

RADIOLOGIC AND ENGINEERING ASSESSMENT

FOR

DOE ID NO.: GJ-03936-RS  
ADDRESS: 2414 HALL AVENUE

AUGUST 1985

FOR

URANIUM MILL TAILINGS REMEDIAL ACTION PROJECT OFFICE

ALBUQUERQUE OPERATIONS OFFICE

DEPARTMENT OF ENERGY

BY

BENDIX FIELD ENGINEERING CORPORATION  
P.O. Box 1569  
Grand Junction, Colorado 81502

APPROVED BY

*M.K. Tucker* *by* *RA*

M. TUCKER  
DOE PROJECT ENGINEER

DATE

*August 2, 1985*

REA03936:REA-705

8508150066 850802  
PDR WASTE  
WM-54 PDR

## TABLE OF CONTENTS

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

## **1.0 EXECUTIVE SUMMARY**

### **1.1 Introduction**

The location, DOE ID No. GJ-03936-RS, is a single-family residence located at 2414 Hall 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, 1 cu. yd.; interior, 0 cu. yd.

## 2.0 PROPERTY DESCRIPTION

### 2.1 General Description

Address: 2414 Hall Avenue, Grand Junction, Colorado

Zoning: Residential (RSF-8)

Lot Size: Approximately 7,800 sf (0.18 acres)

Legal Description: Lot 4, excluding east 4 feet, Block 1, Regent Subdivision, City of Grand Junction, County of Mesa, State of Colorado.

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

### 2.2 Existing Facilities and Structures

Primary Structure:

Type:	Single-story residence
Size:	Approximately 1,000 sf
Construction Date:	1958
Construction:	Wood-frame
Foundation:	Concrete stemwall on spread footing
Footing Depth:	Approximately 24" to bottom of footing from grade
Basement:	None
Crawl Space:	Yes - under entire living area
Condition:	Good

Other Structures:           None

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-03936-RS on July 5, 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 along the east property line.

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: 15 to 16 uR/h  
Highest Outside Gamma Reading (HOG): 94 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: 15 to 17 uR/h  
Highest Inside Gamma Reading (HIG): 17 uR/h

Interior gamma exposure-rate measurements are summarized in Appendix Table 3.2.

#### 3.3 Boreholes, Soil Samples, and Other Measurements

Areas which displayed elevated gamma levels were further investigated; these areas are shown in Appendix Figure 3.2. Data from these investigations are included in Appendix Table 3.1.

#### 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 that contain identified residual radioactive materials are:

- (Area A) Surface Material: Lawn  
Direction From Primary Structure: South  
Total Depth of Contamination: 12 inches  
Approximate Square Footage: 20
- (Area B) Surface Material: Lawn  
Direction From Primary Structure: North  
Total Depth of Contamination: 6 inches  
Approximate Square Footage: 30

#### 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) when averaged over 100 m<sup>2</sup>.

The EPA Standards are:

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

Appendix Table 4.1 presents the area and volume calculations of contamination present on the property. The average radium concentration for this property is 2.8 pCi/g which falls below the allowable EPA Standard, including background, of 7 pCi/g for this area. 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	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	Exterior Sample Locations
Figure 3.3	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

DOE ID #GJ-03936-RS

2414 Hall Avenue

Page 1 of 2

Loc #	Grid Location	Depth (in.)	Meas. Type	In Situ Ra-226 (pCi/g)		Chem Ra-226 (pCi/g)	Comments
				Tot. Ct	Spectr.		
1	140288	00	DS	5.1		*	East fence line
		06	DS	2.1		*	
2	143277	00	DS	1.5		*	Sidewalk north of primary structure
3	170288	00	DS	2.2		*	East fence line
		06	DS	1.4		*	
4	185258	03	TC	2.8		*	Next to sewer line DC = 0 inches
		06	TC	3.0		*	
		09	TC	3.2		*	
		12	TC	3.3		*	
		15	TC	3.3		*	
		18	TC	3.3		*	
		21	TC	3.4		*	
		24	TC	3.5		*	
		27	TC	3.5		*	
		30	TC	3.5		*	
		33	TC	3.5		*	
		36	TC	3.5		*	
		39	TC	3.4		*	
		42	TC	3.5		*	
		45	TC	3.5		*	
		48	TC	3.5		*	
		51	TC	3.5		*	
		54	TC	3.5		*	
		57	TC	3.5		*	
5	189269	03	TC	3.7		*	Foundation DC = 0 inches
		06	TC	4.0		*	
		09	TC	3.9		*	
		12	TC	3.7		*	
		15	TC	3.6		*	
		18	TC	3.6		*	
		21	TC	3.6		*	
		24	TC	3.5		*	
		27	TC	3.6		*	
		30	TC	2.9		*	
		33	TC	3.5		*	

