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ANALYTICAL RESULTS REPORT OF
AIR SAMPLING AT RICHARDSON FLAT
PARK CITY, UTAH

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ANALYTICAL RESULTS REPORT
FOR RICHARDSON FLAT TAILINGS
PARK CITY, UTAH
TDD #R8-8608-05

I. INTRODUCTION

This report was prepared to satisfy the requirements of Technical Directive Document (TDD) R8-8608-05 issued to Ecology and Environment's Field Investigation Team (E&E FIT) by Region VIII Environmental Protection Agency (EPA). This report addresses the analytical results for the air sampling activities conducted at the Richardson Flat Tailings site in Park City, Utah. FIT members conducting the air sampling during July 7-14, 1986 were Henry Schmelzer and Dave Franzen. Sampling procedures used in this investigation conform to the Region VIII FIT SOP for Hi-Vol Air Sampling at Hazardous Waste Site; the Quality Assurance Handbook for Air Pollution Measurement Systems, Volume II - Ambient Air Specific Methods; EPA-600/4-77-027A, May, 1977, U.S. EPA, Research Triangle Park, N.C.; and 40 CFR Part 58, July, 1983.

The overall scope of the project involved the set up and operation of a total of five high volume (hi-vol) air samplers at four sampling locations over a five day period. A total of twenty-nine samples were collected including four duplicates and five blanks. Site access was set up by Sue Kennedy of Ecology and Environment, and Kelsey Land and Matt Cohn of Region VIII EPA.

The objectives of this investigation were to determine if the migration of heavy metal contaminated suspended particulate matter exists and to further substantiate and complete the HRS air route score. This score was previously based on photo-documentation of wind blown tailings material.

II. SITE DESCRIPTION

Richardson Flat Tailings is located in Summit County, Utah approximately 3.5 miles northeast of Park City. The tailings cover approximately 160 acres in the NW 1/4, Section 1 and NE 1/4 of Section 2, Township 2 South, Range 4 East (Figure 1). Highway 40 runs east and north of the area, and a Union Pacific Railroad track bisects the southern portion of the tailings. Silver Creek is located approximately 500 feet from the northwestern most extension of the tailings. An intermittent stream (water diversion ditch) forms the southeastern border of the tailings. An ephemeral pond overlies the northeastern portion of the tailings, and is contained by a dam at the northwestern end.

III. SITE HISTORY

The mill tailings at Richardson Flat came from the Keetley Ontario Mine and other metal mines currently owned by United Park City Mines (UPCM). The most recent use of the area for tailings disposal was during the period of time from 1975 to 1981. During this time, UPCM had all its mining properties leased to either Park City Ventures or Noranda Mining, Inc. who constructed and operated milling facilities on UPCM property.

It is estimated that at least seven million tons of tailings were deposited on Richardson Flat. While there is no current dumping of tailings on site, Mr. Ray Wortley is leasing the land the tailings are on from UPCM and using the tailings material for sewer line and road base backfill.

The site is not secured in any way from public access. An unpaved county road along the southern boundary of the tailings is unrestricted. Cattle and sheep are grazed in the area, and cattle have been observed walking across the tailings.

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On June 20, 1985, clouds of fugitive dust moving offsite as a result of strong winds from the west-northwest were photographed by the original EPA-FIT team doing the site investigation. Results of analyses of surface tailings samples showed concentrations as high as 3,600 ppm arsenic, 80 ppm cadmium, 8,530 ppm lead, and 6,360 ppm zinc. Mean soil concentrations for those metals in the western U.S. respectively are 5.5 ppm, 0.2 ppm, 17 ppm, and 55 ppm (Shacklette, 1984).

IV. METEOROLOGY

The Richardson Flat tailings lie in a small flat topographic basin of approximately 800 acres. The configuration of the basin was expected to have a pronounced effect on local air flow. The basin is situated at 6600 feet elevation and is surrounded by ridges of the Wasatch Mountains that range from 6700 feet to 7600 feet. Silver Creek enters the basin from the west-southwest then angles to the north. Daytime up valley air flows were anticipated to originate from the west northwest. This was found to be the case.

The data presented in the following section was acquired from The Climatic Atlas of the United States, U.S. Department of Commerce, Environmental Sciences Services Administration, Environmental Data Service, June 1968. The climate of the Park City area is characterized by moderate fluctuations in temperature and precipitation throughout the year. Mean monthly temperatures range from 10 degrees Fahrenheit (°F) in December, January, and February to 80°F in June, July and August. During the month of July the average temperature is approximately 60°F. Precipitation for the Park City area varies from a mean monthly amount of 1.00 inches in July to 2.22 inches in December. Prevailing wind direction at Park City is typically from a southeasterly direction throughout the year. Relative humidity for the Park City area varies from 40 percent in August to 80 percent in December and February. The average relative humidity in July is 50 percent. Barometric pressure ranges from 1022 millibars (30.18 inches of mercury) in December and January to approximately 1010 millibars (29.83 inches of mercury) in June.

V. METHODOLOGY

All air sampling stations under this TDD were set up to sample in the breathing zone and were located in accordance with the Region VIII FIT SOP for Hi-Vol Sampling at Hazardous Waste Sites. The meteorologic station was set up next to sample locations AM-03 and AM-04. The wind vane was calibrated to magnetic north.

Air temperature, barometric pressure and relative humidity were also measured. This information was used to correct all flows and air concentrations to standard temperature and pressure conditions (STP).

The samplers were calibrated using a General Metal Works GMW-35 top loading orifice calibrator using an 8" x 10" cellulose filter in place. All samplers were set to run for 12 hours at approximately 40 cubic feet per minute. No calibration curve was available at the time the samplers were set up to initially calibrate them. It was decided to not attempt to change the flow rates since they had been set to 40 cfm at the last sampling site. When the sampling at Richardson Flat was completed, a calibration curve for the calibrator used was prepared at EPA-ESD in Denver and the actual flow rates of the samplers were calculated. See Appendix III.

All samplers were equipped with elapsed timers to record the total sample time. Each hi-vol also was equipped with a flow recorder which measured the flow throughout the sampling period. Any fluctuations in flow during the sample period would be noted on the recorder disk. It also served as a check on the elapsed timer.

Surficial soil samples from five locations were also taken. There was some concern that lead emissions from gasoline powered vehicles would cause interference in the air samples from the traffic along U.S. 40 and the county road. Samples were collected at two feet, ten feet and fifty feet from the edge of the asphalt roadway to see if deposition of lead from these vehicles would cause any interference or affect the results.

VI. QUALITY ASSURANCE

The air samples were analyzed for arsenic, cadmium, lead and zinc only. Soil samples were analyzed for Task 1 and 2 metals. The inorganic analytical data were examined thoroughly for compliance with contract laboratory program quality assurance criteria. The data were found to be of good quality. In the air samples, spike recoveries for cadmium and zinc were 65% and 60% respectively and actual values in the tables may be higher than presented. The analytical results for lead in soils were also of good quality. Duplicates showed good agreement. A blank was submitted for each sampling day. The quality assurance reports and raw data are shown in Appendix II.

VII. ANALYTICAL RESULTS

The results of the inorganic analyses are noted in Table 1. Sample locations are noted in Figure 2.

Formulas used for determining the airborne concentrations are presented along with an explanation of terms with Table 2. Table 2 shows the calculations used to determine the total volume of air sampled corrected to standard conditions by each sampler on each sampling day. This information was used to create Table 3 which contains the average concentration per cubic meter for each of the four elements of concern. When combined with the wind speed and direction information from Figures 4-13, offsite migration of the contaminants can be determined. Table 4 shows the field increases for each days samples comparing upwind and downwind concentrations and downwind versus the remote background. Table 5 shows the Task 1 and 2 metal concentration in soils by the two major roadways by the site.

VIII. DISCUSSION

DAY 1

The sampling period began at 1745 hours on July 8, 1986 with the start up of the hi-vol sampler at location AM-01. The last hi-vol sampler shut off at approximately 0700 hours on the morning of July 9th. The wind rose for this period is shown in Figure 4. The predominant wind flow for this period is from the SE at 61% of the sample period. The SSE direction also accounted for 18% of the wind during this time period. Wind speed and direction at the start of the sample period at 1800 hours were 5-10 mph from the SSE. At 2000 the winds increased slightly to around 10 mph and from the SE. At 2100 the wind speed increased to 15-20 mph from the SE. Winds again increased to over 20 mph with several gusts over 40 mph at 0030. Winds dropped back to 10-20 mph at 0130 and continued until 0500 when winds died to near calm, continuing that way until the end of the sample period at 0700.

Based on sampler locations during this time period, sampler AM-02 would be upwind and samplers AM-03 and AM-04 would be downwind. Sampler AM-05 was located fairly close to these last two locations and can serve as a secondary downwind sample location on this day. Results from Table 4 show a 102 fold increase in lead an 83 fold increase in cadmium, a 49 fold increase in arsenic, and a 40 fold increase in zinc, when comparing upwind versus downwind concentrations.

When sample location AM-02 is compared to AM-05, the results from Table 4 show a 59 fold increase in lead, a 50 fold increase in zinc, a 25 fold increase in arsenic and a 14 fold increase in cadmium.

DAY 2

Sampling began at 1100 on July 9th and ended at 0300 on July 10th. The wind rose for this sample period is shown in Figure 5. The

predominant winds are from the WNW and NW with 25% and 18% of the wind respectively from those vectors. The sample period started with light and variable winds from 0-10 mph. At 1430, the wind increased to 10-20 mph and stabilized from the WNW. At 1800 hours the wind dropped back to 5-10 mph and at 2000 the wind went calm and continued that way until the sample period ended.

Based on the wind rose, the upwind sample location would be AM-04 and the downwind location would be AM-02. Comparing upwind versus downwind sample locations reveals an 11 fold increase in lead, a 5 fold increase in zinc, and 7 fold increase in arsenic.

DAY 3

The sample period began at 1100 hours on July 10th and continued until 2300 hours. Figure 6 shows the wind rose for the site for this period of time. The predominant wind direction is WNW with 69% of the wind for this time period from that direction. Based on the wind rose and sampler locations, the upwind sampler would be AM-04 and the downwind location would be AM-02.

The wind at the start of the sampling period was from the NNW at 5-10 mph. At 1045, the wind picked up to 10-20 mph from the WNW and continued so until 1800 hours when the wind slowed to 5-10 and then went calm at 2000 hours.

Results from Table 4 show a 9 fold increase in lead, a three fold increase in zinc, a ten fold increase in arsenic and a two fold increase in cadmium when comparing upgradient versus downgradient.

DAY 4

Sampling was initiated at 1000 hours and continued until 2300 hours. Figure 7 shows the wind rose for this sampling period. The predominant wind direction is WNW with 55% of the sampling time followed by NW with 10%. Based on this information, the upgradient sample location is AM-04 and the downgradient is AM-02.

The sample period began with the wind blowing from the east at 5-10 mph. At 1100 hours, the wind became light at less than 5 mph and variable but at 1130 hours it stabilized with the wind coming from the WNW at 5-10 mph. The wind speed picked up to 10-20 mph at 1230 hours. It continued at this speed and direction through 1930 hours and also had a period of gusts to 30 mph around 1400 hours. The wind died off to 5-10 mph at 1930 hours and remained calm after 2000 hours.

Results from Table 4 show an increase in contaminant concentration of two fold for lead, three fold for zinc, seven fold for arsenic and 1.1 fold for cadmium for this sample period. Sampler AM-02 was the last sampler started so consequently when the winds went calm and remained that way for the last 3 1/2 - 4 hours of the sampling period there would be less particulate material becoming airborne to be collected by the sampler.

DAY 5

The sample period for the 5th day started at 1000 hours and stopped at 2400 hours. Figure 8 shows the wind rose for this sample period. The predominant wind direction was NW with 25% of the sample time but 18% of the time the wind was from the SE, the completely opposite direction. No reliable upgradient or downgradient sample locations can be derived from the information so the three sample locations next to the tailing were compared to the remote background at AM-01.

The wind was 0-5 mph and variable at the start of the sample period at 1000 hours. It increased to 5-10 at 1300 hours and was predominantly from the SE but shifted to the NW at 1400 hours. This remained the predominant wind direction until 1930 when the wind died and went calm until the end of the sample period.

In comparison to the remote background location at AM-01, the sampler at AM-02 shows a six-fold increase in lead, a two-fold increase in zinc and a 1.8 fold increase in arsenic. When comparing

AM-01 to AM-04 there is a 3.5 fold increase in lead, 1.3 fold increase in zinc, and a 1.5 fold increase in arsenic at sample location AM-04. Comparing AM-05 to AM-01 there is a 2.4 fold increase in lead, a 1.5 fold increase in zinc, a 1.2 fold increase in arsenic and a 1.25 fold increase in cadmium at sample location AM-05.

Five soil samples were also taken on this day. The results are shown in Table 5. Of principle concern was the potential for interference with lead from vehicle emissions along U.S. 40 and the county road. Deposition of lead from vehicle emissions is most pronounced within the first 15 meters of the roadway. (40 CFR, Part 58, Appendix E, 7.3 and Daines, 1970). The samples taken 2 feet off of the asphalt edge of the roadway on U.S. 40 and the county road show lead at 477 and 418 mg/kg concentrations respectively. At 10 feet from the county road the concentration drops to 133 mg/kg. At 50 feet from U.S. 40 the concentration is 13 mg/kg which is within the range of the average lead in soil concentration for the Western U.S. of 9-31 mg/kg (Shacklette, 1984).

The air sampling location nearest to either U.S. 40 of the county road is over 200 yards. The concentration of lead in the tailings is 8530 mg/kg and the samplers were placed next to the tailings. Hence, based on the soil sampling and the air station placement, lead from vehicle emissions is not likely to be a major contributing factor to lead deposition in the air samples.

Soil sample SO-05 was intended to be a background sample for the soils. It was taken outside of the major airshed for the area in Park City, unfortunately by the Prospector Hotel. The sample contained 3479 mg/kg of lead and through an oversight, was collected from the Silver Creek Tailings proposed NPL site. Hence, sample SO-05 is not a background sample.

IX. CONCLUSIONS AND RECOMMENDATIONS

Table 4 compares the airborne metal concentrations of downgradient versus upgradient sample locations by sample day. Lead released from daily downgradient sample location ranged from 2.28 to 102.35 times the upgradient sample location. Zinc ranged from 2.43 to 49.58. Arsenic ranged from 7.33 to 48.84. Cadmium ranged from 1.0 to 82.5. When compared to the remote background, the increases are even higher: 261.56 for lead and 91.67 for cadmium.

Strong winds observed on the evening of July 7 prompted a night-time sample run. Winds during this sampling period were the strongest observed during the field activities and lasted throughout the sampling period. This may account for the largest release occurring on the first sampling day.

Based upon the information presented in this analytical results report, it can be concluded that Richardson Flat Tailing site is the source of a release of hazardous substances to the air. Onsite soil concentrations of arsenic, cadmium, lead and zinc documented in previous reports are yielding substantial concentrations of suspended particulates containing these elements. These contaminated particulates are migrating into the air at downwind sample locations on a daily basis when compared to the upwind sample location. The same is true when comparing the downwind samples to those taken at the same times from the remote background location. Based on this information, it is recommended that the Hazard Ranking System documentation package be updated and supplied with the current information.

TABLE 1
RICHARDSON FLATS
ARSENIC, CADMIUM, LEAD AND ZINC CONCENTRATIONS IN
TOTAL ug/filter BY SAMPLE DAY

	AM-06	AM-01	AM-04	AM-03	AM-02	AM-05A INITIAL LOCATION	AM-05B STATION MOVED
DAY 1				BLANK			
Arsenic	--	1.0u	54	1.0u	1.0u	17	
Cadmium	--	.5ur	4.8r	.5ur	.5u	5.2r	
Lead	--	3.4	959	.5u	8.3	348	
Zinc	--	17j	672j	.4uj	15j	527j	
DAY 2	BLANK						
Arsenic	1.0u	1.0u	1.5	1.4	6.8	1.0u	
Cadmium	.5ur	.5ur	.5ur	.5ur	.5ur	.5ur	
Lead	.5u	8.90	30	26	147	14	
Zinc	.4uj	21j	39j	34j	88j	17j	
DAY 3	BLANK						
Arsenic	1.0u	1.0u	1.5	1.0u	13	1.4	
Cadmium	.5ur	.5ur	.5ur	.5ur	.8r	.5ur	
Lead	.5u	12	36	25	264	30	
Zinc	.4uj	23j	43j	28j	169j	55j	
DAY 4	BLANK						
Arsenic	1.0u	1.0u	1.0u	1.2	6.6	--	1.1
Cadmium	.5ur	.5ur	.5ur	.5ur	.5ur	--	.5ur
Lead	.5u	29	64	40	131	--	35
Zinc	.4uj	43j	35j	36j	98j	--	43j
DAY 5	BLANK						
Arsenic	1.0u	1.0u	1.5	1.0u	1.8	--	1.0u
Cadmium	.5ur	.5ur	.5ur	.5ur	.5ur	--	.5ur
Lead	.5u	8.0	27	30	48	--	16
Zinc	.4uj	22j	27j	23j	51j	--	27j

u Element is undetected. Detection limit given.
j Matrix spike recovery was 65% for cadmium. Actual value may be higher. Duplicat relative percent of differences were out of CLP criteria for zinc.
r Matrix spike recovery for zinc was 60%. Values given are estimates.

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EXPLANATION OF TABLE 2

FORMULAS:

$$Qstd_{CFM} = QR_{CFM} \times \frac{Pa\ in\ Hg \times 25.4}{TaK} \times \frac{298K\ (Tstd)}{760mm\ (Pstd)\ of\ Hg}$$

$$Vol._{std\ m^3} = tmin \times Qstd_{CFM} / 35.32$$

QRI CFM = Initial flow rate in cubic feet per minute.

QRF CFM = Final flow rate in cubic feet per minute.

QR CFM = Average flow rate in cubic feet per minute.

Ti F = Initial temperature in degrees Fahrenheit.

Tf F = Final temperature in degrees Fahrenheit.

Ta K = Average temperature converted to degrees Kelvin.

Pa in. Hg = average barometric pressure in inches of mercury.

Qstd CFM = Flow rate in cubic feet per minute at standard temperature and pressure.

t min = Total time in minutes that sampler ran.

Vol. std m^3 = Total volume of air sampled in cubic meters at standard temperature and pressure.

TABLE 2. CALCULATIONS OF STANDARD FLOW RATES

	STATION NUMBER	LOCATION	FILTER #	QR CFM	TAK	PA INCHES	QSTD CFM	T MIN	V STD M^3
DAY 1									
	AM-01	BACKGROUND	AM-01-1	43	290	23.25	34.33	552	536.60
	AM-02	SE	AM-02-1	41	287	23.25	33.08	549	514.25
	AM-03	BLANK	AM-03-1	0.0	--	--	--	--	--
	AM-04	DAM	AM-04-1	42	288	23.25	33.77	609	582.34
	AM-05	NW	AM-05-1	41	289	23.25	32.85	391	363.72
DAY 2									
	AM-01	BACKGROUND	AM-01-2	40.5	289	23.25	32.45	704	646.89
	AM-02	SE	AM-02-2	39	288	23.25	31.36	696	617.99
	AM-03	DUPLICATE	AM-03-2	39.5	290	23.25	31.54	590	526.93
	AM-04	DAM	AM-04-2	42.5	290	23.25	33.94	610	586.17
	AM-05	NW	AM-05-2	41	288	23.25	32.96	699	652.48
	AM-06	BLANK	AM-06-2	0.0	--	--	--	--	--
DAY 3									
	AM-01	BACKGROUND	AM-01-3	42.5	291	23.35	33.96	650	625.13
	AM-02	SE	AM-02-3	42	290	23.35	33.68	589	561.73
	AM-03	DUPLICATE	AM-03-3	39.5	290	23.35	31.68	678	608.12
	AM-04	DAM	AM-04-3	43	290	23.35	34.48	674	658.10
	AM-05	NW	AM-05-3	40.5	290	23.35	32.48	658	605.13
	AM-06	BLANK	AM-06-3	0.0	--	--	--	--	--
DAY 4									
	AM-01	BACKGROUND	AM-01-4	45.5	293	23.35	36.11	726	742.41
	AM-02	SE	AM-02-4	40	293	23.35	31.75	624	560.97
	AM-03	DUPLICATE	AM-03-4	40	293	23.35	31.75	665	597.83
	AM-04	DAM	AM-04-4	42	293	23.35	33.34	661	623.95
	AM-05	W	AM-05-4	37.5	292	23.35	29.87	630	532.79
	AM-06	BLANK	AM-06-4	0.0	--	--	--	--	--
DAY 5									
	AM-01	BACKGROUND	AM-01-5	40.5	293	23.40	32.21	688	627.58
	AM-02	SE	AM-02-5	41	296	23.40	32.28	658	601.47
	AM-03	DUPLICATE	AM-03-5	38	296	23.40	29.92	642	543.90
	AM-04	DAM	AM-04-5	42.5	296	23.40	33.46	642	608.31
	AM-05	W	AM-05-5	39	292	23.40	31.13	586	516.50
	AM-06	BLANK	AM-06-5	0.0	--	--	--	--	--

TABLE 3
AVERAGE AIRBORNE CONCENTRATIONS OF ARSENIC, CADMIUM, LEAD AND ZINC
PER DAY IN ug/m^3

	BACKGROUND AM-01	DAM AM-04	DUPLICATE AM-03	SE AM-02	NW AM-05A	W AM-05B
DAY 1						
Arsenic	.0019 u	.0928	--	.0019 u	.0467	--
Cadmium	.0009 ur	.0825 r	--	.0010 u	.0143 r	--
Lead	.0063	1.6478	--	.0161	.9560	--
Zinc	.0317 j	1.1546 j	--	.0292 j	1.4478 j	--
DAY 2						
Arsenic	.0015 u	.0026	.0027	.0110	.0015	--
Cadmium	.0007 ur	.0009 ur	.0009 ur	.0008 ur	.0008 ur	--
Lead	.0138	.0512	.0493	.2379	.0214	--
Zinc	.0325 j	.0666 j	.0645 j	.1424 j	.0260 j	--
DAY 3						
Arsenic	.0016 u	.0023	.0016 u	.0231	.0023	--
Cadmium	.0008 ur	.0008 ur	.0008 ur	.0014 r	.0008 ur	--
Lead	.0192	.0547	.0411	.4698	.0496	--
Zinc	.0368 j	.0653 j	.0461 j	.3007 j	.0909 j	--
DAY 4						
Arsenic	.0013 u	.0016 u	.0020	.0118	--	.0021
Cadmium	.0007 ur	.0008 ur	.0008 ur	.0009 ur	--	.0009 u
Lead	.0391	.1026	.0669	.2335	--	.0657
Zinc	.0580 j	.0561 j	.0602 j	.1747 j	--	.0807 j
DAY 5						
Arsenic	.0016 u	.0025	.0018 u	.0029	--	.0019 u
Cadmium	.0008 ur	.0008 ur	.0009 ur	.0008 ur	--	.0010 u
Lead	.0127	.0444	.0551	.0799	--	.0309
Zinc	.0350 j	.0444 j	.0423 j	.0849 j	--	.0522 j

-- Sample not run.

u Element is undetected.
j Matrix spike recovery was 65% for cadmium. Actual value may be higher. Duplicate relative percent of differences were out of CLP criteria for zinc.
r Matrix spike recovery for zinc was 60%. Values given are estimates.

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TABLE 4. COMPARISON OF DOWNGRADIENT VS. UPGRADIENT AND BACKGROUND AIRBORNE METALS CONCENTRATION BY SAMPLE DAY IN ug/m^3

DAY	PREVAILING WIND	REMOTE BCKGRD	UPGRADIENT LOCATION	PRIMARY DNGRADIENT LOCATION	SECONDARY DNGRADIENT LOCATION	CONTAMINANT INCREASE (TIMES UPGRADIENT) PRIMARY	SECONDARY	REMOTE BACKGROUND
1	SE	AM-01	AM-02	AM-04	AM-05A			
		AS.0019	.0019	.0928	.0467	48.84	24.58	48.84
		CD.0009	.0010	.0825	.0143	82.50	14.30	91.67
		PB.0063	.0161	1.6478	.9560	102.35	59.38	261.56
		ZN.0317	.0292	1.1546	1.4478	39.54	49.58	36.42
2	WNW	AM-01	AM-05A	AM-02				
		AS.0015	.0015	.0110	--	7.33	--	7.33
		CD.0007	.0008	.0008	--	1.0	--	1.14
		PB.0138	.0214	.2379	--	11.12	--	17.24
		ZN.0325	.0260	.1424	--	5.48	--	4.38
3	WNW	AM-01	AM-05A	AM-02	--			
		AS.0016	.0023	.0231	--	10.04	--	14.44
		CD.0008	.0008	.0014	--	1.75	--	1.75
		PB.0192	.0496	.4698	--	9.47	--	24.47
		ZN.0368	.0909	.3007	--	3.31	--	8.17
4	WNW	AM-01	AM-04	AM-02	--			
		AS.0013	.0016	.0118	--	7.38	--	9.08
		CD.0007	.0008	.0009	--	1.125	--	1.29
		PB.0391	.1026	.2335	--	2.28	--	5.97
		ZN.0580	.0561	.1747	--	3.11	--	3.01
				INCREASE VS REMOTE BACKGROUND				
5	NONE	AM-01	AM-02	AM-04	AM-05B	AM-02	AM-04	AM-05
		AS.0016	.0029	.0025	.0019	1.81	1.56	1.19
		CD.0008	.0008	.0008	.0010	1.0	1.0	1.25
		PB.0127	.0799	.0444	.0309	6.29	3.49	2.43
		ZN.0350	.0849	.0444	.0522	2.43	1.27	1.49

-- No secondary downgradient

Rept 2

TABLE 5
SOIL CONCENTRATION OF TASK 1 AND 2 METALS
IN RICHARDSON FLAT AREA

	CNTY RD 2' SO-01	CNTY RD 10' SO-02	US40 2' SO-03	US40 50' SO-04	HOTEL SO-05	WESTERN U.S. AVERAGE
Aluminum	3790*	11900*	11300*	10500*	13200*	58000
Antimony	18e	70e	89e	40e	104e	.47
Arsenic	87	7.7	7.5	2.1u	188	5.5
Barium	95	200	144	668	225	580
Beryllium	.4ue	5.2e	43e	1.4e	1.0e	.68
Cadmium	3.9*	12*	12*	4.5*	38*	.35
Calcium	46900*	14300*	12900*	6350*	14900*	--
Chromium	17*	443*	743*	4.3*	21*	41
Cobalt	[2.9]e	14e	159e	11e	21e	7.1
Copper	21	44	100	15	222	21
Iron	10600	94200	10300	33900	46100	21000
Lead	477*	133*	418*	13*	3479*	17
Magnesium	14200*	55800*	36700*	3560*	5550*	--
Manganese	284	8320	15400	112	1730	380
Mercury	1.0*	0.5*	0.2*	0.5*	3.9*	.05
Nickel	12	44	52	21	34	15
Potassium	[436]e	1480e	[965]e	1160e	1960e	--
Selenium	1.0u	1.0u	1.0u	1.0u	6.9	.23
Silver	2.0u	2.0u	2.0u	2.1u	18	.5
Sodium	[336]	5620	5130	[976]	1320	--
Thallium	2.4	2.0u	2.0u	2.1u	13	.2
Vanadium	11e	561e	1390e	81e	12e	70
Zinc	440*	331*	84*	96*	4630*	55

r Spike recovery beyond the ± 25% control limit.
* Duplicate results exceeded the relative percent difference limit of ±35%. Consider an estimate.
e An interference may be present for these elements.
[] Results is below CLP contract detection limit but above the detection limit for t instrument.

TABLE 6: AIR SAMPLING DATA

LOCATION	DATE	START TIME	STOP TIME	COMMENTS
AM-01	7/8/86	1745	0257	
AM-02	7/8/86	2125	0634	
AM-03	7/8/86	2012		Blow down; sample not used
AM-04	7/8/86	1929	0538	
AM-05	7/8/86	2032	0303	
AM-01	7/9/86	1125	2309	
AM-02	7/9/86	1410	0146	
AM-03	7/9/86	1333	2323	
AM-04	7/9/86	1315	2325	
AM-05	7/9/86	1504	0243	
AM-01	7/10/86	1005	2055	Sheep grazing in area of sampler
AM-02	7/10/86	1230	2219	
AM-03	7/10/86	1110	2228	
AM-04	7/10/86	1110	2224	
AM-05	7/10/86	1158	2257	
AM-01	7/11/86	1030	2236	
AM-02	7/11/86	1244	2308	
AM-03	7/11/86	1123	2228	
AM-04	7/11/86	1128	2229	
AM-05	7/11/86	1214	2244	Sampler moved 300 yards to south.
AM-01	7/12/86	1025	2153	
AM-02	7/12/86	1218	2316	
AM-03	7/12/86	1129	2211	
AM-04	7/12/86	1129	2211	
AM-05	7/12/86	1154	2140	

Ref 2

REFERENCES

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Daines, R.H., H. Moto, and D.M. Chilko. Atmospheric Lead: Its Relationship to Traffic Volume and Proximity to Highways. Environ. Sci. and Technol., 4:318, 1970.

Johnson, E.E., et al. Epidemiologic Study of the Effects of Automobile Traffic on Blood Lead Levels, Southwest Research Institute, Houston, TX. Prepared for U.S. Environmental Protection Agency, Research Triangle Park, NC. EPA-600/1-78-055, August 1978.
Air Quality Criteria for Lead. Office of Research and Development, U.S. Environmental Protection Agency, Washington, D.C. EPA-600/8-77-017. December 1977.

Lyman, D.R. The Atmospheric Diffusion of Carbon Monoxide and Lead from an Expressway. Ph.D. Dissertation, University of Cincinnati, Cincinnati, OH. 1972.

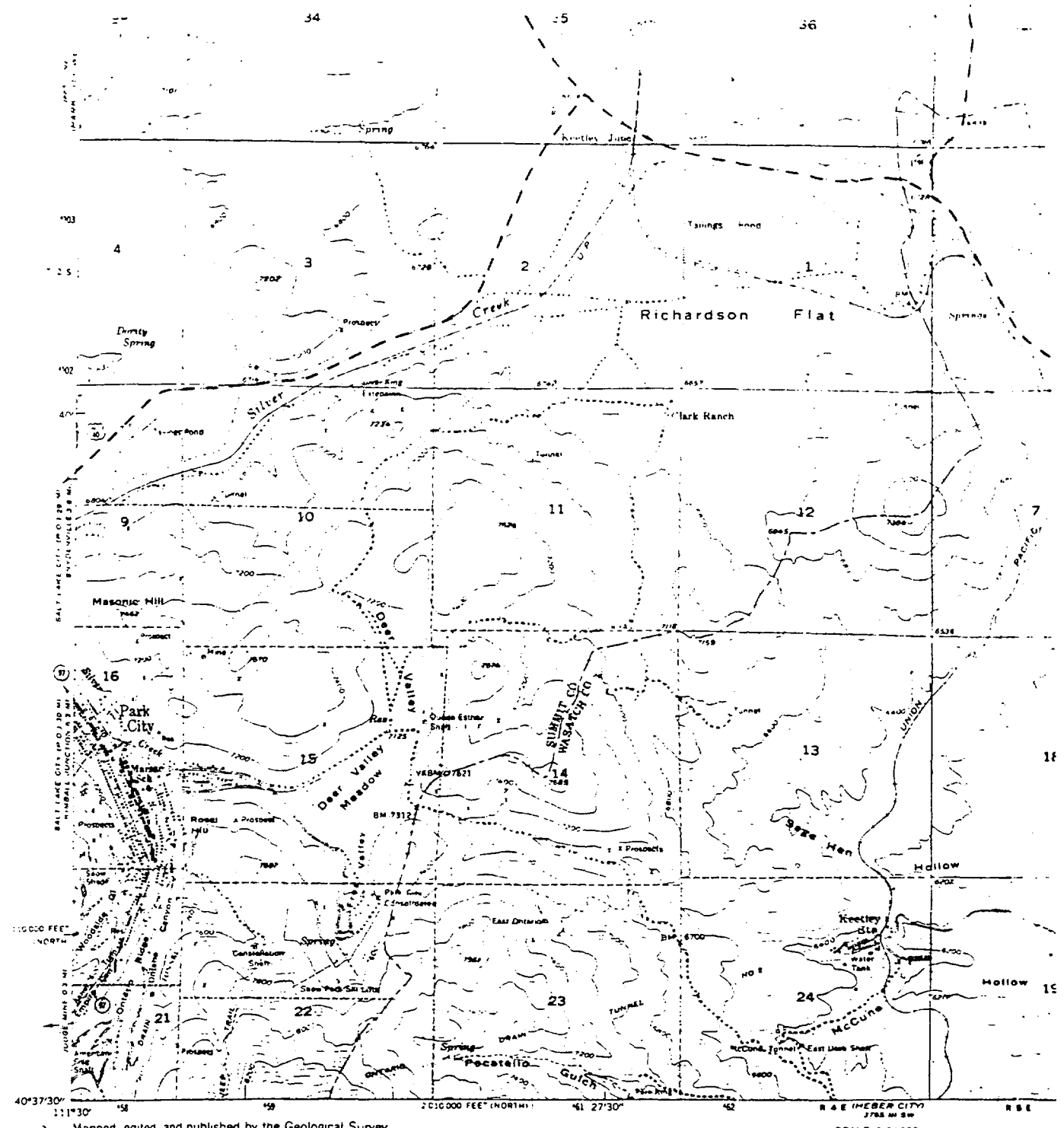
Shacklette, H.T., and Boerngen, J.G.; 1984: Element Concentrations in Soils and other Surficial Materials of the Conterminous United States. U.S. Geol. Surv. Professional Paper 1270. 105pp.

Rev 2

APPENDIX I

FIGURES

Ref. 2



SCALE 1:24000

Mapped, edited, and published by the Geological Survey

Control by USGS and USC&GS

Topography from aerial photographs by multiplex methods
Aerial photographs taken 1953 Field check 1955

Polyconic projection 1927 North American datum
10 000-foot grid based on Utah coordinate system, north and central zones

Dashed land lines indicate approximate locations

CONTOUR INTERVAL 40 FEET
NATIONAL GEODETIC VERTICAL DATUM OF 1929

THIS MAP COMPLIES WITH NATIONAL MAP ACCURACY STANDARDS
FOR SALE BY U.S. GEOLOGICAL SURVEY DENVER, COLORADO 80225 OR RESTON VIRGINIA 22092
A FOLDER DESCRIBING TOPOGRAPHIC MAPS AND SYMBOLS IS AVAILABLE ON REQUEST

FIELD INVESTIGATIONS OF UNCONTROLLED HAZARDOUS WASTE SITES
TASK REPORT TO THE E.P.A.

TITLE:

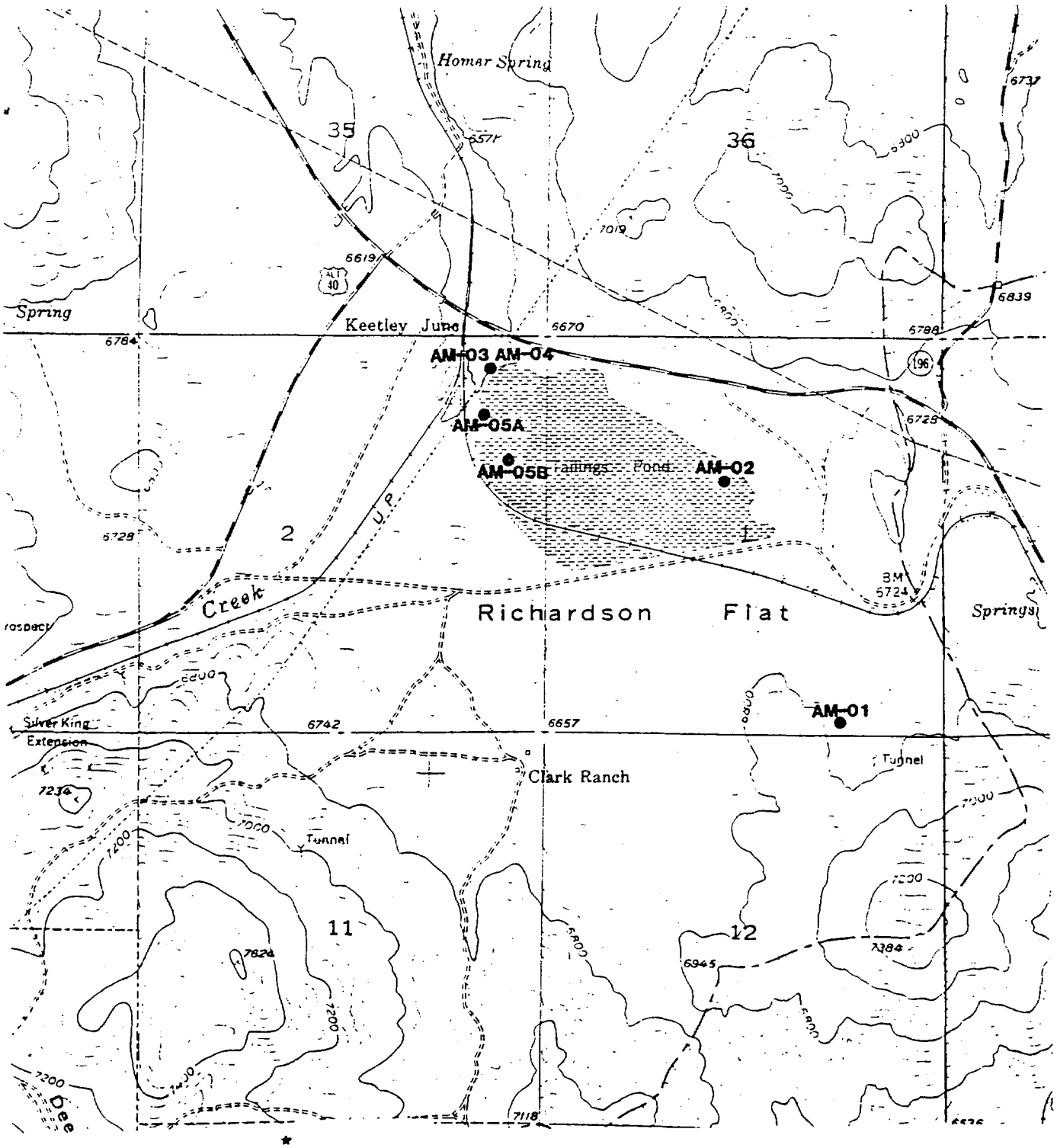
Park City Utah Area Map

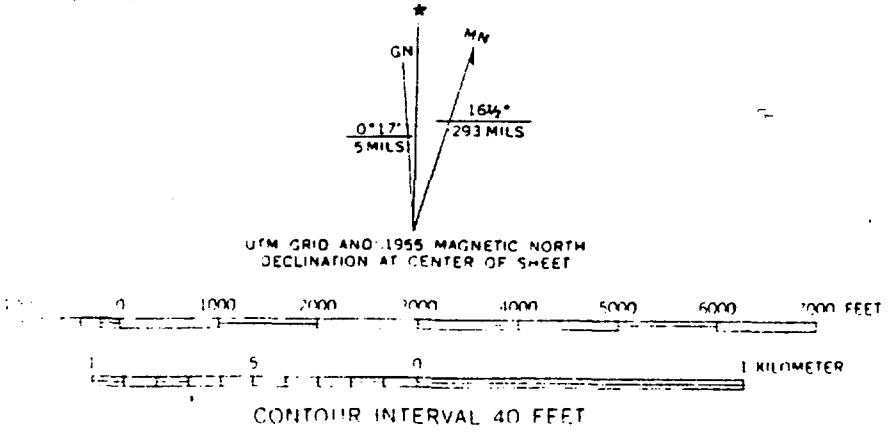
T.D.D R8-8605-12

ecology and environment, inc.
DENVER, COLORADO

FIG. 1

Date _____ Drawn by _____ Scale _____





FIELD INVESTIGATIONS OF UNCONTROLLED HAZARDOUS WASTE SITES
TASK REPORT TO THE E.P.A.

