

RADIOLOGIC AND ENGINEERING ASSESSMENT

FOR

DOE ID NO.: GJ-04676-RS
ADDRESS: 2126 TEXAS AVENUE

JULY 1985

FOR

URANIUM MILL TAILINGS REMEDIAL ACTION PROJECT OFFICE

ALBUQUERQUE OPERATIONS OFFICE

DEPARTMENT OF ENERGY

BY

BENDIX FIELD ENGINEERING CORPORATION
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DATE

July 22, 1985

REA04676:REA-703

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1.0 EXECUTIVE SUMMARY

1.1 Introduction

The location, DOE ID No. GJ-04676-RS, is a single-family residence located at 2126 Texas Avenue, Grand Junction, Colorado.

The purpose of this assessment is to evaluate the extent of uranium millsite contamination at this property and present a recommendation based on this assessment.

1.2 Evaluation and Recommendation

It is recommended that no remedial action be performed on this property (as discussed in Section 4.0) and that a Property Completion Report be prepared for use in the DOE certification process. The identified residual radioactive material found on this property is tailings; the estimated volume is: exterior, 6 cu. yd.; interior, 0 cu. yd.

2.0 PROPERTY DESCRIPTION

2.1 General Description

Address: 2126 Texas Avenue, Grand Junction, Colorado

Zoning: Residential (RSF-8)

Lot Size: Approximately 7,900 sf (0.18 acre)

Legal Description: Lot 4, Block 1, Velvet Lawns Subdivision, City of Grand Junction, County of Mesa, State of Colorado.

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

2.2 Existing Facilities and Structures

Primary Structure:

Type:	Single-story residence
Size:	Approximately 1,500 sf
Construction Date:	1957
Construction:	Wood-frame with brick veneer
Foundation:	Concrete stemwall of spread footing
Footing Depth:	Approximately 30" to bottom of footing from grade
Basement:	None
Crawl Space:	Yes - under entire living area
Condition:	Good

Other Structures:

Type:	Shed
Size:	Approximately 70 sf
Construction:	Wood-frame
Foundation:	Concrete slab-on-grade
Condition:	Good

General Remarks:

Structures, utilities, landscaping, and other special features of this property are included in Appendix Figure 2.2.

Historical Data:

This structure is not over 50 years old. Therefore, it does not meet the eligibility criteria for consideration of inclusion on the National Register of Historic Places.

3.0 RADIOLOGIC SURVEY

3.1 Introduction

Radiologic data were collected by Bendix at DOE ID No. GJ-04676-RS on June 4, 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 the contamination to be in the yard, carport and storage shed. 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: 14 to 17 uR/h
Highest Outside Gamma Reading (HOG): 24 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 17 uR/h
Highest Inside Gamma Reading (HIG): 17 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 Figure 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 Figures 3.4a and 3.4b show identified areas and estimated depths of contamination on this property, based on assessments of all measurements taken. As noted in these figures, areas recommended for remedial action that contain identified residual radioactive materials are:

- (Area A) Surface Material: concrete
Direction From Primary Structure: east, interior
Other Directions: storage shed floor
Other (height or thickness): 5-inch-thick
Comments: The concrete floor itself is contaminated
Approximate Square Footage: 80
- (Area B) Surface Material: concrete
Direction From Primary Structure: east
Other Directions: carport slab
Total Depth of Contamination: 5 inches
Other (height or thickness): 5-inch-thick
Comments: Just the concrete itself is contaminated, not
the soil beneath
Approximate Square Footage: 300
- (Area C) Surface Material: soil
Direction From Primary Structure: southeast
Other Directions: under evergreen hedge
Total Depth of Contamination: 6 inches
Comments: A small section of contaminated soil
Approximate Square Footage: 8

4.0 RECOMMENDED REMEDIAL ACTION

4.1 Decontamination and Restoration

We do not recommend decontamination and restoration of this property. It is recommended that no remedial action be performed and that a brief Property Completion Report be prepared for use in the DOE certification process.

4.2 Evaluation of Recommended Remedial Action

The recommendation that no remedial action be performed on this property is made because the levels of radioactivity on this property fall below the EPA Standards (40 CFR 192):

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

Appendix Table 4.1 presents the area and volume calculations of contamination present on the property. Appendix Table 4.2 presents the calculations for concentrations of Radium-226 in soil for this location.

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	Calculations for Concentration 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	Interior Gamma Exposure Rates and Sample Locations
Figure 3.3	Exterior Sample Locations
Figure 3.4a	Interior Estimated Extent of Contamination
Figure 3.4b	Exterior Estimated Extent of Contamination

Official Survey Report

Team Leader Notes

Deconvolution Graphs (Apparent Radium-226 Concentration)

Exterior Gamma Scan Map

Radium Concentrations at Exterior Locations

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2126 Texas Avenue

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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.		
4	150260	00	DS	1.6		*	Background
		03	TC	3.1		*	
		06	BH	3.6	1.8	*	DC = 0 inches
		09	TC	3.9		*	
		12	BH	3.8	1.5	*	
		15	TC	3.7		*	
		18	BH	3.8	1.5	*	
		21	TC	3.8		*	
		24	BH	3.8	1.7	*	
		27	TC	3.7		*	
		30	BH	3.6	1.4	*	
		33	TC	3.6		*	
		36	TC	3.5		*	
		39	TC	3.5		*	
		42	TC	3.5		*	
5	169249	03	TC	3.3		*	Sewer line
		06	TC	3.5		*	North side of
		09	TC	3.6		*	primary structure
		12	TC	3.7		*	
		15	TC	3.7		*	DC = 0 inches
		18	TC	3.7		*	
		21	TC	3.7		*	
		24	TC	3.6		*	
		27	TC	3.7		*	
		30	TC	3.6		*	
		33	TC	3.7		*	
		36	TC	3.6		*	
		39	TC	3.6		*	
		42	TC	3.5		*	
		45	TC	3.6		*	
		48	TC	3.5		*	
		51	TC	3.6		*	
		54	TC	3.6		*	
		57	TC	3.6		*	
		60	TC	3.6		*	
6	170271	03	TC	3.0		*	Northeast side of
		06	TC	3.2		*	primary structure
		09	TC	3.3		*	
							DC = 0 inches

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	170271	12	TC	3.3		*	
		15	TC	3.3		*	
		18	TC	3.4		*	
		21	TC	3.4		*	
		24	TC	3.3		*	
		27	TC	3.3		*	
		30	TC	3.3		*	
		33	TC	3.4		*	
		36	TC	3.2		*	
7	190271	00	DS	1.7		*	East side of primary structure
		06	DS	2.1		*	
		12	DS	2.1		*	
		15	DS	<1.0		*	
8	200271	03	TC	3.4		*	East side of primary structure front of patio DC = 0 inches
		06	TC	3.6		*	
		09	TC	3.5		*	
		12	TC	3.4		*	
		15	TC	3.4		*	
		18	TC	3.4		*	
		21	TC	3.3		*	
		24	TC	3.3		*	
		27	TC	3.2		*	
		30	TC	3.1		*	
		33	TC	3.0		*	
		36	TC	3.0		*	
9	200281	03	TC	3.6		*	North of driveway DC = 0 inches
		06	TC	3.6		*	
		09	TC	3.7		*	
		12	TC	3.6		*	
		15	TC	3.6		*	
		18	TC	3.7		*	
		21	TC	3.6		*	
		24	TC	3.6		*	
		27	TC	3.5		*	
		30	TC	3.5		*	
		33	TC	3.3		*	
		36	TC	3.3		*	
10	200290	03	TC	3.2		*	Northeast corner of storage shed DC = 0 inches
		06	TC	3.5		*	
		09	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.		
10	200290	12	TC	3.9		*	
		15	TC	3.8		*	
		18	TC	3.6		*	
		21	TC	3.6		*	
		24	TC	3.6		*	
		27	TC	3.6		*	
		30	TC	3.5		*	
		33	TC	3.4		*	
		36	TC	3.3		*	
		39	TC	3.3		*	
11	203266	00	DS	1.4		*	Northwest of driveway
12	203270	00	DS	5.4		*	Northwest end of carport
13	203280	00	DS	4.4		*	North end carport
14	203284	00	DS	5.8		*	Carport next to storage shed
15	210239	00	DS	1.6		*	Sidewalk west of primary structure
16	210270	00	DS	1.9		*	On driveway
17	210274	00	DS	5.3		*	Carport
18	210280	03	TC	4.7		*	Middle of carport
		06	BH	4.4	1.6	*	
		09	TC	3.8		*	
		12	BH	3.5	1.8	*	DC = 5 inches
		15	TC	3.5		*	Based on all
		18	BH	3.4	1.5	*	available data
		21	TC	3.3		*	
		24	BH	3.2	1.6	*	
		27	TC	3.3		*	
		30	TC	3.2		*	
		33	TC	3.2		*	
		36	TC	3.0		*	
		39	TC	3.0		*	

Radium Concentrations at Exterior Locations

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Loc #	Grid Location	Depth (in.)	Meas. Type	In Situ Ra-226 (pCi/g)		Chem Ra-226 (pCi/g)	Comments
				Tot. Ct	Spectr.		
19	210291	03	TC	3.4		*	East side of storage shed DC = 0 inches
		06	TC	3.5		*	
		09	TC	3.6		*	
		12	TC	3.6		*	
		15	TC	3.5		*	
		18	TC	3.4		*	
		21	TC	3.3		*	
		24	TC	3.2		*	
		27	TC	3.2		*	
		30	TC	3.1		*	
		33	TC	3.1		*	
20	216284	00	DS	6.0		*	Carport next to storage shed
21	218271	00	DS	5.6		*	Southwest end carport
22	218280	00	DS	5.0		*	Carport
23	218286	03	TC	3.5		*	Southwest corner of storage shed DC = 0 inches
		06	TC	3.6		*	
		09	TC	3.8		*	
		12	TC	3.7		*	
		15	TC	3.8		*	
		18	TC	3.6		*	
		21	TC	3.7		*	
		24	TC	3.6		*	
		27	TC	3.6		*	
		30	TC	3.5		*	
		33	TC	3.5		*	
24	220269	03	TC	2.7		*	By carport on sidewalk DC = 0 inches
		06	TC	3.0		*	
		09	TC	3.2		*	
		12	TC	3.2		*	
		15	TC	3.3		*	
		18	TC	3.3		*	
		21	TC	3.3		*	
		24	TC	3.2		*	
		27	TC	3.2		*	
		30	TC	3.2		*	
		33	TC	3.1		*	
		36	TC	3.0		*	

