Spot checked 8-18-
Could check short calcs.

COMPANY: SOLAR TURBINES
DATE: JUNE 26 1989
UNIT: TURBINE #1
REPORT #: 89-017

NOx/CO/O2 DATA

RUN #1

TIME INTERVAL BEGIN	- END	CONCENTRATIONS O2;%	NOx;ppm	CO;ppm	% Full Scale O2%fs	NOx%fs	CO%fs
12:25 PM	- 12:30 PM	17.63	45.05	4.49	80.7	54.5	14.5
12:30 PM	- 12:35 PM	ok 17.63	ok 45.05	ok 4.49	80.7	54.5	14.5
12:35 PM	- 12:40 PM	17.71	45.05	4.49	81	54.5	14.5
12:40 PM	- 12:45 PM	17.71	44.55	4.49	81	54	14.5
12:45 PM	- 12:50 PM	17.71	45.05	4.49	81	54.5	14.5
12:50 PM	- 12:55 PM	17.71	45.56	4.49	81	55	14.5
Averages;		17.68 ✓	45.05	4.49 ✓	81	55	15

	O2	NOx	CO
INITAL zero	10	9.9	10
INITAL span	70	59	60.5
FINAL zero	10	9.9	10.1
FINAL span	71	59	60.3
ZERO DRIFT %/ppm:	0	0	0
CALIB. DRIFT %/ppm:	0.3	0	0
ZERO DRIFT %fs:	0	0	-0.1
CALIB.DRIFT %fs:	-1	0	0.2
CAL GAS value	15	49.6	50.4
FULL SCALE RANGE	25	100	100

SDCFM = 10162 (average flow rates from EPA #2,3 & 4)

	%O2	NOx, ppm ppm	@ 3 %O2	@15%O2	lbs/hr
NOx values;	17.68 ok	45.05 ok	ok 250	82.5	3.33 ok

	%O2	CO, ppm ppm	@ 3 %O2	@15%O2	lbs/hr
CO values;	ok 17.68	ok 4.49	ok 25	8.2	0.2

COMPANY: SOLAR TURBINES
DATE: JUNE 26 1989
UNIT: TURBINE #1
REPORT #: 89-017

NOx/CO/O2 DATA

RUN #2

TIME INTERVAL BEGIN	- END	CONCENTRATIONS O2;%	NOx;ppm	CO;ppm	% Full Scale O2%fs	NOx%fs	CO%fs
02:05 PM	- 02:10 PM	17.50	47.04	4.60	80	55.5	14.5
02:10 PM	- 02:15 PM	17.50	47.04	4.60	80	55.5	14.5
02:15 PM	- 02:20 PM	17.50	47.04	4.80	80	55.5	14.7
02:20 PM	- 02:25 PM	17.50	47.04	4.70	80	55.5	14.6
02:25 PM	- 02:30 PM	17.50	47.04	4.60	80	55.5	14.5
02:30 PM	- 02:35 PM	17.50	44.24	4.60	80	52.8	14.5
Averages;		17.5	46.57	4.65	80	55	15

	O2	NOx	CO
INITAL zero	10	10.2	9.9
INITAL span	69.8	59	60.2
FINAL zero	10.2	10	10
FINAL span	69.9	52.5	60.1
ZERO DRIFT %/ppm:	0.1	0	0
CALIB. DRIFT %/ppm:	0	-7	0
ZERO DRIFT %fs:	-0.2	0.2	-0.1
CALIB.DRIFT %fs:	-0.1	6.5	0.1
CAL GAS value	15	49.6	50.4
FULL SCALE RANGE	25	100	100

SDCFM = 10013 (average flow rates from EPA #2,3 & 4)

