RADIOLOGIC AND ENGINEERING ASSESSMENT

FOR

DOE ID NO.: GJ-04232-RS
ADDRESS: 1208 MAIN STREET

SEPTEMBER 1985

FOR

URANIUM MILL TAILINGS REMEDIAL ACTION PROJECT OFFICE

ALBUQUERQUE OPERATIONS OFFICE

DEPARTMENT OF ENERGY

BY

BENDIX FIELD ENGINEERING CORPORATION
P.O. Box 1569
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DATE September 25, 1985

REA04232-REA-715

TABLE OF CONTENTS

1.0 EXECUTIVE SUMMARY

1.1 Introduction

The location, DOE ID No. GJ-04232-RS, is a single-family residence located at 1208 Main Street, 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, 19 cu. yd.; interior 0 cu. yd.

Estimated cost to perform remedial action is $2,953. Remedial action on this property will take approximately 14 days to complete.

2.0 PROPERTY DESCRIPTION

2.1 General Description

Address: 1208 Main Street, Grand Junction, Colorado

Zoning: Residential (RSF-8)

Lot Size: Approximately 6,290 sf (0.14 acres)

Legal Description: Lots 29 and 30, Block G, Keith Addition, City of Grand Junction, County of Mesa, State of Colorado.

Point of Reference: This property is located approximately 1 mile(s) 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:	Main Street
East:	Single-family residence
West:	Single-family residence

2.2 Existing Facilities and Structures

Primary Structure:

Type:	Two-story residence with enclosed porch
Size:	Approximately 3,400 sf
Construction Date:	1907
Construction:	Wood-frame
Foundation:	Concrete foundation wall and footing
Footing Depth:	Approximately 24" to bottom of footing from grade
Basement:	Yes - partial (cellar)
Crawl Space:	Yes - partial
Condition:	Good

Other Structures:

Type:	Garage
Size:	Approximately 200 sf
Construction:	Wood-frame
Foundation:	Concrete slab-on-grade
Condition:	Fair

Type:	Wood shed
Size:	Approximately 30 sf
Construction:	Wood-frame
Foundation:	None
Condition:	Fair

General Remarks:

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

Historical Data:

This structure is over 50 years old. Therefore, it does meet the eligibility criteria for consideration of inclusion on the National Register of Historic Places.

Alterations to Structure: Minor modifications to the interior of the structure.

Architectural Significance: Good example of turn of the century vernacular wood-frame.

Historical Significance: None known

3.0 RADIOLOGIC SURVEY

3.1 Introduction

Radiologic data were collected by Bendix at DOE ID No. GJ-04232-RS on August 20, 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 the historical information available for this property was conducted to determine the areas of potential contamination identified during previous radiologic assessments.

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 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): 69 uR/h

Exterior radium-concentration measurements are presented in Appendix Table 3.1. Exterior exposure-rate 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): 31 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.

3.3 Boreholes, Soil Samples, and Other Measurements

Areas which displayed elevated gamma levels were further investigated; the locations and types of these investigations are shown in Appendix Figures 3.2a and 3.2b. 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 3.3 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) Surface Material: Concrete
Direction From Primary Structure: South
Other (height or thickness): See Figure 3.3, Detail A
Comments: This area contains a set of concrete steps. There is 9 inches of tailings beneath the steps, measured from ground level. The tailings may extend beneath the enclosed porch to the north. This should be monitored at the time of remedial action.
Approximate Square Footage: 38

(Area B) Surface Material: Concrete
Direction From Primary Structure: South
Other Directions: South of Area A
Total Depth of Contamination: Estimated at 12 inches
Other (height or thickness): 4-inch-thick concrete
Comments: The depth of contamination is based on data collected in Area A.
Approximate Square Footage: 27

(Area C) Surface Material: Lawn
Direction From Primary Structure: South
Other Directions: East and west of sidewalk
Total Depth of Contamination: 6 inches
Comments: This area is made up of two deposits.
Approximate Square Footage: 510

(Area D) Surface Material: Soil
Direction From Primary Structure: South
Other Directions: East of Area A
Total Depth of Contamination: 9 inches
Approximate Square Footage: 28

(Area E) Surface Material: Soil
Direction From Primary Structure: South
Other Directions: West of Area A
Total Depth of Contamination: 12 inches
Approximate Square Footage: 16

(Area F) Surface Material: Wood
Direction From Primary Structure: South
Other Directions: East and west of Area A
Total Depth of Contamination: Estimated at 9 inches
Comments: These two deposits are enclosed by a wood frame along the steps. The depth of contamination is based on data collected in Area A, measured from the soil surface.
Approximate Square Footage: 8

(Area G) Surface Material: Lawn
Direction From Primary Structure: West
Other Directions: East of driveway
Total Depth of Contamination: 12 inches
Approximate Square Footage: 28

(Area H) Surface Material: Concrete
Direction From Primary Structure: Southwest
Other Directions: Southwest property corner
Total Depth of Contamination: Estimated at 15 inches
Other (height or thickness): 4-inch-thick concrete
Comments: The depth of contamination is based on data collected in Area I
Approximate Square Footage: 16

(Area I) Surface Material: Road base
Direction From Primary Structure: Southwest
Other Directions: In driveway
Total Depth of Contamination: 15 inches
Other (height or thickness): 3-inch-thick road base
Approximate Square Footage: 16

(Area J) Surface Material: Soil
Direction From Primary Structure: North
Other Directions: South of alley
Total Depth of Contamination: 6 inches
Comments: This area is made up of two deposits.
Approximate Square Footage: 78

(Area K) Surface Material: Soil
Direction From Primary Structure: North
Other Directions: South of alley
Total Depth of Contamination: 12 inches
Approximate Square Footage: 36

(Area L) Surface Material: Road base
Direction From Primary Structure: West
Other Directions: In driveway
Total Depth of Contamination: 6 inches
Other (height or thickness): 3-inch-thick road base
Approximate Square Footage: 20

4.0 RECOMMENDED REMEDIAL ACTION

4.1 Decontamination and Restoration

The recommended remedial action for this property, DOE ID No. GJ-04232-RS includes removal of all areas identified as containing radioactive material (as discussed in Section 3.5 and shown in Appendix Figure(s) 3.3) 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 $2,953.

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 3.2a	Interior Sample Locations
Figure 3.2b	Exterior Sample Locations
Figure 3.3	Exterior Estimated Extent of Contamination

Team Leader Notes

Deconvolution Graphs (Apparent Radium-226 Concentration)

Exterior Gamma Scan Map

RADRPT V85.1<850619.1456> Table 3.1

Radium Concentrations at Exterior Locations

DOE ID #GJ-04232-RS 1208 Main Street

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
5	123245	00	DS	3.6		*	Next to alley
		06	DS	1.4		*	
6	125245	00	DS	10.4		*	Next to alley
		06	DS	4.5		*	
		12	DS	2.5		*	
7	150240	00	DS	1.9		*	Background
		03	TC	3.2		*	North of primary
		06	TC	3.5		*	structure
		09	TC	3.6		*	DC = 0 inches
		12	TC	3.7		*	
		15	TC	3.7		*	
		18	TC	3.8		*	
		21	TC	3.7		*	
		24	TC	3.7		*	
		27	TC	3.6		*	
		30	TC	3.6		*	
		33	TC	3.5		*	
		36	TC	3.5		*	
		39	TC	3.7		*	
8	157219	00	DS	3.3		*	
		06	DS	2.7		*	
9	162227	03	TC	3.3		*	West of primary
		06	TC	3.6		*	structure
		09	TC	3.8		*	Auger refusal
		12	TC	3.8		*	DC = 0 inches
		15	TC	3.9		*	
		18	TC	3.9		*	
		21	TC	3.9		*	
		24	TC	4.0		*	
		27	TC	4.1		*	
		30	TC	4.1		*	
		33	TC	4.1		*	
		36	TC	4.1		*	
		39	TC	4.2		*	
		42	TC	4.2		*	
		45	TC	4.3		*	
		48	TC	4.3		*	

Loc #	Grid Location	Depth (in.)	Meas. Type	In Situ Ra-226 (pCi/g) Tot. Ct	Spectr.	Chem Ra-226 (pCi/g)	Comments
10	180226	00	DS	1.9		*	Sewer line
		03	TC	3.6		*	DC = 0 inches
		06	TC	3.9		*	
		09	TC	4.0		*	
		12	TC	4.0		*	
		15	TC	4.0		*	
		18	TC	3.9		*	
		21	TC	3.7		*	
		24	TC	3.6		*	
		27	TC	3.7		*	
		30	TC	3.9		*	
		33	TC	3.9		*	
		36	TC	4.0		*	
		39	TC	4.0		*	
		42	TC	4.1		*	
		45	TC	4.2		*	
		48	TC	4.1		*	
		51	TC	4.2		*	
		54	TC	4.1		*	
		57	TC	4.1		*	
		60	TC	4.1		*	
		63	TC	4.1		*	
11	188223	00	DS	1.5		*	Gas line
		24	DS	1.0		*	On gas line
12	190260	00	DS	2.2		*	East of primary
		03	TC	3.5		*	structure
		06	TC	3.7		*	DC = 0 inches
		09	TC	3.8		*	
		12	TC	3.9		*	
		15	TC	3.8		*	
		18	TC	3.8		*	
		21	TC	3.9		*	
		24	TC	3.9		*	
		27	TC	4.0		*	
		30	TC	3.9		*	
		33	TC	3.9		*	
		36	TC	4.0		*	
		39	TC	3.9		*	
		42	TC	3.8		*	
		45	TC	3.8		*	
		48	TC	3.9		*	

