

RADIOLOGIC AND ENGINEERING ASSESSMENT

FOR

DOE ID NO.: GJ-03196-RS
ADDRESS: 260 LAURA LEE AVENUE

JUNE 1985

FOR

URANIUM MILL TAILINGS REMEDIAL ACTION PROJECT OFFICE

ALBUQUERQUE OPERATIONS OFFICE

DEPARTMENT OF ENERGY

BY

BENDIX FIELD ENGINEERING CORPORATION
P.O. Box 1569
Grand Junction, Colorado 81502

APPROVED BY

Michael K Tucker

M. TUCKER
DOE PROJECT ENGINEER

DATE

June 13, 1985

REA03196:REA-KL008

8507080103 850614
PDR WASTE
WM-54 PDR

TABLE OF CONTENTS

<u>Section</u>	<u>Page</u>
1.0 EXECUTIVE SUMMARY	1
1.1 Introduction	1
1.2 Evaluation and Recommendation	1
2.0 PROPERTY DESCRIPTION	2
2.1 General Description	2
2.2 Existing Facilities and Structures	2
3.0 RADIOLOGIC SURVEY	4
3.1 Introduction	4
3.2 Gamma Exposure-Rate Surveys	4
3.2.1 Exterior Findings	4
3.2.2 Interior Findings	4
3.3 Boreholes, Soil Samples, and Other Measurements	4
3.4 Radon/Radon Daughter Concentration	5
3.5 Extent of Contamination	5
4.0 RECOMMENDED REMEDIAL ACTION	7
4.1 Decontamination and Restoration	7
4.2 Evaluation of Recommended Remedial Action	7
5.0 REFERENCES	8
6.0 APPENDIX	9

1.0 EXECUTIVE SUMMARY

1.1 Introduction

The location, DOE ID No. GJ-03196-RS, is a single-family residence located at 260 Laura Lee Avenue, 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 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, 269 cu. yd.; interior, 4 cu. yd.

Estimated cost to perform remedial action, including dislocation when applicable, is \$12,078. Remedial action on this property will take approximately 21 days to complete.

2.0 PROPERTY DESCRIPTION

2.1 General Description

Address: 260 Laura Lee Avenue, Grand Junction, Colorado

Zoning: Residential (RSF-8)

Lot Size: Approximately 8,925 sf (0.2 acres)

Legal Description: Lot 6, Block 2, Towns Subdivision, Section 25, T1S, R1W, City of Grand Junction, County of Mesa, State of Colorado.

Point of Reference: This property is located approximately 1 mile south 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/underground to irrigation pump
Gas:	Underground
Telephone:	Overhead
Sewer:	Underground
Water:	Underground
Cable TV:	Overhead

Bordering Properties:

North:	Single-family residence
South:	Single-family residence
East:	Irrigation/utility easement
West:	Laura Lee Avenue

2.2 Existing Facilities and Structures

Primary Structure:

Type:	One-story residence
Size:	Approximately 970 sf
Construction Date:	1960
Construction:	Wood-frame
Foundation:	Concrete stemwall on spread footing
Footing Depth:	Approximately 22" to bottom of footing from grade
Basement:	None
Crawl Space:	Yes, full
Condition:	Good

Other Structures:

Type:	Shed
Size:	Approximately 60 sf
Construction:	Pre-fabricated metal
Foundation:	Concrete slab-on-grade
Condition:	Good

General Remarks:

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-03196-RS on February 13, 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 in the yard around the primary structure.

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: 15 to 17 uR/h
Highest Outside Gamma Reading (HOG): 72 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 16 uR/h
Highest Inside Gamma Reading (HIG): 16 uR/h

Interior gamma exposure rate measurements are summarized in Appendix Table 3.2. Appendix Figure 3.3 shows 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 (RDC)

Determined by CDH: 0.011 gross working level (WL). No additional 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) Soil under the metal shed is contaminated to a total depth of 15 inches from the surface of an uncontaminated 3-inch-thick concrete slab. The assessment is based on data collected in Area I (approximately 70 sf).
- (AREA B) West of the primary structure, in the gravel driveway, several deposits of contamination extend to a depth of 12 inches (approximately 448 sf).
- (AREA C) The lawn, northwest of the primary structure, is contaminated to a depth of 12 inches (approximately 919 sf).
- (AREA D) The planter around the roof extension support is filled with contaminated soil. The soil in the planter is 18 inches above ground level. The estimated total depth of contamination is 30 inches, based on data collected in Area C (approximately 10 sf).
- (AREA E) Adjacent to the west side of the primary structure, in a flower planter, contamination extends to a depth of 15 inches (approximately 25 sf).
- (AREA F) South of Area E, in the flower planter, contamination extends to a depth of 27 inches (approximately 15 sf).
- (AREA G) Contamination is 18 inches deep adjacent to the south side of the primary structure (approximately 50 sf).
- (AREA H) The soil west of the metal shed is contaminated to a depth of 12 inches (approximately 30 sf).
- (AREA I) A large area of lawn west, south, and east of the primary structure is contaminated to a depth of 12 inches (approximately 3,422 sf).
- (AREA J) Adjacent to Area I, contamination in the lawn northeast of the primary structure is 18 inches deep (approximately 616 sf).

- (AREA K) The sidewalk and underlying soil along the north property line are contaminated. The total depth of contamination is 15 inches from the surface of the 4-inch-thick concrete slab (approximately 168 sf).
- (AREA L) East of Area J, contamination in the dirt garden area extends to a depth of 18 inches (approximately 216 sf).
- (AREA M) Contamination in the soil east of Area L extends to a depth of 6 inches (approximately 459 sf).
- (AREA N) The soil east of Area I is contaminated to a depth of 12 inches (approximately 579 sf).
- (AREAS REQUIRING FURTHER INVESTIGATION DURING REMEDIAL ACTION)
Area F should be closely monitored to ensure that the sewer line is not packed in contaminated soil.

4.0 RECOMMENDED REMEDIAL ACTION

4.1 Decontamination and Restoration

The recommended remedial action for this property, DOE ID No. GJ-03196-RS, includes removal of all 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.

Estimated cost of remedial action is \$12,078.

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

There is no owner preference with respect to remedial action and 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

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 3.3	Interior Gamma Exposure Rates
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 No. GJ-03196-RS

260 Laura Lee

Page 1 of 7

Loc No.	Grid Location	Depth (in.)	Meas. Type	In Situ Ra-226 (pCi/g)		Chem Ra-226 (pCi/g)	Comments
				Tot. Ct	Spectr.		
1	150235	03	TC	8.1		*	DC = 12 inches Based on the deconvolution graph
		06	TC	8.3		*	
		09	TC	6.5		*	
		12	TC	5.0		*	
		15	TC	3.8		*	
		18	TC	3.7		*	
		21	TC	3.6		*	
		24	TC	3.5		*	
		27	TC	3.4		*	
		30	TC	3.4		*	
		33	TC	3.4		*	
		36	TC	3.4		*	
		39	TC	3.3		*	
2	152237	03	TC	8.8		*	DC = 12 inches Based on the deconvolution graph
		06	TC	8.3		*	
		09	TC	6.6		*	
		12	TC	5.5		*	
		15	TC	4.7		*	
		18	TC	4.4		*	
		21	TC	4.1		*	
		24	TC	4.1		*	
3	153248	03	TC	9.8		*	Water main DC = 12 inches Based on the deconvolution graph
		06	TC	8.6		*	
		09	TC	6.9		*	
		12	TC	5.5		*	
		15	TC	4.7		*	
		18	TC	4.4		*	
		21	TC	4.2		*	
		24	TC	4.1		*	
4	157274	03	TC	13.9		*	DC = 12 inches Based on the deconvolution graph
		06	TC	13.6		*	
		09	TC	10.4		*	
		12	TC	7.3		*	
		15	TC	5.5		*	
		18	TC	4.5		*	
		21	TC	4.0		*	
		24	TC	3.9		*	
5	160254	00-04	SS			1.9	Concrete core
		04-10	SS			2.8	Soil under core

Radium Concentrations at Exterior Locations

DOE ID No. GJ-03196-RS

260 Laura Lee

Page 2 of 7

Page 1 of 1

Loc No.	Grid Location	Depth (in.)	Meas. Type	In Situ Ra-226 (pCi/g)		Chem Ra-226 (pCi/g)	Comments
				Tot. Ct	Spectr.		
5	160254	03	TC	3.7		*	Front sidewalk DC = 0 inches
		06	TC	4.2		*	
		09	TC	4.6		*	
		12	TC	4.7		*	
		15	TC	4.6		*	
		18	TC	4.4		*	
		21	TC	4.2		*	
		24	TC	4.1		*	
		27	TC	4.0		*	
		30	TC	4.0		*	
6	163272	03	TC	24.1		*	DC = 12 inches Based on the deconvolution graph
		06	TC	26.6		*	
		09	TC	20.5		*	
		12	TC	13.7		*	
		15	TC	9.1		*	
		18	TC	7.0		*	
		21	TC	5.9		*	
		24	TC	5.1		*	
		27	TC	4.7		*	
		30	TC	4.3		*	
7	165285	00	DS	1.0		*	Rock garden
8	170290	03	TC	4.4		*	DC = 0 inches
		06	TC	4.3		*	
		09	TC	4.1		*	
		12	TC	3.9		*	
		15	TC	3.6		*	
		18	TC	3.3		*	
		21	TC	3.3		*	
9	184235	03	TC	7.1		*	DC = 12 inches Based on the deconvolution graph
		06	TC	7.0		*	
		09	TC	5.9		*	
		12	TC	5.0		*	
		15	TC	4.3		*	
		18	TC	3.9		*	
		21	TC	3.7		*	
		24	TC	3.6		*	
10	186242	03	TC	4.9		*	Sewer DC = 27 inches
		06	TC	4.9		*	

Front sidewalk
DC = 0 inchesDC = 12 inches
Based on the
deconvolution graph

Rock garden

DC = 0 inches

DC = 12 inches
Based on the
deconvolution graphSewer
DC = 27 inches

Radium Concentrations at Exterior Locations

DOE ID No. GJ-03196-RS

260 Laura Lee

Page 3 of 7

Loc No.	Grid Location	Depth (in.)	Meas. Type	In Situ Ra-226 (pCi/g)		Chem Ra-226 (pCi/g)	Comments
				Tot. Ct	Spectr.		
10	186242	09	TC	5.1		*	Based on the deconvolution graph
		12	TC	5.3		*	
		15	TC	5.8		*	
		18	TC	5.9		*	
		21	TC	5.8		*	
		24	TC	5.8		*	
		27	TC	5.3		*	
		30	TC	4.9		*	
		33	TC	4.5		*	
		36	TC	4.1		*	
		39	TC	3.4		*	
		42	TC	3.1		*	
		45	TC	3.1		*	
		48	TC	3.1		*	
11	186248	03	TC	7.4		*	Water line DC = 15 inches Based on the deconvolution graph
		06	TC	9.1		*	
		09	TC	9.4		*	
		12	TC	7.8		*	
		15	TC	6.2		*	
		18	TC	5.3		*	
		21	TC	4.7		*	
		24	TC	4.3		*	
		27	TC	4.0		*	
12	190290	00	DS	1.1		*	Rock garden near fence
13	198238	03	TC	20.2		*	Gas line DC = 18 inches Based on the deconvolution graph
		06	TC	20.2		*	
		09	TC	16.7		*	
		12	TC	12.3		*	
		15	TC	8.3		*	
		18	TC	5.9		*	
		21	TC	4.7		*	
		24	TC	4.2		*	
		30	TC	4.1		*	
14	200230	00	DS	5.3		*	S of house
15	206283	03	TC	9.7		*	DC = 12 inches
		06	TC	10.2		*	
		09	TC	8.9		*	

Radium Concentrations at Exterior Locations

DOE ID No. GJ-03196-RS

260 Laura Lee

Page 4 of 7

Loc No.	Grid Location	Depth (in.)	Meas. Type	In Situ Ra-226 (pCi/g)		Chem Ra-226 (pCi/g)	Comments
				Tot. Ct	Spectr.		
15	206283	12	TC	6.8		*	Based on the deconvolution graph
		15	TC	5.6		*	
		18	TC	4.9		*	
		21	TC	4.5		*	
		24	TC	4.1		*	
		27	TC	3.9		*	
		30	TC	3.7		*	
16	207293	00	DS	22.2		*	NW of the shed
17	209290	00	DS	6.3		*	NW corner of shed
18	211243	03	TC	3.9		*	DC = 0 inches
		06	TC	4.0		*	
		09	TC	4.0		*	
		12	TC	3.8		*	
		15	TC	3.7		*	
		18	TC	3.7		*	
		21	TC	3.6		*	
		24	TC	3.6		*	
		27	TC	3.6		*	
		30	TC	3.5		*	
		33	TC	3.6		*	
		36	TC	3.7		*	
		39	TC	3.7		*	
		42	TC	3.7		*	
		45	TC	3.8		*	
		48	TC	3.8		*	
19	216285	03	TC	11.7		*	DC = 12 inches Based on the deconvolution graph
		06	TC	11.3		*	
		09	TC	8.7		*	
		12	TC	6.4		*	
		15	TC	5.3		*	
		18	TC	4.5		*	
		21	TC	4.0		*	
		24	TC	3.8		*	
		27	TC	3.7		*	
		30	TC	3.6		*	
		33	TC	3.6		*	
		36	TC	3.6		*	
20	220250	03	TC	5.1		*	Backyard DC = 12 inches
		06	TC	5.8		*	

