

DEPARTMENT OF ENERGY
ALBUQUERQUE OPERATIONS OFFICE
CONTRACT NO. DE-AC04-83AL18796

Radiological and Engineering Assessment

Vicinity Property No. CAN-133

Remedial Actions
Contractor
for the
Uranium Mill Tailings
Remedial Actions
Project



MORRISON
KNUDSEN

URFO-8

Vicinity Property No. CAN-133

9707110017 840625
PDR WASTE
WH-39 PDR

NRC FILE CENTER COPY

THE RADIOLOGICAL AND ENGINEERING ASSESSMENT
AND FINAL DESIGN

FOR

CANONSBURG PROPERTY

CA-133

June 25, 1984

PREPARED FOR

URANIUM MILL TAILINGS REMEDIAL ACTION PROJECT OFFICE

UNITED STATES DEPARTMENT OF ENERGY

PREPARED BY

MORRISON-KNUDSEN COMPANY, INC.

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1.0 EXECUTIVE SUMMARY

1.1 Introduction

Property CA-133 is a vacant lot located at Spruce and Glenn Streets, Canonsburg, PA.

1.2 Evaluation and Recommendation

1.2.1 Residual Radioactive Material Involvement

One large area of contamination was found in the vacant lot which borders Spruce and Glenn Streets.

1.2.2 Recommended Remedial Action Option

The recommended option is removal of the contaminated material by excavation.

1.2.3 Estimated Costs

The estimated cost for removal of the contaminated material and restoration of the property is \$46,850.00.

1.2.4 Schedule

The estimated duration of the remedial action effort is 20 to 30 days.

2.0 ENGINEERING FIELD SURVEY

2.1 Property Description

2.1.1 Property Use and Occupancy

Property CA-133 is a vacant lot located at Spruce and Glenn Streets and owned by the Borough of Canonsburg. The map in Figure 2.1 illustrates the property's vicinity location.

2.1.2 Legal Description

The legal description as recorded with the Washington County Recorder's Office in Deed Book No. 558/492,493

13 Lots (#108 - 120 white lawn terrace)

2.1.3 Bordering Properties

The property is located in a residential area less than one mile north of the old Vitro mill tailings site. The property is bounded on the north by vacant property; on the east by Glenn Avenue; on the south by Spruce Street; and on the west by residential property.

2.2 Existing Facilities and Structures

2.2.1 Structures

There are no improvements on the property. A hill rises eastwardly on the property, and is covered with brush and trees. From the base of the hill, westwardly to Glenn Street, the property is grassy with occasional brush.

2.2.2 Utilities

There are no utilities servicing the property.

2.2.3 Site Plan and Survey Data

See Figure 4.1 for a site plan of the property. Property survey data and photos are presented in Table 2.1 and Figures 2.2 and 2.3.

Table 2.1

PROPERTY SURVEY DATA

GENERAL:

Site Location: Canonsburg

Property Address: Spruce & Glenn Ave. (CA 133)

Owner's Name: Paul Amic (745-1800) Address: _____

Manager - Borough of Canonsburg

Lot No.: 113-120 Property Type: Residential (Vacant Lot)

Occupancy Group: Adults: NA Children: NA

Survey Completed By: V. De Vries/B. Bindi Date: 12-9-83

Property Description - Exterior:

Dwelling: Sq. Ft.: Vacant Lot in Residential Area

Levels: _____

Construction Type: _____

Foundation: _____

Garage: None

Storage Bldg: Prefab: _____

For Gas Pumps Other: Concrete Block With Concrete Roof Slab (4") - Block Fdn.

Improvement Additions: None Porches: None

to Dwellings: Deck: None Patio: None

Other: None

Driveway: Concrete: _____ Paved: _____

Gravel: As Noted On Dwg. Other: _____

Sidewalks: Concrete/Paved: None Other: _____

Fences/Gates: Wood: None Other: _____

Chain Link: _____

Table 2.1 (cont'd)

PROPERTY SURVEY DATA

Site Location: Canonsburg

Property Address: Spruce & Glenn Ave. (CA 133)

Electric Line Location: As Noted On Dwg.

Gas Line Location: As Noted On Dwg.

Water Line Location: Not Applicable

Sewage Line Location: As Noted on Dwg.

Telephone Line Location: As Noted On Dwg.

Building Codes and Zoning: BOCA

<u>Codes</u>	<u>Local</u>	<u>State</u>	<u>Federal</u>
<u>Building Work</u>			
<u>Plumbing</u>			
<u>HVAC</u>			
<u>Electrical</u>			
<u>Other</u>			

Zoning District: R-1

Present Dwelling Zoning: R-1

Setbacks: Front: NA

Rear: NA

Side: NA

Other: NA

Photographs:

<u>Roll Frame</u>	<u>Description</u>	<u>Direction</u>
<u>2-15</u>	<u>View of Property</u>	<u>Looking South</u>
<u>2-16</u>	<u>View of Property</u>	<u>Looking North</u>

