

RADIOLOGIC AND ENGINEERING ASSESSMENT

FOR

DOE ID NO.: GJ-00055-MR  
ADDRESS: 2530 MESA AVENUE

AUGUST 1985

FOR

URANIUM MILL TAILINGS REMEDIAL ACTION PROJECT OFFICE

ALBUQUERQUE OPERATIONS OFFICE

DEPARTMENT OF ENERGY

BY

BENDIX FIELD ENGINEERING CORPORATION  
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September 3, 1985

REA00055:REA-617

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## 1.0 EXECUTIVE SUMMARY

### 1.1 Introduction

The location, DOE ID No. GJ-00055-MR, is a single-family residence located at 2530 Mesa 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, 48 cu. yd.; interior, 1 cu. yd.

It is recommended that no remedial action be performed on Areas A and B of this property as discussed in Section 4.0 of this REA.

Estimated cost to perform remedial action, including dislocation when applicable, is \$6,366. Remedial action on this property will take approximately 14 days to complete.

## 2.0 PROPERTY DESCRIPTION

### 2.1 General Description

Address: 2530 Mesa Avenue, Grand Junction, Colorado

Zoning: Residential (RSF-8)

Lot Size: Approximately 6,900 sf (0.16 acres)

Legal Description: East 60 feet of the west 240 feet of Lot 12, Block 2, of the Melrose Subdivision, City of Grand Junction, County of Mesa, State of Colorado.

Point of Reference: This property is located approximately 2 mile(s) 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:	Overhead
Sewer:	Underground
Water:	Underground
Cable TV:	Overhead

Bordering Properties:

North:	Alley
South:	Mesa Avenue (asphalt)
East:	Single-family residence
West:	Single-family residence

### 2.2 Existing Facilities and Structures

Primary Structure:

Type:	Single-story residence with attached garage
Size:	Approximately 900 sf
Construction Date:	1958
Construction:	Wood-frame
Foundation:	Concrete stemwall on spread footing
Footing Depth:	Approximately 30" to bottom of footing from grade
Basement:	None
Crawl Space:	Yes - under entire living area
Condition:	Good



Other Structures:

Type:	Attached carport/shed
Size:	Approximately 260 sf
Construction:	Wood-frame
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-00055-MR on June 12, 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 carport, in the north yard against the primary structure, and in the foundation of 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, deconvolution graphs, and Exterior Gamma Scan map are included in the Appendix (Section 6.0).

#### 3.2 Gamma Exposure-Rate Surveys

##### 3.2.1 Exterior Findings

Background Readings: 16 to 17 uR/h  
Highest Outside Gamma Reading (HOG): 65 uR/h

Exterior radium-concentration measurements are presented in Appendix Table 3.1. Grid-point survey results are shown in Appendix Figure 3.1.

##### 3.2.2 Interior Findings

Background Readings: 14 to 18 uR/h  
Highest Inside Gamma Reading (HIG): 24 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 3.2a and 3.2b 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 3.2a and 3.3. Data from these investigations are included in Appendix Tables 3.1 and 3.2

### 3.4 Radon/Radon Daughter Concentration (RDC)

Determined by CDH: 0.016 gross working level (WL). No additional RDC measurements were taken by Bendix.

### 3.5 Extent of Contamination

Appendix Figures 3.4a and 3.4b show identified areas and estimated depths of contamination on this property, based on assessments of all measurements taken. As noted in these figures, areas that contain identified residual radioactive materials are:

- (Area A) Surface Material: Concrete  
 Direction From Primary Structure: Crawl space  
 Other (height or thickness): See detail A  
 Comments: The support pads and columns in the crawl space are contaminated.  
 Approximate Square Footage: N/A (This area is excluded from remedial action.)
- (Area B) Surface Material: Concrete  
 Direction From Primary Structure: Crawl space  
 Other (height or thickness): See detail B  
 Comments: The footing and the foundation walls are contaminated.  
 Approximate Square Footage: N/A (This area is excluded from remedial action.)
- (Area C) Surface Material: Concrete  
 Direction From Primary Structure: West  
 Total Depth of Contamination: 5 inches  
 Other (height or thickness): 5-inch-thick concrete  
 Approximate Square Footage: 46
- (Area D) Surface Material: Soil  
 Direction From Primary Structure: North  
 Other Directions: At north property line  
 Total Depth of Contamination: 6 inches  
 Comments: Two deposits are included in this area.  
 Approximate Square Footage: 24
- (Area E) Surface Material: Roadbase  
 Direction From Primary Structure: North  
 Other Directions: In alley  
 Total Depth of Contamination: 9 inches  
 Approximate Square Footage: 30

- (Area F) Surface Material: Roadbase  
Direction From Primary Structure: North  
Other Directions: Northeast property corner  
Total Depth of Contamination: 12 inches  
Comments: In alley  
Approximate Square Footage: 30
- (Area G) Surface Material: Lawn  
Direction From Primary Structure: North  
Other Directions: Northeast property corner  
Total Depth of Contamination: 18 inches  
Approximate Square Footage: 25
- (Area H) Surface Material: Lawn  
Direction From Primary Structure: North  
Other Directions: Northeast property corner  
Total Depth of Contamination: 6 inches  
Comments: Trees, bushes, and a fence are within this area.  
Approximate Square Footage: 165
- (Area I) Surface Material: Concrete  
Direction From Primary Structure: Northwest  
Total Depth of Contamination: 4 inches  
Other (height or thickness): 4-inch-thick concrete  
Approximate Square Footage: 128
- (Area J) Surface Material: Lawn  
Direction From Primary Structure: North  
Other Directions: Abuts north edge of patio  
Total Depth of Contamination: 6 inches  
Comments: Trees are within this area.  
Approximate Square Footage: 64
- (Area K) Surface Material: Lawn  
Direction From Primary Structure: North  
Other Directions: East of Area J  
Total Depth of Contamination: 18 inches  
Comments: Sprinkler system in lawn  
Approximate Square Footage: 133
- (Area L) Surface Material: Lawn  
Direction From Primary Structure: Northwest  
Other Directions: North of the shed  
Total Depth of Contamination: 12 inches  
Approximate Square Footage: 144
- (Area M) Surface Material: Soil  
Direction From Primary Structure: Northwest  
Other Directions: North of the shed  
Total Depth of Contamination: 12 inches  
Comments: A flower bed is within this area. Two deposits are included.  
Approximate Square Footage: 108

- (Area N) Surface Material: Masonry pavers  
 Direction From Primary Structure: North  
 Other Directions: Patio; abuts north foundation  
 Total Depth of Contamination: 12 inches  
 Other (height or thickness): 2-inch-thick masonry pavers  
 Comments: The bricks have been laid without mortar.  
 Approximate Square Footage: 208
- (Area O) Surface Material: Soil  
 Direction From Primary Structure: North  
 Other Directions: Abuts north foundation  
 Total Depth of Contamination: 12 inches  
 Comments: A flower bed is within this area.  
 Approximate Square Footage: 44
- (Area P) Surface Material: Lawn  
 Direction From Primary Structure: Northeast  
 Other Directions: Along east property line  
 Total Depth of Contamination: 6 inches  
 Comments: Small isolated area  
 Approximate Square Footage: 25
- (Area Q) Surface Material: Lawn  
 Direction From Primary Structure: North  
 Other Directions: North of Area O  
 Total Depth of Contamination: 12 inches  
 Comments: A small bush is within this area.  
 Approximate Square Footage: 126
- (Area R) Surface Material: Masonry pavers  
 Direction From Primary Structure: Northwest  
 Other Directions: North of the shed  
 Total Depth of Contamination: 12 inches  
 Other (height or thickness): 2-inch-thick masonry pavers  
 Comments: The depth of contamination is based on data  
 collected in Area N.  
 Approximate Square Footage: 18
- (Area S) Surface Material: Concrete  
 Direction From Primary Structure: West  
 Other Directions: South of the shed  
 Total Depth of Contamination: 5 inches  
 Other (height or thickness): 5-inch-thick concrete  
 Comments: The west and south stoops are included in this  
 area.  
 Approximate Square Footage: 318
- (Area T) Surface Material: Lawn  
 Direction From Primary Structure: Southwest  
 Total Depth of Contamination: 6 inches  
 Comments: Next to south stoop  
 Approximate Square Footage: 16

#### 4.0 RECOMMENDED REMEDIAL ACTION

##### 4.1 Decontamination and Restoration

The recommended remedial action for this property, DOE ID No. GJ-00055-MR, includes removal of all areas identified as containing radioactive material (as discussed in Section 3.5 and shown in Appendix Figures 3.4a and 3.4b) and transport of removed material to the disposal site.

Remedial action will not be performed on Areas A and B of this property because the levels of radioactivity in these areas do not exceed the EPA Standards (40 CFR 192), as described below:

- (1) Indoor radon-decay products shall not exceed a working level of 0.03, nor, to the extent possible, a working level of 0.02. (At this property the gross working level, as determined by CDH, is 0.016.)
- (2) Indoor gamma radiation shall not exceed 20 microroentgens per hour (uR/h above background levels). (At this location the interior background readings were found to be between 14 and 18 uR/h, with the highest mean surface gamma reading at 28 uR/h.)

An indoor RDC measurement will be completed on this property. If the RDC measurement exceeds EPA standards, then the REA will be revised and remedial action accomplished on Areas A and B in accordance with the Vicinity Property Management and Implementation Manual.

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 \$6,336.

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-GMD4-84AL28460) 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	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 2.2	Site Plan
Figure 3.1	Exterior Grid-Point Exposure Rates
Figure 3.2a	Interior Gamma Exposure Rates and Sample Locations
Figure 3.2b	Interior Gamma Exposure Rates
Figure 3.3	Exterior Sample Locations
Figure 3.4a	Interior Estimated Extent of Contamination
Figure 3.4b	Exterior Estimated Extent of Contamination

Official Survey Report

Memo of Understanding

Team Leader Notes

Deconvolution Graphs (Apparent Radium-226 Concentration)

Exterior Gamma Scan Map



## 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.		
13	116255	00	DS	1.5		*	Alley
		06	DS	1.4		*	
14	121253	03	TC	13.9		*	Alley
		06	TC	10.2		*	DC = 9 inches
		09	TC	7.0		*	Based on the
		12	TC	5.3		*	deconvolution graph
		15	TC	4.3		*	
		18	TC	3.9		*	
		21	TC	3.7		*	
		24	TC	3.6		*	
		27	TC	3.6		*	
		30	TC	3.8		*	
		33	TC	3.9		*	
15	122275	00	DS	3.7		*	Alley
		06	DS	6.6		*	
		12	DS	<1.0		*	
16	124268	00	DS	11.6		*	Alley
		06	DS	1.9		*	
17	125246	00	DS	4.9		*	Alley
		06	DS	1.5		*	
18	125251	00	DS	2.0		*	Alley
		06	DS	1.2		*	
19	126224	00	DS	7.1		*	North fence
		06	DS	1.7		*	
20	127258	00	DS	2.6		*	Along north fence
		06	DS	1.4		*	
21	131271	03	TC	7.1		*	Northeast corner of property DC = 18 inches Based on the deconvolution graph
		06	TC	9.1		*	
		09	TC	10.0		*	
		12	TC	9.0		*	
		15	TC	7.1		*	
		18	TC	5.5		*	
		21	TC	4.7		*	
		24	TC	4.2		*	
		27	TC	3.9		*	

