ A) = (60)(71.9281)(78.5398) = 338952.9$$

$$Qsd = (3600\ sec/hr)(1 - Bws)(Vs\ A) \left\{ \frac{Tstd\ Ps}{Ts\ Pstd} \right\}$$

$$= (3600)(1 - .0479)(71.9281)(78.5398) \left\{ \frac{(528)(30.002)}{(771)(29.92)} \right\} = 13291232.0\ dscf/hr$$
$$= 221520.5\ dscf/min$$

CROSS SECTIONAL SCHEMATIC OF STACK TRAVERSE POINT LAYOUT





DRAW ARROW NORTH

E T S FIELD DATA, METHOD(S) 1-5

PLANT NISCO
DATE 11 5 92
LOCATION West Lake La.
OPERATOR DAMON WOOD
STACK NO. Boiler # 1
RUN NO. 3

SAMPLE BOX NO. BL
METER BOX NO. 792
AMBIENT TEMPERATURE 60°
BAROMETRIC PRESSURE 30.09
FILTER TARE wt mg 1908
NOZZLE DIAMETER, in. 0.2130

STACK DIAMETER, in. 120
PITOT TUBE NO. P-10-3
PITOT FACTOR 0.813
METER Δ Hₒ 1.6805
D.G.M.C. FACTOR 0.9768
K FACTOR 1.2421
T = 954.0898

TRAVERSE POINT NUMBER	SAMPLING TIME (θ), min.	STATIC PRESSURE (in. H₂O)	STACK TEMP (Ts), °F	VELOCITY HEAD (ΔPs)	(√ΔPs)	PRESSURE DIFFERENTIAL ACROSS ORIFICE METER (ΔH) in. H₂O ACTUAL	DESIRED	GAS SAMPLE VOLUME (Vm), ft³	GAS SAMPLE TEMPERATURE AT DRY GAS METER INLET (Tmin), °F	OUTLET (Tmout), °F	SAMPLE BOX TEMPERATURE °F	TEMPERATURE OF GAS LEAVING CONDENSER OR LAST IMPINGER F	PUMP VACUUM in. Hg gauge
1	1547		310.0	1.150	1.072	1.400	1.424	091.066	78	79	316	55	9.0
	1548	off @	—	—	—	—	—	091.865	—	—	—	—	—
1	1550	on @	—		—	—	—	091.865	~~78~~	~~77~~	—	—	—
2	1559	-1.30	312	1.200	1.095	1.500	1.483	097.653	83	79	320	51	8.0
3	1609		313	1.250	1.118	1.550	1.542	104.545	84	80	325	51	8.5
4	1619		314	1.400	1.183	1.700	1.725	111.600	84	80	325	49	9.0
5	1629		314	1.300	1.140	1.600	1.602	118.992	85	81	324	48	8.5
6	1639		313	1.150	1.072	1.400	1.419	126.190	86	82	326	46	7.5
—	1649	off @	—	—	—	—	—	132.959	—	—	—	—	—
7	1653	on @	314	1.300	1.140	1.600	1.602	132.959	85	81	316	48	8.0
8	1703		314	1.200	1.095	1.500	1.479	139.263	87	83	325	43	8.0
9	1713		315	1.200	1.095	1.500	1.477	146.929	87	83	324	45	8.0
10	1723		315	1.400	1.183	1.700	1.723	153.952	86	83	326	46	9.0
11	1733		315	1.350	1.161	1.650	1.661	161.940	87	83	324	47	9.0
12	1743		314	1.200	1.095	1.500	1.479	168.799	86	83	327	48	8.0
		off @						175.818					
AVERAGE	120.0	-1.30	313.58		1.121	1.563		84.752	83.04				

VOLUME OF LIQUID WATER COLLECTED	IMPINGER WEIGHTS			
	Total wt 84.7			
FINAL	587.5	582.2	462.2	684.3
INITIAL	538.1	570.1	457.4	666.0
WEIGHT COLLECTED	49.4	12.1	4.8	18.3
TOTAL WEIGHT		84.7		

ORSAT MEASUREMENT

	CO_2	O_2	CO	N_2
1	14.3	5.1		
2				
3				
4				

COMMENTS: stoped b/c of High ~~Vacuum~~ Vacuum

PRE-LEAK CHECK GOOD @ 10 in Hg at .001 CFM for 1 min
POST-LEAK CHECK GOOD @ 10 in Hg at .001 CFM for 1 min

6.1.6

E T S

Emission Testing Services, Inc.

Client : NISCO
Source : BOILER 1A
Test Date : 11- 5-92
Run No. : 3

DETERMINATION of STACK GAS MOISTURE, MOLECULAR WEIGHT, VELOCITY, and VOLUMETRIC FLOW RATE

A - Cross-sectional area of the stack, ft3
Acf - Stack gas flow rate, actual, acfm
Bws - Stack gas moisture fraction, %/100
Cp - Pitot tube coefficient
dH - Meter orifice pressure differential, in. H2O
dP - Stack gas velocity head, in. H2O
F1 - Conversion factor, 13.6 in. H2O/ in. Hg
Kp - Pitot tube constant, 85.49
MCO2 - Molecular weight of CO2, 44.01 lb/ lb mole
Md - Stack gas molecular weight, dry lb/lb mole
MH2O - Molecular weight of water, 18.02 lb/lb mole
MN2 - Molecular weight of N2, 28.01 lb/lb mole
MO2 - Molecular weight of O2, 32.00 lb/lb mole
Ms - Stack gas molecular weight, wet lb/lb mole
Pbar - Barometric pressure, in. Hg
Ps - Stack gas static pressure, in. H2O
Ps - Stack gas absolute pressure, in. Hg
Pstd Standard absolute pressure, 29.92 in. Hg
Qsd - Stack gas volumetric flow rate, dry scfm
R - Ideal gas constant, 21.85
Tm - Meter temperature, R
Ts - Stack gas temperature, R
Tstd - Standard temperature, 528 R
Vi - Water vapor condensed, impinger 1, g
Vii - Water vapor condensed, impinger 2, g
Viii - Water vapor condensed, impinger 3, g
Viv - Water vapor condensed, impinger 4, g
Vm - Gas meter sample volume, dry ft3
Vmstd - Gas meter sample volume, dry std. ft3
Vs - Stack gas velocity, ft/sec
Vm - Total water vapor condensed, ft3
Y - Dry gas meter calibration factor
%CO2 - Stack gas CO concentration, %/100
%N2 Stack gas N2 concentration, %/100
O2 - Stack gas O2 concentration, %/100

$$Vw = \left\{ \frac{(Vi + Vii + Viii + Viv)\ R\ Tstd}{(453.6\ g/lb)\ Pstd\ MH2O} \right\} = \left\{ \frac{(49.4 + 12.1 + 4.8 + 18.3)(21.85)(528)}{(453.6)(29.92)(18.02)} \right\} = 3.99086$$

$$Vmstd = Vm\ Y \left\{ \frac{(Pb + dH/F1)\ Tstd}{Pstd\ Tm} \right\} = (84.752)(.9768) \left\{ \frac{(30.090 + 1.5500/13.6)(528)}{(29.92)(543)} \right\} = 81.25662$$

$$Bws = \left\{ \frac{Vw}{Vw + Vmstd} \right\} = \left\{ \frac{(3.99086)}{(3.99086 + 81.25662)} \right\} = .0468$$

$$Md = (MCO2)(\%CO2) + (MO2)(\%O2) + (MN2)(\%N2)$$
$$= (44.01)(.143) + (32.00)(.051) + (28.01)(.806) = 30.501$$

$$Ms = Md\ (1 - Bws) + (MH2O\ Bws) = (30.501)(1 - .0468) + (18.02)(.0468) = 29.917$$

$$Vs = Kp\ Cp\ (dP)^{1/2} \left\{ \frac{Ts}{Ps\ Ms} \right\}^{1/2} = (85.49)(.8130)(1.1211) \left\{ \frac{(774)}{(29.994)(29.917)} \right\}^{1/2} = 72.3478$$

$$Acf = (60\ sec/min)(Vs\ A) = (60)(72.3478)(78.5398) = 340930.5$$

$$Qsd = (3600\ sec/hr)(1 - Bws)(Vs\ A) \left\{ \frac{Tstd\ Ps}{Ts\ Pstd} \right\}$$

$$= (3600)(1 - .0468)(72.3478)(78.5398) \left\{ \frac{(528)(29.994)}{(774)(29.92)} \right\} = 13341351.0\ dscf/hr$$
$$= 222355.8\ dscf/min$$

Emission Testing Services, Inc.
P.O. Box 15075
Baton Rouge, LA 70895
504-925-8405

Client : NISCO
Source : BOILER 1A
Testing Date : 11- 5-92
Run : 1

DETERMINATION OF PARTICULATE EMISSIONS
(modified to include metals emissions)

dH - Average pressure differential, meter orifice, in-H20
Pbar - Barometric pressure at the sampling site, in Hg
Pstd - Standard absolute pressure, 29.92 in Hg
Tm - Average dry gas meter temperature, deg R
Tstd - Standard absolute temperature, 528 deg R
Vm - Volume of gas sample, actual dry ft3
Vmstd - Volume of gas sample, dry, Std. cond., DSCF
Y - Dry gas meter calibration factor

$$Vmstd = Vm\ Y \frac{Tstd}{Tm} \frac{Pbar + dH/13.6}{Pstd}$$

$$Vmstd = (\ 75.073\ )(\ .9768\ )\left(\frac{528}{531.}\right)\left(\frac{30.09 + (1.2833/13.6)}{29.92}\right)$$

Vmstd = 73.54396

An - Cross-sectional area of nozzle, ft2
Ps - Absolute stack gas pressure, in Hg
Qsd - Dry volumetric stack gas flow rate, dscf/hr
St - Total sampling time, min
Ts - Absolute stack gas temperature, deg R
Vs - Average stack gas velocity, ft/sec

----- ISOKINETIC SAMPLING RATE -----

$$I = \frac{Ts\ Vmstd\ Pstd\ 100}{Tstd\ Vs\ An\ St\ Ps\ (\ 60\ )(\ 1-Bws\ )}$$

$$I = \frac{(\ 768.\ )(\ 73.54396\ )(\ 29.92\ )(\ 100\ )}{528\ (\ 66.4398)(.00024745)(120)(29.998)\ 60\ (1 -\ .0479)}$$

I = 94.68

Emission Testing Services, Inc.
P.O. Box 15075
Baton Rouge, LA 70895
504-925-8405

Client : NISCO
Source : BOILER 1A
Testing Date : 11- 5-92
Run : 1

DETERMINATION OF PARTICULATE EMISSIONS
(modified to include metals emissions)

Ep - Particulate emission rate, lb/hr
Css - Concentration of particulate, grain/DSCF
Ca -Particulate concentration, blank DI water, mg/l
Mf -Particulate catch on filter, mg
Mn -Total particulate collected, mg
Mp -particulate in probe wash, mg Vp -Volume, probe wash,ml

---- Solids, probe wash ----

Mp =(Mp)-(Ca Vp) =(14.70) -(.000)(350.0) = 14.700

---- Solids, filter ----

Mf = 4.2

---- Total Solids collected ----

Mn = Mp + Mf

= (14.700)+(4.2) = 18.900

-------- CONCENTRATION and EMISSION RATE --------

Css = (Mn/Vmstd)(0.01543 grain/mg)

= (18.900/ 73.54396)(0.01543)

= .00397

Ep = (Mn)(2.2046 X 10-6 lb/mg)(Qsd) / Vmstd

= (18.900)(2.2046 X 10-6)(12326583.0) / (73.54396)

= 6.984

Emission Testing Services, Inc.
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504-925-8405

Client : NISCO
Source : BOILER 1A
Testing Date : 11- 5-92
Run : 1

DETERMINATION OF PARTICULATE EMISSIONS
(modified to include metals emissions)

Bf - Metal content of blank filter, mg
Bi - Metal concentration, blank impinger catch, mg/l
Bp - Metal concentration, blank probe wash, mg/l
Em - Metal emission rate, lb/hr
Mf - Metal content of sample filter, mg
Mi - Metal concentration, impinger sample, mg/l
Mp - Metal concentration, probe wash sample, mg/l

Qsd - Stack gas flow rate, dscf/hr
Tmf - Total metal collected on filter, mg
Tmi - Total metal collected in impinger sample, mg
Tmp - Total metal collected in probe wash, mg
Vi - Volume of impinger sample, ml
Vmstd- Stack gas sample volume, dscf
Vp - Volume of probe wash, ml

Tmp = (Mp Vp/1000) - (Bp Vp/1000) Tmi = (Mi Vi/1000) - (Bi Vi/1000)

Tmf = (Mf - Bf) Em = (Tmp + Tmf + Tmi)(2.2046 X 10-6 lb/mg)(Qsd / Vmstd)

------ Nickel ------

Tmp = (1.485)(350/1000) - (.000)(350/1000) = .5198
Mf = (.0055 - .0052) = .0003
Mi = (.000)(262/1000) - (.000)(262/1000) = .0000

Em =(.5198 + .0003 + .0000)(2.2046 X 10-6)(12326583.0 /73.54396) = .1932

------ Chromium ------

Tmp = (.120)(350/1000) - (.000)(350/1000) = .0420
Mf = (.0000 - .0000) = .0000
Mi = (.000)(262/1000) - (.000)(262/1000) = .0000

Em =(.0420 + .0000 + .0000)(2.2046 X 10-6)(12326583.0 /73.54396) = .0155

------ Vanadium ------

Tmp = (1.515)(350/1000) - (.000)(350/1000) = .5303
Mf = (.0000 - .0000) = .0000
Mi = (.000)(262/1000) - (.000)(262/1000) = .0000

Em =(.5303 + .0000 + .0000)(2.2046 X 10-6)(12326583.0 /73.54396) = .1959

------ Mercury ------

Tmp = (.000)(350/1000) - (.000)(350/1000) = .0000
Mf = (.0000 - .0000) = .0000
Mi = (.000)(262/1000) - (.000)(262/1000) = .0000

Em =(.0000 + .0000 + .0000)(2.2046 X 10-6)(12326583.0 /73.54396) = .0000

------ Cadmium ------

Tmp = (.444)(350/1000) - (.000)(350/1000) = .1554
Mf = (.0017 - .0018) = .0000
Mi = (.000)(262/1000) - (.000)(262/1000) = .0000

Em =(.1554 + .0000 + .0000)(2.2046 X 10-6)(12326583.0 /73.54396) = .0574

------ Beryllium ------

Tmp = (.120)(350/1000) - (.000)(350/1000) = .0420
Mf = (.0000 - .0000) = .0000
Mi = (.000)(262/1000) - (.000)(262/1000) = .0000

Em =(.0420 + .0000 + .0000)(2.2046 X 10-6)(12326583.0 /73.54396) = .0155

Emission Testing Services, Inc.
P.O. Box 15075
Baton Rouge, LA 70895
504-925-8405

Client : NISCO
Source : BOILER 1A
Testing Date : 11- 5-92
Run : 2

DETERMINATION OF PARTICULATE EMISSIONS
(modified to include metals emissions)

dH - Average pressure differential, meter orifice, in-H20
Pbar - Barometric pressure at the sampling site, in Hg
Pstd - Standard absolute pressure, 29.92 in Hg
Tm - Average dry gas meter temperature, deg R
Tstd - Standard absolute temperature, 528 deg R
Vm - Volume of gas sample, actual dry ft3
Vmstd - Volume of gas sample, dry, Std. cond., DSCF
Y - Dry gas meter calibration factor

$$Vmstd = Vm\ Y \frac{Tstd}{Tm} \frac{Pbar + dH/13.6}{Pstd}$$

$$Vmstd = (\ 83.015\ )(\ .9768\ )\left(\frac{528}{538.}\right)\left(\frac{30.09 + (1.5333/13.6)}{29.92}\right)$$

Vmstd = 80.32143

An - Cross-sectional area of nozzle, ft2
Ps - Absolute stack gas pressure, in Hg
Qsd - Dry volumetric stack gas flow rate, dscf/hr
St - Total sampling time, min
Ts - Absolute stack gas temperature, deg R
Vs - Average stack gas velocity, ft/sec

----- ISOKINETIC SAMPLING RATE -----

$$I = \frac{Ts\ Vmstd\ Pstd\ 100}{Tstd\ Vs\ An\ St\ Ps\ (\ 60\ )(\ 1-Bws\ )}$$

$$I = \frac{(\ 771.\ )(\ 80.32143\ )(\ 29.92\ )(\ 100\ )}{528\ (\ 71.9281)(.00024745)(120)(30.002)\ 60\ (1 -\ .0479)}$$

I = 95.90

Emission Testing Services, Inc.
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Client : NISCO
Source : BOILER 1A
Testing Date : 11- 5-92
Run : 2

DETERMINATION OF PARTICULATE EMISSIONS
(modified to include metals emissions)

Ep - Particulate emission rate, lb/hr
Css - Concentration of particulate, grain/DSCF
Ca -Particulate concentration, blank DI water, mg/l
Mf -Particulate catch on filter, mg
Mn -Total particulate collected, mg
Mp -particulate in probe wash, mg Vp -Volume, probe wash,ml

---- Solids, probe wash ----

Mp =(Mp)-(Ca Vp) =(8.88) -(.000)(370.0) = 8.880

---- Solids, filter ----

Mf = 5.2

---- Total Solids collected ----

Mn = Mp + Mf

= (8.880)+(5.2) = 14.080

-------- CONCENTRATION and EMISSION RATE --------

Css = (Mn/Vmstd)(0.01543 grain/mg)

= (14.080/ 80.32143)(0.01543)

= .00270

Ep = (Mn)(2.2046 X 10-6 lb/mg)(Qsd) / Vmstd

= (14.080)(2.2046 X 10-6)(13291232.0) / (80.32143)

= 5.136

Emission Testing Services, Inc.
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504-925-8405

Client : NISCO
Source : BOILER 1A
Testing Date : 11- 5-92
Run : 2

DETERMINATION OF PARTICULATE EMISSIONS
(modified to include metals emissions)

Bf - Metal content of blank filter, mg
Bi - Metal concentration, blank impinger catch, mg/l
Bp - Metal concentration, blank probe wash, mg/l
Em - Metal emission rate, lb/hr
Mf - Metal content of sample filter, mg
Mi - Metal concentration, impinger sample, mg/l
Mp - Metal concentration, probe wash sample, mg/l

Qsd - Stack gas flow rate, dscf/hr
Tmf - Total metal collected on filter, mg
Tmi - Total metal collected in impinger sample, mg
Tmp - Total metal collected in probe wash, mg
Vi - Volume of impinger sample, ml
Vmstd- Stack gas sample volume, dscf
Vp - Volume of probe wash, ml

Tmp = (Mp Vp/1000) - (Bp Vp/1000) Tmi = (Mi Vi/1000) - (Bi Vi/1000)

Tmf = (Mf - Bf) Em = (Tmp + Tmf + Tmi)(2.2046 X 10-6 lb/mg)(Qsd / Vmstd)

------ Nickel ------

Tmp = (1.365)(370/1000) - (.000)(370/1000) = .5051
Mf = (.0051 - .0052) = .0000
Mi = (.000)(271/1000) - (.000)(271/1000) = .0000

Em =(.5051 + .0000 + .0000)(2.2046 X 10-6)(13291232.0 /80.32143) = .1842

------ Chromium ------

Tmp = (.090)(370/1000) - (.000)(370/1000) = .0333
Mf = (.0000 - .0000) = .0000
Mi = (.000)(271/1000) - (.000)(271/1000) = .0000

Em =(.0333 + .0000 + .0000)(2.2046 X 10-6)(13291232.0 /80.32143) = .0121

------ Vanadium ------

Tmp = (1.785)(370/1000) - (.000)(370/1000) = .6605
Mf = (.0000 - .0000) = .0000
Mi = (.000)(271/1000) - (.000)(271/1000) = .0000

Em =(.6605 + .0000 + .0000)(2.2046 X 10-6)(13291232.0 /80.32143) = .2409

------ Mercury ------

Tmp = (.000)(370/1000) - (.000)(370/1000) = .0000
Mf = (.0000 - .0000) = .0000
Mi = (.000)(271/1000) - (.000)(271/1000) = .0000

Em =(.0000 + .0000 + .0000)(2.2046 X 10-6)(13291232.0 /80.32143) = .0000

------ Cadmium ------

Tmp = (.527)(370/1000) - (.000)(370/1000) = .1948
Mf = (.0016 - .0018) = .0000
Mi = (.000)(271/1000) - (.000)(271/1000) = .0000

Em =(.1948 + .0000 + .0000)(2.2046 X 10-6)(13291232.0 /80.32143) = .0711

------ Beryllium ------

Tmp = (.075)(370/1000) - (.000)(370/1000) = .0278
Mf = (.0000 - .0000) = .0000
Mi = (.000)(271/1000) - (.000)(271/1000) = .0000

Em =(.0278 + .0000 + .0000)(2.2046 X 10-6)(13291232.0 /80.32143) = .0101

Emission Testing Services, Inc.
P.O. Box 15075
Baton Rouge, LA 70895
504-925-8405

Client : NISCO
Source : BOILER 1A
Testing Date : 11- 5-92
Run : 3

DETERMINATION OF PARTICULATE EMISSIONS
(modified to include metals emissions)

dH - Average pressure differential, meter orifice, in-H20
Pbar - Barometric pressure at the sampling site, in Hg
Pstd - Standard absolute pressure, 29.92 in Hg
Tm - Average dry gas meter temperature, deg R
Tstd - Standard absolute temperature, 528 deg R
Vm - Volume of gas sample, actual dry ft3
Vmstd - Volume of gas sample, dry, Std. cond., DSCF
Y - Dry gas meter calibration factor

$$Vmstd = Vm\ Y \frac{Tstd}{Tm} \frac{Pbar + dH/13.6}{Pstd}$$

$$Vmstd = (\ 84.752\ )(\ .9768\ )\left(\frac{528}{543.}\right)\left(\frac{30.09 + (1.5500/13.6)}{29.92}\right)$$

Vmstd = 81.25662

An - Cross-sectional area of nozzle, ft2
Ps - Absolute stack gas pressure, in Hg
Qsd - Dry volumetric stack gas flow rate, dscf/hr
St - Total sampling time, min
Ts - Absolute stack gas temperature, deg R
Vs - Average stack gas velocity, ft/sec

----- ISOKINETIC SAMPLING RATE -----

$$I = \frac{Ts\ Vmstd\ Pstd\ 100}{Tstd\ Vs\ An\ St\ Ps\ (\ 60\ )(\ 1-Bws\ )}$$

$$I = \frac{(\ 774.\ )(\ 81.25662\ )(\ 29.92\ )(\ 100\ )}{528\ (\ 72.3477)(.00024745)(120)(29.994)\ 60\ (1 -\ .0468)}$$

I = 96.66

Emission Testing Services, Inc.
P.O. Box 15075
Baton Rouge, LA 70895
504-925-8405

Client : NISCO
Source : BOILER 1A
Testing Date : 11- 5-92
Run : 3

DETERMINATION OF PARTICULATE EMISSIONS
(modified to include metals emissions)

Ep - Particulate emission rate, lb/hr
Css - Concentration of particulate, grain/DSCF
Ca -Particulate concentration, blank DI water, mg/l
Mf -Particulate catch on filter, mg
Mn -Total particulate collected, mg
Mp -particulate in probe wash, mg Vp -Volume, probe wash,ml

---- Solids, probe wash ----

Mp =(Mp)-(Ca Vp) =(5.60) -(.000)(200.0) = 5.600

---- Solids, filter ----

Mf = 3.3

---- Total Solids collected ----

Mn = Mp + Mf

= (5.600)+(3.1) = 8.700

-------- CONCENTRATION and EMISSION RATE --------

Css = (Mn/Vmstd)(0.01543 grain/mg)

= (8.700/ 81.25662)(0.01543)

= .00165

Ep = (Mn)(2.2046 X 10-6 lb/mg)(Qsd) / Vmstd

= (8.700)(2.2046 X 10-6)(13341351.0) / (81.25662)

= 3.149

Emission Testing Services, Inc.
P.O. Box 15075
Baton Rouge, LA 70895
504-925-8405

Client : NISCO
Source : BOILER 1A
Testing Date : 11- 5-92
Run : 3

DETERMINATION OF PARTICULATE EMISSIONS
(modified to include metals emissions)

Bf - Metal content of blank filter, mg
Bi - Metal concentration, blank impinger catch, mg/l
Bp - Metal concentration, blank probe wash, mg/l
Em - Metal emission rate, lb/hr
Mf - Metal content of sample filter, mg
Mi - Metal concentration, impinger sample, mg/l
Mp - Metal concentration, probe wash sample, mg/l

Qsd - Stack gas flow rate, dscf/hr
Tmf - Total metal collected on filter, mg
Tmi - Total metal collected in impinger sample, mg
Tmp - Total metal collected in probe wash, mg
Vi - Volume of impinger sample, ml
Vmstd- Stack gas sample volume, dscf
Vp - Volume of probe wash, ml

Tmp = (Mp Vp/1000) - (Bp Vp/1000)

Tmi = (Mi Vi/1000) - (Bi Vi/1000)

Tmf = (Mf - Bf)

Em = (Tmp + Tmf + Tmi)(2.2046 X 10-6 lb/mg)(Qsd / Vmstd)

------ Nickel ------

Tmp = (1.470)(400/1000) - (.000)(400/1000) = .5880
Mf = (.0057 - .0052) = .0005
Mi = (.000)(363/1000) - (.000)(363/1000) = .0000

Em =(.5880 + .0005 + .0000)(2.2046 X 10-6)(13341351.0 /81.25662) = .2130

------ Chromium ------

Tmp = (.000)(400/1000) - (.000)(400/1000) = .0000
Mf = (.0000 - .0000) = .0000
Mi = (.000)(363/1000) - (.000)(363/1000) = .0000

Em =(.0000 + .0000 + .0000)(2.2046 X 10-6)(13341351.0 /81.25662) = .0000

------ Vanadium ------

Tmp = (1.125)(400/1000) - (.000)(400/1000) = .4500
Mf = (.0000 - .0000) = .0000
Mi = (.000)(363/1000) - (.000)(363/1000) = .0000

Em =(.4500 + .0000 + .0000)(2.2046 X 10-6)(13341351.0 /81.25662) = .1629

------ Mercury ------

Tmp = (.000)(400/1000) - (.000)(400/1000) = .0000
Mf = (.0000 - .0000) = .0000
Mi = (.000)(363/1000) - (.000)(363/1000) = .0000

Em =(.0000 + .0000 + .0000)(2.2046 X 10-6)(13341351.0 /81.25662) = .0000

------ Cadmium ------

Tmp = (.528)(400/1000) - (.000)(400/1000) = .2112
Mf = (.0019 - .0018) = .0001
Mi = (.000)(363/1000) - (.000)(363/1000) = .0000

Em =(.2112 + .0001 + .0000)(2.2046 X 10-6)(13341351.0 /81.25662) = .0765

------ Beryllium ------

Tmp = (.105)(400/1000) - (.000)(400/1000) = .0420
Mf = (.0000 - .0000) = .0000
Mi = (.000)(363/1000) - (.000)(363/1000) = .0000

Em =(.0420 + .0000 + .0000)(2.2046 X 10-6)(13341351.0 /81.25662) = .0152

Emission Testing Services, Inc.
P.O. Box 15075
Baton Rouge, LA 70895
504-925-8405

Client : NISCO
Source : BOILER 1A
Testing Date : 11- 5-92
Run : 1 - 3

SULFUR DIOXIDE EMISSION RATE

ESO2 - Sulfur dioxide emission rate, lb/hr
SO2ms - SO2 concentration as measured, PPM
F - (1.66281 X 10-7 lb SO2/ft3) / (PPM)
Qsd - Stack gas flow rate, dscf/hr

ESO2 = (SO2ms)(F)(Qsd)

-------- RUN 1 --------

ESO2 = (154.10)(1.66281 X 10-7)(12326580.0) = 315.855

-------- RUN 2 --------

ESO2 = (157.70)(1.66281 X 10-7)(13291230.0) = 348.530

-------- RUN 3 --------

ESO2 = (173.00)(1.66281 X 10-7)(13341350.0) = 383.785

Emission Testing Services, Inc.
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Baton Rouge, LA 70895
504-925-8405

Client : NISCO
Source : BOILER 1A
Testing Date : 11- 5-92
Run : 1 - 3

OXIDES OF NITROGEN EMISSION RATE

ENOX - NOX emission rate as NO2, lb/hr
F - NO2 factor, 1.1948 X 10-7 (lb/ft3)/ PPM
NOXmsc - NOX concentration as measured, PPM
Qsd - Dry volumetric stack gas flow rate, DSCF/hr

ENOX = (NOXmsc)(F)(Qsd)

-------- RUN 1 --------

ENOX = (71.20)(1.1948 X 10-7)(12326580.0) = 104.862

-------- RUN 2 --------

ENOX = (86.00)(1.1948 X 10-7)(13291230.0) = 136.571

-------- RUN 3 --------

ENOX = (87.80)(1.1948 X 10-7)(13341350.0) = 139.955

Emission Testing Services, Inc.
P.O. Box 15075
Baton Rouge, LA 70895
504-925-8405

Client : NISCO
Source : BOILER 1A
Testing Date : 11- 5-92
Run : 1 - 3

CARBON MONOXIDE EMISSION RATE

ECO - Carbon Monoxide Emission Rate - Lb/Hr
F - CO conv. factor, 7.2727 X 10-8 (lb/ft3)/(PPM)
COms - Concentration of carbon monoxide - PPM
Qsd - Dry volumetric stack gas flow rate, DSCF/Hr

ECO = (COms)(F)(Qsd)

-------- RUN 1 --------

ECO = (12.50)(7.2727 X 10-8)(12326580.0) = 11.206

-------- RUN 2 --------

ECO = (10.40)(7.2727 X 10-8)(13291230.0) = 10.053

-------- RUN 3 --------

ECO = (9.80)(7.2727 X 10-8)(13341350.0) = 9.509

ETS

EMISSION TESTING SERVICES, INC.

ADSORPTION TUBE DATA FORM

CLIENT NISCO DATE 5 NOV 92

SOURCE ID Boiler #1 RUN NO 1

OPERATOR SCOTT LESLEY

Sample Time (min.)	Barometric Pressure (in. Hg)	Ambient Temperature °F	Pump Vacuum (in. Hg)
480 (8 HRS)		57°	27"

INITIAL CALIBRATION

SET 1 20.4/20.4/20.3 cc/min

SET 2 22.9/23.0/22.9 cc/min

SET 3 22.0/22.5/22.3 cc/min

FINAL CALIBRATION

SET 1 19.0/19.0/19.0 cc/min

SET 2 20.6/20.3/20.7 cc/min

SET 3 20.0/20.0/19.9 cc/min

Time

Start 0925

Stop 1725

8.00

480 min

SAMPLE I.D.

LOT NUMBER Silica #L698

CHARC. #120

SAMPLE 1) R1-S1-TA

SAMPLE 2) R1-S1-TB

SAMPLE 3) R1-S1-TC

SAMPLE 4) R1-S2-TA

SAMPLE 5) R1-S2-TB

SAMPLE 6) R1-S2-TC

SAMPLE 7) R1-S3-TA

SAMPLE 8) R1-S3-TB

SAMPLE 9) R1-S3-TC

BAG SAMPLE

Time: _____ to _____

Total _____

COMMENTS: _____

\FORMS\ADSOR.TU

Emission Testing Services, Inc.
P.O. Box 15075
Baton Rouge, LA 70895
504-925-8405

Client : NISCO
Source : BOILER 1A
Testing Date : 11- 5-92
Run : 1

ORGANIC EMISSIONS

Er -Emission rate - lb/hr
Fr -Sample flow rate, cc/min
St -Sample time, min
Tstd -Temp standard, 528 deg R
Pstd -Std atm press., 29.92 in.Hg
Vstd -Sample volume, std cc
Qsd -Vblumetric flow rate of stack gas, DSCF/hr
Deff -Desorption efficiency from sample media
Fc -Conver. factor, ug/cc to PPM, 24039/mole weight, MW

PPM -Concentration, PPM
Sw -Sample collected, ug
Swb -Sample blank, ug
Ta -Ambient temp, deg R
Pbar -Baro press., in.Hg

Vstd = (Fr)(St)(Tstd/Ta)(Pbar/Pstd)

Er = ((Sw - Swb) /Deff Vstd)(6.242725 X 10-5 lb cc/ft3 ug)(Qsd)

PPM = ((Sw - Swb) /Deff Vstd)(Fc)

----- RUN 1, set 1 ----- Qsd = 12986389.0(1)

Vstd =(19.683)(480.0)(528/ 517.)(30.09/ 29.92)= 9703.845

Compound	Sw	Swb	Deff	MW	PPM	Er
Benzene	nd	nd	.880	78.117	nd	nd
Ethyl Benzene	nd	nd	.900	106.172	nd	nd
Toluene	nd	nd	.910	92.144	nd	nd
Xylene	nd	nd	.880	106.172	nd	nd
Napthalene	nd	nd	.855	128.179	nd	nd

(1) Flow rate is the average of test Runs 1 - 3.

Emission Testing Services, Inc.
P.O. Box 15075
Baton Rouge, LA 70895
504-925-8405

Client : NISCO
Source : BOILER 1A
Testing Date : 11- 5-92
Run : 1

ORGANIC EMISSIONS

----- RUN 1, set 2 ----- Qsd = 12986389.0(1)

Vstd =(21.733)(480.0)(528/ 517.)(30.09/ 29.92)=10714.327

Compound	Sw	Swb	Deff	MW	PPM	Er
Benzene	nd	nd	.880	78.117	nd	nd
Ethyl Benzene	nd	nd	.900	106.172	nd	nd
Toluene	nd	nd	.910	92.144	nd	nd
Xylene	nd	nd	.880	106.172	nd	nd
Napthalene	nd	nd	.855	128.179	nd	nd

----- RUN 1, set 3 ----- Qsd = 12986389.0(1)

Vstd =(21.117)(480.0)(528/ 517.)(30.09/ 29.92)=10410.640

Compound	Sw	Swb	Deff	MW	PPM	Er
Benzene	nd	nd	.880	78.117	nd	nd
Ethyl Benzene	nd	nd	.900	106.172	nd	nd
Toluene	nd	nd	.910	92.144	nd	nd
Xylene	nd	nd	.880	106.172	nd	nd
Napthalene	nd	nd	.855	128.179	nd	nd

(1) Flow rate is the average of test Runs 1 - 3.

ETS

EMISSION TESTING SERVICES, INC.

ADSORPTION TUBE DATA FORM

CLIENT NISCO DATE 5 Nov 92

SOURCE ID Boiler #1 RUN NO 2

OPERATOR SCOTT LESLEY

Sample Time (min.)	Barometric Pressure (in. Hg)	Ambient Temperature °F	Pump Vacuum (in. Hg)
120 (2 HRS)			

INITIAL CALIBRATION

SET 1 20.5/20.6/20.8 cc/min

SET 2 _____ cc/min

SET 3 _____ cc/min

FINAL CALIBRATION

SET 1 18.5/18.6/18.8 cc/min

SET 2 _____ cc/min

SET 3 _____ cc/min

Time

Start 0955

Stop 1155

SAMPLE I.D.

LOT NUMBER Silica #698

CHAR. #120

SAMPLE 1) R2-SI-TA

SAMPLE 2) R2-SI-TB

SAMPLE 3) R2-SI-TC

SAMPLE 4) _____

SAMPLE 5) _____

SAMPLE 6) _____

SAMPLE 7) _____

SAMPLE 8) _____

SAMPLE 9) _____

BAG SAMPLE

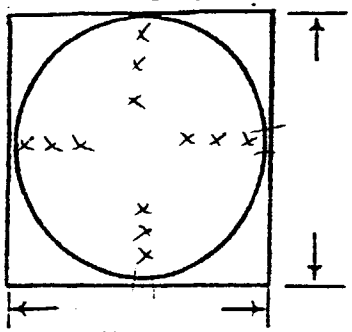
Time: _____ to _____

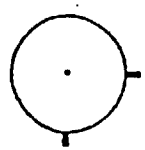
Total _____

COMMENTS: _____

INFORMATION TU

CROSS SECTIONAL SCHEMATIC OF STACK TRAVERSE POINT LAYOUT





DRAW ARROW NORTH

ETS FIELD DATA, METHOD(S) 1-5

PLANT NISCO
DATE 11 5 92
LOCATION West lake La.
OPERATOR DAMON WOOD
STACK NO. Boiler #1
RUN NO. 2

SAMPLE BOX NO. SL
METER BOX NO. 792
AMBIENT TEMPERATURE 58°
BAROMETRIC PRESSURE 30.09
FILTER TARE wt mg 1907
NOZZLE DIAMETER, in. 0.2130

STACK DIAMETER, in. 120.0
PITOT TUBE NO. P-10-3
PITOT FACTOR 0.813
METER Δ Hₒ ~~1.9768~~ 1.6805
D.G.M.C. FACTOR 0.9768
K FACTOR 1.2421
T = 954.0898

TRAVERSE POINT NUMBER	SAMPLING TIME (θ), min.	STATIC PRESSURE (in. H₂O)	STACK TEMP (Ts), °F	VELOCITY HEAD (ΔPs)	(√ΔPs)	PRESSURE DIFFERENTIAL ACROSS ORIFICE METER (ΔH) in. H₂O ACTUAL	DESIRED	GAS SAMPLE VOLUME (Vm), ft³	GAS SAMPLE TEMPERATURE AT DRY GAS METER INLET (Tmin), °F	OUTLET (Tmout), °F	SAMPLE BOX TEMPERATURE °F	TEMPERATURE OF GAS LEAVING CONDENSER OR LAST IMPINGER F	PUMP VACUUM in. Hg gauge
1	1250	on Q	306.0	1.200	1.095	1.500	1.494	003.220	71	71	321	45	5.0
2	1300	-1.20	307	1.300	1.145	1.600	1.617	009.976	78	75	332	43	5.0
3	1310		308	1.250	1.118	1.550	1.552	016.942	79	75	321	42	5.0
4	1320		308	1.450	1.204	1.800	1.801	023.896	80	75	319	41	5.5
5	1330		311	1.360	1.140	1.600	1.608	031.389	80	76	320	40	5.0
6	1340		311	1.100	1.048	1.350	1.361	038.621	81	76	320	40	5.0
1350	~~off~~	off Q	—	—	—	—	—	044.979	—	—	—	—	—
7	1354	on Q	311	1.150	1.072	1.400	1.423	044.979	79	77	320	41	5.0
8	1404		315	1.150	1.072	1.400	1.415	051.543	81	77	317	40	5.0
9	1414		315	1.150	1.072	1.400	1.415	058.131	82	78	322	40	5.0
10	1424		315	1.350	1.161	1.650	1.661	064.737	82	78	321	40	5.0
11	1434		315	1.350	1.161	1.650	1.661	071.999	83	78	321	41	5.0
12	1444		314	1.200	1.095	1.500	1.479	079.303	83	79	318	42	5.0
	1454							086.235					
AVERAGE	120.0	-1.20	311.33		1.113	1.533		~~40~~ 83.0.5		78.082			

VOLUME OF LIQUID WATER COLLECTED (Total 85.6)	IMPINGER WEIGHTS			
FINAL	588.2	586.7	463.3	687.7
INITIAL	542.4	570.8	458.6	668.5
WEIGHT COLLECTED	45.8	15.9	4.7	19.2
TOTAL WEIGHT		85.6		

ORSAT MEASUREMENT

	CO_2	O_2	CO	N_2
1	14.0	5.1		
2				
3				
4				

COMMENTS:

PRE-LEAK CHECK GOOD @ 10 in Hg ~~at~~ .001 cfm for 1 min
POST-LEAK CHECK GOOD @ 10 in Hg at .001 cfm for 1 min

6.1.4

Emission Testing Services, Inc.
P.O. Box 15075
Baton Rouge, LA 70895
504-925-8405

Client : NISCO
Source : BOILER 1A
Testing Date : 11- 5-92
Run : 2

ORGANIC EMISSIONS

Er -Emission rate - lb/hr
Fr -Sample flow rate, cc/min
St -Sample time, min
Tstd -Temp standard, 528 deg R
Pstd -Std atm press., 29.92 in.Hg
Vstd -Sample volume, std cc
Qsd -Vblumetric flow rate of stack gas, DSCF/hr
Deff -Desorption efficiency from sample media
Fc -Conver. factor, ug/cc to PPM, 24039/mole weight, MW

PPM -Concentration, PPM
Sw -Sample collected, ug
Swb -Sample blank, ug
Ta -Ambient temp, deg R
Pbar -Baro press., in.Hg

Vstd = (Fr)(St)(Tstd/Ta)(Pbar/Pstd)

Er = ((Sw - Swb) /Deff Vstd)(6.242725 X 10-5 lb cc/ft3 ug)(Qsd)

PPM = ((Sw - Swb) /Deff Vstd)(Fc)

----- RUN 2 ----- Qsd = 12326583.0(1)

Vstd =(19.633)(120.0)(528/ 517.)(30.09/ 29.92)= 2419.799

Compound	Sw	Swb	Deff	MW	PPM	Er
Benzene	nd	nd	.880	78.117	nd	nd
Ethyl Benzene	nd	nd	.900	106.172	nd	nd
Toluene	nd	nd	.910	92.144	nd	nd
Xylene	nd	nd	.880	106.172	nd	nd
Napthalene	nd	nd	.855	128.179	nd	nd

(1) Flow rate from test Run 1.

ETS

EMISSION TESTING SERVICES, INC.

ADSORPTION TUBE DATA FORM

CLIENT NISCO DATE 5 Nov 92

SOURCE ID Boiler #1 RUN NO 3

OPERATOR Scott Lusley

Sample Time (min.)	Barometric Pressure (in. Hg)	Ambient Temperature °F	Pump Vacuum (in. Hg)
180 (3 hrs)			

INITIAL CALIBRATION

SET 1 22.3/22.5/22.5 cc/min

SET 2 _____ cc/min

SET 3 _____ cc/min

FINAL CALIBRATION

SET 1 18.5/18.3/18.4 cc/min

SET 2 _____ cc/min

SET 3 _____ cc/min

Time

Start 0955

Stop 1255

SAMPLE I.D.

LOT NUMBER Silica #698

Char. #120

SAMPLE 1) R3-S1-TA

SAMPLE 2) R3-S1-TB

SAMPLE 3) R3-S1-TC

SAMPLE 4) _____

SAMPLE 5) _____

SAMPLE 6) _____

SAMPLE 7) _____

SAMPLE 8) _____

SAMPLE 9) _____

BAG SAMPLE

Time: _____ to _____

Total _____

COMMENTS: _____

Emission Testing Services, Inc.
P.O. Box 15075
Baton Rouge, LA 70895
504-925-8405

Client : NISCO
Source : BOILER 1A
Testing Date : 11- 5-92
Run : 3

ORGANIC EMISSIONS

Er -Emission rate - lb/hr
Fr -Sample flow rate, cc/min
St -Sample time, min
Tstd -Temp standard, 528 deg R
Pstd -Std atm press., 29.92 in.Hg
Vstd -Sample volume, std cc
Qsd -Volumetric flow rate of stack gas, DSCF/hr
Deff -Desorption efficiency from sample media
Fc -Conver. factor, ug/cc to PPM, 24039/mole weight, MW

PPM -Concentration, PPM
Sw -Sample collected, ug
Swb -Sample blank, ug
Ta -Ambient temp, deg R
Pbar -Baro press., in.Hg

Vstd = (Fr)(St)(Tstd/Ta)(Pbar/Pstd)

Er = ((Sw - Swb) /Deff Vstd)(6.242725 X 10-5 lb cc/ft3 ug)(Qsd)

PPM = ((Sw - Swb) /Deff Vstd)(Fc)

----- RUN 3 ----- Qsd = 12326583.0(1)

Vstd =(20.417)(180.0)(528/ 517.)(30.09/ 29.92)= 3774.517

Compound	Sw	Swb	Deff	MW	PPM	Er
Benzene	nd	nd	.880	78.117	nd	nd
Ethyl Benzene	nd	nd	.900	106.172	nd	nd
Toluene	nd	nd	.910	92.144	nd	nd
Xylene	nd	nd	.880	106.172	nd	nd
Napthalene	nd	nd	.855	128.179	nd	nd

(1) Flow rate is from test Run 1.

ETS

EMISSION TESTING SERVICES, INC.

ADSORPTION TUBE DATA FORM

CLIENT NISCO DATE 5 NOV 92

SOURCE ID Boiler #1 RUN NO 4

OPERATOR Scott Lesley

Sample Time (min.)	Barometric Pressure (in. Hg)	Ambient Temperature °F	Pump Vacuum (in. Hg)
		57°	27"

INITIAL CALIBRATION

SET 1 20.2/20.1/20.0 cc/min

SET 2 _____ cc/min

SET 3 _____ cc/min

FINAL CALIBRATION

SET 1 18.7/18.8/18.9 cc/min

SET 2 _____ cc/min

SET 3 _____ cc/min

Time

Start 1158

stop 1258

SAMPLE I.D.

LOT NUMBER SILCA #698

CHAR. #120

SAMPLE 1) R4-S1-TA

SAMPLE 2) R4-S1-TB

SAMPLE 3) R4-S1-TC

SAMPLE 4) _____

SAMPLE 5) _____

SAMPLE 6) _____

SAMPLE 7) _____

SAMPLE 8) _____

SAMPLE 9) _____

BAG SAMPLE

Time: _____ to _____

Total _____

COMMENTS: _____

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Emission Testing Services, Inc.
P.O. Box 15075
Baton Rouge, LA 70895
504-925-8405

Client : NISCO
Source : BOILER 1A
Testing Date : 11- 5-92
Run : 4

ORGANIC EMISSIONS

Er -Emission rate - lb/hr
Fr -Sample flow rate, cc/min
St -Sample time, min
Tstd -Temp standard, 528 deg R
Pstd -Std atm press., 29.92 in.Hg
Vstd -Sample volume, std cc
Qsd -Volumetric flow rate of stack gas, DSCF/hr
Deff -Desorption efficiency from sample media
Fc -Conver. factor, ug/cc to PPM, 24039/mole weight, MW

PPM -Concentration, PPM
Sw -Sample collected, ug
Swb -Sample blank, ug
Ta -Ambient temp, deg R
Pbar -Baro press., in.Hg

Vstd = (Fr)(St)(Tstd/Ta)(Pbar/Pstd)

Er = ((Sw - Swb) /Deff Vstd)(6.242725 X 10-5 lb cc/ft3 ug)(Qsd)

PPM = ((Sw - Swb) /Deff Vstd)(Fc)

----- RUN 4 ----- Qsd = 12326583.0(1)

Vstd =(19.450)(60.00)(528/ 517.)(30.09/ 29.92)= 1198.602

Compound	Sw	Swb	Deff	MW	PPM	Er
Benzene	nd	nd	.880	78.117	nd	nd
Ethyl Benzene	nd	nd	.900	106.172	nd	nd
Toluene	nd	nd	.910	92.144	nd	nd
Xylene	nd	nd	.880	106.172	nd	nd
Napthalene	nd	nd	.855	128.179	nd	nd

(1) Flow rate is from test Run 1.

