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Benzene Fugitive Leaks Coke Oven By-Product Plants

Emission Test Report Wheeling-Pittsburgh Steel Corporation Monessen, Pennsylvania

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EMISSION TEST REPORT

FUGITIVE EMISSIONS TESTING
AT THE
WHEELING-PITTSBURGH STEEL
MONESSEN PLANT

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SECTION 1

INTRODUCTION

This report presents the results of testing for fugitive VOC (Volatile Organic Compounds) and benzene emissions at the Wheeling-Pittsburgh Steel plant in Monessen, Pennsylvania. The testing was performed by Radian Corporation on November 24 through December 5, 1980.

This work was funded and administered by the Emission Measurement Branch of the U.S. Environmental Protection Agency under Contract No. 68-02-3542. The results of this testing may be used in support of a National Emissions Standard for Hazardous Air Pollutants for benzene from coke oven by-products recovery units in steel mills.

Potential sources of fugitive benzene emissions in the by-product unit were screened with a portable hydrocarbon detector to estimate the frequency of leak occurrence. The liquid and vapor benzene emission rates were measured by collecting and analyzing samples from leaking fittings. Also, liquid samples were obtained from process lines to provide data on the proportion of benzene in process lines relative to the proportion of benzene in the vapor emitted from fittings on those lines.

The following sections present a summary of results, a description of the process configuration, the testing methodology, and QA/QC procedures. Example calculations and a full listing of data and other supplemental information are included in the appendices.

SECTION 2

SUMMARY OF RESULTS

This section presents a summary of the fugitive emission data gathered at the Wheeling-Pittsburgh Steel plant in Monessen. All data are presented in the form of original data sheets in Appendix B.

The plant screening results are presented in Table 2-1. This table presents the distribution of OVA readings for each source type.

The results of the baggable sampling are presented in Table 2-2. The mass emission rates are presented in pounds per day for each source in terms of both benzene and nonmethane hydrocarbons. Mass emission rates are also presented in terms of vapor phase and liquid phase emission rate. Each source was rescreened immediately before and after bagging. The average of these two values is also presented in Table 2-2 for both the OVA and the TLV.

A comparison of the benzene concentration in vapor-phase and total emissions with the benzene concentrations in the liquid lines is presented in Table 2-3. The benzene concentration in the vapor-phase leak and the total leak (vapor plus liquid) is expressed as a ratio of the benzene emission rate to non-methane hydrocarbon emission rate, since bag samples are diluted with air.

TABLE 2-1. OVA SCREENING VALUE DISTRIBUTION: WHEELING-PITTSBURGH STEEL MONESSEN PLANT

OVA Screening Value (PPMV)	Flanges		Threaded Fittings		Valves		Pump Seals		Exhausters	
	#[a]	%[b]	#	%	#	%	#	%	#	%
0 to 199	25	100.0	28	100.0	85	97.7	6	50.0	4	100.0
200 to 9,999	0	0.0	0	0.0	0	0.0	2	16.7	0	0.0
> = 10,000	0	0.0	0	0.0	2	2.3	4	33.3	0	0.0
Total Sources Screened[c]	25	100.0	28	100.0	87	100.0	12	100.0	4	100.0

a) # - number of sources in each category
b) % - percent of total sources screened
c) An additional 14 valves were included on the screening data sheets but were not actually screened with the OVA because of inaccessibility

TABLE 2-2. SUMMARY OF BENZENE AND NONMETHANE HYDROCARBON LEAK RATES (LBS/HR) FROM SAMPLED SOURCES: WHEELING-PITTSBURGH STEEL MONESSEN PLANT

	Sampling Date	Source ID	Mean OVA Screening Value[a]	Mean TLV Screening Value[a]	Benzene Leak Rates			Nonmethane-HC Leak Rates		
					Vapor	Liquid	Total	Vapor	Liquid	Total
Block Valves	12/04/80	18	1250	530	0.000021	0.000000	0.000021	0.000135	0.000000	0.000135
Pumps	12/04/80	139-I[b]	50000	5900	.[c]	0.565700	.	0.142887	1.413000	1.555887
		139-Ø	11000	4850	.	0.000000	.	0.093284	0.000000	0.093284
	12/05/80	98-I	3500	3800	0.054684	0.000000	0.054684	0.065151	0.000000	0.065151
		139-I[d]	3000	3850	0.091357	0.563360	0.654717	0.083309	1.407000	1.490309
		141-I	325	550	0.000874	0.000000	0.000874	0.000971	0.000000	0.000971
		98-Ø	27500	10001	0.153253	0.128556	0.281809	0.157413	0.164056	0.321469
		117-Ø	7515	9601	0.037533	0.000000	0.037533	0.039802	0.000000	0.039802
		131-Ø	5250	6850	0.106385	0.162920	0.269305	0.117251	0.207690	0.324941
		139-Ø[d]	1500	2050	0.057614	0.000000	0.057614	0.074159	0.000000	0.074159

a) Average of before and after sampling screening values (given in Appendix B-2)

b) I denotes inboard seal and Ø denotes outboard seal of a pump with two seals

c) This symbol denotes that no data was taken in that category

d) Sources 139-I and 139-Ø were sampled twice because of incomplete data on first set of samples

TABLE 2-3. COMPARISON OF BENZENE CONTENT IN EMISSIONS AND IN LIQUID LINES: WHEELING-PITTSBURGH STEEL MONESSEN PLANT

Line	Temp (°F)	Press (psig)	Wt% Benzene in Line	Source ID	Wt% Benzene in[a] Vapor Leak	Wt% Benzene[b] in Total Leak
Scrubber "A" Effluent	160	42	39.4	18	17[c]	17[c]
				139-I[d]	109[e]	44
				139-0	78	78
Scrubber "B" Effluent	160	34	0.97	141-I	83	83
Rectifier Bottoms	130	20	85.1	98-I	84	84
				98-0	97	88
Crude Light Oil	50	20	77.3	117-0	94	94
				131-0	91	83

a) Weight percent benzene in the vapor $= \frac{\text{Vapor mass emissions of benzene}}{\text{Vapor mass emissions of NMHC}} \times 100$

b) Weight percent benzene in the total leak $= \frac{\text{Total mass emissions of benzene}}{\text{Total mass emissions of NMHC}} \times 100$

c) Ambient sample benzene concentration was high relative to sample benzene concentration

d) I denotes inboard seal, 0 denotes outboard seal of a pump with two seals

e) Analysis of benzene and NMHC were performed on separate instruments; this sample was probably almost pure benzene

SECTION 3

PROCESS DESCRIPTION

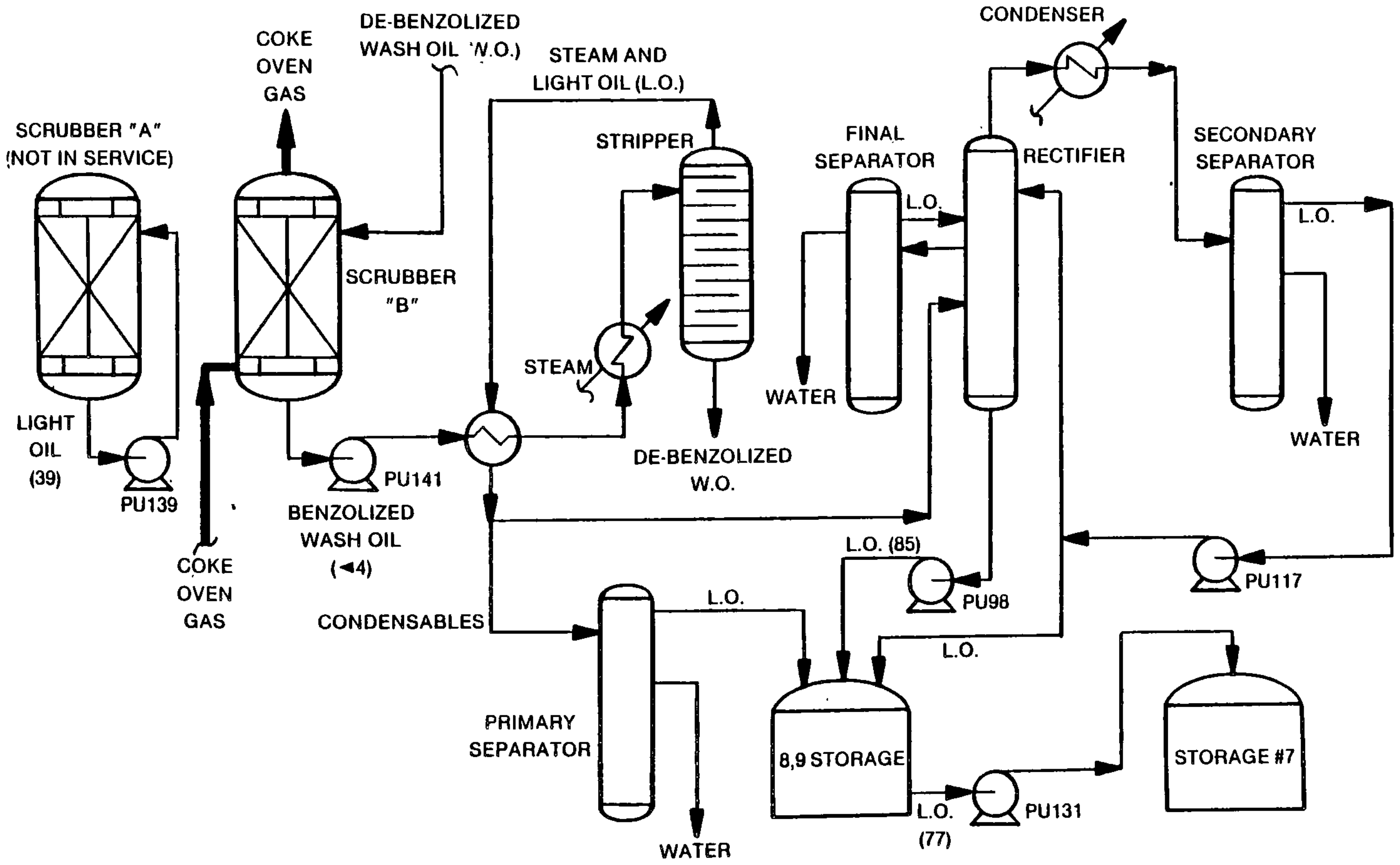
The Wheeling-Pittsburgh Steel Monessen plant operates with a wash oil absorption system to recover light oil from the coke oven gas. The crude light oil product is sent outside of the plant for refining.

During the testing period, the coke ovens were producing 560 tons per day of coke and 8.27 MMSCFD of coke oven gas. The light oil recovery unit was recovering 2,730 gallons per day of crude light oil.

A simplified flow diagram for the plant is shown in Figure 3-1. The light oil recovery unit normally operates with two wash oil scrubbers in series. During the testing period, however, only one scrubber was in service. The other scrubber was being flushed with a cleaning oil containing about 39 weight percent benzene.

The benzolized wash oil from the scrubber is stripped with steam to separate the light oil from the wash oil. The light oil then goes to a rectifier. The rectifier splits the light oil into two fractions, and was formerly used as one step towards refining. Currently, the rectifier overhead is recombined with the rectifier bottoms, after the overhead is condensed and the water is removed in the secondary separator. Condensables from the stripper overhead go to the primary separator for water removal then are also recombined with the crude light oil.

Fugitive emissions testing was to be performed in all areas of the plant with at least 4 weight percent benzene. This included the scrubber cleaning oil, the stripper overhead, condensables, and light oil product.



- Numbers following the letters VA and PU are source ID numbers for valves and pumps, respectively, from which fugitive emissions were detected.
- Numbers in parentheses are the weight percent benzene in that line.

Figure 3-1. Light Oil Recovery unit, Wheeling-Pittsburgh Steel.

The benzolized wash oil line and exhausters were also screened, although these contained less than 4 percent benzene. The exhausters are upstream from light oil recovery on the coke oven gas line, and are not shown in Figure 3-1.

SECTION 4

METHODOLOGY

The fugitive emissions testing at the Wheeling-Pittsburgh Steel Monessen plant included both "screening" and "bagging" operations. Screening is a generic term covering any quick portable method of detecting fugitive emissions. Bagging refers to a quantitative emission measurement achieved by enclosing the source in a Mylar® shroud and analyzing an equilibrium flow of air through the enclosure.

4.1 SCREENING PROCEDURES

Screening was done according to the procedures specified in EPA's Method 21, a copy of which may be found in Appendix A-2. The instrument used in performing this screening was the Century Systems Organic Vapor Analyzer (OVA) Model 108. Method 21 requires the results of the screening to be recorded (as specified in the applicable regulation) only if the leak definition is met or exceeded. Since this effort was more oriented to standards development than to regulatory monitoring, the exact screening value was recorded for all sources.

The screening methods were used to survey every accessible valve and pump, and a portion of the valves, on lines handling at least 4 weight percent benzene. Only one-third of the flanges were screened because of their large population. Exhausters were also screened, although they are not in the light oil recovery section of the plant and the coke oven gas they handle contains less than 4 weight percent benzene. Exhausters were included because they can potentially have high emissions.

The survey was conducted on a line-by-line basis with plant flow diagrams to ensure that no sources were missed and to group sources subject to similar process conditions. Plant personnel corroborated the identification of process lines and supplied data that was not otherwise immediately available, such as the composition and phase of the material in the line.

Fourteen sources were not screened due to either physical inaccessibility or safety problems which prevented close approach, but these sources were recorded on the data sheets to insure that a complete source inventory was obtained. All leaking valves, pump seals, and exhauster seals were tagged with their respective ID numbers and were subsequently bagged.

4.2 SAMPLING PROCEDURES

Bagging procedures were carried out according to methods developed in previous refinery testing. Before and after a source was sampled, it was again screened. This time, however, a J.W. Bacharach "TLV Sniffer" (TLV) was used in addition to the OVA. The OVA uses a flame ionization detector and has a quick response time that makes it ideal for the initial screening. The TLV uses a catalytic oxidation detector and has a slower response than the OVA.

The leaking area of the source was completely enclosed in a shroud of Mylar® plastic to contain any emissions. Mylar® is well suited to this function, because it does not absorb significant amounts of hydrocarbons and has a high melting point (250°C). The enclosures were kept as small as possible, generally less than one cubic foot in volume except for enclosures of exhauster seals. A small enclosure provided a more effective seal, minimized the time required to make the enclosure and reach steady-state conditions, and minimized the condensation of heavy hydrocarbons within the enclosure.

The enclosure was connected to the sampling train shown in Figure 4-1. The sampling train included a cold trap, a dry gas meter, and a vacuum pump. The vacuum pump induced a flow of air, plus any fugitive emissions contained

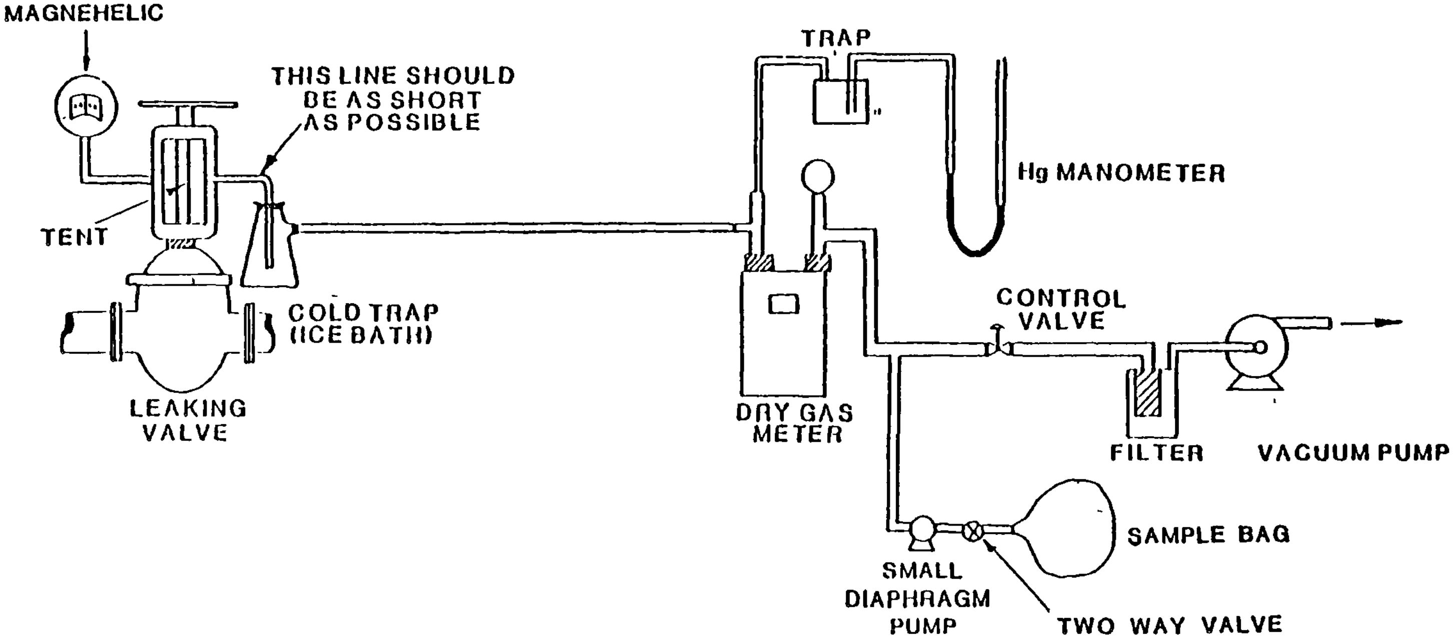


Figure 4-1. Sampling train for baggable source of Hydrocarbon emissions.

within the enclosure, through the sampling train. A magnehelic connected to the enclosure with a short piece of latex tubing was used to ensure that a slight, but measurable, vacuum was maintained within the enclosure. A slight vacuum prevented fugitive emissions from leaking out of the enclosure.

The cold trap was used to condense water and heavy organics that might otherwise condense downstream in lines and equipment. This trap consisted of a 500 ml flask in an ice bath. No condensate was observed at the Monessen plant; however, if an organic condensate were collected, it would be measured, analyzed, and included in calculating the total leak rate.

Downstream from the cold trap, a dry gas meter measured the volume of gas that passed through the sampling train. By measuring the volume of gas during a known period of time, it was possible to calculate the dry gas flow rate. The gas flow rate could be varied, and the maximum flow rate achievable was about 2.5 cubic feet per minute. The temperature and pressure of the gas were measured to allow a conversion to standard conditions.

When sufficient time had passed to allow the system to reach steady-state (generally, 4 minutes was more than adequate for an enclosure of 1 cubic foot), a Tedlar® sampling bag was filled from the discharge of the small Teflon®-lined diaphragm pump. A second Tedlar® bag was filled with a sample of ambient air near the enclosure. The two samples were then taken to the mobile lab on the plant grounds for analysis.

Liquid leak rates were estimated by capturing the liquid in a watchglass and measuring the volume collected over a known period of time. Samples of each liquid leak and of the liquids from process lines were taken back to the laboratory for benzene analysis. Sample bottles were filled to the brim to minimize any vapor overhead space that would allow the benzene in the liquid sample to become dispersed between two phases.

4.3 ANALYTICAL TECHNIQUES

To quantify the VOC emissions from the bagged sources, the concentration of total hydrocarbon and also that of benzene were determined using gas chromatographic procedures. Primary analysis of fugitive volatile organic compounds (VOC) was performed on a Byron 301C Total Hydrocarbon Analyzer (THC). The THC has an upper detection limit of 20,000 ppmv. Dilutions of more concentrated samples were made with a 1.5 liter gas-tight syringe.

Methane calibrations were carried out daily on the THC with an 8000 ppmv methane/air standard. Nonmethane hydrocarbon calibrations were also carried out daily on the THC with a 713 ppmw NBS propane standard.