Radium Concentrations at Exterior Locations

DOE ID No. GJ-03196-RS

260 Laura Lee

Page 5 of 7

Loc No.	Grid Location	Depth (in.)	Meas. Type	In Situ Ra-226 (pCi/g)		Chem Ra-226 (pCi/g)	Comments
				Tot. Ct	Spectr.		
20	220250	09	TC	5.6		*	Based on the deconvolution graph
		12	TC	5.0		*	
		15	TC	4.7		*	
		18	TC	4.4		*	
		21	TC	4.2		*	
		24	TC	4.0		*	
		27	TC	3.8		*	
		30	TC	3.6		*	
		33	TC	3.6		*	
21	240270	03	TC	9.7		*	Backyard DC = 18 inches Based on the deconvolution graph
		06	TC	11.2		*	
		09	TC	10.0		*	
		12	TC	7.7		*	
		15	TC	6.4		*	
		18	TC	5.4		*	
		21	TC	5.0		*	
		24	TC	4.7		*	
		27	TC	4.6		*	
		30	TC	4.3		*	
		33	TC	4.3		*	
22	240291	00-04	SS			7.4	Concrete core Soil under core N sidewalk DC = 15 inches Based on the deconvolution graph
		04-10	SS			16.4	
		03	TC	10.2		*	
		06	TC	14.3		*	
		09	TC	12.6		*	
		12	TC	8.9		*	
		15	TC	6.8		*	
		18	TC	5.8		*	
		21	TC	5.1		*	
		24	TC	4.6		*	
		27	TC	4.5		*	
		30	TC	4.2		*	
23	258264	03	TC	23.7		*	DC = 15 inches Based on the deconvolution graph
		06	TC	22.1		*	
		09	TC	15.3		*	
		12	TC	9.7		*	
		15	TC	5.3		*	
		18	TC	4.7		*	
		21	TC	4.6		*	
		24	TC	4.5		*	

Radium Concentrations at Exterior Locations

DOE ID No. GJ-03196-RS

260 Laura Lee

Page 6 of 7

Loc No.	Grid Location	Depth (in.)	Meas. Type	In Situ Ra-226 (pCi/g)		Chem Ra-226 (pCi/g)	Comments
				Tot. Ct	Spectr.		
24	260250	03	TC	3.8		*	
		06	TC	3.9		*	DC = 0 inches
		09	TC	3.7		*	
		12	TC	3.5		*	
		15	TC	3.3		*	
		18	TC	3.2		*	
		21	TC	3.2		*	
		24	TC	3.3		*	
		27	TC	3.5		*	
		30	TC	3.7		*	
25	270280	03	TC	4.1		*	Backyard
		06	TC	4.4		*	DC = 6 inches
		09	TC	4.3		*	Based on all
		12	TC	4.1		*	data taken
		15	TC	4.0		*	
		18	TC	3.9		*	
		21	TC	3.8		*	
		24	TC	3.7		*	
		27	TC	3.8		*	
		30	TC	3.8		*	
26	275235	00	DS	1.5		*	Background
		00-06	SS			3.9	DC = 0 inches
		03	TC	3.6		*	
		06	TC	4.0		*	
		09	TC	4.0		*	
		12	TC	3.8		*	
		15	TC	3.5		*	
		18	TC	3.3		*	
		21	TC	3.3		*	
27	283231	00	DS	2.5		*	Alley
		06	DS	1.2		*	
		00-06	SS			4.1	
28	285245	03	TC	3.4		*	
		06	TC	3.6		*	DC = 0 inches
		09	TC	3.9		*	
		12	TC	4.0		*	
		15	TC	4.0		*	
		18	TC	4.1		*	
		21	TC	4.1		*	

Radium Concentrations at Exterior Locations

DOE ID No. GJ-03196-RS

260 Laura Lee

Page 7 of 7

Loc No.	Grid Location	Depth (in.)	Meas. Type	In Situ Ra-226 (pCi/g)		Chem Ra-226 (pCi/g)	Comments
				Tot. Ct	Spectr.		
28	285245	24	TC	4.0		*	
		27	TC	3.9		*	
29	285280	03	TC	3.4		*	
		06	TC	4.0		*	DC = 0 inches
		09	TC	4.4		*	
		12	TC	4.7		*	
		15	TC	4.9		*	
		18	TC	4.8		*	
		21	TC	4.4		*	
		24	TC	4.1		*	
		27	TC	3.8		*	
		30	TC	3.6		*	

Tool Types: GB = GAD-6 Borehole
 GS = GAD-6 Surface
 DS = Delta Scintillometer
 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 = 02-13-85
 Team Leader = DGD

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)
-----	-----	-----	-----	-----	-----	-----
PRIMARY STRUCTURE	*	*	*	*	13-16	*
SHED	*	*	*	*	24-32	*
-----	-----	-----	-----	-----	-----	-----

* The CDH and ORNL data indicated the absence of interior contamination 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 3.3.

Page 1 of 2

EXTERIOR

	Concrete									
K	2	x	72	=	144	x	0.3	=	43	
	Volume of Concrete						=	<u>43</u>	=	43/27 = 2
	Contaminated Fill									
B	2	x	22	=	44					
	32	x	10	=	320					
	15	x	4	=	60					
	2	x	12	=	24					
					<u>448</u>	x	1.0	=	448	
C	10	x	12	=	120					
	19	x	25	=	475					
	18	x	18	=	324					
					<u>919</u>	x	1.0	=	919	
D	5	x	2	=	10	x	2.5	=	25	
E	5	x	5	=	25	x	1.3	=	33	
F	5	x	3	=	15	x	2.3	=	35	
G	10	x	5	=	50	x	1.5	=	75	

Table 4.1
Area and Volume Calculations
DOE ID No. GJ-03196-RS

Page 2 of 2

H	2	x	15	=	30	x	1.0	=	30
---	---	---	----	---	----	---	-----	---	----

I	24	x	32	=	768
	8	x	18	=	144
	10	x	75	=	750
	38	x	40	=	1,520
	12	x	20	=	240

<u>3,422</u>	x	1.0	=	3,422
--------------	---	-----	---	-------

J	28	x	22	=	616	x	1.5	=	924
---	----	---	----	---	-----	---	-----	---	-----

K	2	x	84	=	168	x	1.0	=	168
---	---	---	----	---	-----	---	-----	---	-----

L	12	x	18	=	216	x	1.5	=	324
---	----	---	----	---	-----	---	-----	---	-----

M	18	x	20	=	360
	9	x	11	=	99

<u>459</u>	x	0.5	=	230
------------	---	-----	---	-----

N	17	x	20	=	340
	5	x	23	=	115
	7	x	12	=	84
	4	x	7	=	28
	3	x	4	=	12

<u>579</u>	x	1.0	=	579
------------	---	-----	---	-----

Volume of Fill		=	<u>7,212</u>	=	7,212/27	=	<u>267</u>
----------------	--	---	--------------	---	----------	---	------------

TOTAL VOLUME - EXTERIOR		=	269
-------------------------	--	---	-----

See Appendix Figures 3.5a and 3.5b For Areas

=====

Table 4.2
Estimated Cost of Decontamination and Restoration
DOE ID No. GJ-03196-RS

Page 1 of 2

INTERIOR

Remove/replace storage shed and contents	
Lump sum	\$ 100
Remove/replace concrete slab	
70 sf @ \$3.00/sf	210
Remove identified residual radioactive material	
3 cy @ \$14.50/cy (machine-open)	44
Replace area with roadbase	
3 cy @ \$11.50/cy	35
	<hr/>
TOTAL INTERIOR	\$ 389

EXTERIOR

Remove/replace concrete sidewalk	
144 sf @ \$3.00/sf	\$ 432
Remove/replace stone planter	
Lump sum	250
Remove identified residual radioactive material	
257 cy @ \$14.50/cy (machine-open)	3,727
10 cy @ \$44.00/cy (manual-open)	440
Replace areas with sod	
4,957 sf @ \$0.25/sf	1,239
Replace areas with roadbase	
44 cy @ \$11.50/cy	506
Replace areas with topsoil	
223 cy @ \$9.50/cy	2,119
	<hr/>
TOTAL EXTERIOR	\$ 8,713

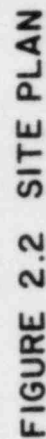
TOTAL EXTERIOR	\$	8,713
TOTAL INTERIOR		389
ACCESS CONTROL		100
		<hr/>
SUBTOTAL	\$	9,202
CONTINGENCY @ 5%		460
		<hr/>
SUBTOTAL	\$	9,662
CONTRACTOR OVERHEAD & PROFIT @ 25%		2,416
		<hr/>
GRAND TOTAL	\$	12,078