Emission Testing Services, Inc.
P.O. Box 15075
Baton Rouge, LA 70895
504-925-8405

Client : NISCO
Source : BOILER 1A
Testing Date : 11- 5-92
Run No. : 1 - 3
FUEL : Petroleum Coke

FUEL F FACTOR CALCULATIONS

Fc - Carbon F factor, dscf/MM Btu
Fd - Dry F factor, dscf/MM Btu
%H2 - Hydrogen in fuel, (including H2O), weight %
%C - Carbon in fuel, weight %
%S - Sulfur in fuel, weight %
%N2 - Nitrogen in fuel, weight %
%O2 - Oxygen in fuel, (including H2O), weight %
K - Conversion factor, 1,000,000 Btu/MM Btu
Khd - 3.64 (scf/lb) / %
Kc - 1.53 (scf/lb) / %
Kcc - 0.321 (scf/lb) / %
Ks - 0.57 (scf/lb) / %
Kn - 0.14 (scf/lb) / %
Ko - 0.46 (scf/lb) / %
GCV - Gross calorific value of the fuel, Btu/lb

```
Fd = K [ (Khd)(%H2) + (Kc)(%C) +
         (Ks)(%S) + (Kn)(%N2) + (Ko)(%O2) ] / GCV

   = ( 1,000,000 ) [ ( 3.64 )(  3.80 ) +
                     ( 1.53 )( 79.98 ) +
                     ( 0.57 )(  4.54 ) +
                     ( 0.14 )(  1.70 ) -
                     ( 0.46 )(  9.35 )   ] / ( 15440 )
   =  8725.8

Fc = K [ (Kcc)(%C) ] / GCV

   = ( 1,000,000 ) [ ( 0.321 )( 79.98 ) ] / 15440

   =  1662.8
```

Emission Testing Services, Inc.
P.O. Box 15075
Baton Rouge, LA 70895
504-925-8405

Client : NISCO
Source : BOILER 1A
Testing Date : 11- 5-92
Run No. : 1 - 3
FUEL : Petroleum Coke

DETERMINATION of OVERALL REDUCTION in POTENTIAL SULFUR DIOXIDE EMISSIONS

Cd - SO2 concentration, PPMv dry
Eai - Average SO2 emission rate into control device (inlet), lb/MM Btu
Eao - Average SO2 emission rate from control device (outlet), lb/MM Btu
Fd - Dry "F" factor, dscf/ MM Btu
f - Conversion factor, SO2, 1.660 X 10-7 lb/scf / PPMv
GCV - Gross calorific value of the fuel, Btu/lb
K - Constant, 2 X 10+4 lb-Btu/ %-MM Btu
O2 - O2 concentration, vol % dry
%Rg - Control device removal efficiency, %
%S - Sulfur in fuel, weight %

Eai = K (%S / GCV)

Eao = (Cd f) Fd [20.9 / (20.9 - O2)]

%Rg = (100) [1 - (Eao / Eai)]

-------- Run 1 --------

Eai = (2 X 10+4)(4.54 / 15440) = 5.88083

Eao = (154.1)(1.660 X 10-7)(8725.8)[20.9 / (20.9 - 4.9)]

= .29157

%Rg = (100) [1 - (.29157 / 5.88083)] = 95.04

-------- Run 2 --------

Eai = (2 X 10+4)(4.54 / 15440) = 5.88083

Eao = (157.7)(1.660 X 10-7)(8725.8)[20.9 / (20.9 - 4.8)]

= .29653

%Rg = (100) [1 - (.29653 / 5.88083)] = 94.96

-------- Run 3 --------

Eai = (2 X 10+4)(4.54 / 15440) = 5.88083

Eao = (173.0)(1.660 X 10-7)(8725.8)[20.9 / (20.9 - 4.8)]

= .32530

%Rg = (100) [1 - (.32530 / 5.88083)] = 94.47

Emission Testing Services, Inc.
P.O. Box 15075
Baton Rouge, LA 70895
504-925-8405

Client : NISCO
Source : BOILER 1A
Testing Date : 11- 5-92
Run : 1 - 3

TOTAL HYDROCARBONS EMISSION RATE

ETHC - Total hydrocarbons emission rate as C3H8, lb/hr
F - C3H8 conv. factor, 1.1446 X 10-7 lb/ft3 / PPM
THCms - THC concentration as measured, PPM
Qsd - Dry volumetric stack gas flow rate, DSCF/hr

ETHC = (THCms)(F)(Qsd)

-------- RUN 1 --------

ETHC = (.40)(1.1446 X 10-7)(12326580.0) = .564

-------- RUN 2 --------

ETHC = (.60)(1.1446 X 10-7)(13291230.0) = .913

-------- RUN 3 --------

ETHC = (.60)(1.1446 X 10-7)(13341350.0) = .916

Test analyzer response, Method 3A, 6C, 7E, 10, and 25A, was recorded by a computer data acquisition system. One minute average data were printed as recorded and served as a hardcopy record of the test data. Presented on the following pages are the computer printouts of the test data.

Each test analyzer was calibrated before and after each test run by challenging the analyzer with a set of certified calibration gases. Analyzer response was recorded by a computer data acquisition system. Calibration data sheets were manually completed as the calibrations were performed serving as a hardcopy record of the calibration. Calibration results were taken directly from the computer to avoid any data system bias. Analyzer calibration data sheets are presented following the test data printouts.

ETS
EMISSION TESTING SERVICES, INC.

NISCO

UNIT 1

RUN - #1

DATE: 11/05/92

TIME	CO-PPM	NOX-PPM	O2-%	THC-PPM	SO2-PPM	TIME	CO-PPM	NOX-PPM	O2-%	THC-PPM	SO2-PPM
09:56:37	12.4	66.5	4.9	0.4	168.4	10:26:39	12.2	69.1	5.0	0.4	153.5
09:57:37	12.4	65.4	5.1	0.4	169.2	10:27:39	12.2	67.6	5.0	0.4	155.7
09:58:37	12.5	66.1	5.0	0.4	164.7	10:28:39	12.1	68.3	4.9	0.4	158.4
09:59:37	12.5	67.9	4.9	0.4	165.7	10:29:39	12.1	70.2	5.1	0.4	159.7
10:00:37	12.3	69.4	5.0	0.4	166.7	10:30:39	12.1	70.0	5.1	0.4	158.9
10:01:37	12.4	68.9	5.1	0.4	165.7	10:31:39	12.1	70.8	5.1	0.4	157.7
10:02:37	12.4	68.7	5.0	0.4	164.2	10:32:39	12.1	70.9	4.9	0.4	157.2
10:03:37	12.4	68.7	5.0	0.4	163.7	10:33:39	12.0	72.5	5.0	0.4	155.7
10:04:37	12.4	69.4	5.1	0.4	164.2	10:34:39	12.1	71.3	5.2	0.4	151.0
10:05:37	12.3	69.4	5.1	0.4	162.7	10:35:39	12.0	72.5	5.0	0.4	152.0
10:06:38	12.3	67.7	5.0	0.4	162.4	10:36:39	12.1	75.0	5.1	0.4	153.5
10:07:38	12.3	68.9	4.9	0.4	160.7	10:37:39	12.2	73.7	5.3	0.4	153.7
10:08:38	12.3	68.2	5.1	0.4	155.5	10:38:39	12.2	73.3	5.3	0.4	151.0
10:09:38	12.2	68.8	5.0	0.4	155.0	10:39:40	12.2	74.5	5.3	0.4	152.5
10:10:38	12.2	69.9	5.0	0.4	157.7	10:40:40	12.2	76.0	5.5	0.4	152.7
10:11:38	12.2	69.6	5.0	0.4	154.5	10:41:40	12.2	73.9	5.5	0.4	150.5
10:12:38	12.1	68.3	5.0	0.4	151.2	10:42:40	12.5	73.7	5.4	0.4	149.2
10:13:38	12.2	68.1	5.0	0.4	150.7	10:43:40	12.5	73.8	5.6	0.4	148.5
10:14:38	12.1	67.9	5.0	0.4	151.7	10:44:40	12.6	74.3	5.6	0.4	146.0
10:15:38	12.1	68.7	5.0	0.4	153.5	10:45:40	12.5	73.5	5.5	0.4	146.5
10:16:38	12.1	69.4	5.0	0.4	154.5	10:46:40	12.4	73.1	5.4	0.4	149.7
10:17:38	12.2	69.4	5.0	0.4	155.7	10:47:40	12.4	70.3	5.2	0.4	152.2
10:18:38	12.2	69.4	4.9	0.4	156.9	10:48:40	12.4	68.4	5.2	0.4	154.5
10:19:39	12.0	70.3	4.9	0.4	156.2	10:49:40	12.5	67.7	5.0	0.4	156.7
10:20:39	12.0	69.6	5.0	0.4	156.7	10:50:40	12.5	68.3	5.0	0.4	157.7
10:21:39	12.1	71.2	5.0	0.4	155.5	10:51:40	12.5	66.0	5.1	0.4	155.5
10:22:39	12.1	70.1	5.0	0.4	156.9	10:52:40	12.4	66.1	4.9	0.4	154.2
10:23:39	12.1	70.7	5.0	0.4	158.7	10:53:40	12.2	66.5	4.7	0.4	158.7
10:24:39	12.1	69.9	5.1	0.4	158.2	10:54:40	12.3	68.4	4.8	0.4	162.4
10:25:39	12.2	69.0	5.1	0.4	154.2	10:55:40	12.4	70.0	4.8	0.4	160.7

ETS
EMISSION TESTING SERVICES, INC.

NISCO

UNIT 1

RUN - #1

DATE: 11/05/92

TIME	CO-PPM	NOX-PPM	O2-%	THC-PPM	SO2-PPM	TIME	CO-PPM	NOX-PPM	O2-%	THC-PPM	SO2-PPM
10:56:40	12.4	69.1	4.8	0.4	155.9	11:26:42	12.7	72.3	4.9	0.4	147.2
10:57:41	12.4	70.2	4.7	0.4	155.9	11:27:42	12.7	70.9	4.8	0.5	148.2
10:58:41	12.3	70.9	4.6	0.4	155.0	11:28:42	12.8	70.3	4.9	0.5	146.5
10:59:41	12.2	71.5	4.7	0.4	152.0	11:29:42	12.8	68.9	4.9	0.5	143.7
11:00:41	12.3	72.3	4.7	0.4	149.7	11:30:42	12.8	69.1	4.7	0.5	145.5
11:01:41	12.2	72.3	4.7	0.4	150.7	11:31:42	12.8	67.9	4.6	0.5	151.0
11:02:41	12.2	73.9	4.8	0.4	147.5	11:32:42	12.8	67.3	4.5	0.5	154.0
11:03:41	12.2	73.9	4.8	0.4	147.0	11:33:42	12.8	67.5	4.7	0.5	156.9
11:04:41	12.1	73.5	4.8	0.4	148.2	11:34:42	12.7	66.8	4.7	0.5	154.7
11:05:41	12.3	73.3	4.8	0.4	149.5	11:35:42	12.8	67.1	4.7	0.5	152.2
11:06:41	12.1	73.3	4.8	0.4	149.2	11:36:42	12.9	68.9	4.7	0.5	154.5
11:07:41	12.1	74.1	4.8	0.4	152.0	11:37:43	12.8	68.8	4.6	0.4	156.9
11:08:41	12.0	76.1	5.0	0.4	149.7	11:38:43	12.8	67.7	4.5	0.4	156.4
11:09:41	12.1	76.3	5.0	0.4	150.0	11:39:43	13.0	67.7	4.6	0.4	156.4
11:10:41	12.1	74.9	4.8	0.4	148.5	11:40:43	12.9	68.7	4.6	0.5	156.4
11:11:41	12.1	76.2	4.8	0.4	149.7	11:41:43	12.9	69.6	4.7	0.4	156.9
11:12:41	12.3	76.3	5.0	0.4	149.5	11:42:43	12.8	70.3	4.6	0.4	154.5
11:13:41	12.1	76.1	4.9	0.4	149.0	11:43:43	13.0	72.7	4.7	0.5	160.2
11:14:41	12.1	76.5	4.9	0.4	151.5	11:44:43	13.0	71.2	4.7	0.4	162.4
11:15:41	12.2	75.1	5.1	0.4	150.7	11:45:43	12.9	70.3	4.6	0.5	161.9
11:16:41	12.1	78.4	4.9	0.4	148.5	11:46:43	13.1	70.3	4.6	0.5	160.2
11:17:41	12.1	80.7	4.9	0.4	149.0	11:47:43	13.0	70.2	4.7	0.4	156.7
11:18:41	12.4	80.2	5.0	0.4	147.5	11:48:43	13.2	71.4	4.6	0.5	156.2
11:19:42	12.5	78.7	5.0	0.4	148.0	11:49:43	13.3	73.3	4.8	0.5	156.2
11:20:42	12.6	78.3	5.2	0.5	148.2	11:50:43	13.4	73.2	4.7	0.5	156.2
11:21:42	12.6	76.8	5.2	0.4	147.5	11:51:43	13.5	71.4	4.6	0.5	155.0
11:22:42	12.8	74.8	5.1	0.5	143.7	11:52:44	13.5	71.1	4.7	0.5	152.2
11:23:42	12.7	74.8	5.1	0.5	143.7	11:53:44	13.6	73.7	4.7	0.5	150.0
11:24:42	12.9	72.7	5.1	0.5	141.8	11:54:44	13.4	74.7	4.7	0.5	153.5
11:25:42	12.8	71.9	4.9	0.5	143.0	11:55:44	13.4	74.1	4.7	0.5	153.5
						AVG CONC	12.5	71.2	4.9	0.4	154.1

ETS
EMISSION TESTING SERVICES, INC.

NISCO

UNIT 1

RUN - #2

DATE: 11/05/92

TIME	CO-PPM	NOX-PPM	O2-%	THC-PPM	SO2-PPM	TIME	CO-PPM	NOX-PPM	O2-%	THC-PPM	SO2-PPM
12:50:40	11.2	88.1	4.8	0.7	138.7	13:20:42	11.0	86.3	4.8	0.6	147.1
12:51:40	11.1	85.9	4.7	0.7	138.7	13:21:42	10.9	85.8	5.0	0.6	149.6
12:52:40	11.2	86.4	4.8	0.6	140.3	13:22:42	11.0	84.4	4.7	0.6	147.1
12:53:40	11.2	87.5	4.8	0.6	140.5	13:23:42	11.0	84.9	4.9	0.6	147.4
12:54:40	11.2	85.5	4.7	0.6	140.3	13:24:42	10.9	84.5	4.7	0.6	147.4
12:55:40	11.2	84.7	4.9	0.6	141.7	13:25:42	11.1	85.8	4.8	0.6	150.8
12:56:40	11.0	84.5	4.7	0.6	143.0	13:26:42	11.0	84.1	4.9	0.6	151.3
12:57:40	11.0	85.7	4.8	0.6	144.2	13:27:42	11.0	84.5	4.7	0.6	150.1
12:58:40	11.0	86.2	4.8	0.6	145.2	13:28:42	10.9	83.5	4.9	0.6	151.5
12:59:40	11.0	84.6	4.7	0.6	143.0	13:29:42	10.7	81.5	4.6	0.6	152.0
13:00:41	11.2	86.5	5.0	0.6	142.0	13:30:42	10.8	83.8	4.7	0.4	152.3
13:01:41	11.2	85.9	4.7	0.6	141.2	13:31:42	10.8	85.2	4.7	0.4	155.5
13:02:41	11.2	87.1	4.7	0.6	143.0	13:32:42	10.8	83.2	4.6	0.5	156.0
13:03:41	11.2	88.1	4.9	0.6	143.2	13:33:42	10.8	82.8	4.8	0.4	157.9
13:04:41	11.2	84.6	4.8	0.6	139.3	13:34:42	10.7	83.1	4.6	0.5	155.5
13:05:41	11.2	87.6	4.9	0.6	140.3	13:35:42	10.6	85.6	4.8	0.5	157.4
13:06:41	11.0	86.9	4.8	0.6	140.5	13:36:42	10.5	84.7	4.8	0.5	158.2
13:07:41	11.1	86.3	4.8	0.6	141.0	13:37:43	10.5	84.9	4.7	0.5	157.9
13:08:41	11.2	86.1	5.0	0.6	142.0	13:38:43	10.6	86.3	4.9	0.5	157.9
13:09:41	11.1	85.2	4.7	0.6	140.0	13:39:43	10.5	85.1	4.7	0.5	159.9
13:10:41	11.1	87.4	4.8	0.6	142.0	13:40:43	10.5	86.1	4.9	0.5	157.4
13:11:41	11.0	85.0	4.7	0.6	141.5	13:41:43	10.3	86.2	4.8	0.5	159.1
13:12:41	11.0	84.7	4.7	0.6	140.5	13:42:43	10.3	87.1	4.8	0.5	157.9
13:13:41	11.1	87.7	4.9	0.5	139.8	13:43:43	10.4	88.6	4.9	0.5	160.6
13:14:41	10.9	84.3	4.6	0.5	142.2	13:44:43	10.2	86.3	4.7	0.5	158.2
13:15:41	10.9	85.6	4.8	0.6	143.7	13:45:43	10.2	88.1	4.9	0.4	158.4
13:16:41	11.0	86.8	4.8	0.6	144.9	13:46:43	10.2	85.2	4.9	0.5	159.9
13:17:41	11.0	84.7	4.8	0.6	145.7	13:47:43	10.2	84.7	4.8	0.5	158.9
13:18:41	11.0	85.3	4.9	0.6	145.2	13:48:43	10.4	87.4	4.9	0.5	161.1
13:19:41	10.9	84.6	4.8	0.6	144.9	13:49:43	10.3	87.4	4.8	0.5	161.6

NISCO

UNIT 1

RUN - #2

DATE: 11/05/92

PAGE 2 OF 2

TIME	CO-PPM	NOX-PPM	O2-%	THC-PPM	SO2-PPM
13:50:44	10.4	85.1	4.9	0.5	161.1
13:51:44	10.3	84.1	4.8	0.5	162.3
13:52:44	10.3	85.3	4.7	0.5	166.3
13:53:44	10.2	85.0	4.9	0.5	166.5
13:54:44	10.2	83.3	4.7	0.5	165.0
13:55:44	10.2	82.1	4.7	0.5	167.5
13:56:44	10.2	83.2	4.8	0.5	167.7
13:57:44	10.1	84.5	4.7	0.5	168.9
13:58:44	10.1	85.5	4.9	0.5	171.6
13:59:44	10.1	84.9	4.7	0.5	169.2
14:00:44	10.2	83.3	4.7	0.6	168.0
14:01:44	10.2	84.7	4.8	0.5	169.4
14:02:44	10.1	86.6	4.7	0.5	170.2
14:03:44	10.3	86.5	4.9	0.5	170.7
14:04:44	10.3	87.0	4.8	0.5	168.2
14:05:45	10.2	84.6	4.8	0.5	166.0
14:06:45	10.2	86.2	4.9	0.5	166.7
14:07:45	10.2	86.1	4.7	0.5	164.3
14:08:45	10.3	87.0	4.9	0.5	164.8
14:09:45	10.2	86.2	4.7	0.6	162.1
14:10:45	10.2	86.4	4.8	0.5	161.1
14:11:45	10.2	86.3	4.8	0.6	164.8
14:12:45	10.1	86.4	4.7	0.5	164.8
14:13:45	10.2	85.9	4.9	0.6	165.0
14:14:45	10.2	85.5	4.6	0.6	166.3
14:15:45	9.9	85.3	4.8	0.6	164.3
14:16:45	9.9	84.9	4.6	0.5	162.1
14:17:45	10.0	87.7	4.8	0.6	164.0
14:18:45	10.2	86.4	4.7	0.6	163.6
14:19:45	10.1	86.6	4.7	0.5	164.5
14:20:45	10.0	87.0	4.6	0.6	167.0
14:21:45	10.0	88.9	4.7	0.6	164.3
14:22:46	10.0	88.7	4.7	0.6	167.2
14:23:46	9.9	88.0	4.7	0.6	165.8
14:24:46	9.9	89.4	4.7	0.6	166.5
14:25:46	9.9	87.4	4.7	0.6	165.0
14:26:46	10.0	88.6	4.9	0.6	166.3
14:27:46	10.0	86.5	4.7	0.6	163.3
14:28:46	10.0	88.0	4.8	0.6	167.7
14:29:46	9.9	87.6	4.7	0.6	166.3
14:30:46	9.9	87.4	4.8	0.6	166.3
14:31:46	9.8	86.9	4.7	0.6	166.5
14:32:46	9.9	87.7	4.9	0.6	165.3
14:33:46	9.7	86.4	4.6	0.6	165.8
14:34:46	9.9	86.9	4.8	0.6	171.9
14:35:46	9.9	87.0	4.7	0.6	171.4
14:36:46	9.9	85.1	4.6	0.6	170.4
14:37:46	9.8	87.5	4.7	0.6	171.2
14:38:46	9.8	85.6	4.7	0.6	170.9
14:39:47	9.7	87.4	4.8	0.6	171.9
14:40:47	9.7	87.2	4.7	0.6	166.3
14:41:47	9.8	89.3	4.9	0.6	168.9
14:42:47	9.9	86.9	4.7	0.6	166.5
14:43:47	9.8	87.5	4.9	0.6	167.2
14:44:47	9.8	85.5	4.6	0.6	168.5
14:45:47	9.9	86.6	4.8	0.6	171.4
14:46:47	9.8	87.2	4.6	0.6	172.4
14:47:47	9.9	86.5	4.7	0.6	165.8
14:48:47	9.8	86.3	4.7	0.6	165.5
14:49:47	9.9	85.7	4.8	0.6	166.3
AVG CONC	10.4	86.0	4.8	0.6	157.7

ETS
EMISSION TESTING SERVICES, INC.

NISCO

UNIT 1

RUN - #3

DATE: 11/05/92

TIME	CO-PPM	NOX-PPM	O2-%	THC-PPM	SO2-PPM	TIME	CO-PPM	NOX-PPM	O2-%	THC-PPM	SO2-PPM
15:40:17	9.9	84.8	4.7	0.5	184.8	16:10:19	9.8	85.5	4.7	0.6	176.8
15:41:17	9.9	85.8	4.9	0.5	183.9	16:11:19	10.0	88.1	4.8	0.6	179.7
15:42:17	9.9	86.4	4.6	0.5	179.7	16:12:19	9.9	87.2	4.6	0.6	176.3
15:43:17	10.1	86.0	4.9	0.5	179.5	16:13:19	10.2	90.1	4.9	0.6	176.0
15:44:18	10.0	84.7	4.8	0.5	180.2	16:14:19	10.2	88.2	4.7	0.6	172.6
15:45:18	10.0	85.7	4.9	0.5	183.9	16:15:19	10.2	89.0	4.8	0.6	169.2
15:46:18	10.0	83.2	4.6	0.5	181.7	16:16:19	10.2	86.9	4.8	0.6	165.0
15:47:18	10.0	86.1	4.8	0.5	183.9	16:17:19	10.1	89.0	4.8	0.6	171.9
15:48:18	9.9	85.2	4.7	0.6	178.7	16:18:19	10.1	87.2	4.8	0.6	175.1
15:49:18	9.9	84.8	4.9	0.6	177.3	16:19:19	9.9	89.0	4.8	0.6	172.6
15:50:18	9.9	85.2	4.6	0.6	177.3	16:20:19	10.0	87.1	4.9	0.6	171.4
15:51:18	10.0	84.5	4.8	0.6	178.5	16:21:19	10.1	88.2	4.8	0.6	174.1
15:52:18	9.9	84.0	4.7	0.6	174.8	16:22:19	10.1	87.8	4.9	0.6	174.8
15:53:18	9.9	84.3	4.8	0.6	174.8	16:23:19	10.0	87.8	4.7	0.6	172.1
15:54:18	9.9	84.6	4.7	0.6	178.2	16:24:19	9.9	88.3	4.7	0.6	169.2
15:55:18	9.7	85.3	4.8	0.6	178.7	16:25:19	9.8	89.6	4.7	0.5	168.5
15:56:18	9.8	85.3	4.7	0.6	176.5	16:26:19	10.1	89.0	4.8	0.5	172.1
15:57:18	9.9	86.1	4.8	0.6	177.7	16:27:19	10.0	89.5	4.7	0.5	169.2
15:58:18	9.8	85.5	4.8	0.6	175.5	16:28:19	10.1	89.6	4.9	0.5	168.5
15:59:18	10.0	88.1	4.8	0.6	174.6	16:29:19	9.8	88.2	4.6	0.5	169.7
16:00:18	10.0	85.7	4.8	0.6	171.6	16:30:19	9.9	87.6	4.8	0.5	175.1
16:01:18	9.8	85.7	4.8	0.6	173.3	16:31:19	10.0	86.7	4.7	0.5	174.3
16:02:18	9.9	85.8	4.6	0.5	176.5	16:32:19	10.0	88.9	4.8	0.5	176.3
16:03:18	9.9	87.4	4.9	0.6	181.9	16:33:19	10.1	89.3	4.9	0.6	175.5
16:04:18	9.9	85.9	4.7	0.6	176.8	16:34:19	9.9	87.1	4.8	0.6	174.8
16:05:18	9.9	85.9	4.8	0.6	176.0	16:35:19	9.8	86.7	4.8	0.6	176.5
16:06:19	9.9	85.1	4.7	0.6	175.8	16:36:20	9.6	87.8	4.7	0.6	174.8
16:07:19	9.9	86.0	4.9	0.6	177.5	16:37:20	9.9	87.6	4.8	0.6	175.1
16:08:19	9.7	84.8	4.7	0.6	176.3	16:38:20	9.9	87.4	4.7	0.6	173.6
16:09:19	9.9	87.0	4.8	0.6	178.2	16:39:20	10.0	87.7	4.9	0.6	174.8

NISCO

UNIT 1

RUN - #3

DATE: 11/05/92

TIME	CO-PPM	NOX-PPM	O2-%	THC-PPM	SO2-PPM	TIME	CO-PPM	NOX-PPM	O2-%	THC-PPM	SO2-PPM
16:40:20	9.9	86.1	4.7	0.6	172.4	17:10:21	9.6	86.7	4.8	0.6	167.2
16:41:20	10.0	87.8	4.8	0.6	173.3	17:11:22	9.4	89.5	4.9	0.6	172.1
16:42:20	9.8	89.6	4.7	0.6	170.9	17:12:22	9.4	87.5	4.7	0.6	172.9
16:43:20	9.8	92.2	4.9	0.6	167.5	17:13:22	9.6	88.6	5.0	0.6	176.5
16:44:20	9.8	89.2	4.7	0.6	163.8	17:14:22	9.7	86.4	5.0	0.6	171.9
16:45:20	9.8	90.7	4.9	0.6	162.3	17:15:22	9.7	86.7	5.0	0.6	172.6
16:46:20	9.6	88.6	4.7	0.6	166.5	17:16:22	9.6	87.7	4.9	0.6	170.7
16:47:20	9.8	88.7	4.8	0.6	173.8	17:17:22	9.5	90.1	4.8	0.6	174.6
16:48:20	9.8	89.5	4.7	0.6	170.7	17:18:22	9.6	88.8	5.0	0.6	174.1
16:49:20	9.8	90.3	5.0	0.6	165.3	17:19:22	9.6	88.8	4.9	0.6	169.7
16:50:20	9.6	89.3	4.7	0.6	163.1	17:20:22	9.7	89.4	4.9	0.6	168.0
16:51:20	9.8	91.0	4.9	0.6	169.4	17:21:22	9.6	89.4	4.9	0.6	164.5
16:52:21	9.7	88.4	4.9	0.6	173.3	17:22:22	9.6	88.2	4.9	0.6	168.5
16:53:21	9.7	90.7	5.1	0.6	170.4	17:23:22	9.5	89.9	4.9	0.6	175.5
16:54:21	9.7	88.6	4.9	0.6	165.0	17:24:23	9.5	89.4	4.9	0.6	172.9
16:55:21	9.6	89.0	5.0	0.6	164.8	17:25:24	9.4	91.1	5.1	0.6	168.7
16:56:21	9.4	88.7	4.8	0.6	168.9	17:26:23	9.4	88.2	4.9	0.6	165.8
16:57:21	9.7	90.3	5.0	0.6	173.1	17:27:23	9.3	89.9	5.0	0.6	169.2
16:58:21	9.7	90.7	5.0	0.6	166.0	17:28:24	9.4	89.2	4.8	0.6	169.7
16:59:21	9.6	90.0	5.1	0.6	162.1	17:29:24	9.5	89.9	5.1	0.6	172.4
17:00:21	9.5	88.6	4.9	0.6	161.8	17:30:24	9.5	88.3	5.0	0.6	171.1
17:01:21	9.5	89.2	4.9	0.6	168.5	17:31:24	9.6	87.2	5.1	0.6	171.1
17:02:21	9.6	90.7	4.9	0.6	170.7	17:32:24	9.4	87.1	4.8	0.6	176.8
17:03:21	9.8	88.8	4.9	0.6	170.7	17:33:25	9.5	87.0	4.8	0.6	180.4
17:04:21	9.8	89.3	5.1	0.6	167.2	17:34:25	9.4	88.8	4.8	0.6	178.7
17:05:21	9.4	87.0	4.9	0.6	165.5	17:35:25	9.6	87.1	4.9	0.6	174.3
17:06:21	9.4	88.0	4.9	0.6	172.6	17:36:25	9.6	89.3	5.1	0.6	169.7
17:07:21	9.5	89.3	4.9	0.6	173.6	17:37:25	9.6	87.2	5.0	0.6	168.0
17:08:21	9.6	88.2	4.9	0.6	174.8	17:38:25	9.5	87.1	4.9	0.6	173.6
17:09:21	9.6	90.0	5.1	0.6	169.7	17:39:25	9.6	86.1	4.8	0.6	177.3
						AVG CONC	9.8	87.8	4.8	0.6	173.0

ETS
EMISSION TESTING SERVICES, INC.

METHOD 3A DATA SHEET

CLIENT Nisco DATE 11-05-92

SOURCE ID Unit #1 PARAMETER O_2

OPERATOR Brad Latham RUN # 1 LOAD % MAX

CALIBRATION STATISTICS

Cylinder Value		Analyzer Response volt	Analyzer Response ppm	Absolute Difference volt	Absolute Difference ppm	% Drift ±3%
Zero	N_2	0.08	0.16	0.08	0.16	0.0
Mid	8.88	3.38	8.50	3.37	8.48	-0.09
High	14.15	5.70	14.37	5.70	14.37	0.0

Calibration curve: ppm = (response volt)(slope) + intercept

Slope 2.52949 Intercept -0.04672 Span Range 25.31

Analyzer Cal		Init volt	Analyzer ppm	Resp Bias ±5	Final volt	Analyzer ppm	Resp Bias ±5	Span Drift ±3%
Conc.	N_2	0.09	0.18	0.08	0.09	0.16	0.0	-0.05

$$\text{Sys. Cal. Bias} = \frac{\text{Sys. cal. (ppm)} - \text{analyzer cal. (ppm)}}{\text{Span (ppm)}} \times 100$$

$$\%\text{Drift} = \frac{\text{Final sys. resp. (ppm)} - \text{Initial sys. resp. (ppm)}}{\text{span (ppm)}} \times 100$$

TEST DATA

Start Time: _____ Finish Time: _____ Minutes per point: _____

Sample Port _____

Test Point Volt

1 ____	4 ____	7 ____	10 ____	13 ____	16 ____	19 ____	22 ____	25 ____	28 ____
2 ____	5 ____	8 ____	11 ____	14 ____	17 ____	20 ____	23 ____	26 ____	29 ____
3 ____	6 ____	9 ____	12 ____	15 ____	18 ____	21 ____	24 ____	27 ____	30 ____

AVG VOLT _____ AVG CONC _____ ppm

CORRELATION COEFFICIENT: 0.999

COMMENTS: _____

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ETS

EMISSION TESTING SERVICES, INC.

METHOD 6C DATA SHEET

CLIENT Nisco DATE 11-05-92

SOURCE ID Unit #1 PARAMETER SO_2

OPERATOR Brad Latham RUN # 1 LOAD % MAX

CALIBRATION STATISTICS

Cylinder Value		Analyzer Response volt	Analyzer Response ppm	Absolute Difference volt	Absolute Difference ppm	% Drift ±3%
Zero	N_2	0.0	-3.72	0.08	-3.21	0.10
Mid	197.8	4.00	205.39	4.14	207.43	0.40
High	410.2	8.04	406.33	8.18	413.47	1.41

Calibration curve: ppm = (response volt)(slope) + intercept

Slope 51.00112 Intercept -3.71787 Span Range 506.3

Analyzer Cal		Init volt	Analyzer ppm	Resp Bias ±5	Final volt	Analyzer ppm	Resp Bias ±5	Span Drift ±3%
Conc.	197.8	3.76	188.05	-3.43	3.78	189.07	-3.63	0.20

$$\text{Sys. Cal. Bias} = \frac{\text{Sys. cal. (ppm)} - \text{analyzer cal. (ppm)}}{\text{Span (ppm)}} \times 100$$

$$\%\text{Drift} = \frac{\text{Final sys. resp. (ppm)} - \text{Initial sys. resp. (ppm)}}{\text{span (ppm)}} \times 100$$

TEST DATA

Start Time: _____ Finish Time: _____ Minutes per point: _____

Sample Port _____

Test Point Volt

1 ____	4 ____	7 ____	10 ____	13 ____	16 ____	19 ____	22 ____	25 ____	28 ____
2 ____	5 ____	8 ____	11 ____	14 ____	17 ____	20 ____	23 ____	26 ____	29 ____
3 ____	6 ____	9 ____	12 ____	15 ____	18 ____	21 ____	24 ____	27 ____	30 ____

AVG VOLT _____ AVG CONC _____ ppm

CORRELATION COEFFICIENT: 0.999

COMMENTS: _____

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ETS

EMISSION TESTING SERVICES, INC.

METHOD 7E DATA SHEET

CLIENT Nisco DATE 11-05-92

SOURCE ID Unit #1 PARAMETER NOx

OPERATOR Brad Latham RUN # 1 LOAD % MAX

CALIBRATION STATISTICS

Cylinder Value		Analyzer Response volt	Analyzer Response ppm	Absolute Difference volt	Absolute Difference ppm	% Drift ±3%
Zero	N2	0.12	-0.70	0.10	-1.19	-0.20
Mid	91.89	3.94	93.24	3.91	92.50	-0.31
High	195.2	8.06	194.55	8.09	195.29	0.31

Calibration curve: ppm = (response volt)(slope) + intercept

Slope 24.59080 Intercept -3.65015 Span Range 242.3

Analyzer Cal		Init volt	Analyzer ppm	Resp Bias ±5	Final volt	Analyzer ppm	Resp Bias ±5	Span Drift ±3%
Conc.	91.89	3.74	89.32	-2.03	3.71	87.58	-2.03	-0.31

$$\text{Sys. Cal. Bias} = \frac{\text{Sys. cal. (ppm)} - \text{analyzer cal. (ppm)}}{\text{Span (ppm)}} \times 100$$

$$\%\text{Drift} = \frac{\text{Final sys. resp. (ppm)} - \text{Initial sys. resp. (ppm)}}{\text{span (ppm)}} \times 100$$

TEST DATA

Start Time: _____ Finish Time: _____ Minutes per point: _____

Sample Port _____

Test Point Volt

1 ____	4 ____	7 ____	10 ____	13 ____	16 ____	19 ____	22 ____	25 ____	28 ____
2 ____	5 ____	8 ____	11 ____	14 ____	17 ____	20 ____	23 ____	26 ____	29 ____
3 ____	6 ____	9 ____	12 ____	15 ____	18 ____	21 ____	24 ____	27 ____	30 ____

AVG VOLT _____ AVG CONC _____ ppm

CORRELATION COEFFICIENT: 0.9999

COMMENTS: _____

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ETS

EMISSION TESTING SERVICES, INC.

METHOD 10 DATA SHEET

CLIENT Nisco DATE 11-05-92

SOURCE ID Unit #1 PARAMETER Co

OPERATOR Brad Latham RUN # 1 LOAD % MAX

CALIBRATION STATISTICS

Cylinder Value		Initial Analyzer Response volt	Initial Analyzer Response ppm	Final Analyzer Response volt	Final Analyzer Response ppm	% Drift ±3%
Zero	N2	0.01	0.26	0.01	0.26	0.0
Low	29.37	2.87	29.18	2.87	29.18	0.0
Mid	57.22	5.61	56.88	5.61	56.88	0.0
High	86.72	8.59	87.01	8.63	87.42	0.41

Calibration curve: ppm = (response volt)(slope) + intercept

Slope 10.11101 Intercept 3.579155 Span Range 99.6

$$\%\text{Drift} = \frac{\text{Final sys. resp. (ppm)} - \text{Initial sys. resp. (ppm)}}{\text{span (ppm)}} \times 100$$

TEST DATA

Start Time: _____ Finish Time: _____ Minutes per point: _____

Sample Port _____

Test Point Volt

1 ____	4 ____	7 ____	10 ____	13 ____	16 ____	19 ____	22 ____	25 ____	28 ____
2 ____	5 ____	8 ____	11 ____	14 ____	17 ____	20 ____	23 ____	26 ____	29 ____
3 ____	6 ____	9 ____	12 ____	15 ____	18 ____	21 ____	24 ____	27 ____	30 ____

AVG VOLT _____ AVG CONC _____ ppm

CORRELATION COEFFICIENT: 0.9999

COMMENTS: _____

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ETS

EMISSION TESTING SERVICES, INC.

METHOD 25A DATA SHEET

CLIENT Nisco DATE 11-05-92

SOURCE ID unit #1 PARAMETER THC

OPERATOR Brad Latham RUN # 1 LOAD% MAX

CALIBRATION STATISTICS

Cylinder Value		Analyzer Response volt	Analyzer Response ppm	Absolute Difference volt	Absolute Difference ppm	% Drift ±3%
Zero	N_2	-0.04	0.07	-0.04	0.07	0.0
Low	10.19	1.49	10.09	1.48	10.03	-0.20
Mid	20.05	3.01	20.05	3.01	20.05	0.0
High	30.30	4.58	30.33	4.61	30.53	~~1.29~~ 0.60

Calibration curve: ppm = (response volt)(slope) + intercept

Slope 6.55128 Intercept 0.32911 Span Range 33.1

Analyzer Cal		Init volt	Analyzer ppm	Resp Bias ±5	Final volt	Analyzer ppm	Resp Bias ±5	Span Drift ±3%
Low	10.19	1.51	10.22	0.40	1.58	10.68	1.96	1.39
Mid	20.05	3.12	20.77	2.17	3.10	20.64	1.78	-0.39

$$\text{Sys. Cal. Bias} = \frac{\text{Sys. cal. (ppm)} - \text{analyzer cal. (ppm)}}{\text{Span (ppm)}} \times 100$$

$$\%\text{Drift} = \frac{\text{Final sys. resp. (ppm)} - \text{Initial sys. resp. (ppm)}}{\text{span (ppm)}} \times 100$$

Response Time Test -- Stabilize with zero gas and switch to high concentration. Record time for 95% change.

Time: 1) _____ 2) _____ 3) _____ Minutes per point _____

TEST DATA

Start Time: _____ Finish Time: _____ Minutes per point: _____

Sample Port _____

Test Point Volt

1 ____	4 ____	7 ____	10 ____	13 ____	16 ____	19 ____	22 ____	25 ____	28 ____
2 ____	5 ____	8 ____	11 ____	14 ____	17 ____	20 ____	23 ____	26 ____	29 ____
3 ____	6 ____	9 ____	12 ____	15 ____	18 ____	21 ____	24 ____	27 ____	30 ____

AVG VOLT _____ AVG CONC _____ ppm

CORRELATION COEFFICIENT: 0.9999

COMMENTS: _____

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ETS
EMISSION TESTING SERVICES, INC.

METHOD 3A DATA SHEET

CLIENT Nisco DATE 11-05-92

SOURCE ID Unit # 1 PARAMETER O_2

OPERATOR Brad Latham RUN # 2 LOAD% Max

CALIBRATION STATISTICS

Cylinder Value		Analyzer Response volt	percent	Absolute Difference volt	percent	% Drift ±3%
Zero	N_2	0.08	0.16	0.07	0.14	-0.09
Mid	8.88	3.37	8.49	3.40	8.56	0.28
High	14.15	5.70	14.38	5.70	14.38	0.0

Calibration curve: ppm = (response volt)(slope) + intercept

Slope 2.52976 Intercept -0.03911 Span Range 25.3

Analyzer Cal		Init volt	Analyzer percent	Resp Bias ±5	Final volt	Analyzer percent	Resp Bias ±5	Span Drift ±3%
Conc.	N_2	0.08	0.16	0.0	0.08	0.16	0.08	0.0

$$\text{Sys. Cal. Bias} = \frac{\text{Sys. cal. (ppm)} - \text{analyzer cal. (ppm)}}{\text{Span (ppm)}} \times 100$$

$$\%\text{Drift} = \frac{\text{Final sys. resp. (ppm)} - \text{Initial sys. resp. (ppm)}}{\text{span (ppm)}} \times 100$$

TEST DATA

Start Time: _____ Finish Time: _____ Minutes per point: _____

Sample Port _____

Test Point Volt

1 ____	4 ____	7 ____	10 ____	13 ____	16 ____	19 ____	22 ____	25 ____	28 ____
2 ____	5 ____	8 ____	11 ____	14 ____	17 ____	20 ____	23 ____	26 ____	29 ____
3 ____	6 ____	9 ____	12 ____	15 ____	18 ____	21 ____	24 ____	27 ____	30 ____

AVG VOLT _____ AVG CONC _____ %

CORRELATION COEFFICIENT: 0.999

COMMENTS: _____

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ETS

EMISSION TESTING SERVICES, INC.

METHOD 6C DATA SHEET

CLIENT Nisco DATE 11-05-92

SOURCE ID Unit # 1 PARAMETER SO_2

OPERATOR Brad Latham RUN # 2 LOAD % Max

CALIBRATION STATISTICS

Cylinder	Value	Analyzer Response volt	Analyzer Response ppm	Absolute Difference volt	Absolute Difference ppm	% Drift ±3%
Zero	N_2	0.01	-3.15	0.01	-3.15	0.0
Mid	197.9	4.14	204.17	4.14	204.17	0.0
High	410.2	8.18	406.98	8.20	407.98	0.20

Calibration curve: ppm = (response volt)(slope) + intercept

Slope 50.19949 Intercept -3.65322 Span Range 498.3

Analyzer Cal		Init volt	Analyzer ppm	Resp Bias ±5	Final volt	Analyzer ppm	Resp Bias ±5	Span Drift ±3%
Conc.	197.8	3.78	186.16	-3.63	3.80	187.10	-3.42	0.20

$$\text{Sys. Cal. Bias} = \frac{\text{Sys. cal. (ppm)} - \text{analyzer cal. (ppm)}}{\text{Span (ppm)}} \times 100$$

$$\%\text{Drift} = \frac{\text{Final sys. resp. (ppm)} - \text{Initial sys. resp. (ppm)}}{\text{span (ppm)}} \times 100$$

TEST DATA

Start Time: _____ Finish Time: _____ Minutes per point: _____

Sample Port _____

Test Point Volt

1 ____	4 ____	7 ____	10 ____	13 ____	16 ____	19 ____	22 ____	25 ____	28 ____
2 ____	5 ____	8 ____	11 ____	14 ____	17 ____	20 ____	23 ____	26 ____	29 ____
3 ____	6 ____	9 ____	12 ____	15 ____	18 ____	21 ____	24 ____	27 ____	30 ____

AVG VOLT _____ AVG CONC _____ ppm

CORRELATION COEFFICIENT: 0.999

COMMENTS: _____

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ETS

EMISSION TESTING SERVICES, INC.

METHOD 7E DATA SHEET

CLIENT Nisco DATE 11-05-92

SOURCE ID Unit #1 PARAMETER NOx

OPERATOR Brad Latham RUN # 2 LOAD% MAX

CALIBRATION STATISTICS

Cylinder Value		Analyzer Response volt	Analyzer Response ppm	Absolute Difference volt	Absolute Difference ppm	% Drift ±3%
Zero	N_2	0.10	-0.41	0.11	-0.17	-0.01
Mid	91.89	3.91	92.68	3.92	95.20	1.04
High	195.2	8.09	194.82	8.00	191.2	-1.50

Calibration curve: ppm = (response volt)(slope) + intercept

Slope 24.43513 Intercept -2.85837 Span Range 241.5

Analyzer Cal		Init volt	Analyzer ppm	Resp Bias ±5	Final volt	Analyzer ppm	Resp Bias ±5	Span Drift ±3%
Conc.	91.89	3.71	90.26	-1.00	3.72	90.49	-1.95	0.10

$$\text{Sys. Cal. Bias} = \frac{\text{Sys. cal. (ppm)} - \text{analyzer cal. (ppm)}}{\text{Span (ppm)}} \times 100$$

$$\%\text{Drift} = \frac{\text{Final sys. resp. (ppm)} - \text{Initial sys. resp. (ppm)}}{\text{span (ppm)}} \times 100$$

TEST DATA

Start Time: _____ Finish Time: _____ Minutes per point: _____

Sample Port _____

Test Point Volt

1 ____	4 ____	7 ____	10 ____	13 ____	16 ____	19 ____	22 ____	25 ____	28 ____
2 ____	5 ____	8 ____	11 ____	14 ____	17 ____	20 ____	23 ____	26 ____	29 ____
3 ____	6 ____	9 ____	12 ____	15 ____	18 ____	21 ____	24 ____	27 ____	30 ____

AVG VOLT _____ AVG CONC _____ppm

CORRELATION COEFFICIENT: 0.9999

COMMENTS: _____

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ETS
EMISSION TESTING SERVICES, INC.