Radium Concentrations at Exterior Locations

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Loc #	Grid Location	Depth (in.)	Meas. Type	In Situ Ra-226 (pCi/g)		Chem Ra-226 (pCi/g)	Comments
				Tot. Ct	Spectr.		
25	222285	00	DS	2.2		*	Southeast end carport
26	224270	00	DS	1.3		*	Driveway slab
27	224280	00	DS	1.2		*	Driveway slab
		03	TC	3.0		*	Driveway (core)
		06	TC	3.4		*	
		09	TC	3.6		*	DC = 0 inches
		12	TC	3.7		*	
		15	TC	3.8		*	
		18	TC	3.9		*	
		21	TC	3.7		*	
		24	TC	3.6		*	
		27	TC	3.7		*	
		30	TC	3.7		*	
		33	TC	3.6		*	
		36	TC	3.5		*	
		39	TC	3.5		*	
28	230237	00	DS	1.8		*	Gas line
		16	DS	<1.0		*	
29	235250	00	DS	1.3		*	South of primary structure
30	236263	03	TC	2.8		*	Water line
		06	TC	3.1		*	
		09	TC	3.4		*	DC = 0 inches
		12	TC	3.5		*	
		15	TC	3.7		*	
		18	TC	3.7		*	
		21	TC	3.8		*	
		24	TC	3.6		*	
		27	TC	3.7		*	
		30	TC	3.8		*	
		33	TC	3.8		*	
		36	TC	3.8		*	
		39	TC	3.9		*	
		42	TC	3.7		*	
		45	TC	3.7		*	
		48	TC	3.6		*	
		51	TC	3.5		*	
		54	TC	3.5		*	

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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.		
30	236263	57	TC	3.5		*	
		60	TC	3.5		*	
		63	TC	3.6		*	
31	245292	00	DS	5.1		*	By hedge, east
		06	DS	2.3		*	side of yard
		12	DS	1.3		*	
							DC = 6 inches

Measurement GB = GAD-6 Borehole
 Types: GS = GAD-6 Surface
 DS = Delta Scintillometer
 TC = Total Count Borehole
 SS = Soil Sample
 BH = Combined GAD-6 and
 Total Count Borehole

Notes: DC = Depth of Contamination
 * = No Soil Sample Taken
 [n] = Reading Taken n-Inches
 Above Floor or Ground
 Date of Survey = 06-04-85
 Team Leader = JH

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		03	TC	4.5		*	Storage shed DC = 5 inches Based on all available data
		06	TC	4.3		*	
		09	TC	3.9		*	
		12	TC	3.6		*	
		15	TC	3.5		*	
		18	TC	3.4		*	
		21	TC	3.3		*	
		24	TC	3.2		*	
		27	TC	3.2		*	
		30	TC	3.2		*	
		33	TC	3.2		*	
		36	TC	3.1		*	
2		00	DS	6.4		*	Storage shed
3		00	DS	6.0		*	Storage shed

Measurement Types:

GB = GAD-6 Borehole
 GS = GAD-6 Surface
 DS = Delta Scintillometer
 TC = Total Count Borehole
 SS = Soil Sample
 BH = Combined GAD-6 and
 Total Count Borehole

Notes: DC = Depth of Contamination
 * = No Soil Sample Taken
 [n] = Reading Taken n-Inches
 Above Floor or Ground
 Date of Survey = 06-04-85
 Team Leader = JH

Table 3.3
Summary of Interior Gamma Exposure Rates

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Location *		Number of Readings Taken at Waist Level	Range at Waist Level (uR/h)	Mean at Waist Level (uR/h)	Number of Readings Taken at Surface	Range at Surface (uR/h)	Mean Surface (uR/h)
CRAWL SPACE	A	*	*	*	*	15-17	*
SHED	B	*	*	*	*	13-15	*
STORAGE SHED	C	08	17-19	18	08	19-24	22

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*Exposure Rates and Room Locations Shown in Appendix Figure 3.2

Table 4.1
Area and Volume Calculations
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<u>AREA</u>	<u>CALCULATIONS(ft)</u>	<u>SF</u>	<u>DEPTH(ft)</u>	<u>CF</u>	<u>CUBIC YARDS</u>
EXTERIOR					
*A	16 x 5 =	80	x 0.4 =	32	
B	20 x 15 =	300	x 0.4 =	120	
C	2 x 4 =	8	x 0.5 =	4	
TOTAL VOLUME - EXTERIOR				= 156 =	156/27 = 6

NOTE: Total square feet of Areas A, B, and C = 388 square feet
388 square feet = 35.6 square meters

*NOTE: Area A is a storage shed and shall be considered as exterior involvement.

See Appendix Figures 3.4a and 3.4b For Areas

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Table 4.2
Calculations for Concentration of Radium-226 in Soil
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$$C_{avg} = \frac{C_c \times A_c + C_b (100m^2 - A_c)}{100m^2}$$

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)

$$C_{avg} = \frac{6.0 \times 35.6 + 2 (100 - 35.6)}{100}$$

$$C_{avg} = 3.4 < 7$$

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

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

=====

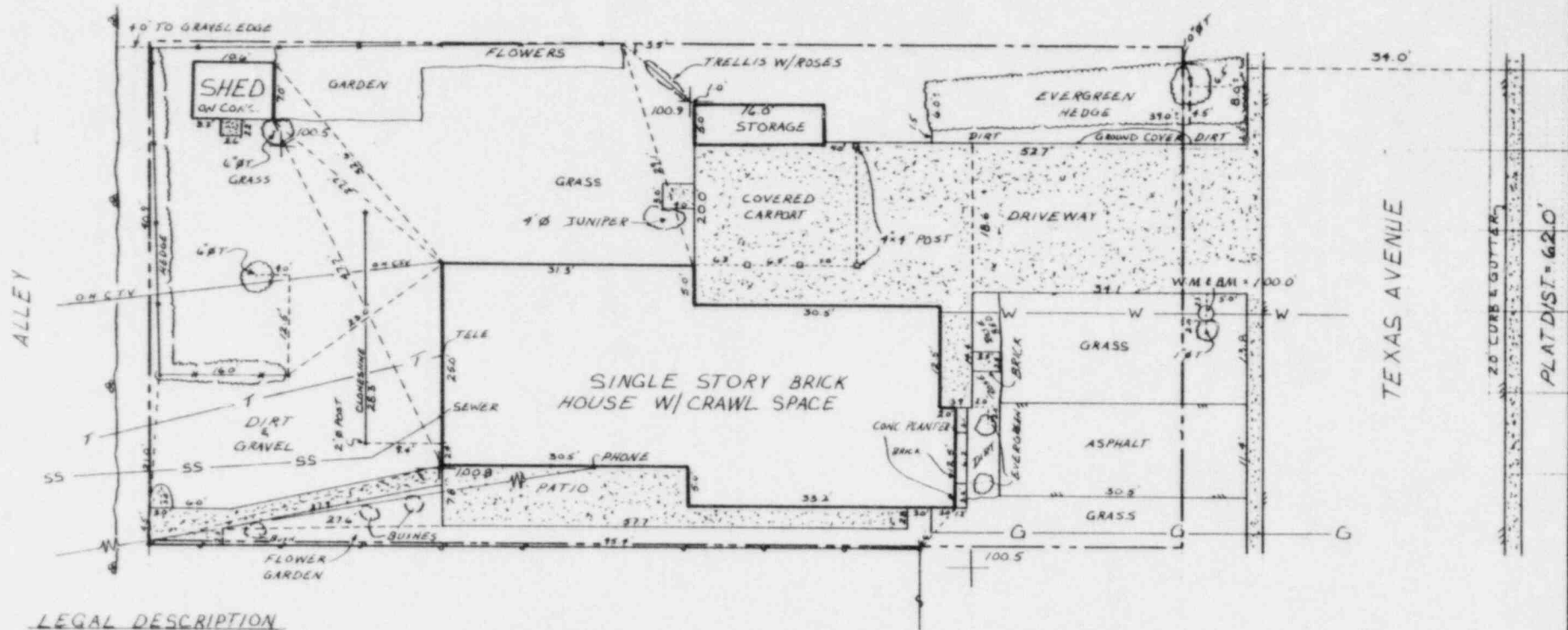
RR071885
REA04676/REA-703/AP



FIGURE 2.1
VICINITY MAP



PLAT DIST = 127.5'