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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.		
21	131271	30	TC	3.8		*	
		33	TC	3.7		*	
		36	TC	3.6		*	
22	133228	00	DS	1.7		*	Off sidewalk
		00	DS	4.6		*	On sidewalk
		06	DS	1.5		*	
		12	DS	1.5		*	Horizontal
23	135261	00	DS	2.9		*	Near north fence
		06	DS	1.7		*	
24	137273	00	DS	2.8		*	Near north fence
		06	DS	1.6		*	
25	147274	00	DS	1.3		*	North of primary structure
		06	DS	<1.0		*	
26	154231	00	DS	1.8		*	Off sidewalk
		00	DS	4.4		*	On sidewalk
		06	DS	1.7		*	Horizontal
		09	DS	2.3		*	
27	164225	00	DS	<1.0		*	
		06	DS	<1.0		*	
28	165243	00	DS	2.4		*	North of primary structure
		06	DS	1.7		*	
29	167217	00	DS	1.9		*	West of rose bed
		06	DS	1.0		*	
30	169273	00	DS	1.1		*	North of primary structure
		06	DS	<1.0		*	
31	170266	00	DS	1.6		*	North of primary structure
		06	DS	<1.0		*	
32	171234	00	DS	4.8		*	North of primary structure
		06	DS	2.9		*	
		12	DS	1.4		*	

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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.		
33	172254	03	TC	3.3		*	North yard DC = 0 inches
		06	TC	3.7		*	
		09	TC	3.9		*	
		12	TC	3.9		*	
		15	TC	3.9		*	
		18	TC	3.8		*	
		21	TC	3.7		*	
		24	TC	3.8		*	
		27	TC	3.7		*	
		30	TC	3.7		*	
		33	TC	3.6		*	
		36	TC	3.6		*	
		39	TC	3.5		*	
34	175217	03	TC	5.7		*	West fence line DC = 12 inches Based on the deconvolution graph
		06	TC	5.4		*	
		09	TC	5.1		*	
		12	TC	4.5		*	
		15	TC	4.1		*	
		18	TC	3.8		*	
		21	TC	3.7		*	
		24	TC	3.4		*	
		27	TC	3.4		*	
35	175228	03	TC	13.8		*	North lawn next to sidewalk DC = 12 inches Based on the deconvolution graph
		06	TC	15.8		*	
		09	TC	12.5		*	
		12	TC	8.3		*	
		15	TC	6.1		*	
		18	TC	4.8		*	
		21	TC	4.1		*	
		24	TC	3.7		*	
		27	TC	3.7		*	
		30	TC	3.7		*	
36	176274	00	DS	2.0		*	East fence line DC = 0 inches
		03	TC	3.8		*	
		06	TC	4.0		*	
		09	TC	3.9		*	
		12	TC	3.8		*	
		15	TC	3.7		*	

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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.		
36	176274	18	TC	3.6		*	
		21	TC	3.6		*	
		24	TC	3.5		*	
		27	TC	3.5		*	
		30	TC	3.5		*	
		33	TC	3.4		*	
		36	TC	3.4		*	
37	179255	03	TC	17.7		*	North yard
		06	TC	24.4		*	DC = 18 inches
		09	TC	29.5		*	Based on the
		12	TC	25.7		*	deconvolution graph
		15	TC	16.1		*	
		18	TC	10.9		*	
		21	TC	7.9		*	
		24	TC	6.0		*	
		27	TC	5.2		*	
		30	TC	4.8		*	
		33	TC	4.6		*	
		36	TC	4.6		*	
38	182236	03	TC	9.8		*	North patio
		06	TC	11.6		*	DC = 12 inches
		09	TC	10.9		*	Based on the
		12	BH	7.9	3.6	*	deconvolution graph
		15	TC	5.9		*	
		18	TC	4.9		*	
		21	TC	4.5		*	
		24	TC	4.2		*	
		27	TC	3.9		*	
		30	TC	3.9		*	
		33	TC	3.9		*	
		36	TC	3.9		*	
39	183224	03	TC	24.9		*	North of shed
		06	TC	28.6		*	DC = 12 inches
		09	TC	22.2		*	Based on the
		12	TC	13.9		*	deconvolution graph
		15	TC	8.8		*	
		18	TC	6.6		*	
		21	TC	5.5		*	
		24	TC	4.9		*	

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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.		
39	183224	27	TC	4.5		*	
		30	TC	4.3		*	
		33	TC	4.3		*	
40	183263	03	TC	9.5		*	North yard
		06	TC	9.1		*	DC = 12 inches
		09	TC	6.9		*	Based on the
		12	TC	5.0		*	deconvolution graph
		15	TC	4.3		*	
		18	TC	3.8		*	
		21	TC	3.6		*	
		24	TC	3.6		*	
		27	TC	3.5		*	
		30	TC	3.5		*	
		33	TC	3.5		*	
		36	TC	3.5		*	
41	183272	00	DS	2.6		*	Near northeast corner
		06	DS	1.4		*	of primary structure
42	189247	03	TC	9.2		*	North side of primary
		06	TC	8.8		*	structure
		09	TC	6.8		*	DC = 12 inches
		12	BH	5.5	3.1	*	Based on the
		15	TC	4.9		*	deconvolution graph
		18	TC	4.7		*	
		21	TC	4.6		*	
		24	TC	4.3		*	
		27	TC	4.1		*	
		30	TC	3.9		*	
		33	TC	3.8		*	
		36	TC	3.8		*	
		39	TC	3.7		*	
		42	TC	3.6		*	
		45	TC	3.5		*	
43	192217	00	DS	1.8		*	West of carport
		06	DS	1.7		*	
44	193229	00	DS	1.9		*	West steps

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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.		
45	195271	03	TC	3.8		*	East side of primary structure DC = 0 inches Elevated readings are shine from foundation
		06	TC	4.2		*	
		09	TC	4.5		*	
		12	TC	4.5		*	
		15	TC	4.7		*	
		18	TC	4.9		*	
		21	TC	5.3		*	
		24	TC	5.9		*	
46	204272	00	DS	1.3		*	East of primary structure
		06	DS	1.2		*	
47	205225	03	TC	6.7		*	In carport 5-inch-thick core DC = 5 inches Based on all available data
		06	TC	6.9		*	
		09	TC	5.6		*	
		12	BH	4.8	1.6	*	
		15	TC	4.3		*	
		18	TC	4.1		*	
		21	TC	4.0		*	
		24	TC	3.9		*	
		27	TC	3.8		*	
		30	TC	3.9		*	
		33	TC	3.8		*	
		36	TC	3.7		*	
		39	TC	3.6		*	
48	213270	00	DS	1.1		*	Gas line
		20	DS	2.6		*	
49	214217	00	DS	1.9		*	Beside driveway
		06	DS	1.8		*	
50	215257	00	DS	2.4		*	Water line
51	215266	00	DS	1.9		*	Sewer line
52	216233	00	DS	7.8		*	Off south steps
53	216237	00	DS	9.7		*	South steps
54	220236	00	DS	5.0		*	South of south porch
		06	DS	2.1		*	

## Radium Concentrations at Exterior Locations

DOE ID #GJ-00055-MR

2530 Mesa Avenue

Page 7 of 7

Loc #	Grid Location	Depth (in.)	Meas. Type	In Situ Ra-226 (pCi/g)		Chem Ra-226 (pCi/g)	Comments
				Tot. Ct	Spectr.		
55	230270	00	DS	<1.0		*	Gas line
		18	DS	1.2		*	
56	233216	00	DS	1.2		*	Background
		03	TC	3.0		*	West of driveway
		06	TC	3.4		*	DC = 0 inches
		09	TC	3.6		*	
		12	BH	3.7	1.3	*	
		15	TC	3.9		*	
		18	TC	3.8		*	
		21	TC	3.8		*	
		24	TC	3.8		*	
		27	TC	3.8		*	
		30	TC	3.7		*	
		33	TC	3.7		*	

Measurement 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 = 06-12-85  
 Team Leader = PT

## Radium Concentrations at Interior Locations

DOE ID #GJ-00055-MR

2530 Mesa Avenue

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		[06]	DS	12.7		*	On wall
		00	DS	2.2		*	On soil
		[24]	GS		15.0	*	On wall
		00	GS		13.9	*	On footing
2		00	DS	11.0		*	On footing
		00	GS		7.5	*	On soil
3		[18]	DS	8.8		*	On wall
		00	DS	<1.0		*	On soil
		00	DS	9.5		*	On footing
		[18]	GS		14.3	*	On wall
		00	GS		12.0	*	On footing
4		00	DS	10.6		*	On footing
		00	GS		8.0	*	On soil
5		00	DS	<1.0		*	On soil
		00	GS		2.7	*	
6		[18]	DS	10.0		*	On wall
		00	GS		12.2	*	On footing
7		00	DS	9.0		*	On footing
		00	GS		16.6	*	
8		00	DS	11.9		*	Middle of crawl space
		[12]	GS		10.9	*	on concrete pad
9		00	DS	<1.0		*	On soil
10		00	DS	<1.0		*	On soil
11		00	DS	1.3		*	On soil
12		00	DS	1.6		*	On soil

Measurement 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 = 06-12-85  
 Team Leader = PT



Table 3.3

## Summary of Interior Gamma Exposure Rates

DOE ID #GJ-00055-MR

2530 Mesa Avenue

Page 1 of 1

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	00	00-00	00	16	21-49	28
Room A	17	15-20	17	17	16-24	20
Room B	06	16-18	17	06	17-23	20
Room C	06	16-18	17	06	18-23	20
Room D	06	15-17	16	06	18-20	19
Room E	03	14-16	15	03	16-17	16
Shed	01	26-26	26	01	34-34	34

Exposure rates and room locations are shown in Appendix Figures 3.2a and 3.2b.

Table 4.1  
Area and Volume Calculations  
DOE ID No. GJ-00055-MR

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>
INTERIOR (shed)					
Concrete					
C	5.3 x 8.6 =	46	x 0.4 =	18	
Volume of Concrete				18 =	18/27 = 1
TOTAL VOLUME - INTERIOR					= 1
EXTERIOR					
Concrete and Masonry Pavers					
I	64 x 2 =	128	x 0.3 =	38	
N	13 x 16 =	208	x 0.2 =	42	
R	2 x 9 =	18	x 0.2 =	4	
S	20 x 12 =	240			
	3 x 12 =	36			
	3 x 2 =	6			
				282 x 0.4 =	113
	4 x 6 =	24	x 1.2 =	29 (stoop)	
	3 x 4 =	12	x 0.5 =	6 (stoop)	
Volume of Concrete and Masonry Pavers				232 =	232/27 = 9
Contaminated Fill					
D	4 x 6 =	24	x 0.5 =	12	
E	5 x 6 =	30	x 0.8 =	24	
F	5 x 6 =	30	x 1.0 =	30	
G	5 x 5 =	25	x 1.5 =	38	
H	15 x 11 =	165	x 0.5 =	83	
J	4 x 16 =	64	x 0.5 =	32	

Table 4.1  
Area and Volume Calculations  
DOE ID No. GJ-00055-MR

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	7	x	19	=	133	x	1.5	=	200	
L	16	x	9	=	144	x	1.0	=	144	
M	20	x	4	=	80					
	7	x	4	=	28					
					108	x	1.0	=	108	
N	13	x	16	=	208	x	0.8	=	166	
O	22	x	2	=	44	x	1.0	=	44	
P	5	x	5	=	25	x	0.5	=	13	
Q	18	x	7	=	126	x	1.0	=	126	
R	2	x	9	=	18	x	0.8	=	14	
T	8	x	2	=	16	x	0.5	=	8	
Volume of Fill									= 1,042 = 1,042/27 =	39
TOTAL VOLUME - EXTERIOR										= 48

See Appendix Figures 3.4a and 3.4b For Areas

---

INTERIOR (shed)

Remove/replace 5" concrete 46 sf @ \$4.75/sf	\$ 219
Shore and support shed 28 lf @ \$3/lf	84
	<hr/>
TOTAL INTERIOR	\$ 303