	%O2	NOx, ppm ppm	@ 3 %O2	@15%O2	lbs/hr
NOx values;	17.5	46.57	245	80.8	3.39

	%O2	CO, ppm ppm	@ 3 %O2	@15%O2	lbs/hr
CO values;	17.5	4.65	24	8.1	0.21

Spot checked 8-18
Charts NC

COMPANY: SOLAR TURBINES
DATE: JUNE 26 1989
UNIT: TURBINE #1
REPORT #: 89-017

NOx/CO/O2 DATA

RUN #3

TIME INTERVAL BEGIN	- END	CONCENTRATIONS O2;%	NOx;ppm	CO;ppm	% Full Scale O2%fs	NOx%fs	CO%fs
03:50 PM	- 03:55 PM	17.51	46.61	4.31	79.6	56.5	14.3
03:55 PM	- 03:50 PM	17.41	47.11	5.02	79.2	57	15
03:50 PM	- 03:55 PM	17.36	47.11	5.02	79	57	15
03:55 PM	- 04:00 PM	17.36	44.10	5.02	79	54	15
04:00 PM	- 04:06 PM	17.36	44.10	5.02	79	54	15
04:06 PM	- 04:11 PM	17.36	43.10	5.02	79	53	15
Averages;		17.39	45.36	4.9	79	55	15

	O2	NOx	CO
INITAL zero	10.2	10	10
INITAL span	69.9	59.8	60.2
FINAL zero	10.1	10	10
FINAL span	68.8	57.5	60.5
ZERO DRIFT %/ppm:	0	0	0
CALIB. DRIFT %/ppm:	-0.3	-2	0
ZERO DRIFT %fs:	0.1	0	0
CALIB.DRIFT %fs:	1.1	2.3	-0.3
CAL GAS value	15	49.6	50.4
FULL SCALE RANGE	25	100	100

SDCFM = 10197 (average flow rates from EPA #2,3 & 4)

	NOx, ppm				
	%O2	PPM	@ 3 %O2	@15%O2	lbs/hr
NOx values;	17.39	45.36	231	76.2	3.36

	CO, ppm				
	%O2	PPM	@ 3 %O2	@15%O2	lbs/hr
CO values;	17.39	4.9	25	8.2	0.22

Charts-NC 8-18

Spot checked

COMPANY: SOLAR TURBINES
DATE: 6-27-89
UNIT: TURBINE #2
REPORT #: 89-017

NOx/CO/O2 DATA

RUN #1

TIME INTERVAL BEGIN	- END	CONCENTRATIONS O2;%	NOx;ppm	CO;ppm	% Full Scale O2%fs	NOx%fs	CO%fs
09:35 AM	- 09:40 AM	ok 17.44	ok 41.58	ok 5.95	79.8	51	15.9
09:40 AM	- 09:45 AM	17.44	41.58	5.34	79.8	51	15.3
09:45 AM	- 09:50 AM	17.41	41.48	5.34	79.7	50.9	15.3
09:50 AM	- 09:55 AM	17.41	41.28	5.85	79.7	50.7	15.8
09:55 AM	- 10:00 AM	17.36	41.28	5.34	79.5	50.7	15.3
10:00 AM	- 10:05 AM	17.36	41.38	5.54	79.5	50.8	15.5
Averages;		17.4 ✓	41.43	5.56 ✓	80	51	16

	O2	NOx	CO
INITAL zero	10	10	10
INITAL span	70	59.4	60
FINAL zero	10	9.6	10
FINAL span	70.3 ok	58.2 ok	60
ZERO DRIFT %/ppm:	0	0	0
CALIB. DRIFT %/ppm:	0.1	-1	0
ZERO DRIFT %fs:	0	0.4	0
CALIB.DRIFT %fs:	-0.3	1.2	0
CAL GAS value	15	49.6	50.4
FULL SCALE RANGE	25	100	100

SDCFM = 10526 (average flow rates from EPA #2,3 & 4)

	%O2	NOx, ppm ppm	@ 3 %O2	@15%O2	lbs/hr
NOx values;	ok 17.4	ok 41.43	ok 212	69.8	3.17