Analyses for benzene were performed on a Hewlett Packard 5730A Dual FID Gas Chromatograph. Dual gas samples were introduced simultaneously onto separate columns with a Valco 10 port Hastalloy C multiport valve installed immediately forward of the GC syringe injection ports. Peak integrations were compiled on two Hewlett Packard 3380A electronic integrators. Liquid samples were analyzed by normal syringe injection techniques using benzene as an external standard.

The columns and conditions used for the benzene analyses are listed below:

- 1/8" OD, 2 mm ID, 15 feet, 5% SP-2100/1.75% Benton 34 on 100/120 mesh Supelcoport.
- 1/8" OD, 2 mm ID, 15 feet, 10% TCEP on 100/120 mesh Chromosorb P acid washed.
- N_2 carrier at 30 ml/min.
- Isothermal at 110°C.

The instrument was calibrated daily with a 5571 ppmw benzene in air standard. Single analyses were done simultaneously on the two different columns after calibration.

SECTION 5

QUALITY CONTROL/QUALITY ASSURANCE

5.1 QUALITY CONTROL FOR SCREENING PROCEDURES

The screening was done with three different instruments in use at various times in the Monessen Plant. These included two Century Systems Organic Vapor Analyzers (Model OVA-108) and one J. W. Bacharach Instrument Company "TLV Sniffer". The corresponding instrument identification numbers are given below:

Device Type	Assigned ID Number
OVA	2
OVA	3
TLV	4

The OVA and TLV instruments were calibrated each day they were used. Standards of 90 ppmv and 1990 ppmv hexane in air were used to obtain a two point calibration on the TLV; 7990 ppmv methane in air was used to calibrate the OVA. Before a recalibration was made each day, the values obtained from the instrument were recorded. This served two purposes:

- a check for instrument damage or malfunction, and
- a rough check of the stability of the daily calibration.

In addition to the high (and low for TLV) standard calibrations, a dilution probe was occasionally attached to the instrument and another reading was taken. The probe was set at 10:1 dilution of the high standard concentration. The calibration data is summarized in Table 5-1.

TABLE 5-1. CALIBRATION CHECKING OF OVA AND TLV

	OVA 2		OVA 3		TLV 4		
Date	High Stand.,ppmv[a]	Dil Probe,ppmv[b]	High Stand.,ppmv[a]	Dil Probe,ppmv[b]	Low Stand,ppmv[c]	High Stand,ppmv[d]	Dil Probe,ppmv[e]
11/24/80	5000	650					
11/25	5000	750					
11/26	6500						
12/01	5000				40	1400	200
12/02	5800				90	2200	400
12/03					280	1900	520
12/04			6200	1500	60	2400	420
12/05			9500	1000	60	1950	900

Footnotes:

[a] OVA calibration standard contained 7990 ppmv methane in air

[b] OVA reading with dilution probe should be 800 ppmv

[c] TLV low calibration standard contained 90 ppmv hexane in air

[d] TLV high calibration standard contained 1990 ppmv hexane in air

[e] TLV reading with dilution probe should be about 200 ppmv

The calibration checking results do indicate some significant drift. It should be noted, however, that these readings are taken in the morning before calibration and not at the close of the screening day. It is likely that most of the calibration drift occurs due to the overnight shutdown and recharge rather than during the days screening. The phenomenon of calibration drift over a shutdown and re-start has been observed in other studies.

5.2 QUALITY CONTROL FOR ANALYTICAL AND SAMPLING PROCEDURES

Quality control procedures were implemented to insure accurate, consistent, and unbiased analytical and sampling techniques during the project. The procedures discussed in this section include:

- blind standards
- accuracy checks

5.2.1 BLIND STANDARDS

Standard materials were prepared and submitted to the analyst without divulging the concentration of benzene or hexane present in order to evalute the quality of data generated by the Byron 301C Total Hydrocarbon Analyzer (THC) and the HP5703A Dual FID Gas Chromatograph. Blind standards were implemented in two separate analyses. A gaseous hexane standard was used to verify the gaseous fugitive emissions and a liquid benzene standard was used to verify the liquid leak and liquid line samples.

A 263 ppm hexane standard was implemented to demonstrate the precision and accuracy of the analysis of bag samples by the Byron THC. Table 5-2 lists the data from blind hexane standard analyses. The difference between the prepared and measured concentration is shown as the percent difference. The percent difference is calculated as follows:

% Diff = (Prepared - Measured Concentration) X 100/Prepared Concentration

The % Difference mean and standard deviation are -2.16% and 7.76% respectively, indicating no significant bias in the THC analysis.

TABLE 5-2. BLIND STANDARDS DATA LISTING

Instr.	Date	Gas Type	Prepared	Measured	Diff.	Percent Diff
THC	12/02/80	Hexane	263.0	284.3	-21.3	-8.099
THC	12/02/80	Hexane	263.0	241.9	21.1	8.023
THC	12/02/80	Hexane	263.0	272.7	-9.7	-3.688
THC	12/02/80	Hexane	263.0	293.0	-30.0	-11.407

Average: -2.16%
Standard Deviation: 7.76%

A 63.1% benzene liquid standard was used to verify the accuracy of the gas chromatographic analysis of liquid leaks and line samples. Table 5-3 indicates that the amount of benzene found was 1.9% less than the concentration at which it was prepared, indicating no significant bias in the analysis.

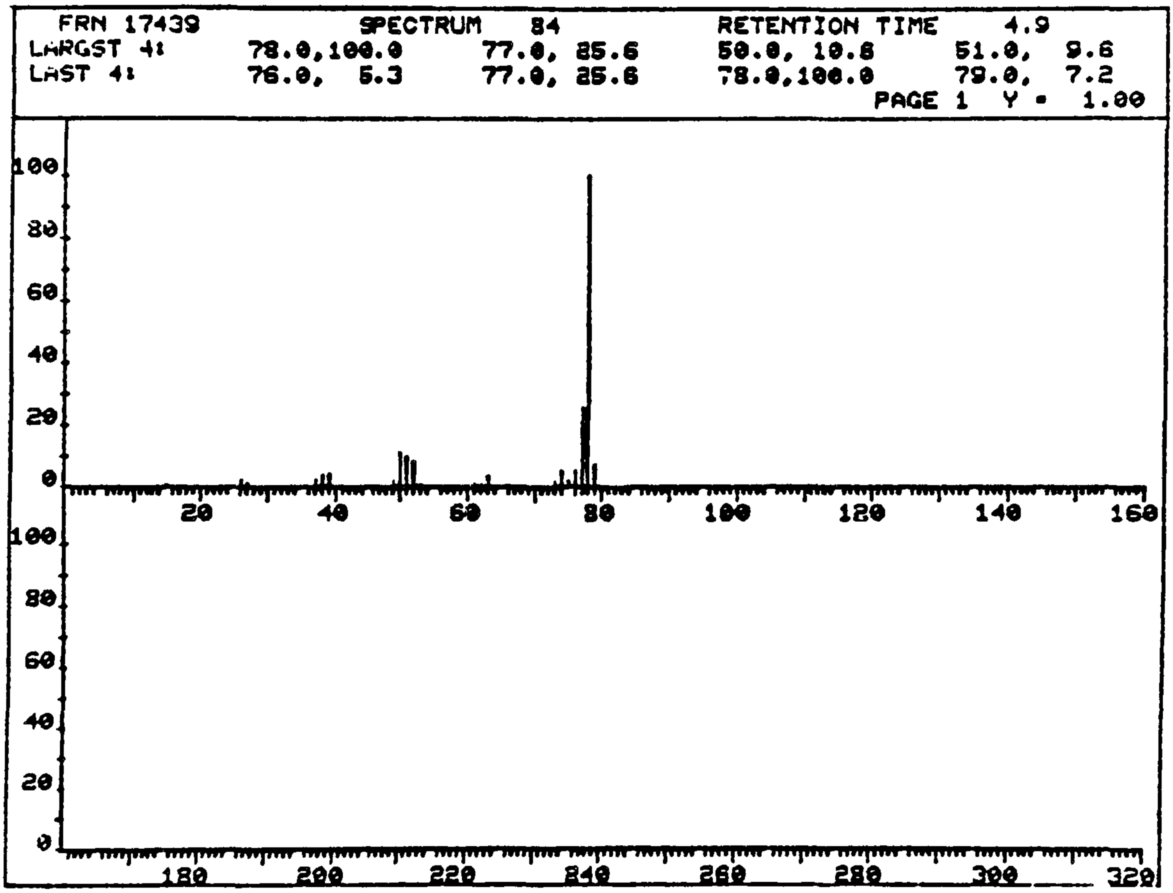
TABLE 5-3. LIQUID BLIND STANDARD ANALYSIS RESULTS

Standard I.D.	Actual % Benzene	Measured % Benzene
Pu 69	63.1	61.9

In addition to the blind standard materials analysis, a selected number of liquid leak and line samples were analyzed by GC/MS to confirm that the amounts of benzene found by GC were only benzene and were not any coeluting compounds. Analysis of four samples on each of two columns, as depicted graphically in Figures 5-1 through 5-8, demonstrates that there were no other compounds present with the same retention time as benzene.

5.2.2 ACCURACY CHECKS

Accuracy checks were used to evaluate the overall accuracy of the sampling and analysis techniques. It basically involves inducing a known flow rate of a concentrated calibration gas into the sampling system and taking a bag sample of the diluted calibration gas at the exit of the system. Analysis of the bag



```
  FRN 17439              SPECTRUM    84            RETENTION TIME     4.9
LARGST 4:     78.0,100.0      77.0, 25.6      50.0, 10.8        51.0,  9.6
LAST 4:       76.0,   5.3     77.0, 25.6      78.0,100.0        79.0,  7.2
                                                          PAGE 1  Y =  1.00
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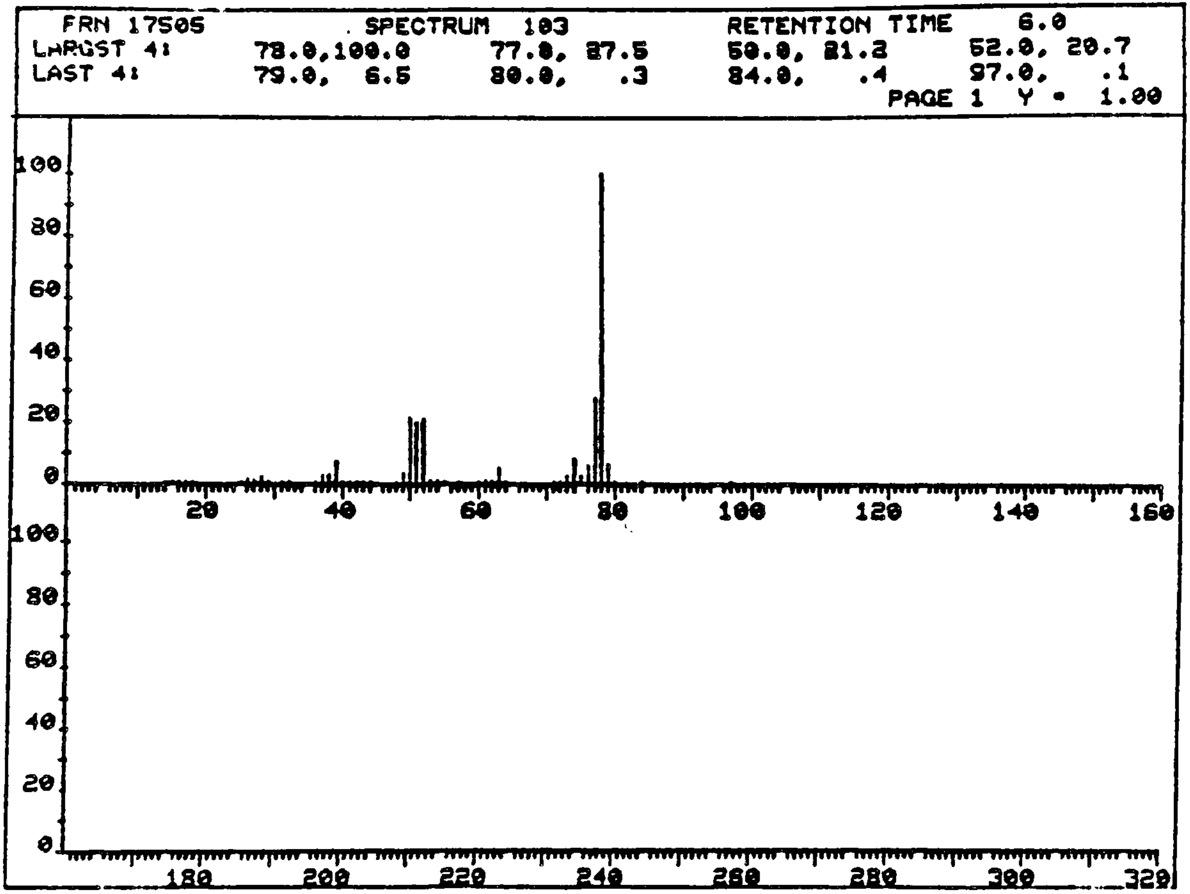
Figure 5-1. Mass spectrum of light oil from the separator on SP-2100/Bentone.



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  FRN 17505              SPECTRUM  103            RETENTION TIME     6.0
LARGST 4:     78.0,100.0     77.0, 27.5     50.0, 21.2       52.0, 20.7
LAST 4:       79.0,   6.5    80.0,    .3    84.0,    .4      97.0,    .1
                                                     PAGE 1  Y =  1.00
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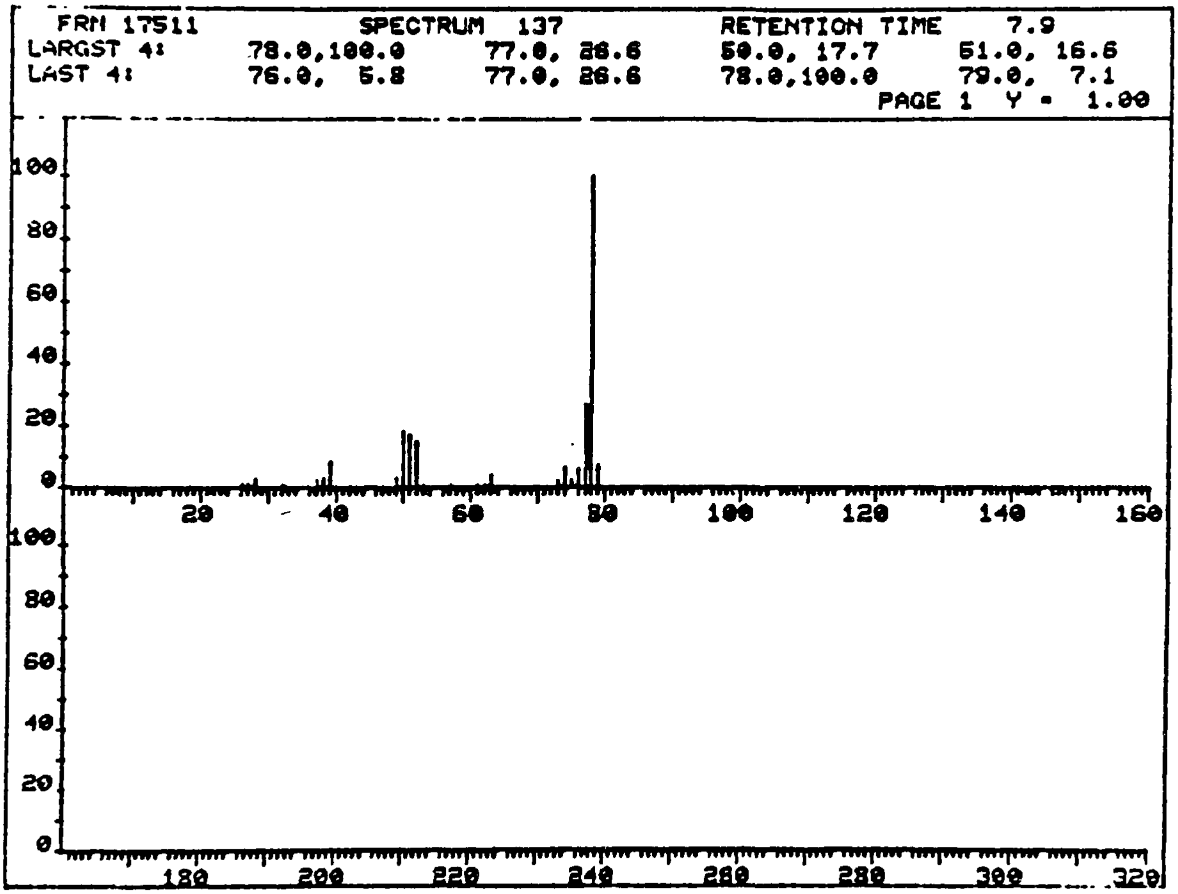
Figure 5-2. Mass spectrum of light oil from the separator on TCEP.



