

RADIOLOGIC AND ENGINEERING ASSESSMENT

FOR

DOE ID NO.: GJ-00069-RS
ADDRESS: 1733 NORTH 17TH STREET

JUNE 1985

FOR

URANIUM MILL TAILINGS REMEDIAL ACTION PROJECT OFFICE

ALBUQUERQUE OPERATIONS OFFICE

DEPARTMENT OF ENERGY

BY

BENDIX FIELD ENGINEERING CORPORATION
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DATE

June 29, 1985

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1.0 EXECUTIVE SUMMARY

1.1 Introduction

The location, DOE ID No. GJ-00069-RS, is a single-family residence located at 1733 North 17th Street, Grand Junction, Colorado.

The purpose of this assessment is to evaluate the extent of uranium millsite contamination at this property. This assessment includes recommended remedial action, estimated volume of material to be removed, and estimated cost of the proposed action.

1.2 Evaluation and Recommendation

The action recommended is the select removal of contaminated material and restoration of the property to its original condition. The identified residual radioactive material found on this property is tailings; the estimated volume is: exterior, 202 cu. yd.; interior, 0 cu. yd.

Estimated cost to perform remedial action, including dislocation when applicable, is \$17,064. Remedial action on this property will take approximately 30 days to complete.

2.0 PROPERTY DESCRIPTION

2.1 General Description

Address: 1733 North 17th Street, Grand Junction, Colorado

Zoning: RSF-8

Lot Size: Approximately 7,766 sq. ft. (0.178 acres)

Legal Description: Lot 9, Blk 1, Sunnyvale Acres, City of Grand Junction, County of Mesa, State of Colorado.

Point of Reference: This property is located approximately 4 miles north of the State of Colorado Tailings Repository. Appendix Figure 2.1 shows the property location relative to its surroundings.

Utilities: Utility locations are shown in Appendix Figure 2.2.

Electrical:	Overhead
Gas:	Underground
Telephone:	Overhead
Sewer:	Underground
Water:	Underground
Cable TV:	Overhead

Bordering Properties:

North:	Single-family residence
South:	Single-family residence
East:	North 17th Street
West:	Alley

2.2 Existing Facilities and Structures

Primary Structure:

Type:	One-story, single-family residence
Size:	Approx. 787 sq. ft. Construction Date: 1948
Construction:	Wood-frame
Foundation:	Concrete stemwall on concrete spread footing
Footing Depth:	Approximately 16" to bottom of footing from grade
Basement:	None
Crawl Space:	Full under structure
Condition:	Good

Other Structures:

Type: Single-car garage
Size: Approximately 248 sq. ft.
Construction: Wood-frame
Foundation: Concrete slab-on-grade
Condition: Good

Type: Metal-prefab storage shed
Size: Approximately 96 sq. ft.
Construction: Metal-prefab
Foundation: Concrete slab-on-grade
Condition: Good

General Remarks:

A large planter is located in the yard west of the primary structure. Planters are also located adjacent to the west and east sides of the primary structure. Structures, utilities, landscaping, and other special features of this property are included in Appendix Figure 2.2.

Historical Data:

This structure is not over 50 years old. Therefore, it does not meet the eligibility criteria for consideration of inclusion on the National Register of Historic Places.

3.0 RADIOLOGIC SURVEY

3.1 Introduction

Radiologic data were collected by Bendix at DOE ID No. GJ-00069-RS on January 2, 1985. Data collection methods were performed in accordance with procedures fully described in the Radiologic Support Operations Procedures Manual GJ-07(84) (Bendix Field Engineering Corporation, 1984). These data were evaluated to determine the areal and vertical extent of uranium mill tailings contamination at this property as well as any other contaminated material that may have originated from the millsite.

A review of historical information from the files of the Colorado Department of Health (CDH) and the inclusion data from Oak Ridge National Laboratory (ORNL) was conducted. These records indicate contamination east, west, and south of the house. No contamination was associated with the interior of the house.

The Bendix radiologic survey was designed to investigate the entire property, with emphasis on previously identified areas of contamination. Conclusions based upon data analyses are discussed in Section 3.5, Extent of Contamination. Photocopies of the Official Survey Report, Memo of Understanding, team leader notes, and deconvolution graphs are included in the Appendix (Section 6.0).

3.2 Gamma Exposure-Rate Surveys

3.2.1 Exterior Findings

Background Readings: 10 to 14 uR/h
Highest Outside Gamma Reading (HOG): 97 uR/h

Exterior radium-concentration measurements are presented in Appendix Table 3.1. Grid-point survey results are shown in Appendix Figure 3.1. Appendix Figure 3.2 presents the ranges of elevated gamma readings and indicates areas of possible contamination.

3.2.2 Interior Findings

Background Readings: 13 to 15 uR/h
Highest Inside Gamma Reading (HIG): 21 uR/h

Interior gamma exposure-rate measurements are summarized in Appendix Table 3.2. Appendix Figures 3.3a and 3.3b show interior exposure rates and locations of these measurements.

3.3 Boreholes, Soil Samples, and Other Measurements

Areas which displayed elevated gamma levels were further investigated; these areas are shown in Appendix Figure 3.4. Data from these investigations are included in Appendix Table 3.1.

3.4 Radon/Radon Daughter Concentration

Radon daughter concentration (RDC):

The working level was not assessed by CDH.

No RDC measurements were taken by Bendix.

3.5 Extent of Contamination

Appendix Figures 3.5a and 3.5b show identified areas and estimated depths of contamination on this property, based on assessments of all measurements taken. As noted in these figures, areas recommended for remedial action that contain identified residual radioactive materials are:

- (AREA A) The shed, located south of the garage, is constructed on a 3-inch-thick concrete slab. The estimated total depth of contamination is 9 inches, based on information collected in Area I (approximately 95 sf).
- (AREA B) Around the southern portion of the house, the depth of contamination is 21 inches (approximately 232 sf).
- (AREA C) Along the foundation at the northeast corner of the house contamination extends to a depth of 21 inches (approximately 57 sf).
- (AREA D) Two small areas west of the house are contaminated to a 12 inch depth (approximately 140 sf).
- (AREA E) The southern portion of the lawn in the backyard is contaminated to a depth of 12 inches (approximately 960 sf).
- (AREA F) West of the shed, the depth of contamination is estimated to be 9 inches, based on information collected in Area I (approximately 154 sf).
- (AREA G) North of Area I, in the driveway, contamination extends to a depth of 9 inches (approximately 285 sf).
- (AREA H) The depth of contamination west of the primary structure in the garden area in the backyard is 27 inches (approximately 690 sf).
- (AREA I) The northern portion of the lawn in the backyard is contaminated to a depth of 9 inches (approximately 504 sf).
- (AREA J) East of Area C, northeast of the primary structure, contamination extends to a 15-inch depth (approximately 119 sf).
- (AREA K) A portion of the lawn east of the house is contaminated to a depth of 6 inches (approximately 1,742 sf).

- (AREA L) A small portion of the lawn west of the house is contaminated to a depth of 6 inches (approximately 50 sf).
- (AREA M) The east-west sidewalk in the backyard is contaminated to an estimated total depth of 9 inches, based on information collected in Area I. The concrete is 3 inches thick (approximately 83 sf).
- (AREA N) West of Area H in the backyard garden, the depth of contamination is 6 inches (approximately 90 sf).
- (AREA O) The soil under the incinerator west of the shed has an estimated depth of contamination of 9 inches, based on information collected in Area I (approximately 25 sf).
- (AREA P) A small isolated area in the driveway north of the primary structure is contaminated to a depth of 3 inches (approximately 50 sf).
- (AREA Q) The depth of contamination along the east property boundary beside Area K is 6 inches (approximately 450 sf).

(AREAS REQUIRING FURTHER INVESTIGATION DURING REMEDIAL ACTION)

The north-south sidewalk in the west yard and the sidewalk in the north yard should be investigated during remedial action to assure that contamination does not extend under them.

4.0 RECOMMENDED REMEDIAL ACTION

4.1 Decontamination and Restoration

The recommended remedial action for this property, DOE ID No. GJ-00069-RS, includes removal of select areas identified as containing radioactive material (as discussed in Section 3.5 and shown in Appendix Figures 3.5a and 3.5b) and transport of removed material to the disposal site.

After remedial action is completed, the areas involved will be restored to original condition in accordance with the Bendix drawings, Vicinity Properties General Construction Specification (Bendix Field Engineering Corporation, 1984), and Statement of Work for Construction Subcontractor.

Dislocation of the occupants will not be required for this remedial action.

4.2 Evaluation of Recommended Remedial Action

Volume calculations of the areas included for remedial action are presented in Appendix Table 4.1. Cost estimates are presented in Appendix Table 4.2. Appendix Table 4.3 presents the calculations for concentrations of Radium-226 exempted on this property. See Figure 3.5b for excluded areas.

Estimated cost of remedial action is \$17,064.

This remedial action will result in select removal of identified residual radioactive materials.

The recommendation that partial remedial action be performed on this property is made because the owner requested that rare plantings be exempted from remedial action and the levels of radioactivity in these areas fall below the EPA standards (40 CFR 192):

The concentration of Radium-226 in soil averaged over any area of 100 square meters shall not exceed the background level by more than

- (1) 5 pCi/g, averaged over the first 15 cm of soil below the surface, and
- (2) 15 pCi/g, averaged over 15-cm-thick layers of soil more than 15 cm below the surface.

Owner preference is to start construction after the growing season (late September or early October) and that as many of the plants be saved as possible. No legal or other complications are foreseen at this time.

5.0 REFERENCES

ARIX, A Professional Corporation, Procedures Manual for the Grand Junction Remedial Action Program, for Colorado Department of Health, Radiation Control Division, and the U.S. Department of Energy, 1983.

Bendix Field Engineering Corporation, Procedures Manual Radiologic Support Operations Grand Junction Vicinity Properties, (GJ-07), for U.S. Department of Energy, UMTRA Project Office, Albuquerque Operations Office, Albuquerque, New Mexico, 1984.

Bendix Field Engineering Corporation, Engineering, Construction, and Land Support Manual Grand Junction Vicinity Properties Project, (GJ-08), for U.S. Department of Energy, UMTRA Project Office, Albuquerque Operations Office, Albuquerque, New Mexico, 1984.

Bendix Field Engineering Corporation, Grand Junction Vicinity Properties Operating Manual, (GJ-16) for U.S. Department of Energy, Nuclear Energy Programs, Division of Remedial Action Projects, UMTRA, 1984.

Bendix Field Engineering Corporation, Vicinity Properties General Construction Specification, for U.S. Department of Energy, Nuclear Energy Programs, Division of Remedial Action Projects, UMTRA, 1984.

Bendix Field Engineering Corporation, Environmental Assessment of Preliminary Cleanup Activities at Offsite Properties Contaminated by Tailings from the Grand Junction Inactive Uranium Millsite, (GJ-04), for U.S. Department of Energy, UMTRA Project Office, Albuquerque Operations, Albuquerque, New Mexico, 1983.

U.S. Department of Energy, Programmatic Memorandum of Agreement (DOE No. DE-GM04-84AL28460) between the U.S. Department of Energy, the Advisory Council on Historic Preservation, and the Colorado State Historic Preservation Officer, for UMTRA Project Office, Albuquerque Operations Office, Albuquerque, New Mexico, 1984.