=====


SC060385
REA03196/REA-KL008

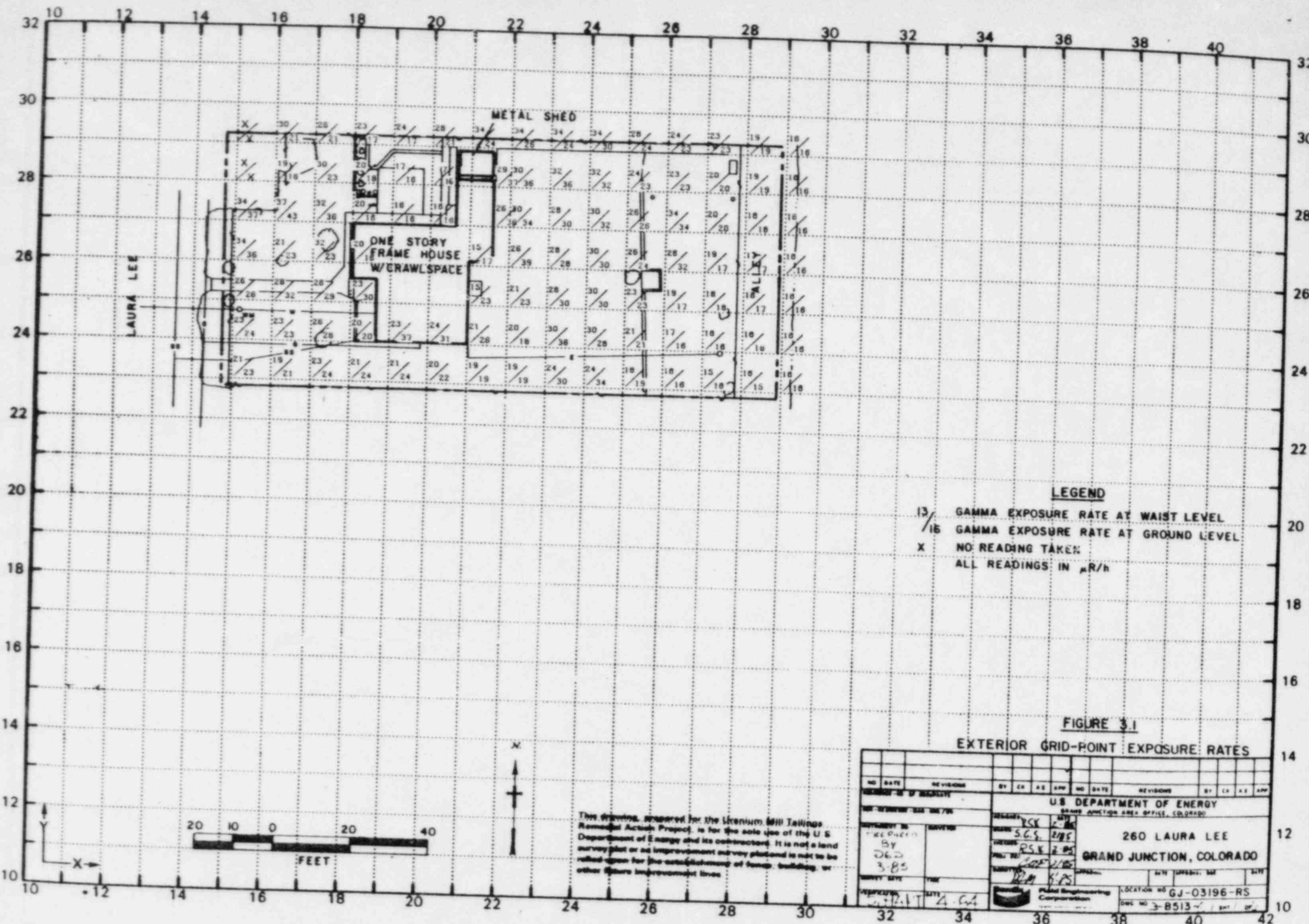


FIGURE 2.1
VICINITY MAP

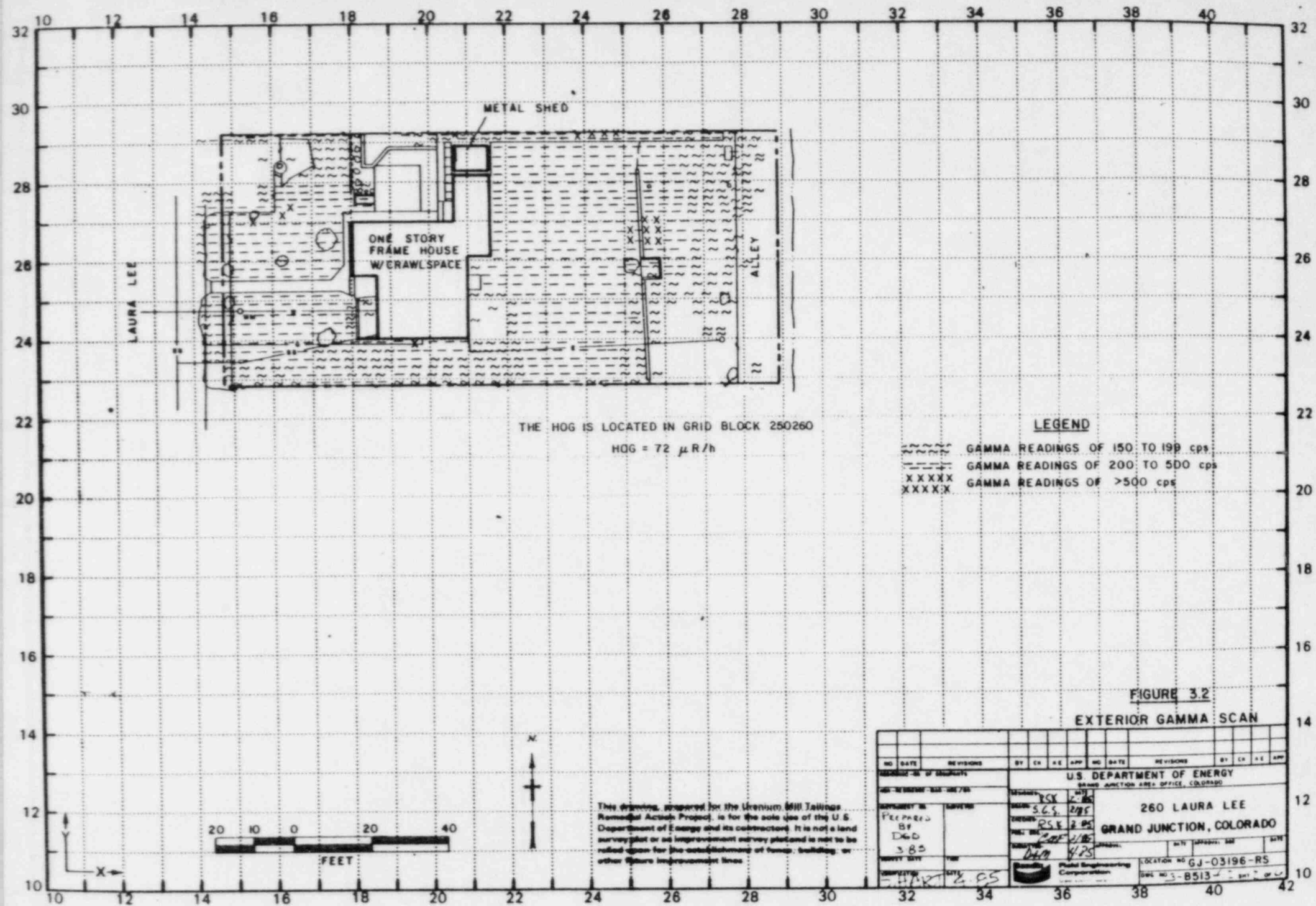
[illegible]

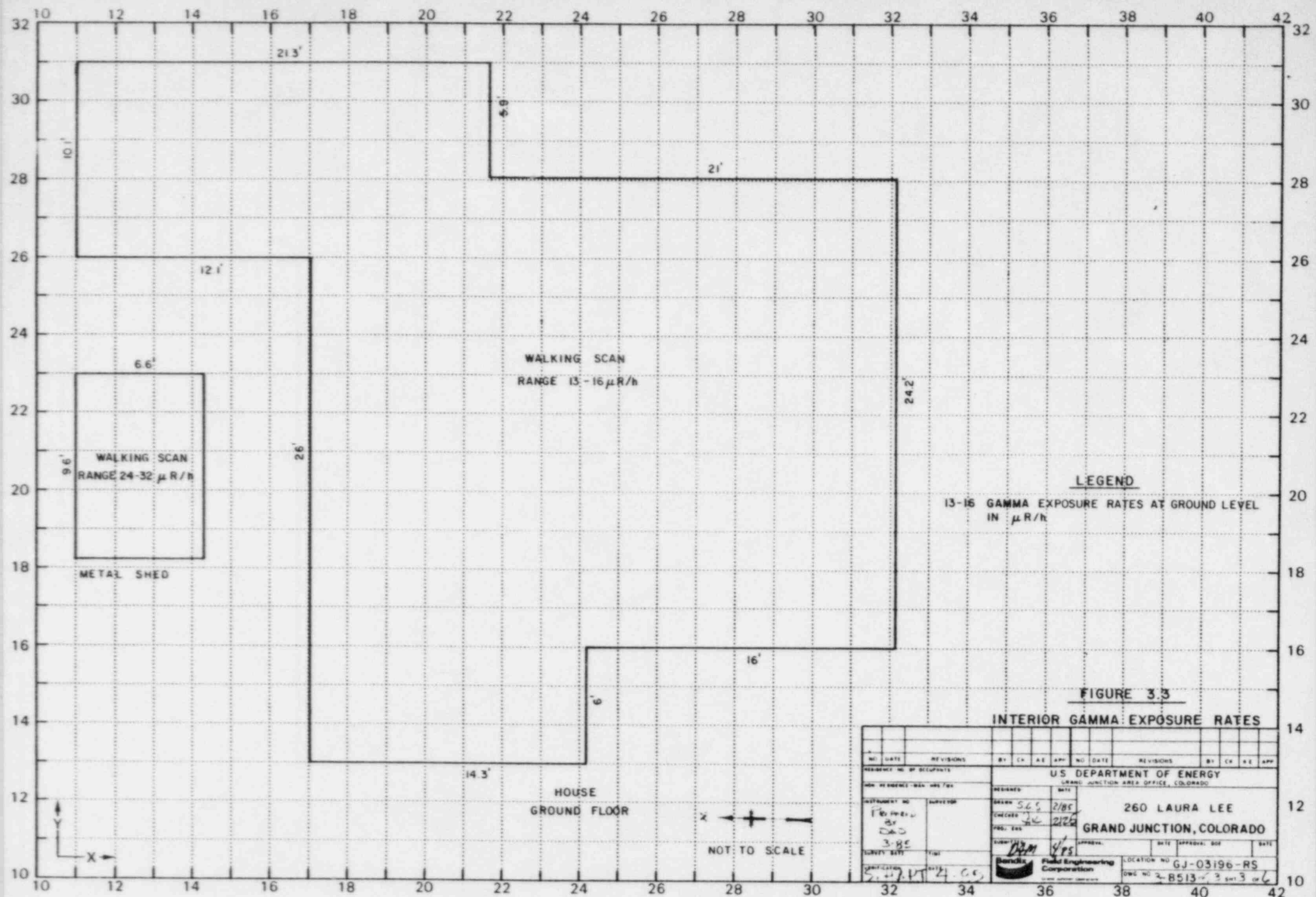
This drawing, prepared for the Uranium Mill Tailings Remedial Action Project, is for the sole use of the U.S. Department of Energy and its contractors. It is not a site survey plot or an improvement survey plot and is not to be relied upon for the establishment of fence, building, or other future improvement lines.

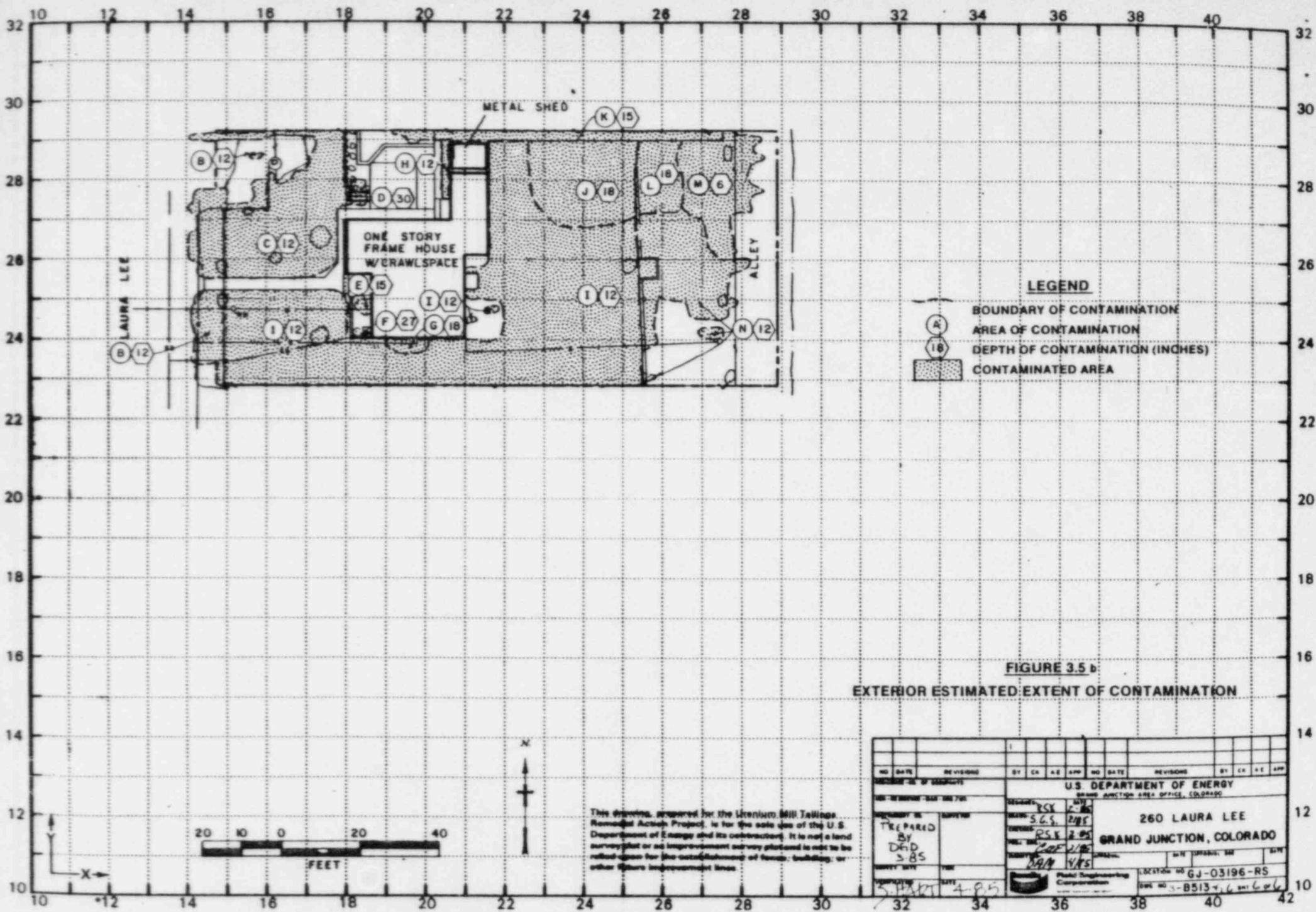
U.S. DEPARTMENT OF ENERGY GRAND JUNCTION AREA OFFICE, COLORADO	LOCATION NO GJ03196RS
ADDRESS 260 LAURA LEE GRAND JUNCTION, COLO.	 Bentley MicroStation ProjectWise InRoads OpenRoads OpenRoads Designer MicroStation ProjectWise InRoads OpenRoads OpenRoads Designer
OWNER	TELE
TENANT	TELE
SURV. 2 205 RSK	CR 111
PLAT 20513 - F1	SHEET 1 OF 1



NO. DATE										REVISIONS										BY CH. A.E. APP. NO. DATE										REVISIONS										BY CH. A.E. APP.									
REVISIONS OF THIS DRAWING																																																	
FOR: 260 LAURA LEE																				BY: RSK																													
DRAWN BY: RSK																				CHECKED BY: RSK																													
DATE: 3-85																				DATE: 3-85																													
PROJECT NO. 4-64																				PROJECT NO. 4-64																													
LOCATION: 260 LAURA LEE, GRAND JUNCTION, COLORADO																				LOCATION: 260 LAURA LEE, GRAND JUNCTION, COLORADO																													
DRAWING NO. GJ-03196-RS																				DRAWING NO. GJ-03196-RS																													
SCALE: 1" = 40'																				SCALE: 1" = 40'																													







DOE ID NO. GJ-03196-RS Date March 28, 1985

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

Official Survey Report

Property Address 260 Laura LeeProperty Owner Patrick Geery

Address of Owner (if different from above) _____

Report Prepared By David Dille

I. PRESENCE/ABSENCE OF RESIDUAL RADIOACTIVE MATERIALS

1 1 No evidence of residual radioactive material on surveyed property.

