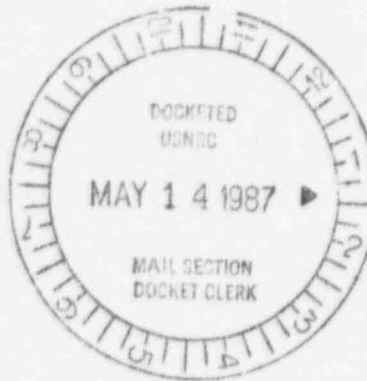


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FINAL DECOMMISSIONING REPORT

for

The Lucky Boy Pilot Plant

Prepared by

Thomas A. Clary, G.P.  
Pinal Minerals & Mining, Ltd.

April 13, 1987

Prepared for

United States Nuclear Regulatory Commission  
Uranium Recovery Field Office, Region IV  
Box 25325, Denver, Colorado 80225

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## I. SUMMARY

Decommissioning plans for the Lucky Boy pilot plant were presented in October 1984. In November 1985 the United States Nuclear Regulatory Commission amended the Lucky Boy Source Material License SUA-1388 by adding License Condition No. 16.

### A. Sequential Decommissioning Work Summary

In summary, the Lucky Boy pilot plant operation was decommissioned sequentially by:

- excavating the burial site,
- steam cleaning the plant components,
- covering the evaporation pond and by policing the area of all debris.

Contaminated plant components and the leached ore pile were placed on the burial site and covered with decomposed limestone.

The concrete plant foundation was ripped, stacked, compacted and buried on site.

Reusable plant components are stored on site.

### B. Decommissioning Radiological Survey Summary

Dr. John Mcklveen of Radiation and Environmental Monitoring Inc. visited the Lucky Boy property on February 3, 1987 and conducted PM&M's Close Out radiological survey.

At the onset of activities on the Lucky Boy property a system of monitoring stations were established for monitoring radioactivity;

- Appendix I is a topographic map showing locations of the system of monitoring stations,
- Appendix II is pre-operations, operational and the close-out surveys of the monitoring system,
- Section I-D is a summary of the close out radiological survey showing results in the area of the plant, burial site, leach pad, mine, down drainage and the evaporation pond area.

### C. Conclusions

Dr. Mcklveen has reported that, "all direct radiation measurements performed during the close out survey on February 3, 1987 are normal and less than twice background."

"soil sample Ra-226 assays performed by Controls for Environmental Pollution. All are less than 1 pCi/gram which is well below the 5 pCi/gram limit for remedial action." See Appendix II.

It is concluded that the Lucky Boy operation has been decommissioned and restored and is ready for final inspection by the United States Nuclear Regulatory Commission.

D. Summary Lucky Boy Close Out Radiological Survey 2/3/87

Sta. No.	Location Area	Gamma lm*	Dose GND	Soil Sample Radium 226 - pCi/g
1	Plant	9.1	8.5	0.50+ <sub>-</sub> 0.04
2	Plant	9.6	7	0.34+ <sub>-</sub> 0.03
3	Lab Trailer	-	-	No longer exist
4	Plant	10	8.5	0.71 ± 0.04
5	Plant	8.5	8	
6	Burial Site	9	7	
7	Burial Site	11.3	13	0.37 ± 0.04
8	Between Plant Leach Pad	10.2	8.5	0.67 ± 0.07
9	Leach Pads	14.3	20	0.43 ± 0.03
10	Mine- Ore Body	80	130	
11	Above Ore Body	27	30	
12	Old Mine Entrance	130	160	
13	Dow. Drainage	14	16	



14	Down Drainage	-	-	
15	Down Drainage	19	17	<0.05
16	Down Drainage	19	29	
17	Down Drainage	13.1	13.5	
18	Adjacent to Orebody		130	
19	-	-	-	
20	Evapora- tion Pond	15	14	$0.50 \pm 0.04$
21	Evapora- tion Pond	8	6	$0.57 \pm 0.04$
22	Evapora- tion Pond	9	6	

## II. Work Completed During Decommissioning

As discussed in the October 1984 DECOMMISSIONING PLANS, the Lucky Boy operation was planned with restoration plans built into the site layout plans and into the original "plan of operation."

Decommissioning the Lucky Boy included five major work components:

- preparing a burial site adjacent to the 3,000-ton leached ore pile,
- decommissioning the plant components and restoring the plant site,
- restoring the evaporation pond,
- policing the mine site for debris,
- conducting close-out radiological survey.

Photograph 1, Figure 1, is an overview showing the restored leach pad, burial site and plant site.

Photograph 2 shows the leach pad and the three benches on the burial site. Drainage ditches are visible on the left side of the photo.

Photograph 3 is an overview of the restored plant site. Plant components removed from the plant site can be seen in the background.

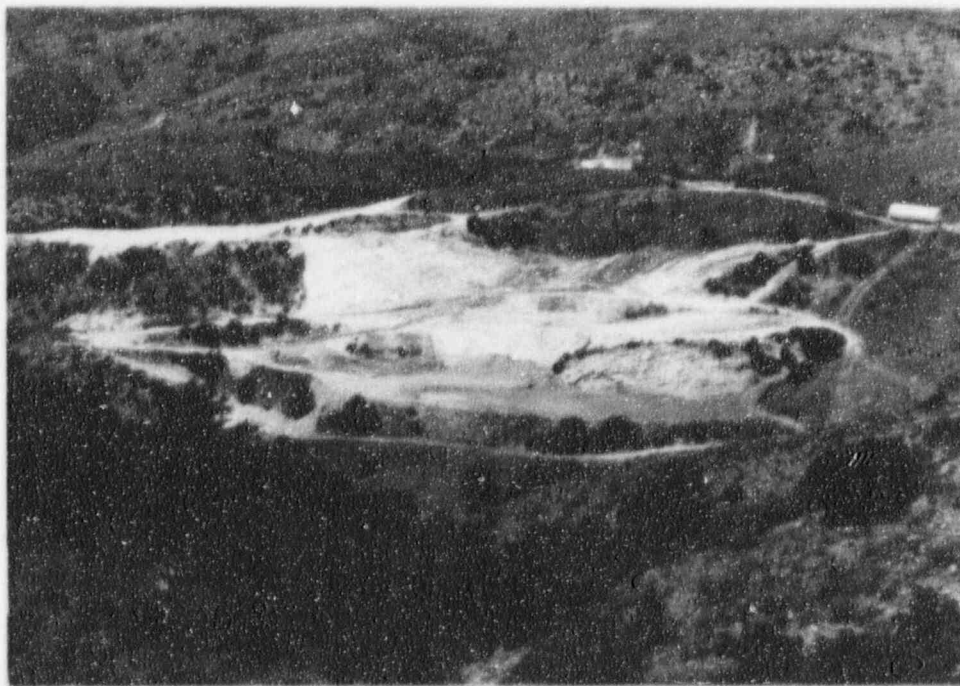
Photograph 4 is an overview of the restored evaporation pond.

