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Emissions Test Report Air Toxics
Sampling at Wyckoff, Inc.
Bainbridge Island, Washington

Engineering-Science, Fairfax, VA

Prepared for

Environmental Protection Agency, Seattle, WA

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BAINBRIDGE ISLAND, WASHINGTON

Submitted to

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CHAPTER 1

INTRODUCTION AND SUMMARY

From July 22 to August 2, 1985, ES sampled five sources at two plants in the Seattle, Washington area to collect data on emission of toxic compounds. This report discusses the results of sampling two vacuum exhausts and the fugitive emissions from two retorts at Wyckoff, Inc.'s, creosote treating plant.

CHAPTER 2

PROCESS DESCRIPTION

Wyckoff, Inc., operates a log-treating plant on Bainbridge Island which is devoted to pentachlorophenol and creosote pressure-treating of logs for utility poles and marine pilings. The equipment for treating the logs is the same regardless of the preservative being used, although operating parameters are somewhat different.

Wyckoff has six retorts (five of which are operable) connected to two vacuum systems. In one system, one retort is used solely for penta treating, and one for either penta or creosote. The other system (three retorts) is dedicated to creosote treating. Each retort is a steam-jacketed insulated cylinder 130 feet long with a 90-inch inside diameter. Logs are debarked, loaded onto trams, and placed inside a retort. The door to the end of the retort is closed and bolted shut and the treating cycle commenced.

The treating process consists of several major phases and some minor ones, and there are general operating standards established by the Douglas Fir Association. The actual operating conditions and inclusion or exclusion of certain steps are determined by the operating personnel. The sampling plan was predicated on an incomplete understanding of the standard cycle and was not appropriate for the way the process is operated, at least at this facility. The following paragraph discusses the process as operated at Wyckoff.

The first step after bolting the door is evacuating the retort to 22" Hg which takes 45-60 minutes. The retort is then filled, via vacuum, with preservative and heated to 210°F with the steam jacket. The contents are held at 210° and 22" vacuum for about 48 hours. This conditioning phase removes water from the logs and the phase is ended when all the water has been extracted, as measured by periodic gauging of the collected water. After conditioning, the vacuum is released and the retort emptied, refilled with cold preservative, and then emptied again. This phase takes about three hours, and then the retort is pressurized with 30 psig air for about an hour. The retort is again filled (1-1/2 - 2 hours) with preservative and the pressure-treating begun. The bath is heated to 240°F and kept under pressure for about two hours. An optional expansion bath, lasting 1-2 hours if used, follows the pressure-treating. The retort is again pumped out (one hour) and live steam injected for two hours. The last step is called final vacuum and removes residual preservative and allows the load to cool down. When the temperature drops below 175°F, the door can be opened and the load removed.

Normally, the door is open for about 30 minutes while the load is pulled out and a new load put in. Copies of the process records for the loads handled while sampling was being performed are included in Appendix A.

The initial plan for sampling envisioned that vacuum vent emissions occurred during several phases because the retort was placed under vacuum during these times. However, this vacuum was used as the motive force for filling the retort with liquid and thus there was no discharge to the atmosphere as a result. Observations of the process and additonal discussions with plant management and operating personnel confirmed that significant emissions occurred throughout the entire conditioning time and during final vacuum and not during other phases of the heating process. These two phases were the ones sampled.

The pollutants of concern are pentachlorophenol (C_6HCl_5), creosote compounds and PNAs. The specific compounds that comprise creosote are PNAs and typically include 2-4% each of acenaphthene, fluorene, diphenylene oxide, anthracene, carbazole, 12-14% phenanthrene and naphthalene The remainder is unspecified PNAs. Penta consists of 5% pentachlorophenol in a light fuel oil (equivalent to #2 diesel fuel).

CHAPTER 3

TEST SCHEDULE AND SAMPLING LOCATIONS

As previously discussed, emission samples were taken from the vacuum vents when emissions were being vented, and from the open retort during load changes. Separate samples were taken from creosote and from penta treating. Each test involved collecting duplicate samples with paired sampling trains. Figures 3.1 and 3.2 portray the general arrangements for vacuum vent and retort fugitive sampling.

Table 3.1 provides a chronological summary of the test runs. As mentioned in Chapter 2, initially, samples were to be collected during other phases of the treating cycle. Observation of the process and further clarifications of the process by plant management led to the conclusion that the emissions during these other phases were negligible and therefore were not sampled. Copies of the field data are included as Appendix B.

TABLE 3.1

SAMPLING CHRONOLOGY

Date	Run Code	Sampling Time	Sample Type	Retort	Process Cycle
7/26/85	WCF-X-1A	1248-1319	NIOSH-XAD	D	Creosote fugitives
	WCF-X-1B	1248-1319	NIOSH-XAD	D	Creosote fugitives
7/29/85	WPV-MM5-1A	1235-1435	MM5-XAD	E	Penta-conditioning
	WPV-MM5-1B	1230-1430	MM5-XAD	E	Initial vacuum
7/31/85	WPV-MM5-2A	0927-1106	MM5-XAD	E	Penta-cool down
	WPV-MM5-2B	0922-1102	MM5-XAD	E	Final vacuum
7/31/85	WPF-X-1A	1116-1209	NIOSH-XAD	E	Penta fugitives
	WPF-X-1B	1116-1209	NIOSH-XAD	E	
7/31/85	WCF-X-2A	1337-1410	NIOSH-XAD	D	Creosote fugitives
	WCF-X-2B	1337-1417	NIOSH-XAD	D	
7/31/85	WCV-M5-1A	1700-1830	MM5-XAD	C	Creosote-conditioning
	WCV-M5-1B	1705-1825	MM5-XAD	C	Initial vacuum
8/1/85	WCV-X-2	0808-0828	NIOSH-XAD	C	Creosote-conditioning End of vacuum
8/1/85	WCV-MM5-2A	1800-1900	MM5-XAD	C	Creosote-cool down
	WCV-MM5-2B	1805-1900	MM5-XAD	C	Final vacuum

CHAPTER 4

SAMPLING AND ANALYTICAL PROCEDURES

The sampling and analytical procedures for this project are derived from EPA's "Test Methods for Evaluating Solid Waste" (SW-846, July 1982); "Sampling and Analysis Methods for Hazardous Waste Combustion (Draft)" (A.D. Little, Inc., February 1983); "NIOSH Manual of Analytical Methods", U.S. DHEW, NIOSH, Publication #75-121; and Title 40, Part 60, Appendix A, Code of Federal Regulations. The laboratory results are contained in Appendix C of this report.

SAMPLING PROCEDURES

Modified Method 5 - General

The MM5 sampling train was used to collect organic compounds with boiling points between 100°C and 300°C such as products of incomplete combustion (PICs), PNAs, PCP and creosote compounds.

Extracts, rinses, and related materials from the sampling system for each sampling period were analyzed to quantify the specific compounds of interest for each test. A total of 13 runs were conducted.

Sampling Train

The gas stream was directed to a modified EPA Method 5 train, depicted in Figure 4.1. This system consists of the following components in series: nozzle, probe, heated particle filter, one sorbent module, a bank of impingers, and a meter box. A detailed discussion of the physical construction of the unmodified Method 5 train and its assembly is given by Martin; maintenance is given by Rom (APTD-0581, APTD-0576).

A glass fiber (particle) filter was enclosed in a glass housing and supported by a stainless steel mesh. This section of the train was contained in an electrically heated box with manual temperature regulation to maintain a sample gas temperature of about 120°C.

A typical sorbent module/condenser is also depicted in Figure 4-1. There are separate sections for cooling the incoming gas stream and for trapping organic gas constituents. Cooling was accomplished by routing the gas through a coil of glass tubing surrounded by water circulated from an ice and water bath. Organic consitutents of the gas are removed by 20/40 mesh XAD-2 resin contained in an all-glass trap. High collection efficiencies (90-100%) are typical for vapor phase organic species

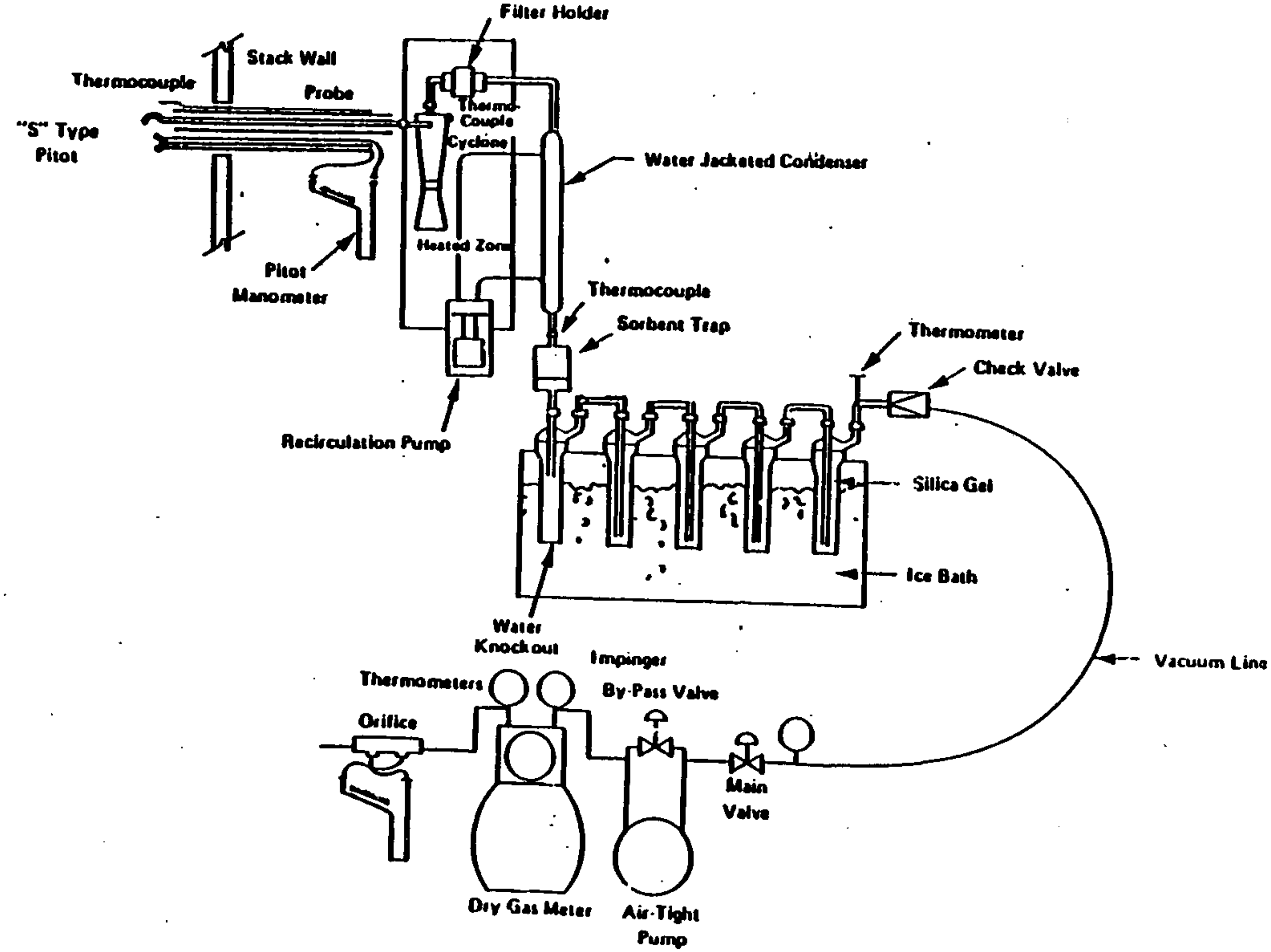


Figure 4.1 MM5 train schematic diagram

The temperature of the gas at the outlet of the sorbent was measured and maintained between the limits of 0° and 20°C. Cooling of the gas condenses part of the sample gas moisture which may entrain and/or dissolve certain organic species. To insure that this material is collected, the sorbent module was positioned vertically such that the condensate percolated through the resin bed and into the bank of impingers.

During sampling of Wyckoff's vacuum vents, the mass of organic matter condensed on the surfaces of the cooling coil was large enough to markedly reduce the heat transfer rate and prevented proper cooling of the sample gas. The detailed results section of this report contains additional discussion of the effects of the organic compound condensation.

The impinger bank consisted of four impingers connected in series. The first impinger was initially empty to collect the condensate from the preceding sorbent module. The Greenberg-Smith nozzle was replaced by a very short stem such that the sampled gas does not bubble through the collected condensate.

The second and third impingers were included to remove acid species from the gas, and each contained 100 ml chromatographic-grade distilled water. The fourth impinger was filled with silica gel to absorb moisture remaining in the gas, thereby assuring accurate gas flow measurements and preventing damage to the pumping system.

A standard Method 5 meter box containing a variety of gas handling and metering devices followed the impinger bank.

All components of the sampling train were joined either by stainless steel Swagelok® fittings or by ground glass ball-and-socket joints capable of leak-free seals under sampling conditions. Stopcock grease was not used at any point in the system.

All components of the train which contact the sample gas were vigorously cleaned prior to transport to the field. The cleaning consisted of soaking in chromerge®, rinsing with tap water, distilled water, and chromatographic-grade methanol, successively. All components were sealed with methylene chloride-rinsed aluminum foil. Preparation of the XAD modules and resin is discussed in the analytical section.

Prior to each run, the individual components of the sampling train were assembled, and the probe/sampling train leak-tested. The heating and cooling systems are started and allowed to reach equilibrium. Then, the nozzle was plugged and the system evacuated to about 200 mm Hg (15"). If the leakage exceeded the lesser of 4% of the sampling rate or 0.02 cfm, the leak was corrected.

Sampling Procedure

The sampling plan called for multiple point isokinetic sampling for 3-4 hours. The condensation of organic material discussed above was great enough to prevent sampling isokinetically for the duration of the sampling period. Further, the exhaust gas velocity was very low across the cross section of the stack and, within the accuracy of the pitot tube the cross section of the stack and, within the accuracy of the pitot tube system, essentially constant so lack of multiple point traversing and isokinetic sampling was judged to have minimal consequences. The samples were collected at a point of average velocity at a rate as near to isokinetic as possible.

Post-Test Operations

At the conclusion of the test, the train was leak checked and allowed to cool. The probe/nozzle unit was removed and capped, and the filter holder inlet capped, and all components taken to the cleanup area for sample recovery. The basic procedures of EPA Method 5 were followed, modified as necessary for recovery of samples for organic analysis. The probe, nozzle and filter holder were each rinsed three times with acetone and then three times with methylene chloride. All liquid samples were transferred to glass bottles with Teflon®-lined caps which had been cleaned as previously described for the glassware. The XAD module was removed from the train and sealed with grease-free glass balls and sockets. The impingers were removed and the volume of condensed water collected measured. The percolated condensate from the first impinger was transferred to a sample bottle along with rinses from the condenser, the contents of the second and third impingers and acetone and methylene chloride rinses of all three impingers and connecting glassware. All bottles were tightly capped, sealed with Teflon®-lined caps and Teflon® tape, and the liquid level marked on the bottles.

For these tests, one XAD module was exposed as a field blank to the lab. There was one trip blank included in the shipment. The field blanks were installed into a sample train, leak checked, heated to 120°C for 2 hours, and then recovered along with the other sample train fractions.

NIOSH Sorbent Tube Sampling

Retort fugitive emissions were to be sampled for 6 hours (3 runs @ 2 hours/run) with a MM5 train. This approach became impractical when we discovered that the door was left open for only half an hour rather than 8 hours. A sampling system using NIOSH-type sorbent tubes was devised to collect a sample in a short time (approximately 30 minutes) and retain the analytical sensitivity of MM5.

Sampling Train

Figure 4.2 displays a typical NIOSH design sorbent tube and the sampling train used to extract the sample gas from the stack. An EPA Method 6 type metering/flow control system was used to pull the sample gas and measure the sampled gas volume. The sample train consisted of one or two sorbent tubes containing 600 mg of XAD-2, a moisture removal trap, sample line, and control console containing pump, rotameter and dry gas meter. Flow rates and total gas volume were set and measured to match the capacity of the sorbent and the analytical sensitivity necessary. Two separate systems were used to collect duplicate samples.

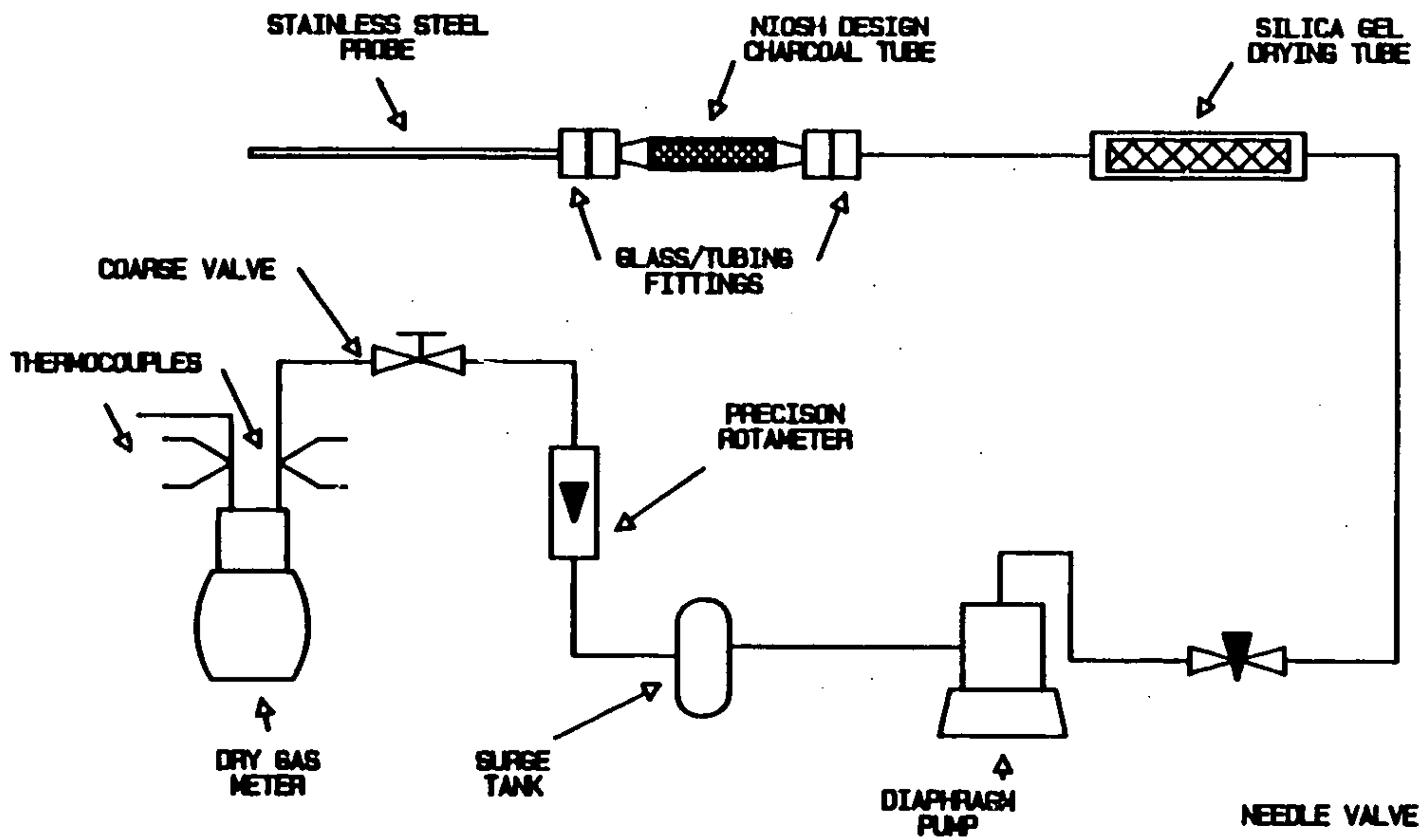


FIGURE 4.2

CHARCOAL TUBE SAMPLING TRAIN

Figure 4.3 shows how the tubes, sample lines and anemometer were assembled. The anemometer was used to obtain an average velocity for the sampling time as well as intermediate velocity readings. The area of the retort opening which had gas outflowing or inflowing was estimated by observing a set of wind sock "directional flags" placed in front of the opening.

