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REPORT OF SAMPLING ACTIVITIES
RICHARDSON FLAT TAILINGS
SUMMIT COUNTY, UTAH
TDD R8-8505-27

EPA REGIONAL SITE PROJECT OFFICER: ERIC JOHNSON
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WILLIAM GEISE - REM-FIT COORDINATOR

DATE SUBMITTED: SEPTEMBER 30, 1985

Ref 24

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REPORT OF SAMPLING ACTIVITIES
RICHARDSON FLAT TAILINGS
SUMMIT COUNTY, UTAH
TDD R8-8505-27

I. INTRODUCTION

This report has been prepared to satisfy the requirements of Technical Directive Document (TDD) R8-8505-27 issued to Ecology and Environment's Field Investigation Team (FIT) by Region VIII, U.S. Environmental Protection Agency (EPA). The field investigation was conducted on June 19 and 20, and July 30 through August 2, 1985. FIT members conducting this investigation were Jeff Holcomb, Dave Tuesday, Tom Smith and Susan Kennedy who served as project officer. Rob Smith served as drilling supervisor. Eric Johnson, EPA Regional Site Project Officer, accompanied the FIT during the June sampling. Wade Hansen and Joel Hebdon (Utah Bureau of Solid and Hazardous Waste - UBSHW) accompanied the FIT during a portion of the sampling activities. Kerry Gee, United Park City Mines Company (UPCM), was present on site during drilling and sampling on August 1 and 2, 1985.

Sampling procedures used throughout this study were in accordance with the Region VIII FIT Standard Operating Procedures (SOP III-2) for sampling.

Richardson Flat Tailings consist primarily of metal ore mill slurries and fine ground waste rock materials. The objectives of this drilling and multi-media sampling investigation were to 1) determine whether ground water has been contaminated by leaching of metals from tailings, 2) characterize the tailings and determine levels of contaminants at the surface and below the surface, and 3) determine whether contaminants are being released to Silver Creek and to area intermittent streams.

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The scope of the project involved the installation of one background monitoring well, and the collection of six surface water samples, one surface soil sample, four surface tailings samples, six subsurface tailings and soils samples, and four ground water samples. Subsurface tailings and soil samples to be analyzed for cyanide were shipped via Federal Express to Versar Laboratory in Springfield, Virginia on August 5, 1985. Remaining samples collected at Richardson Flat Tailings were either shipped by Federal Express or hand delivered to the EPA Region VIII Laboratory in Lakewood, Colorado. Surface water, surface soil and surface tailings samples were shipped on June 20, 1985. Ground water samples, and subsurface tailings samples for metals analysis were delivered to Region VIII Lab on August 6, 1985.

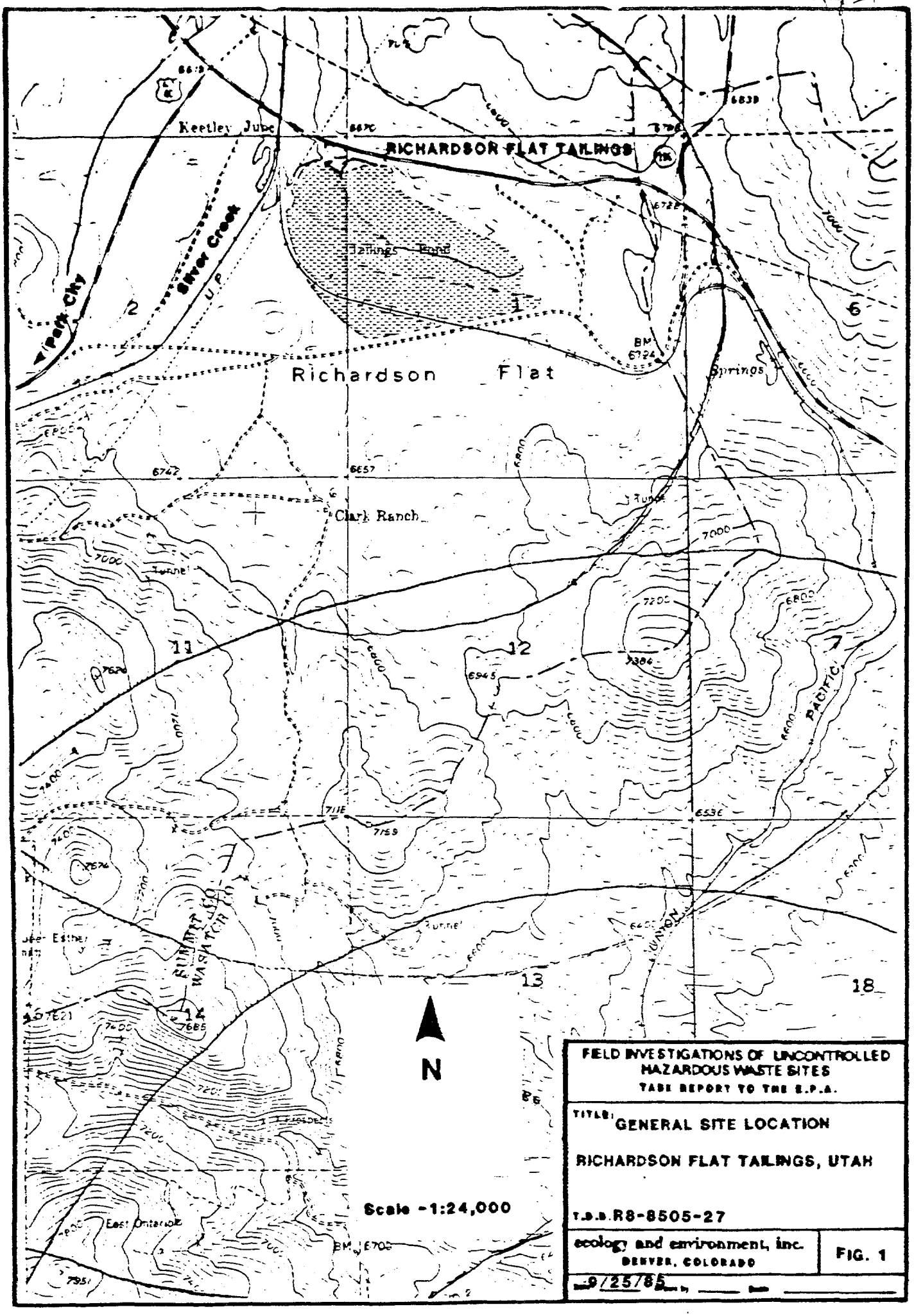
All samples were low hazard and were received by the labs under proper chain of custody procedures. Soil cyanide samples were handled under SMO S.A.S. #1801-H.

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, Township 2 South, Range 1 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 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. Six UPCM monitoring wells are located near the base of the dam.