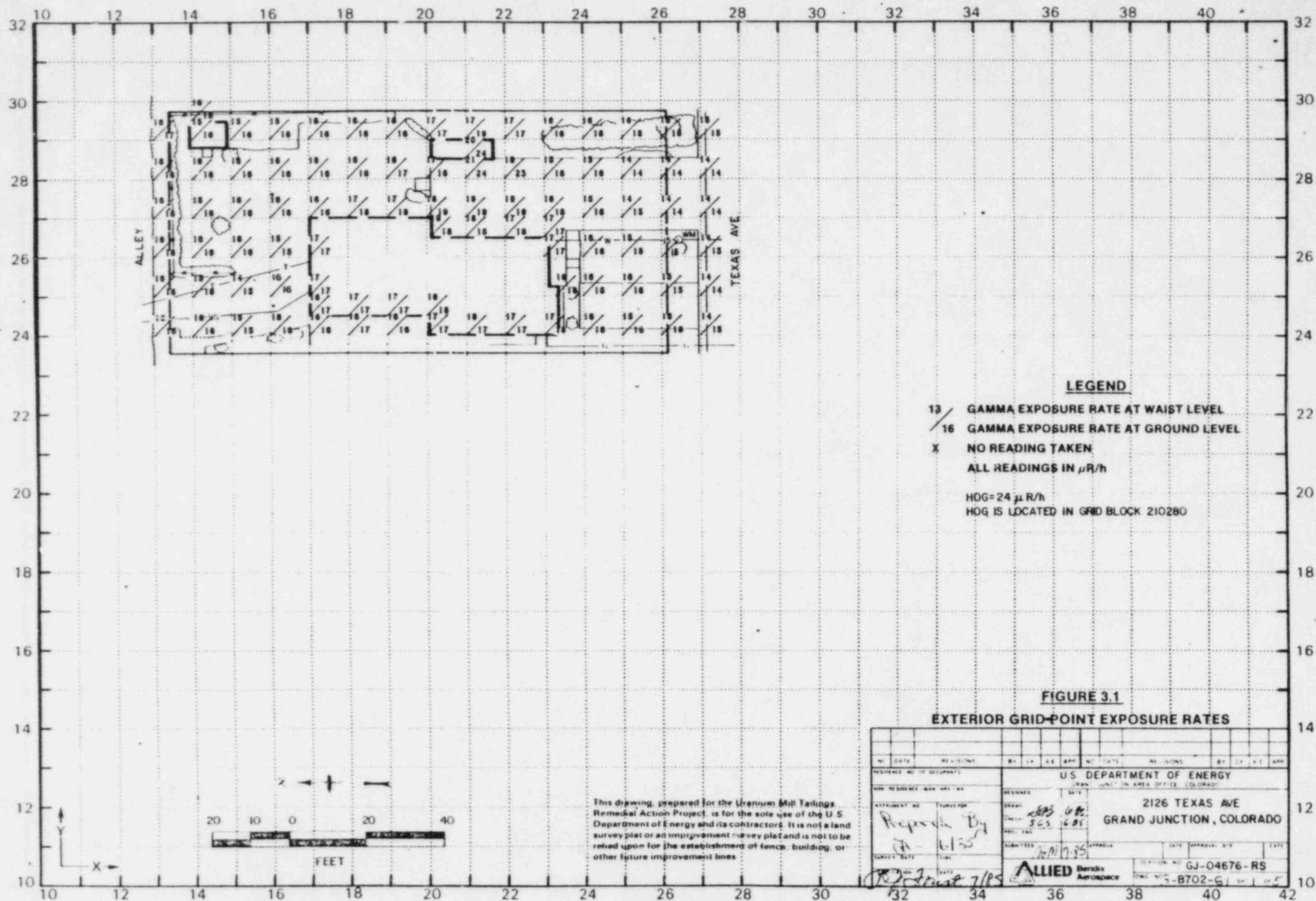
LEGAL DESCRIPTION
 LOT 4 BLOCK 1 OF THE
 VELVET LAWS SUBDIVISION
 GRAND JUNCTION CITY LIMITS
 MESA COUNTY, CO

