

RADIOLOGIC AND ENGINEERING ASSESSMENT

FOR

DOE ID NO.: GJ-03311-RS
ADDRESS: 3155 F ROAD

JULY 1985

FOR

URANIUM MILL TAILINGS REMEDIAL ACTION PROJECT OFFICE

ALBUQUERQUE OPERATIONS OFFICE

DEPARTMENT OF ENERGY

BY

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July 15, 1985

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1.0 EXECUTIVE SUMMARY

1.1 Introduction

The location, DOE ID No. GJ-03311-RS, is a single-family residence located at 3155 F Road, 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, 359 cu. yd.; interior, 0 cu. yd.

Estimated cost to perform remedial action, including dislocation when applicable, is \$17,401. Remedial action on this property will take approximately 5 days to complete.

2.0 PROPERTY DESCRIPTION

2.1 General Description

Address: 3155 F Road, Grand Junction, Colorado 81504

Zoning: Residential (R-2)

Lot Size: Approximately 85,400 sf (2 acres)

Legal Description: W2E2NW4NW4NE4 Sec 10 1S 1E Exc W 25 ft for ROW
Per B-872 P-58 and Exc N 50 ft per Civil Action
No. 82CV734 B-1399 P-613 thru P-620 of Mesa
County Records, County of Mesa, State of
Colorado.

Point of Reference: This property is located approximately 5
miles northeast 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: Underground
Sewer: Underground
Water: Underground
Cable TV: Overhead

Bordering Properties:

North: F Road
South: Vacant land
East: Vacant land
West: County road right-of-way

2.2 Existing Facilities and Structures

Primary Structure:

Type: One-story, single-family residence
Size: Approximately 1,836 sf
Construction Date: 1965
Construction: Brick and wood-frame
Foundation: Concrete stemwall on spread footing
Footing Depth: Approximately 36" to bottom of footing
from grade
Basement: None
Crawl Space: Under original structure
Condition: Good

Other Structures:

Type:	Shed
Size:	Approximately 216 sf
Construction:	Steel
Foundation:	None
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-03311-RS on March 19, 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 that CDH completed remedial action in November 1977. Two-hundred-fifty cubic yards of tailings were removed from under the family room, garage, and crawl space, as well as outside the foundation to 10 feet. Tailings remain mixed in the yard more than 10 feet from the house, and in the mortar of the brick planter. Post-remedial records indicate the average interior gamma radiation exposure-rate is at background level.

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: 11 to 15 uR/h
Highest Outside Gamma Reading (HOG): 127 uR/h

Exterior radium-concentration measurements are presented in Appendix Tables 3.1a and 3.1b. Grid-point survey results are shown in Appendix Figure 3.1a. Appendix Figure 3.1b shows the range of gamma exposure rates in the south portion of the property. Appendix Figures 3.2a and 3.2b present the ranges of elevated gamma readings and indicate areas of possible contamination.

3.2.2 Interior Findings

Background Readings: 10 to 15 uR/h
 Highest Inside Gamma Reading (HIG): 19 uR/h

Interior radium-concentration measurements are presented in Appendix Table 3.2. Interior gamma exposure-rate measurements are summarized in Appendix Table 3.3. 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 Figures 3.4a and 3.4b. Data from these investigations are included in Appendix Tables 3.1a and 3.1b.

3.4 Radon/Radon Daughter Concentration (RDC)

Determined by CDH: 0.007 gross working level (WL). No additional RDC measurements were taken by Bendix.

3.5 Extent of Contamination

Appendix Figures 3.5a, 3.5b, and 3.5c 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 soil in the shed is contaminated to a depth of 12 inches (approximately 216 sf).
- (AREA B) A deposit north of the primary structure, in the gravel driveway, is contaminated to a depth of 60 inches (approximately 40 sf).
- (AREA C) Adjacent to the north side of Area D, northwest of the primary structure, there is contamination to a depth of 6 inches (approximately 837 sf).
- (AREA D) A deposit north and northwest of the primary structure is contaminated to a depth of 12 inches (approximately 753 sf).
- (AREA E) A large deposit beginning northwest and west of the garage, and extending around the south side of the primary structure, is contaminated to a depth of 15 inches (approximately 2,928 sf).
- (AREA F) A small deposit in the gravel driveway northeast of the primary structure is contaminated to a depth of 15 inches (approximately 15 sf).

- (AREA G) The soil adjacent to the west property line, in the county road right-of-way, is contaminated to a depth of 9 inches (approximately 297 sf).
- (AREA H) There is a small deposit adjacent to the south side of Area G, extending around the west end of the shed. It is contaminated to a depth of 6 inches (approximately 386 sf).
- (AREA I) A small area east of the primary structure is contaminated to a depth of 9 inches (approximately 66 sf).
- (AREA J) The soil adjacent to the south side of Area E is contaminated to a depth of 12 inches (approximately 3,142 sf).
- (AREA K) A deposit southeast of the primary structure is contaminated to a depth of 6 inches (approximately 1,080 sf).
- (AREA L) A very small deposit over an abandoned sewer line, south of the primary structure and north of Area E, is contaminated to a depth of 96 inches (approximately 15 sf).

(AREAS REQUIRING FURTHER INVESTIGATION DURING REMEDIAL ACTION)

- Area L will require further investigation during remedial action. There appears to be an abandoned sewer line in this area. This investigation should extend out and around the abandoned septic tank to insure that no tailings exist under the tank.
- CDH indicated that the water line was observed to be contaminated at the time of the GJRAP remedial action. It was not found during our radiologic survey. If the water line is encountered during remedial action, it will require further investigation.
- Area E, along the south side of the patio, should be investigated for tailings that may have leached up to and under the edge of the concrete.
- Area I will require further investigation during remedial action because it is over the sewer line.

4.0 RECOMMENDED REMEDIAL ACTION

4.1 Decontamination and Restoration

The recommended remedial action for this property, DOE ID No. GJ-03311-RS, includes removal of all areas identified as containing radioactive material (as discussed in Section 3.5 and shown in Appendix Figures 3.5a, 3.5b, and 3.5c) 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 \$17,401.

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 3.1a	Radium Concentrations at Exterior Locations
Table 3.1b	Radium Concentrations at Exterior Locations
Table 3.2	Radium Concentrations at Interior Locations
Table 3.3	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 2.2a	Site Plan
Figure 2.2b	Site Plan
Figure 3.1a	Exterior Grid-Point Exposure Rates
Figure 3.1b	Exterior Grid-Point Exposure Rates: Gamma Exposure Rates - South Property
Figure 3.2a	Exterior Gamma Scan
Figure 3.2b	Exterior Gamma Scan
Figure 3.3a	Interior Gamma Exposure Rates - Crawl Space
Figure 3.3b	Interior Gamma Exposure Rates and Sample Locations
Figure 3.4a	Exterior Sample Locations
Figure 3.4b	Exterior Sample Locations
Figure 3.5a	Interior Estimated Extent of Contamination
Figure 3.5b	Exterior Estimated Extent of Contamination
Figure 3.5c	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

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Loc #	Grid Location	Depth (in.)	Meas. Type	In Situ Ra-226 (pCi/g)		Chem Ra-226 (pCi/g)	Comments
				Tot. Ct	Spectr.		
8	157250	03	TC	3.3		*	By water meter next to F Road DC = 0 inches
		06	TC	3.5		*	
		09	TC	3.5		*	
		12	TC	3.6		*	
		15	TC	3.6		*	
		18	TC	3.7		*	
		21	TC	3.7		*	
		24	TC	3.7		*	
		27	TC	3.7		*	
		30	TC	3.7		*	
		33	TC	3.8		*	
9	175184	00	DS	2.2		*	Front yard
10	180250	06	DS	1.5		*	Water line 25 feet from meter
		32	DS	<1.0		*	
11	181211	00	DS	2.9		*	Front yard
		06	DS	1.4		*	
12	181270	00	DS	2.8		*	Driveway
		06	DS	6.7		*	
		03	TC	6.9		*	By F Road DC = 15 inches Based on the deconvolution graph
		06	TC	8.4		*	
		09	TC	8.2		*	
		12	TC	6.9		*	
		15	TC	5.6		*	
		18	TC	5.0		*	
		21	TC	4.5		*	
		24	TC	4.3		*	
		27	TC	4.1		*	
		30	TC	4.1		*	
		33	TC	4.0		*	
		36	TC	3.9		*	
		39	TC	4.0		*	
		42	TC	3.9		*	
		45	TC	3.9		*	
		48	TC	3.9		*	
		51	TC	3.8		*	
		54	TC	3.8		*	
		57	TC	3.6		*	

Radium Concentrations at Exterior Locations

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Loc #	Grid Location	Depth (in.)	Meas. Type	In Situ Ra-226 (pCi/g)		Chem Ra-226 (pCi/g)	Comments
				Tot.	Ct Spectr.		
12	181270	60	TC	3.7		*	
		63	TC	3.6		*	
		66	TC	3.6		*	
		69	TC	3.5		*	
13	183166	03	TC	7.5		*	North by tree
		06	TC	6.5		*	DC = 9 inches
		09	TC	5.2		*	Based on the
		12	TC	4.5		*	deconvolution graph
		15	TC	4.2		*	
		18	TC	4.0		*	
		21	TC	3.8		*	
		24	TC	3.7		*	
		27	TC	3.7		*	
		30	TC	3.7		*	
		33	TC	3.7		*	
14	188194	03	TC	9.1		*	North of house
		06	TC	6.5		*	DC = 12 inches
		09	TC	6.2		*	Based on the
		12	TC	4.9		*	deconvolution graph
		15	TC	4.3		*	
		18	TC	3.9		*	
		21	TC	3.8		*	
		24	TC	3.7		*	
		27	TC	3.6		*	
		30	TC	3.6		*	
		33	TC	3.5		*	
		36	TC	3.7		*	
		39	TC	3.6		*	
		42	TC	3.6		*	
		45	TC	3.6		*	
		48	TC	3.6		*	
		51	TC	3.5		*	
		54	TC	3.4		*	
		57	TC	3.4		*	
		60	TC	3.4		*	
		63	TC	3.3		*	
		66	TC	3.4		*	
		69	TC	3.3		*	
15	190162	00	DS	3.3		*	East of the tree
		06	DS	1.8		*	

Radium Concentrations at Exterior Locations

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Loc #	Grid Location	Depth (in.)	Meas. Type	In Situ Ra-226 (pCi/g)		Chem Ra-226 (pCi/g)	Comments
				Tot. Ct	Spectr.		
16	190223	00	DS	1.9		*	Driveway
17	190250	03	TC	3.8		*	Next to water line
		06	TC	4.2		*	DC = 0 inches
		09	TC	4.2		*	
		12	TC	4.0		*	
		15	TC	3.9		*	
		18	TC	3.8		*	
		21	TC	3.8		*	
		24	TC	3.8		*	
		27	TC	3.9		*	
		30	TC	3.9		*	
18	195155	00	DS	2.1		*	West of driveway
19	195175	00	DS	4.9		*	Driveway
		06	DS	9.1		*	
		03	TC	7.8		*	DC = 15 inches
		06	TC	9.3		*	Based on the
		09	TC	11.2		*	deconvolution graph
		12	TC	10.6		*	
		15	TC	7.5		*	
		18	TC	6.3		*	
		21	TC	5.6		*	
		24	TC	5.5		*	
		27	TC	5.4		*	
		30	TC	5.4		*	
		33	TC	5.4		*	
		36	TC	5.3		*	
		39	TC	5.2		*	
		42	TC	4.9		*	
		45	TC	4.9		*	
		48	TC	4.8		*	
20	198199	03	TC	3.7		*	DC = 0 inches
		06	TC	3.9		*	
		09	TC	4.4		*	
		12	TC	4.5		*	
		15	TC	4.6		*	
		18	TC	4.7		*	
		21	TC	4.9		*	
		24	TC	5.0		*	
		27	TC	5.0		*	

Radium Concentrations at Exterior Locations

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Loc #	Grid Location	Depth (in.)	Meas. Type	In Situ Ra-226 (pCi/g)		Chem Ra-226 (pCi/g)	Comments
				Tot. Ct	Spectr.		
20	198199	30	TC	5.0		*	
		33	TC	4.9		*	
		36	TC	4.8		*	
		39	TC	4.8		*	
		42	TC	4.7		*	
		45	TC	4.5		*	
		48	TC	4.3		*	
		51	TC	4.1		*	
		54	TC	4.0		*	
		57	TC	4.0		*	
21	198250	06	DS	28.3		*	Water line by
		55	DS	5.2		*	house
		63	DS	1.3		*	
22	200230	03	TC	11.8		*	DC = 12 inches
		06	TC	15.4		*	Based on the
		09	TC	12.5		*	deconvolution graph
		12	TC	8.5		*	
		15	TC	6.2		*	
		18	TC	5.3		*	
		21	TC	4.6		*	
		24	TC	4.4		*	
		27	TC	4.3		*	
		30	TC	4.2		*	
		33	TC	4.1		*	
		36	TC	4.0		*	
		39	TC	3.9		*	
		42	TC	3.9		*	
		45	TC	3.8		*	
		48	TC	3.7		*	
		51	TC	3.6		*	
		54	TC	3.5		*	
		57	TC	3.6		*	
		60	TC	3.6		*	
23	203240	03	TC	3.1		*	Water line
		06	TC	3.3		*	DC = 0 inches
		09	TC	3.5		*	
		12	TC	3.6		*	
		15	TC	3.7		*	

Radium Concentrations at Exterior Locations

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Loc #	Grid Location	Depth (in.)	Meas. Type	In Situ Ra-226 (pCi/g)		Chem Ra-226 (pCi/g)	Comments
				Tot. Ct	Spectr.		
23	203240	18	TC	3.6		*	
		21	TC	3.7		*	
		24	TC	3.8		*	
		27	TC	3.6		*	
		30	TC	3.5		*	
		33	TC	3.5		*	
		36	TC	3.5		*	
24	205170	03	TC	90.8		*	West of house
		06	TC	98.7		*	DC = 15 inches
		09	TC	68.3		*	Based on all
		12	TC	38.6		*	data available
		15	TC	22.9		*	
		18	TC	16.0		*	
		21	TC	12.6		*	
		24	TC	10.7		*	
		27	TC	9.9		*	
		30	TC	9.3		*	
		33	TC	8.8		*	
		36	TC	8.2		*	
		39	TC	7.8		*	
		42	TC	7.4		*	
		45	TC	7.0		*	
		48	TC	6.7		*	
		51	TC	6.3		*	
		54	TC	6.1		*	
		57	TC	6.2		*	
		60	TC	6.2		*	
25	209213	00	GS		2.3	*	Behind fireplace
26	209220	00	GS		2.5	*	On side of house ground level
27	209260	00	DS	<1.0		*	Front of house
28	210175	00	DS	1.3		*	North side of drive
29	213272	03	TC	3.4		*	Gas line
		06	TC	3.7		*	DC = 0 inches
		09	TC	3.6		*	
		12	TC	3.6		*	
		15	TC	3.6		*	
		18	TC	3.6		*	

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Loc #	Grid Location	Depth (in.)	Meas. Type	In Situ Ra-226 (pCi/g)		Chem Ra-226 (pCi/g)	Comments
				Tot. Ct	Spectr.		
29	213272	21	TC	3.5		*	
		24	TC	3.5		*	
		27	TC	3.4		*	
		30	TC	3.5		*	
		33	TC	3.3		*	
		36	TC	3.2		*	
		39	TC	3.2		*	
		42	TC	3.1		*	
		45	TC	3.1		*	
		48	TC	3.0		*	
		51	TC	3.0		*	
		54	TC	3.0		*	
		57	TC	3.0		*	
		60	TC	3.1		*	
		63	TC	3.2		*	
30	220152	03	TC	6.2		*	DC = 9 inches
		06	TC	6.4		*	Based on the
		09	TC	5.3		*	deconvolution graph
		12	TC	4.5		*	
		15	TC	4.2		*	
		18	TC	4.1		*	
		21	TC	4.0		*	
		24	TC	3.9		*	
		27	TC	3.9		*	
		30	TC	3.8		*	
31	220169	03	TC	20.6		*	West of concrete
		06	TC	32.0		*	driveway
		09	TC	39.8		*	DC = 15 inches
		12	TC	28.2		*	Based on the
		15	TC	15.8		*	deconvolution graph
		18	TC	10.0		*	
		21	TC	7.2		*	
		24	TC	6.1		*	
		27	TC	5.4		*	
		30	TC	5.0		*	
		33	TC	4.9		*	
		36	TC	4.7		*	
		39	TC	4.6		*	
		42	TC	4.5		*	
		45	TC	4.3		*	
		48	TC	4.4		*	

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Loc #	Grid Location	Depth (in.)	Meas. Type	In Situ Ra-226 (pCi/g)		Chem Ra-226 (pCi/g)	Comments
				Tot. Ct	Spectr.		
31	220169	51	TC	4.4		*	
		54	TC	4.4		*	
		57	TC	4.3		*	
		60	TC	4.3		*	
		63	TC	4.3		*	
		66	TC	4.2		*	
		69	TC	4.1		*	
		72	TC	4.0		*	
		75	TC	4.1		*	
		78	TC	4.1		*	
		81	TC	4.2		*	
32	220171	00	DS	2.1		*	Driveway
33	235180	03	TC	19.1		*	DC = 15 inches Based on the deconvolution graph
		06	TC	32.8		*	
		09	TC	40.7		*	
		12	TC	23.7		*	
		15	TC	13.2		*	
		18	TC	8.7		*	
		21	TC	6.9		*	
		24	TC	5.9		*	
		27	TC	5.4		*	
		30	TC	5.0		*	
		33	TC	4.8		*	
		36	TC	4.7		*	
		39	TC	4.6		*	
		42	TC	4.3		*	
		45	TC	4.0		*	
		48	TC	3.9		*	
		51	TC	3.7		*	
		54	TC	3.8		*	
		57	TC	3.9		*	
		60	TC	4.0		*	
		63	TC	4.0		*	
		66	TC	4.1		*	
34	235189	00	DS	1.2		*	West of patio
35	236280	00	DS	1.1		*	East of house
36	237280	06	DS	3.0		*	
		12	DS	1.0		*	

Radium Concentrations at Exterior Locations

DOE ID #GJ-03311-RS

3155 F Road

Page 8 of 12

Loc #	Grid Location	Depth (in.)	Meas. Type	In Situ Ra-226 (pCi/g)		Chem Ra-226 (pCi/g)	Comments
				Tot. Ct	Spectr.		
37	238192	00	DS	<1.0		*	South of house on patio
38	238210	00	DS	9.4		*	On patio
		10	DS	3.2		*	Horizontal under patio
39	239192	00	DS	6.4		*	South of house
		06	DS	8.1		*	next to patio
40	239210	00	DS	60.7		*	South of house
		06	DS	196.9		*	next to patio
41	239240	00	DS	1.9		*	East of house
42	241255	03	TC	3.9		*	Sewer line DC = 0 inches
		06	TC	3.9		*	
		09	TC	3.8		*	
		12	TC	3.7		*	
		15	TC	3.7		*	
		18	TC	3.8		*	
		21	TC	3.8		*	
		24	TC	3.8		*	
		27	TC	3.7		*	
		30	TC	3.8		*	
		33	TC	3.7		*	
		36	TC	3.7		*	
		39	TC	3.6		*	
		42	TC	3.6		*	
		45	TC	3.6		*	
		48	TC	3.6		*	
		51	TC	3.6		*	
		54	TC	3.6		*	
		57	TC	3.6		*	
		60	TC	3.4		*	
		63	TC	3.4		*	
		66	TC	3.4		*	
		69	TC	3.4		*	
		72	TC	3.6		*	
		75	TC	3.6		*	
		78	TC	3.6		*	
		81	TC	3.8		*	
		84	TC	3.8		*	
		87	TC	3.8		*	

Radium Concentrations at Exterior Locations

DOE ID #GJ-03311-RS

3155 F Road

Page 9 of 12

Loc #	Grid Location	Depth (in.)	Meas. Type	In Situ Ra-226 (pCi/g)		Chem Ra-226 (pCi/g)	Comments
				Tot. Ct	Spectr.		
42	241255	90	TC	3.8		*	
		93	TC	3.8		*	
		96	TC	3.7		*	
43	243213	03	TC	62.0		*	DC = 15 inches Based on all data available
		06	TC	95.4		*	
		09	TC	106.0		*	
		12	TC	70.7		*	
		15	TC	37.3		*	
		18	TC	21.6		*	
		21	TC	14.4		*	
		24	TC	10.8		*	
		27	TC	9.4		*	
		30	TC	8.0		*	
		33	TC	7.2		*	
		36	TC	6.7		*	
		39	TC	6.1		*	
		42	TC	5.7		*	
		45	TC	5.5		*	
		48	TC	5.2		*	
		51	TC	5.0		*	
		54	TC	4.8		*	
44	245265	00	DS	3.6		*	Southeast corner of house
		06	DS	2.1		*	
45	249254	03	TC	31.2		*	
		06	TC	39.5		*	
		09	TC	44.2		*	
		12	TC	43.2		*	
		15	TC	40.1		*	
		18	TC	36.8		*	
		21	TC	29.5		*	
		24	TC	23.7		*	
		27	TC	21.0		*	
		30	TC	23.1		*	
		33	TC	26.0		*	
		36	TC	28.3		*	
		39	TC	24.5		*	
		42	TC	21.8		*	
		45	TC	18.1		*	
		48	TC	14.8		*	

