PO # 1012
U.S. Navy - NCBC

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Complies with A/C and Rules

NEESA 2-164 OCTOBER 1990

SOURCE EMISSION TEST FOR NO_X, CO, AND ROC FROM CONVENTIONAL STEAM BOILER

AT

THOMAS PLANT, BUILDING 373
NAVAL CONSTRUCTION BATALLION CENTER
PORT HUENEME, CALIFORNIA

By:

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EXECUTIVE SUMMARY

This report describes source emission tests performed on the Cleaver-Brooks steam boiler located at the Thomas Plant aboard the Naval Construction Batallion Center (NCBC) Port Hueneme, CA.

The tests were required to determine compliance with conditions set by the Ventura County Air Pollution Control District (VCAPCD). Specifically, the NO_X emission concentration may not exceed 40 parts per million on a dry volume basis (ppmdv), while burning natural gas, or 115 ppmdv while burning #2 fuel oil. The carbon monoxide concentration may not exceed 400 ppmdv while burning either fuel. All figures are referenced to 3% oxygen concentration. See Appendix (F) for correspondence setting these limits.

NEESA conducted the field work on September 20, 21, and 24, 1990, using United States Environmental Protection Agency (USEPA) Methods 1, 2, 3A, 4, 7E, 10, and 18. Section II of this report contains the complete test protocol, as agreed with VCAPCD. Pacific Gas Technology of Bakersfield analyzed the samples collected with USEPA Method 18. BC Laboratories of Bakersfield analyzed the fuel sample.

The following table summarizes the most important results:

TABLE 1
TEST RESULTS

	NATURAL GAS					FUEL OIL #2				
	VCAPCD LIMIT	LOAD				VCAPCD LIMIT	LOAD			
		25%	50%	75%	100%		25%	50%	75%	100%
CO	400	145	193	179	135	400	65	90	13	9
NO_X	40	29	20	29	37	115	115	105	103	98

Note: All values are averages, expressed as parts per million, dry basis, referenced to 3% oxygen.

FUEL SULFUR CONTENT: 0.04%

I. INTRODUCTION

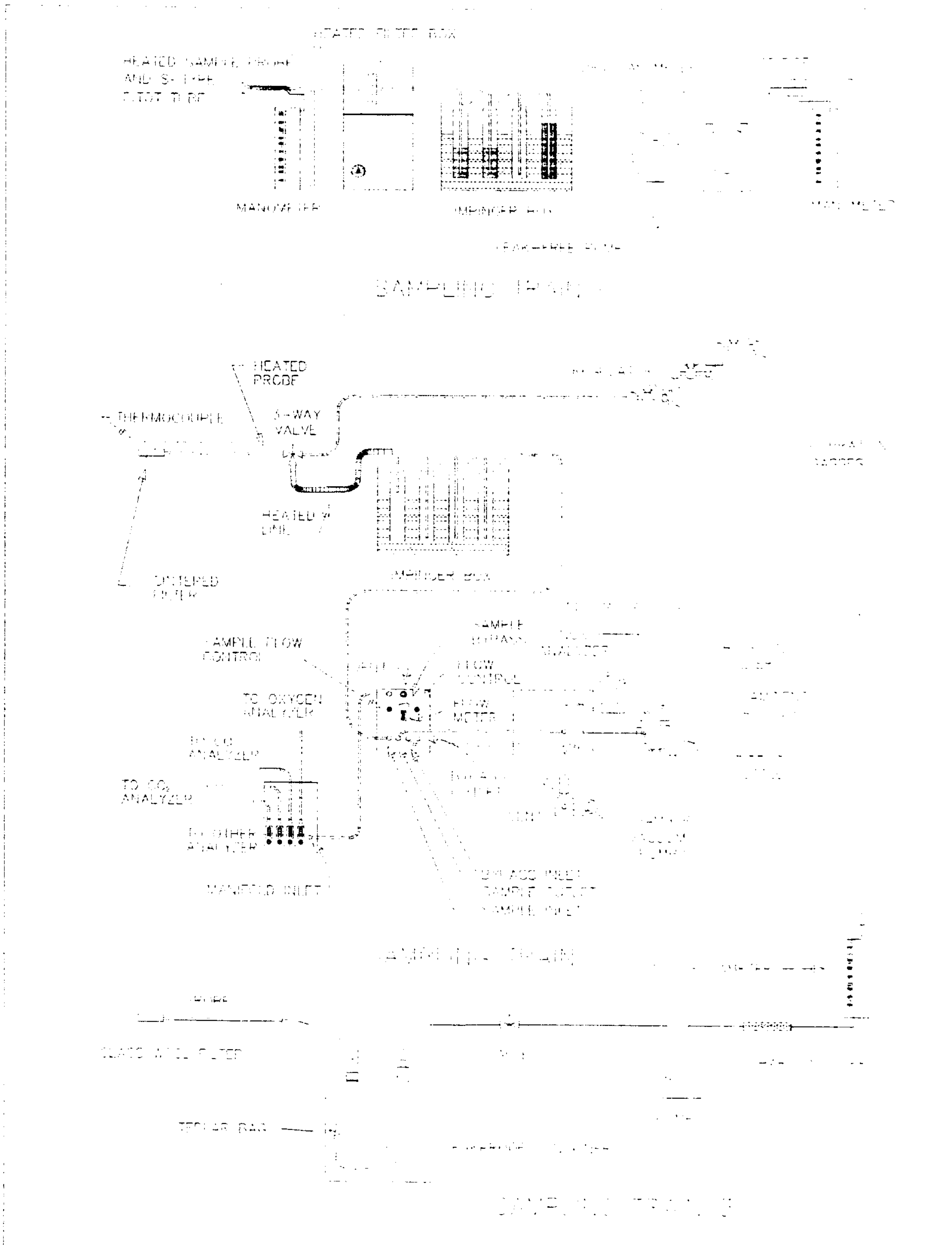
The Thomas Plant provides steam for space heating to the entire base. Recently, three aging Erie City boilers were replaced with one Cleaver-Brooks conventional steam boiler and a Solar gas turbine under MILCON project P-386. The turbine generates both steam (using a heat-recovery boiler) and electricity.

The Cleaver-Brooks boiler is equipped to burn both natural gas and #2 fuel oil. It has a low-NO_x burner, flue gas recirculation (FGR), and an oxygen trim system, all intended to reduce the formation of NO_x. In the authority to construct the boiler, VCAPCD limited operation of the boiler to 8000 hours per year, of which not more than 1080 hours may be used to burn fuel oil. These limits may be changed by VCAPCD; they are used here only as a basis for estimating yearly mass emissions of the pollutants of interest.

II. TEST PROTOCOL

NEESA tested the boiler for emissions of oxides of nitrogen (NO_x), carbon monoxide (CO), and reactive organic compounds (ROC). We ran tests while burning each of two fuels (natural gas and #2 fuel oil) at four different loads: 25%, 50%, 75%, and full load (or as close to these load settings as could reasonably be achieved). There was good agreement between the first two test runs in all cases. There was never a need to conduct a third run.

We used three sampling trains: one for stack gas velocity and moisture content, one for instrumental gas measurements, and one for bag samples taken to measure ROC. The duration of each instrumental gas sampling run was one hour. We recorded NO_x concentrations continuously with a strip chart recorder. We recorded measurements of all other instrumentally determined gas concentrations every five minutes. See Figure 1 for the sampling trains, and refer to the following description.



FIGURE

SAMPLING TRAINS

A. SAMPLE TRAIN 1.

1. We used United States Environmental Protection Agency (USEPA) Method 1 to determine sampling locations. Since we made no particulate measurements during these tests, we followed the guidance for velocity traverses. We used existing ports on the boiler stack, which were installed to allow boiler tune-up. See Figure 2 for a description of the geometry of the ports and stack.

2. We used USEPA Method 2 to determine stack gas velocity, with an S-type pitot tube. We determined moisture content of the stack gas with USEPA Method 4. We ran each of these methods a total of eight times - once at each load on each fuel. We ran these methods independently of the gas sampling methods.

B. SAMPLE TRAIN 2.

All calibration gasses are traceable to the National Institute of Standards and Technology (NIST). See Appendix (C) for the certificates.

We drew the stack gas through a sintered filter into a heated stainless steel sampling probe, followed by four empty standard impingers in an ice bath. The first impinger had a short stem, to minimize any gas contact with the collected condensate. The gas was then passed to the analyzers. See Figure 1.

1. We used USEPA Method 3A to measure the concentrations of O_2 and CO_2 in the stack gas, and to determine its excess air and dry molecular weight. We measured the concentration of CO with USEPA Method 10. We used non-dispersive infrared analyzers to measure CO and CO_2. We measured O_2 with a paramagnetic analyzer. We calibrated the O_2 analyzer at zero with a CO/CO_2 mixture containing no O_2; at approximately 3.0% with an O_2/N_2 mixture; and at 20.9% with ambient air. We calibrated the CO_2 analyzer at zero with an NO/NO_2 mixture containing no CO_2 and at approximately 50% of the scale used with a CO/CO_2 gas mixture. We calibrated the CO analyzer at zero with an NO/NO_2 mixture containing no O_2, and at approximately 25% and 50% of full scale with CO/CO_2 mixtures.

2. We measured NO_x concentration in the stack gas with a chemiluminescence analyzer according to USEPA Method 7E. The zero span gas was a CO/CO_2 mixture containing no NO_x. We calibrated the analyzer at 50 - 60% of the scale used, and again at 80 - 90% of this scale, with NO/NO_2 mixtures. We used a strip chart recorder attached to the NO_x analyzer to provide a continuous record of NO_x measurements (including calibration). We did not traverse the stack for NO_x measurements.

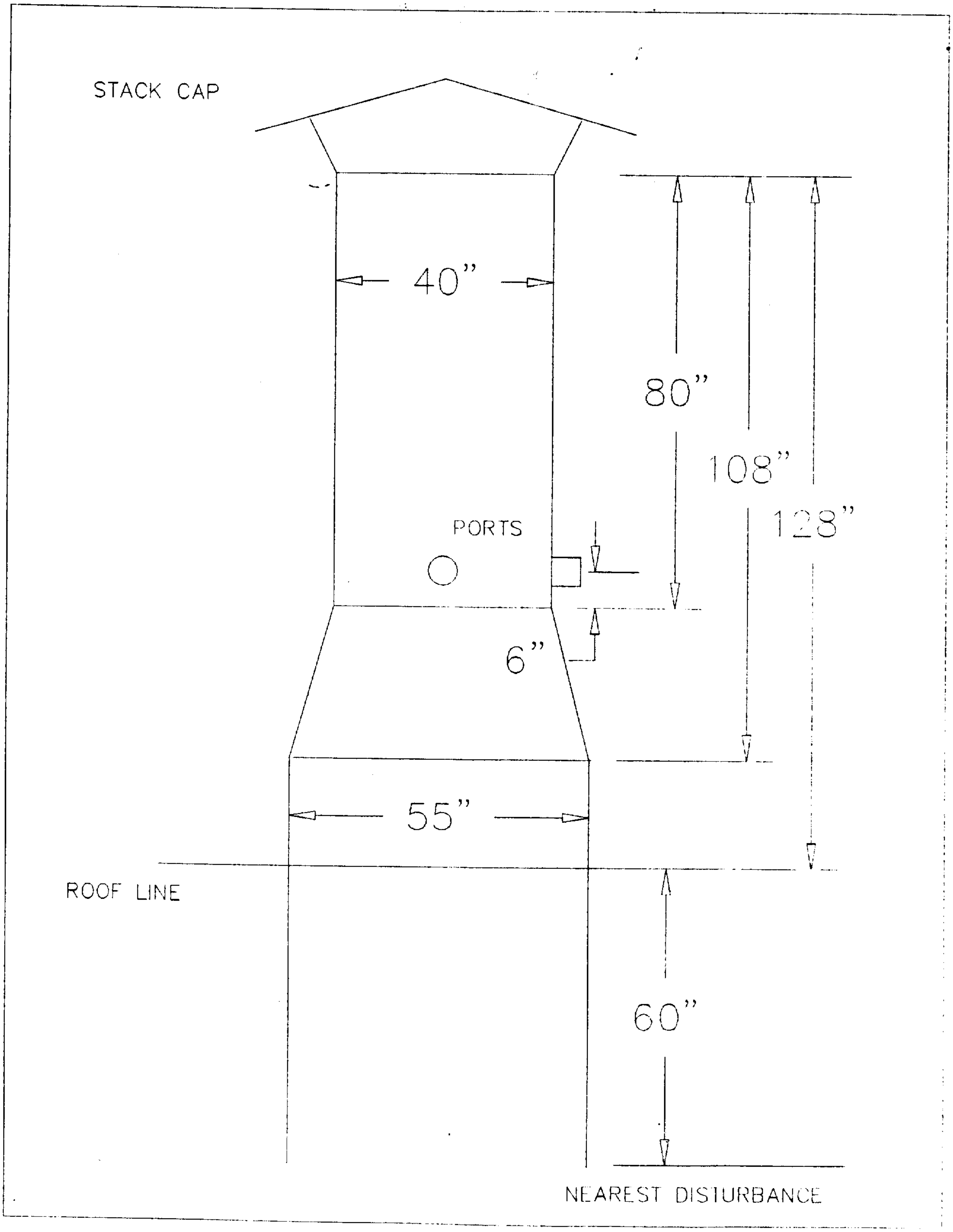


FIGURE 2
TEST PORT LOCATIONS

C. SAMPLE TRAIN 3.

1. We collected stack gas samples according to USEPA Method 18 for later laboratory analysis for reactive organic compounds. We took two Tedlar bag samples at each load setting for each fuel, with one exception. We took only one sample while at 25% load on fuel oil, due to a lack of spare bags. This was agreed upon in advance in a conversation between NEESA and VCAPCD. A number of the sample bags leaked after sample collection, precluding analysis. The contents of the bags which were intact were then analyzed for C_1 through C_6 alkanes via gas chromatography. The methane portion, which is non-reactive, was subtracted from the total. See Figure 1 for a diagram of the sampling train.

III. RESULTS

We entered the raw data taken during the tests in the computer spreadsheet shown in the following pages as Table 2. All calculations were performed with this spreadsheet. All equations and constants used to perform these calculations are documented at the end of the spreadsheet. Table 3 shows the results of the fuel analysis.

This section revised

TABLE 2
EMISSION DATA AND CALCULATIONS

	GAS-25-1	GAS-25-2	GAS-50-1	GAS-50-2
GENERAL DATA				
1. HOURS PER YEAR ON GAS	6500	6500	6500	6500
2. HOURS PER YEAR ON OIL	1080	1080	1080	1080
3. HOURS PER YEAR TOTAL	7580	7580	7580	7580
4. DATE (DD-MMM-YY)	20-Sep-90	20-Sep-90	20-Sep-90	20-Sep-90
5. DESIRED LOAD (%)	25	25	50	50
6. ESTIMATED ACTUAL LOAD (%)	25	25	50	50
7. STACK DIAMETER (INCHES)	40.00	40.00	40.00	40.00
8. STACK AREA (SQUARE FEET)	8.73	8.73	8.73	8.73
SAMPLE TRAIN 1				
9. TIME BEGIN (HH:MM AM/PM)	7:33 PM	7:33 PM	4:10 PM	4:10 PM
10. TIME END (HH:MM AM/PM)	8:09 PM	8:09 PM	4:46 PM	4:46 PM
11. RUN DURATION (MINUTES)	36	60	36	36
12. AMBIENT TEMP (DEGREES F)	64	70	70	70
13. BAROMETRIC PRESSURE (INCHES MERCURY)	29.763	29.763	29.763	29.763
14. STACK STATIC PRESSURE (INCHES WATER, GAUGE)	0.04	0.04	0.03	0.03
15. STACK TEMP (DEGREES F)	353.15	356.31	385.54	380.85
16. METHOD 4 DRY GAS VOLUME (DSCF)	24.30	24.30	27.46	27.46
17. METHOD 4 COLLECTED WATER WEIGHT (GRAMS)	91.28	91.28	119.18	119.18
18. VOLUME % H2O IN STACK GAS	15.06	15.06	17.00	17.00
19. MOLE FRACTION DRY GAS	0.85	0.85	0.83	0.83
20. AVG STACK VELOCITY (FEET PER MINUTE)	423	424	444	443
21. STACK FLOWRATE (ACFM)	3,694	3,702	3,874	3,864
22. STACK FLOWRATE (DSCFM)	2,027	2,023	1,997	2,003
SAMPLE TRAIN 2				
23. TIME BEGIN (HH:MM AM/PM)	7:08 PM	8:30 PM	3:48 PM	5:12 PM
24. TIME END (HH:MM AM/PM)	8:08 PM	9:30 PM	4:48 PM	6:12 PM
25. RUN DURATION (MINUTES)	60	60	60	60
26. NATURAL GAS INPUT DURING TEST (STD CUBIC FT)	5,970	6,030	9,260	9,350
27. FUEL OIL INPUT DURING TEST (GALLONS)	0	0	0	0
28. ENERGY INPUT DURING TEST (BTU)	6,268,500	6,331,500	9,723,000	9,817,500
29. ENERGY INPUT RATE DURING TEST (BTU/HOUR)	6,268,500	6,331,500	9,723,000	9,817,500
30. STACK GAS DRY MOLECULAR WEIGHT (LB/LB MOLE)	29.54	29.53	29.68	29.67
31. STACK GAS WET MOLECULAR WEIGHT (LB/LB MOLE)	27.80	27.80	27.69	27.69
32. EXCESS AIR (%)	45.83	43.82	26.26	23.61
33. FUEL FACTOR FO	1.76	1.78	1.74	1.76
34. AVG CO2 (VOLUME % RAW)	7.84	7.86	9.31	9.38
35. AVG O2 (VOLUME % RAW)	7.06	6.86	4.72	4.35
36. AVG CO (PPMDV RAW)	119.09	106.73	180.62	171.78
37. AVG CO (PPMDV @ 3% O2)	154	136	200	186
38. AVG CO (LBS/HR)	0.68	0.61	0.98	0.94
39. AVG CO (LBS/MM BTU)	0.11	0.10	0.10	0.10
40. AVG CO (TONS/YEAR)	2.21	1.97	3.17	3.04
41. AVG NOX (PPMDV RAW)	22.5	22.99	18.24	18.17
42. AVG NOX (PPMDV) @ 3% O2	29	29	20	20
43. AVG NOX (LBS/HR)	0.21	0.21	0.16	0.16
44. AVG NOX (LBS/MM BTU)	0.03	0.03	0.02	0.02
45. AVG NOX (TONS/YEAR)	1.37	1.39	1.05	1.06
SAMPLE TRAIN 3				
46. DATE (DD-MMM-YY)	24-Sep-90	25-Sep-90	24-Sep-90	25-Sep-90
47. TIME BEGIN (HH:MM AM/PM)	10:30 AM	7:30 AM	3:00 PM	7:45 AM
48. TEST DURATION (MIN)	GRAB	GRAB	GRAB	GRAB
49. ENERGY INPUT RATE DURING TEST (BTU/HOUR)	6,268,500	6,331,500	9,723,000	9,817,500
50. SAMPLE VOLUME (LITERS)	10	10	10	10
51. C1 ALKANES (PPMWV RAW) (NON-REACTIVE)	SEE NOTE	SEE NOTE	7.80	SEE NOTE
52. C2 ALKANES (PPMWV RAW)	SEE NOTE	SEE NOTE	1.00	SEE NOTE
53. C3 ALKANES (PPMWV RAW)	SEE NOTE	SEE NOTE	1.00	SEE NOTE
54. C4 ALKANES (PPMWV RAW)	SEE NOTE	SEE NOTE	1.00	SEE NOTE
55. C5 ALKANES (PPMWV RAW)	SEE NOTE	SEE NOTE	1.00	SEE NOTE
56. C6 ALKANES (PPMWV RAW)	SEE NOTE	SEE NOTE	1.00	SEE NOTE
57. TOTAL ROC (C2 THROUGH C6) (LBS/HR)	SEE NOTE	SEE NOTE	0.07	SEE NOTE
58. TOTAL ROC (C2 THROUGH C6) (LBS/MM BTU)	SEE NOTE	SEE NOTE	0.01	SEE NOTE
59. TOTAL ROC (C2 THROUGH C6) (TONS/YEAR)	SEE NOTE	SEE NOTE	0.22	SEE NOTE

TABLE 2
EMISSION DATA AND CALCULATIONS

	GAS-75-1	GAS-75-2	GAS-100-1	GAS-100-2	
GENERAL DATA					
1. HOURS PER YEAR ON GAS	6500	6500	6500	6500	
2. HOURS PER YEAR ON OIL	1080	1080	1080	1080	
3. HOURS PER YEAR TOTAL	7580	7580	7580	7580	
4. DATE (DD-MMM-YY)	20-Sep-90	20-Sep-90	20-Sep-90	20-Sep-90	
5. DESIRED LOAD (%)	75	75	100	100	
6. ESTIMATED ACTUAL LOAD (%)	75	75	100	100	
7. STACK DIAMETER (INCHES)	40.00	40.00	40.00	40.00	
8. STACK AREA (SQUARE FEET)	8.73	8.73	8.73	8.73	
SAMPLE TRAIN 1					
9. TIME BEGIN (HH:MM AM/PM)	12:44 PM	12:44 PM	9:39 AM	9:39 AM	
10. TIME END (HH:MM AM/PM)	1:20 PM	1:20 PM	10:16 AM	10:16 AM	
11. RUN DURATION (MINUTES)	36	36	36	36	
12. AMBIENT TEMP (DEGREES F)	70	70	59	59	
13. BAROMETRIC PRESSURE (INCHES MERCURY)	29.763	29.763	29.763	29.763	
14. STACK STATIC PRESSURE (INCHES WATER, GAUGE)	0.03	0.03	0.03	0.00	
15. STACK TEMP (DEGREES F)	451.92	452.23	543.92	542.31	
16. METHOD 4 DRY GAS VOLUME (DSCF)	23.16	23.16	24.20	24.20	
17. METHOD 4 COLLECTED WATER WEIGHT (GRAMS)	102.76	102.76	106.62	106.62	
18. VOLUME % H2O IN STACK GAS	17.32	17.32	17.21	17.22	
19. MOLE FRACTION DRY GAS	0.83	0.83	0.83	0.83	
20. AVG STACK VELOCITY (FEET PER MINUTE)	811	811	1486	1485	
21. STACK FLOWRATE (ACFM)	7,073	7,074	12,968	12,959	
22. STACK FLOWRATE (DSCFM)	3,368	3,368	5,617	5,622	
SAMPLE TRAIN 2					
23. TIME BEGIN (HH:MM AM/PM)	12:22 PM	1:44 PM	8:57 AM	10:22 AM	
24. TIME END (HH:MM AM/PM)	1:22 PM	2:44 PM	9:57 AM	11:22 AM	
25. RUN DURATION (MINUTES)	60	60	60	60	
26. NATURAL GAS INPUT DURING TEST (STD CUBIC FT)	15,690	15,950	26,790	26,630	
27. FUEL OIL INPUT DURING TEST (GALLONS)	0	0	0	0	
28. ENERGY INPUT DURING TEST (BTU)	16,474,500	16,747,500	28,129,500	27,961,500	
29. ENERGY INPUT RATE DURING TEST (BTU/HOUR)	16,474,500	16,747,500	28,129,500	27,961,500	
30. STACK GAS DRY MOLECULAR WEIGHT (LB/LB MOLE)	29.69	29.70	29.71	29.70	
31. STACK GAS WET MOLECULAR WEIGHT (LB/LB MOLE)	27.67	27.67	27.69	27.69	
32. EXCESS AIR (%)	24.63	24.43	22.10	22.22	
33. FUEL FACTOR FO	1.74	1.73	1.74	1.74	
34. AVG CO2 (VOLUME % RAW)	9.44	9.48	9.65	9.60	
35. AVG O2 (VOLUME % RAW)	4.49	4.46	4.12	4.14	
36. AVG CO (PPMDV RAW)	162.44	165.9	127.23	124.7	
37. AVG CO (PPMDV @ 3% O2)	177	181	136	133	
38. AVG CO (LBS/HR)	1.37	1.40	1.63	1.60	← 1.51
39. AVG CO (LBS/MM BTU)	0.08	0.08	0.06	0.06	
40. AVG CO (TONS/YEAR)	4.46	4.55	5.29	5.20	
41. AVG NOX (PPMDV RAW)	26.49	26.07	34.5	34.21	
42. AVG NOX (PPMDV) @ 3% O2	29	28	37	37	
43. AVG NOX (LBS/HR)	0.37	0.36	0.73	0.72	← 0.68
44. AVG NOX (LBS/MM BTU)	0.02	0.02	0.03	0.03	
45. AVG NOX (TONS/YEAR)	2.39	2.35	4.72	4.69	
SAMPLE TRAIN 3					
46. DATE (DD-MMM-YY)	24-Sep-90	24-Sep-90	25-Sep-90	24-Sep-90	
47. TIME BEGIN (HH:MM AM/PM)	2:20 PM	2:35 PM	8:00 AM	1:00 PM	
48. TEST DURATION (MIN)	GRAB	GRAB	GRAB	GRAB	
49. ENERGY INPUT RATE DURING TEST (BTU/HOUR)	16,474,500	16,747,500	28,129,500	27,961,500	
50. SAMPLE VOLUME (LITERS)	10	10	10	10	
51. C1 ALKANES (PPMWV RAW) (NON-REACTIVE)	6.40	8.10	SEE NOTE	13.00	
52. C2 ALKANES (PPMWV RAW)	1.00	1.00	SEE NOTE	1.00	
53. C3 ALKANES (PPMWV RAW)	1.00	1.00	SEE NOTE	1.00	
54. C4 ALKANES (PPMWV RAW)	1.00	1.00	SEE NOTE	1.00	
55. C5 ALKANES (PPMWV RAW)	1.00	1.00	SEE NOTE	1.00	
56. C6 ALKANES (PPMWV RAW)	1.00	1.00	SEE NOTE	1.00	
57. TOTAL ROC (C2 THROUGH C6) (LBS/HR)	0.11	0.11	SEE NOTE	0.16	← 0.15
58. TOTAL ROC (C2 THROUGH C6) (LBS/MM BTU)	0.01	0.01	SEE NOTE	0.01	
59. TOTAL ROC (C2 THROUGH C6) (TONS/YEAR)	0.34	0.34	SEE NOTE	0.52	

TABLE 2
EMISSION DATA AND CALCULATIONS

	OIL-25-1	OIL-25-2	OIL-50-1	OIL-50-2
GENERAL DATA				
1. HOURS PER YEAR ON GAS	6500	6500	6500	6500
2. HOURS PER YEAR ON OIL	1080	1080	1080	1080
3. HOURS PER YEAR TOTAL	7580	7580	7580	7580
4. DATE (DD-MMM-YY)	21-Sep-90	21-Sep-90	21-Sep-90	21-Sep-90
5. DESIRED LOAD (%)	25	25	50	50
6. ESTIMATED ACTUAL LOAD (%)	25	25	50	50
7. STACK DIAMETER (INCHES)	40.00	40.00	40.00	40.00
8. STACK AREA (SQUARE FEET)	8.73	8.73	8.73	8.73
SAMPLE TRAIN 1				
9. TIME BEGIN (HH:MM AM/PM)	6:40 PM	6:40 PM	4:09 PM	4:09 PM
10. TIME END (HH:MM AM/PM)	7:16 PM	7:16 PM	4:45 PM	4:45 PM
11. RUN DURATION (MINUTES)	36	36	36	36
12. AMBIENT TEMP (DEGREES F)	73	73	76	76
13. BAROMETRIC PRESSURE (INCHES MERCURY)	29.923	29.923	29.923	29.923
14. STACK STATIC PRESSURE (INCHES WATER, GAUGE)	0.03	0.03	0.04	0.04
15. STACK TEMP (DEGREES F)	355.23	354.08	379.69	384.00
16. METHOD 4 DRY GAS VOLUME (DSCF)	34.97	34.97	32.10	32.10
17. METHOD 4 COLLECTED WATER WEIGHT (GRAMS)	86.66	86.66	90.72	90.72
18. VOLUME % H2O IN STACK GAS	10.47	10.47	11.77	11.77
19. MOLE FRACTION DRY GAS	0.90	0.90	0.88	0.88
20. AVG STACK VELOCITY (FEET PER MINUTE)	328	328	501	502
21. STACK FLOWRATE (ACFM)	2,865	2,864	4,369	4,381
22. STACK FLOWRATE (DSCFM)	1,661	1,663	2,424	2,419
SAMPLE TRAIN 2				
23. TIME BEGIN (HH:MM AM/PM)	6:11 PM	7:28 PM	3:05 PM	4:25 PM
24. TIME END (HH:MM AM/PM)	7:11 PM	8:28 PM	4:05 PM	5:25 PM
25. RUN DURATION (MINUTES)	60	60	60	60
26. NATURAL GAS INPUT DURING TEST (STD CUBIC FT)	0	0	0	0
27. FUEL OIL INPUT DURING TEST (GALLONS)	57.73	57.73	86.66	86.66
28. ENERGY INPUT DURING TEST (BTU)	8,139,930	8,139,930	12,219,060	12,219,060
29. ENERGY INPUT RATE DURING TEST (BTU/HOUR)	8,139,930	8,139,930	12,219,060	12,219,060
30. STACK GAS DRY MOLECULAR WEIGHT (LB/LB MOLE)	29.96	29.94	30.16	30.14
31. STACK GAS WET MOLECULAR WEIGHT (LB/LB MOLE)	28.71	28.69	28.73	28.72
32. EXCESS AIR (%)	44.56	45.78	25.35	25.38
33. FUEL FACTOR FO	1.34	1.35	1.33	1.34
34. AVG CO2 (VOLUME % RAW)	10.57	10.40	12.40	12.29
35. AVG O2 (VOLUME % RAW)	6.73	6.86	4.44	4.45
36. AVG CO (PPMDV RAW)	50.63	51.14	82.7	82.83
37. AVG CO (PPMDV @ 3% O2)	64	65	90	90
38. AVG CO (LBS/HR)	0.24	0.24	0.55	0.55 ← 0.51
39. AVG CO (LBS/MM BTU)	0.03	0.03	0.04	0.04
40. AVG CO (TONS/YEAR)	0.13	0.13	0.30	0.29
41. AVG NOX (PPMDV RAW)	90.86	90.15	95.32	96.4
42. AVG NOX (PPMDV) @ 3% O2	115	115	104	105
43. AVG NOX (LBS/HR)	0.70	0.70	1.04	1.04 ← 0.97 1.67
44. AVG NOX (LBS/MM BTU)	0.09	0.09	0.09	0.09
45. AVG NOX (TONS/YEAR)	0.76	0.75	1.12	1.13
SAMPLE TRAIN 3				
46. DATE (DD-MMM-YY)	24-Sep-90	SEE NOTE	24-Sep-90	24-Sep-90
47. TIME BEGIN (HH:MM AM/PM)	4:47 PM	SEE NOTE	4:20 PM	4:30 PM
48. TEST DURATION (MIN)	GRAB	SEE NOTE	GRAB	GRAB
49. ENERGY INPUT RATE DURING TEST (BTU/HOUR)	8,139,930	SEE NOTE	12,219,060	12,219,060
50. SAMPLE VOLUME (LITERS)	10	SEE NOTE	10	10
51. C1 ALKANES (PPMWV RAW) (NON-REACTIVE)	1.00	SEE NOTE	1.00	1.00
52. C2 ALKANES (PPMWV RAW)	1.80	SEE NOTE	1.10	1.30
53. C3 ALKANES (PPMWV RAW)	1.00	SEE NOTE	1.00	1.00
54. C4 ALKANES (PPMWV RAW)	1.00	SEE NOTE	1.00	1.00
55. C5 ALKANES (PPMWV RAW)	1.00	SEE NOTE	1.00	1.00
56. C6 ALKANES (PPMWV RAW)	1.00	SEE NOTE	1.00	1.00
57. TOTAL ROC (C2 THROUGH C6) (LBS/HR)	0.06	SEE NOTE	0.08	0.08 ← 0.07
58. TOTAL ROC (C2 THROUGH C6) (LBS/MM BTU)	0.01	SEE NOTE	0.01	0.01
59. TOTAL ROC (C2 THROUGH C6) (TONS/YEAR)	0.03	SEE NOTE	0.04	0.04

$$PPM@3\% = PPM \frac{20.9\% - 3\%}{20.9 - \%O_2\ meas} = 90.86\ \frac{20.9-3}{20.9-6.73} = 114.78$$

$$90.15\ \frac{20.9-3}{20.9-6.86} = 114.93$$

Changed items:

38, 43, 57

Rec'd 10·31·90

Sources of equations, constants, and information:

1, 2, & 3. From Authority to Construct #1012-1 issued by Ventura County Air Pollution Control District (VCAPCD), dated July 29, 1987. These limits may be modified by VCAPCD, and are presented here only to give an approximate idea of yearly mass emissions.

4. Self explanatory.

5. Desired load settings for the source tests were set forth in a letter from VCAPCD to NCBC Port Hueneme, dated 26 July 1990.

6. Actual load was determined by comparing measured steam rate to the known capacity of the boiler.

7. As measured by NEESA.

8. Calculated as $\pi r^2/144$.

9, 10. As recorded on field data sheets.

11. Run time for Sample Train 1, in minutes.

12. As measured with thermocouple and digital readout.

13. From weather station aboard Naval Air Station, Point Mugu, CA. The sampling location on the boiler stack at the Thomas Plant is 29 feet above sea level, while the NAS Point Mugu weather data is measured at 12 feet above sea level. Therefore, the figure received from Mugu was corrected by subtracting 0.017 inches of mercury per USEPA Method 4.

14. As measured immediately before sampling. A U-tube manometer was used.

15. As measured with thermocouple and digital readout.

16. The measurement taken from the face of the dry gas meter on our sampling equipment was corrected for temperature as follows:

$$V_{m(std)} = V_m[T_{std}/(T_m+460)][P_b/P_{std}]$$

where:

$V_{m(std)}$ = Volume of air collected, in dry standard cubic feet
V_m = Volume read from dry gas meter, dry cubic feet
T_{std} = 528 °R
P_b = Barometric pressure at sampling point, inches of mercury
P_{std} = 29.92126 inches of mercury
T_m = Average meter temperature, °F

17. Calculated by subtracting pretest impinger weights from post-test impinger weights. We used a Mettler AE PB 3000 electronic balance calibrated with weights traceable to the International Order of Legal Metrology (IOLM).

18. Calculated as follows:

$$\%M = [100 * V_{w(gas)}]/[V_{m(std)} + V_{w(gas)}]$$

where:

$\%M$ = Volume percent water vapor in stack gas
$V_{w(gas)}$ = Volume of water vapor collected during method 4 run. This is obtained by multiplying the mass of the collected water in grams by 0.0472.
$V_{m(std)}$ = Dry gas volume collected, as computed in item 16, above.

19. Calculated as 100% - Volume % water vapor.

20. Velocity pressure was measured at each traverse point using an S-type pitot tube and a U-tube manometer.

21. Calculated by multiplying stack area by actual stack velocity.

22. Calculated as follows:

$$Q_{dscfm} = Q_{acfm}[T_{std}/(T_s+460)][P_b/P_{std}][M_d]$$

Q_{dscfm} = Stack flow rate, in dry standard cubic feet per minute
Q_{acfm} = Stack flow rate, in actual cubic feet per minute
T_{std} = 528 °R
P_b = Barometric pressure at sampling point, inches of mercury
P_{std} = 29.92126 inches of mercury
T_s = Average stack temperature, °F
M_d = Mole fraction of dry gas in stack gas

23, 24. As recorded on data sheets

25. Run duration of Sample Train 2.

26. Calculated by subtracting gas meter reading at test start from gas meter reading at test conclusion.

27. Since there is no fuel meter which directly measures fuel input to the boiler, fuel consumption was estimated as follows: The fuel meter which measures input to an intermediate holding tank was monitored during testing, and fuel levels in the tank compared. Due to operator error, this measurement was not performed during the run at 75% load on fuel oil. The figure shown in Table 2 was obtained by straight line interpolation between fuel consumption rates at 50% and 100%.

28. Calculated as follows:

$$H = (1050\ Btu/cf)(G)+(141{,}000\ Btu/gal)(O)$$

where:

H = Energy input during test, in Btu
G = Natural gas consumed during test, in cubic feet
O = Gallons of #2 fuel oil consumed during test.

The heating values for these two fuels were obtained from the Ventura County APCD emission factors and calculation procedures booklet.

29. Calculated by dividing energy input by test duration.

30. Calculated as follows:

$$MW_d = [0.44(\%CO_2)]+[0.32(\%O_2)]+[0.28(100 - \%O_2 - \%CO_2]$$

where:

MW_d = Molecular weight of dry stack gas, lb/lb mole
$\%CO_2$ = Volume % of CO_2 in stack gas, raw
$\%O_2$ = Volume % of O_2 in stack gas, raw

31. Calculated as follows:

$$MW = (MW_d)(M_d) + 18(1-M_d)$$

where:

MW = Molecular weight of stack gas, lb/lb mole
MW_d = Molecular weight of dry stack gas, lb/lb mole
M_d = Mole fraction of dry gas in stack gas, dimensionless

32. Calculated as follows:

$$\%EA = 100(\%O_2)/[26.4 - 1.264(\%O_2) - 0.264(\%CO_2)]$$

where:

%EA = % excess air
$\%CO_2$ = Volume % of CO_2 in stack gas, raw
$\%O_2$ = Volume % of O_2 in stack gas, raw

33. Calculated as follows:

$F_o = (20.9 - \%O_2)/\%CO_2$

where:

F_o = Fuel factor
$\%CO_2$ = Volume % of CO_2 in stack gas, raw
$\%O_2$ = Volume % of O_2 in stack gas, raw

This equation is taken from USEPA Method 3. It is useful for comparing calculated values of F_o with expected values, which are dependent on the type of fuel burned. The ranges are:

Natural gas: 1.600 - 1.836
Fuel oil #2: 1.260 - 1.413

34 - 36. As recorded from the instrumental analyzers, averaged and corrected for analyzer drift per USEPA Method 6C calculations.

37. Calculated as follows:

$\%CO_{(@3\%\ O2)} = [(\%CO_{(raw)})(20.9 - 3.0)]/[20.9 - \%O_{2(raw)}]$

where:

$\%CO_{(@3\%\ O2)}$ = Volume % CO corrected to 3% O_2
$\%CO_{(raw)}$ = Volume % CO, as measured
$\%O_{2(raw)}$ = Volume % O_2, as measured

38. Calculated as follows:

$CO_{(lb/hr)}$ =

$$\left[\frac{[(CO_{(ppmdv)})(MW_{CO})(Q)(60\ min/hr)]}{(24.13\ l/mole)(454\ g/lb)(1000\ ml/l)(35.31\ ft^3/m^3)(T/530)(29.92/P)}\right]$$

530
460
70°

where:

$CO_{(lb/hr)}$ = Emission rate of CO in pounds per hour
$CO_{(ppmdv)}$ = Measured CO concentration in stack gas
MW_{CO} = Molecular weight of CO (= 28)
Q = Stack flow rate, in dry standard cubic feet per minute
T = 528 °R
P = 29.92 inches of mercury

24.13 × 454 × 1000 × 35.31 = 386.8 × 10^6

39. Calculated as follows:

$CO_{(lb/mmbtu)} = CO_{(lb/hr)}/E$

where:

$CO_{(lb/mmbtu)}$ = Emission rate of CO, in pounds per million Btu of fuel burned
$CO_{(lb/hr)}$ = Emission rate of CO, in pounds per hour
E = Energy input rate in million btu per hour

40. Calculated by multiplying the emission rate in pounds per hour by the number of hours the device will be operated in one year.

41. As measured with the instrumental analyzer, averaged and corrected for analyzer drift using USEPA Method 6C calculations.

42. Calculated as follows:

$\%NO_{x(@3\%\ O2)} = [(\%NO_{x(raw)})(20.9 - 3.0)]/[20.9 - \%O_{2(raw)}]$

where:

$\%NO_{x(@3\%\ O2)}$ = Volume % NO_x corrected to 3% O_2
$\%NO_{x(raw)}$ = Volume % NO_x, as measured
$\%O_{2(raw)}$ = Volume % O_2, as measured

43. Calculated as follows:

$NO_{x(lb/hr)}$ =

$$\left[\frac{[(NO_{x(ppmdv)})(MW_{NOx})(Q)(60\ min/hr)]}{(24.13\ l/mole)(454\ g/lb)(1000\ ml/l)(35.31\ ft^3/m^3)(T/530)(29.92/P)}\right]$$

22.4 @ 0°   549 x 10^6   ≃ 5.91 x 10^-8

where:

$NO_{x(lb/hr)}$ = Emission rate of NO_x in pounds per hour
$NO_{x(ppmdv)}$ = Measured NO_x concentration in stack gas
MW_{NOx} = Molecular weight of NO_x. To be conservative, all the NO_x will be assumed to be NO_2. The molecular weight is 46.
Q = Stack flow rate, in dry standard cubic feet per minute
T = 528 °R ← correct is @ 68°F
P = 29.92 inches of mercury

$22.4 @ \frac{530}{460} = 24.13$ = 25.8

$22.4 @ \frac{810}{530} = 34.23$

$22.4 \times 454 \times 1000 \times 35.31 \times \frac{294}{273} = 386.7 \times 10^6$ @ 70°F

44. Calculated as follows:

$$NO_{x(lb/mmbtu)} = NO_{x(lb/hr)}/E$$

where:

$NO_{x(lb/mmbtu)}$ = Emission rate of NO_x, in pounds per million Btu of fuel burned
$NO_{x(lb/hr)}$ = Emission rate of NO_x, in pounds per hour
E = Energy input rate in million btu per hour

45. Calculated by multiplying the emission rate in pounds per hour by the number of hours the device will be operated in one year.

46 - 47. As recorded on chain-of-custody sheet.

48. All bag samples were taken as grab samples, meaning that approximately 10 L of sample gas was collected at a rate of 1 to 3 liters per minute.

49. Same as item 29.

50. The sample bags used were 12 L capacity. We filled each bag with not more than 10 L of sample, to allow expansion during shipment to the laboratory.

51 - 56. As measured by gas chromatography performed on bag samples. Those runs marked "See note" are bags which leak checked OK prior to the test, but leaked before analysis on bag contents could be performed. The limit of detection for the analysis was 1 ppm for each species. Many of the reported concentrations were below this figure. Where this was the case, 1 ppm was assumed.

57. Calculated as follows:

$$ROC_{(lb/hr)} = \Sigma_{i=2 \text{ to } 6} \left[\frac{[(C_{i(ppmdv)})(MW_{Ci})(Q)(60 \text{ min/hr})]}{(24.13 \text{ l/mole})(454 \text{ g/lb})(1000 \text{ ml/l})(35.31 \text{ ft}^3/\text{m}^3)(T/530)(29.92/P)} \right]$$

where:

$ROC_{(lb/hr)}$ = Emission rate of ROC in pounds per hour
$C_{i(ppmdv)}$ = Measured C_i concentration in stack gas
MW_{Ci} = Molecular weight of C_i. The following figures were used:

C_2 (ethane) MW = 30
C_3 (propane) MW = 44
C_4 (butane) MW = 58
C_5 (pentane) MW = 72
C_6 (hexane) MW = 86

Methane is defined as non-reactive by VCAPCD, and was not included in the total.

Q = Stack flow rate, in dry standard cubic feet per minute
T = 528 °R
P = 29.92 inches of mercury

58. Calculated as follows:

$$ROC_{(lb/mmbtu)} = ROC_{(lb/hr)}/E$$

where:

$ROC_{(lb/mmbtu)}$ = Emission rate of ROC, in pounds per million Btu of fuel burned
$ROC_{(lb/hr)}$ = Emission rate of ROC, in pounds per hour
E = Energy input rate in million btu per hour

59. Calculated by multiplying the emission rate in pounds per hour by the number of hours the boiler is currently allowed to operate each year. See items 1 and 2.