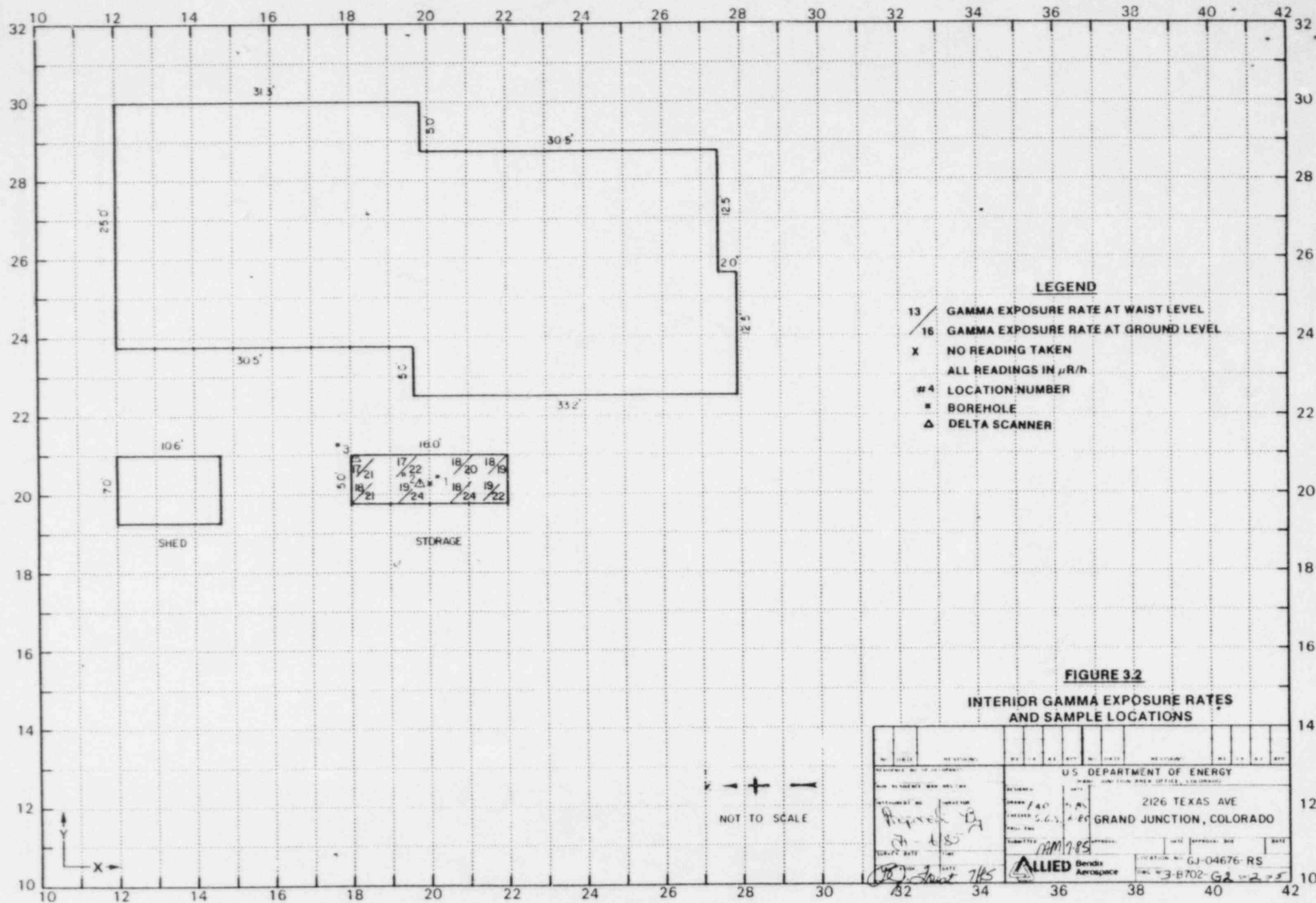


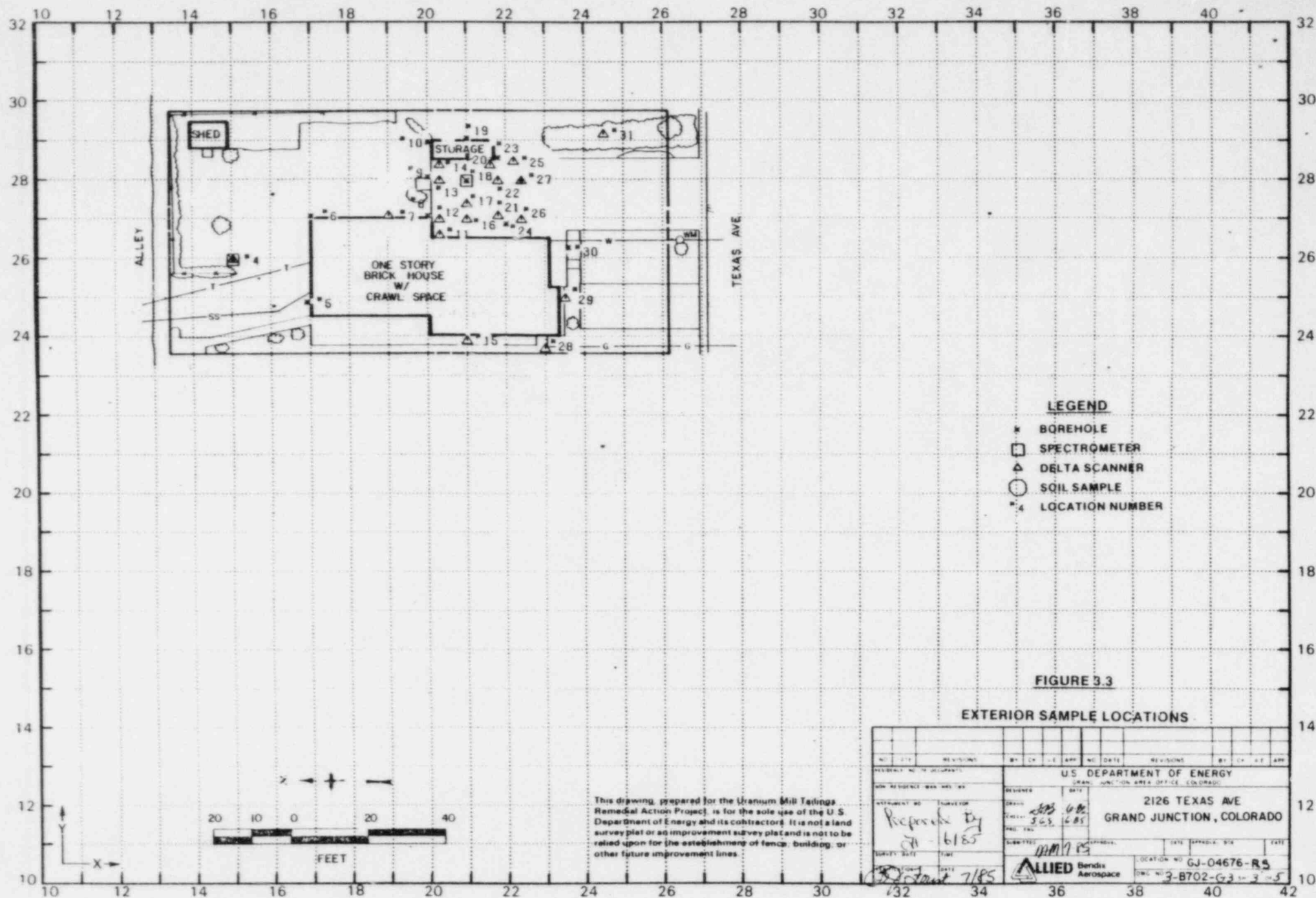
FIGURE 2.2 SITE PLAN

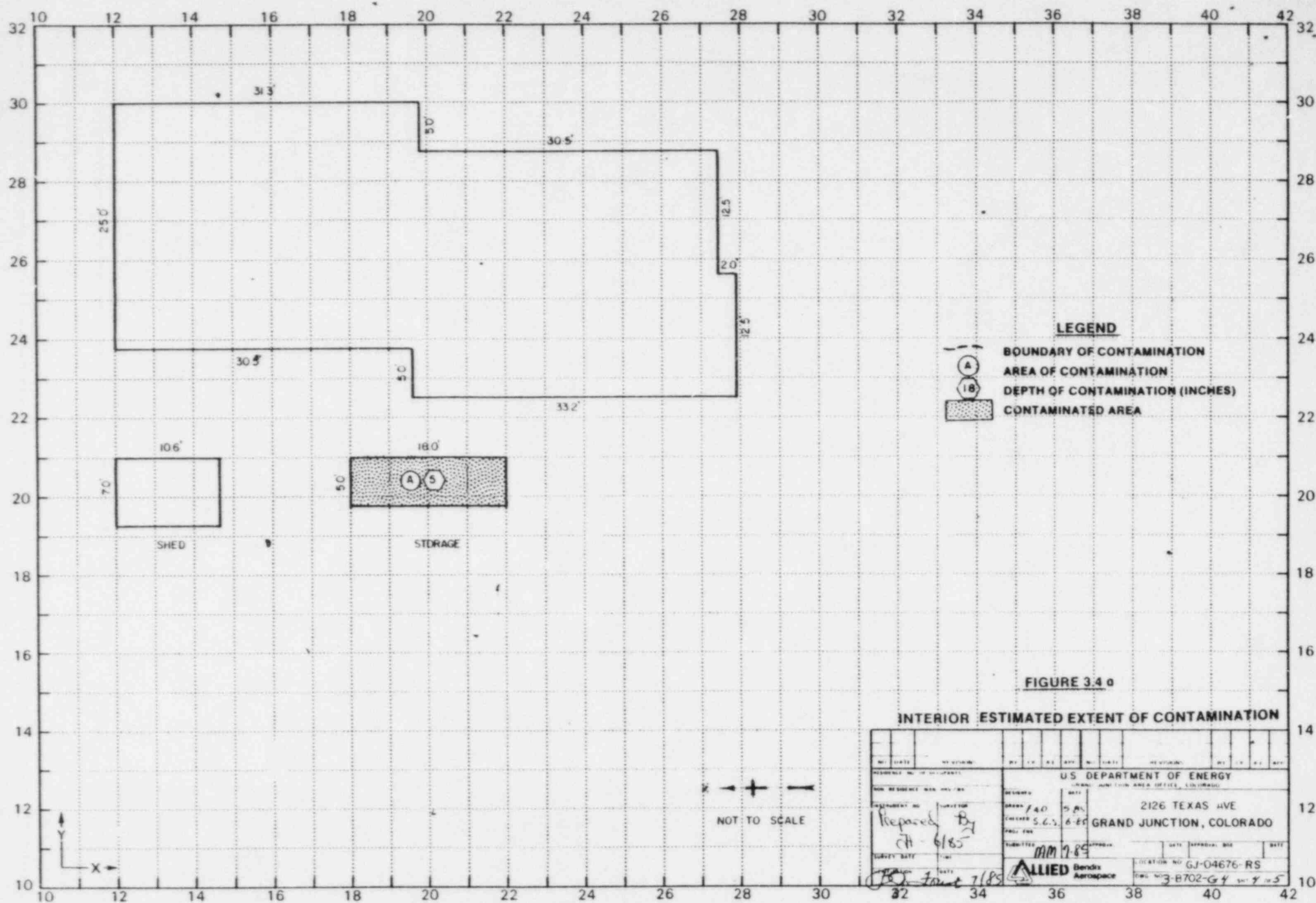
This drawing, prepared for the Uranium Mill Tailings Remedial Action Project, is for the sole use of the U.S. Department of Energy and its contractors. It is not a land survey plot or an improvement survey plot and is not to be relied upon for the establishment of lines, buildings, or other future improvement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

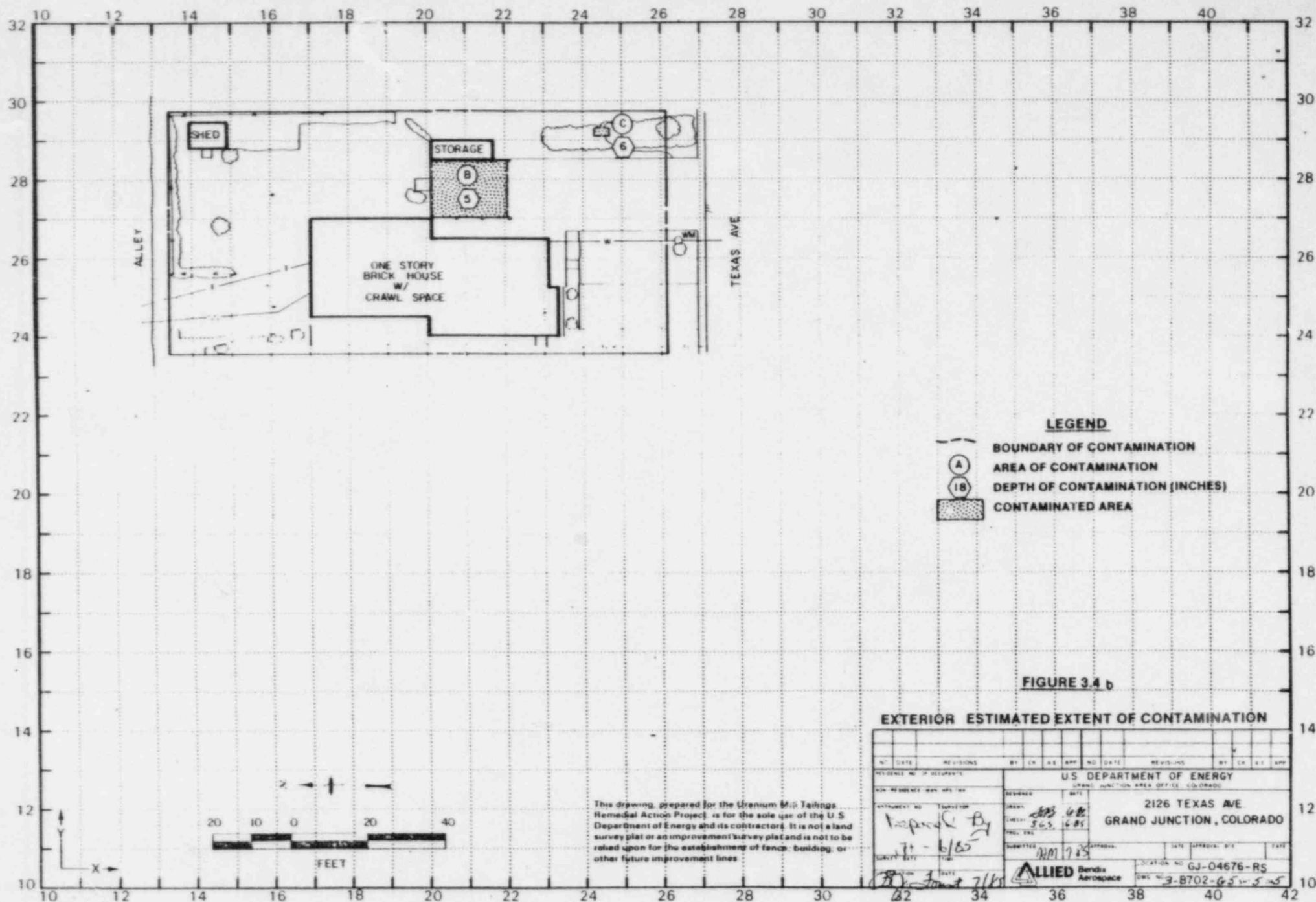
U.S. DEPARTMENT OF ENERGY GRAND JUNCTION PROJECT OFFICE, COLORADO		DOE D.N.O. GJ04676RS
ADDRESS 2126 TEXAS AVE. GRAND JUNCTION, CO		ALLIED ENGINEERING Grand Junction Operations
SURV. RLB 5-30-85	DRAFT AGJ 5-31-85	CR CHA 5-31-85
DRAWING NO. 3C-702-F1	SHEET 1 OF 1	











3/85

DOE ID NO. GJ-04676-RC

Date June 18, 1985

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

Official Survey Report

Property Address 2126 Texas Avenue Grand Junction Colorado

Property Owner Mr. & Mrs. Brown

Address of Owner (if different from above) ----

Report Prepared By Juna Hebel

I. PRESENCE/ABSENCE OF RESIDUAL RADIOACTIVE MATERIALS

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

1 XX 1 Residual radioactive materials found at the following locations:

1 XX 1 In open areas.

1 XX 1 Under or around exterior improvements.

1 XX 1 Under or around a typically nonoccupied structure.

1 XX 1 Under or around a typically occupied structure.

II. RESULTS OF RADIOLOGIC ASSESSMENT

1 1 Levels of radiation from residual radioactive materials, if any, do not exceed EPA Standards and no action is required under the Uranium Mill Tailings Remedial Action Project.

