

RADIOLOGIC AND ENGINEERING ASSESSMENT

FOR

DOE ID NO.: GJ-07332-MR
ADDRESS: 3010 C ROAD

(INCLUDES A PORTION OF: DOE ID NO. GJ-45271-VL
ADDRESS: 3012 C ROAD)

APRIL 1992

FOR

URANIUM MILL TAILINGS REMEDIAL ACTION PROJECT OFFICE

ALBUQUERQUE OPERATIONS OFFICE

DEPARTMENT OF ENERGY

BY

CHEM-NUCLEAR GEOTECH, INC.
P.O. Box 14000
Grand Junction, Colorado 81502-5504

APPROVED BY

Joseph E. Vergona
J. VERGONA
DOE PROJECT ENGINEER

DATE

5/27/92

SUPPLEMENTAL
STANDARD

GO7332RE.SS:CROAD

9707020190 920430
PDR WASTE
WM-39

PDR

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1.0 INTRODUCTION

The Environmental Protection Agency (EPA) Standards for Remedial Actions at Inactive Uranium Processing Sites (40CFR Part 192) defines two types of remedial action: control and cleanup. Control is the operation which places the tailings piles in a condition that will minimize the risk to man over a long period of time. Cleanup is the operation which reduces the potential health consequences of tailings that have been dispensed from tailings piles by natural forces or removed by man and used elsewhere in buildings or land. The purpose of the EPA Standards for cleanup is to provide the maximum reasonable protection of public health and the environment. The varied conditions at the designated sites and limited experience with remedial actions, which existed at the time the law was created, made it appropriate for the EPA to allow tailings to be left in place where circumstances make such action reasonable. Circumstances which make removal of tailings contamination unreasonable are accommodated by the EPA through provisions within 40 CFR Part 192 for Supplemental Standards. The Department of Energy (DOE) requested that Chem-Nuclear Geotech, Inc. (Geotech) consider Application for Supplemental Standards and alternatives for remedial action work in an area located at 3010 C Road, Grand Junction, Colorado. Two parcels are involved and are identified as DOE ID Nos. GJ-07332-MR and a portion of GJ-45271-VL.

This Radiologic and Engineering Assessment (REA) considers the area on a steep hillside on the boundary line between these two parcels. Both parcels are involved in this Supplemental Standards Application due to a property line dispute that exists between the adjacent property owners. For purposes of filing for Supplemental Standards in the cliff area, Geotech has determined that the Supplemental Standards area is more appropriately referenced in GJ-07332-MR; however, the outcome of the property line dispute could result in the cliff being located on either the GJ-07332-MR or the GJ-45271-VL property. A separate Supplemental Standards Application has been applied for in another area of GJ-45271-VL which is located in a Wetlands, adjacent to the cliff/hillside.

This REA serves as an Executive Summary for the remainder of this document and contains a description of remediation alternatives, evaluation of health risks for the alternative action, estimated costs of the remedial action, approximate volumes of contaminated materials, and the recommended action. Appendix A contains the Executive Summary for the Radiologic Assessment data and tables that summarize the available radiological data. Appendix B is the Supplemental Standards Application and contains analysis of: land use, health risk, alternative action, construction costs, and local agency input.

2.0 EVALUATION

No structures are located within the area being considered by the Supplemental Standards Application; therefore, consideration of the National Register of Historic Places is not required.

This REA is focused on the mill tailings contamination located on the northern cliff of the bluff overlooking the Colorado River. Field Assessment radiological data are provided in the Radiological Assessment, Appendix A. From this data, it was concluded the depth of contamination is approximately 6 inches. The mill tailings that have been found are assumed to be spillover from tailings placed in the horse pasture of 3010 C Road; this horse pasture has since been completely remediated. Figures 1 and 2 depict the areas being considered for Supplemental Standards. Figures 3 and 4 summarize the contamination data for this Supplemental Standards Application.

The alternative actions considered in Appendix B can be summarized as follows:

Alternative 1 - Complete Remediation (All Contaminated Material - Assessed and Unassessed Areas)

Health Risk - Reduced to within EPA standards
 Estimated Construction Cost - Unknown (Due to incomplete assessment data)
 Approximate Volume of Contaminated Material Removed - Unknown (Due to incomplete assessment data)
 Approximate Volume of Contaminated Material Remaining - 0 cy

Alternative 2 - Partial Remediation (Supplemental Standards Application - Remediate Deposits in Assessed Areas)

Health Risk - Reduced to within EPA standards in assessed areas
 Estimated Construction Cost - \$8,175
 Approximate Volume of Contaminated Materials Removed - 75 cy
 Approximate Volume of Contaminated Materials Remaining - Unknown (Due to incomplete assessment data)

Alternative 3 - No Remediation (Supplemental Standards Application)

Health Risk - See Appendix B, Table B.T1
 Estimated Construction Cost - \$ 0
 Approximate Volume of Contaminated Material Removed - 0 cy
 Approximate Volume of Contaminated Material Remaining - Unknown (Due to incomplete assessment data)

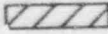

3.0 CONCLUSION AND RECOMMENDATIONS

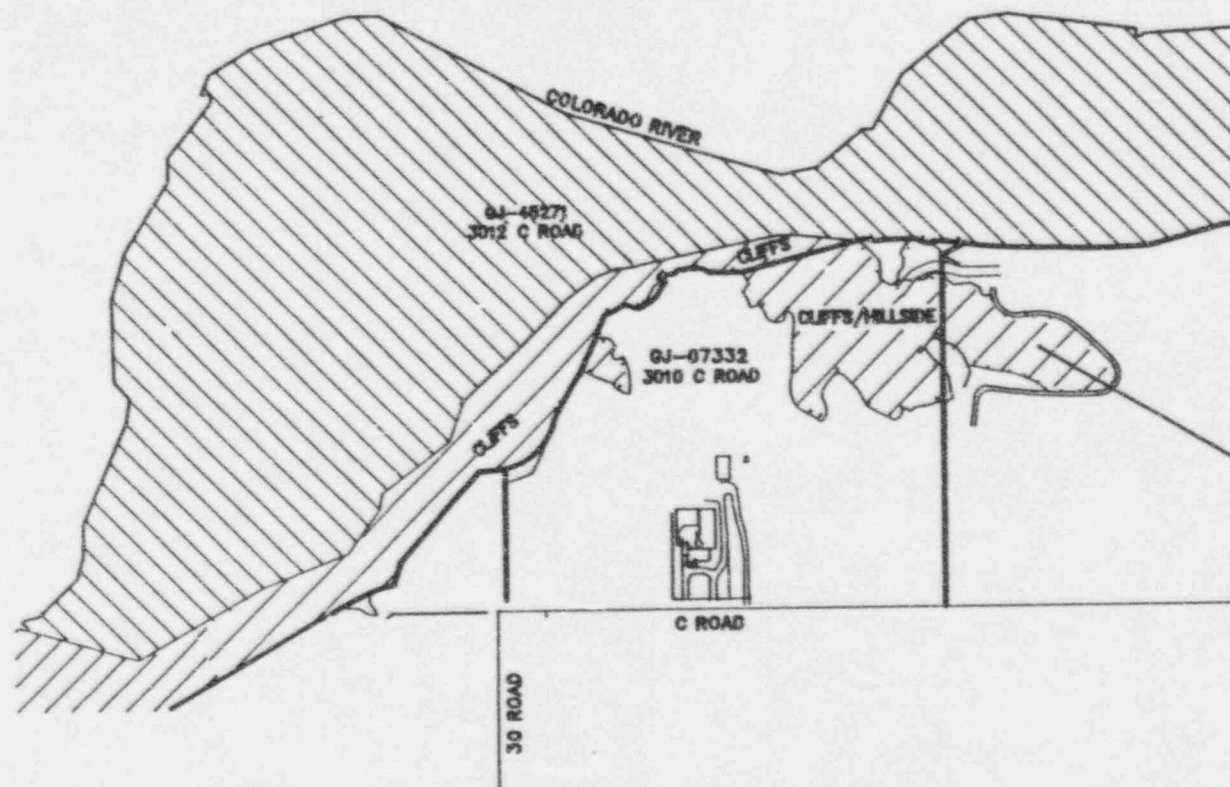
Examination of the health risk performed in Appendix B suggests that there are no identifiable significant health risks if this Application for Supplemental Standards is approved. The cost of remediation is excessive when no significant health risks exist. The resulting environmental damage to the potentially unstable slope and the risk to workers attempting remediation is unreasonable when compared to the health risks. No change in land use is expected within the foreseeable future. The potential for future migration of low level tailings down the hillside exists. Geotech believes that the environmental damage that would be inflicted to the hillside by remediation is excessive when compared to the minor amounts of low level tailings that might migrate down the hillside.

Approval of Supplemental Standards Application should be applied under 40 CFR Part 192.21 Criteria A and B (see Appendix B, Section B.1). A long-term tailings management, disposal, and migration control plan should be developed and implemented. The plan should address undiscovered deposits, deposits left in place through Application of Supplemental Standards, and deposits that are not within existing inclusion boundaries.

MP040892
 G07332RE.SS:CROAD:DZ

LEGEND

- PROPERTY LINE
-  APPROXIMATE AREA OF SUPPLEMENTAL STANDARDS FOR GJ-07332-MR (THIS APPLICATION)
-  APPROXIMATE AREA OF SUPPLEMENTAL STANDARDS FOR GJ-45271-VL (SEPARATE APPLICATION)

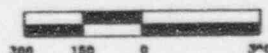


LOCATION OF SUPPLEMENTAL STANDARDS AREA FOR THIS PROJECT



LOCATION PLAN

SCALE IN FEET



INCLUDES A PORTION OF GJ-45271-VL LOCATED AT 3012 C ROAD

U.S. DEPARTMENT OF ENERGY

3010 C ROAD
GRAND JUNCTION, CO

DOE ID NO. GJ-07332-MR

FIGURE 1

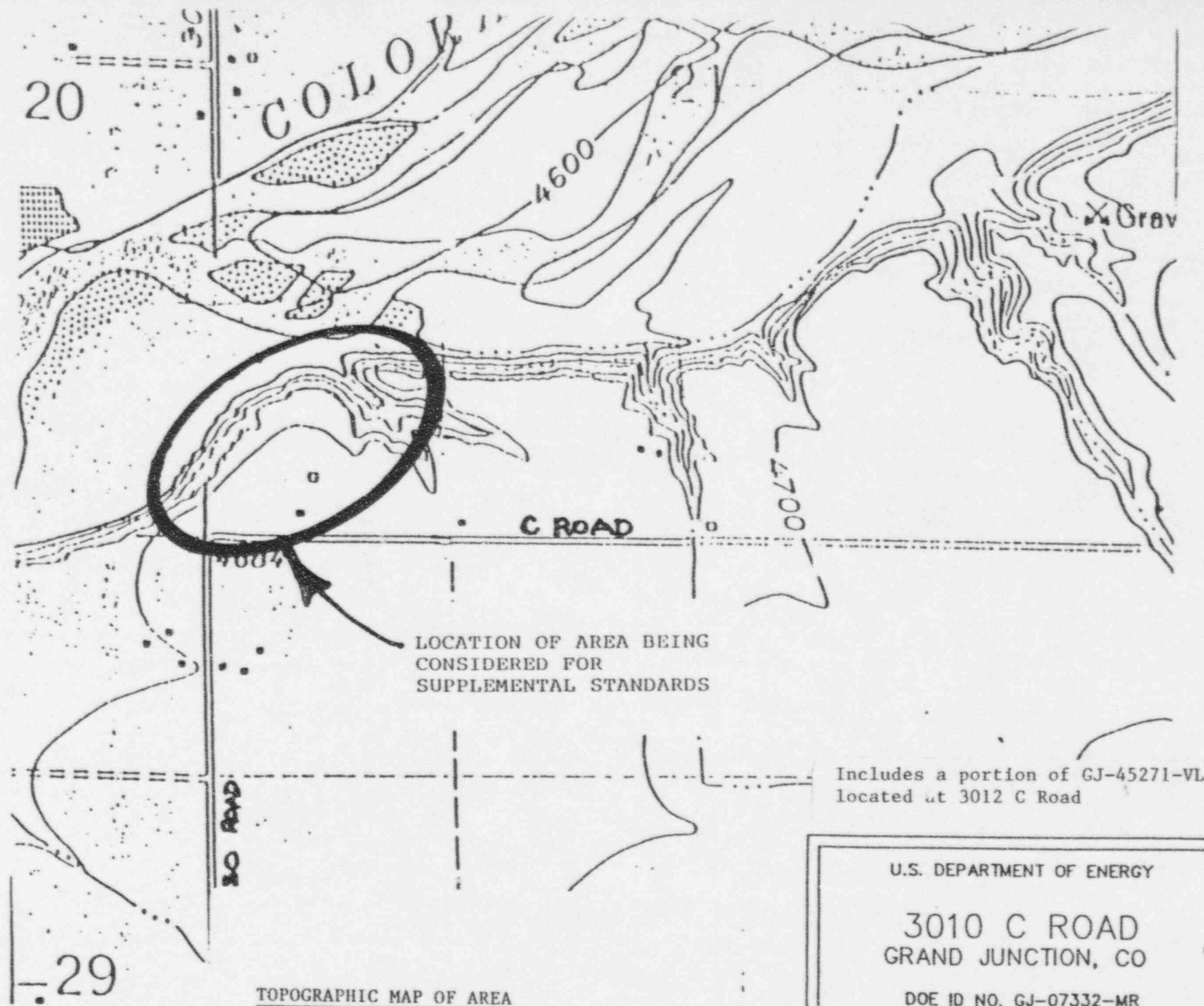


FIGURE 2

APPENDIX A
SUPPLEMENTAL STANDARDS
RADIOLOGICAL ASSESSMENT
FOR

DOE ID NO. GJ-07332-MR
3010 C ROAD

(Includes a portion of:
DOE ID NO. GJ-45271-VL
3012 C ROAD)

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Post Construction Appendix A for GJ-07332-MR
April 29, 1991 Memo Defining Supplemental Standards Area
Contamination
Appendix A for GJ-45271-VL

EXECUTIVE SUMMARY

1.0 INTRODUCTION

This appendix contains the applicable radiological information that was gathered during the Field Assessment of 3010 and 3012 C Road.

Following the procedures described in the Field Assessment Operations Technical Data Procedures Manual, data was collected to assess the location and extent of contamination due to residual radioactive material in quantities in excess of the Environmental Protection Agency "Standards for Remedial Action at Inactive Uranium Processing Sites" (40 CFR 192).

2.0 GAMMA EXPOSURE RATE SURVEYS

2.1 Exterior

The area background reading is 13 uR/h. The high exterior gamma level is 30 uR/h. Exterior gamma exposure rates in the area along the hillside are shown on the radiological map, Figure 4. A summary of the gamma exposure rates is shown in Table A.T1.

Note: the steep terrain of the hillside prevented Field Assessments from obtaining a complete radiological assessment. In the areas where the terrain permitted safe access, a complete radiological survey was performed. Several surveys were performed to obtain as complete an assessment as possible. The Appendix A for GJ-45271-VL and the letter dated April 29, 1991 reflect the current radiological assessments of the properties.

2.2 Interior

Interior gamma exposure rates are not applicable. The hillside is in an open-air environment with no structures near the contaminated areas.

3.0 RADON/RADON DECAY-PRODUCT CONCENTRATION (RDC)

Radon decay-product concentrations are not applicable. The hillside is an open-air environment with no structures near the contaminated areas.

4.0 EXTENT OF CONTAMINATION

4.1 Exterior

The extent of contamination is presented in Figure 3.

4.2 Interior

Not applicable - vacant land.

5.0 REMEDIAL ACTION RECOMMENDATIONS

5.1 Exterior

The hillside between 3010 C Road and 3012 C Road should be considered for Application of Supplemental Standards in the areas shown on Figure 1 (see Appendix B for further evaluation of the alternatives and recommendations).

5.2 Interior

Not applicable - vacant land.

6.0 COMMINGLED WASTE INVESTIGATION

No commingled waste investigation was performed on this property.

MP070191
G07332EX.SUM:CROAD:CP

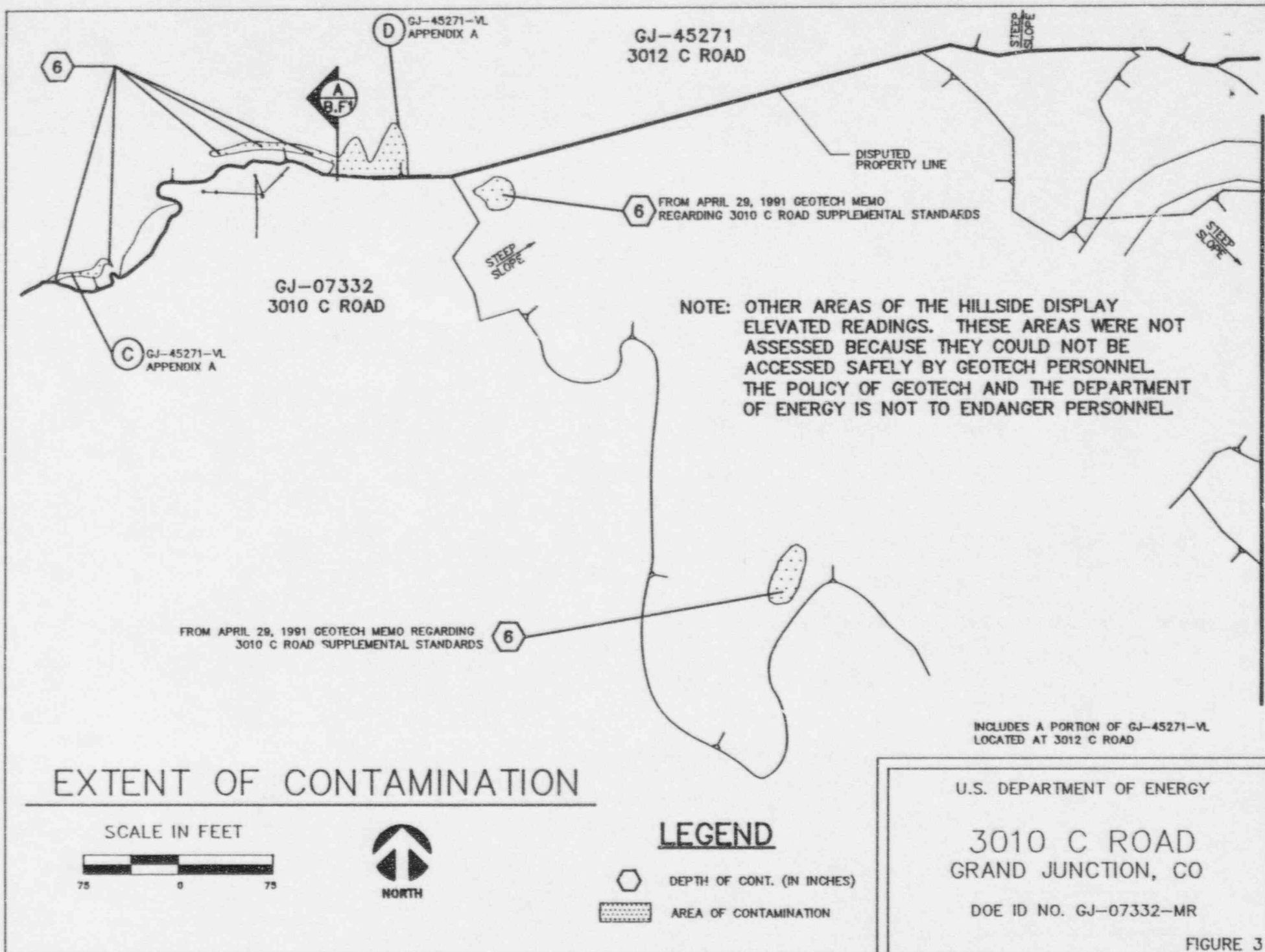
TABLE A. T1

SUMMARY OF RADIOLOGICAL DATA

GJ-07332-MR
3010 C ROAD
(INCLUDES A PORTION OF
GJ-45271-VL, 3012 C ROAD)

SUPPLEMENTAL STANDARDS APPLICATION

AREA DESCRIPTION	GAMMA (CPM)				RADIUM 226				ESTIMATED DEPTH OF CONTAMINATION			
	SURFACE LEVEL				pCi/g							
	BACKGROUND	MAX	MIN	AVE	BACKGROUND	MAX	MIN	MAX	MIN	MAX	MIN	
HILLSIDE	13	30	16	23	2.4	16.3	5.7	6	6	6	6	



GJ-45271
3012 C ROAD

DISPUTED
PROPERTY LINE

STEEP
SLOPE

16 - 22 μ R/h

16 - 17 μ R/h

16 - 22 μ R/h

16 - 20 μ R/h

16 - 30 μ R/h

GJ-07332
3010 C ROAD

NOTE: OTHER AREAS OF THE HILLSIDE DISPLAY
ELEVATED READINGS. THESE AREAS WERE NOT
ASSESSED BECAUSE THEY COULD NOT BE
ACCESSED SAFELY BY GEOTECH PERSONNEL.
THE POLICY OF GEOTECH AND THE DEPARTMENT
OF ENERGY IS NOT TO ENDANGER PERSONNEL.

STEEP
SLOPE

STEEP
SLOPE

16 - 20 μ R/h

LEGEND

16-20 μ R/h RANGE OF GAMMA EXPOSURE RATES
TAKEN AT SURFACE LEVEL

INCLUDES A PORTION OF GJ-45271-VL
LOCATED AT 3012 C ROAD

RADIOLOGICAL MAP OF GAMMA EXPOSURE RATES

SCALE IN FEET



U.S. DEPARTMENT OF ENERGY

3010 C ROAD
GRAND JUNCTION, CO

DOE ID NO. GJ-07332-MR

FIGURE 4

ATTACHMENTS

Appendix A for GJ-07332-MR
Post Construction Appendix A for GJ-07332-MR
April 29, 1991 Memo Defining Supplemental Standards Area Contamination
Appendix A for GJ-45271-VL

APPENDIX A

RADIOLOGICAL ASSESSMENT FOR
DOE ID NO. GJ-07332-MR

Submitted: November 3, 1989

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Figures 4a through 4d. Exterior Estimated Extent of Contamination
Figure 4e. Interior Estimated Extent of Contamination

EXECUTIVE SUMMARY

1.0 INTRODUCTION

This property is a residence located at 3010 C Road.

Following procedures described in the *Field Assessments Procedures Manual*, data were collected on this property and assessed to estimate the location of residual radioactive material in excess of the Environmental Protection Agency (EPA) 'Standards for Remedial Action at Inactive Uranium Processing Sites' (40 CFR 192).

This property has been included for remedial action consideration by Oak Ridge National Laboratory on the basis of excess radium-226 concentration in the land area.

2.0 GAMMA EXPOSURE-RATE SURVEYS

2.1 Exterior

The area backgrounds are 15 $\mu\text{R/h}$ and 2.4 pCi/g. The high outside gamma is 125 $\mu\text{R/h}$. Exterior gamma exposure rates are shown in Figures 1a through 1e.

2.2 Interior

The interior background, as determined by UNC Geotech, is 14 $\mu\text{R/h}$. The high inside gamma is 20 $\mu\text{R/h}$; there is no area exceeding the EPA standard. Areas of elevated interior gamma exposure rates are shown in Figures 1f and 2.

3.0 RADON/RADON DECAY-PRODUCT CONCENTRATION (RDC)

A continuous Working Level Monitor measurement was taken by UNC Geotech. The results are as follows:

<u>Date In</u>	<u>Date Out</u>	<u>Maximum</u>	<u>Average</u>
October 11, 1989	October 15, 1989	0.0599	0.0357

The measurement location is shown in Figure 2. This measurement indicates this property will probably exceed the EPA standard.

4.0 EXTENT OF CONTAMINATION

4.1 Exterior

Figures 3a through 3d show the locations and types of explorations and radium measurements made; the related radium data are listed in Tables 1a through 1d. The maximum radium concentration in the contaminated area is 84.7 pCi/g.

Figures 4a through 4d show the estimated boundaries and depths of exterior contamination. The deposits containing identified residual radioactive materials are characterized as follows:

In the concrete aggregate of and/or beneath the sidewalks, the stoops, the patio slab, in the lawn and bare soil areas, and in the roadbase/gravel-fill areas.

4.2 Interior

Figure 2 shows the location and type of measurements made.

Figure 4e shows the estimated boundaries and depths of interior contamination. The deposit containing identified residual radioactive material is characterized as follows:

In the concrete aggregate of the cistern walls and floor.

5.0 REMEDIAL ACTION RECOMMENDATIONS

5.1 Exterior

Exterior Deposits A and B (Figures 4a through 4d) should be removed and the appropriate cover material replaced.

5.2 Interior

Interior Deposit C (Figure 4e) should be remediated as follows:

Insulate and ventilate the crawl space; isolate the basement from the crawl space.

TEAM LEADER NOTES

DOE ID NUMBER: GJ-07332-MR

SURVEY DATES: August 21 through August 25, 1989

TEAM LEADER: Dan Fossey

Owners: Edward and Jerrie Rozman Telephone Numbers: (303) 434-5927 (Home)
(303) 527-3747 (Work)

The designation of this property has been changed from an 'RS' to 'MR.'

All deposits described in the historical data were located and investigated. Additional contamination was identified in the abandoned cistern beneath the house in the crawl space.

The owner informed the survey team that a Colorado Department of Health representative indicated that the carport slab and the south stoop were contaminated; however, there is nothing in the historical data to substantiate this information.

The water meter pit was not investigated with a scintillometer, as there is no water meter pit on this property.

Underground utility lines located during the assessment are shown on the drawings.

The gas line was not investigated because it does not underlie any areas of contamination. Data collected indicate the contamination associated with the water and sewer lines is surficial and does not involve the lines or trenches.

Interior contamination is associated with the concrete walls and the bottom of the abandoned cistern in the crawl space (Deposit C, Figure 4e). The depth to the bottom of the cistern is 72 inches. It does not appear to be bedded in tailings.

The foundation of the house was investigated; data collected do not indicate tailings involvement of the foundation.

Tailings from adjacent exterior deposits do not extend under the footing.

The concrete patio surrounding the swimming pool is 4 inches thick. There are visible tailings sand beneath the concrete at sample Location 9 (Figure 3a). There are two layers of concrete with a layer of tailings sand between the two slabs.

TEAM LEADER NOTES
GJ-07332-MR
Page 2

Contamination from this property spills over to the north onto Bureau of Land Management (BLM) land.

The north property boundary follows the crest of the bluffs. The side of the bluffs was too steep to accurately obtain spillover data onto the adjacent BLM land. A portion of Area B (Figure 4d), over the edge of the bluffs, is a trash dump.

The property owners are planning to build a new house in the center of Area B (Figures 4b through 4d).

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Radium Concentrations at Exterior Locations

DOE ID #GJ-07332-MR

3010 C Road

Page 1 of 4

Loc #	Grid Location	Depth (in.)	Meas. Type	Ra-226 (pCi/g)		RDC	Alpha	Comments
				Non-Deconv.	Deconv.			
1	570390	00-06	OC	2.4				MLP-984, background
		00	DS	2.1				Dirt
2	580403	00	DS	2.1				Dirt
3	582395	00	DS	9.2				Dirt
		00	DS	5.4				Concrete
4	587375	00	DS	1.9				Dirt
		00	DS	17.4				Concrete-4" thick
5	597368	00	DS	<1.0				Concrete-south pour
		00	DS	13.3				Concrete-north pour
6	597397	00	DS	11.4				Concrete
		03	TC	8.4	8.4			4" concrete
		06	TC	14.3	25.1			
		09	TC	14.1	21.2			DC = 12 inches
		12	TC	9.9	6.9			
		15	TC	7.4	4.7			
		18	TC	6.4	6.4			
7	600353	00	DS	1.9				Concrete
8	603333	[12]	DS	2.1				Brick facing
		00	DS	1.8				Concrete
9	605353	00	DS	40.2				Concrete
		03	TC	23.8	23.8			4" concrete at surface and
		06	TC	42.5	78.4			4" concrete at 9"; auger
		09	TC	41.0	70.9			refusal
		12	TC	22.7	6.7			
		15	TC	13.4	4.2			DC = 9 inches
		18	TC	9.3	5.7			
		21	TC	7.2	7.2			
10	610374	00	DS	28.2				Concrete
		03	TC	31.4	31.4			
		06	TC	26.0	32.4			DC = 12 inches
		09	TC	17.0	10.1			
		12	TC	11.9	7.1			
		15	TC	9.5	6.1			
11	610394	00	DS	1.4				Concrete pool lip

Radium Concentrations at Exterior Locations

DOE ID #GJ-07332-MR

3010 C Road

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Loc #	Grid Location	Depth (in.)	Meas. Type	Ra-226 (pCi/g)		RDC	Alpha	Comments
				Non-Deconv.	Deconv.	Working Level	dpm/100 cm ²	
11	610394	36	DS	<1.0				Pool side
		48	DS	<1.0				Pool bottom
12	610400	00	DS	2.9				Concrete-south pour
		00	DS	1.4				Concrete-north pour
13	613317	[12]	DS	1.9				Brick facing
		00	DS	1.3				Dirt
14	615352	[08]	DS	5.2				Concrete step
		00	DS	41.5				Concrete
15	619324	[12]	DS	1.7				Brick facing
		00	DS	<1.0				Stoop
16	620370	00	DS	4.0				Concrete-north pour
		00	DS	2.5				Concrete-south pour
17	626358	00	DS	16.4				Dirt
		03	TC	9.2	9.2			
		06	TC	9.6	14.2			DC = 12 inches
		09	TC	7.4	6.5			
		12	TC	5.7	4.3			
		15	TC	4.8	3.7			
		18	TC	4.5	4.5			
18	628355	00	DS	4.4				Dirt
		00	DS	2.8				Concrete-west pour
		06	DS	6.2				
		08	DS	2.9				Hz under stoop
		12	DS	6.1				
19	628388	00	DS	1.1				Concrete stoop-east pour
20	631400	00	DS	14.2				Concrete-east pour
		00	DS	2.3				Concrete-west pour
21	634408	00	DS	7.3				Dirt
		00	DS	1.7				Concrete-north pour
		00	DS	7.0				Concrete-south pour
22	640319	[12]	DS	1.5				Brick facing
		00	DS	1.4				Dirt
23	640416	00	DS	2.0				Gravel

Loc #	Grid Location	Depth (in.)	Meas. Type	Ra-226 (pCi/g)		RDC Working Level	Alpha dpm/100 cm ²	Comments
				Non-Deconv.	Deconv.			
24	646390	00	DS	4.0				Grass
		03	TC	4.0	4.0			
		06	TC	4.1	4.3			DC = 6 inches
		09	TC	4.1	4.1			
		12	TC	4.1	3.6			
		15	TC	4.4	4.8			
		18	TC	4.5	4.5			
		21	TC	4.6	4.8			
		24	TC	4.6	5.0			
		27	TC	4.4	4.4			
		30	TC	4.2	4.0			
		33	TC	4.1	4.1			
25	650360	00	DS	4.8				Grass
		03	TC	3.6	3.6			
		06	TC	4.0	4.5			DC = 6 inches
		09	TC	4.1	4.1			
		12	TC	4.2	4.2			
		15	TC	4.3	4.8			
		18	TC	4.1	4.1			
26	660332	[12]	DS	2.0				Brick facing
		00-06	OC	3.7				MLP-983
		00	DS	3.8				Grass
		03	TC	3.9	3.9			
		06	TC	3.9	3.9			
		09	TC	3.9	3.9			
		12	TC	3.9	4.3			
		15	TC	3.7	3.3			
		18	TC	3.7	3.7			
27	663390	00	DS	2.5				Grass
		00-06	OC	3.5				MLP-982
28	665340	00	DS	2.3				Grass
29	670370	00	DS	6.4				Grass
		03	TC	5.3	5.3			
		06	TC	5.8	7.2			DC = 6 inches
		09	TC	5.5	6.0			
		12	TC	4.9	4.2			
		15	TC	4.7	4.5			

Radium Concentrations at Exterior Locations

DOE ID #GJ-07332-MR

3010 C Road

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		Ra-226 (pCi/g)		RDC	Alpha		

Loc	Grid	Depth	Meas.	Non-		Working	dpm/
#	Location	(in.)	Type	Deconv.	Deconv.	Level	100 cm ²

29	670370	18	TC	4.6	4.4		
		21	TC	4.6	4.8		
		24	TC	4.5	4.5		

30	680370	00	DS	<1.0			Dirt

Measurement AS = Alpha Sample
Types: DH = Downhole Survey
DS = Delta Scintillometer
GB = GAD-6 Borehole
GS = GAD-6 Surface
OC = Soil Sample by Opp. Crys. Sys.
RP = Radon Profile
SS = Soil Sample by UNC Lab
TC = Total Count Borehole

Notes: DC = Depth of Contamination
[n] = Reading Taken n-Inches
Above Floor or Ground
Date of Survey = 08-22-89
Team Leader = DF

Radium Concentrations at Exterior Locations

DOE ID #GJ-07332-MR

3010 C Road

Page 1 of 1

				Ra-226 (pCi/g)		RDC	Alpha	Comments
Loc #	Grid Location	Depth (in.)	Meas. Type	Non-Deconv.	Deconv.	Working Level	dpm/100 cm ²	
31	120320	00	DS	2.4				Dirt
32	130360	00-06	OC	6.3				MLP-976
		00	DS	3.4				Dirt (soil sample)
		06	DS	2.8				
33	130410	00	DS	10.1				Dirt
		06	DS	3.2				
34	130460	00	DS	9.4				Dirt
		06	DS	3.4				
35	160460	00	DS	4.1				Dirt
		06	DS	3.5				
36	170410	00	DS	2.3				Dirt

Measurement AS = Alpha Sample
Types: DH = Downhole Survey
DS = Delta Scintillometer
GB = GAD-6 Borehole
GS = GAD-6 Surface
OC = Soil Sample by Opp. Crys. Sys.
RP = Radon Profile
SS = Soil Sample by UNC Lab
TC = Total Count Borehole

Notes: DC = Depth of Contamination
[n] = Reading Taken n-Inches
Above Floor or Ground
Date of Survey = 08-22-89
Team Leader = DF

