NON-RECOVERY COKE OVEN WASTE HEAT AND AIR POLLUTION CHARACTERIZATION
Revision 1.0

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5.2 Pushing Emissions

Table 5-1 also summarizes the results of the pushing emissions test runs. Because of the difficulty in measuring the exhaust gas volume during pushing, only grab samples of the particulate matter in the air inside the Hotcar shed were collected during pushing. For the 5 test runs the average concentration of particulate matter was 0.23 grains/dscf and the average gas temperature was 215 degrees F. The CO (average of 47 ppm) and total volatile HC (average of 16 ppm) concentrations were measured in an integrated sample obtained from the pushing plume. No SO_2 was detected. As with the charging filters, the four with the highest gas sample volumes were divided and one half was analyzed for metals and the other half was analyzed for BSO and BaP.

Benzene soluble organics (BSO) were detected in one of the four samples at 0.23% of the total particulate matter. Benzo-a-pyrene (BaP) was not detected in any of the samples. The limit of detection was 300 nanograms per sample. For the average pushing sample, this was 0.000038% of the total particulate collected.

Figure 5-5 graphically illustrates the particle size distribution of the pushing emissions. The curves in this figure show that the particle size distribution depends on proximity to the oven being pushed. As large particles fall out inside the Hotcar shed, the size distribution changes (gets smaller). Run #1 was obtained 45-60 feet away from the oven being pushed and contained 10 % of its particle mass at sizes larger than 10 microns (90% smaller than 10 microns). Run #2 was obtained directly above, or very near, the oven being pushed and 63 % of its mass was larger than 10 microns (37% smaller than 10 microns).

As with the charging samples, the particulate material emitted during pushing was analyzed for toxic metals (after digesting the sample) using Inductively Coupled Plasma (ICP). This information has also been included in Table 4-2 with the metal content expressed as percent of total particulate. Lead was present at levels ranging from 0.006 to .026% of the total particulate. Barium was found at levels of 0.014 to

2.0 SUMMARY OF RESULTS

Table 2-1 summarizes the average measurements of sensible heat and air pollutants obtained during this study expressed as normalized emission rates (per ton dry coal charged). This table includes the primary air pollutants as well as the highest values for "toxic" air pollutants. The individual sections of this report contain complete test results as well as specific information about field and analytical procedures.

The coal carbonization cycle used during the tests was 24 hours. Stack emissions occurred on a continuous basis throughout the 24 hour cycle, while pushing and charging emissions occur only during those operations. Pushing was accomplished in approximately 30 seconds per oven. Charging took approximately 3.5 minutes per oven.

All results shown in Table 2-1 are measured results, except for the particulate emission rate for coke pushing which is an EPA emission factor (USEPA, "Compilation of Air Pollutant Emission Factors, Vol. 1: Stationary Point and Area Sources," AP-42, Fourth Edition, September, 1985). Benzene soluble organics (BSO) and benzo-a-pyrene (BaP) measurements were made on samples of the particulate matter obtained during pushing. The emission rates of BSO and BaP were determined by applying the measured values to the emission factor.

3.0 STACK EXHAUST PROFILE
(Revised, January 16, 1991)

In order to characterize the coke oven exhaust gas stream throughout an entire carbonization cycle, measurements of the gas volumetric flowrate and gas characteristics were made at intervals of approximately one hour. In all, 22 separate sets of measurements were made over a 24 hour period.

The results of the gas measurements have been summarized in Table 3-1. Each oven was charged with 25 wet tons (11.4% moisture) of a priority coal blend. All of the measurements were made at the same location, near the exit plane of stack #1 in battery #3-B. The stack temperature averaged 1695 degrees Fahrenheit, and ranged from 1540 to 1785 degrees F. The average gas flowrate from the 8.67 ovens served by the stack (3 stacks for 26 ovens) was 90,700 acfm, and ranged from 62,800 to 113,400 acfm. Sensible heat was exhausted at an average rate of 43.0 MMBTU/hr (range: 28.5 to 54.8 MMBTU/hr). The average normalized heat rate was 5.3 MMBTU/dry ton of coal charged.

The measured mass of CO_2 and H_2O exhausted was compared with the expected amounts of those compounds (based on carbon, hydrogen, and water mass balances). Based on this comparison, the measured values were approximately 15% lower than the expected values. These calculations are included in the Appendix.

The first of the hourly tests was started as soon as the 10 ovens below the stack had been charged. The measurements were made at the same location on the stack as the air emissions stack tests that are discussed in the next section of this report. The velocity pressure of the gas stream was measured using as S-type Pitot tube and the temperature was measured with a K-type thermocouple. The volume percent moisture was measured by condensing the water vapor portion of a slipstream

of the exhaust gas in an ice bath. Tedlar bags were filled with a sample of stack gas and this sample was subsequently analyzed as follows: for CO_2 and O_2 using Fyrite gas analyzers (orsat type); for CO with a Teledyne electrochemical CO/O_2 analyzer; for total volatile hydrocarbons (HC) with a Foxboro Organic Vapor Analyzer (OVA) with an FID detector. Calibration gas standards for the CO and HC analyzers were obtained in compressed gas cylinders from Scott Specialty Gases, Plumsteadville, Pa.

4.0 STACK EMISSIONS

The stack emissions were assessed for a number of parameters, including particulate, SO_2, total and speciated hydrocarbons, and NO_x. All measurements were performed at the Battery 3-B stack, a schematic of which can be seen in Figure 4.1. The location and number of sample and velocity points were determined using EPA Reference Method 1. Subsequent sections detail the methods used in the stack emissions determinations.

4.1 Particulate and SO_2 Emissions

For each of the three runs, the particulate emission rate of the stack was measured using an EPA Method 5 sampling system (see Figure 4.2). The sample train was altered in order to obtain SO_2 emission rates. The modifications followed procedures outlined in EPA Reference Method 8. Supplementary to these measurements, analysis was performed on the probe rinse and the filter in order to determine toxic metal constituents of the particulate emissions.

4.1.1 Sampling and Analytical Procedures

The sampling system consists of sampling train and a control box. The control box is comprised of a fiber vane rotary pump, a dry gas meter with inlet and outlet thermometers, a dual inclined manometer, probe and filter oven temperature controllers, and a calibrated orifice to enable isokinetic sampling. The sampling train components are as follows: a water-cooled, stainless steel lined sampling probe and nozzle assembly, heated filter unit, and impinger train. The water cooled probe was used due to high exhaust gas temperatures. The heated filter holder contained a pre-weighed EPM-2000 low ash glass fiber filter. The probe assembly and the filter unit were connected to one another and attached to a support structure to enable traversing the stack. The filter was connected to the impinger box by a silicon hose. The sampling train was connected to the control box with a flexible umbilical cord. A thermocouple, which was attached to

the probe assembly, was used to obtain stack temperatures. The updraft air velocities were obtained with an S-type pitot tube and a digital manometer.

The impinger train included four 500 ml impingers connected in series with ground glass fittings. The first and third impingers were standard Greenburg-Smith impingers, and the second and fourth were modified Greenburg-Smith types. The first impinger contained 100 ml of 80% isopropanol with glass wool being packed into the impinger outlet in order to prevent carry over of sulfuric acid mist. The second and third impingers each contained 100 ml of 3% hydrogen peroxide. The fourth impinger held 200 grams of silica gel.

Sampling occurred for five minutes at each point. A full velocity traverse was performed prior to inserting the sampling probe. During sampling, the probe and filter temperature were maintained above the gaseous dew point to prevent condensation. Leak checks were performed before and after each test run to insure no system leakage occurred during testing. Immediately after the final leak check, ambient air was drawn through the impingers for 15 minutes so that any SO_2 remaining in the first impinger would be carried over into the second and third impingers.

At the conclusion of a test run, a clean-up was conducted on the sample train. The clean-up procedures were as folows:

Probe Rinse - The nozzle, probe, and front half of the filter were brushed and rinsed with acetone into a leak free jar.

Particulate Filter - The filter was removed from the filter holder and placed into a petri dish and sealed.

Impingers - The water was removed from the first three impingers and measured volumetrically to determine moisture gain, and then placed into a glass jar for later analysis. The fourth impinger containing the silica gel was weighed to determine moisture gain.

The lab analysis procedures used for the samples were as follows:

Probe Rinse - The probe rinse was placed into a pre-weighed beaker and evaporated to dryness at ambient conditions. The beaker was then placed into a desiccator for 24 hours and then weighed to a constant weight which was determined to the nearest 0.1 mg. After weighing, the resulting particulate was analyzed for certain metals using Inductively Coupled Plasma (ICP) emission spectroscopy.

Particulate Filter - The particulate filter was placed in a desiccator for 24 hours. The desiccated filter was also weighed to a constant weight to the nearest 0.1 mg. The filter was then sent to an analytical lab where it was acid digested and the resulting solution analyzed in the same manner as the probe wash.

Impinger Collection - The impinger liquids were titrated with barium perchlorate in order to determine SO_2 and H_2SO_4 concentrations. The titrations were performed according to EPA Method 8 protocol.

The combined dry weights of the probe rinse and filter make up the total particulate catch. This is the value that was used to calculate the particulate emission rate.

4.1.2 Results

The average particulate emission rate from the stack was 24.5 pounds per hour, with the highest of the three emision rates occurring during the first test run (41 pounds per hour). The average SO_2 emission rate for the cycle was 87 pounds per hour. The highest emission for the three runs also occurred during Run 1, when the SO_2 emission rate was 109 pounds per hour. All test results for particulate and SO_2 emissions are summarized in Table 4.1.

The toxic metal data is summarized in Table 4.2. The toxic metals for which the samples were analyzed are as follows: arsenic, barium, beryllium, cadmium, chromium, lead, and thallium. The metals which appeared in samples from all three test runs included arsenic, barium, chromium, and lead.

It appears that the chromium is present as a contaminant rather than representing a constituent of the particulate matter. No chromium was detected in either the pushing or charging samples. In addition to chromium, nickel was present and their relative magnitudes indicate that the samples were probably contaminated by the inconel nozzle or the stainless steel liner of the water cooled probe due to the high temperature stack environment.

The most prevalent toxic metal was lead, which was measured at 0.056 to 0.162% of the total particulate matter. Smaller amounts of arsenic and barium were also detected in all three test runs. The complete results of the ICP scan and the certificates of analysis for all samples and blanks have been included in the Appendix.

4.2 NOx, CO, and Total Volatile Hydrocarbon Emissions

Parallel to the other stack emission tests, an EPA Method 7 train was run in order to determine the nitrogen oxide emissions from the stack. Four samples were run for each test run in order to obtain an average NO_x concentration. In addition to the NO_x sampling, an integrated grab sample was pulled into a Tedlar bag in order to determine the CO and total volatile hydrocarbon (HC) levels in the stack gas. A minimum of one grab sample was acquired during each test run.

4.2.1 Sampling and Analytical Procedures

The sampling system consists of sampling probe, a collection flask, a flask valve, a vacuum gauge, and an evacuation pump (see Figure 4.3). Prior to sampling, the flask was charged with 25 ml of an absorbing solution (a diluted H_2SO_4 and 3% hydrogen peroxide solution). Once the apparatus was assembled, the gas sample was obtained by first evacuating the flask and then valving in the flask so that its vacuum pulled a sample through the probe. The sample analysis was performed using the phenoldisulfonic acid (PDS) colorimetric procedure. The sampling and analysis procedures followed EPA Method 7 protocol.

The bag sample was obtained by pulling the sample into the bag through a glass probe with a squeeze bulb. The samples were analyzed with a Teledyne electrochemical CO/O_2 analyzer and a Foxboro Organic Vapor Analyzer (OVA) for the CO and HC concentrations.

4.2.2 Results

The average NO_x concentration for the three runs was 31.44 ppm, which equates to a mass emission rate of 4.68 pounds per hour. The highest NO_x concentration occurred at the beginning of the cycle (Run 1). The average CO concentration was 11 ppm (0.95 pounds per hour), with the highest value occurring during Run 2, when the concentration was 22 ppm (1.97 pounds per hour). The HC concentration averaged 14.3 ppm, with a high of 18 ppm which occurred during Run 2. A summary of the results can be found in Table 4.1.

4.3 Semivolatile Organics

Concurrent to the particulate emission testing, a separate sampling train was run in order to quantify the emission rates of the semivolatile organics included on the Hazardous Substance List (HSL). The samples were analyzed for a total of 112 semivolatile organic compounds.

4.3.1 Sampling and Analytical Procedures

The samples were obtained using a Modified EPA Method 5 sampling train (see Figure 4.4). This system is designed to collect organic compounds with boiling points higher than 100 °C. The system is a standard Method 5 train except for the addition of an organic sampling module in line between the heated filter and the first impinger.

The organic sampling module consists of three sections: a gas condensing component, a sorbent trap, and a condensate removal trap. The gas condenser coil was cooled via ice water which was pumped through the outer jacket from a separate container. The sorbent trap contained 20 grams of a porous polymeric resin (XAD-2) which met the EPA's recommended criteria for purity. The condensate removal trap was

an impinger similar to the others in the sampling system except that it had a shorter center stem.

The sample recovery for the probe wash, filter, and impinger catch for each test run was similar to the Method 5 train except that methanol was used instead of acetone for all washes. The recovery for the sorbent trap was to remove the trap from the configuration, seal both ends, cover in aluminum foil, and pack in ice for transport.

The sample analyses were performed using a GC/MS (gas chromatograph with mass spectrometer). The filters, washes, and sorbent resins were combined for each test run and soxhlet extracted. The impinger waters and blanks were extracted by separatory funnel. The detection limit for most samples was less than 50 micrograms.

Two resin blanks, one field blank and one travel blank, along with a probe wash blank and an impinger water blank were submited for analysis. The field resin blank was prepared by exposing a sorbent trap to ambient air for approximately ten minutes. The travel blank was simply a sorbent trap which was packaged with the other sorbent traps during transport to the site and during shipment to the lab. Both blanks were analyzed in the same manner as the samples.

4.3.2 Results

Of the 112 compounds for which the samples were analyzed, only four were found in all three test runs. The four compounds were: naphthalene, di-n-butylphthalate, bis(2-ethylhexyl)-phthalate, and phenol. The results for each of the four compounds are summarized in Table 4.3. None of the polycyclic aromatic hydrocarbons (PAHs) typically associated with coke oven emissions were detected (e.g., benzo-a-pyrene, anthracene, phenanthrene, chysene, and pyrene). The semivolatile compound with the highest emission rate over the cycle was naphthalene, which had an average emission rate of 0.0046 pounds per hour. The next most prevalent compound was di-n-butylphthalate, which had an average emission rate of 0.0018 pounds per hour.

None of the other compounds in the search list were consistently found in the test samples at levels above their detection limits. The certificates of analysis for the samples, field blanks, trip blanks, and method blanks can be found in the Appendix.

4.4 Volatile Organics

The test method used for volatile organics is designed to measure compounds with boiling points lower than 100 °C. The specific compound sought were the speciated volatile organic compounds (VOCs) on the EPA Hazardous Substances List (HSL). In addition to the compounds from the HSL, the samples were analyzed for other VOCs, using a computerized library of over 40,000 compounds.

4.4.1 Sampling and Analytical Methods

Samples were collected using a volatile organic sampling train (VOST). The sampling and analytical procedures outlined in SW 846, Methods 0030 and 5040 were followed while conducting the sampling and analysis. A schematic of the sampling train is shown in Figure 4-5. The test consisted of three sampling runs, one run near the beginning of the coking cycle, one near the mid-point of the cycle and one near the end of the cycle. Each run consisted of four sets of samples.

Each set of samples consisted of two sorbent tubes. The first sorbent tube was packed with approximately 1.6 grams of Tenax. The second sorbent tube contained approximately one gram of Tenax and one gram of activated carbon.

After passing through a heated glass probe and the sorbent tubes, the sampled gas stream passed through silica gel desiccant to remove the moisture from the sample. The gas stream then passed through a dry gas meter, which was used to determine the sample volume for each set of sorbent tubes.

After each set of samples was collected, the sorbent traps were placed on dry ic to minimize the possibility of migration of organic compounds through the sorbent media. The samples remained on dry ice until analysis was initiated.

The sorbent tubes were analyzed by thermal desorption followed by gas chromatography, followed by mass spectrometry. Detection limits for the analysis ranged from 5 to 10 nanograms per sample, resulting in an overall detection limit of 0.25 to 0.5 micrograms per cubic meter in the stack gas.

Quality assurance procedures included preparing one set of field blank sample tubes for each of the three sampling runs performed. The field blanks were prepared by simulating the installation of the sorbent tubes into the train. The tubes were opened and allowed to remain exposed to ambient air for a period of approximately ten minutes. The tubes were then recapped and placed on dry ice with the normal samples. The field blanks were analyzed in the same manner as the samples. By exposing a blank pair of sorbent tubes to ambient air, data on the potential effects of trace VOCs present in the ambient air could be gathered and evaluated.

In addition to the field blanks, one trip blank was prepared. The sealed trip blank was packaged with the sorbent tubes during transport to the site, while site work was underway and during the shipment of the samples to the lab. The trip blank provided data on any contamination due to shipment.

4.4.2 Results of Volatile Organic Sampling

Analysis for the 35 volatile organic compounds which comprise the HSL was performed on each sorbent tube pair. Of the 35 compounds included in the analysis, only four compounds were present in each of the samples. Those were, benzene, bromomethane, methyl ethyl ketone (2-butanone) and carbon disulfide. Table 4-4 summarizes the results for each of those four compounds. Benzene was the volatile organic compound found in the greatest quantity, with an average emission rate over the coking cycle of 0.0026 pounds per hour. The next highest emission rate was for bromomethane, with an average emission rate of 0.00019 pounds per hour.

Emission rates for each of the 35 VOCs included in the analysis have been calculated and are included in the Appendix. Also included in the Appendix are the certificates of analysis for the samples, field blanks, trip blanks and method blanks.

Other VOCs were detected in several of the samples but were not found consistently in each of the samples. These compounds include, methylene chloride, 1,1,1-trichloroethane, and acetone. All of these compounds were detected in the field blanks and/or the trip blank. Methylene chloride was also found in the method blank. Therefore, the actual presence of these compounds in the stack gases is u... y.

5.0 PUSHING AND CHARGING EMISSIONS

The pushing and charging emission measurements were made on October 28 and 29, 1989 at battery #3-B at Jewell Coal and Co. The charging emission measurements were made above the door of each oven as it was charged. The pushing emission samples were obtained in the Hotcar shed, above the group of ovens being pushed.

5.1 Charging Emissions

Table 5-1 summarizes the results of the charging emissions test runs. For the 5 test runs, the average charging time was 3.5 minutes. During this time, the average plume flowrate was 26,000 acfm at 340 degrees Fahrenheit (17,000 scfm). The average mass of particulate emitted per charge was 0.27 lbs or 0.013 lbs of particulate per dry ton coal charged. Small concentrations of CO (average of 15 ppm), total volatile HC (average of 19 ppm), and SO_2 (average of 0.8 ppm) were measured in an integrated gas sample obtained from the charging plume. The four filters with the highest gas sample volumes were cut in half. One half of the filter was analyzed for metals and the other half was analyzed for benzene soluble organics and benzo-a-pyrene.

No benzene soluble organics (BSO) were detected in any of the samples. The limit of detection was 0.48 milligrams per sample. For the average charging sample, this was 0.15% of the total particulate collected. Benzo-a-pyrene (BaP) was detected in two of the four samples, but at very low levels (680 and 360 nanograms).

Figure 5-1 graphically illustrates the particle size distribution of the charging emissions. The data in this figure represents a composite sample obtained with a cascade impactor from charging ovens #4 - #7. Approximately 30% of the particles were smaller than 10 microns.

The particulate material emitted during charging was analyzed for toxic metals (after digesting the sample) using Inductively Coupled Plasma (ICP). This information has been summarized in Table 4-2 with the metal content expressed as percent of the

total particulate. The lead content of one charging sample was 0.012%. No lead was detected in the other three samples. All of the samples contained barium at levels of 0.019 to 0.037%. The other metals (arsenic, beryllium, cadmium, chromium, and thallium) were ND, not detected.

Figure 5-2 illustrates the equipment used to measure the charging plume's volumetric flowrate, particulate concentration, and temperature. The equipment was located in the same plane, above the center of the oven door. An S-type Pitot tube was used to measure velocity pressure and a K-type thermocouple was used to measure temperature. The typical angle of" spreading" for thermal plumes in air is 30 degrees. Using this value, the dimensions of the charging plume, as shown in Figures 5-2 and 5-3, was 180 inches by 35 inches. This was also confirmed by visual observation of charging operations.

A high volume stack sampler was used to collect the particulate sample. Figure 5-4 shows the principle components of the high volume sampler. During charging, the air sampling rate was measured using a calibrated orifice flow meter mounted in the sampler. As shown in the figure, a plume gas sample was collected in a Tedlar bag simultaneously with the particulate sample.

Particle size sampling was obtained along with the particulate measurements with an Andersen Mark III cascade impactor located along side the high volume stack sampler. The impactor is a multi-stage, multi-jet device that aerodynamically classifies particles into multiple size ranges and accounts for all their physical properties: namely size, shape, and density. A preseparator was used on the inlet to the impactor to collect particles larger than 10 microns. Following the preseparator, each group of particles was collected on preweighed stainless steel foil plates. In all, there were 8 size groups that ranged from approximately 0.5 to 10 microns.

5.2 Pushing Emissions

Table 5-1 also summarizes the results of the pushing emissions test runs. Because of the difficulty in measuring the exhaust gas volume during pushing, only grab samples of the particulate matter in the air inside the Hotcar shed were collected during pushing. For the 5 test runs the average concentration of particulate matter was 0.23 grains/dscf and the average gas temperature was 215 degrees F. The CO (average of 47 ppm) and total volatile HC (average of 16 ppm) concentrations were measured in an integrated sample obtained from the pushing plume. No SO_2 was detected. As with the charging filters, the four with the highest gas sample volumes were divided and one half was analyzed for metals and the other half was analyzed for BSO and BaP.

Benzene soluble organics (BSO) were detected in one of the four samples at 0.23% of the total particulate matter. Benzo-a-pyrene (BaP) was not detected in any of the samples. The limit of detection was 300 nanograms per sample. For the average pushing sample, this was 0.000038% of the total particulate collected.

Figure 5-5 graphically illustrates the particle size distribution of the pushing emissions. The curves in this figure show that the particle size distribution depends on proximity to the oven being pushed. As large particles fall out inside the Hotcar shed, the size distribution changes (gets smaller). Run #1 was obtained 45-60 feet away from the oven being pushed and contained 10 % of its particle mass at sizes larger than 10 microns (90% smaller than 10 microns). Run #2 was obtained directly above, or very near, the oven being pushed and 63 % of its mass was larger than 10 microns (37% smaller than 10 microns).

As with the charging samples, the particulate material emitted during pushing was analyzed for toxic metals (after digesting the sample) using Inductively Coupled Plasma (ICP). This information has also been included in Table 4-2 with the metal content expressed as percent of total particulate. Lead was present at levels ranging from 0.006 to .026% of the total particulate. Barium was found at levels of 0.014 to

0.025%. Arsenic was found at levels of 0..008 to 0.0.022 % The other metals (beryllium, cadmium, chromium, and thallium) were not detected.

As with charging operations, a high volume stack sampler was used to collect a particulate sample of pushing emissions and a gas sample was simultaneously collected in a Tedlar bag. Particle size sampling was also performed using an Andersen Mark III cascade impactor located along side the high volume stack sampler.

Stack Sampling Jan 11, 1990

Table 4-1 192 dry T coal charged

(24.5 x 24 lbs/cycle)/192 tons/cycle = 3.06 dry tons

① PM ~~lb/hr~~ = 24.5 lb/hr x 1/~~192 T~~ 24.0 hr = ~~.1276 lb/ton~~ 1.03 PM

② SO_2 ~~lb/hr~~ = ~~87~~ lb/hr x 1/192 T/hr coal = ~~.4531~~ ~~.3390~~ 3.63 lb/ton SO_2 10.87

24.0

③ NO_x = 4.68 lb/hr x 1/192 T/hr coal = ~~.0244 lb/ton~~ .195 NO_2

24 hr

④ CO = .95 lb/hr x 1/~~192~~ T/27.1 hr = ~~.0049 lb CO~~ .0396 ton coal

prod. rate (1 - .114) x 26 ovens x 25 T/oven Moist / 24 hr = ~~62.1~~ T/hr

VOC

24.0 T/hr dry

Metal HAP's

Organic HAP's ND - anthracene, phenanthracene chrysene, pyrene

			* 1/192 T/hr coal
Table 4-3	Naphthalene	4.649 E-03 lb/hr	2.42 E-05 lb/t
	Di-n-butyl phthalate	1.84 E-03 lb/hr	9.58 E-06 lb/t
	bis(2-ethylhexyl) phthalate	1.151 E-03 lb/hr	5.99 E-06
	benzo(a) pyrene	0 - ND	ϕ
	phenol	1.011 E-03	5.27 E-06

$* \frac{1}{192 \frac{lb\ coal}{hr}}$

Table 4.4	benzene	2.59 E-03 $\frac{lb}{hr}$	134 E-05
	bromomethane	1.91 E-04	9.95 E-07
	2-butanone	8.35 E-05	4.35 E-07
	carbon disulfide	8.99 E-05	4.68 E-07

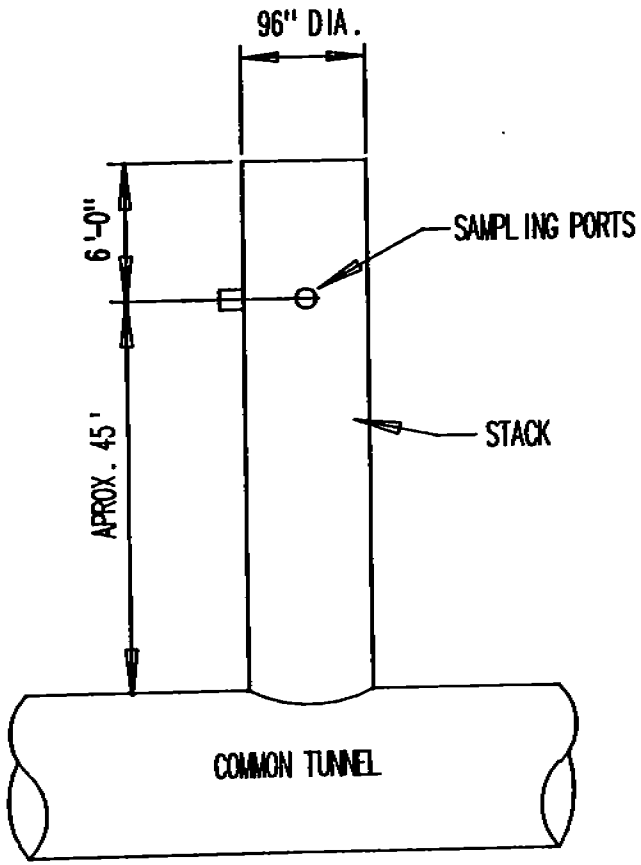
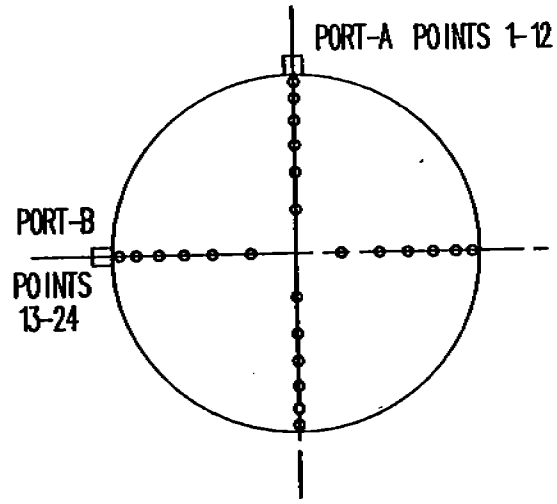


FIGURE 4.1 SCHEMATIC OF BATTERY 3-B STACK



CROSS SECTION

TRAVERSE POINT NO.	DISTANCE FROM WALL (inches)
1/13	2.01
2/14	6.43
3/15	11.33
4/16	17.00
5/17	24.00
6/18	34.08
7/19	61.92
8/20	72.00
9/21	79.00
10/22	84.67
11/23	89.57
12/24	93.98

IIT

STARTING DATE: 11-15-89	DATE LAST REV.:	INITIATOR: M. MOWERY	DRAWING NO.: 406000-S-03
DRAWN BY: M. MOWERY	REV. DRAWN BY:	PROJ. MGR.: J. CARSON	PROJ. NO.: 406000.12

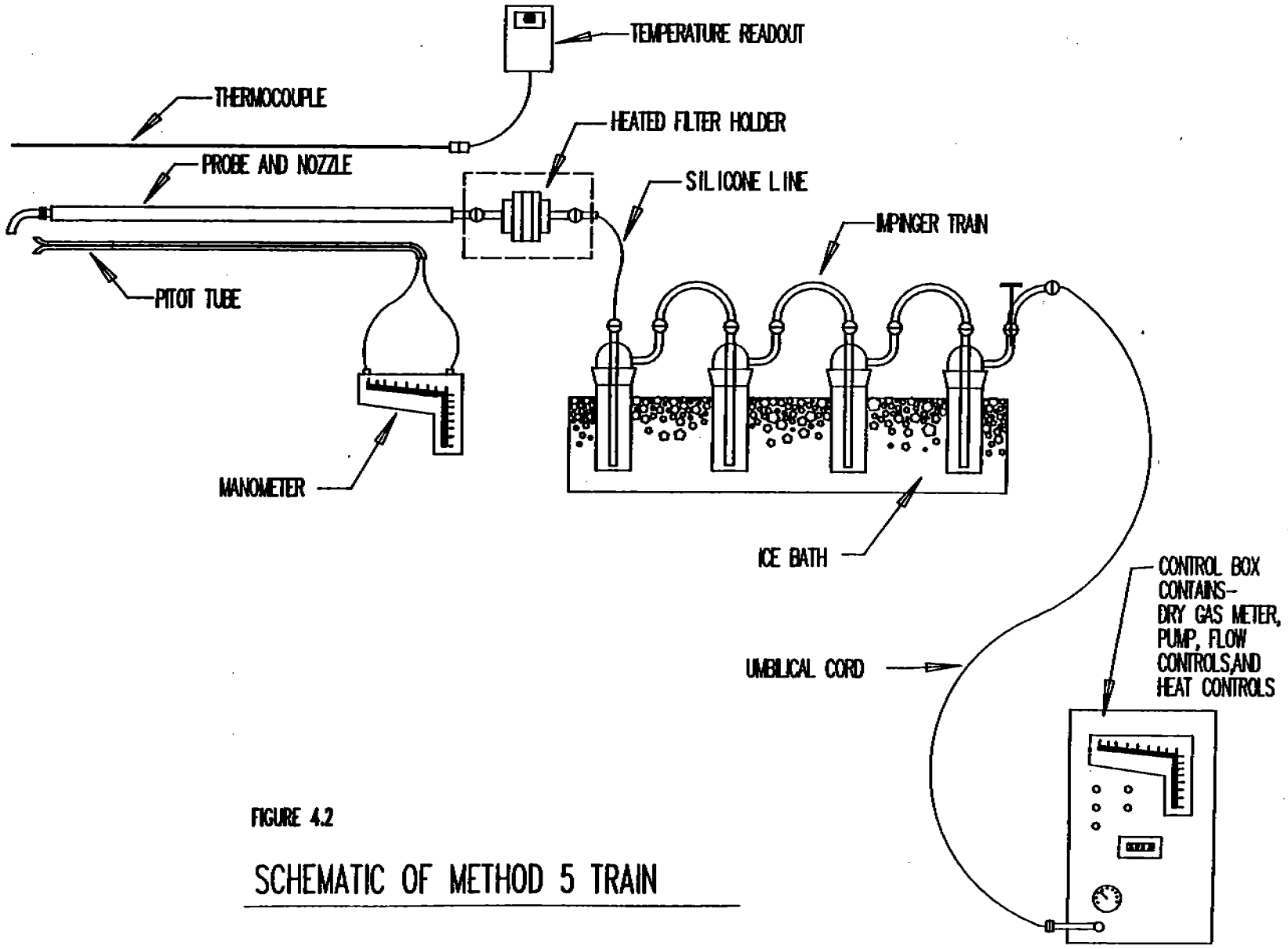


FIGURE 4.2

SCHEMATIC OF METHOD 5 TRAIN

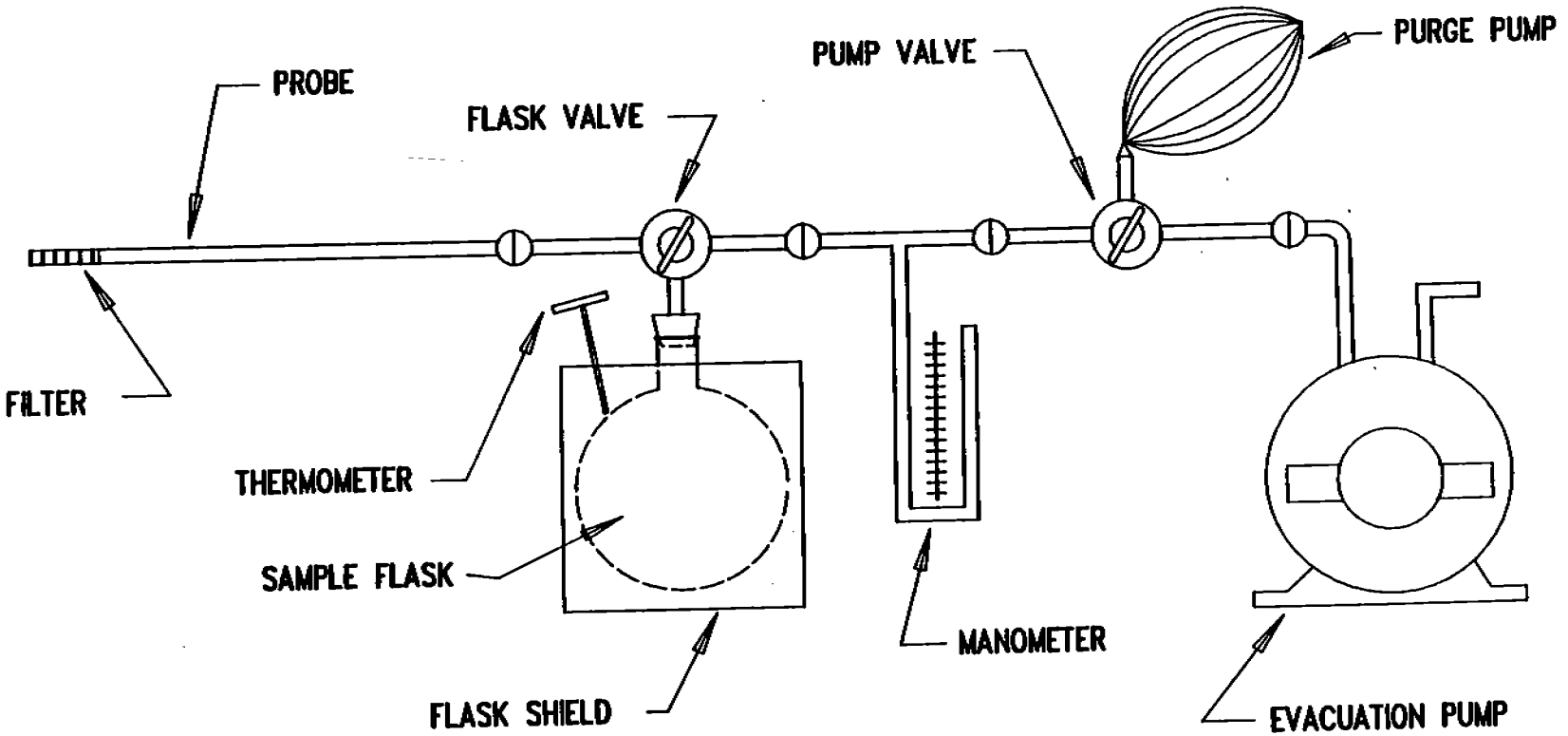


FIGURE 4.3

SCHEMATIC OF METHOD 7 TRAIN

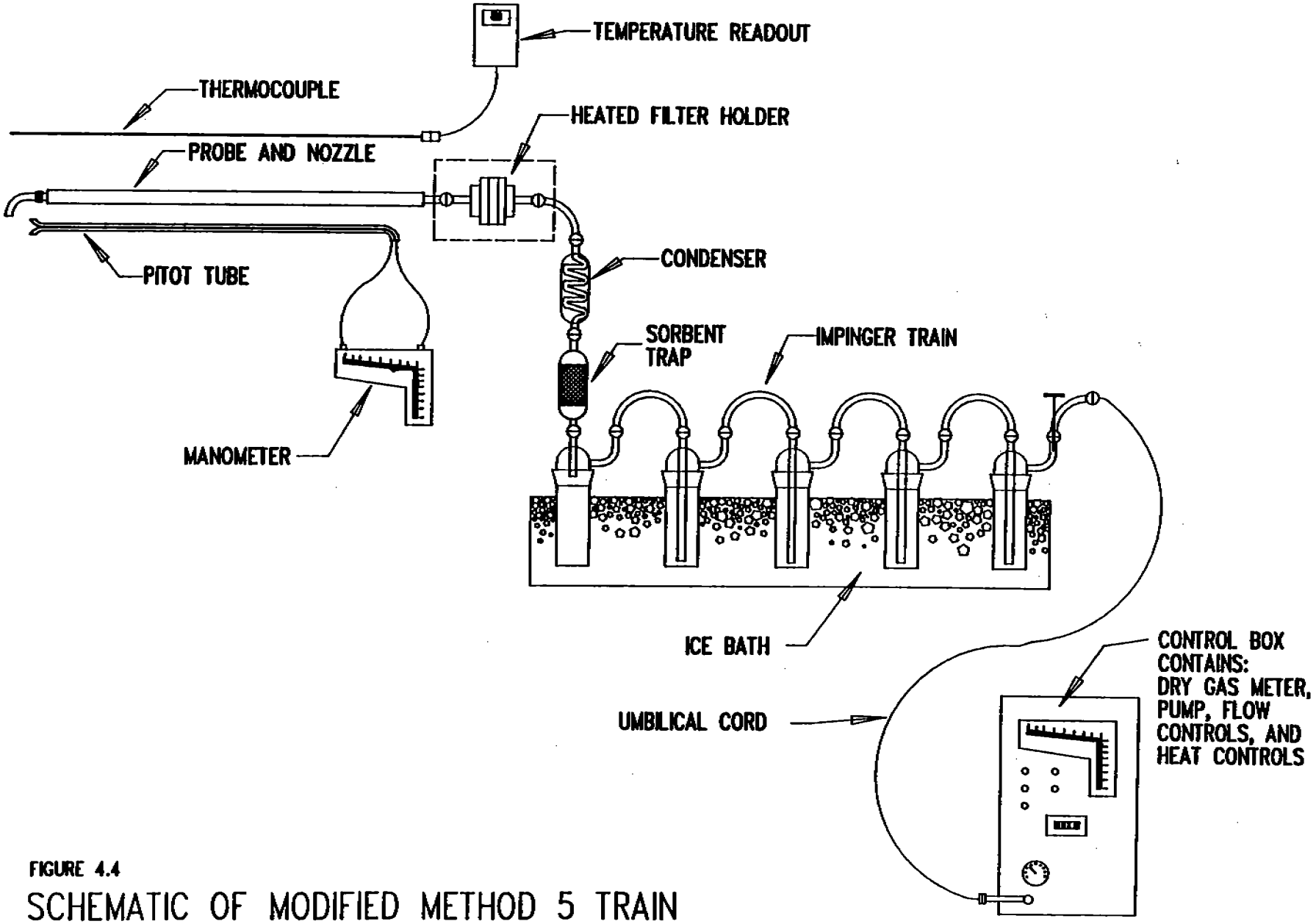


FIGURE 4.4

SCHEMATIC OF MODIFIED METHOD 5 TRAIN

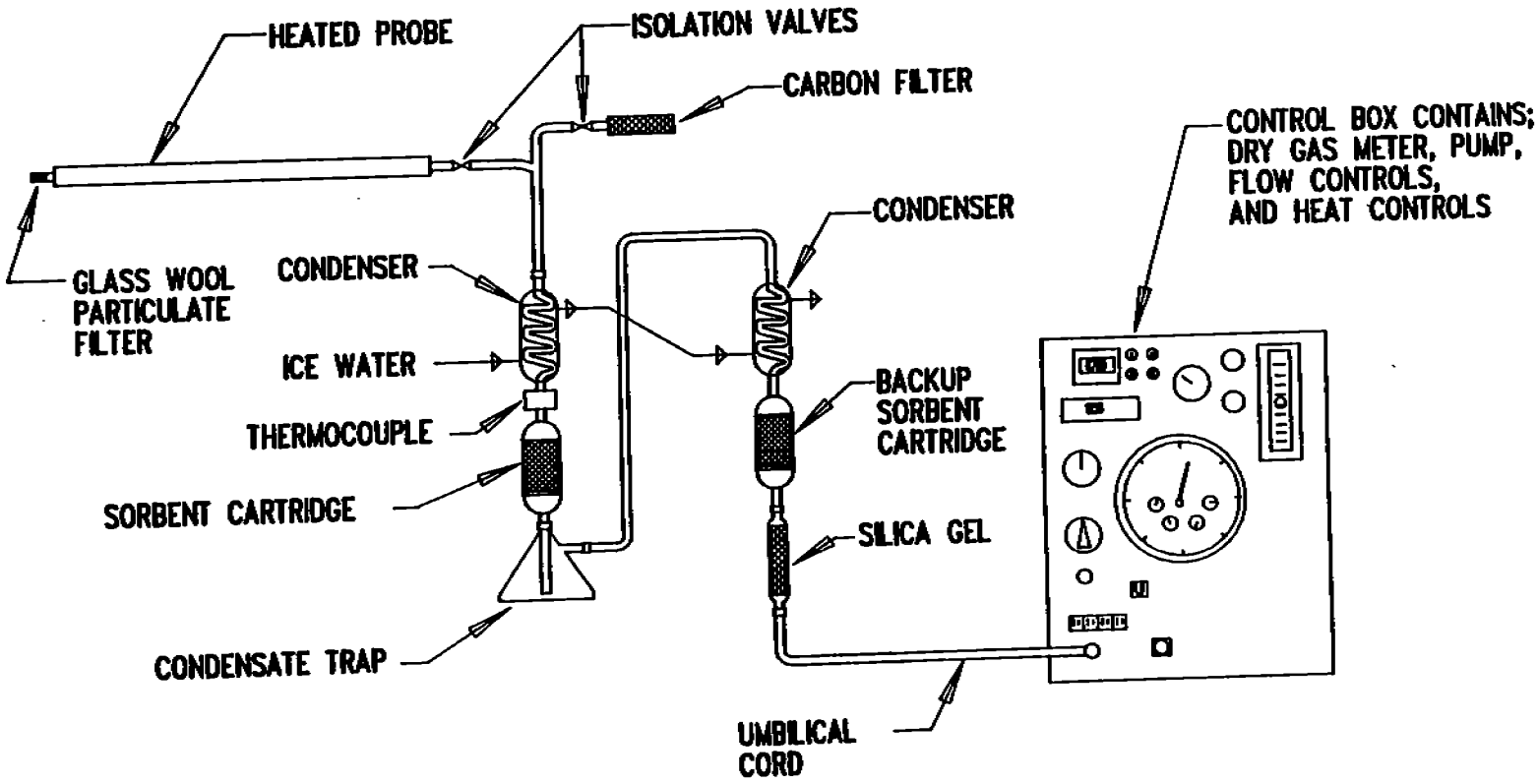
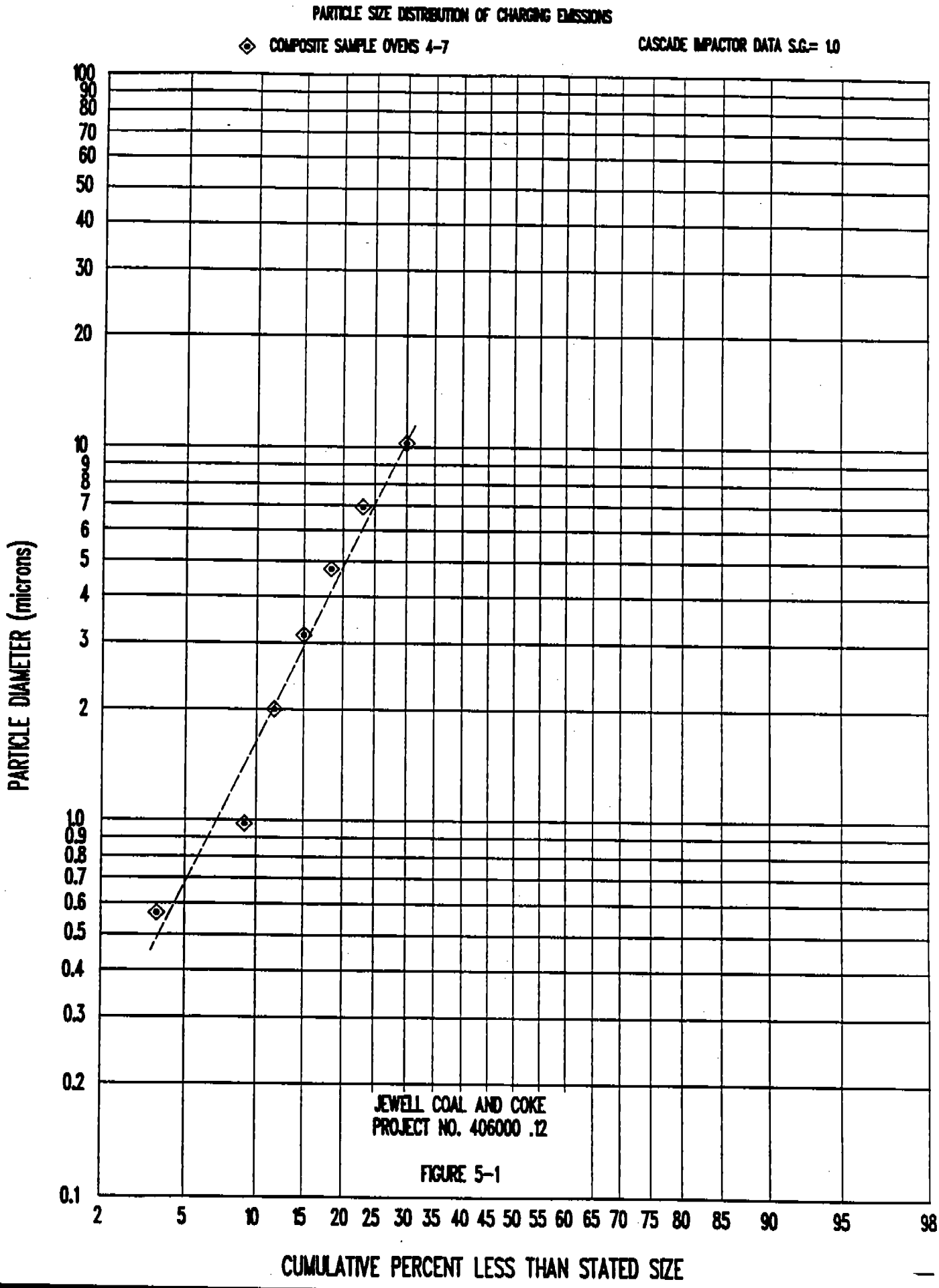
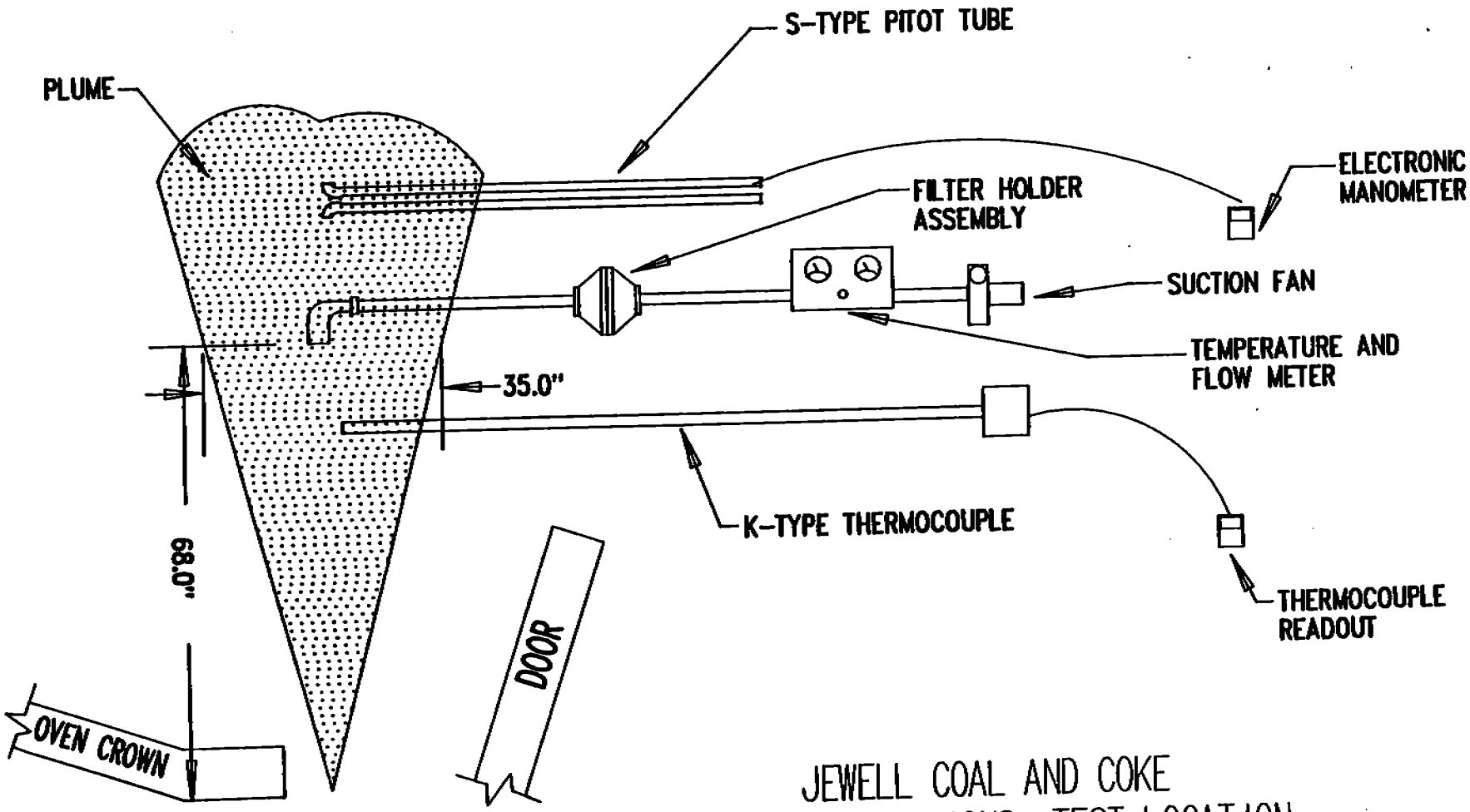


FIGURE 4.5

SCHEMATIC OF VOST SAMPLING TRAIN

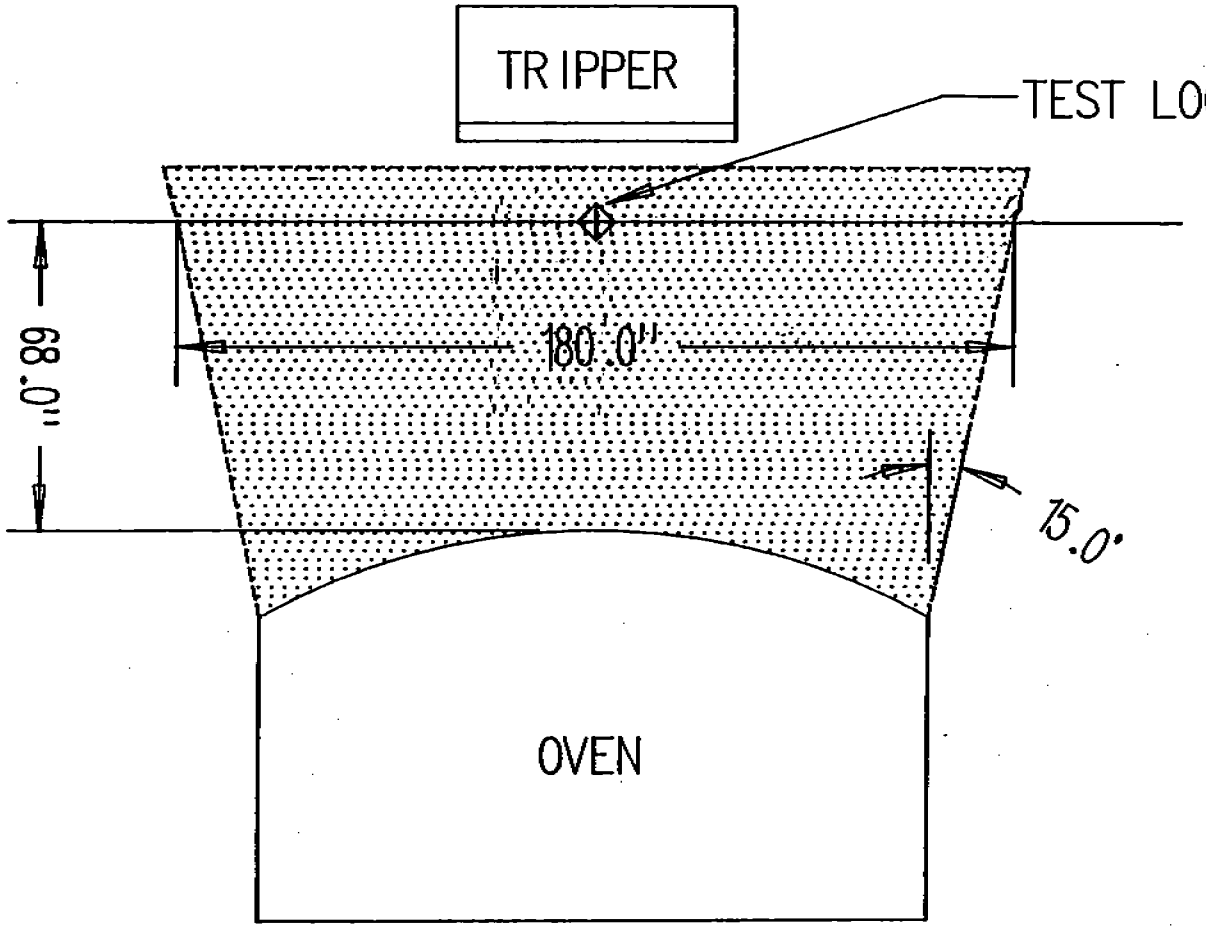

PARTICLE SIZE DISTRIBUTION OF CHARGING EMISSIONS
COMPOSITE SAMPLE OVENS 4-7
CASCADE IMPACTOR DATA S.G.= 1.0
PARTICLE DIAMETER (microns)
100
90
80
70
60
50
40
30
20
10
9
8
7
6
5
4
3
2
1.0
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
2 5 10 15 20 25 30 35 40 45 50 55 60 65 70 75 80 85 90 95 98
CUMULATIVE PERCENT LESS THAN STATED SIZE
JEWELL COAL AND COKE
PROJECT NO. 406000 .12
FIGURE 5-1