1 XX 1 Residual radioactive materials found at the following locations:

1 XX 1 In open areas.

1 1 Under or around exterior improvements.

1 1 Under or around a typically nonoccupied structure.

1 XX 1 Under or around a typically occupied structure.

II. RESULTS OF RADIOLOGIC ASSESSMENT

1 1 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.

1 XX 1 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 = 16 uR/h
HOG = 72 uR/h



**Field Engineering
Corporation**

Grand Junction Operations

March 29, 1985

P O Box 1569
Grand Junction, CO 81502
Tel (303) 242-8621

A Subsidiary of
The Bendix Corporation

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

ATTN: Jon Luellen

Dear Jon:

Regarding the issues that we discussed at the technical review of DOE ID #GJ-03196-RS (260 Laura Lee) on March 21, 1985, I have made the following comments:

1. The radon daughter concentration (RDC) projected working level information was added to the folio.
2. Mrs. Geery (homeowner) indicated that the house was never on a septic system.
3. A borehole was augered near the sewer line away from the house. The results indicate a lack of contamination at the level of the sewer line.
4. I rechecked the tin shed with a scintillometer. Apparently during the initial survey, I read the wrong scale. This shed is underlain with contaminated material to a depth of 15 inches. The concrete pad was constructed in 1976.
5. The sidewalk running North/south (west of the tin shed) appears to be a different pour than the east/west sidewalk.
6. The wooden deck is constructed on 6" by 8" railroad ties. It was built in 1982.

Thank you for your time and consideration. If you have any questions or comments, call me at 242-8621, ext. 462.

Very truly yours,

David Dille
RAD Technician

INTERNAL
MEMORANDUM

Bendix Field Engineering Corporation
Grand Junction Projects Office

Date: March 27, 1985

To: Files

From: David Dille DGD

Subject: Team Leader Notes - GJ-03196-RS

Owner: Patrick and Debra Geery

Occupancy: 4

Team Members

C. Adams	S. Larsen
S. Southern	M. Duran
L. Kula	R. Beltz
D. Dille	

Date: February 13, 1985

The Colorado Department of Health (CDH) and Oak Ridge National Laboratory (ORNL) data indicate contamination in the yard around the house. The historical data also indicates a lack of interior involvement. A walking scan of the primary structure will be performed to verify this condition.

Mr. and Mrs. Geery informed me that they have no knowledge of the tailings, extent or location. They have lived at this residence since 1979.

Records show that the house was built in 1960. The property size is 140-feet by 64-feet.

Bendix field members scanned the interior, including the walls (100 - 120 cps readings were found).

The small tin shed was locked but a gap in the doors allowed insertion of the crutch mount scintillometer (range 100 - 140 cps).

Team Leader Notes
David Dille
GJ-03196-RS
March 27, 1985
Page 2

Bendix field members augered near the utilities (water, sewer, and gas lines).

A camper trailer and pick-up truck on blocks prevented more than one auger hole in the driveway.

Bendix field members cored and collected soil samples from the front and rear sidewalks.

Delta measurements were taken on the rock garden and in the planter.

Soil samples and delta measurements were taken in the alley.

Neighboring yard to the north has contamination. Placing scintillometer at arms length over the fence (measured 1300 cps).

All personnel were frisked and found to be clean of contamination.

Date: March 27, 1985

Team Members

D. Martz

D. Dille

Instruments

Scintillometer - C-1247

Total Count - C-4006

A revisit was conducted as per CDH.

Two holes were drilled and logged, one near the sewer line and one near the shed.

Bendix field members also rescanned the tin shed. A new range was discovered (250 - 350 cps).

Team Leader Notes
David Dille
GJ-03196-RS
March 27, 1985
Page 3

Mrs. Geery indicated that the house was never on a septic system. Mrs. Geery's contract records indicate that the concrete pad for the tin shed was built in 1976.

During the initial survey, I apparently read the scintillometer erroneously (wrong scale) when scanning the small tin shed.

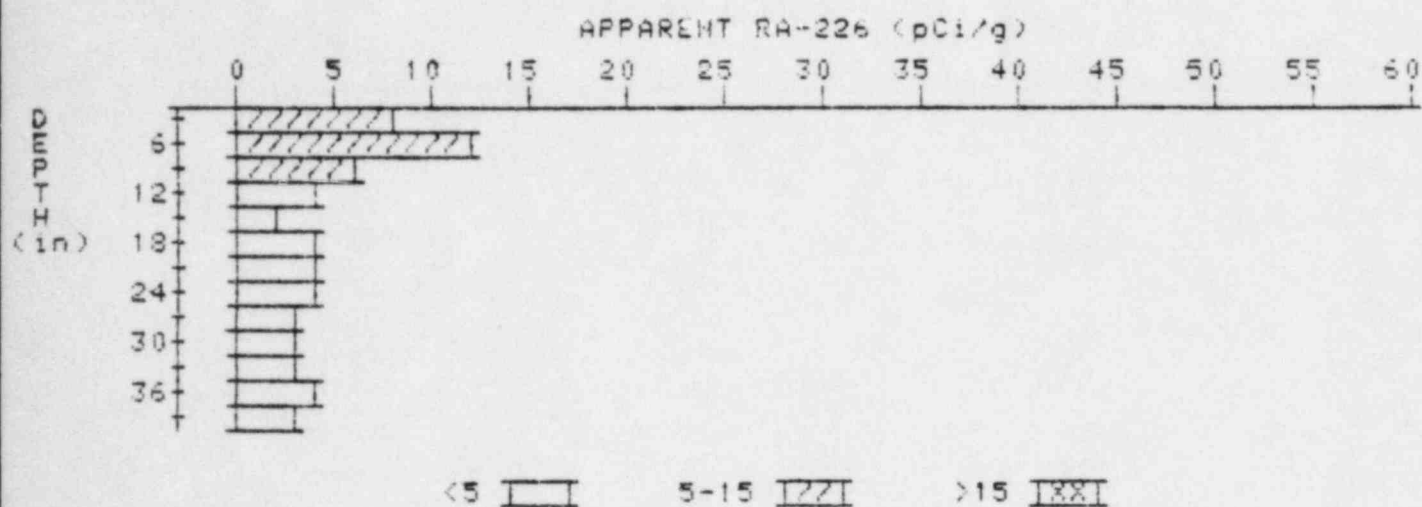
APPARENT RADIUM-226 CONCENTRATION DECONVOLUTION GRAPH

1

PROPERTY NUMBER: GJ-03196-RS

HOLE NUMBER: 1

LOCATION: 150235



Depth (in)	Apparent Radium-226 (pCi/g) Undeconvolved	Apparent Radium-226 (pCi/g) Deconvolved
3	8.1	8.1
6	8.3	11.9
9	6.5	6.0
12	5.0	4.5
15	3.8	1.8
18	3.7	3.7
21	3.6	3.6
24	3.5	3.5
27	3.4	3.2
30	3.4	3.4
33	3.4	3.4
36	3.4	3.6
39	3.3	3.3

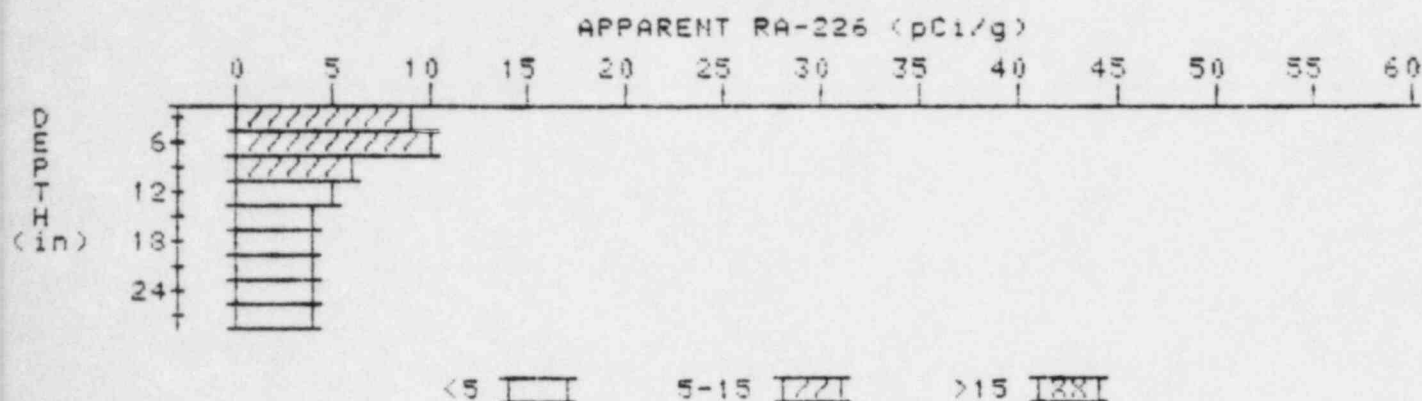
APPARENT RADIUM-226 CONCENTRATION DECONVOLUTION GRAPH

2

PROPERTY NUMBER: GJ-03196-R3

HOLE NUMBER: 2

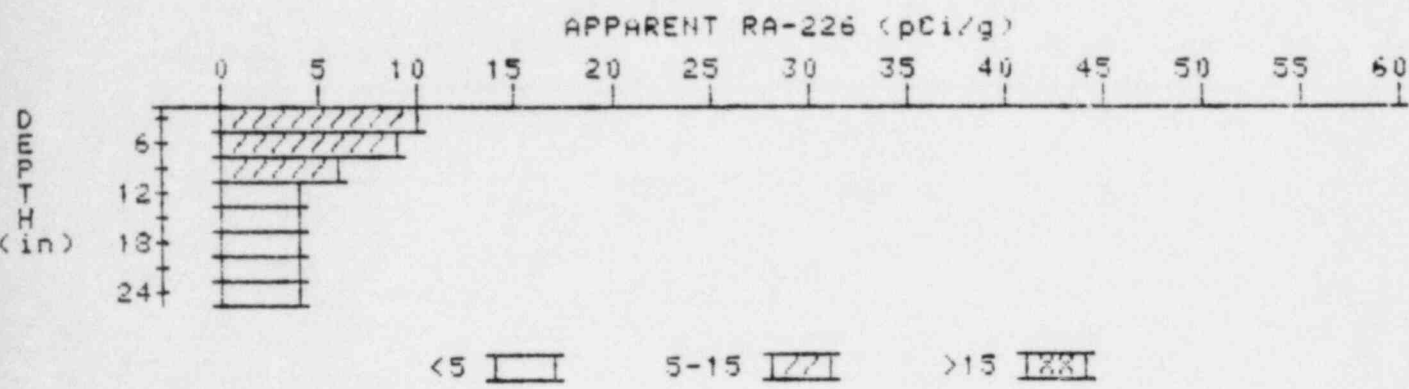
LOCATION: 152237



Depth (in)	Apparent Radium-226 (pCi/g) Undeconvolved	Apparent Radium-226 (pCi/g) Deconvolved
3	8.8	8.8
6	8.3	10.4
9	6.6	5.5
12	5.5	5.0
15	4.7	3.8
18	4.4	4.4
21	4.1	3.6
24	4.1	4.1
27	4.1	4.1

APPARENT RADIUM-226 CONCENTRATION 3 DECONVOLUTION GRAPH

PROPERTY NUMBER: GJ-03196-RS
 HOLE NUMBER: 3
 LOCATION: 153248



Depth (in)	Apparent Radium-226 (pCi/g) Undeconvolved	Apparent Radium-226 (pCi/g) Deconvolved
3	9.8	9.8
6	8.6	9.3
9	6.9	6.4
12	5.5	4.4
15	4.7	3.8
18	4.4	4.2
21	4.2	4.0
24	4.1	4.1

