RADIOLOGIC AND ENGINEERING ASSESSMENT

FOR

DOE ID NO.: GJ-13381-MR
ADDRESS: 701 ASH DRIVE

AUGUST 1985

FOR

URANIUM MILL TAILINGS REMEDIAL ACTION PROJECT OFFICE

ALBUQUERQUE OPERATIONS OFFICE

DEPARTMENT OF ENERGY

BY

BENDIX FIELD ENGINEERING CORPORATION
P.O. Box 1569
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DATE August 19, 1985

REA13381:REA-KL017

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1.0 EXECUTIVE SUMMARY

1.1 Introduction

The location, DOE ID No. GJ-13381-MR, is a single-family residence located at 701 Ash Drive, 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, 60 cu. yd.; interior, 0 cu. yd.

Areas A and E will not be included in this remedial action as discussed in Section 4.0 of this REA.

Estimated cost to perform remedial action, including dislocation when applicable, is $4,950. Remedial action on this property will take approximately 14 days to complete.

2.0 PROPERTY DESCRIPTION

2.1 General Description

Address: 701 Ash Drive, Grand Junction, Colorado

Zoning: Residential (R1-B)

Lot Size: Approximately 10,890 sf (0.25 acres)

Legal Description: Lot 6, Block 7, Sunset Terrace Subdivision, Section 35, T1N, R1W, County of Mesa, State of Colorado.

Point of Reference: This property is located approximately 5 miles north of the State of Colorado Tailings Repository. Appendix Figure 2.1 shows the property location relative to its surroundings.

Utilities: Utility locations are shown in Appendix Figure 2.2.

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

Bordering Properties:

North:	Single-family residence
South:	G Road
East:	Ash Drive
West:	Single-family residence

2.2 Existing Facilities and Structures

Primary Structure:

Type:	Single-family residence
Size:	Approximately 2,100 sf
Construction Date:	1958
Construction:	Wood-frame structure with brick veneer exterior
Foundation:	10" poured concrete with assumed spread footing
Footing Depth:	Approximately 74" to bottom of footing from grade
Basement:	Full basement
Crawl Space:	None
Condition:	Fair

Other Structures:

Type:	Garage
Size:	Approximately 484 sf
Construction:	Wood-frame, horizontal siding
Foundation:	Slab-on-grade, 12" thick monolithic footing
Condition:	Fair

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-13381-MR, April 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 interior contamination associated with the basement walls, floor, and fireplace. Exterior anomalies were noted (1) at the northeast corner of the property, (2) near the southern property line, (3) within concrete retaining walls at the northwest and southwest corners of the primary structure, and (4) deriving from portions of the concrete sidewalks east and west 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, and deconvolution graphs are included in the Appendix (Section 6.0).

3.2 Gamma Exposure-Rate Surveys

3.2.1 Exterior Findings

Background Readings: 15 to 16 uR/h
Highest Outside Gamma Reading (HOG): 38 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: None
Highest Inside Gamma Reading (HIG): 34 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 3.3a 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: 0.015 gross working level (WL). No additional RDC measurements were taken by Bendix.

3.5 Extent of Contamination

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

(AREA A) The 5-inch-thick basement slab is contaminated (approximately 1,860 sf; excluded in this remedial action).

(AREA B) A portion of the concrete sidewalk east of the primary structure, and the underlying soil, are contaminated to a total depth of 12 inches (approximately 45 sf).

(AREA C) In the northeast corner of the property there is contamination which extends to the edge of Ash Drive. The depth of contamination is 12 inches (approximately 579 sf).

(AREA D) There are two small, isolated deposits adjacent to the north property line. A small portion of this area is 4-inch-thick concrete. The depth of contamination is estimated to be 12 inches, based on data obtained in Area C (approximately 114 sf).

(AREA E) The concrete retaining walls at the southwest and northwest corners of the primary structure are contaminated. The walls are 66 inches high, from the base of the footing, and 10 inches thick (approximately 237 sf; excluded in this remedial action).

(AREA F) At the west side of the primary structure, two separate concrete pours within the patio are contaminated. The depth of contamination is estimated to be 5 inches, based on data obtained in Area A (approximately 36 sf).

(AREA G) A deposit is located between the south property line and G Road. The depth of contamination is 33 inches (approximately 300 sf).

4.0 RECOMMENDED REMEDIAL ACTION

4.1 Decontamination and Restoration

The recommended remedial action for this property, DOE ID No. GJ-13381-MR, includes removal of select areas identified as containing radioactive material (as discussed in Section 3.5 and shown in Appendix Figure 3.5b) and transport of removed material to the disposal site.

Remedial action will not be performed on Area E of this property because the levels of radioactivity on this property fall below the EPA Standards (40 CFR 192) when averaged over 100 m^2.

The EPA Standards are:

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

The average radium concentration for this area is 3.08 pCi/g which falls below the allowable EPA Standard, including background, of 7 pCi/g for this area. Appendix Table 4.3 presents the calculations for concentrations of Radium-226 in soil for this area.

Remedial action will not be performed on Area A 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 0.015.)
(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 15 and 16 uR/h, with the highest mean surface gamma reading at 33 uR/h.)

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 $4,950.

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

The owner prefers not to have the trees in Area G replaced. No legal or other complications are foreseen at this time.

5.0 REFERENCES

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

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

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

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

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

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

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

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

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

6.0 APPENDIX

This Appendix contains the following:

Appendix Tables:

Table 3.1	Radium Concentrations at Exterior Locations
Table 3.2	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
Table 4.3	Calculations for Concentrations of Radium-226 in Soil

Appendix Figures:

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

Official Survey Report
Memo of Understanding
Team Leader Notes
Deconvolution Graphs (Apparent Radium-226 Concentration)

Loc #	Grid Location	Depth (in.)	Meas. Type	In Situ Ra-226 (pCi/g) Tot. Ct	In Situ Ra-226 (pCi/g) Spectr.	Chem Ra-226 (pCi/g)	Comments
13	140230	00	DS	1.6		*	Background
		06	DS	1.6		*	
		00	GS		<1.0	*	
		00-06	SS			2.3	Moist layer over dry
		03	TC	3.0		*	DC = 0 inches
		06	BH	3.4	1.5	*	
		09	TC	3.7		*	
		12	BH	3.8	1.6	*	
		15	TC	3.9		*	
		18	BH	3.9	1.8	*	
		21	TC	3.9		*	
		24	BH	4.0	1.8	*	
14	142240	03	TC	3.1		*	DC = 0 inches
		06	TC	3.6		*	
		09	TC	3.8		*	
		12	TC	3.9		*	
		15	TC	4.0		*	
		18	TC	4.1		*	
		21	TC	4.1		*	
		24	TC	4.1		*	
		27	TC	4.1		*	
		30	TC	4.1		*	
15	149249	03	TC	3.3		*	DC = 0 inches
		06	TC	3.7		*	
		09	TC	3.9		*	
		12	TC	4.2		*	
		15	TC	4.1		*	
		18	TC	4.2		*	
		21	TC	4.2		*	
		24	TC	4.2		*	
		27	TC	4.2		*	
		30	TC	4.1		*	
		33	TC	4.2		*	
16	152257	03	TC	3.1		*	DC = 0 inches
		06	TC	3.6		*	
		09	TC	3.8		*	
		12	TC	4.0		*	
		15	TC	3.9		*	
		18	TC	4.0		*	
		21	TC	3.9		*	
		24	TC	4.0		*	

Loc #	Grid Location	Depth (in.)	Meas. Type	In Situ Ra-226 (pCi/g) Tot. Ct	Spectr.	Chem Ra-226 (pCi/g)	Comments
16	152257	27	TC	4.0		*	
		30	TC	4.0		*	
		33	TC	4.0		*	
		36	TC	4.0		*	
17	160280	03	TC	3.3		*	DC = 0 inches
		06	TC	3.7		*	
		09	TC	3.9		*	
		12	TC	4.1		*	
		15	TC	4.2		*	
		18	TC	4.3		*	
		21	TC	4.1		*	
		24	TC	4.2		*	
		27	TC	4.2		*	
		30	TC	4.1		*	
18	173266	00	DS	1.6		*	Gas line
		12	DS	1.9		*	East of garage
19	173267	00	DS	<1.0		*	Gas line
		12	DS	1.2		*	East of garage
20	181248	03	TC	3.5		*	Next to rear patio
		06	TC	3.8		*	Sewer line
		09	TC	4.0		*	
		12	TC	4.1		*	DC = 0 inches
		15	TC	4.2		*	
		18	TC	4.2		*	
		21	TC	4.1		*	
		24	TC	4.2		*	
		27	TC	4.2		*	
		30	TC	4.2		*	
		33	TC	4.2		*	
		36	TC	4.2		*	
		39	TC	4.2		*	
		42	TC	4.3		*	
		45	TC	4.4		*	
		48	TC	4.3		*	
		51	TC	4.3		*	
		54	TC	4.2		*	
		57	TC	4.3		*	

Loc #	Grid Location	Depth (in.)	Meas. Type	In Situ Ra-226 (pCi/g) Tot. Ct	In Situ Ra-226 (pCi/g) Spectr.	Chem Ra-226 (pCi/g)	Comments
21	184216	00	GS		5.1	*	On retaining wall
22	184220	00	DS	1.5		*	West of southwest retaining wall
23	186220	[56]	DS	6.3		*	On top of wall
		00	DS	2.8		*	Beside southwest
		06	DS	1.8		*	retaining wall
		[56]	GS		4.5	*	
		00-06	SS			2.6	Wet; 1" mud, 5" clay
24	186280	[60]	DS	6.9		*	On top of wall
		00	DS	1.6		*	Beside northwest
		06	DS	1.2		*	retaining wall
		00-06	SS			3.6	
25	186283	[56]	GS		5.1	*	On top wall
26	187237	00	DS	1.2		*	Off slab
27	189238	00	DS	6.7		*	On slab by sliding glass doors
28	189251	00	DS	1.1		*	
29	189254	00	DS	7.8		*	Slab by rear entrance
30	190250	00	GS		1.2	*	
31	190270	00	DS	<1.0		*	West side of primary structure
32	193273	00	GS		2.6	*	North wall of primary structure
33	194273	00	DS	1.6		*	West side off back porch
34	201196	03	TC	5.3		*	Between south
		06	BH	6.3	5.8	*	property line and
		09	TC	6.7		*	G Road
		12	BH	7.3	6.6	*	
		15	TC	8.6		*	
		18	BH	10.8	12.5	*	

Loc #	Grid Location	Depth (in.)	Meas. Type	In Situ Ra-226 (pCi/g) Tot. Ct	In Situ Ra-226 (pCi/g) Spectr.	Chem Ra-226 (pCi/g)	Comments
34	201196	21	TC	12.2		*	
		24	BH	11.6	11.4	*	DC = 33 inches
		27	TC	10.3		*	Based on all
		30	TC	9.2		*	available data
		33	TC	7.8		*	
		36	TC	6.3		*	
		39	TC	5.3		*	
		42	TC	4.7		*	
		45	TC	4.4		*	
		48	TC	4.5		*	
35	207230	00	GS		1.4	*	Horizontal, against primary structure
36	214277	00	GS		<1.0	*	
37	220230	00	DS	1.3		*	Main gas line
		06	DS	1.0		*	
		18	DS	1.3		*	
38	221262	00	DS	1.0		*	
39	222287	00	DS	2.1		*	
40	223244	00	DS	1.1		*	
41	223252	00	DS	1.2		*	
42	223263	00	GS		1.8	*	East wall of
		03	TC	3.4		*	primary structure
		06	TC	3.6		*	
		09	TC	3.9		*	Foundation and
		12	TC	3.9		*	water line
		15	TC	4.1		*	investigation
		18	TC	4.0		*	
		21	TC	4.0		*	DC = 0 inches
		24	TC	4.0		*	
		27	TC	4.1		*	
		30	TC	4.0		*	
		33	TC	4.1		*	
		36	TC	4.0		*	
		39	TC	4.0		*	
		42	TC	4.1		*	
		45	TC	4.0		*	