Radium Concentration at Exterior locations

DOE ID #GJ-03311-RS

3155 F Road

Page 10 of 12

Loc #	Grid Location	Depth (in.)	Meas. Type	In Situ Ra-226 (pCi/g)		Chem Ra-226 (pCi/g)	Comments
				Tot. Ct	Spectr.		
45	249254	51	TC	10.9		*	
		54	TC	9.1		*	DC = 96 inches
		57	TC	7.7		*	Based on the
		60	TC	6.8		*	deconvolution graph
		63	TC	6.1		*	
		66	TC	6.1		*	
		69	TC	6.1		*	
		72	TC	6.7		*	
		75	TC	7.2		*	
		78	TC	8.0		*	
		81	TC	10.0		*	
		84	TC	14.0		*	
		87	TC	20.6		*	
		90	TC	25.5		*	
		93	TC	21.7		*	
		96	TC	14.0		*	
		99	TC	9.1		*	
		102	TC	6.7		*	
		105	TC	5.4		*	
		108	TC	4.8		*	
		111	TC	4.6		*	
46	254161	00	DS	4.7		*	West side of house
		06	DS	1.3		*	
47	255265	00	DS	6.4		*	East of big tree
		06	DS	1.3		*	South of house
48	258254	03	TC	5.6		*	DC = 6 inches
		06	TC	5.1		*	Based on the
		09	TC	4.5		*	deconvolution graph
		12	TC	4.1		*	
		15	TC	3.9		*	
		18	TC	3.8		*	
		21	TC	3.8		*	
		24	TC	3.7		*	
		27	TC	3.7		*	
		30	TC	3.8		*	
		33	TC	3.7		*	
		36	TC	3.7		*	

Radium Concentrations at Exterior Locations

DOE ID #GJ-03311-RS

3155 F Road

Page 11 of 12

Loc #	Grid Location	Depth (in.)	Meas. Type	In Situ Ra-226 (pCi/g)		Chem Ra-226 (pCi/g)	Comments
				Tot. Ct	Spectr.		
49	260290	00	DS	1.8		*	Background
		00-06	SS			3.9	Dry
		03	TC	3.4		*	
		06	TC	3.5		*	DC = 0 inches
		09	TC	3.5		*	
		12	TC	3.4		*	
		15	TC	3.4		*	
		18	TC	3.2		*	
		21	TC	3.3		*	
		24	TC	3.2		*	
		27	TC	3.3		*	
		30	TC	3.3		*	
		33	TC	3.4		*	
		36	TC	3.4		*	
		39	TC	3.3		*	
		42	TC	3.3		*	
		45	TC	3.3		*	
		48	TC	3.2		*	
		51	TC	3.3		*	
		54	TC	3.3		*	
		57	TC	3.3		*	
		60	TC	3.3		*	
		63	TC	3.3		*	
		66	TC	3.4		*	
		69	TC	3.4		*	
50	264244	00	DS	3.0		*	South of house
		06	DS	1.0		*	
51	270212	03	TC	6.2		*	DC = 12 inches
		06	TC	7.5		*	Based on the
		09	TC	6.5		*	deconvolution graph
		12	TC	5.2		*	
		15	TC	4.3		*	
		18	TC	3.9		*	
		21	TC	3.7		*	
		24	TC	3.6		*	
		27	TC	3.5		*	
		30	TC	3.6		*	
		33	TC	3.5		*	
52	273257	03	TC	4.5		*	DC = 6 inches
		06	TC	4.4		*	Based on the
		09	TC	4.1		*	deconvolution graph

Radium Concentration at Exterior Locations

DOE ID #GJ-03311-RS

3155 F Road

Page 12 of 12

Loc #	Grid Location	Depth (in.)	Meas. Type	In Situ Ra-226 (pCi/g)		Chem Ra-226 (pCi/g)	Comments
				Tot.	Ct Spectr.		
52	273257	12	TC	3.8		*	
		15	TC	3.6		*	
		18	TC	3.7		*	
		21	TC	3.7		*	
		24	TC	3.6		*	
		27	TC	3.7		*	
		30	TC	3.7		*	
		33	TC	3.6		*	
53	275276	00	DS	1.8		*	
		00-06	SS			6.4	Dry
54	278172	00	DS	3.1		*	South of shed
		06	DS	1.5		*	

Measurement Type: 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 = 03-19-85
 Team Leader = WCM

Radium Concentrations at Exterior Location#

DOE ID #GJ-03311-RS

3155 F Road

Page 1 of 1

Loc #	Grid Location	Depth (in.)	Meas. Type	In Situ Ra-226 (pCi/g)		Chem Ra-226 (pCi/g)	Comments
				Tot. Ct	Spectr.		
55	123240	03	TC	11.4		*	In field
		06	TC	11.9		*	DC = 12 inches
		09	TC	10.5		*	Based on the
		12	TC	7.7		*	deconvolution graph
		15	TC	5.7		*	
		18	TC	4.8		*	
		21	TC	4.2		*	
		24	TC	4.2		*	
		27	TC	3.9		*	
		30	TC	3.7		*	
		33	TC	3.9		*	
56	123272	00	DS	3.5		*	Field west of
		06	DS	1.2		*	property line
57	125220	00	DS	3.0		*	South of house in
		06	DS	3.4		*	garden
		12	DS	1.2		*	
		00-06	SS			7.3	Dry
58	128242	00	DS	3.1		*	South of double
		06	DS	2.2		*	door

Measurement Type: 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 = 03-19-85
 Team Leader = WCM

Radium Concentrations at Interior Locations

DOE ID #GJ-03311-RS

3155 F Road

Page 1 of 1

Loc #	Grid Location	Depth (in.)	Meas. Type	In Situ Ra-226 (pCi/g)		Chem Ra-226 (pCi/g)	Comments
				Tot. Ct	Spectr.		
1		00	GS		2.8	*	
2		[12]	GS		2.0	*	On fireplace hearth
3		00	DS	4.0		*	On floor
4		00	GS		3.4	*	Inside fireplace
5		00	DS	<1.0		*	Horizontal on brick
6		00	DS	3.1		*	Inside shed
		06	DS	2.4		*	
7		03	TC	5.3		*	In shed
		06	TC	6.0		*	DC = 12 inches
		09	TC	5.6		*	Based on the
		12	TC	4.8		*	deconvolution graph
		15	TC	4.2		*	
		18	TC	3.8		*	
		21	TC	3.7		*	
		24	TC	3.6		*	
		27	TC	3.6		*	
		30	TC	3.6		*	
		33	TC	3.6		*	
		36	TC	3.5		*	

Measurement Type: 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 = 03-19-85
 Team Leader = WCM

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)
CRAWL SPACE	*	*	*	12	13-15	14
GROUND FLOOR	*	*	*	*	10-14	*
FAMILY ROOM	06	11-13	13	07	12-19	14
GARAGE	07	10-11	10	07	10-16	12
SHED	06	13-17	15	05	15-18	17

* 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 3.3b. Exposure rates in the crawl space are shown in Appendix Figure 3.3a.

Table 4.1
Area and Volume Calculations
DOE ID No. GJ-03311-RS

Page 1 of 2

<u>AREA</u>	<u>CALCULATIONS(ft)</u>	<u>SF</u>	<u>DEPTH(ft)</u>	<u>CF</u>	<u>CUBIC YARDS</u>
EXTERIOR					
Contaminated Fill					
A	12 x 18	= 216	x 1.0	= 216	
B	8 x 5	= 40	x 5.0	= 200	
C	13 x 8	= 104			
	12 x 11	= 132			
	9 x 64	= 576			
	5 x 5	= 25			
		<u>837</u>	x 0.5	= 419	
D	45 x 5	= 225			
	12 x 44	= 528			
		<u>753</u>	x 1.0	= 753	
E	30 x 20	= 600			
	30 x 24	= 720			
	67 x 24	= 1,608			
		<u>2,928</u>	x 1.3	= 3,806	
F	3 x 5	= 15	x 1.3	= 20	
G	27 x 11	= 297	x 0.8	= 238	
H	5 x 20	= 100			
	26 x 11	= 286			
		<u>386</u>	x 0.5	= 193	
I	3 x 22	= 66	x 0.8	= 53	
J	90 x 15	= 1,350			
	112 x 16	= 1,792			
		<u>3,142</u>	x 1.0	= 3,142	

Table 4.1
Area and Volume Calculations
DOE ID No. GJ-03311-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>
K	36 x 30 =	1,080	x 0.5 =	540	
L	3 x 5 =	15	x 8.0 =	120	
Volume of Contaminated Fill				= 9,700	= 9,700/27 = 359
TOTAL VOLUME - EXTERIOR					= 359

See Appendix Figures 3.5a, 3.5b, and 3.5c For Areas

Table 4.2
Estimated Cost of Decontamination and Restoration
DOE ID No. GJ-0331-RS

Page 1 of 2

EXTERIOR

Remove identified residual radioactive material 359 cy @ \$14.50/cy (machine)	\$ 5,206
Remove 2 large trees 2 ea @ \$100/ea	200
Replace compacted roadbase 70 cy @ \$11.50/cy	805
Replace topsoil 191 cy @ \$9.50/cy	1,815
Replace 3/4" crushed rock 10 cy @ \$13.50/cy	135
Replace sod 4,322 sf @ \$.25/sf	1,081
Replace soil/compost (weed-free) 88 cy @ \$12.50/cy	1,100
Replace landscaping 3 trees @ \$30/ea 9 rosebushes @ \$20/ea	90 180
Replace sprinkler system 900 sf @ \$.40/sf	360
Remove/replace chainlink fence 165 lf @ \$2.60/lf	429
	<hr/>
TOTAL EXTERIOR	\$ 11,401

TOTAL EXTERIOR	\$ 11,401
TOTAL INTERIOR	0
ACCESS CONTROL	200
	<hr/>
SUBTOTAL	\$ 11,601
CONTINGENCY @ 20%	2,320
	<hr/>
SUBTOTAL	\$ 13,921
CONTRACTOR OVERHEAD & PROFIT @ 25%	3,480
	<hr/>
GRAND TOTAL	\$ 17,401

VD/071285
REA03311/REA-KL013/LMR

DOE ID #
03311

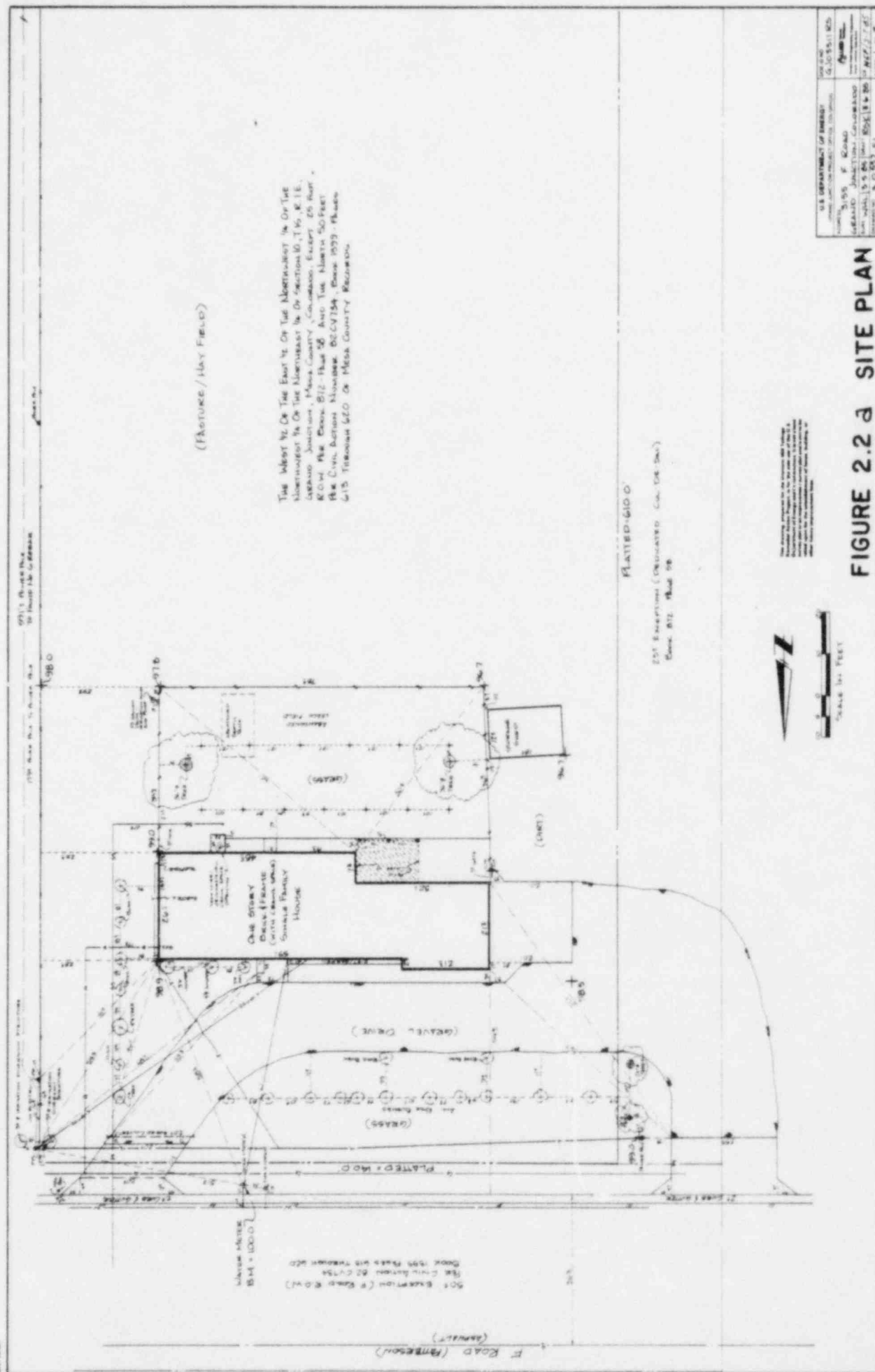
" 3155 F" RD



STATE OF COLORADO
TAILINGS REPOSITORY



FIGURE 2.1
VICINITY MAP



THE WEST 1/2 OF THE EAST 1/2 OF THE NORTHWEST 1/4 OF THE NORTHWEST 1/4 OF THE NORTHEAST 1/4 OF SECTION 10, T15, R1E, GRAND JUNCTION, MESA COUNTY, COLORADO, EXCEPT 25 FOOT R.O.W. PER BOOK 872-PAGE 58 AND THE NORTH 50 FEET PER CIVIL ACTION NUMBER 82CV734, BOOK 1399-PAGES 613 THROUGH 620 OF MESA COUNTY RECORDS.