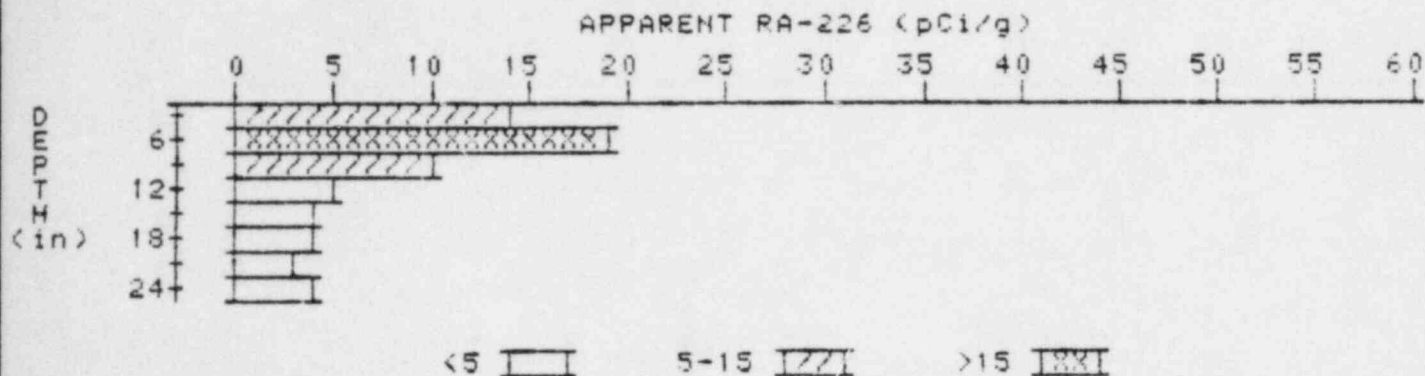
APPARENT RADIUM-226 CONCENTRATION DECONVOLUTION GRAPH

4

PROPERTY NUMBER: GJ-03196-RS

HOLE NUMBER: 4

LOCATION: 157274



Depth (in)	Apparent Radium-226 (pCi/g) Undeconvolved	Apparent Radium-226 (pCi/g) Deconvolved
3	13.9	13.9
6	13.6	13.8
9	10.4	10.2
12	7.3	5.0
15	5.5	4.1
18	4.5	3.6
21	4.0	3.3
24	3.9	3.9

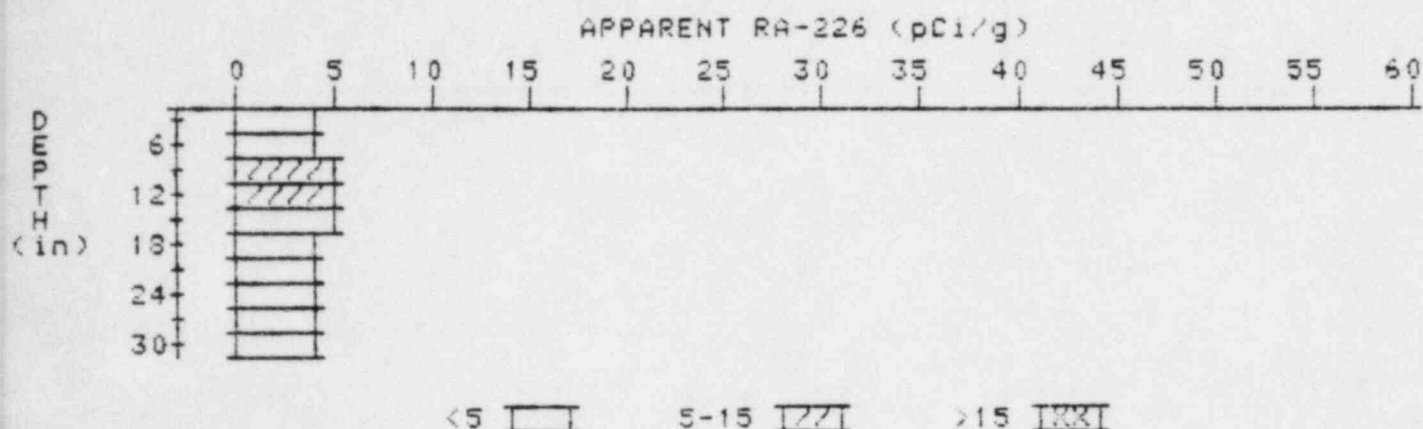
APPARENT RADIUM-226 CONCENTRATION DECONVOLUTION GRAPH

5

PROPERTY NUMBER: GJ-03196-R3

HOLE NUMBER: 5

LOCATION: 160254



Depth (in)	Apparent Radium-226 (pCi/g) Undeconvolved	Apparent Radium-226 (pCi/g) Deconvolved
3	3.7	3.7
6	4.2	4.4
9	4.6	5.1
12	4.7	5.1
15	4.6	4.8
18	4.4	4.4
21	4.2	4.0
24	4.1	4.1
27	4.0	3.8
30	4.0	4.0

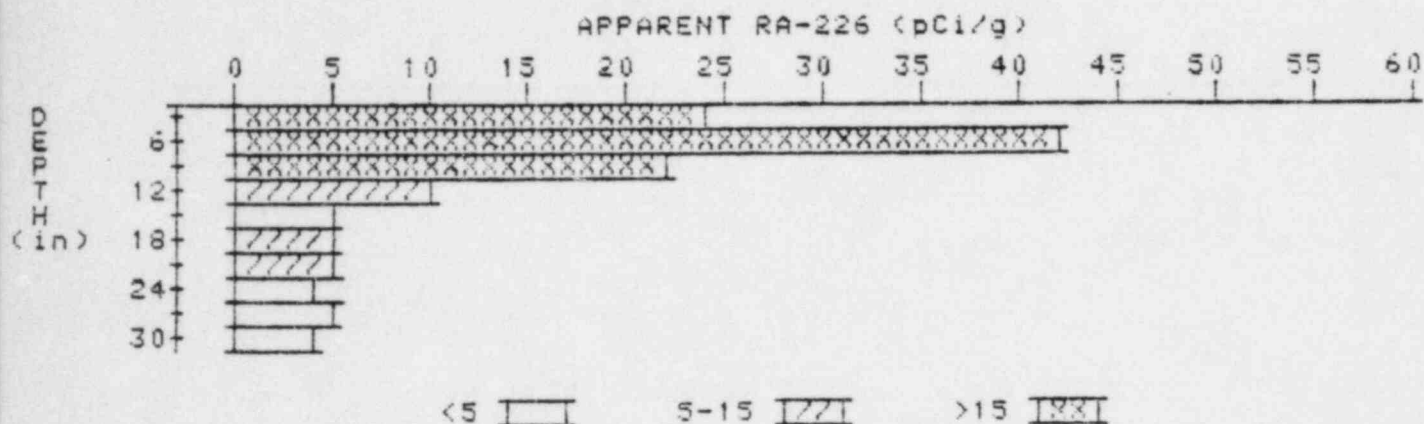
APPARENT RADIUM-226 CONCENTRATION DECONVOLUTION GRAPH

6

PROPERTY NUMBER: GJ-03196-RS

HOLE NUMBER: 6

LOCATION: 163272



Depth (in)	Apparent Radium-226 (pCi/g) Undeconvolved	Apparent Radium-226 (pCi/g) Deconvolved
3	24.1	24.1
6	26.6	41.9
9	20.5	21.7
12	13.7	9.8
15	9.1	4.7
18	7.0	5.2
21	5.9	5.4
24	5.1	4.4
27	4.7	4.7
30	4.3	4.3

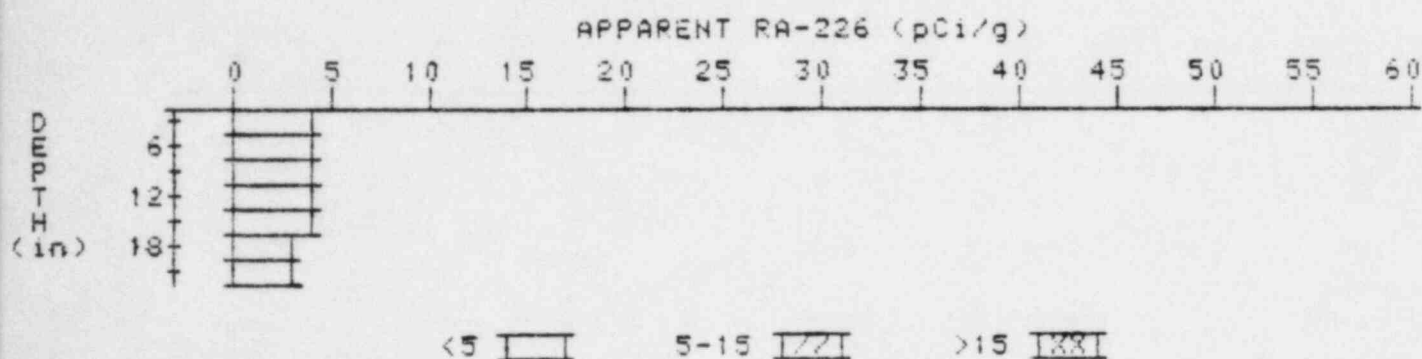
APPARENT RADIUM-226 CONCENTRATION DECONVOLUTION GRAPH

8

PROPERTY NUMBER: GJ-03196-R3

HOLE NUMBER: 8

✓ LOCATION: 170290

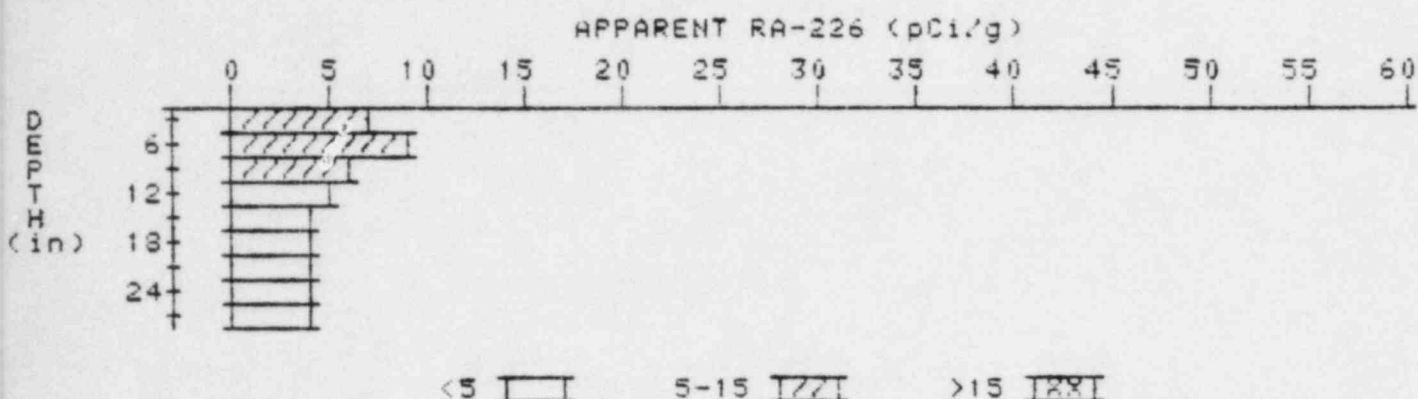


Depth (in)	Apparent Radium-226 (pCi/g)	Apparent Radium-226 (pCi/g)
	Undeconvolved	Deconvolved
3	4.4	4.4
6	4.3	4.5
9	4.1	4.1
12	3.9	4.1
15	3.6	3.6
18	3.3	2.8
21	3.3	3.3

APPARENT RADIUM-226 CONCENTRATION DECONVOLUTION GRAPH

9

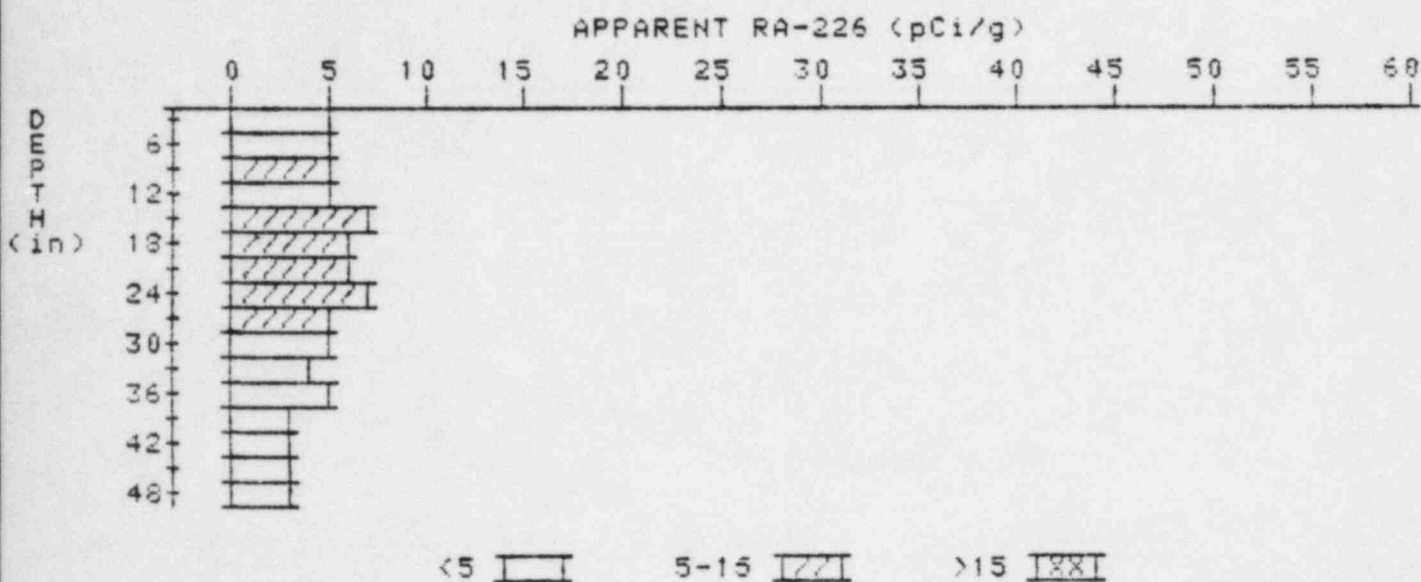
PROPERTY NUMBER: GJ-03196-RS
HOLE NUMBER: 9
LOCATION: 184235



