

RADIOLOGIC AND ENGINEERING ASSESSMENT

FOR

DOE ID NO.: GJ-00137-MR
ADDRESS: 221 HILL 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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APPROVED BY

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DATE

August 6, 1985

REA00137:REA-GE005

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1.0 EXECUTIVE SUMMARY

1.1 Introduction

The location, DOE ID No. GJ-00137-MR, is a single-family residence located at 221 Hill 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, 38 cu. yd.; interior, 14 cu. yd.

Estimated cost to perform remedial action, including dislocation when applicable, is \$12,511. Remedial action on this property will take approximately 20 days to complete.

2.0 PROPERTY DESCRIPTION

2.1 General Description

Address: 221 Hill Avenue, Grand Junction, Colorado

Zoning: Residential (RMF-32)

Lot Size: Approximately 6,250 sf (0.14 acre)

Legal Description: Lots 5 and 6, Block 35, City of Grand Junction, County of Mesa, State of Colorado

Point of Reference: This property is located approximately 2 miles northwest 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:	Hill Avenue
South:	Alley
East:	Single-family residence
West:	Single-family residence

2.2 Existing Facilities and Structures

Primary Structure:

Type:	Single-family residence
Size:	Approximately 1,391 sf
Construction Date:	1915
Construction:	Wood-frame with wood siding
Foundation:	Concrete basement wall and footing at basement; concrete stem wall and footing at crawl space; concrete thickened edge at concrete slab
Footing Depth:	Approximately 80" to bottom of footing from grade at basement; approximately 26" to bottom of footing from grade at crawl space; approximately 8" to bottom of thickened edge from grade at slab
Basement:	Yes; partial
Crawl Space:	Yes; partial
Condition:	Good

Other Structures:

Type:	Garage
Size:	Approximately 185 sf
Construction:	Wood-frame
Foundation:	Concrete slab-on-grade
Condition:	Good
Type:	Carport
Size:	Approximately 216 sf
Construction:	Wood-frame roof on wood posts
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 over 50 years old. Therefore, it does meet the eligibility criteria for consideration of inclusion on the National Register of Historic Places.

Alterations to Structure: Family room and carport additions to original structure

Architectural Significance: Minimal

Historical Significance: None Known

3.0 RADIOLOGIC SURVEY

3.1 Introduction

Radiologic data were collected by Bendix at DOE ID No. GJ-00137-MR on May 1, 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 associated with the concrete north and east of the shed and north of the primary structure in the family room.

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: 14 to 16 uR/h
Highest Outside Gamma Reading (HOG): 64 uR/h

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

3.2.2 Interior Findings

Background Readings: 15 to 17 uR/h
Highest Inside Gamma Reading (HIG): 42 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 3.3b and 3.4.

Data from these investigations are included in Appendix Tables 3.1 and 3.2.

3.4 Radon/Radon Daughter Concentration (RDC)

Determined by CDH: 0.011 working level (WL). No additional RDC measurements were taken by Bendix.

3.5 Extent of Contamination

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

- (AREA A) The soil beneath the concrete slab on the south end of the primary structure is contaminated. The total estimated depth of contamination is 15 inches, based on engineering design. The estimated thickness of the slab is 4 inches (approximately 264 sf).
- (AREA B) North of the primary structure, the soil beneath the 4-inch-thick city sidewalk is contaminated to total depth of 12 inches (approximately 270 sf).
- (AREA C) South of the city sidewalk, a small deposit is contaminated to a depth of 12 inches (approximately 54 sf).
- (AREA D) The soil along the north and south sides of the city sidewalk has contamination extending to a depth of 6 inches (approximately 156 sf).
- (AREA E) At the north and south ends of the driveway, the soil beneath the 4-inch-thick concrete pad has an estimated total depth of contamination of 6 inches, based on information gathered from Area F (approximately 22 sf).
- (AREA F) The soil adjacent to Area E, along the north and south ends of the driveway, is contaminated to a depth of 6 inches (approximately 51 sf).
- (AREA G) In the carport, west of the primary structure, the concrete slab and under-lying soil are contaminated to total depth of 12 inches. The concrete is 4 inches thick (approximately 220 sf).
- (AREA H) South of Area G and along the south side of the primary structure, the soil beneath the 3-inch-thick concrete slab is contaminated to a total depth of 12 inches (approximately 245 sf).

- (AREA I) East of Area H, there is contamination extending to a depth of 9 inches (approximately 17 sf).
- (AREA J) The 9-inch-thick concrete slab in the south yard is contaminated. The slab is covered by 3 inches of soil. The total depth of contamination is 12 inches (approximately 62 sf).
- (AREA K) Southeast of the garage, the 5-inch-thick concrete sidewalk and underlying soil are contaminated to total depth of 9 inches (approximately 33 sf).

(AREAS REQUIRING FURTHER INVESTIGATION DURING REMEDIAL ACTION)

AREA A should be monitored during remedial action. The depth of contamination is estimated, since a borehole was not possible in this area.

4.0 RECOMMENDED REMEDIAL ACTION

4.1 Decontamination and Restoration

The recommended remedial action for this property, DOE ID No. GJ-00137-MR, includes removal of all areas identified as containing radioactive material (as discussed in Section 3.5 and shown in Appendix Figures 3.5a and 3.5b) and transport of removed material to the disposal site.

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

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

4.2 Evaluation of Recommended Remedial Action

Volume calculations of the areas included for remedial action are presented in Appendix Table 4.1. Cost estimates are presented in Appendix Table 4.2.

Estimated cost of remedial action is \$12,511.

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

High concentrations of contamination around the interior space are believed to be the cause of the high interior background readings. The background readings should reflect more closely the exterior background readings; therefore, interior work (Area A) is recommended.

Owner requests a minimum one month notice prior to commencement of construction.

There are no legal or other complications foreseen at this time.

5.0 REFERENCES

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

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

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

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

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

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

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

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

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

6.0 APPENDIX

This Appendix contains the following:

Appendix Tables:

Table 3.1	Radium Concentrations at Exterior Locations
Table 3.2	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 3.2	Exterior Gamma Scan
Figure 3.3a	Interior Gamma Exposure Rates-Basement and Crawl Space
Figure 3.3b	Interior Gamma Exposure Rates and Sample Locations-Ground Floor
Figure 3.4	Exterior Sample Locations
Figure 3.5a	Interior Estimated Extent of Contamination
Figure 3.5b	Exterior Estimated Extent of Contamination

Official Survey Report

Memo of Understanding

Team Leader Notes

Deconvolution Graphs (Apparent Radium-226 Concentration)

Radium Concentrations at Exterior Locations

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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.		
6	142243	00	DS	6.3		*	Driveway
		06	DS	1.8		*	
7	153244	00	DS	7.6		*	Driveway
		06	DS	2.5		*	
8	155287	00-04	SS			2.6	Core
		05-11	SS			96.4	Soil
		03	TC	38.5		*	Through city sidewalk
		06	TC	46.8		*	
		09	TC	29.7		*	DC = 12 inches Based on the deconvolution graph
		12	TC	17.8		*	
		15	TC	11.4		*	
		18	TC	8.4		*	
		21	TC	6.9		*	
		24	TC	6.0		*	
		27	TC	5.4		*	
		30	TC	5.0		*	
		33	TC	4.7		*	
		36	TC	4.7		*	
9	158244	00	DS	5.7		*	Driveway
		06	DS	3.0		*	
10	162262	00	DS	3.4		*	South of city sidewalk
		06	DS	<1.0		*	
11	162266	00	DS	23.0		*	North of primary structure
		06	DS	4.3		*	
		12	DS	1.8		*	
12	165265	00	DS	11.1		*	North of primary structure
		12	DS	4.4		*	
13	169265	00	DS	6.2		*	Gas line
		12	DS	1.8		*	
14	169273	00	DS	2.0		*	Water line
15	169275	03	TC	2.9		*	Water line DC = 0 inches
		06	TC	3.2		*	
		09	TC	3.5		*	
		12	TC	3.7		*	
		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.		
15	169275	18	TC	3.8		*	
		21	TC	3.7		*	
		24	TC	3.6		*	
		27	TC	3.7		*	
		30	TC	3.7		*	
		33	TC	3.7		*	
		36	TC	3.8		*	
		39	TC	3.9		*	
		42	TC	3.9		*	
		45	TC	3.9		*	
		48	TC	4.0		*	
		51	TC	4.0		*	
16	190240	03	TC	3.5		*	West property line DC = 0 inches
		06	TC	3.7		*	
		09	TC	3.8		*	
		12	TC	3.9		*	
		15	TC	3.8		*	
		18	TC	3.8		*	
		21	TC	3.7		*	
		24	TC	3.6		*	
		27	TC	3.6		*	
		30	TC	3.5		*	
		33	TC	3.5		*	
17	190249	00-04	SS			0.8	Core
		04-10	SS			1.3	Soil
		03	TC	2.9		*	DC = 0 inches
		06	TC	3.3		*	
		09	TC	3.4		*	
		12	TC	3.7		*	
		15	TC	3.8		*	
		18	TC	3.8		*	
		21	TC	3.8		*	
		24	TC	3.7		*	
		27	TC	3.7		*	
		30	TC	3.7		*	
		33	TC	3.6		*	
		36	TC	3.5		*	
		39	TC	3.6		*	
		42	TC	3.6		*	
		45	TC	3.7		*	
		48	TC	3.8		*	
		51	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.		
17	190249	54	TC	3.7		*	
		57	TC	3.7		*	
		60	TC	3.9		*	
		63	TC	3.8		*	
		66	TC	3.8		*	
		69	TC	3.7		*	
		72	TC	3.8		*	
		75	TC	3.9		*	
		78	TC	3.8		*	
		81	TC	3.9		*	
		84	TC	3.9		*	
		87	TC	4.0		*	
		90	TC	4.0		*	
		93	TC	3.9		*	
		96	TC	3.9		*	
		99	TC	3.7		*	
		102	TC	3.6		*	
18	205240	00	DS	2.3		*	
		06	DS	<1.0		*	
19	209246	00	DS	42.9		*	Off driveway pad
		06	DS	2.8		*	
		12	DS	1.3		*	
20	213242	00-04	SS			6.1	Core
		04-10	SS			95.6	Dry, sandy soil
		03	TC	31.0		*	Inside carport
		06	TC	31.1		*	DC = 12 inches
		09	TC	18.0		*	Based on the
		12	TC	11.2		*	deconvolution graph
		15	TC	7.3		*	
		18	TC	5.9		*	
		21	TC	5.2		*	
		24	TC	4.9		*	
		27	TC	4.7		*	
		30	TC	4.7		*	
		33	TC	4.5		*	
		36	TC	4.4		*	
21	226273	03	TC	3.5		*	Backyard
		06	TC	3.9		*	DC = 0 inches
		09	TC	3.9		*	
		12	TC	3.8		*	