Loc #	Grid Location	Depth (in.)	Meas. Type	In Situ Ra-226 (pCi/g) Tot. Ct	In Situ Ra-226 (pCi/g) Spectr.	Chem Ra-226 (pCi/g)	Comments
42	223263	48	TC	4.0		*	
		51	TC	4.0		*	
		54	TC	4.1		*	
		57	TC	4.1		*	
		60	TC	4.0		*	
		63	TC	4.1		*	
		66	TC	4.1		*	
		69	TC	4.1		*	
		72	TC	4.3		*	
		75	TC	4.2		*	
43	224244	00	DS	1.2		*	
44	229282	00	DS	2.1		*	North of east entrance steps
45	238280	00	DS	6.4		*	Northeast of
		06	DS	6.8		*	primary structure
		12	DS	<1.0		*	DC = 12 inches
46	240272	03	TC	5.0		*	Northeast of
		06	TC	6.1		*	primary structure
		09	TC	5.6		*	
		12	TC	4.8		*	DC = 12 inches
		15	TC	4.3		*	Based on the
		18	TC	4.0		*	deconvolution graph
		21	TC	3.8		*	
		24	TC	3.6		*	
		27	TC	3.5		*	
		30	TC	3.5		*	
		33	TC	3.3		*	
		36	TC	3.4		*	
		39	TC	3.4		*	
47	240274	00	GS		7.9	*	On east sidewalk
48	241274	00-04	SS			13.7	Concrete core
		04-10	SS			4.3	Rocky soil
		03	TC	7.7		*	Walkway in front
		06	TC	7.3		*	of east steps
		09	TC	5.8		*	DC = 12 inches
		12	TC	5.1		*	Based on the
		15	TC	4.3		*	deconvolution graph
		18	TC	4.1		*	

Loc #	Grid Location	Depth (in.)	Meas. Type	In Situ Ra-226 (pCi/g) Tot. Ct	In Situ Ra-226 (pCi/g) Spectr.	Chem Ra-226 (pCi/g)	Comments
48	241274	21	TC	3.8		*	
		24	TC	3.7		*	
		27	TC	3.7		*	
		30	TC	3.4		*	
		33	TC	3.4		*	
49	247274	00	DS	8.8		*	East (front) sidewalk
50	247276	00	DS	3.5		*	East side Off sidewalk
51	250288	03	TC	4.8		*	Northeast corner
		06	TC	6.1		*	of property
		09	TC	6.7		*	DC = 12 inches
		12	TC	5.8		*	Based on all
		15	TC	5.1		*	available data
		18	TC	4.4		*	
		21	TC	4.2		*	
		24	TC	3.9		*	
		27	TC	3.7		*	
		30	TC	3.5		*	
		33	TC	3.4		*	
		36	TC	3.4		*	
		39	TC	3.5		*	
52	258273	00	DS	6.9		*	East of primary
		06	DS	19.0		*	structure
		12	DS	1.1		*	DC = 12 inches
53	258280	03	TC	17.7		*	East of primary
		06	BH	26.8	29.7	*	structure
		09	TC	24.1		*	DC = 12 inches
		12	BH	15.4	8.0	*	Based on all
		15	TC	9.9		*	available data
		18	BH	6.5	3.2	*	
		21	TC	4.9		*	
		24	BH	4.1	2.3	*	
		27	TC	3.8		*	
		30	TC	3.7		*	
		33	TC	3.6		*	
		36	TC	3.9		*	

Loc #	Grid Location	Depth (in.)	Meas. Type	(pCi/g) Tot. Ct	(pCi/g) Spectr.	Chem Ra-226 (pCi/g)	Comments
54	260260	00	DS	2.3		*	

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 = 04-19-85
Team Leader = JD

RADRPT V85.1<850225.1330> Table 3.2

Radium Concentrations at Interior Locations

DOE ID #GJ-13381-MR 701 Ash Drive

Loc #	Grid Location	Depth (in.)	Meas. Type	In Situ Ra-226 (pCi/g) Tot. Ct	Spectr.	Chem Ra-226 (pCi/g)	Comments
1		00	DS	10.7		*	Center furnace room
		00-05	SS			15.6	Concrete core
		05-11	SS			1.8	Rocky soil under slab
		03	TC	8.0		*	
		06	TC	7.2		*	
		09	TC	6.4		*	
		12	TC	5.3		*	DC = 6 inches
		15	TC	4.8		*	Based on soil
		18	TC	4.6		*	sample analyses
		21	TC	4.5		*	
		24	TC	4.5		*	
		27	TC	4.5		*	
		30	TC	4.6		*	
		33	TC	4.5		*	
		36	TC	4.6		*	
2		[36]	DS	<1.0		*	On east wall
		00	DS	6.5		*	On basement slab
3		[36]	DS	<1.0		*	On north wall
		00	DS	8.1		*	On basement slab
4		[36]	DS	2.8		*	On north wall
		00	DS	7.2		*	On basement slab
5		00	DS	7.6		*	On basement slab
6		[36]	DS	<1.0		*	On west wall
		00	DS	5.1		*	On basement slab
7		[36]	DS	<1.0		*	On south wall
		00	DS	8.2		*	On basement slab
8		00	DS	10.2		*	On basement slab
9		[36]	DS	<1.0		*	On south wall
		00	DS	8.6		*	On basement slab
10		[36]	DS	1.1		*	On east wall
		00	DS	5.5		*	On basement slab

Loc #	Grid Location	Depth (in.)	Meas. Type	In Situ Ra-226 (pCi/g) Tot. Ct	In Situ Ra-226 (pCi/g) Spectr.	Chem Ra-226 (pCi/g)	Comments
11		00	DS	11.3		*	On basement slab
12		00	DS	8.9		*	10′ west of fireplace

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 = 04-19-85
Team Leader = JD

Table 3.3

Summary of Interior Gamma Exposure Rates

DOE ID No. GJ-13381-MR 701 Ash Drive

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	09	22-26	25	09	31-33	32
ROOM B	18	22-26	25	18	29-33	32
ROOM C	06	22-25	24	06	29-34	32
ROOM D	06	25-26	25	06	32-34	33
ROOM E	10	19-28	20	09	20-22	21
ROOM F	06	19-20	19	06	19-21	20
ROOM G	05	19-21	20	05	19-21	20
ROOM H	04	18-19	19	04	20-20	20
ROOM I	06	18-19	19	06	19-22	21
ROOM J	05	19-19	19	05	19-20	19
GARAGE	17	14-15	15	17	14-15	15
SHED	04	13-14	14	04	14-15	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-13381-MR

AREA	CALCULATIONS(ft)		SF		DEPTH(ft)		CF				CUBIC YARDS
EXTERIOR											
	Concrete										
B	19 x 3	=	57	x	0.4	=	23				
D	12 x 4	=	48	x	0.4	=	20				
F	7 x 3	=	21								
	5 x 3	=	15								
			36	x	0.4	=	14				
	Volume of Concrete					=	57	=	57/27	=	2
	Contaminated Fill										
B	15 x 3	=	45	x	0.6	=	27				
C	30 x 10	=	300								
	7 x 7	=	49								
	10 x 18	=	180								
	5 x 10	=	50								
			579	x	1.0	=	579				
D	6 x 6	=	36								
	10 x 6	=	60								
			96	x	1.0	=	96				
	3 x 6	=	18	x	0.6	=	11				
G	20 x 15	=	300	x	2.8	=	840				
	Volume of Contaminated Fill					=	1,553	=	1,553/27	=	58
	TOTAL VOLUME - EXTERIOR									=	60

Areas A and E are excluded in this remedial action.

See Appendix Figures 3.5a and 3.5b For Areas

Table 4.2
Estimated Cost of Decontamination and Restoration
DOE ID No. GJ-13381-MR

EXTERIOR		
Remove identified residual radioactive fill 58 cy @ $14.50/cy (machine)	$	841
Remove identified residual radioactive concrete sidewalk (5") 141 sf @ $1.48/sf		209
Remove 4 trees, dispose trunk and branches at landfill, transport stumps to repository 4 ea @ $75/ea		300
Remove shrubs, transport to repository Allowance		100
Repair sprinkler line Allowance		100
Replace excavated areas as indicated with compacted roadbase 22 cy @ $11.50/cy		253
Replace excavated areas as indicated with topsoil 36 cy @ $9.50/cy		342
Replace excavated area of lawn with new sod 975 sf @ $.25/sf		244
Replace exterior concrete sidewalk with 4" concrete reinforced with 6 x 6 - 10-10 wire mesh 141 sf @ $1.50/sf		212
Replace 1 sycamore tree 1 ea @ $55/ea		55
Replace shrubs (5-gallon size) 7 ea @ $20/ea		140
Site cleanup Allowance		100
TOTAL EXTERIOR	$	2,896

Table 4.2
Estimated Cost of Decontamination and Restoration
DOE ID No. GJ-13381-MR

TOTAL EXTERIOR	$ 2,896
TOTAL INTERIOR	0
ACCESS CONTROL	150
SUBTOTAL	$ 3,046
CONTINGENCY @ 25%	762
SUBTOTAL	$ 4,950
CONTRACTOR OVERHEAD & PROFIT @ 30%	1,142
GRAND TOTAL	$ 4,950

Table 4.3
Calculations for Concentration of Radium-226 in Soil
DOE ID No. GJ-13381-MR

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

Where

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

C_c = Concentration of Contamination (pCi/g)

A_c = Area of Concentration (m^2)

C_b = Background Concentration (pCi/g)

$$C_{avg} = \frac{6.9 \times 22.0 + 2\ (100 - 22.0)}{100}$$

$C_{avg} = 3.08 < 7$

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

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

Total square feet of exterior Area E = 237 square feet
237 square feet = 22 square meters

