RADIOLOGIC AND ENGINEERING ASSESSMENT

FOR

DOE ID NO.: GJ-01191-RS
ADDRESS: 715 HEMLOCK DRIVE

MAY 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 May 23, 1985

REA01191:REA-604

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1.0 EXECUTIVE SUMMARY

1.1 Introduction

The location, DOE ID No. GJ-01191-RS, is a single-family residence located at 715 Hemlock 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, 36 cu. yd.; interior, 8 cu. yd.

Estimated cost to perform remedial action, including dislocation when applicable, is $4,419. Remedial action on this property will take approximately 15 days to complete.

2.0 PROPERTY DESCRIPTION

2.1 General Description

Address: 715 Hemlock Drive, Grand Junction, Colorado 81506

Zoning: Residential (R-1-B)

Lot Size: Approximately 19,330 sf (0.4 acres)

Legal Description: Lot 14, Block 8, Sunset Terrace Replat, Section 35, 1N, 1W, County of Mesa, State of Colorado.

Point of Reference: This property is located approximately 4 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:	Heather Road
South:	Single-family residence
East:	Single-family residence
West:	Hemlock Drive

2.2 Existing Facilities and Structures

Primary Structure:

Type:	Single-story residence
Size:	Approximately 1,193 sf
Construction Date:	1964
Construction:	Wood-frame
Foundation:	Concrete stemwall on spread footing
Footing Depth:	Approximately 48" to bottom of footing from grade
Basement:	Yes (partial)
Crawl Space:	Yes (partial)
Condition:	Good

Other Structures:

Type:	Shed
Size:	Approximately 81 sf
Construction:	Pre-fabricated metal

Foundation:	None
Condition:	Good
Type:	Carport and shed
Size:	Approximately 460 sf
Construction:	Wood-frame
Foundation:	Slab-on-grade
Condition:	Good
General Remarks:	The property is well landscaped; the house is in good condition. 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-01191-RS on March 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 contamination is located under the shed, the carport, and down slope from the shed. Elevated gamma readings were also observed in the northeast corner of the living room.

The Bendix radiologic survey was designed to investigate the entire property, with emphasis on previously identified areas of contamination. Conclusions based upon data analyses are discussed in Section 3.5, Extent of Contamination. Photocopies of the Official Survey Report, Memo of Understanding, team leader notes, and deconvolution graphs are included in the Appendix (Section 6.0).

3.2 Gamma Exposure-Rate Surveys

3.2.1 Exterior Findings

Background Readings: 11 to 13 uR/h
Highest Outside Gamma Reading (HOG): 135 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: 12 to 14 uR/h
Highest Inside Gamma Reading (HIG): 19 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, 3.3b, and 3.3c 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, 3.3b, 3.3c, and 3.4. 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 3.5a 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 4-inch-thick uncontaminated concrete slab in the wooden storage shed is underlain by contamination. The total depth of contamination is 30 inches (approximately 80 sf).

(AREA B) The soil in the lawn, northeast of the wooden storage shed, is contaminated to a depth of 12 inches (approximately 638 sf).

(AREA C) Northeast of the driveway, the lawn is contaminated to a depth of 18 inches (approximately 50 sf).

(AREA D) The 4-inch-thick concrete driveway adjacent to the southwest side of the wooden storage shed is contaminated. The total depth of contamination is 18 inches. The concrete is not contaminated (approximately 66 sf).

(AREA E) There is a spot of contamination in the planter adjacent to the northwest side of the primary structure. The depth of contamination is 6 inches (approximately 15 sf).

(AREA F) Adjacent to the northeast side of the wooden storage shed, a strip of contamination in the lawn extends to a depth of 18 inches (approximately 48 sf).

(AREA G) There is contamination to a depth of 6 inches in the lawn northeast of the wooden storage shed (approximately 84 sf).

4.0 RECOMMENDED REMEDIAL ACTION

4.1 Decontamination and Restoration

The recommended remedial action for this property, DOE ID No. GJ-01191-RS, includes removal of all areas identified as containing radioactive material (as discussed in Section 3.5 and shown in Appendix Figures 3.5a and 3.5b) and transport of removed material to the disposal site.

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

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

4.2 Evaluation of Recommended Remedial Action

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

Estimated cost of remedial action is $4,419.

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

There is no owner preference with respect to remedial action and no legal or other complications are foreseen at this time.

5.0 REFERENCES

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

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

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

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

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

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

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

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

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

6.0 APPENDIX

This Appendix contains the following:

Appendix Tables:

Table 3.1	Radium Concentrations at Exterior Locations
Table 3.2	Radium Concentrations at Interior Locations
Table 3.3	Summary of Interior Gamma Exposure Rates
Table 4.1	Area and Volume Calculations
Table 4.2	Estimated Cost of Decontamination and Restoration

Appendix Figures:

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

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

RADRPT V85.1<850225.1330> Table 3.1

Radium Concentrations at Exterior Locations

DOE ID #GJ-01191-RS 715 Hemlock Drive

Loc #	Grid Location	Depth (in.)	Meas. Type	In Situ Ra-226 (pCi/g) Tot. Ct	Spectr.	Chem Ra-226 (pCi/g)	Comments
7	160240	00	DS	14.6		*	North of carport
		03	TC	12.0		*	DC = 12 inches
		06	TC	10.6		*	Based on the
		09	TC	8.1		*	deconvolution graph
		12	TC	6.5		*	
		15	TC	5.5		*	
		18	TC	4.9		*	
		21	TC	4.6		*	
		24	TC	4.3		*	
		27	TC	4.2		*	
		30	TC	4.0		*	
		33	TC	3.8		*	
		36	TC	3.8		*	
		39	TC	3.8		*	
		42	TC	3.9		*	
		45	TC	4.2		*	
		48	TC	4.3		*	
		51	TC	4.5		*	
		54	TC	4.6		*	
8	161228	00	DS	19.4		*	Visible tailings
		12	DS	7.1		*	at 6 inches
		18	DS	1.1		*	DC = 18 inches
9	165247	00	DS	1.7		*	North of house
		06	DS	2.1		*	DC = 0 inches
		00-06	SS			2.5	
10	168225	00	DS	1.8		*	Driveway slab DC = 0 inches
11	169229	00	DS	3.2		*	North side of shed
		00-06	SS			2.8	DC = 0 inches
		03	TC	5.0		*	
		06	TC	5.4		*	
		09	TC	5.6		*	
		12	TC	5.7		*	
		15	TC	5.5		*	
		18	TC	5.3		*	
		21	TC	5.3		*	
		24	TC	5.2		*	
		27	TC	5.1		*	
		30	TC	4.8		*	

Loc #	Grid Location	Depth (in.)	Meas. Type	In Situ Ra-226 (pCi/g) Tot. Ct	Spectr.	Chem Ra-226 (pCi/g)	Comments
11	169229	33	TC	4.8		*	
		36	TC	4.6		*	
		39	TC	4.5		*	
		42	TC	4.2		*	
		45	TC	4.2		*	
		48	TC	4.0		*	
		51	TC	4.1		*	
		54	TC	4.3		*	
		57	TC	4.4		*	
		60	TC	4.5		*	
		63	TC	4.6		*	
		66	TC	4.5		*	
		69	TC	4.5		*	
		72	TC	4.4		*	
		75	TC	4.4		*	
		78	TC	4.5		*	
		81	TC	4.4		*	
		84	TC	4.6		*	
		87	TC	4.7		*	
12	170243	00	DS	8.5		*	Northeast of the
		06	DS	7.1		*	storage shed
		12	DS	2.6		*	DC = 12 inches
		18	DS	2.5		*	
		24	DS	2.1		*	
13	170257	03	TC	5.5		*	Northeast yard
		06	TC	6.3		*	DC = 12 inches
		09	TC	6.2		*	Based on the
		12	TC	5.5		*	deconvolution graph
		15	TC	4.8		*	
		18	TC	4.4		*	
		21	TC	4.5		*	
		24	TC	4.5		*	
		27	TC	4.8		*	
		30	TC	4.9		*	
		33	TC	4.7		*	
14	175165	00	DS	1.2		*	Leach field
		06	DS	1.3		*	DC = 0 inches
		18	DS	1.2		*	

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
15	176246	00	DS	6.9		*	Northeast of
		06	DS	3.4		*	driveway
		12	DS	2.4		*	DC = 12 inches
		18	DS	1.2		*	
16	180215	00	DS	1.7		*	Carport slab
							DC = 0 inches
17	180235	00	DS	1.8		*	Northeast of
		03	TC	3.8		*	carport
		06	TC	3.9		*	DC = 0 inches
		09	TC	4.1		*	
		12	TC	4.2		*	
		15	TC	4.3		*	
		18	TC	4.4		*	
		21	TC	4.4		*	
		24	TC	4.6		*	
		27	TC	4.5		*	
		30	TC	4.4		*	
		33	TC	4.3		*	
		36	TC	4.1		*	
		39	TC	4.0		*	
		42	TC	3.8		*	
		45	TC	3.7		*	
		48	TC	3.8		*	
		51	TC	3.8		*	
		54	TC	4.0		*	
		57	TC	4.1		*	
		60	TC	4.1		*	
		63	TC	4.3		*	
18	182224	00	DS	10.1		*	Carport slab
		00-04	SS			1.1	Concrete core
		04-10	SS			28.7	Soil under core
		03	TC	14.9		*	DC = 18 inches
		06	TC	21.8		*	Based on graphic
		09	TC	20.3		*	analysis
		12	TC	15.5		*	
		15	TC	12.9		*	
		18	TC	11.3		*	
		21	TC	10.1		*	
		24	TC	8.8		*	
		27	TC	8.0		*	

Loc #	Grid Location	Depth (in.)	Meas. Type	In Situ Ra-226 (pCi/g) Tot. Ct	Spectr.	Chem Ra-226 (pCi/g)	Comments
18	182224	30	TC	7.6		*	
		33	TC	7.1		*	
		36	TC	6.7		*	
		39	TC	6.3		*	
		42	TC	6.0		*	
		45	TC	5.7		*	
		48	TC	5.6		*	
		51	TC	5.4		*	
		54	TC	5.3		*	
		57	TC	5.3		*	
		60	TC	5.2		*	
		63	TC	5.0		*	
		66	TC	4.8		*	
		69	TC	4.7		*	
		72	TC	4.6		*	
		75	TC	4.5		*	
		78	TC	4.6		*	
19	182236	00	DS	3.1		*	Northeast of the
		06	DS	2.4		*	storage shed
		12	DS	1.9		*	DC = 6 inches
20	185283	03	TC	3.1		*	Water meter
		06	TC	3.5		*	DC = 0 inches
		09	TC	3.9		*	
		12	TC	4.1		*	
		15	TC	4.1		*	
		18	TC	4.1		*	
		21	TC	4.0		*	
		24	TC	4.1		*	
		27	TC	4.1		*	
21	188231	00	DS	15.6		*	Water line
		03	TC	16.1		*	DC = 18 inches
		06	TC	19.4		*	Based on the
		09	TC	18.0		*	deconvolution graph
		12	TC	14.2		*	
		15	TC	10.8		*	
		18	TC	8.6		*	
		21	TC	7.3		*	
		24	TC	6.5		*	
		27	TC	6.1		*	

Loc #	Grid Location	Depth (in.)	Meas. Type	In Situ Ra-226 (pCi/g) Tot. Ct	Spectr.	Chem Ra-226 (pCi/g)	Comments
21	188231	30	TC	5.7		*	
		33	TC	5.4		*	
		36	TC	5.0		*	
		39	TC	4.8		*	
		42	TC	4.4		*	
		45	TC	4.4		*	
		48	TC	4.3		*	
		51	TC	4.2		*	
		54	TC	4.2		*	
		57	TC	4.3		*	
		60	TC	4.3		*	
		63	TC	4.3		*	
22	191210	00	DS	3.0		*	Front planter
		06	DS	1.4		*	DC = 6 inches
		00-06	SS			4.2	
23	191229	00	DS	4.1		*	
24	192167	00	DS	1.0		*	Septic tank
		00-06	SS			1.7	Background
		03	TC	3.2		*	DC = 0 inches
		06	TC	3.6		*	
		09	TC	3.8		*	
		12	TC	4.0		*	
		15	TC	4.0		*	
		18	TC	4.0		*	
		21	TC	4.0		*	
		24	TC	4.1		*	
		27	TC	4.1		*	
		30	TC	4.1		*	
		33	TC	4.1		*	
		36	TC	4.1		*	
		39	TC	4.1		*	
		42	TC	4.1		*	
		45	TC	4.1		*	
		48	TC	4.2		*	
		51	TC	4.1		*	
		54	TC	4.1		*	
		57	TC	4.2		*	
		60	TC	4.2		*	
25	192220	00	DS	1.7		*	DC = 0 inches

