

RADIOLOGIC AND ENGINEERING ASSESSMENT

FOR

DOE ID NO.: GJ-05752-RS
ADDRESS: 2495 SOUTH BROADWAY

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
Grand Junction, Colorado 81502

APPROVED BY

M.K. Tucker ^{6/24}
M. TUCKER
DOE PROJECT ENGINEER

DATE

August 12, 1985

REA05752:REA-GE007

8508290369 850812
PDR WASTE PDR
WM-54

TABLE OF CONTENTS

<u>Section</u>	<u>Page</u>
1.0 EXECUTIVE SUMMARY	1
1.1 Introduction	1
1.2 Evaluation and Recommendation	1
2.0 PROPERTY DESCRIPTION	2
2.1 General Description	2
2.2 Existing Facilities and Structures	2
3.0 RADIOLOGIC SURVEY	4
3.1 Introduction	4
3.2 Gamma Exposure-Rate Surveys	4
3.2.1 Exterior Findings	4
3.2.2 Interior Findings	4
3.3 Boreholes, Soil Samples, and Other Measurements	5
3.4 Radon/Radon Daughter Concentration	5
3.5 Extent of Contamination	5
4.0 RECOMMENDED REMEDIAL ACTION	6
4.1 Decontamination and Restoration	6
4.2 Evaluation of Recommended Remedial Action	6
5.0 REFERENCES	7
6.0 APPENDIX	8

1.0 EXECUTIVE SUMMARY

1.1 Introduction

The location, DOE ID No. GJ-05752-RS, is a single-family residence located at 2495 South Broadway, 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, 14 cu. yd.; interior, 0 cu. yd.

Estimated cost to perform remedial action, including dislocation when applicable, is \$2,089. Remedial action on this property will take approximately 10 days to complete.

2.0 PROPERTY DESCRIPTION

2.1 General Description

Address: 2495 South Broadway, Grand Junction, Colorado

Zoning: Residential (R-2)

Lot Size: Approximately 15,000 sf (0.34 acre)

Legal Description: Lot 2, Ellington Subdivision, County of Mesa,
State of Colorado

Point of Reference: This property is located approximately 3 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:	South Broadway
South:	Single-family residence
East:	Single-family residence
West:	Single-family residence

2.2 Existing Facilities and Structures

Primary Structure:

Type:	Single-family residence
Size:	Approximately 2,242 sf
Construction Date:	1948
Construction:	Stucco on wood-frame
Foundation:	Concrete stem wall and footing
Footing Depth:	Approximately 9" to top of footing from grade at north wall; approximately 24" to top of footing from grade at new west wall; approximately 32" to top of footing from grade at original west wall
Basement:	None
Crawl Space:	Yes; partial
Condition:	Good

Other Structures:

Type:	One story stucco structure
Size:	Approximately 127 sf
Construction:	Stucco on wood-frame
Foundation:	Slab-on-grade
Condition:	Good
Type:	Root cellar
Size:	Approximately 46 sf
Construction:	Concrete roof, walls, and floor
Foundation:	Concrete slab
Condition:	Fair
Type:	Storage shed
Size:	Approximately 48 sf
Construction:	Prefabricated wood-frame with composition board siding
Foundation:	Concrete block 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-05752-RS on May 3, 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 adjacent to the primary structure on the west side, associated with the cellar entry, and in the concrete slab south of the primary structure. Scattered ore was indicated along the north and south property lines. The owner performed remedial action in 1985 prior to construction of an enclosed patio.

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, 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: 13 to 15 uR/h
Highest Outside Gamma Reading (HOG): 362 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: 13 to 14 uR/h
Highest Inside Gamma Reading (HIG): 27 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 Figure 3.2 shows interior exposure rates and locations of these measurements.

3.3 Boreholes, Soil Samples, and Other Measurements

Areas which displayed elevated gamma levels were further investigated; these areas are shown in Appendix Figures 3.2 and 3.3. Data from these investigations are included in Appendix Tables 3.1 and 3.2.

3.4 Radon/Radon Daughter Concentration (RDC)

The working level was not assessed by CDH. No RDC measurements were taken by Bendix.

3.5 Extent of Contamination

Appendix Figure 3.4 shows identified areas and estimated depths of contamination on this property, based on assessments of all measurements taken. As noted in this figure, areas recommended for remedial action that contain identified residual radioactive materials are:

- (AREA A) Four areas underlaid by buried ore samples are located north of the property line in the road right-of-way. The depth of contamination is 6 inches (approximately 132 sf).
- (AREA B) A section of the concrete sidewalk north of the primary structure is contaminated. The contaminated pad is 4 inches thick. The soil underneath is not contaminated (approximately 50 sf).
- (AREA C) The dirt along the south property line is contaminated to a depth of 6 inches (approximately 84 sf).
- (AREA D) A rock retaining wall between Areas C and E is underlaid by contamination to an estimated depth of 12 inches, based on data collected in Area E (approximately 6 sf).
- (AREA E) The dirt adjacent to the south patio is contaminated to a depth of 12 inches (approximately 44 sf).
- (AREA F) The asparagus bed, between the concrete cistern and sidewalk, is contaminated to a depth of 12 inches (approximately 48 sf).
- (AREA G) A small area of lawn southwest of the primary structure is contaminated to a depth of 9 inches (approximately 24 sf).
- (AREA H) An area of lawn adjacent to the west side of the primary structure is contaminated to a depth of 15 inches (approximately 90 sf).

(AREAS REQUIRING FURTHER INVESTIGATION DURING REMEDIAL ACTION)

Room F, in the garage, should be investigated after removal of the adjacent exterior contamination.

4.0 RECOMMENDED REMEDIAL ACTION

4.1 Decontamination and Restoration

The recommended remedial action for this property, DOE ID No. GJ-05752-RS, includes removal of all areas identified as containing radioactive material (as discussed in Section 3.5 and shown in Appendix Figure 3.4) 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 \$2,089.

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

Owner preference is for remedial action to commence as soon as possible.

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	Interior Gamma Exposure Rates and Sample Locations - Ground Floor
Figure 3.3	Exterior Sample Locations
Figure 3.4	Estimated Extent of Contamination
Official Survey Report	
Exterior Gamma Scan	
Team Leader Notes	
Deconvolution Graphs (Apparent Radium-226 Concentration)	

Radium Concentrations at Exterior Locations

DOE ID #GJ-05752-RS

2495 South Broadway

Page 1 of 8

Loc #	Grid Location	Depth (in.)	Meas. Type	In Situ Ra-226 (pCi/g)		Chem Ra-226 (pCi/g)	Comments
				Tot. Ct	Spectr.		
6	136264	00	DS	17.3		*	Road right-of-way
		03	TC	13.7		*	
		06	TC	9.5		*	
		09	TC	6.2		*	
		12	TC	4.8		*	
		15	TC	4.2		*	
		18	TC	3.9		*	DC = 6 inches
		21	TC	3.8		*	Based on all
		24	TC	3.7		*	available data
		27	TC	3.6		*	
		30	TC	3.6		*	
		33	TC	3.6		*	
		36	TC	3.5		*	
		39	TC	3.4		*	
7	180240	00	DS	<1.0		*	Background
		00-06	SS			1.1	
		03	TC	2.8		*	
		06	TC	3.2		*	
		09	TC	3.4		*	DC = 0 inches
		12	BH	3.5	1.3	*	
		15	TC	3.6		*	
		18	BH	3.6	1.5	*	
		21	TC	3.7		*	
		24	TC	3.6		*	
		27	TC	3.6		*	
		30	TC	3.5		*	
		33	TC	3.6		*	
		36	TC	3.5		*	
8	221231	00	DS	<1.0		*	Sewer line
		03	TC	2.7		*	
		06	TC	2.9		*	
		09	TC	3.2		*	
		12	TC	3.4		*	
		15	TC	3.4		*	Dc = 0 inches
		18	TC	3.5		*	
		21	TC	3.5		*	
		24	TC	3.5		*	
		27	TC	3.4		*	
9	230229	00	DS	<1.0		*	West of garage
		03	TC	2.7		*	DC = 0 inches

Radium Concentrations at Exterior Locations

DOE ID #GJ-05752-RS

2495 South Broadway

Page 2 of 8

Loc #	Grid Location	Depth (in.)	Meas. Type	In Situ Ra-226 (pCi/g)		Chem Ra-226 (pCi/g)	Comments
				Tot. Ct	Spectr.		
9	230229	06	TC	3.0		*	
		09	TC	3.2		*	
		12	TC	3.3		*	
		15	TC	3.4		*	
		18	TC	3.4		*	
		21	TC	3.3		*	
		24	TC	3.4		*	
		27	TC	3.4		*	
		30	TC	3.2		*	
		33	TC	3.3		*	
		36	TC	3.3		*	
10	250222	00	DS	1.3		*	Septic tank
		03	TC	2.8		*	
		06	TC	3.1		*	
		09	TC	3.3		*	
		12	TC	3.4		*	
		15	TC	3.3		*	DC = 0 inches
		18	TC	3.4		*	
		21	TC	3.4		*	
		24	TC	3.5		*	
		27	TC	3.5		*	
		30	TC	3.5		*	
		33	TC	3.6		*	
11	253264	00	DS	1.4		*	Water line north of primary structure
		03	TC	3.0		*	
		06	TC	3.3		*	
		09	TC	3.4		*	
		12	TC	3.5		*	DC = 0 inches
		15	TC	3.5		*	
		18	TC	3.4		*	
		21	TC	3.4		*	
		24	TC	3.5		*	
		27	TC	3.4		*	
		30	TC	3.4		*	
		33	TC	3.3		*	
12	254275	00	DS	1.5		*	Sidewalk
13	256230	00	DS	<1.0		*	Horizontally into old foundation

Radium Concentrations at Exterior Locations

DOE ID #GJ-05752-RS

2495 South Broadway

Page 3 of 8

Loc #	Grid Location	Depth (in.)	Meas. Type	In Situ Ra-226 (pCi/g)		Chem Ra-226 (pCi/g)	Comments
				Tot. Ct	Spectr.		
14	256269	00	DS	20.3		*	North sidewalk
		00-04	SS			84.7	Concrete core
		04-10	SS			1.4	Soil
		03	TC	7.6		*	
		06	TC	7.7		*	
		09	TC	6.4		*	DC = 4 inches
		12	BH	5.3	1.6	*	Based on soil
		15	TC	4.6		*	sample analyses
		18	TC	4.1		*	
		21	TC	3.9		*	
		24	BH	3.6	<1.0	*	
		27	TC	3.4		*	
		30	TC	3.3		*	
		33	TC	3.2		*	
		36	TC	3.3		*	
		39	TC	3.3		*	
15	257255	00	DS	1.7		*	Sewer line
		18	DS	<1.0		*	
16	257286	13	DS	<1.0		*	Gas line
17	260230	00	DS	32.4		*	West of primary
		03	TC	40.8		*	structure
		06	TC	36.2		*	
		09	TC	27.1		*	
		12	TC	18.7		*	
		15	TC	11.1		*	
		18	TC	7.6		*	DC = 15 inches
		21	TC	5.7		*	Based on the
		24	TC	4.7		*	deconvolution graph
		27	TC	4.4		*	
		30	TC	4.2		*	
		33	TC	4.2		*	
		36	TC	4.4		*	
		39	TC	4.3		*	
		42	TC	3.9		*	
		45	TC	3.8		*	
18	269229	00	DS	2.3		*	Dirt
		00-06	SS			4.5	West of primary
		03	TC	3.3		*	structure
		06	TC	3.4		*	
		09	TC	3.4		*	

Radium Concentrations at Exterior Locations

DOE ID #GJ-05752-RS

2495 South Broadway

Page 4 of 8

Loc #	Grid Location	Depth (in.)	Meas. Type	In Situ Ra-226 (pCi/g)		Chem Ra-226 (pCi/g)	Comments
				Tot. Ct	Spectr.		
18	269229	12	TC	3.3		*	
		15	TC	3.4		*	DC = 15 inches
		18	TC	3.4		*	Based on all
		21	TC	3.4		*	available data
		24	TC	3.4		*	
		27	TC	3.4		*	
		30	TC	3.4		*	
19	270292	00	DS	<1.0		*	Flower garden
		03	TC	2.8		*	East of primary
		06	TC	3.1		*	structure
		09	TC	3.3		*	DC = 0 inches
		12	TC	3.4		*	
		15	TC	3.5		*	
		18	TC	3.5		*	
		21	TC	3.5		*	
		24	TC	3.4		*	
		27	TC	3.3		*	
		30	TC	3.4		*	
		33	TC	3.3		*	
		36	TC	3.2		*	
20	281232	03	TC	2.7		*	Empty cistern
		06	TC	2.8		*	
		09	TC	2.9		*	
		12	TC	2.9		*	
		15	TC	3.0		*	DC = 0 inches
		18	TC	3.0		*	
		21	TC	3.0		*	
		24	TC	3.0		*	
		27	TC	3.0		*	
		30	TC	3.0		*	
		33	TC	3.0		*	
		36	TC	3.0		*	
		39	TC	3.1		*	
		42	TC	3.0		*	
		45	TC	3.0		*	
		48	TC	3.0		*	
		51	TC	3.0		*	
		54	TC	3.1		*	
		57	TC	3.1		*	
		60	TC	3.1		*	
		63	TC	3.1		*	
		66	TC	3.0		*	