JEWELL COAL AND COKE
CHARGING EMISSIONS, TEST LOCATION

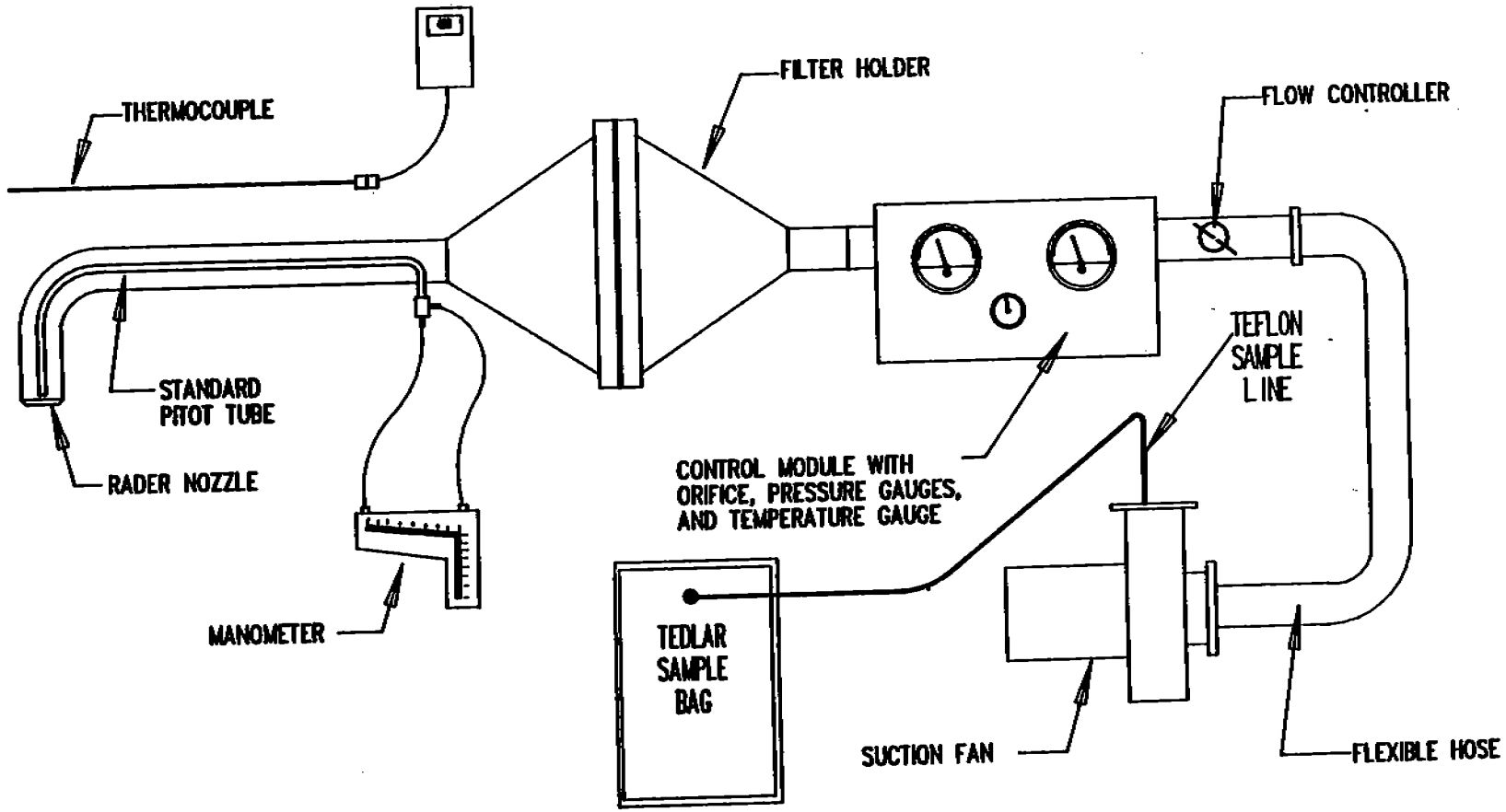
PROJECT NO: 406000.12

FIGURE 5-2



JEWELL COAL AND COKE
CHARGING EMISSIONS, TEST LOCATION

PROJECT NO: 406000.12
FIGURE 5.3

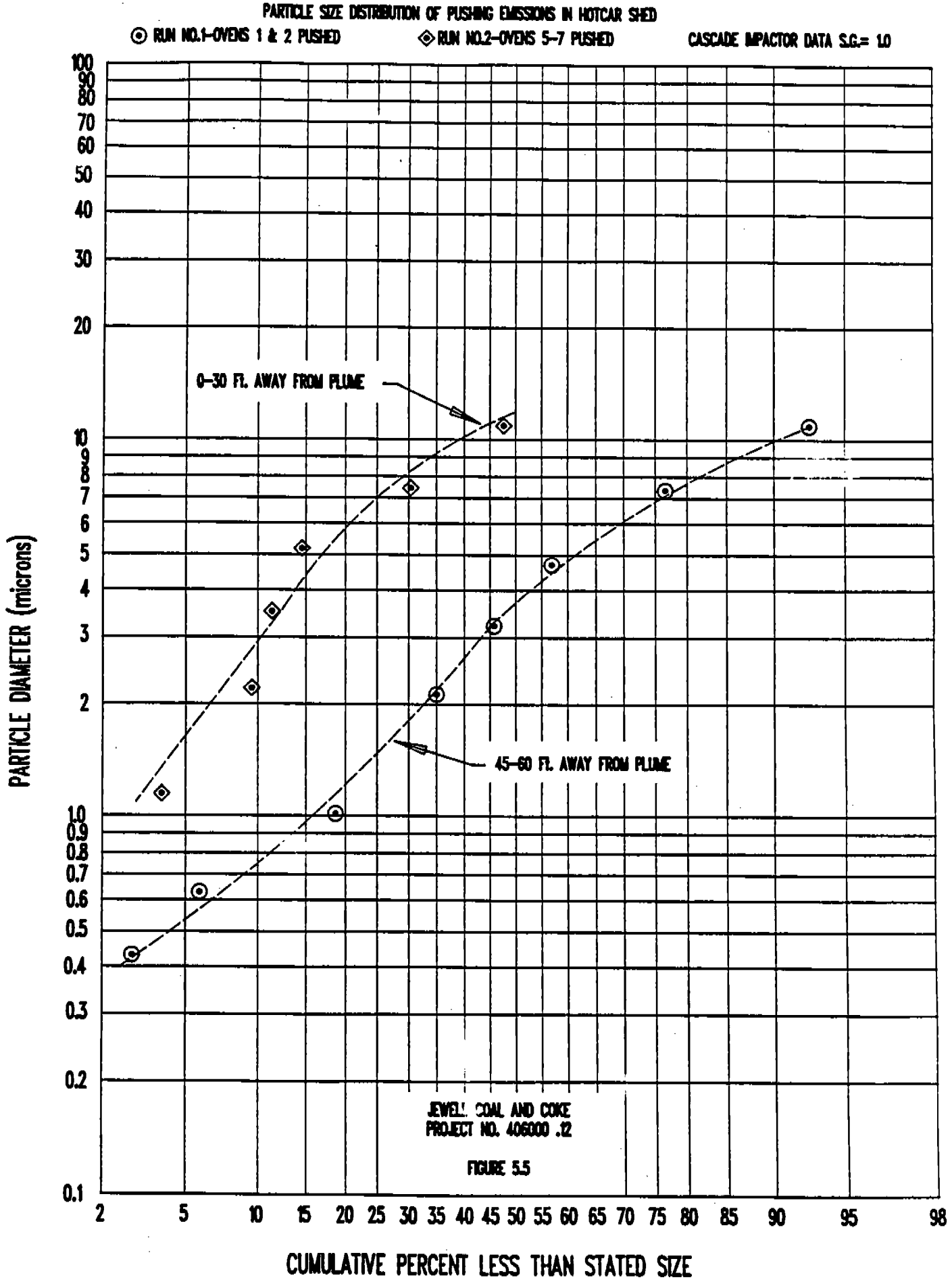


SCHEMATIC OF RADER SAMPLER

JEWELL COAL AND COKE

PROJECT NO. 406000 .12

FIGURE 5-4



JEWELL COAL AND COKE
PROJECT NO. 406000 .12

FIGURE 5.5

TABLE 4-1
JEWELL COAL AND COKE CO.
BATTERY 3-B
OCTOBER 26-29, 1989
STACK SAMPLING DATA SUMMARY (A)
Revised January 16, 1991

Time in Cycle	Run #1 Early	Run #3 Middle	Run #2 Late	Average
Date Charged	10/26/90	10/27/90	10/26/90	
Test Date	10/26/89	10/28/89	10/27/89	
Hours After Charging	2.5-3.5	13.0-14.0	21.0-22.0	
Net Test Time (Min)	60	84	84	
Vol. Sampled at STP (Ft^3)	34.7	50.3	36.5	39.5
Stack Gas Temp (F)	1800.0	1651.0	1490.0	1647.0
Moist. Content (%Vol)	16.8	13.2	11.7	13.9
CO_2 (%Vol - Dry Basis)	9.0	8.0	4.4	7.1
O_2 (%Vol - Dry Basis)	7.2	8.5	11.3	9.0
CO (ppm Dry Basis)	5.0	22.0	6.0	11.0
CO Mass Rate (lbs/hr)	0.49	1.97	0.40	0.95
Total Volatile HC (ppm)(B)	9.9	18.	15.	14.3
Stack Vel. (Ft/Min)	2354.	1917.	1301.	1857.
Gas Flow Rate (ACFM)(C)	118311.	96367.	65394.	93357.
Gas Flow Rate (DSCFM)(D)	22575.	20684.	15427.	19562.
%Isokinetic	95.	107.	103.	102.
Part. Con. (GR/DSCF)	0.2116	0.0843	0.1326	0.143
Part. Mass Rate (Lbs/Hr)	41.0	14.9	17.5	24.5
SO_2 Conc. (ppm - Dry Basis)	486	422	425	445
SO_2 Mass Rate (Lbs/Hr)	109	87	65	87
H_2SO_4 Conc. (% of SO_2)	5.0	1.2	NA	3.1
NO_x Conc. (ppm dry basis)	52.44	25.91	15.98	31.44
NO_x Mass Rate (lbs/hr)	8.45	3.82	1.76	4.68
Coal Charged (dry tons)				192.

(A) 25 tons coal charged per oven (11.4% average moisture)
Battery contains 26 ovens and 3 stacks (8.67 ovens/stacks)
(B) Foxboro organic vapor analyzer (calibrated with methane)
(C) Stack temperature and pressure
(D) 70 degrees F, 29.92 in Hg (dry basis)

NA Not Available

TABLE 4-2
TOXIC METALS IN PARTICULATE MATTER
ANALYZED BY INDUCTIVELY COUPLED PLASMA (ICP)
JEWELL COAL AND COKE CO.
BATTERY #3-B
OCTOBER 26-29, 1989

STACK RESULTS

TEST NO.	PART. CONC. (GR/SCF)	TOTAL PART. COLLECTED (GRAMS)	PERCENT ARSENIC (%)	PERCENT BARIUM (%)	PERCENT BERYLLIUM (%)	PERCENT CADMIUM (%)	(A) PERCENT CHROMIUM (%)	PERCENT LEAD (%)	PERCENT THALLIUM (%)
1	0.2116	0.4764	0.0157	0.0005	ND	ND	0.2262	0.0560	ND
2	0.1326	0.3136	0.0233	0.0014	ND	ND	0.6756	0.1620	ND
3	0.0843	0.2750	0.0345	0.0007	<0.0004	<0.0018	1.6809	0.1309	ND

A - INCONEL NOZZLE CONTAMINATION

CHARGING RESULTS (B)

TEST NO.	PART. CONC. (GR/SCF)	TOTAL PART. COLLECTED (GRAMS)	PERCENT ARSENIC (%)	PERCENT BARIUM (%)	PERCENT BERYLLIUM (%)	PERCENT CADMIUM (%)	PERCENT CHROMIUM (%)	PERCENT LEAD (%)	PERCENT THALLIUM (%)
2	0.0650	0.5822	ND	0.0188	ND	ND	ND	0.0120	ND
3	0.0276	0.2683	ND	0.0279	ND	ND	ND	ND	ND
4	0.0174	0.1744	ND	0.0374	ND	ND	ND	ND	ND
5	0.0238	0.2294	ND	0.0265	ND	ND	ND	ND	ND

B - TEST 1 WAS NOT ANALYZED DUE TO LOW SAMPLE VOLUME

PUSHING RESULTS (C)

TEST NO.	PART. CONC. (GR/SCF)	TOTAL PART. COLLECTED (GRAMS)	PERCENT ARSENIC (%)	PERCENT BARIUM (%)	PERCENT BERYLLIUM (%)	PERCENT CADMIUM (%)	PERCENT CHROMIUM (%)	PERCENT LEAD (%)	PERCENT THALLIUM (%)
1	0.0623	0.6288	0.0223	0.0253	ND	ND	ND	0.0258	ND
2	0.0893	0.5865	0.0143	0.0201	ND	ND	ND	0.0215	ND
4	0.2151	1.0790	0.0078	0.0141	ND	ND	ND	0.0059	ND
5	0.1242	0.8974	0.0109	0.0186	ND	ND	ND	0.0134	ND

C - TEST 3 WAS NOT ANALYZED DUE TO LOW SAMPLE VOLUME

DETECTION LIMITS OF ANALYZED METALS = ARSENIC (21 ug), BARIUM (1.4 ug), BERYLLIUM (0.7 ug), CADMIUM (3.5 ug), CHROMIUM (7.0 ug), LEAD (21 ug), THALLIUM (21 ug)

ND - NOT DETECTED

TABLE 4-3

SUMMARY OF RESULTS
STACK EMISSIONS OF SEMIVOLATILE ORGANIC COMPOUNDS
JEWELL COAL AND COKE COMPANY
BATTERY #3-B, OCTOBER 26-29, 1989

Compound	Composite (ug)	Impinger Liquid (ug)	Total Concentration (ug)	Total Concentration (ug/m^3)	Mass Rate (lbs/hr)
RUN 1					
Naphthalene	150	ND	150	63.20	5.354E-03
Di-n-butylphthalate	70	5	75	31.69	2.684E-03
Bis(2-ethylhexyl)-phthalate	26	6	32	13.37	1.132E-03
Benzo(a)pyrene*	ND	ND	0	0.00	0.000E+00
Phenol	17	ND	17	7.16	6.068E-04
RUN 2					
Naphthalene	180	ND	180	84.18	4.712E-03
Di-n-butylphthalate	69	5	74	34.64	1.939E-03
Bis(2-ethylhexyl)-phthalate	27	ND	27	12.63	7.069E-04
Benzo(a)pyrene*	ND	ND	0	0.00	0.000E+00
Phenol	74	ND	74	34.61	1.937E-03
RUN 3					
Naphthalene	150	ND	150	57.63	3.879E-03
Di-n-butylphthalate	35	ND	35	13.45	9.051E-04
Bis(2-ethylhexyl)-phthalate	55	7	62	23.96	1.612E-03
Benzo(a)pyrene*	ND	ND	0	0.00	0.000E+00
Phenol	16	3	19	7.28	4.898E-04
AVERAGES					
Naphthalene	160	0	160	68.34	4.649E-03
Di-n-butylphthalate	58	3	61	26.59	1.843E-03
Bis(2-ethylhexyl)-phthalate	36	4	40	16.65	1.151E-03
Benzo(a)pyrene*	0	0	0	0.00	0.000E+00
Phenol	36	1	37	16.35	1.011E-03

* Other polycyclic aromatic hydrocarbons (PAHs) also not detected include anthracene, phenanthrene, chrysene and pyrene.

TABLE 4.4

SUMMARY OF RESULTS
STACK EMISSIONS OF VOLATILE ORGANIC COMPOUNDS
JEWELL COAL AND COKE COMPANY
OCTOBER 26-29, 1989

COMPOUND	START OF CYCLE AVERAGE (lbs/hr)	MIDCYCLE AVERAGE (lbs/hr)	END CYCLE AVERAGE (lbs/hr)	COMPLETE CYCLE AVERAGE (lbs/hr)
Benzene	1.30E-03	4.36E-03	2.07E-03	2.58E-03
Bromomethane	3.90E-04	6.09E-05	1.22E-04	1.91E-04
2-Butanone	1.26E-04	7.48E-05	5.02E-05	8.35E-05
Carbon Disulfide	1.31E-04	2.50E-05	1.14E-04	8.99E-05

TABLE 5-1
PUSHING AND CHARGING EMISSIONS
JEWELL COAL AND COKE CO.
BATTERY #3-B
OCTOBER 28-29, 1989
REVISED 1/16/91

OPERATION	RUN #	CHG TIME (MIN)	AVE VEL (FT/MIN)	GAS TEMP (DEG F)	ACFM	SCFM	CONC (GR/SCF)	-PARTICULATE EMISSIONS- (LBS/CHARGE)	(LBS/TON)	BSO (LBS/TON)	BAP (LBS/TON)	CO (PPM)	TOTAL HC (PPM) (A)	SO2 (PPM)
CHARGING (B)	1	3.13	571	303	24981	17353	0.0228	0.177	0.0079			39	48	ND < 1
"	2	3.65	509	298	22269	15570	0.0650	0.528	0.0237	ND	2.76E-08	12	6	ND < 1
"	3	3.68	600	343	26250	17326	0.0276	0.251	0.0113	ND	1.51E-08	5	15	1.5
"	4	3.67	606	358	26513	17178	0.0174	0.157	0.0070	ND	ND	9	10	ND < 1
"	5	3.50	716	397	31325	19373	0.0238	0.230	0.0103	ND	ND	9	15	2.5
	AVERAGE	3.53	600	340	26268	17360	0.0313	0.269	0.0120	ND < 0.15% OF PART (C)	2.14E-08	15	19	0.8
PUSHING (D)	1			177			0.0623		(E) 0.47	ND	ND	44	8	ND < 1
"	2			225			0.0893		0.47	1.06E-03	ND	21	10	ND < 1
"	3			215			0.6819		0.47			68	NA	ND < 1
"	4			226			0.2151		0.47	ND	ND	55	29	ND < 1
"	5			232			0.1242		0.47	ND	ND	47	17	ND < 1
	AVERAGE			215			0.2345		(E) 0.47	2.64E-04	ND<.000038% OF PART (F)	47	16	ND < 1

A - FOXBORO ORGANIC VAPOR ANALYZER - CALIBRATED WITH METHANE
B - MEASURED ABOVE OVEN DOORS, OVENS CHARGED WITH 25 TONS COAL - 10.9% AVERAGE MOISTURE
C - BSO DETECTION LIMIT = 0.48 MG/SAMPLE (AVERAGE OF 0.15% OF TOTAL PARTICULATE)
D - MEASURED IN UPPER HOTCAR SHED, ABOVE GROUP OF OVENS BEING CHARGED
E - NOT MEASURED - EPA EMISSION FACTOR (AP-42)
F - BAP DETECTION LIMIT = 300 NANOGRAMS PER SAMPLE (AVERAGE OF 0.000038% OF TOTAL PARTICULATE)
NA - NOT AVAILABLE, SAMPLE BAG PUNCTURED IN FIELD
ND - NOT DETECTED

TABLE 2-1

RESULTS SUMMARY
JEWELL COAL AND COKE COMPANY
BATTERY #3-B
OCTOBER 26-30, 1989
Revised January 16, 1991

SOURCE	CONTROLLED/ UNCONTROLLED	EMISSION TYPE	EMISSION RATE
Stacks	U	Sensible Heat Exhausted	5.3 MMBtu/dry ton coal
"	C	Total Suspended Particulate (TSP)	3.06 lb/dry ton coal
"	U	Lead	0.0030 lb/dry ton coal (A)
"	U	Sulfur Dioxide (SO_2)	10.9 lb/dry ton coal
"	U	Nitrogen Oxides (NO_x as NO_2)	0.59 lb/dry ton coal
"	C	Carbon Monoxide (CO)	0.12 lb/dry ton coal
"	C	Napthalene	5.81×10^{-4} lb/dry ton coal(B)
"	C	Di-n-butylphthlate	2.30×10^{-4} lb/dry ton coal(B)
"	C	Benzene	3.23×10^{-4} lb/dry ton coal(C)
"	C	Bromomethane	2.39×10^{-5} lb/dry ton coal(C)
Pushing	U	TSP	0.47 lb/dry ton coal (D)
"	U	Benzene soluble organics (BSO)	0.0011 lb/dry ton coal (E)
"	U	Benzo-a-pyrene (BaP)	ND (F)
"	U	Barium	9.18×10^{-5} lb/dry ton coal (A)
"	U	Lead	7.83×10^{-5} lb/dry ton coal (A)
Charging	U	TSP	0.0120 lb/dry ton coal
"	U	BSO	ND (G)
"	U	BaP	2.14×10^{-6} lb/dry ton coal
"	U	Barium	3.24×10^{-6} lb/dry ton coal (A)
"	U	Lead	2.84×10^{-6} lb/dry ton coal (A,H)

A All metals not listed found at lower levels.
B All semi-volatile organic compounds not listed found at lower levels.
C All volatile organic compounds not listed found at lower levels.
D EPA Emission Factor (USEPA, "Compilation of Air Pollutant Emission Factors, Vol. 1: Stationary point, and Area Sources," AP-42, Fourth Edition, September, 1985).
E Represents maximum BSO value (detected in only 1 of 4 runs).
F BaP detection limit = 300 nanograms per sample (average of 0.000038% of total particulate).
G BSO detection limit = 0.48 mg/sample (average of 0.15% of total particulate).
H Represents maximum lead value (detected in only 1 of 4 runs.)
ND Not detected

TABLE 3.1

EXHAUST GAS MEASUREMENTS
STACK #1 / BATTERY #3-B
JEWELL COAL AND COKE CO.
OCTOBER 29-30, 1989

TEST #	HOURS AFTER CHARGING	H20(%)	CO2(%)A	O2(%)A	N2(%)B	CO(PPM)	HC(PPM)	TEMP (F)	ACFM	SCFM(C)	GAS DENSITY (LB/FT3)	SPECIFIC HEAT BTU/LB*F	HEAT(D RATE MMBTU/H
1	1.5	13.69	6.90	7.34	72.07	11	180.00	1785	112968	25869	0.072	0.286	54.8
2	2.5	15.17	5.09	6.79	72.96	< 5	7.00	1723	113395	26705	0.071	0.288	54.2
3	3.5	14.35	4.71	8.56	72.37	< 5	12.00	1740	110061	25719	0.071	0.287	52.5
4	4.5	14.20	5.15	8.58	72.07	< 5	12.00	1741	111349	26008	0.072	0.287	53.9
5	5.5	11.92	5.29	11.01	71.79	< 5	13.00	1726	105670	24851	0.072	0.282	50.1
6	6.5	11.87	4.85	8.81	74.47	< 5	120.00	1748	108993	25378	0.072	0.282	51.9
7	7.5	14.96	5.10	8.93	71.01	< 5	110.00	1751	111741	25982	0.071	0.288	53.6
8	8.5	14.36	5.14	8.56	71.94	< 5	110.00	1755	100242	23266	0.071	0.287	47.9
9	9.5	13.21	5.21	8.68	72.90	< 5	110.00	1742	102929	24031	0.072	0.285	49.5
10	10.5	9.83	6.13	8.57	75.47	< 5	110.00	1713	94336	22319	0.073	0.279	44.8
11	11.5	11.00	5.87	8.01	75.11	< 5	110.00	1712	90027	21309	0.073	0.281	43.1
12	12.5	12.45	5.69	8.93	72.93	< 5	60.00	1725	89807	21130	0.072	0.283	42.8
13	13.5	11.25	5.33	8.88	74.55	< 5	80.00	1707	94285	22368	0.072	0.281	44.4
14	14.5	11.87	6.17	8.46	73.50	< 5	60.00	1700	78189	18610	0.073	0.282	37.5
15	15.5	11.85	5.29	8.82	74.05	< 5	90.00	1670	77116	18613	0.072	0.282	36.3
16	16.5	12.84	4.53	6.80	75.83	< 5	70.00	1666	85207	20604	0.071	0.284	39.8
17	17.5	10.92	4.90	8.02	76.17	< 5	110.00	1660	74838	18148	0.072	0.280	34.9
18	18.5	8.88	4.92	8.20	78.00	< 5	120.00	1640	69694	17062	0.073	0.277	32.5
19	19.5	13.86	3.02	12.06	71.07	< 5	85.00	1635	64467	15820	0.071	0.284	30.0
20	20.5	10.15	4.76	10.24	74.85	< 5	75.00	1620	69447	17165	0.073	0.278	32.4
21	21.5	11.22	2.66	8.88	77.23	< 5	85.00	1580	62833	15835	0.071	0.280	28.5
22	22.5	8.01	3.68	12.42	75.89	< 5	45.00	1540	68621	17639	0.073	0.273	31.0
MAXIMUM		15.17	6.90	12.42	78.00		180.00	1785	113395	26705	0.073	0.288	54.8
MINIMUM		8.01	2.66	6.79	71.01		7.00	1540	62833	15820	0.071	0.273	28.5
AVERAGE		12.18	5.02	8.89	73.92		80.64	1695	90737	21565	0.072	0.283	43.0

A - WET BASIS
B - BY DIFFERENCE
C - 70 DEGREES F, 29.92 in HG (WET BASIS)
D - REFERENCED TO 70 DEGREES F

NOTE: OVENS CHARGED WITH 25 TONS OF COAL (10.8% MOISTURE)
BATTERY CONTAINS 26 OVENS AND 3 STACKS (8.67 OVENS/STACK)

TABLE A-1

AIR EMISSION TEST MATRIX
THOMPSON NON-RECOVERY COKE OVENS
JEWELL COAL AND COKE COMPANY
OCTOBER 26-30, 1989

Emission Source	Controlled/ Uncontrolled	Type Compound	# Test Runs	Method	Reference
Stack	C	Particulate	3	EPA Method 5	40 CFR 60; App A
Stack	U	SO_2/H_2SO_4	3	EPA Method 8	40 CFR 60; App A
Stack	U	NO_x	3 (12 samples)	EPA Method 7	40 CFR 60; App A
Stack	C	CO	3	Bag Sample/ Electrochemical Analyzer	
Stack	U	Metals	3	Extraction & Analysis of Particulate sample	ICP Metal Scan
Stack	C	Volatile Organics	3 (12 Pairs of Tubes)	VOST	SW 846[A] (Method 0030)
Stack	C	Semi-Volatile Organics	3	Modified EPA Method 5	SW846[A] (Method 0010)
Pushing	U	Particulate	5	Hi Volume Stack Sampler	B
Pushing	U	BSO[C] & BAP[D]	4	Extraction & Analysis of Particulate Sample	NIOSH Methods 5023 P&CAM 251
Pushing	U	Metals	4	Extraction & Analysis Particulate Sample	ICP Metal Scan
Pushing	U	CO	5	Bag Sample/ Electrochemical analyzer	
Pushing	U	Total Volatile HC	4	Bag Sample/ FID Analyzer	

TABLE A-1 (cont'd)

AIR EMISSION TEST MATRIX
THOMPSON NON-RECOVERY COKE OVENS
JEWELL COAL AND COKE COMPANY
OCTOBER 26-30, 1989

Emission Source	Controlled/ Uncontrolled	Type Compound	# Test Runs	Method	Reference
Pushing	U	SO_2	5	Bag Sample/ Gas Detector Tube	
Charging	U	Particulate	5	Hi Volume Stack Sampler	B
Charging	U	BSO & GAP	4	Extraction & Analysis of Particulate Sample	NIOSH Methods 5023 & P&CAM 251
Charging	U	Metals	4	Extraction & Analysis Particulate Sample	ICP Metal Scan
Charging	U	CO	5	Bag Sample/ Electrochemical Analyzer	
Charging	U	Total Volatile HC	5	Bag Sample/ FID Analyzer	
Charging	U	SO_2	5	Bag Sample/ Gas Detector Tube	

A Test Methods for Evaluating Solid Waste, SW846, 3rd Edition, Sept. 1986.
B Boubel, Richard W., "A High Volume Stack Sampler," APCA Journal, Vol. 21, No. 12, Dec. 1971.
C Benzene Soluble Organics (BSO) - Also known as coal tar pitch volatiles.
D BAP - Benzo-a-pyrene

QA/QC SAMPLES

Emission Source	Type of Test	QA/QC Samples
Charging	Metals/BSO/BAP	1-Blank Filter
Pushing	Metals/BSO/BAP	1-Blank Filter
Stack	Metals	1-Blank filter 1-Blank Probe Wash 1-Cannister Blank
Stack	Semi-Volatiles	1-Field Blank Train

QA/QC SAMPLES (cont'd)

Emission Source	Type of Test	QA/QC Samples
Stack	Volatile Organics	3-Pairs of Sorbent Traps
Stack	NO_x	1-Blank

Client: IT Sun Coal
Date: November 8, 1989
Client Project ID: PN 3003-315

IT ANALYTICAL SERVICES
CINCINNATI, OH

D074

VOLATILE ORGANICS ANALYSIS DATA SHEET

Matrix: Tenax

Sample Wt/Vol: N/A

Level: (low/med) N/A

% Moisture: not dec. N/A

Column: Packed

Client Sample ID:
T3999/TC4236 0205
Lab Sample No:
T9-10-252-11
Date Received:10/31/89
Date Analyzed:11/03/89

Dilution Factor: 1

CONCENTRATION UNITS:
Total Ng

CAS NO.	COMPOUND	Q
74-87-3	Chloromethane	U
74-83-9	Bromomethane	
75-01-4	Vinyl Chloride	U
75-00-3	Chloroethane	U
75-09-2	Methylene Chloride	B
67-64-1	Acetone	B
75-15-0	Carbon Disulfide	
75-35-4	1,1-Dichloroethene	
75-35-3	1,1-Dichloroethane	U
540-59-0	1,2-dichloroethene (Total)	U
67-66-3	Chloroform	U
107-06-2	1,2-dichloroethane	U
78-93-3	2-butanone	
71-55-6	1,1,1-trichloroethane	
56-23-5	Carbon Tetrachloride	U
108-05-4	Vinyl Acetate	U
75-27-4	Bromodichloromethane	U
78-87-5	1,2-dichloropropane	U
10061-02-6	Trans1,3-dichloropropene	U
79-01-6	Trichloroethene	U
124-48-1	Dibromochloromethane	U
79-00-5	1,1,2-trichloroethane	U
71-43-2	Benzene	
10061-01-5	Cis-1,3-dichloropropene	U
110-75-8	2-chloroethylvinylether	U
75-25-2	Bromoform	U
108-10-1	4-methyl-2-pentanone	U
591-78-6	2-hexanone	U
127-18-4	Tetrachloroethene	U
79-34-5	1,1,2,2tetrachloroethane	U
108-88-3	Toluene	U
108-90-7	Chlorobenzene	
100-41-4	Ethylbenzene	U
100-42-5	Styrene	U
1330-20-7	Total Xylenes	U

Client: IT Sun Coal
Date: November 8, 1989
Client Project ID: PN 3003-315

IT ANALYTICAL SERVICES
CINCINNATI, OH

D073

VOLATILE ORGANICS ANALYSIS DATA SHEET

Matrix: Tenax

Sample Wt/Vol: N/A

Level: (low/med) N/A

% Moisture: not dec. N/A

Column: Packed

Client Sample ID:
T4240/TC3549 0204
Lab Sample No:
T9-10-252-10
Date Received:10/31/89
Date Analyzed:11/03/89

Dilution Factor: 1

CONCENTRATION UNITS:
Total Ng Q

CAS NO.	COMPOUND		
74-87-3	Chloromethane	10	U
74-83-9	Bromomethane	29	
75-01-4	Vinyl Chloride	10	U
75-00-3	Chloroethane	10	U
75-09-2	Methylene Chloride	72	B
67-64-1	Acetone	73	B
75-15-0	Carbon Disulfide	9	
75-35-4	1,1-Dichloroethene	5	U
75-35-3	1,1-Dichloroethane	5	U
540-59-0	1,2-dichloroethene (Total)	5	U
67-66-3	Chloroform	5	U
107-06-2	1,2-dichloroethane	5	U
78-93-3	2-butanone	24	
71-55-6	1,1,1-trichloroethane	5	U
56-23-5	Carbon Tetrachloride	5	U
108-05-4	Vinyl Acetate	5	U
75-27-4	Bromodichloromethane	5	U
78-87-5	1,2-dichloropropane	5	U
10061-02-6	Trans1,3-dichloropropene	5	U
79-01-6	Trichloroethene	5	U
124-48-1	Dibromochloromethane	5	U
79-00-5	1,1,2-trichloroethane	5	U
71-43-2	Benzene	1500	
10061-01-5	Cis-1,3-dichloropropene	5	U
110-75-8	2-chloroethylvinylether	10	U
75-25-2	Bromoform	5	U
108-10-1	4-methyl-2-pentanone	10	U
591-78-6	2-hexanone	10	U
127-18-4	Tetrachloroethene	5	U
79-34-5	1,1,2,2tetrachloroethane	5	U
108-88-3	Toluene	5	U
108-90-7	Chlorobenzene	5	
100-41-4	Ethylbenzene	5	U
100-42-5	Styrene	5	U
1330-20-7	Total Xylenes	5	U

Client: IT Sun Coal
Date: 11/8/89
Client Project ID: PN 3003-315
X656

IT ANALYTICAL SERVICES
CINCINNATI, OH

VOLATILE ORGANICS ANALYSIS DATA SHEET

Matrix: Tenax

Sample Vol: N/A

Level: (low/med) N/A

% Moisture: not dec. N/A

Column: Packed

CLIENT SAMPLE NO.
T3999/TC4236 0205

Lab Sample ID: T9-10-252-11

Date Received: 10/31/89
Date Analyzed: 11/3/89

Dilution Factor: N/A

CONCENTRATION UNITS: Total Ng

COMPOUND NAME	RT	EST. CONC	Q
HYDROCARBON	4:40	100	J
TRICHLOROFLUOROMETHANE	6:06	600	J

Client: IT Sun Coal
Date: 11/8/89
Client Project ID: PN 3003-315
X655

IT ANALYTICAL SERVICES
CINCINNATI, OH

VOLATILE ORGANICS ANALYSIS DATA SHEET

Matrix: Tenax

Sample Vol: N/A

Level: (low/med) N/A

% Moisture: not dec. N/A

Column: Packed

CLIENT SAMPLE NO.
T4581/TC3054 0206

Lab Sample ID: T9-10-252-12

Date Received: 10/31/89
Date Analyzed: 11/3/89

Dilution Factor: N/A

CONCENTRATION UNITS: Total Ng

COMPOUND NAME	RT	EST. CONC	Q
HYDROCARBON	4:40	300	J
HYDROCARBON	5:04	80	J
UNKNOWN	6:02	200	J
TETRAHYDROTETRAMETHYLFURAN	22:08	20	J

Client: IT Sun Coal
Date: November 8, 1989
Client Project ID: PN 3003-315

IT ANALYTICAL SERVICES
CINCINNATI, OH

D075

VOLATILE ORGANICS ANALYSIS DATA SHEET

Matrix: Tenax

Sample Wt/Vol: N/A

Level: (low/med) N/A

% Moisture: not dec. N/A

Column: Packed

Client Sample ID:
T4581/TC3054 0206
Lab Sample No:
T9-10-252-12
Date Received:10/31/89
Date Analyzed:11/03/89

Dilution Factor: 1

CONCENTRATION UNITS:

CAS NO.	COMPOUND	Total Ng	Q
74-87-3	Chloromethane	10	U
74-83-9	Bromomethane	6	J
75-01-4	Vinyl Chloride	10	U
75-00-3	Chloroethane	10	U
75-09-2	Methylene Chloride	38	B
67-64-1	Acetone	100	B
75-15-0	Carbon Disulfide	5	U
75-35-4	1,1-Dichloroethene	5	U
75-35-3	1,1-Dichloroethane	5	U
540-59-0	1,2-dichloroethene (Total)	5	U
67-66-3	Chloroform	5	U
107-06-2	1,2-dichloroethane	5	U
78-93-3	2-butanone	18	
71-55-6	1,1,1-trichloroethane	5	U
56-23-5	Carbon Tetrachloride	5	U
108-05-4	Vinyl Acetate	5	U
75-27-4	Bromodichloromethane	5	U
78-87-5	1,2-dichloropropane	5	U
10061-02-6	Trans1,3-dichloropropene	5	U
79-01-6	Trichloroethene	5	U
124-48-1	Dibromochloromethane	5	U
79-00-5	1,1,2-trichloroethane	5	U
71-43-2	Benzene	1800	
10061-01-5	Cis-1,3-dichloropropene	5	U
110-75-8	2-chloroethylvinylether	10	U
75-25-2	Bromoform	5	U
108-10-1	4-methyl-2-pentanone	10	U
591-78-6	2-hexanone	10	U
127-18-4	Tetrachloroethene	5	U
79-34-5	1,1,2,2tetrachloroethane	5	U
108-88-3	Toluene	5	U
108-90-7	Chlorobenzene	5	U
100-41-4	Ethylbenzene	5	U
100-42-5	Styrene	5	U
1330-20-7	Total Xylenes	5	U

Client: IT Sun Coal
Date: 11/8/89
Client Project ID: PN 3003-315
X657

IT ANALYTICAL SERVICES
CINCINNATI, OH

VOLATILE ORGANICS ANALYSIS DATA SHEET

Matrix: Tenax

Sample Vol: N/A

Level: (low/med) N/A

% Moisture: not dec. N/A

Column: Packed

CLIENT SAMPLE NO.
T4240/TC3549 0204

Lab Sample ID: T9-10-252-10

Date Received: 10/31/89
Date Analyzed: 11/3/89

Dilution Factor: N/A

CONCENTRATION UNITS: Total Ng

COMPOUND NAME	RT	EST. CONC	Q
HYDROCARBON	4:40	200	J
TRICHLOROFLUOROMETHANE	6:08	400	J
SULFUR DIOXIDE	6:36	90	J
HYDROCARBON	24:42	20	J
HYDROCARBON	25:10	30	J

Client: IT Sun Coal
Date: November 8, 1989
Client Project ID: PN 3003-315

IT ANALYTICAL SERVICES
CINCINNATI, OH

D071

VOLATILE ORGANICS ANALYSIS DATA SHEET

Matrix: Tenax

Sample Wt/Vol: N/A

Level: (low/med) N/A

% Moisture: not dec. N/A

Column: Packed

Client Sample ID:
T4038/TC4027 0202
Lab Sample No:
T9-10-252-08
Date Received:10/31/89
Date Analyzed:11/03/89

Dilution Factor: 1

CONCENTRATION UNITS:
Total Ng Q

CAS NO.	COMPOUND		
74-87-3	Chloromethane	10	U
74-83-9	Bromomethane	6	J
75-01-4	Vinyl Chloride	10	U
75-00-3	Chloroethane	10	U
75-09-2	Methylene Chloride	140	B
67-64-1	Acetone	99	B
75-15-0	Carbon Disulfide	5	U
75-35-4	1,1-Dichloroethene	5	U
75-35-3	1,1-Dichloroethane	5	U
540-59-0	1,2-dichloroethene (Total)	5	U
67-66-3	Chloroform	5	U
107-06-2	1,2-dichloroethane	5	U
78-93-3	2-butanone	15	
71-55-6	1,1,1-trichloroethane	5	U
56-23-5	Carbon Tetrachloride	5	U
108-05-4	Vinyl Acetate	5	U
75-27-4	Bromodichloromethane	5	U
78-87-5	1,2-dichloropropane	5	U
10061-02-6	Trans1,3-dichloropropene	5	U
79-01-6	Trichloroethene	5	U
124-48-1	Dibromochloromethane	5	U
79-00-5	1,1,2-trichloroethane	5	U
71-43-2	Benzene	6	
10061-01-5	Cis-1,3-dichloropropene	5	U
110-75-8	2-chloroethylvinylether	10	U
75-25-2	Bromoform	5	U
108-10-1	4-methyl-2-pentanone	10	U
591-78-6	2-hexanone	10	U
127-18-4	Tetrachloroethene	5	U
79-34-5	1,1,2,2tetrachloroethane	5	U
108-88-3	Toluene	5	U
108-90-7	Chlorobenzene	5	U
100-41-4	Ethylbenzene	5	U
100-42-5	Styrene	5	U
1330-20-7	Total Xylenes	5	U

Client: IT Sun Coal
Date: 11/8/89
Client Project ID: PN 3003-315
X659

IT ANALYTICAL SERVICES
CINCINNATI, OH

VOLATILE ORGANICS ANALYSIS DATA SHEET

Matrix: Tenax

Sample Vol: N/A

Level: (low/med) N/A

% Moisture: not dec. N/A

Column: Packed

CLIENT SAMPLE NO.
T4038/TC4027 0202

Lab Sample ID: T9-10-252-08

Date Received: 10/31/89
Date Analyzed: 11/3/89

Dilution Factor: N/A

CONCENTRATION UNITS: Total Ng

COMPOUND NAME	RT	EST. CONC	Q
HYDROCARBON	4:42	80	J
TRICHLOROFLUOROMETHANE	6:10	50	J
SULFUR DIOXIDE	6:44	100	J
OXYGENATED HYDROCARBON	8:24	50	J

Client: IT Sun Coal
Date: November 8, 1989
Client Project ID: PN 3003-315

IT ANALYTICAL SERVICES
CINCINNATI, OH

D072

VOLATILE ORGANICS ANALYSIS DATA SHEET

Matrix: Tenax

Sample Wt/Vol: N/A

Level: (low/med) N/A

% Moisture: not dec. N/A

Column: Packed

Client Sample ID:
T2315/TC2322 0203
Lab Sample No:
T9-10-252-09
Date Received:10/31/89
Date Analyzed:11/03/89

Dilution Factor: 1

CONCENTRATION UNITS:

CAS NO.	COMPOUND	Total Ng	Q
74-87-3	Chloromethane	10	U
74-83-9	Bromomethane	21	
75-01-4	Vinyl Chloride	10	U
75-00-3	Chloroethane	10	U
75-09-2	Methylene Chloride	62	B
67-64-1	Acetone	150	B
75-15-0	Carbon Disulfide	5	U
75-35-4	1,1-Dichloroethene	5	U
75-35-3	1,1-Dichloroethane	5	U
540-59-0	1,2-dichloroethene (Total)	5	U
67-66-3	Chloroform	5	U
107-06-2	1,2-dichloroethane	5	U
78-93-3	2-butanone	26	
71-55-6	1,1,1-trichloroethane	7	
56-23-5	Carbon Tetrachloride	5	U
108-05-4	Vinyl Acetate	5	U
75-27-4	Bromodichloromethane	5	U
78-87-5	1,2-dichloropropane	5	U
10061-02-6	Trans1,3-dichloropropene	5	U
79-01-6	Trichloroethene	3	J
124-48-1	Dibromochloromethane	5	U
79-00-5	1,1,2-trichloroethane	5	U
71-43-2	Benzene	1300	
10061-01-5	Cis-1,3-dichloropropene	5	U
110-75-8	2-chloroethylvinylether	10	U
75-25-2	Bromoform	5	U
108-10-1	4-methyl-2-pentanone	8	J B
591-78-6	2-hexanone	10	U
127-18-4	Tetrachloroethene	5	U
79-34-5	1,1,2,2tetrachloroethane	5	U
108-88-3	Toluene	4	J
108-90-7	Chlorobenzene	5	U
100-41-4	Ethylbenzene	5	U
100-42-5	Styrene	5	U
1330-20-7	Total Xylenes	5	U

Client: IT Sun Coal
Date: 11/8/89
Client Project ID: PN 3003-315
X658

IT ANALYTICAL SERVICES
CINCINNATI, OH

VOLATILE ORGANICS ANALYSIS DATA SHEET

Matrix: Tenax

Sample Vol: N/A

Level: (low/med) N/A

% Moisture: not dec. N/A

Column: Packed

CLIENT SAMPLE NO.
T2315/TC2322 0203

Lab Sample ID: T9-10-252-09

Date Received: 10/31/89
Date Analyzed: 11/3/89

Dilution Factor: N/A

CONCENTRATION UNITS: Total Ng

COMPOUND NAME	RT	EST. CONC	Q
HYDROCARBON	4:40	100	J
UNKNOWN	6:10	300	J
SULFUR DIOXIDE	6:36	200	J

Client: IT Sun Coal
Date: November 8, 1989
Client Project ID: PN 3003-315

IT ANALYTICAL SERVICES
CINCINNATI, OH

D076

VOLATILE ORGANICS ANALYSIS DATA SHEET

Matrix: Tenax

Sample Wt/Vol: N/A

Level: (low/med) N/A

% Moisture: not dec. N/A

Column: Packed

Client Sample ID:
T3912/TC4374 0201
Lab Sample No:
T9-10-252-13
Date Received: 10/31/89
Date Analyzed: 11/03/89

Dilution Factor: 1

CONCENTRATION UNITS:

CAS NO.	COMPOUND	Total Ng	Q
74-87-3	Chloromethane	10	U
74-83-9	Bromomethane	10	U
75-01-4	Vinyl Chloride	10	U
75-00-3	Chloroethane	10	U
75-09-2	Methylene Chloride	41	B
67-64-1	Acetone	10	U
75-15-0	Carbon Disulfide	6	
75-35-4	1,1-Dichloroethene	10	
75-35-3	1,1-Dichloroethane	5	U
540-59-0	1,2-dichloroethene (Total)	5	U
67-66-3	Chloroform	5	U
107-06-2	1,2-dichloroethane	5	U
78-93-3	2-butanone	10	U
71-55-6	1,1,1-trichloroethane	6	
56-23-5	Carbon Tetrachloride	5	U
108-05-4	Vinyl Acetate	5	U
75-27-4	Bromodichloromethane	5	U
78-87-5	1,2-dichloropropane	5	U
10061-02-6	Trans1,3-dichloropropene	5	U
79-01-6	Trichloroethene	5	U
124-48-1	Dibromochloromethane	5	U
79-00-5	1,1,2-trichloroethane	5	U
71-43-2	Benzene	1	J
10061-01-5	Cis-1,3-dichloropropene	5	U
110-75-8	2-chloroethylvinylether	10	U
75-25-2	Bromoform	5	U
108-10-1	4-methyl-2-pentanone	10	U
591-78-6	2-hexanone	10	U
127-18-4	Tetrachloroethene	5	U
79-34-5	1,1,2,2tetrachloroethane	5	U
108-88-3	Toluene	5	U
108-90-7	Chlorobenzene	5	U
100-41-4	Ethylbenzene	5	U
100-42-5	Styrene	5	U
1330-20-7	Total Xylenes	5	U

Client: IT Sun Coal
Date: 11/8/89
Client Project ID: PN 3003-315
X654

IT ANALYTICAL SERVICES
CINCINNATI, OH

VOLATILE ORGANICS ANALYSIS DATA SHEET

Matrix: Tenax

Sample Vol: N/A

Level: (low/med) N/A

% Moisture: not dec. N/A

Column: Packed

CLIENT SAMPLE NO.
T3912/TC4374 0201FB

Lab Sample ID: T9-10-252-13

Date Received: 10/31/89
Date Analyzed: 11/3/89

Dilution Factor: N/A

CONCENTRATION UNITS: Total Ng

COMPOUND NAME	RT	EST. CONC	Q
TRICHLOROFLUOROMETHANE	6:14	80	J
TRICHLOROTRIFLUOROETHANE	9:58	40	J

Client: IT Sun Coal
Date: November 8, 1989
Client Project ID: PN 3003-315

IT ANALYTICAL SERVICES
CINCINNATI, OH

D077

VOLATILE ORGANICS ANALYSIS DATA SHEET

Matrix: Tenax

Sample Wt/Vol: N/A

Level: (low/med) N/A

% Moisture: not dec. N/A

Column: Packed

Client Sample ID:
T1878/TC2094 0207
Lab Sample No:
T9-10-252-14
Date Received:10/31/89
Date Analyzed:11/03/89

Dilution Factor: 1

CONCENTRATION UNITS:

CAS NO.	COMPOUND	Total Ng	Q
74-87-3	Chloromethane	10	U
74-83-9	Bromomethane	10	U
75-01-4	Vinyl Chloride	10	U
75-00-3	Chloroethane	10	U
75-09-2	Methylene Chloride	190	B
67-64-1	Acetone	10	U
75-15-0	Carbon Disulfide	5	U
75-35-4	1,1-Dichloroethene	5	U
75-35-3	1,1-Dichloroethane	5	U
540-59-0	1,2-dichloroethene (Total)	5	U
67-66-3	Chloroform	5	U
107-06-2	1,2-dichloroethane	5	U
78-93-3	2-butanone	10	U
71-55-6	1,1,1-trichloroethane	5	
56-23-5	Carbon Tetrachloride	5	U
108-05-4	Vinyl Acetate	5	U
75-27-4	Bromodichloromethane	5	U
78-87-5	1,2-dichloropropane	5	U
10061-02-6	Trans1,3-dichloropropene	5	U
79-01-6	Trichloroethene	5	U
124-48-1	Dibromochloromethane	5	U
79-00-5	1,1,2-trichloroethane	5	U
71-43-2	Benzene	5	U
10061-01-5	Cis-1,3-dichloropropene	5	U
110-75-8	2-chloroethylvinylether	10	U
75-25-2	Bromoform	5	U
108-10-1	4-methyl-2-pentanone	10	U
591-78-6	2-hexanone	10	U
127-18-4	Tetrachloroethene	5	U
79-34-5	1,1,2,2tetrachloroethane	5	U
108-88-3	Toluene	5	U
108-90-7	Chlorobenzene	5	U
100-41-4	Ethylbenzene	5	U
100-42-5	Styrene	5	U
1330-20-7	Total Xylenes	5	U

Client: IT Sun Coal
Date: 11/8/89
Client Project ID: PN 3003-315
X653

IT ANALYTICAL SERVICES
CINCINNATI, OH

VOLATILE ORGANICS ANALYSIS DATA SHEET

Matrix: Tenax

CLIENT SAMPLE NO.
T1878/TC2094 0207TB

Sample Vol: N/A

Lab Sample ID: T9-10-252-14

Level: (low/med) N/A

Date Received: 10/31/89
Date Analyzed: 11/3/89

% Moisture: not dec. N/A

Column: Packed

Dilution Factor: N/A

CONCENTRATION UNITS: Total Ng

COMPOUND NAME	RT	EST. CONC	Q
TRICHLOROFLUOROMETHANE	6:14	200	J

Client: IT Sun Coal
Date: November 8, 1989
Client Project ID: PN 3003-315

IT ANALYTICAL SERVICES
CINCINNATI, OH

D078

VOLATILE ORGANICS ANALYSIS DATA SHEET

Matrix: Tenax

Sample Wt/Vol: N/A

Level: (low/med) N/A

% Moisture: not dec. N/A

Column: Packed

Client Sample ID:
T3330/TC4407 0196
Lab Sample No:
T9-10-252-15
Date Received: 10/31/89
Date Analyzed: 11/03/89

Dilution Factor: 1

CAS NO.	COMPOUND	CONCENTRATION UNITS: Total Ng	Q
74-87-3	Chloromethane	10	U
74-83-9	Bromomethane	10	U
75-01-4	Vinyl Chloride	10	U
75-00-3	Chloroethane	10	U
75-09-2	Methylene Chloride	49	B
67-64-1	Acetone	22	B
75-15-0	Carbon Disulfide	5	U
75-35-4	1,1-Dichloroethene	5	U
75-35-3	1,1-Dichloroethane	5	U
540-59-0	1,2-dichloroethene (Total)	5	U
67-66-3	Chloroform	5	U
107-06-2	1,2-dichloroethane	5	U
78-93-3	2-butanone	10	U
71-55-6	1,1,1-trichloroethane	5	
56-23-5	Carbon Tetrachloride	5	U
108-05-4	Vinyl Acetate	5	U
75-27-4	Bromodichloromethane	5	U
78-87-5	1,2-dichloropropane	5	U
10061-02-6	Trans1,3-dichloropropene	5	U
79-01-6	Trichloroethene	5	U
124-48-1	Dibromochloromethane	5	U
79-00-5	1,1,2-trichloroethane	5	U
71-43-2	Benzene	5	U
10061-01-5	Cis-1,3-dichloropropene	5	U
110-75-8	2-chloroethylvinylether	10	U
75-25-2	Bromoform	5	U
108-10-1	4-methyl-2-pentanone	10	U
591-78-6	2-hexanone	10	U
127-18-4	Tetrachloroethene	5	U
79-34-5	1,1,2,2tetrachloroethane	5	U
108-88-3	Toluene	5	U
108-90-7	Chlorobenzene	5	U
100-41-4	Ethylbenzene	5	U
100-42-5	Styrene	5	U
1330-20-7	Total Xylenes	5	U