Loc #	Grid Location	Depth (in.)	Meas. Type	In Situ Ra-226 (pCi/g) Tot. Ct	Spectr.	Chem Ra-226 (pCi/g)	Comments
26	198236	03	TC	3.4		*	Sewer line
		06	TC	3.8		*	DC = 0 inches
		09	TC	4.0		*	
		12	TC	4.2		*	
		15	TC	4.3		*	
		18	TC	4.3		*	
		21	TC	4.4		*	
		24	TC	4.3		*	
		27	TC	4.3		*	
		30	TC	4.2		*	
		33	TC	4.1		*	
		36	TC	3.9		*	
		39	TC	3.8		*	
		42	TC	3.7		*	
		45	TC	3.6		*	
		48	TC	3.7		*	
		51	TC	3.7		*	
		54	TC	3.8		*	
		57	TC	4.0		*	
27	221180	00	DS	1.4		*	Electrical line
		18	DS	1.0		*	DC = 0 inches
28	221227	00	DS	1.4		*	Gas line
		24	DS	1.7		*	DC = 0 inches
		00-06	SS			1.9	
29	221228	00	DS	1.3		*	Northeast of house DC = 0 inches

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 = 03-19-85
Team Leader = TC

RADRPT V85,1<850225,1330> Table 5.2

Radium Concentrations at Interior Locations

DOE ID #GJ-01191-RS 715 Hemlock 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	2.1		*	Basement
2		00	DS	<1.0		*	Crawl space Sewer line
3		00	DS	<1.0		*	Crawl space
4		00	DS	1.2		*	Kitchen
5		00	DS	1.2		*	Living room
6		00	DS	56.6		*	Inside wooden shed
		00-04	SS			3.5	Concrete core
		04-10	SS			227.8	DC = 30 inches
		03	TC	91.3		*	Based on the
		06	TC	121.1		*	deconvolution graph
		09	TC	134.0		*	
		12	TC	137.6		*	
		15	TC	135.0		*	
		18	TC	126.0		*	
		21	TC	108.9		*	
		24	TC	81.1		*	
		27	TC	51.8		*	
		30	TC	29.3		*	
		33	TC	18.8		*	
		36	TC	14.1		*	
		39	TC	11.5		*	
		42	TC	9.3		*	
		45	TC	7.9		*	
		48	TC	7.0		*	
		51	TC	6.5		*	
		54	TC	6.0		*	
		57	TC	5.9		*	
		60	TC	5.8		*	
		63	TC	5.7		*	
		66	TC	5.5		*	
		69	TC	5.5		*	
		72	TC	5.6		*	

Measurement Types: DS = Delta Scintillometer; TC = Total Count Borehole; SS = Soil Sample

Notes: DC = Depth of Contamination; * = No Soil Sample Taken; Date of Survey = 03-19-85; TC = Team Leader

Table 3.3
Summary of Interior Gamma Exposure Rates
DOE ID No. GJ-01191-RS 715 Hemlock 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)
BASEMENT	01	13	13	01	16	16
CRAWL SPACE	00	-	-	13	14-17	16
ROOM A	08	13-16	14	07	13-15	14
ROOM B	01	12-12	12	01	13-13	13
ROOM C	03	13-19	15	03	14-17	15
ROOM D	06	12-16	14	05	13-15	14
ROOM E	04	12-13	12	04	13-13	13
ROOM F	06	13-16	14	05	13-15	13
ROOM G	06	13-19	15	06	13-19	15
WOODEN SHED	03	22-29	25	03	52-69	58
METAL SHED	02	08-08	08	02	08-08	02
CHICKEN COOP	01	11-11	11	01	12-12	12

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

Table 4.1
Area and Volume Calculations
DOE ID No. GJ-01191-RS

AREA	CALCULATIONS(ft)		SF		DEPTH(ft)		CF				CUBIC YARDS
INTERIOR											
	Concrete										
A	20 x 4	=	80	x	0.3	=	24				
		VOLUME OF CONCRETE				=	24	=	24/27	=	1
	Tailings										
A	20 x 4	=	80	x	2.2	=	176				
		VOLUME OF TAILINGS				=	176	=	176/27	=	7
		TOTAL VOLUME - INTERIOR								=	8
EXTERIOR											
	Concrete										
D	20 x 9	=	180								
	5 x 6	=	30								
			210	x	0.3	=	63				
		VOLUME OF CONCRETE					63	=	63/27	=	2
	Tailings										
B	22 x 29	=	638	x	1.0	=	638				
C	10 x 5	=	50	x	1.5	=	75				
D	22 x 3	=	66	x	1.2	=	79				
E	3 x 5	=	15	x	0.5	=	8				

Table 4.1
Area and Volume Calculations
DOE ID No. GJ-01191-RS

AREA	CALCULATIONS(ft)		SF		DEPTH(ft)		CF				CUBIC YARDS
F	24 x 2	=	48	x	1.5	=	72				
G	12 x 7	=	84	x	0.5	=	42				
		VOLUME OF TAILINGS				=	914	=	914/27	=	34
	TOTAL VOLUME - EXTERIOR					=		=			36

See Appendix Figure 3.5a and 3.5b For Areas

Table 4.2
Estimated Cost of Decontamination and Restoration
DOE ID No. GJ-01191-RS Page 1 of 2

INTERIOR		
Remove identified residual radioactive material		
7 cy @ $44/cy (manual-open)	$	308
Remove/replace concrete		
80 sf @ $3/sf		240
Shore wood-frame		
48 lf @ $3/lf		144
Replace compacted roadbase		
7 cy @ $11.50/cy		81
TOTAL VOLUME INTERIOR	$	773
EXTERIOR		
Remove identified residual radioactive material		
31 cy @ $14.50/cy (machine-open)	$	450
3 cy @ $44/cy (manual-open)		132
Remove/replace concrete		
210 sf @ $3/sf		630
Replace compacted roadbase		
4 cy @ $11.50/cy		46
Replace water-settled topsoil		
30 cy @ $9.50/cy		285
Replace sod		
820 sf @ $.30/sf		246
Replace indoor/outdoor carpet		
114 sf @ $1/sf		114
Saw-cut concrete slab		
20 lf @ $1.50/lf		30
TOTAL VOLUME EXTERIOR	$	1,933

Table 4.2
Estimated Cost of Decontamination and Restoration
DOE ID No. GJ-01191-RS Page 2 of 2

TOTAL EXTERIOR	$ 1,933
TOTAL INTERIOR	773
ACCESS CONTROL	250
SUBTOTAL	$ 2,956
CONTINGENCY @ 15%	443
SUBTOTAL	$ 3,399
CONTRACTOR OVERHEAD & PROFIT @ 30%	1,020
GRAND TOTAL	$ 4,419