A. Burial Site

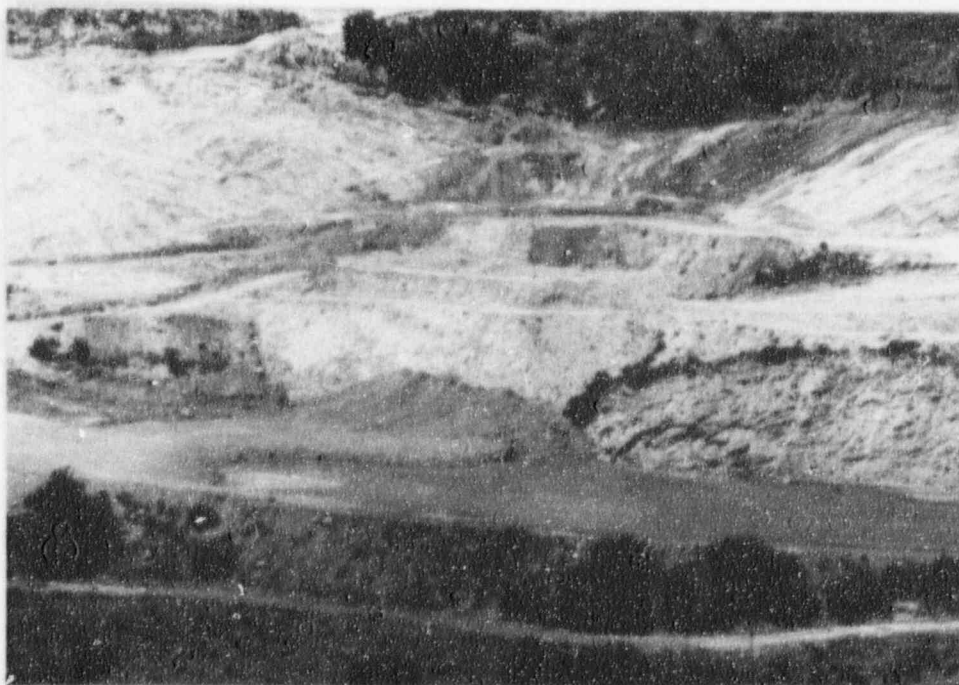
Sequence of events on the burial site are as follows:

- excavated burial site pad,
- transported the mobile home laboratory to the pad, dismantled it from the frame and burned it,
- transported plant clean-up solutions via pipe line to the burial site and permitted partial evaporation.
- transported barrels of resin and debris from storage area to the site,
- compacted all material on the burial site pad,
- bulldozed leached ore pile onto the burial pad,
- transported stainless steel tank from the plant to the pad and collapsed it.
- covered the leached ore with 5 feet of decomposed limestone,
- trenched the limestone cover and buried the plant ion exchange resin pots,
- stripped the plant of all remaining pipe, component support braces and transported the debris to the pad,
- covered and compacted the burial site with 10 feet of decomposed limestone, and
- terraced and established drainage.

Figure 2 is a x-section of the burial site.

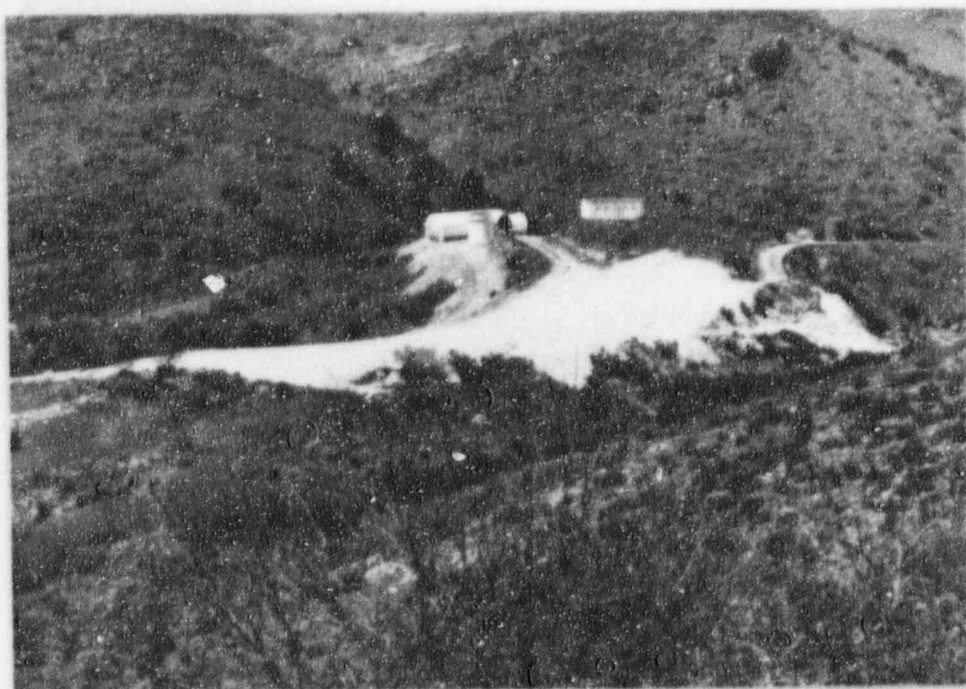


1



2

Figure 1



3



4

Figure 1

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B. Plant Site

Sequence of events at the plant site were:

- moved the mobile home laboratory to the burial site,
- stripped plumbing from the plant components,
- transported rainwater and residue via pipeline from the plant to the burial pad,
- steam cleaned the plant components,
- moved stainless steel storage tank to pad,
- cut braces, nuts and bolts and flanges from the plant components,
- removed mixers from mixing tanks and laid tanks on their side,
- steam cleaned plant components,
- moved ion exchange pots to the burial pad,
- moved reusable plant components off the plant concrete pad,
- ripped the concrete slab and compacted it on the north end of the plant site,
- removed the top few inches of soil from the plant site and compacted it over the concrete,
- buried the concrete with 10 feet of decomposed limestone, and
- cut a drainage ditch and contoured the area with a landscaper.

C. Evaporation Pond

The pipeline leading to the evaporation pond was removed and the pond was covered with 10 feet of decomposed clayey diabase.

D. General Mine Site Area

Throughout the decommissioning period, the area was continuously policed for scraps of paper and other rubbish.

Restoration was sequentially completed on the evaporation pond followed by covering the plant site and lastly covering the burial site.