	%O2	CO, ppm ppm	@ 3 %O2	@15%O2	lbs/hr
CO values;	ok 17.4	ok 5.56	ok 28	9.4	0.26

Spot ✓ 8-18
Chart #✓

COMPANY: SOLAR TURBINES
DATE: 6-27-89
UNIT: TURBINE #2
REPORT #: 89-017

NOx/CO/O2 DATA

RUN #2

TIME INTERVAL BEGIN	- END	CONCENTRATIONS O2;%	NOx;ppm	% Full Scale O2%fs	NOx%fs
11:55 AM	- 12:00 PM	17.63	42.79	80.7	52.5
12:00 PM	- 12:05 PM	17.58	42.39	80.5	52.1
12:05 PM	- 12:10 PM	17.58	42.29	80.5	52
12:10 PM	- 12:15 PM	17.63	42.39	80.7	52.1
12:15 PM	- 12:20 PM	17.66	41.79	80.8	51.5
12:20 PM	- 12:25 PM	17.63	41.79	80.7	51.5
Averages;		17.62	42.24	81	52

	O2	NOx
INITAL zero	10	10
INITAL span	70	59.3
FINAL zero	10	10
FINAL span	71	59
ZERO DRIFT %/ppm:	0	0
CALIB. DRIFT %/ppm:	0.3	0
ZERO DRIFT %fs:	0	0
CALIB.DRIFT %fs:	-1	0.3
CAL GAS value	15	49.6
FULL SCALE RANGE	25	100

SDCFM = 11104 (average flow rates from EPA #2,3 & 4)

	%O2	NOx, ppm ppm	@ 3 %O2	@15%O2	lbs/hr
NOx values;	17.62	42.24	231	76	3.41

Spot ✓ 8-18
Charts #✓

COMPANY: SOLAR TURBINES
DATE: 6-27-89
UNIT: TURBINE #2
REPORT #: 89-017

NOx/SO2/O2 DATA

RUN #3

TIME INTERVAL BEGIN	END	CONCENTRATIONS O2;%	NOx;ppm	SO2;ppm	% Full Scale O2%fs	NOx%fs	SO2%f
01:35 PM	01:40 PM	17.79	40.16	2.88	81	49.3	12.9
01:40 PM	01:45 PM	17.72	39.34	2.88	80.7	48.5	12.9
01:45 PM	01:50 PM	17.54	39.34	2.78	80	48.5	12.8
01:50 PM	01:55 PM	17.47	39.54	2.78	79.7	48.7	12.8
01:55 PM	02:00 PM	17.42	39.34	2.58	79.5	48.5	12.6
02:00 PM	02:05 PM	17.32	39.34	2.48	79.1	48.5	12.5
Averages;		17.54 ✓	39.51	2.73	80	49	13

	O2	NOx	SO2
INITAL zero	10	10	10
INITAL span	70	59	91.3
FINAL zero	10	9.5	10
FINAL span	69	58.6	91.3
ZERO DRIFT %/ppm:	0	-1	0
CALIB. DRIFT %/ppm:	-0.3	0	0
ZERO DRIFT %fs:	0	0.5	0
CALIB.DRIFT %fs:	1	0.4	0
CAL GAS value	15	49.6	80.7
FULL SCALE RANGE	25	100	100

SDCFM = 10423 (average flow rates from EPA #2,3 & 4)

	%O2	NOx, ppm ppm	@ 3 %O2	@15%O2	lbs/hr
NOx values;	17.54	39.51	210	69.4	2.99

	%O2	SO2, ppm ppm	@ 3 %O2	@15%O2	lbs/hr
SO2 values;	17.54	2.73	15	4.8	0.29

COMPANY: SOLAR TURBINES
SITE: SAN MARCOS LANDFILL
REPRT #: 89-017
DATES: JUNE 26 & 27, 1989

Chart 4 F-18
SPV

SO2 DATA

TURBINE #1:
RUN #1

TIME	DSCFM	%O2	SO2 RESULTS PPM	@ 3%O2	@15%O2	lb/hr
1225	10162	17.68	0	0.00	0.00	0.00
1230			1	5.56	1.83	0.10
1235			1	5.56	1.83	0.10
1245			1	5.56	1.83	0.10
1247			0	0.00	0.00	0.00
1250			1	5.56	1.83	0.10
1255			1	5.56	1.83	0.10
1300			1	5.56	1.83	0.10
1302			1	5.56	1.83	0.10
1305			1	5.56	1.83	0.10
RUN #1 AVERAGES			0.8	4.45	1.47	0.08