## Radium Concentrations at Exterior Locations

DOE ID #GJ-03936-RS

2414 Hall Avenue

Page 2 of 2

Loc #	Grid Location	Depth (in.)	Meas. Type	In Situ Ra-226 (pCi/g)		Chem Ra-226 (pCi/g)	Comments
				Tot. Ct	Spectr.		
5	189269	36	TC	3.6		*	
		39	TC	3.6		*	
6	190288	00	DS	2.2		*	East fence line
		06	DS	1.4		*	
7	215281	00	DS	1.1		*	Gas line
		18	DS	1.2		*	
8	238258	03	TC	3.0		*	Next to water line
		06	TC	3.2		*	Background
		09	TC	3.4		*	DC = 0 inches
		12	TC	3.3		*	
		15	TC	3.3		*	
		18	TC	3.3		*	
		21	TC	3.4		*	
		24	TC	3.4		*	
		27	TC	3.5		*	
		30	TC	3.4		*	
		33	TC	3.4		*	
		36	TC	3.5		*	
		39	TC	3.5		*	
		42	TC	3.4		*	
		45	TC	3.3		*	
		48	TC	3.4		*	
		51	TC	3.5		*	
		54	TC	3.5		*	
		57	TC	3.7		*	
		60	TC	3.7		*	
		63	TC	3.7		*	
9	253263	00	DS	8.7		*	South of primary
		06	DS	19.6		*	structure
		12	DS	2.8		*	

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 = 07-05-85  
Team Leader = SM

Table 3.2

## Summary of Interior Gamma Exposure Rates

DOE ID No. GJ-03936-RS

2414 Hall Avenue

Page 1 of 1

Location	Number of Readings Taken at Waist Level	Range at Waist Level (uR/h)	Mean at Waist Level (uR/h)	Number of Readings Taken at Surface	Range at Surface (uR/h)	Mean Surface (uR/h)
	-----	-----	-----	-----	-----	-----
Basement	*	*	*	*	15-17	*

\* A walking gamma scan was performed to confirm the absence of interior contamination at this location.

Table 4.1  
Area and Volume Calculations  
DOE ID No. GJ-03936-RS

Page 1 of 1

<u>AREA</u>	<u>CALCULATIONS(ft)</u>		<u>SF</u>	<u>DEPTH(ft)</u>		<u>CF</u>		<u>CUBIC YARDS</u>
EXTERIOR								
A	5 x 4	=	20	x	1.0	=	20	
B	6 x 5	=	30	x	0.5	=	15	
TOTAL VOLUME - EXTERIOR						=	35	= 35/27 = 1

NOTE: Total square feet of Exterior Areas A and B = 50 square feet  
50 square feet = 4.6 square meters

See Appendix Figure 3.3 For Areas

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Table 4.2  
Calculations for Concentration of Radium-226 in Soil  
DOE ID No. GJ-03936-RS

Page 1 of 1

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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)

$$C_{avg} = \frac{19.6 \times 4.6 + 2 (100 - 4.6)}{100}$$

$$C_{avg} = 2.8 < 7$$

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

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

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RR080185  
REA03936/REA-705/AP