U.S. Department of Energy, Vicinity Properties Management and Implementation Manual, for UMTRA Project Office, Albuquerque Operations Office, Albuquerque, New Mexico, 1984.

U.S. Environmental Protection Agency, Standards for Remedial Action at Inactive Uranium Processing Sites (40 CFR Part 192), Washington, D.C., 1983.

6.0 APPENDIX

This Appendix contains the following:

Appendix Tables:

Table 3.1	Radium Concentrations at Exterior Locations
Table 3.2	Summary of Interior Gamma Exposure Rates
Table 4.1	Area and Volume Calculations
Table 4.2	Estimated Cost of Decontamination and Restoration
Table 4.3	Calculations for Concentrations of Radium-226 in Soil

Appendix Figures:

Figure 2.1	Vicinity Map
Figure 2.2	Site Plan
Figure 3.1	Exterior Grid-Point Exposure Rates
Figure 3.2	Exterior Gamma Scan
Figure 3.3a	Interior Gamma Survey (Ground Floor)
Figure 3.3b	Interior Gamma Survey
Figure 3.4	Exterior Sample Locations
Figure 3.5a	Interior Estimated Extent of Contamination
Figure 3.5b	Exterior Estimated Extent of Contamination

Official Survey Report

Memo of Understanding

Team Leader Notes

Deconvolution Graphs (Apparent Radium-226 Concentration)

Radium Concentrations at Exterior Locations

DOE ID #GJ-00069-RS

1733 North 17th Street

Loc #	Grid Location	Depth (in.)	Meas. Type	In Situ Ra-226 (pCi/g)		Chem Ra-226 (pCi/g)	Comments
				Tot. Ct	Spectr.		
1	136217	06	DS	1.8		*	West of back fence
2	139260	18	DS	1.1		*	Under garage foundation
3	140240	00	DS	2.2		*	Sidewalk
4	145225	03	TC	30.0		*	Garden area DC = 27 inches Based on the deconvolution graph
		06	TC	33.2		*	
		09	TC	33.3		*	
		12	TC	30.5		*	
		15	TC	24.3		*	
		18	TC	16.6		*	
		21	TC	11.3		*	
		24	TC	8.7		*	
		27	TC	7.2		*	
		30	TC	6.1		*	
		33	TC	5.5		*	
		36	TC	5.0		*	
		39	TC	4.7		*	
		42	TC	4.5		*	
		45	TC	4.3		*	
		48	TC	4.1		*	
		51	TC	4.0		*	
		54	TC	4.0		*	
		57	TC	3.9		*	
		60	TC	3.9		*	
		63	TC	3.8		*	
		66	TC	3.9		*	
		69	TC	3.8		*	
5	150240	04	DS	8.1		*	Horizontally under sidewalk
6	157244	04	DS	22.2		*	Horizontally under shed slab
7	160240	00	DS	1.5		*	Sidewalk
8	162243	03	TC	10.2		*	East of shed
		06	TC	7.3		*	
		09	TC	5.3		*	

Table 3.1

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Radium Concentrations at Exterior Locations

DOE ID #GJ-00069-RS

1733 North 17th Street

Loc #	Grid Location	Depth (in.)	Meas. Type	In Situ Ra-226 (pCi/g)		Chem Ra-226 (pCi/g)	Comments
				Tot. Ct	Spectr.		
8	162243	12	TC	4.5		*	
		15	TC	4.1		*	
		18	TC	4.0		*	
		21	TC	3.9		*	DC = 9 inches
		24	TC	3.8		*	Based on the
		27	TC	3.7		*	deconvolution graph
		30	TC	3.8		*	
		33	TC	3.8		*	
		36	TC	3.7		*	
9	165265	03	TC	3.7		*	Driveway
		06	TC	3.6		*	
		09	TC	3.5		*	DC = 0 inches
		12	TC	3.4		*	
		15	TC	3.5		*	
		18	TC	3.5		*	
		21	TC	3.4		*	
		24	TC	3.5		*	
		27	TC	3.5		*	
		30	TC	3.4		*	
		33	TC	3.5		*	
10	175225	03	TC	8.6		*	Lawn west of house
		06	TC	7.1		*	
		09	TC	5.7		*	
		12	TC	4.8		*	
		15	TC	4.3		*	
		18	TC	4.1		*	DC = 12 inches
		21	TC	4.0		*	Based on the
		24	TC	3.8		*	deconvolution graph
		27	TC	3.8		*	
		30	TC	3.7		*	
		33	TC	3.6		*	
11	175256	03	TC	5.0		*	Driveway
		06	TC	4.8		*	
		09	TC	4.2		*	DC = 9 inches
		12	TC	3.9		*	Based on the
		15	TC	3.5		*	deconvolution graph

Table 3.1

Radium Concentrations at Exterior Locations

DOE ID #GJ-00069-RS

1733 North 17th Street

Loc #	Grid Location	Depth (in.)	Meas. Type	In Situ Ra-226 (pCi/g)		Chem Ra-226 (pCi/g)	Comments
				Tot. Ct	Spectr.		
11	175256	18	TC	3.5		*	
		21	TC	3.4		*	
		24	TC	3.4		*	
		27	TC	3.3		*	
		30	TC	3.3		*	
		33	TC	3.3		*	
12	180240	00	DS	<1.0		*	Sidewalk
13	137250	03	TC	6.2		*	Northeast corner backyard
		06	TC	5.8		*	
		09	TC	4.8		*	
		12	TC	4.4		*	
		15	TC	4.1		*	
		18	TC	4.0		*	
		21	TC	4.0		*	DC = 9 inches Based on the deconvolution graph
		24	TC	3.9		*	
		27	TC	3.9		*	
		30	TC	3.8		*	
		33	TC	3.8		*	
		36	TC	3.8		*	
		39	TC	3.8		*	
14	192236	03	TC	8.5		*	Sewer line west of house
		06	TC	6.2		*	
		09	TC	5.0		*	
		12	TC	4.3		*	
		15	TC	3.9		*	
		18	TC	3.7		*	DC = 6 inches Based on the deconvolution graph
		21	TC	3.7		*	
		24	TC	3.6		*	
		27	TC	3.6		*	
		30	TC	3.7		*	
		33	TC	3.6		*	
		36	TC	3.6		*	
		39	TC	3.6		*	
		42	TC	3.5		*	
		45	TC	3.4		*	
		48	TC	3.4		*	

Table 3.1

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Radium Concentrations at Exterior Locations

DOE ID #GJ-00069-RS

1/33 North 17th Street

Loc #	Grid Location	Depth (in.)	Meas. Type	In Situ Ra-226 (pCi/g)		Chem Ra-226 (pCi/g)	Comments
				Tot. Ct	Spectr.		
14	192236	51	TC	3.3		*	
		54	TC	3.4		*	
		57	TC	3.4		*	
		60	TC	3.4		*	
		63	TC	3.5		*	
		66	TC	3.6		*	
		69	TC	3.5		*	
15	194216	00	DS	<1.0		*	Sidewalk
16	194237	00	DS	<1.0		*	Sidewalk
17	194252	00	DS	<1.0		*	Sidewalk
18	198236	03	TC	14.3		*	West foundation
		06	TC	11.6		*	
		09	TC	8.0		*	
		12	TC	5.7		*	
		15	TC	4.6		*	
		18	TC	4.1		*	
		21	TC	3.8		*	DC = 12 inches
		24	TC	3.7		*	Based on the
		27	TC	3.6		*	deconvolution graph
		30	TC	3.6		*	
		33	TC	3.7		*	
19	198247	22	DS	1.7		*	Gas line
20	202253	00	DS	2.4		*	Sidewalk
21	208253	00	DS	<1.0		*	Sidewalk
22	211219	03	TC	35.4		*	South foundation
		06	TC	34.4		*	
		09	TC	29.2		*	
		12	TC	19.9		*	
		15	TC	12.2		*	
		18	TC	8.3		*	DC = 21 inches
		21	TC	6.2		*	Based on the
		24	TC	5.1		*	deconvolution graph
		27	TC	4.6		*	
		30	TC	4.3		*	

Radium Concentrations at Exterior Locations

DOE ID #GJ-00069-RS

1733 North 17th Street

Loc #	Grid Location	Depth (in.)	Meas. Type	In Situ Ra-226 (pCi/g)		Chem Ra-226 (pCi/g)	Comments
				Tot. Ct	Spectr.		
22	211219	33	TC	4.0		*	
		36	TC	3.9		*	
		39	TC	3.7		*	
		42	TC	3.6		*	
		45	TC	3.7		*	
		48	TC	3.6		*	
		51	TC	3.7		*	
		54	TC	3.7		*	
		57	TC	3.7		*	
		60	TC	3.8		*	
		63	TC	3.9		*	
		66	TC	3.9		*	
		69	TC	4.0		*	
23	220253	03	TC	18.7		*	North foundation
		06	TC	20.2		*	
		09	TC	19.3		*	
		12	TC	14.9		*	
		15	TC	10.4		*	DC = 21 inches Based on the deconvolution graph
		18	TC	7.6		*	
		21	TC	5.9		*	
		24	TC	5.0		*	
		27	TC	4.5		*	
		30	TC	4.3		*	
		33	TC	4.2		*	
24	226243	03	TC	9.3		*	Water line
		06	TC	11.2		*	
		09	TC	11.1		*	
		12	TC	9.0		*	
		15	TC	6.5		*	DC = 15 inches Based on the deconvolution graph
		18	TC	5.2		*	
		21	TC	4.6		*	
		24	TC	4.5		*	
		27	TC	4.4		*	
		30	TC	4.5		*	
		33	TC	4.5		*	
		36	TC	4.5		*	
		39	TC	4.2		*	
		42	TC	3.8		*	

Radium Concentrations at Exterior Locations

DOE ID #GJ-00069-RS

1733 North 17th Street

Loc #	Grid Location	Depth (in.)	Meas. Type	In Situ Ra-226 (pCi/g)		Chem Ra-226 (pCi/g)	Comments
				Tot. Ct	Spectr.		
24	226243	45	TC	3.6		*	
		48	TC	3.5		*	
		51	TC	3.5		*	
		54	TC	3.5		*	
25	230247	00	DS	<1.0		*	
26	230250	00	DS	<1.0		*	
27	230270	00	DS	8.3		*	Driveway
		06	DS	1.5		*	
28	235257	00	DS	1.5		*	Driveway
29	240238	00	DS	<1.0		*	Crack of sidewalk
30	250230	03	TC	6.2		*	Lawn east of house
		06	TC	4.8		*	
		09	TC	4.1		*	DC = 6 inches
		12	TC	3.8		*	Based on the
		15	TC	3.7		*	deconvolution graph
		18	TC	3.5		*	
		21	TC	3.5		*	
		24	TC	3.5		*	
		27	TC	3.5		*	
		30	TC	3.6		*	
		33	TC	3.6		*	
31	255257	00	DS	2.2		*	Driveway
32	260237	00	DS	<1.0		*	Hole in sidewalk

Tool Types: GB = GAD-6 Borehole
 GS = GAD-6 Surface
 DS = Delta Scanner
 TC = Total Count Borehole
 SS = Soil Sample
 BH = Combined GAD-6 and
 Total Count Borehole

Notes: DC = Depth of Contamination
 * = No Soil Sample Taken
 [n] = Reading Taken n-Inches
 Above Floor or Ground
 Date of Survey = 01-02-85
 Team Leader = BJF

Table 3.2

Summary of Interior Gamma Exposure Rates

DOE ID #GJ-00069-RS

1733 North 17th Street

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Location *	Number of Readings Taken at Waist Level	Range at Waist Level (uR/h)	Mean at Waist Level (uR/h)	Number of Readings Taken at Surface	Range at Surface (uR/h)	Mean Surface (uR/h)
HOUSE	*	*	*	*	13-21	*
GARAGE	3	10-11	10	3	10-12	11
SHED	1	19	19	1	21	21

* The CDH and ORNL data indicated the absence of interior contamination associated with the primary structure at this property. This information was investigated by performing a walking gamma scan. These areas and the ranges of gamma measurements are shown in Appendix Figure 3.3a. Exposure rates for the garage and shed are shown in Appendix Figure 3.3b.