RUN #2

TIME	DSCFM	%O2	SO2 RESULTS PPM	@ 3%O2	@15%O2	lb/hr
1405	10013	17.5	1	5.26	1.74	0.10
1410			1	5.26	1.74	0.10
1415			1	5.26	1.74	0.10
1417			0	0.00	0.00	0.00
1420			1	5.26	1.74	0.10
1423			1	5.26	1.74	0.10
1425			1	5.26	1.74	0.10
RUN #2 AVERAGES			0.9	4.51	1.49	0.09

RUN #3

TIME	DSCFM	%O2	SO2 RESULTS PPM	@ 3%O2	@15%O2	lb/hr
1540	10197	17.39	0	0.00	0.00	0.00
1543			1	5.10	1.68	0.10
1547			1	5.10	1.68	0.10
1552			2.1	10.71	3.53	0.22
1557			0	0.00	0.00	0.00
1600			0	0.00	0.00	0.00
1603			1	5.10	1.68	0.10
1610			1	5.10	1.68	0.10
1613			1	5.10	1.68	0.10
1617			1	5.10	1.68	0.10
RUN #1 AVERAGES			0.81	4.13	1.36	0.08
TURBINE AVERAGES			0.8	4.36	1.44	0.08

COMPANY: SOLAR TURBINES
SITE: SAN MARCOS LANDFILL
REPRT #: 89-017
DATES: JUNE 27, 1989

Spot ✓ 8-18
Chk #✓

SO2 DATA

TURBINE #2:

RUN #1

TIME	DSCFM	%O2	SO2 RESULTS PPM	@ 3%O2	@15%O2	lb/hr
935	10526	17.4	0	0.00	0.00	0.00
940			0	0.00	0.00	0.00
942			1	5.11	1.69	0.11
947			1	5.11	1.69	0.11
950			1	5.11	1.69	0.11
955			1	5.11	1.69	0.11
RUN #1 AVERAGES			ok 0.7 ✓	ok 3.41	1.12	0.07

RUN #2

TIME	DSCFM	%O2	SO2 RESULTS PPM	@ 3%O2	@15%O2	lb/hr
1145	11104	17.62	1	5.46	1.80	0.11
1147			2	10.91	3.60	0.22
1150			2	10.91	3.60	0.22
1157			2	10.91	3.60	0.22
1205			2	10.91	3.60	0.22
1215			2	10.91	3.60	0.22
1222			1	5.46	1.80	0.11
RUN #2 AVERAGES			ok 1.7 ✓	ok 2.36	3.08	0.19

RUN #3: see NOx/SO2/O2 run #3

TIME	DSCFM	%O2	SO2 RESULTS PPM	@ 3%O2	@15%O2	lb/hr
1335	10423	17.54	ok 2.73 ✓	ok 15.00	4.80	0.29
1404						

check chart 6-10-89

TURBINE AVERAGES			ok 1.7	ok 9.25	3.00	0.18

2102
65.4

SO_2 log

6/26/89

Time	Initial Zero	Initial Final	Final Zero	Final Final
1212	0.00	~~80~~ 81	~~000~~	
1326			000	80
1406	-0.00	80.00		
1444	~~-000~~	~~80~~	000	81
1643			-000	80

6/27/89

Time	Initial Zero	Initial Span ~~Final~~	Final Zero	Final Span
0938	000	81.		
1014			000	81
1139	000	81.		
1244			000	81

1315 SO_2 on-line w/ Blue CO pen

CONTINUOUS EMISSION MONITORING SYSTEM (CEMS)
CARB Method 1-100

REFERENCE:

BAAQMD, Manual of Procedures; St-13A, Jan. 1982 State of California, Air Resources Board, Test methods 1-100, June 1979 CRF 40 parts 53 to 80, test methods 7E and 20, 1985.