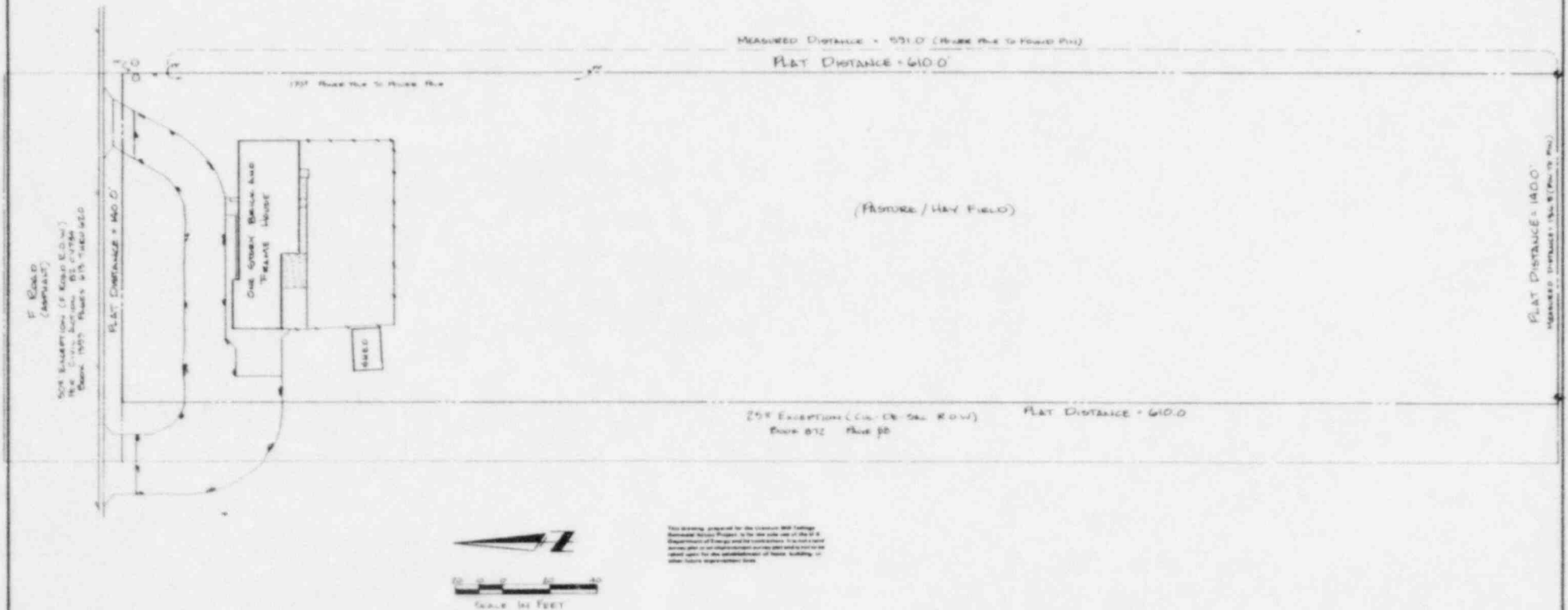

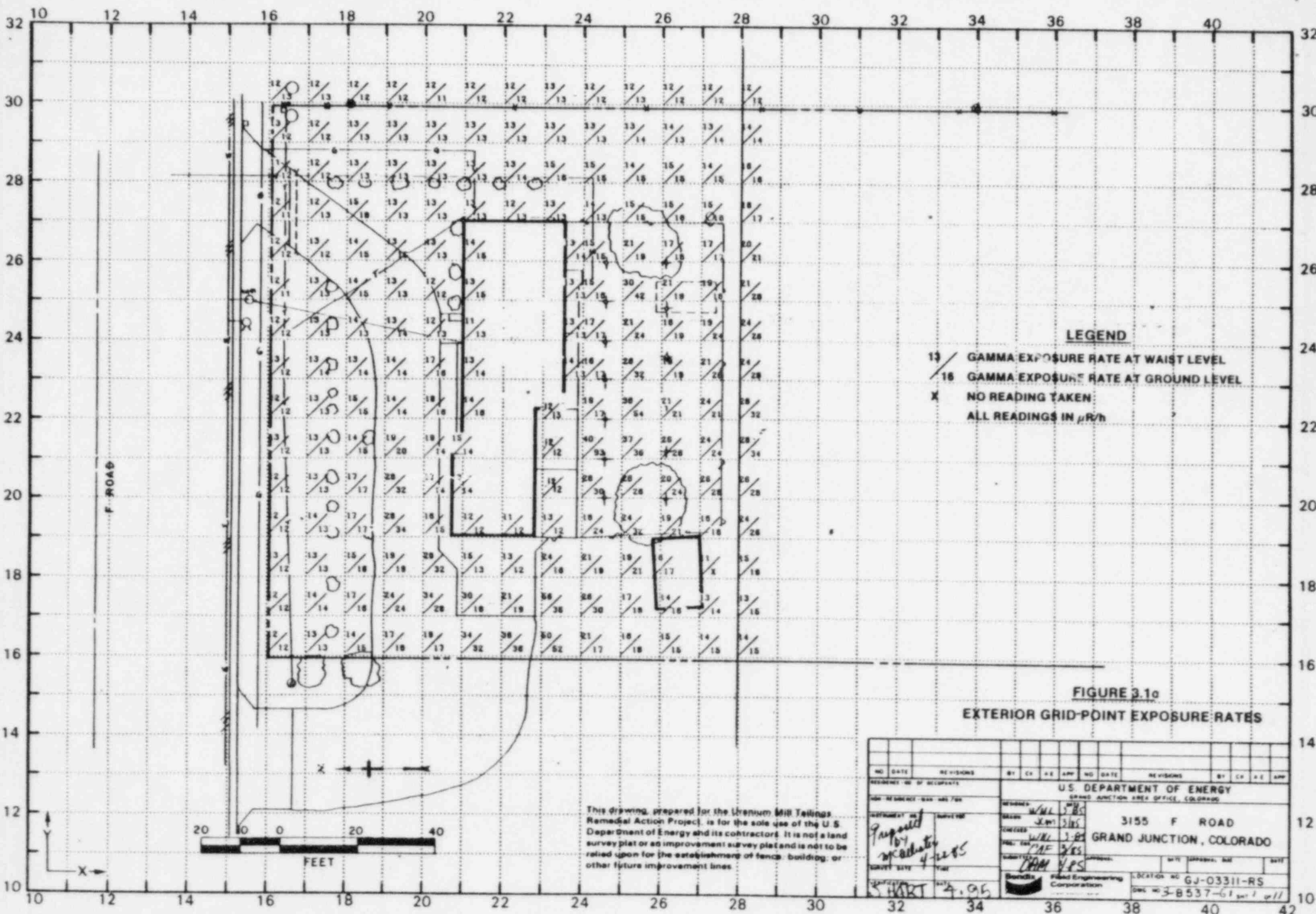
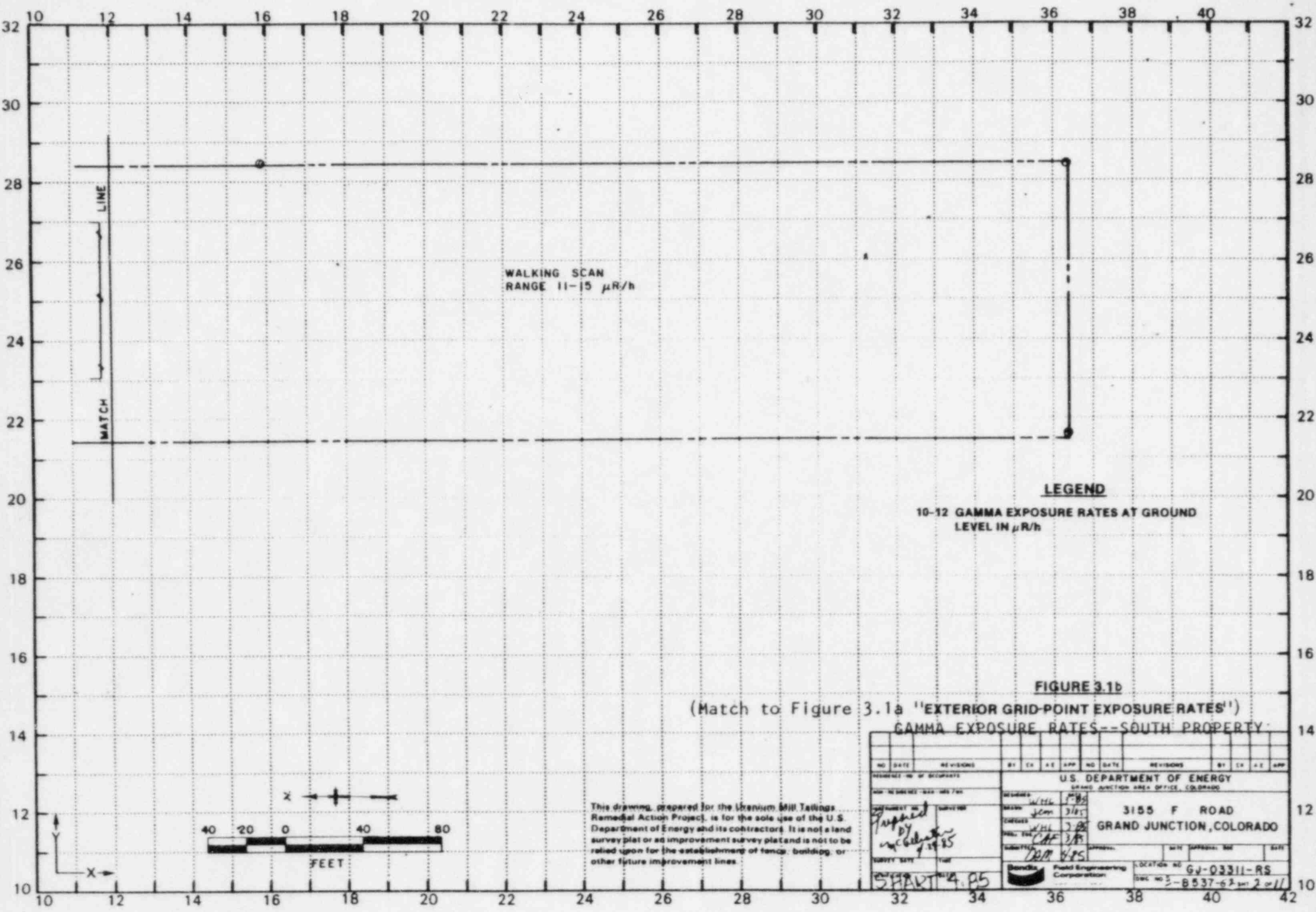


FIGURE 2.2 b SITE PLAN

U.S. DEPARTMENT OF ENERGY		DOE FORM 102
SPENDING ACCOUNT PROJECT OFFICE: CALS-0000		63-09561-05
ACCOUNT:	3155 F ROAD	 American Nuclear Energy Corporation
GRAND JUNCTION, COLORADO		
WORK:	WJL 36 05	DOE 7/3/85
CONTRACT NO.:	63-09561-05	DATE: 7/3/85





LEGEND

10-12 GAMMA EXPOSURE RATES AT GROUND LEVEL IN $\mu R/h$

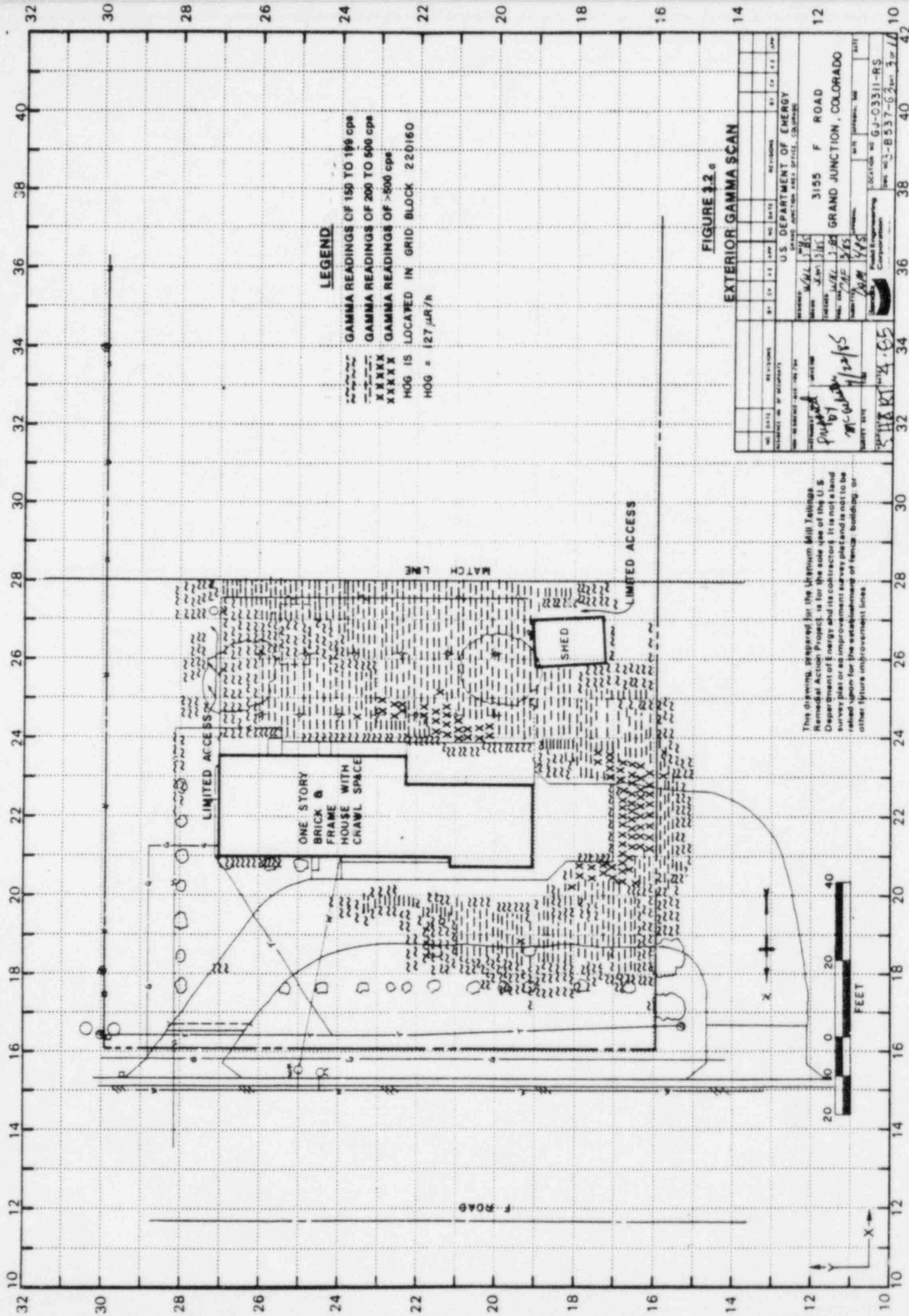
FIGURE 3.1b

(Match to Figure 3.1a "EXTERIOR GRID-POINT EXPOSURE RATES")

GAMMA EXPOSURE RATES--SOUTH PROPERTY

REVISIONS									
NO.	DATE	REVISIONS	BY	EX	AE	APP	NO.	DATE	REVISIONS
<p>U.S. DEPARTMENT OF ENERGY GRAND JUNCTION AREA OFFICE, COLORADO</p> <p>3155 F ROAD GRAND JUNCTION, COLORADO</p> <p>DESIGNED BY: <i>WHL</i> DATE: <i>1/85</i> CHECKED BY: <i>JCM</i> DATE: <i>3/85</i> DRAWN BY: <i>WHL</i> DATE: <i>3/85</i> SCALE: <i>1"=40'</i> SURVEY SITE: <i>CHART 4.85</i></p> <p>Prepared by: <i>WHL</i> DATE: <i>1/85</i></p> <p>Field Engineering Corporation</p> <p>LOCATION NO: <i>GJ-03311-RS</i> DCL NO: <i>5-B537-52-2 of 11</i></p>									

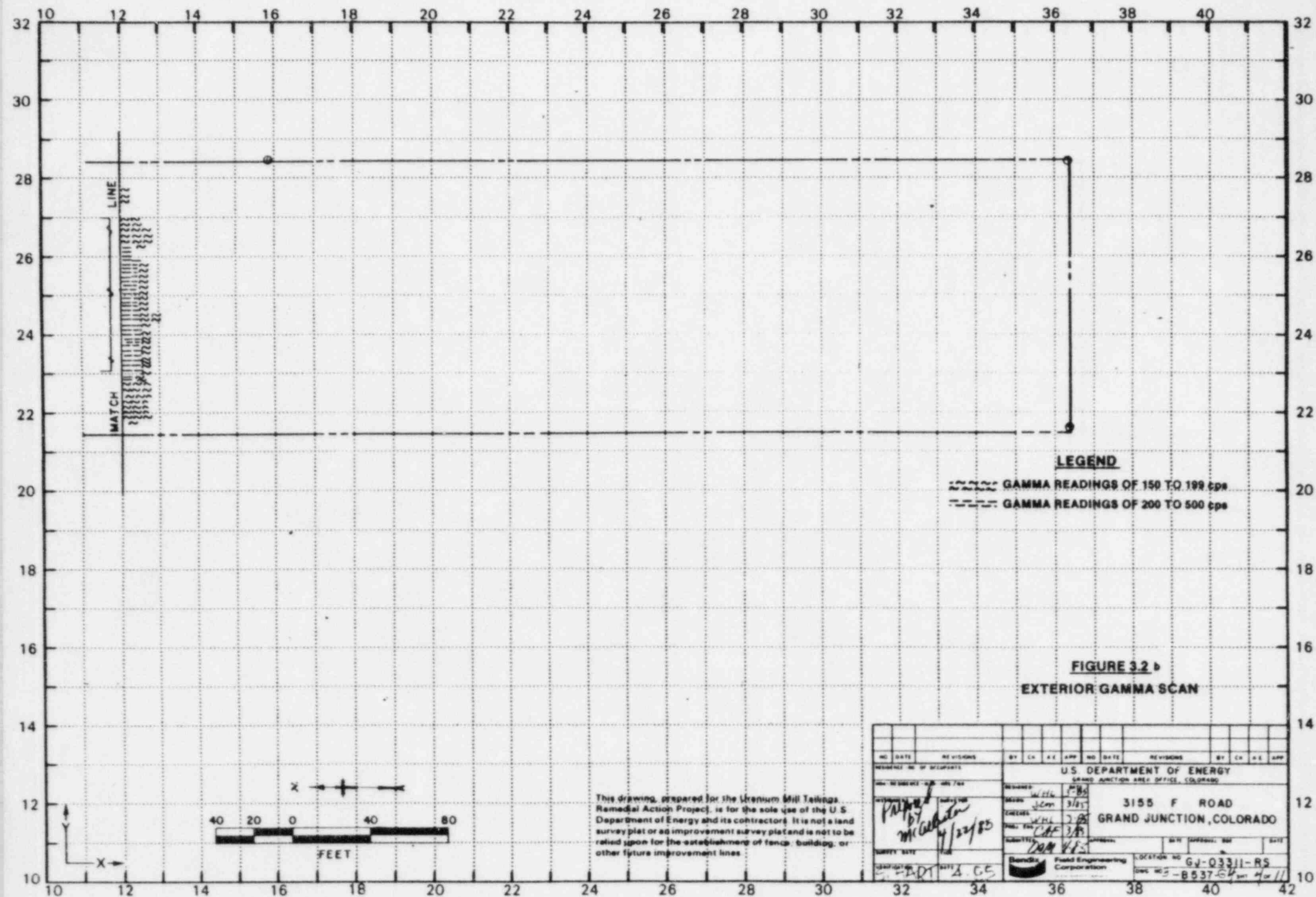
This drawing, prepared for the Uranium Mill Tailings Remedial Action Project, is for the sole use of the U.S. Department of Energy and its contractors. It is not a land survey plat or an improvement survey plat and is not to be relied upon for the establishment of fence, building, or other future improvement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

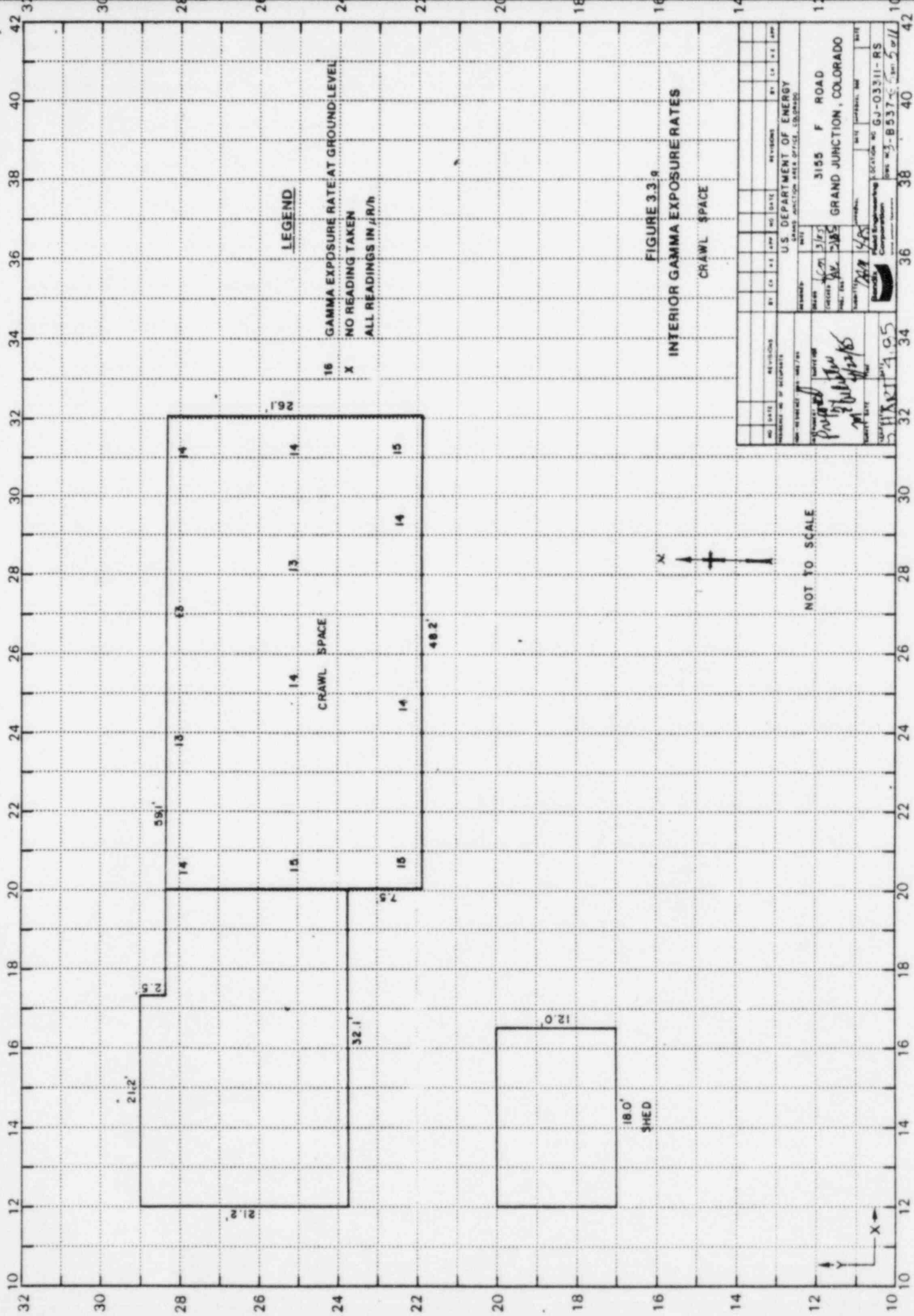


This drawing, prepared for the Uranium Mill Tailings Remedial Action Project, is for the sole use of the U.S. Department of Energy and its contractors. It is not a land survey plat or an improvement survey plat and is not to be relied upon for the establishment of fence, building, or other future improvement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

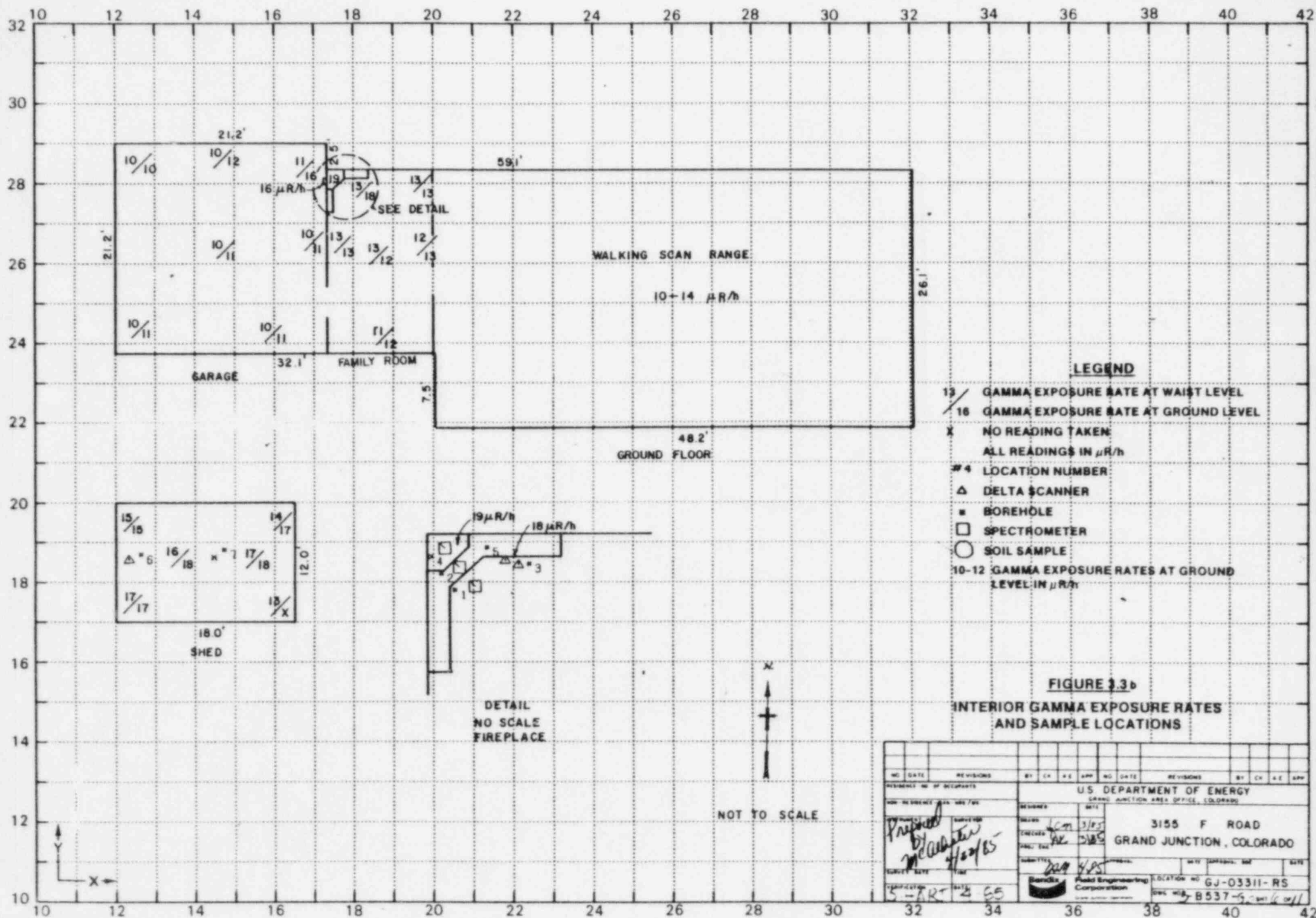
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Drawing No: GJ-03311-RS
Scale: 1" = 40'
Date: 1/2/65
Author: [Signature]
Checker: [Signature]