METHOD 10 DATA SHEET

CLIENT Nisco DATE 11-05-92

SOURCE ID Unit #1 PARAMETER CO

OPERATOR Brad Latham RUN # 2 LOAD % MAX

CALIBRATION STATISTICS

Cylinder Value		Initial Analyzer Response volt	Initial Analyzer Response ppm	Final Analyzer Response volt	Final Analyzer Response ppm	% Drift ±3%
Zero	N_2	0.01	0.34	0.01	0.34	0.0
Low	29.39	2.87	29.14	2.87	29.14	0.0
Mid	57.22	5.61	56.72	5.62	56.82	0.10
High	86.72	8.63	87.13	8.63	87.13	0.0

Calibration curve: ppm = (response volt)(slope) + intercept

Slope 10.06772 Intercept 0.24265 Span Range 100.9

$$\%\text{Drift} = \frac{\text{Final sys. resp. (ppm)} - \text{Initial sys. resp. (ppm)}}{\text{span (ppm)}} \times 100$$

TEST DATA

Start Time: _____ Finish Time: _____ Minutes per point: _____

Sample Port _____

Test Point Volt

1 ____	4 ____	7 ____	10 ____	13 ____	16 ____	19 ____	22 ____	25 ____	28 ____
2 ____	5 ____	8 ____	11 ____	14 ____	17 ____	20 ____	23 ____	26 ____	29 ____
3 ____	6 ____	9 ____	12 ____	15 ____	18 ____	21 ____	24 ____	27 ____	30 ____

AVG VOLT _____ AVG CONC _____ppm

CORRELATION COEFFICIENT: 0.9999

COMMENTS: _____

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ETS
EMISSION TESTING SERVICES, INC.

METHOD 25A DATA SHEET

CLIENT Nisco DATE 11-05-92

SOURCE ID Unit #1 PARAMETER THC

OPERATOR Brad Latham RUN # 2 LOAD% MAX

CALIBRATION STATISTICS

Cylinder Value		Analyzer Response volt	Analyzer Response ppm	Absolute Difference volt	Absolute Difference ppm	% Drift ±3%
Zero	N_2	-0.04	0.13	-0.04	0.13	0.0
Low	10.19	1.48	10.03	1.48	10.03	0.0
Mid	20.05	3.01	19.92	3.00	19.92	-0.19
High	30.30	4.61	30.40	4.60	30.33	-0.21

Calibration curve: ppm = (response volt)(slope) + intercept

Slope 6.50836 Intercept 0.39357 Span Range 32.9

Analyzer Cal		Init volt	Analyzer ppm	Resp Bias ±5	Final volt	Analyzer ppm	Resp Bias ±5	Span Drift ±3%
Low	10.19	1.58	10.68	1.97	1.56	10.55	1.57	-1.22
Mid	20.05	3.10	20.57	1.79	3.08	20.44	1.58	-0.40

$$\text{Sys. Cal. Bias} = \frac{\text{Sys. cal. (ppm)} - \text{analyzer cal. (ppm)}}{\text{Span (ppm)}} \times 100$$

$$\%\text{Drift} = \frac{\text{Final sys. resp. (ppm)} - \text{Initial sys. resp. (ppm)}}{\text{span (ppm)}} \times 100$$

Response Time Test -- Stabilize with zero gas and switch to high concentration. Record time for 95% change.

Time: 1) _____ 2) _____ 3) _____ Minutes per point _____

TEST DATA

Start Time: _____ Finish Time: _____ Minutes per point: _____

Sample Port _____

Test Point Volt

1 ____	4 ____	7 ____	10 ____	13 ____	16 ____	19 ____	22 ____	25 ____	28 ____
2 ____	5 ____	8 ____	11 ____	14 ____	17 ____	20 ____	23 ____	26 ____	29 ____
3 ____	6 ____	9 ____	12 ____	15 ____	18 ____	21 ____	24 ____	27 ____	30 ____

AVG VOLT _____ AVG CONC _____ ppm

CORRELATION COEFFICIENT: 0.9999

COMMENTS: _____

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ETS

EMISSION TESTING SERVICES, INC.

METHOD 3A DATA SHEET

CLIENT Nisco DATE 11-05-92

SOURCE ID Unit #1 PARAMETER O2

OPERATOR Brad Latham RUN # 3 LOAD % Max

CALIBRATION STATISTICS

Cylinder Value		Analyzer Response volt	Analyzer Response ppm	Absolute Difference volt	Absolute Difference ppm	% Drift ±3%
Zero	N2	0.07	0.14	0.07	0.14	0.0
Mid	8.88	3.40	8.54	3.41	8.57	0.12
High	14.15	5.70	14.35	5.70	14.35	0.0

Calibration curve: ppm = (response volt)(slope) + intercept

Slope 2.52426 Intercept -0.03916 Span Range 25.2

Analyzer Cal		Init volt	Analyzer ppm	Resp Bias ±5	Final volt	Analyzer ppm	Resp Bias ±5	Span Drift ±3%
Conc.	N2	0.08	0.16	0.09	0.08	0.16	0.8	0.0

$$\text{Sys. Cal. Bias} = \frac{\text{Sys. cal. (ppm) - analyzer cal. (ppm)}}{\text{Span (ppm)}} \times 100$$

$$\%\text{Drift} = \frac{\text{Final sys. resp. (ppm) - Initial sys. resp. (ppm)}}{\text{span (ppm)}} \times 100$$

TEST DATA

Start Time: _____ Finish Time: _____ Minutes per point: _____

Sample Port _____

Test Point Volt

1 ____	4 ____	7 ____	10 ____	13 ____	16 ____	19 ____	22 ____	25 ____	28 ____
2 ____	5 ____	8 ____	11 ____	14 ____	17 ____	20 ____	23 ____	26 ____	29 ____
3 ____	6 ____	9 ____	12 ____	15 ____	18 ____	21 ____	24 ____	27 ____	30 ____

AVG VOLT _____ AVG CONC _____ ppm

CORRELATION COEFFICIENT: 0.999

COMMENTS: _____

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ETS

EMISSION TESTING SERVICES, INC.

METHOD 6C DATA SHEET

CLIENT Nisco DATE 11-05-92

SOURCE ID Unit #1 PARAMETER SO_2

OPERATOR Brad Latham RUN # 3 LOAD% MAX

CALIBRATION STATISTICS

Cylinder Value		Analyzer Response volt	Analyzer Response ppm	Absolute Difference volt	Absolute Difference ppm	% Drift ±3%
Zero	N_2	0.01	-2.99	0.01	-2.99	0.0
Mid	197.8	4.14	203.8	4.14	203.8	0.0
High	410.2	8.20	407.25	8.19	406.66	-0.10

Calibration curve: ppm = (response volt)(slope) + intercept

Slope 50.07917 Intercept -3.49259 Span Range 497.3

Analyzer Cal		Init volt	Analyzer ppm	Resp Bias ±5	Final volt	Analyzer ppm	Resp Bias ±5	Span Drift ±3%
Conc.	197.8	3.80	186.8	-3.42	3.81	187.31	3.34	0.1

$$\text{Sys. Cal. Bias} = \frac{\text{Sys. cal. (ppm)} - \text{analyzer cal. (ppm)}}{\text{Span (ppm)}} \times 100$$

$$\%\text{Drift} = \frac{\text{Final sys. resp. (ppm)} - \text{Initial sys. resp. (ppm)}}{\text{span (ppm)}} \times 100$$

TEST DATA

Start Time: _____ Finish Time: _____ Minutes per point: _____

Sample Port _____

Test Point Volt

1 ____	4 ____	7 ____	10 ____	13 ____	16 ____	19 ____	22 ____	25 ____	28 ____
2 ____	5 ____	8 ____	11 ____	14 ____	17 ____	20 ____	23 ____	26 ____	29 ____
3 ____	6 ____	9 ____	12 ____	15 ____	18 ____	21 ____	24 ____	27 ____	30 ____

AVG VOLT _____ AVG CONC _____ ppm

CORRELATION COEFFICIENT: 0.999

COMMENTS: _____

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ETS

EMISSION TESTING SERVICES, INC.

METHOD 7E DATA SHEET

CLIENT Nisco DATE 11-05-92

SOURCE ID Unit # 1 PARAMETER Nox

OPERATOR Brad Latham RUN # 3 LOAD% Max

CALIBRATION STATISTICS

Cylinder Value		Analyzer Response volt	Analyzer Response ppm	Absolute Difference volt	Absolute Difference ppm	% Drift ±3%
Zero	N2	0.11	-0.82	0.10	-1.06	-0.10
Mid	91.89	3.82	93.47	3.91	93.22	-0.10
High	195.2	8.00	194.44	8.01	194.65	0.1

Calibration curve: ppm = (response volt)(slope) + intercept

Slope 24.74703 Intercept -3.53891 Span Range 243.9

Analyzer Cal		Init volt	Analyzer ppm	Resp Bias ±5	Final volt	Analyzer ppm	Resp Bias ±5	Span Drift ±3%
Conc.	91.89	3.72	88.52	-2.03	3.73	88.71	-1.83	0.10

$$\text{Sys. Cal. Bias} = \frac{\text{Sys. cal. (ppm)} - \text{analyzer cal. (ppm)}}{\text{Span (ppm)}} \times 100$$

$$\%\text{Drift} = \frac{\text{Final sys. resp. (ppm)} - \text{Initial sys. resp. (ppm)}}{\text{span (ppm)}} \times 100$$

TEST DATA

Start Time: _____ Finish Time: _____ Minutes per point: _____

Sample Port _____

Test Point Volt

1 ____	4 ____	7 ____	10 ____	13 ____	16 ____	19 ____	22 ____	25 ____	28 ____
2 ____	5 ____	8 ____	11 ____	14 ____	17 ____	20 ____	23 ____	26 ____	29 ____
3 ____	6 ____	9 ____	12 ____	15 ____	18 ____	21 ____	24 ____	27 ____	30 ____

AVG VOLT _____ AVG CONC _____ ppm

CORRELATION COEFFICIENT: 0.9999

COMMENTS: _____

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ETS
EMISSION TESTING SERVICES, INC.

METHOD 10 DATA SHEET

CLIENT Nisco DATE 11-05-92

SOURCE ID Unit # 1 PARAMETER CO

OPERATOR Brad Latham RUN # 3 LOAD% max

CALIBRATION STATISTICS

Cylinder Value		Initial Analyzer Response volt	Initial Analyzer Response ppm	Final Analyzer Response volt	Final Analyzer Response ppm	% Drift ±3%
Zero	N_2	0.01	0.33	0.01	0.33	0.0
Low	29.39	2.87	29.12	2.88	29.22	0.1
Mid	57.22	5.62	56.79	5.63	56.89	0.1
High	86.72	8.63	87.09	8.63	87.09	0.0

Calibration curve: ppm = (response volt)(slope) + intercept

Slope 1006456 Intercept 0.23104 Span Range 100.8

$$\%Drift = \frac{\text{Final sys. resp. (ppm)} - \text{Initial sys. resp. (ppm)}}{\text{span (ppm)}} \times 100$$

TEST DATA

Start Time: _____ Finish Time: _____ Minutes per point: _____

Sample Port _____

Test Point Volt

1 ____	4 ____	7 ____	10 ____	13 ____	16 ____	19 ____	22 ____	25 ____	28 ____
2 ____	5 ____	8 ____	11 ____	14 ____	17 ____	20 ____	23 ____	26 ____	29 ____
3 ____	6 ____	9 ____	12 ____	15 ____	18 ____	21 ____	24 ____	27 ____	30 ____

AVG VOLT _____ AVG CONC _____ ppm

CORRELATION COEFFICIENT: 0.9999

COMMENTS: _____

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ETS

EMISSION TESTING SERVICES, INC.

METHOD 25A DATA SHEET

CLIENT Nisco DATE 11-05-92

SOURCE ID Unit #1 PARAMETER THC

OPERATOR Brad Latham RUN # 3 LOAD% max

CALIBRATION STATISTICS

Cylinder Value		Analyzer Response volt	Analyzer Response ppm	Absolute Difference volt	Absolute Difference ppm	% Drift ±3%
Zero	N2	-0.04	0.13	-0.04	0.13	0.0
Low	10.19	1.49	10.05	1.49	10.11	0.18
Mid	20.05	3.00	19.96	3.00	19.96	0.0
High	30.30	4.60	30.40	4.60	30.4	0.0

Calibration curve: ppm = (response volt)(slope) + intercept

Slope 6.52520 Intercept 0.38865 Span Range ~~65.6~~ 33.0

Analyzer Cal		Init volt	Analyzer ppm	Resp Bias ±5	Final volt	Analyzer ppm	Resp Bias ±5	Span Drift ±3%
Low	10.19	1.56	10.57	1.57	1.55	10.50	1.19	-0.21
Mid	20.05	3.08	20.49	1.59	3.06	20.36	1.20	-0.39

$$\text{Sys. Cal. Bias} = \frac{\text{Sys. cal. (ppm)} - \text{analyzer cal. (ppm)}}{\text{Span (ppm)}} \times 100$$

$$\%\text{Drift} = \frac{\text{Final sys. resp. (ppm)} - \text{Initial sys. resp. (ppm)}}{\text{span (ppm)}} \times 100$$

Response Time Test -- Stabilize with zero gas and switch to high concentration. Record time for 95% change.

Time: 1) _____ 2) _____ 3) _____ Minutes per point _____

TEST DATA

Start Time: _____ Finish Time: _____ Minutes per point: _____

Sample Port _____

Test Point Volt

1 ____	4 ____	7 ____	10 ____	13 ____	16 ____	19 ____	22 ____	25 ____	28 ____
2 ____	5 ____	8 ____	11 ____	14 ____	17 ____	20 ____	23 ____	26 ____	29 ____
3 ____	6 ____	9 ____	12 ____	15 ____	18 ____	21 ____	24 ____	27 ____	30 ____

AVG VOLT _____ AVG CONC _____ ppm

CORRELATION COEFFICIENT: 0.9999

COMMENTS: _____

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Presented on the following pages are results of the laboratory analysis conducted on the samples collected during testing on Boiler 1A.

During sample recovery, 200 ml of the probe wash sample was removed and used for metals analysis. The total volume reported on the total solids analytical report does not reflect this split. Total volumes of the probe wash samples are presented below.

The 200 ml metals sample split from the probe wash sample was preserved by adding an 100 ml aliquot of nitric acid solution. This dilution of the sample must be considered when determining the total metals catch - including the other half of the probe wash used for total solids analysis.

The impinger catch sample volume was not reported on the analytical report. These volumes are presented below.

Probe Wash Run 1	233 ml total volume
Probe Wash Run 2	232 ml total volume
Probe Wash Run 3	288 ml total volume

Impinger Catch Run 1	262 ml total volume
Impinger Catch Run 2	271 ml total volume
Impinger Catch Run 3	363 ml total volume

FILTER WEIGHTS

Company NISCO Source Boiler #1

Unit ID Test Date 11-4-92

Filter Number	Sample ID	Initial Weight		Final Weight		Weight Gained
Tentex						
110930 1906	Run #1	3.8120	3.8125	3.8168	3.8167	
110931 1907	Run #2	3.8202	3.8204	3.8254	3.8256	
110932 1908	Run #3	3.8033	3.8036	3.8070	3.8069	

Company Nisco Source Boiler #2

Unit ID Test Date 11-4-92

Filter Number	Sample ID	Initial Weight		Final Weight		Weight Gained
Tentex						
110933 1863	Run #1	3.8609	3.8610	3.8738	3.8739	
110934 1893	Run #2	3.8322	3.8320	3.8415	3.8417	
110935 1905	Run #3	3.8544	3.8546	3.8639	3.8636	
110936 1909	Blank	3.8634	3.8636	3.8633	3.8635	

Analyst Earl Dowling Analysis Date 11-15-92

CHEMTEX
Environmental & Industrial Hygiene Services

3082 25th Street, Port Arthur, Texas 77642, 409-983-4575
FAX: 409-982-1522

Client: E T S Inc.
10461 Mammoth Dr.
Baton Rouge, LA 70814

Report Date: 11/16/92
Date Collected: 11/5/92
Collected By: Client
Date Received: 11/8/92
CHEMTEX FILE #: 2110379

PROJECT: BOILER #1, NISCO

RESULTS OF ANALYSIS

CHEMTEX #	SAMPLE #	Sample Identification	Total Volume (ml)	Total Solids (mg/l)	Total Solids (mg/sample)
2110379	#1	PW #1	150	42	6.3
2110380	#2	PW #2	170	24	4.0
2110381	#3	PW #3	200	14	2.8

Date Analyzed/ Analyst: 11/12/92 NC/KR

Dr. C. N. Reddy, Ph.D
Director

CJH/CNR

CHEMTEX

Environmental & Industrial Hygiene Services

3082 25th Street, Port Arthur, Texas 77642, 409-983-4575
FAX: 409-982-1522

Client: E T S Inc.
10389 Mammoth Dr.
Baton Rouge, LA 70814

Report Date: 11/23/92
Date Collected: 11/5/92
Collected By: Client
Date Received: 11/8/92
CHEMTEX FILE #: 2110394

PROJECT: BOILER #1, NISCO

Sample Identification: PW-1

CHEMTEX #: 2110394

RESULTS OF ANALYSIS

		Date Analyzed/ Analyst
Nickel (mg/l)	0.99	11/20/92 KR/CK
Chromium (mg/l)	0.08	11/20/92 KR/CK
Vanadium (mg/l)	1.01	11/20/92 KR/CK
Mercury (mg/l)	< 0.005	11/20/92 KR/CK
Cadmium (mg/l)	0.296	11/20/92 KR/CK
Beryllium (mg/l)	0.08	11/20/92 KR/CK

METHOD REFERENCE:
Nickel - EPA Method 249.1
Chromium - EPA Method 218.1
Vanadium - EPA Method 286.1
Mercury - EPA Method 245.1
Cadmium - EPA Method 213.2
Beryllium - EPA Method 210.1

Dr. C. N. Reddy, Ph.D
Director

CJH/CNR

CHEMTEX

Environmental & Industrial Hygiene Services

3082 25th Street, Port Arthur, Texas 77642, 409-983-4575
FAX: 409-982-1522

Client: E T S Inc.
10389 Mammoth Dr.
Baton Rouge, LA 70814

Report Date: 11/23/92
Date Collected: 11/5/92
Collected By: Client
Date Received: 11/8/92
CHEMTEX FILE #: 2110394

PROJECT: BOILER #1, NISCO

Sample Identification: PW-2

CHEMTEX #: 2110395

RESULTS OF ANALYSIS

		Date Analyzed/ Analyst
Nickel (mg/l)	0.91	11/20/92 KR/CK
Chromium (mg/l)	0.06	11/20/92 KR/CK
Vanadium (mg/l)	1.19	11/20/92 KR/CK
Mercury (mg/l)	< 0.005	11/20/92 KR/CK
Cadmium (mg/l)	0.351	11/20/92 KR/CK
Beryllium (mg/l)	0.05	11/20/92 KR/CK

METHOD REFERENCE:
Nickel - EPA Method 249.1
Chromium - EPA Method 218.1
Vanadium - EPA Method 286.1
Mercury - EPA Method 245.1
Cadmium - EPA Method 213.2
Beryllium - EPA Method 210.1

CNReddy

Dr. C. N. Reddy, Ph.D
Director

CJH/CNR

CHEMTEX

Environmental & Industrial Hygiene Services

3082 25th Street, Port Arthur, Texas 77642, 409-983-4575
FAX: 409-982-1522

Client: E T S Inc.
10389 Mammoth Dr.
Baton Rouge, LA 70814

Report Date: 11/23/92
Date Collected: 11/5/92
Collected By: Client
Date Received: 11/8/92
CHEMTEX FILE #: 2110394

PROJECT: BOILER #1, NISCO

Sample Identification: PW-3

CHEMTEX #: 2110396

RESULTS OF ANALYSIS

		Date Analyzed/ Analyst
Nickel (mg/l)	0.98	11/20/92 KR/CK
Chromium (mg/l)	< 0.05	11/20/92 KR/CK
Vanadium (mg/l)	0.75	11/20/92 KR/CK
Mercury (mg/l)	< 0.005	11/20/92 KR/CK
Cadmium (mg/l)	0.352	11/20/92 KR/CK
Beryllium (mg/l)	0.07	11/20/92 KR/CK

METHOD REFERENCE:
Nickel - EPA Method 249.1
Chromium - EPA Method 218.1
Vanadium - EPA Method 286.1
Mercury - EPA Method 245.1
Cadmium - EPA Method 213.2
Beryllium - EPA Method 210.1

Dr. C. N. Reddy, Ph.D
Director

CJH/CNR

CHEMTEX
Environmental & Industrial Hygiene Services
3082 25th Street, Port Arthur, Texas 77642, 409-983-4575
FAX: 409-982-1522

Client: E T S Inc.
10389 Mammoth Dr.
Baton Rouge, LA 70814

Report Date: 11/23/92
Date Collected: 11/5/92
Collected By: Client
Date Received: 11/8/92
CHEMTEX FILE #: 2110394

PROJECT: BOILER #1, NISCO

Sample Identification: Blank 2

CHEMTEX #: 2110397

RESULTS OF ANALYSIS

		Date Analyzed/ Analyst
Nickel (mg/l)	< 0.04	11/20/92 KR/CK
Chromium (mg/l)	< 0.05	11/20/92 KR/CK
Vanadium (mg/l)	< 0.5	11/20/92 KR/CK
Mercury (mg/l)	< 0.005	11/20/92 KR/CK
Cadmium (mg/l)	< 0.005	11/20/92 KR/CK
Beryllium (mg/l)	< 0.01	11/20/92 KR/CK

METHOD REFERENCE:
Nickel - EPA Method 249.1
Chromium - EPA Method 218.1
Vanadium - EPA Method 286.1
Mercury - EPA Method 245.1
Cadmium - EPA Method 213.2
Beryllium - EPA Method 210.1

Dr. C. N. Reddy, Ph.D
Director

CJH/CNR

CHEMTEX
Environmental & Industrial Hygiene Services
3082 25th Street, Port Arthur, Texas 77642, 409-983-4575
FAX: 409-982-1522

Client: E T S Inc.
10389 Mammoth Dr.
Baton Rouge, LA 70814

Report Date: 11/23/92
Date Collected: 11/5/92
Collected By: Client
Date Received: 11/8/92
CHEMTEX FILE #: 2110930

PROJECT: BOILER #1, NISCO

Sample Identification: 1906 Filter

CHEMTEX #: 2110930

RESULTS OF ANALYSIS

		Date Analyzed/ Analyst
Nickel (mg/sample)	0.0055	11/20/92 KR/CK
Chromium (mg/sample)	< 0.0025	11/20/92 KR/CK
Vanadium (mg/sample)	< 0.025	11/20/92 KR/CK
Mercury (mg/sample)	< 0.15	11/20/92 KR/CK
Cadmium (mg/sample)	0.0017	11/20/92 KR/CK
Beryllium (mg/sample)	< 0.0005	11/20/92 KR/CK

METHOD REFERENCE:
Nickel - EPA Method 7520
Chromium - EPA Method 7190
Vanadium - EPA Method 7910
Mercury - EPA Method 7471
Cadmium - EPA Method 7130
Beryllium - EPA Method 7090

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Dr. C. N. Reddy, Ph.D
Director

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CHEMTEX

Environmental & Industrial Hygiene Services

3082 25th Street, Port Arthur, Texas 77642, 409-983-4575
FAX: 409 982 1522

Client: E T S Inc.
10389 Mammoth Dr.
Baton Rouge, LA 70814

Report Date: 11/23/92
Date Collected: 11/4/92
Collected By: Client
Date Received: 11/8/92
CHEMTEX FILE #: 2110933

PROJECT: BOILER #2, NISCO

Sample Identification: Blank Filter Blank

CHEMTEX #: 2110936

RESULTS OF ANALYSIS

		Date Analyzed/ Analyst
Nickel (mg/sample)	0.0052	11/20/92 KR/CK
Chromium (mg/sample)	< 0.0026	11/20/92 KR/CK
Vanadium (mg/sample)	< 0.025	11/20/92 KR/CK
Mercury (mg/sample)	< 0.15	11/20/92 KR/CK
Cadmium (mg/sample)	0.0018	11/20/92 KR/CK
Beryllium (mg/sample)	< 0.0005	11/20/92 KR/CK

METHOD REFERENCE:
Nickel - EPA Method 7520
Chromium - EPA Method 7190
Vanadium - EPA Method 7910
Mercury - EPA Method 7471
Cadmium - EPA Method 7130
Beryllium - EPA Method 7090

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Director

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CHEMTEX

Environmental & Industrial Hygiene Services

3082 25th Street, Port Arthur, Texas 77642, 409-983-4575
FAX: 409 982-1522

Client: E T S Inc.
10389 Mammoth Dr.
Baton Rouge, LA 70814

Report Date: 11/23/92
Date Collected: 11/5/92
Collected By: Client
Date Received: 11/8/92
CHEMTEX FILE #: 2110930

PROJECT: BOILER #1, NISCO

Sample Identification: 1906 Filter

CHEMTEX #: 2110930

RESULTS OF ANALYSIS

		Date Analyzed/ Analyst
Nickel (mg/sample)	0.0055	11/20/92 KR/CK
Chromium (mg/sample)	< 0.0025	11/20/92 KR/CK
Vanadium (mg/sample)	< 0.025	11/20/92 KR/CK
Mercury (mg/sample)	< 0.15	11/20/92 KR/CK
Cadmium (mg/sample)	0.0017	11/20/92 KR/CK
Beryllium (mg/sample)	< 0.0005	11/20/92 KR/CK

METHOD REFERENCE:
Nickel - EPA Method 7520
Chromium - EPA Method 7190
Vanadium - EPA Method 7910
Mercury - EPA Method 7471
Cadmium - EPA Method 7130
Beryllium - EPA Method 7090

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CHEMTEX

Environmental & Industrial Hygiene Services

3082 25th Street, Port Arthur, Texas 77642, 409-983-4575
FAX: 409-982-1522

Client: E T S Inc.
10389 Mammoth Dr.
Baton Rouge, LA 70814

Report Date: 11/23/92
Date Collected: 11/5/92
Collected By: Client
Date Received: 11/8/92
CHEMTEX FILE #: 2110930

PROJECT: BOILER #1, NISCO

Sample Identification: 1907 Filter Can 2

CHEMTEX #: 2110931

RESULTS OF ANALYSIS

		Date Analyzed/ Analyst
Nickel (mg/sample)	0.0051	11/20/92 KR/CK
Chromium (mg/sample)	< 0.0023	11/20/92 KR/CK
Vanadium (mg/sample)	< 0.025	11/20/92 KR/CK
Mercury (mg/sample)	< 0.15	11/20/92 KR/CK
Cadmium (mg/sample)	0.0016	11/20/92 KR/CK
Beryllium (mg/sample)	< 0.0005	11/20/92 KR/CK

METHOD REFERENCE:
Nickel - EPA Method 7520
Chromium - EPA Method 7190
Vanadium - EPA Method 7910
Mercury - EPA Method 7471
Cadmium - EPA Method 7130
Beryllium - EPA Method 7090

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Dr. C. N. Reddy, Ph.D
Director

CJH/CNR

CHEMTEX

Environmental & Industrial Hygiene Services

3082 25th Street, Port Arthur, Texas 77642, 409-983-4575
FAX: 409-982-1522

Client: E T S Inc.
10389 Mammoth Dr.
Baton Rouge, LA 70814

Report Date: 11/23/92
Date Collected: 11/5/92
Collected By: Client
Date Received: 11/8/92
CHEMTEX FILE #: 2110930

PROJECT: BOILER #1, NISCO

Sample Identification: 1908 Filter

CHEMTEX #: 2110932

RESULTS OF ANALYSIS

		Date Analyzed/ Analyst
Nickel (mg/sample)	0.0057	11/20/92 KR/CK
Chromium (mg/sample)	< 0.0026	11/20/92 KR/CK
Vanadium (mg/sample)	< 0.025	11/20/92 KR/CK
Mercury (mg/sample)	< 0.15	11/20/92 KR/CK
Cadmium (mg/sample)	0.0019	11/20/92 KR/CK
Beryllium (mg/sample)	< 0.0005	11/20/92 KR/CK

METHOD REFERENCE:
Nickel - EPA Method 7520
Chromium - EPA Method 7190
Vanadium - EPA Method 7910
Mercury - EPA Method 7471
Cadmium - EPA Method 7130
Beryllium - EPA Method 7090

Dr. C. N. Reddy, Ph.D
Director

CJH/CNR

CHEMTEX

Environmental & Industrial Hygiene Services

3082 25th Street, Port Arthur, Texas 77642, 409-983-4575
FAX: 409 982 1522

Client: E T S Inc.
10389 Mammoth Dr.
Baton Rouge, LA 70814

Report Date: 11/23/92
Date Collected: 11/4/92
Collected By: Client
Date Received: 11/8/92
CHEMTEX FILE #: 2110933

PROJECT: BOILER #2, NISCO

Sample Identification: Blank Filter Blank

CHEMTEX #: 2110936

RESULTS OF ANALYSIS

		Date Analyzed/ Analyst
Nickel (mg/sample)	0.0052	11/20/92 KR/CK
Chromium (mg/sample)	< 0.0026	11/20/92 KR/CK
Vanadium (mg/sample)	< 0.025	11/20/92 KR/CK
Mercury (mg/sample)	< 0.15	11/20/92 KR/CK
Cadmium (mg/sample)	0.0018	11/20/92 KR/CK
Beryllium (mg/sample)	< 0.0005	11/20/92 KR/CK

METHOD REFERENCE:
Nickel - EPA Method 7520
Chromium - EPA Method 7190
Vanadium - EPA Method 7910
Mercury - EPA Method 7471
Cadmium - EPA Method 7130
Beryllium - EPA Method 7090

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Dr. C. N. Reddy, Ph.D
Director

CJH/CNR

CHEMTEX

Environmental & Industrial Hygiene Services

3082 25th Street, Port Arthur, Texas 77642, 409-983-4575
FAX: 409-982-1522

Client: E T S Inc.
10389 Mammoth Dr.
Baton Rouge, LA 70814

Report Date: 11/23/92
Date Collected: 11/5/92
Collected By: Client
Date Received: 11/8/92
CHEMTEX FILE #: 2110398

PROJECT: BOILER #1, NISCO

Sample Identification: Imp. Catch #1

CHEMTEX #: 2110398

RESULTS OF ANALYSIS

		Date Analyzed/ Analyst
Nickel (mg/l)	< 0.04	11/20/92 KR/CK
Chromium (mg/l)	< 0.05	11/20/92 KR/CK
Vanadium (mg/l)	< 0.5	11/20/92 KR/CK
Mercury (mg/l)	< 0.005	11/20/92 KR/CK
Cadmium (mg/l)	< 0.005	11/20/92 KR/CK
Beryllium (mg/l)	< 0.01	11/20/92 KR/CK

METHOD REFERENCE:
Nickel - EPA Method 249.1
Chromium - EPA Method 218.1
Vanadium - EPA Method 286.1
Mercury - EPA Method 245.1
Cadmium - EPA Method 213.2
Beryllium - EPA Method 210.1

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Director

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CHEMTEX

Environmental & Industrial Hygiene Services

3082 25th Street, Port Arthur, Texas 77642, 409-983-4575
FAX: 409-982-1522

Client: E T S Inc.
10389 Mammoth Dr.
Baton Rouge, LA 70814

Report Date: 11/23/92
Date Collected: 11/5/92
Collected By: Client
Date Received: 11/8/92
CHEMTEX FILE #: 2110398

PROJECT: BOILER #1, NISCO

Sample Identification: Imp. Catch #2

CHEMTEX #: 2110399

RESULTS OF ANALYSIS

		Date Analyzed/ Analyst
Nickel (mg/l)	< 0.04	11/20/92 KR/CK
Chromium (mg/l)	< 0.05	11/20/92 KR/CK
Vanadium (mg/l)	< 0.5	11/20/92 KR/CK
Mercury (mg/l)	< 0.005	11/20/92 KR/CK
Cadmium (mg/l)	< 0.005	11/20/92 KR/CK
Beryllium (mg/l)	< 0.01	11/20/92 KR/CK

METHOD REFERENCE:
Nickel - EPA Method 249.1
Chromium - EPA Method 218.1
Vanadium - EPA Method 286.1
Mercury - EPA Method 245.1
Cadmium - EPA Method 213.2
Beryllium - EPA Method 210.1

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CHEMTEX

Environmental & Industrial Hygiene Services

3082 25th Street, Port Arthur, Texas 77642, 409-983-4575
FAX: 409-982-1522

Client: E T S Inc.
10461 Mammoth Dr.
Baton Rouge, LA 70814

Report Date: 11/11/92
Date Collected: 11/5/92
Collected By: Client
Date Received: 11/8/92
CHEMTEX FILE #: 2110429

PROJECT: BOILER #1, NISCO

RESULTS OF ANALYSIS

CHEMTEX #	Sample Identification	BENZENE (CAS #71-43-2) (ug/sample)
2110429	R1-S1-TA	< 2.0
2110430	R1-S1-TB	< 2.0
2110431	R1-S1-TC	< 2.0
2110432	R1-S2-TA	< 2.0
2110433	R1-S2-TB	< 2.0
2110434	R1-S2-TC	< 2.0
2110435	Blank Silica Gel	< 2.0
2110436	R1-S3-TA	< 2.0
2110437	R1-S3-TB	< 2.0
2110438	R1-S3-TC	< 2.0
2110439	Blank Charcoal	< 2.0

Date Analyzed/ Analyst: 11/9/92 SP

Desorption Efficiency (%): 89/87

Analyzed by NIOSH Method 1501, "NIOSH Manual of Analytical Methods, 3rd Edition, 1984, by GC/FID."

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CHEMTEX

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Client: E T S Inc.
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Report Date: 11/11/92
Date Collected: 11/5/92
Collected By: Client
Date Received: 11/8/92
CHEMTEX FILE #: 2110429

PROJECT: BOILER #1, NISCO

RESULTS OF ANALYSIS

CHEMTEX #	Sample Identification	ETHYL BENZENE (CAS #100-41-4) (ug/sample)
2110429	R1-S1-TA	< 2.0
2110430	R1-S1-TB	< 2.0
2110431	R1-S1-TC	< 2.0
2110432	R1-S2-TA	< 2.0
2110433	R1-S2-TB	< 2.0
2110434	R1-S2-TC	< 2.0
2110435	Blank Silica Gel	< 2.0
2110436	R1-S3-TA	< 2.0
2110437	R1-S3-TB	< 2.0
2110438	R1-S3-TC	< 2.0
2110439	Blank Charcoal	< 2.0

Date Analyzed/ Analyst: 11/9/92 SP

Desorption Efficiency (%): 92/88

Analyzed by NIOSH Method 1501, "NIOSH Manual of Analytical Methods, 3rd Edition, 1984, by GC/FID."

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Client: E T S Inc.
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Report Date: 11/11/92
Date Collected: 11/5/92
Collected By: Client
Date Received: 11/8/92
CHEMTEX FILE #: 2110429

PROJECT: BOILER #1, NISCO

RESULTS OF ANALYSIS

CHEMTEX #	Sample Identification	TOLUENE (CAS #108-88-3) (ug/sample)
2110429	R1-S1-TA	< 2.0
2110430	R1-S1-TB	< 2.0
2110431	R1-S1-TC	< 2.0
2110432	R1-S2-TA	< 2.0
2110433	R1-S2-TB	< 2.0
2110434	R1-S2-TC	< 2.0
2110435	Blank Silica Gel	< 2.0
2110436	R1-S3-TA	< 2.0
2110437	R1-S3-TB	< 2.0
2110438	R1-S3-TC	< 2.0
2110439	Blank Charcoal	< 2.0
	Date Analyzed/ Analyst	11/9/92 SP

Desorption Efficiency (%): 92/90

Analyzed by NIOSH Method 1501, "NIOSH Manual of Analytical Methods, 3rd Edition, 1984, by GC/FID."

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Client: E T S Inc.
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Baton Rouge, LA 70814

Report Date: 11/11/92
Date Collected: 11/5/92
Collected By: Client
Date Received: 11/8/92
CHEMTEX FILE #: 2110429

PROJECT: BOILER #1, NISCO

RESULTS OF ANALYSIS

CHEMTEX #	Sample Identification	XYLENE (CAS #1330-20-7) (ug/sample)
2110429	R1-S1-TA	< 4.0
2110430	R1-S1-TB	< 4.0
2110431	R1-S1-TC	< 4.0
2110432	R1-S2-TA	< 4.0
2110433	R1-S2-TB	< 4.0
2110434	R1-S2-TC	< 4.0
2110435	Blank Silica Gel	< 4.0
2110436	R1-S3-TA	< 4.0
2110437	R1-S3-TB	< 4.0
2110438	R1-S3-TC	< 4.0
2110439	Blank Charcoal	< 4.0
	Date Analyzed/ Analyst	11/9/92 SP

Desorption Efficiency (%): 90/86

Analyzed by NIOSH Method 1501, "NIOSH Manual of Analytical Methods, 3rd Edition, 1984, by GC/FID."

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6.3.18

CHEMTEX

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FAX: 409-982-1522

Client: E T S Inc.
10461 Mammoth Dr.
Baton Rouge, LA 70814

Report Date: 11/11/92
Date Collected: 11/5/92
Collected By: Client
Date Received: 11/8/92
CHEMTEX FILE #: 2110429

PROJECT: BOILER #1, NISCO

RESULTS OF ANALYSIS

CHEMTEX #	Sample Identification	NAPTHALENE (CAS #91-20-3) (ug/sample)
2110429	R1-S1-TA	< 4.0
2110430	R1-S1-TB	< 4.0
2110431	R1-S1-TC	< 4.0
2110432	R1-S2-TA	< 4.0
2110433	R1-S2-TB	< 4.0
2110434	R1-S2-TC	< 4.0
2110435	Blank Silica Gel	< 4.0
2110436	R1-S3-TA	< 4.0
2110437	R1-S3-TB	< 4.0
2110438	R1-S3-TC	< 4.0
2110439	Blank Charcoal	< 4.0

Date Analyzed/ Analyst: 11/9/92 SP

Desorption Efficiency (%): 84/87

Analyzed by NIOSH Method 1501, "NIOSH Manual of Analytical Methods, 3rd Edition, 1984, by GC/FID."

C.N. Reddy

Dr. C. N. Reddy, Ph.D
Director

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CHEMTEX
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FAX: 409-982-1522

Client: E T S Inc.
10461 Mammoth Dr.
Baton Rouge, LA 70814

Report Date: 11/11/92
Date Collected: 11/5/92
Collected By: Client
Date Received: 11/8/92
CHEMTEX FILE #: 2110440

PROJECT: BOILER #1, NISCO

RESULTS OF ANALYSIS

CHEMTEX #	Sample Identification	BENZENE (CAS #71-43-2) (ug/sample)
2110440	R2-S1-TA	< 2.0
2110441	R2-S1-TB	< 2.0
2110442	R2-S1-TC	< 2.0
2110443	Blank Silica Gel	< 2.0
2110444	Blank Charcoal	< 2.0
	Date Analyzed/ Analyst	11/9/92 SP

Desorption Efficiency (%): 89/87

Analyzed by NIOSH Method 1501, "NIOSH Manual of Analytical Methods, 3rd Edition, 1984, by GC/FID."

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FAX: 409-982-1522

Client: E T S Inc.
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Report Date: 11/11/92
Date Collected: 11/5/92
Collected By: Client
Date Received: 11/8/92
CHEMTEX FILE #: 2110440

PROJECT: BOILER #1, NISCO

RESULTS OF ANALYSIS

CHEMTEX #	Sample Identification	ETHYL BENZENE (CAS #100-41-4) (ug/sample)
2110440	R2-S1-TA	< 2.0
2110441	R2-S1-TB	< 2.0
2110442	R2-S1-TC	< 2.0
2110443	Blank Silica Gel	< 2.0
2110444	Blank Charcoal	< 2.0
Date Analyzed/ Analyst		11/9/92 SP

Desorption Efficiency (%): 92/88

Analyzed by NIOSH Method 1501, "NIOSH Manual of Analytical Methods, 3rd Edition, 1984, by GC/FID."

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Client: E T S Inc.
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Report Date: 11/11/92
Date Collected: 11/5/92
Collected By: Client
Date Received: 11/8/92
CHEMTEX FILE #: 2110440

PROJECT: BOILER #1, NISCO

RESULTS OF ANALYSIS

CHEMTEX #	Sample Identification	TOLUENE (CAS #108-88-3) (ug/sample)
2110440	R2-S1-TA	< 2.0
2110441	R2-S1-TB	< 2.0
2110442	R2-S1-TC	< 2.0
2110443	Blank Silica Gel	< 2.0
2110444	Blank Charcoal	< 2.0
	Date Analyzed/ Analyst	11/9/92 SP

Desorption Efficiency (%): 92/90

Analyzed by NIOSH Method 1501, "NIOSH Manual of Analytical Methods, 3rd Edition, 1984, by GC/FID."

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Report Date: 11/11/92
Date Collected: 11/5/92
Collected By: Client
Date Received: 11/8/92
CHEMTEX FILE #: 2110440

PROJECT: BOILER #1, NISCO

RESULTS OF ANALYSIS

CHEMTEX #	Sample Identification	XYLENE (CAS #1330-20-7) (ug/sample)
2110440	R2-S1-TA	< 4.0
2110441	R2-S1-TB	< 4.0
2110442	R2-S1-TC	< 4.0
2110443	Blank Silica Gel	< 4.0
2110444	Blank Charcoal	< 4.0
	Date Analyzed/ Analyst	11/9/92 SP

Desorption Efficiency (%): 90/86

Analyzed by NIOSH Method 1501, "NIOSH Manual of Analytical Methods, 3rd Edition, 1984, by GC/FID."

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CHEMTEX

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FAX: 409-982-1522

Client: E T S Inc.
10461 Mammoth Dr.
Baton Rouge, LA 70814

Report Date: 11/11/92
Date Collected: 11/5/92
Collected By: Client
Date Received: 11/8/92
CHEMTEX FILE #: 2110440

PROJECT: BOILER #1, NISCO

RESULTS OF ANALYSIS

CHEMTEX #	Sample Identification	NAPTHALENE (CAS #91-20-3) (ug/sample)
2110440	R2-S1-TA	< 4.0
2110441	R2-S1-TB	< 4.0
2110442	R2-S1-TC	< 4.0
2110443	Blank Silica Gel	< 4.0
2110444	Blank Charcoal	< 4.0
	Date Analyzed/ Analyst	11/9/92 SP

Desorption Efficiency (%): 84/87

Analyzed by NIOSH Method 1501, "NIOSH Manual of Analytical Methods, 3rd Edition, 1984, by GC/FID."

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CHEMTEX

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Client: E T S Inc.
10461 Mammoth Dr.
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Report Date: 11/11/92
Date Collected: 11/5/92
Collected By: Client
Date Received: 11/8/92
CHEMTEX FILE #: 2110445

PROJECT: BOILER #1, NISCO

RESULTS OF ANALYSIS

CHEMTEX #	Sample Identification	BENZENE (CAS #71-43-2) (ug/sample)
2110445	R3-S1-TA	< 2.0
2110446	R3-S1-TB	< 2.0
2110447	R3-S1-TC	< 2.0
Date Analyzed/ Analyst		11/9/92 SP

Desorption Efficiency (%): 89/87

Analyzed by NIOSH Method 1501, "NIOSH Manual of Analytical Methods, 3rd Edition, 1984, by GC/FID."

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CHEMTEX

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Report Date: 11/11/92
Date Collected: 11/5/92
Collected By: Client
Date Received: 11/8/92
CHEMTEX FILE #: 2110445

PROJECT: BOILER #1, NISCO

RESULTS OF ANALYSIS

CHEMTEX #	Sample Identification	ETHYL BENZENE (CAS #100-41-4) (ug/sample)
2110445	R3-S1-TA	< 2.0
2110446	R3-S1-TB	< 2.0
2110447	R3-S1-TC	< 2.0
Date Analyzed/ Analyst		11/9/92 SP

Desorption Efficiency (%): 92/88

Analyzed by NIOSH Method 1501, "NIOSH Manual of Analytical Methods, 3rd Edition, 1984, by GC/FID."

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Client: E T S Inc.
10461 Mammoth Dr.
Baton Rouge, LA 70814

Report Date: 11/11/92
Date Collected: 11/5/92
Collected By: Client
Date Received: 11/8/92
CHEMTEX FILE #: 2110445

PROJECT: BOILER #1, NISCO

RESULTS OF ANALYSIS

CHEMTEX #	Sample Identification	TOLUENE (CAS #108-88-3) (ug/sample)
2110445	R3-S1-TA	< 2.0
2110446	R3-S1-TB	< 2.0
2110447	R3-S1-TC	< 2.0
Date Analyzed/ Analyst		11/9/92 SP

Desorption Efficiency (%): 92/90

Analyzed by NIOSH Method 1501, "NIOSH Manual of Analytical Methods, 3rd Edition, 1984, by GC/FID."

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CHEMTEX

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FAX: 409-982-1522

Client: E T S Inc.
10461 Mammoth Dr.
Baton Rouge, LA 70814

Report Date: 11/11/92
Date Collected: 11/5/92
Collected By: Client
Date Received: 11/8/92
CHEMTEX FILE #: 2110445

PROJECT: BOILER #1, NISCO

RESULTS OF ANALYSIS

CHEMTEX #	Sample Identification	XYLENE (CAS #1330-20-7) (ug/sample)
2110445	R3-S1-TA	< 4.0
2110446	R3-S1-TB	< 4.0
2110447	R3-S1-TC	< 4.0
Date Analyzed/ Analyst		11/9/92 SP

Desorption Efficiency (%): 90/86

Analyzed by NIOSH Method 1501, "NIOSH Manual of Analytical Methods, 3rd Edition, 1984, by GC/FID."

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CHEMTEX

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FAX: 409-982-1522

Client: E T S Inc.
10461 Mammoth Dr.
Baton Rouge, LA 70814

Report Date: 11/11/92
Date Collected: 11/5/92
Collected By: Client
Date Received: 11/8/92
CHEMTEX FILE #: 2110445

PROJECT: BOILER #1, NISCO

RESULTS OF ANALYSIS

CHEMTEX #	Sample Identification	NAPTHALENE (CAS #91-20-3) (ug/sample)
2110445	R3-S1-TA	< 4.0
2110446	R3-S1-TB	< 4.0
2110447	R3-S1-TC	< 4.0
Date Analyzed/ Analyst		11/9/92 SP

Desorption Efficiency (%): 84/87

Analyzed by NIOSH Method 1501, "NIOSH Manual of Analytical Methods, 3rd Edition, 1984, by GC/FID."

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Report Date: 11/11/92
Date Collected: 11/5/92
Collected By: Client
Date Received: 11/8/92
CHEMTEX FILE #: 2110448

PROJECT: BOILER #1, NISCO

RESULTS OF ANALYSIS

CHEMTEX #	Sample Identification	BENZENE (CAS #71-43-2) (ug/sample)
2110448	R4-S1-TA	< 2.0
2110449	R4-S1-TB	< 2.0
2110450	R4-S1-TC	< 2.0
Date Analyzed/ Analyst		11/9/92 SP

Desorption Efficiency (%): 89/87

Analyzed by NIOSH Method 1501, "NIOSH Manual of Analytical Methods, 3rd Edition, 1984, by GC/FID."