INSTRUMENTATION SUMMARY:

A constant sample of flue gas is extracted, dried, filtered and delivered to an instrument manifold system for distribution to one or more analyzers. Instrument results are recorded on an analog strip chart recorder. Manifold calibration checks are performed at the beginning and end of each test run. System calibration check is performed at the beginning and end of each day. Final data reduction includes zero and calibration drift corrections by computer.

SAMPLE CONDITIONING SYSTEM:

Sampling system consists of a 316 grade stainless steel probe fitted with a cindered stainless steel or pyrex glass wool particulated filter. The probe is fitted with a teflon (TFE) sample line which connects to a water condensation system located at the sources. The condensation system consists of three (3) 500 ml glass impingers connected in a series, immersed in a dry ice glycol bath. The sample gas leaving the sample conditioner is maintained below 50'F, assuring less than 1% moisture. The gas is delivered to the instrument van with a teflon line (3/8"O.D.) through two in line Balston particulate filters drawn by a teflon coated diaphram pump. The sample system is leak checked prior to sampling by plugging the end of the sample probe and adjusting the sample pump to its maximum rate (approximately 27 in.Hg).

SAMPLING PROCEDURES:

An oxygen traverse is performed to document if a concentration is present. If less than 5% difference is documented a single point run is performed for run #2. Run time is a minimum of one minute plus the average system response time.

MANIFOLD SYSTEM:

Sample gas is delivered to each analyzer through a five (5) way valve and regulated with a needle valve flowmeter. Manifold pressure is controlled by a back pressure regulator which is typically set at three (3) psi. Zero gas (N2) and calibration gases are delivered to the analyzers using the same five-way valve and flowmeter. All manifold parts are glass, stainless steel or teflon materials.

CALIBRATION PROCEDURES:

A. System calibration Procedures:
System calibration checks are performed at the beginning and end of each test day to insure against sample system leaks or contamination. Calibration gas is introduced at the sample probe tip at a normal sample rate and vacuum, the final instrument value must be within +/- 5% of the calibration gas value full scale.

B. Manifold Calibration:
Instrument calibration checks are performed and adjustments made before and after each test run. Each analyzer is checked with a zero grade nitrogen gas for a zero baseline and then with a calibration gas similar to the expected sample concentration (60-90% of full scale).

Calibration gases used in both manifold and system calibrations are EPA protocol No. 1 gases recently analyzed by EPA Standards SRM, or with gases recently analyzed by EPA Reference Methods. All zero and calibration checks are documented and noted on the recorder strip charts. A NO2 efficiency test was performed after each test run.

DATA REDUCTION:

Concentrations are read as % full scale directly from the strip charts. % full scale zero and span readings and calibration gas values are all entered into the computer which calculates actual, corrected concentrations. The following equation is used:

[(%fs-Zi)*Cal.gas(Si-Zi)]*[1+((Si-SFf/Si)/#increments]*[1+((Zi-Zf)/Zi)/#increments]

INSTRUMENTS:

The following instruments will be employed to measure the various compounds:

NOx: Thermo Electron model 10 NO/NOx analyzer
CO: Thermo Electron model 48 CO Analyzer or Automated Custom Systems model 3300 Analyzer
O2: Teledyne Fuel Cell model 320ax O2 analyzer

EQUATIONS:

NOx and CO @ 15% O2 = NOx/CO ppm * (20.9-15%O2)/(20.9-%O2)

NOx and CO @ 3% O2 = NOx/CO ppm * (20.9-3.0%O2)/(20.9-%O2)

NOx or CO lb/hr = NOx/CO ppm * DSCFM * MW * 1.581 * 10-7

MW NOx = 46 grams/mole
MW CO = 28 grams/mole
1.581 * 10-7 = 10 mg/gram * moles /10 moles * 1.195 mol
2.2046 * 10 lb/mg * 60 min/hr