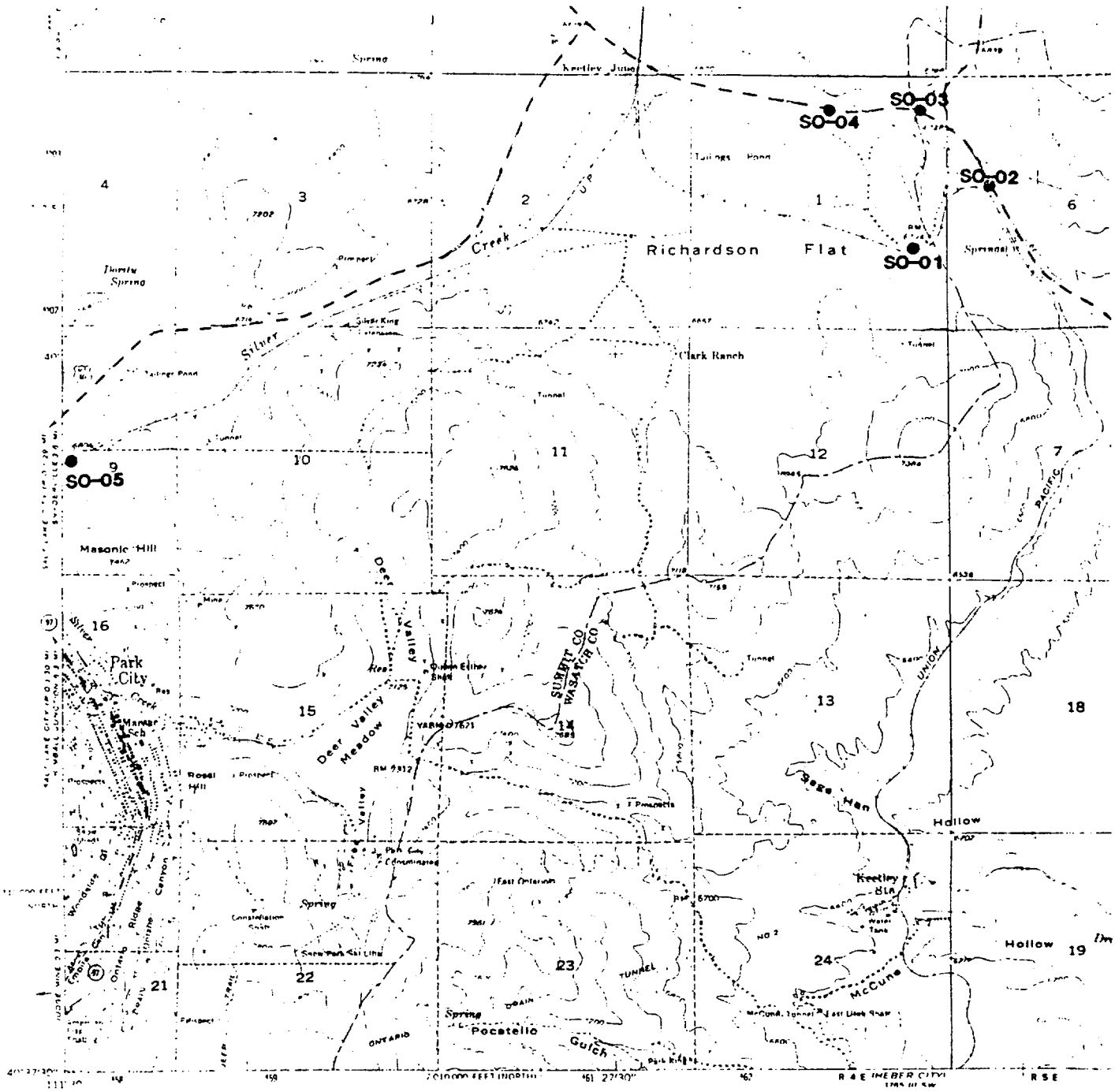
TITLE: **Richardson Flat**

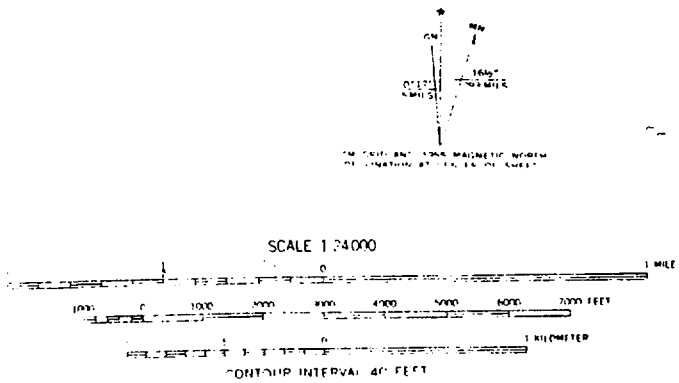
Air Sample Locations

T.D.D R8-8605-12

ecology and environment, inc.
DENVER, COLORADO

FIG.2





FIELD INVESTIGATIONS OF UNCONTROLLED HAZARDOUS WASTE SITES

TASK REPORT TO THE E.P.A.

TITLE: **Richardson Flat**

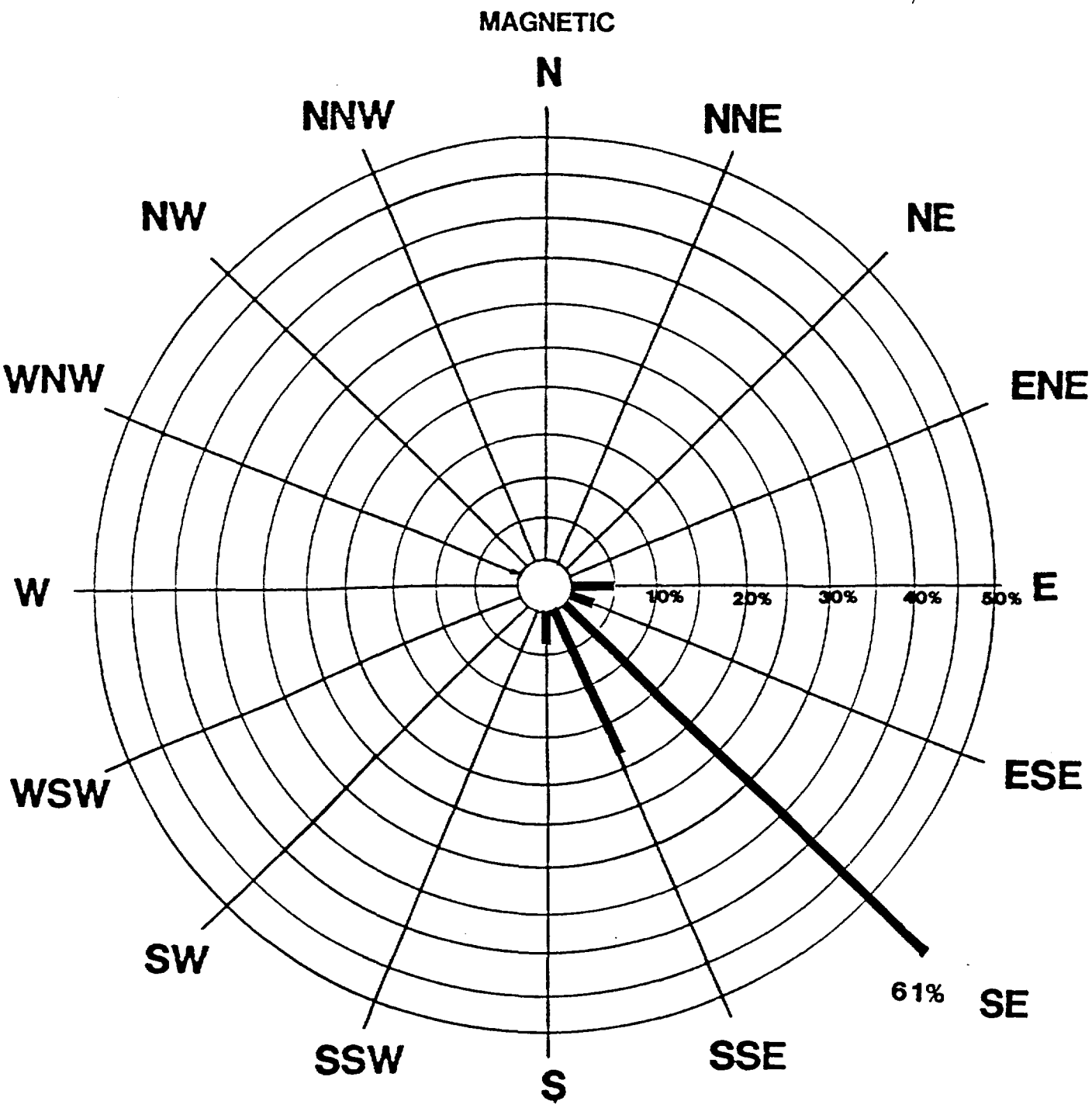
Soil Sample Locations

T.D.D R8-8605-12

ecology and environment, inc.
DENVER, COLORADO

FIG.3

Date _____ Drawn by _____ Scale _____



9.6 % CALM

FIELD INVESTIGATIONS OF UNCONTROLLED HAZARDOUS WASTE SITES
TASK REPORT TO THE E.P.A.

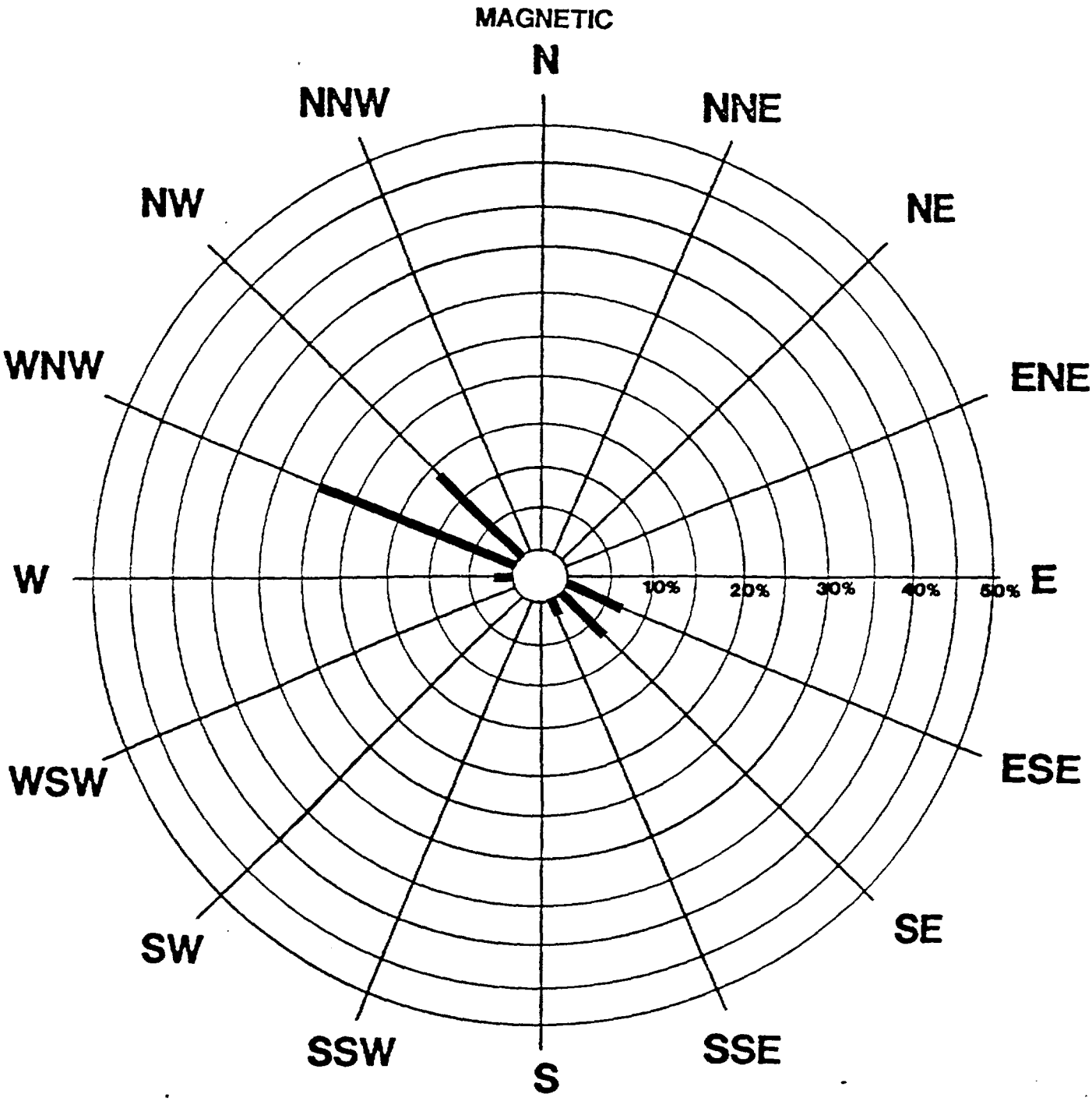
TITLE: Richardson Flats Wind Rose in % of Sample Time for DAY 1 1800 - 0700 Hours

July 8-9,1986

T.D.# R8-8605-12

ecology and environment, inc.
DENVER, COLORADO

FIG.4



37.5 % Calm

FIELD INVESTIGATIONS OF UNCONTROLLED HAZARDOUS WASTE SITES
TASK REPORT TO THE E.P.A.

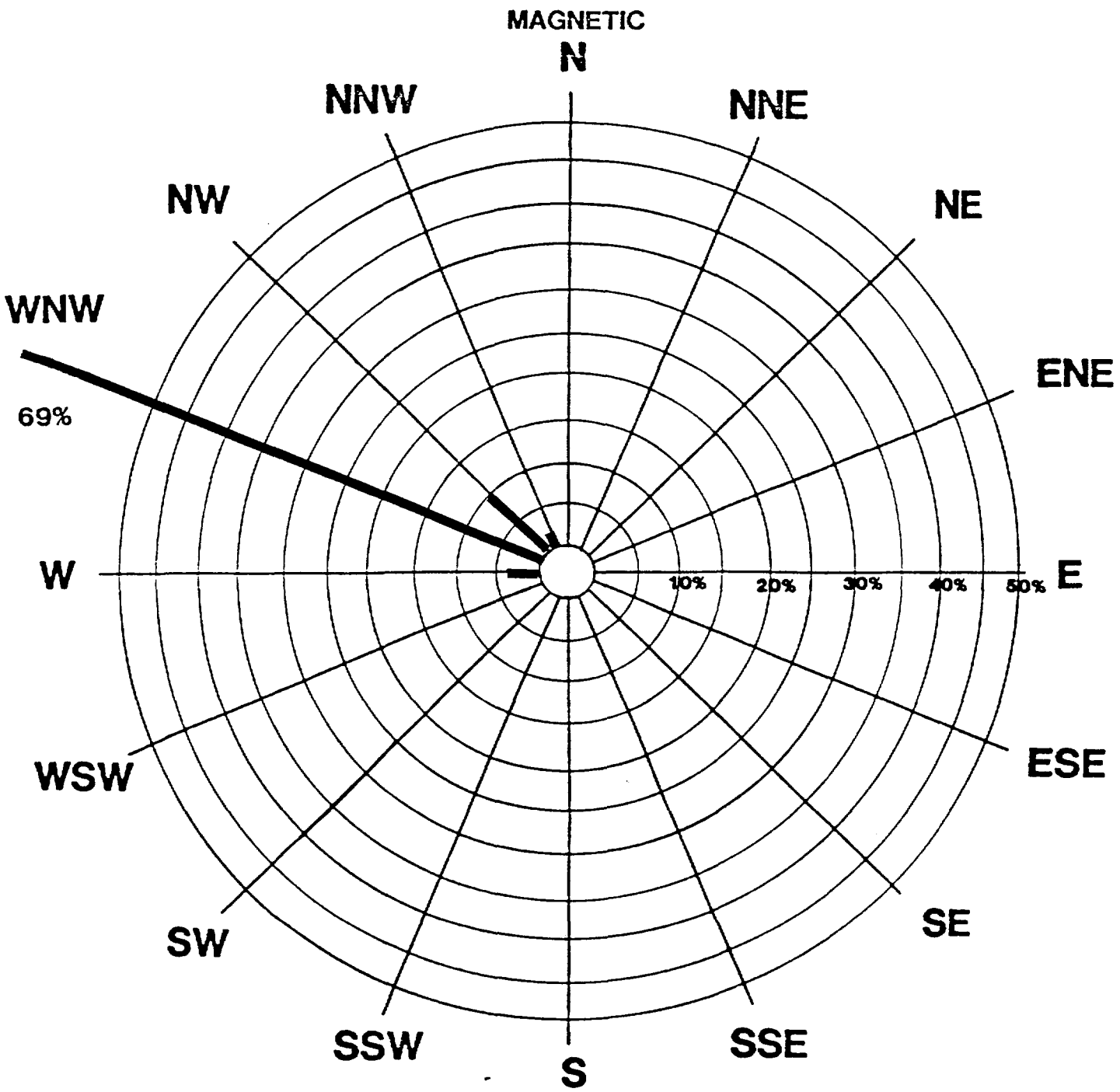
TITLE: Richardson Flats Wind Rose in % of Sample Time for DAY 2 1100 -0300 Hours

July 9-10,1986

T.D.# R8-8605-12

ecology and environment, inc.
DENVER, COLORADO

FIG.5



17.3 % CALM

FIELD INVESTIGATIONS OF UNCONTROLLED HAZARDOUS WASTE SITES
TASK REPORT TO THE E.P.A.

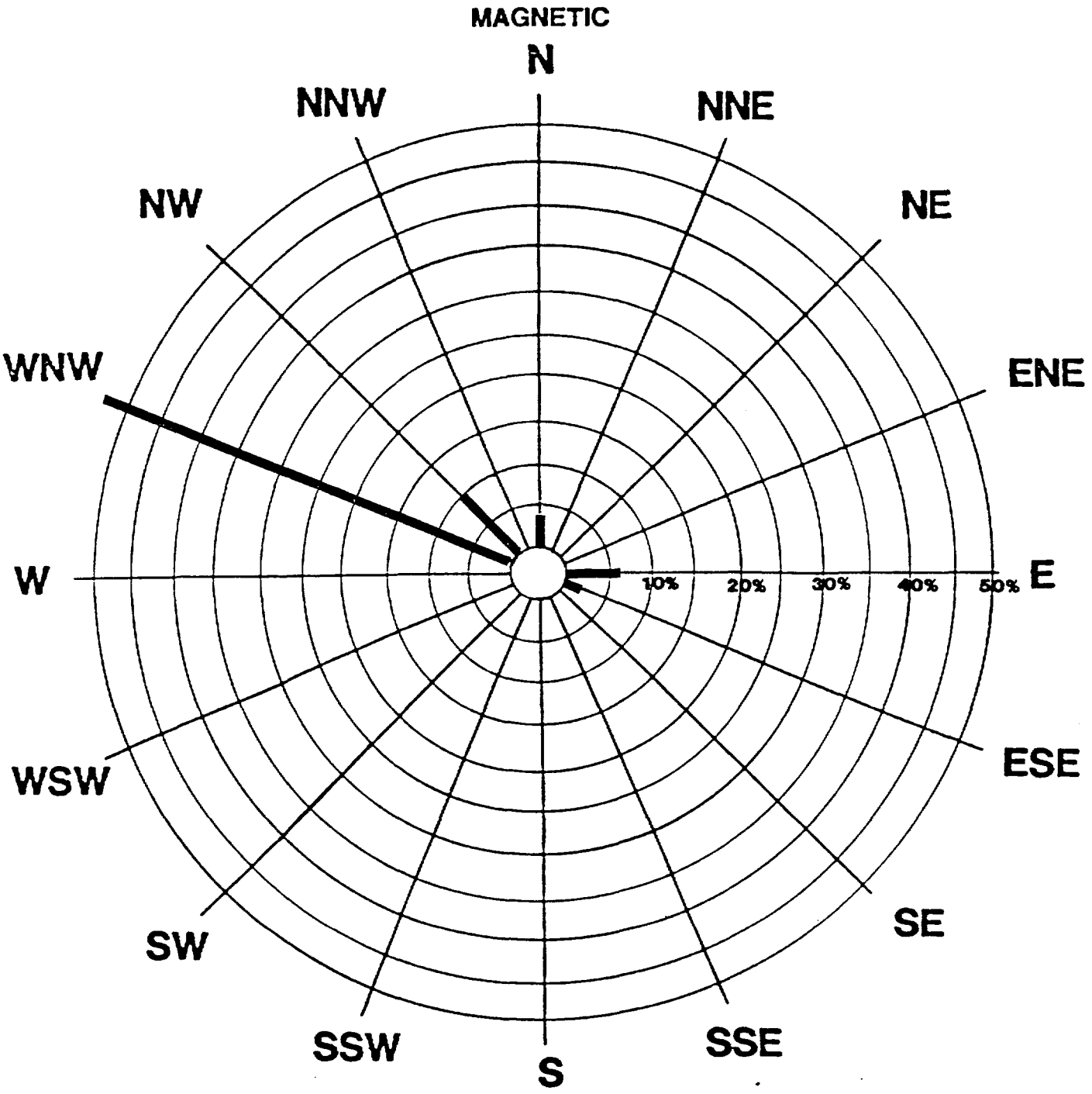
TITLE: Richardson Flats Wind Rose in % of Sample Time for DAY 3 1000-2300 Hours

July 10,1986

T.D.# R8-8605-12

ecology and environment, inc.
DENVER, COLORADO

FIG.6



21.1 % CALM

FIELD INVESTIGATIONS OF UNCONTROLLED HAZARDOUS WASTE SITES
TASK REPORT TO THE E.P.A.

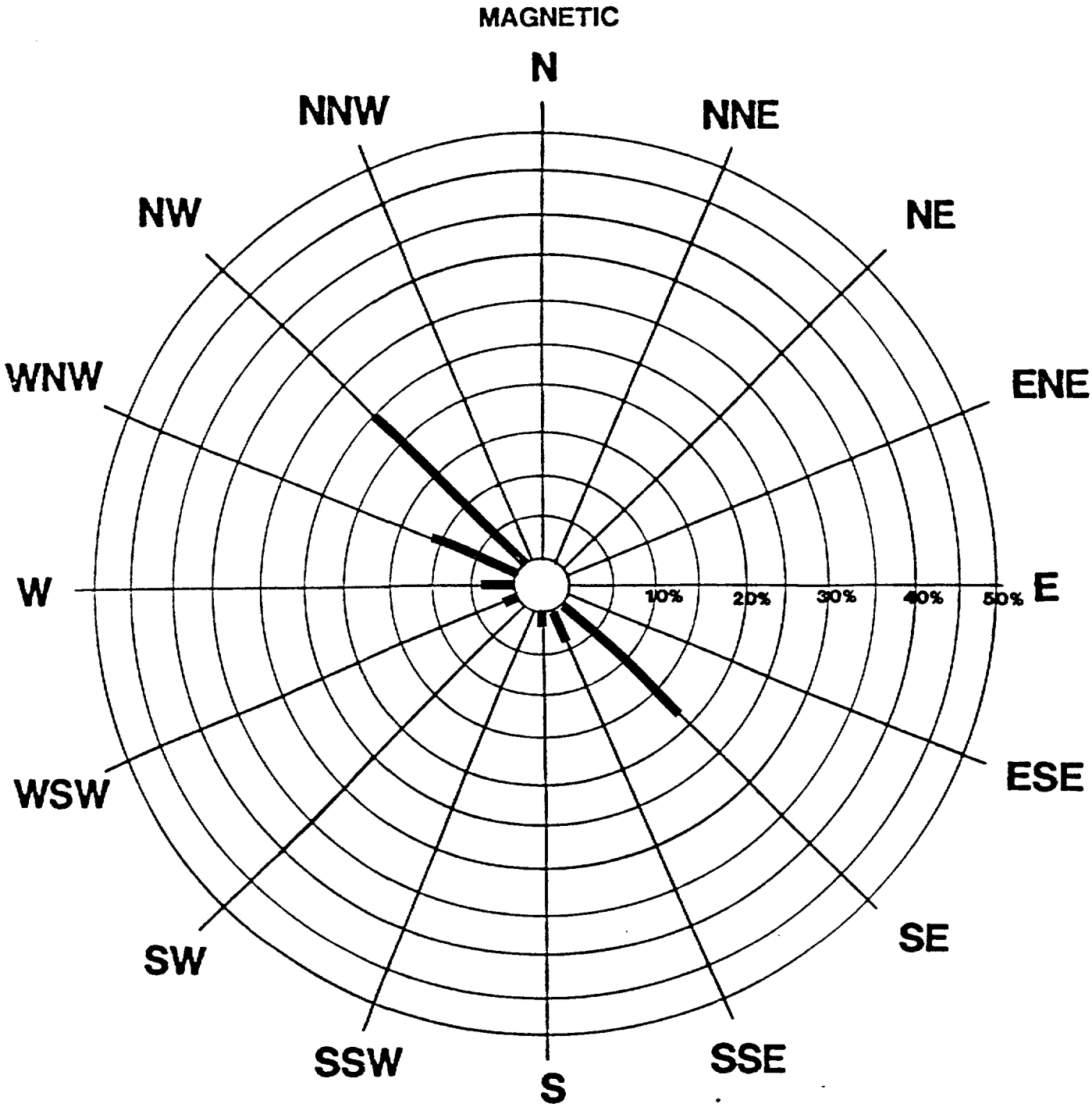
TITLE: Richardson Flats Wind Rose in % of Sample Time for DAY 4 1000-2300 Hours

July 11, 1986

T.D.# R8-8605-12

ecology and environment, inc.
DENVER, COLORADO

FIG. 7



21.4 % CALM

FIELD INVESTIGATIONS OF UNCONTROLLED HAZARDOUS WASTE SITES
TASK REPORT TO THE E.P.A.

TITLE: Richardson Flats Wind Rose in % of Sample Time for DAY 5 1000-2400 Hours July 12, 1986

T.D.# R8-8605-12

ecology and environment, inc.
DENVER, COLORADO

FIG.8

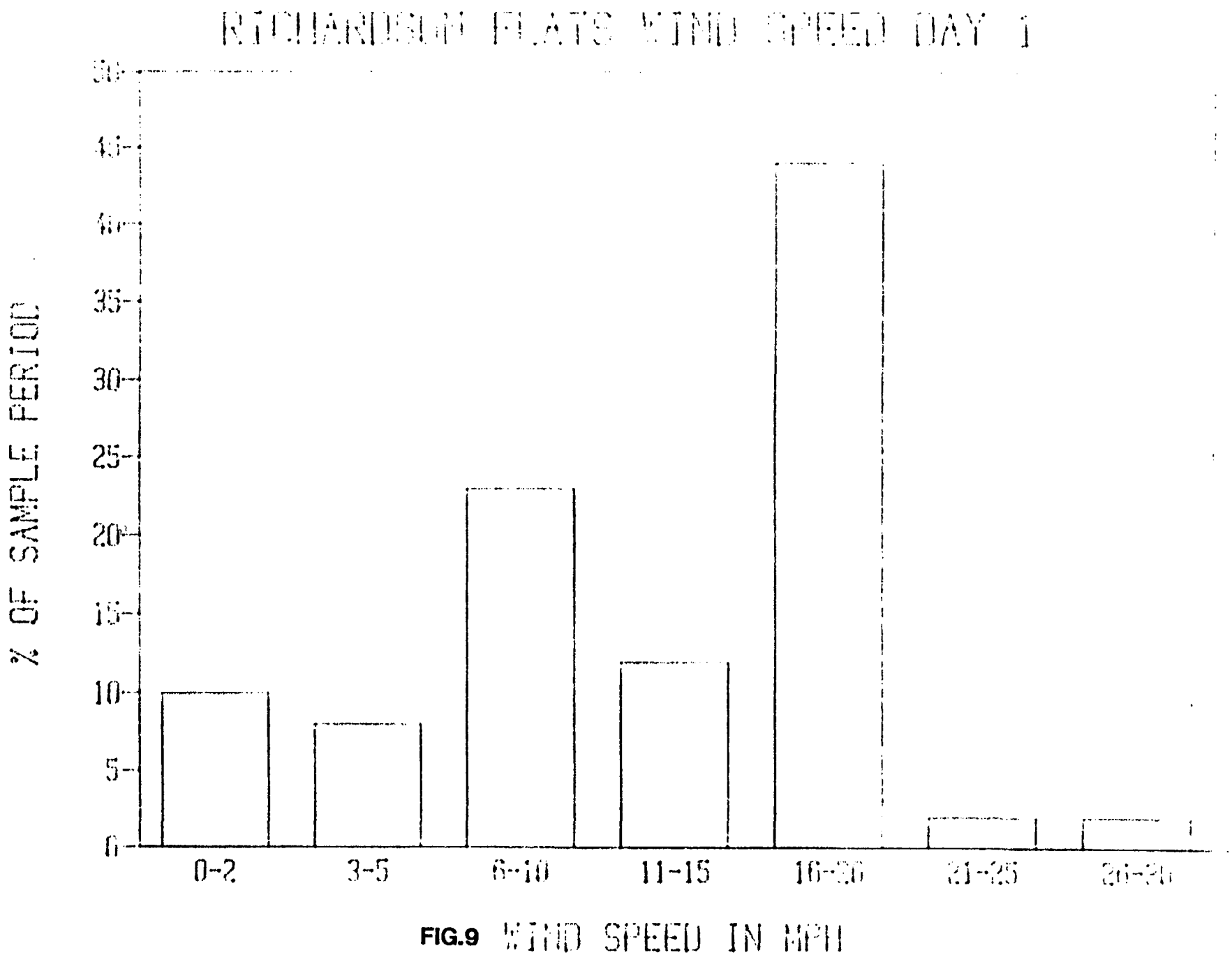

RICHARDSON FLATS WIND SPEED DAY 1
% OF SAMPLE PERIOD
50
45
40
35
30
25
20
15
10
5
0
0-2
3-5
6-10
11-15
16-20
21-25
26-30
WIND SPEED IN MPH