Depth (in)	Apparent Radium-226 (pCi/g) Undeconvolved	Apparent Radium-226 (pCi/g) Deconvolved
3	7.1	7.1
6	7.0	6.8
9	5.9	5.5
12	5.0	4.6
15	4.3	3.8
18	3.9	3.5
21	3.7	3.5
24	3.6	3.6
27	3.5	3.5

APPARENT RADIUM-226 CONCENTRATION 10 DECONVOLUTION GRAPH

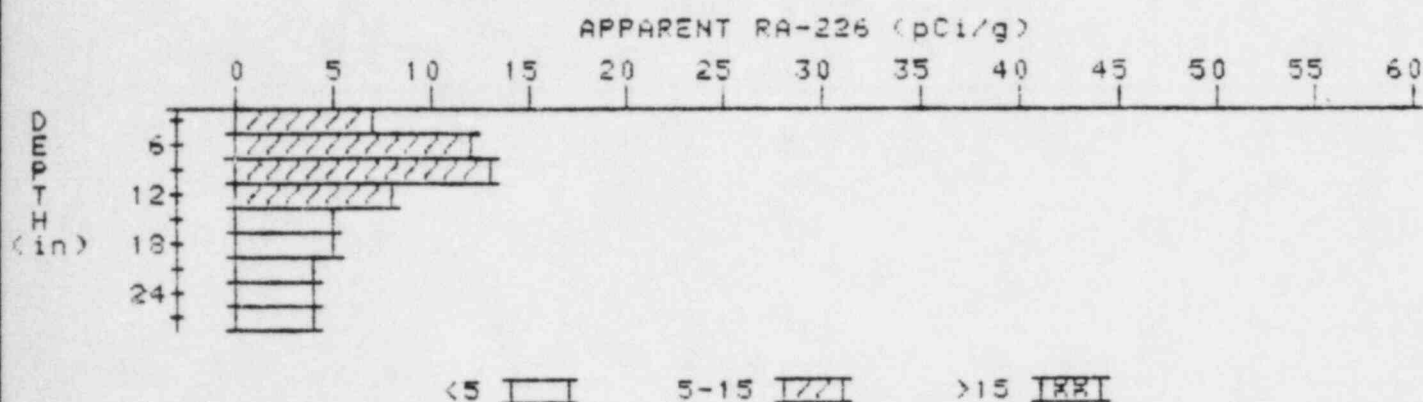
PROPERTY NUMBER: GJ-03196-RS
HOLE NUMBER: 10
LOCATION: 186242



Depth (in)	Apparent Radium-226 (pCi/g) Undeconvolved	Apparent Radium-226 (pCi/g) Deconvolved
3	4.9	4.9
6	4.9	4.5
9	5.1	5.1
12	5.3	4.8
15	5.8	6.5
18	5.9	6.3
21	5.8	5.6
24	5.8	6.7
27	5.3	5.1
30	4.9	4.9
33	4.5	4.5
36	4.1	4.6
39	3.4	2.7
42	3.1	2.6
45	3.1	3.1
48	3.1	3.1

APPARENT RADIUM-226 CONCENTRATION 11 DECONVOLUTION GRAPH

PROPERTY NUMBER: GJ-03196-RS
HOLE NUMBER: 11
LOCATION: 186248

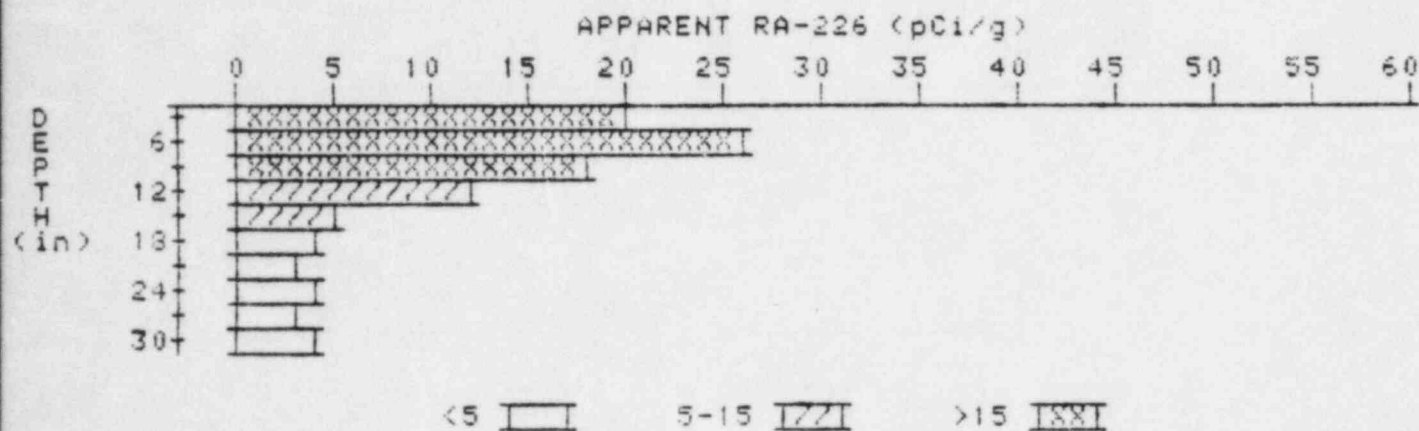


Depth (in)	Apparent Radium-226 (pCi/g) Undeconvolved	Apparent Radium-226 (pCi/g) Deconvolved
3	7.4	7.4
6	9.1	11.6
9	9.4	12.8
12	7.8	7.8
15	6.2	5.0
18	5.3	4.8
21	4.7	4.3
24	4.3	4.1
27	4.0	4.0

APPARENT RADIUM-226 CONCENTRATION 13

DECONVOLUTION GRAPH

PROPERTY NUMBER: GJ-03196-RS
HOLE NUMBER: 13
LOCATION: 198233

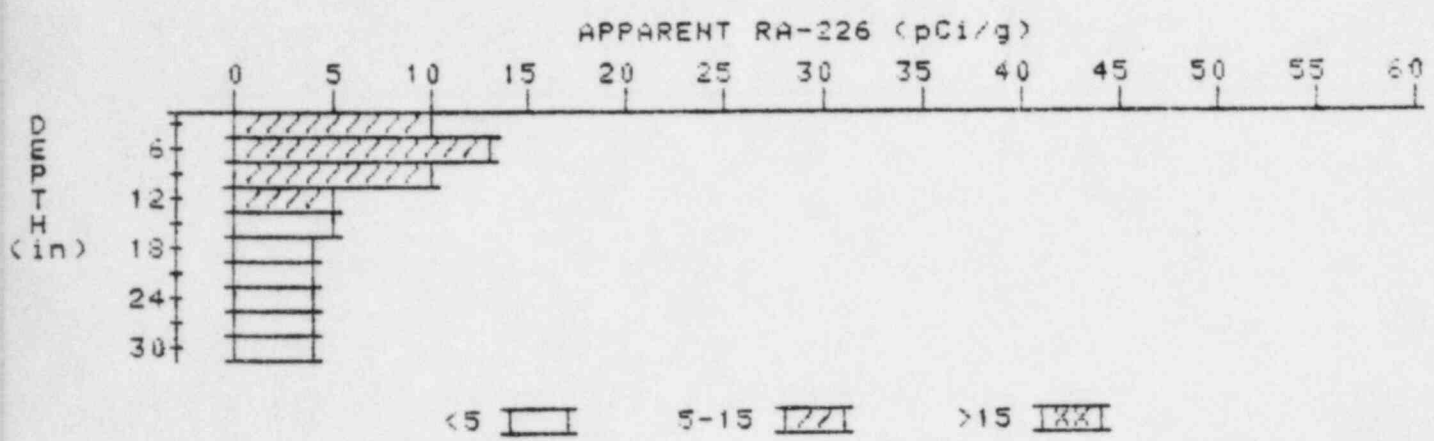


Depth (in)	Apparent Radium-226 (pCi/g) Undeconvolved	Apparent Radium-226 (pCi/g) Deconvolved
3	20.2	20.2
6	20.2	26.4
9	16.7	18.3
12	12.3	11.6
15	8.3	5.5
18	5.9	3.8
21	4.7	3.5
24	4.2	3.7
27	4.0	3.5
30	4.1	4.1

APPARENT RADIUM-226 CONCENTRATION 15

DECONVOLUTION GRAPH

PROPERTY NUMBER: GJ-03196-RS
HOLE NUMBER: 15
LOCATION: 206283

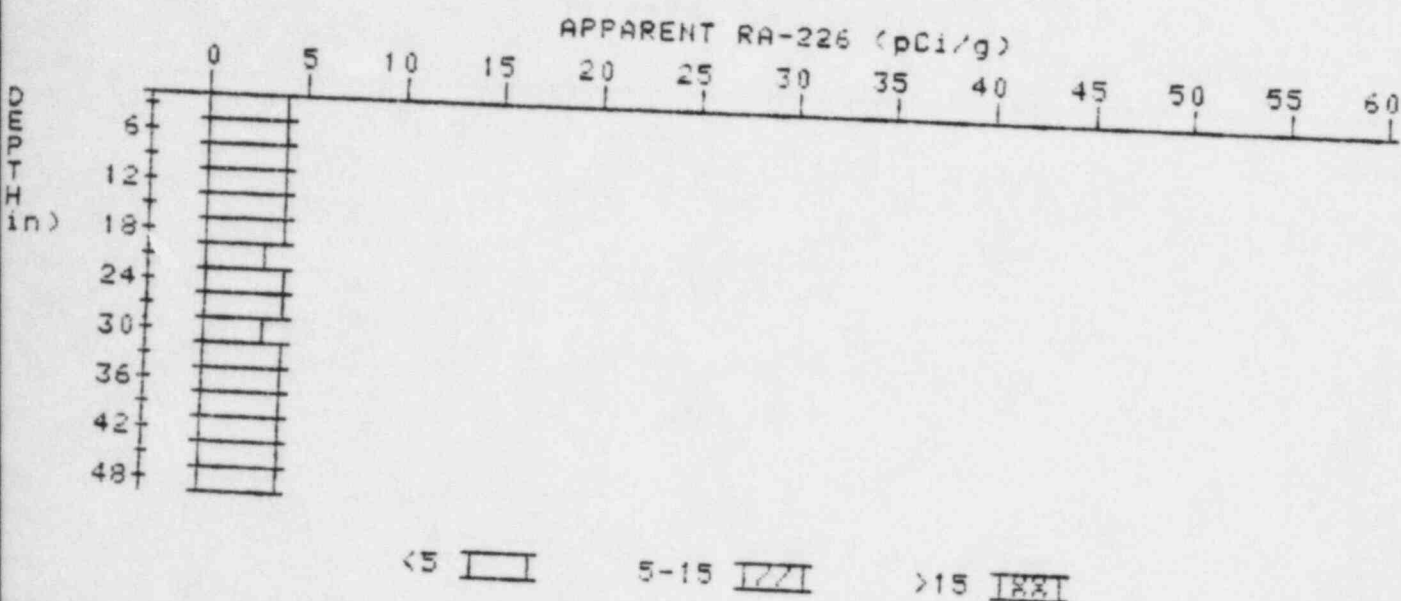


Depth (in)	Apparent Radium-226 (pCi/g) Undeconvolved	Apparent Radium-226 (pCi/g) Deconvolved
3	9.7	9.7
6	10.2	13.4
9	8.9	10.3
12	6.8	5.2
15	5.6	4.7
18	4.9	4.4
21	4.5	4.5
24	4.1	3.7
27	3.9	3.9
30	3.7	3.7