Loc #	Grid Location	Depth (in.)	Meas. Type	In Situ Ra-226 (pCi/g) Tot. Ct	Spectr.	Chem Ra-226 (pCi/g)	Comments
12	190260	51	TC	3.8		*	
		54	TC	3.8		*	
		57	TC	3.8		*	
		60	TC	3.8		*	
		63	TC	3.8		*	
13	223262	00	DS	4.9		*	East of primary
		06	DS	2.9		*	structure
14	225257	00	DS	2.5		*	
		06	DS	2.0		*	
15	228226	00	DS	6.9		*	Southwest corner of
		06	DS	3.6		*	primary structure
		03	TC	4.8		*	DC = 12 inches
		06	TC	5.5		*	Based on the
		09	TC	5.6		*	deconvolution graph
		12	TC	5.1		*	
		15	TC	4.7		*	
		18	TC	4.5		*	
		21	TC	4.3		*	
		24	TC	4.1		*	
		27	TC	4.2		*	
		30	TC	4.2		*	
		33	TC	4.1		*	
		36	TC	4.1		*	
		39	TC	4.0		*	
		42	TC	4.0		*	
		45	TC	4.0		*	
		48	TC	3.9		*	
16	229237	00	DS	5.9		*	On dirt
		06	DS	5.7		*	South of primary
		12	DS	1.2		*	structure
17	230234	03	TC	3.5		*	South of primary
		06	TC	3.9		*	structure
		09	TC	3.9		*	Water line
		12	TC	4.0		*	DC = 0 inches
		15	TC	4.0		*	
		18	TC	3.9		*	
		21	TC	3.9		*	
		24	TC	3.9		*	
		27	TC	4.0		*	

Loc #	Grid Location	Depth (in.)	Meas. Type	In Situ Ra-226 (pCi/g) Tot. Ct	Spectr.	Chem Ra-226 (pCi/g)	Comments
17	230234	30	TC	4.0		*	
		33	TC	4.1		*	
		36	TC	4.0		*	
		39	TC	4.1		*	
		42	TC	4.0		*	
		45	TC	4.0		*	
		48	TC	4.0		*	
		51	TC	4.0		*	
18	230240	00	DS	44.2		*	On concrete step
		03	TC	48.1		*	Concrete steps
		06	TC	75.4		*	DC = 18 inches
		09	TC	85.4		*	Based on the
		12	TC	80.9		*	deconvolution graph
		15	TC	57.5		*	
		18	TC	30.0		*	
		21	TC	17.7		*	
		24	TC	11.4		*	
		27	TC	8.2		*	
		30	TC	6.6		*	
		33	TC	6.1		*	
		36	TC	7.0		*	
		39	TC	5.2		*	
		42	TC	4.5		*	
		45	TC	4.2		*	
		48	TC	4.2		*	
19	230250	00	DS	9.0		*	Concrete step
		03	TC	7.5		*	South of primary
		06	TC	6.1		*	structure
		09	TC	5.2		*	DC = 9 inches
		12	TC	4.7		*	Based on the
		15	TC	4.5		*	deconvolution graph
		18	TC	4.2		*	
		21	TC	4.1		*	
		24	TC	4.2		*	
		27	TC	4.1		*	
		30	TC	4.2		*	
		33	TC	4.1		*	
		36	TC	4.0		*	
		39	TC	3.9		*	
		42	TC	4.0		*	
		45	TC	4.0		*	

Loc #	Grid Location	Depth (in.)	Meas. Type	In Situ Ra-226 (pCi/g) Tot. Ct	In Situ Ra-226 (pCi/g) Spectr.	Chem Ra-226 (pCi/g)	Comments
20	233252	00	DS	2.8		*	South lawn
		06	DS	2.1		*	
21	234237	00	DS	3.8		*	South of primary
		06	DS	2.4		*	structure
		06	DS	5.0		*	Horizontal under sidewalk
22	235245	00	DS	8.5		*	
23	235262	00	DS	2.7		*	Southeast of
		06	DS	2.3		*	primary structure
24	238217	00	DS	2.8		*	Southwest drive
		06	DS	2.6		*	
25	240240	00	DS	3.1		*	South of primary
		06	DS	1.7		*	structure
26	240245	00	DS	<1.0		*	On sidewalk
27	240250	00	DS	3.2		*	South lawn
		06	DS	2.9		*	
28	247220	00	DS	2.0		*	In driveway
		06	DS	2.0		*	
29	249220	00	DS	26.1		*	South end of
		06	DS	5.0		*	driveway
		06	DS	19.8		*	Horizontal under
		12	DS	6.2		*	sidewalk
		03	TC	13.9		*	DC = 15 inches
		06	TC	15.9		*	Based on all
		09	TC	15.1		*	Available data
		12	TC	11.6		*	
		15	TC	8.1		*	
		18	TC	6.4		*	
		21	TC	5.7		*	
		24	TC	5.2		*	
		27	TC	5.2		*	
		30	TC	5.2		*	
		33	TC	5.0		*	
		36	TC	5.0		*	
		39	TC	5.0		*	

Loc #	Grid Location	Depth (in.)	Meas. Type	In Situ Ra-226 (pCi/g) Tot. Ct	In Situ Ra-226 (pCi/g) Spectr.	Chem Ra-226 (pCi/g)	Comments
29	249220	42	TC	4.8		*	
		45	TC	4.6		*	
		48	TC	4.5		*	
30	252220	00	DS	5.7		*	On sidewalk

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 = 08-20-85
Team Leader = DF

RADRPT V85.1<850619.1456> Table 3.2

Radium Concentrations at Interior Locations

DOE ID #GJ-04232-RS 1208 Main Street

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
1		00	DS	22.6		*	Enclosed front porch
2		00	DS	18.2		*	Enclosed front porch
3		00	DS	1.7		*	Enclosed front porch
4		00	DS	2.3		*	Enclosed front porch

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 = 08-20-85
- Team Leader = DF

Table 3.3
Summary of Interior Gamma Exposure Rates
DOE ID No. GJ-04232-RS 1208 Main Street

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	*	*	*	*	13-16	*
Ground Floor	*	*	*	*	13-17	*
Enclosed Porch	08	17-31	21	08	14-31	21
Garage	*	*	*	*	14-16	*

* Walking gamma scans were performed to confirm the absence of interior contamination.

Table 4.1
Area and Volume Calculations
DOE ID No. GJ-04232-RS

AREA	CALCULATIONS(ft)		SF		DEPTH(ft)		CF		CUBIC YARDS		
EXTERIOR											
	Concrete										
A	9.5 x 4	=	38	x	0.5	=	19				
B	9.5 x 2.5	=	24								
	7.5 x 0.8	=	6								
			30	x	0.3	=	9				
H	2 x 8	=	16	x	0.3	=	5				
	Volume of Concrete					=	33	=	33/27	=	1
	Contaminated Fill										
A	9.5 x 4	=	38	x	0.8	=	30				
B	(Area B concrete)		27	x	0.7	=	19				
C	13 x 15	=	195								
	8 x 4	=	32								
	12 x 10	=	120								
	10 x 10	=	100								
	9 x 7	=	63								
			510	x	0.5	=	255				
D	4 x 7	=	28	x	0.8	=	22				
E	4 x 4	=	16	x	1.0	=	16				
F	1 x 4.2 x 2	=	8	x	0.8	=	6				
G	7 x 4	=	28	x	1.0	=	28				
H	2 x 8	=	16	x	1.0	=	16				
I	2 x 8	=	16	x	1.3	=	21				

Table 4.1
Area and Volume Calculations
DOE ID No. GJ-04232-RS

AREA	CALCULATIONS(ft)		SF		DEPTH(ft)		CF				CUBIC YARDS
J	3 x 10	=	30								
	4 x 12	=	48								
			78	x	0.5	=	39				
K	12 x 3	=	36	x	1.0	=	36				
L	10 x 2	=	20	x	0.5	=	10				
	Volume of Fill					=	498	=	498/27	=	18
	TOTAL VOLUME - EXTERIOR									=	19

See Appendix Figure(s) 3.3 For Areas

Table 4.2
Estimated Cost of Decontamination and Restoration
DOE ID No. GJ-04232-RS

EXTERIOR		
Remove/store/replace personal property items	$	50
Remove/replace siding from interior surface of steprails		200
Remove/replace concrete steps (replace as/UBC) 1 cy @ $275/cy		275
Remove/replace concrete walks 45 sf @ $3/sf		135
Remove identified residual radioactive material 16 cy @ $14.50/cy (machine-open) 2 cy @ $44/cy (manual-open)		232 88
Replace areas with compacted roadbase 6 cy @ $11.50/cy		69
Replace areas with topsoil 10 cy $ $9.50/cy		95
Replace areas with topsoil/organic mix 2 cy $ $12.50/cy		25
Replace one vine		30
Replace perennial plantings 40 sf @ $3/sf		120
Replace areas with sod 560 sf @ $.25/sf		140
Place new handrails at steps as/UBC code		200
Clean up Lump sum		100
TOTAL EXTERIOR	$	1,759

Table 4.2
Estimated Cost of Decontamination and Restoration
DOE ID No. GJ-04232-RS

TOTAL EXTERIOR	$	1,759
TOTAL INTERIOR		0
ACCESS CONTROL		250
SUBTOTAL	$	2,009
CONTINGENCY @ 5%		100
SUBTOTAL	$	2,109
CONTRACTOR OVERHEAD & PROFIT @ 40%		844
GRAND TOTAL	$	2,953