FIG.9

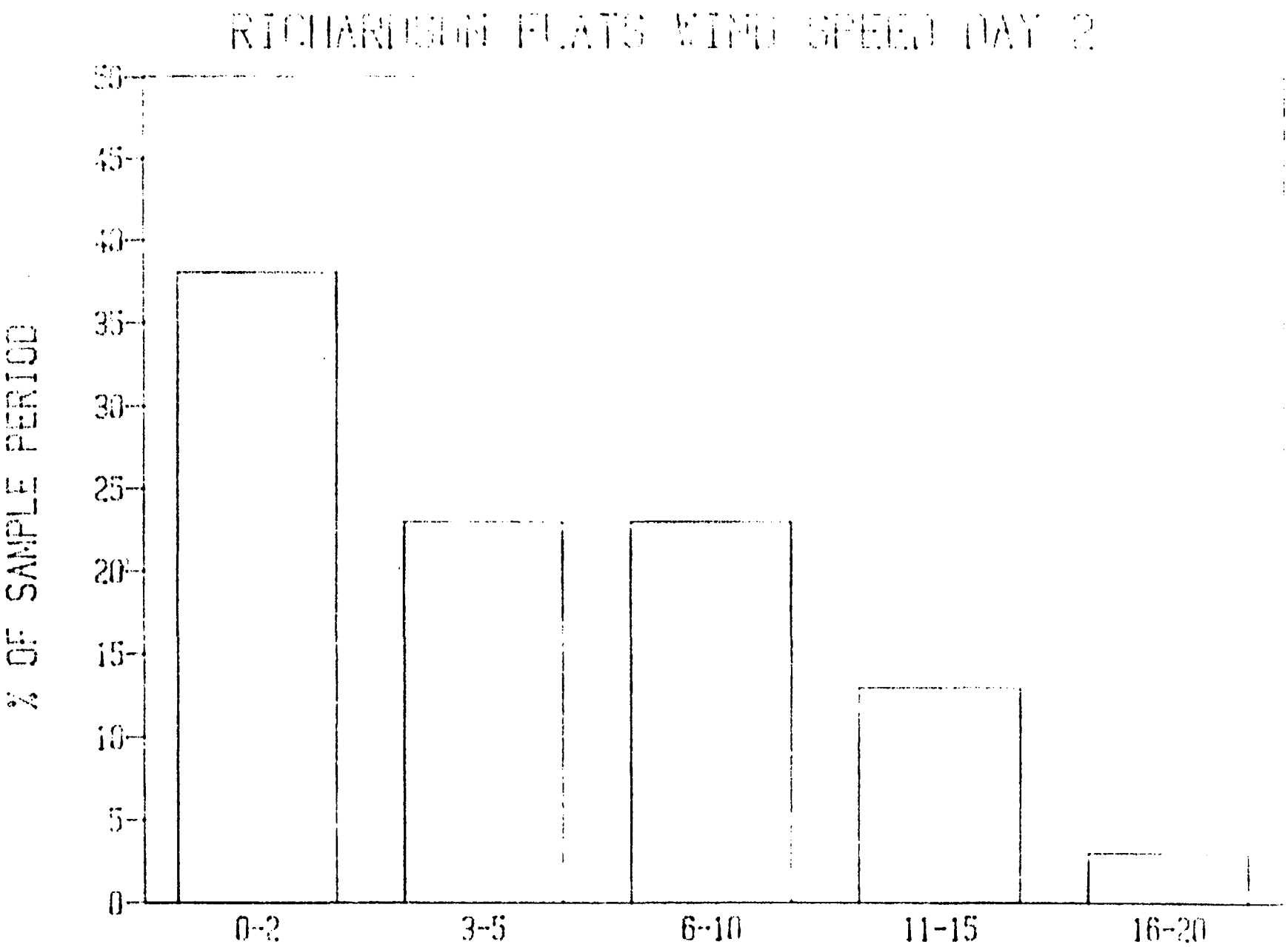


FIG.10 WIND SPEED IN MPH

Rev. 2

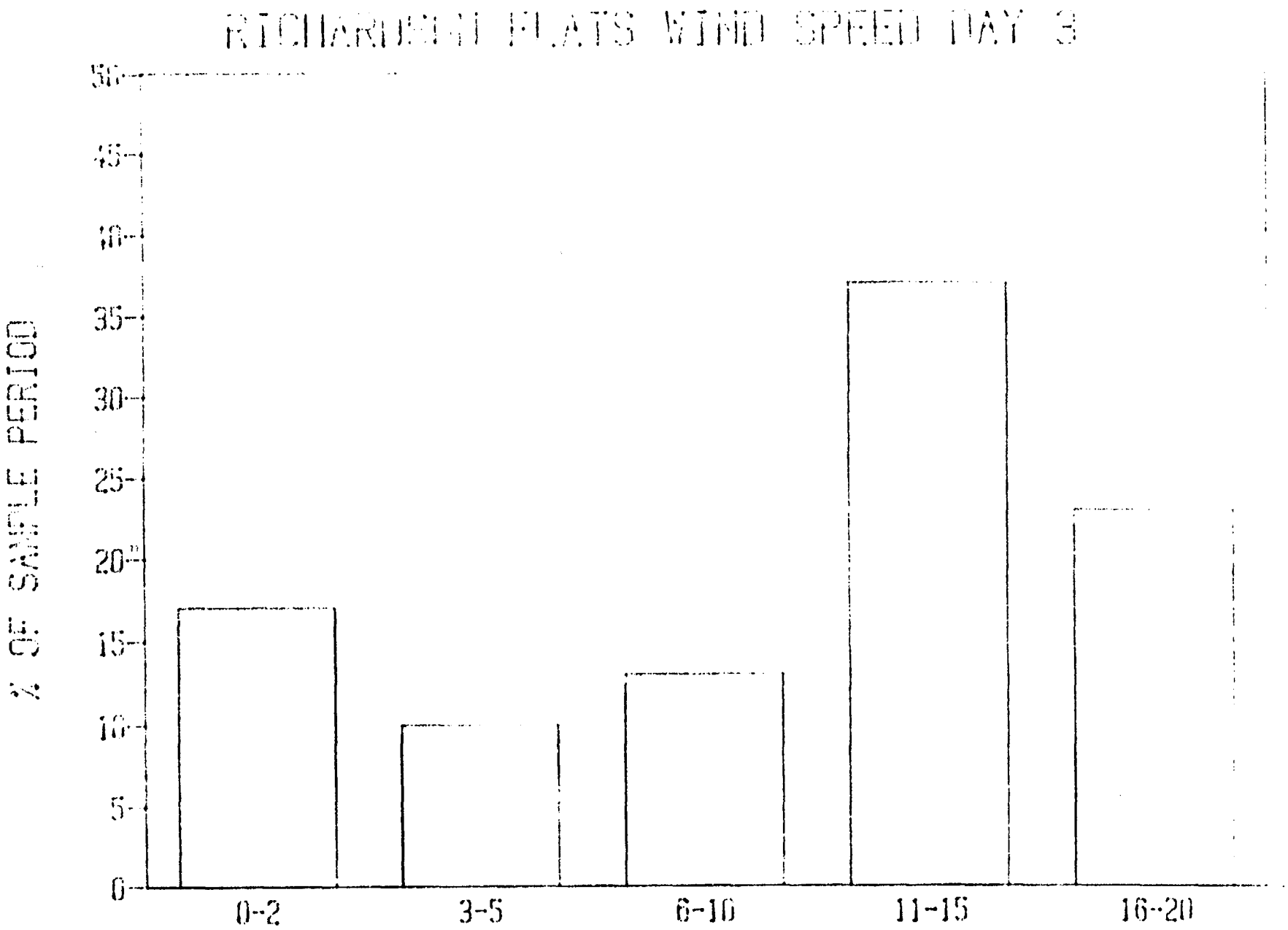


FIG.11 WIND SPEED IN MPH

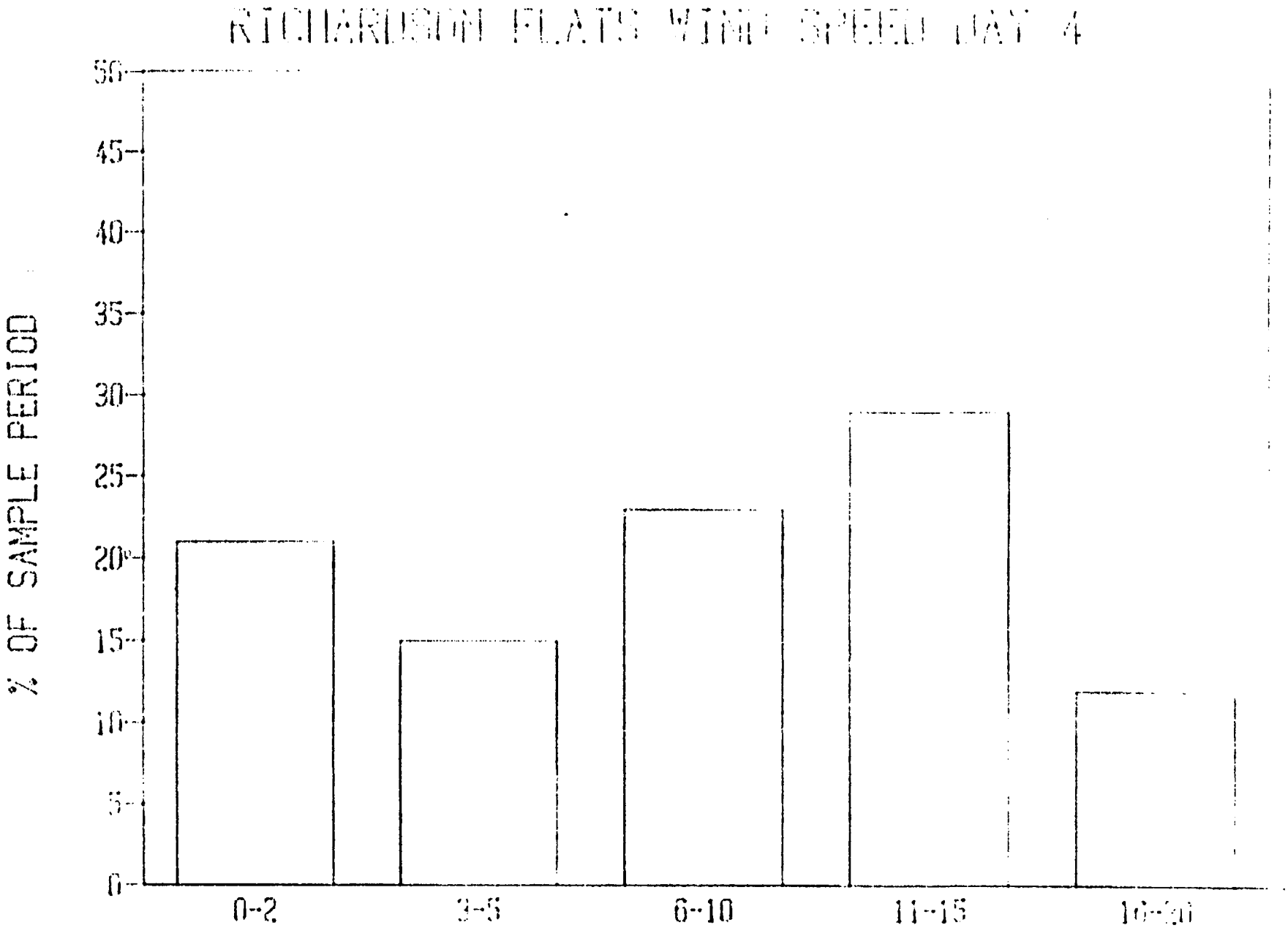


FIG. 12 WIND SPEED IN MPH

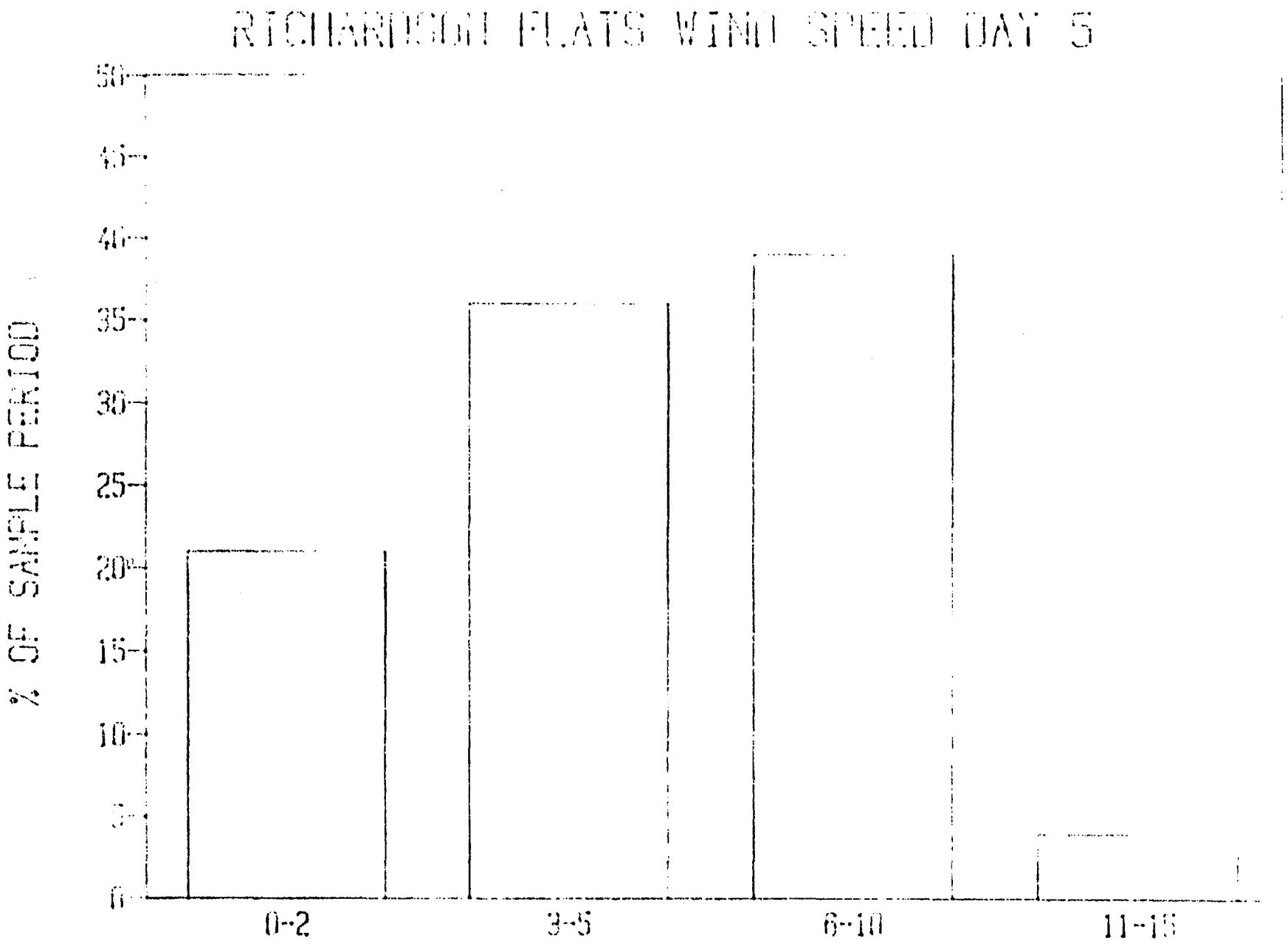


FIG.13 WIND SPEED IN MPH

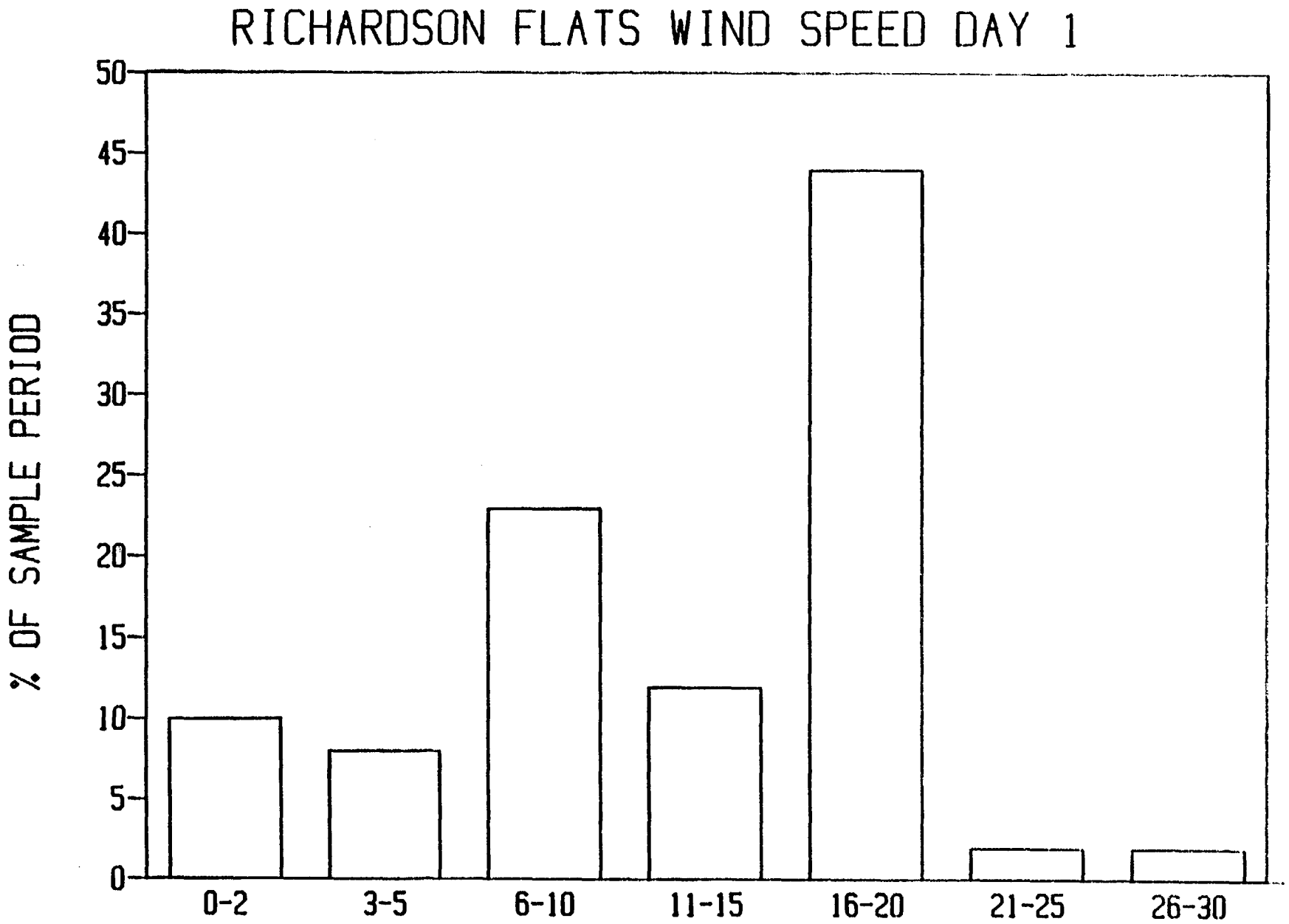


FIG.9 WIND SPEED IN MPH

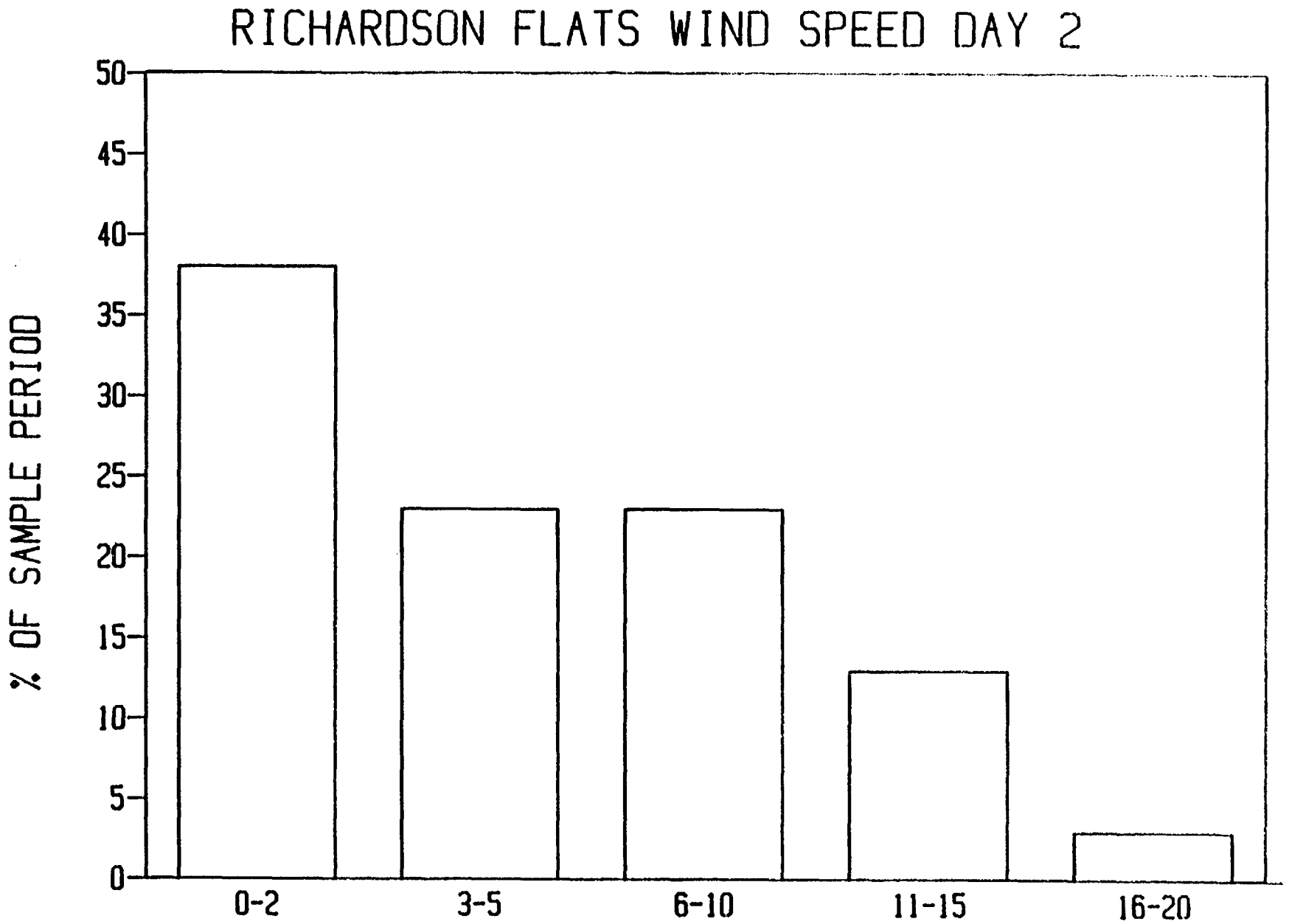

RICHARDSON FLATS WIND SPEED DAY 2
% OF SAMPLE PERIOD
50
45
40
35
30
25
20
15
10
5
0
0-2
3-5
6-10
11-15
16-20
WIND SPEED IN MPH

FIG. 10

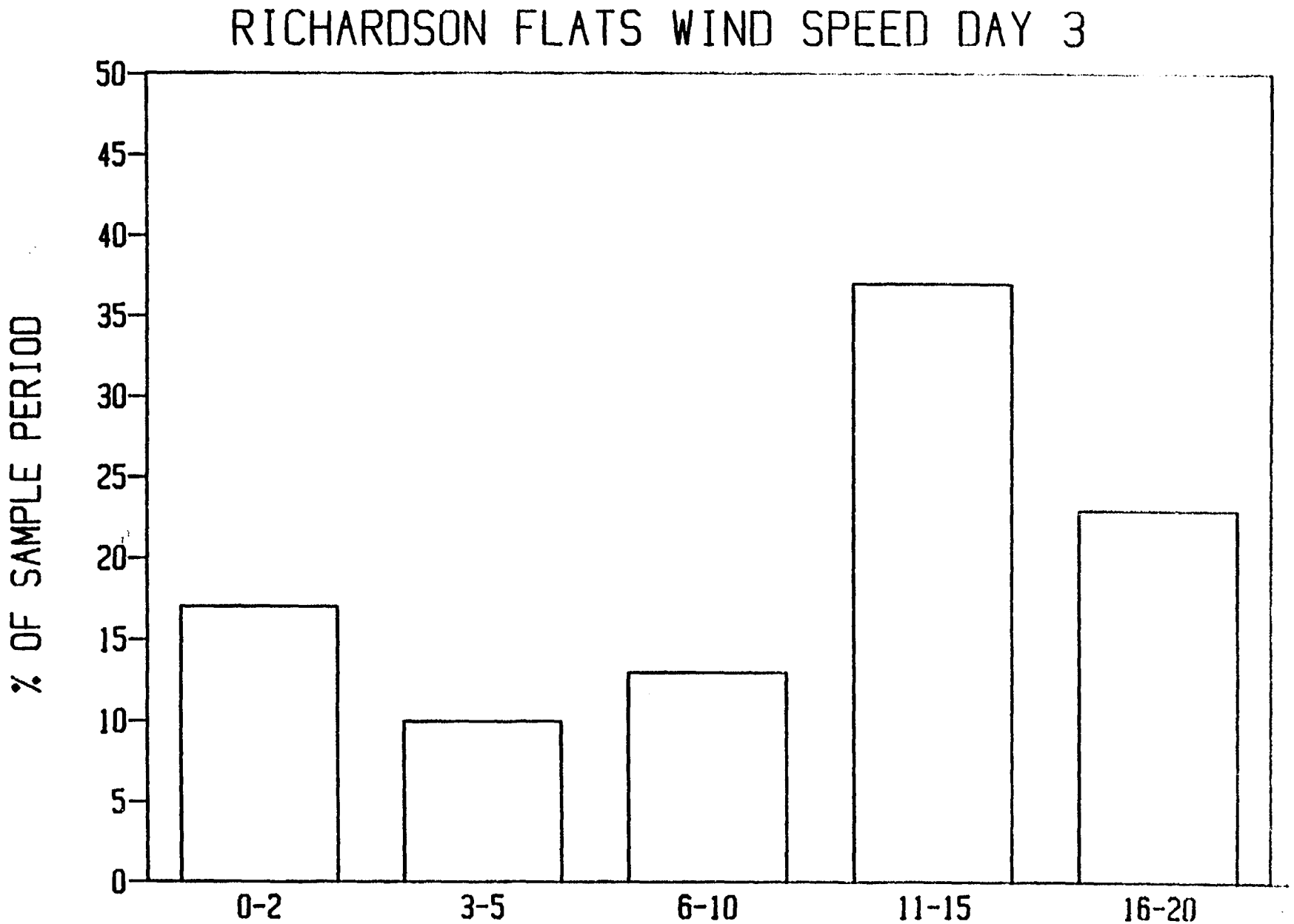


FIG. 11 WIND SPEED IN MPH

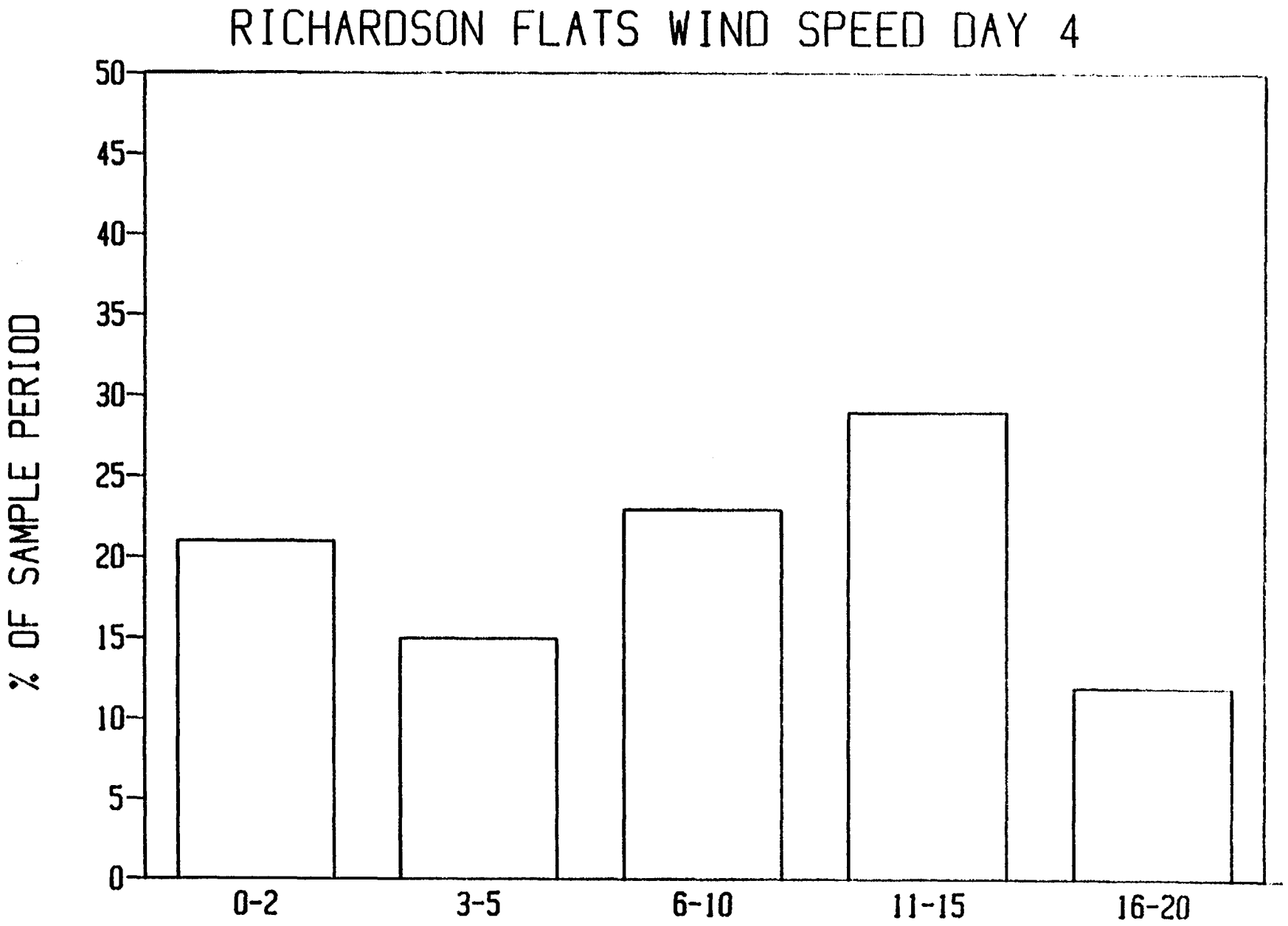


FIG.12 WIND SPEED IN MPH

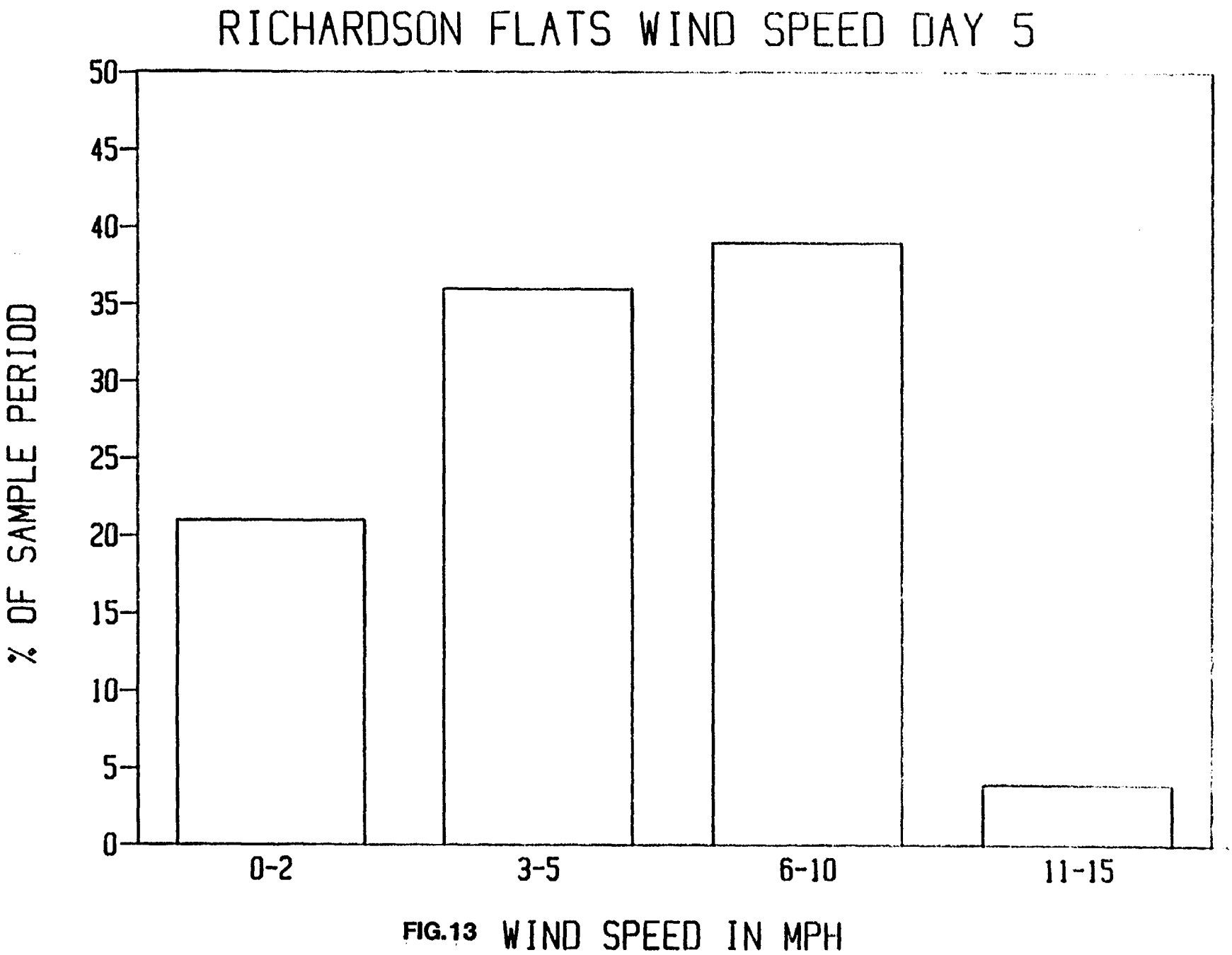

RICHARDSON FLATS WIND SPEED DAY 5
% OF SAMPLE PERIOD
50
45
40
35
30
25
20
15
10
5
0
0-2
3-5
6-10
11-15
WIND SPEED IN MPH

FIG.13

APPENDIX II

RAW RESULTS AND QA REPORT

~~Rep. 2~~

REGION VIII SUMMARY OF DATA QUALITY ASSURANCE REVIEW

Case No. SAS 23564 Project No. _____

Site Richardson Flats

Contractor Laboratory Hittman Ebasco Assoc.

Data Reviewer L Roberts Date of Review 9/3/86

Sample Matrix Cellulose Filters

Sample No. See Laboratory Cover Sheet.

( ) Data are acceptable for use

( ) Data are acceptable for use with qualification noted ~~above~~ below

(✓) Data are preliminary - pending action or verification

( ) Data are unacceptable

Action required by DPO?

No ____ Yes ✓ Following items require action Detection limits requested by region were not met by the laboratory. Lab should resubmit furnace results with RSD values.

Action required by Project Officer (PO)?

No ✓ Yes ____

Ref 2

Following are our findings:

Cellulose air filters were submitted for analysis of arsenic, cadmium, lead and zinc. This was a SAS request.

The spike recovery for cadmium was 65%. The cadmium results, therefore, have been flagged with an "R". The zinc Laboratory Control Sample recovery result was only 60%. The zinc results may be biased low and have been flagged as estimated (J).

Two aspects of the contract were not fulfilled by the laboratory. Detection limits of 1 ug/L were specified by the SAS contract. However, the actual instrument detection limits for As, Cd, Pb and Zn were from 3.8 - 4.8 ug/L. Also, the RSD results for duplicate furnace injections were not reported. The duplicate results appear to agree well, however.

Ref. 2

FORM A

Inorganic Data Completeness Checklist

✓ Inorganic analysis data sheets

✓ Initial calibration and calibration verification results

✓ Continuing calibration verification

✓ Instrument Detection limits

✓ Duplicate results

✓ Spike results

✓ ICP interference check sample

✓ Blank results

NR Serial Dilution Results

✓ Raw data for calibration standards

✓ Raw data for blanks

✓ Raw data for samples

✓ Raw data for duplicates

✓ Raw data for spikes

✓ Raw data for furnace AA

NR Percent solids calculation - soils only

✓ Traffic Reports

Rev 2

FORM B

Initial calibration data were reviewed. Initial calibration data were included in the package and met all contract requirements.

YES ✓ NO_____

Comments:

Continuing calibration data were reviewed and these data met all contract requirements.

YES ✓ NO_____

Comments:

A blank was run with every twenty samples or less per case.

YES ✓ NO_____

Comments:

two prep blanks were prepared

How many elements were detected above the required detection limit? 1

lead at 7 ug/L

How many elements were detected at greater than one half the amount detected in any sample? Ø

Comments:

Rej'd

FORM C

The interference check sample was run twice per eight hour shift. No massive interferences were present.

YES ✓ NO_____

Comments:

All matrix spike requirements were met.

YES ✓ NO_____

Comments:
Corrections made on form were difficult to read and not initialed. a clean filter was spiked, all recoveries were within 65-120%. Cadmium results are flagged due to a 65% spike recovery.

A duplicate sample was run with every twenty or fewer samples of a similar matrix, or one per case, whichever is more frequent.

YES ✓ NO_____

The RPD's were tabulated.

YES ✓ NO_____

Comments:

All inorganic detection limits met the contract requirements.

YES_____ NO ✓

Comments:
SAS request specified 1 ug/L detection limit for the four elements. The lab did not reach these limits.

Rep 2

FORM D

All Laboratory Control Samples met specified contract limits.

YES_____ NO ✓

Comments:

Zinc 60% Recovery – zinc results estimated.
LCS performed as required.

Serial Dilution requirements were met.

YES_____ NO_____

Not Required

The Furnace Atomic Absorption Analysis Scheme was followed correctly.

YES_____ NO ✓

RSD results are not reported. Duplicate injections appear to have good agreement. MSA were performed as required.

All holding times were met.

YES ✓ NO_____

Comments:

Ref. 2

U.S. EPA Contract Laboratory Program
Sample Management Office
P.O. Box 818 - Alexandria, VA 22313
703/557-2490 FTS: 8-557-2490

Date 8-14-86

COVER PAGE A
INORGANIC ANALYSES DATA PACKAGE

Lab Name HITTMAN ERASCO ASSOCIATES INC. Case No. SAS 2356H

SOW No. 7/84 Q.C. Report No. 53

Sample Numbers

EPA No.	Lab ID No.	EPA No.	Lab ID No.
AM-01-1	*	AM-01-3	*
AM-02-1		AM-02-3	
AM-04-1		AM-03-3	
AM-05-1		AM-04-3	
AM-01-2		AM-05-3	
AM-02-2		AM-01-4	
AM-03-2		AM-02-4	
AM-04-2		AM-03-4	
AM-05-2		AM-04-4	

Comments: * - same as EPA number
Zn was analyzed by ICP, Region 8 and SMO approved this method change 8-13-86.

ICP Interelement and background corrections applied? Yes X No ___.

If yes, corrections applied before X or after ___ generation of raw data.

Footnotes:

NR - not required by contract at this time

Form I:

Value - If the result is a value greater than or equal to the instrument detection limit but less than the contract required detection limit, report the value in brackets (i.e., [10]). Indicate the analytical method used with P (for ICP/Flame AA) or F (for furnace).

U - Indicates element was analyzed for but not detected. Report with the detection limit value (e.g., 10U).

E - Indicates a value estimated or not reported due to the presence of interference. Explanatory note included on cover page.

S - Indicates value determined by Method of Standard Addition.

R - Indicates spike sample recovery is not within control limits.

* - Indicates duplicate analysis is not within control limits.

+ - Indicates the correlation coefficient for method of standard addition is less than 0.995

U.S. EPA Contract Laboratory Program
Sample Management Office
P.O. Box 818 - Alexandria, VA 22313
703/557-2490 FTS: 8-557-2490

Rev. 7

Date 8-14-86

COVER PAGE B
INORGANIC ANALYSES DATA PACKAGE

Lab Name HITTMAN ERASCO ASSOCIATES INC. Case No. SAS 2356H

SOW No. 7/84 Q.C. Report No. 53

Sample Numbers

EPA No.	Lab ID No.	EPA No.	Lab ID No.
AM-05-4	☆	AM-06-4	☆
AM-01-5		AM-06-5	1
AM-02-5			
AM-03-5			
AM-04-5			
AM-05-5			
AM-03-1			
AM-06-2			
AM-06-3			

Comments: ☆ - same as EPA number

ICP Interelement and background corrections applied? Yes X No ___.

If yes, corrections applied before X or after ___ generation of raw data.

Footnotes:

NR - not required by contract at this time

Form I:

Value - If the result is a value greater than or equal to the instrument detection limit but less than the contract required detection limit, report the value in brackets (i.e., [10]). Indicate the analytical method used with P (for ICP/Flame AA) or F (for furnace).

U - Indicates element was analyzed for but not detected. Report with the detection limit value (e.g., 10U).

E - Indicates a value estimated or not reported due to the presence of interference. Explanatory note included on cover page.

S - Indicates value determined by Method of Standard Addition.

R - Indicates spike sample recovery is not within control limits.

* - Indicates duplicate analysis is not within control limits.

+ - Indicates the correlation coefficient for method of standard addition is less than 0.995

Form I

U.S. EPA Contract Laboratory Program
Sample Management Office
P.O. Box 818 - Alexandria, VA 22313
703/557-2490 FTS: 8-557-2490

EPA Sample No. AM-01-1

Date 8-14-86

INORGANIC ANALYSIS DATA SHEET

LAB NAME Hittman Ebasco Assoc., Inc. CASE NO. SAS 2356H

SOW NO. 7/84

LAB SAMPLE ID. NO. NA QC REPORT NO. 53

Elements Identified and Measured

Concentration: Low X Medium ____

Matrix: Water ____ Soil ____ Sludge ____ Other X

ug/filter ug/L or mg/kg dry weight (Circle One)

1. Aluminum		13. Magnesium	
2. Antimony		14. Manganese	
3. Arsenic	1.0UF	15. Mercury	
4. Barium		16. Nickel	
5. Beryllium		17. Potassium	
6. Cadmium	.50UFR	18. Selenium	
7. Calcium		19. Silver	
8. Chromium		20. Sodium	
9. Cobalt		21. Thallium	
10. Copper		22. Tin	
11. Iron		23. Vanadium	
12. Lead	3.4F	24. Zinc	17P J

Cyanide ____ Percent Solids (%) ____

Footnotes: For reporting results to EPA, standard result qualifiers are used as defined on Cover Page. Additional flags or footnotes explaining results are encouraged. Definition of such flags must be explicit and contained on Cover Page, however.

Comments: ____

Lab Manager Gail Solomon/mc

Rev 2

Form I

U.S. EPA Contract Laboratory Program
Sample Management Office
P.O. Box 818 - Alexandria, VA 22313
703/557-2490 FTS: 8-557-2490

EPA Sample No. AM-01-2

Date 8-14-86

INORGANIC ANALYSIS DATA SHEET

LAB NAME Hittman Ebasco Assoc., Inc. CASE NO. SAS 2356H

SOW NO. 7/84

LAB SAMPLE ID. NO. NA QC REPORT NO. 53

Elements Identified and Measured

Concentration: Low X Medium ____

Matrix: Water ____ Soil ____ Sludge ____ Other X

ug/filter ug/L or mg/kg dry weight (Circle One)

1. Aluminum		13. Magnesium	
2. Antimony		14. Manganese	
3. Arsenic	1.0UF	15. Mercury	
4. Barium		16. Nickel	
5. Beryllium		17. Potassium	
6. Cadmium	0.5UFR	18. Selenium	
7. Calcium		19. Silver	
8. Chromium		20. Sodium	
9. Cobalt		21. Thallium	
10. Copper		22. Tin	
11. Iron		23. Vanadium	
12. Lead	8.9F	24. Zinc	21P J

Cyanide ____ Percent Solids (%) ____

Footnotes: For reporting results to EPA, standard result qualifiers are used as defined on Cover Page. Additional flags or footnotes explaining results are encouraged. Definition of such flags must be explicit and contained on Cover Page, however.

Comments: ____

Lab Manager Gail Solomon/DWK

Rej-R

Form I

U.S. EPA Contract Laboratory Program
Sample Management Office
P.O. Box 818 - Alexandria, VA 22313
703/557-2490 FTS: 8-557-2490

EPA Sample No. AM-01-3

Date 8-14-86

INORGANIC ANALYSIS DATA SHEET

LAB NAME Hittman Ebasco Assoc., Inc. CASE NO. SAS 2356H

SOW NO. 7/84

LAB SAMPLE ID. NO. NA QC REPORT NO. 53

Elements Identified and Measured

Concentration: Low X Medium ____

Matrix: Water ____ Soil ____ Sludge ____ Other X

ug/filter ug/L or mg/kg dry weight (Circle One)

1. Aluminum		13. Magnesium	
2. Antimony		14. Manganese	
3. Arsenic	1.0UF	15. Mercury	
4. Barium		16. Nickel	
5. Beryllium		17. Potassium	
6. Cadmium	0.5UFR	18. Selenium	
7. Calcium		19. Silver	
8. Chromium		20. Sodium	
9. Cobalt		21. Thallium	
10. Copper		22. Tin	
11. Iron		23. Vanadium	
12. Lead	12FS	24. Zinc	23P J
Cyanide		Percent Solids (%)	

Footnotes: For reporting results to EPA, standard result qualifiers are used as defined on Cover Page. Additional flags or footnotes explaining results are encouraged. Definition of such flags must be explicit and contained on Cover Page, however.