### III. Close-Out Radiological Survey

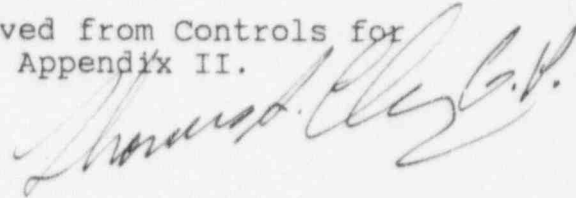
At the onset of operations at the Lucky Boy pilot plant 21 monitoring stations were established in the area of the operation. These stations were monitored quarterly during active operations. Appendix I shows in plan view the spacial relationship between the operation and the monitoring stations.

Appendix II of this report is the records of the monitoring stations, including the Close Out Survey.

Dr. John Mcklveen of Radiation and Environmental Monitoring Inc. visited the Lucky Boy property on February 3, 1987 and conducted PM&M's Close Out Radiological Survey. This survey included direct readings and soil sampling. These results are tabulated in Section I-D.

Dr. Mcklveen reports that all direct readings are less than twice background and that all radium 226 assays are well below the 5 pCi/g limit for remedial action. See Section I-D.

The soil sample assay report sheet received from Controls for Environmental Pollution, Inc. is contained in Appendix II.





Appendix I



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Appendix II



## Radiation and Environmental Monitoring Inc.

118 West Jeanine Dr. • Tempe, Arizona 85284 • Telephone (602) 839-8856

March 2, 1987

Mr. Tom Clary  
PO Box 2513  
Globe, Arizona  
85502

Dear Tom:

Enclosed please find the original and two copies of our pre-operational, operational, and closeout surveys. All direct radiation measurements performed during the closeout survey on February 3, 1987 are normal and less than twice background.

I have enclosed a copy of the soil sample Ra-226 assays performed by Controls for Environmental Pollution. All are less than 1 pCi/gram which is well below the 5 pCi/gram limit for remedial action.

Finally, I have enclosed some pictures which I took during our closeout survey.

Sincerely,

A handwritten signature in dark ink, appearing to read 'John W. McKlveen', is written over the typed name.

John W. McKlveen, PhD

Enclosures:



PAGE 2

REPORT OF ANALYSIS

LAB #

87-02-189

SAMPLE_IDENIIEICATION	DATE_COLLECTED	TYPE_OF_ANALYSIS	---pCi/gm---
Site 1	02/03/87	Radium-226	0.50+/-0.04
Site 2	02/03/87	Radium-226	0.34+/-0.03
Site 4	02/03/87	Radium-226	0.71+/-0.04
Site 7	02/03/87	Radium-226	0.37+/-0.04
Site 8	02/03/87	Radium-226	0.67+/-0.07
Site 9	02/03/87	Radium-226	0.43+/-0.03
Site 15	02/03/87	Radium-226	<0.05
Site 20	02/03/87	Radium-226	0.50+/-0.04
Site 21	02/03/87	Radium-226	0.57+/-0.04

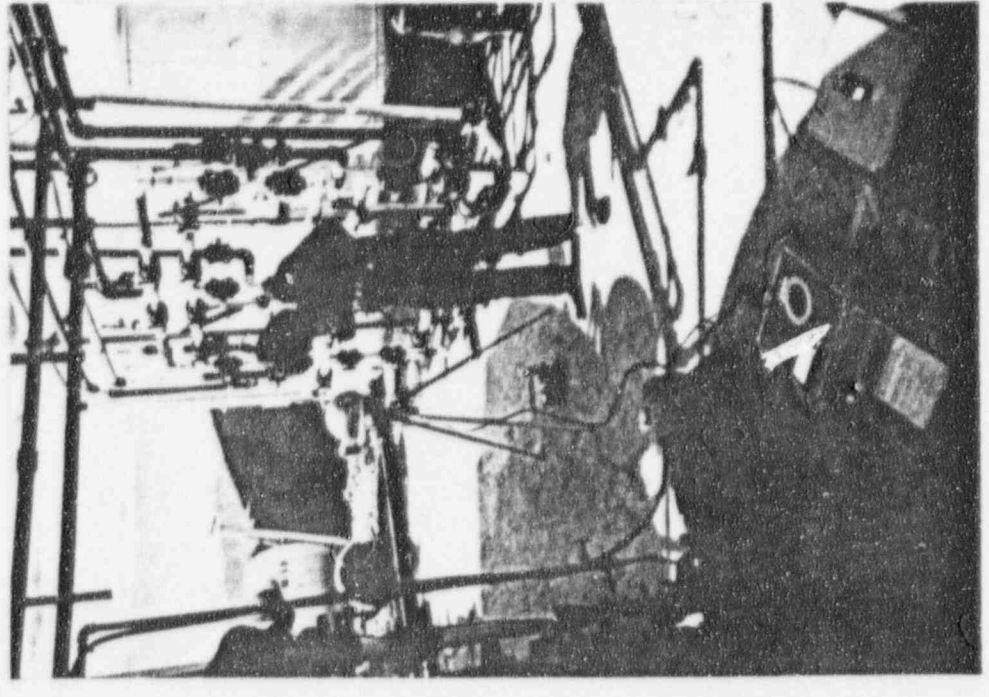
Page 2

ENVIRONMENTAL SURVEY LOCATION #

1

Cement Pad  
between 3 resin bed tanks (W)  
And large collection tank (E)

AND MILL ASSAY DATA



ENVIRONMENTAL SURVEY LOCATION # 1

[illegible]