```
 FRN 17511            SPECTRUM  137            RETENTION TIME    7.9
LARGST 4:     78.0,100.0     77.0, 26.6     50.0, 17.7      51.0, 16.6
LAST 4:       76.0,  5.8     77.0, 26.6     78.0,100.0      79.0,  7.1
                                                      PAGE 1  Y =  1.00
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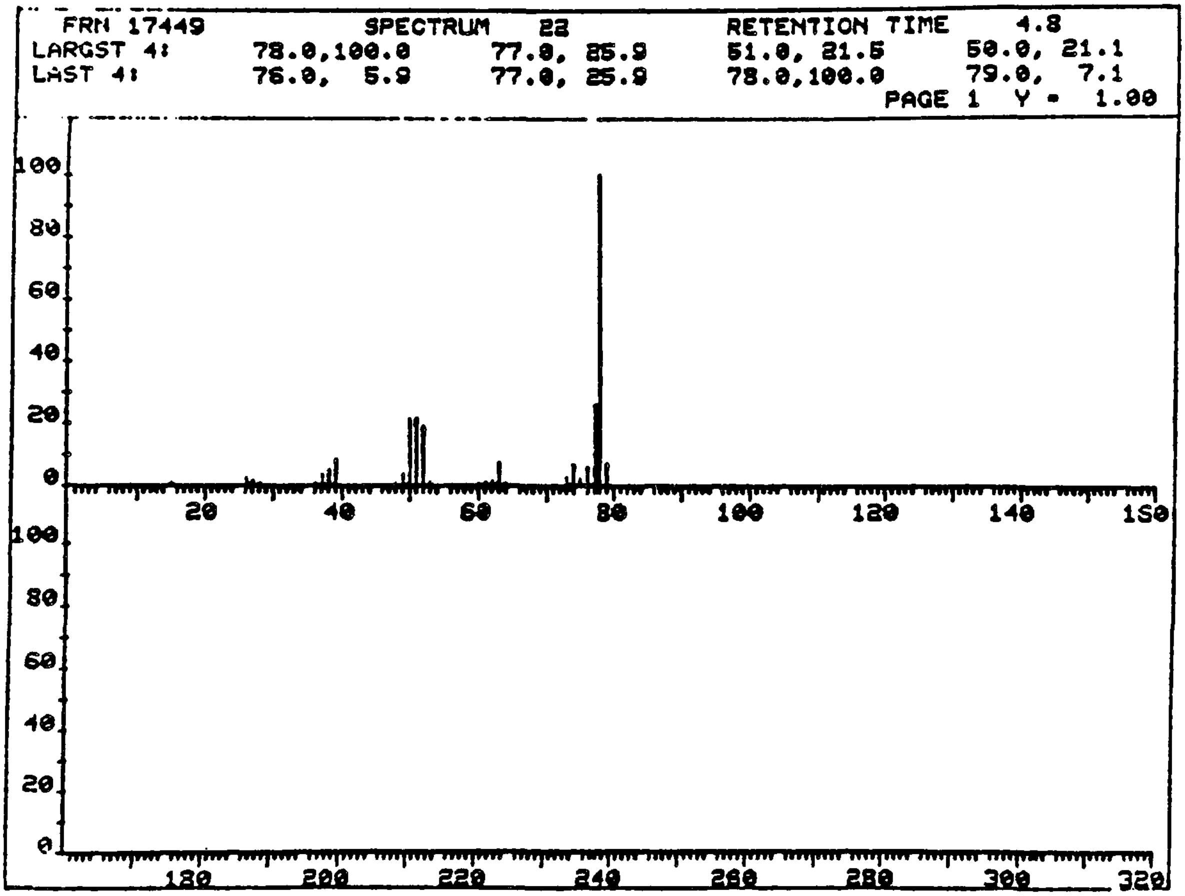
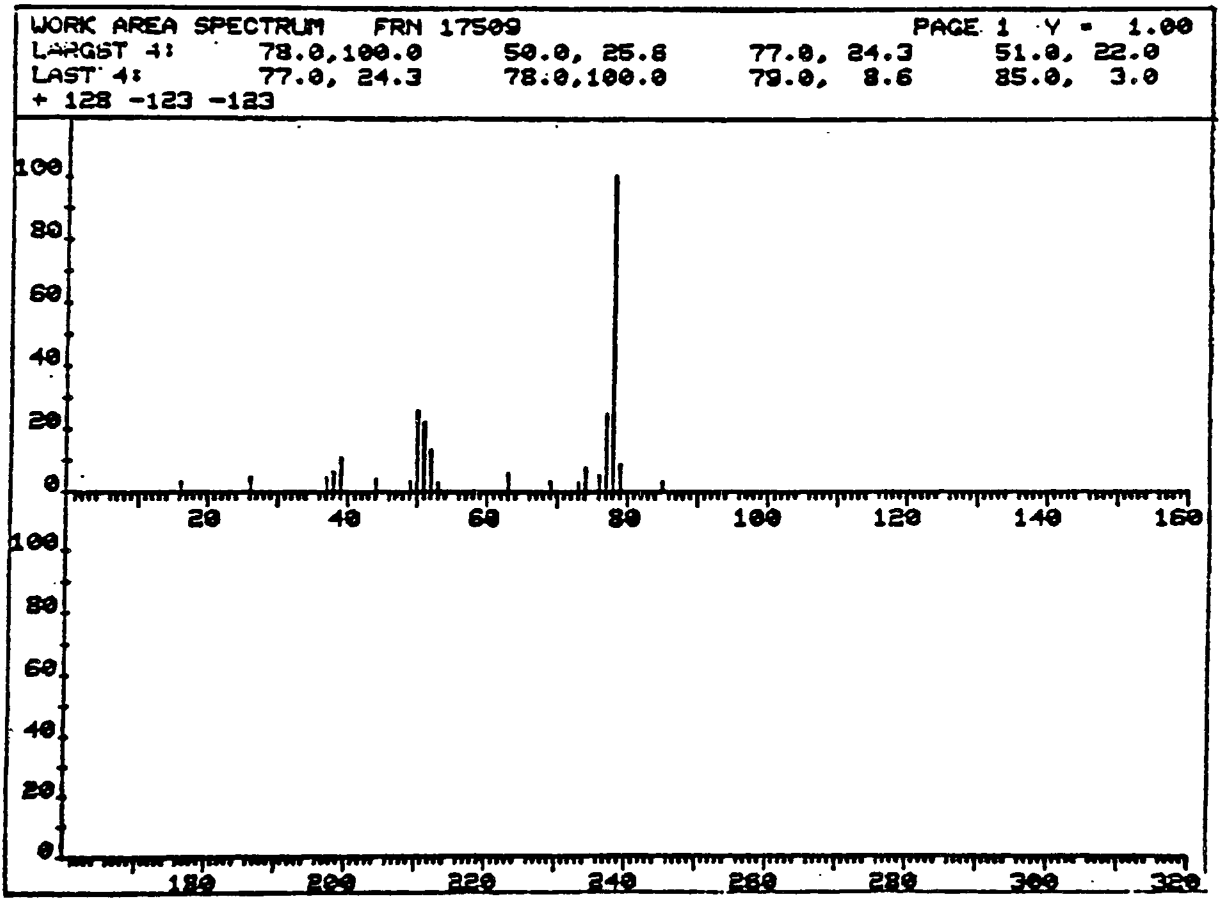
Figure 5-3. Mass spectrum of liquid leak from PU-139 on TCEP.



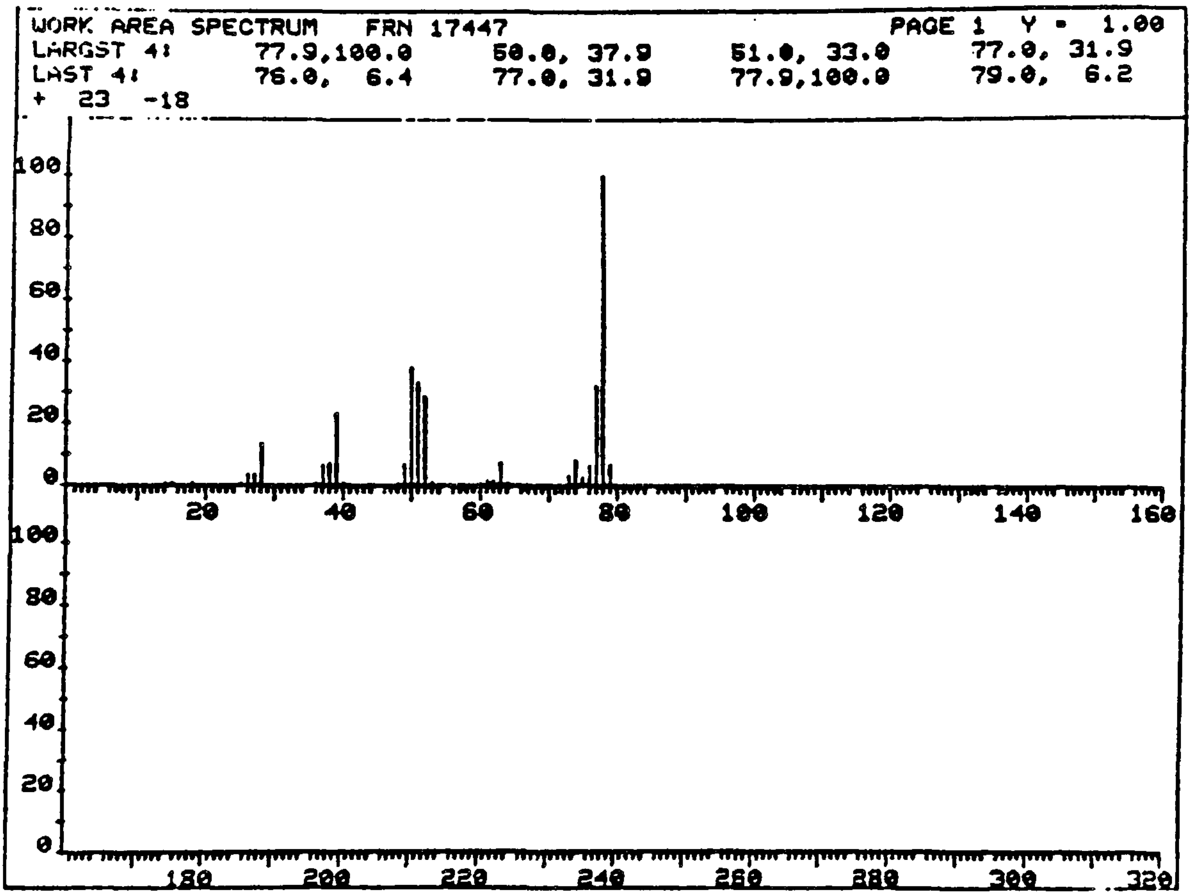
```
  FRN 17449          SPECTRUM    22            RETENTION TIME      4.8
LARGST 4:     78.0,100.0      77.0, 25.9     51.0, 21.5       50.0, 21.1
LAST 4:       76.0,   5.9     77.0, 25.9     78.0,100.0       79.0,   7.1
                                                        PAGE 1  Y =  1.00
```

Figure 5-4. Mass spectrum of liquid leak from PU-139 on SP-2100/Bentone.



```
WORK AREA SPECTRUM   FRN 17509                                PAGE 1  Y =  1.00
LARGST 4:      78.0,100.0       50.0, 25.8       77.0, 24.3       51.0, 22.0
LAST 4:        77.0, 24.3       78.0,100.0       79.0,  8.6       85.0,  3.0
+ 128 -123 -123
```

Figure 5-5. Mass spectrum of line sample from scrubber "B" on TCEP.



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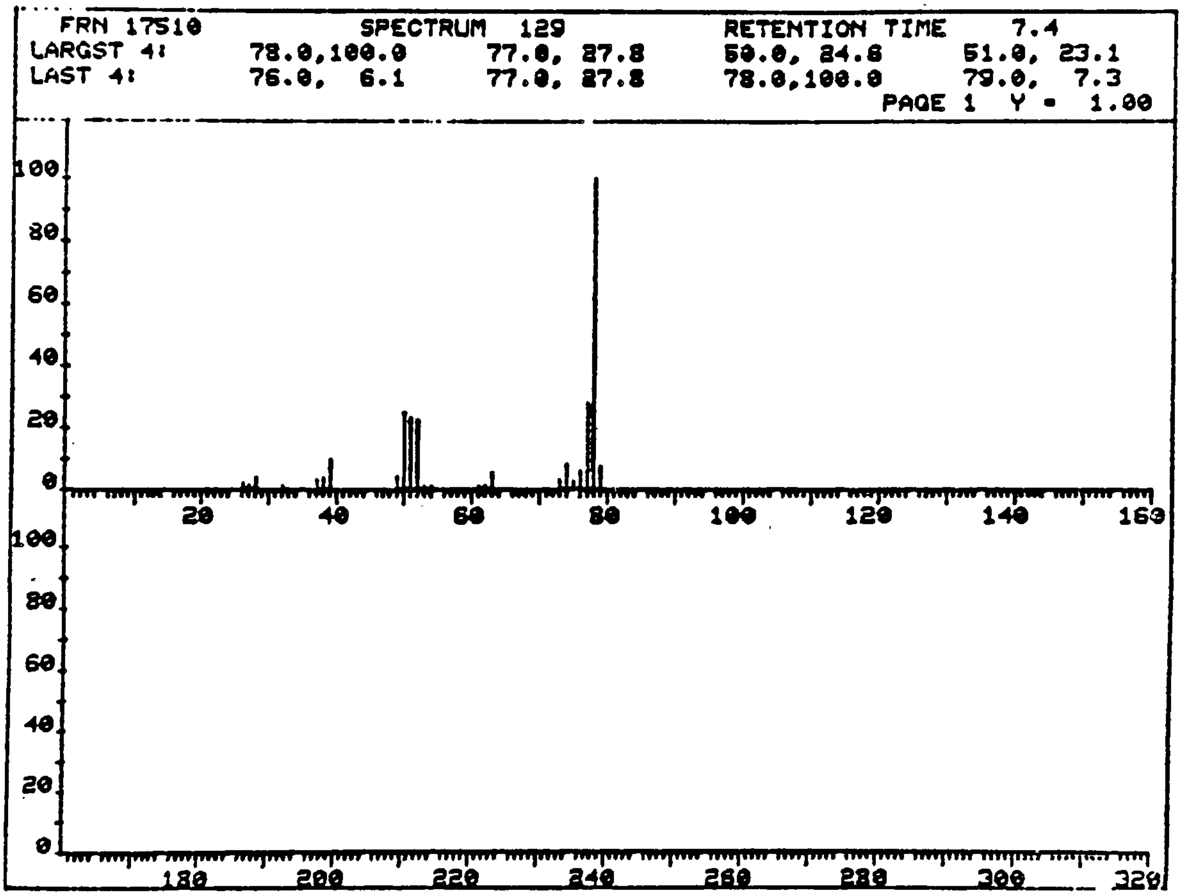
WORK AREA SPECTRUM   FRN 17447                   PAGE 1   Y =  1.00
LARGST 4:     77.9,100.0      50.0, 37.9      51.0, 33.0      77.0, 31.9
LAST 4:       76.0,  6.4      77.0, 31.9      77.9,100.0      79.0,  6.2
+  23  -18
```

Figure 5-6. Mass spectrum of line sample from scrubber "B" on SP-2100/Bentone.



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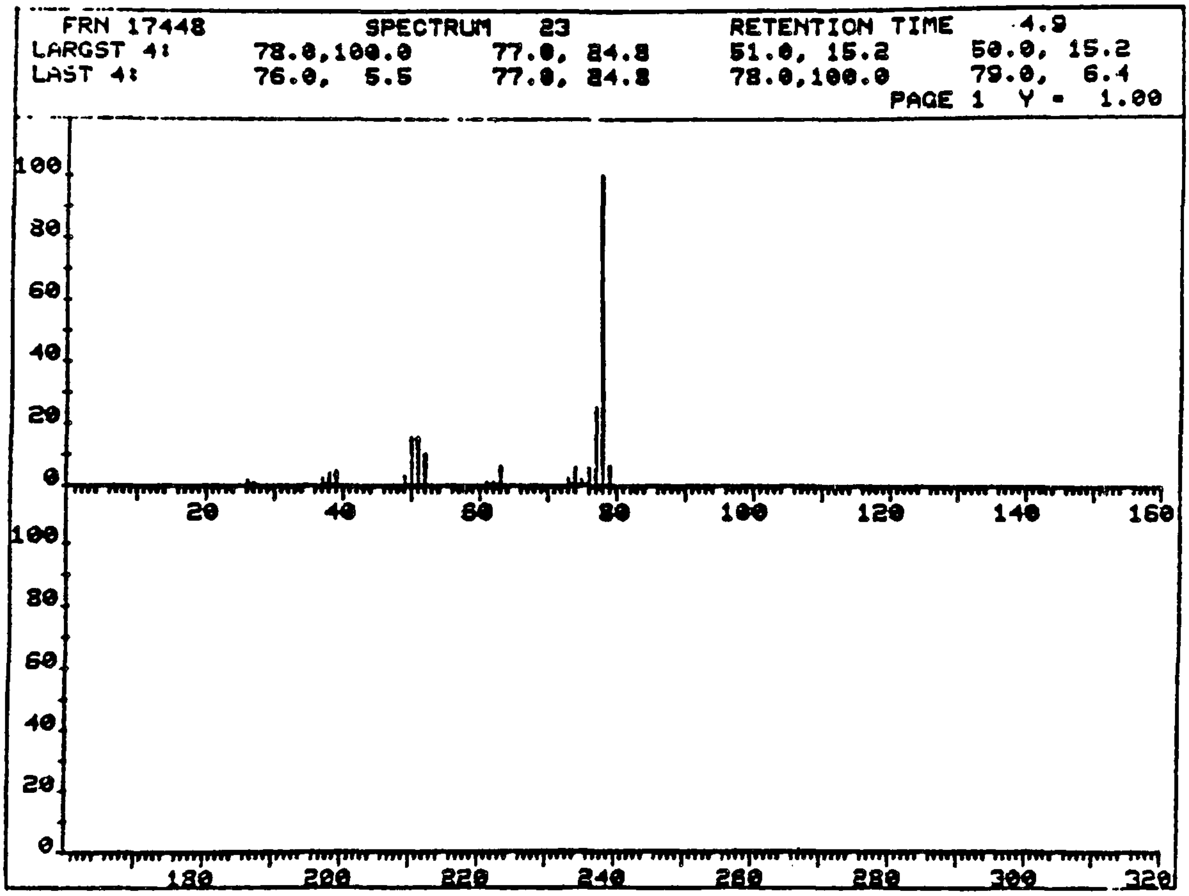
  FRN 17510            SPECTRUM  129            RETENTION TIME     7.4
LARGST 4:     78.0,100.0      77.0, 27.8      50.0, 24.8       51.0, 23.1
LAST 4:       76.0,  6.1      77.0, 27.8      78.0,100.0       79.0,  7.3
                                                           PAGE 1  Y =  1.00
```

Figure 5-7. Mass spectrum of line sample from scrubber "A" on TCEP.