EXTERIOR

Remove identified residual radioactive material 31 cy @ \$14.50/cy (machine-open) 8 cy @ \$44/cy (manual-open)	\$ 450 352
Remove/replace concrete 282 sf @ \$4/sf (5" slab) 128 sf @ \$3/sf (4" slab) 1.5 cy @ \$275/cy (stoop)	1,128 384 413
Remove/replace masonry pavers 208 sf @ \$2/sf	416
Replace topsoil 29 cy @ \$9.50/cy	276
Replace roadbase 10 cy @ \$11.50/cy	115
Remove/replace plantings and landscape items Lump sum	500
Replace sod 648 sf @ \$.35/sf	227
	<hr/>
SUBTOTAL EXTERIOR	\$ 4,261

TOTAL EXTERIOR	\$	4,261
TOTAL INTERIOR		303
ACCESS CONTROL		100
		<hr/>
SUBTOTAL	\$	4,664
CONTINGENCY @ 5%		233
		<hr/>
SUBTOTAL	\$	4,897
CONTRACTOR OVERHEAD & PROFIT @ 30%		1,469
		<hr/>
GRAND TOTAL	\$	6,366

=====

JF082985  
REA00055/REA-617/LMR

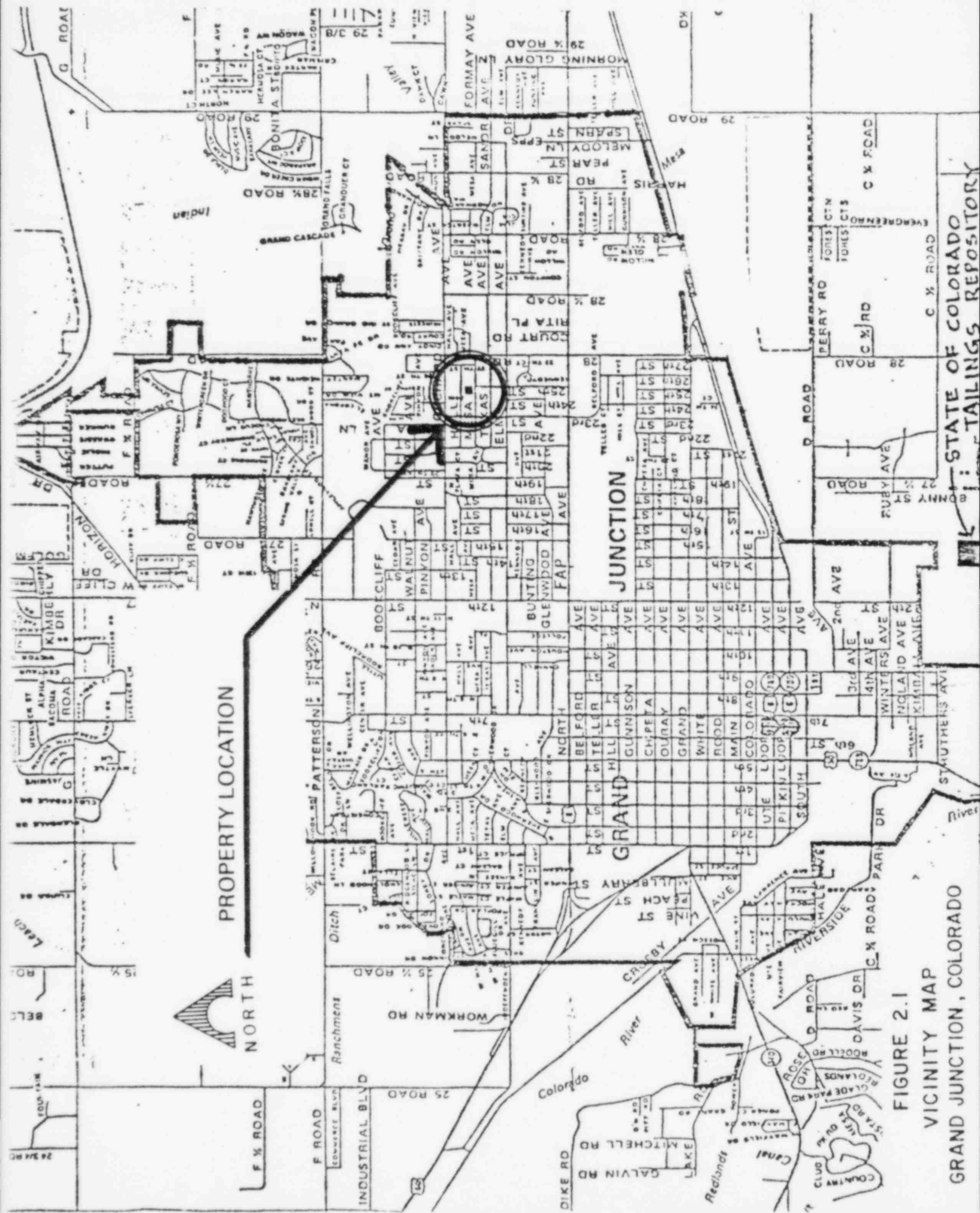


FIGURE 2.1

VICINITY MAP  
GRAND JUNCTION, COLORADO

THE EAST 60.0 FEET OF THE WEST 240.0 FEET  
OF LOT 12 BLOCK 2 MELROSE SUBDIVISION,  
CITY OF GRAND JUNCTION, COLORADO.

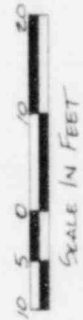
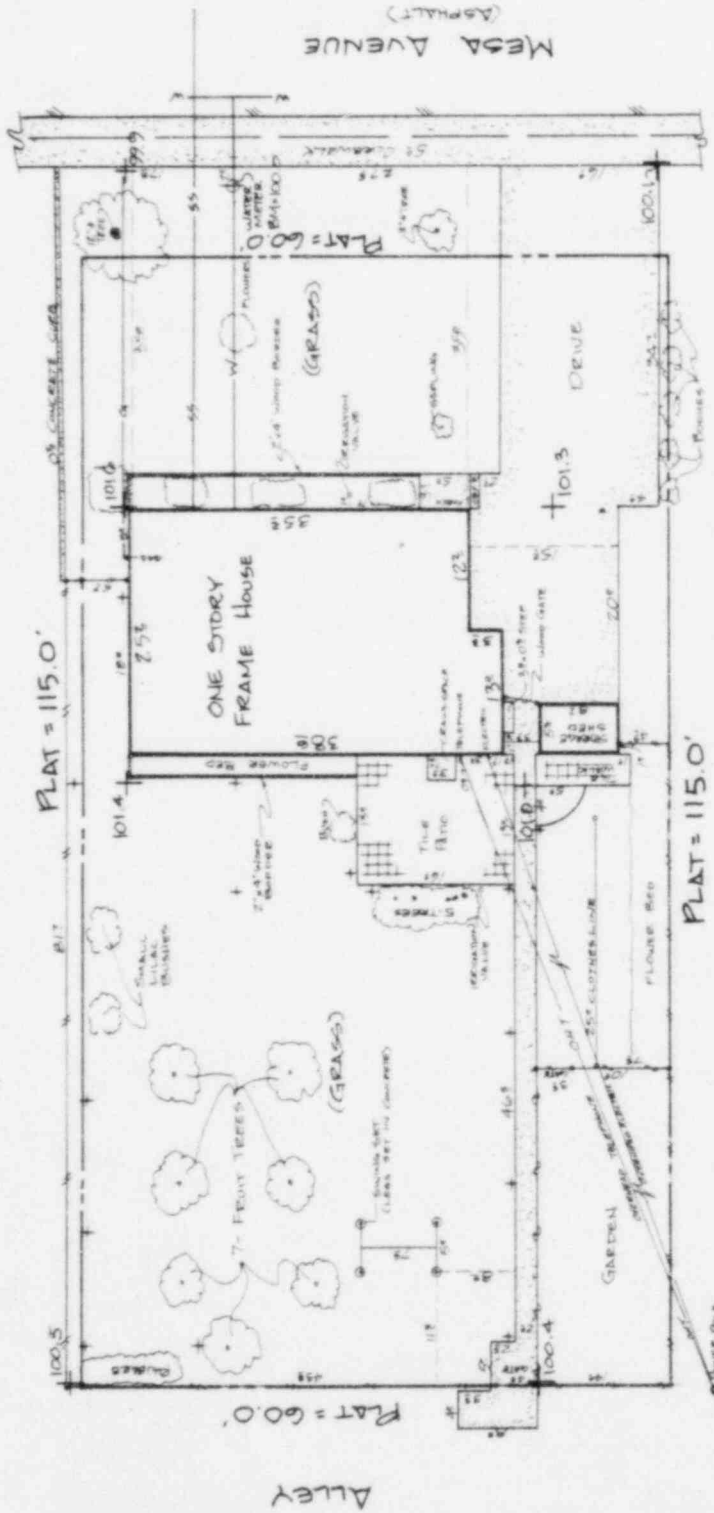
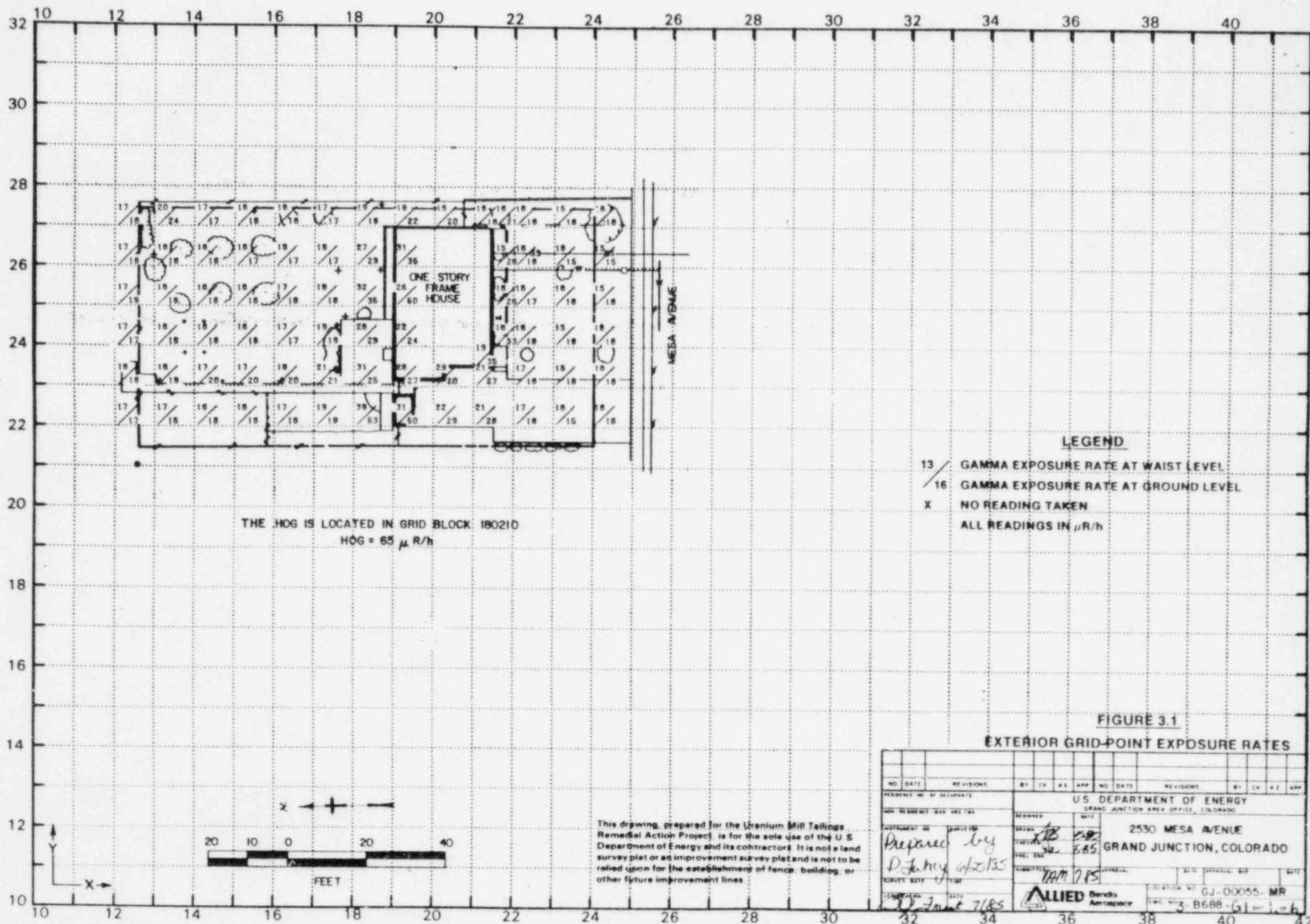