Sampling Procedure

Samples were collected by breaking off the ends of the flame sealed sorbent tubes and pulling sample gas through the tube at 0.25 liter/minute for about 30 minutes. At the conclusion of sampling, the tubes were removed from the trains and capped with caps supplied by the manufacturer, and then placed in an envelope, pre-labeled with the date, run number, and sample ID number.

Post-Test Operations

Field blanks were taken by breaking the ends of a tube and exposing to ambient air for a time period equal to sample collection time. A trip blank (a tube taken to the field but not opened) was stored and shipped with the sample tubes.

ANALYTICAL PROCEDURES

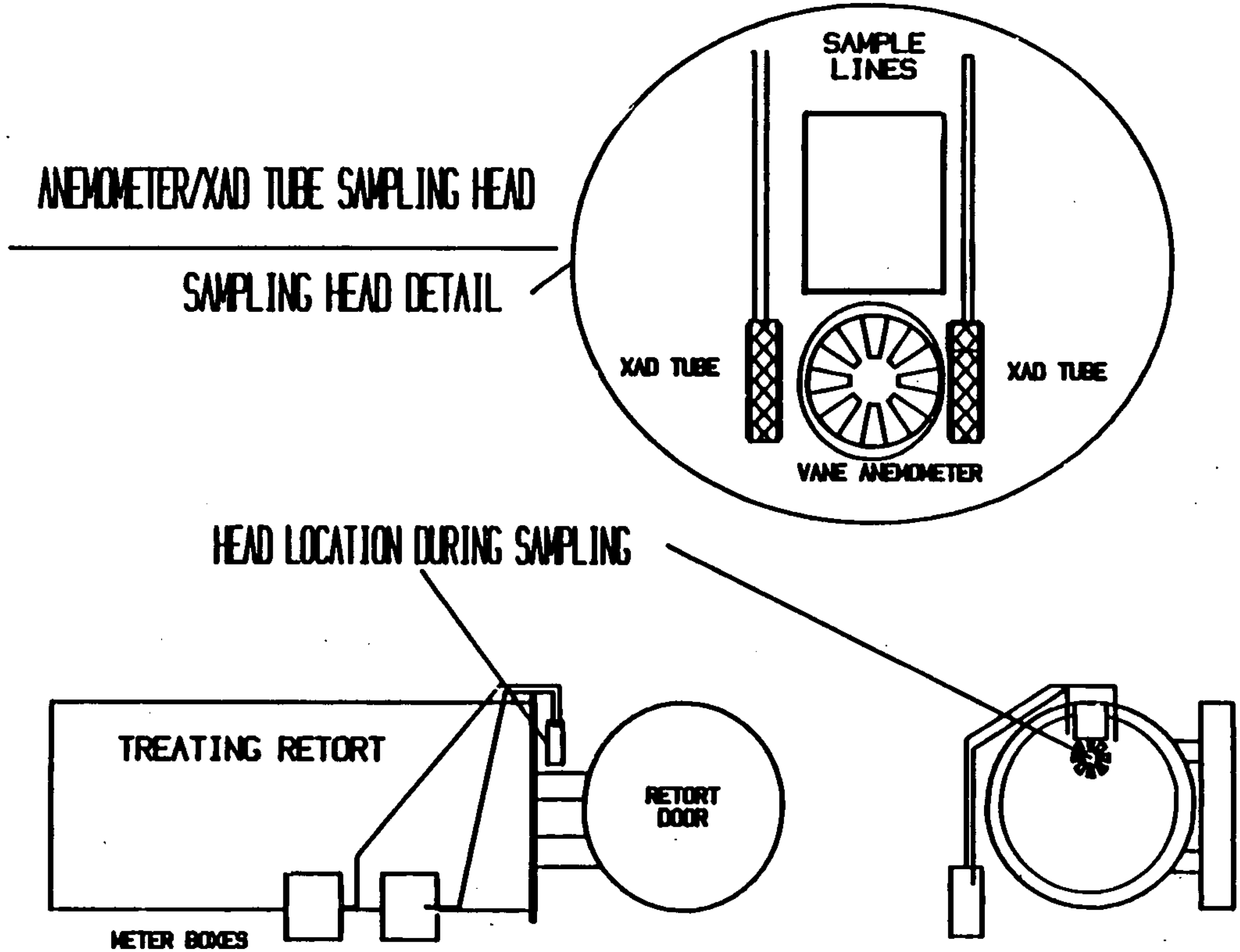
Modified Method 5 Analyses

Preparation and analysis of the MM5 samples is described below.

1. Container No. 1 (contents of the first, second, and third impingers from the MM5 sample train) - Noted the physical properties of the sample as to color, consistency, presence of solids, and measured the volume. Spiked the sample as necessary with the required surrogate compounds for QC purposes. Without adjusting the sample pH, transferred the impinger solution to a 1000-ml separatory funnel. Rinsed the sample container with 20 ml of acetone, followed by two 20 ml portions of methylene chloride, adding the rinses to the separatory funnel. Extracted the sample with three separate aliquots of methylene chloride, transferring to a K-D evaporator, after filtering through pre-extracted, dried Na_2SO_4.

2. Container No. 2 (methylene chloride, acetone rinse of probe, filter housing, and any miscellaneous glassware) - Noted the physical properties of the sample as to color, consistency, presence of solids, and measure the volume. Spiked the original solvent sample as necessary for QC purposes. Added to the K-D evaporator as in Step A.

3. Container No. 3 (filter) - Noted the physical properties of the filter as to color, consistency, and presence of particles. Placed the filter into the thimble containing the XAD-2® resin and proceed as described in 4 below.



RETORT FUGITIVE SAMPLING SCHEMATIC

4. XAD-2® Adsorbent - Observed and noted the physical properties of the sample. Spiked the sample as necessary with compounds directly into the adsorbents before their removal from the glass sorbent trap. Expel the entire contents of the sorbent trap into a glass extraction thimble with a coarse-fritted bottom.

The resin in the thimble was covered with glass wool to prevent the resin from floating out into the Soxhlet extractor. The sorbent trap was rinsed with 10 ml acetone and then three 10 ml portions of methylene chloride, and these rinses added to the receiver. The Soxhlet extractor was charged with 250 ml methylene chloride, and this resin extracted for 24 hours with a cycle time of 10 to 14 times per hour. The extractate was then added to the K-D evaporator as described above for Container No. 1.

6. After all components of the sample were combined in the K-D evaporator, the volume was reduced to a known, small volume (5 ml). This sample was further evaporated or rediluted as required to obtain analytical responses within the ranges of the calibration curves for the various analytes.

The samples were injected into a temperature-programmed capillary column gas chromatograph with mass spectrometer (GC/MS) for identification and quantification of analytes. The samples were first analyzed on GC/FID to obtain approximate analyte concentrations to establish appropriate dilutions, if any, for mass spec analysis. The general procedure described in EPA publication SW 846 was used for set up and calibration of the GC/MS and compound identification performed by the data system with verification by the analyst. Quantification of analytes was made by response factor calculation relative to phenanthrene for the PNAs and to specific calibration standards for pentachlorophenol and naphthalene.

CHAPTER 5

RESULTS

The emission rates for a variety of organic compounds have been estimated and are summarized in this section. The major parameters determining the calculated emisison rates are volumetric flow rate of exhaust gas and pollutant concentration, calculated from various measurements. The major elements of the measurement and their precision are discussed below.

Exhaust Gas Flow Rate - Vacuum Vents

The vacuum vent stack discharges the vapor from a condensate knockout tank which receives the exhaust from the process vacuum pumps. These tanks are covered with a steel deck with a steel stack over the middle of the tank. The rate of gas discharged is determined by the pressure in tank and gas exits through stack and through cracks and holes in the deck plating. The pulsations of the vacuum are somewhat damped by the volume of the tanks, but the exhaust gas velocity varies in a pulsing manner. A preliminary velocity traverse was conducted in each of the stacks, the average velocity calculated, and a point of average velocity selected. During sampling, the velocity head at this point was measured and assumed to be average velocity. The velocity data herein reported represent the average value of the velocity at the point over the sample period, and were calculated with Equation 2-9 of EPA Method 2 (40 CFR Part 60, Appendix A).

Normal operations at Wyckoff has three retorts operating at different phases of the treating cycle and the vapor discharges from all three venting to one knockout tank. For these tests, however, only 1 retort was operated in order to obtain samples from 1 phase of the cycle and thus the total gas flow was lower than normal. The resulting increase in uncertainty as to flow rates was considered less important than obtaining a sample representative of the emission from one and only one phase of the treating cycle. Table 5.1 summarizes the calculated stack parameters. These flow rates reflect the system exhaust in the first hours of vacuum on a charge, whether the final vacuum/cool-down or the beginning of conditioning. Limited data taken with a vane anemometer at the end of conditioning (i.e., after 36 hours of vacuum) on the creosote system yield a gas velocity of 4.8 ft/sec or approximately 360 acfm, which is slightly lower than the initial hours. This is expected as most of the water and air have been removed from the logs and the gas discharge probably represents the continuing volatilization of treating oil and air inleakage caused by the system vacuum (22" Hg).

Exhaust Gas Flow Rate - Retort Fugitives

The method employed to estimate the volume of gas discharged from the retort caused by opening the doors yielded surprisingly reproducible results. The flow rates were calculated by measuring the velocity of the outflowing gas near the top center of the retort opening with a vane anemometer, estimating the fraction of retort opening in each of three regimens (in-flowing, out-flowing, and stagnant) and calculating a flow rate as the product of velocity and discharge area. Table 5.2 summarizes the measurements and resulting flow rates. These data represent the flow rate while the retort is empty with door wide open, i.e., after the treated load has been pulled, but before a new load is put in. When a treated load is pulled, the volume occupied by the logs and trams is replaced with ambient air and when a new charge is loaded, a volume of air is displaced by the new load. The total retort volume is about 5,700 ft^3 and a typical full load probably occupies 50-75% of the total volume. The air drawn in with removal of a load can be considered as displaced when a new load is charged. This amounts to 3,000-4,500 ft^3 during a 2-5 minute period. If the retort is open and empty for half an hour and is discharging at a rate of 4,000 acfm, the total gas exhaused is 120,000 ft^3 and the volume displaced by changing loads is relatively insignificant (only 3-4% of the total).

The major areas of uncertainly associated with these measurements and results are estimation of the area of discharge and the uniformity of the velocity across that area. The area estimation is probably within $\pm$25% of the true value. The velocity measurements taken are reasonably accurate ($\pm$5%) but an uncertainty derives from whether the velocity at the measured point is in fact the average bulk velocity of the exhaust gas. Some basic heat transfer calculations suggest that 1×10^6 ft^3 of air are required to cool the retort from 180° to 80°F. If the retort cools down in 2 hours, the flow rate would be 8,300 acfm which compares favorably, given the nature and extent of the variables involved, with measured values of 4,000-5,000 acfm.

Sampling Data

Tables 5.3 and 5.4 summarize the measured and calculated values for the MM5 and fugitive sample collection. The calculation procedures are routine and the equations of Method 5 are used. Example calculations are included in Appendix D. Table 5.5a and 5.5b present the results of GC/MS analysis of the samples. The results are expressed as total ug of the analytes in the sample and reflect the instrumental value, any dilutions or concentrations and calculation of total mass of analytes in the sample. Data are presented for PNA compounds found in the sample from EPA's priority pollutant list and includes those specific compounds which were specifically targeted for analysis (pentachlorophenol, naphthalene).

Emission Estimates

The data in tables 5.6 -5.9 are derived from the analysis results, sampling parameters, and gas flow rate estimations. The mass emission rates should not be considered as representative of overall facility emission; they are supplied to provide a reference for time rate of discharge.

The fugitive emission rates are representative, within the limits previously discussed, of short-term emission rate; process schedules, actual work practices regarding open door and recharging, and treating oil variation would need to be considered to establish overall emission rates. The vacuum vent rates are more reliable and representative of emission from the treating process; again, however, process operating schedule, and work practices such time of conditioning need to be considered in extrapolating single retort data to the whole facility. Some estimate of the overall emission rate can be made for the available data. A typical treating cycle is listed below showing the duration of each phase of this cycle.

Phase	Duration (hrs)	Pressure (P) or Vacuum (V)	Discharge to Atmosphere	Comments
Conditioning	48	V	Yes	
Pressure Treating	1	P	No	
Expansion	3	V	No	
Steam Cleaning	2	V	Yes	Negligible gas flow
Final Vacuum	1	V	Yes	
Fugitive	1/2	—	Yes	

Table 5.10 presents estimated emissions for one complete cycle of penta and creosote treating. The rate given are based on the flow measurements and concentration data previously discussed.

TABLE 5.1

FLOW RATE DATA

Run	Date	Average Stack Temp. °F	Moisture %	Velocity ft/sec	Volumetric Flow Rates acfm	dscfm
WPV-MM5-1A	7/29	152.4	26.9	12.2		
-1B	7/29	152.3	27.9	12.2		
Avg		152.4	27.2	12.2	780	490
WPV-MM5-2A	7/31	145.8	21.4	11.5		
-2B	7/31	145.3	22.6	11.8		
Avg		145.6	22.0	11.7	750	510
WCV-MM5-1A	7/31	131.5	17.2	6.2		
-1B	7/31	131.2	16.7	6.3		
Avg		131.4	17.0	6.3	460	340
WCV-MM5-2A	8/1	145.4	20.5	6.3		
-2B	8/1	145.3	21.7	6.3		
Avg		145.4	21.1	6.3	460	320

TABLE 5.2

RETORT FUGITIVE FLOW RATES

Retort	C	D	E
Treating Oil	Creosote	Creosote	Penta
Date	7/26/85	7/31/85	7/31/85
Time	1255-1355	1350-1420	1157-1227
Average Velocity ft/min	302	313	372
(Range of Intermediate Velocities)	(316-375)	(286-333)	(400)
Average Discharge Area, % (Range)	37 (29-41)	30 (13-35)	30 (22-35)
Average Discharge Area, ft^2	16.4	13.3	13.3
Average Discharge Gas Flow Rate acfm	4960	4160	4950

TABLE 5.3

MODIFIED METHOD 5 SAMPLING

Run ID	WCV 1A	WCV 2A	HPV 1A	HPV 2A
SAMPLING DATA				
Meter Volume, acf	52.666	36.822	59.403	73.376
Meter Pressure (DH), in H_2O	1.02	1.27	0.60	1.56
Meter Temp, °F	90.3	94.2	96.7	85.2
Barometric Pressure, in. Hg	29.9	29.9	29.9	29.9
Gamma	1.013	1.013	1.007	1.007
Condensate, ml	227.9	196.1	445.8	416.4
Area of Stack, ft^2	1.227	1.227	1.069	1.069
DERIVED DATA				
Meter Volume, dscf	51.477	35.759	56.996	72.057
Water Volume, scf	10.727	9.230	20.984	19.600
Moisture Content, %	17.2	20.5	26.9	21.4
Molecular Weight, Dry	28.84	28.84	28.84	28.84
Molecular Weight, Wet	26.98	26.62	25.92	26.52
Stack Velocity, ft/sec	6.25	6.27	12.20	11.62
Stack Temp, °F	131.3	145.4	152.4	145.6
Volumetric Flow Rate				
- acfm	460	462	783	745
- dscfm	342	319	493	509

TABLE 5.4

FUGITIVE EMISSION SAMPLING DATA

Run ID	WPF-X 1A	WPF-X 1B	WCF-X 1A	WCF-X 2A	WCF-X 2B
Meter Volume, liters	15.240	14.23	9.835	10.22	8.18
Meter Volume, acf	0.539	0.520	0.348	0.361	0.289
Meter Pressure, in. H_2O	1.00	1.20	1.00	0.97	1.21
Meter Temp, °F	83.6	79.8	86.1	81.3	77.9
Barometric Pressure, in. Hg	29.9	29.9	29.9	29.9	29.9
Gamma	0.951	0.955	0.951	0.951	0.955
Meter Volume, dscf	0.500	0.489	0.321	0.321	0.273

TABLE 5.5a

VACUUM VENT SAMPLING ANALYSIS RESULTS
Total ug of Analyte

Compound	Creosote WCV 1A	Creosote WCV 2A	WCV X-2	Penta WPV 1A	Penta WPV 1A
Naphthalene	2,500,000	900,000	7200	2,000,000	1,000,000
Acenaphthylene	2,400	8,200	ND	ND	ND
Acenaphthene	3,600	40,000	20	30,000	25,000
Phenanthrene	1,400	3,400	ND	2,100	1,700
Fluoranthene	ND	ND	ND	ND	ND
Fluorene	4,700	25,000	ND	8,400	9,800
Pyrene	ND	ND	ND	ND	ND
Pentachlorophenol	ND	ND	ND	ND	ND
Anthracene	ND	ND	ND	ND	ND
Detection Limit	1,000	1,000	10	1,000	1,000

TABLE 5.5b

FUGITIVE SAMPLING ANALYSIS RESULTS
Total ug of Analyte

Compound	WPF 1A	WPF 1B	WCF 1A	WCF 2A	WCV 2B
Naphthalene	50	200	3,000	11,070	1,200
Acenaphthylene	ND	ND	ND	90	60
Acenaphthene	ND	10	2,200	1,900	1,500
Phenanthrene	ND	10	640	300	130
Fluoranthene	ND	ND	300	40	ND
Fluorene	ND	20	740	580	340
Pyrene	ND	ND	ND	20	ND
Pentachlorophenol	ND	600	ND	ND	ND
Anthracene	ND	ND	100	100	20
Detection Limit	10	10	10	10	10

TABLE 5.6a

EMISSION RATES
PROCESS CYCLE - CREOSOTE CONDITIONING (INITIAL VACUUM)
EXHAUST GAS FLOW RATE - 342 dscfm

Compound	Emissions		
	#/dscf	ppmv	#/hour
Naphthalene	107×10^{-6}	323	2.20
Acenaphthylene	0.103×10^{-6}	0.26	0.0021
Acenaphthene	0.154×10^{-6}	0.39	0.0032
Phenanthrene	0.060×10^{-6}	0.13	0.0012
Fluoranthene	$<0.043 \times 10^{-6}$	<0.08	<0.0009
Fluorene	0.201×10^{-6}	0.47	0.0041
Pyrene	$<0.043 \times 10^{-6}$	<0.08	<0.0009
Pentachlorophenol	$<0.043 \times 10^{-6}$	<0.06	<0.0009
Anthracene	$<0.043 \times 10^{-6}$	<0.09	<0.0009

TABLE 5.6b

EMISSION RATES
PROCESS CYCLE - CREOSOTE COOL-DOWN (FINAL VACUUM)
EXHAUST GAS FLOW RATE, 319 dscfm

Compound	Emissions #/dscf	ppmv	#/hour
Naphthalene	55.5×10^{-6}	168	1.06
Acenaphthylene	0.506×10^{-6}	1.29	0.0097
Acenaphthene	2.47×10^{-6}	6.19	0.0472
Phenanthrene	0.210×10^{-6}	0.46	0.0040
Fluoranthene	$<0.062 \times 10^{-6}$	<0.12	<0.0012
Fluorene	1.54×10^{-6}	3.59	0.0295
Pyrene	$<0.062 \times 10^{-6}$	<0.12	<0.0012
Pentachlorophenol	$<0.062 \times 10^{-6}$	<0.09	<0.0012
Anthracene	$<0.062 \times 10^{-6}$	<0.13	<0.0012