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

cc:

G. A. Franz, III, GJ/CDH

J. Themelis, Mgr. UMTRA Proj. Off.

HIG = 17 uR/h
HOG = 24 uR/h

MEMORANDUM

ALLIED Bendix
Aerospace

Bendix Field Engineering Corporation
Grand Junction Operations
Grand Junction, Colorado

Date: June 4, 1985

To: Files

From: Juna Hebel

Subject: *Juna Hebel*
Team Leader Notes - GJ-04676-RS

Address: 2126 Texas

Owner: Mr. and Mrs. Brown

Occupancy: Two

Telephone: 242-1831

Weather: Nice and sunny.

Date of Survey: June 4, 1985, 0730 hours.

Colorado Department of Health (CDH) and Oak Ridge National Laboratory (ORNL) data indicates contamination located in the yard, carport, and storage shed.

Team Members

J. Hebel (Team Leader)
R. Wilkins
M. Gilfillan
S. Southern

D. Dow
H. Mattison
R. Herman

Team Leader Notes
Juna Hebel
GJ-04676-RS
June 4, 1985
Page 2

Instruments

Scintillometers: C-1185, C-1020, C-1236, C-1247, C-1036, C-1169
Delta Scintillometers: C-3938, C-3935
Total Count Meters: C-4005, C-1062
Surface Spectrometers: C-3413
Downhole Spectrometers: C-0385

(C-1169 malfunctioned in the field, it was sent to the Electronics Laboratory. This instrument was not used).

The Bendix team members were met by Mr. and Mrs. Brown, approval to survey was verbally given.

The primary structure is made into two apartments. The Brown's live in the back apartment, the front apartment is empty.

Mr. Brown stated that he thought they purchased the house in approximately 1970.

The carport slab was already there when the house was purchased. The second slab (driveway) was put in approximately in 1975.

Mr. Brown showed the Bendix team members the access to the crawl space, which is located in the northwest section of the house (closet). An interior gamma survey was performed in this crawl space, no elevated readings were found.

A walking scan was performed in the shed, which is located in the northeast section of the property. No elevated readings were found.

Elevated measurements were found in the storage shed, adjacent to the carport. This area was further investigated by performing grid points and a (core/auger) hole in the concrete floor, which was logged with a total count meter. The concrete core is 5-inches thick.

On the exterior, the property was laid out in 10- by 10-foot grids. An exterior gamma scan and grid point exposure rates measurements were taken to verify or deny data taken by CDH and ORNL.

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Page 3

Instrument SC-1169 was used to start the gamma scan survey, after the first few grids it was noted that the instrument was acting wrong. The survey was stopped and a new instrument was used. The gamma scan was started over from the beginning. (C-1169 was sent to the Electronics Laboratory).

Elevated measurements were detected in the carport area east of the primary structure and in a small dirt area, northeast of the primary structure, underneath an evergreen hedge.

These areas were further investigated by deltas, downhole spectrometer measurements, and auger holes, and then logged with a total count meter.

In the carport and driveway, the concrete cores were 5-inches thick.

Utility lines were investigated by auger holes and then logged with a total count meter.

A surface and subsurface delta was performed over and on top of the gas line. No evidence of contamination was found around the utility.

No evidence of contamination was found around the primary structure of the foundation.

All work details and actions were performed in a safe manner. No accidents occurred while on the site.

The Bendix team members were frisked for possible contamination, none was found on persons.

Note: During remedial action, the sidewalk adjacent to the primary structure on the east side should be monitored closely. Also, the new concrete slab (driveway) adjacent to the carport slab should be monitored closely. From the data taken and gamma survey, no contamination was found or detected.

Team Leader Notes
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Page 4

Date: June 13, 1985, 1030 AM

Revisit

The purpose of the revisit was to gather more information.

Team Members

J. Hebel

Instruments

Delta Scintillometer: C-3940

Approval was given to gather more information from the owners,
Mr. and Mrs. Brown.

Delta surface measurements were taken on the carport slab, storage
shed slab, driveway, and the sidewalk, east of the primary
structure.

The purpose of these measurements was to confirm the data that was
taken on June 4, 1985.

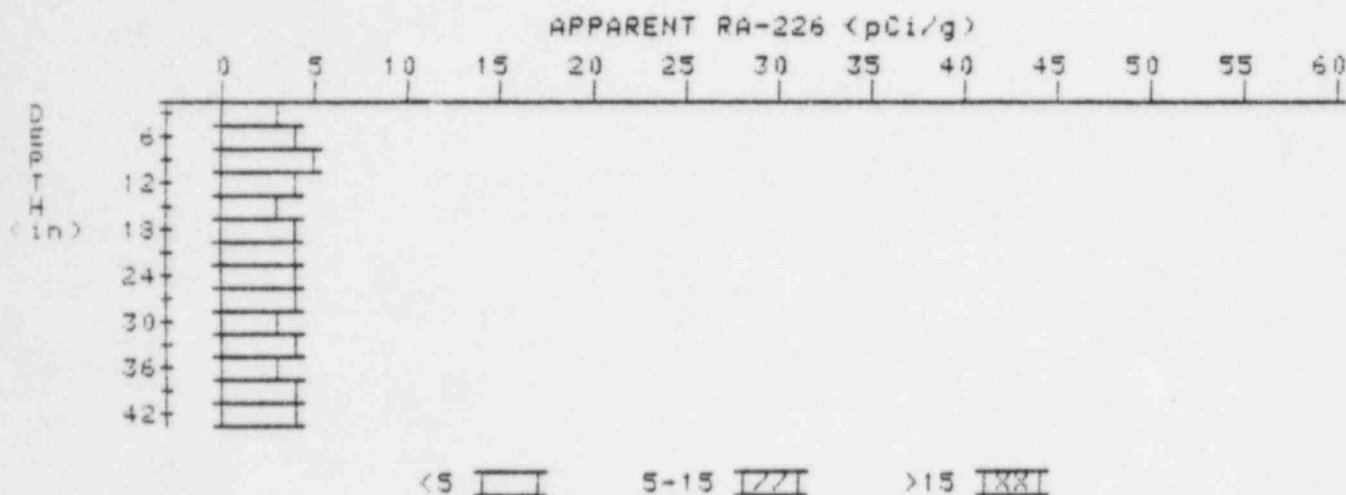
APPARENT RADIUM-226 CONCENTRATION DECONVOLUTION GRAPH

4

PROPERTY NUMBER: GJ-04676-R5

HOLE NUMBER: 4

LOCATION: 150260



Depth (in)	Apparent Radium-226 (pCi/g) Undeconvolved	Apparent Radium-226 (pCi/g) Deconvolved
3	3.1	3.1
6	3.6	4.0
9	3.9	4.6
12	3.8	3.8
15	3.7	3.3
18	3.8	4.0
21	3.8	3.8
24	3.8	4.0
27	3.7	3.7
30	3.6	3.4
33	3.6	3.8
36	3.8	3.3
39	3.8	3.8
42	3.8	3.8

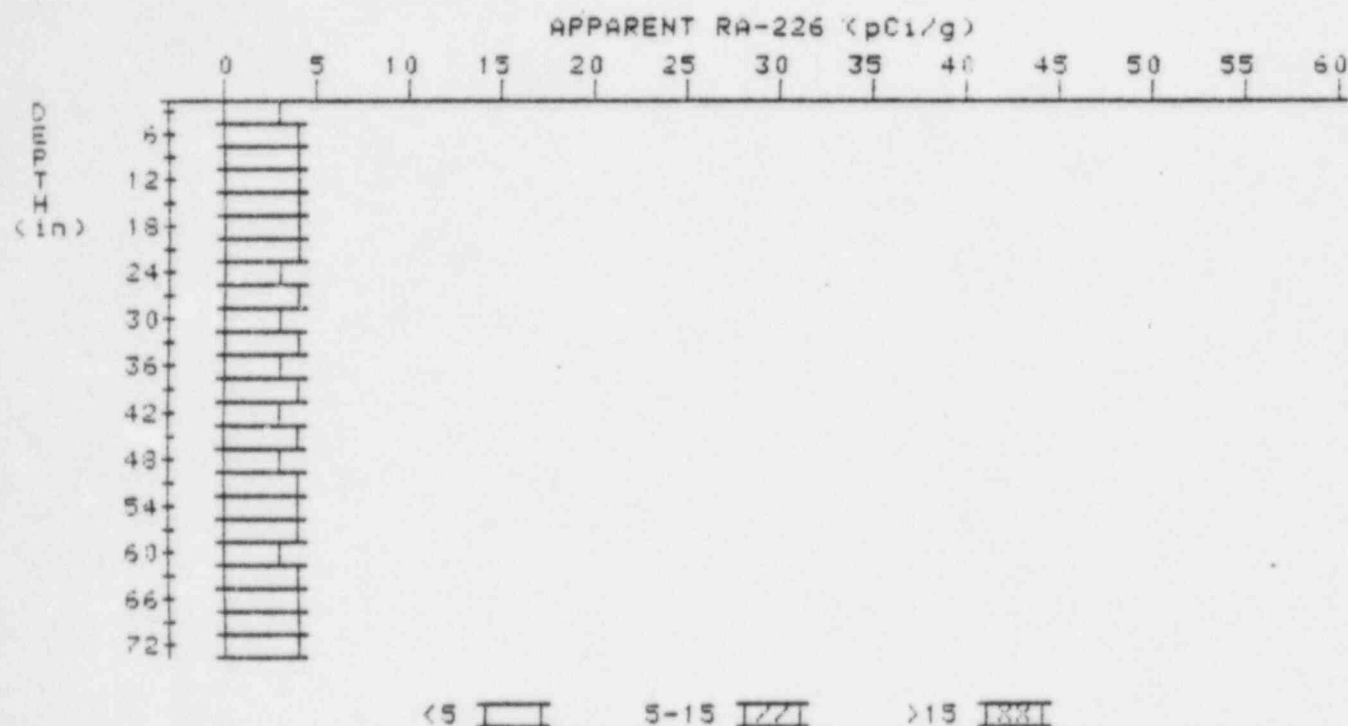
APPARENT RADIUM-226 CONCENTRATION DECONVOLUTION GRAPH

5

PROPERTY NUMBER: GJ-04676-RS

HOLE NUMBER: 5

LOCATION: 169249



Depth (in)	Apparent Radium-226 (pCi/g) Undeconvolved	Apparent Radium-226 (pCi/g) Deconvolved
3	3.3	3.3
6	3.5	3.7
9	3.6	3.6
12	3.7	3.9
15	3.7	3.7
18	3.7	3.7
21	3.7	3.9
24	3.6	3.2
27	3.7	4.1
30	3.5	3.2
33	3.7	4.1
36	3.6	3.4
39	3.5	3.3
42	3.5	3.1
45	3.6	4.0