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FAX: 409-982-1522

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Report Date: 11/11/92
Date Collected: 11/5/92
Collected By: Client
Date Received: 11/8/92
CHEMTEX FILE #: 2110448

PROJECT: BOILER #1, NISCO

RESULTS OF ANALYSIS

CHEMTEX #	Sample Identification	ETHYL BENZENE (CAS #100-41-4) (ug/sample)
2110448	R4-S1-TA	< 2.0
2110449	R4-S1-TB	< 2.0
2110450	R4-S1-TC	< 2.0
Date Analyzed/ Analyst		11/9/92 SP

Desorption Efficiency (%): 92/88

Analyzed by NIOSH Method 1501, "NIOSH Manual of Analytical Methods, 3rd Edition, 1984, by GC/FID."

C.N. Reddy

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CHEMTEX

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FAX: 409-982-1522

Client: E T S Inc.
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Report Date: 11/11/92
Date Collected: 11/5/92
Collected By: Client
Date Received: 11/8/92
CHEMTEX FILE #: 2110448

PROJECT: BOILER #1, NISCO

RESULTS OF ANALYSIS

CHEMTEX #	Sample Identification	TOLUENE (CAS #108-88-3) (ug/sample)
2110448	R4-S1-TA	< 2.0
2110449	R4-S1-TB	< 2.0
2110450	R4-S1-TC	< 2.0
Date Analyzed/ Analyst		11/9/92 SP

Desorption Efficiency (%): 92/90

Analyzed by NIOSH Method 1501, "NIOSH Manual of Analytical Methods, 3rd Edition, 1984, by GC/FID."

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CHEMTEX

Environmental & Industrial Hygiene Services

3082 25th Street, Port Arthur, Texas 77642, 409-983-4575
FAX: 409-982-1522

Client: E T S Inc.
10461 Mammoth Dr.
Baton Rouge, LA 70814

Report Date: 11/11/92
Date Collected: 11/5/92
Collected By: Client
Date Received: 11/8/92
CHEMTEX FILE #: 2110448

PROJECT: BOILER #1, NISCO

RESULTS OF ANALYSIS

CHEMTEX #	Sample Identification	XYLENE (CAS #1330-20-7) (ug/sample)
2110448	R4-S1-TA	< 4.0
2110449	R4-S1-TB	< 4.0
2110450	R4-S1-TC	< 4.0
Date Analyzed/ Analyst		11/9/92 SP

Desorption Efficiency (%): 90/86

Analyzed by NIOSH Method 1501, "NIOSH Manual of Analytical Methods, 3rd Edition, 1984, by GC/FID."

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CHEMTEX

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FAX: 409-982-1522

Client: E T S Inc.
10461 Mammoth Dr.
Baton Rouge, LA 70814

Report Date: 11/11/92
Date Collected: 11/5/92
Collected By: Client
Date Received: 11/8/92
CHEMTEX FILE #: 2110448

PROJECT: BOILER #1, NISCO

RESULTS OF ANALYSIS

CHEMTEX #	Sample Identification	NAPTHALENE (CAS #91-20-3) (ug/sample)
2110448	R4-S1-TA	< 4.0
2110449	R4-S1-TB	< 4.0
2110450	R4-S1-TC	< 4.0

Date Analyzed/ Analyst	11/9/92 SP

Desorption Efficiency (%): 84/87

Analyzed by NIOSH Method 1501, "NIOSH Manual of Analytical Methods, 3rd Edition, 1984, by GC/FID."

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CHEMTEX
Environmental & Industrial Hygiene Services
3082 25th Street, Port Arthur, Texas 77642, 409-983-4575
FAX: 409-982-1522

Client: E T S Inc.
10389 Mammoth Dr.
Baton Rouge, LA 70814

Report Date: 12/10/92
Date Collected: 11/4-5/92
Collected By: Client
Date Received: 11/8/92
CHEMTEX FILE#: 2120392

PROJECT: UNIT #1 AND UNIT #2

Sample Identification: FUEL 1A

CHEMTEX #: 2110392

ULTIMATE FUEL ANALYSIS

			Date Analyzed/ Analyst
Nickel (mg/kg)	85.66		11/20/92 CK/KR
Chromium (mg/kg)	< 0.5		11/20/92 CK/KR
Vanadium (mg/kg)	287		11/20/92 CK/KR
Cadmium (mg/kg)	0.20		11/20/92 CK/KR
Beryllium (mg/kg)	< 0.20		11/20/92 CK/KR
Mercury (mg/kg)	0.030		11/20/92 CK/KR
Elemental C (wt%)	85.66	79.98	12/9/92 SC
Elemental H_2 (wt%)	4.07	3.80	12/9/92 SC
Elemental O_2 (wt%)	10.01	9.35	12/9/92 SC
Elemental N_2 (wt%)	1.82	1.70	12/9/92 SC
Elemental S (wt%)	4.86	4.54	12/9/92 SC
Ash (wt%)	0.43	0.40	12/8/92 MK
Moisture (wt%)	0.25	0.23	12/8/92 MK
High Heat Value (BTU/lb)	15,440		12/14/92 MK

106.42%
101.1

* Calculated on the basis of Calcium analysis.
** Calculated on the basis of Magnesium analysis.

CNReddy

Dr. C. N. Reddy, Ph.D
Director

JLH/CNR

CHEMTEX

Environmental & Industrial Hygiene Services

3082 25th Street, Port Arthur, Texas 77642, 409-983-4575
FAX: 409-982-1522

Client: E T S Inc.
10389 Mammoth Dr.
Baton Rouge, LA 70814

Report Date: 12/10/92
Date Collected: 11/4-5/92
Collected By: Client
Date Received: 11/8/92
CHEMTEX FILE#: 2120392

PROJECT: UNIT #1 AND UNIT #2

Sample Identification: FUEL 1A

CHEMTEX #: 2110392

ULTIMATE FUEL ANALYSIS

		Date Analyzed/ Analyst
Nickel (mg/kg)	85.66	11/20/92 CK/KR
Chromium (mg/kg)	< 0.5	11/20/92 CK/KR
Vanadium (mg/kg)	287	11/20/92 CK/KR
Cadmium (mg/kg)	0.20	11/20/92 CK/KR
Beryllium (mg/kg)	< 0.20	11/20/92 CK/KR
Mercury (mg/kg)	0.030	11/20/92 CK/KR
Elemental C (wt%)	85.66	12/9/92 SC
Elemental H_2 (wt%)	4.07	12/9/92 SC
Elemental O_2 (wt%)	10.01	12/9/92 SC
Elemental N_2 (wt%)	1.82	12/9/92 SC
Elemental S (wt%)	4.86	12/9/92 SC
Ash (wt%)	0.43	12/8/92 MK
Moisture (wt%)	0.25	12/8/92 MK
High Heat Value (BTU/lb)	15,440	12/14/92 MK

* Calculated on the basis of Calcium analysis.
** Calculated on the basis of Magnesium analysis.

CNReddy

Dr. C. N. Reddy, Ph.D
Director

JLH/CNR

CHEMTEX

Environmental & Industrial Hygiene Services

3082 25th Street, Port Arthur, Texas 77642, 409-983-4575
FAX: 409-982-1522

Client: E T S Inc.
10389 Mammoth Dr.
Baton Rouge, LA 70814

Report Date: 12/10/92
Date Collected: 11/4-5/92
Collected By: Client
Date Received: 11/8/92
CHEMTEX FILE#: 2120390

PROJECT: UNIT #1 AND UNIT #2

Sample Identification: LIMESTONE 1A

CHEMTEX #: 2110390

ULTIMATE FUEL ANALYSIS

		Date Analyzed/ Analyst
Nickel (mg/kg)	11.3	11/20/92 CK/KR
Chromium (mg/kg)	9.5	11/20/92 CK/KR
Vanadium (mg/kg)	35.7	11/20/92 CK/KR
Cadmium (mg/kg)	3.79	11/20/92 CK/KR
Beryllium (mg/kg)	0.20	11/20/92 CK/KR
Mercury (mg/kg)	0.074	11/20/92 CK/KR
Elemental S (wt%)	< 0.01	12/9/92 SC
Elemental N (wt%)	< 0.01	12/9/92 SC
Ash (wt%)	83.66	12/8/92 MK
Moisture (wt%)	< 0.01	12/8/92 MK
Calcium (mg/kg)	520,000	12/11/92 CK
Calcium Carbonate mg/kg)*	1,298,440	12/11/92 CK
Magnesium (mg/kg)	14,750	12/11/92 CK
Magnesium Carbonate (mg/kg)**	51,170	12/11/92 CK

* Calculated on the basis of Calcium analysis.
** Calculated on the basis of Magnesium analysis.

CNReddy

Dr. C. N. Reddy, Ph.D
Director

JLH/CNR

6.3.36

CHEMTEX
Environmental & Industrial Hygiene Services

3082 25th Street, Port Arthur, Texas 77642, 409-983-4575
FAX: 409-982-1522

Client: E T S Inc.
10389 Mammoth Dr.
Baton Rouge, LA 70814

Report Date: 12/10/92
Date Collected: 11/4-5/92
Collected By: Client
Date Received: 11/8/92
CHEMTEX FILE#: 2120386

PROJECT: UNIT #1 AND UNIT #2

Sample Identification: BOTTOM ASH 1A

CHEMTEX #: 2110388

ULTIMATE FUEL ANALYSIS

		Date Analyzed/ Analyst
Nickel (mg/kg)	134.0	11/20/92 CK/KR
Chromium (mg/kg)	9.9	11/20/92 CK/KR
Vanadium (mg/kg)	1020.0	11/20/92 CK/KR
Cadmium (mg/kg)	2.48	11/20/92 CK/KR
Beryllium (mg/kg)	0.2	11/20/92 CK/KR
Mercury (mg/kg)	0.058	11/20/92 CK/KR
Elemental S (wt%)	17.65	12/9/92 SC
Elemental C (wt%)	< 0.05	12/9/92 SC
Ash (wt%)	99.05	12/8/92 MK
Moisture (wt%)	< 0.01	12/8/92 MK
Calcium (mg/kg)	355,000	12/11/92 CK
Calcium Sulfate(mg/kg)*	1,205,940	12/11/92 CK
Calcium oxide (mg/kg)*	496,650	12/11/92 CK
Magnesium (mg/kg)	18,500	12/11/92 CK
Magnesium Oxide (mg/kg)**	30,670	12/11/92 CK

* Calculated on the basis of Calcium analysis.
** Calculated on the basis of Magnesium analysis.

CNReddy

Dr. C. N. Reddy, Ph.D
Director

JLH/CNR

6.3.37

CHEMTEX
Environmental & Industrial Hygiene Services

3082 25th Street, Port Arthur, Texas 77642, 409-983-4575
FAX: 409-982-1522

Client: E T S Inc.
10389 Mammoth Dr.
Baton Rouge, LA 70814

Report Date: 12/10/92
Date Collected: 11/4-5/92
Collected By: Client
Date Received: 11/8/92
CHEMTEX FILE#: 2110386

PROJECT: UNIT #1 AND UNIT #2

SAMPLE IDENTIFICATION: FLY ASH 1A

CHEMTEX #: 2110386

ULTIMATE FUEL ANALYSIS

		Date Analyzed/ Analyst
Nickel (mg/kg)	83.0	11/20/92 CK/KR
Chromium (mg/kg)	11.6	11/20/92 CK/KR
Vanadium (mg/kg)	681.0	11/20/92 CK/KR
Cadmium (mg/kg)	2.92	11/20/92 CK/KR
Beryllium (mg/kg)	0.2	11/20/92 CK/KR
Mercury (mg/kg)	0.10	11/20/92 CK/KR
Elemental S (wt%)	11.79	12/9/92 SC
Elemental C (wt%)	3.87	12/9/92 SC
Ash (wt%)	91.43	12/8/92 MK
Moisture (wt%)	< 0.01	12/8/92 MK
Calcium (mg/kg)	535,000	12/11/92 CK
Calcium Sulfate(mg/kg)*	1,817,400	12/11/92 CK
Calcium oxide (mg/kg)*	748,470	12/11/92 CK
Magnesium (mg/kg)	22,000	12/11/92 CK
Magnesium Oxide (mg/kg)*	36,480	12/11/92 CK

* Calculated on the basis of Calcium analysis.
** Calculated on the basis of Magnesium analysis.

Dr. C. N. Reddy, Ph.D
Director

JLH/CNR

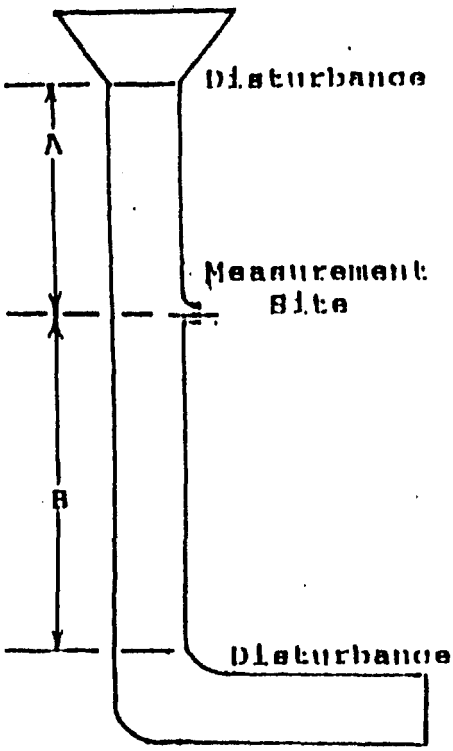
6.3.38

Presented on the following pages are Boiler 1A operating data collected during the emissions tests.

NISCO Unit 1A Operational Data for November 4-5, 1992.							
Date	Time	Generation	Steam Pressure	Steam Temp	Fuel Flow	Limestone Flow	Steam Flow
		MA1JT15.PV	AA1PT35.PV	AA1TI37.OPEU	JM1FI09.PV	JU1FI03.PV	AB1FY01.PV
		MWATTS	PSIG	DEG	KPPH	KPPH	KPPH
11/4/92	8:00:00	43.859	1569.528	969.18	33.593		360.094
11/4/92	9:00:00	43.777	1565.587	969.736	33.581		358.905
11/4/92	10:00:00	43.926	1569.724	968.385	33.606		359.385
11/4/92	11:00:00	43.805	1566.374	962.987	33.58		360.936
11/4/92	12:00:00	43.418	1554.389	962.405	33.562		362.014
11/4/92	13:00:00	44.013	1571.825	960.224	33.552		365.871
11/4/92	14:00:00	43.713	1565.212	960.93	33.566		363.526
11/4/92	15:00:00	43.641	1569.553	963.386	33.562		363.86
11/4/92	16:00:00	43.196	1546.475	960.931	33.643		359.446
11/4/92	17:00:00	48.477	1567.868	976.838	37.359		398.892
11/4/92	18:00:00	55.842	1591.051	991.244	41.648		453.497
11/4/92	19:00:00	61.671	1580.97	1000.328	44.848		497.706
11/4/92	20:00:00	67.495	1562.587	1007.214	47.847		540.186
11/4/92	21:00:00	70.161	1604.439	1005.295	49.267		559.988
11/4/92	22:00:00	73.145	1616.649	1004.661	50.646		582.245
11/4/92	23:00:00	73.637	1587.53	1005.098	51.495		587.036
11/5/92	0:00:00	76.149	1579.674	1004.934	52.695		601.789
11/5/92	1:00:00	78.09	1571.987	1005.583	53.87		614.907
11/5/92	2:00:00	82.657	1593.814	1005.159	56.691		654.595
11/5/92	3:00:00	86.123	1590.917	1005.461	58.898		686.333
11/5/92	4:00:00	86.413	1584.89	1005.407	58.973		687.568
11/5/92	5:00:00	86.784	1589.464	1004.906	58.971		691.442
11/5/92	6:00:00	86.655	1581.156	1004.638	59.03		690.241
11/5/92	7:00:00	86.851	1583.808	1004.889	59.021		691.22
11/5/92	8:00:00	86.887	1585.451	1004.933	59.026	13.233	692.389
11/5/92	9:00:00	86.566	1578.585	1004.802	59.04	13.956	689.571
11/5/92	10:00:00	86.361	1576.123	1005.164	59.02	15.594	687.94
11/5/92	11:00:00	86.418	1576.195	1004.775	59.345	16.962	688.427
11/5/92	12:00:00	91.977	1574.471	1005.79	62.896	16.62	736.868
11/5/92	13:00:00	99.443	1610.001	1005.265	67.576	15.753	804.47
11/5/92	14:00:00	101.432	1608.735	1004.57	68.38	15.828	824.883
11/5/92	15:00:00	101.649	1608.968	1005.045	68.281	15.873	824.826
11/5/92	16:00:00	101.631	1607.864	1004.969	68.195	16.393	822.925
11/5/92	17:00:00	101.539	1608.766	1005.019	68.825	17.04	828.386
11/5/92	18:00:00	101.542	1608.171	1005.152	68.544	16.574	829.055
11/5/92	19:00:00	101.577	1606.857	1005.049	68.935	17.257	827.622
11/5/92	20:00:00	101.664	1608.517	1004.756	69.155	16.972	828.674

ETS

EMISSION TESTING SERVICES, INC.
Traverse Point Layout



Client Nisco

Date 11 3 92

Unit Tested Boiler #2

Location Westlake, La.

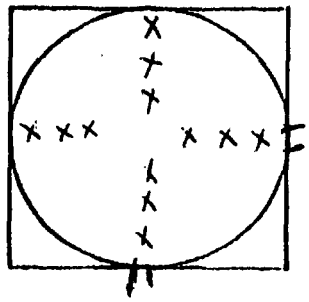
Upstream Distance (A) Greater than 8 dia

Downstream Distance (B) Greater than 2 dia.

Inside Diameter 120.0"

Coupling Length 15.0"

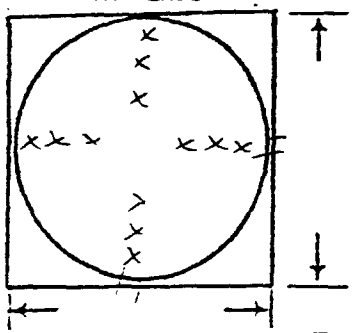
Coupling Type 8 bolt 4"

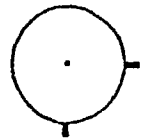


Cross Section Schematic of Stack

Traverse Point	Distance % of Diameter		Stack Diameter		Coupling Length		Traverse Points
1	4.4	x	120.0	+	15.0	=	20.28
2	14.6						32.52
3	29.6						50.52
4	70.4						99.48
5	85.4						117.48
6	95.6		120.0		15.0		129.72
7							
8							
9							
10							
11							
12							

CROSS SECTIONAL SCHEMATIC OF STACK TRAVERSE POINT LAYOUT





DRAW ARROW NORTH

ETS FIELD DATA, METHOD(S) 1-5

PLANT NISCO
DATE 11 4 92
LOCATION West Lake La.
OPERATOR DAMON WOOD
STACK NO. Boiler #2
RUN NO. 1

SAMPLE BOX NO. SL
METER BOX NO. 792
AMBIENT TEMPERATURE 72°
BAROMETRIC PRESSURE 29.80
FILTER TARE wt mg 1863
NOZZLE DIAMETER, in. 0.2130

STACK DIAMETER, in. 120.00
PITOT TUBE NO. P-10-3
PITOT FACTOR 0.813
METER Δ H@ 1.6805
D.G.M.C. FACTOR 0.9768
K FACTOR 1.1797
T = 917.8262

TRAVERSE POINT NUMBER	SAMPLING TIME (θ), min.	STATIC PRESSURE (in.H2O)	STACK TEMP (Ts), °F	VELOCITY HEAD (ΔPs)	(√ΔPs)	PRESSURE DIFFERENTIAL ACROSS ORIFICE METER (ΔH) in. H2O ACTUAL	DESIRED	GAS SAMPLE VOLUME (Vm), ft3	GAS SAMPLE TEMPERATURE AT DRY GAS METER INLET (Tmin), °F	OUTLET (Tmout), °F	SAMPLE BOX TEMPERATURE °F	TEMPERATURE OF GAS LEAVING CONDENSER OR LAST IMPINGER F	PUMP VACUUM in. Hg gauge
1	0950	on @	302.0	1.050	1.024	1.250	1.264	689.001	74	71	339	59	5.0
2	1000	-1.25	303.0	1.100	1.048	1.300	1.323	695.559	80	77	330	58	5.0
3	1010		303.0	1.100	1.048	1.300	1.323	702.211	83	78	321	56	5.0
4	1020		303	1.000	1.000	1.200	1.202	708.843	84	80	320	56	5.0
5	1030		303	0.955	0.977	1.150	1.148	715.368	86	82	322	57	5.0
6	1040		302	0.900	0.948	1.000	1.084	721.900	87	83	320	58	5.0
—	1050	off @	—	—	—	—	—	729.985	—	—	—	—	—
7	1102	on @	303	1.000	1.000	1.200	1.200	729.985	83	82	313	58	5.0
8	1112		302	0.935	0.966	1.150	1.126	734.439	95	86	334	56	5.0
9	1122		303	0.975	0.987	1.150	1.172	740.771	104	95	336	56	5.0
10	1132		303	1.100	1.048	1.300	1.323	747.148	112	102	334	57	5.0
11	1142		303	1.150	1.072	1.350	1.385	753.942	119	110	335	56	5.5
12	1152		303	1.050	1.024	1.250	1.263	761.071	123	115	331	58	5.5
	1202	off @						767.743					
AVERAGE	120.0	-1.25	302.75		1.012	1.217		78.742		91.292			

VOLUME OF LIQUID WATER COLLECTED	IMPINGER WEIGHTS			
	Total w/ gel 79.1			
FINAL	613.2	582.1	495.2	643.8
INITIAL	558.5	570.5	442.9	633.3
WEIGHT COLLECTED	54.7	11.6	2.3	10.5
TOTAL WEIGHT		79.1		

ORSAT MEASUREMENT

	CO2	O2	CO	N2
1	14.6	3.8		
2		4.2		
3				
4				

COMMENTS:

PRE-LEAK CHECK GOOD @ 10 in Hg at .001 CFM for 1 min
POST-LEAK CHECK GOOD @ 10 in Hg at .001 CFM for 1 min

6.5.2

E T S

Emission Testing Services, Inc.

Client : NISCO
Source : BOILER 2A
Test Date : 11- 4-92
Run No. : 1

DETERMINATION of STACK GAS MOISTURE, MOLECULAR WEIGHT, VELOCITY, and VOLUMETRIC FLOW RATE

A - Cross-sectional area of the stack, ft3
Acf - Stack gas flow rate, actual, acfm
Bws - Stack gas moisture fraction, %/100
Cp - Pitot tube coefficient
dH - Meter orifice pressure differential, in. H2O
dP - Stack gas velocity head, in. H2O
F1 - Conversion factor, 13.6 in. H2O/ in. Hg
Kp - Pitot tube constant, 85.49
MCO2 - Molecular weight of CO2, 44.01 lb/ lb mole
Md - Stack gas molecular weight, dry lb/lb mole
MH2O - Molecular weight of water, 18.02 lb/lb mole
MN2 - Molecular weight of N2, 28.01 lb/lb mole
MO2 - Molecular weight of O2, 32.00 lb/lb mole
Ms - Stack gas molecular weight, wet lb/lb mole
Pbar - Barometric pressure, in. Hg
Ps - Stack gas static pressure, in. H2O
Ps - Stack gas absolute pressure, in. Hg
Pstd Standard absolute pressure, 29.92 in. Hg
Qsd - Stack gas volumetric flow rate, dry scfm
R - Ideal gas constant, 21.85
Tm - Meter temperature, R
Ts - Stack gas temperature, R
Tstd - Standard temperature, 528 R
Vi - Water vapor condensed, impinger 1, g
Vii - Water vapor condensed, impinger 2, g
Viii - Water vapor condensed, impinger 3, g
Viv - Water vapor condensed, impinger 4, g
Vm - Gas meter sample volume, dry ft3
Vmstd - Gas meter sample volume, dry std. ft3
Vs - Stack gas velocity, ft/sec
Vm - Total water vapor condensed, ft3
Y - Dry gas meter calibration factor
%CO2 - Stack gas CO concentration, %/100
%N2 Stack gas N2 concentration, %/100
O2 - Stack gas O2 concentration, %/100

$$Vw = \left\{ \frac{(Vi + Vii + Viii + Viv)\ R\ Tstd}{(453.6\ g/lb)\ Pstd\ MH2O} \right\} = \left\{ \frac{(54.7 + 11.6 + 2.3 + 10.5)(21.85)(528)}{(453.6)(29.92)(18.02)} \right\} = 3.73141$$

$$Vmstd = Vm\ Y \left\{ \frac{(Pb + dH/F1)\ Tstd}{Pstd\ Tm} \right\} = (78.742)(.9768) \left\{ \frac{(29.800 + 1.2167/13.6)(528)}{(29.92)(551)} \right\} = 73.59039$$

$$Bws = \left\{ \frac{Vw}{Vw + Vmstd} \right\} = \left\{ \frac{(3.73141)}{(3.73141 + 73.59039)} \right\} = .0483$$

$$Md = (MCO2)(\%CO2) + (MO2)(\%O2) + (MN2)(\%N2)$$
$$= (44.01)(.146) + (32.00)(.042) + (28.01)(.812) = 30.514$$

$$Ms = Md\ (1 - Bws) + (MH2O\ Bws) = (30.514)(1 - .0483) + (18.02)(.0483) = 29.911$$

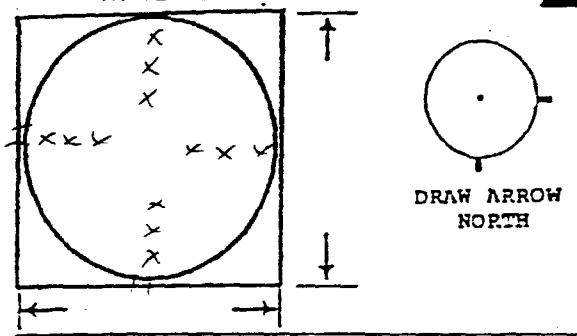
$$Vs = Kp\ Cp\ (dP)^{1/2} \left\{ \frac{Ts}{Ps\ Ms} \right\}^{1/2} = (85.49)(.8130)(1.0124) \left\{ \frac{(763)}{(29.708)(29.911)} \right\}^{1/2} = 65.1910$$

$$Acf = (60\ sec/min)(Vs\ A) = (60)(65.1910)(78.5398) = 307205.3$$

$$Qsd = (3600\ sec/hr)(1 - Bws)(Vs\ A) \left\{ \frac{Tstd\ Ps}{Ts\ Pstd} \right\}$$

$$= (3600)(1 - .0483)(65.1910)(78.5398) \left\{ \frac{(528)(29.708)}{(763)(29.92)} \right\} = 12057684.0\ dscf/hr = 200961.4\ dscf/min$$

CROSS SECTIONAL SCHEMATIC OF STACK TRAVERSE POINT LAYOUT



E T S FIELD DATA, METHOD(S) 1-5

PLANT NISCO
DATE 11 4 92
LOCATION west Lake La
OPERATOR Damon Wood
STACK NO. Boiler #2
RUN NO. 2

SAMPLE BOX NO. BL
METER BOX NO. 4 92
AMBIENT TEMPERATURE 68
BAROMETRIC PRESSURE 29.80
FILTER TARE wt mg 18.93
NOZZLE DIAMETER, in. 0.2130

STACK DIAMETER, in. 120.0
PITOT TUBE NO. P-10-3
PITOT FACTOR 0.813
METER Δ Hₒ 1.6805
D.G.M.C. FACTOR 0.9768
K FACTOR 1.2978
T = 989.9284

TRAVERSE POINT NUMBER	SAMPLING TIME (θ), min.	STATIC PRESSURE (in. H₂O)	STACK TEMP (Ts), °F	VELOCITY HEAD (ΔPs)	(√ΔPs)	PRESSURE DIFFERENTIAL ACROSS ORIFICE METER (ΔH) in. H₂O ACTUAL	DESIRED	GAS SAMPLE VOLUME (Vm), ft³	GAS SAMPLE TEMPERATURE AT DRY GAS METER INLET (Tmin), °F	OUTLET (Tmout), °F	SAMPLE BOX TEMPERATURE °F	TEMPERATURE OF GAS LEAVING CONDENSER OR LAST IMPINGER F	PUMP VACUUM in. Hg gauge
1	1325	on @	298	0.965	0.982	1.250	1.275	772.530	84	84	321	53	5.0
2	1335	-1.30	299	0.930	0.964	1.200	1.212	778.881	86	84	320	52	5.0
3	1345		300	0.965	0.982	1.250	1.256	785.232	85	82	326	52	5.0
4	1355		300	1.150	1.072	1.500	1.497	791.735	85	82	330	50	6.0
5	1405		300	1.100	1.048	1.450	1.432	798.013	85	81	225	52	6.0
6	1415	~~off~~	299	0.955	0.977	1.250	1.245	805.812	85	81	318	52	5.5
—	1425	off @	—	—	—	—	—	812.463	—	—	—	—	—
7	1434	on @	301	1.050	1.024	1.350	1.365	812.463	81	79	324	56	5.5
8	1444		301	1.150	1.072	1.500	1.495	819.060	84	81	320	57	6.0
9	1454		301	1.050	1.024	1.350	1.365	826.072	85	81	322	58	6.0
10	1504		300	1.000	1.000	1.300	1.302	832.831	85	82	320	58	6.0
	1512	off @	—	—	—	—	—	838.331	—	—	—	—	—
	1529	on @	—	—	—	—	—	838.331	—	—	—	—	—
11	1531		300	1.050	1.024	1.350	1.365	839.475	84	81	310	60	6.0
12	1541		300	0.955	0.977	1.250	1.243	846.112	85	82	317	60	6.0
	1551	off @						852.675					
AVERAGE	120.0		299.92		1.012	1.33		80.145		83.08			

VOLUME OF LIQUID WATER COLLECTED	(net Gain 89.0) IMPINGER WEIGHTS			
FINAL	593.8	585.9	460.0	656.7
INITIAL	536.8	570.1	456.3	643.3
WEIGHT COLLECTED	57.0	14.9	3.7	13.4
TOTAL WEIGHT		89.0		

ORSAT MEASUREMENT

	CO_2	O_2	CO	N_2
1	14.2	5.1		
2				
3				
4				

COMMENTS:

PRE-LEAK CHECK GOOD @ 10 in/Hg .001 CFM for 1 min
POST-LEAK CHECK GOOD @ 10 in/Hg .001 CFM for 1 min

6.5.4

E T S

Emission Testing Services, Inc.

Client : NISCO
Source : BOILER 2A
Test Date : 11- 4-92
Run No. : 2

DETERMINATION of STACK GAS MOISTURE, MOLECULAR WEIGHT, VELOCITY, and VOLUMETRIC FLOW RATE

A - Cross-sectional area of the stack, ft3
Acf - Stack gas flow rate, actual, acfm
Bws - Stack gas moisture fraction, %/100
Cp - Pitot tube coefficient
dH - Meter orifice pressure differential, in. H2O
dP - Stack gas velocity head, in. H2O
F1 - Conversion factor, 13.6 in. H2O/ in. Hg
Kp - Pitot tube constant, 85.49
MCO2 - Molecular weight of CO2, 44.01 lb/ lb mole
Md - Stack gas molecular weight, dry lb/lb mole
MH2O - Molecular weight of water, 18.02 lb/lb mole
MN2 - Molecular weight of N2, 28.01 lb/lb mole
MO2 - Molecular weight of O2, 32.00 lb/lb mole
Ms - Stack gas molecular weight, wet lb/lb mole
Pbar - Barometric pressure, in. Hg
Pa - Stack gas static pressure, in. H2O
Ps - Stack gas absolute pressure, in. Hg
Pstd Standard absolute pressure, 29.92 in. Hg
Qsd - Stack gas volumetric flow rate, dry scfm
R - Ideal gas constant, 21.85
Tm - Meter temperature, R
Ts - Stack gas temperature, R
Tstd - Standard temperature, 528 R
Vi - Water vapor condensed, impinger 1, g
Vii - Water vapor condensed, impinger 2, g
Viii - Water vapor condensed, impinger 3, g
Viv - Water vapor condensed, impinger 4, g
Vm - Gas meter sample volume, dry ft3
Vmstd - Gas meter sample volume, dry std. ft3
Vs - Stack gas velocity, ft/sec
Vm - Total water vapor condensed, ft3
Y - Dry gas meter calibration factor
%CO2 - Stack gas CO concentration, %/100
%N2 Stack gas N2 concentration, %/100
O2 - Stack gas O2 concentration, %/100

$$Vw = \left\{ \frac{(Vi + Vii + Viii + Viv)\ R\ Tstd}{(453.6\ g/lb)\ Pstd\ MH2O} \right\} = \left\{ \frac{(57.0 + 14.9 + 3.7 + 13.4)(21.85)(528)}{(453.6)(29.92)(18.02)} \right\} = 4.19842$$

$$Vmstd = Vm\ Y \left\{ \frac{(Pb + dH/F1)\ Tstd}{Pstd\ Tm} \right\} = (80.145)(.9768) \left\{ \frac{(29.800 + 1.3333/13.6)(528)}{(29.92)(543)} \right\} = 76.05547$$

$$Bws = \left\{ \frac{Vw}{Vw + Vmstd} \right\} = \left\{ \frac{(4.19842)}{(4.19842 + 76.05547)} \right\} = .0523$$

$$Md = (MCO2)(\%CO2) + (MO2)(\%O2) + (MN2)(\%N2)$$
$$= (44.01)(.142) + (32.00)(.051) + (28.01)(.807) = 30.485$$

$$Ms = Md\ (1 - Bws) + (MH2O\ Bws) = (30.485)(1 - .0523) + (18.02)(.0523) = 29.833$$

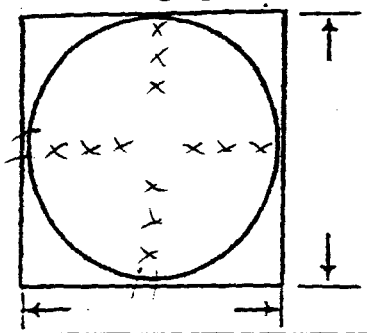
$$Vs = Kp\ Cp\ (dP)^{1/2} \left\{ \frac{Ts}{Ps\ Ms} \right\}^{1/2} = (85.49)(.8130)(1.0126) \left\{ \frac{(760)}{(29.704)(29.833)} \right\}^{1/2} = 65.1726$$

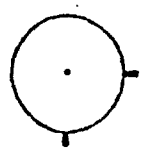
$$Acf = (60\ sec/min)(Vs\ A) = (60)(65.1726)(78.5398) = 307118.3$$

$$Qsd = (3600\ sec/hr)(1 - Bws)(Vs\ A) \left\{ \frac{Tstd\ Ps}{Ts\ Pstd} \right\}$$

$$= (3600)(1 - .0523)(65.1726)(78.5398) \left\{ \frac{(528)(29.704)}{(760)(29.92)} \right\} = 12046156.0\ dscf/hr$$
$$= 200769.3\ dscf/min$$

CROSS SECTIONAL SCHEMATIC OF STACK
TRAVERSE POINT LAYOUT





DRAW ARROW NORTH

E T S FIELD DATA, METHOD(S) 1-5

PLANT NISCO
DATE 11 4 92
LOCATION West Lake La
OPERATOR Damon Wood
STACK NO. Boiler #2
RUN NO. 3

SAMPLE BOX NO. SL
METER BOX NO. 792
AMBIENT TEMPERATURE 66°
BAROMETRIC PRESSURE 29.80
FILTER TARE wt mg 1905
NOZZLE DIAMETER, in. .2130

STACK DIAMETER, in. 120.0"
PITOT TUBE NO. P-10-3
PITOT FACTOR 0.813
METER Δ H@ 1.6805
D.G.M.C. FACTOR 0.9768
K FACTOR 1.1797
T = 917.8262

TRAVERSE POINT NUMBER	SAMPLING TIME (θ), min.	STATIC PRESSURE (in. H2O)	STACK TEMP (Ts), °F	VELOCITY HEAD (ΔPs)	(√ΔPs)	PRESSURE DIFFERENTIAL ACROSS ORIFICE METER (ΔH) in. H2O ACTUAL	DESIRED	GAS SAMPLE VOLUME (Vm), ft3	GAS SAMPLE TEMPERATURE AT DRY GAS METER INLET (Tmin), °F	OUTLET (Tmout), °F	SAMPLE BOX TEMPERATURE °F	TEMPERATURE OF GAS LEAVING CONDENSER OR LAST IMPINGER F	PUMP VACUUM in. Hg gauge
1	1630	on	301	1.150	1.072	1.500	1.495	852.768	78	77	314	53	5.0
2	1640	-1.3	301	1.050	1.024	1.250	1.266	859.841	81	78	317	56	5.0
3	1650		302	1.100	1.048	1.300	1.324	866.312	81	78	317	47	5.0
4	1700		302	0.890	0.943	1.050	1.072	872.908	81	77	310	45	4.0
5	1710		301	0.950	0.974	1.150	1.145	878.871	81	78	310	45	4.5
6	1720		302	0.920	0.959	1.100	1.108	885.109	82	78	314	48	4.0
—	1730	off	—	—	—	—	—	891.155	—	—	—	—	—
7	1738	on	300	0.970	0.984	1.150	1.171	891.155	79	77	316	52	4.5
8	1748		301	0.940	0.969	1.150	1.133	897.371	82	79	330	50	4.5
9	1758		301	0.930	0.964	1.150	1.145	903.456	81	78	320	53	4.5
10	1808		301	1.100	1.048	1.350	1.326	909.973	81	77	318	53	4.5
11	1818		300	1.050	1.024	1.250	1.268	916.001	81	77	317	54	5.0
12	1828		300	0.890	0.943	1.050	1.074	922.198	81	77	815	56	4.5
	1838	off						927.812					
AVERAGE	120.0		301.00		0.997	1.204		~~75.044~~ 75.044		79.17			

VOLUME OF LIQUID WATER COLLECTED	IMPINGER WEIGHTS			
	Total 86.2			
FINAL	596.7	584.8	459.3	661.0
INITIAL	542.5	570.7	456.6	645.8
WEIGHT COLLECTED	54.2	14.1	2.7	15.2

ORSAT MEASUREMENT

	CO2	O2	CO	N2
1	14.4	4.5		
2				
3				
4				

COMMENTS:

PRE-LEAK CHECK GOOD @ 10 in/Hg .001 for 1 min
POST-LEAK CHECK GOOD @ 10 in/Hg .001 for 1 min

6.5.6

E T S

Emission Testing Services, Inc.

Client : NISCO
Source : BOILER 2A
Test Date : 11- 4-92
Run No. : 3

DETERMINATION of STACK GAS MOISTURE, MOLECULAR WEIGHT, VELOCITY, and VOLUMETRIC FLOW RATE

A - Cross-sectional area of the stack, ft3
Acf - Stack gas flow rate, actual, acfm
Bws - Stack gas moisture fraction, %/100
Cp - Pitot tube coefficient
dH - Meter orifice pressure differential, in. H2O
dP - Stack gas velocity head, in. H2O
F1 - Conversion factor, 13.6 in. H2O/ in. Hg
Kp - Pitot tube constant, 85.49
MCO2 - Molecular weight of CO2, 44.01 lb/ lb mole
Md - Stack gas molecular weight, dry lb/lb mole
MH2O - Molecular weight of water, 18.02 lb/lb mole
MN2 - Molecular weight of N2, 28.01 lb/lb mole
MO2 - Molecular weight of O2, 32.00 lb/lb mole
Ms - Stack gas molecular weight, wet lb/lb mole
Pbar - Barometric pressure, in. Hg
Ps - Stack gas static pressure, in. H2O
Pa - Stack gas absolute pressure, in. Hg
Pstd Standard absolute pressure, 29.92 in. Hg
Qsd - Stack gas volumetric flow rate, dry scfm
R - Ideal gas constant, 21.85
Tm - Meter temperature, R
Ts - Stack gas temperature, R
Tstd - Standard temperature, 528 R
Vi - Water vapor condensed, impinger 1, g
Vii - Water vapor condensed, impinger 2, g
Viii - Water vapor condensed, impinger 3, g
Viv - Water vapor condensed, impinger 4, g
Vm - Gas meter sample volume, dry ft3
Vmstd - Gas meter sample volume, dry std. ft3
Vs - Stack gas velocity, ft/sec
Vm - Total water vapor condensed, ft3
Y - Dry gas meter calibration factor
%CO2 - Stack gas CO concentration, %/100
%N2 Stack gas N2 concentration, %/100
O2 - Stack gas O2 concentration, %/100

$$Vw = \left\{ \frac{(Vi + Vii + Viii + Viv)\ R\ Tstd}{(453.6\ g/lb)\ Pstd\ MH2O} \right\} = \left\{ \frac{(54.2 + 14.1 + 2.7 + 15.2)(21.85)(528)}{(453.6)(29.92)(18.02)} \right\} = 4.06633$$

$$Vmstd = Vm\ Y \left\{ \frac{(Pb + dH/F1)\ Tstd}{Pstd\ \ Tm} \right\} = (75.044)(.9768) \left\{ \frac{(29.800 + 1.2042/13.6)(528)}{(29.92)\ (539)} \right\} = 71.70933$$

$$Bws = \left\{ \frac{Vw}{Vw + Vmstd} \right\} = \left\{ \frac{(4.06633)}{(4.06633 + 71.70933)} \right\} = .0537$$

$$Md = (MCO2)(\%CO2) + (MO2)(\%O2) + (MN2)(\%N2)$$
$$= (44.01)(.144) + (32.00)(.045) + (28.01)(.811) = 30.494$$

$$Ms = Md\ (1 - Bws) + (MH2O\ Bws) = (30.494)(1 - .0537) + (18.02)(.0537) = 29.824$$

$$Vs = Kp\ Cp\ (dP)^{1/2} \left\{ \frac{Ts}{Ps\ Ms} \right\}^{1/2} = (85.49)(.8130)(.9974) \left\{ \frac{(761)}{(29.704)(29.824)} \right\}^{1/2} = 64.2517$$

$$Acf = (60\ sec/min)(Vs\ \ A) = (60)(64.2517)(78.5398) = 302778.9$$

$$Qsd = (3600\ sec/hr)(1 - Bws)(Vs\ A) \left\{ \frac{Tstd\ Ps}{Ts\ Pstd} \right\}$$

$$= (3600)(1 - .0537)(64.2517)(78.5398) \left\{ \frac{(528)(29.704)}{(761)(29.92)} \right\} = 11842172.0\ dscf/hr$$
$$= 197369.5\ dscf/min$$

Emission Testing Services, Inc.
P.O. Box 15075
Baton Rouge, LA 70895
504-925-8405

Client : NISCO
Source : BOILER 2A
Testing Date : 11- 4-92
Run : 1

DETERMINATION OF PARTICULATE EMISSIONS
(modified to include metals emissions)

dH - Average pressure differential, meter orifice, in-H20
Pbar - Barometric pressure at the sampling site, in Hg
Pstd - Standard absolute pressure, 29.92 in Hg
Tm - Average dry gas meter temperature, deg R
Tstd - Standard absolute temperature, 528 deg R
Vm - Volume of gas sample, actual dry ft3
Vmstd - Volume of gas sample, dry, Std. cond., DSCF
Y - Dry gas meter calibration factor

$$Vmstd = Vm\ Y \frac{Tstd}{Tm} \frac{Pbar + dH/13.6}{Pstd}$$

$$Vmstd = (\ 78.742\ )(\ .9768\ )\left(\frac{528}{551.}\right)\left(\frac{29.80 + (1.2167/13.6)}{29.92}\right)$$

Vmstd = 73.59039

An - Cross-sectional area of nozzle, ft2
Ps - Absolute stack gas pressure, in Hg
Qsd - Dry volumetric stack gas flow rate, dscf/hr
St - Total sampling time, min
Ts - Absolute stack gas temperature, deg R
Vs - Average stack gas velocity, ft/sec

----- ISOKINETIC SAMPLING RATE -----

$$I = \frac{Ts\ Vmstd\ Pstd\ 100}{Tstd\ Vs\ An\ St\ Ps\ (\ 60\ )(\ 1-Bws\ )}$$

$$I = \frac{(\ 763.\ )(\ 73.59039\ )(\ 29.92\ )(\ 100\ )}{528\ (\ 65.1910)(.00024745)(120)(29.708)\ 60\ (1 -\ .0483)}$$

I = 96.86

Emission Testing Services, Inc.
P.O. Box 15075
Baton Rouge, LA 70895
504-925-8405

Client : NISCO
Source : BOILER 2A
Testing Date : 11- 4-92
Run : 1

DETERMINATION OF PARTICULATE EMISSIONS
(modified to include metals emissions)

Ep - Particulate emission rate, lb/hr
Css - Concentration of particulate, grain/DSCF
Ca -Particulate concentration, blank DI water, mg/l
Mf -Particulate catch on filter, mg
Mn -Total particulate collected, mg
Mp -particulate in probe wash, mg Vp -Volume, probe wash,ml

---- Solids, probe wash ----

Mp =(Mp)-(Ca Vp) =(17.74) -(.000)(490.0) = 17.740

---- Solids, filter ----

Mf = 12.9

---- Total Solids collected ----

Mn = Mp + Mf

= (17.740)+(12.9) = 30.640

-------- CONCENTRATION and EMISSION RATE --------

Css = (Mn/Vmstd)(0.01543 grain/mg)

= (30.640/ 73.59039)(0.01543)

= .00642

Ep = (Mn)(2.2046 X 10-6 lb/mg)(Qsd) / Vmstd

= (30.640)(2.2046 X 10-6)(12057684.0) / (73.59039)

= 11.068

Emission Testing Services, Inc.
P.O. Box 15075
Baton Rouge, LA 70895
504-925-8405

Client : NISCO
Source : BOILER 2A
Testing Date : 11- 4-92
Run : 1

DETERMINATION OF PARTICULATE EMISSIONS
(modified to include metals emissions)

Bf - Metal content of blank filter, mg
Bi - Metal concentration, blank impinger catch, mg/l
Bp - Metal concentration, blank probe wash, mg/l
Em - Metal emission rate, lb/hr
Mf - Metal content of sample filter, mg
Mi - Metal concentration, impinger sample, mg/l
Mp - Metal concentration, probe wash sample, mg/l

Qsd - Stack gas flow rate, dscf/hr
Tmf - Total metal collected on filter, mg
Tmi - Total metal collected in impinger sample, mg
Tmp - Total metal collected in probe wash, mg
Vi - Volume of impinger sample, ml
Vmstd- Stack gas sample volume, dscf
Vp - Volume of probe wash, ml

Tmp = (Mp Vp/1000) - (Bp Vp/1000) Tmi = (Mi Vi/1000) - (Bi Vi/1000)

Tmf = (Mf - Bf) Em = (Tmp + Tmf + Tmi)(2.2046 X 10-6 lb/mg)(Qsd / Vmstd)

------ Nickel ------

Tmp = (1.485)(490/1000) - (.000)(490/1000) = .7277
Mf = (.0152 - .0052) = .0100
Mi = (.000)(275/1000) - (.000)(275/1000) = .0000