Client: IT Sun Coal
Date: 11/8/89
Client Project ID: PN 3003-315
X652

IT ANALYTICAL SERVICES
CINCINNATI, OH

VOLATILE ORGANICS ANALYSIS DATA SHEET

Matrix: Tenax

Sample Vol: N/A

Level: (low/med) N/A

% Moisture: not dec. N/A

Column: Packed

CLIENT SAMPLE NO.
T3330/TC4407 0196FB

Lab Sample ID: T9-10-252-15

Date Received: 10/31/89
Date Analyzed: 11/3/89

Dilution Factor: N/A

CONCENTRATION UNITS: Total Ng

COMPOUND NAME	RT	EST. CONC	Q
TRICHLOROFLUOROMETHANE	6:08	300	J
TRICHLOROTRIFLUOROETHANE	9:52	20	J

Client: IT Sun Coal
Date: November 8, 1989
Client Project ID: PN 3003-315

IT ANALYTICAL SERVICES
CINCINNATI, OH

D079

VOLATILE ORGANICS ANALYSIS DATA SHEET

Matrix: Tenax

Sample Wt/Vol: N/A

Level: (low/med) N/A

% Moisture: not dec. N/A

Column: Packed

Client Sample ID:
T1852/TC3917 TB
Lab Sample No:
T9-10-252-16
Date Received: 10/31/89
Date Analyzed: 11/03/89

Dilution Factor: 1

CAS NO.	COMPOUND	CONCENTRATION UNITS: Total Ng	Q
74-87-3	Chloromethane	10	U
74-83-9	Bromomethane	10	U
75-01-4	Vinyl Chloride	10	U
75-00-3	Chloroethane	10	U
75-09-2	Methylene Chloride	40	B
67-64-1	Acetone	20	B
75-15-0	Carbon Disulfide	5	U
75-35-4	1,1-Dichloroethene	5	U
75-35-3	1,1-Dichloroethane	5	U
540-59-0	1,2-dichloroethene (Total)	5	U
67-66-3	Chloroform	5	U
107-06-2	1,2-dichloroethane	5	U
78-93-3	2-butanone	10	U
71-55-6	1,1,1-trichloroethane	5	U
56-23-5	Carbon Tetrachloride	5	U
108-05-4	Vinyl Acetate	5	U
75-27-4	Bromodichloromethane	5	U
78-87-5	1,2-dichloropropane	5	U
10061-02-6	Trans1,3-dichloropropene	5	U
79-01-6	Trichloroethene	5	U
124-48-1	Dibromochloromethane	5	U
79-00-5	1,1,2-trichloroethane	5	U
71-43-2	Benzene	5	U
10061-01-5	Cis-1,3-dichloropropene	5	U
110-75-8	2-chloroethylvinylether	10	U
75-25-2	Bromoform	5	U
108-10-1	4-methyl-2-pentanone	10	U
591-78-6	2-hexanone	9	J B
127-18-4	Tetrachloroethene	5	U
79-34-5	1,1,2,2tetrachloroethane	5	U
108-88-3	Toluene	5	U
108-90-7	Chlorobenzene	5	U
100-41-4	Ethylbenzene	5	U
100-42-5	Styrene	5	U
1330-20-7	Total Xylenes	5	U

Client: IT Sun Coal
Date: 11/8/89
Client Project ID: PN 3003-315
X651

IT ANALYTICAL SERVICES
CINCINNATI, OH

VOLATILE ORGANICS ANALYSIS DATA SHEET

Matrix: Tenax

CLIENT SAMPLE NO.
T1852/TC3917 TB

Sample Vol: N/A

Lab Sample ID: T9-10-252-16

Level: (low/med) N/A

Date Received: 10/31/89

% Moisture: not dec. N/A

Date Analyzed: 11/3/89

Column: Packed

Dilution Factor: N/A

CONCENTRATION UNITS: Total Ng

COMPOUND NAME	RT	EST. CONC	Q
DICHLORODIFLUOROMETHANE	1:54	100	J
TRICHLOROFLUOROMETHANE	6:06	100	J

Client: IT Sun Coal
Date: November 8, 1989
Client Project ID: PN 3003-315

IT ANALYTICAL SERVICES
CINCINNATI, OH

D080

VOLATILE ORGANICS ANALYSIS DATA SHEET

Matrix: Tenax

Client Sample ID:

Sample Wt/Vol: N/A

Lab Sample No:
METHOD BLANK

Level: (low/med) N/A

Date Received:

Date Analyzed: 11/03/89

% Moisture: not dec. N/A

Dilution Factor: 1

Column: Packed

CONCENTRATION UNITS:

CAS NO.	COMPOUND	Total Ng	Q
74-87-3	Chloromethane	10	U
74-83-9	Bromomethane	10	U
75-01-4	Vinyl Chloride	10	U
75-00-3	Chloroethane	10	U
75-09-2	Methylene Chloride	16	
67-64-1	Acetone	10	U
75-15-0	Carbon Disulfide	5	U
75-35-4	1,1-Dichloroethene	5	U
75-35-3	1,1-Dichloroethane	5	U
540-59-0	1,2-dichloroethene (Total)	5	U
67-66-3	Chloroform	5	U
107-06-2	1,2-dichloroethane	5	U
78-93-3	2-butanone	10	U
71-55-6	1,1,1-trichloroethane	5	U
56-23-5	Carbon Tetrachloride	5	U
108-05-4	Vinyl Acetate	5	U
75-27-4	Bromodichloromethane	5	U
78-87-5	1,2-dichloropropane	5	U
10061-02-6	Trans1,3-dichloropropene	5	U
79-01-6	Trichloroethene	5	U
124-48-1	Dibromochloromethane	5	U
79-00-5	1,1,2-trichloroethane	5	U
71-43-2	Benzene	5	U
10061-01-5	Cis-1,3-dichloropropene	5	U
110-75-8	2-chloroethylvinylether	10	U
75-25-2	Bromoform	5	U
108-10-1	4-methyl-2-pentanone	4	J
591-78-6	2-hexanone	28	
127-18-4	Tetrachloroethene	5	U
79-34-5	1,1,2,2tetrachloroethane	5	U
108-88-3	Toluene	5	U
108-90-7	Chlorobenzene	5	U
100-41-4	Ethylbenzene	5	U
100-42-5	Styrene	5	U
1330-20-7	Total Xylenes	5	U

IT ANALYTICAL SERVICES
CINCINNATI, OH

Client: IT Sun Coal
Date: 11/8/89
Client Project ID: PN 3003-315
[illegible]868

VOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

Matrix: Tenax

Sample Vol: N/A

Lab Sample ID: METHOD BLANK

Level: (low/med) N/A

Date Received:
Date Analyzed: 11/3/89

% Moisture: not dec. N/A

Column: Packed

Dilution Factor: N/A

CONCENTRATION UNITS: Total Ng

COMPOUND NAME	RT	EST. CONC	Q
NONE			

Client: IT Sun Coal
Date: 11/8/89
Client Project ID: PN 3003-315
X667

IT ANALYTICAL SERVICES
CINCINNATI, OH

VOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

Matrix: Tenax

Sample Vol: N/A

Level: (low/med) N/A

% Moisture: not dec. N/A

Column: Packed

Lab Sample ID: METHOD BLANK

Date Received:
Date Analyzed: 11/6/89

Dilution Factor: N/A

CONCENTRATION UNITS: Total Ng

COMPOUND NAME	RT	EST. CONC	Q
NONE			

IT Corporation Sun Coal
Date: November 8, 1989
Client Project ID: N 3003-315

IT ANALYTICAL SERVICES
CINCINNATI, OH

D082

Quality Assurance Data

Surrogate Recovery, Percent

Sample ID	PEI No.	d4-1,2-Dichloroethane	d8-Toluene	p-Bromofluorobenzene
METHOD BLANK	VBLK 1106	93	103	93
METHOD BLANK	VBLK 1103	97	97	94
Tube # T4609/TC11A # 0193	-01	95	92	91
Tube # T4555/TC3020 # 0194	-02	111	99	98
Tube # T4321/TC3687 # 0195	-03	107	106	103
Tube # T4464/TC3244 # 0197	-04	86	108	95
Tube # T16A/TC3254 # 0198	-05	91	99	98
Tube # T4541/TC1861 # 0199	-06	98	105	90
Tube # T6 A/TC4205 # 0200	-07	96	101	96
Tube # T4038/TC4027 # 0202	-08	101	98	98
Tube # T42315/TC2322 # 0203	-09	97	93	91
Tube # T4240/TC3549 # 0204	-10	106	110	109
Tube # T3999/TC4236 # 0205	-11	107	104	98
Tube # T4581/TC3054 # 0206	-12	100	92	89
Tube # T3912/TC4374 # 0201	-13	102	120	81
Tube # T1878/TC2094 # 0207	-14	91	94	94
Tube # T3330/TC4407 # 0196	-15	96	94	95
Tube # T1852/TC3917 TB	-16	103	99	85

Samoling Parameters

Run 1 Set 1	Run 1 Set 2	Run 1 Set 3	Run 1 Set 4
Nominal Sample Volume 20.43 L	Nominal Sample Volume 20.55 L	Nominal Sample Volume 20.42 L	Nominal Sample Volume 20.72 L
Average Meter Temperature 28.72 C	Average Meter Temperature 22 C	Average Meter Temperature 20.5 C	Average Meter Temperature 19.2 C
Barometric Pressure 29.27 in. Hg	Barometric Pressure 29.27 in. Hg	Barometric Pressure 29.27 in. Hg	Barometric Pressure 29.27 in. Hg
Corrected Sample Volume 19.56 L	Corrected Sample Volume 20.13 L	Corrected Sample Volume 20.10 L	Corrected Sample Volume 20.49 L
Stack Flow Rate 22604.5 DSCFM	Stack Flow Rate 22604.5 DSCFM	Stack Flow Rate 22604.5 DSCFM	Stack Flow Rate 22604.5 DSCFM

SUN/INLAND/NIPSCO
VOLATILE ORGANIC EMISSIONS FROM THOMPSON COKE OVENS

COMPOUND	Start of Cycle #0193 ng/sample	Start of Cycle #0194 ng/sample	Start of Cycle #0195 ng/sample	Start of Cycle #0197 ng/sample	Start of Cycle #0196 ng/sample BLANK
Chloromethane	1600 (	10 (	10 (	10 (	10
Bromomethane	120	140	62	46 (	10
Vinyl Chloride	(10 (	10 (	10 (	10 (	10
Chloroethane	(10 (	10 (	10 (	10 (	10
Methylene Chloride	(120	40	36	220	49
Acetone	(10 (	10	130	70	22
Carbon Disulfide	9	11	18	88 (	5
1,1-Dichloroethene	(5 (	5 (	5	37 (	5
1,1-Dichloroethane	(5 (	5 (	5 (	5 (	5
1,2-Dichloroethene	(5 (	5 (	5 (	5 (	5
Chloroform	210 (	5 (	5 (	5 (	5
1,2 -Dichlroethane	(5 (	5 (	5 (	5 (	5
2-Butanone	61	20	24	13 (	10
1,1,1-Trichlroethane	10	31 (	5	2000	5
Carbon Tetrachloride	10 (	5 (	5 (	5 (	5
Vinyl Acetate	(5 (	5 (	5 (	5 (	5
Bromodichloromethane	(5 (	5 (	5 (	5 (	5
1,2-Dichloropropane	(5 (	5 (	5 (	5 (	5
Trans 1,3-Dichloropropene	(5 (	5 (	5 (	5 (	5
Trichloroethene	(5 (	5 (	5 (	5 (	5
Dibromochloromethane	(5 (	5 (	5 (	5 (	5
1,1,2-Trichloroethane	(5 (	5 (	5 (	5 (	5
Benzene	580	81	210	360 (	5
Cis-1,3-Dichloropropene	(5 (	5 (	5 (	5 (	5
2-Chloroethylvinylether	(10 (	10 (	10 (	10 (	10
Bromoform	(5 (	5 (	5 (	5 (	5
4-Methyl-2-Pentanone	(10 (	10 (	10 (	10 (	10
2-Hexanone	(10 (	10 (	10 (	10 (	10
Tetrachloroethene	(5 (	5 (	5 (	5 (	5
1,1,2,2-Tetrachloroethane	(5 (	5 (	5 (	5 (	5
Toluene	400 (	5 (	5	7 (	5
Chlorobenzene	(5 (	5 (	5 (	5 (	5
Ethylbenzene	3 (	5 (	5 (	5 (	5
Styrene	(5 (	5 (	5 (	5 (	5
Total Xylenes	(5 (	5 (	5 (	5 (	5

SUN/INLAND/NIPSCO

VOLATILE ORGANIC EMISSIONS FROM THOMPSON COKE OVENS

12-Dec-89

CONCENTRATIONS ug/m3

COMPOUND		Start of Cycle #0193 Pair 1 ug/m3		Start of Cycle #0194 Pair 2 ug/m3		Start of Cycle #0195 Pair 3 ug/m3		Start of Cycle #0197 Pair 4 ug/m3		Start of Cycle Average ug/m3
Chloromethane		81.791	(	0.497	(	0.498	(	0.488	(	20.818
Bromomethane		6.134		6.956		3.085		2.245		4.605
Vinyl Chloride	(	0.511	(	0.497	(	0.498	(	0.488	(	0.498
Chloroethane	(	0.511	(	0.497	(	0.498	(	0.488	(	0.498
Methylene Chloride	(	6.134		1.988		1.791		10.739	(	5.163
Acetone	(	0.511	(	0.497		6.468		3.417	(	2.723
Carbon Disulfide		0.460		0.547		0.896		4.296		1.549
1,1-Dichloroethene	(	0.256	(	0.248	(	0.249		1.806	(	0.640
1,1-Dichloroethane	(	0.256	(	0.248	(	0.249	(	0.244	(	0.249
1,2-Dichloroethene	(	0.256	(	0.248	(	0.249	(	0.244	(	0.249
Chloroform		10.735	(	0.248	(	0.249	(	0.244	(	2.869
1,2 -Dichlrorethane	(	0.256	(	0.248	(	0.249	(	0.244	(	0.249
2-Butanone		3.118		0.994		1.194		0.635		1.485
1,1,1-Trichlroethane		0.511		1.540	(	0.249		97.627	(	24.982
Carbon Tetrachloride		0.511	(	0.248	(	0.249	(	0.244	(	0.313
Vinyl Acetate	(	0.256	(	0.248	(	0.249	(	0.244	(	0.249
Bromodichloromethane	(	0.256	(	0.248	(	0.249	(	0.244	(	0.249
1,2-Dichloropropane	(	0.256	(	0.248	(	0.249	(	0.244	(	0.249
Trans 1,3-Dichloropropene	(	0.256	(	0.248	(	0.249	(	0.244	(	0.249
Trichloroethene	(	0.256	(	0.248	(	0.249	(	0.244	(	0.249
Dibromochloromethane	(	0.256	(	0.248	(	0.249	(	0.244	(	0.249
1,1,2-Trichloroethane	(	0.256	(	0.248	(	0.249	(	0.244	(	0.249
Benzene		29.649		4.025		10.448		17.573		15.424
[illegible]-1,3-Dichloropropene	(	0.256	(	0.248	(	0.249	(	0.244	(	0.249
2-Chloroethylvinylether	(	0.511	(	0.497	(	0.498	(	0.488	(	0.498
Bromoform	(	0.256	(	0.248	(	0.249	(	0.244	(	0.249
4-Methyl-2-Pentanone	(	0.511	(	0.497	(	0.498	(	0.488	(	0.498
2-Hexanone	(	0.511	(	0.497	(	0.498	(	0.488	(	0.498
Tetrachloroethene	(	0.256	(	0.248	(	0.249	(	0.244	(	0.249
1,1,2,2-Tetrachloroethane	(	0.256	(	0.248	(	0.249	(	0.244	(	0.249
Toluene		20.448	(	0.248	(	0.249		0.342	(	5.322
Chlorobenzene	(	0.256	(	0.248	(	0.249	(	0.244	(	0.249
Ethylbenzene		0.153	(	0.248	(	0.249	(	0.244	(	0.224
Styrene	(	0.256	(	0.248	(	0.249	(	0.244	(	0.249
Total Xylenes	(	0.256	(	0.248	(	0.249	(	0.244	(	0.249

SUN/INLAND/NIPSCO

VOLATILE ORGANIC EMISSIONS FROM THOMPSON COKE OVENS

12-Dec-89

CONCENTRATIONS ppbv

COMPOUND		Start of Cycle #0193 Pair 1 ppb		Start of Cycle #0194 Pair 2 ppb		Start of Cycle #0195 Pair 3 ppb		Start of Cycle #0197 Pair 4 ppb		Start of Cycle Average ppb
Chloromethane		38.554	(	0.234	(	0.235	(	0.230	(	9.813
Bromomethane		1.552		1.760		0.781		0.568		1.165
Vinyl Chloride	(	0.197	(	0.191	(	0.191	(	0.188	(	0.192
Chloroethane	(	0.190	(	0.185	(	0.185	(	0.182	(	0.186
Methylene Chloride	(	1.735		0.562		0.507		3.037	(	1.460
Acetone	(	0.212	(	0.206		2.681		1.416	(	1.129
Carbon Disulfide		0.146		0.173		0.283		1.359		0.490
1,1-Dichloroethene	(	0.063	(	0.062	(	0.062		0.448	(	0.159
1,1-Dichloroethane	(	0.062	(	0.060	(	0.060	(	0.059	(	0.061
1,2-Dichloroethene	(	0.063	(	0.062	(	0.062	(	0.060	(	0.062
Chloroform		2.169	(	0.050	(	0.050	(	0.049	(	0.580
1,2 -Dichlrorethane	(	0.062	(	0.060	(	0.060	(	0.059	(	0.061
2-Butanone		1.041		0.332		0.399		0.212		0.496
1,1,1-Trichloroethane		0.092		0.278	(	0.045		17.646	(	4.516
Carbon Tetrachloride		0.080	(	0.039	(	0.039	(	0.038	(	0.049
Vinyl Acetate	(	0.071	(	0.069	(	0.069	(	0.068	(	0.070
Bromodichloromethane	(	0.038	(	0.036	(	0.037	(	0.036	(	0.037
1,2-Dichloropropane	(	0.054	(	0.053	(	0.053	(	0.052	(	0.053
Trans 1,3-Dichloropropene	(	0.055	(	0.054	(	0.054	(	0.053	(	0.054
Trichloroethene	(	0.047	(	0.046	(	0.046	(	0.045	(	0.046
Dibromochloromethane	(	0.029	(	0.029	(	0.029	(	0.028	(	0.029
1,1,2-Trichloroethane	(	0.046	(	0.045	(	0.045	(	0.044	(	0.045
Benzene		9.138		1.240		3.220		5.416		4.754
Cis-1,3-Dichloropropene	(	0.055	(	0.054	(	0.054	(	0.053	(	0.054
2-Chloroethylvinylether	(	0.115	(	0.112	(	0.112	(	0.110	(	0.112
Bromoform	(	0.024	(	0.024	(	0.024	(	0.023	(	0.024
4-Methyl-2-Pentanone	(	0.123	(	0.119	(	0.119	(	0.117	(	0.120
2-Hexanone	(	0.123	(	0.119	(	0.120	(	0.117	(	0.120
Tetrachloroethene	(	0.037	(	0.036	(	0.036	(	0.035	(	0.036
1,1,2,2-Tetrachloroethane	(	0.037	(	0.036	(	0.036	(	0.035	(	0.036
Toluene		5.343	(	0.065	(	0.065		0.089	(	1.391
Chlorobenzene	(	0.054	(	0.053	(	0.053	(	0.052	(	0.053
Ethylbenzene		0.035	(	0.056	(	0.056	(	0.055	(	0.051
Styrene	(	0.059	(	0.057	(	0.058	(	0.056	(	0.058
Total Xylenes	(	0.058	(	0.056	(	0.056	(	0.055	(	0.057

SUN/INLAND/NIPSCO
VOLATILE ORGANIC EMISSIONS FROM THOMPSON COKE OVENS

COMPOUND	End Cycle #0198 ng/sample	End Cycle #0199 ng/sample	End Cycle #0200 ng/sample	End Cycle #0202 ng/sample	End Cycle #0201 ng/sample BLANK
Chloromethane	< 10	< 10	< 10	< 10	10
Bromomethane	16	58	80	6 <	10
Vinyl Chloride	< 10	< 10	< 10	< 10	< 10
Chloroethane	< 10	< 10	< 10	< 10	< 10
Methylene Chloride	54	200	33	140	41
Acetone	90	79	56	99 <	10
Carbon Disulfide	10	100	34 <	5	6
1,1-Dichloroethene	< 5	11 <	5 <	5	10

SUN/INLAND/NIPSCO

VOLATILE ORGANIC EMISSIONS FROM THOMPSON COKE OVENS

COMPOUND		End Cycle #0198 ng/sample		End Cycle #0199 ng/sample		End Cycle #0200 ng/sample		End Cycle #0202 ng/sample		End Cycle #0201 ng/sample BLANK
Chloromethane	<	10	<	10	<	10	<	10	<	10
Bromomethane		16		58		80		6	<	10
Vinyl Chloride	<	10	<	10	<	10	<	10	<	10
Chloroethane	<	10	<	10	<	10	<	10	<	10
Methylene Chloride		54		200		33		140		41
Acetone		90		79		56		99	<	10
Carbon Disulfide		10		100		34	<	5		6
1,1-Dichloroethene	<	5		11	<	5	<	5		10
1,1-Dichloroethane	<	5	<	5	<	5	<	5	<	5
1,2-Dichloroethene	<	5	<	5	<	5	<	5	<	5
Chloroform	<	5	<	5	<	5	<	5	<	5
1,2 -Dichlrorethane	<	5	<	5	<	5	<	5	<	5
2-Butanone		17		22		12		15	<	10
1,1,1-Trichlroethane		24		660		76	<	5		6
Carbon Tetrachloride	<	5	<	5	<	5	<	5	<	5
Vinyl Acetate	<	5	<	5	<	5	<	5	<	5
Bromodichloromethane	<	5	<	5	<	5	<	5	<	5
1,2-Dichloropropane	<	5	<	5	<	5	<	5	<	5
Trans 1,3-Dichloropropene	<	5	<	5	<	5	<	5	<	5
Trichloroethene	<	5	<	5	<	5	<	5	<	5
Dibromochloromethane	<	5	<	5	<	5	<	5	<	5
1,1,2-Trichloroethane	<	5	<	5	<	5	<	5	<	5
Benzene		1400		360		980		6		1
Cis-1,3-Dichloropropene	<	5	<	5	<	5	<	5	<	5
2-Chloroethylvinylether	<	10	<	10	<	10	<	10	<	10
Bromoform	<	5	<	5	<	5	<	5	<	5
4-Methyl-2-Pentanone	<	10		6	<	10	<	10	<	10
2-Hexanone	<	10	<	10	<	10	<	10	<	10
Tetrachloroethene	<	5	<	5	<	5	<	5	<	5
'1,1,2,2-Tetrachloroethane	<	5	<	5	<	5	<	5	<	5
Toluene		7		10	<	5	<	5	<	5
Chlorobenzene	<	5	<	5	<	5	<	5	<	5
Ethylbenzene	<	5	<	5	<	5	<	5	<	5
Styrene	<	5	<	5	<	5	<	5	<	5
Total Xylenes		6		5	<	5	<	5	<	5

SUN/INLAND/NIPSCO
VOLATILE ORGANIC EMISSIONS FROM THOMPSON COKE OVENS
12-Dec-89
CONCENTRATIONS ug/m3

COMPOUND	End Cycle #0198 Pair 1 ug/m3	End Cycle #0199 Pair 2 ug/m3	End Cycle #0200 Pair 3 ug/m3	End Cycle #0202 Pair 4 ug/m3	End Cycle Average ug/m3
Chloromethane	< 0.518	< 0.537	< 0.543	< 0.543	0.535
Bromomethane	0.829	3.114	4.343	0.326	2.153
Vinyl Chloride	< 0.518	< 0.537	< 0.543	< 0.543	0.535
Chloroethane	< 0.518	< 0.537	< 0.543	< 0.543	0.535
Methylene Chloride	2.799	10.736	1.791	7.609	5.734
Acetone	4.665	4.241	3.040	5.381	4.332
Carbon Disulfide	0.518	5.368	1.846 <	0.272 <	2.001
1,1-Dichloroethene	< 0.259	0.591	0.271 <	0.272 <	0.348
1,1-Dichloroethane	< 0.259	< 0.268	< 0.271	< 0.272	< 0.268
1,2-Dichloroethene	< 0.259	< 0.268	< 0.271	< 0.272	< 0.268
Chloroform	< 0.259	< 0.268	< 0.271	< 0.272	< 0.268
1,2 -Dichlroethane	< 0.259	< 0.268	< 0.271	< 0.272	< 0.268
2-Butanone	0.881	1.181	0.651	0.815	0.882
1,1,1-Trichloroethane	1.244	35.430	4.126 <	0.272 <	10.268
Carbon Tetrachloride	< 0.259	< 0.268	< 0.271	< 0.272	< 0.268
Vinyl Acetate	< 0.259	< 0.268	< 0.271	< 0.272	< 0.268
Bromodichloromethane	< 0.259	< 0.268	< 0.271	< 0.272	< 0.268
1,2-Dichloropropane	< 0.259	< 0.268	< 0.271	< 0.272	< 0.268
Trans 1,3-Dichloropropene	< 0.259	< 0.268	< 0.271	< 0.272	< 0.268
Trichloroethene	< 0.259	< 0.268	< 0.271	< 0.272	< 0.268
Dibromochloromethane	< 0.259	< 0.268	< 0.271	< 0.272	< 0.268
1,1,2-Trichloroethane	< 0.259	< 0.268	< 0.271	< 0.272	< 0.268
Benzene	72.565	19.326	53.199	0.326	36.354
Cis-1,3-Dichloropropene	< 0.259	< 0.268	< 0.271	< 0.272	< 0.268
2-Chloroethylvinylether	< 0.518	< 0.537	< 0.543	< 0.543	< 0.535
Bromoform	< 0.259	< 0.268	< 0.271	< 0.272	< 0.268
4-Methyl-2-Pentanone	< 0.518	0.322 <	0.543 <	0.543 <	0.482
2-Hexanone	< 0.518	< 0.537	< 0.543	< 0.543	< 0.535
Tetrachloroethene	< 0.259	< 0.268	< 0.271	< 0.272	< 0.268
1,1,2,2-Tetrachloroethane	< 0.259	< 0.268	< 0.271	< 0.272	< 0.268
Toluene	0.363	0.537	0.271 <	0.272 <	0.361
Chlorobenzene	< 0.259	< 0.268	< 0.271	< 0.272	< 0.268
Ethylbenzene	< 0.259	< 0.268	< 0.271	< 0.272	< 0.268
Styrene	< 0.259	0.268 <	0.271 <	0.272 <	0.268
Total Xylenes	0.311	0.268 <	0.271 <	0.272 <	0.281

SUN/INLAND/NIPSCO
VOLATILE ORGANIC EMISSIONS FROM THOMPSON COKE OVENS
12-Dec-89
CONCENTRATIONS ppbv

COMPOUND		End Cycle #0198 Pair 1 ppb	End Cycle #0199 Pair 2 ppb	End Cycle #0200 Pair 3 ppb	End Cycle #0202 Pair 4 ppb	End Cycle Average ppb
Chloromethane	(	0.244	0.253 (	0.256 (	0.256 (	0.252
Bromomethane		0.210	0.788	1.099	0.083	0.545
Vinyl Chloride	(	0.199 (	0.206 (	0.209 (	0.209 (	0.206
Chloroethane	(	0.193 (	0.200 (	0.202 (	0.203 (	0.199
Methylene Chloride		0.792	3.037	0.507	2.152	1.622
Acetone		1.934	1.758	1.260	2.230	1.795
Carbon Disulfide		0.164	1.698	0.584 (	0.086 (	0.633
1,1-Dichloroethene	(	0.064	0.146	0.067 (	0.067 (	0.086
1,1-Dichloroethane	(	0.063 (	0.065 (	0.066 (	0.066 (	0.065
1,2-Dichloroethene	(	0.064 (	0.067 (	0.067 (	0.067 (	0.066
Chloroform	(	0.052 (	0.054 (	0.055 (	0.055 (	0.054
1,2 -Dichlroethane	(	0.063 (	0.065 (	0.066 (	0.066 (	0.065
2-Butanone		0.294	0.394	0.218	0.272	0.295
1,1,1-Trichloroethane		0.225	6.404	0.746 (	0.048 (	1.856
Carbon Tetrachloride	(	0.040 (	0.042 (	0.042 (	0.042 (	0.042
Vinyl Acetate	(	0.072 (	0.075 (	0.076 (	0.076 (	0.075
Bromodichloromethane	(	0.038 (	0.039 (	0.040 (	0.040 (	0.039
1,2-Dichloropropane	(	0.055 (	0.057 (	0.058 (	0.058 (	0.057
Trans 1,3-Dichloropropene	(	0.056 (	0.058 (	0.059 (	0.059 (	0.058
Trichloroethene	(	0.048 (	0.049 (	0.050 (	0.050 (	0.049
Dibromochloromethane	(	0.030 (	0.031 (	0.031 (	0.031 (	0.031
1,1,2-Trichloroethane	(	0.047 (	0.049 (	0.049 (	0.049 (	0.048
Benzene		22.365	5.956	16.396	0.101	11.204
Cis-1,3-Dichloropropene	(	0.056 (	0.058 (	0.059 (	0.059 (	0.058
2-Chloroethylvinylether	(	0.117 (	0.121 (	0.122 (	0.122 (	0.121
Bromoform	(	0.025 (	0.026 (	0.026 (	0.026 (	0.025
4-Methyl-2-Pentanone	(	0.124	0.077 (	0.130 (	0.130 (	0.116
2-Hexanone	(	0.125 (	0.129 (	0.131 (	0.131 (	0.129
Tetrachloroethene	(	0.038 (	0.039 (	0.039 (	0.039 (	0.039
1,1,2,2-Tetrachloroethane	(	0.037 (	0.038 (	0.039 (	0.039 (	0.038
Toluene		0.095	0.142	0.071 (	0.071 (	0.094
Chlorobenzene	(	0.055 (	0.057 (	0.058 (	0.058 (	0.057
Ethylbenzene	(	0.059 (	0.061 (	0.062 (	0.062 (	0.061
Styrene	(	0.061 (	0.062 (	0.063 (	0.063 (	0.062
Total Xylenes		0.061	0.061 (	0.062 (	0.062 (	0.064

SUN/INLAND/NIPSCO
VOLATILE ORGANIC EMISSIONS FROM THOMPSON COKE OVENS
12-Dec-89
CONCENTRATIONS ppbv

COMPOUND		Start of Cycle #0193 Pair 1 ppb		Start of Cycle #0194 Pair 2 ppb		Start of Cycle #0195 Pair 3 ppb		Start of Cycle #0197 Pair 4 ppb		Start of Cycle Average ppb
Chloromethane		38.554	(	0.234	(	0.235	(	0.230	(	9.813
Bromomethane		1.552		1.760		0.781		0.568		1.165
Vinyl Chloride	(	0.197	(	0.191	(	0.191	(	0.188	(	0.192
Chloroethane	(	0.190	(	0.185	(	0.185	(	0.182	(	0.186
Methylene Chloride	(	1.735		0.562		0.507		3.037	(	1.460
Acetone	(	0.212	(	0.206		2.681		1.416	(	1.129
Carbon Disulfide		0.146		0.173		0.283		1.359		0.490
1,1-Dichloroethene	(	0.063	(	0.062	(	0.062		0.448	(	0.159
1,1-Dichloroethane	(	0.062	(	0.060	(	0.060	(	0.059	(	0.061
1,2-Dichloroethene	(	0.063	(	0.062	(	0.062	(	0.060	(	0.062
Chloroform		2.169	(	0.050	(	0.050	(	0.049	(	0.580
1,2 -Dichlroethane	(	0.062	(	0.060	(	0.060	(	0.059	(	0.061
2-Butanone		1.041		0.332		0.399		0.212		0.496
1,1,1-Trichloroethane		0.092		0.278	(	0.045		17.646	(	4.516
Carbon Tetrachloride		0.080	(	0.039	(	0.039	(	0.038	(	0.049
Vinyl Acetate	(	0.071	(	0.069	(	0.069	(	0.068	(	0.070
Bromodichloromethane	(	0.038	(	0.036	(	0.037	(	0.036	(	0.037
1,2-Dichloropropane	(	0.054	(	0.053	(	0.053	(	0.052	(	0.053
Trans 1,3-Dichloropropene	(	0.055	(	0.054	(	0.054	(	0.053	(	0.054
Trichloroethene	(	0.047	(	0.046	(	0.046	(	0.045	(	0.046
Dibromochloromethane	(	0.029	(	0.029	(	0.029	(	0.028	(	0.029
1,1,2-Trichloroethane	(	0.046	(	0.045	(	0.045	(	0.044	(	0.045
Benzene		9.138		1.240		3.220		5.416		4.754
Cis-1,3-Dichloropropene	(	0.055	(	0.054	(	0.054	(	0.053	(	0.054
2-Chloroethylvinylether	(	0.115	(	0.112	(	0.112	(	0.110	(	0.112
Bromoform	(	0.024	(	0.024	(	0.024	(	0.023	(	0.024
4-Methyl-2-Pentanone	(	0.123	(	0.119	(	0.119	(	0.117	(	0.120
2-Hexanone	(	0.123	(	0.119	(	0.120	(	0.117	(	0.120
Tetrachloroethene	(	0.037	(	0.036	(	0.036	(	0.035	(	0.036
'1,1,2,2-Tetrachloroethane	(	0.037	(	0.036	(	0.036	(	0.035	(	0.036
Toluene		5.343	(	0.065	(	0.065		0.089	(	1.391
Chlorobenzene	(	0.054	(	0.053	(	0.053	(	0.052	(	0.053
Ethylbenzene		0.035	(	0.056	(	0.056	(	0.055	(	0.051
Styrene	(	0.059	(	0.057	(	0.058	(	0.056	(	0.058
Total Xylenes	(	0.058	(	0.056	(	0.056	(	0.055	(	0.057

SUN/INLAND/NIPSCO
VOLATILE ORGANIC EMISSIONS FROM THOMPSON COKE OVENS
12-Dec-89
MASS EMISSION RATES lbs/hr

COMPOUND	Start of Cycle #0193 Pair 1 lbs/hr	Start of Cycle #0194 Pair 2 lbs/hr	Start of Cycle #0195 Pair 3 lbs/hr	Start of Cycle #0197 Pair 4 lbs/hr	Start of Cycle Average lbs/hr
Chloromethane	6.92E-03 (	4.20E-05 (	4.21E-05 (	4.13E-05 (	1.76E-03
Bromomethane	5.19E-04	5.89E-04	2.61E-04	1.90E-04	3.90E-04
Vinyl Chloride	(4.32E-05 (	4.20E-05 (	4.21E-05 (	4.13E-05 (	4.22E-05
Chloroethane	(4.32E-05 (	4.20E-05 (	4.21E-05 (	4.13E-05 (	4.22E-05
Methylene Chloride	(5.19E-04	1.68E-04	1.52E-04	9.09E-04 (	4.37E-04
Acetone	(4.32E-05 (	4.20E-05	5.47E-04	2.89E-04 (	2.30E-04
Carbon Disulfide	3.89E-05	4.62E-05	7.58E-05	3.63E-04	1.31E-04
1,1-Dichloroethene	(2.16E-05 (	2.10E-05 (	2.10E-05	1.53E-04 (	5.41E-05
1,1-Dichloroethane	(2.16E-05 (	2.10E-05 (	2.10E-05 (	2.06E-05 (	2.11E-05
1,2-Dichloroethene	(2.16E-05 (	2.10E-05 (	2.10E-05 (	2.06E-05 (	2.11E-05
Chloroform	9.08E-04 (	2.10E-05 (	2.10E-05 (	2.06E-05 (	2.43E-04
1,2 -Dichlrorethane	(2.16E-05 (	2.10E-05 (	2.10E-05 (	2.06E-05 (	2.11E-05
2-Butanone	2.64E-04	8.41E-05	1.01E-04	5.37E-05	1.26E-04
1,1,1-Trichlroethane	4.32E-05	1.30E-04 (	2.10E-05	8.26E-03 (	2.11E-03
Carbon Tetrachloride	4.32E-05 (	2.10E-05 (	2.10E-05 (	2.06E-05 (	2.65E-05
Vinyl Acetate	(2.16E-05 (	2.10E-05 (	2.10E-05 (	2.06E-05 (	2.11E-05
Bromodichloromethane	(2.16E-05 (	2.10E-05 (	2.10E-05 (	2.06E-05 (	2.11E-05
1,2-Dichloropropane	(2.16E-05 (	2.10E-05 (	2.10E-05 (	2.06E-05 (	2.11E-05
Trans 1,3-Dichloropropene	(2.16E-05 (	2.10E-05 (	2.10E-05 (	2.06E-05 (	2.11E-05
Trichloroethene	(2.16E-05 (	2.10E-05 (	2.10E-05 (	2.06E-05 (	2.11E-05
Dibromochloromethane	(2.16E-05 (	2.10E-05 (	2.10E-05 (	2.06E-05 (	2.11E-05
1,1,2-Trichloroethane	(2.16E-05 (	2.10E-05 (	2.10E-05 (	2.06E-05 (	2.11E-05
Benzene	2.51E-03	3.41E-04	8.84E-04	1.49E-03	1.30E-03
Cis-1,3-Dichloropropene	(2.16E-05 (	2.10E-05 (	2.10E-05 (	2.06E-05 (	2.11E-05
2-Chloroethylvinylether	(4.32E-05 (	4.20E-05 (	4.21E-05 (	4.13E-05 (	4.22E-05
Bromoform	(2.16E-05 (	2.10E-05 (	2.10E-05 (	2.06E-05 (	2.11E-05
4-Methyl-2-Pentanone	(4.32E-05 (	4.20E-05 (	4.21E-05 (	4.13E-05 (	4.22E-05
2-Hexanone	(4.32E-05 (	4.20E-05 (	4.21E-05 (	4.13E-05 (	4.22E-05
Tetrachloroethene	(2.16E-05 (	2.10E-05 (	2.10E-05 (	2.06E-05 (	2.11E-05
1,1,2,2-Tetrachloroethane	(2.16E-05 (	2.10E-05 (	2.10E-05 (	2.06E-05 (	2.11E-05
Toluene	1.73E-03 (	2.10E-05 (	2.10E-05	2.89E-05 (	4.50E-04
Chlorobenzene	(2.16E-05 (	2.10E-05 (	2.10E-05 (	2.06E-05 (	2.11E-05
Ethylbenzene	1.30E-05 (	2.10E-05 (	2.10E-05 (	2.06E-05 (	1.89E-05
Styrene	(2.16E-05 (	2.10E-05 (	2.10E-05 (	2.06E-05 (	2.11E-05
Total Xylenes	(2.16E-05 (	2.10E-05 (	2.10E-05 (	2.06E-05 (	2.11E-05

Sampling Parameters

Run 2 Set 1	Run 2 Set 2	Run 2 Set 3	Run 2 Set 4
Nominal Sample Volume 19.21 L	Nominal Sample Volume 20.79 L	Nominal Sample Volume 19.69 L	Nominal Sample Volume 17.95 L
Average Meter Temperature 8.875 C	Average Meter Temperature 7.875 C	Average Meter Temperature 7.5 C	Average Meter Temperature 8 C
Barometric Pressure 29.45 in. Hg	Barometric Pressure 29.45 in. Hg	Barometric Pressure 29.45 in. Hg	Barometric Pressure 29.45 in. Hg
Corrected Sample Volume 19.81 L	Corrected Sample Volume 21.52 L	Corrected Sample Volume 20.40 L	Corrected Sample Volume 18.57 L
Stack Flow Rate 19333.5 DSCFM	Stack Flow Rate 19333.5 DSCFM	Stack Flow Rate 19333.5 DSCFM	Stack Flow Rate 19333.5 DSCFM

SUN/INLAND/NIPSCO
VOLATILE ORGANIC EMISSIONS FROM THOMPSON COKE OVENS

COMPOUND		Midcycle #0203 ng/sample		Midcycle #0204 ng/sample		Midcycle #0205 ng/sample		Midcycle #0206 ng/sample		Midcycle #0207 ng/sample BLANK
Chloromethane	<	10	<	10	<	10	<	10	<	10
Bromomethane		21		29		13		6	<	10
Vinyl Chloride	<	10	<	10	<	10	<	10	<	10
Chloroethane	<	10	<	10	<	10	<	10	<	10
Methylene Chloride		62		72		250		38		190
Acetone		150		73		160		100	<	10
Carbon Disulfide	<	5		9		9	<	5	<	5
1,1-Dichloroethene	<	5	<	5		14	<	5	<	5
1,1-Dichloroethane	<	5	<	5	<	5	<	5	<	5
1,2-Dichloroethene	<	5	<	5	<	5	<	5	<	5
Chloroform	<	5	<	5	<	5	<	5	<	5
1,2 -Dichlroethane	<	5	<	5	<	5	<	5	<	5
2-Butanone		26		24		15		18	<	10
1,1,1-Trichloroethane		7	<	5		430	<	5		5
Carbon Tetrachloride	<	5	<	5	<	5	<	5	<	5
Vinyl Acetate	<	5	<	5	<	5	<	5	<	5
Bromodichloromethane	<	5	<	5	<	5	<	5	<	5
1,2-Dichloropropane	<	5	<	5	<	5	<	5	<	5
Trans 1,3-Dichloropropene	<	5	<	5	<	5	<	5	<	5
Trichloroethene		3	<	5	<	5	<	5	<	5
Dibromochloromethane	<	5	<	5	<	5	<	5	<	5
1,1,2-Trichloroethane	<	5	<	5	<	5	<	5	<	5
Benzene		1300		1500		180		1800	<	5
Cis-1,3-Dichloropropene	<	5	<	5	<	5	<	5	<	5
2-Chloroethylvinylether	<	10	<	10	<	10	<	10	<	10
Bromoform	<	5	<	5	<	5	<	5	<	5
4-Methyl-2-Pentanone		8	<	10	<	10	<	10	<	10
2-Hexanone	<	10	<	10	<	10	<	10	<	10
Tetrachloroethene	<	5	<	5	<	5	<	5	<	5
'1,1,2,2-Tetrachloroethane	<	5	<	5	<	5	<	5	<	5
Toluene		4	<	5		5	<	5	<	5
Chlorobenzene	<	5		5	<	5	<	5	<	5
Ethylbenzene	<	5	<	5	<	5	<	5	<	5
Styrene	<	5	<	5	<	5	<	5	<	5
Total Xylenes	<	5	<	5	<	5	<	5	<	5

SUN/INLAND/NIPSCO
VOLATILE ORGANIC EMISSIONS FROM THOMPSON COKE OVENS
12-Dec-89
MASS EMISSION RATES lbs/hr

COMPOUND		Midcycle #0203 Pair 1 lbs/hr		Midcycle #0204 Pair 2 lbs/hr		Midcycle #0205 Pair 3 lbs/hr		Midcycle #0206 Pair 4 lbs/hr		Midcycle Average lbs/hr
Chloromethane		3.65E-05	(	3.36E-05	(	3.55E-05	(	3.90E-05	(	3.61E-05
Bromomethane		7.67E-05		9.75E-05		4.61E-05		2.34E-05		6.09E-05
Vinyl Chloride	(	3.65E-05	(	3.36E-05	(	3.55E-05	(	3.90E-05	(	3.61E-05
Chloroethane		3.65E-05	(	3.36E-05	(	3.55E-05	(	3.90E-05	(	3.61E-05
Methylene Chloride	(	2.26E-04		2.42E-04		8.87E-04		1.48E-04	(	3.76E-04
Acetone	(	5.48E-04	(	2.46E-04		5.67E-04		3.90E-04	(	4.38E-04
Carbon Disulfide		1.83E-05		3.03E-05		3.19E-05		1.95E-05		2.50E-05
1,1-Dichloroethene	(	1.83E-05	(	1.68E-05	(	4.96E-05		1.95E-05	(	2.61E-05
1,1-Dichloroethane	(	1.83E-05	(	1.68E-05	(	1.77E-05	(	1.95E-05	(	1.81E-05
1,2-Dichloroethene	(	1.83E-05	(	1.68E-05	(	1.77E-05	(	1.95E-05	(	1.81E-05
Chloroform		1.83E-05	(	1.68E-05	(	1.77E-05	(	1.95E-05	(	1.81E-05
1,2 -Dichlrorethane	(	1.83E-05	(	1.68E-05	(	1.77E-05	(	1.95E-05	(	1.81E-05
2-Butanone		9.50E-05		8.07E-05		5.32E-05		7.01E-05		7.48E-05
1,1,1-Trichlroethane		2.56E-05		1.68E-05	(	1.52E-03		1.95E-05	(	3.97E-04
Carbon Tetrachloride		1.83E-05	(	1.68E-05	(	1.77E-05	(	1.95E-05	(	1.81E-05
Vinyl Acetate	(	1.83E-05	(	1.68E-05	(	1.77E-05	(	1.95E-05	(	1.81E-05
Bromodichloromethane	(	1.83E-05	(	1.68E-05	(	1.77E-05	(	1.95E-05	(	1.81E-05
1,2-Dichloropropane	(	1.83E-05	(	1.68E-05	(	1.77E-05	(	1.95E-05	(	1.81E-05
Trans 1,3-Dichloropropene	(	1.83E-05	(	1.68E-05	(	1.77E-05	(	1.95E-05	(	1.81E-05
Trichloroethene	(	1.10E-05	(	1.68E-05	(	1.77E-05	(	1.95E-05	(	1.62E-05
Dibromochloromethane	(	1.83E-05	(	1.68E-05	(	1.77E-05	(	1.95E-05	(	1.81E-05
1,1,2-Trichloroethane	(	1.83E-05	(	1.68E-05	(	1.77E-05	(	1.95E-05	(	1.81E-05
Benzene		4.75E-03		5.04E-03		6.38E-04		7.01E-03		4.36E-03
Cis-1,3-Dichloropropene	(	1.83E-05	(	1.68E-05	(	1.77E-05	(	1.95E-05	(	1.81E-05
2-Chloroethylvinylether	(	3.65E-05	(	3.36E-05	(	3.55E-05	(	3.90E-05	(	3.61E-05
Bromoform	(	1.83E-05	(	1.68E-05	(	1.77E-05	(	1.95E-05	(	1.81E-05
4-Methyl-2-Pentanone	(	2.92E-05	(	3.36E-05	(	3.55E-05	(	3.90E-05	(	3.43E-05
2-Hexanone	(	3.65E-05	(	3.36E-05	(	3.55E-05	(	3.90E-05	(	3.61E-05
Tetrachloroethene	(	1.83E-05	(	1.68E-05	(	1.77E-05	(	1.95E-05	(	1.81E-05
'1,1,2,2-Tetrachloroethane	(	1.83E-05	(	1.68E-05	(	1.77E-05	(	1.95E-05	(	1.81E-05
Toluene		1.46E-05	(	1.68E-05	(	1.77E-05		1.95E-05	(	1.72E-05
Chlorobenzene	(	1.83E-05	(	1.68E-05	(	1.77E-05	(	1.95E-05	(	1.81E-05
Ethylbenzene		1.83E-05	(	1.68E-05	(	1.77E-05	(	1.95E-05	(	1.81E-05
Styrene	(	1.83E-05	(	1.68E-05	(	1.77E-05	(	1.95E-05	(	1.81E-05
Total Xylenes	(	1.83E-05	(	1.68E-05	(	1.77E-05	(	1.95E-05	(	1.81E-05

Sampling Parameters

Run 3 Set 1	Run 3 Set 2	Run 3 Set 3	Run 3 Set 4
Nominal Sample Volume 20 L	Nominal Sample Volume 20 L	Nominal Sample Volume 20 L	Nominal Sample Volume 20 L
Average Meter Temperature 28.125 C	Average Meter Temperature 38.875 C	Average Meter Temperature 42.375 C	Average Meter Temperature 42.75 C
Barometric Pressure 29.43 in. Hg	Barometric Pressure 29.43 in. Hg	Barometric Pressure 29.43 in. Hg	Barometric Pressure 29.43 in. Hg
Corrected Sample Volume 19.29 L	Corrected Sample Volume 18.63 L	Corrected Sample Volume 18.42 L	Corrected Sample Volume 18.40 L
Stack Flow Rate 15191.5 DSCFM	Stack Flow Rate 15191.5 DSCFM	Stack Flow Rate 15191.5 DSCFM	Stack Flow Rate 15191.5 DSCFM

SUN/INLAND/NIPSCO
VOLATILE ORGANIC EMISSIONS FROM THOMPSON COKE OVENS
12-Dec-89
MASS EMISSION RATES lbs/hr

COMPOUND		End Cycle #0198 Pair 1 lbs/hr		End Cycle #0199 Pair 2 lbs/hr		End Cycle #0200 Pair 3 lbs/hr		End Cycle #0202 Pair 4 lbs/hr		End Cycle Average lbs/hr
Chloromethane		2.95E-05	(	3.05E-05	(	3.09E-05	(	3.09E-05	(	3.04E-05
Bromomethane		4.72E-05		1.77E-04		2.47E-04		1.85E-05		1.22E-04
Vinyl Chloride	(	2.95E-05	(	3.05E-05	(	3.09E-05	(	3.09E-05	(	3.04E-05
Chloroethane		2.95E-05	(	3.05E-05	(	3.09E-05	(	3.09E-05	(	3.04E-05
Methylene Chloride	(	1.55E-04		6.10E-04		1.02E-04		4.33E-04	(	3.26E-04
Acetone	(	3.65E-04	(	2.41E-04		1.73E-04		3.09E-04	(	2.46E-04
Carbon Disulfide		2.95E-05		3.05E-04		1.05E-04		1.55E-05		1.14E-04
1,1-Dichloroethane	(	1.47E-05	(	3.36E-05	(	1.54E-05		1.55E-05	(	1.98E-05
1,1-Dichloroethene	(	1.47E-05	(	1.53E-05	(	1.54E-05	(	1.55E-05	(	1.52E-05
1,2-Dichloroethene	(	1.47E-05	(	1.53E-05	(	1.54E-05	(	1.55E-05	(	1.52E-05
Chloroform		1.47E-05	(	1.53E-05	(	1.54E-05	(	1.55E-05	(	1.52E-05
1,2 -Dichlroethane	(	1.47E-05	(	1.53E-05	(	1.54E-05	(	1.55E-05	(	1.52E-05
2-Butanone		5.01E-05		5.73E-05		3.70E-05		4.64E-05		5.02E-05
1,1,1-Trichlroethane		7.07E-05		2.01E-03	(	2.35E-04		1.55E-05	(	5.24E-04
Carbon Tetrachloride		1.47E-05	(	1.53E-05	(	1.54E-05	(	1.55E-05	(	1.52E-05
Vinyl Acetate	(	1.47E-05	(	1.53E-05	(	1.54E-05	(	1.55E-05	(	1.52E-05
Bromodichloromethane	(	1.47E-05	(	1.53E-05	(	1.54E-05	(	1.55E-05	(	1.52E-05
1,2-Dichloropropane	(	1.47E-05	(	1.53E-05	(	1.54E-05	(	1.55E-05	(	1.52E-05
Trans 1,3-Dichloropropene	(	1.47E-05	(	1.53E-05	(	1.54E-05	(	1.55E-05	(	1.52E-05
Trichloroethene	(	1.47E-05	(	1.53E-05	(	1.54E-05	(	1.55E-05	(	1.52E-05
Dibromochloromethane	(	1.47E-05	(	1.53E-05	(	1.54E-05	(	1.55E-05	(	1.52E-05
1,1,2-Trichloroethane	(	1.47E-05	(	1.53E-05	(	1.54E-05	(	1.55E-05	(	1.52E-05
Benzene		4.13E-03		1.10E-03		3.02E-03		1.85E-05		2.07E-03
Cis-1,3-Dichloropropene	(	1.47E-05	(	1.53E-05	(	1.54E-05	(	1.55E-05	(	1.52E-05
2-Chloroethylvinylether	(	2.95E-05	(	3.05E-05	(	3.09E-05	(	3.09E-05	(	3.04E-05
Bromoform	(	1.47E-05	(	1.53E-05	(	1.54E-05	(	1.55E-05	(	1.52E-05
4-Methyl-2-Pentanone	(	2.95E-05	(	1.83E-05	(	3.09E-05	(	3.09E-05	(	2.74E-05
2-Hexanone	(	2.95E-05	(	3.05E-05	(	3.09E-05	(	3.09E-05	(	3.04E-05
Tetrachloroethene	(	1.47E-05	(	1.53E-05	(	1.54E-05	(	1.55E-05	(	1.52E-05
1,1,2,2-Tetrachloroethane	(	1.47E-05	(	1.53E-05	(	1.54E-05	(	1.55E-05	(	1.52E-05
Toluene		2.06E-05	(	3.05E-05	(	1.54E-05		1.55E-05	(	2.05E-05
Chlorobenzene	(	1.47E-05	(	1.53E-05	(	1.54E-05	(	1.55E-05	(	1.52E-05
Ethylbenzene		1.47E-05	(	1.53E-05	(	1.54E-05	(	1.55E-05	(	1.52E-05
Styrene	(	1.47E-05	(	1.53E-05	(	1.54E-05	(	1.55E-05	(	1.52E-05
Total Xylenes	(	1.77E-05	(	1.53E-05	(	1.54E-05	(	1.55E-05	(	1.50E-05

INTERNATIONAL TECHNOLOGY CORPORATION

ANALYTICAL SERVICES

CERTIFICATE OF ANALYSIS

IT Corporation
312 Directors Drive
Knoxville, TN 37923
ATTN: John Carson

December 26, 1989

Job Number: ITAQ 44763

P.O. Number: 406000.12

This is the Certificate of Analysis for the following samples:

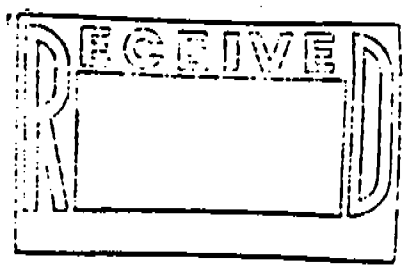
Client Project ID:	Sun/Inland/Nipsco
Date Received by Lab:	12/08/89
Number of Samples:	Eighteen (18)
Sample Type:	Filters-thirteen (13), Solids-three (3), Blanks-two (2).

I. Introduction

On 12/08/89 thirteen (13) filters, three (3) solids and two (2) blanks arrived at the ITAS-Knoxville, Tennessee laboratory from IT-Air Quality Services for the Sun/Inland/Nipsco Project. The list of analytical tests performed, as well as date of receipt and analysis, can be found in the attached report.

II. Analytical Results/Methodology

The analytical results for this report are presented by analytical test. Each set of data will include sample identification information and the analytical results. Please note that all data are blank corrected, i.e., if any compound is found in the corresponding laboratory blank, it is subtracted from the analytical result before it is reported.