U.S. DEPARTMENT OF ENERGY
OFFICE OF ENVIRONMENTAL AND SAFETY
3155 F ROAD
GRAND JUNCTION, COLORADO

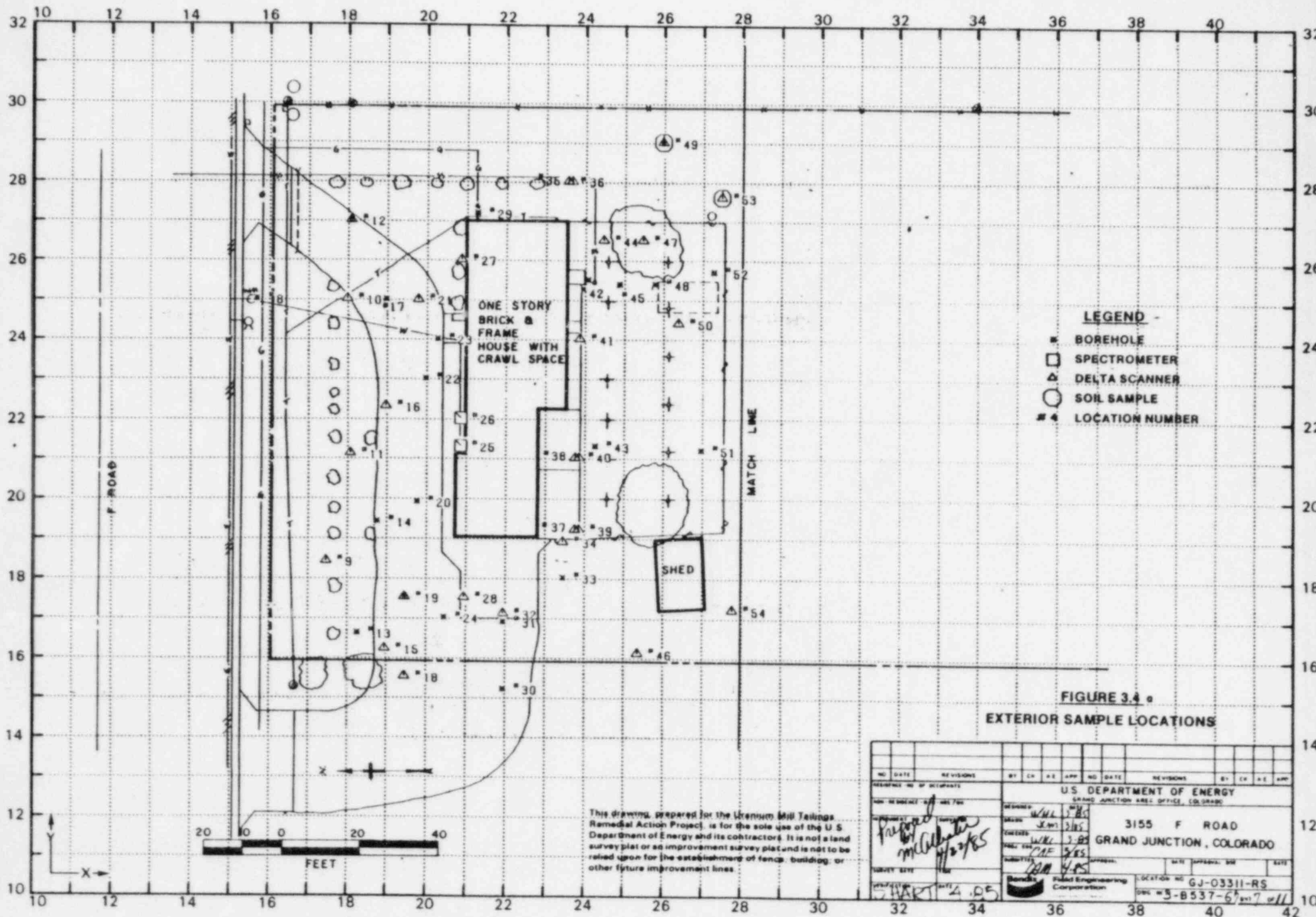


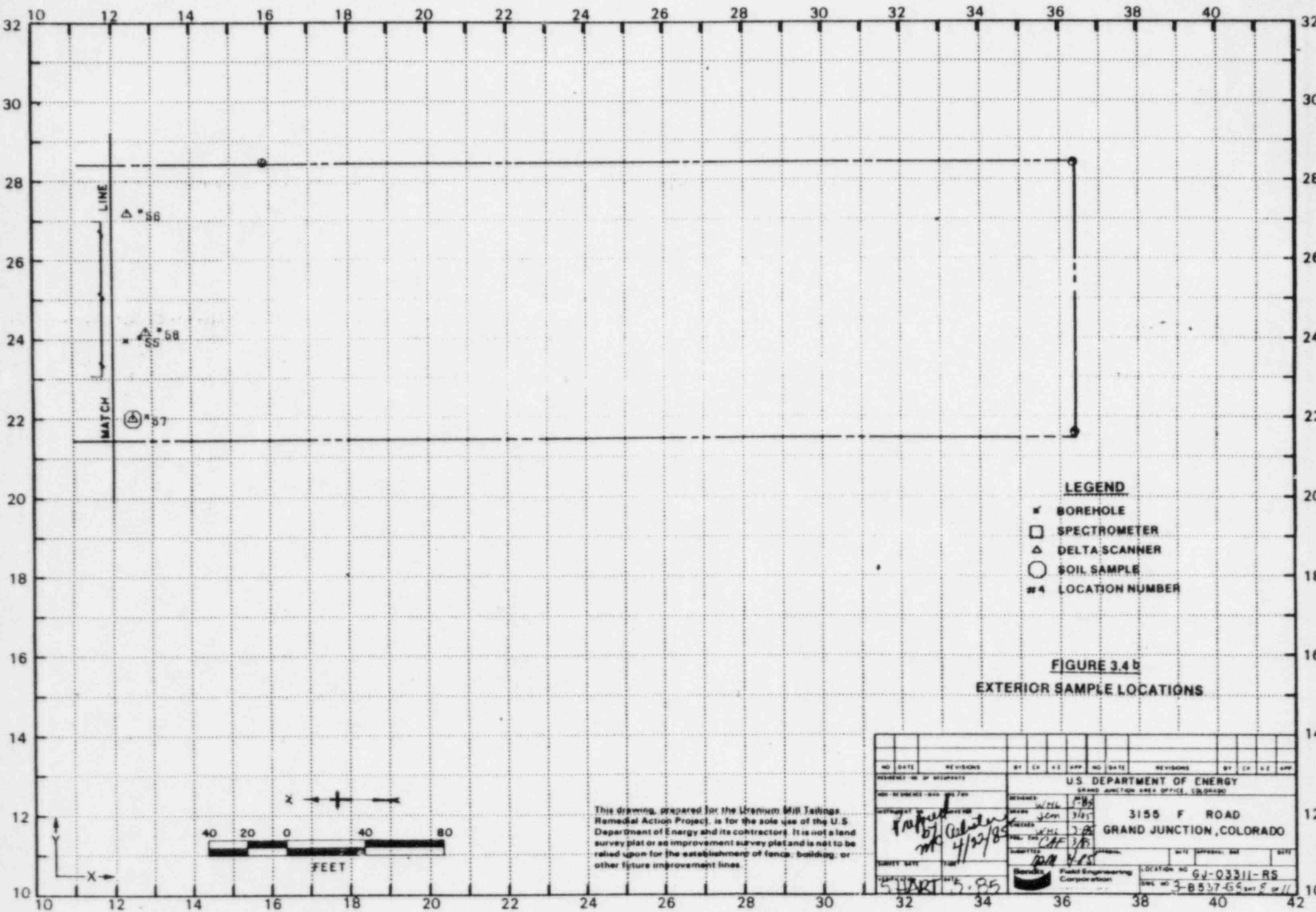


NO.	DATE	REVISED	BY	CA	EE	APP	NO	DATE	REVISED	BY	CA	EE	APP
U.S. DEPARTMENT OF ENERGY GRAND JUNCTION AREA OFFICE, COBORO													
3155 F. ROAD GRAND JUNCTION, COLORADO													
PROJECT: <i>Interior Gamma Exposure Rates</i> DRAWING NO.: <i>3155 F. ROAD</i> SCALE: <i>1" = 10'</i> DATE: <i>5/1/75</i> DRAWN BY: <i>W. J. [Signature]</i> CHECKED BY: <i>[Signature]</i> APPROVED BY: <i>[Signature]</i> PROJECT ENGINEER: <i>[Signature]</i> PROJECT MANAGER: <i>[Signature]</i> PROJECT SUPERVISOR: <i>[Signature]</i> PROJECT ASSISTANT: <i>[Signature]</i> PROJECT CLERK: <i>[Signature]</i> PROJECT FILE NO.: <i>3155 F. ROAD</i> PROJECT LOCATION: <i>3155 F. ROAD</i> PROJECT AREA: <i>3155 F. ROAD</i> PROJECT DATE: <i>5/1/75</i> PROJECT STATUS: <i>Complete</i> PROJECT COMMENTS: <i>See 3-B57-C for 5/1/75</i>													



NO. DATE		REVISIONS		BY CH. A.E. APP.		NO. DATE		REVISIONS		BY CH. A.E. APP.	
<p>RESIDENT NO. OF OCCUPANTS</p> <p>NO. RESIDENTS MAX. NO. / YR.</p> <p>DESIGNED BY: <i>McGraw-Hill</i></p> <p>ENGINEER: <i>McGraw-Hill</i></p> <p>DATE: <i>4/20/65</i></p> <p>PROJECT: <i>5-ART-2-65</i></p>											
<p>U.S. DEPARTMENT OF ENERGY</p> <p>GRAND JUNCTION AREA OFFICE, COLORADO</p>						<p>3155 F ROAD</p> <p>GRAND JUNCTION, COLORADO</p>					
<p>LOCATION NO. GJ-03311-RS</p>						<p>DATE: 8/5/65</p>					



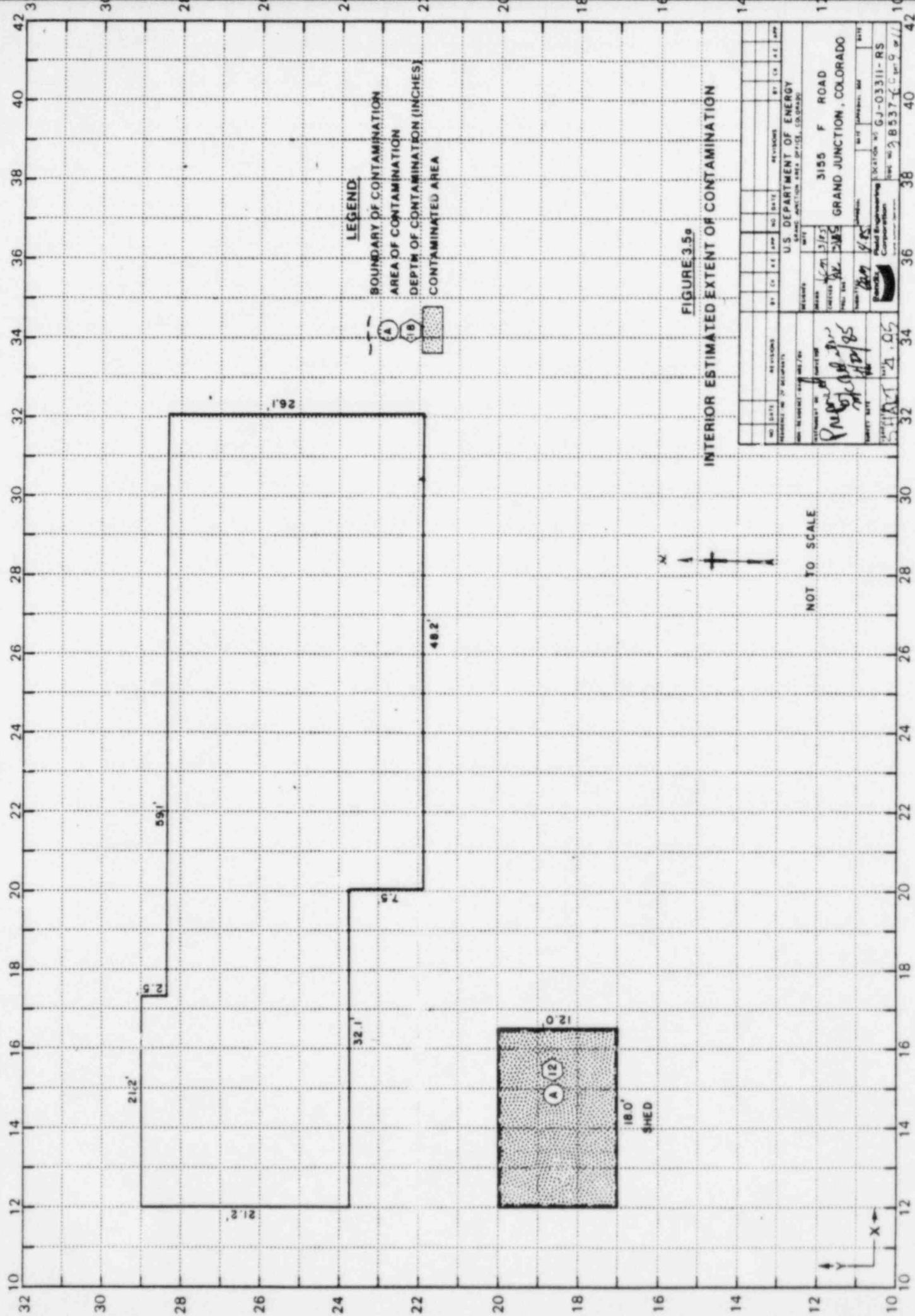


- LEGEND**
- ✕ BOREHOLE
 - SPECTROMETER
 - △ DELTA SCANNER
 - SOIL SAMPLE
 - # LOCATION NUMBER

FIGURE 3.4b
EXTERIOR SAMPLE LOCATIONS

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 land survey plat or an improvement survey plat and is not to be relied upon for the establishment of fence, building, or other future improvement lines.

NO. DATE		REVISIONS		BY	CH	AE	APP	NO. DATE		REVISIONS		BY	CH	AE	APP
U.S. DEPARTMENT OF ENERGY GRAND JUNCTION AREA OFFICE, COLORADO															
3155 F ROAD								12							
GRAND JUNCTION, COLORADO								10							
DATE: 4/22/89								DATE: 4/22/89							
SUBMITTER: P. J. S.								SUBMITTER: P. J. S.							
DRAWN: W. H. S.								DRAWN: W. H. S.							
CHECKED: J. C. S.								CHECKED: J. C. S.							
APPROVED: J. C. S.								APPROVED: J. C. S.							
LOCATION NO: GJ-03311-RS								LOCATION NO: GJ-03311-RS							
SHEET NO: 3-B537-55								SHEET NO: 3-B537-55							



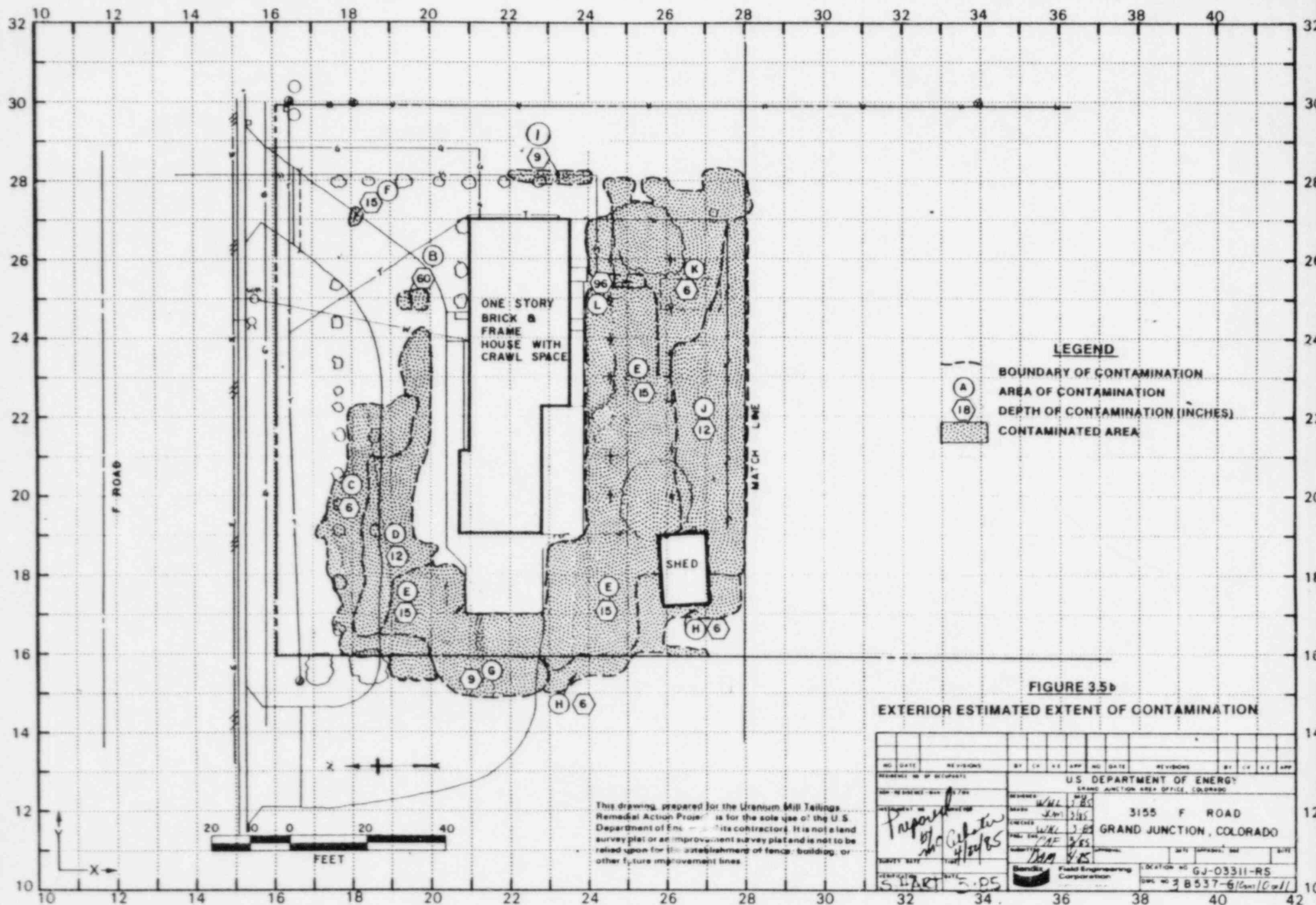
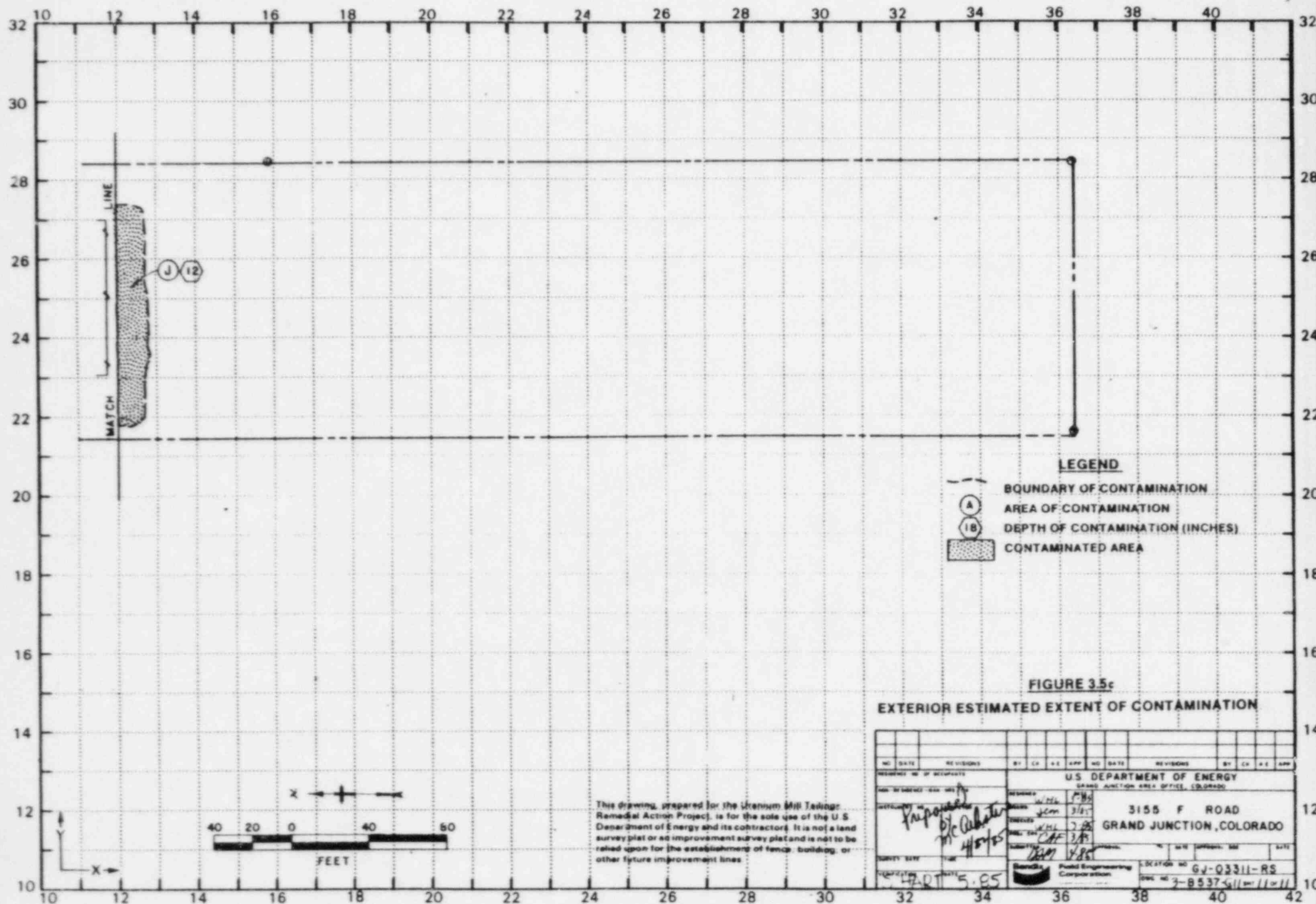