CK092385
REA04232/REA-715/AP

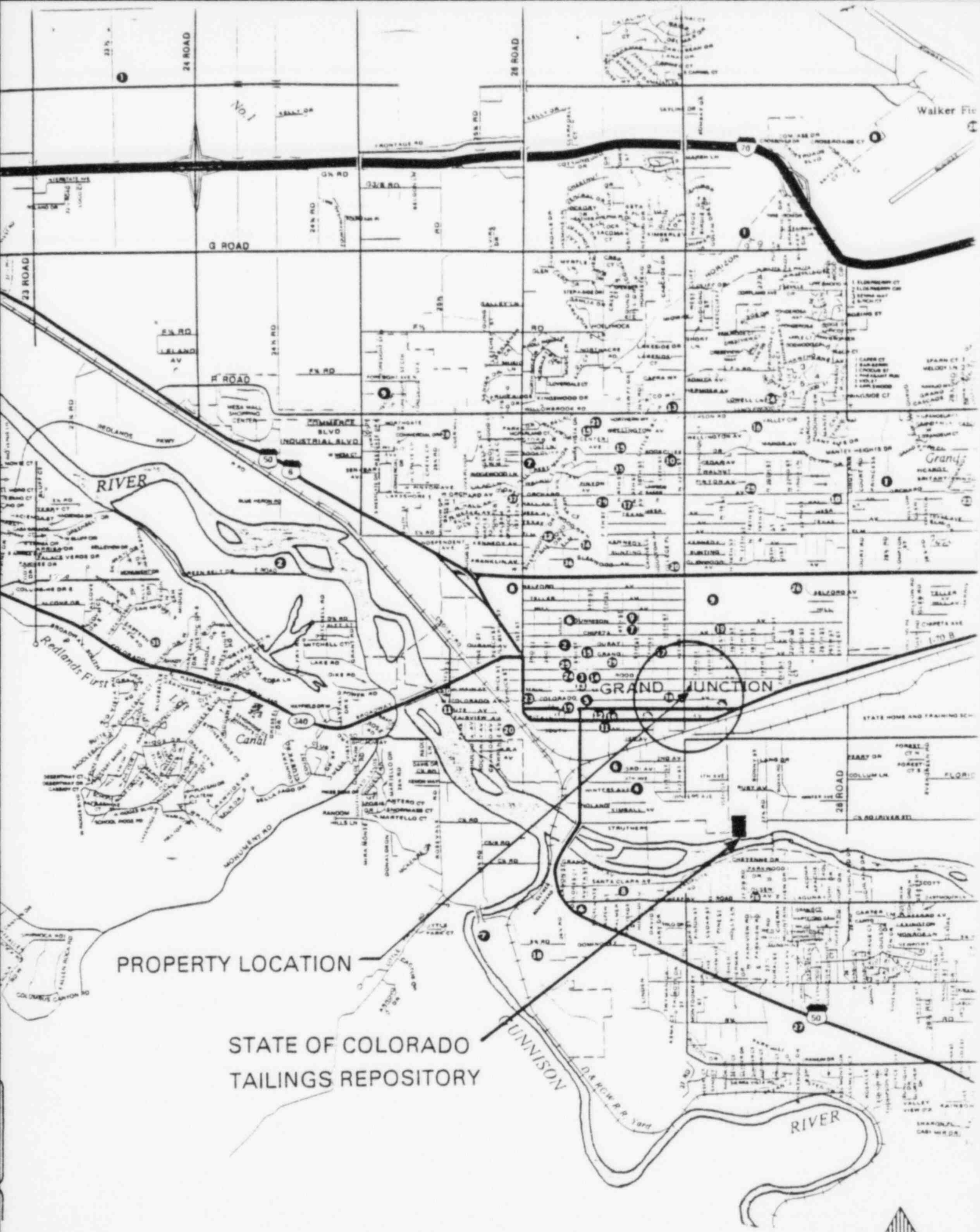
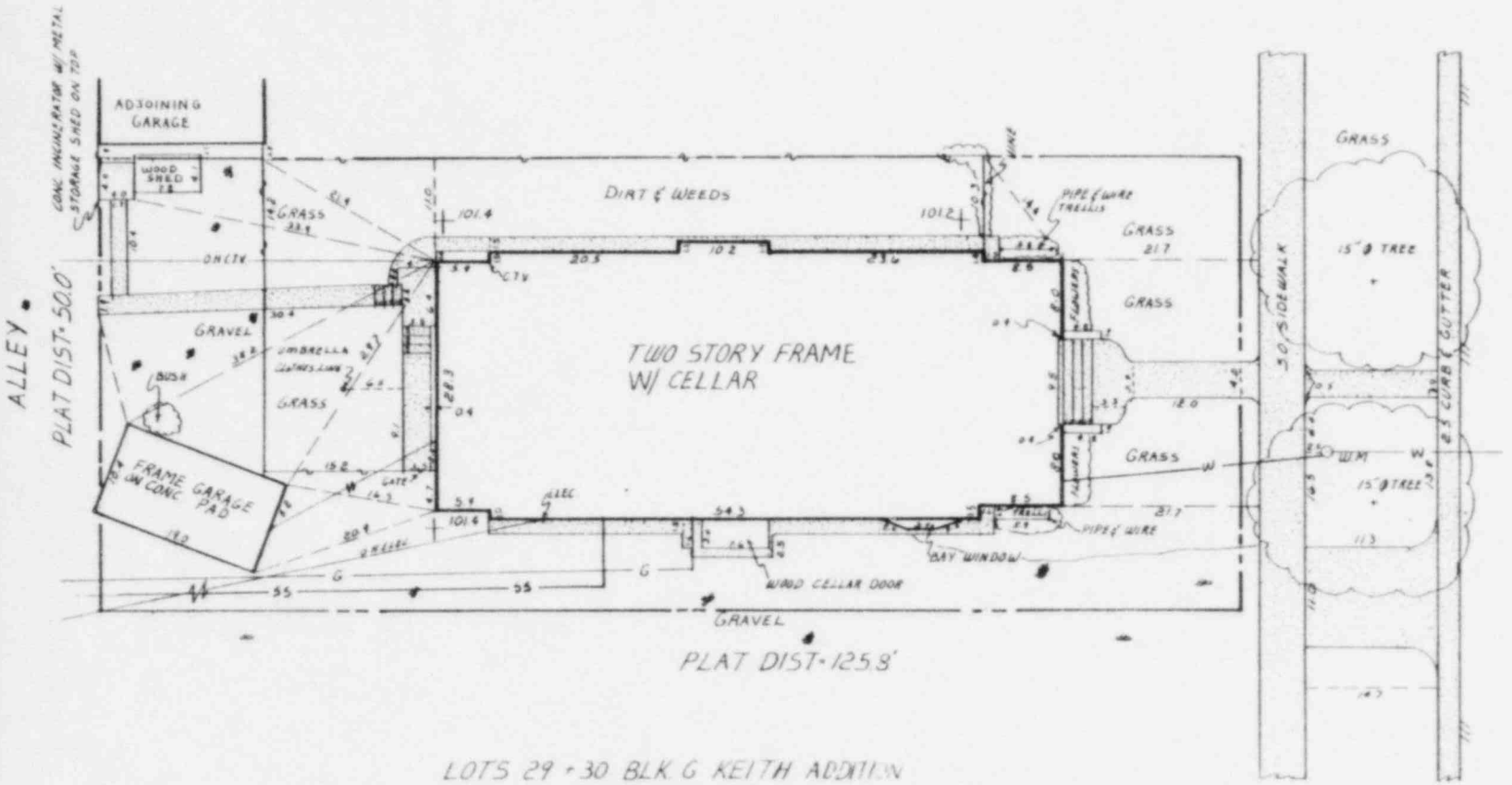


FIGURE 2.1
VICINITY MAP



LOTS 29 & 30 BLK. G KEITH ADDITION
CITY OF GRAND JUNCTION
MESA COUNTY, COLORADO

10' 5' 0 10' 20'
(SCALE IN FEET)

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 2.2 SITE PLAN

U.S. DEPARTMENT OF ENERGY GRAND JUNCTION PROJECT OFFICE, COLORADO	DOE I.D. NO. GJ-04232-RS
ADDRESS 1208 MAIN ST GRAND JUNCTION, COLORADO	ALLIED Bendix Aerospace Bendix Field Engineering Corporation
SURV. GDE/8-15-83 DRAFT TPW/8-16-83	CK.
DRAWING NO. 3-C-893-F1	SHEET 2 OF 2