10.31.90

TABLE 2
EMISSION DATA AND CALCULATIONS

	GAS-25-1	GAS-25-2	GAS-50-1	GAS-50-2
---------- GENERAL DATA ----------				
1. HOURS PER YEAR ON GAS	6500	6500	6500	6500
2. HOURS PER YEAR ON OIL	1080	1080	1080	1080
3. HOURS PER YEAR TOTAL	7580	7580	7580	7580
4. DATE (DD-MMM-YY)	20-Sep-90	20-Sep-90	20-Sep-90	20-Sep-90
5. DESIRED LOAD (%)	25	25	50	50
6. ESTIMATED ACTUAL LOAD (%)	25	25	50	50
7. STACK DIAMETER (INCHES)	40.00	40.00	40.00	40.00
8. STACK AREA (SQUARE FEET)	8.73	8.73	8.73	8.73
---------- SAMPLE TRAIN 1 ----------				
9. TIME BEGIN (HH:MM AM/PM)	7:33 PM	7:33 PM	4:10 PM	4:10 PM
10. TIME END (HH:MM AM/PM)	8:09 PM	8:09 PM	4:46 PM	4:46 PM
11. RUN DURATION (MINUTES)	36	60	36	36
12. AMBIENT TEMP (DEGREES F)	64	70	70	70
13. BAROMETRIC PRESSURE (INCHES MERCURY)	29.763	29.763	29.763	29.763
14. STACK STATIC PRESSURE (INCHES WATER, GAUGE)	0.04	0.04	0.03	0.03
15. STACK TEMP (DEGREES F)	353.15	356.31	385.54	380.85
16. METHOD 4 DRY GAS VOLUME (DSCF)	24.30	24.30	27.46	27.46
17. METHOD 4 COLLECTED WATER WEIGHT (GRAMS)	91.28	91.28	119.18	119.18
18. VOLUME % H20 IN STACK GAS	15.06	15.06	17.00	17.00
19. MOLE FRACTION DRY GAS	0.85	0.85	0.83	0.83
20. AVG STACK VELOCITY (FEET PER MINUTE)	423	424	444	443
21. STACK FLOWRATE (ACFM)	3,694	3,702	3,874	3,864
22. STACK FLOWRATE (DSCFM)	2,027	2,023	1,997	2,003
---------- SAMPLE TRAIN 2 ----------				
23. TIME BEGIN (HH:MM AM/PM)	7:08 PM	8:30 PM	3:48 PM	5:12 PM
24. TIME END (HH:MM AM/PM)	8:08 PM	9:30 PM	4:48 PM	6:12 PM
25. RUN DURATION (MINUTES)	60	60	60	60
26. NATURAL GAS INPUT DURING TEST (STD CUBIC FT)	5,970	6,030	9,260	9,350
27. FUEL OIL INPUT DURING TEST (GALLONS)	0	0	0	0
28. ENERGY INPUT DURING TEST (BTU)	6,268,500	6,331,500	9,723,000	9,817,500
29. ENERGY INPUT RATE DURING TEST (BTU/HOUR)	6,268,500	6,331,500	9,723,000	9,817,500
30. STACK GAS DRY MOLECULAR WEIGHT (LB/LB MOLE)	29.54	29.53	29.68	29.67
31. STACK GAS WET MOLECULAR WEIGHT (LB/LB MOLE)	27.80	27.80	27.69	27.69
32. EXCESS AIR (%)	9.16 45.83	8.76 43.82	5.25 26.26	4.7 23.61
33. FUEL FACTOR FO	1.76	1.78	1.74	1.76
34. AVG CO2 (VOLUME % RAW)	7.84	7.86	9.31	9.38
35. AVG O2 (VOLUME % RAW)	7.06	6.86	4.72	4.35
36. AVG CO (PPMDV RAW)	119.09	106.73	180.62	171.78
37. AVG CO (PPMDV @ 3% O2)	154	136	200	186
38. AVG CO (LBS/HR)	1.05	0.94	1.57	1.50
39. AVG CO (LBS/MM BTU)	0.17	0.15	0.16	0.15
40. AVG CO (TONS/YEAR)	3.42	3.06	5.11	4.88
41. AVG NOX (PPMDV RAW)	22.5	22.99	18.24	18.17
42. AVG NOX (PPMDV) @ 3% O2	29	29	20	20
43. AVG NOX (LBS/HR)	0.33	0.33	0.26	0.26
44. AVG NOX (LBS/MM BTU)	0.05	0.05	0.03	0.03
45. AVG NOX (TONS/YEAR)	2.12	2.17	1.70	1.69
---------- SAMPLE TRAIN 3 ----------				
46. DATE (DD-MMM-YY)	24-Sep-90	25-Sep-90	24-Sep-90	25-Sep-90
47. TIME BEGIN (HH:MM AM/PM)	10:30 AM	7:30 AM	3:00 PM	7:45 AM
48. TEST DURATION (MIN)	GRAB	GRAB	GRAB	GRAB
49. ENERGY INPUT RATE DURING TEST (BTU/HOUR)	6,268,500	6,331,500	9,723,000	9,817,500 9350 SCFH
50. SAMPLE VOLUME (LITERS)	10	10	10	10
51. C1 ALKANES (PPMWV RAW) (NON-REACTIVE)	SEE NOTE	SEE NOTE	7.80	SEE NOTE
52. C2 ALKANES (PPMWV RAW)	SEE NOTE	SEE NOTE	1.00	SEE NOTE
53. C3 ALKANES (PPMWV RAW)	SEE NOTE	SEE NOTE	1.00	SEE NOTE
54. C4 ALKANES (PPMWV RAW)	SEE NOTE	SEE NOTE	1.00	SEE NOTE
55. C5 ALKANES (PPMWV RAW)	SEE NOTE	SEE NOTE	1.00	SEE NOTE
56. C6 ALKANES (PPMWV RAW)	SEE NOTE	SEE NOTE	1.00	SEE NOTE
57. TOTAL ROC (C2 THROUGH C6) (LBS/HR)	SEE NOTE	SEE NOTE	0.09	SEE NOTE
58. TOTAL ROC (C2 THROUGH C6) (LBS/MM BTU)	SEE NOTE	SEE NOTE	0.01	SEE NOTE
59. TOTAL ROC (C2 THROUGH C6) (TONS/YEAR)	SEE NOTE	SEE NOTE	0.29	SEE NOTE

$$\frac{ppm \times Q \times 60 \times MW}{386.7 \times 10^6} = \#/hr$$

TABLE 2
EMISSION DATA AND CALCULATIONS

	GAS-75-1	GAS-75-2	GAS-100-1	GAS-100-2	
GENERAL DATA					
1. HOURS PER YEAR ON GAS	6500	6500	6500	6500	
2. HOURS PER YEAR ON OIL	1080	1080	1080	1080	
3. HOURS PER YEAR TOTAL	7580	7580	7580	7580	
4. DATE (DD-MMM-YY)	20-Sep-90	20-Sep-90	20-Sep-90	20-Sep-90	
5. DESIRED LOAD (%)	75	75	100	100	
6. ESTIMATED ACTUAL LOAD (%)	75	75	100	100	
7. STACK DIAMETER (INCHES)	40.00	40.00	40.00	40.00	
8. STACK AREA (SQUARE FEET)	8.73	8.73	8.73	8.73	
SAMPLE TRAIN 1					
9. TIME BEGIN (HH:MM AM/PM)	12:44 PM	12:44 PM	9:39 AM	9:39 AM	
10. TIME END (HH:MM AM/PM)	1:20 PM	1:20 PM	10:16 AM	10:16 AM	
11. RUN DURATION (MINUTES)	36	36	36	36	
12. AMBIENT TEMP (DEGREES F)	70	70	59	59	
13. BAROMETRIC PRESSURE (INCHES MERCURY)	29.763	29.763	29.763	29.763	
14. STACK STATIC PRESSURE (INCHES WATER, GAUGE)	0.03	0.03	0.03	0.00	
15. STACK TEMP (DEGREES F)	451.92	452.23	543.92	542.31	
16. METHOD 4 DRY GAS VOLUME (DSCF)	23.16	23.16	24.20	24.20	
17. METHOD 4 COLLECTED WATER WEIGHT (GRAMS)	102.76	102.76	106.62	106.62	
18. VOLUME % H20 IN STACK GAS	17.32	17.32	17.21	17.22	
19. MOLE FRACTION DRY GAS	0.83	0.83	0.83	0.83	
20. AVG STACK VELOCITY (FEET PER MINUTE)	811	811	1486	1485	
21. STACK FLOWRATE (ACFM)	7,073	7,074	12,968	12,959	
22. STACK FLOWRATE (DSCFM)	3,368	3,368	5,617	5,622	
SAMPLE TRAIN 2					
23. TIME BEGIN (HH:MM AM/PM)	12:22 PM	1:44 PM	8:57 AM	10:22 AM	
24. TIME END (HH:MM AM/PM)	1:22 PM	2:44 PM	9:57 AM	11:22 AM	
25. RUN DURATION (MINUTES)	60	60	60	60	Ave
26. NATURAL GAS INPUT DURING TEST (STD CUBIC FT)	15,690	15,950	26,790	26,630	28,045,500
27. FUEL OIL INPUT DURING TEST (GALLONS)	0	0	0	0	
28. ENERGY INPUT DURING TEST (BTU)	16,474,500	16,747,500	28,129,500	27,961,500	
29. ENERGY INPUT RATE DURING TEST (BTU/HOUR)	16,474,500	16,747,500	28,129,500	27,961,500	
30. STACK GAS DRY MOLECULAR WEIGHT (LB/LB MOLE)	29.69	29.70	29.71	29.70	
31. STACK GAS WET MOLECULAR WEIGHT (LB/LB MOLE)	27.67	27.67	27.69	27.69	
32. EXCESS AIR (%)	4.9 24.63	4.9 24.43	4.9 22.10	4.9 22.22	
33. FUEL FACTOR FO	1.74	1.73	1.74	1.74	
34. AVG CO2 (VOLUME % RAW)	9.44	9.48	9.65	9.60	
35. AVG O2 (VOLUME % RAW)	4.49	4.46	4.12	4.14	
36. AVG CO (PPMDV RAW)	162.44	165.9	127.23	124.7	
37. AVG CO (PPMDV @ 3% O2)	177	181	136	133	3.09 ave
38. AVG CO (LBS/HR)	2.39	2.44	3.12	3.06	
39. AVG CO (LBS/MM BTU)	0.14	0.15	0.11	0.11	
40. AVG CO (TONS/YEAR)	7.75	7.92	10.13	9.93	1.39 ave
41. AVG NOX (PPMDV RAW)	26.49	26.07	34.5	34.21	
42. AVG NOX (PPMDV) @ 3% O2	29	28	37	37	
43. AVG NOX (LBS/HR)	0.64	0.63	1.39	1.38	
44. AVG NOX (LBS/MM BTU)	0.04	0.04	0.05	0.05	
45. AVG NOX (TONS/YEAR)	4.15	4.09	9.02	8.95	
SAMPLE TRAIN 3					
46. DATE (DD-MMM-YY)	24-Sep-90	24-Sep-90	25-Sep-90	24-Sep-90	
47. TIME BEGIN (HH:MM AM/PM)	2:20 PM	2:35 PM	8:00 AM	1:00 PM	26.71 ave MCFH
48. TEST DURATION (MIN)	GRAB	GRAB	GRAB	GRAB	
49. ENERGY INPUT RATE DURING TEST (BTU/HOUR)	16,474,500	16,747,500	28,129,500	27,961,500	@ 100%
50. SAMPLE VOLUME (LITERS)	10	10	10	10	
51. C1 ALKANES (PPMWV RAW) (NON-REACTIVE)	6.40	8.10	SEE NOTE	13.00	
52. C2 ALKANES (PPMWV RAW)	1.00	1.00	SEE NOTE	1.00	
53. C3 ALKANES (PPMWV RAW)	1.00	1.00	SEE NOTE	1.00	
54. C4 ALKANES (PPMWV RAW)	1.00	1.00	SEE NOTE	1.00	
55. C5 ALKANES (PPMWV RAW)	1.00	1.00	SEE NOTE	1.00	
56. C6 ALKANES (PPMWV RAW)	1.00	1.00	SEE NOTE	1.00	
57. TOTAL ROC (C2 THROUGH C6) (~~LBS/HR~~)	0.15	0.15	SEE NOTE	0.25	0.25
58. TOTAL ROC (C2 THROUGH C6) (LBS/MM BTU)	0.01	0.01	SEE NOTE	0.01	
59. TOTAL ROC (C2 THROUGH C6) (TONS/YEAR)	0.49	0.49	SEE NOTE	0.82	

TABLE 2
EMISSION DATA AND CALCULATIONS

	OIL-25-1	OIL-25-2	OIL-50-1	OIL-50-2
GENERAL DATA				
1. HOURS PER YEAR ON GAS	6500	6500	6500	6500
2. HOURS PER YEAR ON OIL	1080	1080	1080	1080
3. HOURS PER YEAR TOTAL	7580	7580	7580	7580
4. DATE (DD-MMM-YY)	21-Sep-90	21-Sep-90	21-Sep-90	21-Sep-90
5. DESIRED LOAD (%)	25	25	50	50
6. ESTIMATED ACTUAL LOAD (%)	25	25	50	50
7. STACK DIAMETER (INCHES)	40.00	40.00	40.00	40.00
8. STACK AREA (SQUARE FEET)	8.73	8.73	8.73	8.73
SAMPLE TRAIN 1				
9. TIME BEGIN (HH:MM AM/PM)	6:40 PM	6:40 PM	4:09 PM	4:09 PM
10. TIME END (HH:MM AM/PM)	7:16 PM	7:16 PM	4:45 PM	4:45 PM
11. RUN DURATION (MINUTES)	36	36	36	36
12. AMBIENT TEMP (DEGREES F)	73	73	76	76
13. BAROMETRIC PRESSURE (INCHES MERCURY)	29.923	29.923	29.923	29.923
14. STACK STATIC PRESSURE (INCHES WATER, GAUGE)	0.03	0.03	0.04	0.04
15. STACK TEMP (DEGREES F)	355.23	354.08	379.69	384.00
16. METHOD 4 DRY GAS VOLUME (DSCF)	34.97	34.97	32.10	32.10
17. METHOD 4 COLLECTED WATER WEIGHT (GRAMS)	86.66	86.66	90.72	90.72
18. VOLUME % H2O IN STACK GAS	10.47	10.47	11.77	11.77
19. MOLE FRACTION DRY GAS	0.90	0.90	0.88	0.88
20. AVG STACK VELOCITY (FEET PER MINUTE)	328	328	501	502
21. STACK FLOWRATE (ACFM)	2,865	2,864	4,369	4,381
22. STACK FLOWRATE (DSCFM)	1,661	1,663	2,424	2,419
SAMPLE TRAIN 2				
23. TIME BEGIN (HH:MM AM/PM)	6:11 PM	7:28 PM	3:05 PM	4:25 PM
24. TIME END (HH:MM AM/PM)	7:11 PM	8:28 PM	4:05 PM	5:25 PM
25. RUN DURATION (MINUTES)	60	60	60	60
26. NATURAL GAS INPUT DURING TEST (STD CUBIC FT)	0	0	0	0
27. FUEL OIL INPUT DURING TEST (GALLONS)	57.73	57.73	86.66	86.66
28. ENERGY INPUT DURING TEST (BTU)	8,139,930	8,139,930	12,219,060	12,219,060
29. ENERGY INPUT RATE DURING TEST (BTU/HOUR)	8,139,930	8,139,930	12,219,060	12,219,060
30. STACK GAS DRY MOLECULAR WEIGHT (LB/LB MOLE)	29.96	29.94	30.16	30.14
31. STACK GAS WET MOLECULAR WEIGHT (LB/LB MOLE)	28.71	28.69	28.73	28.72
32. EXCESS AIR (%)	44.56	45.78	25.35	25.38
33. FUEL FACTOR FO	1.34	1.35	1.33	1.34
34. AVG CO2 (VOLUME % RAW)	10.57	10.40	12.40	12.29
35. AVG O2 (VOLUME % RAW)	6.73	6.86	4.44	4.45
36. AVG CO (PPMDV RAW)	50.63	51.14	82.7	82.83
37. AVG CO (PPMDV @ 3% O2)	64	65	90	90
38. AVG CO (LBS/HR)	0.37	0.37	0.87	0.87
39. AVG CO (LBS/MM BTU)	0.05	0.05	0.07	0.07
40. AVG CO (TONS/YEAR)	0.20	0.20	0.47	0.47
41. AVG NOX (PPMDV RAW)	90.86	90.15	95.32	96.4
42. AVG NOX (PPMDV) @ 3% O2	115	115	104	105
43. AVG NOX (LBS/HR)	1.08	1.07	1.65	1.67
44. AVG NOX (LBS/MM BTU)	0.13	0.13	0.14	0.14
45. AVG NOX (TONS/YEAR)	1.17	1.16	1.79	1.80
SAMPLE TRAIN 3				
46. DATE (DD-MMM-YY)	24-Sep-90	SEE NOTE	24-Sep-90	24-Sep-90
47. TIME BEGIN (HH:MM AM/PM)	4:47 PM	SEE NOTE	4:20 PM	4:30 PM
48. TEST DURATION (MIN)	GRAB	SEE NOTE	GRAB	GRAB
49. ENERGY INPUT RATE DURING TEST (BTU/HOUR)	8,139,930	SEE NOTE	12,219,060	12,219,060
50. SAMPLE VOLUME (LITERS)	10	SEE NOTE	10	10
51. C1 ALKANES (PPMWV RAW) (NON-REACTIVE)	1.00	SEE NOTE	1.00	1.00
52. C2 ALKANES (PPMWV RAW)	1.80	SEE NOTE	1.10	1.30
53. C3 ALKANES (PPMWV RAW)	1.00	SEE NOTE	1.00	1.00
54. C4 ALKANES (PPMWV RAW)	1.00	SEE NOTE	1.00	1.00
55. C5 ALKANES (PPMWV RAW)	1.00	SEE NOTE	1.00	1.00
56. C6 ALKANES (PPMWV RAW)	1.00	SEE NOTE	1.00	1.00
57. TOTAL ROC (C2 THROUGH C6) (LBS/HR)	0.08	SEE NOTE	0.11	0.11 50
58. TOTAL ROC (C2 THROUGH C6) (LBS/MM BTU)	0.01	SEE NOTE	0.01	0.01
59. TOTAL ROC (C2 THROUGH C6) (TONS/YEAR)	0.04	SEE NOTE	0.06	0.06

TABLE 2
EMISSION DATA AND CALCULATIONS

	OIL-75-1	OIL-75-2	OIL-100-1	OIL-100-2	
GENERAL DATA					
1. HOURS PER YEAR ON GAS	6500	6500	6500	6500	
2. HOURS PER YEAR ON OIL	1080	1080	1080	1080	
3. HOURS PER YEAR TOTAL	7580	7580	7580	7580	
4. DATE (DD-MMM-YY)	21-Sep-90	21-Sep-90	21-Sep-90	21-Sep-90	
5. DESIRED LOAD (%)	75	75	100	100	
6. ESTIMATED ACTUAL LOAD (%)	75	75	100	100	
7. STACK DIAMETER (INCHES)	40.00	40.00	40.00	40.00	
8. STACK AREA (SQUARE FEET)	8.73	8.73	8.73	8.73	
SAMPLE TRAIN 1					
9. TIME BEGIN (HH:MM AM/PM)	12:03 PM	12:03 PM	09:17 AM	09:17 AM	
10. TIME END (HH:MM AM/PM)	12:39 PM	12:39 PM	09:53 AM	09:53 AM	
11. RUN DURATION (MINUTES)	36	36	36	36	
12. AMBIENT TEMP (DEGREES F)	75	75	66	66	
13. BAROMETRIC PRESSURE (INCHES MERCURY)	29.923	29.923	29.923	29.923	
14. STACK STATIC PRESSURE (INCHES WATER, GAUGE)	0.04	0.04	0.04	0.04	
15. STACK TEMP (DEGREES F)	435.23	435.62	526.69	528.15	
16. METHOD 4 DRY GAS VOLUME (DSCF)	24.59	24.59	28.76	28.76	
17. METHOD 4 COLLECTED WATER WEIGHT (GRAMS)	69.16	69.16	80.78	80.78	
18. VOLUME % H2O IN STACK GAS	11.72	11.72	11.70	11.70	
19. MOLE FRACTION DRY GAS	0.88	0.88	0.88	0.88	
20. AVG STACK VELOCITY (FEET PER MINUTE)	721	722	1302	1304	
21. STACK FLOWRATE (ACFM)	6,295	6,296	11,366	11,377	
22. STACK FLOWRATE (DSCFM)	3,278	3,277	5,371	5,368	
SAMPLE TRAIN 2					
23. TIME BEGIN (HH:MM AM/PM)	12:01 PM	1:17 PM	8:54 AM	12:00 PM	
24. TIME END (HH:MM AM/PM)	1:01 PM	2:17 PM	9:54 AM	01:00 PM	
25. RUN DURATION (MINUTES)	60	60	60	60	
26. NATURAL GAS INPUT DURING TEST (STD CUBIC FT)	0	0	0	0	
27. FUEL OIL INPUT DURING TEST (GALLONS)	157.58	157.58	228.25	228.25	
28. ENERGY INPUT DURING TEST (BTU)	22,218,780	22,218,780	32,183,250	32,183,250	
29. ENERGY INPUT RATE DURING TEST (BTU/HOUR)	22,218,780	22,218,780	32,183,250	32,183,250	228.25 gal/hr
30. STACK GAS DRY MOLECULAR WEIGHT (LB/LB MOLE)	30.19	30.19	30.19	30.18	
31. STACK GAS WET MOLECULAR WEIGHT (LB/LB MOLE)	28.76	28.76	28.77	28.76	
32. EXCESS AIR (%)	23.88	24.98	23.95	24.07	
33. FUEL FACTOR FO	1.32	1.31	1.32	1.32	
34. AVG CO2 (VOLUME % RAW)	12.64	12.61	12.65	12.57	
35. AVG O2 (VOLUME % RAW)	4.23	4.38	4.24	4.26	
36. AVG CO (PPMDV RAW)	12.07	12.15	6.4	10.43	
37. AVG CO (PPMDV @ 3% O2)	13	13	7	11	
38. AVG CO (LBS/HR)	0.17	0.17	0.15	0.24	0.20
39. AVG CO (LBS/MM BTU)	0.01	0.01	0.00	0.01	
~~40. AVG CO (TONS/YEAR)~~	~~0.09~~	~~0.09~~	~~0.08~~	~~0.13~~	0.11
41. AVG NOX (PPMDV RAW)	95.11	95.11	90.07	92.18	
42. AVG NOX (PPMDV) @ 3% O2	102	103	97	99	
43. AVG NOX (LBS/HR)	~~2.23~~	~~2.23~~	~~3.46~~	~~3.54~~	3.50
44. AVG NOX (LBS/MM BTU)	0.10	0.10	0.11	0.11	
45. AVG NOX (TONS/YEAR)	2.41	2.41	3.74	3.83	
SAMPLE TRAIN 3					
46. DATE (DD-MMM-YY)	24-Sep-90	24-Sep-90	24-Sep-90	24-Sep-90	
47. TIME BEGIN (HH:MM AM/PM)	3:56 PM	4:05 PM	3:35 PM	3:40 PM	
48. TEST DURATION (MIN)	GRAB	GRAB	GRAB	GRAB	
49. ENERGY INPUT RATE DURING TEST (BTU/HOUR)	22,218,780	22,218,780	32,183,250	32,183,250	
50. SAMPLE VOLUME (LITERS)	10	10	10	10	
51. C1 ALKANES (PPMWV RAW) (NON-REACTIVE)	1.00	SEE NOTE	1.00	1.00	
52. C2 ALKANES (PPMWV RAW)	1.00	SEE NOTE	1.00	1.00	
53. C3 ALKANES (PPMWV RAW)	1.00	SEE NOTE	1.00	1.00	
54. C4 ALKANES (PPMWV RAW)	1.00	SEE NOTE	1.00	1.00	
55. C5 ALKANES (PPMWV RAW)	1.00	SEE NOTE	1.00	1.00	
56. C6 ALKANES (PPMWV RAW)	1.00	SEE NOTE	1.00	1.00	
~~57. TOTAL ROC (C2 THROUGH C6) (LBS/HR)~~	~~0.15~~	~~SEE NOTE~~	~~0.24~~	~~0.24~~	0.24
58. TOTAL ROC (C2 THROUGH C6) (LBS/MM BTU)	0.01	SEE NOTE	0.01	0.01	
59. TOTAL ROC (C2 THROUGH C6) (TONS/YEAR)	0.08	SEE NOTE	0.13	0.13	

TABLE 2
EMISSION DATA AND CALCULATIONS

	OIL-75-1	OIL-75-2	OIL-100-1	OIL-100-2	
GENERAL DATA					
1. HOURS PER YEAR ON GAS	6500	6500	6500	6500	
2. HOURS PER YEAR ON OIL	1080	1080	1080	1080	
3. HOURS PER YEAR TOTAL	7580	7580	7580	7580	
4. DATE (DD-MMM-YY)	21-Sep-90	21-Sep-90	21-Sep-90	21-Sep-90	
5. DESIRED LOAD (%)	75	75	100	100	
6. ESTIMATED ACTUAL LOAD (%)	75	75	100	100	
7. STACK DIAMETER (INCHES)	40.00	40.00	40.00	40.00	
8. STACK AREA (SQUARE FEET)	8.73	8.73	8.73	8.73	
SAMPLE TRAIN 1					
9. TIME BEGIN (HH:MM AM/PM)	12:03 PM	12:03 PM	09:17 AM	09:17 AM	
10. TIME END (HH:MM AM/PM)	12:39 PM	12:39 PM	09:53 AM	09:53 AM	
11. RUN DURATION (MINUTES)	36	36	36	36	
12. AMBIENT TEMP (DEGREES F)	75	75	66	66	
13. BAROMETRIC PRESSURE (INCHES MERCURY)	29.923	29.923	29.923	29.923	
14. STACK STATIC PRESSURE (INCHES WATER, GAUGE)	0.04	0.04	0.04	0.04	
15. STACK TEMP (DEGREES F)	435.23	435.62	526.69	528.15	
16. METHOD 4 DRY GAS VOLUME (DSCF)	24.59	24.59	28.76	28.76	
17. METHOD 4 COLLECTED WATER WEIGHT (GRAMS)	69.16	69.16	80.78	80.78	
18. VOLUME % H2O IN STACK GAS	11.72	11.72	11.70	11.70	
19. MOLE FRACTION DRY GAS	0.88	0.88	0.88	0.88	
20. AVG STACK VELOCITY (FEET PER MINUTE)	721	722	1302	1304	
21. STACK FLOWRATE (ACFM)	6,295	6,296	11,366	11,377	
22. STACK FLOWRATE (DSCFM)	3,278	3,277	5,371	5,368	
SAMPLE TRAIN 2					
23. TIME BEGIN (HH:MM AM/PM)	12:01 PM	1:17 PM	8:54 AM	12:00 PM	
24. TIME END (HH:MM AM/PM)	1:01 PM	2:17 PM	9:54 AM	01:00 PM	
25. RUN DURATION (MINUTES)	60	60	60	60	
26. NATURAL GAS INPUT DURING TEST (STD CUBIC FT)	0	0	0	0	
27. FUEL OIL INPUT DURING TEST (GALLONS)	157.58	157.58	228.25	228.25	
28. ENERGY INPUT DURING TEST (BTU)	22,218,780	22,218,780	32,183,250	32,183,250	
29. ENERGY INPUT RATE DURING TEST (BTU/HOUR)	22,218,780	22,218,780	32,183,250	32,183,250	
30. STACK GAS DRY MOLECULAR WEIGHT (LB/LB MOLE)	30.19	30.19	30.19	30.18	
31. STACK GAS WET MOLECULAR WEIGHT (LB/LB MOLE)	28.76	28.76	28.77	28.76	
32. EXCESS AIR (%)	23.88	24.98	23.95	24.07	
33. FUEL FACTOR FO	1.32	1.31	1.32	1.32	
34. AVG CO2 (VOLUME % RAW)	12.64	12.61	12.65	12.57	
35. AVG O2 (VOLUME % RAW)	4.23	4.38	4.24	4.26	
36. AVG CO (PPMDV RAW)	12.07	12.15	6.4	10.43	
37. AVG CO (PPMDV @ 3% O2)	13	13	7	11	
38. AVG CO (LBS/HR)	0.10	0.10	0.08	0.13	← 0.12
39. AVG CO (LBS/MM BTU)	0.00	0.00	0.00	0.00	
40. AVG CO (TONS/YEAR)	0.05	0.06	0.04	0.07	
41. AVG NOX (PPMDV RAW)	95.11	95.11	90.07	92.18	
42. AVG NOX (PPMDV) @ 3% O2	102	103	97	99	
43. AVG NOX (LBS/HR)	1.32	1.32	1.85	1.89	← 1.75
44. AVG NOX (LBS/MM BTU)	0.06	0.06	0.06	0.06	
45. AVG NOX (TONS/YEAR)	1.42	1.42	2.00	2.04	
SAMPLE TRAIN 3					
46. DATE (DD-MMM-YY)	24-Sep-90	24-Sep-90	24-Sep-90	24-Sep-90	
47. TIME BEGIN (HH:MM AM/PM)	3:56 PM	4:05 PM	3:35 PM	3:40 PM	
48. TEST DURATION (MIN)	GRAB	GRAB	GRAB	GRAB	
49. ENERGY INPUT RATE DURING TEST (BTU/HOUR)	22,218,780	22,218,780	32,183,250	32,183,250	
50. SAMPLE VOLUME (LITERS)	10	10	10	10	
51. C1 ALKANES (PPMWV RAW) (NON-REACTIVE)	1.00	SEE NOTE	1.00	1.00	
52. C2 ALKANES (PPMWV RAW)	1.00	SEE NOTE	1.00	1.00	
53. C3 ALKANES (PPMWV RAW)	1.00	SEE NOTE	1.00	1.00	
54. C4 ALKANES (PPMWV RAW)	1.00	SEE NOTE	1.00	1.00	
55. C5 ALKANES (PPMWV RAW)	1.00	SEE NOTE	1.00	1.00	
56. C6 ALKANES (PPMWV RAW)	1.00	SEE NOTE	1.00	1.00	
57. TOTAL ROC (C2 THROUGH C6) (LBS/HR)	0.10	SEE NOTE	0.15	0.15	← 0.14
58. TOTAL ROC (C2 THROUGH C6) (LBS/MM BTU)	0.00	SEE NOTE	0.00	0.00	
59. TOTAL ROC (C2 THROUGH C6) (TONS/YEAR)	0.05	SEE NOTE	0.08	0.08	

Sources of equations, constants, and information:

1, 2, & 3. From Authority to Construct #1012-1 issued by Ventura County Air Pollution Control District (VCAPCD), dated July 29, 1987. These limits may be modified by VCAPCD, and are presented here only to give an approximate idea of yearly mass emissions.

4. Self explanatory.

5. Desired load settings for the source tests were set forth in a letter from VCAPCD to NCBC Port Hueneme, dated 26 July 1990.

6. Actual load was determined by comparing measured steam rate to the known capacity of the boiler.

7. As measured by NEESA.

8. Calculated as $\pi r^2/144$.

9, 10. As recorded on field data sheets.

11. Run time for Sample Train 1, in minutes.

12. As measured with thermocouple and digital readout.

13. From weather station aboard Naval Air Station, Point Mugu, CA. The sampling location on the boiler stack at the Thomas Plant is 29 feet above sea level, while the NAS Point Mugu weather data is measured at 12 feet above sea level. Therefore, the figure received from Mugu was corrected by subtracting 0.017 inches of mercury per USEPA Method 4.

14. As measured immediately before sampling. A U-tube manometer was used.

15. As measured with thermocouple and digital readout.

16. The measurement taken from the face of the dry gas meter on our sampling equipment was corrected for temperature as follows:

$$V_{m(std)} = V_m[T_{std}/(T_m+460)][P_b/P_{std}]$$

where:

$V_{m(std)}$ = Volume of air collected, in dry standard cubic feet
V_m = Volume read from dry gas meter, dry cubic feet
T_{std} = 528 °R
P_b = Barometric pressure at sampling point, inches of mercury
P_{std} = 29.92126 inches of mercury
T_m = Average meter temperature, °F

17. Calculated by subtracting pretest impinger weights from post-test impinger weights. We used a Mettler AE PB 3000 electronic balance calibrated with weights traceable to the International Order of Legal Metrology (IOLM).

18. Calculated as follows:

$$\%M = [100 * V_{w(gas)}]/[V_{m(std)} + V_{w(gas)}]$$

where:

$\%M$ = Volume percent water vapor in stack gas
$V_{w(gas)}$ = Volume of water vapor collected during method 4 run. This is obtained by multiplying the mass of the collected water in grams by 0.0472.
$V_{m(std)}$ = Dry gas volume collected, as computed in item 16, above.

19. Calculated as 100% - Volume % water vapor.

20. Velocity pressure was measured at each traverse point using an S-type pitot tube and a U-tube manometer.

21. Calculated by multiplying stack area by actual stack velocity.

22. Calculated as follows:

$$Q_{dscfm} = Q_{acfm}[T_{std}/(T_s+460)][P_b/P_{std}][M_d]$$

Q_{dscfm} = Stack flow rate, in dry standard cubic feet per minute
Q_{acfm} = Stack flow rate, in actual cubic feet per minute
T_{std} = 528 °R
P_b = Barometric pressure at sampling point, inches of mercury
P_{std} = 29.92126 inches of mercury
T_s = Average stack temperature, °F
M_d = Mole fraction of dry gas in stack gas

23, 24. As recorded on data sheets

25. Run duration of Sample Train 2.

26. Calculated by subtracting gas meter reading at test start from gas meter reading at test conclusion.

27. Since there is no fuel meter which directly measures fuel input to the boiler, fuel consumption was estimated as follows: The fuel meter which measures input to an intermediate holding tank was monitored during testing, and fuel levels in the tank compared. Due to operator error, this measurement was not performed during the run at 75% load on fuel oil. The figure shown in Table 2 was obtained by straight line interpolation between fuel consumption rates at 50% and 100%.

28. Calculated as follows:

$$H = (1050\ Btu/cf)(G)+(141{,}000\ Btu/gal)(O)$$

where:

H = Energy input during test, in Btu
G = Natural gas consumed during test, in cubic feet
O = Gallons of #2 fuel oil consumed during test.

The heating values for these two fuels were obtained from the Ventura County APCD emission factors and calculation procedures booklet.

29. Calculated by dividing energy input by test duration.

30. Calculated as follows:

$$MW_d = [0.44(\%CO_2)]+[0.32(\%O_2)]+[0.28(100 - \%O_2 - \%CO_2]$$

where:

MW_d = Molecular weight of dry stack gas, lb/lb mole
$\%CO_2$ = Volume % of CO_2 in stack gas, raw
$\%O_2$ = Volume % of O_2 in stack gas, raw

31. Calculated as follows:

$$MW = (MW_d)(M_d) + 18(1-M_d)$$

where:

MW = Molecular weight of stack gas, lb/lb mole
MW_d = Molecular weight of dry stack gas, lb/lb mole
M_d = Mole fraction of dry gas in stack gas, dimensionless

32. Calculated as follows:

$$\%EA = 100(\%O_2)/[26.4 - 1.264(\%O_2) - 0.264(\%CO_2)]$$

where:

%EA = % excess air
$\%CO_2$ = Volume % of CO_2 in stack gas, raw
$\%O_2$ = Volume % of O_2 in stack gas, raw

33. Calculated as follows:

$$F_o = (20.9 - \%O_2)/\%CO_2$$

where:

F_o = Fuel factor
$\%CO_2$ = Volume % of CO_2 in stack gas, raw
$\%O_2$ = Volume % of O_2 in stack gas, raw

This equation is taken from USEPA Method 3. It is useful for comparing calculated values of F_o with expected values, which are dependent on the type of fuel burned. The ranges are:

Natural gas: 1.600 - 1.836
Fuel oil #2: 1.260 - 1.413

34 - 36. As recorded from the instrumental analyzers, averaged and corrected for analyzer drift per USEPA Method 6C calculations.

37. Calculated as follows:

$$\%CO_{(@3\%\ O2)} = [(\%CO_{(raw)})(20.9 - 3.0)]/[20.9 - \%O_{2(raw)}]$$

where:

$\%CO_{(@3\%\ O2)}$ = Volume % CO corrected to 3% O_2
$\%CO_{(raw)}$ = Volume % CO, as measured
$\%O_{2(raw)}$ = Volume % O_2, as measured

38. Calculated as follows:

$$CO_{(lb/hr)} = \left[\frac{[(CO_{(ppmdv)})(MW_{CO})(Q)(60\ min/hr)]}{(24.13\ l/mole)(454\ g/lb)(1000\ ml/l)(35.31\ ft^3/m^3)(T/530)(29.92/P)}\right]$$

where:

$CO_{(lb/hr)}$ = Emission rate of CO in pounds per hour
$CO_{(ppmdv)}$ = Measured CO concentration in stack gas
MW_{CO} = Molecular weight of CO (= 28)
Q = Stack flow rate, in dry standard cubic feet per minute
T = Measured stack temperature, °R
P = Stack static pressure, inches of mercury

39. Calculated as follows:

$$CO_{(lb/mmbtu)} = CO_{(lb/hr)}/E$$

where:

$CO_{(lb/mmbtu)}$ = Emission rate of CO, in pounds per million Btu of fuel burned
$CO_{(lb/hr)}$ = Emission rate of CO, in pounds per hour
E = Energy input rate in million btu per hour

40. Calculated by multiplying the emission rate in pounds per hour by the number of hours the device will be operated in one year.

41. As measured with the instrumental analyzer, averaged and corrected for analyzer drift using USEPA Method 6C calculations.

42. Calculated as follows:

$$\%NO_{x(@3\%\ O2)} = [(\%NO_{x(raw)})(20.9 - 3.0)]/[20.9 - \%O_{2(raw)}]$$

where:

$\%NO_{x(@3\%\ O2)}$ = Volume % NO_x corrected to 3% O_2
$\%NO_{x(raw)}$ = Volume % NO_x, as measured
$\%O_{2(raw)}$ = Volume % O_2, as measured

43. Calculated as follows:

$$NO_{x(lb/hr)} =$$

$$\left[\frac{[(NO_{x(ppmdv)})(MW_{NOx})(Q)(60\ min/hr)]}{(\underbrace{24.13\ l/mole}_{22.4})(454\ g/lb)(1000\ ml/l)(35.31\ ft^3/m^3)(T/530)(29.92/P)}\right]$$

where:

$NO_{x(lb/hr)}$ = Emission rate of NO_x in pounds per hour
$NO_{x(ppmdv)}$ = Measured NO_x concentration in stack gas
MW_{NOx} = Molecular weight of NO_x. To be conservative, all the NO_x will be assumed to be NO_2. The molecular weight is 46.
Q = Stack flow rate, in dry standard cubic feet per minute
T = Measured stack temperature, °R
P = Stack static pressure, inches of mercury

$$\frac{\cancel{gm}}{gm\text{-}\cancel{mole}} \times \frac{\cancel{ft^3}}{hr} \times \frac{\cancel{mole}}{\cancel{liter}} \times \frac{lb}{\cancel{gram}} \times \frac{\cancel{liters}}{ml} \times \frac{m^3}{\cancel{ft^3}} = \frac{lb}{hr}$$

44. Calculated as follows:

$$NO_{x(lb/mmbtu)} = NO_{x(lb/hr)}/E$$

where:

$NO_{x(lb/mmbtu)}$ = Emission rate of NO_x, in pounds per million Btu of fuel burned
$NO_{x(lb/hr)}$ = Emission rate of NO_x, in pounds per hour
E = Energy input rate in million btu per hour

45. Calculated by multiplying the emission rate in pounds per hour by the number of hours the device will be operated in one year.

46 - 47. As recorded on chain-of-custody sheet.

48. All bag samples were taken as grab samples, meaning that approximately 10 L of sample gas was collected at a rate of 1 to 3 liters per minute.

49. Same as item 29.

50. The sample bags used were 12 L capacity. We filled each bag with not more than 10 L of sample, to allow expansion during shipment to the laboratory.

51 - 56. As measured by gas chromatography performed on bag samples. Those runs marked "See note" are bags which leak checked OK prior to the test, but leaked before analysis on bag contents could be performed. The limit of detection for the analysis was 1 ppm for each species. Many of the reported concentrations were below this figure. Where this was the case, 1 ppm was assumed.

57. Calculated as follows:

$$ROC_{(lb/hr)} = \Sigma_{i=2 \text{ to } 6} \left[\frac{[(C_{i(ppmdv)})(MW_{Ci})(Q)(60 \text{ min/hr})]}{(24.13 \text{ l/mole})(454 \text{ g/lb})(1000 \text{ ml/l})(35.31 \text{ ft}^3/\text{m}^3)(T/530)(29.92/P)} \right]$$

where:

$ROC_{(lb/hr)}$ = Emission rate of ROC in pounds per hour
$C_{i(ppmdv)}$ = Measured C_i concentration in stack gas
MW_{Ci} = Molecular weight of C_i. The following figures were used:

C_2 (ethane) MW = 30
C_3 (propane) MW = 44
C_4 (butane) MW = 58
C_5 (pentane) MW = 72
C_6 (hexane) MW = 86

Methane is defined as non-reactive by VCAPCD, and was not included in the total.

Q = Stack flow rate, in dry standard cubic feet per minute
T = Measured stack temperature, °R
P = Stack static pressure, inches of mercury

58. Calculated as follows:

$$ROC_{(lb/mmbtu)} = ROC_{(lb/hr)}/E$$

where:

$ROC_{(lb/mmbtu)}$ = Emission rate of ROC, in pounds per million Btu of fuel burned
$ROC_{(lb/hr)}$ = Emission rate of ROC, in pounds per hour
E = Energy input rate in million btu per hour

59. Calculated by multiplying the emission rate in pounds per hour by the number of hours the boiler is currently allowed to operate each year. See items 1 and 2.

TABLE 3
FUEL ANALYSIS

SULFUR CONTENT :	0.04%
NITROGEN CONTENT :	0.07%

Note: Concentrations are expressed as weight percentage. Analysis performed by BC Laboratories in Bakersfield, CA.

V. DISCUSSION AND CONCLUSIONS

The measured NO_x and CO levels from the device are under limits set by VCAPCD. The sulfur content of the fuel oil is under the 0.05% limit set by VCAPCD.

APPENDIX A

CHAIN OF CUSTODY DOCUMENTS AND LABORATORY ANALYSES

PACIFIC GAS TECHNOLOGY

4200 Easton Drive · Suite 5
Bakersfield, California 93309
805/324-1317
Fax: 805/324-2746

CRL ENVIRONMENTAL
2810 Bunsen Avenue
Unit A
Ventura, CA 93003

Attention: Leo Robb

SAMPLED: SEPTEMBER 26, 1990
REPORTED: SEPTEMBER 28, 1990
SUBMITTED: SEPTEMBER 26, 1990
LAB # 3046

HYDROCARBONS ANALYSIS

SAMPLE ID :	COMPONENTS ppm (vol/vol) C1	C2	C3	C4	C5	C6 +
AMBIENT	1.6	ND	ND	ND	ND	TR < 1
TRIP BLANK	ND	ND	ND	ND	ND	TR < 1
OIL 25-1	TR < 1	1.8	TR < 1	ND	ND	TR < 1
OIL 50-1	TR < 1	1.1	ND	ND	ND	TR < 1
OIL 50-2	TR < 1	1.3	ND	ND	ND	TR < 1
OIL 75-1	ND	ND	ND	ND	ND	TR < 1
OIL 100-1	ND	ND	ND	ND	ND	TR < 1
OIL 100-2	ND	ND	ND	ND	ND	TR < 1
GAS 50-1	7.8	TR < 1	TR < 1	ND	ND	TR < 1
GAS 75-1	6.4	TR < 1	TR < 1	ND	ND	TR < 1
GAS 75-2	8.1	TR < 1	TR < 1	ND	ND	TR < 1
GAS 100-2	13.0	TR < 1	TR < 1	ND	ND	TR < 1
OIL 75-2	LEAKED	-	-	-	-	-
GAS 25-1	LEAKED	-	-	-	-	-
GAS 25-2	LEAKED	-	-	-	-	-
GAS 50-2	LEAKED	-	-	-	-	-
GAS 100-1	LEAKED	-	-	-	-	-

ANALYZED BY WAYNE HAUSAUER

METHOD 18 FIELD DATA AND CUSTODY SHEET

	SAMPLE ID	DATE	TIME BEGIN	TIME END	FLOW RATE	SAMPLED BY (TIME)	TRANSPORT BY (TIME)	RECEIVED BY (TIME)
	GAS-25-1	9/24	10:30A	10:40A	520cc/m	JR	DC	REP 1750
X	GAS-25-2	~~9/24~~ 9/25	~~10:47A~~ 7:30A	~~10:57A~~		JR	JR	JH 8:53 Am 9/25
	GAS-50-1	9/24	3:00p	3:05p		JR	DC	REP 1750
X	GAS-50-2	~~9/24~~ 9/25	~~3:05p~~ 7:45	~~3:10p~~		CR	JR	JH 8:53 Am 9/25
	GAS-75-1	9/24	2:20p	2:25p		JR	DC	REP 1750
	GAS-75-2	9/24	2:35p	2:40p		JR	"	REP 1750
X	GAS-100-1	~~9/24~~ 9/25	~~12:40p~~ 8:00	~~12:45~~		JR	JR	JH 8:53 Am 9/25
	GAS-100-2	9/24	13:00	13:05		CR	DC	REP 1750
	OIL-25-1	9/24	4:47p	4:49p		CR	DC	REP 1750
	OIL-25-2							
	OIL-50-1	9/24	4:20p	4:25p		CR	DC	REP 1750
	OIL-50-2	9/24	4:35p	4:37p		CR		REP
	OIL-75-1	9/24	3:56p	3:59p		JR		REP
	OIL-75-2	9/24	4:05p	4:07p		CR		REP
	OIL-100-1	9/24	3:35p	3:40p		CR		REP
	OIL-100-2	9/24	3:40p	3:45p		CR		REP
X	TRIP BLNK	8/29				Enseco	JR	JH 8:53 AM 9/25
	AMB BLANK	9/24	10:06A	10:20A		JR	DC	REP 1750

ENVIRONMENTAL
CHEMICAL ANALYSIS
PETROLEUM

BC LABORATORIES, INC.
J. J. EGLIN, REG. CHEM. ENGR.
4100 ATLAS CT., BAKERSFIELD, CALIFORNIA 93308 PHONE (805) 327-4911 FAX (805) 327-1918

Date Reported: 10/05/90
Date Received: 09/27/90
Laboratory No.: 8485-1

JAMES C. REICHLE
3111 E. HARBOR
VENTURA, CA 93001
805-644-5065

Sample Description: T-PLANT, 9/21/90 (U.S. NAVY)

OIL ANALYSIS

Constituents	Sample Results	Method P.Q.L.	Units	Method
Total Nitrogen	0.07	0.05	%	ASTM-D3228
Total Sulfur	0.04	-.	%	ASTM-D2622

BY J. J. Eglin
J. J. Eglin

APPENDIX B

EQUIPMENT CALIBRATION DATA

S TYPE PITOT TUBE CALIBRATION WORKSHEET
THOMAS PLANT SOURCE TEST - PROBE #5-8

PITOT #	SIDE	RUN	NBS VP (IN WG)	S TYPE VP (IN WG)	CP(S)	MEAN	DEVIATION	SIGMA
1	A	1	0.200	0.300	0.816	0.808	0.009	-2.8E-17
1	A	2	0.290	0.450	0.803		-0.005	
1	A	3	0.350	0.540	0.805		-0.003	
1	A	4	0.390	0.600	0.806		-0.001	
1	B	1	0.390	0.600	0.806	0.802	0.004	2.8E-17
1	B	2	0.350	0.540	0.805		0.003	
1	B	3	0.290	0.450	0.803		0.000	
1	B	4	0.190	0.300	0.796		-0.007	

ANALYZER METHOD 6C CALIBRATION SHEET

BASE: CBC PORT HUENEME
BUILDING: 373 THOMAS PLANT
DATE: 20 SEPT 90
CAL. BY: NEWTON

RUN NO: GAS-25
BOILER NO: CB
FUEL: NAT GAS
LOAD: 25%

ANALYZER: O2
SPAN: 20.9
UNITS: %
RESP TIME: 90 sec

SPAN GAS INPUT	SPAN GAS RANGE	CYLINDER VALUE	CALIBRATION RESPONSE	ABS. DIFF.	CAL. BIAS % OF SPAN	DRIFT % OF SPAN
ANALYZER PRETEST	HIGH	20.90	20.9	0	0.0	N/A
	MID	3.116	3.2	0.084	0.4	N/A
	ZERO	0.00	0	0	0.0	N/A
SYSTEM PRETEST	UPSCALE	3.12	3.1	0.1	0.5	N/A
	ZERO	0.00	0	0	0.0	N/A
SYSTEM POST RUN 1	UPSCALE	3.12	3.2	0	0.0	0.5
	ZERO	0.00	0.1	0.1	0.5	0.5
SYSTEM POST RUN 2	UPSCALE	3.12	3.2	0	0.0	0.5
	ZERO	0.00	0.1	0.1	0.5	0.5

	RUN 1	RUN 2	
Co=	0.05	0.10	Avg zero gas system calibration bias.
Cm=	3.15	3.20	Avg upscale gas sys. cal. bias.
Cma=	3.12	3.12	Upscale gas concentration.
C=	7.07	6.92	Avg gas analyzer concentration reading.
Cgas=	7.06	6.86	Corrected gas concentration.