LR051785
REA01191/REA-604/LMR

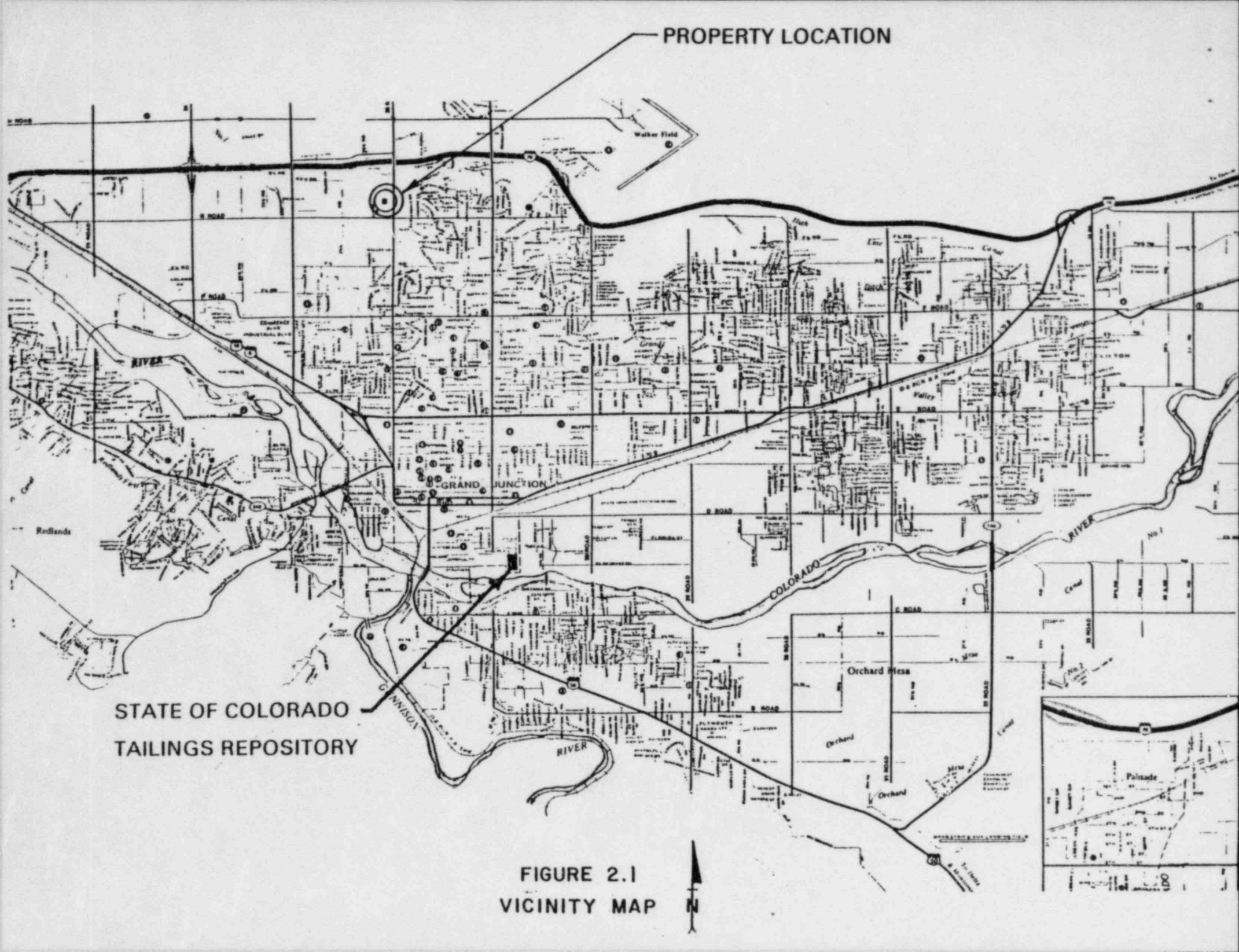


FIGURE 2.1
VICINITY MAP

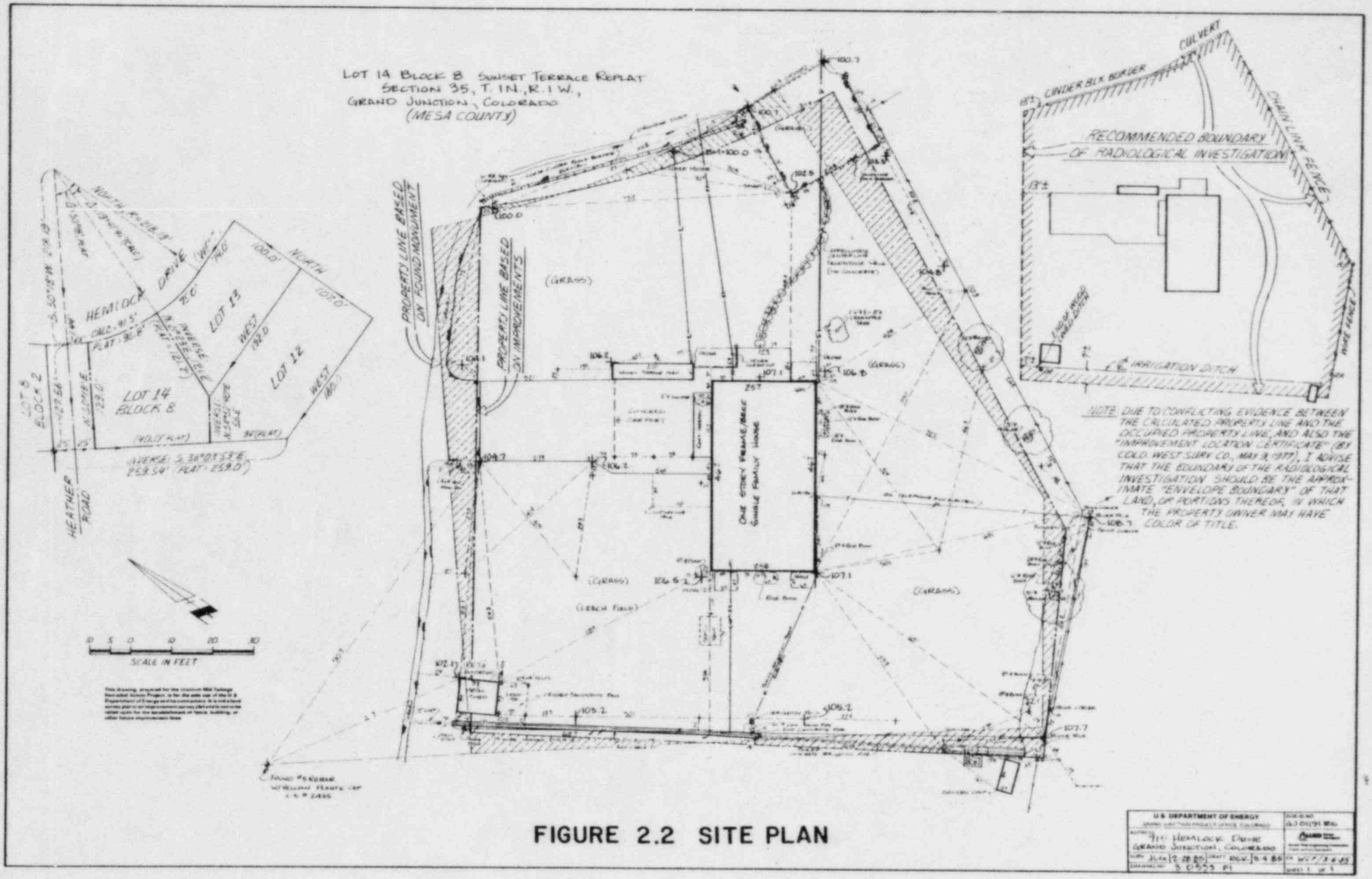
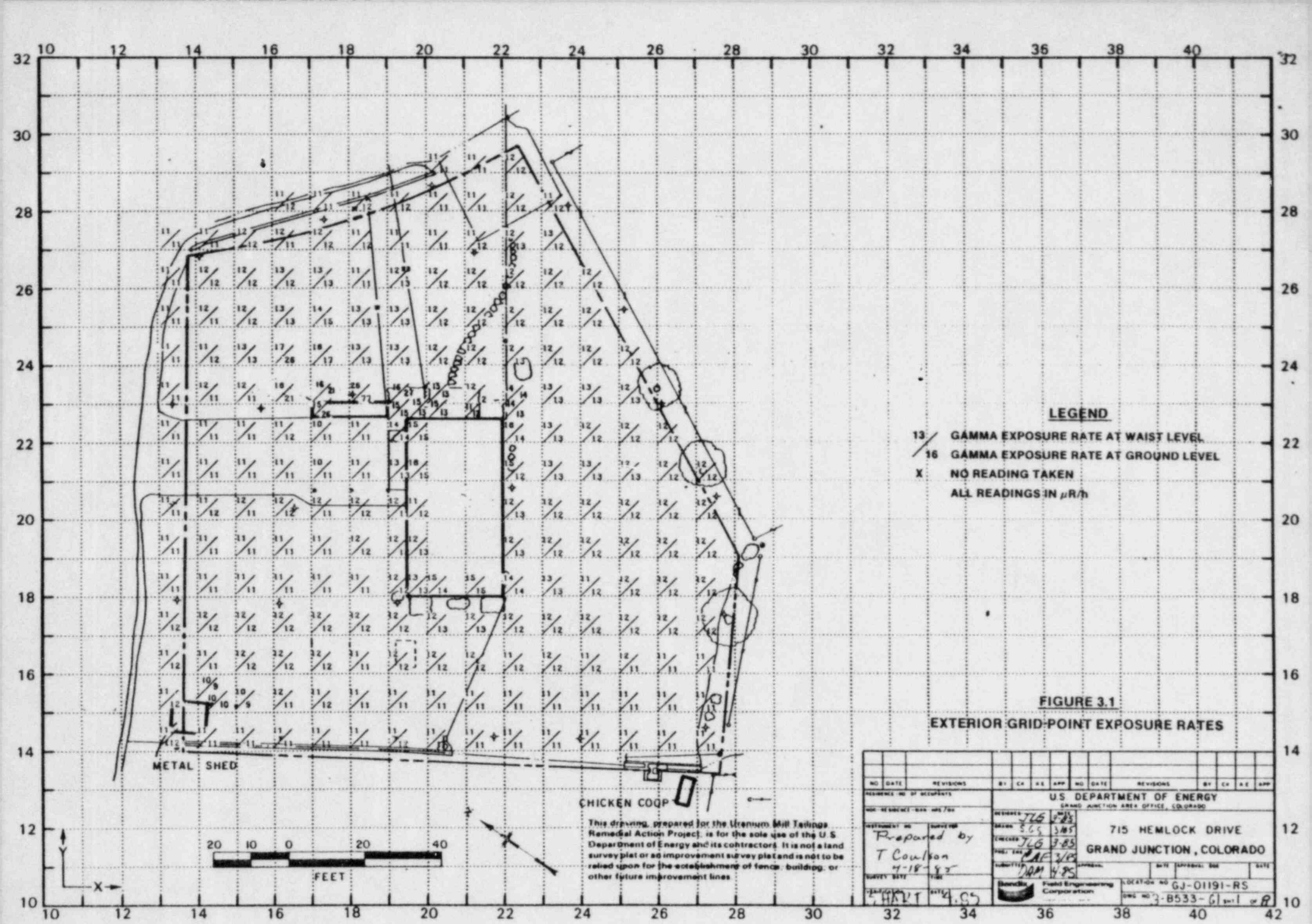


FIGURE 2.2 SITE PLAN



LEGEND

13 / 16 GAMMA EXPOSURE RATE AT WAIST LEVEL / GAMMA EXPOSURE RATE AT GROUND LEVEL

X NO READING TAKEN

ALL READINGS IN $\mu R/h$

FIGURE 3.1

EXTERIOR GRID-POINT EXPOSURE RATES

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.

Prepared by T Coulson 7-18-85

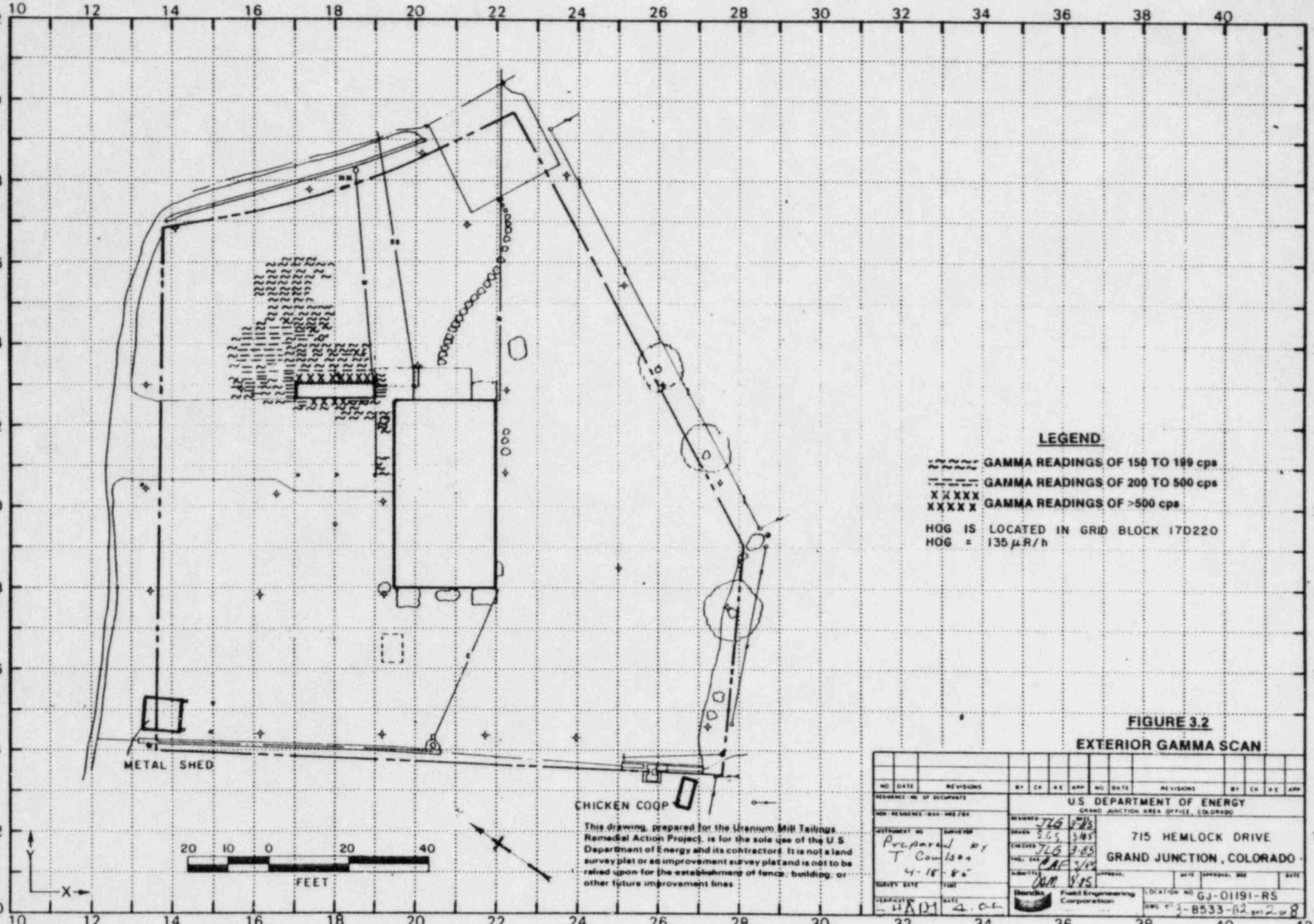
U.S. DEPARTMENT OF ENERGY
GRAND JUNCTION AREA OFFICE, COLORADO

715 HEMLOCK DRIVE
GRAND JUNCTION, COLORADO

Bendix Field Engineering Corporation

LOCATION NO GJ-01191-RS

DWG NO 3-8533-G sht 1 of 2



LEGEND

GAMMA READINGS OF 150 TO 199 cps

GAMMA READINGS OF 200 TO 500 cps

GAMMA READINGS OF >500 cps

HOG IS LOCATED IN GRID BLOCK 17D220
HOG = 135 μR/h

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 as improvement survey plat and is not to be relied upon for the establishment of fence, building, or other future improvement lines.