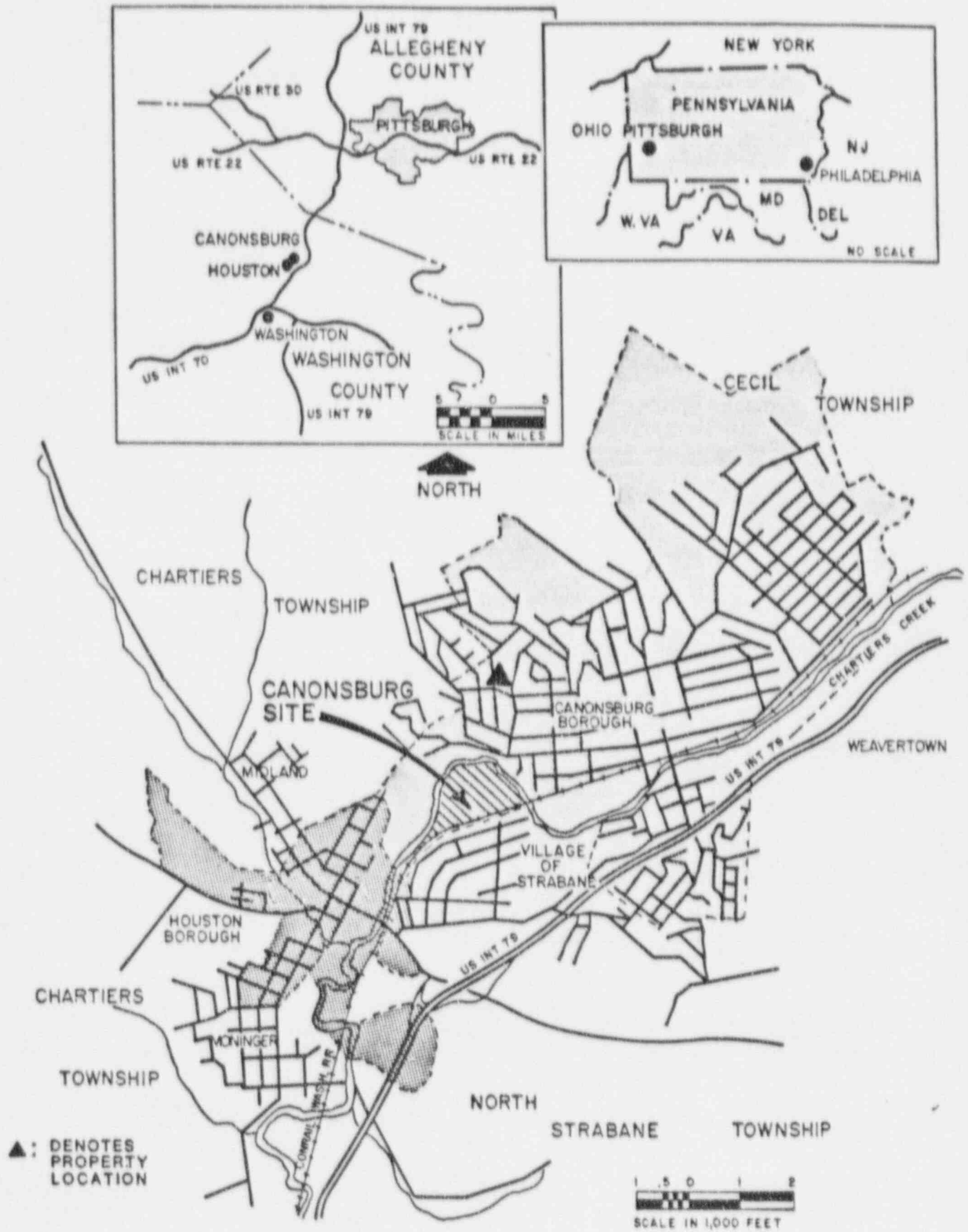


Figure 2.1 Vicinity Map - Canonsburg Site



View of Property Looking South



View of Property Looking North

Figure 2.2 Property Photos



View of Lot and Road Barrier Looking South

Figure 2.3 Property Photos

3.0 RADIOLOGICAL SURVEY AND ASSESSMENT

3.1 Gamma Exposure Rate Survey

3.1.1 Survey Method

A gamma survey of the property was conducted in accordance with Health Physics Procedure RAC-019. The gamma screening survey sheets are attached in Appendix "A."

An indoor scan was not conducted at property CA-133 since the property is a vacant lot.

3.1.2 Survey Results

Surface gamma readings at the boundary of the identified contaminated region (Figure 3.1) range from 12 to 14 micro R/hr (Table 3.1) as compared to a background of 11 micro R/hr for the Canonsburg area.

3.2 Borehole Surveys

3.2.1 Survey Method

A gasoline powered auger was used to drill 4 inch diameter holes in and around the region identified as contaminated during the gamma survey. The holes were surveyed in accordance with Health Physics Procedure RAC-018.

3.2.2 Survey Results

Contamination, as defined in RAC-018, was found in 10 of the 26 holes augered. The location and depth of the contamination is shown in Table 3.2. Three supplemental boreholes were drilled subsequent to the original survey. No contamination was found in these holes.

3.3 Radon/Radon Daughter Surveys

No radon/radon daughter surveys were performed, since a structure is not located on the property.

3.4 Extent of Contamination

Figure 3.1 shows the approximate area of contamination. The average depth of contamination is 3'-0". Refer to property photos Figures 2.2 and 2.3 for contour.

TABLE 3.1
 OUTDOOR GAMMA SURVEY
 Property CA-133

POINT	COORDINATES	READING AT 3 cm (CPM)	Micro R/hr
Bkg	(-100.0,20.8)	12550	12
1	(-87.9,2.2)	17410	13
2	(-91.0,8.9)	18500	14
3	(-94.4,6.5)	15000	13
4	(-101.2,9.2)	16260	13
5	(-114.2,11.0)	17020	13
6	(-119.1,11.6)	16110	13
7	(-126.4,12.6)	16770	13
8	(-138.4,11.9)	15860	13
9	(-143.0,11.4)	15680	13
10	(-155.2,11.3)	17700	14
11	(-163.6,13.2)	16320	13
12	(-171.4,13.5)	16080	13
13	(-178.6,13.7)	17200	13
14	(-186.4,14.7)	14800	13
15	(-191.3,15.8)	16000	13
16	(-196.0,16.9)	15860	13
17	(-204.7,17.4)	15040	13
18	(-209.8,17.7)	15360	13
19	(-216.3,16.6)	15780	13
20	(-223.5,17.2)	16010	13

TABLE 3.1 (cont'd.)

OUTDOOR GAMMA SURVEY

Property CA-133

POINT	COORDINATES	READING AT 3 cm (CPM)	Micro R/hr
21	(-232.0,17.0)	15490	13
22	(-244.2,17.3)	15780	13
23	(-253.7,16.2)	16320	13
24	(-266.0,14.5)	16600	13
25	(-275.8,14.4)	15480	13
26	(-281.8,12.2)	15710	13
27	(-292.8,10.2)	15450	13
28	(-299.4,5.8)	16580	13
29	(-301.5,-2.7)	14990	13
30	(-305.9,-8.1)	16660	13
31	(-307.1,-12.4)	16420	13
32	(-307.4,-17.8)	15500	13
33	(-308.8,-23.7)	15260	13
34	(-310.0,-30.2)	16620	13
35	(-309.8,-30.2)	16940	13
36	(-310.8,-35.5)	15940	13
37	(-310.8,-43.1)	16470	13
38	(-314.0,-52.6)	16650	13
39	(-317.6,-65.2)	14690	13
40	(-321.8,-72.7)	16330	13
41	(-325.7,-77.8)	15730	13

TABLE 3.1 (cont'd.)