FIGURE 2.1





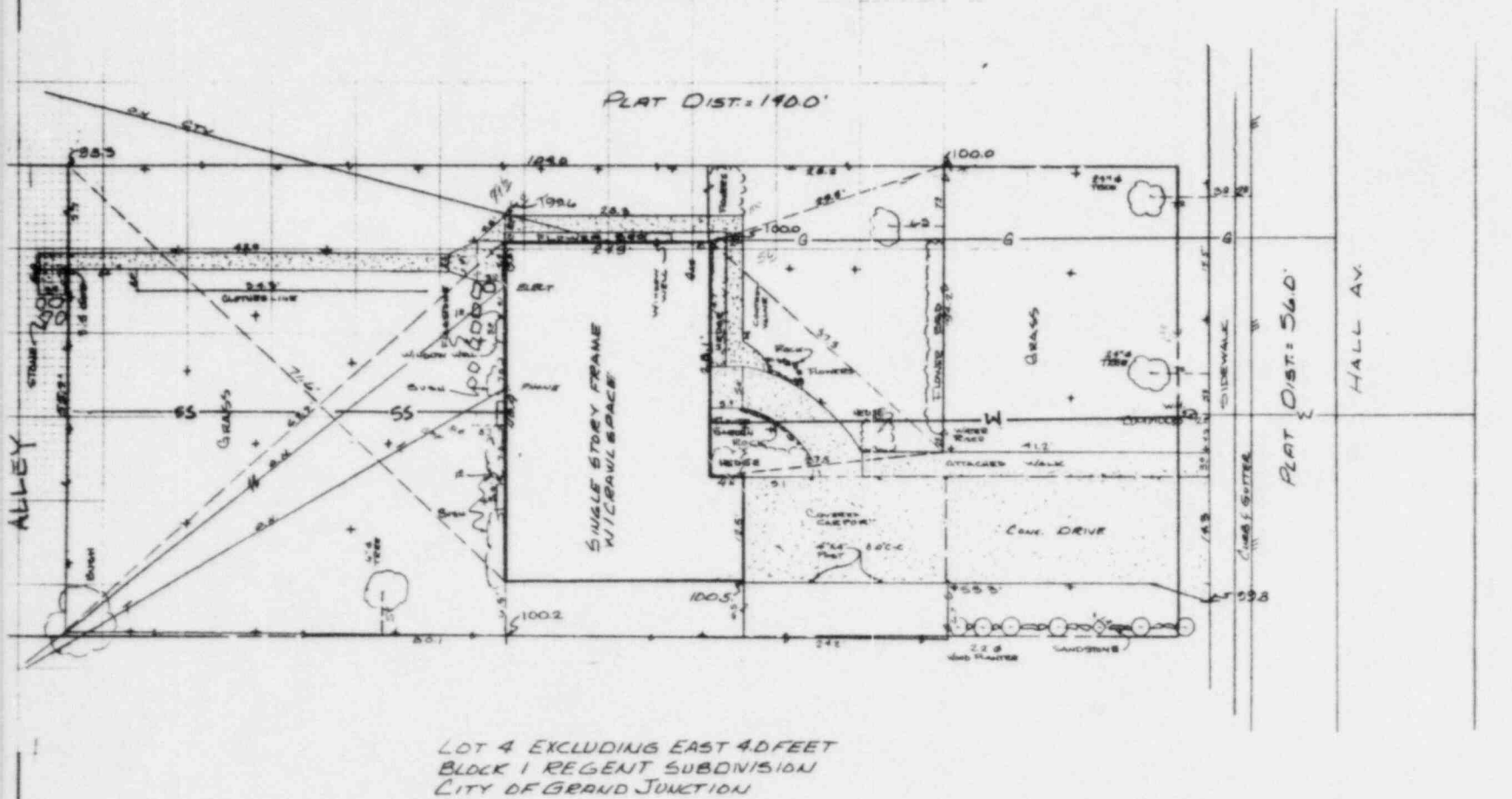
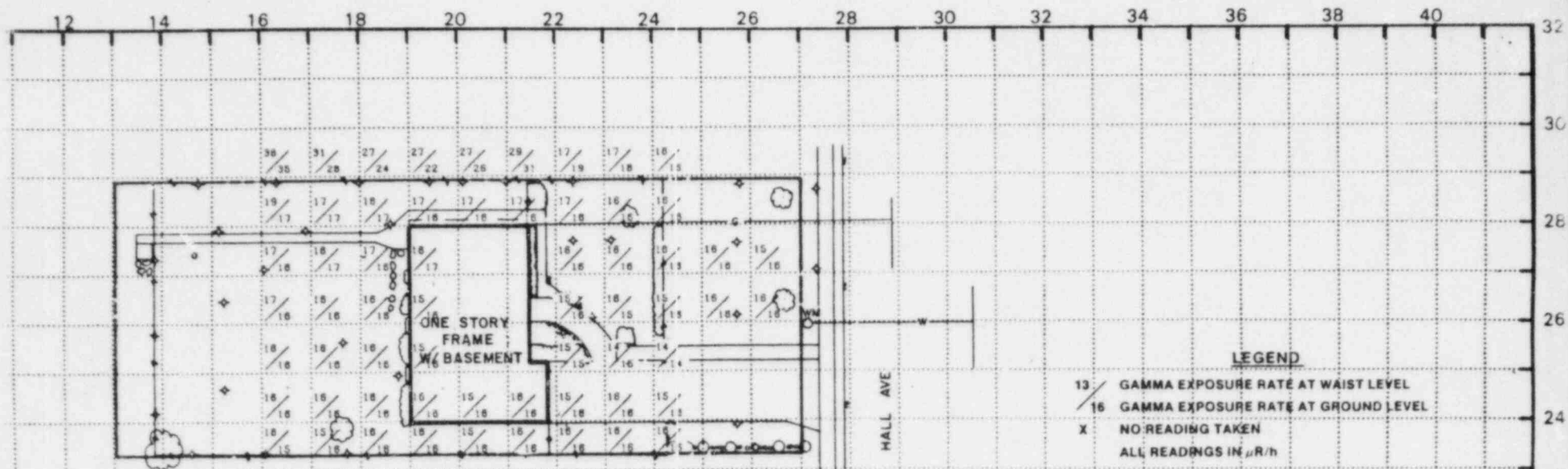