Loc #	Grid Location	Depth (in.)	Meas. Type	Ra-226 (pCi/g)		RDC	Alpha		Comments
				Non-Deconv.	Deconv.		Working Level	dpm/100 cm ²	
37	470500	00	DS	2.4					Dirt
38	510440	00	DS	2.3					Dirt
39	510480	00	DS	2.5					
40	546408	00	DS	1.5					Dirt
41	550425	00	DS	5.1					Dirt
		06	DS	4.0					
42	550460	00	DS	1.7					Dirt
43	564405	00	DS	1.2					Dirt
44	585425	00	DS	9.8					Dirt
		06	DS	2.8					
45	590460	00-06	OC	2.4					MLP-977
		00	DS	3.5					Dirt (soil sample)
46	610360	00-06	OC	2.4					MLP-979
		00	DS	3.7					Dirt (soil sample)
		06	DS	2.0					
47	610410	00-06	OC	7.7					MLP-978
		00	DS	3.7					Dirt (soil sample)
		06	DS	3.6					
48	610460	06	DS	1.6					
		00	DS	7.9					Dirt
49	660330	00	DS	2.2					Dirt
50	660360	00	DS	5.3					Dirt
		06	DS	4.2					
51	660410	00	DS	6.3					Dirt
		06	DS	3.8					
52	660460	00	DS	8.0					Dirt
		06	DS	4.1					
53	710360	00	DS	7.3					Dirt

Radium Concentrations at Exterior Locations

DOE ID #GJ-07332-MR

3010 C Road

Page 2 of 2

		Ra-226 (pCi/g)		RDC	Alpha		
Loc #	Grid Location	Depth (in.)	Meas. Type	Non-Deconv.	Deconv.	Working Level	dpm/100 cm ² Comments
53	710360	06	DS	6.7			
54	710410	00	DS	6.6			Dirt
		06	DS	5.6			
55	710460	00	DS	9.6			Dirt
		06	DS	7.7			

Measurement Types:

- AS = Alpha Sample
- DH = Downhole Survey
- DS = Delta Scintillometer
- GB = GAD-6 Borehole
- GS = GAD-6 Surface
- OC = Soil Sample by Opp. Crys. Sys.
- RP = Radon Profile
- SS = Soil Sample by UNC Lab
- TC = Total Count Borehole

Notes:

- DC = Depth of Contamination
- [n] = Reading Taken n-Inches Above Floor or Ground
- Date of Survey = 08-22-89
- Team Leader = DF

Radium Concentrations at Exterior Locations

DOE ID #GJ-07332-MR

3010 C Road

Page 1 of 6

Loc #	Grid Location	Depth (in.)	Meas. Type	Ra-226 (pCi/g)		RDC	Alpha	Comments
				Non-Deconv.	Deconv.			
						Working Level	dpm/100 cm ²	
56	140260	00	DS	13.3				Dirt
		03	TC	6.0	6.0			
		06	TC	5.4	5.4			DC = 6 inches
		09	TC	4.8	3.9			
		12	TC	4.7	4.9			
		15	TC	4.5	4.1			
		18	TC	4.5	5.0			
		21	TC	4.2	4.2			
57	160230	00	DS	4.3				Dirt
		03	TC	3.9	3.9			
		06	TC	4.2	4.6			DC = 6 inches
		09	TC	4.3	4.7			
		12	TC	4.2	4.4			
		15	TC	4.0	4.4			
		18	TC	3.6	3.1			
		21	TC	3.5	3.5			
58	170290	00	DS	13.7				Dirt
		03	TC	5.5	5.5			
		06	TC	5.1	4.9			DC = 6 inches
		09	TC	4.8	4.6			
		12	TC	4.6	4.4			
		15	TC	4.5	4.7			
		18	TC	4.3	4.3			
		21	TC	4.1	4.3			
		24	TC	3.8	3.8			
59	200200	00	DS	2.3				Dirt
		03	TC	3.6	3.6			
		06	TC	3.8	3.8			DC = 0 inches
		09	TC	4.0	4.5			
		12	TC	3.9	3.9			
		15	TC	3.8	4.0			
		18	TC	3.6	3.4			
		21	TC	3.5	3.5			
		24	TC	3.4	3.4			
60	200250	00	DS	25.9				Dirt
		03	TC	11.8	11.8			
		06	TC	8.9	7.7			DC = 6 inches
		09	TC	6.7	4.9			
		12	TC	5.5	4.8			

Radium Concentrations at Exterior Locations

DOE ID #GJ-07332-MR

3010 C Road

Page 2 of 6

		Ra-226 (pCi/g)		RDC		Alpha		Comments
Loc #	Grid Location	Depth (in.)	Meas. Type	Non-Deconv.	Deconv.	Working Level	dpm/100 cm ²	
60	200250	15	TC	4.7	3.8			
		18	TC	4.4	4.2			
		21	TC	4.2	3.8			
		24	TC	4.2	4.2			
61	240290	00	DS	84.7				Dirt
		03	TC	54.2	54.2			
		06	TC	48.1	69.4			DC = 12 inches
		09	TC	30.0	20.0			
		12	TC	17.5	5.9			
		15	TC	11.5	7.1			
		18	TC	8.0	4.1			
		21	TC	6.7	5.3			
62	270180	00-06	OC	4.2				MLP-980
		00	DS	2.4				Dirt
63	270200	00	DS	23.7				Dirt
		03	TC	9.7	9.7			
		06	TC	8.7	9.6			DC = 9 inches
		09	TC	7.2	6.7			
		12	TC	6.0	5.1			
		15	TC	5.3	4.9			
64	270250	00	DS	35.6				Dirt
		03	TC	12.3	12.3			
		06	TC	8.9	6.9			DC = 6 inches
		09	TC	6.6	5.2			
		12	TC	5.1	3.9			
		15	TC	4.3	3.6			
65	280380	00	DS	1.4				Dirt
		03	TC	2.8	2.8			
		06	TC	2.8	3.0			DC = 0 inches
		09	TC	2.7	2.3			
		12	TC	2.8	3.0			
		15	TC	2.8	2.8			
66	290290	00	DS	49.3				Dirt
		03	TC	11.7	11.7			
		06	TC	9.1	8.0			DC = 6 inches

Radium Concentrations at Exterior Locations

DOE ID #GJ-07332-MR

3010 C Road

Page 3 of 6

Loc #	Grid Location	Depth (in.)	Meas. Type	Ra-226 (pCi/g)		RDC	Alpha	Comments
				Non-Deconv.	Deconv.	Working Level	dpm/100 cm ²	
66	290290	09	TC	7.1	5.9			
		12	TC	5.8	4.9			
		15	TC	5.0	4.6			
		18	TC	4.4	3.7			
		21	TC	4.2	4.2			
67	290330	00	DS	8.2				Dirt
		03	TC	3.9	3.9			
		06	TC	4.0	4.2			DC = 6 inches
		09	TC	4.0	3.6			
		12	TC	4.2	3.8			
		15	TC	4.6	6.2			
		18	TC	4.1	4.1			
68	320290	00	DS	18.3				Dirt
		03	TC	5.1	5.1			
		06	TC	4.6	4.6			DC = 6 inches
		09	TC	4.1	3.7			
		12	TC	3.8	3.8			
		15	TC	3.5	3.1			
		18	TC	3.4	3.4			
69	320330	00	DS	9.5				Dirt
		03	TC	5.5	5.5			
		06	TC	5.0	4.8			DC = 6 inches
		09	TC	4.6	4.6			
		12	TC	4.2	3.8			
		15	TC	4.0	4.0			
70	320360	00	DS	2.4				Dirt
		03	TC	3.4	3.4			
		06	TC	3.6	4.3			DC = 0 inches
		09	TC	3.4	3.2			
		12	TC	3.3	3.1			
71	320390	00	DS	6.1				Dirt
		03	TC	6.6	6.6			
		06	TC	5.6	4.9			DC = 6 inches
		09	TC	5.0	4.5			
		12	TC	4.7	4.3			
72	330180	00	DS	4.6				Dirt

Radium Concentrations at Exterior Locations

DOE ID #GJ-07332-MR

3010 C Road

Page 5 of 6

Loc #	Grid Location	Depth (in.)	Meas. Type	Ra-226 (pCi/g)		RDC	Alpha	Comments
				Non-Deconv.	Deconv.	Working Level	dpm/100 cm ²	
79	350390	00	DS	7.7				Dirt
		03	TC	4.7	4.7			DC = 6 inches
		06	TC	4.6	4.4			
		09	TC	4.6	5.0			
		12	TC	4.4	4.4			
		15	TC	4.2	4.2			
80	400180	00	DS	7.6				Dirt
		06	DS	3.9				
81	400230	00	DS	7.2				Dirt
		06	DS	3.4				
82	400280	00	DS	7.7				Dirt
		06	DS	2.6				
83	400330	00	DS	8.2				Dirt
		06	DS	3.6				
84	400355	00	DS	15.5				Dirt
		06	DS	6.6				
85	400380	00-06	OC	6.8				MLP-981
		00	DS	3.4				Dirt
		06	DS	2.9				
86	450180	00	DS	10.7				Dirt
		06	DS	4.5				
87	450230	00	DS	13.5				Dirt
		06	DS	4.3				
88	450280	00	DS	13.1				Dirt
		06	DS	3.3				
89	450330	00	DS	11.8				Dirt
		06	DS	3.1				
90	450355	00	DS	11.9				Dirt
		06	DS	3.5				
91	450380	00	DS	4.7				Dirt
		06	DS	3.0				
92	490180	00	DS	16.9				Dirt

Radium Concentrations at Exterior Locations

DOE ID #GJ-07332-MR

3010 C Road

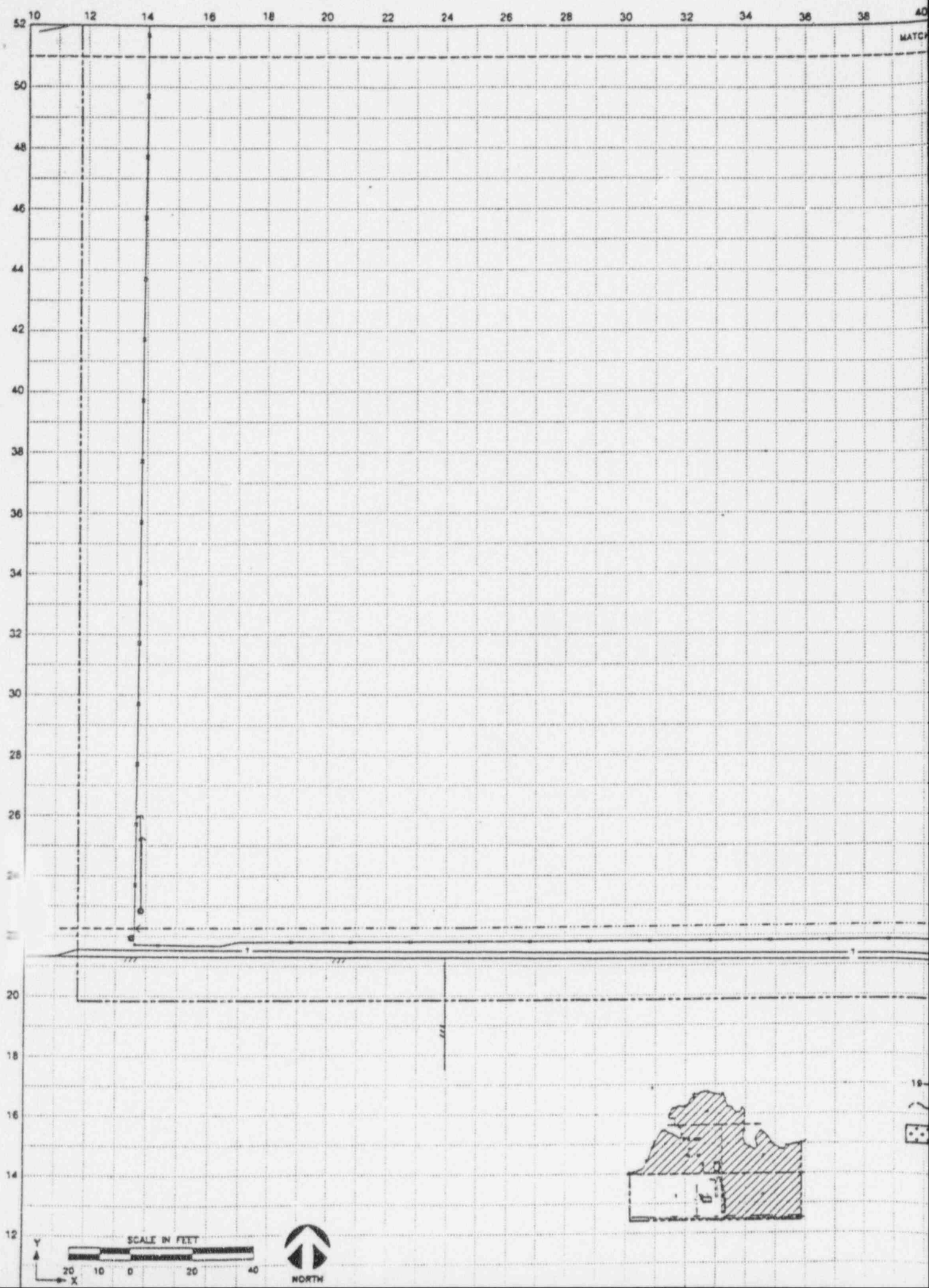
Page 6 of 6

Loc #	Grid Location	Depth (in.)	Meas. Type	Ra-226 (pCi/g)		RDC Working Level	Alpha dpm/100 cm ²	Comments
				Non-Deconv.	Deconv.			
92	490180	06	DS	5.1				
93	490230	00	DS	15.5				Dirt
		06	DS	4.0				
94	490280	00	DS	22.9				Dirt
		06	DS	5.9				
95	490340	00	DS	7.7				Dirt
		06	DS	2.5				
96	520180	00	DS	5.1				Dirt
		06	DS	5.0				
97	520230	00	DS	6.3				Dirt
		06	DS	6.7				
98	520280	00	DS	8.0				Dirt
		06	DS	7.1				
99	540180	00	DS	2.4				Dirt
100	540230	00	DS	2.4				Dirt
101	540280	00	DS	2.2				Dirt

Measurement Types:

- AS = Alpha Sample
- DH = Downhole Survey
- DS = Delta Scintillometer
- GB = GAD-6 Borehole
- GS = GAD-6 Surface
- OC = Soil Sample by Opp. Crys. Sys.
- RP = Radon Profile
- SS = Soil Sample by UNC Lab
- TC = Total Count Borehole

Notes: DC = Depth of Contamination
 [n] = Reading Taken n-Inches
 Above Floor or Ground
 Date of Survey = 08-22-89
 Team Leader = DF



**Also Available on
Aperture Card**



ALL GAMMA MEASUREMENTS ARE WITHIN THE
RANGE OF NORMAL BACKGROUND UNLESS
OTHERWISE NOTED.

C. ROAD

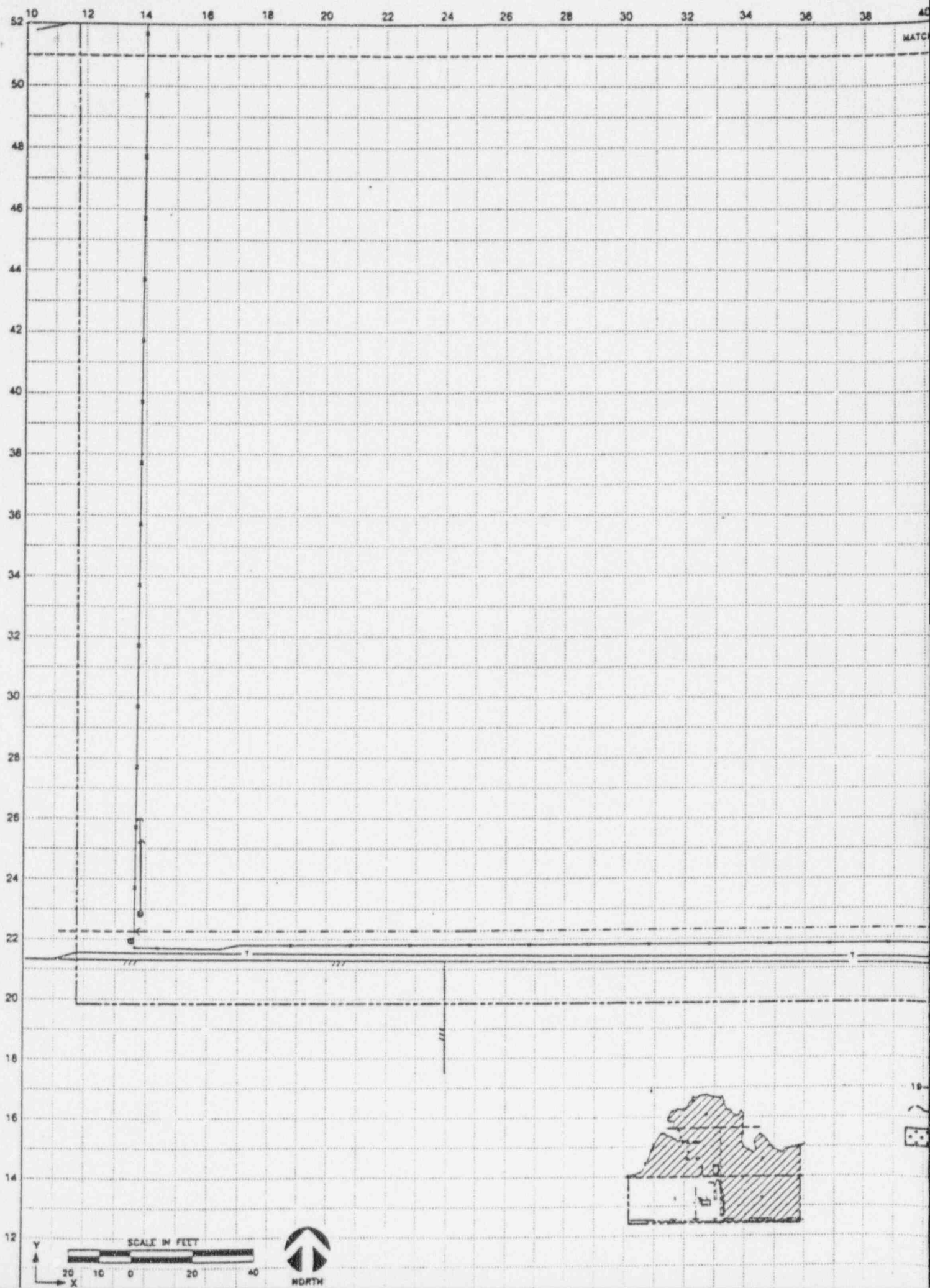
DCUBE 1A
GAMMA EXPOSURE RATES

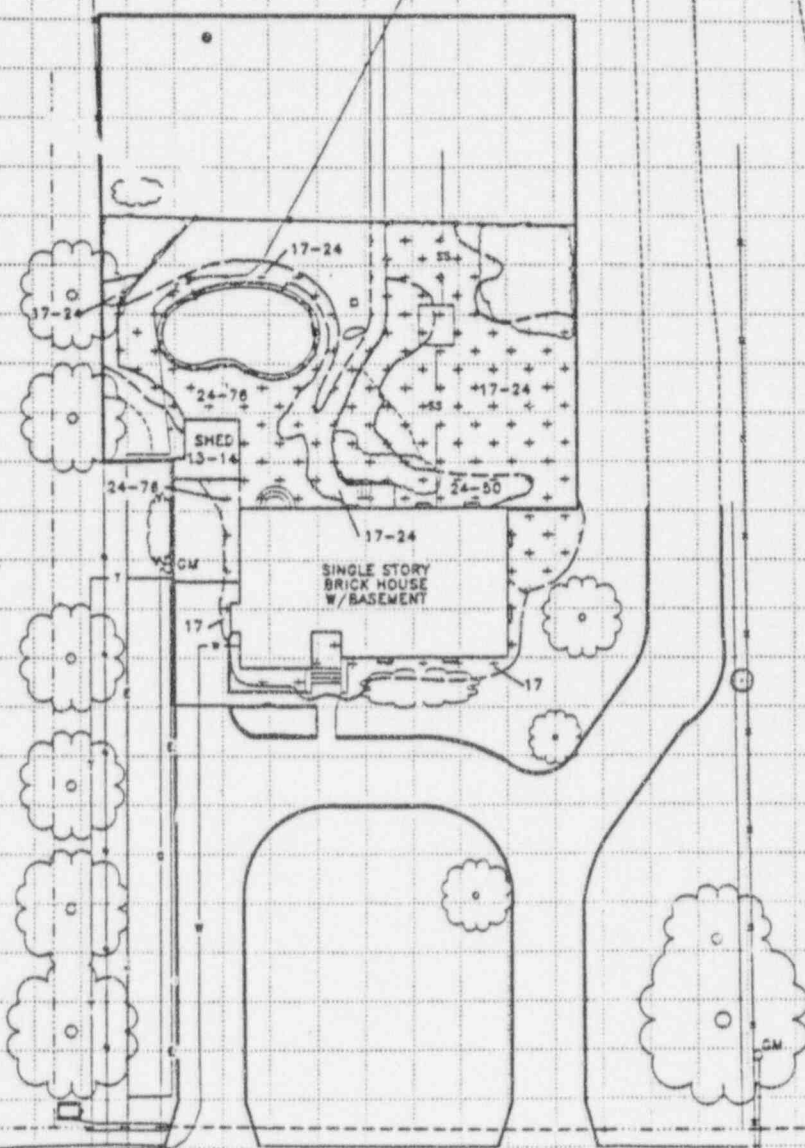
9707020190

GROUND
WATER
EXPOSURE RATES

[illegible]

This drawing, prepared for the American M&E Testing Bureau, Action Plan, is for the sale of the U.S. Department of Energy and its subsidiaries, it is not a final survey plan or an engineering drawing and is not to be used as such in the establishment of a final drawing, or other future engineering work.





ALL GAMMA MEASUREMENTS ARE WITHIN THE
RANGE OF NORMAL BACKGROUND UNLESS
OTHERWISE NOTED.

GAMMA EXPOSURE RATES AT GROUND
 LEVEL IN $\mu\text{R}/\text{h}$
 BOUNDARY FOR AREA OF ELEVATED
 EXPOSURE RATES

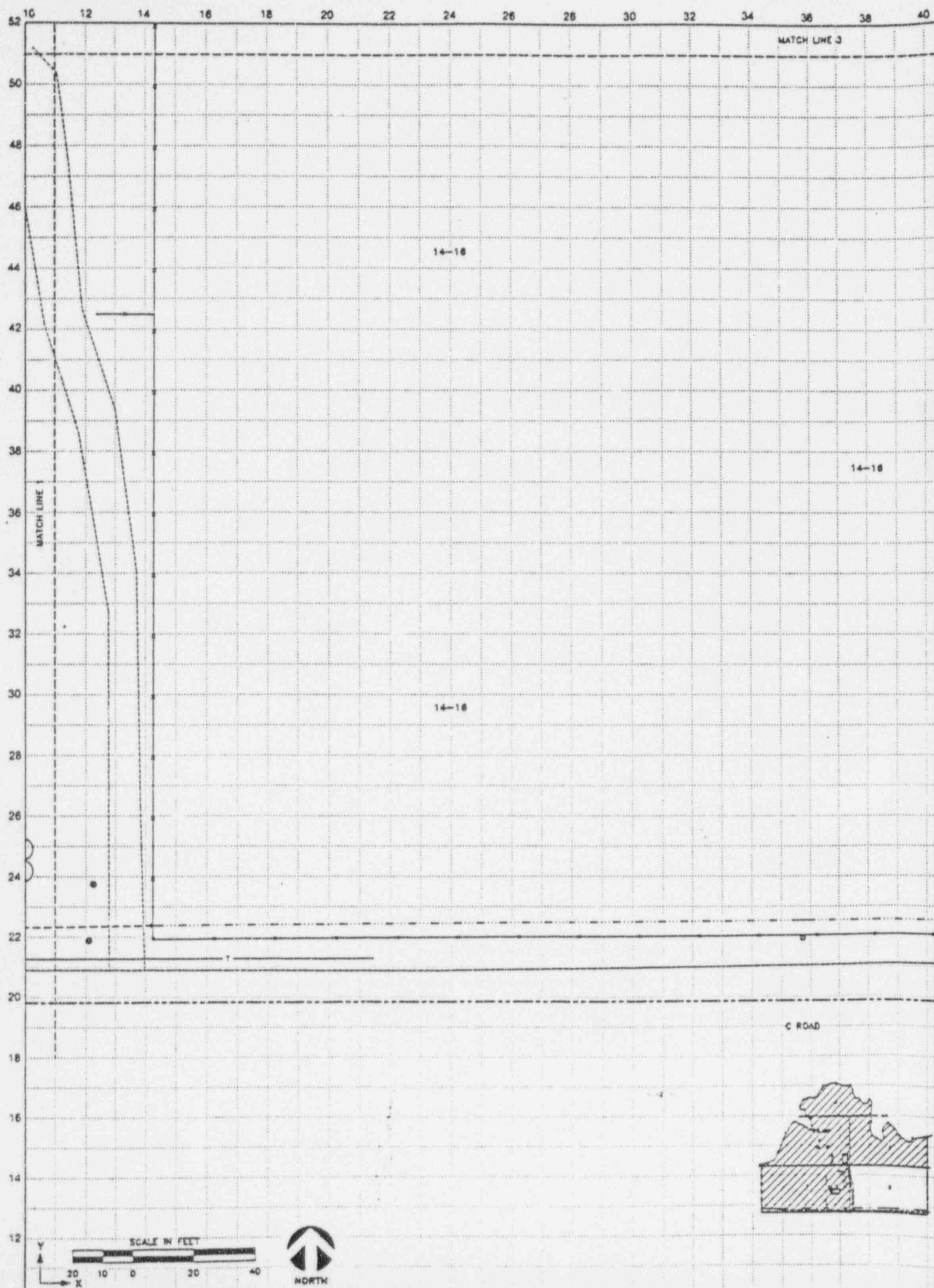
AREA OF ELEVATED GAMMA EXPOSURE RATES

9707020190-01

FIGURE 10
GAMMA EXPOSURE RATES

NO.		DATE		REVISIONS		BY		CR.		A.S.		APP.	
RESIDENCE - NO. OF OCCUPANTS													
NON-RESIDENCE - NO. OF OCC.													
INSTRUMENT NO.				SURVEY FOR				DESIGNED DATE DRAWN <i>EKR</i> 10/20 CHECKED <i>W</i> 10/29 PLOT ENG. <i>W</i> SUBMITTED <i>W</i> 10/29					
Prepared By <i>D. J. Jorgensen</i> 9-21-79				3010 E. ROAD GRAND JUNCTION, COLORADO									
START DATE		TIME		APPROVAL		DATE		APPROVAL		DATE		DATE	
VELOCITY		EQUIP		DIST. NO. 10-7-332 DIST. NO. 3-10-7-333-61									
LIFE Geotech													

This drawing, prepared for the Livestock and Poultry Quarantine Action Project, is for the sole use of the U.S. Department of Energy and its contractors. It is not a work survey and it is not intended to be used as a basis for any other survey or for the establishment of terms, conditions, or other future agreements.



14-18

14-18

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CARD**

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ALL GAMMA MEASUREMENTS ARE WITHIN THE
RANGE OF NORMAL BACKGROUND UNLESS
OTHERWISE NOTED.

LEGEND -

19-25 GAMMA EXPOSURE RATES AT GROUND
LEVEL IN $\mu R/h$

FIGURE 19
GAMMA 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
survey map or an engineering survey map and is
not to be relied upon for the establishment of legal
boundary or other future improvement lines.

NO.	DATE	REVISIONS	BY	CL	A.E.	APP.	NO.	DATE	REVISIONS	BY	CL	A.E.	APP.
U.S. DEPARTMENT OF ENERGY GRAND JUNCTION PROJECTS OFFICE, COLORADO													
NON-RESIDENCE - 3010 C ROAD							3010 C ROAD GRAND JUNCTION, COLORADO						
DESIGNED <i>DATE</i>							DATE						
BY <i>DATE</i>							DATE						
CHECKED <i>DATE</i>							DATE						
APPROVED <i>DATE</i>							DATE						
SURVEY DATE <i>DATE</i>							DATE						
FLUORINATION <i>DATE</i>							DATE						
UIC Geotech							UIC Geotech						

10 12 14 16 18 20 22 24 26 28 30 32 34 36 38 40

MATCH LINE 5

50

48

46

44

42

40

38

36

34

MATCH LINE 4

32

30

28

26

24

22

20

18

16

14

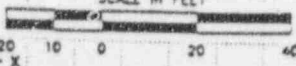
12

10

Y

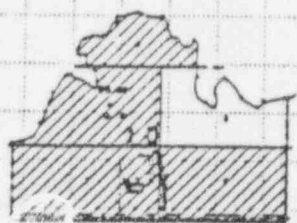
X

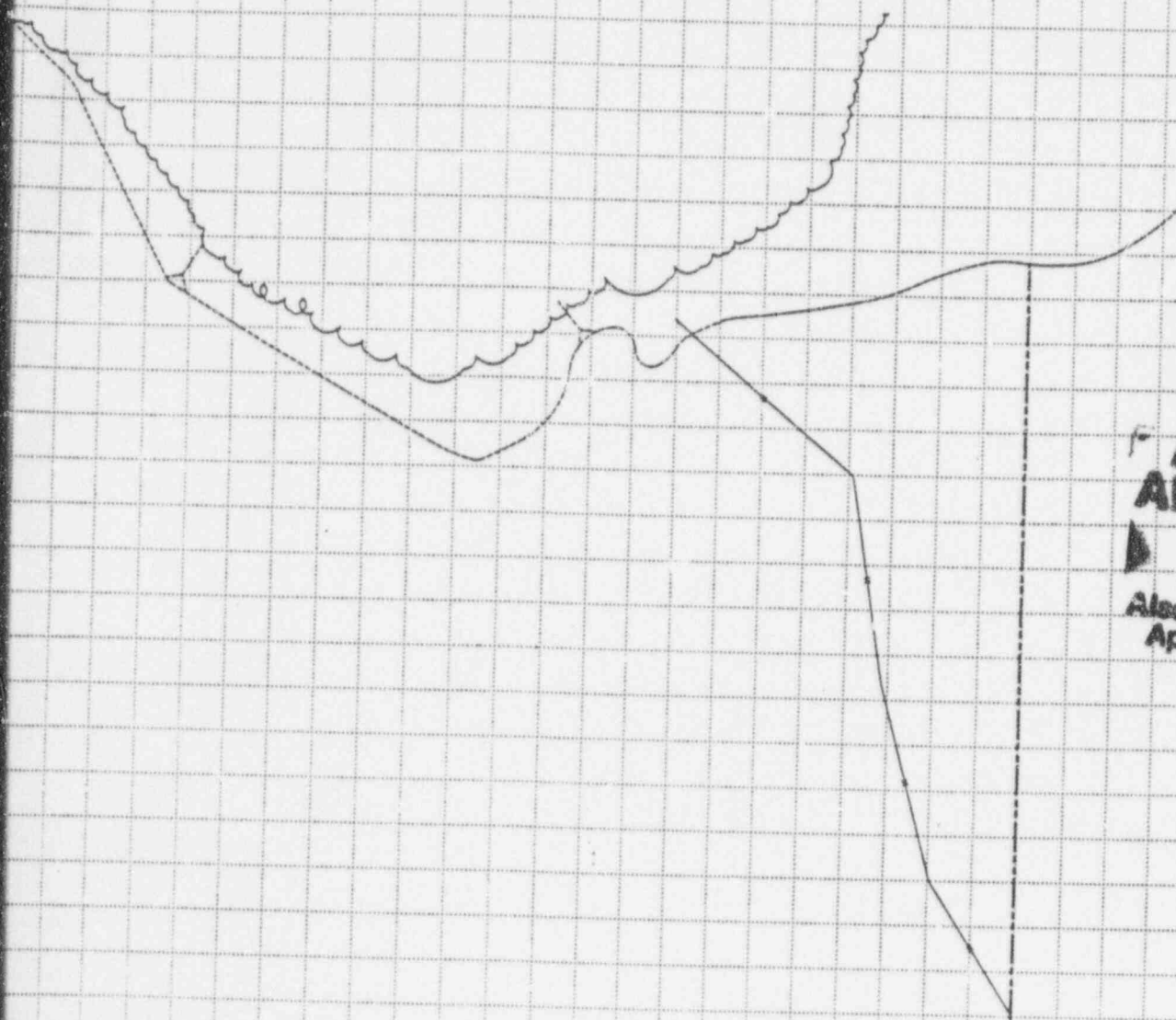
SCALE IN FEET



NORTH

MATCH LINE 2





**ANSTEC
APERTURE
CARD**

Also Available on
Aperture Card

9707020190-03

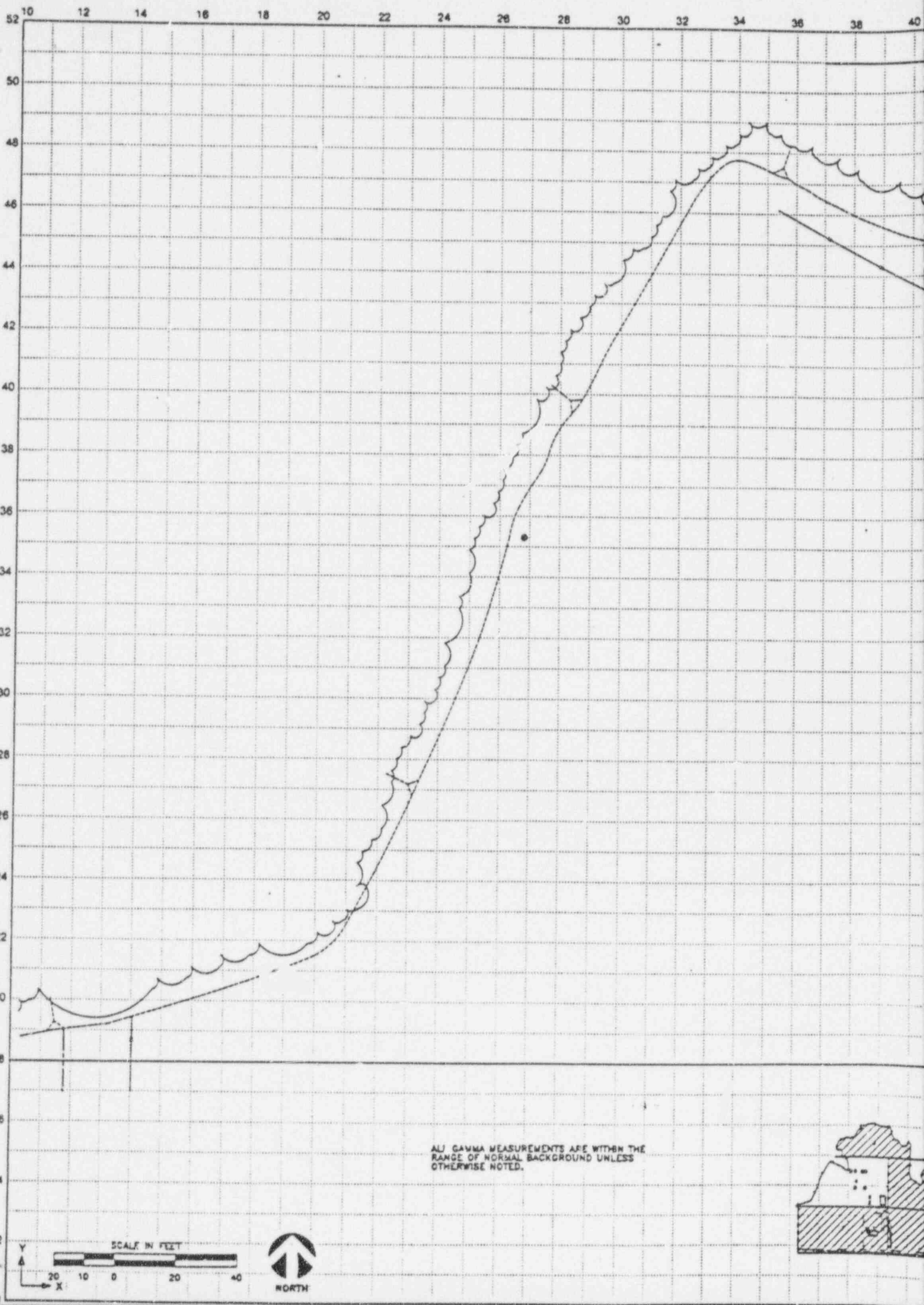
ALL GAMMA MEASUREMENTS ARE WITHIN THE
RANGE OF NORMAL BACKGROUND UNLESS
OTHERWISE NOTED.