Analyzer Absolute Difference = |Analyzer Cal. Response - Cyl. Value|
Analyzer Cal. Bias = Analyzer Absolute Difference / Span * 100

Sys. Absolute Difference = |Sys. Cal. Response - Analyzer Cal. Response|
System Cal. Bias = System Absolute Difference / Span Range * 100

Drift = (Sys. Cal. Response - Pretest Sys. Cal. Response) / Span * 100

Cgas = (C-Co)*Cma/(Cm-Co)

ANALYZER METHOD 6C CALIBRATION SHEET

BASE: CBC PORT HUENEME
BUILDING: 373 THOMAS PLANT
DATE: 20 SEPT 90
CAL. BY: NEWTON

RUN NO: GAS-25
BOILER NO: CB
FUEL: NAT GAS
LOAD: 25%

ANALYZER: CO2
SPAN: 20
UNITS: %
RESP TIME: 100 sec

SPAN GAS INPUT	SPAN GAS RANGE	CYLINDER VALUE	CALIBRATION RESPONSE	ABS. DIFF.	CAL. BIAS % OF SPAN	DRIFT % OF SPAN
ANALYZER PRETEST	HIGH			0	0.0	N/A
	MID	11.01	11	0.01	0.0	N/A
	ZERO	0.00	0	0	0.0	N/A
SYSTEM PRETEST	UPSCALE	11.01	11	0	0.0	N/A
	ZERO	0.00	0	0	0.0	N/A
SYSTEM POST RUN 1	UPSCALE	11.01	11	0	0.0	0
	ZERO	0.00	0	0	0.0	0
SYSTEM POST RUN 2	UPSCALE	11.01	10.9	0.1	0.5	0.5
	ZERO	0.00	0	0	0.0	0

	RUN 1	RUN 2	
Co=	0.00	0.00	Avg zero gas system calibration bias.
Cm=	11.00	10.95	Avg upscale gas sys. cal. bias.
Cma=	11.01	11.01	Upscale gas concentration.
C=	7.33	7.82	Avg gas analyzer concentration reading.
Cgas=	7.34	7.86	Corrected gas concentration.

Analyzer Absolute Difference = |Analyzer Cal. Response - Cyl. Value|
Analyzer Cal. Bias = Analyzer Absolute Difference / Span * 100

Sys. Absolute Difference = |Sys. Cal. Response - Analyzer Cal. Response|
System Cal. Bias = System Absolute Difference / Span Range * 100

Drift = (Sys. Cal. Response - Pretest Sys. Cal. Response) / Span * 100

Cgas = (C-Co)*Cma/(Cm-Co)

ANALYZER METHOD 6C CALIBRATION SHEET

BASE: CBC PORT HUENEME
BUILDING: 373 THOMAS PLANT
DATE: 20 SEPT 90
CAL. BY: NEWTON

RUN NO: GAS-25
BOILER NO: CB
FUEL: NAT GAS
LOAD: 25%

ANALYZER: CO
SPAN: 500
UNITS: PPM
RESP TIME: 90 sec

SPAN GAS INPUT	SPAN GAS RANGE	CYLINDER VALUE	CALIBRATION RESPONSE	ABS. DIFF.	CAL. BIAS % OF SPAN	DRIFT % OF SPAN
ANALYZER PRETEST	HIGH	501.5	500	1.5	0.3	N/A
	MID	248.1	250	1.9	0.4	N/A
	ZERO	0.00	0	0	0.0	N/A
SYSTEM PRETEST	UPSCALE	248.10	250	0	0.0	N/A
	ZERO	0.00	0	0	0.0	N/A
SYSTEM POST RUN 1	UPSCALE	248.10	250	0	0.0	0
	ZERO	0.00	0	0	0.0	0
SYSTEM POST RUN 2	UPSCALE	248.10	247	3	0.6	0.6
	ZERO	0.00	0	0	0.0	0

	RUN 1	RUN 2	
Co=	0.00	0.00	Avg zero gas system calibration bias.
Cm=	250.00	248.50	Avg upscale gas sys. cal. bias.
Cma=	248.10	248.10	Upscale gas concentration.
C=	120.00	106.90	Avg gas analyzer concentration reading.
Cgas=	119.09	106.73	Corrected gas concentration.

Analyzer Absolute Difference = |Analyzer Cal. Response - Cal. Value|
Analyzer Cal. Bias = Analyzer Absolute Difference / Span * 100

Sys. Absolute Difference = |Sys. Cal. Response - Analyzer Cal. Response|
System Cal. Bias = System Absolute Difference / Span Range * 100

Drift = (Sys. Cal. Response - Pretest Sys. Cal. Response) / Span * 100

Cgas = (C-Co)*Cma/(Cm-Co)

ANALYZER METHOD 6C CALIBRATION SHEET

BASE: CBC PORT HUENEME
BUILDING: 373 THOMAS PLANT
DATE: 20 SEPT 90
CAL. BY: NEWTON

RUN NO: GAS-25
BOILER NO: CB
FUEL: NAT GAS
LOAD: 25%

ANALYZER: NOX
SPAN: 100
UNITS: PPM
RESP TIME: 90 sec

SPAN GAS INPUT	SPAN GAS RANGE	CYLINDER VALUE	CALIBRATION RESPONSE	ABS. DIFF.	CAL. BIAS % OF SPAN	DRIFT % OF SPAN
ANALYZER PRETEST	HIGH	90.71	90	0.71	0.7	N/A
	MID	51.98	51.5	0.48	0.5	N/A
	ZERO	0.00	0.5	0.5	0.5	N/A
SYSTEM PRETEST	UPSCALE	51.98	51	0.5	0.5	N/A
	ZERO	0.00	1	0.5	0.5	N/A
SYSTEM POST RUN 1	UPSCALE	51.98	52	0.5	0.5	1
	ZERO	0.00	1.5	1	1.0	0.5
SYSTEM POST RUN 2	UPSCALE	51.98	52	0.5	0.5	1
	ZERO	0.00	1	0.5	0.5	0

	RUN 1	RUN 2	
Co=	1.25	1.25	Avg zero gas system calibration bias.
Cm=	51.50	52.00	Avg upscale gas sys. cal. bias.
Cma=	51.98	51.98	Upscale gas concentration.
C=	23.00	23.70	Avg gas analyzer concentration reading.
Cgas=	22.50	22.99	Corrected gas concentration.

Analyzer Absolute Difference = |Analyzer Cal. Response - Cyl. Value|
Analyzer Cal. Bias = Analyzer Absolute Difference / Span * 100

Sys. Absolute Difference = |Sys. Cal. Response - Analyzer Cal. Response|
System Cal. Bias = System Absolute Difference / Span Range * 100

Drift = (Sys. Cal. Response - Pretest Sys. Cal. Response) / Span * 100

Cgas = (C-Co)*Cma/(Cm-Co)

ANALYZER METHOD 6C CALIBRATION SHEET

BASE: CBC PORT HUENEME
BUILDING: 373 THOMAS PLANT
DATE: 20 SEPT 90
CAL. BY: NEWTON

RUN NO: GAS-50
BOILER NO: CB
FUEL: NAT GAS
LOAD: 50%

ANALYZER: 02
SPAN: 20.9
UNITS: %
RESP TIME: 90 sec

SPAN GAS INPUT	SPAN GAS RANGE	CYLINDER VALUE	CALIBRATION RESPONSE	ABS. DIFF.	CAL. BIAS % OF SPAN	DRIFT % OF SPAN
ANALYZER PRETEST	HIGH	20.90	20.9	0	0.0	N/A
	MID	3.116	3.2	0.084	0.4	N/A
	ZERO	0.00	0.1	0.1	0.5	N/A
SYSTEM PRETEST	UPSCALE	3.12	3.2	0	0.0	N/A
	ZERO	0.00	0.1	0	0.0	N/A
SYSTEM POST RUN 1	UPSCALE	3.12	3.2	0	0.0	0
	ZERO	0.00	0.1	0	0.0	0
SYSTEM POST RUN 2	UPSCALE	3.12	3.2	0	0.0	0
	ZERO	0.00	0.1	0	0.0	0

	RUN 1	RUN 2	
Co=	0.10	0.10	Avg zero gas system calibration bias.
Cm=	3.20	3.20	Avg upscale gas sys. cal. bias.
Cma=	3.12	3.12	Upscale gas concentration.
C=	4.60	4.43	Avg gas analyzer concentration reading.
Cgas=	4.72	4.35	Corrected gas concentration.

Analyzer Absolute Difference = |Analyzer Cal. Response - Cyl. Value|
Analyzer Cal. Bias = Analyzer Absolute Difference / Span * 100

Sys. Absolute Difference = |Sys. Cal. Response - Analyzer Cal. Response|
System Cal. Bias = System Absolute Difference / Span Range * 100

Drift = (Sys. Cal. Response - Pretest Sys. Cal. Response) / Span * 100

Cgas = (C-Co)*Cma/(Cm-Co)

ANALYZER METHOD 6C CALIBRATION SHEET

BASE: CBC PORT HUENEME
BUILDING: 373 THOMAS PLANT
DATE: 20 SEPT 90
CAL. BY: NEWTON

RUN NO: GAS-50
BOILER NO: CB
FUEL: NAT GAS
LOAD: 50%

ANALYZER: CO2
SPAN: 20
UNITS: %
RESP TIME: 100 sec

SPAN GAS INPUT	SPAN GAS RANGE	CYLINDER VALUE	CALIBRATION RESPONSE	ABS. DIFF.	CAL. BIAS % OF SPAN	DRIFT % OF SPAN
ANALYZER PRETEST	HIGH			0	0.0	N/A
	MID	11.01	11	0.01	0.0	N/A
	ZERO	0.00	0.1	0.1	0.5	N/A
SYSTEM PRETEST	UPSCALE	11.01	10.8	0.2	1.0	N/A
	ZERO	0.00	0	0.1	0.5	N/A
SYSTEM POST RUN 1	UPSCALE	11.01	10.8	0.2	1.0	0
	ZERO	0.00	0	0.1	0.5	0
SYSTEM POST RUN 2	UPSCALE	11.01	10.5	0.5	2.5	1.5
	ZERO	0.00	0	0.1	0.5	0

	RUN 1	RUN 2	
Co=	0.00	0.00	Avg zero gas system calibration bias.
Cm=	10.80	10.65	Avg upscale gas sys. cal. bias.
Cma=	11.01	11.01	Upscale gas concentration.
C=	9.13	9.07	Avg gas analyzer concentration reading.
Cgas=	9.31	9.38	Corrected gas concentration.

Analyzer Absolute Difference = |Analyzer Cal. Response - Cyl. Value|
Analyzer Cal. Bias = Analyzer Absolute Difference / Span * 100

Sys. Absolute Difference = |Sys. Cal. Response - Analyzer Cal. Response|
System Cal. Bias = System Absolute Difference / Span Range * 100

Drift = (Sys. Cal. Response - Pretest Sys. Cal. Response) / Span * 100

Cgas = (C-Co)*Cma/(Cm-Co)

ANALYZER METHOD 6C CALIBRATION SHEET

BASE: CBC PORT HUENEME
BUILDING: 373 THOMAS PLANT
DATE: 20 SEPT 90
CAL. BY: NEWTON

RUN NO: GAS-50
BOILER NO: CB
FUEL: NAT GAS
LOAD: 50%

ANALYZER: CO
SPAN: 500
UNITS: PPM
RESP TIME: 90 sec

SPAN GAS INPUT	SPAN GAS RANGE	CYLINDER VALUE	CALIBRATION RESPONSE	ABS. DIFF.	CAL. BIAS % OF SPAN	DRIFT % OF SPAN
ANALYZER PRETEST	HIGH	501.5	500	1.5	0.3	N/A
	MID	248.1	250	1.9	0.4	N/A
	ZERO	0.00	2	2	0.4	N/A
SYSTEM PRETEST	UPSCALE	248.10	250	0	0.0	N/A
	ZERO	0.00	0	2	0.4	N/A
SYSTEM POST RUN 1	UPSCALE	248.10	250	0	0.0	0
	ZERO	0.00	0	2	0.4	0
SYSTEM POST RUN 2	UPSCALE	248.10	250	0	0.0	0
	ZERO	0.00	0	2	0.4	0

	RUN 1	RUN 2	
Co=	0.00	0.00	Avg zero gas system calibration bias.
Cm=	250.00	250.00	Avg upscale gas sys. cal. bias.
Cma=	248.10	248.10	Upscale gas concentration.
C=	182.00	173.10	Avg gas analyzer concentration reading.
Cgas=	180.62	171.78	Corrected gas concentration.

Analyzer Absolute Difference = |Analyzer Cal. Response - Cyl. Value|
Analyzer Cal. Bias = Analyzer Absolute Difference / Span * 100

Sys. Absolute Difference = |Sys. Cal. Response - Analyzer Cal. Response|
System Cal. Bias = System Absolute Difference / Span Range * 100

Drift = (Sys. Cal. Response - Pretest Sys. Cal. Response) / Span * 100

Cgas = (C-Co)*Cma/(Cm-Co)

ANALYZER METHOD 6C CALIBRATION SHEET

BASE: CBC PORT HUENEME
BUILDING: 373 THOMAS PLANT
DATE: 20 SEPT 90
CAL. BY: NEWTON

RUN NO: GAS-50
BOILER NO: CB
FUEL: NAT GAS
LOAD: 50%

ANALYZER: NOX
SPAN: 100
UNITS: PPM
RESP TIME: 90 sec

SPAN GAS INPUT	SPAN GAS RANGE	CYLINDER VALUE	CALIBRATION RESPONSE	ABS. DIFF.	CAL. BIAS % OF SPAN	DRIFT % OF SPAN
ANALYZER PRETEST	HIGH	90.71	91	0.29	0.3	N/A
	MID	51.98	52	0.02	0.0	N/A
	ZERO	0.00	1	1	1.0	N/A
SYSTEM PRETEST	UPSCALE	51.98	52	0	0.0	N/A
	ZERO	0.00	1	0	0.0	N/A
SYSTEM POST RUN 1	UPSCALE	51.98	51	1	1.0	1
	ZERO	0.00	0	1	1.0	1
SYSTEM POST RUN 2	UPSCALE	51.98	49.5	2.5	2.5	2.5
	ZERO	0.00	-0.5	1.5	1.5	1.5

	RUN 1	RUN 2	
Co=	0.50	-0.25	Avg zero gas system calibration bias.
Cm=	51.50	50.25	Avg upscale gas sys. cal. bias.
Cma=	51.98	51.98	Upscale gas concentration.
C=	18.40	17.40	Avg gas analyzer concentration reading.
Cgas=	18.24	18.17	Corrected gas concentration.

Analyzer Absolute Difference = |Analyzer Cal. Response - Cyl. Value|
Analyzer Cal. Bias = Analyzer Absolute Difference / Span * 100

Sys. Absolute Difference = |Sys. Cal. Response - Analyzer Cal. Response|
System Cal. Bias = System Absolute Difference / Span Range * 100

Drift = (Sys. Cal. Response - Pretest Sys. Cal. Response) / Span * 100

Cgas = (C-Co)*Cma/(Cm-Co)

ANALYZER METHOD 6C CALIBRATION SHEET

BASE: CBC PORT HUENEME
BUILDING: 373 THOMAS PLANT
DATE: 20 SEPT 90
CAL. BY: NEWTON TN

RUN NO: GAS-75
BOILER NO: CB
FUEL: NAT GAS
LOAD: 75%

ANALYZER: CO2
SPAN: 20
UNITS: %
RESP TIME: 100 sec

SPAN GAS INPUT	SPAN GAS RANGE	CYLINDER VALUE	CALIBRATION RESPONSE	ABS. DIFF.	CAL. BIAS % OF SPAN	DRIFT % OF SPAN
ANALYZER PRETEST	HIGH			0	0.0	N/A
	MID	11.01	11	0.01	0.0	N/A
	ZERO	0.00	0	0	0.0	N/A
SYSTEM PRETEST	UPSCALE	11.01	11	0	0.0	N/A
	ZERO	0.00	0	0	0.0	N/A
SYSTEM POST RUN 1	UPSCALE	11.01	11	0	0.0	0
	ZERO	0.00	0	0	0.0	0
SYSTEM POST RUN 2	UPSCALE	11.01	10.8	0.2	1.0	1
	ZERO	0.00	0	0	0.0	0

	RUN 1	RUN 2	
Co=	0.00	0.00	Avg zero gas system calibration bias.
Cm=	11.00	10.90	Avg upscale gas sys. cal. bias.
Cma=	11.01	11.01	Upscale gas concentration.
C=	9.43	9.39	Avg gas analyzer concentration reading.
Cgas=	9.44	9.48	Corrected gas concentration.

Analyzer Absolute Difference = |Analyzer Cal. Response - Cyl. Value|
Analyzer Cal. Bias = Analyzer Absolute Difference / Span * 100

Sys. Absolute Difference = |Sys. Cal. Response - Analyzer Cal. Response|
System Cal. Bias = System Absolute Difference / Span Range * 100

Drift = (Sys. Cal. Response - Pretest Sys. Cal. Response) / Span * 100

Cgas = (C-Co)*Cma/(Cm-Co)

ANALYZER METHOD 6C CALIBRATION SHEET

BASE: CBC PORT HUENEME	RUN NO: GAS-75	ANALYZER: 02	
BUILDING: 373 THOMAS PLANT	BOILER NO: CB	SPAN:	20.9
DATE: 20 SEPT 90	FUEL: NAT GAS	UNITS: %	
CAL. BY: NEWTON GN	LOAD: 75%	RESP TIME: 90 sec	

SPAN GAS INPUT	SPAN GAS RANGE	CYLINDER VALUE	CALIBRATION RESPONSE	ABS. DIFF.	CAL. BIAS % OF SPAN	DRIFT % OF SPAN
ANALYZER PRETEST	HIGH	20.90	20.9	0	0.0	N/A
	MID	3.116	3.2	0.084	0.4	N/A
	ZERO	0.00	0	0	0.0	N/A
SYSTEM PRETEST	UPSCALE	3.12	3.2	0	0.0	N/A
	ZERO	0.00	0.1	0.1	0.5	N/A
SYSTEM POST RUN 1	UPSCALE	3.12	3.2	0	0.0	0
	ZERO	0.00	0.1	0.1	0.5	0
SYSTEM POST RUN 2	UPSCALE	3.12	3.3	0.1	0.5	0.5
	ZERO	0.00	0.1	0.1	0.5	0

	RUN 1	RUN 2	
Co=	0.10	0.10	Avg zero gas system calibration bias.
Cm=	3.20	3.25	Avg upscale gas sys. cal. bias.
Cma=	3.12	3.12	Upscale gas concentration.
C=	4.57	4.61	Avg gas analyzer concentration reading.
Cgas=	4.49	4.46	Corrected gas concentration.

Analyzer Absolute Difference = |Analyzer Cal. Response - Cyl. Value|
Analyzer Cal. Bias = Analyzer Absolute Difference / Span * 100

Sys. Absolute Difference = |Sys. Cal. Response - Analyzer Cal. Response|
System Cal. Bias = System Absolute Difference / Span Range * 100

Drift = (Sys. Cal. Response - Pretest Sys. Cal. Response) / Span * 100

Cgas = (C-Co)*Cma/(Cm-Co)

ANALYZER METHOD 6C CALIBRATION SHEET

BASE: CBC PORT HUENEME	RUN NO: GAS-75	ANALYZER: CO	
BUILDING: 373 THOMAS PLANT	BOILER NO: CB	SPAN:	500
DATE: 20 SEPT 90	FUEL: NAT GAS	UNITS: PPM	
CAL. BY: NEWTON	LOAD: 75%	RESP TIME: 90 sec	

SPAN GAS INPUT	SPAN GAS RANGE	CYLINDER VALUE	CALIBRATION RESPONSE	ABS. DIFF.	CAL. BIAS % OF SPAN	DRIFT % OF SPAN
ANALYZER PRETEST	HIGH	501.5	500	1.5	0.3	N/A
	MID	248.1	250	1.9	0.4	N/A
	ZERO	0.00	0	0	0.0	N/A
SYSTEM PRETEST	UPSCALE	248.10	250	0	0.0	N/A
	ZERO	0.00	0	0	0.0	N/A
SYSTEM POST RUN 1	UPSCALE	248.10	250	0	0.0	0
	ZERO	0.00	3	3	0.6	0.6
SYSTEM POST RUN 2	UPSCALE	248.10	250	0	0.0	0
	ZERO	0.00	5	5	1.0	1

	RUN 1	RUN 2	
Co=	1.50	4.00	Avg zero gas system calibration bias.
Cm=	250.00	250.00	Avg upscale gas sys. cal. bias.
Cma=	248.10	248.10	Upscale gas concentration.
C=	164.20	168.50	Avg gas analyzer concentration reading.
Cgas=	162.44	165.90	Corrected gas concentration.

Analyzer Absolute Difference = |Analyzer Cal. Response - Cyl. Value|
Analyzer Cal. Bias = Analyzer Absolute Difference / Span * 100

Sys. Absolute Difference = |Sys. Cal. Response - Analyzer Cal. Response|
System Cal. Bias = System Absolute Difference / Span Range * 100

Drift = (Sys. Cal. Response - Pretest Sys. Cal. Response) / Span * 100

Cgas = (C-Co)*Cma/(Cm-Co)

ANALYZER METHOD 6C CALIBRATION SHEET

BASE: CBC PORT HUENEME
BUILDING: 373 THOMAS PLANT
DATE: 20 SEPT 90
CAL. BY: NEWTON

RUN NO: GAS-75
BOILER NO: CB
FUEL: NAT GAS
LOAD: 75%

ANALYZER: NOX
SPAN: 100
UNITS: PPM
RESP TIME: 90 sec

SPAN GAS INPUT	SPAN GAS RANGE	CYLINDER VALUE	CALIBRATION RESPONSE	ABS. DIFF.	CAL. BIAS % OF SPAN	DRIFT % OF SPAN
ANALYZER PRETEST	HIGH	90.71	91	0.29	0.3	N/A
	MID	51.98	52	0.02	0.0	N/A
	ZERO	0.00	0	0	0.0	N/A
SYSTEM PRETEST	UPSCALE	51.98	52	0	0.0	N/A
	ZERO	0.00	0	0	0.0	N/A
SYSTEM POST RUN 1	UPSCALE	51.98	53	1	1.0	1
	ZERO	0.00	1	1	1.0	1
SYSTEM POST RUN 2	UPSCALE	51.98	53	1	1.0	1
	ZERO	0.00	1.5	1.5	1.5	1.5

	RUN 1	RUN 2	
Co=	0.50	1.25	Avg zero gas system calibration bias.
Cm=	52.50	53.00	Avg upscale gas sys. cal. bias.
Cma=	51.98	51.98	Upscale gas concentration.
C=	27.00	27.20	Avg gas analyzer concentration reading.
Cgas=	26.49	26.07	Corrected gas concentration.

Analyzer Absolute Difference = |Analyzer Cal. Response - Cyl. Value|
Analyzer Cal. Bias = Analyzer Absolute Difference / Span * 100

Sys. Absolute Difference = |Sys. Cal. Response - Analyzer Cal. Response|
System Cal. Bias = System Absolute Difference / Span Range * 100

Drift = (Sys. Cal. Response - Pretest Sys. Cal. Response) / Span * 100

$C_{gas} = (C - C_o) * C_{ma} / (C_m - C_o)$

ANALYZER METHOD 6C CALIBRATION SHEET

BASE: CBC PORT HUENEME
BUILDING: 373 THOMAS PLANT
DATE: 20 SEPT 90
CAL. BY: NEWTON

RUN NO: GAS-100
BOILER NO: CB
FUEL: NAT GAS
LOAD: 100%

ANALYZER: 02
SPAN: 20.[illegible]
UNITS: %
RESP TIME: 30 sec

SPAN GAS INPUT	SPAN GAS RANGE	CYLINDER VALUE	CALIBRATION RESPONSE	ABS. DIFF.	CAL. BIAS % OF SPAN	DRIFT % OF SPAN
ANALYZER PRETEST	HIGH	20.90	20.9	0	0.0	N/A
	MID	3.116	3.1	0.016	0.1	N/A
	ZERO	0.00	0	0	0.0	N/A
SYSTEM PRETEST	UPSCALE	3.12	3.1	0	0.0	N/A
	ZERO	0.00	0	0	0.0	N/A
SYSTEM POST RUN 1	UPSCALE	3.12	3.2	0.1	0.5	[illegible].5
	ZERO	0.00	0	0	0.0	[illegible]
SYSTEM POST RUN 2	UPSCALE	3.12	3.2	0.1	0.5	0.47846889
	ZERO	0.00	0.1	0.1	0.5	0.47846889

	RUN 1	RUN 2	
Co=	0.00	0.05	Avg zero gas system calibration bias.
Cm=	3.15	3.20	Avg upscale gas sys. cal. bias.
Cma=	3.12	3.12	Upscale gas concentration.
C=	4.16	4.24	Avg gas analyzer concentration reading.
Cgas=	4.12	4.14	Corrected gas concentration.

Analyzer Absolute Difference = |Analyzer Cal. Response - Cyl. Value|
Analyzer Cal. Bias = Analyzer Absolute Difference / Span * 100

Sys. Absolute Difference = |Sys. Cal. Response - Analyzer Cal. Response|
System Cal. Bias = System Absolute Difference / Span Range * 100

Drift = (Sys. Cal. Response - Pretest Sys. Cal. Response) / Span * 100

Cgas = (C-Co)*Cma/(Cm-Co)

ANALYZER METHOD 6C CALIBRATION SHEET

BASE: CBC PORT HUENEME
BUILDING: 373 THOMAS PLANT
DATE: 20 SEPT 90
CAL. BY: NEWTON N

RUN NO: GAS-100
BOILER NO: CB
FUEL: NAT GAS
LOAD: 100%

ANALYZER: CO2
SPAN: 20
UNITS: %
RESP TIME: 100 sec

SPAN GAS INPUT	SPAN GAS RANGE	CYLINDER VALUE	CALIBRATION RESPONSE	ABS. DIFF.	CAL. BIAS % OF SPAN	DRIFT % OF SPAN
ANALYZER PRETEST	HIGH			0	0.0	N/A
	MID	11.01	11	0.01	0.0	N/A
	ZERO	0.00	0	0	0.0	N/A
SYSTEM PRETEST	UPSCALE	11.01	10.9	0.1	0.5	N/A
	ZERO	0.00	0	0	0.0	N/A
SYSTEM POST RUN 1	UPSCALE	11.01	10.6	0.4	2.0	1.5
	ZERO	0.00	-0.1	0.1	0.5	0.5
SYSTEM POST RUN 2	UPSCALE	11.01	10.6	0.4	2.0	1.5
	ZERO	0.00	-0.1	0.1	0.5	0.5

	RUN 1	RUN 2	
Co=	-0.05	-0.10	Avg zero gas system calibration bias.
Cm=	10.75	10.60	Avg upscale gas sys. cal. bias.
Cma=	11.01	11.01	Upscale gas concentration.
C=	9.42	9.23	Avg gas analyzer concentration reading.
Cgas=	9.65	9.60	Corrected gas concentration.

Analyzer Absolute Difference = |Analyzer Cal. Response - Cyl. Value|
Analyzer Cal. Bias = Analyzer Absolute Difference / Span * 100

Sys. Absolute Difference = |Sys. Cal. Response - Analyzer Cal. Response|
System Cal. Bias = System Absolute Difference / Span Range * 100

Drift = (Sys. Cal. Response - Pretest Sys. Cal. Response) / Span * 100

Cgas = (C-Co)*Cma/(Cm-Co)

ANALYZER METHOD 6C CALIBRATION SHEET

BASE: CBC PORT HUENEME
BUILDING: 373 THOMAS PLANT
DATE: 20 SEPT 90
CAL. BY: NEWTON

RUN NO: GAS-100
BOILER NO: CB
FUEL: NAT GAS
LOAD: 100%

ANALYZER: CO
SPAN: 500
UNITS: PPM
RESP TIME: 90 sec

SPAN GAS INPUT	SPAN GAS RANGE	CYLINDER VALUE	CALIBRATION RESPONSE	ABS. DIFF.	CAL. BIAS % OF SPAN	DRIFT % OF SPAN
ANALYZER PRETEST	HIGH	501.5	500	1.5	0.3	N/A
	MID	248.1	250	1.9	0.4	N/A
	ZERO	0.00	0	0	0.0	N/A
SYSTEM PRETEST	UPSCALE	248.10	250	0	0.0	N/A
	ZERO	0.00	0	0	0.0	N/A
SYSTEM POST RUN 1	UPSCALE	248.10	255	5	1.0	1
	ZERO	0.00	5	5	1.0	1
SYSTEM POST RUN 2	UPSCALE	248.10	255	5	1.0	1
	ZERO	0.00	10	10	2.0	2

	RUN 1	RUN 2	
Co=	2.50	7.50	Avg zero gas system calibration bias.
Cm=	252.50	255.00	Avg upscale gas sys. cal. bias.
Cma=	248.10	248.10	Upscale gas concentration.
C=	130.70	131.90	Avg gas analyzer concentration reading.
Cgas=	127.23	124.70	Corrected gas concentration.

Analyzer Absolute Difference = |Analyzer Cal. Response - Cyl. Value|
Analyzer Cal. Bias = Analyzer Absolute Difference / Span * 100

Sys. Absolute Difference = |Sys. Cal. Response - Analyzer Cal. Response|
System Cal. Bias = System Absolute Difference / Span Range * 100

Drift = (Sys. Cal. Response - Pretest Sys. Cal. Response) / Span * 100

Cgas = (C-Co)*Cma/(Cm-Co)

ANALYZER METHOD 6C CALIBRATION SHEET

BASE: CBC PORT HUENEME
BUILDING: 373 THOMAS PLANT
DATE: 20 SEPT 90
CAL. BY: NEWTON

RUN NO: GAS-100
BOILER NO: CB
FUEL: NAT GAS
LOAD: 100%

ANALYZER: NOX
SPAN: 100
UNITS: PPM
RESP TIME: 30 sec

SPAN GAS INPUT	SPAN GAS RANGE	CYLINDER VALUE	CALIBRATION RESPONSE	ABS. DIFF.	CAL. BIAS % OF SPAN	DRIFT % OF SPAN
ANALYZER PRETEST	HIGH	90.71	91	0.29	0.3	N/A
	MID	51.98	52	0.02	0.0	N/A
	ZERO	0.00	1	1	1.0	N/A
SYSTEM PRETEST	UPSCALE	51.98	52	0	0.0	N/A
	ZERO	0.00	1	0	0.0	N/A
SYSTEM POST RUN 1	UPSCALE	51.98	54	2	2.0	2
	ZERO	0.00	1.5	0.5	0.5	0.5
SYSTEM POST RUN 2	UPSCALE	51.98	54.5	2.5	2.5	2.5
	ZERO	0.00	2	1	1.0	1

	RUN 1	RUN 2	
Co=	1.25	1.75	Avg zero gas system calibration bias.
Cm=	53.00	54.25	Avg upscale gas sys. cal. bias.
Cma=	51.98	51.98	Upscale gas concentration.
C=	35.60	36.50	Avg gas analyzer concentration reading.
Cgas=	34.50	34.21	Corrected gas concentration.

Analyzer Absolute Difference = |Analyzer Cal. Response - Cyl. Value|
Analyzer Cal. Bias = Analyzer Absolute Difference / Span * 100

Sys. Absolute Difference = |Sys. Cal. Response - Analyzer Cal. Response|
System Cal. Bias = System Absolute Difference / Span Range * 100

Drift = (Sys. Cal. Response - Pretest Sys. Cal. Response) / Span * 100

Cgas = (C-Co)*Cma/(Cm-Co)

ANALYZER METHOD 6C CALIBRATION SHEET

BASE: CBC PORT HUENEME	RUN NO: OIL-25	ANALYZER: 02	
BUILDING: 373 THOMAS PLANT	BOILER NO: CB	SPAN:	20.9
DATE: 21 SEPT 90	FUEL: OIL	UNITS: %	
CAL. BY: NEWTON	LOAD: 25%	RESP TIME: 90 sec	

SPAN GAS INPUT	SPAN GAS RANGE	CYLINDER VALUE	CALIBRATION RESPONSE	ABS. DIFF.	CAL. BIAS % OF SPAN	DRIFT % OF SPAN
ANALYZER PRETEST	HIGH	20.90	20.9	0	0.0	N/A
	MID	3.116	3.1	0.016	0.1	N/A
	ZERO	0.00	0	0	0.0	N/A
SYSTEM PRETEST	UPSCALE	3.12	3.1	0	0.0	N/A
	ZERO	0.00	0	0	0.0	N/A
SYSTEM POST RUN 1	UPSCALE	3.12	3.1	0	0.0	0
	ZERO	0.00	0	0	0.0	0
SYSTEM POST RUN 2	UPSCALE	3.12	3.1	0	0.0	0.0
	ZERO	0.00	0	0	0.0	0

	RUN 1	RUN 2	
Co=	0.00	0.00	Avg zero gas system calibration bias.
Cm=	3.10	3.10	Avg upscale gas sys. cal. bias.
Cma=	3.12	3.12	Upscale gas concentration.
C=	6.70	6.62	Avg gas analyzer concentration reading.
Cgas=	6.73	6.66	Corrected gas concentration.

Analyzer Absolute Difference = |Analyzer Cal. Response - Cyl. Value|
Analyzer Cal. Bias = Analyzer Absolute Difference / Span * 100

Sys. Absolute Difference = |Sys. Cal. Response - Analyzer Cal. Response|
System Cal. Bias = System Absolute Difference / Span Range * 100

Drift = (Sys. Cal. Response - Pretest Sys. Cal. Response) / Span * 100

Cgas = (C-Co)*Cma/(Cm-Co)

ANALYZER METHOD 6C CALIBRATION SHEET

BASE: CBC PORT HUENEME
BUILDING: 373 THOMAS PLANT
DATE: 21 SEPT 90
CAL. BY: NEWTON

RUN NO: OIL-25
BOILER NO: CB
FUEL: OIL
LOAD: 25%

ANALYZER: CO2
SPAN: 20
UNITS: %
RESP TIME: 100 sec

SPAN GAS INPUT	SPAN GAS RANGE	CYLINDER VALUE	CALIBRATION RESPONSE	ABS. DIFF.	CAL. BIAS % OF SPAN	DRIFT % OF SPAN
ANALYZER PRETEST	HIGH			0	0.0	N/A
	MID	11.01	11	0.01	0.0	N/A
	ZERO	0.00	0	0	0.0	N/A
SYSTEM PRETEST	UPSCALE	11.01	11	0	0.0	N/A
	ZERO	0.00	0	0	0.0	N/A
SYSTEM POST RUN 1	UPSCALE	11.01	10.9	0.1	0.5	0.5
	ZERO	0.00	0	0	0.0	0
SYSTEM POST RUN 2	UPSCALE	11.01	10.9	0.1	0.5	0.5
	ZERO	0.00	0	0	0.0	0

	RUN 1	RUN 2	
Co=	0.00	0.00	Avg zero gas system calibration bias.
Cm=	10.95	10.90	Avg upscale gas sys. cal. bias.
Cma=	11.01	11.01	Upscale gas concentration.
C=	10.51	10.30	Avg gas analyzer concentration reading.
Cgas=	10.57	10.40	Corrected gas concentration.

Analyzer Absolute Difference = |Analyzer Cal. Response - Cyl. Value|
Analyzer Cal. Bias = Analyzer Absolute Difference / Span * 100

Sys. Absolute Difference = |Sys. Cal. Response - Analyzer Cal. Response|
System Cal. Bias = System Absolute Difference / Span Range * 100

Drift = (Sys. Cal. Response - Pretest Sys. Cal. Response) / Span * 100

Cgas = (C-Co)*Cma/(Cm-Co)

ANALYZER METHOD 6C CALIBRATION SHEET

BASE: CBC PORT HUENEME
BUILDING: 373 THOMAS PLANT
DATE: 21 SEPT 90
CAL. BY: NEWTON

RUN NO: OIL-25
BOILER NO: CB
FUEL: OIL
LOAD: 25%

ANALYZER: CO
SPAN: 500
UNITS: PPM
RESP TIME: 90 sec

SPAN GAS INPUT	SPAN GAS RANGE	CYLINDER VALUE	CALIBRATION RESPONSE	ABS. DIFF.	CAL. BIAS % OF SPAN	DRIFT % OF SPAN
ANALYZER PRETEST	HIGH	501.5	500	1.5	0.3	N/A
	MID	248.1	250	1.9	0.4	N/A
	ZERO	0.00	0	0	0.0	N/A
SYSTEM PRETEST	UPSCALE	248.10	245	5	1.0	N/A
	ZERO	0.00	0	0	0.0	N/A
SYSTEM POST RUN 1	UPSCALE	248.10	245	5	1.0	0
	ZERO	0.00	0	0	0.0	0
SYSTEM POST RUN 2	UPSCALE	248.10	240	10	2.0	1
	ZERO	0.00	-5	5	1.0	1

	RUN 1	RUN 2	
Co=	0.00	-2.50	Avg zero gas system calibration bias.
Cm=	245.00	242.50	Avg upscale gas sys. cal. bias.
Cma=	248.10	248.10	Upscale gas concentration.
C=	50.00	48.00	Avg gas analyzer concentration reading.
Cgas=	50.63	51.14	Corrected gas concentration.

Analyzer Absolute Difference = |Analyzer Cal. Response - Cyl. Value|
Analyzer Cal. Bias = Analyzer Absolute Difference / Span * 100

Sys. Absolute Difference = |Sys. Cal. Response - Analyzer Cal. Response|
System Cal. Bias = System Absolute Difference / Span Range * 100

Drift = (Sys. Cal. Response - Pretest Sys. Cal. Response) / Span * 100

Cgas = (C-Co)*Cma/(Cm-Co)

ANALYZER METHOD 6C CALIBRATION SHEET

BASE: CBC PORT HUENEME	RUN NO: OIL-25	ANALYZER: NOX	
BUILDING: 373 THOMAS PLANT	BOILER NO: CB	SPAN:	250
DATE: 21 SEPT 90	FUEL: OIL	UNITS: PPM	
CAL. BY: NEWTON	LOAD: 25%	RESP TIME: 90 sec	

SPAN GAS INPUT	SPAN GAS RANGE	CYLINDER VALUE	CALIBRATION RESPONSE	ABS. DIFF.	CAL. BIAS % OF SPAN	DRIFT % OF SPAN
ANALYZER PRETEST	HIGH	203.7	205	1.3	0.5	N/A
	MID	131.1	130	1.1	0.4	N/A
	ZERO	0.00	0	0	0.0	N/A
SYSTEM PRETEST	UPSCALE	131.10	127.5	2.5	1.0	N/A
	ZERO	0.00	0	0	0.0	N/A
SYSTEM POST RUN 1	UPSCALE	131.10	125	5	2.0	1
	ZERO	0.00	0	0	0.0	0
SYSTEM POST RUN 2	UPSCALE	131.10	125	5	2.0	1
	ZERO	0.00	0	0	0.0	0

	RUN 1	RUN 2	
Co=	0.00	0.00	Avg zero gas system calibration bias.
Cm=	126.25	125.00	Avg upscale gas sys. cal. bias.
Cma=	131.10	131.10	Upscale gas concentration.
C=	87.50	85.96	Avg gas analyzer concentration reading.
Cgas=	90.86	90.15	Corrected gas concentration.

Analyzer Absolute Difference = |Analyzer Cal. Response - Cyl. Value|
Analyzer Cal. Bias = Analyzer Absolute Difference / Span * 100

Sys. Absolute Difference = |Sys. Cal. Response - Analyzer Cal. Response|
System Cal. Bias = System Absolute Difference / Span Range * 100