FIGURE 2.2 SITE PLAN



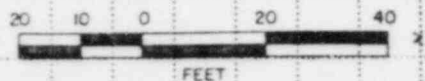
This drawing, prepared for the Uranium Mill Tailings Remedial Action Project, is for the sole use of the U.S. Department of Energy and its contractors. It is not a land survey plot or an improvement survey plat and is not to be used for the improvement of lands, including the construction of any building.

U.S. DEPARTMENT OF ENERGY GRAND JUNCTION PROJECT OFFICE, COLORADO		DDEJG NO 6J0893625
ADDRESS 2414 HALL AVENUE GRAND JUNCTION, COLORADO		ALLIED Survey Engineering Corporation Grand Junction, Colorado
SURV PLS 6-28-80	DRAFT PLS 6-28-80	CR 7-2-80
DRAWING NO B-C-788 F1	SHEET OF	



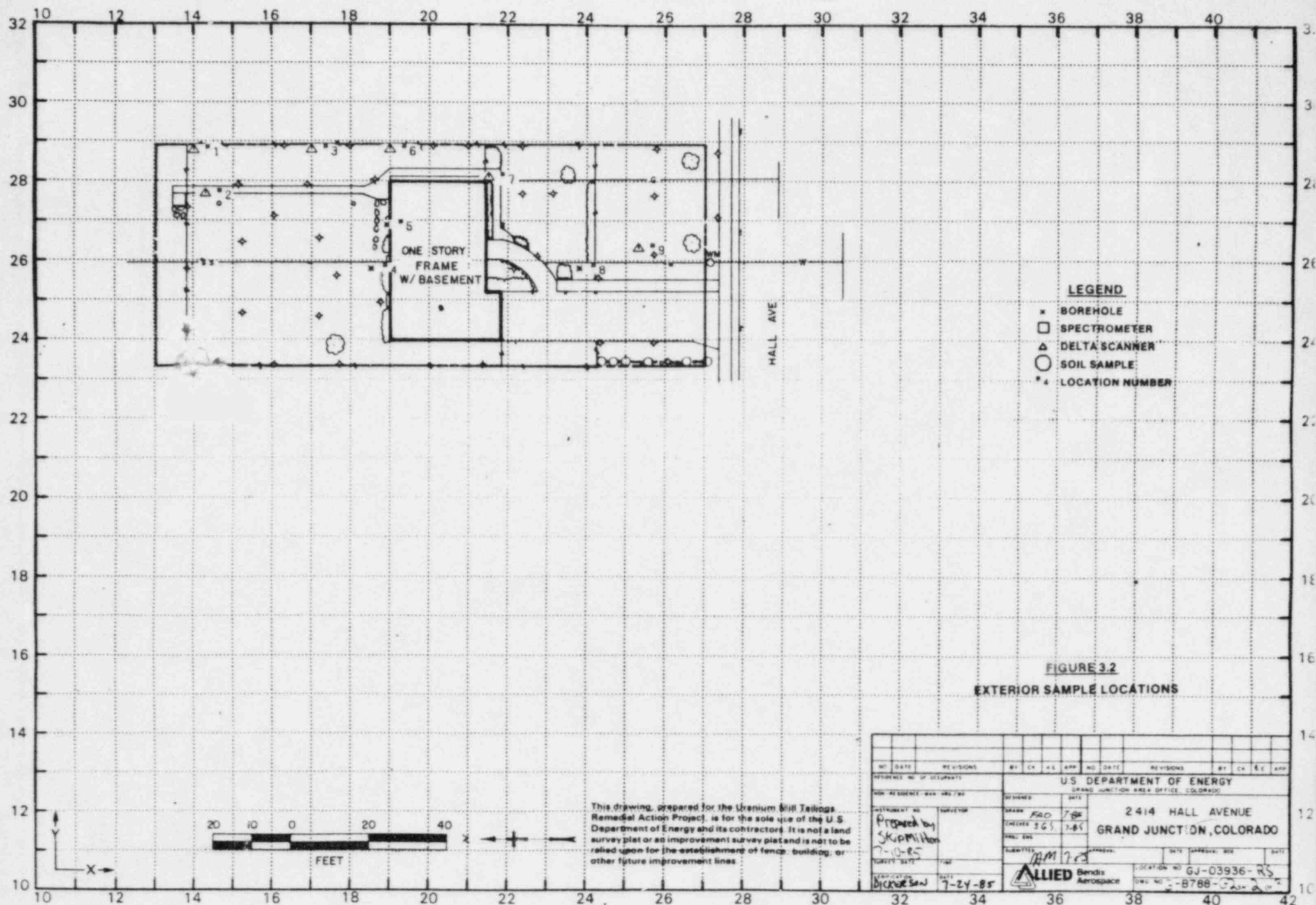
THE HOG IS LOCATED IN GRID BLOCK 140280  
 HOG =  $94 \mu R/h$