- LEGEND**
- 18-25 GAMMA EXPOSURE RATES AT GROUND
LEVEL IN $\mu\text{R/h}$
 - ~ ~ ~ BOUNDARY FOR AREA OF ELEVATED
EXPOSURE RATES
 - □ □ AREA OF ELEVATED GAMMA EXPOSURE RATES

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Remedial Action Project, is for the sole use of the U.S.
Department of Energy and its contractors. It is not a
survey or part of an improvement survey and is
not to be used as a basis for the establishment of lines,
boundaries, or other future improvements.

FIGURE 16
GAMMA EXPOSURE RATES

NO.	DATE	REVISIONS	BY	CL	A.E.	APP.	NO.	DATE	REVISIONS	BY	CL	A.E.	APP.
<p>U.S. DEPARTMENT OF ENERGY GRAND JUNCTION PROJECTS OFFICE, COLORADO</p> <p>3010 C ROAD GRAND JUNCTION, COLORADO</p> <p>DESIGNED: <i>[Signature]</i> DATE: <i>[Date]</i></p> <p>CHECKED: <i>[Signature]</i> DATE: <i>[Date]</i></p> <p>APPROVED: <i>[Signature]</i> DATE: <i>[Date]</i></p> <p>INSTRUMENT NO. SURVEYOR</p> <p>9-14-89</p> <p>VERIFICATION DATE</p> <p>UNC Geotech</p>													



42 44 46 48 50 52 54 56 58 60 62 64 66 68 70 72 74



0707020190-04

LEGEND

19-25 GAMMA EXPOSURE RATES AT GROUND LEVEL IN $\mu\text{R}/\text{h}$
 --- BOUNDARY FOR AREA OF ELEVATED EXPOSURE RATES

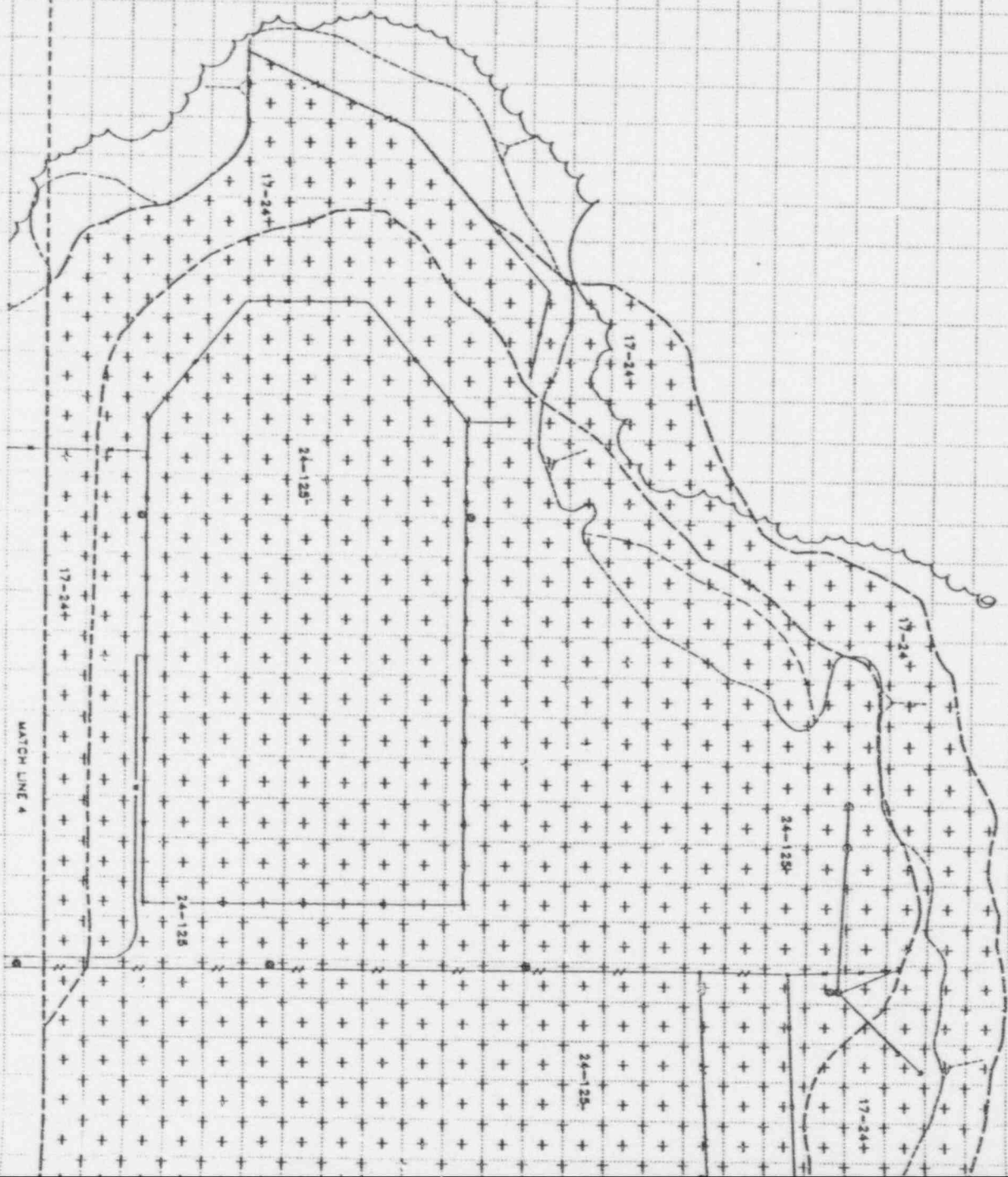
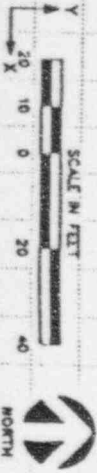
AREA OF ELEVATED GAMMA EXPOSURE RATES

This drawing, prepared for the Uranium Mill Tailings Remedial Action Project, is for the use of the U.S. Department of Energy and its contractors. It is not a final survey plot or an improvement survey plot and is not to be used for the establishment of title, liability, or other future improvement lines.

FIGURE 16
GAMMA EXPOSURE RATES

NO.	DATE	REVISIONS	BY	CR.	A.S.	APP.	NO.	DATE	REVISIONS	BY	CR.	A.S.	APP.
RESIDENCE - NO. OF OCCUPANTS													
U.S. DEPARTMENT OF ENERGY GRAND JUNCTION PROJECTS OFFICE COLORADO													
PROJECT NO. 100-100-100-100													
DRAWN BY: DATE													
CHECKED BY: DATE													
REVIEWED BY: DATE													
APPROVED BY: DATE													
3610 C ROAD GRAND JUNCTION, COLORADO													
FIGURE NO. 16-07323													
SHEET NO. 5-007323-24													

UNC Geotech



COLORADO RIVER

ANSTEC APERTURE CARD

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LEGEND
 18-23 GAMMA EXPOSURE RATES AT GROUND
 LEVEL IN $\mu\text{R}/\text{h}$
 BOUNDARY FOR AREA OF ELEVATED
 EXPOSURE RATES
 AREA OF ELEVATED GAMMA EXPOSURE RATES

9707020180-05

ALL GAMMA MEASUREMENTS ARE WITHIN THE
 RANGE OF NORMAL BACKGROUND UNLESS
 OTHERWISE NOTED.

MATCH LINE ?

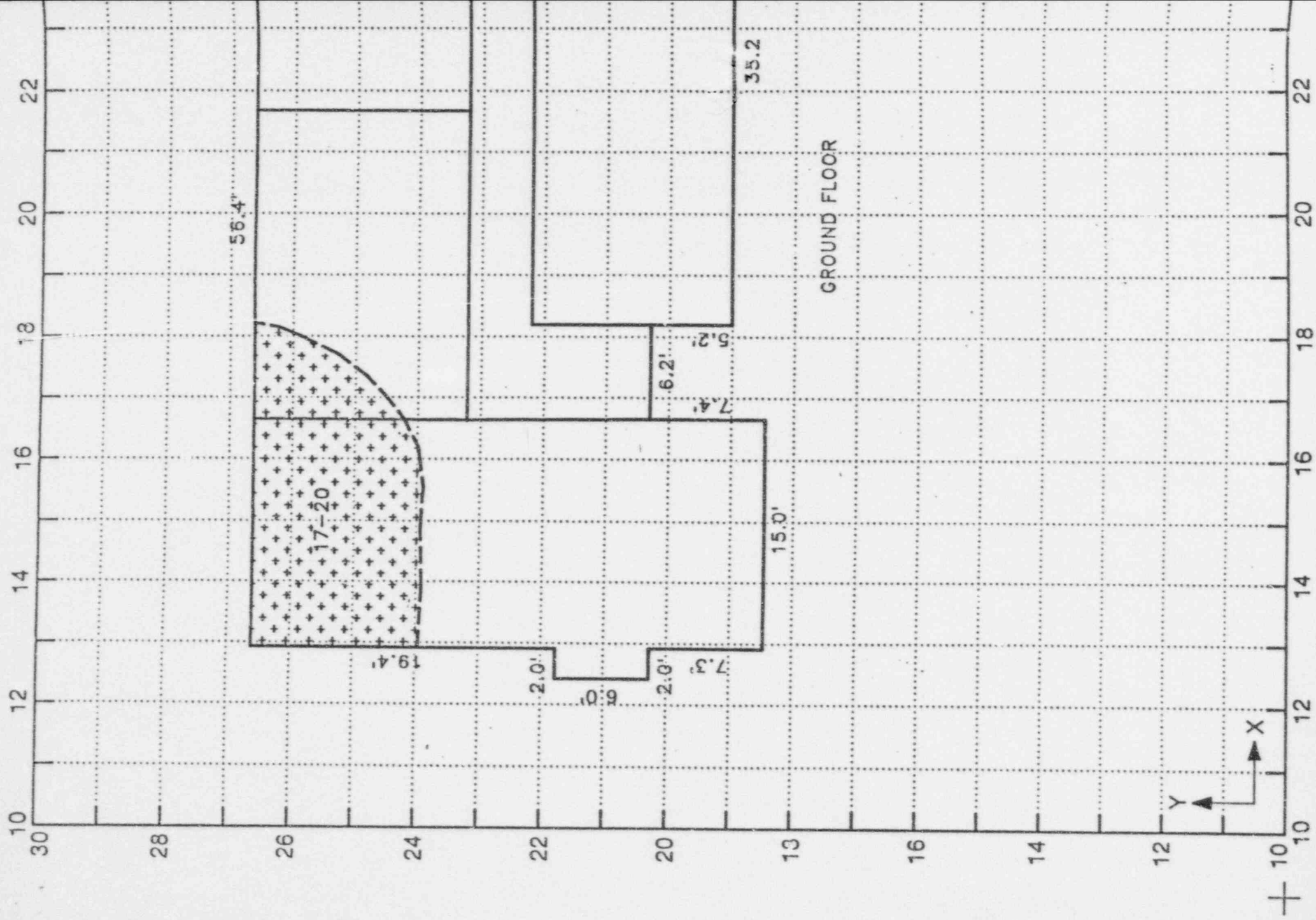
FIGURE 1A
 GAMMA EXPOSURE RATES

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 nor an engineering survey and it is
 not to be relied upon for the establishment of lines,
 buildings, or other future improvements thereon.

NO. DATE		REVISIONS		BY	CR.	A.E.	APP.	NO.	DATE	REVISIONS	BY	CR.	A.E.	APP.	
U.S. DEPARTMENT OF ENERGY GRAND JUNCTION PROJECTS OFFICE, COLORADO															
3016 C ROAD GRAND JUNCTION, COLORADO															
INSTRUMENT NO.		SURVEYOR		DATE		TIME		SUNSHINE		WIND		TEMP.		HUMIDITY	
9-14-99		D. J. JAMES		9/14/99		10:00		100%		100%		100%		100%	
SURVEY DATE		TIME		SUNSHINE		WIND		TEMP.		HUMIDITY		DATE		APPROVAL BOX	
9-14-99		10:00		100%		100%		100%		100%		DATE		APPROVAL BOX	
VERIFICATION		DATE		SUNSHINE		WIND		TEMP.		HUMIDITY		DATE		APPROVAL BOX	
												DATE		APPROVAL BOX	

UNC Geotech

5-DC1332-68



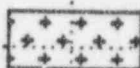
26 28 30 32 34 36 38 40

30.5'

LEGEND

19-25 GAMMA EXPOSURE RATES AT GROUND LEVEL IN $\mu R/h$

~ BOUNDARY FOR AREA OF ELEVATED EXPOSURE RATES



AREA OF ELEVATED GAMMA EXPOSURE RATES

**ANSTEC
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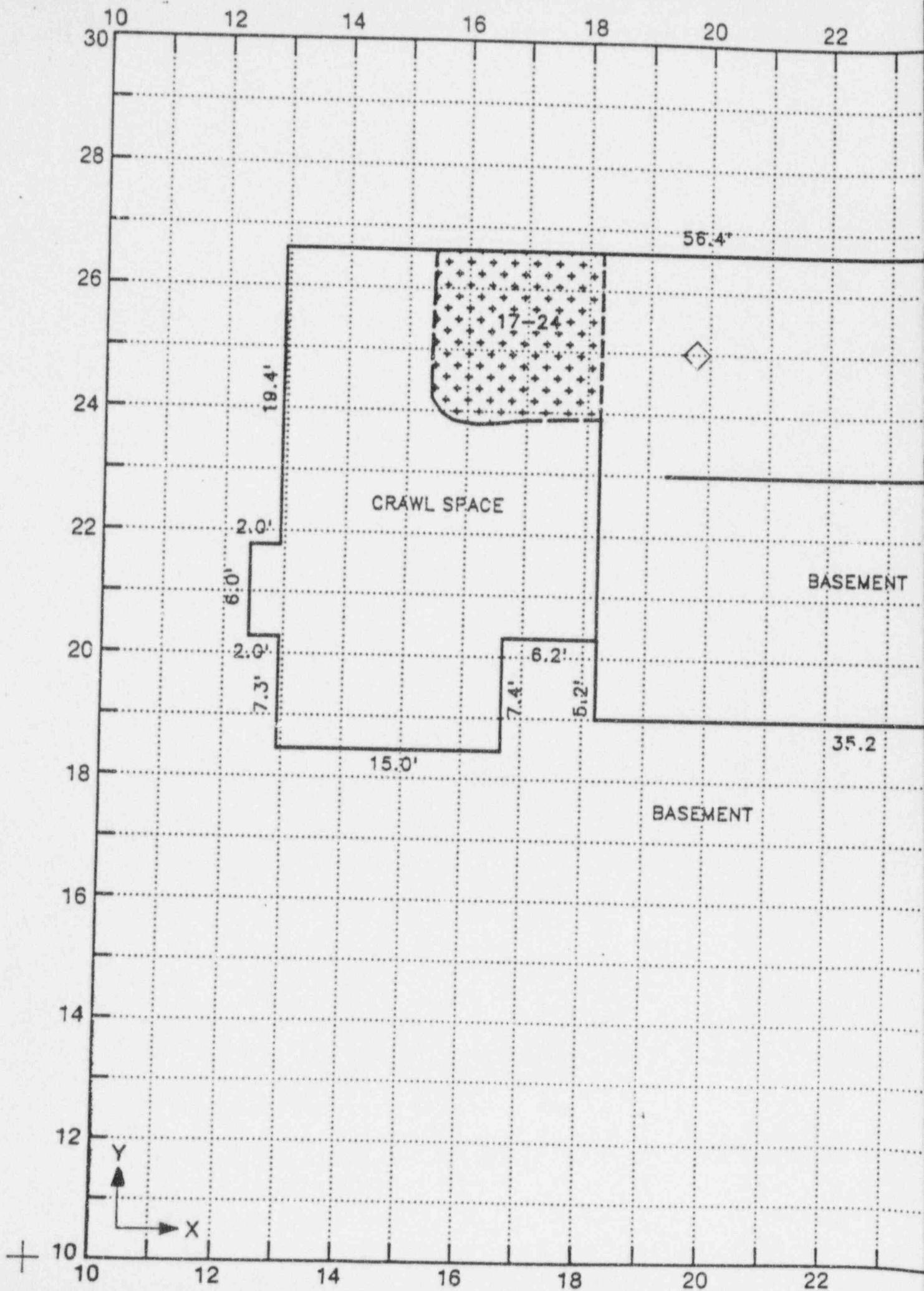
9707020190 - 06

FIGURE 1f
INTERIOR GAMMA EXPOSURE RATES



NO. DATE		REVISIONS		BY	CK	A.E.	APP	NO	DATE	REVISIONS		BY	CK	A.E.	APP
RESIDENCE—NO. OF OCCUPANTS															
NON-RESIDENCE—MAN-HRS. WK.															
INSTRUMENT NO.		SURVEYOR		DESIGNED		DATE		U.S. DEPARTMENT OF ENERGY GRAND JUNCTION PROJECTS OFFICE, COLORADO 3010 C ROAD GRAND JUNCTION, COLORADO							
9-14-89		Designed By [Signature]		DRAWN		BKR 9/14/89									
SURVEY DATE		TIME		CHECKED		J. [Signature]									
VERIFICATION		DATE		PROJ. ENG.		[Signature]									
SUBMITTED		[Signature]		APPROVAL		DATE		APPROVAL DOE		DATE					
UNC Geotech				DOE ID NO.		GJ-07332		DWG. NO.		3-B07332-G6, 5, 6		16			

26 28 30 32 34 36 38 40



4 26 28 30 32 34 36 38 40

28

26

24

22

20

18

16

14

12

LEGEND

19-25 GAMMA EXPOSURE RATES AT GROUND LEVEL IN $\mu R/h$

BOUNDARY FOR AREA OF ELEVATED EXPOSURE RATES

AREA OF ELEVATED GAMMA EXPOSURE RATES

ASSESSMENT RDC

**ANSTEC
APERTURE
CARD**

Also Available on
Aperture Card

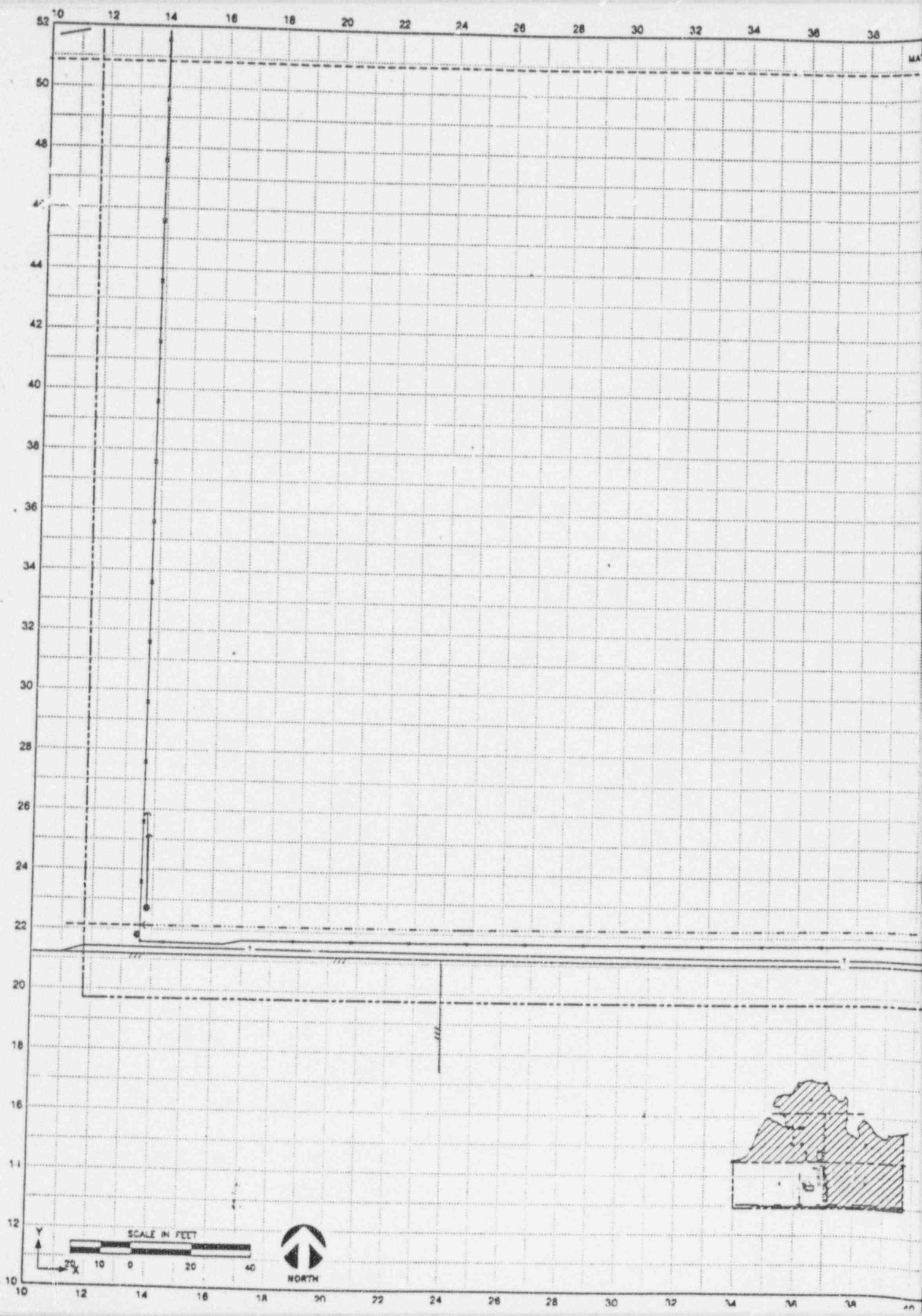
9707020190-07

FIGURE 2
INTERIOR GAMMA EXPOSURE RATES/SAMPLE LOCATION



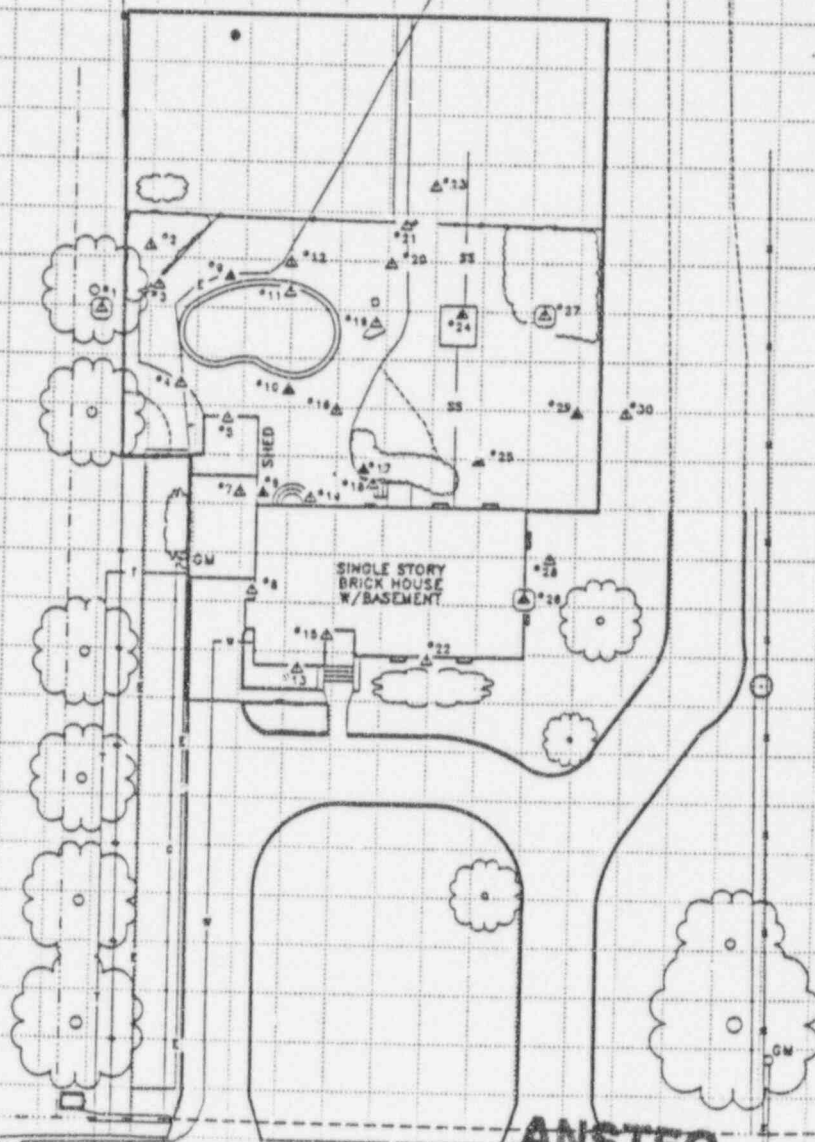
NO. DATE REVISIONS		BY	CK.	A.E.	/PP	NO. DATE	REVISIONS		BY	CK.	A.E.	APP.
U.S. DEPARTMENT OF ENERGY GRAND JUNCTION PROJECTS OFFICE, COLORADO												
RESIDENCE - NO. OF OCCUPANTS		3010 C ROAD GRAND JUNCTION, COLORADO										
WORK RESIDENCE - NAME - FOLK, WE.		DESIGNED: DATE										
INSTRUMENT NO. SURVEYOR		DRAWN: BKR 9/89										
Prepared By D. J. Jansing 9-14-89		CHECKED: J. O'S										
SURVEY DATE TIME		PROJ. ENG.										
VE. REPRESENTATION DATE		SUBMITTED: A. Jansing 9/89										
		APPROVAL DATE APPROVAL DOE DATE										
		DOE # NO. GJ-07332										
		DWA. NO. 3-B07332-67 7 16										
UNC Geotech												

26 28 30 32 34 36 38 40



LINE 4

MATCH LINE 2



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C ROAD

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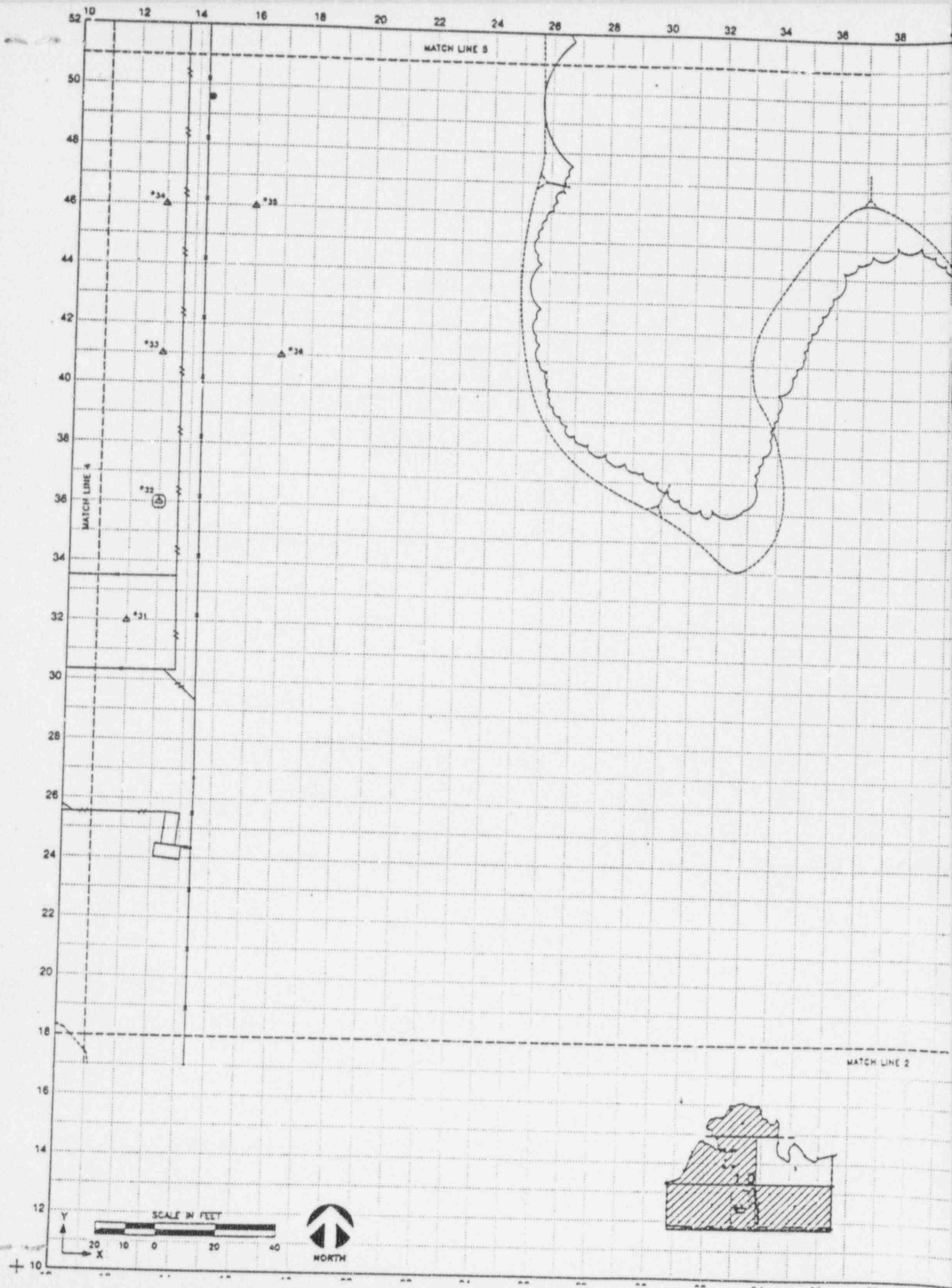
Also Available on
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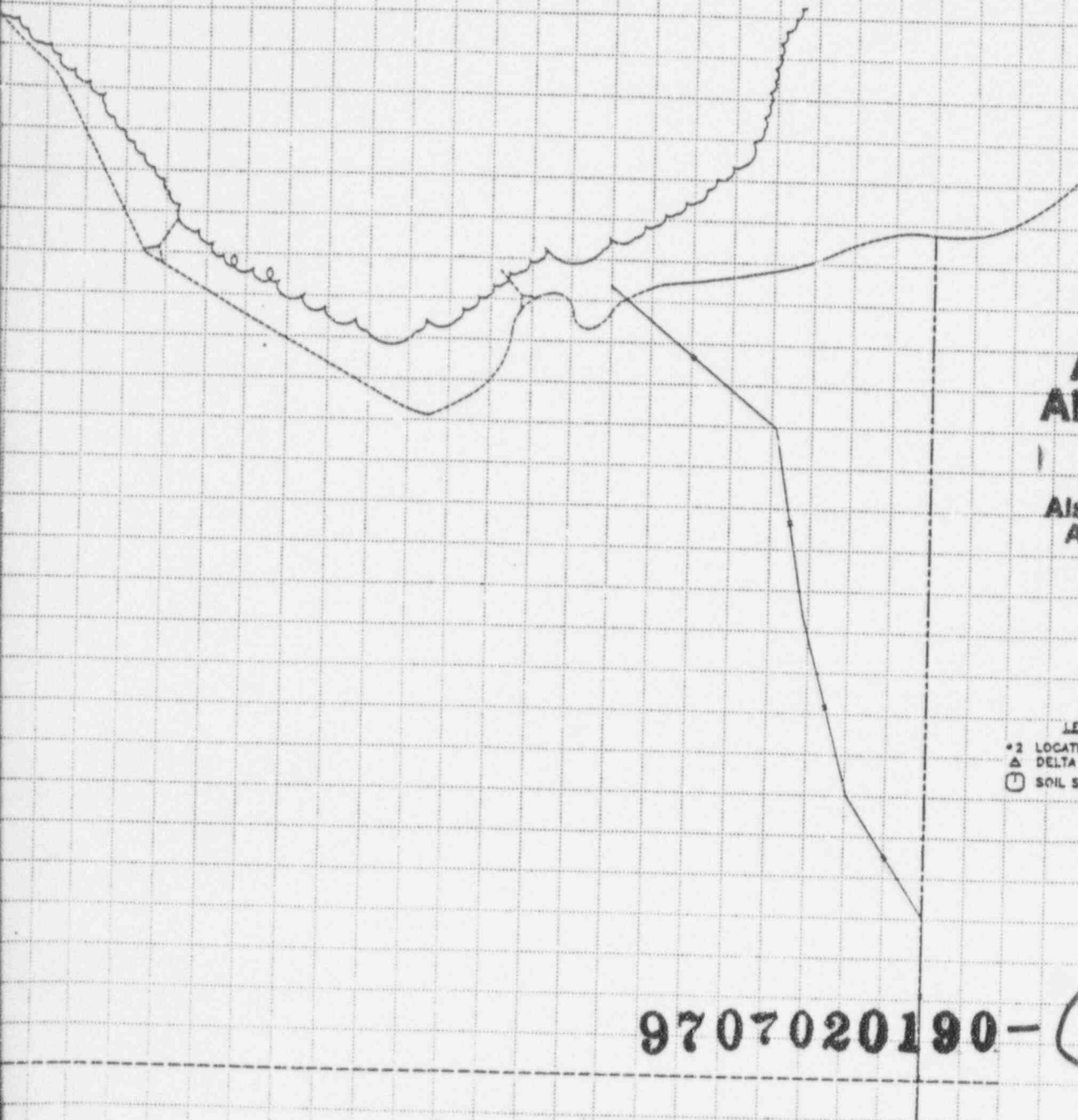
- LEGEND**
- *X LOCATION NUMBER
 - Δ DELTA SCANNER
 - BOREHOLE
 - SOIL SAMPLE