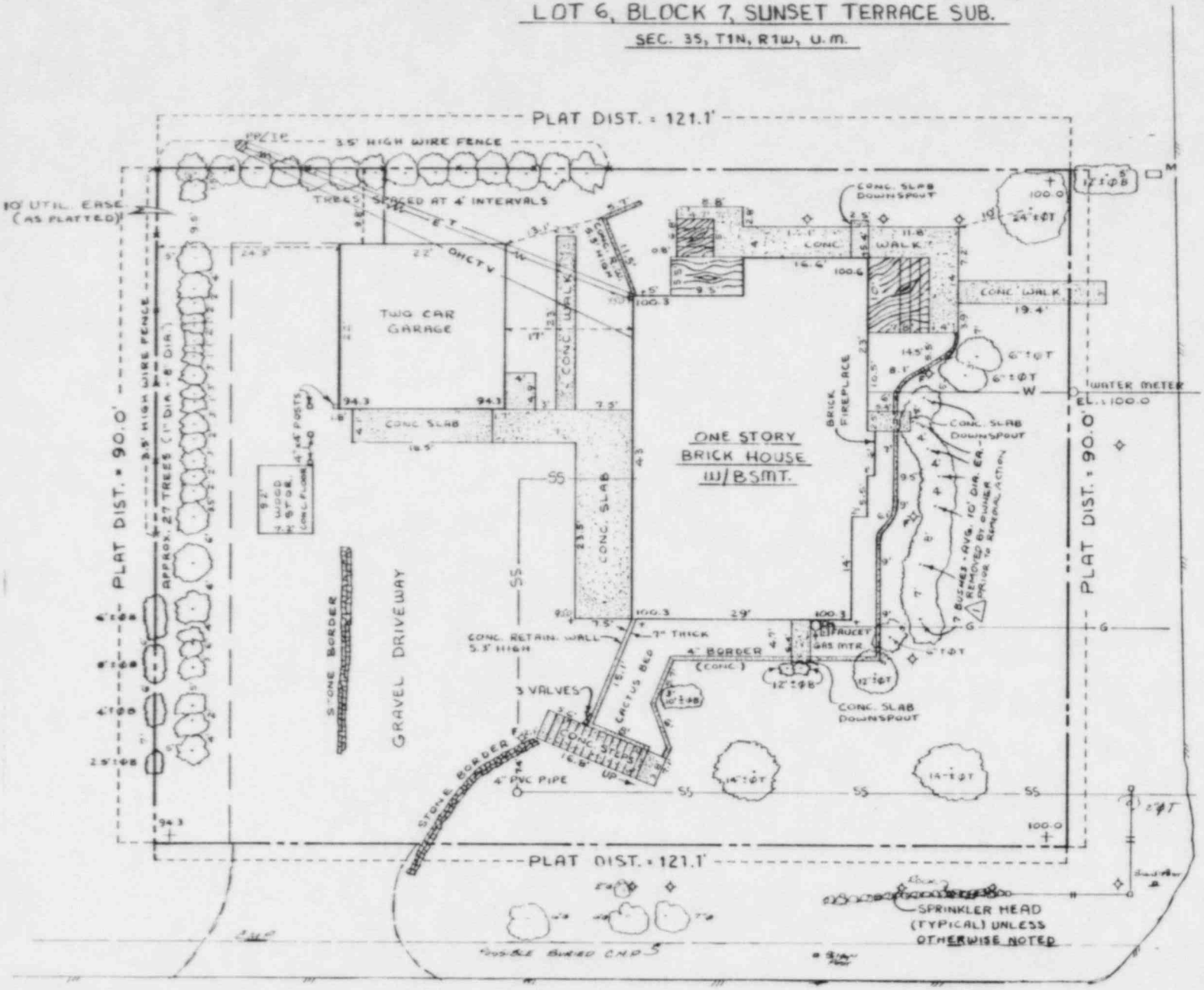
GRAND JUNCTION VICINITY MAP

FIGURE 2.1

REV	DESCRIPTION	BY	APP

LOT 6, BLOCK 7, SUNSET TERRACE SUB.

SEC. 35, T1N, R1W, U.M.



'G' ROAD

⚠ NOTED OWNER REMOVED HEDGE
JDT 8/13/85

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.

SITE PLAN

FIGURE 2.2

TAX SCHEDULE No. 2701-353-18-006

U.S. DEPARTMENT OF ENERGY GRAND JUNCTION PROJECT OFFICE, COLORADO			DOE ID NO. GJ-13381-MR
ADDRESS 701 ASH DR. GRAND JUNCTION, CO 81501			
SURV USW Jr / 3-29-85	DRAFT USW / 3-30-85	CK JDT 4-4-85	
DRAWING NO. 3-C-602-F1			SHEET 1 OF 1