OUTDOOR GAMMA SURVEY

Property CA-133

POINT	COORDINATES	READING AT 3 cm (CPM)	Micro R/hr
42	(-322.0,-82.4)	15790	13
43	(-317.0,-96.4)	14970	13
44	(-307.6,106.0)	17500	14
45	(-295.6,111.2)	18390	14
46	(-286.5,108.2)	18500	14
47	(-281.9,-106.0)	18550	14
48	(-274.7,-100.5)	18940	14
49	(-259.3,-100.5)	19390	14
50	(-248.2,-99.2)	21000	14
51	(-236.7,-96.5)	17600	14
52	(-229.4,-93.0)	18140	14
53	(-218.7,-87.5)	18260	14
54	(-213.1,-88.8)	19580	14
55	(-200.0,-83.0)	16240	13
56	(-192.0,-77.2)	17550	14
57	(-179.1,-70.0)	19270	14
58	(-170.3,-59.0)	18990	14
59	(-158.3,-57.7)	18990	14
60	(-152.2,-59.0)	13130	12
61	(-147.7,-54.0)	17990	14
62	(-136.2,-39.7)	17890	14

TABLE 3.1 (cont'd.)

OUTDOOR GAMMA SURVEY

Property CA-133

POINT	COORDINATES	READING AT 3 cm (CPM)	Micro R/hr
63	(-128.3,-35.6)	16830	13
64	(-131.6,-32.1)	18190	13
65	(-121.8,-23.9)	16510	13
66	(-121.5,-20.2)	17390	13
67	(-120.7,-15.5)	15710	13
68	(-118.4,-10.4)	16680	13
69	(-111.4,-6.0)	16300	13

TABLE 3.2
BOREHOLE SURVEY
Property CA-133

Hole	Coordinates	Contamination Depth	Soil Type
A	(-158.1,-7.5)	19-21"	Rock/Clay
B	(-115.9,-4.7)	None	Clay/Rock
C	(-120.5,-25.4)	None	Clay/Rock
D*			
E	(-250.0,76.0)	13-21"	Clay/Rock
F	(270.9,-59.7)	7-11"	Clay/Rock
G	(-211.2,-40.8)	5-15"	Clay/Rock
H	(-140.4,3.2)	None	Clay/Rock
I	(-184.3,9.2)	39-51"	Clay/Rock
J	(-182.0,12.7)	54-63"	Clay/Rock
K	(-232.0,12.4)	81-90"	Clay/Rock
L	(-300.0,7.5)	None	Clay/Rock
M	(-299.4,2.2)	None	Clay/Rock
N	(-311.2,-46.9)	None	Clay/Rock
O	(-314.7,-107.3)	None	Clay/Rock
P	(-137.4,13.0)	45-53"	Clay/Rock
Q	(-92.3,15.1)	None	Clay/Rock
R	(-119.0,14.1)	None	Clay/Rock
S	(-258.4,11.8)	None	Clay/Rock
T	(-245.0,12.1)	None	Clay/Rock
U	(-296.9,-28.9)	None	Clay/Rock

*Data from Hole D was not utilized.

TABLE 3.2 (cont'd.)

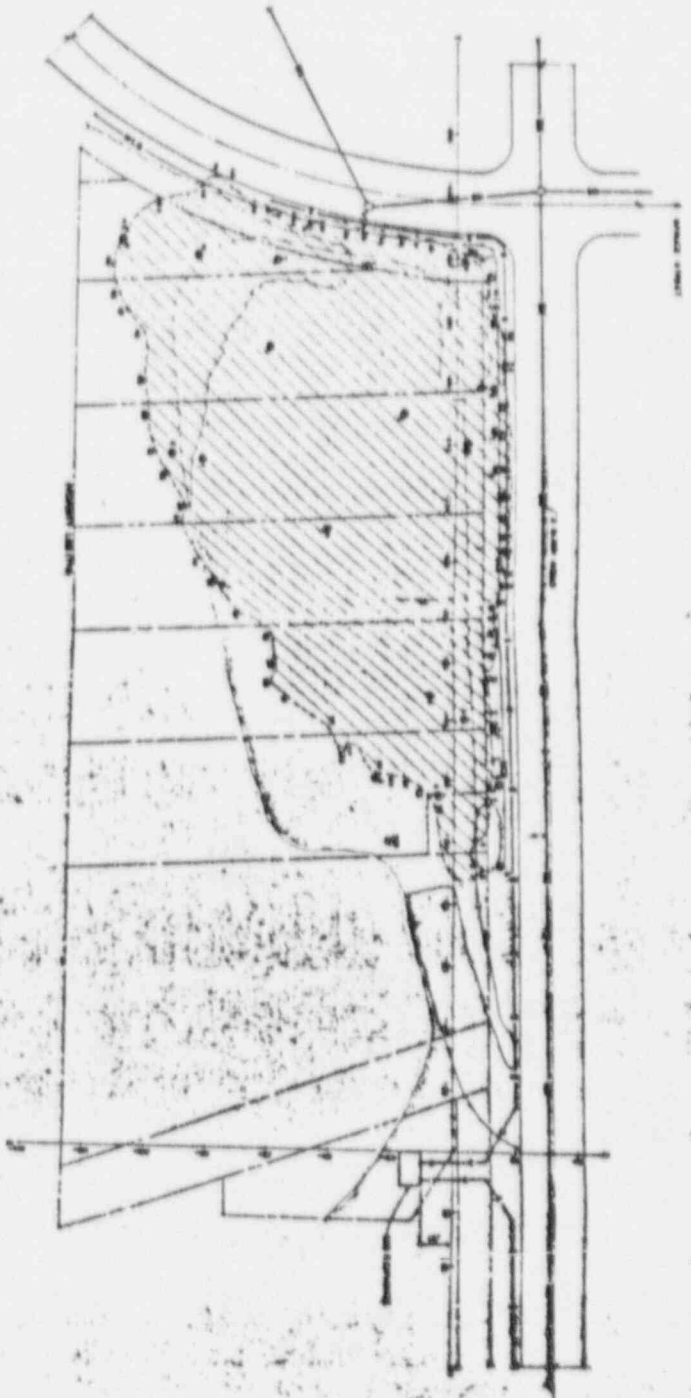
BOREHOLE SURVEY

Property CA-133

Hole	Coordinates	Contamination Depth	Soil Type
V	(-298.9,-57.5)	41-43"	Clay/Rock
W	(-240.4,4.0)	None	Clay/Rock
X	(-190.4,-74.8)	None	Clay/Rock
Y	(-235.0,-81.5)	None	Clay/Rock
Z	(-236.4,-91.5)	None	Clay/Rock
A1	(-300.0,-83.0)	15-27"	Clay/Rock