Reviewed and Approved:

Mary Tyler
Laboratory Project Manager

IT Corporation
December 26, 1989

Client Project ID: Sun/Inland/Nipsco

IT ANALYTICAL SERVICES
5815 MIDDLEBROOK PIKE
KNOXVILLE, TN

Job Number: ITAQ 44763

METALS ANALYSIS

Results in ug/filter

Sample Matrix: Filter

Client Sample ID:	Method Blank	5707086	5707087
Lab Sample ID:	PBFC1274	KK0853	KK0854
Silver	3.5 U	5.6	3.5 U
Aluminum	28 U	3,160	1,390
Arsenic	21 U	21 U	21 U
Boron	7 U	245	130
Barium	1.4 U	54.6	37.4
[illegible]yllium	0.7 U	0.7 U	0.7 U
[illegible]cium	21 U	2,340	1,820
[illegible]dmium	3.5 U	3.5 U	3.5 U
Cobalt	14 U	14 U	14 U
Chromium	7 U	7	7 U
Copper	14	7 U	7 U
Iron	14	1,550	1,040
Lithium	3.5 U	5.2	4.2
Magnesium	21 U	515	441
Manganese	1.4 U	12.2	5.6
Molybdenum	7 U	7 U	7 U
Sodium	140 U	16,700	18,100
[illegible]ickel	14 U	14 U	14 U
Lead	21 U	35	21 U
Antimony	21 U	21 U	21 U
Selenium	42 U	42 U	42 U
Silicon	7 U	1,790	686
Tin	14	14 U	14 U
Strontium	0.7 U	51.4	26.6
Titanium	36.4	46.6	38.5
Thallium	21 U	21 U	21 U
Zinc	3.5 U	2,920	573

U - Compound was analyzed for but not detected. The number is the detection limit for the sample.

Date Digested: 12/19/89
Date Analyzed: 12/19/89

IT Corporation
December 26, 1989

Client Project ID: Sun/Inland/Nipsco

IT ANALYTICAL SERVICES
5815 MIDDLEBROOK PIKE
KNOXVILLE, TN

Job Number: ITAQ 44763

METALS ANALYSIS

Results in ug/filter

Sample Matrix: Filter

Client Sample ID:	5707088	5707089	5707090
Lab Sample ID:	KK0855	KK0856	KK0857
Silver	3.5 U	3.5 U	3.5 U
Aluminum	1,160	970	2,000
Arsenic	21 U	21 U	70
Boron	126	105	168
Barium	32.6	30.4	79.4
Beryllium	0.7 U	0.7 U	0.7 U
Calcium	1,630	1,530	2,640
Cadmium	3.5 U	3.5 U	3.5 U
Cobalt	14 U	14 U	14 U
Chromium	7 U	7 U	7 U
Copper	7 U	7 U	7
Iron	1,290	406	1,880
Lithium	3.5 U	3.5 U	8.8
Magnesium	410	371	532
Manganese	4.9	3.8	9.8
Molybdenum	7 U	7 U	14
Sodium	16,600	15,400	19,600
[illegible]el	14 U	14 U	14 U
[illegible]	21 U	21 U	81
[illegible]mony	21 U	21 U	21 U
Selenium	42 U	42 U	42 U
Silicon	1,330	1,280	1,070
Tin	14 U	14 U	14 U
Strontium	21.0	22.4	73.2
Titanium	50.0	17.5	114
Thallium	21 U	21 U	21 U
Zinc	534	205	179

U - Compound was analyzed for but not detected. The number is the detection limit for the sample.

Date Digested: 12/19/89
Date Analyzed: 12/19/89

IT Corporation
December 26, 1989

Client Project ID: Sun/Inland/Nipsco

IT ANALYTICAL SERVICES
5815 MIDDLEBROOK PIKE
KNOXVILLE, TN

Job Number: ITAQ 44763

METALS ANALYSIS

Results in µg/filter

Sample Matrix: Filter

Client Sample ID:	5707091		5707093	
Lab Sample ID:	KK0858		KK0859	
Silver	3.5	U	3.5	U
Aluminum	1,410		1,830	
Arsenic	42		42	
Boron	140		133	
Barium	58.8		76.0	
Beryllium	0.7	U	0.7	U
Calcium	2,090		2,380	
Cadmium	3.5	U	3.5	U
Cobalt	14	U	14	U
Chromium	7	U	7	U
Copper	7	U	7	U
Iron	1,250		1,540	
Lithium	7.4		7.7	
Magnesium	462		452	
Manganese	6.6		8.4	
Molybdenum	7		7	
Sodium	17,700		15,200	
Nickel	14	U	14	U
Lead	63		32	
Antimony	21	U	21	U
Selenium	42	U	42	U
Silicon	1,380		1,790	
Tin	14	U	14	U
Strontium	56.0		77.4	
Titanium	120		112	
Thallium	21	U	21	U
Zinc	178		127	

U - Compound was analyzed for but not detected. The number is the detection limit for the sample.

Date Digested: 12/19/89
Date Analyzed: 12/19/89

METALS ANALYSIS

Results in µg/filter

Sample Matrix: Filter

Client Sample ID:	5707094		5743393	
Lab Sample ID:	KK0860		KK0861	
Silver	3.5	U	3.5	U
Aluminum	1,850		336	
Arsenic	49		21	U
Boron	144		109	
Barium	83.3		1.4	U
Beryllium	0.7	U	0.7	U
Calcium	2,410		917	
Cadmium	3.5	U	3.5	U
Cobalt	14	U	14	U
Chromium	7	U	7	U
Copper	7	U	7	U
Iron	1,910		252	
Lithium	8.8		3.5	U
Magnesium	504		287	
Manganese	9.1		1.4	U
Molybdenum	14		7	U
Sodium	18,000		9,590	
Nickel	14	U	14	U
Lead	60		21	U
Antimony	21	U	21	U
Selenium	42	U	42	U
Silicon	1,540		1,100	
Tin	14	U	14	U
Strontium	77		1.4	
Titanium	136		135	
Thallium	21	U	21	U
Zinc	154		14.4	

U - Compound was analyzed for but not detected. The number is the detection limit for the sample.

Date Digested: 12/19/89
Date Analyzed: 12/19/89

METALS ANALYSIS

Results in µg/filter

Sample Matrix: Filter

Client Sample ID:	Method Blank	0230	0231
Lab Sample ID:	PBFC1275	KK0862	KK0863
Silver	0.5 U	1.9	3.5
Aluminum	4 U	416	190
Arsenic	3 U	49	57
Boron	1 U	92	17
Barium	0.2 U	2.7	3.9
Beryllium	0.1 U	0.1 U	0.1 U
Calcium	3 U	963	355
Cadmium	0.5 U	0.5 U	0.5 U
Cobalt	2 U	14	28
Chromium	1 U	357	884
Copper	1 U	76	56
Iron	1 U	786	1,090
Lithium	0.5 U	8.8	13.9
Magnesium	3 U	27	16
Manganese	0.2 U	47.8	93.0
Molybdenum	1 U	1 U	1 U
Sodium	20 U	359	531
Nickel	2 U	10,300	32,500
Lead	3 U	184	434
Antimony	3 U	3 U	3 U
Selenium	6 U	6 U	6 U
Silicon	2	331	208
Tin	2 U	4	10
Strontium	0.1 U	4.9	4.9
Titanium	0.8	24.7	22.4
Thallium	3 U	3 U	3 U
Zinc	2.2	212	463

U - Compound was analyzed for but not detected. The number is the detection limit for the sample.

Date Digested: 12/19/89
Date Analyzed: 12/19/89

IT Corporation
December 26, 1989

Client Project ID: Sun/Inland/Nipsco

IT ANALYTICAL SERVICES
5815 MIDDLEBROOK PIKE
KNOXVILLE, TN

Job Number: ITAQ 44763

METALS ANALYSIS

Results in µg/filter

Sample Matrix: Filter

Client Sample ID:	0232	0233
Lab Sample ID:	KK0864	KK0865
Silver	3.3	0.5 U
Aluminum	84	297
Arsenic	40	3 U
Boron	10	78
Barium	1.4	0.6
Beryllium	1.0	0.1 U
Calcium	299	693
Cadmium	4.9	0.5 U
Cobalt	3	2 U
Chromium	48	1 U
Copper	81	1 U
Iron	684	18
Lithium	13.1	0.6
Magnesium	4	17
Manganese	17.5	0.2 U
Molybdenum	26	1 U
Sodium	441	108
Nickel	240	2 U
Lead	245	3 U
Antimony	3 U	3 U
Selenium	6 U	6 U
Silicon	146	383
Tin	6	2 U
Strontium	1.8	5.4
Titanium	11.6	19.7
Thallium	3 U	3 U
Zinc	301	0.5 U

U - Compound was analyzed for but not detected. The number is the detection limit for the sample.

Date Digested: 12/19/89
Date Analyzed: 12/19/89

METALS ANALYSIS

Results in total µg

Sample Matrix: Filter

Client Sample ID:	Method Blank	0225
Lab Sample ID:	PBWC1297	KK0866
Silver	0.2 U	1.7
Aluminum	2 U	28
Arsenic	1 U	26
Boron	0.5 U	26.2
Barium	0.09 U	0.23
Beryllium	0.05 U	0.05 U
Calcium	1 U	101
Cadmium	0.2 U	0.2 U
Cobalt	0.9 U	30.4
Chromium	0.5 U	796
Copper	0.5 U	29.9
Iron	0.5	1,820
Lithium	0.2 U	29.4
Magnesium	1 U	4
Manganese	0.09 U	120
Molybdenum	0.05 U	0.05 U
Sodium	9 U	506
Nickel	0.9 U	20,300
Lead	1 U	83
Antimony	1 U	1 U
Selenium	3 U	3 U
Silicon	2.3	46.0
Tin	0.9 U	1.8
Strontium	0.05 U	0.14
Titanium	0.1 U	7.4
Thallium	1 U	1 U
Zinc	0.2 U	350
Solid Wt. (grams)	-	0.3956

U - Compound was analyzed for but not detected. The number is the detection limit for the sample.

Date Digested: 12/19/89
Date Analyzed: 12/19/89

IT Corporation
December 26, 1989

Client Project ID: Sun/Inland/Nipsco

IT ANALYTICAL SERVICES
5815 MIDDLEBROOK PIKE
KNOXVILLE, TN

Job Number: ITAQ 44763

METALS ANALYSIS

Results in total µg

Sample Matrix: Filter

Client Sample ID:	0226	0227
Lab Sample ID:	KK0867	KK0868
Silver	0.3	20.2
Aluminum	43	120
Arsenic	16	55
Boron	6.0	50.6
Barium	1.0	1.2
Beryllium	0.05 U	0.05 U
Calcium	1,590	312
Cadmium	0.2 U	0.2 U
Cobalt	8.3	69.0
Chromium	1,310	4,650
Copper	14.3	46.0
Iron	1,320	10,900
Lithium	2.7	6.9
Magnesium	8	1 U
Manganese	101	271
Molybdenum	0.05 U	0.05 U
Sodium	202	538
Nickel	5,340	31,200
Lead	74	115
Antimony	1 U	1 U
Selenium	3 U	3 U
Silicon	64.4	175
Tin	0.9 U	2.8
Strontium	1.3	0.78
Titanium	16.1	46.0
Thallium	1 U	1 U
Zinc	50.6	156
Solid Wt. (grams)	0.1290	0.2111

U - Compound was analyzed for but not detected. The number is the detection limit for the sample.

Date Digested: 12/19/89
Date Analyzed: 12/19/89

IT Corporation
December 26, 1989

Client Project ID: Sun/Inland/Nipsco

IT ANALYTICAL SERVICES
5815 MIDDLEBROOK PIKE
KNOXVILLE, TN

Job Number: ITAQ 44763

METALS ANALYSIS

Results in total µg

Sample Matrix: Filter

Client Sample ID:	0228		0229	
Lab Sample ID:	KK0869		KK0870	
Silver	1.9		0.2	U
Aluminum	2		2	U
Arsenic	1	U	1	U
Boron	1.4		1.4	
Barium	0.09	U	0.09	U
Beryllium	0.05	U	0.05	U
Calcium	7		5	
Cadmium	0.2	U	0.2	U
Cobalt	0.9	U	0.9	U
Chromium	73.6		1.8	
Copper	0.9		0.5	U
Iron	156		6.0	
Lithium	0.2	U	0.2	U
Magnesium	1	U	1	U
Manganese	2.8		0.09	
Molybdenum	0.05	U	0.05	U
Sodium	9	U	9	U
Nickel	188		12.9	
Lead	1	U	1	U
Antimony	1	U	1	U
Selenium	3	U	3	U
Silicon	17.0		2.3	
Tin	0.9	U	0.9	U
Strontium	0.05	U	0.05	U
Titanium	2.0		0.5	
Thallium	1	U	1	U
Zinc	2.5		0.9	
Solid Wt. (grams)	-		-	

U - Compound was analyzed for but not detected. The number is the detection limit for the sample.

Date Digested: 12/19/89
Date Analyzed: 12/19/89

IT CORPORATION

(FAX) TELECOPY COVER SHEET

Time in _____ Time Out _____ Pages to Follow: 9 Date: 1/4/90

Project No. ITAQ482350

TO: Randall Moore

— AUSTIN	— OAK RIDGE (nuc)
— CARLSBAD	— MARTINEZ
— CERRITOS LAB	— PITTSBURGH
— CINCINNATI	— PORT ALLEN
— DENVER	— RICHLAND
— EDISON	— TAMPA
— EXPORT	— TORRANCE
— HOUSTON	— ST. PAUL
— IRVINE	— WASHINGTON, DC-PEI
— KNOXVILLE/MIDDLEBROOK	— WASHINGTON DC-IT
	— WILMINGTON

OTHER DESTINATIONS

Company Name I.T. 312 Directors Dr.

City & State

Fax # 690-3626

FROM: Patti Carswell

COMMENTS:

Technology Development Lab
304 Directors Drive
Knoxville, TN 37923

TELECOPIER TELEPHONE: (615) 694-9573
VERIFICATION #: (615) 690-3211, ext. 4801

Sending Operator

Client Sample ID: 5707086

Sample Matrix: Filter
IT Sample ID: GG2368
Date Extracted: 12/22/89
Date Analyzed: 12/29/89

Analyte	milligrams concentration
Cyclohexane Solubles	19.2
" "	<0.24*

~~Sample Filter as received Blank Filter Weight Subtracted~~

* Corrected for the mass recovered in the Blank Filter (Client sample number 5743393, IT Sample number GG2390) as specified in NIOSH method 5023.

QC PMP 1-4-90

Client Sample ID: 5707087

Sample Matrix: Filter
IT Sample ID: GG2369
Date Extracted: 12/20/89
Date Analyzed: 12/29/89

Analyte	milligrams Concentration
Cyclohexane Solubles	19.5
"	<0.24*

*Corrected for the mass recovered in the Blank Filter (Client Sample number 5743393, IT Sample number GG2390) as specified in NIOSH Method 5023.

QC PRLP 1-4-90

Client Sample ID: 5707088

Sample Matrix: Filter
IT Sample ID: GG-2370
Date Extracted: 12/22/89
Date Analyzed: 12/26/89

Analyte	milligrams
Cyclohexane Solubles	20.6
"	<0.24*

d

*Corrected for the mass recovered in the Blank Filter (Client Sample number 574393, IT Sample number GG-2390) as specified in NIOSH Method 5023.

QC PRUP 1-4-90

Client Sample ID: 5707089

Sample Matrix: Filter
IT Sample ID: GG2371
Date Extracted: 12/20/89
Date Analyzed: 12/21/89

Analyte	milligrams
Cyclohexane Solubles	19.3
" "	<0.24*

*Corrected for the mass recovered in the Blank Filter (Client Sample number 5743393, IT sample number GG2390) as specified in NIOSH method 5023.

QC Prep 1-4-90

Client Sample ID: 5707090

Sample Matrix: Filter
IT Sample ID: 66-2372
Date Extracted: 12/22/89
Date Analyzed: 12/28/89

Analyte	milligrams
Cyclohexane Solubles	16.1
" "	<0.24

*Corrected for the mass recovered in the Blank Filter (Client Sample number 5743393, IT Sample number 66-2390) as specified in NIOSH method 5023.

QC PMP 1-4-90

Client Sample ID: 5707093

Sample Matrix: Filter
IT Sample ID: 662374
Date Extracted: 12/22/89
Date Analyzed: 12/29/89

Analyte	milligrams
Cyclohexane Solubles	19.9
" "	<0.24

*Corrected for the mass recovered in the Blank Filter (Client sample number 5743393, IT Sample number 662390) as specified in NIOSH Method 5523.

QC Prep 1-4-90

Client Sample ID: 5707094

Sample Matrix: Filter
IT Sample ID: GG2375
Date Extracted: 12-22-89
Date Analyzed: 12/29/89

Analyte	milligrams concentration
Cyclohexane Solubles	19.7
" "	<0.24

*Corrected for the mass recovered in the Blank Filter (Sample number 574393, IT sample number GGB...) as specified in NIOSH method 5023.

QC PWP 1-4-90

Client Sample ID: 5743993

Sample Matrix: Bank Filter
IT Sample ID: GG2390
Date Extracted: 12/22/89
Date Analyzed: 12/29/89

Analyte	milligrams ~~concentration~~
Cyclohexane Solubles	22.2

~~QA/QC~~

* Actual value; not corrected for itself.

QC Prep 1-4-90

IT ANALYTICAL SERVICES
304 DIRECTORS DRIVE
KNOXVILLE, TN

SUN INLAND ITAQ 482350

Client Sample ID: 5707086

Sample Matrix: Filter
IT Sample ID: GG2968
Date Extracted: 12/22/89
Date Analyzed: 12/29/89
Method: P+CAM 251

Analyte	Concentration (ng)
Benzo(a)pyrene	340

ghe/PEC145

QC hw
DKR 1/10/90

IT ANALYTICAL SERVICES
304 DIRECTORS DRIVE
KNOXVILLE, TN

Sun Inland ITAQ48350

Client Sample ID: 5707087

Sample Matrix: Filter
IT Sample ID: GG 2369
Date Extracted: 12/22/89
Date Analyzed: 12/29/89
Method: P+CAM 251

Analyte	Concentration (ng)
Benzo (a) pyrene	180

QC hw
DKR 1/10/90

qhc/PBC745

IT ANALYTICAL SERVICES
304 DIRECTORS DRIVE
KNOXVILLE, TN

Sun Inland ITAQ482350

Client Sample ID: 5707088

Sample Matrix: Filter
IT Sample ID: GG2370
Date Extracted: 12/22/89
Date Analyzed: 12/29/89
Method: P+CAM 251

Analyte	Concentration (ng)
Benzo(a)pyrene	< 150

QC Rev
DKR 1/10/90

che/PBC745

IT ANALYTICAL SERVICES
304 DIRECTORS DRIVE
KNOXVILLE, TN

SUN INLAND ITAQ 482350

Client Sample ID: 5707089

Sample Matrix: Filter
IT Sample ID: GG 2371
Date Extracted: 12/22/89
Date Analyzed: 12/29/89
Method: P+CAM251

Analyte	Concentration (ng)
Benzo(a)pyrene	< 150

QC hw
DKR 1/10/90

che/PBC145

IT ANALYTICAL SERVICES
304 DIRECTORS DRIVE
KNOXVILLE, TN

SUN INLAND ITAD 482350

Client Sample ID: 5707090

Sample Matrix: Filter
IT Sample ID: GG2372
Date Extracted: 12/22/89
Date Analyzed: 12/29/89
Method: P+CAM251

Analyte	Concentration (ng)
Benzo(a)pyrene	~~450~~ <150

QC by DKR 1/10/90

qhe/PBC145

IT ANALYTICAL SERVICES
304 DIRECTORS DRIVE
KNOXVILLE, TN

SUN INLAND ITAQ 482350

Client Sample ID: 5707091

Sample Matrix: Filter
IT Sample ID: GG 2373
Date Extracted: 12/22/89
Date Analyzed: 12/29/89
Method: P+CAM251

Analyte	Concentration (ng)
Benzo(a)pyrene	< 150

QC DKR
12/10/90

ghc/PBC145

IT ANALYTICAL SERVICES
304 DIRECTORS DRIVE
KNOXVILLE, TN

SUN INLAND ITAD 482350

Client Sample ID: 5707093

Sample Matrix: Filter
IT Sample ID: GG2374
Date Extracted: 12/22/89
Date Analyzed: 12/29/89
Method: P+CAM251

Analyte	Concentration (ng)
Benzo(a)pyrene	<150

QC Rev
DKR 1/10/90

chc/PBC745

IT ANALYTICAL SERVICES
304 DIRECTORS DRIVE
KNOXVILLE, TN

SUN INLAND ITAQ 482350

Client Sample ID: 5707094

Sample Matrix: Filter
IT Sample ID: GG2375
Date Extracted: 12/22/89
Date Analyzed: 12/29/89
Method: P+CAM251

Analyte	Concentration (ng)
Benzo(a)pyrene	< 150

QC by
DKR 1/10/90

che/PEC145

IT ANALYTICAL SERVICES
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KNOXVILLE, TN

SUN INLAND ITAQ 482350

Client Sample ID: 5743393

Sample Matrix: Filter
IT Sample ID: GG2390
Date Extracted: 12/22/89
Date Analyzed: 12/29/89
Method: P+CAM251

Analyte	Concentration (ng)
Benzo(a)pyrene	< 30.

QC DFR
lw 1/10/90

qhc/PBC145

IT ANALYTICAL SERVICES
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KNOXVILLE, TN

Sun Inland ITAQ 482350

Client Sample ID: N/A

Sample Matrix: Reagent BLANK
IT Sample ID: BLANK 3096
Date Extracted: 12/22/89
Date Analyzed: 12/29/89
Method: P+CAM 251

Analyte	Concentration (ng)
Benzo(a)pyrene	~~340~~ <30

DKR
QC hw
1/10/90
DKR

che/PBC145

ITS CORPORATION

RECEIVED
C

TELECOPY # _____

IF OTHER THAN IT LOCATION

TO: Mike Mowery
IT- Directors Drive

FROM: Mary Tyler
ITAS-Knoxville

DATE: 11-16-89

3. 1 OF 3

☐ DISCARD WHEN SENT
☐ PLEASE RETURN

RECEPTIONIST
5815 MIDDLEBROOK PIKE
KNOXVILLE, TN
615 - 588-6401

NOTES _____

INTERNATIONAL TECHNOLOGY CORPORATION

ANALYTICAL SERVICES

CERTIFICATE OF ANALYSIS

Attn:

Job Number: ITKD 44506 P.O. Number: 406000.12

This is the Certificate of Analysis for the following samples:

Client Project ID: Jewell / Inland
Date Received by Lab: 11-3-88
Number of Samples: Thirteen (13)
Sample Type: Water

Reviewed and Approved:

Robyn Wagner
Operations Manager

(Client Company Name) _____
Date: _____

Client Project ID: _____

IT ANALYTICAL SERVICES
5815 MIDDLEBROOK PIKE
KNOXVILLE, TN

Job Number: ITBG 44505

Results in ~~total ug NOx per sample~~ ug NO2 per Sample

Sample matrix: water

(Nitrous Oxide) Nitrogen Oxide

Lab Sample ID	Client Sample ID	NOx ug			
P0624	Method Blank	0.54 U			
JJ8796	0208	812.69	210		
JJ8797	0209	205.94	210		
JJ8798	0210	187.87	190		
JJ8799	0211	157.82	160		
JJ8800	0212	59.93	60		
JJ8801	0213	57.93	60		
JJ8802	0214	34.60	35		
JJ8803	0215	59.92	60		
JJ8804	0216	59.92	60		
JJ8805	0217	86.09	86		
JJ8806	0218	105.5	110		
JJ8807	0219	91.15	91		
JJ8808	0220	8.57	19		
		MD			

Analysis Date: 11/13/88

U = Compound was analyzed for but not detected. The number is the detection limit for the sample.

INTERNATIONAL TECHNOLOGY CORPORATION

ANALYTICAL SERVICES

CERTIFICATE OF ANALYSIS

IT Corporation
312 Directors Drive
Knoxville, TN 37923
ATTN: Mike Mowery

November 17, 1989

Job Number: ITAQ 44505

P.O. Number: 406000.12

This is the Certificate of Analysis for the following samples:

Client Project ID:	Jewell/Inland
Date Received by Lab:	11/03/89
Number of Samples:	Thirteen (13)
Sample Type:	Water

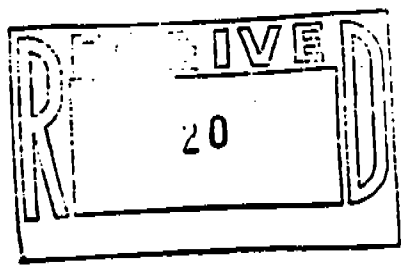
I. Introduction

On 11/03/89 thirteen (13) water samples arrived at the ITAS-Knoxville, Tennessee laboratory from IT-Air Quality Services in Knoxville, Tennessee. The list of analytical tests performed, as well as date of receipt and analysis, can be found in the attached report.

II. Analytical Results/Methodology

The analytical results for this report are presented by analytical test. Each set of data will include sample identification information and the analytical results. Please note that all data are blank corrected, i.e., if any compound is found in the corresponding laboratory blank, it is subtracted from the analytical result before it is reported.

Reviewed and Approved:
Alyce Moore
Alyce Moore
Laboratory Manager



IT Corporation
November 17, 1989

Client Project ID: Jewell/Inland

IT ANALYTICAL SERVICES
5815 MIDDLEBROOK PIKE
KNOXVILLE, TN

Job Number: ITAQ 44505

NITROGEN OXIDE ANALYSIS

Results in Total µg NO_2 per sample

Sample Matrix: Water

Client Sample ID	Lab Sample ID	Result
Method Blank	P0624	0.84 U
0208	JJ8796	210
0209	JJ8797	210
0210	JJ8798	190
0211	JJ8799	160
0212	JJ8800	60
0213	JJ8801	60
0214	JJ8802	35
0215	JJ8803	60
0216	JJ8804	60
--/	JJ8805	86
0218	JJ8806	110
0219	JJ8807	91
0220	JJ8808	19

U - Compound was analyzed for but not detected. The number is the detection limit for the sample.

Date Analyzed: 11/13/89

INTERNATIONAL TECHNOLOGY CORPORATION

ANALYTICAL SERVICES

CERTIFICATE OF ANALYSIS

IT Corporation
312 Directors Drive
Knoxville, TN 37923
ATTN: Randall Moore/Bill Anderson

December 11, 1989

Job Number: ITAQ 44463

P.O. Number: 406000.12.02.80

This is the Certificate of Analysis for the following samples:

Client Project ID:	Sun/Inland/NIPSCO
Date Received by Lab:	10/30/89
Number of Samples:	Sixteen (16)
Sample Type:	Liquid-eight (8), XAD tube samples-five (5) and Filters-three (3)

I. Introduction

On 10/30/89 eight (8) liquid samples, five (5) XAD tube samples and three (3) filter samples arrived at the ITAS-Knoxville, Tennessee laboratory in support of the Sun/Inland/NIPSCO project. The list of analytical tests performed, as well as date of receipt and analysis, can be found in the attached report.

II. Analytical Results/Methodology

The analytical results for this report are presented by analytical test. Each set of data will include sample identification information and the analytical results. Please note that all data are blank corrected, i.e., if any compound is found in the corresponding laboratory blank, it is subtracted from the analytical result before it is reported.

The samples were analyzed for Appendix IX semivolatile organic compounds by gas chromatography/mass spectroscopy (GC/MS) based on EPA SW-846 method 8270.

Reviewed and Approved:
Alyce Moore
Alyce Moore
Laboratory Manager

III. Quality Control

The semivolatiles analyses were performed on 11/10 and 11/13/89 by direct injection of sample extract on a Restek RTX-5 capillary column on a Finnigan 4500 GC/MS/DS. The samples consisted of filters, washes, resins, impinger waters, and associated blanks for sampling trains, for 3 different runs. The first 3 items were combined and soxhlet extracted for each run; the impinger waters and blank were each extracted by separatory funnel. Resin field and travel blank were also soxhlet extracted, and the probe wash acetone blank was concentrated down in simulation of soxhlet extract handling (this blank had no surrogates added in extraction; they were added at the instrument level). Additionally, laboratory soxhlet and water method blanks were extracted and analyzed. The analysis was for Appendix IX compounds. Standardization was done for all species, with initial and continuing calibrations. The quantitation limits reported were based on previous and current standard data and on the method. The sample runs went well. Small variations were seen in single surrogate recoveries in R0796 (impinger water) and the composite of run #2, but no samples exceeded compliance limits. The data were reported as follows:

> The filter, probe wash, resin composites were designated by run, i.e. Run 1 Comp, Run 2 Comp, etc., and total µg was reported for each run. Resin blanks and probe wash were also reported in µg. The impinger waters and associated blanks were reported in µg/liter: multiplication by initial volumes (L) will provide total µg. For each sample, forms were submitted listing results for HSL compounds, and any additional, non-HSL Appendix IX analytes (note: diphenylamine and N-nitrosodiphenylamine were indistinguishable by the method, and both were reported if seen).

There were no problems seen in final review of the data.

IT Corporation
December 11, 1989

IT ANALYTICAL SERVICES
5815 MIDDLEBROOK PIKE
KNOXVILLE, TN

Client Project ID: Sun/Inland/NIPSCO

Job Number: ITAQ 44463

APPENDIX IX ANALYSIS

Results in µg/liter (ppb)

Sample Matrix: Water

Client Sample ID: Method Blank
Lab Sample ID: BL0027

Compound		Compound	
phenol	10 U	bis(2-chloroethoxy)methane	10 U
bis(2-chloroethyl)ether	10 U	2,4-dichlorophenol	10 U
2-chlorophenol	10 U	1,2,4-trichlorobenzene	10 U
1,3-dichlorobenzene	10 U	naphthalene	10 U
1,4-dichlorobenzene	10 U	4-chloroaniline	10 U
benzyl alcohol	10 U	hexachlorobutadiene	10 U
1,2-dichlorobenzene	10 U	4-chloro-3-methylphenol	10 U
2-methylphenol	10 U	2-methylnaphthalene	10 U
bis(2-chloroisopropyl)ether	10 U	hexachlorocyclopentadiene	10 U
4-methylphenol	10 U	2,4,6-trichlorophenol	10 U
n-nitroso-di-n-propylamine	10 U	2,4,5-trichlorophenol	50 U
hexachloroethane	10 U	2-chloronaphthalene	10 U
nitrobenzene	10 U	2-nitroaniline	50 U
isophorone	10 U	dimethyl phthalate	10 U
2-nitrophenol	10 U	acenaphthylene	10 U
2,4-dimethylphenol	10 U	2,6-dinitrotoluene	10 U

U - Compound was analyzed for but not detected. The number is the detection limit for the sample.
J - Indicates an estimated value less than the detection limit.

Date Extracted: 11/02/89
Date Analyzed: 11/10/89
Dilution Factor: 1

This method blank applies to the following samples: R0787, R0791, R0796, R0798.

APPENDIX IX ANALYSIS (continued)

Results in µg/liter (ppb)

Sample Matrix: Water

Client Sample ID: Method Blank
Lab Sample ID: BL0027

Compound		Compound	
3-nitroaniline	50 U	anthracene	10 U
acenaphthene	10 U	di-n-butylphthalate	10 U
2,4-dinitrophenol	50 U	fluoranthene	10 U
4-nitrophenol	50 U	pyrene	10 U
dibenzofuran	10 U	butylbenzylphthalate	10 U
2,4-dinitrotoluene	10 U	3,3'-dichlorobenzidine	20 U
diethylphthalate	10 U	benzo(a)anthracene	10 U
4-chlorophenyl-phenylether	10 U	chrysene	10 U
fluorene	10 U	bis(2-ethylhexyl)phthalate	10 U
4-nitroaniline	50 U	di-n-octylphthalate	10 U
4,6-dinitro-2-methylphenol	50 U	benzo(b)fluoranthene	10 U
nitrosodiphenylamine[1]	3 J	benzo(k)fluoranthene	10 U
bromophenyl-phenylether	10 U	benzo(a)pyrene	10 U
achlorobenzene	10 U	indeno(1,2,3-cd)pyrene	10 U
chlorophenol	50 U	dibenzo(a,h)anthracene	10 U
[illegible]	10 U	benzo(g,h,i)perylene	10 U

U - Compound was analyzed for but not detected. The number is the detection limit for the sample.
J - Indicates an estimated value less than the detection limit.
1 - Detected as diphenylamine.

Date Extracted: 11/02/89
Date Analyzed: 11/10/89
Dilution Factor: 1

APPENDIX IX ANALYSIS (continued)

Results in µg/liter (ppb)

Sample Matrix: Water

Client Sample ID: Method Blank
Lab Sample ID: BL0027

n-nitrosodimethylamine	10 U	m-dinitrobenzene	10 U
2-picoline	70 U	pentachlorobenzene	20 U
n-nitrosomethylethylamine	10 U	2-naphthylamine	170 U
methyl methanesulfonate	10 U	1-naphthylamine	120 U
n-nitrosodiethylamine	10 U	2,3,4,6-tetrachlorophenol	10 U
ethyl methanesulfonate	10 U	5-nitro-o-toluidine	20 U
aniline	50 U	diphenylamine	10 U
pentachloroethane	20 U	tetraethyl dithiopyropho(3)	10 U
3-methylphenol	10 U	sym-trinitrobenzene	10 U
n-nitrosopyrrolidine	10 U	phenacetin	10 U
acetophenone	10 U	diallate	10 U
n-nitrosomorpholine	10 U	4-aminobiphenyl	50 U
o-toluidine	10 U	pronamide	30 U
n-nitrosopiperidine	10 U	pentachloronitrobenzene	20 U
o,o,o-triethylphosphorot(2)	10 U	dinoseb	20 U
2,6-dichlorophenol	10 U	4-nitroquinoline-1-oxide	10 U
hexachloropropene	20 U	methapyrilene	40 U
a,a-dimethylphenethylamine	10 U	aramite	10 U
n-nitrosodi-n-butylamine	20 U	p-(dimethylamino)azobenzene	30 U
p-phenylenediamine	50 U	3,3'-dimethylbenzidine	80 U
safrole	10 U	2-acetylaminofluorene	10 U
1,2,4,5-tetrachlorobenzene	10 U	7,12-dimethylbenz(a)anth(4)	20 U
isosafrole	10 U	hexachlorophene	500 U
1,4-naphthoquinone	10 U	3-methylcholanthrene	30 U

U - Compound was analyzed for but not detected. The number is the detection limit for the sample.
J - Indicates an estimated value less than the detection limit.
2 - o,o,o-triethylphosphorothioate
  - tetraethyl dithiopyrophosphate
4 - 7,12-dimethylbenz(a)anthracene

Date Extracted: 11/02/89
Date Analyzed: 11/10/89
Dilution Factor: 1

IT ANALYTICAL SERVICES
5815 MIDDLEBROOK PIKE
KNOXVILLE, TN

IT Corporation
December 11, 1989

Client Project ID: Sun/Inland/NIPSCO

Job Number: ITAQ 44463

APPENDIX IX ANALYSIS

Results in ug/liter (ppb)

Sample Matrix: Water

Client Sample ID: R0787
Lab Sample ID: JJ8443

Compound		Compound	
phenol	19 U	bis(2-chloroethoxy)methane	19 U
bis(2-chloroethyl)ether	19 U	2,4-dichlorophenol	19 U
2-chlorophenol	19 U	1,2,4-trichlorobenzene	19 U
1,3-dichlorobenzene	19 U	naphthalene	19 U
1,4-dichlorobenzene	19 U	4-chloroaniline	19 U
benzyl alcohol	19 U	hexachlorobutadiene	19 U
1,2-dichlorobenzene	19 U	4-chloro-3-methylphenol	19 U
2-methylphenol	19 U	2-methylnaphthalene	19 U
bis(2-chloroisopropyl)ether	19 U	hexachlorocyclopentadiene	19 U
4-methylphenol	19 U	2,4,6-trichlorophenol	19 U
n-nitroso-di-n-propylamine	19 U	2,4,5-trichlorophenol	96 U
hexachloroethane	19 U	2-chloronaphthalene	19 U
nitrobenzene	19 U	2-nitroaniline	96 U
isophorone	19 U	dimethyl phthalate	19 U
2-nitrophenol	19 U	acenaphthylene	19 U
2,4-dimethylphenol	19 U	2,6-dinitrotoluene	19 U

U - Compound was analyzed for but not detected. The number is the detection limit for the sample.
J - Indicates an estimated value less than the detection limit.

Date Extracted: 11/02/89
Date Analyzed: 11/10/89
Dilution Factor: 1
Sample Volume: 520 ML

IT ANALYTICAL SERVICES
5815 MIDDLEBROOK PIKE
KNOXVILLE, TN

IT Corporation
December 11, 1989

Client Project ID: Sun/Inland/NIPSCO

Job Number: ITAQ 44463

APPENDIX IX ANALYSIS (continued)

Results in µg/liter (ppb)

Sample Matrix: Water

Client Sample ID: R0787
Lab Sample ID: JJ8443

Compound		Compound	
3-nitroaniline	96 U	anthracene	19 U
acenaphthene	19 U	di-n-butylphthalate	10 J
2,4-dinitrophenol	96 U	fluoranthene	19 U
4-nitrophenol	96 U	pyrene	19 U
dibenzofuran	19 U	butylbenzylphthalate	19 U
2,4-dinitrotoluene	19 U	3,3'-dichlorobenzidine	38 U
diethylphthalate	19 U	benzo(a)anthracene	19 U
4-chlorophenyl-phenylether	19 U	chrysene	19 U
fluorene	19 U	bis(2-ethylhexyl)phthalate	11 J
4-nitroaniline	96 U	di-n-octylphthalate	19 U
4,6-dinitro-2-methylphenol	96 U	benzo(b)fluoranthene	19 U
n-nitrosodiphenylamine[1]	6 BJ	benzo(k)fluoranthene	19 U
4-bromophenyl-phenylether	19 U	benzo(a)pyrene	19 U
hexachlorobenzene	19 U	indeno(1,2,3-cd)pyrene	19 U
pentachlorophenol	96 U	dibenzo(a,h)anthracene	19 U
phenanthrene	19 U	benzo(g,h,i)perylene	19 U

U - Compound was analyzed for but not detected. The number is the detection limit for the sample.
1 - Indicates an estimated value less than the detection limit.
B - Analyte was found in the blank as well as the sample.
J - Detected as diphenylamine.

Date Extracted: 11/02/89
Date Analyzed: 11/10/89
Dilution Factor: 1
Sample Volume: 520 ML

APPENDIX IX ANALYSIS (continued)

Results in µg/liter (ppb)

Sample Matrix: Water

Client Sample ID: R0787
Lab Sample ID: JJ8443

n-nitrosodimethylamine	19 U	m-dinitrobenzene	19 U
2-picoline	130 U	pentachlorobenzene	38 U
n-nitrosomethylethylamine	19 U	2-naphthylamine	330 U
methyl methanesulfonate	19 U	1-naphthylamine	230 U
n-nitrosodiethylamine	19 U	2,3,4,6-tetrachlorophenol	19 U
ethyl methanesulfonate	19 U	5-nitro-o-toluidine	38 U
aniline	96 U	diphenylamine	19 U
pentachloroethane	38 U	tetraethyl dithiopyropho(3)	19 U
3-methylphenol	19 U	sym-trinitrobenzene	19 U
n-nitrosopyrrolidine	19 U	phenacetin	19 U
acetophenone	19 U	diallate	19 U
n-nitrosomorpholine	19 U	4-aminobiphenyl	96 U
o-toluidine	19 U	pronamide	58 U
n-nitrosopiperidine	19 U	pentachloronitrobenzene	38 U
o,o,o-triethylphosphorot(2)	19 U	dinoseb	38 U
2,6-dichlorophenol	19 U	4-nitroquinoline-1-oxide	19 U
hexachloropropene	38 U	methapyrilene	77 U
a,a-dimethylphenethylamine	19 U	aramite	19 U
n-nitrosodi-n-butylamine	38 U	p-(dimethylamino)azobenzene	58 U
p-phenylenediamine	96 U	3,3'-dimethylbenzidine	150 U
safrole	19 U	2-acetylaminofluorene	19 U
1,2,4,5-tetrachlorobenzene	19 U	7,12-dimethylbenz(a)anth(4)	38 U
isosafrole	19 U	hexachlorophene	960 U
1,4-naphthoquinone	19 U	3-methylcholanthrene	58 U

U - Compound was analyzed for but not detected. The number is the detection limit for the ample.
- Indicates an estimated value less than the detection limit.
- o,o,o-triethylphosphorothioate
- tetraethyl dithiopyrophosphate
4 - 7,12-dimethylbenz(a)anthracene

Date Extracted: 11/02/89
Date Analyzed: 11/10/89
Dilution Factor: 1
Sample Volume: 520 ML

IT ANALYTICAL SERVICES
5815 MIDDLEBROOK PIKE
KNOXVILLE, TN

IT Corporation
December 11, 1989

Client Project ID: Sun/Inland/NIPSCO

Job Number: ITAQ 44463

APPENDIX IX ANALYSIS

Results in µg/liter (ppb)

Sample Matrix: Water

Client Sample ID: R0791
Lab Sample ID: JJ8444

Compound		Compound	
phenol	26 U	bis(2-chloroethoxy)methane	26 U
bis(2-chloroethyl)ether	26 U	2,4-dichlorophenol	26 U
2-chlorophenol	26 U	1,2,4-trichlorobenzene	26 U
1,3-dichlorobenzene	26 U	naphthalene	26 U
1,4-dichlorobenzene	26 U	4-chloroaniline	26 U
benzyl alcohol	26 U	hexachlorobutadiene	26 U
1,2-dichlorobenzene	26 U	4-chloro-3-methylphenol	26 U
2-methylphenol	26 U	2-methylnaphthalene	26 U
bis(2-chloroisopropyl)ether	26 U	hexachlorocyclopentadiene	26 U
4-methylphenol	26 U	2,4,6-trichlorophenol	26 U
n-nitroso-di-n-propylamine	26 U	2,4,5-trichlorophenol	130 U
hexachloroethane	26 U	2-chloronaphthalene	26 U
nitrobenzene	26 U	2-nitroaniline	130 U
isophorone	26 U	dimethyl phthalate	26 U
2-nitrophenol	26 U	acenaphthylene	26 U
2,4-dimethylphenol	26 U	2,6-dinitrotoluene	26 U

U - Compound was analyzed for but not detected. The number is the detection limit for the sample.
J - Indicates an estimated value less than the detection limit.

Date Extracted: 11/02/89
Date Analyzed: 11/10/89
Dilution Factor: 1
Sample Volume: 390 ML

IT Corporation
December 11, 1989

IT ANALYTICAL SERVICES
5815 MIDDLEBROOK PIKE
KNOXVILLE, TN

Client Project ID: Sun/Inland/NIPSCO

Job Number: ITAQ 44463

APPENDIX IX ANALYSIS (continued)

Results in µg/liter (ppb)

Sample Matrix: Water

Client Sample ID: R0791
Lab Sample ID: JJ8444

Compound		Compound	
nitroaniline	130 U	anthracene	26 U
acenaphthene	26 U	di-n-butylphthalate	13 J
2,4-dinitrophenol	130 U	fluoranthene	26 U
nitrophenol	130 U	pyrene	26 U
dibenzofuran	26 U	butylbenzylphthalate	26 U
2,4-dinitrotoluene	26 U	3,3'-dichlorobenzidine	51 U
ethylphthalate	26 U	benzo(a)anthracene	26 U
chlorophenyl-phenylether	26 U	chrysene	26 U
fluorene	26 U	bis(2-ethylhexyl)phthalate	26 U
nitroaniline	130 U	di-n-octylphthalate	26 U
6-dinitro-2-methylphenol	130 U	benzo(b)fluoranthene	26 U
n-nitrosodiphenylamine[1]	8 BJ	benzo(k)fluoranthene	26 U
bromophenyl-phenylether	26 U	benzo(a)pyrene	26 U
exachlorobenzene	26 U	indeno(1,2,3-cd)pyrene	26 U
pentachlorophenol	130 U	dibenzo(a,h)anthracene	26 U
phenanthrene	26 U	benzo(g,h,i)perylene	26 U

- Compound was analyzed for but not detected. The number is the detection limit for the sample.
J - Indicates an estimated value less than the detection limit.
- Analyte was found in the blank as well as the sample.
- Detected as diphenylamine.

te Extracted: 11/02/89
ate Analyzed: 11/10/89
Dilution Factor: 1
mple Volume: 390 ML

APPENDIX IX ANALYSIS (continued)

Results in µg/liter (ppb)

Sample Matrix: Water

Client Sample ID: R0791
Lab Sample ID: JJ8444

n-nitrosodimethylamine	26 U	m-dinitrobenzene	26 U
2-picoline	180 U	pentachlorobenzene	51 U
n-nitrosomethylethylamine	26 U	2-naphthylamine	440 U
methyl methanesulfonate	26 U	1-naphthylamine	310 U
n-nitrosodiethylamine	26 U	2,3,4,6-tetrachlorophenol	26 U
ethyl methanesulfonate	26 U	5-nitro-o-toluidine	51 U
aniline	130 U	diphenylamine	26 U
pentachloroethane	51 U	tetraethyl dithiopyropho(3)	26 U
3-methylphenol	26 U	sym-trinitrobenzene	26 U
n-nitrosopyrrolidine	26 U	phenacetin	26 U
acetophenone	26 U	diallate	26 U
n-nitrosomorpholine	26 U	4-aminobiphenyl	130 U
o-toluidine	26 U	pronamide	77 U
n-nitrosopiperidine	26 U	pentachloronitrobenzene	51 U
o,o,o-triethylphosphorot(2)	26 U	dinoseb	51 U
2,6-dichlorophenol	26 U	4-nitroquinoline-1-oxide	26 U
hexachloropropene	51 U	methapyrilene	100 U
a,a-dimethylphenethylamine	26 U	aramite	26 U
n-nitrosodi-n-butylamine	51 U	p-(dimethylamino)azobenzene	77 U
p-phenylenediamine	130 U	3,3'-dimethylbenzidine	200 U
safrole	26 U	2-acetylaminofluorene	26 U
1,2,4,5-tetrachlorobenzene	26 U	7,12-dimethylbenz(a)anth(4)	51 U
isosafrole	26 U	hexachlorophene	1,300 U
1,4-naphthoquinone	26 U	3-methylcholanthrene	77 U

U - Compound was analyzed for but not detected. The number is the detection limit for the sample.
J - Indicates an estimated value less than the detection limit.
2 - o,o,o-triethylphosphorothioate
3 - tetraethyl dithiopyrophosphate
4 - 7,12-dimethylbenz(a)anthracene

Date Extracted: 11/02/89
Date Analyzed: 11/10/89
Dilution Factor: 1
Sample Volume: 390 ML

IT Corporation
December 11, 1989

IT ANALYTICAL SERVICES
5815 MIDDLEBROOK PIKE
KNOXVILLE, TN

Client Project ID: Sun/Inland/NIPSCO

Job Number: ITAQ 44463

APPENDIX IX ANALYSIS

Results in µg/liter (ppb)

Sample Matrix: Water

Client Sample ID: R0796
Lab Sample ID: JJ8445

Compound		Compound	
phenol	6 J	bis(2-chloroethoxy)methane	20 U
bis(2-chloroethyl)ether	20 U	2,4-dichlorophenol	20 U
2-chlorophenol	20 U	1,2,4-trichlorobenzene	20 U
1,3-dichlorobenzene	20 U	naphthalene	20 U
1,4-dichlorobenzene	20 U	4-chloroaniline	20 U
benzyl alcohol	20 U	hexachlorobutadiene	20 U
1,2-dichlorobenzene	20 U	4-chloro-3-methylphenol	20 U
2-methylphenol	20 U	2-methylnaphthalene	20 U
bis(2-chloroisopropyl)ether	20 U	hexachlorocyclopentadiene	20 U
4-methylphenol	20 U	2,4,6-trichlorophenol	20 U
n-nitroso-di-n-propylamine	20 U	2,4,5-trichlorophenol	100 U
hexachloroethane	20 U	2-chloronaphthalene	20 U
nitrobenzene	20 U	2-nitroaniline	100 U
isophorone	20 U	dimethyl phthalate	20 U
2-nitrophenol	20 U	acenaphthylene	20 U
2,4-dimethylphenol	20 U	2,6-dinitrotoluene	20 U

U - Compound was analyzed for but not detected. The number is the detection limit for the sample.
J - Indicates an estimated value less than the detection limit.

Date Extracted: 11/02/89
Date Analyzed: 11/10/89
Dilution Factor: 1
Sample Volume: 490 ML

APPENDIX IX ANALYSIS (continued)

Results in µg/liter (ppb)

Sample Matrix: Water

Client Sample ID: R0796
Lab Sample ID: JJ8445

n-nitrosodimethylamine	20 U	m-dinitrobenzene	20 U
2-picoline	140 U	pentachlorobenzene	41 U
n-nitrosomethylethylamine	20 U	2-naphthylamine	350 U
methyl methanesulfonate	20 U	1-naphthylamine	240 U
n-nitrosodiethylamine	20 U	2,3,4,6-tetrachlorophenol	20 U
ethyl methanesulfonate	20 U	5-nitro-o-toluidine	41 U
aniline	100 U	diphenylamine	20 U
pentachloroethane	41 U	tetraethyl dithiopyropho(3)	20 U
3-methylphenol	20 U	sym-trinitrobenzene	20 U
n-nitrosopyrrolidine	20 U	phenacetin	20 U
acetophenone	20 U	diallate	20 U
n-nitrosomorpholine	20 U	4-aminobiphenyl	100 U
o-toluidine	20 U	pronamide	61 U
n-nitrosopiperidine	20 U	pentachloronitrobenzene	41 U
o,o,o-triethylphosphorot(2)	20 U	dinoseb	41 U
2,6-dichlorophenol	20 U	4-nitroquinoline-1-oxide	20 U
hexachloropropene	41 U	methapyrilene	82 U
a,a-dimethylphenethylamine	20 U	aramite	20 U
n-nitrosodi-n-butylamine	41 U	p-(dimethylamino)azobenzene	61 U
p-phenylenediamine	100 U	3,3'-dimethylbenzidine	160 U
safrole	20 U	2-acetylaminofluorene	20 U
1,2,4,5-tetrachlorobenzene	20 U	7,12-dimethylbenz(a)anth(4)	41 U
isosafrole	20 U	hexachlorophene	1,000 U
1,4-naphthoquinone	20 U	3-methylcholanthrene	61 U

U - Compound was analyzed for but not detected. The number is the detection limit for the sample.
J - Indicates an estimated value less than the detection limit.
2 - o,o,o-triethylphosphorothioate
3 - tetraethyl dithiopyrophosphate
4 - 7,12-dimethylbenz(a)anthracene

Date Extracted: 11/02/89
Date Analyzed: 11/10/89
Dilution Factor: 1
Sample Volume: 490 ML

IT Corporation
ecember 11, 1989

IT ANALYTICAL SERVICES
5815 MIDDLEBROOK PIKE
KNOXVILLE, TN

Client Project ID: Sun/Inland/NIPSCO

Job Number: ITAQ 44463

APPENDIX IX ANALYSIS

Results in µg/liter (ppb)

Sample Matrix: Water

ient Sample ID: R0798
ab Sample ID: JJ8448

Compound		Compound	
henol	25 U	bis(2-chloroethoxy)methane	25 U
is(2-chloroethyl)ether	25 U	2,4-dichlorophenol	25 U
2-chlorophenol	25 U	1,2,4-trichlorobenzene	25 U
1,3-dichlorobenzene	25 U	naphthalene	25 U
1,4-dichlorobenzene	25 U	4-chloroaniline	25 U
benzyl alcohol	25 U	hexachlorobutadiene	25 U
1,2-dichlorobenzene	25 U	4-chloro-3-methylphenol	25 U
2-methylphenol	25 U	2-methylnaphthalene	25 U
is(2-chloroisopropyl)ether	25 U	hexachlorocyclopentadiene	25 U
4-methylphenol	25 U	2,4,6-trichlorophenol	25 U
n-nitroso-di-n-propylamine	25 U	2,4,5-trichlorophenol	120 U
exachloroethane	25 U	2-chloronaphthalene	25 U
nitrobenzene	25 U	2-nitroaniline	120 U
isophorone	25 U	dimethyl phthalate	25 U
2-nitrophenol	25 U	acenaphthylene	25 U
2,4-dimethylphenol	25 U	2,6-dinitrotoluene	25 U

U - Compound was analyzed for but not detected. The number is the detection limit for the sample.
J - Indicates an estimated value less than the detection limit.

Date Extracted: 11/02/89
ate Analyzed: 11/10/89
ilution Factor: 1
Sample volume: 400 ML

APPENDIX IX ANALYSIS (continued)

Results in µg/liter (ppb)

Sample Matrix: Water

Client Sample ID: R0798
Lab Sample ID: JJ8448

n-nitrosodimethylamine	25 U	m-dinitrobenzene	25 U
2-picoline	180 U	pentachlorobenzene	50 U
n-nitrosomethylethylamine	25 U	2-naphthylamine	420 U
methyl methanesulfonate	25 U	1-naphthylamine	300 U
n-nitrosodiethylamine	25 U	2,3,4,6-tetrachlorophenol	25 U
ethyl methanesulfonate	25 U	5-nitro-o-toluidine	50 U
aniline	120 U	diphenylamine	25 U
pentachloroethane	50 U	tetraethyl dithiopyropho(3)	25 U
3-methylphenol	25 U	sym-trinitrobenzene	25 U
n-nitrosopyrrolidine	25 U	phenacetin	25 U
acetophenone	25 U	diallate	25 U
n-nitrosomorpholine	25 U	4-aminobiphenyl	120 U
o-toluidine	25 U	pronamide	75 U
n-nitrosopiperidine	25 U	pentachloronitrobenzene	50 U
o,o,o-triethylphosphorot(2)	25 U	dinoseb	50 U
2,6-dichlorophenol	25 U	4-nitroquinoline-1-oxide	25 U
hexachloropropene	50 U	methapyrilene	100 U
a,a-dimethylphenethylamine	25 U	aramite	25 U
n-nitrosodi-n-butylamine	50 U	p-(dimethylamino)azobenzene	75 U
p-phenylenediamine	120 U	3,3'-dimethylbenzidine	200 U
safrole	25 U	2-acetylaminofluorene	25 U
1,2,4,5-tetrachlorobenzene	25 U	7,12-dimethylbenz(a)anth(4)	50 U
isosafrole	25 U	hexachlorophene	1,200 U
1,4-naphthoquinone	25 U	3-methylcholanthrene	75 U

U - Compound was analyzed for but not detected. The number is the detection limit for the sample.
J - Indicates an estimated value less than the detection limit.
2 - o,o,o-triethylphosphorothioate
3 - tetraethyl dithiopyrophosphate
4 - 7,12-dimethylbenz(a)anthracene

Date Extracted: 11/02/89
Date Analyzed: 11/10/89
Dilution Factor: 1
Sample Volume: 400 ML

WATER SURROGATE PERCENT RECOVERY SUMMARY

	SEMI-VOLATILE					
Sample No.	Nitro-Benzene-D5 (35-114%)*	2-Fluoro-Biphenyl (43-116%)*	Terphenyl-D14 (33-141%)*	Phenol-D5 (10-94%)*	2-Fluoro-Phenol (21-100%)*	2,4,6 Tribromo-Phenol (10-123%)*
R0787	59	60	79	32	45	76
R0791	57	55	75	37	50	75
R0796	21 **	68	71	36	55	77
R0798	62	62	81	38	51	62
Method Blank	70	64	82	26	47	81

*Values in parenthesis represent USEPA contract required QC limits.
**Values are outside of contract required QC limits.