TABLE 5.7a

EMISSION RATES
PROCESS CYCLE - PENTA CONDITIONING (INITIAL VACUUM)
EXHAUST GAS FLOW RATE, 493 dscfm

Compound	Emissions		
	#/dscf	ppmv	#/hour
Naphthalene	77.4×10^{-6}	234	2.29
Acenaphthylene	$<0.039 \times 10^{-6}$	<0.10	<0.0011
Acenaphthene	1.16×10^{-6}	2.91	0.0343
Phenanthrene	0.081×10^{-6}	0.18	0.0024
Fluoranthene	$<0.039 \times 10^{-6}$	<0.07	<0.0011
Fluorene	0.325×10^{-6}	0.76	0.0096
Pyrene	$<0.039 \times 10^{-6}$	<0.07	<0.0011
Pentachlorophenol	$<0.039 \times 10^{-6}$	<0.06	<0.0011
Anthracene	$<0.039 \times 10^{-6}$	<0.08	<0.0011

TABLE 5.7b

EMISSION RATES
PROCESS CYCLE - PENTA COOL DOWN (FINAL VACUUM)
EXHAUST GAS FLOW RATE, 493 dscfm

Compound	Emissions		
	#/dscf	ppmv	#/hour
Naphthalene	30.6×10^{-6}	92.4	0.93
Acenaphthalene	$<0.031 \times 10^{-6}$	<0.08	<0.0009
Acenaphthene	0.765×10^{-6}	1.92	0.0234
Phenanthrene	0.052×10^{-6}	0.11	0.0016
Fluoranthene	$<0.031 \times 10^{-6}$	<0.06	<0.0009
Fluorene	0.300×10^{-6}	0.70	0.0092
Pyrene	$<0.031 \times 10^{-6}$	<0.06	<0.0009
Pentachlorophenol	$<0.031 \times 10^{-6}$	<0.04	<0.0009
Anthracene	$<0.031 \times 10^{-6}$	<0.07	<0.0009

TABLE 5.8

PROCESS CYCLE - CREOSOTE FUGITIVE
EXHAUST GAS FLOW RATE, approximately 3800 dscfm

Compound	Sample	Emissions #/dscf	Emissions ppmv	Emissions #/hour
Naphthalene	A	72.4×10^{-6}	219	16.5
	B	9.69×10^{-6}	29.3	2.21
Acenaphthalene	A	0.59×10^{-6}	1.5	0.134
	B	0.49×10^{-6}	1.2	0.111
Acenaphthene	A	12.4×10^{-6}	31.2	2.83
	B	12.1×10^{-6}	30.4	2.76
Phenanthrene	A	1.96×10^{-6}	4.3	0.447
	B	1.05×10^{-6}	2.3	0.239
Fluoranthene	A	0.26×10^{-6}	0.50	0.060
	B	$<0.08 \times 10^{-6}$	<0.15	<0.018
Fluorene	A	3.79×10^{-6}	8.8	0.865
	B	2.75×10^{-6}	6.4	0.626
Pyrene	A	0.13×10^{-6}	0.25	0.030
	B	$<0.081 \times 10^{-6}$	<0.15	<0.018
Pentachlorophenol	A	$<0.065 \times 10^{-6}$	<0.10	<0.015
	B	$<0.081 \times 10^{-6}$	<0.12	<0.018
Anthracene	A	$<0.65 \times 10^{-6}$	1.4	0.149
	B	0.16×10^{-6}	0.35	0.037

TABLE 5.9

EMISSION RATES
PROCESS CYCLE - PENTA FUGITIVE
EXHAUST GAS FLOW RATE, approximately 4500 dscfm

Compound	Emissions		
	#/dscf	ppmv	#/hour
Naphthalene	0.900×10^{-6}	2.7	0.24
Acenaphthalene	$<0.045 \times 10^{-6}$	<0.11	<0.012
Acenaphthene	0.045×10^{-6}	0.11	0.012
Phenanthrene	0.045×10^{-6}	0.10	0.012
Fluoranthene	$<0.045 \times 10^{-6}$	<0.09	<0.012
Fluorene	0.090×10^{-6}	0.21	0.024
Pyrene	$<0.045 \times 10^{-6}$	<0.09	<0.012
Pentachlorophenol	2.71×10^{-6}	3.9	0.72
Anthracene	$<0.045 \times 10^{-6}$	<0.1	<0.012

TABLE 5.10a

TOTAL CREOSOTE CYCLE EMISSIONS
(LB/HR)

COMPOUND	EMISSIONS (LB/HR) CONDITIONING (48 HR)	FINAL (1 HR)	FUGITIVE (1/2 HR)	CYCLE TOTAL (56 HR)
Naphthalene	106	1.06	4.68	111
Acenaphthalene	0.101	0.0097	0.613	0.172
Acenaphthene	0.154	0.0472	1.40	1.60
Phenanthrene	0.0576	0.004	0.172	0.233
Fluoranthene	<0.0432[a]	<0.0012	0.0195	<0.0639
Fluorene	0.197	0.0295	0.373	0.599
Pyrene	<0.0432	<0.0012	0.012	<0.0564
Pentachlorophenol	<0.0432	<0.0012	0.0083	<0.0527
Anthracene	<0.0432	<0.0012	<0.0465	<0.0477

111 lb / 56 h = 1.9[illegible] [illegible]

[illegible] 84,815 [illegible]

43.4 [illegible]

TABLE 5.10b.

TOTAL PENTA CYCLE EMISSIONS
(LB/HR)

COMPOUND	EMISSIONS (LB/HR)			
	CONDITIONING (48 HR)	FINAL (1 HR)	FUGITIVE (1/2 HR)	CYCLE TOTAL (56 HR)
Naphthalene	110	0.933	0.120	111
Acenaphthalene	<0.0528	<0.0009	<0.006	<0.0597
Acenaphthene	1.65	1.920	0.006	3.57
Phenanthrene	0.115	0.110	0.006	0.231
Fluoranthene	<0.0528	<0.0009	<0.006	<0.597
Fluorene	0.461	0.0092	0.012	0.482
Pyrene	<0.0528	<0.0009	<0.006	<0.0597
Pentachlorophenol	<0.0528	<0.0009	0.360	<0.414
Anthracene	<0.0528	<0.0009	<0.006	<0.0597

* < indicates values calculated lower limit of detection.

$$\frac{2.91 \frac{lb}{hr} / \text{cycle} * \frac{24 hr}{day} * \frac{365 days}{yr}}{56 \, hr/cycle} = 455 \, lbs/yr \text{ of } [illegible]$$

$$\frac{4.6}{0.12} = 39 \text{ times}$$

[illegible]

APPENDIX A

PROCESS DATA RECORDS

PENTA LOAD

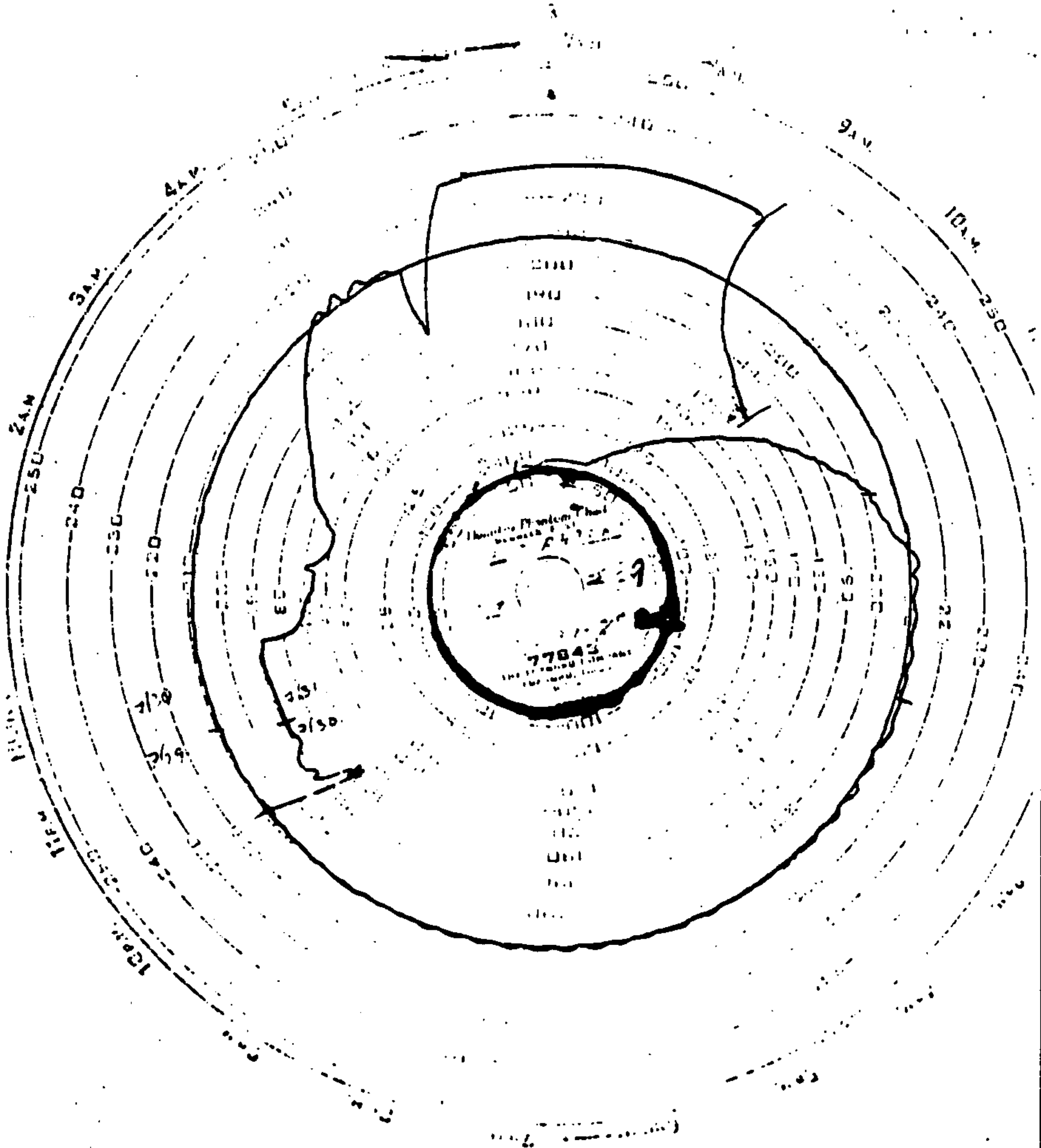
E- RETORT

		APPROX HRS 7-30-85
START LOAD	11:00PM	
PUMP-OUT + COLD OIL		2 3/4
30# I AIR		1 1/4
PUMP BACK		1 3/4
PRESS		1 1/2
X-BATH		1 1/2
PUMP-OUT		1 HR
L-STEAM		2 HRS
FINAL VAC		2 HRS
		13 3/4 TOTAL HRS

LOAD SHOULD BE DONE
BY 2:00 PM WED. 7-31-85

BUTCH - HOME PHONE
842-3341

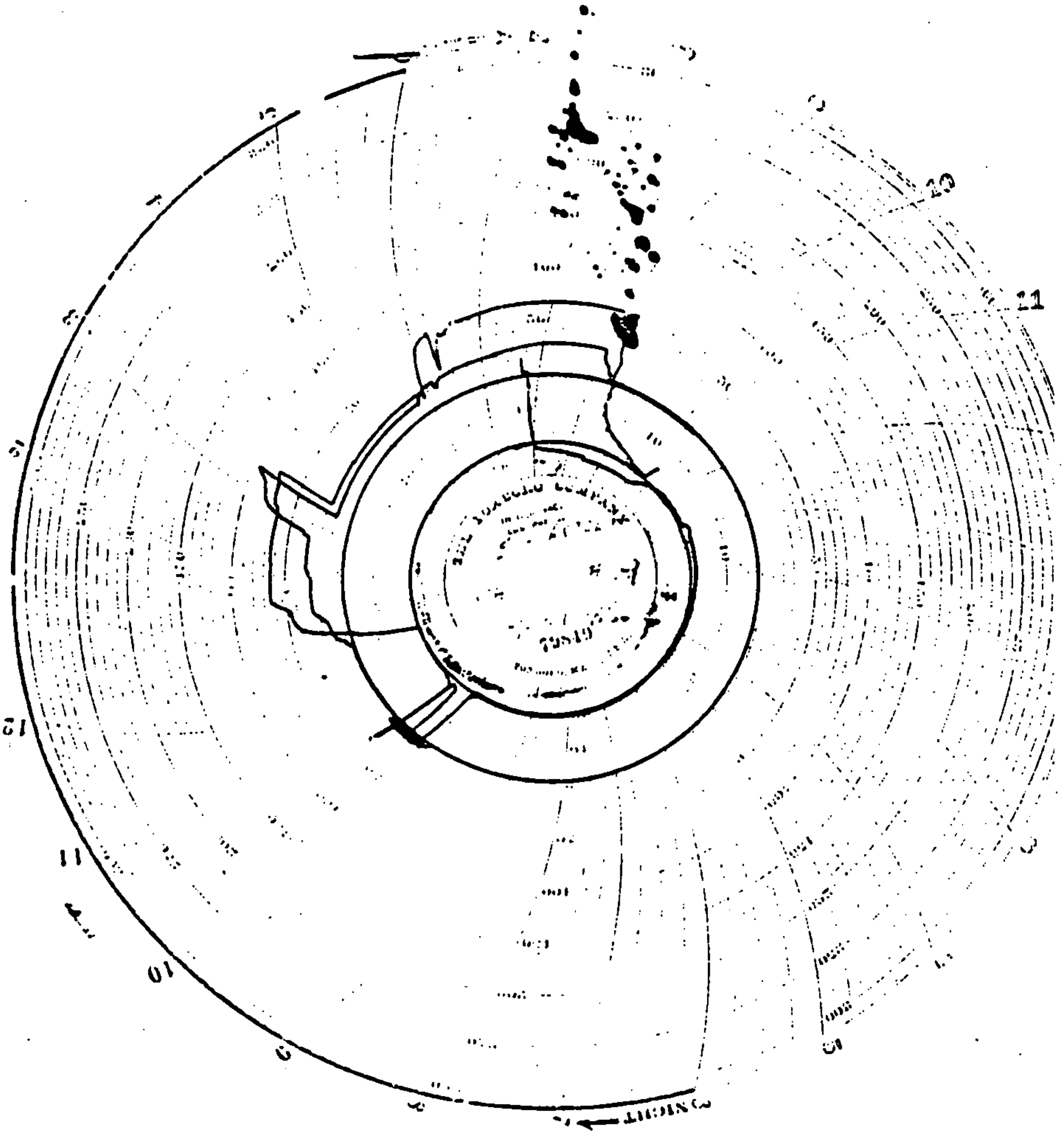
OR PAGER 997-0497



[illegible] E [illegible]
START: 7/2[illegible]/[illegible]
STOP: 7/31/[illegible]