Radium Concentrations at Exterior Locations

DOE ID #GJ-05752-RS

2495 South Broadway

Page 5 of 8

Loc #	Grid Location	Depth (in.)	Meas. Type	In Situ Ra-226 (pCi/g)		Chem Ra-226 (pCi/g)	Comments
				Tot. Ct	Spectr.		
20	281232	69	TC	3.1		*	
		72	TC	3.0		*	
		75	TC	3.1		*	
		78	TC	3.1		*	
		81	TC	3.0		*	
		84	TC	3.0		*	
21	283253	00	DS	26.7		*	By cellar door
		00-06	SS			14.1	Sandy soil, roots
		03	TC	9.5		*	
		06	TC	7.2		*	
		09	TC	5.3		*	
		12	BH	4.3	1.9	*	DC = 6 inches
		15	TC	3.7		*	Based on all
		18	TC	3.4		*	available data
		21	TC	3.3		*	
		24	BH	3.1	1.3	*	
		27	TC	3.1		*	
		30	TC	3.1		*	
		33	TC	3.1		*	
22	285225	00	DS	13.9		*	Lawn southwest of
		00-06	SS			4.1	primary structure
		03	TC	13.9		*	
		06	TC	12.0		*	
		09	TC	7.5		*	DC = 9 inches
		12	TC	5.1		*	Based on the
		15	TC	4.4		*	deconvolution graph
		18	TC	3.8		*	
		21	TC	3.7		*	
		24	TC	3.7		*	
		27	TC	3.7		*	
		30	TC	3.8		*	
		33	TC	3.6		*	
23	285293	00	DS	<1.0		*	North of stucco
		03	TC	2.6		*	structure
		06	TC	2.9		*	
		09	TC	3.1		*	
		12	TC	3.2		*	DC = 0 inches
		15	TC	3.2		*	
		18	TC	3.3		*	
		21	TC	3.3		*	
		24	TC	3.3		*	

Radium Concentrations at Exterior Locations

DOE ID #GJ-05752-RS

2495 South Broadway

Page 6 of 8

Loc #	Grid Location	Depth (in.)	Meas. Type	In Situ Ra-226 (pCi/g)		Chem Ra-226 (pCi/g)	Comments
				Tot. Ct	Spectr.		
23	285293	27	TC	3.3		*	
		30	TC	3.2		*	
		33	TC	3.2		*	
		36	TC	3.1		*	
24	286233	00	DS	2.1		*	Top of cistern
		00-07	SS			3.8	Concrete core
25	290234	00	DS	15.6		*	Dirt between cistern
		03	TC	14.9		*	and sidewalk
		06	TC	15.7		*	
		09	TC	11.8		*	
		12	BH	8.1	3.4	*	
		15	TC	6.0		*	
		18	TC	5.0		*	DC = 12 inches
		21	TC	4.5		*	Based on the
		24	BH	4.2	1.4	*	deconvolution graph
		27	TC	4.1		*	
		30	TC	4.0		*	
		33	TC	4.0		*	
		36	TC	3.8		*	
26	290257	00	DS	3.6		*	South patio
		00-04	SS			1.7	Concrete core
		04-06	SS			2.1	Soil
		03	TC	3.9		*	
		06	TC	4.2		*	
		09	TC	4.0		*	
		12	BH	3.7	1.4	*	DC = 0 inches
		15	TC	3.5		*	
		18	TC	3.4		*	
		21	TC	3.2		*	
		24	BH	3.2	1.3	*	
		27	TC	3.1		*	
		30	TC	3.2		*	
27	291240	00	DS	<1.0		*	South patio
		00	DS	39.2		*	Dirt by rock pile
		03	TC	34.8		*	

Radium Concentrations at Exterior Locations

DOE ID #GJ-05752-RS

2495 South Broadway

Page 7 of 8

Loc #	Grid Location	Depth (in.)	Meas. Type	In Situ Ra-226 (pCi/g)		Chem Ra-226 (pCi/g)	Comments
				Tot. Ct	Spectr.		
28	294240	06	TC	23.6		*	
		09	TC	14.3		*	
		12	BH	8.9	3.5	*	
		15	TC	6.1		*	
		18	TC	4.8		*	
		21	TC	4.5		*	
		24	BH	4.1	1.4	*	DC = 12 inches
		27	TC	3.9		*	Based on the
		30	TC	3.8		*	deconvolution graph
		33	TC	3.8		*	
		36	TC	3.9		*	
29	294252	00	DS	32.8		*	South of cellar door
		03	TC	17.7		*	
		06	TC	11.3		*	DC = 6 inches
		09	TC	7.4		*	Based on all
		12	BH	5.5	2.8	*	available data
		15	TC	4.3		*	
		18	TC	3.8		*	
		21	TC	3.5		*	
		24	BH	3.4	1.6	*	
		27	TC	3.3		*	
		30	TC	3.2		*	
		33	TC	3.3		*	
30	297283	00	DS	1.2		*	West of stucco
		03	TC	2.7		*	structure
		06	TC	3.0		*	
		09	TC	3.1		*	DC = 0 inches
		12	TC	3.1		*	
		15	TC	3.2		*	
		18	TC	3.2		*	
		21	TC	3.2		*	
		24	TC	3.2		*	

Radium Concentrations at Exterior Locations

DOE ID #GJ-05752-RS

2495 South Broadway

Page 8 of 8

Loc #	Grid Location	Depth (in.)	Meas. Type	In Situ Ra-226 (pCi/g)		Chem Ra-226 (pCi/g)	Comments
				Tot. Ct	Spectr.		
30	297283	27	TC	3.2		*	
		30	TC	3.2		*	
		33	TC	3.3		*	
		36	TC	3.2		*	
		39	TC	3.2		*	

Measurement Types:	GB = GAD-6 Borehole	Notes:	DC = Depth of Contamination
	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 = 05-03-85
	BH = Combined GAD-6 and		Team Leader = CRK
	Total Count Borehole		

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	<1.0		*	Garage, concrete floor
2		00	DS	1.3		*	Garage
3		00	DS	<1.0		*	Garage
4		00	DS	<1.0		*	Cellar, middle step
5		00	DS	<1.0		*	Cellar, top step

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 = 05-03-85
Team Leader = CRK

Table 3.3
Summary of Interior Gamma Exposure Rates

DOE ID No. GJ-05752-RS 2495 South Broadway 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	12-14	13	05	13-14	14
ROOM B	08	13-14	13	08	13-14	14
ROOM C	05	13-14	13	05	14-16	14
ROOM D	04	11-14	13	04	12-16	14
ROOM E	10	13-14	14	10	14-15	14
ROOM F	09	14-27	16	09	13-17	14
ROOM G	05	13-16	14	05	14-16	14
ROOM H	05	13-15	14	05	14-16	15
STUCCO STRUCTURE	05	14-15	14	04	14-15	15
ROOT CELLAR	06	17-21	18	05	16-18	17

=====

*Exposure Rates and Room Locations Shown in Appendix Figure 3.2

Table 4.1
Area and Volume Calculations
DOE ID No. GJ-05752-RS

Page 1 of 2

<u>AREA</u>	<u>CALCULATIONS(ft)</u>	<u>SF</u>	<u>DEPTH(ft)</u>	<u>CF</u>	<u>CUBIC YARDS</u>
EXTERIOR					
Concrete					
B	13 x 2 =	26			
	8 x 3 =	24			
		<hr/>			
		50	x 0.3 =	15	
				<hr/>	
	Volume of Concrete			= 15 =	15/27 = 1
Contaminated Fill					
A	5 x 5 =	25			
	5 x 2 =	10			
	6 x 12 =	72			
	5 x 5 =	25			
		<hr/>			
		132	x 0.5 =	66	
C	3 x 2 =	6			
	12 x 5 =	60			
	6 x 3 =	18			
		<hr/>			
		84	x 0.5 =	42	
D	6 x 1 =	6	x 1.0 =	6	
E	7 x 6 =	42			
	2 x 1 =	2			
		<hr/>			
		44	x 1.0 =	44	
F	5 x 4 =	20			
	7 x 4 =	28			
		<hr/>			
		48	x 1.0 =	48	

Table 4.1
Area and Volume Calculations
DOE ID No. GJ-05752-RS

Page 2 of 2

<u>AREA</u>	<u>CALCULATIONS(ft)</u>	<u>SF</u>	<u>DEPTH(ft)</u>	<u>CF</u>	<u>CUBIC YARDS</u>
G	6 x 4 =	24	x 0.8 =	19	
H	15 x 6 =	90	x 1.3 =	117	
Volume of Contaminated Fill				= 342 =	342/27 = 13
TOTAL VOLUME - EXTERIOR					= 14

See Appendix Figure 3.4 For Areas

Table 4.2
Estimated Cost of Decontamination and Restoration
DOE ID No. GJ-05752-RS

Page 1 of 2

Remove concrete sidewalk 50 sf @ \$1.50/sf	\$ 75
*Remove fill beneath concrete sidewalk 1 cy @ \$44/cy	44
Remove stone retaining wall Lump Sum	50
Remove identified residual radioactive material (manual-open) 13 cy @ \$44/cy	572
Replace roadbase 4 cy @ \$11.50/cy	46
Replace new concrete sidewalk 50 sf @ \$1.50/sf	75
Place topsoil 10 cy @ \$9.50/cy	95
Replace stone retaining wall Lump Sum	50
Place sod 30 sf @ \$.50/sf	15
Replace new asparagus roots Lump Sum	25
<hr/>	
TOTAL EXTERIOR	\$ 1,047

* This uncontaminated volume is removed and replaced with roadbase to provide stability in adobe clay soils.

Table 4.2
Estimated Cost of Decontamination and Restoration
DOE ID No. GJ-05752-RS Page 2 of 2

TOTAL EXTERIOR	\$	1,047
TOTAL INTERIOR		0
ACCESS CONTROL		250
		<hr/>
SUBTOTAL	\$	1,297
CONTINGENCY @ 15%		195
		<hr/>
SUBTOTAL	\$	1,492
CONTRACTOR OVERHEAD & PROFIT @ 40%		597
		<hr/>
GRAND TOTAL	\$	2,089