FIGURE 3.1

EXTERIOR GRID-POINT EXPOSURE RATES

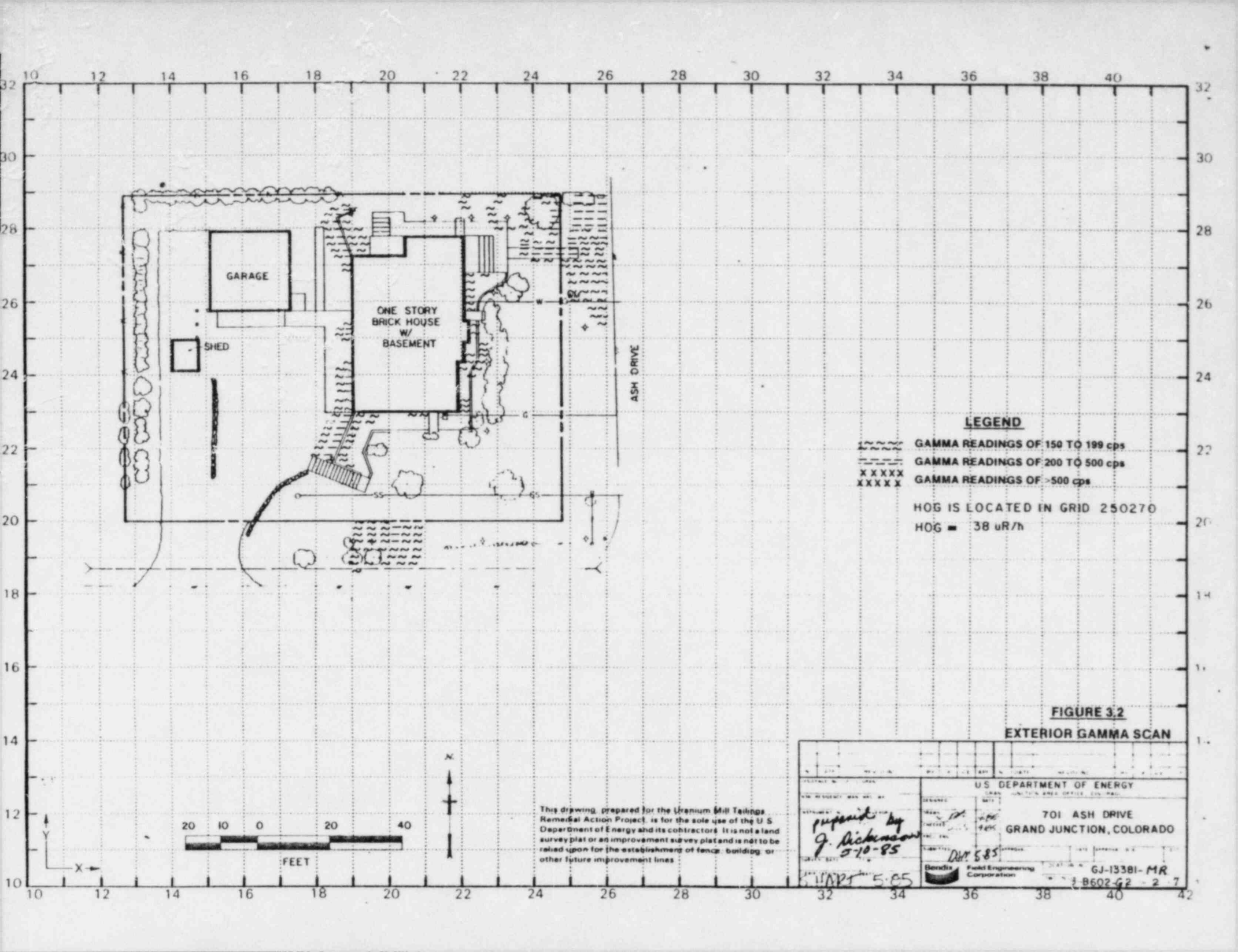


FIGURE 3.2
EXTERIOR GAMMA SCAN

FIGURE 3.3a

INTERIOR GAMMA EXPOSURE RATES AND SAMPLE LOCATIONS

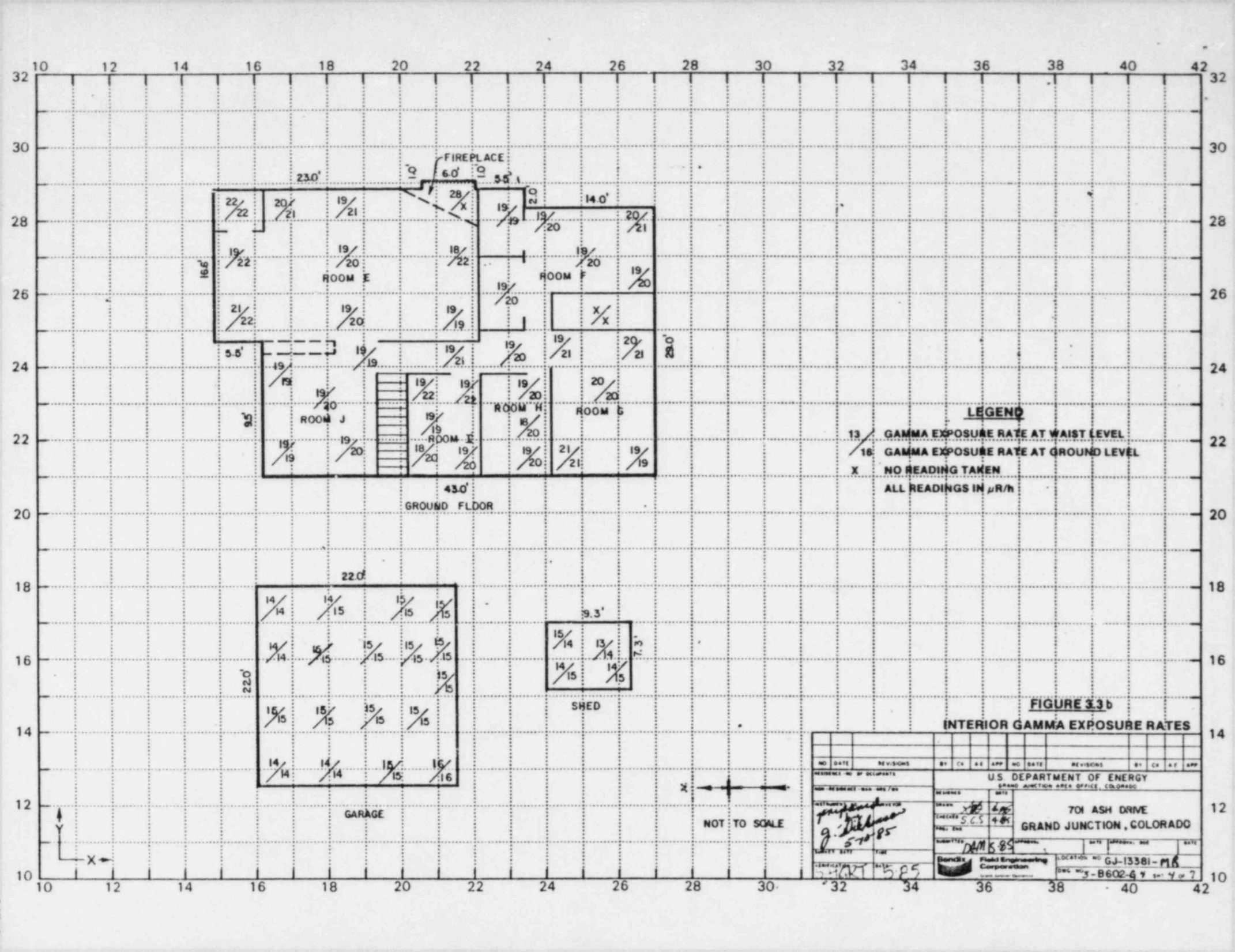


FIGURE 3.3b

INTERIOR GAMMA EXPOSURE RATES

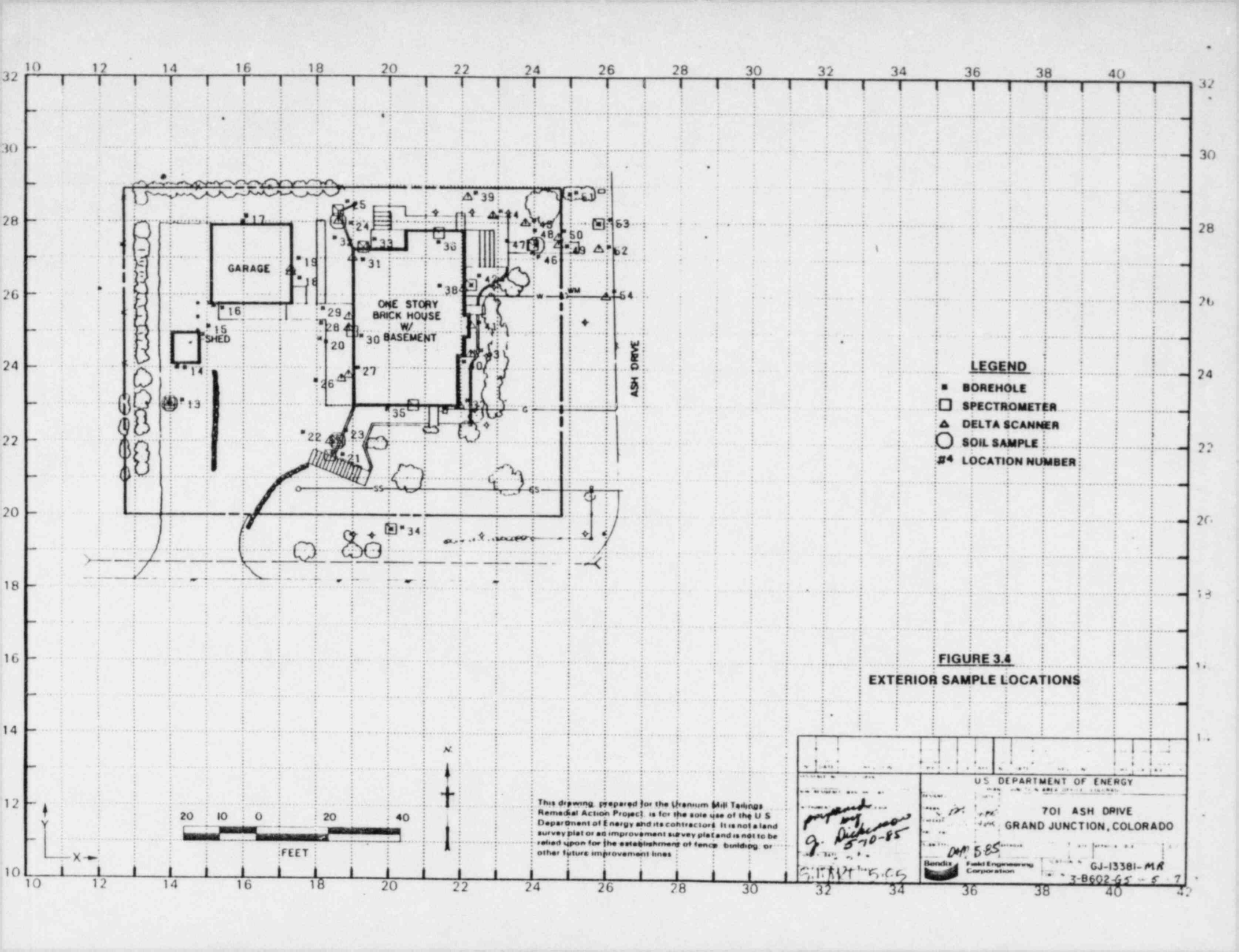


FIGURE 3.4

EXTERIOR SAMPLE LOCATIONS

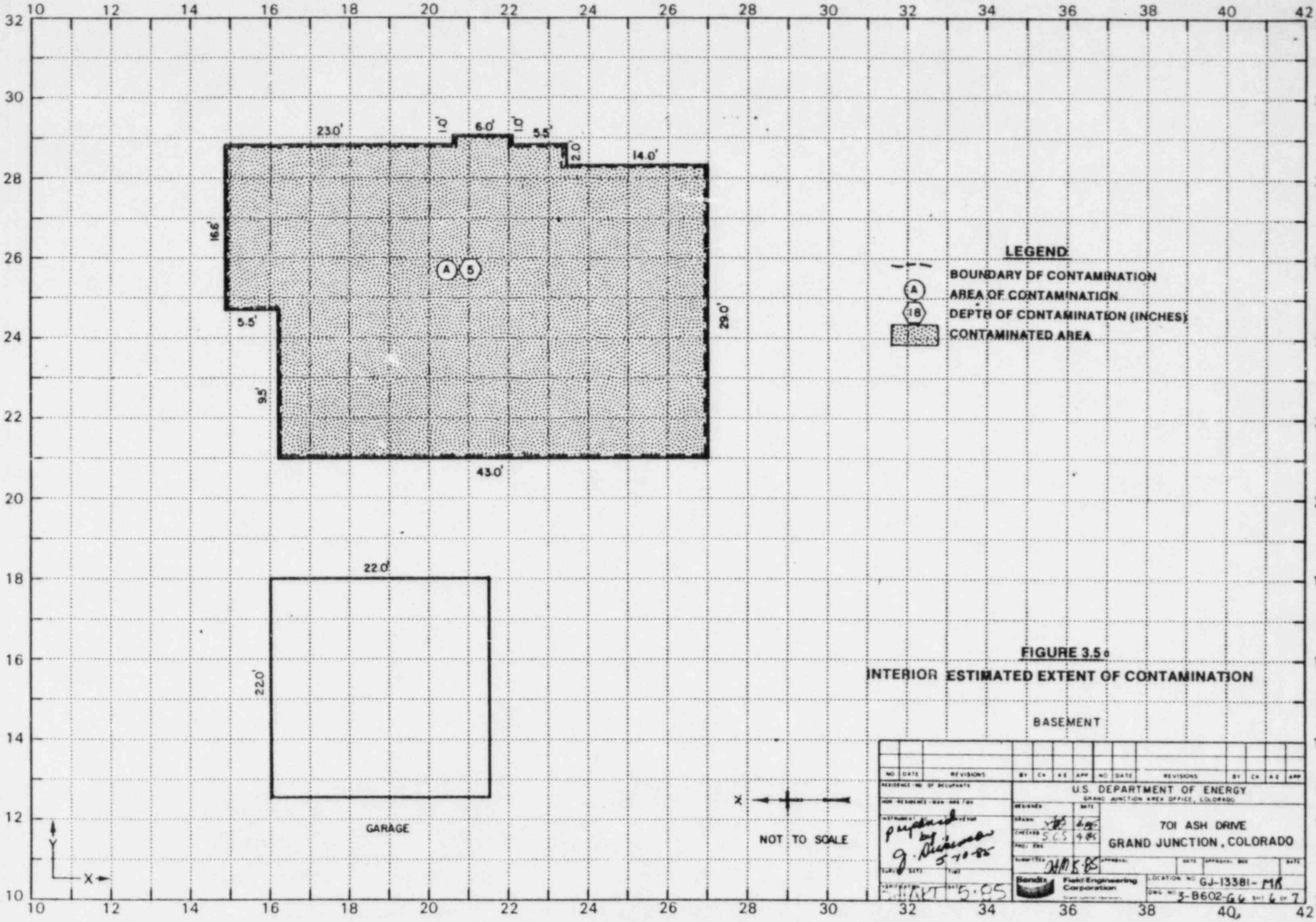


FIGURE 3.5 e

INTERIOR ESTIMATED EXTENT OF CONTAMINATION

BASEMENT

U.S. DEPARTMENT OF ENERGY
GRAND JUNCTION AREA OFFICE, COLORADO

701 ASH DRIVE
GRAND JUNCTION, COLORADO

Bendix Field Engineering Corporation

LOCATION NO. GJ-13381-MR
DRWG NO. 3-B602-G4 SHT 6 OF 7

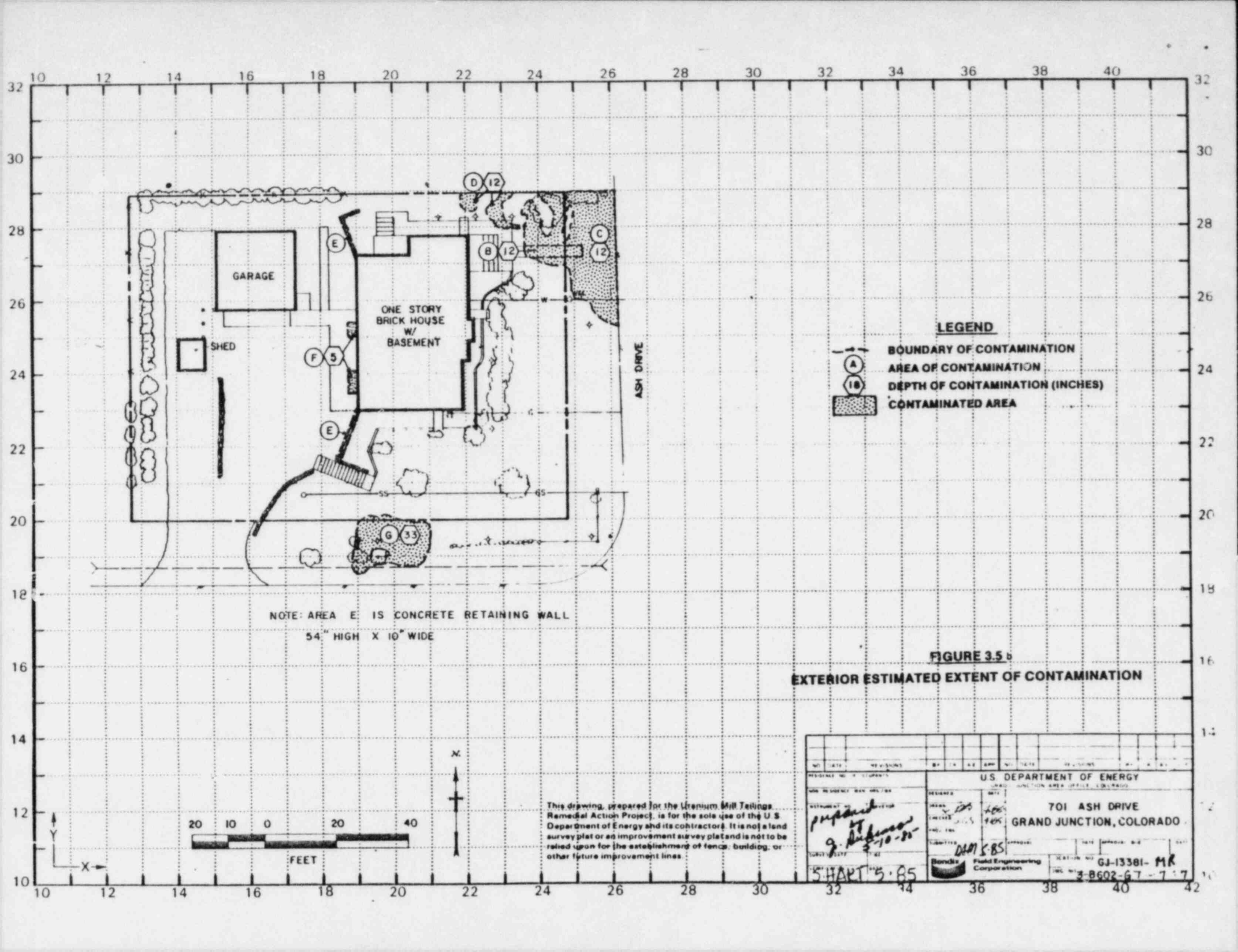


FIGURE 3.5 b

EXTERIOR ESTIMATED EXTENT OF CONTAMINATION

3/85

DOE ID NO. GJ-13381-MR Date 5-10-85

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

Official Survey Report

Property Address 701 Ash Drive, Grand Junction, Co.