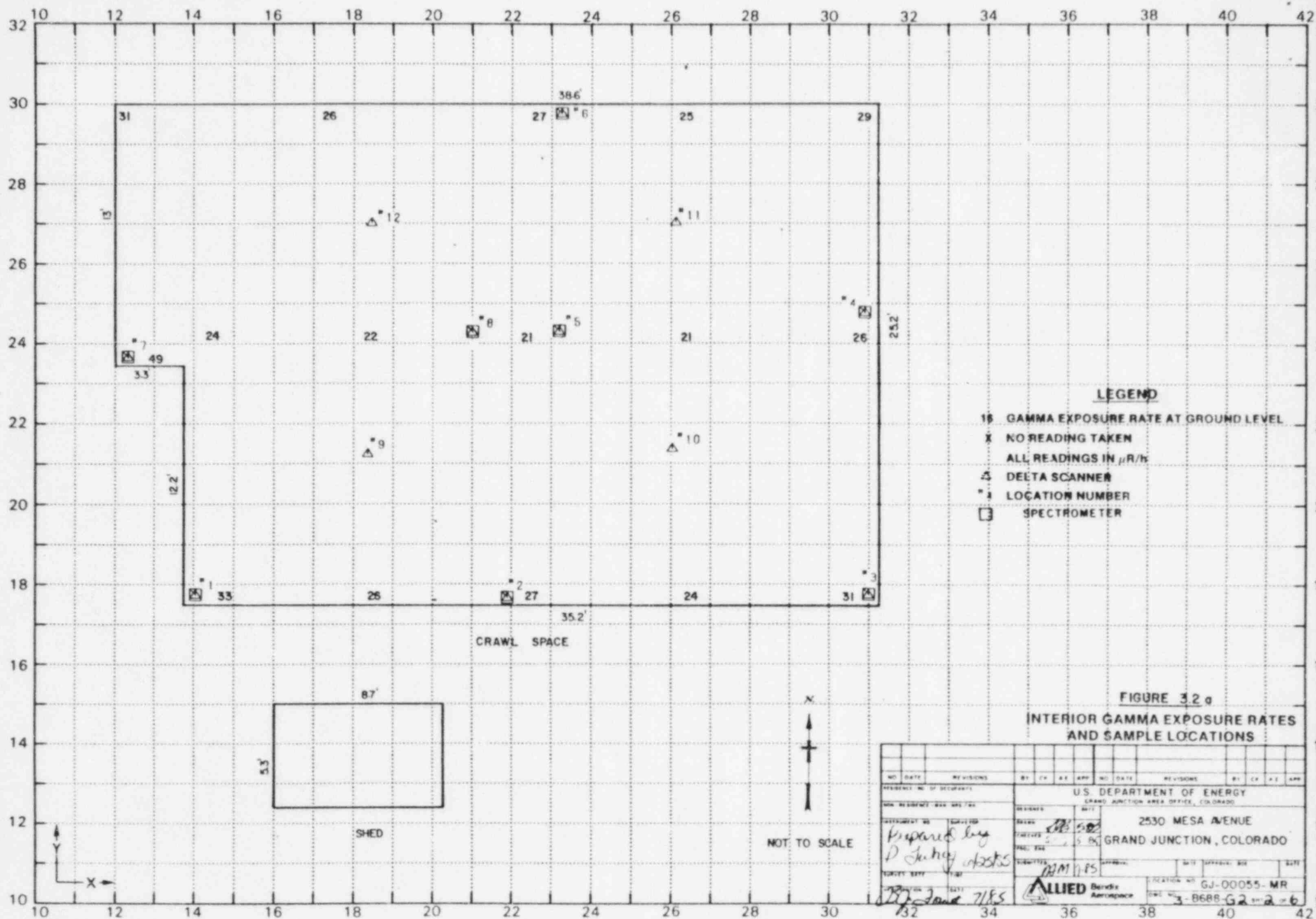
FIGURE 2.2 SITE PLAN

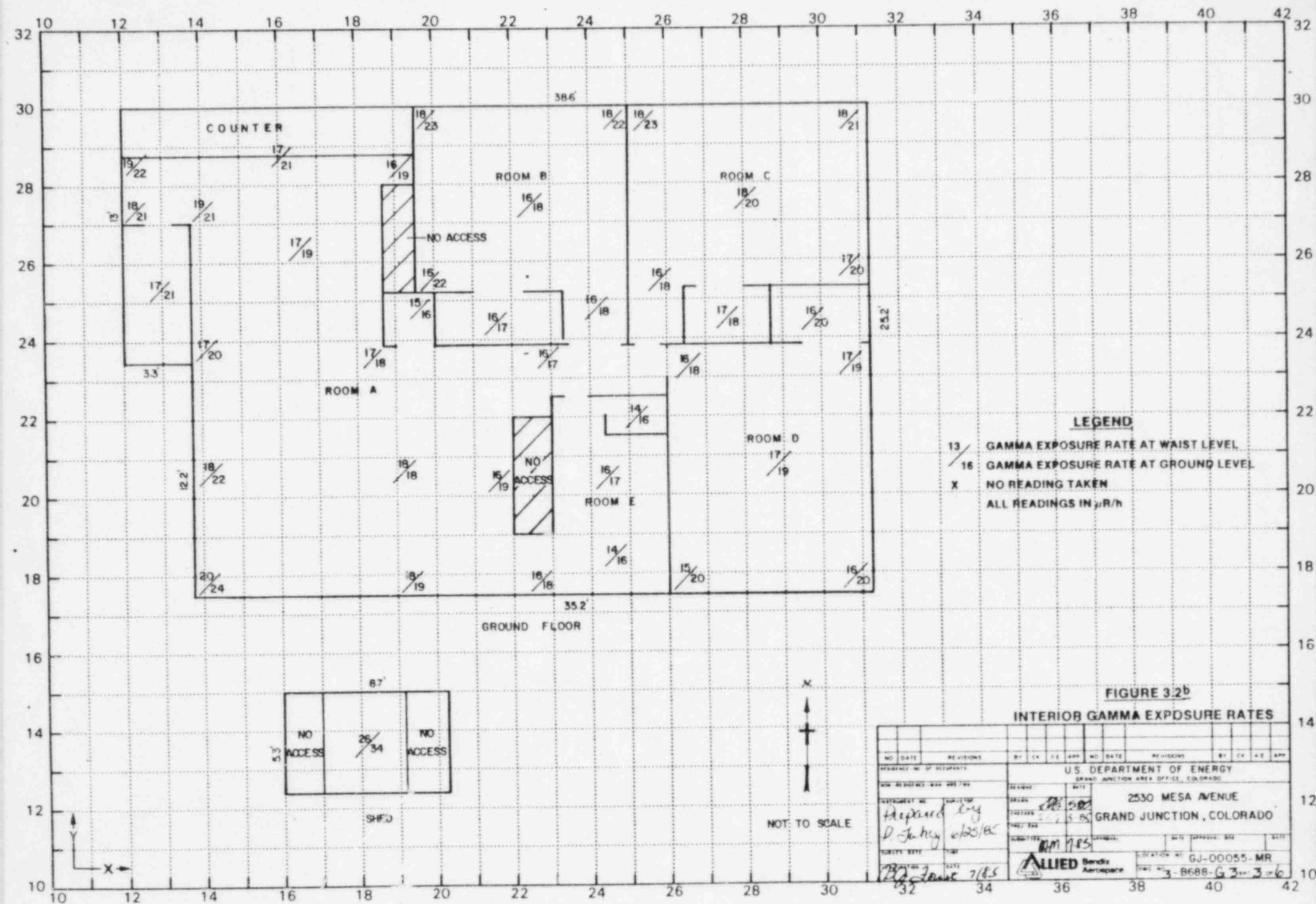
U.S. DEPARTMENT OF ENERGY GRAND JUNCTION PROJECT OFFICE, COLORADO	DATE: 05/17/2012
ADDRESS: 2550 MESA AVENUE	PROJECT NO: 360055 M2
GRAND JUNCTION, COLORADO	CLIENT: AURORA
SURV: 666/516/85	DATE: 5/21/85
DRAWING NO: 360055 F1	SHEET: 1 OF 1

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 to be used for any other purpose without the express written consent of the U.S. Department of Energy. No other future improvements, not shown.





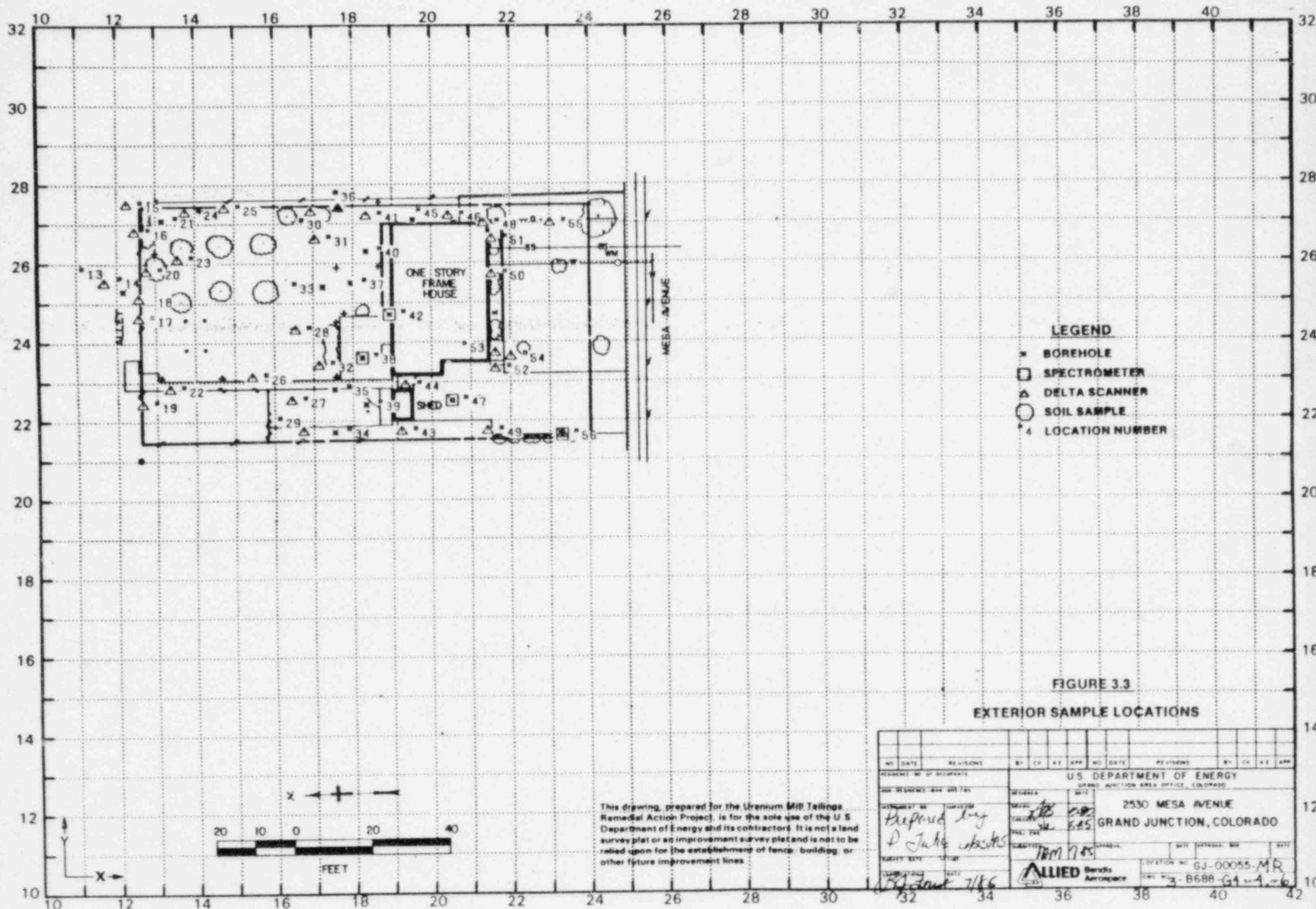
[illegible]