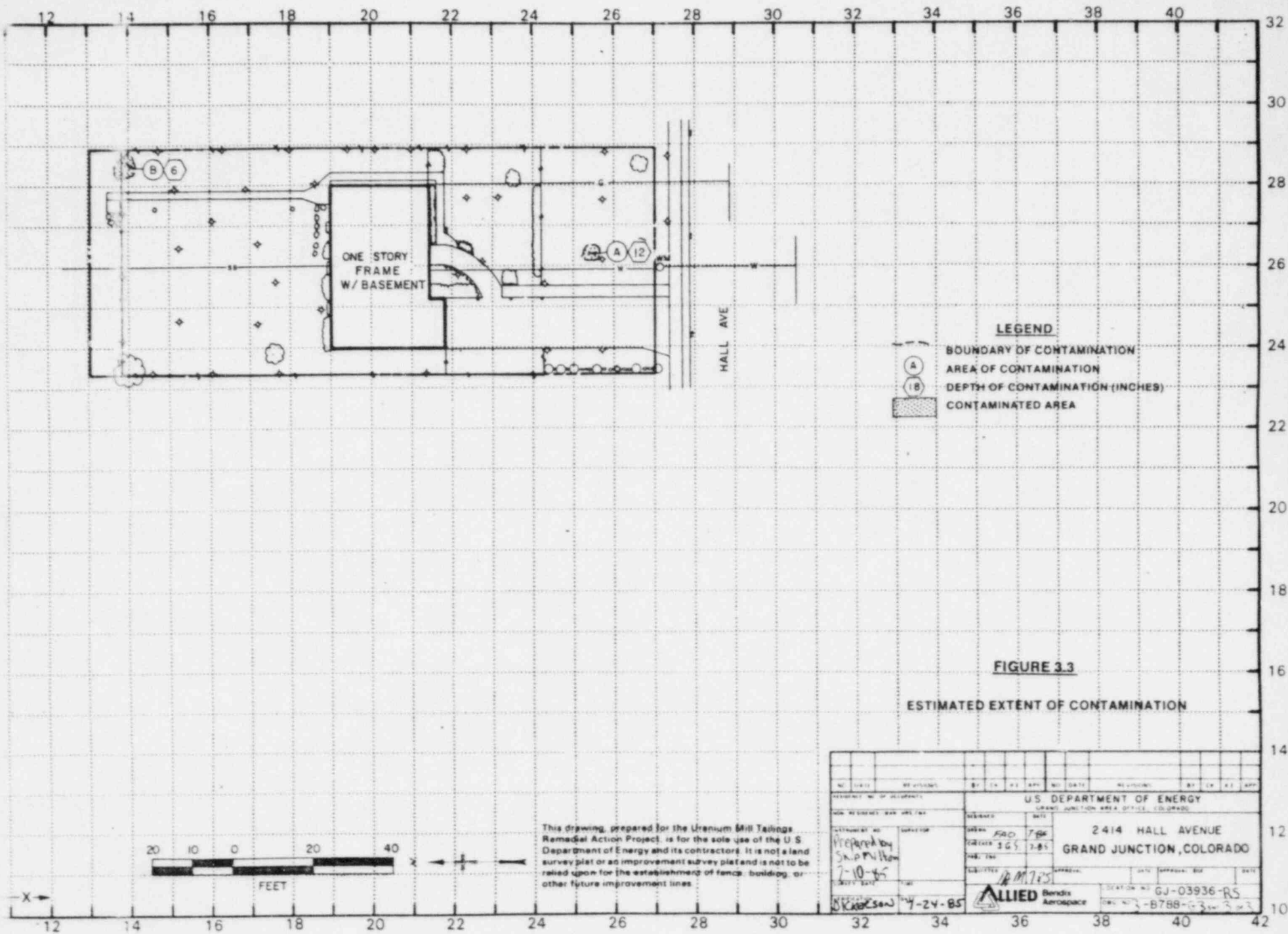
FIGURE 3.1  
 EXTERIOR GRID-POINT EXPOSURE RATES



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.