RDJ080785
REA05752/GE007/AP

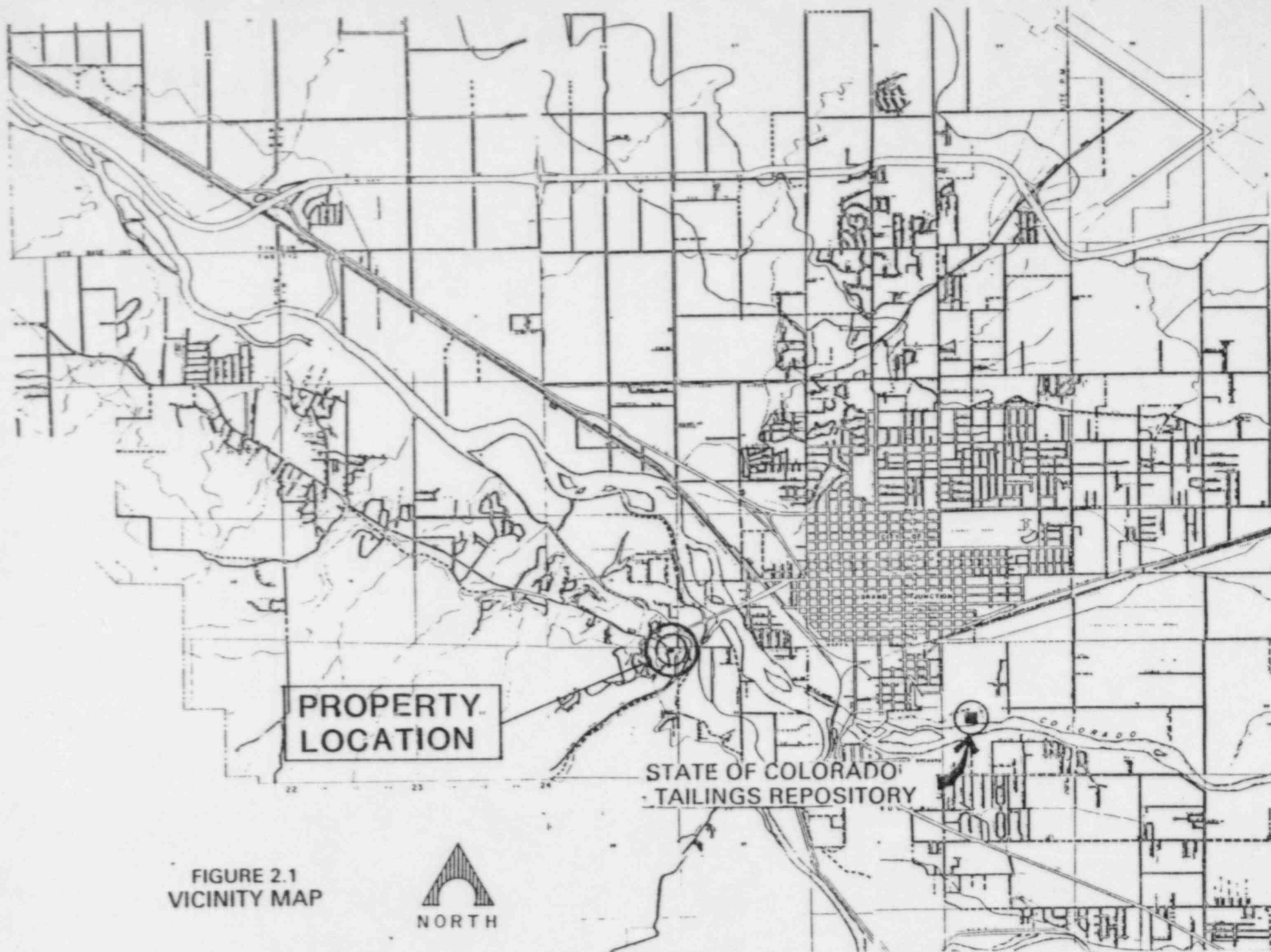
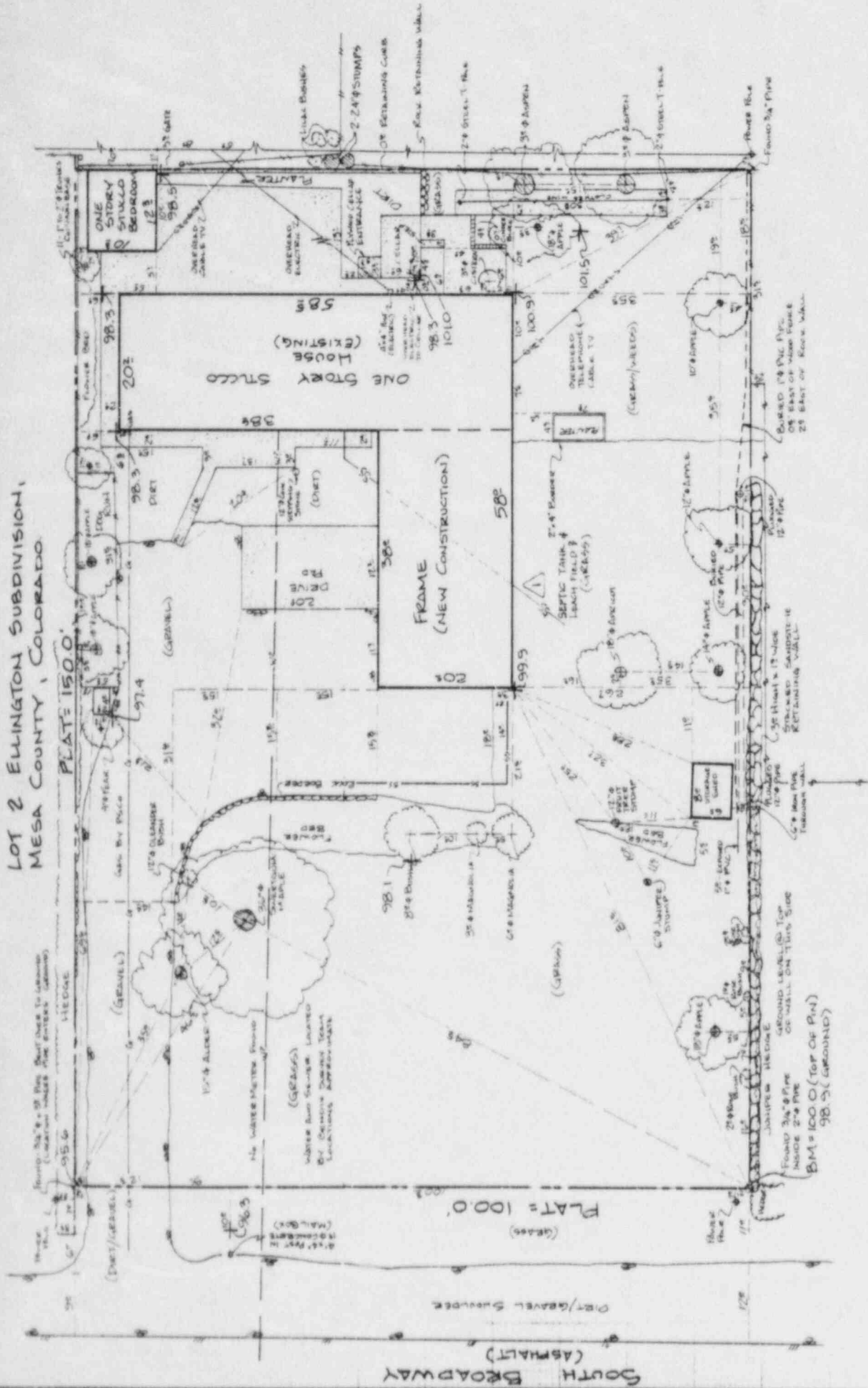