Em =(.7277 + .0100 + .0000)(2.2046 X 10-6)(12057684.0 /73.59039) = .2665

------ Chromium ------

Tmp = (.120)(490/1000) - (.000)(490/1000) = .0588
Mf = (.0000 - .0000) = .0000
Mi = (.000)(275/1000) - (.000)(275/1000) = .0000

Em =(.0588 + .0000 + .0000)(2.2046 X 10-6)(12057684.0 /73.59039) = .0212

------ Vanadium ------

Tmp = (1.830)(490/1000) - (.000)(490/1000) = .8967
Mf = (.0670 - .0000) = .0670
Mi = (.000)(275/1000) - (.000)(275/1000) = .0000

Em =(.8967 + .0670 + .0000)(2.2046 X 10-6)(12057684.0 /73.59039) = .3481

------ Mercury ------

Tmp = (.000)(490/1000) - (.000)(490/1000) = .0000
Mf = (.0000 - .0000) = .0000
Mi = (.000)(275/1000) - (.000)(275/1000) = .0000

Em =(.0000 + .0000 + .0000)(2.2046 X 10-6)(12057684.0 /73.59039) = .0000

------ Cadmium ------

Tmp = (.531)(490/1000) - (.000)(490/1000) = .2602
Mf = (.0018 - .0018) = .0000
Mi = (.009)(275/1000) - (.000)(275/1000) = .0025

Em =(.2602 + .0000 + .0025)(2.2046 X 10-6)(12057684.0 /73.59039) = .0949

------ Beryllium ------

Tmp = (.105)(490/1000) - (.000)(490/1000) = .0515
Mf = (.0000 - .0000) = .0000
Mi = (.000)(275/1000) - (.000)(275/1000) = .0000

Em =(.0515 + .0000 + .0000)(2.2046 X 10-6)(12057684.0 /73.59039) = .0186

Emission Testing Services, Inc.
P.O. Box 15075
Baton Rouge, LA 70895
504-925-8405

Client : NISCO
Source : BOILER 2A
Testing Date : 11- 4-92
Run : 2

DETERMINATION OF PARTICULATE EMISSIONS
(modified to include metals emissions)

dH - Average pressure differential, meter orifice, in-H20
Pbar - Barometric pressure at the sampling site, in Hg
Pstd - Standard absolute pressure, 29.92 in Hg
Tm - Average dry gas meter temperature, deg R
Tstd - Standard absolute temperature, 528 deg R
Vm - Volume of gas sample, actual dry ft3
Vmstd - Volume of gas sample, dry, Std. cond., DSCF
Y - Dry gas meter calibration factor

$$Vmstd = Vm\ Y \frac{Tstd}{Tm} \frac{Pbar + dH/13.6}{Pstd}$$

$$Vmstd = (\ 80.145\ )(\ .9768\ )\left(\frac{528}{543.}\right)\left(\frac{29.80 + (1.3333/13.6)}{29.92}\right)$$

Vmstd = 76.05547

An - Cross-sectional area of nozzle, ft2
Ps - Absolute stack gas pressure, in Hg
Qsd - Dry volumetric stack gas flow rate, dscf/hr
St - Total sampling time, min
Ts - Absolute stack gas temperature, deg R
Vs - Average stack gas velocity, ft/sec

----- ISOKINETIC SAMPLING RATE -----

$$I = \frac{Ts\ Vmstd\ Pstd\ 100}{Tstd\ Vs\ An\ St\ Ps\ (\ 60\ )(\ 1-Bws\ )}$$

$$I = \frac{(\ 760.\ )(\ 76.05547\ )(\ 29.92\ )(\ 100\ )}{528\ (\ 65.1726)(.00024745)(120)(29.704)\ 60\ (1 -\ .0523)}$$

I = 100.20

Emission Testing Services, Inc.
P.O. Box 15075
Baton Rouge, LA 70895
504-925-8405

Client : NISCO
Source : BOILER 2A
Testing Date : 11- 4-92
Run : 2

DETERMINATION OF PARTICULATE EMISSIONS
(modified to include metals emissions)

Ep - Particulate emission rate, lb/hr
Css - Concentration of particulate, grain/DSCF
Ca -Particulate concentration, blank DI water, mg/l
Mf -Particulate catch on filter, mg
Mn -Total particulate collected, mg
Mp -particulate in probe wash, mg Vp -Volume, probe wash,ml

---- Solids, probe wash ----

Mp =(Mp)-(Ca Vp) =(62.78) -(.000)(430.0) = 62.780

---- Solids, filter ----

Mf = 9.7

---- Total Solids collected ----

Mn = Mp + Mf

= (62.780)+(9.7) = 72.480

-------- CONCENTRATION and EMISSION RATE --------

Css = (Mn/Vmstd)(0.01543 grain/mg)

= (72.480/ 76.05547)(0.01543)

= .01470

Ep = (Mn)(2.2046 X 10-6 lb/mg)(Qsd) / Vmstd

= (72.480)(2.2046 X 10-6)(12046156.0) / (76.05547)

= 25.308

Emission Testing Services, Inc.
P.O. Box 15075
Baton Rouge, LA 70895
504-925-8405

Client : NISCO
Source : BOILER 2A
Testing Date : 11- 4-92
Run : 2

DETERMINATION OF PARTICULATE EMISSIONS
(modified to include metals emissions)

Bf - Metal content of blank filter, mg
Bi - Metal concentration, blank impinger catch, mg/l
Bp - Metal concentration, blank probe wash, mg/l
Em - Metal emission rate, lb/hr
Mf - Metal content of sample filter, mg
Mi - Metal concentration, impinger sample, mg/l
Mp - Metal concentration, probe wash sample, mg/l

Qsd - Stack gas flow rate, dscf/hr
Tmf - Total metal collected on filter, mg
Tmi - Total metal collected in impinger sample, mg
Tmp - Total metal collected in probe wash, mg
Vi - Volume of impinger sample, ml
Vmstd- Stack gas sample volume, dscf
Vp - Volume of probe wash, ml

Tmp = (Mp Vp/1000) - (Bp Vp/1000) Tmi = (Mi Vi/1000) - (Bi Vi/1000)

Tmf = (Mf - Bf) Em = (Tmp + Tmf + Tmi)(2.2046 X 10-6 lb/mg)(Qsd / Vmstd)

------ Nickel ------

Tmp = (1.575)(430/1000) - (.000)(430/1000) = .6773
Mf = (.0117 - .0052) = .0065
Mi = (.000)(272/1000) - (.000)(272/1000) = .0000

Em =(.6773 + .0065 + .0000)(2.2046 X 10-6)(12046156.0 /76.05547) = .2388

------ Chromium ------

Tmp = (.120)(430/1000) - (.000)(430/1000) = .0516
Mf = (.0000 - .0000) = .0000
Mi = (.000)(272/1000) - (.000)(272/1000) = .0000

Em =(.0516 + .0000 + .0000)(2.2046 X 10-6)(12046156.0 /76.05547) = .0180

------ Vanadium ------

Tmp = (2.535)(430/1000) - (.000)(430/1000) = 1.0901
Mf = (.0500 - .0000) = .0500
Mi = (.000)(272/1000) - (.000)(272/1000) = .0000

Em =(1.0901 + .0500 + .0000)(2.2046 X 10-6)(12046156.0 /76.05547) = .3981

------ Mercury ------

Tmp = (.000)(430/1000) - (.000)(430/1000) = .0000
Mf = (.0000 - .0000) = .0000
Mi = (.000)(272/1000) - (.000)(272/1000) = .0000

Em =(.0000 + .0000 + .0000)(2.2046 X 10-6)(12046156.0 /76.05547) = .0000

------ Cadmium ------

Tmp = (.528)(430/1000) - (.000)(430/1000) = .2270
Mf = (.0021 - .0018) = .0003
Mi = (.008)(272/1000) - (.000)(272/1000) = .0022

Em =(.2270 + .0003 + .0022)(2.2046 X 10-6)(12046156.0 /76.05547) = .0801

------ Beryllium ------

Tmp = (.150)(430/1000) - (.000)(430/1000) = .0645
Mf = (.0000 - .0000) = .0000
Mi = (.000)(272/1000) - (.000)(272/1000) = .0000

Em =(.0645 + .0000 + .0000)(2.2046 X 10-6)(12046156.0 /76.05547) = .0225

Emission Testing Services, Inc.
P.O. Box 15075
Baton Rouge, LA 70895
504-925-8405

Client : NISCO
Source : BOILER 2A
Testing Date : 11- 4-92
Run : 3

DETERMINATION OF PARTICULATE EMISSIONS
(modified to include metals emissions)

dH - Average pressure differential, meter orifice, in-H20
Pbar - Barometric pressure at the sampling site, in Hg
Pstd - Standard absolute pressure, 29.92 in Hg
Tm - Average dry gas meter temperature, deg R
Tstd - Standard absolute temperature, 528 deg R
Vm - Volume of gas sample, actual dry ft3
Vmstd - Volume of gas sample, dry, Std. cond., DSCF
Y - Dry gas meter calibration factor

$$Vmstd = Vm\ Y \frac{Tstd}{Tm} \frac{Pbar + dH/13.6}{Pstd}$$

$$Vmstd = (\ 75.044\ )(\ .9768\ )\frac{(\ 528\ )}{(\ 539.\ )}\frac{(\ 29.80\ + (1.2042/13.6))}{(\ 29.92\ )}$$

Vmstd = 71.70933

An - Cross-sectional area of nozzle, ft2
Ps - Absolute stack gas pressure, in Hg
Qsd - Dry volumetric stack gas flow rate, dscf/hr
St - Total sampling time, min
Ts - Absolute stack gas temperature, deg R
Vs - Average stack gas velocity, ft/sec

----- ISOKINETIC SAMPLING RATE -----

$$I = \frac{Ts\ Vmstd\ Pstd\ 100}{Tstd\ Vs\ An\ St\ Ps\ (\ 60\ )(\ 1-Bws\ )}$$

$$I = \frac{(\ 761.\ )(\ 71.70933\ )(\ 29.92\ )(\ 100\ )}{528\ (\ 64.2517)(.00024745)(120)(29.704)\ 60\ (1 -\ .0537)}$$

I = 96.10

Emission Testing Services, Inc.
P.O. Box 15075
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504-925-8405

Client : NISCO
Source : BOILER 2A
Testing Date : 11- 4-92
Run : 3

DETERMINATION OF PARTICULATE EMISSIONS
(modified to include metals emissions)

Ep - Particulate emission rate, lb/hr
Css - Concentration of particulate, grain/DSCF
Ca -Particulate concentration, blank DI water, mg/l
Mf -Particulate catch on filter, mg
Mn -Total particulate collected, mg
Mp -particulate in probe wash, mg Vp -Volume, probe wash,ml

---- Solids, probe wash ----

Mp =(Mp)-(Ca Vp) =(40.09) -(.000)(420.0) = 40.090

---- Solids, filter ----

Mf = 9.0

---- Total Solids collected ----

Mn = Mp + Mf

= (40.090)+(9.0) = 49.090

-------- CONCENTRATION and EMISSION RATE --------

Css = (Mn/Vmstd)(0.01543 grain/mg)

= (49.090/ 71.70933)(0.01543)

= .01056

Ep = (Mn)(2.2046 X 10-6 lb/mg)(Qsd) / Vmstd

= (49.090)(2.2046 X 10-6)(11842172.0) / (71.70933)

= 17.872

Emission Testing Services, Inc.
P.O. Box 15075
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504-925-8405

Client : NISCO
Source : BOILER 2A
Testing Date : 11- 4-92
Run : 3

DETERMINATION OF PARTICULATE EMISSIONS
(modified to include metals emissions)

Bf - Metal content of blank filter, mg
Bi - Metal concentration, blank impinger catch, mg/l
Bp - Metal concentration, blank probe wash, mg/l
Em - Metal emission rate, lb/hr
Mf - Metal content of sample filter, mg
Mi - Metal concentration, impinger sample, mg/l
Mp - Metal concentration, probe wash sample, mg/l

Qsd - Stack gas flow rate, dscf/hr
Tmf - Total metal collected on filter, mg
Tmi - Total metal collected in impinger sample, mg
Tmp - Total metal collected in probe wash, mg
Vi - Volume of impinger sample, ml
Vmstd- Stack gas sample volume, dscf
Vp - Volume of probe wash, ml

Tmp = (Mp Vp/1000) - (Bp Vp/1000)

Tmi = (Mi Vi/1000) - (Bi Vi/1000)

Tmf = (Mf - Bf)

Em = (Tmp + Tmf + Tmi)(2.2046 X 10-6 lb/mg)(Qsd / Vmstd)

------ Nickel ------

Tmp = (1.485)(420/1000) - (.000)(420/1000) = .6237
Mf = (.0131 - .0052) = .0079
Mi = (.000)(270/1000) - (.000)(270/1000) = .0000

Em =(.6237 + .0079 + .0000)(2.2046 X 10-6)(11842172.0 /71.70933) = .2299

------ Chromium ------

Tmp = (.105)(420/1000) - (.000)(420/1000) = .0441
Mf = (.0000 - .0000) = .0000
Mi = (.000)(270/1000) - (.000)(270/1000) = .0000

Em =(.0441 + .0000 + .0000)(2.2046 X 10-6)(11842172.0 /71.70933) = .0161

------ Vanadium ------

Tmp = (2.490)(420/1000) - (.000)(420/1000) = 1.0458
Mf = (.0460 - .0000) = .0460
Mi = (.000)(270/1000) - (.000)(270/1000) = .0000

Em =(1.0458 + .0460 + .0000)(2.2046 X 10-6)(11842172.0 /71.70933) = .3975

------ Mercury ------

Tmp = (.000)(420/1000) - (.000)(420/1000) = .0000
Mf = (.0000 - .0000) = .0000
Mi = (.000)(270/1000) - (.000)(270/1000) = .0000

Em =(.0000 + .0000 + .0000)(2.2046 X 10-6)(11842172.0 /71.70933) = .0000

------ Cadmium ------

Tmp = (.539)(420/1000) - (.000)(420/1000) = .2262
Mf = (.0016 - .0018) = .0000
Mi = (.000)(270/1000) - (.000)(270/1000) = .0000

Em =(.2262 + .0000 + .0000)(2.2046 X 10-6)(11842172.0 /71.70933) = .0824

------ Beryllium ------

Tmp = (.120)(420/1000) - (.000)(420/1000) = .0504
Mf = (.0000 - .0000) = .0000
Mi = (.000)(270/1000) - (.000)(270/1000) = .0000

Em =(.0504 + .0000 + .0000)(2.2046 X 10-6)(11842172.0 /71.70933) = .0183

Emission Testing Services, Inc.
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504-925-8405

Client : NISCO
Source : BOILER 2A
Testing Date : 11- 4-92
Run : 1 - 3

SULFUR DIOXIDE EMISSION RATE

ESO2 - Sulfur dioxide emission rate, lb/hr
SO2ms - SO2 concentration as measured, PPM
F - (1.66281 X 10-7 lb SO2/ft3) / (PPM)
Qsd - Stack gas flow rate, dscf/hr

ESO2 = (SO2ms)(F)(Qsd)

-------- RUN 1 --------

ESO2 = (162.60)(1.66281 X 10-7)(12057684.0) = 326.007

-------- RUN 2 --------

ESO2 = (139.00)(1.66281 X 10-7)(12046156.0) = 278.424

-------- RUN 3 --------

ESO2 = (247.10)(1.66281 X 10-7)(11842172.0) = 486.572

Emission Testing Services, Inc.
P.O. Box 15075
Baton Rouge, LA 70895
504-925-8405

Client : NISCO
Source : BOILER 2A
Testing Date : 11- 4-92
Run : 1 - 3

OXIDES OF NITROGEN EMISSION RATE

ENOX - NOX emission rate as NO2, lb/hr
F - NO2 factor, 1.1948 X 10-7 (lb/ft3)/ PPM
NOXmsc - NOX concentration as measured, PPM
Qsd - Dry volumetric stack gas flow rate, DSCF/hr

ENOX = (NOXmsc)(F)(Qsd)

-------- RUN 1 --------

ENOX = (29.00)(1.1948 X 10-7)(12057680.0) = 41.779

-------- RUN 2 --------

ENOX = (35.10)(1.1948 X 10-7)(12046160.0) = 50.519

-------- RUN 3 --------

ENOX = (66.60)(1.1948 X 10-7)(11842170.0) = 94.233

Emission Testing Services, Inc.
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Baton Rouge, LA 70895
504-925-8405

Client : NISCO
Source : BOILER 2A
Testing Date : 11- 4-92
Run : 1 - 3

CARBON MONOXIDE EMISSION RATE

ECO - Carbon Monoxide Emission Rate - Lb/Hr
F - CO conv. factor, 7.2727 X 10-8 (lb/ft3)/(PPM)
COms - Concentration of carbon monoxide - PPM
Qsd - Dry volumetric stack gas flow rate, DSCF/Hr

ECO = (COms)(F)(Qsd)

-------- RUN 1 --------

ECO = (9.00)(7.2727 X 10-8)(12057680.0) = 7.892

-------- RUN 2 --------

ECO = (9.80)(7.2727 X 10-8)(12046160.0) = 8.586

-------- RUN 3 --------

ECO = (15.50)(7.2727 X 10-8)(11842170.0) = 13.349

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EMISSION TESTING SERVICES, INC.

ADSORPTION TUBE DATA FORM

CLIENT NISCO DATE 4 NOV 92

SOURCE ID BOILER #2 RUN NO 1

OPERATOR SCOTT LESLEY

Sample Time (min.)	Barometric Pressure (in. Hg)	Ambient Temperature °F	Pump Vacuum (in. Hg)
480 (8 HRS.)		72°	27"
480 (8 HRS)		72°	27"
480 (8 HRS)		72°	27"

INITIAL CALIBRATION

SET 1 20.6/20.8/20.9 cc/min

SET 2 22.5/22.4/22.2 cc/min

SET 3 23.1/23.4/23.0 cc/min

FINAL CALIBRATION

SET 1 19.4/19.4/19.3 cc/min

SET 2 20.4/21.2/20.9 cc/min

SET 3 21.0/22.3/21.7 cc/min

Time

Start 0949

Stop 1749

8 HRS (480 mins)

SAMPLE I.D.

LOT NUMBER Silica #L98

CHARC. #120

SAMPLE 1) R1-S1-TA

SAMPLE 2) R1-S1-TB

SAMPLE 3) R1-S1-TC

SAMPLE 4) R1-S2-TA

SAMPLE 5) R1-S2-TB

SAMPLE 6) R1-S2-TC

SAMPLE 7) R1-S3-TA

SAMPLE 8) R1-S3-TB

SAMPLE 9) R1-S3-TC

BAG SAMPLE

Time: _____ to _____

Total _____

COMMENTS: _____

NORMSADSOR TU

Emission Testing Services, Inc.
P.O. Box 15075
Baton Rouge, LA 70895
504-925-8405

Client : NISCO
Source : BOILER 2A
Testing Date : 11- 4-92
Run : 1

ORGANIC EMISSIONS

Er -Emission rate - lb/hr
Fr -Sample flow rate, cc/min
St -Sample time, min
Tstd -Temp standard, 528 deg R
Pstd -Std atm press., 29.92 in.Hg
Vstd -Sample volume, std cc
Qsd -Volumetric flow rate of stack gas, DSCF/hr
Deff -Desorption efficiency from sample media
Fc -Conver. factor, ug/cc to PPM, 24039/mole weight, MW

PPM -Concentration, PPM
Sw -Sample collected, ug
Swb -Sample blank, ug
Ta -Ambient temp, deg R
Pbar -Baro press., in.Hg

Vstd = (Fr)(St)(Tstd/Ta)(Pbar/Pstd)

Er = ((Sw - Swb) /Deff Vstd)(6.242725 X 10-5 lb cc/ft3 ug)(Qsd)

PPM = ((Sw - Swb) /Deff Vstd)(Fc)

----- RUN 1, set 1 ----- Qsd =11982004.0

Vstd =(20.067)(480.0)(528/ 532.)(29.80/ 29.92)= 9521.237

Compound	Sw	Swb	Deff	MW	PPM	Er
Benzene	nd	nd	.880	78.117	nd	nd
Ethyl Benzene	nd	nd	.900	106.172	nd	nd
Toluene	nd	nd	.910	92.144	nd	nd
Xylene	nd	nd	.880	106.172	nd	nd
Napthalene	nd	nd	.855	128.179	nd	nd

Emission Testing Services, Inc.
P.O. Box 15075
Baton Rouge, LA 70895
504-925-8405

Client : NISCO
Source : BOILER 2A
Testing Date : 11- 4-92
Run : 1

ORGANIC EMISSIONS

----- RUN 1, set 2 ----- Qsd =11982004.0

Vstd =(21.600)(480.0)(528/ 532.)(29.80/ 29.92)=10248.775

Compound	Sw	Swb	Deff	MW	PPM	Er
Benzene	nd	nd	.880	78.117	nd	nd
Ethyl Benzene	nd	nd	.900	106.172	nd	nd
Toluene	nd	nd	.910	92.144	nd	nd
Xylene	nd	nd	.880	106.172	nd	nd
Napthalene	nd	nd	.855	128.179	nd	nd

----- RUN 1, set 3 ----- Qsd =11982004.0

Vstd =(22.417)(480.0)(528/ 532.)(29.80/ 29.92)=10636.425

Compound	Sw	Swb	Deff	MW	PPM	Er
Benzene	nd	nd	.880	78.117	nd	nd
Ethyl Benzene	nd	nd	.900	106.172	nd	nd
Toluene	nd	nd	.910	92.144	nd	nd
Xylene	nd	nd	.880	106.172	nd	nd
Napthalene	nd	nd	.855	128.179	nd	nd

ETS

EMISSION TESTING SERVICES, INC.

ADSORPTION TUBE DATA FORM

CLIENT NISCO DATE 4 NOV 92

SOURCE ID Boiler #2 RUN NO 2

OPERATOR Scott Lesley

Sample Time (min.)	Barometric Pressure (in. Hg)	Ambient Temperature °F	Pump Vacuum (in. Hg)
60		72°	27"

INITIAL CALIBRATION

SET 1 21.2/21.3/21.3 cc/min

SET 2 _____ cc/min

SET 3 _____ cc/min

FINAL CALIBRATION

SET 1 18.2/18.3/18.2 cc/min

SET 2 _____ cc/min

SET 3 _____ cc/min

Time

Start 1130

Stop 1230

60

BAG SAMPLE

Time: _____ to _____

Total _____

SAMPLE I.D.

LOT NUMBER Silica #698

Charc. #120

SAMPLE 1) R2-SI-TA

SAMPLE 2) R2-SI-TB

SAMPLE 3) R2-SI-TC

SAMPLE 4) _____

SAMPLE 5) _____

SAMPLE 6) _____

SAMPLE 7) _____

SAMPLE 8) _____

SAMPLE 9) _____

COMMENTS: _____

INFORMS ADSOR TU

Emission Testing Services, Inc.
P.O. Box 15075
Baton Rouge, LA 70895
504-925-8405

Client : NISCO
Source : BOILER 2A
Testing Date : 11- 4-92
Run : 2

ORGANIC EMISSIONS

Er -Emission rate - lb/hr
Fr -Sample flow rate, cc/min
St -Sample time, min
Tstd -Temp standard, 528 deg R
Pstd -Std atm press., 29.92 in.Hg
Vstd -Sample volume, std cc
Qsd -Volumetric flow rate of stack gas, DSCF/hr
Deff -Desorption efficiency from sample media
Fc -Conver. factor, ug/cc to PPM, 24039/mole weight, MW

PPM -Concentration, PPM
Sw -Sample collected, ug
Swb -Sample blank, ug
Ta -Ambient temp, deg R
Pbar -Baro press., in.Hg

Vstd = (Fr)(St)(Tstd/Ta)(Pbar/Pstd)

Er = ((Sw - Swb) /Deff Vstd)(6.242725 X 10-5 lb cc/ft3 ug)(Qsd)

PPM = ((Sw - Swb) /Deff Vstd)(Fc)

----- RUN 2 ----- Qsd =12057684.0

Vstd =(19.750)(60.00)(528/ 532.)(29.80/ 29.92)= 1171.373

Compound	Sw	Swb	Deff	MW	PPM	Er
Benzene	nd	nd	.880	78.117	nd	nd
Ethyl Benzene	nd	nd	.900	106.172	nd	nd
Toluene	nd	nd	.910	92.144	nd	nd
Xylene	nd	nd	.880	106.172	nd	nd
Napthalene	nd	nd	.855	128.179	nd	nd

ETS

EMISSION TESTING SERVICES, INC.

ADSORPTION TUBE DATA FORM

CLIENT NISCO DATE 4 NOV 92

SOURCE ID Boiler # 2 RUN NO 3

OPERATOR Scott Lesley

Sample Time (min.)	Barometric Pressure (in. Hg)	Ambient Temperature °F	Pump Vacuum (in. Hg)
120		72°	27"

INITIAL CALIBRATION

SET 1 22.4/22.3/22.2 cc/min

SET 2 _____ cc/min

SET 3 _____ cc/min

Time
Start 0952
Stop 1152
120

FINAL CALIBRATION

SET 1 20.4/20.3/20.3 cc/min

SET 2 _____ cc/min

SET 3 _____ cc/min

BAG SAMPLE

Time: _____ to _____

Total _____

SAMPLE I.D.

LOT NUMBER Silica #698
CHARC #120

SAMPLE 1) R3-SI-TA

SAMPLE 2) R3-SI-TB

SAMPLE 3) R3-SI-TC

SAMPLE 4) _____

SAMPLE 5) _____

SAMPLE 6) _____

SAMPLE 7) _____

SAMPLE 8) _____

SAMPLE 9) _____

COMMENTS: _____

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Emission Testing Services, Inc.
P.O. Box 15075
Baton Rouge, LA 70895
504-925-8405

Client : NISCO
Source : BOILER 2A
Testing Date : 11- 4-92
Run : 3

ORGANIC EMISSIONS

Er -Emission rate - lb/hr
Fr -Sample flow rate, cc/min
St -Sample time, min
Tstd -Temp standard, 528 deg R
Pstd -Std atm press., 29.92 in.Hg
Vstd -Sample volume, std cc
Qsd -Volumetric flow rate of stack gas, DSCF/hr
Deff -Desorption efficiency from sample media
Fc -Conver. factor, ug/cc to PPM, 24039/mole weight, MW

PPM -Concentration, PPM
Sw -Sample collected, ug
Swb -Sample blank, ug
Ta -Ambient temp, deg R
Pbar -Baro press., in.Hg

Vstd = (Fr)(St)(Tstd/Ta)(Pbar/Pstd)

Er = ((Sw - Swb) /Deff Vstd)(6.242725 X 10-5 lb cc/ft3 ug)(Qsd)

PPM = ((Sw - Swb) /Deff Vstd)(Fc)

----- RUN 3 ----- Qsd =12057684.0

Vstd =(21.317)(120.0)(528/ 532.)(29.80/ 29.92)= 2528.584

Compound	Sw	Swb	Deff	MW	PPM	Er
Benzene	nd	nd	.880	78.117	nd	nd
Ethyl Benzene	nd	nd	.900	106.172	nd	nd
Toluene	nd	nd	.910	92.144	nd	nd
Xylene	nd	nd	.880	106.172	nd	nd
Napthalene	nd	nd	.855	128.179	nd	nd

ETS

EMISSION TESTING SERVICES, INC.

ADSORPTION TUBE DATA FORM

CLIENT NISCO DATE 4 Nov 92

SOURCE ID Boiler #2 RUN NO 4

OPERATOR Scott Lesley

Sample Time (min.)	Barometric Pressure (in. Hg)	Ambient Temperature °F	Pump Vacuum (in. Hg)
180		72°	27"

INITIAL CALIBRATION

SET 1 20.7/20.7/20.4 cc/min

SET 2 _____ cc/min

SET 3 _____ cc/min

FINAL CALIBRATION

SET 1 18.4/18.4/18.4 cc/min

SET 2 _____ cc/min

SET 3 _____ cc/min

Time

Start 1335

Stop 1635

180 min

SAMPLE I.D.

LOT NUMBER Silica #698

Char. #120

SAMPLE 1) R4-S1-TA

SAMPLE 2) R4-S1-TB

SAMPLE 3) R4-S1-TC

SAMPLE 4) _____

SAMPLE 5) _____

SAMPLE 6) _____

SAMPLE 7) _____

SAMPLE 8) _____

SAMPLE 9) _____

BAG SAMPLE

Time: _____ to _____

Total _____

COMMENTS: _____

INFORMATION TU

Emission Testing Services, Inc.
P.O. Box 15075
Baton Rouge, LA 70895
504-925-8405

Client : NISCO
Source : BOILER 2A
Testing Date : 11- 4-92
Run : 4

ORGANIC EMISSIONS

Er -Emission rate - lb/hr
Fr -Sample flow rate, cc/min
St -Sample time, min
Tstd -Temp standard, 528 deg R
Pstd -Std atm press., 29.92 in.Hg
Vstd -Sample volume, std cc
Qsd -Volumetric flow rate of stack gas, DSCF/hr
Deff -Desorption efficiency from sample media
Fc -Conver. factor, ug/cc to PPM, 24039/mole weight, MW

PPM -Concentration, PPM
Sw -Sample collected, ug
Swb -Sample blank, ug
Ta -Ambient temp, deg R
Pbar -Baro press., in.Hg

Vstd = (Fr)(St)(Tstd/Ta)(Pbar/Pstd)

Er = ((Sw - Swb) /Deff Vstd)(6.242725 X 10-5 lb cc/ft3 ug)(Qsd)

PPM = ((Sw - Swb) /Deff Vstd)(Fc)

----- RUN 4 ----- Qsd =12046156.0

Vstd =(19.500)(180.0)(528/ 532.)(29.80/ 29.92)= 3469.637

Compound	Sw	Swb	Deff	MW	PPM	Er
Benzene	nd	nd	.880	78.117	nd	nd
Ethyl Benzene	nd	nd	.900	106.172	nd	nd
Toluene	nd	nd	.910	92.144	nd	nd
Xylene	nd	nd	.880	106.172	nd	nd
Napthalene	nd	nd	.855	128.179	nd	nd

Emission Testing Services, Inc.
P.O. Box 15075
Baton Rouge, LA 70895
504-925-8405

Client : NISCO
Source : BOILER 2A
Testing Date : 11- 4-92
Run No. : 1 - 3
FUEL : Petroleum Coke

FUEL F FACTOR CALCULATIONS

Fc - Carbon F factor, dscf/MM Btu
Fd - Dry F factor, dscf/MM Btu
%H2 - Hydrogen in fuel, (including H2O), weight %
%C - Carbon in fuel, weight %
%S - Sulfur in fuel, weight %
%N2 - Nitrogen in fuel, weight %
%O2 - Oxygen in fuel, (including H2O), weight %
K - Conversion factor, 1,000,000 Btu/MM Btu
Khd - 3.64 (scf/lb) / %
Kc - 1.53 (scf/lb) / %
Kcc - 0.321 (scf/lb) / %
Ks - 0.57 (scf/lb) / %
Kn - 0.14 (scf/lb) / %
Ko - 0.46 (scf/lb) / %
GCV - Gross calorific value of the fuel, Btu/lb

$$Fd = K\ [\ (Khd)(\%H2) + (Kc)(\%C) + (Ks)(\%S) + (Kn)(\%N2) + (Ko)(\%O2)\ ]\ /\ GCV$$

$$= (\ 1{,}000{,}000\ )\ [\ (\ 3.64\ )(\ 3.55\ ) + (\ 1.53\ )(\ 80.51\ ) + (\ 0.57\ )(\ 4.70\ ) + (\ 0.14\ )(\ 1.74\ ) - (\ 0.46\ )(\ 5.97\ )\ ]\ /\ (\ 15440\ )$$

$$= 8826.3$$

$$Fc = K\ [\ (Kcc)(\%C)\ ]\ /\ GCV$$

$$= (\ 1{,}000{,}000\ )\ [\ (\ 0.321\ )(\ 80.51\ )\ ]\ /\ 15440$$

$$= 1673.8$$

Emission Testing Services, Inc.
P.O. Box 15075
Baton Rouge, LA 70895
504-925-8405

Client : NISCO
Source : BOILER 2A
Testing Date : 11- 4-92
Run No. : 1 - 3
FUEL : Petroleum Coke

DETERMINATION of OVERALL REDUCTION in POTENTIAL SULFUR DIOXIDE EMISSIONS

Cd - SO2 concentration, PPMv dry
Eai - Average SO2 emission rate into control device (inlet), lb/MM Btu
Eao - Average SO2 emission rate from control device (outlet), lb/MM Btu
Fd - Dry "F" factor, dscf/ MM Btu
f - Conversion factor, SO2, 1.660 X 10-7 lb/scf / PPMv
GCV - Gross calorific value of the fuel, Btu/lb
K - Constant, 2 X 10+4 lb-Btu/ %-MM Btu
O2 - O2 concentration, vol % dry
%Rg - Control device removal efficiency, %
%S - Sulfur in fuel, weight %

Eai = K (%S / GCV)

Eao = (Cd f) Fd [20.9 / (20.9 - O2)]

%Rg = (100) [1 - (Eao / Eai)]

-------- Run 1 --------

Eai = (2 X 10+4)(4.70 / 15440) = 6.08808

Eao = (162.6)(1.660 X 10-7)(8826.3)[20.9 / (20.9 - 4.5)]

= .30361

%Rg = (100) [1 - (.30361 / 6.08808)] = 95.01

-------- Run 2 --------

Eai = (2 X 10+4)(4.70 / 15440) = 6.08808

Eao = (139.0)(1.660 X 10-7)(8826.3)[20.9 / (20.9 - 4.4)]

= .25797

%Rg = (100) [1 - (.25797 / 6.08808)] = 95.76

-------- Run 3 --------

Eai = (2 X 10+4)(4.70 / 15440) = 6.08808

Eao = (247.1)(1.660 X 10-7)(8826.3)[20.9 / (20.9 - 4.1)]

= .45040

%Rg = (100) [1 - (.45040 / 6.08808)] = 92.60

Emission Testing Services, Inc.
P.O. Box 15075
Baton Rouge, LA 70895
504-925-8405

Client : NISCO
Source : BOILER 2A
Testing Date : 11- 4-92
Run : 1 - 4

TOTAL HYDROCARBONS EMISSION RATE

ETHC - Total hydrocarbons emission rate as C3H8, lb/hr
F - C3H8 conv. factor, 1.1446 X 10-7 lb/ft3 / PPM
THCms - THC concentration as measured, PPM
Qsd - Dry volumetric stack gas flow rate, DSCF/hr

ETHC = (THCms)(F)(Qsd)

-------- RUN 1 --------

ETHC = (1.60)(1.1446 X 10-7)(12057684.0) = 2.208

-------- RUN 2 --------

ETHC = (1.20)(1.1446 X 10-7)(12046156.0) = 1.655

-------- RUN 3 --------

ETHC = (6.00)(1.1446 X 10-7)(11842172.0) = 8.133

Test analyzer response, Method 3A, 6C, 7E, 10, and 25A, was recorded by a computer data acquisition system. One minute average data were printed as recorded and served as a hardcopy record of the test data. Presented on the following pages are the computer printouts of the test data.

Each test analyzer was calibrated before and after each test run by challenging the analyzer with a set of certified calibration gases. Analyzer response was recorded by a computer data acquisition system. Calibration data sheets were manually completed as the calibrations were performed serving as a hardcopy record of the calibration. Calibration results were taken directly from the computer to avoid any data system bias. Analyzer calibration data sheets are presented following the test data printouts.

NISCO

UNIT 2

RUN - #1

DATE: 11/04/92

TIME	CO-PPM	NOX-PPM	O2-%	THC-PPM	SO2-PPM	TIME	CO-PPM	NOX-PPM	O2-%	THC-PPM	SO2-PPM
09:48:15	8.7	29.3	4.6	1.0	155.6	10:18:16	8.7	26.7	4.3	1.1	240.6
09:49:15	8.6	29.8	4.5	1.0	156.6	10:19:16	8.7	27.4	4.4	1.0	260.8
09:50:16	8.5	28.7	4.4	1.1	155.9	10:20:17	9.0	27.8	4.6	1.3	273.7
09:51:16	8.5	29.1	4.4	1.1	157.6	10:21:17	9.0	28.6	4.6	1.1	226.0
09:52:16	8.6	29.7	4.4	1.0	159.5	10:22:17	8.7	30.9	4.6	1.1	172.4
09:53:16	8.5	30.6	4.5	0.9	160.7	10:23:17	8.5	31.8	4.5	1.0	145.1
09:54:16	8.5	30.9	4.6	1.1	160.5	10:24:17	8.5	32.4	4.6	1.0	137.6
09:55:16	8.4	30.2	4.6	1.0	160.0	10:25:17	8.6	31.9	4.5	1.6	142.5
09:56:16	8.5	29.4	4.5	1.0	160.2	10:26:17	8.4	31.2	4.5	1.1	152.2
09:57:16	8.6	29.4	4.5	1.0	160.7	10:27:17	8.4	30.8	4.5	5.4	158.1
09:58:16	8.4	29.4	4.3	1.0	164.6	10:28:17	8.4	30.1	4.5	1.1	157.3
09:59:16	8.6	30.3	4.3	1.0	173.4	10:29:17	8.6	30.9	4.5	1.1	157.6
10:00:16	8.6	31.0	4.5	1.0	172.7	10:30:17	8.5	31.0	4.5	1.1	157.1
10:01:16	8.6	31.3	4.7	1.0	164.6	10:31:17	8.5	31.0	4.5	1.0	159.0
10:02:16	8.7	31.3	4.6	1.1	152.2	10:32:17	8.6	28.8	4.5	1.0	156.8
10:03:16	8.5	30.4	4.5	1.0	151.2	10:33:17	8.6	27.0	4.5	1.0	151.7
10:04:16	8.4	30.3	4.3	1.0	158.3	10:34:17	8.9	27.6	4.6	1.0	153.4
10:05:16	8.4	31.2	4.3	1.0	167.3	10:35:17	8.8	28.2	4.6	1.0	157.6
10:06:16	8.5	31.4	4.4	1.0	172.4	10:36:17	9.1	26.9	4.6	1.0	159.3
10:07:16	8.6	31.4	4.6	1.0	164.9	10:37:17	9.6	28.3	4.5	1.6	183.4
10:08:16	8.7	31.0	4.6	1.0	154.2	10:38:17	10.0	31.4	4.6	1.1	198.5
10:09:16	8.6	30.3	4.5	1.0	149.8	10:39:17	10.5	32.8	4.6	1.1	190.9
10:10:16	8.6	30.6	4.5	1.0	153.9	10:40:17	10.4	32.9	4.7	1.1	182.4
10:11:16	8.6	31.0	4.5	1.0	161.2	10:41:17	10.4	35.3	4.6	1.1	174.8
10:12:16	8.5	30.7	4.5	1.0	161.0	10:42:17	10.5	36.0	4.5	1.1	170.7
10:13:16	8.8	30.9	4.6	1.0	157.8	10:43:17	10.0	31.2	4.3	1.1	164.1
10:14:16	8.7	30.9	4.6	1.5	153.9	10:44:17	9.7	29.3	4.2	1.1	144.9
10:15:16	8.6	30.6	4.6	1.1	155.6	10:45:17	9.4	30.1	4.4	1.1	141.5
10:16:16	8.5	30.1	4.5	1.1	156.1	10:46:17	9.3	30.8	4.4	1.2	141.0
10:17:16	8.6	28.0	4.4	1.0	189.0	10:47:17	9.2	30.8	4.4	1.1	141.0

NISCO

UNIT 2

RUN - #1

DATE: 11/04/92

TIME	CO-PPM	NOX-PPM	O2-%	THC-PPM	SO2-PPM
10:48:18	9.3	30.7	4.5	1.1	139.3
10:49:18	9.0	30.2	4.5	1.2	140.3
10:50:18	9.2	28.8	4.5	1.4	147.1
10:51:18	8.9	28.3	4.4	1.6	150.7
10:52:18	9.0	28.7	4.4	1.7	153.9
10:53:18	8.9	29.4	4.5	1.2	152.9
10:54:18	8.8	29.8	4.5	1.2	153.2
10:55:18	8.9	27.8	4.4	1.2	150.0
10:56:18	8.9	26.9	4.3	1.2	153.4
10:57:18	9.0	27.7	4.5	1.7	155.9
10:58:18	9.0	28.1	4.8	1.4	154.6
10:59:18	8.9	27.1	4.6	2.2	157.3
11:00:18	9.0	26.7	4.5	1.2	159.3
11:01:18	9.1	27.7	4.7	1.6	164.6
11:02:18	9.2	26.7	4.7	1.5	160.2
11:03:18	9.1	25.9	4.6	1.2	152.0
11:04:18	9.1	25.8	4.7	1.5	154.4
11:05:18	9.2	27.1	4.7	1.2	158.3
11:06:18	9.0	27.1	4.5	1.3	159.3
11:07:18	8.8	27.4	4.5	1.2	163.9
11:08:18	8.9	27.4	4.6	1.2	163.6
11:09:18	9.1	28.0	4.6	8.1	164.4
11:10:18	9.2	27.8	4.6	1.1	165.6
11:11:18	9.0	27.2	4.6	1.2	162.9
11:12:18	9.0	26.1	4.5	1.3	162.4
11:13:18	9.0	25.1	4.4	2.3	161.2
11:14:18	9.2	24.9	4.5	1.6	157.6
11:15:18	9.1	25.1	4.5	2.1	162.7
11:16:18	9.2	24.8	4.5	1.2	168.3
11:17:18	9.4	24.3	4.5	1.2	164.4
11:18:19	9.4	24.5	4.6	1.3	162.7
11:19:19	9.4	25.5	4.8	2.6	161.9
11:20:19	9.4	24.8	4.7	1.3	161.5
11:21:19	9.2	24.4	4.5	1.6	161.5
11:22:19	9.1	25.0	4.5	1.1	165.8
11:23:19	9.1	27.1	4.6	1.1	164.6
11:24:19	9.1	28.1	4.7	1.3	157.1
11:25:19	9.1	27.4	4.7	1.4	157.3
11:26:19	9.5	31.2	4.6	2.5	183.4
11:27:19	9.7	32.4	4.6	4.6	195.5
11:28:19	10.0	34.2	4.6	1.5	194.8
11:29:19	10.0	31.8	4.6	1.2	189.7
11:30:19	9.7	30.1	4.5	1.7	176.1
11:31:19	9.3	28.6	4.4	1.7	153.2
11:32:19	9.1	28.2	4.3	2.6	144.4
11:33:19	9.1	29.2	4.5	1.1	144.2
11:34:19	9.1	29.1	4.5	1.3	147.8
11:35:19	9.2	28.0	4.6	1.3	146.1
11:36:19	9.3	28.2	4.6	1.2	149.0
11:37:19	9.1	27.6	4.5	2.1	153.7
11:38:19	8.9	27.8	4.3	1.2	155.6
11:39:19	9.0	28.8	4.4	1.6	161.0
11:40:19	9.0	29.6	4.5	1.2	160.0
11:41:19	8.9	29.4	4.5	1.2	154.4
11:42:19	8.9	28.2	4.5	1.4	148.3
11:43:19	9.0	27.4	4.5	1.2	148.8
11:44:19	9.1	27.0	4.5	1.4	150.3
11:45:19	9.0	26.6	4.5	4.4	157.8
11:46:19	8.9	25.9	4.4	1.6	159.8
11:47:19	9.0	26.1	4.6	1.5	160.0
AVG CONC	9.0	29.0	4.5	1.6	162.6

ETS
EMISSION TESTING SERVICES, INC.