**FIGURE 3.2b**

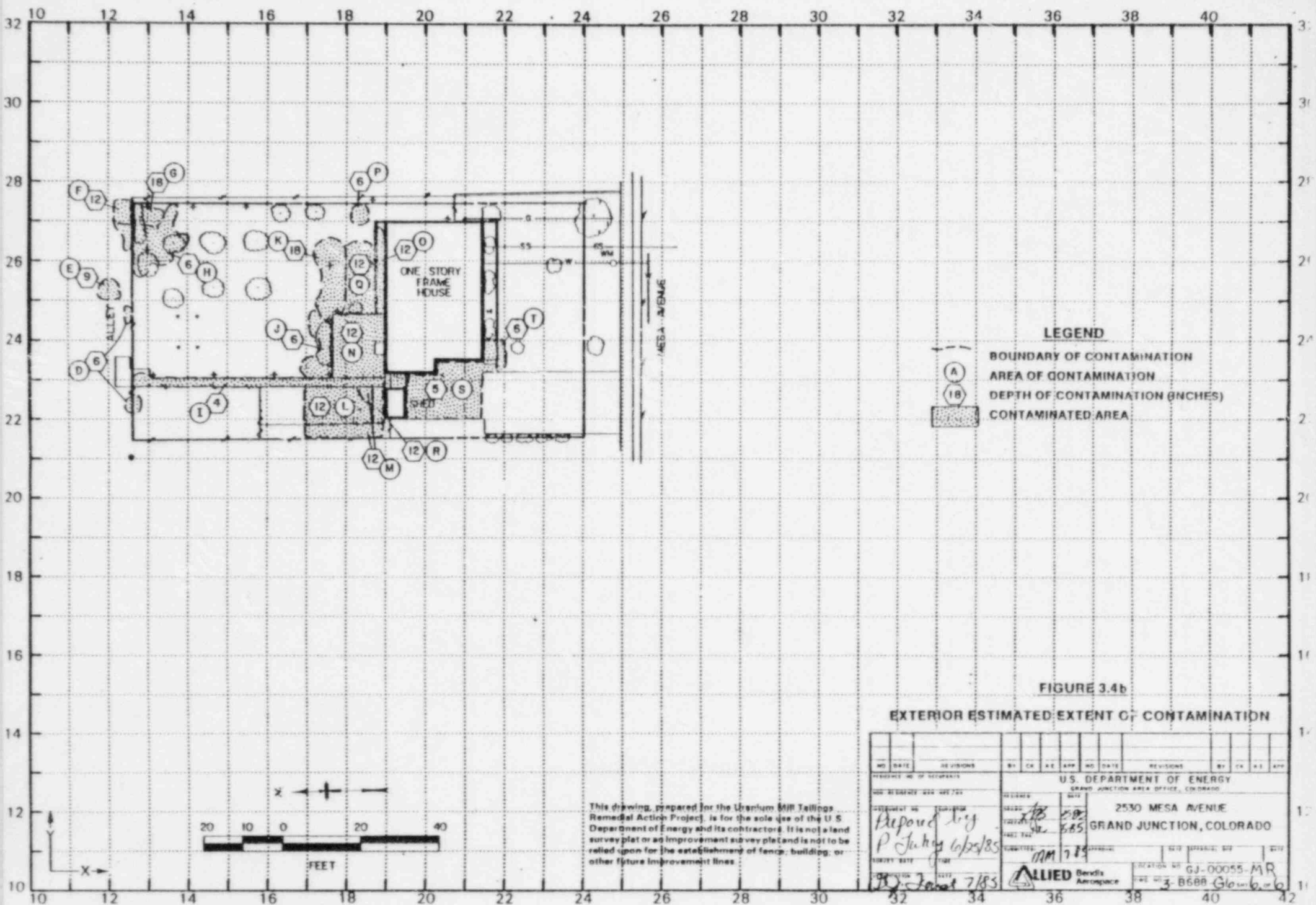
### INTERIOR GAMMA EXPOSURE RATES

[illegible]









3/85

DOE ID NO. GJ-00055-PH

Date June 26, 1985

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

Official Survey Report

Property Address 2530 Mesa Avenue

Property Owner Muirl M. Kagie

Address of Owner (if different from above) \_\_\_\_\_

Report Prepared By Penny Tuohy

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 1 In open areas.

1 XX 1 Under or around exterior improvements.

1 XX 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/CDE

J. Themelis, Mgr. UMTRA Proj. Off.

HIG = 24 uR/h  
HOG = 65 uR/h

July 9, 1985

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

ATTN: Elaine Brummett

Dear Elaine:

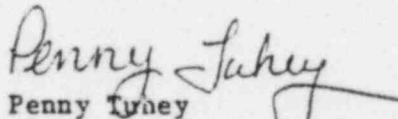
The following is in response to your questions and comments concerning  
Department of Energy (DOE) Identification (IL) number GJ-00055-MSR(2530  
Orchard Avenue) dated July 2, 1985. *my 8-85*

*Mesa  
my 8-85*

1. Location 21 has been changed to read 18 inches of contamination
2. Delta readings were not performed only on the surface. Boreholes were augered at both the water and sewer lines. A downhole scintillometer was used to log the hole instead of a total count. The downhole scintillometer data is not in our computer system, therefore, no final data shows up.

Thank you for your time and cooperation. If you should have additional questions or comments you may contact me at 242-8621, extension 298.

Sincerely,

  
Penny Tuney  
RSD Survey Team Leader

PT:pr

MEMORANDUM

ALLIED Bendix  
Aerospace

Bendix Field Engineering Corporation  
Grand Junction Operations  
Grand Junction, Colorado

Date: June 12, 1985

To: Files

From: Penny Tuhey

Subject: Team Leader Notes - GJ-00055-MR

Address: 2530 Mesa Avenue

Owner: Muirl M. Kagie

Arrival Time: 7:30 AM

Team Members

P. Tuhey (Team Leader)  
M. Dexter  
L. Kula  
G. Larsen

M. Johnson  
H. Mattison  
K. Roemer

Instruments

Scintillometers: C-1086, C-1070, C-1184, C-1158, C-1024, C-1208  
Delta: C-3940, C-4060  
Surface Spectrometer: C-3431  
Downhole Spectrometer: C-0498  
Total Count: C-3957, C-4006

Verbal approval was given by the homeowner before the survey was started.

The foundation beneath the primary structure is contaminated. Deltas and surface spectrometer readings were taken in the crawl space on the concrete walls and support pads to confirm this.



Team Leader Notes  
Penny Tuhey  
GJ-00055-MR  
June 12, 1985  
Page 2

Delta readings were also taken on the soil in the crawl space. No evidence of contamination was discovered.

Portions of the backyard, carport pad, concrete pad beneath the wooden shed, and a sidewalk running north and south in the backyard appears to be contaminated. A concrete core, boreholes, and deltas were taken to confirm this.

All utility lines were investigated for possible contamination.

All team members were frisked before lunch and leaving the property at 3:15 PM.

No problems or accidents occurred while performing the survey.

#### Revisit

Date: June 17, 1985

A revisit was performed on this property in order to take more deltas (delta C-3943 was used).

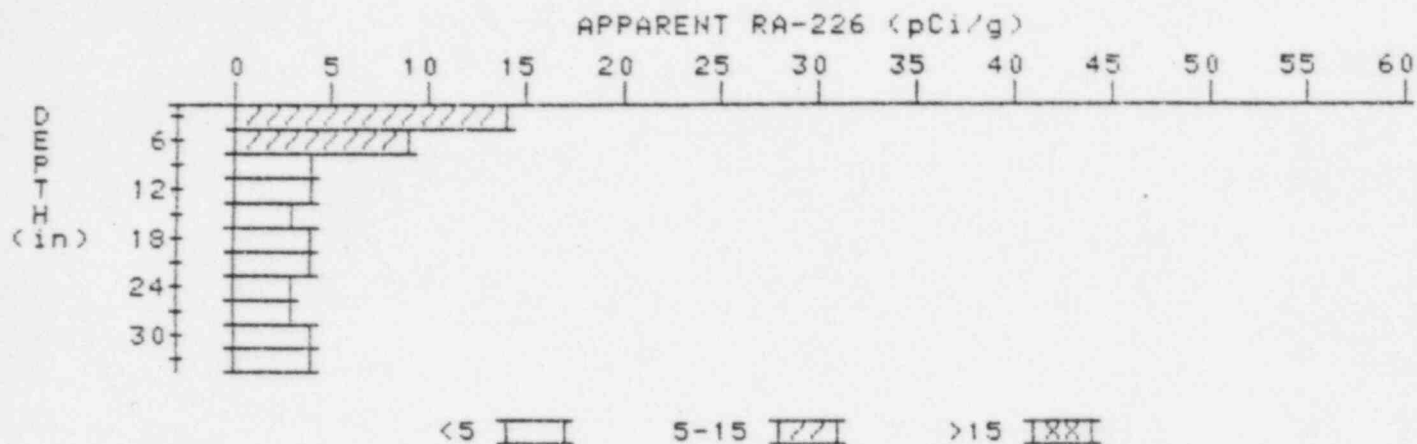
A few deltas were taken to confirm whether these locations (176274, 193229, 216233, and 215237) were contaminated and whether they should be included in the assessment.