APPARENT RADIUM-226 CONCENTRATION DECONVOLUTION GRAPH

18

PROPERTY NUMBER: GJ-03196-RS
HOLE NUMBER: 18
LOCATION: 211243



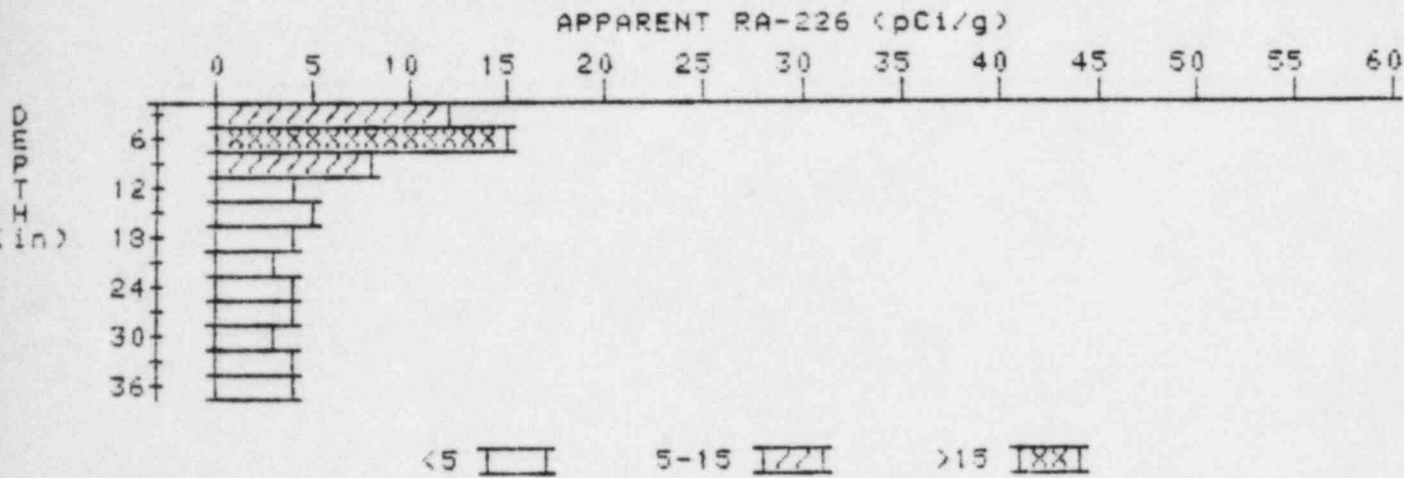
Depth (in)	Apparent Radium-226 (pCi/g) Undeconvolved	Apparent Radium-226 (pCi/g) Deconvolved
3	3.9	3.9
6	4.0	4.2
9	4.0	4.4
12	3.8	3.6
15	3.7	3.5
18	3.7	3.9
21	3.6	3.4
24	3.6	3.6
27	3.6	3.6
30	3.5	3.6
33	3.6	3.1
36	3.6	3.6
39	3.7	3.9
42	3.7	3.7
45	3.6	3.5
48	3.6	4.0
	3.8	3.8

APPARENT RADIUM-226 CONCENTRATION

DECONVOLUTION GRAPH

19

PROPERTY NUMBER: GJ-03196-RS
HOLE NUMBER: 19
LOCATION: 216285

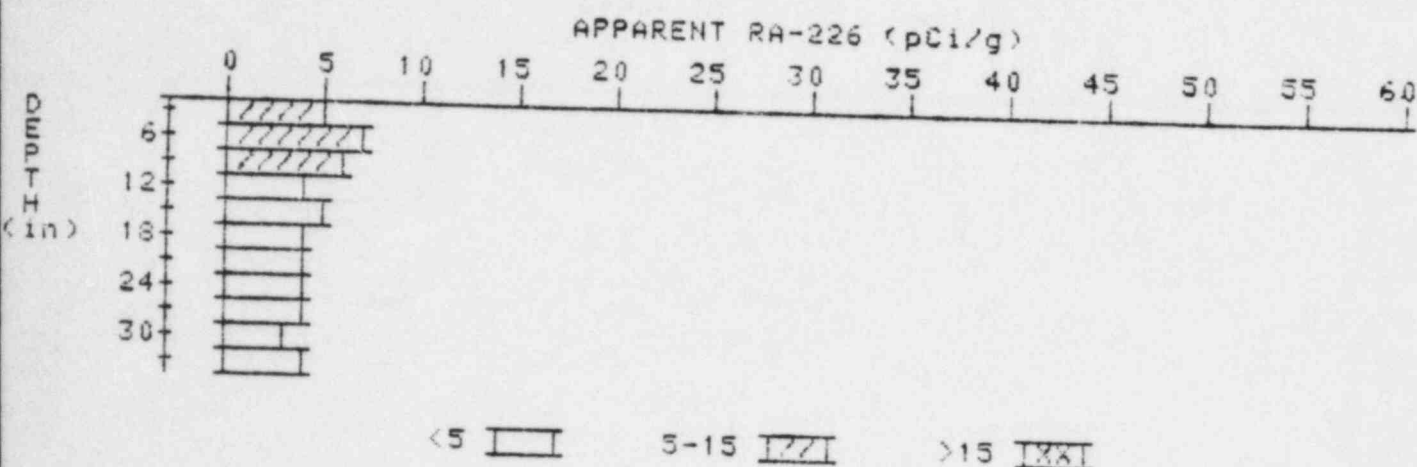


Depth (in)	Apparent Radium-226 (pCi/g) Undeconvolved	Apparent Radium-226 (pCi/g) Deconvolved
3	11.7	11.7
6	11.3	15.2
9	8.7	8.2
12	6.4	4.3
15	5.3	4.8
18	4.5	4.0
21	4.0	3.5
24	3.8	3.6
27	3.7	3.7
30	3.6	3.4
33	3.6	3.6
36	3.6	3.6

APPARENT RADIUM-226 CONCENTRATION DECONVOLUTION GRAPH

20

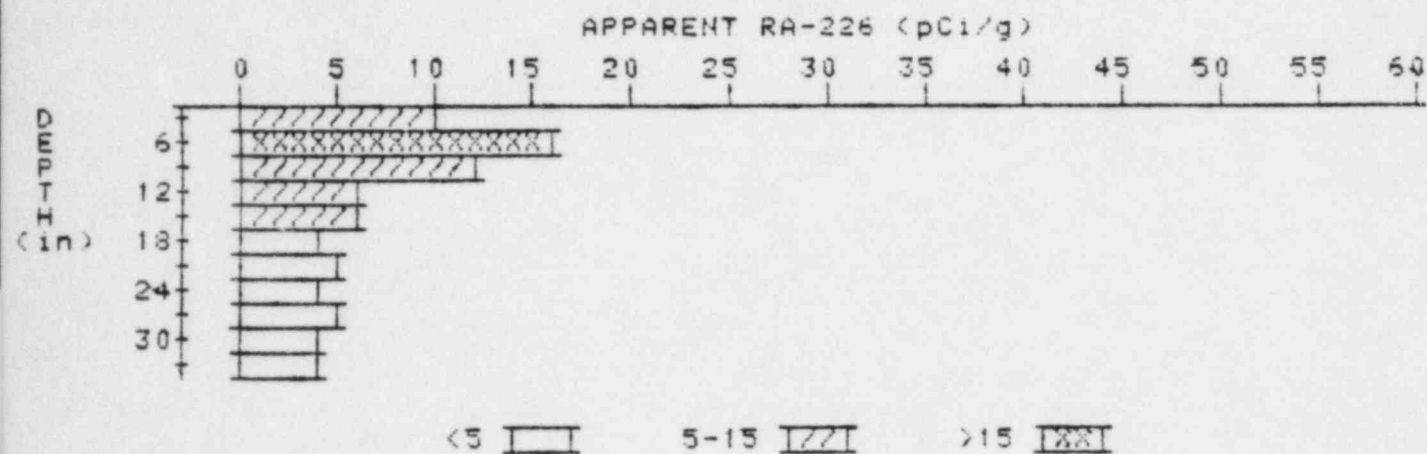
PROPERTY NUMBER: GJ-03196-RS
HOLE NUMBER: 20
LOCATION: 220250



Depth (in)	Apparent Radium-226 (pCi/g) Undeconvolved	Apparent Radium-226 (pCi/g) Deconvolved
3	5.1	5.1
6	5.8	7.4
9	5.6	6.3
12	5.0	4.5
15	4.7	4.7
18	4.4	4.2
21	4.2	4.2
24	4.0	4.0
27	3.8	3.8
30	3.6	3.2
33	3.6	3.6

APPARENT RADIUM-226 CONCENTRATION 21 DECONVOLUTION GRAPH

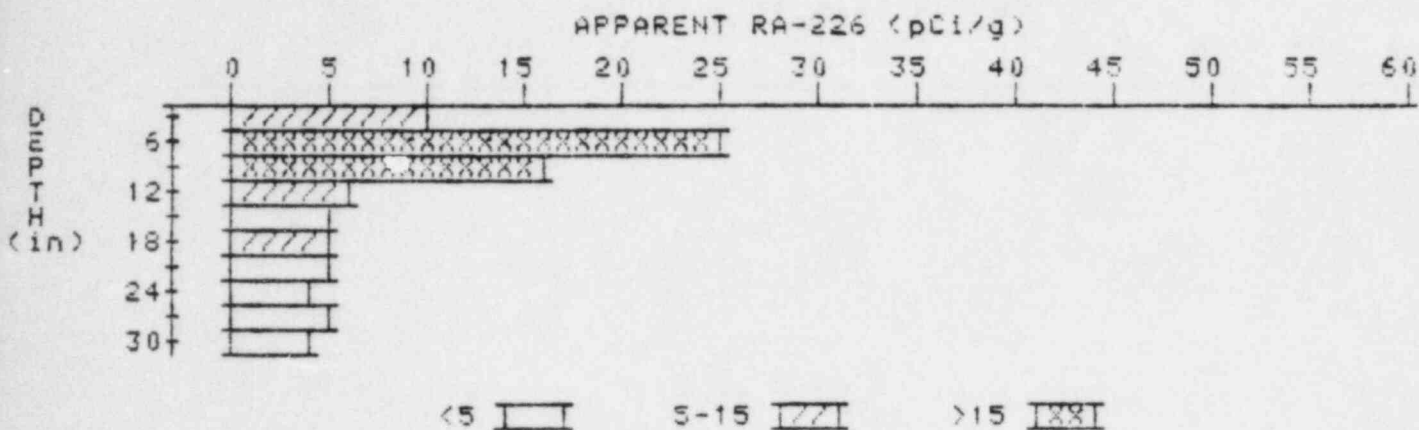
PROPERTY NUMBER: GJ-03196-RS
HOLE NUMBER: 21
LOCATION: 240270



Depth (in)	Apparent Radium-226 (pCi/g) Undeconvolved	Apparent Radium-226 (pCi/g) Deconvolved
3	9.7	9.7
6	11.2	16.0
9	10.0	12.0
12	7.7	5.9
15	6.4	5.9
18	5.4	4.3
21	5.0	4.8
24	4.7	4.3
27	4.6	5.0
30	4.3	3.8
33	4.3	4.3

APPARENT RADIUM-226 CONCENTRATION 22 DECONVOLUTION GRAPH

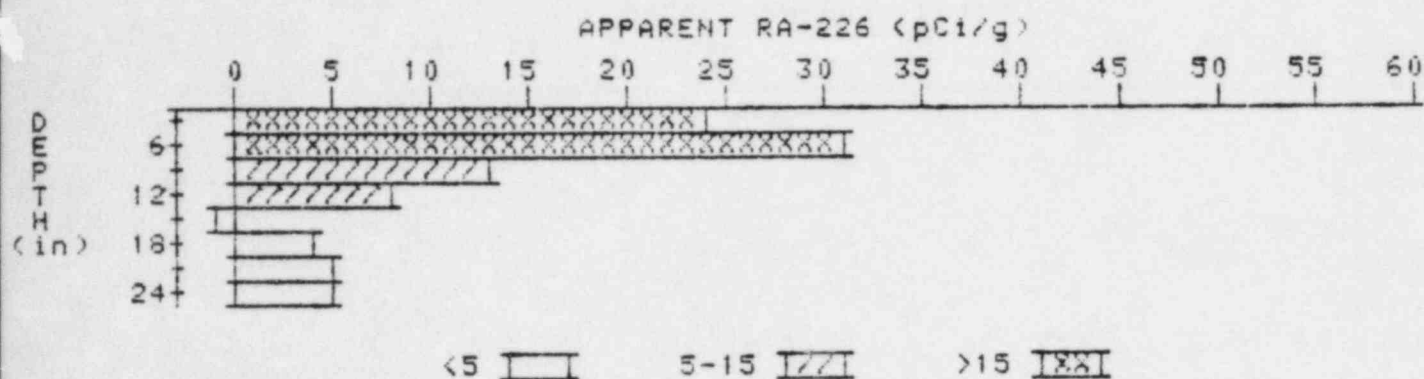
PROPERTY NUMBER: GJ-03196-RS
HOLE NUMBER: 22
LOCATION: 240291