Supplemental Boreholes

A	(-200.0,40.0)	None
B	(-175.0,40.0)	None
C	(-120.0,40.0)	None



Section	1	2	3	4	5	6	7	8	9	10
Topography										
Geology										
Structure										
Other										

U. S. DEPARTMENT OF ENERGY
 ALBUQUERQUE, NEW MEXICO

PROJECT NO. **28-135-CM**

GEOLOGICAL SURVEY DATA SHEET

SUBJECT: **SECTION OF SANDSTONE, WASHINGTON COUNTY, NM**

PREPARED BY: **DR. ACOA-83ALB798**

DATE: **28-135-CM**

LEGEND

[Symbol]	Topography
[Symbol]	Geology
[Symbol]	Structure
[Symbol]	Other

4.0 ENGINEERING ASSESSMENT

Engineering options were formulated and evaluated based on the radiological and engineering assessment for this property. Factors forming the basis of the evaluation were: the extent and location of the contamination, construction costs, and required demolition and constructability for the various options. Results of the evaluation are detailed below:

4.1 Evaluation of Options

4.1.1 Options

Two options were evaluated for property CA-133:

1. No action should be taken.
2. Decontamination of the property including retrieval of the contaminated material designated for removal in this REA and restoration of the property.

Option 2 includes excavation of contaminated soil designated on Drawing CA-133-100 and replacement with clean fill and topsoil. Seeding is required, rather than sodding, because the property is vacant and normal vegetation should be re-established within one growing season. The area to be excavated is approximately 15,500 square feet. See Figure 4.1. The depths of excavation vary across the area from 1 to 9 feet, with the average depth being approximately 3 feet. There are no utilities within the excavation area and there are no safety hazards to contractor for performing the work. The work area is directly accessible from Glenn Avenue.

If additional contamination is found extending under Spruce Street or Glenn Avenue, the extent and radiation level of the contamination shall be established and documented. This contamination shall not be removed. (Reference: Supplemental Standards, 40CFR 192.21 Subsection (c).) Efforts to establish extent of contamination will consider the high pressure gas lines in the area and minimize construction delays.

4.1.2 Costs

Estimated costs for the activities associated with Option 2 are detailed in Table 4.1. Costs include labor, material, equipment, supplies, excavation, removal, restoration, and contingency. All costs are listed in 1984 dollars. It is anticipated that the time required for the subcontractor to complete the work will be 20 to 30 days.

4.2 Recommendation

The limited cost and amount of remedial action work precluded evaluating any more than these two options. The results of the radiological assessment concluded that contamination levels on the property exceeded EPA guidelines. Therefore, based on these guidelines, it is recommended that Option 2, decontamination of the property, be pursued. The total estimated cost for Option 2 is \$46,850.00

Table 4.1
OPTION 2 COSTS

<u>Activity</u>	<u>Unit Price</u>	<u>Quantity</u>	<u>Estimated Cost</u>
Excavate and Remove Contaminated Material	4.30	1725 cy	7,418.00
Clean Backfill	11.30	1435 cy	16,216.00
Topsoil (6" deep)	24.00	290 cy	6,960.00
Seed, Fertilizer & Mulch	1.00	1725 sy	1,725.00
Subcontractor's Contingency	LS	1	1,616.00
Overhead and Profit	LS	1	6,790.00
Subtotal			40,725.00
Contingency			6,109.00
Total			46,834.00
Rounded Total			46,850.00

5.0 TECHNICAL SPECIFICATIONS

Technical specifications applicable to this property are indexed in Table 5.1. Those specifications previously approved by the Department of Energy (DOE) are noted in the table as standard specifications. Also listed are specifications not previously submitted to the DOE which require approval. The text for these additional specifications follow the table.

Table 5.1

INDEX OF TECHNICAL SPECIFICATIONS

Description	Standard Specifications	New Submittals
Division 2 - Site Work		
SECTION 02110	CLEARING AND GRUBBING	X
SECTION 02130	CONTAMINATED MATERIAL REMOVAL	X
SECTION 02200	EXCAVATION AND BACKFILL	X
SECTION 02480	LANDSCAPING	X

6.0 CONSTRUCTION DRAWINGS

Listed below is an index of the construction drawings required for remedial action on this property. Copies of the drawings follow this section.

<u>Drawing Number</u>	<u>Drawing Title</u>
CA-133-100	Property Site Plan CA-133

CA-133 - APPENDIX A
OUTDOOR GAMMA SCREENING AND
BOREHOLE LOGGING DATA SHEETS

OUTDOOR GAMMA SCREENING SURVEY DATA SHEET

Date 2/2/84
 Time 1330

Surveyors Ray A. Wilson
E. K. ...

Property ID KA-133

Instrument Model _____ Serial No. can-038
 Probe Model _____ Serial No. _____
 Background Gamma Exposure rates 1. 1260
 2. 1245 Avg. 1255
 3. 1261

Other Information _____

Stake ID	Reading at 3 cm, $\mu\text{R/h}$	Remarks
1	1791	
2	1250	
3	1500	
4	1626	
5	1702	
6	1611	
7	1617	
8	1526	
9	1548	
10	1770	
11	1632	
12	1600	
13	1720	
14	1430	
15	1600	
16	1546	
17	1504	
18	1536	
19	1572	
20	1601	
21	1544	
22	1572	
23	1632	
24	1666	
25	1542	
26	1571	
27	1545	
28	1652	

OUTDOOR GAMMA SCREENING SURVEY DATA SHEET

Date 7/2/74
 Time 1330

Surveyors Ray Anderson
(Kolata)

Property ID CA-133

Instrument Model _____ Serial No. CAV-028

Probe Model _____ Serial No. _____

Background Gamma Exposure Rates 1. 126.0
 2. 124.5 Avg. 125.5
 3. 126.1

Other Information _____

Stake ID	Reading at 3 cm, ^{cpm} Y10	Remarks
20	1497	
21	11066	
21	1642	
22	1550	
22	1730	
24	1064	
25	1674	
30	1594	
27	1647	
30	1665	
31	1467	
40	1633	
41	1573	
47	1574	
43	1447	
44	1750	
45	1829	
46	1550	
47	1855	
48	1224	
49	1934	
50	2100	
51	1760	
52	1814	
53	1226	
54	1455	
55	2020 1624	
57	1725	

REV. NO.