APPENDIX IX ANALYSIS

Results in µg

Sample Matrix: Resin, Wash and Composites

Client Sample ID: Method Blank
Lab Sample ID: BL0043

Compound		Compound	
phenol	10 U	bis(2-chloroethoxy)methane	10 U
bis(2-chloroethyl)ether	10 U	2,4-dichlorophenol	10 U
2-chlorophenol	10 U	1,2,4-trichlorobenzene	10 U
1,3-dichlorobenzene	10 U	naphthalene	10 U
1,4-dichlorobenzene	10 U	4-chloroaniline	10 U
benzyl alcohol	10 U	hexachlorobutadiene	10 U
1,2-dichlorobenzene	10 U	4-chloro-3-methylphenol	10 U
2-methylphenol	10 U	2-methylnaphthalene	10 U
bis(2-chloroisopropyl)ether	10 U	hexachlorocyclopentadiene	10 U
4-methylphenol	10 U	2,4,6-trichlorophenol	10 U
n-nitroso-di-n-propylamine	10 U	2,4,5-trichlorophenol	50 U
hexachloroethane	10 U	2-chloronaphthalene	10 U
nitrobenzene	10 U	2-nitroaniline	50 U
isophorone	10 U	dimethyl phthalate	10 U
2-nitrophenol	10 U	acenaphthylene	10 U
2,4-dimethylphenol	10 U	2,6-dinitrotoluene	10 U

U - Compound was analyzed for but not detected. The number is the detection limit for the sample.
J - Indicates an estimated value less than the detection limit.

Date Extracted: 11/02/89
Date Analyzed: 11/10/89
Dilution Factor: 1

This method blank applies to the following samples: R0792, R0797, R0799, RUN 1 COMP, RUN 2 COMP, RUN 3 COMP.

APPENDIX IX ANALYSIS (continued)

Results in µg

Sample Matrix: Resin, Wash and Composites

Client Sample ID: Method Blank
Lab Sample ID: BL0043

Compound		Compound	
3-nitroaniline	50 U	anthracene	10 U
acenaphthene	10 U	di-n-butylphthalate	10 U
2,4-dinitrophenol	50 U	fluoranthene	10 U
4-nitrophenol	50 U	pyrene	10 U
dibenzofuran	10 U	butylbenzylphthalate	10 U
2,4-dinitrotoluene	10 U	3,3'-dichlorobenzidine	20 U
diethylphthalate	10 U	benzo(a)anthracene	10 U
4-chlorophenyl-phenylether	10 U	chrysene	10 U
fluorene	10 U	bis(2-ethylhexyl)phthalate	10 U
4-nitroaniline	50 U	di-n-octylphthalate	10 U
4,6-dinitro-2-methylphenol	50 U	benzo(b)fluoranthene	10 U
n-nitrosodiphenylamine[1]	2 J	benzo(k)fluoranthene	10 U
4-bromophenyl-phenylether	10 U	benzo(a)pyrene	10 U
hexachlorobenzene	10 U	indeno(1,2,3-cd)pyrene	10 U
pentachlorophenol	50 U	dibenzo(a,h)anthracene	10 U
phenanthrene	10 U	benzo(g,h,i)perylene	10 U

U - Compound was analyzed for but not detected. The number is the detection limit for the sample.
J - Indicates an estimated value less than the detection limit.
1 - Detected as diphenylamine.

Date Extracted: 11/02/89
Date Analyzed: 11/10/89
Dilution Factor: 1

IT Corporation
December 11, 1989

IT ANALYTICAL SERVICES
5815 MIDDLEBROOK PIKE
KNOXVILLE, TN

Client Project ID: Sun/Inland/NIPSCO

Job Number: ITAQ 44463

APPENDIX IX ANALYSIS (continued)

Results in µg

Sample Matrix: Resin, Wash and Composites

Client Sample ID: Method Blank
Lab Sample ID: BL0043

n-nitrosodimethylamine	10 U	m-dinitrobenzene	10 U
2-picoline	70 U	pentachlorobenzene	20 U
nitrosomethylethylamine	10 U	2-naphthylamine	170 U
ethyl methanesulfonate	10 U	1-naphthylamine	120 U
n-nitrosodiethylamine	10 U	2,3,4,6-tetrachlorophenol	10 U
hyl methanesulfonate	10 U	5-nitro-o-toluidine	20 U
iline	50 U	diphenylamine	1 J
pentachloroethane	20 U	tetraethyl dithiopyropho(3)	10 U
methylphenol	10 U	sym-trinitrobenzene	10 U
nitrosopyrrolidine	10 U	phenacetin	10 U
acetophenone	10 U	diallate	10 U
n-nitrosomorpholine	10 U	4-aminobiphenyl	50 U
toluidine	10 U	pronamide	30 U
nitrosopiperidine	10 U	pentachloronitrobenzene	20 U
o,o,o-triethylphosphorot(2)	10 U	dinoseb	20 U
6-dichlorophenol	10 U	4-nitroquinoline-1-oxide	10 U
xachloropropene	20 U	methapyrilene	40 U
a,a-dimethylphenethylamine	10 U	aramite	10 U
nitrosodi-n-butylamine	20 U	p-(dimethylamino)azobenzene	30 U
phenylenediamine	50 U	3,3'-dimethylbenzidine	80 U
safrole	10 U	2-acetylaminofluorene	10 U
1,2,4,5-tetrachlorobenzene	10 U	7,12-dimethylbenz(a)anth(4)	20 U
osafrole	10 U	hexachlorophene	500 U
4-naphthoquinone	10 U	3-methylcholanthrene	30 U

- Compound was analyzed for but not detected. The number is the detection limit for the sample.
J - Indicates an estimated value less than the detection limit.
2 - o,o,o-triethylphosphorothioate
- tetraethyl dithiopyrophosphate
4 - 7,12-dimethylbenz(a)anthracene

te Extracted: 11/02/89
te Analyzed: 11/10/89
Dilution Factor: 1

Client: IT Sun Coal
Date: 11/8/89
Client Project ID: PN 3003-315
X660

IT ANALYTICAL SERVICES
CINCINNATI, OH

VOLATILE ORGANICS ANALYSIS DATA SHEET

Matrix: Tenax

Sample Vol: N/A

Level: (low/med) N/A

% Moisture: not dec. N/A

Column: Packed

CLIENT SAMPLE NO.
T6 A/TC4206 0200

Lab Sample ID: T9-10-252-07

Date Received: 10/31/89
Date Analyzed: 11/6/89

Dilution Factor: N/A

CONCENTRATION UNITS: Total Ng

COMPOUND NAME	RT	EST. CONC	Q
DICHLORODIFLUOROMETHANE	1:56	50	J
OXYGENATED HYDROCARBON	4:40	200	J
DIMETHYL DISULFIDE	14:10	30	J

IT Corporation
December 11, 1989

IT ANALYTICAL SERVICES
5815 MIDDLEBROOK PIKE
KNOXVILLE, TN

Client Project ID: Sun/Inland/NIPSCO

Job Number: ITAQ 44463

APPENDIX IX ANALYSIS

Results in µg

Sample Matrix: Wash

Client Sample ID: R0799
Lab Sample ID: JJ8449

Compound		Compound	
phenol	200 U	bis(2-chloroethoxy)methane	200 U
bis(2-chloroethyl)ether	200 U	2,4-dichlorophenol	200 U
2-chlorophenol	200 U	1,2,4-trichlorobenzene	200 U
1,3-dichlorobenzene	200 U	naphthalene	200 U
1,4-dichlorobenzene	200 U	4-chloroaniline	200 U
benzyl alcohol	200 U	hexachlorobutadiene	200 U
1,2-dichlorobenzene	200 U	4-chloro-3-methylphenol	200 U
2-methylphenol	200 U	2-methylnaphthalene	200 U
bis(2-chloroisopropyl)ether	200 U	hexachlorocyclopentadiene	200 U
4-methylphenol	200 U	2,4,6-trichlorophenol	200 U
n-nitroso-di-n-propylamine	200 U	2,4,5-trichlorophenol	980 U
hexachloroethane	200 U	2-chloronaphthalene	200 U
nitrobenzene	200 U	2-nitroaniline	980 U
isophorone	200 U	dimethyl phthalate	200 U
2-nitrophenol	200 U	acenaphthylene	200 U
2,4-dimethylphenol	200 U	2,6-dinitrotoluene	200 U

U - Compound was analyzed for but not detected. The number is the detection limit for the sample.
J - Indicates an estimated value less than the detection limit.

Date Extracted: 11/06/89
Date Analyzed: 11/10/89
Dilution Factor: 1

APPENDIX IX ANALYSIS (continued)

Results in µg

Sample Matrix: Wash

Client Sample ID: R0799
Lab Sample ID: JJ8449

n-nitrosodimethylamine	200 U	m-dinitrobenzene	200 U
2-picoline	1,400 U	pentachlorobenzene	390 U
n-nitrosomethylethylamine	200 U	2-naphthylamine	3,300 U
methyl methanesulfonate	200 U	1-naphthylamine	2,400 U
n-nitrosodiethylamine	200 U	2,3,4,6-tetrachlorophenol	200 U
ethyl methanesulfonate	200 U	5-nitro-o-toluidine	390 U
aniline	980 U	diphenylamine	200 U
pentachloroethane	390 U	tetraethyl dithiopyropho(3)	200 U
3-methylphenol	200 U	sym-trinitrobenzene	200 U
n-nitrosopyrrolidine	200 U	phenacetin	200 U
acetophenone	200 U	diallate	200 U
n-nitrosomorpholine	200 U	4-aminobiphenyl	980 U
o-toluidine	200 U	pronamide	590 U
n-nitrosopiperidine	200 U	pentachloronitrobenzene	390 U
o,o,o-triethylphosphorot(2)	200 U	dinoseb	390 U
2,6-dichlorophenol	200 U	4-nitroquinoline-1-oxide	200 U
hexachloropropene	390 U	methapyrilene	780 U
a,a-dimethylphenethylamine	200 U	aramite	200 U
n-nitrosodi-n-butylamine	390 U	p-(dimethylamino)azobenzene	590 U
p-phenylenediamine	980 U	3,3'-dimethylbenzidine	1,600 U
safrole	200 U	2-acetylaminofluorene	200 U
1,2,4,5-tetrachlorobenzene	200 U	7,12-dimethylbenz(a)anth(4)	390 U
isosafrole	200 U	hexachlorophene	9,800 U
1,4-naphthoquinone	200 U	3-methylcholanthrene	590 U

U - Compound was analyzed for but not detected. The number is the detection limit for the sample.
J - Indicates an estimated value less than the detection limit.
B - Analyte was found in the blank as well as the sample.
2 - o,o,o-triethylphosphorothioate
3 - tetraethyl dithiopyrophosphate
4 - 7,12-dimethylbenz(a)anthracene

Date Extracted: 11/06/89
Date Analyzed: 11/10/89
Dilution Factor: 1

APPENDIX IX ANALYSIS (continued)

Results in µg

Sample Matrix: Composite

Client Sample ID: RUN 3 COMP
Lab Sample ID: JJ8440C

n-nitrosodimethylamine	20 U	m-dinitrobenzene	20 U
2-picoline	140 U	pentachlorobenzene	40 U
n-nitrosomethylethylamine	20 U	2-naphthylamine	340 U
methyl methanesulfonate	20 U	1-naphthylamine	240 U
n-nitrosodiethylamine	20 U	2,3,4,6-tetrachlorophenol	20 U
ethyl methanesulfonate	20 U	5-nitro-o-toluidine	40 U
aniline	100 U	diphenylamine	3 JB
pentachloroethane	40 U	tetraethyl dithiopyropho(3)	20 U
3-methylphenol	20 U	sym-trinitrobenzene	20 U
n-nitrosopyrrolidine	20 U	phenacetin	20 U
acetophenone	7 J	diallate	20 U
n-nitrosomorpholine	20 U	4-aminobiphenyl	100 U
o-toluidine	20 U	pronamide	60 U
n-nitrosopiperidine	20 U	pentachloronitrobenzene	40 U
o,o,o-triethylphosphorot(2)	20 U	dinoseb	40 U
2,6-dichlorophenol	20 U	4-nitroquinoline-1-oxide	20 U
hexachloropropene	40 U	methapyrilene	80 U
a,a-dimethylphenethylamine	20 U	aramite	20 U
n-nitrosodi-n-butylamine	40 U	p-(dimethylamino)azobenzene	60 U
p-phenylenediamine	100 U	3,3'-dimethylbenzidine	160 U
safrole	20 U	2-acetylaminofluorene	20 U
1,2,4,5-tetrachlorobenzene	20 U	7,12-dimethylbenz(a)anth(4)	40 U
isosafrole	20 U	hexachlorophene	1,000 U
1,4-naphthoquinone	20 U	3-methylcholanthrene	60 U

U - Compound was analyzed for but not detected. The number is the detection limit for the sample.
J - Indicates an estimated value less than the detection limit.
B - Analyte was found in the blank as well as the sample.
2 - o,o,o-triethylphosphorothioate
3 - tetraethyl dithiopyrophosphate
4 - 7,12-dimethylbenz(a)anthracene

Date Extracted: 11/02/89
Date Analyzed: 11/13/89
Dilution Factor: 1

INTERNATIONAL TECHNOLOGY CORPORATION

ANALYTICAL SERVICES

CERTIFICATE OF ANALYSIS

IT Corporation
312 Directors Drive
Knoxville, TN 37923
Attn: Mr. Randall Moore

Date: November 8, 1989

Job Number PN 3003-315

This is the Certificate of Analysis for the following samples:

Client Project ID: Sun Coal
Date Received by Lab: October 31, 1989
Number of Samples: 16
Sample Type: VOST Tubes

I. Introduction

Sixteen collected on VOST tubes arrived at ITAS Cincinnati on October 31, 1989. The samples were sent for analytical work in support of monitoring work at the Sun Coal Project. The samples were collected on October 26, 27 and 28, 1989 and were labeled as follows:

Tube # T4609/TC11A # 0193
Tube # T4555/TC3020 # 0194
Tube # T4321/TC3687 # 0195
Tube # T4464/TC3244 # 0197
Tube # T16A/TC3254 # 0198
Tube # T4541/TC1861 # 0199
Tube # T6 A/TC4205 # 0200
Tube # T4038/TC4027 # 0202
Tube # T42315/TC2322 # 0203
Tube # T4240/TC3549 # 0204
Tube # T3999/TC4236 # 0205
Tube # T4581/TC3054 # 0206
Tube # T3912/TC4374 # 0201
Tube # T1878/TC2094 # 0207
Tube # T3330/TC4407 # 0196
Tube # T1852/TC3917 TB

II. Analytical Results/Methodology

The analytical results for this report are presented by analytical test. Each set of data will include sample identification information, the analytical results, and the appropriate detection limits. Please note that data is not "blank corrected". The analyses requested include the Hazardous Substance List (HSL) volatile organic compounds and a library search of other peaks.

Reviewed and Approved:

H. William Jess
Organic Laboratory Supervisor
D062 T9-10-252

APPENDIX IX ANALYSIS

Results in µg

Sample Matrix: Composite

Client Sample ID: RUN 1 COMP
Lab Sample ID: JJ8434C

Compound		Compound	
phenol	17 J	bis(2-chloroethoxy)methane	20 U
bis(2-chloroethyl)ether	20 U	2,4-dichlorophenol	20 U
2-chlorophenol	6 J	1,2,4-trichlorobenzene	20 U
1,3-dichlorobenzene	20 U	naphthalene	150
1,4-dichlorobenzene	20 U	4-chloroaniline	20 U
benzyl alcohol	20 U	hexachlorobutadiene	20 U
1,2-dichlorobenzene	20 U	4-chloro-3-methylphenol	20 U
2-methylphenol	20 U	2-methylnaphthalene	20 U
bis(2-chloroisopropyl)ether	20 U	hexachlorocyclopentadiene	20 U
4-methylphenol	20 U	2,4,6-trichlorophenol	20 U
n-nitroso-di-n-propylamine	20 U	2,4,5-trichlorophenol	100 U
hexachloroethane	20 U	2-chloronaphthalene	20 U
nitrobenzene	20 U	2-nitroaniline	100 U
isophorone	20 U	dimethyl phthalate	20 U
2-nitrophenol	20 U	acenaphthylene	20 U
2,4-dimethylphenol	20 U	2,6-dinitrotoluene	20 U

U - Compound was analyzed for but not detected. The number is the detection limit for the sample.
J - Indicates an estimated value less than the detection limit.

Date Extracted: 11/02/89
Date Analyzed: 11/13/89
Dilution Factor: 1

IT Corporation
December 11, 1989

Client Project ID: Sun/Inland/NIPSCO

IT ANALYTICAL SERVICES
5815 MIDDLEBROOK PIKE
KNOXVILLE, TN

Job Number: ITAQ 44463

APPENDIX IX ANALYSIS (continued)

Results in µg

Sample Matrix: Composite

Client Sample ID: RUN 1 COMP
Lab Sample ID: JJ8434C

Compound		Compound	
3-nitroaniline	100 U	anthracene	12 J
acenaphthene	20 U	di-n-butylphthalate	70
2,4-dinitrophenol	100 U	fluoranthene	20 U
4-nitrophenol	100 U	pyrene	4 J
dibenzofuran	20 U	butylbenzylphthalate	3 J
2,4-dinitrotoluene	20 U	3,3'-dichlorobenzidine	40 U
diethylphthalate	18 J	benzo(a)anthracene	20 U
4-chlorophenyl-phenylether	20 U	chrysene	20 U
fluorene	20 U	bis(2-ethylhexyl)phthalate	26
4-nitroaniline	100 U	di-n-octylphthalate	4 J
4,6-dinitro-2-methylphenol	100 U	benzo(b)fluoranthene	20 U
n-nitrosodiphenylamine[1]	5 BJ	benzo(k)fluoranthene	20 U
4-bromophenyl-phenylether	20 U	benzo(a)pyrene	20 U
hexachlorobenzene	20 U	indeno(1,2,3-cd)pyrene	20 U
pentachlorophenol	100 U	dibenzo(a,h)anthracene	20 U
phenanthrene	7 J	benzo(g,h,i)perylene	20 U

U - Compound was analyzed for but not detected. The number is the detection limit for the sample.
J - Indicates an estimated value less than the detection limit.
B - Analyte was found in the blank as well as the sample.
[1] - Detected as diphenylamine.

Date Extracted: 11/02/89
Date Analyzed: 11/13/89
Dilution Factor: 1

II. Analytical Results/Methodology (cont)

The samples were thermally desorbed and analyzed by Gas Chromatography/ Mass Spectrometry according to the ITAS Cincinnati VOST Protocol.

Detection limits are based on concentration in the total sample and are expressed in Total Nanograms.

III. Quality Control

Immediately following the analytical data for the samples can be found the QA/QC information that pertains to these samples. The purpose of this information is to demonstrate that the data enclosed is scientifically valid and defensible. This QA/QC data is used to assess the laboratories performance during the analysis of the samples it accompanies. All quantitations were performed from within the calibrated range of the analytical instrument.

IV. Data Report Qualifiers

Following are descriptions of data report qualifiers which may have been used in this analytical report.

ND The analyte was not detected in the sample or extract. The value reported in parentheses after the "ND" is the detection limit for that compound in that sample.

U The analyte was not detected in the sample or extract. The value reported with the "U" is the detection limit for that compound in that sample.

VALUE The result is a value equal to or greater than the detection limit for that compound.

J Indicates an estimated value. This flag is used when mass spectral data indicates the presence of the compound, but the result is less than the specified detection limit.

B This flag is used whenever the analyte is found in the blank as well as in the sample.

E This flag indicates that the quantity of this compound detected in this sample is above than the linear range of the instrument. Results are probably lower than actual.

Client: IT Sun Coal
Date: November 8, 1989
Client Project ID: PN 3003-315

IT ANALYTICAL SERVICES
CINCINNATI, OH

D064

VOLATILE ORGANICS ANALYSIS DATA SHEET

Matrix: Tenax

Sample Wt/Vol: N/A

Level: (low/med) N/A

% Moisture: not dec. N/A

Column: Packed

Client Sample ID:
T4609/TC11A 0193
Lab Sample No:
T9-10-252-01
Date Received:10/31/89
Date Analyzed:11/06/89

Dilution Factor: 1

CAS NO.	COMPOUND	CONCENTRATION UNITS: Total Ng	Q
74-87-3	Chloromethane	1600	
74-83-9	Bromomethane	120	
75-01-4	Vinyl Chloride	10	U
75-00-3	Chloroethane	10	U
75-09-2	Methylene Chloride	120	B
67-64-1	Acetone	10	U
75-15-0	Carbon Disulfide	9	
75-35-4	1,1-Dichloroethene	5	U
75-35-3	1,1-Dichloroethane	5	U
540-59-0	1,2-dichloroethene (Total)	5	U
67-66-3	Chloroform	210	
107-06-2	1,2-dichloroethane	5	U
78-93-3	2-butanone	61	B
71-55-6	1,1,1-trichloroethane	10	
56-23-5	Carbon Tetrachloride	10	
108-05-4	Vinyl Acetate	5	U
75-27-4	Bromodichloromethane	5	U
78-87-5	1,2-dichloropropane	5	U
10061-02-6	Trans1,3-dichloropropene	5	U
79-01-6	Trichloroethene	5	U
124-48-1	Dibromochloromethane	5	U
79-00-5	1,1,2-trichloroethane	5	U
71-43-2	Benzene	580	
10061-01-5	Cis-1,3-dichloropropene	5	U
110-75-8	2-chloroethylvinylether	10	U
75-25-2	Bromoform	5	U
108-10-1	4-methyl-2-pentanone	10	U
591-78-6	2-hexanone	10	U
127-18-4	Tetrachloroethene	5	U
79-34-5	1,1,2,2tetrachloroethane	5	U
108-88-3	Toluene	400	
108-90-7	Chlorobenzene	5	U
100-41-4	Ethylbenzene	3	J
100-42-5	Styrene	5	U
1330-20-7	Total Xylenes	5	U

Client: IT Sun Coal
Date: 11/8/89
Client Project ID: PN 3003-315
X666

IT ANALYTICAL SERVICES
CINCINNATI, OH

VOLATILE ORGANICS ANALYSIS DATA SHEET

Matrix: Tenax

Sample Vol: N/A

Level: (low/med) N/A

% Moisture: not dec. N/A

Column: Packed

CLIENT SAMPLE NO.
T4609/TC11A 0193

Lab Sample ID: T9-10-252-01

Date Received: 10/31/89
Date Analyzed: 11/6/89

Dilution Factor: N/A

CONCENTRATION UNITS: Total Ng

COMPOUND NAME	RT	EST. CONC	Q
OXYGENATED HYDROCARBON	5:04	20	J
TRICHLOROFLUOROMETHANE	6:22	8	J
OXYGENATED HYDROCARBON	7:20	200	J
TRICHLOROTRIFLUOROETHANE	9:58	5	J
OXYGENATED HYDROCARBON	11:36	1	J
ORGANIC ACID ESTER	17:06	50	J
ALKANE	21:18	50	J
ALKANE	24:48	20	J
ALKANE	25:32	10	J

Client: IT Sun Coal
Date: November 8, 1989
Client Project ID: PN 3003-315

IT ANALYTICAL SERVICES
CINCINNATI, OH

D065

VOLATILE ORGANICS ANALYSIS DATA SHEET

Matrix: Tenax

Sample Wt/Vol: N/A

Level: (low/med) N/A

% Moisture: not dec. N/A

Column: Packed

Client Sample ID:
T4555/TC3020 0194
Lab Sample No:
T9-10-252-02
Date Received:10/31/89
Date Analyzed:11/06/89

Dilution Factor: 1

CAS NO.	COMPOUND	CONCENTRATION UNITS: Total Ng	Q
74-87-3	Chloromethane	10	U
74-83-9	Bromomethane	140	
75-01-4	Vinyl Chloride	10	U
75-00-3	Chloroethane	10	U
75-09-2	Methylene Chloride	40	B
67-64-1	Acetone	10	U
75-15-0	Carbon Disulfide	11	
75-35-4	1,1-Dichloroethene	5	U
75-35-3	1,1-Dichloroethane	5	U
540-59-0	1,2-dichloroethene (Total)	5	U
67-66-3	Chloroform	5	U
107-06-2	1,2-dichloroethane	5	U
78-93-3	2-butanone	20	B
71-55-6	1,1,1-trichloroethane	31	
56-23-5	Carbon Tetrachloride	5	U
108-05-4	Vinyl Acetate	5	U
75-27-4	Bromodichloromethane	5	U
78-87-5	1,2-dichloropropane	5	U
10061-02-6	Trans1,3-dichloropropene	5	U
79-01-6	Trichloroethene	5	U
124-48-1	Dibromochloromethane	5	U
79-00-5	1,1,2-trichloroethane	5	U
71-43-2	Benzene	81	
10061-01-5	Cis-1,3-dichloropropene	5	U
110-75-8	2-chloroethylvinylether	10	U
75-25-2	Bromoform	5	U
108-10-1	4-methyl-2-pentanone	10	U
591-78-6	2-hexanone	10	U
127-18-4	Tetrachloroethene	5	U
79-34-5	1,1,2,2tetrachloroethane	5	U
108-88-3	Toluene	5	U
108-90-7	Chlorobenzene	5	U
100-41-4	Ethylbenzene	5	U
100-42-5	Styrene	5	U
1330-20-7	Total Xylenes	5	U

Client: IT Sun Coal
Date: November 8, 1989
Client Project ID: PN 3003-315

IT ANALYTICAL SERVICES
CINCINNATI, OH

D066

VOLATILE ORGANICS ANALYSIS DATA SHEET

Matrix: Tenax

Sample Wt/Vol: N/A

Level: (low/med) N/A

% Moisture: not dec. N/A

Column: Packed

Client Sample ID:
T4321/TC3687 0195
Lab Sample No:
T9-10-252-03
Date Received:10/31/89
Date Analyzed:11/06/89

Dilution Factor: 1

CONCENTRATION UNITS:

CAS NO.	COMPOUND	Total Ng	Q
74-87-3	Chloromethane	10	U
74-83-9	Bromomethane	62	
75-01-4	Vinyl Chloride	10	U
75-00-3	Chloroethane	10	U
75-09-2	Methylene Chloride	36	B
67-64-1	Acetone	130	
75-15-0	Carbon Disulfide	18	
75-35-4	1,1-Dichloroethene	5	U
75-35-3	1,1-Dichloroethane	5	U
540-59-0	1,2-dichloroethene (Total)	5	U
67-66-3	Chloroform	5	U
107-06-2	1,2-dichloroethane	5	U
78-93-3	2-butanone	24	B
71-55-6	1,1,1-trichloroethane	5	U
56-23-5	Carbon Tetrachloride	5	U
108-05-4	Vinyl Acetate	5	U
75-27-4	Bromodichloromethane	5	U
78-87-5	1,2-dichloropropane	5	U
10061-02-6	Trans1,3-dichloropropene	5	U
79-01-6	Trichloroethene	5	U
124-48-1	Dibromochloromethane	5	U
79-00-5	1,1,2-trichloroethane	5	U
71-43-2	Benzene	210	
10061-01-5	Cis-1,3-dichloropropene	5	U
110-75-8	2-chloroethylvinylether	10	U
75-25-2	Bromoform	5	U
108-10-1	4-methyl-2-pentanone	10	U
591-78-6	2-hexanone	10	U
127-18-4	Tetrachloroethene	5	U
79-34-5	1,1,2,2tetrachloroethane	5	U
108-88-3	Toluene	5	U
108-90-7	Chlorobenzene	5	U
100-41-4	Ethylbenzene	5	U
100-42-5	Styrene	5	U
1330-20-7	Total Xylenes	5	U

Client: IT Sun Coal
Date: 11/8/89
Client Project ID: PN 3003-315
X664

IT ANALYTICAL SERVICES
CINCINNATI, OH

VOLATILE ORGANICS ANALYSIS DATA SHEET

Matrix: Tenax

Sample Vol: N/A

Level: (low/med) N/A

% Moisture: not dec. N/A

Column: Packed

CLIENT SAMPLE NO.
T4321/TC3687 0195

Lab Sample ID: T9-10-252-03

Date Received: 10/31/89
Date Analyzed: 11/6/89

Dilution Factor: N/A

CONCENTRATION UNITS: Total Ng

COMPOUND NAME	RT	EST. CONC	Q
SULFUR DIOXIDE	6:52	100	J
UNKNOWN	9:24	100	J
TRICHLOROTRIFLUOROETHANE	9:56	70	J

Client: IT Sun Coal
Date: November 8, 1989
Client Project ID: PN 3003-315

IT ANALYTICAL SERVICES
CINCINNATI, OH

D067

VOLATILE ORGANICS ANALYSIS DATA SHEET

Matrix: Tenax

Sample Wt/Vol: N/A

Level: (low/med) N/A

% Moisture: not dec. N/A

Column: Packed

Client Sample ID:
T4464/TC3244 0197
Lab Sample No:
T9-10-252-04
Date Received:10/31/89
Date Analyzed:11/06/89

Dilution Factor: 1

CONCENTRATION UNITS:

CAS NO.	COMPOUND	Total Ng	Q
74-87-3	Chloromethane	10	U
74-83-9	Bromomethane	46	
75-01-4	Vinyl Chloride	10	U
75-00-3	Chloroethane	10	U
75-09-2	Methylene Chloride	220	B
67-64-1	Acetone	70	
75-15-0	Carbon Disulfide	88	
75-35-4	1,1-Dichloroethene	37	
75-35-3	1,1-Dichloroethane	5	U
540-59-0	1,2-dichloroethene (Total)	5	U
67-66-3	Chloroform	5	U
107-06-2	1,2-dichloroethane	5	U
78-93-3	2-butanone	13	B
71-55-6	1,1,1-trichloroethane	2000	
56-23-5	Carbon Tetrachloride	5	U
108-05-4	Vinyl Acetate	5	U
75-27-4	Bromodichloromethane	5	U
78-87-5	1,2-dichloropropane	5	U
10061-02-6	Trans1,3-dichloropropene	5	U
79-01-6	Trichloroethene	5	U
124-48-1	Dibromochloromethane	5	U
79-00-5	1,1,2-trichloroethane	5	U
71-43-2	Benzene	360	
10061-01-5	Cis-1,3-dichloropropene	5	U
110-75-8	2-chloroethylvinylether	10	U
75-25-2	Bromoform	5	U
108-10-1	4-methyl-2-pentanone	10	U
591-78-6	2-hexanone	10	U
127-18-4	Tetrachloroethene	5	U
79-34-5	1,1,2,2tetrachloroethane	5	U
108-88-3	Toluene	7	
108-90-7	Chlorobenzene	5	U
100-41-4	Ethylbenzene	5	U
100-42-5	Styrene	5	U
1330-20-7	Total Xylenes	5	U

Client: IT Sun Coal
Date: 11/8/89
Client Project ID: PN 3003-315
X663

IT ANALYTICAL SERVICES
CINCINNATI, OH

VOLATILE ORGANICS ANALYSIS DATA SHEET

Matrix: Tenax

CLIENT SAMPLE NO.
T4464/TC32443254 0197

Sample Vol: N/A

Lab Sample ID: T9-10-252-04

Level: (low/med) N/A

Date Received: 10/31/89

% Moisture: not dec. N/A

Date Analyzed: 11/6/89

Column: Packed

Dilution Factor: N/A

CONCENTRATION UNITS: Total Ng

COMPOUND NAME	RT	EST. CONC	Q
TRICHLOROFLUOROMETHANE	6:10	200	J
TRICHLOROTRIFLUOROETHANE	9:56	60	J
DIMETHYL DISULFIDE	14:12	90	J

Client: IT Sun Coal
Date: November 8, 1989
Client Project ID: PN 3003-315

IT ANALYTICAL SERVICES
CINCINNATI, OH

D068

VOLATILE ORGANICS ANALYSIS DATA SHEET

Matrix: Tenax

Sample Wt/Vol: N/A

Level: (low/med) N/A

% Moisture: not dec. N/A

Column: Packed

Client Sample ID:
T16 A/TC3254 0198
Lab Sample No:
T9-10-252-05
Date Received:10/31/89
Date Analyzed:11/06/89

Dilution Factor: 1

CONCENTRATION UNITS:
Total Ng

CAS NO.	COMPOUND		Q
74-87-3	Chloromethane	10	U
74-83-9	Bromomethane	16	
75-01-4	Vinyl Chloride	10	U
75-00-3	Chloroethane	10	U
75-09-2	Methylene Chloride	54	B
67-64-1	Acetone	90	
75-15-0	Carbon Disulfide	10	
75-35-4	1,1-Dichloroethene	5	U
75-35-3	1,1-Dichloroethane	5	U
540-59-0	1,2-dichloroethene (Total)	5	U
67-66-3	Chloroform	5	U
107-06-2	1,2-dichloroethane	5	U
78-93-3	2-butanone	17	B
71-55-6	1,1,1-trichloroethane	24	
56-23-5	Carbon Tetrachloride	5	U
108-05-4	Vinyl Acetate	5	U
75-27-4	Bromodichloromethane	5	U
78-87-5	1,2-dichloropropane	5	U
10061-02-6	Trans1,3-dichloropropene	5	U
79-01-6	Trichloroethene	5	U
124-48-1	Dibromochloromethane	5	U
79-00-5	1,1,2-trichloroethane	5	U
71-43-2	Benzene	1400	
10061-01-5	Cis-1,3-dichloropropene	5	U
110-75-8	2-chloroethylvinylether	10	U
75-25-2	Bromoform	5	U
108-10-1	4-methyl-2-pentanone	10	U
591-78-6	2-hexanone	10	U
127-18-4	Tetrachloroethene	5	U
79-34-5	1,1,2,2tetrachloroethane	5	U
108-88-3	Toluene	7	
108-90-7	Chlorobenzene	5	U
100-41-4	Ethylbenzene	5	U
100-42-5	Styrene	5	U
1330-20-7	Total Xylenes	6	

Client: IT Sun Coal
Date: November 8, 1989
Client Project ID: PN 3003-315

IT ANALYTICAL SERVICES
CINCINNATI, OH

D069

VOLATILE ORGANICS ANALYSIS DATA SHEET

Matrix: Tenax

Sample Wt/Vol: N/A

Level: (low/med) N/A

% Moisture: not dec. N/A

Column: Packed

Client Sample ID:
T4541/TC1861 0199
Lab Sample No:
T9-10-252-06
Date Received: 10/31/89
Date Analyzed: 11/06/89

Dilution Factor: 1

CONCENTRATION UNITS:

CAS NO.	COMPOUND	Total Ng	Q
74-87-3	Chloromethane	10	U
74-83-9	Bromomethane	58	
75-01-4	Vinyl Chloride	10	U
75-00-3	Chloroethane	10	U
75-09-2	Methylene Chloride	200	B
67-64-1	Acetone	79	
75-15-0	Carbon Disulfide	100	
75-35-4	1,1-Dichloroethene	11	
75-35-3	1,1-Dichloroethane	5	U
540-59-0	1,2-dichloroethene (Total)	5	U
67-66-3	Chloroform	5	U
107-06-2	1,2-dichloroethane	5	U
78-93-3	2-butanone	22	B
71-55-6	1,1,1-trichloroethane	660	
56-23-5	Carbon Tetrachloride	5	U
108-05-4	Vinyl Acetate	5	U
75-27-4	Bromodichloromethane	5	U
78-87-5	1,2-dichloropropane	5	U
10061-02-6	Trans1,3-dichloropropene	5	U
79-01-6	Trichloroethene	5	U
124-48-1	Dibromochloromethane	5	U
79-00-5	1,1,2-trichloroethane	5	U
71-43-2	Benzene	360	
10061-01-5	Cis-1,3-dichloropropene	5	U
110-75-8	2-chloroethylvinylether	10	U
75-25-2	Bromoform	5	U
108-10-1	4-methyl-2-pentanone	6	J B
591-78-6	2-hexanone	10	U
127-18-4	Tetrachloroethene	5	U
79-34-5	1,1,2,2tetrachloroethane	5	U
108-88-3	Toluene	10	
108-90-7	Chlorobenzene	5	U
100-41-4	Ethylbenzene	5	U
100-42-5	Styrene	5	U
1330-20-7	Total Xylenes	5	

11.6% moisture

JEWELL COAL AND COKE COMPANY

Date: 11-26-89

Coke Plant - Battery 3B

DAILY OPERATING SUMMARY

Note: Should be 25 tons. (jc) 1/16/91

OVEN NO.	TIME PUSHED	TIME CHARGED	REMARKS	TONS
1	4:20	4:46		24
2	4:32	4:58		24
3	4:42	5:08		24
4	4:49	4:55		24
5	4:59	5:66		24
6	5:09	5:15		24
7	5:18	5:24		24
8	5:26	5:42		24
9	5:44	5:50		24
10	5:59	6:11		24
11	6:09	6:17		24
12	6:15	6:22		24
13	6:20	6:28		24
14	6:26	6:35		24
15	6:31	6:37		24
16	6:35	6:42		24
17	6:40	6:44		24
18	6:45	6:50		24
19	6:50	6:58		24
20	6:56	7:07		24
21	7:05	7:13		24
22	7:11	7:19		24
23	7:16	7:23		24
24	7:21	7:27		24
25	7:25	7:34		24
26	7:32	7:40		24

1,489.
1,254.
2,743
+ 1,259.

Remarks:

(S) Lacey Brown

11.0% moisture

JEWELL COAL AND COKE COMPANY

Date: 10-28-89

Coke Plant - Battery 3B

DAILY OPERATING SUMMARY

Note: Should be 25 Tons. (OC) 1/16/91

OVEN NO.	TIME PUSHED	TIME CHARGED	REMARKS	TONS
1				
2	4:02	4:09		24
3	4:14	4:20		24
4	4:25	4:31		24
5	4:34	4:40		24
6	4:43	4:49		24
7	4:52	4:58		24
8	4:59	5:05		24
9	5:12	5:19		24
10	5:22	5:28		24
11	5:34	5:42		24
12	5:40	5:49		24
13	5:47	5:55		24
14	5:53	6:00		24
15	5:58	6:06		24
16	6:04	6:14		24
17	6:11	6:21		24
18	6:19	6:26		24
19	6:24	6:31		24
20	6:29	6:35		24
21	6:33	6:40		24
22	6:38	6:45		24
23	6:43	6:50		24
24	6:48	6:55		24
25	6:53	6:59		24
26	6:57	7:03		24
	7:01	7:07		24
				1,490
				1,234
				2,724
				1,301

Remarks:

(S) Rose Fiddler

10.8% moisture

JEWELL COAL AND COKE COMPANY

Date: 12-29-89

Coke Plant - Battery 3B

DAILY OPERATING SUMMARY

Note: Should be 25 tons QC 1/16/90

OVEN NO.	TIME PUSHED	TIME CHARGED	REMARKS	TONS	OVEN NO.	TIME PUSHED	TIME CHARGED	REMARKS	TONS
1	3113	3125		24	14	5103	5111		24
2	3123	3133		24	15	5108	5115		24
3	3131	3141		24	16	5113	5120		24
4	3139	3149		24	17	5118	5125		24
5	3147	3150		24	18	5123	5130		24
6	3158	4108		24	19	5128	5135		24
7	4106	4119		24	20	5133	5140		24
8	4117	4128		24	21	5138	5145		24
9	4126	4139		24	22	5143	5151		24
10	4137	4147		24	23	5149	5156		24
11	4145	4152		24	24	5154	6100		24
12	4150	4158		24	25	5158	6104		24
13	4156	5105		24	26	6102	6106		24

1,460
1,214
2,674
1,324

Remarks:

(S) Rene Burden

10.7% moisture

JEWELL COAL AND COKE COMPANY

Date: 10-30-89

Coke Plant - Battery 3B

DAILY OPERATING SUMMARY

Note Should be 25 tons. (99) 1/16/91

OVEN NO.	TIME PUSHED	TIME CHARGED	REMARKS	TONS
1	3103	3109		24
2	3108	3114		24
3	3120	3124		24
4	3126	3132		24
5	3135	3141		24
6	3143	3149		24
7	3153	3159		24
8	4101	4107		24
9	4110	4116		24
10	4119	4125		24
11	4126	4134		24
12	4132	4142		24
13	4140	4152		24
14	4150	4157		24
15	4155	5102		24
16	5100	5107		24
17	5105	5112		24
18	5110	5118		24
19	5116	5123		24
20	5121	5129		24
21	5127	5135		24
22	5133	5140		24
23	5138	5145		24
24	5143	5151		24
25	5149	5156		24
26	5154	6101		24
				1,469.
				1,198
				2667.
				1,346.

Remarks:

(S) Rocco Buccilli

Stack # 1 Battery

Ds = 2.5 ft

Field Data

INTERNATIONAL TECHNOLOGY CORPORATION

By MAB Date 10/29/89 Start 5:00 pm Subject Jewell/Inland/NIPSCO Sheet No. 1 of 1

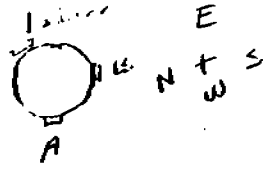
Chkd. By ____ Date ____ 24 hr heat study Proj. No. 401.000

Meter Temp	Test No.	Dry G. Initial	Dry G. Final	Time	Initial wt.	Final wt.	CO_2	O_2 Fyrite/Telecheck	CO	OVA	dilutro O_2
118, 116	1	212.471	219.951	~~5:00~~ pm	1451.0	1474.0	8.0	8.5/6.1	11 ppm	95ppm	6.1/13
117, 115	2	219.951	226.00	6:00	1474.0	1495.0	6.0	8.0/7.7	0 ppm	5.3ppm	7.7/11.5
116, 105	3	226.000	229.200	7:00	1495.0	1505.5	5.5	10.0/7.8	0 ppm	9.4ppm	7.8/10.4
115, 100	4	229.200	231.900	8:00	1505.5	1514.3	6.0	10.0/7.8	0 ppm	9.5ppm	7.8/10.2
115, 104	5	231.900	234.500	9:00	1514.3	1521.2	6.0	12.5/8.7	0 ppm	9.4ppm	8.7/11.
114, 105	6	234.500	237.300	10:00	1521.2	1528.6	5.5	10.0/7.5	0 ppm	100.0ppm	7.5/10
111, 98	7	237.300	240.000	11:00	1460.5	1469.9	6.0	10.5/8.0	0 ppm	95.0ppm	8.0/9.
100, 94	8	240.000	243.000	12:00	1469.9	1480.0	6.0	10.0/7.9	0 ppm	95.0ppm	7.9/9.
98, 92	9	243.000	246.000	1:00 10/30 am	1480.0	1489.2	6.0	10.0/8.0	0 ppm	90.0ppm	8.0/10
96, 92	10	246.000	250.000	2:00	1489.2	1498.0	6.8	9.5/7.8	0 ppm	80ppm	7.8/11.-
96, 90	11	250.000	253.400	3:00	1498.0	1506.5	6.6	9.0/8.0	0 ppm	110ppm	no d.
95, 89	12	253.400	257.400	4:00	1506.5	1518.0	6.5	10.2/8.2	0 ppm	<20ppm	no d
91, 87	13	257.400	260.500	5:00	1518.0	1526.0	6.0	10.0/8.5	0 ppm	80 ppm	no d
	14	260.500	263.6	6:00	1526.0	1528.0	7.0	9.6/7.7	0 ppm	60 ppm	no d.
90, 86	15	263.6	266.7	0100	1520.0	1530.0	6.0	10.0/8.1	0 ppm	90 ppm	no d.
91, 86	16	266.7	273.7	0800	1530.0	1551.0	5.2	7.8/8.4	0 ppm	70 ppm	no d.
91, 84	17	273.7	277.7	0900	1551.0	1581.0	5.5	9.0/8.0	1 ppm	110 ppm	no d.
85/84	18	277.7	280.7	10:00	1581.0	1587.0	5.4	9.0/8.4	2 ppm	120 ppm	no d.
~~85/84~~ 104/99	19	280.7	283.7	11:00	1587.0	1596.6	3.5	14/9.0	0 ppm	85 ppm	no d
118/110	20	283.7	286.7	12:00	1596.6	1603.2	5.3	11.4/9.2	0 ppm	75 ppm	no d
124/118	21	286.7	289.7	1:00	1603.2	1610.5	3.0%	10/10.0	0 ppm	85 ppm	no d
	22	289.7	293.7	2:00	1610.5	1617.2	4.0%	35/12.4	0 ppm	45 ppm	no d
	23										
	24										

JSC 12/1/89

INTERNATIONAL TECHNOLOGY CORPORATION

RESPONSIVE TO THE NEEDS OF ENVIRONMENTAL MANAGEMENT



Test No. 2 - 1800

Location _____

VELOCITY TRAVERSE DATA

	Point	Position, inches[a]	Reading, Δp inches of H_2O	$\sqrt{\Delta p}$	T_s, °F
A	1		.02		1723
	2		.08		
	3		.11		
	4		.13		
	5		.14		
	6		.15		
B	1		.04		
	2		.08		
	3		.13		
	4		.13		
	5		.14		
	6		.12		
	Total				
	Average			0.317	

[a] From outside of port to sampling point.

Pitot tube _____
Manometer _____
Thermometer _____

Stack Inside Dimensions _____

Stack Area = _____ ft^2

Barometric Pressure, P_b = _____ inches Hg, stack gauge

Pressure = _____ inches H_2O

Stack Abs. Pressure, P_s = _____ inches $\frac{H_2O}{13.6}$ + P_b = _____ inches Hg

Stack Gas Temp., T_s = _____ °F. + 460 = _____ °R

Molecular Weight of Stack Gas, M_s = _____

1. $V_s = 174\ C_p \sqrt{\Delta p T_s} \times \frac{29.92}{P_s} \times \frac{28.96}{M_s}$

   V_s = _____ ft/min

2. Volume = _____ ft/min x _____ ft^2 = _____ ft^3/min

   Standard Volume at 70°F and 29.92 inches Hg:

3. $ft^3/min \times \frac{530}{T_s} \times \frac{P_s}{29.92}$ = _____ x $\frac{530}{29.92}$ x _____ =

   _____ scfm

Data Recorder DWN

Date 10/29/89

Gas velocity and volume data.

INTERNATIONAL TECHNOLOGY CORPORATION

JSC 12/1/89

RESPONSIVE TO THE NEEDS OF ENVIRONMENTAL MANAGEMENT

Test No. 3- 19:00

Location _____

VELOCITY TRAVERSE DATA

	Point	Position, inches[a]	Reading, Δp inches of H_2O	$\sqrt{\Delta p}$	T_s, °F
A	1		0.03		140
	2		0.09		
	3		0.11		
	4		0.13		
	5		0.12		
	6		0.10		
B	1		0.04		
	2		0.09		
	3		0.11		
	4		0.14		
	5		0.12		
	6		0.09		
	Total				
	Average			2.307	

[a] From outside of port to sampling point.

Pitot tube _____
Manometer _____
Thermometer _____

Stack Inside Dimensions _____

Stack Area = _____ ft^2

Barometric Pressure, P_b = _____ inches Hg, stack gauge

Pressure = _____ inches H_2O

Stack Abs. Pressure, P_s = _____ inches H_2O / 13.6 + P_b = _____ inches Hg

Stack Gas Temp., T_s = _____ °F. + 460 = _____ °R

Molecular Weight of Stack Gas, M_s = _____

1. $V_s = 174\ C_p \sqrt{\Delta p T_s} \times \frac{29.92}{P_s} \times \frac{28.96}{M_s}$

   V_s = _____ ft/min

2. Volume = _____ ft/min x _____ ft^2 = _____ ft^3/min

   Standard Volume at 70°F and 29.92 inches Hg:

3. $ft^3/min \times \frac{530}{T_s} \times \frac{P_s}{29.92}$ = _____ x $\frac{530}{29.92}$ x _____ =

   _____ scfm

Data Recorder DWG

Date 10 | 29 | 89

Gas velocity and volume data.

INTERNATIONAL TECHNOLOGY CORPORATION

DOC 12/11/89

RESPONSIVE TO THE NEEDS OF ENVIRONMENTAL MANAGEMENT

Test No. 4-20.00

Location _____

VELOCITY TRAVERSE DATA

	Point	Position, inches[a]	Reading, Δp inches of H_2O	$\sqrt{\Delta p}$	T_s, °F
A	1		0.04		1741
	2		0.07		
	3		0.09		
	4		0.12		
	5		0.13		
	6		0.11		
B	1		0.04		
	2		0.08		
	3		0.11		
	4		0.14		
	5		0.15		
	6		0.12		
	Total				
	Average			0.311	

[a] From outside of port to sampling point.

Pitot tube _____
Manometer _____
Thermometer _____

Stack Inside Dimensions _____

Stack Area = _____ ft^2

Barometric Pressure, P_b = _____ inches Hg, stack gauge

Pressure = _____ inches H_2O

Stack Abs. Pressure, P_s = _____ inches H_2O ÷ 13.6 + P_b = _____ inches Hg

Stack Gas Temp., T_s = _____ °F. + 460 = _____ °R

Molecular Weight of Stack Gas, M_s = _____

1. $V_s = 174\ C_p \sqrt{\Delta p T_s} \times \frac{29.92}{P_s} \times \frac{28.96}{M_s}$

   V_s = _____ ft/min

2. Volume = _____ ft/min x _____ ft^2 = _____ ft^3/min

   Standard Volume at 70°F and 29.92 inches Hg:

3. $ft^3/min \times \frac{530}{T_s} \times \frac{P_s}{29.92}$ = _____ x $\frac{530}{\text{_____}}$ x $\frac{\text{_____}}{29.92}$ =

   _____ scfm

Data Recorder Duf

Date 10/29/89

Gas velocity and volume data.

INTERNATIONAL TECHNOLOGY CORPORATION

12/1/89

RESPONSIVE TO THE NEEDS OF ENVIRONMENTAL MANAGEMENT

Test No. 6 - 22.00

Location _____

VELOCITY TRAVERSE DATA

	Point	Position, inches[a]	Reading, Δp inches of H_2O	$\sqrt{\Delta p}$	T_s, °F
A	1		0.05		1748
	2		0.09		
	3		0.11		
	4		0.11		
	5		0.14		
	6		0.10		
B	1		0.04		
	2		0.09		
	3		0.10		
	4		0.10		
	5		0.12		
	6		0.09		
	Total				
	Average			2305	

[a] From outside of port to sampling point.

Pitot tube _____
Manometer _____
Thermometer _____

Stack Inside Dimensions _____

Stack Area = _____ ft^2

Barometric Pressure, P_b = _____ inches Hg, stack gauge Pressure = _____ inches H_2O

Stack Abs. Pressure, P_s = _____ inches $\frac{H_2O}{13.6}$ + P_b = _____ inches Hg

Stack Gas Temp., T_s = _____ °F. + 460 = _____ °R

Molecular Weight of Stack Gas, M_s = _____

1. $V_s = 174\ C_p \sqrt{\Delta p T_s} \times \frac{29.92}{P_s} \times \frac{28.96}{M_s}$

   V_s = _____ ft/min

2. Volume = _____ ft/min x _____ ft^2 = _____ ft^3/min

   Standard Volume at 70°F and 29.92 inches Hg:

3. $ft^3/min \times \frac{530}{T_s} \times \frac{P_s}{29.92}$ = _____ x $\frac{530}{29.92}$ x _____ =

   _____ scfm

Data Recorder DWJ

Date 10/29/89

Gas velocity and volume data.

INTERNATIONAL TECHNOLOGY CORPORATION

RESPONSIVE TO THE NEEDS OF ENVIRONMENTAL MANAGEMENT

Test No. B-5:00

Location _____

VELOCITY TRAVERSE DATA

	Point	Position, inches[a]	Reading, Δp inches of H_2O	$\sqrt{\Delta p}$	T_s, °F
A	1		0.03		1707
	2		0.05		
	3		0.08		
	4		0.09		
	5		0.09		
	6		0.09		
B	1		0.03		
	2		0.07		
	3		0.08		
	4		0.08		
	5		0.10		
	6		0.09		
	Total		———		
	Average		———	0.367	

[a] From outside of port to sampling point.

Pitot tube _____
Manometer _____
Thermometer _____

Stack Inside Dimensions _____

Stack Area = _____ ft^2

Barometric Pressure, P_b = _____ inches Hg, stack gauge

Pressure = _____ inches H_2O

Stack Abs. Pressure, P_s = _____ inches H_2O / 13.6 + P_b = _____ inches Hg

Stack Gas Temp., T_s = _____ °F. + 460 = _____ °R

Molecular Weight of Stack Gas, M_s = _____

1. $V_s = 174\ C_p \sqrt{\Delta p T_s} \times \frac{29.92}{P_s} \times \frac{28.96}{M_s}$

   V_s = _____ ft/min

2. Volume = _____ ft/min x _____ ft^2 = _____ ft^3/min

   Standard Volume at 70°F and 29.92 inches Hg:

3. $ft^3/min \times \frac{530}{T_s} \times \frac{P_s}{29.92}$ = _____ x $\frac{530}{\text{_____}}$ x $\frac{\text{_____}}{29.92}$ =

   _____ scfm

Data Recorder TB

Date 10/30/89

Gas velocity and volume data

INTERNATIONAL TECHNOLOGY CORPORATION

RESPONSIVE TO THE NEEDS OF ENVIRONMENTAL MANAGEMENT

JJC 12/1/89

VELOCITY TRAVERSE DATA

Test No. 15-0700

Location Jewell

	Point	Position, inches[a]	Reading, Δp inches of H_2O	$\sqrt{\Delta p}$	T_s, °F
A	1				
	2		.02		1670
	3		.05		
	4		.06		
	5		.06		
	6		.07		
			.06		
B	1				
	2		.025		
	3		.04		
	4		.05		
	5		.05		
	6		.05		
			.06		
	Total				
	Average			0.220	

[a] From outside of port to sampling point.