FIGURE 30
EXTERIOR SAMPLE LOCATIONS

NO. DATE REVISIONS		ST. CL. A.E. APP. NO. DATE REVISIONS	ST. CL. A.E. APP.
REFERENCE - NO. OF DOCUMENTS			
DRAWING NO. - 9707020190-08			
DESIGNED BY <i>By and by</i> 9-11-89		U.S. DEPARTMENT OF ENERGY GRAND JUNCTION PROJECTS OFFICE, COLORADO	
CHECKED BY <i>By and by</i>		3010 C ROAD GRAND JUNCTION, COLORADO	
APPROVED BY <i>By and by</i>		DATE APPROVAL FOR DATE	
SUBMITTED BY <i>By and by</i>		DATE APPROVAL FOR DATE	
DATE		DATE	
UNIC Geotech		SWS NO. 3-007333-08	

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LEGEND

- *2 LOCATION NUMBER
- Δ DELTA SCANNER
- SOIL SAMPLE

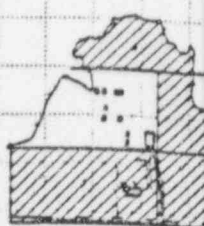
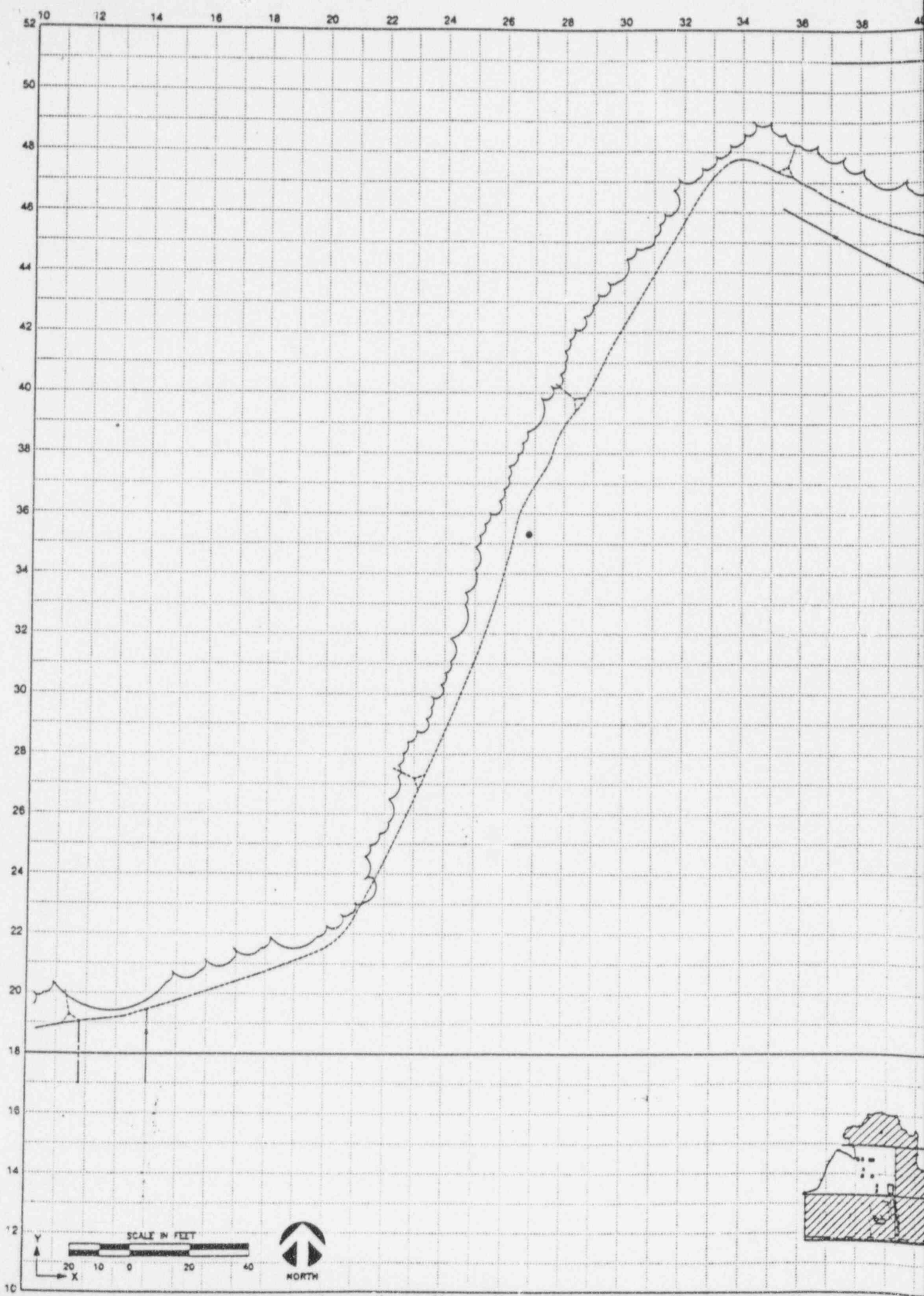
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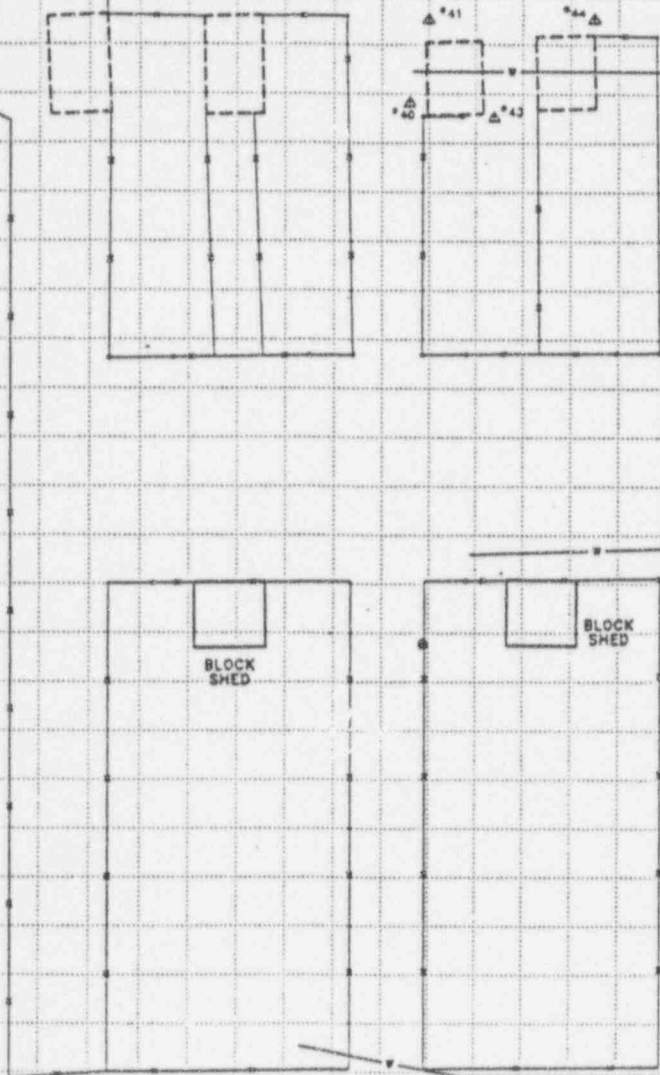
FIGURE 3D
EXTERIOR SAMPLE LOCATIONS

This drawing, prepared for the Grand Junction Project, is for the use of the U.S. Department of Energy and its contractors. It is not a final drawing and any reproduction thereof and its use to be based upon for the establishment of force, building, or other future requirements.

NO. DATE		REVISIONS		BY	CL	A.E.	APP	NO.	DATE	REVISIONS		BY	CL	A.E.	APP
RESIDENCE - NO. OF OCCUPANTS															
NON-RESIDENCE - BACHELOR, etc.															
CONTRACT NO.				U.S. DEPARTMENT OF ENERGY GRAND JUNCTION PROJECT OFFICE, COLORADO											
SURVEY NO.				DATE				3010 C ROAD GRAND JUNCTION, COLORADO							
DRAWN BY				CHECKED BY				DATE							
SURVEY DATE				TIME				DATE							
CLASSIFICATION				DATE				DATE							

UNC Geotech





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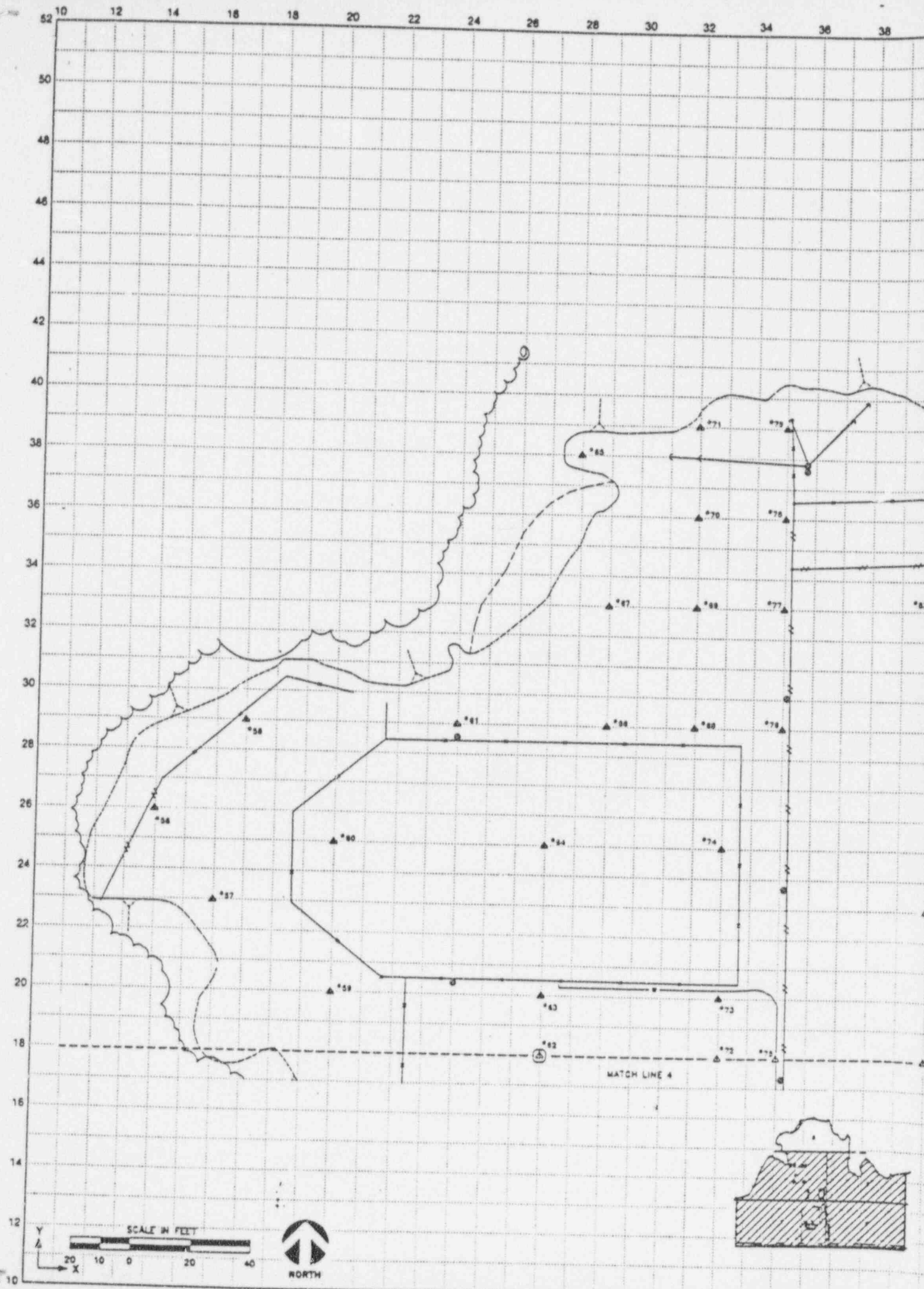
9707020190 - 10

- LEGEND**
- *2 LOCATION NUMBER
 - Δ DELTA SCANNER
 - SOIL SAMPLE

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FIGURE 30
EXTERIOR SAMPLE LOCATIONS

NO. DATE REVISIONS				NO. DATE REVISIONS				NO. DATE REVISIONS			
U.S. DEPARTMENT OF ENERGY GRAND JUNCTION PROJECTS OFFICE, COLORADO											
DESIGNED BY: DATE:				CHECKED BY: DATE:				APPROVED BY: DATE:			
SUBMITTED BY: DATE:				SUBMITTED BY: DATE:				SUBMITTED BY: DATE:			
3610 C ROAD GRAND JUNCTION, COLORADO				3610 C ROAD GRAND JUNCTION, COLORADO				3610 C ROAD GRAND JUNCTION, COLORADO			
UNC Geotech				UNC Geotech				UNC Geotech			



COLORADO RIVER

ANSTEC APERTURE CARD

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- LEGEND**
- *2 LOCATION NUMBER
 - Δ DELTA SCANNER
 - BOREHOLE
 - ① SOIL SAMPLE

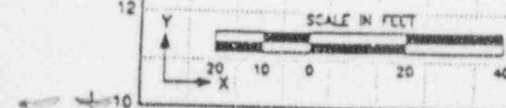
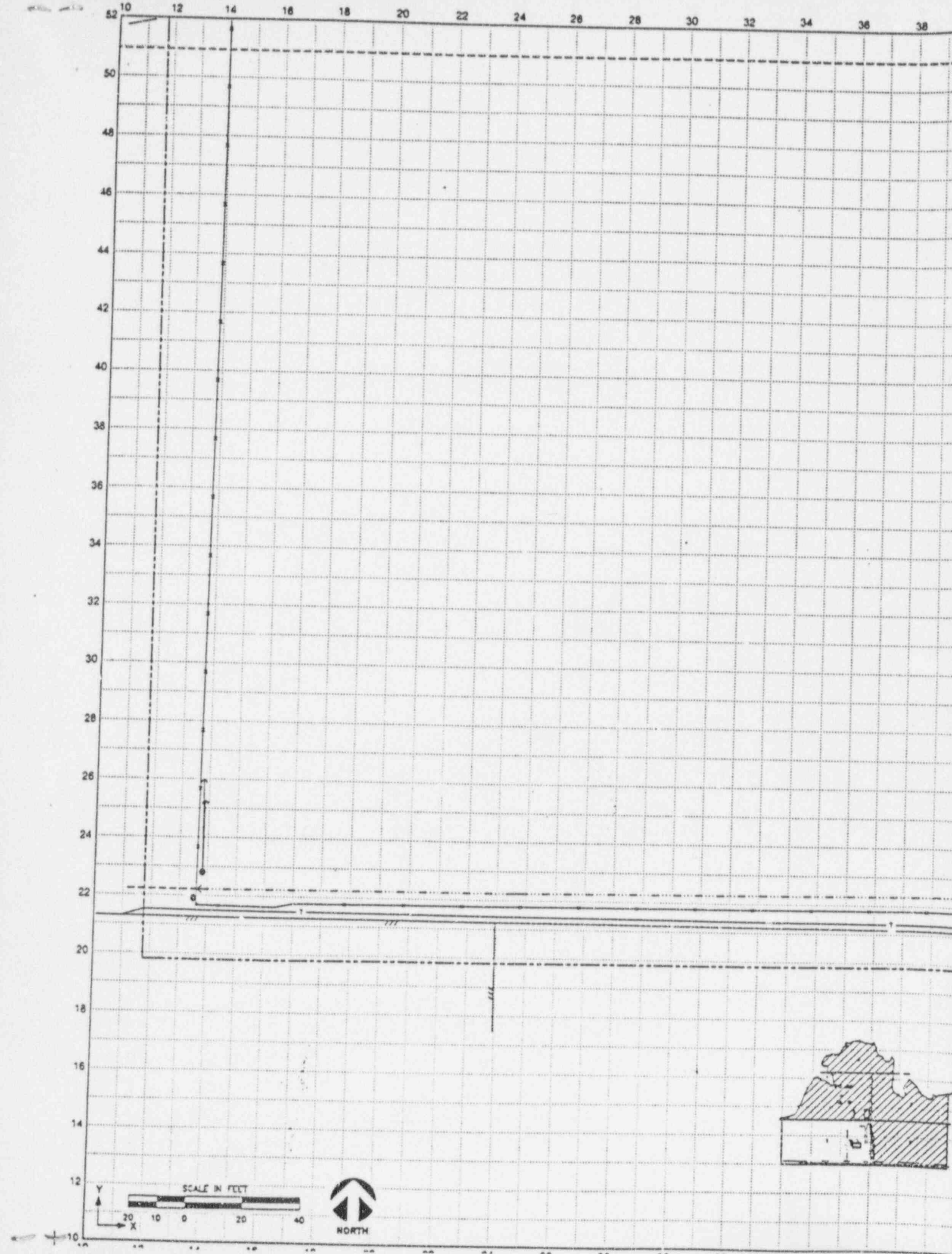
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MATCH LINE 3

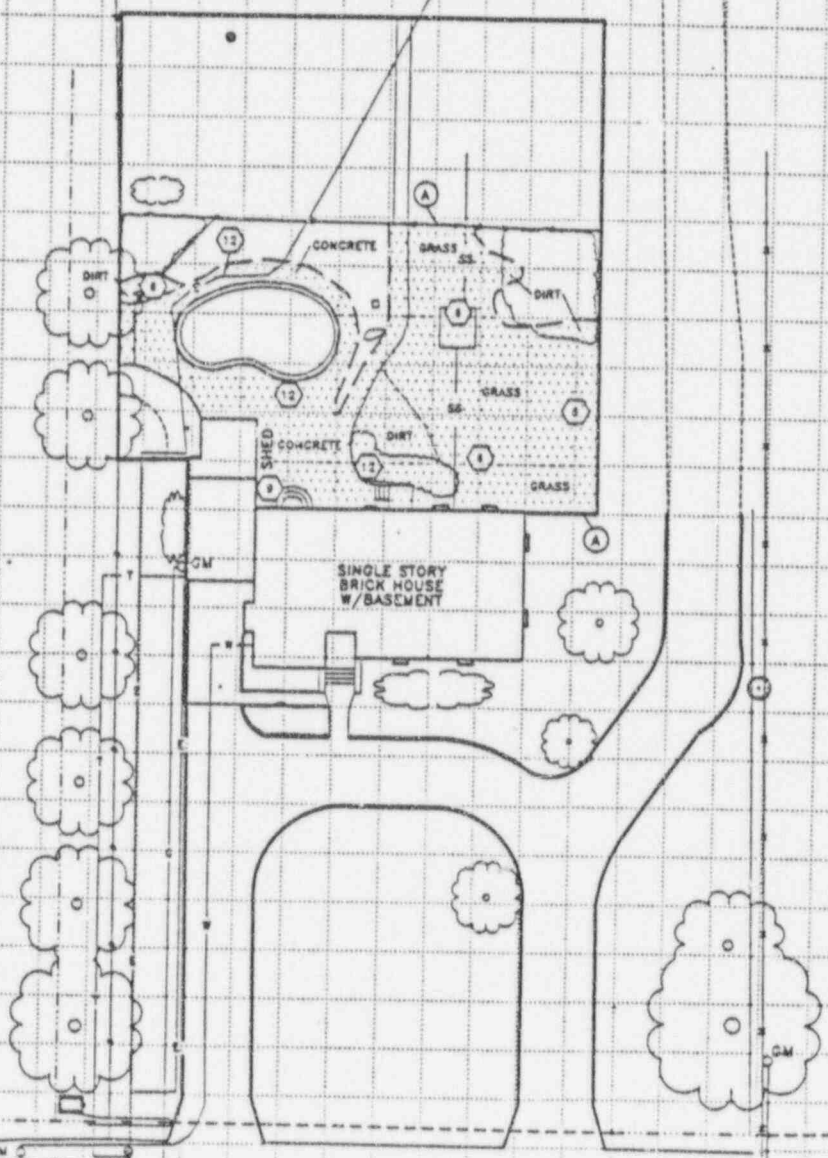
FIGURE 3A
EXTERIOR SAMPLE LOCATIONS

This drawing, prepared for the U.S. Army Corps of Engineers, is for the use of the U.S. Department of Energy and its contractors. It is not a final survey plot or an engineering survey plot and is not to be relied upon for the establishment of lines, boundaries, or other future improvements.

NO. DATE		REVISIONS		BY	CHK.	A.S.	APP.	NO.	DATE	REVISIONS		BY	CHK.	A.S.	APP.
U.S. DEPARTMENT OF ENERGY GRAND JUNCTION PROJECTS OFFICE, COLORADO															
3015 C ROAD GRAND JUNCTION, COLORADO															
INSTRUMENT NO.		SURVEYOR		DRAWN		DATE									
9-14-89		J. L. Smith		J. L. Smith		9/89									
SHEET NO.		TOTAL		CHECKED		DATE									
1		1		J. L. Smith		9/89									
SCALE		DATE		APPROVAL		DATE									
1" = 100'		9/89		J. L. Smith		9/89									
UNIC Geotech															



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C ROAD

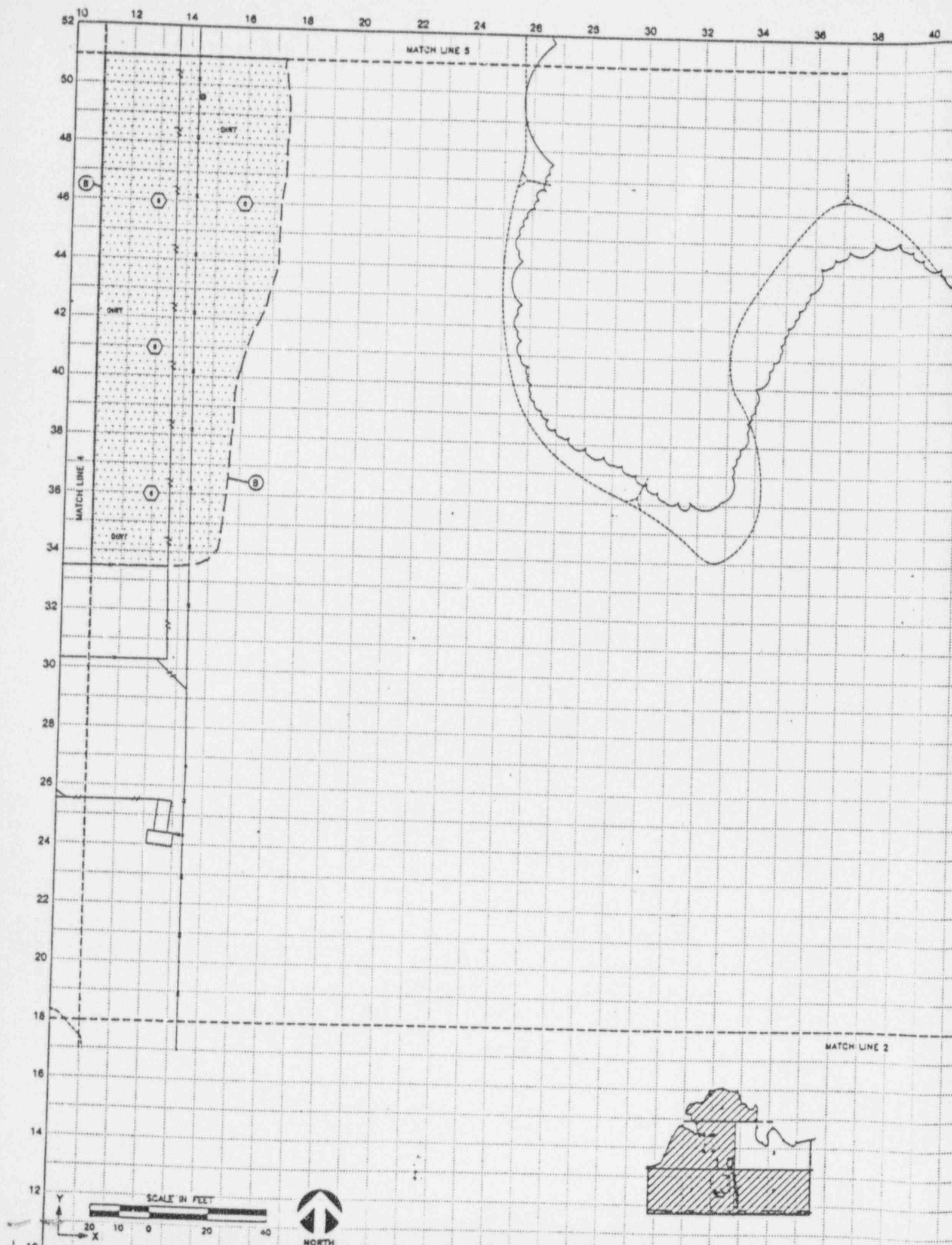
9707020190 - 12

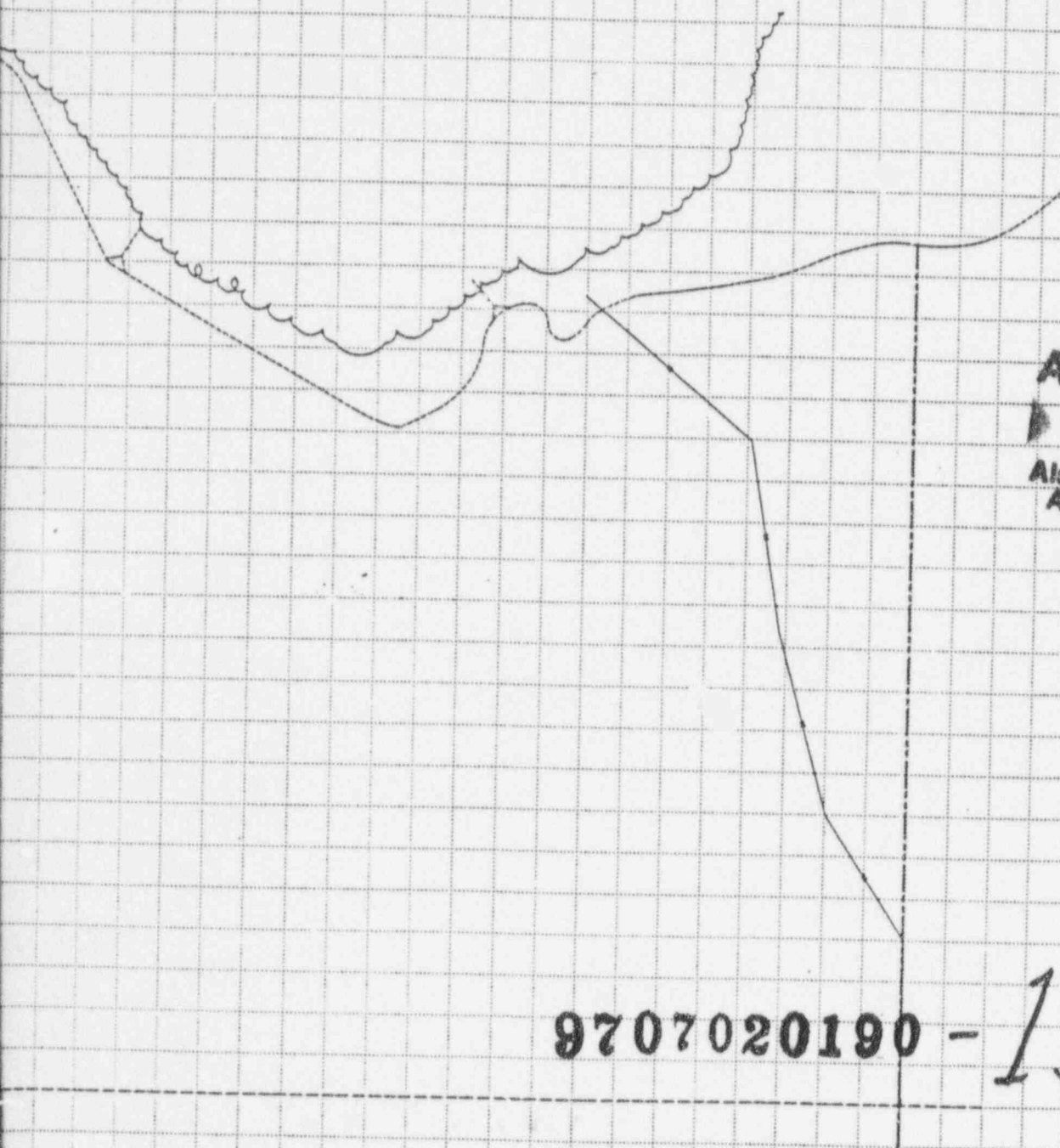
FIGURE 40
EXTERIOR ESTIMATED EXTENT OF CONTAMINATION

- LEGEND**
- BOUNDARY OF CONTAMINATION
 - DESIGNATION OF RESIDUAL RADIOACTIVE DEPOSIT
 - DEPTH OF CONTAMINATION (INCHES)
 - CONTAMINATED AREA

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

NO. DATE REVISIONS				NO. DATE REVISIONS			
REVISIONS - NO. OF OCCUPANTS				U.S. DEPARTMENT OF ENERGY GRAND JUNCTION PROJECTS OFFICE, COLORADO			
NO. IN SIDE VIEW - NO. IN PLAN, VIEW				3010 C ROAD GRAND JUNCTION, COLORADO			
NO. IN PLAN VIEW - NO. IN SIDE VIEW				DATE			
SURVEY DATE				DATE			
SURVEY TIME				DATE			
VERIFICATION				DATE			
DESIGNED BY CHECKED BY SURVEYED BY DATE 9-14-89				APPROVAL DATE 10-1-89			
UNC Geotech 3-DC7332-012				3-DC7332-012			





9707020190 - 13

- LEGEND**
- BOUNDARY OF CONTAMINATION
 - DESIGNATION OF RESIDUAL RADIOACTIVE DEPOSIT
 - DEPTH OF CONTAMINATION (INCHES)
 - CONTAMINATED AREA

This drawing, prepared for the Uranium Mill Tailings Remedial Action Project, is for the use of the U.S. Department of Energy and its contractors. It is not a legal survey nor an improvement survey and is not to be used for the establishment of legal boundaries.