48
51
54
57
60
63
66
69
72

3.5
3.6
3.6
3.6
3.6
3.7
3.7
3.7
3.6

3.1
3.6
3.6
3.6
3.4
3.9
3.7
3.9
3.6

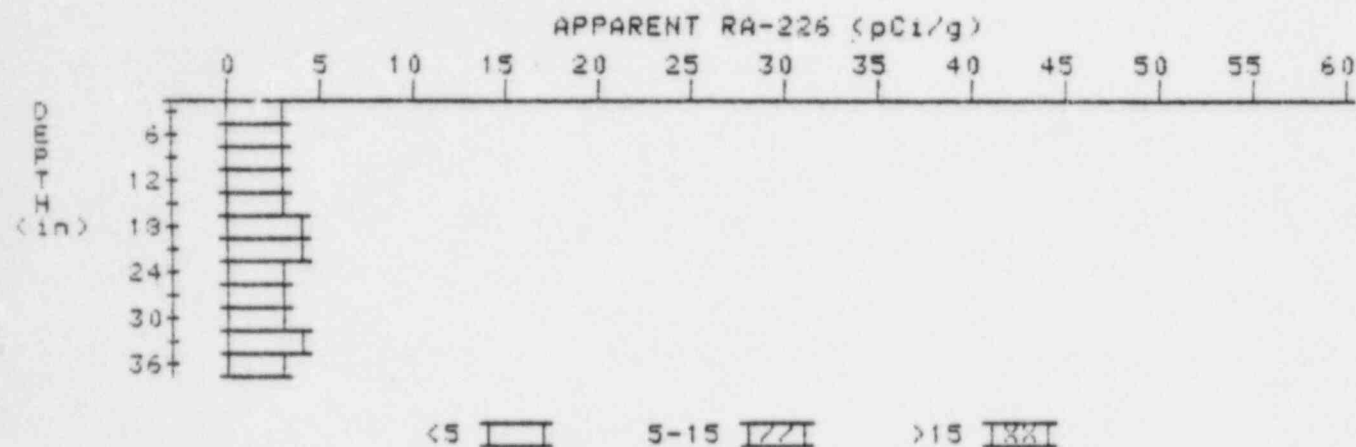
APPARENT RADIUM-226 CONCENTRATION DECONVOLUTION GRAPH

6

PROPERTY NUMBER: GJ-04676-RS

HOLE NUMBER: 6

LOCATION: 170271



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

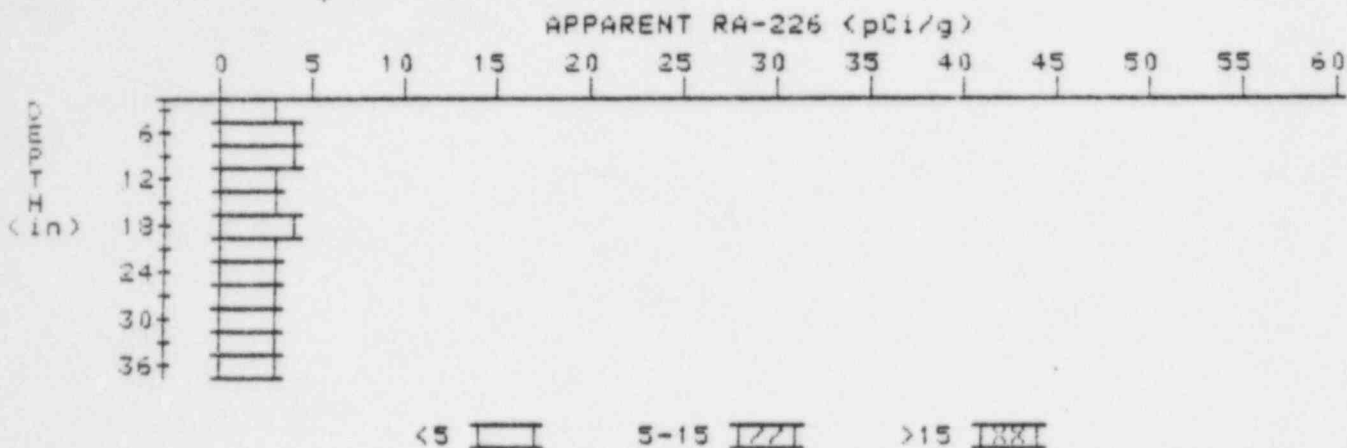
APPARENT RADIUM-226 CONCENTRATION DECONVOLUTION GRAPH

8

PROPERTY NUMBER: GJ-04676-RS

HOLE NUMBER: 8

LOCATION: 200271



Depth (in)	Apparent Radium-226 (pCi/g) Undeconvolved	Apparent Radium-226 (pCi/g) Deconvolved
3	3.4	3.4
6	3.6	4.1
9	3.5	3.5
12	3.4	3.2
15	3.4	3.4
18	3.4	3.6
21	3.3	3.1
24	3.3	3.5
27	3.2	3.2
30	3.1	3.1
33	3.0	2.8
36	3.0	3.0

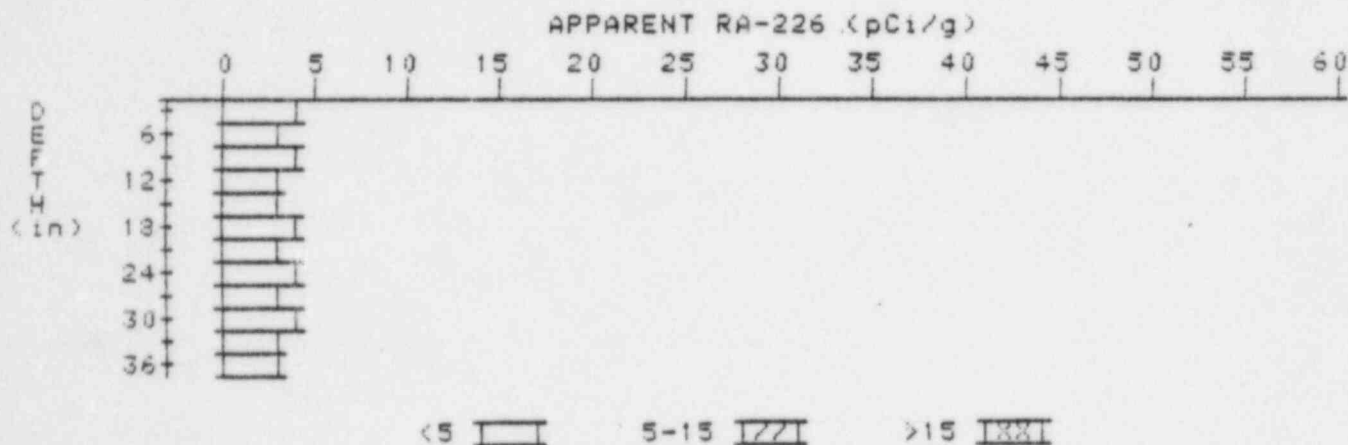
APPARENT RADIUM-226 CONCENTRATION DECONVOLUTION GRAPH

9

PROPERTY NUMBER: GJ-04676-RS

HOLE NUMBER: 9

LOCATION: 200291



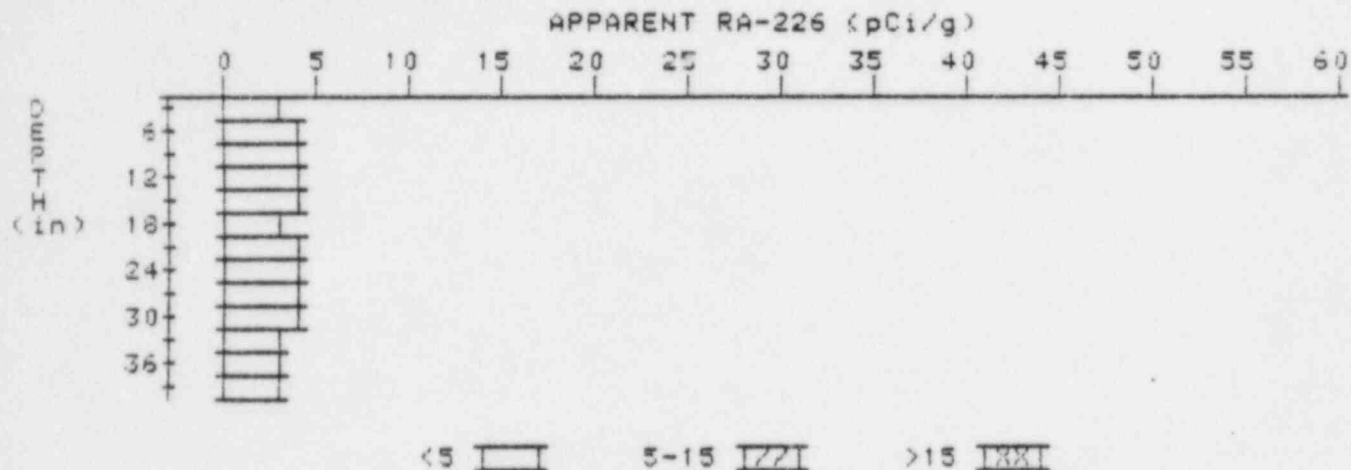
Depth (in)	Apparent Radium-226 (pCi/g) Undeconvolved	Apparent Radium-226 (pCi/g) Deconvolved
3	3.6	3.6
6	3.6	3.4
9	3.7	4.1
12	3.6	3.4
15	3.6	3.4
18	3.7	4.1
21	3.6	3.4
24	3.6	3.3
27	3.8	3.3
30	3.8	3.9
33	3.3	2.9
36	3.3	3.3