Comments:

Lab Manager Gail Solomon/pwk

Rep. 2

Form I

U.S. EPA Contract Laboratory Program
Sample Management Office
P.O. Box 818 - Alexandria, VA 22313
703/557-2490 FTS: 8-557-2490

EPA Sample No. AM-01-4

Date 8-14-86

INORGANIC ANALYSIS DATA SHEET

LAB NAME Hittman Ebasco Assoc., Inc. CASE NO. SAS 2356H

SOW NO. 7/84

LAB SAMPLE ID. NO. NA QC REPORT NO. 53

Elements Identified and Measured

Concentration: Low X Medium ____

Matrix: Water ____ Soil ____ Sludge ____ Other X

ug/filter ug/L or mg/kg dry weight (Circle One)

1. Aluminum		13. Magnesium	
2. Antimony		14. Manganese	
3. Arsenic	1.0UF	15. Mercury	
4. Barium		16. Nickel	
5. Beryllium		17. Potassium	
6. Cadmium	0.5UFR	18. Selenium	
7. Calcium		19. Silver	
8. Chromium		20. Sodium	
9. Cobalt		21. Thallium	
10. Copper		22. Tin	
11. Iron		23. Vanadium	
12. Lead	29FS	24. Zinc	43P J
Cyanide		Percent Solids (%)	

Footnotes: For reporting results to EPA, standard result qualifiers are used as defined on Cover Page. Additional flags or footnotes explaining results are encouraged. Definition of such flags must be explicit and contained on Cover Page, however.

Comments:

Lab Manager Gail Solomon/DMK

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Form I

U.S. EPA Contract Laboratory Program
Sample Management Office
P.O. Box 818 - Alexandria, VA 22313
703/557-2490 FTS: 8-557-2490

EPA Sample No. AM-01-5

Date 8-14-86

INORGANIC ANALYSIS DATA SHEET

LAB NAME Hittman Ebasco Assoc., Inc. CASE NO. SAS 2356H

SOW NO. 7/84

LAB SAMPLE ID. NO. NA QC REPORT NO. 53

Elements Identified and Measured

Concentration: Low X Medium ____

Matrix: Water ____ Soil ____ Sludge ____ Other X

ug/filter ug/L or mg/kg dry weight (Circle One)

1. Aluminum		13. Magnesium	
2. Antimony		14. Manganese	
3. Arsenic	1.0UF	15. Mercury	
4. Barium		16. Nickel	
5. Beryllium		17. Potassium	
6. Cadmium	0.5UFR	18. Selenium	
7. Calcium		19. Silver	
8. Chromium		20. Sodium	
9. Cobalt		21. Thallium	
10. Copper		22. Tin	
11. Iron		23. Vanadium	
12. Lead	8.0FS	24. Zinc	22P J

Cyanide ____ Percent Solids (%) ____

Footnotes: For reporting results to EPA, standard result qualifiers are used as defined on Cover Page. Additional flags or footnotes explaining results are encouraged. Definition of such flags must be explicit and contained on Cover Page, however.

Comments: ____

Lab Manager Gail Solomon

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Form I

U.S. EPA Contract Laboratory Program
Sample Management Office
P.O. Box 818 - Alexandria, VA 22313
703/557-2490 FTS: 8-557-2490

EPA Sample No. AM-02-1

Date 8-14-86

INORGANIC ANALYSIS DATA SHEET

LAB NAME Hittman Ebasco Assoc., Inc. CASE NO. SAS 2356H

SOW NO. 7/84

LAB SAMPLE ID. NO. NA QC REPORT NO. 53

Elements Identified and Measured

Concentration: Low X Medium ____

Matrix: Water ____ Soil ____ Sludge ____ Other X

ug/filter ug/L or mg/kg dry weight (Circle One)

1. Aluminum		13. Magnesium	
2. Antimony		14. Manganese	
3. Arsenic	1.0UF	15. Mercury	
4. Barium		16. Nickel	
5. Beryllium		17. Potassium	
6. Cadmium	0.5UFS	18. Selenium	
7. Calcium		19. Silver	
8. Chromium		20. Sodium	
9. Cobalt		21. Thallium	
10. Copper		22. Tin	
11. Iron		23. Vanadium	
12. Lead	8.3FS	24. Zinc	15P J
Cyanide		Percent Solids (%)	

Footnotes: For reporting results to EPA, standard result qualifiers are used as defined on Cover Page. Additional flags or footnotes explaining results are encouraged. Definition of such flags must be explicit and contained on Cover Page, however.

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Lab Manager Gail Solomon

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U.S. EPA Contract Laboratory Program
Sample Management Office
P.O. Box 818 - Alexandria, VA 22313
703/557-2490 FTS: 8-557-2490

EPA Sample No. AM-02-2

Date 8-14-86

INORGANIC ANALYSIS DATA SHEET

LAB NAME Hittman Ebasco Assoc., Inc. CASE NO. SAS 2356H

SOW NO. 7/84

LAB SAMPLE ID. NO. NA QC REPORT NO. 53

Elements Identified and Measured

Concentration: Low X Medium ____

Matrix: Water ____ Soil ____ Sludge ____ Other X

ug/filter ug/L or mg/kg dry weight (Circle One)

1. Aluminum		13. Magnesium	
2. Antimony		14. Manganese	
3. Arsenic	6.8FS	15. Mercury	
4. Barium		16. Nickel	
5. Beryllium		17. Potassium	
6. Cadmium	0.5UFR	18. Selenium	
7. Calcium		19. Silver	
8. Chromium		20. Sodium	
9. Cobalt		21. Thallium	
10. Copper		22. Tin	
11. Iron		23. Vanadium	
12. Lead	147FS	24. Zinc	88P J
Cyanide		Percent Solids (%)	

Footnotes: For reporting results to EPA, standard result qualifiers are used as defined on Cover Page. Additional flags or footnotes explaining results are encouraged. Definition of such flags must be explicit and contained on Cover Page, however.

Comments:

Lab Manager Gail Solomon/[illegible]

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U.S. EPA Contract Laboratory Program
Sample Management Office
P.O. Box 818 - Alexandria, VA 22313
703/557-2490 FTS: 8-557-2490

EPA Sample No. AM-02-3

Date 8-14-86

INORGANIC ANALYSIS DATA SHEET

LAB NAME Hittman Ebasco Assoc., Inc. CASE NO. SAS 2356H

SDW NO. 7/84

LAB SAMPLE ID. NO. NA QC REPORT NO. 53

Elements Identified and Measured

Concentration: Low X Medium ____

Matrix: Water ____ Soil ____ Sludge ____ Other X

ug/filter ug/L or mg/kg dry weight (Circle One)

1. Aluminum		13. Magnesium	
2. Antimony		14. Manganese	
3. Arsenic	13FS	15. Mercury	
4. Barium		16. Nickel	
5. Beryllium		17. Potassium	
6. Cadmium	0.8FR	18. Selenium	
7. Calcium		19. Silver	
8. Chromium		20. Sodium	
9. Cobalt		21. Thallium	
10. Copper		22. Tin	
11. Iron		23. Vanadium	
12. Lead	264FS	24. Zinc	169PJ

Cyanide ____ Percent Solids (%) ____

Footnotes: For reporting results to EPA, standard result qualifiers are used as defined on Cover Page. Additional flags or footnotes explaining results are encouraged. Definition of such flags must be explicit and contained on Cover Page, however.

Comments: ____

Lab Manager Gail Solomon/mk

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Form I

U.S. EPA Contract Laboratory Program
Sample Management Office
P.O. Box 818 - Alexandria, VA 22313
703/557-2490 FTS: 8-557-2490

EPA Sample No. AM-02-4

Date 8-14-86

INORGANIC ANALYSIS DATA SHEET

LAB NAME Hittman Ebasco Assoc., Inc. CASE NO. SAS 2356H

SOW NO. 7/84

LAB SAMPLE ID. NO. NA QC REPORT NO. 53

Elements Identified and Measured

Concentration: Low X Medium ____

Matrix: Water ____ Soil ____ Sludge ____ Other X

ug/filter ug/L or mg/kg dry weight (Circle One)

1. Aluminum		13. Magnesium	
2. Antimony		14. Manganese	
3. Arsenic	6.6FS	15. Mercury	
4. Barium		16. Nickel	
5. Beryllium		17. Potassium	
6. Cadmium	0.54FR	18. Selenium	
7. Calcium		19. Silver	
8. Chromium		20. Sodium	
9. Cobalt		21. Thallium	
10. Copper		22. Tin	
11. Iron		23. Vanadium	
12. Lead	131F	24. Zinc	98P S
Cyanide		Percent Solids (%)	

Footnotes: For reporting results to EPA, standard result qualifiers are used as defined on Cover Page. Additional flags or footnotes explaining results are encouraged. Definition of such flags must be explicit and contained on Cover Page, however.

Comments:

Lab Manager Gail Solomon/SMIC

Rc/R

Form I

U.S. EPA Contract Laboratory Program
Sample Management Office
P.O. Box 818 - Alexandria, VA 22313
703/557-2490 FTS: 8-557-2490

EPA Sample No. AM-02-5

Date 8-14-86

INORGANIC ANALYSIS DATA SHEET

LAB NAME Hittman Ebasco Assoc., Inc. CASE NO. SAS 2356H

SOW NO. 7/84

LAB SAMPLE ID. NO. NA QC REPORT NO. 53

Elements Identified and Measured

Concentration: Low X Medium ____

Matrix: Water ____ Soil ____ Sludge ____ Other X

ug/filter ug/L or mg/kg dry weight (Circle One)

1. Aluminum		13. Magnesium	
2. Antimony		14. Manganese	
3. Arsenic	1.8FS	15. Mercury	
4. Barium		16. Nickel	
5. Beryllium		17. Potassium	
6. Cadmium	0.5UFR	18. Selenium	
7. Calcium		19. Silver	
8. Chromium		20. Sodium	
9. Cobalt		21. Thallium	
10. Copper		22. Tin	
11. Iron		23. Vanadium	
12. Lead	48FS	24. Zinc	51PJ

Cyanide ____ Percent Solids (%) ____

Footnotes: For reporting results to EPA, standard result qualifiers are used as defined on Cover Page. Additional flags or footnotes explaining results are encouraged. Definition of such flags must be explicit and contained on Cover Page, however.

Comments: ____

Lab Manager Gail Solomon/DMK

Ref. 2

Form I

U.S. EPA Contract Laboratory Program
Sample Management Office
P.O. Box 818 - Alexandria, VA 22313
703/557-2490 FTS: 8-557-2490

EPA Sample No. AM-03-1

Date 8-14-86

INORGANIC ANALYSIS DATA SHEET

LAB NAME Hittman Ebasco Assoc., Inc. CASE NO. SAS 2356H

SDW NO. 7/84

LAB SAMPLE ID. NO. NA QC REPORT NO. 53

Elements Identified and Measured

Concentration: Low X Medium ____

Matrix: Water ____ Soil ____ Sludge ____ Other X

ug/filter ug/L or mg/kg dry weight (Circle One)

1. Aluminum		13. Magnesium	
2. Antimony		14. Manganese	
3. Arsenic	1.0UF	15. Mercury	
4. Barium		16. Nickel	
5. Beryllium		17. Potassium	
6. Cadmium	0.5UFR	18. Selenium	
7. Calcium		19. Silver	
8. Chromium		20. Sodium	
9. Cobalt		21. Thallium	
10. Copper		22. Tin	
11. Iron		23. Vanadium	
12. Lead	0.5UFR KH	24. Zinc	0.4UP S
Cyanide		Percent Solids (%)	

Footnotes: For reporting results to EPA, standard result qualifiers are used as defined on Cover Page. Additional flags or footnotes explaining results are encouraged. Definition of such flags must be explicit and contained on Cover Page, however.

Comments:

Lab Manager Gail Solomon/DMK

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U.S. EPA Contract Laboratory Program
Sample Management Office
P.O. Box 818 - Alexandria, VA 22313
703/557-2490 FTS: 8-557-2490

EPA Sample No. AM-03-2

Date 8-14-86

INORGANIC ANALYSIS DATA SHEET

LAB NAME Hittman Ebasco Assoc., Inc. CASE NO. SAS 2356H

SOW NO. 7/84

LAB SAMPLE ID. NO. NA QC REPORT NO. 53

Elements Identified and Measured

Concentration: Low X Medium ____

Matrix: Water ____ Soil ____ Sludge ____ Other X

ug/filter ug/L or mg/kg dry weight (Circle One)

1. Aluminum		13. Magnesium	
2. Antimony		14. Manganese	
3. Arsenic	1.4FS	15. Mercury	
4. Barium		16. Nickel	
5. Beryllium		17. Potassium	
6. Cadmium	0.5UFR	18. Selenium	
7. Calcium		19. Silver	
8. Chromium		20. Sodium	
9. Cobalt		21. Thallium	
10. Copper		22. Tin	
11. Iron		23. Vanadium	
12. Lead	26E	24. Zinc	34P S

Cyanide ____ Percent Solids (%) ____

Footnotes: For reporting results to EPA, standard result qualifiers are used as defined on Cover Page. Additional flags or footnotes explaining results are encouraged. Definition of such flags must be explicit and contained on Cover Page, however.

Comments: ____

Lab Manager Gail Solomon/DWK

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Form I

U.S. EPA Contract Laboratory Program
Sample Management Office
P.O. Box 818 - Alexandria, VA 22313
703/557-2490 FTS: 8-557-2490

EPA Sample No. AM-03-3

Date 8-14-86

INORGANIC ANALYSIS DATA SHEET

LAB NAME Hittman Ebasco Assoc., Inc. CASE NO. SAS 2356H

SOW NO. 7/84

LAB SAMPLE ID. NO. NA QC REPORT NO. 53

Elements Identified and Measured

Concentration: Low X Medium ____

Matrix: Water ____ Soil ____ Sludge ____ Other X

ug/filter ug/L or mg/kg dry weight (Circle One)

1. Aluminum		13. Magnesium	
2. Antimony		14. Manganese	
3. Arsenic	1.0UF	15. Mercury	
4. Barium		16. Nickel	
5. Beryllium		17. Potassium	
6. Cadmium	0.5UFR	18. Selenium	
7. Calcium		19. Silver	
8. Chromium		20. Sodium	
9. Cobalt		21. Thallium	
10. Copper		22. Tin	
11. Iron		23. Vanadium	
12. Lead	25FS	24. Zinc	28P J

Cyanide ____ Percent Solids (%) ____

Footnotes: For reporting results to EPA, standard result qualifiers are used as defined on Cover Page. Additional flags or footnotes explaining results are encouraged. Definition of such flags must be explicit and contained on Cover Page, however.

Comments: ____

Lab Manager Gail Solomon/pmc

Pg. 2

Form I

U.S. EPA Contract Laboratory Program
Sample Management Office
P.O. Box 818 - Alexandria, VA 22313
703/557-2490 FTS: 8-557-2490

EPA Sample No. AM-03-4

Date 8-14-86

INORGANIC ANALYSIS DATA SHEET

LAB NAME Hittman Ebasco Assoc., Inc. CASE NO. SAS 2356H

SOW NO. 7/84

LAB SAMPLE ID. NO. NA QC REPORT NO. 53

Elements Identified and Measured

Concentration: Low X Medium ____

Matrix: Water ____ Soil ____ Sludge ____ Other X

ug/filter ug/L or mg/kg dry weight (Circle One)

1. Aluminum		13. Magnesium	
2. Antimony		14. Manganese	
3. Arsenic	1.2FS	15. Mercury	
4. Barium		16. Nickel	
5. Beryllium		17. Potassium	
6. Cadmium	0.5UFR	18. Selenium	
7. Calcium		19. Silver	
8. Chromium		20. Sodium	
9. Cobalt		21. Thallium	
10. Copper		22. Tin	
11. Iron		23. Vanadium	
12. Lead	40FS	24. Zinc	36P J
Cyanide		Percent Solids (%)	

Footnotes: For reporting results to EPA, standard result qualifiers are used as defined on Cover Page. Additional flags or footnotes explaining results are encouraged. Definition of such flags must be explicit and contained on Cover Page, however.

Comments:

Lab Manager Gail Solomon/DWK

Ref. 2

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U.S. EPA Contract Laboratory Program
Sample Management Office
P.O. Box 818 - Alexandria, VA 22313
703/557-2490 FTS: 8-557-2490

EPA Sample No. AM-03-5

Date 8-14-86

INORGANIC ANALYSIS DATA SHEET

LAB NAME Hittman Ebasco Assoc., Inc. CASE NO. SAS 2356H

SOW NO. 7/84

LAB SAMPLE ID. NO. NA QC REPORT NO. 53

Elements Identified and Measured

Concentration: Low X Medium ____

Matrix: Water ____ Soil ____ Sludge ____ Other X

ug/filter ug/L or mg/kg dry weight (Circle One)

1. Aluminum		13. Magnesium	
2. Antimony		14. Manganese	
3. Arsenic	1.0UF	15. Mercury	
4. Barium		16. Nickel	
5. Beryllium		17. Potassium	
6. Cadmium	0.5UFR	18. Selenium	
7. Calcium		19. Silver	
8. Chromium		20. Sodium	
9. Cobalt		21. Thallium	
10. Copper		22. Tin	
11. Iron		23. Vanadium	
12. Lead	30FS	24. Zinc	23P J

Cyanide ____ Percent Solids (%) ____

Footnotes: For reporting results to EPA, standard result qualifiers are used as defined on Cover Page. Additional flags or footnotes explaining results are encouraged. Definition of such flags must be explicit and contained on Cover Page, however.

Comments: ____

Lab Manager Gail Solomon/DMK

Rep. 2

Form I

U.S. EPA Contract Laboratory Program
Sample Management Office
P.O. Box 818 - Alexandria, VA 22313
703/557-2490 FTS: 8-557-2490

EPA Sample No. AM-04-1

Date 8-14-86

INORGANIC ANALYSIS DATA SHEET

LAB NAME Hittman Ebasco Assoc., Inc. CASE NO. SAS 2356H

SOW NO. 7/84

LAB SAMPLE ID. NO. NA QC REPORT NO. 53

Elements Identified and Measured

Concentration: Low X Medium ____

Matrix: Water ____ Soil ____ Sludge ____ Other X

ug/filter ug/L or mg/kg dry weight (Circle One)

1. Aluminum		13. Magnesium	
2. Antimony		14. Manganese	
3. Arsenic	54F	15. Mercury	
4. Barium		16. Nickel	
5. Beryllium		17. Potassium	
6. Cadmium	4.8 FRS	18. Selenium	
7. Calcium		19. Silver	
8. Chromium		20. Sodium	
9. Cobalt		21. Thallium	
10. Copper		22. Tin	
11. Iron		23. Vanadium	
12. Lead	959F	24. Zinc	672P S
Cyanide		Percent Solids (%)	

Footnotes: For reporting results to EPA, standard result qualifiers are used as defined on Cover Page. Additional flags or footnotes explaining results are encouraged. Definition of such flags must be explicit and contained on Cover Page, however.

Comments:

Lab Manager Gail Solomon/[illegible]

Rep. 2

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U.S. EPA Contract Laboratory Program
Sample Management Office
P.O. Box 818 - Alexandria, VA 22313
703/557-2490 FTS: 8-557-2490

EPA Sample No. AM-04-2

Date 8-14-86

INORGANIC ANALYSIS DATA SHEET

LAB NAME Hittman Ebasco Assoc., Inc. CASE NO. SAS 2356H

SOW NO. 7/84

LAB SAMPLE ID. NO. NA QC REPORT NO. 53

Elements Identified and Measured

Concentration: Low X Medium ____

Matrix: Water ____ Soil ____ Sludge ____ Other X

Mg/filter ug/L or mg/kg dry weight (Circle One)

1.	Aluminum		13.	Magnesium	
2.	Antimony		14.	Manganese	
3.	Arsenic	1.5 FS	15.	Mercury	
4.	Barium		16.	Nickel	
5.	Beryllium		17.	Potassium	
6.	Cadmium	.50 UFR	18.	Selenium	
7.	Calcium		19.	Silver	
8.	Chromium		20.	Sodium	
9.	Cobalt		21.	Thallium	
10.	Copper		22.	Tin	
11.	Iron		23.	Vanadium	
12.	Lead	30F	24.	Zinc	39 P S

Cyanide ____ Percent Solids (%) ____

Footnotes: For reporting results to EPA, standard result qualifiers are used as defined on Cover Page. Additional flags or footnotes explaining results are encouraged. Definition of such flags must be explicit and contained on Cover Page, however.

Comments:

Lab Manager Gail Solomon/DMK

Rep. 2

Form I

U.S. EPA Contract Laboratory Program
Sample Management Office
P.O. Box 818 - Alexandria, VA 22313
703/557-2490 FTS: 8-557-2490

EPA Sample No. AM-04-3

Date 8-14-86

INORGANIC ANALYSIS DATA SHEET

LAB NAME Hittman Ebasco Assoc., Inc. CASE NO. SAS 2356H

SOW NO. 7/84

LAB SAMPLE ID. NO. NA QC REPORT NO. 53

Elements Identified and Measured

Concentration: Low X Medium ____

Matrix: Water ____ Soil ____ Sludge ____ Other X

mg/filter ug/L or mg/kg dry weight (Circle One)

1. Aluminum		13. Magnesium	
2. Antimony		14. Manganese	
3. Arsenic	1.5 FS	15. Mercury	
4. Barium		16. Nickel	
5. Beryllium		17. Potassium	
6. Cadmium	.50 UFR	18. Selenium	
7. Calcium		19. Silver	
8. Chromium		20. Sodium	
9. Cobalt		21. Thallium	
10. Copper		22. Tin	
11. Iron		23. Vanadium	
12. Lead	36 FS	24. Zinc	43 PJ

Cyanide ____ Percent Solids (%) ____

Footnotes: For reporting results to EPA, standard result qualifiers are used as defined on Cover Page. Additional flags or footnotes explaining results are encouraged. Definition of such flags must be explicit and contained on Cover Page, however.

Comments: ____

Lab Manager Gail Solomon/DMK

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U.S. EPA Contract Laboratory Program
Sample Management Office
P.O. Box 818 - Alexandria, VA 22313
703/557-2490 FTS: 8-557-2490

EPA Sample No. AM-04-4

Date 8-14-86

INORGANIC ANALYSIS DATA SHEET

LAB NAME Hittman Ebasco Assoc., Inc. CASE NO. SAS 2356H

SOW NO. 7/84

LAB SAMPLE ID. NO. NA QC REPORT NO. 53

Elements Identified and Measured

Concentration: Low X Medium ____

Matrix: Water ____ Soil ____ Sludge ____ Other X

(ug/filter) ug/L or mg/kg dry weight (Circle One)

1.	Aluminum		13.	Magnesium	
2.	Antimony		14.	Manganese	
3.	Arsenic	1.0 UF	15.	Mercury	
4.	Barium		16.	Nickel	
5.	Beryllium		17.	Potassium	
6.	Cadmium	.50 UFR	18.	Selenium	
7.	Calcium		19.	Silver	
8.	Chromium		20.	Sodium	
9.	Cobalt		21.	Thallium	
10.	Copper		22.	Tin	
11.	Iron		23.	Vanadium	
12.	Lead	64 FS	24.	Zinc	35 PJ

Cyanide ____ Percent Solids (%) ____

Footnotes: For reporting results to EPA, standard result qualifiers are used as defined on Cover Page. Additional flags or footnotes explaining results are encouraged. Definition of such flags must be explicit and contained on Cover Page, however.

Comments: ____

Lab Manager Gail Solomon DMK

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Form I

U.S. EPA Contract Laboratory Program
Sample Management Office
P.O. Box 818 - Alexandria, VA 22313
703/557-2490 FTS: 8-557-2490

EPA Sample No. AM-04-5

Date 8-14-86

INORGANIC ANALYSIS DATA SHEET

LAB NAME Hittman Ebasco Assoc., Inc. CASE NO. SAS 2356H

SOW NO. 7/84

LAB SAMPLE ID. NO. NA QC REPORT NO. 53

Elements Identified and Measured

Concentration: Low X Medium ____

Matrix: Water ____ Soil ____ Sludge ____ Other X

Mg/filter ug/L or mg/kg dry weight (Circle One)

1.	Aluminum		13.	Magnesium	
2.	Antimony		14.	Manganese	
3.	Arsenic	1.5 FS	15.	Mercury	
4.	Barium		16.	Nickel	
5.	Beryllium		17.	Potassium	
6.	Cadmium	.50 UFR	18.	Selenium	
7.	Calcium		19.	Silver	
8.	Chromium		20.	Sodium	
9.	Cobalt		21.	Thallium	
10.	Copper		22.	Tin	
11.	Iron		23.	Vanadium	
12.	Lead	27 F	24.	Zinc	27 PJ

Cyanide ____ Percent Solids (%) ____

Footnotes: For reporting results to EPA, standard result qualifiers are used as defined on Cover Page. Additional flags or footnotes explaining results are encouraged. Definition of such flags must be explicit and contained on Cover Page, however.

Comments: ____

Lab Manager Gail Solomon
DWF

Rep-2

Form I

U.S. EPA Contract Laboratory Program
Sample Management Office
P.O. Box 818 - Alexandria, VA 22313
703/557-2490 FTS: 8-557-2490

EPA Sample No. AM-05-1

Date 8-14-86

INORGANIC ANALYSIS DATA SHEET

LAB NAME Hittman Ebasco Assoc., Inc. CASE NO. SAS 2356H

SOW NO. 7/84

LAB SAMPLE ID. NO. NA QC REPORT NO. 53

Elements Identified and Measured

Concentration: Low X Medium ____

Matrix: Water ____ Soil ____ Sludge ____ Other X

Mo/Silver ug/L or mg/kg dry weight (Circle One)

1.	Aluminum	13.	Magnesium
2.	Antimony	14.	Manganese
3.	Arsenic 17 ~~5~~ FS	15.	Mercury
4.	Barium	16.	Nickel
5.	Beryllium	17.	Potassium
6.	Cadmium 5.2 ~~0.5~~ U FRS	18.	Selenium
7.	Calcium	19.	Silver
8.	Chromium	20.	Sodium
9.	Cobalt	21.	Thallium
10.	Copper	22.	Tin
11.	Iron	23.	Vanadium
12.	Lead 348 ~~27~~ F	24.	Zinc 527 PJ

Cyanide ____ Percent Solids (%) ____

Footnotes: For reporting results to EPA, standard result qualifiers are used as defined on Cover Page. Additional flags or footnotes explaining results are encouraged. Definition of such flags must be explicit and contained on Cover Page, however.

Comments: ____

Lab Manager Gail Solomon/DMK

Ref. 2

Form I

U.S. EPA Contract Laboratory Program
Sample Management Office
P.O. Box 818 - Alexandria, VA 22313
703/557-2490 FTS: 8-557-2490

EPA Sample No. AM-05-2

Date 8-14-86

INORGANIC ANALYSIS DATA SHEET

LAB NAME Hittman Ebasco Assoc., Inc. CASE NO. SAS 2356H

SOW NO. 7/84

LAB SAMPLE ID. NO. NA QC REPORT NO. 53

Elements Identified and Measured

Concentration: Low X Medium ____

Matrix: Water ____ Soil ____ Sludge ____ Other X

mg/filter ug/L or mg/kg dry weight (Circle One)

1. Aluminum		13. Magnesium	
2. Antimony		14. Manganese	
3. Arsenic	1.0 UF	15. Mercury	
4. Barium		16. Nickel	
5. Beryllium		17. Potassium	
6. Cadmium	.50 UFR	18. Selenium	
7. Calcium		19. Silver	
8. Chromium		20. Sodium	
9. Cobalt		21. Thallium	
10. Copper		22. Tin	
11. Iron		23. Vanadium	
12. Lead	14 FS	24. Zinc	17 PJ
Cyanide		Percent Solids (%)	

Footnotes: For reporting results to EPA, standard result qualifiers are used as defined on Cover Page. Additional flags or footnotes explaining results are encouraged. Definition of such flags must be explicit and contained on Cover Page, however.

Comments:

Lab Manager Gail Solomon/DMC

Rep 2

Form I

U.S. EPA Contract Laboratory Program
Sample Management Office
P.O. Box 818 - Alexandria, VA 22313
703/557-2490 FTS: 8-557-2490

EPA Sample No. AM-05-3

Date 8-14-86

INORGANIC ANALYSIS DATA SHEET

LAB NAME Hittman Ebasco Assoc., Inc. CASE NO. SAS 2356H

SOW NO. 7/84

LAB SAMPLE ID. NO. NA QC REPORT NO. 53

Elements Identified and Measured

Concentration: Low X Medium ____

Matrix: Water ____ Soil ____ Sludge ____ Other X

ug/liter ug/L or mg/kg dry weight (Circle One)

1.	Aluminum		13.	Magnesium	
2.	Antimony		14.	Manganese	
3.	Arsenic	1.4 F	15.	Mercury	
4.	Barium		16.	Nickel	
5.	Beryllium		17.	Potassium	
6.	Cadmium	.50 UFR	18.	Selenium	
7.	Calcium		19.	Silver	
8.	Chromium		20.	Sodium	
9.	Cobalt		21.	Thallium	
10.	Copper		22.	Tin	
11.	Iron		23.	Vanadium	
12.	Lead	30 F	24.	Zinc	55 P J

Cyanide ____ Percent Solids (%) ____

Footnotes: For reporting results to EPA, standard result qualifiers are used as defined on Cover Page. Additional flags or footnotes explaining results are encouraged. Definition of such flags must be explicit and contained on Cover Page, however.

Comments: ____

Lab Manager Gail Solomon/DMK

Ref 2

Form 1

U.S. EPA Contract Laboratory Program
Sample Management Office
P.O. Box 818 - Alexandria, VA 22313
703/557-2490 FTS: 8-557-2490

EPA Sample No. AM-06-4

Date 8-14-86

INORGANIC ANALYSIS DATA SHEET

LAB NAME Hittman Ebasco Assoc., Inc. CASE NO. SAS 2356H

SOW NO. 7/84

LAB SAMPLE ID. NO. NA QC REPORT NO. 53

Elements Identified and Measured

Concentration: Low X Medium ____

Matrix: Water ____ Soil ____ Sludge ____ Other X

ug/L filter ug/L or mg/kg dry weight (Circle One)

1. Aluminum		13. Magnesium	
2. Antimony		14. Manganese	
3. Arsenic	1.1 F	15. Mercury	
4. Barium		16. Nickel	
5. Beryllium		17. Potassium	
6. Cadmium	.50 UFR	18. Selenium	
7. Calcium		19. Silver	
8. Chromium		20. Sodium	
9. Cobalt		21. Thallium	
10. Copper		22. Tin	
11. Iron		23. Vanadium	
12. Lead	35 FS	24. Zinc	43 PJ
Cyanide		Percent Solids (%)	

Footnotes: For reporting results to EPA, standard result qualifiers are used as defined on Cover Page. Additional flags or footnotes explaining results are encouraged. Definition of such flags must be explicit and contained on Cover Page, however.

Comments: ____

Lab Manager Gail Solomon

Ref. 2

Form I

U.S. EPA Contract Laboratory Program
Sample Management Office
P.O. Box 818 - Alexandria, VA 22313
703/557-2490 FTS: 8-557-2490

EPA Sample No. AM-05-5

Date 8-14-86

INORGANIC ANALYSIS DATA SHEET

LAB NAME Hittman Ebasco Assoc., Inc. CASE NO. SAS 2356H

SOW NO. 7/84

LAB SAMPLE ID. NO. NA QC REPORT NO. 53

Elements Identified and Measured

Concentration: Low X Medium ____

Matrix: Water ____ Soil ____ Sludge ____ Other X

No filter ug/L or mg/kg dry weight (Circle One)

1. Aluminum		13. Magnesium	
2. Antimony		14. Manganese	
3. Arsenic	1.0 UF	15. Mercury	
4. Barium		16. Nickel	
5. Beryllium		17. Potassium	
6. Cadmium	.50 UFR	18. Selenium	
7. Calcium		19. Silver	
8. Chromium		20. Sodium	
9. Cobalt		21. Thallium	
10. Copper		22. Tin	
11. Iron		23. Vanadium	
12. Lead	16F	24. Zinc	27 PJ

Cyanide ____ Percent Solids (%) ____

Footnotes: For reporting results to EPA, standard result qualifiers are used as defined on Cover Page. Additional flags or footnotes explaining results are encouraged. Definition of such flags must be explicit and contained on Cover Page, however.

Comments: ____

Lab Manager Gail Solomon/DMK

Rev. 2

Form I

U.S. EPA Contract Laboratory Program
Sample Management Office
P.O. Box 818 - Alexandria, VA 22313
703/557-2490 FTS: 8-557-2490

EPA Sample No. AM-06-2

Date 8-14-86

INORGANIC ANALYSIS DATA SHEET

LAB NAME Hittman Ebasco Assoc., Inc. CASE NO. SAS 2356H

SOW NO. 7/84

LAB SAMPLE ID. NO. NA QC REPORT NO. 53

Elements Identified and Measured

Concentration: Low X Medium ____

Matrix: Water ____ Soil ____ Sludge ____ Other X

ug/L (filter) or mg/kg dry weight (Circle One)

1. Aluminum		13. Magnesium	
2. Antimony		14. Manganese	
3. Arsenic	10 UF	15. Mercury	
4. Barium		16. Nickel	
5. Beryllium		17. Potassium	
6. Cadmium	50 UFR	18. Selenium	
7. Calcium		19. Silver	
8. Chromium		20. Sodium	
9. Cobalt		21. Thallium	
10. Copper		22. Tin	
11. Iron		23. Vanadium	
12. Lead	50UF ~~16F~~ DK	24. Zinc	0.4 UF ~~27 PKI~~

Cyanide ____ Percent Solids (%) ____

Footnotes: For reporting results to EPA, standard result qualifiers are used as defined on Cover Page. Additional flags or footnotes explaining results are encouraged. Definition of such flags must be explicit and contained on Cover Page, however.

Comments: ____

Lab Manager Gail Solomon/DWK

Rep 2

Form I

U.S. EPA Contract Laboratory Program
Sample Management Office
P.O. Box 818 - Alexandria, VA 22313
703/557-2490 FTS: 8-557-2490

EPA Sample No. AM-06-3

Date 8-14-86

INORGANIC ANALYSIS DATA SHEET

LAB NAME Hittman Ebasco Assoc., Inc. CASE NO. SAS 2356H

SOW NO. 7/84

LAB SAMPLE ID. NO. NA QC REPORT NO. 53

Elements Identified and Measured

Concentration: Low X Medium ____

Matrix: Water ____ Soil ____ Sludge ____ Other X

ug/filter ug/L or mg/kg dry weight (Circle One)

1.	Aluminum		13.	Magnesium	
2.	Antimony		14.	Manganese	
3.	Arsenic	10 UF	15.	Mercury	
4.	Barium		16.	Nickel	
5.	Beryllium		17.	Potassium	
6.	Cadmium	.50 UFR	18.	Selenium	
7.	Calcium		19.	Silver	
8.	Chromium		20.	Sodium	
9.	Cobalt		21.	Thallium	
10.	Copper		22.	Tin	
11.	Iron		23.	Vanadium	
12.	Lead	.50 UF	24.	Zinc	0.4 UPJ

Cyanide ____ Percent Solids (%) ____

Footnotes: For reporting results to EPA, standard result qualifiers are used as defined on Cover Page. Additional flags or footnotes explaining results are encouraged. Definition of such flags must be explicit and contained on Cover Page, however.

Comments: ____

Lab Manager Gail Solomon/mk

Ref-2

Form I

U.S. EPA Contract Laboratory Program
Sample Management Office
P.O. Box 818 - Alexandria, VA 22313
703/557-2490 FTS: 8-557-2490

EPA Sample No. AM-06-4

Date 8-14-86

INORGANIC ANALYSIS DATA SHEET

LAB NAME Hittman Ebasco Assoc., Inc. CASE NO. SAS 2356H

SOW NO. 7/84

LAB SAMPLE ID. NO. NA QC REPORT NO. 53

Elements Identified and Measured

Concentration: Low X Medium ____

Matrix: Water ____ Soil ____ Sludge ____ Other X

(No filter) ug/L or mg/kg dry weight (Circle One)

1. Aluminum		13. Magnesium	
2. Antimony		14. Manganese	
3. Arsenic	1.0 UF	15. Mercury	
4. Barium		16. Nickel	
5. Beryllium		17. Potassium	
6. Cadmium	0.5 UFR	18. Selenium	
7. Calcium		19. Silver	
8. Chromium		20. Sodium	
9. Cobalt		21. Thallium	
10. Copper		22. Tin	
11. Iron		23. Vanadium	
12. Lead	0.5 UF	24. Zinc	0.4 UPJ

Cyanide ____ Percent Solids (%) ____

Footnotes: For reporting results to EPA, standard result qualifiers are used as defined on Cover Page. Additional flags or footnotes explaining results are encouraged. Definition of such flags must be explicit and contained on Cover Page, however.

Comments: ____

Lab Manager Gail Solomon/DMK

Rep. 2

Form I

U.S. EPA Contract Laboratory Program
Sample Management Office
P.O. Box 818 - Alexandria, VA 22313
703/557-2490 FTS: 8-557-2490

EPA Sample No. AM-06-5

Date 8-14-86

INORGANIC ANALYSIS DATA SHEET

LAB NAME Hittman Ebasco Assoc., Inc. CASE NO. SAS 2356H

SOW NO. 7/84

LAB SAMPLE ID. NO. NA QC REPORT NO. 53

Elements Identified and Measured

Concentration: Low X Medium ____

Matrix: Water ____ Soil ____ Sludge ____ Other X

no filter ug/L or mg/kg dry weight (Circle One)

1. Aluminum		13. Magnesium	
2. Antimony		14. Manganese	
3. Arsenic	1.0 UF	15. Mercury	
4. Barium		16. Nickel	
5. Beryllium		17. Potassium	
6. Cadmium	0.5 UFR	18. Selenium	
7. Calcium		19. Silver	
8. Chromium		20. Sodium	
9. Cobalt		21. Thallium	
10. Copper		22. Tin	
11. Iron		23. Vanadium	
12. Lead	0.5 UF	24. Zinc	0.4 UFJ

Cyanide ____ Percent Solids (%) ____

Footnotes: For reporting results to EPA, standard result qualifiers are used as defined on Cover Page. Additional flags or footnotes explaining results are encouraged. Definition of such flags must be explicit and contained on Cover Page, however.