Table 4.1
Area and Volume Calculations
DOE ID No. GJ-00069-RS

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<u>AREA</u>	<u>CALCULATIONS(ft)</u>	<u>SF</u>	<u>DEPTH(ft)</u>	<u>CF</u>	<u>CUBIC YARDS</u>
EXTERIOR					
Concrete					
A	9.5 x 10 =	95	x 0.3 =	29	
M	55 x 1.5 =	83	x 0.3 =	25	
				54	
Volume of Concrete				=	54/27 = 2
Contaminated Fill					
A	9.5 x 10 =	95	x 0.5 =	48	
B	26 x 8 =	208			
	8 x 3 =	24			
		232	x 1.8 =	418	
C	19 x 3 =	57	x 1.8 =	103	
D	5 x 28 =	140	x 1.0 =	140	
E	32 x 30 =	960	x 1.0 =	960	
F	11 x 14 =	154	x 0.8 =	123	
G	5 x 57 =	285	x 0.8 =	228	
H	23 x 30 =	690	x 2.3 =	1,587	
I	36 x 14 =	504	x 0.8 =	403	
J	7 x 17 =	119	x 1.3 =	155	
K	40 x 24 =	960			
	34 x 23 =	782			
		1,742	x 0.5 =	871	
L	10 x 5 =	50	x 0.5 =	25	
M	55 x 1.5 =	83	x 0.5 =	42	
N	3 x 30 =	90	x 0.5 =	45	

Table 4.1
Area and Volume Calculations
DOE ID No. GJ-00069-RS

Page 2 of 2

<u>AREA</u>	<u>CALCULATIONS(ft)</u>	<u>SF</u>	<u>DEPTH(ft)</u>	<u>CF</u>	<u>CUBIC YARDS</u>
O	5 x 5 =	25	x 0.8 =	20	
P	5 x 10 =	50	x 0.3 =	15	
Q	10 x 45 =	450	x 0.5 =	225	
Volume of Fill				= 5,408	= 5,408/27 = 200
TOTAL VOLUME - EXTERIOR					= 202

See Appendix Figures 3.5a and 3.5b For Areas

Table 4.2
Estimated Cost of Decontamination and Restoration
DOE ID No. GJ-00069-RS

Page 1 of 2

EXTERIOR

Remove/replace metal-prefab structure 95 sf - (allowance)	\$ 250
Remove 4" concrete slab 95 sf @ 2.00/sf	190
Replace concrete slab-on-grade 95 sf @ 1.50/sf	143
Remove identified residual radioactive material 177 cy @ 14.50/cy (machine)	2,567
23 cy @ 65.00/cy (manual)	1,495
Replace gravel driveway - 3/4" washed 9 cy @ 15.00/cy	135
Replace backfill material/pit run 74 cy @ 9.00/cy	666
Replace water-settled topsoil 117 cy @ 10.50/cy	1,229
Replace two large trees at structure 2 @ 100.00/each	200
Remove concrete incinerator unit (allowance)	450
Remove concrete sidewalk 83 sf @ 2.00/sf	166
Replace concrete sidewalk 83 sf @ 1.50/sf	125
Remove/replace fencing 150 lf @ 2.00/lf	300
Remove/replace landscaping features (allowance) - rock, railroad ties, etc.	400

Table 4.2
Estimated Cost of Decontamination and Restoration
DOE ID No. GJ-00069-RS

Page 2 of 2

Remove/replace clothesline (allowance)	250
Remove/replace landscaping - sod 2,900 sf @ 0.40/sf	1,160
Replace landscaping - flowers, shrubs and vines (allowance)	900
Cleanup	250
Protection	500
<hr/>	
TOTAL EXTERIOR	\$ 11,376
TOTAL INTERIOR	\$ 0
<hr/>	
SUBTOTAL	\$ 11,376
CONTINGENCY @ 20%	2,275
<hr/>	
SUBTOTAL	\$ 13,651
CONTRACTOR OVERHEAD & PROFIT @ 25%	3,413
<hr/>	
GRAND TOTAL	\$ 17,064

GV061985

REA00069:REA-KL003:LMR

Table 4.3
Calculations for Concentration of Radium-226 in Soil
DOE ID No. GJ-00069-RS

Page 1 of 1

$$C_{avg} = \frac{C_c \times A_c + C_b (100m^2 - A_c)}{100m^2}$$

Where

C_{avg} = Concentration average (pCi/g)

C_c = Concentration of Contamination (pCi/g)

A_c = Area of Concentration (m²)

C_b = Background Concentration (pCi/g)