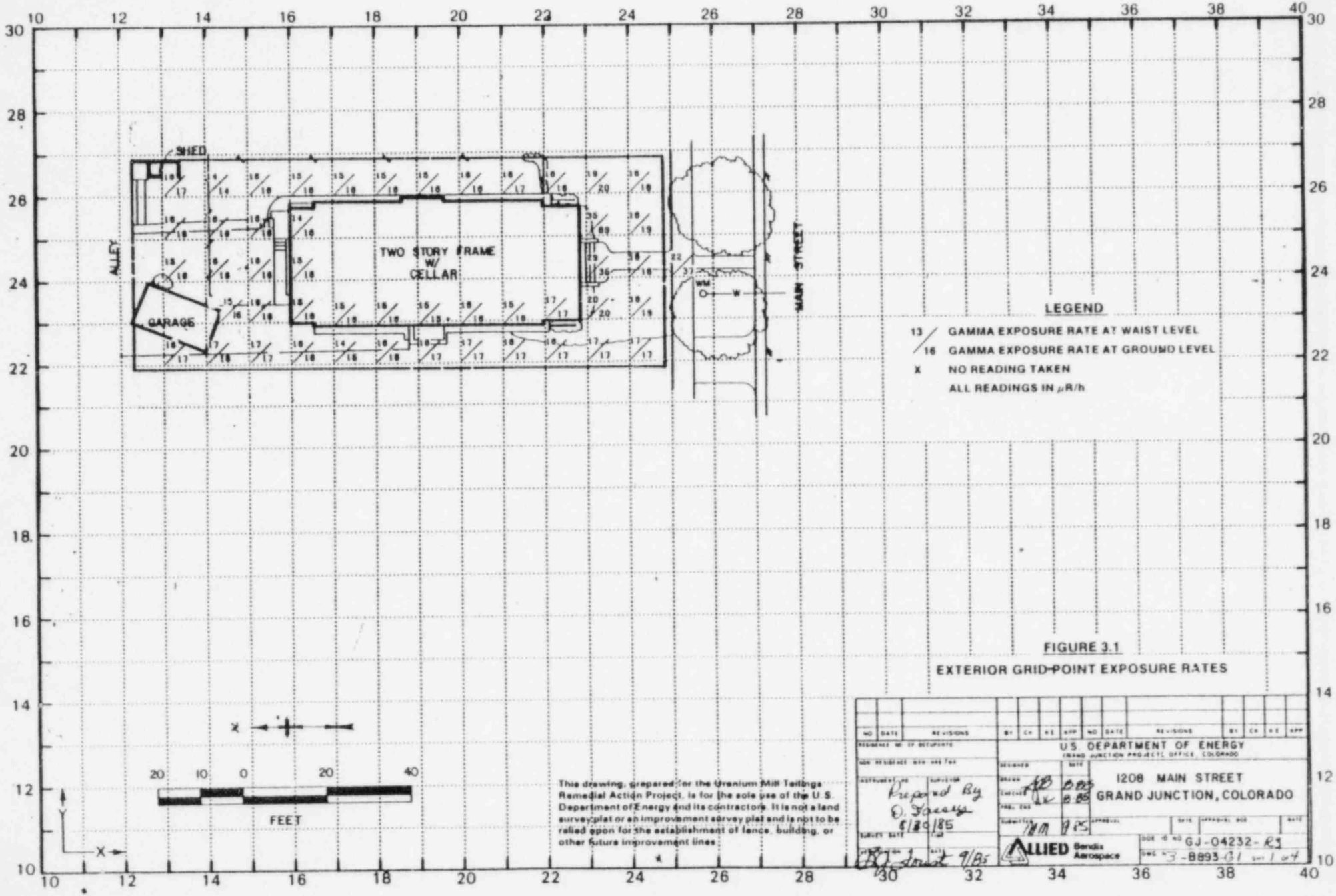


FIGURE 3.1

EXTERIOR GRID-POINT EXPOSURE RATES

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

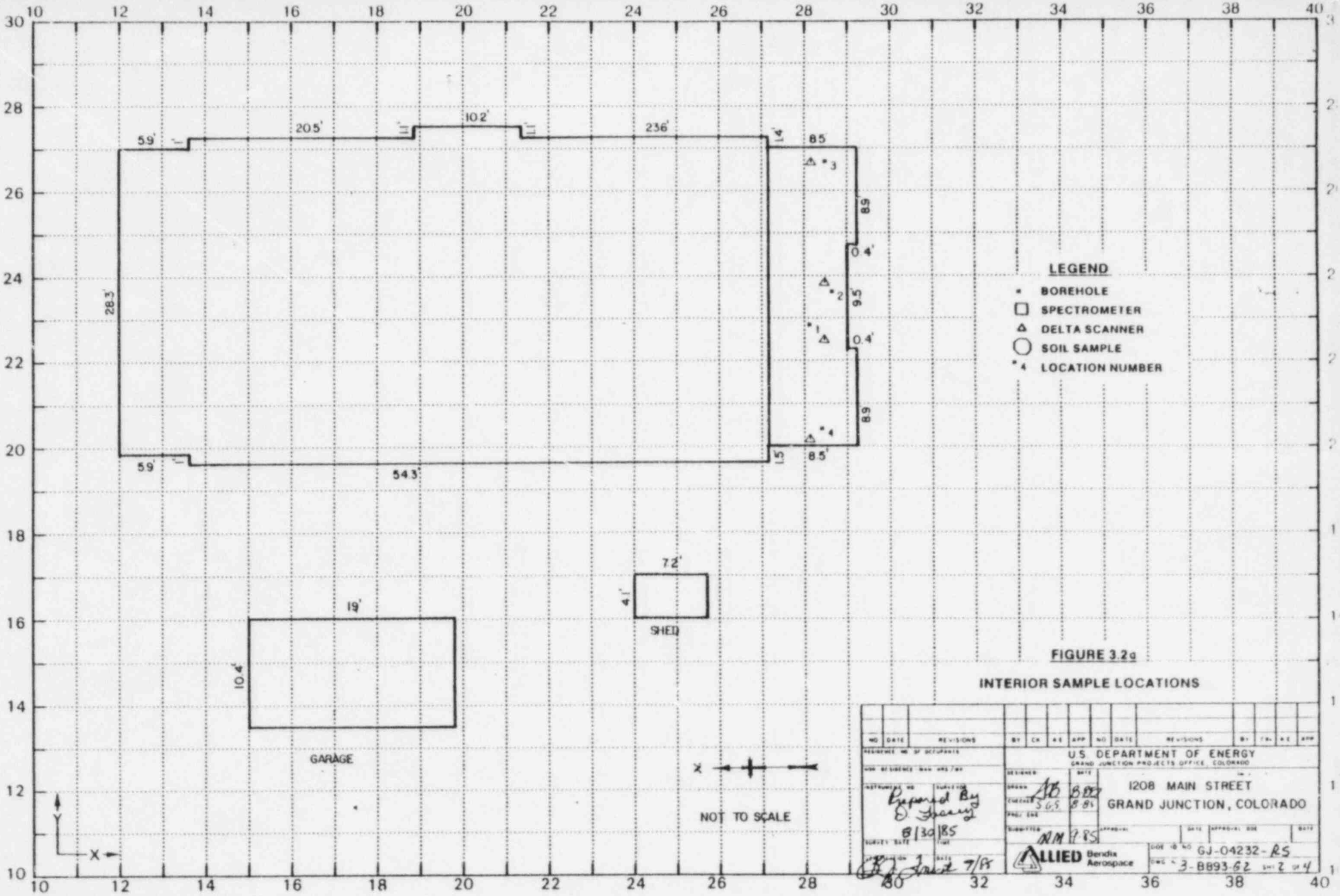
1208 MAIN STREET
GRAND JUNCTION, COLORADO

Prepared By
D. Tarcza
8/30/85

ALLIED Bendix Aerospace

DOE ID NO GJ-04232-R3

DWG NO 3-8893-31 SH 1 of 4


59'
20.5'
1'
10.2'
1'
23.6'
1'
8.5
3
8.9'
0.4'
2
9.5'
1
0.4'
4
8.9'
28.3'
59'
1'
54.3'
1'
8.5'
7.2'
4'
SHED
19'
10.4'
GARAGE
X
NOT TO SCALE
Y
X
LEGEND
BOREHOLE
SPECTROMETER
DELTA SCANNER
SOIL SAMPLE
LOCATION NUMBER
FIGURE 3.2g
INTERIOR SAMPLE LOCATIONS
U.S. DEPARTMENT OF ENERGY
GRAND JUNCTION PROJECTS OFFICE, COLORADO
1208 MAIN STREET
GRAND JUNCTION, COLORADO
Prepared By
B/30/85
7/85
ALLIED Bendix Aerospace
GJ-04232-RS
3-B893-62

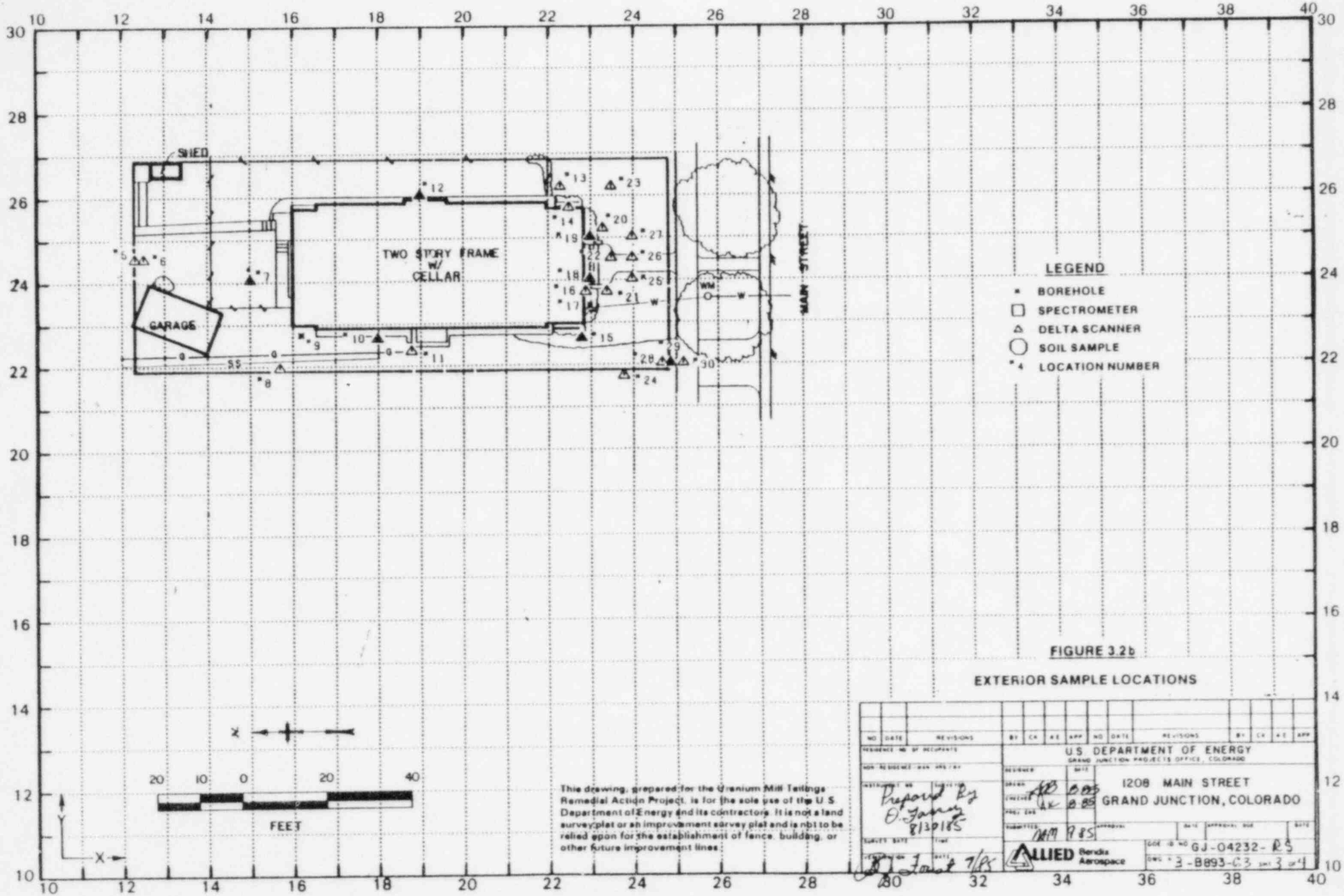


FIGURE 3.2b

EXTERIOR SAMPLE LOCATIONS

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NO	DATE	REVISIONS	BY	CK	AE	APP

