

RADIOLOGIC AND ENGINEERING ASSESSMENT

FOR

DOE ID NO.: GJ-43552-OT
ADDRESS: 200 DIKE ROAD

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
Grand Junction, Colorado 81502

APPROVED BY

Michael K. Tucker
M. TUCKER
DOE PROJECT ENGINEER

DATE

September 10, 1985

REA43552:REA-713

8509270202 850912
PDR WASTE
WM-54 PDR

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1.0 EXECUTIVE SUMMARY

1.1 Introduction

The location, DOE ID No. GJ-43552-OT, is a farm located at 200 Dike Road, 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, 66 cu. yd.; interior, 0 cu. yd.

Estimated cost to perform remedial action is \$3,818. Remedial action on this property will take approximately 14 days to complete.

2.0 PROPERTY DESCRIPTION

2.1 General Description

Address: 200 Dike Road, Grand Junction, Colorado

Zoning: Residential (R-4)

Lot Size: Approximately 128,502 sf (2.9 acres)

Legal Description: Lot 8 Section 15, T.1S, R.1W, U.M., Mesa County, Colorado; Except beginning at the southwest corner of Lot 8, thence north 416.14 feet, thence east 50.0 feet, thence south 208.7 feet, thence east 135.0 feet, thence south 208.7 feet, thence west 185.0 feet to beginning; and except road right-of-way as recorded in Book 947 Page 526 to 528 in the County Clerk's Office.

Point of Reference: This property is located approximately 3 mile(s) 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:	None
Telephone:	None
Sewer:	None
Water:	Underground
Cable TV:	None

Bordering Properties:

North:	Vacant land (agricultural)/Colorado River
South:	Vacant land (agricultural)
East:	Colorado River
West:	Single-family residence (GJ-32090-MR)

2.2 Existing Facilities and Structures

Structures:

Type:	Wood shed (shed 1)
Size:	Approximately 204 sf
Construction:	Wood-frame
Foundation:	Monolithic concrete slab-on-grade
Condition:	Fair

Type:	Chicken coop (coop 1)
Size:	Approximately 56 sf
Construction:	Wood-frame

Foundation: Mudsill on undisturbed soil
Condition: Fair

Type: Chicken coop (coop 2)
Size: Approximately 101 sf
Construction: Wood-frame
Foundation: Mudsill on undisturbed soil
Condition: Fair

Type: Shed (shed 2)
Size: Approximately 63 sf
Construction: Wood-frame
Foundation: Mudsill on undisturbed soil
Condition: Fair

Type: Wood shed (shed 3)
Size: Approximately 90 sf
Construction: Wood-frame
Foundation: Mudsill on undisturbed soil
Condition: Fair

Type: Metal shed (shed 4)
Size: Approximately 40 sf
Construction: Prefabricated metal building
Foundation: Monolithic concrete slab
Condition: Good

Type: Metal shed (shed 5)
Size: Approximately 90 sf
Construction: Prefabricated metal building
Foundation: None
Condition: Good

Type: Lean-to
Size: Approximately 132 sf
Construction: Wood-frame
Foundation: Dirt
Condition: Fair

General Remarks:

This property contains a covered, partially enclosed, hay storage building (approximately 240 sf), stock tank, feed bin, loading chute, lean-to, concrete slabs, and fences. Structures, utilities, landscaping, and other special features of this property are included in Appendix Figure 2.2.

Historical Data:

These structures are not over 50 years old. Therefore, they do 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-43552-OT on August 2, 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 3.4, 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: 13 to 17 uR/h
Highest Outside Gamma Reading (HOG): 94 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): Not Applicable

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; the locations and types of these investigations are shown in Appendix Figure 3.2. Data from these investigations are included in Appendix Table 3.1.

3.4 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 on this property and several measurements taken on DOE ID No. GJ-32090-MR. As noted in this figure, areas recommended for remedial action that contain identified residual radioactive materials are:

- (Area A) Surface Material: Top soil
Direction: Northeast of Shed 1
Total Depth of Contamination: 21 inches
Comments: These 2 deposits are in the garden.
Approximate Square Footage: 621
- (Area B) Surface Material: Top soil
Direction: North of Shed 1
Total Depth of Contamination: Estimated at 12 inches
Comments: These 2 deposits are in the garden. The depth of contamination is based on information collected in Area C.
Approximate Square Footage: 300
- (Area C) Surface Material: Soil
Direction: North of Shed 1
Total Depth of Contamination: 12 inches
Comments: There are 2 deposits in this area.
Approximate Square Footage: 162
- (Area D) Surface Material: Gravel
Direction: South of Shed 1
Other Directions: North of Shed 4
Total Depth of Contamination: 27 inches
Other (Height or Thickness) The gravel is 8 inches thick
Comments: There is a water line in this area.
Approximate Square Footage: 81
- (Area E) Surface Material: Soil
Direction: Southeast of Shed 4
Other Directions: North of Lean-to
Total Depth of Contamination: 12 inches
Approximate Square Footage: 15

4.0 RECOMMENDED REMEDIAL ACTION

4.1 Decontamination and Restoration

The recommended remedial action for this property, DOE ID No. GJ-43552-OT, includes removal of all areas identified as containing radioactive material (as discussed in Section 3.4 and shown in Appendix Figure 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 \$3,818.

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

Owner preference is to have construction done concurrently with DOE ID No. GJ-32090-MR. If this property would hold up the remedial action on DOE ID No. GJ-32090-MR, the owner prefers to have remedial action finished on this property before spring planting. 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 Office, 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	Estimated Cost of Decontamination and Restoration

Appendix Figures:

Figure 2.1	Vicinity Map
Figure 2.2a	Site Plan
Figure 2.2b	Site Plan
Figure 3.1	Exterior Exposure Rates
Figure 3.2	Exterior Sample Locations
Figure 3.3	Exterior Estimated Extent of Contamination

Team Leader Notes

Deconvolution Graphs (Apparent Radium-226 Concentration)

Exterior Gamma Scan Map

Radium Concentrations at Exterior Locations

DOE ID #GJ-43552-OT

200 Dike Road

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	523419	03	TC	7.7		*	Auger refusal
		06	TC	9.8		*	DC = 21 inches
		09	TC	11.1		*	Based on the
		12	TC	12.4		*	deconvolution graph
		15	TC	11.8		*	
		18	TC	9.1		*	
		21	TC	7.0		*	
		24	TC	5.8		*	
		27	TC	5.2		*	
2	530420	00	DS	8.0		*	Garden
		06	DS	20.9		*	
		12	DS	24.8		*	
		18	DS	10.1		*	
		24	DS	2.2		*	
3	577410	00	DS	3.2		*	
		06	DS	3.6		*	
		12	DS	2.9		*	
4	617366	03	TC	3.5		*	Water line
		06	TC	4.4		*	DC = 27 inches
		09	TC	5.1		*	Based on the
		12	TC	5.6		*	deconvolution graph
		15	TC	6.4		*	
		18	TC	7.3		*	
		21	TC	6.4		*	
		24	TC	5.6		*	
		27	TC	5.0		*	
		30	TC	4.5		*	
		33	TC	4.2		*	
		36	TC	4.0		*	
		39	TC	3.8		*	
		42	TC	3.8		*	
5	635275	00	DS	1.1		*	Background
		03	TC	3.3		*	Auger refusal
		06	TC	3.8		*	DC = 0 inches
		09	TC	4.0		*	
		12	TC	4.0		*	
		15	TC	4.1		*	
		18	TC	4.2		*	

Radium Concentrations at Exterior Locations

DOE ID #GJ-43552-OT

200 Dike Road

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.		
6	676403	00	DS	43.6		*	North of lean-to
		06	DS	10.0		*	
		12	DS	1.3		*	

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 = 08-02-85
Team Leader = JDG

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)
-----	-----	-----	-----	-----	-----	-----
Shed 1	*	*	*	*	14-17	*
Shed 2	*	*	*	*	16-17	*
Shed 3	*	*	*	*	14-16	*
Shed 4	*	*	*	*	13-15	*
Shed 5	*	*	*	*	14-16	*
Coop 1	*	*	*	*	15-16	*
Coop 2	*	*	*	*	15-17	*
Lean-to	*	*	*	*	14-16	*
=====	=====	=====	=====	=====	=====	=====

* A walking gamma scan was performed to confirm the absence of interior contamination.