FIGURE 3.2

EXTERIOR GAMMA SCAN

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

715 HEMLOCK DRIVE
GRAND JUNCTION, COLORADO

Prepared by T Coulson 4-18-85

Bendix Field Engineering Corporation

LOCATION NO. GJ-01191-RS

DWG NO. 1-8533-62 SH 2 OF 8

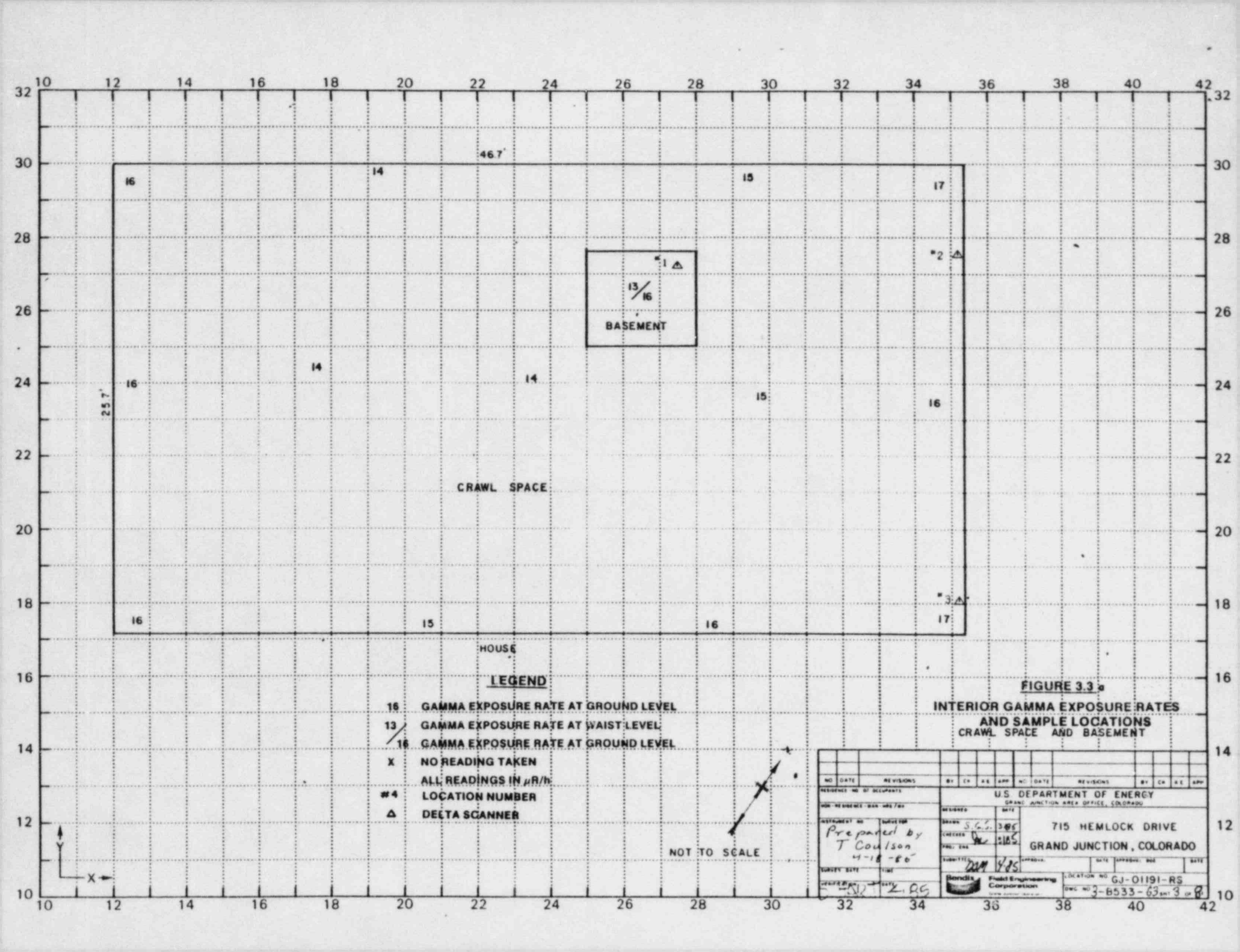


FIGURE 3.3 a

INTERIOR GAMMA EXPOSURE RATES AND SAMPLE LOCATIONS
CRAWL SPACE AND BASEMENT

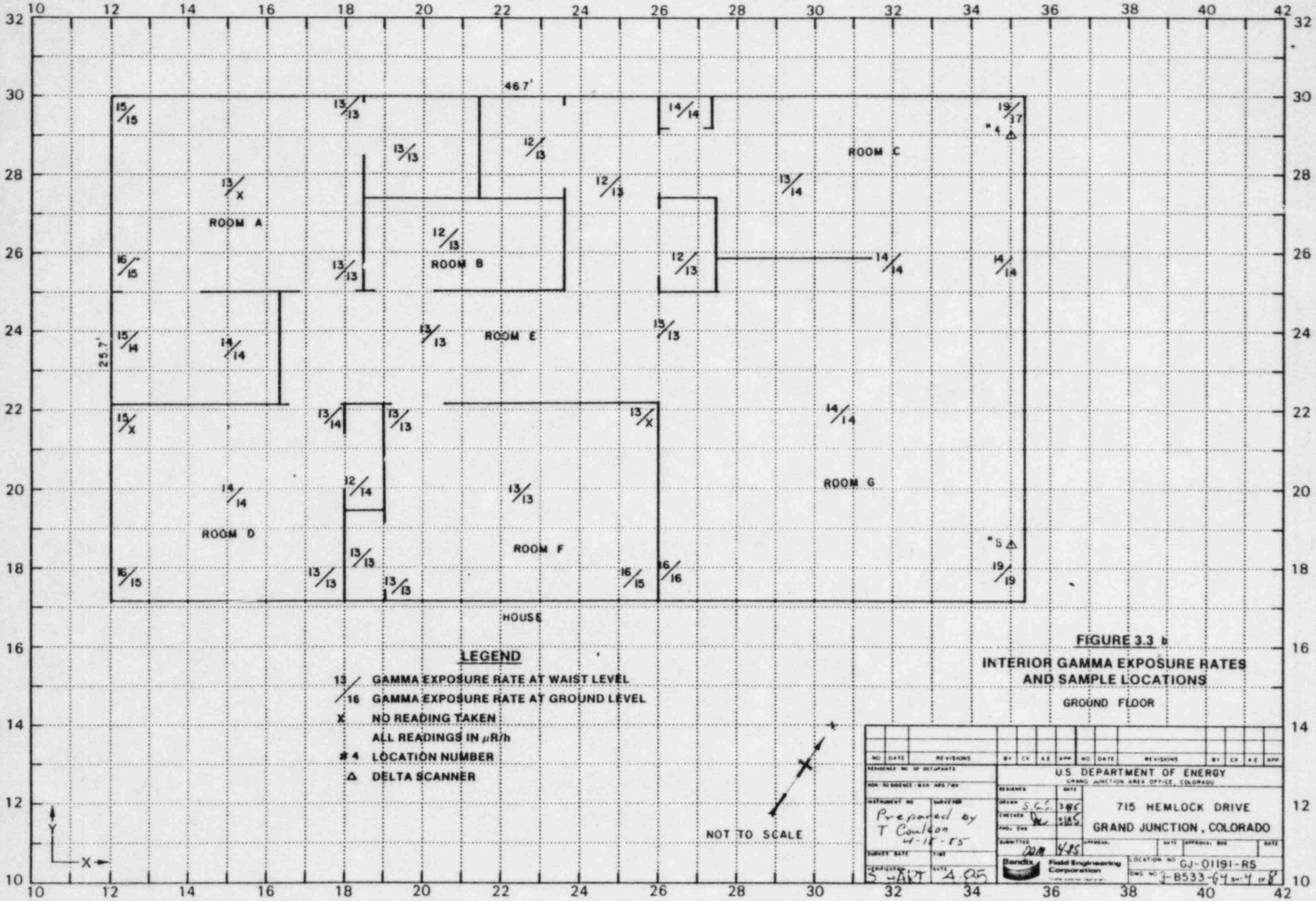


FIGURE 3.3 b

INTERIOR GAMMA EXPOSURE RATES AND SAMPLE LOCATIONS

GROUND FLOOR

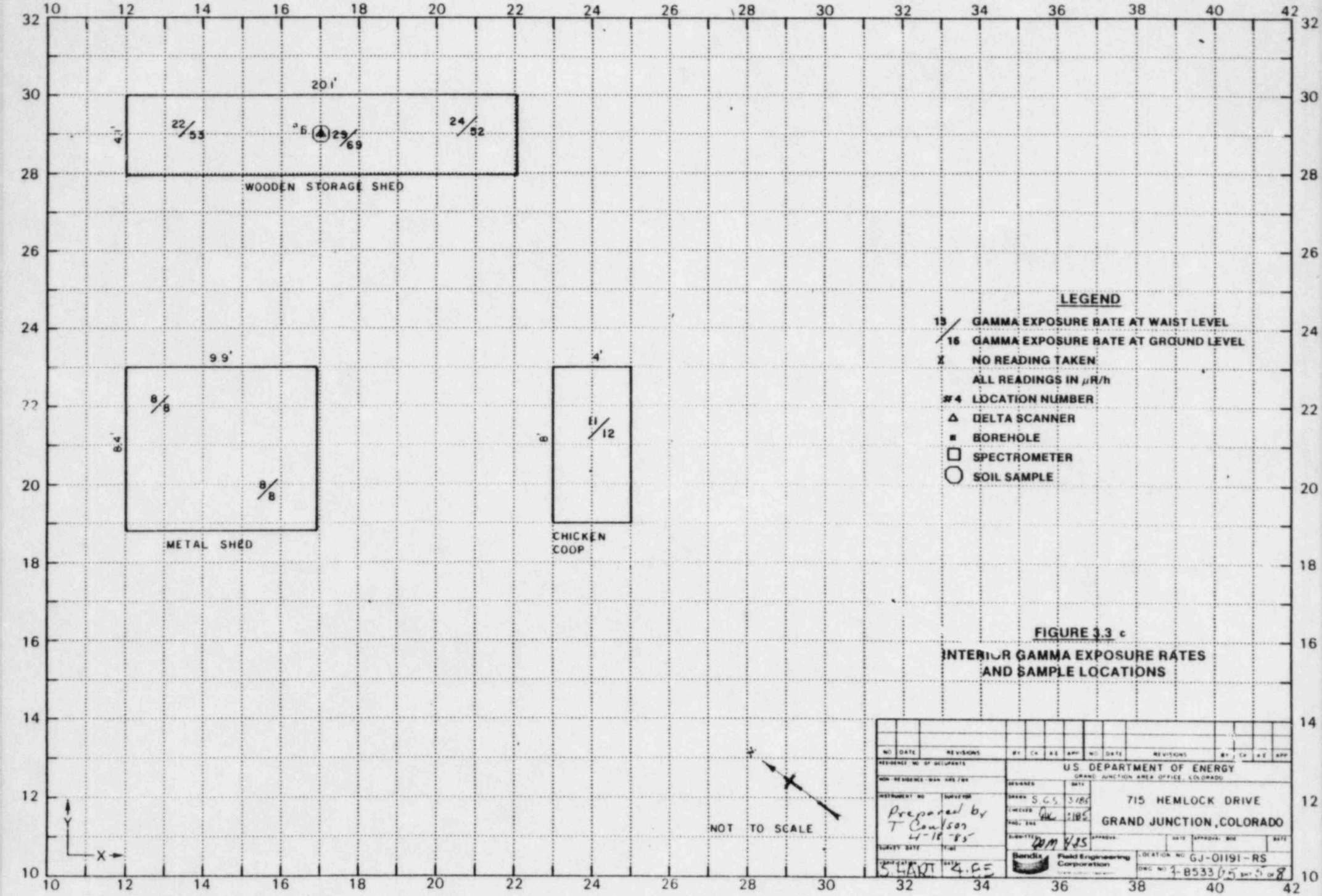
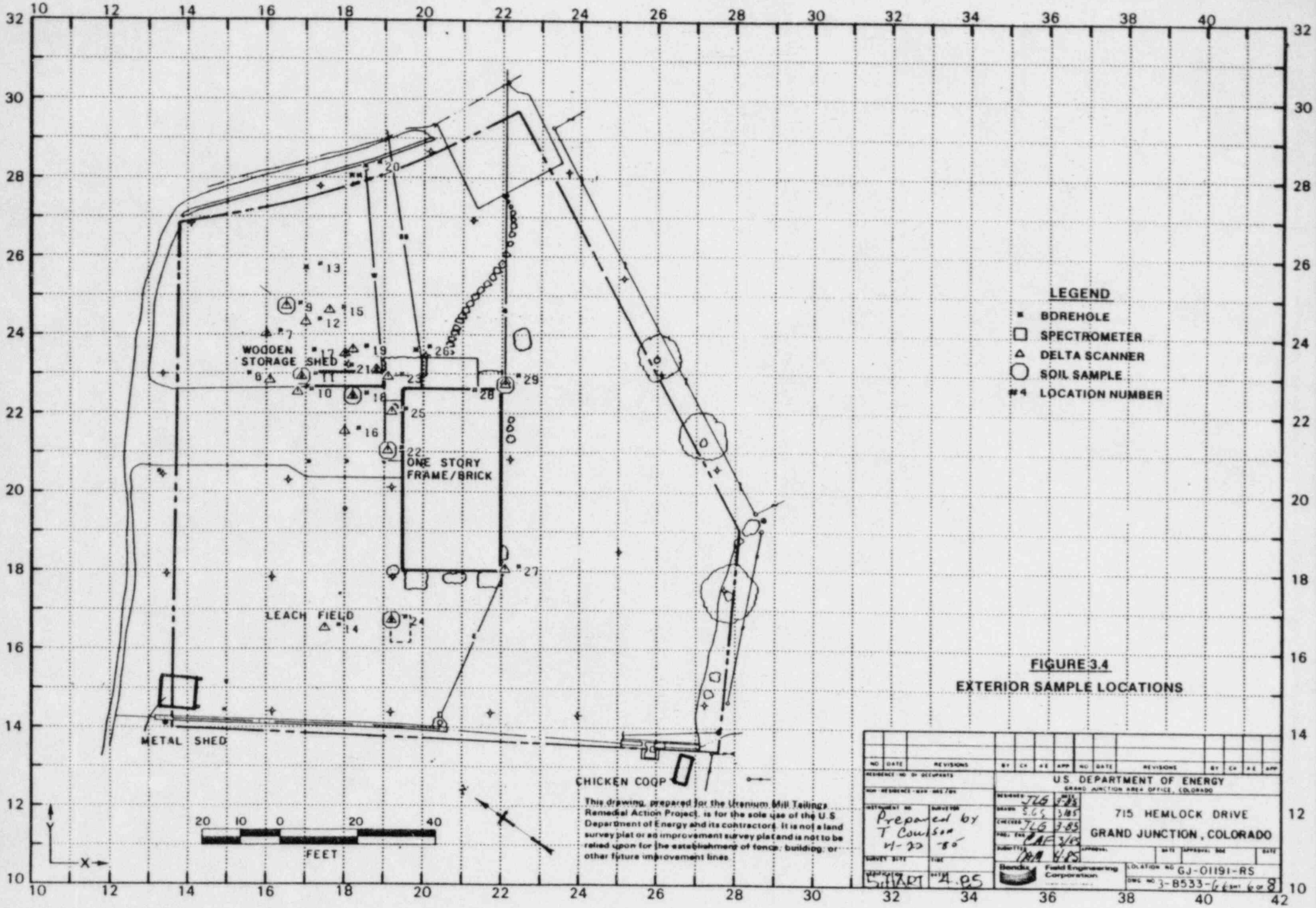