$$C_{avg} = \frac{33.2 \times 14.6 + 2 (100 - 14.6)}{100}$$

$$C_{avg} = 6.56 < 7$$

Therefore, concentration does not meet EPA Standards of 7 pCi/g

NOTE: Background Radium concentration for this area is 2 pCi/g

=====

JT061985

REA00069/KL003/LMR

LOCATION #
00069

1733 N. 17TH ST.

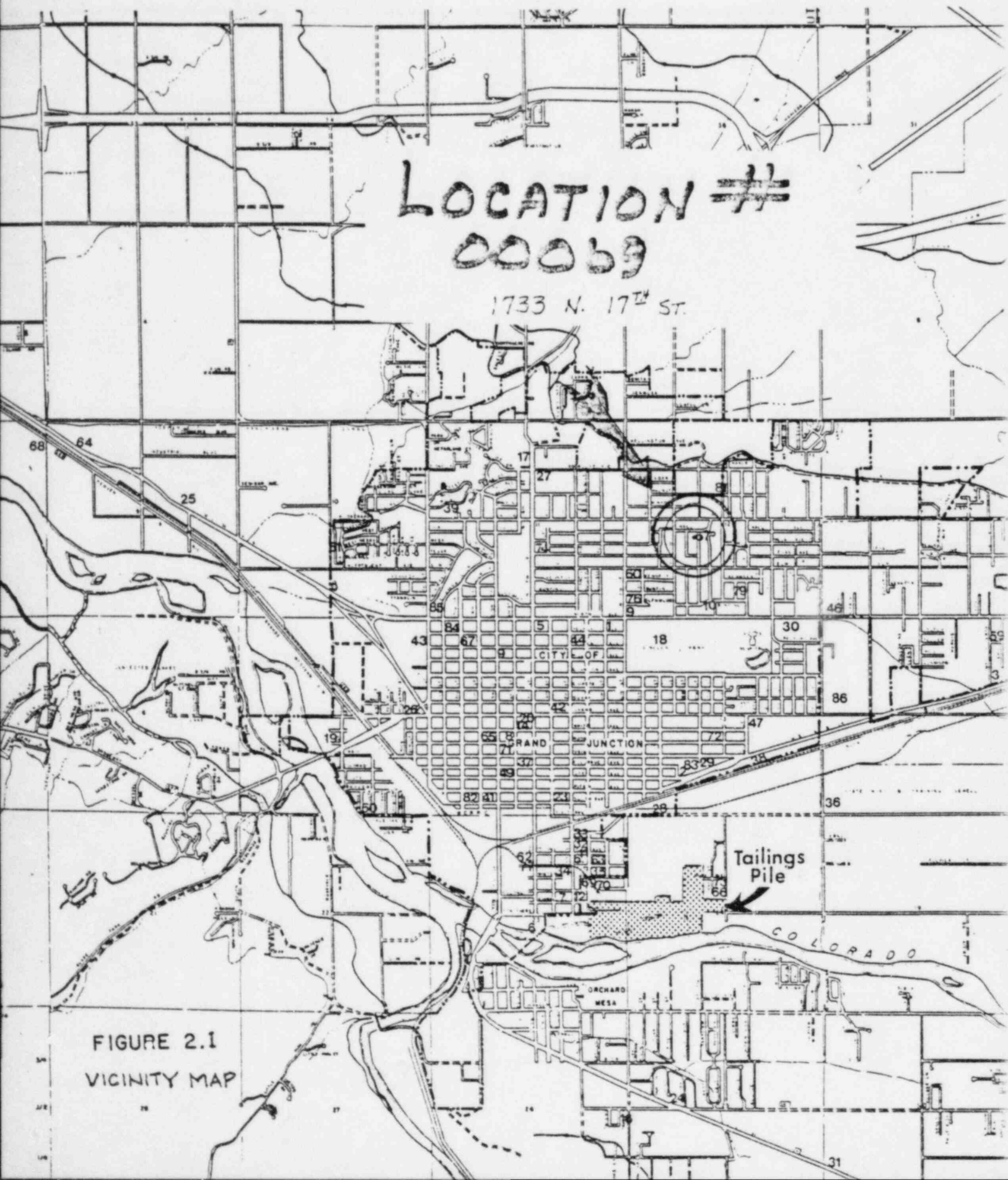
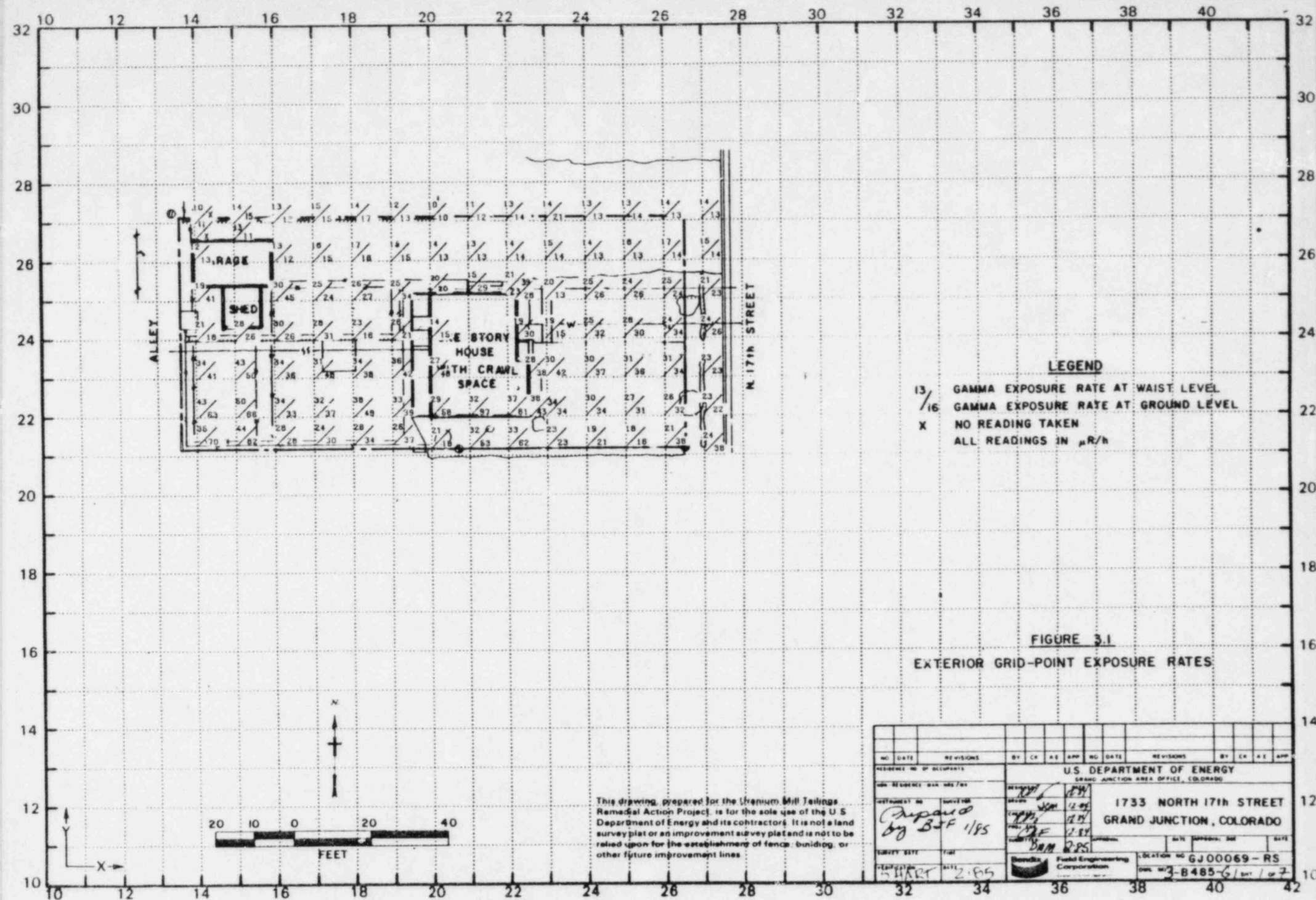
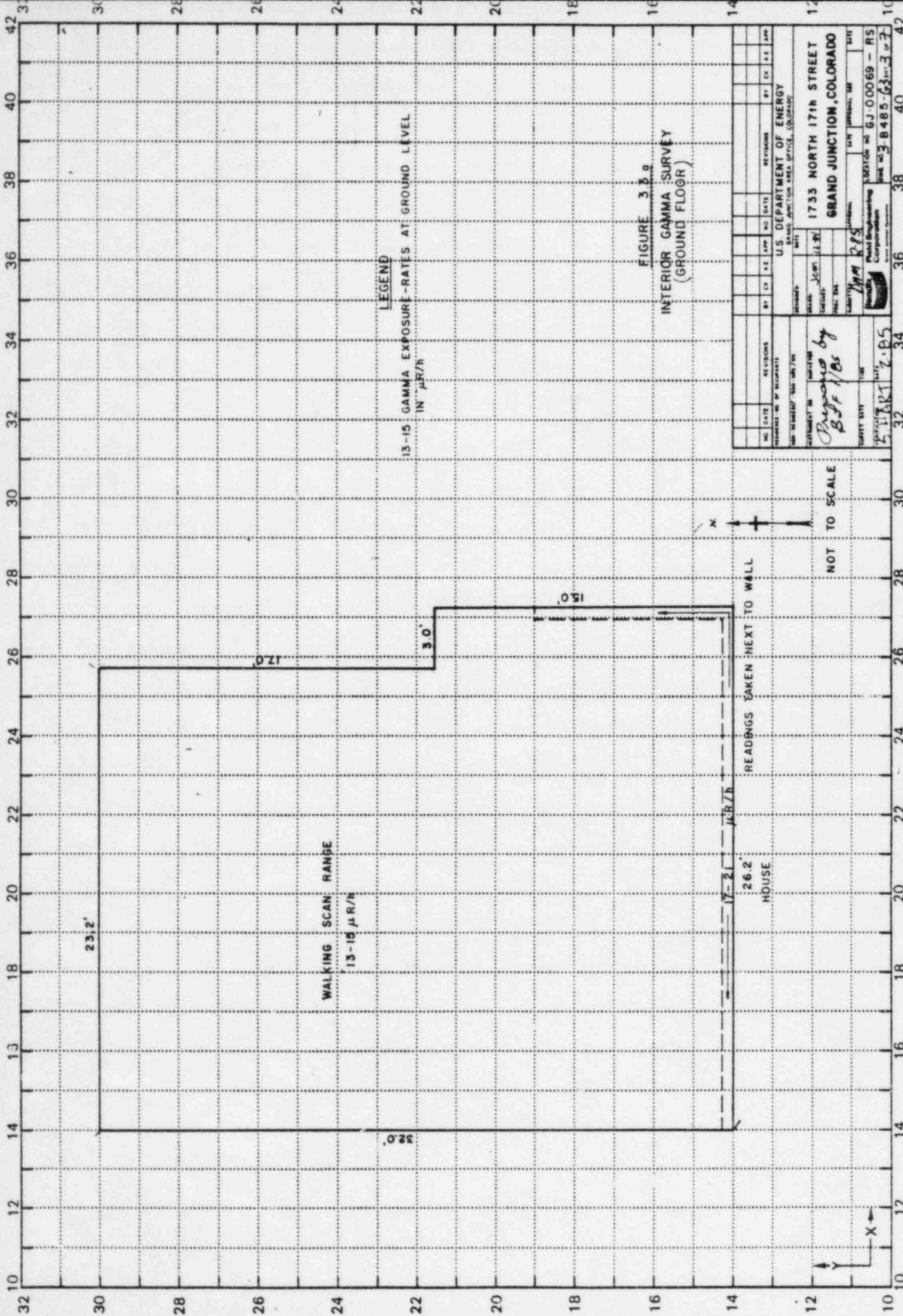


FIGURE 2.1
VICINITY MAP



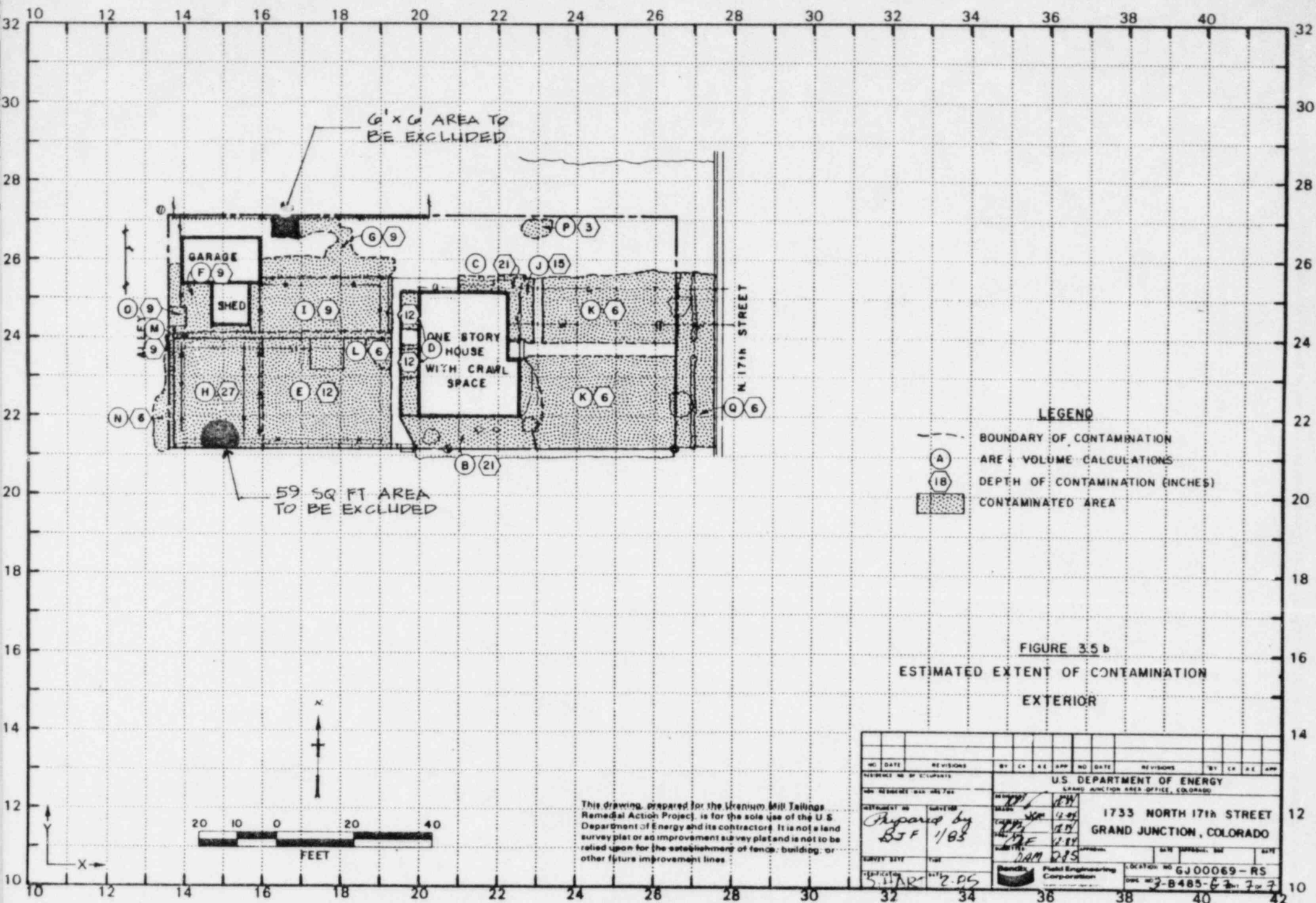


LEGEND

13-15 GAMMA EXPOSURE RATES AT GROUND LEVEL
IN μ R/h

FIGURE 3.3.9
INTERIOR GAMMA SURVEY
(GROUND FLOOR)

NO. DATE		REVISED		BY		DATE		REVISED		BY		DATE	
U.S. DEPARTMENT OF ENERGY HEALTH, SAFETY, AND ENVIRONMENTAL DIVISION OFFICE OF RADIATION PHYSICS													
PROJECT NO. 17-21 PROJECT TITLE: 1733 NORTH 17TH STREET GRAND JUNCTION, COLORADO				DATE: 11/11/85 BY: JAM RPS CHECKED: JAM RPS APPROVED: JAM RPS				U.S. DEPARTMENT OF ENERGY HEALTH, SAFETY, AND ENVIRONMENTAL DIVISION OFFICE OF RADIATION PHYSICS					
DRAWN BY: JAM RPS DATE: 11/11/85				CHECKED BY: JAM RPS DATE: 11/11/85				APPROVED BY: JAM RPS DATE: 11/11/85					
SCALE: 1" = 10'				LOCATION: 1733 NORTH 17TH STREET GRAND JUNCTION, COLORADO				PROJECT NO. GJ-00069 - RS DRAWING NO. 3-B485-6311-3-07					



12/84.

Location No. GJ-0006 3

Date 1/28/85

U.S. DEPARTMENT OF ENERGY
URANIUM MILL TAILINGS REMEDIAL ACTION PROJECT
GRAND JUNCTION VICINITY PROPERTIES

Official Survey Report

Property Address 1733 N. 17th Street

Property Owner P. A. and E. Kappel

Address of Owner (if different from above) _____

Report Prepared By Billie Foust

I. PRESENCE/ABSENCE OF RESIDUAL RADIOACTIVE MATERIALS

☐ No evidence of residual radioactive material on surveyed property.