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  FRN 17448             SPECTRUM   23              RETENTION TIME    4.9
LARGST 4:      78.0,100.0      77.0, 24.8       51.0, 15.2       50.0, 15.2
LAST 4:        76.0,   5.5     77.0, 24.8       78.0,100.0       79.0,  6.4
                                                          PAGE 1  Y =  1.00
```

Figure 5-8. Mass spectrum of line sample from scrubber "A" on SP-2100/Bentone.

sample by THC or GC provides data to calculate the measured leak rate. The induced leak rate is calculated from the flow rate and concentration of the induced standard gas.

Table 5-4 lists the data from four accuracy tests. The measured leak rate, induced leak rate, and the percent recovery are shown. The percent recovery is calculated as follows:

$$\text{Percent Recovery} = \frac{\text{Measured leak rate}}{\text{Induced leak rate}} \text{ X } 100\%$$

The average recovery and its standard deviation are 90.88% and 6.77% respectively.

TABLE 5-4. ACCURACY CHECKS DATA LISTING

Date	Standard Type	Measured Leak Rate (lbs/hr)	Induced Leak Rate (lbs/hr)	Percent Recovery
12/01/80	Hexane	0.00079596	0.00090550	87.903
12/02/80	Hexane	0.00073697	0.00081650	90.259
12/02/80	Benzene	0.00061463	0.00072420	84.870
12/03/80	Benzene	0.00076771	0.00076410	100.472

Average: 90.88%
Standard Deviation: 6.77%

WHEELING-PITTSBURGH STEEL
MONESSEN PLANT

APPENDIX A

CALCULATIONS AND METHODS

WHEELING-PITTSBURGH STEEL

MONESSEN PLANT

A-1 Sample Emission Calculations

APPENDIX A-1

EMISSION CALCULATIONS

The emission rates can be calculated from the physical measurements recorded during the operation of the sampling train and with the anlyses of the hydrocarbon content of the air passing through the sampling train. The basic equation is:

$$L=\frac{k_1\ DF(P-\Delta P)M(C_T-C_A)}{460+T} \qquad \text{(A-1)}$$

where L = Hydrocarbon vapor emission rate, lb/hr

k_1 = $2.75\mathrm{x}10^{-6}$ (°R-min-mole/SCF-in.Hg-hr-ppmw)

D = Dry gas meter correction factor (dimensionless)

F = Flow rate, cubic feet per minute

P = Ambient atmospheric pressure, in. Hg

ΔP = Pressure differential between ambient pressure and pressure at dry gas meter, in. Hg

M = Average molecular weight of gas (essentially air) passing through dry gas meter, lb/lb.mole

C_T = Total hydrocarbon concentration in air passing through the dry gas meter, ppmw

C_A = Total hydrocarbon concentration in air near the sampled leak source, ppmw

T = Temperature of gas (air) stream at the dry gas meter, °F.

The constant k_1 is a product of several conversion constants:

$$k_1=\frac{(520^\circ\mathrm{R})\ \mathrm{x}\ (60\ \mathrm{min/hr})}{(379\ \frac{\mathrm{SCF}}{\mathrm{mole}})\ \mathrm{x}\ (29.92\ \mathrm{in.\ Hg})\ \mathrm{x}\ (10^6\ \mathrm{ppmw})}$$

$k_1 = 2.75 \times 10^{-6}$ (°R-min-mole/SCF-in.Hg-hr-ppmw)

As an example calculation, assume a total hydrocarbon concentration of 19,000 ppmw was measured in the gas stream from a tent around a leaking source in an ethylene unit. The hydrocarbon would be assumed to be hexane (MW-86). The following values were recorded during the sampling:

$F = 1.5$ CFM
$P = 29.9$ in. Hg
$\Delta P = 2.0$ in. Hg (at the dry gas meter)
$C_T = 19{,}000$ ppmw
$C_A = 20$ ppmw
$T = 75°F$

and $D = 0.95$

Then

$$M = \frac{10^6}{\frac{19{,}000}{86} + \frac{10^6 - 19{,}000}{29}} = 29.37$$

The vapor emission rate L is then calculated from Equation (A-1)

$$L = \frac{(2.75 \times 10^{-6})(0.95)(1.5)(29.9 - 2.0)(29.37)(19{,}000 - 20)}{460 + 75}$$

$L = 0.114$ lb/hr.

The vapor emission rate of benzene is estimated from the hydrocarbon emission rate and the concentration data for benzene and non-methane hydrocarbons. The equation used is:

$$B = L \frac{(C_B - C_{AB})}{(C_T - C_A)} \qquad \text{(A-2)}$$

where B = Benzene vapor emission rate, lb/hr
C_B = Benzene concentration in air passing through the dry gas meter, ppmw
C_{AB} = Benzene concentration in air near the sampled leak source, ppmw.

For example, using the previous example with the data:

C_B = 15,500 ppmw

C_{AB} = 10 ppmw

the benzene vapor emission rate is calculated:

$$B = 0.114 \frac{(15,500 - 10)}{(19,000 - 20)}$$

B = 0.093 lb/hr.

The emission rates for liquid leaks are calculated by the equation:

$$TLLR = 7.93 \frac{\rho V}{t} \qquad (A-3)$$

where TLLR = Total liquid leak rate, lb/hr

7.93 = Conversion factor from g/sec to lb/hr

V = Volume of liquid collected, cc

t = Time of collection, sec

ρ = Density of sample, g/cc.

For example, 4.0 cc of liquid from a leaking source were captured in 60 seconds, and the liquid was found to have a density of 0.75 g/cc, then:

TLLR = (7.93)(0.75)(4.0)/(60)

TLLR = 0.40 lb/hr.

The liquid benzene leak rate is:

$$BLLR = \frac{TLLR\ [Benz.]}{100} \qquad (A-4)$$

where BLLR = Benzene liquid leak rate

[Benz]= Benzene concentration in liquid, weight percent

For example, if the liquid leak described above was found to have 79 wt percent benzene then:

BLLR = (0.40)(79)/(100)

BLLR = 0.31 lb/hr.

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A-2 EPA Proposed Method 21

PROPOSED METHOD 21. DETERMINATION OF VOLATILE ORGANIC COMPOUND LEAKS

1. Applicability and Principle

1.1 Applicability. This method applies to the determination of volatile organic compound (VOC) leaks from organic process equipment. These sources include, but are not limited to, valves, flanges and other connections, pumps and compressors, pressure relief devices, process drains, open-ended valves, pump and compressor seal system degassing vents, accumulator vessel vents, and access door seals.

1.2 Principle. A portable instrument is used to detect VOC leaks from individual sources. The instrument detector is not specified, but it must meet the specifications and performance criteria contained in paragraph 2.1.

2. Apparatus

2.1 Monitoring Instrument. The monitoring instrument shall be as follows:

2.1.1 Specifications.

a. The VOC instrument detector shall respond to the organic compounds being processed. Detectors which may meet this requirement include, but are not limited to, catalytic oxidation, flame ionization, infrared absorption, and photoionization.

b. The instrument shall be intrinsically safe for operation in explosive atmospheres as defined by the applicable U.S.A. Standards (e.g., National Electrical Code by the National Fire Prevention Association).

c. The instrument shall be able to measure the leak definition concentration specified in the regulation.

d. The instrument shall be equipped with a pump so that a continuous sample is provided to the detector. The nominal sample flow rate shall be 1-3 liters per minute.

e. The scale of the instrument meter shall be readable to ±5 percent of the specified leak definition concentration.

2.1.2 Performance Criteria. The instrument must meet the following performance criteria. The definitions and evaluation procedures for each parameter are given in Section 4.

2.1.2.1 The instrument response time must be 30 seconds or less. The response time must be determined for the instrument system configuration to be used during testing, including dilution equipment. The use of a system with a shorter response time than that specified will reduce the time required for field component surveys.

2.1.2.2 Calibration Precision: The calibration precision must be less than or equal to 10 percent of the calibration gas value.

2.1.2.3 Quality Assurance. The instrument shall be subjected to response time and calibration precision tests prior to being placed in service. The calibration precision test shall be repeated every 6 months thereafter. If any modification or replacement of the instrument detector is required, the instrument shall be retested and a new 6 month quality assurance test schedule will apply. The response time test shall be repeated if any modifications to the sample pumping system or flow configuration is made that would change the response time.

2.3 Calibration Gases. The monitoring instrument is calibrated in terms of parts per million by volume (ppmv) of the compound specified in the applicable regulation. The calibration gases required for monitoring and instrument performance evaluation are a zero gas (air, 3 ppmv VOC) and a calibration gas in air mixture approximately equal to the leak definition specified in the regulation. If cylinder calibration gas mixtures are used, they must be analyzed and certified by the manufacturer to be within ±2 percent accuracy. Calibration gases may be prepared by the user according to any accepted gaseous standards preparation procedure that will yield a mixture accurate to within ±2 percent. Alternative calibration gas species may be used in place of the calibration compound if a relative response factor for each instrument is determined so that calibrations with the alternative species may be expressed as calibration compound equivalents on the meter readout.

3. Procedures

3.1 Calibration. Assemble and start up the VOC analyzer and recorder according to the manufacturer's instructions. After the appropriate warmup period and zero or internal calibration procedure, introduce the calibration gas into the instrument sample probe. Adjust the instrument meter readout to correspond to the calibration gas value.

If a dilution apparatus is used, calibration must include the instrument and dilution apparatus assembly. The nominal dilution factor may be used to establish a scale factor for converting to an undiluted basis. For example, if a nominal 10:1 dilution apparatus is used, the meter reading for a 10,000 ppm calibration would be set at 1,000. During field surveys, the scale factor of 10 would be used to convert measurements to an undiluted basis.

3.2 Individual Source Surveys.

3.2.1 Case I - Leak Definition Based on Concentration Value. Place the probe inlet at the surface of the component interface where leakage could occur. Move the probe along the interface periphery while observing the instrument readout. If an increased meter reading is observed, slowly probe the interface where leakage is indicated until the maximum meter reading is obtained. Leave the probe inlet at this maximum reading location for approximately two times the instrument response time. If the maximum observed meter reading is greater than the leak definition in the applicable regulation, record and report the results as specified in the regulation reporting requirements. Examples of the application of this general technique to specific equipment types are:

a. Valves--The most common source of leaks from valves is at the seal between the stem and housing. Place the probe at the interface where the stem exits the packing gland and sample the stem circumference. Also, place the probe at the interface of the packing gland take-up flange seat and sample the periphery. In addition, survey valve housings of multipart assembly at the surface of all interfaces where leaks can occur.

b. Flanges and Other Connections--For welded flanges, place the probe at the outer edge of the flange-gasket interface and sample around the circumference of the flange. Sample other types of nonpermanent joints (such as threaded connections) with a similar traverse.

c. Pumps and Compressors--Conduct a circumferential traverse at the outer surface of the pump or compressor shaft and seal interface. If the source is a rotating shaft, position the probe inlet within one centimeter of the shaft-seal interface for the survey. If the housing configuration prevents a complete traverse of the shaft periphery, sample all accessible portions. Sample all other joints on the pump or compressor housing where leakage can occur.

d. Pressure Relief Devices--The configuration of most pressure relief devices prevents sampling at the sealing seat interface. For those devices equipped with an enclosed extension, or horn, place the probe inlet at approximately the center of the exhaust area to the atmosphere for sampling.

e. Process Drains--For open drains, place the probe inlet at approximately the center of the area open to the atmosphere for sampling. For covered drains, place the probe at the surface of the cover interface and conduct a peripheral traverse.

f. Open-Ended Lines or Valves--Place the probe inlet at approximately the center of the opening to the atmosphere for sampling.

g. Seal System Degassing Vents and Accumulator Vents--Place the probe inlet at approximately the center of the opening to the atmosphere for sampling.

h. Access Door Seals--Place the probe inlet at the surface of the door seal interface and conduct a peripheral traverse.

3.2.2 Case II-Leak Definition Based on "No Detectable Emission".

a. Determine the local background concentration around the source by moving the probe inlet randomly upwind and downwind at distance of one to two meters from the source. If an interference exists with this determination due to a nearby emission or leak, the local background concentration may be determined at distances closer to the source, but in no case shall the distance be less than 25 centimeters. Note the background concentration and then move the probe inlet to the surface of the source and conduct a survey as described in 3.2.1. If a concentration increase greater than 2 percent of the concentration-based leak definition is obtained, record and report the results as specified by the regulation.

b. For those cases where the regulation requires a specific device installation, or that specified vents be ducted or piped to a control device, the existence of these conditions shall be visually confirmed. When the regulation also requires that no detectable emissions exist, visual observations and sampling surveys are required. Examples of this technique are:

i. Pump or Compressor Seals--If applicable, determine the type of shaft seal. Perform a survey of the local area ambient VOC concentration and determine if detectable emissions exist as described in 3.2.2.a.

ii. Seal system degassing vents, accumulator vessel vents, pressure relief devices--If applicable, observe whether or not the applicable ducting or piping exists. Also, determine if any sources exist in the ducting or piping where emissions could occur prior to the control device. If the required ducting or piping exists and there are no sources of where the emissions could be vented to the atmosphere prior to the control device, then it is presumed that no detectable emissions are present.

4. Instrument Performance Evaluation Procedures

4.1 Definitions.

4.1.1 Calibration Precision. The difference between the average VOC concentration indicated by the meter readout for consecutive repetitions and the known concentration of a test gas mixture.

4.1.2 Response Time. The time interval from a step change in VOC concentration at the input of the sampling system to the time at which 90 percent of the corresponding final value is reached as displayed on the instrument readout meter.

4.2 Evaluation Procedures. At the beginning of the instrument performance evaluation test, assemble and start up the instrument according to the manufacturer's instructions for recommended warmup period and preliminary adjustments. If a dilution apparatus is used during field surveys, the evaluation procedure must be performed on the instrument-dilution system combination.