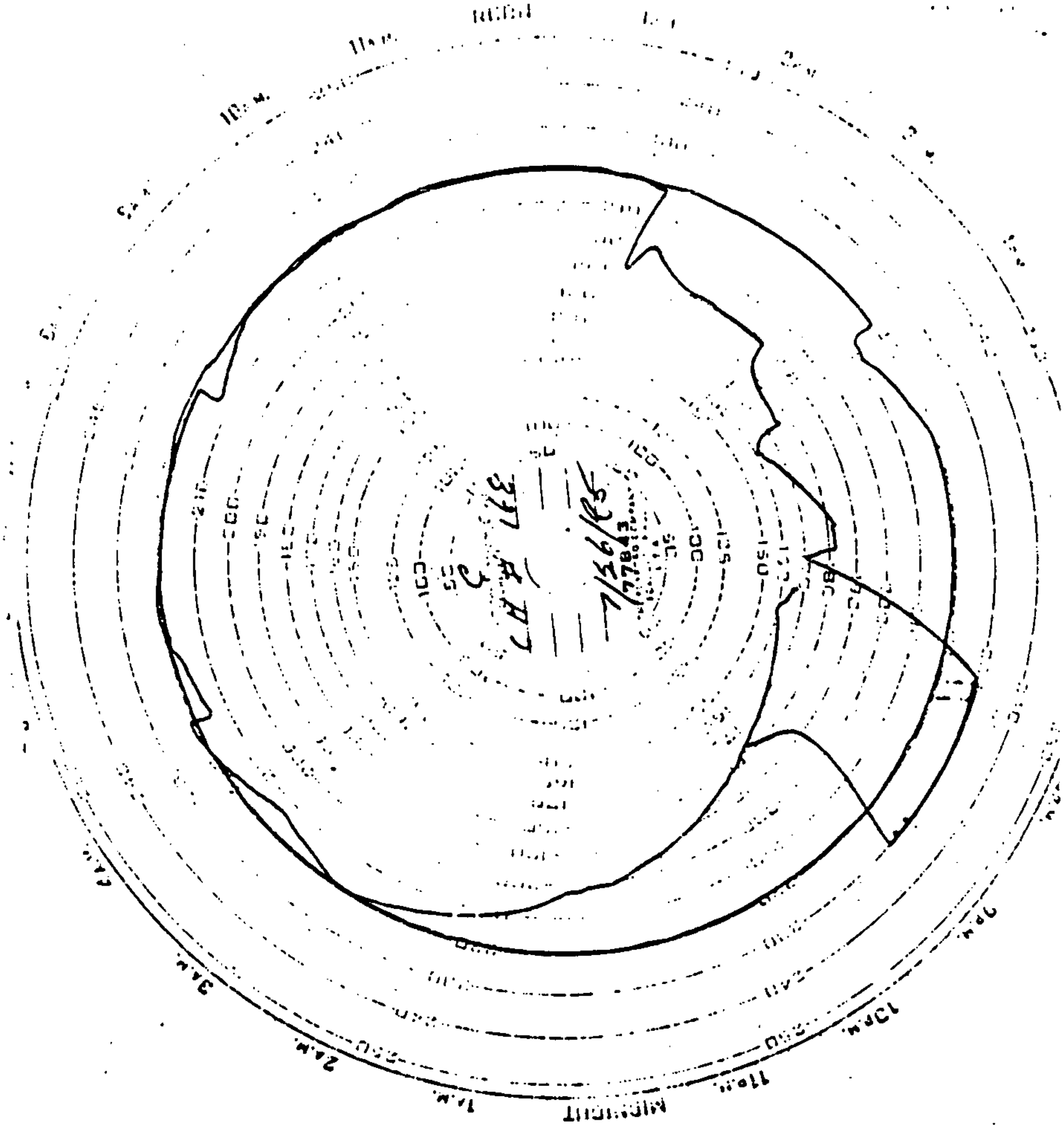
TEMP. CHART °F

H-2

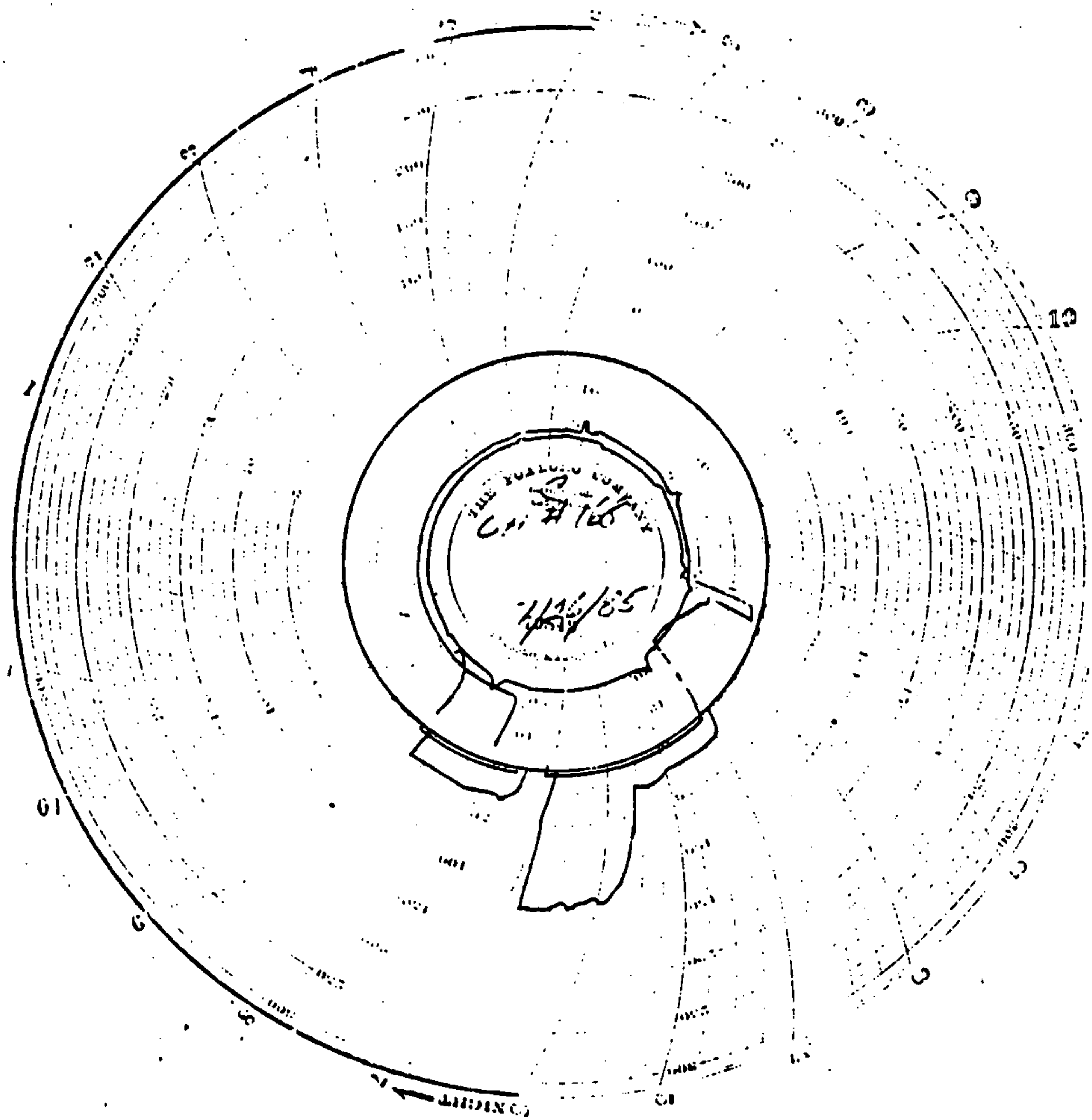


VACUUM, [illegible] PRESSURE [illegible] CHART

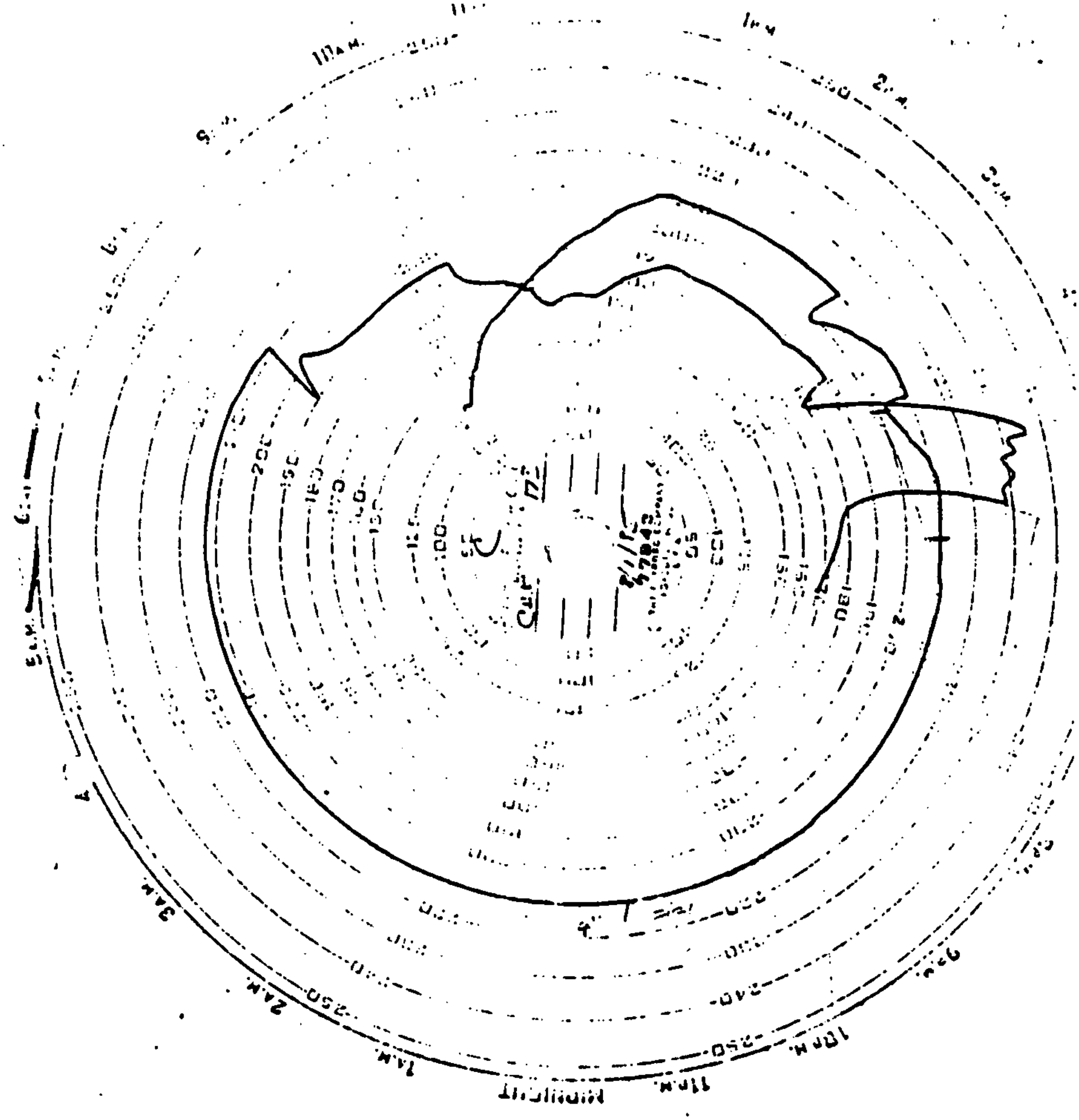
A-3



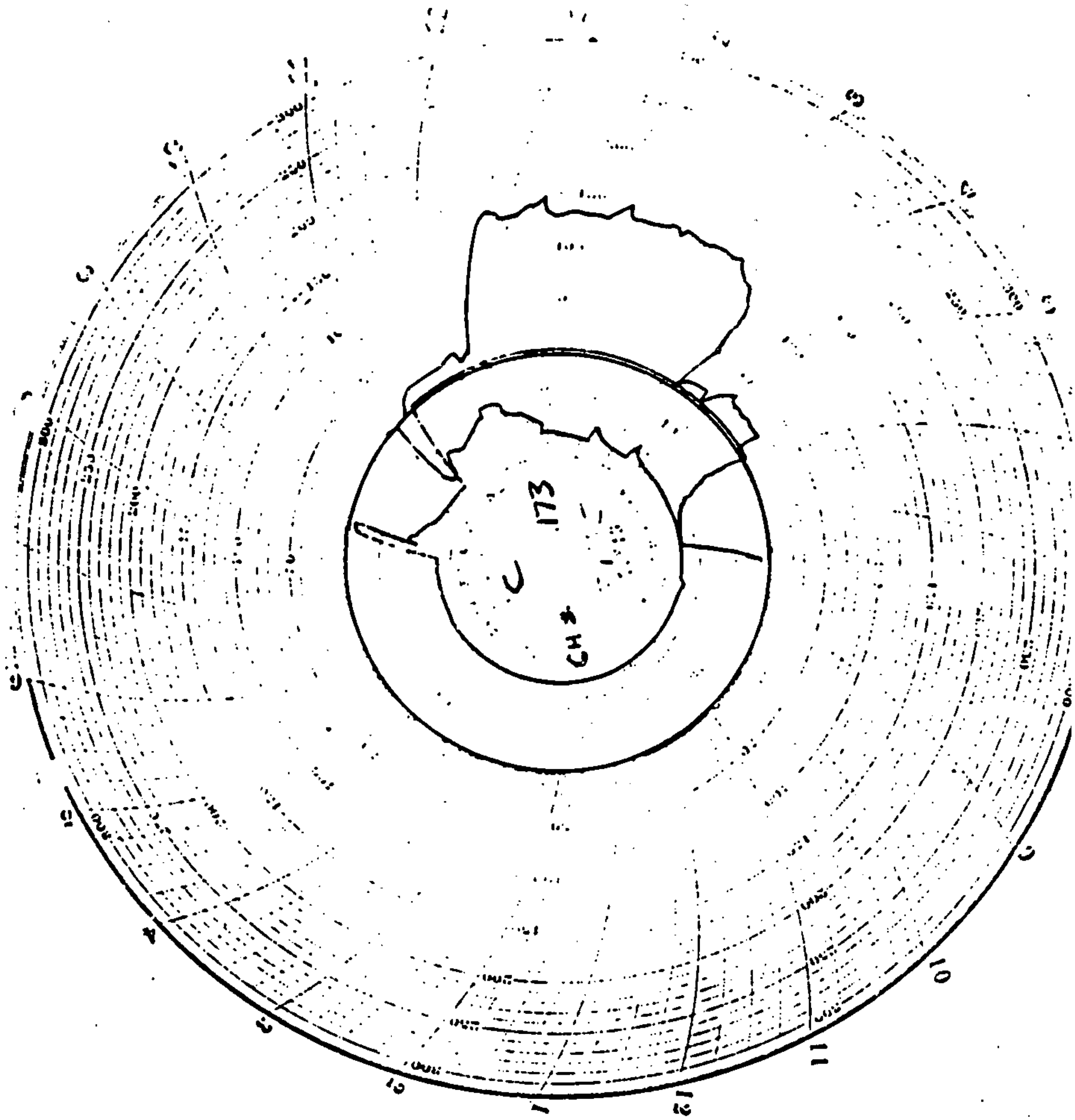
TESUAT [illegible])
START : 7/2[illegible]/8[illegible]
STOP : 7/2[illegible]/8[illegible]

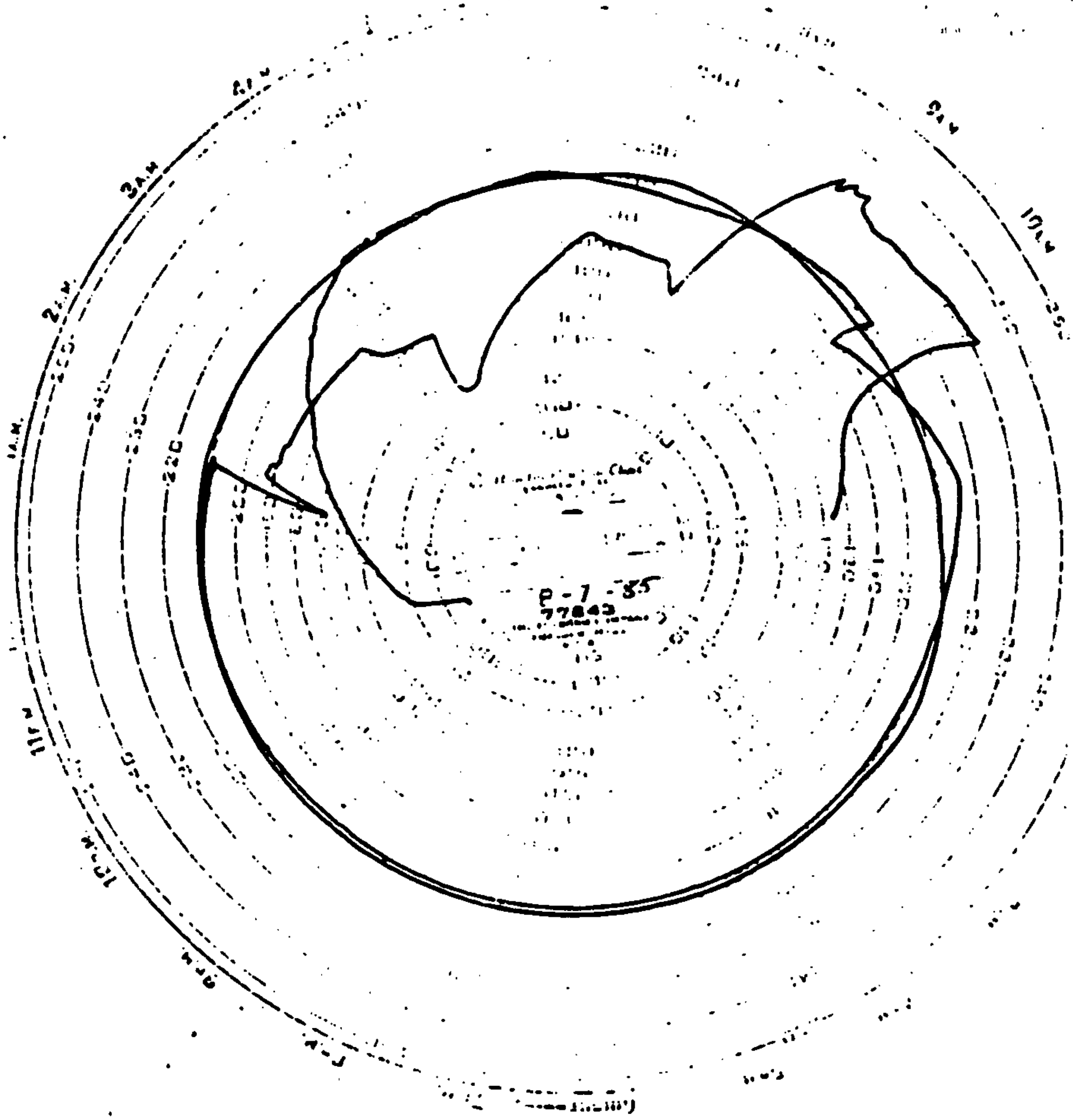


A-5

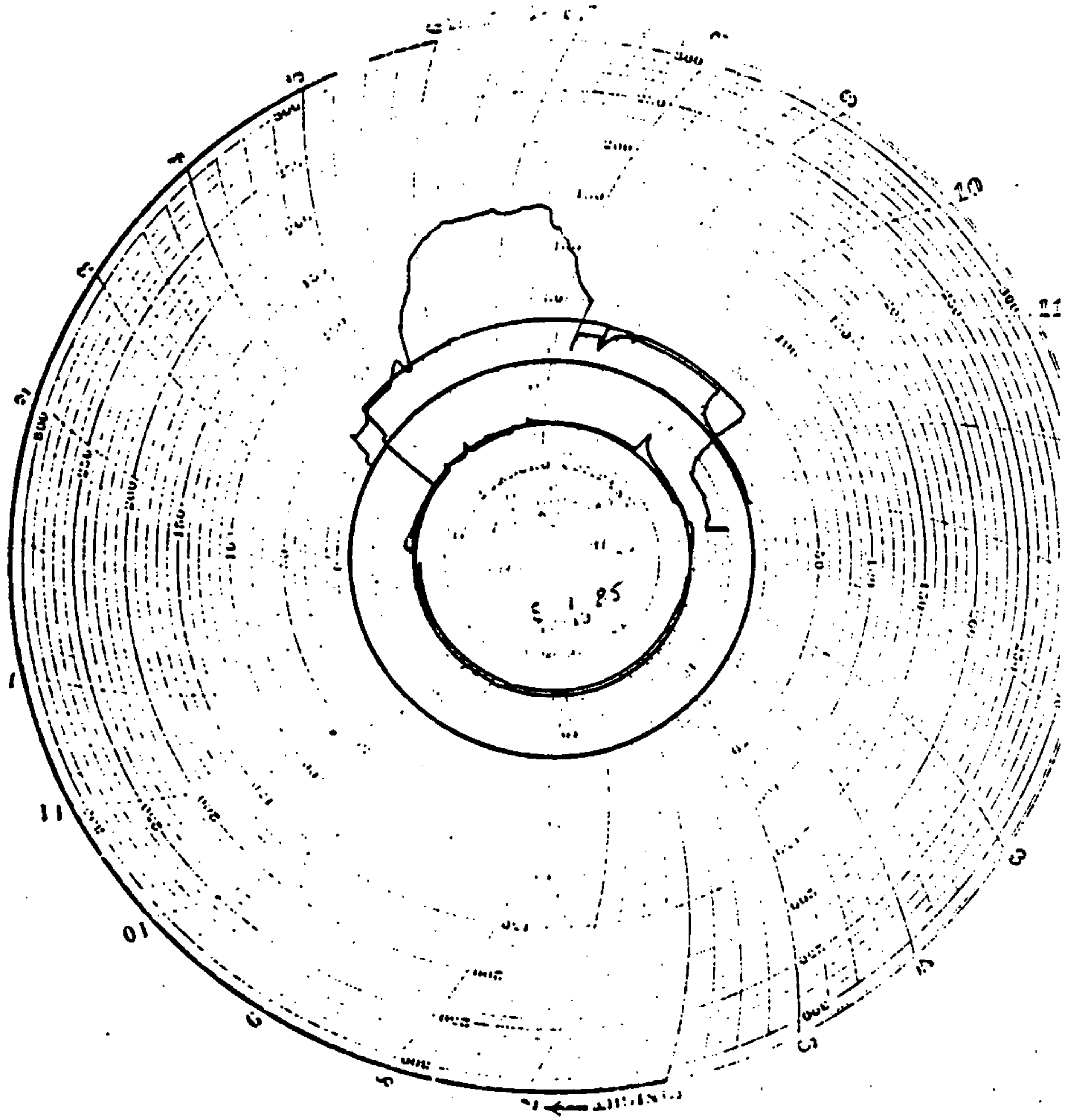


Robert C. [illegible]
Start 7/31/85
Stop 8/1/85


173
C
CH #



Start: 7/31/85
Finish: 8/1/85



A-9

APPENDIX B

FIELD DATA

FIELD DATA

Plant Wycoff
Date 7/26/85
Sampling Location Robot Fugitives
Sample Type XAD NIOSH Tubes
Run Number WCF-XAD-1B
Operator [illegible]
Ambient Temperature 75 °F
Barometric Pressure
Static Pressure (P_s) —
Filter Number(s) —
Pretest Leak Rate = OK cfm @ ___ in. Hg
Pretest Pitot Leak Check —
Pretest Orsat Leak Check —
Read and Record all Data Every 5 Minutes