Comments: ____

Lab Manager Gail Solomon/MK

Rep. 2

REGION VIII SUMMARY OF DATA QUALITY ASSURANCE REVIEW

Case No. 6218 Project No. 8608-05

Site Richardson Flats

Contractor Laboratory Hittman Ebasco

Data Reviewer L Roberts Date of Review 9/5/86

Sample Matrix Soil - Inorganic

Sample No. MH0861

MH0862

MH0863

MH0864

MH0865

( ) Data are acceptable for use

(✓) Data are acceptable for use with qualification noted ~~above~~ below

( ) Data are preliminary - pending action or verification

( ) Data are unacceptable

Action required by DPO?

No ✓ Yes ____ Following items require action ____

Action required by Project Officer (PO)?

No ✓ Yes ____

Ref. 2

Following are our findings:

The As, Hg, Sb, Se and Tl results are flagged with an R due to spike recoveries beyond the ± 25% control limit. The As Hg and Tl matrix spike recoveries are very high, this may indicate a positive bias. The duplicate RPD results for Cr, Al, Ca, Mg, Hg and Zn were between 39 and 61%. These results should be considered quantitative estimates. The serial dilution results for Be, Co, K, Sb and V indicate that an interference may be present for these elements.

The laboratory submitted corrected Form I's because they had originally miscalculated the matrix spike recoveries. The new Form I's are difficult to read and confusing.

Rev. 2

FORM A

Inorganic Data Completeness Checklist

✓ Inorganic analysis data sheets

✓ Initial calibration and calibration verification results

✓ Continuing calibration verification

✓ Instrument Detection limits

✓ Duplicate results

✓ Spike results

✓ ICP interference check sample

✓ Blank results

✓ Serial Dilution Results

✓ Raw data for calibration standards

✓ Raw data for blanks

✓ Raw data for samples

✓ Raw data for duplicates

✓ Raw data for spikes

✓ Raw data for furnace AA

✓ Percent solids calculation - soils only

✓ Traffic Reports

Rep 2

FORM B

Initial calibration data were reviewed. Initial calibration data were included in the package and met all contract requirements.

YES ✓ NO_____

Comments:

Continuing calibration data were reviewed and these data met all contract requirements.

YES ✓ NO_____

Comments:

A blank was run with every twenty samples or less per case.

YES ✓ NO_____

Comments:

How many elements were detected above the required detection limit? Ø

How many elements were detected at greater than one half the amount detected in any sample? Ø

Comments:

Ref 5

FORM C

The interference check sample was run twice per eight hour shift. No massive interferences were present.

YES_____ NO ✓

Comments:

Final ICS for antimony was not analyzed

All matrix spike requirements were met.

YES_____ NO ✓

Comments:

As 280% Sb 67%
Hg 150%
Se 55%
Tl 218%

As, Hg & Tl results may be biased high.
N flag applied to results.

Laboratory miscalculated spike recoveries and submitted new forms.

A duplicate sample was run with every twenty or fewer samples of a similar matrix, or one per case, whichever is more frequent.

YES ✓ NO_____

Cr 61% RPD
Al 39%
Ca 56%
Mg 58%
Hg 57%
Zn 42%

Limit - 35 RPD
+ flag applied

The RPD's were tabulated.

YES ✓ NO_____

Comments:

All inorganic detection limits met the contract requirements.

YES ✓ NO_____

Comments:

Ref. R

FORM D

All Laboratory Control Samples met specified contract limits.

YES ✓ NO_____

Comments:

Serial Dilution requirements were met.

YES_____ NO ✓

Results >I 10%
Sb 34% V 68%
Co 14% Be 12%
K 15%

E flag applied
Laboratory did not flag data.

The Furnace Atomic Absorption Analysis Scheme was followed correctly.

YES ✓ NO_____

All holding times were met.

YES ✓ NO_____

Comments:

Rev. 2

U.S. EPA Contract Laboratory Program
Sample Management Office
P.O. Box 818 - Alexandria, VA 22313
703/557-2490 FTS: 8-557-2490

Date 8/22/86

COVER PAGE
INORGANIC ANALYSES DATA PACKAGE

Lab Name HITTMAN EBASCO ASSOC. INC. Case No. 6218

SOW No. 7/85 Q.C. Report No. 55

Lab Receipt Date 7/16/86

Sample Numbers

EPA No.	Lab ID No.	EPA No.	Lab ID No.
MHD 861	*		
862			
863			
864			
865			

Comments: * - same as EPA #. CV - Cold Vapor
Sb - furnace spike levels used for ICAP analysis, ICS (final) not run. Analyst will be more careful in the future.

ICP interelement and background corrections applied? Yes X No ___.

If yes, corrections applied before X or after ___ generation of raw data.

Footnotes:

NR - Not required by contract at this time

Form I:

Value - If the result is a value greater than or equal to the instrument detecion limit but less than the contract-required detection limit, report the value in brackets (i.e., [10]). Indicate the analytical method used with P (for ICP), A (for Flame AA) or F (for Furnace AA).

U - Indicates element was analyzed for but not detected. Report with the instrument detection limit value (e.g., 10U).

E - Indicates a value estimated or not reported due to the presence of interference. Explanatory note included on cover page.

s - Indicates value determined by Method of Standard Addition.

N - Indicates spike sample recovery is not within control limits.

* - Indicates duplicate analysis is not within control limits.

+ - Indicates the correlation coefficient for method of standard addition is less than 0.995

M - Indicates duplicate injection results exceeded control limits.

Indicate method used: P for ICP; A for Flame AA and F for Furnace.

Corrected form

Form I

U.S. EPA Contract Laboratory Program
Sample Management Office
P.O. Box 818 - Alexandria, VA 22313
703/557-2490 FTS: 8-557-2490

EPA Sample No. MHD 861

Date 8/22/86

INORGANIC ANALYSIS DATA SHEET

LAB NAME HITTMAN EBASCO ASSOC. INC. CASE NO. 6218

SOW NO. 7/85

LAB SAMPLE ID. NO. N/A QC REPORT NO. 55

Elements Identified and Measured

Concentration: Low Y Medium ____

Matrix: Water ____ Soil Y Sludge ____ Other ____

ug/L or mg/kg dry weight (Circle One)

1.	Aluminum	11300 P*	13.	Magnesium	36700P*
2.	Antimony	89PN E	14.	Manganese	15400P*KH
3.	Arsenic	7.5FNS	15.	Mercury	0.2CVN*
4.	Barium	144P*KH	16.	Nickel	52P*KH
5.	Beryllium	~~41P~~KH 43P*E E	17.	Potassium	[965] P E
6.	Cadmium	12P*	18.	Selenium	1.0UFN
7.	Calcium	129000P*	19.	Silver	2.0UF
8.	Chromium	743F*S	20.	Sodium	5130P
9.	Cobalt	159P*KH E	21.	Thallium	2.0UFN
10.	Copper	100P*KH	22.	Vanadium	1390P*KH E
11.	Iron	103000P	23.	Zinc	84P*
12.	Lead	418F*		Precent Solids (%)	98.7
	Cyanide	NR			

Footnotes: For reporting results to EPA, standard result qualifiers are used as defined on Cover Page. Additional flags or footnotes explaining results are encouraged. Definition of such flags must be explicit and contained on Cover Page, however.

Comments: Color - white; Clarity - opaque; texture medium

Lab Manager [signature]

Corrected Form

Ref. 2

Form I

U.S. EPA Contract Laboratory Program
Sample Management Office
P.O. Box 818 - Alexandria, VA 22313
703/557-2490 FTS: 8-557-2490

EPA Sample No. MHD 862

Date 8/22/86

INORGANIC ANALYSIS DATA SHEET

LAB NAME HITTMAN EBASCO ASSOC. INC. CASE NO. 6218

SOW NO. 7/85

LAB SAMPLE ID. NO. N/A QC REPORT NO. 55

Elements Identified and Measured

Concentration: Low Y Medium ____

Matrix: Water ____ Soil Y Sludge ____ Other ____

ug/L or mg/kg dry weight (Circle One)

1.	Aluminum	3790P*	13.	Magnesium	14200P*
2.	Antimony	18PN, E	14.	Manganese	284PA* KH
3.	Arsenic	87FN	15.	Mercury	1.0CVN*
4.	Barium	95PA* KH	16.	Nickel	12PA* KH
5.	Beryllium	0.4UPA* KH E	17.	Potassium	[436]P E
6.	Cadmium	3.9P*	18.	Selenium	1.0UFNS
7.	Calcium	46900P*	19.	Silver	2.0UF
8.	Chromium	17F*S	20.	Sodium	[336]P
9.	Cobalt	[2.9]PA* KH E	21.	Thallium	2.4FN
10.	Copper	21PA* KH	22.	Vanadium	11PA* KH E
11.	Iron	10600P	23.	Zinc	440P*
12.	Lead	477F*		Precent Solids (%)	98.2
Cyanide		NR			

Footnotes: For reporting results to EPA, standard result qualifiers are used as defined on Cover Page. Additional flags or footnotes explaining results are encouraged. Definition of such flags must be explicit and contained on Cover Page, however.

Comments: Color-white; clarity-opaque; texture coarse

Lab Manager Gail Solomon

Corrected Form

Ref. 2

Form I

U.S. EPA Contract Laboratory Program
Sample Management Office
P.O. Box 818 - Alexandria, VA 22313
703/557-2490 FTS: 8-557-2490

EPA Sample No. MHD863

Date 8/22/86

INORGANIC ANALYSIS DATA SHEET

LAB NAME HITTMAN EBASCO ASSOC. INC. CASE NO. 6218

SOW NO. 7/85

LAB SAMPLE ID. NO. N/A QC REPORT NO. 55

Elements Identified and Measured

Concentration: Low X Medium ____

Matrix: Water ____ Soil X Sludge ____ Other ____

ug/L or mg/kg dry weight (Circle One)

1.	Aluminum	11900P*	13.	Magnesium	55800P*
2.	Antimony	70PNE	14.	Manganese	8320PN*KH
3.	Arsenic	7.7FN	15.	Mercury	0.5CVN*
4.	Barium	200PN*KH	16.	Nickel	44PN*KH
5.	Beryllium	5.2PN*KH E	17.	Potassium	1480PE
6.	Cadmium	~~5.2~~ KH 12P*	18.	Selenium	1.0UFN
7.	Calcium	143000P*	19.	Silver	2.0UF
8.	Chromium	443F*	20.	Sodium	5620P
9.	Cobalt	14PN*KH E	21.	Thallium	2.0UFN
10.	Copper	44PN*KH	22.	Vanadium	561PN*KH E
11.	Iron	94200P	23.	Zinc	331P*
12.	Lead	133F*		Precent Solids (%)	99.3
	Cyanide	NR			

Footnotes: For reporting results to EPA, standard result qualifiers are used as defined on Cover Page. Additional flags or footnotes explaining results are encouraged. Definition of such flags must be explicit and contained on Cover Page, however.

Comments: Sample description: odor-white; clarity-opaque; texture-medium

Lab Manager [signature]

Corrected Form

Rev. 2

Form I

U.S. EPA Contract Laboratory Program
Sample Management Office
P.O. Box 818 - Alexandria, VA 22313
703/557-2490 FTS: 8-557-2490

EPA Sample No. MHD 864

Date 8/02/86

INORGANIC ANALYSIS DATA SHEET

LAB NAME HITTMAN EBASCO ASSOC. INC. CASE NO. 6218

SOW NO. 7/85

LAB SAMPLE ID. NO. N/A QC REPORT NO. 55

Elements Identified and Measured

Concentration: Low X Medium ____

Matrix: Water ____ Soil X Sludge ____ Other ____

ug/L or mg/kg dry weight (Circle One)

1.	Aluminum	10500P*	13.	Magnesium	3560P*
2.	Antimony	40PN E	14.	Manganese	112P ~~N~~ KH
3.	Arsenic	2.1UFN	15.	Mercury	~~ND.4CV~~ 0.5CUN*
4.	Barium	668P ~~N~~ KH	16.	Nickel	21P ~~N~~ KH
5.	Beryllium	~~1.6P~~ KH 1.4PN KH E	17.	Potassium	1160 P E
6.	Cadmium	4.5P*	18.	Selenium	1.0 UFN
7.	Calcium	6350P*	19.	Silver	2.1UF
8.	Chromium	~~21F~~ KH 4.3F* S	20.	Sodium	~~1030 UF~~ KH [976]P
9.	Cobalt	11P ~~N~~ KH E	21.	Thallium	2.1UFN
10.	Copper	15P ~~N~~ KH	22.	Vanadium	81P ~~N~~ KH E
11.	Iron	33900P	23.	Zinc	96P*
12.	Lead	~~3500F~~ KH 13F*S		Precent Solids (%)	97.3

Cyanide NR

Footnotes: For reporting results to EPA, standard result qualifiers are used as defined on Cover Page. Additional flags or footnotes explaining results are encouraged. Definition of such flags must be explicit and contained on Cover Page, however.

Comments: Sample description: color-white; clarity-opaque; texture-coarse

Lab Manager [signature]

Corrected Form

Rev 2

Form I

U.S. EPA Contract Laboratory Program
Sample Management Office
P.O. Box 818 - Alexandria, VA 22313
703/557-2490 FTS: 8-557-2490

EPA Sample No. MHD 865

Date 8/22/86

INORGANIC ANALYSIS DATA SHEET

LAB NAME HITTMAN EBASCO ASSOC. INC. CASE NO. 6218

SOW NO. 7/85

LAB SAMPLE ID. NO. N/A QC REPORT NO. 55

Elements Identified and Measured

Concentration: Low X Medium ____

Matrix: Water ____ Soil X Sludge ____ Other ____

ug/L or (mg/kg) dry weight (Circle One)

1.	Aluminum	13200P*	13.	Magnesium	5550P*
2.	Antimony	104PN E	14.	Manganese	1730PA*KH
3.	Arsenic	188FN	15.	Mercury	3.9CVN*
4.	Barium	225PA*KH	16.	Nickel	34PA*KH
5.	Beryllium	~~3.1P~~KH ~~3.1P~~KH 1.0PA*KH E	17.	Potassium	1960PE
6.	Cadmium	38P*	18.	Selenium	6.9FNS
7.	Calcium	14900P*	19.	Silver	18F
8.	Chromium	~~101F~~KH 21F*S	20.	Sodium	1320P
9.	Cobalt	21PA*KH E	21.	Thallium	13FN
10.	Copper	222PA*KH	22.	Vanadium	12PA*KHE
11.	Iron	46100P	23.	Zinc	4630P*
12.	Lead	3470F*S		Precent Solids (%)	98.1
	Cyanide	NR			

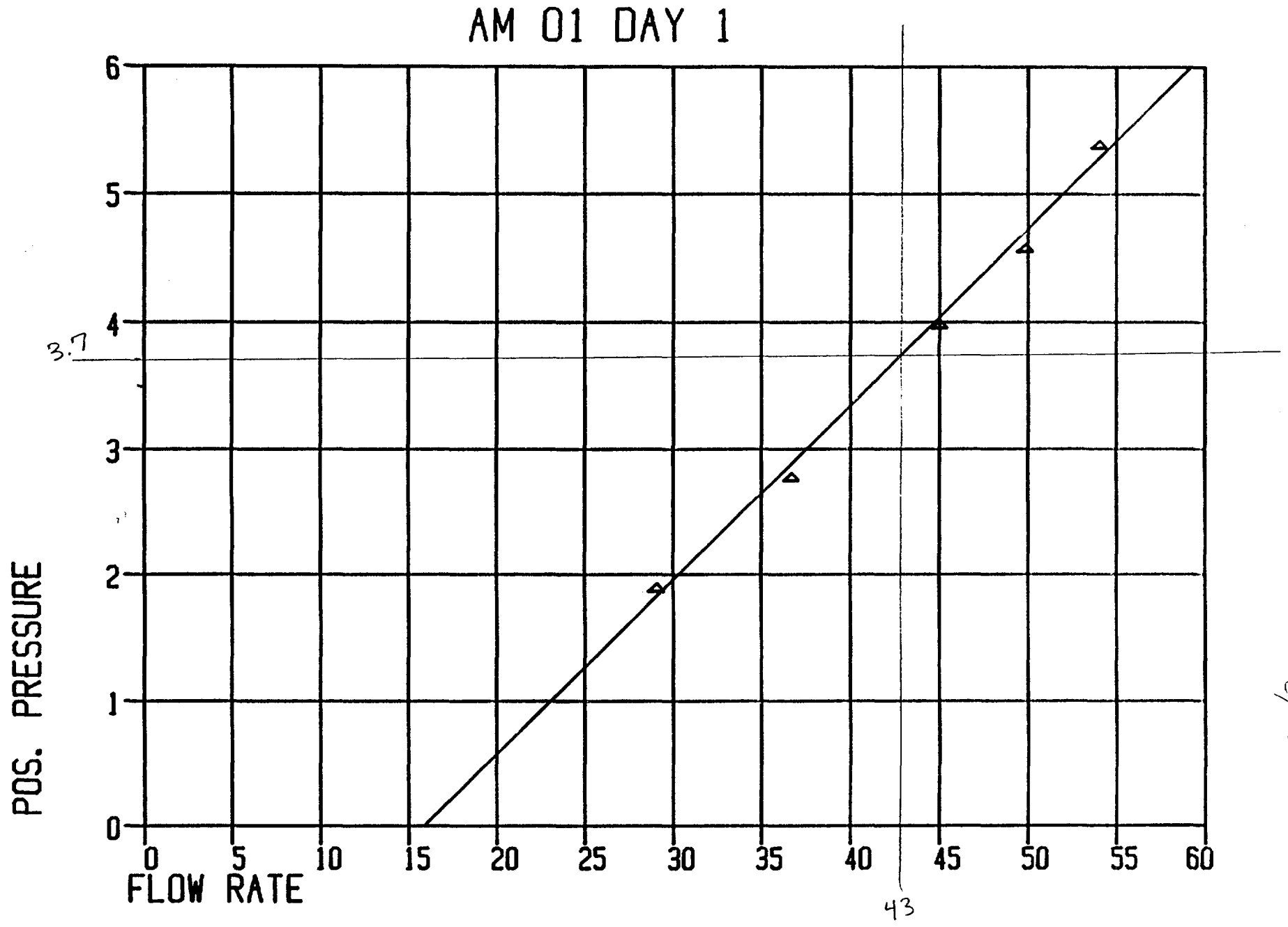
Footnotes: For reporting results to EPA, standard result qualifiers are used as defined on Cover Page. Additional flags or footnotes explaining results are encouraged. Definition of such flags must be explicit and contained on Cover Page, however.

Comments: sample description: color-white; clarity-opaque; texture-medium

Lab Manager Gail Salomon

APPENDIX III

CALIBRATION DATA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1
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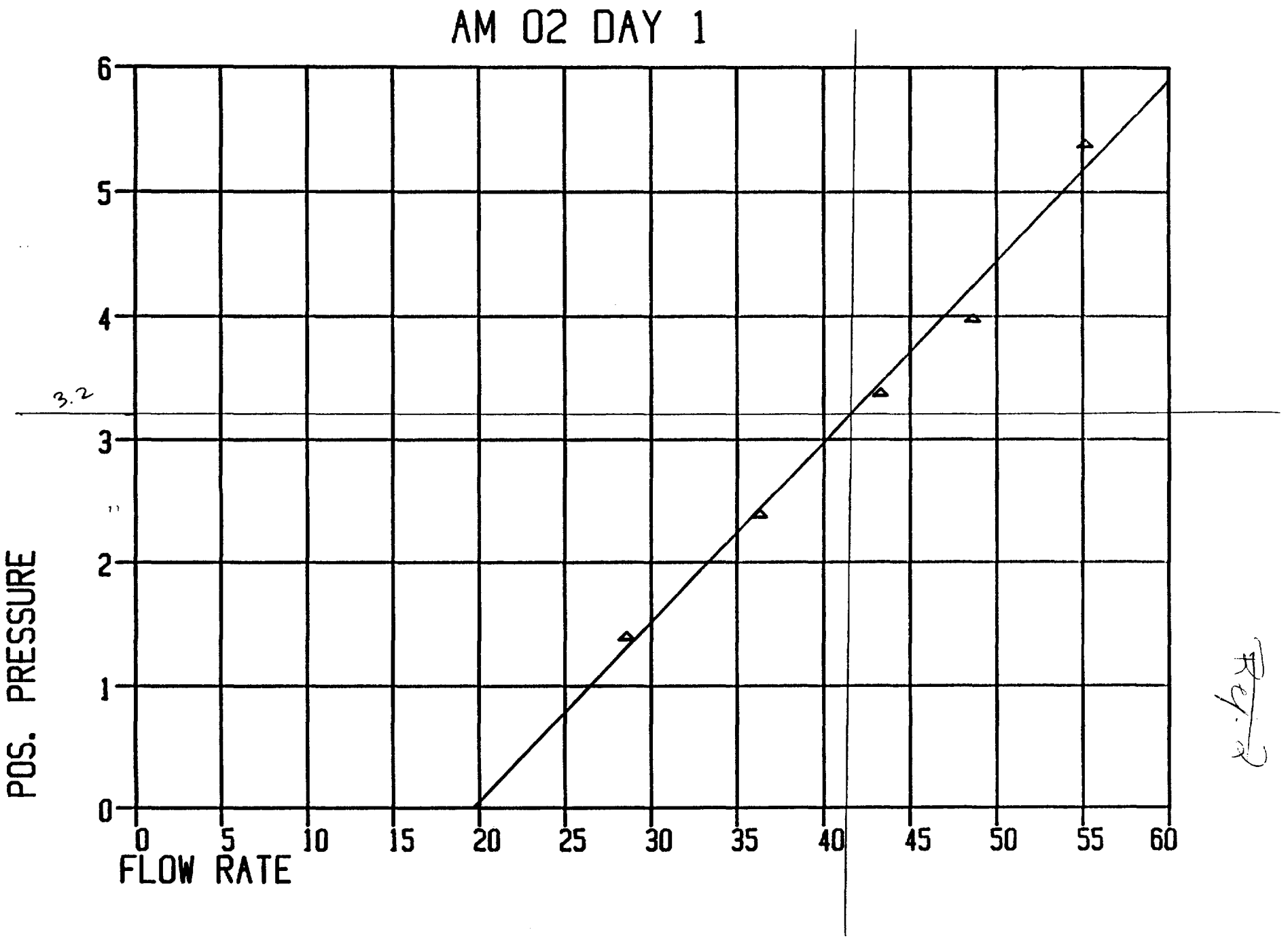
3.7
43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FLOW RATE
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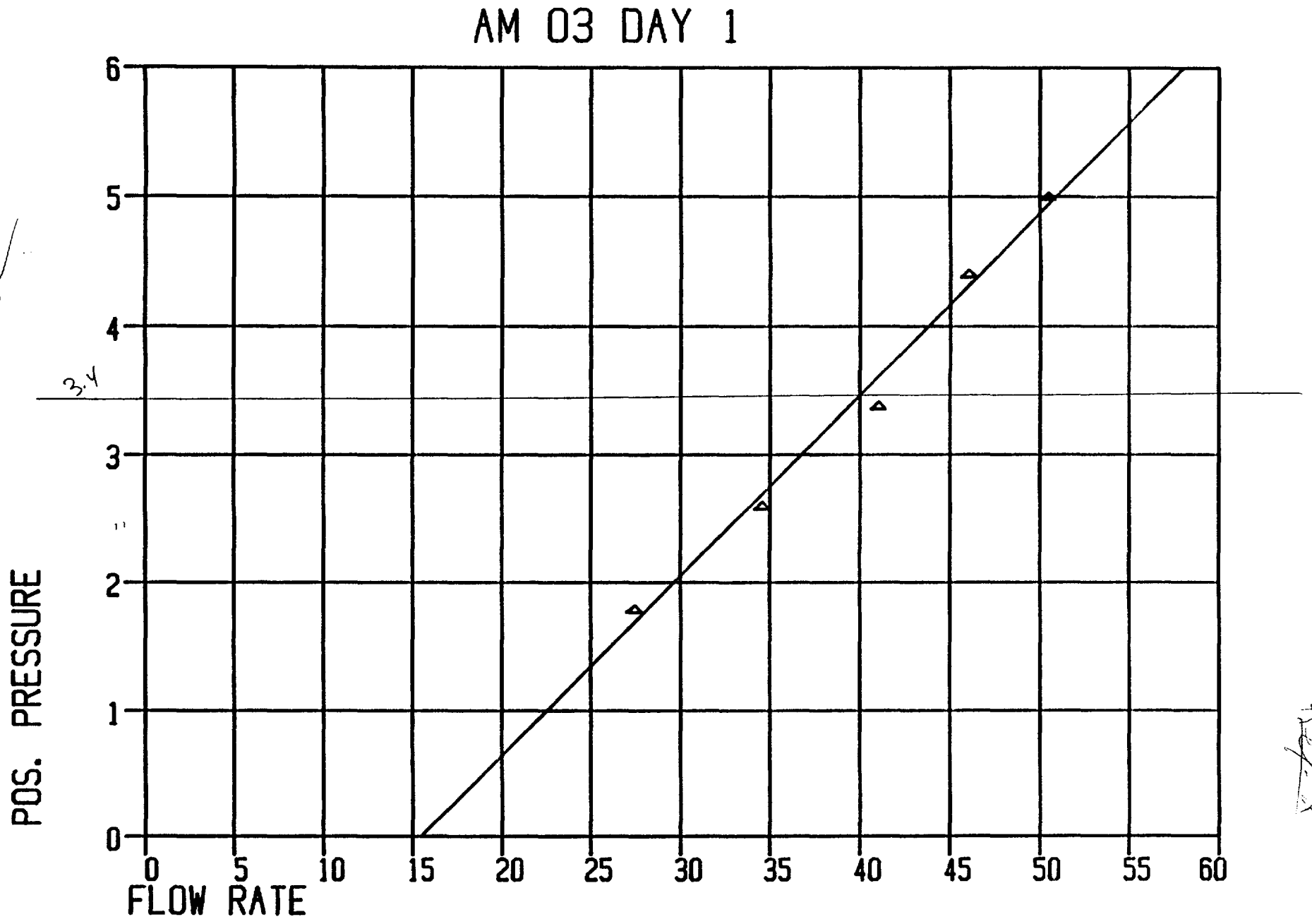
60
3.2

Fig. 2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FLOW RATE
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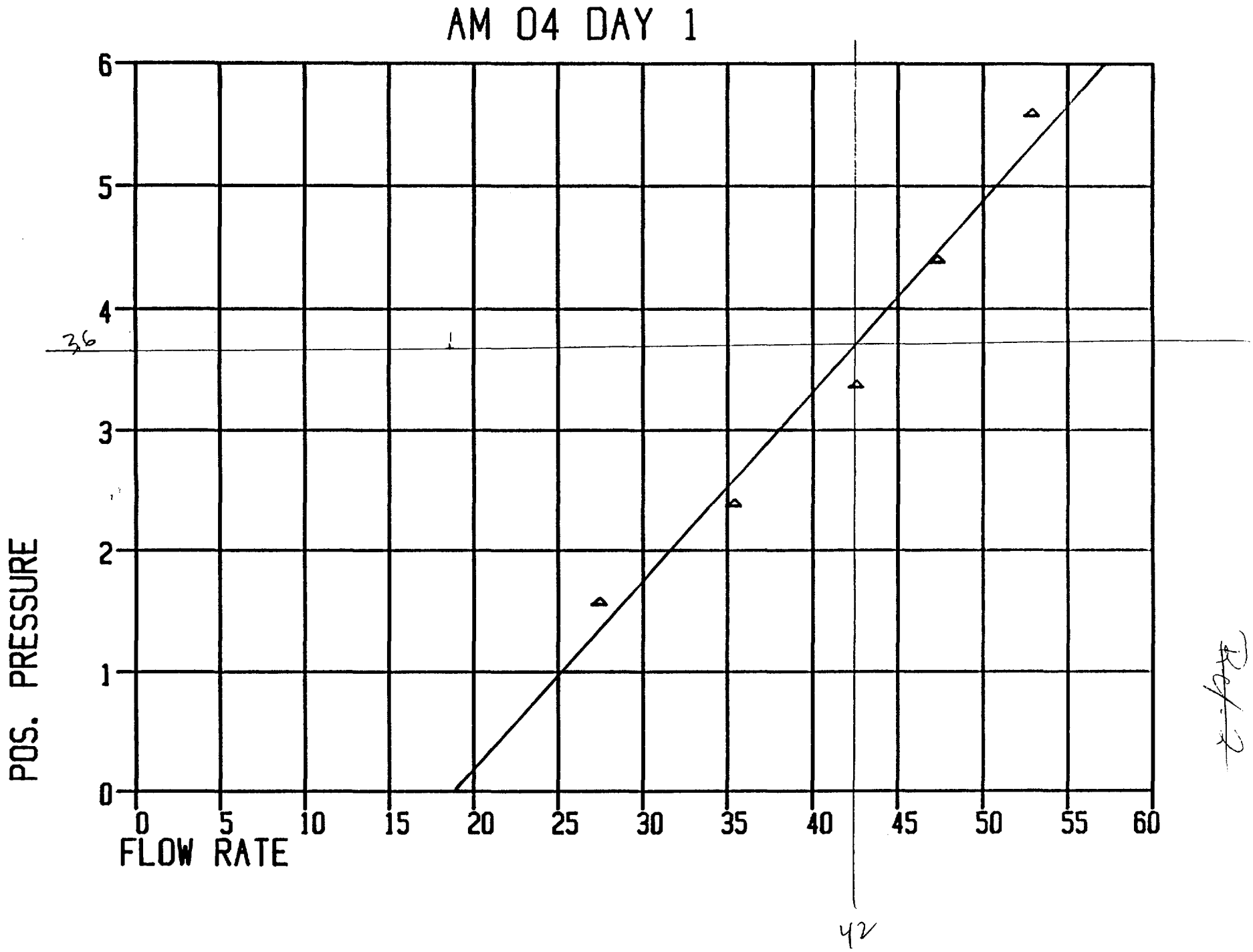
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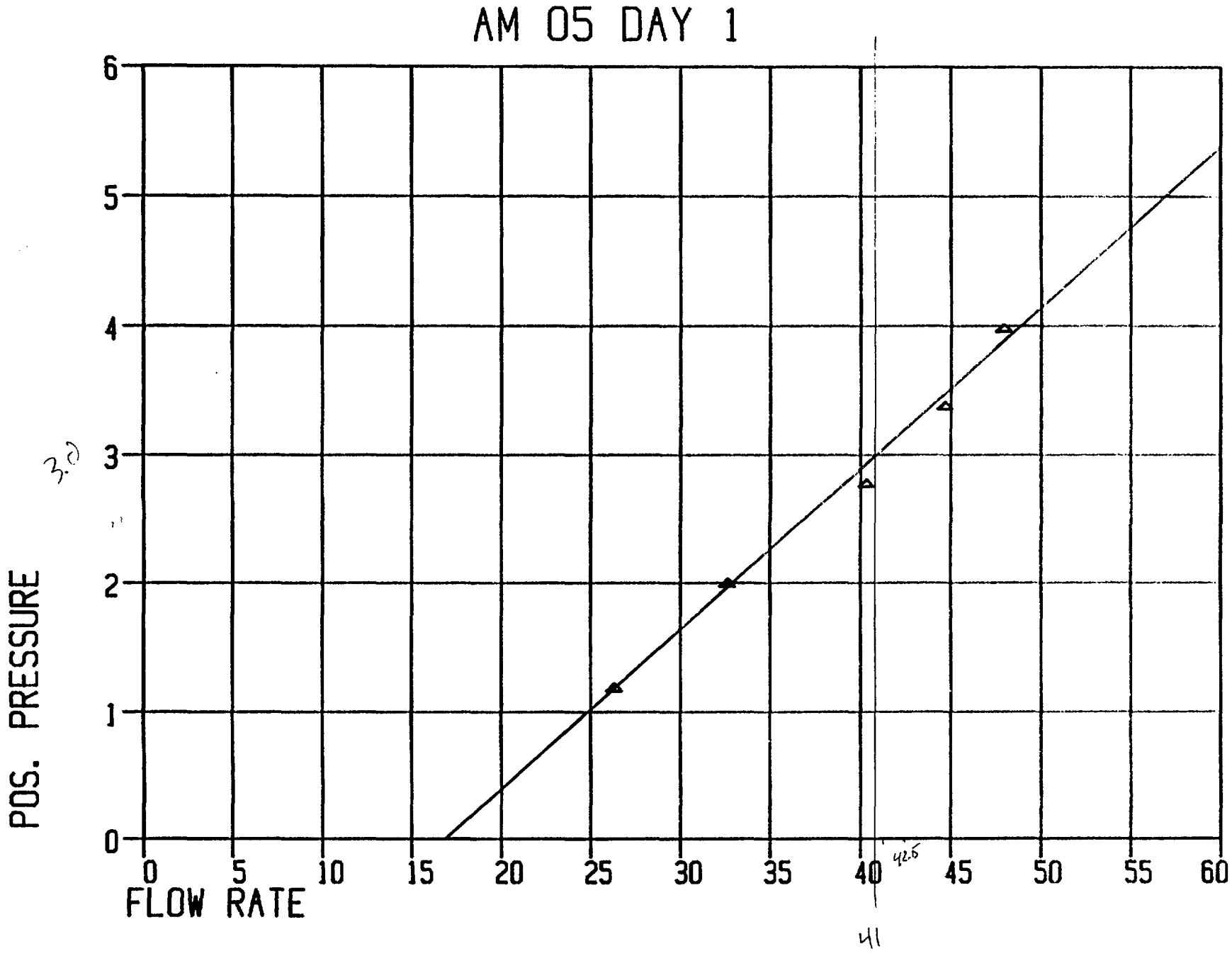
60
3.6
42