Drift = (Sys. Cal. Response - Pretest Sys. Cal. Response) / Span * 100

Cgas = (C-Co)*Cma/(Cm-Co)

```
AB43: [W12] '@3% O2                                                      READY

          Y          Z          AA          AB         AC         AD         AE
29  ----------------------------------------------------------------------------------
30  SYSTEM
31  POST RUN 2
32              UPSCALE      131.10         125         5         2.0          1
33
34              ZERO           0.00           0         0         0.0          0
35  ----------------------------------------------------------------------------------
36
37                    RUN 1      RUN 2
38         Co=         0.00       0.00 Avg zero gas system calibration bias.
39         Cm=       126.25     125.00 Avg upscale gas sys. cal. bias.
40        Cma=       131.10     131.10 Upscale gas concentration.
41          C=        87.50      85.96 Avg gas analyzer concentration reading.
42       Cgas=        90.86      90.15 Corrected gas concentration.
43              114.81614 114.90172 @3% O2
44
45   Analyzer Absolute Difference = |Analyzer Cal. Response - Cyl. Value|
46   Analyzer Cal. Bias = Analyzer Absolute Difference / Span * 100
47
48   Sys. Absolute Difference = |Sys. Cal. Response - Analyzer Cal. Response|
21-Sep-90  08:57 PM                                               CAPS
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ANALYZER METHOD 6C CALIBRATION SHEET

BASE: CBC PORT HUENEME	RUN NO: OIL-50	ANALYZER: O2	
BUILDING: 373 THOMAS PLANT	BOILER NO: CB	SPAN:	20.9
DATE: 21 SEPT 90	FUEL: OIL	UNITS: %	
CAL. BY: NEWTON	LOAD: 50%	RESP TIME: 90 sec	

SPAN GAS INPUT	SPAN GAS RANGE	CYLINDER VALUE	CALIBRATION RESPONSE	ABS. DIFF.	CAL. BIAS % OF SPAN	DRIFT % OF SPAN
ANALYZER PRETEST	HIGH	20.90	20.9	0	0.0	N/A
	MID	3.116	3.1	0.016	0.1	N/A
	ZERO	0.00	0	0	0.0	N/A
SYSTEM PRETEST	UPSCALE	3.12	3.2	0.1	0.5	N/A
	ZERO	0.00	0	0	0.0	N/A
SYSTEM POST RUN 1	UPSCALE	3.12	3.2	0.1	0.5	0
	ZERO	0.00	0	0	0.0	0
SYSTEM POST RUN 2	UPSCALE	3.12	3.2	0.1	0.5	0
	ZERO	0.00	0.1	0.1	0.5	0.5

	RUN 1	RUN 2	
Co=	0.00	0.05	Avg zero gas system calibration bias.
Cm=	3.20	3.20	Avg upscale gas sys. cal. bias.
Cma=	3.12	3.12	Upscale gas concentration.
C=	4.56	4.55	Avg gas analyzer concentration reading.
Cgas=	4.44	4.45	Corrected gas concentration.

Analyzer Absolute Difference = |Analyzer Cal. Response - Cyl. Value|
Analyzer Cal. Bias = Analyzer Absolute Difference / Span * 100

Sys. Absolute Difference = |Sys. Cal. Response - Analyzer Cal. Response|
System Cal. Bias = System Absolute Difference / Span Range * 100

Drift = (Sys. Cal. Response - Pretest Sys. Cal. Response) / Span * 100

Cgas = (C-Co)*Cma/(Cm-Co)

ANALYZER METHOD 6C CALIBRATION SHEET

BASE: CBC PORT HUENEME
BUILDING: 373 THOMAS PLANT
DATE: 21 SEPT 90
CAL. BY: NEWTON

RUN NO: OIL-50
BOILER NO: CB
FUEL: OIL
LOAD: 50%

ANALYZER: CO2
SPAN: 20
UNITS: %
RESP TIME: 100 sec

SPAN GAS INPUT	SPAN GAS RANGE	CYLINDER VALUE	CALIBRATION RESPONSE	ABS. DIFF.	CAL. BIAS % OF SPAN	DRIFT % OF SPAN
ANALYZER PRETEST	HIGH			0	0.0	N/A
	MID	11.01	11.1	0.09	0.4	N/A
	ZERO	0.00	0	0	0.0	N/A
SYSTEM PRETEST	UPSCALE	11.01	10.8	0.3	1.5	N/A
	ZERO	0.00	-0.1	0.1	0.5	N/A
SYSTEM POST RUN 1	UPSCALE	11.01	11.2	0.1	0.5	2
	ZERO	0.00	0	0	0.0	0.5
SYSTEM POST RUN 2	UPSCALE	11.01	11.1	0	0.0	1.5
	ZERO	0.00	-0.1	0.1	0.5	0

	RUN 1	RUN 2	
Co=	-0.05	-0.05	Avg zero gas system calibration bias.
Cm=	11.00	11.15	Avg upscale gas sys. cal. bias.
Cma=	11.01	11.01	Upscale gas concentration.
C=	12.40	12.45	Avg gas analyzer concentration reading.
Cgas=	12.40	12.29	Corrected gas concentration.

Analyzer Absolute Difference = |Analyzer Cal. Response - Cyl. Value|
Analyzer Cal. Bias = Analyzer Absolute Difference / Span * 100

Sys. Absolute Difference = |Sys. Cal. Response - Analyzer Cal. Response|
System Cal. Bias = System Absolute Difference / Span Range * 100

Drift = (Sys. Cal. Response - Pretest Sys. Cal. Response) / Span * 100

Cgas = (C-Co)*Cma/(Cm-Co)

ANALYZER METHOD 6C CALIBRATION SHEET

BASE: CBC PORT HUENEME
BUILDING: 373 THOMAS PLANT
DATE: 21 SEPT 90
CAL. BY: NEWTON

RUN NO: OIL-50
BOILER NO: CB
FUEL: OIL
LOAD: 50%

ANALYZER: CO
SPAN: 500
UNITS: PPM
RESP TIME: 90 sec

SPAN GAS INPUT	SPAN GAS RANGE	CYLINDER VALUE	CALIBRATION RESPONSE	ABS. DIFF.	CAL. BIAS % OF SPAN	DRIFT % OF SPAN
ANALYZER PRETEST	HIGH	501.5	500	1.5	0.3	N/A
	MID	248.1	255	6.9	1.4	N/A
	ZERO	0.00	5	5	1.0	N/A
SYSTEM PRETEST	UPSCALE	248.10	255	0	0.0	N/A
	ZERO	0.00	5	0	0.0	N/A
SYSTEM POST RUN 1	UPSCALE	248.10	255	0	0.0	0
	ZERO	0.00	10	5	1.0	1
SYSTEM POST RUN 2	UPSCALE	248.10	255	0	0.0	0
	ZERO	0.00	7	2	0.4	0.4

	RUN 1	RUN 2	
Co=	7.50	8.50	Avg zero gas system calibration bias.
Cm=	255.00	255.00	Avg upscale gas sys. cal. bias.
Cma=	248.10	248.10	Upscale gas concentration.
C=	90.00	90.80	Avg gas analyzer concentration reading.
Cgas=	82.70	82.83	Corrected gas concentration.

Analyzer Absolute Difference = |Analyzer Cal. Response - Cyl. Value|
Analyzer Cal. Bias = Analyzer Absolute Difference / Span * 100

Sys. Absolute Difference = |Sys. Cal. Response - Analyzer Cal. Response|
System Cal. Bias = System Absolute Difference / Span Range * 100

Drift = (Sys. Cal. Response - Pretest Sys. Cal. Response) / Span * 100

Cgas = (C-Co)*Cma/(Cm-Co)

ANALYZER METHOD 6C CALIBRATION SHEET

BASE: CBC PORT HUENEME
BUILDING: 373 THOMAS PLANT
DATE: 21 SEPT 90
CAL. BY: NEWTON

RUN NO: OIL-50
BOILER NO: CB
FUEL: OIL
LOAD: 50%

ANALYZER: NOX
SPAN: 250
UNITS: PPM
RESP TIME: 90 sec

SPAN GAS INPUT	SPAN GAS RANGE	CYLINDER VALUE	CALIBRATION RESPONSE	ABS. DIFF.	CAL. BIAS % OF SPAN	DRIFT % OF SPAN
ANALYZER PRETEST	HIGH	203.7	207	3.3	1.3	N/A
	MID	131.1	132	0.9	0.4	N/A
	ZERO	0.00	0	0	0.0	N/A
SYSTEM PRETEST	UPSCALE	131.10	130	2	0.8	N/A
	ZERO	0.00	1	1	0.4	N/A
SYSTEM POST RUN 1	UPSCALE	131.10	130	2	0.8	0
	ZERO	0.00	2.5	2.5	1.0	0.6
SYSTEM POST RUN 2	UPSCALE	131.10	127.5	4.5	1.8	1
	ZERO	0.00	0	0	0.0	0.4

	RUN 1	RUN 2	
Co=	1.75	1.25	Avg zero gas system calibration bias.
Cm=	130.00	128.75	Avg upscale gas sys. cal. bias.
Cma=	131.10	131.10	Upscale gas concentration.
C=	95.00	95.00	Avg gas analyzer concentration reading.
Cgas=	95.32	96.40	Corrected gas concentration.

Analyzer Absolute Difference = |Analyzer Cal. Response - Cyl. Value|
Analyzer Cal. Bias = Analyzer Absolute Difference / Span * 100

Sys. Absolute Difference = |Sys. Cal. Response - Analyzer Cal. Response|
System Cal. Bias = System Absolute Difference / Span Range * 100

Drift = (Sys. Cal. Response - Pretest Sys. Cal. Response) / Span * 100

Cgas = (C-Co)*Cma/(Cm-Co)

ANALYZER METHOD 6C CALIBRATION SHEET

BASE: CBC PORT HUENEME
BUILDING: 373 THOMAS PLANT
DATE: 21 SEPT 90
CAL. BY: NEWTON

RUN NO: OIL-75
BOILER NO: C3
FUEL: OIL
LOAD: 75%

ANALYZER: O2
SPAN: 20.9
UNITS: %
RESP TIME: 90 sec

SPAN GAS INPUT	SPAN GAS RANGE	CYLINDER VALUE	CALIBRATION RESPONSE	ABS. DIFF.	CAL. BIAS % OF SPAN	DRIFT % OF SPAN
ANALYZER PRETEST	HIGH	20.90	20.9	0	0.0	N/A
	MID	3.116	3.1	0.016	0.1	N/A
	ZERO	0.00	0	0	0.0	N/A
SYSTEM PRETEST	UPSCALE	3.12	3.2	0.1	0.5	N/A
	ZERO	0.00	0	0	0.0	N/A
SYSTEM POST RUN 1	UPSCALE	3.12	3.2	0.1	0.5	0
	ZERO	0.00	0	0	0.0	0
SYSTEM POST RUN 2	UPSCALE	3.12	3.2	0.1	0.5	0
	ZERO	0.00	0.1	0.1	0.5	0.5

	RUN 1	RUN 2	
Co=	0.00	0.05	Avg zero gas system calibration bias.
Cm=	3.20	3.20	Avg upscale gas sys. cal. bias.
Cma=	3.12	3.12	Upscale gas concentration.
C=	4.34	4.48	Avg gas analyzer concentration reading.
Cgas=	4.23	4.38	Corrected gas concentration.

Analyzer Absolute Difference = |Analyzer Cal. Response - Cyl. Value|
Analyzer Cal. Bias = Analyzer Absolute Difference / Span * 100

Sys. Absolute Difference = |Sys. Cal. Response - Analyzer Cal. Response|
System Cal. Bias = System Absolute Difference / Span Range * 100

Drift = (Sys. Cal. Response - Pretest Sys. Cal. Response) / Span * 100

Cgas = (C-Co)*Cma/(Cm-Co)

ANALYZER METHOD 6C CALIBRATION SHEET

BASE: CBC PORT HUENEME	RUN NO: OIL-75	ANALYZER: CO2	
BUILDING: 373 THOMAS PLANT	BOILER NO: CB	SPAN:	[illegible]
DATE: 21 SEPT 90	FUEL: OIL	UNITS: %	
CAL. BY: NEWTON	LOAD: 75%	RESP TIME: 150 sec	

SPAN GAS INPUT	SPAN GAS RANGE	CYLINDER VALUE	CALIBRATION RESPONSE	ABS. DIFF.	CAL. BIAS % OF SPAN	DRIFT % OF SPAN
ANALYZER PRETEST	HIGH			0	0.0	N/A
	MID	11.01	11	0.01	0.0	N/A
	ZERO	0.00	0	0	0.0	N/A
SYSTEM PRETEST	UPSCALE	11.01	10.9	0.1	0.5	N/A
	ZERO	0.00	0	0	0.0	N/A
SYSTEM POST RUN 1	UPSCALE	11.01	10.8	0.2	1.0	0.5
	ZERO	0.00	0.1	0.1	0.5	0.5
SYSTEM POST RUN 2	UPSCALE	11.01	10.8	0.2	1.0	[illegible]
	ZERO	0.00	0	0	0.0	[illegible]

	RUN 1	RUN 2	
Co=	0.05	0.05	Avg zero gas system calibration bias.
Cm=	10.85	10.80	Avg upscale gas sys. cal. bias.
Cma=	11.01	11.01	Upscale gas concentration.
C=	12.45	12.36	Avg gas analyzer concentration reading.
Cgas=	12.64	12.61	Corrected gas concentration.

Analyzer Absolute Difference = |Analyzer Cal. Response - Cal. Value|
Analyzer Cal. Bias = Analyzer Absolute Difference / Span * 100

Sys. Absolute Difference = |Sys. Cal. Response - Analyzer Cal. Response|
System Cal. Bias = System Absolute Difference / Span Range * 100

Drift = (Sys. Cal. Response - Pretest Sys. Cal. Response) / Span * 100

Cgas = (C-Co)*Cma/(Cm-Co)

ANALYZER METHOD 6C CALIBRATION SHEET

BASE: CBC PORT HUENEME
BUILDING: 373 THOMAS PLANT
DATE: 21 SEPT 90
CAL. BY: NEWTON

RUN NO: OIL-75
BOILER NO: CB
FUEL: OIL
LOAD: 75%

ANALYZER: CO
SPAN: 500
UNITS: PPM
RESP TIME: 90 sec

SPAN GAS INPUT	SPAN GAS RANGE	CYLINDER VALUE	CALIBRATION RESPONSE	ABS. DIFF.	CAL. BIAS % OF SPAN	DRIFT % OF SPAN
ANALYZER PRETEST	HIGH	501.5	500	1.5	0.3	N/A
	MID	248.1	255	6.9	1.4	N/A
	ZERO	0.00	0	0	0.0	N/A
SYSTEM PRETEST	UPSCALE	248.10	250	5	1.0	N/A
	ZERO	0.00	0	0	0.0	N/A
SYSTEM POST RUN 1	UPSCALE	248.10	250	5	1.0	
	ZERO	0.00	5	5	1.0	[illegible]
SYSTEM POST RUN 2	UPSCALE	248.10	250	5	1.0	
	ZERO	0.00	5	5	1.0	[illegible]

	RUN 1	RUN 2	
Co=	2.50	5.00	Avg zero gas system calibration bias.
Cm=	250.00	250.00	Avg upscale gas sys. cal. bias.
Cma=	248.10	248.10	Upscale gas concentration.
C=	14.54	17.00	Avg gas analyzer concentration reading.
Cgas=	12.07	12.15	Corrected gas concentration.

Analyzer Absolute Difference = |Analyzer Cal. Response - Cyl. Value|
Analyzer Cal. Bias = Analyzer Absolute Difference / Span * 100

Sys. Absolute Difference = |Sys. Cal. Response - Analyzer Cal. Response|
System Cal. Bias = System Absolute Difference / Span Range * 100

Drift = (Sys. Cal. Response - Pretest Sys. Cal. Response) / Span * 100

Cgas = (C-Co)*Cma/(Cm-Co)

ANALYZER METHOD 6C CALIBRATION SHEET

BASE:	CBC PORT HUENEME	RUN NO:	OIL-75
BUILDING:	373 THOMAS PLANT	BOILER NO:	CB
DATE:	21 SEPT 90	FUEL:	OIL
CAL. BY:	NEWTON	LOAD:	75%

ANALYZER: NOX
SPAN: 250
UNITS: PPM
RESP TIME: 90 sec

SPAN GAS INPUT	SPAN GAS RANGE	CYLINDER VALUE	CALIBRATION RESPONSE	ABS. DIFF.	CAL. BIAS % OF SPAN	DRIFT % OF SPAN
ANALYZER PRETEST	HIGH	203.7	205	1.3	0.5	N/A
	MID	131.1	130	1.1	0.4	N/A
	ZERO	0.00	0	0	0.0	N/A
SYSTEM PRETEST	UPSCALE	131.10	127.5	2.5	1.0	N/A
	ZERO	0.00	0	0	0.0	N/A
SYSTEM POST RUN 1	UPSCALE	131.10	127.5	2.5	1.0	0
	ZERO	0.00	0	0	0.0	0
SYSTEM POST RUN 2	UPSCALE	131.10	127.5	2.5	1.0	0
	ZERO	0.00	0	0	0.0	0

	RUN 1	RUN 2	
Co=	0.00	0.00	Avg zero gas system calibration bias.
Cm=	127.50	127.50	Avg upscale gas sys. cal. bias.
Cma=	131.10	131.10	Upscale gas concentration.
C=	92.50	92.50	Avg gas analyzer concentration reading.
Cgas=	95.11	95.11	Corrected gas concentration.

Analyzer Absolute Difference = |Analyzer Cal. Response - Cyl. Value|
Analyzer Cal. Bias = Analyzer Absolute Difference / Span * 100

Sys. Absolute Difference = |Sys. Cal. Response - Analyzer Cal. Response|
System Cal. Bias = System Absolute Difference / Span Range * 100

Drift = (Sys. Cal. Response - Pretest Sys. Cal. Response) / Span * 100

Cgas = (C-Co)*Cma/(Cm-Co)

ANALYZER METHOD 6C CALIBRATION SHEET

BASE: CBC PORT HUENEME
BUILDING: 373 THOMAS PLANT
DATE: 21 SEPT 90
CAL. BY: NEWTON

RUN NO: OIL-100
BOILER NO: CB
FUEL: OIL
LOAD: 100%

ANALYZER: O2
SPAN: 20.9
UNITS: %
RESP TIME: 90 sec

SPAN GAS INPUT	SPAN GAS RANGE	CYLINDER VALUE	CALIBRATION RESPONSE	ABS. DIFF.	CAL. BIAS % OF SPAN	DRIFT % OF SPAN
ANALYZER PRETEST	HIGH	20.90	20.9	0	0.0	N/A
	MID	3.116	3.2	0.084	0.4	N/A
	ZERO	0.00	0	0	0.0	N/A
SYSTEM PRETEST	UPSCALE	3.12	3.2	0	0.0	N/A
	ZERO	0.00	0	0	0.0	N/A
SYSTEM POST RUN 1	UPSCALE	3.12	3.2	0	0.0	0
	ZERO	0.00	0	0	0.0	0
SYSTEM POST RUN 2	UPSCALE	3.12	3.3	0.1	0.5	0.5
	ZERO	0.00	0.1	0.1	0.5	0.5

	RUN 1	RUN 2	
Co=	0.00	0.05	Avg zero gas system calibration bias.
Cm=	3.20	3.25	Avg upscale gas sys. cal. bias.
Cma=	3.12	3.12	Upscale gas concentration.
C=	4.35	4.42	Avg gas analyzer concentration reading.
Cgas=	4.24	4.26	Corrected gas concentration.

Analyzer Absolute Difference = |Analyzer Cal. Response - Cyl. Value|
Analyzer Cal. Bias = Analyzer Absolute Difference / Span * 100

Sys. Absolute Difference = |Sys. Cal. Response - Analyzer Cal. Response|
System Cal. Bias = System Absolute Difference / Span Range * 100

Drift = (Sys. Cal. Response - Pretest Sys. Cal. Response) / Span * 100

Cgas = (C-Co)*Cma/(Cm-Co)

ANALYZER METHOD 6C CALIBRATION SHEET

BASE: CBC PORT HUENEME
BUILDING: 373 THOMAS PLANT
DATE: 21 SEPT 90
CAL. BY: NEWTON *[initials]*

RUN NO: OIL-100
BOILER NO: CB
FUEL: OIL
LOAD: 100%

ANALYZER: CO_2
SPAN: 20
UNITS: %
RESP TIME: 150 sec

SPAN GAS INPUT	SPAN GAS RANGE	CYLINDER VALUE	CALIBRATION RESPONSE	ABS. DIFF.	CAL. BIAS % OF SPAN	DRIFT % OF SPAN
ANALYZER PRETEST	HIGH			0	0.0	N/A
	MID	11.01	11	0.01	0.0	N/A
	ZERO	0.00	0	0	0.0	N/A
SYSTEM PRETEST	UPSCALE	11.01	10.8	0.2	1.0	N/A
	ZERO	0.00	0	0	0.0	N/A
SYSTEM POST RUN 1	UPSCALE	11.01	10.9	0.1	0.5	0.5
	ZERO	0.00		0	0.0	0
SYSTEM POST RUN 2	UPSCALE	11.01	11	0	0.0	1
	ZERO	0.00	0	0	0.0	0

	RUN 1	RUN 2	
Co=	0.00	0.00	Avg zero gas system calibration bias.
Cm=	10.85	10.95	Avg upscale gas sys. cal. bias.
Cma=	11.01	11.01	Upscale gas concentration.
C=	12.47	12.50	Avg gas analyzer concentration reading.
Cgas=	12.65	12.57	Corrected gas concentration.

Analyzer Absolute Difference = |Analyzer Cal. Response - Cyl. Value|
Analyzer Cal. Bias = Analyzer Absolute Difference / Span * 100

Sys. Absolute Difference = |Sys. Cal. Response - Analyzer Cal. Response|
System Cal. Bias = System Absolute Difference / Span Range * 100

Drift = (Sys. Cal. Response - Pretest Sys. Cal. Response) / Span * 100

Cgas = (C-Co)*Cma/(Cm-Co)

ANALYZER METHOD 6C CALIBRATION SHEET

BASE:	CBC PORT HUENEME	RUN NO: OIL-100	ANALYZER: CO
BUILDING:	373 THOMAS PLANT	BOILER NO: CB	SPAN: 500
DATE:	21 SEPT 90	FUEL: OIL	UNITS: PPM
CAL. BY:	NEWTON	LOAD: 100%	RESP TIME: 90 sec

SPAN GAS INPUT	SPAN GAS RANGE	CYLINDER VALUE	CALIBRATION RESPONSE	ABS. DIFF.	CAL. BIAS % OF SPAN	DRIFT % OF SPAN
ANALYZER PRETEST	HIGH	501.5	500	1.5	0.3	N/A
	MID	248.1	250	1.9	0.4	N/A
	ZERO	0.00	0	0	0.0	N/A
SYSTEM PRETEST	UPSCALE	248.10	250	0	0.0	N/A
	ZERO	0.00	0	0	0.0	N/A
SYSTEM POST RUN 1	UPSCALE	248.10	245	5	1.0	1
	ZERO	0.00	0	0	0.0	0
SYSTEM POST RUN 2	UPSCALE	248.10	255	5	1.0	1
	ZERO	0.00	5	5	1.0	1

	RUN 1	RUN 2	
Co=	0.00	2.50	Avg zero gas system calibration bias.
Cm=	247.50	250.00	Avg upscale gas sys. cal. bias.
Cma=	248.10	248.10	Upscale gas concentration.
C=	6.38	12.90	Avg gas analyzer concentration reading.
Cgas=	6.40	10.43	Corrected gas concentration.

Analyzer Absolute Difference = |Analyzer Cal. Response - Cyl. Value|
Analyzer Cal. Bias = Analyzer Absolute Difference / Span * 100

Sys. Absolute Difference = |Sys. Cal. Response - Analyzer Cal. Response|
System Cal. Bias = System Absolute Difference / Span Range * 100

Drift = (Sys. Cal. Response - Pretest Sys. Cal. Response) / Span * 100

Cgas = (C-Co)*Cma/(Cm-Co)

ANALYZER METHOD 6C CALIBRATION SHEET

BASE:	CBC PORT HUENEME	RUN NO:	OIL-100	ANALYZER:	NOX
BUILDING:	373 THOMAS PLANT	BOILER NO:	CB	SPAN:	250
DATE:	21 SEPT 90	FUEL:	OIL	UNITS:	PPM
CAL. BY:	NEWTON	LOAD:	100%	RESP TIME:	90 sec

SPAN GAS INPUT	SPAN GAS RANGE	CYLINDER VALUE	CALIBRATION RESPONSE	ABS. DIFF.	CAL. BIAS % OF SPAN	DRIFT % OF SPAN
ANALYZER PRETEST	HIGH	203.7	205	1.3	0.5	N/A
	MID	131.1	126	5.1	2.0	N/A
	ZERO	0.00	0	0	0.0	N/A
SYSTEM PRETEST	UPSCALE	131.10	127.5	1.5	0.6	N/A
	ZERO	0.00	0	0	0.0	N/A
SYSTEM POST RUN 1	UPSCALE	131.10	130	4	1.6	1
	ZERO	0.00	2.5	2.5	1.0	1
SYSTEM POST RUN 2	UPSCALE	131.10	131	5	2.0	1.4
	ZERO	0.00	2.5	2.5	1.0	1

	RUN 1	RUN 2	
Co=	1.25	2.50	Avg zero gas system calibration bias.
Cm=	128.75	130.50	Avg upscale gas sys. cal. bias.
Cma=	131.10	131.10	Upscale gas concentration.
C=	88.85	92.50	Avg gas analyzer concentration reading.
Cgas=	90.07	92.18	Corrected gas concentration.

Analyzer Absolute Difference = |Analyzer Cal. Response - Cyl. Value|
Analyzer Cal. Bias = Analyzer Absolute Difference / Span * 100

Sys. Absolute Difference = |Sys. Cal. Response - Analyzer Cal. Response|
System Cal. Bias = System Absolute Difference / Span Range * 100

Drift = (Sys. Cal. Response - Pretest Sys. Cal. Response) / Span * 100

Cgas = (C-Co)*Cma/(Cm-Co)

Scott Specialty Gases, Inc. FAX: 714-887-0549
PHONE: 714-887-2571
2600 CAJON BLVD., SAN BERNARDINO, CA 92405

8/22/90

DEPARTMENT OF THE NAVY
MARK FOR N0537A90
P8487
PORT HUENEME CA 93043-0000
RECEIVING OFFICER BLDG801

PROJECT #: 02-06923
PO #: N62583900P8487

CYLINDER #: AAL3761

ANALYTICAL ACCURACY: +/-1%

COMPONENT	REQUESTED CONCENTRATION		ANALYSIS 1 (MOLES) U/M	
CARBON MONOXIDE	250.0	PPM	248.1	PPM
NITROGEN	BALANCE GAS			N/A

DATE OF ANALYSIS: 8/21/90

ANALYST: MAYNARD JOHNSON

APPROVED BY: ROBERT SHEALY

Scott Specialty Gases a division of
TELEX: 510-100-8831 (ScotGas)
FAX: 714-887-0549
PHONE: 714-887-2571
Scott Environmental Technology Inc. 2600 CAJON BLVD., SAN BERNARDINO, CA 92405

U.S. NAVY

Shipped From: Scott SAN BERNARDINO, CA
Date Shipped 2/14/90
Our Project No: 4930
Your P.O. No: N6258390M1899
Page 1 of 1
Expiration Date: 8/90

CERTIFICATE OF ANALYSIS – EPA PROTOCOL GASES*

Certified Per Traceability Protocol No. 1 Procedure No. G1 Cylinder No. AAL-4746 Cylinder Pressure 1900 psig Certified Accuracy ±1% % NBS Traceable

		REFERENCE STD			GAS ANALYZER		
COMPONENTS	CERTIFIED CONC	SRM/CRM NO.	CYL. NO.	CONC.	MAKE/MODEL/SERIAL NO.	LAST CAL. DATE	ANALYTICAL PRINCIPLE
CARBON MONOXIDE	501.5 ppm	CRM2637	AAL-10133	2412 ppm	HORIBA AIA24 4564403	1/29/90	INFRA-RED
CARBON DIXOIDE	11.01%	CRM1675B	ALM-1308	14.08%	HORIBA PIR2000 406004	1/29/90	INFRA-RED

BALANCE GAS NITROGEN

ANALYZER READINGS: Z = Zero Gas T = Test Gas R = Reference Gas

Component CARBON MONOXIDE
First Analysis Date 2/5/90 Units ppm

Z	00.0	R	93.3	T	35.8
R	93.3	Z	00.0	T	35.7
Z	00.0	T	35.7	R	93.3

Mean Test Assay 502.1 ppm

Second Analysis Date 2/12/90 Units ppm

Z	00.0	R	93.3	T	35.7
R	93.3	Z	00.0	T	35.7
Z	00.0	T	35.7	R	93.3

Mean Test Assay 501.5 ppm

Component CARBON DIOXIDE
Date 2/5/90 Units %

Z	00.0	R	93.3	T	80.6
R	93.3	Z	00.0	T	80.6
Z	00.0	T	80.6	R	93.3

Mean Test Assay 11.01%

Date ______ Units ______

Z		R		T	
R		Z		T	
Z		T		R	

Mean Test Assay ______

Component ______
Date ______ Units ______

Z		R		T	
R		Z		T	
Z		T		R	

Mean Test Assay ______

Date ______ Units ______

Z		R		T	
R		Z		T	
Z		T		R	

Mean Test Assay ______

Chronology: Date ______
Assay ______

Analyst LEE OLDHAM

Approved By: [signature]

TELEX: 510-100-8831 (ScotGas)
FAX: 714-887-0549
PHONE: 714-887-2571

Scott Specialty Gases a division of
Scott Environmental Technology Inc. 2600 CAJON BLVD., SAN BERNARDINO, CA 92405

U.S. NAVY
US NAVY

Shipped From: Scott SAN BERNARDINO, CA
Date Shipped 2/14/90
Our Project No: 4930
Your P.O. No: N 6258390M1899
Page 1 of 1
Expiration Date: 8/91

CERTIFICATE OF ANALYSIS – EPA PROTOCOL GASES*

Certified Per Traceability Protocol No. 1 Procedure No. G1 Cylinder No. ALM-3479 Cylinder Pressure 1900 psig Certified Accuracy ±1% NBS Traceable

COMPONENTS	CERTIFIED CONC	REFERENCE STD: SRM/CRM NO.	CYL. NO.	CONC.	GAS ANALYZER: MAKE/MODEL/SERIAL NO.	LAST CAL. DATE	ANALYTICAL PRINCIPLE
OXYGEN	3.116%	CRM 2658	AAL-18548	10.08%	BECKMAN 755 100410	1/29/90	PARAMAGNETIC

BALANCE GAS NITROGEN

ANALYZER READINGS: Z = Zero Gas T = Test Gas R = Reference Gas

Component OXYGEN
First Analysis Date 2/5/90 Units %

Z	00.0	R	97.4	T	30.1
R	97.4	Z	00.0	T	30.1
Z	00.0	T	30.1	R	97.4

Mean Test Assay 3.116%

Second Analysis Date ______ Units ______

Z		R		T	
R		Z		T	
Z		T		R	

Mean Test Assay ______

Component ______
Date ______ Units ______

Z		R		T	
R		Z		T	
Z		T		R	

Mean Test Assay ______

Date ______ Units ______

Z		R		T	
R		Z		T	
Z		T		R	

Mean Test Assay ______

Component ______
Date ______ Units ______

Z		R		T	
R		Z		T	
Z		T		R	

Mean Test Assay ______

Date ______ Units ______

Z		R		T	
R		Z		T	
Z		T		R	

Mean Test Assay ______

Chronology: Date ______
Assay ______

Analyst D. BUTTERFIELD

Approved By: [signature]

Scott Specialty Gases a division of
Scott Environmental Technology Inc. 2600 CAJON BLVD., SAN BERNARDINO, CA 92405
TELEX: 510-100-8831 (ScotGas)
FAX: 714-887-0549
PHONE: 714-887-2571

U.S. NAVY

Shipped From: Scott SAN BERNARDINO, CA
Date Shipped 2/14/90
Our Project No: 4930
Your P.O. No: N6258390M1899
Page 1 of 1
Expiration Date: 8/91

CERTIFICATE OF ANALYSIS—EPA PROTOCOL GASES*

Certified Per Traceability Protocol No. 1 Procedure No. G1 Cylinder No. AAL-6113 Cylinder Pressure 1900 psig Certified Accuracy ±1% NBS Traceable

COMPONENTS	CERTIFIED CONC	REFERENCE STD SRM/CRM NO.	CYL. NO.	CONC.	GAS ANALYZER MAKE/MODEL/SERIAL NO.	LAST CAL. DATE	ANALYTICAL PRINCIPLE
NITRIC OXIDE	90.60 ppm	CRM 1684B	ALM-3640	97.28 ppm	THERMO-ELECTRON 10 AR 14853-150	11/10/89	CHEMI-LUMINESCENT
NOX	90.71 ppm						

BALANCE GAS NITROGEN

ANALYZER READINGS: Z = Zero Gas T = Test Gas R = Reference Gas

Component NITRIC OXIDE
First Analysis Date 1/31/90 Units ppm

Z	0.00	R	97.30	T	90.60
R	97.42	Z	0.05	T	90.77
Z	0.00	T	90.88	R	97.60

Mean Test Assay 90.60 ppm

Second Analysis Date 2/7/90 Units ppm

Z	0.00	R	97.25	T	90.55
R	97.28	Z	0.02	T	90.56
Z	0.00	T	90.60	R	97.23

Mean Test Assay 90.60 ppm

Component ____ Date ____ Units ____
Z ____ R ____ T ____
R ____ Z ____ T ____
Z ____ T ____ R ____
Mean Test Assay ____
Date ____ Units ____
Z ____ R ____ T ____
R ____ Z ____ T ____
Z ____ T ____ R ____
Mean Test Assay ____

Component ____ Date ____ Units ____
Z ____ R ____ T ____
R ____ Z ____ T ____
Z ____ T ____ R ____
Mean Test Assay ____
Date ____ Units ____
Z ____ R ____ T ____
R ____ Z ____ T ____
Z ____ T ____ R ____
Mean Test Assay ____

Chronology: Date ____
Assay ____

Analyst LEE OLDHAM

Approved By: [signature]

Scott Specialty Gases a division of
Scott Environmental Technology Inc. 2600 CAJON BLVD., SAN BERNARDINO, CA 92405
TELEX: 510-100-8831 (ScotGas)
FAX: 714-887-0549
PHONE: 714-887-2571

U.S. NAVY

Shipped From: Scott SAN BERNARDINO, CA
Date Shipped 2/14/90
Our Project No: 4930
Your P.O. No: N6258390M1899
Page 1 of 1
Expiration Date: 8/91

CERTIFICATE OF ANALYSIS – EPA PROTOCOL GASES*

Certified Per Traceability Protocol No. 1 Procedure No. G1 Cylinder No. AAL-8361 Cylinder Pressure 1900 psig Certified Accuracy ±1% NBS Traceable

COMPONENTS	CERTIFIED CONC	REFERENCE STD: SRM/CRM NO.	CYL. NO.	CONC.	GAS ANALYZER: MAKE/MODEL/SERIAL NO.	LAST CAL. DATE	ANALYTICAL PRINCIPLE
NITRIC OXIDE	51.81 ppm	CRM 1684B	ALM-3640	97.28 ppm	THERMO-ELECTRON 10 AR 14853-150	11/10/89	CHEMI-LUMINENSCENT
NOX	51.98 ppm						

BALANCE GAS NITROGEN

ANALYZER READINGS: Z = Zero Gas T = Test Gas R = Reference Gas

Component NITRIC OXIDE

First Analysis Date 1/31/90 Units ppm

Z 0.00	R 97.33	T 51.80
R 97.50	Z 0.06	T 51.83
Z 0.04	T 51.89	R 97.50

Mean Test Assay 51.73 ppm

Second Analysis Date 2/7/90 Units ppm

Z 0.00	R 97.30	T 51.80
R 97.20	Z 0.03	T 51.80
Z 0.02	T 51.80	R 97.24

Mean Test Assay 51.81 ppm

Component ______

Date ______ Units ______

Z	R	T
R	Z	T
Z	T	R

Mean Test Assay ______

Date ______ Units ______

Z	R	T
R	Z	T
Z	T	R

Mean Test Assay ______

Component ______

Date ______ Units ______

Z	R	T
R	Z	T
Z	T	R

Mean Test Assay ______

Date ______ Units ______

Z	R	T
R	Z	T
Z	T	R

Mean Test Assay ______

Chronology: Date ______

Assay ______

Analyst LEE OLDHAM

Approved By: [signature]

APPENDIX C

FIELD DATA SHEETS

Method 4

[redacted] SAMPLE BOX SET UP
CHECKLIST

DATE: ____________________

PLANT: *Thomas*

LOCATION: ____________________

PREP. BY: ____________________

RUN NO.: *Gas 25-1*

STACK NO: *-*

SAMPLE BOX NO.: ____________________

( ) 1. Wash all glassware with distilled water and then acetone.

( ) 2. Place approx. 100 ml distilled water in the first impinger, a modified Greenburg-Smith with straight tube 1/2 inch from the impinger bottom. Record exact weight to 1/10 of a gram.

( ) 3. Place approx. 100 ml distilled water in the second impinger, a standard Greenburg-Smith impinger (caricell tip). Record exact weight to 1/10 of a gram.

( ) 4. Impinger three is a dry modified Greenburg-Smith with straight tube 1/2 inch from the impinger bottom. Record dry tare weight to 1/10 of a gram.

( ) 5. Place approx. 175 ml of silica gel in the fourth impinger, a modified Greenburg-Smith with straight tube 1/2 inch from the impinger bottom. Record exact weight to 1/10 of a gram.

( ) 6. PLACE [redacted] FILTER INTO FILTER HOLDER ON THE CYCLONE SIDE OF THE HOLDER. Smooth side of filter is to face frittered glass of filter holder. [redacted]

Impinger No.	Impinger weights (GRAMS)	Tare	Initial	Final	Condensate	TOTAL
X-1	1. 100 ml		568.92	639.47	70.55	
X-2	2. 100 ml		550.76	564.89	14.13	
X-3	3. Dry		471.59	472.97	1.38	
X-4	4. 175 g silica gel		666.27	671.49	5.22	91.28

50%

( ) 7. Assemble [redacted] filter holder.

( ) 8. Assemble impinger bottles and glass elbows so air flows from a small hole to a larger hole.

METHOD 1 - 4

SOURCE EMISSION TESTING DATA SHEET

(SJS rev11/88, #02510)

PLANT Thomas	BAROMETRIC PRESSURE, in Hg	METER BOX # [illegible]	PROBE # (PITOT #)	NOZZLE #
LOCATION CBC Bldg 373	AMBIENT TEMPERATURE, °F 64	METER ΔH@	PITOT COEF 0.80	IDEAL NOZZLE DIA, in.
DATE 9/20/90	AVE STATIC PRESSURE, in H_2O	METER γ	PROBE LENGTH, in.	ACTUAL NOZZLE DIA, in.
OPERATOR JM	AVE VEL HEAD, in H_2O	SAMPLE BOX #	PROBE LINER MATERIAL	LEAK CHECK @ PITOT'S CK @ .14" H_2O
RUN # Gas-25-1	ASSUMED MOISTURE, %	HEATER BOX SETTING	PROBE HEATER SETTING	LEAK RATE CFM@ in Hg Pre Ck @

SCHEMATIC OF STACK CROSS SECTION (SHOW TRAVERSE PTS)

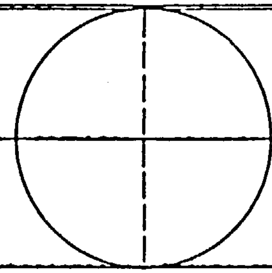
TRAVERSE POINT #	SAMPLING TIME min	GAS METER READING (Vm) ft^3	VELOCITY HEAD (MEAS) (ΔP) in H_2O	STACK TEMPERATURE (1) (Ts) °F	GAS SAMPLE TEMPERATURE AT DRY GAS METER (6) Inlet (Tm in) °F	(7) Outlet (Tm out) °F	IMPINGER TEMPERATURE (4) °F	SAMPLE BOX TEMPERATURE (3) °F	SAMPLE VACUUM in Hg
1	7:33pm Ø	135.458	.005	353	66	65	53	248	5.0
2	3	137.[illegible]	.01	352	66	66	42	252	
3	6	139.[illegible]	.01	352	68	66	41	252	
4	9	141.634	.01	352	69	66	43	250	
5	12	143.692	.01	352	72	67	44	253	
6	15	145.758	.015	351	72	67	45	254	
7	18	147.805	.015	351	74	68	46	255	
8	21	149.83	.017	351	74	68	46	255	
9	24	151.3[illegible]	.01	351	76	69	46	256	
10	27	153.132	.01	351	77	70	47	253	
11	30	155.110	.011	352	78	70	48	254	
12	33	158.00[illegible]	.01	353	78	71	49	255	
13	36	160.019	.01	353	78	71	50	254	
TOTAL									
AVERAGE									

Post: .01 cfm @10" Hg

ETH S #1

SOURCE EMISSION TESTING DATA SHEET

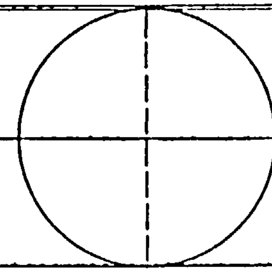
(SJS rev11/88, #0251Q)

PLANT Thomas	BAROMETRIC PRESSURE, in Hg		METER BOX #	PROBE # (PITOT #)	NOZZLE #
LOCATION CBC Bldg 373	AMBIENT TEMPERATURE, °F		METER ΔH@	PITOT COEF	IDEAL NOZZLE DIA, in.
DATE	AVE STATIC PRESSURE, in H_2O		METER γ	PROBE LENGTH, in.	ACTUAL NOZZLE DIA, in.
OPERATOR	AVE VEL HEAD, in H_2O		SAMPLE BOX #	PROBE LINER MATERIAL	LEAK CHECK @ PITOT'S
RUN #, Gas-25-1	ASSUMED MOISTURE, %	SCHEMATIC OF STACK CROSS SECTION (SHOW TRAVERSE PTS)	HEATER BOX SETTING	PROBE HEATER SETTING	LEAK RATE CFM@ in Hg

TRAVERSE POINT #	SAMPLING TIME min	GAS METER READING (Vm) ft^3	VELOCITY HEAD (MEAS) (ΔP) in H_2O	STACK TEMPERATURE (Ts) °F	GAS SAMPLE TEMPERATURE AT DRY GAS METER Inlet (Tm in) °F	GAS SAMPLE TEMPERATURE AT DRY GAS METER Outlet (Tm out) °F	IMPINGER TEMPERATURE °F	SAMPLE BOX TEMPERATURE °F	SAMPLE VACUUM in Hg
14			0.03						
15			.011						
16			.012						
TOTAL									
AVERAGE									

SOURCE EMISSION TESTING DATA SHEET

(SJS rev11/88, #02510)

PLANT Thomas	BAROMETRIC PRESSURE, in Hg		METER BOX #	PROBE # (PITOT #)	NOZZLE #
LOCATION CBC	AMBIENT TEMPERATURE, °F		METER ΔH@	PITOT COEF	IDEAL NOZZLE DIA, in.
DATE 9/20/90	AVE STATIC PRESSURE, in H_2O		METER γ	PROBE LENGTH, in.	ACTUAL NOZZLE DIA, in.
OPERATOR D Cook	AVE VEL HEAD, in H_2O		SAMPLE BOX #	PROBE LINER MATERIAL	LEAK CHECK @ PITOT'S
RUN # GAS-25-1	ASSUMED MOISTURE, %	SCHEMATIC OF STACK CROSS SECTION (SHOW TRAVERSE PTS)	HEATER BOX SETTING	PROBE HEATER SETTING	LEAK RATE CFM@ in Hg

~~TRAVERSE~~ POINT #	SAMPLING TIME min		STACK TEMPERATURE (Ts) °F		O_2 %	CO_2 %	CO ppm	NOX ppm
		FUEL METER START START TIME 19:08 FUEL: 799912						
1	0		360		7.1	7.8	125	22
2	5		356		7.1	7.8	110	23
3	10		355		7.0	7.8	120	23
4	15		354		7.1	7.8	120	23
5	20		354		6.9	7.9	120	23
6	25		353		7.2	7.8	130	23
7	30		352		7.1	7.9	120	23
8	35		352		7.0	7.9	120	23
9	40		351		7.2	7.8	125	23
10	45		351		6.9	7.9	110	23
11	50		351		7.1	7.8	130	23
12	55		351		7.1	7.8	120	23
	60		351		7.1	7.8	110	24
TOTAL		FUEL METER END 20:08 FUEL: 800509	:	AVG	7.07	7.83	120	23
AVERAGE								

SOURCE EMISSION TESTING DATA SHEET

(SJS rev11/88, #02510)

PLANT Thomas	BAROMETRIC PRESSURE, in Hg	METER BOX #	PROBE # (PITOT #)	NOZZLE #
LOCATION CBC	AMBIENT TEMPERATURE, °F	METER ΔH@	PITOT COEF	IDEAL NOZZLE DIA, in.
DATE 9/20/90	AVE STATIC PRESSURE, in H_2O	METER γ	PROBE LENGTH, in.	ACTUAL NOZZLE DIA, in.
OPERATOR [illegible]	AVE VEL HEAD, in H_2O	SAMPLE BOX #	PROBE LINER MATERIAL	LEAK CHECK @ PITOT'S
RUN # GAS-25-2	ASSUMED MOISTURE, %	HEATER BOX SETTING	PROBE HEATER SETTING	LEAK RATE CFM@ in Hg

SCHEMATIC OF STACK CROSS SECTION (SHOW TRAVERSE PTS)

FUEL METER START 300719
TIME 20.30

~~TRAVERSE~~ POINT #	SAMPLING TIME min	STACK TEMPERATURE (Ts) °F	O_2 %	CO_2 %	CO ppm	NOX ppm
1	0	360	7.1	7.9	110	23
2	5	360	7.0	7.9	115	23
3	10	361	6.8	7.9	110	23
4	15	361	6.9	7.8	100	24
5	20	361	6.9	7.8	110	24
6	25	359	7.0	7.7	105	24
7	30	356	6.9	7.8	110	24
8	35	353	7.0	7.7	100	24
9	40	351	7.0	7.8	110	24
10	45	351	6.9	7.8	120	24
11	50	353	6.8	7.9	105	24
12	55	353	6.8	7.8	100	24
	60	353	6.8	7.8	105	23
TOTAL			AVG 6.92	7.82	106.9	23.7
AVERAGE						

STOP 21:30
FUEL METER END 301322

ANALYZER METHOD 6C CALIBRATION SHEET

BASE: CBC PORT HUENEME   RUN NO: GAS-25   ANALYZER: NOX
BUILDING: 373 THOMAS PLANT   BOILER NO: SPAN: 100
DATE: 9/20/90   FUEL: NAT GAS   UNITS: PPM