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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	226273	15	TC	3.7		*	
		18	TC	3.6		*	
		21	TC	3.5		*	
		24	TC	3.5		*	
		27	TC	3.4		*	
		30	TC	3.5		*	
		33	TC	3.4		*	
		36	TC	3.3		*	
22	228272	09-12	SS			3.1	Concrete chips
23	233252	00	DS	12.4		*	
24	233260	00	DS	2.4		*	Sidewalk on south
		06	DS	2.5		*	side of primary
		12	DS	1.7		*	structure
25	234246	00-03	SS			2.8	Core
		03-09	SS			168.5	Soil
		03	TC	48.6		*	Backyard through
		06	TC	41.5		*	concrete patio
		09	TC	24.0		*	DC = 12 inches
		12	TC	14.2		*	Based on the
		15	TC	9.3		*	deconvolution graph
		18	TC	7.3		*	
		21	TC	6.4		*	
		24	TC	5.9		*	
		27	TC	5.5		*	
		30	TC	5.3		*	
		33	TC	5.2		*	
		36	TC	5.1		*	
26	237253	00	DS	2.1		*	Backyard
		06	DS	1.3		*	
27	240251	00	DS	12.5		*	Sewer line
		06	DS	7.5		*	DC = 9 inches
		12	DS	3.6		*	
		03	TC	8.4		*	
		06	TC	9.2		*	
		09	TC	8.3		*	
		12	TC	6.9		*	
		15	TC	5.9		*	
		18	TC	5.4		*	

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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.		
27	240250	21	TC	5.1		*	
		24	TC	5.0		*	
		27	TC	4.9		*	
		30	TC	4.6		*	
		33	TC	4.5		*	
		36	TC	4.3		*	
		39	TC	4.3		*	
		42	TC	4.1		*	
		45	TC	4.1		*	
		48	TC	4.1		*	
		51	TC	4.0		*	
28	250251	00	DS	1.5		*	East side of garage
		06	DS	1.3		*	
29	250280	00	DS	1.1		*	Background DC = 0 inches
		00-06	SS			2.2	
		03	TC	3.2		*	
		06	TC	3.3		*	
		09	TC	3.5		*	
		12	TC	3.6		*	
		15	TC	3.6		*	
		18	TC	3.7		*	
		21	TC	3.6		*	
		24	TC	3.5		*	
		27	TC	3.5		*	
		30	TC	3.4		*	
30	258251	03	TC	3.1		*	West side of garage DC = 0 inches
		06	TC	3.5		*	
		09	TC	3.5		*	
		12	TC	3.6		*	
		15	TC	3.6		*	
		18	TC	3.6		*	
		21	TC	3.6		*	
		24	TC	3.6		*	
		27	TC	3.6		*	
		30	TC	3.5		*	
		33	TC	3.5		*	
		36	TC	3.4		*	

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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	267246	03	TC	3.5		*	South of garage DC = 0 inches
		06	TC	3.7		*	
		09	TC	3.6		*	
		12	TC	3.6		*	
		15	TC	3.7		*	
		18	TC	3.7		*	
		21	TC	3.6		*	
		24	TC	3.7		*	
		27	TC	3.7		*	
		30	TC	3.8		*	
		33	TC	3.8		*	
32	267269	00-05	SS			11.0	Core
		06-08	SS			23.1	Soil
		09-12	SS			>1.0	Core
		12-18	SS			4.9	Soil
		03	TC	9.3		*	Backyard
		06	TC	9.3		*	
		09	TC	6.5		*	DC = 9 inches Based on the deconvolution graph
		12	TC	5.1		*	
		15	TC	4.4		*	
		18	TC	4.0		*	
		21	TC	3.8		*	
		24	TC	3.8		*	
		27	TC	3.8		*	
		30	TC	3.8		*	
		33	TC	3.9		*	
		36	TC	3.8		*	
33	269263	00	DS	1.3		*	Encounterd concrete slab at depth of approximately 3"
		06	DS	2.2		*	
34	271225	00	DS	4.6		*	Next to buried concrete slab Horizontal
		12	DS	1.6		*	
		12	DS	2.3		*	
35	271259	00	DS	4.0		*	Backyard
		02	DS	8.6		*	Top of concrete
		06	DS	3.6		*	
		06-12	SS			1.5	Side of concrete

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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	272267	00	DS	5.9		*	Fence line Backyard

Measurement GB = GAD-6 Borehole Notes: DC = Depth of Contamination
Types: GS = GAD-6 Surface * = No Soil Sample Taken
DS = Delta Scintillometer [n] = Reading Taken n-Inches
TC = Total Count Borehole Above Floor or Ground
SS = Soil Sample Date of Survey = 05-01-85
BH = Combined GAD-6 and Team Leader = TDH
Total Count Borehole

Radium Concentrations at Interior 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.		
1		00	DS	24.2		*	Family room
2		00	DS	7.8		*	Concrete slab
3		00	DS	28.1		*	Family room
4		00	DS	20.3		*	Concrete slab
5		00	DS	1.4		*	Family room

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 = 05-01-85
 Team Leader = TDH

Summary of Interior Gamma Exposure Rates

DOE ID No. GJ-00137-MR

221 Hill 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)
ROOM A	05	15-17	16	06	15-17	16
ROOM B	02	15-16	16	02	15-15	15
ROOM C	01	16-16	16	01	17-17	17
CRAWL SPACE	*	*	*	09	15-16	16
ROOM D	07	17-35	27	07	16-42	34
GROUND FLOOR	*	*	*	*	14-17	*
GARAGE	06	14-19	16	06	14-17	15

*Exposure Rates and Room Locations Shown in Appendix Figures 3.3a and 3.3b

Table 4.1
Area and Volume Calculations
DOE ID No. GJ-00137-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					
Concrete					
A	12 x 20	= 240	x 0.3	= 72	
	6 x 4	= 24	x 2.0	= 48	
Volume of Concrete =				120 =	120/27 = 4
Contaminated Fill					
A	12 x 22	= 264	x 1.0	= 264	
Volume of Contaminated Fill =				264 =	264/27 = 10
TOTAL INTERIOR					= 14
EXTERIOR					
Concrete					
B	5 x 54	= 270	x 0.3	= 81	
E	4 x 3	= 12			
	2 x 3	= 6			
	2 x 2	= 4			
				22 x 0.3	= 7
G	20 x 11	= 220	x 0.3	= 66	
H	19 x 11	= 209			
	18 x 2	= 36			
				245 x 0.3	= 74
				6 x 0.6	= 4
J	2 x 31	= 62	x 0.8	= 50	
K	3 x 11	= 33	x 0.4	= 13	
Volume of Concrete =				295 =	295/27 = 11

Table 4.1
Area and Volume Calculations
DOE ID No. GJ-00137-MR

Page 2 of 2

AREA	CALCULATIONS(ft)	SF	DEPTH(ft)	CF	CUBIC YARDS
Contaminated Fill					
B	5 x 54 =	270	x 0.7 =	189	
C	9 x 6 =	54	x 1.0 =	54	
D	4 x 39 =	156	x 0.5 =	78	
E	4 x 3 =	12			
	2 x 3 =	6			
	2 x 2 =	4			
		22	x 0.2 =	4	
F	11 x 3 =	33			
	2 x 3 =	6			
	2 x 6 =	12			
		51	x 0.5 =	26	
G	20 x 11 =	220	x 0.7 =	154	
H	19 x 11 =	209			
	18 x 2 =	36			
		245	x 0.7 =	172	
I	1 x 17 =	17	x 0.8 =	14	
J	2 x 31 =	62	x 0.2 =	12	
K	3 x 11 =	33	x 0.4 =	13	
Volume of Contaminated Fill =				716 =	716/27 = 27
TOTAL VOLUME - EXTERIOR					= 38
TOTAL VOLUME - INTERIOR					= 14

See Appendix Figures 3.5a and 3.5b For Areas

INTERIOR

Install dust barriers	
Lump Sum	\$ 50
Remove and replace new carpet	
29 sy @ \$15/sy	435
Remove concrete slab	
240 sf @ \$2/sf	480
Remove bulk concrete at circular steps	
2 cy @ \$100/cy	200
Undermine and shore exterior walls	
46 lf @ \$3/lf	138
Remove identified residual radioactive material (manual-open)	
10 cy @ \$44/cy	440
Replace roadbase	
10 cy @ \$11.50/cy	115
Install radon vent system	
64 lf @ \$2.50/lf	160
Replace new concrete slab	
240 sf @ \$2/sf	480
Replace bulk concrete at circular steps	
2 cy @ \$175/cy	350
Place bulk concrete at thickened edge of slab	
2 cy @ \$175/cy	350
	<hr/>
TOTAL INTERIOR	\$ 3,198

EXTERIOR

Remove identified residual radioactive material (machine-open)	
14 cy @ \$14.50/cy	\$ 203
Remove identified residual radioactive material (manual-open)	
13 cy @ \$44/cy	572
Undermine and shore carport posts	
4 posts @ \$15/post	60

Table 4.2
Estimated Cost of Decontamination and Restoration
DOE ID No. GJ-00137-MR

Page 2 of 3

Remove concrete slab 796 sf @ \$1.50/sf	1,194
*Remove bulk concrete at stoop and at Area J 2 cy @ \$100/cy	200
Remove brick wainscoat Lump Sum	75
Remove brick planters Lump Sum	150
Remove and reset fence 19 lf @ \$2.50/lf	48
Replace roadbase 20 cy @ \$11.50/cy	230
Replace topsoil *8 cy @ \$9.50/cy	76
Replace concrete slab *785 sf @ \$1.50/sf	1,178
Replace bulk concrete at stoop 1 cy @ \$175/cy	175
Place bulk concrete at thickened edge 1 cy @ \$175/cy	175
Replace new brick wainscoat 93 sf @ \$4/sf	372
Anchor carport posts Lump Sum	50
Place new sod 269 sf @ \$.50/sf	135
<hr/>	
TOTAL EXTERIOR	\$ 4,893

*The concrete walk in Area J and in part of Area K is to be removed and not replaced. Replace volume with topsoil and sod.