Table 4.1
Area and Volume Calculations
DOE ID No. GJ-43552-OT

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					
	Contaminated Fill				
A	30 x 20 =	600			
	7 x 3 =	21			
		621	x 1.8 =	1,118	
B	42 x 7 =	294			
	2 x 3 =	6			
		300	x 1.0 =	300	
C	12 x 12 =	144			
	6 x 3 =	18			
		162	x 1.0 =	162	
D	27 x 3 =	81	x 2.3 =	186	
E	5 x 3 =	15	x 1.0 =	15	
TOTAL VOLUME - EXTERIOR				= 1,781 = 1,781/27 =	66

See Appendix Figure 3.3 For Areas

=====

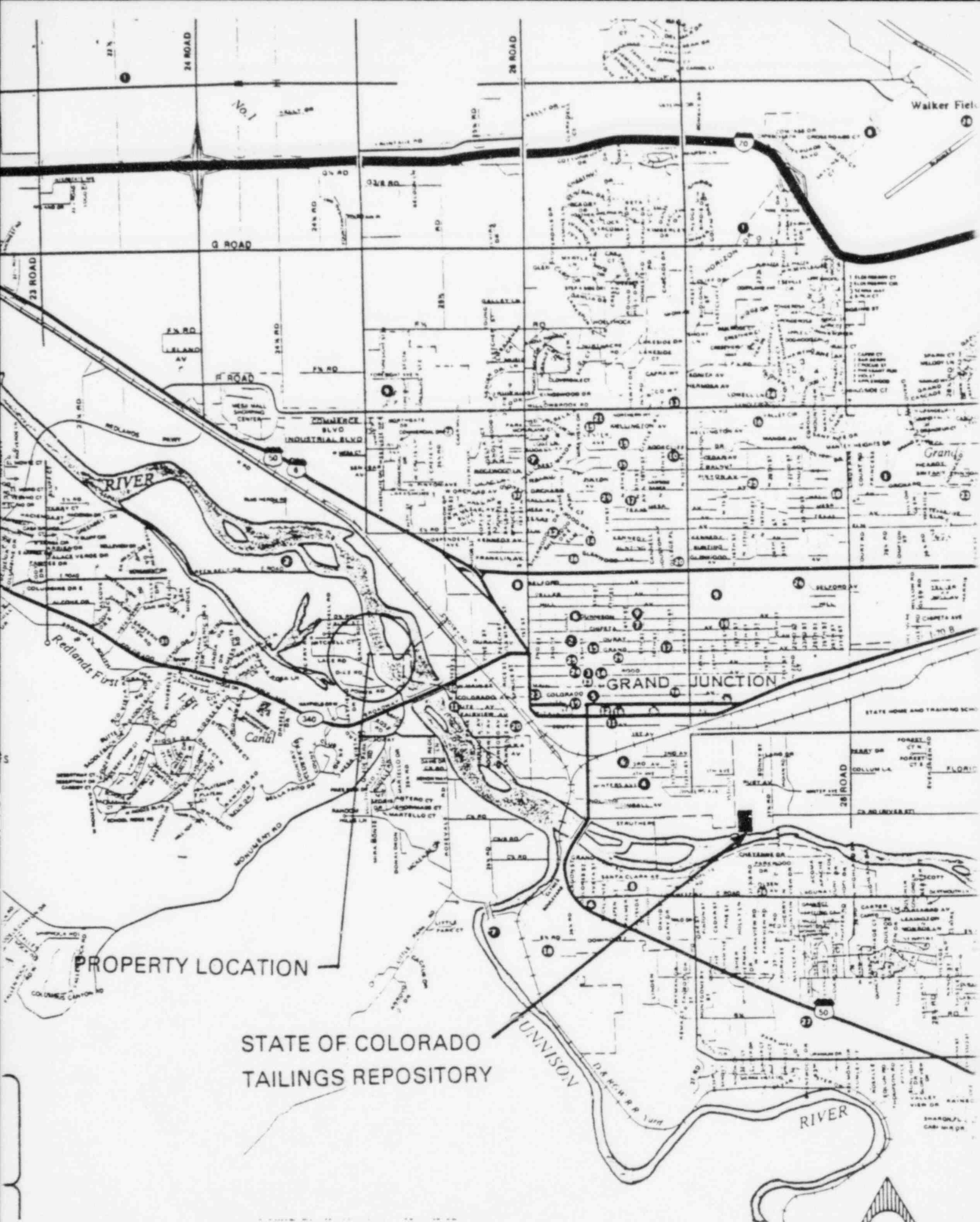
Table 4.2
Estimated Cost of Decontamination and Restoration
DOE ID No. GJ-43552-OT

Page 1 of 1

EXTERIOR

Remove/reset fencing 65 lf @ \$2/lf	\$	130
Remove identified residual radioactive material 3 cy @ \$44/cy (manual-open)		132
63 cy @ \$14.50/cy (machine-open)		914
Replace areas with compacted roadbase 13 cy @ \$11.50/cy		150
Replace areas with topsoil/organic mix 53 cy @ \$12.50/cy		663
Replace 2 fruit trees Lump sum		60
Cleanup Lump sum		100
<hr/>		
TOTAL EXTERIOR	\$	2,149
TOTAL INTERIOR		0
ACCESS CONTROL		200
<hr/>		
SUBTOTAL	\$	2,349
CONTINGENCY @ 30%		705
<hr/>		
SUBTOTAL	\$	3,054
CONTRACTOR OVERHEAD & PROFIT @ 25%		764
<hr/>		
GRAND TOTAL	\$	3,818

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REA43552/REA-713/AP



LOT 2 SECTION 15, T 1 S, R 1 W, 10 M, Mesa County, Colorado,
 EXCEPT BEGINNING AT THE SOUTHWEST CORNER OF LOT 2,
 NORTH 416.14 FEET, THENCE EAST 50.0 FEET, THENCE SOUTH 208.7 FEET,
 THENCE EAST 195.0 FEET, THENCE SOUTH 208.7 FEET, THENCE WEST 185.0
 FEET TO BEGINNING, ALSO EXCEPT ROAD RIGHT-OF-WAY AS RECORDED
 IN BOOK 947 PAGE 526 TO 528 IN THE COUNTY CLERK'S OFFICE.