FIGURE 3.3 c

INTERIOR GAMMA EXPOSURE RATES AND SAMPLE LOCATIONS



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.

FIGURE 3.4

EXTERIOR SAMPLE LOCATIONS

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

715 HEMLOCK DRIVE
GRAND JUNCTION, COLORADO

Prepared by T Coulson 4-22-85

Bendix Field Engineering Corporation

LOCATION NO GJ-01191-RS

DWG NO 3-8533-6 SHT 6 OF 8

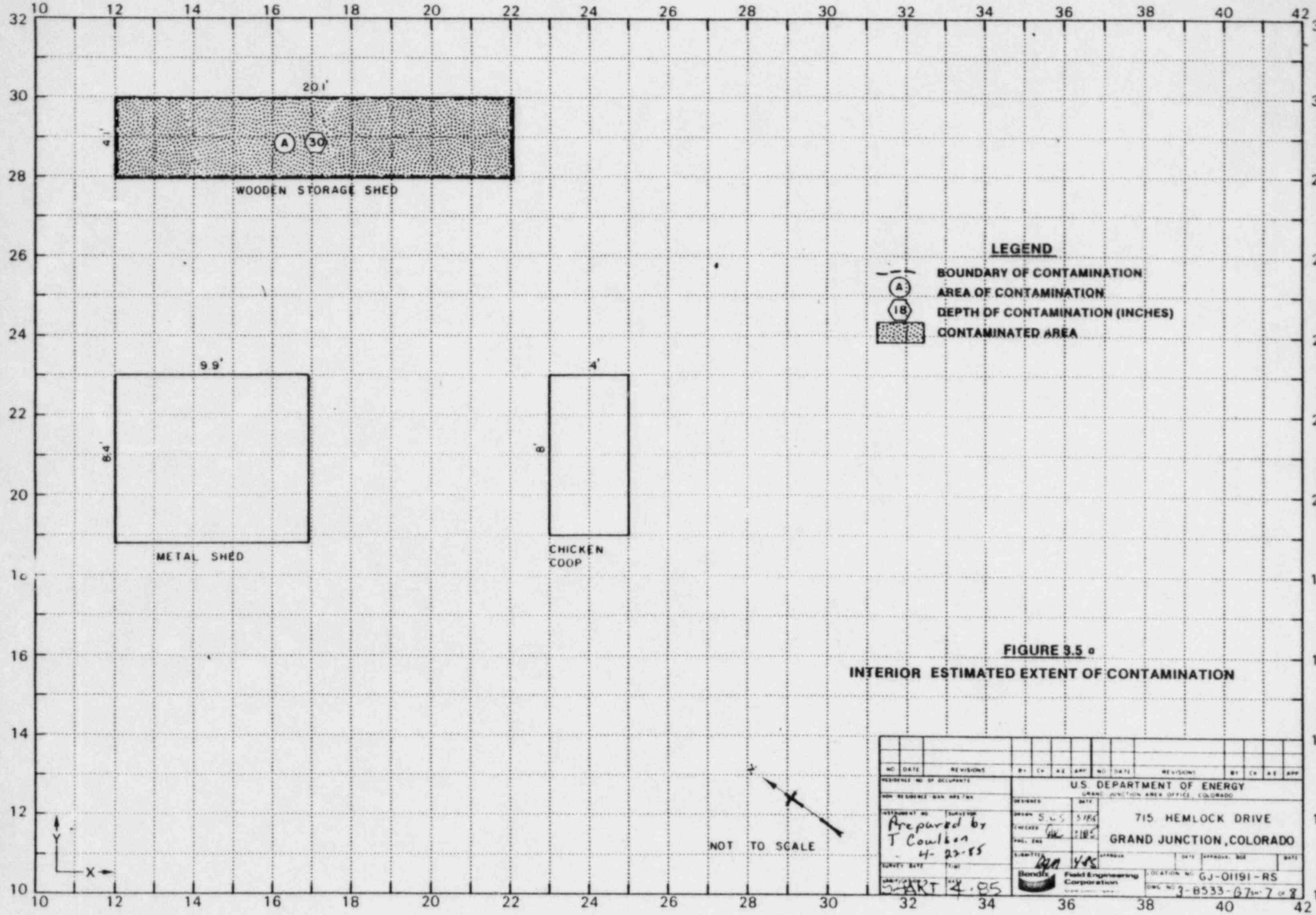


FIGURE 3.5 a

INTERIOR ESTIMATED EXTENT OF CONTAMINATION

FIGURE 3.5b

EXTERIOR ESTIMATED EXTENT OF CONTAMINATION

3/85

DOE ID NO. GJ-01191-RS Date April 23, 1985

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

Official Survey Report

Property Address 715 Hemlock Drive

Property Owner John and Lila Garcia

Address of Owner (if different from above) _____

Report Prepared By T. Coulson

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 X 1 In open areas.

1 X 1 Under or around exterior improvements.

1 X 1 Under or around a typically nonoccupied structure.

1 ___ 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 = 19 uR/h
HOG = 135 uR/h

Bendix

Field Engineering Corporation

Grand Junction Operations

P.O. Box 1569
Grand Junction, CO 81
Tel (303) 242-8621

A Subsidiary of
The Bendix Corporation

April 18, 1985

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

ATTN: Elaine Brummett

Dear Elaine:

The following is in response to your questions and comments noted during the Technical Review concerning Department of Energy (DOE) Identification (ID) number GJ-01191-RS (715 Hemlock Drive) conducted on April 9, 1985.

The areas that require additional work or comments are as follows:

1. Another copy of Figure 3.3c is enclosed.

2. The owner indicated no tailings were used around the 4-foot by 6-foot basement. Also, there were no high readings observed in this area while scanning the crawl space.

3. In comparing the configuration of location numbers 5 and 11, of the deconvolution graph, and in considering the soil sample in this area, the conclusion is drawn that the slightly elevated total count at location number 16 is shine.

4. An 18-inch delta was taken in the leach field at location number 14, it read 1.2 pCi/g.

5. Two shovel holes were dug beside the drive at locations 165227 and 160227, no tailings were sighted.

Bendix

6. The delta reading of 1.7 pCi/g was not further examined when shine from locations 6 and 18 were considered along with the natural radiation from the brick wall of the house.

Thank you for your time and cooperation. If you should have any questions or additional comments, please contact me at 242-8621, extension 433.

Yours very truly,

Terry Coulson

Terry Coulson
RSD Survey Team

Enclosure

TC:pr

MEMORANDUM

ALLIED Bendix
Aerospace

Bendix Field Engineering Corporation
Grand Junction Operations
Grand Junction, Colorado

Date: April 16, 1985

To: Files

From: Terry Coulson

Subject: Team Leader Notes - GJ-01191-RS

Address: 715 Hemlock Drive

Owner: Mr. and Mrs. John Garcia

Team Members

T. Coulson (Team Leader)	B. Wilkins
C. Adams	C. Holmes
N. Wallace	P. Hardy
J. Dickerson	M. Heronema

Instruments

Delta Scintillometer - C-3943
Total Count - C-3959, C-4005
Crutch Scintillometer - C-1127, C-1185

Date: March 19, 1985

Mr. and Mrs. John Garcia have owned this house for eighteen years, they helped the team members locate lines and septic tank. The septic tank is no longer used.

Contamination was located along the northeast side of the carport and beneath the northeast edge of the carport slab and shed.

The crawl space was investigated and the sewer line was located. A delta was taken in the crawl space on the sewer line.

The grade of the yard has been built up (approximately 15-feet) from the street to the carport. It is suspected that tailings were used to accomplish this.

Revisit

Date: March 29, 1985

Three additional deltas were taken. This information was entered into the table. It was decided that shine is seen at location number 11, therefore, a recheck of this area was done for further contamination.

Revisit

Date: April 16, 1985

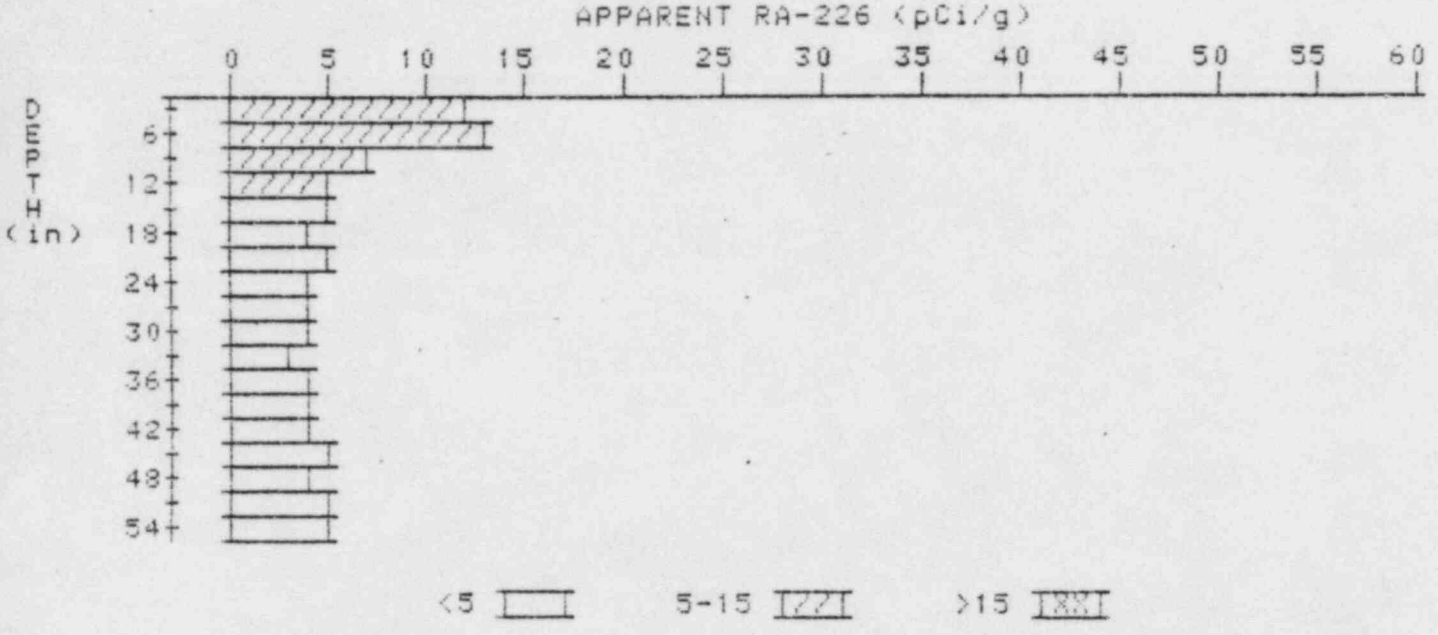
An 18-inch delta was taken at location number 14 to check the leach field. The delta reading was 1.2 pCi/g.