☒ Residual radioactive materials found at the following locations:

☒ In open areas.

☒ Under or around exterior improvements.

☒ Under or around a typically nonoccupied structure. .

☒ Under or around a typically occupied structure.

II. RESULTS OF RADIOLOGIC ASSESSMENT

☐ Levels of radiation from residual radioactive materials, if any, do not exceed EPA Standards and no action is required under the Uranium Mill Tailings Remedial Action Project.

☒ Levels of radiation from residual radioactive materials exceed EPA standards such that remedial action is recommended and will be accomplished, with your consent, as soon as budget and schedule permit.

cc:

G. A. Franz, III, GJ/CDH

J. Themelis, Mgr. UMTRA Proj. Off.

HIG = 21 uR/hr in house

HOG = 97 uR/hr

Bendix

Field Engineering Corporation

Grand Junction Operations

January 28, 1985

P.O. Box 1069
Grand Junction, CO 81502
Tel (303) 242-5621

A Subsidiary of
The Bendix Corporation

Colorado Department of Health
222 S. 6th Street
Grand Junction, CO 81501

Attn: Jon Luellen

Dear Jon:

This letter is a follow-up of the technical review on DOE ID #GJ-00069-RS conducted on 23 January 1985.

The areas that require comments are as follows:

1. Depth of contamination at auger hole at 226243 (previously #16) was changed to 15 inches.
2. A borehole in the driveway was not possible. Mr. Kappel said he dug this area out about 20 inches and filled it in with river gravel. He did not want the large rocks brought up to the surface. You might correct team leader notes to indicate 20 inches removed instead of 12.
3. A delta reading was taken under the garage foundation on the west end. There was no contamination. The south half is inaccessible. The owner believes the garage was built when the house was (about 40 years ago).

A delta was taken under the shed foundation and it was contaminated.

I am enclosing footing/foundation forms for these two buildings.

4. The elevated gamma at the northwest edge of the house were recorded wrong. The reading is 20/20. Deltas were taken on the sidewalk and showed background readings. I have called for this sidewalk and the north-south sidewalk west of the house to be further investigated during remedial action.
5. The sidewalks in front (east) of the house had holes in them and deltas were taken in these locations. No contamination was found. The owner believes the east-west sidewalks were put in when the house was built, but a delta under the one west of the house showed contamination.

GJ-00069-RS
1733 N. 17th St
PA and E Kappel
1/2/85

Occupancy: 2

CREW: Loust, Viazpando, Garcia,
Adams, Egidi, Bell, Huey

Instruments

Scintillometers C-1181, C-1205,
C-1128, TC-3573, DS-3934,
DS-3937

The owner indicated that he had dug out about one foot of soil in the driveway north of the house and put gravel in. He also indicated that he had brought in six to ten yokes of peat moss from the Grand mesa (that he would want replaced during remedial action. He asked us to drill at least six

- feel away from his
 - Grapevines. The Gas
 line drawn on the
 map shows it coming
 from N 17th St but he
 indicated it ^{comes in from the} ~~is~~ West
 from all utility lines were checked
 CDH and Oak Ridge
 data indicates contamination
 around all sides of
 the house and in the
 yard. The driveway
 does not appear to
 be involved

- I tried to get
 a Spillover Consent
 form from the resident
 at 1523 N 17th. She
 "refused."

- A Walking Scan
 was conducted in
 the house since CDH
 and Oak Ridge

data
 indicate
 were
 the
 walls
 read
 from
 show
 reading
 the
 are
 high

The
 were
 served

all
 crew
 before

GJ00069

GJ00069

data show no contamination. Elevated readings were recorded along the South and East walls, so we recorded readings one foot away from the walls. These showed background readings which indicate the elevated readings are due to shine from high readings outside.

The shed and garage
were full so a complete
survey was not possible

All members of the crew were alpha scanned before leaving the property

1/2/85
BJT

had
 been
 in
 coming
 from the
 west
 had checked
 Fudge
 termination
 of
 the
 driveway
 open to

to get
consent
the resident
17th. She

ing Jean
located in
Sine CDH
Bridge

GJ-0069

1/28/85

1733 N 17th

Resist after Lick
Review

Crew First, Duce, Milton

Instruments: C-3942-Delta
C-3573 PRS-1

Checked with the
owner as to age of
buildings and Sidewalks.
The house and garage are
about 40 yrs. old. The
Sidewalks running east-
west are believed to
have been put in when
house was built. The
flagstone Sidewalk and
the north-south Sidewalk
west of the house was
put in about 15-20 yrs
ago. The Shed was

GS-000697
1733 n 174

put in over 21 years
ago.

Ditta readings
were taken under the
shed and garage
foundations and under
one sidewalk in the
back yard. a ditto
reading was taken on
the last sidewalk through
a hole in the concrete

Two borholes were
augured in the back
yard, north of the
is walls.

Dittas were taken
on the sidewalk north
of the house to show
elevated exposure rate
readings are shown

The tower indicated

GJ-00069R
1733 n 174

21 years

findings
near the
garage
found under
driveway in the
i. a data
was taken on
driveway through
the concrete

holes were
in the back
of the

were taken
north
to show
rate
shine

indicated

GJ-02064-RS
1733 n 174

he is anxious to sell
the property so he
refused him to raise
Lieber.

CDH Jack review notes
indicate a borehole
should be drilled in
the driveway, but
the owner indicated
he dug out 20' of
soil then filled in
with river gravel. He
did not want a
borehole in this area,
because it would bring
large rocks to the
surface. He had
previously said the
driveway had been
dug out about one
foot

BTF
1/28/85

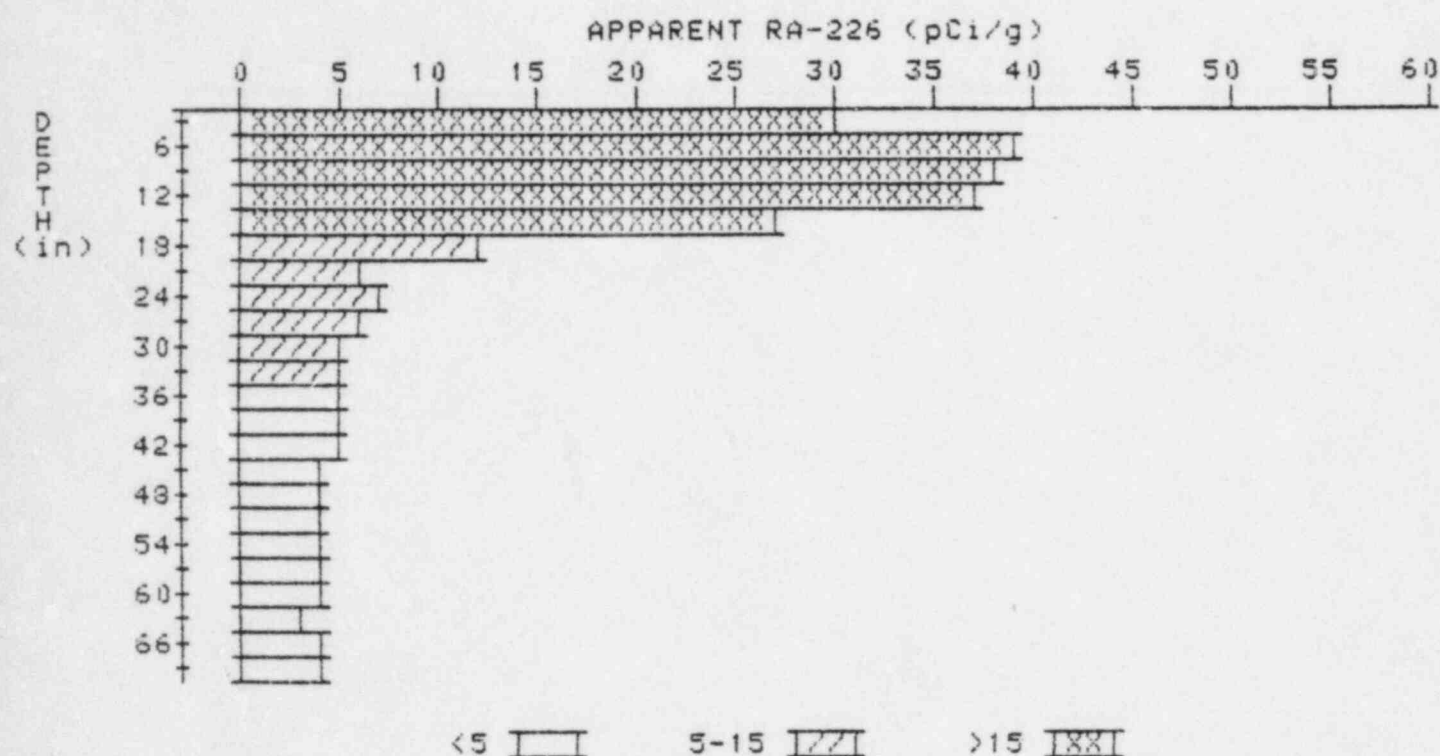
APPARENT RADIUM-226 CONCENTRATION DECONVOLUTION GRAPH

4

PROPERTY NUMBER: GJ-00069-RS

HOLE NUMBER: 4

LOCATION: 145225



Depth (in)	Apparent Radium-226 (pCi/g) Undeconvolved	Apparent Radium-226 (pCi/g) Deconvolved
3	30.0	30.0
6	33.2	38.7
9	33.3	38.5
12	30.5	36.5
15	24.3	27.0
18	16.6	12.3
21	11.3	6.5
24	8.7	6.7
27	7.2	6.5
30	6.1	5.2
33	5.5	5.3
36	5.0	4.6
39	4.7	4.5
42	4.5	4.5
45	4.3	4.3