FIGURE 2.1
VICINITY MAP

LOT 2 ELLINGTON SUBDIVISION, MESA COUNTY, COLORADO



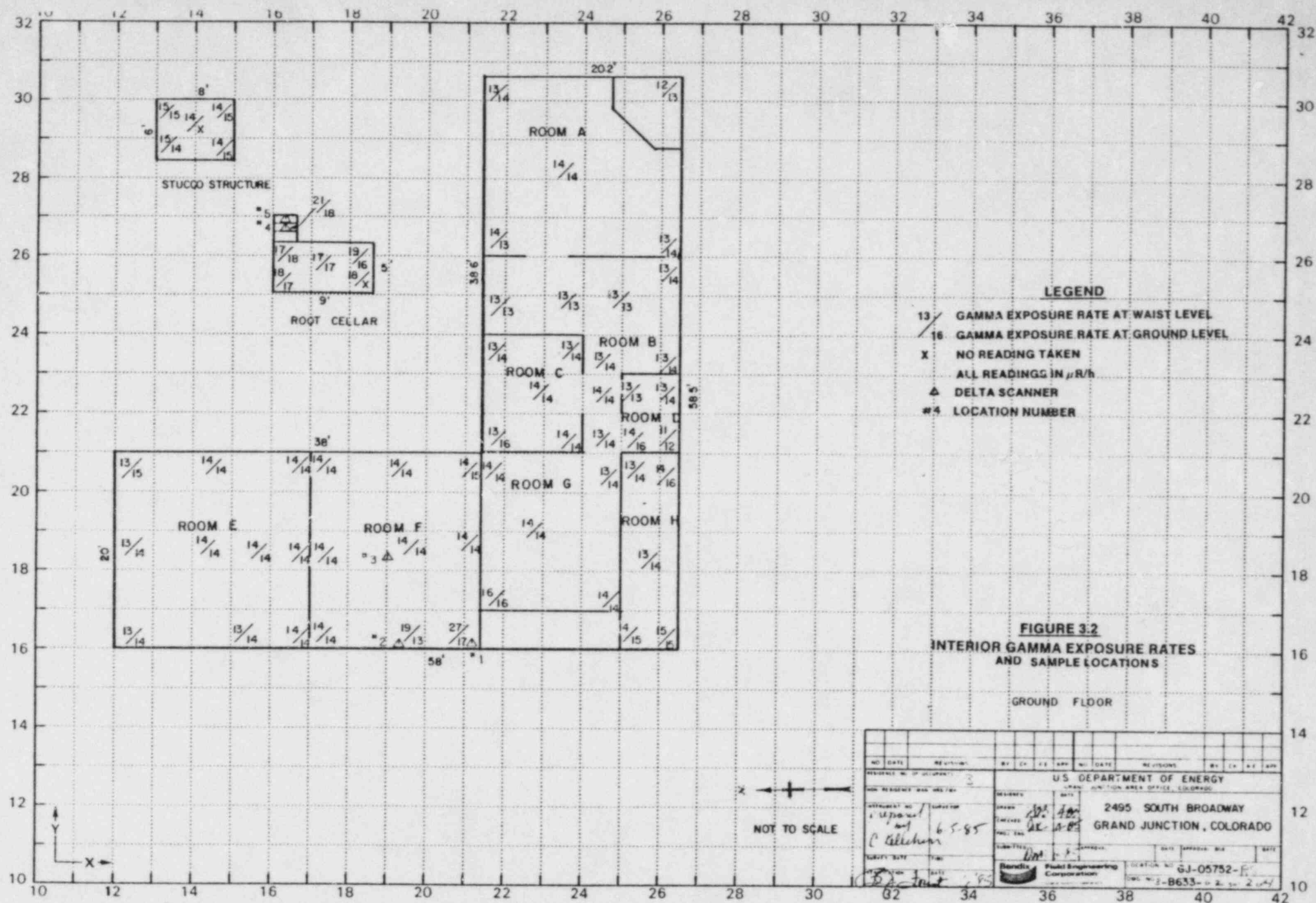
SCALE IN FEET
0 5 10 15 20

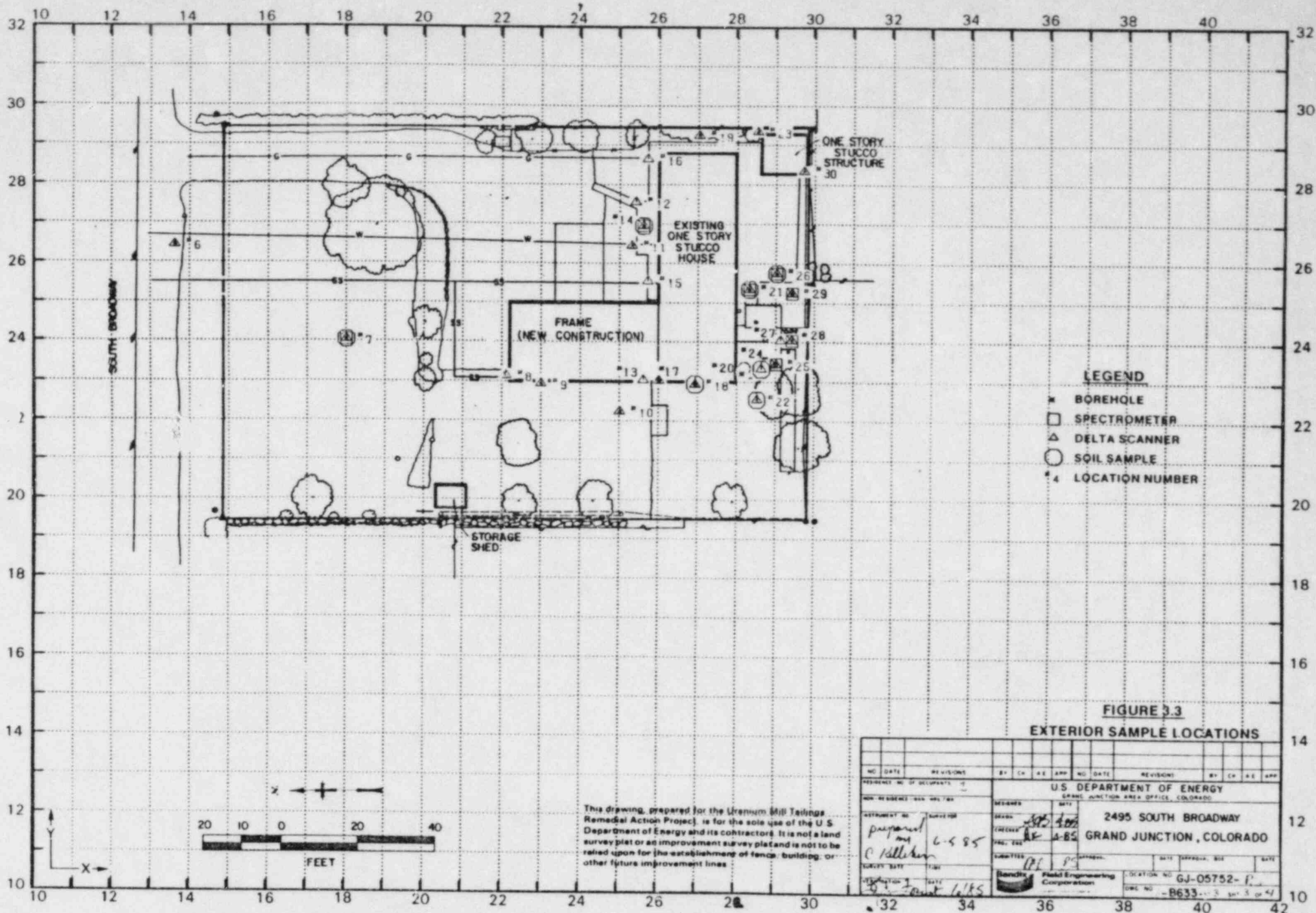
FIGURE 2.2 SITE PLAN

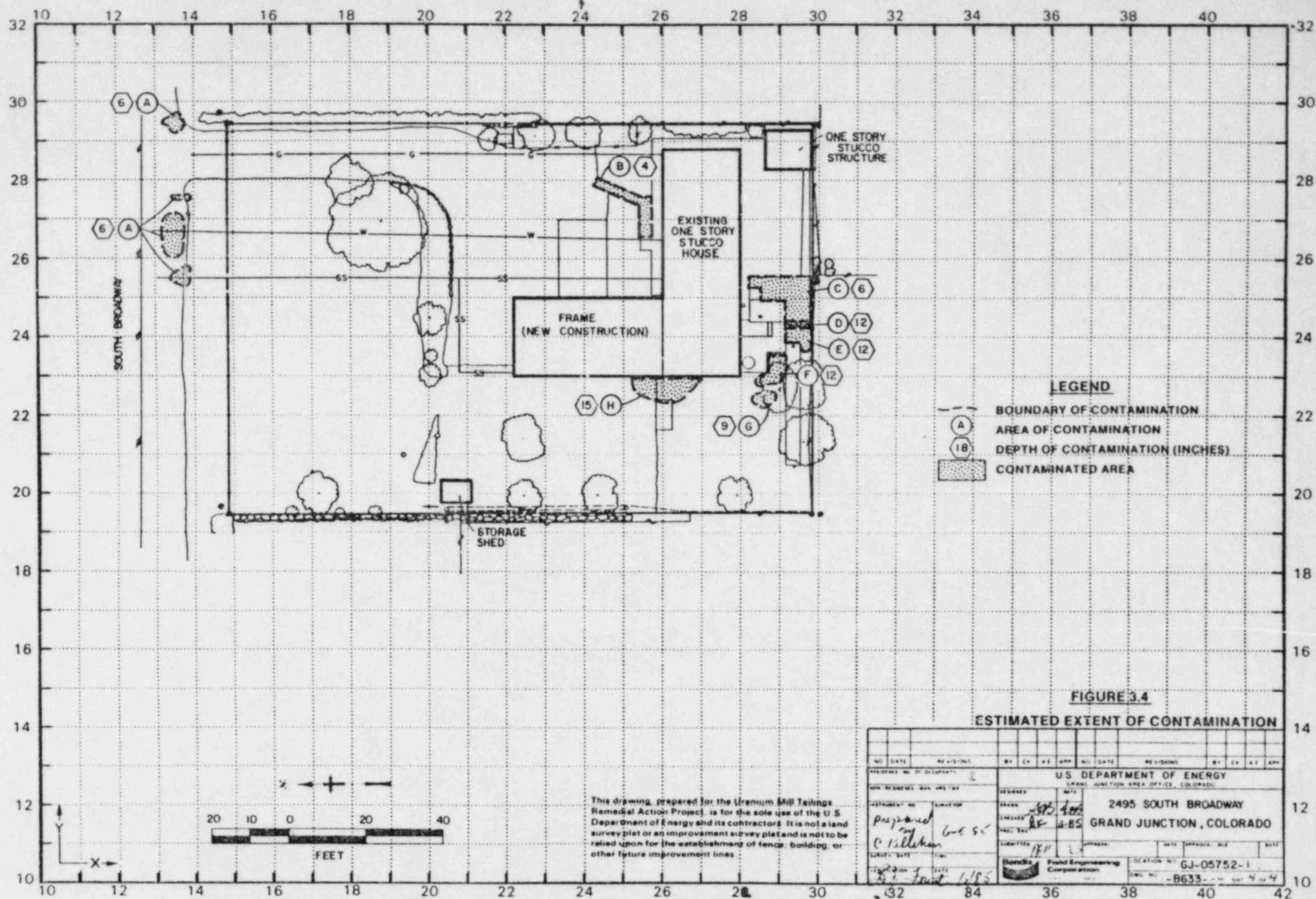
This drawing prepared for the Uranium Mill Tailings Remedial Action Project, is for the sole use of the U.S. Department of Energy. It is not to be used for any other purpose without the written consent of the U.S. Department of Energy. The U.S. Department of Energy assumes no responsibility for the establishment of fence, building, or other future improvement lines.

U.S. DEPARTMENT OF ENERGY	DOE ID NO.
GRAND JUNCTION PROJECT OFFICE, COLORADO	GJ05752 ES
ADDRESS 2495 SOUTH BROADWAY	ALBEDO
GRAND JUNCTION, COLORADO	ALBEDO
SURV. RES. 4 23 05	DATE RES. 4 25 85
DRAWING NO. 3, C 653, F1	SHEET 1 OF 1

1 CONNECTED 95 LINE LOCATION - JUL 8/85







3/85

DOE ID NO. GJ-05752-RS

Date June 4, 1995

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

Official Survey Report

Property Address 2495 South Broadway

Property Owner R.J. Hobart and B. B. Hobart

Address of Owner (if different from above) same

Report Prepared By Catherine Kelleher

I. PRESENCE/ABSENCE OF RESIDUAL RADIOACTIVE MATERIALS

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

xxxxx 1 Residual radioactive materials found at the following locations:

xxx 1 In open areas.

xxx 1 Under or around exterior improvements.

1 1 Under or around a typically nonoccupied structure.

xxxxx 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.

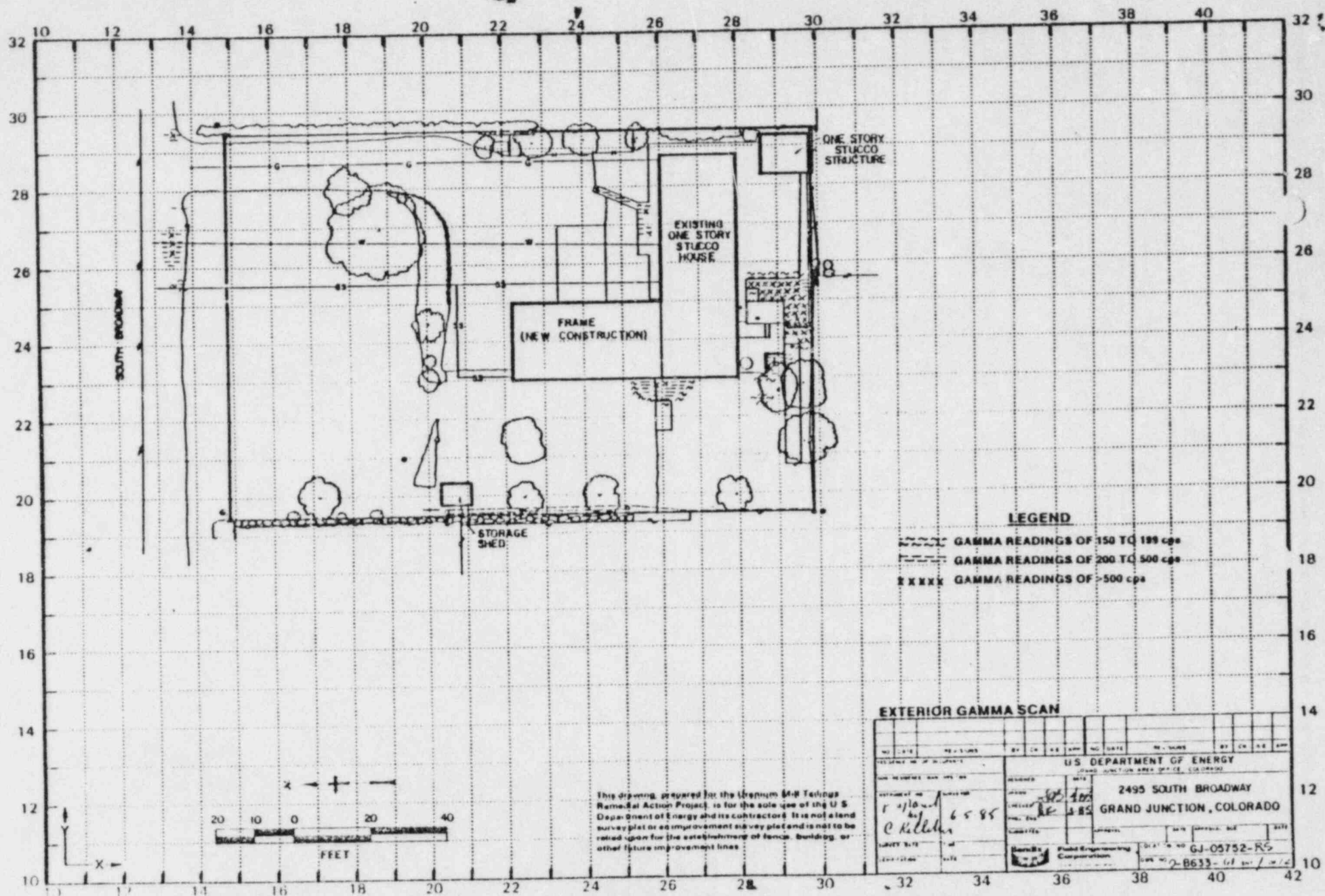
xxxxx 1 Levels of radiation from residual radioactive materials exceed EPA Standards such that Remedial Action is recommended and will be accomplished, with your consent, as soon as budget and schedule permit.

cc:

G. A. Franz, III, GJ/CDH

J. Themelis, Mgr. UMTRA Proj. Off.

HIG = 27 uR/h
HOG = 362 uR/h



MEMORANDUM

ALLIED Bendix
Aerospace

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

DATE: May 6, 1985
TO: Files
FROM: Cathy Kelleher
SUBJECT: Team Leader Notes - GJ-05752-RS

Address: 2495 South Broadway

Owner: Mr. and Mrs. Hobart

Date Surveyed: May 3, 1985

Telephone: 243-4870

Occupancy: Three

Weather: Overcast, hot and humid. No rain.

Team Members

C. Kelleher (Team Leader)	P. Tuhey
M. Dexter	S. Southern
D. Dow	H. Mattison
S. Larsen	M. Duran

Instruments

See Equipment Summary Sheet.

Oak Ridge National Laboratories (ORNL) data shows contamination adjacent to the house on the west side, north side, and south side. Scattered ore is indicated along the north and south property lines.

Team Leader Notes
Cathy Kelleher
GJ-05752-RS
May 6, 1985
Page 2

Utilities:

Gas - A shovel hole was dug over the gas line 2 to 3 feet out from the meter. A delta in the bottom of the hole was negative.

Sewer - The sewer line shown on the map is incorrect. It does not run north to the street. It runs west, under the new section of the house to a septic tank. A hole augered at Location 257255 went through a sewer line. It appeared to be an abandoned line; no flow was observed when the owner flushed the toilet. Therefore, it was covered up without repair. Subsequently the homeowner's husband informed us it was a waste water line from the kitchen sink. A plumber was sent out Monday, 6 May 1985, to repair it. The delta over the broken line was negative. A borehole was augered next to the septic tank.

Water - The water line was checked by a borehole.

Telephone and Electric - Telephone and electric lines were overhead.

Interior: The house consists of an older stucco house on the south and a new addition on the north. The original house was built in 1948. Elevated gamma levels along the south wall appeared to be shine from the patio, since the readings were higher at waist level than at ground level. Elevated readings along the west wall of the addition also appear to be due to shine. Delta readings taken along this wall showed only background readings. The one story stucco structure at the southeast corner was not surveyed, as the key was with the owner's son who was in Denver. The son and key will be returning and we should be able to survey it on 13 May. The cellar south of the house will also be surveyed at that time.

Exterior: The deposit shown by ORNL west of the house is some twenty feet south of where shown on their maps.

The major area of contamination was south of the house. The dirt adjacent to the patio was contaminated. Two cores were drilled adjacent to these dirt areas to decide if the contamination extended under the concrete. One of the two cores was through the top of an empty cistern. The core was retrieved after it fell to the bottom of the cistern. The hole was patched, but with difficulty. There were numerous ore samples in this area. About

Team Leader Notes
Cathy Kelleher
GJ-05752-RS
May 6, 1985
Page 3

60 to 70 pounds of rock were removed to the repository but more appear to remain buried in the dirt. Ore which was buried in the dirt was also found along the north property line by the mailbox, it was not removed.

A concrete pad by the door on the north side of the house was contaminated. A core was drilled in this area. Deltas were taken on adjacent slabs to confirm they were not contaminated.

The empty cistern was checked using a scintillometer. The range was 120 to 140 cps using instrument C-1185.

Cross sections were drawn of the concrete retaining walls along the south patio.