NO. DATE		NO. DATE		NO. DATE		NO. DATE		NO. DATE	
REVISION		REVISION		REVISION		REVISION		REVISION	
U.S. DEPARTMENT OF ENERGY									
GRAND JUNCTION AREA OFFICE, COLORADO									
2414 HALL AVENUE					GRAND JUNCTION, COLORADO				
DATE					DATE				
APPROVED					APPROVED				
SIGNED					SIGNED				
TITLE					TITLE				
DATE					DATE				
LOCATION NO. GJ-03936-RS					DRAWING NO. B-788-G-1-1-1				
ALLIED Bendix Aerospace									





3/85

DOE ID NO. GJ-03936-RS

Date 7-11-85

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

Official Survey Report

Property Address 2414 Hall Avenue

Property Owner Robert M. Stabenon

Address of Owner (if different from above) \_\_\_\_\_

Report Prepared By Skip Milton

I. PRESENCE/ABSENCE OF RESIDUAL RADIOACTIVE MATERIALS

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

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

1 XXX 1 In open areas.

1 1 Under or around exterior improvements.

1 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 XXX 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 = 94 uR/h



ALLIED Bendix  
Aerospace

Bendix Field Engineering Corporation  
Grand Junction Operations  
Grand Junction, Colorado

Date: July 5, 1985

To: Files

From: Skip Milton

Subject: Team Leader Notes - GJ-03936-RS

Address: 2414 Hall Avenue

Owner: Robert M. Stabenow

Weather: Clear, sunny

Team Members

S. Milton (Team Leader)  
C. Holmes  
H. Mattison  
V. Young

N. Wallace  
M. Dexter  
H. Lucero

The exterior gamma scan showed elevated readings along the east property line. Deltas were performed in this area at 0- to 6-inches in depth. This proved that the elevated scan taken along the property line was probably due to "shine" from the adjacent property.

A spillover consent form was not signed since the property was recently surveyed by Bendix.

Mr. Stabenow (homeowner) indicated that he was employed for the contractor that built the house on this property. He also stated that he was not aware of tailings being used.

A cement holding tank was found in the backyard, it was investigated with a borehole.

Team Leader Notes  
Skip Milton  
GJ-03936-RS  
July 5, 1985  
Page 2

An interior gamma survey was performed, no elevated readings were noted.

All utility lines were located and investigation with boreholes and/or deltas.

All team members were frisked before returning to the compound.

Note

The foundation exploration holes on the east, west, and south sides were inaccessible. The exposure-rates in the basement indicate that no tailings were used around the foundation.