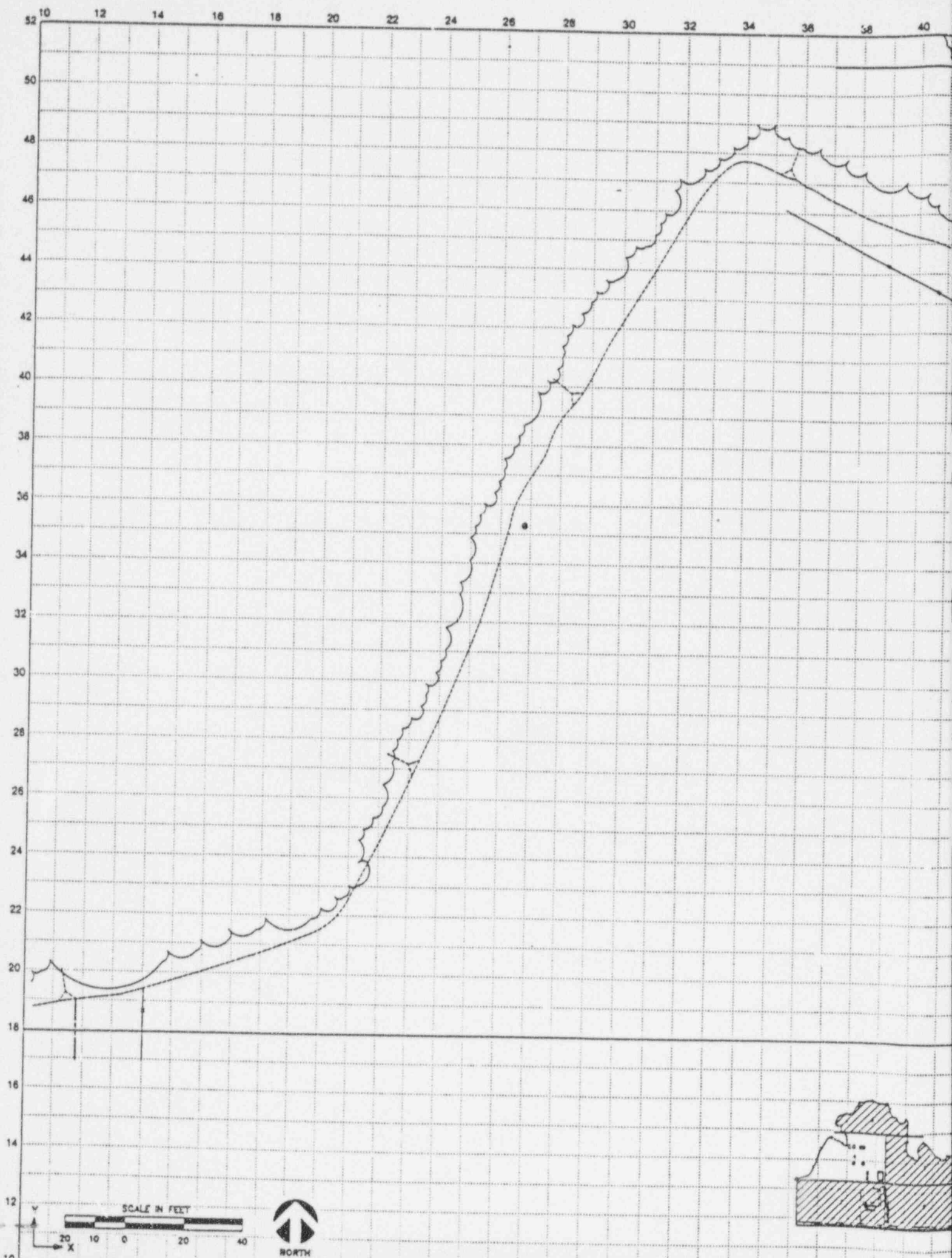
FIGURE 4B
EXTERIOR ESTIMATED EXTENT OF CONTAMINATION

NO. DATE REVISIONS				NO. DATE REVISIONS			
NO. DATE REVISIONS				NO. DATE REVISIONS			
NO. DATE REVISIONS				NO. DATE REVISIONS			

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

NO. DATE	REVISIONS	NO. DATE	REVISIONS
1	SKP 9/80	2	10/80
3	10/80	4	10/80

3010 C ROAD
GRAND JUNCTION, COLORADO





COLORADO RIVER



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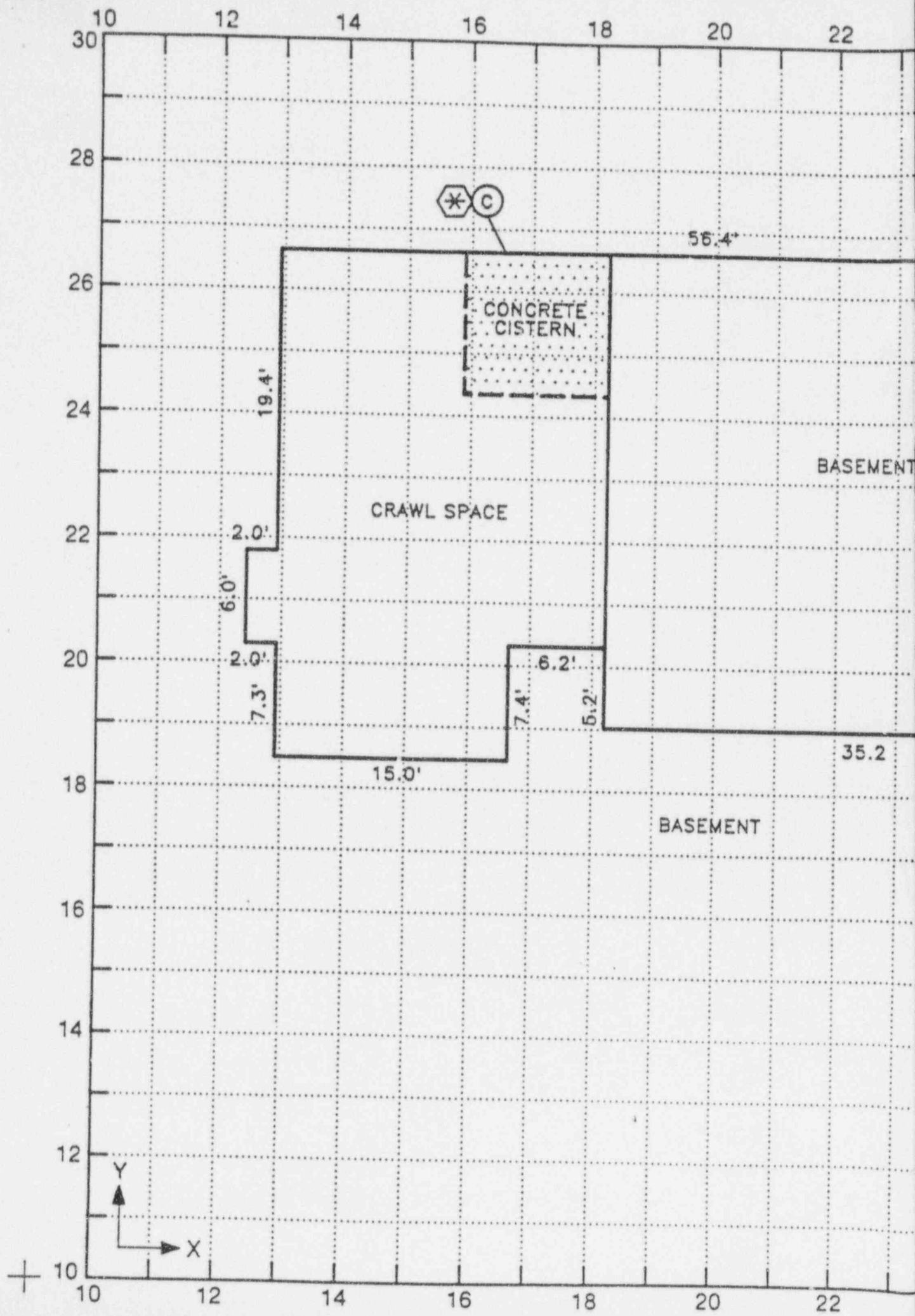
MATCH LINE 3

FIGURE 4d
EXTERIOR ESTIMATED EXTENT OF CONTAMINATION

- LEGEND**
- BOUNDARY OF CONTAMINATION
 - DESIGNATION OF RESIDUAL RADIOACTIVE DEPOSIT
 - DEPTH OF CONTAMINATION (INCHES)
 - CONTAMINATED AREA

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

NO. DATE REV.		A.E. APP. NO. DATE		REVISIONS		ST.	CL.	A.S.	APP.
REFERENCE - NO. OF DOCUMENTS									
NON-REVISIONS - NO. OF DOCUMENTS									
DESIGNED BY <i>Richard E. Jones</i> 9-14-89					CHECKED BY <i>J. Jones</i> 9-14-89				
SURVEY DATE 9-14-89					VERIFICATION DATE				
U.S. DEPARTMENT OF ENERGY GRAND JUNCTION PROJECTS OFFICE, COLORADO					3010 C ROAD GRAND JUNCTION, COLORADO				
DRAWN BY <i>J. Jones</i>					DATE 9-14-89				
APPROVED BY <i>J. Jones</i>					DATE 9-14-89				
UNC Geotech					DOE NO. 3-07333				
DOE NO. 3-07333-013					SHEET 13 OF 18				



24 26 28 30 32 34 36 38 40

30.5'

LEGEND

- BOUNDARY OF CONTAMINATION
- DESIGNATION OF RESIDUAL RADIOACTIVE DEPOSIT
- DEPTH OF CONTAMINATION (INCHES)
- CONTAMINATED AREA

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FIGURE 4e
INTERIOR ESTIMATED EXTENT OF CONTAMINATION



NO. DATE		REVISIONS		BY CK. A.E. APP. NO. DATE		REVISIONS		BY CK. A.E. APP.	
RESIDENCE—NO. OF OCCUPANTS					U.S. DEPARTMENT OF ENERGY GRAND JUNCTION PROJECTS OFFICE, COLORADO				
NON-RESIDENCE—MAN-HRS./WK.					3010 C ROAD GRAND JUNCTION, COLORADO				
INSTRUMENT NO.		SURVEYOR		DESIGNED		DATE			
Prepared By		D. J. J. J.		DRAWN		BKR 9/89			
9-14-89				CHECKED		J. J. J.			
SURVEY DATE		TIME		PROV. ENG.					
VERIFICATION		DATE		SUBMITTED		APPROVAL		DATE	
				L. J. J. J.					
				UNC Geotech		DOE ID NO.		GJ-07332	
						DWG NO.		B07332-G16-16 of 16	

4 26 28 30 32 34 36 38 40

APPENDIX A

POST-CONSTRUCTION RADIOLOGICAL ASSESSMENT FOR

DOE ID NO. GJ-07332-MR

Submitted: October 12, 1990

CONTENTS

Executive Summary
Addendum to Team Leader Notes

Table

Table 1. Radium Concentrations at Exterior Locations

Figures

Figure 1. Post-Construction Gamma Exposure Rates
Figure 2. Post-Construction Gamma Exposure Rates/Sample Locations
Figure 3. Post-Construction Estimated Extent of Contamination

EXECUTIVE SUMMARY

1.0 INTRODUCTION

This property is a residence located at 3010 C Road.

Following procedures described in the *Field Assessments Procedures Manual*, data were collected on this property and assessed to estimate the location of residual radioactive material in excess of the Environmental Protection Agency (EPA) 'Standards for Remedial Action at Inactive Uranium Processing Sites' (40 CFR 192).

This property has been included for remedial action by the Department of Energy on the basis of Oak Ridge National Laboratory's identification of excess radium-226 concentration in the land area.

2.0 GAMMA EXPOSURE-RATE SURVEYS

2.1 Exterior

The area backgrounds from the original assessment are 15 $\mu\text{R}/\text{h}$ and 2.4 pCi/g. The high outside gamma exposure rate is 21 $\mu\text{R}/\text{h}$. Exterior gamma exposure rates are shown in Figure 1.

2.2 Interior

Not applicable - the interior was remediated during the construction phase.

3.0 RADON/RADON DECAY-PRODUCT CONCENTRATION (RDC)

No RDC measurements were taken by Geotech or the Colorado Department of Health.

4.0 EXTENT OF CONTAMINATION

4.1 Exterior

Figure 2 shows the locations and types of explorations and radium measurements made; the related radium data are listed in Table 1. The maximum radium concentration in the contaminated areas 6.6 pCi/g.

Figure 3 shows the estimated boundaries and depths of exterior contamination. The deposit containing identified residual radioactive materials is characterized as follows:

In the bare soil area.

4.2 Interior

Not applicable - the interior was remediated during the construction phase.

5.0 REMEDIAL ACTION RECOMMENDATIONS

5.1 Exterior

Exterior Deposit A (Figure 3) should be removed and the appropriate cover material replaced.

5.2 Interior

Not applicable - the interior was remediated during the construction phase.

6.0 COMMINGLED WASTE INVESTIGATION

A commingled waste investigation was not performed on this property.

:pr

ADDENDUM TO TEAM LEADER NOTES

DOE ID NUMBER: GJ-07332-MR

SURVEY DATE: September 10, 1990

TEAM LEADER: Dan P. Fossey

Owners: Edward and Jerrie Rozman Telephone Numbers: (303) 434-5927 (Home)
(303) 527-3747 (Work)

Additional assessment work was performed on this property on September 10 and September 11, 1990. The additional assessment work was done on two portions of the property that were not included on the original assessment maps. Evidently, the property boundaries were not correct on the original assessment maps. This was not discovered until after construction was completed on the property. The corrected boundaries were re-drawn by Land Survey and are shown in Figure 1.

One area of contamination was found on the additionally assessed portions of the property. This area is in the northeast corner of the property (Deposit A, Figure 3).

2000 / 2001

Table 1
Radium Concentrations at Exterior Locations
3010 C Road

DOE ID #GJ-07332-MR

Page 1 of 1

				Ra-226 (pCi/g)		RDC	Alpha		
Loc #	Grid Location	Depth (in.)	Meas. Type	Non-Deconv.	Deconv.	Working Level	dpm/100 cm ²	Comments	
1	310430	00-06	OC	4.2				NAD-427	
		00	DS	6.0				Soil	
		06	DS	5.7					
2	325445	00-06	OC	5.5				NAD-428	
		00	DS	6.6				Soil	
		06	DS	6.0					
3	350440	00-06	OC	4.1				NAD-426	
		00	DS	4.6				Soil	
		06	DS	5.6					

Measurement Types:

- AS = Alpha Sample
- DH = Downhole Survey
- DS = Delta Scintillometer
- GB = GAD-6 Borehole
- GS = GAD-6 Surface
- OC = Soil Sample by Opp. Crys. Sys.
- RP = Radon Profile
- SS = Soil Sample by Geotech Lab
- TC = Total Count Borehole

Notes: DC = Depth of Contamination
[n] = Reading Taken n-Inches
Above Floor or Ground
Date of Survey = 09-10-90
Team Leader = DF

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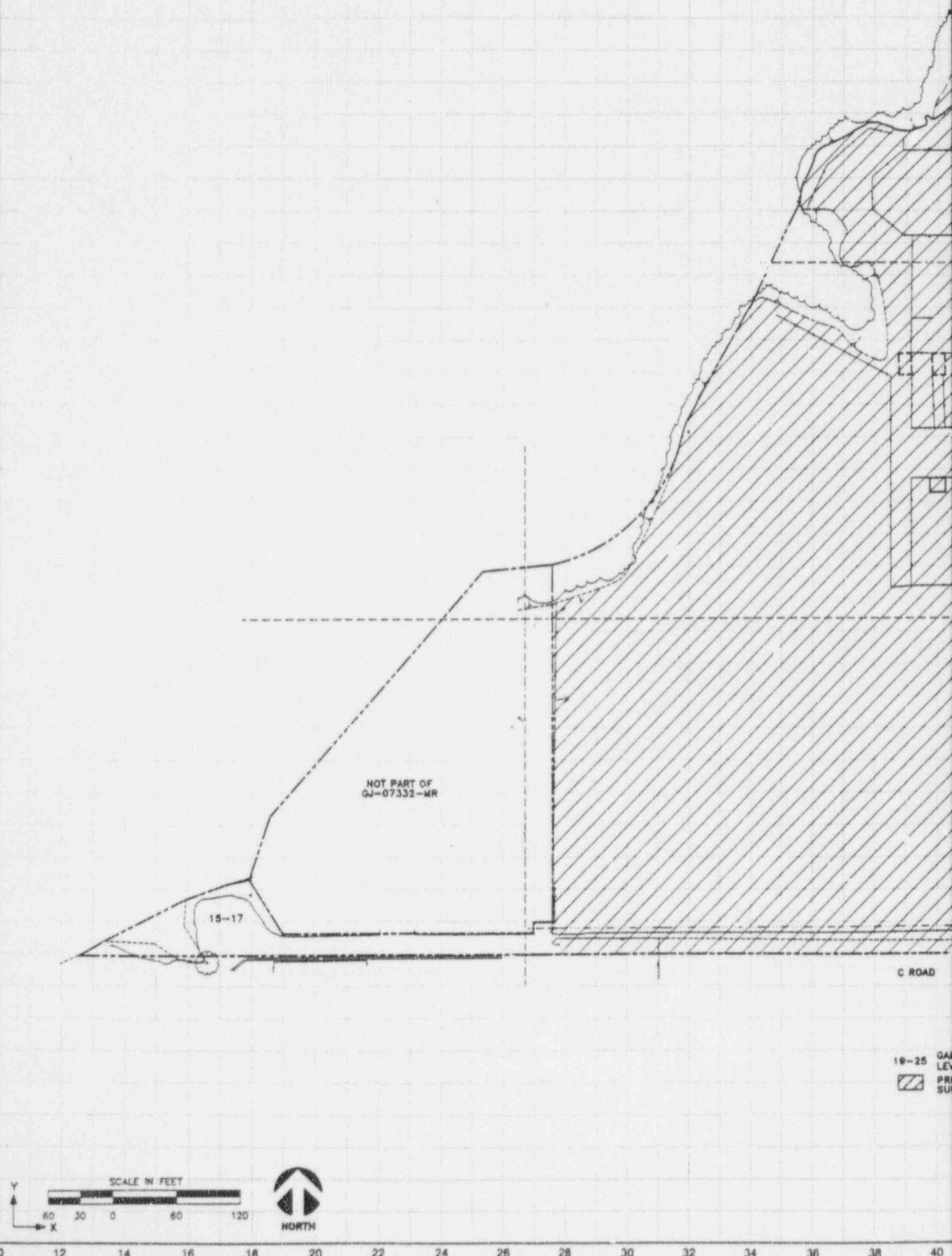
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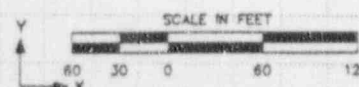
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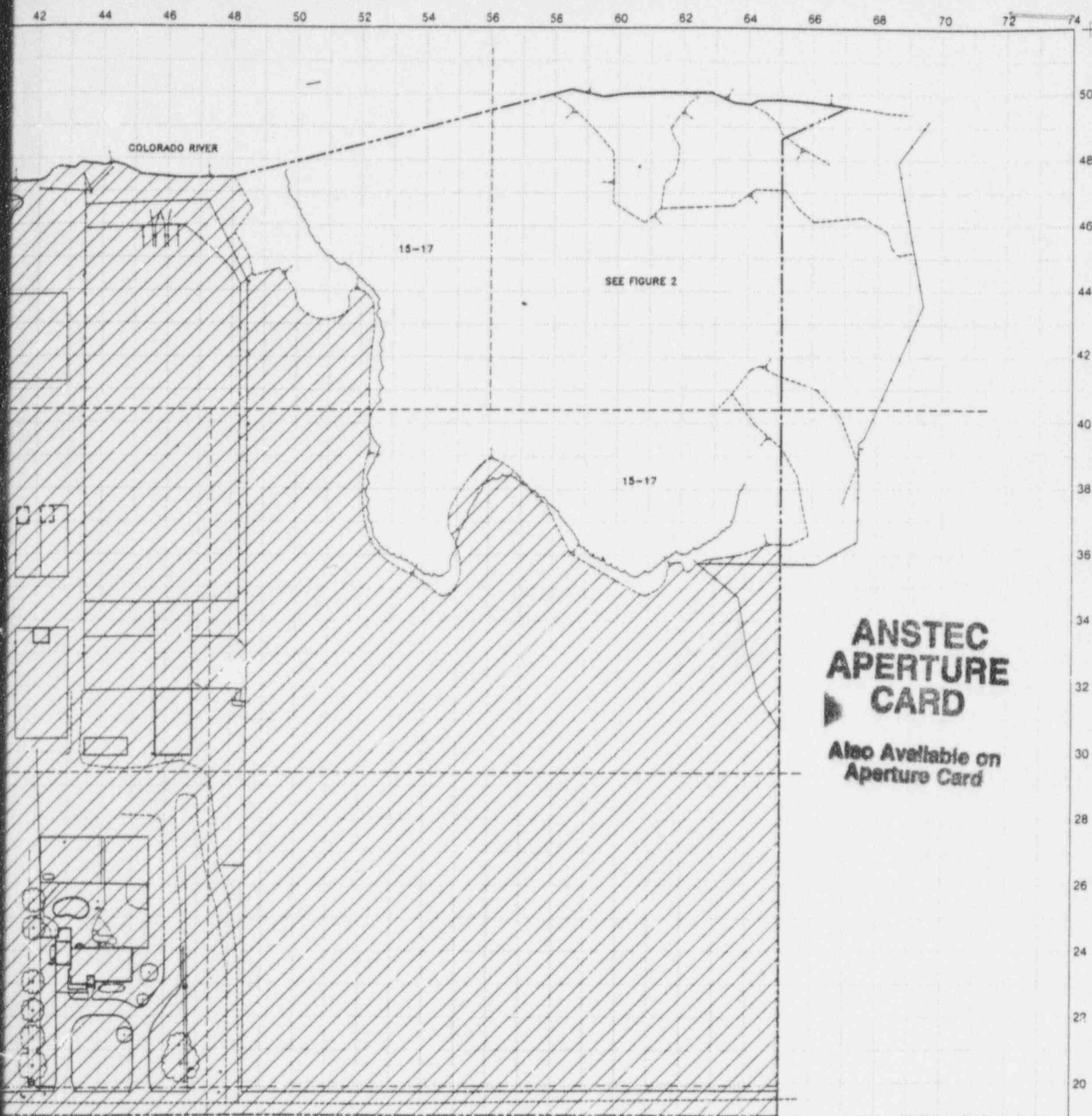
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19-25
GAL
LEV
PRI
SU



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ALL GAMMA MEASUREMENTS ARE WITHIN THE
RANGE OF NORMAL BACKGROUND UNLESS
OTHERWISE NOTED.

**FIGURE 1
POST-CONSTRUCTION GAMMA EXPOSURE RATES**

LEGEND
EXPOSURE RATES AT GROUND
IN $\mu\text{R}/\text{h}$
USUALLY ASSESSED AND
DATED NOVEMBER 3, 1990

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Remedial Action Project, is for the 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.

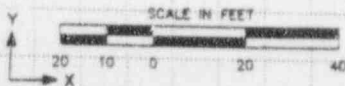
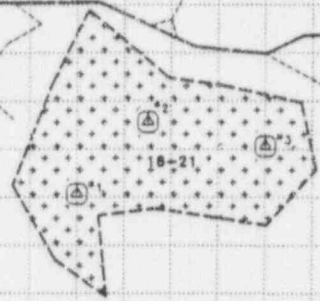
NO.	DATE	REVISIONS	BY	CK	A.E.	APP	NO.	DATE	REVISIONS	BY	CK	A.E.	APP
U.S. DEPARTMENT OF ENERGY GRAND JUNCTION PROJECTS OFFICE, COLORADO													
3010 C ROAD GRAND JUNCTION, COLORADO													
INSTRUMENT NO.		SURVEYOR		DESIGNED		DATE		CHECKED		DATE		APPROVAL	
3707020190		JF 10/90		BKR		10/90		JF		10/90		JF	
SURVEY DATE		TIME		SUBMITTED		DATE		APPROVAL		DATE		DATE	
10/90		10:40		JF		10/90		JF		10/90		JF	
VERIFICATION		DATE		UNC Geotech		DOE NO.		GJ-07333		DOE NO.		3-007333-01	
												SHT. OF 3	

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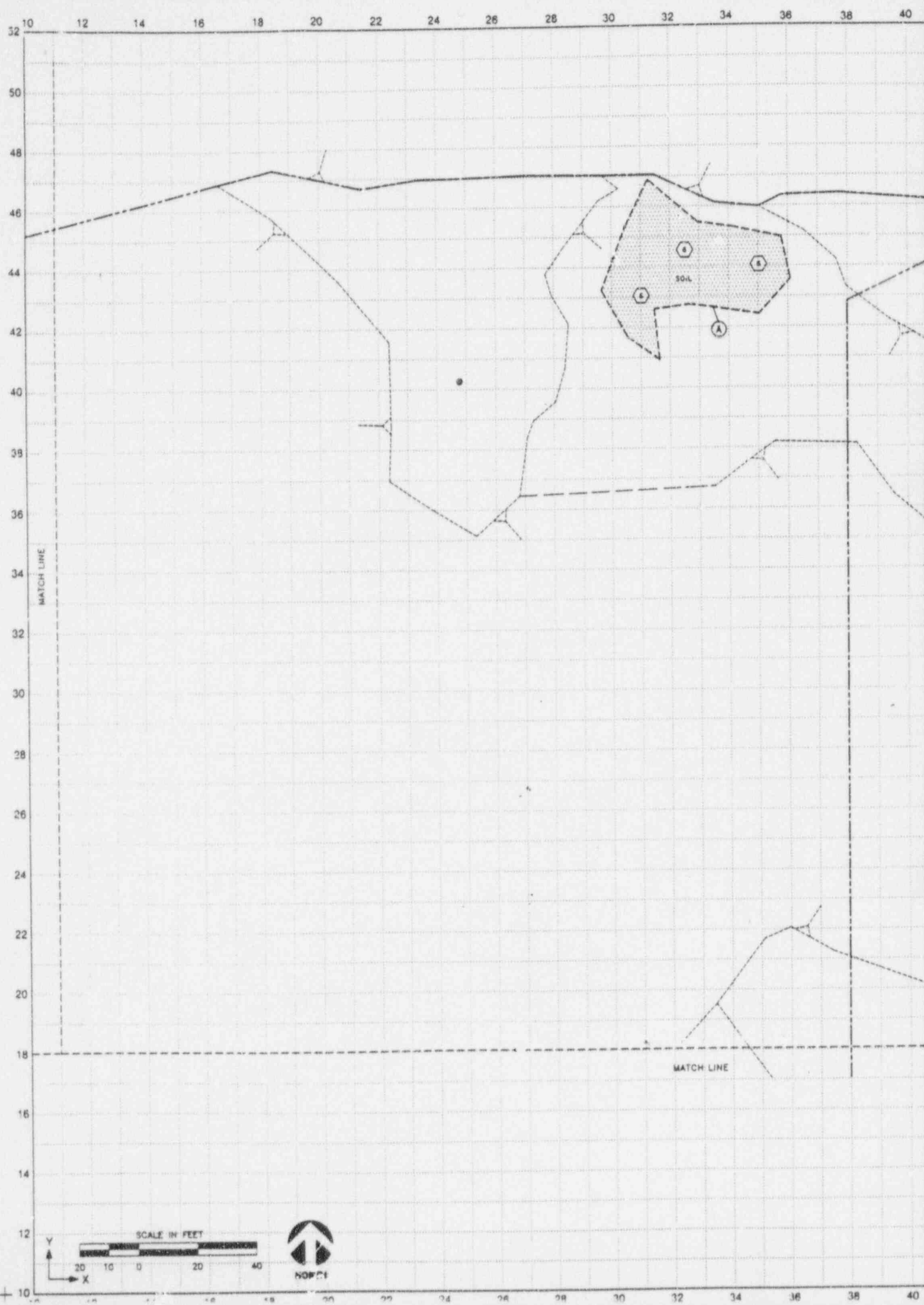
MATCH LINE

MATCH LINE



10 12 14 16 18 20 22 24 26 28 30 32 34 36 38 40

UNC Geotech





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LEGEND

- BOUNDARY OF CONTAMINATION
- DESIGNATION OF RESIDUAL RADIOACTIVE DEPOSIT
- DEPTH OF CONTAMINATION (INCHES)
- ▨ CONTAMINATED AREA

9707020190-19

FIGURE 3
POST-CONSTRUCTION EXTERIOR ESTIMATED EXTENT OF CONTAMINATION

NO. DATE		REVISIONS		BY	CK.	A.E.	APP.	NO.	DATE	REVISIONS		BY	CK.	A.E.	APP.
RESIDENCE - NO. OF OCCUPANTS															
NON-RESIDENCE - MAN-HRS. WK.															
INSTRUMENT NO.		SURVEYOR		DESIGNED		DATE		U.S. DEPARTMENT OF ENERGY GRAND JUNCTION PROJECTS OFFICE, COLORADO 3010 C ROAD GRAND JUNCTION, COLORADO							
Prepared by CF 10/90				DRAWN		BKR 10/90									
				CHECKED											
				PROJ. ENG.											
SURVEY DATE		TIME		SUBMITTED		10/90		APPROVAL		DATE		APPROVAL DOE		DATE	
VERIFICATION		DATE		UNC Geotech				DOE # NO.		GJ-07333		DOE # NO.		J-007333-63	

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DATE: April 29, 1991

TO: J. E. Elmer

FROM:

R. M. Ryan 

SUBJECT: SUPPLEMENTAL STANDARDS FOR HILLSIDE ADJACENT
TO 3010 C ROAD

To determine the possibility of applying for supplemental standards for the hillside adjacent to DOE ID number GJ-07332-MR, located at 3010 C Road, a gamma scan of the accessible areas was collected along the hillside. The approximate areas of elevated readings were recorded and shown on the attached maps. The attached maps are copies of the Extent of Contamination maps submitted during the original assessment of DOE ID number GJ-07332-MR. The additional gamma scan information as well as the soil sample locations are shown on these maps. Other areas of the hillside also displayed areas of elevated readings; however, these areas were not accessible.

Additional soil samples were collected in areas of the hillside which could be accessed. The locations of the soil samples are shown on the attached map.

The results of the soil samples are as follows:

<u>Soil Sample Number</u>	<u>Radium-226 (pCi/g)</u>	<u>Depth</u>	<u>Sample ID</u>
1	15.5	00-06"	NAF 945
2	14.0	00-06"	NAF 946
3	5.7	00-06"	NAF 947
4	12.9	00-06"	NAF 948

The areas of elevated readings appeared to follow the drainage indentations from the top of the hillside. The contamination on top of the hillside that was present prior to remediation of 3010 C Road, appeared to have washed off the side of the hill into the drainage areas.

The soil sample results and the size of the deposits indicate that there is sufficient contamination to exceed the EPA guidelines for radium-226 in soil. Since these areas are unlikely to be used for building sites

Memorandum to J. E. Elmer

Page 2

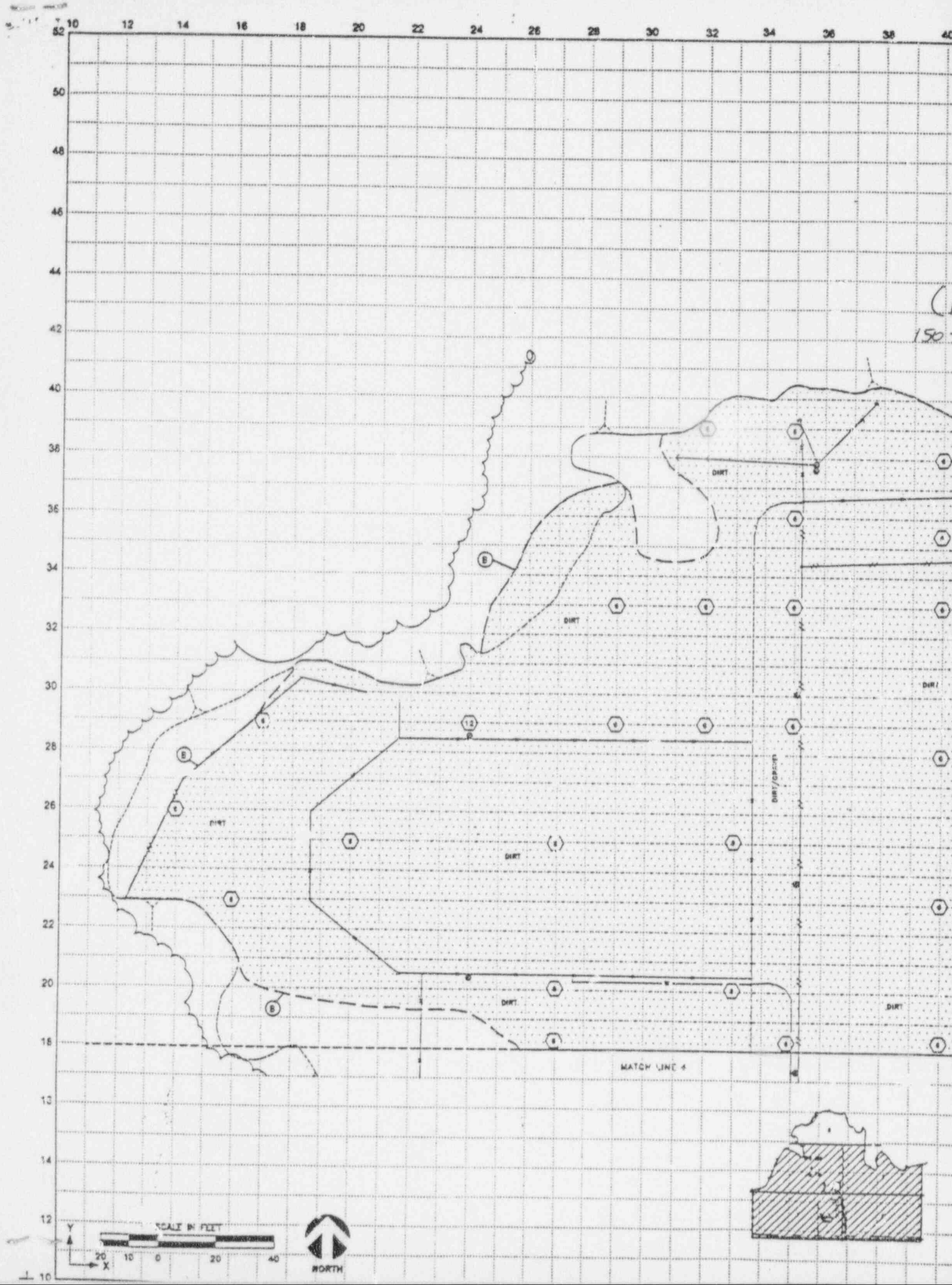
April 29, 1991

and the destruction to the integrity of the hillside is probable if remediated, this hillside should be considered for supplemental standards.

If you have any questions or comments, please do not hesitate to contact me at extension 6651.