Table 4.2
Estimated Cost of Decontamination and Restoration
DOE ID No. GJ-00137-MR

Page 3 of 3

TOTAL INTERIOR	\$	3,198
TOTAL EXTERIOR		4,893
ACCESS CONTROL		250
		<hr/>
SUBTOTAL	\$	8,341
CONTINGENCY @ 20%		1,668
		<hr/>
SUBTOTAL	\$	10,009
CONTRACTOR OVERHEAD & PROFIT @ 25%		2,502
		<hr/>
GRAND TOTAL	\$	12,511

=====

RDJ080185
REA00137/REA-GE005

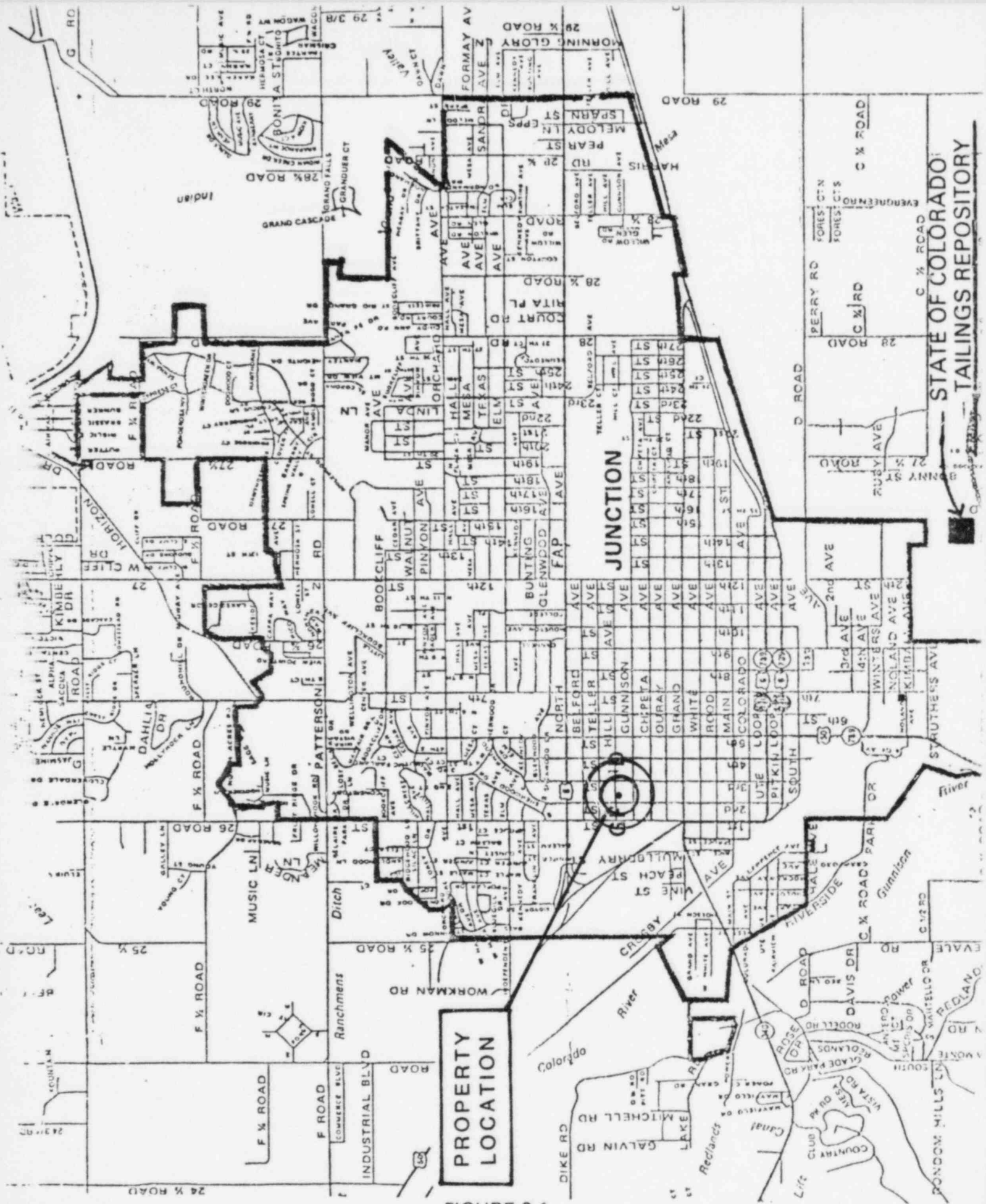


FIGURE 2.1
VICINITY MAP

STATE OF COLORADO
TAILINGS REPOSITORY

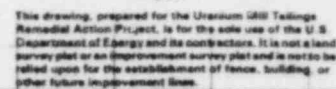
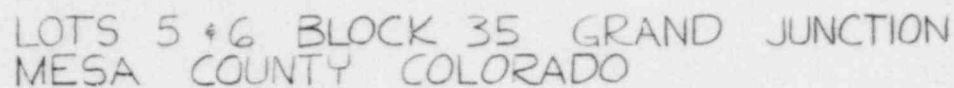

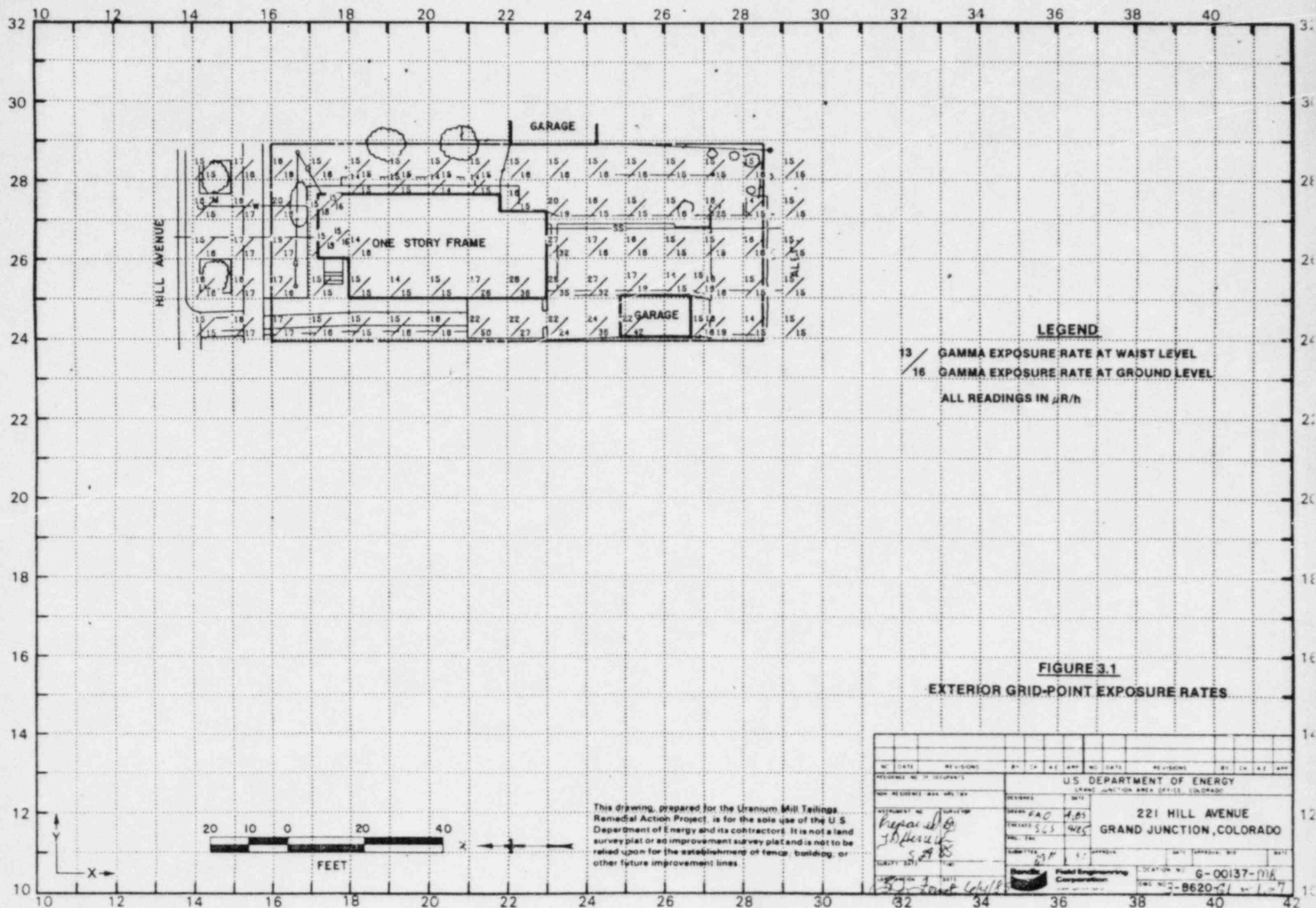
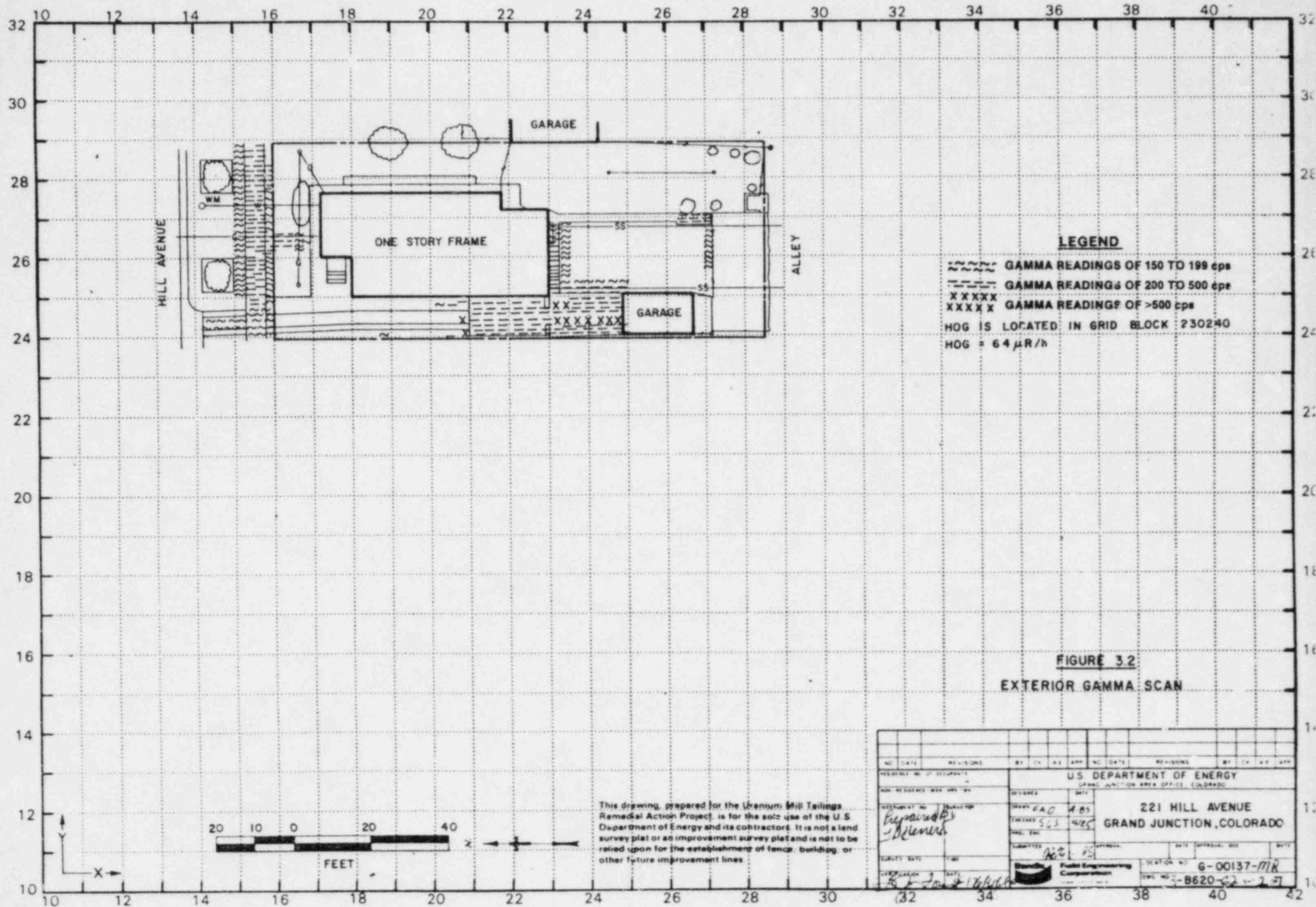
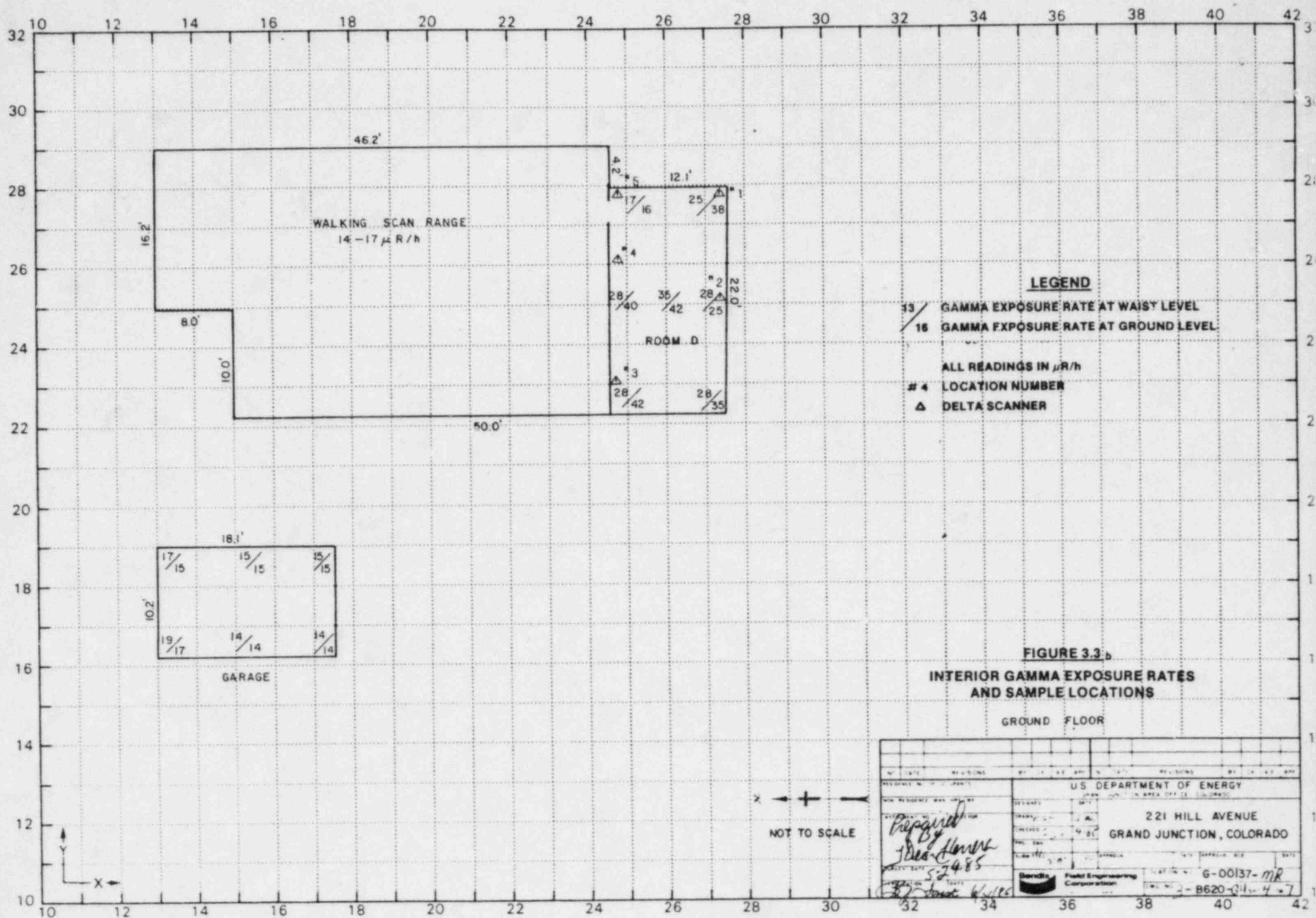