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

R4/4



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

TITLE: GENERAL SITE LOCATION

RICHARDSON FLAT TAILINGS, UTAH

T.D.D. R8-8505-27

ecology and environment, inc.
DENVER, COLORADO

FIG. 1

9/25/85

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of 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 Wortey is leasing the tailings from UPCM to use for sewer line and road base backfill. Photo #1 (Appendix A) shows a dump truck being filled with tailings material on June 20, 1985.

The site is not secured in any way from public access. An unpaved road along the southern boundary of the tailings is unrestricted. Several vehicles were observed using the road on June 19 and 20, however, no on-site activity was noted. Cattle and sheep are grazed in the area, and cattle were observed walking across the tailings on June 20 (Photo 2).

III. FIELD ACTIVITIES

Field activities on-site followed the guidelines proposed in the Sampling Plan for Richardson Flat Tailings submitted in May, 1985 (TDD R8-8504-23). Changes in the Sampling Plan brought about by field conditions and drilling complications are discussed in the subsections dealing with sample collection.

A. DRILLING ACTIVITIES

Drilling commenced on Thursday, August 1, 1985 with the upgradient well, RT-1 (Photo 3). The drill site was chosen primarily because of good access and the upgradient location. The drilling was easy and a highly productive gravel zone was found at 34 to 36 feet. Split spoon samples were collected from five to seven feet deep. The same day, a monitoring well was installed and completed at a depth of 38 feet in accordance with Region VIII FIT Standard Operating Procedures for well installation. Detailed drilling and well completion information is provided in Appendix B. The next day, August 2, 1985, the

Ky 24

drill rig was deconned and moved onto the tailings pond, for the subsurface tailings sampling. Split-spoon sampling was performed continuously from the surface to a depth of eighteen feet, when native soil was reached. At this point, the material was either too coarse or dropped out of the split spoon sampler. Only enough material for one eight-ounce jar was obtained for analysis. A detailed log of the hole is included in Appendix B. The hole was grouted and backfilled. The drill rig was deconned and moved offsite.

C. SAMPLE COLLECTION

Four ground water samples, six surface water samples, one surface soil sample, two subsurface soil samples, four surface tailings samples and four subsurface tailings samples were collected during this sampling effort. Sampling locations are shown in Figure 2. Field data for ground water, surface water and soil/tailings samples are provided in Tables 1, 2 and 3 respectively.

Surface water samples and surface soil and tailings samples were collected on June 19 and 20, 1985. Ground water samples and subsurface soils and tailings samples were collected on August 1 and 2, 1985, in conjunction with drilling activities. Weather conditions on all days of sampling were typically sunny to partly cloudy with temperatures in the 80's.

An HNu and explosimeter were used to monitor conditions during all phases of drilling. No readings above background were obtained. For this reason and because all samples collected at Richardson Flat were low hazard, Level D protection was used.

Field data for pH, specific conductance and temperature were recorded at the time of sample collection of ground water (Table 1) and surface water (Table 2). Nitric acid (HNO_3) preservative was added to water samples to be analyzed for metals, and sodium hydroxide (NaOH) preservative was added to water samples to be analyzed for cyanide.

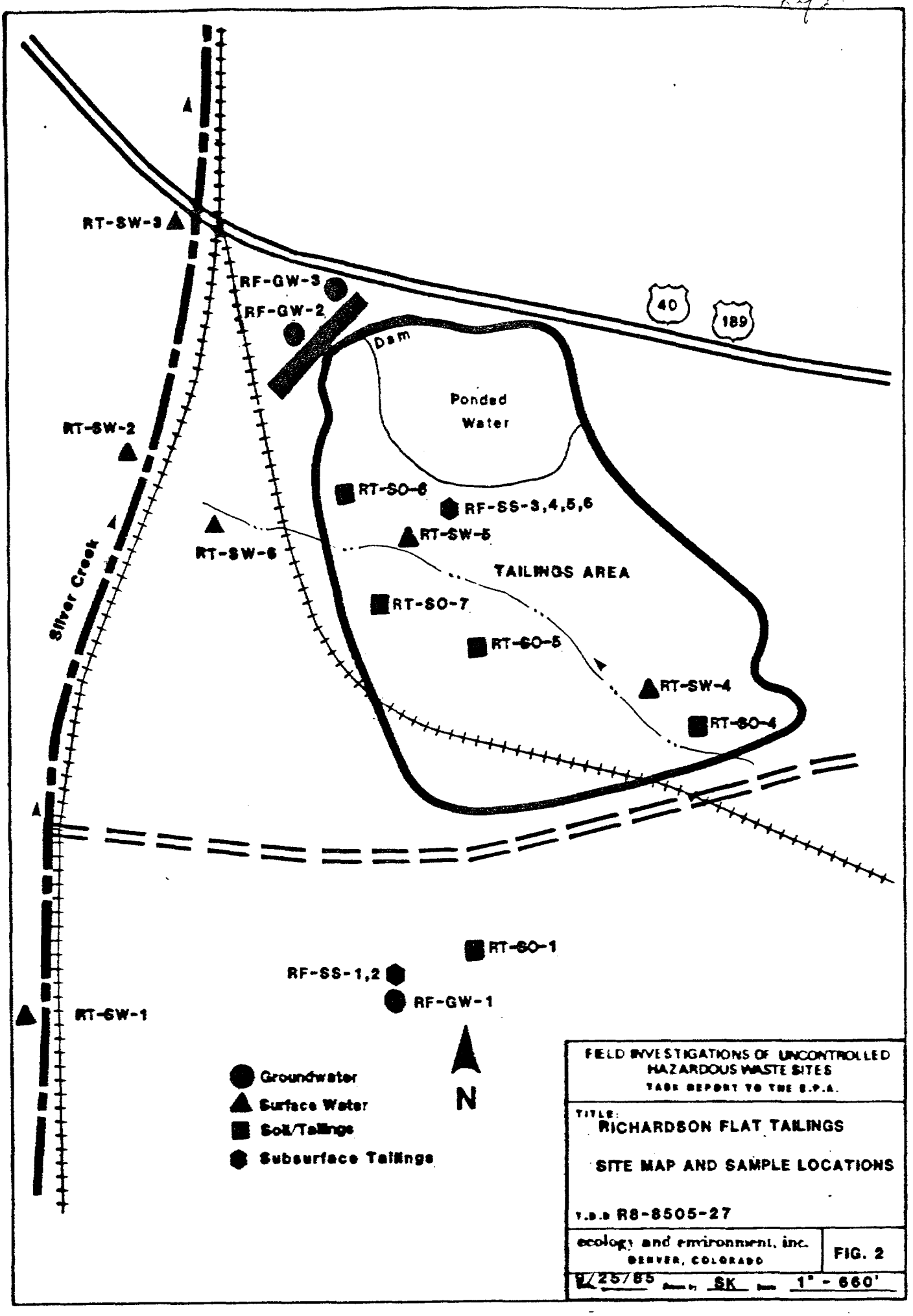
RT-SW-3
RF-GW-3
RF-GW-2
40
189
Dam
Ponded Water
RT-SW-2
RT-SO-6
RF-SS-3,4,5,6
RT-SW-5
RT-SW-6
TAILINGS AREA
Silver Creek
RT-SO-7
RT-SO-5
RT-SW-4
RT-SO-4
RT-SO-1
RF-SS-1,2
RF-GW-1
RT-SW-1
N
Groundwater
Surface Water
Soil/Tailings
Subsurface Tailings
FIELD INVESTIGATIONS OF UNCONTROLLED HAZARDOUS WASTE SITES
TASK REPORT TO THE E.P.A.
TITLE:
RICHARDSON FLAT TAILINGS
SITE MAP AND SAMPLE LOCATIONS
T.D.# R8-8505-27
ecology and environment, inc.
DENVER, COLORADO
FIG. 2
9/25/85
SK
1" - 660'