CAL. BY: [illegible]   LOAD: 25%   RESP TIME:

SPAN GAS INPUT	SPAN GAS RANGE	CYLINDER VALUE	CALIBRATION RESPONSE	ABS. DIFF.	CAL. BIAS % OF SPAN	DRIFT % OF SPAN
ANALYZER PRETEST	HIGH	90.71	90	90.71	90.7	N/A
	MID	51.98	51.5	51.98	52.0	N/A
	ZERO	0.00	0.5	0	0.0	N/A
SYSTEM PRETEST	UPSCALE	51.98	51	0	0.0	N/A
	ZERO	0.00	1	0	0.0	N/A
SYSTEM POST RUN 1	UPSCALE	51.98	52	0	0.0	
	ZERO	0.00	1.5	0	0.0	
SYSTEM POST RUN 2	UPSCALE	51.98	52	0	0.0	0
	ZERO	0.00	1	0	0.0	0

	RUN 1	RUN 2	
Co=	0.00	0.00	Avg zero gas system calibration bias.
Cm=	0.00	0.00	Avg upscale gas sys. cal. bias.
Cma=	51.98	51.98	Upscale gas concentration.
C=			Avg gas analyzer concentration reading.
Cgas=	ERR	ERR	Corrected gas concentration.

Analyzer Absolute Difference = |Analyzer Cal. Response - Cyl. Value|
Analyzer Cal. Bias = Analyzer Absolute Difference / Span * 100

Sys. Absolute Difference = |Sys. Cal. Response - Analyzer Cal. Response|
System Cal. Bias = System Absolute Difference / Span Range * 100

Drift = (Sys. Cal. Response - Pretest Sys. Cal. Response) / Span * 100

Cgas = (C-Co)*Cma/(Cm-Co)

ANALYZER METHOD 6C CALIBRATION SHEET

BASE:	CBC PORT HUENEME	RUN NO: GAS-25	ANALYZER: 02
BUILDING:	373 THOMAS PLANT	BOILER NO: 0	SPAN: 20.9
DATE:	0	FUEL: NAT GAS	UNITS: %
CAL. BY:	0	LOAD: 25%	RESP TIME:

SPAN GAS INPUT	SPAN GAS RANGE	CYLINDER VALUE	CALIBRATION RESPONSE	ABS. DIFF.	CAL. BIAS % OF SPAN	DRIFT % OF SPAN
ANALYZER PRETEST	HIGH	20.90	20.9	20.9	100.0	N/A
	MID	3.116	3.2	3.116	14.9	N/A
	ZERO	0.00	0	0	0.0	N/A
SYSTEM PRETEST			20.8			
	UPSCALE	3.12	3.1	0	0.0	N/A
	ZERO	0.00	0	0	0.0	N/A
SYSTEM POST RUN 1			20.9			
	UPSCALE	3.12	3.2	0	0.0	0
	ZERO	0.00	0.1	0	0.0	0
SYSTEM POST RUN 2			20.9			
	UPSCALE	3.12	3.2	0	0.0	0
	ZERO	0.00	0.1	0	0.0	0

	RUN 1	RUN 2	
Co=	0.00	0.00	Avg zero gas system calibration bias.
Cm=	0.00	0.00	Avg upscale gas sys. cal. bias.
Cma=	3.12	3.12	Upscale gas concentration.
C=			Avg gas analyzer concentration reading.
Cgas=	ERR	ERR	Corrected gas concentration.

Analyzer Absolute Difference = |Analyzer Cal. Response - Cyl. Value|
Analyzer Cal. Bias = Analyzer Absolute Difference / Span * 100

Sys. Absolute Difference = |Sys. Cal. Response - Analyzer Cal. Response|
System Cal. Bias = System Absolute Difference / Span Range * 100

Drift = (Sys. Cal. Response - Pretest Sys. Cal. Response) / Span * 100

Cgas = (C-Co)*Cma/(Cm-Co)

ANALYZER METHOD 6C CALIBRATION SHEET

BASE: CBC PORT HUENEME RUN NO: GAS-25 ANALYZER: CO
BUILDING: 373 THOMAS PLANT BOILER NO: 0 SPAN: 500
DATE: 0 FUEL: NAT GAS UNITS: PPM
CAL. BY: 0 LOAD: 25% RESP TIME:

SPAN GAS INPUT	SPAN GAS RANGE	CYLINDER VALUE	CALIBRATION RESPONSE	ABS. DIFF.	CAL. BIAS % OF SPAN	DRIFT % OF SPAN
ANALYZER PRETEST	HIGH	~~499.7~~ 501.5	500	499.7	99.9	N/A
	MID	248.1	250	248.1	49.6	N/A
	ZERO	0.00	0	0	0.0	N/A
SYSTEM PRETEST	UPSCALE	248.10	250	0	0.0	N/A
	ZERO	0.00	0	0	0.0	N/A
SYSTEM POST RUN 1			250			
	UPSCALE	248.10	250	0	0.0	
	ZERO	0.00	0	0	0.0	
SYSTEM POST RUN 2	UPSCALE	248.10	247	0	0.0	0
	ZERO	0.00	0	0	0.0	0

	RUN 1	RUN 2	
Co=	0.00	0.00	Avg zero gas system calibration bias.
Cm=	0.00	0.00	Avg upscale gas sys. cal. bias.
Cma=	248.10	248.10	Upscale gas concentration.
C=			Avg gas analyzer concentration reading.
Cgas=	ERR	ERR	Corrected gas concentration.

Analyzer Absolute Difference = |Analyzer Cal. Response - Cyl. Value|
Analyzer Cal. Bias = Analyzer Absolute Difference / Span * 100

Sys. Absolute Difference = |Sys. Cal. Response - Analyzer Cal. Response|
System Cal. Bias = System Absolute Difference / Span Range * 100

Drift = (Sys. Cal. Response - Pretest Sys. Cal. Response) / Span * 100

Cgas = (C-Co)*Cma/(Cm-Co)

ANALYZER METHOD 6C CALIBRATION SHEET

BASE: CBC PORT HUENEME
BUILDING: 373 THOMAS PLANT
DATE: 0
CAL. BY: 0

RUN NO: GAS-25
BOILER NO: 0
FUEL: NAT GAS
LOAD: 25%

ANALYZER: CO2
SPAN: 20
UNITS: %
RESP TIME:

SPAN GAS INPUT	SPAN GAS RANGE	CYLINDER VALUE	CALIBRATION RESPONSE	ABS. DIFF.	CAL. BIAS % OF SPAN	DRIFT % OF SPAN
ANALYZER PRETEST	HIGH			0	0.0	N/A
	MID	11.01	11.0	11.01	55.1	N/A
	ZERO	0.00	0	0	0.0	N/A
SYSTEM PRETEST	UPSCALE	11.01	11.0	0	0.0	N/A
	ZERO	0.00	0	0	0.0	N/A
SYSTEM POST RUN 1	UPSCALE	11.01	11.0	0	0.0	
	ZERO	0.00	0	0	0.0	
SYSTEM POST RUN 2	UPSCALE	11.01	10.9	0	0.0	0
	ZERO	0.00	0	0	0.0	0

	RUN 1	RUN 2	
Co=	0.00	0.00	Avg zero gas system calibration bias.
Cm=	0.00	0.00	Avg upscale gas sys. cal. bias.
Cma=	11.01	11.01	Upscale gas concentration.
C=			Avg gas analyzer concentration reading.
Cgas=	ERR	ERR	Corrected gas concentration.

Analyzer Absolute Difference = |Analyzer Cal. Response - Cyl. Value|
Analyzer Cal. Bias = Analyzer Absolute Difference / Span * 100

Sys. Absolute Difference = |Sys. Cal. Response - Analyzer Cal. Response|
System Cal. Bias = System Absolute Difference / Span Range * 100

Drift = (Sys. Cal. Response - Pretest Sys. Cal. Response) / Span * 100

Cgas = (C-Co)*Cma/(Cm-Co)

Method 4

[redacted] SAMPLE BOX SET UP
CHECKLIST

DATE: ____________

PLANT: *Thomas*

LOCATION: ____________

PREP. BY: ____________

RUN NO.: *G45-SC-1*

STACK NO: ____________

SAMPLE BOX NO.: ____________

( ) 1. Wash all glassware with distilled water and then acetone.

( ) 2. Place approx. 100 ml distilled water in the first impinger, a modified Greenburg-Smith with straight tube 1/2 inch from the impinger bottom. Record exact weight to 1/10 of a gram.

( ) 3. Place approx. 100 ml distilled water in the second impinger, a standard Greenburg-Smith impinger (caricell tip). Record exact weight to 1/10 of a gram.

( ) 4. Impinger three is a dry modified Greenburg-Smith with straight tube 1/2 inch from the impinger bottom. Record dry tare weight to 1/10 of a gram.

( ) 5. Place approx. 175 ml of silica gel in the fourth impinger, a modified Greenburg-Smith with straight tube 1/2 inch from the impinger bottom. Record exact weight to 1/10 of a gram.

( ) 6. PLACE [redacted] FILTER INTO FILTER HOLDER ON THE CYCLONE SIDE OF THE HOLDER. Smooth side of filter is to face frittered glass of filter holder. [redacted]

Impinger No.	Impinger weights (GRAMS)	Tare	Initial	Final	Condensate	
1	1. 100 ml		648.49	739.83	91.34	
2	2. 100 ml		622.20	640.08	17.88	
3	3. Dry		502.76	505.49	2.73	TOTAL
4	4. 175 g silica gel		739.49	746.72	7.23	119.18

35[illegible]

( ) 7. Assemble [redacted] filter holder.

( ) 8. Assemble impinger bottles and glass elbows so air flows from a small hole to a larger hole.

. ETI_S I — # .

SOURCE EMISSION TESTING DATA SHEET

(SJS rev11/88, #02510)

PLANT Thomas	BAROMETRIC PRESSURE, in Hg		METER BOX # NC448	PROBE # (PITOT #)	NOZZLE #
LOCATION CBC Bldg 373	AMBIENT TEMPERATURE, °F 70		METER ΔH@	PITOT COEF 0.80	IDEAL NOZZLE DIA, in.
DATE 9/20/90	AVE STATIC PRESSURE, in H_2O		METER γ	PROBE LENGTH, in.	ACTUAL NOZZLE DIA, in.
OPERATOR JM	AVE VEL HEAD, in H_2O		SAMPLE BOX #	PROBE LINER MATERIAL	LEAK CHECK @ PITOT'S
RUN # GAS-50-1	ASSUMED MOISTURE, %	SCHEMATIC OF STACK CROSS SECTION (SHOW TRAVERSE PTS)	HEATER BOX SETTING	PROBE HEATER SETTING	LEAK RATE CFM@ in Hg Pre: .012 cfm @ 12" Hg

Post: .014 cfm @ 12" Hg

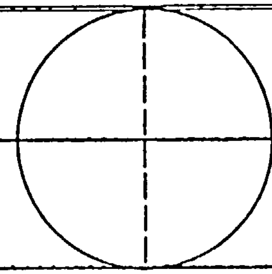
TRAVERSE POINT #	SAMPLING TIME min	GAS METER READING (Vm) ft³	VELOCITY HEAD (MEAS) (ΔP) in H_2O	STACK TEMPERATURE (1) (Ts) °F	GAS SAMPLE TEMPERATURE AT DRY GAS METER (6) Inlet (Tm in) °F	(7) Outlet (Tm out) °F	IMPINGER TEMPERATURE (4) °F	SAMPLE BOX TEMPERATURE (3) °F	SAMPLE VACUUM in Hg
1	4.15 m Ø	106.792	.01	385	71	71	60	251	4.5
2	3	109.046	.01	385	71	71	52	253	
3	6	111.435	.01	386	73	71	50	254	
4	9	113.800	.01	386	74	71	52	255	
5	12	116.141	.015	386	76	72	52	255	
6	15	118.473	.015	386	77	72	53	255	
7	18	[illegible]	.02	381	78	72	53	257	
8	21	123.148	.02	384	79	73	53	256	
9	24	125.477	.005	381	80	73	54	256	
10	27	127.798	.01	385	[illegible]	73	55	257	
11	30	130.104	.01	383	[illegible]	74	56	257	
12	33	132.441	.01	383	[illegible]	74	57 57	256	
13	36	[illegible]	[illegible]	380	80	75	57	251	
TOTAL									
AVERAGE									

ETH..S I— #1

SOURCE EMISSION TESTING DATA SHEET

(SJS rev11/88, #0251Q)

PLANT Thomas	BAROMETRIC PRESSURE, in Hg	METER BOX #	PROBE # (PITOT #)	NOZZLE #
LOCATION CBC Bldg 373	AMBIENT TEMPERATURE, °F	METER ΔH@	PITOT COEF	IDEAL NOZZLE DIA, in.
DATE	AVE STATIC PRESSURE, in H_2O	METER γ	PROBE LENGTH, in.	ACTUAL NOZZLE DIA, in.
OPERATOR	AVE VEL HEAD, in H_2O	SAMPLE BOX #	PROBE LINER MATERIAL	LEAK CHECK @ PITOT'S
RUN # GAS-SO-1	ASSUMED MOISTURE, %	HEATER BOX SETTING	PROBE HEATER SETTING	LEAK RATE CFM@ in Hg



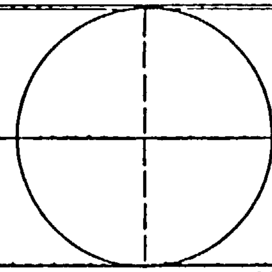
SCHEMATIC OF STACK CROSS SECTION (SHOW TRAVERSE PTS)

TRAVERSE POINT #	SAMPLING TIME min	GAS METER READING (Vm) ft^3	VELOCITY HEAD (MEAS) (ΔP) in H_2O	STACK TEMPERATURE (Ts) °F	GAS SAMPLE TEMPERATURE AT DRY GAS METER Inlet (Tm in) °F	GAS SAMPLE TEMPERATURE AT DRY GAS METER Outlet (Tm out) °F	IMPINGER TEMPERATURE °F	SAMPLE BOX TEMPERATURE °F	SAMPLE VACUUM in Hg
14			[illegible]						
15			[illegible]						
16			[illegible]						
TOTAL									
AVERAGE									

SOURCE EMISSION TESTING DATA SHEET

(SJS rev11/88, #02510)

PLANT Thomas	BAROMETRIC PRESSURE, in Hg	METER BOX #	PROBE # (PITOT #)	NOZZLE #
LOCATION CBC	AMBIENT TEMPERATURE, °F	METER ΔH@	PITOT COEF	IDEAL NOZZLE DIA, in.
DATE 9/20/90	AVE STATIC PRESSURE, in H_2O	METER γ	PROBE LENGTH, in.	ACTUAL NOZZLE DIA, in.
OPERATOR [illegible]	AVE VEL HEAD, in H_2O	SAMPLE BOX #	PROBE LINER MATERIAL	LEAK CHECK @ PITOT'S
RUN # GAS-50-1	ASSUMED MOISTURE, %	HEATER BOX SETTING	PROBE HEATER SETTING	LEAK RATE CFM@ in Hg



SCHEMATIC OF STACK CROSS SECTION (SHOW TRAVERSE PTS)

START FUEL METER 797085

START 1548

~~TRAVERSE~~ POINT #	SAMPLING TIME min	STACK TEMPERATURE (Ts) °F	O_2 %	CO_2 %	CO ppm	NOX ppm
1	0	384	4.9	9.1	180	19
2	5	385	4.9	9.1	200	19
3	10	385	4.7	9.2	160	19
4	15	384	4.8	9.2	150	19
5	20	384	4.7	9.2	180	19
6	25	384	4.8	9.1	180	18
7	30	386	4.9	9.1	190	18
8	35	386	4.8	9.1	140	18
9	40	386	4.8	9.1	190	18
10	45	386	4.8	9.1	180	18
11	50	386	4.7	9.1	170	18
12	55	388	4.6	9.1	210	18
	60	388	4.7	9.2	220	18
TOTAL			AVG 4.8	9.13	182	18.4
AVERAGE					182	

STOP 1648
FUEL METER FINAL 798011

SOURCE EMISSION TESTING DATA SHEET

(SJS rev11/88, #0251Q)

PLANT Thomas	BAROMETRIC PRESSURE, in Hg	SCHEMATIC OF STACK CROSS SECTION (SHOW TRAVERSE PTS)	METER BOX #	PROBE # (PITOT #)	NOZZLE #
LOCATION CBC	AMBIENT TEMPERATURE, °F		METER ΔH@	PITOT COEF	IDEAL NOZZLE DIA, in.
DATE 9/20/90	AVE STATIC PRESSURE, in H_2O		METER γ	PROBE LENGTH, in.	ACTUAL NOZZLE DIA, in.
OPERATOR	AVE VEL HEAD, in H_2O		SAMPLE BOX #	PROBE LINER MATERIAL	LEAK CHECK @ PITOT'S
RUN # GAS-50-2	ASSUMED MOISTURE, %		HEATER BOX SETTING	PROBE HEATER SETTING	LEAK RATE CFM@ in Hg

FUEL METER START 798372

START TIME 1712

~~TRAVERSE~~ POINT #	SAMPLING TIME min	STACK TEMPERATURE (Ts) °F	O_2 %	CO_2 %	CO ppm	NOX ppm
1	0	379	4.5	9.2	240	17
2	5	379	4.4	9.2	220	18
3	10	379	4.4	9.2	190	18
4	15	380	4.4	9.2	190	18
5	20	381	4.4	9.1	150	18
6	25	381	4.3	9.2	180	18
7	30	381	4.4	1.1	190	17
8	35	381	4.7	8.9	90	17
9	40	382	4.5	9.0	140	17
10	45	382	4.5	8.9	130	17
11	50	382	4.5	8.9	140	17
12	55	382	4.4	9.0	170	17
	60	382	4.2	9.1	230	17
TOTAL						
AVG			4.43	9.07	173.1	17.4
AVERAGE	~~[illegible]~~					

STOP 1812

FUEL METER END 799307

EMPTY IMPINGERS
LEAK CHECK GOOD

ANALYZER METHOD 6C CALIBRATION SHEET

BASE: CBC PORT HUENEME — RUN NO: GAS-50 — ANALYZER: NOX
BUILDING: 373 THOMAS PLANT — BOILER NO: — SPAN: 100
DATE: 9/20/90 — FUEL: NAT GAS — UNITS: PPM
CAL. BY: [signature] — LOAD: 50% — RESP TIME:

SPAN GAS INPUT	SPAN GAS RANGE	CYLINDER VALUE	CALIBRATION RESPONSE	ABS. DIFF.	CAL. BIAS % OF SPAN	DRIFT % OF SPAN
ANALYZER PRETEST	HIGH	90.71	91	90.71	90.7	N/A
	MID	51.98	52	51.98	52.0	N/A
	ZERO	0.00	1	0	0.0	N/A
SYSTEM PRETEST	UPSCALE	51.98	52	0	0.0	N/A
	ZERO	0.00	1	0	0.0	N/A
SYSTEM POST RUN 1	UPSCALE	51.98	51	0	0.0	0
	ZERO	0.00	0	0	0.0	0
SYSTEM POST RUN 2	UPSCALE	51.98	49.5	0	0.0	0
	ZERO	0.00	-0.5	0	0.0	0

	RUN 1	RUN 2	
Co=	0.00	0.00	Avg zero gas system calibration bias.
Cm=	0.00	0.00	Avg upscale gas sys. cal. bias.
Cma=	51.98	51.98	Upscale gas concentration.
C=			Avg gas analyzer concentration reading.
Cgas=	ERR	ERR	Corrected gas concentration.

Analyzer Absolute Difference = |Analyzer Cal. Response - Cyl. Value|
Analyzer Cal. Bias = Analyzer Absolute Difference / Span * 100

Sys. Absolute Difference = |Sys. Cal. Response - Analyzer Cal. Response|
System Cal. Bias = System Absolute Difference / Span Range * 100

Drift = (Sys. Cal. Response - Pretest Sys. Cal. Response) / Span * 100

Cgas = (C-Co)*Cma/(Cm-Co)

ANALYZER METHOD 6C CALIBRATION SHEET

BASE: CBC PORT HUENEME	RUN NO: GAS-50	ANALYZER: 02	
BUILDING: 373 THOMAS PLANT	BOILER NO: 0	SPAN:	20.9
DATE: 0	FUEL: NAT GAS	UNITS: %	
CAL. BY: 0	LOAD: 50%	RESP TIME:	

SPAN GAS INPUT	SPAN GAS RANGE	CYLINDER VALUE	CALIBRATION RESPONSE	ABS. DIFF.	CAL. BIAS % OF SPAN	DRIFT % OF SPAN
ANALYZER PRETEST	HIGH	20.90	20.9	20.9	100.0	N/A
	MID	3.116	3.2	3.116	14.9	N/A
	ZERO	0.00	0.1	0	0.0	N/A
SYSTEM PRETEST						
	UPSCALE	3.12	3.2	0	0.0	N/A
	ZERO	0.00	0.1	0	0.0	N/A
SYSTEM POST RUN 1			20.8			
	UPSCALE	3.12	3.2	0	0.0	0
	ZERO	0.00	0.1	0	0.0	0
SYSTEM POST RUN 2			[illegible]			
	UPSCALE	3.12	3.2	0	0.0	0
	ZERO	0.00	0.1	0	0.0	0

	RUN 1	RUN 2	
Co=	0.00	0.00	Avg zero gas system calibration bias.
Cm=	0.00	0.00	Avg upscale gas sys. cal. bias.
Cma=	3.12	3.12	Upscale gas concentration.
C=			Avg gas analyzer concentration reading.
Cgas=	ERR	ERR	Corrected gas concentration.

Analyzer Absolute Difference = |Analyzer Cal. Response - Cyl. Value|
Analyzer Cal. Bias = Analyzer Absolute Difference / Span * 100

Sys. Absolute Difference = |Sys. Cal. Response - Analyzer Cal. Response|
System Cal. Bias = System Absolute Difference / Span Range * 100

Drift = (Sys. Cal. Response - Pretest Sys. Cal. Response) / Span * 100

Cgas = (C-Co)*Cma/(Cm-Co)

ANALYZER METHOD 6C CALIBRATION SHEET

BASE: CBC PORT HUENEME	RUN NO: GAS-50	ANALYZER: CO	
BUILDING: 373 THOMAS PLANT	BOILER NO: 0	SPAN:	500
DATE: 0	FUEL: NAT GAS	UNITS: PPM	
CAL. BY: 0	LOAD: 50%	RESP TIME:	

SPAN GAS INPUT	SPAN GAS RANGE	CYLINDER VALUE	CALIBRATION RESPONSE	ABS. DIFF.	CAL. BIAS % OF SPAN	DRIFT % OF SPAN
ANALYZER PRETEST	HIGH	~~499.7~~ 501.5	500	499.7	99.9	N/A
	MID	248.1	250	248.1	49.6	N/A
	ZERO	0.00	2	0	0.0	N/A
SYSTEM PRETEST			[illegible]			
	UPSCALE	248.10	250	0	0.0	N/A
	ZERO	0.00	0	0	0.0	N/A
SYSTEM POST RUN 1			500			
	UPSCALE	248.10	250	0	0.0	0
	ZERO	0.00	0	0	0.0	0
SYSTEM POST RUN 2			500			
	UPSCALE	248.10	250	0	0.0	0
	ZERO	0.00	0	0	0.0	0

	RUN 1	RUN 2	
Co=	0.00	0.00	Avg zero gas system calibration bias.
Cm=	0.00	0.00	Avg upscale gas sys. cal. bias.
Cma=	248.10	248.10	Upscale gas concentration.
C=			Avg gas analyzer concentration reading.
Cgas=	ERR	ERR	Corrected gas concentration.

Analyzer Absolute Difference = |Analyzer Cal. Response - Cyl. Value|

Analyzer Cal. Bias = Analyzer Absolute Difference / Span * 100

Sys. Absolute Difference = |Sys. Cal. Response - Analyzer Cal. Response|

System Cal. Bias = System Absolute Difference / Span Range * 100

Drift = (Sys. Cal. Response - Pretest Sys. Cal. Response) / Span * 100

Cgas = (C-Co)*Cma/(Cm-Co)

ANALYZER METHOD 6C CALIBRATION SHEET

BASE: CBC PORT HUENEME
BUILDING: 373 THOMAS PLANT
DATE: 0
CAL. BY: 0

RUN NO: GAS-50
BOILER NO: 0
FUEL: NAT GAS
LOAD: 50%

ANALYZER: CO2
SPAN:
UNITS: %
RESP TIME:

SPAN GAS INPUT	SPAN GAS RANGE	CYLINDER VALUE	CALIBRATION RESPONSE	ABS. DIFF.	CAL. BIAS % OF SPAN	DRIFT % OF SPAN
ANALYZER PRETEST	HIGH			0	0.0	N/A
	MID	11.01	11.0	11.01	55.1	N/A
	ZERO	0.00	0.1	0	0.0	N/A
SYSTEM PRETEST	UPSCALE	11.01	10.8	0	0.0	N/A
	ZERO	0.00	0	0	0.0	N/A
SYSTEM POST RUN 1	UPSCALE	11.01	10.5	0	0.0	0
	ZERO	0.00	0	0	0.0	0
SYSTEM POST RUN 2	UPSCALE	11.01	10.5	0	0.0	0
	ZERO	0.00	0	0	0.0	0

	RUN 1	RUN 2	
Co=	0.00	0.00	Avg zero gas system calibration bias.
Cm=	0.00	0.00	Avg upscale gas sys. cal. bias.
Cma=	11.01	11.01	Upscale gas concentration.
C=			Avg gas analyzer concentration reading.
Cgas=	ERR	ERR	Corrected gas concentration.

Analyzer Absolute Difference = |Analyzer Cal. Response - Cyl. Value|
Analyzer Cal. Bias = Analyzer Absolute Difference / Span * 100

Sys. Absolute Difference = |Sys. Cal. Response - Analyzer Cal. Response|
System Cal. Bias = System Absolute Difference / Span Range * 100

Drift = (Sys. Cal. Response - Pretest Sys. Cal. Response) / Span * 100

Cgas = (C-Co)*Cma/(Cm-Co)

Method 4.

[redacted] SAMPLE BOX SET UP
CHECKLIST

DATE: ____________________

PLANT: *Thomas*

LOCATION: ____________________

PREP. BY: *JR*

RUN NO.: *GAS-75-1*

STACK NO: ____________________

SAMPLE BOX NO.: ____________________

( ) 1. Wash all glassware with distilled water and then acetone.

( ) 2. Place approx. 100 ml distilled water in the first impinger, a modified Greenburg-Smith with straight tube 1/2 inch from the impinger bottom. Record exact weight to 1/10 of a gram.

( ) 3. Place approx. 100 ml distilled water in the second impinger, a standard Greenburg-Smith impinger (caricell tip). Record exact weight to 1/10 of a gram.

( ) 4. Impinger three is a dry modified Greenburg-Smith with straight tube 1/2 inch from the impinger bottom. Record dry tare weight to 1/10 of a gram.

( ) 5. Place approx. 175 ml of silica gel in the fourth impinger, a modified Greenburg-Smith with straight tube 1/2 inch from the impinger bottom. Record exact weight to 1/10 of a gram.

( ) 6. PLACE [redacted] FILTER INTO FILTER HOLDER ON THE CYCLONE SIDE OF THE HOLDER. Smooth side of filter is to face frittered glass of filter holder. [redacted]

Impinger No.	Impinger weights (GRAMS)	Tare	Initial	Final	Condensate	TOTAL
X-1	1. 100 ml		572.09	651.60	79.51	
X-2	2. 100 ml		547.44	562.52	15.08	
X-3	3. Dry		471.24	473.06	1.82	
X-4	4. 175 g silica gel		660.01	666.36	6.35	102.76

10[illegible]

( ) 7. Assemble [redacted] filter holder.

( ) 8. Assemble impinger bottles and glass elbows so air flows from a small hole to a larger hole.

11ND-CBC-3960/47 (REV. 11-78)

SOURCE EMISSION TESTING DATA SHEET

(SJS rev11/88, #0251Q)

PLANT Thomas	BAROMETRIC PRESSURE, in Hg	METER BOX # No 448	PROBE # (PITOT #)	NOZZLE #
LOCATION CBC Bldg 373	AMBIENT TEMPERATURE, °F 70	METER ΔH@	PITOT COEF 0.80	IDEAL NOZZLE DIA, in.
DATE 9/20/90	AVE STATIC PRESSURE, in H_2O	METER γ	PROBE LENGTH, in.	ACTUAL NOZZLE DIA, in.
OPERATOR JM	AVE VEL HEAD, in H_2O	SAMPLE BOX #	PROBE LINER MATERIAL	LEAK CHECK @ PITOT'S
RUN # GAS-75-1	ASSUMED MOISTURE, %	HEATER BOX SETTING	PROBE HEATER SETTING	LEAK RATE CFM@ in Hg Pre: OK .011 cfm @ [illegible]" Hg Post: OK .02 cfm @ 11" Hg

SCHEMATIC OF STACK CROSS SECTION (SHOW TRAVERSE PTS)

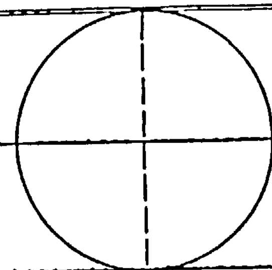
TRAVERSE POINT #	SAMPLING TIME min	GAS METER READING (Vm) ft^3	VELOCITY HEAD (MEAS) (ΔP) in H_2O	STACK TEMPERATURE (1) (Ts) °F	GAS SAMPLE TEMPERATURE AT DRY GAS METER (6) Inlet (Tm in) °F	(7) Outlet (Tm out) °F	IMPINGER TEMPERATURE (4) °F	SAMPLE BOX TEMPERATURE (3) °F	SAMPLE VACUUM in Hg
1	12:44 a.m. Ø	82.895	Ø.Ø4	451	69	69	73	253	5.0
2	3	84.705	Ø.Ø35	450	70	69	50	253	5.0
3	6	86.698	Ø.Ø32	454	71	69	48	254	5.0
4	9	88.698	Ø.Ø2	451	73	70	48.	254	
5	12	90.682	Ø.Ø25	450	73	70	49	255	
6	15	92.664	Ø.Ø4	452	74	70	50	255	
7	18	94.638	Ø.Ø5	453	75	71	51	255	
8	21	96.593	Ø.Ø55	451	76	71	52	255	
9	24	98.571	Ø.Ø35	452	77	72	53	256	
10	27	100.549	Ø.Ø35	452	78	72	53	255	
11	30	102.497	Ø.Ø4	451	78	73	54	254	
12	33	104.463	Ø.Ø35	450	78	73	50	256	
13	36	106.409	Ø.Ø2	451	79	73	49	255	
TOTAL									
AVERAGE									

ETM _5 (#

SOURCE EMISSION TESTING DATA SHEET

(SJS rev11/88, #0251Q)

PLANT Thomas	BAROMETRIC PRESSURE, in Hg	METER BOX #	PROBE # (PITOT #)	NOZZLE #
LOCATION CBC Bldg 373	AMBIENT TEMPERATURE, °F	METER ΔH@	PITOT COEF	IDEAL NOZZLE DIA, in.
DATE	AVE STATIC PRESSURE, in H_2O	METER γ	PROBE LENGTH, in.	ACTUAL NOZZLE DIA, in.
OPERATOR	AVE VEL HEAD, in H_2O	SAMPLE BOX #	PROBE LINER MATERIAL	LEAK CHECK @ PITOT'S
RUN # GAS-75-1	ASSUMED MOISTURE, %	HEATER BOX SETTING	PROBE HEATER SETTING	LEAK RATE CFM@ in Hg



SCHEMATIC OF STACK CROSS SECTION (SHOW TRAVERSE PTS)

TRAVERSE POINT #	SAMPLING TIME min	GAS METER READING (Vm) ft^3	VELOCITY HEAD (MEAS) (ΔP) in H_2O	STACK TEMPERATURE (Ts) °F	GAS SAMPLE TEMPERATURE AT DRY GAS METER Inlet (Tm in) °F	Outlet (Tm out) °F	IMPINGER TEMPERATURE °F	SAMPLE BOX TEMPERATURE °F	SAMPLE VACUUM in Hg
14			0.025						
15			0.04						
16			0.04						
TOTAL									
AVERAGE									

SOURCE EMISSION TESTING DATA SHEET

(SJS rev11/88, #0251Q)

PLANT Thomas	BAROMETRIC PRESSURE, in Hg	SCHEMATIC OF STACK CROSS SECTION (SHOW TRAVERSE PTS)	METER BOX #	PROBE # (PITOT #)	NOZZLE #
LOCATION CBC	AMBIENT TEMPERATURE, °F		METER ΔH@	PITOT COEF	IDEAL NOZZLE DIA, in.
DATE 20 SEPT 92	AVE STATIC PRESSURE, in H_2O		METER γ	PROBE LENGTH, in.	ACTUAL NOZZLE DIA, in.
OPERATOR [signature]	AVE VEL HEAD, in H_2O		SAMPLE BOX #	PROBE LINER MATERIAL	LEAK CHECK @ PITOT'S
RUN # GAS-75-1	ASSUMED MOISTURE, %		HEATER BOX SETTING	PROBE HEATER SETTING	LEAK RATE CFM@ in Hg

GAS METER START 92138

1222pm

1322pm GAS METER FINAL 793707

~~TRAVERSE~~ POINT #	SAMPLING TIME min	STACK TEMPERATURE (Ts) °F	O_2 %	CO_2 %	CO ppm	NOX ppm
1	0	454	4.5	9.4	190	26
2	5	452	4.5	9.4	180	26
3	10	452	4.5	9.4	195	27
4	15	451	4.5	9.5	180	27
5	20	452	4.7	9.3	80	27
6	25	452	4.6	9.4	180	27
7	30	452	4.6	9.4	160	27
8	35	452	4.6	9.4	140	27
9	40	452	4.5	9.5	200	27
10	45	452	4.5	9.5	190	27
11		452	4.7	9.4	100	28
12	55	451	4.6	9.5	140	28
	60	451	4.6	9.5	200	27
			[illegible]	9.4	[illegible]	27
TOTAL						
AVERAGE						

SOURCE EMISSION TESTING DATA SHEET

(SJS rev11/88, #02510)

PLANT Thomas	BAROMETRIC PRESSURE, in Hg	SCHEMATIC OF STACK CROSS SECTION (SHOW TRAVERSE PTS)	METER BOX #	PROBE # (PITOT #)	NOZZLE #
LOCATION CBC	AMBIENT TEMPERATURE, °F		METER ΔH@	PITOT COEF	IDEAL NOZZLE DIA, in.
DATE 20 SEPT 90	AVE STATIC PRESSURE, in H_2O		METER γ	PROBE LENGTH, in.	ACTUAL NOZZLE DIA, in.
OPERATOR Clark	AVE VEL HEAD, in H_2O		SAMPLE BOX #	PROBE LINER MATERIAL	LEAK CHECK @ PITOT'S
RUN # GAS-75-2	ASSUMED MOISTURE, %		HEATER BOX SETTING	PROBE HEATER SETTING	LEAK RATE CFM@ in Hg

GAS METER START 794315

START TIME 13:44

STOP TIME 14:44

GAS METER FINAL 795916

~~TRAVERSE~~ POINT #	SAMPLING TIME min	STACK TEMPERATURE (Ts) °F		O_2 %	CO_2 %	CO ppm	NOX ppm
1	0	452		4.6	9.5	150	27
2	5	452		4.6	9.5	110	27
3	10	451		4.7	9.5	125	27
4	15	453		4.6	9.5	215	27
5	20	452		4.5	9.5	220	27
6	25	452		4.8	9.3	120	27
7	30	452		4.4	9.5	240	27
8	35	452		4.7	9.3	140	28
9	40	453		4.6	9.4	190	27
10	45	452		4.6	9.4	[illegible]	27
11	50	452		4.6	9.3	190	27
12	55	453		4.6	9.2	150	28
	60	453		4.7	9.2	140	27
			AVG	4.61	9.39	168.5	27.2
TOTAL							
AVERAGE							

ANALYZER METHOD 6C CALIBRATION SHEET

BASE: CBC PORT HUENEME
BUILDING: 373 THOMAS PLANT
DATE: 20 SEPT 90
CAL. BY: [illegible]

RUN NO: GAS-75
BOILER NO:
FUEL: NAT GAS
LOAD: 75%

ANALYZER: NOX
SPAN: 100
UNITS: PPM
RESP TIME:

SPAN GAS INPUT	SPAN GAS RANGE	CYLINDER VALUE	CALIBRATION RESPONSE	ABS. DIFF.	CAL. BIAS % OF SPAN	DRIFT % OF SPAN
ANALYZER PRETEST	HIGH	90.71	91	90.71	90.7	N/A
	MID	51.98	52	51.98	52.0	N/A
	ZERO	0.00	0	0	0.0	N/A
SYSTEM PRETEST	UPSCALE	51.98	52	0	0.0	
	ZERO	0.00	0	0	0.0	
SYSTEM POST RUN 1	UPSCALE	51.98	53	0	0.0	
	ZERO	0.00	1	0	0.0	
SYSTEM POST RUN 2	UPSCALE	51.98	53	0	0.0	
	ZERO	0.00	1.5	0	0.0	0

	RUN 1	RUN 2	
Co=	0.00	0.00	Avg zero gas system calibration bias.
Cm=	0.00	0.00	Avg upscale gas sys. cal. bias.
Cma=	51.98	51.98	Upscale gas concentration.
C=			Avg gas analyzer concentration reading.
Cgas=	ERR	ERR	Corrected gas concentration.

Analyzer Absolute Difference = |Analyzer Cal. Response - Cyl. Value|
Analyzer Cal. Bias = Analyzer Absolute Difference / Span * 100

Sys. Absolute Difference = |Sys. Cal. Response - Analyzer Cal. Response|
System Cal. Bias = System Absolute Difference / Span Range * 100

Drift = (Sys. Cal. Response - Pretest Sys. Cal. Response) / Span * 100

Cgas = (C-Co)*Cma/(Cm-Co)

ANALYZER METHOD 6C CALIBRATION SHEET

BASE:	CBC PORT HUENEME	RUN NO:	GAS-75
BUILDING:	373 THOMAS PLANT	BOILER NO:	0
DATE:	0	FUEL:	NAT GAS
CAL. BY:	0	LOAD:	75%

ANALYZER: 02
SPAN: 20.9
UNITS: %
RESP TIME:

SPAN GAS INPUT	SPAN GAS RANGE	CYLINDER VALUE	CALIBRATION RESPONSE	ABS. DIFF.	CAL. BIAS % OF SPAN	DRIFT % OF SPAN
ANALYZER PRETEST	HIGH	20.90	20.9	20.9	100.0	N/A
	MID	3.116	3.2	3.116	14.9	N/A
	ZERO	0.00	0	0	0.0	N/A
SYSTEM PRETEST			2			
	UPSCALE	3.12	3.2	0	0.0	N/A
	ZERO	0.00	0.1	0	0.0	N/A
SYSTEM POST RUN 1			21.0			
	UPSCALE	3.12	3.2	0	0.0	[illegible]
	ZERO	0.00	0.1	0	0.0	
SYSTEM POST RUN 2			21.0			
	UPSCALE	3.12	~~3.2~~ 3.3	0	0.0	0
	ZERO	0.00	0.1	0	0.0	0

	RUN 1	RUN 2	
Co=	0.00	0.00	Avg zero gas system calibration bias.
Cm=	0.00	0.00	Avg upscale gas sys. cal. bias.
Cma=	3.12	3.12	Upscale gas concentration.
C=			Avg gas analyzer concentration reading.
Cgas=	ERR	ERR	Corrected gas concentration.

Analyzer Absolute Difference = |Analyzer Cal. Response - Cyl. Value|
Analyzer Cal. Bias = Analyzer Absolute Difference / Span * 100

Sys. Absolute Difference = |Sys. Cal. Response - Analyzer Cal. Response|
System Cal. Bias = System Absolute Difference / Span Range * 100

Drift = (Sys. Cal. Response - Pretest Sys. Cal. Response) / Span * 100

$$C_{gas} = (C - C_o) * C_{ma} / (C_m - C_o)$$

ANALYZER METHOD 6C CALIBRATION SHEET

BASE: CBC PORT HUENEME
BUILDING: 373 THOMAS PLANT
DATE: 0
CAL. BY: 0

RUN NO: GAS-75
BOILER NO: 0
FUEL: NAT GAS
LOAD: 75%

ANALYZER: CO
SPAN: 500
UNITS: PPM
RESP TIME:

SPAN GAS INPUT	SPAN GAS RANGE	CYLINDER VALUE	CALIBRATION RESPONSE	ABS. DIFF.	CAL. BIAS % OF SPAN	DRIFT % OF SPAN
ANALYZER PRETEST	HIGH	499.7	500	499.7	99.9	N/A
	MID	248.1	250	248.1	49.6	N/A
	ZERO	0.00	0	0	0.0	N/A
SYSTEM PRETEST	UPSCALE	248.10	250	0	0.0	N/A
	ZERO	0.00	0	0	0.0	N/A
SYSTEM POST RUN 1	UPSCALE	248.10	250	0	0.0	
	ZERO	0.00	3	0	0.0	0
SYSTEM POST RUN 2	UPSCALE	248.10	500 250	0	0.0	0
	ZERO	0.00	5	0	0.0	0

	RUN 1	RUN 2	
Co=	0.00	0.00	Avg zero gas system calibration bias.
Cm=	0.00	0.00	Avg upscale gas sys. cal. bias.
Cma=	248.10	248.10	Upscale gas concentration.
C=			Avg gas analyzer concentration reading.
Cgas=	ERR	ERR	Corrected gas concentration.

Analyzer Absolute Difference = |Analyzer Cal. Response - Cal. [illegible]
Analyzer Cal. Bias = Analyzer Absolute Difference / Span * [illegible]

Sys. Absolute Difference = |Sys. Cal. Response - Analyzer Cal. Response|
System Cal. Bias = System Absolute Difference / Span Range * 100

Drift = (Sys. Cal. Response - Pretest Sys. Cal. Response) / Span * 100

Cgas = (C-Co)*Cma/(Cm-Co)

ANALYZER METHOD 6C CALIBRATION SHEET

BASE: CBC PORT HUENEME
BUILDING: 373 THOMAS PLANT
DATE: 0
CAL. BY: 0

RUN NO: GAS-75
BOILER NO: 0
FUEL: NAT GAS
LOAD: 75%

ANALYZER: CO2
SPAN: 20
UNITS: %
RESP TIME:

SPAN GAS INPUT	SPAN GAS RANGE	CYLINDER VALUE	CALIBRATION RESPONSE	ABS. DIFF.	CAL. BIAS % OF SPAN	DRIFT % OF SPAN
ANALYZER PRETEST	HIGH			0	0.0	N/A
	MID	11.01	11	11.01	55.1	N/A
	ZERO	0.00	0	0	0.0	N/A
SYSTEM PRETEST	UPSCALE	11.01	11	0	0.0	N/A
	ZERO	0.00	0	0	0.0	N/A
SYSTEM POST RUN 1	UPSCALE	11.01	11	0	0.0	[illegible]
	ZERO	0.00	0	0	0.0	[illegible]
SYSTEM POST RUN 2	UPSCALE	11.01	10.9	0	0.0	0
	ZERO	0.00	0	0	0.0	0

	RUN 1	RUN 2	
Co=	0.00	0.00	Avg zero gas system calibration bias.
Cm=	0.00	0.00	Avg upscale gas sys. cal. bias.
Cma=	11.01	11.01	Upscale gas concentration.
C=			Avg gas analyzer concentration reading.
Cgas=	ERR	ERR	Corrected gas concentration.

Analyzer Absolute Difference = |Analyzer Cal. Response - Cyl. Value|
Analyzer Cal. Bias = Analyzer Absolute Difference / Span * 100

Sys. Absolute Difference = |Sys. Cal. Response - Analyzer Cal. Response|
System Cal. Bias = System Absolute Difference / Span Range * 100

Drift = (Sys. Cal. Response - Pretest Sys. Cal. Response) / Span * 100

Cgas = (C-Co)*Cma/(Cm-Co)

Method 4

[redacted] SAMPLE BOX SET UP

CHECKLIST

DATE: 9/20/90

PLANT: Thomas

LOCATION:

PREP. BY: JR / JM

RUN NO.: GAS-100-1

STACK NO: BOILER-1

SAMPLE BOX NO.:

(X) 1. Wash all glassware with distilled water and then acetone.

( ) 2. Place approx. 100 ml distilled water in the first impinger, a modified Greenburg-Smith with straight tube 1/2 inch from the impinger bottom. Record exact weight to 1/10 of a gram.

( ) 3. Place approx. 100 ml distilled water in the second impinger, a standard Greenburg-Smith impinger (caricell tip). Record exact weight to 1/10 of a gram.

( ) 4. Impinger three is a dry modified Greenburg-Smith with straight tube 1/2 inch from the impinger bottom. Record dry tare weight to 1/10 of a gram.

( ) 5. Place approx. 175 ml of silica gel in the fourth impinger, a modified Greenburg-Smith with straight tube 1/2 inch from the impinger bottom. Record exact weight to 1/10 of a gram.

( ) 6. PLACE [redacted] FILTER INTO FILTER HOLDER ON THE CYCLONE SIDE OF THE HOLDER. Smooth side of filter is to face frittered glass of filter holder. [redacted]

Impinger No.	Impinger weights (GRAMS)	Tare	Initial	Final	Condensate	TOTAL
1	1. 100 ml		580.93 ~~581.09~~ ~~494.11~~	649.38	68.45	
2	2. 100 ml		637.25	663.88	26.63	
3	3. Dry		500.77	504.39	3.62	
4	4. 175 g silica gel		731.79	739.71	7.92	106.62
				10%		

( ) 7. Assemble [redacted] filter holder.

( ) 8. Assemble impinger bottles and glass elbows so air flows from a small hole to a larger hole.

11ND-CBC-3960/47 (REV. 11-78)

METHOD 5 — #

SOURCE EMISSION TESTING DATA SHEET

(SJS rev11/88, #0251Q)

PLANT Thomas	BAROMETRIC PRESSURE, in Hg 29.780	METER BOX # N0448	PROBE # (PITOT #)	NOZZLE #
LOCATION CBC Bldg 373	AMBIENT TEMPERATURE, °F 59	METER ΔH@	PITOT COEF 0.80	IDEAL NOZZLE DIA, in.
DATE 9/20/90	AVE STATIC PRESSURE, in H_2O	METER γ	PROBE LENGTH, in.	ACTUAL NOZZLE DIA, in.
OPERATOR JM	AVE VEL HEAD, in H_2O	SAMPLE BOX #	PROBE LINER MATERIAL	LEAK CHECK @ PITOT'S OK @ 5 1/2"
RUN # GAS-100-1	ASSUMED MOISTURE, %	HEATER BOX SETTING	PROBE HEATER SETTING	LEAK RATE CFM@ in Hg PRE OK .012 cfm @ 12" Hg

SCHEMATIC OF STACK CROSS SECTION (SHOW TRAVERSE PTS)

Post OK .011 cfm @ 7" Hg

TRAVERSE POINT #	SAMPLING TIME min	GAS METER READING (Vm) ft^3	VELOCITY HEAD (MEAS) (ΔP) in H_2O	STACK TEMPERATURE (1) (Ts) °F	GAS SAMPLE TEMPERATURE AT DRY GAS METER (6) Inlet (Tm in) °F	(7) Outlet (Tm out) °F	IMPINGER TEMPERATURE (4) °F	SAMPLE BOX TEMPERATURE (3) °F	SAMPLE VACUUM in Hg
1	9:39 a.m. 0	58.037	0.12	548	64	64	59	254	5.0
2	3	59.972	0.11	545	64	64	48	253	
3	6	62.058	0.09	549	65	64	48	254	
4	9	64.137	0.07	549	67	65	49	255	
5	12	66.190	0.085	548	69	66	50	257	
6	15	68.243	0.13	549	71	66	52	258	
7	18	70.278	0.16	546	73	67	56	256	
8	21	72.303	0.18	548	74	68	57	259	
9	24	74.324	0.11	543	75	68	58	260	
10	27	76.364	0.115	546	77	69	56	259	
11	30	78.399	0.11	545	76	70	56	257	