4.2.1 Calibration Precision Test. Make a total of nine measurements by alternately using zero gas and the specified calibration gas. Record the meter readings (example data sheet shwon in Figure 21-1).

4.2.2 Response Time Test Procedure. Introduce zero gas into the instrument sample probe. When the meter reading has stabilized, switch quickly to the specified calibration gas. Measure the time from concentration switching to 95 percent of final stable reading. Perform this test sequence three times and record the results (example data sheet given in Figure 21-2).

4.3 Calculations. All results are expressed as mean values, calculated by:

$$\overline{x} = \frac{1}{n} \sum_{i=1}^{n} x_i$$

Where:

x_i = Value of the measurements.

Σ = Sum of the individual values.

$\overline{x}$ = Mean value.

n = Number of data points.

WHEELING-PITTSBURGH STEEL
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APPENDIX B

SAMPLING DATA SHEETS

WHEELING-PITTSBURGH STEEL
MONESSEN PLANT

B-1 Screening Data

TABLE B-1.1. SOURCE TYPE IDENTIFICATION CODES

Source Type	Source Type Code
Flange	1
Process Drain	2
Open-End Line	3
Agitator Seal	4
Relief Valve	5
Screwed Fitting	6
Valves	
Block valve - gate type	10
Block valve - globe type	11
Block valve - plug type	12
Block valve - ball type	13
Block valve - butterfly type	14
Block valve - other types	15
Control valve - gate type	20
Control valve - globe type	21
Control valve - plug type	22
Control valve - ball type	23
Control valve - butterfly type	24
Control valve - other types	25
On-Line Pump Seals*	
Single, mechanical, emission point at seal	30
Single, mechanical, emission point at vent	31
Single, mechanical, other emission point	32
Double, mechanical, emission point at seal	33
Double, mechanical, emission point at vent	34
Double, mechanical, other emission point	35

Continued ...

TABLE B-1.1. CONTINUED

Source Type	Source Type Code
Single, packed, emission point at seal	36
Single, packed, emission point at vent	37
Single, packed, other emission point	38
Sealless pumps	39
Off-Line Pump Seals	
Single, mechanical, emission point at seal	40
Single, mechanical, emission point at vent	41
Single, mechanical, other emission point	42
Double, mechanical, emission point at seal	43
Double, mechanical, emission point at vent	44
Double, mechanical, other emission point	45
Single, packed, emission point at seal	46
Single, packed, emission point at vent	47
Single, packed, other emission point	48
Sealless pumps	49
On-Line Compressor Seals	
Single, mechanical, emission point at seal	50
Single, mechanical, emission point at vent	51
Single, mechanical, other emission point	52
Double, mechanical, emission point at seal	53
Double, mechanical, emission point at vent	54
Double, mechanical, other emission point	55
Single, packed, emission point at seal	56
Single, packed, emission point at vent	57
Single, packed, other emission point	58
Sealless compressors	59

Continued ...

TABLE B-1.1. CONTINUED

Source Type	Source Type Code
Off-Line Compressor Seals	
Single, mechanical, emission point at seal	60
Single, mechanical, emission point at vent	61
Single, mechanical, other emission point	62
Double, mechanical, emission point at seal	63
Double, mechanical, emission point at vent	64
Double, mechanical, other emission point	65
Single, packed, emission point at seal	66
Single, packed, emission point at vent	67
Single, packed, other emission point	68
Sealless compressors	69
Exhausters	
Suction side	70
High pressure side	71

* O = outboard seal; I = inboard seal

TABLE B-1.2. STREAM IDENTIFICATION CODES

Code	Description of Stream
1	Coke oven gas
3	Steam and vaporized light oil
5	Light oil (BTX and 2° oil)
6	Light oil used to clean scrubber
7	Benzolized wash oil
8	Rectifier bottoms (essentially BTX and 2° oil as #5 above)
	Service
1	Gas
2	Light liquid
3	Heavy liquid
	Elevation
1	Sources at ground level
2	Sources at one level above ground level
3	Sources at two levels above ground level

SCREENING DATA SHEET

UNIT #1

Month 1	Day 3	Screening Team 5	Instrument 7	Source ID 8	Screening Value 13	Source Type 20	Process Unit 22	Service 24	~~Primary Material~~ ~~ID~~ STREAM 25	Conc. 28	~~Secondary Material~~ ID 29	~~Conc.~~ SEAL 32	Line Temperature °F 33	Line Pressure psig 37	Ambient Air Temperature °F 41	Elevation 44	Comments 45
11	24	03	2	1	0	10	1	3	7							1	
11	24			2	0	13	1										
11	24			3	0	10	1										21
11	24			4	0	10	1										
11	24			5	0	13	1										
11	24			6	0	13	1										
11	24			7	0	10	1										
11	24			8	100	13	1						160		~~160~~		22
11	24			9	0	13	1						360	34	~~360~~		
11	24			10	0	13	1										
11	24			11	0	13	1										
11	24			12	30	13	1										2~~2~~3
11	24			13	20	13	1		6				160		~~160~~		22
11	24			14	0	10	1										
11	24			15	0	10	1										
11	24			16	0	13	1										
11	24			17	0	10	1										
11	24			18	10000	10	1						160	42	~~160~~		22
11	24			19	0	10	1										
11	24			20	0	10	1										

COMMENTS: 1 INLET VALVE ON B SCRUBBER PUMP

2) #8, 18, 13 ARE IN SERVICE OF RECIRCULATING OIL THROUGH SCRUBBER A

3) #12 IS IN SERVICE OF PUMPING OIL FROM SCRUBBER B TO HEAT X.

SCREENING DATA SHEET

Month 1	Day 3	Screening Team 5	Instrument 7	Source ID 9	Screening Value 13	Source Type 20	Process Unit 22	Service 24	~~Primary Material~~ ID STREAM 25	Conc. 28	~~Secondary Material~~ ID 29	Conc. 32	Line Temperature °F 33	Line Pressure psig 37	Ambient Air Temperature °F 41	Elevation 43	Comments 45
11	24	03	2	21	0	10	1	3	6							1	2
11	2~~4~~5	01	2	22	0	10			6							2	2
11	2~~4~~5			23	0	1			7								
11	2~~4~~5			24	0	1											
11	2~~4~~5			25	0	10											
11	2~~4~~5			26	0	1											
11	2~~4~~5			27	0	1											
11	2~~4~~5			28	0	10											
11	2~~4~~5			29	0	1											
11	2~~4~~5			30	0	1											
11	2~~4~~5			31	0	10											
11	25			32	0	1											
11	25			33	0	1											
11	25			34	0	10											
11	25			35	0	1											
11	25			36	0	10											
11	25			37	0	1											
11	25			38	0	10											
11	25			39	0	1											
11	25			40	0	10											

COMMENTS: 1 - See back for configuration of valves at heat, these are all valves and flanges for heavy oil plus light oil going into stripper. Valves and flanges 22-40 are associated with ~~t~~ H.O.+L.O. heat exchanger well stream + L.O.

SCREENING DATA SHEET

Month 1	Day 3	Screening Team 5	Instrument 7	Source ID 8	Screening Value 13	Source Type 20	Process Unit 22	Service 24	~~Primary Material~~ ID STREAM 25 7	Conc. 28	~~Secondary Material~~ ID 29	Conc. 32	Line Temperature °F 33	Line Pressure psig 37	Ambient Air Temperature °F 41	Elevation 44	Comments 45
11	25	01	2	41	0	1	1	3								2	2
11	25	01	2	42	0	10											
11	25	01	2	43	0	1											
11	25	01	2	4A	0	10											
11	25	01	2	45	0	6											2 3
~~11~~	~~25~~	~~01~~	~~2~~	~~46~~	~~200~~	~~3~~		~~DON'T NEED THIS~~									
11	25	01	2	47	0	10		3									
11	25	01	2	48	0	6											
11	25	01	2	49	0	10											
11	25	01	2	50	0	6											
11	25	01	2	51	0	10											
11	25	01	2	52	0	6											
11	25	01	2	53	0	10											
11	25	01	2	54	0	6											
11	25	01	2	55	0	10											
11	25	01	2	56	0	6											
~~11~~	~~25~~	~~01~~	~~2~~	~~57~~	~~80~~	~~2~~		~~DON'T NEED THIS~~									
11	25	01	2	58	0	10		3									2 2
11	25	01	2	59	0	6											
11	25	01	2	60	0	6											

COMMENTS: 1) 41 - 56 ARE VALVES AND FLANGES AND SCREWED FITTINGS FOR WASH OIL + LIGHT OIL TO HEAT EX PRIOR TO STRIPPER,

2) WASH OIL + LIGHT OIL INTO FINAL HEAT EX BEFORE STRIPPER

3) SOURCE ID 6 DENOTES A SCREWED FITTING

SCREENING DATA SHEET

IN CONDENS H2O SERVICE

Month 1	Day 3	Screening Team 5	Instrument 7	Source ID 8	Screening Value 13	Source Type 20	Process Unit 22	Service 24	~~Primary~~ ~~Material~~ ID 25 STREAM	Conc. 28	~~Secondary~~ ~~Material~~ ID 29	Conc. 32	Line Temperature °F 33	Line Pressure psig 37	Ambient Air Temperature °F 41	Elevation 44	Comments 45	
11	25	01	2	61	0	10	1	3	7							2	2	1
11	25	01	2	62	0	1												
11	25	01	2	63	0	1												
11	25	01	2	64	0	10											2	2
11	25	01	2	65	0	1												
11	25	01	2	66	0	1												
11	25	01	2	67	0	10											2	3
11	25	01	2	68	0	1												
11	25	01	2	69	0	1		3	7									
11	25	01	2	70	0	1		1	3								2	4
11	25	01	2	71	0	10		1	3								2	5
~~11~~	~~25~~	~~01~~	~~2~~	~~72~~	~~100001~~	~~3~~			DON'T NEED THIS								2	6
~~11~~	~~25~~	~~01~~	~~2~~	~~73~~	~~0~~	~~1~~											2	7
~~11~~	~~25~~	~~01~~	~~2~~	~~74~~	~~0~~	~~10~~											2	7
~~11~~	~~25~~	~~01~~	~~2~~	~~75~~	~~0~~	~~6~~											2	7
~~11~~	~~25~~	~~01~~	~~2~~	~~76~~	~~0~~	~~6~~											2	7
11	25	01	2	77	0	1		1	3								2	8
~~11~~	~~25~~	~~01~~	~~2~~	~~78~~	~~100001~~	~~3~~			DON'T NEED THIS								2	9,10
~~11~~	~~25~~	~~01~~	~~2~~	~~79~~	~~100001~~	~~3~~			DON'T NEED THIS								2	9
11	25	01	2	80	0	1		1	3								2	9..

COMMENTS: 1. HC + LO FROM HEAT EX W/ STEAM + L.O TO FINAL HEAT EXCHANGE, 2) BY-PASS FINAL HEAT EX; 3) EXIT FINAL HEAT EXCHANGE 4) BYPASS RECTIFIER; 5) TO RECTIFIER, 6) TO LIGHT OIL FROM DECANT, 7) BOTTOM C- CONDENSER, 8) TOP C- CONDENSER; 9) OPEN VENTS FROM CONDENSER, 10) "NONCONDENSABLES"

REVISION OF ORIGINAL DATA SHEET.
REVISED 12/2/80 FOR LEGIBILITY

SCREENING DATA SHEET

Month 1	Day 3	Screening Team 5	Instrument 7	Source ID 8	Screening Value 13	Source Type 20	Process Unit 22	Service 24	~~Primary Material~~ ID STREAM 25	~~Primary Material~~ Conc. 28	Secondary ~~Material~~ ID 29	Secondary ~~Material~~ SEAL ~~Conc.~~ 32	Line Temperature °F 33	Line Pressure psig 37	Ambient Air Temperature °F 41	Elevation 44	Comments 45	
11	25	01	2	81	0	10	1	2	8							1	2	1
11	25	01	2	82	0	6										1		
11	25	01	2	83	0	6										1		
11	25	01	2	84	0	1										1		
11	25	01	2	85	0	1										1		
11	25	01	2	86	0	6										1		
11	25	01	2	87	0	6										1		
11	25	01	2	88	0	10										1		
11	25	01	2	89	0	10										1		
11	25	01	2	90	0	6										1		
11	25	01	2	91	0	6										1		
11	25	01	2	92	0	10										1		
11	25	01	2	93	0	6										1		
11	25	01	2	94	0	6										1		
11	25	01	2	95	0	10										1		
11	25	01	2	96	0	6										1		
11	25	01	2	97	0	6										1		
11	25	01	2	98	10000	36						0	130		~~130~~	1	2	2
11	25	01	2	99	0	10										1		
11	25	01	2	100	0	10	↓		↓							1		

COMMENTS: 1) SOURCES 81-108 ARE IN THE SERVICE OF SENDING HEAVY BOTTOMS FROM THE RECTIFIER TO THE 8,9 TANK 2) PUMP SEALS. OUTBOARD SEAL 98O - 10,000 ppm; INBOARD 98I SEAL - 700 ppm; SUBSEQUENT INBOARD/OUTBOARD SEALS WERE GIVEN INDIVIDUAL ID NOS.

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SCREENING DATA SHEET

									~~Primary Material~~		Secondary ~~Material~~							
	Month 1	Day 3	Screening Team 5	Instrument 7	Source ID 8	Screening Value 13	Source Type 20	Process Unit 22	Service 24	ID STREAM 25	Conc. 28	ID 29	SEAL ~~Conc.~~ 32	Line Temperature °F 33	Line Pressure psig 37	Ambient Air Temperature °F 41	Elevation 44	Comments 45	
	11	25	01	2	101	0	10	1	2	8							1		
	11	25	01	2	102	0	6	1	2								1		
	11	25	01	2	103	0	6		2								1		
	11	25	01	2	104	0	10		2								1		
	11	25	01	2	105	0	10		2								1		
	11	25	01	2	106	0	6		2								1		
	11	25	01	2	107	0	10		2	↓							1		
	11	25	01	2	108	0	6		2	8							1		
	11	25	01	2	109	0	70		1	1							2	2	1
	11	25	01	2	110	0	70		1	1							2		
	11	25	01	2	111	0	10		2	5							1	2	2
	11	25	01	2	112	0	10		2								1		
	11	25	01	2	113	0	6		2								1		
	11	25	01	2	114	0	10		2								1		
	11	25	01	2	115	0	10		2								1		
	11	25	01	2	~~116~~ 117	0	36		2				I				1	2	3
✓	11	25	01	2	117	40000	36		2				0	50		~~130~~ 50	1	2	4
	11	25	01	2	118	0	10		2								1		
	11	25	01	2	119	0	10		2								1		
	11	25	01	2	120	0	6	↓	2	↓							1		

COMMENTS: 1) SOURCE ID 70 DESIGNATES INBOARD AND OUTBOARD SEAL OF AN EXHAUSTER, THESE WERE 10 FOR ALL EXHAUSTER SEALS 2) SOURCES 111-120 ARE IN RECTIFIER REFLUX SERVICE 3) INBOARD PUMP SEAL 4) OUTBOARD PUMP SEAL.

REVISED 12/2/80 FOR LEGIBILITY

SCREENING DATA SHEET

Month 1	Day 3	Screening Team 5	Instrument 7	Source ID 8	Screening Value 13	Source Type 20	Process Unit 22	Service 24	~~Primary Material~~ ID STREAM 25	Conc. 28	~~Secondary Material~~ ID 29	~~Code~~ SEAL 32	Line Temperature °F 33	Line Pressure psig 37	Ambient Air Temperature °F 41	Elevation 44	Comments 45	
11	25	01	2	121	10000	10	1	2	5				50		50	1	2	1,2,5
11	25	01	2	122	0	10												
11	25	01	2	123	0	10												
11	25	01	2	124	0	13												
11	25	01	2	125	0	10												
11	25	01	2	126	0	6												
11	25	01	2	127	0	10												
11	25	01	2	128	0	10												
11	25	01	2	129	0	10												
11	25	01	2	130	0	36						I					2	3
11	25	01	2	131	200	36						0	50		~~+30~~ 50		2	4,5
11	25	01	2	132	0	10												
11	25	01	2	133	0	10												
11	25	01	2	134	0	10												
11	25	01	2	135	0	6												
11	25	01	2	136	0	10												
11	25	01	2	137	0	10												
11	25	01	2	138	0	10												
11	25	01	2	98	700	36	1	2	8			I	50		~~+30~~ 50	1		
11	25	01	2	109	0	71	1	1	1						2			

COMMENTS: 1) LIQUID HYDROCARBON LEAK, 2) SOURCES 121-138 ARE IN SERVICE OF PUMPING LIGHT OIL TO STORAGE TANK #7. 3) INBOARD SEAL 4) OUTBOARD SEAL.
5) PRESSURES IN 121, 131 ARE PROBABLY LOW.

REVISION OF ORIGINAL DATA SHEET
REVISED 12/2/80

SCREENING DATA SHEET

	Month 1	Day 3	Screening Team 5	Instrument 7	Source ID 8	Screening Value 13	Source Type 20	Process Unit 22	Service 24	~~Primary~~ ~~Material~~ ID STREAM 25	Conc. 28	Secondary ~~Material~~ ID 29	Conc. SEAL 32	Line Temperature °F 33	Line Pressure psig 37	Ambient Air Temperature °F 41	Elevation 44	Comments 45	
✓	11	26	01	2	139	20000	36	1	2	6			I		42	160	1	2	1, 11
✓	11	26	01	2	~~140~~ 139	22000	36	1		6			0		42	160	1	2	2, 11
✓	11	26	01	2	141	50	36			7			I		34	360	1	2	3, 12
	11	26	01	2	142	40	46			5			I		0	60	1	2	4
	11	26	01	2	143	0	46			5			0				1	2	5
	11	26	01	2	144		11			3							3	1	6
	11	26	01	2	145		10			3							3	1	7
	11	26	01	2	146		10			3							3	1	
	11	26	01	2	147		10			3							3	1	
	11	26	01	2	148		10			3 ↓							3	1	
	11	26	01	2	149		10			5							2	1	8
	11	26	01	2	150		10			5							2	1	
	11	26	01	2	151		10			5							2	1	9
	11	26	01	2	152		10			5							2	1	
	11	26	01	2	153		10			↓							2	1	
	11	26	01	2	154	0	10			8							1	2	10
	11	26	01	2	155	0	6			8							1	2	
	11	26	01	2	156	0	6			8							1	2	
	11	26	01	2	157	0	1			8							1	2	
	11	26	01	2	158	0	10	↓		8 ↓							1	2	

COMMENTS: 1) 139-141 ARE AT BASE OF LIGHT OIL SCRUBBERS, 139-INBOARD SEAL; 2) OUTBOARD SEAL, LIQUID LEAK IN 139 AND 140; 3). INBOARD SEAL; 4) 142-143 FOR A STANDBY PUMP TO SEND L.O. TO STORAGE TANK #7, 142 IS INBOARD SEAL 5) OUTBOARD SEAL; 6) SIDE STREAM FROM STRIPPER; 7) 145-148 ~~CARRY~~ IN SERVICE OF STEAM + L.O. FROM HEAT EX. TO RECTIFIER AND CONDENSER; 8) REFLUX TO RECTIFIER; 9) 151-153 FINAL SEPARATOR TO RECTIFIER 10) 154-158 AT BASE OF RECTIFIER 11) THE PUMP IS CURRENTLY

SCREENING DATA SHEET

									Primary Material		Secondary Material							
Month 1	Day 3	Screening Team 5	Instrument 7	Source ID 8	Screening Value 13	Source Type 20	Process Unit 22	Service 24	ID 25 STREAM	Conc. 28	ID 29	SEAL Conc. 32	Line Temperature °F 33	Line Pressure psig 37	Ambient Air Temperature °F 41	Elevation 44	Comments 45	
11	26	01	2	1150	0	10	1	2	8							1	2	1
11	26	01	2	1160	0	10	↓	↓	8							1	2	1
11	26	01	2	1161	0	11	↓	↓	5							1	2	2