TABLE 1 GROUND WATER FIELD DATA SITE Richardson Flat Tailings

SAMPLE ID	TOTAL DEPTH (FEET)	DEPTH TO WATER (FEET)	GALLONS PURGED (3 VOLUMES)	SAMPLING DATE	SAMPLING TIME	FIELD DATA PH	FIELD DATA TEMPERATURE (C)	FIELD DATA CONDUCTIVITY (umhos/cm)	SHIPPING DATE	COMMENTS
RF-GW-1	35	17	185	8/2/85	1700	6.43	9.5°	350	8/6/85	Background
RF-GW-2	43	15	10	↓	1630	6.80	11°	1700	↓	
RF-GW-3	25.2	5	23	↓	1915	6.89	9.5°	1450	↓	
RF-GW-4	25.2	5	23	↓	1915	6.89	9.5°	1450	↓	Duplicate of GW-3

Fig 24

TABLE 2 SURFACE WATER FIELD DATA SITE Richardson Flat Tailings

SAMPLE ID	SAMPLING		FIELD DATA			SHIPPING DATE	COMMENTS
	DATE	TIME	PH	CONDUCTIVITY (umhos/cm)	TEMPERATURE (C)		
RT-SW-1	6/20/85	1055	7.33	600	21°	6/20/85	Background
RT-SW-2		1245	7.54	600	21°		
RT-SW-3		1110	7.47	550	19°		
RT-SW-4		1025	7.26	700	20°		
RT-SW-5		1220	7.40	1200	21°		
RT-SW-6		1240	7.40	1400	21°		

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TABLE 3 SOIL AND SEDIMENT FIELD DATA SITE Richardson Flat Tailings

SAMPLE ID	pH	SAMPLING DATE	SAMPLING TIME	SHIPPING DATE		COMMENTS
RT-50-1	—	6/19/85	1510	(to Region VIII Lab) 6/20/85		
RT-50-4	—	6/19/85	1540			
RT-50-5	—	6/19/85	1545			
RT-50-6	—	6/19/85	1555			
RT-50-7	—	6/19/85	1630			
RF-SS-1	7.44	8/1/85	1211	Region VIII 8/6/85	Versar 8/5/85	
RF-SS-2	7.35	8/1/85	1300			
RF-SS-3	6.88	8/2/85	1400			
RF-SS-4	7.39	8/2/85	1430			
RF-SS-5	7.54	8/2/85	1600			
RF-SS-6	—	8/2/85	1600			

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1. Ground Water Samples

A total of four ground water samples were collected. The background ground water sample (RF-GW-1) was taken from the newly-installed monitoring well, located approximately 1,600 feet southwest of the tailings. After purging the well of two to three casing volumes, the samples were collected. Drilling of the second proposed well (west of the tailings between the railroad tracks) was cancelled because FIT members were able to sample two existing on-site PVC wells.

The remaining ground water samples were collected from monitoring wells at the base of the dam. Sample RF-GW-2 was taken from United Park City Mine Well #2, and RF-GW-3 was taken from UPCM Well #1. Sample RF-GW-4 is a duplicate of RF-GW-3. Sampling methodology for the existing wells consisted of purging the wells of two to three casing volumes, allowing the wells to recharge, then collecting the sample. Well information is included in Appendix B. All ground water samples were analyzed for total and dissolved metals, cyanide and sulfate.

2. Surface Water Samples

One upstream background surface water sample and two downstream surface water samples were collected from Silver Creek. Three additional surface water samples were collected from the ditch running through the tailings. Photo 4 shows sample collection at Station RT-SW-4, the drainage ditch southeast of the tailings.

All surface water samples were collected directly into one-liter polyethylene bottles and analyzed for total metals, cyanide and sulfate. A triple volume of surface water from RT-SW-6 (drainage ditch west of tailings) was collected to fulfill laboratory requirements. The water from Silver Creek and from the intermittent stream was clear, and no unusual odors were observed.

Key-4

3. Soil Samples

One off-site background soil sample was collected as planned, however, the two proposed downwind off-site soil samples were omitted. It was the opinion of Eric Johnson and the FIT that quantifying wind blown contaminants on off-site soils was beyond the scope of this sampling effort.

Four surface tailings samples were collected from dispersed locations on the tailings. Photo 5 shows FIT members collecting a composite surface tailings sample (RT-SO-6), where a surficial salt crust is evident. The fourth tailings sample location was added to photo document air-borne tailings material while simultaneously sampling from the source (Photo 6). Surface soil and tailings samples were composited from a triangular grid, and collected with a stainless steel spoon from the top zero to six inches. Surface soil and tailings samples were analyzed for total metals and cyanide.

4. Split Spoon Samples

Two subsurface background soil samples and four subsurface tailings samples were collected. During drilling of the background well, two subsurface soil samples were collected using the split spoon sampler. Sample RF-SS-1 was composited over the five to seven foot depth interval. Sample RF-SS-2 was composited over the ten to twelve foot depth interval.

Four subsurface tailings samples were collected from a hole drilled in to the tailings, using the split spoon sampler. The subsurface tailings samples were composited over the following depth intervals:

Sample #	Depth to Interval	Zone
RF-SS-3	1.0 - 3.5	oxidized*
RF-SS-4	3.5 - 7.5	reduced*
RF-SS-5	12.0 - 17.8	tailings/soil contact
RF-SS-6	17.8 - 18.0	soil beneath tailings

* Tailings zones determined on-site by FIT geochemist, Dave Tuesday.

Because of the gravelly nature of the soil below eighteen feet, only enough sample to fill one eight-ounce jar was recovered. Cyanide analysis for sample RF-SS-6 was therefore omitted. All other subsurface soil and tailings samples were analyzed for total metals and cyanide.

B. QUALITY CONTROL

The quality control measures followed during sampling are summarized below.

1. Background Samples

The ground water sample RF-GW-1, surface water sample RT-SW-1, surface soil sample RT-SO-1, and subsurface soil samples RF-SS-1 and RF-SS-2 were collected to establish naturally occurring concentrations for the parameters of interest in this study area.