\* 1m = 1 meter

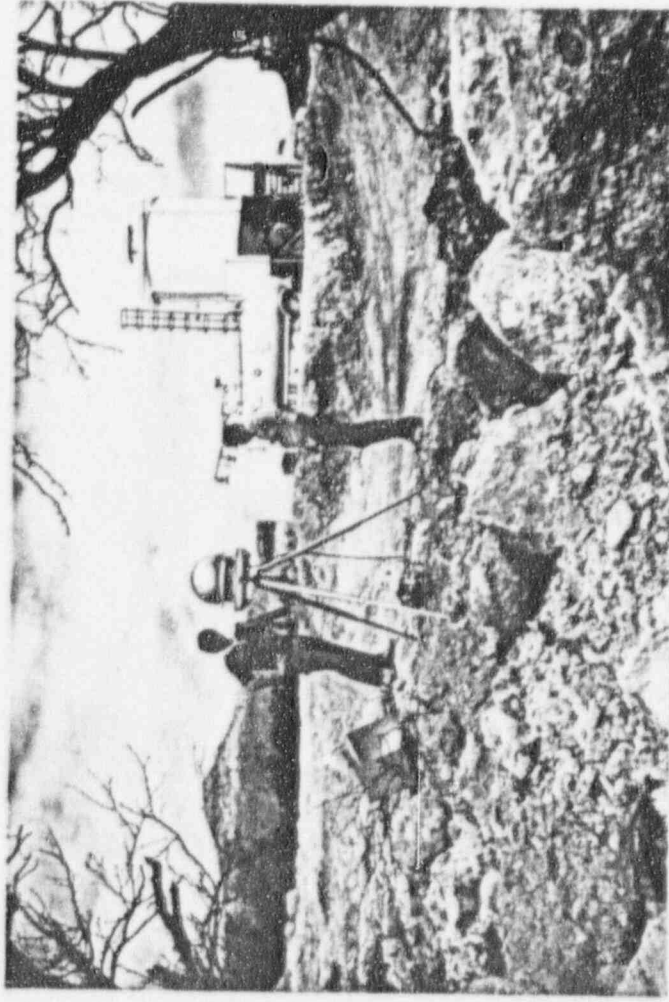
\*\* WL = Working Levels

ENVIRONMENTAL SURVEY

LOCATION #

2

South of Cement Pad  
between two small trees  
near Aluminum painted  
tank with red top



2

SOLID TYPE

Soil

[illegible]





## ENVIRONMENTAL SURVEY LOCATION # 3

[illegible]

\* 1m = 1 meter

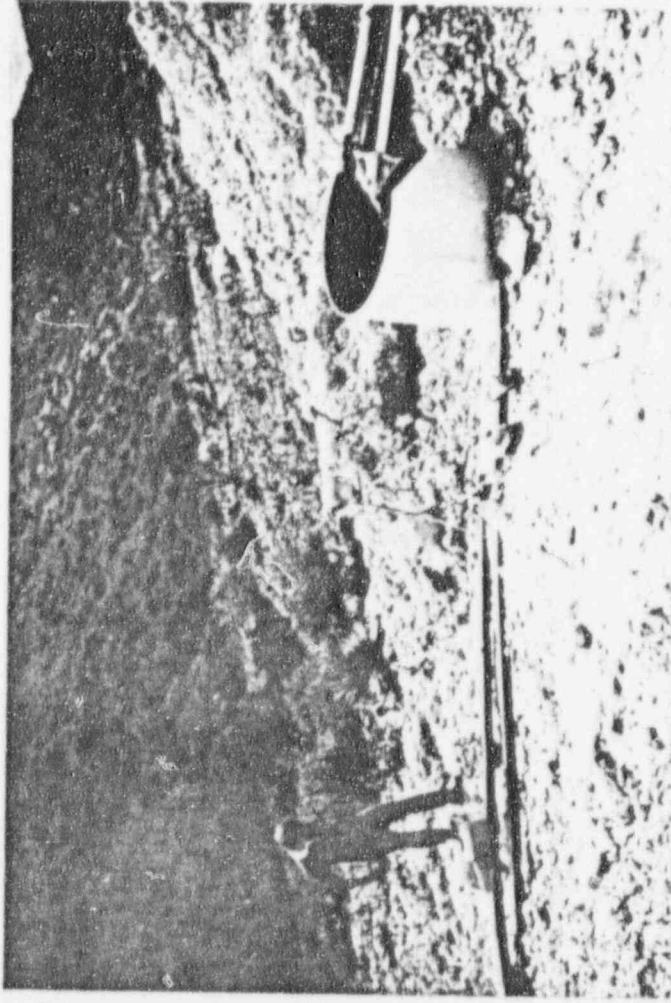
\*\* WL = Working Levels

ENVIRONMENTAL SURVEY

LOCATION #

4

Acid return sump  
3 foot DE  
STRADDLING return pipes



ENVIRONMENTAL SURVEY LOCATION # 4

[illegible]

\* 1m = 1 meter      \*\* WL = Working Levels

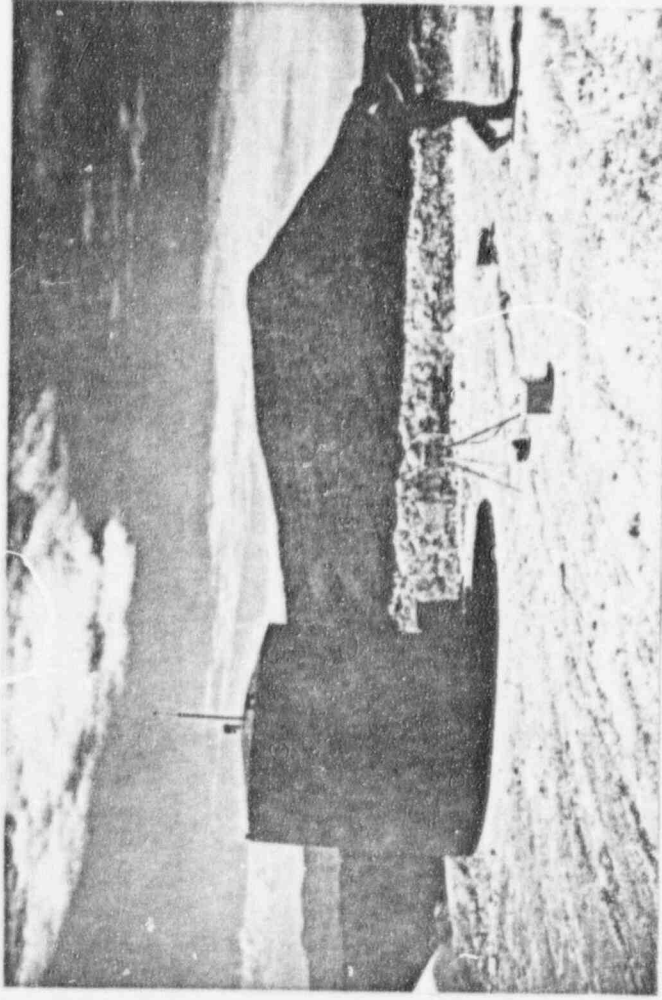


ENVIRONMENTAL SURVEY

LOCATION #

5

Road by red Acid Tank  
About 15 feet from pipe  
which opens out to North





ENVIRONMENTAL SURVEY LOCATION # 5

[illegible]