# APPARENT RADIUM-226 CONCENTRATION DECONVOLUTION GRAPH

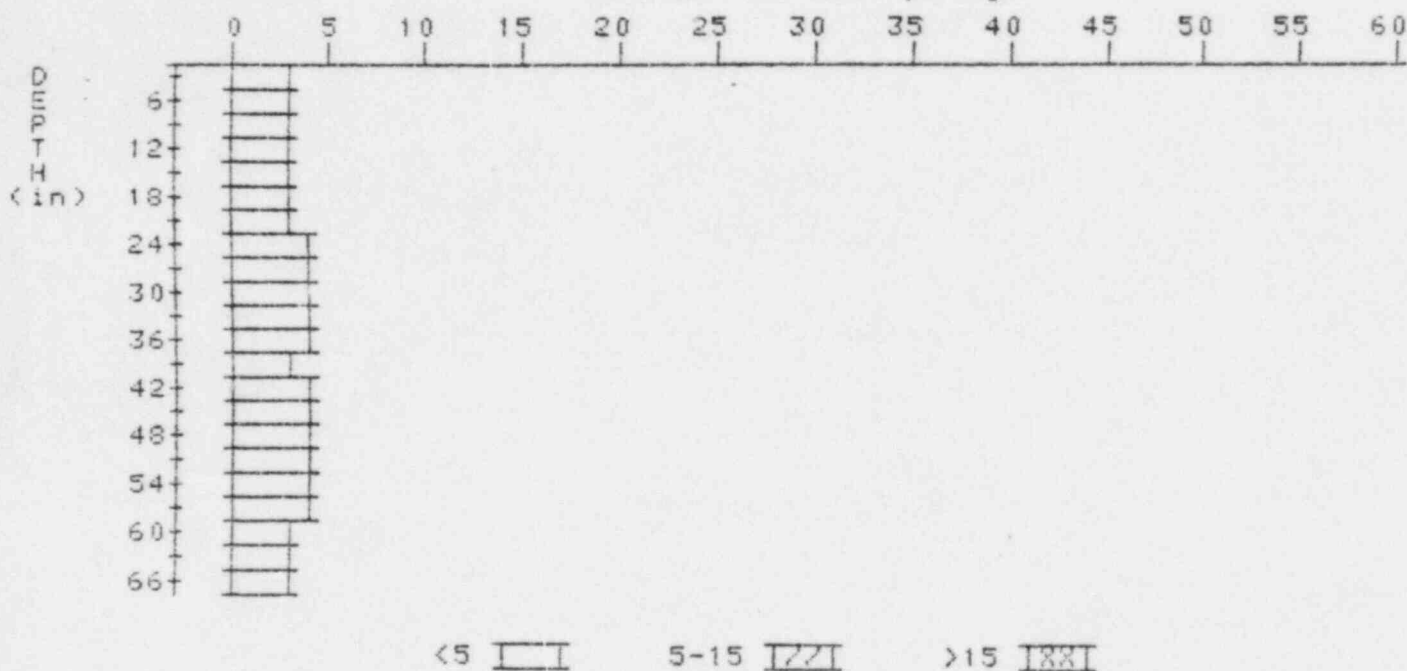
4

PROPERTY NUMBER: GJ-03936-RS

HOLE NUMBER: 4

LOCATION: 185258

APPARENT RA-226 (pCi/g)



Depth (in)	Apparent Radium-226 (pCi/g) Undeconvolved	Apparent Radium-226 (pCi/g) Deconvolved
3	2.8	2.8
6	3.0	3.0
9	3.2	3.4
12	3.3	3.5
15	3.3	3.3
18	3.3	3.1
21	3.4	3.4
24	3.5	3.7
27	3.5	3.5
30	3.5	3.5
33	3.5	3.5
36	3.5	3.7
39	3.4	3.0
42	3.5	3.7
45	3.5	3.5
48	3.5	3.5



51  
54  
57  
60  
63  
66

3.5  
3.5  
3.5  
3.4  
3.4  
3.4

3.5  
3.5  
3.7  
3.2  
3.4  
3.4

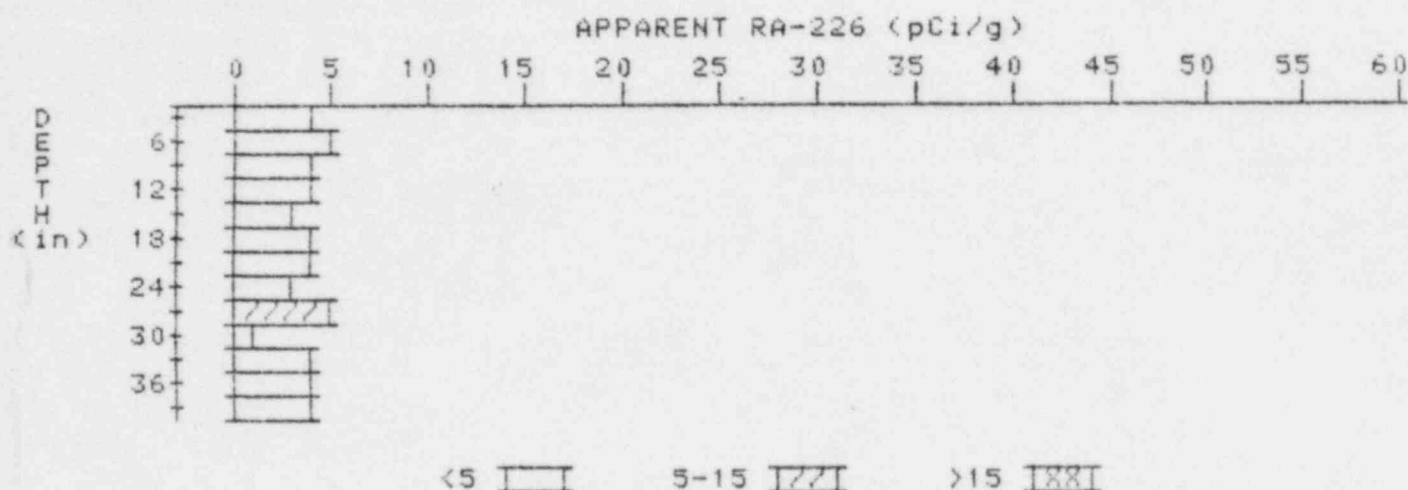
# APPARENT RADIUM-226 CONCENTRATION DECONVOLUTION GRAPH

5

PROPERTY NUMBER: GJ-03936-RS

HOLE NUMBER: 5

LOCATION: 189269



Depth (in)	Apparent Radium-226 (pCi/g) Undeconvolved	Apparent Radium-226 (pCi/g) Deconvolved
3	3.7	3.7
6	4.0	4.7
9	3.9	4.1
12	3.7	3.5
15	3.6	3.4
18	3.6	3.6
21	3.6	3.8
24	3.5	3.1
27	3.6	5.0
30	2.9	.6
33	3.5	4.4
36	3.6	3.8
39	3.6	3.6