The fill under the driveway slab was visibly investigated with two shovel holes, one at location number 165227 and one at 160227. No tailings were sighted at either location.

DECON V85.1<850117.1233>

APPARENT RADIUM-226 CONCENTRATION DECONVOLUTION GRAPH 7

PROPERTY NUMBER: GJ-01191-RS
HOLE NUMBER: 7
LOCATION: 160240

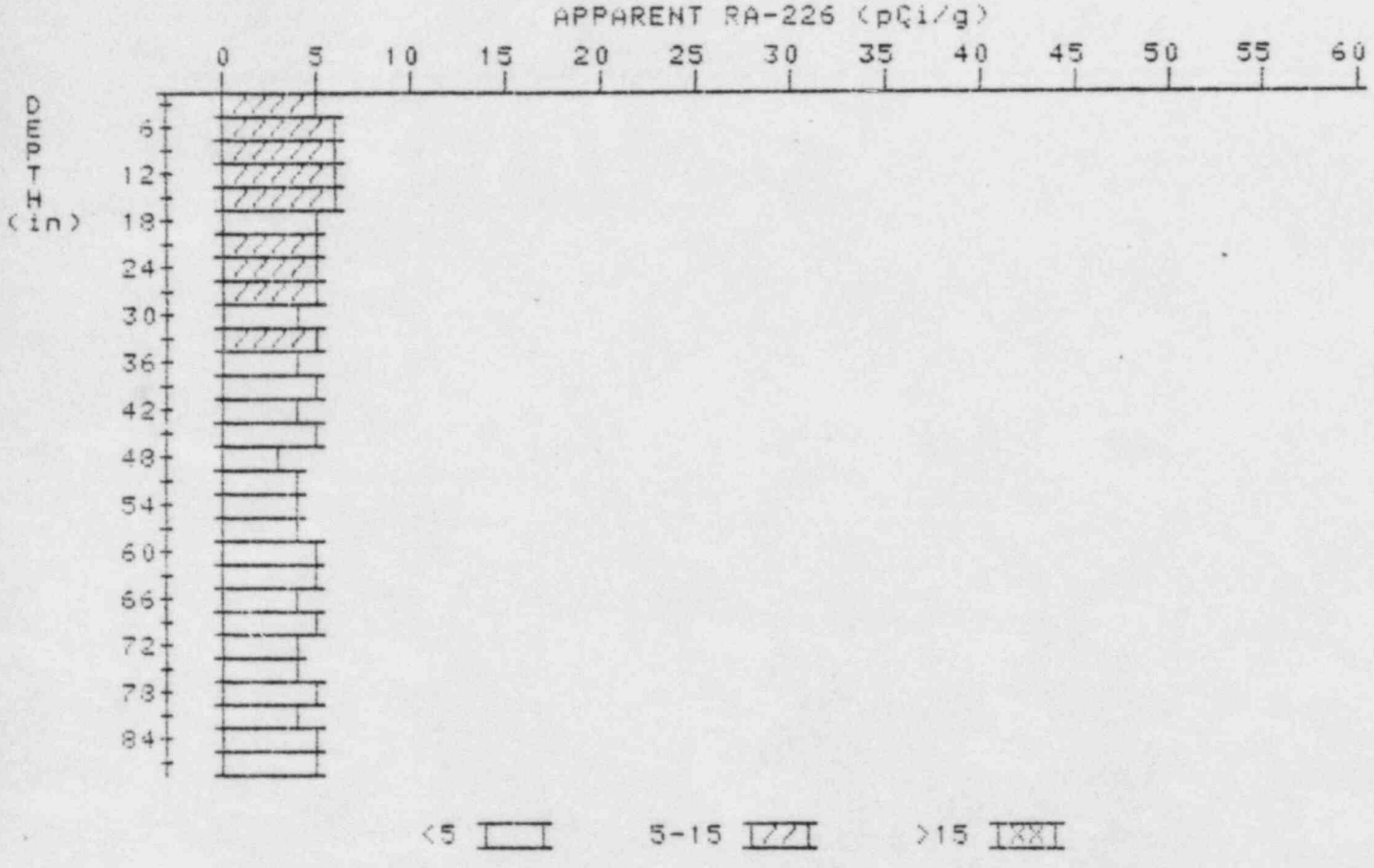


Depth (in)	Apparent Radium-226 (pCi/g) Undeconvolved	Apparent Radium-226 (pCi/g) Deconvolved
3	12.0	12.0
6	10.6	12.6
9	8.1	6.5
12	6.5	5.4
15	5.5	4.8
18	4.9	4.4
21	4.6	4.6
24	4.3	3.9
27	4.2	4.4
30	4.0	4.0
33	3.8	3.4
36	3.8	3.8
39	3.8	3.6
42	3.9	3.5
45	4.2	4.6
48	4.3	4.1
51	4.5	4.7
54	4.6	4.6

DECON V85.1<850117.1233>

APPARENT RADIUM-226 CONCENTRATION DECONVOLUTION GRAPH 11

PROPERTY NUMBER: GJ-01191-RS
HOLE NUMBER: 11
LOCATION: 169229



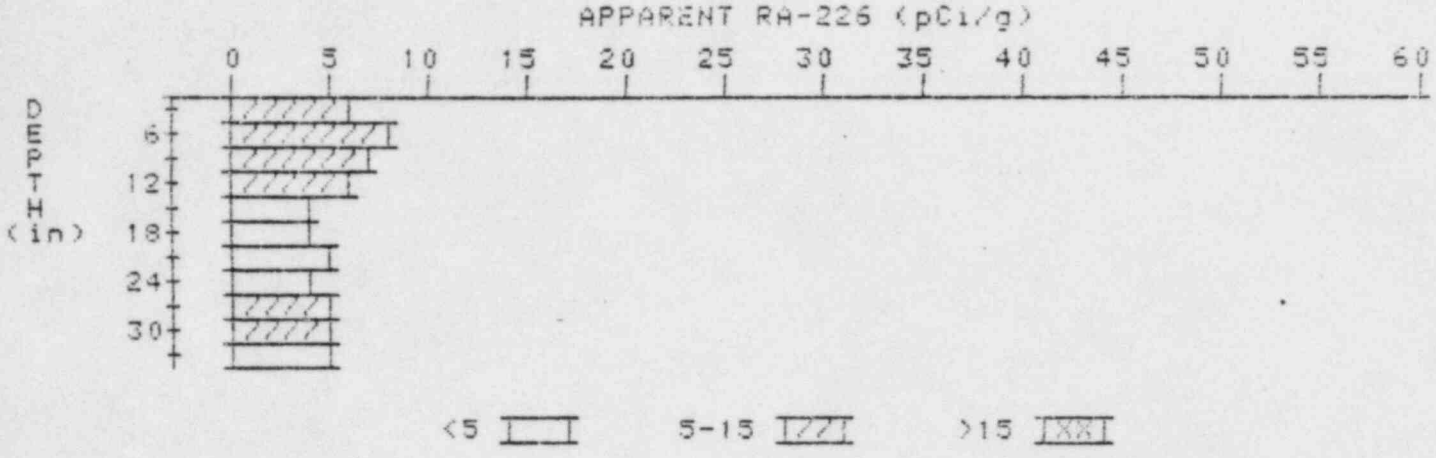
Depth (in)	Apparent Radium-226 (pCi/g) Undeconvolved	Apparent Radium-226 (pCi/g) Deconvolved
3	5.0	5.0
6	5.4	5.8
9	5.6	5.8
12	5.7	6.2
15	5.5	5.5
18	3.3	4.9
21	5.3	5.5
24	5.2	5.2
27	5.1	5.5
30	4.8	4.3
33	4.8	5.2

36	4.6	4.4
39	4.5	4.9
42	4.2	3.7
45	4.2	4.6
48	4.0	3.5
51	4.1	3.9
54	4.3	4.5
57	4.4	4.4
60	4.5	4.5
63	4.6	5.0
66	4.5	4.3
69	4.5	4.7
72	4.4	4.2
75	4.4	4.2
78	4.5	4.9
81	4.4	3.9
84	4.6	4.8
87	4.7	4.7

DECON V85.1<850117.1233>

APPARENT RADIUM-226 CONCENTRATION 13
DECONVOLUTION GRAPH

PROPERTY NUMBER: GJ-01191-RS
HOLE NUMBER: 13
LOCATION: 170257

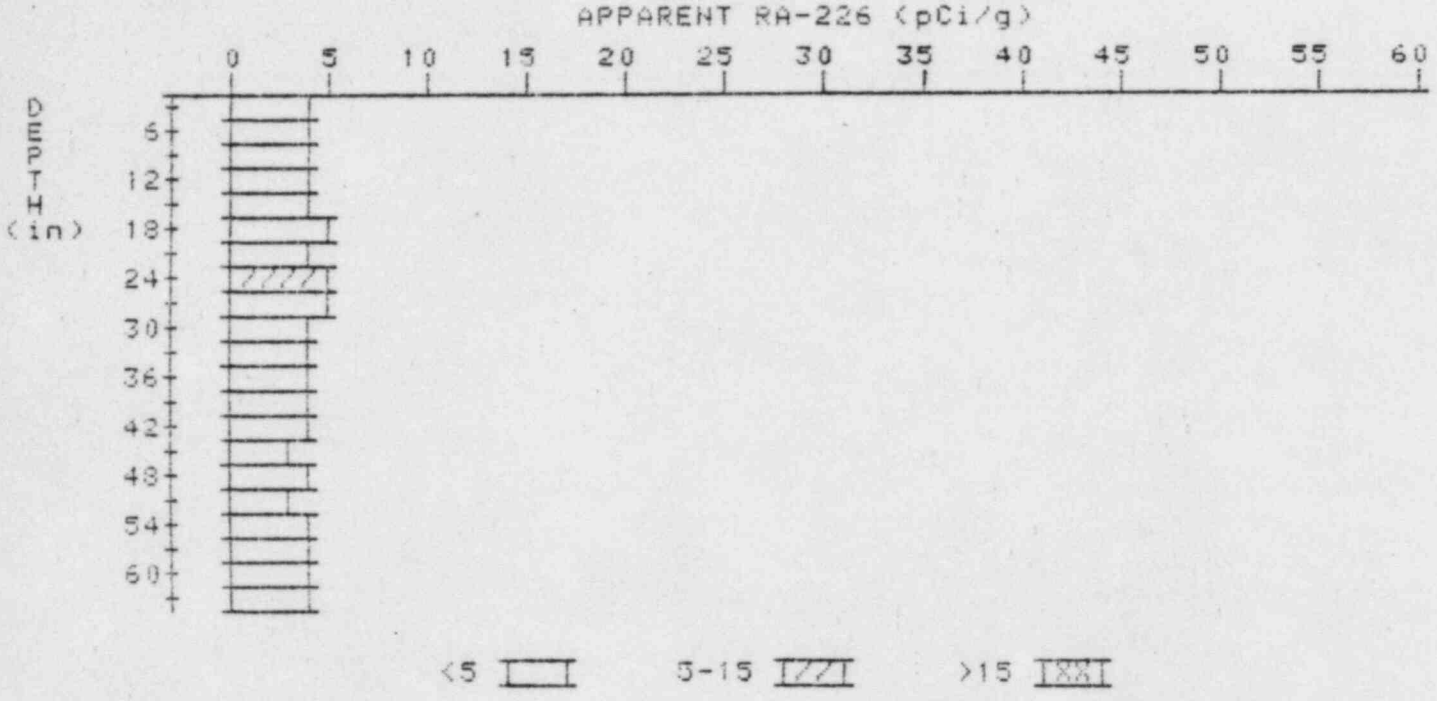


Depth (in)	Apparent Radium-226 (pCi/g) Undeconvolved	Apparent Radium-226 (pCi/g) Deconvolved
3	5.5	5.5
6	6.3	7.9
9	6.2	7.3
12	5.5	5.5
15	4.8	4.3
18	4.4	3.5
21	4.5	4.7
24	4.5	4.0
27	4.8	5.2
30	4.9	5.4
33	4.7	4.7