\* 1m = 1 meter      \*\* WL = Working Levels

ENVIRONMENTAL SURVEY

LOCATION #

6

Bend N Road  
Overlooking Leaching  
Area





## 6

Close out survey

\*\*\* WL = Working Levels

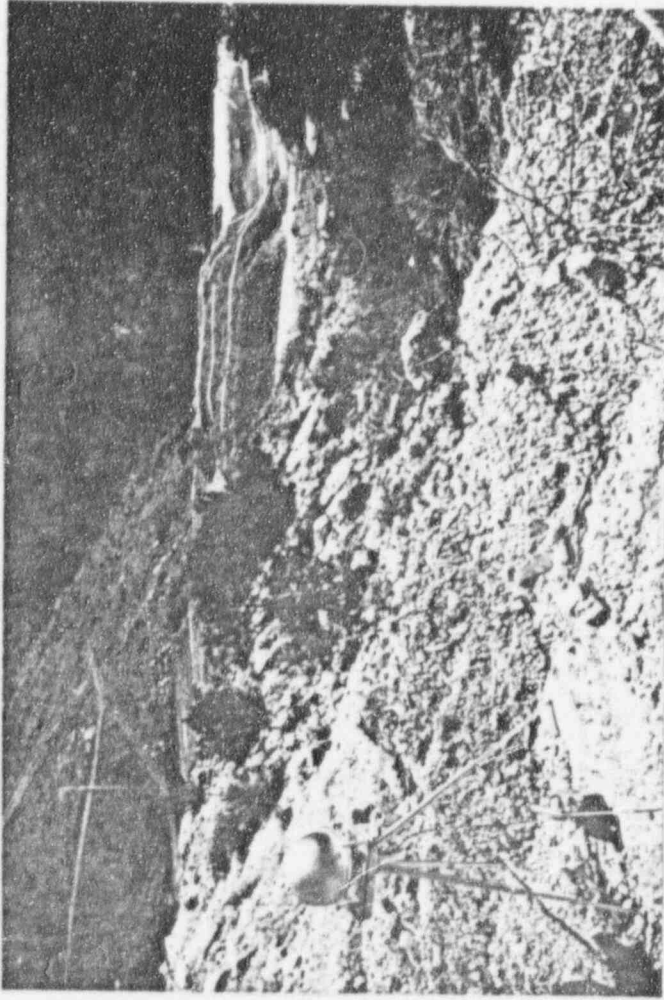
ENVIRONMENTAL SURVEY

LOCATION #

7

Y Junction Above  
leaching pond

(Now 2/87 in middle  
of (Gravel area)



## ENVIRONMENTAL SURVEY LOCATION # 7

[illegible]

\* 1m = 1 meter      \*\* WL = Working Levels

ENVIRONMENTAL SURVEY

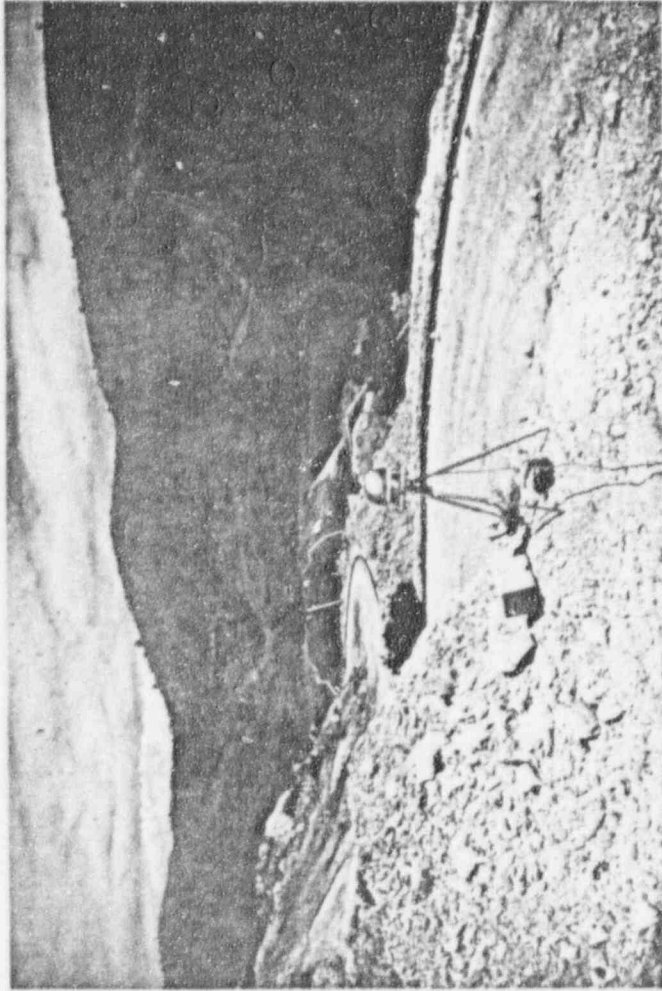
LOCATION #

8

Bend in road

down towards

leaching pond



ENVIRONMENTAL SURVEY LOCATION # 8

[illegible]

\* 1m = 1 meter      \*\* WL = Working Levels



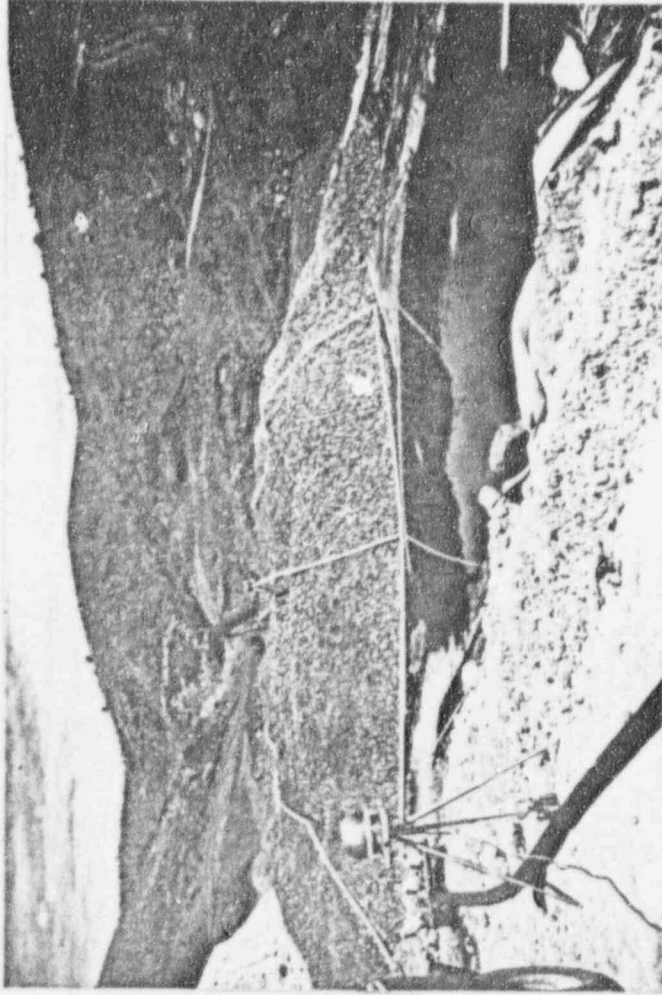
ENVIRONMENTAL SURVEY

LOCATION #

9

About 10 foot above  
VALVE ARRANGEMENT  
which controls Acid  
flow to leach pond  
STRUTTING PIPE

See LOCATION #1 for  
Additional Assays of leach  
liquor.