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

1208 MAIN STREET
GRAND JUNCTION, COLORADO

Prepared By D. Farmer 8/30/85

ALLIED Bendix Aerospace

GJ-04232-R5

3-B893-63 SHT 3 OF 4

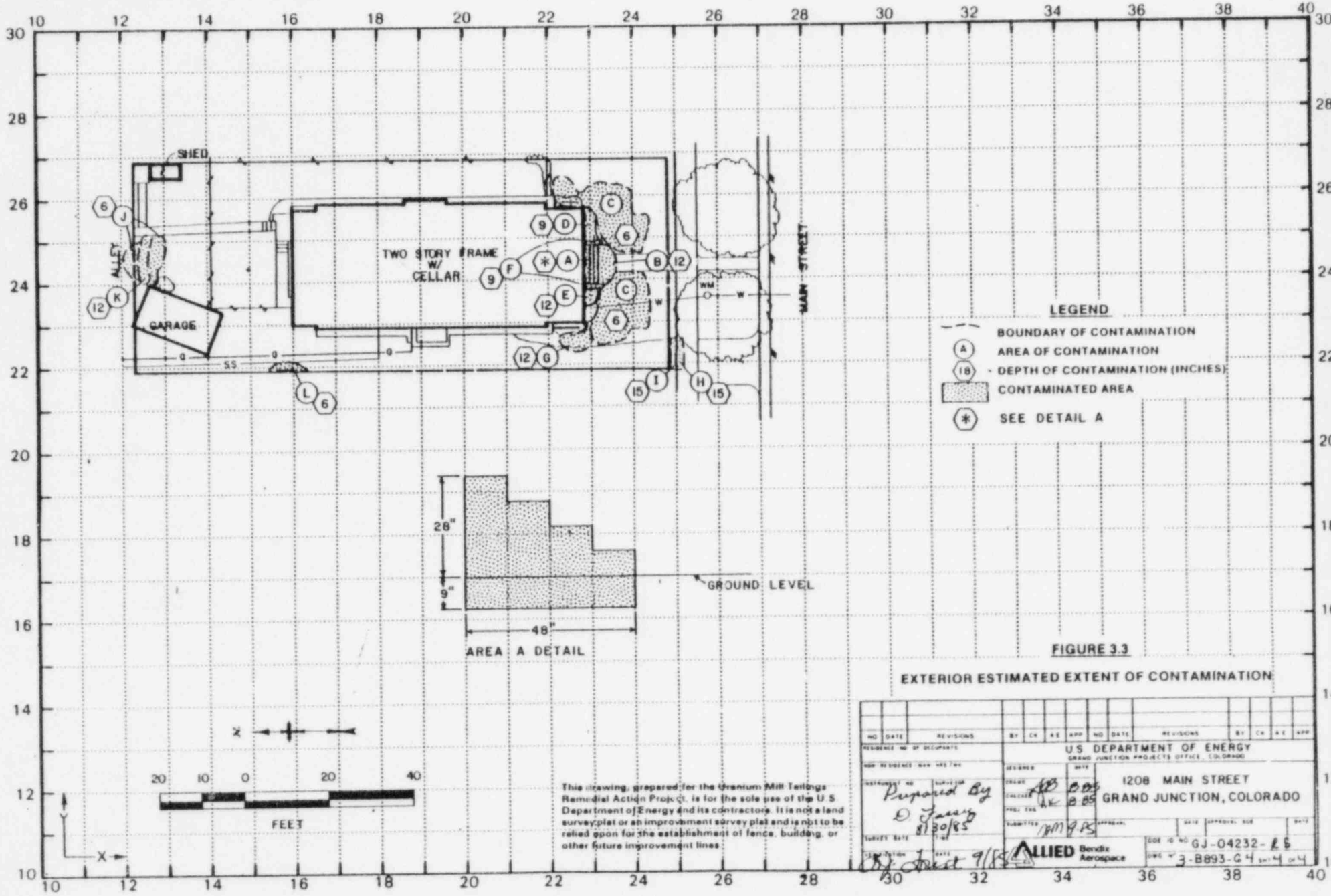

FIGURE 3.3

EXTERIOR ESTIMATED EXTENT OF CONTAMINATION

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

1208 MAIN STREET
GRAND JUNCTION, COLORADO

Prepared By D. Jarvis 8/30/85

ALLIED Bendix Aerospace

GJ-04232-C6

3-B893-G4 SHT 4 OF 4

MEMORANDUM

ALLIED Bendix
Aerospace

Bendix Field Engineering Corporation
Grand Junction Operations
Grand Junction, Colorado

Date: August 20, 1985

To: Files

From: Dan Fossey

Subject: Team Leader Notes - GJ-04232-RS

Address: 1208 Main Street

Owner: Howard J. and J.D. Roland

Telephone: 245-3737

Year Built: 1909

Occupancy: Two

Arrival Time: 7:45 AM

Team Members

D. Fossey (Team Leader)
L. Kula
H. Mattison
S. Southern
M. Dexter
S. Garcia

Instruments

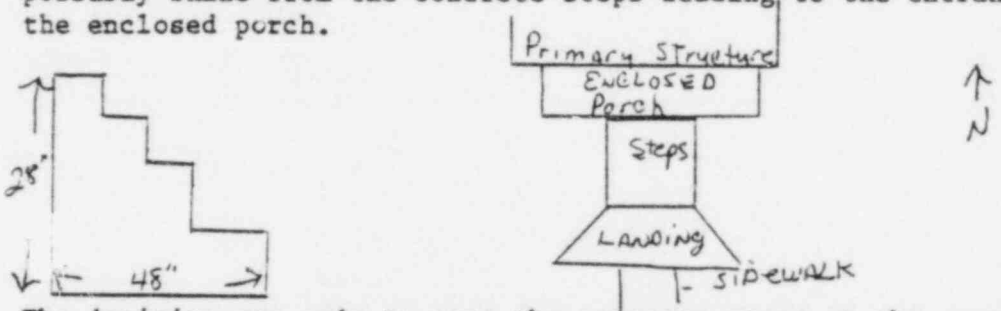
See Equipment Summary sheet

The Colorado Department of Health (CDH) data indicates elevated gamma readings in the enclosed porch at the south end of the primary structure, and associated with the concrete steps south of the primary structure.

T. Flores arrived on the site at 8:15 AM to borrow the equipment truck so that he could conduct a revisit. S. Garica accompanied T. Flores to assist him on the revisit. S. Garcia and the equipment truck returned to the site at approximately 10:30 AM.

Team members located the water and gas lines. These lines were noted on the Exterior Sample Location map. Team members were unable to locate the sewer line.

During the interior gamma survey, elevated gamma readings were recorded in the enclosed porch at the south end of the primary structure. There was no access to the crawl space under this portion of the primary structure. The elevated gamma readings are possibly shine from the concrete steps leading to the entrance of the enclosed porch.



The decision was made to core the concrete steps at the south entrance of the primary structure. This was done to investigate the soil beneath the steps for possible contamination. What appears to be tailings sand was found beneath the steps.

The concrete steps are 114-inches long. Both sides of the steps are enclosed with a wooden frame and plastic siding.

Augering was very difficult throughout the entire property. The soil was mainly hard packed clay.

The survey was completed at 2:30 PM. All team members were alpha scanned before returning to the compound.

REVISIT

Date: August 26, 1985

The purpose of this revisit is to investigate the sewer line, which was not located during the initial survey. The sewer line was located with the help of the homeowner. The auger hole was performed at grid point 180226. Data for this auger hole has been added to the Appendix Table 3.1.

A horizontal delta reading was taken at grid point 249220 to investigate the soil underneath the city sidewalk. The delta showed the soil to be contaminated.

Date: September 9, 1985

ADDENDUM

Instrument C-4064 failed the post-calibration on 21 August 1985. This instrument was sent to the E-Lab for repair. The E-Lab personnel found that the DC power supply (6 "D"-cell batteries) were slightly below normal operating current. The batteries were replaced and the DC high voltage indicator was adjusted. No other problems were found with this instrument. It was determined that the data taken with this instrument is valid.

Date: September 19, 1985

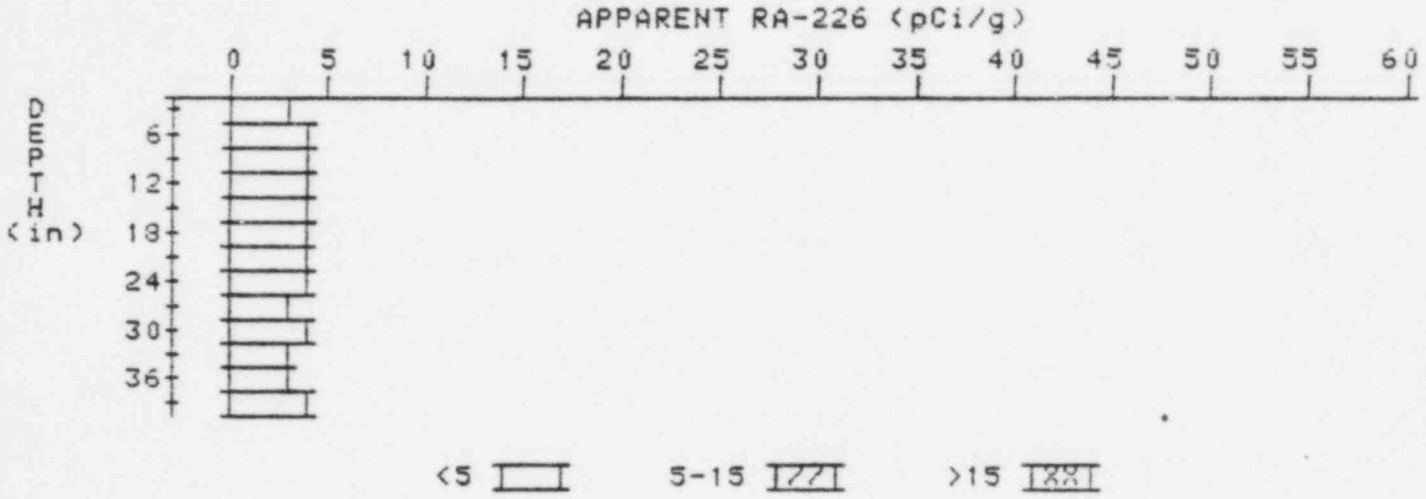
Phone conversation with Dan Fossey:

Cathy Kelleher stated that there was not enough spillover on the west property line to request a spillover inclusion.