Schematic of Traverse Point Layout

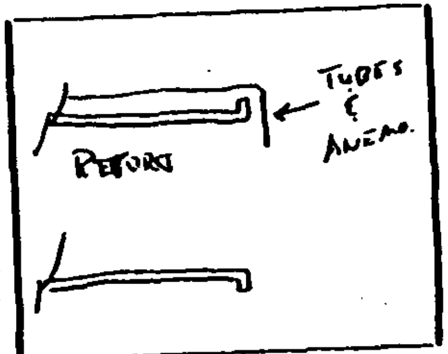
Probe Length and Type —
Pitot Tube I.D. No. —
Nozzle I.D. —
Assumed Moisture, % —
Temp. Readout S/N VOST °C
Meter Box Number VOST °C
Meter $H_@$ —
C Factor —
Meter Gamma 0.955
Heater Box Setting —
Reference Δp —
Post Test Leak Rate = — cfm @ ___ in. Hg
Post Test Pitot Leak Check —
Post Test Orsat Leak Check —

Rotameter

Traverse Point Number	Sampling Time, (min)	Clock Time (24-hour clock)	Liters Gas Meter Reading ~~(V_m) ft³~~	Setting ~~Velocity Head (ΔP_s)~~ in. H_2O	Orifice Press. Differential (H) in. H_2O Desired	Orifice Press. Differential (H) in. H_2O Actual	Stack Temp. (T_s) °F	Dry Gas Meter Temp. Inlet ($T_{m_{in}}$) °F	Dry Gas Meter Temp. Outlet ($T_{m_{out}}$) °F	Pump Vacuum in. Hg	Sample Box Temp. Filter Temp. °F	Impinger Temp. °F
N/A	2	1248	57.936	48	—	1.15	34	28	28	0	—	—
	5	1253	—	48	—	1.15	33	29	28	0	—	
	10	1258	60.10	48	—	1.2	34	29	28	0	—	
	15	1303	61.40	48	—	1.15	33	29	30	0	—	
	20	1308	62.65	48	—	1.25	28	31	31	0	—	
	25	1313	64.90	48	—	1.2	36	32	32	0	—	
	30	1318	65.10	48	—	1.15	38	33	33		—	
	31	1319	65.511	STOP	- END	TEST						
	31		7.575			1.18	552.7 °R		546.1 °R			
			[illegible]									
			[illegible]	DIF								

FIELD DATA

Plant Wyuff
Date 7/26/85
Sampling Location R.&.G. Fugitives
Sample Type XAD NIOSH Tubes
Run Number WCF-XAD-1A
Operator Wx
Ambient Temperature 75°F
Barometric Pressure —
Static Pressure (P_s) —
Filter Number(s) —
Pretest Leak Rate = OK cfm @ ___ in. Hg
Pretest Pitot Leak Check —
Pretest Orsat Leak Check —
Read and Record all Data Every 5 Minutes



Schematic of Traverse Point Layout

Probe Length and Type —
Pitot Tube I.D. No. —
Nozzle I.D. —
Assumed Moisture, % —
Temp. Readout S/N UOST °F
Meter Box Number UOST °F
Meter $H_@$ —
C Factor —
Meter Gamma 0.951
Heater Box Setting —
Reference ΔP —
Post Test Leak Rate = — cfm @ ___ in. Hg
Post Test Pitot Leak Check —
Post Test Orsat Leak Check —

Traverse Point Number	Sampling Time, (min)	Clock Time (24-hour clock)	Liters Gas Meter Reading ~~(V_m) ft³~~	Rotameter Setting ~~Velocity Head (ΔP_s) in. H_2O~~	Orifice Pres. Differential (ΔH) in. H_2O Desired	Orifice Pres. Differential (ΔH) in. H_2O Actual	Stack Temp. (T_s) °F	Dry Gas Meter Temp. Inlet ($T_{m_{in}}$) °F	Dry Gas Meter Temp. Outlet ($T_{m_{out}}$) °F	Pump Vacuum in. Hg	Sample Box Temp. Filter Temp. °F	Impinger Temp. °F
NA	0	1248	72.207	48	—	1.0	104	80	80	0	—	
	5	1253	—	—	—	1.0	100	81	80	0	—	
	10	1258	75.30	—	—	0.9	98	81	81	0	—	
	15	1303	77.30	—	—	1.1	102	83	83	0	—	
	20	1308	79.20	—	—	1.0	91	84	84	0	—	
	25	1313	80.35	~~48~~	—	1.0	100	86	86	0	—	
	30	1318	81.60	48	—	1.0	107	88	88		—	
	31	1319	82.042	STOP	-END	TEST						
						1.0	5603 °R	546.1 °R				
	31		9.835									
			9.077									
			0.321	DSCF								

B-3

FIELD DATA

Plant: Wyckoff
Date: 7/31/85
Sampling Location: Pond Discharge Fan(?)
Sample Type: XAD
Run Number: WPF-X-1B
Operator:
Ambient Temperature: 79°F
Barometric Pressure:
Static Pressure (P_s):
Filter Number(s):
Pretest Leak Rate = ___ cfm @ ___ in. Hg
Pretest Pitot Leak Check:
Pretest Orsat Leak Check:
Read and Record all Data Every ___ Minutes

Schematic of Traverse Point Layout

Probe Length and Type:
Pitot Tube I.D. No.:
Nozzle I.D.:
Assumed Moisture, %:
Temp. Readout S/N:
Meter Box Number: U037 °C
Meter $H_@$:
C Factor:
Meter Gamma: 0.953
Heater Box Setting:
Reference ΔP:
Post Test Leak Rate = ___ cfm @ ___ in. Hg
Post Test Pitot Leak Check:
Post Test Orsat Leak Check:

Rosemount

Traverse Point Number	Sampling Time, (min)	Clock Time (24-hour clock)	Gas Meter Reading (V_m) ft³	Velocity Head (P_s) in. H_2O	Orifice Press. Differential (H) in. H_2O Desired	Orifice Press. Differential (H) in. H_2O Actual	Stack Temp. (T_s) °F	Dry Gas Meter Temp. Inlet ($T_{m_{in}}$) °F	Dry Gas Meter Temp. Outlet ($T_{m_{out}}$) °F	Pump Vacuum in. Hg	Sample Box Temp. Filter Temp. °F	Impinger Temp. °F
	0	1116	4166.63		48		~~78~~	23°C		1.2		
	5	1121	~~67.90~~		48			24°C		1.2		
	10.8	1126	69.15 STOP	FOR		DOOR	CLOSE					
	~~15~~											
	~~20~~ 10.8	1139	69.15		48			26		1.2		
	~~25~~		7									
	16	1145	70.5		48		~~25~~	26		1.2		
	20	1149	71.50		48		~~27~~	27		1.15		
	25	1154	72.81		48		~~28~~	28		1.15		
	30	1159	74.0		48		~~27~~	28		1.15		
	40	1209	76.30		48			27		~~1.20~~		
	50	1215	78.9		48		60	30		1.20		
	60	1209	4181.36	END			83					
								26.4		1.2		
			14.73		48							
								79.0°F				
			0.45 DSCF									

E-4

FIELD DATA

Plant: Wyckoff
Date: 7/31/85
Sampling Location: Pound Loose Exh
Sample Type: XAD
Run Number: WPF-X 1A
Operator:
Ambient Temperature:
Barometric Pressure:
Static Pressure (P_s):
Filter Number(s):
Pretest Leak Rate = ___ cfm @ ___ in. Hg
Pretest Pitot Leak Check:
Pretest Orsat Leak Check:
Read and Record all Data Every ___ Minutes

Schematic of Traverse Point Layout

Probe Length and Type:
Pitot Tube I.D. No.:
Nozzle I.D.:
Assumed Moisture, %:
Temp. Readout S/N:
Meter Box Number: VOST OF
Meter $H_@$:
C Factor:
Meter Gamma: .951
Heater Box Setting:
Reference ΔP:
Post Test Leak Rate = ___ cfm @ ___ in. Hg
Post Test Pitot Leak Check:
Post Test Orsat Leak Check:

VOST ROTAMETER P_{H_2O}

Traverse Point Number	Sampling Time, (min)	Clock Time (24-hour clock)	Gas Meter Reading (V_m) ft^3	Velocity Head (P_s) in. H_2O	Orifice Press. Differential (H) in. H_2O Desired	Orifice Press. Differential (H) in. H_2O Actual	Stack Temp. (T_s) °F	Dry Gas Meter Temp. Inlet ($T_{m_{in}}$) °F	Dry Gas Meter Temp. Outlet ($T_{m_{out}}$) °F	~~Pump~~ Vacuum in. Hg	Sample Box Temp. Filter Temp. °F	Impinger Temp. °F
	0	1116	7182.15		48		73	78	X	1.0		
	5	1121	83.33		48			79	X	0.9		
	~~[illegible]~~	1126	84.61	STOP	POR		DOOR	CLOSE				
	~~10~~ [illegible]	1139	84.61		48			82		1.0		
	16	1145	86.2		48		~~74~~	83		0.9		
	20	1149	87.11		48		~~[illegible]~~	84		0.9		
	25	1154	88.40		48		~~76~~	85				
	30	1159	89.8		48		~~79~~	86		0.9		
	40	1209	92.00		48			87		1.0		
	50	1219	94.8		48		125	88		1.0		
	60	1229	7197.39	END	TEST					1.0		
			15.24					83.6		1.0		
					48							
			14.131									
			0.1499	DSCF								

B

FIELD DATA

Plant Wyckoff
Date 2/31/85
Sampling Location Creo D
Sample Type XAD
Run Number WA-FX-2B
Operator JB
Ambient Temperature
Barometric Pressure
Static Pressure (P_s)
Filter Number(s)
Pretest Leak Rate = ___ cfm @ ___ in. Hg
Pretest Pitot Leak Check
Pretest Orsat Leak Check
Read and Record all Data Every ___ Minutes

VOST
Schematic of Traverse Point Layout

Probe Length and Type
Pitot Tube I.D. No.
Nozzle I.D.
Assumed Moisture, %
Temp. Readout S/N
Meter Box Number VOST °C
Meter $H_@$
C Factor
Meter Gamma
Heater Box Setting
Reference ΔP
Post Test Leak Rate = ___ cfm @ ___ in. Hg
Post Test Pitot Leak Check
Post Test Orsat Leak Check

Traverse Point Number	Sampling Time, (min)	Clock Time (24-hour clock)	Gas Meter Reading (V_m) ft³	Velocity Head (P_s) in. H_2O	Orifice Pres. Differential (H) in. H_2O Desired	Actual	Stack Temp. (T_s)	Dry Gas Meter Temp. Inlet ($T_{m_{in}}$)	Outlet ($T_{m_{out}}$) °F	Pump Vacuum in. Hg	Sample Box Temp. Filter Temp. °F	Impinger Temp. °F
	0	1333	4181.49		48	48	72	23	24	1.2		
	6	1343	82.9									
	10	1347	84.05			48	72	25	25	1.2		
	16	1353	85.7			48	92	25	25	1.2		
	20	1357	86.44			48	92	26	26	1.2		
	25	1402	87.75			48	92	26	26	1.25		
	30	1407	88.01			48	92	27	27	1.20		
	92.7	1410	4189.47		END	TEST		TUBE	DROPPED	OUT OF		
					EXHAUST		GAS	ABSION				
							91					
	~~48~~						90					
			6.18							1.20		
						46		25.5				
			9.697									
				DSF				77.9 °F				
			1.17									

B-6

FIELD DATA

Plant: Wyckoff
Date: 7/31/85
Sampling Location: Cacu D
Sample Type: SOD
Run Number: WCF-X 2A
Operator: JB
Ambient Temperature: 71°F
Barometric Pressure: 30
Static Pressure (P_s): —
Filter Number(s): —
Pretest Leak Rate = ___ cfm @ ___ in. Hg
Pretest Pitot Leak Check: —
Pretest Orsat Leak Check: —
Read and Record all Data Every ___ Minutes

VOST

Schematic of Traverse Point Layout

Probe Length and Type ___
Pitot Tube I.D. No. ___
Nozzle I.D. ___
Assumed Moisture, % ___
Temp. Readout S/N ___
Meter Box Number: VOST °F
Meter $H_@$ ___
C Factor ___
Meter Gamma: 0.951
Heater Box Setting ___
Reference ΔP ___
Post Test Leak Rate = ___ cfm @ ___ in. Hg
Post Test Pitot Leak Check ___
Post Test Orsat Leak Check ___

Traverse Point Number	Sampling Time, (min)	Clock Time (24-hour clock)	Gas Meter Reading (V_m) ft³	Velocity Head (P_s) in. H_2O	Orifice Press. Differential (H) in. H_2O Desired (Rotameter)	Orifice Press. Differential (H) in. H_2O Actual	Stack Temp. (T_s) °F	Dry Gas Meter Temp. Inlet ($T_{m_{in}}$) °F	Dry Gas Meter Temp. Outlet ($T_{m_{out}}$) °F	Pump Vacuum in. Hg (Press)	Sample Box Temp. Filter Temp. °F	Impinger Temp. °F
	0	1337	7197.39		48	48		78	78	1.0		
	6	1343	98.8									
	10	1347	7200.97			48	132	78	78			
	16	1353	01.6			48	79	80	80	1.0		
	20	1357	02.37			48	82	80	80			
	25	1402	03.76			48	86	82	82	0.95		
	30	1407	05.07			48	86	83	83	0.95		
	35	1412	06.30			48	82	84	84	1.0		
	40	1417	7207.61	END	SAMPLE	48	93 (194°)	85	85	0.95		
			10.22			48		81.3		0.97		
			9.514									
			0.336 DSCF									

1- Filter
3- condenser
4- impinger
5- stack

bm yellow probe

FIELD DATA

Plant Wycoff
Date 7/29/85
Sampling Location Penta Vac Vent
Sample Type MMS
Run Number UP-V-MMS-1 B A
Operator JB JM
Ambient Temperature 69°
Barometric Pressure
Static Pressure (P_s)
Filter Number(s) NA
Pretest Leak Rate 0.004 cfm @ 16 in. Hg
Pretest Pitot Leak Check
Pretest Orsat Leak Check
Read and Record all Data Every ___ Minutes

Schematic of Traverse Point Layout

Probe Length and Type 2'
Pitot Tube I.D. No.
Nozzle I.D.
Assumed Moisture, %
Temp. Readout S/N
Meter Box Number 2010-84C/9
Meter $H_@$ 1.557
C Factor
Meter Gamma 1.007
Heater Box Setting
Reference ΔP
Post Test Leak Rate 0.008 cfm @ 20 in. Hg
Post Test Pitot Leak Check
Post Test Orsat Leak Check

B-8

* Condenser Temp climbed to 130°F For approx 2-3 minutes at approx 1342-1345

(1)

Probe Liner	Traverse Point Number	Sampling Time, (min)	Clock Time (24-hour clock)	Gas Meter Reading (V_m) ft³	Velocity Head (P_s) in. H_2O	Orifice Pres. Differential (H) in. H_2O Desired	Actual	Stack Temp. (T_s) °F	Dry Gas Meter Temp. Inlet ($T_{m_{in}}$) °F	Outlet ($T_{m_{out}}$) °F (condenser)	Pump Vacuum in. Hg	Sample Box Temp. Filter Temp. °F	Impinger Temp. °F
272		0	1235	583.054	0.035	0.69	0.69	146	91	63	7	183	83
342		15	1250	595.3	0.040	0.69	0.69	152	93	75	8	203	72
344		30	1305	602.9	0.040	0.69	0.69	156	94	76	9	210	75
342		45	1320	610.4	0.040	0.69	0.69	154	94.5	73	11	212	71
344		60	1335	618.0	0.035	0.69	0.69	154	93.5	72	13	214	71
331		75	1350	625.6	0.035	0.69	0.69	156	96.5	75	13.5	216	77
333		85	1400	620.7	0.040	0.69	0.69	155	97.5	67	20	214	76
308		90	1405	633.1	0.035	0.69	0.64	154	97.5	68	20	214	78
280		95	1410	635.6	0.035	0.69	0.63	152	98	69	20	214	80
255		100	1415	638.0	0.035	0.69	0.61	152	99	67	20	216	78
338		105	1420	641.4	0.035	0.69	0.60	152	100	66	20	214	77
334		110	1425	642.7	0.035	0.69	0.58	151	100	69	20	215	78
333		115	1430	645.1	0.035	0.69	0.57	149	100	68	20	212	77
33[illegible]		120	1435	647.416	0.035	0.69	0.57	151	99	66	20	212	77
				59.403 × Y 59.819	√ΔP 0.191		.604	152.4	96.7				

SAMPLE RECOVERY DATA

Plant: Wycoff

Date:

Sampling Location: Penta Vac. Vent

Sample Type: MMS

Run Number: WP-V-MMS1-A

Sample Box Number:

Clean-up Man:

Job Number:

Comments:

FRONT HALF

Filter Number: N/A

Description of Filter:

MOISTURE

Impingers

Final Volume:	615	ml		ml		ml
Initial Volume:	100	ml	100	ml		ml
Net Volume:		ml		ml		ml
Total H_2O:					415	

Silica Gel

Final Volume:	466.5	g		g		g
Initial Volume	234.7	g	202.0	g		g
Net Volume		g		g	29.8	g
Total Moisture:			29.8		445.8	

Description of Impinger Catch:

Ⓐ (B) 5/10

FIELD DATA

Plant	Wycoff
Date	7/29/85
Sampling Location	PENTA VAC VENT
Sample Type	MMS
Run Number	WP-V-MMS-1 B 2/1
Operator	JB, JM
Ambient Temperature	~~68°~~ 76°
Barometric Pressure	
Static Pressure (P_s)	
Filter Number(s)	NA
Pretest Leak Rate = 0.005 cfm @ 15 in. Hg	
Pretest Pitot Leak Check	~~NA~~
Pretest Orsat Leak Check	
Read and Record all Data Every ___ Minutes	

Schematic of Traverse Point Layout

Probe Length and Type	2'
Pitot Tube I.D. No.	
Nozzle I.D.	
Assumed Moisture, %	
Temp. Readout S/N	
Meter Box Number	ES-5
Meter $H_@$	1.703
C Factor	
Meter Gamma	1.013
Heater Box Setting	
Reference ΔP	
Post Test Leak Rate = ___ cfm @ ___ in. Hg	
Post Test Pitot Leak Check	
Post Test Orsat Leak Check	

Traverse Point Number	Sampling Time, (min)	Clock Time (24-hour clock)	Gas Meter Reading (V_m) ft^3	Velocity Head (P_s) in. H_2O (RUN F)	Orifice Pres. Differential (H) in. H_2O Desired (0.5 DSCFM)	Orifice Pres. Differential (H) in. H_2O Actual	① Stack Temp. (T_s) °F	Dry Gas Meter Temp. ~~Inlet~~ Avg ($T_{m_{in}}$) °F	③ (COMMON) Dry Gas Meter Temp. ~~Outlet~~ ($T_{m_{out}}$) °F	Pump Vacuum in. Hg	② Sample Box Temp. Filter Temp. °F	④ Impinger Temp. °F
NA	0	1230	095.455	0.035	0.76	—	140	40	60	5	265	85
	15	1245	122.98	0.035	0.76	—	149	~~88~~ 91	68	7	243	86
	30	1300	111.0	0.040	0.76	0.70	155	94	70	9	260	70
	45	1315	118.05	0.040	0.76	0.76	154	96	70	10 1/2	245	69
	60	1330	125.67	0.040	0.76		153	96	67	12	241	65
	75	1345	138.8	0.035	0.76		155	99	73	14 1/2	255	66
	90	1400	141.0	0.035	0.76		155	102	71	16 1/2	252	67
	105	1415	148.6	0.035	0.76		152	104	69	18	234	71
	120	1430	156.334							(19)		
			60.879 / 61.569	0.192	0.75		153.3	95.9				

B-10

SAMPLE RECOVERY DATA

Plant: Wycoff

Date:

Sampling Location: Penta. Vac. Vent

Sample Type: MM5

Run Number: WP-V-MM5 1-B

Sample Box Number:

Clean-up Man:

Job Number:

Comments:

FRONT HALF

Filter Number: N/A

Description of Filter:

MOISTURE

Impingers

Final Volume:	645	ml		ml		ml
Initial Volume:	100	ml	100	ml		ml
Net Volume:		ml		ml		ml
Total H_2O:					445	

Silica Gel

Final Volume:	505.5	g		g		g
Initial Volume	251.0	g	229.2	g		g
Net Volume		g		g	25.3	g
Total Moisture:			25.3		470.3	

Description of Impinger Catch:

FIELD DATA

Plant: Wyckoff
Date: 7/21/85
Sampling Location: Parton Vac Vom
Sample Type: MMS
Run Number: WP-35 2A
Operator: [illegible]
Ambient Temperature: 68°
Barometric Pressure:
Static Pressure (P_s): NA
Filter Number(s):
Pretest Leak Rate = 0.005 cfm @ 18 in. Hg
Pretest Pitot Leak Check:
Pretest Orsat Leak Check:
Read and Record all Data Every ___ Minutes

Schematic of Traverse Point Layout

Probe Length and Type:
Pitot Tube I.D. No.:
Nozzle I.D.:
Assumed Moisture, %:
Temp. Readout S/N:
Meter Box Number:
Meter $H_@$:
C Factor:
Meter Gamma: 1.007
Heater Box Setting:
Reference ΔP:
Post Test Leak Rate = 0.012 cfm @ 20 in. Hg
Post Test Pitot Leak Check:
Post Test Orsat Leak Check:

	Traverse Point Number	Sampling Time, (min) / Clock Time (24-hour clock)	Gas Meter Reading (V_m) ft^3	Velocity Head (P_s) in. H_2O	Orifice Press. Differential (H) in. H_2O Desired	Orifice Press. Differential (H) in. H_2O Actual	Stack Temp. (T_s) °F (1)	Dry Gas Meter Temp. Inlet ($T_{m_{in}}$) °F	Dry Gas Meter Temp. ~~Outlet~~ ($T_{m_{out}}$) °F (4) condenser	Pump Vacuum in. Hg	Sample Box Temp. Filter Temp. °F (3)	Impinger Temp. °F (5)
276		0 / 0927	647.862	0.040	1.56	1.56	155	77	72	13	239	59
230		10 / 0937	655.0	0.035	1.56	1.56	155	80	76	13.5	231	59
220		20 / 0947	662.3	0.030	1.56	1.56	153	82.5	77	15	247	66
240		30 / 0957	669.5	0.040	1.56	1.56	149	84	82	16	241	66
[illegible]		40 / 1007	676.7	0.035	1.56	1.56	147	86	88	18	225	67
[illegible]		50 / 1017	684.2	0.035	1.56	1.56	143	87	67	18	225	71
[illegible]		60 / 1027	691.7	0.035	1.56	1.56	146	87.5	68	18.5	227	70
[illegible]		70 / 1037	699.3	0.030	1.56	1.56	138	89	69	19	233	72
[illegible]		80 / 1047	706.8	0.030	1.56	1.56	134	89.5	69	19.5	233	70
[illegible]		90 / 1057	714.4	0.025	1.56	1.56	132	89.5	62	19.5	235	70
		90 / 1100	721.388		~~1.56~~	~~1.56~~	STOP - END TEST					

B-12

SAMPLE RECOVERY DATA

Plant: Wyckoff

Date: 7/31/85

Sampling Location: Vac. Vent

Sample Type: MMS

Run Number: WP-V-MMS-2A

Sample Box Number:

Clean-up Man: LKJ

Job Number:

Comments:

FRONT HALF

Filter Number: N/A

Description of Filter:

MOISTURE

Impingers

Final Volume:	585 ml	ml	ml
Initial Volume:	100 ml	100 ml	ml
Net Volume:	ml	ml	ml
Total H_2O:			385

Silica Gel

Final Volume:	505.0 g	g	g
Initial Volume	241.9 g	231.7 g	g
Net Volume	g	g	31.4 g
Total Moisture:			416.4

Description of Impinger Catch:

①

FIELD DATA

Plant: Wyckoff
Date: 7/31/85
Sampling Location: Portable Vac Vam
Sample Type: MM5
Run Number: WPV-MS-2B
Operator: JB
Ambient Temperature: 62°
Barometric Pressure: 30.
Static Pressure (P_s):
Filter Number(s):
Pretest Leak Rate = 0.009 cfm @ 15 in. Hg
Pretest Pitot Leak Check:
Pretest Orsat Leak Check:
Read and Record all Data Every ___ Minutes

Schematic of Traverse Point Layout

Probe Length and Type: 4'
Pitot Tube I.D. No.:
Nozzle I.D.: .375
Assumed Moisture, %: 22
Temp. Readout S/N: -
Meter Box Number: 55
Meter $H_@$: 1.788
C Factor:
Meter Gamma: 1.013
Heater Box Setting:
Reference ΔP:
Post Test Leak Rate = .005 cfm @ 20 in. Hg
Post Test Pitot Leak Check:
Post Test Orsat Leak Check:
comparison

Traverse Point Number	Sampling Time, (min)	Clock Time (24-hour clock)	Gas Meter Reading (V_m) ft³	Velocity Head (P_s) in. H_2O	Orifice Press. Differential (H) in. H_2O Desired (046 ⑤)	Orifice Press. Differential (H) in. H_2O Actual	Stack Temp. (T_s) °F ①	Dry Gas Meter Temp. Inlet ($T_{m_{in}}$) °F ③	Dry Gas Meter Temp. Outlet ($T_{m_{out}}$) °F	Pump Vacuum in. Hg	Sample Box Temp. Filter Temp. °F ②	Impinger Temp. °F 4
	0	0922	156.655	0.040	1.70		154	88	64	10	248	62
	15	0932	165	0.040	1.70		155	90	65	12	229	51
	20	0942	171.2	0.038	1.70		155	92	66	13 1/2	234	55
	30	0952	178.5	0.035	1.70		152	93	64	14	232	55
	40	1002	186.2	0.040	1.70		142	95	65	15	241	57
	50	1012	193.3	0.035	1.70		143	96	62		241	60
	60	1022	201.1	0.030	1.70		140	97	55	16	246	60
	70	1032	208	0.030	1.70		139	98	60	17 1/2	246	61
	80	1048	217	0.031	1.70		134	100	61	17 1/2	252	64
	90	1058	223.4	0.030	1.70		134	95	56	18	245	66
	100	1102	231.161	STOP	-END	TEST						
			74.512 ~~76~~ 75.481	68" .187	1.70		145.3	94 1/2				

B-14

SAMPLE RECOVERY DATA

Plant: Wycoff
Date: 7/31/85
Sampling Location: Vac. Vent
Sample Type: MMS
Run Number: WP-V-MMS-2B
Sample Box Number:
Clean-up Man: [illegible]
Job Number:
Comments:

FRONT HALF

Filter Number: N/A
Description of Filter:

MOISTURE

Impingers

Final Volume:	620 ml	ml	ml
Initial Volume:	100 ml	100 ml	ml
Net Volume:	ml	ml	ml
Total H_2O:			420

Silica Gel

Final Volume:	500.0 g	g	g
Initial Volume	225.5 g	245.8 g	g
Net Volume	g	g	g
Total Moisture:		28.7	~~28.7~~ 448.7

Description of Impinger Catch:

FIELD DATA

Plant: Wyckoff
Date: 7/31/88
Sampling Location: Cond Vac Vent
Sample Type:
Run Number: WCV-M5-1A
Operator: JB
Ambient Temperature: 70°
Barometric Pressure:
Static Pressure (P_s): +.5
Filter Number(s): NA
Pretest Leak Rate = 0.00 cfm @ 16 in. Hg
Pretest Pitot Leak Check:
Pretest Orsat Leak Check:
Read and Record all Data Every 10 Minutes

Schematic of Traverse Point Layout

Probe Length and Type: 5'
Pitot Tube I.D. No.:
Nozzle I.D.: 1/4
Assumed Moisture, %: LOTS
Temp. Readout S/N: —
Meter Box Number: GS-5
Meter $H_@$: 1.703
C Factor:
Meter Gamma: 1.013
Heater Box Setting:
Reference ΔP:
Post Test Leak Rate = 0.007 cfm @ 22 in. Hg
Post Test Pitot Leak Check:
Post Test Orsat Leak Check:

	Traverse Point Number	Sampling Time, (min)	Clock Time (24-hour clock)	Gas Meter Reading (V_m) ft³	Velocity Head (P_s) in. H_2O	Orifice Press. Differential (H) in. H_2O Desired	Orifice Press. Differential (H) in. H_2O Actual	Stack Temp. (T_s) °F	Dry Gas Meter Temp. Inlet ($T_{m_{in}}$) °F	Dry Gas Meter Temp. Outlet ($T_{m_{out}}$) °F	Pump Vacuum in. Hg	Sample Box Temp. Filter Temp. °F	Impinger Temp. °F
@ Probe								0		4 Condenser		3	5
237	NA	0	1700	231.207	0.010	1.70		135	74	61	10	185	66
313		10	1710	238.8	0.010	1.70		134	76	60	13	205	75
		20	1720	249.03	0.010	1.70		134	82	78 ×	15	207	69
313		30	1730	253.23	0.010	1.70		133	86	82	18	209	72
316		40	1740	259.95	0.010	1.70	1.05	132	90	70 ×	20½	205	73
320		45	1745	263.2	0.010		1.05	132	91	74	20½	197	75
308		50	1750	265.90	0.015		0.95	132	92	72	20½	199	75
318		55	1755	268.78	0.010		0.86	130	93	73	21	200	73
322		60	1800	271.35	0.010		0.79	130	94	72	21	196	72
314 306		65	1805	274	0.010		0.71	130	96	72	21	193	69
303		70	1810	276.35	0.01		0.65	130	96	71	21	192	67
316		75	1815	278.63	0.01		0.55	130	97	71	21	192	68
320		80	1820	280.77	0.01		0.46	130	98	72	21½	192	70
341		85	1825	282.67	0.01		0.36	129	99	66	21	190	71
		90	1830	284.323	END	TEST							
													717
				~~52.41~~ 53.121			1.016	135	90.3				
B-16													
	*		SOLID MATERIAL		COATING		INSIDE		OF COIL		*		
			TO	WELL	WON'T	COOL	ER/						
	**		TOOK	COLLING	WATER	OFF	SAL	E ~	2 MIN/	MAX VAC	of FLOW RATE	@ 35"	

SAMPLE RECOVERY DATA

Plant: Wycoff

Date: 7/31/85

Sampling Location:

Sample Type: MMS

Run Number: WC-V-MMS-1A

Sample Box Number:

Clean-up Man: RLJ

Job Number:

Comments:

FRONT HALF

Filter Number: N/A

Description of Filter:

MOISTURE

Impingers

Final Volume:	370 ml	ml	ml
Initial Volume:	100 ml	100 ml	ml
Net Volume:	ml	ml	ml
Total H_2O:			190

Silica Gel

Final Volume:	512.5 g	g	g
Initial Volume	240.9 g	233.7 g	g
Net Volume	g	g	37.9 g
Total Moisture:		37.9	227.9

Description of Impinger Catch:

FIELD DATA

Plant WYCKOFF
Date 7/31/85
Sampling Location CREO VACUUM VENT
Sample Type MM5
Run Number WCV-MS-1B
Operator Mesenh
Ambient Temperature 70°
Barometric Pressure ____
Static Pressure (P_s) 7.5
Filter Number(s) ____
Pretest Leak Rate = 0.002 cfm @ 15 in. Hg
Pretest Pitot Leak Check ____
Pretest Orsat Leak Check ____
Read and Record all Data Every ____ Minutes

Schematic of Traverse Point Layout

Probe Length and Type ____
Pitot Tube I.D. No. ____
Nozzle I.D. ____
Assumed Moisture, % ____
Temp. Readout S/N ____
Meter Box Number 2010-84019
Meter $H_@$ ____
C Factor ____
Meter Gamma 1.007
Heater Box Setting ____
Reference ΔP ____
Post Test Leak Rate = .006 cfm @ 21 in. Hg
Post Test Pitot Leak Check ____
Post Test Orsat Leak Check ____

0 ③ condenser ② ①

Traverse Point Number	Sampling Time, (min)	Clock Time (24-hour clock)	Gas Meter Reading (V_m) ft³	Velocity Head (P_s) in. H_2O	Orifice Press. Differential (H) in. H_2O Desired	Actual	Stack Temp. (T_s) °F	Dry Gas Meter Temp. Inlet ($T_{m_{in}}$) °F	~~Outlet~~ ($T_{m_{out}}$) °F	Pump Vacuum in. Hg	Sample Box Temp. Filter Temp. °F	Impinger Temp. °F
	0	1305	221.301	0.015	1.56	1.56	136	74.5	60	8.5	273	63
	10	1310	228.8	0.015	1.56	1.56	134	75	71	10	272	58
	20	1320	236.0	0.010	1.56	1.56	132	77	73	13	264	59
	30	1325	243.4	0.010	1.56	1.56	131	76	73	11	256	59
	40	1335	250.0	0.010	1.56	1.10	132	80	70	20	252	58
	45	1340	252.8	0.010	1.56	0.83	132	79.5	67	21	249	59
	50	1345	255.4	0.010	1.56	0.65	130	79	74	21	245	60
	55	1350	257.7	0.010	1.56	0.53	130	79	62	21	244	61
	60	1355	259.8	0.010	1.56	0.41	130	79	62	21	242	62
	65	1400	261.7	0.010	1.56	0.35	130	79	61	21	238	63
	70	1405	263.5	0.010	1.56	0.30	130	79	62	21	235	64
	75	1410	265.1	0.010	1.56	0.24	130	78.5	63	21	237	64
	80	1415	266.5	0.010	1.56	0.17	130	79	60	21	244	66
	85	1420	267.8	0.010	1.56	0.16	129	78	55	21	251	62
	90	1425	268.342	STOP. END TEST								
			47.041 x 2 / 47.593			.706	131.2	78.0				

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SAMPLE RECOVERY DATA

Plant: Wycoff

Date: 7/31/85

Sampling Location:

Sample Type: MMS

Run Number: WC-V-MMS-1B

Sample Box Number:

Clean-up Man: hig

Job Number:

Comments:

FRONT HALF

Filter Number: N/A

Description of Filter:

MOISTURE

Impingers

Final Volume:	370	ml		ml		ml
Initial Volume:	150	ml	100	ml		ml
Net Volume:		ml		ml		ml
Total H_2O:					170	

Silica Gel

Final Volume:	513.5	g		g		g
Initial Volume	244.3	g	240.4	g		g
Net Volume		g		g	28.8	g
Total Moisture:			28.8		198.8	

Description of Impinger Catch:

FIELD DATA

Plant: WYCLEFF
Date: 8/1/85
Sampling Location: Glass. Vac. Unit C
Sample Type: X4D
Run Number: WIV-X4
Operator: [illegible]
Ambient Temperature: 62°
Barometric Pressure: ____
Static Pressure (P_s): ____
Filter Number(s): ____
Pretest Leak Rate = ____ cfm @ ____ in. Hg
Pretest Pitot Leak Check ____
Pretest Orsat Leak Check ____
Read and Record all Data Every ____ Minutes

Schematic of Traverse Point Layout

Probe Length and Type ____
Pitot Tube I.D. No. ____
Nozzle I.D. ____
Assumed Moisture, % ____
Temp. Readout S/N ____
Meter Box Number: VOST OC
Meter $H_@$ ____
C Factor ____
Meter Gamma: 0.9[illegible]
Heater Box Setting ____
Reference ΔP ____
Post Test Leak Rate = ____ cfm @ ____ in. Hg
Post Test Pitot Leak Check ____
Post Test Orsat Leak Check ____

ANEMOMETER
UEC 6-1/7/90

Traverse Point Number	Sampling Time, (min)	Clock Time (24-hour clock)	Gas Meter Reading (V_m) ft³	~~Velocity~~ MUTEN Head (P_s) in. H_2O	Orifice Press. Differential (H) in. H_2O (ROTAMETER) Desired	Actual	Stack Temp. (T_s) °F	Dry Gas Meter Temp. Inlet ($T_{m_{in}}$) °F	Outlet ($T_{m_{out}}$) °F	Pump Vacuum in. Hg	Sample Box Temp. Filter Temp. °F	Impinger Temp. °F
	0	0803	7107.62	1.0	4.5	48	104	60	60	0		
305	5	0813	7109.0	1.6	48	48	105	60	60	0		
293	10	0818	7116.4	0.9	46	45	105	61	61	0		
290	15	0823	7111.6	1.6	48	48	104	62	62	0		
276	30	0828	7112.91	STOP	-1230	TEST						
								60.8				
291			5.27.4				104					
			3.141	0								
			0.182	DSCF								

B-20

FIELD DATA

Plant WYCKOFF
Date 8/1/85
Sampling Location CREO VACUUM
Sample Type MMS
Run Number WCV-MS-2B
Operator MESSNER
Ambient Temperature 68
Barometric Pressure 30
Static Pressure (P_s) 7.5
Filter Number(s)
Pretest Leak Rate = 0.007 cfm @ 16 in. Hg
Pretest Pitot Leak Check
Pretest Orsat Leak Check
Read and Record all Data Every ___ Minutes

Schematic of Traverse Point Layout

Probe Length and Type
Pitot Tube I.D. No.
Nozzle I.D.
Assumed Moisture, %
Temp. Readout S/N
Meter Box Number 2010-84014
Meter $H_@$ 1.557
C Factor
Meter Gamma 1.007
Heater Box Setting
Reference ΔP
Post Test Leak Rate = 0.020 cfm @ 21 in. Hg
Post Test Pitot Leak Check
Post Test Orsat Leak Check
@ Condenser

Traverse Point Number	Sampling Time, (min)	Clock Time (24-hour clock)	Gas Meter Reading (V_m) ft³	Velocity Head (P_s) in. H_2O	Orifice Press. Differential (H) in. H_2O Desired	Orifice Press. Differential (H) in. H_2O Actual	Stack Temp. (T_s) °F	Dry Gas Meter Temp. Inlet ($T_{m_{in}}$) °F	Dry Gas Meter Temp. ~~Outlet ($T_{m_{out}}$) °F~~	Pump Vacuum in. Hg	Sample Box Temp. Filter Temp. °F	Impinger Temp. °F
	0	1805	769.255	0.010	1.56	1.56	149	70	58	10	224	66
	5	1810	772.8	0.010	1.56	1.56	149	70.5	77	10.5	207	57
	10	1815	776.3	0.010	1.56	1.56	150	71.5	86	12	205	55
	15	1820	779.9	0.010	1.56	1.56	149	73	95	13	201	59
	20	1825	783.6	0.010	1.56	1.56	147	73.5	99	15	198	60
	25	1830	787.2	0.010	1.56	1.56	146	74.5	102	21	189	62
	30	1835	790.6	0.010	1.56	1.20	146	76	100	20	183	62
	35	1840	793.8	0.010	1.56	0.48	144	77	99	20	187	63
	40	1845	796.7	0.010	1.56	0.90	142	77	91	20	185	63
	45	1850	799.4	0.010	1.56	0.66	141	77.5	85	20	195	64
	50	1855	801.7	0.010	1.56	0.53	140	77.5	77	20	205	65
	55	1900	803.7	0.010	1.56	0.43	140	77.5	75	20	210	65
	60	1905	805.581	~~0.05~~	~~1.56~~	0.33	STOP - END	TEST		20		
			36.326									
			36.580			1.17	145.3	74.4				

B-21

SAMPLE RECOVERY DATA

Plant: Wycoff

Date: 8/·/85

Sampling Location: Vac Vent

Sample Type: MMS

Run Number: WC-V-MM5-2A

Sample Box Number: —

Clean-up Man: 1.L8

Job Number:

Comments:

FRONT HALF

Filter Number: N/A

Description of Filter:

MOISTURE

Impingers

Final Volume:	390	ml		ml		ml
Initial Volume:	·–	ml	·00	ml		ml
Net Volume:		ml		ml		ml
Total H_2O:					190	

Silica Gel

Final Volume:	484.0	g		g		g
Initial Volume	230.C	g	230.4	g		g
Net Volume		g		g	23.4	g
Total Moisture:					213.6	

Description of Impinger Catch:

0°F 45"

FIELD DATA

Plant: L SKOPP
Date: 8/1/85
Sampling Location: Cross Vac Unit
Sample Type: HCHS
Run Number: WCV-MS-2A
Operator: [illegible]
Ambient Temperature: [illegible]°F
Barometric Pressure: 30
Static Pressure (P_s): t.5
Filter Number(s): NA
Pretest Leak Rate = 0.001 cfm @ 20" in. Hg
Pretest Pitot Leak Check
Pretest Orsat Leak Check
Read and Record all Data Every 5 Minutes

0:17:00 405 ft/min
0:27:00 407 ft/min
0:51:00 455 ft/min
0:62:00 41.5 ft/min
(Anemometer)

Schematic of Traverse Point Layout

Probe Length and Type: 3'
Pitot Tube I.D. No.: 1/4
Nozzle I.D.
Assumed Moisture, %: LOTS
Temp. Readout S/N
Meter Box Number: 05-5
Meter $H_@$: 1.703
C Factor
Meter Gamma: 1.013
Heater Box Setting
Reference ΔP
Post Test Leak Rate = 0.03 cfm @ 22 in. Hg
Post Test Pitot Leak Check
Post Test Orsat Leak Check

PAONG

B23

CONDENS.