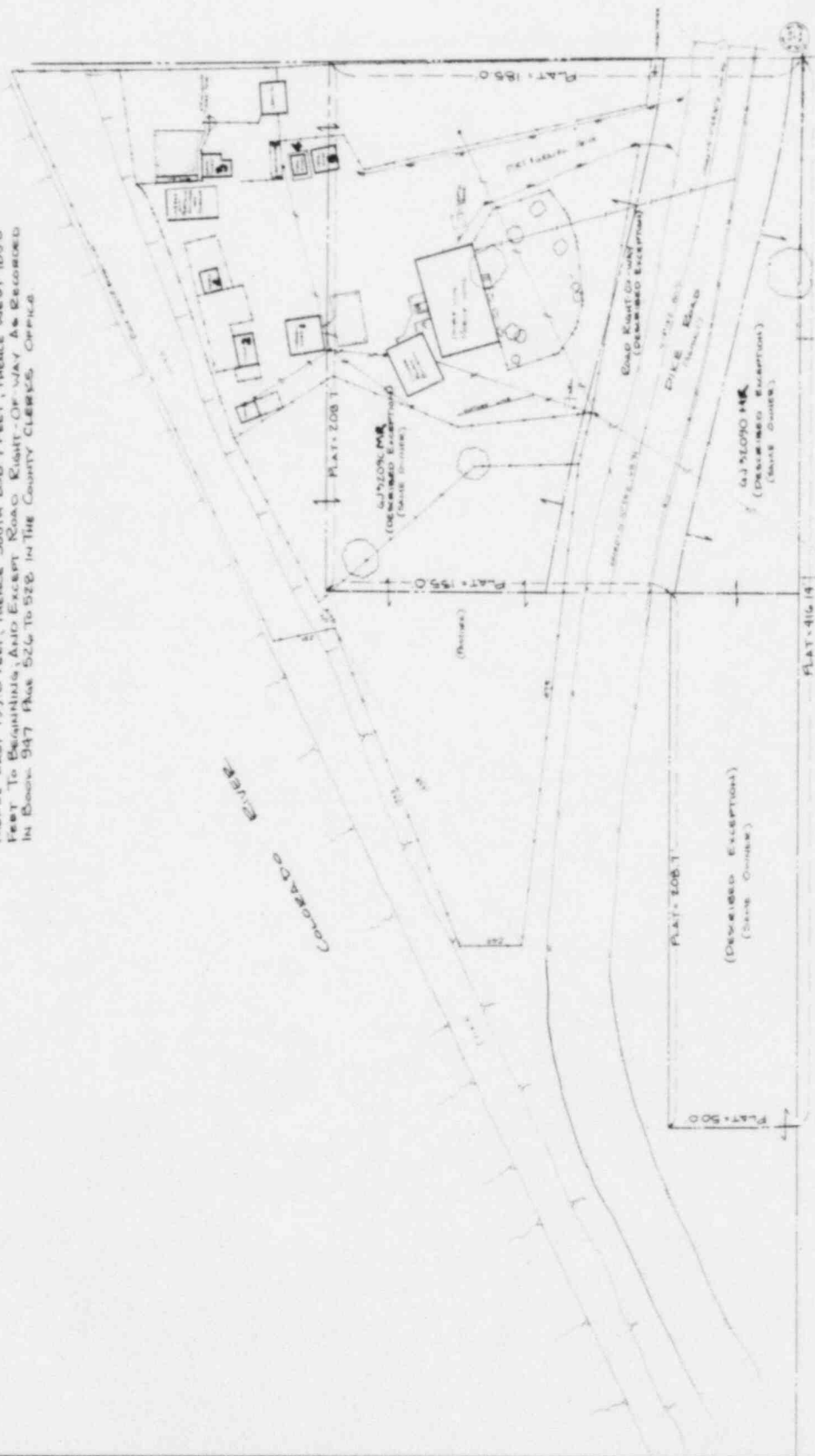


FIGURE 2.2 a

SITE PLAN

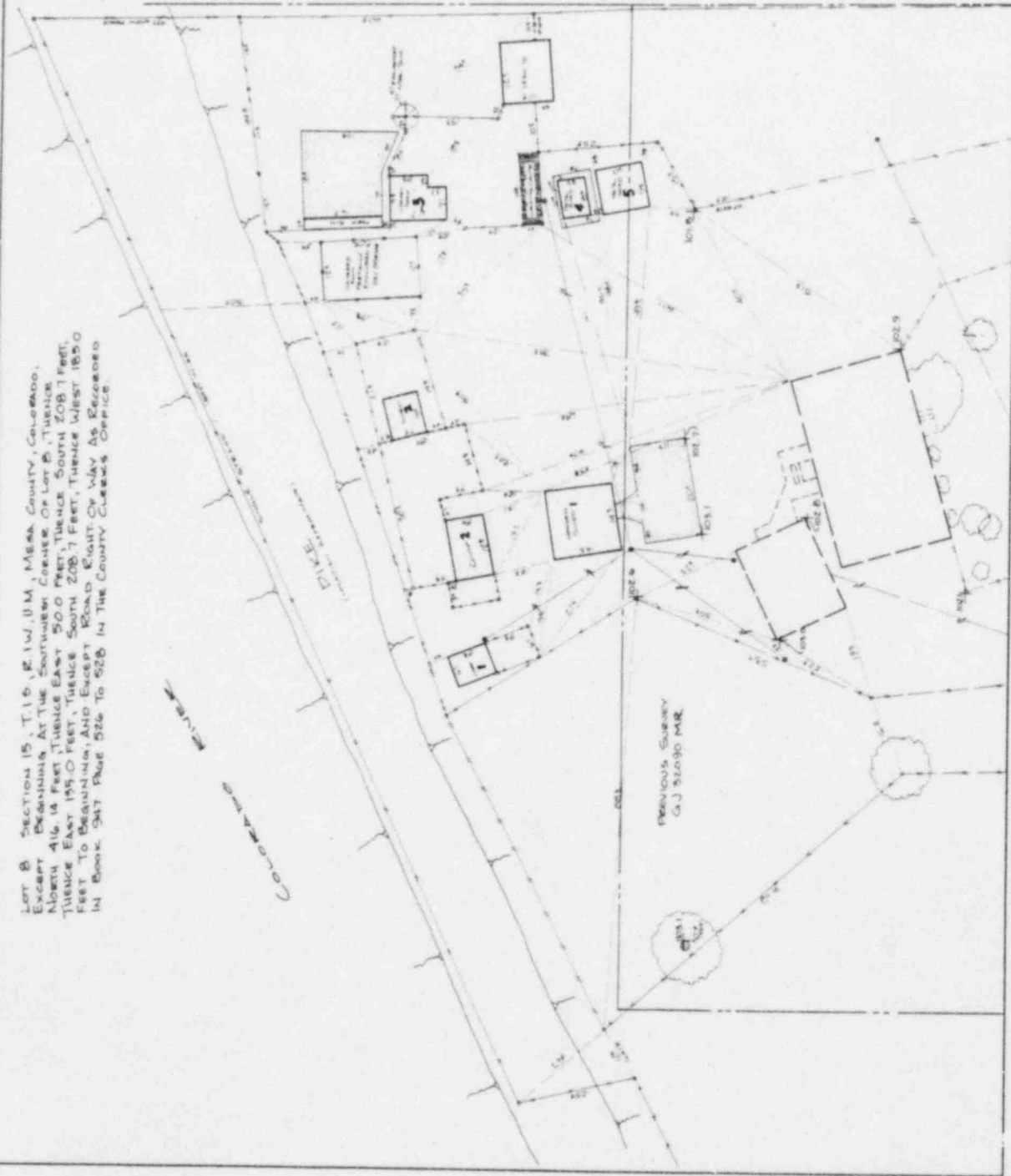


SCALE IN FEET
 0 10 20 30 40

NOTES:
 1. The site plan is based on the survey data provided by the applicant.
 2. The site plan is subject to change without notice.
 3. The site plan is not to be used for any other purpose without the written consent of the engineer.

U.S. DEPARTMENT OF ENERGY	6.13552-OT
PROJECT: 200 DICE ROAD	
OWNER: Mesa County, Colorado	
DATE: 10/10/1991	
BY: [Signature]	
CHECKED: [Signature]	
SCALE: 1" = 40'	