PAGE NO.

HOLE LOGGING DATA SAMPLE SHEET

Date 2-15-84

Surveyors Bill F. [unclear]
Gene L. [unclear]
Callars

Property Id CA133

Drilled material composition pink clay

Instrument Model L-2020

Serial No. CAM 028

Probe Model 2x2

Serial No. LA2025

Hole Fluid Depth _____

Hole Diameter _____

Time of drilling 0935

Time of logging 0940

1005

1010

Casing type and thickness _____

Other _____

Hole Id	Depth (in)	Counts (cpm)	Hole Id	Depth (in)	Counts (cpm)
<u>R10</u>			<u>A</u>		
1	0	1636		0	2831
	2	1612		2	2874
	4	1604		4	2739
	6	1711		6	2717
	8	1591		8	2759
	10	1663		10	2633
	12	2096		12	2717
	14	2276		14	2954
	16	2369		16	4237
	18	2473		18	5205
	20	2437		20	5696
	22	2397		22	5258
	24	2553		24	4452
	26	2660		26	3736
	28	2721		28	3361
	30	2842		30	3021
	32	2943		32	2922
	34	2859		34	2858
	36	2920		36	2437
	38	2986		38	2849
	40	2851		40	2757
	42	2954		42	2720
	44	2865		44	2879
	46	2882		46	2977
	48			48	2504
	50			50	
	52			52	
	54			54	

REV. NO. 0
P. 5E NO. 7

HOLE LOGGING DATA SAMPLE SHEET

Date 2-15-84

Surveyors Parcil
Zalinski
Tomkinson

Drilled material composition Play Rock

Property Id 132
Instrument Model 4-222.0 Serial No. CAW-025
Probe Model 2.22 Serial No. CAW-025
Hole Fluid Depth -
Hole Diameter -
Time of drilling 1110
Time of logging 1115
Casing type and thickness -
Other -

1125
1130

Hole Id	Depth (in)	Counts (cpm)	Hole Id	Depth (in)	Counts (cpm)
<u>B</u>	0	1680	<u>C</u>	0	1609
	2	1634		2	1629
	4	1766		4	1595
	6	1767		6	1561
	8	1804		8	1587
	10	2042		10	1878
	12	2278		12	2247
	14	2222		14	2329
	16	2242		16	2480
	18	2289		18	2626
	20	2177		20	2572
	22	2204		22	2716
	24	2327		24	2832
	26	2464		26	2832
	28	2594		28	2846
	30	2737		30	2844
	32	<u>Not used</u>		32	2770
	34	<u>Not used</u>		34	<u>Not used</u>
	36	<u>Not used</u>		36	<u>Not used</u>
	38			38	<u>Not used</u>
	40			40	
	42			42	
	44			44	
	46			46	
	48			48	
	50			50	
	52			52	
	54			54	
	56			56	

REV. NO. 0
P' SE NO. 7

HOLE LOGGING DATA SAMPLE SHEET

Date 2-1984

Surveyors *[Signature]*
[Signature]
[Signature]

Drilled material composition slay rock

Property Id 133
Instrument Model 4-2220 Serial No. Cam-025
Probe Model 212 Serial No. Cam-025
Hole Fluid Depth —
Hole Diameter —
Time of drilling 1337
Time of logging 1332
Casing type and thickness —
Other —

1337
1345

Hole Id	Depth (in)	Counts (cpm)	Hole Id	Depth (in)	Counts (cpm)
<u>D</u>	0		<u>E</u>	0	13950
	2			2	11200
	4			4	11601
	6			6	12105
	8			8	13152
	10			10	16046
	12			12	20714
	14			14	27721
	16			16	37543
	18			18	35307
	20			20	26807
	22			22	18588
	24			24	12686
	26			26	8824
	28			28	7279
	30			30	5788
	32			32	4546
	34			34	3969
	36			36	3510
	38			38	3184
	40			40	3100
	42			42	2975
	44			44	2828
	46			46	2692
	48			48	2466
	50			50	2530
	52			52	2327
	54			54	2334
	56	3763		56	2100
	58	3889		58	2057
	60	3699		60	2119
	62	3764		62	2047
	64	3904		64	2373
	66	3657			
	68	3683			
	70	3600			
	72	3153			

[Handwritten notes: "Depth 140 ft D"]

3

[Handwritten notes: "N/A"]

REV. NO. 0
PAGE NO. 7

HOLE LOGGING DATA SAMPLE SHEET

Date 2-15-83

Surveyors D. Mail
B. Miller
W. J. ...

Drilled material composition Clay/rock

Property Id 132
Instrument Model 2-2220 Serial No. Com-025
Probe Model 3.77 Serial No. Com-028
Hole Fluid Depth N/A
Hole Diameter "4"
Time of drilling 1355
Time of logging 1405
Casing type and thickness used PVC
Other used PVC

1417
1430
Used PVC

Hole Id	Depth (in)	Counts (cpm)	Hole Id	Depth (in)	Counts (cpm)
<u>15</u>	0	<u>5453</u>	<u>6</u>	0	<u>4259</u>
	2	<u>4404</u>		2	<u>12829</u>
	4	<u>4264</u>		4	<u>12088</u>
	6	<u>5185</u>		6	<u>252184</u>
	8	<u>5712</u>		8	<u>37782</u>
	10	<u>5162</u>		10	<u>41044</u>
	12	<u>4852</u>		12	<u>30883</u>
	14	<u>3937</u>		14	<u>20305</u>
	16	<u>3541</u>		16	<u>14363</u>
	18	<u>3144</u>		18	<u>8812</u>
	20	<u>2909</u>		20	<u>6110</u>
	22	<u>2930</u>		22	<u>4500</u>
	24	<u>2873</u>		24	<u>3812</u>
	26	<u>2865</u>		26	<u>2457</u>
	28	<u>2789</u>		28	<u>3072</u>
	30	<u>2823</u>		30	<u>2860</u>
	32	<u>2825</u>		32	<u>2869</u>
	34	<u>3030</u>		34	<u>2881</u>
	36	<u>2905</u>		36	<u>2966</u>
	38	<u>2825</u>		38	<u>2126</u>
	40	<u>2842</u>		40	<u>2157</u>
	42	<u>2742</u>		42	<u>2400</u>
	44			44	<u>3311</u>
	46			46	<u>3146</u>
	48			48	<u>3276</u>
	50			50	<u>3141</u>
	52			52	
	54			54	
	56			56	