Property Owner Lyola Guy

Address of Owner (if different from above) _____

Report Prepared By J. Dickerson

I. PRESENCE/ABSENCE OF RESIDUAL RADIOACTIVE MATERIALS

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

1 X 1 Residual ractioactive materials found at the following locations:

1 ___ 1 In open areas.

1 ___ 1 Under or around exterior improvements.

1 ___ 1 Under or around a typically nonoccupied structure.

1 X 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 X 1 Levels of radiation from residual radioactive materials exceed EPA Standards such that Remedial Action is recommended and will be accomplished, with your consent, as soon as budget and schedule permit.

cc:
G. A. Franz, III, GJ/CDH
J. Themelis, Mgr. UMTRA Proj. Off.

HIG = 34 uR/h
HOG = 38 uR/h

ALLIED Bendix Aerospace

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

May 8, 1985

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

ATTN: Jon Luellen

Dear Jon:

The following is in response to your questions and comments during the Technical Review concerning Department of Energy (DOE) Identification (ID) number GJ-13381-MR (701 Ash Drive), conducted 6 May 1985.

Areas requiring additional comments are:

1. Sample location 12 has been labeled on Figure 3.3a.

2. The source of the 2.8 pCi/g delta reading at sample location 4 is undetermined. There was no indication of an obvious source of contamination. Two readings were taken at this location; due to a 15.5 percent uncertainty with the first reading. It is possible that the second reading was done at a 120 second count time, which would yield a delta measure of approximately 1.0 pCi/g.

3. Basement 'fireplace' is actually a stove insert, and the presence of fire-brick is suspected as the source of the anomalous waist level reading.

4. The contamination at location 34 is not associated with the sprinkler system. The sprinkler lines are approximately six (6) inches subsurface, whereas the contamination is most intense at 18 to 21 inches

5. The water-main pit was investigated with a scintillometer; no anomalous readings were found.

6. The sewer line exits the house approximately 54 inches below ground level and runs parallel to the rear of the house (no association with elevated readings adjacaent to southwest retaining wall).

7. It is not known whether this residence was previously on a septic system. The current owner is not the original owner, and offered no information concerning a septic system; nor do the background data indicate the presence of a former leach field.

Thank you for your time and cooperation. If you should have additional questions or comments you may contact me at 242-8621, extension 506.

Sincerely,

John Dickerson

John Dickerson
RSD Survey Team Leader

JD:pr

CDH.LETTER:13381:DICKERSON

MEMORANDUM

ALLIED Bendix
Aerospace

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

DATE: April 25, 1985

TO: Files

FROM: John Dickerson JD

SUBJECT: Team Leader Notes - GJ-13381-~~RS~~ MR mg 8-85

Address: 701 Ash Drive

Owner: (Lee) Lyola Guy

Team Members

J. Dickerson (Team Leader)
S. Southern
R. Beltz
P. Hardy
R. Herman
V. Rothman
M. Gilfillan
R. Wilkins
R. Schouten

Instruments

Delta - C-3937
PRS-1 - C-3959
Crutch Scintillometer - C-1127, C-1196, C-1180
Spectrometer - C-1372, C-0385

Date: April 19, 1985

Foundation and water line on east side of house was investigated by borehole (72-inch hole).

Depth to base of northwest retaining wall = 12 inches.
Depth to base of southwest retaining wall = 12 inches.

Gas line to house and garage investigated by shovel and delta measurements.

Irrigation pipe (23-1/2 inches by 1 inch diameter) punctured on south side of shed (replace splice).

Sewer line will be investigated (20 April 1985) when location can be determined.

Spillover contamination found at northeast corner of property, extending to 703 Ash Drive; consent form signed by Donald Maxey.

Slope of surface approximately 3/10 at northeast corner and along south boundary (contaminated).

Isolated anomalies investigated by deltas west side of house and east side (by 'planter' curb).

Foundation description of garage accomplished by shovel hole.

Primary structure foundation will be investigated from within basement 20 April 1985.

Date: April 20, 1985

Return for survey of primary structure interior.

Residence is a house with full, walk-in basement. Both floors surveyed (waist and floor level readings).

Upper level range: 160 to 220 cps at floor level.

Basement range: 250 to 375 cps.

As waist level readings in basement are approximately 100 cps < floor level, contamination appears to derive from basement slab (floor).

A core/auger hole was taken in basement (total count, ss, and delta) to investigate depth of contamination.

Delta measurements were taken at twelve locations in the basement, investigating both walls and floor. Results indicate tailings involvement only with floor slab.

Date: April 22, 1985

On the exterior, the sewer line was investigated by total count (borehole). Line runs 9 feet out perpendicular to west wall of basement, then turns south (to vent shown on maps).

A core, soil sample, and PRS-1 readings were taken for east yard sidewalk.

Utilities investigated (gas, water, and sewer) do not indicate tailings involvement.

Contaminated areas include: Northeast corner of property, area along south boundary, retaining walls, and basement slab.

Date: April 25, 1985

Revisit to GJ-13381 is necessary to obtain additional information to discriminate readings (gamma) deriving from concrete retaining walls and the material used for backfill.

Oak Ridge National Laboratory (ORNL) inclusion data indicate soil sample results of approximately 2.5 to 3.0 pCi/g over 18 inches (at 15 cm increments) behind the northwest retaining wall.

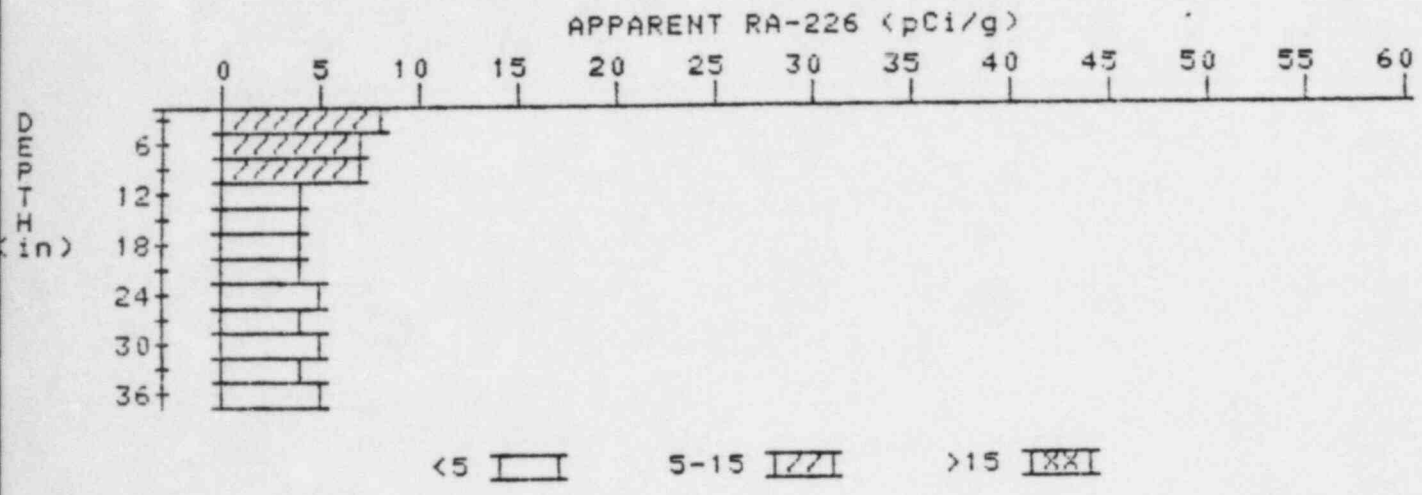
Revisit will include obtaining a sample from the retaining wall and delta measurements on/behind wall, if a suitable sampling location can be found.

25 April 1985, above revisit postponed and/or cancelled until present data analyzed.

DECON V85.1<850117.1233>

APPARENT RADIUM-226 CONCENTRATION DECONVOLUTION GRAPH

PROPERTY NUMBER: GJ-13381-~~RSMR~~ 8.85
HOLE NUMBER: 1
LOCATION:

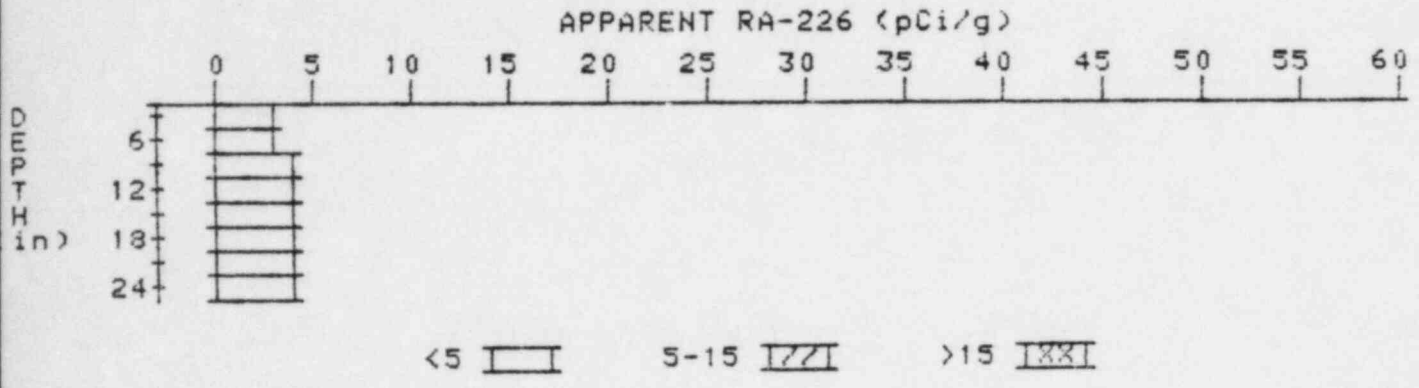


Depth (in)	Apparent Radium-226 (pCi/g) Undeconvolved	Apparent Radium-226 (pCi/g) Deconvolved
3	8.0	8.0
6	7.2	7.2
9	6.4	6.9
12	5.3	4.2
15	4.8	4.3
18	4.6	4.4
21	4.5	4.3
24	4.5	4.5
27	4.5	4.3
30	4.6	5.0
33	4.5	4.1
36	4.6	4.6