2. Duplicates, Triplicates and Split Samples

Ground water sample, RF-GW-4, was collected as a duplicate of RF-GW-3. Triplicate volume of surface water sample RT-SW-6 was provided in accordance with laboratory requirements. With the exception of subsurface tailings sample RF-SS-6, split samples of all water, soil and tailings samples were provided to United Park City Mines.

3. Sample Containers and Preservation

The sample bottles used in this investigation were supplied through the SMO bottle repository contract. Bottle lot numbers were recorded in the field logbook, and the preservatives used were in accordance with the SOP referenced earlier in this report. Table 4 provides detailed sample container and preservation information.

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TABLE 4

SAMPLE CONTAINER AND PRESERVATION REQUIREMENTS

FOR LOW HAZARD SAMPLES

SAMPLE	PARAMETER	CONTAINER	PRESERVATION
Water	Metals	(1) 1 L polyethylene bottle	Cool to 4°C HNO_3 to pH<2
	Cyanide	(1) 1 L polyethylene bottle	Cool to 4°C NaOH to pH>12
	Sulfate	(1) 1 L polyethylene bottle	Cool to 4°C
Soil/Tailings	Metals/ Cyanide	(1) 8 oz wide-mouth glass jar	Cool to 4°C

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4. Equipment Decontamination

Sample collection equipment was decontaminated prior to and after each use by the following procedure: detergent and tap water wash, tap water rinse, triple acetone rinse, and a final triple rinse with deionized water.

Drilling equipment was cleaned by the drillers before and after well RT-1 was drilled. The FIT monitored this activity closely and inspected the drilling equipment to insure proper decontamination procedures were followed.

5. Equipment Calibration

The pH and conductivity meters were calibrated daily prior to performing any field measurements. The HNu and combustible gas analyzer/oxygen meter were also calibrated prior to field use. All calibrations were in accordance with the manufacturer's and the EPA's recommended procedures.

C. SAMPLE DOCUMENTATION

Collected samples were handled in strict accordance with chain of custody protocol prescribed by the NEIC Procedures Manual for the Evidence Audit of Enforcement Investigation by Contractor Evidence Audit Teams, April, 1984 (EPA 330/9-81-003-R). Chain of custody record number, sample tag number and other pertinent data are presented in Table 5.

IV. FIELD OBSERVATIONS

The tailings are predominantly grey in color and in some areas a surficial salt crust is evident. Vegetation is absent from most of the tailings except at the periphery and along the drainage ditch.

TABLE 5 SITE Richardson Flat Tailings

SAMPLE ID	Cyanide	Sulfate	Total METALS	Dissolved Metals	HAZARD LEVEL E M H	ORGANIC TRAFFIC REPORT	ORGANIC TAGS	ORGANIC CHAIN OF CUSTODY	INORGANIC LSR	INORGANIC TAGS	INORGANIC CHAIN OF CUSTODY
RF-GW-1	X	X	X	X	E				RT-11,12	8-27932 8-27944 8-27943 8-27945	8-2699
RF-GW-2	↓	↓	↓	↓	↓				RT-11,12	8-27927 8-27930 8-27931 8-27926	8-2699
RF-GW-3	↓	↓	↓	↓	↓				RT-11,12	8-27946 8-27945 8-27947 8-27948	8-2617
RF-GW-4	↓	↓	↓	↓	↓				RT-11,12	8-27950 8-27949 8-27983 8-27984	8-2617
RT-SW-1		X	X						RT-1,2	8-26116 8-26118	8-2047
RT-SW-2		↓	↓						RT-1,2	8-26119 8-26121	8-2047
RT-SW-3		↓	↓						RT-1,2	8-26122 8-26063	8-2047
RT-SW-4		↓	↓						RT-1,2	8-26064 8-26066	8-2047
RT-SW-5		↓	↓						RT-3,4	8-26067 8-26069	8-2047
RT-SW-6		↓	↓						RT-3,4	*	8-2047
RT-SO-1	X		X						RT-3,4	8-26082	8-2047
RT-SO-4	↓		↓						RT-3,4	8-26085	8-2047
RT-SO-5	↓		↓		↓				RT-3,4	8-26086	8-2047

*8-26079
8-26070
8-26076
8-26072
8-26081
8-26078

TABLE 5 SITE Richardson Flat Tailings

SAMPLE ID	Cyanide	Sulfate	Total METALS	Dissolved Metals	HAZARD LEVEL E M H	ORGANIC TRAFFIC REPORT	ORGANIC TAGS	ORGANIC CHAIN OF CUSTODY	INORGANIC SAS/Packing Slip	INORGANIC TAGS	INORGANIC CHAIN OF CUSTODY
RT-SO-6	X		X		E				RT-7,8	8-26087	8-2047
RT-SO-7	↓		↓		↓				RT-7,8	8-26097	8-2047
RF-SS-1									RT-9,10 RT-SAS-1	8-27917 8-27918	8-2699 8-2701
RF-SS-2									RT-9,10 RT-SAS-1	8-27919 8-27920	8-2699 8-2701
RF-SS-3									RT-9,10 RT-SAS-1	8-27921 8-27922	8-2699 8-2701
RF-SS-4									RT-9,10 RT-SAS-1	8-27923 8-27924	8-2699 8-2701
RF-SS-5	↓								RT-9,10 RT-SAS-1	8-27925 8-27926	8-2699 8-2701
RF-SS-6			↓		↓				RT-9,10	8-27927	8-2699

Analytical results consistently demonstrate elevated levels of total arsenic, calcium, copper and lead in the surface tailings samples as compared to the background soil sample. Field pH's of surface and subsurface tailings range from 6.88 to 7.54.

As of this writing, analytical results of subsurface tailings samples and ground water samples have not yet been received. However, results of surface water analysis indicate a release of significant amounts of lead from the tailings into Silver Creek.

FIT members observed wind-borne tailings blowing in a northeasterly direction toward Highway 40 carried by gusty, afternoon winds on June 19, 1985.

V. RECOMMENDATIONS

Based on the well drilling and multi-media sampling investigation, the FIT recommends the following action:

1. Air monitoring should be instituted to evaluate hazards associated with air-borne tailings material. The air pathway should be characterized primarily becuase blowing particulate has been observed to migrate off-site and secondly, since the air pathway must be evaluated to properly complete an HRS package.

2. Because an observed release of lead into Silver Creek has been indicated, an interpretive study should be made of all the available data to determine the actual extent and migration potential of the contaminant. Silver Creek does not serve as a drinking water source for area residents, however, water is diverted approximately 1,000 feet downstream of the tailings for irrigation purposes.

3. Because the tailings contain high levels of metals and arsenic, the area should be fenced to prevent on-site grazing by domestic sheep and cattle, and to keep people off the site.

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4. If analytical results indicate ground water contamination, further study is recommended to determine potential of contaminant migration into drinking water supplies. The preliminary HRS score is 33.30 without ground water data. A draft site inspection form is attached as Appendix C. Both the HRS and the SI will be updated when all analytical data is received.