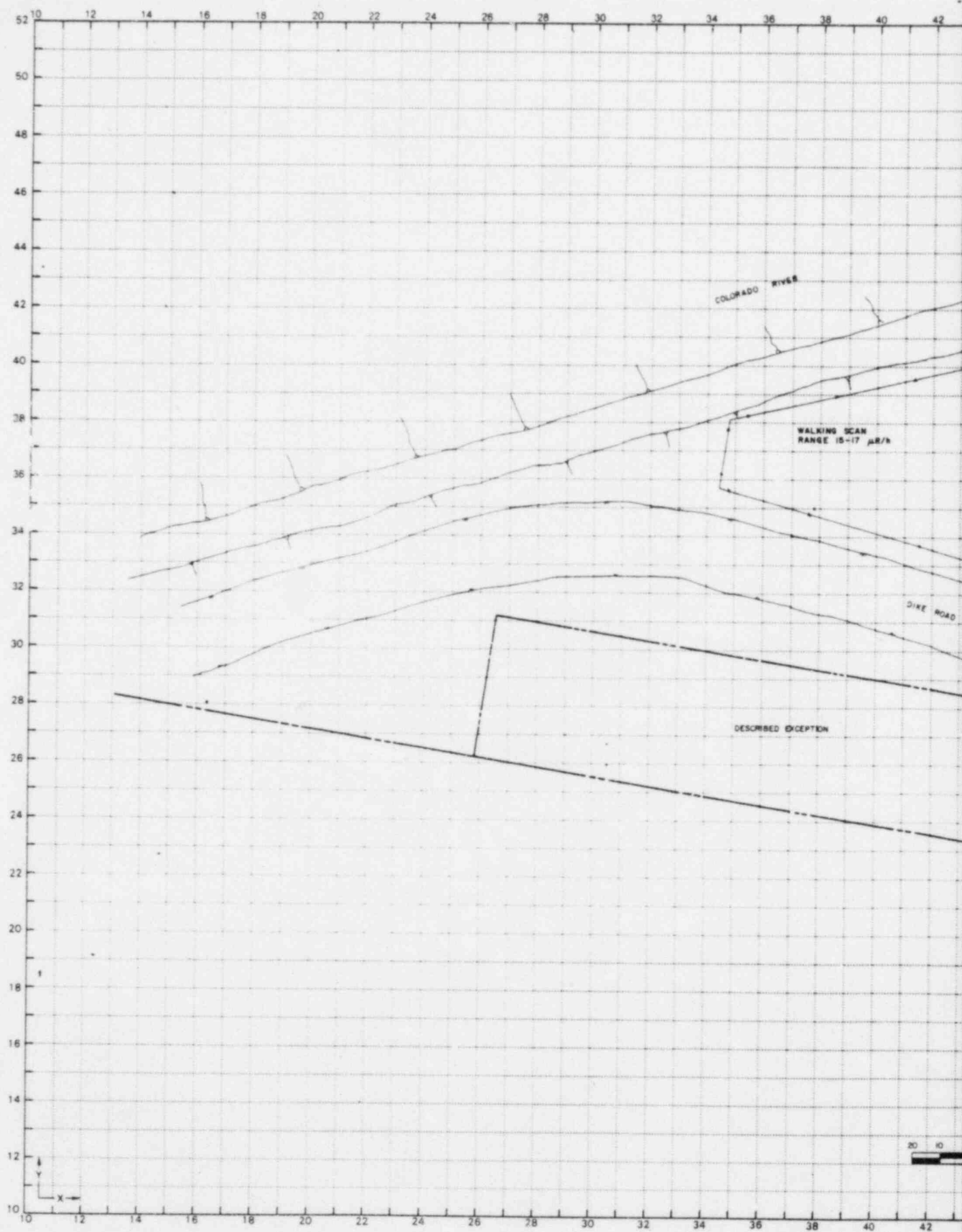
LOT 8 SECTION 15, T.16, R.1W, U.M., MENA COUNTY, COLORADO,
EXCEPT BEGINNING AT THE SOUTHERN CORNER OF LOT 8, THENCE
NORTH 416.14 FEET THENCE EAST 50.0 FEET THENCE SOUTH 208.1 FEET,
THENCE EAST 195.0 FEET, THENCE SOUTH 208.7 FEET, THENCE WEST 185.0
FEET TO BEGINNING, AND EXCEPT ROAD RIGHT-OF-WAY AS RECORDED
IN BOOK 947 PAGE 526 TO 528 IN THE COUNTY CLERK'S OFFICE.

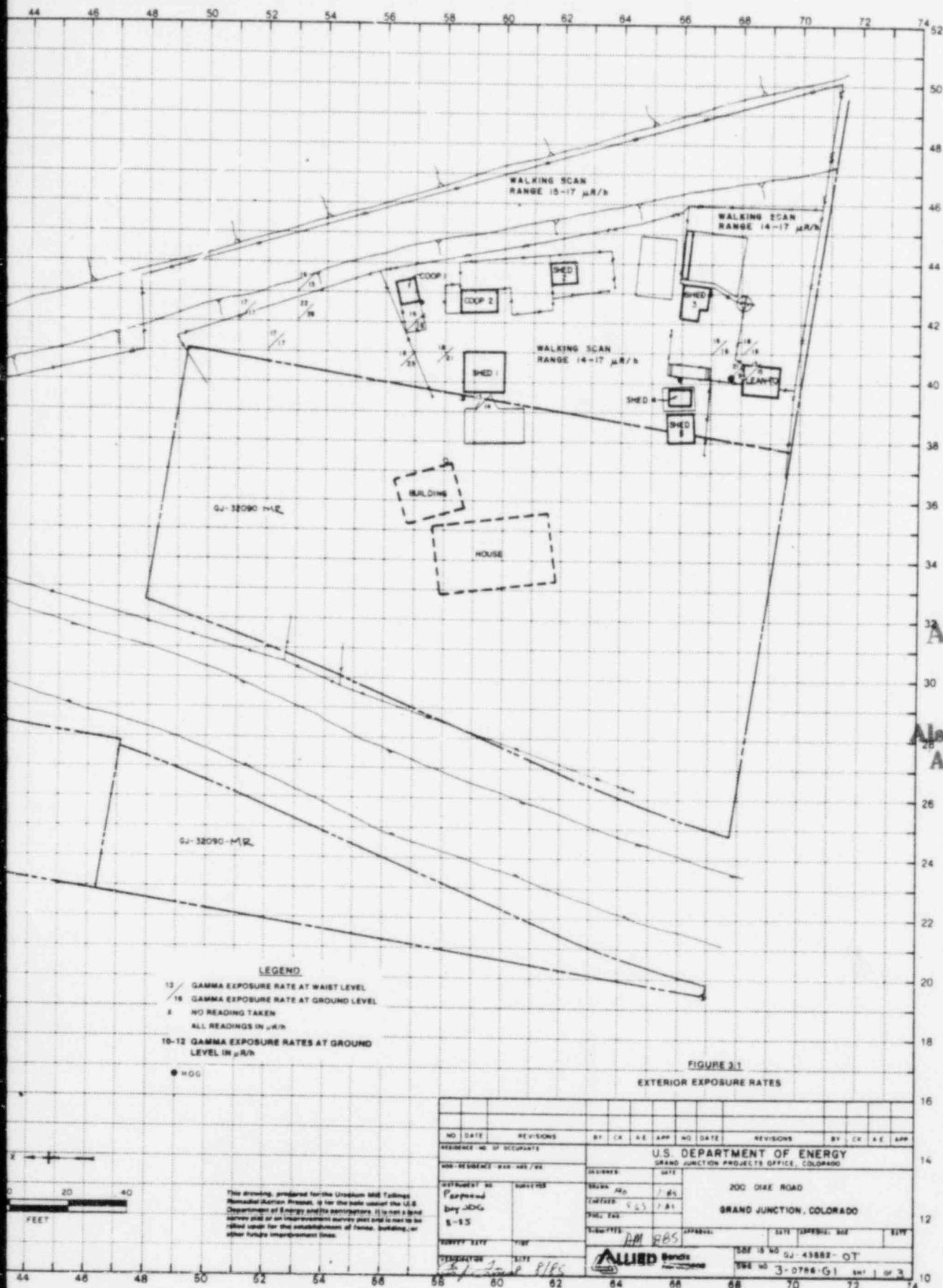


This drawing is a reproduction of the original drawing and is not to be used for any other purpose without the written consent of the Engineer.