DECON V85.1<850524.0823>

APPARENT RADIUM-226 CONCENTRATION DECONVOLUTION GRAPH

PROPERTY NUMBER: GJ-04232-RS
HOLE NUMBER: 7
LOCATION: 150240



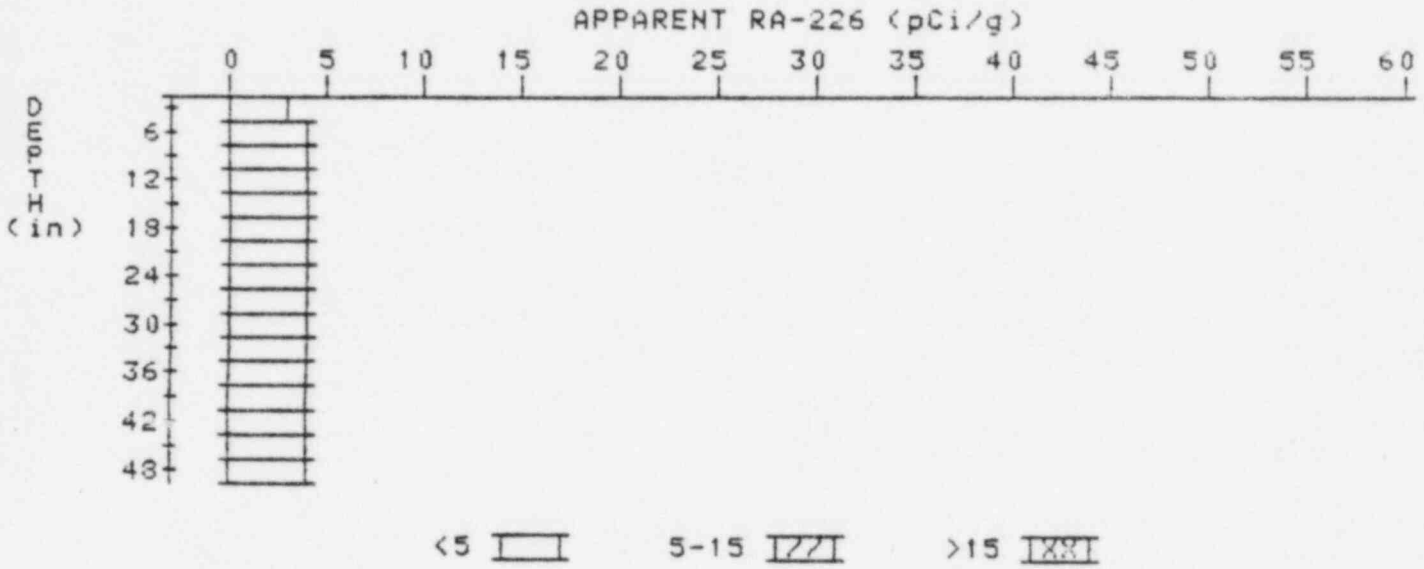
Depth (in)	Apparent Radium-226 (pCi/g) Undeconvolved	Apparent Radium-226 (pCi/g) Deconvolved
3	3.2	3.2
6	3.5	3.9
9	3.6	3.6
12	3.7	3.9
15	3.7	3.5
18	3.8	4.2
21	3.7	3.5
24	3.7	3.9
27	3.6	3.4
30	3.6	3.8
33	3.5	3.3
36	3.5	3.1
39	3.7	3.7

DECON V85.1<850524.0823>

APPARENT RADIUM-226 CONCENTRATION DECONVOLUTION GRAPH

9

PROPERTY NUMBER: GJ-04232-RS
HOLE NUMBER: 9
LOCATION: 162227

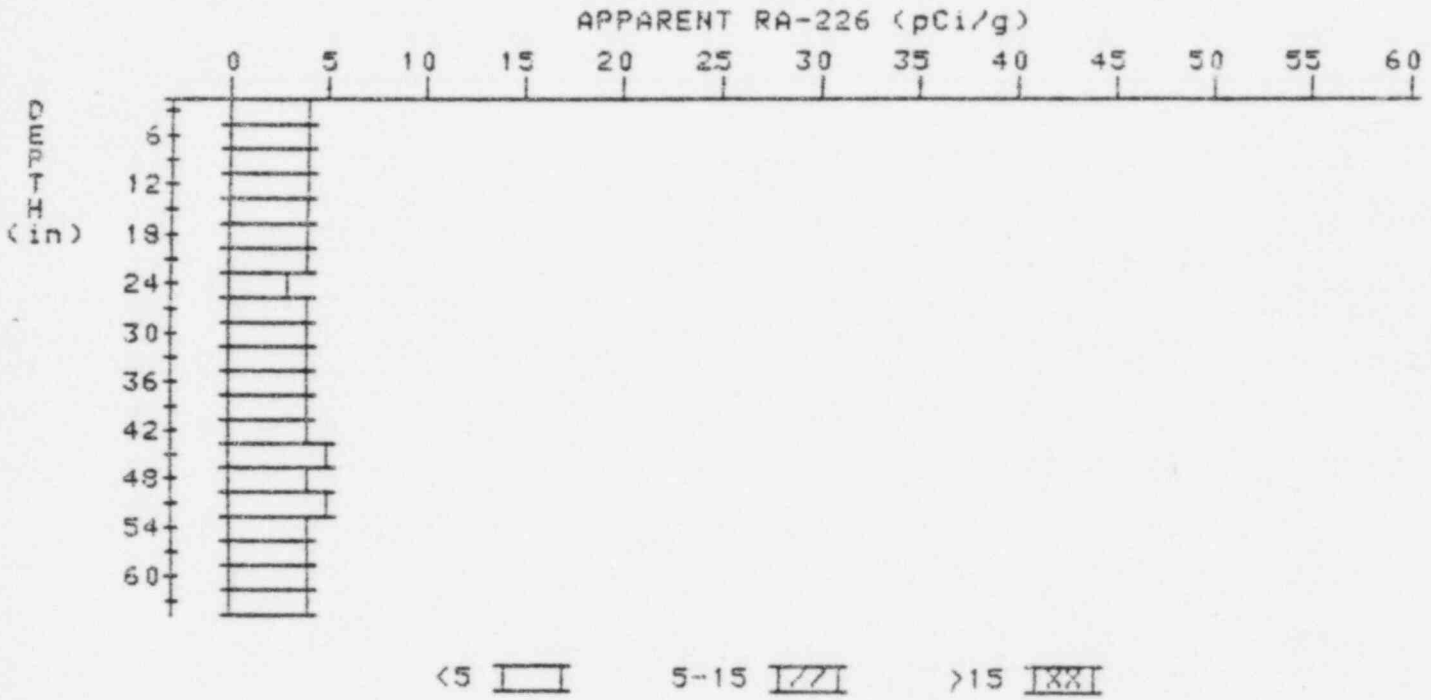


Depth (in)	Apparent Radium-226 (pCi/g) Undeconvolved	Apparent Radium-226 (pCi/g) Deconvolved
3	3.3	3.3
6	3.6	3.8
9	3.8	4.2
12	3.8	3.6
15	3.9	4.1
18	3.9	3.9
21	3.9	3.7
24	4.0	4.0
27	4.1	4.3
30	4.1	4.1
33	4.1	4.1
36	4.1	3.9
39	4.2	4.4
42	4.2	4.0
45	4.3	4.5
48	4.3	4.3

DECON V85.1<850524.0823>

APPARENT RADIUM-226 CONCENTRATION DECONVOLUTION GRAPH 10

PROPERTY NUMBER: GJ-04232-RS
HOLE NUMBER: 10
LOCATION: 180226



Depth (in)	Apparent Radium-226 (pCi/g) Undeconvolved	Apparent Radium-226 (pCi/g) Deconvolved
3	3.6	3.6
6	3.9	4.3
9	4.0	4.2
12	4.0	4.0
15	4.0	4.2
18	3.9	4.1
21	3.7	3.5
24	3.6	3.2
27	3.7	3.5
30	3.9	4.3
33	3.9	3.7
36	4.0	4.2
39	4.0	3.8
42	4.1	4.1
45	4.2	4.6
48	4.1	3.7
51	4.2	4.6

54	4.1	3.9
57	4.1	4.1
60	4.1	4.1
63	4.1	4.1

DECON V85.1<850524.0823>

APPARENT RADIUM-226 CONCENTRATION DECONVOLUTION GRAPH 12

PROPERTY NUMBER: GJ-04232-RS
HOLE NUMBER: 12
LOCATION: 190260

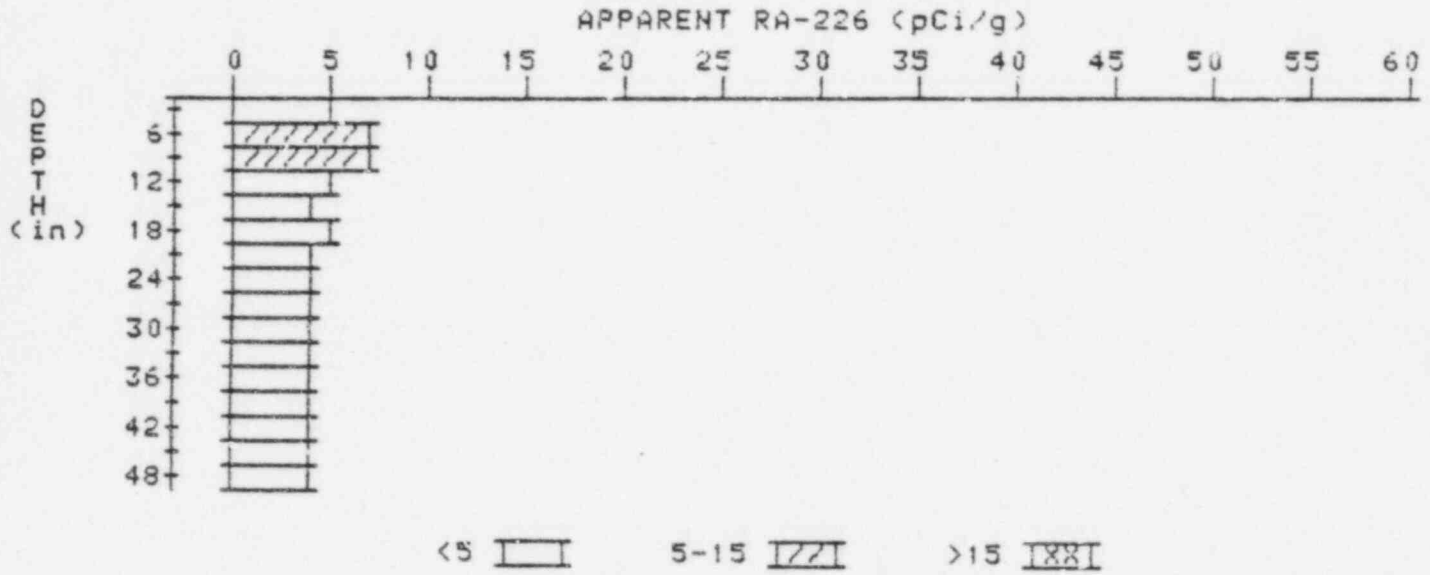
Depth (in)	Apparent Radium-226 (pCi/g) Undeconvolved	Aoparent Radium-226 (pCi/g) Deconvolved
3	3.5	3.5
6	3.7	3.9
9	3.8	3.8
12	3.9	4.3
15	3.8	3.6
18	3.8	3.6
21	3.9	4.1
24	3.9	3.7
27	4.0	4.4
30	3.9	3.7
33	3.9	3.7
36	4.0	4.4
39	3.9	3.9
42	3.8	3.6
45	3.8	3.6
48	3.9	4.3
51	3.8	3.6