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APPENDIX A
PHOTO LOG

PHOTO 5: FIT MEMBERS COLLECTING COMPOSITE SURFACE TAILINGS SAMPLE, RT-SO-6.

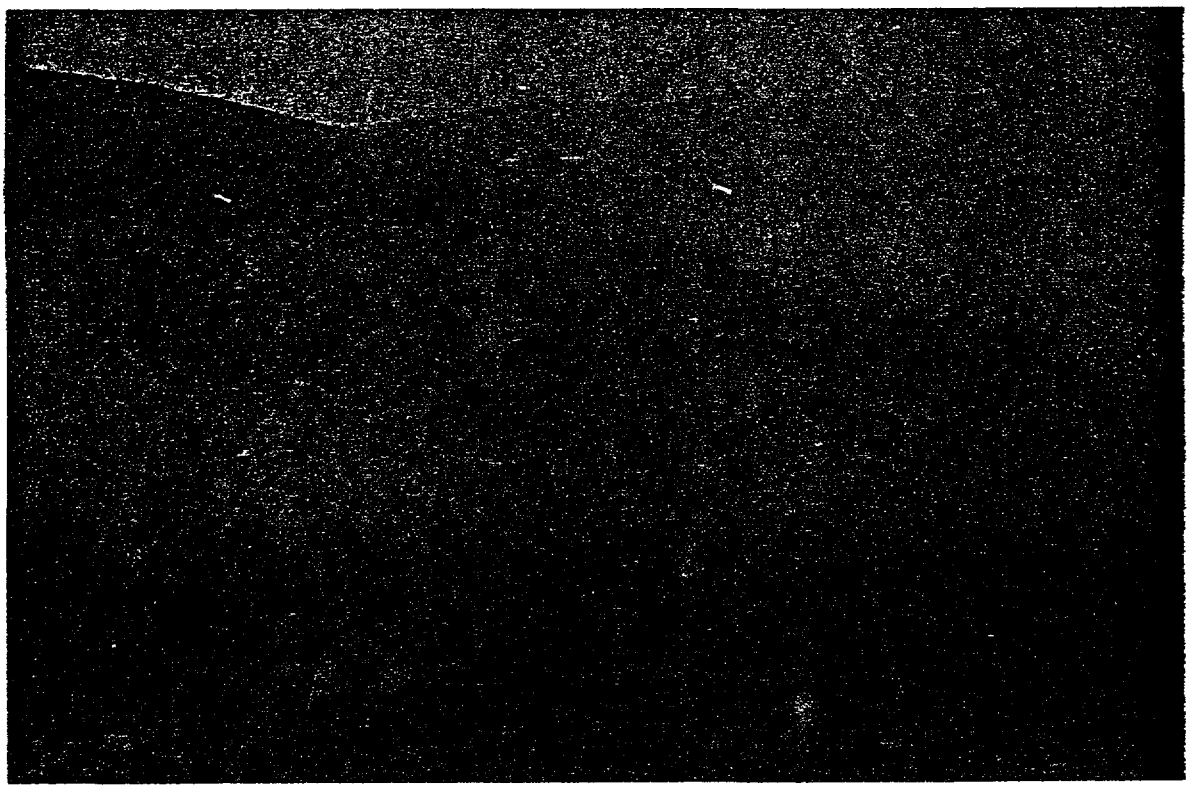

PHOTO 6: SAMPLE STATION RT-SO-7; SAMPLE COLLECTION AND PHOTO DOCUMENTATION OF AIR-BORNE TAILINGS MATERIAL.

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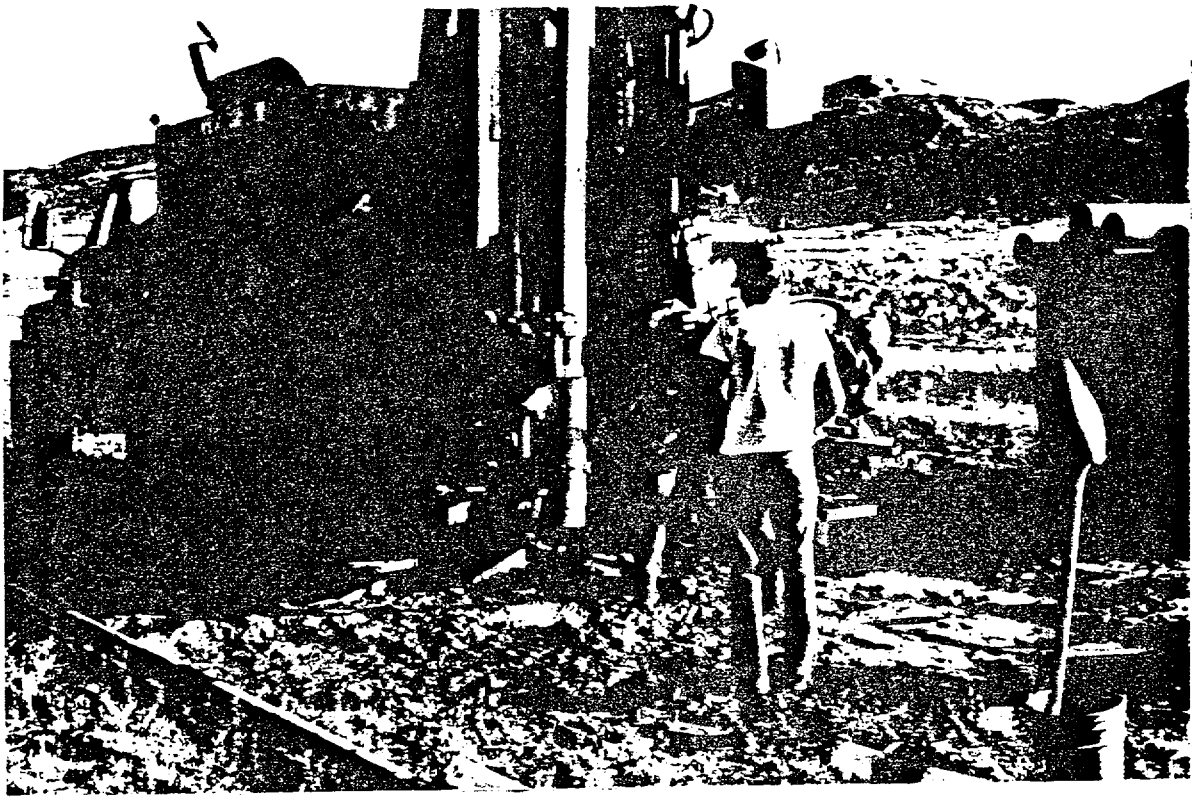

PHOTO 3: DRILLING HOLE RT-1; SAMPLE STATION FOR RF-GW-1, RF-SS-1 AND RF-SS-2.