2nd count migration occurred

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HOLE LOGGING DATA SAMPLE SHEET

Date 2-15-84

Surveyors *[Signature]*
[Signature]
[Signature]

Property Id 133

Drilled material composition Clay Rock

Instrument Model L-2220

Serial No. Can-028

Probe Model 222

Serial No. Can-028

Hole Fluid Depth —

Hole Diameter 44

Date 2-16

Time of drilling 1450

840

Time of logging 1500

750

Casing type and thickness 1.504 PVC

Other

Hole Id	Depth (in)	Counts (cpm)	Hole Id	Depth (in)	Counts (cpm)
H	0	1925 1909	I	0	2002
	2	2292 2337		2	2038
	4	2140 2552		4	2244
	6	2158 2020		6	2422
	8	2297 2172		8	2464
	10	2709 2126		10	2524
	12	2483 2367		12	2774
	14	2643 2770		14	2842
	16	2245 2005		16	2910
	18	2219 2045		18	3004
	20	2295 2038		20	3052
	22	2793 2205		22	3213
	24	2815		24	3352
	26	2790		26	3456
	28	2793		28	3271
	30	2839		30	4181
	32	2749		32	4246
	34			34	5537
	36			36	6282
	38			38	9147
	40			40	11225
	42			42	13554
	44			44	14532
	46			46	14164
	48			48	12750
	50			50	10792
	52			52	8442
	54			54	7543
	56			56	6297
	76		3267	58	5515
	78			60	4729
	80			62	4593
				64	4317
				66	3944
				68	3731
				70	3611
				72	3467
				74	3254

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HOLE LOGGING DATA SAMPLE SHEET

Date 2-16-84

Surveyors Timail
on/11/11
T.H.

Property Id Com-133
Instrument Model L-2220 Serial No. Com-025
Probe Model 242 Serial No. Com-025
Hole Fluid Depth unknown
Hole Diameter 4"
Time of drilling 0910
Time of logging 0920
Casing type and thickness Using P.V.C.
Other _____

Drilled material composition clay/sand
0945
0955

Hole Id	Depth (in)	Counts (cpm)	Hole Id	Depth (in)	Counts (cpm)			
J	0	1661	K	0	2127			
	2	1763		2	2180			
	4	1887		4	2212			
	6	2101		6	2412			
	8	2214		8	2411			
	10	2270		10	2513			
	12	2344		12	2475			
	14	2502		14	2629			
	16	2576		16	2663			
	18	2541		18	2731			
	20	2702		20	2773			
	22	2540		22	2899			
	24	2543		24	2922			
	26	2664		26	2951			
	28	2761		28	2871			
	30	2699		30	2971			
	32	2727		32	3043			
	34	2736		34	2991			
	36	2912		36	2853			
	38	3050		38	2986			
	40	3194		40	3042			
	42	3321		42	2934			
	44	3456		44	2963			
	46	3724		46	2967			
	48	4062		48	3061			
	50	4562		50	2985			
	52	5522		52	2976			
	54	7242		54	3133			
	56	8917		56	3014			
	58	8671	EG	3286	58	2199	72	5612
	60	8552	82	3121	60	3041	76	6657
	62	9165	84	2432	62	3075	80	7946
	64	9287	86	2279	64	2979	84	8214
	66	9650	88	2726	66	3009	88	8524
	68	9736	90	2660	68	2497	92	8736
	70	4700	92	2524	70	3042	96	9331
	72	3905	94	2366	72	3156		
	74	3144	96	2312	74	3122		
	76	3566			76	3070		

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HOLE LOGGING DATA SAMPLE SHEET

Date 2-16-94

Surveyors *W. Smith*
W. Smith
J. J.

Property Id POW-122
Instrument Model 6-2220 Serial No. POW-028
Probe Model 247 Serial No. POW-028
Hole Fluid Depth _____
Hole Diameter 4"
Time of drilling 1000
Time of logging 1013
Casing type and thickness _____

Drilled material composition oil / rock
SI

1030
1037

Other Struck apparent pipe line (steel?)

Hole Id	Depth (in)	Counts (cpm)	Hole Id	Depth (in)	Counts (cpm)
L	0	1500	M	0	1813
	2	1720		2	1867
	4	1788		4	2008
	6	2016		6	2119
	8	2284		8	2378
	10	2387		10	2526
	12	2544		12	2566
	14	2603		14	2626
	16	2670		16	2518
	18	2578		18	2614
	20	2566		20	2516
	22	2467		22	2420
	24	2353		24	2392
	26	2276		26	2369
	28	2274		28	2337
	30	2313		30	2466
	32	2345		32	2554
	34	2372		34	2513
	36	2445		36	2483
	38	2572		38	2569
	40	2505		40	2542
	42	2561		42	2516
	44	2654		44	2550
	46	2604		46	2623
	48	2614		48	2657
	50	2546		50	2664
	52	2599		52	2640
	54	2525		54	2522
	56			56	2553
				58	2394
				60	2551
				62	2442
				64	2423
				66	2290
				68	2364
				70	2334

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HOLE LOGGING DATA SAMPLE SHEET

Date 2-11-54

Surveyors Thomson
Walker
...