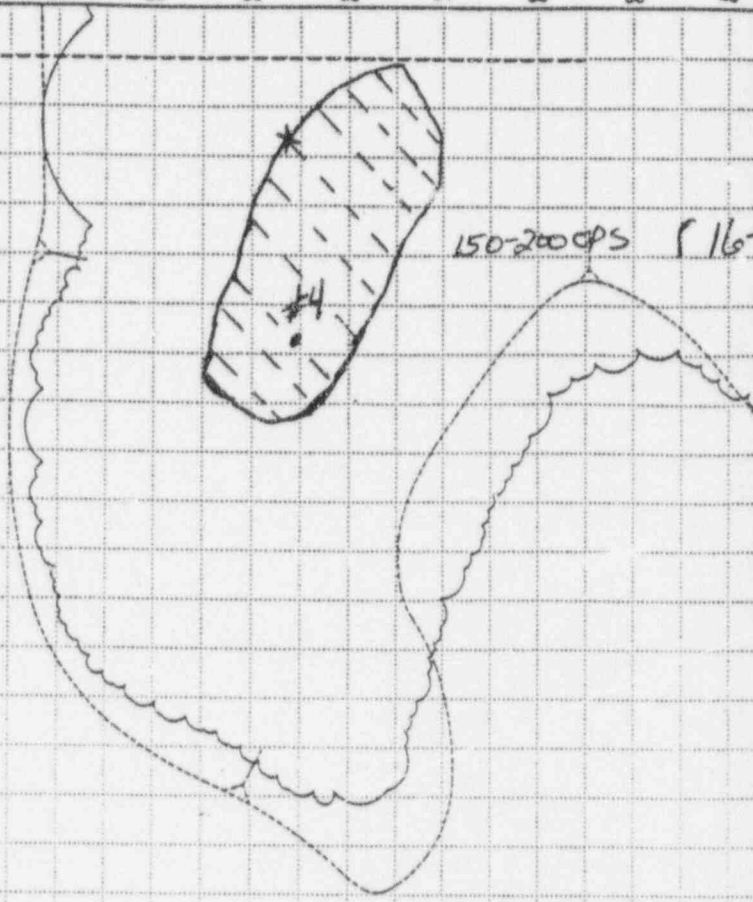
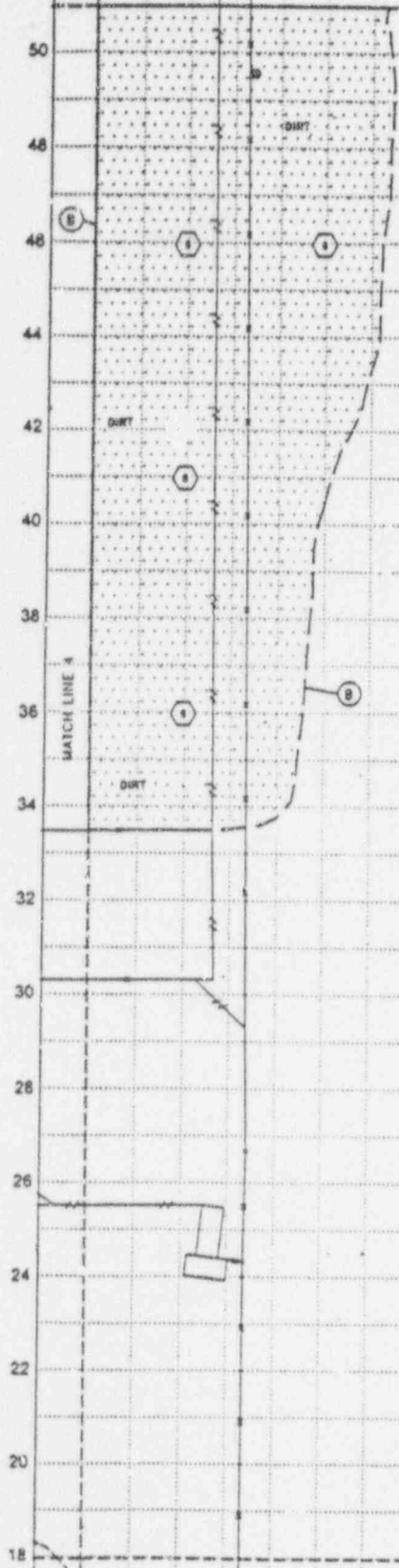
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cc: E Colunga
DP Fossey
KR Ivie, Sr.
TR Unrein
Folio (GJ-07332-MR)

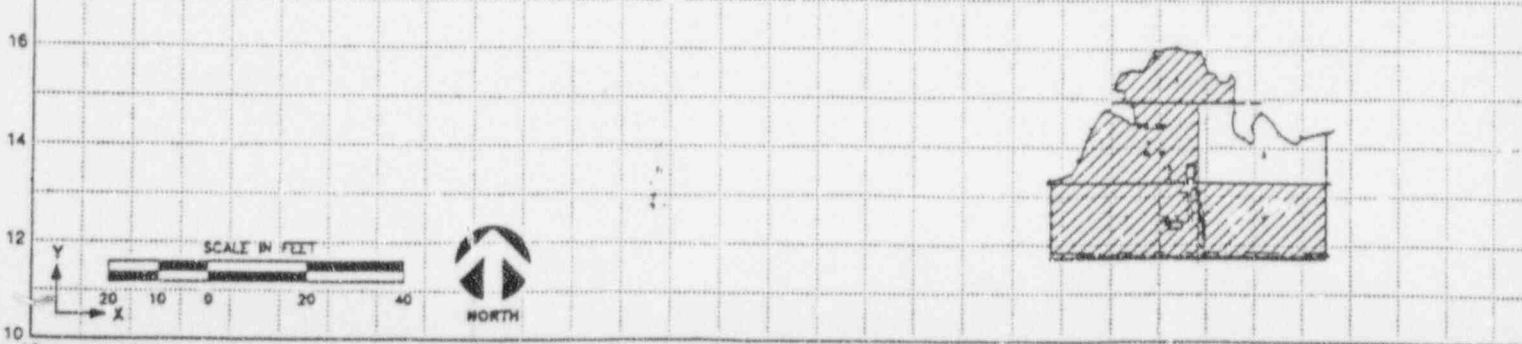


10 12 14 16 18 20 22 24 26 28 30 32 34 36 38 40

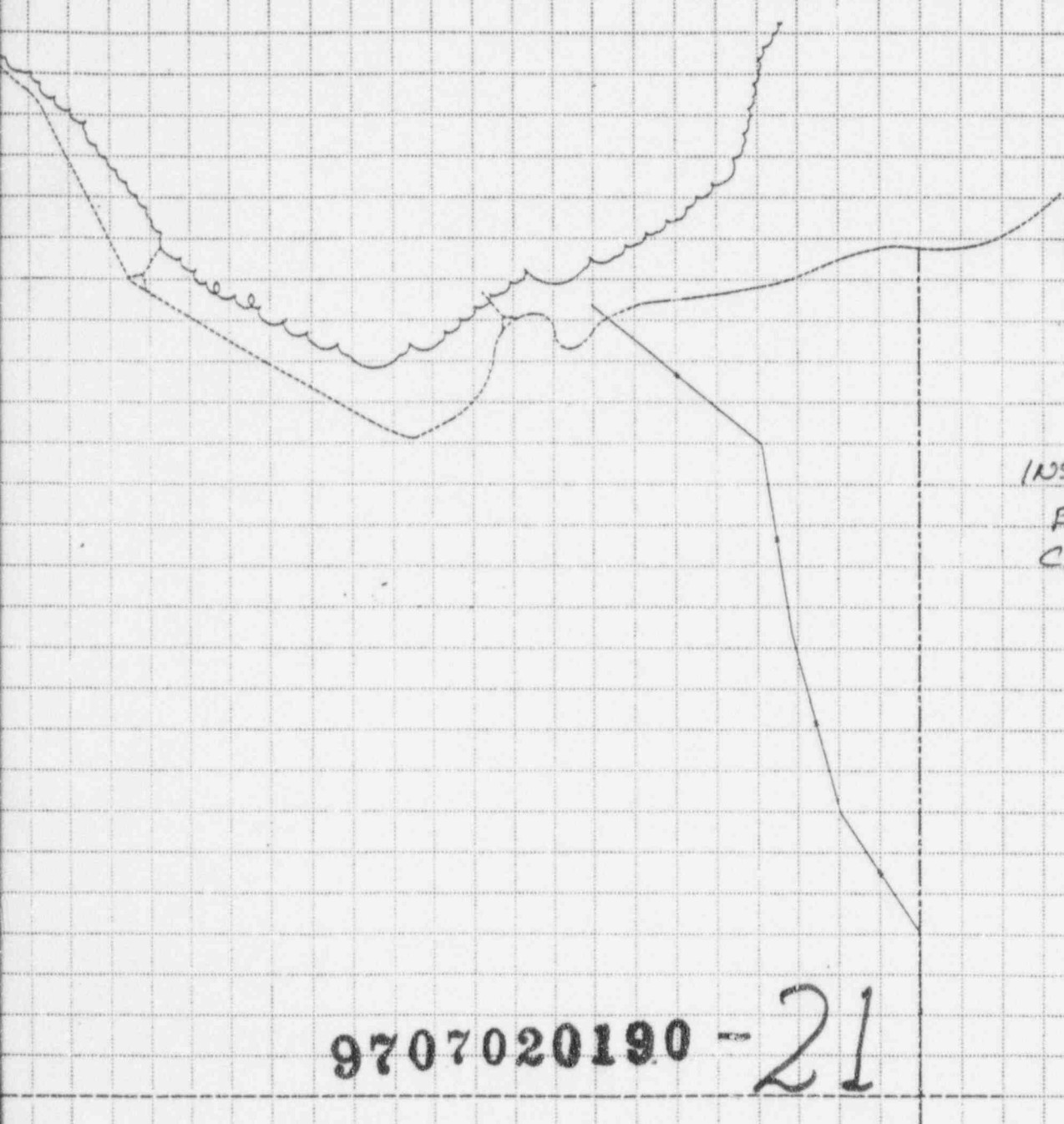
MATCH LINE 5



MATCH LINE 2



20 LR/1



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FIGURE 4B
EXTERIOR ESTIMATED EXTENT OF CONTAMINATION

- LEGEND**
- ✓ BOUNDARY OF CONTAMINATION
 - DESIGNATION OF RESIDUAL RADIOACTIVE DEPOSIT
 - DEPTH OF CONTAMINATION (INCHES)
 - CONTAMINATED AREA

This drawing, prepared for the Mountain View Technical Support Project, is for the use of the U.S. Department of Energy and its contractors. It is not a legal survey plot or an engineering survey plotted to not to be relied upon for the maintenance of title, building, or other legally required record files.

NO.	DATE	REVISIONS	BY	CL	A.S.	APP.	NO.	DATE	REVISIONS	BY	CL	A.S.	APP.
U.S. DEPARTMENT OF ENERGY GRAND JUNCTION PROJECTS OFFICE, COLORADO													
3010 C ROAD GRAND JUNCTION, COLORADO													
BOR M. NO. 67-5735													
SWE. NO. 3-007535-013													
SHEET 13 OF 14													

APPROVED: *[Signature]* DATE: 9/80
BY: *[Signature]* DATE: 9-14-80
UNC Geotech

APPENDIX A

RADIOLOGICAL ASSESSMENT FOR

DOE ID NO. GJ-45271-VL

Revised: July 11, 1991

CONTENTS

Executive Summary
Team Leader Notes

Tables

Tables 1a through 11. Radium Concentrations at Exterior Locations

Figures

Figure 1.	Gamma Exposure Rates
Figures 2a through 2l.	Gamma Exposure Rates/Sample Locations
Figures 3a through 3g.	Exterior Estimated Extent of Contamination

EXECUTIVE SUMMARY

1.0 INTRODUCTION

This property is a vacant lot located at 3012 C Road (River Bluff).

Following procedures described in the *Field Assessments Procedures Manual*, data were collected on this property and assessed to estimate the location of residual radioactive material in excess of the Environmental Protection Agency (EPA) 'Standards for Remedial Action at Inactive Uranium Processing Sites' (40 CFR 192).

This property has been included for remedial action by the Department of Energy on the basis of Oak Ridge National Laboratory's identification of excess gamma exposure rates in the land area.

2.0 GAMMA EXPOSURE-RATE SURVEYS

2.1 Exterior

The area backgrounds are 13 $\mu\text{R/h}$ and 2.4 pCi/g. The high exterior gamma exposure rate is 30 $\mu\text{R/h}$. Exterior gamma exposure rates are shown in Figure 1, and Figures 2a through 2l.

2.2 Interior

Not applicable - vacant lot.

3.0 RADON/RADON DECAY-PRODUCT CONCENTRATION (RDC)

Not applicable - vacant lot.

4.0 EXTENT OF CONTAMINATION

4.1 Exterior

Figures 2a through 2l show the locations and types of explorations and radium measurements made; the related radium data are listed in Tables 1a through 1l. The maximum radium concentration in the contaminated areas is 22.1 pCi/g.

Figures 3a through 3g show the estimated boundaries and depths of exterior contamination. The deposits containing identified residual radioactive materials are characterized as follows:

In the bare soil areas.

4.2 Interior

Not applicable - vacant lot.

5.0 REMEDIAL ACTION RECOMMENDATIONS

5.1 Exterior

Exterior Deposits A, B, and E through G (Figures 3a, 3b, and 3d through 3g) should be removed and the appropriate cover material replaced.

Exterior Deposits C and D (Figure 3c) should be considered for supplemental standards.

5.2 Interior

Not applicable - vacant lot.

6.0 COMMINGLED WASTE INVESTIGATION

A commingled waste investigation was not performed on this property.

:mm/pr

TEAM LEADER NOTES

DOE ID NUMBER: GJ-45271-VL

SURVEY DATE: March 21, 1991

TEAM LEADER: Ernie Colunga

=====

Owners: Paul X. and Nancy B. McMenaman

Telephone Numbers: (303) 434-5355 (Home)
(303) 434-5146 (Work)

All deposits described in the historical data were located and investigated. Additional contamination was identified throughout the property.

The deposits mentioned in Oak Ridge National Laboratory's inclusion report have been partially cleaned up during the remediation performed at DOE ID number on GJ-07332-MR. The investigation of the remaining deposits are shown in Figure 2d and Table 1d. These deposits (Figure 3c) should be considered for supplemental standards, as they are located on the side of the cliffs of Orchard Mesa.

Figure 1 shows the locations and identifies the specific nature of each of the "No-Access" areas located on this property. Deposits C and D (Figure 3c) are adjacent to a "No-Access" area. It is undetermined if the deposits extend onto the "No-Access" area, as they are located on the side of the cliffs, which were determined to be too dangerous for personnel to attempt to assess.

There is no spillover to other adjacent properties, as determined by a scintillometer scan.

/pr

Radium Concentrations at Exterior Locations

DOE ID #GJ-45271-VL

3012 C Road (River Bluff)

Page 1 of 1

Loc #	Grid Location	Depth (in.)	Meas. Type	Ra-226 (pCi/g)		RDC	Alpha dpm/100 cm ²	Comments
				Non-Deconv.	Deconv.			
1	257270	00-06	OC	3.5				NAH-143
		00	DS	4.9				Soil
		03	TC	5.0	5.0			
		06	DS	6.6				DC = 0 inches
		06	TC	5.8	5.8			
		09	TC	6.6	9.1			
		12	TC	6.0	6.9			
		18	TC	4.9	4.7			
		24	TC	3.9	3.4			
		30	TC	3.2	3.2			
2	276265	00-06	OC	1.5				NAH-144
		00	DS	2.5				Soil
		03	TC	4.0	4.0			
		06	TC	4.8	5.2			DC = 0 inches
		09	TC	5.4	5.9			
		12	TC	5.7	5.3			
		18	TC	6.2	6.2			
		24	TC	6.7	8.3			
		30	TC	6.3	7.2			
		36	TC	5.4	5.2			
		42	TC	4.6	4.6			

Measurement Types:

AS = Alpha Sample
 DH = Downhole Survey
 DS = Delta Scintillometer
 GB = GAD-6 Borehole
 GS = GAD-6 Surface
 OC = Soil Sample by Opp. Crys. Sys.
 RP = Radon Profile
 SS = Soil Sample by Laboratory Analysis
 TC = Total Count Borehole

Notes: DC = Depth of Contamination
 [n] = Reading Taken n-Inches
 Above Floor or Ground
 Date of Survey = 03-21-91
 Team Leader = EC

Radium Concentrations at Exterior Locations

DOE ID #GJ-45271-VL

3012 C Road (River Bluff)

Page 1 of 3

Loc #	Grid Location	Depth (in.)	Meas. Type	Ra-226 (pCi/g)		RDC	Alpha	dpm/100 cm ²	Comments
				Non-Deconv.	Deconv.				
3	640450	00-06	OC	3.5					NAH-155
		00	DS	2.6					Soil
		03	TC	3.9	3.9				
		06	TC	4.4	4.9				DC = 0 inches
		09	TC	4.6	5.5				
		12	TC	4.3	4.3				
		15	TC	4.0	3.3				
		18	TC	4.1	4.5				
		21	TC	4.0	4.0				
		24	TC	3.9	3.9				
		27	TC	3.8	3.6				
		30	TC	3.8	3.8				
		33	TC	3.8	4.0				
		36	TC	3.7	3.7				
4	640500	00	DS	2.3					Soil
		03	TC	4.1	4.1				Auger refusal
		06	TC	4.8	4.8				
		12	TC	5.5	7.6				DC = 0 inches
		18	TC	5.0	5.5				
		24	TC	4.2	4.2				
5	670370	00	DS	1.8					Soil
		03	TC	4.3	4.3				
		06	TC	4.8	5.9				DC = 0 inches
		09	TC	4.7	5.2				
		12	TC	4.3	4.1				
		15	TC	4.0	4.0				
		18	TC	3.7	3.2				
		21	TC	3.7	3.7				
		24	TC	3.7	3.9				
		27	TC	3.6	3.6				
		30	TC	3.5	3.5				
		33	TC	3.4	3.4				
6	670420	00	DS	1.9					Soil
		03	TC	4.6	4.6				
		06	TC	5.3	5.7				DC = 0 inches
		09	TC	5.8	6.3				
		12	TC	6.0	6.7				
		15	TC	5.8	6.5				
		18	TC	5.2	4.8				
		21	TC	4.8	4.6				
		24	TC	4.5	4.7				

Radium Concentrations at Exterior Locations

DOE ID #GJ-45271-VL

3012 C Road (River Bluff)

Page 2 of 3

				Ra-226 (pCi/g)		RDC	Alpha		
Loc #	Grid Location	Depth (in.)	Meas. Type	Non-Deconv.	Deconv.	Working Level	dpm/100 cm ²	Comments	
6	670420	27	TC	4.1	3.2				
		30	TC	4.2	4.9				
		33	TC	3.9	3.9				
7	670474	03	TC	4.4	4.4			Auger refusal Soil DC > 27 inches	
		06	TC	5.2	5.2				
		09	TC	6.0	6.0				
		12	TC	6.8	6.6				
		15	TC	7.7	7.3				
		18	TC	8.8	8.8				
		21	TC	9.9	10.6				
		24	TC	10.6	11.8				
		27	TC	10.6	10.6				
8	670500	00	DS	1.8				Soil Auger refusal DC > 39 inches	
		03	TC	3.8	3.8				
		06	TC	4.6	5.1				
		09	TC	5.1	4.6				
		12	TC	5.9	5.9				
		15	TC	6.7	6.3				
		18	TC	7.7	7.0				
		21	TC	9.1	9.8				
		24	TC	10.1	9.7				
		27	TC	11.3	10.1				
		30	TC	13.2	17.3				
		33	TC	12.8	14.8				
		36	TC	11.3	10.8				
		39	TC	10.1	10.1				
9	700450	00	DS	<1.0				Soil DC = 36 inches	
		03	TC	3.5	3.5				
		06	TC	3.8	3.8				
		09	TC	4.1	3.4				
		12	TC	4.8	4.3				
		15	TC	5.8	5.3				
		18	TC	7.1	6.2				
		21	TC	8.9	8.9				
		24	TC	10.7	9.6				
		27	TC	13.1	16.7				
		30	TC	13.5	16.5				
		33	TC	12.2	14.9				
		36	TC	9.4	9.6				
		39	TC	6.5	3.8				
		42	TC	5.1	3.9				

Radium Concentrations at Exterior Locations

DOE ID #GJ-45271-VL

3012 C Road (River Bluff)

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Loc #	Grid Location	Depth (in.)	Meas. Type	Ra-226 (pCi/g)		RDC Working Level	Alpha dpm/100 cm ²	Comments
				Non-Deconv.	Deconv.			
9	700450	45	TC	4.4	3.7			
		48	TC	4.1	4.1			
10	700500	00-06	OC	2.5				NAF-603
		00	DS	3.0				Soil
		03	TC	4.5	4.5			
		06	TC	5.2	6.3			DC = 0 inches
		09	TC	5.3	5.5			
		12	TC	5.3	6.4			
		18	TC	4.7	4.7			
		24	TC	4.1	3.4			
		30	TC	3.9	3.9			
11	720420	00	DS	1.3				Soil
		03	TC	2.9	2.9			Auger refusal
		06	TC	2.9	2.4			
		09	TC	3.2	3.4			DC = 0 inches
		12	TC	3.4	3.8			
		15	TC	3.4	3.4			
12	720470	00	DS	1.0				Soil
		03	TC	3.1	3.1			
		06	TC	3.5	3.7			DC = 0 inches
		09	TC	3.8	4.2			
		12	TC	3.9	4.1			
		15	TC	3.9	4.1			
		18	TC	3.8	3.4			
		21	TC	3.9	4.3			
		24	TC	3.8	4.0			
		27	TC	3.6	3.4			
		30	TC	3.5	3.5			
		33	TC	3.4	3.2			
		36	TC	3.4	3.2			
		39	TC	3.5	3.5			

Measurement Types:

AS = Alpha Sample
 DH = Downhole Survey
 DS = Delta Scintillometer
 GB = GAD-6 Borehole
 GS = GAD-6 Surface
 OC = Soil Sample by Opp. Crys. Sys.
 RP = Radon Profile
 SS = Soil Sample by Laboratory Analysis
 TC = Total Count Borehole

Notes: DC = Depth of Contamination
 [n] = Reading Taken n-Inches
 Above Floor or Ground
 Date of Survey = 03-21-91
 Team Leader = EC

Radium Concentrations at Exterior Locations

DOE ID #GJ-45271-VL

3012 C Road (River Bluff)

		Ra-226 (pCi/g)		RDC	Alpha			
Loc #	Grid Location	Depth (in.)	Meas. Type	Non-Deconv.	Deconv.	Working Level	dpm/100 cm ²	Comments
13	290500	00	DS	1.7				Soil
		03	TC	3.4	3.4			Auger refusal
		06	TC	3.9	4.8			
		09	TC	3.9	3.9			DC = 0 inches
		12	TC	3.9	3.9			
		15	TC	3.9	4.1			
		18	TC	3.8	3.8			
14	293405	00	DS	2.1				Soil
		03	TC	3.4	3.4			
		06	TC	3.5	3.5			DC = 0 inches
		09	TC	3.6	4.1			
		12	TC	3.4	3.2			
		18	TC	3.3	3.3			
		24	TC	3.2	3.2			
		30	TC	3.1	2.9			
15	307456	00-06	OC	2.2				NAH-142
		00	DS	2.6				Soil
		03	TC	3.4	3.4			
		09	TC	4.0	5.8			DC = 0 inches
		15	TC	3.6	3.2			
		21	TC	3.4	3.4			
		27	TC	3.2	3.0			
16	340460	00-06	OC	5.5				NAG-669
		00	DS	3.0				Soil
		03	TC	4.0	4.0			
		09	TC	4.7	6.7			DC = 6 inches
		15	TC	4.3	4.7			
		21	TC	3.7	3.3			
		27	TC	3.3	2.8			
17	340502	00-06	OC	7.0				NAH-138
		00	DS	2.8				Soil
		03	TC	3.5	3.5			
		09	TC	4.3	6.1			DC = 6 inches
		15	TC	4.1	4.5			
		21	TC	3.7	3.3			
		27	TC	3.5	3.3			
		33	TC	3.4	3.4			

Radium Concentrations at Exterior Locations

DOE ID #GJ-45271-VL

3012 C Road (River Bluff)

Page 2 of 7

Loc #	Grid Location	Depth (in.)	Meas. Type	Ra-226 (pCi/g)		RDC Working Level	Alpha dpm/100 cm ²	Comments
				Non-Deconv.	Deconv.			
18	341416	00	DS	2.3				Soil
		03	TC	4.1	4.1			
		06	TC	4.0	3.8			DC = 0 inches
		09	TC	4.0	4.4			
		12	TC	3.8	3.4			
		18	TC	3.8	4.0			
		24	TC	3.7	3.7			
		30	TC	3.6	3.4			
		36	TC	3.6	3.6			
19	380462	00-06	OC	6.1				NAH-136
		00	DS	3.1				Soil
		03	TC	4.0	4.0			Auger refusal
		09	TC	4.2	5.6			
		15	TC	3.6	3.2			DC = 6 inches
		21	TC	3.2	2.3			
		27	TC	3.3	3.5			
		33	TC	3.3	3.3			
20	394368	00-06	OC	4.4				NAH-141
		00	DS	3.1				Soil
		03	TC	4.6	4.6			Auger refusal
		09	TC	5.6	7.9			
		15	TC	5.3	6.4			DC = 0 inches
		21	TC	4.4	4.4			
21	419424	00-06	OC	6.5				NAH-139
		00	DS	4.4				Soil
		03	TC	4.1	4.1			
		06	TC	4.4	4.9			
		06	DS	3.4				DC = 6 inches
		09	TC	4.4	4.6			
		12	TC	4.3	4.5			
		18	TC	4.1	3.9			
		24	TC	4.0	4.0			
		30	TC	3.9	4.1			
		36	TC	3.7	3.5			
22	420280	00-06	OC	5.6				NAG-665
		00	DS	3.0				Soil
		03	TC	3.8	3.8			
		06	TC	4.0	4.2			DC = 6 inches
		09	TC	4.1	4.5			

Radium Concentrations at Exterior Locations

DOE ID #GJ-45271-VL

3012 C Road (River Bluff)

Page 3 of 7

				Ra-226 (pCi/g)		RDC	Alpha	Comments
Loc #	Grid Location	Depth (in.)	Meas. Type	Non-Deconv.	Deconv.	Working Level	dpm/100 cm ²	
22	420280	12	TC	4.0	4.4			
		18	TC	3.7	3.3			
		24	TC	3.6	3.4			
		30	TC	3.6	3.6			
		36	TC	3.6	3.8			
		42	TC	3.5	3.5			
23	420500	00-06	OC	6.6				NAF-997
		00	DS	2.7				Soil
		03	TC	3.6	3.6			
		06	TC	3.8	4.5			DC = 6 inches
		09	TC	3.6	3.2			
		12	TC	3.6	3.6			
		21	TC	3.6	3.2			
		27	TC	3.8	4.3			
		33	TC	3.7	3.7			
24	425458	00	DS	<1.0				Soil
		03	TC	3.0	3.0			Auger refusal
		06	TC	3.4	3.6			
		09	TC	3.7	4.1			DC = 0 inches
		12	TC	3.8	4.0			
		15	TC	3.8	4.3			
		21	TC	3.5	3.1			
		27	TC	3.4	3.4			
25	429318	00-06	OC	6.6				NAH-140
		00	DS	2.5				Soil
		03	TC	3.6	3.6			
		09	TC	4.0	4.5			DC = 6 inches
		15	TC	4.1	4.3			
		21	TC	4.1	4.1			
		27	TC	4.1	4.5			
		33	TC	3.9	3.7			
		39	TC	3.8	3.8			
26	430350	00-06	OC	5.9				NAG-666
		00	DS	3.0				Soil
		03	TC	4.5	4.5			
		06	TC	4.5	4.7			DC = 6 inches
		09	TC	4.4	4.8			
		12	TC	4.1	3.7			
		15	TC	4.0	4.2			
		18	TC	3.8	3.4			

Radium Concentrations at Exterior Locations

DOE ID #GJ-45271-VL

3012 C Road (River Bluff)

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Loc #	Grid Location	Depth (in.)	Meas. Type	Ra-226 (pCi/g)		RDC	Alpha	Comments
				Non-Deconv.	Deconv.			
26	430350	21	TC	3.8	3.3			
		24	TC	4.1	4.5			
		27	TC	4.2	4.9			
		30	TC	3.9	3.7			
		33	TC	3.7	3.3			
		36	TC	3.7	3.7			
		39	TC	3.7	3.7			
27	460370	00-06	OC	6.3				NAH-137
		00	DS	2.5				Soil
		03	TC	3.8	3.8			
		06	TC	4.6	5.5			DC = 6 inches
		09	TC	4.9	5.6			
		12	TC	4.8	5.5			
		18	TC	4.3	3.9			
		24	TC	4.0	3.3			
		30	TC	4.1	4.3			
28	460410	00-06	OC	8.5				NAG-662
		00	DS	3.6				Soil
		03	TC	4.6	4.6			
		06	TC	4.8	5.9			DC = 6 inches
		09	TC	4.4	4.0			
		12	TC	4.2	4.4			
		18	TC	3.9	3.7			
		24	TC	3.7	3.5			
		30	TC	3.6	3.4			
29	470320	00-06	OC	5.2				NAG-664
		00	DS	3.1				Soil
		03	TC	3.6	3.6			Auger refusal
		06	TC	3.7	3.7			
		09	TC	3.8	4.2			DC = 6 inches
		12	TC	3.7	3.7			
		15	TC	3.6	3.4			
		18	TC	3.6	3.6			
		21	TC	3.6	3.6			
30	470500	00-06	OC	5.2				NAF-998
		00	DS	3.1				Soil
		03	TC	4.7	4.7			
		09	TC	5.1	7.6			DC = 6 inches

Radium Concentrations at Exterior Locations
3012 C Road (River Bluff)

DOE ID #GJ-45271-VL

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Loc #	Grid Location	Depth (in.)	Meas. Type	Ra-226 (pCi/g)		RDC	Alpha	dpm/100 cm ²	Comments
				Non-Deconv.	Deconv.				
30	470500	15	TC	4.1	2.5				
		21	TC	4.0	4.5				
		27	TC	3.6	3.6				
		33	TC	3.2	3.2				
31	475454	00-06	OC	5.9					NAH-135
		00	DS	3.2					Soil
		03	TC	4.5	4.5				
		06	TC	4.4	4.9				DC = 6 inches
		09	TC	4.0	3.5				
		12	TC	3.9	3.9				
		18	TC	3.8	3.8				
		24	TC	3.7	3.3				
		30	TC	3.8	4.2				
		36	TC	3.7	3.7				
32	500370	00-06	OC	4.6					NAG-663
		00	DS	3.1					Soil
		03	TC	3.8	3.8				
		06	TC	3.8	4.0				DC = 0 inches
		09	TC	3.7	3.5				
		12	TC	3.7	3.9				
		15	TC	3.6	3.4				
		18	TC	3.6	3.6				
		24	TC	3.6	3.8				
		30	TC	3.5	3.3				
33	510330	00	DS	1.8					Soil
		03	TC	3.8	3.8				Water at 24"
		06	TC	4.0	4.5				
		09	TC	3.9	4.1				DC = 0 inches
		12	TC	3.7	3.3				
		15	TC	3.7	3.9				
		18	TC	3.6	3.4				
		21	TC	3.6	3.8				
		24	TC	3.5	3.5				
		27	TC	3.4	3.4				
34	510408	00	DS	2.0					Soil
		03	TC	3.1	3.1				DC = 0 inches
		09	TC	3.5	4.0				

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		Ra-226 (pCi/g)		RDC	Alpha		
Loc #	Grid Location	Depth (in.)	Meas. Type	Non-Deconv.	Deconv.	Working Level	dpm/100 cm ² Comments
34	510408	15	TC	3.6	3.4		
		21	TC	3.8	3.6		
		27	TC	4.1	4.6		
		33	TC	4.1	4.5		
		39	TC	3.9	3.9		
35	523450	00	DS	2.1			Soil
		03	TC	3.5	3.5		
		06	TC	4.2	3.8		DC = 0 inches
		09	TC	5.1	5.8		
		12	TC	5.6	5.4		
		15	TC	6.2	7.6		
		18	TC	6.0	7.2		
		21	TC	5.1	5.3		
		24	TC	4.1	2.9		
		27	TC	3.8	3.3		
		30	TC	3.8	4.0		
		33	TC	3.7	3.7		
36	537484	00-06	OC	6.6			NAH-134
		00	DS	4.2			Soil
		03	TC	4.7	4.7		
		06	DS	5.2			DC = 6 inches
		06	TC	5.6	5.8		
		09	TC	6.4	7.1		
		12	TC	6.8	9.6		
		18	TC	5.6	5.8		
		24	TC	4.3	2.3		
37	560450	00-06	OC	4.6			NAG-667
		00	DS	3.1			Soil
		03	TC	3.7	3.7		
		06	TC	3.7	3.7		DC = 0 inches
		09	TC	3.7	3.9		
		12	TC	3.6	3.4		
		15	TC	3.6	3.6		
		18	TC	3.6	3.6		
		21	TC	3.6	3.8		
		24	TC	3.5	3.1		
		27	TC	3.6	3.8		

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		Ra-226 (pCi/g)		RDC		Alpha	
Loc #	Grid Location	Depth (in.)	Meas. Type	Non-Deconv.	Deconv.	Working Level	dpm/100 cm ² Comments
37	560450	30	TC	3.6	3.6		
		33	TC	3.6	3.6		

Measurement AS = Alpha Sample
Types: DH = Downhole Survey
DS = Delta Scintillometer
GB = GAD-6 Borehole
GS = GAD-6 Surface
OC = Soil Sample by Opp. Crys. Sys.
RP = Radon Profile
SS = Soil Sample by Laboratory Analysis
TC = Total Count Borehole

Notes: DC = Depth of Contamination
[n] = Reading Taken n-Inches
Above Floor or Ground
Date of Survey = 03-21-91
Team Leader = EC

Radium Concentrations at Exterior Locations
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Loc #	Grid Location	Depth (in.)	Meas. Type	Ra-226 (pCi/g)		RDC	Alpha dpm/100 cm ²	Comments
				Non-Deconv.	Deconv.			
38	413507	00	DS	2.0				Soil
		03	TC	3.5	3.5			
		09	TC	4.2	5.8			DC = 0 inches
		15	TC	4.0	3.6			
		21	TC	4.0	4.9			
		27	TC	3.5	3.5			
		33	TC	3.0	2.6			
		39	TC	2.7	2.3			
		45	TC	2.6	2.6			
39	417325	00	DS	16.3				Soil
		06	DS	7.4				
40	440323	00	DS	1.2				Soil
41	459338	00	DS	8.5				Soil
		06	DS	1.5				
42	513402	00	DS	1.1				Soil
43	545413	00	DS	1.8				Soil
44	545423	00	DS	4.7				Soil
		06	DS	3.8				
45	580428	00	DS	6.1				Soil
		06	DS	2.0				
46	620422	00	DS	6.7				Soil
		06	DS	3.3				
47	654426	00-06	OC	15.5				NAF-945; soil
48	680412	00-06	OC	14.0				NAF-946; soil

Measurement Types:

AS = Alpha Sample
 DH = Downhole Survey
 DS = Delta Scintillometer
 GB = GAD-6 Borehole
 GS = GAD-6 Surface
 OC = Soil Sample by Opp. Crys. Sys.
 RP = Radon Profile
 SS = Soil Sample by Laboratory Analysis
 TC = Total Count Borehole

Notes: DC = Depth of Contamination
 [n] = Reading Taken n-Inches
 Above Floor or Ground
 Date of Survey = 03-21-91
 Team Leader = EC