Page 2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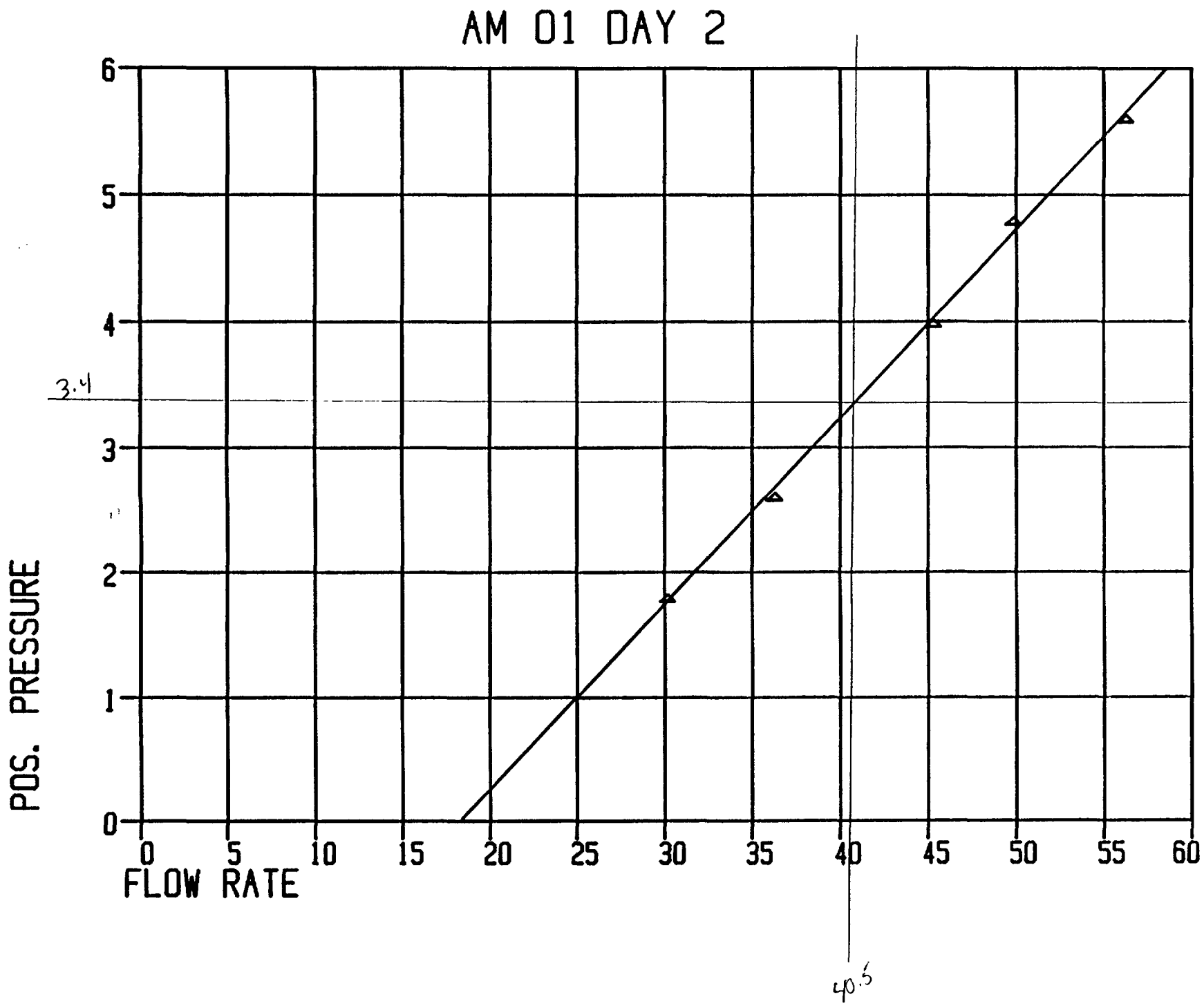
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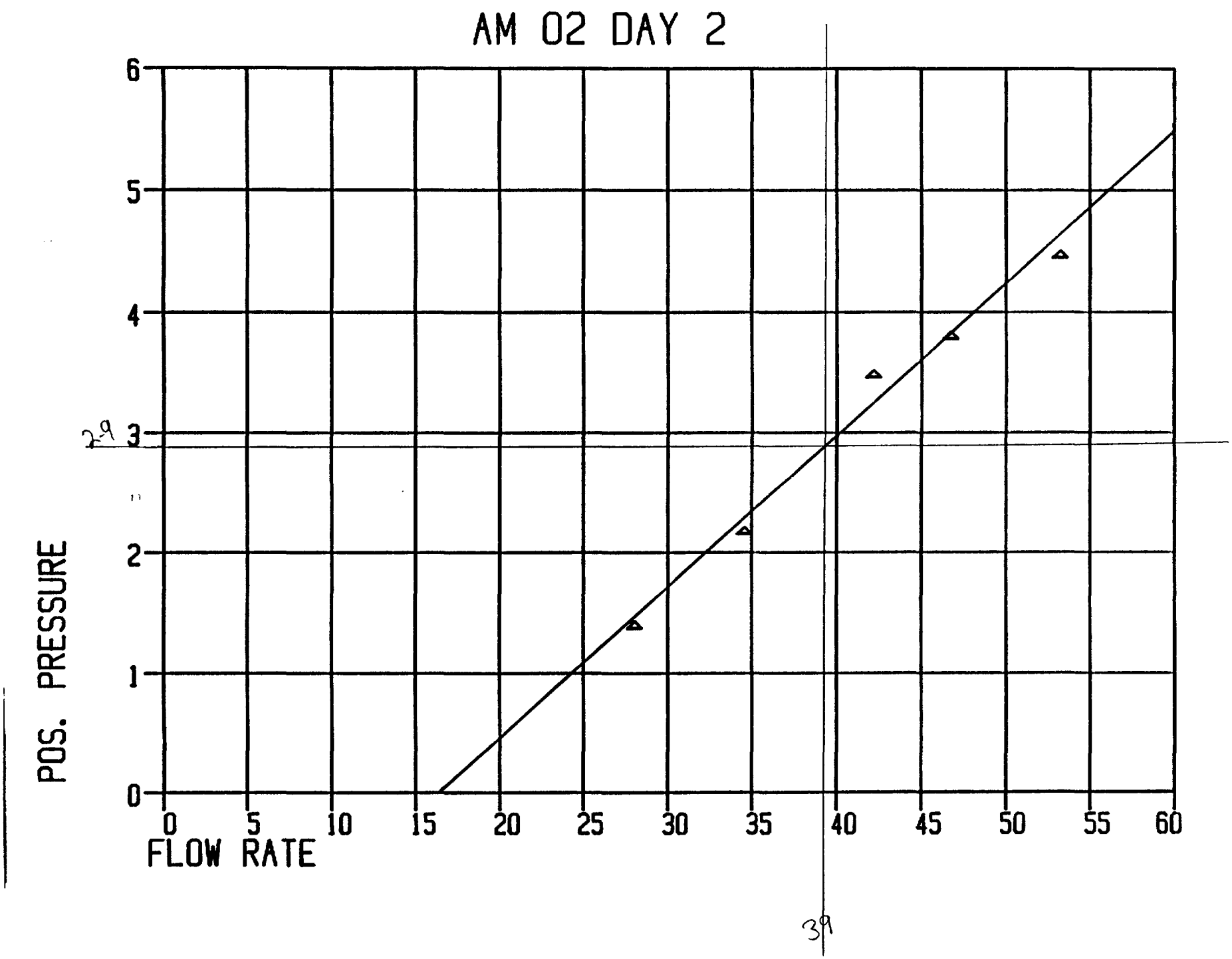
Fig 2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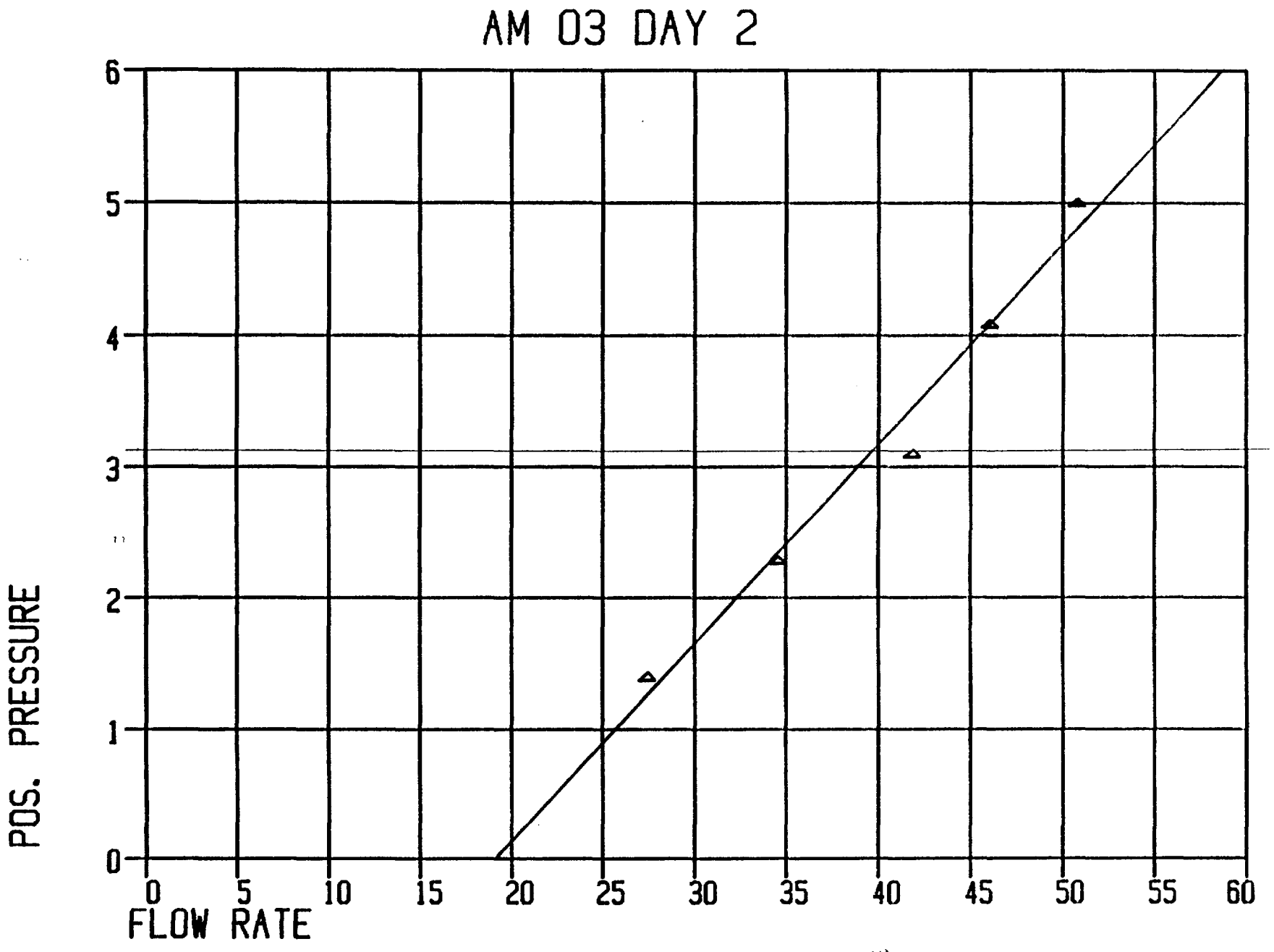
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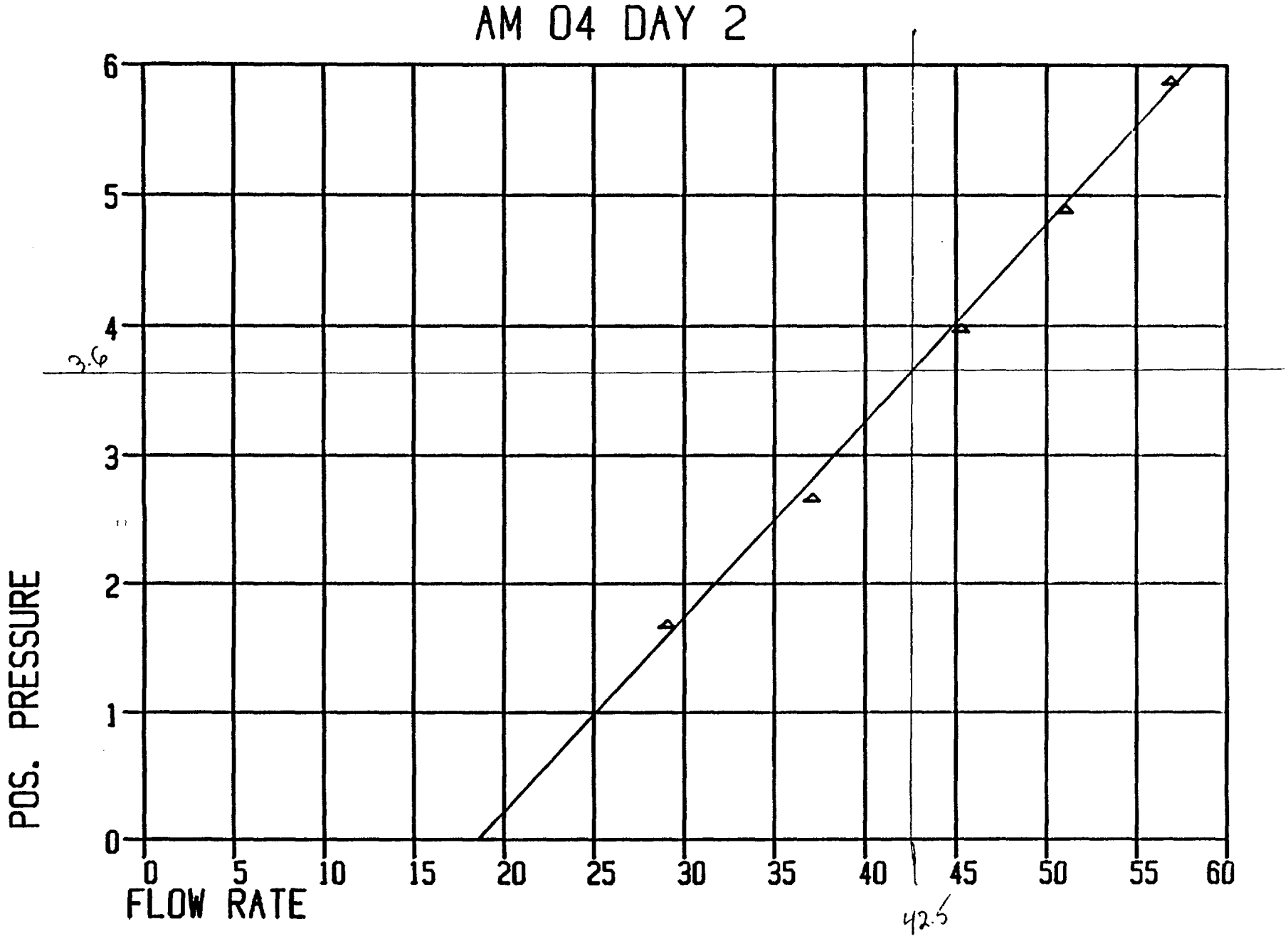
~~40~~
39.5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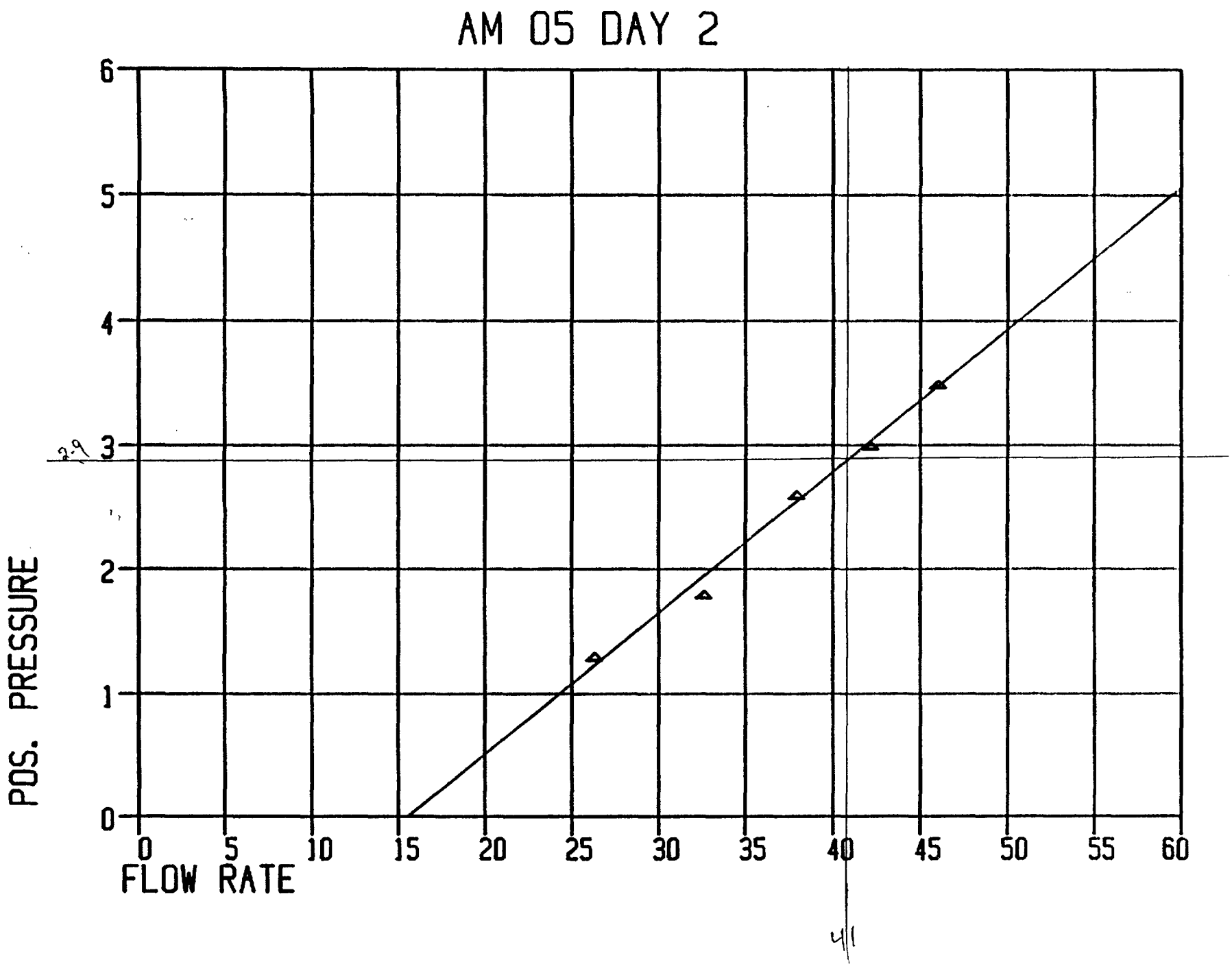
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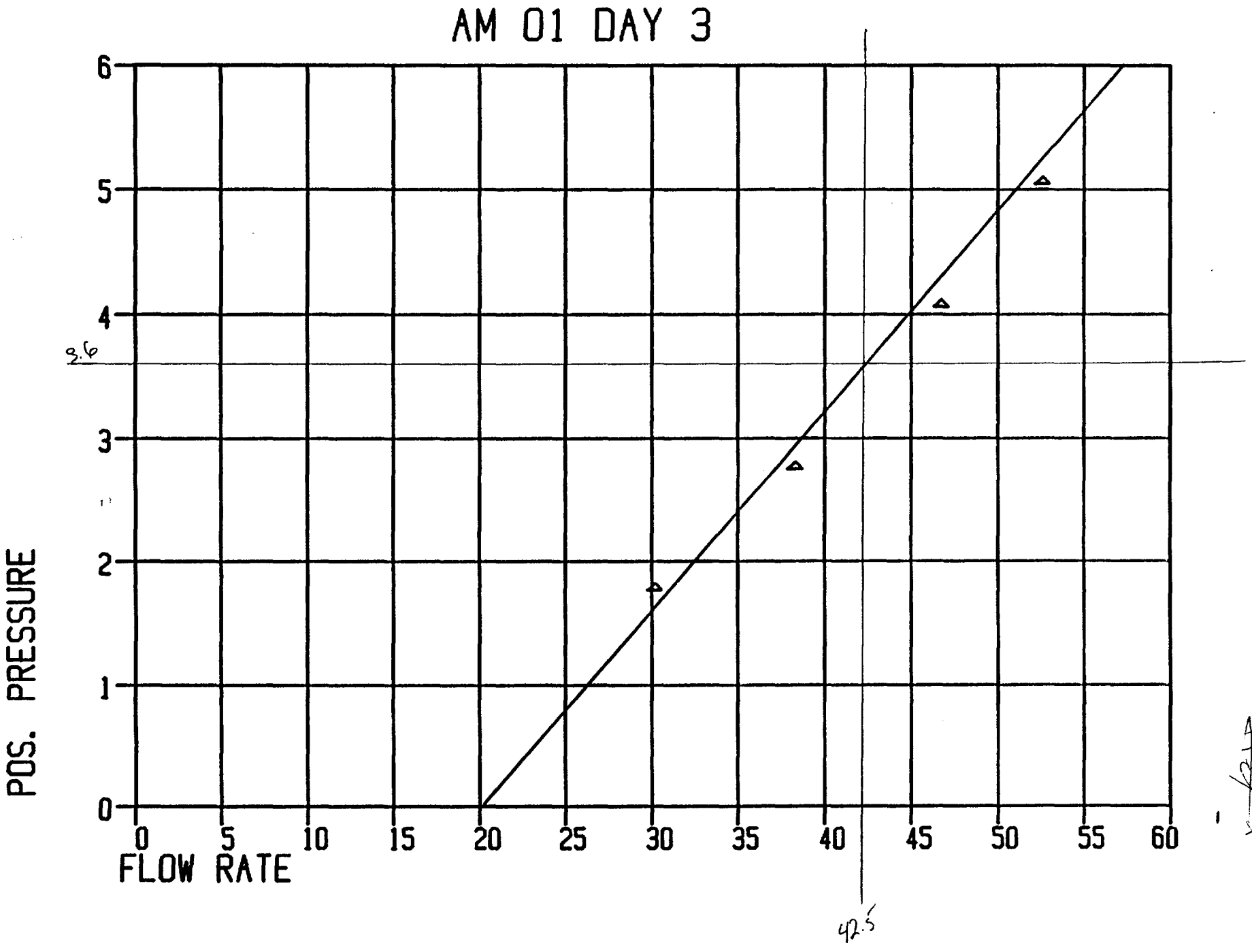
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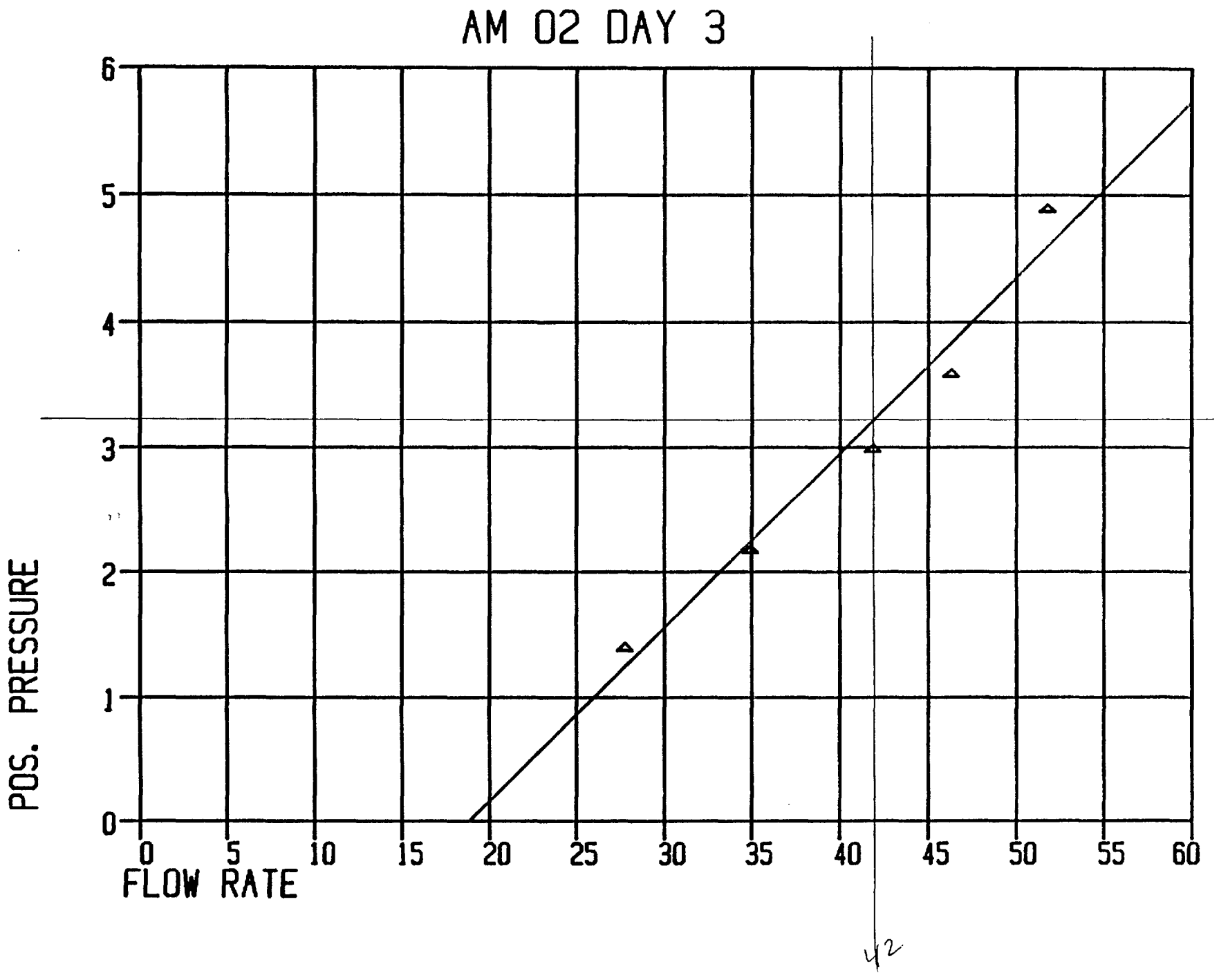
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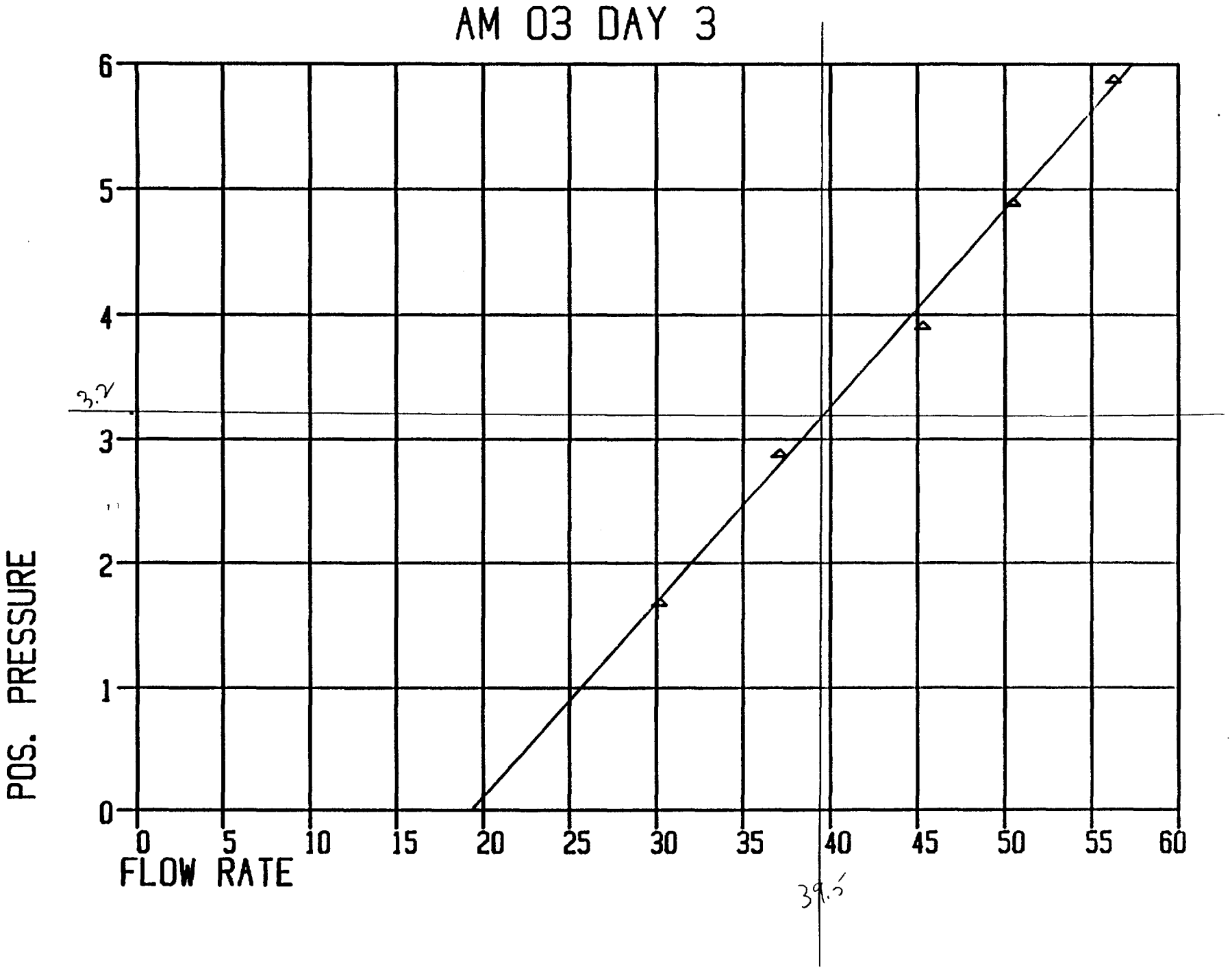
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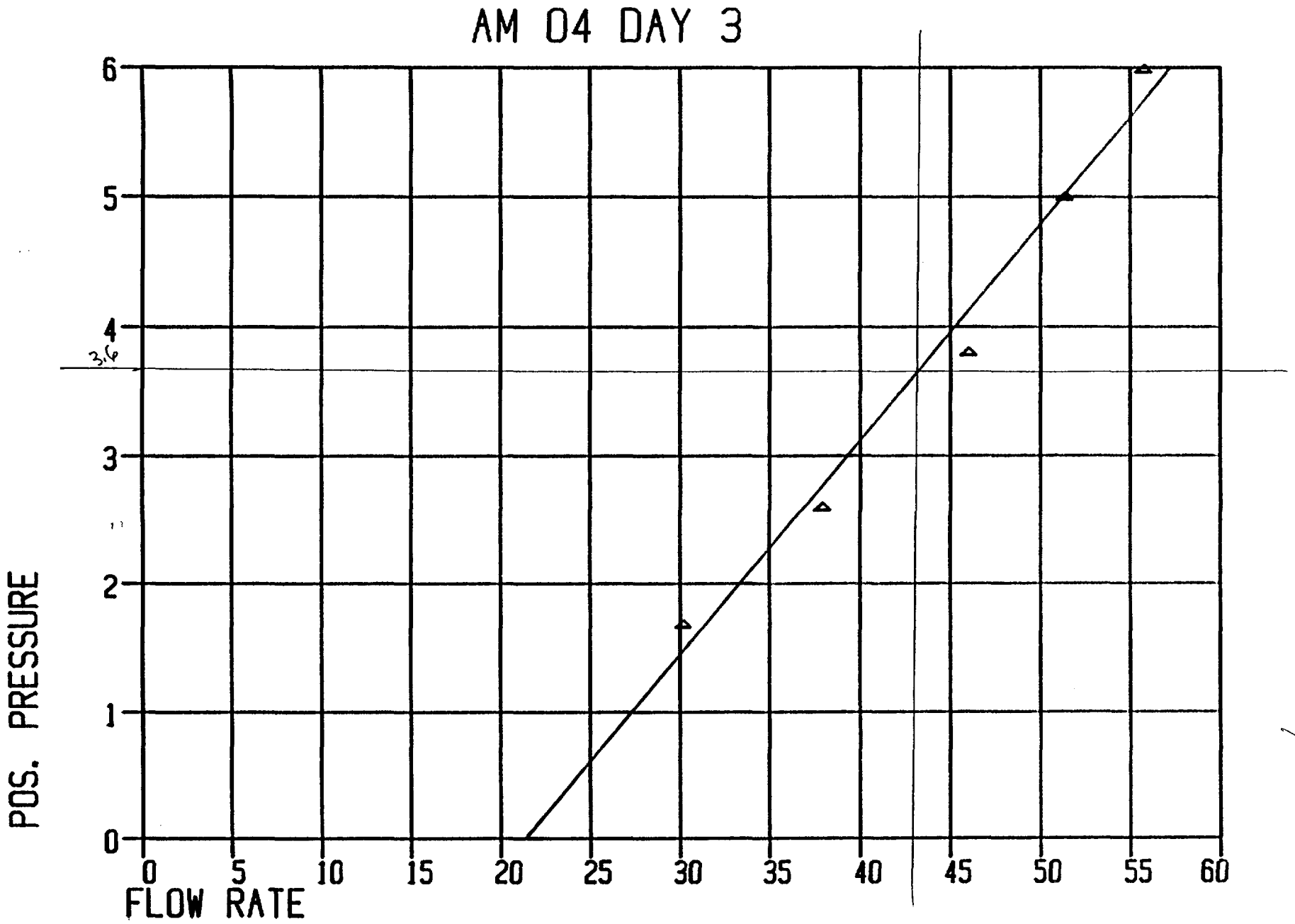
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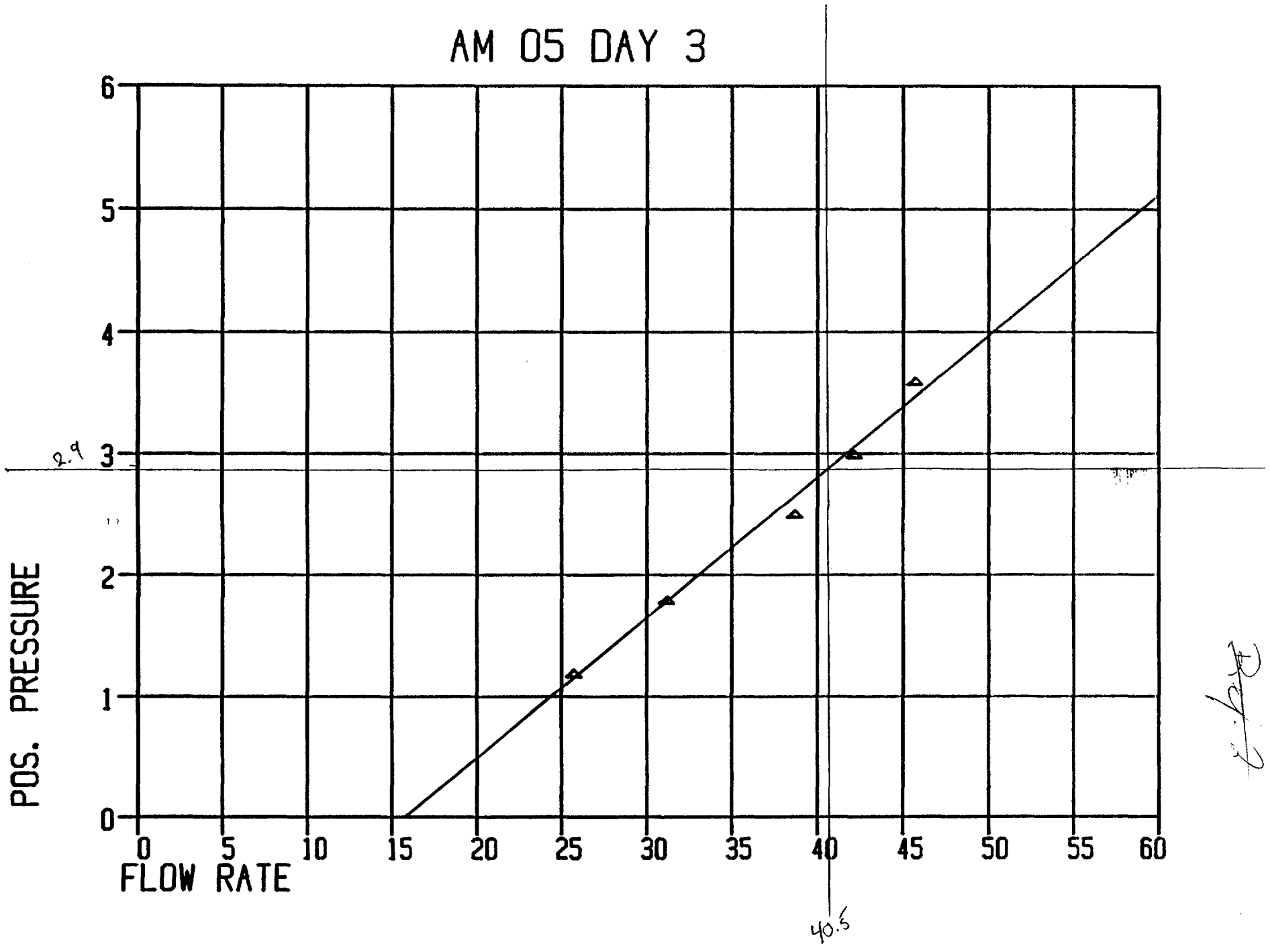
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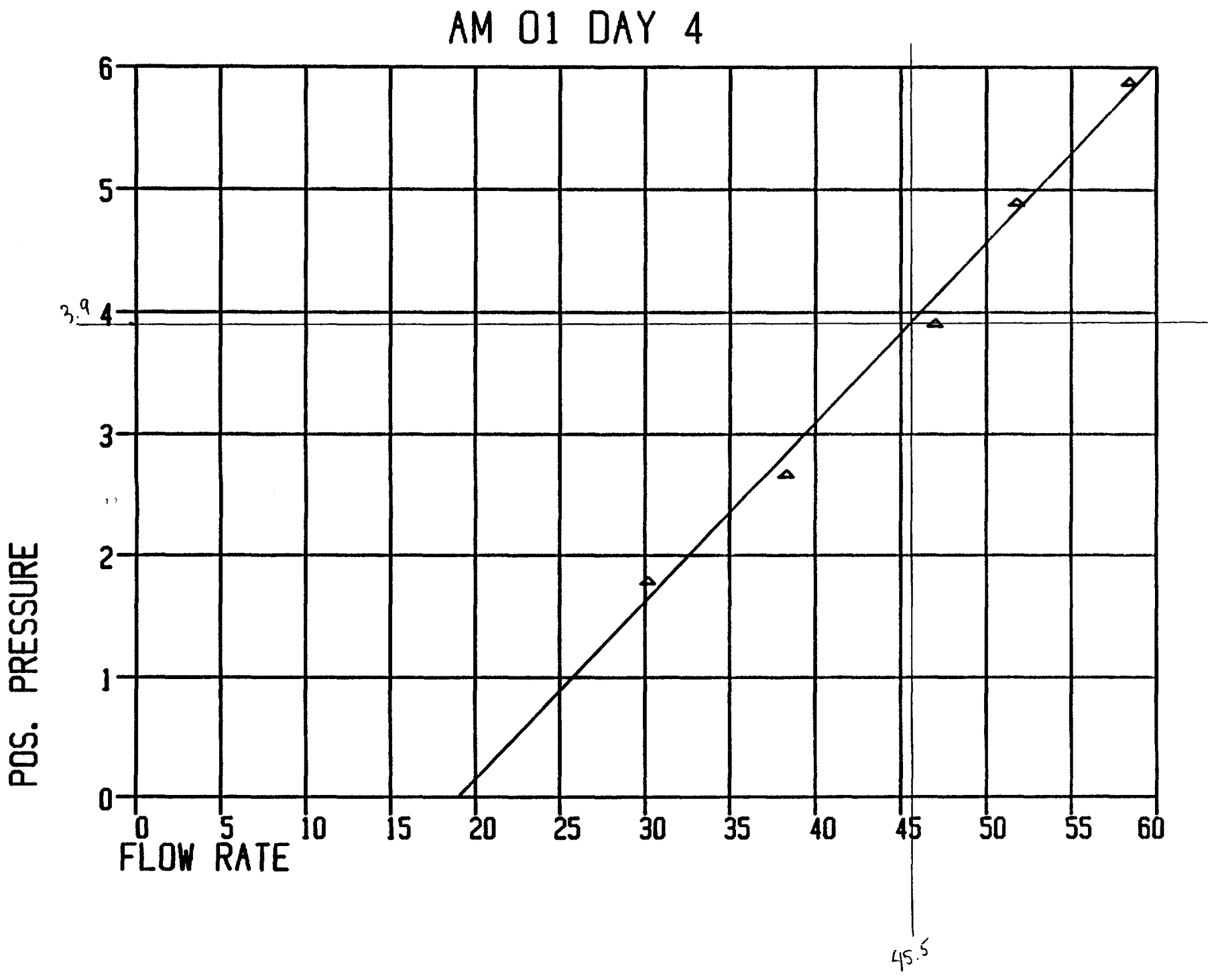
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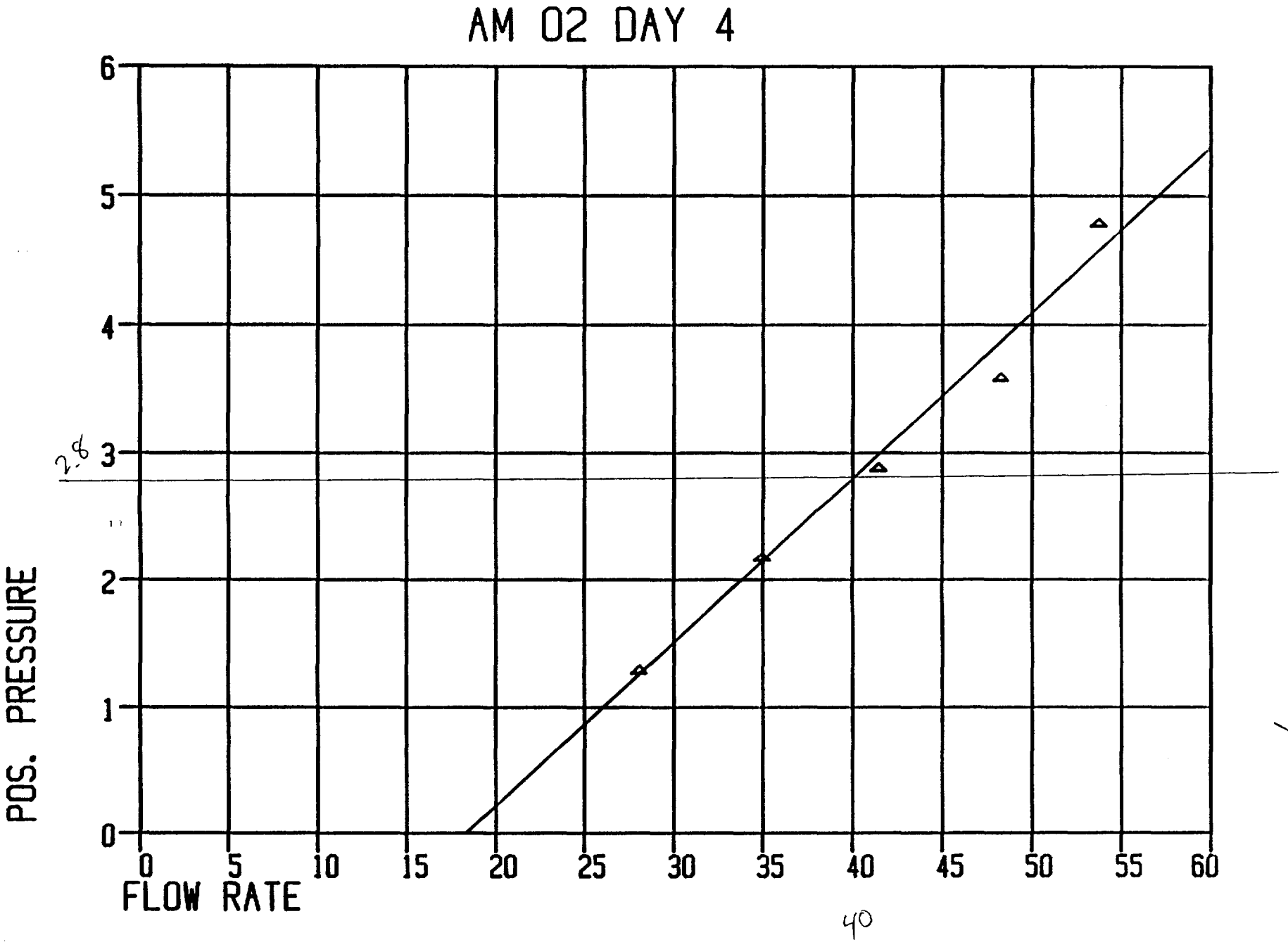
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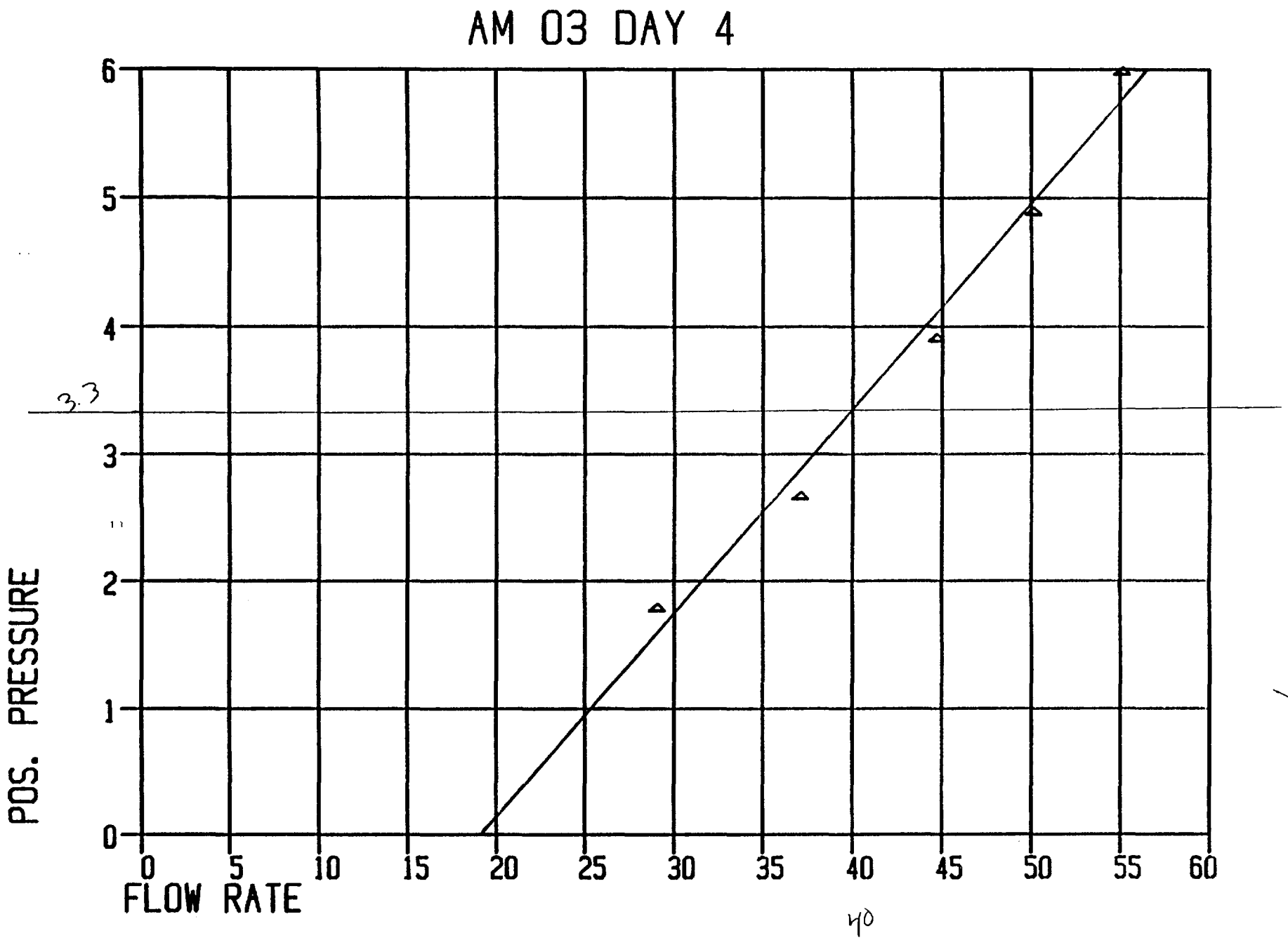
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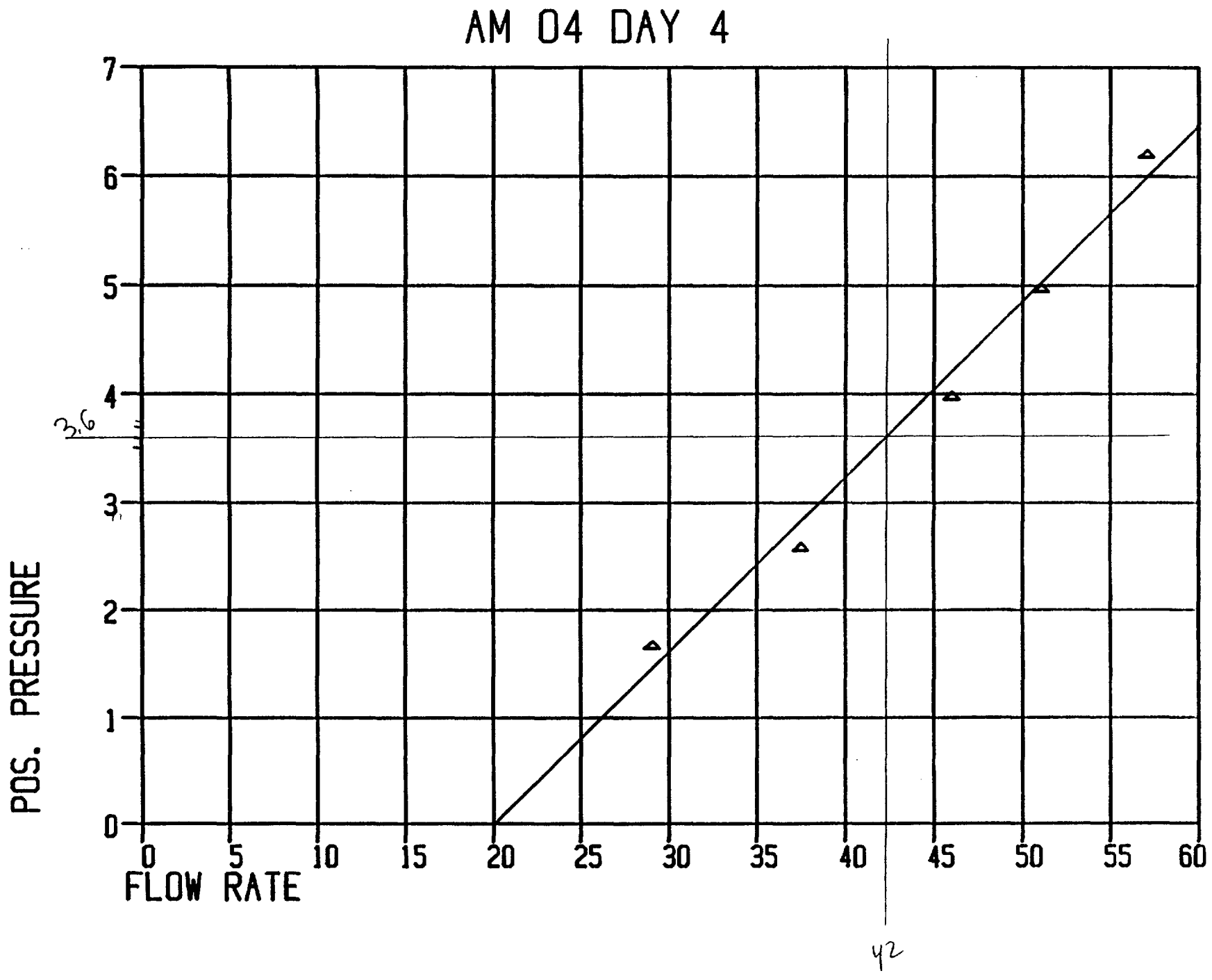
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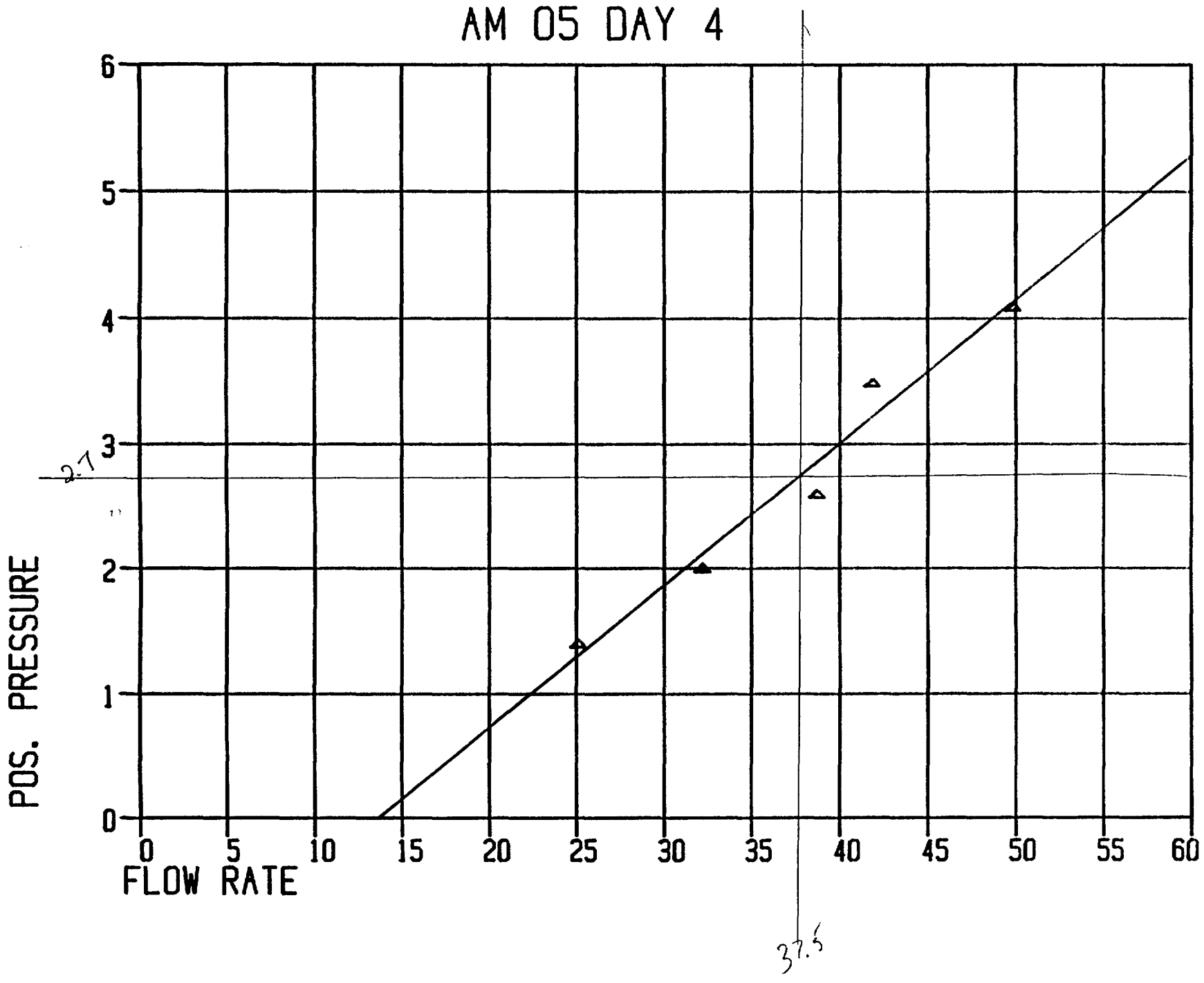
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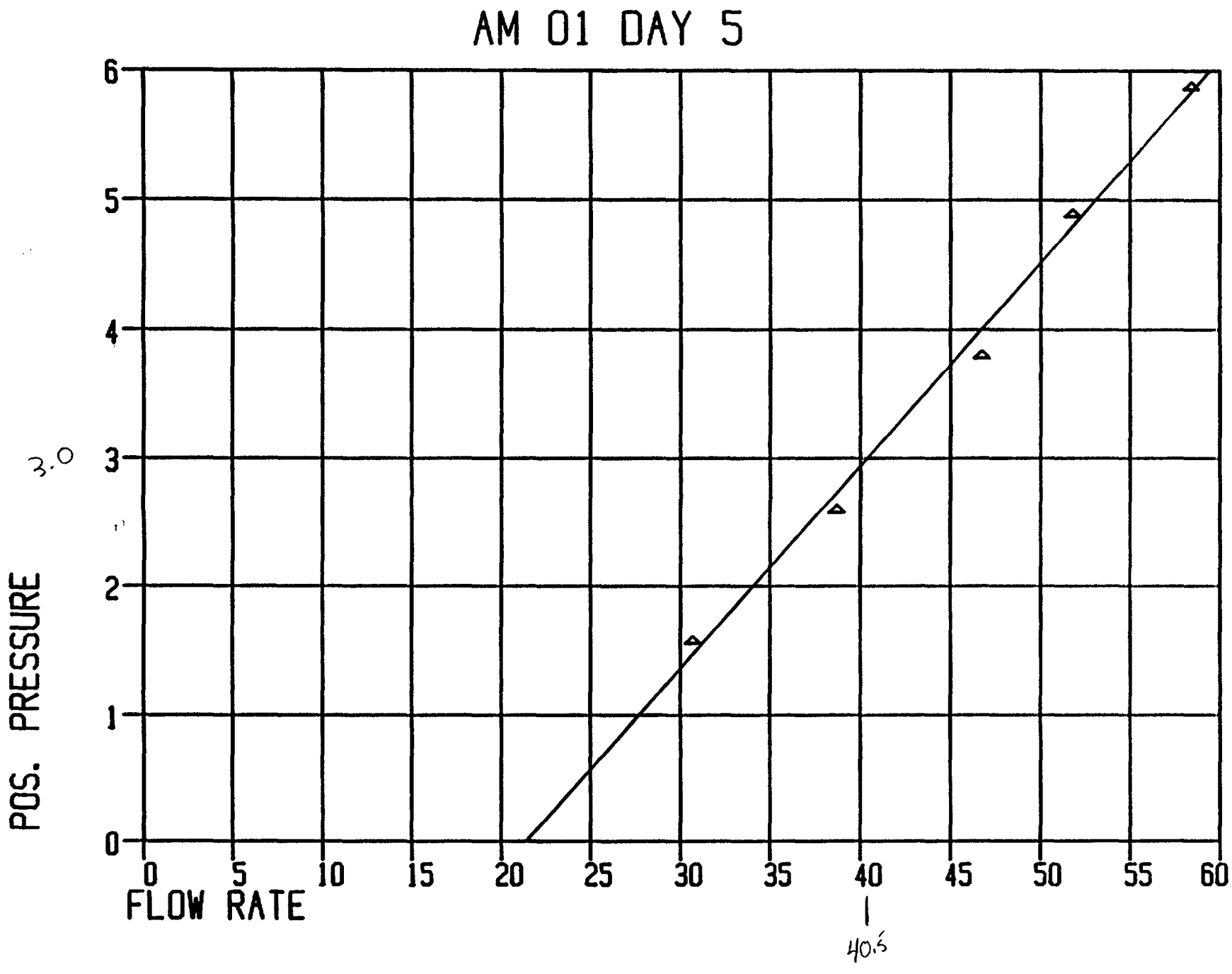
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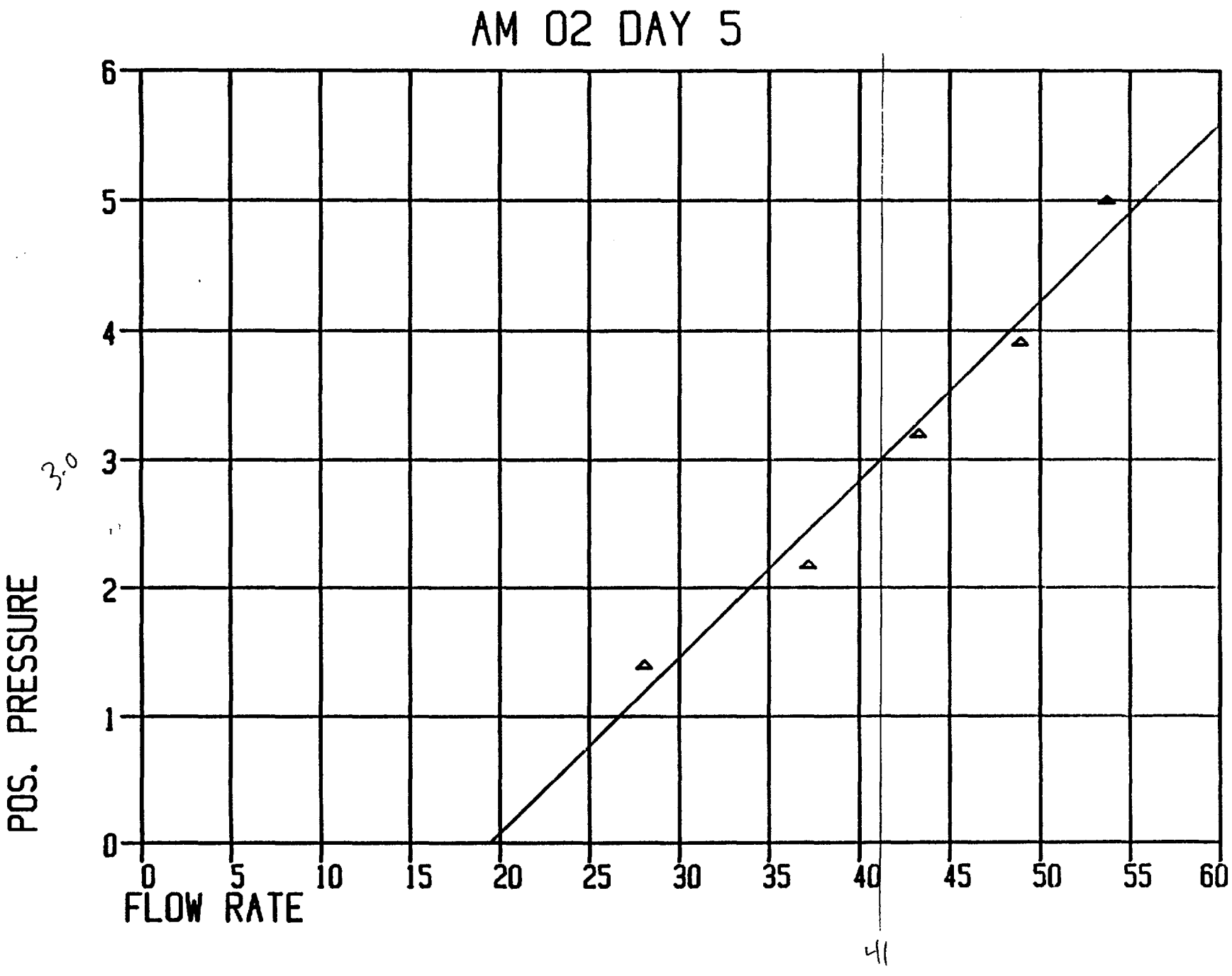
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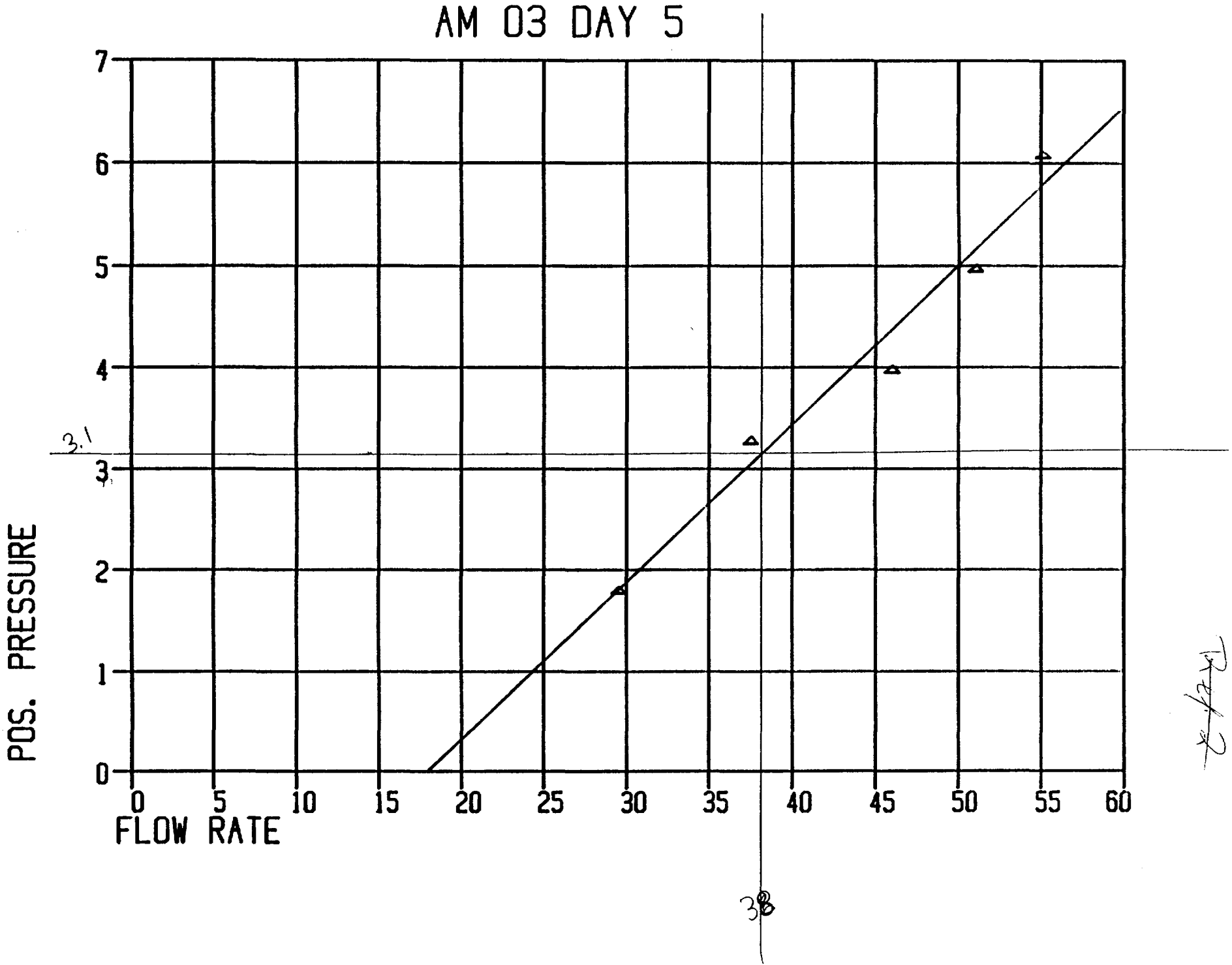
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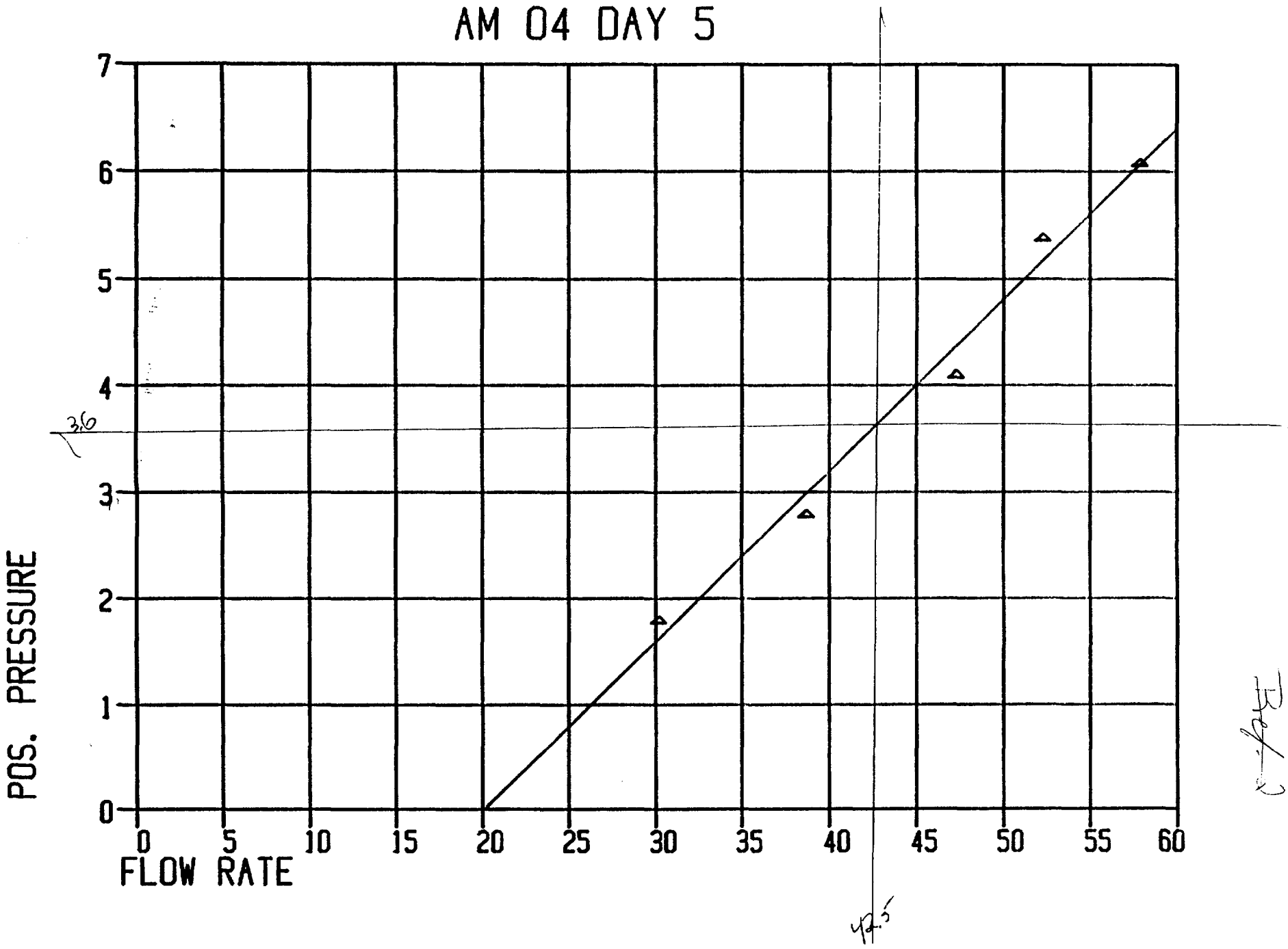
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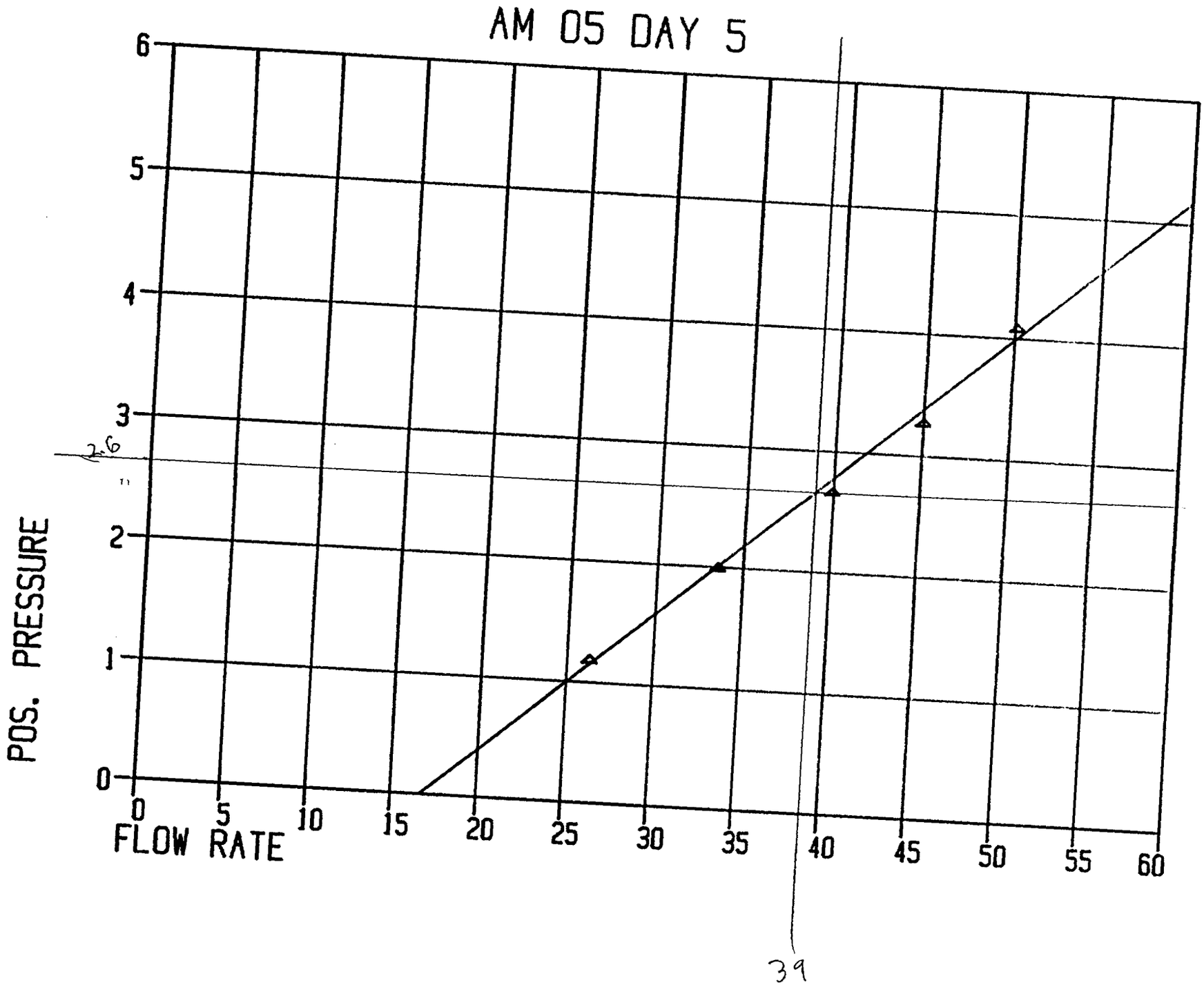
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APPENDIX IV