DECON V85.1<850117.1233>

APPARENT RADIUM-226 CONCENTRATION DECONVOLUTION GRAPH 13

PROPERTY NUMBER: GJ-13381-RSMR mg 8.85
HOLE NUMBER: 13
LOCATION: 140230



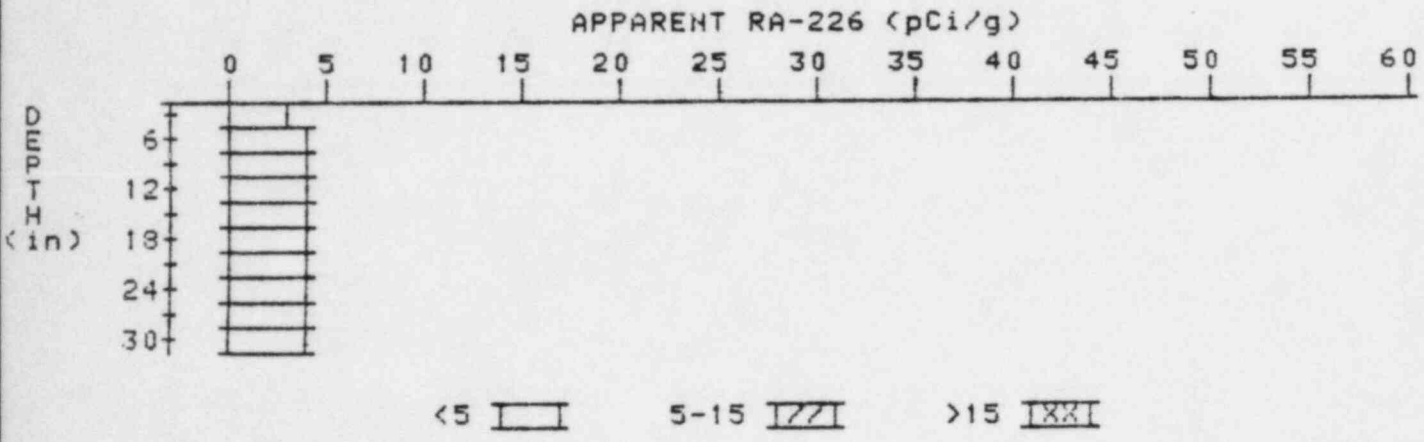
Depth (in)	Apparent Radium-226 (pCi/g) Undeconvolved	Apparent Radium-226 (pCi/g) Deconvolved
3	2.9	2.9
6	3.3	3.5
9	3.6	4.0
12	3.7	3.7
15	3.8	4.0
18	3.8	3.8
21	3.8	3.6
24	3.9	3.9

DECON V85.1<850117.1233>

APPARENT RADIUM-226 CONCENTRATION DECONVOLUTION GRAPH

14

PROPERTY NUMBER: GJ-13381 ~~RS~~ MR mjg 8-85
HOLE NUMBER: 14
LOCATION: 142240

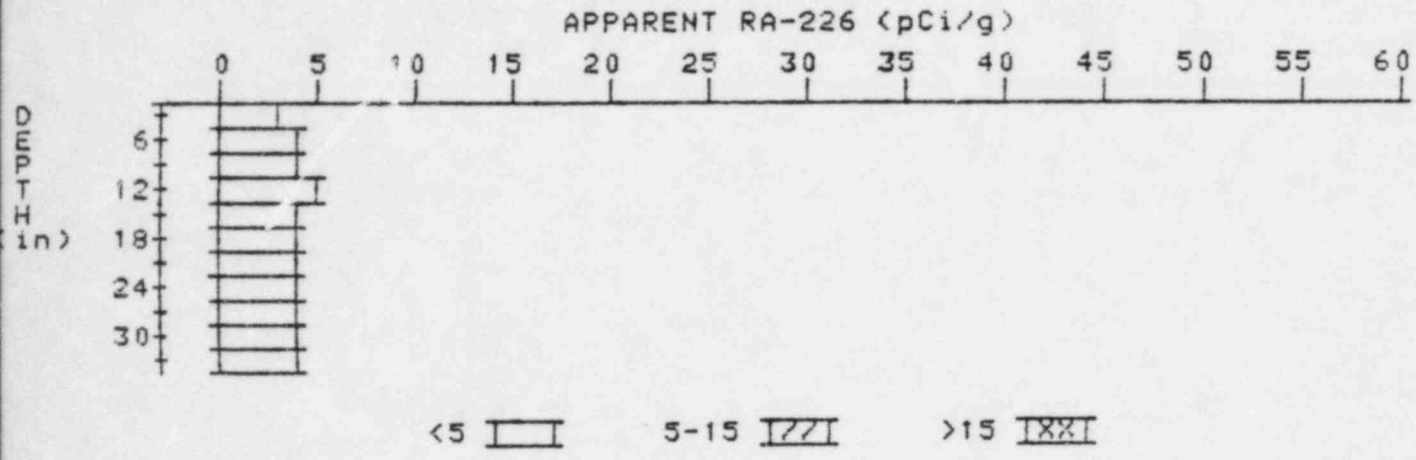


Depth (in)	Apparent Radium-226 (pCi/g) Undeconvolved	Apparent Radium-226 (pCi/g) Deconvolved
3	3.0	3.0
6	3.5	4.0
9	3.7	3.7
12	3.9	4.3
15	3.9	3.7
18	4.0	4.2
21	4.0	4.0
24	4.0	4.0
27	4.0	4.0
30	4.0	4.0

DECON V85.1<850117.1233>

APPARENT RADIUM-226 CONCENTRATION DECONVOLUTION GRAPH 15

PROPERTY NUMBER: GJ-13381-~~RS~~MR mgbes
HOLE NUMBER: 15
LOCATION: 149249

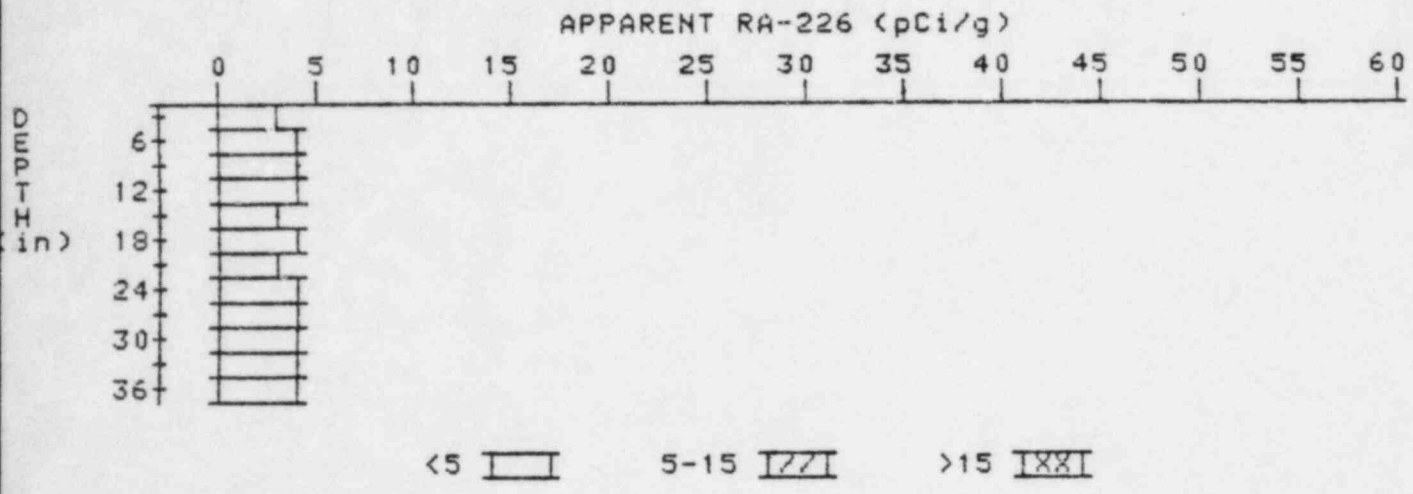


Depth (in)	Apparent Radium-226 (pCi/g) Undeconvolved	Apparent Radium-226 (pCi/g) Deconvolved
3	3.2	3.2
6	3.6	4.0
9	3.8	3.6
12	4.1	4.8
15	4.0	3.6
18	4.1	4.3
21	4.1	4.1
24	4.1	4.1
27	4.1	4.3
30	4.0	3.6
33	4.1	4.1

DECON V85.1<850117.1233>

APPARENT RADIUM-226 CONCENTRATION DECONVOLUTION GRAPH 16

PROPERTY NUMBER: GJ-13381-~~RS~~MR
HOLE NUMBER: 16
LOCATION: 15225

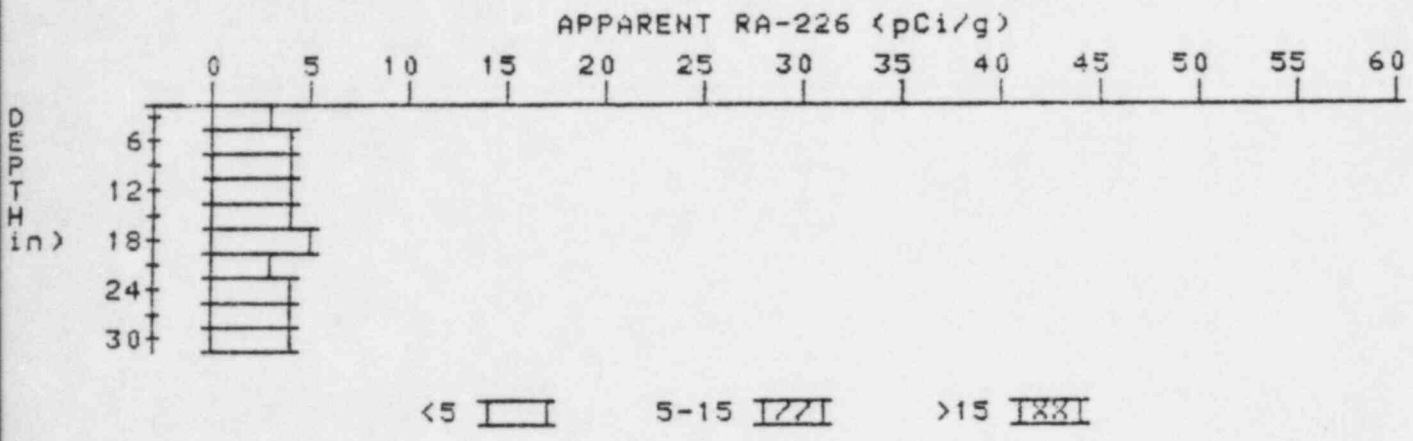


Depth (in)	Apparent Radium-226 (pCi/g) Undeconvolved	Apparent Radium-226 (pCi/g) Deconvolved
3	3.0	3.0
6	3.5	4.0
9	3.7	3.7
12	3.9	4.4
15	3.8	3.4
18	3.9	4.3
21	3.8	3.4
24	3.9	4.1
27	3.9	3.9
30	3.9	3.9
33	3.9	3.9
36	3.9	3.9