FIGURE 2.2 b
SITE PLAN

U.S. DEPARTMENT OF ENERGY	PROJECT NO.	DOE/ER-0155
OFFICE OF ENVIRONMENTAL AND SAFETY HAZARD INVESTIGATION	PROJECT NAME	DOE/ER-0155
DOE/ER-0155	PROJECT LOCATION	DOE/ER-0155
DOE/ER-0155	PROJECT DATE	DOE/ER-0155
DOE/ER-0155	PROJECT SCALE	DOE/ER-0155
DOE/ER-0155	PROJECT SHEET	DOE/ER-0155

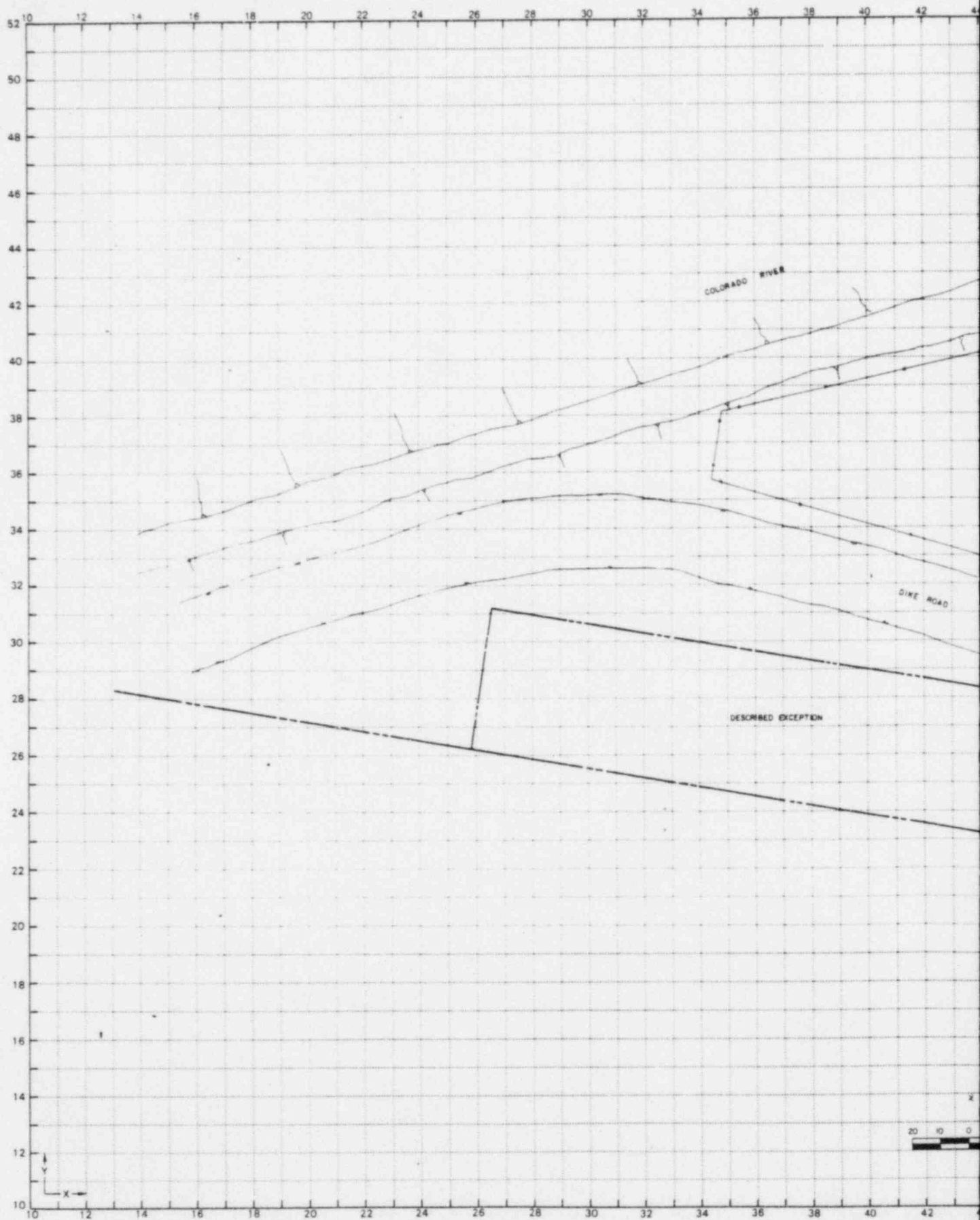


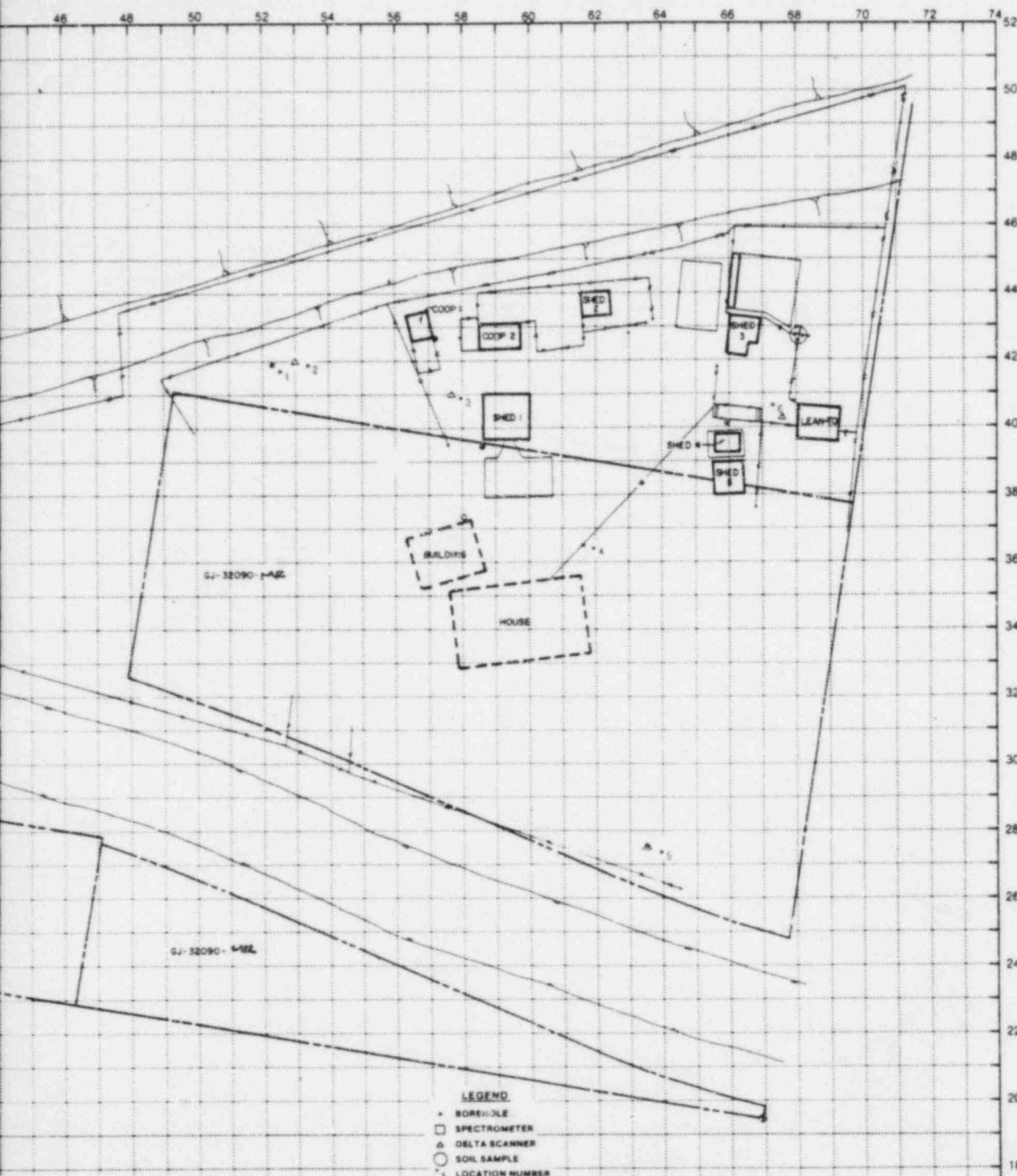


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APERTURE
CARD

Also Available On
Aperture Card

8509270202-01





- LEGEND**
- * BOREHOLE
 - SPECTROMETER
 - △ DELTA SCANNER
 - SOIL SAMPLE
 - * LOCATION NUMBER

FIGURE 3.2

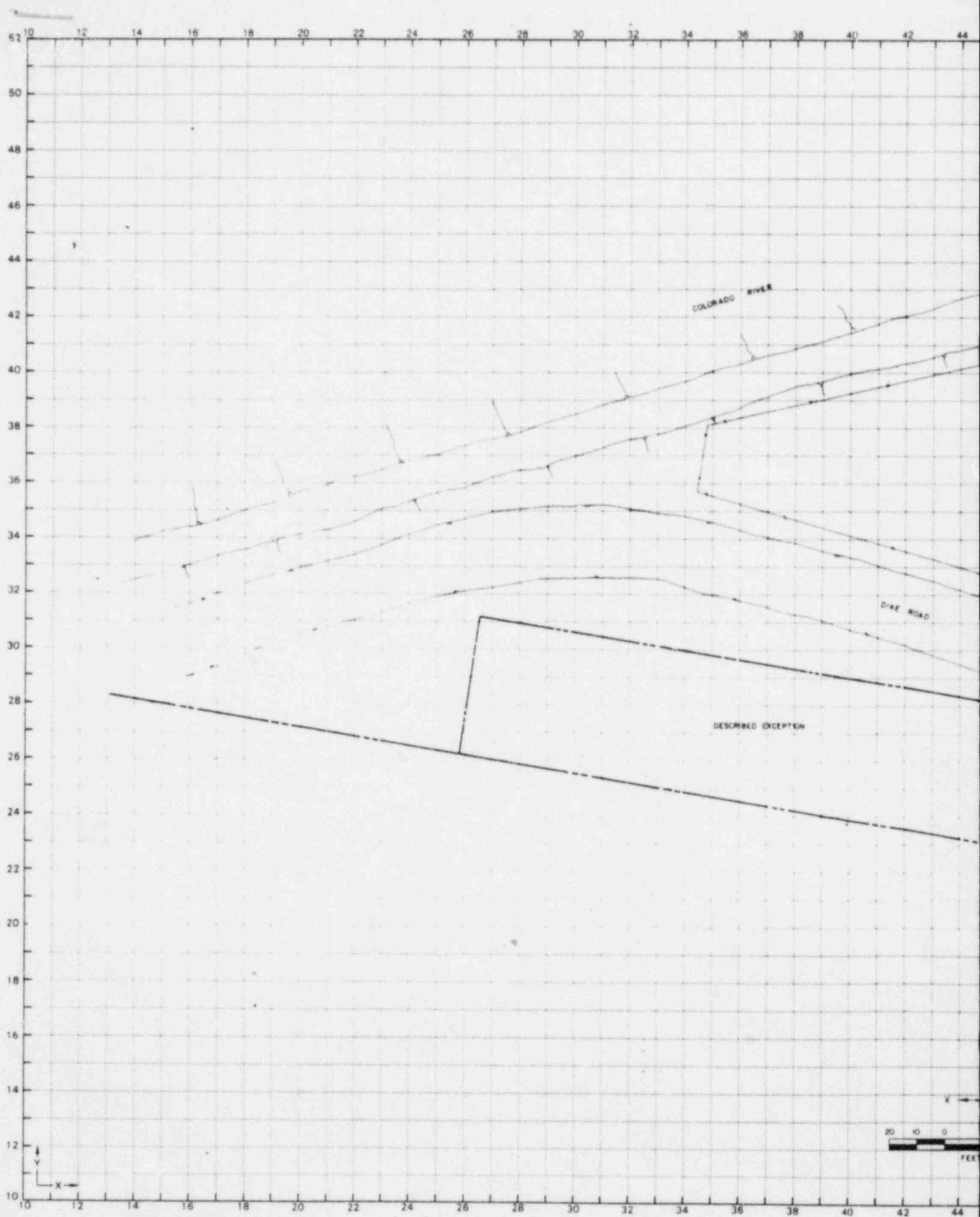
EXTERIOR SAMPLE LOCATIONS

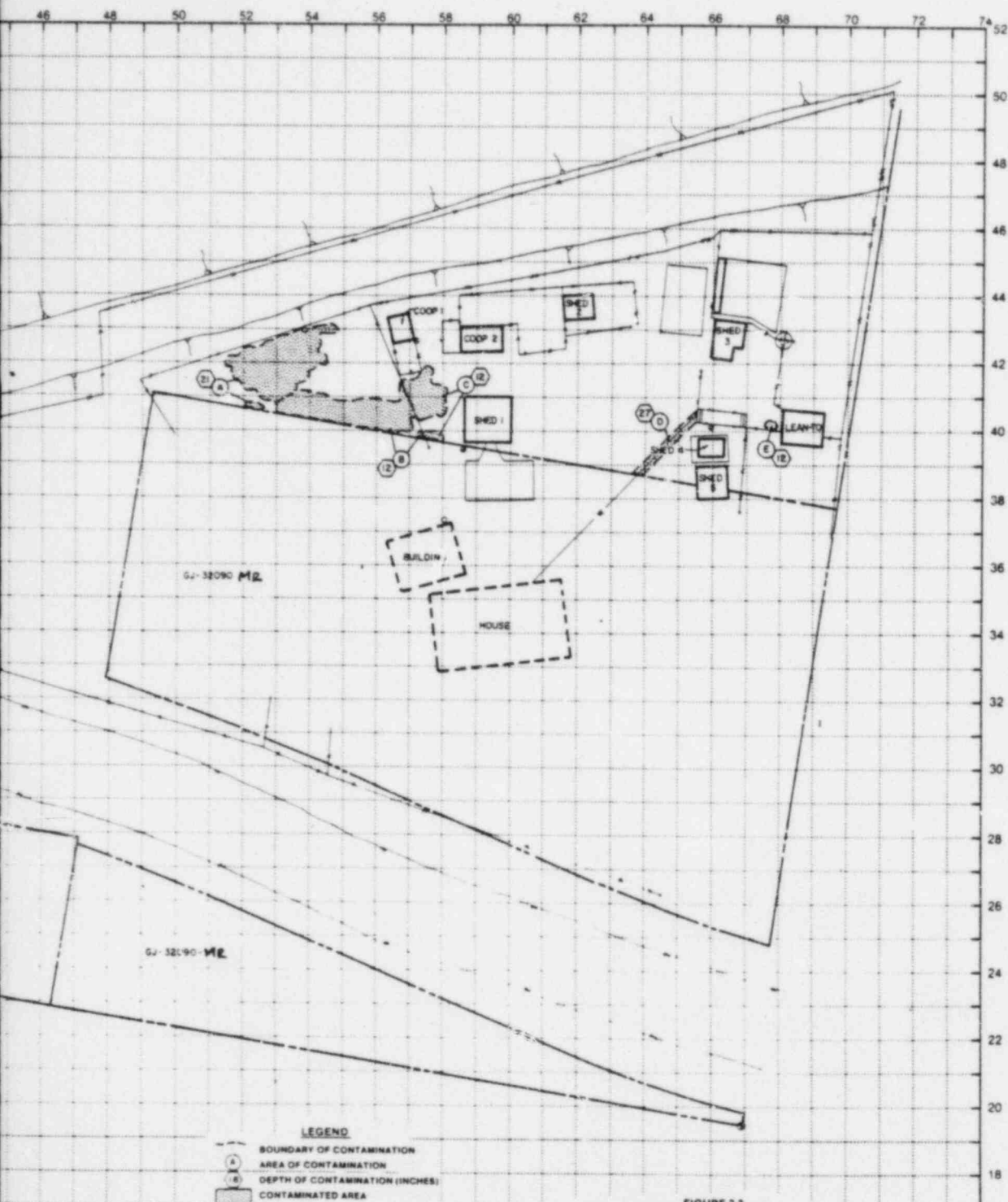
**TI
APERTURE
CARD**

**Also Available On
Aperture Card**

NO. DATE		REVISIONS		BY	CR	APP	NO. DATE	REVISIONS		BY	CR	APP
RESIDENCE NO. OF OCCUPANTS NON-RESIDENCE - MAX. HRS. / WK. INSTRUMENT NO. SURVEY FOR PREPARED BY SURVEY DATE TIME												
U.S. DEPARTMENT OF ENERGY GRAND JUNCTION PROJECTS OFFICE, COLORADO DESIGNED BY DRAWN BY CHECKED BY PROJ. ENG. SURVEYED BY APPROVED BY DATE APPROVAL BOX DATE												
ZOO DIKE ROAD GRAND JUNCTION, COLORADO DOWNSIDE NO. 02-43552-07 DOWNSIDE NO. 3-0786-62 DWT 2.00												

8509270202-02





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CARD

Also Available On
Aperture

8509270202-03

MEMORANDUM

ALLIED Bendix
Aerospace

Bendix Field Engineering Corporation
Grand Junction Operations
Grand Junction, Colorado

Date: August 2, 1985

To: Files

From: James D. Garcia

Subject: Team Leader Notes - GJ-43552-RS OT *mg 9.85*

Address: 200 Dike Road

Owner: Vearl and Evelyn Anway

Parcel Number: 294515200009

Year Built: 1970

Telephone: None

Team Members

J. Garcia (Team Leader)
M. Gilfillan
R. Wilkins

S. Larsen
R. Herman
S. Garcia

Instruments

See Equipment Operational Summary sheet

This property was included as a spillover from Department of Energy (DOE) Identification (ID) GJ-32090-RS. *MR mg 9.85* Some data will be used from the survey of GJ-32090, since it was valid data. Copies of the final survey maps will also be placed in this folio.