FIGURE 3.5b

EXTERIOR ESTIMATED EXTENT OF CONTAMINATION

NO.		DATE		REVISIONS		BY		CK		X		APP		NO.		DATE		REVISIONS		BY		CK		X		APP													
RESIDENT NO. OF OCCUPANTS										US DEPARTMENT OF ENERGY																													
APR. RESIDENTIAL - 1/2/85										GRAND JUNCTION AREA OFFICE, COLORADO																													
PROJECT NO.										3155 F ROAD																													
PROPOSED BY										GRAND JUNCTION, COLORADO																													
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U.S. DEPARTMENT OF ENERGY
URANIUM MILL TAILINGS REMEDIAL ACTION PROJECT
GRAND JUNCTION VICINITY PROPERTIES

Official Survey Report

Property Address 3155 F Road Grand Junction, Colo. 81504

Property Owner Patrick and Martha Darmody

Address of Owner (if different from above)

Report Prepared By W.C. McAllister

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 = 19 uR/h
HOG = 127 uR/h



COLORADO DEPARTMENT OF HEALTH

Richard D. Lamm
Governor

Thomas M. Vernon, M.D.
Executive Director

April 25, 1985

Mr. Wilbur McAllister
Bemix Field Engineering Corporation
P. O. Box 1569
Grand Junction, CO 81502-1569

RE: GJ-03311-RS

Dear Wilbur:

Thank you for your letter of April 19, 1985. The following comments come to mind regarding your updated data:

1. What were the characteristics of the tailings involvement displayed in the 5-foot by 3-foot trench dug out 12 feet north from the house? Is delta #10 (180250) deep enough to detect possible contamination at 5 feet in depth at this location?

The water line in this yard should be further investigated during remedial action.

2. Based on the results of borehole #45 (249254) it is possible that contamination may exist under and/or around the septic tank at depths of up to about 9 feet. This possibility has not been investigated.
3. At what approximate depth(s) does the sewer line run between the clean-out port (in the south yard) and F Road? Delta explorations #35 and #36 in the east yard may not be deep enough to check for possible contaminated involvement of this line at this location.
4. DC in borehole #243213 may not be as deep as indicated.

If I can be of further assistance, please let me know.

Sincerely,

Jon R. Luellen
Health Physicist

JRL:sk

cc: UMTRA Location File



ALLIED Bendix
Aerospace

Bendix Field Engineering Corporation
P. O. Box 1569
Grand Junction, CO 81502-1569
Telephone (303) 242-8621
Telex: 454-338

May 2, 1985

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

ATTN: Jon Luellen

SUBJECT: GJ-03311-RS

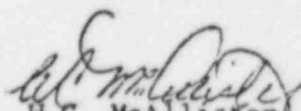
Dear Jon:

Reference your letter of 25 April 1985.

1. The tailings displayed in the trench that was dug out 12-feet north of the house were mixed lightly with the tailings. Delta number 10 (130250) was not deep enough to detect possible contamination at 5-feet in depth. However, it was decided to have the area included for further investigation during remedial action.
2. The septic tank has been included for further investigation during remedial action.
3. The sewer line at the clean-out port (in the south yard) measures 32-inches to the bottom of the line. The depths probably increase as it nears the main sewer line. The contamination where delta numbers 35 and 36 were taken was changed to 9-inches on the final map, and will be further investigated during remedial action.
4. The depth of contamination for borehole (grid location 243213) has been changed on the final map to 15-inches.

Thank you for your time and cooperation. If you should have additional questions or comments you may contact me at 242-8621, extension 560.

Sincerely,


W.C. McAllister
RSD Survey Team

WCM:pr

MEMORANDUM

ALLIED Bendix
Aerospace

Bendix Field Engineering Corporation
Grand Junction Operations
Grand Junction, Colorado

Date: April 10, 1985

To: Files

From: Wilbur McAllister *WMB*

Subject: Team Leader Notes - GJ-03311-RS

Address: 3144 'F' Road

Owner: Patrick Darmody

Telephone Contact: Theresa Hetherington, (303) 464-7491

Weather: Cloudy, 50 Degrees

Team Members

W. McAllister (Team Leader)

M. Dexter

D. Herrera

M. Duran

H. Mattison

D. Fossey

S. Larsen

B. Beltz

S. Southern

Instruments

Equipment that was used is listed in the equipment summary in the folio.

Date: March 19, 1985

Colorado Department of Health (CDH) data indicated that the property was surveyed in May 1976. Remedial action was completed in August 1980. Two-hundred and fifty cubic yards of tailings were removed from under the family room, garage, outside the foundation to 10-feet, as well as from the inside of the crawl space.

Tailings remain mixed in the yard greater than 10-feet from the house and in the mortar of the brick planter.

Oak Ridge National Laboratory (ORNL) background information indicates elevated readings in an area approximately 40-feet by 60-feet south of the house and in the gravel driveway north of the house.

A walking scan was performed inside the house over the crawl space, which showed no elevated readings.

A gamma survey in the family room and garage showed elevated readings located in the fireplace, on the fireplace hearth, on the floor in front of the hearth, and in front of the fireplace clean-out port in the garage.

Delta readings and a surface spectrometer reading were taken in and around the fireplace.

The boreholes around the garage and patio showed a blue-gray color.

Deltas on the edge of the concrete showed no contamination under the concrete. A 10-inch delta, vertical under the edge of the patio, shows the blue-gray tailings up next to the concrete but not underneath the concrete.

Team members experienced problems with the vertical delta readings showing negative results, it could be possible that the blue-gray tailings surrounding the top of the instrument had some effect.

The crawl space showed no elevated readings.

The grid had to be extended 40-feet out in the field area. Contamination extended approximately 25-feet in the field.

No elevated readings on or around the brick planter were discovered.

The bottom of the footing is approximately 36-inches.

The exposure rate measurements at grid point 240230 was taken after the borehole was drilled, this caused an elevated reading higher than average.

The shed was setting on the ground and was open on one end with no doors, therefore, it was surveyed along with the yard.

Revisit

Date: March 20, 1985

Team members arrived on the property and began taking grid point readings in the shed, the grid point at location number 240230 was retaken after the borehole was filled. This grid point reading remained elevated.

Revisit

Date: March 26, 1985

The purpose of this visit was to take three delta readings at the edge of the contamination which extends out in the open field. This should help define the area where it drops off.

Revisit

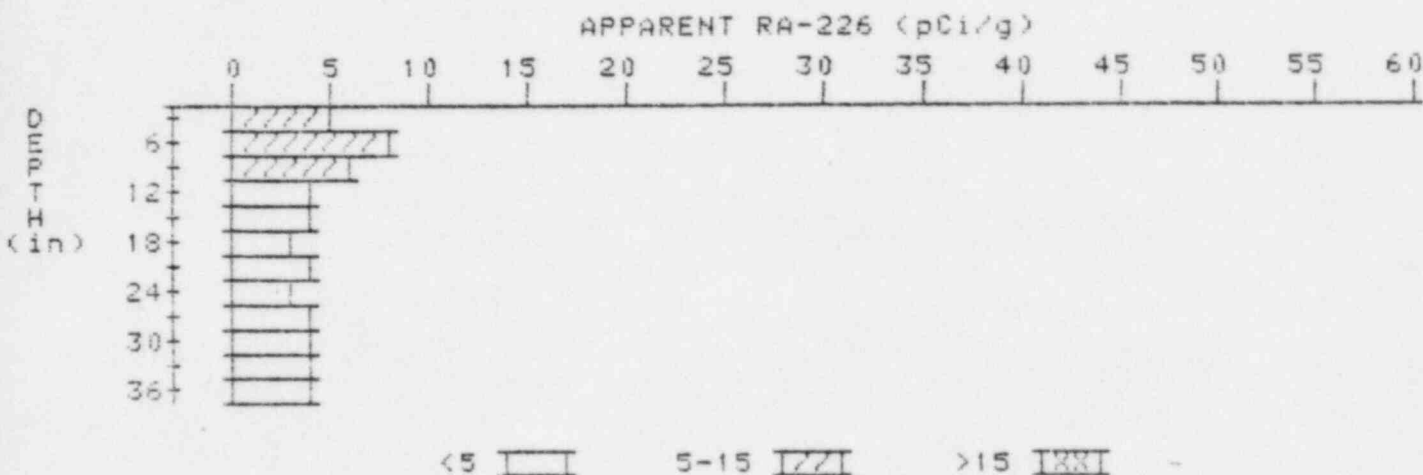
Date: April 10, 1985

During the original survey the water and sewer lines were investigated closer than 10-feet from the house. This was already performed by CDH during their remedial action. Information from CDH indicates that the water line comes straight in from the street.

The water line was located in the crawl space and appeared to enter the house straight in from the meter; but after the team members dug a 63-inch deep and 60-inch wide trench at an exterior location, the water line could not be found. A delta reading showed tailings at 60-inches. Team members drilled a borehole 12-feet from the house towards the septic tank which showed elevated readings down to an old sewer line, probably running to the septic. The homeowner indicated that the septic tank was near the surface.

APPARENT RADIUM-226 CONCENTRATION 7 DECONVOLUTION GRAPH

PROPERTY NUMBER: GJ-03311-RS
HOLE NUMBER: 7
LOCATION:

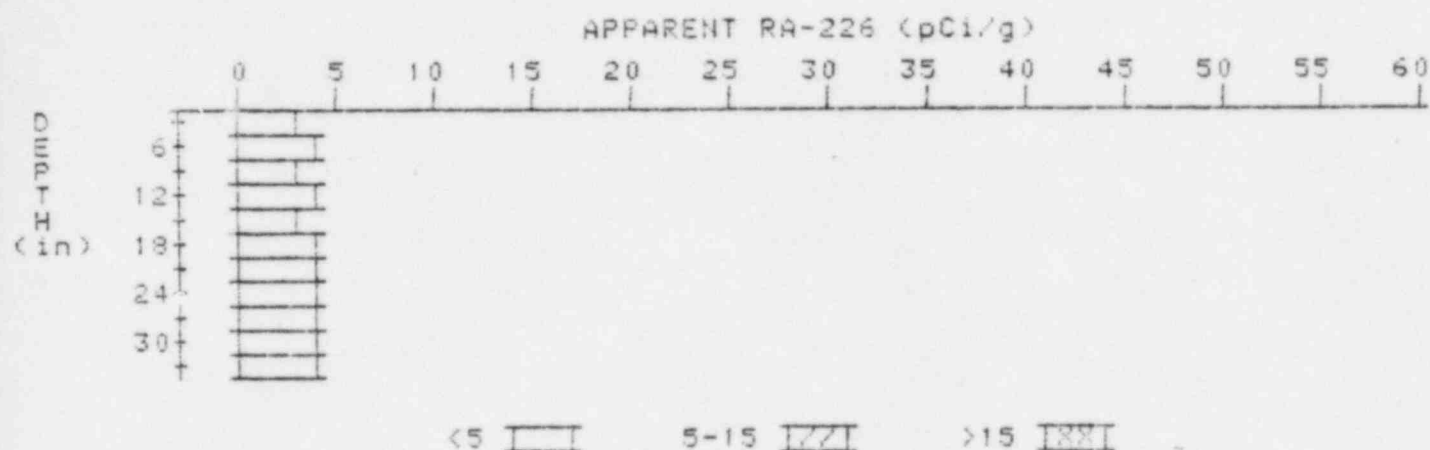


Depth (in)	Apparent Radium-226 (pCi/g) Undeconvolved	Apparent Radium-226 (pCi/g) Deconvolved
3	5.3	5.3
6	6.0	3.0
9	5.6	6.3
12	4.8	4.4
15	4.2	3.8
18	3.8	3.3
21	3.7	3.7
24	3.6	3.4
27	3.6	3.6
30	3.6	3.6
33	3.6	3.8
36	3.5	3.5

APPARENT RADIUM-226 CONCENTRATION DECONVOLUTION GRAPH

8

PROPERTY NUMBER: GJ-03311-RS
HOLE NUMBER: 8
LOCATION: 157250



Depth (in)	Apparent Radium-226 (pCi/g) Undeconvolved	Apparent Radium-226 (pCi/g) Deconvolved
3	3.3	3.3
6	3.5	3.9
9	3.5	3.3
12	3.6	3.8
15	3.6	3.4
18	3.7	3.9
21	3.7	3.7
24	3.7	3.7
27	3.7	3.7
30	3.7	3.5
33	3.8	3.0

APPARENT RADIUM-226 CONCENTRATION 12 DECONVOLUTION GRAPH

PROPERTY NUMBER: GJ-03311-RS
HOLE NUMBER: 12
LOCATION: 181270



Depth (in)	Apparent Radium-226 (pCi/g) Undeconvolved	Apparent Radium-226 (pCi/g) Deconvolved
3	6.9	6.9
6	8.4	11.4
9	8.2	10.2
12	6.9	6.9
15	5.6	4.4
18	5.0	4.8
21	4.5	4.0
24	4.3	4.3
27	4.1	3.7
30	4.1	4.3
33	4.0	4.0
36	3.9	3.5
39	4.0	4.4
42	3.9	3.7
45	3.9	3.9

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54
57
60
63
66
69

3.9
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3.6
3.7
3.6
3.6
3.5

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3.1
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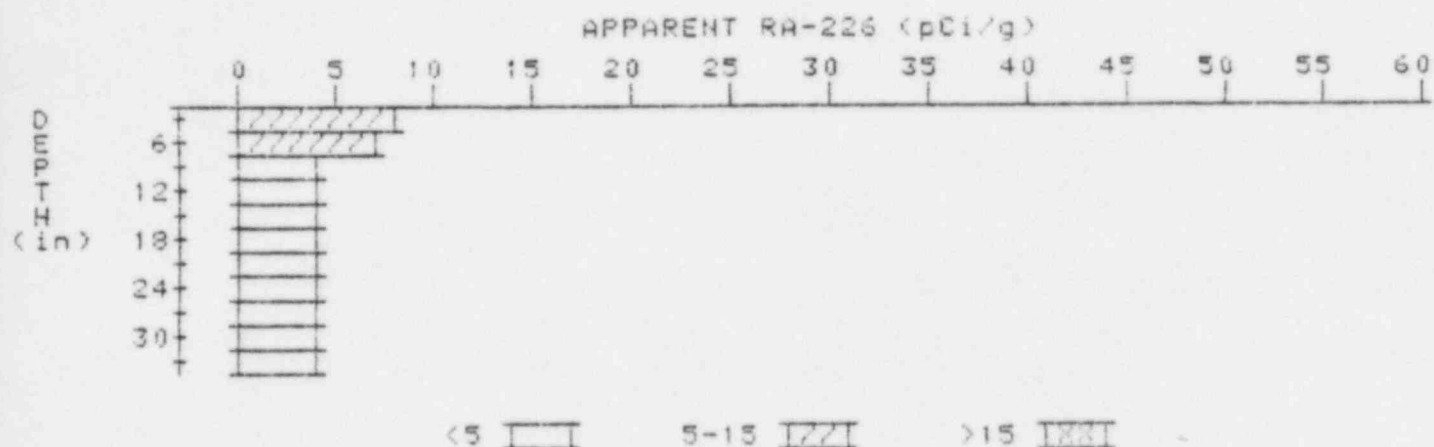
APPARENT RADIUM-226 CONCENTRATION 13

DECONVOLUTION GRAPH

PROPERTY NUMBER: GJ-03311-RS

HOLE NUMBER: 13

LOCATION: 183166



Depth (in)	Apparent Radium-226 (pCi/g) Undeconvolved	Apparent Radium-226 (pCi/g) Deconvolved
3	7.5	7.5
6	6.5	7.0
9	5.2	4.1
12	4.5	3.8
15	4.2	4.0
18	4.0	4.0
21	3.8	3.6
24	3.7	3.5
27	3.7	3.7
30	3.7	3.7
33	3.7	3.7

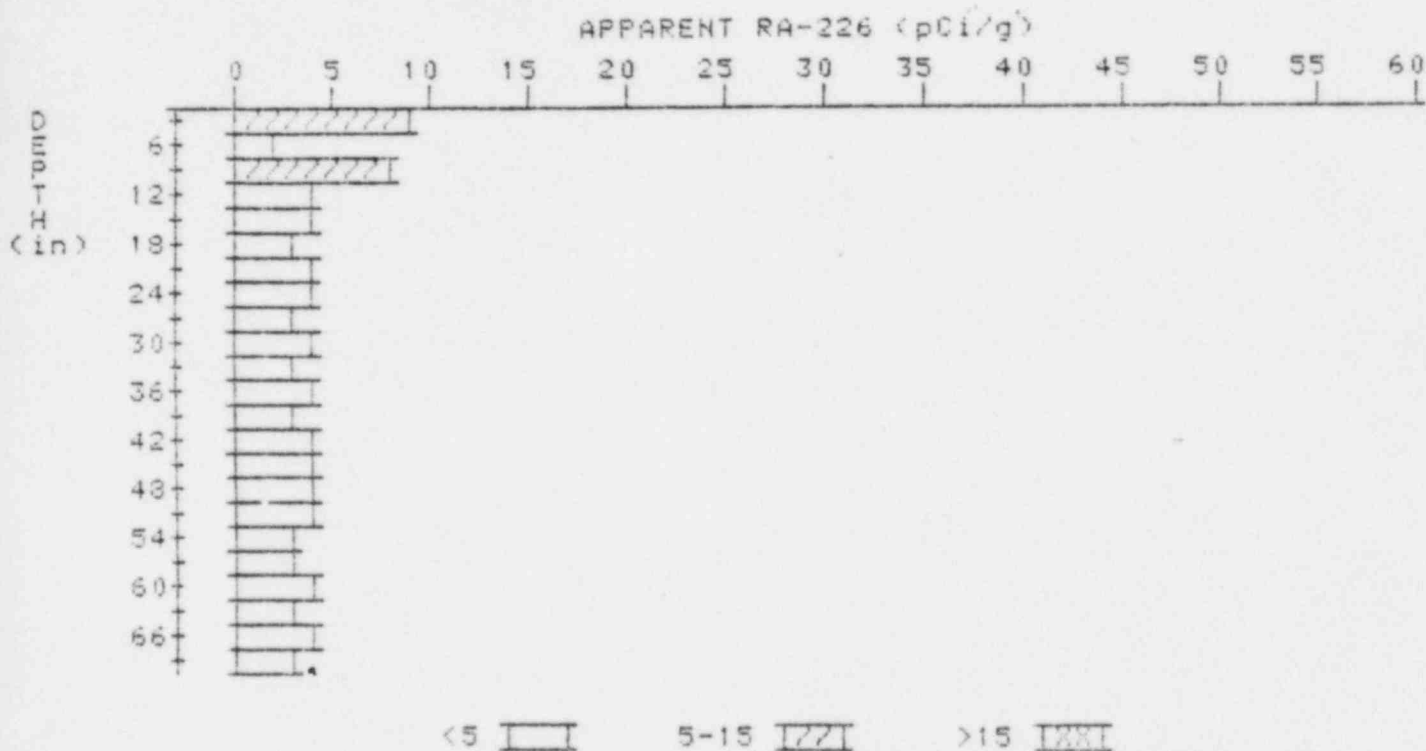
APPARENT RADIUM-226 CONCENTRATION 14

DECONVOLUTION GRAPH

PROPERTY NUMBER: GJ-03311-RS

HOLE NUMBER: 14

LOCATION: 188194



Depth (in)	Apparent Radium-226 (pCi/g) Undeconvolved	Apparent Radium-226 (pCi/g) Deconvolved
3	9.1	9.1
6	6.5	2.4
9	6.2	8.0
12	4.9	3.7
15	4.3	3.9
18	3.9	3.4
21	3.8	3.8
24	3.7	3.7
27	3.6	3.4
30	3.6	3.8
33	3.5	3.0
36	3.7	4.2
39	3.6	3.4
42	3.6	3.6
45	3.6	3.6