# APPARENT RADIUM-226 CONCENTRATION 14 DECONVOLUTION GRAPH

PROPERTY NUMBER: GJ-00055-MR

HOLE NUMBER: 14

LOCATION: 121253



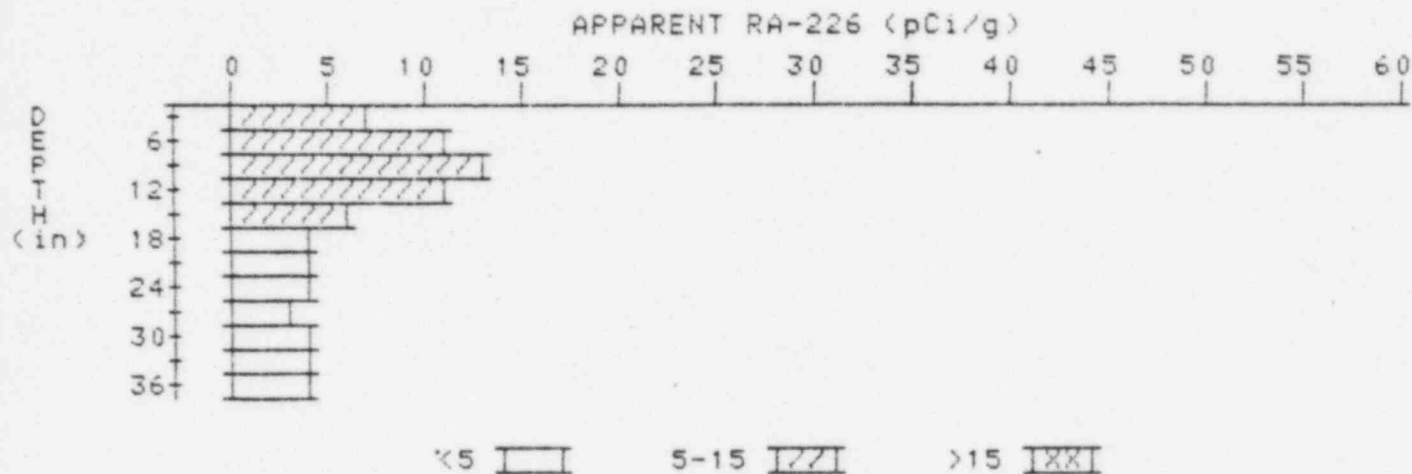
Depth (in)	Apparent Radium-226 (pCi/g) Undeconvolved	Apparent Radium-226 (pCi/g) Deconvolved
3	13.9	13.9
6	10.2	9.3
9	7.0	4.3
12	5.3	4.1
15	4.3	3.2
18	3.9	3.5
21	3.7	3.5
24	3.6	3.4
27	3.6	3.2
30	3.8	4.0
33	3.9	3.9

# APPARENT RADIUM-226 CONCENTRATION 21 DECONVOLUTION GRAPH

PROPERTY NUMBER: GJ-00055-MR

HOLE NUMBER: 21

LOCATION: 131271



Depth (in)	Apparent Radium-226 (pCi/g) Undeconvolved	Apparent Radium-226 (pCi/g) Deconvolved
3	7.0	7.0
6	9.0	11.1
9	9.8	12.8
12	8.9	10.7
15	7.0	6.3
18	5.5	4.4
21	4.6	3.7
24	4.2	4.2
27	3.8	3.3
30	3.7	3.7
33	3.6	3.6
36	3.5	3.5

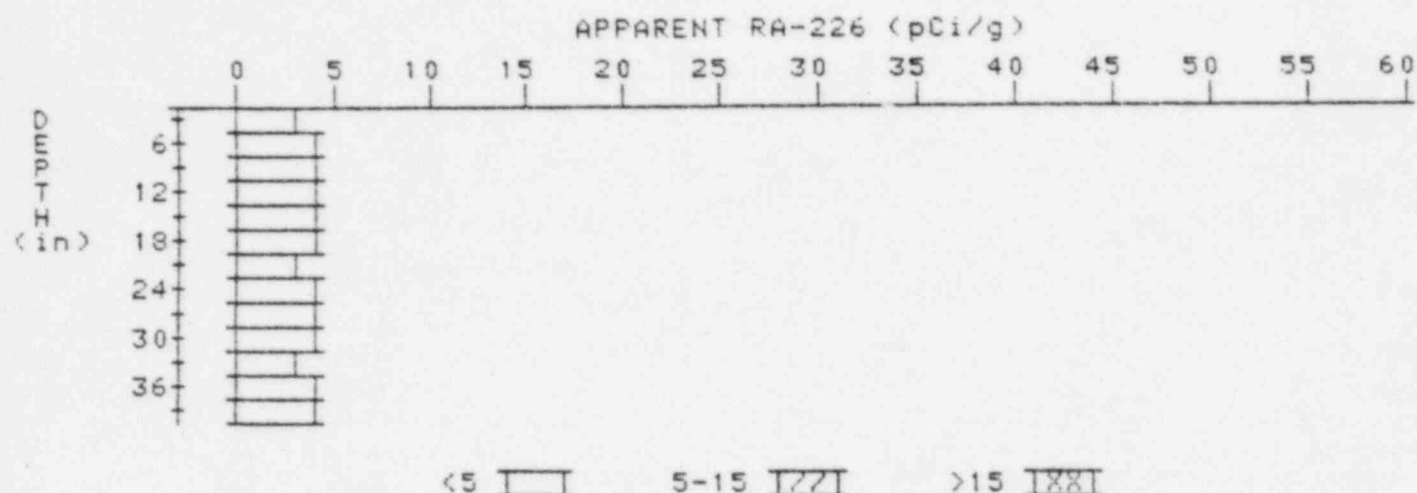
# APPARENT RADIUM-226 CONCENTRATION 33

## DECONVOLUTION GRAPH

PROPERTY NUMBER: GJ-00055-MR

HOLE NUMBER: 33

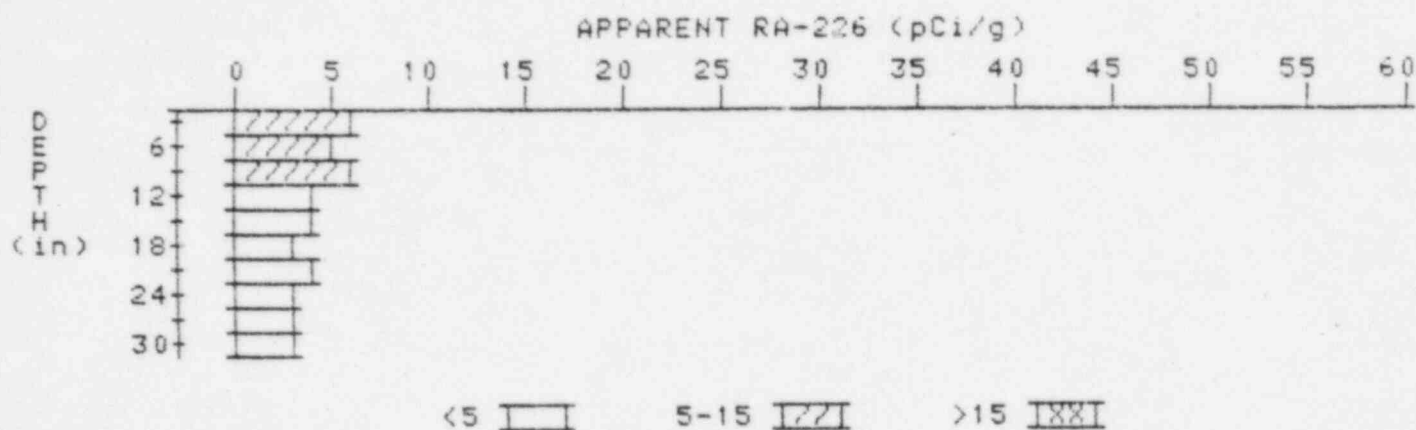
LOCATION: 172254



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

# APPARENT RADIUM-226 CONCENTRATION 34 DECONVOLUTION GRAPH

PROPERTY NUMBER: GJ-00055-MR  
HOLE NUMBER: 34  
LOCATION: 175217



Depth (in)	Apparent Radium-226 (pCi/g) Undeconvolved	Apparent Radium-226 (pCi/g) Deconvolved
3	5.7	5.7
6	5.4	5.4
9	5.1	5.6
12	4.5	4.1
15	4.1	3.9
18	3.8	3.4
21	3.7	4.1
24	3.4	2.9
27	3.4	3.4
30	3.4	3.4

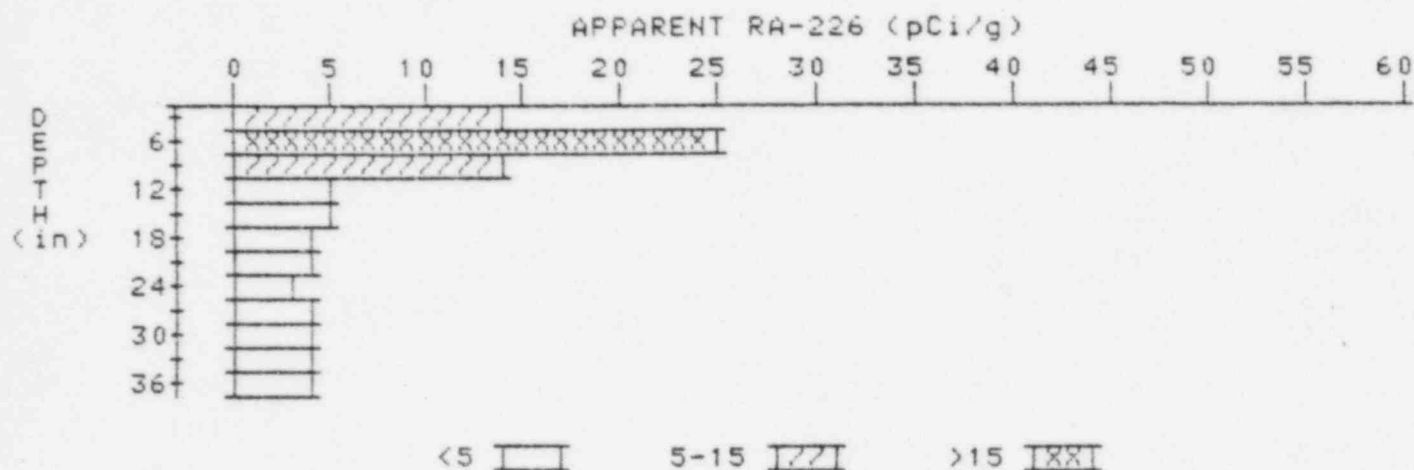
# APPARENT RADIUM-226 CONCENTRATION 35

## DECONVOLUTION GRAPH

PROPERTY NUMBER: GJ-00055-MR

HOLE NUMBER: 35

LOCATION: 175228



Depth (in)	Apparent Radium-226 (pCi/g) Undeconvolved	Apparent Radium-226 (pCi/g) Deconvolved
3	13.8	13.8
6	15.8	25.2
9	12.5	14.1
12	8.3	4.7
15	6.1	4.5
18	4.8	3.7
21	4.1	3.6
24	3.7	3.0
27	3.7	3.7
30	3.7	3.7
33	3.7	3.9
36	3.6	3.6

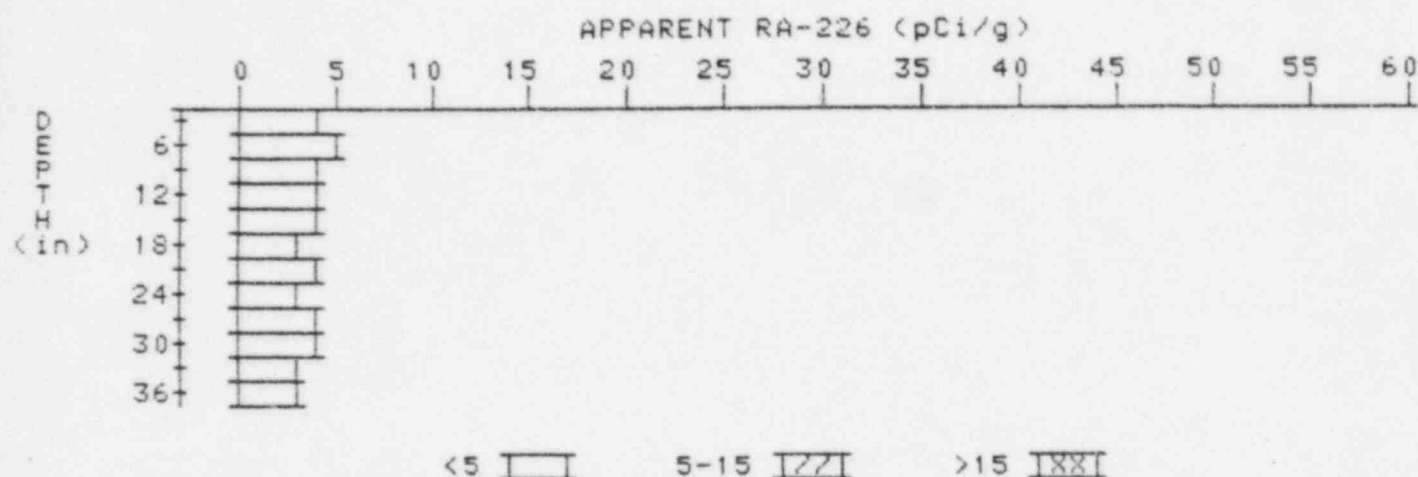
# APPARENT RADIUM-226 CONCENTRATION 36

## DECONVOLUTION GRAPH

PROPERTY NUMBER: GJ-00055-MR

HOLE NUMBER: 36

LOCATION: 176274



Depth (in)	Apparent Radium-226 (pCi/g) Undeconvolved	Apparent Radium-226 (pCi/g) Deconvolved
3	3.8	3.8
6	4.0	4.5
9	3.9	3.9
12	3.8	3.8
15	3.7	3.7
18	3.6	3.4
21	3.6	3.8
24	3.5	3.3
27	3.5	3.5
30	3.5	3.7
33	3.4	3.2
36	3.4	3.4