Property Id RAM-122
Instrument Model 2-2220
Probe Model 270
Hole Fluid Depth
Hole Diameter 4"
Time of drilling 1042
Time of logging 1054
Casing type and thickness N/A
Other

Drilled material composition Clay/Coak
(1)
1115
1127

Hole Id	Depth (in)	Counts (cpm)	Hole Id	Depth (in)	Counts (cpm)
N	0	1551 52 2440	O	0	1653
	2	1602 60 2461		2	1851
	4	1733 62 2549		4	1890
	6	1884 64 2415		6	2036
	8	2002 66 2454		8	2287
	10	2143 68 2354		10	2352
	12	2284 70 2417		12	2524
	14	2242 72 2432		14	2552
	16	2376 74 2332		16	2614
	18	2294 76 2441		18	2637
	20	2496 78 2379		20	2822
	22	2399 80 2312		22	2792
	24	2453 82 2477		24	2861
	26	2504 84 2604		26	2780
	28	2520 86 2645		28	2887
	30	2520 88 2523		30	3096
	32	2517 90 2652		32	3217
	34	2455 92 2622		34	3405
	36	2604 94 2637		36	3435
	38	2449 96 2620		38	3540
	40	2505		40	3412
	42	2327		42	3151
	44	2472		44	3007
	46	2523		46	
	48	2457		48	
	50	2442		50	
	52	2378		52	
	54	2429		54	
	56	2434		56	

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HOLE LOGGING DATA SAMPLE SHEET

Date 2-18-94

Surveyors Thom P. [Signature]
[Signature]
[Signature]

Property Id 000-120
 Instrument Model 1-3227 Serial No. 920-028
 Probe Model RXD Serial No. 920-028
 Hole Fluid Depth _____
 Hole Diameter _____ 4"
 Time of drilling 1250
 Time of logging 1308
 Casing type and thickness NH
 Other _____

Drilled material composition 1315
1322
NH

Hole Id	Depth (in)	Counts (cpm)	Hole Id	Depth (in)	Counts (cpm)
P	0	1590	G	0	1285
	2	1612		2	1434
	4	1673		4	1524
	6	1846		6	1738
	8	1977		8	1891
	10	2011		10	2014
	12	2171		12	2194
	14	2313		14	2260
	16	2396		16	2251
	18	2441		18	2372
	20	2608		20	2458
	22	2653		22	2462
	24	2697		24	2514
	26	2743		26	2525
	28	2764		28	2602
	30	2428		30	2574
	32	2905		32	2601
	34	3162		34	2556
	36	3425		36	2601
	38	3801		38	2746
	40	4299		40	2745
	42	5527		42	2755
	44	7003		44	2725
	46	8629		46	2790
	48	11067		48	2887
	50	11104		50	2968
	52	9770		52	2905
	54	7751		54	2885
	56	575X		56	2883
	58	4453			
	60	3699			
		Hit hard rock			

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HOLE LOGGING DATA SAMPLE SHEET

Date 2-11-54

Surveyors Wencil
Salinas
YSL

Property Id Cam-122

Drilled material composition clay/rock

Instrument Model 4-2220

Serial No. Cam-028

Probe Model 2x2

Serial No. 11

Hole Fluid Depth _____

Hole Diameter 1 1/2"

Time of drilling 1328

Time of logging 1335

Casing type and thickness 3/4"

Other _____

1345
1353
11H

Hole Id	Depth (in)	Counts (cpm)	Hole Id	Depth (in)	Counts (cpm)
R	0	1446	S	0	1715
	2	1466		2	1691
	4	1430		4	1757
	6	1571		6	1902
	8	1763		8	2090
	10	1813		10	2217
	12	1983		12	2366
	14	2021		14	2420
	16	2135		16	2473
	18	2206		18	2504
	20	2333		20	2631
	22	2497		22	2697
	24	2579		24	2796
	26	2602		26	2726
	28	2736		28	2746
	30	2764		30	2867
	32	2827		32	2823
	34	2766		34	2872
	36	2724		36	2914
	38	2742		38	2829
	40	2754		40	2906
	42	2875		42	2941
	44	2873		44	2941
	46	2826		46	2827
	48	2863		48	2957
	50	2820		50	3057
	52	2935		52	3076
	54	2247		54	3112
	56	2829		56	3043
	58	2261 74 2510		58	3022
	60	2230 76 2529		60	3059
	62	2656 78 2504		62	2954
	64	2626 80 2597		64	3027
	66	2570		66	2920
	68	2641		68	2924
	70	2675		70	2963
	72	2582		72	2854
				74	2784

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HOLE LOGGING DATA SAMPLE SHEET

Date 2-17-84

Surveyors W. J. ...
...
...

Property Id CA-132
Instrument Model 4-2220 Serial No. CA-028
Probe Model 2XR Serial No. 11
Hole Fluid Depth _____
Hole Diameter 4"
Time of drilling 1400
Time of logging 1414
Casing type and thickness N/A
Other _____

Drilled material composition slay/rock

1428
1436
N/A

Hole Id	Depth (in)	Counts (cpm)	Hole Id	Depth (in)	Counts (cpm)
T	0	1779	U	0	2220
	2	1752		2	2237
	4	1705		4	2223
	6	1945		6	2208
	8	2009		8	2325
	10	2257		10	2393
	12	2359		12	2552
	14	2527		14	2596
	16	2572		16	2629
	18	2631		18	2532
	20	2535		20	2496
	22	2670		22	2502
	24	2704		24	2510
	26	2742		26	2363
	28	2853		28	2447
	30	2902		30	2296
	32	2825		32	2292
	34	2891		34	2324
	36	2846		36	2251
	38	2972		38	2372
	40	2912		40	2303
	42	2939		42	2226
	44	2935		44	2228
	46	2925		46	2222
	48	2894		48	2275
	50	2900		50	2269
	52	2879		52	2232
	54	2916		54	
	56	3002		56	
	58	2891	74	2262	
	60	3061	76	2229	
	62	3015	78	2722	
	64	2471			
	66	2993			
	68	2916			
	70	2923			
	72	2913			

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HOLE LOGGING DATA SAMPLE SHEET

Date 2-16-84

Surveyors Fossil
B. Smith
T. S.