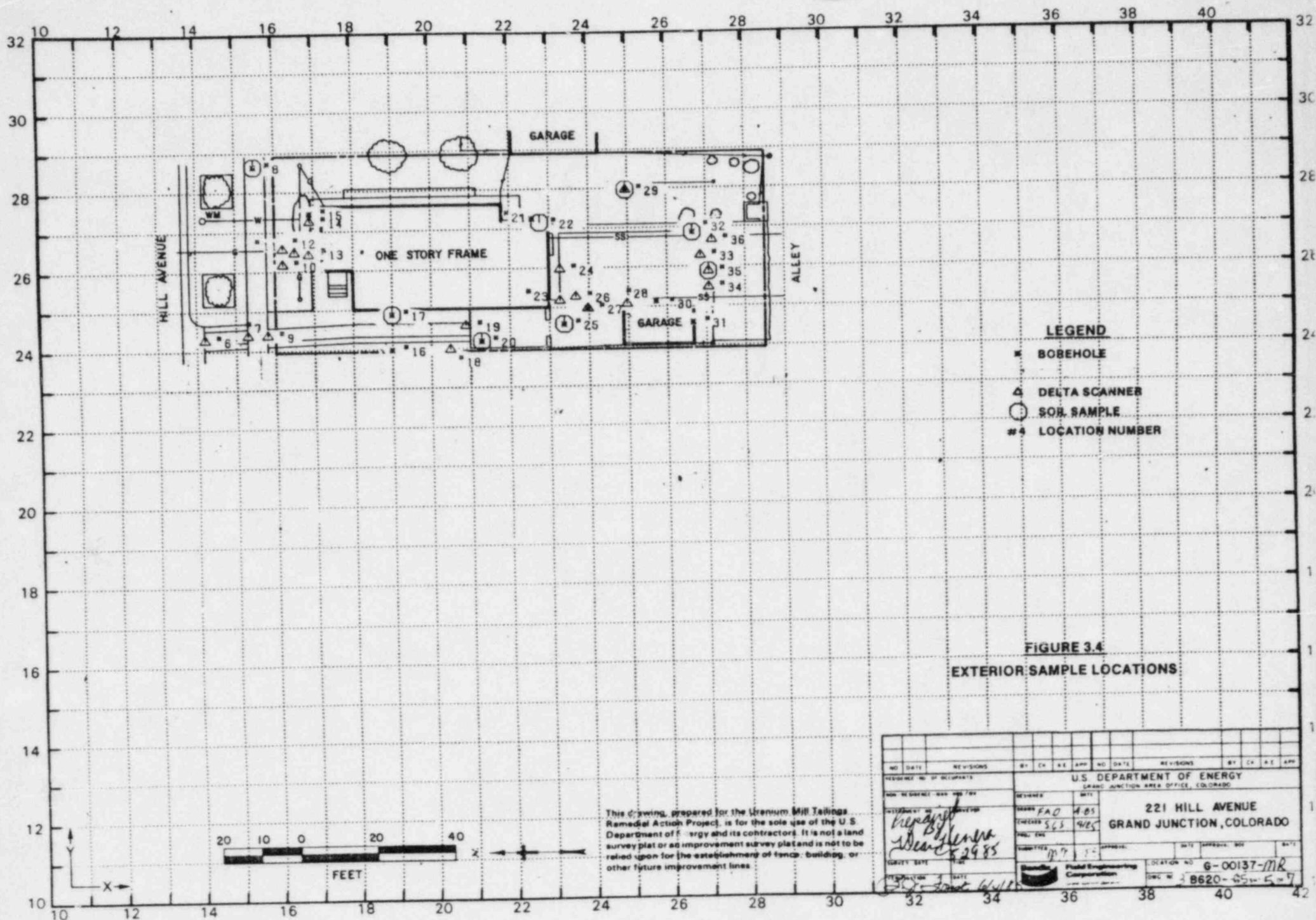
FIGURE 2.2 SITE PLAN

U.S. DEPARTMENT OF ENERGY		DOE ID NO
GRAND JUNCTION PROJECT OFFICE COLORADO		GJ 00137 MA
ADDRESS 221 HILL AVENUE		 Allied Engineering Corporation 221 Hill Avenue Grand Junction, Colorado 81505 Phone (303) 243-1111 Fax (303) 243-1112
GRAND JUNCTION, COLO		
SURV GDE 41685	DRAFT T J 41885	Sheet 1 of 985
DRAWING NO 3 C 620	FI	CHECK 1 OF 1