DECON V85.1<850117.1233>

APPARENT RADIUM-226 CONCENTRATION 17
DECONVOLUTION GRAPH

PROPERTY NUMBER: GJ-01191-RS
HOLE NUMBER: 17
LOCATION: 180235



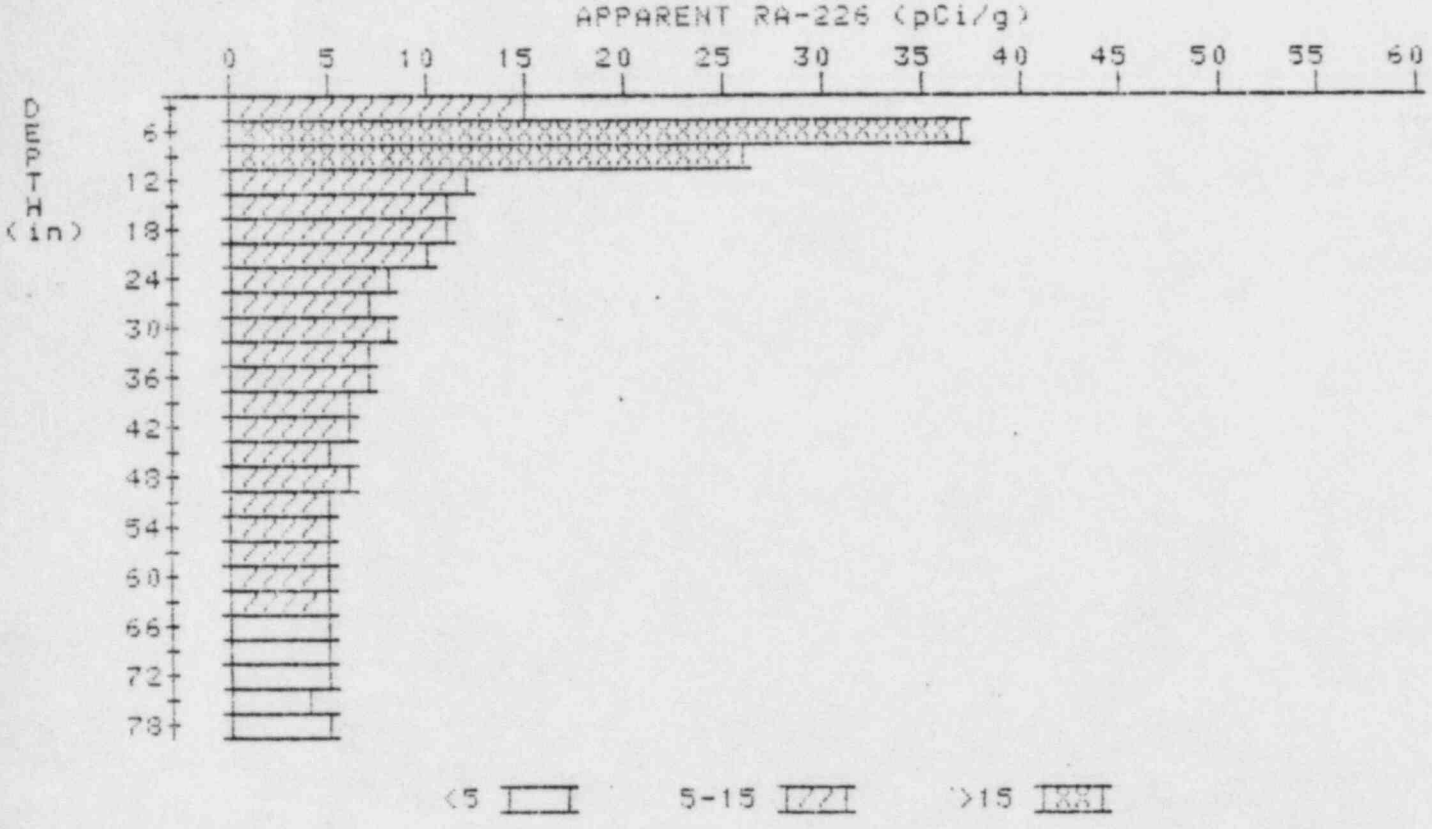
Depth (in)	Apparent Radium-226 (pCi/g) Undeconvolved	Apparent Radium-226 (pCi/g) Deconvolved
3	3.8	3.8
6	3.9	3.7
9	4.1	4.3
12	4.2	4.2
15	4.3	4.3
18	4.4	4.6
21	4.4	4.0
24	4.6	5.1
27	4.5	4.5
30	4.4	4.4
33	4.3	4.5
36	4.1	3.9
39	4.0	4.2
42	3.8	3.6
45	3.7	3.3
48	3.8	4.0
51	3.8	3.4

54	4.0	4.2
57	4.1	4.3
60	4.1	3.7
63	4.3	4.3

DECON V85.1<850117.1233>

APPARENT RADIUM-226 CONCENTRATION 18
DECONVOLUTION GRAPH

PROPERTY NUMBER: GJ-01191-RS
HOLE NUMBER: 18
LOCATION: 182224



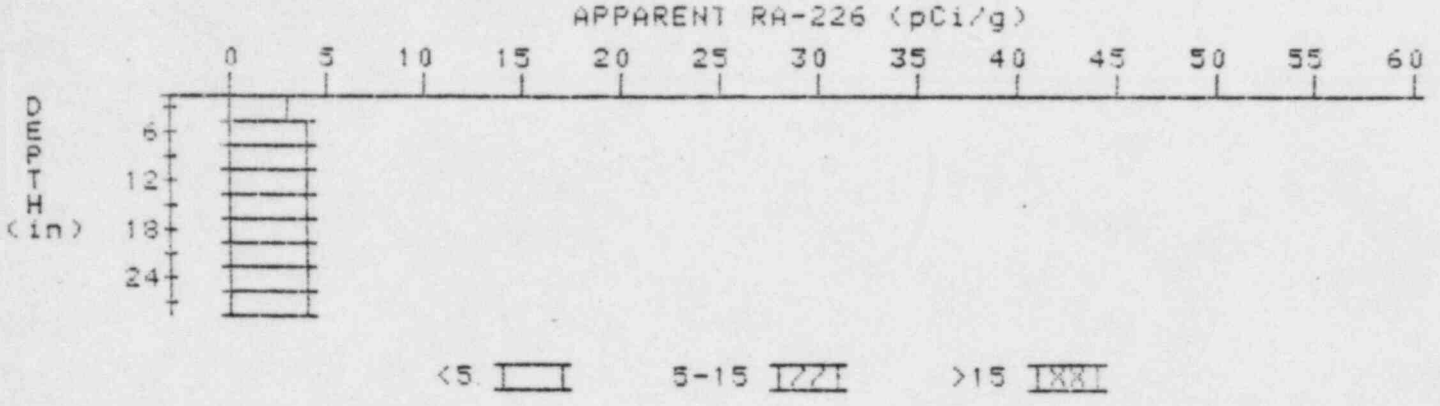
Depth (in)	Apparent Radium-226 (pCi/g) Undeconvolved	Apparent Radium-226 (pCi/g) Deconvolved
3	14.9	14.9
6	21.8	36.7
9	20.3	26.2
12	15.5	11.6
15	12.9	11.1
18	11.3	10.6
21	10.1	10.3
24	8.8	7.9
27	8.0	7.3
30	7.6	7.8
33	7.1	6.9
36	6.7	6.7
39	6.3	6.1

42	6.0	6.0
45	5.7	5.3
48	5.6	5.8
51	5.4	5.2
54	5.3	5.1
57	5.3	5.5
60	5.2	5.4
63	5.0	5.0
66	4.8	4.6
69	4.7	4.7
72	4.6	4.6
75	4.5	4.1
78	4.6	4.6

DECON V85.1<950117.1233>

APPARENT RADIUM-226 CONCENTRATION 20
DECONVOLUTION GRAPH

PROPERTY NUMBER: GJ-01191-RS
HOLE NUMBER: 20
LOCATION: 185283

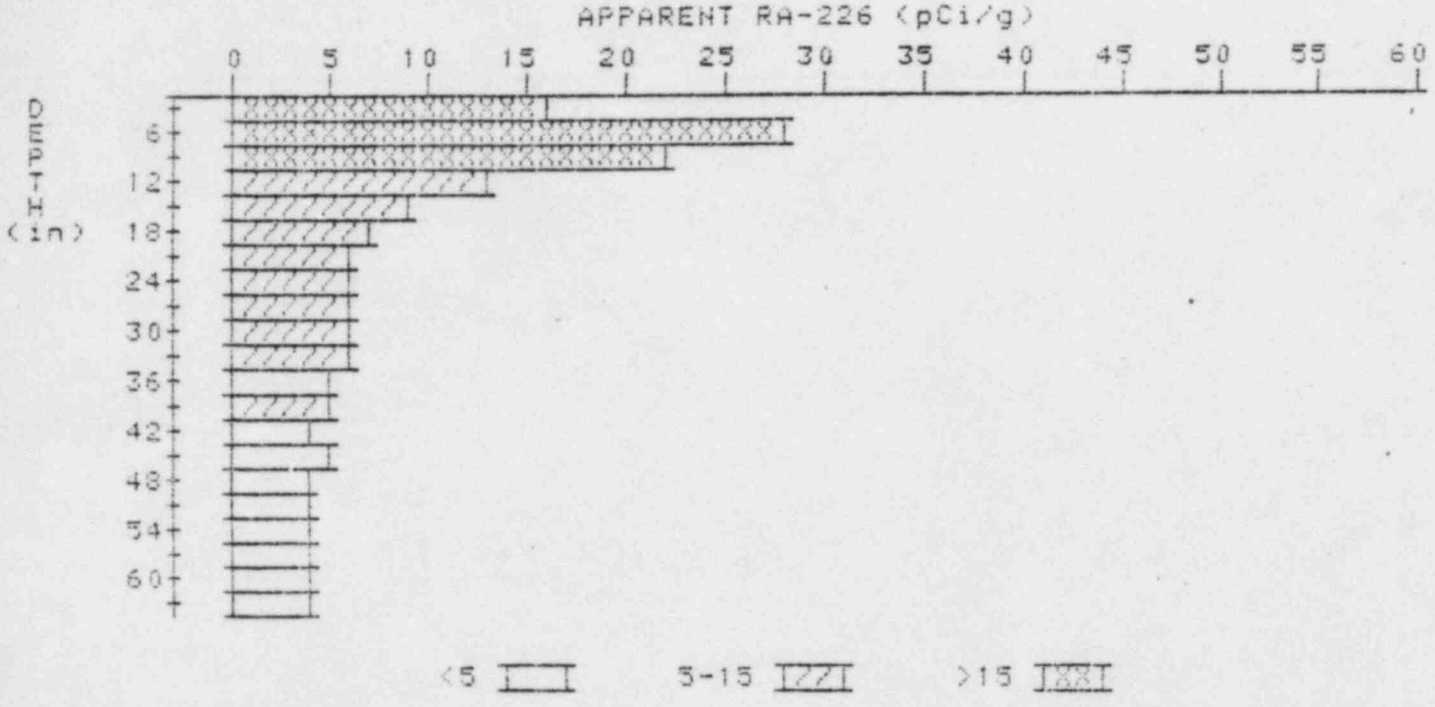


Depth (in)	Apparent Radium-226 (pCi/g) Undeconvolved	Apparent Radium-226 (pCi/g) Deconvolved
3	3.1	3.1
6	3.5	3.5
9	3.9	4.3
12	4.1	4.5
15	4.1	4.1
18	4.1	4.3
21	4.0	3.6
24	4.1	4.3
27	4.1	4.1