NISCO

UNIT 2

RUN - #2

DATE: 11/04/92

TIME	CO-PPM	NOX-PPM	O2-%	THC-PPM	SO2-PPM
13:22:51	9.4	25.4	4.3	1.2	163.6
13:23:51	9.3	25.8	4.5	1.6	162.7
13:24:51	9.3	25.6	4.4	0.9	161.2
13:25:51	9.4	26.1	4.5	1.7	157.3
13:26:51	9.4	26.3	4.5	1.3	152.0
13:27:51	9.3	26.4	4.5	1.6	156.3
13:28:51	9.3	26.5	4.4	1.1	161.2
13:29:51	9.3	26.4	4.3	1.5	167.5
13:30:51	9.3	25.6	4.3	1.3	171.2
13:31:51	9.2	24.6	4.3	1.8	167.8
13:32:52	9.2	25.2	4.4	1.6	162.1
13:33:52	9.3	25.4	4.5	1.6	161.6
13:34:53	9.4	25.4	4.6	1.7	161.1
13:35:53	9.3	25.8	4.5	1.1	160.9
13:36:53	9.3	25.7	4.4	1.3	161.8
13:37:53	9.2	24.6	4.3	1.3	158.7
13:38:53	9.3	25.6	4.3	1.3	166.4
13:39:53	9.4	26.0	4.4	1.2	172.3
13:40:53	9.3	26.4	4.4	1.6	171.8
13:41:54	9.3	26.5	4.5	1.1	168.6
13:42:54	9.5	26.3	4.4	1.0	161.3
13:43:54	9.4	25.9	4.4	1.3	159.9
13:44:54	9.3	26.3	4.4	1.1	160.6
13:45:54	9.2	26.2	4.3	1.5	159.2
13:46:54	9.4	28.1	4.4	1.8	153.3
13:47:54	9.3	27.1	4.3	1.1	146.8
13:48:54	9.1	25.7	4.5	1.9	162.6
13:49:54	9.1	27.2	4.3	1.2	169.4
13:50:54	0.0	39.7	4.3	1.0	111.5
13:51:54	0.7	54.4	4.5	1.0	68.7
13:52:55	1.3	77.5	4.4	1.8	42.9
13:53:55	1.5	80.2	4.5	1.1	29.8
13:54:55	1.5	80.0	4.5	1.2	29.3
13:55:55	1.4	81.2	4.5	1.0	28.4
13:56:55	1.1	77.0	4.5	1.5	27.9
13:57:55	1.1	76.8	4.5	1.3	29.8
13:58:55	1.3	81.9	4.3	1.0	30.1
13:59:55	1.5	92.1	4.5	1.0	31.8
14:00:55	2.2	98.9	4.5	1.3	37.1
14:01:55	2.7	109.7	4.4	1.4	33.9
14:02:55	3.0	111.5	4.5	1.0	32.0
14:03:55	2.4	83.4	4.7	1.2	49.3
14:04:55	1.4	59.9	4.4	0.9	79.2
14:05:55	0.7	49.0	4.4	0.9	85.5
14:06:55	0.4	41.4	4.2	0.9	85.2
14:07:55	9.9	38.0	4.2	0.9	96.4
14:08:55	9.7	37.3	4.4	0.9	102.5
14:09:55	9.8	36.9	4.3	0.9	106.2
14:10:55	9.8	33.9	4.6	1.4	111.7
14:11:55	9.8	32.4	4.6	1.0	113.4
14:12:56	9.7	30.4	4.5	1.0	114.4
14:13:56	9.7	29.5	4.5	0.9	121.2
14:14:56	9.6	29.5	4.4	1.0	126.3
14:15:56	9.5	28.8	4.3	0.9	134.8
14:16:56	9.7	31.3	4.3	1.3	148.5
14:17:56	0.0	31.9	4.4	1.0	164.7
14:18:56	0.5	32.4	4.5	1.0	177.6
14:19:56	1.0	33.2	4.6	1.0	188.1
14:20:56	0.7	29.2	4.4	0.9	186.9
14:21:56	0.1	26.0	4.3	0.9	171.8

NISCO

UNIT 2

RUN - #2

DATE: 11/04/92

TIME	CO-PPM	NOX-PPM	O2-%	THC-PPM	SO2-PPM
14:22:56	9.7	25.4	4.1	1.2	162.8
14:23:56	9.7	26.0	4.2	1.1	166.4
14:24:56	9.7	25.8	4.2	0.9	166.9
14:25:56	9.6	25.4	4.3	0.9	160.9
14:26:56	9.4	26.3	4.4	1.0	164.0
14:27:57	9.6	26.8	4.4	1.0	167.2
14:28:57	9.5	26.0	4.4	0.9	168.6
14:29:57	9.4	25.7	4.4	0.9	170.1
14:30:57	9.3	25.2	4.4	0.9	176.4
14:31:57	9.3	25.4	4.4	0.9	173.5
14:32:57	9.4	25.5	4.3	0.9	169.4
14:33:57	9.5	25.4	4.3	1.1	168.1
14:34:57	9.4	25.3	4.4	0.9	167.9
14:35:57	9.4	25.8	4.5	0.8	171.3
14:36:57	9.5	25.3	4.5	0.9	174.5
14:37:57	9.5	24.7	4.5	0.9	172.0
14:38:57	9.3	24.0	4.4	0.8	175.9
14:39:57	9.4	24.5	4.4	5.2	177.1
14:40:57	9.5	24.7	4.4	0.9	181.5
14:41:57	9.5	25.1	4.5	1.0	177.6
14:42:57	9.4	25.2	4.5	0.9	175.0
14:43:57	9.5	24.6	4.4	0.9	168.9
14:44:57	9.4	24.5	4.3	0.8	166.9
14:45:57	9.4	24.1	4.2	0.8	167.7
14:46:57	9.5	25.1	4.5	0.9	167.9
14:47:58	9.6	25.3	4.5	0.9	162.3
14:48:58	9.6	24.9	4.4	1.0	156.0
14:49:58	9.6	25.1	4.5	0.9	158.9
14:50:58	9.5	24.1	4.4	1.0	164.5
14:51:58	9.4	23.9	4.3	0.9	174.7
14:52:58	9.5	23.4	4.3	0.9	175.4
14:53:58	9.6	24.2	4.3	1.3	169.1
14:54:58	9.6	24.7	4.5	1.1	162.3
14:55:58	9.8	30.0	4.6	0.9	146.5
14:56:58	0.1	32.9	4.4	1.1	116.9
14:57:58	0.2	34.1	4.3	0.9	100.8
14:58:58	9.8	28.4	4.4	0.9	124.1
14:59:58	9.4	26.5	4.4	0.9	152.6
15:00:58	9.4	25.5	4.3	0.9	170.6
15:01:59	9.6	24.3	4.2	0.9	172.5
15:02:59	9.6	24.7	4.3	1.0	172.8
15:03:59	9.6	26.0	4.4	0.9	173.5
15:04:59	9.8	26.3	4.5	0.8	169.9
15:05:59	9.7	25.7	4.4	0.9	167.4
15:06:59	9.6	25.8	4.4	3.6	164.7
15:07:59	9.5	25.7	4.4	0.9	162.6
15:08:59	9.4	26.0	4.4	0.9	160.9
15:09:59	9.5	26.0	4.4	0.9	164.3
15:10:59	9.5	25.4	4.2	1.0	166.4
15:11:59	9.1	25.1	4.2	1.0	170.8
15:12:59	9.4	28.8	4.3	1.0	165.7
15:13:59	0.6	52.5	4.3	1.2	96.4
15:14:59	1.1	62.2	4.3	1.0	55.3
15:15:59	0.3	48.6	4.4	0.9	53.6
15:17:00	9.6	34.2	4.4	1.0	91.6
15:18:00	9.7	38.7	4.3	1.1	105.7
15:19:00	0.2	41.2	4.4	1.8	85.2
15:20:00	9.5	33.9	4.4	1.1	111.7
15:21:00	9.8	44.7	4.3	1.1	99.3
AVG CONC	9.8	35.1	4.4	1.2	139.0

ETS
EMISSION TESTING SERVICES, INC.

NISCO

UNIT 2

RUN - #3

DATE: 11/04/92

TIME	CO-PPM	NOX-PPM	O2-%	THC-PPM	SO2-PPM	TIME	CO-PPM	NOX-PPM	O2-%	THC-PPM	SO2-PPM
16:28:06	11.9	34.4	3.7	0.7	129.8	16:58:08	12.1	47.4	5.0	0.8	217.5
16:29:06	11.6	33.8	3.8	0.7	111.0	16:59:08	12.1	36.7	4.6	0.8	231.7
16:30:06	11.7	35.9	4.0	0.7	95.0	17:00:08	11.1	28.0	4.1	0.8	213.4
16:31:06	11.5	36.5	4.0	0.7	92.8	17:01:08	10.4	26.8	4.0	0.7	185.4
16:32:06	11.3	37.7	4.1	0.7	90.1	17:02:08	10.3	27.6	3.9	0.7	168.3
16:33:06	11.1	38.0	4.1	0.7	86.4	17:03:08	10.6	34.4	4.1	0.7	155.9
16:34:06	10.7	39.4	4.1	0.7	88.1	17:04:08	12.1	48.8	4.5	0.8	175.9
16:35:06	10.5	40.0	4.3	0.7	94.5	17:05:08	13.3	51.8	4.6	0.8	208.5
16:36:06	10.3	40.5	4.4	0.7	93.0	17:06:08	13.8	52.7	4.6	0.8	246.5
16:37:06	10.1	38.8	4.3	0.7	92.3	17:07:08	14.6	54.4	4.6	0.8	283.8
16:38:07	9.8	39.8	4.3	0.7	94.0	17:08:08	15.4	54.2	4.5	0.8	300.4
16:39:07	9.8	41.5	4.4	0.7	89.3	17:09:08	16.3	57.6	4.5	0.8	320.1
16:40:07	9.8	42.3	4.4	0.7	90.8	17:10:08	17.1	59.6	4.2	0.8	346.0
16:41:07	9.6	42.6	4.2	0.7	91.1	17:11:08	17.4	50.2	3.9	0.8	369.4
16:42:07	9.5	42.4	4.3	0.7	91.1	17:12:08	15.3	35.5	3.6	0.8	321.1
16:43:07	9.5	41.1	4.5	0.7	95.2	17:13:09	13.8	29.6	3.5	0.8	235.3
16:44:07	9.2	37.6	4.4	0.7	108.4	17:14:09	13.1	28.8	3.6	0.8	178.1
16:45:07	9.1	35.3	4.3	0.7	121.8	17:15:09	13.0	31.9	3.7	0.7	138.1
16:46:07	9.2	34.2	4.4	0.7	127.9	17:16:09	12.5	33.2	3.8	0.7	114.0
16:47:07	9.1	33.5	4.3	0.7	135.2	17:17:09	12.0	38.1	3.9	0.7	110.1
16:48:07	8.9	33.2	4.3	0.7	141.5	17:18:09	12.5	53.0	4.4	0.8	147.1
16:49:07	9.0	33.5	4.4	0.7	138.1	17:19:09	13.0	55.6	4.5	0.9	180.7
16:50:07	9.1	33.2	4.5	0.7	138.1	17:20:09	13.6	56.8	4.7	1.1	208.3
16:51:07	9.1	31.9	4.5	0.7	132.7	17:21:09	13.8	56.3	4.6	1.7	226.6
16:52:07	8.8	31.4	4.5	0.7	130.3	17:22:09	14.1	55.1	4.5	1.2	283.6
16:53:07	8.8	31.2	4.4	0.7	132.0	17:23:09	14.4	55.4	4.4	1.9	311.1
16:54:07	8.9	31.7	4.4	0.7	141.3	17:24:09	15.2	60.1	4.3	4.7	355.0
16:55:07	9.4	43.8	4.6	0.7	155.4	17:25:10	16.6	62.4	4.1	3.8	405.9
16:56:07	10.6	49.3	4.9	0.8	185.9	17:26:10	17.3	64.5	4.2	1.3	424.7
16:57:07	11.3	49.5	4.9	0.8	202.9	17:27:10	17.6	63.6	4.1	8.5	409.6

NISCO

UNIT 2

RUN - #3

DATE: 11/04/92

TIME	CO-PPM	NOX-PPM	O2-%	THC-PPM	SO2-PPM	TIME	CO-PPM	NOX-PPM	O2-%	THC-PPM	SO2-PPM
17:28:10	17.6	64.7	4.0	1.3	359.1	17:58:12	17.9	90.0	3.7	6.9	304.1
17:29:10	17.8	64.7	4.0	5.9	347.7	17:59:12	17.6	92.9	3.9	1.7	301.1
17:30:10	18.3	66.9	3.9	3.9	341.6	18:00:12	17.7	93.1	4.1	3.0	299.9
17:31:10	18.7	68.8	3.8	2.0	327.9	18:01:12	17.6	93.4	4.1	1.6	298.2
17:32:10	19.5	70.0	4.0	2.5	324.0	18:02:12	17.7	94.0	4.2	9.7	292.4
17:33:10	20.2	72.6	4.0	9.0	336.0	18:03:12	17.1	91.0	3.9	9.2	286.0
17:34:10	20.9	72.0	3.9	9.6	337.0	18:04:12	16.9	92.7	4.0	8.4	298.2
17:35:10	20.5	71.7	3.8	5.1	347.9	18:05:12	17.6	94.5	4.0	5.9	318.7
17:36:10	21.1	75.1	3.8	8.3	349.9	18:06:12	17.6	93.5	4.2	1.6	330.6
17:37:10	19.9	77.9	3.9	6.5	332.1	18:07:12	17.9	91.6	4.1	8.3	349.6
17:38:11	19.9	79.0	3.9	0.6	334.0	18:08:12	17.2	92.5	4.1	1.1	302.6
17:39:11	20.0	83.2	3.9	6.8	307.0	18:09:12	17.3	94.2	4.1	9.0	293.8
17:40:11	19.6	85.0	3.9	0.5	307.2	18:10:12	17.4	94.0	4.1	8.6	298.4
17:41:11	19.8	86.5	4.0	4.2	307.0	18:11:12	17.1	93.6	4.1	8.7	286.5
17:42:11	19.7	85.3	4.1	8.4	319.2	18:12:13	17.6	93.7	4.1	0.0	307.7
17:43:11	20.7	87.3	4.0	8.6	327.0	18:13:13	17.3	91.8	3.9	7.8	293.3
17:44:11	22.4	87.2	3.9	2.6	370.8	18:14:13	17.1	92.5	4.1	9.8	275.3
17:45:11	21.7	84.4	3.8	3.0	388.9	18:15:13	17.2	94.2	4.1	7.2	269.9
17:46:11	23.4	85.0	3.8	3.6	395.4	18:16:13	17.4	95.7	4.3	0.5	249.5
17:47:11	23.1	87.7	3.8	3.5	379.4	18:17:13	17.3	97.4	4.2	7.6	223.4
17:48:11	25.9	88.1	3.9	2.1	406.2	18:18:13	17.5	97.4	4.2	7.0	269.9
17:49:11	23.6	88.8	3.8	0.5	409.6	18:19:13	17.5	93.6	4.1	9.6	307.0
17:50:11	21.9	87.9	3.8	0.5	393.7	18:20:13	17.0	93.4	4.0	7.7	287.0
17:51:11	20.2	86.6	3.8	3.3	373.5	18:21:13	17.3	96.4	4.2	8.5	266.0
17:52:11	19.6	90.1	3.8	2.4	350.8	18:22:13	18.6	105.7	4.1	9.3	237.0
17:53:11	19.8	89.4	3.9	3.8	360.6	18:23:13	19.5	112.9	4.0	6.1	230.0
17:54:11	19.1	90.6	3.9	1.3	343.5	18:24:13	20.0	125.8	4.1	6.8	218.5
17:55:12	19.4	89.9	3.9	0.3	355.0	18:25:13	19.8	131.4	4.1	7.7	162.7
17:56:12	18.9	88.1	3.8	1.4	372.0	18:26:13	20.0	136.7	4.1	6.7	138.1
17:57:12	18.6	88.7	3.7	0.8	329.2	18:27:13	19.6	142.8	4.0	8.0	136.6
						AVG CONC	15.5	66.6	4.1	6.0	247.1

NISCO

NOX CONVERTER EFFICIENCY TEST

DATE: 11/03/92

PERCENT CHANGE FROM HIGHEST PEAK VALUE TO LAST READING -0.54 %

TIME	NOX-PPM
16:08:03	127.6
16:09:03	127.1
16:10:03	127.1
16:11:03	127.6
16:12:03	127.6
16:13:03	126.9
16:14:03	127.6
16:15:03	126.9
16:16:03	127.9
16:17:03	127.4
16:18:03	127.9
16:19:04	127.1
16:20:04	127.1
16:21:04	127.4
16:22:04	127.4
16:23:04	127.1
16:24:04	127.6
16:25:04	127.1
16:26:04	127.4
16:27:04	126.9
16:28:04	127.4
16:29:04	127.4
16:30:04	127.4
16:31:04	127.4
16:32:04	127.6
16:33:04	127.9
16:34:04	127.1
16:35:04	128.1
16:36:04	127.6
16:37:04	127.6
16:38:04	127.4

ETS

EMISSION TESTING SERVICES, INC.

METHOD 3A DATA SHEET

CLIENT Nisco DATE 11-04-92

SOURCE ID Unit #2 PARAMETER O_2

OPERATOR Brad Latham RUN # 1 LOAD % MAX

CALIBRATION STATISTICS

Cylinder Value		Analyzer Response volt	Analyzer Response percent	Absolute Difference volt	Absolute Difference percent	% Drift ±3%
Zero	N_2	0.07	0.15	0.07	0.15	0.0
Mid	8.88	3.39	8.53	3.41	8.58	0.19
High	14.15	5.70	14.36	5.73	14.43	0.28

Calibration curve: ppm = (response volt)(slope) + intercept

Slope 2.52458 Intercept −0.0372 Span Range 25.2

Analyzer Cal		Init volt	Analyzer percent	Resp Bias ±5	Final volt	Analyzer percent	Resp Bias ±5	Span Drift ±3%
Conc.	N_2	0.15	0.35	0.99	0.13	0.30	0.58	−0.20

$$\text{Sys. Cal. Bias} = \frac{\text{Sys. cal. (ppm)} - \text{analyzer cal. (ppm)}}{\text{Span (ppm)}} \times 100$$

$$\%\text{Drift} = \frac{\text{Final sys. resp. (ppm)} - \text{Initial sys. resp. (ppm)}}{\text{span (ppm)}} \times 100$$

TEST DATA

Start Time: _____ Finish Time: _____ Minutes per point: _____

Sample Port _____

Test Point Volt

1 ____	4 ____	7 ____	10 ____	13 ____	16 ____	19 ____	22 ____	25 ____	28 ____
2 ____	5 ____	8 ____	11 ____	14 ____	17 ____	20 ____	23 ____	26 ____	29 ____
3 ____	6 ____	9 ____	12 ____	15 ____	18 ____	21 ____	24 ____	27 ____	30 ____

AVG VOLT _____ AVG CONC _____%

CORRELATION COEFFICIENT: 0.999

COMMENTS: _____

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ETS

EMISSION TESTING SERVICES, INC.

METHOD 6C DATA SHEET

CLIENT N.Sco DATE 11-4-92

SOURCE ID Unit #2 PARAMETER SO2

OPERATOR Brad Latham RUN # 1 LOAD% MAX

CALIBRATION STATISTICS

Cylinder Value		Analyzer Response volt	Analyzer Response ppm	Absolute Difference volt	Absolute Difference ppm	% Drift ±3%
Zero	N2	0.01	-2.83	0.01	-2.83	0.0
Mid	192.8	4.15	203.5	4.15	203.5	0.0
High	410.2	8.24	407.3	8.25	407.83	0.11

Calibration curve: ppm = (response volt)(slope) + intercept

Slope 49.83784 Intercept -3.32972 Span Range 495.0

Analyzer Cal		Init volt	Analyzer Resp ppm	Bias ±5	Final volt	Analyzer Resp ppm	Bias ±5	Span Drift ±3%
Conc.	192.8	3.72	186.1	-4.33	3.71	181.57	-4.43	0.0

Sys. Cal. Bias = $\frac{\text{Sys. cal. (ppm) - analyzer cal. (ppm)}}{\text{Span (ppm)}}$ X 100

%Drift = $\frac{\text{Final sys. resp. (ppm) - Initial sys. resp. (ppm)}}{\text{span (ppm)}}$ X 100

TEST DATA

Start Time: _____ Finish Time: _____ Minutes per point: _____

Sample Port _____

Test Point Volt

1 ____	4 ____	7 ____	10 ____	13 ____	16 ____	19 ____	22 ____	25 ____	28 ____
2 ____	5 ____	8 ____	11 ____	14 ____	17 ____	20 ____	23 ____	26 ____	29 ____
3 ____	6 ____	9 ____	12 ____	15 ____	18 ____	21 ____	24 ____	27 ____	30 ____

AVG VOLT _____ AVG CONC _____ppm

CORRELATION COEFFICIENT: 0.999

COMMENTS: _____

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ETS

EMISSION TESTING SERVICES, INC.

METHOD 7E DATA SHEET

CLIENT Nisco DATE 11-04-92

SOURCE ID Unit #2 PARAMETER NOx

OPERATOR Brad Latham RUN # 1 LOAD% max

CALIBRATION STATISTICS

Cylinder Value		Analyzer Response volt	Analyzer Response ppm	Absolute Difference volt	Absolute Difference ppm	% Drift ±3%
Zero	N_2	0.09	-0.24	0.08	-0.49	-0.10
Mid	91.89	3.77	92.34	3.84	94.10	0.71
High	195.2	7.85	194.99	7.98	198.26	1.31

Calibration curve: ppm = (response volt)(slope) + intercept

Slope 25.15764 Intercept -2.50200 Span Range 249.1

Analyzer Cal		Init volt	Analyzer ppm	Resp Bias ±5	Final volt	Analyzer ppm	Resp Bias ±5	Span Drift ±3%
Conc.	91.89	3.60	88.1	-1.72	3.62	88.57	-2.22	0.19

$$\text{Sys. Cal. Bias} = \frac{\text{Sys. cal. (ppm)} - \text{analyzer cal. (ppm)}}{\text{Span (ppm)}} \times 100$$

$$\%\text{Drift} = \frac{\text{Final sys. resp. (ppm)} - \text{Initial sys. resp. (ppm)}}{\text{span (ppm)}} \times 100$$

TEST DATA

Start Time: _____ Finish Time: _____ Minutes per point: _____

Sample Port _____

Test Point Volt

1 ____	4 ____	7 ____	10 ____	13 ____	16 ____	19 ____	22 ____	25 ____	28 ____
2 ____	5 ____	8 ____	11 ____	14 ____	17 ____	20 ____	23 ____	26 ____	29 ____
3 ____	6 ____	9 ____	12 ____	15 ____	18 ____	21 ____	24 ____	27 ____	30 ____

AVG VOLT _____ AVG CONC _____ ppm

CORRELATION COEFFICIENT: 0.99999

COMMENTS: _____

ETS

EMISSION TESTING SERVICES, INC.

METHOD 10 DATA SHEET

CLIENT Nisco DATE 11-04-92

SOURCE ID Unit #2 PARAMETER CO

OPERATOR Brad Latham RUN # 1 LOAD% MAX

CALIBRATION STATISTICS

Cylinder Value		Initial Analyzer Response volt	Initial Analyzer Response ppm	Final Analyzer Response volt	Final Analyzer Response ppm	% Drift ±3%
Zero	N_2	0.01	0.27	0.01	0.27	0.0
Low	29.39	2.88	29.15	2.88	29.15	0.0
Mid	57.22	5.64	56.92	5.62	56.71	-0.20
High	86.72	8.63	87.00	8.63	87.00	0.0

Calibration curve: ppm = (response volt)(slope) + intercept

Slope 10.06166 Intercept 0.16798 Span Range 100.8

$$\%\text{Drift} = \frac{\text{Final sys. resp. (ppm)} - \text{Initial sys. resp. (ppm)}}{\text{span (ppm)}} \times 100$$

TEST DATA

Start Time: _____ Finish Time: _____ Minutes per point: _____

Sample Port _____

Test Point Volt

1 ____	4 ____	7 ____	10 ____	13 ____	16 ____	19 ____	22 ____	25 ____	28 ____
2 ____	5 ____	8 ____	11 ____	14 ____	17 ____	20 ____	23 ____	26 ____	29 ____
3 ____	6 ____	9 ____	12 ____	15 ____	18 ____	21 ____	24 ____	27 ____	30 ____

AVG VOLT _____ AVG CONC _____ ppm

CORRELATION COEFFICIENT: 0.99996

COMMENTS: _____

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EMISSION TESTING SERVICES, INC.

METHOD 25A DATA SHEET

CLIENT N.Sco DATE 11-04-92

SOURCE ID Unit # 2 PARAMETER THC

OPERATOR Brad Latham RUN # 1 LOAD% MAX

CALIBRATION STATISTICS

Cylinder Value		Analyzer Response volt	Analyzer Response ppm	Absolute Difference volt	Absolute Difference ppm	% Drift ±3%
Zero	N_2	-0.07	0.05	-0.07	0.05	0.0
Low	10.19	1.49	10.15	1.50	10.21	0.1
Mid	20.05	3.01	19.99	3.05	20.25	0.40
High	30.30	4.61	30.15	4.66	30.65	0.50

Calibration curve: ppm = (response volt)(slope) + intercept

Slope 6.47539 Intercept 0.50063 Span Range 32.9

Analyzer Cal		Init volt	Analyzer ppm	Resp Bias ±5	Final volt	Analyzer ppm	Resp Bias ±5	Span Drift ±3%
Low	10.19	1.63	11.06	2.77	1.65	11.19	2.96	0.40
Mid	20.05	3.21	21.29	3.94	3.24	21.48	3.74	0.58

$$\text{Sys. Cal. Bias} = \frac{\text{Sys. cal. (ppm) - analyzer cal. (ppm)}}{\text{Span (ppm)}} \times 100$$

$$\%\text{Drift} = \frac{\text{Final sys. resp. (ppm) - Initial sys. resp. (ppm)}}{\text{span (ppm)}} \times 100$$

Response Time Test -- Stabilize with zero gas and switch to high concentration. Record time for 95% change.

Time: 1) ____ 2) ____ 3) ____ Minutes per point ____

TEST DATA

Start Time: ____ Finish Time: ____ Minutes per point: ____

Sample Port

Test Point Volt

1	4	7	10	13	16	19	22	25	28
2	5	8	11	14	17	20	23	26	29
3	6	9	12	15	18	21	24	27	30

AVG VOLT ____ AVG CONC ____ ppm

CORRELATION COEFFICIENT: 0.99999

COMMENTS: ____

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EMISSION TESTING SERVICES, INC.

METHOD 3A DATA SHEET

CLIENT Nisco DATE 11-04-92

SOURCE ID Unit #2 PARAMETER O_2

OPERATOR Brad Latham RUN # 2 LOAD% MAX

CALIBRATION STATISTICS

Cylinder Value		Analyzer Response volt	Analyzer Response percent	Absolute Difference volt	Absolute Difference percent	% Drift ±3%
Zero	N_2	0.07	0.14	0.07	0.14	0.0
Mid	8.88	3.41	8.53	3.38	8.46	-0.30
High	14.15	5.73	14.36	5.72	14.33	-0.11

Calibration curve: ppm = (response volt)(slope) + intercept

Slope 2.51113 Intercept -0.03250 Span Range 25.1

Analyzer Cal		Init volt	Analyzer percent	Resp Bias ±5	Final volt	Analyzer percent	Resp Bias ±5	Span Drift ±3%
Conc.	N_2	0.13	0.29	0.61	0.13	0.29	0.61	0.0

Sys. Cal. Bias = $\frac{\text{Sys. cal. (ppm) - analyzer cal. (ppm)}}{\text{Span (ppm)}}$ X 100

%Drift = $\frac{\text{Final sys. resp. (ppm) - Initial sys. resp. (ppm)}}{\text{span (ppm)}}$ X 100

TEST DATA

Start Time: _____ Finish Time: _____ Minutes per point: _____

Sample Port _____

Test Point Volt

1 ____	4 ____	7 ____	10 ____	13 ____	16 ____	19 ____	22 ____	25 ____	28 ____
2 ____	5 ____	8 ____	11 ____	14 ____	17 ____	20 ____	23 ____	26 ____	29 ____
3 ____	6 ____	9 ____	12 ____	15 ____	18 ____	21 ____	24 ____	27 ____	30 ____

AVG VOLT _____ AVG CONC _____%

CORRELATION COEFFICIENT: 0.999

COMMENTS: _____

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ETS

EMISSION TESTING SERVICES, INC.

METHOD 6C DATA SHEET

CLIENT Nisco DATE 11-04-92

SOURCE ID Unit #2 PARAMETER SO_2

OPERATOR Brad Latham RUN # 2 LOAD% MAX

CALIBRATION STATISTICS

Cylinder Value		Analyzer Response volt	Analyzer Response ppm	Absolute Difference volt	Absolute Difference ppm	% Drift ±3%
Zero	N_2	0.01	-2.75	0.02	-2.25	0.10
Mid	197.8	4.15	203.33	4.15	203.33	0.0
High	410.2	8.25	407.42	8.24	406.92	-0.10

Calibration curve: ppm = (response volt)(slope) + intercept

Slope 49.77830 Intercept -3.24955 Span Range 494.5

Analyzer Cal		Init volt	Analyzer ppm	Resp Bias ±5	Final volt	Analyzer ppm	Resp Bias ±5	Span Drift ±3%
Conc.	197.8	3.71	181.43	-4.43	3.69	180.43	-4.63	-0.20

$$\text{Sys. Cal. Bias} = \frac{\text{Sys. cal. (ppm)} - \text{analyzer cal. (ppm)}}{\text{Span (ppm)}} \times 100$$

$$\%\text{Drift} = \frac{\text{Final sys. resp. (ppm)} - \text{Initial sys. resp. (ppm)}}{\text{span (ppm)}} \times 100$$

TEST DATA

Start Time: _____ Finish Time: _____ Minutes per point: _____

Sample Port _____

Test Point Volt

1 ____	4 ____	7 ____	10 ____	13 ____	16 ____	19 ____	22 ____	25 ____	28 ____
2 ____	5 ____	8 ____	11 ____	14 ____	17 ____	20 ____	23 ____	26 ____	29 ____
3 ____	6 ____	9 ____	12 ____	15 ____	18 ____	21 ____	24 ____	27 ____	30 ____

AVG VOLT _____ AVG CONC _____ ppm

CORRELATION COEFFICIENT: 0.99973

COMMENTS: _____

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ETS

EMISSION TESTING SERVICES, INC.

METHOD 7E DATA SHEET

CLIENT Nisco DATE 11-04-92

SOURCE ID Unit #2 PARAMETER Nox

OPERATOR Brad Latham RUN # 2 LOAD% MAX

CALIBRATION STATISTICS

Cylinder Value		Analyzer Response volt	Analyzer Response ppm	Absolute Difference volt	Absolute Difference ppm	% Drift ±3%
Zero	N_2	0.08	-0.35	0.09	-0.11	0.10
Mid	91.99	3.84	92.57	3.84	92.57	0.0
High	195.2	7.98	194.88	7.97	194.63	-0.10

Calibration curve: ppm = (response volt)(slope) + intercept

Slope 24.71298 Intercept -2.33148 Span Range 244.8

Analyzer Cal		Init volt	Analyzer ppm	Resp Bias ±5	Final volt	Analyzer ppm	Resp Bias ±5	Span Drift ±3%
Conc.	91.89	3.62	87.13	-2.22	3.63	87.38	-2.12	0.10

$$\text{Sys. Cal. Bias} = \frac{\text{Sys. cal. (ppm) - analyzer cal. (ppm)}}{\text{Span (ppm)}} \times 100$$

$$\%\text{Drift} = \frac{\text{Final sys. resp. (ppm) - Initial sys. resp. (ppm)}}{\text{span (ppm)}} \times 100$$

TEST DATA

Start Time: _____ Finish Time: _____ Minutes per point: _____

Sample Port _____

Test Point Volt

1	4	7	10	13	16	19	22	25	28
2	5	8	11	14	17	20	23	26	29
3	6	9	12	15	18	21	24	27	30

AVG VOLT _____ AVG CONC _____ ppm

CORRELATION COEFFICIENT: 0.9999

COMMENTS: _____

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EMISSION TESTING SERVICES, INC.

METHOD 10 DATA SHEET

CLIENT Nisco DATE 11-04-92

SOURCE ID Unit # 2 PARAMETER CO

OPERATOR Brad Latham RUN # 2 LOAD% MAX

CALIBRATION STATISTICS

Cylinder Value		Initial Analyzer Response volt	Initial Analyzer Response ppm	Final Analyzer Response volt	Final Analyzer Response ppm	% Drift ±3%
Zero	N2	0.01	0.29	0.01	0.29	0.0
Low	29.39	2.88	29.19	2.87	29.09	-0.1
Mid	57.22	5.62	56.77	5.62	56.77	0.0
High	86.72	8.63	87.08	8.64	87.18	0.1

Calibration curve: ppm = (response volt)(slope) + intercept

Slope 10.06808 Intercept 0.19078 Span Range 100.9

$$\%\text{Drift} = \frac{\text{Final sys. resp. (ppm)} - \text{Initial sys. resp. (ppm)}}{\text{span (ppm)}} \times 100$$

TEST DATA

Start Time: _____ Finish Time: _____ Minutes per point: _____

Sample Port _____

Test Point Volt

1 ____	4 ____	7 ____	10 ____	13 ____	16 ____	19 ____	22 ____	25 ____	28 ____
2 ____	5 ____	8 ____	11 ____	14 ____	17 ____	20 ____	23 ____	26 ____	29 ____
3 ____	6 ____	9 ____	12 ____	15 ____	18 ____	21 ____	24 ____	27 ____	30 ____

AVG VOLT _____ AVG CONC _____ ppm

CORRELATION COEFFICIENT: 0.99995

COMMENTS: _____

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ETS

EMISSION TESTING SERVICES, INC.

METHOD 25A DATA SHEET

CLIENT Nisco DATE 11-04-92

SOURCE ID Unit #2 PARAMETER THC

OPERATOR Brad Latham RUN # 2 LOAD% MAX

CALIBRATION STATISTICS

Cylinder Value		Analyzer Response volt	Analyzer Response ppm	Absolute Difference volt	Absolute Difference ppm	% Drift ±3%
Zero	N2	-0.07	0.06	-0.07	0.06	0.0
Low	10.19	1.50	10.11	1.50	10.11	0.0
Mid	20.05	3.05	20.03	3.04	19.97	-0.1
High	30.30	4.66	30.34	4.67	30.40	0.1

Calibration curve: ppm = (response volt)(slope) + intercept

Slope 6.40143 Intercept 0.50772 Span Range 32.5

Analyzer Cal		Init volt	Analyzer ppm	Resp Bias ±5	Final volt	Analyzer ppm	Resp Bias ±5	Span Drift ±3%
Low	10.19	1.65	11.07	2.95	1.70	11.39	3.94	0.98
Mid	20.05	3.24	21.25	3.75	3.26	21.38	4.32	0.40

$$\text{Sys. Cal. Bias} = \frac{\text{Sys. cal. (ppm)} - \text{analyzer cal. (ppm)}}{\text{Span (ppm)}} \times 100$$

$$\%\text{Drift} = \frac{\text{Final sys. resp. (ppm)} - \text{Initial sys. resp. (ppm)}}{\text{span (ppm)}} \times 100$$

Response Time Test -- Stabilize with zero gas and switch to high concentration. Record time for 95% change.

Time: 1) _____ 2) _____ 3) _____ Minutes per point _____

TEST DATA

Start Time: _____ Finish Time: _____ Minutes per point: _____

Sample Port _____

Test Point Volt

1 ____	4 ____	7 ____	10 ____	13 ____	16 ____	19 ____	22 ____	25 ____	28 ____
2 ____	5 ____	8 ____	11 ____	14 ____	17 ____	20 ____	23 ____	26 ____	29 ____
3 ____	6 ____	9 ____	12 ____	15 ____	18 ____	21 ____	24 ____	27 ____	30 ____

AVG VOLT _____ AVG CONC _____ ppm

CORRELATION COEFFICIENT: 0.99999

COMMENTS: _____

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ETS

EMISSION TESTING SERVICES, INC.

METHOD 3A DATA SHEET

CLIENT Nisco DATE 11-4-92

SOURCE ID Unit #2 PARAMETER O2

OPERATOR Brad Latham RUN # 3 LOAD % MAX

CALIBRATION STATISTICS

Cylinder Value		Analyzer Response volt	Analyzer Response percent	Absolute Difference volt	Absolute Difference percent	% Drift ±3%
Zero	N2	0.07	0.16	0.07	0.16	0.0
Mid	8.88	3.38	8.49	3.38	8.49	0.0
High	14.15	5.72	14.38	5.70	14.33	-0.21

Calibration curve: ppm = (response volt)(slope) + intercept

Slope 2.51627 Intercept -0.01472 Span Range 25.1

Analyzer Cal		Init volt	Analyzer Resp percent	Resp Bias ±5	Final volt	Analyzer Resp percent	Resp Bias ±5	Span Drift ±3%
Conc.	N2	0.13	0.31	0.61	0.13	0.31	0.61	0.0

$$\text{Sys. Cal. Bias} = \frac{\text{Sys. cal. (ppm)} - \text{analyzer cal. (ppm)}}{\text{Span (ppm)}} \times 100$$

$$\%\text{Drift} = \frac{\text{Final sys. resp. (ppm)} - \text{Initial sys. resp. (ppm)}}{\text{span (ppm)}} \times 100$$

TEST DATA

Start Time: _____ Finish Time: _____ Minutes per point: _____

Sample Port _____

Test Point Volt

1 ____	4 ____	7 ____	10 ____	13 ____	16 ____	19 ____	22 ____	25 ____	28 ____
2 ____	5 ____	8 ____	11 ____	14 ____	17 ____	20 ____	23 ____	26 ____	29 ____
3 ____	6 ____	9 ____	12 ____	15 ____	18 ____	21 ____	24 ____	27 ____	30 ____

AVG VOLT _____ AVG CONC _____%

CORRELATION COEFFICIENT: 0.999

COMMENTS: _____

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ETS
EMISSION TESTING SERVICES, INC.

METHOD 6C DATA SHEET

CLIENT Nisco DATE 11-4-92

SOURCE ID Unit #2 PARAMETER SO2

OPERATOR Brad Latham RUN # 3 LOAD% MAX

CALIBRATION STATISTICS

Cylinder Value		Analyzer Response volt	Analyzer Response ppm	Absolute Difference volt	Absolute Difference ppm	% Drift ±3%
Zero	N2	0.02	-2.75	0.02	-2.75	0.0
Mid	197.8	4.15	203.33	4.16	203.83	0.10
High	410.2	8.24	407.42	8.24	407.42	0.0

Calibration curve: ppm = (response volt)(slope) + intercept

Slope 49.99940 Intercept -3.75052 Span Range 495.2

Analyzer Cal		Init volt	Analyzer ppm	Resp Bias ±5	Final volt	Analyzer ppm	Resp Bias ±5	Span Drift ±3%
Conc.	197.8	3.69	180.38	-4.63	3.68	179.86	-4.84	-0.10

Sys. Cal. Bias = $\frac{\text{Sys. cal. (ppm) - analyzer cal. (ppm)}}{\text{Span (ppm)}}$ X 100

%Drift = $\frac{\text{Final sys. resp. (ppm) - Initial sys. resp. (ppm)}}{\text{span (ppm)}}$ X 100

TEST DATA

Start Time: _____ Finish Time: _____ Minutes per point: _____

Sample Port _____

Test Point Volt

1 ____	4 ____	7 ____	10 ____	13 ____	16 ____	19 ____	22 ____	25 ____	28 ____
2 ____	5 ____	8 ____	11 ____	14 ____	17 ____	20 ____	23 ____	26 ____	29 ____
3 ____	6 ____	9 ____	12 ____	15 ____	18 ____	21 ____	24 ____	27 ____	30 ____

AVG VOLT _____ AVG CONC _____ppm

CORRELATION COEFFICIENT: 0.999

COMMENTS: _____

D:\FORM\METH 06C

Test analyzer response, Method 3A, 6C, 7E, 10, and 25A, was recorded by a computer data acquisition system. One minute average data were printed as recorded and served as a hardcopy record of the test data. Presented on the following pages are the computer printouts of the test data.

Each test analyzer was calibrated before and after each test run by challenging the analyzer with a set of certified calibration gases. Analyzer response was recorded by a computer data acquisition system. Calibration data sheets were manually completed as the calibrations were performed serving as a hardcopy record of the calibration. Calibration results were taken directly from the computer to avoid any data system bias. Analyzer calibration data sheets are presented following the test data printouts.

ETS

EMISSION TESTING SERVICES, INC.

METHOD 7E DATA SHEET

CLIENT Nisco DATE 11-04-92

SOURCE ID Unit #2 PARAMETER Nox

OPERATOR Brad Latham RUN # 3 LOAD % Max

CALIBRATION STATISTICS

Cylinder Value		Analyzer Response volt	Analyzer Response ppm	Absolute Difference volt	Absolute Difference ppm	% Drift ±3%
Zero	N_2	0.09	-0.35	0.08	-0.60	-0.1
Mid	91.89	3.84	92.56	3.84	92.56	0.0
High	195.2	7.97	194.88	7.97	194.88	0.0

Calibration curve: ppm = (response volt)(slope) + intercept

Slope 24.77566 Intercept -2.58013 Span Range 245.2

Analyzer Cal		Init volt	Analyzer ppm	Resp Bias ±5	Final volt	Analyzer ppm	Resp Bias ±5	Span Drift ±3%
Conc.	91.89	3.63	87.36	-2.12	3.62	87.11	-2.22	-0.10

$$\text{Sys. Cal. Bias} = \frac{\text{Sys. cal. (ppm)} - \text{analyzer cal. (ppm)}}{\text{Span (ppm)}} \times 100$$

$$\%\text{Drift} = \frac{\text{Final sys. resp. (ppm)} - \text{Initial sys. resp. (ppm)}}{\text{span (ppm)}} \times 100$$

TEST DATA

Start Time: _____ Finish Time: _____ Minutes per point: _____

Sample Port _____

Test Point Volt

1 ____	4 ____	7 ____	10 ____	13 ____	16 ____	19 ____	22 ____	25 ____	28 ____
2 ____	5 ____	8 ____	11 ____	14 ____	17 ____	20 ____	23 ____	26 ____	29 ____
3 ____	6 ____	9 ____	12 ____	15 ____	18 ____	21 ____	24 ____	27 ____	30 ____

AVG VOLT _____ AVG CONC _____ ppm

CORRELATION COEFFICIENT: 0.9999

COMMENTS: _____

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ETS

EMISSION TESTING SERVICES, INC.

METHOD 10 DATA SHEET

CLIENT Nisco DATE 11-4-92

SOURCE ID Unit #2 PARAMETER CO

OPERATOR Brad Latham RUN # 3 LOAD % MAX

CALIBRATION STATISTICS

Cylinder Value		Initial Analyzer Response volt	Initial Analyzer Response ppm	Final Analyzer Response volt	Final Analyzer Response ppm	% Drift ±3%
Zero	N_2	0.01	0.35	0.01	0.35	0.0
Low	29.39	2.87	29.11	2.88	29.21	0.1
Mid	57.22	5.62	56.75	5.62	56.75	0.0
High	86.72	8.64	87.12	8.64	87.12	0.0

Calibration curve: ppm = (response volt)(slope) + intercept

Slope 10.05378 Intercept 0.25205 Span Range 100.8

$$\%\text{Drift} = \frac{\text{Final sys. resp. (ppm)} - \text{Initial sys. resp. (ppm)}}{\text{span (ppm)}} \times 100$$

TEST DATA

Start Time: _____ Finish Time: _____ Minutes per point: _____

Sample Port _____

Test Point Volt

1 ____	4 ____	7 ____	10 ____	13 ____	16 ____	19 ____	22 ____	25 ____	28 ____
2 ____	5 ____	8 ____	11 ____	14 ____	17 ____	20 ____	23 ____	26 ____	29 ____
3 ____	6 ____	9 ____	12 ____	15 ____	18 ____	21 ____	24 ____	27 ____	30 ____

AVG VOLT _____ AVG CONC _____ ppm

CORRELATION COEFFICIENT: 0.9999

COMMENTS: _____

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ETS
EMISSION TESTING SERVICES, INC.

METHOD 25A DATA SHEET

CLIENT Nisco DATE 11-4-92

SOURCE ID Unit #2 PARAMETER THC

OPERATOR Brad Latham RUN # 3 LOAD% MAX

CALIBRATION STATISTICS

Cylinder Value		Analyzer Response volt	Analyzer Response ppm	Absolute Difference volt	Absolute Difference ppm	% Drift ±3%
Zero	N2	-0.07	0.08	-0.07	0.09	0.0
Low	10.19	1.50	10.12	1.51	10.18	0.18
Mid	20.05	3.04	18.96	3.04	19.96	0.0
High	30.30	4.67	30.38	4.68	30.45	0.20

Calibration curve: ppm = (response volt)(slope) + intercept

Slope 6.39299 Intercept 0.52702 Span Range 32.5

Analyzer Cal		Init volt	Analyzer ppm	Resp Bias ±5	Final volt	Analyzer ppm	Resp Bias ±5	Span Drift ±3%
Low	10.19	1.7	11.40	3.92	1.75	11.71	4.71	0.95
Mid	20.05	3.26	21.37	4.34	3.24	21.24	3.94	-0.40

Sys. Cal. Bias = $\frac{\text{Sys. cal. (ppm) - analyzer cal. (ppm)}}{\text{Span (ppm)}}$ X 100

%Drift = $\frac{\text{Final sys. resp. (ppm) - Initial sys. resp. (ppm)}}{\text{span (ppm)}}$ X 100

Response Time Test -- Stabilize with zero gas and switch to high concentration. Record time for 95% change.

Time: 1) _____ 2) _____ 3) _____ Minutes per point _____

TEST DATA

Start Time: _____ Finish Time: _____ Minutes per point: _____

Sample Port _____

Test Point Volt

1 ____	4 ____	7 ____	10 ____	13 ____	16 ____	19 ____	22 ____	25 ____	28 ____
2 ____	5 ____	8 ____	11 ____	14 ____	17 ____	20 ____	23 ____	26 ____	29 ____
3 ____	6 ____	9 ____	12 ____	15 ____	18 ____	21 ____	24 ____	27 ____	30 ____

AVG VOLT _____ AVG CONC _____ ppm

CORRELATION COEFFICIENT: 0.9999

COMMENTS: _____

D:\FORM\METH-25A

Presented on the following pages are results of the laboratory analysis conducted on the samples collected during testing on Boiler 2A.

During sample recovery, 200 ml of the probe wash sample was removed and used for metals analysis. The total volume reported on the total solids analytical report does not reflect this split. Total volumes of the probe wash samples are presented below.

The 200 ml metals sample split from the probe wash sample was preserved by adding an 100 ml aliquot of nitric acid solution. This dilution of the sample must be considered when determining the total metals catch - including the other half of the probe wash used for total solids analysis.

The impinger catch sample volume was not reported on the analytical report. These volumes are presented below.