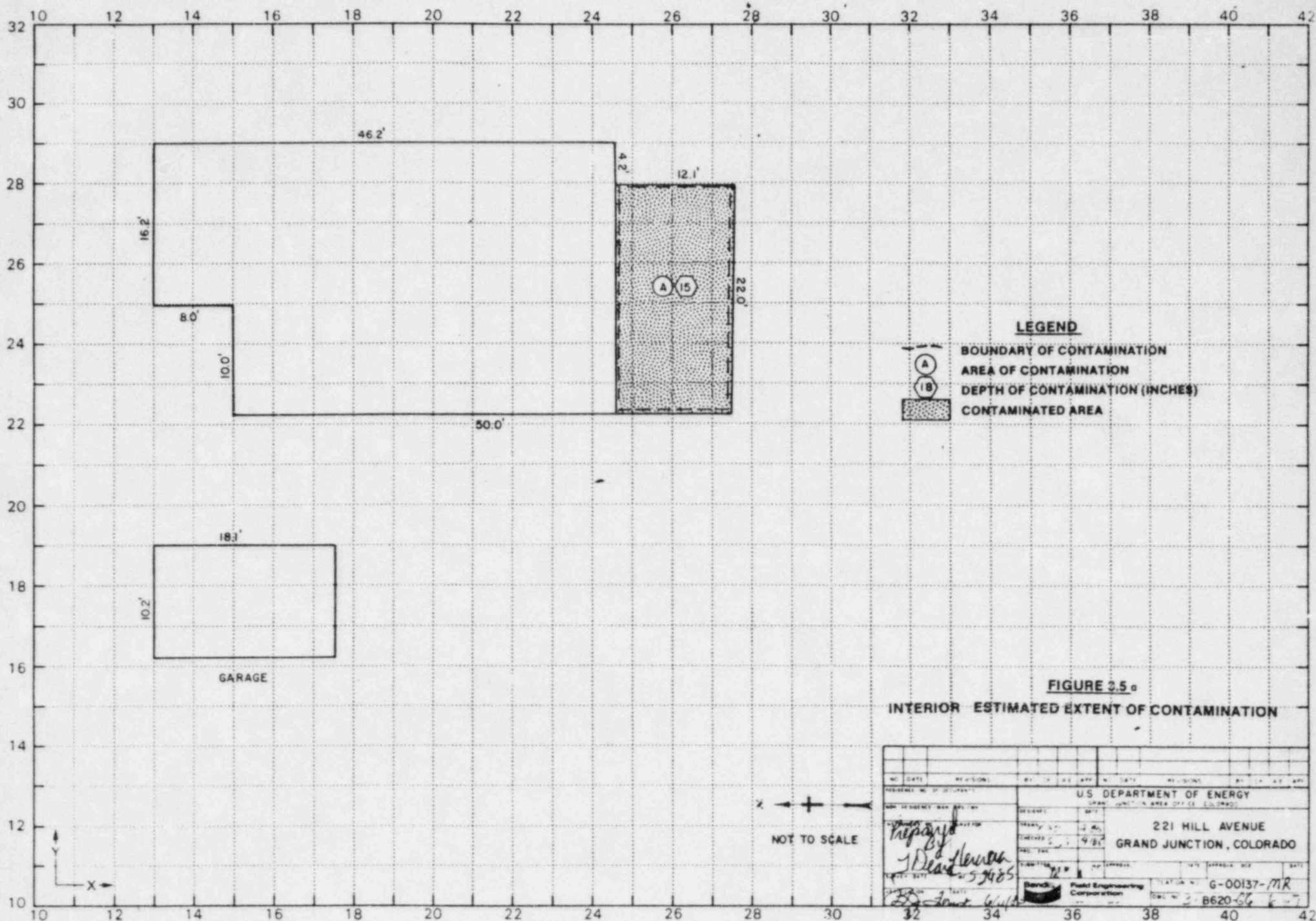
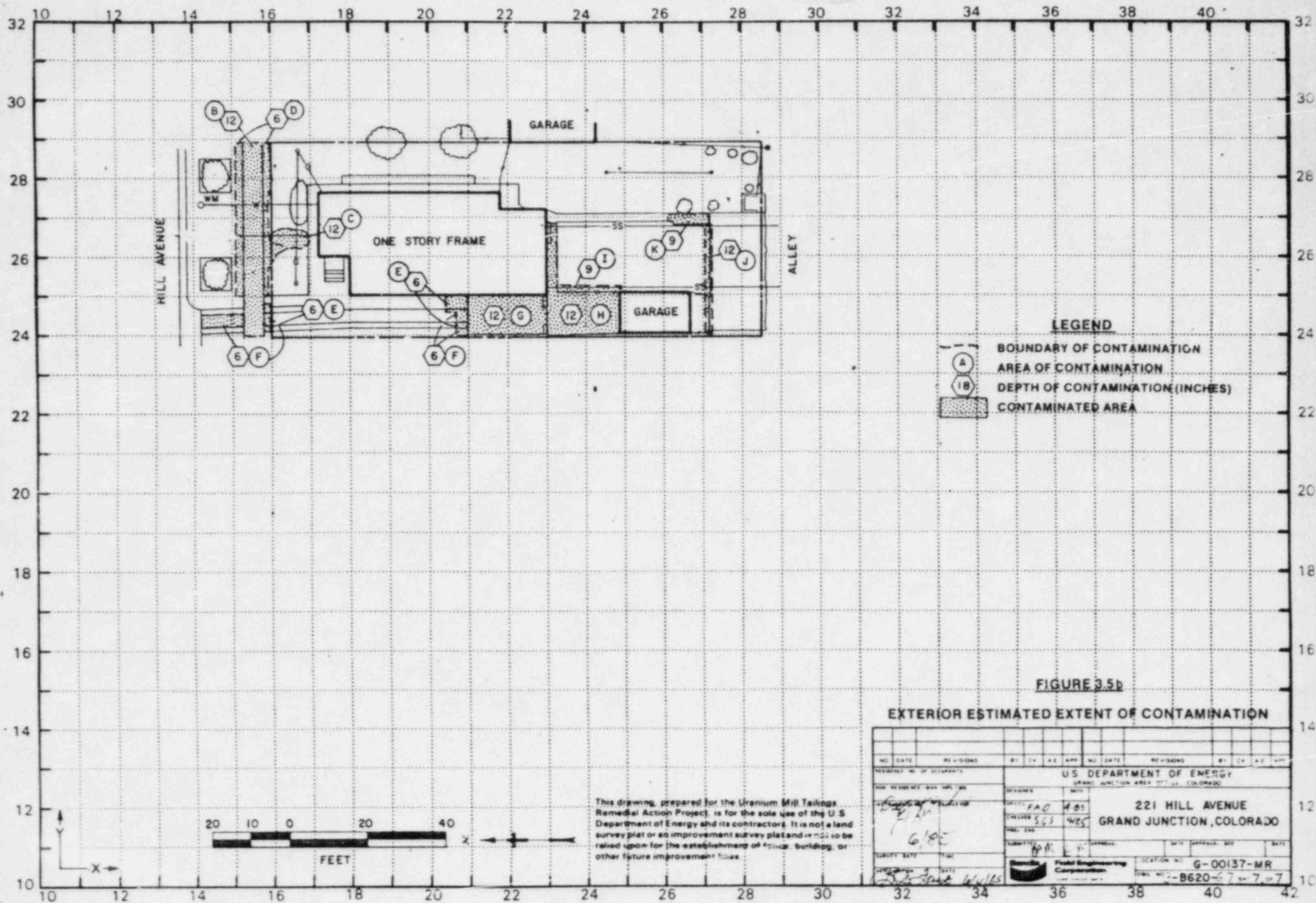


FIGURE 3.5

INTERIOR ESTIMATED EXTENT OF CONTAMINATION

NO.	DATE	REVISIONS	BY	CHK	APP	N	DATE	NO.	DATE	BY	CHK	APP
U.S. DEPARTMENT OF ENERGY GRAND JUNCTION AREA OFFICE, COLORADO 221 HILL AVENUE GRAND JUNCTION, COLORADO												
PROJECT NO. 10-10-10-10 PROJECT NAME: 10-10-10-10 PROJECT LOCATION: 10-10-10-10			PROJECT NO. 10-10-10-10 PROJECT NAME: 10-10-10-10 PROJECT LOCATION: 10-10-10-10									
PROJECT NO. 10-10-10-10 PROJECT NAME: 10-10-10-10 PROJECT LOCATION: 10-10-10-10			PROJECT NO. 10-10-10-10 PROJECT NAME: 10-10-10-10 PROJECT LOCATION: 10-10-10-10									
PROJECT NO. 10-10-10-10 PROJECT NAME: 10-10-10-10 PROJECT LOCATION: 10-10-10-10			PROJECT NO. 10-10-10-10 PROJECT NAME: 10-10-10-10 PROJECT LOCATION: 10-10-10-10									



3/85

DOE ID NO. GJ-00137-MR

Date 05-01-85

U.S. DEPARTMENT OF ENERGY
URANIUM MILL TAILINGS REMEDIAL ACTION PROJECT
GR/ND JUNCTION VICINITY PROPERTIES

Official Survey Report

Property Address 221 Hill Avenue

Property Owner Robert Mc Gee

Address of Owner (if different from above) Same

Report Prepared By T. Dean Herrera

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 = 42 uR/h
HOG = 64 uR/h



Bendix
Aerospace

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

June 4, 1985

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

ATTN: Chuck Thornberg

Dear Chuck:

In response to the technical review comments received in the mail for DOE ID No. GJ-00137-MR (221 Hill Avenue), the following comments are in order.

1. We have found that readings of up to 200 cps are common in water meter pits due to the geometry of the hole.
2. The depths of contamination have been called according to the current procedure used at Bendix. If it does extend deeper, it will be removed at the time of remedial action.
3. The working level information has been documented in the REA.

If you have further questions or comments, please contact me at 242-8621, ext. 435.

Very truly yours,

T. Dean Herrera
RAD Technician

MEMORANDUM

**ALLIED Bendix
Aerospace**

Bendix Field Engineering Corporation
Grand Junction Operations
Grand Junction, Colorado 81501

DATE: May 8, 1985
TO: Files
FROM: T. Dean Herrera
SUBJECT: Team Leader Notes - GJ-00137-MR

Address: 221 Hill Avenue

Owner: Robert McGee

Occupancy: One

Weather: Sunny, 80 degrees.

Team Members

D. Herrera (Team Leader)	T. Flores
V. Rothman	P. Tuhey
M. Duran	L. Kula
M. Dexter	B. Wilkins

Instruments

Crutch Scintillometer - C-1149, C-1182, C-1036, C-1042, C-1128
Delta Scintillometer - C-3941, C-3935
Total Count - C-3959, C-3573
Downhole Spectrometer - C-3361
Surface Spectrometer - C-1372

Date: May 1, 1985

The site arrival time was approximately 0855.

The concrete in the family room appears to be contaminated.
Concrete chips were taken and submitted for analysis. This area is
a later addition to the original home. It is slab on grade.

Team Leader Notes
T. Dean Herrera
GJ-00137-MR
May 8, 1985
Page 2

When shoveling to check the sewer line, a layer of possible tailings sand spewed out from under the patio at a depth of approximately 8 to 11 inches. The sewer line was not located.

The water meter pit was investigated. The reading at the top of the pit was 190 cps and the bottom reading of the pit was 190 cps.

Before breaking for lunch all team members were frisked.

After lunch team members investigated elevated gamma readings in the front yard. At a depth of 3 to 6 inches, encountered possible tailings sand.

Scintillometer SC-1128 failed in the field, this instrument was tagged and noted to be repaired.

The gas line comes in from the alley, not the front of the house as shown on the map (this was noted). The meter is located in the basement of the house. T. Flores and B. Wilkins shoveled for gas line to a depth of 46 inches and did not determine the location. Public Service supposedly located and marked the line on the grass but it appears not to be where Public Service has marked.

Revisit

Date: May 8, 1985

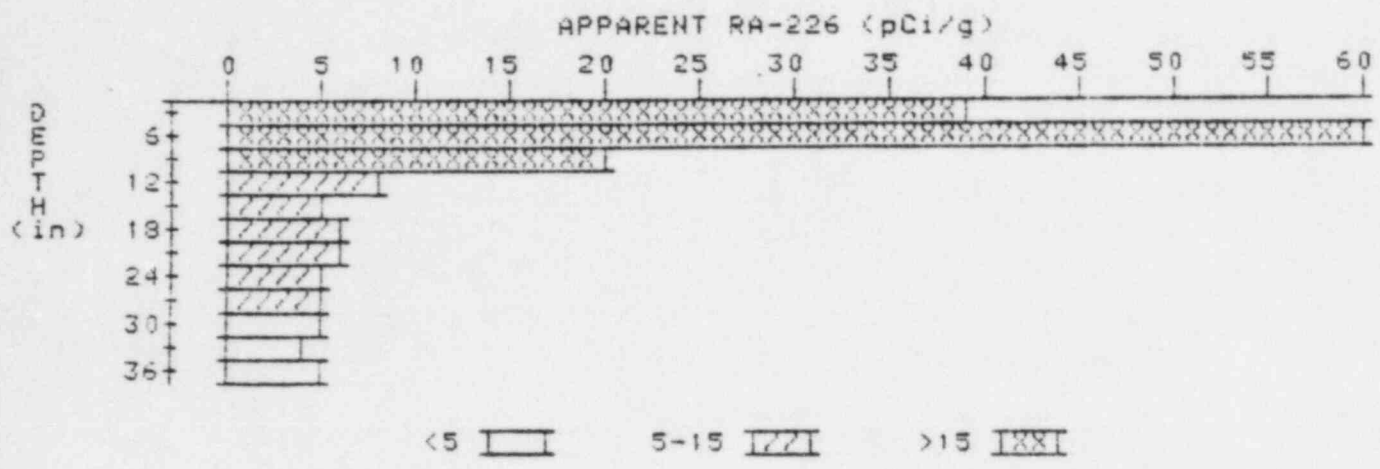
D. Fossey and myself rechecked the sewer and water lines with a borehole and total count.