ENVIRONMENTAL SURVEY LOCATION # 9

[illegible]

\* 1m = 1 meter

★★ WL = Working Levels



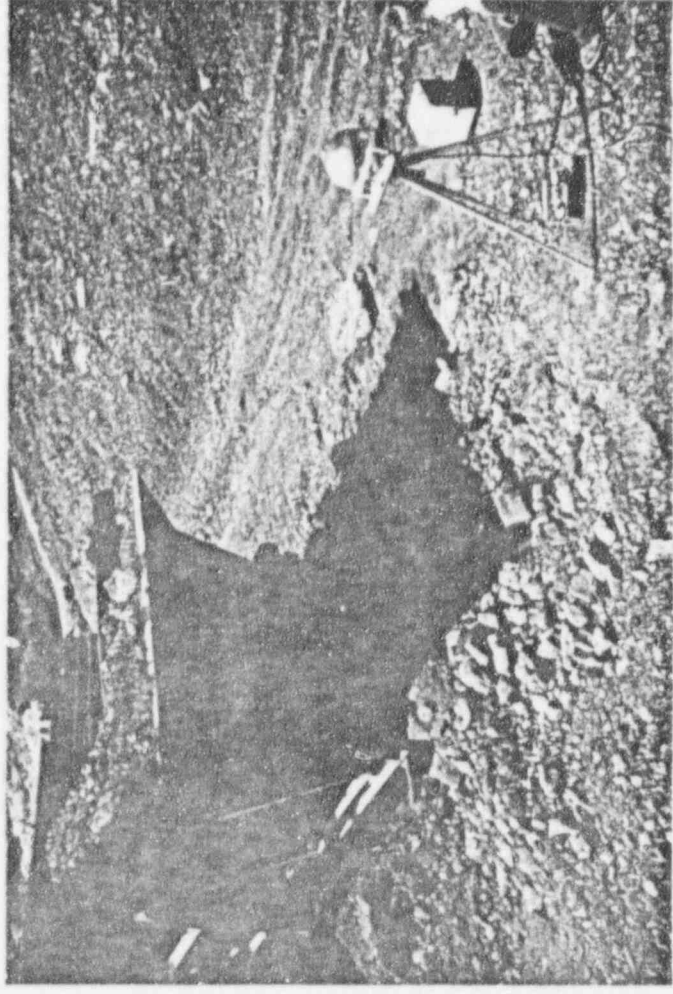
ENVIRONMENTAL SURVEY

LOCATION #

10

Directly in Front  
of Crusher Unit  
(North)  
Crusher Removed 6/78  
New Sump & Leach Heap  
Created just north of here 8/78.

FBH - 79-2 76 monitor well  
79-13  
79-14  
79-19  
79-20  
79-21



ENVIRONMENTAL SURVEY LOCAT ON # 10

[illegible]

\* 1m = 1 meter

\*\* WL = Working Levels

ENVIRONMENTAL SURVEY

LOCATION # 11

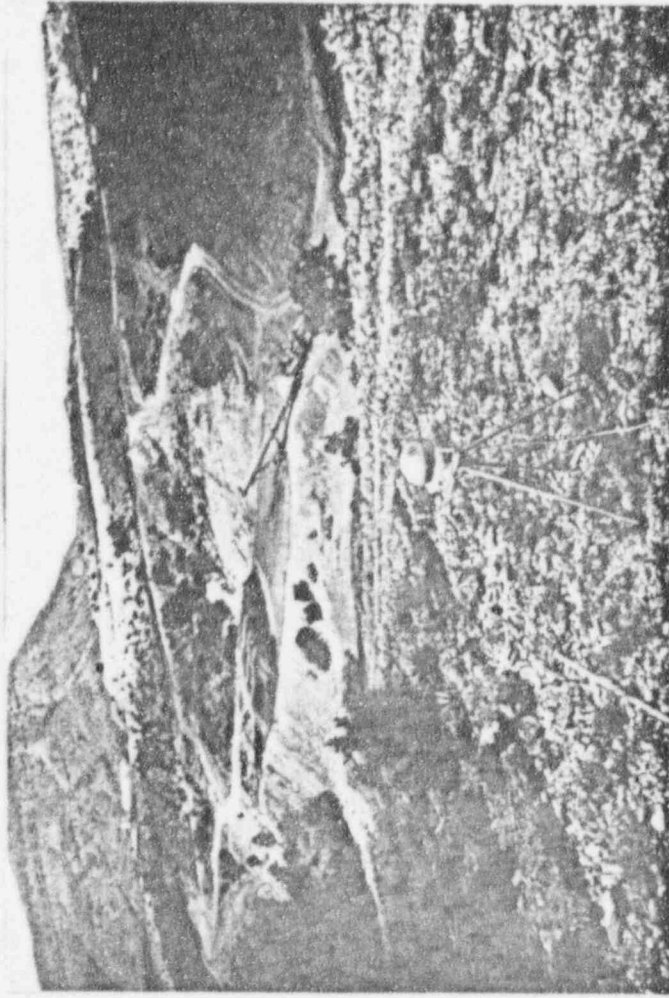
Top of hill

EAST OF MANWORE BODY

NORTH OF E-W RAINE

Bladed OUT AREA

North FISH well about 1/2 mile N



ENVIRONMENTAL SURVEY LOCATION # 11

[illegible]

\* 1m = 1 meter

★★ WL = Working Levels

ENVIRONMENTAL SURVEY

LOCATION #

12

Base of Rock Pile

below crusher region

by outcropping on west side

about 20' from rock

fill across north ravine

H<sub>2</sub>O from below tunnel

but before confluence

Mine Tunnel Assays

EGH 79-7 Monmouth (90')





ENVIRONMENTAL SURVEY LOCATION # 12

[illegible]

\* 1m = 1 meter

\*\* WL = Working Levels

ENVIRONMENTAL SURVEY

LOCATION # 13

About 50 feet south

of #12.