DECON V85.1<850117.1233>

APPARENT RADIUM-226 CONCENTRATION 21
DECONVOLUTION GRAPH

PROPERTY NUMBER: GJ-01191-RS
HOLE NUMBER: 21
LOCATION: 188231



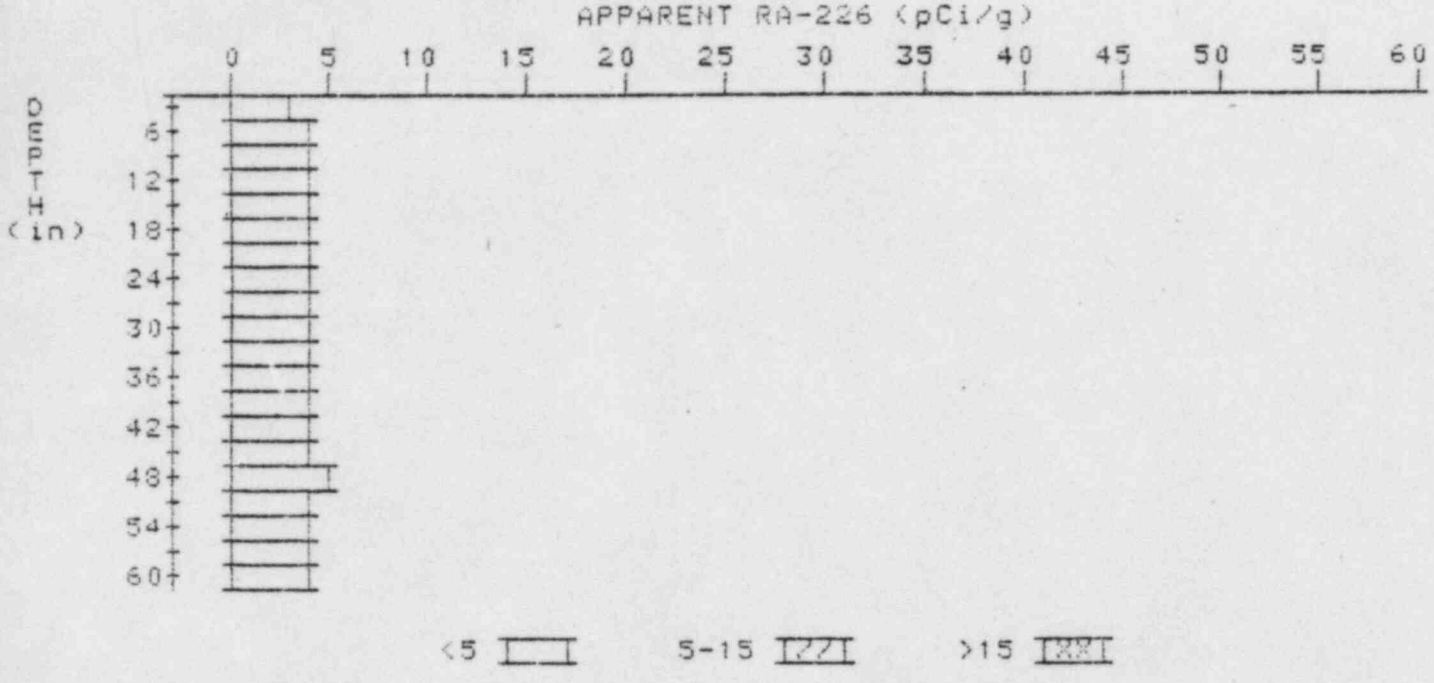
Depth (in)	Apparent Radium-226 (pCi/g) Undeconvolved	Apparent Radium-226 (pCi/g) Deconvolved
3	16.1	16.1
6	19.4	27.8
9	18.0	22.3
12	14.2	13.5
15	10.9	8.7
18	8.6	7.0
21	7.3	6.4
24	6.5	5.8
27	6.1	6.1
30	5.7	5.5
33	5.4	5.6
36	5.0	4.6
39	4.8	5.2
42	4.4	3.7
45	4.4	4.6
48	4.3	4.3
51	4.2	4.0

54	4.2	4.0
57	4.3	4.5
60	4.3	4.3
63	4.3	4.3

DECON V85.1(850117.1233)

APPARENT RADIUM-226 CONCENTRATION DECONVOLUTION GRAPH 24

PROPERTY NUMBER: GJ-01191-RS
HOLE NUMBER: 24
LOCATION: 192167



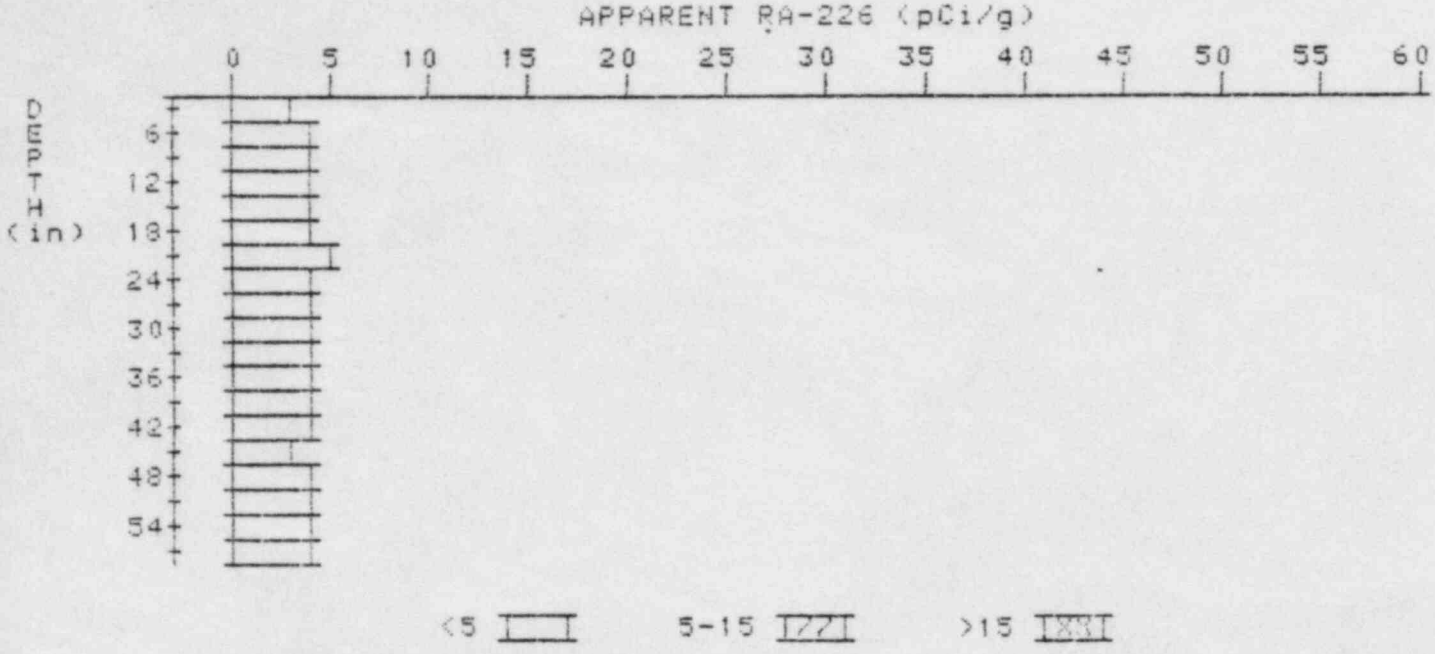
Depth (in)	Apparent Radium-226 (pCi/g) Undeconvolved	Apparent Radium-226 (pCi/g) Deconvolved
3	3.2	3.2
6	3.6	4.0
9	3.8	3.8
12	4.0	4.4
15	4.0	4.0
18	4.0	4.0
21	4.0	3.8
24	4.1	4.3
27	4.1	4.1
30	4.1	4.1
33	4.1	4.1
36	4.1	4.1
39	4.1	4.1
42	4.1	4.1
45	4.1	3.9
48	4.2	4.6
51	4.1	3.9
54	4.1	3.9

57	4.2	4.4
60	4.2	4.2

DECON V85.1(850117.1233)

APPARENT RADIUM-226 CONCENTRATION 26
DECONVOLUTION GRAPH

PROPERTY NUMBER: GJ-01191-RS
HOLE NUMBER: 26
LOCATION: 198236



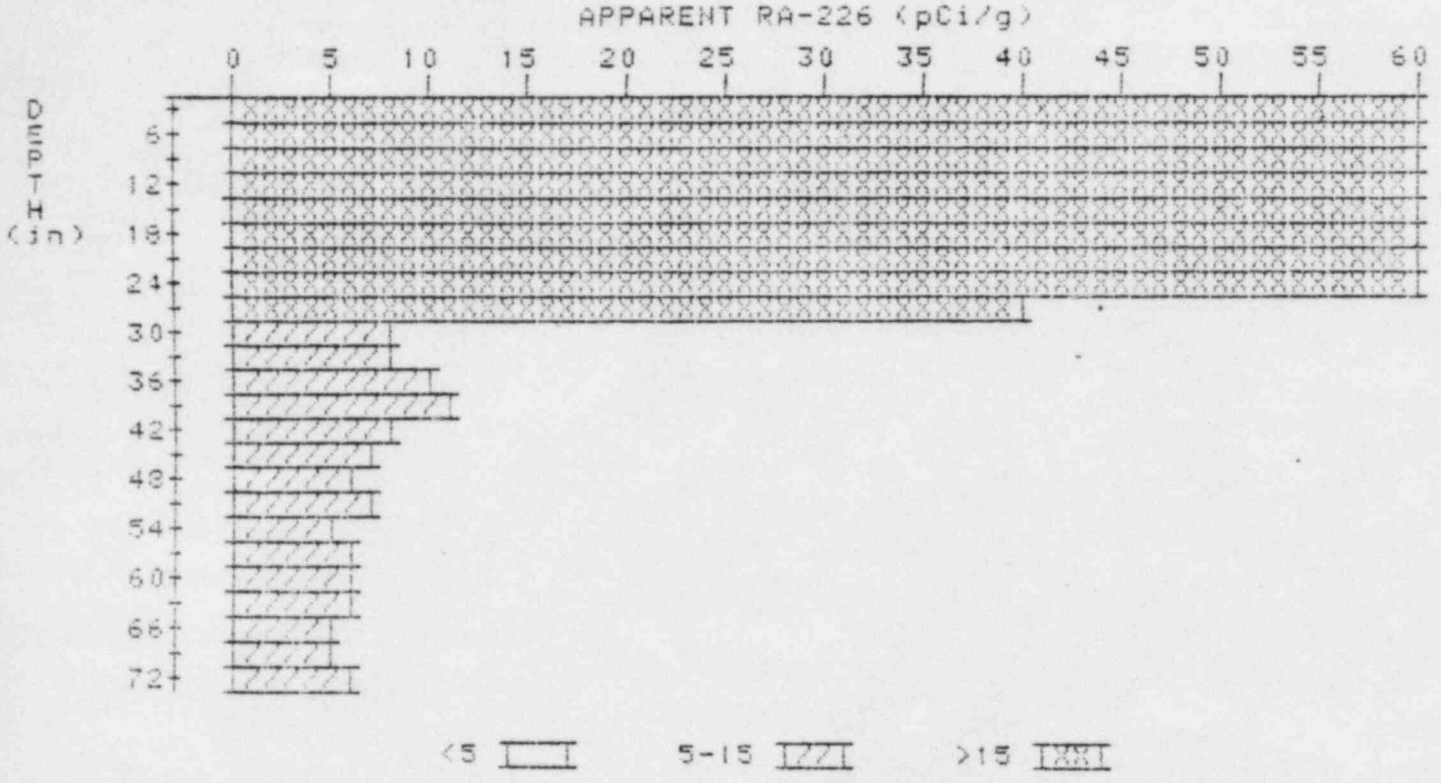
Depth (in)	Apparent Radium-226 (pCi/g) Undeconvolved	Apparent Radium-226 (pCi/g) Deconvolved
3	3.4	3.4
6	3.8	4.2
9	4.0	4.0
12	4.2	4.4
15	4.3	4.5
18	4.3	4.1
21	4.4	4.8
24	4.3	4.1
27	4.3	4.5
30	4.2	4.2
33	4.1	4.3
36	3.9	3.7
39	3.8	3.8
42	3.7	3.7
45	3.6	3.2
48	3.7	3.9
51	3.7	3.5
54	3.8	3.6

57	4.0	4.0

DECON V85.1<850117.1233>

APPARENT RADIUM-226 CONCENTRATION DECONVOLUTION GRAPH 6

PROPERTY NUMBER: GJ-01191-RS
HOLE NUMBER: 6
LOCATION:



Depth (in)	Apparent Radium-226 (pCi/g) Undeconvolved	Apparent Radium-226 (pCi/g) Deconvolved
3	91.3	91.3
6	121.1	151.1
9	134.0	150.5
12	137.6	148.6
15	135.0	146.4
18	126.0	140.4
21	108.9	127.9
24	81.1	83.8
27	51.8	39.7
30	29.3	8.0
33	18.8	8.5
36	14.1	10.4
39	11.5	10.8
42	9.3	7.9
45	7.9	7.0

48	7.0	6.3
51	6.5	6.5
54	6.0	5.3
57	5.9	5.9
60	5.8	5.8
63	5.7	5.9
66	5.5	5.1
69	5.5	5.3
72	5.6	5.6