48
51
54
57
60
63
66
69

4.1
4.0
4.0
3.9
3.9
3.8
3.9
3.8

3.1
3.8
4.2
3.7
4.1
3.4
4.3
3.8

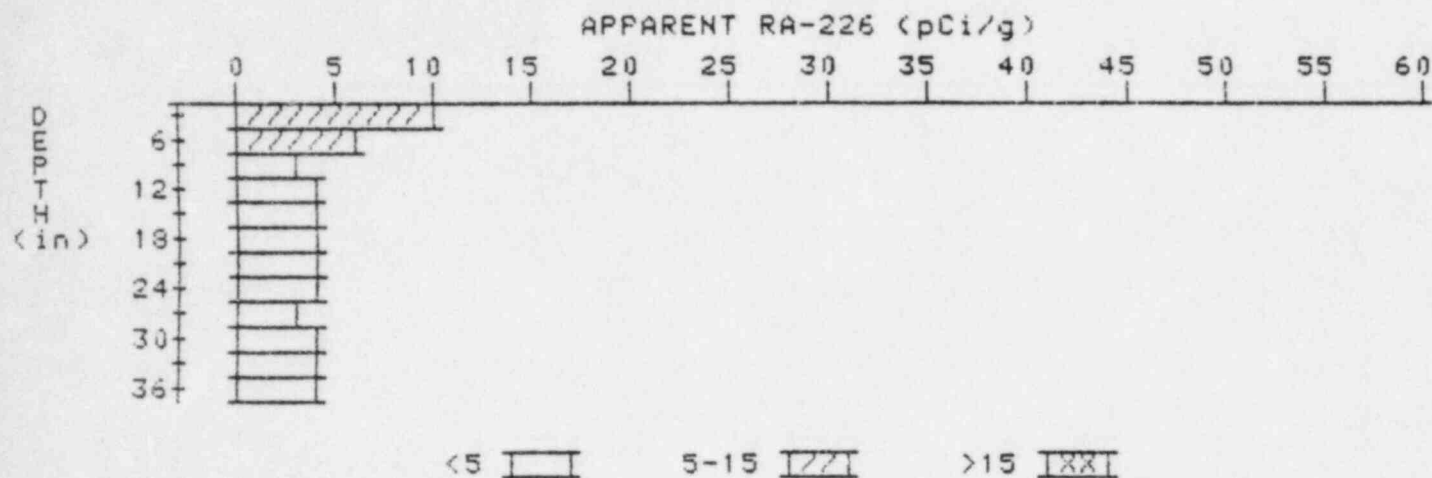
APPARENT RADIUM-226 CONCENTRATION DECONVOLUTION GRAPH

8

PROPERTY NUMBER: GJ-00069-RS

HOLE NUMBER: 8

LOCATION: 162243



Depth (in)	Apparent Radium-226 (pCi/g) Undeconvolved	Apparent Radium-226 (pCi/g) Deconvolved
3	10.2	10.2
6	7.3	5.7
9	5.3	3.2
12	4.5	3.8
15	4.1	3.6
18	4.0	4.0
21	3.9	3.9
24	3.8	3.8
27	3.7	3.3
30	3.8	4.0
33	3.8	4.0
36	3.7	3.7

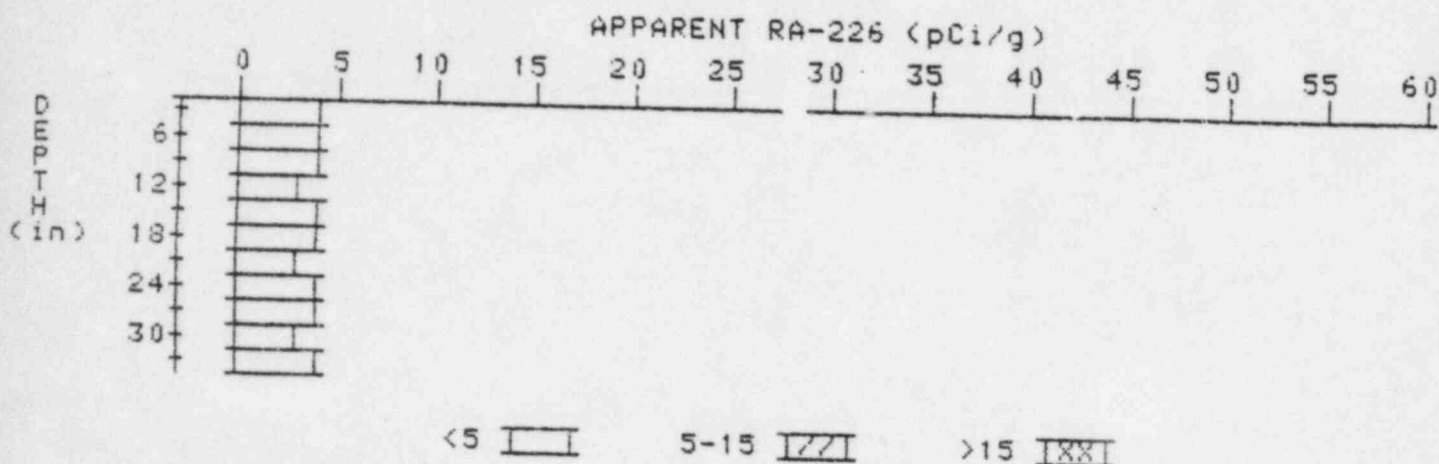
APPARENT RADIUM-226 CONCENTRATION DECONVOLUTION GRAPH

9

PROPERTY NUMBER: GJ-00069-RS

HOLE NUMBER: 9

LOCATION: 165265



Depth (in)	Apparent Radium-226 (pCi/g) Undeconvolved	Apparent Radium-226 (pCi/g) Deconvolved
3	3.7	3.7
6	3.6	3.6
9	3.5	3.5
12	3.4	3.0
15	3.5	3.7
18	3.5	3.7
21	3.4	3.0
24	3.5	3.7
27	3.5	3.7
30	3.4	3.0
33	3.5	3.5

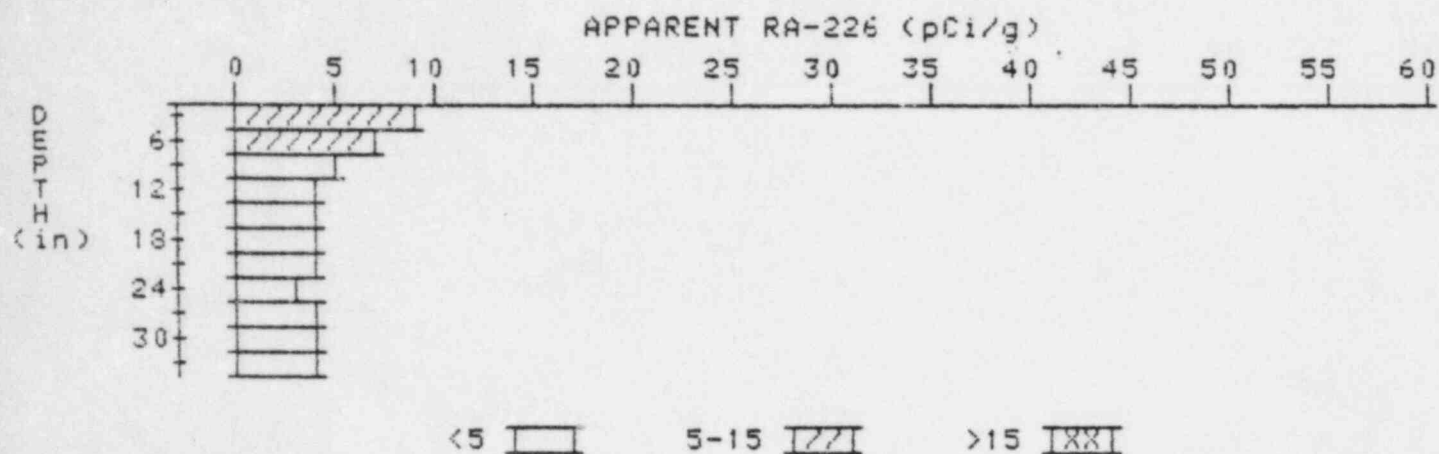
APPARENT RADIUM-226 CONCENTRATION DECONVOLUTION GRAPH

10

PROPERTY NUMBER: GJ-00069-RS

HOLE NUMBER: 10

LOCATION: 175225



Depth (in)	Apparent Radium-226 (pCi/g) Undeconvolved	Apparent Radium-226 (pCi/g) Deconvolved
3	8.6	8.6
6	7.1	6.9
9	5.7	4.8
12	4.8	4.1
15	4.3	3.8
18	4.1	3.9
21	4.0	4.2
24	3.8	3.4
27	3.8	4.0
30	3.7	3.7
33	3.6	3.6

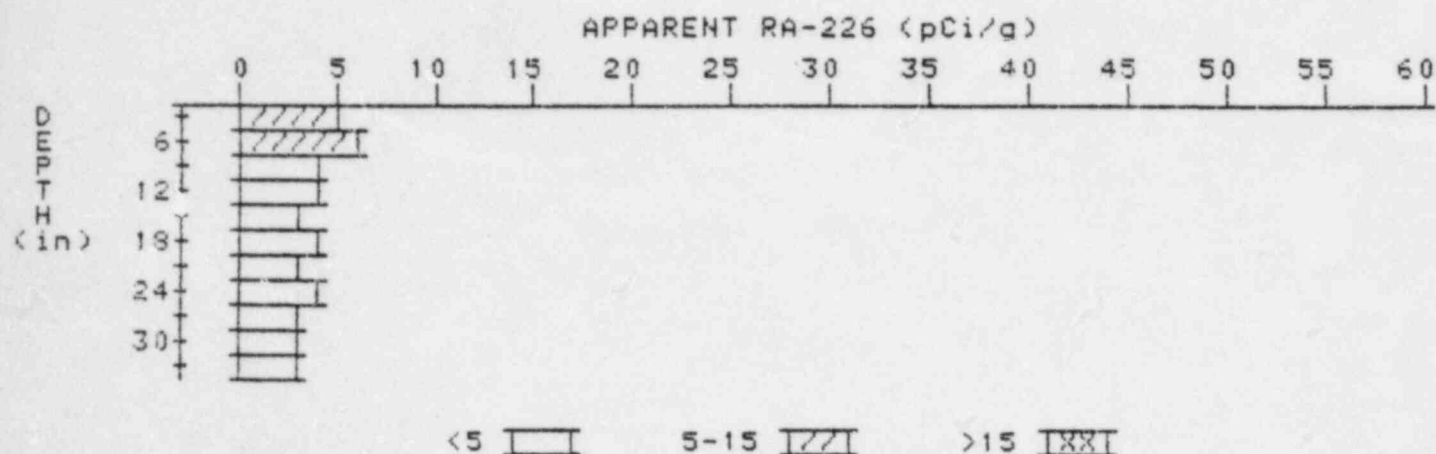
APPARENT RADIUM-226 CONCENTRATION 11

DECONVOLUTION GRAPH

PROPERTY NUMBER: GJ-00069-RS

HOLE NUMBER: 11

LOCATION: 175256



Depth (in)	Apparent Radium-226 (pCi/g) Undeconvolved	Apparent Radium-226 (pCi/g) Deconvolved
3	5.0	5.0
6	4.8	5.5
9	4.2	3.7
12	3.9	4.1
15	3.5	2.8
18	3.5	3.7
21	3.4	3.2
24	3.4	3.6
27	3.3	3.1
30	3.3	3.3
33	3.3	3.3