11	26	01	2	1162	0	10	↓	↓	5							1	2	2
11	26	01	2	1163		10	↓	↓	5							2	1	2
11	26	01	2	1164		10	↓	↓	5							2	1	2
11	26	01	2	1165	0	10	↓	↓	↓							2	2	3
11	26	01	2	1166	0	10	↓	↓	↓							2	2	3
11	26	01	2	1167	0	10	↓	↓	↓							2	2	3
11	26	01	2	1168	0	10	↓	↓	↓							2	2	3
11	26	01	2	1169	0	10	↓	↓	↓							2	2	3
11	26	01	2	1170	0	10	↓	↓	↓							2	2	3
11	26	01	2	1171	0	10	↓	↓	↓							2	2	3
11	26	01	2	1172	0	10	↓	↓	↓							2	2	3
11	26	01	2	1173	0	10	↓	↓	↓							2	2	3
11	26	01	2	1174		10	↓	↓	↓							2	1	3
11	26	01	2	1175		10	↓	↓	↓							2	1	3
~~11~~	~~25~~	~~01~~	~~2~~	~~1176~~	~~700~~	~~36~~	~~1~~	↓							~~130~~	~~1~~		
11	26	01	2	141	0	36	1	2	7			0		34	360	1		
11	25	01	2	110	0	71	1	1	1							2		

COMMENTS: 1. Wire [illegible] 2) L.O Storage #7 3) L.O Storage #8, 9

WHEELING-PITTSBURGH STEEL

MONESSEN PLANT

B-2 Screening Sheet For Sample Data

RADIAN
CORPORATION

SCREENING SHEET
FOR SAMPLE DATA

Card 1 S C
1

1. Radian Valve/Pump ID # 01 VA00118
3

2. Unit/Process Coke By-products

3. Plant Name Wheeling-Pittsburgh Steel

4. Date Mo. Day Yr. 12 04 80
11

5. Screener's ID DPW
17

6. Before Tenting Screening Time (Military Time) 1045
20

7. Before Tenting OVA Screening Value 1500
24

TLV Screening Value 400
31

8. Screener's ID DPW
38

9. After Sampling Screening Time (Military Time) 1245
41

10. After Sampling OVA Screening Value 1000
45

TLV Screening Value 660
52

Comment 1
59

Comment 2
61

✓

RADIAN
CORPORATION

SCREENING SHEET

FOR SAMPLE DATA

Card 1 | S | C |
1

1. Radian Valve/Pump ID # | 0 | 1 | P | U | ~~0 | 1 | 7 | 6~~ | I 0 9 8
3

2. Unit/Process Coke BP

3. Plant Name W-P Steel

---

4. Date Mo. Day Yr. | 12 | 05 | 80 |
11

5. Screener's ID | D | P | W |
17

6. Before Tenting Screening Time (Military Time) | 1 | 5 | 1 | 0 |
20

7. Before Tenting OVA Screening Value | | | | 1 | 0 | 0 | 0 | 0 |
24

TLV Screening Value | | | | 4 | 2 | 0 | 0 |
31

LIQUID LEAK DETECTED

---

8. Screener's ID | D | P | W |
38

9. After Sampling Screening Time (Military Time) | 1 | 6 | 5 | 5 |
41

10. After Sampling OVA Screening Value | | | | 6 | 0 | 0 | 0 |
45

TLV Screening Value | | | | 3 | 4 | 0 | 0 |
52

Comment 1 | | |
59

Comment 2 | | | | | | | |
61

✓

SCREENING SHEET
FOR SAMPLE DATA

Card 1 S C
1

1. Radian Valve/Pump ID # 0 1 P V 0 0 9 8
3

2. Unit/Process Coke BP

3. Plant Name W-P Steel

---

4. Date Mo. 1 2 Day 0 5 Yr. 8 0
11

5. Screener's ID DFIIV
17

6. Before Tenting Screening Time (Military Time) 1 5 1 0
20

7. Before Tenting OVA Screening Value 4 5 0 0 0
24

TLV Screening Value 1 0 0 0 1
31

---

8. Screener's ID D [illegible]
38

9. After Sampling Screening Time (Military Time) 1 5 2 5
41

10. After Sampling OVA Screening Value 1 0 0 0 0
45

TLV Screening Value 1 0 0 0 1
52

Comment 1
59

Comment 2
61

✓

RADIAN
CORPORATION

SCREENING SHEET
FOR SAMPLE DATA

Card 1 SC
1

1. Radian Valve/Pump ID # 01PV07
3

2. Unit/Process Coke BP

3. Plant Name W-P Steel

---

4. Date Mo. 12 Day 05 Yr. 80
11

5. Screener's ID DPW
17

6. Before Tenting Screening Time (Military Time) 1535
20

7. Before Tenting OVA Screening Value 15000
24

TLV Screening Value 1000
31

8. Screener's ID DPW
38

9. After Sampling Screening Time (Military Time) 1750
41

10. After Sampling OVA Screening Value 30
45

TLV Screening Value 3200
52

Comment 1
59

Comment 2
61

RADIAN
CORPORATION

SCREENING SHEET
FOR SAMPLE DATA

Card 1 S C
1

1. Radian Valve/Pump ID # 01PU011311
3

2. Unit/Process Coke B.P

3. Plant Name W D Steel

4. Date Mo. Day Yr. 12 05 80
11

5. Screener's ID DPW
17

6. Before Tenting Screening Time (Military Time) 1440
20

7. Before Tenting OVA Screening Value 6000
24

TLV Screening Value 6500
31

8. Screener's ID DPW
38

9. After Sampling Screening Time (Military Time) 1420
41

10. After Sampling OVA Screening Value 4500
45

TLV Screening Value 7200
52

Comment 1
59

Comment 2
61

RADIAN
CORPORATION

SCREENING SHEET
FOR SAMPLE DATA

Card 1 | S | C |
1

I
1. Radian Valve/Pump ID # | 0 | 1 | P | U | ~~2~~ | 1 | 3 | 9 |
3

2. Unit/Process Coke By-product

3. Plant Name Wheeling-Pittsburgh Steel

---

4. Date Mo. Day Yr. | 1 | 2 | 0 | 4 | 8 | 0 |
11

5. Screener's ID | D | P | W |
17

6. Before Tenting Screening Time (Military Time) | 1 | 2 | 4 | 5 |
20

7. Before Tenting OVA Screening Value | | | 6 | ~~0~~ | ~~0~~ | ~~5~~ | ~~0~~ |
24
~~70000~~
40000

TLV Screening Value | | | 9 | ~~6~~ | ~~0~~ | ~~0~~ |
31
7500

---

8. Screener's ID | D | P | W |
38

9. After Sampling Screening Time (Military Time) | 1 | 5 | 1 | 5 |
41

10. After Sampling OVA Screening Value | | | 6 | 0 | 0 | 0 | 0 |
45

TLV Screening Value | | | 4 | 3 | 0 | 0 |
52

Comment 1 | | |
59

Comment 2 | | | | | | | |
61

Reading w/o dilution probe in ambient air = ~2000 ppm
Pump [illegible] reading of Radian valve = ~~30,000~~ 75,000 ppm

9 × 2000 + 1 × x = 10 × ~~8~~ 7,500
18,000 + x = 75,000
x = 57,000 ≈ 60,000 ppm

9 × 4500 + x = 90,000
49,500

RADIAN
CORPORATION

SCREENING SHEET
FOR SAMPLE DATA

Card 1 | S | C |
1

1. Radian Valve/Pump ID # | 0 | 1 | P | V | [illegible] I | 1 | 1 | 3 | 0 |
3

2. Unit/Process Ck B.P

3. Plant Name W P Steel

---

4. Date (Mo. Day Yr.) | 1 | 2 | 0 | 5 | 8 | 0 |
11

5. Screener's ID | D | P | W |
17

6. Before Tenting Screening Time (Military Time) | | 9 | 3 | 0 |
20

7. Before Tenting OVA Screening Value | | | 5 | 0 | 0 | 0 |
24

TLV Screening Value | | | 5 | 4 | 0 | 0 |
31

---

8. Screener's ID | D | P | W |
38

9. After Sampling Screening Time (Military Time) | 1 | 1 | 0 | 0 |
41

10. After Sampling OVA Screening Value | | | | 1 | 0 | 0 | 0 |
45

TLV Screening Value | | | | 2 | 3 | 0 | 0 |
52

Comment 1 | | |
59

Comment 2 | | | | | | | |
61

at 1550, OVA = 150 ; TLV = 4000

SCREENING SHEET
FOR SAMPLE DATA

Card 1 S C
1

0139

1. Radian Valve/Pump ID # 01P0~~0140~~
3

2. Unit/Process Coke By-products

3. Plant Name Wheeling-Pittsburgh Steel

Mo. Day Yr.

4. Date 12 04 80
11

5. Screener's ID DPW
17

6. Before Tenting Screening Time (Military Time) 1045
20

7000 0

4000

7. Before Tenting OVA Screening Value ~~10000~~
24

TLV Screening Value ~~1800~~
31

---

8. Screener's ID DPW
38

2

9. After Sampling Screening Time (Military Time) 1700
41

10. After Sampling OVA Screening Value 15000
45

TLV Screening Value 5700
52

Comment 1
59

Comment 2
61

RADIAN
CORPORATION

SCREENING SHEET
FOR SAMPLE DATA

Card 1 | S | C |
1

∅ 1 3 9

1. Radian Valve/Pump ID # | 0 | 1 | P | U | ~~0 | 1 | 4 | 0~~ |
3

2. Unit/Process Coke B-P

3. Plant Name W-P Steel

---

4. Date Mo. Day Yr. | 12 | 05 | 86 |
11

5. Screener's ID | D | R | W |
17

6. Before Tenting Screening Time (Military Time) | 2 | 9 | 4 | 0 |
20

7. Before Tenting OVA Screening Value | | | | 1 | 0 | 0 | 0 |
24

TLV Screening Value | | | | 1 | 1 | 0 | 0 |
31

---

8. Screener's ID | D | R | W |
38

9. After Sampling Screening Time (Military Time) | 1 | 1 | 0 | 0 |
41

10. After Sampling OVA Screening Value | | | | 2 | 0 | 0 | 0 |
45

TLV Screening Value | | | | 3 | 0 | 0 | 0 |
52

Comment 1 | | |
59

Comment 2 | | | | | | | |
61

01555 OVA = 100
TLV = 1400

RADIAN
CORPORATION

SCREENING SHEET
FOR SAMPLE DATA

Card 1 S C
1

I

1. Radian Valve/Pump ID # 01PU[illegible]141
3

2. Unit/Process ___________

3. Plant Name ______________________________

---

4. Date Mo. Day Yr. 12 05 80
11

5. Screener's ID DRW
17

6. Before Tenting Screening Time (Military Time) 950
20

7. Before Tenting OVA Screening Value 500
24

TLV Screening Value 700
31

- -

8. Screener's ID DRW
38

9. After Sampling Screening Time (Military Time) 1150
41

10. After Sampling OVA Screening Value 150
45

TLV Screening Value 400
52

Comment 1 ☐☐
59

Comment 2 ☐☐☐☐☐☐☐
61

@ 1600
OVA= 30, TLV = $320

RADIAN
CORPORATION

SCREENING SHEET
FOR SAMPLE DATA

Card 1 | S | C |
1

1. Radian Valve/Pump ID # 01VA0008
3

2. Unit/Process Coke By-products

3. Plant Name Wheeling-Pittsburgh Steel

4. Date Mo. 12 Day 03 Yr. 80
11

5. Screener s ID JFW
17

6. Before Tenting Screening Time (Military Time) 1615
20

7. Before Tenting OVA Screening Value 0
24

TLV Screening Value
31

8. Screener's ID
38

9. After Sampling Screening Time (Military Time)
41

10. After Sampling OVA Screening Value
45

TLV Screening Value
52

Comment 1
59

Comment 2
61

AMBIENT ~ 3,000

RADIAN
CORPORATION

SCREENING SHEET
FOR SAMPLE DATA

Card 1 | S | C |
1

1. Radian Valve/Pump ID # | 0 | 1 | V | A | C | 0 | 1 | 2 |
3

2. Unit/Process Coke by-product

3. Plant Name Wheeling-Pittsburgh Steel

---

4. Date Mo. | 1 | 2 | Day | 0 | 3 | Yr. | 8 | 0 |
11

5. Screener's ID | D | P | W |
17

6. Before Tenting Screening Time (Military Time) | 1 | 6 | 0 | 0 |
20

7. Before Tenting OVA Screening Value | | | | | | | 0 |
24

TLV Screening Value | | | | | | | |
31

---

8. Screener's ID | | | |
38

9. After Sampling Screening Time (Military Time) | | | | |
41

10. After Sampling OVA Screening Value | | | | | | | |
45

TLV Screening Value | | | | | | | |
52

Comment 1 | | |
59

Comment 2 | | | | | | | |
61

AMBIENT ~ 700 ppm

RADIAN
CORPORATION

SCREENING SHEET
FOR SAMPLE DATA

Card 1 S C
1

1. Radian Valve/Pump ID # 0 1 V A 0 0 1 3
3

2. Unit/Process Coke By-products

3. Plant Name. Wheeling Pittsburgh Steel

Mo. Day Yr.

4. Date 6 0 3 8 0
11

5. Screener's ID D P W
17

6. Before Tenting Screening Time (Military Time) 1 6 0 0
20

7. Before Tenting OVA Screening Value 0
24

TLV Screening Value
31

---

8. Screener's ID
38

9. After Sampling Screening Time (Military Time)
41

10. After Sampling OVA Screening Value
45

TLV Screening Value
52

Comment 1
59

Comment 2
61

AMBIENT ~ 500 ppm

SCREENING SHEET
FOR SAMPLE DATA

Card 1 S C
1

1. Radian Valve/Pump ID # 0 1 V A 0 0 1 8   2. Unit/Process Coke By-produ
3

3. Plant Name Wheeling-Pittsbrugh Steel

---

4. Date (Mo. Day Yr.) 12 03 80   5. Screener's ID D P W
11   17

6. Before Tenting Screening Time (Military Time) 1600
20

7. Before Tenting OVA Screening Value 12800   TLV Screening Value 2600
24   31

- -

8. Screener's ID
38

9. After Sampling Screening Time (Military Time)
41

10. After Sampling OVA Screening Value   TLV Screening Value
45   52

Comment 1   Comment 2
59   61

RADIAN
CORPORATION

SCREENING SHEET
FOR SAMPLE DATA

Card 1 S C
1

1. Radian Valve/Pump ID # 0 1 V A 0 1 2 1
3

2. Unit/Process Coke B.P.

3. Plant Name WP Steel

---

4. Date Mo. 1 2 Day 0 5 Yr. 8 0
11

5. Screener's ID D P W
17

6. Before Tenting Screening Time (Military Time) 1 4 3 0
20

7. Before Tenting OVA Screening Value 0
24

TLV Screening Value
31

---

8. Screener's ID
38

9. After Sampling Screening Time (Military Time)
41

10. After Sampling OVA Screening Value
45

TLV Screening Value
52

Comment 1
59

Comment 2
61

UNIT #1

RADIAN
CORPORATION

SCREENING SHEET
FOR SAMPLE DATA

I

Card 1 S C
1

1. Radian Valve/Pump ID # 01 1PU0 1139
3

2. Unit/Process. Coke by-produ

*3. Plant Name Wheeling-Pittsburgh Stell

4. Date Mo. 12 Day 03 Yr. 80
11

5. Screener's ID DPW
17

6. Before Tenting Screening Time (Military Time) 1545
20

7. Before Tenting OVA Screening Value 55000
24

TLV Screening Value 12000
31

8. Screener's ID
38

9. After Sampling Screening Time (Military Time)
41

10. After Sampling OVA Screening Value
45

TLV Screening Value
52

Comment 1
59

Comment 2
61

$* \ 3000 \text{ w/ dilution} \times \frac{2000}{500} = 12{,}000$

RADIAN
CORPORATION

SCREENING SHEET
FOR SAMPLE DATA

Card 1 SC
1

1. Radian Valve/Pump ID # 011PV~~0140~~ Ø139
3

2. Unit/Process Coke By-products

3. Plant Name Wheeling-Pittsburgh Steel

---

4. Date Mo. 12 Day 03 Yr. 80
11

5. Screener's ID DFW
17

6. Before Tenting Screening Time (Military Time) 1545
20

7. Before Tenting OVA Screening Value 5000
24

TLV Screening Value 10000
31

---

8. Screener's ID
38

9. After Sampling Screening Time (Military Time)
41

10. After Sampling OVA Screening Value
45

TLV Screening Value
52

Comment 1
59

Comment 2
61

RADIAN
CORPORATION

SCREENING SHEET
FOR SAMPLE DATA

Card 1 S C
1

I

1. Radian Valve/Pump ID # 01PU[illegible]141
3

2. Unit/Process Coke By-products

3. Plant Name Wheeling Pittsburgh Steel

---

4. Date Mo. 12 Day 13 Yr. 80
11

5. Screener's ID DFW
17

6. Before Tenting Screening Time (Military Time) 1615
20

7. Before Tenting OVA Screening Value 200
24

TLV Screening Value 560
31

---

8. Screener's ID
38

9. After Sampling Screening Time (Military Time)
41

10. After Sampling OVA Screening Value
45

TLV Screening Value
52

Comment 1
59

Comment 2
61

LIQUID LEAK

RADIAN
CORPORATION

SCREENING SHEET
FOR SAMPLE DATA

Card 1 S | C
1

1. Radian Valve/Pump ID # 0 | 1 | P | V | [illegible] I | 1 | 4 | 1
3

2. Unit/Process Coke By-products

3. Plant Name Wheeling-Pittsburgh Steel

---

4. Date Mo. 1 2 Day 0 4 Yr. 8 0
11

5. Screener's ID D | R | W
17

6. Before Tenting Screening Time (Military Time) 1 3 4 0
20

7. Before Tenting OVA Screening Value ~~7 [illegible]~~ ~~3 6 0 0~~ 3000 ~~[illegible]~~
24

TLV Screening Value 160 ~~1 6 0~~ Ambient ~~[illegible]~~ ~ 500 ppm
31

- -

8. Screener's ID
38

9. After Sampling Screening Time (Military Time)
41

10. After Sampling OVA Screening Value
45

TLV Screening Value
52

Comment 1
59

Comment 2
61

RADIAN
CORPORATION

SCREENING SHEET
FOR SAMPLE DATA

Card 1 | S | C |
1

I / 42

1. Radian Valve/Pump ID # | 0 | 1 | P | V | ~~0 | 1 | 6 | 8~~ | 2. Unit/Process Coke B P
3

3. Plant Name W P Steel.

Mo. Day Yr.
4. Date | 1 | 2 | 0 | 5 | 8 | 0 | 5. Screener's ID | D | P | W |
11 17

6. Before Tenting Screening Time (Military Time) | 1 | 4 | 5 | 0 |
20

7. Before Tenting OVA Screening Value | | | | | | | 0 | TLV Screening Value | | | | | | | |
24 31

---

8. Screener's ID | | | |
38

9. After Sampling Screening Time (Military Time) | | | | |
41

10. After Sampling OVA Screening Value | | | | | | | | TLV Screening Value | | | | | | | |
45 52

Comment 1 | | | Comment 2 | | | | | | | |
59 61

WHEELING-PITTSBURGH STEEL

MONESSEN PLANT

B-3 Sample Data

UNIT #1

RADIAN
CORPORATION

SAMPLE DATA SHEET

Card 1 | 1 | S |
1

1. Radian Valve/Pump ID# 01 VA00 13 01VA0018 3 2. Unit/Process COKE PLANT

3. Plant Name WHEELING PITTSBURGH

---

4. Date Mo. 12 Day 04 Yr. 80 11 5. Sampler's Initials [illegible] 17

6. Time (Military Time) 1130 20 7. Cart ID# 1 24 8. N.B.# ____ 9. Page # ____

10. Meter #1 ~~[illegible]~~ 731.20 25 12. Meter #2 731.61 31

1.1367

11. Time #1 10 37 13. Time #2 13 41

14. Temp #1 °F 131 45 15. Temp #2 °F 131 48

16. Bar. Press., in. Hg. 29.60 51 17. ΔP, in. Hg. 1.0 56

18. DGM Correction Factor 1.065 61 19. Meter # 715572

20. Vol. Org. Condensate ml 0 66

21. Coll. time, minutes 6 71 22. Specific Gravity of Organic Condensate — 75

23. Comment — 78

X = Ø
R = 1
B = 2

RADIAN
CORPORATION

Card 1 | 1 | S | 1

SAMPLE DATA SHEET

1. Radian Valve/Pump ID# 011AU~~01176~~ I098 3
2. Unit/Process COKE

3. Plant Name 10-F

---

4. Date Mo. 12 Day 05 Yr. 80 11
5. Sampler's Initials DW 17

6. Time (Military Time) 20
7. Cart ID# 1 24
8. N.B.# ____
9. Page #

10. Meter #1 5931.610 25
12. Meter #2 5971.015 31

11. Time #1 0 37
13. Time #2 7 41

14. Temp #1 °F 144 45
15. Temp #2 °F 144 48

16. Bar. Press., in. Hg. 29.148 51
17. ΔP, in. Hg. 1.3 56

18. DGM Correction Factor 1.0063 61
19. Meter # 715572

20. Vol. Org. Condensate ml 0 66

21. Coll. time, minutes 16 71
22. Specific Gravity of Organic Condensate 75

23. Comment 78

L/Q LEAK

0.3 ml IN 9 MIN.

RADIAN