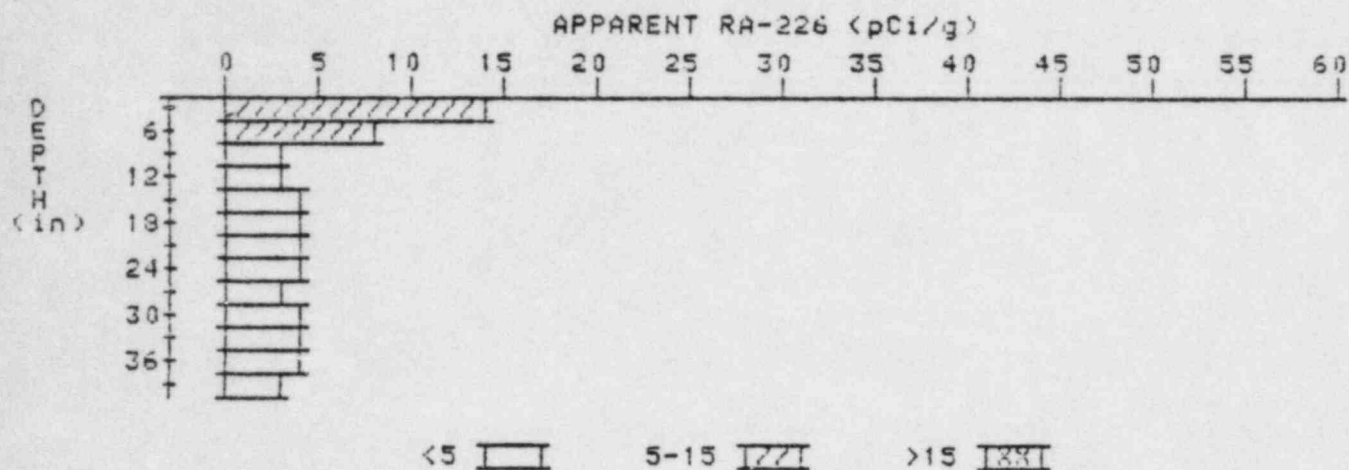
APPARENT RADIUM-226 CONCENTRATION DECONVOLUTION GRAPH

6

PROPERTY NUMBER: GJ-05752-RS

HOLE NUMBER: 6

LOCATION: 136264



Depth (in)	Apparent Radium-226 (pCi/g) Undeconvolved	Apparent Radium-226 (pCi/g) Deconvolved
3	13.7	13.7
6	9.5	7.9
9	6.2	2.8
12	4.3	3.4
15	4.2	3.7
18	3.9	3.5
21	3.8	3.8
24	3.7	3.7
27	3.6	3.4
30	3.6	3.6
33	3.6	3.8
36	3.5	3.5
39	3.4	3.4

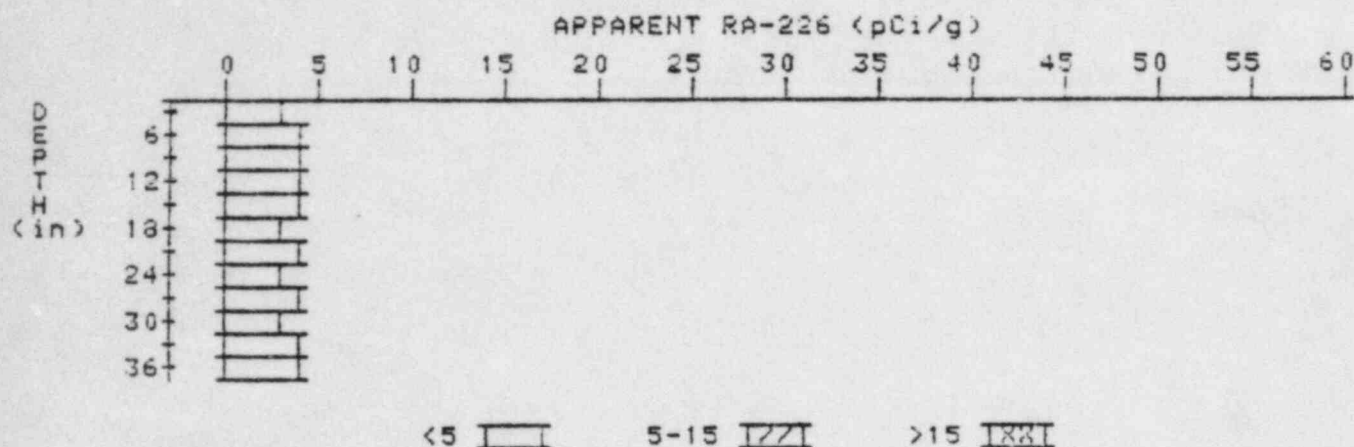
APPARENT RADIUM-226 CONCENTRATION DECONVOLUTION GRAPH

7

PROPERTY NUMBER: GJ-05752-RS

HOLE NUMBER: 7

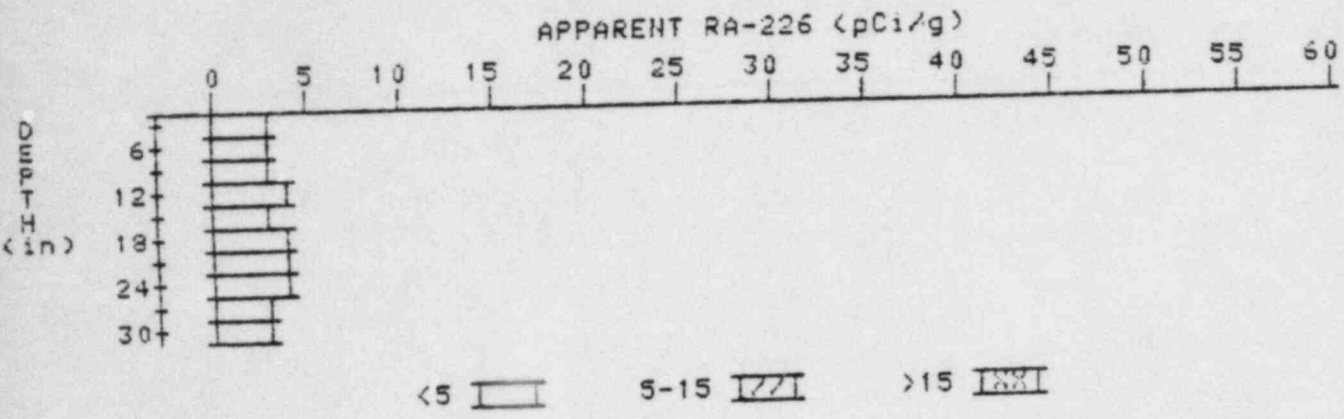
LOCATION: 180240



Depth (in)	Apparent Radium-226 (pCi/g) Undeconvolved	Apparent Radium-226 (pCi/g) Deconvolved
3	2.8	2.8
6	3.2	3.6
9	3.4	3.6
12	3.5	3.5
15	3.6	3.8
18	3.6	3.4
21	3.7	4.1
24	3.6	3.4
27	3.6	3.8
30	3.5	3.1
33	3.6	4.0
36	3.5	3.5

APPARENT RADIUM-226 CONCENTRATION 8 DECONVOLUTION GRAPH

PROPERTY NUMBER: GJ-05752-RS
HOLE NUMBER: 8
LOCATION: 221231

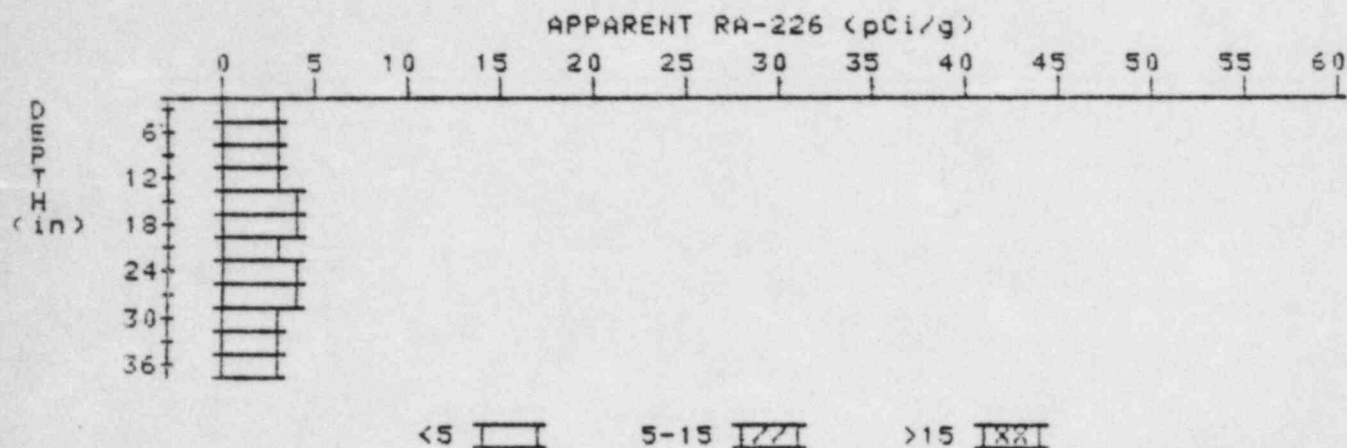


Depth (in)	Apparent Radium-226 (pCi/g) Undeconvolved	Apparent Radium-226 (pCi/g) Deconvolved
3	2.7	2.7
6	2.9	2.7
9	3.2	3.4
12	3.4	3.8
15	3.4	3.2
18	3.5	3.7
21	3.5	3.5
24	3.5	3.7
27	3.4	3.2
30	3.4	3.4

APPARENT RADIUM-226 CONCENTRATION DECONVOLUTION GRAPH

9

PROPERTY NUMBER: GJ-05752-RS
HOLE NUMBER: 9
LOCATION: 230229



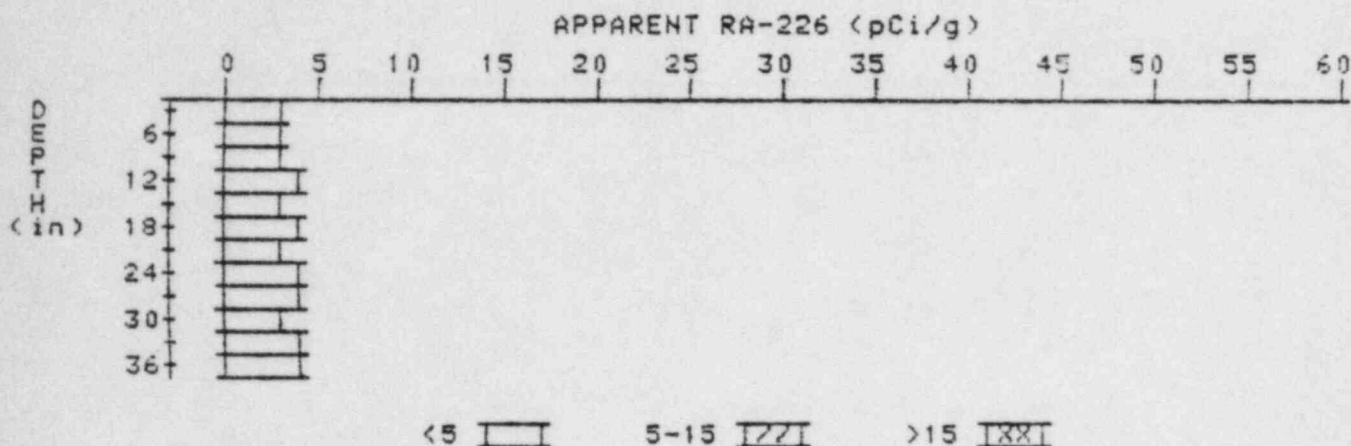
Depth (in)	Apparent Radium-226 (pCi/g) Undeconvolved	Apparent Radium-226 (pCi/g) Deconvolved
3	2.7	2.7
6	3.0	3.2
9	3.2	3.4
12	3.3	3.3
15	3.4	3.6
18	3.4	3.6
21	3.3	2.9
24	3.4	3.6
27	3.4	3.8
30	3.2	2.7
33	3.3	3.5
36	3.3	3.3