54	3.8	3.9
57	3.9	3.8
60	3.8	3.8
63	3.8	3.9

DECON V85.1<850524.0823>

APPARENT RADIUM-226 CONCENTRATION DECONVOLUTION GRAPH 15

PROPERTY NUMBER: GJ-04232-RS
HOLE NUMBER: 15
LOCATION: 228226

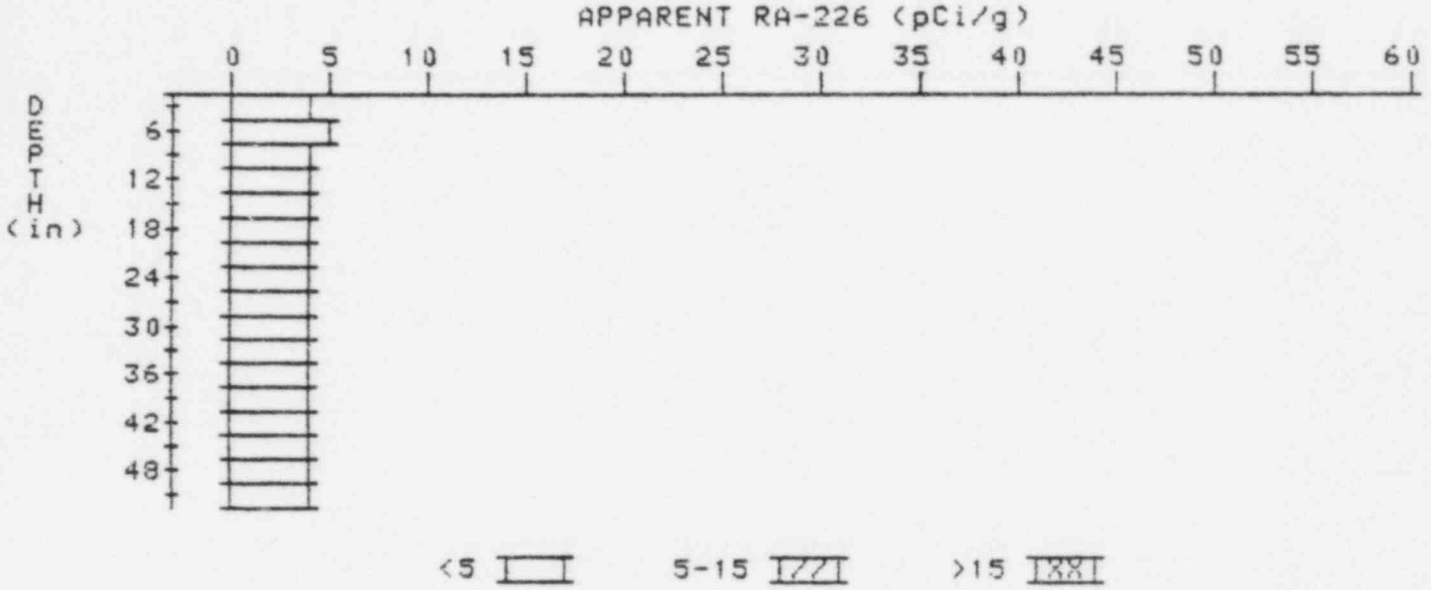


Depth (in)	Apparent Radium-226 (pCi/g) Undeconvolved	Apparent Radium-226 (pCi/g) Deconvolved
3	4.8	4.8
6	5.5	6.6
9	5.6	6.7
12	5.1	4.9
13	4.7	4.3
18	4.5	4.5
21	4.3	4.3
24	4.1	3.6
27	4.2	4.4
30	4.2	4.4
33	4.1	3.9
36	4.1	4.3
39	4.0	3.8
42	4.0	4.0
45	4.0	4.2
48	3.9	3.9

DECON V85.1<850524.0823>

APPARENT RADIUM-226 CONCENTRATION 17
DECONVOLUTION GRAPH

PROPERTY NUMBER: GJ-04232-RS
HOLE NUMBER: 17
LOCATION: 230234



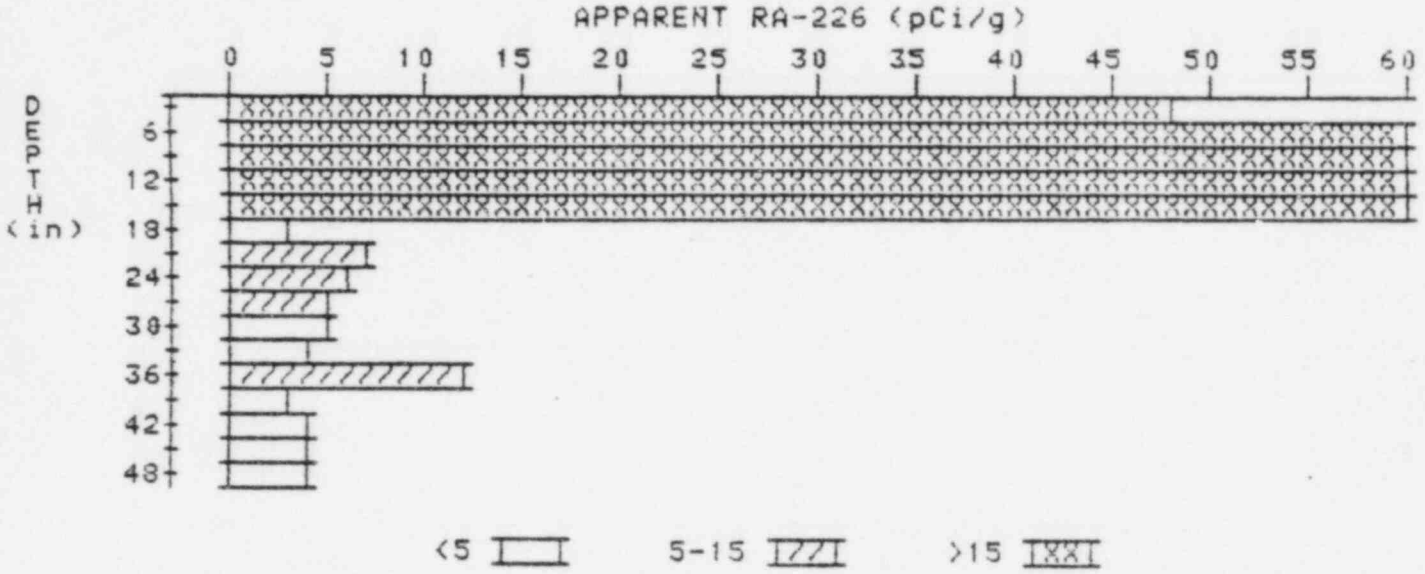
Depth (in)	Apparent Radium-226 (pCi/g) Undeconvolved	Apparent Radium-226 (pCi/g) Deconvolved
3	3.5	3.5
6	3.9	4.6
9	3.9	3.7
12	4.0	4.2
15	4.0	4.2
18	3.9	3.7
21	3.9	3.9
24	3.9	3.7
27	4.0	4.2
30	4.0	3.8
33	4.1	4.5
36	4.0	3.6
39	4.1	4.5
42	4.0	3.8
45	4.0	4.0
48	4.0	4.0
51	4.0	4.0