APPARENT RADIUM-226 CONCENTRATION 10 DECONVOLUTION GRAPH

PROPERTY NUMBER: GJ-04676-R3

HOLE NUMBER: 10

LOCATION: 200290



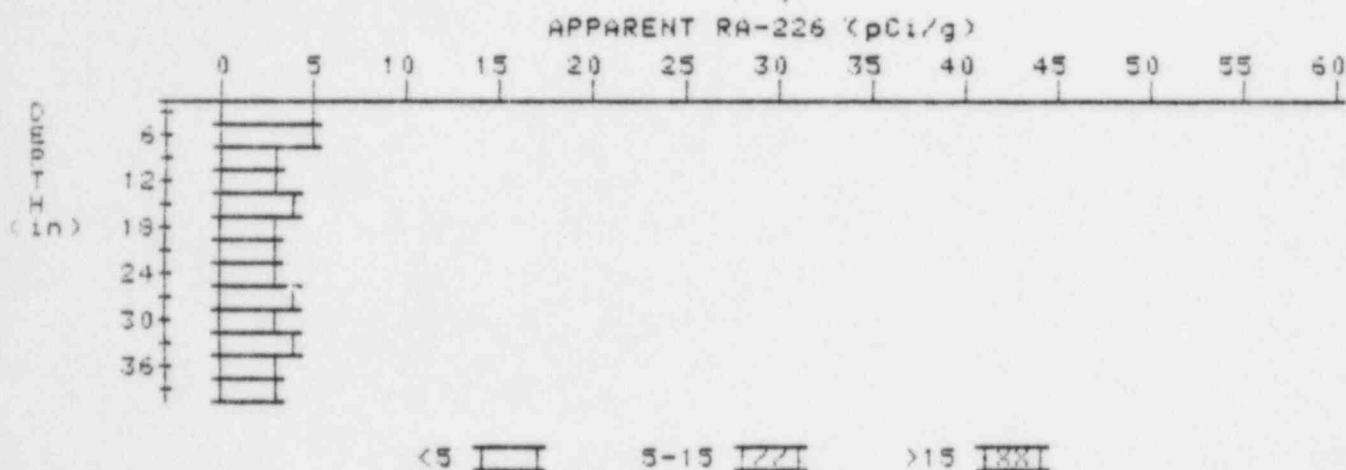
Depth (in)	Apparent Radium-226 (pCi/g) Undeconvolved	Apparent Radium-226 (pCi/g) Deconvolved
3	3.2	3.2
6	3.5	3.7
9	3.7	3.7
12	3.9	4.4
15	3.8	4.0
18	3.6	3.2
21	3.6	3.6
24	3.6	3.6
27	3.6	3.3
30	3.8	3.5
33	3.4	3.4
36	3.3	3.1
39	3.3	3.3

APPARENT RADIUM-226 CONCENTRATION 18 DECONVOLUTION GRAPH

PROPERTY NUMBER: GJ-04676-R5

HOLE NUMBER: 18

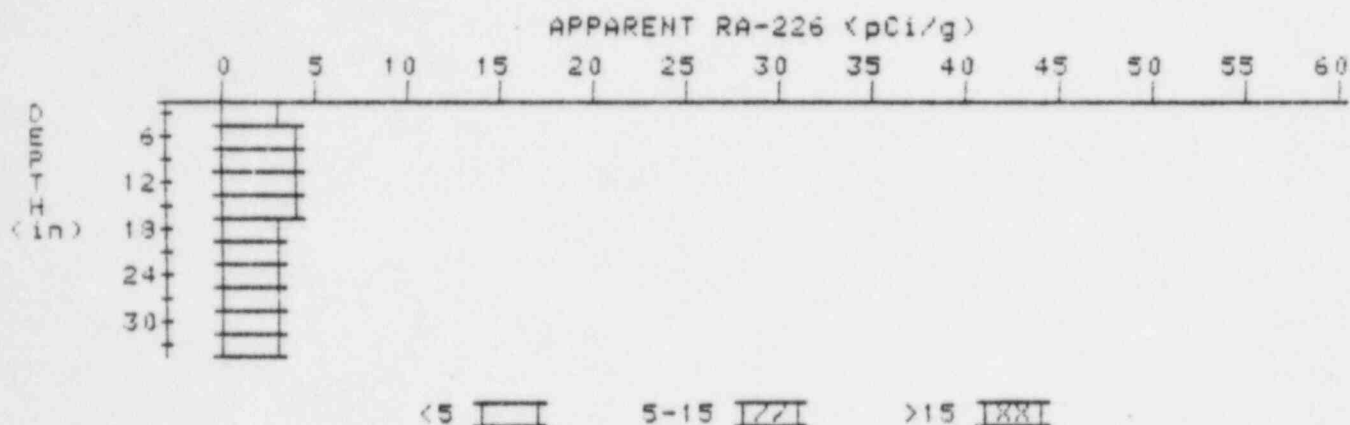
LOCATION: 210280



Depth (in)	Apparent Radium-226 (pCi/g) Undeconvolved	Apparent Radium-226 (pCi/g) Deconvolved
3	4.7	4.7
6	4.4	4.9
9	3.8	3.3
12	3.5	3.0
15	3.5	3.7
18	3.4	3.4
21	3.3	3.3
24	3.2	2.8
27	3.3	3.7
30	3.2	3.0
33	3.2	3.6
36	3.0	2.6
39	3.0	3.0

APPARENT RADIUM-226 CONCENTRATION 19 DECONVOLUTION GRAPH

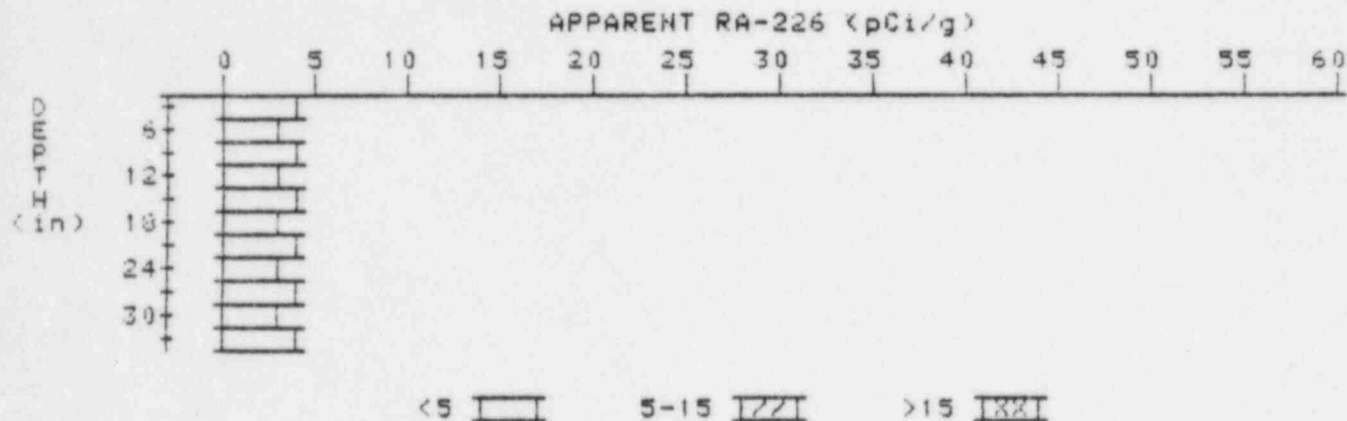
PROPERTY NUMBER: GJ-04676-RS
HOLE NUMBER: 19
LOCATION: 210291



Depth (in)	Apparent Radium-226 (pCi/g) Undeconvolved	Apparent Radium-226 (pCi/g) Deconvolved
3	3.4	3.4
6	3.5	3.5
9	3.6	3.8
12	3.6	3.8
15	3.5	3.5
18	3.4	3.4
21	3.3	3.3
24	3.2	3.0
27	3.2	3.4
30	3.1	2.9
33	3.1	3.1

APPARENT RADIUM-226 CONCENTRATION 23 DECONVOLUTION GRAPH

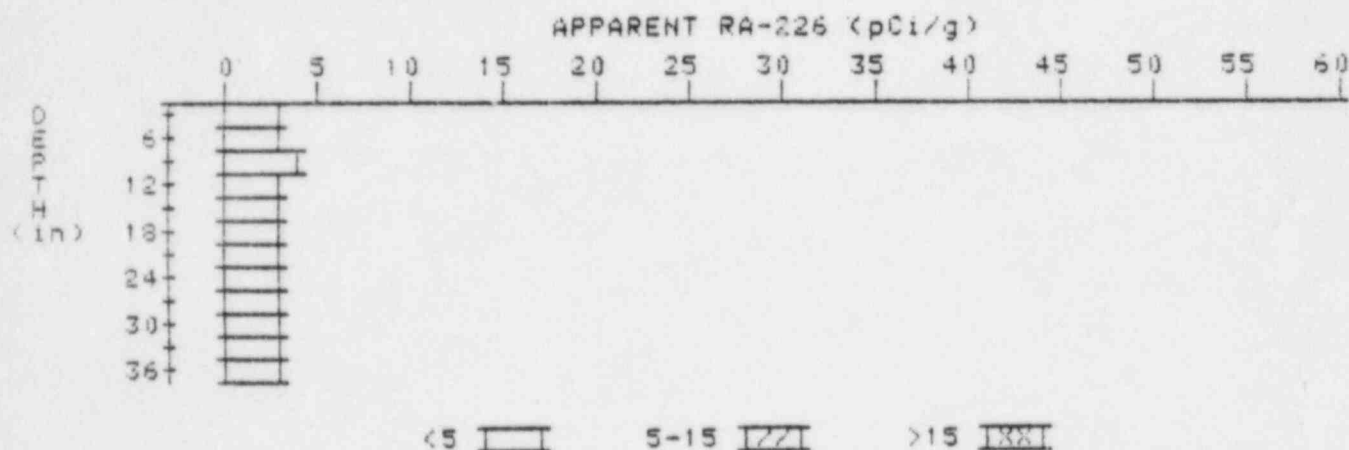
PROPERTY NUMBER: GJ-04676-RS
HOLE NUMBER: 23
LOCATION: 218286