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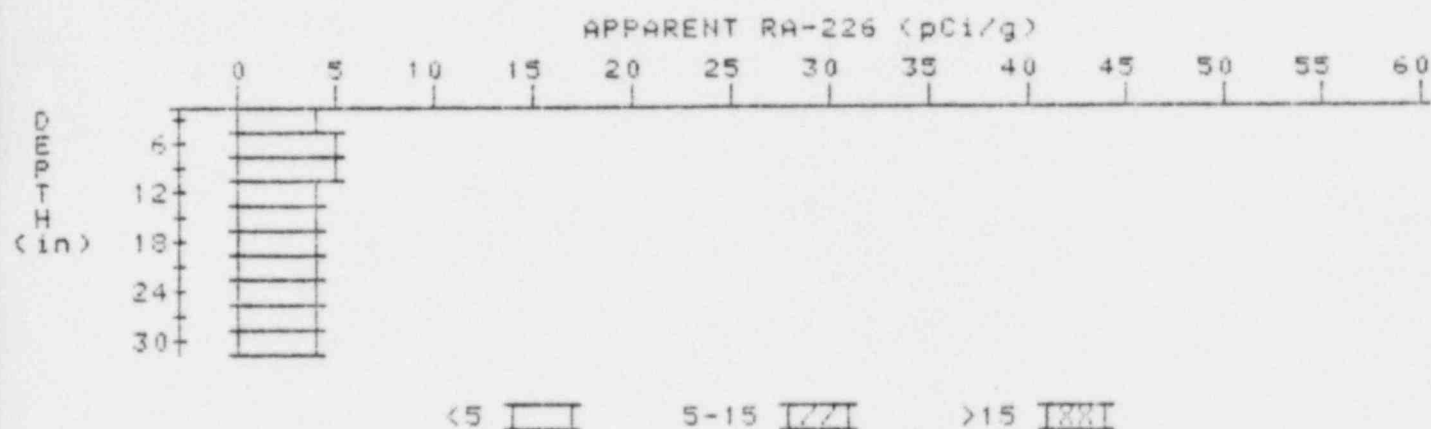
APPARENT RADIUM-226 CONCENTRATION 17

DECONVOLUTION GRAPH

PROPERTY NUMBER: GJ-03311-RS

HOLE NUMBER: 17

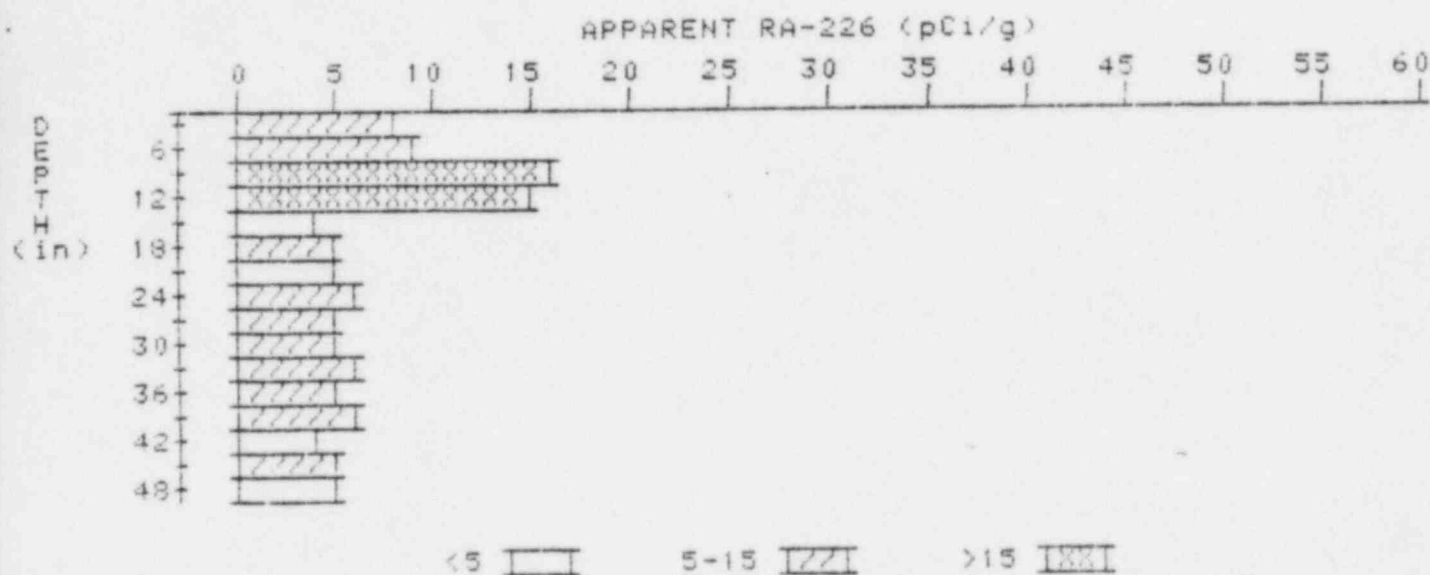
LOCATION: 190250



Depth (in)	Apparent Radium-226 (pCi/g) Undeconvolved	Apparent Radium-226 (pCi/g) Deconvolved
3	3.8	3.8
6	4.2	4.9
9	4.2	4.6
12	4.0	3.8
15	3.9	3.9
18	3.8	3.6
21	3.8	3.8
24	3.8	3.6
27	3.9	4.1
30	3.9	3.9

APPARENT RADIUM-226 CONCENTRATION 19 DECONVOLUTION GRAPH

PROPERTY NUMBER: GJ-03311-RS
HOLE NUMBER: 19
LOCATION: 195175



Depth (in)	Apparent Radium-226 (pCi/g) Undeconvolved	Apparent Radium-226 (pCi/g) Deconvolved
3	7.8	7.8
6	9.3	8.6
9	11.2	15.6
12	10.6	15.0
15	7.5	4.1
18	6.3	5.4
21	5.6	4.5
24	5.5	5.5
27	5.4	5.2
30	5.4	5.4
33	5.4	5.6
36	5.3	5.3
39	5.2	5.6
42	4.9	4.4
45	4.9	5.1
48	4.8	4.8

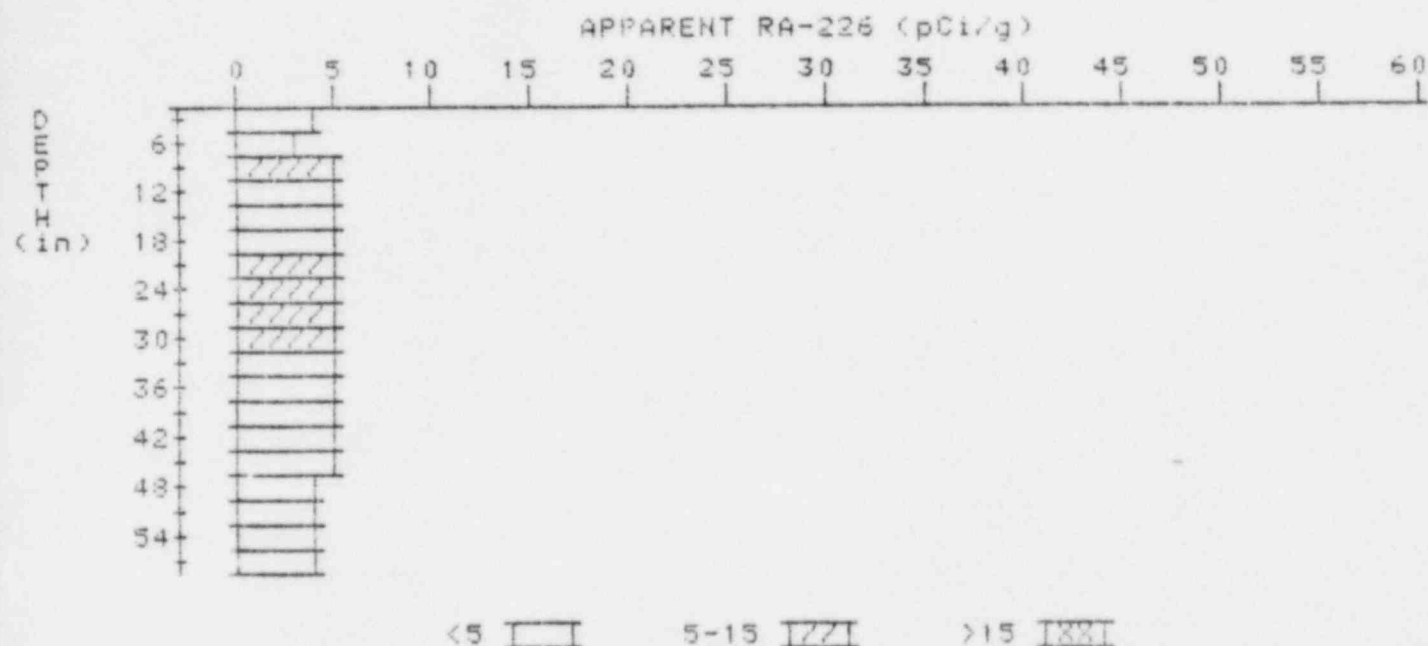
APPARENT RADIUM-226 CONCENTRATION 20

DECONVOLUTION GRAPH

PROPERTY NUMBER: GJ-03311-RS

HOLE NUMBER: 20

LOCATION: 198199



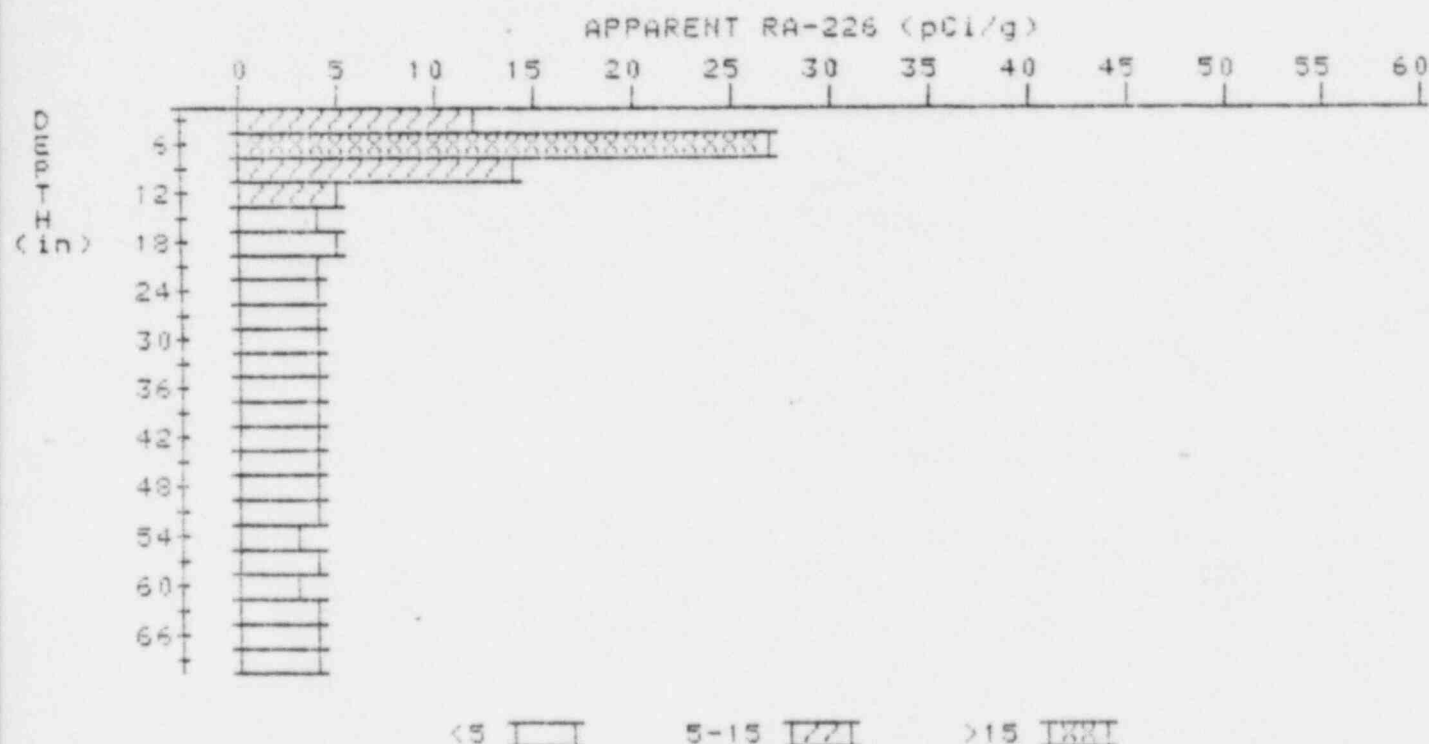
Depth (in)	Apparent Radium-226 (pCi/g) Undeconvolved	Apparent Radium-226 (pCi/g) Deconvolved
3	3.7	3.7
6	3.9	3.4
9	4.4	5.1
12	4.5	4.5
15	4.6	4.6
18	4.7	4.5
21	4.9	5.1
24	5.0	5.2
27	5.0	5.0
30	5.0	5.2
33	4.9	4.9
36	4.8	4.6
39	4.8	5.0
42	4.7	4.9
45	4.5	4.5
48	4.3	4.3
51	4.1	3.9
54	4.0	3.8

APPARENT RADIUM-226 CONCENTRATION 22 DECONVOLUTION GRAPH

PROPERTY NUMBER: GJ-03311-RS

HOLE NUMBER: 22

LOCATION: 200230



Depth (in)	Apparent Radium-226 (pCi/g) Undeconvolved	Apparent Radium-226 (pCi/g) Deconvolved
3	11.8	11.8
6	15.4	27.0
9	12.5	14.5
12	8.5	5.5
15	6.2	3.7
18	5.3	4.9
21	4.6	3.7
24	4.4	4.2
27	4.3	4.3
30	4.2	4.2
33	4.1	4.1
36	4.0	4.0
39	3.9	3.7
42	3.9	4.1
45	3.8	3.8

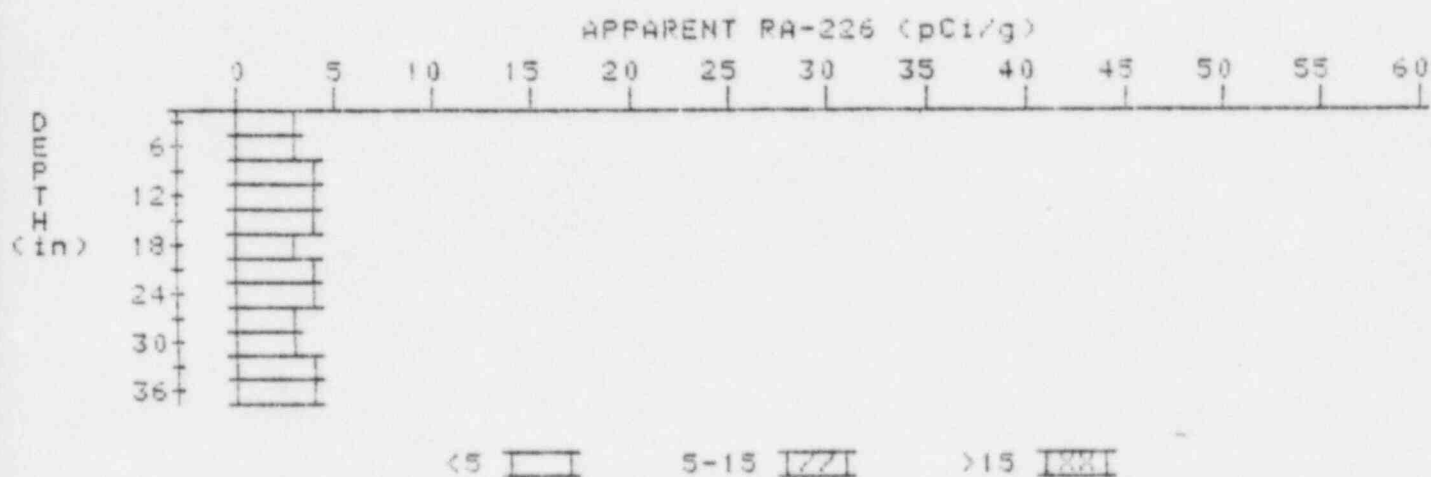
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APPARENT RADIUM-226 CONCENTRATION 23 DECONVOLUTION GRAPH

PROPERTY NUMBER: GJ-03311-RS
HOLE NUMBER: 23
LOCATION: 203240



Depth (in)	Apparent Radium-226 (pCi/g) Undeconvolved	Apparent Radium-226 (pCi/g) Deconvolved
3	3.1	3.1
6	3.3	3.3
9	3.5	3.7
12	3.6	3.6
15	3.7	4.1
18	3.6	3.2
21	3.7	3.7
24	3.8	4.3
27	3.6	3.4
30	3.5	3.3
33	3.5	3.5
36	3.5	3.5

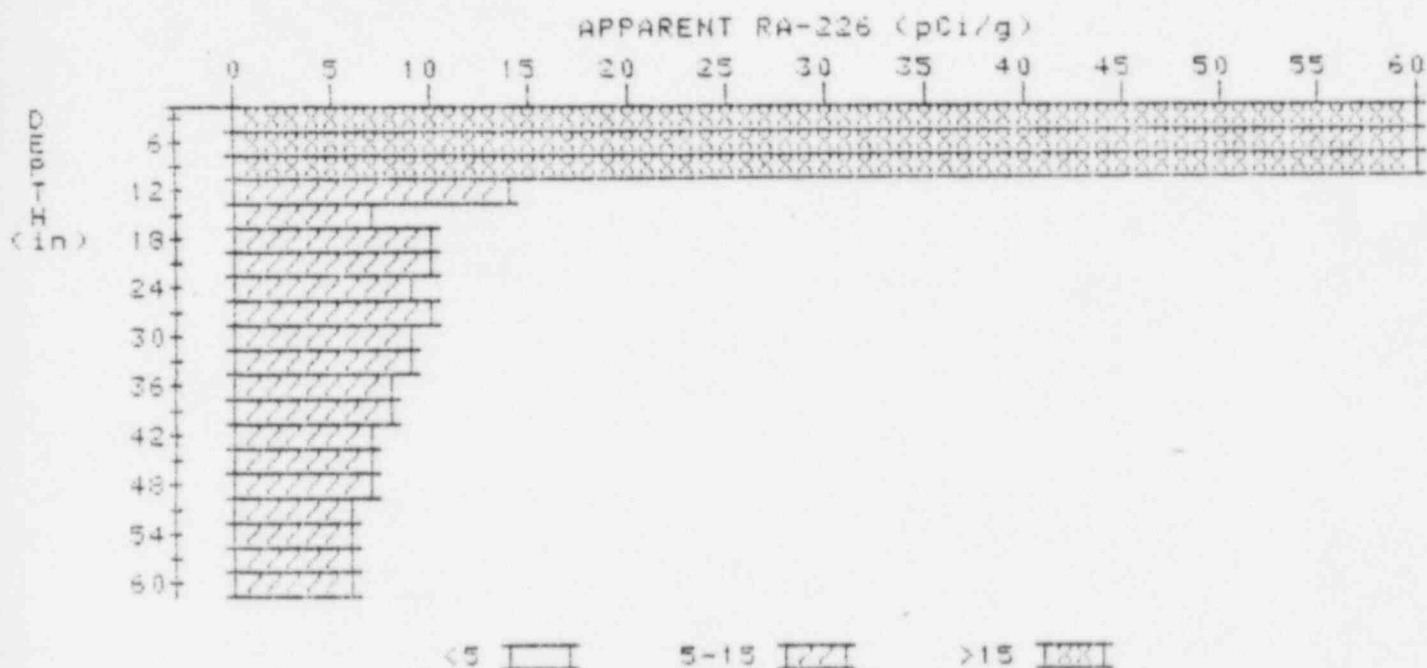
APPARENT RADIUM-226 CONCENTRATION DECONVOLUTION GRAPH