UPDATED SITE INVESTIGATION FORMS

EPA

POTENTIAL HAZARDOUS WASTE SITE
SITE INSPECTION REPORT
PART 1 - SITE LOCATION AND INSPECTION INFORMATION

I. IDENTIFICATION

01 STATE	02 SITE NUMBER
UT	D980952840

II. SITE NAME AND LOCATION

01 SITE NAME (Legal, common, or descriptive name of site)	02 STREET, ROUTE NO., OR SPECIFIC LOCATION IDENTIFIER
Richardson Flat Tailings	approx. 2.5 miles NE of Park City, Utah

03 CITY	04 STATE	05 ZIP CODE	06 COUNTY	07 COUNTY CODE	08 CONG DIST
Park City	UT	84060	Summit	043	UT-03

09 COORDINATES LATITUDE	LONGITUDE	10 TYPE OF OWNERSHIP (Check one)
40° 40' 50"	111° 26' 40"	☒ A. PRIVATE ☐ B. FEDERAL ☐ C. STATE ☐ D. COUNTY ☐ E. MUNICIPAL ☐ F. OTHER ☐ G. UNKNOWN

III. INSPECTION INFORMATION

01 DATE OF INSPECTION	02 SITE STATUS	03 YEARS OF OPERATION
6 / 19 / 85 * (MONTH DAY YEAR)	☐ ACTIVE ☒ INACTIVE	late 1960's / 1981 (BEGINNING YEAR / ENDING YEAR) ___ UNKNOWN

04 AGENCY PERFORMING INSPECTION (Check all that apply) E&E

☐ A. EPA ☒ B. EPA CONTRACTOR Ecology & Environment Inc (Name of firm) ☐ C. MUNICIPAL ☐ D. MUNICIPAL CONTRACTOR ___ (Name of firm)

☐ E. STATE ☐ F. STATE CONTRACTOR ___ (Name of firm) ☐ G. OTHER ___ (Specify)

05 CHIEF INSPECTOR	06 TITLE	07 ORGANIZATION	08 TELEPHONE NO.
Susan Kennedy	Terrestrial Biologist	E&E	(303) 757-4984

09 OTHER INSPECTORS	10 TITLE	11 ORGANIZATION	12 TELEPHONE NO.
Eric Johnson	EPA Reg. Site Project Officer	EPA	(303) 293-1519
Jeff Holcomb	Chemical Engineer	E&E	(303) 757-4984
Tom Smith	Safety Officer	E&E	(303) 757-4984
Wade Hansen	Geologist	Utah Dept. Env. Health	(801) 533-4145
Rob Smith	Chief Hydrogeologist	E&E	(303) 757-4984
Dave Tuesday	Geochemist	E&E	(303) 757-4984

13 SITE REPRESENTATIVES INTERVIEWED	14 TITLE	15 ADDRESS	16 TELEPHONE NO
E.L. Osika, Jr.	Vice President	United Park City Mines 309 Kearns Bldg. Salt Lake City, UT	(801) 532-4031
Kerry C. Gee	Geologist/ Engineer	same as above	(801) 532-4031
			( )
			( )
			( )
			( )

17 ACCESS GAINED BY (Check one)	18 TIME OF INSPECTION	19 WEATHER CONDITIONS
☒ PERMISSION ☐ WARRANT		varied

IV. INFORMATION AVAILABLE FROM

01 CONTACT	02 OF (Agency/Organization)	03 TELEPHONE NO.
Paula Schmittdiel	EPA - Region VIII Denver	(303) 293-1518

04 PERSON RESPONSIBLE FOR SITE INSPECTION FORM	05 AGENCY	06 ORGANIZATION	07 TELEPHONE NO.	08 DATE
Susan Kennedy	EPA	E&E FIT VIII	(303)757-4984	8 / 27 / 85 (MONTH DAY YEAR)

EPA FORM 2070-13 (7-81)

* 6/19,20/85; 7/30,31/85; 8/1,2/85; 7/7-14/86

Updated: 8/24/87

EPA

POTENTIAL HAZARDOUS WASTE SITE
SITE INSPECTION REPORT
PART 2 - WASTE INFORMATION

I. IDENTIFICATION

01 STATE	02 SITE NUMBER
UT	D980952840

II. WASTE STATES, QUANTITIES, AND CHARACTERISTICS

01 PHYSICAL STATES (Check all that apply)

- [X] A. SOLID
- [X] B. POWDER, FINES
- [ ] C. SLUDGE
- [ ] D. OTHER _____ (Specify)
- [X] E. SLURRY
- [ ] F. LIQUID
- [ ] G. GAS

02 WASTE QUANTITY AT SITE (Measures of waste quantities must be independent)

TONS 2 million[1]

CUBIC YARDS _____

NO. OF DRUMS _____

03 WASTE CHARACTERISTICS (Check all that apply)

- [X] A. TOXIC
- [ ] B. CORROSIVE
- [ ] C. RADIOACTIVE
- [X] D. PERSISTENT
- [X] E. SOLUBLE
- [ ] F. INFECTIOUS
- [ ] G. FLAMMABLE
- [ ] H. IGNITABLE
- [ ] I. HIGHLY VOLATILE
- [ ] J. EXPLOSIVE
- [ ] K. REACTIVE
- [ ] L. INCOMPATIBLE
- [ ] M. NOT APPLICABLE

III. WASTE TYPE

CATEGORY	SUBSTANCE NAME	01 GROSS AMOUNT	02 UNIT OF MEASURE	03 COMMENTS
SLU	SLUDGE			
OLW	OILY WASTE			
SOL	SOLVENTS			
PSD	PESTICIDES			
OCC	OTHER ORGANIC CHEMICALS			
IOC	INORGANIC CHEMICALS	Elevated arsenic, sodium, cyanide.[2]		
ACD	ACIDS			
BAS	BASES			
MES	HEAVY METALS	Heavy metals in tailings material, at least 2 million tons of tailings.		

IV. HAZARDOUS SUBSTANCES (See Appendix for most frequently cited CAS Numbers)

01 CATEGORY	02 SUBSTANCE NAME	03 CAS NUMBER	04 STORAGE/DISPOSAL METHOD	05 CONCENTRATION	06 MEASURE OF CONCENTRATION
IOC	Arsenic	999	Surface impoundment	1650	ug/g *
MES	Cadmium	999	(tailings)	56	ug/g
MES	Copper	999	"	435	ug/g
MES	Lead	999	"	538	ug/g
MES	Manganese	999	"	2280	ug/g
MES	Mercury	999	"	1.24	ug/g
MES	Nickel	7440-02-0	"	23	ug/g
MES	Silver	999	"	21	ug/g
IOC	Sodium	999	"	2998	ug/g
MES	Zinc	999	"	5353	ug/g
IOC	Cyanide	999	"	5.2	ug/g
	* Concentration figured are averages of 4 surface tailings samples				
	(RT-SO-4,5,6 & 7). Total metals.[2]				

V. FEEDSTOCKS (See Appendix for CAS Numbers)

CATEGORY	01 FEEDSTOCK NAME	02 CAS NUMBER	CATEGORY	01 FEEDSTOCK NAME	02 CAS NUMBER
FDS	none		FDS		
FDS			FDS		
FDS			FDS		
FDS			FDS		

VI. SOURCES OF INFORMATION (Cite specific references, e.g., state files, sample analysis, reports)

[1] Memo to File; J. Holcomb; 7/12/85.