DECON V85.1<850524.0823>

APPARENT RADIUM-226 CONCENTRATION DECONVOLUTION GRAPH

18

PROPERTY NUMBER: GJ-04232-RS
HOLE NUMBER: 18
LOCATION: 230240

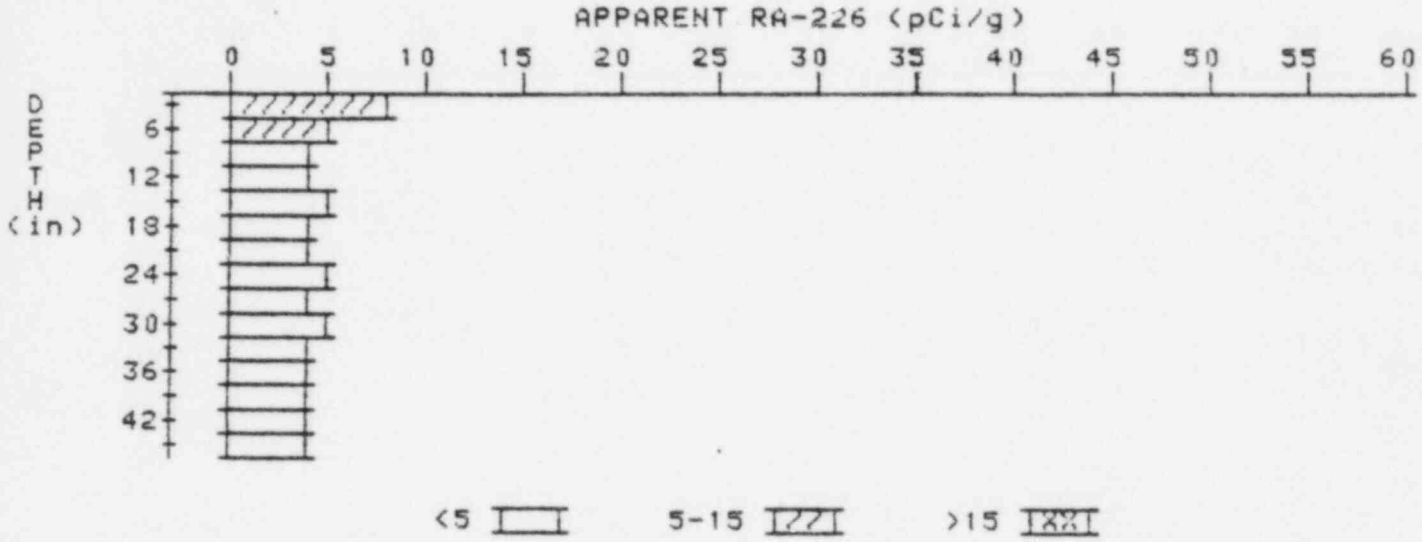


Depth (in)	Apparent Radium-226 (pCi/g) Undeconvolved	Apparent Radium-226 (pCi/g) Deconvolved
3	48.1	48.1
6	75.4	106.2
9	85.4	111.2
12	80.9	114.5
15	57.5	64.8
18	30.0	3.0
21	17.7	7.0
24	11.4	5.9
27	8.2	5.4
30	6.6	4.6
33	6.1	3.6
36	7.0	11.8
39	5.2	3.2
42	4.5	3.8
45	4.2	3.7
48	4.2	4.2

DECON V85.1<850524.0823>

APPARENT RADIUM-226 CONCENTRATION DECONVOLUTION GRAPH 19

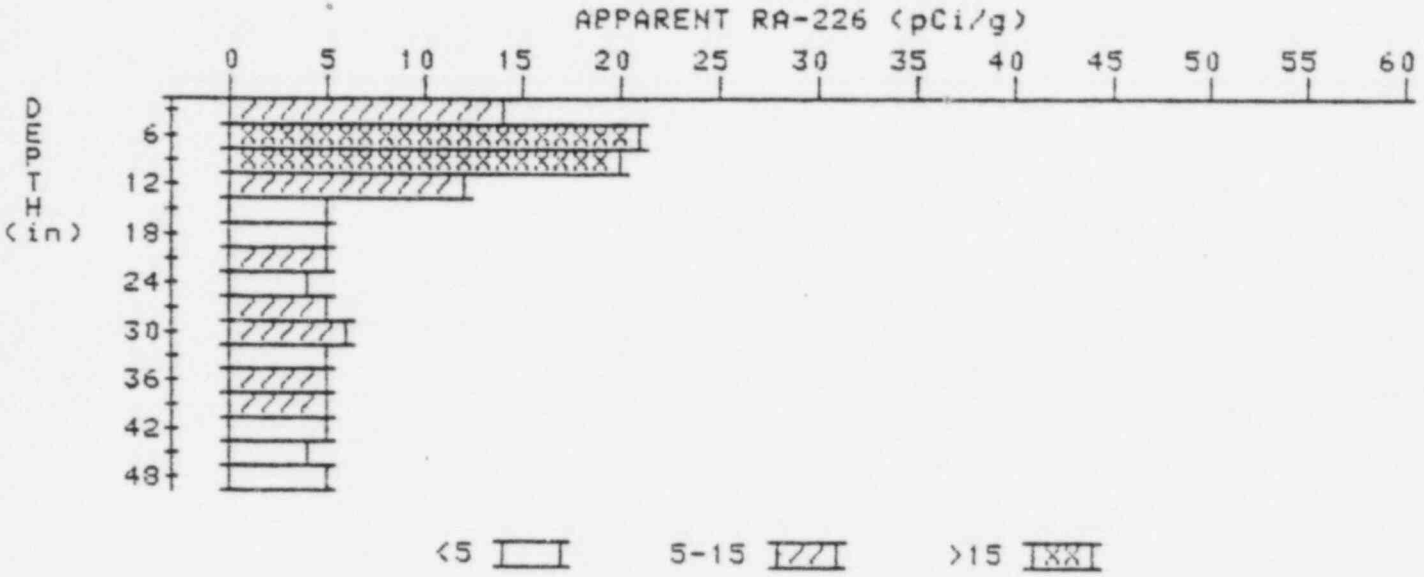
PROPERTY NUMBER: GJ-04232-RS
HOLE NUMBER: 19
LOCATION: 230250



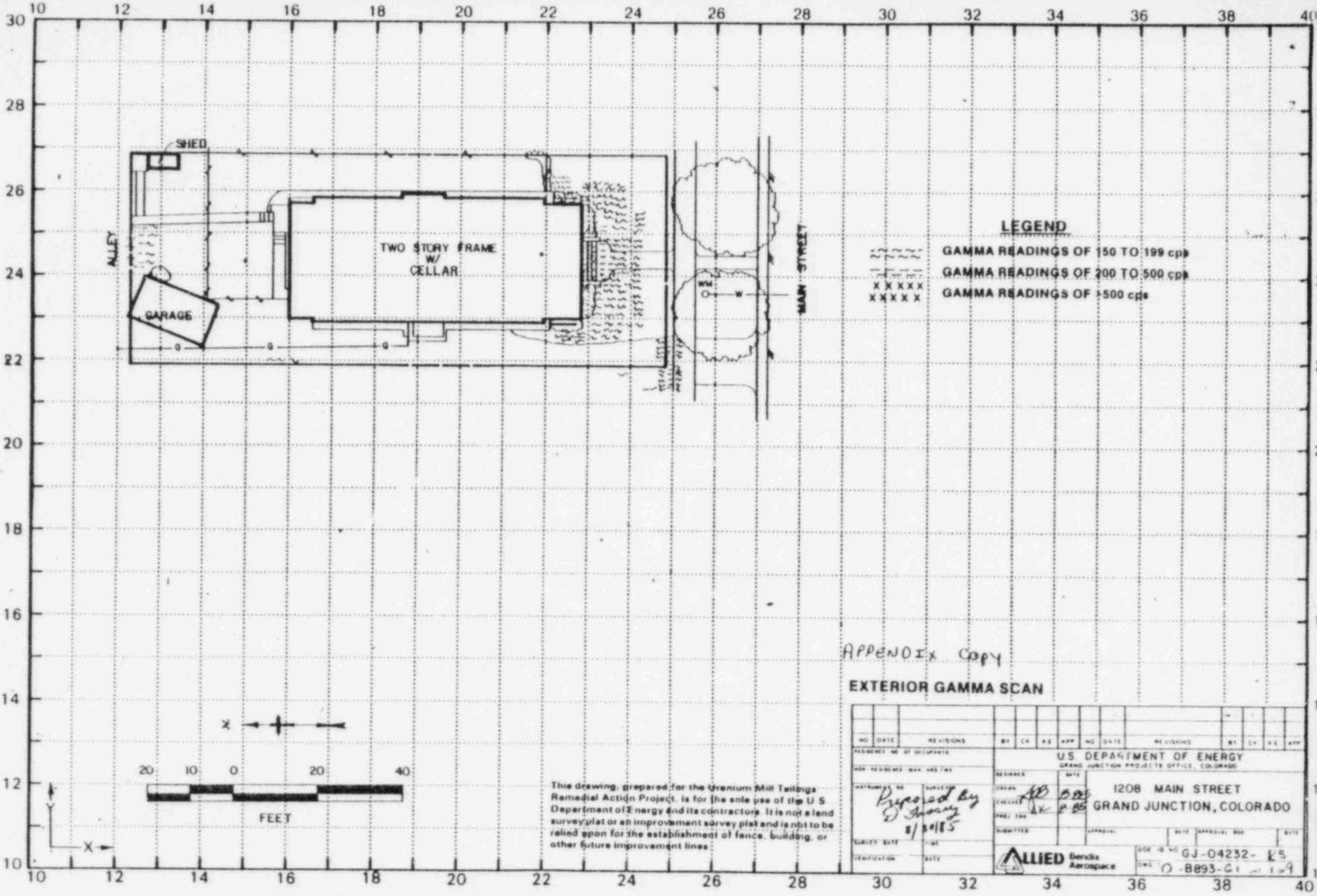
Depth (in)	Apparent Radium-226 (pCi/g) Undeconvolved	Apparent Radium-226 (pCi/g) Deconvolved
3	7.5	7.5
6	6.1	5.2
9	5.2	4.5
12	4.7	4.2
15	4.5	4.7
18	4.2	3.8
21	4.1	3.7
24	4.2	4.6
27	4.1	3.7
30	4.2	4.6
33	4.1	4.1
36	4.0	4.0
39	3.9	3.5
42	4.0	4.2
45	4.0	4.0

APPARENT RADIUM-226 CONCENTRATION DECONVOLUTION GRAPH

PROPERTY NUMBER: GJ-04232-RS
HOLE NUMBER: 29
LOCATION: 249220



Depth (in)	Apparent Radium-226 (pCi/g) Undeconvolved	Apparent Radium-226 (pCi/g) Deconvolved
3	13.9	13.9
6	15.9	20.9
9	15.1	19.9
12	11.6	11.6
15	8.1	4.9
18	6.4	4.6
21	5.7	5.3
24	5.2	4.3
27	5.2	5.2
30	5.2	5.6
33	5.0	4.6
36	5.0	5.0
39	5.0	5.4
42	4.8	4.8
45	4.6	4.4
48	4.5	4.5



APPENDIX COPY

EXTERIOR GAMMA SCAN

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Surveyed By D Thorny 8/30/85

US DEPARTMENT OF ENERGY
GRAND JUNCTION PROJECTS OFFICE, COLORADO

1208 MAIN STREET
GRAND JUNCTION, COLORADO

ALLIED Bendix Aerospace

GJ-04232- KS
O-8893-G1