Edge of stream eroded

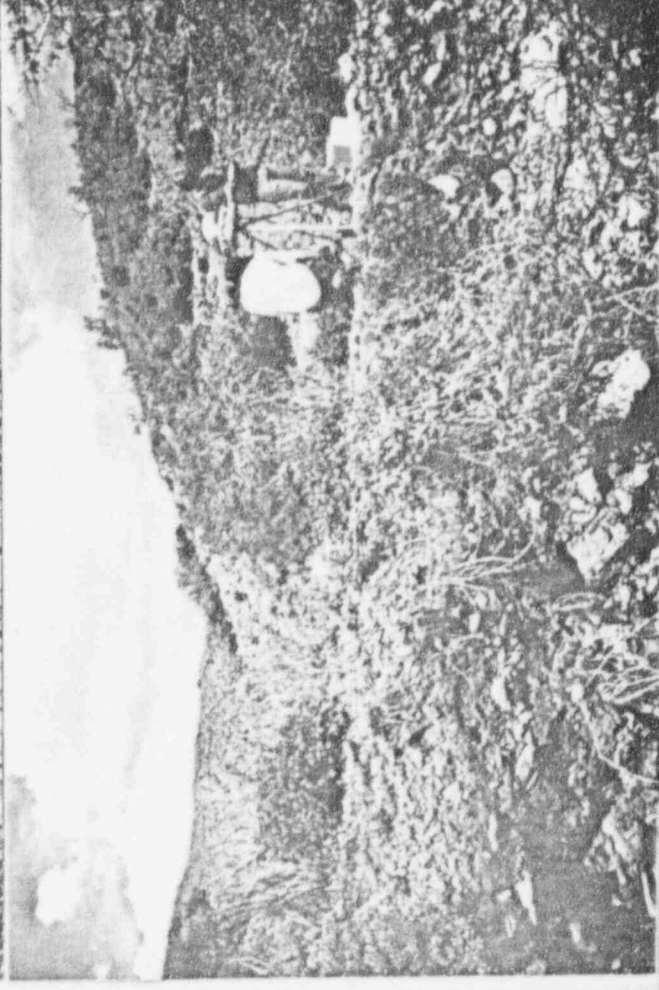
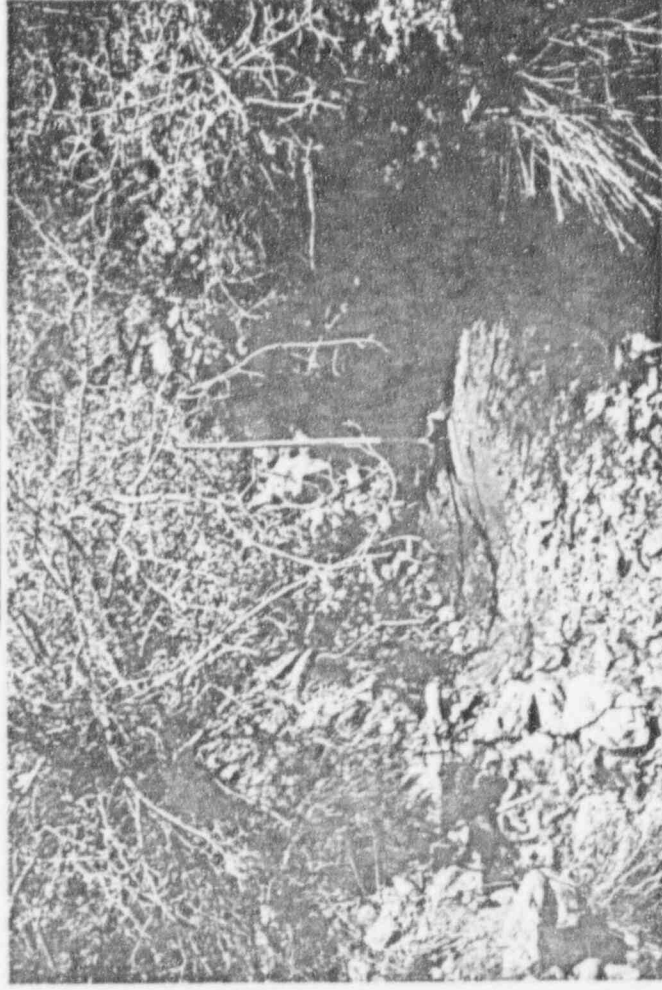
by recent rains (3/78).

→ (Now east of dive)

EBH Not measured

to top of road

Two sides deep, 1st has 4000%





ENVIRONMENTAL SURVEY LOCATION # 13

Date \_\_\_\_\_

Gamma Dose  
uR/hr  
1m\* GND

Bkg. TLD  
mR/Qtr.

Radon  
Daughters  
WL\*\*

Remarks

[illegible]

\* 1m = 1 meter

\*\* WL = Working Levels

ENVIRONMENTAL SURVEY

LOCATION #

14

STREAM BED

DIRECTLY BELOW JUMP

Confluence  $H_2O$

Assay reported at this  
location

East Note Monitored well  
south of East 49-7



## 14

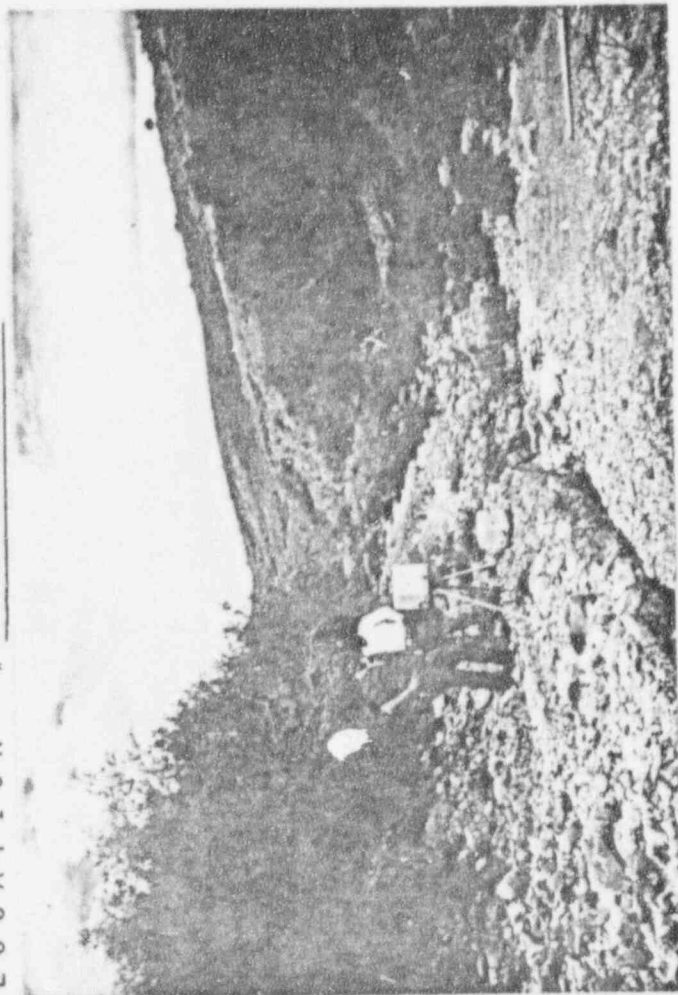
Date	Gamma Dose uR/hr 1m* GND	Bkg. TLD mR/Qtr.	Radon Daughters WL**	Remarks
------	--------------------------------	---------------------	----------------------------	---------