CORPORATION

Card 1 1 S
1

SAMPLE DATA SHEET

1. Radian Valve/Pump ID# 01 PU 0 0 9 8 (3)   2. Unit/Process CoKE

3. Plant Name W-P

---

4. Date Mo. 12 Day 05 Yr. 80 (11)   5. Sampler's Initials DVD (17)

6. Time (Military Time) (20)   7. Cart ID# 1 (24)   8. N.B.# ____   9. Page #

10. Meter #1 6411.140 (25)   12. Meter #2 647.811 (31)

11. Time #1 0 (37)   13. Time #2 5 (41)

14. Temp #1 °F 44 (45)   15. Temp #2 °F 44 (48)

16. Bar. Press., in. Hg. 29.148 (51)   17. ΔP, in. Hg. 1.1 (56)

18. DGM Correction Factor 1.063 (61)   19. Meter # 715572

20. Vol. Org. Condensate ml 0 (66)

21. Coll. time, minutes 8 (71)   22. Specific Gravity of Organic Condensate (75)

23. Comment (78)

LIQ LEAK

1 ml IN 42.2 sec

RADIAN
CORPORATION

Card 1 1 S
1

SAMPLE DATA SHEET

1. Radian Valve/Pump ID# 01 PU 0 1 1 7 (3) 2. Unit/Process COKE

3. Plant Name W-P

4. Date (Mo. Day Yr.) 1 0 0 5 8 0 (11)

5. Sampler's Initials DW (17)

6. Time (Military Time) (20)

7. Cart ID# 1 (24)

8. N.B.# ____

9. Page # ____

10. Meter #1 681.60 (25)

681.60

11. Time #1 0 (37)

12. Meter #2 6851.45 (31)

13. Time #2 3 (41)

14. Temp #1 °F 43 (45)

15. Temp #2 °F 43 (48)

16. Bar. Press., in. Hg. 29.48 (51)

17. ΔP, in. Hg. 1.2 (56)

18. DGM Correction Factor 1.0063 (61)

19. Meter # 715572

20. Vol. Org. Condensate ml (66)

21. Coll. time, minutes 8 (71)

22. Specific Gravity of Organic Condensate (75)

23. Comment (78)

RADIAN
CORPORATION

Card 1 [1|S]
1

SAMPLE DATA SHEET

1. Radian Valve/Pump ID# 0117101311 (3) 2. Unit/Process COKE

3. Plant Name W-P

---

4. Date Mo. Day Yr. 12 05 80 (11) 5. Sampler's Initials EW (17)

6. Time (Military Time) [ ] (20) 7. Cart ID# 1 (24) 8. N.B.# ____ 9. Page #

10. Meter #1 475.60 (25) 12. Meter #2 479.51 (31)

11. Time #1 10 (37) 13. Time #2 13 (41)

14. Temp #1 °F 143 (45) 15. Temp #2 °F 143 (48)

16. Bar. Press., in. Hg. 29.48 (51) 17. ΔP, in. Hg. 1.2 (56)

18. DGM Correction Factor 1.063 (61) 19. Meter # 715572

20. Vol. Org. Condensate ml 0 (66)

21. Coll. time, minutes 6 (71) 22. Specific Gravity of Organic Condensate [ ] (75)

23. Comment [ ] (78)

LIQ LEAK

1.8 ml IN 1 MIN.

RADIAN
CORPORATION

Card 1 | 1 | S |
1

SAMPLE DATA SHEET

I
S

1. Radian Valve/Pump ID# 01 PU ~~0~~ 137 (3)   2. Unit/Process COKE

3. Plant Name WHEELING-PITTSBURGH

---

4. Date Mo. Day Yr. 12 04 80 (11)   5. Sampler's Initials DW (17)

6. Time (Military Time) 1500 (20)   7. Cart ID# 7 (24)   8. N.B.# ____   9. Page # _

10. Meter #1 166.20 (25)   12. Meter #2 170 02 (31)

11. Time #1 10 (37)   13. Time #2 3 (41)

14. Temp #1 °F 56 (45)   15. Temp #2 °F 36 (48)

16. Bar. Press., in. Hg. 29.65 (51)   17. ΔP, in. Hg. 1.2 (56)

18. DGM Correction Factor 1.065 (61)   19. Meter # 715572

20. Vol. Org. Condensate ml 0 (66)

21. Coll. time, minutes 6 (71)   22. Specific Gravity of Organic Condensate ____ (75)

23. Comment ____ (78)

~~LIQ LEAK:~~
~~1.8 ml IN 8.8 sec~~
~~density = 1.0992~~

RADIAN
CORPORATION

SAMPLE DATA SHEET

Card 1 [1 | S]
1

I

1. Radian Valve/Pump ID# [0 1 | P U | ~~0~~ 1 | 3 9] 3 2. Unit/Process COKE

3. Plant Name W — P

Mo. Day Yr.

4. Date [1 2 | 0 5 | 8 0] 11

5. Sampler's Initials [RW] 17

6. Time (Military Time) [| | |] 20

7. Cart ID# [1] 24 8. N.B.# ____ 9. Page #

335.60

10. Meter #1 [3 3 5 . 6 0] 25

540.74

12. Meter #2 [5 4 0 . 7 4] 31

11. Time #1 [| | | 0] 37

13. Time #2 [| | | 5] 41

14. Temp #1 °F [| 3 4] 45

15. Temp #2 °F [| 3 4] 48

✓

16. Bar. Press., in. Hg. [2 9 . 5 0] 51

17. ΔP, in. Hg. [| 0 . 1 7] 56

18. DGM Correction Factor [1 . 0 6 3] 61

19. Meter # 715572

20. Vol. Org. Condensate ml [| | | 0] 66

21. Coll. time, minutes [| | 1 1] 71

22. Specific Gravity of Organic Condensate [|] 75

23. Comment [| |] 78

LIQ LEAK:

2.2 ml IN 10.8 sec

$$5\overline{)5.14}^{\;1.02}$$

RADIAN
CORPORATION

OK - Keypunch this page!

SAMPLE DATA SHEET

Card 1 [1 | S]
1

1. Radian Valve/Pump ID# 01AU~~[illegible]~~ Ø139
3

2. Unit/Process COKE

3. Plant Name WHEEL - PITT

---

4. Date Mo. 12 Day 04 Yr. 80
11

5. Sampler's Initials Pw
17

6. Time (Military Time) ~~[illegible]~~
20

7. Cart ID# /
24

8. N.B.# ____

9. Page # ____

10. Meter #1 280 190
25

12. Meter #2 281.155
31

11. Time #1 0
37

13. Time #2 3
41

14. Temp #1 °F 34
45

15. Temp #2 °F 34
48

16. Bar. Press., in. Hg. 29.165
51

17. ΔP, in. Hg. /./
56

18. DGM Correction Factor 1.045
61

19. Meter # 71557Z

20. Vol. Org. Condensate ml 0
66

21. Coll. time, minutes //
71

22. Specific Gravity of Organic Condensate ––
75

23. Comment ––
78

RADIAN
CORPORATION

Card 1 | 1 | S |
1

SAMPLE DATA SHEET

0139

1. Radian Valve/Pump ID# | 01 | FU | ~~0140~~ | 3   2. Unit/Process COKE

3. Plant Name M-F

---

4. Date (Mo. Day Yr.) | 12 | 05 | 80 | 11   5. Sampler's Initials | DW | 17

6. Time (Military Time) | | 20   7. Cart ID# | 1 | 24   8. N.B.# ____   9. Page # _

10. Meter #1 | 384.50 | 25   12. Meter #2 | 389.20 | 31

11. Time #1 | 0 | 37   13. Time #2 | 4 | 41

14. Temp #1 °F | 34 | 45   15. Temp #2 °F | 35 | 48

16. Bar. Press., in. Hg. | 29.50 | 51   17. ΔP, in. Hg. | 0.9 | 56

18. DGM Correction Factor | 1.063 | 61   19. Meter # 715572

20. Vol. Org. Condensate ml | 0 | 66

21. Coll. time, minutes | 7 | 71   22. Specific Gravity of Organic Condensate | | 75

23. Comment | | 78

RADIAN
CORPORATION

Card 1 1 S
1

SAMPLE DATA SHEET

1. Radian Valve/Pump ID# 01 PU I [illegible] 1 41
3
2. Unit/Process COKE

3. Plant Name W-P

---

4. Date Mo. 12 Day 05 Yr. 80
11

5. Sampler's Initials DW
17

6. Time 1120
20
(Military Time)

7. Cart ID# 1
24

8. N.B.# ____

9. Page # __

10. Meter #1 423.50
25

12. Meter #2 429.58
31

11. Time #1 10
37

13. Time #2 15
41

14. Temp #1 °F 36
45

15. Temp #2 °F 36
48

16. Bar. Press., in. Hg. 29.50
51

17. ΔP, in. Hg. 1.1
56

18. DGM Correction Factor 1.063
61

19. Meter # 715572

20. Vol. Org. Condensate ml
66

21. Coll. time, minutes
71

22. Specific Gravity of Organic Condensate
75

23. Comment
78

RADIAN
CORPORATION

don't keypunch

SAMPLE DATA SHEET

Card 1 1 S 1

1. Radian Valve/Pump ID# 01AMO14V 3 2. Unit/Process COKE

3. Plant Name W-P

---

4. Date Mo. 12 Day 04 Yr. 80 11 5. Sampler's Initials DW 17

6. Time (Military Time) 20 7. Cart ID# 24 8. N.B.# ____ 9. Page #

10. Meter #1 25 12. Meter #2 31

11. Time #1 37 13. Time #2 41

14. Temp #1 °F 45 15. Temp #2 °F 48

16. Bar. Press., in. Hg. 29.65 51 17. ΔP, in. Hg. 56

18. DGM Correction Factor 1.035 61 19. Meter # 715572

20. Vol. Org. Condensate ml 66

21. Coll. time, minutes 71 22. Specific Gravity of Organic Condensate 75

23. Comment 78

WHEELING-PITTSBURGH STEEL

MONESSEN PLANT

B-4 Analysis Data

UNIT #1

ANALYSIS DATA SHEET

(AMBIENT AND BAG)

1 A
1

1. Radian Valve/Pump ID# 0 1 V A 0 0 1 8 (3)   2. Unit/Process Coke Plant

3. Plant Name Wheeling Pitts. Steel

4. Date (Mo. Day Yr.) 1 2 0 4 8 0 (11)   5. Analyst's Initials C J 6 (17)

6. Time (Military) 1 2 3 0 (20)   7. N.B. #______   8. Page #______

9. Instrument Byron 301C THC 1 (24)

AMBIENT AIR   BAG SAMPLE

	Component Code	ppmw		Component Code	ppmw	
1.	9 9 8 25	4 1 9 . 5 28	~~20x5~~ 398 441	9 9 8 34	4 4 3 . 5 37	425 462
2.	43	46		52	55	
3.	61	64		70	73	

X=0
R=1

Card 2 2 A (1) Duplicate columns 3 through 10 from Card 1

	Component Code	ppmw	Component Code	ppmw
4.	11	14	20	23
5.	29	32	38	41
6.	7 7 7 47	2 6 0 0 50	8 8 8 56	2 7 0 0 59

Remarks: 20x100   20x50

X=0
R=1

ANALYSIS DATA SHEET

(AMBIENT AND BAG)

1 | A
1

1. **Radian Valve/Pump ID#** 0 | 1 | V | A | 0 | 0 | 1 | 8 (3)

2. **Unit/Process** Coke Plant

3. **Plant Name** Wheeling Pitts. Steel

4. **Date** (Mo. Day Yr.) 1 | 2 | 0 | 4 | 8 | 0 (11)

5. **Analyst's Initials** | D | W (17)

6. **Time (Military)** 1 | 2 | 3 | 0 (20)

7. **N.B. #**_______

8. **Page #**______

9. **Instrument** HP 5730 GC 2 (24)

AMBIENT AIR / BAG SAMPLE

	Component Code	ppmw	Component Code	ppmw
1.	0 | 1 | 2 (25)	2 | 9 | 4 | . | 8 (28)	0 | 1 | 2 (34)	2 | 9 | 8 | . | 6 (37)
2.	(43)	(46)	(52)	(55)
3.	(61)	(64)	(70)	(73)

X=0
B=2

Card 2 2 | A (1) Duplicate columns 3 through 10 from Card 1

	Component Code	ppmw	Component Code	ppmw
4.	(11)	(14)	(20)	(23)
5.	(29)	(32)	(38)	(41)
6.	(47)	(50)	(56)	(59)

X=0
B=2

Remarks:

ANALYSIS DATA SHEET

(AMBIENT AND BAG)

1 A
1

P U I 0 9 8

1. Radian Valve/Pump ID# 0 1 ~~V A~~ 0 9 8
3

2. Unit/Process Coke Plant

3. Plant Name Wheeling Pitts Steel

4. Date Mo. 12 Day 05 Yr. 80
11

5. Analyst's Initials CJG
17

6. Time (Military) 1745
20

7. N.B. #_______

8. Page #_______

9. Instrument Byron 301C THC 1
24

AMBIENT AIR | BAG SAMPLE

	Component Code	ppmw		Component Code	ppmw	
1.	998 25	190.1 28	204.4 177.2 188.8	998 34	10210 37	10280 10140
2.	43	46		52	55	
3.	61	64		70	73	

Card 2 2 A Duplicate columns 3 through 10 from Card 1
1

	Component Code	ppmw	Component Code	ppmw
4.	11	14	20	23
5.	29	32	38	41
6.	777 47	33 50	888 56	2500 59

Remarks:

ANALYSIS DATA SHEET

(AMBIENT AND BAG)

1 | A
1

P u I 0 9 8

1. Radian Valve/Pump ID# 0 1 ~~V A 0 9 8 X~~ 3   2. Unit/Process Coke Plant

3. Plant Name Wheeling Pitts. Steel

4. Date Mo. Day Yr. 1 2 0 5 8 0 11   5. Analyst's Initials C J G 17

6. Time (Military) 1 7 4 5 20   7. N.B. #______   8. Page #______

9. Instrument HP 5730 GC 2 24

	AMBIENT AIR			BAG SAMPLE		
	Component Code	ppmw		Component Code	ppmw	
1.	0112 25	162.3 28	164.5 160.1	0112 34	8584 37	8890 8278
2.	43	46		52	55	
3.	61	64		70	73	

Card 2 2 | A Duplicate columns 3 through 10 from Card 1
1

	Component Code	ppmw	Component Code	ppmw
4.	11	14	20	23
5.	29	32	38	41
6.	47	50	56	59

Remarks:

ANALYSIS DATA SHEET

(AMBIENT AND BAG)

1 | A
1

PU /

1. Radian Valve/Pump ID# 0 1 1 | ~~V | A~~ | 0 | 9 8 | ~~0~~
3

2. Unit/Process Coke Plant

3. Plant Name Wheeling Pitts. Steel

Mo. Day Yr.

4. Date 1 2 | 0 5 | 8 0
11

5. Analyst's Initials C J G
17

6. Time (Military) 1 7 3 0
20

7. N.B. #________

8. Page #______

9. Instrument Byron 301C THC 1
24

	AMBIENT AIR Component Code	ppmw		BAG SAMPLE Component Code	ppmw	
1.	9 9 8 25	2 9 4 28	290 298	9 9 8 34	2 5 5 8 0 37	25520 25640
2.	43	46		52	55	
3.	61	64		70	73	

Card 2 | 2 | A | Duplicate columns 3 through 10 from Card 1
1

	Component Code	ppmw	Component Code	ppmw
4.	11	14	20	23
5.	29	32	38	41
6.	7 7 7 47	3 3 50	8 8 8 56	4 7 0 0 59

Remarks:

ANALYSIS DATA SHEET

(AMBIENT AND BAG)

1 | A
1

PU

1. Radian Valve/Pump ID# 011 ~~VA098[illegible]~~ 2. Unit/Process Coke Plant
3

3. Plant Name Wheeling Pitts Steel

4. Date Mo. 12 Day 05 Yr. 80 5. Analyst's Initials CJG
11 17

6. Time (Military) 1830 7. N.B. #_______ 8. Page #______
20

9. Instrument HP 5730 GC 2
24

	AMBIENT AIR		BAG SAMPLE	
	Component Code	ppmw	Component Code	ppmw
1.	012 25	290 28	012 34	24940 37
2.	43	46	52	55
3.	61	64	70	73

Card 2 2 | A Duplicate columns 3 through 10 from Card 1
1

ADDED LATER

	Component Code	ppmw	Component Code	ppmw
4.	11	14	20	23
5.	29	32	38	41
6.	47	50	56	59

Remarks:

ANALYSIS DATA SHEET

(AMBIENT AND BAG)

1 | A
1

1. Radian Valve/Pump ID# 0 1 ~~V A~~ P U 0 1 1 1 7
3

2. Unit/Process Coke Plant

3. Plant Name Wheeling Pitts. Steel

4. Date (Mo. Day Yr.) 1 2 0 5 8 0
11

5. Analyst's Initials G J G
17

6. Time (Military) 1 8 4 0
20

7. N.B. #________ 8. Page #______

9. Instrument Byron 301C THC 1
24

	AMBIENT AIR Component Code	ppmw		BAG SAMPLE Component Code	ppmw	
1.	9 9 8 25	2 4 1 . 8 28	240.4 243.2	9 9 8 34	6 7 2 0 37	6730 6710
2.	43	46		52	55	
3.	61	64		70	73	

Card 2 2 | A Duplicate columns 3 through 10 from Card 1
1

	Component Code	ppmw	Component Code	ppmw
4.	11	14	20	23
5.	29	32	38	41
6.	7 7 7 47	29 2 9 50	8 8 8 56	7 1 0 59

Remarks:

ANALYSIS DATA SHEET

(AMBIENT AND BAG)

1 A
1

Pu0

1. **Radian Valve/Pump ID#** 011~~VA0~~1117
3

2. **Unit/Process** Coke Plant

3. **Plant Name** Wheeling Pitts. Steel

Mo. Day Yr.

4. **Date** 120580
11

5. **Analyst's Initials** CJG
17

6. **Time (Military)**
20

7. **N.B. #**

8. **Page #**

9. **Instrument** HP 5730 GC 2
24

AMBIENT AIR

BAG SAMPLE

	Component Code	ppmw		Component Code	ppmw	
1.	012 25	215.2 28	192,3 238	012 34	6327 37	6328 6326
2.	43	46		52	55	
3.	61	64		70	73	

Card 2 2 A Duplicate columns 3 through 10 from Card 1
1

	Component Code	ppmw	Component Code	ppmw
4.	11	14	20	23
5.	29	32	38	41
6.	47	50	56	59

Remarks:

ANALYSIS DATA SHEET

(AMBIENT AND BAG)

1 | A
1

P U

1. Radian Valve/Pump ID# 0 1 | ~~V A~~ | 0 1 1 3 1
3

2. Unit/Process Coke Plant

3. Plant Name Wheeling Pitts. Steel

4. Date Mo. 1 2 Day 0 5 Yr. 8 0
11

5. Analyst's Initials C J G
17

6. Time (Military) 1 5 4 5
20

7. N.B. #

8. Page #

9. Instrument Byron 301C THC 1
24

AMBIENT AIR

BAG SAMPLE

	Component Code	ppmw	Component Code	
				~~16140~~ ~~[illegible]~~
1.	~~998~~ (25)	~~169.~~ ~~210.2~~ ~~168.2~~ (28)	~~[illegible]~~ (34)	~~16140~~ (37) ~~[illegible]~~ ~~[illegible]~~ ~~[illegible]~~
2.	~~998~~ (43)	~~262.4~~ (46)	998 (52)	18880 (55) 19160 18600
3.	~~ ~~ (61)	~~233.6~~ (64)	(70)	~~[illegible]~~ (73)

Card 2 | 2 | A | Duplicate columns 3 through 10 from Card 1
1

	Component Code	ppmw		Component Code	ppmw
4.	998 (11)	241.3 (14)	227.8 262.4 233.6	(20)	(23)
5.	(29)	. (32)		(38)	(41)
6.	777 (47)	24 (50)		888 (56)	50 (59)

Remarks:

ANALYSIS DATA SHEET

(AMBIENT AND BAG)

1 | A
1

1. Radian Valve/Pump ID# P u 01 ~~VA~~ 0 1 3 1 (3)   2. Unit/Process Coke Plant

3. Plant Name Wheeling Pitts. Steel

4. Date Mo. Day Yr. 12 05 80 (11)   5. Analyst's Initials CJG (17)

6. Time (Military) 1550 (20)   7. N.B. #_______   8. Page #______

9. Instrument HP 5730 GC   2 (24)

AMBIENT AIR / BAG SAMPLE

	Component Code	ppmw		Component Code	ppmw	
1.	012 (25)	211.85 (28)	204.4 219.3	012 (34)	17153 (37)	18163 17143
2.	(43)	(46)		(52)	(55)	
3.	(61)	(64)		(70)	(73)	

Card 2   2 | A (1)   Duplicate columns 3 through 10 from Card 1

	Component Code	ppmw	Component Code	ppmw
4.	(11)	(14)	(20)	(23)
5.	(29)	(32)	(38)	(41)
6.	(47)	(50)	(56)	(59)

Remarks:

ANALYSIS DATA SHEET

(AMBIENT AND BAG)

1 | A
1

P u ~~8~~ I

1. Radian Valve/Pump ID# 0 1 ~~V A 0~~ 1 3 9
3

2. Unit/Process Coke Plant

3. Plant Name Wheeling Pitts. Steel

4. Date Mo. 1 2 Day 0 4 Yr. 8 0
11

5. Analyst's Initials C J G
17

6. Time (Military) 1 5 5 4
20

7. N.B. #_______

8. Page #______

9. Instrument Byron 301C THC 1
24

AMBIENT AIR | BAG SAMPLE

~~SEE PAGE~~ A

	Component Code	ppmw		Component Code	ppmw	
1.	9 9 8 25	7 1 1 28	~~2349~~ 718 ← 704 ←	9 9 8 34	~~2 3 4 4 0~~ 37 2 3 4 3 0	23480 23400
2.	43	46		52	55	
3.	61	64		70	73	

Card 2 | 2 | A | Duplicate columns 3 through 10 from Card 1
1

	Component Code	ppmw	Component Code	ppmw
4.	11	14	20	23
5.	29	32	38	41
6.	7 7 7 47	1 1 0 0 0 50	8 8 8 56	8 5 0 0 0 59

Remarks:

8.3960 1.8 ml 88 sec B-60

10.3345

1.9385 g LIP LEAK

⇒ d = 1.0992

OK - Keypunch this sheet !

? ~~Benzene analysis~~

ANALYSIS DATA SHEET

(AMBIENT AND BAG)

1 | A
1

1. Radian Valve/Pump ID# 0 1 1 ~~V A O~~ P U I 1 3 9 (3) 2. Unit/Process Coke Plant

3. Plant Name Wheeling Pitts. Steel

4. Date Mo. 1 2 Day 0 4 Yr. 8 0 (11) 5. Analyst's Initials C J G (17)

6. Time (Military) ____ (20) 7. N.B. #______ 8. Page #______

9. Instrument HP 5730 GC 2 (24)

AMBIENT AIR LEAKY AMB. AIR BAG BAG SAMPLE

	Component Code	ppmw	Component Code	ppmw
1.	0 1 2 (25)	(28)	0 1 2 (34)	2 1 8 0 7 (37) ~~21806.5~~
2.	(43)	(46)	(52)	(55)
3.	(61)	(64)	(70)	(73)

Card 2 2 | A (1) Duplicate columns 3 through 10 from Card 1

	Component Code	ppmw	Component Code	ppmw