12	33	80.432	0.085	542	76	70	56	258	
13	36	82.447	0.06	545	77	71	57	258	
TOTAL									
AVERAGE									

Static -0.03

SOURCE EMISSION TESTING DATA SHEET

(SJS rev11/88, #0251Q)

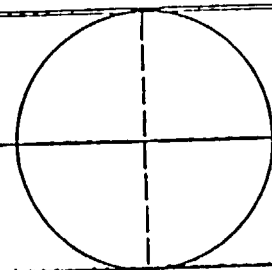
PLANT Thomas	BAROMETRIC PRESSURE, in Hg	SCHEMATIC OF STACK CROSS SECTION (SHOW TRAVERSE PTS)	METER BOX #	PROBE # (PITOT #)	NOZZLE #
LOCATION CBC Bldg 373	AMBIENT TEMPERATURE, °F		METER ΔH@	PITOT COEF	IDEAL NOZZLE DIA, in.
DATE	AVE STATIC PRESSURE, in H_2O		METER γ	PROBE LENGTH, in.	ACTUAL NOZZLE DIA, in.
OPERATOR	AVE VEL HEAD, in H_2O		SAMPLE BOX #	PROBE LINER MATERIAL	LEAK CHECK @ PITOT'S
RUN # GAS-100-1	ASSUMED MOISTURE, %		HEATER BOX SETTING	PROBE HEATER SETTING	LEAK RATE CFM@ in Hg

TRAVERSE POINT #	SAMPLING TIME min	GAS METER READING (Vm) ft^3	VELOCITY HEAD (MEAS) (ΔP) in H_2O	STACK TEMPERATURE (Ts) °F	GAS SAMPLE TEMPERATURE AT DRY GAS METER Inlet (Tm in) °F	GAS SAMPLE TEMPERATURE AT DRY GAS METER Outlet (Tm out) °F	IMPINGER TEMPERATURE °F	SAMPLE BOX TEMPERATURE °F	SAMPLE VACUUM in Hg
14	~~0.08~~ 39		0.08						
15	~~0.40~~ 47		0.10						
16	~~0.72~~ 45		0.13						
TOTAL									
AVERAGE									

SOURCE EMISSION TESTING DATA SHEET

(SJS/rev11/88, #0251Q)

PLANT Thomas	BAROMETRIC PRESSURE, in Hg		METER BOX #	PROBE # (PITOT #)	NOZZLE #
LOCATION CBC	AMBIENT TEMPERATURE, °F		METER ΔH@	PITOT COEF	IDEAL NOZZLE DIA, in.
DATE 9/20/90	AVE STATIC PRESSURE, in H_2O		METER γ	PROBE LENGTH, in.	ACTUAL NOZZLE DIA, in.
OPERATOR [illegible signature]	AVE VEL HEAD, in H_2O		SAMPLE BOX #	PROBE LINER MATERIAL	LEAK CHECK @ PITOT'S
RUN # GAS-100-1	ASSUMED MOISTURE, %	SCHEMATIC OF STACK CROSS SECTION (SHOW TRAVERSE PTS)	HEATER BOX SETTING	PROBE HEATER SETTING	LEAK RATE CFM@ in Hg



GAS START METER 783973

~~TRAVERSE~~ POINT #	SAMPLING TIME min		STACK TEMPERATURE (Ts) °F		O_2 %	CO_2 %	CO ppm	NOX ppm
1	0	8:57	539		4.1	9.6	140	35
2	5		539		4.3	9.4	90	35
3	10		540		4.1	9.6	160	35
4	15		541		4.2	9.5	120	35
5	20		544		4.2	9.5	110	35
6	25		542		4.1	9.6	140	36
7	30		544		4.2	9.4	120	36
8	35		546		4.0	9.5	180	36
9	40		547		4.2	9.4	120	36
10	45		545		4.1	9.3	140	36
11	50		550		4.2	9.3	160	36
12	55		547		4.1	9.3	140	36
	60	9:57 GAS METER FINAL 786652	547		4.3	9.1	80	36
				AVG	4.16	9.42	130.7	35.6
TOTAL								
AVERAGE								

SOURCE EMISSION TESTING DATA SHEET

(SJS rev11/88, #02510)

PLANT Thomas	BAROMETRIC PRESSURE, in Hg	SCHEMATIC OF STACK CROSS SECTION (SHOW TRAVERSE PTS)	METER BOX #	PROBE # (PITOT #)	NOZZLE #
LOCATION CBC	AMBIENT TEMPERATURE, °F		METER ΔH@	PITOT COEF	IDEAL NOZZLE DIA, in.
DATE 9/20/90	AVE STATIC PRESSURE, in H_2O		METER γ	PROBE LENGTH, in.	ACTUAL NOZZLE DIA, in.
OPERATOR [illegible]	AVE VEL HEAD, in H_2O		SAMPLE BOX #	PROBE LINER MATERIAL	LEAK CHECK @ PITOT'S
RUN # GAS-100-2	ASSUMED MOISTURE, %		HEATER BOX SETTING	PROBE HEATER SETTING	LEAK RATE CFM@ in Hg

GAS METER START 787764

~~TRAVERSE~~ POINT #	SAMPLING TIME min		STACK TEMPERATURE (Ts) °F		O_2 %	CO_2 %	CO ppm	NOX ppm
1	0	1022am	542		4.0	9.4	160	36
2	5		542		4.3	9.2	100	36
3	10		545		3.9	9.4	180	36
4	15		541		4.4	9.2	110	36
5	20		542		4.2	9.2	120	36
6	25		542		4.2	9.2	120	36
7	30		542		4.2	9.3	125	37
8	35		543		4.3	9.2	180	36
9	40		542		4.3	9.2	120	36
10	45		542		4.3	9.2	140	37
11	50		542		4.4	9.1	115	37
12	55		543		4.3	9.2	125	37
	60	11:22am	542		4.3	9.2	120	36
				AVG	4.24	9.23	131.9	36.3
TOTAL		GAS METER END 90427		AVG 132	4.2	9.33	131.3	35.96
AVERAGE								

PRETEST LEAK CHECK GOOD
NO FLOW AFTER 10 MIN VACUUM

ANALYZER METHOD 6C CALIBRATION SHEET

BASE: CBC PORT HUENEME
BUILDING: 373 THOMAS PLANT
DATE: 9/20/90
CAL. BY: [illegible]

RUN NO: GAS-100
BOILER NO:
FUEL: NAT GAS
LOAD: 100%

ANALYZER: NOX
SPAN: 100
UNITS: PPM
RESP TIME: ~~140~~" 70S ↑ 90S ↓

SPAN GAS INPUT	SPAN GAS RANGE	CYLINDER VALUE	CALIBRATION RESPONSE	ABS. DIFF.	CAL. BIAS % OF SPAN	DRIFT % OF SPAN
ANALYZER PRETEST	HIGH	90.71	91	90.71	90.7	N/A
	MID	51.98	52	51.98	52.0	N/A
	ZERO	0.00	~~0~~1	0	0.0	N/A
SYSTEM PRETEST		90.71	90			
	UPSCALE	51.98	52	0	0.0	N/A
	ZERO	0.00	1	0	0.0	N/A
SYSTEM POST RUN 1	UPSCALE	51.98	54	0	0.0	
	ZERO	0.00	1.5	0	0.0	
SYSTEM POST RUN 2		90.71	94			
	UPSCALE	51.98	~~53~~ 54	0	0.0	
	ZERO	0.00	~~1.5~~ 2 ppm	0	0.0	

	RUN 1	RUN 2	
Co=	0.00	0.00	Avg zero gas system calibration bias.
Cm=	0.00	0.00	Avg upscale gas sys. cal. bias.
Cma=	51.98	51.98	Upscale gas concentration.
C=			Avg gas analyzer concentration reading.
Cgas=	ERR	ERR	Corrected gas concentration.

Analyzer Absolute Difference = |Analyzer Cal. Response - Cyl. Value|
Analyzer Cal. Bias = Analyzer Absolute Difference / Span * 100

Sys. Absolute Difference = |Sys. Cal. Response - Analyzer Cal. Response|
System Cal. Bias = System Absolute Difference / Span Range * 100

Drift = (Sys. Cal. Response - Pretest Sys. Cal. Response) / Span * 100

Cgas = (C-Co)*Cma/(Cm-Co)

ANALYZER METHOD 6C CALIBRATION SHEET

BASE: CBC PORT HUENEME
BUILDING: 373 THOMAS PLANT
DATE: 0
CAL. BY: 0

RUN NO: GAS-100
BOILER NO: 0
FUEL: NAT GAS
LOAD: 100%

ANALYZER: O2
SPAN: [illegible]
UNITS: %
RESP TIME: [illegible]

SPAN GAS INPUT	SPAN GAS RANGE	CYLINDER VALUE	CALIBRATION RESPONSE	ABS. DIFF.	CAL. BIAS % OF SPAN	DRIFT % OF SPAN
ANALYZER PRETEST	HIGH	20.90	20.9	20.9	100.0	N/A
	MID	3.116	3.1	3.116	14.9	N/A
	ZERO	0.00	0	0	0.0	N/A
SYSTEM PRETEST	UPSCALE	3.12	3.1	0	0.0	N/A
	ZERO	0.00	0	0	0.0	N/A
SYSTEM POST RUN 1	UPSCALE	3.12	3.2	0	0.0	0
	ZERO	0.00	0.0	0	0.0	0
SYSTEM POST RUN 2	UPSCALE	3.12	~~[illegible]~~ 3.2	0	0.0	0
	ZERO	0.00	0.1	0	0.0	0

	RUN 1	RUN 2	
Co=	0.00	0.00	Avg zero gas system calibration bias.
Cm=	0.00	0.00	Avg upscale gas sys. cal. bias.
Cma=	3.12	3.12	Upscale gas concentration.
C=			Avg gas analyzer concentration reading.
Cgas=	ERR	ERR	Corrected gas concentration.

Analyzer Absolute Difference = |Analyzer Cal. Response - Cyl. Value|
Analyzer Cal. Bias = Analyzer Absolute Difference / Span * 100

Sys. Absolute Difference = |Sys. Cal. Response - Analyzer Cal. Response|
System Cal. Bias = System Absolute Difference / Span Range * 100

Drift = (Sys. Cal. Response - Pretest Sys. Cal. Response) / Span * 100

Cgas = (C-Co)*Cma/(Cm-Co)

ANALYZER METHOD 6C CALIBRATION SHEET

BASE:	CBC PORT HUENEME	RUN NO:	GAS-100
BUILDING:	373 THOMAS PLANT	ANALYZER:	CO
DATE:	0	BOILER NO:	0
CAL. BY:	0	SPAN:	500
		FUEL:	NAT GAS
		UNITS:	PPM
		LOAD:	100%
		RESP TIME:	90S ↑ 525V

SPAN GAS INPUT	SPAN GAS RANGE	CYLINDER VALUE	CALIBRATION RESPONSE	ABS. DIFF.	CAL. BIAS % OF SPAN	DRIFT % OF SPAN
ANALYZER PRETEST	HIGH	~~499.7~~ 501.5	500	499.7	99.9	N/A
	MID	248.1	250	248.1	49.6	N/A
	ZERO	0.00	0	0	0.0	N/A
SYSTEM PRETEST	UPSCALE	248.10	250	0	0.0	N/A
	ZERO	0.00	0	0	0.0	N/A
SYSTEM POST RUN 1	UPSCALE	248.10	255	0	0.0	0
	ZERO	0.00	5	0	0.0	0
SYSTEM POST RUN 2	UPSCALE	248.10	255-260	0	0.0	0
	ZERO	0.00	10	0	0.0	0

	RUN 1	RUN 2	
Co=	0.00	0.00	Avg zero gas system calibration bias.
Cm=	0.00	0.00	Avg upscale gas sys. cal. bias.
Cma=	248.10	248.10	Upscale gas concentration.
C=			Avg gas analyzer concentration reading.
Cgas=	ERR	ERR	Corrected gas concentration.

Analyzer Absolute Difference = |Analyzer Cal. Response - Cyl. Value|
Analyzer Cal. Bias = Analyzer Absolute Difference / Span * 100

Sys. Absolute Difference = |Sys. Cal. Response - Analyzer Cal. Response|
System Cal. Bias = System Absolute Difference / Span Range * 100

Drift = (Sys. Cal. Response - Pretest Sys. Cal. Response) / Span * 100

Cgas = (C-Co)*Cma/(Cm-Co)

ANALYZER METHOD 6C CALIBRATION SHEET

BASE: CBC PORT HUENEME
BUILDING: 373 THOMAS PLANT
DATE: 0
CAL. BY: 0

RUN NO: GAS-100
BOILER NO: 0
FUEL: NAT GAS
LOAD: 100%

ANALYZER: CO2
SPAN: 20
UNITS: %
RESP TIME: 100 S

SPAN GAS INPUT	SPAN GAS RANGE	CYLINDER VALUE	CALIBRATION RESPONSE	ABS. DIFF.	CAL. BIAS % OF SPAN	DRIFT % OF SPAN
ANALYZER PRETEST	HIGH			0	0.0	N/A
	MID	11.01	11.0	11.01	55.1	N/A
	ZERO	0.00	0.0	0	0.0	N/A
SYSTEM PRETEST	UPSCALE	11.01	10.9	0	0.0	N/A
	ZERO	0.00	0	0	0.0	N/A
SYSTEM POST RUN 1	UPSCALE	11.01	10.6	0	0.0	0
	ZERO	0.00	-0.1	0	0.0	0
SYSTEM POST RUN 2	UPSCALE	11.01	10.6	0	0.0	0
	ZERO	0.00	-0.1	0	0.0	0

	RUN 1	RUN 2	
Co=	0.00	0.00	Avg zero gas system calibration bias.
Cm=	0.00	0.00	Avg upscale gas sys. cal. bias.
Cma=	11.01	11.01	Upscale gas concentration.
C=			Avg gas analyzer concentration reading.
Cgas=	ERR	ERR	Corrected gas concentration.

Analyzer Absolute Difference = |Analyzer Cal. Response - Cyl. Value|
Analyzer Cal. Bias = Analyzer Absolute Difference / Span * 100

Sys. Absolute Difference = |Sys. Cal. Response - Analyzer Cal. Response|
System Cal. Bias = System Absolute Difference / Span Range * 100

Drift = (Sys. Cal. Response - Pretest Sys. Cal. Response) / Span * 100

Cgas = (C-Co)*Cma/(Cm-Co)

Method 4

[redacted] SAMPLE BOX SET UP

CHECKLIST

DATE: ____________ RUN NO.: *01L-25-1*

PLANT: *Thomas* STACK NO: ____________

LOCATION: ____________ SAMPLE BOX NO.: ____________

PREP. BY: ____________

( ) 1. Wash all glassware with distilled water and then acetone.

( ) 2. Place approx. 100 ml distilled water in the first impinger, a modified Greenburg-Smith with straight tube 1/2 inch from the impinger bottom. Record exact weight to 1/10 of a gram.

( ) 3. Place approx. 100 ml distilled water in the second impinger, a standard Greenburg-Smith impinger (caricell tip). Record exact weight to 1/10 of a gram.

( ) 4. Impinger three is a dry modified Greenburg-Smith with straight tube 1/2 inch from the impinger bottom. Record dry tare weight to 1/10 of a gram.

( ) 5. Place approx. 175 ml of silica gel in the fourth impinger, a modified Greenburg-Smith with straight tube 1/2 inch from the impinger bottom. Record exact weight to 1/10 of a gram.

( ) 6. PLACE [redacted] FILTER INTO FILTER HOLDER ON THE CYCLONE SIDE OF THE HOLDER. Smooth side of filter is to face frittered glass of filter holder. [redacted]

Impinger No.	Impinger weights (GRAMS)	Tare	Initial	Final	Condensate	TOTAL
X-1	1. 100 ml		*587.[illegible]*	*641.64*	*54.50*	
X-2	2. 100 ml		*534.71*	*552.41*	*17.70*	
X-3	3. Dry		*472.77*	*476.42*	*3.65*	
X-4	4. 175 g silica gel		*699.88*	*710.69*	*10.81*	*86.66*

( ) 7. Assemble [redacted] filter holder.

( ) 8. Assemble impinger bottles and glass elbows so air flows from a small hole to a larger hole.

METHOD 5 — # [illegible]

SOURCE EMISSION TESTING DATA SHEET

(SJS rev11/88, #0251Q)

PLANT Thomas	BAROMETRIC PRESSURE, in Hg 29.900	SCHEMATIC OF STACK CROSS SECTION (SHOW TRAVERSE PTS)	METER BOX # [illegible]	PROBE # (PITOT #)	NOZZLE #
LOCATION CBC Bldg 373	AMBIENT TEMPERATURE, °F 73		METER ΔH@	PITOT COEF 0.99	IDEAL NOZZLE DIA, in.
DATE 9.21.[illegible]	AVE STATIC PRESSURE, in H_2O		METER γ	PROBE LENGTH, in.	ACTUAL NOZZLE DIA, in.
OPERATOR [illegible]	AVE VEL HEAD, in H_2O		SAMPLE BOX #	PROBE LINER MATERIAL	LEAK CHECK @ PITOT'S ok
RUN # 01L-25-1	ASSUMED MOISTURE, %		HEATER BOX SETTING [illegible]	PROBE HEATER SETTING [illegible]	LEAK RATE CFM@ in Hg

TRAVERSE POINT #	SAMPLING TIME 6.404 min	GAS METER READING (Vm) ft^3	VELOCITY HEAD (MEAS) (ΔP) in H_2O	STACK TEMPERATURE (Ts) °F	GAS SAMPLE TEMPERATURE AT DRY GAS METER Inlet (Tm in) °F	Outlet (Tm out) °F	IMPINGER TEMPERATURE °F	SAMPLE BOX TEMPERATURE °F	SAMPLE VACUUM in Hg
1	~~[illegible]~~ 0	249.844	0.0075	356	[illegible]	[illegible]	56	251	5"
2	3	252.7[illegible]	0.0075	357	[illegible]	[illegible]	54	248	[illegible]
3	[illegible]	255.717	[illegible]	356	76	74	51	252	5"
4	[illegible]	258.759	[illegible]	358	79	75	53	253	5"
5	[illegible]	261.773	[illegible]	356	81	75	53	253	5
6	[illegible]	264.751	[illegible]	356	83	76	55	253	5
7	[illegible]	267.728	[illegible]	356	84	76	56	255	5
8	[illegible]	270.682	[illegible]	355	86	77	57	255	5
9	[illegible]	273.669	[illegible]	355	86	78	58	256	5
10	[illegible]	276.811	[illegible]	355	87	79	58	256	5
11	[illegible]	279.698	[illegible]	355	88	79	59	255	5
12	[illegible]	282.552	[illegible]	[illegible]	83	79	59	257	5
13	[illegible]	285.619	[illegible]	356	82	80	57	256	5
TOTAL									
AVERAGE									

Pre: [illegible] .0[illegible] cfm @ [illegible]

Post: ~~[illegible]~~ .024 cfm @ 7" Hg

Correct Vm via 36(.024 - .02) = 0.144 cf

New Vm: 285.619 - 249.844 - .144 = 35.631 ft3

METHODS 2 & 1,

SOURCE EMISSION TESTING DATA SHEET

(SJS rev11/88, #02510)

PLANT Thomas	BAROMETRIC PRESSURE, in Hg	SCHEMATIC OF STACK CROSS SECTION (SHOW TRAVERSE PTS)	METER BOX #	PROBE # (PITOT #)	NOZZLE #
LOCATION CBC Bldg 373	AMBIENT TEMPERATURE, °F		METER ΔH@	PITOT COEF	IDEAL NOZZLE DIA, in.
DATE	AVE STATIC PRESSURE, in H_2O		METER γ	PROBE LENGTH, in.	ACTUAL NOZZLE DIA, in.
OPERATOR	AVE VEL HEAD, in H_2O		SAMPLE BOX #	PROBE LINER MATERIAL	LEAK CHECK @ PITOT'S
RUN # 01L-25-1	ASSUMED MOISTURE, %		HEATER BOX SETTING	PROBE HEATER SETTING	LEAK RATE CFM@ in Hg

TRAVERSE POINT #	SAMPLING TIME min	GAS METER READING (V_m) ft^3	VELOCITY HEAD (MEAS) (ΔP) in H_2O	STACK TEMPERATURE (T_s) °F	GAS SAMPLE TEMPERATURE AT DRY GAS METER Inlet (T_m in) °F	GAS SAMPLE TEMPERATURE AT DRY GAS METER Outlet (T_m out) °F	IMPINGER TEMPERATURE °F	SAMPLE BOX TEMPERATURE °F	SAMPLE VACUUM in Hg
14			0.04						
15			0.04						
16			0.035						
TOTAL									
AVERAGE									

SOURCE EMISSION TESTING DATA SHEET

(SJS rev11/88, #02510)

PLANT Thomas	BAROMETRIC PRESSURE, in Hg	SCHEMATIC OF STACK CROSS SECTION (SHOW TRAVERSE PTS)	METER BOX #	PROBE # (PITOT #)	NOZZLE #
LOCATION CBC	AMBIENT TEMPERATURE, °F		METER ΔH@	PITOT COEF	IDEAL NOZZLE DIA, in.
DATE 21 SEPT90	AVE STATIC PRESSURE, in H_2O		METER γ	PROBE LENGTH, in.	ACTUAL NOZZLE DIA, in.
OPERATOR Cook	AVE VEL HEAD, in H_2O		SAMPLE BOX #	PROBE LINER MATERIAL	LEAK CHECK @ PITOT'S
RUN # OIL-25-1	ASSUMED MOISTURE, %		HEATER BOX SETTING	PROBE HEATER SETTING	LEAK RATE CFM@ in Hg

START TIME: 18:11

END TIME: 19:11

AG

~~TRAVERSE~~ POINT #	SAMPLING TIME min	STACK TEMPERATURE (Ts) °F	O_2 %	CO_2 %	CO ppm	NOX ppm
1	0	352	6.7	10.7	55	87.5
2	5	354	6.6	10.6	50	87.5
3	10	355	6.6	10.6	55	87.5
4	15	356	6.7	10.5	50	87.5
5	20	355	6.7	10.5	45	87.5
6	25	356	6.7	10.5	50	87.5
7	30	355	6.6	10.6	50	87.5
8	35	358	6.7	10.6	55	87.5
9	40	356	6.7	10.5	50	87.5
10	45	355	6.7	10.4	50	87.5
11	50	356	6.7	10.4	45	87.5
12	55	355	6.7	10.4	50	87.5
	60	355	6.7	10.4	45	87.5
			6.7	10.4	50	87.5
TOTAL						
AVERAGE						

SOURCE EMISSION TESTING DATA SHEET

(SJS rev11/88, #02510)

PLANT Thomas	BAROMETRIC PRESSURE, in Hg		METER BOX #	PROBE # (PITOT #)	NOZZLE #
LOCATION CBC	AMBIENT TEMPERATURE, °F		METER ΔH@	PITOT COEF	IDEAL NOZZLE DIA, in.
DATE 21 SEPT 90	AVE STATIC PRESSURE, in H_2O		METER γ	PROBE LENGTH, in.	ACTUAL NOZZLE DIA, in.
OPERATOR D Cook	AVE VEL HEAD, in H_2O		SAMPLE BOX #	PROBE LINER MATERIAL	LEAK CHECK @ PITOT'S
RUN # OIL-25-2	ASSUMED MOISTURE, %	SCHEMATIC OF STACK CROSS SECTION (SHOW TRAVERSE PTS)	HEATER BOX SETTING	PROBE HEATER SETTING	LEAK RATE CFM@ in Hg

START TEST: 19:28

END TIME: 20:28

POINT #	SAMPLING TIME min	STACK TEMPERATURE (Ts) °F
1	0	354
2	5	354
3	10	354
4	15	354
5	20	355
6	25	355
7	30	353
8	35	353
9	40	354
10	45	354
11	50	355
12	55	354
	60	354
TOTAL		
AVERAGE		

O_2 %	CO_2 %	CO ppm	NOX ppm
6.8	10.3	50	87.5
6.9	10.3	50	85
6.8	10.3	45	85
6.8	10.3	50	85
6.8	10.3	50	85
6.8	10.3	50	85
6.8	10.3	45	87.5
6.8	10.3	50	85
6.8	10.3	45	85
6.8	10.2	50	87.5
6.9	10.3	45	87.5
6.8	10.3	50	85
6.9	10.4	45	87.5
6.82	10.3	47	85.6

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ANALYZER METHOD 6C CALIBRATION SHEET

BASE: CBC PORT HUENEME
BUILDING: 373 THOMAS PLANT
DATE:
CAL. BY:

RUN NO: OIL-25
BOILER NO:
FUEL: OIL
LOAD: 25%

ANALYZER: NOX
SPAN: 250
UNITS: PPM
RESP TIME:

SPAN GAS INPUT	SPAN GAS RANGE	CYLINDER VALUE	CALIBRATION RESPONSE	ABS. DIFF.	CAL. BIAS % OF SPAN	DRIFT % OF SPAN
ANALYZER PRETEST	HIGH	203.7	205	203.7	81.5	N/A
	MID	131.1	130	131.1	52.4	N/A
	ZERO	0.00	0	0	0.0	N/A
SYSTEM PRETEST	UPSCALE	131.10	127.5	0	0.0	N/A
	ZERO	0.00	0	0	0.0	N/A
SYSTEM POST RUN 1	UPSCALE	131.10	125	0	0.0	0
	ZERO	0.00	0.0	0	0.0	0
SYSTEM POST RUN 2	UPSCALE	131.10	125	0	0.0	0
	ZERO	0.00	0.0	0	0.0	0

	RUN 1	RUN 2	
Co=	0.00	0.00	Avg zero gas system calibration bias.
Cm=	0.00	0.00	Avg upscale gas sys. cal. bias.
Cma=	131.10	131.10	Upscale gas concentration.
C=			Avg gas analyzer concentration reading.
Cgas=	ERR	ERR	Corrected gas concentration.

Analyzer Absolute Difference = |Analyzer Cal. Response - Cyl. Value|
Analyzer Cal. Bias = Analyzer Absolute Difference / Span * 100

Sys. Absolute Difference = |Sys. Cal. Response - Analyzer Cal. Response|
System Cal. Bias = System Absolute Difference / Span Range * 100

Drift = (Sys. Cal. Response - Pretest Sys. Cal. Response) / Span * 100

Cgas = (C-Co)*Cma/(Cm-Co)

ANALYZER METHOD 6C CALIBRATION SHEET

BASE:	CBC PORT HUENEME	RUN NO:	OIL-25	ANALYZER:	O2
BUILDING:	373 THOMAS PLANT	BOILER NO:	0	SPAN:	20.9
DATE:	0	FUEL:	OIL	UNITS:	%
CAL. BY:	0	LOAD:	25%	RESP TIME:	

SPAN GAS INPUT	SPAN GAS RANGE	CYLINDER VALUE	CALIBRATION RESPONSE	ABS. DIFF.	CAL. BIAS % OF SPAN	DRIFT % OF SPAN
ANALYZER PRETEST	HIGH	20.90	20.9	20.9	100.0	N/A
	MID	3.116	3.1	3.116	14.9	N/A
	ZERO	0.00	0	0	0.0	N/A
SYSTEM PRETEST						
	UPSCALE	3.12	3.1	0	0.0	N/A
	ZERO	0.00	0	0	0.0	N/A
SYSTEM POST RUN 1		20.9	20.9			
	UPSCALE	3.12	3.1	0	0.0	0
	ZERO	0.00	0.0	0	0.0	0
SYSTEM POST RUN 2			20.8			
	UPSCALE	3.12	3.1	0	0.0	0
	ZERO	0.00	0	0	0.0	0

	RUN 1	RUN 2	
Co=	0.00	0.00	Avg zero gas system calibration bias.
Cm=	0.00	0.00	Avg upscale gas sys. cal. bias.
Cma=	3.12	3.12	Upscale gas concentration.
C=			Avg gas analyzer concentration reading.
Cgas=	ERR	ERR	Corrected gas concentration.

Analyzer Absolute Difference = |Analyzer Cal. Response - Cyl. Value|
Analyzer Cal. Bias = Analyzer Absolute Difference / Span * 100

Sys. Absolute Difference = |Sys. Cal. Response - Analyzer Cal. Response|
System Cal. Bias = System Absolute Difference / Span Range * 100

Drift = (Sys. Cal. Response - Pretest Sys. Cal. Response) / Span * 100

Cgas = (C-Co)*Cma/(Cm-Co)

ANALYZER METHOD 6C CALIBRATION SHEET

BASE: CBC PORT HUENEME
BUILDING: 373 THOMAS PLANT
DATE: 0
CAL. BY: 0

RUN NO: OIL-25
BOILER NO: 0
FUEL: OIL
LOAD: 25%

ANALYZER: CO
SPAN: 500
UNITS: PPM
RESP TIME:

SPAN GAS INPUT	SPAN GAS RANGE	CYLINDER VALUE	CALIBRATION RESPONSE	ABS. DIFF.	CAL. BIAS % OF SPAN	DRIFT % OF SPAN
ANALYZER PRETEST	HIGH	499.7	500	499.7	99.9	N/A
	MID	248.1	250	248.1	49.6	N/A
	ZERO	0.00	0	0	0.0	N/A
SYSTEM PRETEST			490			
	UPSCALE	248.10	245	0	0.0	N/A
	ZERO	0.00	0	0	0.0	N/A
SYSTEM POST RUN 1						
	UPSCALE	248.10	245	0	0.0	0
	ZERO	0.00	0	0	0.0	0
SYSTEM POST RUN 2			490			
	UPSCALE	248.10	240	0	0.0	0
	ZERO	0.00	-5	0	0.0	0

	RUN 1	RUN 2	
Co=	0.00	0.00	Avg zero gas system calibration bias.
Cm=	0.00	0.00	Avg upscale gas sys. cal. bias.
Cma=	248.10	248.10	Upscale gas concentration.
C=			Avg gas analyzer concentration reading.
Cgas=	ERR	ERR	Corrected gas concentration.

Analyzer Absolute Difference = |Analyzer Cal. Response - Cyl. Value|
Analyzer Cal. Bias = Analyzer Absolute Difference / Span * 100

Sys. Absolute Difference = |Sys. Cal. Response - Analyzer Cal. Response|
System Cal. Bias = System Absolute Difference / Span Range * 100

Drift = (Sys. Cal. Response - Pretest Sys. Cal. Response) / Span * 100

Cgas = (C-Co)*Cma/(Cm-Co)

ANALYZER METHOD 6C CALIBRATION SHEET

BASE:	CBC PORT HUENEME	RUN NO:	OIL-25	ANALYZER:	CO2
BUILDING:	373 THOMAS PLANT	BOILER NO:	0	SPAN:	[illegible]
DATE:	0	FUEL:	OIL	UNITS:	%
CAL. BY:	0	LOAD:	25%	RESP TIME:	

SPAN GAS INPUT	SPAN GAS RANGE	CYLINDER VALUE	CALIBRATION RESPONSE	ABS. DIFF.	CAL. BIAS % OF SPAN	DRIFT % OF SPAN
ANALYZER PRETEST	HIGH			0	0.0	N/A
	MID	11.01	11	11.01	55.1	N/A
	ZERO	0.00	0	0	0.0	N/A
SYSTEM PRETEST						
	UPSCALE	11.01	11	0	0.0	N/A
	ZERO	0.00	0	0	0.0	N/A
SYSTEM POST RUN 1						
	UPSCALE	11.01	10.9	0	0.0	0
	ZERO	0.00	0.0	0	0.0	0
SYSTEM POST RUN 2						
	UPSCALE	11.01	~~10.9~~ 10.9	0	0.0	0
	ZERO	0.00	0.0	0	0.0	0

	RUN 1	RUN 2	
Co=	0.00	0.00	Avg zero gas system calibration bias.
Cm=	0.00	0.00	Avg upscale gas sys. cal. bias.
Cma=	11.01	11.01	Upscale gas concentration.
C=			Avg gas analyzer concentration reading.
Cgas=	ERR	ERR	Corrected gas concentration.

Analyzer Absolute Difference = |Analyzer Cal. Response - Cyl. Value|
Analyzer Cal. Bias = Analyzer Absolute Difference / Span * 100

Sys. Absolute Difference = |Sys. Cal. Response - Analyzer Cal. Response|
System Cal. Bias = System Absolute Difference / Span Range * 100

Drift = (Sys. Cal. Response - Pretest Sys. Cal. Response) / Span * 100

Cgas = (C-Co)*Cma/(Cm-Co)

Method 4

[redacted] SAMPLE BOX SET UP

CHECKLIST

DATE: ____________

PLANT: *Thomas*

LOCATION: ____________

PREP. BY: ____________

RUN NO.: *OIL 50-1*

STACK NO: ____________

SAMPLE BOX NO.: ____________

( ) 1. Wash all glassware with distilled water and then acetone.

( ) 2. Place approx. 100 ml distilled water in the first impinger, a modified Greenburg-Smith with straight tube 1/2 inch from the impinger bottom. Record exact weight to 1/10 of a gram.

( ) 3. Place approx. 100 ml distilled water in the second impinger, a standard Greenburg-Smith impinger (caricell tip). Record exact weight to 1/10 of a gram.

( ) 4. Impinger three is a dry modified Greenburg-Smith with straight tube 1/2 inch from the impinger bottom. Record dry tare weight to 1/10 of a gram.

( ) 5. Place approx. 175 ml of silica gel in the fourth impinger, a modified Greenburg-Smith with straight tube 1/2 inch from the impinger bottom. Record exact weight to 1/10 of a gram.

( ) 6. PLACE [redacted] FILTER INTO FILTER HOLDER ON THE CYCLONE SIDE OF THE HOLDER. Smooth side of filter is to face frittered glass of filter holder. [redacted]

Impinger No.	Impinger weights (GRAMS)	Tare	Initial	Final	Condensate	TOTAL
1	1. 100 ml		677.44	739.26	[illegible]	
2	2. 100 ml		660.43	675.88	15.45	
3	3. Dry		506.18	[illegible]	[illegible]	
4	4. 175 g silica gel		756.06	767.28	[illegible]	90.72

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( ) 7. Assemble [redacted] filter holder.

( ) 8. Assemble impinger bottles and glass elbows so air flows from a small hole to a larger hole.

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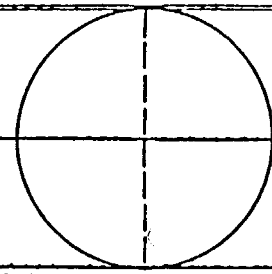
SOURCE EMISSION TESTING DATA SHEET

(SJS rev11/88, #0251Q)

PLANT Thomas	BAROMETRIC PRESSURE, in Hg 29.9	SCHEMATIC OF STACK CROSS SECTION (SHOW TRAVERSE PTS)	METER BOX #	PROBE # (PITOT #)	NOZZLE #
LOCATION CBC Bldg 373	AMBIENT TEMPERATURE, °F 76		METER ΔH@	PITOT COEF 0.84	IDEAL NOZZLE DIA, in.
DATE 9/21/90	AVE STATIC PRESSURE, in H_2O		METER γ	PROBE LENGTH, in.	ACTUAL NOZZLE DIA, in.
OPERATOR JAI	AVE VEL HEAD, in H_2O		SAMPLE BOX #	PROBE LINER MATERIAL	LEAK CHECK @ PITOT'S
RUN # OIL-SO-1	ASSUMED MOISTURE, %		HEATER BOX SETTING	PROBE HEATER SETTING	LEAK RATE CFM@ in Hg



Pre-OK 0.018 cfm @ 6.5" Hg

Post-OK 0.01 cfm @ [illegible]

TRAVERSE POINT #	SAMPLING TIME min	GAS METER READING (Vm) ft³		VELOCITY HEAD (MEAS) (ΔP) in H_2O	STACK TEMPERATURE (1) (Ts) °F	GAS SAMPLE TEMPERATURE AT DRY GAS METER (6) Inlet (Tm in) °F	(7) Outlet (Tm out) °F	IMPINGER TEMPERATURE (4) °F	SAMPLE BOX TEMPERATURE (3) °F	SAMPLE VACUUM in Hg
1	4:54 pm Ø	216.548		0.01	384	78	78	65	250	4.0
2	3	219.393		0.015	385	79	78	56	252	4.5
3	6	222.198		0.015	384	81	78	55	254	
4	9	224.994		0.015	385	84	79	57	255	
5	12	227.813		0.015	385	87	80	58	255	
6	15	230.540		0.025	386	88	82	59	256	
7	18	233.296		0.030	385	89	81	60	257	
8	21	236.043		0.030	385	90	82	61	257	
9	24	238.788	static to 0.04	0.01	385	91	82	62	257	
10	27	241.5[illegible]		0.015	384	91	83	62	257	
11	30	244.216		0.02	384	92	83	63	255	
12	33	246.928		0.040	385	92	84	63	258	
13	36	249.652		0.040	386	92	85	64	251	
TOTAL										
AVERAGE										

ETH _S I _ #

SOURCE EMISSION TESTING DATA SHEET

(SJS rev11/88, #02510)

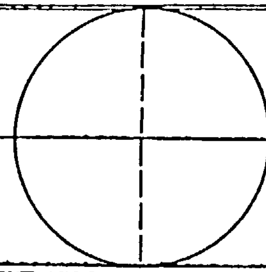
PLANT Thomas	BAROMETRIC PRESSURE, in Hg	SCHEMATIC OF STACK CROSS SECTION (SHOW TRAVERSE PTS)	METER BOX #	PROBE # (PITOT #)	NOZZLE #
LOCATION CBC Bldg 373	AMBIENT TEMPERATURE, °F		METER ΔH@	PITOT COEF	IDEAL NOZZLE DIA, in.
DATE	AVE STATIC PRESSURE, in H_2O		METER γ	PROBE LENGTH, in.	ACTUAL NOZZLE DIA, in.
OPERATOR	AVE VEL HEAD, in H_2O		SAMPLE BOX #	PROBE LINER MATERIAL	LEAK CHECK @ PITOT'S
RUN # 01L-50-1	ASSUMED MOISTURE, %		HEATER BOX SETTING	PROBE HEATER SETTING	LEAK RATE CFM@ in Hg

TRAVERSE POINT #	SAMPLING TIME min	GAS METER READING (Vm) ft^3	VELOCITY HEAD (MEAS) (ΔP) in H_2O	STACK TEMPERATURE (Ts) °F	GAS SAMPLE TEMPERATURE AT DRY GAS METER Inlet (Tm in) °F	GAS SAMPLE TEMPERATURE AT DRY GAS METER Outlet (Tm out) °F	IMPINGER TEMPERATURE °F	SAMPLE BOX TEMPERATURE °F	SAMPLE VACUUM in Hg
14			0.010						
15			0.013						
16			0.015						
TOTAL									
AVERAGE									

SOURCE EMISSION TESTING DATA SHEET

(SJS rev11/88, #0251Q)

PLANT Thomas	BAROMETRIC PRESSURE, in Hg	METER BOX #	PROBE # (PITOT #)	NOZZLE #
LOCATION CBC	AMBIENT TEMPERATURE, °F	METER ΔH@	PITOT COEF	IDEAL NOZZLE DIA, in.
DATE 21 SEPT 90	AVE STATIC PRESSURE, in H_2O	METER γ	PROBE LENGTH, in.	ACTUAL NOZZLE DIA, in.
OPERATOR D Cook	AVE VEL HEAD, in H_2O	SAMPLE BOX #	PROBE LINER MATERIAL	LEAK CHECK @ PITOT'S
RUN # OIC-50-1	ASSUMED MOISTURE, %	HEATER BOX SETTING	PROBE HEATER SETTING	LEAK RATE CFM@ in Hg



SCHEMATIC OF STACK CROSS SECTION (SHOW TRAVERSE PTS)

START TIME: 15:05

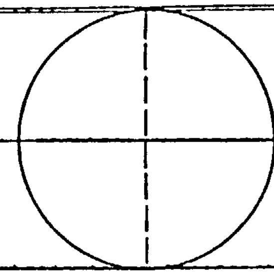
TRAVERSE POINT #	SAMPLING TIME min	STACK TEMPERATURE (Ts) °F	O_2 %	CO_2 %	CO ppm	NOX ppm
1	0	370	4.3	12.5	100	95
2	5	374	4.6	12.3	80	95
3	10	379	4.5	12.4	90	92.5
4	15	380	4.6	12.3	100	95
5	20	380	4.6	12.4	100	95
6	25	380	4.6	12.3	90	95
7	30	380	4.5	12.5	80	95
8	35	381	4.6	12.4	100	95
9	40	382	4.6	12.4	90	95
10	45	381	4.7	12.4	90	95
11	50	383	4.6	12.4	80	95
12	55	383	4.6	12.5	90	95
	60	383	4.6	12.4	90	95
TOTAL						
AVG			4.56	12.4	90	95
AVERAGE						

STOP TIME: 16:05

SOURCE EMISSION TESTING DATA SHEET

(SJS rev11/88, #0251Q)

PLANT THOMAS	BAROMETRIC PRESSURE, in Hg		METER BOX #	PROBE # (PITOT #)	NOZZLE #
LOCATION CBC	AMBIENT TEMPERATURE, °F		METER ΔH@	PITOT COEF	IDEAL NOZZLE DIA, in.
DATE 21 SEPT 90	AVE STATIC PRESSURE, in H_2O		METER γ	PROBE LENGTH, in.	ACTUAL NOZZLE DIA, in.
OPERATOR E Cook	AVE VEL HEAD, in H_2O		SAMPLE BOX #	PROBE LINER MATERIAL	LEAK CHECK @ PITOT'S
RUN # OIL-50-2	ASSUMED MOISTURE, %	SCHEMATIC OF STACK CROSS SECTION (SHOW TRAVERSE PTS)	HEATER BOX SETTING	PROBE HEATER SETTING	LEAK RATE CFM@ in Hg



START TIME 16:25

STOP TIME: 17:25

~~TRAVERSE~~ POINT #	SAMPLING TIME min	STACK TEMPERATURE (Ts) °F		O_2 %	CO_2 %	CO ppm	NOX ppm
1	0	384		4.5	12.5	95	95
2	5	385		4.5	12.5	105	95
3	10	386		4.6	12.5	80	95
4	15	385		4.5	12.6	105	95
5	20	384		4.5	12.5	90	95
6	25	385		4.5	12.5	90	95
7	30	386		4.6	12.4	90	95
8	35	384		4.5	12.5	90	95
9	40	383		4.6	12.4	90	95
10	45	384		4.6	12.4	85	95
11	50	384		4.6	12.4	90	95
12	55	38.1		4.6	12.3	90	95
	60	381		4.6	12.4	80	95
TOTAL			AVG	4.55	12.45	90.8	95
AVERAGE							

ANALYZER METHOD 6C CALIBRATION SHEET

BASE:	CBC PORT HUENEME	RUN NO:	OIL-50	ANALYZER:	NOX
BUILDING:	373 THOMAS PLANT	BOILER NO:		SPAN:	250
DATE:		FUEL:	OIL	UNITS:	PPM
CAL. BY:		LOAD:	50%	RESP TIME:	

SPAN GAS INPUT	SPAN GAS RANGE	CYLINDER VALUE	CALIBRATION RESPONSE	ABS. DIFF.	CAL. BIAS % OF SPAN	DRIFT % OF SPAN
ANALYZER PRETEST	HIGH	203.7	207	203.7	81.5	N/A
	MID	131.1	132	131.1	52.4	N/A
	ZERO	0.00	0	0	0.0	N/A
SYSTEM PRETEST	UPSCALE	131.10	130	0	0.0	N/A
	ZERO	0.00	1	0	0.0	N/A
SYSTEM POST RUN 1	UPSCALE	131.10	130	0	0.0	0
	ZERO	0.00	2.5	0	0.0	0
SYSTEM POST RUN 2	UPSCALE	131.10	[illegible]	0	0.0	0
	ZERO	0.00	0	0	0.0	0

	RUN 1	RUN 2	
Co=	0.00	0.00	Avg zero gas system calibration bias.
Cm=	0.00	0.00	Avg upscale gas sys. cal. bias.
Cma=	131.10	131.10	Upscale gas concentration.
C=			Avg gas analyzer concentration reading.
Cgas=	ERR	ERR	Corrected gas concentration.

Analyzer Absolute Difference = |Analyzer Cal. Response - Cyl. Value|
Analyzer Cal. Bias = Analyzer Absolute Difference / Span * 100

Sys. Absolute Difference = |Sys. Cal. Response - Analyzer Cal. Response|
System Cal. Bias = System Absolute Difference / Span Range * 100

Drift = (Sys. Cal. Response - Pretest Sys. Cal. Response) / Span * 100

Cgas = (C-Co)*Cma/(Cm-Co)

ANALYZER METHOD 6C CALIBRATION SHEET

BASE: CBC PORT HUENEME	RUN NO: OIL-50	ANALYZER: 02	
BUILDING: 373 THOMAS PLANT	BOILER NO: 0	SPAN:	20.9
DATE: 0	FUEL: OIL	UNITS: %	
CAL. BY: 0	LOAD: 50%	RESP TIME:	

SPAN GAS INPUT	SPAN GAS RANGE	CYLINDER VALUE	CALIBRATION RESPONSE	ABS. DIFF.	CAL. BIAS % OF SPAN	DRIFT % OF SPAN
ANALYZER PRETEST	HIGH	20.90	20.9	20.9	100.0	N/A
	MID	3.116	3.1	3.116	14.9	N/A
	ZERO	0.00	0	0	0.0	N/A
SYSTEM PRETEST						
	UPSCALE	3.12	3.2	0	0.0	N/A
	ZERO	0.00	0	0	0.0	N/A
SYSTEM POST RUN 1	POST SPAN		20.9			
	UPSCALE	3.12	3.2	0	0.0	0
	ZERO	0.00	0.0	0	0.0	0
SYSTEM POST RUN 2			20.9			
	UPSCALE	3.12	3.2	0	0.0	0
	ZERO	0.00	0.1	0	0.0	0

	RUN 1	RUN 2	
Co=	0.00	0.00	Avg zero gas system calibration bias.
Cm=	0.00	0.00	Avg upscale gas sys. cal. bias.
Cma=	3.12	3.12	Upscale gas concentration.
C=			Avg gas analyzer concentration reading.
Cgas=	ERR	ERR	Corrected gas concentration.

Analyzer Absolute Difference = |Analyzer Cal. Response - Cyl. Value|
Analyzer Cal. Bias = Analyzer Absolute Difference / Span * 100

Sys. Absolute Difference = |Sys. Cal. Response - Analyzer Cal. Response|
System Cal. Bias = System Absolute Difference / Span Range * 100

Drift = (Sys. Cal. Response - Pretest Sys. Cal. Response) / Span * 100

Cgas = (C-Co)*Cma/(Cm-Co)

ANALYZER METHOD 6C CALIBRATION SHEET

BASE: CBC PORT HUENEME
BUILDING: 373 THOMAS PLANT
DATE: 0
CAL. BY: 0

RUN NO: OIL-50
BOILER NO: 0
FUEL: OIL
LOAD: 50%

ANALYZER: CO
SPAN: 500
UNITS: PPM
RESP TIME:

SPAN GAS INPUT	SPAN GAS RANGE	CYLINDER VALUE	CALIBRATION RESPONSE	ABS. DIFF.	CAL. BIAS % OF SPAN	DRIFT % OF SPAN
ANALYZER PRETEST	HIGH	499.7	500	499.7	99.9	N/A
	MID	248.1	255	248.1	49.6	N/A
	ZERO	0.00	5	0	0.0	N/A
SYSTEM PRETEST			500			
	UPSCALE	248.10	255	0	0.0	N/A
	ZERO	0.00	5	0	0.0	N/A
SYSTEM POST RUN 1						
	UPSCALE	248.10	255	0	0.0	0
	ZERO	0.00	10	0	0.0	0
SYSTEM POST RUN 2			500			
	UPSCALE	248.10	255	0	0.0	0
	ZERO	0.00	7	0	0.0	

	RUN 1	RUN 2	
Co=	0.00	0.00	Avg zero gas system calibration bias.
Cm=	0.00	0.00	Avg upscale gas sys. cal. bias.
Cma=	248.10	248.10	Upscale gas concentration.
C=			Avg gas analyzer concentration reading.
Cgas=	ERR	ERR	Corrected gas concentration.

Analyzer Absolute Difference = |Analyzer Cal. Response - C.I. Value|
Analyzer Cal. Bias = Analyzer Absolute Difference / Span * 100

Sys. Absolute Difference = |Sys. Cal. Response - Analyzer Cal. Response|
System Cal. Bias = System Absolute Difference / Span Range * 100

Drift = (Sys. Cal. Response - Pretest Sys. Cal. Response) / Span * 100

Cgas = (C-Co)*Cma/(Cm-Co)