Depth (in)	Apparent Radium-226 (pCi/g) Undeconvolved	Apparent Radium-226 (pCi/g) Deconvolved
3	10.2	10.2
6	14.3	24.6
9	12.6	16.2
12	8.9	6.1
15	6.8	4.8
18	5.8	5.3
21	5.1	4.7
24	4.6	3.9
27	4.5	4.9
30	4.2	4.2

APPARENT RADIUM-226 CONCENTRATION 23 DECONVOLUTION GRAPH

PROPERTY NUMBER: GJ-03196-RS
HOLE NUMBER: 23
LOCATION: 253264



Depth (in)	Apparent Radium-226 (pCi/g) Undeconvolved	Apparent Radium-226 (pCi/g) Deconvolved
=====	=====	=====
3	23.7	23.7
6	22.1	31.3
9	15.3	13.2
12	9.7	7.6
15	5.3	-1.5
18	4.7	3.8
21	4.6	4.6
24	4.5	4.5

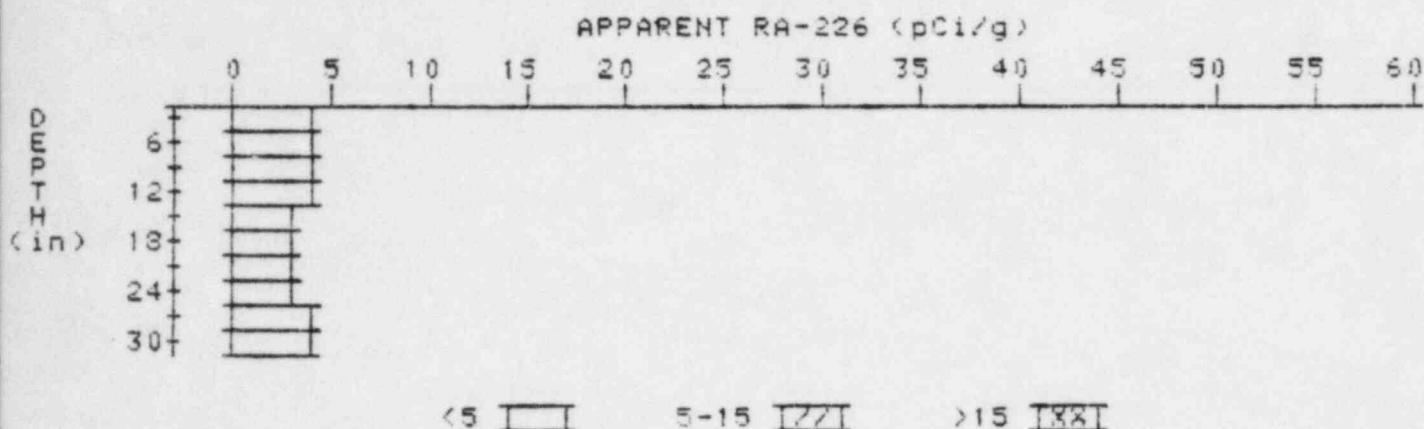
APPARENT RADIUM-226 CONCENTRATION 24

DECONVOLUTION GRAPH

PROPERTY NUMBER: GJ-03196-RS

HOLE NUMBER: 24

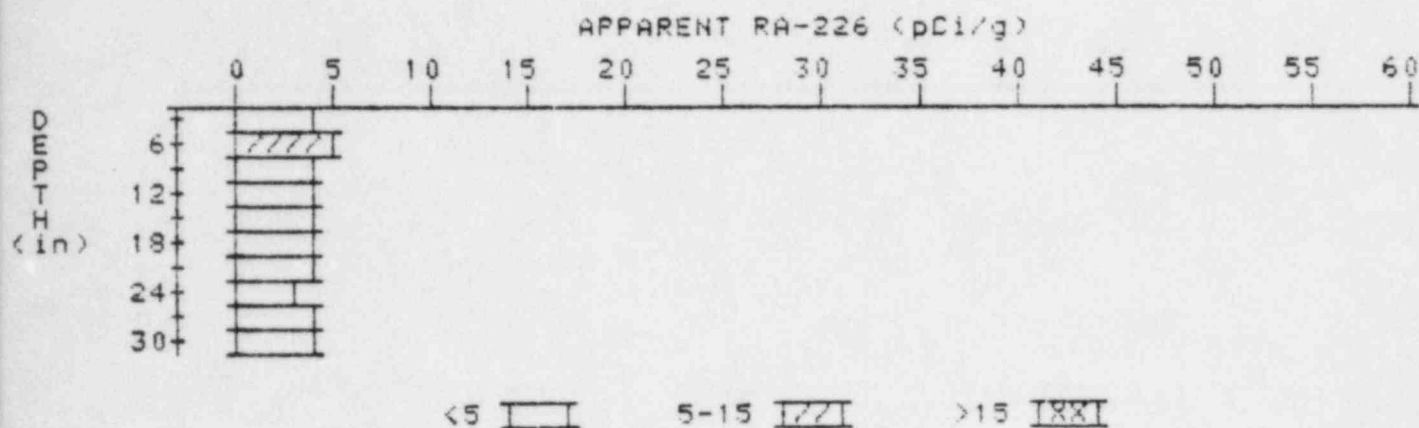
LOCATION: 260250



Depth (in)	Apparent Radium-226 (pCi/g) Undeconvolved	Apparent Radium-226 (pCi/g) Deconvolved
3	3.8	3.8
6	3.9	4.4
9	3.7	3.7
12	3.5	3.5
15	3.3	3.1
18	3.2	3.0
21	3.2	3.0
24	3.3	3.1
27	3.5	3.5
30	3.7	3.7

APPARENT RADIUM-226 CONCENTRATION 25 DECONVOLUTION GRAPH

PROPERTY NUMBER: GJ-03196-RS
HOLE NUMBER: 25
LOCATION: 270280



Depth (in)	Apparent Radium-226 (pCi/g) Undeconvolved	Apparent Radium-226 (pCi/g) Deconvolved
3	4.1	4.1
6	4.4	5.1
9	4.3	4.5
12	4.1	3.9
15	4.0	4.0
18	3.9	3.9
21	3.8	3.8
24	3.7	3.3
27	3.8	4.0
30	3.8	3.8

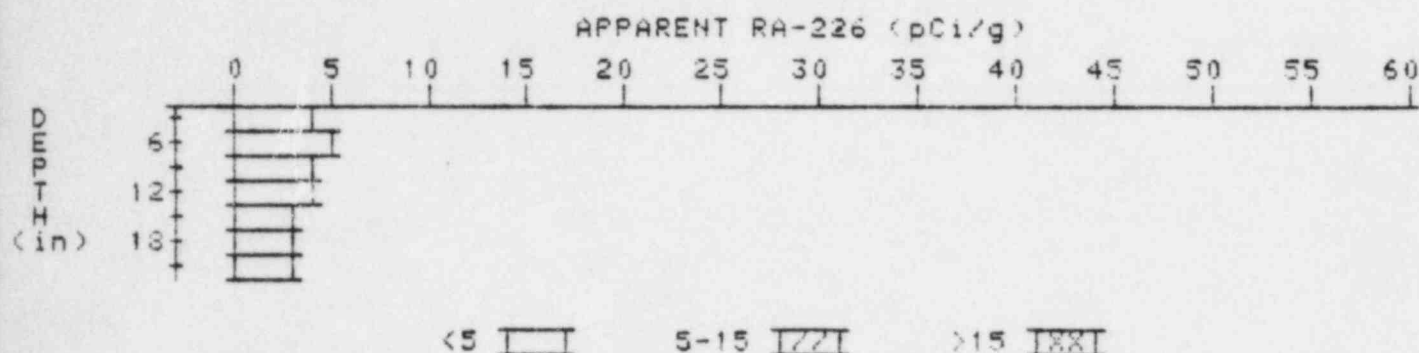
APPARENT RADIUM-226 CONCENTRATION 26

DECONVOLUTION GRAPH

PROPERTY NUMBER: GJ-03196-RS

HOLE NUMBER: 26

LOCATION: 275235



Depth (in)	Apparent Radium-226 (pCi/g) Undeconvolved	Apparent Radium-226 (pCi/g) Deconvolved
3	3.6	3.6
6	4.0	4.7
9	4.0	4.4
12	3.8	4.0
15	3.5	3.3
18	3.3	2.9
21	3.3	3.3

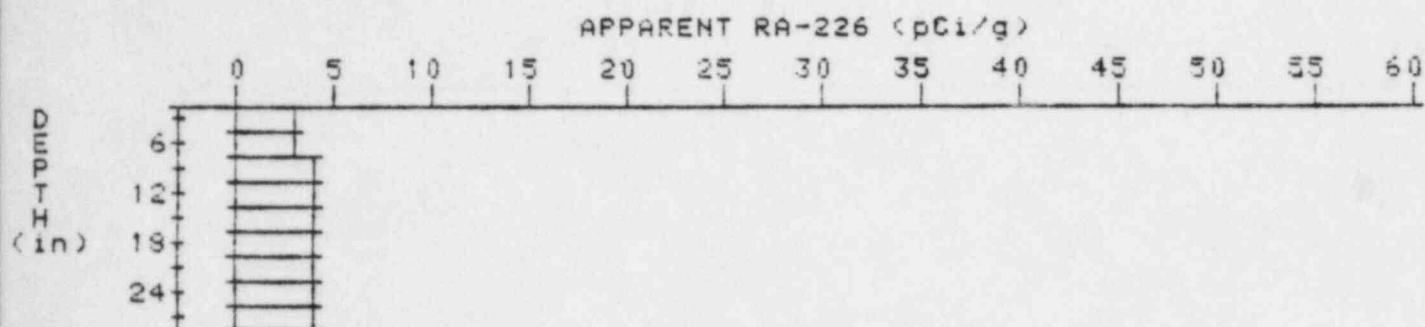
APPARENT RADIUM-226 CONCENTRATION 28

DECONVOLUTION GRAPH

PROPERTY NUMBER: GJ-03196-RS

HOLE NUMBER: 28

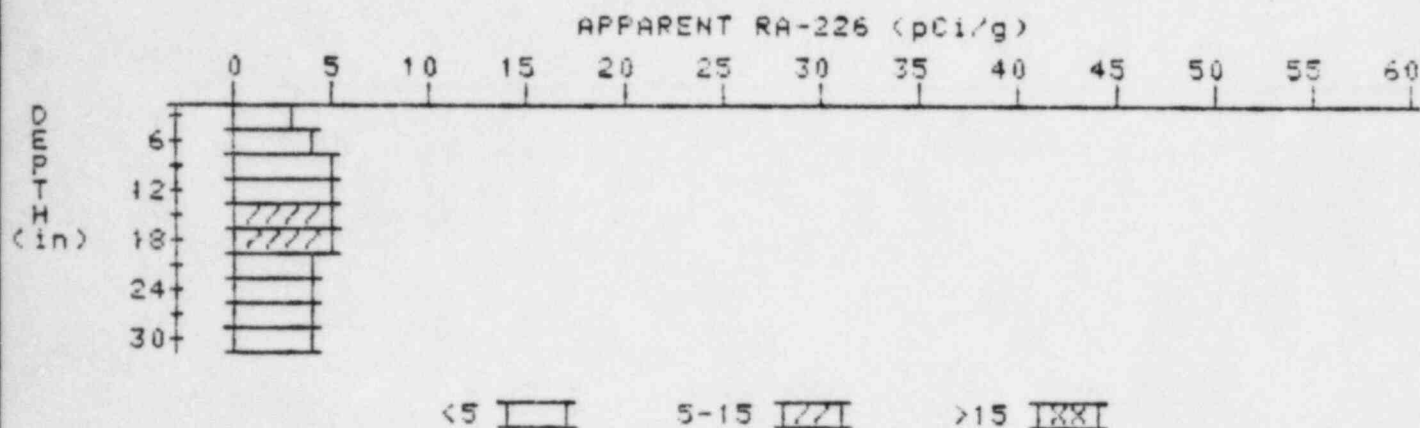
LOCATION: 285245



Depth (in)	Apparent Radium-226 (pCi/g)	Apparent Radium-226 (pCi/g)
	Undeconvolved	Deconvolved
3	3.4	3.4
6	3.6	3.4
9	3.9	4.3
12	4.0	4.2
15	4.0	3.8
18	4.1	4.3
21	4.1	4.3
24	4.0	4.0
27	3.9	3.9

APPARENT RADIUM-226 CONCENTRATION 29 DECONVOLUTION GRAPH

PROPERTY NUMBER: GJ-03196-R3
HOLE NUMBER: 29
LOCATION: 285280



Depth (in)	Apparent Radium-226 (pCi/g) Undeconvolved	Apparent Radium-226 (pCi/g) Deconvolved
3	3.4	3.4
6	4.0	4.4
9	4.4	4.6
12	4.7	4.9
15	4.9	5.4
18	4.8	5.3
21	4.4	4.2
24	4.1	4.1
27	3.8	3.6
30	3.6	3.6