	Traverse Point Number	Sampling Time, (min)	Clock Time (24-hour clock)	Gas Meter Reading (V_m) ft³	10 ANG Velocity Head (P_s) in. H_2O	Orifice Press. Differential (H) in. H_2O Desired	Orifice Press. Differential (H) in. H_2O Actual	Stack Temp. (T_s) °F	Dry Gas Meter Temp. Inlet ($T_{m_{in}}$) °F	Dry Gas Meter Temp. Outlet ($T_{m_{out}}$) °F	Pump Vacuum in. Hg	Sample Box Temp. Filter Temp. °F	Impinger Temp. °F
234	NA	0	1800	284.599	0.010	1.70		147	81	61	12	244	71
220		1051	1805	288.00	"	1.70		149	86	81	14	238	62
212		2010	1810	291.66	"	1.70		150	88	93	15	240	61
207		15	1815	295.34		1.70		150	97	91	17	240	69
218		20	1820	299.1	"	1.70		148	93	100	19	249	73
219		25	1825	302.78	"	1	1.60	147	95	101	20	254	74
232		30	1830	306.4	"		1.30	146	96	101	20	255	75
221		35	1835	309.46	"		1.1	145	97	103	20½	258	77
237		40	1840	312.35	"		0.96	143	98	93	20½	253	72
251		45	1845	315.2	"		0.71	142	99	86	21	256	76
240		50	1850	317.51	"		0.59	140	100	81	21	255	76
232		55	1855	319.6	"		0.42	138	100	74	20	254	76
		60	1900	321.421	cond								
				36.822									
				-8			1.27	145.4	94.2				66.5
				37.301									

ENGINEERING-SCIENCE

SAMPLE RECOVERY DATA

Plant: Wyioff

Date: 9/1/75

Sampling Location: Vac. Vent

Sample Type: MMS

Run Number: WC-V-MMS-2B

Sample Box Number: —

Clean-up Man: KLS

Job Number:

Comments:

FRONT HALF

Filter Number: N/A

Description of Filter:

MOISTURE

Impingers

Final Volume:	375 ml	ml	ml
Initial Volume:	100 ml	100 ml	ml
Net Volume:	ml	ml	ml
Total H_2O:			175

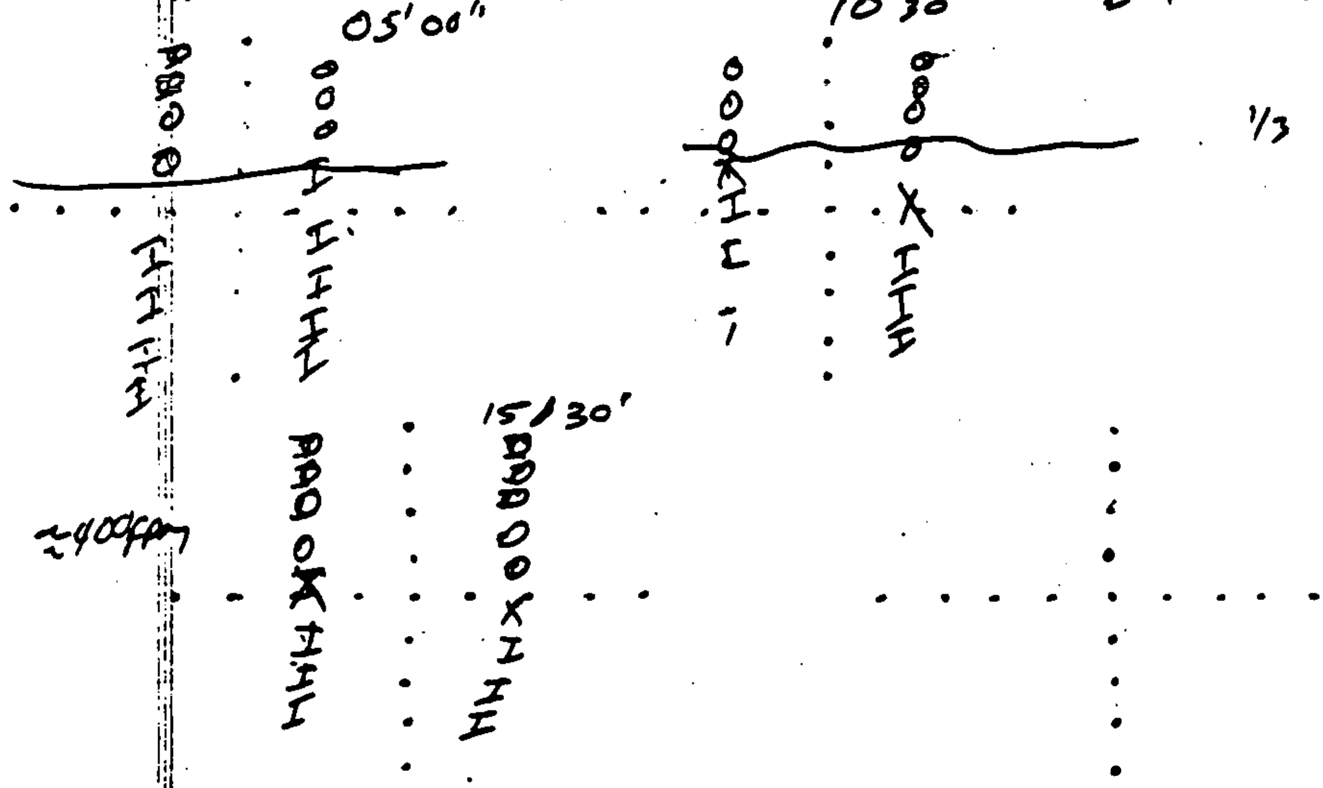
Silica Gel

Final Volume:	502.5 g	g	g
Initial Volume	244.8 g	236.6 g	g
Net Volume	g	g	21.1 g
Total Moisture:			~~234.7~~ 196.1

Description of Impinger Catch:

FLOW ESTIMATION CRSO C 7/26/85

Anemometer 'GRAD 6045 20 min ≈ 400 fpm



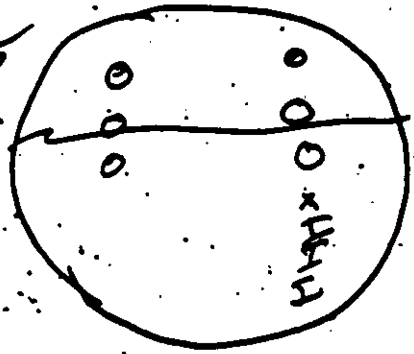
B-2.5

CREO D [illegible]

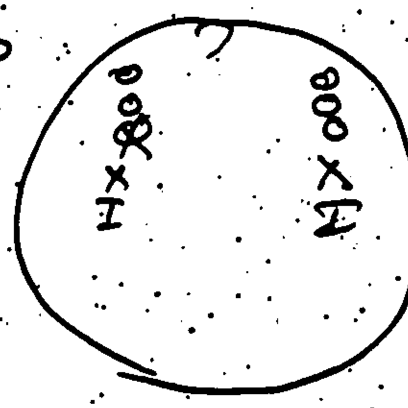
1350 Anemometer start 0 min 0 ft
1420 end 30 9382 ft

22'00" -375

100 ft / 18 sec



10

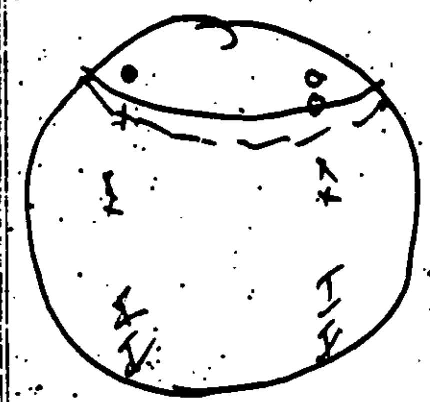


-30

200 F / 36 sec

15

100' / 21 sec



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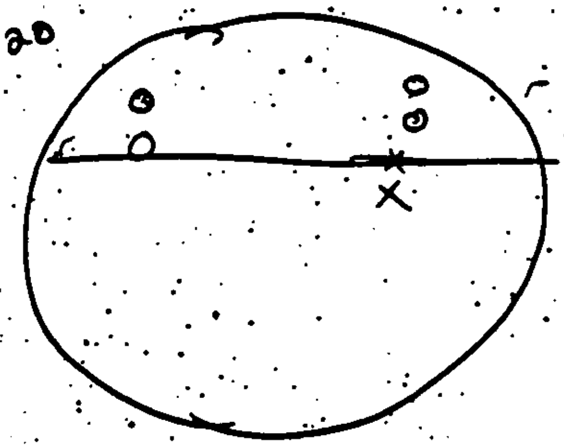


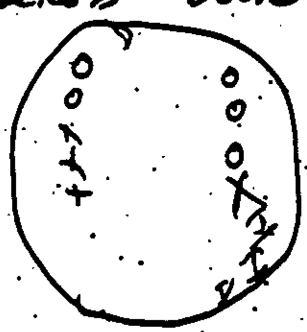
-3

100' / 18 sec

Crackers Door 1350

25'00"

100 ft / 18 sec

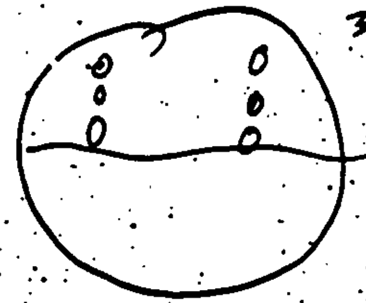


30

3/8

100 / 18 sec

B-26



30

6 Pointer Rotor Fugitives 7/31/83

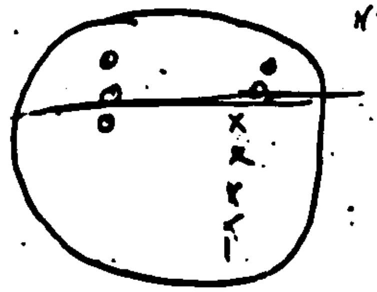
1157 Anemometer Start 0 min 0 ft

10 3

END 50 11135

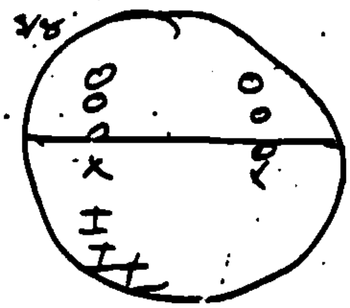
0300
100 ft/19 sec

X3



09

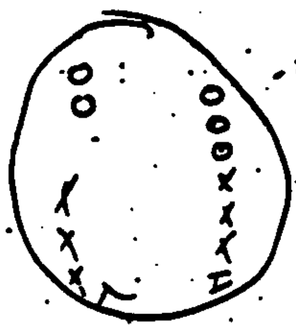
3/8



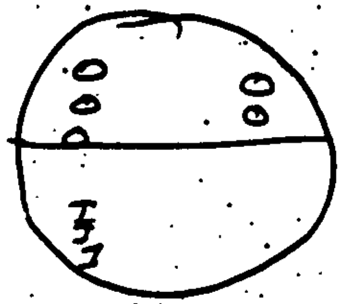
100 ft/17 sec

18'00"
100 ft/18 sec

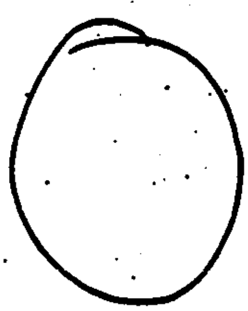
.25

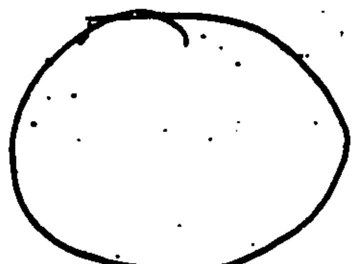


25
1/3



100 ft/16 sec





DONTA
E

WYCKOFF 7/29/85

LOAD IN 0745 FILLED 0745 → 0845 STEAM ON 0930

TIME	RETORT TEMP	VAC	H_2O GAUGE
1230	202	20	
1245	204	20	
1300	208	18	10"
1315	212	19	
1330	212	17	11 1/2"
1345	211	19	
1400	212	19	13
1415	212	19	
1430	212	19	14

7/31 DONTA	RETORT E	P PSI	
0900	235	35	
0912 BLOWDOWN			
0915	225		
START 0920	212	0 VAC → 2	
0935	206	17	(CHART +4
0945	201	19	"
0955	196	20	
1005	191	21	
1015	186	22	
1025			
1045	181	23	

CREOSOTE E

1700	206	24	10 (CHART)
1715	210	24	
1730	211	24	12 1/2
1745	210	24	
1800	210	24	15
1815	210	24	15 1/2
1830	211	24	16 1/2

Pg 2 8

WYCKOFF

7/26/85

RETORT P CREOSOTE

START LIVE STEAM 0830 20psi

END OF LIVE STEAM 10:30 T ≈ 235°

FINAL VAC 22

CR80 VACUUM VOID

8/1/85

TIME	TEMP	VAC
1745	BLOWDOWN	STEAM
1752 ~~1800~~ INTO	VACUUM	
1800	200	14
1810	186	16
1820	181	20
1830	177	21
1840	176	22
1850	175	24
1900		

Run WCV-M5-2A, 2B

MASTER SAMPLE LOG

Plant Wyckoff Page ______ of ______

Location Bainbridge Island, WA Project Number ______

Sample Number	Run Code	Date	Sample Type	Container Type #/Size	Disposition
WC-V-AAS 2A	—	8/1/85	FH AAS	450 ml Bottle	
↓		↓	BH "	1 L Bottle	
↓		↓	Filter "	Petri Dish	
↓		↓	XAD "	XAD Module	
WC-V-AAS 2B	—	8/1/85	FH AAS	450 ml Bottle	
↓		↓	BH "	1 L Bottle	
↓		↓	Filter "	Petri Dish	
↓		↓	XAD "	XAD Module	
WC-V-AAS 3	—	8/1/85	Recovery FH Blank	450 ml Bottle	
↓		↓	BH	1 L Bottle	
↓		↓	Filter	Petri Dish	
↓		↓	XAD	XAD Module	
WCF-XAD 1A	—		XAD Cartridge	Envelope	
WCF-XAD 1B	—		"	"	
WCF-K-2A Front	—		"	"	
" Back	—		"	"	
WCF-K-2B Front	—		"	"	
" Back	-		—	"	
WP-F-X 1A Front	—		—	—	
" Back	-		"	"	
WP F-X 1B Front	-		"	"	
" Back	—		"	"	
WC-V-XZ Front	—		"	"	
" Back	—		"	"	

MASTER SAMPLE LOG

Plant Wycoff Page ______ of ______

Location Bainbridge Island, WA Project Number ______

Sample Number	Run Code	Date	Sample Type	Container Type #/Size	Disposition
WP-V-MMS 1A	–	7/29/85	MMS F.H.	450 ml Bottle	
			MMS B.H	1l Bottle	
			MMS Filter	Petri Dish	
			MMS XAD	XAD Module	
WP-V-MMS 1B	–	7/29/85	MMS FH	450 ml Bottle	
			" BH	1 l Bottle	
			" Filter	Petri Dish	
			" XAD	XAD Module	
WP-V-MMS	–	7/31/85	MMS F.H.	450 ml Bottle	
2A			" B.H.	1 l Bottle	
			" Filter	Petri Dish	
			" XAD	XAD Module	
WP-V-MMS 2B	–	7/31/85	MMS FH	450 ml Bottle	
			" BH	1 l Bottle	
			" Filter	Petri Dish	
			" XAD	XAD Module	
WC-V-MMS 1A	–	7/31/85	MMS FH	450 ml Bottle	
			" BH	1 l Bottle	
			" Filter	Petri Dish	
			" XAD	XAD Module	
WC-V-MMS 1B	–	7/31/85	MMS FH	450 ml Bottle	
			" BH	1 l Bottle	
			" Filter	Petri Dish	
			" XAD	XAD Module	

APPENDIX C

LABORATORY ANALYSIS

RESEARCH AND DEVELOPMENT LABORATORY
600 BANCROFT WAY • BERKELEY, CALIFORNIA 94710 • 415/841-7353

P.O. No.
Job No. 46921
Date Received 8-5-85
Date Reported

LABORATORY ANALYSIS REPORT

For Puget Sound / ES Fairfax Attention John Bolstad

Address

Lab No.	852075F	852077F	852077B	852078 F+B
Source of Sample	WC-F-XAD 1A Front	WC-F-XAD 2A Front	WC-F-XAD 2A Back	WC-F-XAD 2B Front + Back
Date Collected:	—	—	—	—
Time Collected:	—	—	—	—

Analyses	Units	ANALYTICAL RESULTS			
Pentachlorophenol	ug	ND	ND	ND	ND
Acenaphthene		2200	190		1500
Acenaphthylene		ND	90		60
Anthracene		100	180		20
Benzo(a) anthracene		ND	ND		ND
Benzo(b) fluoranthene					
Benzo(k) fluoranthene					
Benzo(a) pyrene					
Benzo (g,h,i) perylene					
2-Chloronaphthalene					
Chrysene					
Dibenzo(a,h) anthracene					
Fluoranthene		300	40		
Fluorene		740	580		340
Indeno (1,2,3-cd) pyrene		ND	ND		ND
Naphthalene		3000	11000	70	1200
Phenanthrene		640	300	ND	130
Pyrene		ND	20	ND	ND

COMMENTS:

THESE RESULTS WERE OBTAINED BY FOLLOWING ACCEPTED LABORATORY PROCEDURES:
THE LIABILITY OF THE CORPORATION SHALL NOT EXCEED THE AMOUNT PAID FOR THIS REPORT.