Investigated a section of concrete in the south portion of the backyard due to lack of information on the initial site visit. It appears that the slab of concrete is contaminated because when a delta scan is taken on the concrete the gamma readings are elevated higher than when a delta is taken on soil at the side and underneath the concrete.

APPARENT RADIUM-226 CONCENTRATION 8

DECONVOLUTION GRAPH

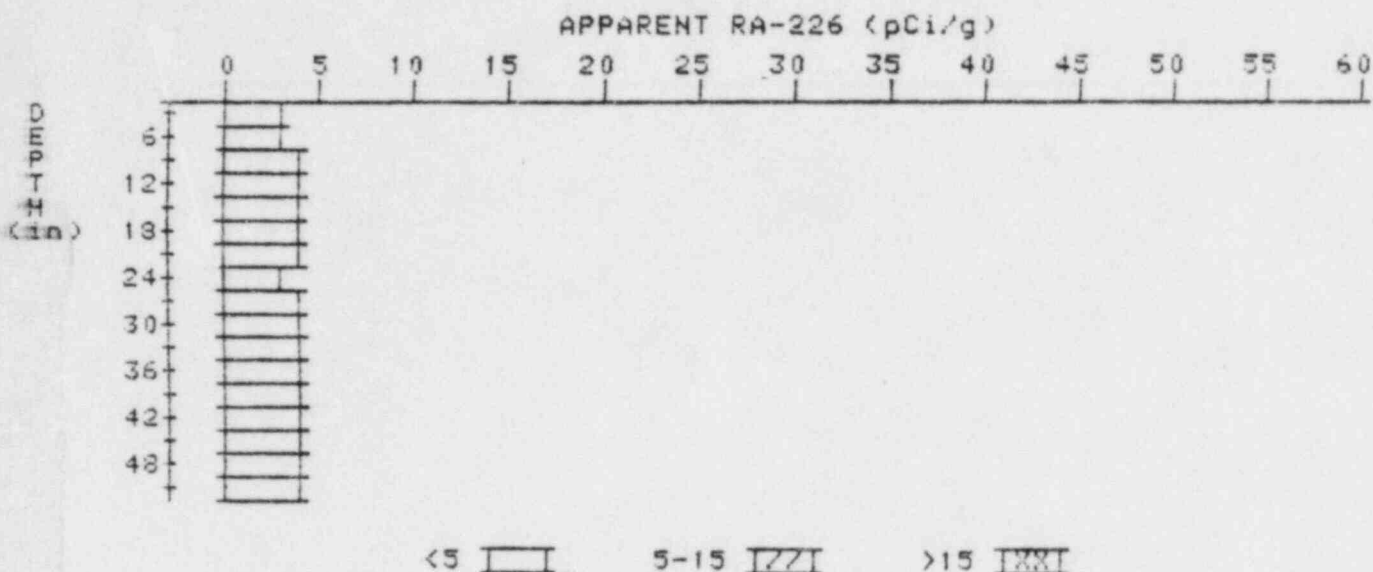
PROPERTY NUMBER: GJ-00137-MR
HOLE NUMBER: 3
LOCATION: 155287



Depth (in)	Apparent Radium-226 (pCi/g) Undeconvolved	Apparent Radium-226 (pCi/g) Deconvolved
3	38.5	38.5
6	46.8	92.0
9	29.7	20.5
12	17.8	3.0
15	11.4	5.4
18	3.4	5.7
21	6.9	5.8
24	6.0	5.5
27	5.4	5.0
30	5.0	4.8
33	4.7	4.2
36	4.7	4.7

APPARENT RADIUM-226 CONCENTRATION 15 DECONVOLUTION GRAPH

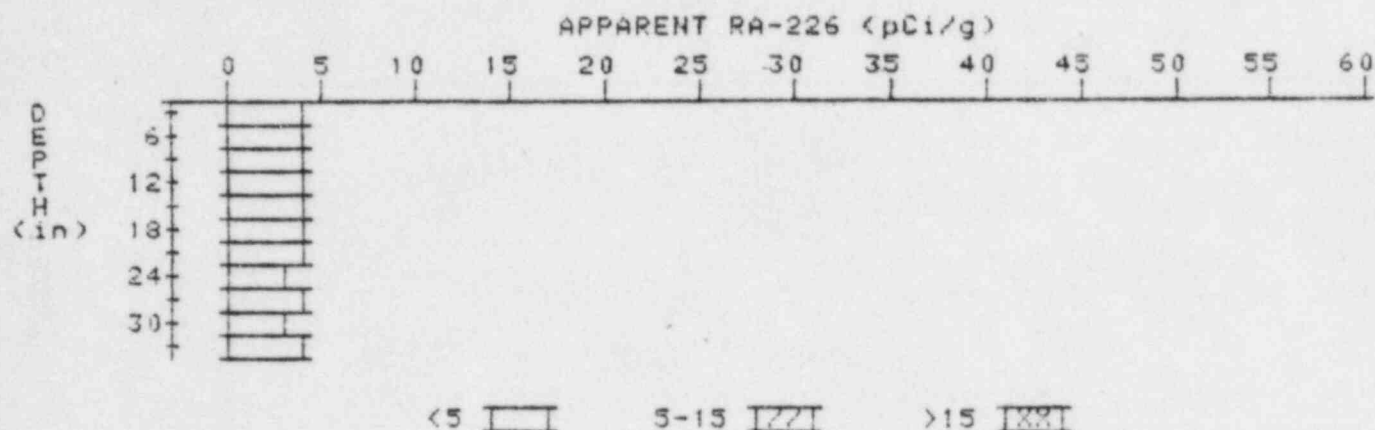
PROPERTY NUMBER: GJ-00137-MR
HOLE NUMBER: 15
LOCATION: 169275



Depth (in)	Apparent Radium-226 (pCi/g) Undeconvolved	Apparent Radium-226 (pCi/g) Deconvolved
3	2.9	2.9
6	3.2	3.2
9	3.5	3.7
12	3.7	4.1
15	3.7	3.5
18	3.8	4.2
21	3.7	3.7
24	3.6	3.2
27	3.7	3.9
30	3.7	3.7
33	3.7	3.5
36	3.8	3.8
39	3.9	4.1
42	3.9	3.9
45	3.9	3.7
48	4.0	4.2
51	4.0	4.0

APPARENT RADIUM-226 CONCENTRATION 16 DECONVOLUTION GRAPH

PROPERTY NUMBER: GJ-00137-MR
HOLE NUMBER: 16
LOCATION: 190240



Depth (in)	Apparent Radium-226 (pCi/g) Undeconvolved	Apparent Radium-226 (pCi/g) Deconvolved
3	3.5	3.5
6	3.7	3.9
9	3.8	3.8
12	3.9	4.3
15	3.8	3.6
19	3.8	4.0
21	3.7	3.7
24	3.6	3.4
27	3.6	3.8
30	3.5	3.7
33	3.5	3.5

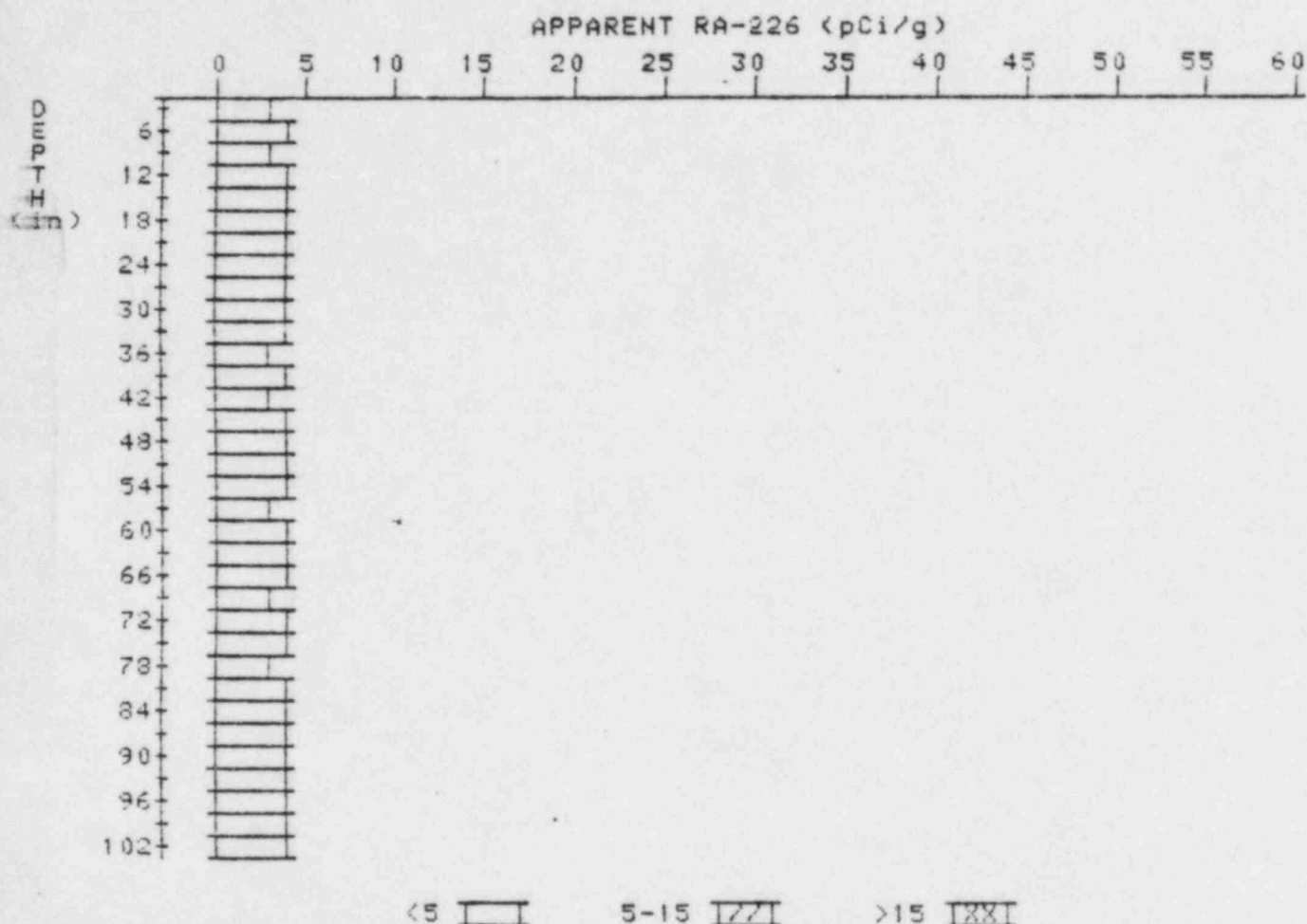
APPARENT RADIUM-226 CONCENTRATION 17

DECONVOLUTION GRAPH

PROPERTY NUMBER: GJ-00137-MR

HOLE NUMBER: 17

LOCATION: 190249



Depth (in)	Apparent Radium-226 (pCi/g) Undeconvolved	Apparent Radium-226 (pCi/g) Deconvolved
3	2.9	2.9
6	3.3	3.9
9	3.4	3.0
12	3.7	4.1
15	3.8	4.0
18	3.8	3.3
21	3.8	4.0