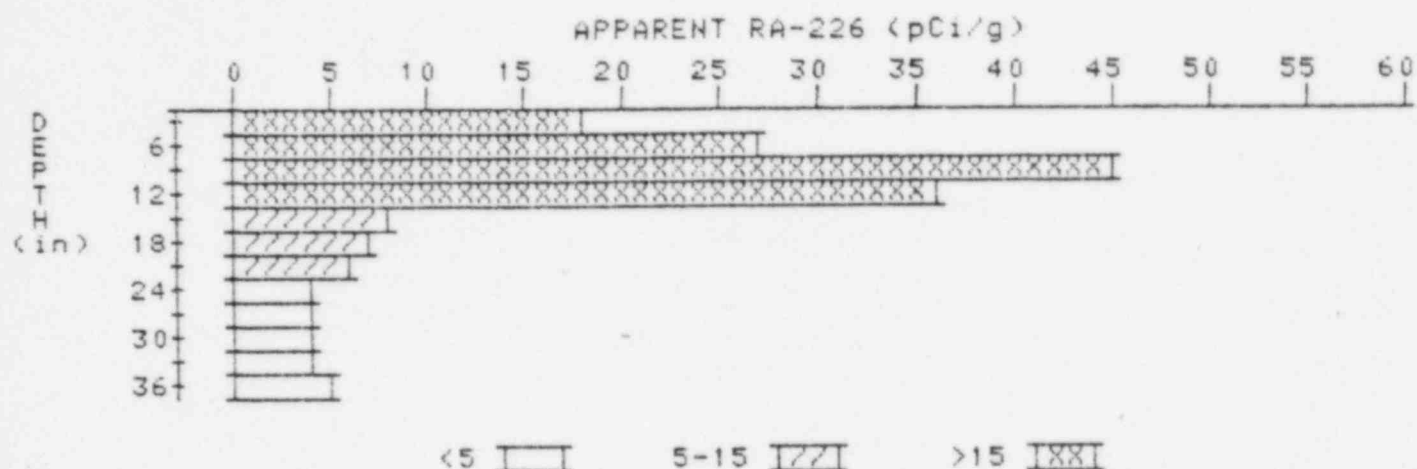


# APPARENT RADIUM-226 CONCENTRATION 37 DECONVOLUTION GRAPH

PROPERTY NUMBER: GJ-00055-MR

HOLE NUMBER: 37

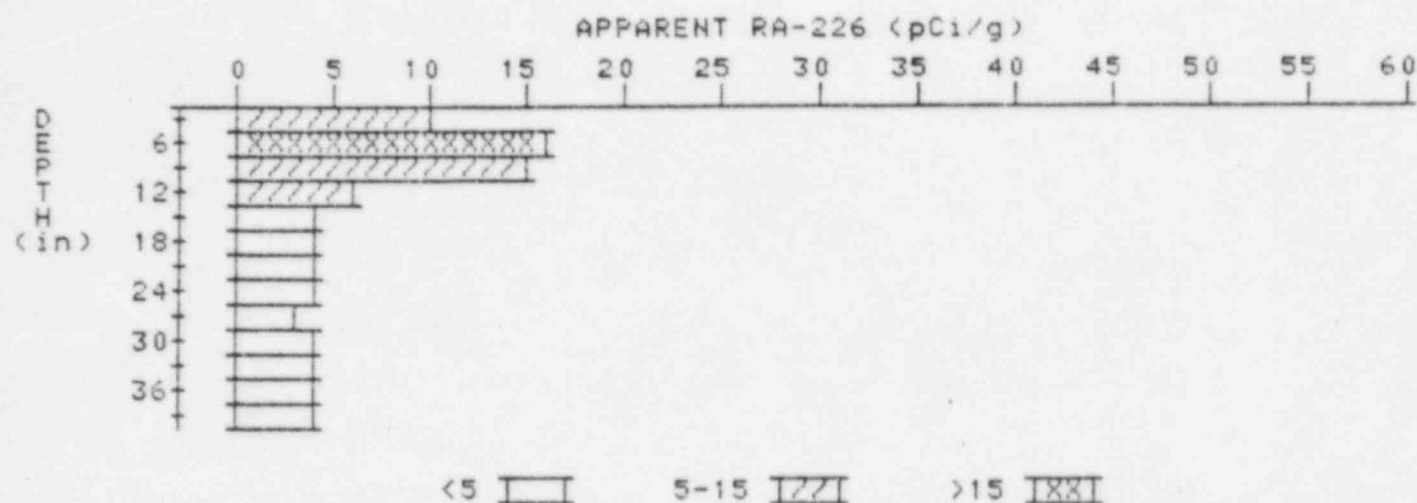
LOCATION: 179255



Depth (in)	Apparent Radium-226 (pCi/g)	Apparent Radium-226 (pCi/g)
	Undeconvolved	Deconvolved
3	17.7	17.7
6	24.4	27.2
9	29.5	45.3
12	25.7	36.0
15	16.1	8.3
18	10.9	7.0
21	7.9	5.9
24	6.0	4.0
27	5.2	4.5
30	4.8	4.4
33	4.6	4.2
36	4.6	4.6

# APPARENT RADIUM-226 CONCENTRATION 38 DECONVOLUTION GRAPH

PROPERTY NUMBER: GJ-00055-MR  
HOLE NUMBER: 38  
LOCATION: 182236



Depth (in)	Apparent Radium-226 (pCi/g) Undeconvolved	Apparent Radium-226 (pCi/g) Deconvolved
3	9.8	9.8
6	11.6	16.0
9	10.9	15.0
12	7.9	6.1
15	5.9	4.1
18	4.9	3.8
21	4.5	4.3
24	4.2	4.2
27	3.9	3.4
30	3.9	3.9
33	3.9	3.9
36	3.9	3.9
39	3.9	3.9

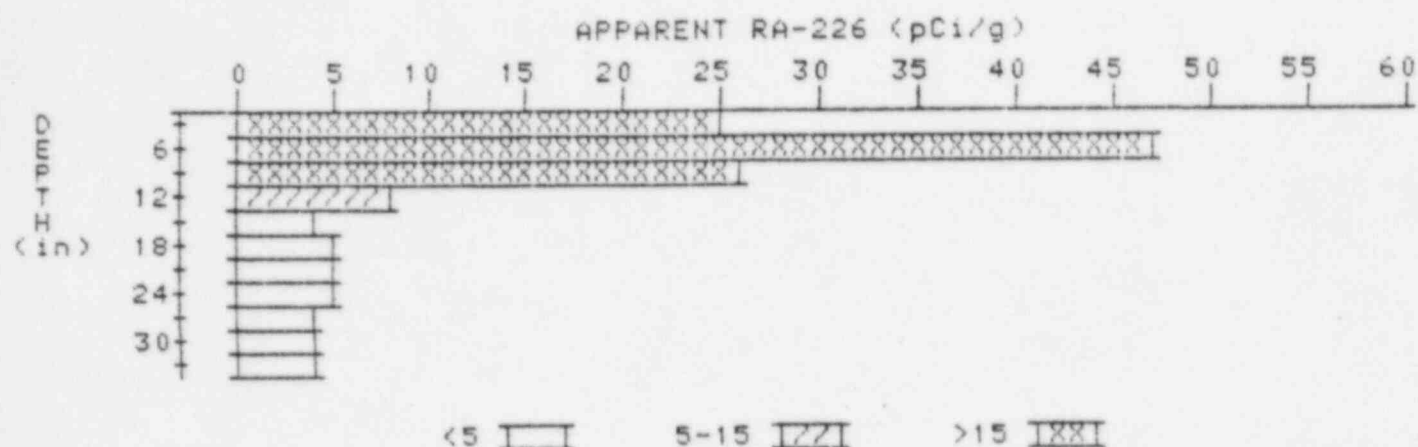
# APPARENT RADIUM-226 CONCENTRATION 39

## DECONVOLUTION GRAPH

PROPERTY NUMBER: GJ-00055-MR

HOLE NUMBER: 39

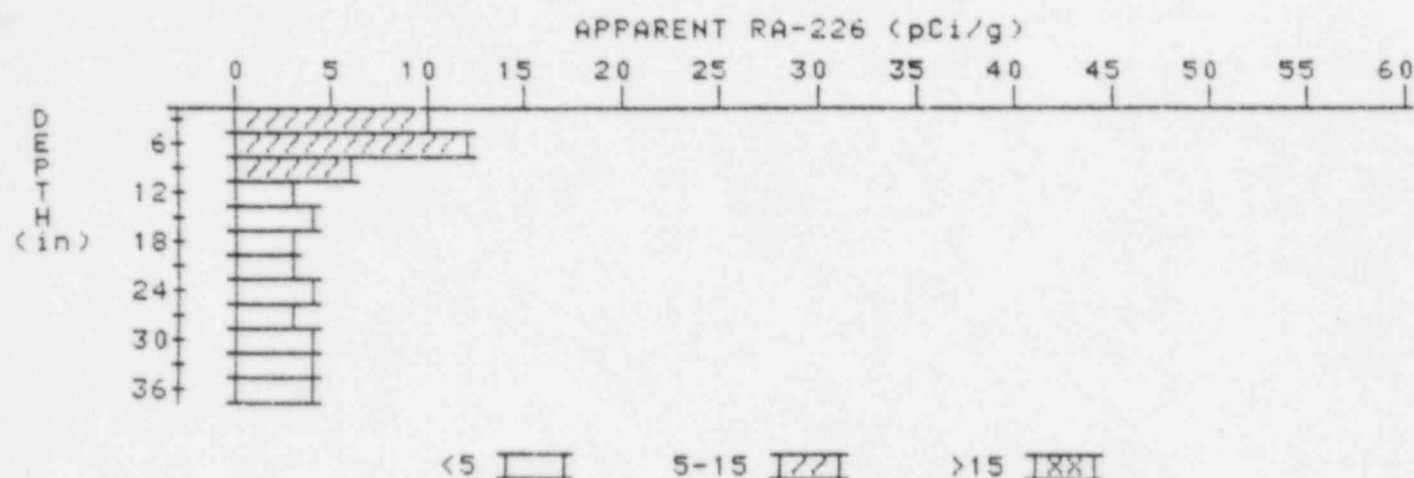
LOCATION: 183224



Depth (in)	Apparent Radium-226 (pCi/g) Undeconvolved	Apparent Radium-226 (pCi/g) Deconvolved
3	24.9	24.9
6	28.6	46.6
9	22.2	25.6
12	13.9	8.2
15	8.8	3.6
18	6.6	4.6
21	5.5	4.6
24	4.9	4.5
27	4.5	4.1
30	4.3	3.9
33	4.3	4.3