★

ENVIRONMENTAL SURVEY

LOCATION # 15

Across from old borehole  
downstream from 14  
(Center of New Road  
comes down from  
west) new road  
HERE



ENVIRONMENTAL SURVEY LOCATION # 15

[illegible]

\* 1m = 1 meter

\*\* WL = Working Levels



15

Soil

[illegible]

ENVIRONMENTAL SURVEY

LOCATION #

16

50 feet downstream

WHERE RUNOFF COMES DOWNHILL  
FROM SUMP & TRAILER AREA  
(NEAR BIG ROCK)





[illegible]

★★ WL = Working Levels

ENVIRONMENTAL SURVEY

LOCATION #

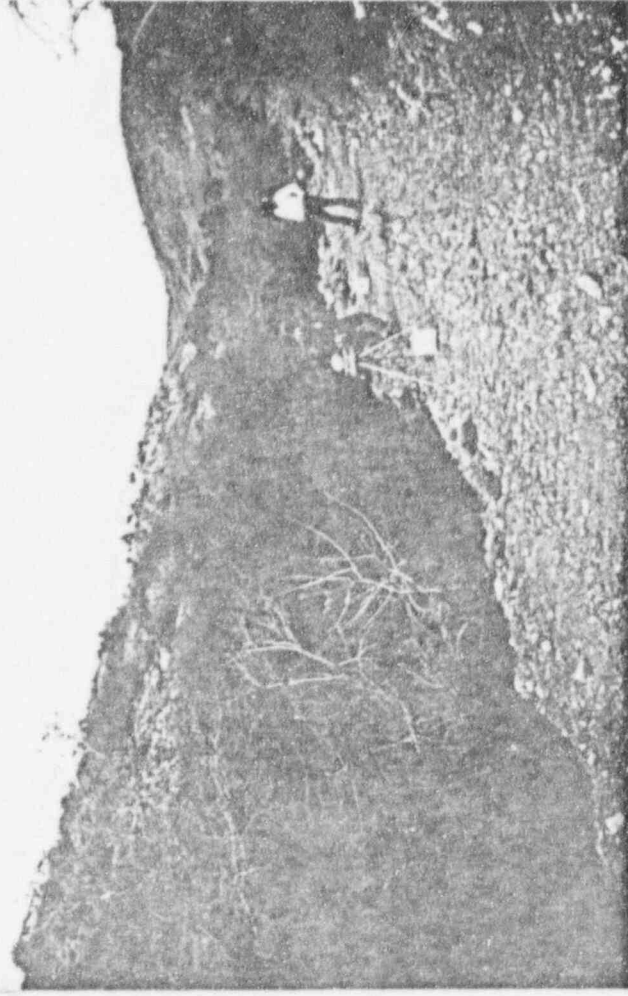
17

Stream Bed

below 16

SE of TRAILER

(open face ROCK TO EAST)



## ENVIRONMENTAL SURVEY LOCATION # 17

[illegible]

\* 1m = 1 meter      \*\* WL = Working Levels

ENVIRONMENTAL SURVEY

LOCATION #

18

Runoff Area

North AND EAST OF

NORTH Ravine

Flow comes DOWN OVER

ROCKS AND ENTERS MINE AREA



## ENVIRONMENTAL SURVEY LOCATION # 18

[illegible]

\* 1m = 1 meter

★★ WL = Working Levels



ENVIRONMENTAL SURVEY LOCATION # 20

ROAD TO EVAP Pond  
WASH DOCK SIDE

## 20

Remarks

Close out survey

## WL = Working Levels



20

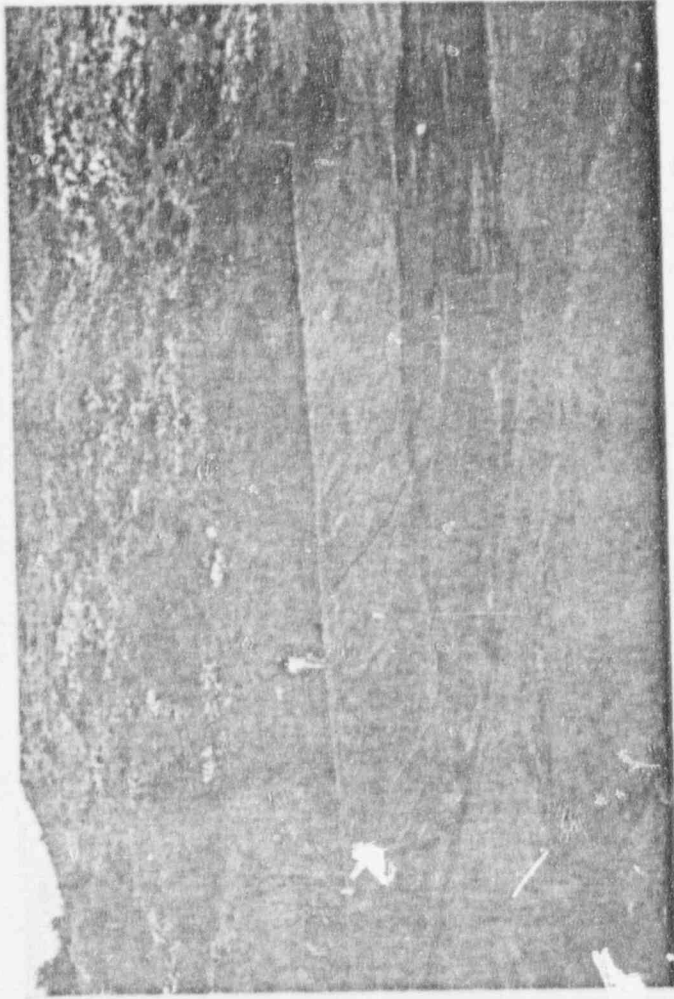
S O L I D    T Y P E

Soil

[illegible]

ENVIRONMENTAL SURVEY LOCATION # 21

Evap Pond  
Ditch Side by Fence  
and house



## ENVIRONMENTAL SURVEY LOCATION # 21

[illegible]

\* 1m = 1 meter

\*\* WL = Working Levels

ENVIRONMENTAL SURVEY

LOCATION # 22

Center of Evap Pond  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