Pitot tube _____
Manometer _____
Thermometer _____

Stack Inside Dimensions _____

Stack Area = _____ ft^2

Barometric Pressure, P_b = _____ inches Hg, stack gauge Pressure = _____ inches H_2O

Stack Abs. Pressure, P_s = _____ inches H_2O / 13.6 + P_b = _____ inches Hg

Stack Gas Temp., T_s = _____ °F. + 460 = _____ °R

Molecular Weight of Stack Gas, M_s = _____

1. $V_s = 174\ C_p \sqrt{\Delta p T_s} \times \frac{29.92}{P_s} \times \frac{28.96}{M_s}$

   V_s = _____ ft/min

2. Volume = _____ ft/min x _____ ft^2 = _____ ft^3/min

   Standard Volume at 70°F and 29.92 inches Hg:

3. $ft^3/min \times \frac{530}{T_s} \times \frac{P_s}{29.92}$ = _____ x $\frac{530}{29.92}$ x _____ =

   _____ scfm

Data Recorder Jerry Buell

Date 12/13/89

Gas velocity and volume data

CLIENT NIPSCO/Inland SOURCE Rotwin #3-2

RUN NO. MM5-#1
DATE 10/26/89
OPERATORS JB/#
METER BOX NO. 4
SAMPLE BOX NO. —
FILTER NO. # 8721
PROBE HEATER SETTING 700

BAROMETRIC PRESSURE 29.
STATIC PRESSURE -0.05
AMBIENT TEMPERATURE 70
PROBE LENGTH 10' ea
PROBE LINER Stainless Steel
PORT LENGTH 15"
PORT DIAMETER 3"

SCHEMATIC OF STACK

Down for ~20 min to adjust crimp in hose

TRAVERSE POINT NUMBER	SAMPLING TIME CLOCK	SAMPLING TIME SAMPLE	VELOCITY HEAD (Δ Psi)	VELOCITY HEAD (√Δ Psi)	ORIFICE METER (ΔH) in. H2O ACTUAL	ORIFICE METER (ΔH) in. H2O DESIRED	GAS SAMPLE TEMP. AT DRY GAS METER INLET (Tm_in) °F	GAS SAMPLE TEMP. AT DRY GAS METER OUTLET (Tm_out) °F	PUMP VACUUM GAUGE in. Hg	SAMPLE BOX TEMP. °F	TEMP. OF GAS LEAVING LAST IMPINGER °F	GAS SAMPLE VOLUME (Vm), ft.³	STA TEM (Ts),
1	6:40	0	.11		1.5	1.5	97	104	4.0	250	19.916	60	18
2	7:00	10	.18		2.5	2.5	108	105	10.0	255		62	17
3	7:10	20	.22		2.3	3.0	117	104	12.0	260	33.4	65	17
4	7:20	30	.23		2.2	3.2	118	104	12.0	265			

INTERNATIONAL TECHNOLOGY CORPORATION

VJC 12/1/89

RESPONSIVE TO THE NEEDS OF ENVIRONMENTAL MANAGEMENT

Test No. 15-0700

Location Level

VELOCITY TRAVERSE DATA

	Point	Position, inches[a]	Reading, Δp inches of H_2O	$\sqrt{\Delta p}$	T_s, °F
A	1		.02		1670
	2		.05		
	3		.06		
	4		.06		
	5		.07		
	6		.06		
B	1		.025		
	2		.04		
	3		.05		
	4		.05		
	5		.05		
	6		.06		
	Total				
	Average			0.220	

[a] From outside of port to sampling point.

Pitot tube _____
Manometer _____
Thermometer _____

Stack Inside Dimensions _____

Stack Area = _____ ft^2

Barometric Pressure, P_b = _____ inches Hg, stack gauge Pressure = _____ inches H_2O

Stack Abs. Pressure, P_s = _____ inches H_2O / 13.6 + P_b = _____ inches Hg

Stack Gas Temp., T_s = _____ °F. + 460 = _____ °R

Molecular Weight of Stack Gas, M_s = _____

1. $V_s = 174\ C_p \sqrt{\Delta p T_s} \times \frac{29.92}{P_s} \times \frac{28.96}{M_s}$

   V_s = _____ ft/min

2. Volume = _____ ft/min x _____ ft^2 = _____ ft^3/min

   Standard Volume at 70°F and 29.92 inches Hg:

3. $ft^3/min \times \frac{530}{T_s} \times \frac{P_s}{29.92}$ = _____ x $\frac{530}{29.92}$ x _____ =

   _____ scfm

Data Recorder Jerry Bell

Date 10/30/95

Gas velocity and volume data

INTERNATIONAL TECHNOLOGY CORPORATION

12/4/89

RESPONSIVE TO THE NEEDS OF ENVIRONMENTAL MANAGEMENT

Test No. 16-0800

Location Jane M

VELOCITY TRAVERSE DATA

	Point	Position, inches[a]	Reading, Δp inches of H_2O	$\sqrt{\Delta p}$	T_s, °F
A	1		0.03		1666
	2		0.05		
	3		0.07		
	4		0.08		
	5		0.08		
	6		0.07		
	7				
	8				
	9				
	10				
	11				
	12				
B	1		0.03		
	2		0.04		
	3		0.06		
	4		0.07		
	5		0.07		
	6		0.07		
	7				
	8				
	9				
	10				
	11				
	12				
	Total				
	Average			0.242	

[a] From outside of port to sampling point.

Pitot tube _____
Manometer _____
Thermometer _____

Stack Inside Dimensions _____

Stack Area = _____ ft^2

Barometric Pressure, P_b = _____ inches Hg, stack gauge Pressure = _____ inches H_2O

Stack Abs. Pressure, P_s = _____ inches H_2O / 13.6 + P_b = _____ inches Hg

Stack Gas Temp., T_s = _____ °F. + 460 = _____ °R

Molecular Weight of Stack Gas, M_s = _____

1. $V_s = 174\ C_p \sqrt{\Delta p T_s} \times \frac{29.92}{P_s} \times \frac{28.96}{M_s}$

   V_s = _____ ft/min

2. Volume = _____ ft/min x _____ ft^2 = _____ ft^3/min

   Standard Volume at 70°F and 29.92 inches Hg:

3. $ft^3/min \times \frac{530}{T_s} \times \frac{P_s}{29.92}$ = _____ x $\frac{530}{29.92}$ x _____ =

   _____ scfm

Data Recorder VB

Date 10/30/87

Gas velocity and volume data.

INTERNATIONAL TECHNOLOGY CORPORATION

12/1/89

RESPONSIVE TO THE NEEDS OF ENVIRONMENTAL MANAGEMENT

Test No. 18-10:00

Location _____

VELOCITY TRAVERSE DATA

	Point	Position, inches[a]	Reading, Δp inches of H_2O	$\sqrt{\Delta p}$	T_s, °F
A	1		0.03		1640
	2		0.03		
	3		0.04		
	4		0.04		
	5		0.04		
	6		0.05		
B	1		0.03		
	2		0.04		
	3		0.05		
	4		0.03		
	5		0.04		
	6		0.05		
	Total				
	Average			0.201	

[a] From outside of port to sampling point.

Pitot tube _____
Manometer _____
Thermometer _____

Stack Inside Dimensions _____

Stack Area = _____ ft^2

Barometric Pressure, P_b = _____ inches Hg, stack gauge Pressure = _____ inches H_2O

Stack Abs. Pressure, P_s = _____ inches H_2O / 13.6 + P_b = _____ inches Hg

Stack Gas Temp., T_s = _____ °F. + 460 = _____ °R

Molecular Weight of Stack Gas, M_s = _____

1. $V_s = 174\ C_p \sqrt{\Delta p T_s} \times \frac{29.92}{P_s} \times \frac{28.96}{M_s}$

   V_s = _____ ft/min

2. Volume = _____ ft/min x _____ ft^2 = _____ ft^3/min

   Standard Volume at 70°F and 29.92 inches Hg:

3. $ft^3/min \times \frac{530}{T_s} \times \frac{P_s}{29.92}$ = _____ x $\frac{530}{29.92}$ x _____ =

   _____ scfm

Data Recorder ABS

Date 10/31/89

Gas velocity and volume data.

INTERNATIONAL TECHNOLOGY CORPORATION

1SU 12/1/89

RESPONSIVE TO THE NEEDS OF ENVIRONMENTAL MANAGEMENT

Test No. 19-11:00

Location _____

VELOCITY TRAVERSE DATA

	Point	Position, inches[a]	Reading, Δp inches of H_2O	$\sqrt{\Delta p}$	T_s, °F
A	1		0.03		1635
	2		0.04		
	3		0.04		
	4		0.04		
	5		0.04		
	6		0.03		
B	1		0.03		
	2		0.03		
	3		0.03		
	4		0.03		
	5		0.04		
	4		0.04		
	Total				
	Average			0.184	

[a] From outside of port to sampling point.

Pitot tube _____
Manometer _____
Thermometer _____

Stack Inside Dimensions _____

Stack Area = _____ ft^2

Barometric Pressure, P_b = _____ inches Hg, stack gauge

Pressure = _____ inches H_2O

Stack Abs. Pressure, P_s = _____ inches H_2O + P_b = _____ inches Hg

T3.6

Stack Gas Temp., T_s = _____ °F. + 460 = _____ °R

Molecular Weight of Stack Gas, M_s = _____

1. $V_s = 174\ C_p \sqrt{\Delta p T_s} \times \frac{29.92}{P_s} \times \frac{28.96}{M_s}$

   V_s = _____ ft/min

2. Volume = _____ ft/min x _____ ft^2 = _____ ft^3/min

   Standard Volume at 70°F and 29.92 inches Hg:

3. $ft^3/min \times \frac{530}{T_s} \times \frac{P_s}{29.92}$ = _____ x $\frac{530}{29.92}$ x _____ =

   _____ scfm

Data Recorder MBS

Date 12/30/89

Gas velocity and volume data

INTERNATIONAL TECHNOLOGY CORPORATION

RESPONSIVE TO THE NEEDS OF ENVIRONMENTAL MANAGEMENT

Test No. 20/12:00

Location _____

VELOCITY TRAVERSE DATA

Point	Position, inches[a]	Reading, Δp inches of H_2O	$\sqrt{\Delta p}$	T_s, °F
1		0.03		1420
2		0.04		
3		0.05		
4		0.05		
5		0.05		
6		0.04		
1		0.03		
2		0.04		
3		0.04		
4		0.04		
5		0.04		
6		0.04		
Total				
Average			0.201	

A

B

[a] From outside of port to sampling point.

Pitot tube _____
Manometer _____
Thermometer _____

Stack Inside Dimensions _____

Stack Area = _____ ft^2

Barometric Pressure, P_b = _____ inches Hg, stack gauge

Pressure = _____ inches H_2O

Stack Abs. Pressure, P_s = _____ inches H_2O / 13.6 + P_b = _____ inches Hg

Stack Gas Temp., T_s = _____ °F. + 460 = _____ °R

Molecular Weight of Stack Gas, M_s = _____

1. $V_s = 174\ C_p \sqrt{\Delta p T_s} \times \frac{29.92}{P_s} \times \frac{28.96}{M_s}$

   V_s = _____ ft/min

2. Volume = _____ ft/min x _____ ft^2 = _____ ft^3/min

   Standard Volume at 70°F and 29.92 inches Hg:

3. $ft^3/min \times \frac{530}{T_s} \times \frac{P_s}{29.92}$ = _____ x $\frac{530}{29.92}$ x _____ =

   _____ scfm

Data Recorder MBS

Date 10/30/89

Gas velocity and volume data

INTERNATIONAL TECHNOLOGY CORPORATION

ITC 12/1/89

RESPONSIVE TO THE NEEDS OF ENVIRONMENTAL MANAGEMENT

Test No. 21/1500pm

Location _____

VELOCITY TRAVERSE DATA

	Point	Position, inches[a]	Reading, Δp inches of H_2O	$\sqrt{\Delta p}$	T_s, °F
A	1		0.02		1580
	2		0.03		
	3		0.03		
	4		0.03		
	5		0.04		
	6		0.03		
B	1		0.03		
	2		0.04		
	3		0.04		
	4		0.03		
	5		0.04		
	6		0.04		
	Total				
	Average			0.182	

[a] From outside of port to sampling point.

Pitot tube _____
Manometer _____
Thermometer _____

Stack Inside Dimensions _____

Stack Area = _____ ft^2

Barometric Pressure, P_b = _____ inches Hg, stack gauge Pressure = _____ inches H_2O

Stack Abs. Pressure, P_s = _____ inches H_2O / 13.6 + P_b = _____ inches Hg

Stack Gas Temp., T_s = _____ °F. + 460 = _____ °R

Molecular Weight of Stack Gas, M_s = _____

1. $V_s = 174\ C_p \sqrt{\Delta p T_s} \times \frac{29.92}{P_s} \times \frac{28.96}{M_s}$

   V_s = _____ ft/min

2. Volume = _____ ft/min x _____ ft^2 = _____ ft^3/min

   Standard Volume at 70°F and 29.92 inches Hg:

3. $ft^3/min \times \frac{530}{T_s} \times \frac{P_s}{29.92}$ = _____ x $\frac{530}{29.92}$ x _____ =

   _____ scfm

Data Recorder MBS

Date 10/30/89

Gas velocity and volume data

INTERNATIONAL TECHNOLOGY CORPORATION

JK 12/1/89

RESPONSIVE TO THE NEEDS OF ENVIRONMENTAL MANAGEMENT

Test No. 22/2:00p

Location _____

VELOCITY TRAVERSE DATA

	Point	Position, inches[a]	Reading, Δp inches of H_2O	$\sqrt{\Delta p}$	T_s, °F
	1	0.02			1540
	2	6.04			
A	3	0.05			
	4	0.04			
	5	0.05			
	6	0.03			
	1	0.03			
	2	0.04			
	3	0.05			
B	4	0.05			
	5	0.04			
	6	0.04			
	Total				
	Average			0.203	

[a] From outside of port to sampling point.

Pitot tube _____
Manometer _____
Thermometer _____

Stack Inside Dimensions _____

Stack Area = _____ ft^2

Barometric Pressure, P_b = _____ inches Hg, stack gauge Pressure = _____ inches H_2O

Stack Abs. Pressure, P_s = _____ inches H_2O / 13.6 + P_b = _____ inches Hg

Stack Gas Temp., T_s = _____ °F. + 460 = _____ °R

Molecular Weight of Stack Gas, M_s = _____

1. $V_s = 174\ C_p \sqrt{\Delta p T_s} \times \frac{29.92}{P_s} \times \frac{28.96}{M_s}$

   V_s = _____ ft/min

2. Volume = _____ ft/min x _____ ft^2 = _____ ft^3/min

   Standard Volume at 70°F and 29.92 inches Hg:

3. $ft^3/min \times \frac{530}{T_s} \times \frac{P_s}{29.92}$ = _____ x $\frac{530}{29.92}$ x _____ =

   _____ scfm

Data Recorder MBS

Date 10/31/89

Gas velocity and volume data.

CLIENT [redacted] SOURCE Jewell Battery 3-13

RUN NO. M5-#2
DATE 10/27/89
OPERATORS D. Davis
METER BOX NO. 2
SAMPLE BOX NO. —
METER NO. 9730
PROBE HEATER SETTING 202

BAROMETRIC PRESSURE 29.43
STATIC PRESSURE -0.05
AMBIENT TEMPERATURE 80
PROBE LENGTH 10' 6"
PROBE LINER Stainless
PORT LENGTH 15"
PORT DIAMETER 3"

SCHEMATIC OF STACK

TRAVERSE POINT NUMBER	SAMPLING TIME CLOCK	SAMPLING TIME SAMPLE	VELOCITY HEAD (ΔPs)	VELOCITY HEAD (√ΔPs)	ORIFICE METER (ΔH) in. H2O ACTUAL	ORIFICE METER (ΔH) in. H2O DESIRED	GAS SAMPLE TEMP. AT DRY GAS METER INLET (Tm_in) °F	GAS SAMPLE TEMP. AT DRY GAS METER OUTLET (Tm_out) °F	PUMP VACUUM GAUGE in. Hg	SAMPLE BOX TEMP. °F	TEMP. OF GAS LEAVING LAST IMPINGER °F	GAS SAMPLE VOLUME (Vm), ft³	STACK TEMP. (Ts) °F
1	12:38	0	0.02		0.36	0.36	101	98	0+2	334	057.635	62	1445
2		7	0.03		0.54	0.54	106	100	2	255	60.061	58	1499
3		14	0.03		0.54	0.54	114	103	2	324	63.231	55	1514
4		21	0.04		0.71	0.71	119	107	3	262	66.101	58	1509
5		28	0.05		0.89	0.89	124	109	3	234	69.530	60	1510
6		35	0.05		0.89	0.89	129	113	3	254	73.438	60	1505
7		42	0.05		0.89	0.89	131	116	3	275	77.342	61	1510
8		49	0.05		0.89	0.89	134	118	3	229	81.386	62	1499
9		56	0.04		0.71	0.71	135	121	2	258	85.242	61	1491
10		63	0.04		0.71	0.71	136	123	2	268	81.787	60	1492
11		70	0.04		0.71	0.71	135	124	2	219	92.403	61	1459
12		77	0.03		0.54	0.54	133	123	1	240	95.465	66	1442
	2405	84									99.121		
	1402												
TOTAL											41.486		
AVERAGE													

STATIC PITOT LEAK-CHECK @ 15 sec. OK
IMPACT PITOT LEAK-CHECK @ 15 sec. OK
TRAIN LEAK RATE @ 60 sec: .01 cf @ 15 in.
TRAIN LEAK RATE @ 60 sec: 0 cf @ 3 in.

STACK GAS ANALYSIS

TIME	CO2	O2	CO	N2

NOZZLE CALIBRATION I.D. NO. _____

PRETEST		POST-TEST	
DIA. 1	0.5	DIA. 1	0.5
DIA. 2	0.5	DIA. 2	0.5
DIA. 3	0.5	DIA. 3	0.5
AVERAGE	0.5	AVERAGE	0.5

INTERNATIONAL TECHNOLOGY CORPORATION

SIGNATURE [signature]
TEST TEAM LEADER

M-5

ITAQS STACK SAMPLING CALCULATIONS
COMPUTER RUN DATE - 1/16/91
RUN BY - SM
PROJECT NAME - JEWELL INLAND
PROJECT NUMBER - 406000.12

SOURCE - BATTERY 3B
ANALYSIS -PARTICULATE
TEST DATE - 10/26-28/89

	TEST 1	TEST 2	TEST 3	AVERAGE
NET TEST TIME (MIN)	60.00	84.00	84.00	
VOL. SAMPLED AT STP FT3	34.7	36.5	50.3	40.5
STACK GAS TEMP (F)	1,800	1,490	1,651	1,647
MOIST. CONTENT (%VOL)	16.8	11.7	13.2	13.9
CO2 (%VOL - DRY BASIS)	9.0	4.4	8.0	7.1
O2 (%VOL - DRY BASIS)	7.2	11.3	8.5	9.0
CO (%VOL-DRY BASIS)	0.0	0.0	0.0	0.0
STACK VEL. (FT/MIN)	2,354	1,301	1,917	1,857
GAS FLOW RATE (ACFM)	118,311	65,394	96,367	93,357
GAS FLOW RATE (DSCFM)	22,575	15,427	20,684	19,562
%ISOKINETIC	95	104	107	102
PART. CON. (GR/DSCF)	0.2116	0.1326	0.0843	0.1428
PART. MASS RATE-LBS/HR	41.0	17.5	14.9	24.5
SO2 CONC. PPM DRY-BASIS	486	425	422	445
SO2 MASS RATE LBS/HR.	109	65	87	87

PARAMETER SHEET

JEWELL INLAND

PARAMETER	TEST 1	TEST 2	TEST 3
H	1.2710	0.6980	1.1520
P	0.3280	0.1960	0.2790
PB	29.2700	29.4300	29.4500
PS	29.2663	29.4263	29.4463
TM	532.9170	578.7500	516.2080
TSR	2,260.4170	1,950.3330	2,110.5000
VM	32.4800	41.4860	50.9630
VMSTO	34.7374	36.4880	50.3448
VLO	148.0000	102.3000	160.9000
VWSTO	7.0152	4.8490	7.6267
BWO	0.1680	0.1173	0.1316
MO	29.7280	29.1480	29.6200
MS	27.7575	27.8403	28.0913
VS	2,353.9790	1,301.1100	1,917.3620
QA	%118,311.0000	65,393.8100	96,366.6100
QSTO	22,575.2600	15,427.2700	20,683.6400
MN	0.4764	0.3136	0.2750
CS	0.2116	0.1326	0.0843

CLIENT NIPSCO/Enland SOURCE Ratio #3-B

RUN NO. MM5-#1
DATE 10/26/89
OPERATORS JB & 4
METER BOX NO. 4
SAMPLE BOX NO. —
FILTER NO. # 8721
PROBE HEATER SETTING 700

BAROMETRIC PRESSURE 29
STATIC PRESSURE -0.05
AMBIENT TEMPERATURE 70
PROBE LENGTH 10' 6"
PROBE LINER Stainless Steel
PORT LENGTH 15"
PORT DIAMETER 3"

SCHEMATIC OF STACK

down for ~20 min to adjust crimp in hose

TRAVERSE POINT NUMBER	SAMPLING TIME CLOCK	SAMPLING TIME SAMPLE	VELOCITY HEAD (ΔP) Psi	VELOCITY HEAD (√ΔP) Psi	ORIFICE METER (ΔH) in. H2O ACTUAL	ORIFICE METER (ΔH) in. H2O DESIRED	GAS SAMPLE TEMP. AT DRY GAS METER INLET (Tm_in) °F	GAS SAMPLE TEMP. AT DRY GAS METER OUTLET (Tm_out) °F	PUMP VACUUM GAUGE in. Hg	SAMPLE BOX TEMP. °F	TEMP. OF GAS LEAVING LAST IMPINGER °F	GAS SAMPLE VOLUME (Vm), ft.³	STA TEM (Ts)
1	6:40	0	.11		1.5	1.5	97	104	4.0	250	19.916	60	18
2	7:00	10	.18		2.5	2.5	108	105	10.0	255		62	17
3	7:10	20	.22		2.3	3.0	117	104	12.0	260	33.4	65	17
4	7:20	30	.23		2.2	3.2	118	104	12.0	255	40.9	65	17
5	7:30	40	.23		2.1	3.2	118	104	12.0	260	48.3	60	17
6	7:40	50	.24		2.1	3.3	118	104	12.2	260	55.5	55	17
7	7:50	60	.23		2.1	3.2	117	103	12.2	255	62.6	53	17
8	8:00	70	.24		2.1	3.3	118	103	12.2	255	70.2	55	17
9	8:10	80	.23		2.1	3.2	116	103	12.2	258	77.4	58	17
10	8:20	90	.18		2.1	2.5	117	103	12.2	250	84.6	60	17
11	8:30	100	.19		2.0	2.6	117	102	12.6	260	92.1	60	17
12	8:40	110	.20		2.0	2.8	114	102	12.6	260	98.9	52	17
	8:50	120									106.327		
TOTAL													
AVERAGE													

STATIC PITOT LEAK-CHECK @ 15 sec.	OK
IMPACT PITOT LEAK-CHECK @ 15 sec.	OK
TRAIN LEAK RATE @ 60 sec:	.01 cf @ 15 in.
TRAIN LEAK RATE @ 60 sec:	0 cf @ 13 in.

STACK GAS ANALYSIS

TIME	CO2	O2	CO	N2

NOZZLE CALIBRATION I.D. NO. —

PRETEST		POST-TEST	
DIA. 1	0.5	DIA. 1	0.5
DIA. 2	0.5	DIA. 2	0.5
DIA. 3	0.5	DIA. 3	0.5
AVERAGE	0.5	AVERAGE	0.5

INTERNATIONAL TECHNOLOGY CORPORATION

SIGNATURE

TEST TEAM LEADER

CLIENT NERCO/Inland SOURCE Jewell Battery 3-B

RUN NO. MM5-#2
DATE 10/27/89
OPERATORS TB/GE
METER BOX NO. 4
SAMPLE BOX NO. —
FILTER NO. 9728
PROBE HEATER SETTING 270

BAROMETRIC PRESSURE 29.21
STATIC PRESSURE -0.05
AMBIENT TEMPERATURE 80
PROBE LENGTH 10' 2A
PROBE LINER S.S.
PORT LENGTH 15"
PORT DIAMETER 3"

SCHEMATIC OF STACK (12 min.)

TRAVERSE POINT NUMBER	SAMPLING TIME CLOCK	SAMPLING TIME SAMPLE	VELOCITY HEAD (ΔPs)	VELOCITY HEAD (√ΔPs)	ORIFICE METER (ΔH) in. H2O ACTUAL	ORIFICE METER (ΔH) in. H2O DESIRED	GAS SAMPLE TEMP. AT DRY GAS METER INLET (Tm) °F	GAS SAMPLE TEMP. AT DRY GAS METER OUTLET (Tm) °F	PUMP VACUUM GAUGE in. Hg	SAMPLE BOX TEMP. °F	TEMP. OF GAS LEAVING LAST IMPINGER °F	GAS SAMPLE VOLUME (Vm) ft.3	STACK TEMP (Ts) °F
1	12:45	0.0	0.02		0.4	0.4	98	98	1.0	250	107.223	60	146
2	1:00	15	0.03		0.6	0.6	96	101	2.0	255	112.3	60	14
3	1:15	30	0.03		0.6	0.6	112	107	2.0	255	118.25	58	15
4	1:30	45	0.04		0.8	0.8	116	108	3.0	250	124.2	58	15
5	1:45	60	0.05		1.0	1.0	120	111	5.0	255	131.1	57	15
6	2:00	75	0.05		1.0	1.0	120	112	5.0	250	138.8	55	15
7	2:15	90	0.05		1.0	1.0	115	109	5.0	250	147	55	15
8	2:30	105	0.04		0.8	0.8	118	109	4.2	255	154.4	56	14
9	2:45	120	0.04		0.8	0.8	120	112	5.0	255	161.3	55	14
10	3:00	135	0.03		0.6	0.6	122	114	4.0	250	168.5	57	14
11	3:15	150	0.03		0.6	0.6	120	112	3.0	250	174.9	58	14
12	3:30	165	0.03		0.6	0.6	120	116	3.0	250	181.1	60	14
	3:45	180									187.171		
TOTAL													
AVERAGE													

STATIC PITOT LEAK-CHECK @ 15 sec.	OK
IMPACT PITOT LEAK-CHECK @ 15 sec.	OK
TRAIN LEAK RATE @ 60 sec:	0.0 cfm @ 13 in.
TRAIN LEAK RATE @ 60 sec:	0 cfm @ 3 in.

STACK GAS ANALYSIS

TIME	CO2	O2	CO	N2

NOZZLE CALIBRATION I.D. NO. —

PRETEST		POST-TEST	
DIA. 1	0.5	DIA. 1	0.5
DIA. 2	0.5	DIA. 2	0.5
DIA. 3	0.5	DIA. 3	0.5
AVERAGE	0.5	AVERAGE	0.5

INTERNATIONAL TECHNOLOGY CORPORATION

SIGNATURE [signature] TEST TEAM LEADER

CLIENT NIPSCO / Inland SOURCE Battery #3 - B

RUN NO. MM5 #3
DATE 10/28/89
OPERATORS VB & GF
METER BOX NO. 4
SAMPLE BOX NO. —
FILTER NO. —
PROBE HEATER SETTING 270

BAROMETRIC PRESSURE 29.45
STATIC PRESSURE -0.05
AMBIENT TEMPERATURE 60
PROBE LENGTH 10' eff
PROBE LINER S.S.
PORT LENGTH 15"
PORT DIAMETER 3"

SCHEMATIC OF STACK

TRAVERSE POINT NUMBER	SAMPLING TIME CLOCK	SAMPLING TIME SAMPLE	VELOCITY HEAD (Δ Ps)	VELOCITY HEAD (√Δ Ps)	ORIFICE METER (ΔH) in. H2O ACTUAL	ORIFICE METER (ΔH) in. H2O DESIRED	GAS SAMPLE TEMP. AT DRY GAS METER INLET (Tm in °F)	GAS SAMPLE TEMP. AT DRY GAS METER OUTLET (Tm out °F)	PUMP VACUUM GAUGE in. Hg	SAMPLE BOX TEMP. °F	TEMP. OF GAS LEAVING LAST IMPINGER °F	GAS SAMPLE VOLUME (Vm) ft³	ST TE FT.
1	6:20	0	0.06		1.0	1.0	60	59	1.0	260	187.950	60	16
2	6:35	15	0.06		1.0	1.0	74	64	2.0	260	195.45	60	16
3	6:50	30	0.08		1.3	1.3	80	69	4.0	255	203.3	54	16
4	7:05	45	0.07		1.15	1.15	86	74	3.5	260	211.7	50	16
5	7:20	60	0.07		1.15	1.15	86	76	3.5	260	219.7	48	17
6	7:35	75	0.08		1.3	1.3	87	78	4.0	260	227.8	48	17
7	7:50	90	0.08		1.3	1.3	87	78	4.0	260	236.5	47	17
8	8:05	105	0.07		1.15	1.15	87	78	3.5	260	245.5	45	17
9	8:20	120	0.06		1.0	1.0	87	78	2.5	260	253.5	46	17
10	8:35	135	0.05		.82	.82	85	78	2.0	260	260.8	47	17
11	8:50	150	0.04		.66	.66	84	78	2.0	260	267.5	47	17
12	9:05	165	0.03		.5	.5	84	78	2.0	260	273.9	47	17
	9:20	180									279.952		
TOTAL													
AVERAGE													

STATIC PITOT LEAK-CHECK @ 15 sec.	OK
IMPACT PITOT LEAK-CHECK @ 15 sec.	OK
TRAIN LEAK RATE @ 60 sec:	0 cf @ 15 in.
TRAIN LEAK RATE @ 60 sec:	0 cf @ 5 in.

STACK GAS ANALYSIS

TIME	CO_2	O_2	CO	N_2

NOZZLE CALIBRATION I.D. NO. —

PRETEST		POST-TEST	
DIA. 1	0.5	DIA. 1	0.5
DIA. 2	0.5	DIA. 2	0.5
DIA. 3	0.5	DIA. 3	0.5
AVERAGE	0.5	AVERAGE	0.5

INTERNATIONAL TECHNOLOGY CORPORATION

552
5 | 9 9 6 8 | 993
4 5 4 4

SIGNATURE

TEST TEAM LEADER

111/12

ITAQS STACK SAMPLING CALCULATIONS
COMPUTER RUN DATE - 11/22/89
RUN BY - SM
PROJECT NAME - JEWELL INLAND - BATTERY 3B
PROJECT NUMBER - 406000.12

SOURCE - BATTERY 3B
ANALYSIS -MM #5
TEST DATE - 10/26-28/89

	TEST 1	TEST 2	TEST 3	AVERAGE
NET TEST TIME (MIN)	120.00	180.00	180.00	
VOL. SAMPLED AT STP FT3	83.8	75.5	91.9	83.
STACK GAS TEMP (F)	1,735	1,490	1,693	1,639
MOIST. CONTENT (%VOL)	19.2	11.7	14.4	15.
CO2 (%VOL - DRY BASIS)	9.0	4.4	8.0	7.
O2 (%VOL - DRY BASIS)	7.2	11.3	8.5	9.
CO (%VOL-DRY BASIS)	0.0	0.0	0.0	0.
STACK VEL. (FT/MIN)	2,304	1,261	1,726	1,764
GAS FLOW RATE (ACFM)	115,788	63,391	86,743	88,641
GAS FLOW RATE (DSCFM)	22,634	14,956	17,983	18,524
%ISOKINETIC	114	103	105	107
PART. CON. (GR/DSCF)	0.0000	0.0000	0.0000	0.
PART. MASS RATE-LBS/HR	0.0	0.0	0.0	0.

PARAMETER SHEET

JEWELL INLAND - BATTERY 3B

PARAMETER	TEST 1	TEST 2	TES
H	2.0920	0.7330	1.0
P	0.3280	0.1900	0.2
PB	29.9700	29.4300	29.4
PS	29.9663	29.4263	29.4
TM	569.0000	571.9170	538.2
TSR	2,194.5000	1,950.3330	2,152.7
VM	86.4110	79.9480	91.5
VMSTD	83.7554	75.4580	91.9
VLO	419.5000	211.4000	327.2
VWSTD	19.8843	10.0204	15.5
BWO	0.1919	0.1172	0.1
MD	29.7280	29.1480	29.6
MS	27.4779	27.8412	27.9
VS	2,303.7850	1,261.2610	1,725.8
QA	%115,788.2000	63,390.9700	86,742
QSTD	22,634.1000	14,956.0900	17,982.9
MN	0.0000	0.0000	0.0
CS	0.0000	0.0000	0.0

COMPUTER RUN DATE -11/15/89
RUN BY -SM
PROJECT NAME -JEWELL INLAND-BATTERY 3B
PROJECT NUMBER -406000.12
FIELD DATA TEST 1

TRAVERSE POINTS	VELOCITY HEAD (IN. W.C.)	ORIFICE METER (IN. W.C.)	GAS SAMPLE TEMP (DEG. F)		STACK TEMP (DEG. F)
1	0.13	1.55	68	68	%1800
2	0.12	1.45	70	68	%1815
3	0.10	1.20	74	68	%1810
4	0.12	1.45	72	68	%1800
5	0.11	1.32	76	68	%1790
6	0.11	1.32	80	70	%1800
7	0.12	1.45	80	70	%1795
8	0.11	1.23	80	70	%1800
9	0.08	0.90	80	70	%1805
10	0.10	1.13	80	70	%1810
11	0.11	1.25	80	70	%1800
12	0.09	1.00	80	70	%1780
TOTAL *	3.942	15.250	1750.000		21605.000
AVERAGE	0.328	1.271	72.917		1800.417

NET GAS SAMPLE VOLUME IS ~~40.23999~~ 32.48 (FT.CUBED).
* AVERAGE OF VELOCITY HEAD SQUARE ROOTS.

COMPUTER RUN DATE -11/22/89
RUN BY -SM
PROJECT NAME -JEWELL INLAND-BATTERY 3B
PROJECT NUMBER =406000.12
FIELD DATA TEST 2

TRAVERSE POINTS	VELOCITY HEAD (IN. W.C.)	ORIFICE METER (IN. W.C.)	GAS SAMPLE TEMP (DEG. F)		STACK TEMP (DEG. F)
1	0.02	0.36	101	98	%1465
2	0.03	0.54	106	100	%1499
3	0.03	0.54	114	103	%1514
4	0.04	0.71	119	105	%1508
5	0.05	0.89	124	109	%1510
6	0.05	0.89	129	113	%1505
7	0.05	0.89	131	116	%1510
8	0.05	0.89	134	118	%1499
9	0.04	0.71	135	121	%1491
10	0.04	0.71	136	123	%1482
11	0.04	0.71	135	124	%1459
12	0.03	0.54	133	123	%1442
TOTAL	* 2.355	8.380	2850.000		17884.000
AVERAGE	0.196	0.698	118.750		1490.333

NET GAS SAMPLE VOLUME IS 41.48601 (FT.CUBED).
* AVERAGE OF VELOCITY HEAD SQUARE ROOTS.

COMPUTER RUN DATE -11/15/89
RUN BY -SM
PROJECT NAME -JEWELL INLAND-3B
PROJECT NUMBER -406000.12
FIELD DATA TEST 3

TRAVERSE POINTS	VELOCITY HEAD (IN. W.C.)	ORIFICE METER (IN. W.C.)	GAS SAMPLE TEMP (DEG. F)		STACK TEMP (DEG. F)
1	0.02	0.29	54	48	%1653
2	0.07	1.00	52	49	%1653
3	0.08	1.15	53	50	%1655
4	0.10	1.40	60	52	%1648
5	0.11	1.60	60	54	%1645
6	0.11	1.60	60	55	%1648
7	0.09	1.26	61	56	%1650
8	0.09	1.26	60	56	%1651
9	0.10	1.40	62	56	%1652
10	0.08	1.15	61	56	%1650
11	0.08	1.15	62	56	%1651
12	0.04	0.57	61	55	%1650
TOTAL *	3.350	13.825	1349.000		19806.000
AVERAGE	0.279	1.152	56.208		1650.500

NET GAS SAMPLE VOLUME IS 50.963 (FT.CUBED).
* AVERAGE OF VELOCITY HEAD SQUARE ROOTS.

INTERNATIONAL TECHNOLOGY CORPORATION

SOURCE SAMPLING EPA PARTICULATE TEST LAB DATA SHEET

COMPANY Jewell / Inland ... DATE 10-26-89

SOURCE Battery 3-B BOX NO. M5 - 1 RUN NO. 1

CONDENSATION

IMPINGER NO.	INITIAL VOL.,ml/g	FINAL VOL., ml/g	NET GAIN, ml/g
1	503.4	599.3	95.9
2	620.3	640.6	20.3
3	582.3	591.8	9.5
4	71.2	93.5	22.3
5			
6			
TOTAL	2437.2	2585.2	148.0

PARTICULATE

COMPONENT I.D. NO.	INITIAL WT.,g	FINAL WT. ,g	NET WT., g
PROBE WASH	25.2071	25.6027	0.3956
ACETONE BLANK	25.8192	25.8192	0.0
PROBE WASH (Blank)			
#1 Filter 8719	0.3432	0.4237	0.0805
#2 Filter			
IMPINGERS	2437.2	2585.2	148.0

PARTICULATE COLLECTED (excluding impinger catch) =	0.4764 ,g
PARTICULATE COLLECTED (including impinger catch) =	148.476 ,g

COMMENTS:

SIGNATURE OF PERSON RESPONSIBLE [signature] DATE 10-31-89

INTERNATIONAL TECHNOLOGY CORPORATION

SOURCE SAMPLING EPA PARTICULATE TEST LAB DATA SHEET

COMPANY Jewell / Inland / NIPSCO DATE 12-22-89

SOURCE Gallery #3-B BOX NO. 115-3 RUN NO. 3

CONDENSATION

IMPINGER NO.	INITIAL VOL.,ml/g	FINAL VOL., ml/g	NET GAIN, ml/g
1	538.1	663.2	125.1
2	608.0	622.3	14.3
3	574.4	581.8	7.4
4	~~699.5~~ 699.5	713.6	14.1
5			
6			
TOTAL	2425.0	2585.9	160.9

PARTICULATE

COMPONENT I.D. NO.	INITIAL WT.,g	FINAL WT. ,g	NET WT., g
PROBE WASH	25.5924	25.8035	0.2111
ACETONE BLANK	25.8192	25.8192	0.0
PROBE WASH (Blank)			
#1 Filter 5732	0.3447	0.4086	0.0639
#2 Filter			
IMPINGERS	2425.0	2585.9	160.9

PARTICULATE COLLECTED (excluding impinger catch) =	0.275 ,g
PARTICULATE COLLECTED (including impinger catch) =	161.175 ,g

COMMENTS:

SIGNATURE OF PERSON RESPONSIBLE Tammy J. Moore DATE 12-31-89

JEWELL INLAND - CALCULATIONS-TEST 3

A-5

VOLUME OF WATER COLLECTED

VWSTD = (VLO)(0.0474)
VWSTD = 160.9 * .0474
VWSTD = 7.62666

VOLUME OF GAS METERED, STANDARD CONDITIONS

VMSTD = ((17.71)(VM)(PB + H / 13.6)(Y)) / TM
VMSTD = (17.71 * 50.963 * (29.45 + 1.152 / 13.6) * .97493) / 516.208
VMSTD = 50.34483

MOISTURE CONTENT

BWO = VWSTD / (VMSTD + VWSTD)
BWO = 7.62666 / 50.34483 + 7.62666
BWO = .1315588

MOLECULAR WEIGHT OF DRY GAS STREAM

MD = (0.44)(%CO2) + (.32)(%O2) + (0.28)(%CO + %N2)
MD = .44 * 8 + .32 * 8.5 + .28 *(0 + 83.5)
MD = 29.62

MOLECULAR WEIGHT OF STACK GAS

MS = MD(1 - BWO) + 18(BWO)
MS = 29.62 *(1 - .1315588) + 18 * .1315588
MS = 28.09129

VELOCITY OF STACK GAS

VS = 174 * CP * P * SQR (TS * (29.92 / PS) * (28.96 / MS))
VS = 174 * .84 * .279 *SQR(2110.5 *(29.92 / 29.44632)*(28.96 / 28.09129
))
VS = 1917.362

TOTAL FLOW OF STACK GAS

QA = AS * VS
QA = 50.26 * 1917.362
QA = 96366.61
QS = QA * (530 / TSR) * (PS / 29.92)
QS = 96366.61 * (530 / 2110.5)*(29.44632 / 29.92)
QS = 23816.98
QSTD = QS(1 - BWO)
QSTD = 23816.98 (1 - .1315588)
QSTD = 20683.64

%IS	1.1366	1.0332	1.046
AS	50.2600	50.2600	50.260
CP	0.8400	0.8400	0.840
E	120.0000	180.0000	180.000
Y	1.0338	1.0338	1.033
AN	0.001364	0.001364	0.001
%CO2	9.0000	4.3500	8.000
%O2	7.2000	11.3000	9.500
PMR	0.0000	0.0000	0.000

NOMECLATURE

A[illegible] - CROSS SECTIONAL AREA OF NOZZLE, SQ. FT.
A[illegible] - CROSS SECTIONAL AREA OF STACK, SQ. FT.
BWO - FRACTION BY VOLUME OF WATER VAPOR IN GAS STREAM.
C[illegible] - PITOT TUBE COEFFICIENT, DIMENSIONLESS.
C[illegible] - CONCENTRATION OF PARTICULATE MATTER IN STACK GAS, GR./DSCF.
D[illegible] - AVERAGE SQ. ROOT VELOCITY HEAD OF STACK GAS, INCHES H2O.
I[illegible] - PERCENT OF ISOKINETIC SAMPLING .
M[illegible] - DRY MOLECULAR WEIGHT OF STACK GAS, LB/LB. MOLE.
MN - TOTAL AMOUNT OF PARTICULATE MATTER COLLECTED, G.
M[illegible] - MOLECULAR WEIGHT OF STACK GAS (WET BASIS), LB/LB. MOLE.
P[illegible] - BAROMETRIC PRESSURE, INCHES HG.
PS - ABSOLUTE STACK GAS PRESSURE, INCHES HG.
PMR - PARTICULATE MASS RATE, LBS/HR.
Q[illegible] - VOLUMETRIC FLOW RATE, ACTUAL CONDITIONS FT3/MIN.
QSTD - VOLUMETRIC FLOW RATE AT STANDARD CONDITIONS, (DRY BASIS) FT3/MIN.
TM - AVERAGE DRY GAS METER TEMPERATURE, *R.
TR - AVERAGE STACK TEMPERAATURE, *R.
T[illegible] - TOTAL SAMPLING TIME, MIN.
VLC - TOTAL VOLUME OF LIQUID COLLECTED IN IMPINGERS AND SILICA GEL. ML.
V[illegible] - VOLUME OF GAS SAMPLE THROUGH THE DRY GAS METER (METER CONDITIONS). CUBI
VMSTD - VOLUME OF GAS SAMPLE THROUGH THE DRY GAS METER AT STANDARD CONDITONS
VWSTD) - VOLUME OF WATER COLLECTED AT 29.92 IN. HG. AND 70* F CUBIC FT.
VS - STACK GAS VELOCITY, ACTUAL FT. PER MINUTE.
Y[illegible] - DRY METER GAS CALIBRATION FACTOR.

M#5

STACK SAMPLING CALCULATIONS INPUT DATA

1. Project Name Jewell Inland
2. Source Battery 3B
3. Computer Run Date 11/15/89
4. Operators Name SM
5. Date Test was Run 10/26-28/89
6. Project Number 406000.12
7. Analysis Type Particulates
8. Test Number #1
9. Volume of Liquid Collected (ml). 148.0
10. Volume of Meter (ft. cubed) ~~40.299~~ 32.48
11. Barometric Pressure 29.27
12. Aver. Delta H (in. water - orifice meter) 1.271
13. Meter Calibration Factor 1.096013
14. Temp. of Meter, (degrees f)(Gas Sample Temp) 72.917
15. % CO2 9%
16. % O2 7.2%
17. % CO Ø
18. Pitot Calibration Factor 0.84
19. Average (SQR) Delta P (Velocity Head) 0.328
20. Temp. of Stack, (Degrees F) 1800.417
21. Gage Stack Pressure (in. water) -0.05
22. Stack Area (Sq. Ft.) 50.26
23. Particulate Collected (Grams) 0.4764
24. Nozzle Diameter (Inches) 0.5
25. Sampling Time (Min.) 60

Stack Sampling Calculations Input Data

(page 2)

26. Output File Name (no more than 8 char.)_____

**********SO2 Calculations**********

27. Normality of Titrant 0.012

28. Total Vol. of Solution (ML) 500

29 Vol. of Aliquot (ML) 5

30. Titrant Vol. (ML) 32.9

31. Titrant Blank (ML) 0

**********Heat Input**********

32. Heat F-Factor (DSCF/MMBTU) _____

33. Heat FC-Factor (SCFCO2/MMBTU) _____

STACK SAMPLING CALCULATIONS INPUT DATA

1. Project Name _____
2. Source _____
3. Computer Run Date _____
4. Operators Name _____
5. Date Test was Run _____
6. Project Number _____
7. Analysis Type _____
8. Test Number #2
9. Volume of Liquid Collected (ml). ~~785.3~~ 0
10. Volume of Meter (ft. cubed) ~~50.963~~ 41.486
11. Barometric Pressure 29.43
12. Aver. Delta H (in. water - orifice meter) 0.698
13. Meter Calibration Factor 0.97493
14. Temp. of Meter, (degrees f)(Gas Sample Temp) 118.250
15. % CO2 4.35%
16. % O2 11.3%
17. % CO Ø
18. Pitot Calibration Factor 0.84
19. Average (SQR) Delta P (Velocity Head) 0.196
20. Temp. of Stack, (Degrees F) ~~1650.500~~ 1490.333
21. Gage Stack Pressure (in. water) -0.05
22. Stack Area (Sq. Ft.) 50.26
23. Particulate Collected (Grams) Ø.3136
24. Nozzle Diameter (Inches) 0.5
25. Sampling Time (Min.) 84

STACK SAMPLING CALCULATIONS INPUT DATA

1. Project Name _____
2. Source _____
3. Computer Run Date _____
4. Operators Name _____
5. Date Test was Run _____
6. Project Number _____
7. Analysis Type _____
8. Test Number #3
9. Volume of Liquid Collected (ml). 160.9
10. Volume of Meter (ft. cubed) 50.963
11. Barometric Pressure 29.45
12. Aver. Delta H (in. water - orifice meter) 1.152
13. Meter Calibration Factor 0.97493
14. Temp. of Meter, (degrees f)(Gas Sample Temp) 56.208
15. % CO2 8%
16. % O2 8.5%
17. % CO Ø
18. Pitot Calibration Factor 0.84
19. Average (SQR) Delta P (Velocity Head) 0.279
20. Temp. of Stack, (Degrees F) 1650.500
21. Gage Stack Pressure (in. water) -0.05
22. Stack Area (Sq. Ft.) 50.26
23. Particulate Collected (Grams) 0.2750
24. Nozzle Diameter (Inches) 0.5
25. Sampling Time (Min.) 84

Stack Sampling Calculations Input Data

(page 2)

26. Output File Name (no more than 8 char.) _____

**********SO2 Calculations**********

27. Normality of Titrant 0.012

28. Total Vol. of Solution (ML) 500

29 Vol. of Aliquot (ML) 5

30. Titrant Vol. (ML) 41.4

31. Titrant Blank (ML) Ø

**********Heat Input**********

32. Heat F-Factor (DSCF/MMBTU) _____

33. Heat FC-Factor (SCFCO2/MMBTU) _____

JEWELL INLAND - BATTERY 3B - CALCULATIONS-TEST 3

VOLUME OF WATER COLLECTED

VWSTD = (VLO)(0.0474)
VWSTD = 327.2 * .0474
VWSTD = 15.50928

VOLUME OF GAS METERED, STANDARD CONDITIONS

VMSTD = ((17.71)(VM)(PB + H / 13.6)(Y)) / TM
VMSTD = (17.71 * 91.502 * (29.45 + 1.027 / 13.6) * 1.033778) / 538.208
VMSTD = 91.90172

MOISTURE CONTENT

BWO = VWSTD / (VMSTD + VWSTD)
BWO = 15.50928 / 91.90172 + 15.50928
BWO = .1443919

MOLECULAR WEIGHT OF DRY GAS STREAM

MD = (0.44)(%CO2) + (.32)(%O2) + (0.28)(%CO - %N2)
MD = .44 * 8 + .32 * 8.5 + .28 *(0 + 83.5)
MD = 29.62

MOLECULAR WEIGHT OF STACK GAS

MS = MD(1 - BWO) + 18(BWO)
MS = 29.62 *(1 - .1443919) + 18 * .1443919
MS = 27.94217

VELOCITY OF STACK GAS

VS = 174 * CP * P * SQR (TS * (29.92 / PS) * (28.96 / MS))
VS = 174 * .84 * .248 *SQR(2152.75 *(29.92 / 29.44632)*(28.96 / 27.94217
VS = 1725.884

TOTAL FLOW OF STACK GAS

QA = AS * VS
QA = 50.25 * 1725.884
QA = 86742.91
QS = QA * (530 / TSR) * (PS / 29.92)
QS = 86742.91 * (530 / 2152.75)*(29.44632 / 29.92)
QS = 21017.73
QSTD = QS(1 - BWO)
QSTD = 21017.73 (1 - .1443919)
QSTD = 17982.94

PARTICULATE CONCENTRATION

CS = (15.43)(MN) / VMSTD
CS = (15.43 * 0) / 91.90172
CS = 0

PARTICULATE MASS RATE

PMR = (MN)(QSTD)(60) / (VMSTD)(453.6)
PMR = (0 * 17982.94 * 60) / (91.90172 * 453.6)
PMR = 0

PERCENT ISOKINETIC OF TEST

IS = VMSTD / (AN * E * VSSTD)
IS = 91.90172 / (1.363542E-03 * 180 * 357.7982)
IS = 1.046513

MM#5

COMPUTER RUN DATE -11/15/89
RUN BY -SM
PROJECT NAME -JEWELL INLAND - BATTERY 3B
PROJECT NUMBER -406000.12
FIELD DATA TEST 1

TRAVERSE POINTS	VELOCITY HEAD (IN. W.C.)	ORIFICE METER (IN. W.C.)	GAS SAMPLE TEMP (DEG. F)		STACK TEMP (DEG. F)
1	0.11	1.50	97	104	%1800
2	0.18	2.50	108	105	%1755
3	0.22	2.30	117	104	%1749
4	0.23	2.20	118	104	%1745
5	0.24	2.10	118	104	%1734
6	0.24	2.10	118	104	%1730
7	0.23	2.10	117	103	%1730
8	0.24	2.10	118	103	%1720
9	0.23	2.10	116	103	%1713
10	0.18	2.10	117	103	%1710
11	0.19	2.00	117	102	%1721
12	0.20	2.00	114	102	%1707
TOTAL *	5.441	25.100	2616.000		20814.000
AVERAGE	0.453	2.092	109.000		1734.500

NET GAS SAMPLE VOLUME IS 86.411 (FT.CUBED).
* AVERAGE OF VELOCITY HEAD SQUARE ROOTS.

mmFS

COMPUTER RUN DATE -11/15/89
RUN BY -SM
PROJECT NAME -JEWELL INLAND - BATTERY 3B
PROJECT NUMBER -406000.12
FIELD DATA TEST 2

TRAVERSE POINTS	VELOCITY HEAD (IN. W.C.)	ORIFICE METER (IN. W.C.)	GAS SAMPLE TEMP (DEG. F)		STACK TEMP (DEG. F)
1	0.02	0.40	98	98	%1465
2	0.03	0.60	96	101	%1499
3	0.03	0.60	112	107	%1514
4	0.04	0.80	116	108	%1508
5	0.05	1.00	120	111	%1510
6	0.05	1.00	120	112	%1505
7	0.05	1.00	115	109	%1510
8	0.04	0.80	118	109	%1499
9	0.04	0.80	120	112	%1491
10	0.03	0.60	122	114	%1482
11	0.03	0.60	120	112	%1459
12	0.03	0.60	120	116	%1442
TOTAL *	2.278	8.800	2686.000		17884.000
AVERAGE	0.190	0.733	111.917		1490.333

NET GAS SAMPLE VOLUME IS 79.94801 (FT.CUBED).
* AVERAGE OF VELOCITY HEAD SQUARE ROOTS.