Team Leader Notes

James D. Garcia

GJ-43552-~~RE~~OT mg 9.85

August 9, 1985

Page 2

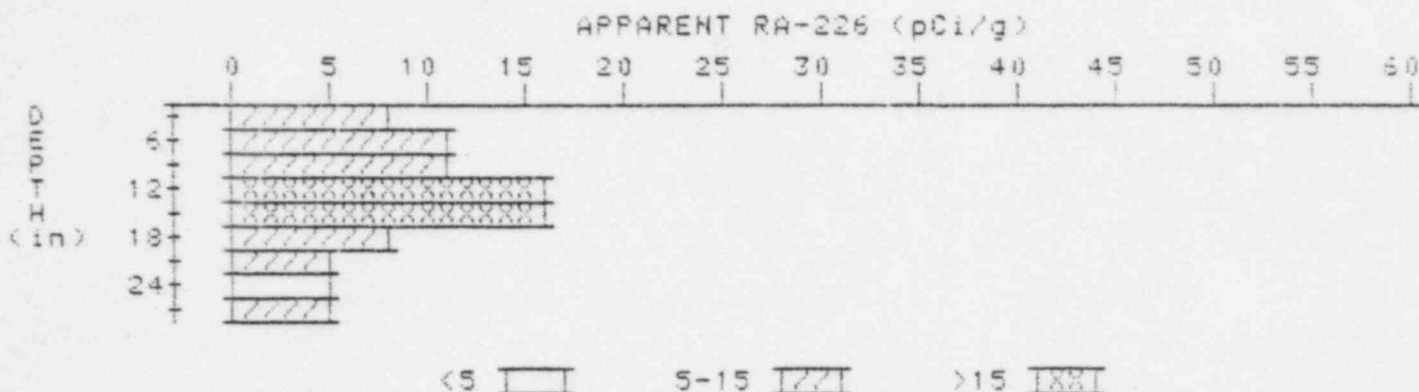
Mr. Anway made a point of asking me to note that he does not want anything disturbed in his garden area until after he has harvested his entire crop. Mr. Anway also stated that it took him several years to get the soil rich enough to grow a productive garden, and he wanted it known that he expects a good rich topsoil to replace the soil that is removed from the garden area.

All team members were alpha scanned before returning to the compound.

APPARENT RADIUM-226 CONCENTRATION DECONVOLUTION GRAPH

1

PROPERTY NUMBER: GJ-43552-0T
HOLE NUMBER: 1
LOCATION: 523419



Depth (in)	Apparent Radium-226 (pCi/g) Undeconvolved	Apparent Radium-226 (pCi/g) Deconvolved
3	7.7	7.7
6	9.8	11.2
9	11.1	11.1
12	12.4	15.8
15	11.8	15.5
18	9.1	8.0
21	7.0	5.4
24	5.8	4.7
27	5.2	5.2

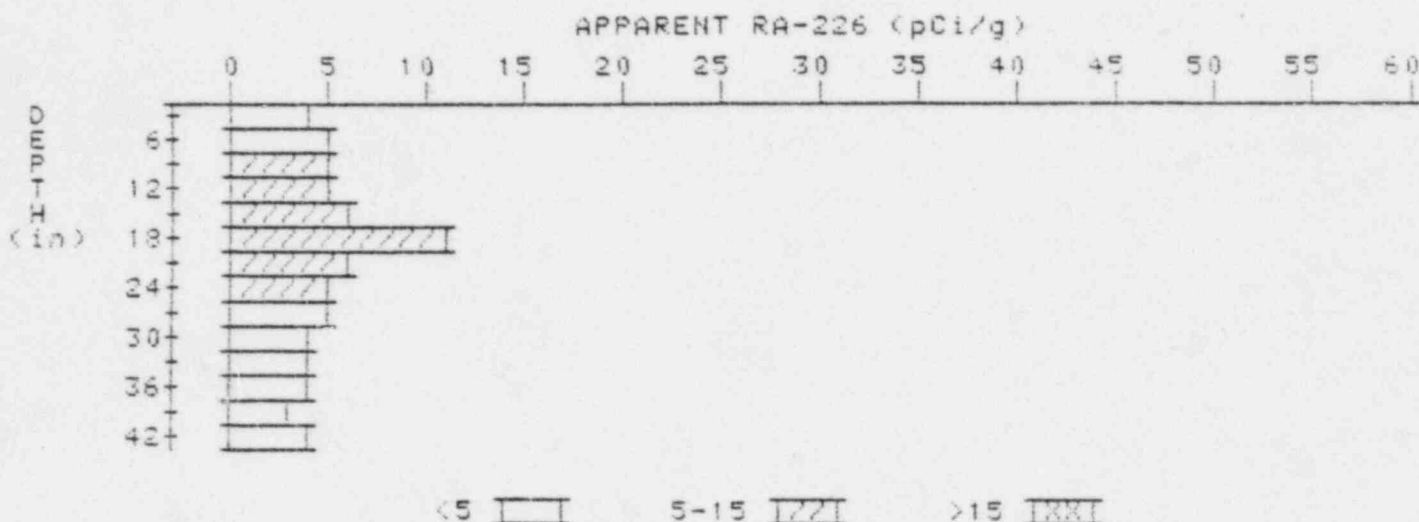
APPARENT RADIUM-226 CONCENTRATION DECONVOLUTION GRAPH

4

PROPERTY NUMBER: GJ-43552-0T

HOLE NUMBER: 4

LOCATION: 617366



Depth (in)	Apparent Radium-226 (pCi/g) Undeconvolved	Apparent Radium-226 (pCi/g) Deconvolved
3	3.5	3.5
6	4.4	4.3
9	5.1	5.5
12	5.6	5.1
15	6.4	6.2
18	7.3	10.5
21	6.4	6.2
24	5.6	5.2
27	5.0	4.8
30	4.5	4.1
33	4.2	4.0
36	4.0	4.0
39	3.8	3.4
42	3.8	3.8