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		Ra-226 (pCi/g)		RDC	Alpha		
Loc #	Grid Location	Depth (in.)	Meas. Type	Non-Deconv.	Deconv.	Working Level	dpm/100 cm ² Comments
49	118225	00	DS	1.4			Soil
		03	TC	3.5	3.5		Auger refusal, water at 39"
		06	TC	3.9	3.7		
		09	TC	4.4	4.6		DC = 0 inches
		12	TC	4.8	5.0		
		15	TC	5.1	5.1		
		18	TC	5.4	5.0		
		21	TC	5.9	5.9		
		24	TC	6.4	6.2		
		27	TC	7.0	7.2		
		30	TC	7.5	7.9		
		33	TC	7.8	7.8		
		36	TC	8.1	8.1		
		39	TC	8.4	8.4		
		42	TC	8.7	8.7		
50	126283	00	DS	1.4			Soil
		03	TC	3.4	3.4		Auger refusal
		06	TC	3.9	3.7		
		09	TC	4.5	5.2		DC = 0 inches
		12	TC	4.7	5.1		
		15	TC	4.7	4.2		
		18	TC	5.0	4.8		
		21	TC	5.4	5.8		
		24	TC	5.6	5.6		
		27	TC	5.8	6.3		
		30	TC	5.7	5.7		
51	340220	00-06	OC	5.7			NAG-668
		00	DS	2.9			Soil
		03	TC	3.8	3.8		
		09	TC	4.6	6.6		DC = 6 inches
		15	TC	4.3	4.7		
		21	TC	3.8	3.4		
		27	TC	3.5	3.1		
		33	TC	3.4	3.4		
52	470210	00-06	OC	6.1			NAF-999
		00	DS	3.0			Soil
		03	TC	3.8	3.8		
		06	TC	4.2	4.7		DC = 6 inches
		09	TC	4.3	4.8		
		12	TC	4.1	4.1		
		15	TC	3.9	4.3		

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Loc #	Grid Location	Depth (in.)	Meas. Type	Ra-226 (pCi/g)		RDC Working Level	Alpha dpm/100 cm ²	Comments
				Non-Deconv.	Deconv.			
52	470210	21	TC	3.5	2.8			
		27	TC	3.5	3.7			
		33	TC	3.4	3.4			
53	500230	00	DS	2.4				Soil
		03	TC	3.1	3.1			Auger refusal
		06	TC	3.4	3.8			
		09	TC	3.5	3.7			DC = 0 inches
		12	TC	3.5	3.5			
		15	TC	3.5	3.5			
54	520196	00-06	OC	8.3				NAH-133
		00	DS	4.8				Soil
		03	TC	4.6	4.6			Auger refusal
		06	DS	4.6				
		09	TC	5.7	8.0			DC = 6 inches
		15	TC	5.5	7.6			
		21	TC	4.1	2.0			
		27	TC	3.9	3.9			

Measurement Types: AS = Alpha Sample
 DH = Downhole Survey
 DS = Delta Scintillometer
 GB = GAD-6 Borehole
 GS = GAD-6 Surface
 OC = Soil Sample by Opp. Crys. Sys.
 RP = Radon Profile
 SS = Soil Sample by Laboratory Analysis
 TC = Total Count Borehole

Notes: DC = Depth of Contamination
 [n] = Reading Taken n-Inches
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Loc #	Grid Location	Depth (in.)	Meas. Type	Ra-226 (pCi/g)		RDC	Alpha	Comments
				Non-Deconv.	Deconv.			
55	558359	00	DS	2.0				Soil
		03	TC	3.4	3.4			Auger refusal
		06	TC	3.9	3.9			
		09	TC	4.4	4.4			DC = 0 inches
		12	TC	4.9	5.6			
		15	TC	5.0	4.8			
		18	TC	5.2	5.2			
56	576358	00	DS	5.4				Soil
		03	TC	5.0	5.0			Auger refusal
		06	TC	6.6	7.3			
		09	TC	7.8	9.0			DC = 18 inches
		12	TC	8.3	7.2			
		15	TC	9.4	15.4			
		18	TC	7.1	4.6			
		21	TC	6.2	5.0			
57	580313	00-06	OC	6.9				NAG-598
		00	DS	3.6				Soil
		03	TC	3.9	3.9			Auger refusal
		06	TC	4.3	4.7			
		09	TC	4.5	4.7			DC = 6 inches
		12	TC	4.6	4.8			
		15	TC	4.6	4.6			
58	590410	00	DS	2.1				Soil
		03	TC	4.8	4.8			
		06	TC	5.3	6.2			DC = 0 inches
		09	TC	5.3	5.5			
		12	TC	5.2	5.9			
		15	TC	4.7	3.6			
		18	TC	4.8	5.0			
		21	TC	4.8	5.0			
		24	TC	4.7	4.3			
		27	TC	4.8	5.0			
		30	TC	4.8	4.8			
		33	TC	4.8	4.8			
59	594361	00-06	OC	8.8				NAG-658
		00	DS	3.4				Soil
		03	TC	3.9	3.9			Auger refusal

Radium Concentrations at Exterior Locations

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				Ra-226 (pCi/g)		RDC	Alpha		
Loc #	Grid Location	Depth (in.)	Meas. Type	Non-Deconv.	Deconv.	Working Level	dpm/100 cm ²	Comments	
59	594361	06	TC	4.5	5.2			DC = 6 inches	
		09	TC	4.7	5.1				
		12	TC	4.7	5.2				
		15	TC	4.4	4.0				
		18	TC	4.3	4.3				
60	595376	00-06	OC	5.0				NAG-597 Soil	
		00	DS	3.5					
		03	TC	4.6	4.6			DC = 21 inches	
		06	TC	5.5	5.5				
		09	TC	6.4	6.4				
		12	TC	7.3	6.4				
		15	TC	8.7	9.2				
		18	TC	9.8	15.7				
		21	TC	7.6	6.0				
		24	TC	6.3	5.6				
		27	TC	5.4	5.0				
		30	TC	4.7	4.7				
61	603350	00-06	OC	7.6				NAG-596 Soil	
		00	DS	3.7					
		03	TC	4.6	4.6			Auger refusal	
		06	TC	4.7	5.4				
		09	TC	4.4	4.2			DC = 6 inches	
		12	TC	4.2	4.0				
		15	TC	4.1	4.3				
		18	TC	3.9	3.7				
62	610401	21	TC	3.8	3.8			Soil DC = 36 inches	
		00	DS	.5					
		03	TC	5.0	5.0				
		06	TC	6.5	6.7				
		09	TC	7.9	8.1				
		12	TC	9.2	9.4				
		15	TC	10.4	10.0				
		18	TC	11.8	12.2				
		21	TC	13.0	13.5				
		24	TC	13.9	14.3				
		27	TC	14.6	18.7				
		30	TC	13.0	15.3				
		33	TC	10.1	9.0				
		36	TC	7.8	5.8				
		39	TC	6.6	6.6				

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Loc #	Grid Location	Depth (in.)	Meas. Type	Ra-226 (pCi/g)		RDC	Alpha	dpm/100 cm ²	Comments
				Non-Deconv.	Deconv.				
63	610450	00	DS	<1.0					Soil
		03	TC	3.2	3.2				DC = 0 inches
		06	TC	3.8	3.8				
		09	TC	4.4	4.8				
		12	TC	4.8	3.7				
		15	TC	5.8	6.7				
		18	TC	6.3	6.7				
		21	TC	6.6	7.8				
		24	TC	6.2	6.6				
		27	TC	5.6	5.2				
		30	TC	5.2	5.2				
64	620430	24-30	OC	22.1					NAG-660
		00-06	OC	3.6					NAG-659
		00	DS	3.5					Soil
		03	TC	5.8	5.8				
		06	TC	7.4	6.9				DC = 39 inches
		09	TC	9.3	9.8				
		12	TC	10.9	11.6				
		15	TC	12.1	12.5				
		18	TC	13.1	12.9				
		21	TC	14.2	14.4				
		24	TC	15.2	15.6				
		27	TC	16.0	17.8				
		30	TC	15.8	17.4				
		33	TC	14.7	17.7				
		36	TC	11.9	11.2				
65	623293	00-06	OC	5.4					NAG-599
		00	DS	3.7					Soil
		03	TC	4.4	4.4				Auger refusal
		06	TC	4.3	4.5				
		09	TC	4.1	4.3				DC = 6 inches
		12	TC	3.8	3.6				
		15	TC	3.6	3.2				
66	630400	00-06	OC	5.4					NAG-671
		00	DS	3.4					Soil
		03	TC	4.6	4.6				Auger refusal
		09	TC	6.2	7.1				
		15	TC	7.3	7.3				DC = 27 inches

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Loc #	Grid Location	Depth (in.)	Meas. Type	Ra-226 (pCi/g)		RDC	Alpha	Comments
				Non-Deconv.	Deconv.	Working Level	dpm/100 cm ²	
66	630400	21	TC	8.4	12.8			
		27	TC	7.0	7.0			
67	636441	00	DS	2.3				Soil
		03	TC	3.6	3.6			
		06	TC	4.1	3.9			DC = 30 inches
		09	TC	4.7	4.2			
		12	TC	5.6	5.8			
		15	TC	6.4	5.5			
		18	TC	7.7	8.1			
		21	TC	8.8	10.0			
		24	TC	9.2	9.7			
		27	TC	9.3	11.3			
		30	TC	8.3	7.6			
		33	TC	7.7	8.4			
		36	TC	6.7	6.0			
		39	TC	6.1	6.1			
68	638368	00-06	OC	1.9				NAH-148
		00	DS	4.1				Soil
		03	TC	4.5	4.5			
		06	TC	5.5	5.9			DC = 0 inches
		06	DS	6.5				
		09	TC	6.3	6.8			
		12	TC	6.8	7.0			
		15	TC	7.2	7.4			
		18	TC	7.5	7.7			
		21	TC	7.7	6.8			
		24	TC	8.4	9.3			
		27	TC	8.6	9.7			
		30	TC	8.2	8.2			
69	640230	00-06	OC	1.1				NAH-154
		00	DS	2.5				Soil
		03	TC	4.8	4.8			
		06	TC	5.2	6.1			DC = 0 inches
		09	TC	5.1	4.9			
		12	TC	5.1	5.1			
		15	TC	5.1	5.3			
		18	TC	5.0	5.0			
		21	TC	4.9	5.1			
		24	TC	4.7	4.3			
27	TC	4.7	4.7					

Radium Concentrations at Exterior Locations

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Loc #	Grid Location	Depth (in.)	Meas. Type	Ra-226 (pCi/g)		RDC	Alpha	Comments
				Non-Deconv.	Deconv.			
70	640350	00-06	OC	5.4				NAG-670
		00	DS	3.6				Soil
		03	TC	4.7	4.7			Auger refusal
		06	TC	5.2	5.6			
		09	TC	5.5	4.1			DC = 6 inches
		12	TC	6.6	8.4			
		15	TC	6.7	7.2			
		18	TC	6.5	6.5			
71	643423	00-06	OC	3.3				NAG-595
		00	DS	2.6				Soil
		03	TC	3.9	3.9			
		06	TC	5.1	5.5			DC = 27 inches
		09	TC	6.1	6.6			
		12	TC	6.8	7.0			
		15	TC	7.4	7.4			
		18	TC	8.0	7.8			
		21	TC	8.7	8.7			
		24	TC	9.4	12.8			
		27	TC	8.2	7.1			
		30	TC	7.6	7.8			
		33	TC	6.9	6.7			
		36	TC	6.3	6.3			
72	653322	00	DS	1.2				Soil
		03	TC	3.3	3.3			Auger refusal
		06	TC	4.1	4.3			
		09	TC	4.8	5.2			DC = 0 inches
		12	TC	5.3	5.1			
		18	TC	5.9	6.6			
		24	TC	6.1	6.1			
73	658260	00	DS	2.4				Soil
		03	TC	4.4	4.4			
		06	TC	4.9	5.4			DC = 0 inches
		09	TC	5.1	5.5			
		12	TC	5.1	4.9			
		15	TC	5.2	5.0			
		18	TC	5.4	5.0			
		21	TC	5.8	7.4			
74	670200	00	DS	1.6				Soil
		03	TC	4.0	4.0			Auger refusal

Radium Concentrations at Exterior Locations

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				Ra-226 (pCi/g)		RDC	Alpha		
Loc #	Grid Location	Depth (in.)	Meas. pe	Non-Deconv.	Deconv.	Working Level	dpm/100 cm ²	Comments	
74	670200	06	TC	4.3	3.9				
		09	TC	4.8	4.6				
		12	TC	5.4	6.5				
		15	TC	5.4	5.4				
		18	TC	5.4	5.2				
		21	TC	5.5	4.6				
		24	TC	6.1	5.9				
		27	TC	6.8	6.1				
		30	TC	7.9	8.1				
		33	TC	8.9	9.1				
		36	TC	9.8	10.9				
		39	TC	10.1	10.1				
75	670230	00-06	OC	4.7				NAG-591	
		00	DS	2.9				Soil	
		03	TC	4.0	4.0			Auger refusal	
		06	TC	4.8	5.0				
		09	TC	5.5				DC = 51 inches	
		12	TC	6.1					
		15	TC	6.6	6.2				
		18	TC	7.3	7.5				
		21	TC	7.9	8.3				
		24	TC	8.3	8.7				
		27	TC	8.5	8.7				
		30	TC	8.6	8.6				
		33	TC	8.7	9.2				
		36	TC	8.5	8.0				
		39	TC	8.6	7.9				
		42	TC	9.1	8.6				
		45	TC	9.9	11.0				
		48	TC	10.1	10.8				
		51	TC	9.9	9.9				
76	673288	00-06	OC	5.8				NAG-592	
		00	DS	3.2				Soil	
		03	TC	4.4	4.4				
		06	TC	5.5	5.9			DC = 6 inches	
		09	TC	6.4	6.8				
		12	TC	7.1	7.1				
		15	TC	7.8	8.2				
		18	TC	8.3	9.0				
		21	TC	8.4	9.1				
		24	TC	8.1	9.3				

Radium Concentrations at Exterior Locations

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				Ra-226 (pCi/g)		DC	Alpha		
Loc #	Grid Location	Depth (in.)	Meas. Type	Non-Deconv.	Deconv.	Working Level	dpm/100 cm ²	Comments	
76	673288	27	TC	7.1	6.9				
		30	TC	6.2	6.2				
77	675382	00	DS	2.2				Soil	
		03	TC	3.1	3.1				
		06	TC	3.8	3.6			DC = 0 inches	
		09	TC	4.6	4.6				
		12	TC	5.4	5.9				
		15	TC	5.9	5.9				
		18	TC	6.4	7.1				
		21	TC	6.5	6.9				
		24	TC	6.4	6.4				
		27	TC	6.3	6.7				
		30	TC	6.0	6.0				
78	677342	00-06	OC	4.8				NAG-657	
		00	DS	2.9				Soil	
		03	TC	4.0	4.0			Auger refusal	
		06	TC	5.0	5.0				
		09	TC	6.0	6.5			DC = 0 inches	
		12	TC	6.7	6.9				
		15	TC	7.3	7.3				
		18	TC	7.9	7.2				
		21	TC	8.9	9.8				
		24	TC	9.4	9.4				
79	692325	00-06	OC	5.7				NAG-594	
		00	DS	3.6				Soil	
		03	TC	4.9	4.9			Auger refusal	
		06	TC	6.0	6.2				
		09	TC	7.0	7.5			DC = 6 inches	
		12	TC	7.7	8.2				
		15	TC	8.1	8.8				
		18	TC	8.1	9.7				
80	700228	00	DS	4.6				Soil	
		03	TC	4.4	4.4				
		06	TC	4.7	3.8			DC = 6 inches	
		09	TC	5.5	5.7				
		12	TC	6.2	6.9				
		15	TC	6.5	7.9				
		18	TC	6.0	6.2				
		21	TC	5.4	5.4				
		24	TC	4.8	3.7				

Radium Concentrations at Exterior Locations

DOE ID #GJ-45271-VL

3012 C Road (River Bluff)

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Loc #	Grid Location	Depth (in.)	Meas. Type	Ra-226 (pCi/g)		RDC	Alpha	Comments
				Non-Deconv.	Deconv.		dpm/100 cm ²	
80	700228	27	TC	4.8	5.0			
		30	TC	4.7	4.7			
		33	TC	4.6	5.0			
		36	TC	4.3	4.3			
81	700360	00	DS	1.7				Soil
		03	TC	3.1	3.1			Auger refusal
		06	TC	3.5	3.3			
		09	TC	4.0	4.4			DC = 0 inches
		12	TC	4.3	4.5			
		18	TC	4.5	4.3			
		24	TC	4.8	5.3			
		30	TC	4.8	5.0			
		36	TC	4.7	4.7			
82	709251	00-06	OC	7.5				NAG-672
		00	DS	3.1				Soil
		03	TC	4.0	4.0			Auger refusal
		06	TC	4.7	5.6			
		09	TC	4.9	5.8			DC = 6 inches
		12	TC	4.6	4.6			
		15	TC	4.3	4.3			
83	713308	00-06	OC	6.6				NAG-593
		00	DS	4.0				Soil
		03	TC	4.3	4.3			
		06	TC	5.4	6.5			DC = 6 inches
		09	TC	5.9	7.0			
		12	TC	5.8	6.3			
		15	TC	5.4	5.6			
		18	TC	4.9	5.6			
		24	TC	4.0	3.1			
		30	TC	3.6	3.1			
		36	TC	3.5	3.5			

Measurement Types:

AS = Alpha Sample

DH = Downhole Survey

DS = Delta Scintillometer

GB = GAD-6 Borehole

GS = GAD-6 Surface

OC = Soil Sample by Opp. Crys. Sys.

RP = Radon Profile

SS = Soil Sample by Laboratory Analysis

TC = Total Count Borehole

Notes: DC = Depth of Contamination

[n] = Reading Taken n-Inches

Above Floor or Ground

Date of Survey = 03-21-91

Team Leader = EC

Radium Concentrations at Exterior Locations
3012 C Road (River Bluff)

DOE ID #GJ-45271-VL

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Loc #	Grid Location	Depth (in.)	Meas. Type	Ra-226 (pCi/g)		RDC	Alpha	dpm/100 cm ²	Comments
				Non-Deconv.	Deconv.				
84	518460	00	DS	1.9					Soil
		03	TC	3.8	3.8				Auger refusal
		09	TC	4.9	5.4				
		15	TC	5.7	6.6				DC = 0 inches
		21	TC	6.0	8.1				
		27	TC	5.1	5.1				
85	518478	00-06	OC	2.8					NAH-147
		00	DS	3.0					Soil
		03	TC	4.6	4.6				
		06	TC	5.5	5.9				DC = 0 inches
		09	TC	6.2	6.2				
		12	TC	6.9	7.4				
		15	TC	7.3	7.1				
		18	TC	7.8	9.8				
		21	TC	7.2	7.6				
		24	TC	6.4	5.9				
		27	TC	5.9	5.5				
		30	TC	5.6	5.6				
86	518507	00	DS	2.1					Soil
		03	TC	3.8	3.8				
		09	TC	5.8	7.9				DC = 0 inches
		15	TC	6.6	8.0				
		21	TC	6.6	8.0				
		27	TC	5.8	5.4				
		33	TC	5.2	5.2				
87	615229	00-06	OC	2.4					NAH-145
		00	DS	3.7					Soil
		03	TC	3.5	3.5				
		06	TC	3.7	4.1				DC = 0 inches
		09	TC	3.7	3.9				
		12	TC	3.6	3.4				
		15	TC	3.6	3.8				
		18	TC	3.5	3.5				

Measurement Types:

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 DH = Downhole Survey
 DS = Delta Scintillometer
 GB = GAD-6 Borehole
 GS = GAD-6 Surface
 OC = Soil Sample by Opp. Crys. Sys.
 RP = R. Con Profile
 SS = Soil Sample by Laboratory Analysis
 TC = Total Count Borehole

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Radium Concentrations at Exterior Locations

DOE ID #GJ-45271-VL

3012 C Road (River Bluff)

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		Ra-226 (pCi/g)		RDC	Alpha			
Loc #	Grid Location	Depth (in.)	Meas. Type	Non-Deconv.	Deconv.	Working Level	dpm/100 cm ²	Comments
88	388183	00-06	OC	3.1				NAH-131
		00	DS	3.2				Soil
		03	TC	5.5	5.5			
		06	TC	5.6	6.0			DC = 0 inches
		09	TC	5.5	7.3			
		12	TC	4.4	2.6			
		18	TC	4.3	4.7			
		24	TC	4.0	3.8			
		30	TC	3.8	3.8			
		36	TC	3.6	3.4			
89	437181	00-06	OC	3.9				NAH-132
		00	DS	4.0				Soil
		03	TC	4.3	4.3			Auger refusal
		06	TC	5.1	6.5			
		06	DS	5.3				DC = 0 inches
		09	TC	5.1	5.6			
		12	TC	4.8	5.5			
		18	TC	4.1	3.2			
		24	TC	3.9	3.7			
		30	TC	3.8	3.8			

Measurement Types:

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 DH = Downhole Survey
 DS = Delta Scintillometer
 GB = GAD-6 Borehole
 GS = GAD-6 Surface
 OC = Soil Sample by Opp. Crys. Sys.
 RP = Radon Profile
 SS = Soil Sample by Laboratory Analysis
 TC = Total Count Borehole

Notes: DC = Depth of Contamination
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Radium Concentrations at Exterior Locations
3012 C Road (River Bluff)

DOE ID #GJ-45271-VL

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				Ra-226 (pCi/g)		RDC	Alpha	Comments
Loc #	Grid Location	Depth (in.)	Meas. Type	Non-Deconv.	Deconv.	Working Level	dpm/100 cm ²	
90	193262	00-06	OC	4.4				NAH-130
		00	DS	3.3				Soil
		03	TC	4.9	4.9			
		06	TC	5.1	5.1			DC = 0 inches
		09	TC	5.3	5.3			
		12	TC	5.5	5.1			
		15	TC	5.9	5.4			
		18	TC	6.6	6.4			
		21	TC	7.4	8.1			
		24	TC	7.8	7.6			
		27	TC	8.3	8.7			
		30	TC	8.6	9.7			
		33	TC	8.3	8.5			
		36	TC	7.9	8.1			
		39	TC	7.4	7.0			
		42	TC	7.1	7.1			
91	214253	00-06	OC	2.6				NAH-129
		00	DS	4.3				Soil
		03	TC	8.8	8.8			
		06	DS	17.0				DC = 33 inches
		06	TC	11.5	10.8			
		09	TC	14.6	15.5			
		12	TC	17.2	17.7			
		15	TC	19.5	22.0			
		18	TC	20.4	21.8			
		21	TC	20.5	24.9			
		24	TC	18.1	18.3			
		27	TC	15.6	16.5			
		30	TC	12.6	14.6			
		33	TC	8.5	2.3			
		36	TC	7.9	7.7			
		39	TC	7.4	7.4			
92	234270	00	DS	2.2				Soil
		03	TC	3.7	3.7			
		06	TC	4.6	5.8			DC = 0 inches
		09	TC	4.8	5.7			
		12	TC	4.5	4.1			
		15	TC	4.4	4.4			
		18	TC	4.3	4.5			
		21	TC	4.1	3.9			
		24	TC	4.0	3.8			
		27	TC	4.0	4.2			

Radium Concentrations at Exterior Locations

DOE ID #GJ-45271-VL

3012 C Road (River Bluff)

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Loc #	Grid Location	Depth (in.)	Meas. Type	Ra-226 (pCi/g)		RDC Working Level	Alpha dpm/100 cm ²	Comments
				Non-Deconv.	Deconv.			
92	234270	30	TC	3.9	4.1			
		33	TC	3.7	3.2			
		36	TC	3.8	3.8			
93	243255	00-06	OC	7.6				NAF-171
		00	DS	5.1				Soil
		03	TC	5.4	5.4			
		06	DS	3.9				DC = 6 inches
		06	TC	6.1	6.6			
		09	TC	6.5	9.0			
		12	TC	5.5	3.7			
		15	TC	5.5	5.9			
		18	TC	5.3	6.5			
		21	TC	4.4	3.2			
		24	TC	4.2	4.2			
		27	TC	4.0	4.0			
		30	TC	3.8	3.4			
		33	TC	3.8	4.0			
		36	TC	3.7	3.5			
		39	TC	3.7	3.7			
94	274254	00-06	OC	4.8				NAF-170
		00	DS	2.5				Soil
		03	TC	4.3	4.3			
		06	TC	4.0	2.6			DC = 0 inches
		09	TC	4.5	5.2			
		12	TC	4.6	4.6			
		15	TC	4.7	4.7			
		18	TC	4.8	4.6			
		21	TC	5.0	4.8			
		24	TC	5.3	6.2			
		27	TC	5.1	5.1			
		30	TC	4.9	4.7			
		33	TC	4.8	4.8			
95	552248	00-06	OC	5.0				NAF-169
		00	DS	2.8				Soil
		03	TC	4.0	4.0			
		06	TC	4.1	3.7			DC = 6 inches
		09	TC	4.4	4.8			
		12	TC	4.5	4.3			
		15	TC	4.7	4.7			

Radium Concentrations at Exterior Locations
3012 C Road (River Bluff)

DOE ID #GJ-45271-VL

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Loc #	Grid Location	Depth (in.)	Meas. Type	Ra-226 (pCi/g)		RDC	Alpha	Working Level	dpm/100 cm ²	Comments
				Non-Deconv.	Deconv.					
95	552248	18	TC	4.9	4.2					
		21	TC	5.5	6.6					
		24	TC	5.5	6.0					
		27	TC	5.2	4.3					
		30	TC	5.4	5.9					
		33	TC	5.3	6.2					
		36	TC	4.7	4.0					
		39	TC	4.5	4.5					
96	591271	00	DS	1.2						Soil
		03	TC	3.4	3.4					
		06	TC	3.7	3.9					DC = 0 inches
		09	TC	3.9	3.9					
		12	TC	4.1	4.1					
		15	TC	4.3	4.3					
		18	TC	4.5	4.3					
		21	TC	4.8	5.2					
		24	TC	4.9	4.5					
		27	TC	5.2	6.1					
		30	TC	5.0	5.5					
		33	TC	4.5	4.0					
		36	TC	4.3	4.3					
97	595255	00-06	OC	6.8						NAF-168
		00	DS	4.8						Soil
		03	TC	5.5	5.5					
		06	TC	6.0	8.8					DC = 6 inches
		06	DS	4.6						
		09	TC	4.9	3.7					
		12	TC	4.5	4.0					
		15	TC	4.4	4.4					
		18	TC	4.3	4.3					
		21	TC	4.2	4.2					
		24	TC	4.1	4.1					
		27	TC	4.0	4.0					
		30	TC	3.9	3.7					
		33	TC	3.9	3.9					
98	646248	00-06	OC	7.2						NAF-167
		00	DS	2.7						Soil
		03	TC	3.8	3.8					Water at 36"
		06	TC	3.9	4.3					DC = 6 inches
		09	TC	3.8	3.6					
		15	TC	3.8	3.6					

Radium Concentrations at Exterior Locations

DOE ID #GJ-45271-VL

3012 C Road (River Bluff)

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				Ra-226 (pCi/g)		RDC	Alpha		
Loc #	Grid Location	Depth (in.)	Meas. Type	Non-Deconv.	Deconv.	Working Level	dpm/100 cm ²	Comments	
98	646248	21	TC	3.9	3.2				
		27	TC	4.4	4.8				
		33	TC	4.7	5.8				
		39	TC	4.4	4.4				
99	647257	00	DS	1.2				Soil	
		03	TC	2.9	2.9			Water at 27"	
		09	TC	3.6	4.0				
		15	TC	4.1	4.5			DC = 0 inches	
		21	TC	4.4	4.6				
		27	TC	4.6	4.8				
		33	TC	4.7	5.1				
		39	TC	4.6	4.6				

Measurement Types:

AS = Alpha Sample
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 GB = GAD-6 Borehole
 GS = GAD-6 Surface
 OC = Soil Sample by Opp. Crys. Sys.
 RP = Radon Profile
 SS = Soil Sample by Laboratory Analysis
 TC = Total Count Borehole

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Radium Concentrations at Exterior Locations

DOE ID #GJ-45271-VL

3012 C Road (River Bluff)

Page 1 of 2

				Ra-226 (pCi/g)		RDC	Alpha	Comments
Loc #	Grid Location	Depth (in.)	Meas. Type	Non-Deconv.	Deconv.	Working Level	dpm/100 cm ²	
100	111200	00-06	OC	3.3				NAH-149
		00	DS	4.4				Soil
		03	TC	5.5	5.5			Auger refusal
		06	DS	5.4				
		06	TC	6.3	6.8			DC = 0 inches
		09	TC	6.8	7.9			
		12	TC	6.7	8.1			
		18	TC	5.8	4.6			
		24	TC	5.6	5.6			
101	111239	00	DS	2.4				Soil
		03	TC	3.4	3.4			
		06	TC	4.3	4.7			DC = 0 inches
		09	TC	5.0	5.7			
		12	TC	5.3	5.8			
		15	TC	5.3	5.3			
		18	TC	5.3	5.7			
		21	TC	5.1	5.6			
		24	TC	4.6	4.8			
		27	TC	4.0	3.5			
		30	TC	3.7	3.7			
		33	TC	3.4	3.2			
		36	TC	3.2	3.2			
		39	TC	3.0	3.0			
102	127224	00-06	OC	6.5				NAH-150
		00	DS	3.6				Soil
		03	TC	5.4	5.4			
		06	TC	5.9	6.4			DC = 6 inches
		09	TC	6.1	6.8			
		12	TC	5.9	6.4			
		18	TC	5.4	5.6			
		24	TC	4.8	5.3			
		30	TC	3.9	3.0			
		36	TC	3.5	3.5			
103	137239	00-06	OC	5.0				NAG-002
		00	DS	3.2				Soil
		03	TC	4.0	4.0			
		09	TC	5.8	8.5			DC = 6 inches
		15	TC	6.1	7.7			
		21	TC	5.5	5.5			
		27	TC	4.9	5.8			
		33	TC	3.8	2.7			

Radium Concentrations at Exterior Locations

DOE ID #GJ-45271-VL

3012 C Road (River Bluff)

Page 2 of 2

Loc #	Grid Location	Depth (in.)	Meas. Type	Ra-226 (pCi/g)		RDC Working Level	Alpha dpm/100 cm ²	Comments
				Non-Deconv.	Deconv.			
103	137239	39	TC	3.3	3.3			
104	145218	00	DS	1.2				Soil
		03	TC	3.2	3.2			
		06	TC	3.3	2.9			DC = 30 inches
		09	TC	3.6	2.9			
		12	TC	4.3	3.4			
		15	TC	5.5	7.8			
		18	TC	5.4	3.4			
		21	TC	6.4	4.6			
		24	TC	8.4	11.2			
		27	TC	8.8	10.8			
		30	TC	8.1	9.3			
		33	TC	6.7	6.9			
		36	TC	5.2	3.1			
		39	TC	4.9	4.9			
105	148250	00-06	OC	4.9				NAG-661
		00	DS	3.2				Soil
		03	TC	4.3	4.3			
		06	TC	5.4	5.9			DC = 0 inches
		09	TC	6.2	7.1			
		12	TC	6.5	7.4			
		15	TC	6.3	6.3			
		18	TC	6.1	6.6			
		21	TC	5.6	5.1			
		24	TC	5.4	6.5			
		27	TC	4.6	4.1			
		30	TC	4.1	3.9			
		33	TC	3.7	4.1			
		36	TC	3.1	2.0			
		39	TC	3.1	3.1			

Measurement Types:

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 GB = GAD-6 Borehole
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 RP = Radon Profile
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Radium Concentrations at Exterior Locations

DOE ID #GJ-45271-VL

3012 C Road (River Bluff)

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Loc #	Grid Location	Depth (in.)	Meas. Type	Ra-226 (pCi/g)		RDC	Alpha	dpm/100 cm ²	Comments
				Non-Deconv.	Deconv.				
106	700193	00-06	OC	2.4					NAG-001; background
		00	DS	1.0					
		03	TC	3.5	3.5				Water at 33"
		09	TC	4.5	6.3				
		15	TC	4.5	5.7				DC = 0 inches
		21	TC	3.8	3.6				
		27	TC	3.2	2.5				
		33	TC	3.0	3.0				
		39	TC	2.8	2.8				

Measurement AS = Alpha Sample
Types: DH = Downhole Survey
DS = Delta Scintillometer
GB = GAD-6 Borehole
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Above Floor or Ground
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Radium Concentrations at Exterior Locations