mm5
meter Box

STACK SAMPLING CALCULATIONS INPUT DATA

1. Project Name Jewell Island
2. Source Battery 3B
3. Computer Run Date 11/15/89
4. Operators Name S.M.
5. Date Test was Run 10/26-28/89
6. Project Number 406000.12
7. Analysis Type MM#5
8. Test Number #1
9. Volume of Liquid Collected (ml). 419.5
10. Volume of Meter (ft. cubed) 86.411
11. Barometric Pressure 29.27
12. Aver. Delta H (in. water - orifice meter) 2.092
13. Meter Calibration Factor 1.033778
14. Temp. of Meter, (degrees f)(Gas Sample Temp) 109.0
15. % CO2 9%
16. % O2 7.2%
17. % CO Ø
18. Pitot Calibration Factor 0.84
19. Average (SQR) Delta P (Velocity Head) 0.453
20. Temp. of Stack, (Degrees F) 1734.50
21. Gage Stack Pressure (in. water) -0.05
22. Stack Area (Sq. Ft.) 50.26
23. Particulate Collected (Grams) —
24. Nozzle Diameter (Inches) 0.50
25. Sampling Time (Min.) 120

run #5
Box 4

STACK SAMPLING CALCULATIONS INPUT DATA

1. Project Name _____
2. Source _____
3. Computer Run Date _____
4. Operators Name _____
5. Date Test was Run _____
6. Project Number _____
7. Analysis Type _____
8. Test Number #2
9. Volume of Liquid Collected (ml). 211.4
10. Volume of Meter (ft. cubed) 79.94801
11. Barometric Pressure 29.43
12. Aver. Delta H (in. water - orifice meter) 0.733
13. Meter Calibration Factor 1.033778
14. Temp. of Meter, (degrees f)(Gas Sample Temp) 111.917
15. % CO2 4.35%
16. % O2 11.3%
17. % CO Ø
18. Pitot Calibration Factor 0.84
19. Average (SQR) Delta P (Velocity Head) 0.190
20. Temp. of Stack, (Degrees F) 1490.333
21. Gage Stack Pressure (in. water) -0.05
22. Stack Area (Sq. Ft.) 50.26
23. Particulate Collected (Grams) —
24. Nozzle Diameter (Inches) 0.500
25. Sampling Time (Min.) 180

MM#5

COMPUTER RUN DATE -11/15/89
RUN BY -SM
PROJECT NAME -JEWELL INLAND - BATTERY 3B
PROJECT NUMBER -406000.12
FIELD DATA TEST 1

TRAVERSE POINTS	VELOCITY HEAD (IN. W.C.)	ORIFICE METER (IN. W.C.)	GAS SAMPLE TEMP (DEG. F)		STACK TEMP (DEG. F)
1	0.11	1.50	97	104	%1800
2	0.18	2.50	108	105	%1755
3	0.22	2.30	117	104	%1749
4	0.23	2.20	118	104	%1745
5	0.24	2.10	118	104	%1734
6	0.24	2.10	118	104	%1730
7	0.23	2.10	117	103	%1730
8	0.24	2.10	118	103	%1720
9	0.23	2.10	116	103	%1713
10	0.18	2.10	117	103	%1710
11	0.19	2.00	117	102	%1721
12	0.20	2.00	114	102	%1707
TOTAL *	5.441	25.100	2616.000		20814.000
AVERAGE	0.453	2.092	109.000		1734.500

NET GAS SAMPLE VOLUME IS 86.411 (FT.CUBED).
* AVERAGE OF VELOCITY HEAD SQUARE ROOTS.

mm #5

COMPUTER RUN DATE -11/15/89
RUN BY -SM
PROJECT NAME -JEWELL INLAND - BATTERY 3B
PROJECT NUMBER -406000.12
FIELD DATA TEST 2

TRAVERSE POINTS	VELOCITY HEAD (IN. W.C.)	ORIFICE METER (IN. W.C.)	GAS SAMPLE TEMP (DEG. F)		STACK TEMP (DEG. F)
1	0.02	0.40	98	98	%1465
2	0.03	0.60	96	101	%1499
3	0.03	0.60	112	107	%1514
4	0.04	0.80	116	108	%1508
5	0.05	1.00	120	111	%1510
6	0.05	1.00	120	112	%1505
7	0.05	1.00	115	109	%1510
8	0.04	0.80	118	109	%1499
9	0.04	0.80	120	112	%1491
10	0.03	0.60	122	114	%1482
11	0.03	0.60	120	112	%1459
12	0.03	0.60	120	116	%1442
TOTAL *	2.278	8.800	2686.000		17884.000
AVERAGE	0.190	0.733	111.917		1490.333

NET GAS SAMPLE VOLUME IS 79.94801 (FT.CUBED).
* AVERAGE OF VELOCITY HEAD SQUARE ROOTS.

mm5
meter Box

STACK SAMPLING CALCULATIONS INPUT DATA

1. Project Name Jessell Island
2. Source Battery 3B
3. Computer Run Date 11/15/89
4. Operators Name S.M.
5. Date Test was Run 10/26-28/89
6. Project Number 406000.12
7. Analysis Type mm#5
8. Test Number #1
9. Volume of Liguid Collected (ml). 419.5
10. Volume of Meter (ft. cubed) 86.411
11. Barometric Pressure 29.27
12. Aver. Delta H (in. water - orifice meter) 2.092
13. Meter Calibration Factor 1.033778
14. Temp. of Meter, (degrees f)(Gas Sample Temp) 109.0
15. % CO2 9%
16. % O2 7.2%
17. % CO Ø
18. Pitot Calibration Factor 0.84
19. Average (SQR) Delta P (Velocity Head) 0.453
20. Temp. of Stack, (Degrees F) 1734.50
21. Gage Stack Pressure (in. water) -0.05
22. Stack Area (Sq. Ft.) 50.26
23. Particulate Collected (Grams) —
24. Nozzle Diameter (Inches) 0.50
25. Sampling Time (Min.) 120

mm #5
Box 4

STACK SAMPLING CALCULATIONS INPUT DATA

1. Project Name _____
2. Source _____
3. Computer Run Date _____
4. Operators Name _____
5. Date Test was Run _____
6. Project Number _____
7. Analysis Type _____
8. Test Number #2
9. Volume of Liguid Collected (ml). 211.4
10. Volume of Meter (ft. cubed) 79.94801
11. Barometric Pressure 29.43
12. Aver. Delta H (in. water - orifice meter) 0.733
13. Meter Calibration Factor 1.033778
14. Temp. of Meter, (degrees f)(Gas Sample Temp) 111.917
15. % CO2 4.35%
16. % O2 11.3%
17. % CO Ø
18. Pitot Calibration Factor 0.84
19. Average (SQR) Delta P (Velocity Head) 0.190
20. Temp. of Stack, (Degrees F) 1490.333
21. Gage Stack Pressure (in. water) -0.05
22. Stack Area (Sq. Ft.) 50.26
23. Particulate Collected (Grams) —
24. Nozzle Diameter (Inches) 0.500
25. Sampling Time (Min.) 180

mm#5
Box #3

STACK SAMPLING CALCULATIONS INPUT DATA

1. Project Name _____
2. Source _____
3. Computer Run Date _____
4. Operators Name _____
5. Date Test was Run _____
6. Project Number _____
7. Analysis Type _____
8. Test Number #3
9. Volume of Liquid Collected (ml). 327.2
10. Volume of Meter (ft. cubed) 91.502
11. Barometric Pressure 29.45
12. Aver. Delta H (in. water - orifice meter) 1.027
13. Meter Calibration Factor 1.033778
14. Temp. of Meter, (degrees f)(Gas Sample Temp) 78.208
15. % CO2 8%
16. % O2 8.5%
17. % CO Ø
18. Pitot Calibration Factor 0.84
19. Average (SQR) Delta P (Velocity Head) 0.248
20. Temp. of Stack, (Degrees F) 1692.750
21. Gage Stack Pressure (in. water) -0.05
22. Stack Area (Sq. Ft.) 50.26
23. Particulate Collected (Grams) —
24. Nozzle Diameter (Inches) 0.500
25. Sampling Time (Min.) 180

INTERNATIONAL TECHNOLOGY CORPORATION

SOURCE SAMPLING EPA PARTICULATE TEST LAB DATA SHEET

COMPANY Jones Island WWTP 40 CFR 503 DATE 10-31-89

SOURCE Boiler #3-R BOX NO. MM5-1 RUN NO. 1

CONDENSATION

IMPINGER NO.	INITIAL VOL.,ml/g	FINAL VOL., ml/g	NET GAIN, ml/g
1	423.5	785.0	361.5
2	579.9	600.3	20.4
3	535.6	543.1	7.5
4	669.1	699.2	30.1
5			
6			
TOTAL	2208.1	2627.6	419.5

PARTICULATE

COMPONENT I.D. NO.	INITIAL WT.,g	FINAL WT. ,g	NET WT., g
PROBE WASH			
ACETONE BLANK			
PROBE WASH (Blank)			
#1 Filter			
#2 Filter			
IMPINGERS			

PARTICULATE COLLECTED (excluding impinger catch) =	,g
PARTICULATE COLLECTED (including impinger catch) =	,g

COMMENTS: _____

SIGNATURE OF PERSON RESPONSIBLE Larry J. Moore DATE 10-31-89

INTERNATIONAL TECHNOLOGY CORPORATION

SOURCE SAMPLING EPA PARTICULATE TEST LAB DATA SHEET

COMPANY Jewell Nitrogen DATE 10-27-89

SOURCE R. Kiln #3-3 BOX NO. MM5-2 RUN NO. 2

CONDENSATION

IMPINGER NO.	INITIAL VOL.,ml/g	FINAL VOL., ml/g	NET GAIN, ml/g
1	470.8	illegible	188.2
2	599.7	illegible	0.3
3	548.8	550.6	1.8
4	663.4	684.5	21.1
5			
6			
TOTAL	2282.7	2494.1	211.4

PARTICULATE

COMPONENT I.D. NO.	INITIAL WT.,g	FINAL WT. ,g	NET WT., g
PROBE WASH			
ACETONE BLANK			
PROBE WASH (Blank)			
#1 Filter 47mm			
#2 Filter			
IMPINGERS			

PARTICULATE COLLECTED (excluding impinger catch) =	,g
PARTICULATE COLLECTED (including impinger catch) =	,g

COMMENTS:

SIGNATURE OF PERSON RESPONSIBLE Danny G. Malone DATE 10-31-89

INTERNATIONAL TECHNOLOGY CORPORATION

SOURCE SAMPLING EPA PARTICULATE TEST LAB DATA SHEET

COMPANY [illegible] DATE 10-22-89

SOURCE Battery #2-B BOX NO. MM5-3 RUN NO. 3

CONDENSATION

IMPINGER NO.	INITIAL VOL.,ml/g	FINAL VOL., ml/g	NET GAIN, ml/g
1	469.4	764.3	294.9
2	604.8	611.0	6.2
3	560.7	563.5	2.8
4	669.2	692.5	23.3
5			
6			
TOTAL	2304.1	2631.3	327.2

PARTICULATE

COMPONENT I.D. NO.	INITIAL WT.,g	FINAL WT. ,g	NET WT., g
PROBE WASH			
ACETONE BLANK			
PROBE WASH (Blank)			
#1 Filter 3722			
#2 Filter			
IMPINGERS			

PARTICULATE COLLECTED (excluding impinger catch) =	,g
PARTICULATE COLLECTED (including impinger catch) =	,g

COMMENTS: _____

SIGNATURE OF PERSON RESPONSIBLE Larry L. Moore DATE 10-31-89

VOST DATA SHEET

LOCATION: Lowell

DATE: 10/26/89

OPERATOR: RM/JL

UNIT NO. _____

FIELD BLANK NOs. _____

BAROMETRIC PRESSURE _____

IT CORPORATION

PAIR NO.	LEAK CHECK	CARTRIDGE ID TENAX	CARTRIDGE ID TENAX CHARCOAL	ROTAMETER READING l/min	TIME	SAMPLING DURATION min	PROBE TEMP. (C)	CONDENSER OUTLET TEMP (C)	METER TEMP (C)	DRY GAS METER READING		SAMPLE VOLUME	SYSTEM VACUUM
1	OK	T4609	TC11A	.5	6:25 pm	0	N/A	15	29	8858.	61	0	
				.526	6:30	5	N/A	14	28	8862.	24		2" Hg
				.53	6:35	10	N/A	13	28	8864.	87		2.5
				.50	6:40	15	N/A	13	28.5	8867.	35	7.73	2.5
				.48	6:45	20	N/A	12.5	29	8869.	75	10.14	3.0
				.51	6:50	25	N/A	12	29	8872.	3	12.64	3.0
				.50	6:55	30	N/A	12	29	8874	80	15.19	3.2
				.52	7:00	35	N/A	12	29	8877.	40	17.79	3.5
					7:05	40.4	N/A	12	29	8880.	04		STOP

COMMENTS: [redacted] No. 0183

VOST DATA SHEET

LOCATION: Jewell

DATE: 10/26/89

OPERATOR: JJL

UNIT NO.

FIELD BLANK NOs.

BAROMETRIC PRESSURE

IT CORPORATION

PAIR NO.	LEAK CHECK	CARTRIDGE ID TENAX	CARTRIDGE ID TENAX CHARCOAL	ROTAMETER READING l/min	TIME	SAMPLING DURATION min	PROBE TEMP. (C)	CONDENSER OUTLET TEMP (C)	METER TEMP (C)	DRY GAS METER READING		SAMPLE VOLUME	SYSTEM VACUUM
2		T4655	TC3020	~.5	2010	Ø	N/A	8	22	2842.	74	Ø	3.0
				.532	2015	5	N/A	7.5	22	2845.	4	2.66	3.0
				.45	2020	10	N/A	8	22	2847.	65	4.96	3.0
				.465	2026	16	N/A	8	22	2850.	44	7.70	4.0
				.515	2030	20	N/A	9	22	2852.	5	9.76	4.1
				.564	2035	25	N/A	9	22	2855.	37	12.58	4.2
				.538	2041	31	N/A	8	22	2858.	55	15.81	4.2
				.52	2046	36	N/A	7	23	2861.	15	18.41	4.2
					2050	40		7	23	2863.	29		4.2

COMMENTS:

VOST DATA SHEET

LOCATION: Jewell

DATE: 10/26/86

OPERATOR: RPM

IT CORPORATION

UNIT NO. No. 0196

FIELD BLANK NOs. T3330 / TC4407

BAROMETRIC PRESSURE

PAIR NO.	LEAK CHECK	CARTRIDGE ID TENAX	CARTRIDGE ID TENAX CHARCOAL	ROTAMETER READING l/min	TIME	SAMPLING DURATION min	PROBE TEMP. (C)	CONDENSER OUTLET TEMP (C)	METER TEMP (C)	DRY GAS METER READING	SAMPLE VOLUME	SYSTEM VACUUM
3	OK	T4321	TC3687	~.5	21:15	0	N/A	8	21	2864.03		3.0
				.5783	21:21	6		9	20	2867.5	3.47	3.0
				.50	21:25	10		10	20.5	2869.5	5.47	3.0
				.475	21:31	16		8	20	2872.35	8.32	3.0
				.483	21:37	22		8	20	2875.25	11.22	3.0
				.50	21:40	25		8	20	2876.75	12.73	3.0
				.48	21:45	30		8	20	2879.15	15.12	3.1
				.536	21:50	35		8.5	21	2881.83	17.8	3.2
	OK				21:55	40		8.5	21	2884.45		3.2

COMMENTS:

No. 0195

VOST DATA SHEET

LOCATION: Jewell

DATE: 10/26/89

OPERATOR: RPM

IT CORPORATION

UNIT NO. _____

FIELD BLANK NOs. _____

BAROMETRIC PRESSURE _____

PAIR NO.	LEAK CHECK	CARTRIDGE ID TENAX	CARTRIDGE ID TENAX CHARCOAL	ROTAMETER READING l/min	TIME	SAMPLING DURATION min	PROBE TEMP. (C)	CONDENSER OUTLET TEMP (C)	METER TEMP (C)	DRY GAS METER READING		SAMPLE VOLUME	SYSTEM VACUUM
4		T4464	TC3294	~.5	22:10	0	N/A	9	20	2884	.63	—	2.8
				.566	22:15	5	N/A	9	19	2887.	46	2.83	2.8
				.476	22:20	10	N/A	9	19	2889.	84	5.21	3.0
				.50	22:26	16	N/A	10	19.5	2892	.84	7.21	3.1
				.495	22:30	20	N/A	10	19	2894.	82	9.18	3.2
				.516	22:41	31	N/A	10	19	2900.	5	15.87	3.5
				.538	22:45	35	N/A	11	19	2902.	65	18.02	3.6
					22:50	40	N/A	11	19	2905.	35		3.7

COMMENTS:

LOCATION: Sewell

DATE: 10/28/89

OPERATOR: DJ

VOST DATA SHEET

IT CORPORATION

UNIT NO. _____

FIELD BLANK NOs. _____

BAROMETRIC PRESSURE _____

PAIR NO.	LEAK CHECK	CARTRIDGE ID TENAX	CARTRIDGE ID TENAX CHARCOAL	ROTAMETER READING l/min	TIME	SAMPLING DURATION min	PROBE TEMP. (C)	CONDENSER OUTLET TEMP (C)	METER TEMP (C)	DRY GAS METER READING		SAMPLE VOLUME	SYSTEM VACUUM
1	OK	T2315	T2322	.5	5:25pm	0	NA	4	9	3086.	31		2"
				0.534		5	N/A	2	8	3088.	98	~~0-5340~~	3
				0.484		10	N/A	2	8	3091.	48		3
				0.49/15min		15	N/A	4	8	3093.	72		3
				0.48/20min.		20	N/A	4	9	3095.	94		3
				0.47/25min.		25	N/A	4	9	3098	01		3
				0.47/25min		30	N/A	3	10	3100	41		4
				0.48/36min.		35	N/A	2	10	3103	47		4
	ok					40				3105	52		

COMMENTS: [redacted]

forgot 3106.31

LOCATION: Jewell

DATE: 10/28/89

OPERATOR: DJ

VOST DATA SHEET

IT CORPORATION

UNIT NO. _____

FIELD BLANK NOs. _____

BAROMETRIC PRESSURE _____

PAIR NO.	LEAK CHECK	CARTRIDGE ID TENAX	CARTRIDGE ID TENAX CHARCOAL	ROTAMETER READING l/min	TIME	SAMPLING DURATION min	PROBE TEMP. (C)	CONDENSER OUTLET TEMP (C)	METER TEMP (C)	DRY GAS METER READING		SAMPLE VOLUME	SYSTEM VACUUM
3	ok	T40	TC4236	5	0805	0	N/A	1	6	3028.	27		3
		T3599		0.46/5min		5	N/A	2	6	3030	57		3
				0.48/10min		10	N/A	2	7	3033	.11		3 1/2
				0.49/15min		15	N/A	2	7	3035	63		3 1/2
				0.50/20min		20	N/A	2	8	3038	25		4
				0.49/25min		25	N/A	2	8	3040.	62		4
				0.49/30min		30	N/A	3	9	3043 ~~3042~~	09		4
				0.49/35min		35	N/A	3	9	3045	.59		4
	OK					40	N/A	3	9	3047	.96		4

COMMENTS: [redacted]

VOST DATA SHEET

LOCATION: Jewell

DATE: 10/26/89

OPERATOR: DJ

IT CORPORATION

UNIT NO. [redacted] No. 0207

FIELD BLANK NOs. T1078 / TC2094

BAROMETRIC PRESSURE

PAIR NO.	LEAK CHECK	CARTRIDGE ID TENAX	CARTRIDGE ID TENAX CHARCOAL	ROTAMETER READING l/min	TIME	SAMPLING DURATION min	PROBE TEMP. (C)	CONDENSER OUTLET TEMP (C)	METER TEMP (C)	DRY GAS METER READING		SAMPLE VOLUME	SYSTEM VACUUM
4	ok	T4591	TC3054	.5	0920	0	NA	3	7	3048.	47		3
				0.62/5min		5	N/A	3	7	3051.	55		3
				0.57/10min		10	N/A	4	7	3054	18		3
				0.53/15min		15	N/A	4	7	3056	46		3
				0.50/20min		20	N/A	5	8	3058	42		3
				0.48/25min		25	N/A	5	9	3060	42		3 1/2
				0.48/30min		30	N/A	5	9	3062	40		3 1/2
						35	N/A	5	10	3064	83		3 1/2
	ok					40		6	10	3066	42		4

COMMENTS: [redacted] No. 0206

VOST DATA SHEET

LOCATION: Sewell

DATE: 10/24/89

OPERATOR: RWG/BS

UNIT NO. _____

FIELD BLANK NOs. _____

BAROMETRIC PRESSURE _____

IT CORPORATION

PAIR NO.	LEAK CHECK	CARTRIDGE ID TENAX	CARTRIDGE ID TENAX CHARCOAL	ROTAMETER READING l/min	TIME	SAMPLING DURATION min	PROBE TEMP. (C)	CONDENSER OUTLET TEMP (C)	METER TEMP (C)	DRY GAS METER READING		SAMPLE VOLUME	SYSTEM VACUUM
1	OK	TLA	R03254	.5	11:24	0	NA	17	21	3905.	55	—	5"
				.5	11:30	5	NA	16	23	3909.	0	3.45	3"
				.5	11:34	10	NA	16	25	3910.	3	4.75	3"
				.44	11:39	15	NA	20	27	3912.5		4.95	4.5"
				.5	11:44	20	NA	19	29	3915.0		9.45	5"
				.5	11:49	25	NA	17	31	3917.6		12.05	5"
				.5	11:54	30	NA	16	33	3920.1		14.55	5"
	OK			.5	11:59	35	NA	18	36	3922.7		17.15	5.5"
					12:04			17	37	3925.	55	20.0	5.5"

COMMENTS: No. 0198

3925.55

LOCATION: Jewell Inland

DATE: 10/27/89

OPERATOR: KBS

VOST DATA SHEET

IT CORPORATION

UNIT NO. _____

FIELD BLANK NOs. _____

BAROMETRIC PRESSURE _____

PAIR NO.	LEAK CHECK	CARTRIDGE ID TENAX	CARTRIDGE ID TENAX CHARCOAL	ROTAMETER READING l/min	TIME	SAMPLING DURATION min	PROBE TEMP. (C)	CONDENSER OUTLET TEMP (C)	METER TEMP (C)	DRY GAS METER READING	SAMPLE VOLUME	SYSTEM VACUUM
2	O.K	T4479	T4396	.5	12:29	0	NA	20	37	3925.76	—	2.0"
		T4861	T4541	.5	12:34	5	NA	21	37	3928.3	2.54	2.5"
				.5	12:39	10	NA	20	38	3931.9	6.14	3.0"
				.5	12:44	15	NA	19	38	3933.4	7.64	4.0"
				.5	12:49	20	NA	20	39	3935.95	10.19	4.0"
				.5	12:54	25	NA	20	40	3938.66	12.89	4.0"
				.5	12:59	30	NA	20	41	3941.1	15.34	4.0"
				.5	13:04	35	NA	21	41	3943.66	17.89	4.0"
	O.K.			.5	13:09	40	NA			3945.76	20.0	

COMMENTS: [redacted]

3945.74

LOCATION: Jewell Island

DATE: 10-27-89

OPERATOR: MBS

VOST DATA SHEET

IT CORPORATION

UNIT NO. [redacted]

FIELD BLANK NOs. [redacted]

BAROMETRIC PRESSURE

PAIR NO.	LEAK CHECK	CARTRIDGE ID TENAX	CARTRIDGE ID TENAX CHARCOAL	ROTAMETER READING l/min	TIME	SAMPLING DURATION min	PROBE TEMP. (C)	CONDENSER OUTLET TEMP (C)	METER TEMP (C)	DRY GAS METER READING		SAMPLE VOLUME	SYSTEM VACUUM
3	OK	T6A	TC4205	.5	1:26	0	NA	21	42	3945.	95	—	2.5"
			TC4206	.5	1:31	5	NA	21	42	3948.	35	2.4	2.5"
				.5	1:36	10	NA	20	42	3950.	85	7.9	4.0"
				.5	1:41	15	NA	20	42	3953	40	7.45	4.0"
				.5	1:46	20	NA	20	42	3955.	5	9.55	5.0"
				.5	1:51	25	NA	21	43	3958.	05	12.10	5.0"
				.5	1:56	30	NA	19	43	3960.	6	14.65	5.0
				.5	2:01	35	NA	17	43	3963.	2	17.25	5.0
	OK				2:06	40	NA			3965.	95	20.0	

COMMENTS: Pair 3 [redacted]

VOST DATA SHEET

LOCATION: Jewell Island

DATE: 10-27-89

OPERATOR: MBS

UNIT NO.

FIELD BLANK NOs.

BAROMETRIC PRESSURE

IT CORPORATION

PAIR NO.	LEAK CHECK	CARTRIDGE ID TENAX	CARTRIDGE ID TENAX CHARCOAL	ROTAMETER READING l/min	TIME	SAMPLING DURATION min	PROBE TEMP. (C)	CONDENSER OUTLET TEMP (C)	METER TEMP (C)	DRY GAS METER READING		SAMPLE VOLUME	SYSTEM VACUUM
4	OK	T4038	TC 4027	.5	2:29	0	NA	19	43	3966.	45	—	2.5"
				.5	2:34	5	NA	20	43	3969.	1	2.65	3.0"
				.5	2:39	10	NA	19	43	3971.	4	4.95	4.0"
				.5	2:44	15	NA	18	43	3973.	8	7.35	4.0"
				.5	2:49	20	NA	19	43	3976.	15	9.70	4.0"
				.5	2:54	25	NA	20	43	3978.	5	12.05	4.5"
				.5	2:59	30	NA	21	44	3981.	2	14.75	5.0"
				.5	3:04	35	NA	20	44	3983.	9	17.45	5.0"
	OK			.5	3:09	40	NA			3986.	45	20.0	

COMMENTS: [redacted]

INTERNATIONAL TECHNOLOGY CORPORATION

Proj. No. 26200.12

NO_x SAMPLING SHEET

Test No. 1 Set #1

Location [illegible] Inlet/NIPSCO Rutter #3.2

Date 10-22-29

Operator mssm

Sample Box No. 5 7:30 am

Bar. pressure in. Hg 29.27

Ambient Temp. 55

Initial Box Temp. 72

Final Box Temp. 70

Initial Flask ~~Pressure~~ Vacuum -22.5 Ø-H

Final Flask ~~Pressure~~ Vacuum Ø 29.9

Volume Flask & Valve 2100

Volume Sample

ug ~~Mg~~ NO2 in Sample 210

Concentration as NO2 (lb/scf)

(ppm)

No. 0208

Final R2 - 29.9

3 lab

INTERNATIONAL TECHNOLOGY CORPORATION

Proj. No. 406000.12

NO_x SAMPLING SHEET

Test No. 5 5.1 #2

Location Jewell

Date 10/27/89

Operator MSM

Sample Box No. 1

Bar. pressure in. Hg 29.43

Ambient Temp. 73

Initial Box Temp. 73

Final Box Temp. 70

Initial Flask Pressure 25.25

Final Flask Pressure 0 (29.9)

Volume Flask & Valve 20.85

Volume Sample

~~Mg~~ NO2 in Sample 60

Concentration as NO2 (lb/scf)

(ppm)

No. 0212

INTERNATIONAL TECHNOLOGY CORPORATION

Proj. No. 420002.12

NO_x SAMPLING SHEET

Test No. 6 Set #2

Location Tank 11

Date 10/27/89

Operator MSM

Sample Box No. 7

Bar. pressure in. Hg 29.43

Ambient Temp. 73

Initial Box Temp. 73

Final Box Temp. 70

Initial Flask Pressure 25.25

Final Flask Pressure 0

Volume Flask & Valve 2023

Volume Sample

Mg NO2 in Sample 60

Concentration as NO2 (lb/scf)

(ppm)

[redacted]

INTERNATIONAL TECHNOLOGY CORPORATION

Proj. No. 410000.12

NO_x SAMPLING SHEET

Test No. ~~X~~ 7 Set #2

Location Jewell Bathe #3

Date 10/27/89

Operator MSM

Sample Box No. 8

Bar. pressure in. Hg 29.43

Ambient Temp. 73

Initial Box Temp. 73

Final Box Temp. 70

Initial Flask Pressure 25.25

Final Flask Pressure 0

Volume Flask & Valve 20.56

Volume Sample

Mg NO2 in Sample 35

Concentration as NO2 (lb/scf)

(ppm)

No. 0214

INTERNATIONAL TECHNOLOGY CORPORATION

NO_x SAMPLING SHEET

Proj. No. 35000.12

Test No. 8 Set #2

Location Train 11

Date 10/27/89

Operator MSM

Sample Box No. 2

Bar. pressure in. Hg 29.43

Ambient Temp. 73

Initial Box Temp. 73

Final Box Temp. 70

Initial Flask Pressure 0 25.25

Final Flask Pressure 0

Volume Flask & Valve 2110

Volume Sample

~~Mg~~ ug NO2 in Sample 1.0

Concentration as NO2 (lb/scf)

(ppm)

INTERNATIONAL TECHNOLOGY CORPORATION

Proj. No. [illegible]

NO_x SAMPLING SHEET

Test No. [illegible]

Location [illegible]

Date [illegible]

Operator [illegible]

Sample Box No. [illegible]

Bar. pressure in. Hg [illegible]

Ambient Temp. [illegible]

Initial Box Temp. [illegible]

Final Box Temp. 70

Initial Flask Pressure [illegible]

Final Flask Pressure [illegible]

Volume Flask & Valve [illegible]

Volume Sample [illegible]

Mg NO2 in Sample 90

Concentration as NO2 (lb/scf) [illegible]

(ppm) [illegible]

No. 0210

INTERNATIONAL TECHNOLOGY CORPORATION

Proj. No. [illegible]

NO_x SAMPLING SHEET

Test No. 4 Set #1

Location [illegible] Boiler #2-B

Date [illegible]

Operator [illegible]

Sample Box No. 4

Bar. pressure in. Hg 29.77

Ambient Temp. 65

Initial Box Temp. 72

Final Box Temp. 70

Initial Flask Pressure [illegible]

Final Flask Pressure [illegible] (29.9)

Volume Flask & Valve [illegible]

Volume Sample

Mg NO2 in Sample 16.0

Concentration as NO2 (lb/scf)

(ppm)

No. 0211

INTERNATIONAL TECHNOLOGY CORPORATION

NO_x SAMPLING SHEET

Proj. No. 476020.12

Test No. 7 Set-3

Location Jewell Battery #3

Date 10-22-91

Operator MM

Sample Box No. 9

Bar. pressure in. Hg 29.45

Ambient Temp. 50

Initial Box Temp. 65

Final Box Temp. 70

Initial Flask Pressure 25.25

Final Flask Pressure 0

Volume Flask & Valve 2017

Volume Sample

Mg NO2 in Sample 1.0

Concentration as NO2 (lb/scf)

(ppm)

NS 0216

INTERNATIONAL TECHNOLOGY CORPORATION

NO_x SAMPLING SHEET

Proj. No. 406000.12

Test No. 12 set-3

Location Jennell Battery #3

Date 12-28-89

Operator MM

Sample Box No. 1

Bar. pressure in. Hg

Ambient Temp. 50

Initial Box Temp. 55

Final Box Temp. 70

Initial Flask Pressure 25.25

Final Flask Pressure 0

Volume Flask & Valve 292

Volume Sample

ug ~~Mg~~ NO2 in Sample 91

Concentration as NO2 (lb/scf)

(ppm)

[redacted]

[redacted]

Test Blank - [redacted]

INTERNATIONAL TECHNOLOGY CORPORATION

ORSAT ANALYSIS FORM

Date 10-26-89

Client Jewell Coal + Coke

Process Battery #3 (B) Stack

Sample Technique Grab

Analyzed By Tony Bobb

COMMENTS:

Beginning Cycle

OVA - 9.9 ppm

Run #	CO_2	$CO_2 + O_2$	$CO_2 + O_2 + CO$	O_2	CO	N_2 (By difference)	Leak Check
1	9 %	16.2 %		7.2 %	5 ppm	83.8 %	✓
				7.5 % - Teledyne			

METHOD #7 CALCULATIONS

Test #: 1 Set #1
Job Title: Jewell/Inland/NIPSCO Battery #3-b
Project #: 406000.12
Date: 10/26/89

K1 = 17.65

1.	Final vacuum of flask (PF) in Hg.:	0
2.	Final temperature of flask (TF) in R:	530
3.	Initial vacuum of flask (PI) in Hg.:	28
4.	Initial temperature of flask (TI) in R:	532
5.	The volume of flask and valve (VF) in ml.:	2100
6.	The initial barometric pressure (IBP) in Hg.:	29.27
7.	Final barometric pressure (FBP) in Hg.:	29.9

VSC = K1(VF - 25ml)[(FBP - PF)/TF - (IBP - PI)/TI]

VSC = 1978.703

K2 = 0.0000624 50/25. aliquot factor. If other than a 25ml aliquot was used for analysis. the corresponding factor must be substituted.

C = Concentration of NOx as NO2, dry basis corrected to standard conditions, mg/dscm (lb/dscf).

1. Mass of NOx as NO2 in gas sample, ug.(m) : 210

C = K2 (M / VSC)

C = 0.000006622

Parts per million (PPM)

PPM = 8.41 * 10^6(C)

PPM = 55.69538015

METHOD #7 CALCULATIONS

Test #:	2 Set #1
Job Title:	Jewell/Inland/NIPSCO Battery #3-b
Project #:	406000.12
Date:	10/26/89

K1 = 17.65 Spectrophotometer calibration factor.

1.	Final vacuum of flask (PF) in Hg.:	0
2.	Final temperature of flask (TF) in R:	530
3.	Initial vacuum of flask (PI) in Hg.:	28
4.	Initial temperature of flask (TI) in R:	532
5.	The volume of flask and valve (VF) in ml.:	2061
6.	The initial barometric pressure (IBP) in Hg.:	29.27
7.	Final barometric pressure (FBP) in Hg.:	29.9

VSC = K1(VF - 25ml)[(FBP - PF)/TF - (IBP - PI)/TI]

VSC = 1941.513

K2 = 0.0000624 50/25. aliquot factor. If other than a 25ml aliquot was used for analysis, the corresponding factor must be substituted.

C = Concentration of NOx as NO2, dry basis corrected to standard conditions. mg/dscm (lb/dscf).

1. Mass of NOx as NO2 in gas sample, ug.(m) : 210

C = K2 (M / VSC)

C = 0.000006749

Parts per million (PPM)

PPM = 8.41 * 10^6(C)

PPM = 56.76823665

METHOD #7 CALCULATIONS

Test #: 3 Set #1
Job Title: Jewell/Inland/NIPSCO Battery #3-b
Project #: 406000.12
Date: 10/26/89

K1 = 17.65 Spectrophotometer calibration factor.

1.	Final vacuum of flask (PF) in Hg.:	0
2.	Final temperature of flask (TF) in R:	530
3.	Initial vacuum of flask (PI) in Hg.:	28
4.	Initial temperature of flask (TI) in R:	532
5.	The volume of flask and valve (VF) in ml.:	2068
6.	The initial barometric pressure (IBP) in Hg.:	29.27
7.	Final barometric pressure (FBP) in Hg.:	29.9

VSC = K1(VF - 25ml)[(FBP - PF)/TF - (IBP - PI)/TI]

VSC = 1948.188

K2 = 0.0000624 50/25, aliquot factor. If other than a 25ml aliquot was used for analysis, the corresponding factor must be substituted.

C = Concentration of NOx as NO2, dry basis corrected to standard conditions, mg/dscm (lb/dscf).

1. Mass of NOx as NO2 in gas sample, ug.(m) : 190

C = K2 (M / VSC)

C = 0.000006085

Parts per million (PPM)

PPM = 8.41 * 10^6(C)

PPM = 51.18034549

METHOD #7 CALCULATIONS

Test #: 5 Set #2
Job Title: Jewell/Inland/NIPSCO Battery #3-b
Project #: 406000.18
Date: 10/27/99

K1 = 17.65 Spectrophotometer calibration factor.

1.	Final vacuum of flask (PF) in Hg.:	0
2.	Final temperature of flask (TF) in R:	530
3.	Initial vacuum of flask (PI) in Hg.:	25.25
4.	Initial temperature of flask (TI) in R:	533
5.	The volume of flask and valve (VF) in ml.:	2085
6.	The initial barometric pressure (IBP) in Hg.:	29.43
7.	Final barometric pressure (FBP) in Hg.:	29.9

VSC = K1(VF - 25ml)[(FBP - PF)/TF - (IBP - PI)/TI]

VSC = 1766.054

K2 = 0.0000624 50/25, aliquot factor. If other than a 25ml aliquot was used for analysis, the corresponding factor must be substituted.

C = Concentration of NOx as NO2, dry basis corrected to standard conditions, mg/dscm (lb/dscf).

8. Mass of NOx as NO2 in gas sample, ug.(m) : 50

C = K2 (M / VSC)

C = 0.00003812

Parts per million (PPM)

PPM = 8.41 * 10^6(C)

PPM = 17.82903036

METHOD #7 CALCULATIONS

Test #: 7 Set #2
Job Title: Jewell/Inland/NIPSCO Battery #3-b
Project #: 406000.12
Date: 10/27/99

K1 = 17.65 Spectrophotometer calibration factor.

1.	Final vacuum of flask (PF) in Hg.:	0
2.	Final temperature of flask (TF) in R:	530
3.	Initial vacuum of flask (PI) in Hg.:	25.25
4.	Initial temperature of flask (TI) in R:	533
5.	The volume of flask and valve (VF) in ml.:	2056
6.	The initial barometric pressure (IBP) in Hg.:	29.43
7.	Final barometric pressure (FBP) in Hg.:	29.9

VSC = K1(VF - 25ml)[(FBP - PF)/TF - (IBP - PI)/TI]

VSC = 1741.192

K2 = 0.0000624 30/25, aliquot factor. If other than a 25ml aliquot was used for analysis, the corresponding factor must be substituted.

C = Concentration of NOx as NO2, dry basis corrected to standard conditions, mg/dscm (lb/dscf).

1. Mass of NOx as NO2 in gas sample, ug.(m) : 35

C = K2 (M / VSC)

C = 0.000001254

Parts per million (PPM)

PPM = 8.41 * 10^6(C)

PPM = 10.54876981

METHOD #7 CALCULATIONS

Test #: 8 Set #2
Job Title: Jewell/Inland/NIPSCO Battery #3-8
Project #: 406000.13
Date: 10/27/89

K1 = 17.65 Spectrophotometer calibration factor.

1.	Final vacuum of flask (PF) in Hg.:	0
2.	Final temperature of flask (TF) in R:	530
3.	Initial vacuum of flask (PI) in Hg.:	25.25
4.	Initial temperature of flask (TI) in R:	533
5.	The volume of flask and valve (VF) in ml.:	2110
6.	The initial barometric pressure (IBP) in Hg.:	29.43
7.	Final barometric pressure (FBP) in Hg.:	29.9

VSC = K1(VF - 25ml)[(FBP - PF)/TF - (IBP - PI)/TI]

VSC = 1787.487

K2 = 0.0000624 50/25, aliquot factor. If other than a 25ml aliquot was used for analysis, the corresponding factor must be substituted.

C = Concentration of NOx as NO2, dry basis corrected to standard conditions, mg/dscm (lb/dscf).

1. Mass of NOx as NO2 in gas sample, ug.(m) : 50

C = K2 (M / VSC)

C = 0.000002094

Parts per million (PPM)

PPM = 8.41 * 10^6(C)

PPM = 17.61525302

METHOD #7 CALCULATIONS

Test #:	9 Set #3
Job Title:	Jewell/Inland/NIPSCO Battery #3-b
Project #:	406000.12
Date:	10/28/89

K1 = 17.65 Spectrophotometer calibration factor.

1.	Final vacuum of flask (PF) in Hg.:	0
2.	Final temperature of flask (TF) in R:	530
3.	Initial vacuum of flask (PI) in Hg.:	25.25
4.	Initial temperature of flask (TI) in R:	525
5.	The volume of flask and valve (VF) in ml.:	2067
6.	The initial barometric pressure (IBP) in Hg.:	29.45
7.	Final barometric pressure (FBP) in Hg.:	29.9

VSC = K1(VF - 25ml)[(FBP - PF)/TF - (IBP - PI)/TI]

VSC = 1744.942

K2 = 0.0000624 50/25, aliquot factor. If other than a 25ml aliquot was used for analysis, the corresponding factor must be substituted.

C = Concentration of NOx as NO2, dry basis corrected to standard conditions, mg/dscm (lb/dscf).

1. Mass of NOx as NO2 in gas sample, ug.(m) : 60

C = K2 (M / VSC)

C = 0.000002145

Parts per million (PPM)

PPM = 8.41 * 10^6(C)

PPM = 18.04473904

METHOD #7 CALCULATIONS

Test #: 10 Set #3
Job Title: Jewell/Inland/NIPSCO Battery #3-b
Project #: 406000.12
Date: 10/28/89

K1 = 17.65 Spectrophotometer calibration factor.

1.	Final vacuum of flask (PF) in Hg.:	0
2.	Final temperature of flask (TF) in R:	530
3.	Initial vacuum of flask (PI) in Hg.:	25.25
4.	Initial temperature of flask (TI) in R:	525
5.	The volume of flask and valve (VF) in ml.:	2085
6.	The initial barometric pressure (IBP) in Hg.:	29.45
7.	Final barometric pressure (FBP) in Hg.:	29.9

$$VSC = K1(VF - 25ml)[(FBP - PF)/TF - (IBP - PI)/TI]$$

$$VSC = 1760.324$$

K2 = 0.0000624 50/25, aliquot factor. If other than a 25ml aliquot was used for analysis, the corresponding factor must be substituted.

C = Concentration of NOx as NO2, dry basis corrected to standard conditions, mg/dscm (lb/dscf).

1. Mass of NOx as NO2 in gas sample, ug.(m) : 86

$$C = K2 (M / VSC)$$

$$C = 0.000003048$$

Parts per million (PPM)

$$PPM = 8.41 * 10^5(C)$$

$$PPM = 25.63812875$$

METHOD #7 CALCULATIONS

Test #: 11 Set #3
Job Title: Jewell/Inland/NIPSCO Battery #3-b
Project #: 406000.12
Date: 10/28/89

K1 = 17.65 Spectrophotometer calibration factor.

1.	Final vacuum of flask (PF) in Hg.:	0
2.	Final temperature of flask (TF) in R:	530
3.	Initial vacuum of flask (PI) in Hg.:	25.25
4.	Initial temperature of flask (TI) in R:	525
5.	The volume of flask and valve (VF) in ml.:	2084
6.	The initial barometric pressure (IBP) in Hg.:	29.45
7.	Final barometric pressure (FBP) in Hg.:	29.9

VSC = K1(VF - 25ml)[(FBP - PF)/TF - (IBP - PI)/TI]

VSC = 1759.469

K2 = 0.0000624 50/25, aliquot factor. If other than a 25ml aliquot was used for analysis, the corresponding factor must be substituted.

C = Concentration of NOx as NO2, dry basis corrected to standard conditions, mg/dscm (lb/dscf).

1. Mass of NOx as NO2 in gas sample, ug.(m) : 110

C = K2 (M / VSC)

C = 0.000003901

Parts per million (PPM)

PPM = 8.41 * 10^6(C)

PPM = 32.80888202

METHOD #7 CALCULATIONS

Test #: 12 Set #3
Job Title: Jewell/Inland/NIPSCO Battery #3-b
Project #: 406000.12
Date: 10/28/89

K1 = 17.65 Spectrophotometer calibration factor.

1.	Final vacuum of flask (PF) in Hg.:	0
2.	Final temperature of flask (TF) in R:	530
3.	Initial vacuum of flask (PI) in Hg.:	25.25
4.	Initial temperature of flask (TI) in R:	525
5.	The volume of flask and valve (VF) in ml.:	2082
6.	The initial barometric pressure (IBP) in Hg.:	29.45
7.	Final barometric pressure (FBP) in Hg.:	29.9

$$VSC = K1(VF - 25ml)[(FBP - PF)/TF - (IBP - PI)/TI]$$

VSC = 1757.760

K2 = 0.0000624 50/25. aliquot factor. If other than a 25ml aliquot was used for analysis, the correspoonding factor must be substituted.

C = Concentration of NOx as NO2, dry basis corrected to standard conditions. mg/dscm (lb/dscf).

1. Mass of NOx as NO2 in gas sample, ug.(m) : 91

$$C = K2 (M / VSC)$$

C = 0.000003330

Parts per million (PPM)

$$PPM = 8.41 * 10^6(C)$$

PPM = 27.16828309

IT

FIELD ACTIVITY DAILY LOG

DAILY LOG | DATE | NO. | SHEET OF

PROJECT NAME [illegible] | PROJECT NO. [illegible]

FIELD ACTIVITY SUBJECT: [illegible]

DESCRIPTION ON DAILY ACTIVITIES AND EVENTS:

RMS-1

Filter R-0734

Probe Wash - R-0735

XAD Trap - R-0736

Impinger Cont. - R-0737

RMS-2

Filter R-0732

Probe Wash - R-0731

XAD Trap - R-0730

Impinger Cont. - R-0729

Test Blank XAD - R-0742

RMS-3

Filter R-0733

Probe Wash R-0738

XAD Trap R-0739

Impinger Cont. R-0740

Filter Blank - R-0743

XAD Trap Blank - R-0744

Probe Wash Blank - R-0745

VISITORS ON SITE:	CHANGES FROM PLANS AND SPECIFICATIONS, AND OTHER SPECIAL ORDERS AND IMPORTANT DECISIONS.
WEATHER CONDITIONS:	IMPORTANT TELEPHONE CALLS:

IT PERSONNEL ON SITE:

(FIELD ENGINEER) DATE

INTERNATIONAL TECHNOLOGY CORPORATION

ORSAT ANALYSIS FORM

Date 10-27-89

Client Jewell Coal + Coke

Process Battery #3 (B) Stack

Sample Technique Grab

Analyzed By MBS

COMMENTS:

Mid - Cycle

OVA ANALYSIS

Bag 1 - 24.0 PPM

Bag 2 - 12.0 PPM

Run #	CO_2	$CO_2 + O_2$	$CO_2 + O_2 + CO$	O_2	CO	N_2 (By difference)	Leak Check
3 Bag #1	5.5 %	16.8 %		11.3 %	15 ppm	83.2 %	✓
				8.8 %	- Tedlyne		
3 Bag #2	5.5 %	16.9 %		11.4 %	29 ppm	83.1 %	✓
				8.8 %	- Tedlyne		

INTERNATIONAL TECHNOLOGY CORPORATION

ORSAT ANALYSIS FORM

Date 10-28-89

Client Jewell Coal + Coke

Process Battery #3

Sample Technique Grab

Analyzed By MRS + TB

COMMENTS:

Charging Study

OVA ANALYSIS

Bag 1 - 48 ppm
Bag 2 - 6.0 ppm
Bag 3 - 15.0 ppm
Bag 4 - 10.0 ppm
Bag 5 - 15.0 ppm

Run #	CO_2	$CO_2 + O_2$	$CO_2 + O_2 + CO$	O_2	CO	N_2 (By difference)	Leak Check
Bag #1	0%	19.5%		19.5%	39 ppm	80.5%	✓
				18.8%	Teledyne		
Bag #2	0%	20%		20%	12 ppm	80%	✓
				20.2%	Teledyne		
Bag #3	0%	20.4%		20.4%	5 ppm	79.6%	✓
				20.4%	Teledyne		
Bag #4	0%	20.3%		20.3%	9 ppm	79.7%	✓
				20.1%	Teledyne		
Bag #5	0%	20.1%		20.1%	9 ppm	79.9%	✓
				20%	Teledyne		

INTERNATIONAL TECHNOLOGY CORPORATION

ORSAT ANALYSIS FORM

Date 10-29-89

Client Jewell Coal + Coke

Process Battery #3

Sample Technique Grab

Analyzed By MRS + TB

COMMENTS:

PUSHING EMISSIONS

OVA ANALYSIS

OVEN 1 - 8 ppm

OVEN 2 - 10 ppm

OVEN 5 -

OVEN 6 - 29 ppm

OVEN 7 - 17 ppm

Run #	CO_2	$CO_2 + O_2$	$CO_2 + O_2 + CO$	O_2	CO	N_2 (By difference)	Leak Check
OVEN #1	0 %	20.7 %		20.7 %	44 ppm	79.3 %	✓
				20.2 %	Teledyne		
OVEN #2	0 %	21.0 %		21.0 %	21 ppm	79.0 %	✓
				20.3 %	Teledyne		
OVEN #5	0 %	20.5 %		20.5 %	68 ppm	79.5 %	✓
				20.0 %	Teledyne		
OVEN #6	0 %	20.5 %		20.5 %	55 ppm	79.5 %	✓
				20.4 %	Teledyne		
OVEN #7	0 %	20.3 %		20.3 %	47 ppm	79.7 %	✓
				20.2 %	Teledyne		

[redacted] Oven #1

RESPONSIVE TO THE NEEDS OF ENVIRONMENTAL MANAGEMENT

Pushing

Orifice Temp

Time VELOCITY TRAVERSE DATA

Filter #5707090

Test No. #1

Location _____

10/27/89 3:15pm

Point	Position, inches[a]	Reading, Δp inches of H_2O	$\sqrt{\Delta p}$	T_s, °F
0	0.7	90		
15	0.7	115		
30	0.7	125		
45	0.7	135		
1:00	0.65	140		143
1:15	0.6	140		
1:25				
00	0.6	140		
15	0.55	150		210
30	0.55	150		
45	0.55	150		
60	0.5	150		
[redacted]				
1:30	0.5	150		
1:45				
2:00	0.5	150		
2:15				
2:30	0.5	150		
2:45	0.45	150		
3:00	0.45	150		
Total				
Average				

Stop go

[a] From outside of port to sampling point.

Pitot tube _____
Manometer _____
Thermometer _____

Stack Inside Dimensions _____

Stack Area = _____ ft^2

Barometric Pressure, P_b = _____ inches Hg, stack gauge

Pressure = _____ inches H_2O

Stack Abs. Pressure, P_s = _____ inches H_2O / 13.6 + P_b = _____ inches Hg

Stack Gas Temp., T_s = _____ °F + 460 = _____ °R

Molecular Weight of Stack Gas, M_s = _____

1. $V_s = 174\ C_p \sqrt{\Delta p}_{avg} \times \frac{29.92}{P_s} \times \frac{28.96}{M_s}$

   V_s = _____ ft/min

2. Volume = _____ ft/min x _____ ft^2 = _____ ft^3/min

   Standard Volume at 70°F and 29.92 inches Hg:

3. $ft^3/min \times \frac{530}{T_s} \times \frac{P_s}{29.92}$ = _____ x $\frac{530}{29.92}$ x _____ =

   _____ scfm

CALC. PERFORMED BY SPREADSHEET

Data Recorder T Ball

Date 10/29/89

Gas velocity and volume data.

CHI. OG. CORPORATION

Ovens 2

Probe

RESPONSIVE TO THE NEEDS OF ENVIRONMENTAL MANAGEMENT

Time orifice Temp

VELOCITY TRAVERSE DATA

Test No. #2

Location _____

Filter # 5707091

Point	Position, inches[a]	Reading, Δp inches of H_2O	$\sqrt{\Delta p}$	T_s, °F
0	0.65	120		
15	0.65	130		
30	0.5	150		
45				
60	0.35	160		
75	0.35	160		
90	0.30	160		
105	0.30	160		
120	0.30	160		
135	0.25	160		
150	0.125	160		
165	0.25	155		
180	0.25	120		225
195				
210	0.25	150		
~~225~~				
Total				
Average				

4 min

Stack Inside Dimensions _____

Stack Area = _____ ft^2

Barometric Pressure, P_b = _____ inches Hg, stack gauge

Pressure = _____ inches H_2O

Stack Abs. Pressure, P_s = _____ inches H_2O / 13.6 + P_b = _____ inches Hg

Stack Gas Temp., T_s = _____ °F. + 460 = _____ °R

Molecular Weight of Stack Gas, M_s = _____

1. $V_s = 174\ C_p \sqrt{\Delta p T_s} \times \frac{29.92}{P_s} \times \frac{28.96}{M_s}$

   V_s = _____ ft/min

2. Volume = _____ ft/min x _____ ft^2 = _____ ft^3/min

   Standard Volume at 70°F and 29.92 inches Hg:

3. $ft^3/min \times \frac{530}{T_s} \times \frac{P_s}{29.92}$ = _____ x $\frac{530}{29.92}$ x _____ =

   _____ scfm

CALC. PERFORMED BY SPREADSHEET

Data Recorder Jerry Babb

Date 10/29/97

[a] From outside of port to sampling point.

Pitot tube _____
Manometer _____
Thermometer _____

Gas velocity and volume data.

HI G CORPORATION

Oven #5

Probe

RESPONSIVE TO THE NEEDS OF ENVIRONMENTAL MANAGEMENT

Time Orifice Temp

VELOCITY TRAVERSE DATA

Test No. 3

Location _____

Filter # 5707092

Point	Position, inches[a]	Reading, Δp inches of H_2O	$\sqrt{\Delta p}$	T_s, °F
0	.60	1.50		
15	.40			
30	.100	1.50		275
45				
60				
1.0				
1:15				
1:30				
1:45				
1:60				
2:00				
2:15				
2:90				
2:45				
3:00				
Total				
Average				

lost power 30 secs 3 min

[a] From outside of port to sampling point.

Pitot tube _____
Manometer _____
Thermometer _____

Stack Inside Dimensions _____

Stack Area = _____ ft^2

Barometric Pressure, P_b = _____ inches Hg, stack gauge

Pressure = _____ inches H_2O

Stack Abs. Pressure, P_s = _____ inches H_2O / 13.6 + P_b = _____ inches Hg

Stack Gas Temp., T_s = _____ °F. + 460 = _____ °R

Molecular Weight of Stack Gas, M_s = _____

1. $V_s = 174\ C_p \sqrt{\Delta p T_s} \times \frac{29.92}{P_s} \times \frac{28.96}{M_s}$

   V_s = _____ ft/min

2. Volume = _____ ft/min x _____ ft^2 = _____ ft^3/min

   Standard Volume at 70°F and 29.92 inches Hg:

3. $ft^3/min \times \frac{530}{T_s} \times \frac{P_s}{29.92}$ = _____ x 530 / _____ x _____ / 29.92 =

   _____ scfm

CALC. PERFORMED BY SPREADSHEET

Data Recorder Jerry Babb

Date 10/29/89

Gas velocity and volume data.

CORPORATION

RESPONSIVE TO THE NEEDS OF ENVIRONMENTAL MANAGEMENT

Start time 4:10

VELOCITY TRAVERSE DATA Stop time 1:02

Test No. 1

Location _____

elapsed time 1:02 − 0

Point	Position, inches[a]	Reading, Δp inches of H_2O	$\sqrt{\Delta p}$	T, °F
1	.60	150	↓	.02
2	.30	140		.02
3		Temp.		
4				
5				
6				
7				
8				
9				
10				
11				
12				
13				
Total			145	0.02
Average				

[a] From outside of port to sampling point.