DECON V85.1<850117.1233>

APPARENT RADIUM-226 CONCENTRATION DECONVOLUTION GRAPH 17

PROPERTY NUMBER: GJ-13381 ~~RS~~ MR ~~-S~~ 885
HOLE NUMBER: 17
LOCATION: 160280

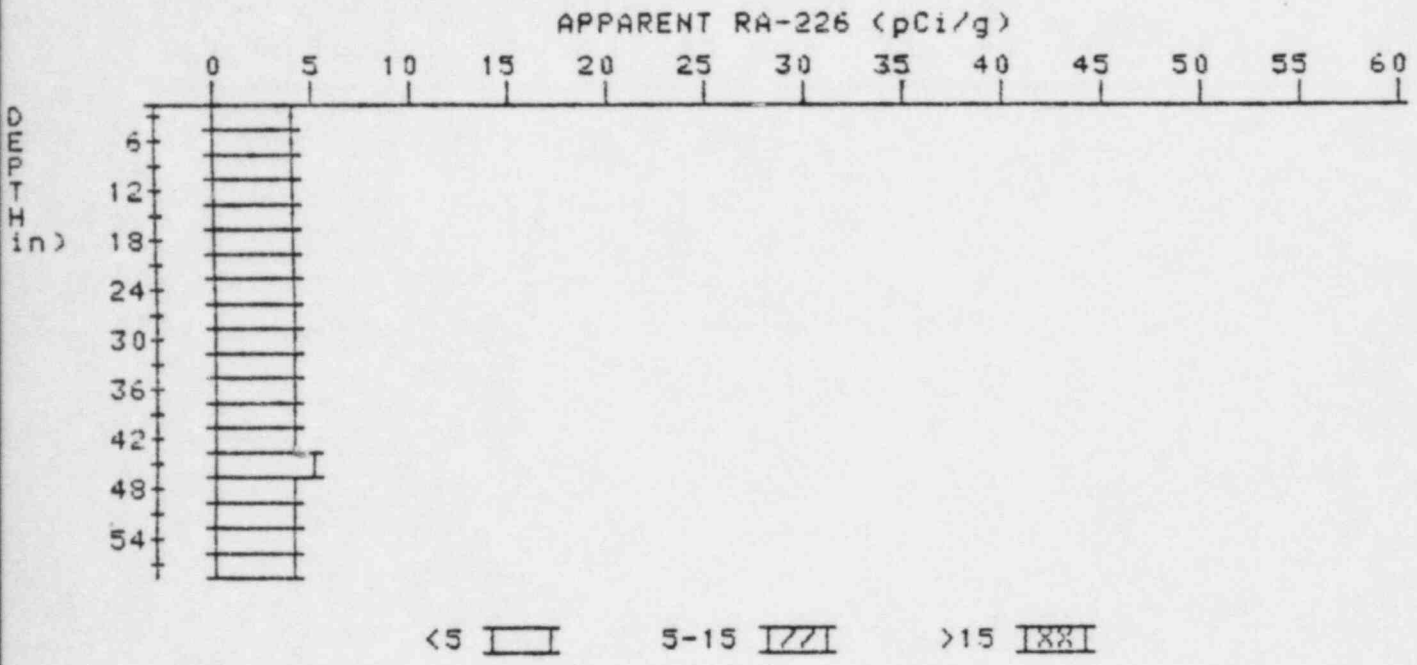


Depth (in)	Apparent Radium-226 (pCi/g) Undeconvolved	Apparent Radium-226 (pCi/g) Deconvolved
3	3.2	3.2
6	3.6	4.0
9	3.8	3.8
12	4.0	4.2
15	4.1	4.1
18	4.2	4.7
21	4.0	3.5
24	4.1	4.3
27	4.1	4.3
30	4.0	4.0

DECON V85.1(850117.1233)

APPARENT RADIUM-226 CONCENTRATION 20
DECONVOLUTION GRAPH

PROPERTY NUMBER: GJ-13381 ~~RS~~ MR mjp 8.85
HOLE NUMBER: 20
LOCATION: 181248

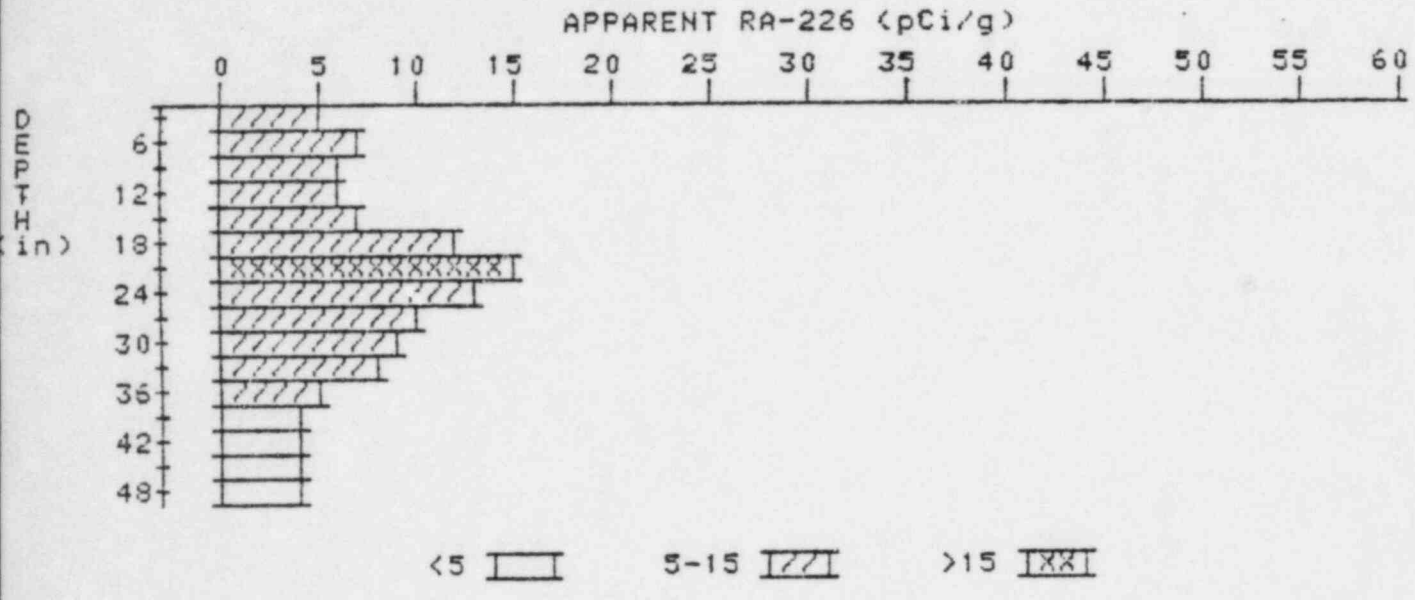


Depth (in)	Apparent Radium-226 (pCi/g) Undeconvolved	Apparent Radium-226 (pCi/g) Deconvolved
3	3.5	3.5
6	3.8	4.0
9	4.0	4.2
12	4.1	4.1
15	4.2	4.4
18	4.2	4.4
21	4.1	3.7
24	4.2	4.4
27	4.2	4.2
30	4.2	4.2
33	4.2	4.2
36	4.2	4.2
39	4.2	4.0
42	4.3	4.3
45	4.4	4.8
48	4.3	4.1
51	4.3	4.5
54	4.2	3.8

DECON V85.1<850117.1233>

APPARENT RADIUM-226 CONCENTRATION 34
DECONVOLUTION GRAPH

PROPERTY NUMBER: GJ-13381 ~~RSMR~~ mg 885
HOLE NUMBER: 34
LOCATION: 201196

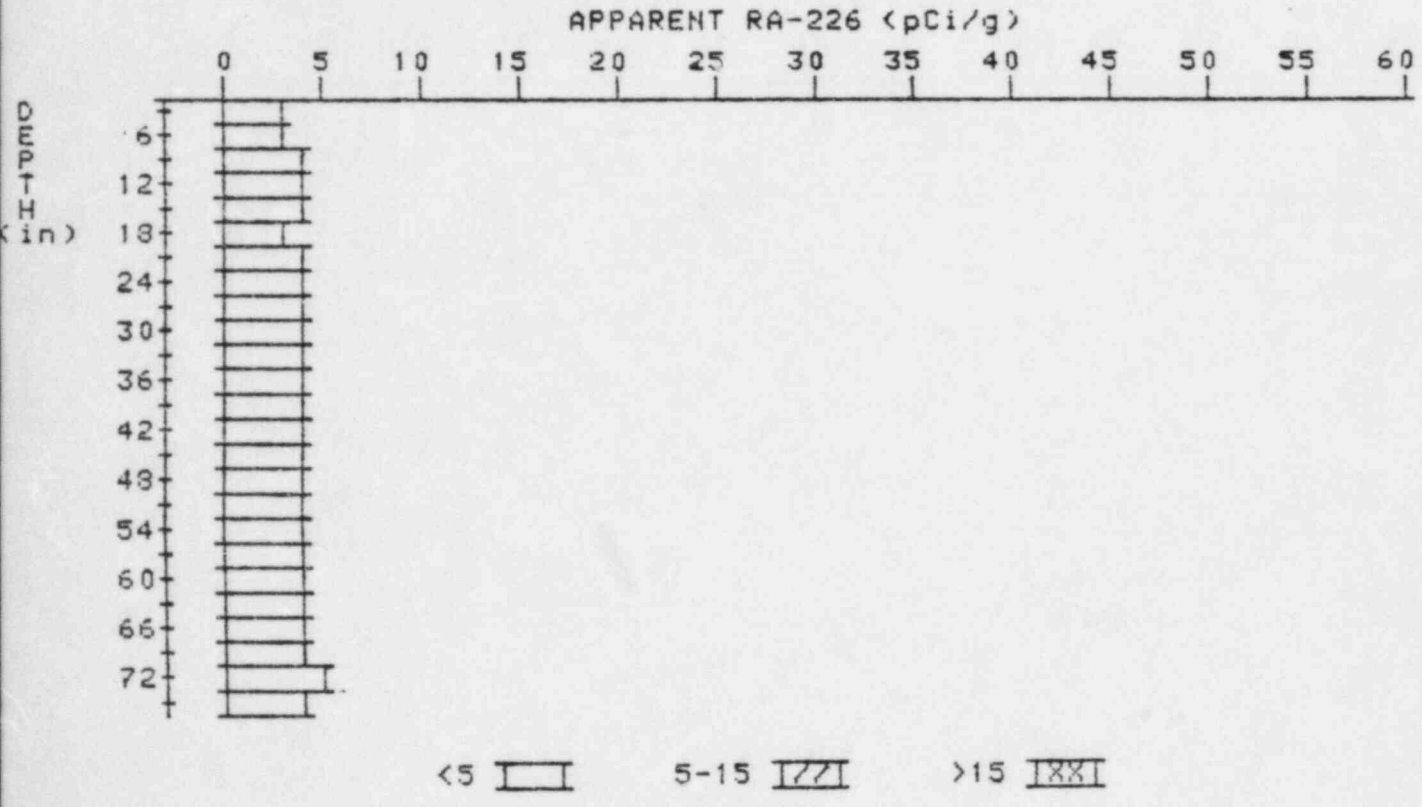


Depth (in)	Apparent Radium-226 (pCi/g) Undeconvolved	Apparent Radium-226 (pCi/g) Deconvolved
3	5.2	5.2
6	6.1	7.0
9	6.5	6.1
12	7.1	5.9
15	8.4	6.8
18	10.6	12.2
21	11.9	15.3
24	11.3	12.5
27	10.0	9.6
30	8.9	9.3
33	7.6	7.8
36	6.2	5.5
39	5.2	4.5
42	4.6	4.1
45	4.3	3.8
48	4.3	4.3