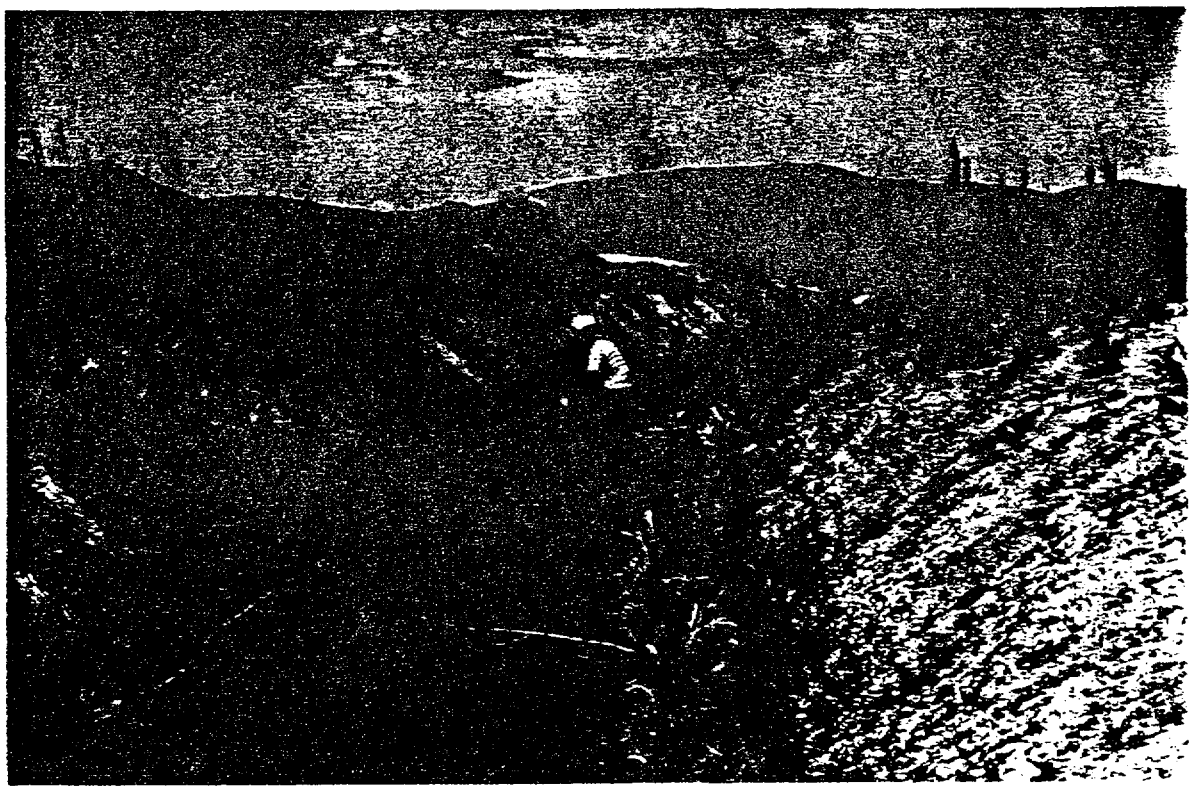

PHOTO 4: DRAINAGE DITCH SOUTHEAST OF TAILINGS; SURFACE WATER SAMPLE STATION RT-SW-4.

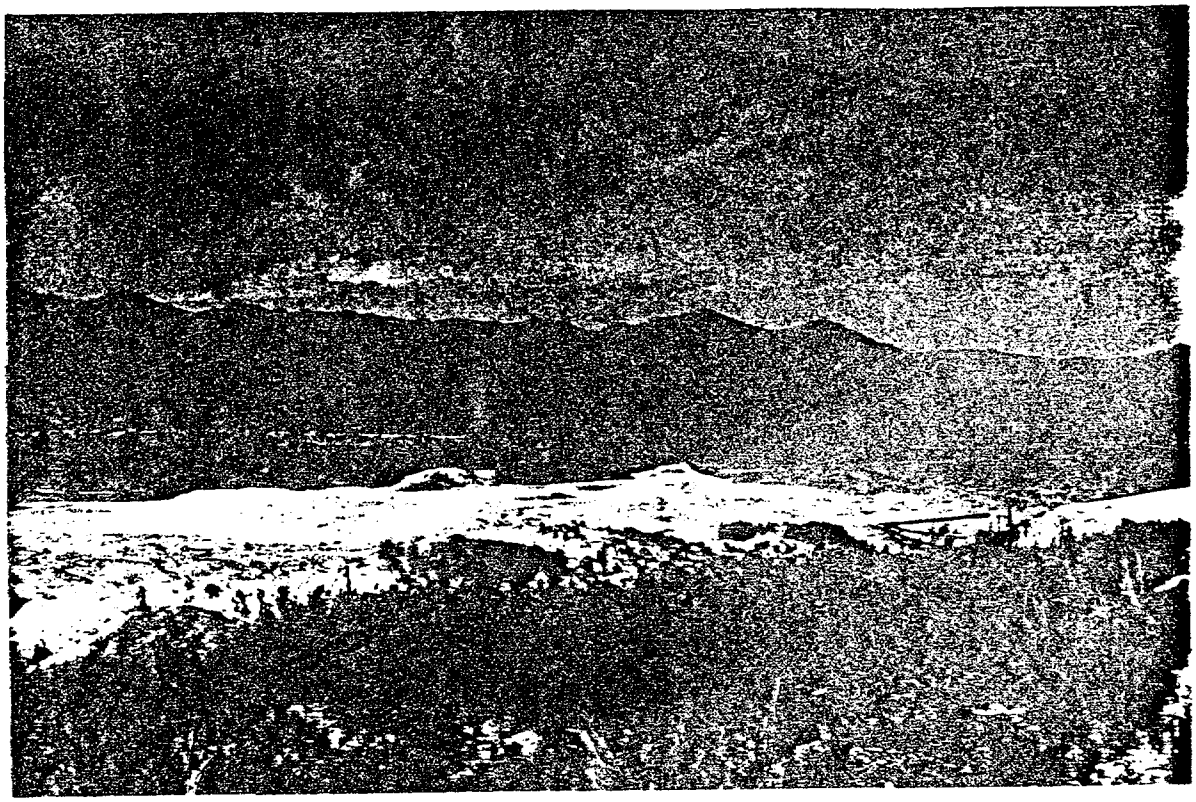

PHOTO 1: DUMP TRUCK BEING FILLED WITH TAILINGS MATERIAL ON JUNE 20, 1985.

PHOTO 2: CATTLE WALKING ACROSS TAILINGS ON JUNE 20, 1985.

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APPENDIX B
DRILLING LOGS

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PAGE ____ OF ____

DRILLING LOG

Well/Boring Number Well RT-1 (upgradient)
Project Richardson Flats Tailings
Project Number R8-8505-27
Date Started 8-1-85
Date Completed 8-1-85

Geologist Rob Smith
Driller Dave's Drilling
Geophysical Logger ——
Permit Number ——
Property Owner Park City Mines, Inc.