Pitot tube _____
Manometer _____
Thermometer _____

Stack Inside Dimensions NA

Stack Area = _____ ft^2

Barometric Pressure, P_b = _____ inches Hg, stack gauge Pressure = _____ inches H_2O

Stack Abs. Pressure, P_s = _____ inches H_2O / 13.6 + P_b = _____ inches Hg

Stack Gas Temp., T_s = _____ °F. + 460 = _____ °R

Molecular Weight of Stack Gas, M_s = _____

1. $V_s = 174\ C_p \sqrt{\Delta p}\ T_s \times \frac{29.92}{P_s} \times \frac{28.96}{M_s}$

V_s = _____ ft/min

2. Volume = _____ ft/min x _____ ft^2 = _____ ft^3/min

Standard Volume at 70°F and 29.92 inches Hg:

3. $ft^3/min \times \frac{530}{T_s} \times \frac{P_s}{29.92}$ = _____ x $\frac{530}{29.92}$ x _____ =

_____ scfm

CALC. PERFORMED ON SPREADSHEET

V_s = 571 ft/min

T_{PLUME} = 303 °F

Data Recorder Sandra McGee

Date 10/28/05

Gas velocity and volume data.

Charging Test

CORPORATION

Three 570/08

RESPONSIVE TO THE NEEDS OF ENVIRONMENTAL MANAGEMENT

start 4:18:31
stop (3:39) elapsed

Test No. 2

Location _____

VELOCITY TRAVERSE DATA

min.	Point	Position, inches[a]	Reading, Δp inches of H_2O	$\sqrt{\Delta p}$	T_s, °F
	1	.60	~~.05~~	.02	175
30	2	.60	~~.05~~	.02	175
60	3	.55		.01	170
200	4	.70		.01	160
230	5	.70		.00	175
3100	6	.65		.00	175
3:39	7	.50		.02	175
		.50		.02	175
Total					
Average				0.016	173

[a] From outside of port to sampling point.

Pitot tube _____
Manometer _____
Thermometer _____

Stack Inside Dimensions _____

Stack Area = _____ ft^2

Barometric Pressure, P_b = _____ inches Hg, stack gauge

Pressure = _____ inches H_2O

Stack Abs. Pressure, P_s = _____ inches H_2O / 13.6 + P_b = _____ inches Hg

Stack Gas Temp., T_s = _____ °F. + 460 = _____ °R

Molecular Weight of Stack Gas, M_s = _____

1. $V_s = 174\ C_p \sqrt{\Delta p T_s} \times \frac{29.92}{P_s} \times \frac{28.96}{M_s}$

V_s = _____ ft/min

2. Volume = _____ ft/min x _____ ft^2 = _____ ft^3/min

Standard Volume at 70°F and 29.92 inches Hg:

3. $ft^3/min \times \frac{530}{T_s} \times \frac{P_s}{29.92}$ = _____ x $\frac{530}{29.92}$ x _____ =

_____ scfm

CALC. PERFORMED ON SPREADSHEET

V_s = 509 ft/min

T_{pump} = 298 °F

Data Recorder Rudy Moore

Date 10/25/89

Gas velocity and volume data.

Charging Test

CORPORATION

RESPONSIVE TO THE NEEDS OF ENVIRONMENTAL MANAGEMENT

Start time 4:27

Stop elapsed 3:41

Test No. 3

Location _____

Elapsed

VELOCITY TRAVERSE DATA

Point	Position, inches[a]	Reading, Δp inches of H_2O	$\sqrt{\Delta p}$	T_s, °F
~~0~~	.80		.00	140
~~20~~	.80		.00	150
60 ~~40~~	.75		.00	130
90 ~~1:30~~	.75		.00	140
2:00	.75		.00	150
2:30	.70		.00	150
3:00	.65		.00	135
3:30	.45		.00	180
3:41	.45		.00	180
Total				
Average				155

[a] From outside of port to sampling point.

Pitot tube _____
Manometer _____
Thermometer _____

Stack Inside Dimensions _____

Stack Area = _____ ft^2

Barometric Pressure, P_b = _____ inches Hg, stack gauge

Pressure = _____ inches H_2O

Stack Abs. Pressure, P_s = _____ inches H_2O / 13.6 + P_b = _____ inches Hg

Stack Gas Temp., T_s = _____ °F + 460 = _____ °R

Molecular Weight of Stack Gas, M_s = _____

1. $V_s = 174\ C_p \sqrt{\Delta p T_s} \times \frac{29.92}{P_s} \times \frac{28.96}{M_s}$

   V_s = _____ ft/min

2. Volume = _____ ft/min x _____ ft^2 = _____ ft^3/min

   Standard Volume at 70°F and 29.92 inches Hg:

3. $ft^3/min \times \frac{530}{T_s} \times \frac{P_s}{29.92}$ = _____ x $\frac{530}{29.92}$ x _____ =

   _____ scfm

CALC. PERFORMED ON SPREADSHEET

Data Recorder Rick Wilson

Date 10/25/89

V_s = 600 ft/min

T_{plume} = 343°F

Gas velocity and volume data.

Charging Test

HI VOL RUN 2

TIME	DELTA P (IN. H2O)	TEMPERATURE (F)	FLOW RATE (DSCFM)	VOLUME (DSCF)
0.00	0.65	120.	39.93	0.00
0.25	0.65	130.	39.62	9.94
0.50	0.50	150.	34.64	9.28
1.00	0.35	160.	29.25	15.97
1.25	0.35	160.	29.25	7.31
1.50	0.30	160.	27.27	7.06
1.75	0.30	160.	27.27	6.82
2.00	0.30	160.	27.27	6.82
2.25	0.25	160.	25.10	6.55
2.50	0.25	160.	25.10	6.28
2.75	0.25	155.	25.20	6.29
3.00	0.25	150.	25.29	6.31
3.50	0.25	150.	25.29	12.64

THE VOLUME SAMPLED DURING RUN # 2 = 101.27 DSCF

HI VOL RUN 3

TIME	DELTA P (IN. H2O)	TEMPERATURE (F)	FLOW RATE (DSCFM)	VOLUME (DSCF)
0.00	0.60	150.	37.63	0.00
0.50	0.60	150.	37.63	18.82

THE VOLUME SAMPLED DURING RUN # 3 = 18.82 DSCF

HI VOL RUN 4

TIME	DELTA P (IN. H2O)	TEMPERATURE (F)	FLOW RATE (DSCFM)	VOLUME (DSCF)
0.00	0.60	80.	39.77	0.00
0.50	0.60	150.	37.63	19.35
0.75	0.60	155.	37.49	9.39
1.00	0.55	160.	35.91	9.18
1.50	0.75	170.	41.04	19.24
2.00	0.70	170.	39.77	20.20

THE VOLUME SAMPLED DURING RUN # 4 = 77.36 DSCF

HI VOL RUN 5

TIME	DELTA P (IN. H2O)	TEMPERATURE (F)	FLOW RATE (DSCFM)	VOLUME (DSCF)
0.00	0.60	70.	40.11	0.00
0.25	0.60	90.	39.44	9.94
0.50	0.55	110.	37.31	9.59
0.75	0.70	170.	39.77	9.63
1.00	0.68	180.	38.97	9.84
1.25	0.65	180.	38.18	9.64
1.50	0.60	190.	36.56	9.34
1.75	0.60	190.	36.56	9.14
2.00	0.60	190.	36.56	9.14
2.50	0.55	180.	35.39	17.99
2.75	0.50	180.	33.90	8.66
3.00	0.50	170.	34.14	8.50

THE VOLUME SAMPLED DURING RUN # 5 = 111.44 DSCF

HI VOL RUN 1

TIME	DELTA P (IN. H2O)	TEMPERATURE (F)	FLOW RATE (DSCFM)	VOLUME (DSCF)
0.00	0.60	150.	38.01	0.00
1.03	0.50	140.	35.25	37.73

THE VOLUME SAMPLED DURING RUN # 1 = 37.73 DSCF

HI VOL RUN 2

TIME	DELTA P (IN. H2O)	TEMPERATURE (F)	FLOW RATE (DSCFM)	VOLUME (DSCF)
0.00	0.60	125.	38.74	0.00
0.50	0.60	125.	38.74	19.37
1.00	0.55	150.	36.53	18.82
2.00	0.70	160.	40.46	38.50
2.50	0.70	175.	40.02	20.12
2.75	0.65	175.	38.70	9.84
3.00	0.50	175.	34.35	9.13
3.65	0.50	175.	34.35	22.33

THE VOLUME SAMPLED DURING RUN # 2 = 138.11 DSCF

HI VOL RUN 3

TIME	DELTA P (IN. H2O)	TEMPERATURE (F)	FLOW RATE (DSCFM)	VOLUME (DSCF)
0.00	0.80	140.	43.63	0.00
0.50	0.80	150.	43.31	21.74
1.00	0.75	130.	42.70	21.50
1.50	0.75	140.	42.37	21.27
2.00	0.75	150.	42.06	21.11
2.50	0.70	150.	40.76	20.70
3.00	0.65	175.	38.70	19.87
3.50	0.45	180.	32.63	17.83
3.68	0.45	180.	32.63	5.87

THE VOLUME SAMPLED DURING RUN # 3 = 149.89 DSCF

HI VOL RUN 4

TIME	DELTA P (IN. H2O)	TEMPERATURE (F)	FLOW RATE (DSCFM)	VOLUME (DSCF)
0.00	0.80	130.	43.97	0.00
0.50	0.80	140.	43.63	21.90
1.00	0.80	150.	43.31	21.74
1.50	0.80	145.	43.47	21.69
2.00	0.80	150.	43.31	21.69
2.50	0.80	150.	43.31	21.65
3.00	0.70	160.	40.46	20.94
3.50	0.55	170.	36.00	19.12
3.66	0.55	175.	35.87	5.75

THE VOLUME SAMPLED DURING RUN # 4 = 154.49 DSCF

HI VOL RUN 5

TIME	DELTA P (IN. H2O)	TEMPERATURE (F)	FLOW RATE (DSCFM)	VOLUME (DSCF)
0.00	0.80	170.	42.68	0.00
0.50	0.80	170.	42.68	21.34
1.00	0.85	150.	44.52	21.80
1.50	0.80	150.	43.31	21.96
2.00	0.80	150.	43.31	21.65
2.50	0.80	150.	43.31	21.65
3.00	0.70	175.	40.02	20.83
3.50	0.65	175.	38.70	19.68

THE VOLUME SAMPLED DURING RUN # 5 = 148.92 DSCF

CASCADE IMPACTOR RESULTS

JEWELL INLAND
BATTERY #3-B PUSHING
COMPUTER RUN DATE 11/29/89
COMPUTER OPERATOR BM
TEST DATE 10/29/89
PROJ # 406000

RUN PUSHING 1
SAMPLING RATE 0.74 (ACFM) AT 177 DEGREES F
STAGE 1 INCLUDES PREIMPACTOR
STAGE 9--BACK-UP FILTER
PARTICLE DENSITY = 1.00 GRAMS/CM3

STAGE #	D50 MICRONS	% MASS	% (= D50
1.00	10.69	6.60	93.40
2.00	7.18	16.98	76.42
3.00	4.83	19.81	56.60
4.00	3.30	11.32	45.28
5.00	2.21	10.38	34.91
6.00	1.04	16.04	18.87
7.00	0.63	13.21	5.66
8.00	0.42	2.83	2.83
9.00		2.83	

CASCADE IMPACTOR RESULTS

JEWELL INLAND
BATTERY #3-B PUSHING
COMPUTER RUN DATE 11/29/89
COMPUTER OPERATOR SM
TEST DATE 10/29/89
PROJ # 406000

RUN PUSHING 2
SAMPLING RATE 0.70 (ACFM) AT 230 DEGREES F
STAGE 1 INCLUDES PREIMPACTOR
STAGE 9--BACK-UP FILTER
PARTICLE DENSITY = 1.00 GRAMS/CM3

STAGE #	D50 MICRONS	% MASS	% <= D50
1.00	11.32	52.71	47.29
2.00	7.60	17.05	30.23
3.00	5.14	13.50	16.73
4.00	3.49	3.88	12.85
5.00	2.23	1.55	8.30
6.00	1.10	5.43	3.88
7.00	0.67	3.10	0.78
8.00	0.44	0.78	0.00
9.00		0.00	

CASCADE IMPACTOR RESULTS

JEWELL INLAND
BATTERY #3-B PUSHING
COMPUTER RUN DATE 11/29/89
COMPUTER OPERATOR BM
TEST DATE 10/29/89
PROJ # 406000

RUN CHARGING 1
SAMPLING RATE 0.93 (.4CFM) AT 300 DEGREES F
STAGE 1 INCLUDES PREIMPACTOR
STAGE 9--BACK-UP FILTER
PARTICLE DENSITY = 1.00 GRAMS/CM3

STAGE #	D50 MICRONS	% MASS	% <= D50
1.00	10.17	12.50	87.50
2.00	6.82	18.75	68.75
3.00	4.61	18.75	50.00
-.00	3.13	3.13	[illegible]
5.00	1.99	12.50	34.38
6.00	0.97	12.50	21.88
7.00	0.58	6.25	15.63
8.00	0.38	6.25	9.38
9.00		9.38	

CASCADE IMPACTOR RESULTS

JEWELL INLAND
BATTER #3-B CHARGING
COMPUTER RUN DATE 1-3-90
COMPUTER OPERATOR DC
TEST DATE [illegible] 10-28-89 1/5/90
PROJ # 406003.12

RUN CHARGING 2
SAMPLING RATE 0.98 (ACFM) AT 380 DEGREES F
STAGE 1 INCLUDES PRESEPARATOR
STAGE 5--BACK-UP FILTER
PARTICLE DENSITY = 1.00 GRAMS/CM3

STAGE #	D50 MICRONS	% MASS	% < D50
[illegible]	10.22	70.09	29.91
[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	1.99	2.80	10.15
[illegible]	0.96	1.74	3.41
[illegible]	0.57	4.07	[illegible]
0.00	0.37	1.60	1.00
[illegible]		0.93	

SOURCE SAMPLING CASCADE IMPACTOR TEST LAB DATA SHEET

COMPANY Tunnell / Ireland DATE 10-29-89

SOURCE Battery #3-B Pushing RUN NO. 1

STAGE	FILTER NO.	INITIAL WEIGHT	FINAL WEIGHT	PARTICULATE WEIGHT	% IN SIZE RANGE	SIZE RANGE (Microns)
0						
1	(X) Back-up	0.2738	0.2741	0.0003		
2	" 1	0.1603	0.1610	0.0007		
3	" 2	0.1443	0.1461	0.0018		
4	" 3	0.1597	0.1618	0.0021		
5	" 4	0.1438	0.1450	0.0012		
6	" 5	0.1594	0.1605	0.0011		
7	" 6	0.1441	0.1458	0.0017		
8	" 7	0.1598	0.1612	0.0014		
9	" 8	0.1438	0.1441	0.0003		

TOTAL PARTICULATE COLLECTED 0.0106

1. PROJECT NAME Tunnell / Ireland
2. SOURCE Battery #3-B Pushing
3. COMPUTER RUN DATE
4. TEST DATE 10-29-89
5. PROJECT NUMBER 406110
6. RUN I.D. 1 Pushing 3
7. BAROMETRIC PRESSURE (IN HG.) 29.14
8. STACK GAS GAUGE PRESSURE (IN W.C.) 0
9. SAMPLING TIME (MIN.) 20
10. AVERAGE GAS METER TEMP. (F) 137
11. AVERAGE GAS METER PRESSURE (IN W.C.) 1.5
12. AVERAGE STACK GAS TEMP. (F) 177
13. VOLUME OF GAS METERED (CF) 14.2
14. STACK GAS MOISTURE (% VOLUME) 7
15. GAS METER CALIBRATION FACTOR (Y) .179
16. TOTAL PARTICULATE (g) 0.0106
17. PARTICLE DENSITY (GRAMS/CM^3 -- USUALLY 1.0) 1.0

INTERNATIONAL TECHNOLOGY CORPORATION

SOURCE SAMPLING CASCADE IMPACTOR TEST LAB DATA SHEET

COMPANY Tunnell / Ireland DATE 10-29-89

SOURCE Battery #3-B Pushing RUN NO. 1

STAGE	FILTER NO.	INITIAL WEIGHT	FINAL WEIGHT	PARTICULATE WEIGHT	% IN SIZE RANGE	SIZE RANGE (Microns)
Pre-impactor 0	(29) 8726	0.3441	0.3507	0.0066		
1	" 1	0.1679	0.1681	0.0002		
2	" 2	0.1491	0.1513	0.0022		
3	" 3	0.1668	0.1688	0.0020		
4	" 4	0.1508	0.1513	0.0005		
5	" 5	0.1672	0.1674	0.0002		
6	" 6	0.1489	0.1496	0.0007		
7	" 7	0.1556	0.1560	0.0004		
8	" 8	0.1510	0.1511	0.0001		
9	" (Final)	0.2163	0.2163	0.0000		

TOTAL PARTICULATE COLLECTED 0.013

1. PROJECT NAME Tunnell / Ireland
2. SOURCE Battery #3-B Pushing
3. COMPUTER RUN DATE
4. TEST DATE 10-29-89
5. PROJECT NUMBER [illegible]
6. RUN I.D. Pressure 1
7. BAROMETRIC PRESSURE (IN HG.) 29.1
8. STACK GAS GAUGE PRESSURE (IN W.C.) 0
9. SAMPLING TIME (MIN.) 20.0
10. AVERAGE GAS METER TEMP. (F) 155
11. AVERAGE GAS METER PRESSURE (IN W.C.) 1.5
12. AVERAGE STACK GAS TEMP. (F) 230
13. VOLUME OF GAS METERED (CF) 12.725
14. STACK GAS MOISTURE (% VOLUME) 0
15. GAS METER CALIBRATION FACTOR (Y) Ave. 979
16. TOTAL PARTICULATE (g) 0.013
17. PARTICLE DENSITY (GRAMS/CM^3 — USUALLY 1.0) 1.0

INTERNATIONAL TECHNOLOGY CORPORATION

SOURCE SAMPLING CASCADE IMPACTOR TEST LAB DATA SHEET

COMPANY Tunnell / Ensland DATE 10-28-89

SOURCE Battery #3-B Charging RUN NO. 1

STAGE	FILTER NO.	INITIAL WEIGHT	FINAL WEIGHT	PARTICULATE WEIGHT	% IN SIZE RANGE	SIZE RANGE (Microns)
0						
1	[illegible]K-10	0.2705	0.2708	0.0003		
2	" 1	0.1627	0.1631	0.0004		
3	" 9	0.1453	0.1459	0.0006		
4	" 3	0.1620	0.1626	0.0006		
5	" 4	0.1465	0.1466	0.0001		
6	" 5	0.1631	0.1635	0.0004		
7	" 6	0.1464	0.1468	0.0004		
8	" 7	0.1622	0.1624	0.0002		
9	" 8	0.1463	0.1465	0.0002		

TOTAL PARTICULATE COLLECTED [illegible]

1. PROJECT NAME Tunnell / Ensland
2. SOURCE Battery #3-B Charging
3. COMPUTER RUN DATE
4. TEST DATE 10-28-89
5. PROJECT NUMBER 406000
6. RUN I.D. [illegible] - 1
7. BAROMETRIC PRESSURE (IN HG.) 29.45
8. STACK GAS GAUGE PRESSURE (IN W.C.) 0
9. SAMPLING TIME (MIN.) 60
10. AVERAGE GAS METER TEMP. (F) 89.5
11. AVERAGE GAS METER PRESSURE (IN W.C.) 1.5
12. AVERAGE STACK GAS TEMP. (F) 300
13. VOLUME OF GAS METERED (CF) 4.75
14. STACK GAS MOISTURE (% VOLUME) —
15. GAS METER CALIBRATION FACTOR (Y) .979
16. TOTAL PARTICULATE (g) .0032
17. PARTICLE DENSITY (GRAMS/CM^3 -- USUALLY 1.0) 1.0

INTERNATIONAL TECHNOLOGY CORPORATION

SOURCE SAMPLING CASCADE IMPACTOR TEST LAB DATA SHEET

COMPANY Jewell / Inland DATE 1-29-79

SOURCE Battery #3-B Charging RUN NO. 2

STAGE	FILTER NO.	INITIAL WEIGHT	FINAL WEIGHT	PARTICULATE WEIGHT	% IN SIZE RANGE	SIZE RANGE (Microns)
0	9723	0.3419	0.3490	0.0071		
-1	(2) Back-up	0.2746	0.2747	0.0001		
2	" 1	0.1596	0.1600	0.0004	0.0075	
3	" 2	0.1443	0.1450	0.0007		
4	" 3	0.1598	0.1603	0.0005		
5	" 4	0.1441	0.1445	0.0004		
6	" 5	0.1601	0.1604	0.0003		
7	" 6	0.1443	0.1446	0.0004		
8	" 7	0.1593	0.1598	0.0005		
9	" 8	0.1443	0.1446	0.0003		

TOTAL PARTICULATE COLLECTED 0.011

1. PROJECT NAME Jewell / Inland
2. SOURCE Battery #3-B Charging
3. COMPUTER RUN DATE
4. TEST DATE 10-28-79
5. PROJECT NUMBER 406100
6. RUN I.D. 2 Charging
7. BAROMETRIC PRESSURE (IN HG.) 29.45
8. STACK GAS GAUGE PRESSURE (IN W.C.) 7
9. SAMPLING TIME (MIN.) [illegible]
10. AVERAGE GAS METER TEMP. (F) [illegible] 105
11. AVERAGE GAS METER PRESSURE (IN W.C.) 1.5
12. AVERAGE STACK GAS TEMP. (F) [illegible] 381
13. VOLUME OF GAS METERED (CF) [illegible]
14. STACK GAS MOISTURE (% VOLUME) 0
15. GAS METER CALIBRATION FACTOR (Y) [illegible] .979
16. TOTAL PARTICULATE (g) 0.011
17. PARTICLE DENSITY (GRAMS/CM^3 -- USUALLY 1.0) 1.0

INTERNATIONAL TECHNOLOGY CORPORATION

checked by JC 1/3/90

SOURCE SAMPLING CASCADE IMPACTOR TEST LAB DATA SHEET

COMPANY Tenneco / Inland DATE 10-29-89

SOURCE Battery #3-B Pushing RUN NO. 2

STAGE	FILTER NO.	INITIAL WEIGHT	FINAL WEIGHT	PARTICULATE WEIGHT	% IN SIZE RANGE	SIZE RANGE (Microns)
Pre-impactor 0	(29) 8726	0.3441	0.3507	0.0066		
1	" 1	0.1679	0.1681	0.0002		
2	" 2	0.1491	0.1513	0.0022		
3	" 3	0.1668	0.1688	0.0020		
4	" 4	0.1508	0.1513	0.0005		
5	" 5	0.1672	0.1674	0.0002		
6	" 6	0.1489	0.1496	0.0007		
7	" 7	0.1556	0.1560	0.0004		
8	" 8	0.1510	0.1511	0.0001		
9	" (FINAL)	0.2163	0.2163	0.0000		

TOTAL PARTICULATE COLLECTED 0.013

1. PROJECT NAME Tenneco / Inland
2. SOURCE Battery #3-B Pushing
3. COMPUTER RUN DATE
4. TEST DATE 10-29-89
5. PROJECT NUMBER 406022.12
6. RUN I.D. Pushing 2
7. BAROMETRIC PRESSURE (IN HG.) 29.14
8. STACK GAS GAUGE PRESSURE (IN W.C.) Ø
9. SAMPLING TIME (MIN.) 20.0
10. AVERAGE GAS METER TEMP. (F) 155
11. AVERAGE GAS METER PRESSURE (IN W.C.) 1.5
12. AVERAGE STACK GAS TEMP. (F) 230
13. VOLUME OF GAS METERED (CF) 12.735
14. STACK GAS MOISTURE (% VOLUME) Ø
15. GAS METER CALIBRATION FACTOR (Y) Est. .979
16. TOTAL PARTICULATE (g) 0.013
17. PARTICLE DENSITY (GRAMS/CM^3 — USUALLY 1.0) 1.0

INTERNATIONAL TECHNOLOGY CORPORATION

Checked by JC 1/3/

SOURCE SAMPLING CASCADE IMPACTOR TEST LAB DATA SHEET

COMPANY Jewell / Inland DATE 10-28-89

SOURCE Battery #3-B Charging RUN NO. 2

STAGE	FILTER NO.	INITIAL WEIGHT	FINAL WEIGHT	PARTICULATE WEIGHT	% IN SIZE RANGE	SIZE RANGE (Microns)
Reimpactor 8	8723	0.3419	0.3490	0.0071		
1	(2) Back-up	0.2746	0.2747	0.0001		
2	" 1	0.1596	0.1600	0.0004	0.0075	
3	" 2	0.1443	0.1450	0.0007		
4	" 3	0.1598	0.1603	0.0005		
5	" 4	0.1441	0.1445	0.0004		
6	" 5	0.1601	0.1604	0.0003		
7	" 6	0.1442	0.1446	0.0004		
8	" 7	0.1593	0.1598	0.0005		
9	" 8	0.1443	0.1446	0.0003		

TOTAL PARTICULATE COLLECTED 0.011

1. PROJECT NAME Jewell / Inland
2. SOURCE Battery #3-B Charging
3. COMPUTER RUN DATE
4. TEST DATE 10-28-89
5. PROJECT NUMBER 406000
6. RUN I.D. 8 Charging 2
7. BAROMETRIC PRESSURE (IN HG.) 29.45
8. STACK GAS GAUGE PRESSURE (IN W.C.) Ø
9. SAMPLING TIME (MIN.) ~~60~~ 13180 msm 1/3/89
10. AVERAGE GAS METER TEMP. (F) ~~104~~ 105 msm 1/3/89
11. AVERAGE GAS METER PRESSURE (IN W.C.) 1.5
12. AVERAGE STACK GAS TEMP. (F) ~~361~~ 381 msm 1/3/89
13. VOLUME OF GAS METERED (CF) ~~4.305~~ 3.375 msm 1/3/89
14. STACK GAS MOISTURE (% VOLUME) Ø
15. GAS METER CALIBRATION FACTOR (Y) ~~.981~~ .979
16. TOTAL PARTICULATE (g) 0.011
17. PARTICLE DENSITY (GRAMS/CM^3 -- USUALLY 1.0) 1.0

INTERNATIONAL TECHNOLOGY CORPORATION

CLIENT _____ SOURCE _____

RUN NO. _____ BAROMETRIC PRESSURE _____
DATE _____ STATIC PRESSURE _____
OPERATORS _____ AMBIENT TEMPERATURE _____
METER BOX NO. _____ PROBE LENGTH _____
SAMPLE BOX NO. _____ PROBE LINER _____
FILTER NO. _____ PORT LENGTH _____
PROBE HEATER SETTING _____ PORT DIAMETER _____

SCHEMATIC OF STACK

TRAVERSE POINT NUMBER	SAMPLING TIME CLOCK	SAMPLING TIME SAMPLE	VELOCITY HEAD (ΔPs)	VELOCITY HEAD (√ΔPs)	ORIFICE METER (ΔH) in. H2O ACTUAL	ORIFICE METER (ΔH) in. H2O DESIRED	GAS SAMPLE TEMP. AT DRY GAS METER INLET (Tm) °F	GAS SAMPLE TEMP. AT DRY GAS METER OUTLET (Tm) °F	PUMP VACUUM GAUGE in. Hg	SAMPLE BOX TEMP. °F	TEMP. OF GAS LEAVING LAST IMPINGER °F	GAS SAMPLE VOLUME (Vm), ft³
TOTAL												
AVERAGE												

STATIC PITOT LEAK-CHECK @ 13 in.	
IMPACT PITOT LEAK-CHECK @ 13 in.	
TRAIN LEAK RATE @ 60 sec:	cf @ in.
TRAIN LEAK RATE @ 60 sec:	cf @ in.

STACK GAS ANALYSIS				
TIME	CO2	O2	CO	N2

NOZZLE CALIBRATION I.D. NO.		
	PRETEST	POST-TEST
DIA. 1		DIA. 1
DIA. 2		DIA. 2
DIA. 3		DIA. 3
AVERAGE		AVERAGE

INTERNATIONAL TECHNOLOGY CORPORATION

SIGNATURE _____
TEST TEAM LEADER

CLIENT Jewell SOURCE Pushing Emissions

RUN NO. P1-2 (JC 1/3/90)

DATE [illegible]

OPERATORS [illegible]

METER BOX NO. [illegible]

SAMPLE BOX NO. NA

FILTER NO. NA

PROBE HEATER SETTING NA

BAROMETRIC PRESSURE 29.14

STATIC PRESSURE 29.14

AMBIENT TEMPERATURE NA

PROBE LENGTH

PROBE LINER

PORT LENGTH

PORT DIAMETER

SCHEMATIC OF STACK

Checked by JC 1/3/

Pushing Emissions

TRAVERSE POINT NUMBER	SAMPLING TIME CLOCK	SAMPLING TIME SAMPLE	VELOCITY HEAD (Δ Ps)	VELOCITY HEAD (√Δ Ps)	ORIFICE METER (ΔH) in. H₂O ACTUAL	ORIFICE METER (ΔH) in. H₂O DESIRED	GAS SAMPLE TEMP. AT DRY GAS METER INLET (Tm_in) °F	GAS SAMPLE TEMP. AT DRY GAS METER OUTLET (Tm_out) °F	PUMP VACUUM GAUGE in. Hg	SAMPLE BOX TEMP. °F	TEMP. OF GAS LEAVING LAST IMPINGER °F	GAS SAMPLE VOLUME (Vm), ft³
[illegible]	[illegible]	[illegible]	[illegible]		1.5		125	132	[illegible]		185.45	
Set-X		[illegible]			1.5		142	133			[illegible]	
		[illegible]					147	134			[illegible]	
[illegible]		[illegible]	[illegible]		1.5		157	149	[illegible]		[illegible]	
Set-21		[illegible]	[illegible]				[illegible]	15[illegible]			[illegible]	
		[illegible]	[illegible]				16[illegible]	15[illegible]			212.375	
TOTAL												
AVERAGE												

STATIC PITOT LEAK-CHECK @ 15 sec. NA

IMPACT PITOT LEAK-CHECK @ 15 sec.

TRAIN LEAK RATE @ 60 sec.: cf @ in.

TRAIN LEAK RATE @ 60 sec.: cf @ in.

STACK GAS ANALYSIS				
TIME	CO_2	O_2	CO	N_2
NA				

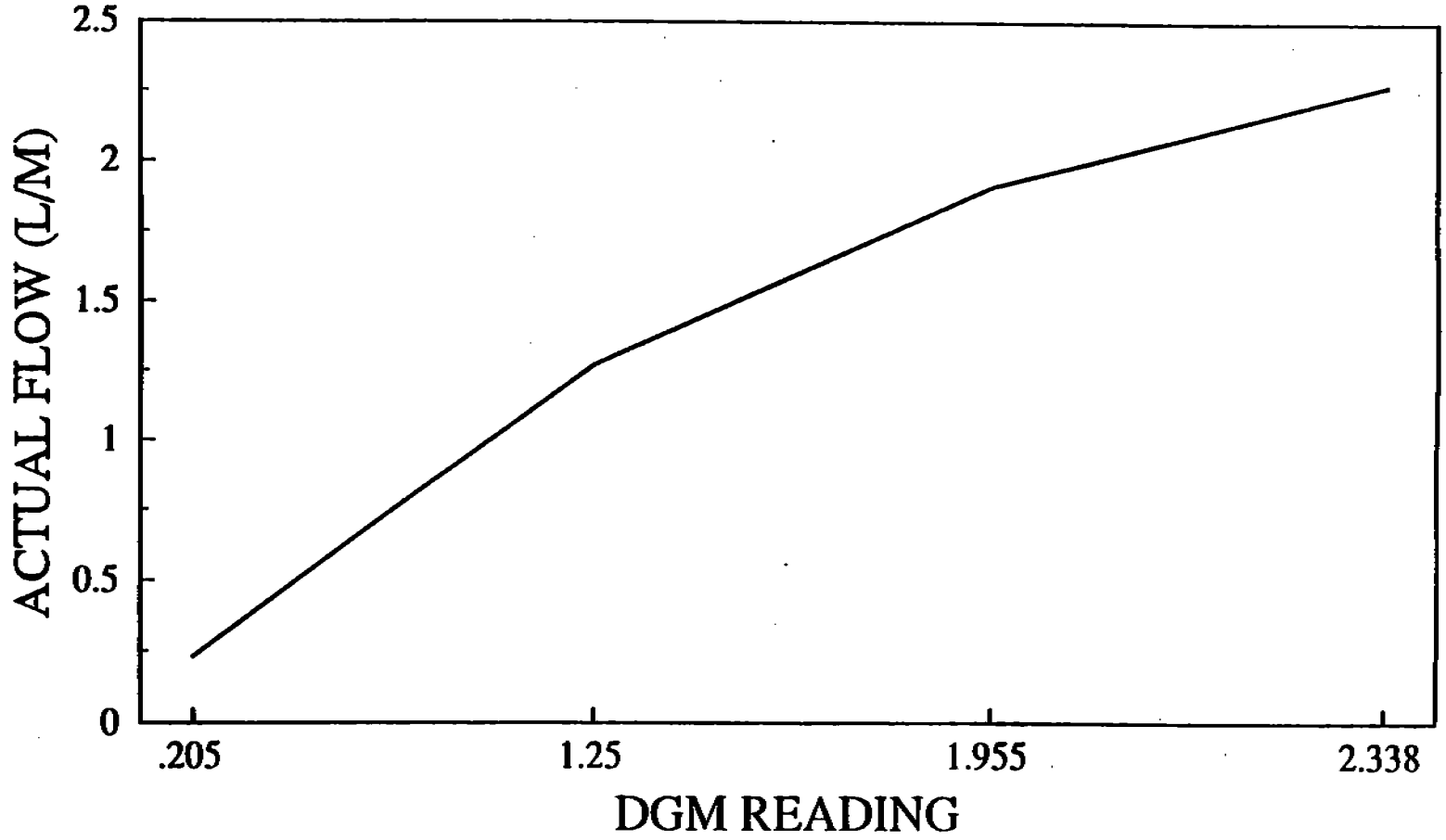
NOZZLE CALIBRATION-I.D. NO.			
PRETEST		POST-TEST	
DIA. 1	NA	DIA. 1	
DIA. 2		DIA. 2	
DIA. 3		DIA. 3	
AVERAGE		AVERAGE	

INTERNATIONAL TECHNOLOGY CORPORATION

SIGNATURE Mike [illegible]

TEST TEAM LEADER

VOST 2 DRY GAS METER CALIBRATION



CALIBRATED BY: M. BLAKE SHIRLEY
11/30/89

Y=0.955(X)+0.048

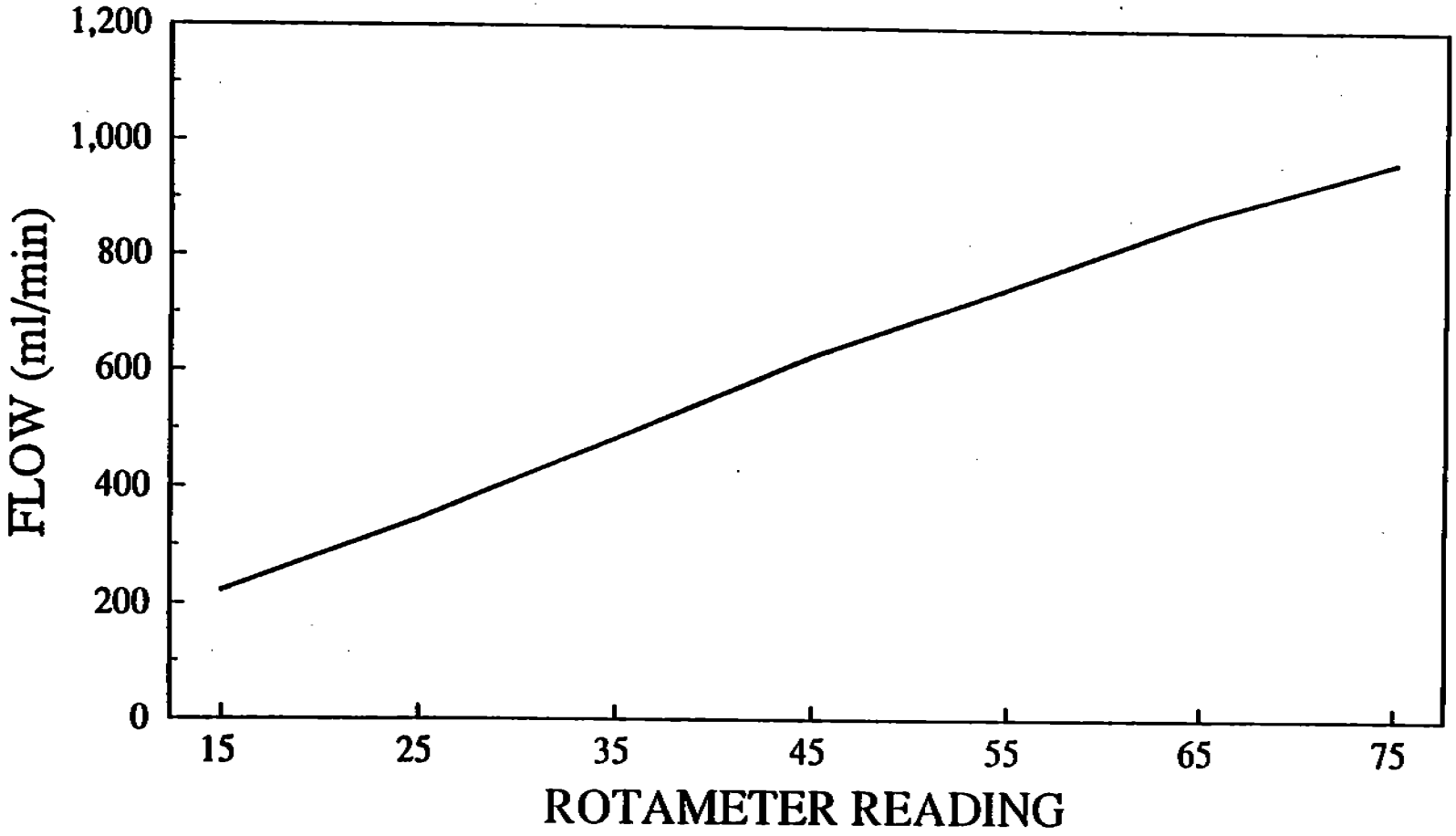
VOST BOX 2 CALIBRATION
PERFORMED 11/30/89
BY M. BLAKE SHIRLEY

DELTA P (inches H2O)	DGM READING (l/m) (l/m)	BUBBLEMETER READING (ml/m)	METER TEMP. (C)
1	0.205	230.3	23
2	1.250	1,271.0	23
3	1.955	1,909.0	24
4	2.338	2,270.0	25

BAR. PSR. - 29.5" Hg

M Blake Shirley

VOST BOX 2 ROTAMETER CALIBRATION



CALIBRATED BY: M. BLAKE SHIRLEY
11/30/89

Y=12.737(X)+37.057

VOST BOX 2 ROTAMETER CALIBRATION

PERFORMED ON 11/30/89

BY M. BLAKE SHIRLEY

ROTAMETER READING	BUBBLEMETER READING (ml/m)	STD CONDITIONS
15	224.1	221.7
25	348.7	344.9
35	490.2	484.9
45	635.1	628.2
55	756.7	748.5
65	882.0	872.5
75	981.5	970.9

BAR. PSR. - 29.5
TEMP. - 72 F

Date 5/2/89 BOX# VOST-1

Orifice Manometer Setting(^H)	Calibrator Gas Volume(Vw Ft3)		Box Dry Gas Meter(Vd Ft3)	Calibrator Meter Temp(Tw F)	Dry Gas Meter Inlet(Tdi F)	Dry Gas Meter Outlet(Tdo F)	Dry Gas Meter Avg(Td F)	Time Tenths(min)	Gamma (Y)	Barometric Pressure(in.Hg)
1.5	0.25	0.247	0.25	68	68	69.8	68.9	4.77	0.987553	29.69
2	0.25	0.247	0.2493	68	69.8	71.6	70.7	3.62	0.992210	
3	0.25	0.247	0.2489	68	71.6	73.4	72.5	2.92	0.994462	
4	0.5	0.494	0.5003	68	73.4	75.2	74.3	5.03	0.990186	
									Avg Y	
									0.991103	

CALIBRATED BY - N. BLAKE SHIRLEY

N Blake Shirley

[redacted] DL BL [redacted] RATIL [redacted] OSHEL [redacted]

Orifice Manometer Setting(delta H)	Calibrator Gas Volume (ft3) Desired	Actual Vw	Control Box Gas Volume (ft3) Vd	Calibrator Temp (F) Tw	Control Box Inlet (F) Tdi	Control Box Outlet (F) Tdo	Control Box Avg Temp (F) Td	Time Tenths(min)	Gamma (Y) Y	Delta H@ Delta H@	Barometric Pressure(in.Hg)
0.5	5	4.919	5.15	69	94	78	86	12.13	0.984692	1.704925	29.4
1	5	4.907	5.282	69	104	82	93	8.73	0.968690	1.762197	
2	10	9.776	10.445	69	110	88	99	12.35	0.984144	1.757317	
4	10	9.727	10.57	69	120	96	108	8.92	0.978350	1.625317	
									Avg Y	Avg Delta H@	
									0.978969	1.762439	

BOX ID NUMBER - 2
CALIBRATION STANDARD - SECONDARY
CALIBRATION STANDARD ID - DGN1
DATE CALIBRATED - 10-3-89

CALIBRATED BY - M. BLAKE SHIRLEY

SIGNATURE - M Blake Shirley

Y - RATIO OF ACCURACY OF WET TEST METER
TOLERANCE = +/- 0.02

DELTA H@ - ORIFICE PRESSURE DIFFERENTIAL THAT YIELDS 0.75 CFM OF AIR AT 70 DEGREES F AND 29.92 INCHES OF MERCURY
TOLERANCE = +/- 0.20

Orifice Manometer Setting(delta H)	Calibrator Gas Volume (ft3) Desired	Actual	Control Box Gas Volume (ft3)	Calibrator Temp (F)	Control Box Inlet (F)	Control Box Outlet (F)	Control Box Avg Temp (F)	Time Tenths(min)	Gamma (Y)	Delta H@	Barometric Pressure(in.Hg)
		Vw	Vd	Tw	Tdi	Tdo	Td		Y	Delta H@	
0.5	5	4.923	4.933	66	89	75	82	13.48	1.026982	2.076517	29.6
1	5	4.912	4.945	66	98	80	89	9.75	1.034089	2.162339	
2	10	9.789	10.026	66	108	87	97.5	13.67	1.029680	2.112864	
4	10	9.740	9.867	66	112	92	102	9.63	1.044360	2.098718	
									Avg Y	Avg Delta H@	
									1.033778	2.112609	

BOX ID NUMBER - 4
CALIBRATION STANDARD - SECONDARY
CALIBRATION STANDARD ID - DGM1
DATE CALIBRATED - 10-13-89

CALIBRATED BY - GREG FISHBACK

SIGNATURE - Greg Fishback

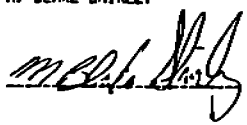
Y - RATIO OF ACCURACY OF WET TEST METER
TOLERANCE = +/- 0.02

DELTA H@ - ORIFICE PRESSURE DIFFERENTIAL THAT YIELDS 0.75 CFM OF AIR AT 70 DEGREES F AND 29.92 INCHES OF MERCURY
TOLERANCE = +/- 0.20

Orifice Manometer Setting(delta H)	Calibrator Gas Volume (ft3) Desired	Actual Vw	Control Box Gas Volume (ft3) Vd	Calibrator Temp (F) Tw	Control Box Inlet (F) Tdi	Control Box Outlet (F) Tdo	Control Box Avg Temp (F) Td	Time Tenths(min)	Gamma (Y) Y	Delta H@ Delta H@	Barometric Pressure(in.Hg)
0.5	5	4.920	4.505	70	81	70	75.5	12.43	1.102111	1.833601	29.24
1	5	4.907	4.574	70	94	76	85	8.8	1.100434	1.827144	
2	10	9.784	9.32	70	95	83	89	13.15	1.081991	2.026149	
4	10	9.736	9.245	71	112	88	100	9.35	1.099515	2.058026	
									Avg Y	Avg Delta H@	
									1.096013	1.936230	

BOX ID NUMBER - 3
CALIBRATION STANDARD - SECONDARY
CALIBRATION STANDARD ID - DGM1
DATE CALIBRATED - 6-1-89

CALIBRATED BY - M. BLAKE SHIRLEY

SIGNATURE - 

Y - RATIO OF ACCURACY OF WET TEST METER
TOLERANCE = +/- 0.02

DELTA H@ - ORIFICE PRESSURE DIFFERENTIAL THAT YIELDS 0.75 CFM OF AIR AT 70 DEGREES F AND 29.92 INCHES OF MERCURY
TOLERANCE = +/- 0.20

Orifice Manometer Setting(delta H)	Calibrator Gas Volume (ft3) Desired	Actual Vw	Control Box Gas Volume (ft3) Vd	Calibrator Temp (F) Tw	Control Box Inlet (F) Tdi	Control Box Outlet (F) Tdo	Control Box Avg Temp (F) Td	Time Tenths(min)	Gamma (Y) Y	Delta H@ Delta H@	Barometric Pressure(in.Hg)
0.5	5	4.922	4.73	72	71	62	66.5	13.13	1.028523	2.080183	29.4
1	5	4.911	4.805	72	98	73	85.5	9.52	1.045283	2.151906	
2	10	9.789	9.685	72	106	79	92.5	13.73	1.044479	2.227541	
4	10	9.740	9.71	73	112	86	99	9.62	1.041631	2.188973	
									Avg Y	Avg Delta H@	
									1.039979	2.162151	

BOX ID NUMBER - 4
CALIBRATION STANDARD - SECONDARY
CALIBRATION STANDARD ID - DGM1
DATE CALIBRATED - 12-18-89

CALIBRATED BY - M. BLAKE SHIRLEY

SIGNATURE - 

Y - RATIO OF ACCURACY OF WET TEST METER
TOLERANCE = +/- 0.02

DELTA H@ - ORIFICE PRESSURE DIFFERENTIAL THAT YIELDS 0.75 CFM OF AIR AT 70 DEGREES F AND 29.92 INCHES OF MERCURY
TOLERANCE = +/- 0.20

Orifice Manometer Setting(delta H)	Calibrator Gas Volume (ft3) Desired	Actual Vw	Control Box Gas Volume (ft3) Vd	Calibrator Temp (F) Tw	Control Box Inlet (F) Tdi	Control Box Outlet (F) Tdo	Control Box Avg Temp (F) Td	Time Tenths(min)	Gamma (Y) Y	Delta H@ Delta H@	Barometric Pressure(in.Hg)
0.5	5	4.919	4.4	72	64	60	62	11.85	1.095475	1.724831	29.03
1	5	4.905	4.45	72	72	64	68	8.39	1.091192	1.725651	
2	10	9.779	9.04	72	95	72	83.5	12.56	1.099506	1.916848	
4	10	9.726	9.1	72	104	77	90.5	8.87	1.094918	1.914508	
									Avg Y	Avg Delta H@	
									1.095273	1.820460	

BOX ID NUMBER - 3
CALIBRATION STANDARD - SECONDARY
CALIBRATION STANDARD ID - DGM1
DATE CALIBRATED - 12-15-89

CALIBRATED BY - M. BLAKE SHIRLEY

SIGNATURE - M Blake Shirley

Y - RATIO OF ACCURACY OF WET TEST METER
TOLERANCE = +/- 0.02

DELTA H@ - ORIFICE PRESSURE DIFFERENTIAL THAT YIELDS 0.75 CFM OF AIR AT 70 DEGREES F AND 29.92 INCHES OF MERCURY
TOLERANCE = +/- 0.20

Coal Blend Proximate Analyses

for 10/29/89

Moisture - 10.8%

VM - 25.9%

Ash - 6.8%

Sulfur - 0.68%

Note: VM, Ash & Sulfur values are calculated on a dry basis

INTERNATIONAL TECHNOLOGY CORPORATION

By JC Date 1/31/90 Subject C + H_2 Sales Sheet No. 1 of

Chkd. By [illegible] Date 1/5/90 Thompson Coke Plant Proj. No. 46103.

A) Purpose: Compare maximum C + H_2 gas quantities with expected values.

B) Assumptions:

1) Coal Analysis:

[illegible] 10.8%
[illegible]
[illegible]
[illegible]
FC 67.3%) dry basis

2) [illegible]

3) Coke oven pushing rate, C/T, t_1 = 20 hrs or 7200 C, 85% t_2

4) Oven size = $\frac{20}{1}$ 20T

5) Coal charged = 24 tons

a) Yields - Volatile C + H_2 Proximate Analysis ~ 37
(for 1a coals with similar volatiles - reference standard

c) Yields/hr = 24 tons/oven x (1 - $\frac{10.8\%}{100}$) x $\frac{35.2\%\ Vol}{100}$ x 0.77 (C+H_2/t_2 x 2000 lbs/T ~
= 854 lbs/oven dry x 5.67 $\frac{ovens}{stack}$ = 74,000 lbs C + H_2/

D) Volatiles up stack

CO_2 = 74,000 lbs Vol x 0.75% C x $\frac{44\ lbs\ CO_2}{12\ lbs\ C}$ = 203,500 lbs CO_2

H_2O = 74,000 lbs Vol x 7.2% H_2 x $\frac{18\ lbs\ H_2O}{2\ lbs\ H_2}$ = 166,500 lbs H_2O

E) Moisture up stack = 24 tons coal/oven x $\frac{10.8\%\ moisture}{100}$ x 5.67 $\frac{ovens}{stack}$ x [illegible]
= 44,900 lbs H_2O

INTERNATIONAL TECHNOLOGY CORPORATION

By _____ Date _____ Subject _____ Sheet No. _____ of _____

Chkd. By _____ Date _____ Proj. No. _____

F) Measured $CO_2 + H_2O$ in tank

H_2O = 176,000 lbs

CO_2 = 178,000 lbs

G) Comparison of measured / calculated

CO_2 = 178,000 lbs / [illegible] = 0.97 (1E-1 mol)

H_2O = 176,000 lbs / (166,000 + 166,000) = 1.06 (1.0E-1 lbs/mol)

∴ [illegible]

INTERNATIONAL TECHNOLOGY CORPORATION

By ____ Date ____ Subject ____ Sheet No. 3 of ____

Chkd. By ____ Date 11/7/90 ____ Proj. No. 410300

Useful tables for engineers and steam users

Thirteenth edition 1978

Typical As-Fired Analyses of Various Bituminous Coals

STATE		Tennessee		Virginia		
COUNTIES		Campbell, Claiborne, Scott, Anderson, Morgan, Fentress, Overton, White	Marion, Grundy, Sequatchie, Bledsoe, Hamilton, Cumberland, Rhea	Tazewell, Buchanan	Tazewell, Dickenson, Buchanan, Harlan	Wise, Lee, Scott, Russell
DISTRICTS OR SEAMS				Pocahontas No. 3		
A.S.T.M. Rank		Class II — Group 3	Class II — Group 3	Class II — Group 1	Class II — Group 3	Class II — Group 3
% By Wt. As Rec'd	Moisture	2.50	3.00	4.00	2.50	2.50
	VM	37.46	30.86	18.40	39.95	34.50
	FC	55.04	38.14	73.60	60.55	57.00
	Ash	5.00	8.00	4.00	7.00	6.00
	Total	100.00	100.00	100.00	100.00	100.00
% By Wt. Dry Ash	Ash	5.00	8.00	4.00	7.00	6.00
	S	1.85	1.07	0.84	0.91	0.91
	H	5.18	4.78	4.42	4.80	4.84
	C	77.15	76.78	82.17	79.18	77.87
	Moisture	2.50	3.00	4.00	2.50	2.50
	N	1.28	1.31	1.50	1.54	1.30
	O	7.04	4.98	2.97	4.15	6.48
	Total	100.00	100.00	100.00	100.00	100.00
Heat Value, Btu/lb (Fuel-Ash), lb/10,000 Btu		13,900	13,550	14,550	14,000	13,900
Theor. Air, lb/10,000 Btu		0.483	0.479	0.488	0.484	0.476
Total H_2O, lb/10,000 Btu		7.560	7.570	7.410	7.570	7.570
		0.233	0.325	0.300	0.305	0.336

$V.I = -4.29/VM$ Pol.: $\frac{83.17 - 73.63) + 4.92}{18.40}$: $\frac{(79 - 63.55) - 4.50}{20.45}$

2.76 2.72

Average 2.77

Table 3A

DAILY PROXIMATE ANALYSES OF COKE FROM THE EXTENDED PLANT TRIALS IN VANSANT

Test Day	Size Fraction, inches	Size Distribution, %	Coke Quality VM, %	Ash, %	Sulfur, %
First Day	+2.0	44.0	0.6	8.4	0.53
	+1.0	52.0	0.7	8.3	0.54
	+0.75	4.0	0.5	8.2	0.54
	Composite		0.7	8.3	0.54
Second Day	+2.0	37.3	0.5	8.3	0.53
	+1.0	57.9	0.6	8.2	0.53
	+0.75	4.8	0.5	8.3	0.52
	Composite		0.6	8.2	0.53
Third Day	+2.0	35.8	0.2	8.6	0.50
	+1.0	56.3	0.3	8.2	0.50
	+0.75	4.8	0.4	8.2	0.51
	Composite		0.3	8.4	0.50
Fourth Day	+2.0	38.8	0.7	8.6	0.51
	+1.0	56.3	0.6	8.6	0.51
	+0.75	4.9	1.0	8.3	0.51
	Composite		0.7	8.6	0.51
Fifth Day	+2.0	40.8	0.4	8.6	0.52
	+1.0	54.8	0.3	8.4	0.52
	+0.75	4.4	0.4	8.1	0.51
	Composite		0.3	8.5	0.52
Sixth Day	+2.0	41.9	0.2	8.5	0.52
	+1.0	53.8	0.4	8.4	0.52
	+0.75	4.3	0.4	8.2	0.52
	Composite		0.3	8.4	0.52
Seventh Day	+2.0	43.6	0.8	9.2	0.55
	+1.0	52.2	0.9	8.1	0.52
	+0.75	4.2	0.7	8.2	0.50
	Composite		0.8	8.6	0.53
Eighth Day	+2.0	40.3	0.8	9.2	0.54
	+1.0	55.7	0.5	8.1	0.53
	+0.75	4.0	0.6	8.0	0.53
	Composite		0.6	8.5	0.53

(coal was changed 10/29/89)