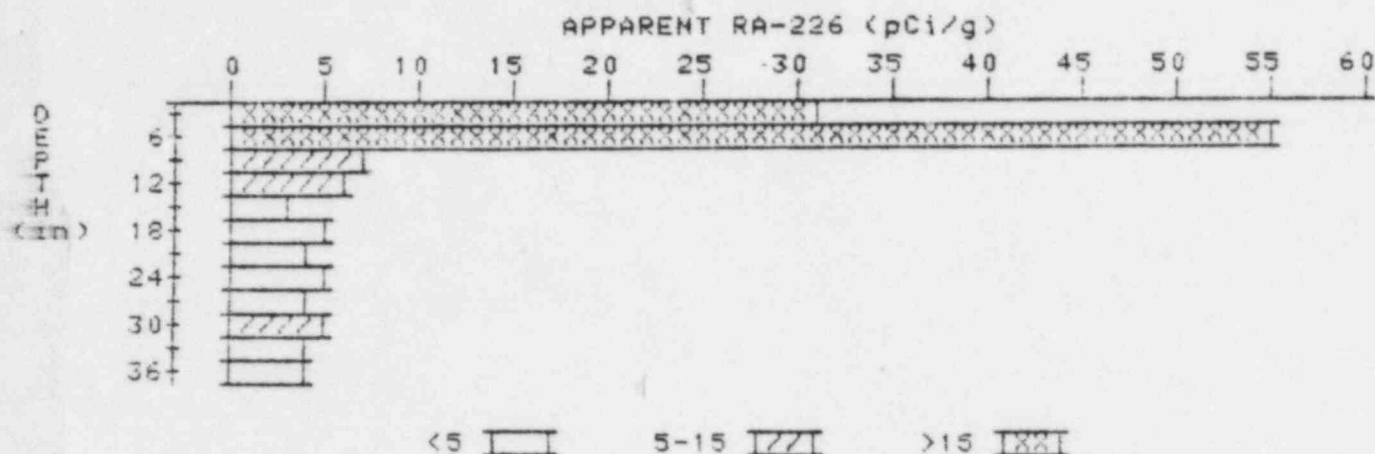
24	3.7	3.5
27	3.7	3.7
30	3.7	3.9
33	3.6	3.6
36	3.5	3.1
39	3.6	3.8
42	3.6	3.4
45	3.7	3.7
48	3.8	4.2
51	3.7	3.5
54	3.7	3.7
57	3.7	3.3
60	3.9	4.4
63	3.8	3.6
66	3.8	4.0
69	3.7	3.3
72	3.8	3.8
75	3.9	4.3
78	3.8	3.4
81	3.9	4.1
84	3.9	3.7
87	4.0	4.2
90	4.0	4.2
93	3.9	3.7
96	3.9	4.3
99	3.7	3.5
102	3.6	3.6

APPARENT RADIUM-226 CONCENTRATION 20 DECONVOLUTION GRAPH

PROPERTY NUMBER: GJ-00137-MR

HOLE NUMBER: 20

LOCATION: 213242



Depth (in)	Apparent Radium-226 (pCi/g) Undeconvolved	Apparent Radium-226 (pCi/g) Deconvolved
3	31.0	31.0
6	31.1	54.6
9	18.0	6.8
12	11.2	6.0
15	7.3	2.9
18	5.9	4.7
21	5.2	4.5
24	4.9	4.7
27	4.7	4.3
30	4.7	5.1
33	4.5	4.3
36	4.4	4.4

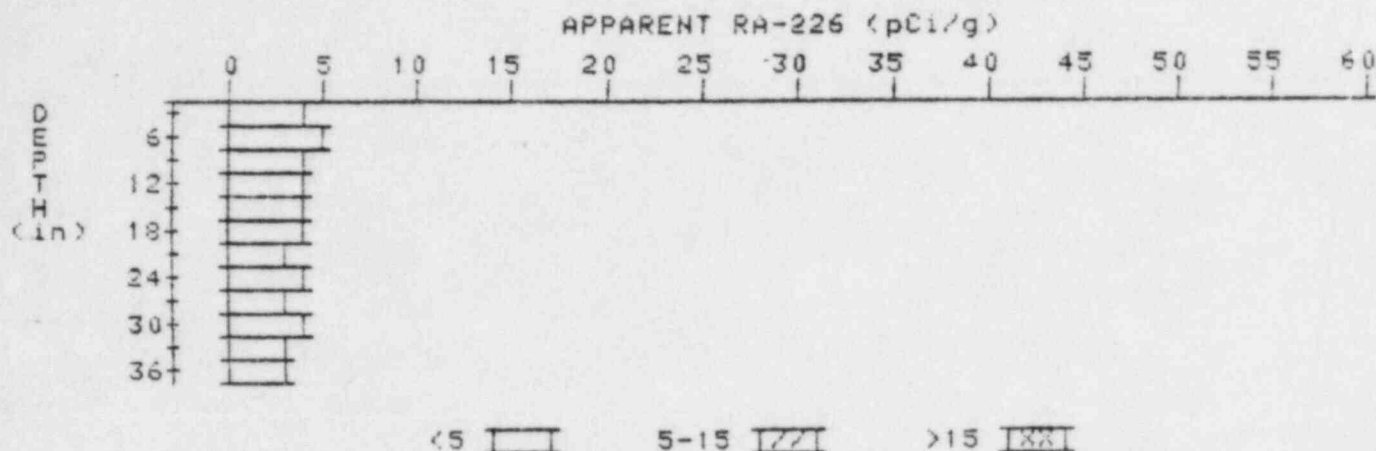
APPARENT RADIUM-226 CONCENTRATION 21

DECONVOLUTION GRAPH

PROPERTY NUMBER: GJ-00137-MR

HOLE NUMBER: 21

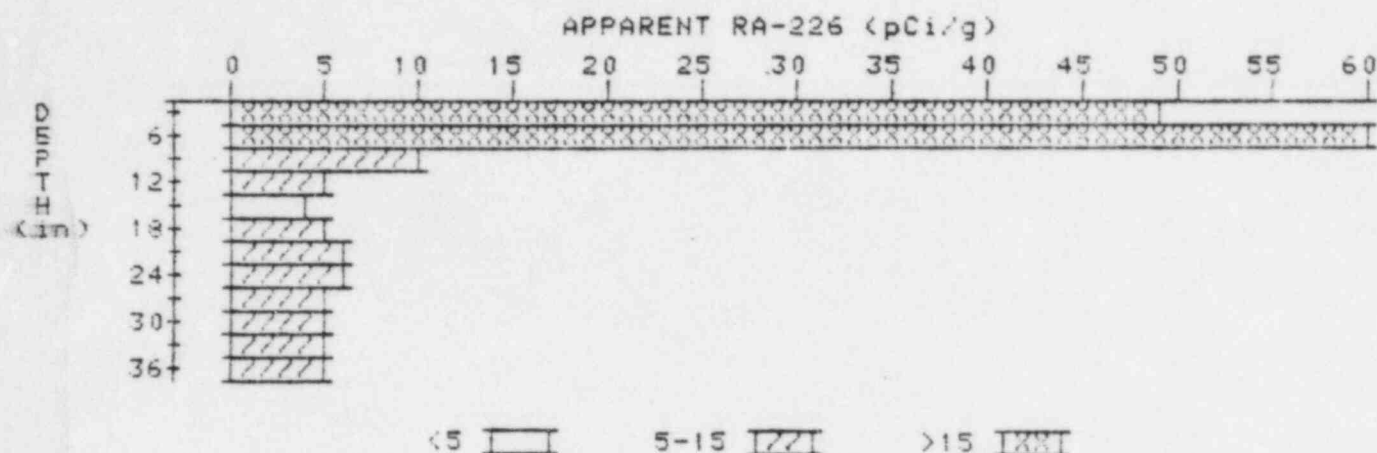
LOCATION: 226273



Depth (in)	Apparent Radium-226 (pCi/g)	Apparent Radium-226 (pCi/g)
	Undeconvolved	Deconvolved
3	3.5	3.5
6	3.9	4.6
9	3.9	4.1
12	3.8	3.8
15	3.7	3.7
18	3.6	3.6
21	3.5	3.3
24	3.5	3.7
27	3.4	3.0
30	3.5	3.9
33	3.4	3.4
36	3.3	3.3

APPARENT RADIUM-226 CONCENTRATION 25 DECONVOLUTION GRAPH

PROPERTY NUMBER: GJ-00137-MR
HOLE NUMBER: 25
LOCATION: 234246



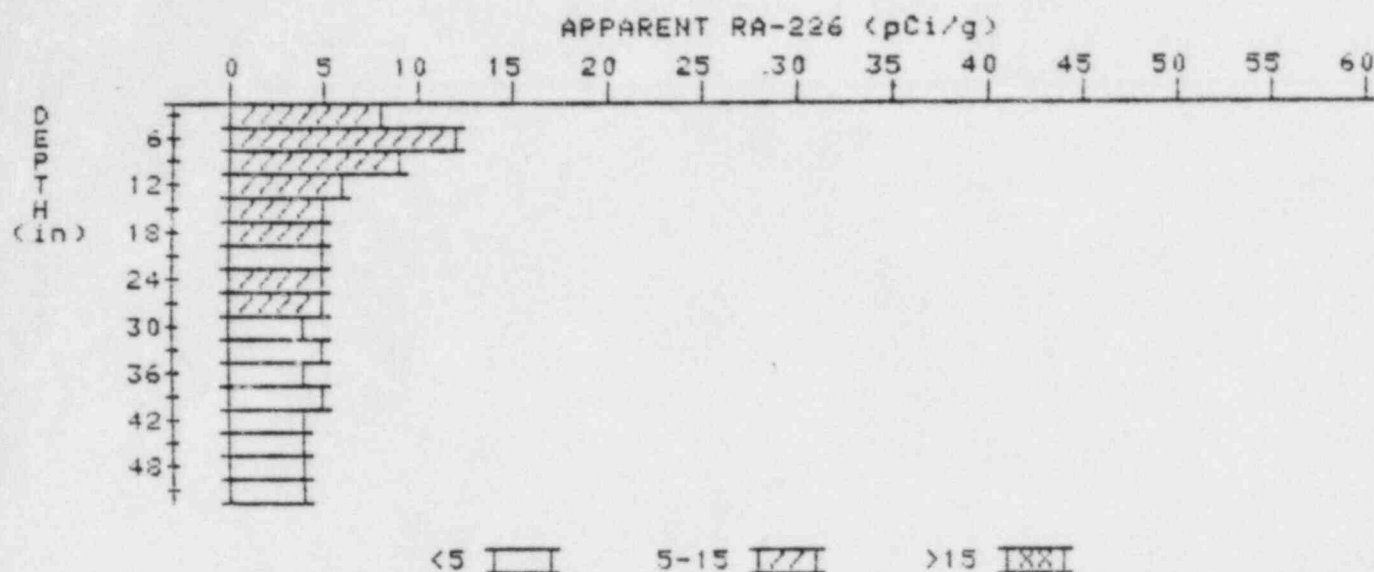
Depth (in)	Apparent Radium-226 (pCi/g) Undeconvolved	Apparent Radium-226 (pCi/g) Deconvolved
3	48.6	48.6
6	41.5	60.0
9	24.0	10.3
12	14.2	5.5
15	9.3	4.1
18	7.3	5.3
21	6.4	5.7
24	5.9	5.7
27	5.5	5.1
30	5.3	5.1
33	5.2	5.2
36	5.1	5.1