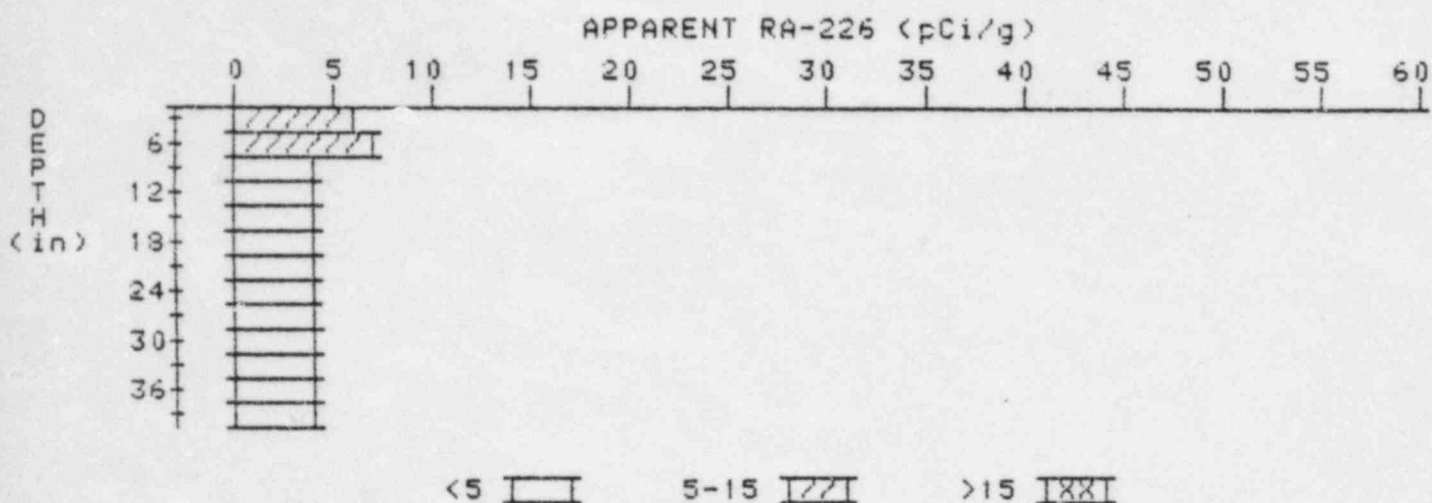
APPARENT RADIUM-226 CONCENTRATION DECONVOLUTION GRAPH

13

PROPERTY NUMBER: GJ-00069-RS

HOLE NUMBER: 13

LOCATION: 187250



Depth (in)	Apparent Radium-226 (pCi/g) Undeconvolved	Apparent Radium-226 (pCi/g) Deconvolved
3	6.2	6.2
6	5.8	6.9
9	4.8	3.7
12	4.4	4.2
15	4.1	3.7
18	4.0	3.8
21	4.0	4.2
24	3.9	3.7
27	3.9	4.1
30	3.8	3.6
33	3.8	3.8
36	3.8	3.8
39	3.8	3.8

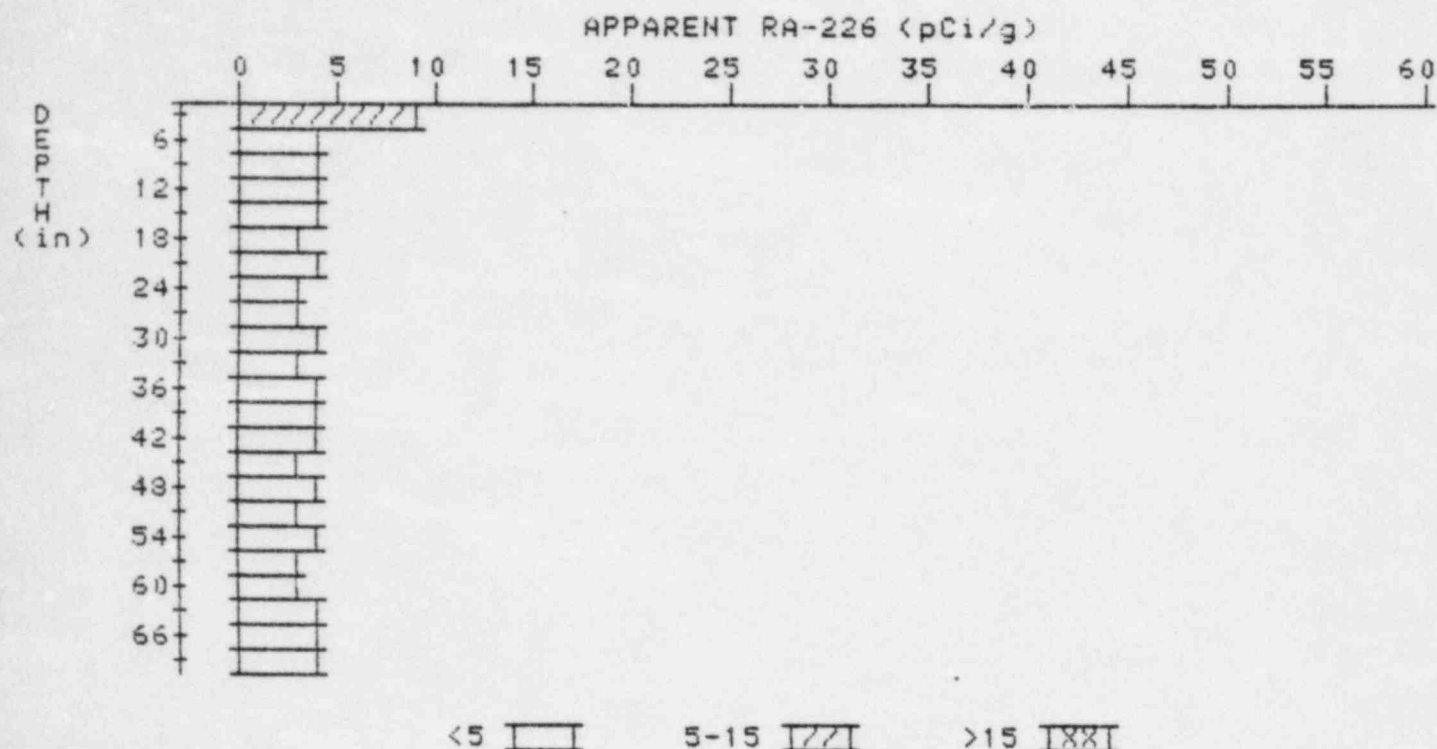
APPARENT RADIUM-226 CONCENTRATION DECONVOLUTION GRAPH

14

PROPERTY NUMBER: GJ-00069-RS

HOLE NUMBER: 14

LOCATION: 192236



Depth (in)	Apparent Radium-226 (pCi/g) Undeconvolved	Apparent Radium-226 (pCi/g) Deconvolved
3	8.5	8.5
6	6.2	4.2
9	5.0	4.1
12	4.3	3.9
15	3.9	3.5
18	3.7	3.3
21	3.7	3.9
24	3.6	3.4
27	3.6	3.4
30	3.7	4.1
33	3.6	3.4
36	3.6	3.6
39	3.6	3.8
42	3.5	3.5
45	3.4	3.2

48
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69

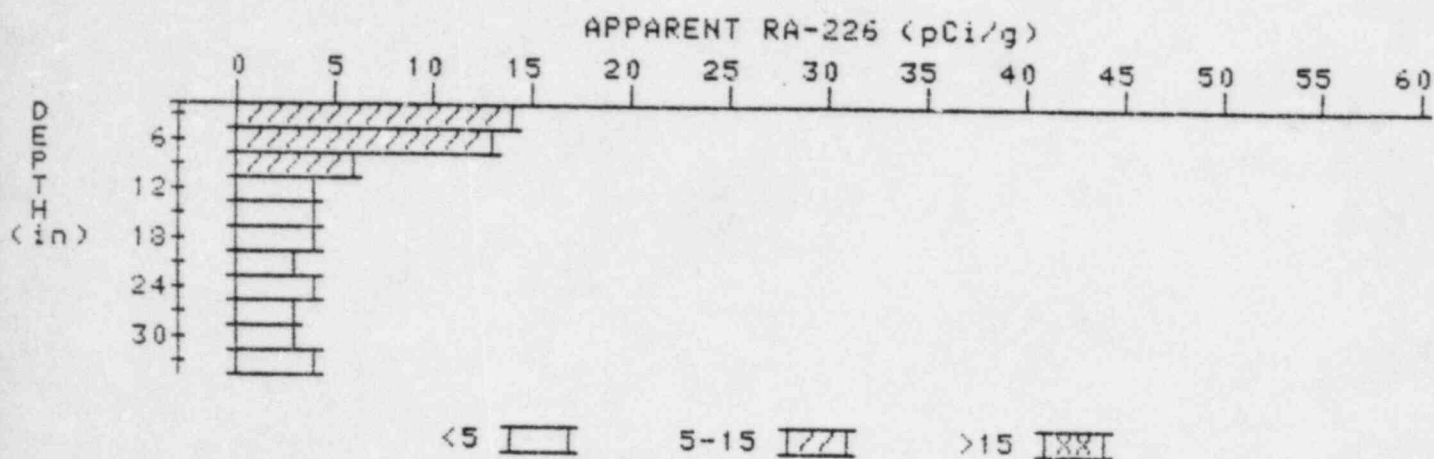
3.4
3.3
3.4
3.4
3.4
3.5
3.6
3.5

3.2
2.9
3.6
3.4
3.2
3.5
4.0
3.5

APPARENT RADIUM-226 CONCENTRATION 18

DECONVOLUTION GRAPH

PROPERTY NUMBER: GJ-00069-RS
 HOLE NUMBER: 18
 LOCATION: 198236



Depth (in)	Apparent Radium-226 (pCi/g) Undeconvolved	Apparent Radium-226 (pCi/g) Deconvolved
3	14.3	14.3
6	11.6	13.2
9	8.0	5.7
12	5.7	3.6
15	4.6	3.5
18	4.1	3.7
21	3.8	3.4
24	3.7	3.7
27	3.6	3.4
30	3.6	3.4
33	3.7	3.7