4.	(11)	(14)	(20)	(23)
5.	(29)	(32)	(38)	(41)
6.	(47)	(50)	(56)	(59)

Remarks:

ANALYSIS DATA SHEET

(AMBIENT AND BAG)

1 A
1

P U I
1. Radian Valve/Pump ID# 0 1 ~~V A 0~~ 1 3 9 (3) 2. Unit/Process Coke Plant

3. Plant Name Wheeling Pitts. Steel

4. Date (Mo. Day Yr.) 1 2 0 5 8 0 (11) 5. Analyst's Initials C 5 6 (17)

6. Time (Military) 1 1 1 0 (20) 7. N.B. #________ 8. Page #______

9. Instrument Byron 301C THC 1 (24)

AMBIENT AIR / BAG SAMPLE

	Component Code	ppmw		Component Code	ppmw	
1.	9 9 8 (25)	696.5 (28)	687 706	9 9 8 (34)	16910 (37)	16780 17040
2.	(43)	(46)		(52)	(55)	
3.	(61)	(64)		(70)	(73)	

Card 2 2 A (1) Duplicate columns 3 through 10 from Card 1

	Component Code	ppmw	Component Code	ppmw
4.	(11)	(14)	(20)	(23)
5.	(29)	(32)	(38)	(41)
6.	7 7 7 (47)	400 (50)	8 8 8 (56)	2200 (59)

Remarks:

ANALYSIS DATA SHEET

(AMBIENT AND BAG)

1 A
1

P U I

1. Radian Valve/Pump ID# 0 1 1 ~~V A 6~~ 1 3 9
3

2. Unit/Process Coke Plant

3. Plant Name Wheeling Pitts. Steel

4. Date Mo. 1 2 Day 0 5 Yr. 8 0
11

5. Analyst's Initials C J G
17

6. Time (Military) 1 1 0 0
20

7. N.B. #______

8. Page #______

9. Instrument HP 5730 GC 2
24

AMBIENT AIR | BAG SAMPLE

	Component Code	ppmw		Component Code	ppmw	
1.	0 1 1 2 25	1 5 9 9 . 4 28	620.1 578.7	0 1 1 2 34	1 1 8 3 7 3 37	19030 17716
2.	43	46		52	55	
3.	61	64		70	73	

Card 2 2 A Duplicate columns 3 through 10 from Card 1
1

	Component Code	ppmw	Component Code	ppmw
4.	11	14	20	23
5.	29	32	38	41
6.	47	50	56	59

Remarks: ~~A~~ ~~19030~~ ~~B~~ ~~17716~~

ANALYSIS DATA SHEET

(AMBIENT AND BAG)

1 | A
1

P U 0 1 3 9

1. Radian Valve/Pump ID# 0 1 1 ~~V A 0 1 4 0~~ (3)

2. Unit/Process Coke Plant

3. Plant Name Wheeling Pitts. Steel

4. Date Mo. 1 2 Day 0 4 Yr. 8 0 (11)

5. Analyst's Initials C J G (17)

6. Time (Military) (20)

7. N.B. #________

8. Page #______

9. Instrument Byron 301C THC 1 (24)

	AMBIENT AIR Component Code	↓ ppmw	BAG SAMPLE Component Code	ppmw	
1.	9 9 8 (25)	6 0 . 4 (28)	9 9 8 (34)	1 5 9 8 0 (37)	15940← 16020←
2.	(43)	(46)	(52)	(55)	
3.	(61)	(64)	(70)	(73)	

Card 2 | 2 | A | (1) Duplicate columns 3 through 10 from Card 1

	Component Code	ppmw	Component Code	ppmw
4.	(11)	(14)	(20)	(23)
5.	(29)	(32)	(38)	(41)
6.	7 7 7 (47)	1 2 0 (50)	8 8 8 (56)	1 4 0 0 0 (59)

Remarks:

✓

ANALYSIS DATA SHEET

(AMBIENT AND BAG)

1 | A
1

1. Radian Valve/Pump ID# PU0139 01 ~~VA01140~~ 3

2. Unit/Process Coke Plant

3. Plant Name Wheeling Pitts. Steel

4. Date Mo. 12 Day 05 Yr. 80 11

5. Analyst's Initials CJS6 17

6. Time (Military) 1147 20

7. N.B. #

8. Page #

9. Instrument Byron 301C THC 1 24

	AMBIENT AIR Component Code	ppmw		BAG SAMPLE Component Code	ppmw	
1.	998 25	165.14 28	65.7 65.1	998 34	12790 37	12760 12820
2.	43	46		52	55	
3.	61	64		70	73	

Card 2 | 2 | A | 1 Duplicate columns 3 through 10 from Card 1

	Component Code	ppmw	Component Code	ppmw
4.	11	14	20	23
5.	29	32	38	41
6.	777 47	1310 50	888 56	11800 59

Remarks:

ANALYSIS DATA SHEET

(AMBIENT AND BAG)

1 | A
1

PU0139

1. Radian Valve/Pump ID# 011 ~~VA01140~~ 3
2. Unit/Process Coke Plant

3. Plant Name Wheeling Pitts. Steel

4. Date Mo. 12 Day 05 Yr. 80 11

5. Analyst's Initials CJ6 17

6. Time (Military) 1140 20

7. N.B. #______

8. Page #______

9. Instrument HP 5730 GC 2 24

	AMBIENT AIR Component Code	ppmw		BAG SAMPLE Component Code	ppmw	
1.	012 (25)	149.65 (28)	55.98 43.31	012 (34)	9957.5 (37)	10365 9550
2.	(43)	(46)		(52)	(55)	
3.	(61)	(64)		(70)	(73)	

Card 2 2 | A 1 Duplicate columns 3 through 10 from Card 1

	Component Code	ppmw	Component Code	ppmw
4.	(11)	(14)	(20)	(23)
5.	(29)	(32)	(38)	(41)
6.	(47)	(50)	(56)	(59)

Remarks:

ANALYSIS DATA SHEET

(AMBIENT AND BAG)

1 A
1

P U I

1. Radian Valve/Pump ID# 01 ~~VAO~~ 141 (3)   2. Unit/Process Coke Plant

3. Plant Name Wheeling Pitts' Steel

4. Date Mo. 12 Day 05 Yr. 80 (11)   5. Analyst's Initials CJG (17)

6. Time (Military) 1213 (20)   7. N.B. #_______   8. Page #______

9. Instrument Byron 301C THC 1 (24)

AMBIENT AIR | | BAG SAMPLE |
---|---|---|---
Component Code | ppmw | Component Code | ppmw
1. 998 (25) | 53.65 (28) 54.1 53.2 | 998 (34) | 218.2 (37)
2. (43) | (46) | (52) | (55)
3. (61) | (64) | (70) | (73)

Not enough sample for accurate analysis by THC

Card 2 | 2 A (1) | Duplicate columns 3 through 10 from Card 1

Component Code	ppmw	Component Code	ppmw
4. (11)	(14)	(20)	(23)
5. (29)	(32)	(38)	(41)
6. 777 (47)	450 (50)	888 (56)	400 (59)

Remarks: GC Total Hydrocarbon

A 272.8
B 163.6

Average 218.2

↑

ANALYSIS DATA SHEET

(AMBIENT AND BAG)

1 A
1

P u I

1. Radian Valve/Pump ID# 01~~1A~~0141
3

2. Unit/Process Coke Plant

3. Plant Name Wheeling Pitts. Steel

Mo. Day Yr.

4. Date 120580
11

5. Analyst's Initials CJG
17

6. Time (Military) 1216
20

7. N.B. #________ 8. Page #______

9. Instrument HP 5730 GC 2
24

AMBIENT AIR | BAG SAMPLE

	Component Code	ppmw		Component Code	ppmw	
1.	012 25	33.81 28	37.97 29.65	012 34	181.95 37	241 122.9
2.	43	46		52	55	
3.	61	64		70	73	

Card 2 2 A Duplicate columns 3 through 10 from Card 1
1

	Component Code	ppmw	Component Code	ppmw
4.	11	14	20	23
5.	29	32	38	41
6.	47	50	56	59

Remarks:

ANALYSIS OF LINE SAMPLES AT UNIT 1

Sample Source	Weight % Benzene
Scrubber "A"	39.4
Scrubber "B"	0.97
Rectifier Bottoms	85.1
Light Oil Product	77.3

WHEELING-PITTSBURGH STEEL
MONESSEN PLANT

B-5 OVA and TLV Calibration Data

Concentration of Standards (?)
Instrument Codes (?) from plant to plant

UNIT #1

CALIBRATION CHECKING FORM

1 Month	3 Day	5 Instrument	6 Screening Team	8 Low standard ____ppm calibration	14 High standard ____ppm calibration	20 Dilution Probe Calibration	UNIT 26
11	24	2	01		5000	650	1
11	25	2	01		5000	700	1
11	26	2	01		6500		1
12	01	4	01	40	1400	200	1
12	01	2 5	01		5000		1
12	02	4	01	90	2200 ~~2600~~	400	1
12	02	2 4	01		5800		1
12	03	4	01	280	1900	520	1
~~12~~	~~03~~	~~2~~	~~01~~				~~1~~

Comments: Instr #4 = TLV 077306, TLV calibrated with 1990 ppm Hexane/Air high std and 90 ppm low standard, The calibrations were performed at Wheeling-Pittsburgh Steel
Instr #2 = OVA calibrated with 7990 ppm Methane/Air
SERIAL #1575, EPA NO. 077317

UNIT #1

~~Gadsden, Republic Steel~~
Wheeling-Pittsburgh Steel

CALIBRATION CHECKING FORM

1 Month	3 Day	5 Instrument	6 Screening Team	8 ____ppm Low standard ppm calibration	14 ____ppm High standard ppm calibration	20 Dilution Probe Calibration
12	04	3	01		6200	1500
12	04	4	01	60	2400	420
12	05	3	01		9500	1000
12	05	4	01	60	1950	900

Comments: INSTR #3 = OVA, #4 = TLV

INSTR #3: RADIAN No. 4980, Ser.# 1080

WHEELING-PITTSBURGH STEEL

MONESSEN PLANT

B-6 Dry Gas Meter Calibration Data

UNIT #1

RADIAN CORPORATION

1 S

SAMPLE DATA SHEET

DGM CALIB.

1. Radian Valve/Pump ID# ☐ 3   2. Unit/Process COKE PLANT

3. Plant Name WHEELING STEEL

---

4. Date Mo. Day Yr. 12 01 80 11   5. Sampler's Initials RWJ 17

6. Time (Military Time) ☐ 20   7. Cart ID# 1 24   8. N.B.# ____   9. Page # ____

HASTINGS: 1.55   1.54

10. Meter #1 992.100 25   12. Meter #2 998.152 31

11. Time #1 10 37   13. Time #2 14 41

14. Temp #1 °F 55 45   15. Temp #2 °F 55 48

16. Bar. Press., in. Hg. 29.167 51   17. ΔP, in. Hg. 3.12 56

18. (DGM Correction Factor) 1.063 61   19. Meter # 715572

20. Vol. Org. Condensate ml ~~☐~~ 66

21. Coll. time, minutes ~~☐~~ 71   22. Specific Gravity of Organic Condensate ~~☐~~ 75

23. Comment ☐ 78

DGMCF = 1.0653

X

WHEELING-PITTSBURGH STEEL
MONESSEN PLANT

B-7 Accuracy Check Data

UNIT #1

ANALYSIS DATA SHEET

(AMBIENT AND BAG)

1 | A
1

01 AC 0001
~~AC 1201801~~

1. Radian Valve/Pump ID# ~~A C # 2 6 1 8 0~~ 3
2. Unit/Process CORE PLANT

3. Plant Name WHEELING STEEL

4. Date Mo. 12 Day 01 Yr. 80 11

5. Analyst's Initials CJG 17

6. Time (Military) ____ 20

7. N.B. #________ 8. Page #______

9. Instrument BYRON 301C THC 1 24

AMBIENT AIR | BAG SAMPLE

	Component Code	ppmw	Component Code	ppmw
1.	25	28	997 34	914.5 37
2.	43	46	52	55
3.	61	64	70	73

Card 2 2 A 1 Duplicate columns 3 through 10 from Card 1

	Component Code	ppmw	Component Code	ppmw
4.	11	14	20	23
5.	29	32	38	41
6.	47	50	56	59

Remarks:

1×100:	20×5	20×10	20×20
80.0	76.?	112	116.8
79.0	77.?	108.4	104.8

MLR = 7.157×10^{-4} lb/hr ⇒ 87 87% RECOV

ANALYSIS DATA SHEET

(AMBIENT AND BAG)

1 | A
1

~~AC1262804~~

1. **Radian Valve/Pump ID#** 0 | 1 | ~~V~~ A | ~~A~~ C | 0 | 0 | 0 | 2
3

2. **Unit/Process** Coke Plant

3. **Plant Name** Wheeling Pitts. Steel

4. **Date** (Mo. Day Yr.) 1 1 | 0 2 | 8 0
11

5. **Analyst's Initials** GJG
17

6. **Time (Military)**
20

7. **N.B. #**

8. **Page #**

9. **Instrument** Byron 301C THC 1
24

AMBIENT AIR			BAG SAMPLE	
	Component Code	ppmw	Component Code	ppmw
1.	25	28	997 (34)	89.5 (37)
2.	43	46	52	55
3.	61	64	70	73

Card 2 2 | A (1) Duplicate columns 3 through 10 from Card 1

	Component Code	ppmw	Component Code	ppmw
4.	11	14	20	23
5.	29	32	38	41
6.	47	50	56	59

B-77

Remarks:

1 X 100	20X5	20X10	20X20
86.5	74.8	10.2	104.8
79.7	82.8	100.4	102
	76.6		

MLR = 7.372 × 10⁻⁴ lb/HR ⇒ 90.28 % RECOV.

ANALYSIS DATA SHEET

(AMBIENT AND BAG)

| 1 | A |
1

~~AC1202802~~

1. Radian Valve/Pump ID# | 0 | 1 | ~~V~~ A | ~~A~~ C | 0 | 0 | 0 | 3 | 3

2. Unit/Process COKE PLANT

3. Plant Name WHEELING PITTSBURGH

4. Date (Mo. Day Yr.) | 1 | 2 | 0 | 2 | 8 | 0 | 11

5. Analyst's Initials | D | W | | 17

6. Time (Military) | 1 | 7 | 0 | 0 | 20

7. N.B. #

8. Page # 1

9. Instrument HP 5730A GC | 2 | 24

AMBIENT AIR Component Code	ppmw	BAG SAMPLE Component Code	ppmw
1. 25	28	34: 0 1 2	37: 73.5
2. 43	46	52	55
3. 61	64	70	73

Card 2 | 2 | A | 1 Duplicate columns 3 through 10 from Card 1

Component Code	ppmw	Component Code	ppmw
4. 11	14	20	23
5. 29	32	38	41
6. 47	50	56	59

Remarks: A (SP-1000/BENTONE 34) B (TCEP)

67.8 77.3

$MLR = 6.15 \times 10^{-4}$ lb/HR

$\Rightarrow$ 84.9 % RECOV.

ANALYSIS DATA SHEET

(AMBIENT AND BAG)

| 1 | A |
1

~~A 0 1 6 0 0 8 0 4~~

1. **Radian Valve/Pump ID#** | 0 | 1 | ~~V~~ A | ~~A~~ C | 0 | 0 | 0 | 4 | (3) 2. **Unit/Process** [illegible]

3. **Plant Name** WHEELING PITTSBURGH

4. **Date** Mo. 12 Day 03 Yr. 80 (11) 5. **Analyst's Initials** [illegible] (17)

6. **Time (Military)** 1200 (20) 7. **N.B. #** ______ 8. **Page #** 2

9. **Instrument** [illegible] | 2 | (24)

AMBIENT AIR — BAG SAMPLE

	Component Code	ppmw	Component Code	ppmw
1.	25	28	012 (34)	116 6 (37)
2.	43	46	52	55
3.	61	64	70	73

Card 2 | 2 | A | (1) Duplicate columns 3 through 10 from Card 1

	Component Code	ppmw	Component Code	ppmw
4.	11	14	20	23
5.	29	32	38	41
6.	47	50	56	59

B-79

Remarks: $M-P = 7.69 \times 10^{-4}$ lb/hr.

99.5% RECOV.

[illegible]

UNIT 1

ILR = ~~7~~ 9.055 x 10^{-4} lb/HR

RADIAN CORPORATION

107.5

MLR/ppmv = 8.025 x 10^{-8}

MLR = 7.957 x 10^{-4} lb/HR

Card 1 [1 S]
1

SAMPLE DATA SHEET

1. Radian Valve/Pump ID# 01AC0001 ~~AC120180~~ 3

2. Unit/Process COKE PLANT

3. Plant Name WHEELING STEEL

---

4. Date Mo. Day Yr. 12 01 80 11

5. Sampler's Initials DW 17

6. Time (Military Time) [ ] 20

7. Cart ID# i 24

8. N.B.# ____

9. Page # ____

10. Meter #1 1210.190 25

12. Meter #2 1251.410 31

11. Time #1 10 37

13. Time #2 13 41

14. Temp #1 °F 154 45

15. Temp #2 °F 154 48

16. Bar. Press., in. Hg. 29.167 51

17. ΔP, in. Hg. 11.130 56

10

18. DGM Correction Factor 1.1063 61

19. Meter # 715572

20. Vol. Org. Condensate ml [ ] 66

21. Coll. time, minutes [ ] 71

22. Specific Gravity of Organic Condensate [ ] 75

23. Comment [ ] 78

(11)

⇒ 944.88 ml/min

BEFORE:

100 ml/6.4 sec
100ml/6.35 sec
100ml/6.4 sec
100ml/6.4 sec
100ml/6.35 sec

100ml/6.32 sec
100ml/6.3 sec
100ml/6.3 sec
100ml/6.4 sec
100ml/6.33 sec
100 ml/6.35 sec

AFTER:

100 ml/6.35 sec
6.2 sec
6.3 sec
6.35 sec
6.35 sec
6.35 sec

RADIAN
CORPORATION

Card 1 | 1 | S |
1

SAMPLE DATA SHEET

01 AC0002
~~AC120280~~

1. Radian Valve/Pump ID# ~~AC1120280~~ 3 2. Unit/Process Coke Plant

3. Plant Name Wheeling Pitts Steel

4. Date Mo. Day Yr. 12 02 80 11 5. Sampler's Initials DW 17

6. Time (Military Time) 20 7. Cart ID# 1 24 8. N.B.# ____ 9. Page # ____

1.7467

10. Meter #1 1661.1610 25 12. Meter #2 1711.1814 31

11. Time #1 0 37 13. Time #2 3 41

502

14. Temp #1 °F 143 45 15. Temp #2 °F 413 48

27.77

16. Bar. Press., in. Hg. 291.1517 51 17. ΔP, in. Hg. 11.16 56

18. DGM Correction Factor 11.10163 61 19. Meter # 715572

20. Vol. Org. Condensate ml 66

21. Coll. time, minutes 71 22. Specific Gravity of Organic Condensate 75

23. Comment 78

$\Rightarrow 833.\overline{33}$ ml/min

Before:
100ml / 7.3 sec
6.0
7.4
7.2
7.25
7.2
7.5
7.2

After:
100m / 7.2 sec

ILR = 8.165×10^{-4} lb/HR

$\frac{MLR}{PPMW}$ = 8.236×10^{-6} lb/HR

$\Rightarrow$ 99.14 ppm

Card 1 | 1 | S |
1

SAMPLE DATA SHEET

1. Radian Valve/Pump ID# 01AC0C03 ~~A1C11202802~~. Unit/Process Coke Plant,
3

3. Plant Name Wheeling Pitts, Steel

---

4. Date Mo. Day Yr. 12 02 80
11

5. Sampler's Initials DW
17

6. Time (Military Time)
20

7. Cart ID# 1 ~~2~~
24

8. N.B.# ____

9. Page # ____

10. Meter #1 ~~70.70~~ ~~180.10~~ 96.40
25

12. Meter #2 ~~185.86~~ 101.73 1.7767
31

11. Time #1 0
37

13. Time #2 3
41

502

14. Temp #1 °F 142
45

15. Temp #2 °F 142
48

16. Bar. Press., in. Hg. 29.57
51

17. ΔP, in. Hg. ~~1.16~~ 1.7 27.87
56

18. DGM Correction Factor 1.063
61

19. Meter # 715572

20. Vol. Org. Condensate ml
66

21. Coll. time, minutes
71

22. Specific Gravity of Organic Condensate
75

23. Comment
78

~~28.108~~ 810.82 ml/min

Before:

100 ml /7.35 sec
7.2
7.2
7.2
7.15

~~After:~~

100 ml /7.4 sec
7.4
7.35
7.4
7.45
7.4

ICR = 7.242 × 10⁻⁴ lb/HR

MLR/ppmw = 8.364 × 10⁻⁶ lb/HR ⇒ 86.68 ppmw

RADIAN
CORPORATION

Card 1 | 1 | S |
1

SAMPLE DATA SHEET

1. Radian Valve/Pump ID# 01AC0004 ~~4C1243807~~ 3
2. Unit/Process COKE PLANT

3. Plant Name WHEELING PITTSBURGH

---

4. Date Mo. Day Yr. 12 03 80 11
5. Sampler's Initials [illegible] 17

6. Time (Military Time) 1600 20
7. Cart ID# [illegible] 24
8. N.B.# ____
9. Page # ____

10. Meter #1 765.100 25
12. Meter #2 769.1035 31

1
1.365

11. Time #1 10 37
13. Time #2 13 41

2
487

14. Temp #1 °F 29 45
15. Temp #2 °F 29 48

3
28.27

16. Bar. Press., in. Hg. 29.57 51
17. ΔP, in. Hg. 1.30 56

18. DGM Correction Factor 1.063 61
19. Meter # 71557-

20. Vol. Org. Condensate ml 66

21. Coll. time, minutes 71
22. Specific Gravity of Organic Condensate 75

23. Comment 78

$\Rightarrow FR = 833.\overline{33}$ ml/min

BEFORE

Foam [illegible]

7.2
7.2

AFTER

7.2
7.2
7.2

$ILR = 7.64 \times 10^{-4}$ lb/hr

$\frac{MLR}{ppmw} = 6.594 \times 10^{-6}$ ⇒ 115.9 ppmw unit 1

STD = 263 ppmw

ANALYSIS DATA SHEET

(AMBIENT AND BAG)

1	A
1

BLIND STD

1. **Radian Valve/Pump ID#** | | V | A | | | | (3)

2. **Unit/Process** COKE PLANT

3. **Plant Name** WHEELING Pittsburgh STEEL

4. **Date** Mo. 12 Day 02 Yr. 80 (11)

5. **Analyst's Initials** CJC (17)

6. **Time (Military)** ____ (20)

7. **N.B. #** ____

8. **Page #** ____

9. **Instrument** Byron 301C THC [1] (24)

AMBIENT AIR

BAG SAMPLE

	Component Code	ppmw	Component Code	ppmw
1.	(25)	(28)	997 (34)	(37)
2.	(43)	(46)	(52)	(55)
3.	(61)	(64)	(70)	(73)

Card 2 | 2 | A | (1) Duplicate columns 3 through 10 from Card 1

	Component Code	ppmw	Component Code	ppmw
4.	(11)	(14)	(20)	(23)
5.	(29)	(32)	(38)	(41)
6.	(47)	(50)	(56)	(59)

B-84

Remarks:

20 x 20	200 x 2	200 x 5	200 x 10	20 x 50	20 x 100
[illegible]	244.3 241.6	243 238	256	275 263	275 283
234 250 < fresh STD	221.8 238.8 < fresh STD	→ 242 252	270 fresh STD		232 258

X