Property Id AW-133
Instrument Model 1-2220 Serial No. 222008
Probe Model DX2 Serial No. "
Hole Fluid Depth 2 feet
Hole Diameter 4"
Time of drilling 1447
Time of logging 1458
Casing type and thickness Used P.V.C.
Other _____

Drilled material composition clay/rock

0727
0840

Hole Id	Depth (in)	Counts (cpm)	Hole Id	Depth (in)	Counts (cpm)
V	0	1824	W	0	2205
	2	1927		2	2247
	4	1914		4	2434
	6	2208		6	2576
	8	2350		8	2764
	10	2351		10	2845
	12	2478		12	3019
	14	2512		14	2930
	16	2538		16	2932
	18	2538		18	3170
	20	2666		20	3153
	22	2711		22	3335
	24	2792		24	3544
	26	2854		26	3822
	28	2966		28	4072
	30	3117		30	5011
	32	3217		32	6117
	34	3588		34	7006
	36	3908		36	7257
	38	4476		38	6129
	40	4931		40	6423
	42	5343		42	
	44	4830		44	
	46	4335		46	
	48	3790		48	
	50	3423		50	
	52	3066		52	
	54	2823		54	
	56	2818		56	
	58	2682			
	60	2555			

Hit hard rock

Hit red clay.
Approx. 4' down.

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HOLE LOGGING DATA SAMPLE SHEET

Date 2/17/84

Surveyors R. A. ...
...
...

Property Id CA-123

Drilled material composition clay/rock

Instrument Model _____ Serial No. CA-028

Probe Model _____ Serial No. _____

Hole Fluid Depth n/a

Hole Diameter 4"

Time of drilling 0846

Time of logging 0902

Casing type and thickness n/a

0900
0908
n/a

Hole Id	Depth (in)	Counts (cpm)	Hole Id	Depth (in)	Counts (cpm)
X	0	2011	Y	0	2462
	2	2184		2	2641
	4	2218		4	2869
	6	2423		6	3013
	8	2517		8	3130
	10	2636		10	3076
	12	2621		12	3096
	14	2791		14	3125
	16			16	
	18			18	
	20			20	
	22			22	
	24			24	
	26			26	
	28			28	
	30			30	
	32			32	
	34			34	
	36			36	
	38			38	
	40			40	
	42			42	
	44			44	
	46			46	
	48			48	
	50			50	
	52			52	
	54			54	
	56			56	

Hit hard rock in holes X + Y

HOLE LOGGING DATA SAMPLE SHEET

Date 2-17-74

Surveyors Richard M. ...
...
...

Property Id 04-133

Drilled material composition clay/rock

Instrument Model _____ Serial No. Cam-028

Probe Model _____ Serial No. _____

Hole Fluid Depth nil

Hole Diameter 4"

Time of drilling 09:30

Time of logging 09:13

Casing type and thickness _____

Other _____

1970
0933
Lead 1.50

Hole Id	Depth (in)	Counts (cpm)	Hole Id	Depth (in)	Counts (cpm)
<u>Z</u>			<u>A1</u>		
	0	1991		0	2437
	2	1867		2	3530
	4	1957		4	3293
	6	2047		6	3270
	8	2167		8	6449
	10	2221		10	7663
	12	2231		12	9127
	14			14	12417
	16			16	15095
	18			18	17703
	20			20	20570
	22			22	18617
	24			24	15475
	26			26	13776
	28			28	11320
	30			30	2763
	32			32	6934
	34			34	5755
	36			36	4716
	38			38	4051
	40			40	3444
	42			42	3002
	44			44	2766
	46			46	2727
	48			48	2754
	50			50	2729
	52			52	2765
	54			54	2775
	56			56	2772
				58	2965
				60	3002

Hit hard rock.

Hit very wet clay

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SUPPLEMENTAL

BOREHOLE LOG

JAN 25

LOGGING CREW: Chris Liechtenstein
David Rollars
Ralph Reed

INSTRUMENT ID NO. 032

SHEET _____ OF _____ PAGE _____

DATE: 5/29/84

PROPERTY ID: Co-133

AREA: 5' North

NOTES: 1. ALL HOLES ARE 4" DIA. UNLESS OTHERWISE NOTED.
2. RECORD UNUSUAL CONDITIONS, SUCH AS THE PRESENCE OF WATER IN BOREHOLES AND DEPTH, CASING TYPE AND THICKNESS IF USED, CONCRETE CORES AND THICKNESS, OBSTRUCTIONS, UTILITIES, ETC., IN THE REMARKS SECTION.

HOLE ID: <u>A</u>	HOLE ID: <u>B</u>	HOLE ID: <u>C</u>	HOLE ID: _____
TIME DRILLED: <u>2:30</u>	TIME DRILLED: <u>1456</u>	TIME DRILLED: <u>1510</u>	TIME DRILLED: _____
TIME LOGGED: <u>2:48</u>	TIME LOGGED: <u>1458</u>	TIME LOGGED: <u>1520</u>	TIME LOGGED: _____
SOIL TYPE: <u>Loam & Gravel</u>	SOIL TYPE: <u>Loam & Gravel</u>	SOIL TYPE: <u>Loam & Gravel</u>	SOIL TYPE: _____

DEPTH	COUNTS/1MIN	DEPTH	COUNTS/1MIN	DEPTH	COUNTS/1MIN	DEPTH	COUNTS/1MIN
SURFACE	1189	SURFACE		SURFACE	1302	SURFACE	
0"	1359	0"	1368	0"	1251	0"	
6"	1868	6"	1819	6"	1643	6"	
12"	2394	12"	2351	12"	2076	12"	
18"	2674	18"	2620	18"	2190	18"	
24"	3024	24"	2884	24"	2291	24"	
30"	3258	30"	3390	30"	2289	30"	
36"	3426	36"	4132	36"	2558	36"	
42"	2921	42"	3467	42"	2613	42"	
48"	2701	48"	2926	48"	2652	48"	
54"	2458	54"	2669	54"		54"	
60"	2384	60"	2433	60"		60"	
66"	2556	66"	2403	66"		66"	
72"	2899	72"		72"		72"	
78"		78"		78"		78"	
84"		84"		84"		84"	
90"		90"		90"		90"	
96"		96"		96"		96"	

REMARKS: ~~Hole "B" location (5' north of "A" 18' north of "C")~~
~~Hole I.D. "A" location~~
~~Hole I.D. "C" location 5' north of "B" on same side of road~~
 NOTE: WE HIT A NATURAL WATER FLOWING STREAM AT THIS THIS

DEPTH in Hole "C"

HOLE	APPROX. COORDINATES
A	(-200, 40)
B	(-175, 90)
C	(-120, 40)