LOCATION

N. ____
E. ____
Elevation 6650' ± 10'

SW 1/4 of NE 1/4 of SE 1/4
Section 2 T 2S R 4E
County Summit State Utah

Drilling Method Air Rotary/Casing Drive
Samples 2 Piezometer
Rig Make and Model Chicago Pneumatic CP-7000
Drill Bit Diameter 7 7/8" (2" splitspoon sampler)

Logs
Res. SP Gam. G-Den. Neut. Calip. Dev. Sonic
Pipe dope used

DRILLING, CORING, BIT AND CASING RECORD

Diameter	Depth From	Depth To	Notes
7 7/8"	0	2	Topsoil
	2	15	Red Fin Sand
	15	23	Yell. Clay
	23	34	Red Sand
	34	38	Gravel

ADDITIVES USED

Depth From	Depth To	Additives

Notes: Two Split Spoon Samples Collected (5-7' + 10-12')
Well completed @ 38', W.L. at ~9'.

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FIELD LOG OF BORING

PROJECT: Richardson Flats R8-8505-27

BORING NO.: RT-1

DEPTH BELOW LAND SURFACE (feet)	GRAPHIC LOG	DESCRIPTION	SAMPLE INTERVAL	BLOW COUNTS/ 6 in.	COMMENTS
1.5		Topsoil - Dk. Brn, Sandy			
4.0		Dk Red-Brn Sandy, Clayey	5'-7' SS-1		
15		DK Red Brn Gravelly Sand	10-12' SS-2		
23		Pale Yellow Brn Clay, Sandy, Water @ 17'			
31		Dk Red-Brn Sandy Clay w/ Gravel			
32		Pale Yellow Grey Clay			
34		Dk Red Brn Sandy Clay w/ Gravel			
36		Gravel, Clean, ¼"-½" diam., (Water 10-15gpm)			
38		T.D. Yellow-grey, Clay			

Rg 4

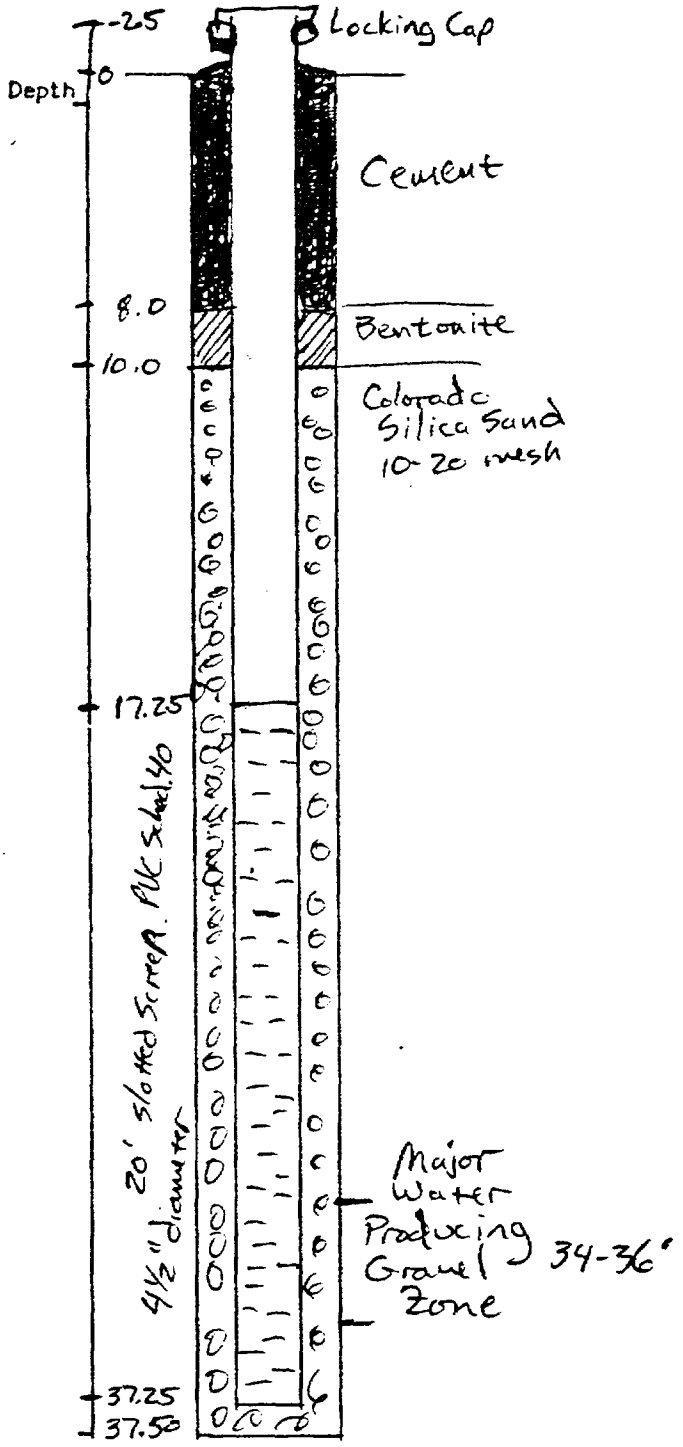
WELL/PIEZOMETER COMPLETION DIAGRAM

Piezometer Number Well # RT-1

Project Richardson Flats R8-8505-27

Aquifer Shallow-Alluvial

Static Water Level ~9'



Geologist Rob Smith

Driller Dave's Drilling - Heber City, UT

Date of Installation 8/1/85

Hole Depth 37.5'

Stickup 2.5'

Protective Casing -2.5' to 2.5' Total 5'

Well Casing -2.5' to 37.5' Total 40'

Top Seal

Cement from 0' to 8'

Bentonite from 8' to 10'

Hole Diameter 7⅞"

Casing Diameter 4½" i.d.

Well Casing Depth 37.25

Screen Diameter 4½" slots =

Centralizers Top of Screen @ 17.5'

Pump Type —

Pump Capacity —

Pump Setting —

Average Pumping —

Remarks Developed by bailing. 185 gallons purged.

Ref 24

PAGE ____ OF ____

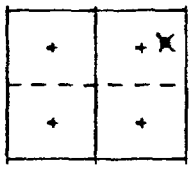
DRILLING LOG

Well/Boring Number Boring RT-2 (Tailings)
Project Richardson Flats Tailings
Project Number R8-8505-27
Date Started 8/2/85
Date Completed 8/2/85

Geologist Rob Smith/D Tuesday
Driller Paul's Drilling
Geophysical Logger —
Permit Number —
Property Owner Park City Mines, Inc.