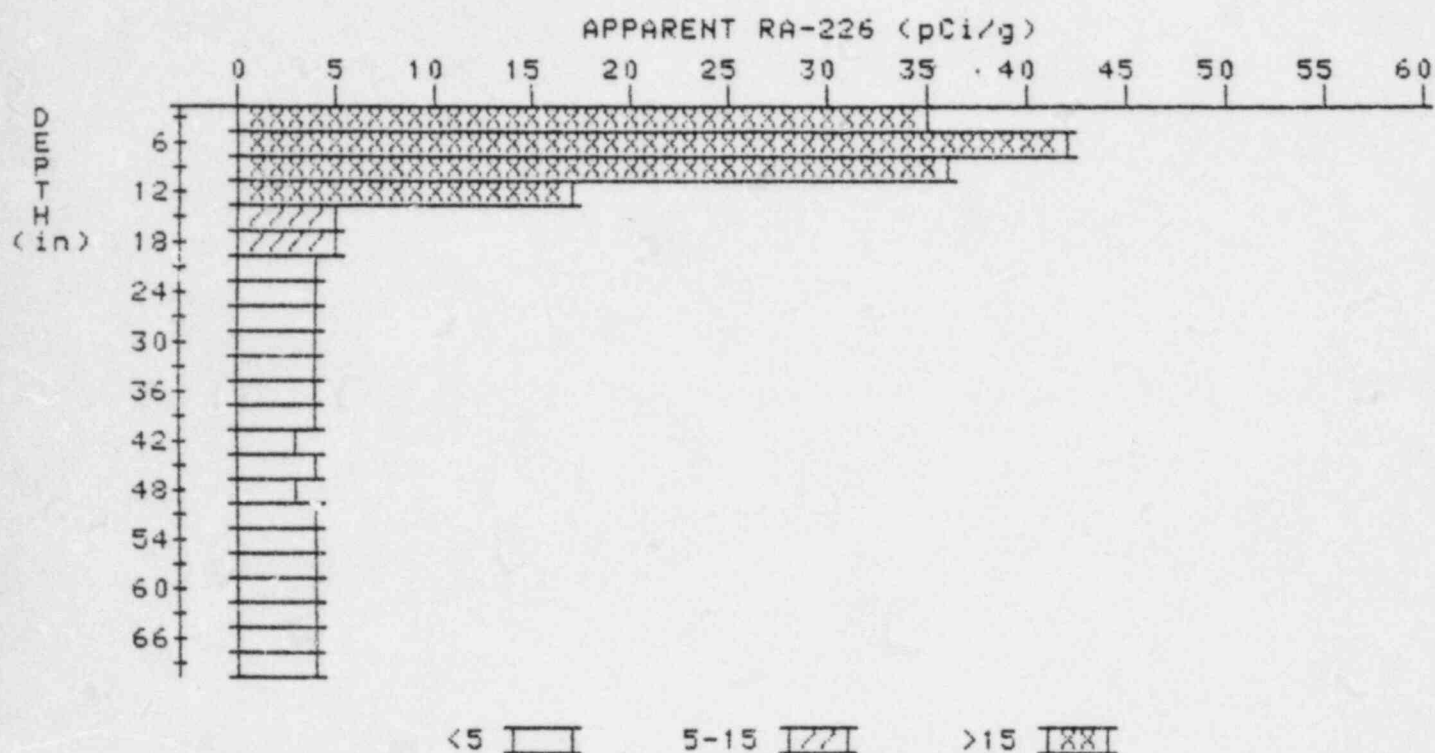
APPARENT RADIUM-226 CONCENTRATION DECONVOLUTION GRAPH

22

PROPERTY NUMBER: GJ-00069-RS

HOLE NUMBER: 22

LOCATION: 211219



Depth (in)	Apparent Radium-226 (pCi/g) Undeconvolved	Apparent Radium-226 (pCi/g) Deconvolved
3	35.4	35.4
6	34.4	41.9
9	29.2	36.5
12	19.9	17.1
15	12.2	5.4
18	3.3	5.1
21	6.2	4.4
24	5.1	4.0
27	4.6	4.2
30	4.3	4.3
33	4.0	3.6
36	3.9	4.1
39	3.7	3.5
42	3.6	3.2
45	3.7	4.1

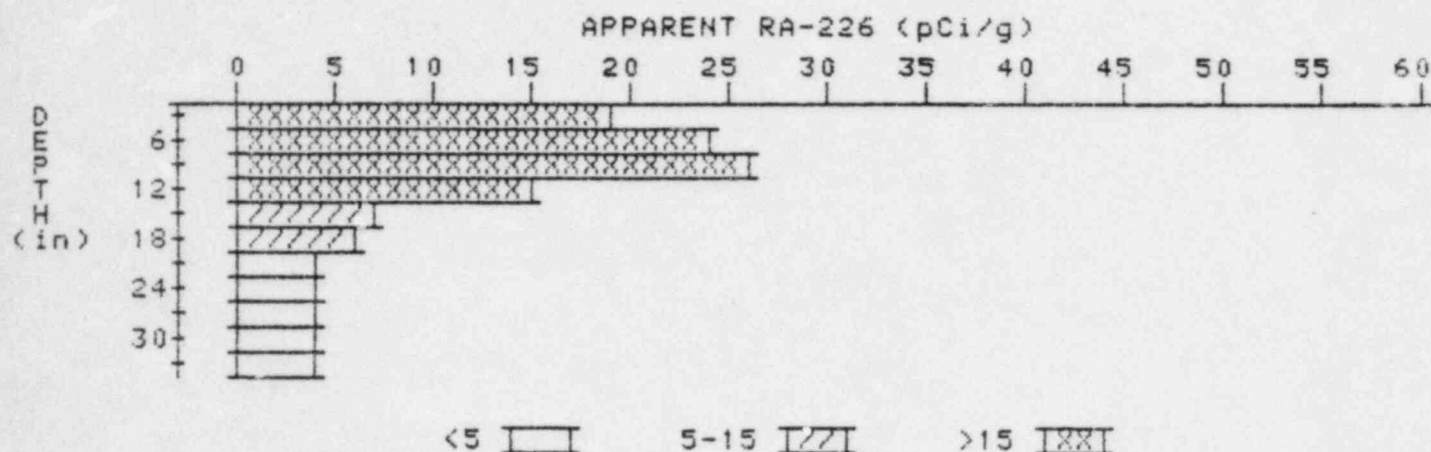
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66
69

3.6
3.7
3.7
3.7
3.8
3.9
3.9
4.0

3.7
3.9
3.7
3.5
3.8
4.1
3.7
4.0

APPARENT RADIUM-226 CONCENTRATION 23 DECONVOLUTION GRAPH

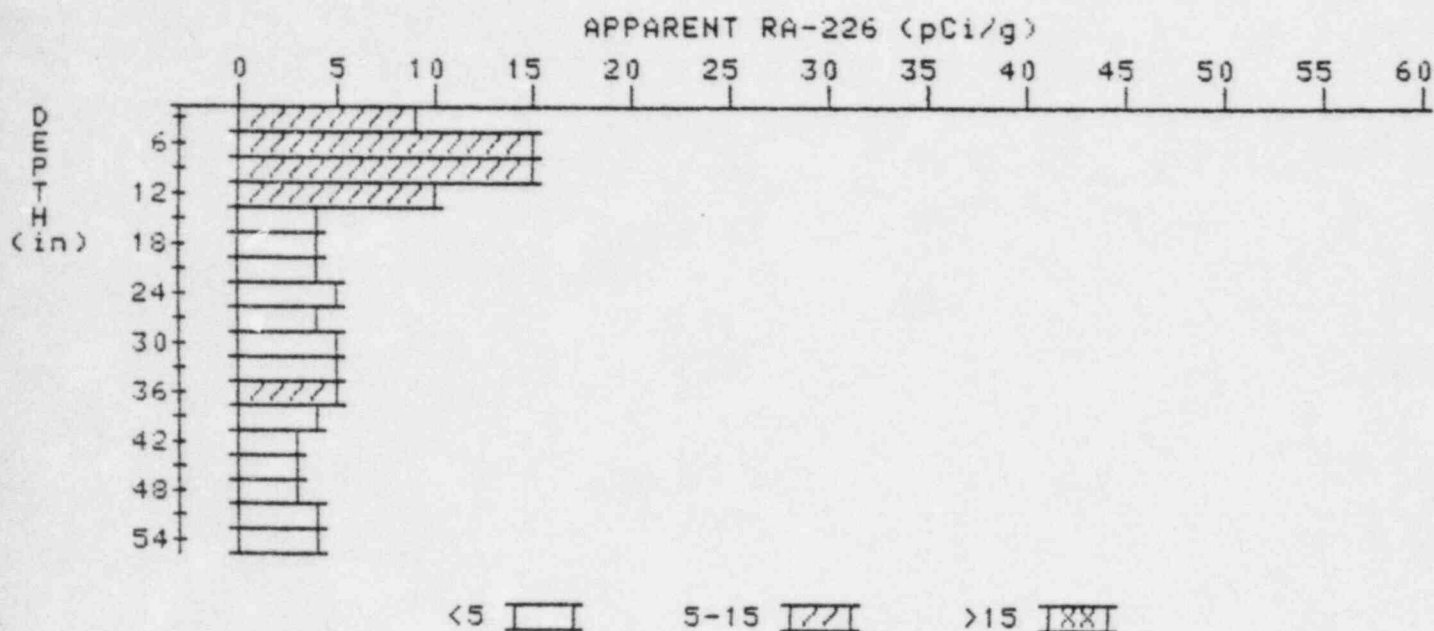
PROPERTY NUMBER: GJ-00069-RS
HOLE NUMBER: 23
LOCATION: 220253



Depth (in)	Apparent Radium-226 (pCi/g) Undeconvolved	Apparent Radium-226 (pCi/g) Deconvolved
3	18.7	18.7
6	20.2	24.5
9	19.3	25.5
12	14.9	15.1
15	10.4	7.4
18	7.6	5.6
21	5.9	4.5
24	5.0	4.3
27	4.5	4.0
30	4.3	4.1
33	4.2	4.2

APPARENT RADIUM-226 CONCENTRATION 24 DECONVOLUTION GRAPH

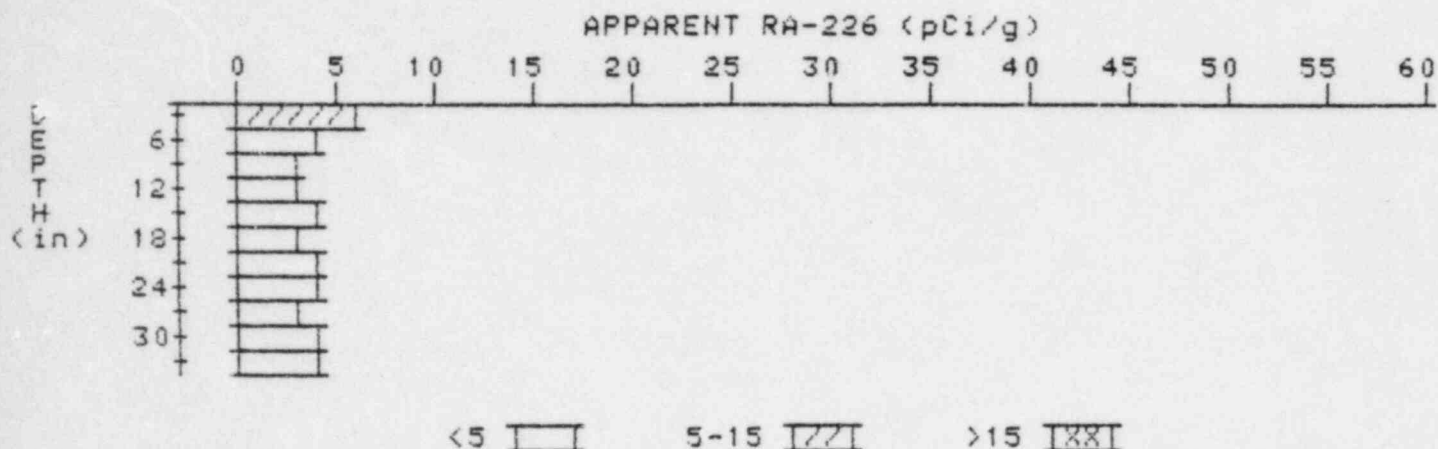
PROPERTY NUMBER: GJ-00069-RS
HOLE NUMBER: 24
LOCATION: 226243



Depth (in)	Apparent Radium-226 (pCi/g) Undeconvolved	Apparent Radium-226 (pCi/g) Deconvolved
3	9.3	9.3
6	11.2	14.8
9	11.1	14.7
12	9.0	9.7
15	6.5	4.4
18	5.2	4.0
21	4.6	3.7
24	4.5	4.5
27	4.4	4.0
30	4.5	4.7
33	4.5	4.5
36	4.5	5.0
39	4.2	4.4
42	3.8	3.4
45	3.6	3.4
48	3.5	3.3
51	3.5	3.5
54	3.5	3.5

APPARENT RADIUM-226 CONCENTRATION 30 DECONVOLUTION GRAPH

PROPERTY NUMBER: GJ-00069-RS
HOLE NUMBER: 30
LOCATION: 250230



Depth (in)	Apparent Radium-226 (pCi/g) Undeconvolved	Apparent Radium-226 (pCi/g) Deconvolved
3	6.2	6.2
6	4.8	3.6
9	4.1	3.4
12	3.8	3.4
15	3.7	3.9
18	3.5	3.1
21	3.5	3.5
24	3.5	3.5
27	3.5	3.3
30	3.6	3.3
33	3.6	3.6