Probe Wash Run 1	292 ml total volume
Probe Wash Run 2	282 ml total volume
Probe Wash Run 3	283 ml total volume

Impinger Catch Run 1	275 ml total volume
Impinger Catch Run 2	272 ml total volume
Impinger Catch Run 3	270 ml total volume

FILTER WEIGHTS

Company NISCO Source Boiler #1

Unit ID Test Date 11-4&5-92

Filter Number	Sample ID	Initial Weight		Final Weight		Weight Gained
1906	Run #1	3.8120	3.8125	3.8168	3.8167	4.2
1907	Run #2	3.8202	3.8204	3.8254	3.8256	5.2
1908	Run #3	3.8033	3.8036	3.8070	3.8069	3.3

Company Nisco Source Boiler #2

Unit ID Test Date 11-4-92

Filter Number	Sample ID	Initial Weight		Final Weight		Weight Gained
1863	Run #1	3.8609	3.8610	3.8738	3.8739	12.9
1893	Run #2	3.8322	3.8320	3.8415	3.8412	9.7
1905	Run #3	3.8544	3.8546	3.8639	3.8636	9.0
1909	Blank	3.8634	3.8636	3.8633	3.8635	0.0

Analyst Fred Dowling Analysis Date 11-15-92

CHEMTEX

Environmental & Industrial Hygiene Services

3082 25th Street, Port Arthur, Texas 77642, 409-983-4575
FAX: 409-982-1522

Client: E T S Inc.
10461 Mammoth Dr.
Baton Rouge, LA 70814

Report Date: 11/16/92
Date Collected: 11/4/92
Collected By: Client
Date Received: 11/8/92
CHEMTEX FILE #: 2110382

PROJECT: BOILER #2, NISCO

RESULTS OF ANALYSIS

CHEMTEX #	SAMPLE #	Sample Identification	Total Volume (ml)	Total Solids (mg/l)	Total Solids (mg/sample)
2110382	#1	PW #1	290	36	10.5
2110383	#2	PW #2	230	146	33.6
2110384	#3	PW #3	220	96	21.0
2110385	BLANK	Acetone	430	< 2	---

Date Analyzed/ Analyst: 11/12/92 NC/KR

CVReddy

Dr. C. N. Reddy, Ph.D
Director

CJH/CNR

CHEMTEX

Environmental & Industrial Hygiene Services

3082 25th Street, Port Arthur, Texas 77642, 409-983-4575
FAX: 409-982-1522

Client: E T S Inc.
10389 Mammoth Dr.
Baton Rouge, LA 70814

Report Date: 11/23/92
Date Collected: 11/4/92
Collected By: Client
Date Received: 11/8/92
CHEMTEX FILE #: 2110401

PROJECT: BOILER #2, NISCO

Sample Identification: PW-1

CHEMTEX #: 2110401

RESULTS OF ANALYSIS

		Date Analyzed/ Analyst
Nickel (mg/l)	0.99	11/20/92 KR/CK
Chromium (mg/l)	0.08	11/20/92 KR/CK
Vanadium (mg/l)	1.22	11/20/92 KR/CK
Mercury (mg/l)	< 0.005	11/20/92 KR/CK
Cadmium (mg/l)	0.354	11/20/92 KR/CK
Beryllium (mg/l)	0.07	11/20/92 KR/CK

METHOD REFERENCE:
Nickel - EPA Method 249.1
Chromium - EPA Method 218.1
Vanadium - EPA Method 286.1
Mercury - EPA Method 245.1
Cadmium - EPA Method 213.2
Beryllium - EPA Method 210.1

Dr. C. N. Reddy, Ph.D
Director

CJH/CNR

CHEMTEX

3082 25th Street, Port Arthur, Texas 77642, 409-983 4575
FAX: 409-982 1522

Environmental & Industrial Hygiene Services

Client: E T S Inc.
10389 Mammoth Dr.
Baton Rouge, LA 70814

Report Date: 11/23/92
Date Collected: 11/4/92
Collected By: Client
Date Received: 11/8/92
CHEMTEX FILE #: 2110401

PROJECT: BOILER #2, NISCO

Sample Identification: PW-2

CHEMTEX #: 2110402

RESULTS OF ANALYSIS

		Date Analyzed/ Analyst
Nickel (mg/l)	1.05	11/20/92 KR/CK
Chromium (mg/l)	0.08	11/20/92 KR/CK
Vanadium (mg/l)	1.69	11/20/92 KR/CK
Mercury (mg/l)	< 0.005	11/20/92 KR/CK
Cadmium (mg/l)	0.352	11/20/92 KR/CK
Beryllium (mg/l)	0.10	11/20/92 KR/CK

METHOD REFERENCE:
Nickel - EPA Method 249.1
Chromium - EPA Method 218.1
Vanadium - EPA Method 286.1
Mercury - EPA Method 245.1
Cadmium - EPA Method 213.2
Beryllium - EPA Method 210.1

CNReddy

Dr. C. N. Reddy, Ph.D
Director

CJH/CNR

CHEMTEX

Environmental & Industrial Hygiene Services

3082 25th Street, Port Arthur, Texas 77642, 409-983-4575
FAX: 409-982-1522

Client: E T S Inc.
10389 Mammoth Dr.
Baton Rouge, LA 70814

Report Date: 11/23/92
Date Collected: 11/4/92
Collected By: Client
Date Received: 11/8/92
CHEMTEX FILE #: 2110401

PROJECT: BOILER #2, NISCO

Sample Identification: PW-3

CHEMTEX #: 2110403

RESULTS OF ANALYSIS

		Date Analyzed/ Analyst
Nickel (mg/l)	0.99	11/20/92 KR/CK
Chromium (mg/l)	0.07	11/20/92 KR/CK
Vanadium (mg/l)	1.66	11/20/92 KR/CK
Mercury (mg/l)	< 0.005	11/20/92 KR/CK
Cadmium (mg/l)	0.359	11/20/92 KR/CK
Beryllium (mg/l)	0.08	11/20/92 KR/CK

METHOD REFERENCE:
Nickel - EPA Method 249.1
Chromium - EPA Method 218.1
Vanadium - EPA Method 286.1
Mercury - EPA Method 245.1
Cadmium - EPA Method 213.2
Beryllium - EPA Method 210.1

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Dr. C. N. Reddy, Ph.D
Director

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CHEMTEX

Environmental & Industrial Hygiene Services

3082 25th Street, Port Arthur, Texas 77642, 409-983-4575
FAX: 409 982-1522

Client: E T S Inc.
10389 Mammoth Dr.
Baton Rouge, LA 70814

Report Date: 11/23/92
Date Collected: 11/4/92
Collected By: Client
Date Received: 11/8/92
CHEMTEX FILE #: 2110933

PROJECT: BOILER #2, NISCO

Sample Identification: 1863 Filter

CHEMTEX #: 2110933

RESULTS OF ANALYSIS

		Date Analyzed/ Analyst
Nickel (mg/sample)	0.0152	11/20/92 KR/CK
Chromium (mg/sample)	< 0.0024	11/20/92 KR/CK
Vanadium (mg/sample)	0.067	11/20/92 KR/CK
Mercury (mg/sample)	< 0.15	11/20/92 KR/CK
Cadmium (mg/sample)	0.0018	11/20/92 KR/CK
Beryllium (mg/sample)	< 0.0005	11/20/92 KR/CK

METHOD REFERENCE:
Nickel - EPA Method 7520
Chromium - EPA Method 7190
Vanadium - EPA Method 7910
Mercury - EPA Method 7471
Cadmium - EPA Method 7130
Beryllium - EPA Method 7090

CNReddy

Dr. C. N. Reddy, Ph.D
Director

CJH/CNR

CHEMTEX
Environmental & Industrial Hygiene Services
3082 25th Street, Port Arthur, Texas 77642, 409-983-4575
FAX: 409-982-1522

Client: E T S Inc.
10389 Mammoth Dr.
Baton Rouge, LA 70814

Report Date: 11/23/92
Date Collected: 11/4/92
Collected By: Client
Date Received: 11/8/92
CHEMTEX FILE #: 2110933

PROJECT: BOILER #2, NISCO

Sample Identification: 1893 Filter

CHEMTEX #: 2110934

RESULTS OF ANALYSIS

		Date Analyzed/ Analyst
Nickel (mg/sample)	0.0117	11/20/92 KR/CK
Chromium (mg/sample)	< 0.0026	11/20/92 KR/CK
Vanadium (mg/sample)	0.050	11/20/92 KR/CK
Mercury (mg/sample)	< 0.15	11/20/92 KR/CK
Cadmium (mg/sample)	0.0021	11/20/92 KR/CK
Beryllium (mg/sample)	< 0.0005	11/20/92 KR/CK

METHOD REFERENCE:
Nickel - EPA Method 7520
Chromium - EPA Method 7190
Vanadium - EPA Method 7910
Mercury - EPA Method 7471
Cadmium - EPA Method 7130
Beryllium - EPA Method 7090

Dr. C. N. Reddy, Ph.D
Director

CJH/CNR

CHEMTEX

Environmental & Industrial Hygiene Services

3082 25th Street, Port Arthur, Texas 77642, 409-983-4575
FAX: 409-982-1522

Client: E T S Inc.
10389 Mammoth Dr.
Baton Rouge, LA 70814

Report Date: 11/23/92
Date Collected: 11/4/92
Collected By: Client
Date Received: 11/8/92
CHEMTEX FILE #: 2110933

PROJECT: BOILER #2, NISCO

Sample Identification: 1905 Filter

CHEMTEX #: 2110935

RESULTS OF ANALYSIS

		Date Analyzed/ Analyst
Nickel (mg/sample)	0.0131	11/20/92 KR/CK
Chromium (mg/sample)	< 0.0024	11/20/92 KR/CK
Vanadium (mg/sample)	0.046	11/20/92 KR/CK
Mercury (mg/sample)	< 0.15	11/20/92 KR/CK
Cadmium (mg/sample)	0.0016	11/20/92 KR/CK
Beryllium (mg/sample)	< 0.0005	11/20/92 KR/CK

METHOD REFERENCE:
Nickel - EPA Method 7520
Chromium - EPA Method 7190
Vanadium - EPA Method 7910
Mercury - EPA Method 7471
Cadmium - EPA Method 7130
Beryllium - EPA Method 7090

CNReddy

Dr. C. N. Reddy, Ph.D
Director

CJH/CNR

CHEMTEX

Environmental & Industrial Hygiene Services

3082 25th Street, Port Arthur, Texas 77642, 409-983-4575
FAX: 409-982-1522

Client: E T S Inc.
10389 Mammoth Dr.
Baton Rouge, LA 70814

Report Date: 11/23/92
Date Collected: 11/4/92
Collected By: Client
Date Received: 11/8/92
CHEMTEX FILE #: 2110404

PROJECT: BOILER #2, NISCO

Sample Identification: Imp. Catch #1

CHEMTEX #: 2110404

RESULTS OF ANALYSIS

		Date Analyzed/ Analyst
Nickel (mg/l)	< 0.04	11/20/92 KR/CK
Chromium (mg/l)	< 0.05	11/20/92 KR/CK
Vanadium (mg/l)	< 0.5	11/20/92 KR/CK
Mercury (mg/l)	< 0.005	11/20/92 KR/CK
Cadmium (mg/l)	0.009	11/20/92 KR/CK
Beryllium (mg/l)	< 0.01	11/20/92 KR/CK

METHOD REFERENCE:
Nickel - EPA Method 249.1
Chromium - EPA Method 218.1
Vanadium - EPA Method 286.1
Mercury - EPA Method 245.1
Cadmium - EPA Method 213.2
Beryllium - EPA Method 210.1

CNReddy

Dr. C. N. Reddy, Ph.D
Director

CJH/CNR

CHEMTEX

Environmental & Industrial Hygiene Services

3082 25th Street, Port Arthur, Texas 77642, 409 983 4575
FAX: 409 982 1522

Client: E T S Inc.
10389 Mammoth Dr.
Baton Rouge, LA 70814

Report Date: 11/23/92
Date Collected: 11/4/92
Collected By: Client
Date Received: 11/8/92
CHEMTEX FILE #: 2110404

PROJECT: BOILER #2, NISCO

Sample Identification: Imp. Catch #2

CHEMTEX #: 2110405

RESULTS OF ANALYSIS

		Date Analyzed/ Analyst
Nickel (mg/l)	< 0.04	11/20/92 KR/CK
Chromium (mg/l)	< 0.05	11/20/92 KR/CK
Vanadium (mg/l)	< 0.5	11/20/92 KR/CK
Mercury (mg/l)	< 0.005	11/20/92 KR/CK
Cadmium (mg/l)	0.008	11/20/92 KR/CK
Beryllium (mg/l)	< 0.01	11/20/92 KR/CK

METHOD REFERENCE:
Nickel - EPA Method 249.1
Chromium - EPA Method 218.1
Vanadium - EPA Method 286.1
Mercury - EPA Method 245.1
Cadmium - EPA Method 213.2
Beryllium - EPA Method 210.1

CNReddy

Dr. C. N. Reddy, Ph.D
Director

CJH/CNR

CHEMTEX

Environmental & Industrial Hygiene Services

3082 25th Street, Port Arthur, Texas 77642, 409-983 4575
FAX: 409 982-1522

Client: E T S Inc.
10389 Mammoth Dr.
Baton Rouge, LA 70814

Report Date: 11/23/92
Date Collected: 11/4/92
Collected By: Client
Date Received: 11/8/92
CHEMTEX FILE #: 2110404

PROJECT: BOILER #2, NISCO

Sample Identification: Imp. Catch #3

CHEMTEX #: 2110406

RESULTS OF ANALYSIS

		Date Analyzed/ Analyst
Nickel (mg/l)	< 0.04	11/20/92 KR/CK
Chromium (mg/l)	< 0.05	11/20/92 KR/CK
Vanadium (mg/l)	< 0.5	11/20/92 KR/CK
Mercury (mg/l)	< 0.005	11/20/92 KR/CK
Cadmium (mg/l)	< 0.005	11/20/92 KR/CK
Beryllium (mg/l)	< 0.01	11/20/92 KR/CK

METHOD REFERENCE:
Nickel - EPA Method 249.1
Chromium - EPA Method 218.1
Vanadium - EPA Method 286.1
Mercury - EPA Method 245.1
Cadmium - EPA Method 213.2
Beryllium - EPA Method 210.1

Dr. C. N. Reddy, Ph.D
Director

CJH/CNR

CHEMTEX

Environmental & Industrial Hygiene Services

3082 25th Street, Port Arthur, Texas 77642, 409-983-4575
FAX: 409-982-1522

Client: E T S Inc.
10461 Mammoth Dr.
Baton Rouge, LA 70814

Report Date: 11/11/92
Date Collected: 11/4/92
Collected By: Client
Date Received: 11/8/92
CHEMTEX FILE #: 2110407

PROJECT: BOILER #2, NISCO

RESULTS OF ANALYSIS

CHEMTEX #	Sample Identification	BENZENE (CAS #71-43-2) (ug/sample)
2110407	R1-S1-TA	< 2.0
2110408	R1-S1-TB	< 2.0
2110409	R1-S1-TC	< 2.0
2110410	R1-S2-TA	< 2.0
2110411	R1-S2-TB	< 2.0
2110412	R1-S2-TC	< 2.0
2110413	Blank Silica Gel	< 2.0
2110414	R1-S3-TA	< 2.0
2110415	R1-S3-TB	< 2.0
2110416	R1-S3-TC	< 2.0
2110417	Blank Charcoal	< 2.0

Date Analyzed/ Analyst: 11/9/92 SP

Desorption Efficiency (%): 89/87

Analyzed by NIOSH Method 1501, "NIOSH Manual of Analytical Methods, 3rd Edition, 1984, by GC/FID."

CNReddy

Dr. C. N. Reddy, Ph.D
Director

CJH/CNR

CHEMTEX

Environmental & Industrial Hygiene Services

3082 25th Street, Port Arthur, Texas 77642, 409-983 4575
FAX: 409-982-1522

Client: E T S Inc.
10461 Mammoth Dr.
Baton Rouge, LA 70814

Report Date: 11/11/92
Date Collected: 11/4/92
Collected By: Client
Date Received: 11/8/92
CHEMTEX FILE #: 2110407

PROJECT: BOILER #2, NISCO

RESULTS OF ANALYSIS

CHEMTEX #	Sample Identification	ETHYL BENZENE (CAS #100-41-4) (ug/sample)
2110407	R1-S1-TA	< 2.0
2110408	R1-S1-TB	< 2.0
2110409	R1-S1-TC	< 2.0
2110410	R1-S2-TA	< 2.0
2110411	R1-S2-TB	< 2.0
2110412	R1-S2-TC	< 2.0
2110413	Blank Silica Gel	< 2.0
2110414	R1-S3-TA	< 2.0
2110415	R1-S3-TB	< 2.0
2110416	R1-S3-TC	< 2.0
2110417	Blank Charcoal	< 2.0
	Date Analyzed/ Analyst	11/9/92 SP

Desorption Efficiency (%): 92/88

Analyzed by NIOSH Method 1501, "NIOSH Manual of Analytical Methods, 3rd Edition, 1984, by GC/FID."

CNReddy

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Environmental & Industrial Hygiene Services

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Client: E T S Inc.
10461 Mammoth Dr.
Baton Rouge, LA 70814

Report Date: 11/11/92
Date Collected: 11/4/92
Collected By: Client
Date Received: 11/8/92
CHEMTEX FILE #: 2110407

PROJECT: BOILER #2, NISCO

RESULTS OF ANALYSIS

CHEMTEX #	Sample Identification	TOLUENE (CAS #108-88-3) (ug/sample)
2110407	R1-S1-TA	< 2.0
2110408	R1-S1-TB	< 2.0
2110409	R1-S1-TC	< 2.0
2110410	R1-S2-TA	< 2.0
2110411	R1-S2-TB	< 2.0
2110412	R1-S2-TC	< 2.0
2110413	Blank Silica Gel	< 2.0
2110414	R1-S3-TA	< 2.0
2110415	R1-S3-TB	< 2.0
2110416	R1-S3-TC	< 2.0
2110417	Blank Charcoal	< 2.0

Date Analyzed/ Analyst: 11/9/92 SP

Desorption Efficiency (%): 92/90

Analyzed by NIOSH Method 1501, "NIOSH Manual of Analytical Methods, 3rd Edition, 1984, by GC/FID."

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Client: E T S Inc.
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Report Date: 11/11/92
Date Collected: 11/4/92
Collected By: Client
Date Received: 11/8/92
CHEMTEX FILE #: 2110407

PROJECT: BOILER #2, NISCO

RESULTS OF ANALYSIS

CHEMTEX #	Sample Identification	XYLENE (CAS #1330-20-7) (ug/sample)
2110407	R1-S1-TA	< 4.0
2110408	R1-S1-TB	< 4.0
2110409	R1-S1-TC	< 4.0
2110410	R1-S2-TA	< 4.0
2110411	R1-S2-TB	< 4.0
2110412	R1-S2-TC	< 4.0
2110413	Blank Silica Gel	< 4.0
2110414	R1-S3-TA	< 4.0
2110415	R1-S3-TB	< 4.0
2110416	R1-S3-TC	< 4.0
2110417	Blank Charcoal	< 4.0

Date Analyzed/ Analyst	11/9/92 SP

Desorption Efficiency (%): 90/86

Analyzed by NIOSH Method 1501, "NIOSH Manual of Analytical Methods, 3rd Edition, 1984, by GC/FID."

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Client: E T S Inc.
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Report Date: 11/11/92
Date Collected: 11/4/92
Collected By: Client
Date Received: 11/8/92
CHEMTEX FILE #: 2110407

PROJECT: BOILER #2, NISCO

RESULTS OF ANALYSIS

CHEMTEX #	Sample Identification	NAPTHALENE (CAS #91-20-3) (ug/sample)
2110407	R1-S1-TA	< 4.0
2110408	R1-S1-TB	< 4.0
2110409	R1-S1-TC	< 4.0
2110410	R1-S2-TA	< 4.0
2110411	R1-S2-TB	< 4.0
2110412	R1-S2-TC	< 4.0
2110413	Blank Silica Gel	< 4.0
2110414	R1-S3-TA	< 4.0
2110415	R1-S3-TB	< 4.0
2110416	R1-S3-TC	< 4.0
2110417	Blank Charcoal	< 4.0

Date Analyzed/ Analyst	11/9/92 SP

Desorption Efficiency (%): 84/87

Analyzed by NIOSH Method 1501, "NIOSH Manual of Analytical Methods, 3rd Edition, 1984, by GC/FID."

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Director

CJH/CNR

CHEMTEX

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FAX: 409-982-1522

Client: E T S Inc.
10461 Mammoth Dr.
Baton Rouge, LA 70814

Report Date: 11/11/92
Date Collected: 11/4/92
Collected By: Client
Date Received: 11/8/92
CHEMTEX FILE #: 2110418

PROJECT: BOILER #2, NISCO

RESULTS OF ANALYSIS

CHEMTEX #	Sample Identification	BENZENE (CAS #71-43-2) (ug/sample)
2110418	R2-S1-TA	< 2.0
2110419	R2-S1-TB	< 2.0
2110420	R2-S1-TC	< 2.0
2110421	Blank Silica Gel	< 2.0
2110422	Blank Charcoal	< 2.0
	Date Analyzed/ Analyst	11/9/92 SP

Desorption Efficiency (%): 89/87

Analyzed by NIOSH Method 1501, "NIOSH Manual of Analytical Methods, 3rd Edition, 1984, by GC/FID."

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Client: E T S Inc.
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Report Date: 11/11/92
Date Collected: 11/4/92
Collected By: Client
Date Received: 11/8/92
CHEMTEX FILE #: 2110418

PROJECT: BOILER #2, NISCO

RESULTS OF ANALYSIS

CHEMTEX #	Sample Identification	ETHYL BENZENE (CAS #100-41-4) (ug/sample)
2110418	R2-S1-TA	< 2.0
2110419	R2-S1-TB	< 2.0
2110420	R2-S1-TC	< 2.0
2110421	Blank Silica Gel	< 2.0
2110422	Blank Charcoal	< 2.0
	Date Analyzed/ Analyst	10/9/92 SP

Desorption Efficiency (%): 92/88

Analyzed by NIOSH Method 1501, "NIOSH Manual of Analytical Methods, 3rd Edition, 1984, by GC/FID."

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FAX: 409-982-1522

Client: E T S Inc.
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Report Date: 11/11/92
Date Collected: 11/4/92
Collected By: Client
Date Received: 11/8/92
CHEMTEX FILE #: 2110418

PROJECT: BOILER #2, NISCO

RESULTS OF ANALYSIS

CHEMTEX #	Sample Identification	TOLUENE (CAS #108-88-3) (ug/sample)
2110418	R2-S1-TA	< 2.0
2110419	R2-S1-TB	< 2.0
2110420	R2-S1-TC	< 2.0
2110421	Blank Silica Gel	< 2.0
2110422	Blank Charcoal	< 2.0
	Date Analyzed/ Analyst	10/9/92 SP

Desorption Efficiency (%): 92/90

Analyzed by NIOSH Method 1501, "NIOSH Manual of Analytical Methods, 3rd Edition, 1984, by GC/FID."

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CHEMTEX

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FAX: 409-982-1522

Client: E T S Inc.
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Report Date: 11/11/92
Date Collected: 11/4/92
Collected By: Client
Date Received: 11/8/92
CHEMTEX FILE #: 2110418

PROJECT: BOILER #2, NISCO

RESULTS OF ANALYSIS

CHEMTEX #	Sample Identification	XYLENE (CAS #1330-20-7) (ug/sample)
2110418	R2-S1-TA	< 4.0
2110419	R2-S1-TB	< 4.0
2110420	R2-S1-TC	< 4.0
2110421	Blank Silica Gel	< 4.0
2110422	Blank Charcoal	< 4.0
	Date Analyzed/ Analyst	10/9/92 SP

Desorption Efficiency (%): 90/86

Analyzed by NIOSH Method 1501, "NIOSH Manual of Analytical Methods, 3rd Edition, 1984, by GC/FID."

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Collected By: Client
Date Received: 11/8/92
CHEMTEX FILE #: 2110418

PROJECT: BOILER #2, NISCO

RESULTS OF ANALYSIS

CHEMTEX #	Sample Identification	NAPTHALENE (CAS #91-20-3) (ug/sample)
2110418	R2-S1-TA	< 4.0
2110419	R2-S1-TB	< 4.0
2110420	R2-S1-TC	< 4.0
2110421	Blank Silica Gel	< 4.0
2110422	Blank Charcoal	< 4.0
	Date Analyzed/ Analyst	10/9/92 SP

Desorption Efficiency (%): 84/87

Analyzed by NIOSH Method 1501, "NIOSH Manual of Analytical Methods, 3rd Edition, 1984, by GC/FID."

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Date Collected: 11/4/92
Collected By: Client
Date Received: 11/8/92
CHEMTEX FILE #: 2110423

PROJECT: BOILER #2, NISCO

RESULTS OF ANALYSIS

CHEMTEX #	Sample Identification	ETHYL BENZENE (CAS #100-41-4) (ug/sample)
2110423	R3-S1-TA	< 2.0
2110424	R3-S1-TB	< 2.0
2110425	R3-S1-TC	< 2.0
Date Analyzed/ Analyst		11/9/92 SP

Desorption Efficiency (%): 92/88

Analyzed by NIOSH Method 1501, "NIOSH Manual of Analytical Methods, 3rd Edition, 1984, by GC/FID."

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Report Date: 11/11/92
Date Collected: 11/4/92
Collected By: Client
Date Received: 11/8/92
CHEMTEX FILE #: 2110418

PROJECT: BOILER #2, NISCO

RESULTS OF ANALYSIS

CHEMTEX #	Sample Identification	NAPTHALENE (CAS #91-20-3) (ug/sample)
2110418	R2-S1-TA	< 4.0
2110419	R2-S1-TB	< 4.0
2110420	R2-S1-TC	< 4.0
2110421	Blank Silica Gel	< 4.0
2110422	Blank Charcoal	< 4.0
	Date Analyzed/ Analyst	10/9/92 SP

Desorption Efficiency (%): 84/87

Analyzed by NIOSH Method 1501, "NIOSH Manual of Analytical Methods, 3rd Edition, 1984, by GC/FID."

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Client: E T S Inc.
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Report Date: 11/11/92
Date Collected: 11/4/92
Collected By: Client
Date Received: 11/8/92
CHEMTEX FILE #: 2110423

PROJECT: BOILER #2, NISCO

RESULTS OF ANALYSIS

CHEMTEX #	Sample Identification	BENZENE (CAS #71-43-2) (ug/sample)
2110423	R3-S1-TA	< 2.0
2110424	R3-S1-TB	< 2.0
2110425	R3-S1-TC	< 2.0
Date Analyzed/ Analyst		11/9/92 SP

Desorption Efficiency (%): 89/87

Analyzed by NIOSH Method 1501, "NIOSH Manual of Analytical Methods, 3rd Edition, 1984, by GC/FID."

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Report Date: 11/11/92
Date Collected: 11/4/92
Collected By: Client
Date Received: 11/8/92
CHEMTEX FILE #: 2110423

PROJECT: BOILER #2, NISCO

RESULTS OF ANALYSIS

CHEMTEX #	Sample Identification	ETHYL BENZENE (CAS #100-41-4) (ug/sample)
2110423	R3-S1-TA	< 2.0
2110424	R3-S1-TB	< 2.0
2110425	R3-S1-TC	< 2.0
Date Analyzed/ Analyst		11/9/92 SP

Desorption Efficiency (%): 92/88

Analyzed by NIOSH Method 1501, "NIOSH Manual of Analytical Methods, 3rd Edition, 1984, by GC/FID."

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Report Date: 11/11/92
Date Collected: 11/4/92
Collected By: Client
Date Received: 11/8/92
CHEMTEX FILE #: 2110423

PROJECT: BOILER #2, NISCO

RESULTS OF ANALYSIS

CHEMTEX #	Sample Identification	TOLUENE (CAS #108-88-3) (ug/sample)
2110423	R3-S1-TA	< 2.0
2110424	R3-S1-TB	< 2.0
2110425	R3-S1-TC	< 2.0
Date Analyzed/ Analyst		11/9/92 SP

Desorption Efficiency (%): 92/90

Analyzed by NIOSH Method 1501, "NIOSH Manual of Analytical Methods, 3rd Edition, 1984, by GC/FID."

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Report Date: 11/11/92
Date Collected: 11/4/92
Collected By: Client
Date Received: 11/8/92
CHEMTEX FILE #: 2110423

PROJECT: BOILER #2, NISCO

RESULTS OF ANALYSIS

CHEMTEX #	Sample Identification	XYLENE (CAS #1330-20-7) (ug/sample)
2110423	R3-S1-TA	< 4.0
2110424	R3-S1-TB	< 4.0
2110425	R3-S1-TC	< 4.0
Date Analyzed/ Analyst		11/9/92 SP

Desorption Efficiency (%): 90/86

Analyzed by NIOSH Method 1501, "NIOSH Manual of Analytical Methods, 3rd Edition, 1984, by GC/FID."

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Report Date: 11/11/92
Date Collected: 11/4/92
Collected By: Client
Date Received: 11/8/92
CHEMTEX FILE #: 2110423

PROJECT: BOILER #2, NISCO

RESULTS OF ANALYSIS

CHEMTEX #	Sample Identification	NAPTHALENE (CAS #91-20-3) (ug/sample)
2110423	R3-S1-TA	< 4.0
2110424	R3-S1-TB	< 4.0
2110425	R3-S1-TC	< 4.0
Date Analyzed/ Analyst		11/9/92 SP

Desorption Efficiency (%): 84/87

Analyzed by NIOSH Method 1501, "NIOSH Manual of Analytical Methods, 3rd Edition, 1984, by GC/FID."

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Client: E T S Inc.
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Report Date: 11/11/92
Date Collected: 11/4/92
Collected By: Client
Date Received: 11/8/92
CHEMTEX FILE #: 2110426

PROJECT: BOILER #2, NISCO

RESULTS OF ANALYSIS

CHEMTEX #	Sample Identification	BENZENE (CAS #71-43-2) (ug/sample)
2110426	R4-S1-TA	< 2.0
2110427	R4-S1-TB	< 2.0
2110428	R4-S1-TC	< 2.0
Date Analyzed/ Analyst		11/9/92 SP

Desorption Efficiency (%): 89/87

Analyzed by NIOSH Method 1501, "NIOSH Manual of Analytical Methods, 3rd Edition, 1984, by GC/FID."

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Report Date: 11/11/92
Date Collected: 11/4/92
Collected By: Client
Date Received: 11/8/92
CHEMTEX FILE #: 2110426

PROJECT: BOILER #2, NISCO

RESULTS OF ANALYSIS

CHEMTEX #	Sample Identification	ETHYL BENZENE (CAS #100-41-4) (ug/sample)
2110426	R4-S1-TA	< 2.0
2110427	R4-S1-TB	< 2.0
2110428	R4-S1-TC	< 2.0
Date Analyzed/ Analyst		11/9/92 SP

Desorption Efficiency (%): 92/88

Analyzed by NIOSH Method 1501, "NIOSH Manual of Analytical Methods, 3rd Edition, 1984, by GC/FID."

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Report Date: 11/11/92
Date Collected: 11/4/92
Collected By: Client
Date Received: 11/8/92
CHEMTEX FILE #: 2110426

PROJECT: BOILER #2, NISCO

RESULTS OF ANALYSIS

CHEMTEX #	Sample Identification	XYLENE (CAS #1330-20-7) (ug/sample)
2110426	R4-S1-TA	< 4.0
2110427	R4-S1-TB	< 4.0
2110428	R4-S1-TC	< 4.0
Date Analyzed/ Analyst		11/9/92 SP

Desorption Efficiency (%): 90/86

Analyzed by NIOSH Method 1501, "NIOSH Manual of Analytical Methods, 3rd Edition, 1984, by GC/FID."

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Client: E T S Inc.
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Report Date: 11/11/92
Date Collected: 11/4/92
Collected By: Client
Date Received: 11/8/92
CHEMTEX FILE #: 2110426

PROJECT: BOILER #2, NISCO

RESULTS OF ANALYSIS

CHEMTEX #	Sample Identification	TOLUENE (CAS #108-88-3) (ug/sample)
2110426	R4-S1-TA	< 2.0
2110427	R4-S1-TB	< 2.0
2110428	R4-S1-TC	< 2.0
Date Analyzed/ Analyst		11/9/92 SP

Desorption Efficiency (%): 92/90

Analyzed by NIOSH Method 1501, "NIOSH Manual of Analytical Methods, 3rd Edition, 1984, by GC/FID."

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Client: E T S Inc.
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Report Date: 11/11/92
Date Collected: 11/4/92
Collected By: Client
Date Received: 11/8/92
CHEMTEX FILE #: 2110426

PROJECT: BOILER #2, NISCO

RESULTS OF ANALYSIS

CHEMTEX #	Sample Identification	NAPTHALENE (CAS #91-20-3) (ug/sample)
2110426	R4-S1-TA	< 4.0
2110427	R4-S1-TB	< 4.0
2110428	R4-S1-TC	< 4.0
Date Analyzed/ Analyst		11/9/92 SP

Desorption Efficiency (%): 84/87

Analyzed by NIOSH Method 1501, "NIOSH Manual of Analytical Methods, 3rd Edition, 1984, by GC/FID."

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CHEMTEX

Environmental & Industrial Hygiene Services

3082 25th Street, Port Arthur, Texas 77642, 409-983-4575
FAX: 409-982-1522

Client: E T S Inc.
10389 Mammoth Dr.
Baton Rouge, LA 70814

Report Date: 12/10/92
Date Collected: 11/4-5/92
Collected By: Client
Date Received: 11/8/92
CHEMTEX FILE#: 2120392

PROJECT: UNIT #1 AND UNIT #2

Sample Identification: FUEL 2A

CHEMTEX #: 2110393

ULTIMATE FUEL ANALYSIS

			Date Analyzed/ Analyst
Nickel (mg/kg)	38.9		11/20/92 CK/KR
Chromium (mg/kg)	< 0.5		11/20/92 CK/KR
Vanadium (mg/kg)	229		11/20/92 CK/KR
Cadmium (mg/kg)	0.16		11/20/92 CK/KR
Beryllium (mg/kg)	< 0.20		11/20/92 CK/KR
Mercury (mg/kg)	0.030		11/20/92 CK/KR
Elemental C (wt%)	87.57	80.51	12/9/92 SC
Elemental H_2 (wt%)	3.86	3.55	12/9/92 SC
Elemental O_2 (wt%)	6.50	5.97	12/9/92 SC
Elemental N^2 (wt%)	108.77 1.89	1.74	12/9/92 SC
Elemental S (wt%)	5.11	4.70	12/9/92 SC
Ash (wt%)	0.64	0.59	12/8/92 MK
Moisture (wt%)	3.20	2.94	12/8/92 MK
High Heat Value (BTU/lb)	15,440		12/14/92 MK

* Calculated on the basis of Calcium analysis.
** Calculated on the basis of Magnesium analysis.

CNReddy

Dr. C. N. Reddy, Ph.D
Director

JLH/CNR

CHEMTEX

Environmental & Industrial Hygiene Services

3082 25th Street, Port Arthur, Texas 77642, 409-983-4575
FAX: 409-982-1522

Client: E T S Inc.
10389 Mammoth Dr.
Baton Rouge, LA 70814

Report Date: 12/10/92
Date Collected: 11/4-5/92
Collected By: Client
Date Received: 11/8/92
CHEMTEX FILE#: 2120392

PROJECT: UNIT #1 AND UNIT #2

Sample Identification: FUEL 2A

CHEMTEX #: 2110393

ULTIMATE FUEL ANALYSIS

		Date Analyzed/ Analyst
Nickel (mg/kg)	38.9	11/20/92 CK/KR
Chromium (mg/kg)	< 0.5	11/20/92 CK/KR
Vanadium (mg/kg)	229	11/20/92 CK/KR
Cadmium (mg/kg)	0.16	11/20/92 CK/KR
Beryllium (mg/kg)	< 0.20	11/20/92 CK/KR
Mercury (mg/kg)	0.030	11/20/92 CK/KR
Elemental C (wt%)	87.57	12/9/92 SC
Elemental H_2 (wt%)	3.86	12/9/92 SC
Elemental O_2 (wt%)	6.50	12/9/92 SC
Elemental N_2 (wt%)	1.89	12/9/92 SC
Elemental S (wt%)	5.11	12/9/92 SC
Ash (wt%)	0.64	12/8/92 MK
Moisture (wt%)	3.20	12/8/92 MK
High Heat Value (BTU/lb)	15,440	12/14/92 MK

* Calculated on the basis of Calcium analysis.
** Calculated on the basis of Magnesium analysis.

CNReddy

Dr. C. N. Reddy, Ph.D
Director

JLH/CNR

CHEMTEX

Environmental & Industrial Hygiene Services

3082 25th Street, Port Arthur, Texas 77642, 409-983-4575
FAX: 409-982-1522

Client: E T S Inc.
10389 Mammoth Dr.
Baton Rouge, LA 70814

Report Date: 12/10/92
Date Collected: 11/4-5/92
Collected By: Client
Date Received: 11/8/92
CHEMTEX FILE#: 2120390

PROJECT: UNIT #1 AND UNIT #2

Sample Identification: LIMESTONE 2A

CHEMTEX #: 2110391

ULTIMATE FUEL ANALYSIS

		Date Analyzed/ Analyst
Nickel (mg/kg)	11.9	11/20/92 CK/KR
Chromium (mg/kg)	10.2	11/20/92 CK/KR
Vanadium (mg/kg)	36.0	11/20/92 CK/KR
Cadmium (mg/kg)	3.83	11/20/92 CK/KR
Beryllium (mg/kg)	0.20	11/20/92 CK/KR
Mercury (mg/kg)	0.030	11/20/92 CK/KR
Elemental S (wt%)	< 0.01	12/9/92 SC
Elemental N (wt%)	< 0.01	12/9/92 SC
Ash (wt%)	81.14	12/8/92 MK
Moisture (wt%)	< 0.01	12/8/92 MK
Calcium (mg/kg)	495,000	12/11/92 CK
Calcium Carbonate (mg/kg)*	1,236,010	12/11/92 CK
Magnesium (mg/kg)	16,000	12/11/92 CK
Magnesium Carbonate (mg/kg)**	55,500	12/11/92 CK

* Calculated on the basis of Calcium analysis.
** Calculated on the basis of Magnesium analysis.

CNReddy

Dr. C. N. Reddy, Ph.D
Director

JLH/CNR

6.7.34

CHEMTEX

3082 25th Street, Port Arthur, Texas 77642, 409-983-4575
FAX: 409-982-1522

Environmental & Industrial Hygiene Services

Client: E T S Inc.
10389 Mammoth Dr.
Baton Rouge, LA 70814

Report Date: 12/10/92
Date Collected: 11/4-5/92
Collected By: Client
Date Received: 11/8/92
CHEMTEX FILE#: 2120386

PROJECT: UNIT #1 AND UNIT #2

Sample Identification: BOTTOM ASH 2A

CHEMTEX #: 2110389

ULTIMATE FUEL ANALYSIS

		Date Analyzed/ Analyst
Nickel (mg/kg)	133.0	11/20/92 CK/KR
Chromium (mg/kg)	8.8	11/20/92 CK/KR
Vanadium (mg/kg)	875.0	11/20/92 CK/KR
Cadmium (mg/kg)	2.31	11/20/92 CK/KR
Beryllium (mg/kg)	0.2	11/20/92 CK/KR
Mercury (mg/kg)	0.058	11/20/92 CK/KR
Elemental S (wt%)	16.43	12/9/92 SC
Elemental C (wt%)	< 0.05	12/9/92 SC
Ash (wt%)	99.70	12/8/92 MK
Moisture (wt%)	< 0.01	12/8/92 MK
Calcium (mg/kg)	410,000	12/11/92 CK
Calcium Sulfate(mg/kg)*	1,392,700	12/11/92 CK
Calcium oxide (mg/kg)*	573,600	12/11/92 CK
Magnesium (mg/kg)	18,500	12/11/92 CK
Magnesium Oxide (mg/kg)**	30,670	12/11/92 CK

* Calculated on the basis of Calcium analysis.
** Calculated on the basis of Magnesium analysis.

Dr. C. N. Reddy, Ph.D
Director

JLH/CNR

6.7.35

CHEMTEX

Environmental & Industrial Hygiene Services

3082 25th Street, Port Arthur, Texas 77642, 409-983-4575
FAX: 409-982-1522

Client: E T S Inc.
10389 Mammoth Dr.
Baton Rouge, LA 70814

Report Date: 12/10/92
Date Collected: 11/4-5/92
Collected By: Client
Date Received: 11/8/92
CHEMTEX FILE#: 2110386

PROJECT: UNIT #1 AND UNIT #2

SAMPLE IDENTIFICATION: FLY ASH 2A

CHEMTEX #: 2110387

ULTIMATE FUEL ANALYSIS

		Date Analyzed/ Analyst
Nickel (mg/kg)	104.0	11/20/92 CK/KR
Chromium (mg/kg)	8.5	11/20/92 CK/KR
Vanadium (mg/kg)	793.0	11/20/92 CK/KR
Cadmium (mg/kg)	3.16	11/20/92 CK/KR
Beryllium (mg/kg)	0.2	11/20/92 CK/KR
Mercury (mg/kg)	0.14	11/20/92 CK/KR
Elemental S (wt%)	13.03	12/9/92 SC
Elemental C (wt%)	5.33	12/9/92 SC
Ash (wt%)	92.94	12/8/92 MK
Moisture (wt%)	< 0.01	12/8/92 MK
Calcium (mg/kg)	655,000	12/11/92 CK
Calcium Sulfate(mg/kg)*	2,225,000	12/11/92 CK
Calcium oxide (mg/kg)*	916,350	12/11/92 CK
Magnesium (mg/kg)	28,500	12/11/92 CK
Magnesium Oxide (mg/kg)**	47,250	12/11/92 CK

* Calculated on the basis of Calcium analysis.
** Calculated on the basis of Magnesium analysis.

CNReddy

Dr. C. N. Reddy, Ph.D
Director

JLH/CNR

6.7.36

NISCO Unit 2A Operation data for November 4-5, 1992.

Date	Time	Generation	Steam Pressure	Steam Temp	Fuel Flow	Limestone Flow	Steam Flow
		MA2JT15.PV	AA2PT35.PV	AA2TI37.OPEU	JM2FI09.PV	JU2FI03.PV	AB2FY01.PV
		MWATTS	PSIG	DEG	KPPH	KPPH	KPPH
11/4/92	8:00:00	87.007	1596.246	1005.074	59.725	16.721	685.525
11/4/92	9:00:00	86.949	1593.281	1004.867	60.092	15.045	684.248
11/4/92	10:00:00	87.45	1594.93	1004.763	60.244	15.004	688.011
11/4/92	11:00:00	88.685	1597.846	1005.282	60.976	13.874	699.497
11/4/92	12:00:00	88.715	1596.721	1004.709	61.319	15.585	700.02
11/4/92	13:00:00	88.728	1597.644	1005.314	61.357	16.426	700.844
11/4/92	14:00:00	88.711	1596.832	1004.809	61.64	15.767	700.191
11/4/92	15:00:00	88.674	1597.226	1005.043	61.792	14.939	700.041
11/4/92	16:00:00	88.669	1596.002	1004.721	62.011	14.618	699.494
11/4/92	17:00:00	88.944	1598.145	1005.515	62.507	14.56	701.606
11/4/92	18:00:00	88.791	1594.135	1004.679	63.103	20.199	701.117
11/4/92	19:00:00	89.315	1600.771	1004.838	62.622	19.415	704.785
11/4/92	20:00:00	89.271	1599.844	1005.106	61.423	15.892	703.638
11/4/92	21:00:00	89.488	1596.747	1004.828	61.975	14.26	704.677
11/4/92	22:00:00	89.39	1597.555	1004.84	61.969	14.473	704.303
11/4/92	23:00:00	89.423	1596.724	1005.236	62.229	17.924	703.977
11/5/92	0:00:00	89.543	1600.012	1004.846	61.79	13.451	705.387
11/5/92	1:00:00	89.346	1599.367	1005.099	61.785	16.715	704.674
11/5/92	2:00:00	87.955	1593.637	1005.018	61.592	20.531	689.919
11/5/92	3:00:00	87.758	1594.769	1004.77	60.769	15.91	688.557
11/5/92	4:00:00	87.754	1595.772	1004.857	60.612	16.583	688.843
11/5/92	5:00:00	87.731	1596.22	1004.92	60.505	16.892	688.397
11/5/92	6:00:00	87.858	1595.715	1005.106	60.853	15.816	689.595
11/5/92	7:00:00	87.74	1592.226	1005	61.168	17.459	688.397
11/5/92	8:00:00	88.2	1599.167	1005.496	61.422	17.794	690.377
11/5/92	9:00:00	87.939	1594.335	1004.975	61.384	14.023	689.197
11/5/92	10:00:00	88.08	1594.582	1004.88	61.561	17.293	690.5
11/5/92	11:00:00	88.34	1597.224	1004.769	61.573	17.891	696.126
11/5/92	12:00:00	88.144	1597.234	1004.881	61.391	18.316	694.656
11/5/92	13:00:00	87.948	1596.822	1005.001	61.041	16.79	692.957
11/5/92	14:00:00	87.545	1596.452	1004.83	60.683	16.05	690.697
11/5/92	15:00:00	87.397	1595.402	1004.962	60.624	15.487	689.235
11/5/92	16:00:00	87.466	1594.122	1004.588	60.955	15.087	688.941
11/5/92	17:00:00	87.667	1595.005	1004.851	60.738	15.888	690.117
11/5/92	18:00:00	88.238	1596.771	1004.896	61.06	15.838	695.583
11/5/92	19:00:00	88.318	1597.061	1005.271	60.801	15.231	695.889
11/5/92	20:00:00	88.127	1595.001	1004.858	60.864	16.165	692.952

Presented on the following pages are Boiler 2A operating data collected during the emissions tests.

VI. APPENDIX

The following appendices are presented as supporting documentation to the emission test report.

7.1.1 Resumes of Test Personnel

7.2.1 Equipment Calibrations

7.3.1 Gas Standard Certifications

7.4.1 Continuous Analyzer descriptions and specifications

Brad E. Latham
Project Engineer
Emission Testing Services, Incorporated
Baton Rouge, Louisiana

EDUCATION & CERTIFICATIONS

Engineering Technology
Louisiana State University

Industrial Technology
Southeastern Louisiana University

Continuing Education in Specialized Environmental Topics
Air-Pollution Training Institute, (EPA)

Certified Visual Emissions Opacity Reader - EPA Method 9
State of Louisiana, Dept. of Environmental Quality

OVERVIEW

Mr. Latham has over 10 years experience in emission testing and has personally performed testing on over 1000 sources. He is proficient in all EPA testing methodologies, various state and local testing methodologies and unique test methods applicable to complex sources. He has provided project management for over 300 projects including several hazardous waste incinerator test burns. Mr. Latham has also been involved in test method development and evaluation.

EXPERIENCE

1987 to Present - Emission Testing Services, Inc. - Project Engineer. Responsible for project management, personnel training and test method development. Co-ordinates testing with clients. Conducts all complex testing utilizing state of the art testing methodologies.

1985 to 1987 - Kemron Environmental Services - Sampling specialist experienced in emission testing, fugitive emissions, continuous emissions and ambient air monitoring. Proficient in source sampling and testing using reference method tests. Conducts calibration and repair of continuous monitoring equipment.

1980 to 1985 - Kemron Environmental Services - Laboratory and emission testing assistant. Conducted routine emission testing, laboratory analysis and preparation of standard laboratory solutions. Also, performed groundwater monitoring, railcar decant monitoring and served as laboratory sample custodian.

PROFESSIONAL SOCIETIES

Air Pollution Control Association

Source Evaluation Society

Brian Scott Lesley
Sampling Specialist
Emission Testing Services, Inc.
Baton Rouge, Louisiana

EDUCATION

High School Graduate

USAF Security Specialist Technical School - Certified
San Antonio, Texas

USAF Telecommunication System Control Specialist Technical School - Certified - Biloxi, Mississippi

Louisiana State University

Florida Junior College

EXPERIENCE

1990 to Present - Emission testing specialist for ETS. Performs EPA Reference methods for compliance testing as well as other non-routine source evaluations. Responsibilities also include equipment calibrations and maintenance of analytical instruments.

1989 to 1990 - Worked as helper for National Maintenance Corporation. Responsibilities included assisting millwrights, pipefitters, boilermakers and welders.

1982 to 1988 - USAF - Air National Guard

Kevin Thibodeaux
Sampling Specialist
Emission Testing Services, Incorporated
Baton Rouge, Louisiana

EDUCATION

High School Graduate

U.S. EPA Round Robin sample integrity audits

Completed Emission Testing Services Air Sampling Techniques Seminar

Participates in on going Air-Pollution Training Institute Courses (APTI)

EPA certified opacity reader (Method 9)

EXPERIENCE

1987 to Present - Emission Testing Services, Inc. - Sampling Specialist in emission testing. Performing EPA Reference Methods and non routine source evaluations. Crew leader for monitor certifications and various other source evaluations.

Responsible for the calibration of pitot tubes, control consoles, and thermocouples.

Damon Wood
Sampling Trainee
Emission Testing Services, Incorporated
Baton Rouge, Louisiana

EDUCATION

High School Graduate

LSU - One year

University of Southwestern Louisiana - one year

EXPERIENCE

Present - Emission Testing Sampling Trainee for ETS. Performs EPA Reference methods for compliance testing as well as other non-routine source evaluations. Responsibilities also include equipment calibrations and maintenance of analytical instruments.