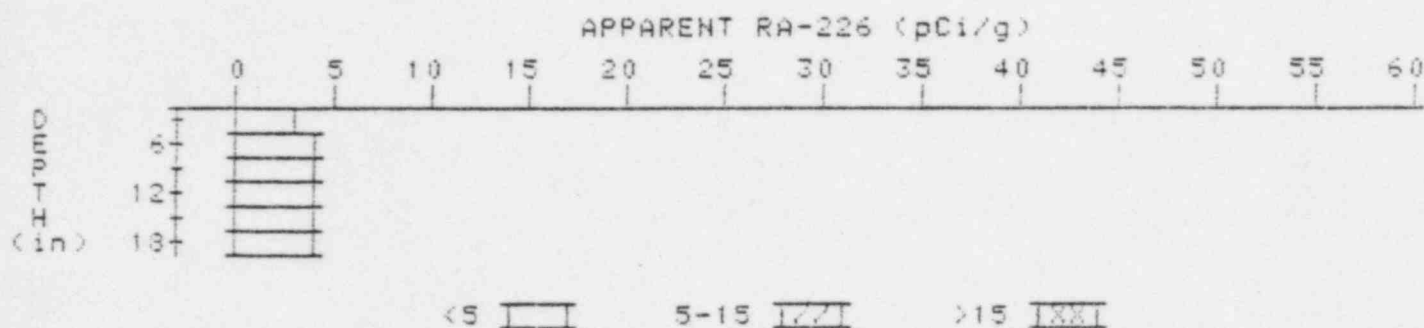
APPARENT RADIUM-226 CONCENTRATION DECONVOLUTION GRAPH

5

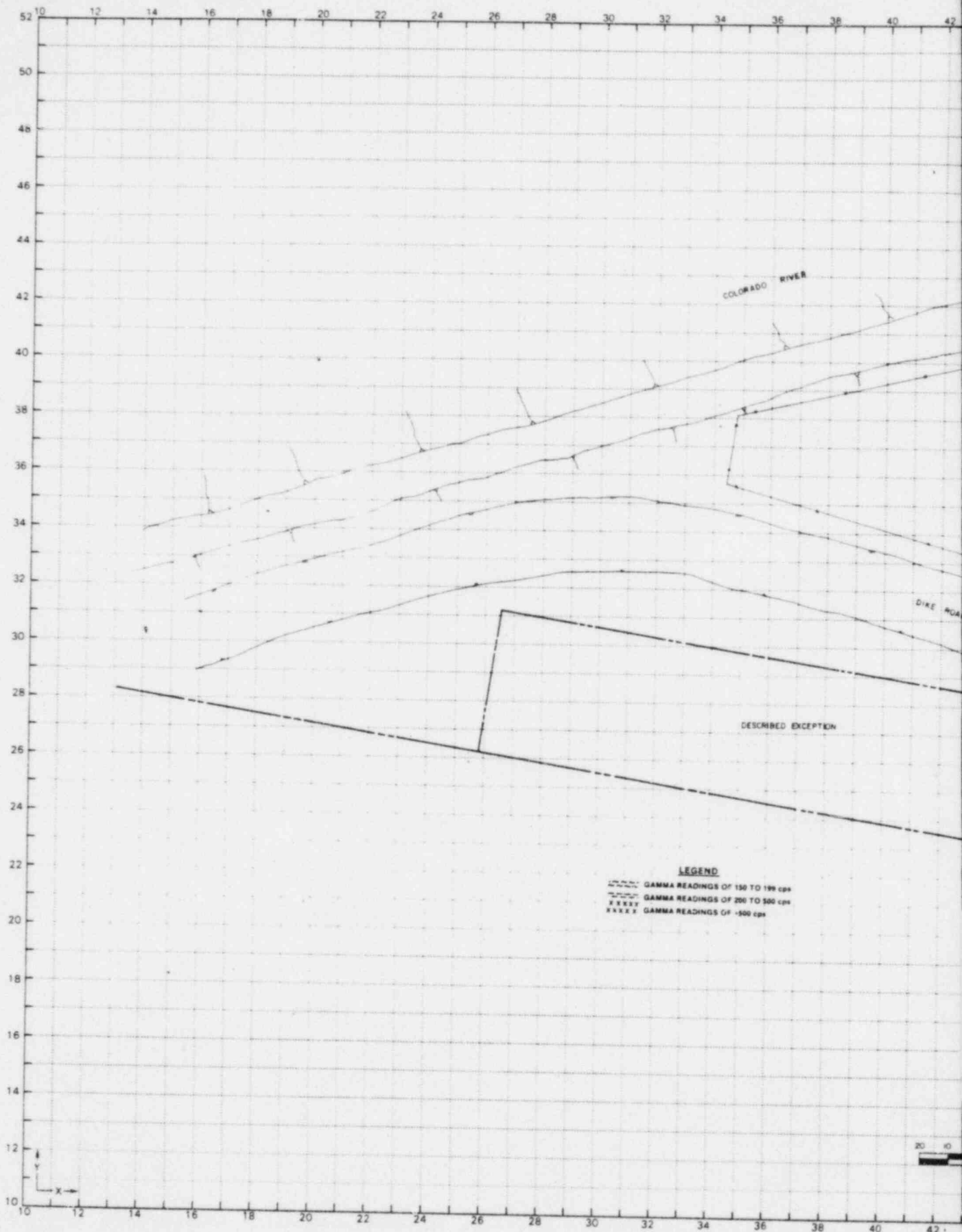
PROPERTY NUMBER: GJ-43552-0T

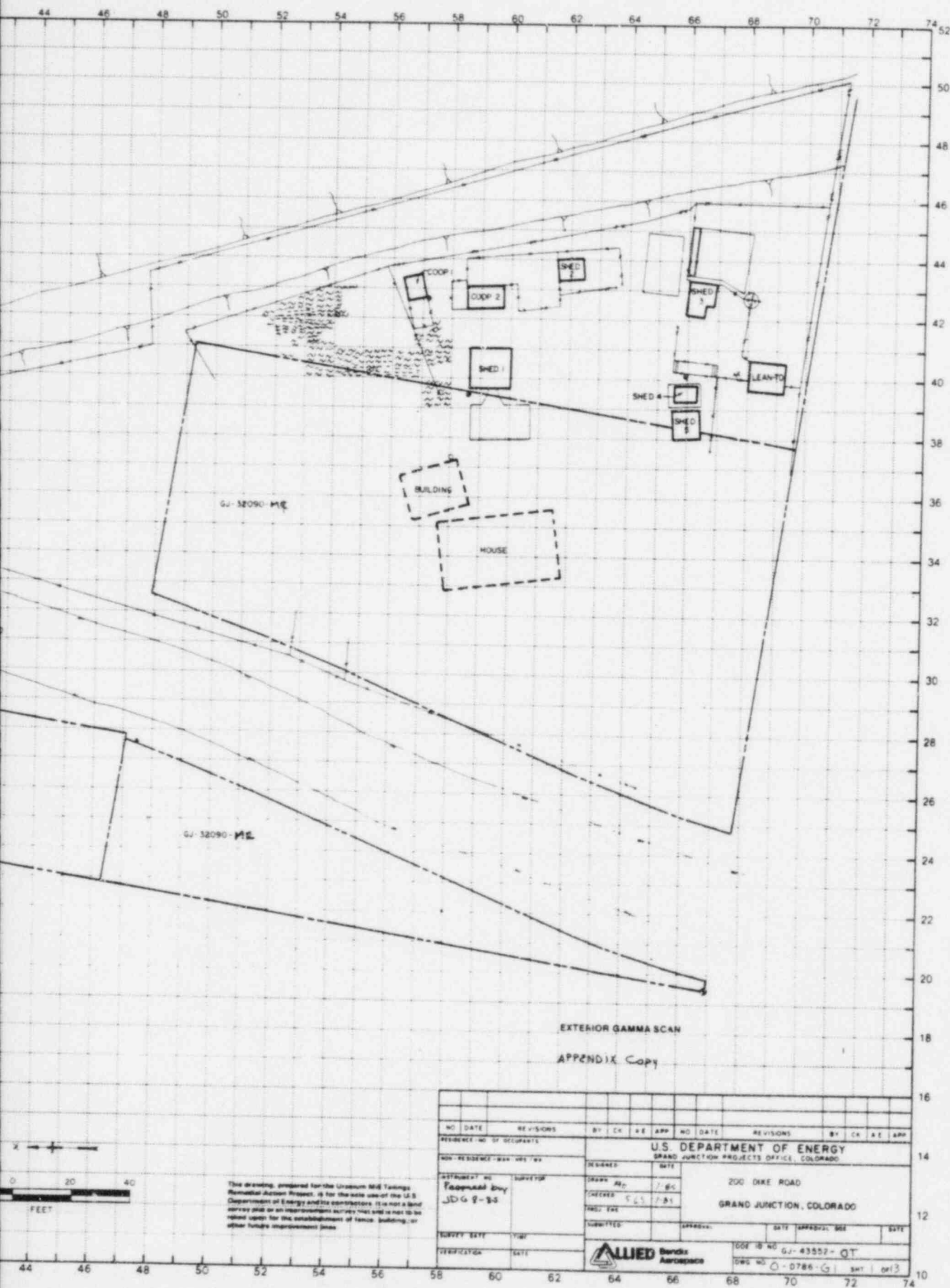
HOLE NUMBER: 5

LOCATION: 635275



Depth (in)	Apparent Radium-226 (pCi/g) Undeconvolved	Apparent Radium-226 (pCi/g) Deconvolved
3	3.3	3.3
6	3.8	4.3
9	4.0	4.4
12	4.0	3.8
15	4.1	4.1
18	4.2	4.2





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