APPARENT RADIUM-226 CONCENTRATION 10 DECONVOLUTION GRAPH

PROPERTY NUMBER: GJ-05752-RS

HOLE NUMBER: 10

LOCATION: 250222



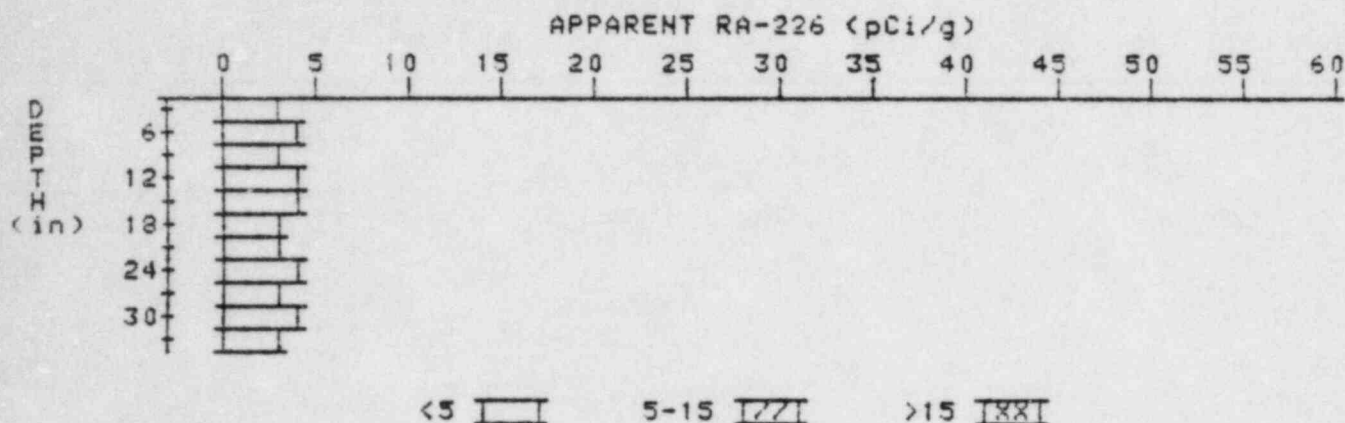
Depth (in)	Apparent Radium-226 (pCi/g) Undeconvolved	Apparent Radium-226 (pCi/g) Deconvolved
3	2.8	2.8
6	3.1	3.3
9	3.3	3.5
12	3.4	3.8
15	3.3	2.9
18	3.4	3.6
21	3.4	3.2
24	3.5	3.7
27	3.5	3.5
30	3.5	3.3
33	3.6	4.0
36	3.5	3.5

APPARENT RADIUM-226 CONCENTRATION 11 DECONVOLUTION GRAPH

PROPERTY NUMBER: GJ-05752-RS

HOLE NUMBER: 11

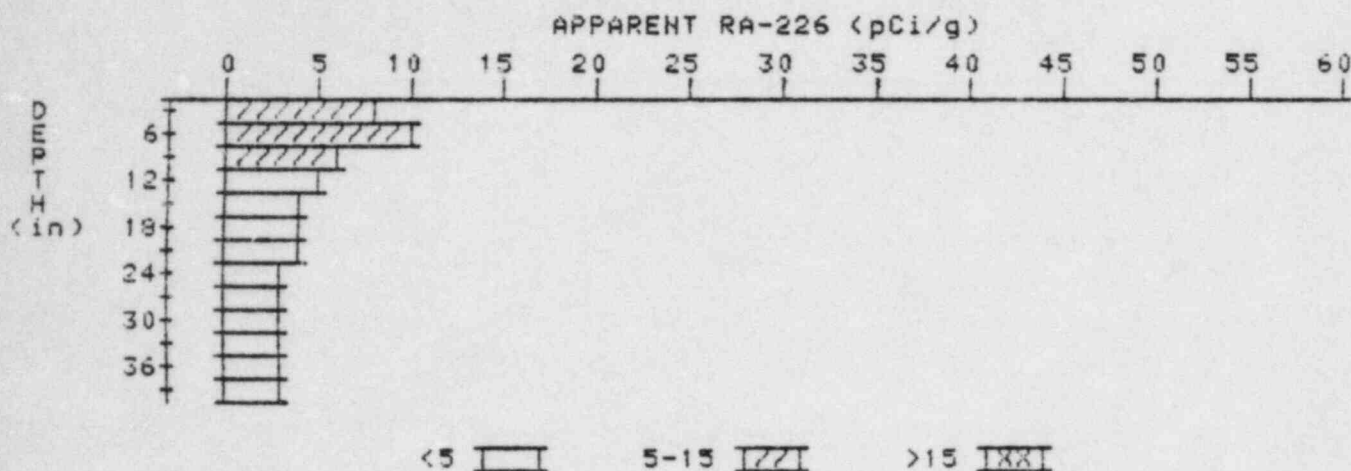
LOCATION: 253264



Depth (in)	Apparent Radium-226 (pCi/g) Undeconvolved	Apparent Radium-226 (pCi/g) Deconvolved
3	3.0	3.0
6	3.3	3.7
9	3.4	3.4
12	3.5	3.7
15	3.5	3.7
18	3.4	3.2
21	3.4	3.2
24	3.5	3.9
27	3.4	3.2
30	3.4	3.6
33	3.3	3.3

APPARENT RADIUM-226 CONCENTRATION 14 DECONVOLUTION GRAPH

PROPERTY NUMBER: GJ-05752-RS
HOLE NUMBER: 14
LOCATION: 256269



Depth (in)	Apparent Radium-226 (pCi/g) Undeconvolved	Apparent Radium-226 (pCi/g) Deconvolved
3	7.6	7.6
6	7.7	10.2
9	6.4	6.0
12	5.3	4.6
15	4.6	4.2
18	4.1	3.6
21	3.9	4.1
24	3.6	3.4
27	3.4	3.2
30	3.3	3.3
33	3.2	2.8
36	3.3	3.5
39	3.3	3.3

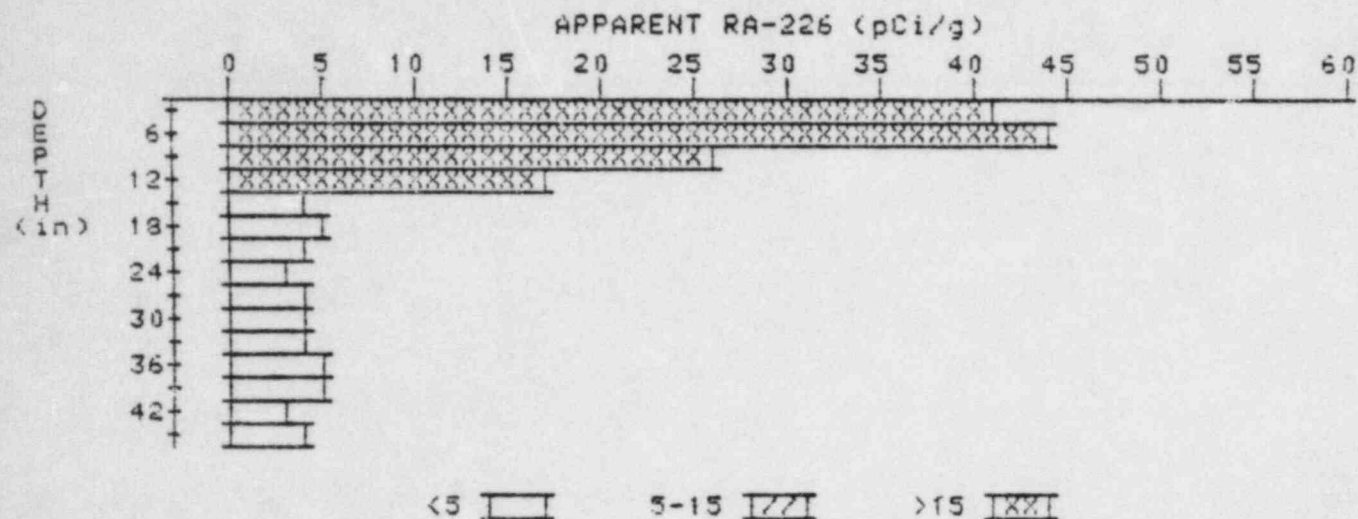
APPARENT RADIUM-226 CONCENTRATION 17

DECONVOLUTION GRAPH

PROPERTY NUMBER: GJ-05752-RS

HOLE NUMBER: 17

LOCATION: 260230

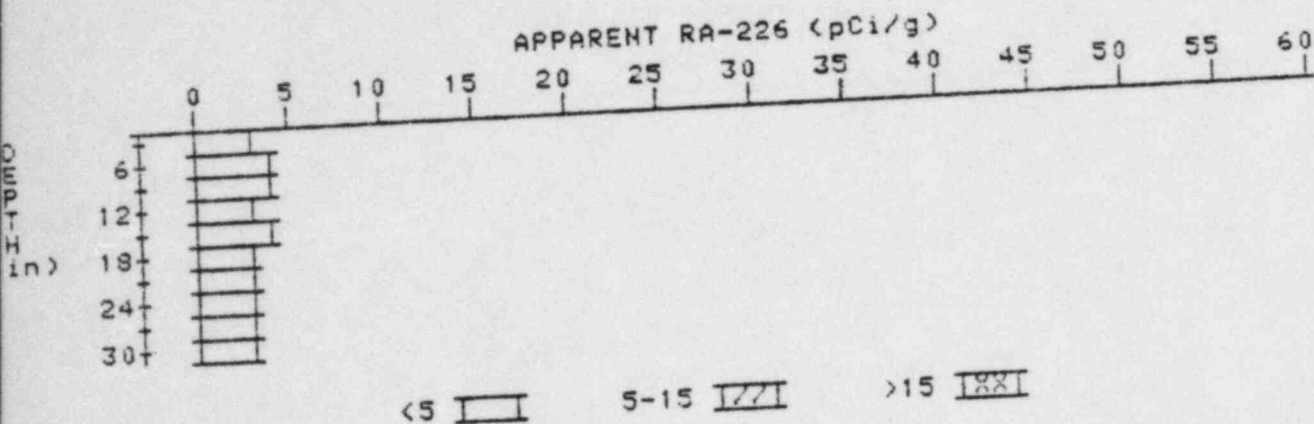


Depth (in)	Apparent Radium-226 (pCi/g) Undeconvolved	Apparent Radium-226 (pCi/g) Deconvolved
3	40.8	40.8
6	36.2	44.2
9	27.1	25.9
12	18.7	17.3
15	11.1	3.8
18	7.6	4.3
21	5.7	4.1
24	4.7	3.5
27	4.4	4.2
30	4.2	3.3
33	4.2	3.3
36	4.4	4.9
39	4.3	4.3
42	3.9	3.4
45	3.3	3.8

APPARENT RADIUM-226 CONCENTRATION DECONVOLUTION GRAPH

18

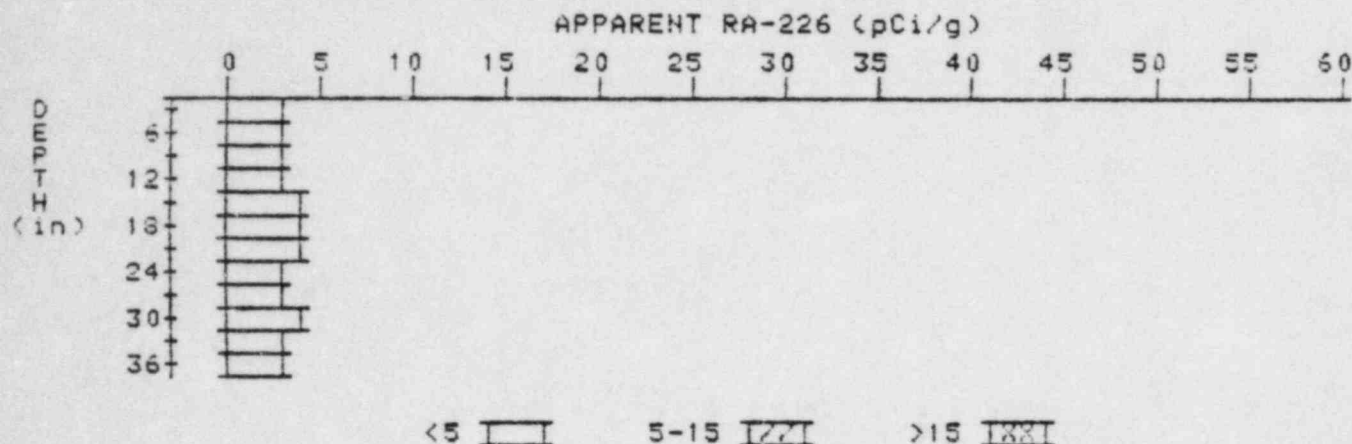
PROPERTY NUMBER: GJ-05752-RS
HOLE NUMBER: 13
LOCATION: 269229



Depth (in)	Apparent Radium-226 (pCi/g) Undeconvolved	Apparent Radium-226 (pCi/g) Deconvolved
3	3.3	3.3
6	3.4	3.6
9	3.4	3.6
12	3.3	2.9
15	3.4	3.6
18	3.4	3.4
21	3.4	3.4
24	3.4	3.4
27	3.4	3.4
30	3.4	3.4