# APPARENT RADIUM-226 CONCENTRATION DECONVOLUTION GRAPH

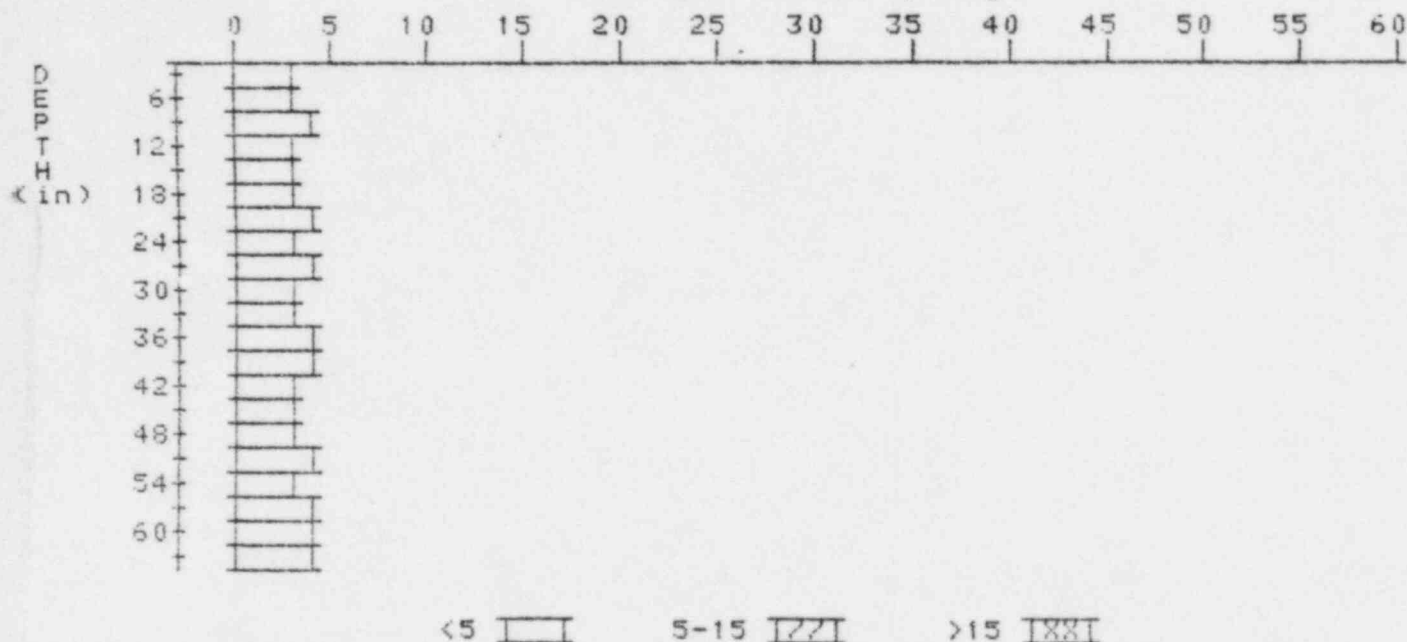
8

PROPERTY NUMBER: GJ-03936-RS

HOLE NUMBER: 8

LOCATION: 238258

APPARENT RA-226 (pCi/g)



Depth (in)	Apparent Radium-226 (pCi/g) Undeconvolved	Apparent Radium-226 (pCi/g) Deconvolved
3	3.0	3.0
6	3.2	3.2
9	3.4	3.9
12	3.3	3.1
15	3.3	3.3
18	3.3	3.1
21	3.4	3.6
24	3.4	3.2
27	3.5	3.9
30	3.4	3.2
33	3.4	3.2
36	3.5	3.7
39	3.5	3.7
42	3.4	3.4
45	3.3	2.9
48	3.4	3.4
51	3.5	3.7

54  
57  
60  
63

3.5  
3.7  
3.7  
3.7

3.1  
4.1  
3.7  
3.7