24

PROPERTY NUMBER: GJ-03311-RS

HOLE NUMBER: 24

LOCATION: 205170



Depth (in)	Apparent Radium-226 (pCi/g) Undeconvolved	Apparent Radium-226 (pCi/g) Deconvolved
3	90.8	90.8
6	98.7	166.8
9	68.3	67.1
12	38.6	13.7
15	22.9	7.3
18	16.0	9.3
21	12.6	9.9
24	10.7	8.7
27	9.9	9.5
30	9.3	9.1
33	8.8	9.0
36	8.2	7.8
39	7.8	7.8
42	7.4	7.4
45	7.0	6.8
48	6.7	6.9
51	6.3	5.9
54	6.1	5.6

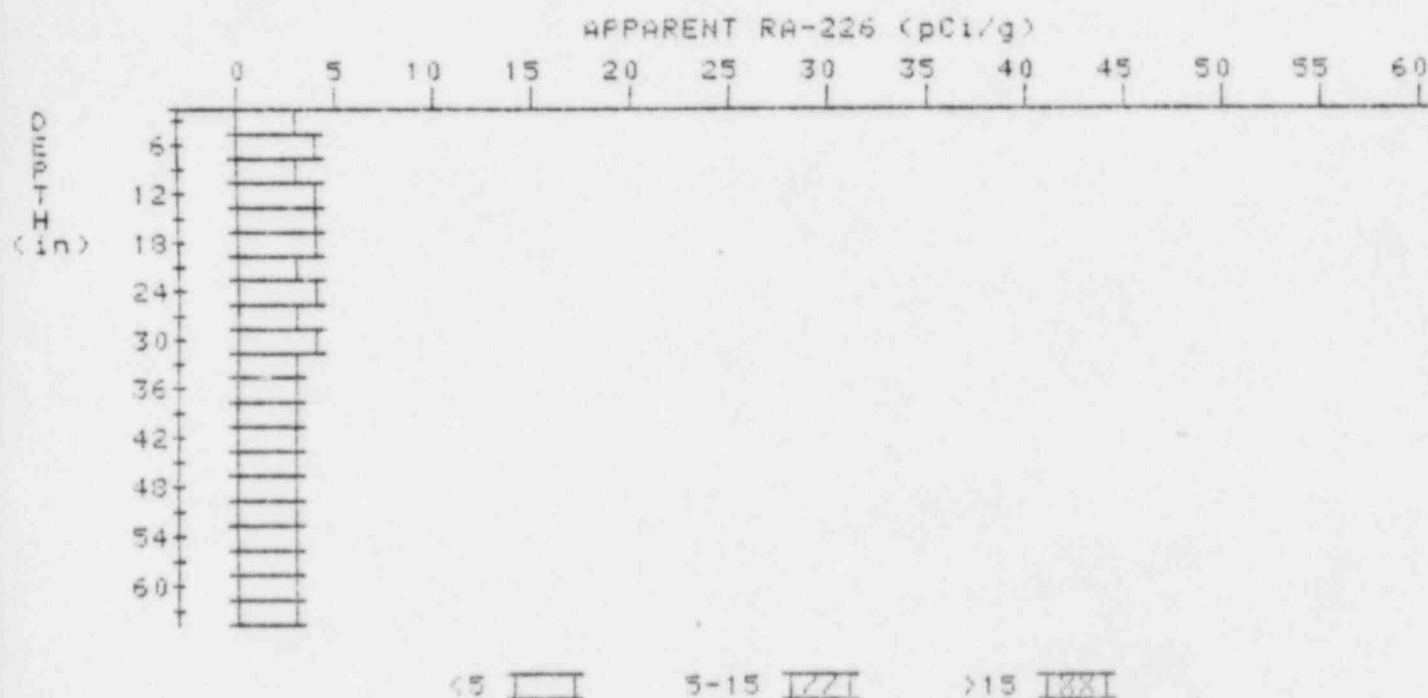
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6.2
6.2

6.4
6.2

APPARENT RADIUM-226 CONCENTRATION 29 DECONVOLUTION GRAPH

PROPERTY NUMBER: GJ-03311-RS
HOLE NUMBER: 29
LOCATION: 213272



Depth (in)	Apparent Radium-226 (pCi/g) Undeconvolved	Apparent Radium-226 (pCi/g) Deconvolved
3	3.4	3.4
6	3.7	4.4
9	3.6	3.4
12	3.6	3.6
15	3.6	3.6
18	3.6	3.3
21	3.9	3.3
24	3.9	3.7
27	3.4	3.0
30	3.8	4.0
33	3.4	3.1
36	3.2	3.0
39	3.2	3.4
42	3.1	2.9
45	3.1	3.3
48	3.0	2.9
51	3.0	3.0

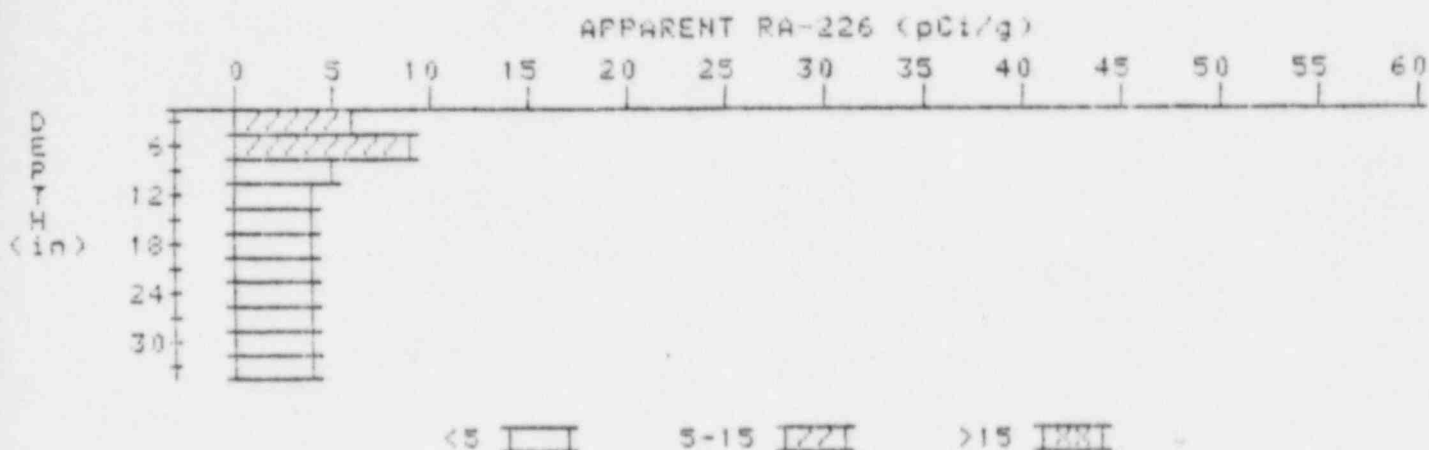
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APPARENT RADIUM-226 CONCENTRATION 30 DECONVOLUTION GRAPH

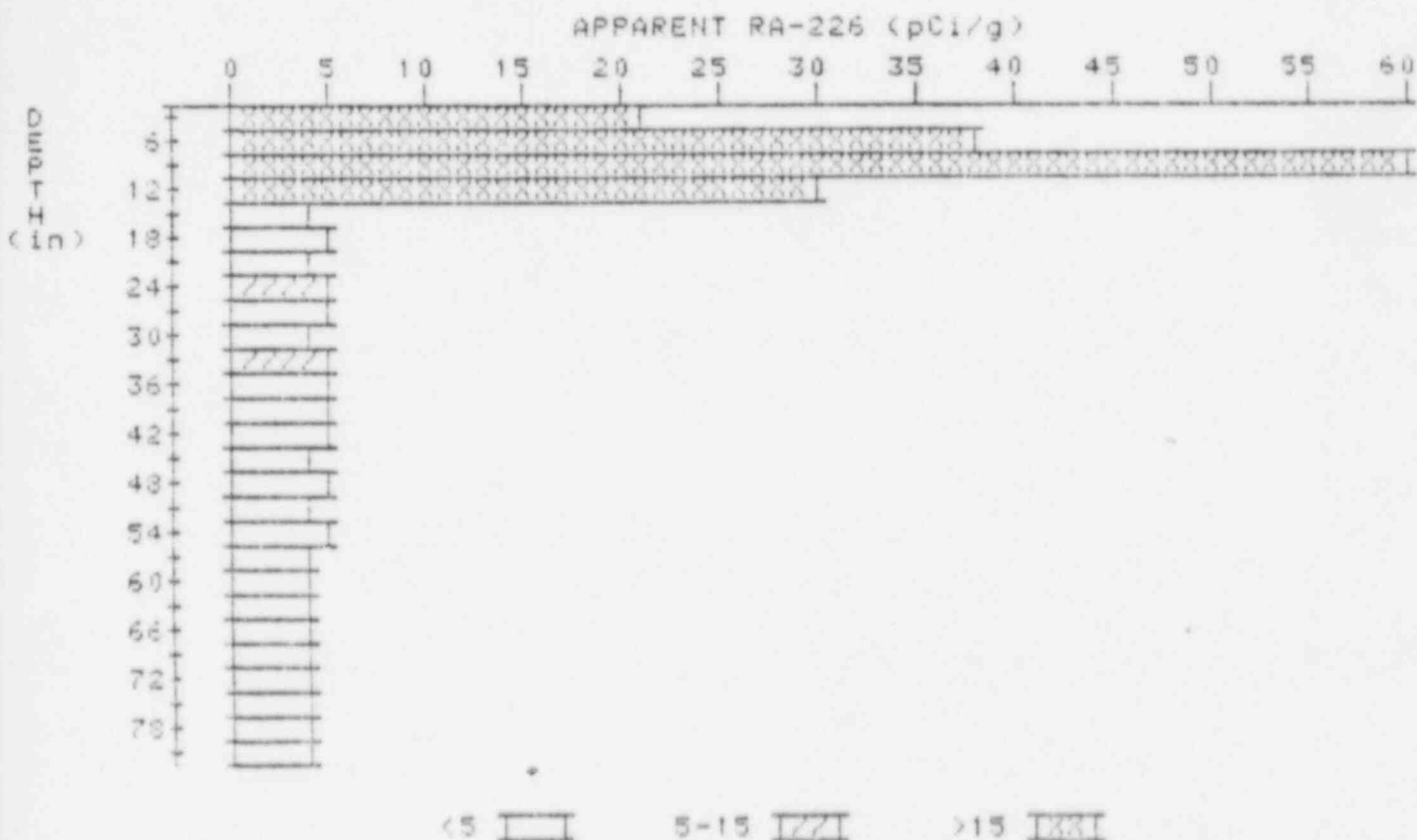
PROPERTY NUMBER: GJ-03311-RS
HOLE NUMBER: 30
LOCATION: 220152



Depth (in)	Apparent Radium-226 (pCi/g) Undeconvolved	Apparent Radium-226 (pCi/g) Deconvolved
3	6.2	6.2
6	6.4	6.7
9	5.3	4.9
12	4.5	3.6
15	4.2	3.8
18	4.1	4.1
21	4.0	4.0
24	3.9	3.7
27	3.9	4.1
30	3.8	3.6
33	3.8	3.8

APPARENT RADIUM-226 CONCENTRATION 31 DECONVOLUTION GRAPH

PROPERTY NUMBER: GJ-03311-RS
HOLE NUMBER: 31
LOCATION: 220169



Depth (in)	Apparent Radium-226 (pCi/g) Undeconvolved	Apparent Radium-226 (pCi/g) Deconvolved
3	20.6	20.6
6	32.0	38.4
9	39.8	74.3
12	28.2	29.6
15	15.3	4.1
18	10.0	4.7
21	7.2	4.2
24	6.1	5.4
27	5.4	4.9
30	5.0	4.5
33	4.9	5.1
36	4.7	4.5

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4.3
3.9
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APPARENT RADIUM-226 CONCENTRATION 33 DECONVOLUTION GRAPH

PROPERTY NUMBER: GJ-03311-RS
HOLE NUMBER: 33
LOCATION: 235180



Depth (in)	Apparent Radium-226 (pCi/g) Undeconvolved	Apparent Radium-226 (pCi/g) Deconvolved
3	19.1	19.1
6	32.8	43.1
9	40.7	85.0
12	23.7	12.1
15	13.2	2.5
18	8.7	3.9
21	6.9	5.5
24	5.9	5.0
27	5.4	5.2
30	5.0	4.8
33	4.8	4.6
36	4.7	4.7
39	4.6	5.0
42	4.3	4.3
45	4.0	3.6
48	3.9	4.1

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4.0
4.1

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3.3
3.9
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3.3
4.1

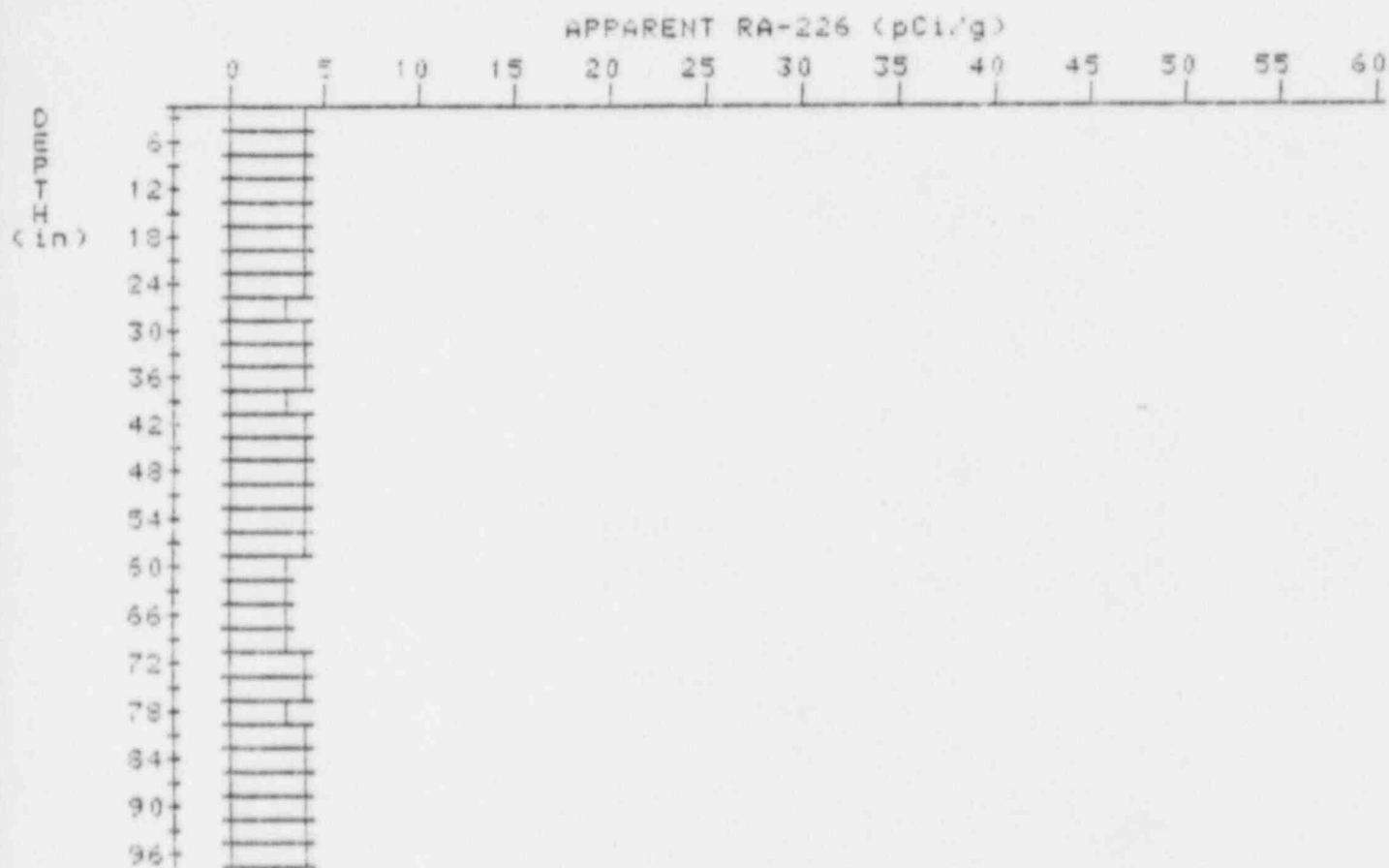
APPARENT RADIUM-226 CONCENTRATION 42

DECONVOLUTION GRAPH

PROPERTY NUMBER: GJ-03311-RS

HOLE NUMBER: 42

LOCATION: 241255



Depth (in)	Apparent Radium-226 (pCi/g) Undeconvolved	Apparent Radium-226 (pCi/g) Deconvolved
3	3.9	3.9
6	3.9	4.1
9	3.8	3.8
12	3.7	3.5
15	3.7	3.5
18	3.8	4.0
21	3.8	3.8
24	3.8	4.0
27	3.7	3.3

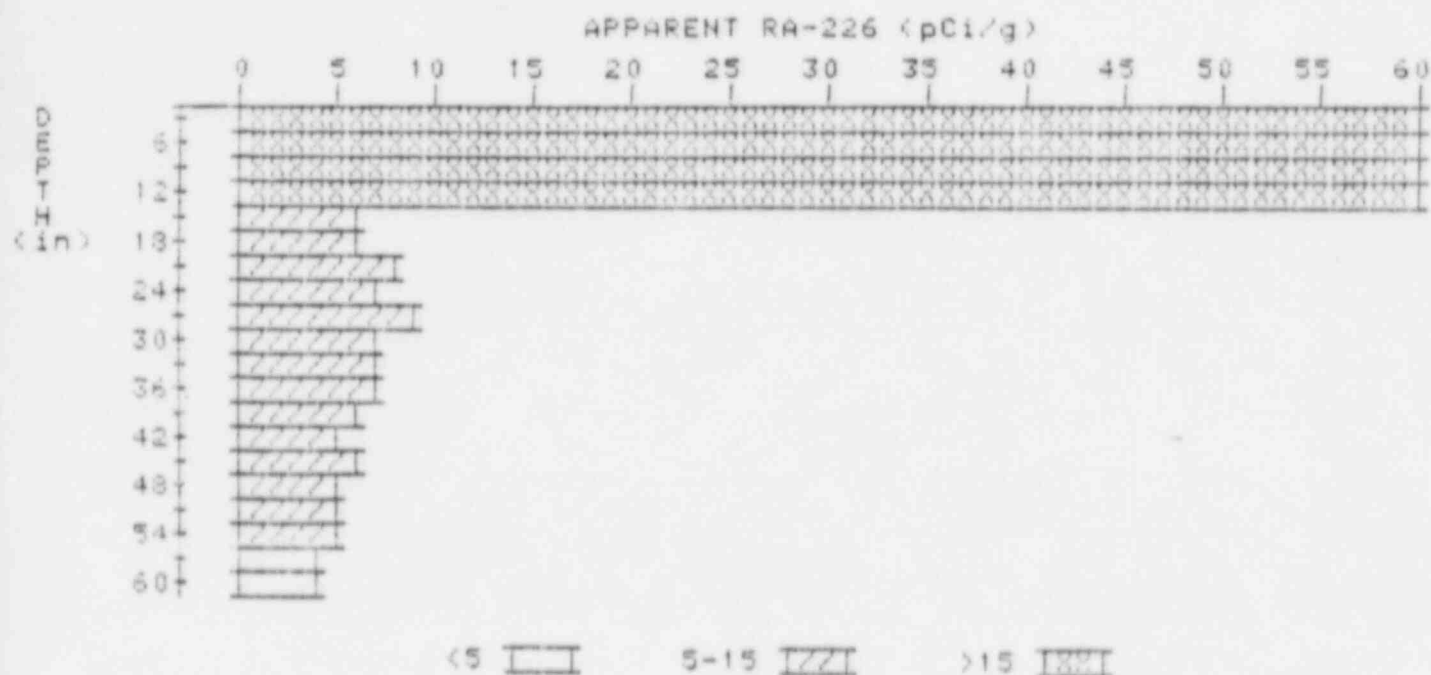
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APPARENT RADIUM-226 CONCENTRATION 43 DECONVOLUTION GRAPH