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

APPARENT RADIUM-226 CONCENTRATION 24 DECONVOLUTION GRAPH

PROPERTY NUMBER: GJ-04676-RS
HOLE NUMBER: 24
LOCATION: 220269



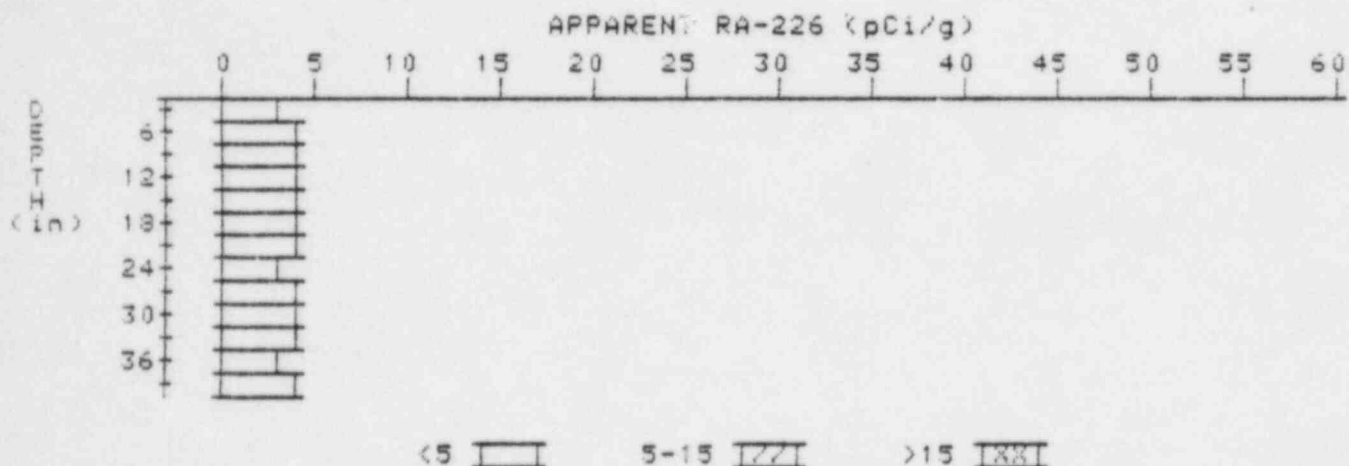
Depth (in)	Apparent Radium-226 (pCi/g) Undeconvolved	Apparent Radium-226 (pCi/g) Deconvolved
3	2.7	2.7
6	3.0	3.2
9	3.2	3.6
12	3.2	3.0
15	3.3	3.5
18	3.3	3.3
21	3.3	3.5
24	3.2	3.0
27	3.2	3.2
30	3.2	3.4
33	3.1	3.1
36	3.0	3.0

APPARENT RADIUM-226 CONCENTRATION 27 DECONVOLUTION GRAPH

PROPERTY NUMBER: GJ-04676-R5

HOLE NUMBER: 27

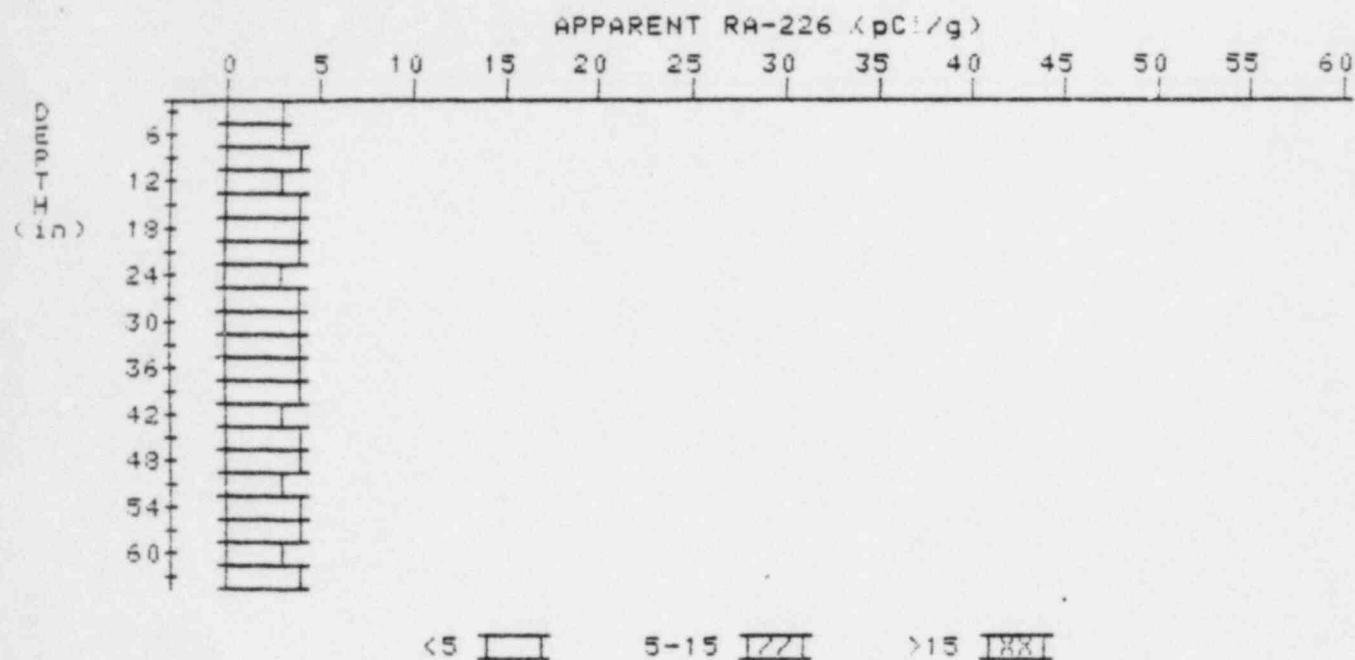
LOCATION: 224280



Depth (in)	Apparent Radium-226 (pCi/g) Undeconvolved	Apparent Radium-226 (pCi/g) Deconvolved
3	3.0	3.0
6	3.4	3.8
9	3.6	3.8
12	3.7	3.7
15	3.8	3.8
18	3.9	4.4
21	3.7	3.5
24	3.6	3.2
27	3.7	3.9
30	3.7	3.9
33	3.6	3.6
36	3.5	3.3
39	3.5	3.5

APPARENT RADIUM-226 CONCENTRATION 30 DECONVOLUTION GRAPH

PROPERTY NUMBER: GJ-04676-RS
HOLE NUMBER: 30
LOCATION: 236263



Depth (in)	Apparent Radium-226 (pCi/g) Undeconvolved	Apparent Radium-226 (pCi/g) Deconvolved
3	2.8	2.8
6	3.1	3.1
9	3.4	3.8
12	3.5	3.3
15	3.7	4.1
18	3.7	3.5
21	3.8	4.3
24	3.6	3.1
27	3.7	3.7
30	3.8	4.0
33	3.8	3.8
36	3.8	3.6
39	3.9	4.4
42	3.7	3.3
45	3.7	3.9
48	3.6	3.6
51	3.5	3.3

54
57
60
63

3.5
3.5
3.5
3.5

3.5
3.5
3.5
3.5

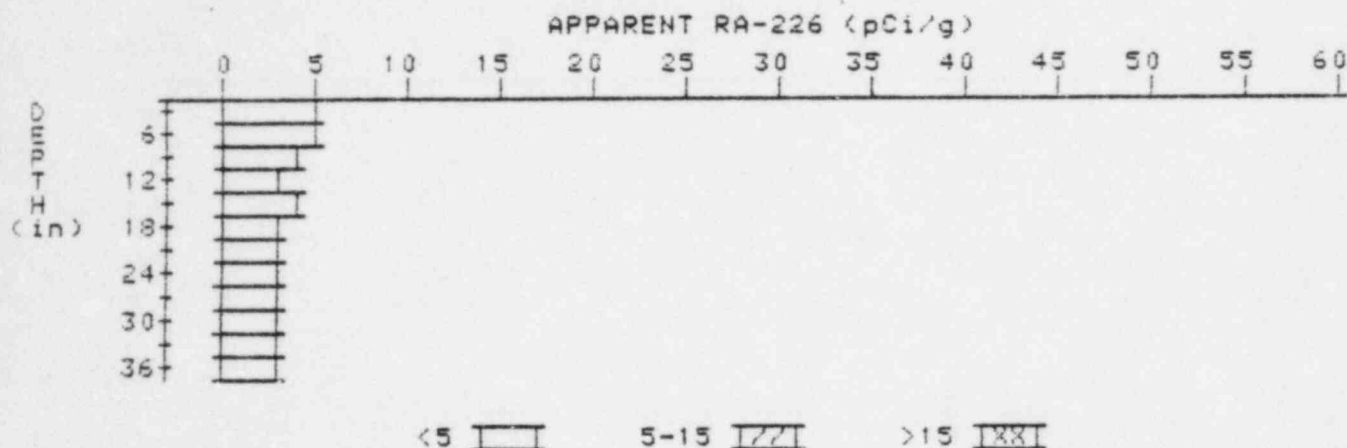
APPARENT RADIUM-226 CONCENTRATION DECONVOLUTION GRAPH

1

PROPERTY NUMBER: GJ-04676-RS

HOLE NUMBER: 1

LOCATION:



Depth (in)	Apparent Radium-226 (pCi/g) Undeconvolved	Apparent Radium-226 (pCi/g) Deconvolved
3	4.5	4.5
6	4.3	4.7
9	3.9	3.7
12	3.6	3.2
15	3.5	3.5
18	3.4	3.4
21	3.3	3.3
24	3.2	3.0
27	3.2	3.2
30	3.2	3.2
33	3.2	3.4
36	3.1	3.1