Laboratory Supervisor

RESEARCH AND DEVELOPMENT LABORATORY
800 BANCROFT WAY • BERKELEY, CALIFORNIA 94710 • 415/841-7353

P.O. No. ______
Job No. 46921
Date Received 8-5-85
Date Reported ______

LABORATORY ANALYSIS REPORT

For Puget Sound / ES Fairfax Attention: John Bolstad

Address ______ Vacum

Lab No.		852079 F	852079 B	852080 F/B	852081 F/B
Source of Samp's		WP-V-XAD 1A Front	WP-V-XAD 1A Back	WP-V-XAD 1B Front + Back	WC-V-XAD 2 Front + Back
Date Collected:					
Time Collected:					
Analyses	**Units**	**ANALYTICAL RESULTS**			
Pentachlorophenol	ug	ND	ND	600	ND
Acenaphthene				10	20
Acenaphthylene				ND	ND
Anthracene					
Benzo(a)anthracene					
Benzo(b)fluoranthene					
Benzo(k)fluoranthene					
Benzo(a)pyrene					
Benzo(g,h,i)perylene					
2-Chloronaphthalene					
Chrysene					
Dibenzo(a,h)anthracene					
Fluoranthene					
Fluorene				20	
Indeno(1,2,3-cd)pyrene				ND	
Naphthalene			50	200	7200
Phenanthrene			ND	10	ND
Pyrene			ND	ND	ND

COMMENTS: ______

THESE RESULTS WERE OBTAINED BY FOLLOWING ACCEPTED LABORATORY PROCEDURES.
THE LIABILITY OF THE CORPORATION SHALL NOT EXCEED THE AMOUNT PAID FOR THIS REPORT.

______
Laboratory Supervisor

ES ENGINEERING-SCIENCE

RESEARCH AND DEVELOPMENT LABORATORY

600 BANCROFT WAY • BERKELEY, CALIFORNIA 94710 • 415/841-7353

P.O. No. ______

Job No. 46921

Date Received 8-5-85

Date Reported ______

LABORATORY ANALYSIS REPORT

For Puget Sound / ES Fairfax Attention: John Bolstad

Address ______

Lab No.	852065	852067	852069	~~Blank~~ 852074
Source of Sample	W-C-V	W-C-V-	W-C-V-	Blank
	MMS-1A	MMS-2A	MMS-3	
Date Collected:				
Time Collected:				

ANALYTICAL RESULTS

Analyses	Units	Detection Limits				
Pentachlorophenol	ug	1000	ND	ND	ND	ND (<20)
Acenaphthene			3.6×10^3	8×10^4		
Acenaphthylene			2400	8200		
Anthracene			ND	ND		
Benzo(a)anthracene						
Benzo(b)fluoranthene						
Benzo(k)fluoranthene						
Benzo(a)pyrene						
Benzo(g,h,i)perylene						
2-Chloronaphthalene						
Chrysene						
Dibenzo(a,h)anthracene						
Fluoranthene						
Fluorene			4700	2.5×10^4		
Indeno(1,2,3-cd)pyrene			ND	ND		
Naphthalene			2.5×10^6	9.0×10^5	440	
Phenanthrene			1400	3400	ND	
Pyrene			ND	ND	ND	

COMMENTS: ______

THESE RESULTS WERE OBTAINED BY FOLLOWING ACCEPTED LABORATORY PROCEDURES:
THE LIABILITY OF THE CORPORATION SHALL NOT EXCEED THE AMOUNT PAID FOR THIS REPORT.

Laboratory Supervisor ______

C-3

ES ENGINEERING SCIENCE
RESEARCH AND DEVELOPMENT LABORATORY
600 BANCROFT WAY • BERKELEY, CALIFORNIA 94710 • 415/841-7353

P.O. No. ______
Job No. 46921
Date Received 8-5-85
Date Reported ______

LABORATORY ANALYSIS REPORT

For Puget Sound / ES Fairfax Attention: John Bolstad

Address ______

Lab No.	852070	852072		
Source of Sample	WP-V-4 MMS-1A	W-P-V- MMS-2A		
Date Collected:				
Time Collected:				

Analysis	Units	Detection Limits	ANALYTICAL RESULTS			
Pentachlorophenol	ug	100	ND	ND		
Acenaphthene			3.0×10^4	2.5×10^4		
Acenaphthylene			ND	ND		
Anthracene						
Benzo(a) Anthracene						
Benzo(b) Fluoranthene						
Benzo(k) Fluoranthene						
Benzo(a) pyrene						
Benzo (g,h,i) perylene						
2-Chloronaphthalene						
Chrysene						
Dibenzo (a,h) anthracene						
Fluoranthene						
Fluorene			8400	9900		
Indeno (1,2,3-cd) pyrene			ND	ND		
Naphthalene			2.0×10^6	1.0×10^6		
Phenanthrene			2100	1700		
Pyrene			ND	ND		

COMMENTS: ______

THESE RESULTS WERE OBTAINED BY FOLLOWING ACCEPTED LABORATORY PROCEDURES; THE LIABILITY OF THE CORPORATION SHALL NOT EXCEED THE AMOUNT PAID FOR THIS REPORT.

Laboratory Supervisor

APPENDIX D

CALCULATIONS

RUN NUMBER	WPV 1A	WPV 1B	WPV 2A	WPV 2B	WCV 1A	WCV 1B	WCV 2A	WCV 2B
METER VOLUME, ACF	59.403	60.779	73.376	74.512	52.666	47.046	36.822	36.326
METER PRESS(DH), IN	0.60	0.75	1.56	1.70	1.02	0.71	1.27	1.17
METER TEMP., DEG. F	96.7	95.9	85.2	94.8	90.3	78.0	94.2	74.6
BAROM PRESS, IN HG	29.9	29.9	29.9	29.9	29.9	29.9	29.9	29.9
GAMMA	1.007	1.013	1.007	1.013	1.013	1.007	1.013	1.007
METER VOL-STD, DSCF	56.996	58.770	72.057	72.360	51.477	46.721	35.759	36.346
CONDENSATE, ML	445.8	470.3	416.4	448.7	227.9	198.8	196.1	213.6
WATER VAPOR, SCF	20.984	22.137	19.600	21.120	10.727	9.358	9.230	10.054
MOISTURE CONTENT, %	26.9%	27.4%	21.4%	22.6%	17.2%	16.7%	20.5%	21.7%
MOLECULAR WT, DRY	28.84	28.84	28.84	28.84	28.84	28.84	28.84	28.84
MOLECULAR WT, WET	25.92	25.87	26.52	26.39	26.97	27.03	26.62	26.49

D-2

```
A5: 'RUN NUMBER
B5: U ^WPV
B6: (T) U ^1A
A7: 'METER VOLUME, ACF
B7: (F3) U 59.403
A8: ^METER PRESS(DH), IN H2O
B8: (F2) U 0.6
A9: ^METER TEMP., DEG. F
B9: (F1) U 96.7
A10: 'BAROM PRESS, IN HG
B10: U 29.9
A11: 'GAMMA
B11: (F3) U 1.007
A14: 'METER VOL-STD, DSCF
B14: (F3) +B7*B11*(530/(B9+460))*((B10+(B8/13.6))/29.92)
A15: 'CONDENSATE, ML
B15: (F1) U 445.8
A16: 'WATER VAPOR, SCF
B16: (F3) +B15*0.04707
A17: 'MOISTURE CONTENT, %
B17: (P1) +B16/(B16+B14)
A19: 'MOLECULAR WT, DRY
B19: 28.84
A20: 'MOLECULAR WT, WET
B20: (F2) U 18*B17+((1-B17)*B19)
```

RUN NUMBER	WPF-X 1A	WPF-X 1B	WCF-X 1A	WCF-X 2A	WCF-X 2B
METER VOLUME, LITERS	9.835	7.575	15.240	10.22	8.18
METER VOLUME, ACF	0.348	0.268	0.539	0.361	0.289
METER PRESS(DH), IN H2O	1.00	1.18	1.00	0.97	1.21
METER TEMP., DEG. F	86.1	86.1	83.6	81.3	77.9
BAROM PRESS, IN HG	29.90	29.90	29.90	29.9	29.9
GAMMA	0.951	0.955	0.951	0.951	0.955
METER VOL-STD, DSCF	0.321	0.249	0.500	0.337	0.273

```
A5: 'RUN NUMBER
C5: U 'WPF-X
C6: (T) U '1A
A7: 'METER VOLUME, LITERS
C7: U 9.835
A8: 'METER VOLUME, ACF
C8: (F3) +C7/28.3
A9: ^METER PRESS(DH), IN H2O
C9: (F2) U 1
A10: ^METER TEMP., DEG. F
C10: (F1) U 86.1
A11: 'BAROM PRESS, IN HG
C11: (F2) U 29.9
A12: 'GAMMA
C12: (F3) U 0.951
A15: 'METER VOL-STD, DSCF
C15: (F3) +C8*C12*(530/(C10+460))*((C11+(C9/13.6))/29.92)
```

PROCESS CYCLE WCV-1A

EXHAUST GAS FLOW RATE, DSCFM 342

SAMPLE VOLUME 51.477

COMPOUND	MW	ug	#/DSCF	PPMV	#/HR
NAPHTHALENE	128.2	2,500,000	1.07E-04	323.20	2.20
ACENAPHTHYLENE	152.2	2,400	1.03E-07	0.26	0.00211
ACENAPHTHENE	154.2	3,600	1.54E-07	0.39	0.00316
PHENANTHRENE	178.2	1,400	6.00E-08	0.13	0.00123
FLUORANTHENE	202.3	(1,000)	-4.28E-08	-0.08	-0.00088
FLUORENE	166.2	4,700	2.01E-07	0.47	0.00413
PYRENE	202.1	(1,000)	-4.28E-08	-0.08	-0.00088
PENTACHLOROPHENOL	266.4	(1,000)	-4.28E-08	-0.06	-0.00088
ANTHRACENE	178.2	(1,000)	-4.28E-08	-0.09	-0.00088

PROCESS CYCLE WCV-2A

EXHAUST GAS FLOW RATE, DSCFM 319

SAMPLE VOLUME 35.759

COMPOUND	MW	ug	#/DSCF	PPMV	#/HR
NAPHTHALENE	128.2	900,000	5.55E-05	167.50	1.06
ACENAPHTHYLENE	152.2	8,200	5.06E-07	1.29	0.00968
ACENAPHTHENE	154.2	40,000	2.47E-06	6.19	0.04720
PHENANTHRENE	178.2	3,400	2.10E-07	0.46	0.00401
FLUORANTHENE	202.3	(1,000)	-6.17E-08	-0.12	-0.00118
FLUORENE	166.2	25,000	1.54E-06	3.59	0.02950
PYRENE	202.1	(1,000)	-6.17E-08	-0.12	-0.00118
PENTACHLOROPHENOL	266.4	(1,000)	-6.17E-08	-0.09	-0.00118

ANTHRACENE	178.2	(1,000)	-6.17E-08	-0.13	-0.00118

PROCESS CYCLE WPV-1A

EXHAUST GAS FLOW RATE, DSCFM 493

SAMPLE VOLUME 56.996

COMPOUND	MW	ug	#/DSCF	PPMV	#/HR
NAPHTHALENE	128.2	2,000,000	7.74E-05	233.53	2.29
ACENAPHTHYLENE	152.2	(1,000)	-3.87E-08	-0.10	-0.00114
ACENAPHTHENE	154.2	30,000	1.16E-06	2.91	0.03432
PHENANTHRENE	178.2	2,100	8.12E-08	0.18	0.00240
FLUORANTHENE	202.3	(1,000)	-3.87E-08	-0.07	-0.00114
FLUORENE	166.2	8,400	3.25E-07	0.76	0.00961
PYRENE	202.1	(1,000)	-3.87E-08	-0.07	-0.00114
PENTACHLOROPHENOL	266.4	(1,000)	-3.87E-08	-0.06	-0.00114
ANTHRACENE	178.2	(1,000)	-3.87E-08	-0.08	-0.00114

PROCESS CYCLE WPV-2A

EXHAUST GAS FLOW RATE, DSCFM 509

SAMPLE VOLUME 72.057

COMPOUND	MW	ug	#/DSCF	PPMV	#/HR
NAPHTHALENE	128.2	1,000,000	3.06E-05	92.36	0.93
ACENAPHTHYLENE	152.2	(1,000)	-3.06E-08	-0.08	-0.00093
ACENAPHTHENE	154.2	25,000	7.65E-07	1.92	0.02336
PHENANTHRENE	178.2	1,700	5.20E-08	0.11	0.00159
FLUORANTHENE	202.3	-(1,000)	-3.06E-08	-0.06	-0.00093
FLUORENE	166.2	9,800	3.00E-07	0.70	0.00916
PYRENE	202.1	(1,000)	-3.06E-08	-0.06	-0.00093

PENTACHLOROPHENOL	266.4	(1,000)	-3.06E-08	-0.04	-0.00093
ANTHRACENE	178.2	(1,000)	-3.06E-08	-0.07	-0.00093

PROCESS CYCLE WPF-X-1B

EXHAUST GAS FLOW RATE, DSCFM 4478.04310

SAMPLE VOLUME 0.489

COMPOUND	MW	ug	#/DSCF	PPMv	#/HR
NAPHTHALENE	128.2	200	9.02E-07	2.72	0.24
ACENAPHTHYLENE	152.2	(10)	-4.51E-08	-0.11	-0.01211
ACENAPHTHENE	154.2	10	4.51E-08	0.11	0.01211
PHENANTHRENE	178.2	10	4.51E-08	0.10	0.01211
FLUORANTHENE	202.3	(10)	-4.51E-08	-0.09	-0.01211
FLUORENE	166.2	20	9.02E-08	0.21	0.02423
PYRENE	202.1	(10)	-4.51E-08	-0.09	-0.01211
PENTACHLOROPHENOL	266.4	600	2.71E-06	3.93	0.72679
ANTHRACENE	178.2	(10)	-4.51E-08	-0.10	-0.01211

PROCESS CYCLE WCF-X-2A

EXHAUST GAS FLOW RATE, DSCFM 3763.36551

SAMPLE VOLUME 0.337

COMPOUND	MW	ug	#/DSCF	PPMv.	#/HR
NAPHTHALENE	128.2	11,070	7.24E-05	218.61	16.35
ACENAPHTHYLENE	152.2	90	5.89E-07	1.50	0.13294
ACENAPHTHENE	154.2	1,900	1.24E-05	31.19	2.80659
PHENANTHRENE	178.2	300	1.96E-06	4.26	0.44315
FLUORANTHENE	202.3	40	2.62E-07	0.50	0.05909
FLUORENE	166.2	580	3.79E-06	8.83	0.85675

PYRENE	202.1	20	1.31E-07	0.25	0.02954
PENTACHLOROPHENOL	266.4	(10)	-6.54E-08	-0.10	-0.01477
ANTHRACENE	178.2	100	6.54E-07	1.42	0.14772

PROCESS CYCLE WCF-X-26

EXHAUST GAS FLOW RATE, DSCFM 3763.36551

SAMPLE VOLUME 0.273

COMPOUND	MW	ug	#/DSCF	PPMV	#/HR
NAPHTHALENE	128.2	1,200	9.69E-06	29.25	2.19
ACENAPHTHYLENE	152.2	60	4.85E-07	1.23	0.10941
ACENAPHTHENE	154.2	1,500	1.21E-05	30.40	2.73516
PHENANTHRENE	178.2	130	1.05E-06	2.28	0.23705
FLUORANTHENE	202.3	(10)	-8.08E-08	-0.15	-0.01823
FLUORENE	166.2	340	2.75E-06	6.39	0.61997
PYRENE	202.1	(10)	-8.08E-08	-0.15	-0.01823
PENTACHLOROPHENOL	266.4	(10)	-8.08E-08	-0.12	-0.01823
ANTHRACENE	178.2	20	1.62E-07	0.35	0.03647

PROCESS CYCLE WCF-X-1AF

EXHAUST GAS FLOW RATE, DSCFM 4487.08965

SAMPLE VOLUME 0.321

COMPOUND	MW	ug	#/DSCF	PPMV	#/HR
NAPHTHALENE	128.2	3,000	2.06E-05	62.20	5.55
ACENAPHTHYLENE	152.2	(10)	-6.87E-08	-0.17	-0.01849
ACENAPHTHENE	154.2	2,200	1.51E-05	37.92	4.06781
PHENANTHRENE	178.2	640	4.40E-06	9.55	1.18336
FLUORANTHENE	202.3	300	2.06E-06	3.94	0.55470

FLUORENE	166.2	740	5.08E-06	11.83	1.36826
PYRENE	202.1	(10)	-6.87E-08	-0.13	-0.01849
PENTACHLOROPHENOL	266.4	(10)	-6.87E-08	-0.10	-0.01849
ANTHRACENE	178.2	100	6.87E-07	1.49	0.18490

END
DATE
FILMED
2-12-87
NTIS

REFERENCE 2
WYCKOFF, INC

ESTIMATE OF VOLUME OF WOOD TREATED
DURING WYCKOFF TEST

VOL. OF RETORT $= \pi r^2 h = \pi (3.75)^2 (130) = 5743$

$\boxed{5740 \text{ ft}^3}$

$d = 90'' = 7.5'$ $r = 3.75'$
$h = 130'$

50% OF RETORT VOLUME = VOL. OF WOOD TREATED

$5740 \times 50\% = \boxed{2870 \text{ ft}^3 \text{ WOOD / BATCH}}$

Ref
2

use 50%
to get vol. wood
treated

calc. vol. of
retort

$\pi r^2 h$

Conditioning or vacuum control? N/K report doesn't say

fugitive - no control

Test Runs?

creo - fug - 4
cond - 3
final vac - 2

PCP - fug - 2
cond - 2
final vac - 2

CREOSOTE CYCLE (TABLE 5-10a) REFERENCE 2
(lb/hr) WYCKOFF, INC.

ESTIMATE OF TOTAL LBS EMITTED DURING ENTIRE CYCLE

Compd	COND. (48 HR)	FINAL VAC. (1 HR)	FUG. (1/2 HR)
Napthalene	106 5088	1.06	4.68 2.34
Acenapthalene	0.101 4.85	0.0097	0.613 0.31
Acenapthene	0.154 7.39	0.0472	1.40 0.7
Phenanthrene	0.0576 2.76	0.004	0.172 ~~0.086~~ 0.09
Fluoranthene	<0.0432 <2.07	<0.0012	0.0195 ~~0.00975~~ 0.01
Fluorene	0.197 9.46	0.0295	0.373 0.19
Pyrene	<0.0432 <2.07	<0.0012	0.012 0.006
Pentachlorophenol	<0.0432 <2.07	<0.0012	0.0083 0.004
Anthracene	<0.0432 <2.07	<0.0012	<0.0465 <0.02

RGD = lb/batch (final vac = same #)

÷ 2870 ft³/batch = lb/ft³

Calculate lb/batch
then
lb/ft³ wood

put in Table
6 TABLES - 3 creosote
3 PCP
(COND, VAC, FUG)

PCP Cycle (Table 5.10 b.)
(lb/hr)

Cmpd	Cond (48 HRS)	Final Vac. (1 HR)	Fug (½ HR)
Naphthalene	110 5280	0.930	0.120 0.06
Acenaphthalene	<0.0528 < 2.53	< 0.0009	< 0.006 ~~<0.0006~~ <0.003
Acenapthene	1.65 79.2	1.920	0.006 0.003
Phenanthrene	0.115 5.52	0.110	0.006 0.003
Fluoranthene	<0.0528 < 2.53	<0.0009	<0.006 <0.003
Fluorene	0.461 22.13	0.0092	0.012 0.006
Pyrene	<0.0528 < 2.53	<0.0009	<0.006 <0.003
Pentachlorophenol	<0.0528 <2.53	<0.0009	0.360 0.18
Anthracene	<0.0528 < 2.53	<0.0009	<0.006 <0.003

(< = below detection limit)

Rw = lb/batch (final vac. = same #)

÷ 2870 ft^3/batch