ANALYZER METHOD 6C CALIBRATION SHEET

BASE: CBC PORT HUENEME
BUILDING: 373 THOMAS PLANT
DATE: 0
CAL. BY: 0

RUN NO: OIL-50
BOILER NO: 0
FUEL: OIL
LOAD: 50%

ANALYZER: O2
SPAN: 20
UNITS: %
RESP TIME:

SPAN GAS INPUT	SPAN GAS RANGE	CYLINDER VALUE	CALIBRATION RESPONSE	ABS. DIFF.	CAL. BIAS % OF SPAN	DRIFT % OF SPAN
ANALYZER PRETEST	HIGH			0	0.0	N/A
	MID	11.01	11.1	11.01	55.1	N/A
	ZERO	0.00	0	0	0.0	N/A
SYSTEM PRETEST	UPSCALE	11.01	10.8	0	0.0	N/A
	ZERO	0.00	-0.1	0	0.0	N/A
SYSTEM POST RUN 1	UPSCALE	11.01	11.2	0	0.0	0
	ZERO	0.00	0.0	0	0.0	0
SYSTEM POST RUN 2	UPSCALE	11.01	11.1	0	0.0	0
	ZERO	0.00	-0.1	0	0.0	0

	RUN 1	RUN 2	
Co=	0.00	0.00	Avg zero gas system calibration bias.
Cm=	0.00	0.00	Avg upscale gas sys. cal. bias.
Cma=	11.01	11.01	Upscale gas concentration.
C=			Avg gas analyzer concentration reading.
Cgas=	ERR	ERR	Corrected gas concentration.

Analyzer Absolute Difference = |Analyzer Cal. Response - Cyl. Value|
Analyzer Cal. Bias = Analyzer Absolute Difference / Span * 100

Sys. Absolute Difference = |Sys. Cal. Response - Analyzer Cal. Response|
System Cal. Bias = System Absolute Difference / Span Range * 100

Drift = (Sys. Cal. Response - Pretest Sys. Cal. Response) / Span * 100

Cgas = (C-Co)*Cma/(Cm-Co)

Method 4

[redacted] SAMPLE BOX SET UP
CHECKLIST

DATE: ____________________

PLANT: *Thomas*

LOCATION: ____________________

PREP. BY: ____________________

RUN NO.: *OIL-75-1*

STACK NO: ____________________

SAMPLE BOX NO.: ____________________

( ) 1. Wash all glassware with distilled water and then acetone.

( ) 2. Place approx. 100 ml distilled water in the first impinger, a modified Greenburg-Smith with straight tube 1/2 inch from the impinger bottom. Record exact weight to 1/10 of a gram.

( ) 3. Place approx. 100 ml distilled water in the second impinger, a standard Greenburg-Smith impinger (caricell tip). Record exact weight to 1/10 of a gram.

( ) 4. Impinger three is a dry modified Greenburg-Smith with straight tube 1/2 inch from the impinger bottom. Record dry tare weight to 1/10 of a gram.

( ) 5. Place approx. 175 ml of silica gel in the fourth impinger, a modified Greenburg-Smith with straight tube 1/2 inch from the impinger bottom. Record exact weight to 1/10 of a gram.

( ) 6. PLACE [redacted] FILTER INTO FILTER HOLDER ON THE CYCLONE SIDE OF THE HOLDER. Smooth side of filter is to face frittered glass of filter holder. [redacted]

Impinger No.	Impinger weights (GRAMS)	Tare	Initial	Final	Condensate	
X-1	1. 100 ml		*511.45*	*558.27*	*46.82*	
X-2	2. 100 ml		*500.90*	*504.[illegible]*	*3.[illegible]*	
X-3	3. Dry		*471.32*	*472.92*	*1.60*	TOTAL
X-4	4. 175 g silica gel		*671.42*	*678.22*	*6.80*	*69.1[illegible]*

[illegible] spent

( ) 7. Assemble [redacted] filter holder.

( ) 8. Assemble impinger bottles and glass elbows so air flows from a small hole to a larger hole.

METHODS 2 & 4

SOURCE EMISSION TESTING DATA SHEET

(SJS rev11/88, #0251Q)

PLANT Thomas	BAROMETRIC PRESSURE, in Hg	METER BOX # NC 4118	PROBE # (PITOT #)	NOZZLE #
LOCATION CBC Bldg 373	AMBIENT TEMPERATURE, °F 75	METER ΔH@	PITOT COEF 0.84	IDEAL NOZZLE DIA, in.
DATE 9/21/10	AVE STATIC PRESSURE, in H_2O +.035	METER γ	PROBE LENGTH, in.	ACTUAL NOZZLE DIA, in.
OPERATOR JM	AVE VEL HEAD, in H_2O	SAMPLE BOX #	PROBE LINER MATERIAL	LEAK CHECK @ PITOT'S
RUN # 01C-25-1	ASSUMED MOISTURE, %	HEATER BOX SETTING	PROBE HEATER SETTING	LEAK RATE CFM@ in Hg Pre CK .015 cfm @ 11" Hg

SCHEMATIC OF STACK CROSS SECTION (SHOW TRAVERSE PTS)

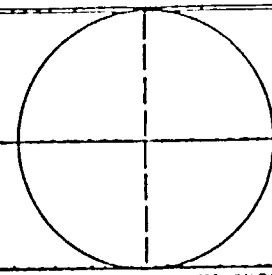
Post Chk 0.017 @ 11" Hg

TRAVERSE POINT #	SAMPLING TIME min	GAS METER READING (Vm) ft^3	VELOCITY HEAD (MEAS) (ΔP) in H_2O	STACK TEMPERATURE (1) (Ts) °F	GAS SAMPLE TEMPERATURE AT DRY GAS METER (6) Inlet (Tm in) °F	(7) Outlet (Tm out) °F	IMPINGER TEMPERATURE (4) °F	SAMPLE BOX TEMPERATURE (3) °F	SAMPLE VACUUM in Hg
1	12:53pm Ø	189.946	.03	431	75	75	70	251	5.5
2	3	192.017	.03	436	76	75	60	252	5.5
3	6	194.186	.025	431	77	75	56	252	
4	9	196.309	.025	436	79	76	57	255	
5	12	198.432	.025	431	81	76	57	256	
6	15	200.552	.035	435	83	77	57	257	
7	18	202.657	.04	435	84	78	58	258	
8	21	204.744	.045	434	85	78	58	258	
9	24	206.821	.03	434	86	79	60	261	
10	27	208.915	.03	435	87	80	61	259	
11	30	210.994	.03	435	88	80	61	260	
12	33	213.052	.025	435	88	81	61	255	
13	36	215.131	.02	435	89	81	61	258	
TOTAL									
AVERAGE									

METHODS 2 & 4

SOURCE EMISSION TESTING DATA SHEET

(SJS rev11/88, #02510)

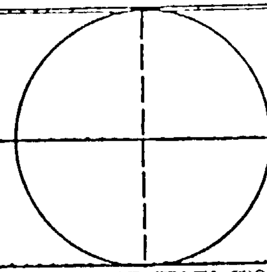
PLANT Thomas	BAROMETRIC PRESSURE, in Hg		METER BOX #	PROBE # (PITOT #)	NOZZLE #
LOCATION CBC Bldg 373	AMBIENT TEMPERATURE, °F		METER ΔH@	PITOT COEF	IDEAL NOZZLE DIA, in.
DATE	AVE STATIC PRESSURE, in H_2O		METER γ	PROBE LENGTH, in.	ACTUAL NOZZLE DIA, in.
OPERATOR	AVE VEL HEAD, in H_2O		SAMPLE BOX #	PROBE LINER MATERIAL	LEAK CHECK @ PITOT'S
RUN # 01L-75-1	ASSUMED MOISTURE, %	SCHEMATIC OF STACK CROSS SECTION (SHOW TRAVERSE PTS)	HEATER BOX SETTING	PROBE HEATER SETTING	LEAK RATE CFM@ in Hg

TRAVERSE POINT #	SAMPLING TIME min	GAS METER READING (Vm) ft^3	VELOCITY HEAD (MEAS) (ΔP) in H_2O	STACK TEMPERATURE (Ts) °F	GAS SAMPLE TEMPERATURE AT DRY GAS METER Inlet (Tm in) °F	GAS SAMPLE TEMPERATURE AT DRY GAS METER Outlet (Tm out) °F	IMPINGER TEMPERATURE °F	SAMPLE BOX TEMPERATURE °F	SAMPLE VACUUM in Hg
14			.02						
15			.03						
16			.035						
TOTAL									
AVERAGE									

SOURCE EMISSION TESTING DATA SHEET

(SJS rev11/88, #02510)

PLANT: THOMAS	BAROMETRIC PRESSURE, in Hg		METER BOX #	PROBE # (PITOT #)	NOZZLE #
LOCATION: CBC Pt. Husband	AMBIENT TEMPERATURE, °F		METER ΔH@	PITOT COEF	IDEAL NOZZLE DIA, in.
DATE: 21 SEPT 1990	AVE STATIC PRESSURE, in H_2O		METER γ	PROBE LENGTH, in.	ACTUAL NOZZLE DIA, in.
OPERATOR: JS Cook	AVE VEL HEAD, in H_2O		SAMPLE BOX #	PROBE LINER MATERIAL	LEAK CHECK @ PITOT'S
RUN #: 01C-75-1	ASSUMED MOISTURE, %	SCHEMATIC OF STACK CROSS SECTION (SHOW TRAVERSE PTS)	HEATER BOX SETTING	PROBE HEATER SETTING	LEAK RATE CFM@ in Hg



START 1201 PM

~~TRAVERSE~~ POINT #	SAMPLING TIME min	STACK TEMPERATURE (Ts) °F	O_2 %	CO_2 %	CO ppm	NOX ppm
1	0	436	4.4	12.5	15	92.5
2	5	436	4.2	12.5	15	92.5
3	10	436	4.4	12.4	12	92.5
4	15	436	4.3	12.5	12	92.5
5	20	435	4.2	12.4	15	92.5
6	25	434	4.3	12.4	15	92.5
7	30	435	4.5	12.5	15	92.5
8	35	435	4.3	12.5	15	92.5
9	40	435	4.3	12.5	15	92.5
10	45	435	4.3	12.5	15	92.5
11	50	435	4.5	12.3	15	92.5
12	55	435	4.3	12.5	15	92.5
	60	435	4.4	12.4	15	92.5
		:				
AVG			4.34	12.45	14.54	92.5
TOTAL						
AVERAGE						

STOP 1301 pm

SOURCE EMISSION TESTING DATA SHEET

(SJS rev11/88, #02510)

PLANT [illegible]	BAROMETRIC PRESSURE, in Hg	METER BOX #	PROBE # (PITOT #)	NOZZLE #
LOCATION SPC	AMBIENT TEMPERATURE, °F	METER ΔH@	PITOT COEF	IDEAL NOZZLE DIA, in.
DATE 21SEPT90	AVE STATIC PRESSURE, in H_2O	METER γ	PROBE LENGTH, in.	ACTUAL NOZZLE DIA, in.
OPERATOR D Cook	AVE VEL HEAD, in H_2O	SAMPLE BOX #	PROBE LINER MATERIAL	LEAK CHECK @ PITOT'S
RUN # 01C-75-2	ASSUMED MOISTURE, %	HEATER BOX SETTING	PROBE HEATER SETTING	LEAK RATE CFM@ in Hg

SCHEMATIC OF STACK CROSS SECTION (SHOW TRAVERSE PTS)

START TIME 1317

TRAVERSE POINT #	SAMPLING TIME min	STACK TEMPERATURE (Ts) °F		O_2 %	CO_2 %	CO ppm	NOX ppm
1	0	437		4.4	12.3	15	92.5
2	5	437		4.4	12.4	15	92.5
3	10	437		4.4	12.4	15	92.5
4	15	434		4.4	12.4	18	92.5
5	20	433		4.4	12.4	15	92.5
6	25	431		4.5	12.3	15	92.5
7	30	433		4.3	12.4	18	92.5
8	35	434		4.3	12.4	19	92.5
9	40	437		4.3	12.5	18	92.5
10	45	437		4.5	12.3	18	92.5
11	50	440		4.5	12.3	18	92.5
12	55	436		4.5	12.3	19	92.5
	60	437		4.5	12.3	18	92.5
			AVG	4.48	12.36	17	92.5
TOTAL							
AVERAGE							

STOP 1417

ANALYZER METHOD 6C CALIBRATION SHEET

BASE: CBC PORT HUENEME
BUILDING: 373 THOMAS PLANT
DATE:
CAL. BY:

RUN NO: OIL-75
BOILER NO:
FUEL: ~~OIL~~
LOAD: 75%

ANALYZER: NOX
SPAN: 250
UNITS: PPM
RESP TIME:

SPAN GAS INPUT	SPAN GAS RANGE	CYLINDER VALUE	CALIBRATION RESPONSE	ABS. DIFF.	CAL. BIAS % OF SPAN	DRIFT % OF SPAN
ANALYZER PRETEST	HIGH	203.7	205	203.7	81.5	N/A
	MID	131.1	[illegible]	131.1	52.4	N/A
	ZERO	0.00	0	0	0.0	N/A
SYSTEM PRETEST	UPSCALE	131.10	[illegible]	0	0.0	N/A
	ZERO	0.00	0	0	0.0	N/A
SYSTEM POST RUN 1	UPSCALE	131.10	[illegible]	0	0.0	0
	ZERO	0.00	0	0	0.0	0
SYSTEM POST RUN 2	UPSCALE	131.10	127.5	0	0.0	0
	ZERO	0.00	~~[illegible]~~ 0	0	0.0	0

	RUN 1	RUN 2	
Co=	0.00	0.00	Avg zero gas system calibration bias.
Cm=	0.00	0.00	Avg upscale gas sys. cal. bias.
Cma=	131.10	131.10	Upscale gas concentration.
C=			Avg gas analyzer concentration reading.
Cgas=	ERR	ERR	Corrected gas concentration.

Analyzer Absolute Difference = |Analyzer Cal. Response - Cyl. Value|
Analyzer Cal. Bias = Analyzer Absolute Difference / Span * 100

Sys. Absolute Difference = |Sys. Cal. Response - Analyzer Cal. Response|
System Cal. Bias = System Absolute Difference / Span Range * 100

Drift = (Sys. Cal. Response - Pretest Sys. Cal. Response) / Span * 100

Cgas = (C-Co)*Cma/(Cm-Co)

ANALYZER METHOD 6C CALIBRATION SHEET

BASE:	CBC PORT HUENEME	RUN NO:	OIL-75	ANALYZER:	02
BUILDING:	373 THOMAS PLANT	BOILER NO:	0	SPAN:	20.9
DATE:	0	FUEL:	OIL	UNITS:	%
CAL. BY:	0	LOAD:	75%	RESP TIME:	

SPAN GAS INPUT	SPAN GAS RANGE	CYLINDER VALUE	CALIBRATION RESPONSE	ABS. DIFF.	CAL. BIAS % OF SPAN	DRIFT % OF SPAN
ANALYZER PRETEST	HIGH	20.90	20.9	20.9	100.0	N/A
	MID	3.116	3.1	3.116	14.9	N/A
	ZERO	0.00	0	0	0.0	N/A
SYSTEM PRETEST	UPSCALE	3.12	3.2	0	0.0	N/A
	ZERO	0.00	0	0	0.0	N/A
SYSTEM POST RUN 1	UPSCALE	3.12	20.8 3.2	0	0.0	0
	ZERO	0.00	0.1	0	0.0	0
SYSTEM POST RUN 2	UPSCALE	3.12	20.9 ~~[illegible]~~ 3.2	0	0.0	0
	ZERO	0.00	0.1	0	0.0	0

	RUN 1	RUN 2	
Co=	0.00	0.00	Avg zero gas system calibration bias.
Cm=	0.00	0.00	Avg upscale gas sys. cal. bias.
Cma=	3.12	3.12	Upscale gas concentration.
C=			Avg gas analyzer concentration reading.
Cgas=	ERR	ERR	Corrected gas concentration.

Analyzer Absolute Difference = |Analyzer Cal. Response - Cyl. Value|
Analyzer Cal. Bias = Analyzer Absolute Difference / Span * 100

Sys. Absolute Difference = |Sys. Cal. Response - Analyzer Cal. Response|
System Cal. Bias = System Absolute Difference / Span Range * 100

Drift = (Sys. Cal. Response - Pretest Sys. Cal. Response) / Span * 100

Cgas = (C-Co)*Cma/(Cm-Co)

ANALYZER METHOD 6C CALIBRATION SHEET

BASE: CBC PORT HUENEME	RUN NO: OIL-75	ANALYZER: CO	
BUILDING: 373 THOMAS PLANT	BOILER NO: 0	SPAN:	500
DATE: 0	FUEL: OIL	UNITS: PPM	
CAL. BY: 0	LOAD: 75%	RESP TIME:	

SPAN GAS INPUT	SPAN GAS RANGE	CYLINDER VALUE	CALIBRATION RESPONSE	ABS. DIFF.	CAL. BIAS % OF SPAN	DRIFT % OF SPAN
ANALYZER PRETEST	HIGH	499.7	500	499.7	99.9	N/A
	MID	248.1	255	248.1	49.6	N/A
	ZERO	0.00	0	0	0.0	N/A
SYSTEM PRETEST	UPSCALE	248.10	250	0	0.0	N/A
	ZERO	0.00	0	0	0.0	N/A
SYSTEM POST RUN 1	UPSCALE	248.10	500 250	0	0.0	0
	ZERO	0.00	5	0	0.0	0
SYSTEM POST RUN 2	UPSCALE	248.10	250	0	0.0	0
	ZERO	0.00	5	0	0.0	0

	RUN 1	RUN 2	
Co=	0.00	0.00	Avg zero gas system calibration bias.
Cm=	0.00	0.00	Avg upscale gas sys. cal. bias.
Cma=	248.10	248.10	Upscale gas concentration.
C=			Avg gas analyzer concentration reading.
Cgas=	ERR	ERR	Corrected gas concentration.

Analyzer Absolute Difference = |Analyzer Cal. Response - Cyl. Value|
Analyzer Cal. Bias = Analyzer Absolute Difference / Span * 100

Sys. Absolute Difference = |Sys. Cal. Response - Analyzer Cal. Response|
System Cal. Bias = System Absolute Difference / Span Range * 100

Drift = (Sys. Cal. Response - Pretest Sys. Cal. Response) / Span * 100

Cgas = (C-Co)*Cma/(Cm-Co)

ANALYZER METHOD 6C CALIBRATION SHEET

BASE:	CBC PORT HUENEME	RUN NO: OIL-75	ANALYZER: CO2
BUILDING:	373 THOMAS PLANT	BOILER NO: 0	SPAN: 20
DATE:	0	FUEL: OIL	UNITS: %
CAL. BY:	0	LOAD: 75%	RESP TIME:

SPAN GAS INPUT	SPAN GAS RANGE	CYLINDER VALUE	CALIBRATION RESPONSE	ABS. DIFF.	CAL. BIAS % OF SPAN	DRIFT % OF SPAN
ANALYZER PRETEST	HIGH			0	0.0	N/A
	MID	11.01	11	11.01	55.1	N/A
	ZERO	0.00	0	0	0.0	N/A
SYSTEM PRETEST	UPSCALE	11.01	10.9	0	0.0	N/A
	ZERO	0.00	0	0	0.0	N/A
SYSTEM POST RUN 1	UPSCALE	11.01	10.5	0	0.0	0
	ZERO	0.00	0.1	0	0.0	0
SYSTEM POST RUN 2	UPSCALE	11.01	10.8	0	0.0	0
	ZERO	0.00	0.0	0	0.0	0

	RUN 1	RUN 2	
Co=	0.00	0.00	Avg zero gas system calibration bias.
Cm=	0.00	0.00	Avg upscale gas sys. cal. bias.
Cma=	11.01	11.01	Upscale gas concentration.
C=			Avg gas analyzer concentration reading.
Cgas=	ERR	ERR	Corrected gas concentration.

Analyzer Absolute Difference = |Analyzer Cal. Response - Cyl. Value|
Analyzer Cal. Bias = Analyzer Absolute Difference / Span * 100

Sys. Absolute Difference = |Sys. Cal. Response - Analyzer Cal. Response|
System Cal. Bias = System Absolute Difference / Span Range * 100

Drift = (Sys. Cal. Response - Pretest Sys. Cal. Response) / Span * 100

Cgas = (C-Co)*Cma/(Cm-Co)

Method 4

[redacted] SAMPLE BOX SET UP

CHECKLIST

DATE: ______________________

PLANT: *Thomas*

LOCATION: ______________________

PREP. BY: ______________________

RUN NO.: *OIL-100-1*

STACK NO: ______________________

SAMPLE BOX NO.: ______________________

( ) 1. Wash all glassware with distilled water and then acetone.

( ) 2. Place approx. 100 ml distilled water in the first impinger, a modified Greenburg-Smith with straight tube 1/2 inch from the impinger bottom. Record exact weight to 1/10 of a gram.

( ) 3. Place approx. 100 ml distilled water in the second impinger, a standard Greenburg-Smith impinger (caricell tip). Record exact weight to 1/10 of a gram.

( ) 4. Impinger three is a dry modified Greenburg-Smith with straight tube 1/2 inch from the impinger bottom. Record dry tare weight to 1/10 of a gram.

( ) 5. Place approx. 175 ml of silica gel in the fourth impinger, a modified Greenburg-Smith with straight tube 1/2 inch from the impinger bottom. Record exact weight to 1/10 of a gram.

( ) 6. PLACE [redacted] FILTER INTO FILTER HOLDER ON THE CYCLONE SIDE OF THE HOLDER. Smooth side of filter is to face frittered glass of filter holder. [redacted]

Impinger No.	Impinger weights (GRAMS)	Tare	Initial	Final	Condensate	
1	1. 100 ml		627.85	677.26	49.4	
2	2. 100 ml		639.99	660.24	20.25	
3	3. Dry		502.90	506.36	3.46	TOTAL
4	4. 175 g silica gel		746.61	754.27	7.66	80.78

80%

( ) 7. Assemble [redacted] filter holder.

( ) 8. Assemble impinger bottles and glass elbows so air flows from a small hole to a larger hole.

METHODS [illegible] #

SOURCE EMISSION TESTING DATA SHEET

(SJS rev11/88, #0251Q)

PLANT Thomas	BAROMETRIC PRESSURE, in Hg 29.940	SCHEMATIC OF STACK CROSS SECTION (SHOW TRAVERSE PTS)	METER BOX # [illegible]	PROBE # (PITOT #)	NOZZLE #
LOCATION CBC Bldg 373	AMBIENT TEMPERATURE, °F [illegible]		METER ΔH@	PITOT COEF [illegible]	IDEAL NOZZLE DIA, in.
DATE 9/21/90	AVE STATIC PRESSURE, in H_2O +.035		METER γ	PROBE LENGTH, in.	ACTUAL NOZZLE DIA, in.
OPERATOR JM	AVE VEL HEAD, in H_2O		SAMPLE BOX #	PROBE LINER MATERIAL	LEAK CHECK @ PITOT'S [illegible]
RUN # OIL-100-1	ASSUMED MOISTURE, %		HEATER BOX SETTING	PROBE HEATER SETTING	LEAK RATE CFM@ in Hg [illegible] @ 11" Hg

Post: OK .0125 @ 11" Hg

TRAVERSE POINT #	SAMPLING TIME min	GAS METER READING (Vm) ft^3	VELOCITY HEAD (MEAS) (ΔP) in H_2O	STACK TEMPERATURE (1) (Ts) °F	GAS SAMPLE TEMPERATURE AT DRY GAS METER (6) Inlet (Tm in) °F	(7) Outlet (Tm out) °F	IMPINGER TEMPERATURE (4) °F	SAMPLE BOX TEMPERATURE (3) °F	SAMPLE VACUUM in Hg
1	9:17am Ø	160.520	.095	528	67	67	[illegible]	250	5"
2	3	163.04	.085	52[illegible]	[illegible]	[illegible]	50	253	5"
3	6	165.[illegible]	.065	52[illegible]	[illegible]	[illegible]	50	253	5"
4	9	167.8[illegible]	.055	52[illegible]	[illegible]	67	52	254	5"
5	12	170.[illegible]	.075	525	71	74	54	252	5"
6	15	172.63	.11	526	76	69	55	25[illegible]	5"
7	18	17[illegible].00	.14	527	77	70	58	255	5"
8	21	177.40	.155	528	78	70	58	259	5"
9	24	179.90	.085	52[illegible]	72	68	56	260	5"
10	27	182.32	.045	52[illegible]	80	72	55	260	5"
11	30	184.75	.045	52[illegible]	82	73	55	260	5"
12	33	187.32 Stab [illegible]	.075	532	82	73	55	256	5"
13	36	1[illegible]	.055	53[illegible]	[illegible]	73	[illegible]	2[illegible]	
TOTAL									
AVERAGE									

(''ETH _S (~ #1 '' (

SOURCE EMISSION TESTING DATA SHEET

(SJS rev11/88, #0251Q)

PLANT Thomas	BAROMETRIC PRESSURE, in Hg	METER BOX #	PROBE # (PITOT #)	NOZZLE #
LOCATION CBC Bldg 373	AMBIENT TEMPERATURE, °F	METER ΔH@	PITOT COEF	IDEAL NOZZLE DIA, in.
DATE	AVE STATIC PRESSURE, in H_2O	METER γ	PROBE LENGTH, in.	ACTUAL NOZZLE DIA, in.
OPERATOR	AVE VEL HEAD, in H_2O	SAMPLE BOX #	PROBE LINER MATERIAL	LEAK CHECK @ PITOT'S
RUN # OIC-100-1	ASSUMED MOISTURE, %	HEATER BOX SETTING	PROBE HEATER SETTING	LEAK RATE CFM@ in Hg

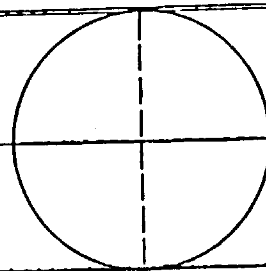
SCHEMATIC OF STACK CROSS SECTION (SHOW TRAVERSE PTS)

TRAVERSE POINT #	SAMPLING TIME min	GAS METER READING (Vm) ft³	VELOCITY HEAD (MEAS) (ΔP) in H_2O	STACK TEMPERATURE (Ts) °F	GAS SAMPLE TEMPERATURE AT DRY GAS METER Inlet (Tm in) °F	Outlet (Tm out) °F	IMPINGER TEMPERATURE °F	SAMPLE BOX TEMPERATURE °F	SAMPLE VACUUM in Hg
14			.06						
15			.075						
16			.15						
TOTAL									
AVERAGE									

SOURCE EMISSION TESTING DATA SHEET

(SJS rev11/88, #02510)

PLANT: THOMAS	BAROMETRIC PRESSURE, in Hg	SCHEMATIC OF STACK CROSS SECTION (SHOW TRAVERSE PTS)	METER BOX #	PROBE # (PITOT #)	NOZZLE #
LOCATION: CHC	AMBIENT TEMPERATURE, °F		METER ΔH@	PITOT COEF	IDEAL NOZZLE DIA, in.
DATE: 21 SEPT 90	AVE STATIC PRESSURE, in H_2O		METER γ	PROBE LENGTH, in.	ACTUAL NOZZLE DIA, in.
OPERATOR: Black	AVE VEL HEAD, in H_2O		SAMPLE BOX #	PROBE LINER MATERIAL	LEAK CHECK @ PITOT'S
RUN #: OIL-100-1	ASSUMED MOISTURE, %		HEATER BOX SETTING	PROBE HEATER SETTING	LEAK RATE CFM@ in Hg



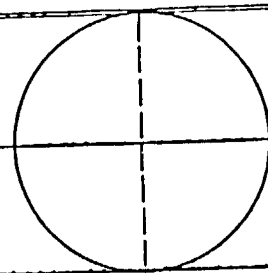
START 854am

~~TRAVERSE~~ POINT #	SAMPLING TIME min	STACK TEMPERATURE (Ts) °F	O_2 %	CO_2 %	CO ppm	NOX ppm
1	0	523	4.4	12.4	5	87.5
2	5	524	4.4	12.4	5	87.5
3	10	524	4.4	12.4	5	87.5
4	15	527	4.4	12.4	5	87.5
5	20	527	4.4	12.4	3	87.5
6	25	525	4.4	12.5	3	87.5
7	30	525	4.3	12.5	10	90
8	35	526	4.3	12.5	7	90
9	40	528	4.3	12.5	7	90
10	45	529	4.3	12.5	7	90
11	50	529	4.3	12.5	8	90
12	55	530	4.3	12.5	8	90
	60	530	4.3	12.6	10	90
			AVG 4.35	12.47	6.38	88.85
TOTAL						
AVERAGE						

STOP 9:54am

SOURCE EMISSION TESTING DATA SHEET

(SJS rev11/88, #02510)

PLANT THOMAS	BAROMETRIC PRESSURE, in Hg		METER BOX #	PROBE # (PITOT #)	NOZZLE #
LOCATION CBC Pt Hueneme	AMBIENT TEMPERATURE, °F		METER ΔH@	PITOT COEF	IDEAL NOZZLE DIA, in.
DATE 21 SEPT 1990	AVE STATIC PRESSURE, in H_2O		METER γ	PROBE LENGTH, in.	ACTUAL NOZZLE DIA, in.
OPERATOR D Cook	AVE VEL HEAD, in H_2O		SAMPLE BOX #	PROBE LINER MATERIAL	LEAK CHECK @ PITOT'S
RUN # OIC-100-2	ASSUMED MOISTURE, %	SCHEMATIC OF STACK CROSS SECTION (SHOW TRAVERSE PTS)	HEATER BOX SETTING	PROBE HEATER SETTING	LEAK RATE CFM@ in Hg

START TEST 10:13 AM

END TEST 11:13 AM

~~TRAVERSE~~ POINT #	SAMPLING TIME min	STACK TEMPERATURE (T_s) °F		O_2 %	CO_2 %	CO ppm	NOX ppm
1	0	529		4.4	12.7	8	92.5
2	5	529		4.3	12.7	9	92.5
3	10	529		4.3	12.5	10	92.5
4	15	530		4.4	12.6	12	92.5
5	20	530		4.4	12.5	12	92.5
6	25	529		4.4	12.5	15	92.5
7	30	529		4.4	12.6	12	92.5
8	35	528		4.4	12.5	15	92.5
9	40	529		4.4	12.5	15	92.5
10	45	526		4.5	12.4	15	92.5
11	50	526		4.5	12.5	15	92.5
12	55	526		4.5	12.4	15	92.5
	60	526		4.5	12.4	15	92.5
		:	AVG	4.42	12.5	12.9	92.5
TOTAL							
AVERAGE							

GOOD LEAKCHECK

ANALYZER METHOD GC CALIBRATION SHEET

BASE: CBC PORT HUENEME
BUILDING: 373 THOMAS PLANT
DATE:
CAL. BY:

RUN NO: OIL-100
BOILER NO:
FUEL: OIL
LOAD: 100%

ANALYZER: NOX
SPAN: 250
UNITS: PPM
RESP TIME: 90

SPAN GAS INPUT	SPAN GAS RANGE	CYLINDER VALUE	CALIBRATION RESPONSE	ABS. DIFF.	CAL. BIAS % OF SPAN	DRIFT % OF SPAN
ANALYZER PRETEST	HIGH	203.7	205	203.7	81.5	N/A
	MID	131.1	126.5	131.1	52.4	N/A
	ZERO	0.00	0	0	0.0	N/A
SYSTEM PRETEST	UPSCALE	131.10	127.5 ~~126~~	0	0.0	N/A
	ZERO	0.00	0	0	0.0	N/A
SYSTEM POST RUN 1	UPSCALE	131.10	130	0	0.0	0
	ZERO	0.00	2.5	0	0.0	0
SYSTEM POST RUN 2	UPSCALE	131.10	131.25	0	0.0	0
	ZERO	0.00	2.5	0	0.0	0

	RUN 1	RUN 2	
Co=	0.00	0.00	Avg zero gas system calibration bias.
Cm=	0.00	0.00	Avg upscale gas sys. cal. bias.
Cma=	131.10	131.10	Upscale gas concentration.
C=			Avg gas analyzer concentration reading.
Cgas=	ERR	ERR	Corrected gas concentration.

Analyzer Absolute Difference = |Analyzer Cal. Response - Cyl. Value|
Analyzer Cal. Bias = Analyzer Absolute Difference / Span * 100

Sys. Absolute Difference = |Sys. Cal. Response - Analyzer Cal. Response|
System Cal. Bias = System Absolute Difference / Span Range * 100

Drift = (Sys. Cal. Response - Pretest Sys. Cal. Response) / Span * 100

ANALYZER METHOD 6C CALIBRATION SHEET

BASE: CBC PORT HUENEME
BUILDING: 373 THOMAS PLANT
DATE: 0
CAL. BY: 0

RUN NO: OIL-100
BOILER NO: 0
FUEL: OIL
LOAD: 100%

ANALYZER: 02
SPAN: 20.9
UNITS: %
RESP TIME:

SPAN GAS INPUT	SPAN GAS RANGE	CYLINDER VALUE	CALIBRATION RESPONSE	ABS. DIFF.	CAL. BIAS % OF SPAN	DRIFT % OF SPAN
ANALYZER PRETEST	HIGH	20.90	20.9	20.9	100.0	N/A
	MID	3.116	3.8	3.116	14.9	N/A
	ZERO	0.00	0	0	0.0	N/A
SYSTEM PRETEST	UPSCALE	3.12	3.2	0	0.0	N/A
	ZERO	0.00	0	0	0.0	N/A
SYSTEM POST RUN 1	UPSCALE	3.12	3.2	0	0.0	0
	ZERO	0.00	0	0	0.0	0
SYSTEM POST RUN 2	UPSCALE	3.12	3.3	0	0.0	
	ZERO	0.00	0.1	0	0.0	0

	RUN 1	RUN 2	
Co=	0.00	0.00	Avg zero gas system calibration bias.
Cm=	0.00	0.00	Avg upscale gas sys. cal. bias.
Cma=	3.12	3.12	Upscale gas concentration.
C=			Avg gas analyzer concentration reading.
Cgas=	ERR	ERR	Corrected gas concentration.

Analyzer Absolute Difference = |Analyzer Cal. Response - Cyl. Value|
Analyzer Cal. Bias = Analyzer Absolute Difference / Span * 100

Sys. Absolute Difference = |Sys. Cal. Response - Analyzer Cal. Response|
System Cal. Bias = System Absolute Difference / Span Range * 100

Drift = (Sys. Cal. Response - Pretest Sys. Cal. Response) / Span * 100

ANALYZER METHOD 6C CALIBRATION SHEET

BASE: CBC PORT HUENEME	RUN NO: OIL-100	ANALYZER: CO	
BUILDING: 373 THOMAS PLANT	BOILER NO: 0	SPAN:	500
DATE: 0	FUEL: OIL	UNITS: PPM	
CAL. BY: 0	LOAD: 100%	RESP TIME: 90 sec	

SPAN GAS INPUT	SPAN GAS RANGE	CYLINDER VALUE	CALIBRATION RESPONSE	ABS. DIFF.	CAL. BIAS % OF SPAN	DRIFT % OF SPAN
ANALYZER PRETEST	HIGH	499.7	500	499.7	99.9	N/A
	MID	248.1	250	248.1	49.6	N/A
	ZERO	0.00	0	0	0.0	N/A
SYSTEM PRETEST	UPSCALE	248.10	250	0	0.0	N/A
	ZERO	0.00	0	0	0.0	N/A
SYSTEM POST RUN 1	UPSCALE	248.10	245	0	0.0	0
	ZERO	0.00	0	0	0.0	0
SYSTEM POST RUN 2	UPSCALE	248.10	255	0	0.0	0
	ZERO	0.00	5	0	0.0	0

	RUN 1	RUN 2	
Co=	0.00	0.00	Avg zero gas system calibration bias.
Cm=	0.00	0.00	Avg upscale gas sys. cal. bias.
Cma=	248.10	248.10	Upscale gas concentration.
C=			Avg gas analyzer concentration reading.
Cgas=	ERR	ERR	Corrected gas concentration.

Analyzer Absolute Difference = |Analyzer Cal. Response - Cyl. Value|
Analyzer Cal. Bias = Analyzer Absolute Difference / Span * 100

Sys. Absolute Difference = |Sys. Cal. Response - Analyzer Cal. Response|
System Cal. Bias = System Absolute Difference / Span Range * 100

Drift = (Sys. Cal. Response - Pretest Sys. Cal. Response) / Span * 100

ANALYZER METHOD 6C CALIBRATION SHEET

BASE:	CBC PORT HUENEME	RUN NO: OIL-100	ANALYZER: CO2
BUILDING:	373 THOMAS PLANT	BOILER NO: 0	SPAN: 20
DATE:	0	FUEL: OIL	UNITS: %
CAL. BY:	0	LOAD: 100%	RESP TIME: 150 sec

SPAN GAS INPUT	SPAN GAS RANGE	CYLINDER VALUE	CALIBRATION RESPONSE	ABS. DIFF.	CAL. BIAS % OF SPAN	DRIFT % OF SPAN
ANALYZER PRETEST	HIGH			0	0.0	N/A
	MID	11.01	11.0	11.01	55.1	N/A
	ZERO	0.00	0	0	0.0	N/A
SYSTEM PRETEST	UPSCALE	11.01	10.8	0	0.0	N/A
	ZERO	0.00	0	0	0.0	N/A
SYSTEM POST RUN 1	UPSCALE	11.01	10.9	0	0.0	0
	ZERO	0.00	0.0	0	0.0	0
SYSTEM POST RUN 2	UPSCALE	11.01	11.0	0	0.0	0
	ZERO	0.00	0.0	0	0.0	0

	RUN 1	RUN 2	
Co=	0.00	0.00	Avg zero gas system calibration bias.
Cm=	0.00	0.00	Avg upscale gas sys. cal. bias.
Cma=	11.01	11.01	Upscale gas concentration.
C=			Avg gas analyzer concentration reading.
Cgas=	ERR	ERR	Corrected gas concentration.

Analyzer Absolute Difference = |Analyzer Cal. Response - Cyl. Value|
Analyzer Cal. Bias = Analyzer Absolute Difference / Span * 100

Sys. Absolute Difference = |Sys. Cal. Response - Analyzer Cal. Response|
System Cal. Bias = System Absolute Difference / Span Range * 100

Drift = (Sys. Cal. Response - Pretest Sys. Cal. Response) / Span * 100

#S-8

SIDE A

Run	ΔP_{STD}	ΔP_s	$C_{P(s)}$	Deviation
1	Ø.2	Ø.3Ø		
2	Ø.290	Ø.45		
3	Ø.35Ø	Ø.54Ø		
4	Ø.39Ø	Ø.6Ø		

SIDE B

Run	ΔP_{STD}	ΔP_s
1	Ø.39	Ø.60
2	Ø.35	Ø.54
3	Ø.29	Ø.45
4	Ø.19	Ø.30

Pitot tube Calibration

BRINGING BOILER UP

RESP ↓ 90S
RESPONSE ~~[illegible]~~ 70S ↑

MID SPAN

RESP 90 0 = 1.5min

HIGH SPAN
INCREASED SPAN FLOW TO REQUIRED CFH

91ppm

AMB AIR Ø

52ppm MID SPAN

PRETEST ANALYZER SPAN

-91ppm

OZONE ON
~~137~~ SPAN HI IN

0-100 RANGE

7/20/90

0 - FULL SCALE

BACKGROUND SUPPRESS 0-2.5 RANGE

705 AM Ø

12cm/hr

0-100ppm SCALE

FULL SCALE

GAS TESTS PRETEST CAL

100% LOAD

705am

5

4

3

2

1 1022 am 100% RUN 2 100-GAS-2

UPSCALE 54ppm

AMB AIR ZERO <1.5ppm

RUN 1 POST TEST SPAN

END RUN GAS-100-1

12

11

10 O2 JUMPED TO 4.9% FOR ≈ 15 SEC (ADJUSTED)

9

8

7

6

5

4

3

2

1 857am START 100% LOAD RUN #1 GAS-100-1

PROBE IN STACK

7
6
5
4
3
2
1 1222pm

75% LOAD RUN #1 75-GAS-1

52ppm
UPSCALE PRESYS SPAN

ZERO

52 UPSCALE MID

0.2 RANGE

51ppm HIGH ADJUST

CHG TO 0-100 RANGE

FULL SCALE

ZERO
0.2.5 RANGE

OZONE ON
ADJ BACK GROUND

UPSCALE 54.5ppm

HIGH 54

POST TEST SPAN ? SYSTEM

END TEST 1022am
100-GAS-2

12
11
10
9
8
7
6

GAS - 4/8

ZERO 1.5ppm

UPSCALE 53ppm
POST RUN 2
SPAN CHECK

END TEST 14:44
GAS-75-2

12

11

10

9

8

7

6

5

4

3

2

1 1344pm
START GAS-75-2

UPSCALE
53ppm

AIR ZERO 1ppm

POST RUN 1
SPAN CHECK

1322pm
END 75-GAS-1

12

11

10

9

8

① START GAS-50-2
1712

~51ppm
UPSCALE

~∅ppm
AMB AIR ZERO
POSTRUN 1 SYSTEM SPAN
CHECK

— END GAS-50-1

— 12

— 11

— 10

— 9

— 8

— 7

— 6

— 5

— 4

— 3

— 2

① 1548pm
START GAS-50-1

~90ppm
DOUBLE CHECK HIGH SYSTEM SPAN

~ZERO SPAN
1 ppm

~ UPSCALE 52ppm
SYSTEM SPAN
~ UPSCALE 52ppm

HIGH
~91ppm
ADJ UST

ANALYZER ADJ. & SPAN 50% RUN

GAS- 6/8

-4

-3

-2

-1 START GAS-25-1
19:08 9/20/90

51ppm
UPSCALE

1ppm
~AMB AIR

PRETEST SYSTEM SPAN

UPSCALE 51.5ppm

HIGH
ADJUST
91ppm

~0.5ppm ZERO

0-100 RANGE PRETEST ANALYZER SPAN

OZONE ON SPIKE

REDO BACKGND
0-2.5

~~OZONE OFF~~

49.5ppm
UPSCALE

~0.5

POST RUN 2 SPAN

END TEST GAS-50-2
TIME 18:12 9/20/90

-12

-11

-10

-9

-8

-7

-6

-5

-4

-3

-2

ZERO AMB 1ppm POST RUN 2 SPAN CHECK

21:30
END
GAS-25-2

12
11
10
9
8
7
6
5
4
3
2
9/20/90
TIME: 20:30
1 START TEST GAS-25-2

52ppm
UPSCALE GAS

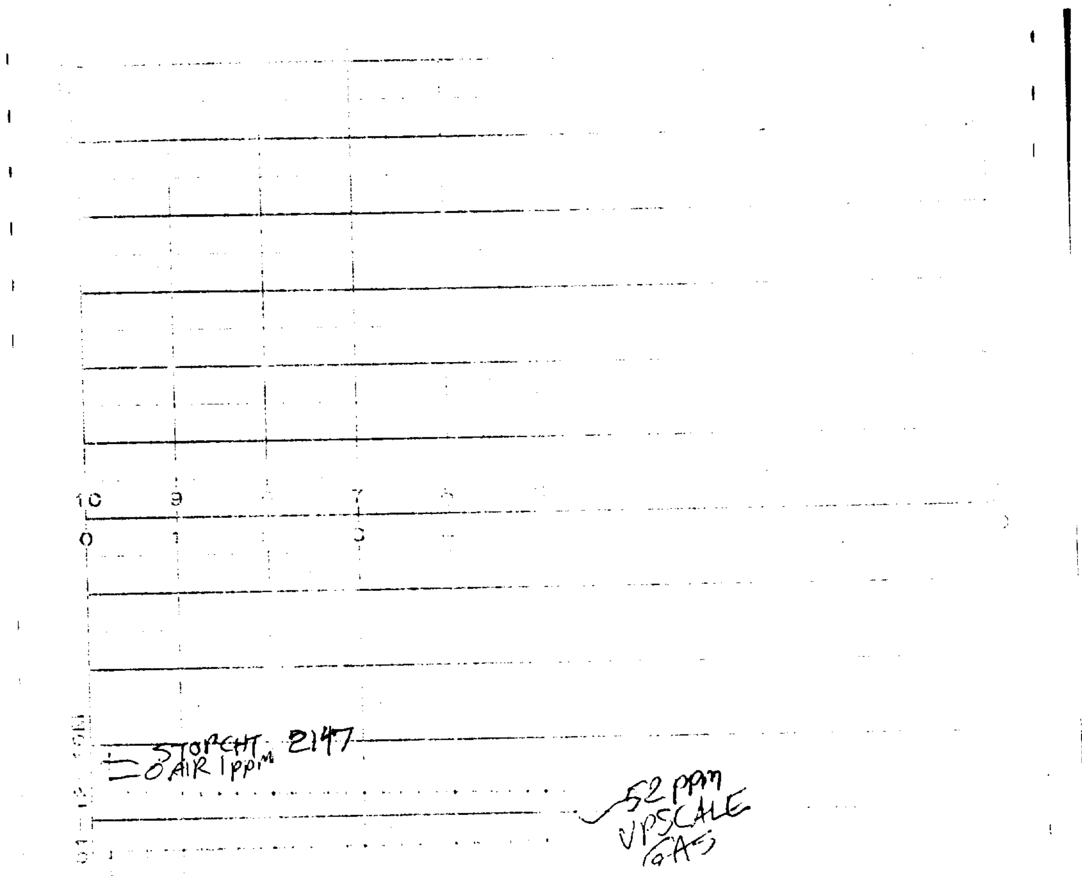
1.5 ppm CHART 1ppm OFF FROM MV
0 AMB AIR

POST RUN SPANCHECK

END TEST 20:08 GAS-25-1

12
11
10
9
8
7
6
5

GAS- 8/8



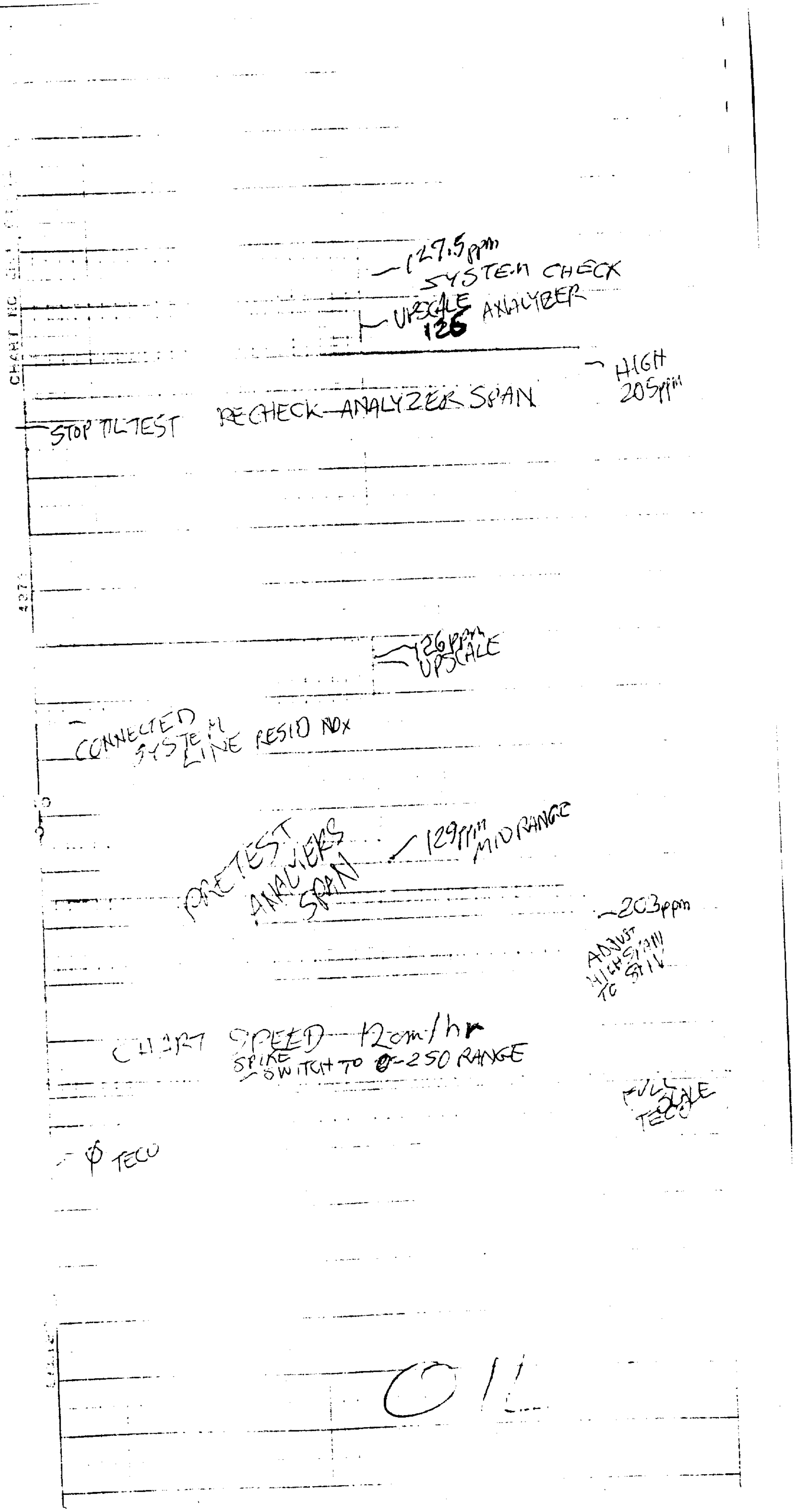


CHART NO.
127.5 ppm
SYSTEM CHECK
UPSCALE
126
ANALYZER
HIGH
205ppm
STOP TIL TEST
RECHECK ANALYZER SPAN
126 ppm
UPSCALE
CONNECTED SYSTEM LINE RESID NOX
PRETEST ANALYZERS SPAN
129ppm MIDRANGE
203ppm
ADJUST HIGH SPAN TO STIV
CHART SPEED 12cm/hr
SPIKE
SWITCH TO 0-250 RANGE
FULL SCALE TECO
Φ TECO
OIL

OIL-2/7

-4

-3

-2

-1 START OIL-100-2 10.13AM

Post run test 1
NOx Span
130 ppm

END TEST 9:54AM
OIL-100-1

-12

-11

10 0

0

-10

-9

-8

-7

-6

-5

-4

-3

-2

START 854am 9/21/90
OIL-100-1

10

0

0

10

OIL - 3/7

9
8
7
6
5
4
3
2

1 START: ~~OIL-75-~~ 12:01 PM
9/21/90

0ppm 0 SPAN

UPSCALE GAS

PRETEST SYSTEM SPAN CHECK

MID 130ppm

HIGH
205ppm

NOX 0ppm AMB AIR

BACK TO 0-250 RANGE

ADJ BACKGROUND

0-225 RANGE

PRE TEST ANALYZER SPAN

SWITCH TO ANAL ZERO

FULL SCALE

8.5ppm C

131 ppm UPSCALE

POST RUN 2 SYSTEM SPAN

END TEST OIL-100-2
11:13 9/21/90

12
11
10
9
8
7
6
5

OIL-4/7

UPSCALE

PRETEST SYSTEM SPAN

Ø SPAN Øppm

MID SPAN 132ppm

207ppm HIGHSPAN

50% TEST ANALYZER SPAN (NO ADJUSTMENTS)

127.5 NOx SPAN UPSCALE

POST-TEST SYSTEM ~~SPAN~~ ZERO

~~NOx 0.0ppm~~

END OIL-75-2 14:17

12

11

10

9

8

7

6

5

4

3

12

1 START 1317 GAS-75-2

ADJUST CHART

UPSCALE 127.5ppm

Øppm ØSPAN

POST RUN 1 SYSTEM SPAN CHECK

END 1301pm OIL-75-1

12

11

10

OIL-5/7

-9

-8

-7

-6

-5

-4

-3

-2

-1 START TEST: OIL-50-2 16:25

(SYSTEM)
- POST TEST 1 SPAN NOx
130.0

- POST TEST ZERO NOx
(SYSTEM)

-END TEST OIL-50-1 16:05

-12

-11

-10

-9

-8

-7

-6

-5

-4

-3

-2

-1 START OIL-50-1 15:05
9/21/90

- 0 SPAN
1 ppm

130 ppm

OIL-6/7

POST RUN 1 ZERO SPAN
END TEST OIL-25-1

12

11

10

9

8

7

6

5

4

3

2

1 START TEST: 18:11
OIL-25-1

0 SPAN AMB
0 ppm

UPSCALE 127.5 ppm
PRETEST SYSTEM SPAN CHECK
MID 230 ppm

205.1 ppm
HIGH
SPAN

PRETEST 25% ANALYZER SP

UPSCALE
127.5 ppm

0 SPAN
0 ppm

POST RUN 2 SYSTEM SPAN
END OIL-50-2 19:24

12

11

10

OIL-7/7

— STOP CHART 2040

— UPSCALE
125ppm

— ΦPPM SPAN
AMB AIR

POST RUN 2 SYSTEM SPAN CHECK

— END TEST OIL-25-2 | 20:28
9/21/90

— 12

— 11

— 10

— 9

— 8

— 7

— 6

— 5

— 4

— 3

— 2

— ① 19:28
START TEST OIL-25-2

— Φppm

POST RUN 1
← SYSTEM NO_x SPAN
125PPM

(SYSTEM)

25%

@5:44

23,134

@ 8:23

23,287

2.55 hrs

3 hrs 16 min
0 hrs 43 min

per Ed B
9/21/90
5:25pm

86.7 gph

$\frac{221 \text{ gal}}{153/60 \text{ hrs}}$

50 % OIL

Beginning of run 22,896 @ 243
gal

End of run 2 23,117 gal
@5:16

125 min

228.25 gph per Ed 9/21/90 100% run

~~[illegible]~~ @ 9:11 bottom of 7/8 mark
21907.5 gal

~~6611/88~~ ~~[illegible]~~
22383.0 @ 11:16 Same mark

100%

22383
21908
$\frac{475 \text{ gal}}{125/60 \text{ hrs}}$

22,435.0
75% 22,435 → @ 1133

APPENDIX D

OPERATION RECORDS FOR BOILER

BOILER PLANT RECORD

PLANT NAME: Thomas Plant | BLDG NO: 373 | DATE: 9-20-90

07:30 Relieve
HRB Secur

TIME	STEAM TEMP. / STEAM PRESS	O_2 / Set At 60	% EFF / STACK TEMP	GAS PRESS	OIL PRESS IN	OIL PRESS OUT	OIL PRESS NOZZ	COND. PUMPS #1	COND. PUMPS #2	PRESS INPUT	#1 DISCH PRESS	#2 DISCH. PRESS	TANK PRESS	TANK TEMP.	SOFTENER #1 METER READING	SOFTENER #1 GAL USED	SOFTENER #2 Service METER READING	SOFTENER #2 GAL USED	WATER S/H	SALT BAGS ADDED	CONV. TDS.	AIR COMPRESSOR COMP #1	AIR COMPRESSOR COMP #2	AIR COMPRESSOR PRESS	TEMP OUTSIDE
																	IN QOC.		5		2035	/		105	74
0700 BEGINNING								x		12/134		221	3	214					5		—	/		105	84
0800	310/165	3.9	516/396	1/3				x		12/132		212	3	196					5		2750	/		105	85
0900	315/56	3.5	734/560	1/5				✓		12/118		207	3	198					5		—	/		105	86
1000	320/57	3.4	965/564	1/4				x		11.5/103		207	1	175					5		2750	x		105	86
1100	315/54	3.5	786/364	1/8				✓		11.5/116		226	0	186					5		—	x		105	87
1200	310/50	3.6	80.7/464	1/8				x		8/90		220	3	178					5		2750	x		105	86
1300	315/56	3.5	80.7/464	1/8				x		11.5/102		224	2	194					5		—	x		105	74
1400	320/90	3.7	80.6/465	1/8				x		11.5/100		225	0	182				OOC							
1500	320/80	3.8	80.5/465	1/8																					
ENDING																									
TOTAL																									

BOILER STEAMING HOURS