DECON V85.1<850117.1233>

APPARENT RADIUM-226 CONCENTRATION 42
DECONVOLUTION GRAPH

PROPERTY NUMBER: GJ-13381-~~RGMR~~ 885
HOLE NUMBER: 42
LOCATION: 223263



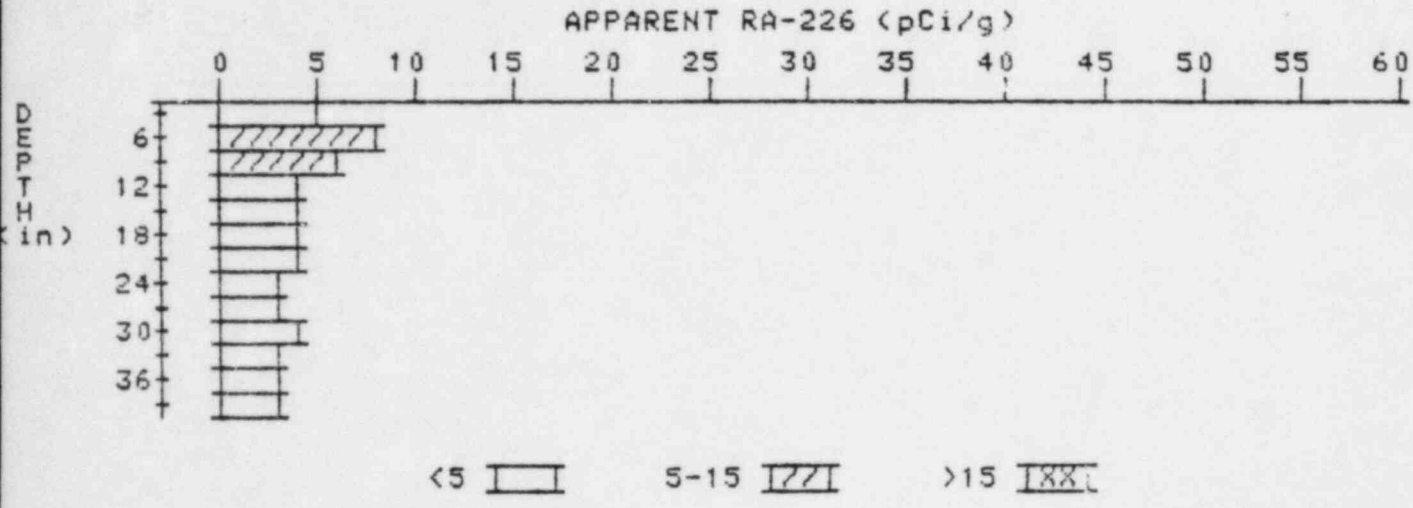
Depth (in)	Apparent Radium-226 (pCi/g) Undeconvolved	Apparent Radium-226 (pCi/g) Deconvolved
3	3.4	3.4
6	3.5	3.1
9	3.8	4.3
12	3.8	3.6
15	3.9	4.3
18	3.8	3.4
21	3.9	4.1
24	3.9	3.7
27	4.0	4.4
30	3.9	3.5
33	4.0	4.4
36	3.9	3.7
39	3.9	3.7
42	4.0	4.4

45	3.9	3.7
48	3.9	3.9
51	3.9	3.7
54	4.0	4.2
57	4.0	4.2
60	3.9	3.5
63	4.0	4.2
66	4.0	4.0
69	4.0	3.6
72	4.2	4.7
75	4.1	4.1

DECON V85.1<850117.1233>

APPARENT RADIUM-226 CONCENTRATION 46
DECONVOLUTION GRAPH

PROPERTY NUMBER: GJ-13381-~~RS~~MR mg 6 85
HOLE NUMBER: 46
LOCATION: 240272

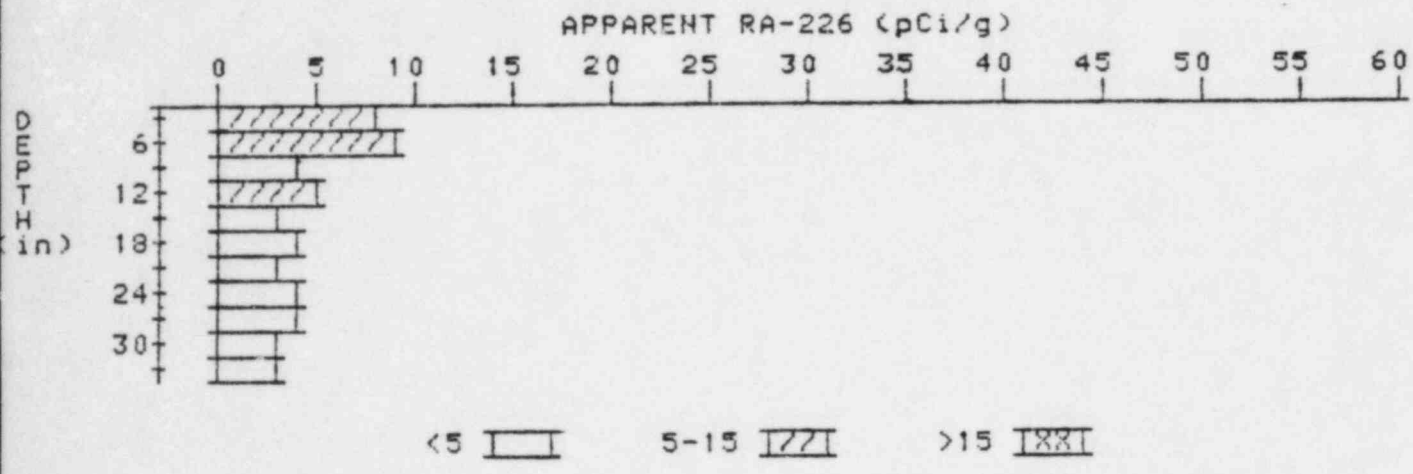


Depth (in)	Apparent Radium-226 (pCi/g) Undeconvolved	Apparent Radium-226 (pCi/g) Deconvolved
3	4.9	4.9
6	5.9	8.4
9	5.5	6.2
12	4.7	4.2
15	4.2	3.8
18	3.9	3.7
21	3.7	3.7
24	3.5	3.3
27	3.4	3.2
30	3.4	3.6
33	3.3	3.1
36	3.3	3.3
39	3.3	3.3

DECON V85.1<850117.1233>

APPARENT RADIUM-226 CONCENTRATION DECONVOLUTION GRAPH 48

PROPERTY NUMBER: GJ-13381-~~RS~~MR mg 8-85
HOLE NUMBER: 48
LOCATION: 241274

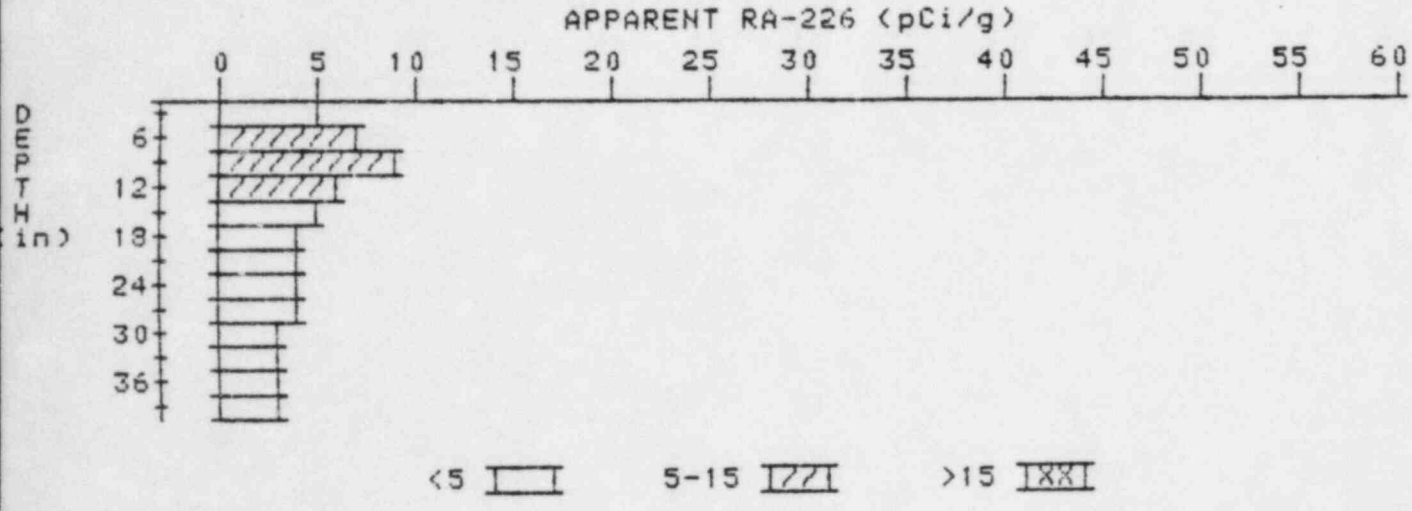


Depth (in)	Apparent Radium-226 (pCi/g) Undeconvolved	Apparent Radium-226 (pCi/g) Deconvolved
3	7.7	7.7
6	7.3	9.3
9	5.8	4.4
12	5.1	5.3
15	4.3	3.2
18	4.1	4.3
21	3.8	3.4
24	3.7	3.5
27	3.7	4.2
30	3.4	2.9
33	3.4	3.4

DECON V85.1<850117.1233>

APPARENT RADIUM-226 CONCENTRATION 51
DECONVOLUTION GRAPH

PROPERTY NUMBER: GJ-13381 ~~RSMR~~ mg 835
HOLE NUMBER: 51
LOCATION: 250288

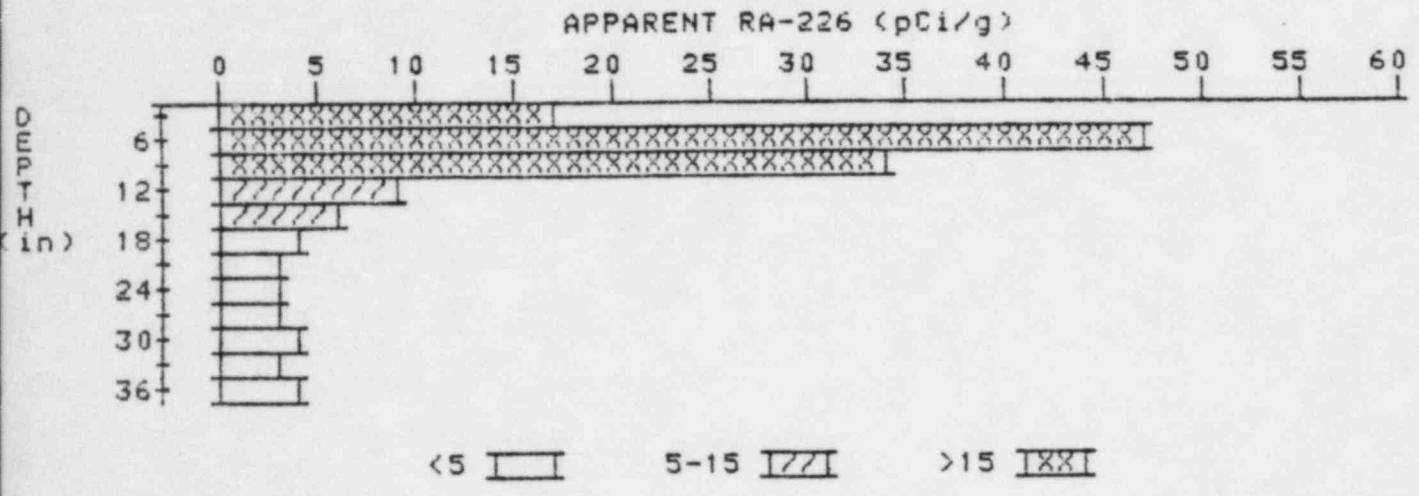


Depth (in)	Apparent Radium-226 (pCi/g) Undeconvolved	Apparent Radium-226 (pCi/g) Deconvolved
3	4.7	4.7
6	6.0	7.4
9	6.5	8.8
12	5.7	5.7
15	4.9	4.5
18	4.3	3.6
21	4.1	4.3
24	3.8	3.6
27	3.6	3.6
30	3.4	3.2
33	3.3	3.1
36	3.3	3.1
39	3.4	3.4

DECON V85.1<850117.1233>

APPARENT RADIUM-226 CONCENTRATION 53
DECONVOLUTION GRAPH

PROPERTY NUMBER: GJ-13381-~~RS~~ MR 8.85
HOLE NUMBER: 53
LOCATION: 258280



Depth (in)	Apparent Radium-226 (pCi/g) Undeconvolved	Apparent Radium-226 (pCi/g) Deconvolved
3	17.3	17.3
6	26.2	46.8
9	23.5	33.8
12	15.0	9.5
15	9.6	5.7
18	6.4	3.6
21	4.8	3.4
24	4.0	3.1
27	3.7	3.3
30	3.6	3.6
33	3.5	2.8
36	3.8	3.8