PROPERTY NUMBER: GJ-03311-RS
HOLE NUMBER: 43
LOCATION: 243213



Depth (in)	Apparent Radium-226 (pCi/g) Undeconvolved	Apparent Radium-226 (pCi/g) Deconvolved
3	62.0	62.0
6	95.4	135.9
9	106.0	187.6
12	70.7	67.3
15	37.3	5.8
18	21.6	6.5
21	14.4	8.0
24	10.8	6.9
27	9.4	9.4
30	8.0	6.9
33	7.2	6.7
36	6.7	6.9
39	6.1	5.7
42	5.7	5.3
45	5.5	5.7
48	5.2	5.0
51	5.0	5.0
54	4.8	5.3

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4.2

3.6
4.2

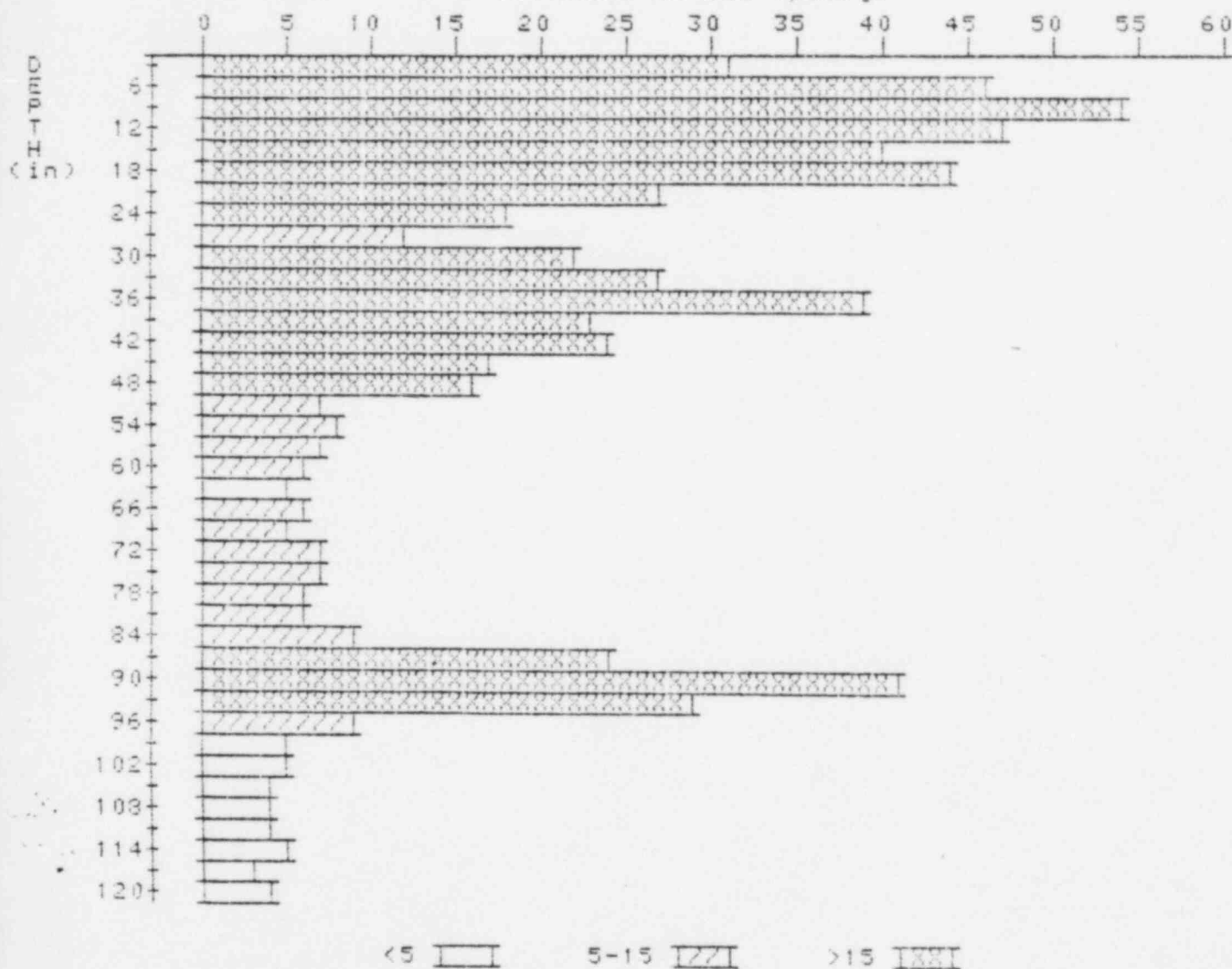
APPARENT RADIUM-226 CONCENTRATION 45 DECONVOLUTION GRAPH

PROPERTY NUMBER: GJ-03311-RS

HOLE NUMBER: 45

LOCATION: 249254

APPARENT RA-226 (pCi/g)



Depth (in)	Apparent Radium-226 (pCi/g) Undeconvolved	Apparent Radium-226 (pCi/g) Deconvolved
3	31.2	31.2
6	39.5	45.9
9	44.2	54.3

12	43.2	46.9
15	40.1	40.5
18	36.8	43.9
21	29.5	26.8
24	23.7	18.2
27	21.0	12.5
30	23.1	21.7
33	26.0	27.1
36	28.3	39.1
39	24.5	22.5
42	21.8	23.6
45	18.1	17.4
48	14.8	15.9
51	10.9	7.2
54	9.1	8.4
57	7.7	6.8
60	6.8	6.4
63	6.1	4.9
66	6.1	6.1
69	6.1	5.0
72	6.7	6.9
75	7.2	6.7
78	8.0	5.9
81	10.0	6.4
84	14.0	9.4
87	20.6	23.6
90	25.5	41.0
93	21.7	28.6
96	14.0	9.0
99	9.1	4.7
102	6.7	4.7
105	5.4	4.2
108	4.8	4.1
111	4.6	4.4
114	4.5	4.9
117	4.2	3.5
120	4.3	4.3

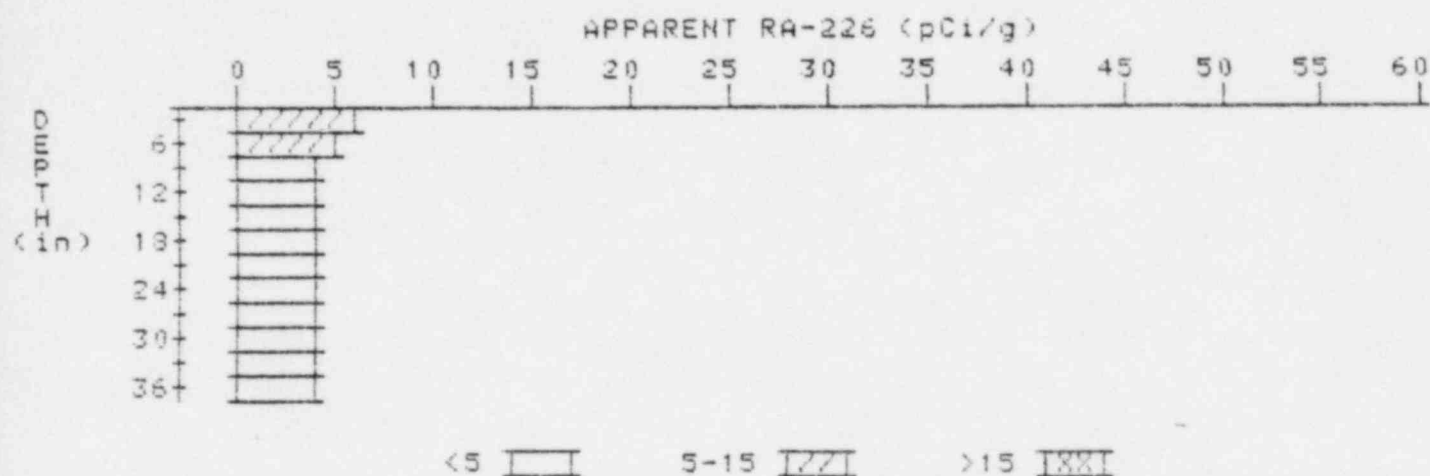
APPARENT RADIUM-226 CONCENTRATION 48

DECONVOLUTION GRAPH

PROPERTY NUMBER: GJ-03311-RS

HOLE NUMBER: 48

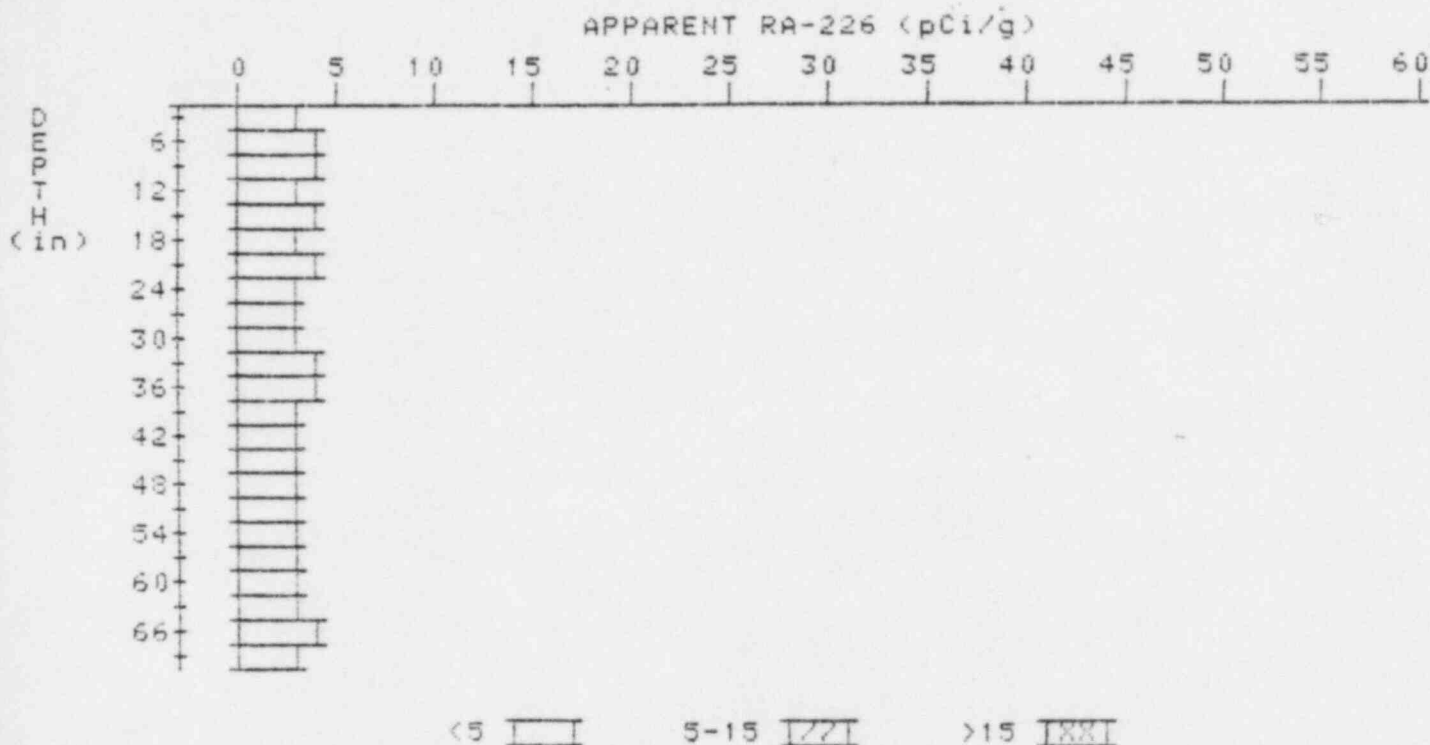
LOCATION: 253254



Depth (in)	Apparent Radium-226 (pCi/g)	Apparent Radium-226 (pCi/g)
	Undeconvolved	Deconvolved
3	5.6	5.6
6	5.1	5.3
9	4.5	4.1
12	4.1	3.7
15	3.9	3.7
18	3.9	3.6
21	3.8	4.0
24	3.7	3.5
27	3.7	3.5
30	3.8	4.2
33	3.7	3.5
36	3.7	3.7

APPARENT RADIUM-226 CONCENTRATION 49 DECONVOLUTION GRAPH

PROPERTY NUMBER: GJ-03311-RS
HOLE NUMBER: 49
LOCATION: 260290



Depth (in)	Apparent Radium-226 (pCi/g) Undeconvolved	Apparent Radium-226 (pCi/g) Deconvolved
3	3.4	3.4
6	3.5	3.7
9	3.5	3.7
12	3.4	3.2
15	3.4	3.8
18	3.2	2.7
21	3.3	3.7
24	3.2	2.8
27	3.3	3.5
30	3.3	3.1
33	3.4	3.6
36	3.4	3.6
39	3.3	3.1
42	3.3	3.3
45	3.3	3.5

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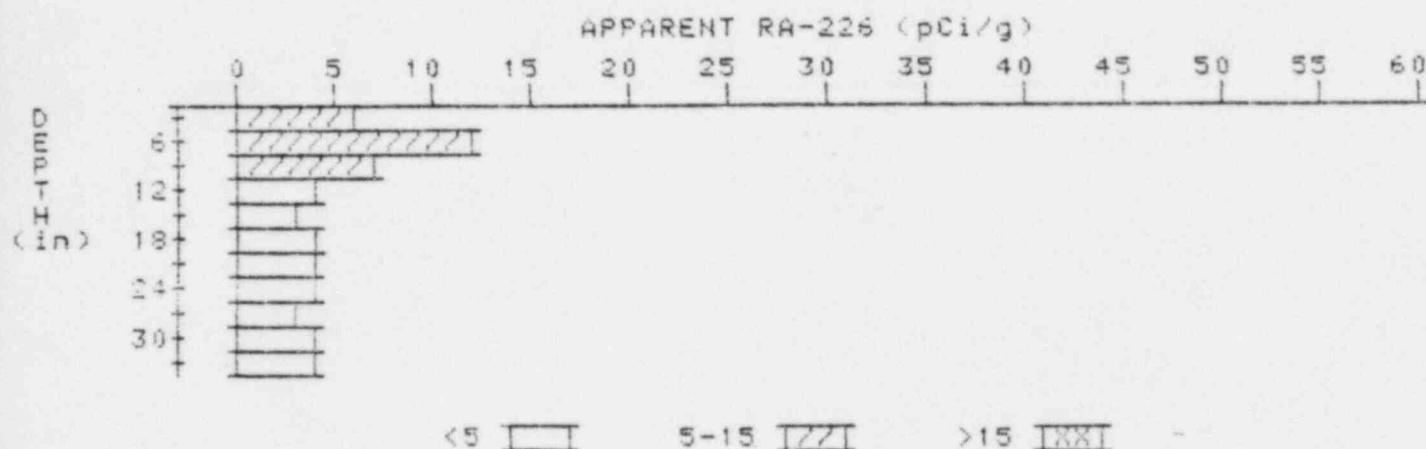
APPARENT RADIUM-226 CONCENTRATION 51

DECONVOLUTION GRAPH

PROPERTY NUMBER: GJ-03311-RS

HOLE NUMBER: 51

LOCATION: 270212



Depth (in)	Apparent Radium-226 (pCi/g) Undeconvolved	Apparent Radium-226 (pCi/g) Deconvolved
3	6.2	6.2
6	7.5	11.6
9	6.5	7.0
12	5.2	4.5
15	4.3	3.4
18	3.9	3.5
21	3.7	3.5
24	3.6	3.6
27	3.5	3.1
30	3.6	4.0
33	3.5	3.5

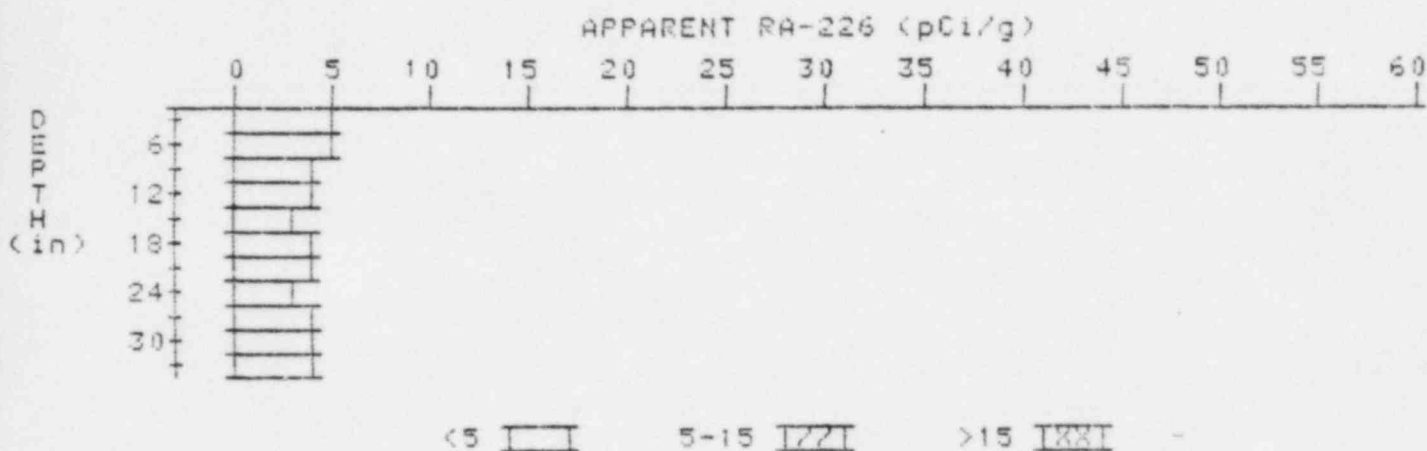
APPARENT RADIUM-226 CONCENTRATION 52

DECONVOLUTION GRAPH

PROPERTY NUMBER: GJ-03311-RS

HOLE NUMBER: 52

LOCATION: 273257



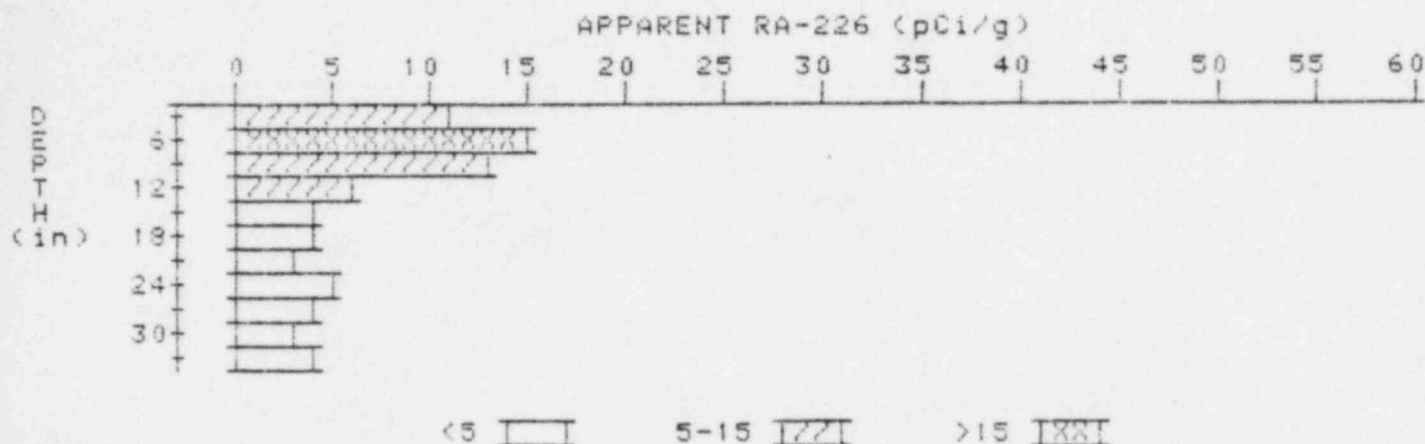
Depth (in)	Apparent Radium-226 (pCi/g)	Apparent Radium-226 (pCi/g)
	Undeconvolved	Deconvolved
3	4.5	4.5
6	4.4	4.8
9	4.1	4.1
12	3.9	3.6
15	3.6	3.1
18	3.7	3.9
21	3.7	3.9
24	3.6	3.2
27	3.7	3.9
30	3.7	3.9
33	3.6	3.6

APPARENT RADIUM-226 CONCENTRATION 55 DECONVOLUTION GRAPH

PROPERTY NUMBER: GJ-03311-RS

HOLE NUMBER: 55

LOCATION: 123240



Depth (in)	Apparent Radium-226 (pCi/g) Undeconvolved	Apparent Radium-226 (pCi/g) Deconvolved
3	11.4	11.4
6	11.9	15.3
9	10.5	13.0
12	7.7	6.3
15	5.7	3.7
18	4.8	4.3
21	4.2	3.1
24	4.2	4.7
27	3.9	3.7
30	3.7	3.0
33	3.9	3.9