1990 (May to August) - West Paine Laboratories, Inc. located in Baton Rouge - Lab Technician

1987 to 1990 - Animal Health Clinic - Veterinary Assistant.

ETS
EMISSION TESTING SERVICES, INC.

METER BOX CALIBRATION DATA AND CALCULATION FORM

(English Units)

Leak Check Good @ 0.00003

T.D.G.M.R. 061.937

Date 9-3-92

Meter box number 792

Barometric pressure, P_b 30.08 in. Hg

Calibrated by B. Magee Jr.

Orifice manometer setting (ΔH), in. H_2O	Wet test meter (V_w), ft^3	Dry gas meter (V_d), ft^3	Wet test meter (t_w), °F	Dry gas meter Inlet (t_{d_i}), °F	Dry gas meter Outlet (t_{d_o}), °F	Dry gas meter Avg (t_d), °F	Time (θ), min.
0.5	5	5.272 067.209	75°	98 101	91 99	97.25	12.32
1.0	5	5.297 072.506	75°	99 95	97 94	96.25	8.68
1.5	10	10.547 083.053	75°	93 91	92 88	91.0	14.30
2.0	10	10.495 093.548	75°	90 92	88 89	89.75	12.48
3.0	10	10.498 104.046	75°	90 93	87 88	89.50	10.27
4.0	10						

ΔH, in. H_2O	$\frac{\Delta H}{13.6}$	$Y_i = \frac{V_w P_b (t_d + 460)}{V_d (P_b + \frac{\Delta H}{13.6}) (t_w + 460)}$	$\Delta H@_i = \frac{0.0317 \Delta H}{P_b (t_d + 460)} \left[\frac{(t_w + 460)\theta}{V_w}\right]^2$
0.5	0.0368	0.9866	1.6431
1.0	0.0737	0.9790	1.6342
1.5	0.110	0.9729	1.6791
2.0	0.147	0.9743	1.7091
3.0	0.221	0.9712	1.7369
4.0	0.294		
Average		0.9768	1.6805

Y = Ratio of reading of wet test meter to dry test meter; tolerance for individual values ± 0.02 from average.

$H_@$ = Orifice pressure differential that equates to 0.75 cfm of air @ 68 F and 29.92 inches of mercury, in. H_2O; tolerance for individual values ± 0.20 from average.

Calibrated by Billy Magee Jr.

ETS

PITOT TUBE CALIBRATION

Pitot Tube Number P-10-3. Cp (std) 0.99.

Calibrated By Ram Dwgum Date Aug/17/92.

Point Number	Standard Pitot Δp (in. H_2O)	"S" Type Pitot Δp (in. H_2O) "A" Side	"B" Side
H 1	1.3	1.9	1.95
M 2	0.87	1.3	1.3
L 3	0.31	0.44	0.48

Calculations:

$$Cp_{(s)} = Cp_{(std)} \times \sqrt{\frac{\Delta p\ (std)}{\Delta p\ (s)}}$$

Deviation $= Cp_{(s)} - \overline{Cp}$ (Side A or B)

Avg. Dev. $= \dfrac{\sum_{1}^{3} \left| Cp_{(s)} - \overline{Cp} \right|}{3}$ (Side A or B)

"A" Side $Cp_{(s)}$	Deviation	"B" Side $Cp_{(s)}$	Deviation
0.819	0.001	0.808	−0.003
0.810	0.01	0.810	−0.005
0.831	−0.011	0.796	0.009

$\overline{Cp}$ = 0.820 = 0.805

$\left| \overline{Cp}\ (\text{Side A}) - \overline{Cp}\ (\text{Side B}) \right|$ = 0.015 (must be $\leq$ 0.01)

Avg. Dev. (Side A) = 0.007. (must be $\leq$ 0.01)

(Side B) = 0.006. (must be $\leq$ 0.01)

$Cp = \dfrac{\overline{Cp}\ (\text{Side A}) + \overline{Cp}\ (\text{Side B})}{2}$ (should be $0.80 \leq Cp \leq 0.85$) = 0.813.

ETS
EMISSION TESTING SERVICES, INC.

BAROMETRIC DATA SHEET

DATE 11 9 92 CLIENT NISCO

LOCATION West Lake La.

********** Meteorology **********

Wind Direction N.E Temperature D_____ W_____

Wind Speed 15 mph Relative Humidity_____

Observation_____

********** BAROMETER **********

BAROMETER ID. 2 B

CALIBRATION DATA

INITIAL CALIBRATION: Initial 29.99 Final 29.99

Adj.(y/n)___

CALIBRATION REFERENCE

ID. Lake Charles weather service

ELEVATION: 75' ELEVATION DIFF: 75'

BAROMETER READING: 29.80

COMMENTS:_____

Signed: Damon Ward Project Number: 92131

File: BAROM

ETS
EMISSION TESTING SERVICES, INC.
P.O. BOX 15075 * BATON ROUGE, LA 70895

OXYGEN CYLINDER CERTIFICATION

Company: QUALITY GAS

Analyst: RAYMOND JONES

Cylinder: CC 83899L

Date: February 28, 1992

Instrument: Orsat Analysis

Trial	O_2	CO_2
1	9.0	0.00
2	8.9	0.00
3	8.8	0.00
4	8.8	0.00
5	9.0	0.00
6	8.8	0.00
7	8.8	0.00
8	8.8	0.00
9	8.8	0.00

Mean O_2 % avg.= 8.86

D:\FORM\02CERT

ETS
EMISSION TESTING SERVICES, INC.

OXYGEN CYLINDER CERTIFICATION

Company: Quality Gas
Analyst: Damon Wood
Cylinder: CC108656
Date: 03/10/92
Instrument: Orsat Analysis

Trial	O_2	CO_2
1	14.8	0.00
2	14.8	0.00
3	15.0	0.00
4	14.8	0.00
5	14.8	0.00
6	15.0	0.00
7	14.8	0.00
8	14.8	0.00
9	14.8	0.00

Mean O_2 % avg.= 14.84%

D:\FORM\02CERT

Scott Specialty Gases

a division of Scott Environmental Technology, Inc.

1290 COMBERMERE STREET, TROY, MICHIGAN 48084 (313) 589-2950

Shipped From : Scott Michigan

Our Project # : 532528

Your P.O. # : 92-0110-2

Expiration Date : 8-5-93

Cylinder Number : ALM-016132

Cylinder Pressure 1900 psig

1 of 2 Component(s)

Customer :
EMISSION TESTING SERVICES
10389 MAMMOTH DR.
BATON ROUGE, LA. 70895

* * * * CERTIFICATE OF ANALYSIS - EPA PROTOCOL GASES * * * *
PERFORMED ACCORDING TO SECTION 3.0.4

Certified Per Traceability Protocol # 1 — Procedure # G1

File # PO-2567

Certified Accuracy 1 % NBS Traceable

ANALYZED CYLINDER		REFERENCE STD			INSTRUMENTATION		
COMPONENT	CERTIFIED CONC.	SRM # (CRM #)	CYLINDER NUMBER	CONC.	INSTR/MODEL/SERIAL #	LAST CALIBRATION DATE	ANALYTICAL PRINCIPLE
NITRIC OXIDE	91.59 PPM	1684	ALM-003644	97.28 PPM	HORIBA	1-13-92	CHEMILUMINESCENCE
	.30	16838	CAL-12726	47.90 PPM	OPE-235		
	91.89						

BALANCE GAS : NITROGEN

NITROGEN DIOXIDE 0.30 PPM (FROM SECOND ANALYSIS)

FIRST ANALYSIS DATE : 1-28-92

ZERO GAS (mV)	TEST GAS (mV)	RESULTS PPM	REFERENCE GAS CONC.	(mV)	RESULTS PPM
0.00	92.30	91.62	97.30 PPM	98.00	97.28
0.00	92.30	91.62		98.00	97.28
0.00	92.30	91.62		98.00	97.28
CALCULATED RESULTS		91.64			
		91.64			
		91.64			
AVERAGE :		91.64 PPM			

SECOND ANALYSIS DATE : 2-5-92

ZERO GAS (mV)	TEST GAS (mV)	RESULTS PPM	REFERENCE GAS CONC.	(mV)	RESULTS PPM
0.00	92.20	91.52	97.30 PPM	98.00	97.28
0.00	92.20	91.52		98.00	97.28
0.00	92.20	91.52		98.00	97.28
0.00	92.50 NOX	91.82			
CALCULATED RESULTS		91.54			
		91.54			
		91.54	91.83 PPM NOX		
AVERAGE :		91.54 PPM			

CALIBRATION CURVE 1 st DEGREE

SRM # (CRM #)	CONC. PPM	SPLIT PT (%)	DVM (mV)	FITTED VALUE	PERCENT ERROR
1684	97.28	100	98.00	97.28	-0.00
	48.00	49	48.50	48.10	0.22
16838	47.90	49	48.30	47.91	0.01
	22.60	23	22.90	22.67	0.32
	0.00	0	0.00	0.00	0.00
		0		0.0000	0.00
		0		0.00	0.00
SMIS	22.60	LOW	22.90	22.67	0.32
	97.28	HIGH	98.00	97.28	-0.00

The only liability of this Company for gas which fails to comply with this analysis shall be replacement thereof by the Company without expense.

* SMIS - GAS MANUFACTURER'S INTERNAL STANDARD

Analyst : _____ Approved By : J. Shapiro

Scott Specialty Gases

a division of Scott Environmental Technology, Inc.

1290 COMBERMERE STREET, TROY, MICHIGAN 48084 (313) 589-2950

Shipped From : Scott Michigan
Our Project # : 526291
Your P.O. # : 910322 REPLACE
Expiration Date : 1-31-93
Cylinder Number : AAL-4260
Cylinder Pressure 1900 psig

Customer :
EMISSION TESTING SERVICES
10389 MAMMOTH DRIVE
BATON ROUGE, LA. 70895

: : : : CERTIFICATE OF ANALYSIS - EPA PROTOCOL GASES : : : :
PERFORMED ACCORDING TO SECTION 3.0.4
Certified Per Traceability Protocol # 1
Procedure # G1
File # PO-0892
Certified Accuracy 1 % NBS Traceable

ANALYZED CYLINDER		REFERENCE STD			INSTRUMENTATION		
COMPONENT	CERTIFIED CONC.	SRM # (CRM #)	CYLINDER NUMBER	CONC.	INSTR/MODEL/SERIAL #	LAST CALIBRATION DATE	ANALYTICAL PRINCIPLE
NITRIC OXIDE	195.2 PPM	1685	ALM-006700	250.3 PPM	BECKMAN	7-31-91	CHEMILUMINESCENCE
		EMIS*	AAL-14484	145.3 PPM	PSIA		

BALANCE GAS : NITROGEN

NITROGEN DIOXIDE 0.00 PPM (FROM SECOND ANALYSIS)

FIRST ANALYSIS DATE : 7-24-91

ZERO GAS (mV)	TEST GAS (mV)	RESULTS PPM	REFERENCE GAS CONC.	(mV)	RESULTS PPM
0.00	65.80	195.2	250.3 PPM	84.40	250.3
0.00	65.80	195.2		84.40	250.3
0.00	65.80	195.2		84.40	250.3
CALCULATED RESULTS		195.2 195.2 195.2			
AVERAGE :		195.2 PPM			

SECOND ANALYSIS DATE : 7-31-91

ZERO GAS (mV)	TEST GAS (mV)	RESULTS PPM	REFERENCE GAS CONC.	(mV)	RESULTS PPM
0.00	65.80	195.2	250.3 PPM	84.40	250.3
0.00	65.80	195.2		84.40	250.3
0.00	65.80	195.2		84.40	250.3
0.00	65.80 NOX	195.2			
CALCULATED RESULTS		195.2 195.2 195.2	195.2 PPM NOX		
AVERAGE :		195.2 PPM			

CALIBRATION CURVE 1 st DEGREE

SRM # (CRM #)	CONC. PPM	SPLIT PT (%)	DVM (mV)	FITTED VALUE	PERCENT ERROR
1685	250.3	100	84.40	250.3	-0.00
	236.0	94	79.80	236.7	0.28
	145.3	58	48.90	145.1	-0.15
	97.30	39	32.80	97.36	0.06
	0.0000	0	0.00	0.0000	0.00
		0		0.0000	0.00
		0		0.00	0.00
1684	97.30 LOW		32.80	97.36	0.06
1685	250.3		84.40	250.3	-0.00

* EMIS - GAS MANUFACTURER'S INTERNAL STANDARD

This Company for goods which fails to comply with this warranty shall be replacement thereof by this Company without extra cost.

J. Shapiro

7.3.4

Scott Specialty Gases

a division of Scott Environmental Technology, Inc.

1290 COMBERMERE STREET, TROY, MICHIGAN 48084 (313) 589-2950

Shipped Date : _____

Our Project # : 53675

Your P.O. # : 1205FD

Expiration Date : 12-22-93

Cylinder Number : ALM014281

Cylinder Pressure 1900 psig

1 of 1 Component(s)

Customer :
EMMISION TESTING SERVICES
10389 MAMMOTH DRIVE
BATON ROUGE LA 70895

* * * * CERTIFICATE OF ANALYSIS - EPA PROTOCOL GASES * * * *
PERFORMED ACCORDING TO SECTION 3.0.4

Certified Per Traceability Protocol # 1 — Procedure # G1

File # FO-3675

Certified Accuracy 1 % NBS Traceable

ANALYZED CYLINDER		REFERENCE STD			INSTRUMENTATION		
COMPONENT	CERTIFIED CONC.	SRM # (CRM #)	CYLINDER NUMBER	CONC.	INSTR/MODEL/SERIAL #	LAST CALIBRATION DATE	ANALYTICAL PRINCIPLE
CARBON MONOXIDE	29.39 PPM	1678A	AAL-5776	47.20 PPM	HORIBA	2-10-92	NON-DISPERSIVE INFRARED
		GMIS1	AAL20120	20.57 PPM	OPE-144E		
					560172153		

BALANCE GAS : NITROGEN

FIRST ANALYSIS — DATE : 6-15-92

ZERO GAS (mV)	TEST GAS (mV)	RESULTS PPM	REFERENCE GAS CONC.	(mV)	RESULTS PPM
0.00	62.00	29.39	47.20 PPM	100.00	47.20
0.00	62.00	29.39		100.00	47.20
0.00	62.00	29.39		100.00	47.20

CALCULATED RESULTS: 29.39, 29.39, 29.39

AVERAGE : 29.39 PPM

SECOND ANALYSIS — DATE : 6-22-92

ZERO GAS (mV)	TEST GAS (mV)	RESULTS PPM	REFERENCE GAS CONC.	(mV)	RESULTS PPM
0.00	62.00	29.39	47.20 PPM	100.00	47.20
0.00	62.00	29.39		100.00	47.20
0.00	62.00	29.39		100.00	47.20

CALCULATED RESULTS: 29.39, 29.39, 29.39

AVERAGE : 29.39 PPM

CALIBRATION CURVE — 3 rd DEGREE

SRM # (CRM #)	CONC. PPM	SPLIT PT (%)	DVM (mV)	FITTED VALUE	PERCENT ERROR
1678A	47.20	100	100.00	47.20	0.00
GMIS	24.31	52	51.50	24.32	0.05
GMIS	20.57	44	43.70	20.55	-0.09
1677C	9.90	21	21.40	9.88	-0.18
	0.00	0	0.00	0.00	0.00
		0		0.0000	0.00
		0		0.00	0.00
GMIS	20.57	LOW	43.70	20.55	-0.09
1678A	47.20	HIGH	100.00	47.20	0.00

* GMIS - GAS MANUFACTURER'S INTERNAL STANDARD

Analyst : F Dorn

Approved By : J Shapiro

The only liability of this Company for gas which fails to comply with this analysis shall be replacement thereof by the Company without extra cost.

Scott Specialty Gases

a division of Scott Environmental Technology, Inc.

1290 COMBERMERE STREET, TROY, MICHIGAN 48084 (313) 589-2950

Shipped From : Scott Michigan
Our Project # : 537662
Your P.O. # : 1205FD
Expiration Date : 12-22-93
Cylinder Number : ALM004919
Cylinder Pressure 1900 psig
1 of 1 Component(s)

Customer :
EMISSION TESTING SERVICES
10389 MAMMOTH DRIVE
BATON ROUGE LA 70895

* * * * CERTIFICATE OF ANALYSIS - EPA PROTOCOL GASES * * * *
PERFORMED ACCORDING TO SECTION 3.0.4
Certified Per Traceability Procedure # G1
Protocol # 1
File # PO-3599
Certified Accuracy 1 % NBS Traceable

ANALYZED CYLINDER		REFERENCE STD			INSTRUMENTATION		
COMPONENT	CERTIFIED CONC.	SRM # (CRM #)	CYLINDER NUMBER	CONC.	INSTR/MODEL/SERIAL #	LAST CALIBRATION DATE	ANALYTICAL PRINCIPLE
CARBON MONOXIDE	57.22 PPM	1697	AAL1355	96.67 PPM	HORIBA	6-22-92	NON-DISPERSIVE INFRARED
		1677C	AAL9235	9.90 PPM	OPE 144E		

BALANCE GAS : NITROGEN

FIRST ANALYSIS DATE : 6-15-92

ZERO GAS (mV)	TEST GAS (mV)	RESULTS PPM	REFERENCE GAS CONC.	(mV)	RESULTS PPM
0.00	101.20	57.17	96.67 PPM	170.00	96.67
0.00	101.20	57.17		170.00	96.67
0.00	101.20	57.17		170.00	96.67

CALCULATED RESULTS 57.17
57.17
57.17

AVERAGE : 57.17 PPM

SECOND ANALYSIS DATE : 6-22-92

ZERO GAS (mV)	TEST GAS (mV)	RESULTS PPM	REFERENCE GAS CONC.	(mV)	RESULTS PPM
0.00	101.40	57.28	96.67 PPM	170.00	96.67
0.00	101.40	57.28		170.00	96.67
0.00	101.40	57.28		170.00	96.67

CALCULATED RESULTS 57.28
57.28
57.28

AVERAGE : 57.28 PPM

CALIBRATION CURVE 2 nd DEGREE

SRM # (CRM #)	CONC. %	SPLIT PT (%)	DVM (mV)	FITTED VALUE	PERCENT ERROR
1697	96.67	100	170.00	96.67	-0.00
GMIS	50.55	52	89.70	50.61	0.12
1678A	47.20	49	83.60	47.14	-0.12
GMIS	20.57	21	36.60	20.53	-0.17
1677C	9.90	10	17.80	9.96	0.58
	0.00	0	0.00	0.0000	0.00
		0		0.00	0.00
1677C	9.90	LOW	17.80	9.96	0.58
1697	96.67	HIGH	170.00	96.67	-0.00

The only liability of this Company for gas which fails to comply with this analysis shall be replacement thereof by the Company without extra cost.

* GMIS - GAS MANUFACTURER'S INTERNAL STANDARD

Analyst : [signature] Approved By : [signature]

7.3.6

Scott Specialty Gases

a division of Scott Environmental Technology, Inc.

1290 COMBERMERE STREET, TROY, MICHIGAN 48084 (313) 589-2950

Shipped From : Scott Michigan

Our Project # : 537662

Your P.O. # : 1205FD

Expiration Date : 12-22-93

Cylinder Number : ALM002848

Cylinder Pressure 1900 psig

1 of 1 Component(s)

Customer :
EMISSION TESTING SERVICES
10389 MAMMOTH DRIVE
BATON ROUGE LA 70895

CERTIFICATE OF ANALYSIS - EPA PROTOCOL GASES

PERFORMED ACCORDING TO SECTION 3.0.4

Certified Per Traceability Protocol # 1

Procedure # G1

File # PO-3601

Certified Accuracy 1 % NBS Traceable

ANALYZED CYLINDER		REFERENCE STD			INSTRUMENTATION		
COMPONENT	CERTIFIED CONC.	SRM # (CRM #)	CYLINDER NUMBER	CONC.	INSTR/MODEL/SERIAL #	LAST CALIBRATION DATE	ANALYTICAL PRINCIPLE
CARBON MONOXIDE	86.72 PPM	1697	AAL1355	96.67 PPM	HORIBA	6-22-92	NON-DISPERSIVE INFRARED
		1677C	AAL9235	9.90 PPM	OPE 144E		

BALANCE GAS : NITROGEN

FIRST ANALYSIS DATE : 6-15-92

ZERO GAS (mV)	TEST GAS (mV)	RESULTS PPM	REFERENCE GAS CONC.	(mV)	RESULTS PPM
0.00	152.80	86.75	96.67 PPM	170.00	96.67
0.00	152.80	86.75		170.00	96.67
0.00	152.80	86.75		170.00	96.67

CALCULATED RESULTS 86.75
86.75
86.75

AVERAGE : 86.75 PPM

SECOND ANALYSIS DATE : 6-22-92

ZERO GAS (mV)	TEST GAS (mV)	RESULTS PPM	REFERENCE GAS CONC.	(mV)	RESULTS PPM
0.00	152.70	86.69	96.67 PPM	170.00	96.67
0.00	152.70	86.69		170.00	96.67
0.00	152.70	86.69		170.00	96.67

CALCULATED RESULTS 86.69
86.69
86.69

AVERAGE : 86.69 PPM

CALIBRATION CURVE 2 nd DEGREE

SRM # (CRM #)	CONC. %	SPLIT PT (%)	DVM (mV)	FITTED VALUE	PERCENT ERROR
1697	96.67	100	170.00	96.67	-0.00
GMIS	50.55	52	89.70	50.61	0.12
1678A	47.20	49	83.60	47.14	-0.12
GMIS	20.57	21	36.60	20.53	-0.17
1677C	9.90	10	17.80	9.96	0.58
	0.00	0	0.00	0.0000	0.00
		0		0.00	0.00
1677C	9.90	LOW	17.80	9.96	0.58
1697	96.67	HIGH	170.00	96.67	-0.00

: GMIS - GAS MANUFACTURER'S INTERNAL STANDARD

Analyst : [signature]

Approved By : J. Shapiro

The only liability of this Company for gas which fails to comply with this analysis shall be replacement thereof by the Company without extra cost.

7.3.7

EPA PROTOCOL
UN1956 BAL AIR
THC AS PROPANE
10.19ppm

NON FLAMMABLE

Date 7-9-92
CYL. ALM009986
PROJECT NO. 37662
EXPIRATION DATE 12-11-93
P.O. 1205FD
P03596

Scott Specialty Gases
MIDWEST 313-589-2950
EAST 215-766-8861
SOUTHWEST 713-844-4820
WEST 714-887-2571
DO NOT REMOVE THIS LABEL

Customer :
EMISSION TESTING SERVICES
10389 MAMMOTH DRIVE
BATON ROUGE, LA. 70895

**** CERTIFICATE OF ANALYSIS - EPA PROTOCOL GASES ****

PERFORMED ACCORDING TO SECTION 3.0.4

Certified Per Traceability Protocol # 1 — Procedure # G1

LAB # 3596

Certified Accuracy 1 % NBS Traceable

Shipped From : Scott Michigan
Our Project # : 537662
Your P.O. # : 1205FD
Expiration Date : 12-11-93
Cylinder Number : ALM-009986
Cylinder Pressure : 1900 psig
Certification Date : 6-11-92
1 of 1 Component(s)

ANALYZED CYLINDER

COMPONENT	CERTIFIED CONCENTRATION
THC AS PROPANE	10.19 PPM

BALANCE GAS : AIR

REFERENCE STANDARDS

SRM # (CRM #)	CYLINDER NUMBER	CONCENTRATION
1667B	FF-26980	47.80 PPM
GMIS	ALM-008846	31.20 PPM

INSTRUMENTATION

INSTRUMENT/ MODEL/SERIAL #	LAST CALIBRATION DATE	ANALYTICAL PRINCIPLE
BECKMAN 400	6-12-92	FLAME IONIZATION DETECTOR

ANALYSIS DATE : 6-11-92

ZERO GAS (mV)	TEST GAS (mV)	CURVE RESULTS PPM	REFERENCE GAS CONCENTR.	(mV)	CURVE RESULTS PPM
0.00	10.10	10.12	47.80 PPM	47.80	47.80
0.00	10.20	10.22		47.80	47.80
0.00	10.20	10.22		47.80	47.80

CALCULATED RESULTS 10.12
10.22
10.22

AVERAGE : 10.19 PPM

CALIBRATION CURVE 3 rd DEGREE

SRM # (CRM #)	CONC. PPM	SPLIT PT (%)	DVM (mV)	FITTED VALUE	PERCENT ERROR
1667B	47.80	100	47.80	47.80	0.00
GMIS	31.20	65	31.40	31.26	0.20
	22.61	47	22.60	22.53	-0.35
NARM	8.171	17	8.200	8.228	0.70
	0.0000	0	0.0000	0.0000	0.00
		0		0.00	0.00
		0		0.00	0.00
NARM	8.171	LOW	8.200	8.228	0.70
1667B	47.80	HIGH	47.80	47.80	0.00

* GMIS - GAS MANUACTURER'S INTERNAL STANDARD

DATA ACQ CYL : 0 FILE # : 80

Analyst : Don Eichler Jr

Approved By : Thomas V. [illegible]

Revised : 3/31/92 RML

EPA PROTOCOL
UN 1956 BAL AIR
THC AS PROPANE 20.05ppm

NON FLAMMABLE

Date 7-9-92
CYL AAL7477
PROJECT NO. 37662
EXPIRATION DATE 12-11-93
P.O. 1205FD

Scott Specialty Gases
MIDWEST 313-589-2950
EAST 215-766-8861
SOUTHWEST 713-844-4820
WEST 714-887-2571
DO NOT REMOVE THIS LABEL

Shipped From : Scott Michigan
Our Project # : 537662
Your P.O. # : 1205FD
Expiration Date : 12-11-93
Cylinder Number : AAL-7477
Cylinder Pressure : 1900 psig
Certification Date : 6-11-92
1 of 1 Component(s)

Customer :
EMISSION TESTING SERVICES
10389 MAMMOTH DRIVE
BATON ROUGE, LA. 70895

**** CERTIFICATE OF ANALYSIS - EPA PROTOCOL GASES ****

PERFORMED ACCORDING TO SECTION 3.0.4

Certified Per Traceability Protocol # 1 — Procedure # G1

LAB # 3511

Certified Accuracy 1 % NBS Traceable

ANALYZED CYLINDER

COMPONENT	CERTIFIED CONCENTRATION
THC AS PROPANE	20.05 PPM

BALANCE GAS : AIR

REFERENCE STANDARDS

SRM # (CRM #)	CYLINDER NUMBER	CONCENTRATION
1667B	FF-26980	47.80 PPM
GMIS	ALM-008846	31.20 PPM

INSTRUMENTATION

INSTRUMENT/ MODEL/SERIAL #	LAST CALIBRATION DATE	ANALYTICAL PRINCIPLE
BECKMAN 400	6-12-92	FLAME IONIZATION DETECTOR

ANALYSIS — DATE : 6-11-92

ZERO GAS (mV)	TEST GAS (mV)	CURVE RESULTS PPM	REFERENCE GAS CONCENTR.	(mV)	CURVE RESULTS PPM
0.00	20.10	20.05	47.80 PPM	47.80	47.80
0.00	20.10	20.05		47.80	47.80
0.00	20.10	20.05		47.80	47.80

CALCULATED RESULTS 20.05, 20.05, 20.05

AVERAGE : 20.05 PPM

CALIBRATION CURVE — 3 rd DEGREE

SRM # (CRM #)	CONC. PPM	SPLIT PT (%)	DVM (mV)	FITTED VALUE	PERCENT ERROR
1667B	47.80	100	47.80	47.80	0.00
GMIS	31.20	65	31.40	31.26	0.20
	22.61	47	22.60	22.53	-0.35
NARM	8.171	17	8.200	8.228	0.70
	0.0000	0	0.0000	0.0000	0.00
		0		0.00	0.00
		0		0.00	0.00
NARM	8.171	LOW	8.200	8.228	0.70
1667B	47.80	HIGH	47.80	47.80	0.00

* GMIS - GAS MANUACTURER'S INTERNAL STANDARD

DATA ACQ CYL : 0 FILE # : 80

Analyst : Don Eichler Jr

Approved By : Thomas V. [illegible]

Revised : 3/31/92 RML

EPA PROTOCOL
UN 1956
BAL AIR
THC AS PROPANE
30.30ppm

NON FLAMMABLE

Date 7-9-92
CYL ALM013246
PROJECT NO. 37662
EXPIRATION DATE 12-11-93
P.O. 1205FD

Scott Specialty Gases
MIDWEST 313-589-2950
EAST 215-766-8861
SOUTHWEST 713-844-4820
WEST 714-887-2571
DO NOT REMOVE THIS LABEL

Shipped From : Scott Michigan
Our Project # : 537662
Your P.O. # : 1205FD
Expiration Date : 12-11-93
Cylinder Number : ALM-013246
Cylinder Pressure : 1900 psig
Certification Date : 6-11-92
1 of 1 Component(s)

Customer :
EMISSION TESTING SERVICES
10389 MAMMOTH DRIVE
BATON ROUGE, LA. 70895

**** CERTIFICATE OF ANALYSIS - EPA PROTOCOL GASES ****

PERFORMED ACCORDING TO SECTION 3.0.4

Certified Per Traceability Protocol # 1 — Procedure # G1

LAB # 3515

Certified Accuracy 1 % NBS Traceable

ANALYZED CYLINDER		REFERENCE STANDARDS			INSTRUMENTATION		
COMPONENT	CERTIFIED CONCENTRATION	SRM # (CRM #)	CYLINDER NUMBER	CONCENTRATION	INSTRUMENT/ MODEL/SERIAL #	LAST CALIBRATION DATE	ANALYTICAL PRINCIPLE
THC AS PROPANE	30.30 PPM	1667B	FF-26980	47.80 PPM	BECKMAN 400	6-12-92	FLAME IONIZATION DETECTOR
		GMIS	ALM-008846	31.20 PPM			

BALANCE GAS : AIR

ANALYSIS — DATE : 6-11-92

ZERO GAS (mV)	TEST GAS (mV)	CURVE RESULTS PPM	REFERENCE GAS CONCENTR.	(mV)	CURVE RESULTS PPM
0.00	30.40	30.27	47.80 PPM	47.80	47.80
0.00	30.50	30.37		47.80	47.80
0.00	30.40	30.27		47.80	47.80

CALCULATED RESULTS 30.27, 30.37, 30.27

AVERAGE : 30.30 PPM

CALIBRATION CURVE — 3 rd DEGREE

SRM # (CRM #)	CONC. PPM	SPLIT PT (%)	DVM (mV)	FITTED VALUE	PERCENT ERROR
1667B	47.80	100	47.80	47.80	0.00
GMIS	31.20	65	31.40	31.26	0.20
	22.61	47	22.60	22.53	-0.35
NARM	8.171	17	8.200	8.228	0.70
	0.0000	0	0.0000	0.0000	0.00
		0		0.00	0.00
		0		0.00	0.00
NARM	8.171	LOW	8.200	8.228	0.70
1667B	47.80	HIGH	47.80	47.80	0.00

* GMIS - GAS MANUACTURER'S INTERNAL STANDARD

DATA ACQ CYL : 0 FILE # : 80

Analyst : Don Eichler Jr

Approved By : Thomas E. Fuller

Revised : 3/31/92 RML

7.3.10

Customer :
EMMISION TESTING SERVICES
10389 MAMMOTH DRIVE
BATON ROUGE LA 70895

Shipped From : Scott Michigan
Our Project # : 537648
Your P.O. # : 1205FD
Expiration Date : 2-18-94
Cylinder Number : AAL5028
Cylinder Pressure 1900 psig

CERTIFICATE OF ANALYSIS - EPA PROTOCOL GASES

PERFORMED ACCORDING TO SECTION 3.0.4

Certified Per Traceability Protocol # 1 — Procedure # G1

File # 5095

Certified Accuracy 1 % NBS Traceable

1 of 1 Component(s)

ANALYZED CYLINDER		REFERENCE STD			INSTRUMENTATION		
COMPONENT	CERTIFIED CONC.	SRM # (CRM #)	CYLINDER NUMBER	CONC.	INSTR/MODEL/SERIAL #	LAST CALIBRATION DATE	ANALYTICAL PRINCIPLE
SULFUR DIOXIDE	410.2 PPM	1661	ALM007057	454.0 PPM	HORIBA	7-14-92	NON-DISPERSIVE INFRARED
		GMIS#	AAL-4050	250.1 PPM	OPE 135		
					56037204		

BALANCE GAS : NITROGEN

FIRST ANALYSIS DATE : 8-10-92

ZERO GAS (mV)	TEST GAS (mV)	RESULTS PPM	REFERENCE GAS CONC.	(mV)	RESULTS PPM
0.00	91.60	410.2	454.0 PPM	100.00	454.0
0.00	91.60	410.2		100.00	454.0
0.00	91.60	410.2		100.00	454.0

CALCULATED RESULTS 410.2, 410.2, 410.2

AVERAGE : 410.2 PPM

SECOND ANALYSIS DATE : 8-18-92

ZERO GAS (mV)	TEST GAS (mV)	RESULTS PPM	REFERENCE GAS CONC.	(mV)	RESULTS PPM
0.00	91.60	410.2	454.0 PPM	100.00	454.0
0.00	91.60	410.2		100.00	454.0
0.00	91.60	410.2		100.00	454.0

CALCULATED RESULTS 410.2, 410.2, 410.2

AVERAGE : 410.2 PPM

CALIBRATION CURVE 2 nd DEGREE

SRM # (CRM #)	CONC. PPM	SPLIT PT (%)	BVM (mV)	FITTED VALUE	PERCENT ERROR
1661	454.0	100	100.00	454.0	0.00
GMIS	250.1	55	58.90	249.5	-0.26
1694B	94.20	21	23.90	94.86	0.70
GMIS	48.32	11	12.50	48.39	0.14
	0.0000	0	0.00	0.0000	0.00
		0		0.0000	0.00
		0		0.00	0.00
GMIS	48.32	LOW	12.50	48.39	0.14
1661	454.0	HIGH	100.00	454.0	0.00

GMIS - GAS MANUFACTURER'S INTERNAL STANDARD

Analyst : E Horan

Approved By : J. Shapiro

Shipped From : SCOTT MATHESON

Our Project # : 537648

Your P.O. # : 1205FB

Expiration Date : 2-18-94

Cylinder Number : ALM016974

Cylinder Pressure 1900 psig

1 of 1 Component(s)

Customer :
EMMISION TESTING SERVICES
10389 MAMMOTH DRIVE
BATON ROUGE LA 70895

CERTIFICATE OF ANALYSIS - EPA PROTOCOL GASES # # #
PERFORMED ACCORDING TO SECTION 3.0.4

Certified Per Traceability Procedure # G1
Protocol # 1

File # 5096

Certified Accuracy 1 % NBS Traceable

ANALYZED CYLINDER		REFERENCE STD			INSTRUMENTATION		
COMPONENT	CERTIFIED CONC.	SRM # (CRM #)	CYLINDER NUMBER	CONC.	INSTR/MODEL/SERIAL #	LAST CALIBRATION DATE	ANALYTICAL PRINCIPLE
SULFUR DIOXIDE	197.8 PPM	1661	ALM007057	454.0 PPM	HORIBA	7-14-92	NON-DISPERSIVE INFRARED
		GMIS#	AAL-4050	250.1 PPM	GPE 135		
					56037204		

BALANCE GAS : NITROGEN

FIRST ANALYSIS DATE : 8-10-92

ZERO GAS (mV)	TEST GAS (mV)	RESULTS PPM	REFERENCE GAS CONC.	(mV)	RESULTS PPM
0.00	47.70	198.0	454.0 PPM	100.00	454.0
0.00	47.70	198.0		100.00	454.0
0.00	47.70	198.0		100.00	454.0

CALCULATED RESULTS 198.0
198.0
198.0

AVERAGE : 198.0 PPM

SECOND ANALYSIS DATE : 8-18-92

ZERO GAS (mV)	TEST GAS (mV)	RESULTS PPM	REFERENCE GAS CONC.	(mV)	RESULTS PPM
0.00	47.60	197.6	454.0 PPM	100.00	454.0
0.00	47.60	197.6		100.00	454.0
0.00	47.60	197.6		100.00	454.0

CALCULATED RESULTS 197.6
197.6
197.6

AVERAGE : 197.6 PPM

CALIBRATION CURVE 2 nd DEGREE

SRM # (CRM #)	CONC. PPM	SPLIT PT (%)	DVM (mV)	FITTED VALUE	PERCENT ERROR
1661	454.0	100	100.00	454.0	0.00
GMIS	250.1	55	58.90	249.5	-0.26
1694B	94.20	21	23.90	94.86	0.70
GMIS	48.32	11	12.50	48.39	0.14
	0.0000	0	0.00	0.0000	0.00
		0		0.0000	0.00
		0		0.00	0.00
GMIS	48.32	LOW	12.50	48.39	0.14
1661	454.0	HIGH	100.00	454.0	0.00

GMIS - GAS MANUFACTURER'S INTERNAL STANDARD

Analyst : F. Doran

Approved By : J. Shapiro

7.3.12

OXYGEN ANALYZER
PRINCIPLE OF OPERATION and SPECIFICATIONS

THERMOX

Model Number : 254

I. PRINCIPLES of OPERATION

The THERMOX oxygen analyzer consists of two units, a sensor and a control-readout unit. The sensor assembly incorporates an electrochemical cell, furnace, resistance temperature detector (RTD), flow block, and associated plumbing. The control-readout unit contains the electronics necessary for control of the cell furnace temperature, detector signal conditioning, and multiple range functions.

The electrochemical cell consists of a closed-end tube made of zirconium oxide (zirconia) with electrodes of porous platinum coated onto the inside and outside. When heated, the zirconia cell becomes a conductor of electricity due to the mobility of oxygen ions in its crystal structure. When the electrodes are in contact with gases of equal pressure having different oxygen concentrations, a voltage is produced that is logarithmically proportional to the ratio of the oxygen concentration on the reference side of the cell, ambient air, and the oxygen concentration on the other side of the cell, the sample gas.

Since the electrochemical cell voltage is also dependent on the cell temperature, the cell temperature is maintained at a constant level using an electrically heated furnace. Furnace temperature is sensed using a platinum RTD and controlled using a proportional temperature controller located in the control unit.

II. SPECIFICATIONS

Ranges	:	0 to 10%
	:	0 to 25%
Detection Limits		
minimum	:	0.01%
maximum	:	25%
Response Time	:	3 sec
Zero Drift, 24 hr	:	+/- 0.2%
Span Drift, 24 hr	:	+/- 0.2%
Precision	:	+/- 0.1%
Linearity	:	+/- 1%
Noise	:	0.05 RMS
Sample flow rate	:	0.5 - 2 l/min
Interferences	:	None

SULFUR DIOXIDE ANALYZER
PRINCIPLE OF OPERATION and SPECIFICATIONS

THERMO ELECTRON

Model Number : 40

I. PRINCIPLES of OPERATION

The Thermo Electron sulfur dioxide analyzer is based upon the measurement of the fluorescence of SO2 produced by its absorption of ultraviolet radiation. Sample gas is drawn into a chamber where the sample is exposed to a pulsating ultraviolet radiation with a wavelength in the range 230 nm to 190 nm. Ultraviolet radiation is produced using a light source that is focused through a narrow bandpass filter into the fluorescencent chamber. SO2 molecules are excited by the radiation pulses. The excited SO2 decays back to its natural ground state between pulses giving off a characteristic fluorescence. The intensity of the fluorescence is directly proportional to the concentration of sulfur dioxide. A second optical filter allows only the fluorescence radiation to pass through and fall on a photomultiplier tube. Electronic signal processing converts the photomultiplier signal to a voltage response which is directly proportional to the concentration of sulfur dioxide.

II. SPECIFICATIONS

Ranges	:	0 to 50 PPM, 0 to 100 PPM, 0 to 500 PPM, 0 to 1000 PPM, 0 to 5000 PPM		
Detection Limits				
minimum	:	1.0 PPM		
maximum	:	5000 PPM		
Response Time	:	5 sec		
Zero Drift, 2 hr	+/- 1%		24 hr :	+/- 2%
Span Drift, 2 hr	+/- 1%		24 hr :	+/- 2%
Accuracy	:	+/- 0.5%		
Linearity	:	+/- 1%		
Noise	:	0.5 PPM, 0 to 50 PPM range		
Sample flow rate	:	0.5 - 2 l/min		
Interferences	:	Negligible		

OXIDES OF NITROGEN ANALYZER
PRINCIPLE OF OPERATION and SPECIFICATIONS

THERMO ENVIRONMENTAL INSTRUMENTS

Model Number : 14A

I. PRINCIPLES of OPERATION

The model 14A NO-NO2-NOX analyzer utilizes the principle of chemiluminescence for the detection of nitrogen oxides. The analyzer consists of a photomultiplier, ozone generator, reaction chamber, NO2 to NO converter, and associated plumbing and electronics.

Sample gas is blended with O3 in a reaction chamber. The gas-phase reaction of NO and O3 produce a characteristic luminescence with an intensity linearly proportional to the concentration of NO. Chemiluminescence from the reaction is monitored through an optical filter using a highly sensitive photomutiplier. The filter photomultiplier combination responds to light in a narrow wavelength band unique to the NO and O3 reaction. In order to measure NOX, NO plus NO2, the sample gas is diverted through a NO2 to NO converter before entering the reaction chamber. The resulting chemiluminescent response is linearly proportional to the NOX concentration of the sample gas.

Ozone for the reaction is produced using an ozone generator. The generator uses a high energy electric arc discharge and dry ambient air to produce ozone.

II. SPECIFICATIONS

Ranges	:	0 to 0.01 PPM	Detection Limit		
		0 to 0.025 PPM	Minimum	:	0.001 PPM
		0 to 0.1 PPM	Maximum	:	2500 PPM
		0 to 0.25 PPM			
		0 to 1.0 PPM	Response Time	:	1 sec
		0 to 10 PPM			
		0 to 100 PPM	Linearity	:	+/- 1%
		0 to 1000 PPM			
		0 to 2500 PPM	Noise	:	0.05 RMS
12 hr Zero Drift	:	< 12%	Precision	:	+/- 1.0 PPM
12 hr Span Drift	:	< 12%			
			Sample flow rate	:	0.5 - 2 l/min

Interferences : Negligible interference from H2O, carbon and sulfur compounds

CARBON MONOXIDE ANALYZER
PRINCIPLE OF OPERATION and SPECIFICATIONS

THERMO ENVIRONMENTAL INSTRUMENTS

Model Number : 48

I. PRINCIPLES of OPERATION

The model 48 CO analyzer utilizes non-dispersive infrared (NDIR) detection of CO enhanced by gas filter correlation (GFC). The analyzer consists of an optical bench, Gas filter chopper, infrared (IR) source, IR detector, and associated electronics.

Sample gas is passed through an optical White Cell in which a beam of IR radiation passes. The White Cell provides a long beam path length in a relatively small cell by utilizing optical mirrors to produce multiple passes of the IR beam through the cell. IR radiation is produced using a wire wound resistor that is heated by passing a regulated DC voltage through the resistor causing it to radiate in the IR range. The radiation is passed through a gas filter chopper and a narrow bandpass interference filter before entering the White cell. As the IR beam passes through the cell, CO molecules absorb the IR proportional to the concentration of CO in the sample. The remaining IR exits the cell and is measured by an IR detector.

Interference from gases in the sample that absorb IR at the same wavelengths as CO are eliminated using GFC. GFC utilizes a correlation wheel consisting of two optical cells, one filled with CO and the other filled with N2. The wheel, positioned in the IR beam path before it enters the White Cell, is rotated by a synchronous motor. The IR beam passes alternately through the CO and N2 cells of the wheel. The CO filter acts to produce a reference beam which can not be further absorbed by CO in the sample cell. The N2 filter is transparent to IR radiation and produces a measure beam which can be absorbed by CO in the sample cell. The chopped detector signal is modulated by the alternation between the two gas filters with an amplitude related to the concentration of CO in the sample cell. Other gases do not cause detector signal modulation since they absorb the reference and measure beams equally.

II. SPECIFICATIONS

Ranges	:	0 to 1 PPM	Detection Limit		
		0 to 2 PPM	Minimum	:	0.10 PPM
		0 to 5 PPM	Maximum	:	1000 PPM
		0 to 10 PPM			
		0 to 20 PPM	Response Time	:	1 min
		0 to 50 PPM			
		0 to 100 PPM	Linearity	:	+/- 1%
		0 to 200 PPM			
		0 to 500 PPM	Noise	:	0.05 RMS
		0 to 1000 PPM			
24 hr Zero Drift	:	+/- 0.2 PPM	Precision	:	+/- 0.1 PPM
24 hr Span Drift	:	+/- 1% full scale			
			Sample flow rate	:	0.5 - 2 l/min
Interferences	:	Negligible interference from H2O and CO2			

HYDROCARBON ANALYZER
PRINCIPLE OF OPERATION and SPECIFICATIONS

BECKMAN

Model Number : 400

I. PRINCIPLES of OPERATION

The analyzer utilizes the flame ionization method of detection. The sensor is a burner where a regulated flow of sample gas passes through a flame sustained by regulated flows of a fuel gas and air. Within the flame, the hydrocarbon components of the sample stream undergo a complex ionization that produces electrons and positive ions. Polarized electrodes collect these ions, causing current to flow through an electronic measuring circuit. The ionization current is proportional to the rate at which carbon atoms enter the burner, and is therefore a measure of the concentration of hydrocarbon in the original sample.

To ensure stable, drift-free operation, particularly in high-sensitivity applications, an internal temperature controller maintains the analyzer interior at a constant 120 F. In order to minimize system response time, an internal sample-bypass feature provides high-velocity sample flow through the analyzer.

Both speed and magnitude of analyzer response are affected by the type of hydrocarbon in the sample. Magnitude of response to an atom of carbon depends on the chemical environment of the atom in the molecule. The characteristic response of a given type of atom is expressed as the "effective carbon number". This number for a particular carbon atom is defined as the ratio between the instrument response caused by the atom and the response caused by an aliphatic carbon atom. Although the instrument does not respond directly to atoms other than carbon, the presence of certain other atoms does change the response to carbon.

II. SPECIFICATIONS

Ranges	:	0 to 1 PPM, 0 to 10 PPM,
	:	0 to 100 PPM, 0 to 1000 PPM
Detection Limits		
minimum	:	0.01 PPM CH4
maximum	:	2% CH4
Response Time	:	90% CH4 within 0.5 sec
Zero Drift, 24 hr	:	+/- 1%
Span Drift, 24 hr	:	+/- 1%
Precision	:	+/- 1%
Linearity	:	+/- 1%
Sample flow rate	:	0.3 - 3 l/min
Interferences	:	None