APPARENT RADIUM-226 CONCENTRATION 19 DECONVOLUTION GRAPH

PROPERTY NUMBER: GJ-03752-RS
HOLE NUMBER: 19
LOCATION: 270292



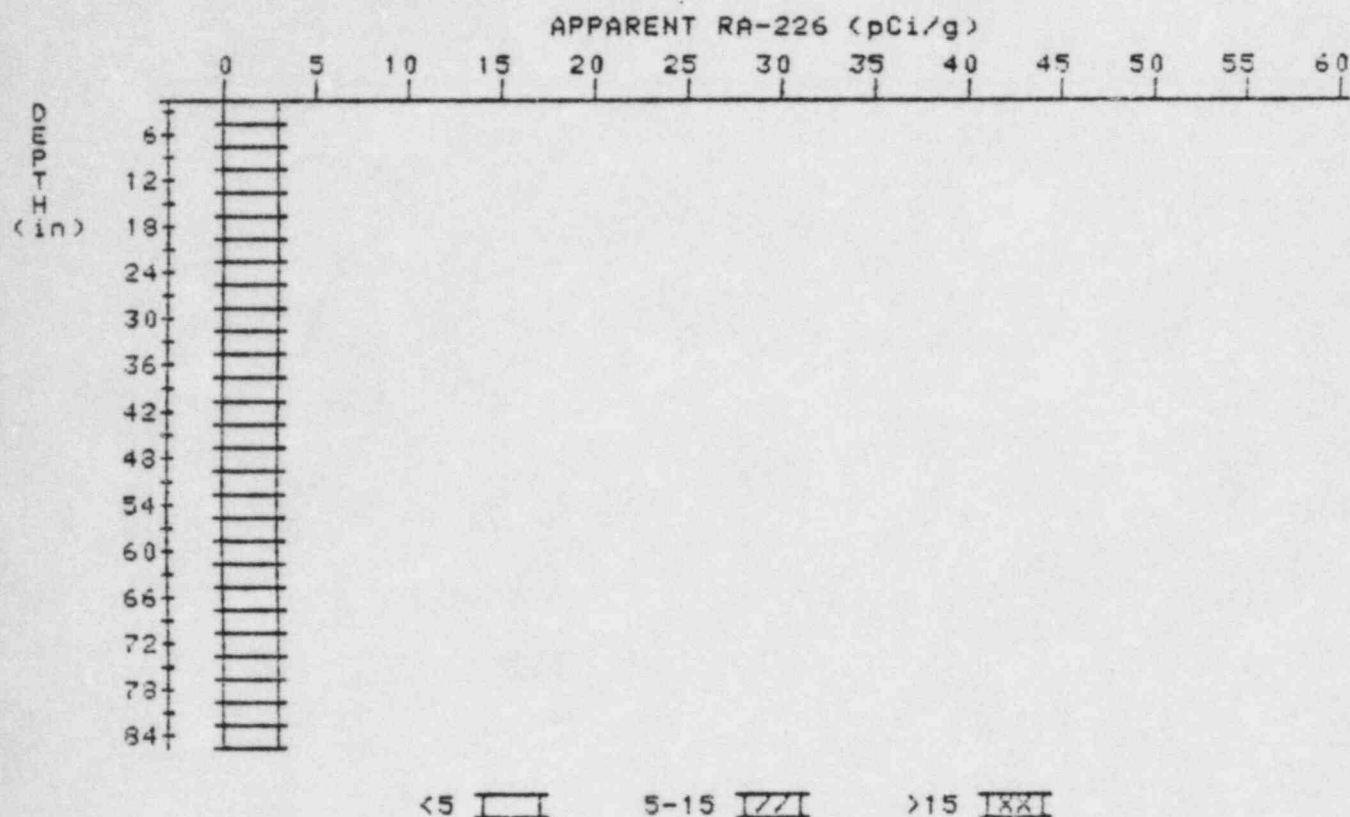
Depth (in)	Apparent Radium-226 (pCi/g) Undeconvolved	Apparent Radium-226 (pCi/g) Deconvolved
3	2.8	2.8
6	3.1	3.3
9	3.3	3.5
12	3.4	3.4
15	3.5	3.7
18	3.5	3.5
21	3.5	3.7
24	3.4	3.4
27	3.3	2.9
30	3.4	3.6
33	3.3	3.3
36	3.2	3.2

APPARENT RADIUM-226 CONCENTRATION 20 DECONVOLUTION GRAPH

PROPERTY NUMBER: GJ-05752-RS

HOLE NUMBER: 20

LOCATION: 281232



Depth (in)	Apparent Radium-226 (pCi/g) Undeconvolved	Apparent Radium-226 (pCi/g) Deconvolved
3	2.7	2.7
6	2.8	2.8
9	2.9	3.1
12	2.9	2.7
15	3.0	3.2
18	3.0	3.0
21	3.0	3.0
24	3.0	3.0
27	3.0	3.0
30	3.0	3.0
33	3.0	3.0
36	3.0	2.8

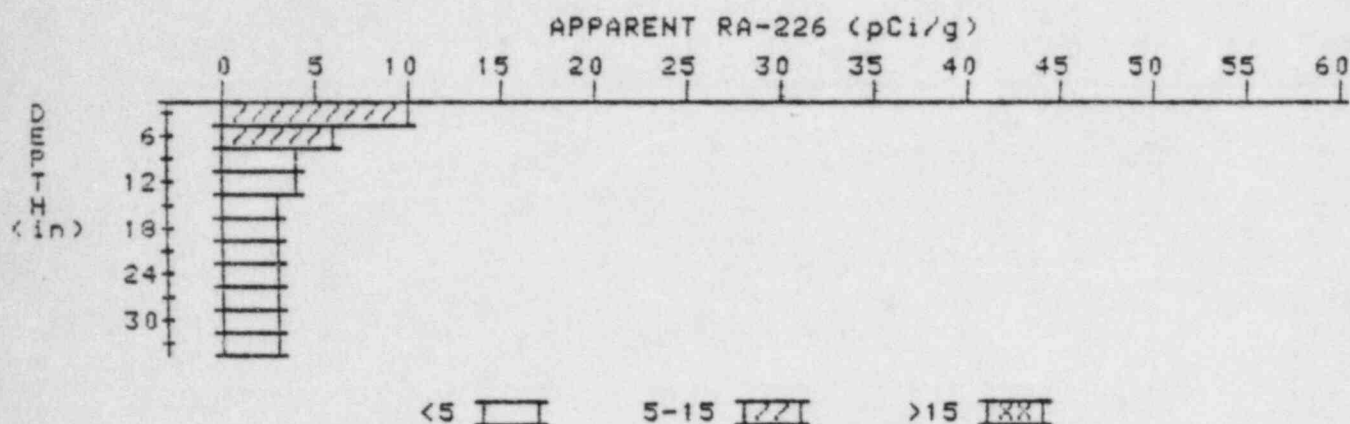
39
42
45
48
51
54
57
60
63
66
69
72
75
78
81
84

3.1
3.0
3.0
3.0
3.0
3.1
3.1
3.1
3.1
3.0
3.1
3.0
3.1
3.1
3.0
3.0

3.5
2.8
3.0
3.0
2.8
3.3
3.1
3.1
3.3
2.6
3.5
2.6
3.3
3.3
2.8
3.0

APPARENT RADIUM-226 CONCENTRATION 21 DECONVOLUTION GRAPH

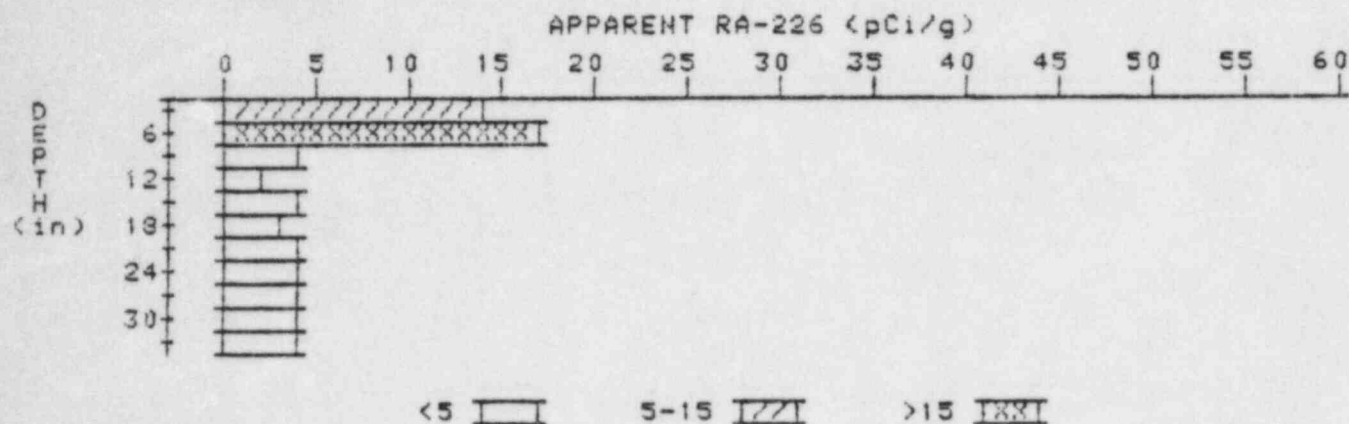
PROPERTY NUMBER: GJ-05752-RS
HOLE NUMBER: 21
LOCATION: 293253



Depth (in)	Apparent Radium-226 (pCi/g) Undeconvolved	Apparent Radium-226 (pCi/g) Deconvolved
3	9.5	9.5
6	7.2	6.5
9	5.3	3.7
12	4.3	3.6
15	3.7	3.2
18	3.4	3.0
21	3.3	3.5
24	3.1	2.7
27	3.1	3.1
30	3.1	3.1
33	3.1	3.1

APPARENT RADIUM-226 CONCENTRATION 22 DECONVOLUTION GRAPH

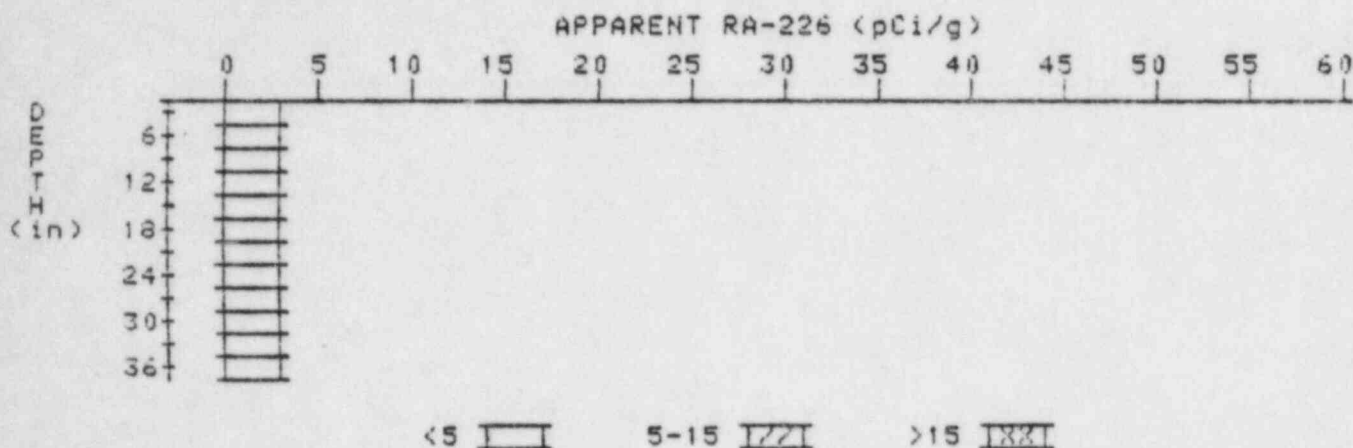
PROPERTY NUMBER: GJ-05752-RS
HOLE NUMBER: 22
LOCATION: 285225



Depth (in)	Apparent Radium-226 (pCi/g) Undeconvolved	Apparent Radium-226 (pCi/g) Deconvolved
3	13.9	13.9
6	12.0	16.6
9	7.5	3.8
12	5.1	2.1
15	4.4	4.2
18	3.8	2.9
21	3.7	3.5
24	3.7	3.7
27	3.7	3.5
30	3.9	4.3
33	3.6	3.6