# APPARENT RADIUM-226 CONCENTRATION 40 DECONVOLUTION GRAPH

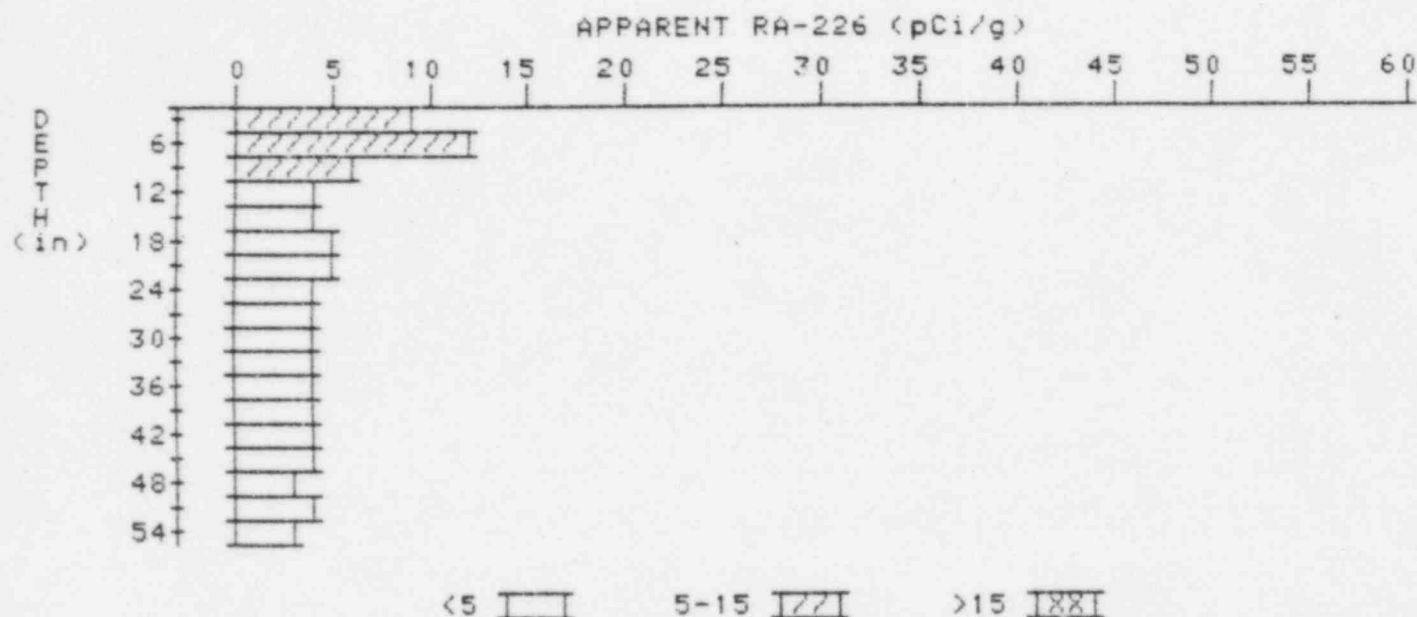
PROPERTY NUMBER: GJ-00055-MR  
HOLE NUMBER: 40  
LOCATION: 183263



Depth (in)	Apparent Radium-226 (pCi/g) Undeconvolved	Apparent Radium-226 (pCi/g) Deconvolved
3	9.5	9.5
6	9.1	12.3
9	6.9	6.4
12	5.0	2.9
15	4.3	3.9
18	3.8	3.3
21	3.6	3.2
24	3.6	3.8
27	3.5	3.3
30	3.5	3.5
33	3.5	3.5
36	3.5	3.5

# APPARENT RADIUM-226 CONCENTRATION 42 DECONVOLUTION GRAPH

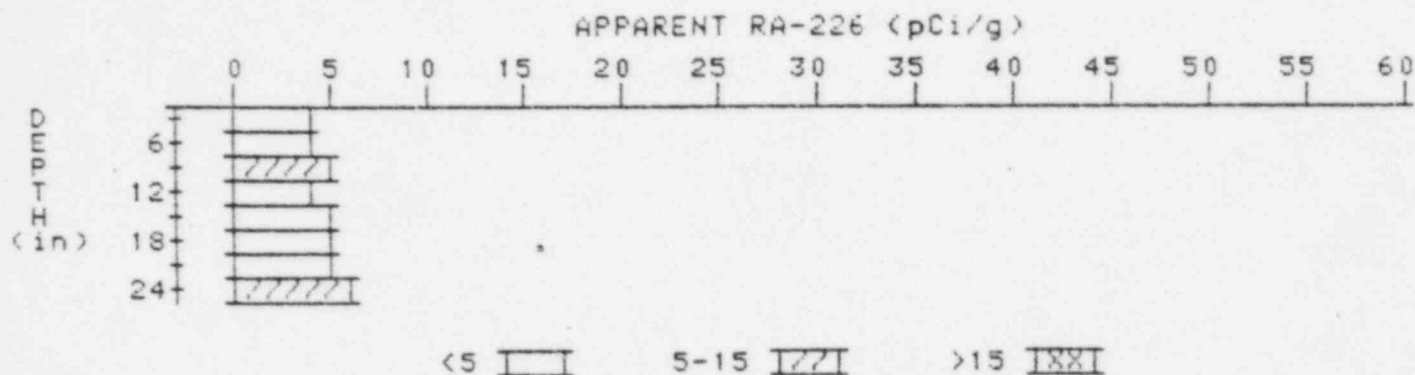
PROPERTY NUMBER: GJ-00055-MR  
HOLE NUMBER: 42  
LOCATION: 189247



Depth (in)	Apparent Radium-226 (pCi/g) Undeconvolved	Apparent Radium-226 (pCi/g) Deconvolved
3	9.2	9.2
6	8.8	11.6
9	6.8	5.6
12	5.5	4.3
15	4.9	4.2
18	4.7	4.5
21	4.6	5.0
24	4.3	4.1
27	4.1	4.1
30	3.9	3.7
33	3.8	3.6
36	3.8	4.0
39	3.7	3.7
42	3.6	3.6
45	3.5	3.5
48	3.4	3.2
51	3.4	3.6
54	3.3	3.3

# APPARENT RADIUM-226 CONCENTRATION 45 DECONVOLUTION GRAPH

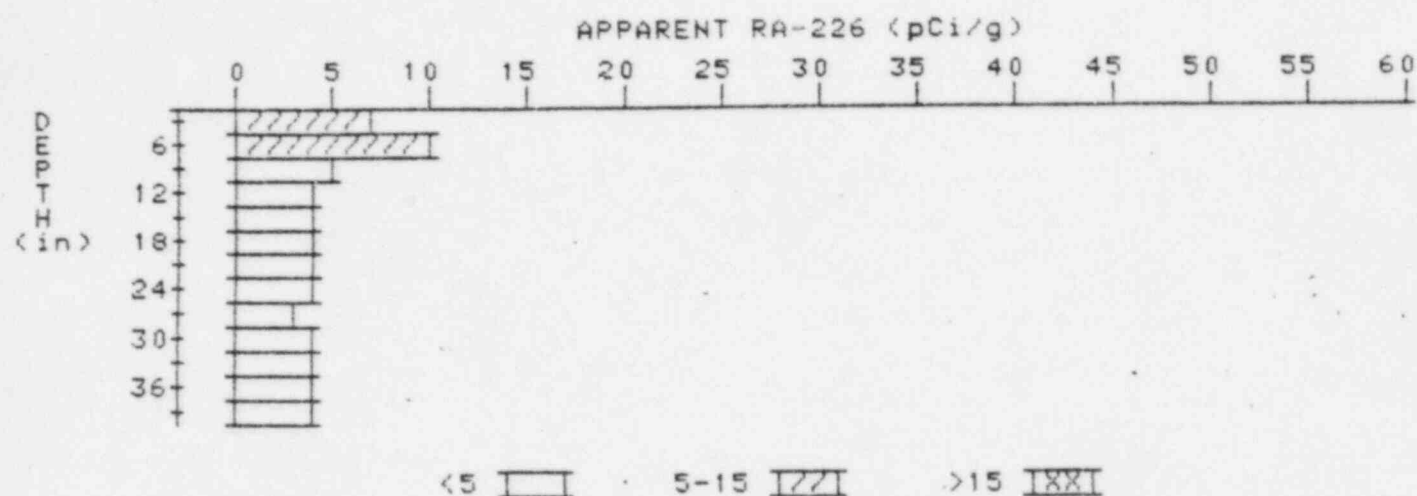
PROPERTY NUMBER: GJ-00055-MR  
HOLE NUMBER: 45  
LOCATION: 195271



Depth (in)	Apparent Radium-226 (pCi/g) Undeconvolved	Apparent Radium-226 (pCi/g) Deconvolved
3	3.8	3.8
6	4.2	4.4
9	4.5	5.0
12	4.5	4.1
15	4.7	4.7
18	4.9	4.5
21	5.3	4.9
24	5.9	5.9

# APPARENT RADIUM-226 CONCENTRATION 47 DECONVOLUTION GRAPH

PROPERTY NUMBER: GJ-00055-MR  
HOLE NUMBER: 47  
LOCATION: 205225



Depth (in)	Apparent Radium-226 (pCi/g) Undeconvolved	Apparent Radium-226 (pCi/g) Deconvolved
3	6.7	6.7
6	6.9	9.6
9	5.6	4.7
12	4.8	4.3
15	4.3	3.8
18	4.1	3.9
21	4.0	4.0
24	3.9	3.9
27	3.8	3.4
30	3.9	4.3
33	3.8	3.8
36	3.7	3.7
39	3.6	3.6



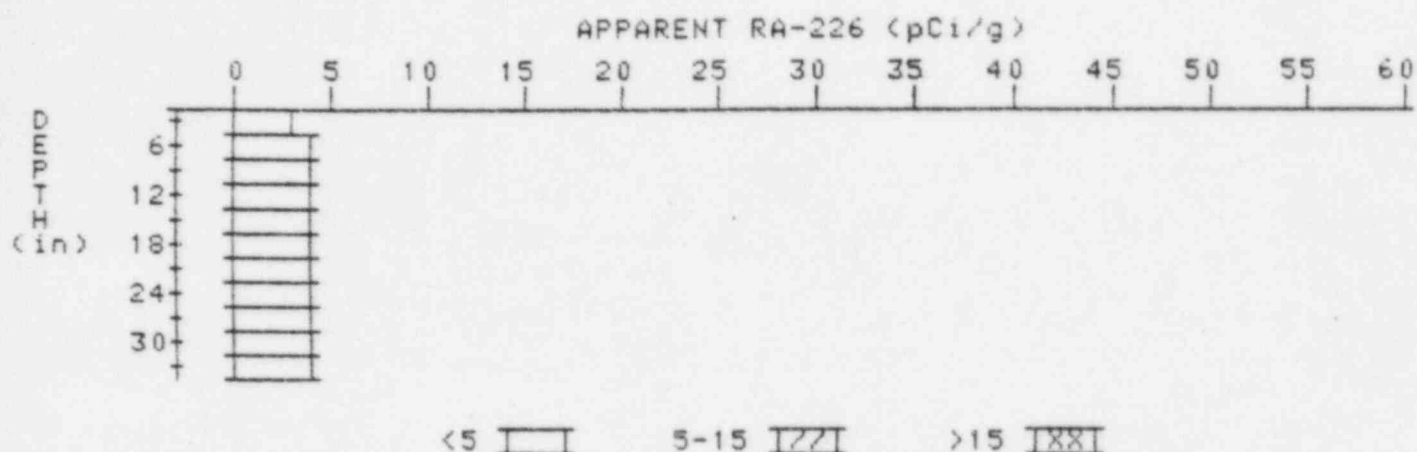
# APPARENT RADIUM-226 CONCENTRATION 56

## DECONVOLUTION GRAPH

PROPERTY NUMBER: GJ-00055-MR

HOLE NUMBER: 56

LOCATION: 233216



Depth (in)	Apparent Radium-226 (pCi/g) Undeconvolved	Apparent Radium-226 (pCi/g) Deconvolved
3	3.0	3.0
6	3.4	3.8
9	3.6	3.8
12	3.7	3.5
15	3.9	4.4
18	3.8	3.6
21	3.8	3.8
24	3.8	3.8
27	3.8	4.0
30	3.7	3.5
33	3.7	3.7