[2] Analytical Results Report for Richardson Flat Tailings; Ecology and Environment, Inc. (E&E); 10/25/85; TDD R8-8508-07.

Ref. 3

EPA

POTENTIAL HAZARDOUS WASTE SITE
SITE INSPECTION REPORT
PART 2 - WASTE INFORMATION

I. IDENTIFICATION

01 STATE	02 SITE NUMBER
UT	D980952840

II. WASTE STATES, QUANTITIES, AND CHARACTERISTICS

01 PHYSICAL STATES (Check all that apply)

- A SOLID
- B POWDER, FINES
- C SLUDGE
- D OTHER _____ (Specify)
- E SLURRY
- F LIQUID
- G GAS

02 WASTE QUANTITY AT SITE (Measures of waste quantities must be independent)

TONS _____

CUBIC YARDS _____

NO OF DRUMS _____

03 WASTE CHARACTERISTICS (Check all that apply)

- A TOXIC
- B CORROSIVE
- C RADIOACTIVE
- D PERSISTENT
- E SOLUBLE
- F INFECTIOUS
- G FLAMMABLE
- H IGNITABLE
- I HIGHLY VOLATILE
- J EXPLOSIVE
- K REACTIVE
- L INCOMPATIBLE
- M NOT APPLICABLE

III. WASTE TYPE

CATEGORY	SUBSTANCE NAME	01 GROSS AMOUNT	02 UNIT OF MEASURE	03 COMMENTS
SLU	SLUDGE			
OLW	OILY WASTE			
SOL	SOLVENTS			
PSD	PESTICIDES			
OCC	OTHER ORGANIC CHEMICALS			
IOC	INORGANIC CHEMICALS			
ACD	ACIDS			
BAS	BASES			
MES	HEAVY METALS			

IV. HAZARDOUS SUBSTANCES (See Appendix for most frequently cited CAS Numbers)

01 CATEGORY	02 SUBSTANCE NAME	03 CAS NUMBER	04 STORAGE/DISPOSAL METHOD	05 CONCENTRATION	06 MEASURE OF CONCENTRATION
IOC	Arsenic	999	Surface Impoundment	.0928	ug/m^3 *
MES	Cadmium	999	(tailings)	.0825	ug/m^3
MES	Lead	999	"	1.6478	ug/m^3
MES	Zinc	999	"	1.4478	ug/m^3
	Ref.[3]				

V. FEEDSTOCKS (See Appendix for CAS Numbers)

CATEGORY	01 FEEDSTOCK NAME	02 CAS NUMBER	CATEGORY	01 FEEDSTOCK NAME	02 CAS NUMBER
FDS			FDS		
FDS			FDS		
FDS			FDS		
FDS			FDS		

VI. SOURCES OF INFORMATION (Cite specific references, e.g., state files, sample analysis, reports)

[3] Analytical Results Report of Air Sampling at Richardson Flat; E&E FIT; 9/19/86; TDD R8-8608-05, E&E Files.

EPA

POTENTIAL HAZARDOUS WASTE SITE
SITE INSPECTION REPORT
PART 3 - DESCRIPTION OF HAZARDOUS CONDITIONS AND INCIDENTS

I. IDENTIFICATION	
01 STATE	02 SITE NUMBER
UT	D980952840

II. HAZARDOUS CONDITIONS AND INCIDENTS

01 ☐ X A. GROUNDWATER CONTAMINATION — 02 ☐ OBSERVED (DATE: 8/2/85) ☐ POTENTIAL ☒ ALLEGED
03 POPULATION POTENTIALLY AFFECTED: 8 — 04 NARRATIVE DESCRIPTION

Ground water samples from UPCM wells (RF-GW-2, RF-GW-3) were collected and analyzed. Dissolved metals analyses revealed elevated levels of arsenic, cobalt, iron, manganese, and zinc. Two domestic wells (210' and 222' deep) have been identified within one mile of the site.[4] The best information available[5] indicates the wells are completed in Tertiary volcanic rock composed primarily of andesitic pyroclastics. Wheather water-bearing units of unconsolidated deposits are hydraulically connected to underlying water-bearing unit of Tertiary orgin is not known.

01 ☒ B. SURFACE WATER CONTAMINATION — 02 ☒ OBSERVED (DATE: 6/20/85) ☐ POTENTIAL ☐ ALLEGED
03 POPULATION POTENTIALLY AFFECTED: 414 — 04 NARRATIVE DESCRIPTION

Surface water samples from Silver Creek, collected downgradient of the site, contained elevated levels of lead. RT-SW-3 (downgradient) contained 1985 ug/l lead as compared to RT-SW-1 (upgradient) containing 147 ug/l lead. Arsenic levels were also elevated. Water diverted from Silver Creek is used for pasture-land irrigation (276 acres) within 3-stream miles of the site.[6,7]

01 ☒ C. CONTAMINATION OF AIR — 02 ☒ OBSERVED (DATE: 7/7/86) ☐ POTENTIAL ☐ ALLEGED
03 POPULATION POTENTIALLY AFFECTED: 4500 — 04 NARRATIVE DESCRIPTION

Hi-volume air sampling performed on July 7-14, 1986 verified the release of inorganic contaminants to the air route. A 100 fold increase in airborne lead concentration was detected when comparing upwind versus downwind sampling stations. Values for arsenic, cadmium and zinc are also highly elevated over the background samples.[3] Population residing within a 4-mile radius is approximately 4500.[8]

01 ☐ D. FIRE/EXPLOSIVE CONDITIONS — 02 ☐ OBSERVED (DATE:) ☐ POTENTIAL ☐ ALLEGED
03 POPULATION POTENTIALLY AFFECTED: 0 — 04 NARRATIVE DESCRIPTION

No recorded history -- fire and explosive conditions do not exist at the site.

01 ☐ X E. DIRECT CONTACT — 02 ☐ OBSERVED (DATE:) ☒ POTENTIAL ☐ ALLEGED
03 POPULATION POTENTIALLY AFFECTED: 4500 — 04 NARRATIVE DESCRIPTION

The site is not secured from public access or access by domestic livestock. On June 19 and 20, vehicles were observed driving near the tailings area along the access road. Sheep and cattle were observed walking on the tailings on June 19 and 20, 1985.

01 ☐ X F. CONTAMINATION OF SOIL — 02 ☐ OBSERVED (DATE: 8/2/85) ☐ POTENTIAL ☒ ALLEGED
03 AREA POTENTIALLY AFFECTED: 640 (Acres) — 04 NARRATIVE DESCRIPTION

Soil beneath the the tailings (RF-SS-6) contains elevated concentrations of antimony, arsenic, cadmium, copper, lead, magnesium, mercury, silver, sodium and zinc. Off site surface soil (RT-SO-1) contained elevated levels of arsenic, cadmium, lead, mercury and zinc probably due to wind deposition.[2]

01 ☒ G. DRINKING WATER CONTAMINATION — 02 ☐ OBSERVED (DATE:) ☒ POTENTIAL ☐ ALLEGED
03 POPULATION POTENTIALLY AFFECTED: 8 — 04 NARRATIVE DESCRIPTION

Two domestic wells are located within one mile of the tailings.[4] Surface water from Silver Creek is not used for drinking water.[9]

01 ☒ H. WORKER EXPOSURE/INJURY — 02 ☐ OBSERVED (DATE:) ☒ POTENTIAL ☐ ALLEGED
03 WORKERS POTENTIALLY AFFECTED: 5 — 04 NARRATIVE DESCRIPTION

The tailings are being removed by Mr. Ray Wortley to be used as backfill for sewer lines and road base. In addition, FIT members observed heavy equipment operators dumping what appeared to be native soil on the tailings area. Observations were made on June 19 and 20, 1985.

01 ☐ X I. POPULATION EXPOSURE/INJURY — 02 ☐ OBSERVED (DATE:) ☒ POTENTIAL ☐ ALLEGED
03 POPULATION POTENTIALLY AFFECTED: 4500 — 04 NARRATIVE DESCRIPTION

No recorded history of population exposure or injury, however, the site is not secured from public access or domestic livestock grazing. Population exposure of concern include airborne contaminants, food chain contamination associated with the surface water route, and threat to domestic wells.

EPA

POTENTIAL HAZARDOUS WASTE SITE
SITE INSPECTION REPORT
PART 3 - DESCRIPTION OF HAZARDOUS CONDITIONS AND INCIDENTS

I. IDENTIFICATION

01 STATE	02 SITE NUMBER
UT	D980952840

II. HAZARDOUS CONDITIONS AND INCIDENTS (Continued)

01 ☒ J. DAMAGE TO FLORA — 02 ☒ OBSERVED (DATE: 6/19/85) ☐ POTENTIAL ☐ ALLEGED
04 NARRATIVE DESCRIPTION
Peripheral tailings support vegetation including Juncus sp., Salix sp. and Verbascum thapsus, but most of the tailings are denuded due to high levels of soluble salts and metals.

01 ☒ K. DAMAGE TO FAUNA — 02 ☐ OBSERVED (DATE: _____) ☒ POTENTIAL ☐ ALLEGED
04 NARRATIVE DESCRIPTION (Include name(s) of species)
No apparent damage to area fauna. Two muskrats were observed swimming in the drainage ditch on site (near RT-SW-4). Fish in Silver Creek could potentially be affected by lead and arsenic released from the tailings.

01 ☒ L. CONTAMINATION OF FOOD CHAIN — 02 ☐ OBSERVED (DATE: _____) ☒ POTENTIAL ☐ ALLEGED
04 NARRATIVE DESCRIPTION
The possibility exists for metals to move through the food chain 1) by domestic livestock grazing in areas where soil is contaminated; 2) by heavy metal concentration in local fish populations.

01 ☒ M. UNSTABLE CONTAINMENT OF WASTES (Spills/Runoff/Standing liquids, Leaking drums) — 02 ☐ OBSERVED (DATE: _____) ☐ POTENTIAL ☐ ALLEGED
03 POPULATION POTENTIALLY AFFECTED: 4500 — 04 NARRATIVE DESCRIPTION
Tailings ponds are uncovered and therefore susceptible to gusty winds which carry fine-grain tailings material off-site. A dam constructed at the northwest end of the tailings prevents mass movement of solid material off-site.

01 ☒ N. DAMAGE TO OFFSITE PROPERTY — 02 ☐ OBSERVED (DATE: _____) ☒ POTENTIAL ☐ ALLEGED
04 NARRATIVE DESCRIPTION
The potential exists for damage to off-site property because the tailings material is allegedly being used as sewer line backfill and road base in the Park City area.

01 ☒ O. CONTAMINATION OF SEWERS, STORM DRAINS, WWTPs — 02 ☐ OBSERVED (DATE: _____) ☒ POTENTIAL ☐ ALLEGED
04 NARRATIVE DESCRIPTION
If tailings material is being used as sewer line backfill, the potential exists for sewer contamination by metals.

01 ☐ P. ILLEGAL/UNAUTHORIZED DUMPING — 02 ☐ OBSERVED (DATE: _____) ☐ POTENTIAL ☐ ALLEGED
04 NARRATIVE DESCRIPTION
Dumping of native soil on to the tailings was observed by FTT members, but is under the supervision of United Park City Mines.

05 DESCRIPTION OF ANY OTHER KNOWN, POTENTIAL, OR ALLEGED HAZARDS
No other hazards are known.

III. TOTAL POPULATION POTENTIALLY AFFECTED: 4500

IV. COMMENTS

V. SOURCES OF INFORMATION (Cite specific references, e.g., state files, sample analysis, reports)

4 Well Logs (#34833 and #A-34356).
5 Water Resources of the Heber-Kamas - Park City Area North-Central Utah; Tech. Publ. No. 27.
6 Telecon; S. Kennedy to J. Anderson; 7/18/85.
7 Weber River Decree and Corresponding Plat.
8 Telecon; S. Kennedy to J. Harrington; 9/4/85.
9 Telecon; S. Kennedy to L. Mize; 7/17/85.

Ref 2

EPA

POTENTIAL HAZARDOUS WASTE SITE
SITE INSPECTION
PART 4 - PERMIT AND DESCRIPTIVE INFORMATION

I. IDENTIFICATION

01 STATE	02 SITE NUMBER
UT	D980952840

II. PERMIT INFORMATION

01 TYPE OF PERMIT ISSUED (Check all that apply)	02 PERMIT NUMBER	03 DATE ISSUED	04 EXPIRATION DATE	05 COMMENTS
☐ A. NPDES				
☐ B. UIC				
☐ C. AIR				
☐ D. RCRA				
☐ E. RCRA INTERIM STATUS				
☐ F. SPCC PLAN				
☐ G. STATE (Specify)				
☐ H. LOCAL (Specify)				
☐ I. OTHER (Specify)				
☒ J. NONE				

III. SITE DESCRIPTION

01 STORAGE/DISPOSAL (Check all that apply)	02 AMOUNT	03 UNIT OF MEASURE
☒ A. SURFACE IMPOUNDMENT	2 million	tons
☐ B. PILES		
☐ C. DRUMS, ABOVE GROUND		
☐ D. TANK, ABOVE GROUND		
☐ E. TANK, BELOW GROUND		
☐ F. LANDFILL		
☐ G. LANDFARM		
☐ H. OPEN DUMP		
☐ I. OTHER (Specify)		

04 TREATMENT (Check all that apply)
- ☐ A. INCENERATION
- ☐ B. UNDERGROUND INJECTION
- ☐ C. CHEMICAL/PHYSICAL
- ☐ D. BIOLOGICAL
- ☐ E. WASTE OIL PROCESSING
- ☐ F. SOLVENT RECOVERY
- ☐ G. OTHER RECYCLING/RECOVERY
- ☐ H. OTHER (Specify)

05 OTHER
- ☐ A. BUILDINGS ON SITE

None

06 AREA OF SITE: 160 (Acres)

07 COMMENTS

Slurry, generated from milling activities, was piped to the Richardson Flat area and currently covers approximately 160 acres. The metal sulfide, and carbonate-containing tailings material is presently a solid matrix. An ephemeral pond overlies a portion of the tailings.

IV. CONTAINMENT

01 CONTAINMENT OF WASTES (Check one)

☐ A. ADEQUATE, SECURE ☐ B. MODERATE ☒ C. INADEQUATE, POOR ☐ D. INSECURE, UNSOUND, DANGEROUS

02 DESCRIPTION OF DRUMS, DIKING, LINERS, BARRIERS, ETC.

A dam at the northwest extension of the tailings is the only form of artificial containment on site. The tailings material is uncovered, and no underlying liner is present.

V. ACCESSIBILITY

01 WASTE EASILY ACCESSIBLE: ☒ YES ☐ NO

02 COMMENTS

The site is not secured from public access or domestic livestock grazing.

VI. SOURCES OF INFORMATION (Cite specific references, e.g. state files, sample analysis, reports)

See pages 2, 2A and 4.

Rev 2

EPA

POTENTIAL HAZARDOUS WASTE SITE
SITE INSPECTION REPORT
PART 5 - WATER, DEMOGRAPHIC, AND ENVIRONMENTAL DATA

I. IDENTIFICATION

01 STATE	02 SITE NUMBER
UT	D980952840

II. DRINKING WATER SUPPLY

01 TYPE OF DRINKING SUPPLY (Check as applicable)

	SURFACE	WELL
COMMUNITY	A. ☐	B. ☐
NON-COMMUNITY	C. ☐	D. ☒

02 STATUS

ENDANGERED	AFFECTED	MONITORED
A. ☒	B. ☐	C. ☐
D. ☐	E. ☐	F. ☐

03 DISTANCE TO SITE

A. 3/4 (mi)

B. _____ (mi)

III. GROUNDWATER

01 GROUNDWATER USE IN VICINITY (Check one)

☐ A. ONLY SOURCE FOR DRINKING ☒ B. DRINKING (Other sources available) COMMERCIAL, INDUSTRIAL, IRRIGATION (No other water sources available) ☐ C. COMMERCIAL, INDUSTRIAL, IRRIGATION (Limited other sources available) ☐ D. NOT USED, UNUSEABLE

02 POPULATION SERVED BY GROUND WATER 8

03 DISTANCE TO NEAREST DRINKING WATER WELL 3/4 (mi)

04 DEPTH TO GROUNDWATER	05 DIRECTION OF GROUNDWATER FLOW	06 DEPTH TO AQUIFER OF CONCERN	07 POTENTIAL YIELD OF AQUIFER	08 SOLE SOURCE AQUIFER
50 4 (ft)	north	50 (ft)	unknown (gpd)	☐ YES ☒ NO

09 DESCRIPTION OF WELLS (Including usage, depth, and location relative to population and buildings)

According to State records, two private domestic wells are located approximately 4000 feet southwest of the site. One of the wells is 210 feet deep with a static water level of 42 feet. The second well is 222 feet deep with a static water level of 55 feet.

10 RECHARGE AREA		11 DISCHARGE AREA	
☒ YES ☐ NO	COMMENTS	☐ YES ☒ NO	COMMENTS

IV. SURFACE WATER

01 SURFACE WATER USE (Check one)

☐ A. RESERVOIR, RECREATION DRINKING WATER SOURCE ☒ B. IRRIGATION, ECONOMICALLY IMPORTANT RESOURCES ☐ C. COMMERCIAL, INDUSTRIAL ☐ D. NOT CURRENTLY USED

02 AFFECTED/POTENTIALLY AFFECTED BODIES OF WATER

NAME:	AFFECTED	DISTANCE TO SITE
Silver Creek	☒	approx. 300' (mi)
GM Pace Ditch	☐	approx. 400' (mi)
	☐	(mi)

V. DEMOGRAPHIC AND PROPERTY INFORMATION

01 TOTAL POPULATION WITHIN

ONE (1) MILE OF SITE	TWO (2) MILES OF SITE	THREE (3) MILES OF SITE
A. 0 NO. OF PERSONS	B. 8 NO. OF PERSONS	C. 95 NO. OF PERSONS

(house count from topo 1955)

02 DISTANCE TO NEAREST POPULATION 1.9 (mi)

03 NUMBER OF BUILDINGS WITHIN TWO (2) MILES OF SITE 2

04 DISTANCE TO NEAREST OFF-SITE BUILDING 1.9 (mi)

05 POPULATION WITHIN VICINITY OF SITE (Provide narrative description of nature of population within vicinity of site, e.g., rural, village, densely populated urban area)

Park City, Utah is approximately 2.5 miles southwest of the site. The population fluctuates from 4500 to 10,000 during the winter ski season. The year-round permanent population is approximately 4500.

Ref 2

EPA

POTENTIAL HAZARDOUS WASTE SITE
SITE INSPECTION REPORT
PART 5 - WATER, DEMOGRAPHIC, AND ENVIRONMENTAL DATA

I. IDENTIFICATION

01 STATE	02 SITE NUMBER
UT	D980952840

VI. ENVIRONMENTAL INFORMATION

01 PERMEABILITY OF UNSATURATED ZONE (Check one)

☐ A. $10^{-6} - 10^{-8}$ cm/sec ☐ B. $10^{-4} - 10^{-6}$ cm/sec ☐ C. $10^{-4} - 10^{-3}$ cm/sec ☒ D. GREATER THAN 10^{-3} cm/sec

02 PERMEABILITY OF BEDROCK (Check one)

☐ A. IMPERMEABLE (Less than 10^{-6} cm/sec) ☒ B. RELATIVELY IMPERMEABLE ($10^{-4} - 10^{-6}$ cm/sec) ☐ C. RELATIVELY PERMEABLE ($10^{-2} - 10^{-4}$ cm/sec) ☐ D. VERY PERMEABLE (Greater than 10^{-2} cm/sec)

03 DEPTH TO BEDROCK	04 DEPTH OF CONTAMINATED SOIL ZONE	05 SOIL pH
25 (ft)	unknown (ft)	7.74

06 NET PRECIPITATION	07 ONE YEAR 24 HOUR RAINFALL	08 SLOPE: SITE SLOPE	DIRECTION OF SITE SLOPE	TERRAIN AVERAGE SLOPE
-12 (in)	1.25 (in)	0-5 %	north northeast	0-5 %

09 FLOOD POTENTIAL

SITE IS IN 100 YEAR FLOODPLAIN

10 ☐ SITE IS ON BARRIER ISLAND, COASTAL HIGH HAZARD AREA, RIVERINE FLOODWAY

11 DISTANCE TO WETLANDS (5 acre minimum)

ESTUARINE: A. N/A (mi)

OTHER (freshwater): B. 0.25 (mi)

12 DISTANCE TO CRITICAL HABITAT (of endangered species)

N/A (mi)

ENDANGERED SPECIES: no endangered species in Park City area.[10]

13 LAND USE IN VICINITY

DISTANCE TO:

COMMERCIAL/INDUSTRIAL: A. 1.5 (mi)

RESIDENTIAL AREAS; NATIONAL/STATE PARKS, FORESTS, OR WILDLIFE RESERVES: 6 mi. National Forest; 1.5 mi. Residential Area; B. 2 (mi)

AGRICULTURAL LANDS — PRIME AG LAND: C. N/A (mi); AG LAND: D. <1 mile (mi) adjacent to site pastureland, hay

14 DESCRIPTION OF SITE IN RELATION TO SURROUNDING TOPOGRAPHY

Richardson Flat is a natural depression at the base of the Wasatch Range, adjacent to Silver Creek.

VII. SOURCES OF INFORMATION (Cite specific references, e.g., state files, sample analysis, reports)

[10] Telecon; S. Kennedy to Larry England; 9/4/85.

Ref 2

EPA

POTENTIAL HAZARDOUS WASTE SITE
SITE INSPECTION REPORT
PART 6 - SAMPLE AND FIELD INFORMATION

I. IDENTIFICATION

01 STATE	02 SITE NUMBER
UT	D980952840

II. SAMPLES TAKEN

SAMPLE TYPE	01 NUMBER OF SAMPLES TAKEN	02 SAMPLES SENT TO	03 ESTIMATED DATE RESULTS AVAILABLE
GROUNDWATER	3	EPA Region 8 Laboratory, Lakewood, CO	Rec'd 10/16/85
SURFACE WATER	6	" " "	Rec'd 7/12/85
WASTE Tailings Surface Subsurface	4 4	" " " EPA Region 8 Lab & Versar Inc. Springfield VA	Rec'd 7/12/85 Rec'd 10/16/85
AIR (High-vol)	29	Hittman-Ebasco, Columbia, MD	8/86
RUNOFF			
SPILL			
SOIL Surface Subsurface	1 2	EPA Region 8 Lab, Lakewood, CO EPA Region 8 Lab & Versar, Inc. Springfield VA	Rec'd 7/12/85 Rec'd 10/16/85
VEGETATION			
OTHER			

III. FIELD MEASUREMENTS TAKEN

01 TYPE	02 COMMENTS
pH	Ground water samples ranged from 6.43 to 6.89 Surface water samples (Silver Cr. tailings ditch) ranged from 7.26 to 7.54
temperature	Ground water 9.5°C to 11°C Surface water 19°C to 20°C
conductivity	Ground water 350 to 1450 umhos/cm Surface water 550 to 1400 umhos/cm
volatile organics (HNu)	No readings greater than background
radiation	No readings greater than background

IV. PHOTOGRAPHS AND MAPS

01 TYPE ☒ GROUND ☐ AERIAL

02 IN CUSTODY OF Ecology and Environment FIT VIII Files (Name of organization or individual)

03 MAPS ☒ YES ☐ NO

04 LOCATION OF MAPS Ecology and Environment FIT VIII Files

V. OTHER FIELD DATA COLLECTED (Provide narrative description)

VI. SOURCES OF INFORMATION (Cite specific references, e.g., state files, sample analysis, reports)

See pages 2, 2A, 4 and 7.

EPA

POTENTIAL HAZARDOUS WASTE SITE
SITE INSPECTION REPORT
PART 7 - OWNER INFORMATION

I. IDENTIFICATION

01 STATE	02 SITE NUMBER
UT	D980952840

II. CURRENT OWNER(S) / **PARENT COMPANY** (If applicable)

01 NAME	02 D+B NUMBER	08 NAME	09 D+B NUMBER
United Park City Mines Co.		N/A	

03 STREET ADDRESS (P.O. Box, RFD #, etc.)	04 SIC CODE	10 STREET ADDRESS (P.O. Box, RFD #, etc.)	11 SIC CODE
309 Kearns Bldg.			

05 CITY	06 STATE	07 ZIP CODE	12 CITY	13 STATE	14 ZIP CODE
Salt Lake City	UT	84101			

01 NAME	02 D+B NUMBER	08 NAME	09 D+B NUMBER

03 STREET ADDRESS (P.O. Box, RFD #, etc.)	04 SIC CODE	10 STREET ADDRESS (P.O. Box, RFD #, etc.)	11 SIC CODE

05 CITY	06 STATE	07 ZIP CODE	12 CITY	13 STATE	14 ZIP CODE

01 NAME	02 D+B NUMBER	08 NAME	09 D+B NUMBER

03 STREET ADDRESS (P.O. Box, RFD #, etc.)	04 SIC CODE	10 STREET ADDRESS (P.O. Box, RFD #, etc.)	11 SIC CODE

05 CITY	06 STATE	07 ZIP CODE	12 CITY	13 STATE	14 ZIP CODE

01 NAME	02 D+B NUMBER	08 NAME	09 D+B NUMBER

03 STREET ADDRESS (P.O. Box, RFD #, etc.)	04 SIC CODE	10 STREET ADDRESS (P.O. Box, RFD #, etc.)	11 SIC CODE

05 CITY	06 STATE	07 ZIP CODE	12 CITY	13 STATE	14 ZIP CODE

III. PREVIOUS OWNER(S) (List most recent first) / **IV. REALTY OWNER(S)** (If applicable; list most recent first)

01 NAME	02 D+B NUMBER	01 NAME	02 D+B NUMBER

03 STREET ADDRESS (P.O. Box, RFD #, etc.)	04 SIC CODE	03 STREET ADDRESS (P.O. Box, RFD #, etc.)	04 SIC CODE

05 CITY	06 STATE	07 ZIP CODE	05 CITY	06 STATE	07 ZIP CODE

01 NAME	02 D+B NUMBER	01 NAME	02 D+B NUMBER

03 STREET ADDRESS (P.O. Box, RFD #, etc.)	04 SIC CODE	03 STREET ADDRESS (P.O. Box, RFD #, etc.)	04 SIC CODE

05 CITY	06 STATE	07 ZIP CODE	05 CITY	06 STATE	07 ZIP CODE

01 NAME	02 D+B NUMBER	01 NAME	02 D+B NUMBER

03 STREET ADDRESS (P.O. Box, RFD #, etc.)	04 SIC CODE	03 STREET ADDRESS (P.O. Box, RFD #, etc.)	04 SIC CODE

05 CITY	06 STATE	07 ZIP CODE	05 CITY	06 STATE	07 ZIP CODE

V. SOURCES OF INFORMATION (Cite specific references, e.g. state files, sample analysis, reports)

See pages 2, 2A, 4 and 7.

EPA

POTENTIAL HAZARDOUS WASTE SITE
SITE INSPECTION REPORT
PART 8 - OPERATOR INFORMATION

I. IDENTIFICATION

01 STATE	02 SITE NUMBER
UT	D980952840

II. CURRENT OPERATOR (Provide if different from owner) / **OPERATOR'S PARENT COMPANY** (If applicable)

01 NAME	02 D+B NUMBER	10 NAME	11 D+B NUMBER
United Park City Mines, Co		N/A	

03 STREET ADDRESS (P.O. Box, RFD #, etc.)	04 SIC CODE	12 STREET ADDRESS (P.O. Box, RFD #, etc.)	13 SIC CODE
309 Kearns Bldg.			

05 CITY	06 STATE	07 ZIP CODE	14 CITY	15 STATE	16 ZIP CODE
Salt Lake City	UT	84101			

08 YEARS OF OPERATION	09 NAME OF OWNER
	same as above.

III. PREVIOUS OPERATOR(S) (List most recent first; provide only if different from owner) / **PREVIOUS OPERATORS' PARENT COMPANIES** (If applicable)

01 NAME	02 D+B NUMBER	10 NAME	11 D+B NUMBER

03 STREET ADDRESS (P.O. Box, RFD #, etc.)	04 SIC CODE	12 STREET ADDRESS (P.O. Box, RFD #, etc.)	13 SIC CODE

05 CITY	06 STATE	07 ZIP CODE	14 CITY	15 STATE	16 ZIP CODE

08 YEARS OF OPERATION	09 NAME OF OWNER DURING THIS PERIOD

01 NAME	02 D+B NUMBER	10 NAME	11 D+B NUMBER

03 STREET ADDRESS (P.O. Box, RFD #, etc.)	04 SIC CODE	12 STREET ADDRESS (P.O. Box, RFD #, etc.)	13 SIC CODE

05 CITY	06 STATE	07 ZIP CODE	14 CITY	15 STATE	16 ZIP CODE

08 YEARS OF OPERATION	09 NAME OF OWNER DURING THIS PERIOD

01 NAME	02 D+B NUMBER	10 NAME	11 D+B NUMBER

03 STREET ADDRESS (P.O. Box, RFD #, etc.)	04 SIC CODE	12 STREET ADDRESS (P.O. Box, RFD #, etc.)	13 SIC CODE

05 CITY	06 STATE	07 ZIP CODE	14 CITY	15 STATE	16 ZIP CODE

08 YEARS OF OPERATION	09 NAME OF OWNER DURING THIS PERIOD

IV. SOURCES OF INFORMATION (Cite specific references, e.g., state files, sample analysis, reports)

See pages 2, 2A, 4 and 7.

EPA

POTENTIAL HAZARDOUS WASTE SITE
SITE INSPECTION REPORT
PART 9 - GENERATOR/TRANSPORTER INFORMATION

I. IDENTIFICATION	
01 STATE	02 SITE NUMBER
UT	D980952840

II. ON-SITE GENERATOR

01 NAME	02 D+B NUMBER
None	
03 STREET ADDRESS (P.O. Box, RFD #, etc.)	04 SIC CODE
05 CITY	06 STATE / 07 ZIP CODE

III. OFF-SITE GENERATOR(S)

01 NAME	02 D+B NUMBER	01 NAME	02 D+B NUMBER
None			
03 STREET ADDRESS (P.O. Box, RFD #, etc.)	04 SIC CODE	03 STREET ADDRESS (P.O. Box, RFD #, etc.)	04 SIC CODE
05 CITY	06 STATE / 07 ZIP CODE	05 CITY	06 STATE / 07 ZIP CODE
01 NAME	02 D+B NUMBER	01 NAME	02 D+B NUMBER
03 STREET ADDRESS (P.O. Box, RFD #, etc.)	04 SIC CODE	03 STREET ADDRESS (P.O. Box, RFD #, etc.)	04 SIC CODE
05 CITY	06 STATE / 07 ZIP CODE	05 CITY	06 STATE / 07 ZIP CODE

IV. TRANSPORTER(S)

01 NAME	02 D+B NUMBER	01 NAME	02 D+B NUMBER
Mr. Ray Wortley *			
03 STREET ADDRESS (P.O. Box, RFD #, etc.)	04 SIC CODE	03 STREET ADDRESS (P.O. Box, RFD #, etc.)	04 SIC CODE
unknown			
05 CITY	06 STATE / 07 ZIP CODE	05 CITY	06 STATE / 07 ZIP CODE
01 NAME	02 D+B NUMBER	01 NAME	02 D+B NUMBER
03 STREET ADDRESS (P.O. Box, RFD #, etc.)	04 SIC CODE	03 STREET ADDRESS (P.O. Box, RFD #, etc.)	04 SIC CODE
05 CITY	06 STATE / 07 ZIP CODE	05 CITY	06 STATE / 07 ZIP CODE

V. SOURCES OF INFORMATION (Cite specific references, e.g., state files, sample analysis, reports)

* Alledgedly removes tailings material for use as sewer line backfill and roadbase.

11 Site Inspection Report, Richardson Flat Tailings; Utah Bureau of Solid and Hazardous Waste; 9/4/84; in E&E files under TDD R8-8504-23.

EPA

POTENTIAL HAZARDOUS WASTE SITE
SITE INSPECTION REPORT
PART 10 - PAST RESPONSE ACTIVITIES

I. IDENTIFICATION	
01 STATE	02 SITE NUMBER
UT	D980952840

II. PAST RESPONSE ACTIVITIES

01 ☐ A. WATER SUPPLY CLOSED — 02 DATE _____ — 03 AGENCY _____
04 DESCRIPTION
No recorded history.

01 ☐ B. TEMPORARY WATER SUPPLY PROVIDED — 02 DATE _____ — 03 AGENCY _____
04 DESCRIPTION
None observed or reported.

01 ☐ C. PERMANENT WATER SUPPLY PROVIDED — 02 DATE _____ — 03 AGENCY _____
04 DESCRIPTION
None observed or reported.

01 ☐ D. SPILLED MATERIAL REMOVED — 02 DATE _____ — 03 AGENCY _____
04 DESCRIPTION
None observed or reported.

01 ☐ E. CONTAMINATED SOIL REMOVED — 02 DATE _____ — 03 AGENCY _____
04 DESCRIPTION
None observed or reported.

01 ☐ F. WASTE REPACKAGED — 02 DATE _____ — 03 AGENCY _____
04 DESCRIPTION
None observed or reported.

01 ☐ G. WASTE DISPOSED ELSEWHERE — 02 DATE _____ — 03 AGENCY _____
04 DESCRIPTION
None observed or reported.

01 ☐ H. ON SITE BURIAL — 02 DATE _____ — 03 AGENCY _____
04 DESCRIPTION
None observed or reported.

01 ☐ I. IN SITU CHEMICAL TREATMENT — 02 DATE _____ — 03 AGENCY _____
04 DESCRIPTION
None observed or reported.

01 ☐ J. IN SITU BIOLOGICAL TREATMENT — 02 DATE _____ — 03 AGENCY _____
04 DESCRIPTION
None observed or reported.

01 ☐ K. IN SITU PHYSICAL TREATMENT — 02 DATE _____ — 03 AGENCY _____
04 DESCRIPTION
None observed or reported.

01 ☐ L. ENCAPSULATION — 02 DATE _____ — 03 AGENCY _____
04 DESCRIPTION
None observed or reported.

01 ☐ M. EMERGENCY WASTE TREATMENT — 02 DATE _____ — 03 AGENCY _____
04 DESCRIPTION
None observed or reported.

01 ☐ N. CUTOFF WALLS — 02 DATE _____ — 03 AGENCY _____
04 DESCRIPTION
None observed or reported.

01 ☒ O. EMERGENCY DIKING/SURFACE WATER DIVERSION — 02 DATE _____ — 03 AGENCY _____
04 DESCRIPTION
A dam was built at the northwestern extension of the tailings to contain the ponded water.

01 ☐ P. CUTOFF TRENCHES/SUMP — 02 DATE _____ — 03 AGENCY _____
04 DESCRIPTION
None observed or reported.

01 ☐ Q. SUBSURFACE CUTOFF WALL — 02 DATE _____ — 03 AGENCY _____
04 DESCRIPTION
None observed or reported.

EPA

POTENTIAL HAZARDOUS WASTE SITE
SITE INSPECTION REPORT
PART 10 - PAST RESPONSE ACTIVITIES

I. IDENTIFICATION	
01 STATE	02 SITE NUMBER
UT	D980952840

II PAST RESPONSE ACTIVITIES *(Continued)*

01 ☐ R. BARRIER WALLS CONSTRUCTED — 02 DATE _____ — 03 AGENCY _____
04 DESCRIPTION
None observed or reported.

01 ☐ S. CAPPING/COVERING — 02 DATE _____ — 03 AGENCY _____
04 DESCRIPTION
None observed or reported.

01 ☐ T. BULK TANKAGE REPAIRED — 02 DATE _____ — 03 AGENCY _____
04 DESCRIPTION
None observed or reported.

01 ☐ U. GROUT CURTAIN CONSTRUCTED — 02 DATE _____ — 03 AGENCY _____
04 DESCRIPTION
None observed or reported.

01 ☐ V. BOTTOM SEALED — 02 DATE _____ — 03 AGENCY _____
04 DESCRIPTION
None observed or reported.

01 ☐ W. GAS CONTROL — 02 DATE _____ — 03 AGENCY _____
04 DESCRIPTION
None observed or reported.

01 ☐ X. FIRE CONTROL — 02 DATE _____ — 03 AGENCY _____
04 DESCRIPTION
None observed or reported.

01 ☐ Y. LEACHATE TREATMENT — 02 DATE _____ — 03 AGENCY _____
04 DESCRIPTION
None observed or reported.

01 ☐ Z. AREA EVACUATED — 02 DATE _____ — 03 AGENCY _____
04 DESCRIPTION
None observed or reported.

01 ☐ 1. ACCESS TO SITE RESTRICTED — 02 DATE _____ — 03 AGENCY _____
04 DESCRIPTION
None observed or reported.

01 ☐ 2. POPULATION RELOCATED — 02 DATE _____ — 03 AGENCY _____
04 DESCRIPTION
None observed or reported.

01 ☐ 3. OTHER REMEDIAL ACTIVITIES — 02 DATE _____ — 03 AGENCY _____
04 DESCRIPTION
None observed or reported.

III. SOURCES OF INFORMATION *(Cite specific references, e.g., state files, sample analysis, reports)*

See pages 2, 2A, 4 and 7 and 11.

EPA

POTENTIAL HAZARDOUS WASTE SITE
SITE INSPECTION REPORT
PART 11 - ENFORCEMENT INFORMATION

I. IDENTIFICATION	
01 STATE	02 SITE NUMBER
UT	D980952840

II. ENFORCEMENT INFORMATION

01 PAST REGULATORY/ENFORCEMENT ACTION ☐ YES ☒ NO

02 DESCRIPTION OF FEDERAL, STATE, LOCAL REGULATORY/ENFORCEMENT ACTION

- No agency enforcement action taken at this site.
- SI performed by State of Utah BSMW 12/21/84.
- SI performed by EPA FIT VIII, 6,7 & 8/85.
- Air sampling performed by EPA FIT VIII, 7/7-14/86.

III. SOURCES OF INFORMATION *(Cite specific references, e.g., state files, sample analysis, reports)*

See pages 2, 2A, 4 and 7 and 11.