BOILER NO	HOURS TODAY	HOURS SERVICE OVERHAUL
1. Conv	8.0	
2.		
3. /		

FUEL OIL RECEIVED

TIME	LOADS	SOUNDINGS BEFORE	SOUNDINGS AFTER	GALLONS RECEIVED

STATEMENT

FUEL OIL SOUNDINGS

TIME	#1 TANK SOUNDING	#1 TANK GALLONS	#2 TANK SOUNDING	#2 TANK GALLONS

FUEL OIL METER INTEG.	GALLONS USED	FUEL OIL SUCTION PUMP #1	PUMP #1 PRESS.	PUMP #2	PUMP #2 PRESS	PLANT STEAM FLOW INTEG	TOTAL PDS PER HOUR	CONV STEAM FLOW INTEG	TOTAL PDS. PER HOUR	NATURAL GAS CONV. INTEG	TOTAL CUBIC FOOT
						02963100		05668000		7815800	
						03074200	111,100	05675600	7600	7822490	6690
						03184800	110,600	05693000	17,400	7839820	17,330
						03304200	119,400	05718200	25,200	7868010	28,190
						03410400	106,200	05740600	22,400	7892820	24,810
						03521300	110,900	05761200	20,600	7913940	21,120
						03640800	119,500	05778200	17,000	7930660	16,720
						03753600	112,800	05793200	15000	7946450	15,790
						03868700	115,100	05808600	15,400	7962640	16,190
							905,600		140,600		146840

TOTAL GAL MAKE UP WATER USED | MUV % | TOTAL LBS: 140,600 | TOTAL CU FT GAS USED: 146,840 | TOTAL LBS STEAM EXPORTED: 905,600 | TOTAL LBS STEAM PRODUCED

OUTSIDE TEMP HIGH° ______ LOW° ______ MEAN° ______ | DEGREE DAYS | RAINFALL

OPERATOR'S SIGNATURE: [illegible]

STEAM PRODUCED BOILER # Conv LBS 140,600 | BOILER # ______ LBS ______

CBC 11300/18 REV 9 89 (BACK)

BOILER PLANT RECORD

PLANT NAME: Thomas Plant | BLDG NO: 377 | DATE: 9-20-96

TIME	STEAM PRESS (Steam Drum)	O_2 / O_2 Set	STACK TEMP. (% EFF)	GAS PRESS	OIL PRESS IN	OIL PRESS OUT	OIL PRESS NOZZ	COND. PUMPS #1	COND. PUMPS #2	PRESS INPUT	#1 DISCH. PRESS	#2 DISCH. PRESS	TANK PRESS	TANK TEMP.	SOFTENER #1 METER READING	SOFTENER #1 GAL. USED	SOFTENER #2 METER READING	SOFTENER #2 GAL. USED	WATER S/H	SALT BAGS ADDED	CONV. TDS.	AIR COMP #1	AIR COMP #2	AIR PRESS	TEMP. OUTSIDE
1500 BEGINNING																	00C								
1600	85/310	3.1/3.0	360°/81.8	1 3/4					✓	12/120		230	6	220					[illegible]		2035	✓		105	74
1700	[illegible]/310	3.7/3.5	380°/81.9	1 3/4					✓	12/120		230	3	210					[illegible]		—	✓		105	70
1800	376/310	3.5/3.5	81.4/376	1 3/4					✓	12/120		230	0	210					[illegible]		2035	✓		100	68
1900	85/320	5.4/5.1	80.3/366	1 3/4					✓	0/200		220	8	215					[illegible]		.	✓		105	67
2000	80/315	5.1/5.0	80.4/364	1 3/4					✓	0/150		230	9	205					[illegible]		2035	✓		105	68
2100	75/310	5.5/5.6	80.7/362	1 3/4					✓	12/140		230	8	228					[illegible]		.	✓		105	66
2200	[illegible]	6.0/6.0	80.1/360	0					✓	12/160		230	8	222					[illegible]		2035	✓		105	60
2300 ENDING	110/330	6.0/5.2	74.9/360	1 3/4					✓	12/180		230	4	230					504		2035	✓		105	
TOTAL																									

BOILER STEAMING HOURS

BOILER NO	HOURS TODAY	HOURS SERVICE OVERHAUL
1.		
2		
3.		

FUEL OIL RECEIVED

TIME	LOADS	SOUNDINGS BEFORE	SOUNDINGS AFTER	GALLONS RECEIVED

STATEMENT

FUEL OIL SOUNDINGS

TIME	#1 TANK SOUNDING	#1 TANK GALLONS	#2 TANK SOUNDING	#2 TANK GALLONS

FUEL OIL METER INTEG	FUEL OIL METER GALLONS USED	FUEL OIL SUCTION PUMP #1	PUMP #1 PRESS.	PUMP #2	PUMP #2 PRESS	PLANT STEAM FLOW INTEG	PLANT STEAM FLOW TOTAL PDS. PER HOUR	CONV. STEAM FLOW INTEG	CONV. STEAM FLOW TOTAL PDS. PER HOUR	NATURAL GAS CONV. INTEG	NATURAL GAS CONV. TOTAL CUBIC FOOT
						03868700		05808600		7962640	
						04006400	137,700	5822500	13,900	7974090	11,450
						4108600	102,200	5832700	10,200	7982420	8,330
						04222900	114,200	5843100	10,400	7991770	9350
						04333200	110,300	5851400	8300	7998390	6620
						04460700	127,500	5858300	6900	8005070	6680
						04564200	103,500	5865600	7300	8010530	5460
						04672200	106,000	5873100	7500	8016140	5610
						04797300	127,100	5879500	6400	8021130	4990
							928,600		70,400		58,490

TOTAL MAKE UP WATER USED | MOVS | TOTAL GAL FUEL OIL USED | TOTAL CU FT GAS USED | TOTAL LBS STEAM EXPORTED | TOTAL LBS STEAM PRODUCED | OPERATOR'S SIGNATURE

TOTAL LBS PRODUCED | BOILER EFF. % | OUTSIDE TEMP HIGH° ____ LOW° ____ MEAN° ____ | DEGREE DAYS | RAINFALL | PLANT SUPERVISOR'S SIGNATURE

STEAM PRODUCED: BOILER # ____ LBS ____ | BOILER # ____ LBS ____

CBC 1130 (C) REV 9/89 (BACK)

2130
2140
2200
2220
2310

PLANT NAME Thomas Plant | BLDG NO 373 | DATE 9-21-90

BOILER PLANT RECORD

TIME	STEAM PRESS	O_2 SET POINT	STACK TEMP.	GAS PRESS	OIL PRESS IN	OIL PRESS OUT	OIL PRESS NOZZ	COND. PUMPS #1	#2	PRESS INPUT	#1 DISCH PRESS	#2 DISCH PRESS	TANK PRESS	TANK TEMP	SOFTENER #1 METER READING	GAL USED	SOFTENER #2 METER READING	GAL USED	WATER S/H	SALT BAGS ADDED	CONV TDS.	AIR COMP #1	#2	PRESS	TEMP. OUTSIDE
																	0 0 C		S		2035			105	62
BEGINNING	80/310	4.7/5.5	371/369	1 3/4				✓		17/180		230.0	8	230			11		S					105	62
2400	85/340	4.8/6.0	85/376	1 3/4				✓		17/180		230.0	8	222					S		2035			105	62
0100	115/330	4.1	85/378	1 3/4				✓		17/160		233.0	9	220					S					105	60
0200	110/370	5.2/6.0	86/360	1 3/4				✓		17/180		234.0	9	230					S		2035			105	59
0300	115/340	5.1/6.0	0/340	1 3/4				✓		17/175		233.0	8	230					S					105	59
0400	110/310	5.1/6.0	14.0/350	1 3/4				✓		17/185		230.5	8	220					S		2180			105	60
0500	113/340	5.1/6.0	86/360	1 3/4				✓		17/170		235.5	9	220					S					105	
0600	110/330	5.0/6.0	85/340	1 3/4				✓		17/180		235.0	8	220											
0700																									
ENDING																									
TOTAL																									

2330-[illegible]
CONV-[illegible]
[illegible]
#1 [illegible]
[illegible]
2340- B[illegible]
2350-S[illegible]
0500-[illegible]
Checked [illegible]

BOILER STEAMING HOURS

BOILER NO	HOURS TODAY	HOURS SERVICE OVERHAUL
1.		
2.		
3.		

FUEL OIL RECEIVED

TIME	LOADS	SOUNDINGS BEFORE	SOUNDINGS AFTER	GALLONS RECEIVED

STATEMENT

FUEL OIL SOUNDINGS

TIME	#1 TANK SOUNDING	#1 TANK GALLONS	#2 TANK SOUNDING	#2 TANK GALLONS

FUEL OIL METER INTEG	GALLONS USED	FUEL OIL SUCTION PUMP #1	PUMP #1 PRESS.	PUMP #2	PUMP #2 PRESS	PLANT STEAM FLOW INTEG	TOTAL PDS. PER HOUR	CONV. STEAM FLOW INTEG	TOTAL PDS. PER HOUR	NATURAL GAS CONV INTEG	TOTAL CUBIC FOOT
						04797300		05874500		8021130	
						04898600	1013.00	05884900	54.00	8024850	372.0
						05015900	1173.0	05889900	50.00	8028990	414.0
						05128600	1127.0	05895700	58.00	803349.0	450.0
						05241900	1133.00	05901700	60.00	8037780	429.0
						05354900	1130.0	05907300	56.00	804198.0	420.0
						05468400	1135.00	05913200	59.00	804625.0	427.0
						05582600	1142.00	05919800	66.00	805064.0	439.0
						05703200	1206.00	05926800	70.00	805593.0	529.0
							9059.00		473.00		3,480.0

TOTAL GAL MAKE UP WATER USED 0.0 | MUV % | TOTAL GAL FUEL OIL USED | TOTAL CU. FT. GAS USED 3,480.0 | TOTAL LBS STEAM EXPORTED | TOTAL LBS STEAM PRODUCED | OPERATOR'S SIGNATURE

TOTAL LBS PRODUCED | BOILER EFF. % | OUTSIDE TEMP HIGH° ____ LOW° ____ MEAN° ____ | DEGREE DAYS | RAINFALL | PLANT SUPERVISOR'S SIGNATURE

STEAM PRODUCED BOILER # CONV LBS 47,300 | BOILER # ____ LBS ____

CBC 11300 1A REV 9 89 (BACK)

PLANT NAME: Thomas BLDG NO: 393 DATE: 9/21/90

BOILER PLANT RECORD

TIME	Steam F.T.M. STEAM PRESS	O2 / CO_2 Set Point	%EFF / STACK TEMP.	BURNER DATA: GAS PRESS	OIL PRESS IN	OIL PRESS OUT	OIL PRESS NOZZ	COND. PUMPS #1	#2	PRESS INPUT	FEED PUMPS: #1 DISCH PRESS	#2 DISCH PRESS	TANK PRESS	TANK TEMP.	MAKE UP FEED WATER: SOFTENER #1 METER READING	GAL. USED	SOFTENER #2 METER READING	GAL. USED	WATER S/H	SALT BAGS ADDED	CONV. TDS.	AIR COMPRESSOR COMP #1	#2	PRESS	TEMP OUTSIDE
0700 BEGINNING																	Q.Q.C.								
0800	9f	6.0 / 6.0	831 / 361	–	100	45	13		X	35/41	228		2	214					Soft		2800	X		110	70
0900	85	3.9 / 2.5	824 / 418	–	46	37	22		X	11.5/149	208		1	200					Hard	3	–	X		110	72
1000	75	7.6 / 3.5	82.1 / 418	–	44	36	22		X	11.5/144	208		1	194					Soft		3500	X		110	84
1100	75	3.5 / 3.5	82.2 / 513	–	46	38	22		X	11.5/142	227		1	184					Soft			X		110	82
1200	85	3.5 / 3.5	84.5 / 450	–	72	46	16		X	11.5/76	229		1	188					Soft		3200	X		110	82
1300	90	3.5 / 3.5	84.5 / 452	–	72	46	16		X	11.5/78	227		1	188					Soft			X		110	76
1400	96	3.5 / 3.5	84.4 / 456		72	46	16		X	11.5/36	228		1	194					Soft		3000	X		110	75
1500	80	3.5 / 3.5	85.4 / 376		86	50	14		X	11.5/40	227		1	194					Soft		2600	X		110	73
ENDING																									
TOTAL																									

BOILER STEAMING HOURS: BOILER NO	HOURS TODAY	HOURS SERVICE OVERHAUL
1.		
2.		
3.		

FUEL OIL RECEIVED: TIME	LOADS	SOUNDINGS BEFORE	SOUNDINGS AFTER	GALLONS RECEIVED

STATEMENT

FUEL OIL SOUNDINGS: TIME	#1 TANK SOUNDING	#1 TANK GALLONS	#2 TANK SOUNDING	#2 TANK GALLONS

FUEL OIL METER INTEG	GALLONS USED	FUEL OIL SUCTION PUMP #1	PUMP #1 PRESS.	PUMP #2	PUMP #2 PRESS	PLANT STEAM FLOW INTEG	TOTAL PDS. PER HOUR	CONV. STEAM FLOW INTEG	TOTAL PDS. PER HOUR	NATURAL GAS CONV. INTEG	TOTAL CUBIC FOOT
0021890						05763200		05926880		8055930	
–						05818400	115200	05933100	6300	8058170	2240
–						05924400	106000	05950600	17500	8058170	Ø
0022120	230					06041400	117000	05973600	23000	–	–
22350	230					06156800	115400	05997600	24000	–	–
22470	120					06268800	112000	06015500	17900	–	–
22660	190					06379100	110300	06028800	13300	–	–
22760	100					06494300	115200	06043000	14200	–	
22890	130					06612800	118500	06056900	13900		2240
	1000						909600		130100		

TOTAL GAL MAKE UP WATER USED ____ MUV % ____ TOTAL GAL FUEL OIL USED ____ TOTAL CU. FT. GAS USED ____ TOTAL LBS STEAM EXPORTED ____ TOTAL LBS STEAM PRODUCED ____ OPERATOR'S SIGNATURE ____

TOTAL LBS PRODUCED ____ BOILER EFF. % ____ OUTSIDE TEMP HIGH° ____ LOW° ____ MEAN° ____ DEGREE DAYS ____ RAINFALL ____ PLANT SUPERVISOR'S SIGNATURE ____

STEAM PRODUCED BOILER # ____ LBS ____ BOILER # ____ LBS ____

0745 [illegible]
Conv [illegible]
conden[illegible]
soft [illegible]
[illegible]
0900 # [illegible]
shifte[illegible]
back [illegible]
1000 # [illegible]
opene[illegible]
1100 #
1200 #
1300 #
1400 #
3000
1500 #
2600

BOILER PLANT RECORD

PLANT NAME: THOMAS | BLDG NO: 373 | DATE: 9-21-90

TIME	STEAM PRESS	CO_2	STACK TEMP	GAS PRESS	OIL PRESS IN	OIL PRESS OUT	OIL PRESS NOZZ	COND. PUMPS #1	COND. PUMPS #2	PRESS INPUT	FEED PUMPS #1 DISCH PRESS	#2 DISCH PRESS	TANK PRESS	TANK TEMP	SOFTENER #1 METER READING	SOFTENER #1 GAL. USED	SOFTENER #2 METER READING	SOFTENER #2 GAL. USED	WATER S/H	SALT BAGS ADDED	CONV TDS.	AIR COMPRESSOR COMP #1	COMP #2	PRESS	TEMP OUTSIDE
																	COC								
BEGINNING	[illegible]	[illegible]	400		JC	50	14		✓	110/12	270		0	200				#1	Hard		2000	✓			72
[illegible]	110	[illegible]	[illegible]	—	[illegible]	50	[illegible]		✓	[illegible]	270		0	200				#1	Hard		2500				72
[illegible]	[illegible]	[illegible]	[illegible]	—	[illegible]	[illegible]	3		✓	1/12	270		0	204				#1	Hard	—	2500	✓			70
[illegible]	[illegible]	5	[illegible]	—	77	[illegible]	3		✓	110/12	270		5	206				#1	"		[illegible]	✓			68
2000	[illegible]	[illegible]	[illegible]	—	10	43	13		✓	110/12	270		5	208				#2	soft		[illegible]	✓			67
2100	[illegible]	[illegible]	[illegible]	—	—	—	—		✓	130/12	270		5	214				#2	soft		2035	✓			67
2200	[illegible]	[illegible]	[illegible]	—	—	—	—		✓	125/12	270		5	218				#2	soft		2025	✓			66
2300	[illegible]	[illegible]	[illegible]				—	—	✓	100/12	270		5	220				#2	soft		2500	✓			65
ENDING	[illegible]	[illegible]	[illegible]																						
TOTAL																									

BOILER NO	HOURS TODAY	HOURS SERVICE OVERHAUL	FUEL OIL RECEIVED TIME	LOADS	SOUNDINGS BEFORE	SOUNDINGS AFTER	GALLONS RECEIVED	STATEMENT
1.								
2.								
3.								

BOILER STEAMING HOURS

FUEL OIL SOUNDINGS

TIME	#1 TANK SOUNDING	#1 TANK GALLONS	#2 TANK SOUNDING	#2 TANK GALLONS

FUEL OIL METER INTEG.	GALLONS USED	FUEL OIL SUCTION PUMP #1	PUMP #1 PRESS.	PUMP #2	PUMP #2 PRESS	PLANT STEAM FLOW INTEG	TOTAL PDS. PER HOUR	CONV. STEAM FLOW INTEG	TOTAL PDS. PER HOUR	NATURAL GAS CONV. INTEG	TOTAL CUBIC FOOT
22890						06612800		06056900		8058170	
0022960	70					06741600	128000	06669200	12200	8058170	Ø
0023040	80					[illegible]	100700	[illegible]	9400	8058170	Ø
0023140	100					06849400	[illegible]	[illegible]	9150	8058170	Ø
[illegible]150	20					[illegible]	[illegible]	[illegible]	7550	no oil	
0023190	30					07181800	114300	[illegible]	7400	no oil	
0023200	110					07289600	101800	[illegible]	6100	8060970	2850
[illegible]						07399800	110250	06113500	5850	8064240	3270
						07516400	117100	06114700	6200	8068420	4180
							904100		62850		10250

TOTAL GAL MAKE UP WATER USED | MUV % | TOTAL GAL FUEL OIL USED | TOTAL CU. FT. GAS USED 10250 | TOTAL LBS STEAM EXPORTED | TOTAL LBS STEAM PRODUCED | DEGREE DAYS | RAINFALL

STEAM PRODUCED BOILER # [illegible] LBS 62800 | BOILER # ______ LBS ______ | TOTAL LBS PRODUCED 904100 | BOILER EFF. % | OUTSIDE TEMP HIGH° ______ LOW° ______ MEAN° ______

OPERATOR'S SIGNATURE

PLANT SUPERVISOR'S SIGNATURE

530 [illegible]
[illegible]
[illegible]
#2
[illegible]
[illegible]
[illegible]
[illegible]
2180 [illegible]
[illegible]
2100 [illegible]
2300 [illegible]

CBC 11300/1C REV 8-89 (BACK)

BOILER PLANT RECORD

PLANT NAME: THOMAS　　BLDG NO: 373　　DATE: 9-24-90

TIME	STEAM PRESS (Stm Temp)	CO_2 (O2)	STACK TEMP. (% Eff)	GAS PRESS	OIL PRESS IN	OIL PRESS OUT	OIL PRESS NOZZ	COND. PUMPS #1	COND. PUMPS #2	PRESS INPUT	FEED PUMPS #1 DISCH PRESS	#2 DISCH PRESS	TANK PRESS	TANK TEMP.	SOFTENER #1 METER READING	SOFTENER #1 GAL USED	SOFTENER #2 METER READING	SOFTENER #2 GAL USED	WATER S/H	SALT BAGS ADDED	CONV. TDS.	AIR COMPRESSOR COMP #1	COMP #2	PRESS	TEMP. OUTSIDE
2300 BEGINNING																	00C								
2400	110/330	5.7/6.0	79.7/357	1 3/4					✓	12/360	234.1		5	220											
0100	115/350	5.8/6.0	79.6/364	1 3/4					✓	12/355	—	234.8	5	220											
0200	110/330	5.8/6.0	79.1/360	1 3/4					✓	0/180		235.1	5	220											
0300	110/330	5.7/6.0	79.4/360	1 3/4					✓	12/190		234.8	4	210											
0400	90/330	5.4/6.0	79.1/361	1 3/4					✓	0/98		200.6	3	190											
0500	102/330	5.9/6.0	79.8/365	1 3/4					✓	12/200		234.8	5	220											
0600	115/330	5.6/6.0	79.1/368	1 3/4					✓	12/190		236.1	5	220											
0700 ENDING	110/330	6.0/6.0	79.1/364	1 3/4					✓	12/300		234.6	5	220			O.O.C								
TOTAL																									

BOILER STEAMING HOURS / **FUEL OIL RECEIVED** / **STATEMENT** / **FUEL OIL SOUNDINGS**

BOILER NO	HOURS TODAY	HOURS SERVICE OVERHAUL	TIME	LOADS	SOUNDINGS BEFORE	SOUNDINGS AFTER	GALLONS RECEIVED	STATEMENT	TIME	#1 TANK SOUNDING	#1 TANK GALLONS	#2 TANK SOUNDING	#2 TANK GALLONS
1.													
2.													
3													

FUEL OIL METER INTEG.	GALLONS USED	FUEL OIL SUCTION PUMP #1	PUMP #1 PRESS.	PUMP #2	PUMP #2 PRESS	PLANT STEAM FLOW INTEG	TOTAL PDS. PER HOUR	CONV. STEAM FLOW INTEG	TOTAL PDS. PER HOUR	NATURAL GAS CONV. INTEG	TOTAL CUBIC FOOT
						12995100		06373900		8244440	
						13111200	1161.0	06378900	50.0	8247670	323.0
						13217600	1064.0	06383100	42.0	8250590	292.0
						13331300	1137.0	06387400	43.0	8253450	286.0
						13444300	1130.0	06391400	40.0	8256290	284.0
						13556900	1126.0	06395000	36.0	8259070	278.0
						13671700	1148.0	06399400	44.0	8261940	287.0
						13786500	1148.0	06404700	53.0	8264910	297.0
						13906400	1199.0	06410600	59.0	8269120	421.0
							9113.0		36,700		24650

TOTAL GAL MAKE UP WATER USED ____ MUV % ____ TOTAL GAL FUEL OIL USED ____ TOTAL CU. FT. GAS USED ____ TOTAL LBS STEAM EXPORTED ____ TOTAL LBS STEAM PRODUCED ____

STEAM PRODUCED BOILER # CONV LBS ____ BOILER # ____ LBS ____ TOTAL LBS PRODUCED ____ BOILER EFF. % ____ OUTSIDE TEMP HIGH° ____ LOW° ____ MEAN° ____ DEGREE DAYS ____ RAINFALL ____

OPERATOR'S SIGNATURE ____
PLANT SUPERVISOR'S SIGNATURE ____

CBC 11300 1A REV 9 89 (BACK)

2335-Alarm
CON- BOT
#2 ...
#1 A...
Che...
2340- BBI...
2350-Sh...
0440-R...
0500-A...
Ch...
#1 Sn...
0700-#2...
Che...

BOILER PLANT RECORD

PLANT NAME: Thomas   REPORT NO: 373   DATE: 9/24/90

TIME	STEAM PRESS	62	STACK TEMP	BURNER DATA: GAS PRESS	OIL PRESS IN	OIL PRESS OUT	OIL PRESS NOZZ	COND. PUMPS: #1	#2	PRESS INPUT	FEED PUMPS: #1 DISCH PRESS	#2 DISCH PRESS	TANK PRESS	TANK TEMP	MAKE UP FEED WATER: SOFTENER #1 METER READING	GAL USED	SOFTENER #2 METER READING	GAL USED	WATER S/H	SALT BAGS ADDED	CONV TDS	AIR COMP		TEMP OUTSIDE
0700 BEGINNING															O,G,C									
0800	330/55	39	78.0/369	1 3/8					x	12/130	183		2	172					5	4	2600	/	105	75
0900	330/36	36	83.1/354	1 7/8					x	12/100	229		2	138					5		—	/	105	82
1000	330/57	5.2	80.4/350	1 3/8					/	+/98	229		2	109					5		3150	/	105	90
1100	325/55	5.5	80.5/360	1 3/8					/	11.5/130	230		2	186					5		—	/	105	90
1200	320/90	36	75.2/365	1 3/8					/	11.5/100	230		2	162					5		—	/	105	86
1300	330/55	3.6	78.5/364	1 3/8					/	11.5/96	229		2	170					5		—	/	105	86
1400	327/55	33	80.7/408	1 7/8					/	0/92	230		2	190					5		3500	/	105	85
1500 ENDING	325/92	3.7	82.7/400	1 3/8					/	0/92	230		2	186					5		—	/	105	74
TOTAL																								

07,30 Relieved Secured

Note: Bob E[illegible]

BOILER STEAMING HOURS

BOILER NO	HOURS TODAY	HOURS SERVICE OVERHAUL
1. Cav	8.0	
2.		
3. /		

FUEL OIL RECEIVED

TIME	LOADS	SOUNDINGS BEFORE	SOUNDINGS AFTER	GALLONS RECEIVED

STATEMENT

FUEL OIL SOUNDINGS

TIME	#1 TANK SOUNDING	#1 TANK GALLONS	#2 TANK SOUNDING	#2 TANK ALLONS

FUEL OIL METER INTEG	GALLONS USED	FUEL OIL SUCTION PUMP #1	PUMP #1 PRESS	PUMP #2	PUMP #2 PRESS	PLANT STEAM FLOW INTEG	TOTAL PDS. PER HOUR	CONV. STEAM FLOW INTEG	TOTAL PDS. PER HOUR	NATURAL GAS CONV. INTEG	TOTAL CUBIC FOOT
						13904400		06410600		8267120	
						14022200	115,800	06426600	16000	8288260	14140
						14111700	89,500	06422300	5700	8290750	7490
						14232200	120,500	06445000	12,700	8304320	13570
						14339400	107,200	06452000	7000	8309050	4760
						14455900	116,500	06472000	20,000	8331110	22,030
						14565200	109,300	06489200	17,200	8348930	17,820
						14687100	121,900	06505700	16,500	8367710	18,790
						14798300	111,200	06519400	13,700	8381350	13,640
							891,900				104,230

TOTAL GAL MAKE UP WATER USED: MUV %:   TOTAL GAL FUEL OIL USED: TOTAL CU FT GAS USED: 104,230   TOTAL LBS STEAM EXPORTED: 891,900   TOTAL LBS STEAM PRODUCED: OPERATOR'S SIGNATURE:

STEAM PRODUCED: BOILER # Cav LBS 107,800   BOILER # ____ LBS ____   TOTAL LBS PRODUCED: 107,800   BOILER EFF. %:   OUTSIDE TEMP HIGH° ____ LOW° ____ MEAN° ____   DEGREE DAYS   RAINFALL   PLANT SUPERVISOR'S SIGNATURE

CBC 11300/18 REV 9 89 (BACK)

BOILER PLANT RECORD

PLANT NAME Thomas Plant

BLDG NO 273

DATE 9-24-90

TIME	Steam Temp / STEAM PRESS	O2 / O2 set Boiler	BEF% / STACK TEMP.	BURNER DATA: GAS PRESS	OIL PRESS IN	OIL PRESS OUT	OIL PRESS NOZZ	COND. PUMPS: #1	#2	PRESS INPUT	FEED PUMPS: #1 DISCH PRESS	#2 DISCH PRESS	TANK PRESS	TANK TEMP.	MAKE UP FEED WATER: SOFTENER #1 METER READING	GAL. USED	SOFTENER #2 METER READING	GAL. USED	WATER S/H	SALT BAGS ADDED	CONV. TDS.	AIR COMPRESSOR: COMP #1	#2	PRESS	TEMP OUTSIDE
1530 BEGINNING															OOC										
1600	320/90	3.4/3.5	94.2/460	—	68	44	17		✓	11.5	230		0	170					5		3900	✓		120	71°
1700	320/84	5.5/6.0	90.2/356	1 3/4					✓	0	239		5	190					5		3500	✓		120	70°
1800	320/96	5.2/6.0	90.3/351	1 3/4					✓	11.5	228		0	210					5		3500	✓		120	68°
1900	315/76	5.2/6.0	90.4/352	1 3/4					✓	0	235		5	200					5		3500	✓		120	67°
2000	315/92	5.5/6.0	90.5/352	1 3/4					✓	0	232		5	214					5		3500	✓		120	66°
2100	315/82	5.2/6.0	90.6/352	1 3/4					✓	12	230		5	218					5		3500	✓		120	66°
2200	320/86	5.1/6.0	80.4/352	1 3/4					✓	12	231		5	220					5		3150	✓		120	66°
2300 ENDING	320/96	5.1/6.0	80.1/364	1 3/4					✓	12	231		5	220					5		2250	✓		120	65°
TOTAL																									

BOILER STEAMING HOURS: BOILER NO	HOURS TODAY	HOURS SERVICE OVERHAUL	FUEL OIL RECEIVED: TIME	LOADS	SOUNDINGS BEFORE	SOUNDINGS AFTER	GALLONS RECEIVED	STATEMENT	FUEL OIL SOUNDINGS: TIME	#1 TANK SOUNDING	#1 TANK GALLONS	#2 TANK SOUNDING	#2 TANK GALLONS
1.													
2.													
3.													

FUEL OIL METER: INTEG.	GALLONS USED	FUEL OIL SUCTION: PUMP #1	PUMP #1 PRESS	PUMP #2	PUMP #2 PRESS	PLANT STEAM FLOW: INTEG	TOTAL PDS. PER HOUR	CONV. STEAM FLOW: INTEG	TOTAL PDS. PER HOUR	NATURAL GAS CONV.: INTEG	TOTAL CUBIC FOOT
						14795300		06519400		8381350	
						14927400	129100	06541400	27000	8383040	1690
						15046300	118900	06549800	8400	8383740	700
						15156700	110400	06556600	6800	8388250	4510
						15274000	117300	06564000	7400	8393030	4780
						15383800	109800	06571200	7200	8397510	4480
						15494600	110800	06579000	7800	8402050	4540
						15609300	114700	06585400	6400	8406760	4710
						15733300	124000	06592900	7500	8411880	5120
							935000		73500		30530

TOTAL GAL MAKE UP WATER USED

MUV %

TOTAL GAL FUEL OIL USED

TOTAL LBS PRODUCED

TOTAL CU FT GAS USED

BOILER EFF. %

TOTAL LBS STEAM EXPORTED

OUTSIDE TEMP HIGH° ______ LOW° ______ MEAN° ______

TOTAL LBS STEAM PRODUCED

DEGREE DAYS

RAINFALL

STEAM PRODUCED

BOILER # Kenw LBS 23500 BOILER # ______ LBS ______

OPERATOR'S SIGNATURE

PLANT SUPERVISOR'S SIGNATURE

1530 assum
or l
1620 open
1730 adde
1815 open
1912 opened
2010 opened
2020 blew
2108 opened
2315 Clea

CBC 11300/1C REV 9 89 (BACK)

BOILER PLANT RECORD

PLANT NAME: Thomas
BLDG NO: 333
DATE: 9 25 96

TIME	STEAM PRESS	CO2	STACK TEMP	GAS PRESS	OIL PRESS IN	OIL PRESS OUT	OIL PRESS NOZZ	COND. PUMPS #1	COND. PUMPS #2	COND. PUMPS PRESS INPUT	FEED PUMPS #1 DISCH PRESS	FEED PUMPS #2 DISCH PRESS	FEED PUMPS TANK PRESS	FEED PUMPS TANK TEMP.	SOFTENER #1 METER READING	SOFTENER #1 GAL USED	SOFTENER #2 METER READING	SOFTENER #2 GAL USED	WATER S/H	SALT BAGS ADDED	CONV. TDS	AIR COMPRESSOR COMP #1	AIR COMPRESSOR COMP #2	AIR COMPRESSOR PRESS	TEMP. OUTSIDE
BEGINNING															QOC										
[illegible]	[illegible]	[illegible]	72 / 412	1.9						2/130	228		5	208	on line				Soft		4300	X	/	110	66
[illegible]	[illegible] / 75	[illegible]	79 / 316	1.9					X	11.5/16	228		5	220	"				Soft		3500	X		110	72
[illegible]	[illegible]	[illegible]	81.3 / [illegible]	1.9						0/35	230		5	220	"				Soft		2900	/		110	88
[illegible]	275	6.0	80.3 / 319	1.9						0/86	230		5	212	"				Soft		2800	X		109	88
1200	265	5.4	80.4 / 350	1.9					X	11.5/22	228		2	214	"				Soft		2800	X		109	94
1300	280	5.6 / 6.0	81 / 348	1.9						3/148	230		2	210	"				Soft		2750	X		107	78
1400	275	5.3 / 6.0	80.2 / 360	1.9						0/57	230		5	214	"				Soft		2750		X	107	76
1500	3.6 / [illegible]	5.9 / 6.0	79.2 / 358	1.9						0/128	228		5	220	"				Soft		2750	X		109	74
ENDING																									
TOTAL																									

BOILER STEAMING HOURS / FUEL OIL RECEIVED / STATEMENT

BOILER NO	HOURS TODAY	HOURS SERVICE OVERHAUL	TIME	LOADS	SOUNDINGS BEFORE	SOUNDINGS AFTER	GALLONS RECEIVED	STATEMENT
1.								
2.								
3.								

FUEL OIL SOUNDINGS

TIME	#1 TANK SOUNDING	#1 TANK GALLONS	#2 TANK SOUNDING	#2 TANK GALLONS

FUEL OIL METER INTEG.	FUEL OIL METER GALLONS USED	FUEL OIL SUCTION PUMP #1	PUMP #1 PRESS.	PUMP #2	PUMP #2 PRESS	PLANT STEAM FLOW INTEG	PLANT STEAM FLOW TOTAL PDS. PER HOUR	CONV. STEAM FLOW INTEG	CONV. STEAM FLOW TOTAL PDS. PER HOUR	NATURAL GAS CONV. INTEG	NATURAL GAS CONV. TOTAL CUBIC FOOT
						16637100		06642200		8448010	
						16750700	113600	06658800	16700	8463860	15850
						16867700	117000	06665900	7000	8469610	5750
						16987700	122000	06671300	5400	8473070	3460
						17098200	116500	06679300	8000	8477530	4470
						17202100	103900	06686300	7000	8482210	4680
						17319100	117000	06693300	7000	8486240	4030
						17432000	112900	06700000	6700	8490710	4470
						17542400	110400	06705800	5800	8494880	4170
							905300		63600		46880

TOTAL GAL MAKE UP WATER USED ______ MUV % ______ TOTAL GAL FUEL OIL USED ______ TOTAL CU FT GAS USED ______ TOTAL LBS STEAM EXPORTED ______ TOTAL LBS STEAM PRODUCED ______

TOTAL LBS PRODUCED ______ BOILER EFF % ______ OUTSIDE TEMP HIGH° ______ LOW° ______ MEAN° ______ DEGREE DAYS ______ RAINFALL ______

STEAM PRODUCED BOILER # ______ LBS ______ BOILER # ______ LBS ______

OPERATOR'S SIGNATURE ______

PLANT SUPERVISOR'S SIGNATURE ______

0745 A[...]
Conv. t[...]
conde[...]
soft 1[...]
valve [...]
conduct[...]
0815 N[...]
0900 =
1000 #
Boiler [...]
Press. [...]
Quincy
1100 #
1200 #
1215 C[...]
and re[...]
1300 #
1400 #
1500 #

CBC 11300/18 REV 9 89 (BACK)

APPENDIX E

CORRESPONDENCE REGARDING EMISSION LIMITS FOR BOILER

RESOURCE MANAGEMENT AGENCY
county of ventura

Air Pollution Control District

Richard H. Baldwin
Air Pollution Control Officer

July 26, 1990

B. Herrington, Director, Planning/Environmental Division
U.S. Naval Construction Battalion Center
Code 80, Public Works, Bldg 850
Port Hueneme, CA 93043-5000

RE: Application for Permit to Operate #1012-101

Dear Mr. Herrington:

Your application for the referenced Ventura County Air Pollution Control District (APCD) Permit to Operate for a Cleaver Brooks Steam Boiler located at the Thomas Plant is incomplete. In order to make your application complete, you must provide the stack test report required by Condition #F.1. on the Authority to Construct for this project, dated July 29, 1987. Also note that this boiler is now subject to additional requirements, see District Rule 74.15. Please review this rule, note the carbon monoxide limits, the required test methods, new reporting requirements, and the bi-annual testing needs. Testing shall demonstrate compliance with the Authority to Construct conditions and District Rule 74.15. In case of conflict, the more stringent requirement shall apply. Two one hour tests shall be performed at 25, 50, 75, and 100% of rated load, or as close to these values as possible. If the test results vary widely, a third test will be required. The 180 day period, within which the approval or disapproval of your application is required by District Rule 25, will not begin until the test report is received.

Submit the test report by September 28, 1990. If additional time is required or you wish to schedule a mutually acceptable source test date, please contact the Bill Flynn at (805)654-2664.

A temporary permit to operate for the subject boiler is enclosed. This temporary operating permit is considered valid until such time as the Permit to Operate is issued or the application is denied. This temporary operating permit is issued based on the statement on the Permit to Operate application that all attachments previously submitted with the Authority to Construct application are valid and no changes have been made. Specifically, the steam boiler may only be operated if equipped with a low NOx burner, a flue gas recirculation system, and oxygen trim, or equivalent emission control methods. Please post this permit in accordance with District Rule 19.

Failure to submit complete or adequate information, within a reasonable period of time, may be grounds for the disapproval of your application. If disapproval occurs, your temporary permit to operate would be rescinded and your project would then be considered only upon resubmittal of the application package, accompanied by the required test report and the appropriate fees (see District Regulation III).

Sincerely,

Karl E. Krause

Karl E. Krause, Manager
Engineering Section

RESOURCE MANAGEMENT AGENCY
county of ventura

Air Pollution Control District

Richard H. Baldwin
Air Pollution Control Officer

August 27, 1990

L.A. Sollenberger, Commander, Civil Engineers Corps
U.S. Navy
Public Works Officer
Naval Construction Battalion Center
Attention: J. Reichle, P.E., NEESA-111C1
Port Hueneme, CA 93043-5000

RE: P/O 1012-101

Dear Mr. Reichle;

As requested in your letter dated August 14, 1990, I have reviewed your test protocol for the Cleaver-Brooks Boiler located in Building 373 Steam Plant. The test plans, modified with the changes we discussed by telephone on August 27, 1990, are acceptable. The most important changes being the need to measure fuel flow during the tests and to use calibration gases that are close to the actual measured concentrations as required by test method CARB 1-100.

If you have further questions or wish to schedule mutually acceptable source test date(s) please call me at (805)654-2664.

Sincerely,

W.J. Flynn
Engineering Section

5090/88blh
September 13, 1990

Resource Management Agency
Air Pollution Control District
Attn: Mr. Allen Danzig
800 South Victoria Avenue
Ventura, CA, 93009

Dear Mr. Danzig

Confirming this morning's phone conversations with you and Bill Flynn, it is the understanding of our staff, that with respect to acceptance testing of our new boiler, APCD Rule 74.15 is the standard that the boiler manufacturer must meet. This standard provides that NOx emissions shall not exceed 40ppm and CO emissions shall not exceed 400ppm.

We currently anticipate acceptance of the boiler on the basis of achieving or exceeding the 40/400 criteria, by the end of this week. Source testing will then be performed at various load levels, in accordance with Authority to Construct #1012-1 and the transmittal letter, dated July 26 1990, for Permit to Operate #1012-101. This Source Testing, will be performed during the week of 17 September, possibly extending into the week of 24 September. Mr. Flynn will be kept aprised by phone, of testing progress so that he may attend any of the test sessions he wishes to observe.

Point of contact for further information is LT Cris Long, phone 982-3740

Sincerely,

L. A. SOLLENBERGER
Commander, Civil Engineer Corps
U. S. Navy
Public Works Officer
By direction of the Commanding Officer

Copy to: NEESA Code 111C

APPENDIX F

RESUMES OF EMISSION TEST PERSONNEL

RESUME

DREK A. NEWTON	Mechanical Engineer
1984	B.S. Mechanical Engineering Cal Poly State University San Luis Obispo, CA
1984-1986	Research and Development Engineer VETCO Offshore, Inc. Ventura, CA
1987-Present	Mechanical Engineer Coal/Air Department Naval Energy and Environmental Support Activity Port Hueneme, CA

RESUME

JIM REICHLE, P.E.	Mechanical Engineer
1982	B.S. Mechanical Engineering University of Portland Portland, OR
1982-1983	Mechanical Engineer FPH Forest Grove, OR
1983-1985	Mechanical Engineer Fläkt Evaporator AB Jönköping, Sweden
1985-Present	Mechanical Engineer Naval Energy and Environmental Support Activity Port Hueneme, CA

RESUME

DAVID COOK	Environmental Engineer
1990	B.S. Environmental Engineering Cal Poly State University San Luis Obispo, CA
1990-Present	Environmental Engineer Coal/Air Department Naval Energy and Environmental Support Activity Port Hueneme, CA

RESUME

KEATON JEFFREY MCCALLISTER	Mechanical Engineer
1987	B.S. Mechanical Engineering Kansas State University Manhattan, Kansas
1988 to Present	Mechanical Engineer, PDC Naval Facilites Engineering Command on assignment to: Coal/Air Department Naval Energy and Environmental Support Activity from: Mobile Utilities Support Equipment Engineering Office Naval Energy and Environmental Support Activity Port Hueneme, California