APPARENT RADIUM-226 CONCENTRATION 27 DECONVOLUTION GRAPH

PROPERTY NUMBER: GJ-00137-MR

HOLE NUMBER: 27

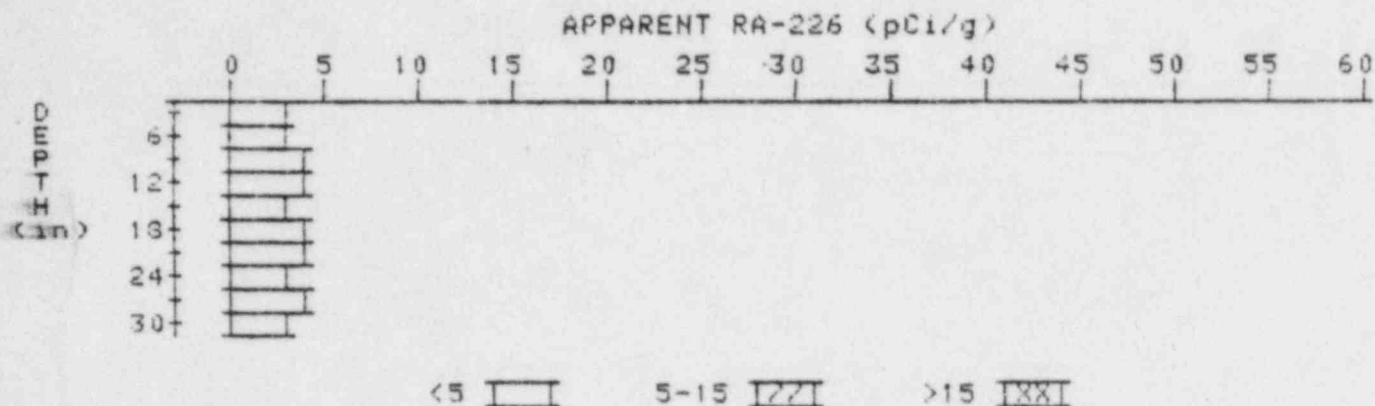
LOCATION: 240251



Depth (in)	Apparent Radium-226 (pCi/g) Undeconvolved	Apparent Radium-226 (pCi/g) Deconvolved
3	8.4	8.4
6	9.2	12.2
9	8.3	9.2
12	6.9	6.2
15	5.9	5.0
18	5.4	5.0
21	5.1	4.7
24	5.0	5.0
27	4.9	5.3
30	4.6	4.2
33	4.5	4.7
36	4.3	3.9
39	4.3	4.7
42	4.1	3.7
45	4.1	4.1
48	4.1	4.3
51	4.0	4.0

APPARENT RADIUM-226 CONCENTRATION 29 DECONVOLUTION GRAPH

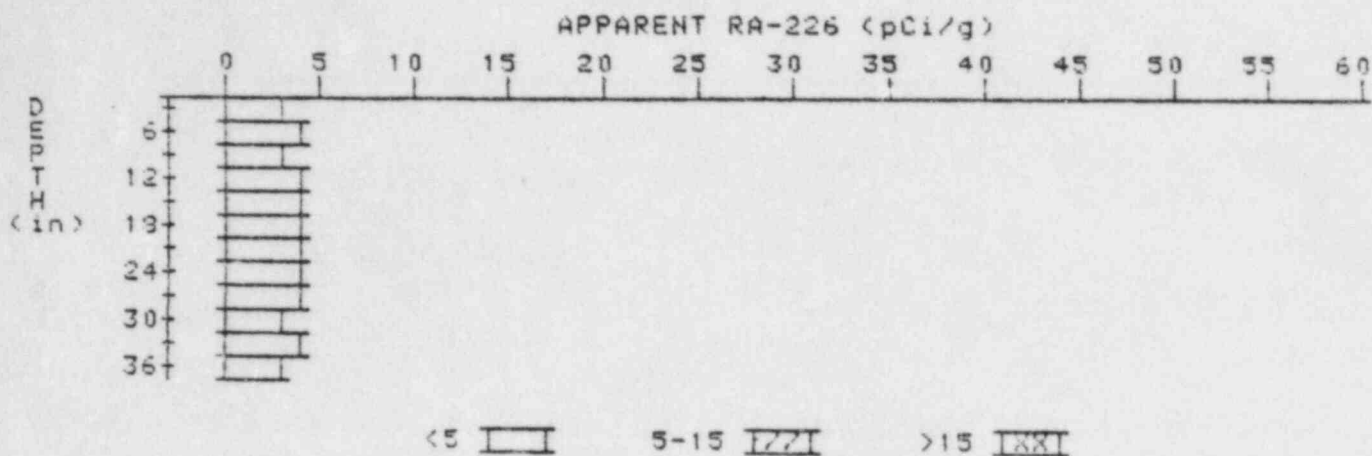
PROPERTY NUMBER: GJ-00137-MR
HOLE NUMBER: 29
LOCATION: 250280



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

APPARENT RADIUM-226 CONCENTRATION 30 DECONVOLUTION GRAPH

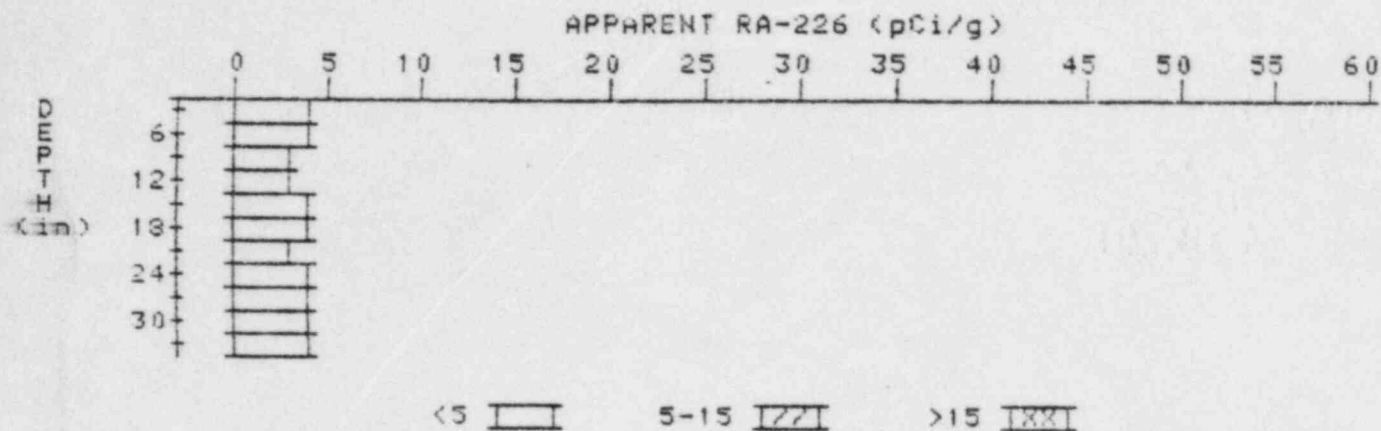
PROPERTY NUMBER: GJ-00137-MR
HOLE NUMBER: 30
LOCATION: 258251



Depth (in)	Apparent Radium-226 (pCi/g) Undeconvolved	Apparent Radium-226 (pCi/g) Deconvolved
3	3.1	3.1
6	3.5	4.2
9	3.5	3.3
12	3.6	3.8
15	3.6	3.6
18	3.6	3.6
21	3.6	3.6
24	3.6	3.6
27	3.6	3.8
30	3.5	3.3
33	3.5	3.7
36	3.4	3.4

APPARENT RADIUM-226 CONCENTRATION 31 DECONVOLUTION GRAPH

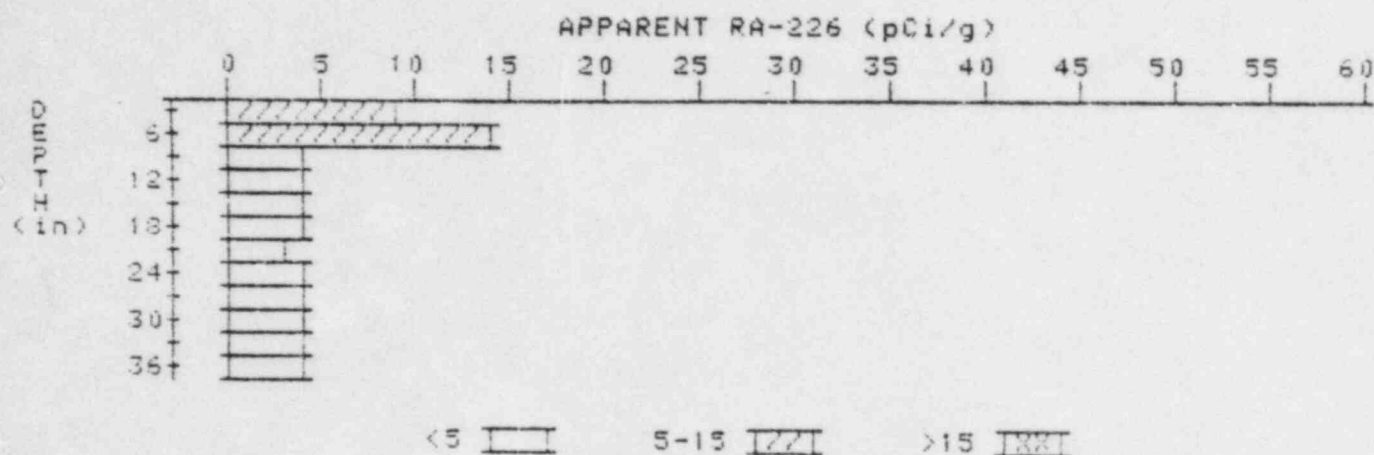
PROPERTY NUMBER: GJ-00137-MR
HOLE NUMBER: 31
LOCATION: 267246



Depth (in)	Apparent Radium-226 (pCi/g) Undeconvolved	Apparent Radium-226 (pCi/g) Deconvolved
3	3.5	3.5
6	3.7	4.2
9	3.6	3.4
12	3.6	3.4
15	3.7	3.9
18	3.7	3.9
21	3.6	3.2
24	3.7	3.9
27	3.7	3.5
30	3.8	4.0
33	3.8	3.8

APPARENT RADIUM-226 CONCENTRATION 32 DECONVOLUTION GRAPH

PROPERTY NUMBER: GJ-00137-MR
HOLE NUMBER: 32
LOCATION: 267269



Depth (in)	Apparent Radium-226 (pCi/g) Undeconvolved	Apparent Radium-226 (pCi/g) Deconvolved
3	9.3	9.3
6	9.3	14.3
9	6.5	4.0
12	5.1	3.9
15	4.4	3.9
18	4.0	3.6
21	3.8	3.4
24	3.8	3.8
27	3.8	3.8
30	3.8	3.6
33	3.9	4.3
36	3.8	3.8