APPARENT RADIUM-226 CONCENTRATION 23 DECONVOLUTION GRAPH

PROPERTY NUMBER: GJ-05752-RS
HOLE NUMBER: 23
LOCATION: 285293

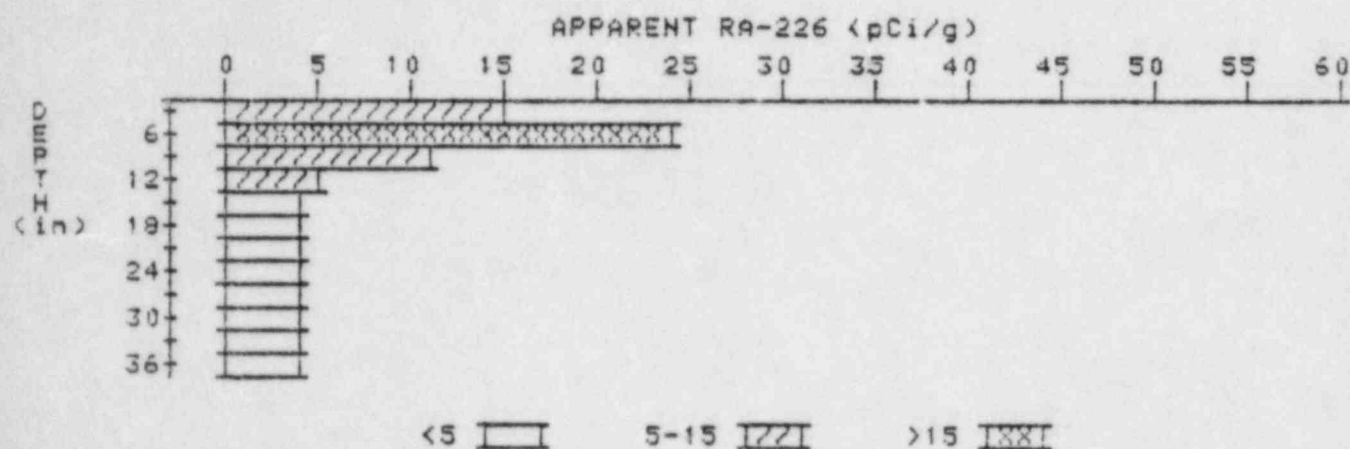


Depth (in)	Apparent Radium-226 (pCi/g) Undeconvolved	Apparent Radium-226 (pCi/g) Deconvolved
3	2.6	2.6
6	2.9	3.1
9	3.1	3.3
12	3.2	3.4
15	3.2	3.0
18	3.3	3.5
21	3.3	3.3
24	3.3	3.3
27	3.3	3.5
30	3.2	3.0
33	3.2	3.4
36	3.1	3.1

APPARENT RADIUM-226 CONCENTRATION 25

DECONVOLUTION GRAPH

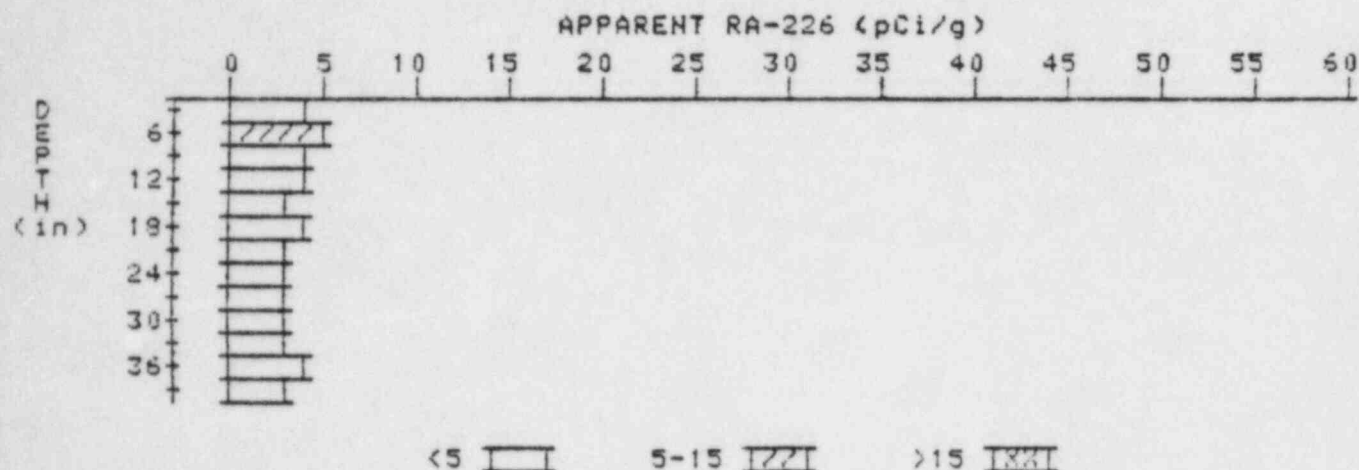
PROPERTY NUMBER: GJ-05752-RS
HOLE NUMBER: 25
LOCATION: 290234



Depth (in)	Apparent Radium-226 (pCi/g) Undeconvolved	Apparent Radium-226 (pCi/g) Deconvolved
3	14.9	14.9
6	15.7	24.1
9	11.2	11.4
12	8.1	5.3
15	6.0	4.0
18	5.0	4.1
21	4.5	4.1
24	4.2	3.8
27	4.1	4.1
30	4.0	3.8
33	4.0	4.4
36	3.8	3.8

APPARENT RADIUM-226 CONCENTRATION 26 DECONVOLUTION GRAPH

PROPERTY NUMBER: GJ-05752-RS
HOLE NUMBER: 26
LOCATION: 290257



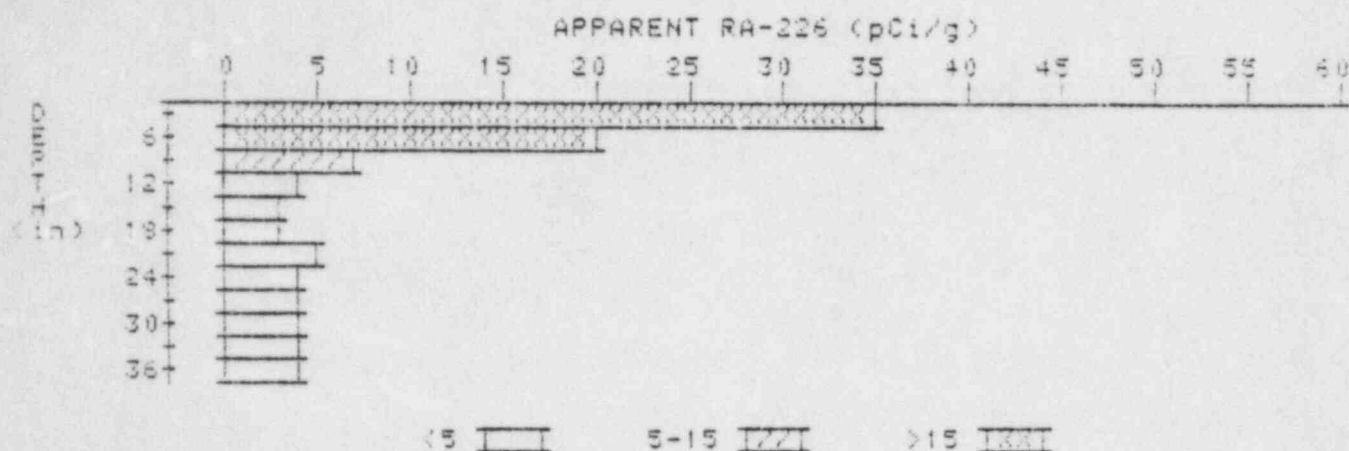
Depth (in)	Apparent Radium-226 (pCi/g) Undeconvolved	Apparent Radium-226 (pCi/g) Deconvolved
3	3.9	3.9
6	4.2	5.1
9	4.0	4.2
12	3.7	3.5
15	3.5	3.3
18	3.4	3.6
21	3.2	2.9
24	3.2	3.4
27	3.1	2.7
30	3.2	3.4
33	3.2	3.2
36	3.2	3.6
39	3.0	3.0

APPARENT RADIUM-226 CONCENTRATION 28 DECONVOLUTION GRAPH

PROPERTY NUMBER: GJ-05752-RS

HOLE NUMBER: 28

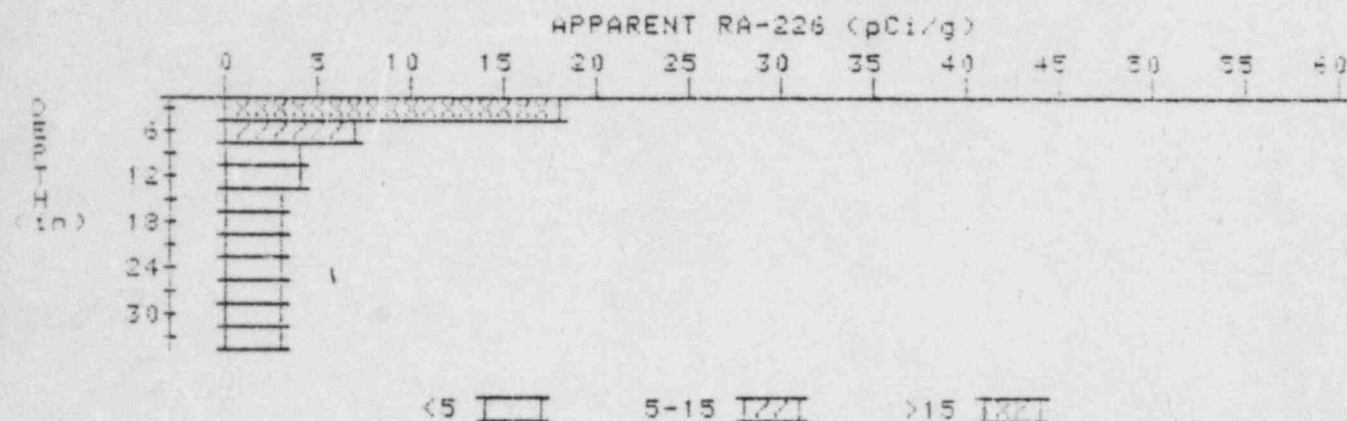
LOCATION: 294240



Depth (in)	Apparent Radium-226 (pCi/g) Undeconvolved	Apparent Radium-226 (pCi/g) Deconvolved
3	34.8	34.8
6	23.6	20.2
9	14.3	7.4
12	3.9	4.3
15	6.1	3.4
18	4.8	3.0
21	4.5	4.7
24	4.1	3.7
27	3.9	3.7
30	3.8	3.6
33	3.8	3.6
36	3.9	3.9

APPARENT RADIUM-226 CONCENTRATION 29 DECONVOLUTION GRAPH

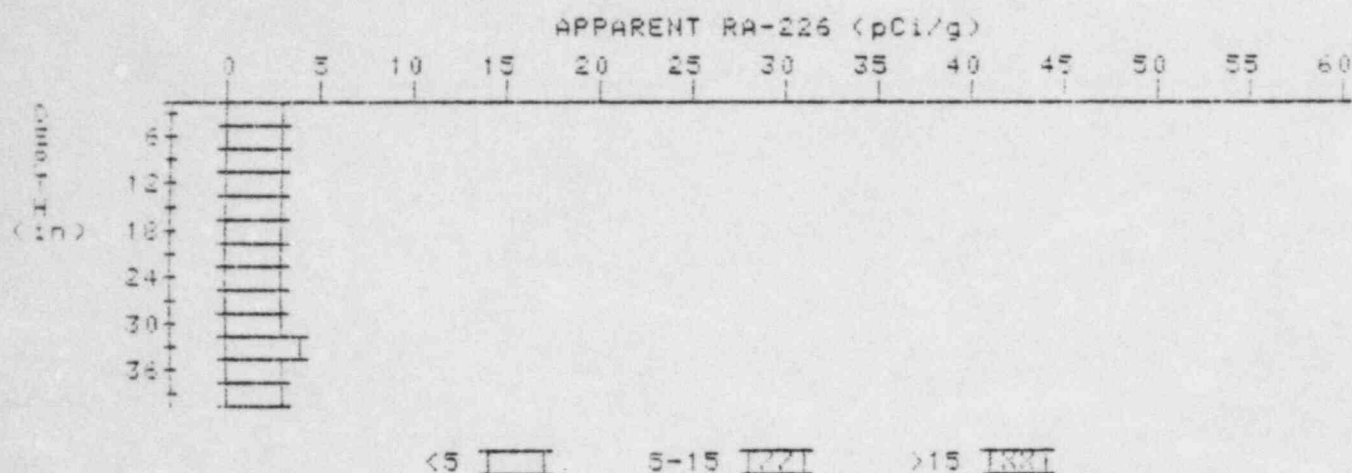
PROPERTY NUMBER: GJ-05752-RS
HOLE NUMBER: 29
LOCATION: 294252



Depth (in)	Apparent Radium-226 (pCi/g) Undeconvolved	Apparent Radium-226 (pCi/g) Deconvolved
3	17.7	17.7
6	11.3	6.9
9	7.4	3.8
12	5.5	4.3
15	4.3	3.1
18	3.8	3.4
21	3.5	3.1
24	3.4	3.4
27	3.3	3.3
30	3.2	2.8
33	3.3	3.3

APPARENT RADIUM-226 CONCENTRATION 30 DECONVOLUTION GRAPH

PROPERTY NUMBER: GJ-05752-R6
HOLE NUMBER: 30
LOCATION: 297283



Depth (in)	Apparent Radium-226 (pCi/g) Undeconvolved	Apparent Radium-226 (pCi/g) Deconvolved
3	2.7	2.7
6	3.0	3.4
9	3.1	3.3
12	3.1	2.9
15	3.2	3.4
18	3.2	3.2
21	3.2	3.2
24	3.2	3.2
27	3.2	3.2
30	3.2	3.0
33	3.3	3.7
36	3.2	3.0
39	3.2	3.2