LOCATION

N. ____
E. ____
Elevation 6600 ± 20



SE 1/4 of NE 1/4 of NE 1/4
Section 2 T 2S R 4E
County Summit State Utah

Drilling Method Air Rotary/Splitspoon Sampler
Samples Piezometer
Rig Make and Model Chicago Pneumatic/CP-7000
Drill Bit Diameter 6" (2" split spoon)

Logs
Res. SP Gam. G-Den. Neut. Calip. Dev. Sonic
Pipe dope used

DRILLING, CORING, BIT AND CASING RECORD

Diameter	Depth From	Depth To	Notes
6"	0	3.5	Oxidized
	3.5	12.5	Reduced
	12.5	14	Coarse Jig Tails
	16	17.7	Clay Sulfides
	17.7	22	Clay & Gravel

ADDITIVES USED

Depth From	Depth To	Additives

Notes: Four Splitspoon Samples taken
Hole in Tailings Pond
Grouted & Back filled after Sampling
Wet at 12'.

Ref 24

FIELD LOG OF BORING

PROJECT: Richardson Flats R8-8505-27

BORING NO.: RT-2 (Tailings)

DEPTH BELOW LAND SURFACE (feet)	GRAPHIC LOG	DESCRIPTION	SAMPLE INTERVAL	BLOW COUNTS/ 6 in.	COMMENTS
0.8		Lt Grey, Sand, No Sulfides, Carbonate			
1.2		Grey Brown, Clay-Silt, Sulfides, Carbonate	SS-3		
1.3		Lt Grey, Sand, No Sulfides, Carbonate	Oxidized		1.0-3.5
3.5		Lt Brown, Clay Silt, Sulfides, Carbonate			
11.0		DK Grey, Sand-Silt, Sulfides, Carbonate	SS-4 red		3.5-7.5
12.5		Lt Brn, Grey, Sand, Gravel, Carbonate + Sulfide		▽ 12'	
14.0		Lt Grey, Tan, Coarse Sand + Gravel, Carbonate + Sulfide			
16.0		No Recovery	SS-5		
17.6		Lt Grey-Tan Coarse Sand + Gravel, Carbonate	Bottom		17-17.8
17.7		DK Grey-Black, Clay, Sulfides			w/o 18-16
18.0		DK Brn, Clay-Silt - Native Soil			
22		Gravel - Partial Recovery	SS-6 Yellow		17.7-18

Rej 24

WELL/PIEZOMETER COMPLETION DIAGRAM

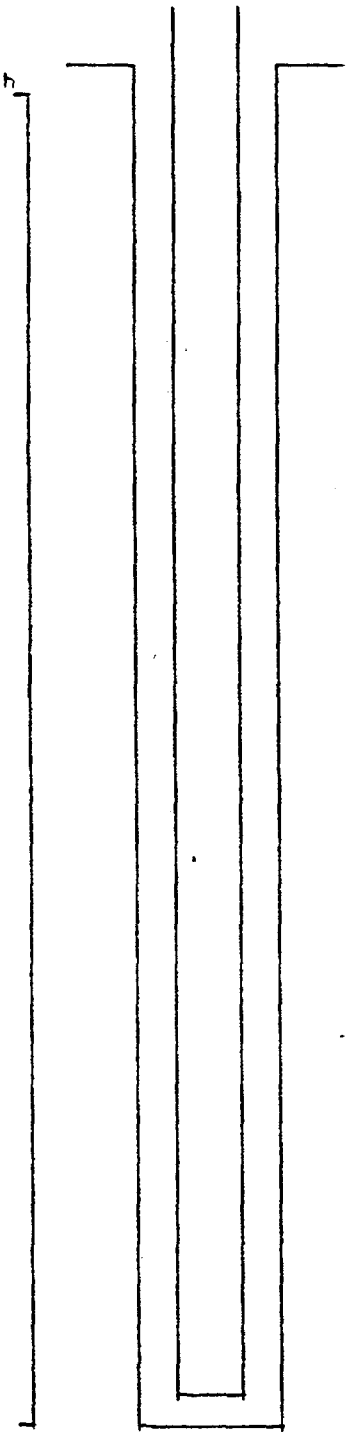
Piezometer Number KF-GW-2 Park City Mines MW #2

Project Richardson Flats/R8-8505-27

Aquifer Shallow Alluvial

Static Water Level 15'

Depth



Geologist —

Driller —

Date of Installation —

Hole Depth 42'

Stickup 8" - broken off

Protective Casing None to No Cap Total

Well Casing ____ to ____ Total 42'

Top Seal

? from ____ to ____

? from ____ to ____

Hole Diameter ?

Casing Diameter 3" i.d.

Well Casing Depth 42'

Screen Diameter ?

Centralizers ?

Pump Type —

Pump Capacity —

Pump Setting —

Average Pumping —

Remarks Slow Recharge
Cloudy Water
At Base of Tailings Dam
Central Well

Ref 24

WELL/PIEZOMETER COMPLETION DIAGRAM

RF-GW-3.4

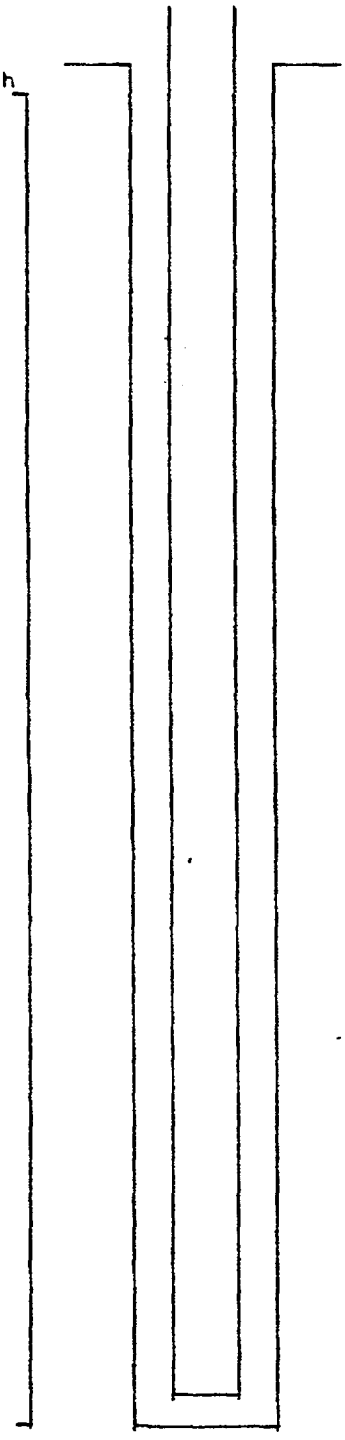
Piezometer Number Park City Mines MW #1

Project Richardson Flats / R8-8505-27

Aquifer Shallow - Alluvial

Static Water Level 5'

Depth



Geologist —

Driller —

Date of Installation ?

Hole Depth 25'

Stickup 2"

Protective Casing None to Capped Total

Well Casing ____ to ____ Total 25'

Top Seal

? from ____ to ____

? from ____ to ____

Hole Diameter ?

Casing Diameter 3" i.d.

Well Casing Depth 25'

Screen Diameter ?

Centralizers ?

Pump Type —

Pump Capacity —

Pump Setting —

Average Pumping —

Remarks Fast Recharge
Cloudy Water
At Base of Tailings Dam
Northern Most well