DOE ID #GJ-45271-VL

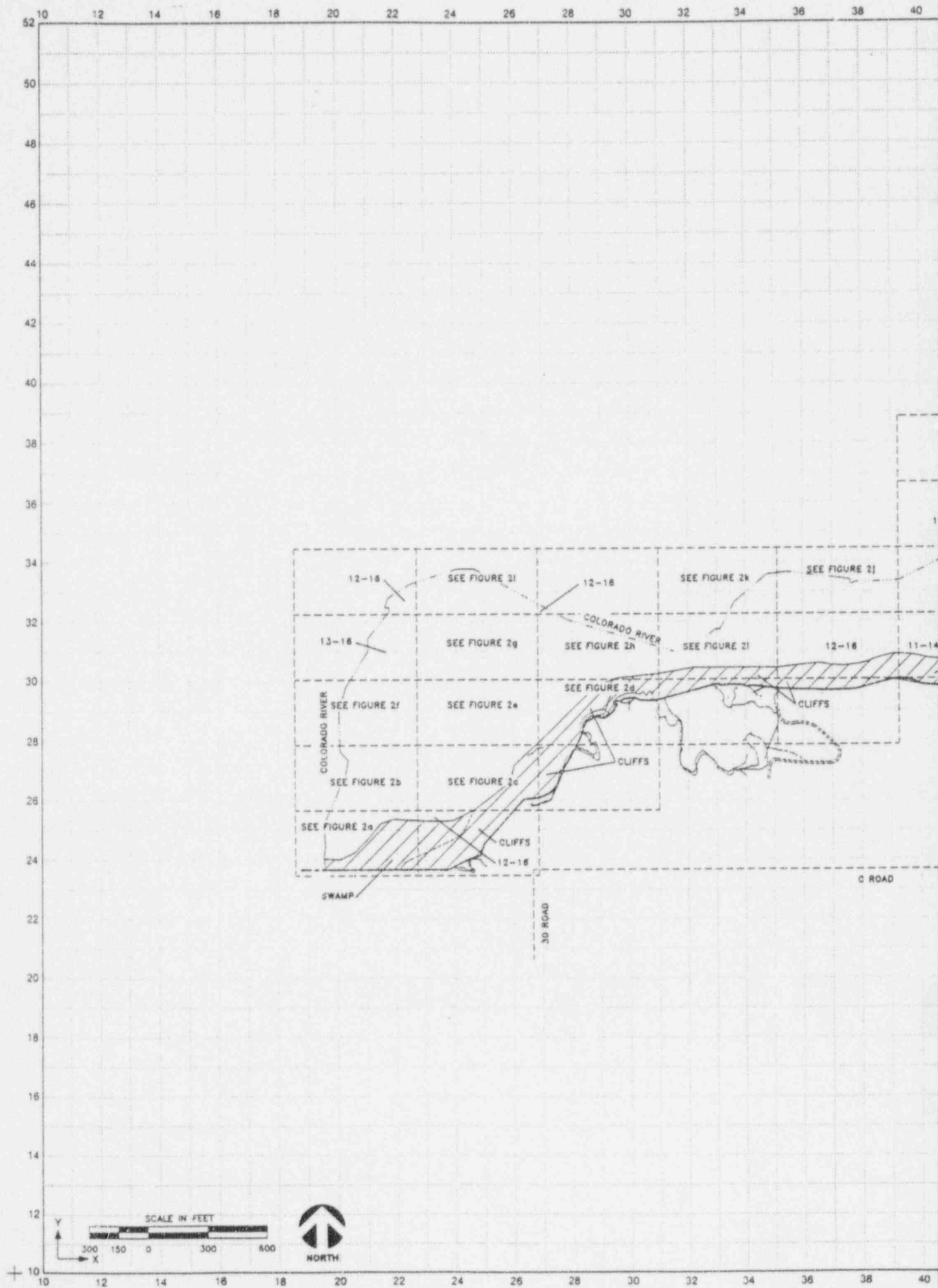
3012 C Road (River Bluff)

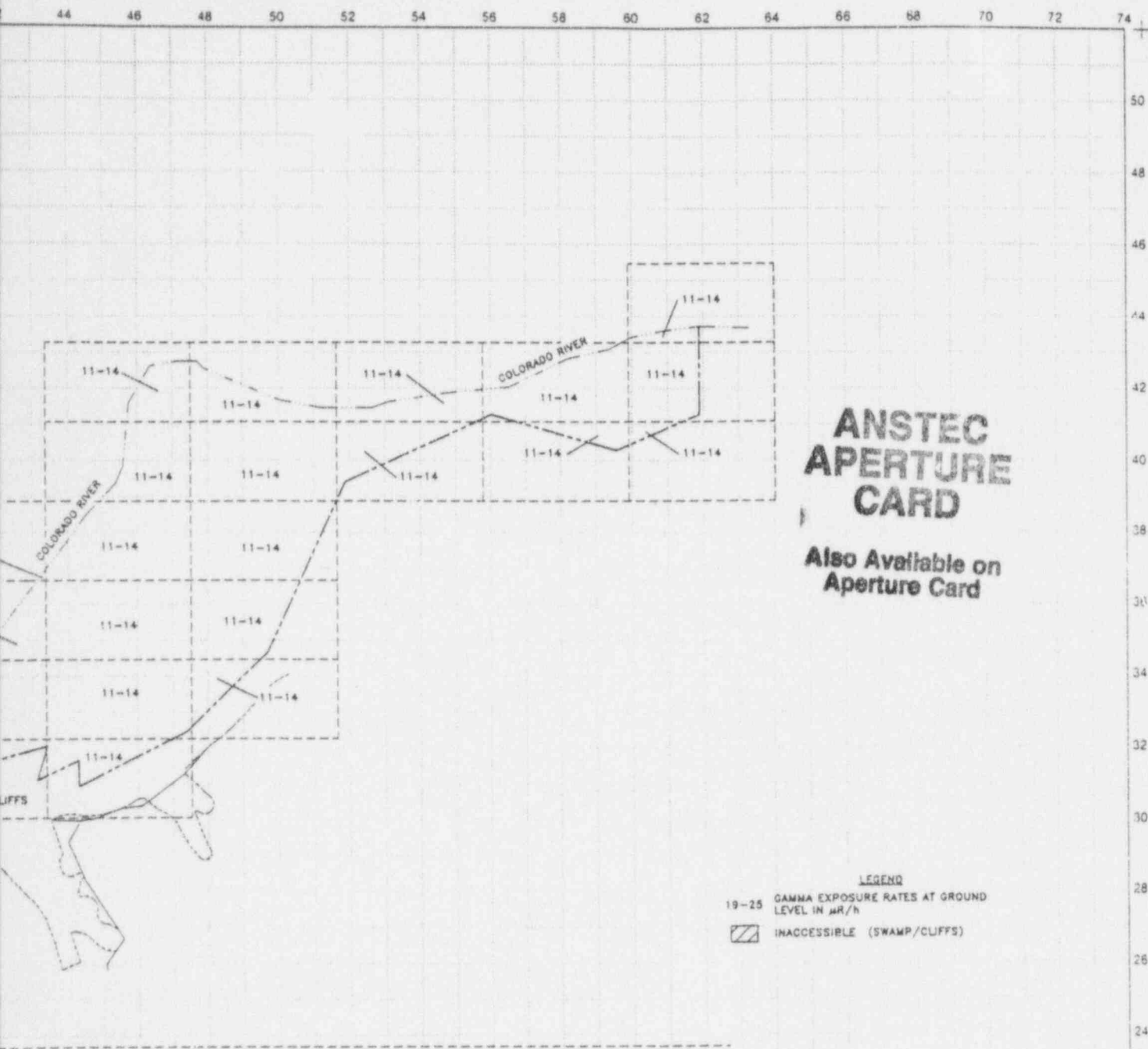
Page 1 of 1

		Ra-226 (pCi/g)		RDC	Alpha			
Loc #	Grid Location	Depth (in.)	Meas. Type	Non-Deconv.	Deconv.	Working Level	dpm/100 cm ²	Comments
107	577190	00-06	OC	2.6				NAH-146
		00	DS	3.8				Soil
		03	TC	4.1	4.1			
		06	TC	5.0	5.7			DC = 0 inches
		09	TC	5.5	5.7			
		12	TC	5.9	6.1			
		15	TC	6.2	6.6			
		18	TC	6.3	6.3			
		21	TC	6.4	6.0			
		24	TC	6.7	7.1			
		27	TC	6.8	7.2			
		30	TC	6.7	6.7			
108	580210	00	DS	2.3				Soil
		03	TC	3.7	3.7			Auger refusal
		06	TC	4.4	6.4			
		09	TC	4.0	3.1			DC = 0 inches
		12	TC	4.1	3.9			
		15	TC	4.3	4.8			
		18	TC	4.2	4.2			
		21	TC	4.1	4.1			
		24	TC	4.0	4.0			
		27	TC	3.9	3.9			

Measurement AS = Alpha Sample
Types: DH = Downhole Survey
DS = Delta Scintillometer
GB = GAD-6 Borehole
GS = GAD-6 Surface
OC = Soil Sample by Opp. Crys. Sys.
RP = Radon Profile
SS = Soil Sample by Laboratory Analysis
TC = Total Count Borehole

Notes: DC = Depth of Contamination
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**ANSTEC
APERTURE
CARD**

Also Available on
Aperture Card

LEGEND

19-25 GAMMA EXPOSURE RATES AT GROUND
LEVEL IN $\mu R/h$

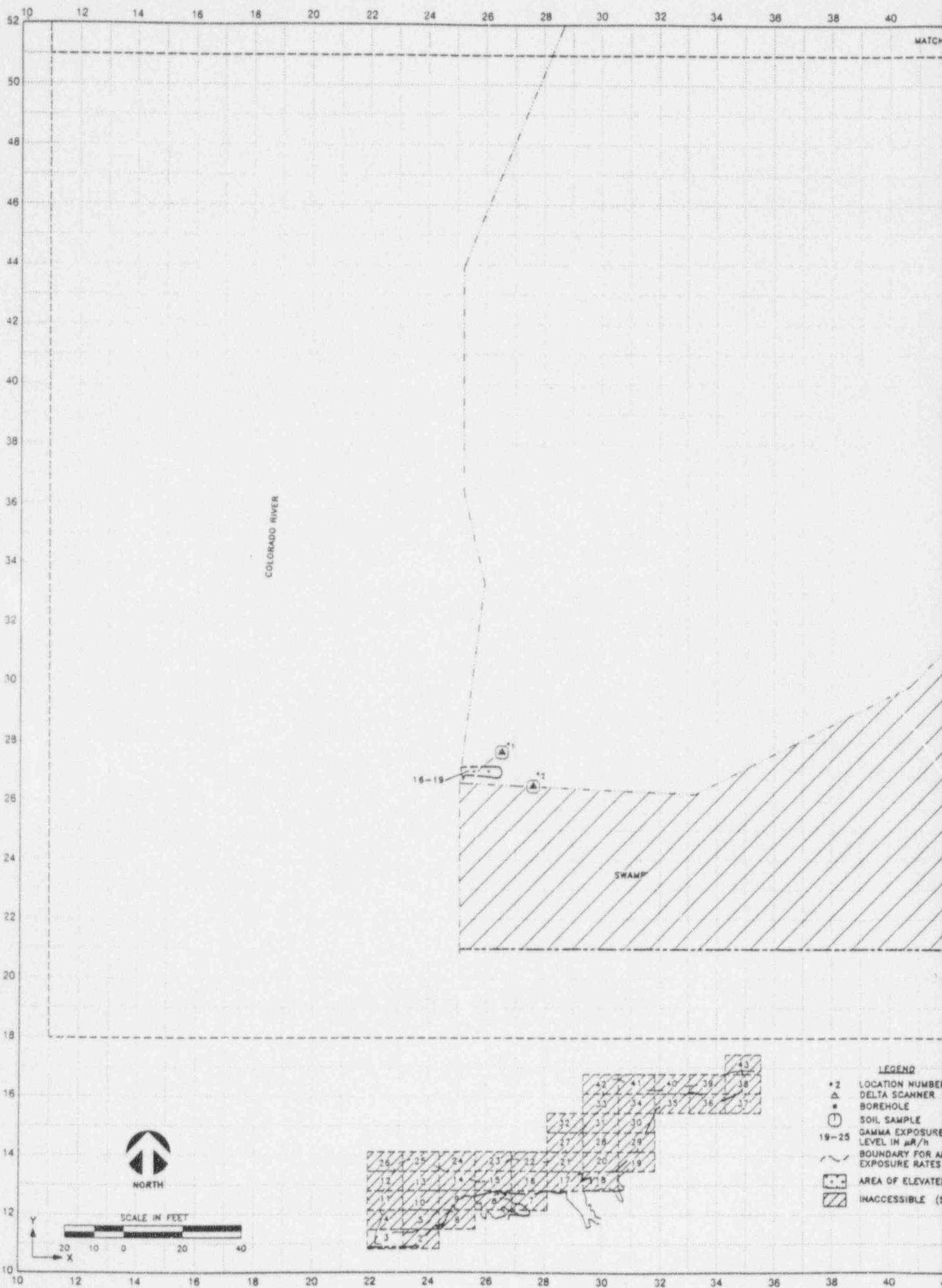
INACCESSIBLE (SWAMP/CLIFFS)

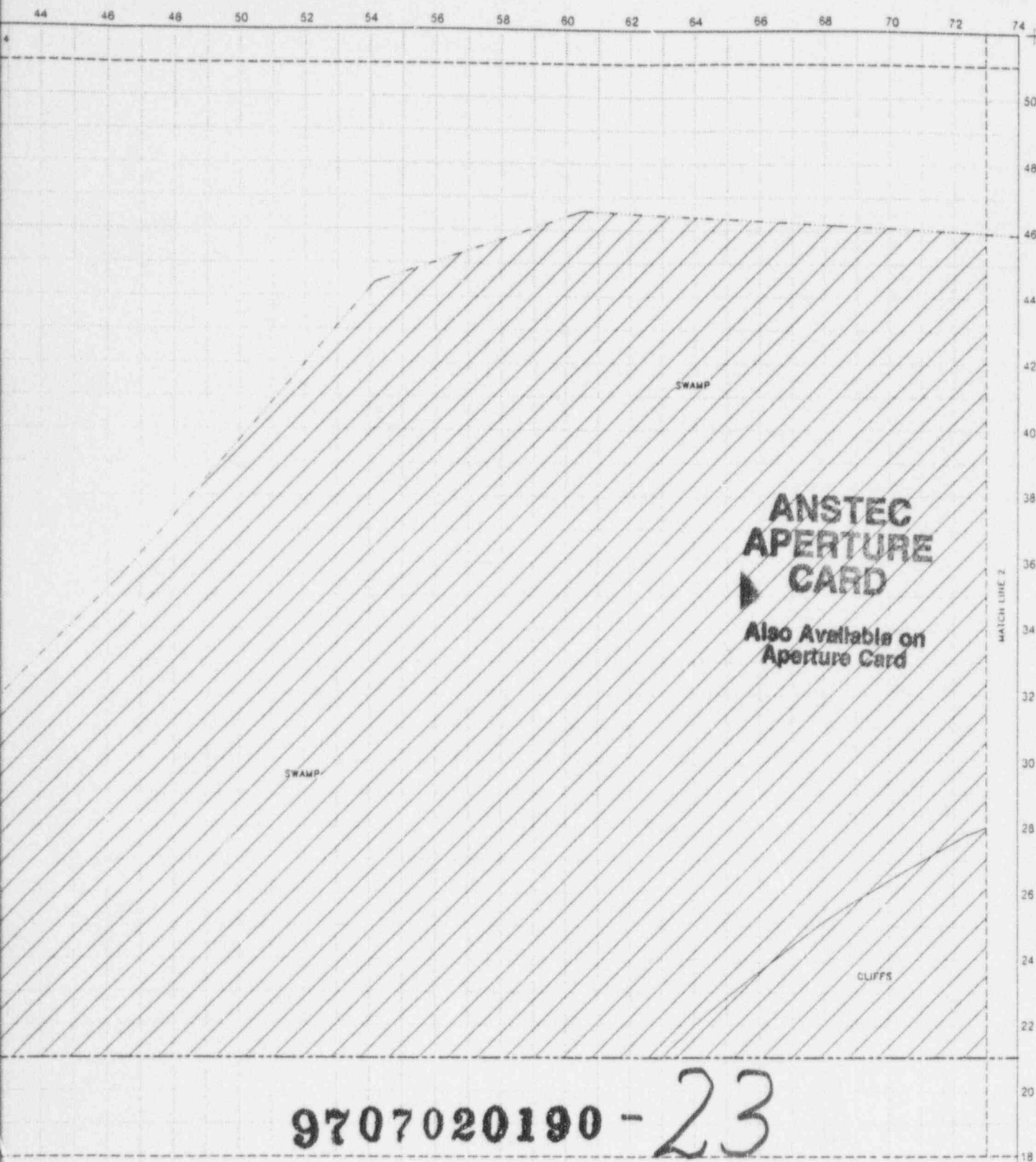
9707020190 - 22

FIGURE 1
GAMMA 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 legal
boundaries, or other future improvement lines.

NO. DATE		REVISIONS		BY	CK	A.E.	APP.	NO.	DATE	REVISIONS		BY	CK	A.E.	APP.
RESIDENCE—NO. OF OCCUPANTS				U.S. DEPARTMENT OF ENERGY GRAND JUNCTION PROJECTS OFFICE, COLORADO											
NON-RESIDENCE—MAN-HRS. WK.				DESIGNED		DATE		3012 C ROAD GRAND JUNCTION, COLORADO							
INSTRUMENT NO.		SURVEYOR		DAMN		2KR 5/91									
Prepared By		EC 6-3-91		CHECKED											
VERIFICATION		DATE		SUBMITTED		6-91		APPROVAL		DATE		APPROVAL SIGN		DATE	
SURVEY DATE		TIME		GEOLOGIC				DOE ID NO.		GJ-45271		DWB NO.		5-545271-01	
				Geotech, Inc.								BY		OF	



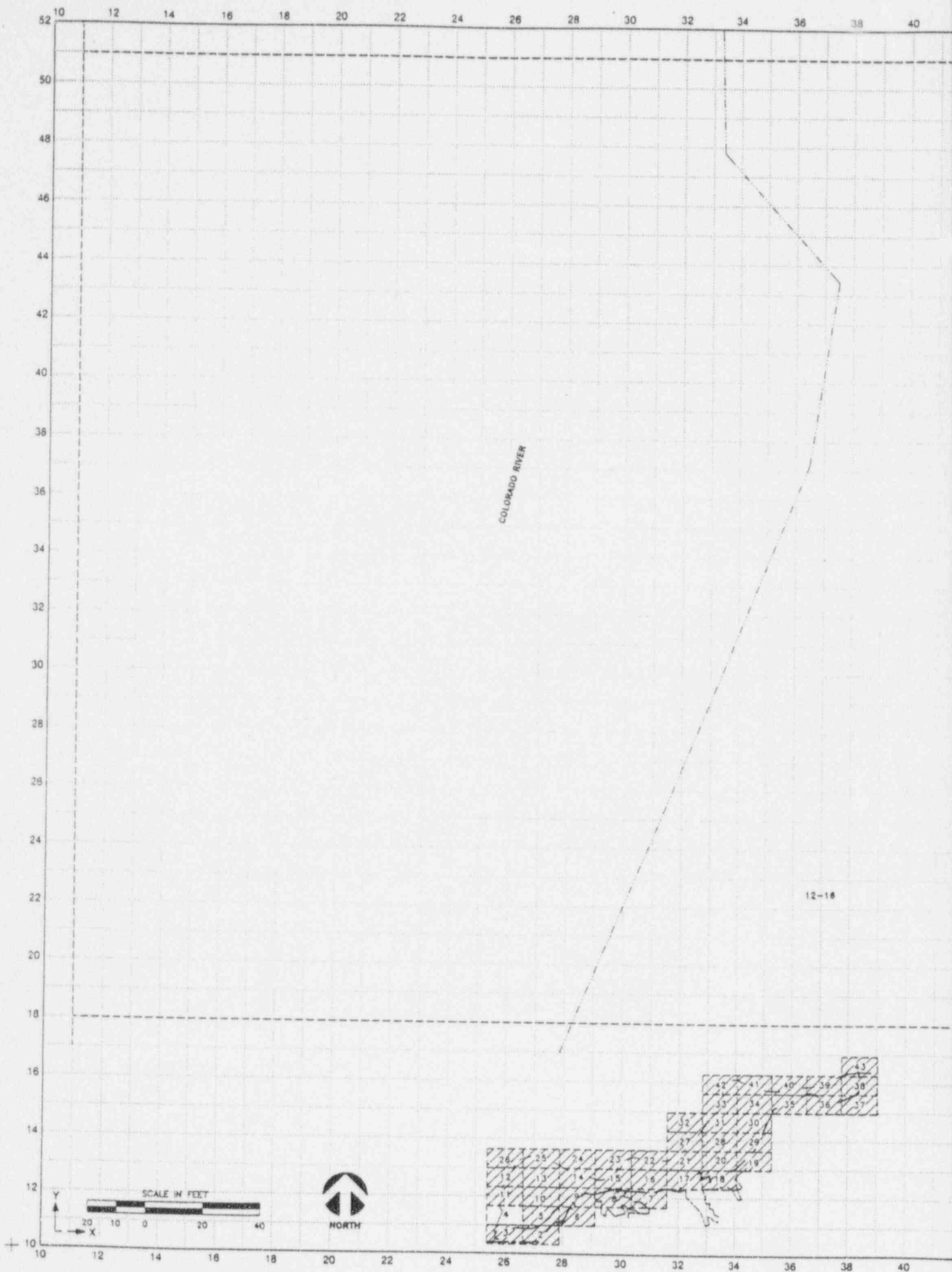


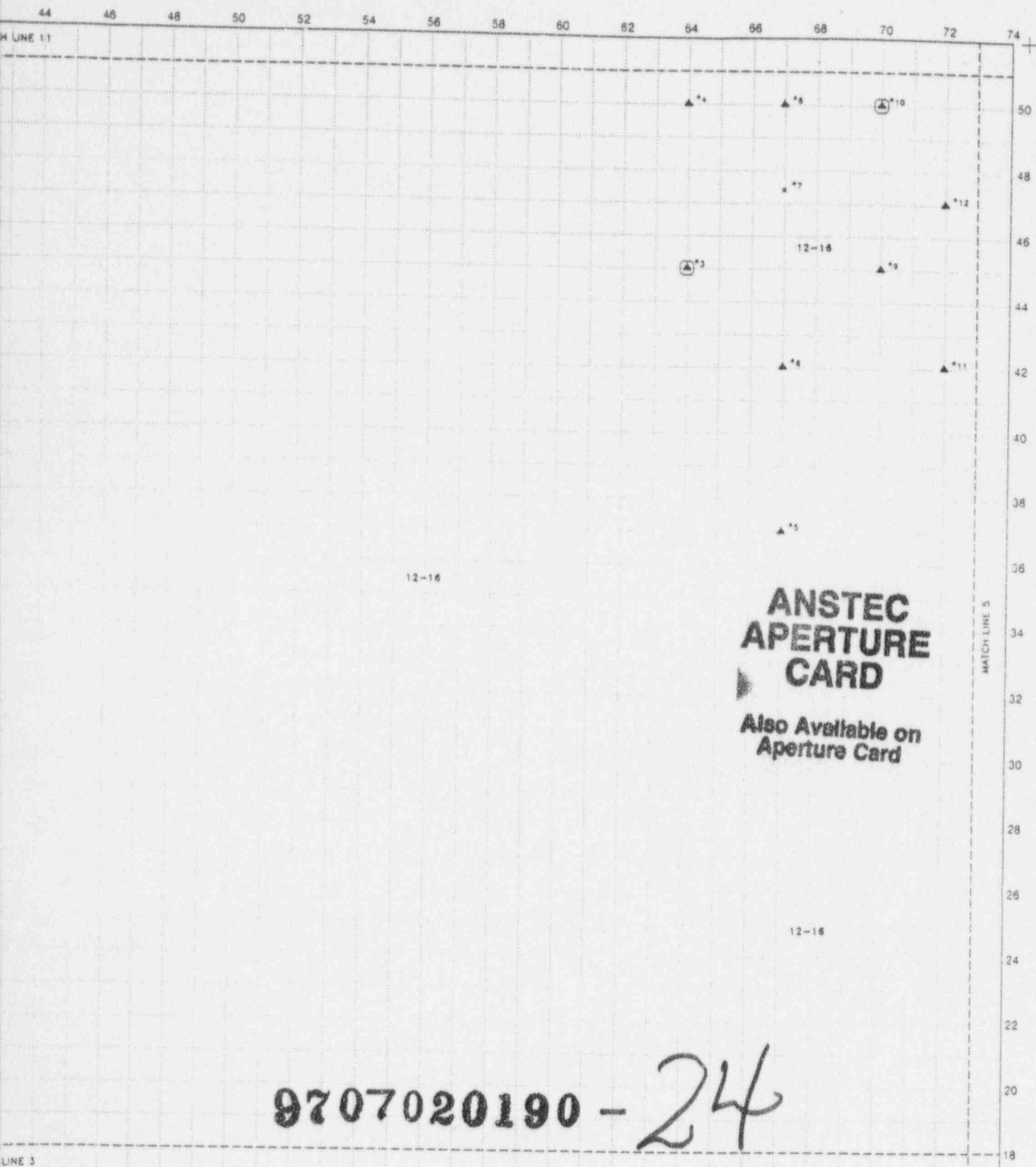
ALL GAMMA MEASUREMENTS ARE WITHIN THE RANGE OF NORMAL BACKGROUND UNLESS OTHERWISE NOTED.

FIGURE 2a
GAMMA EXPOSURE RATES/SAMPLE LOCATIONS

NO.	DATE	REVISIONS	BY	CK.	A.E.	APP.	NO.	DATE	REVISIONS	BY	CK.	A.E.	APP.
RESIDENCE - NO. OF OCCUPANTS													
NON-RESIDENCE - MAN-HRS. WK.													
<div style="display: flex; justify-content: space-between;"> <div> <p>INSTRUMENT NO. SURVEYOR</p> <p>Prepared By</p> <p>EC 6-3-91</p> </div> <div> <p>DESIGNED DATE</p> <p>DRAWN BKR 5/91</p> <p>CHECKED</p> <p>PROJ. ENG.</p> <p>SUBMITTED 5/91</p> <p>VERIFICATION DATE</p> </div> <div> <p>U.S. DEPARTMENT OF ENERGY</p> <p>GRAND JUNCTION PROJECTS OFFICE, COLORADO</p> <p>3012 C ROAD</p> <p>GRAND JUNCTION, COLORADO</p> </div> </div>													
<div style="display: flex; justify-content: space-between;"> <div> <p>DOE IS NO. SJ-43271</p> <p>SWA NO. 3-543271-02</p> </div> <div> <p>APPROVAL DATE APPROVAL DOE DATE</p> <p>Geotech, Inc.</p> </div> </div>													

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





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9707020190 - 24

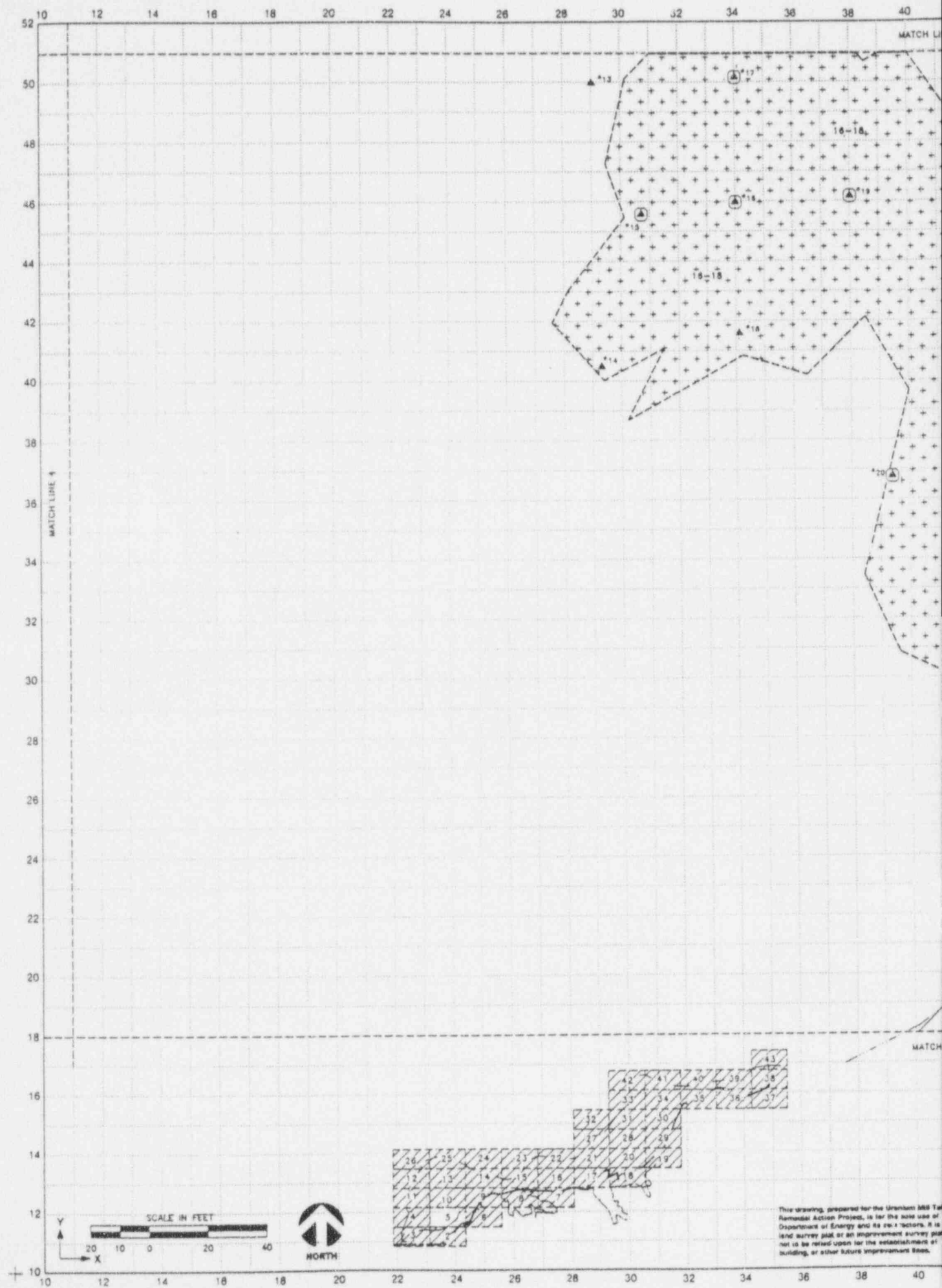
LEGEND

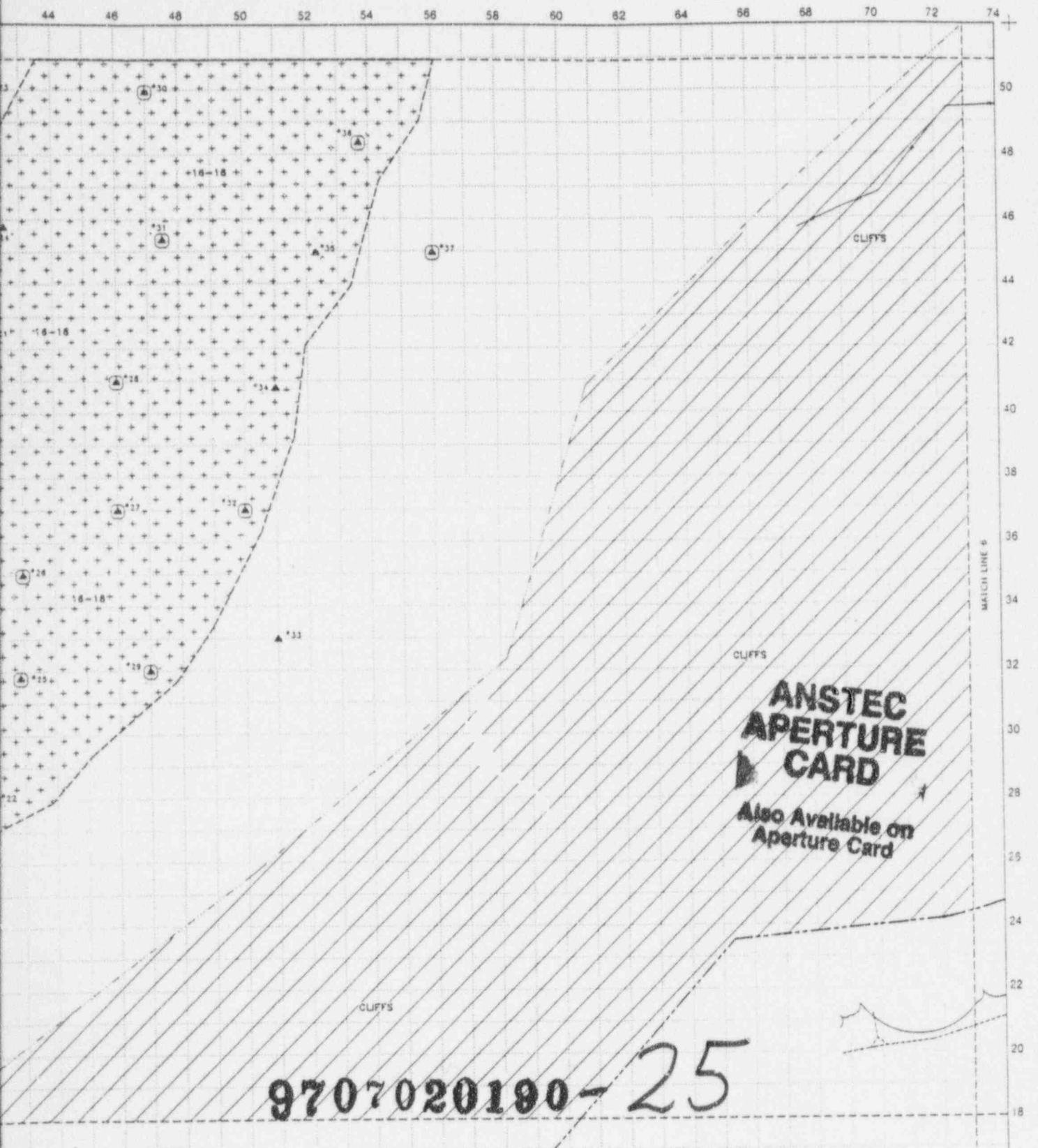
- *2 LOCATION NUMBER
- Δ DELTA SCANNER
- BOREHOLE
- SORL SAMPLE
- 19-25 GAMMA EXPOSURE RATES AT GROUND LEVEL IN $\mu R/h$

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 field survey plot or an improvement survey plot and is not to be relied upon for the establishment of fences, buildings, or other future improvement lines.

**FIGURE 2b
GAMMA EXPOSURE RATES/SAMPLE LOCATIONS**

NO. DATE		REVISIONS		BY	CK	A.E.	APP	NO.	DATE	REVISIONS		BY	CK	A.E.	APP
<p>RESIDENCE - NO. OF OCCUPANTS</p> <p>NON-RESIDENCE - HOURS, WK.</p> <p>INSTRUMENT NO. SURVEYOR</p> <p>Prepared By ELC 6-3-91</p> <p>SURVEY DATE TIME</p> <p>VERIFICATION DATE</p>															
<p>U.S. DEPARTMENT OF ENERGY GRAND JUNCTION PROJECTS OFFICE, COLORADO</p> <p>3012 C ROAD GRAND JUNCTION, COLORADO</p> <p>DESIGNED: DATE</p> <p>DRAWN: BKR 5/91</p> <p>CHECKED:</p> <p>PROJ. ENG.</p> <p>SUBMITTED: KAC 6/91</p> <p>APPROVAL: DATE</p> <p>APPROVAL DOE: DATE</p> <p>DOE ID NO. CJ-45271</p> <p>DWG. NO. 3-245271-03</p> <p>SHT. 3 OF 25</p> <p>Geotech, Inc.</p>															





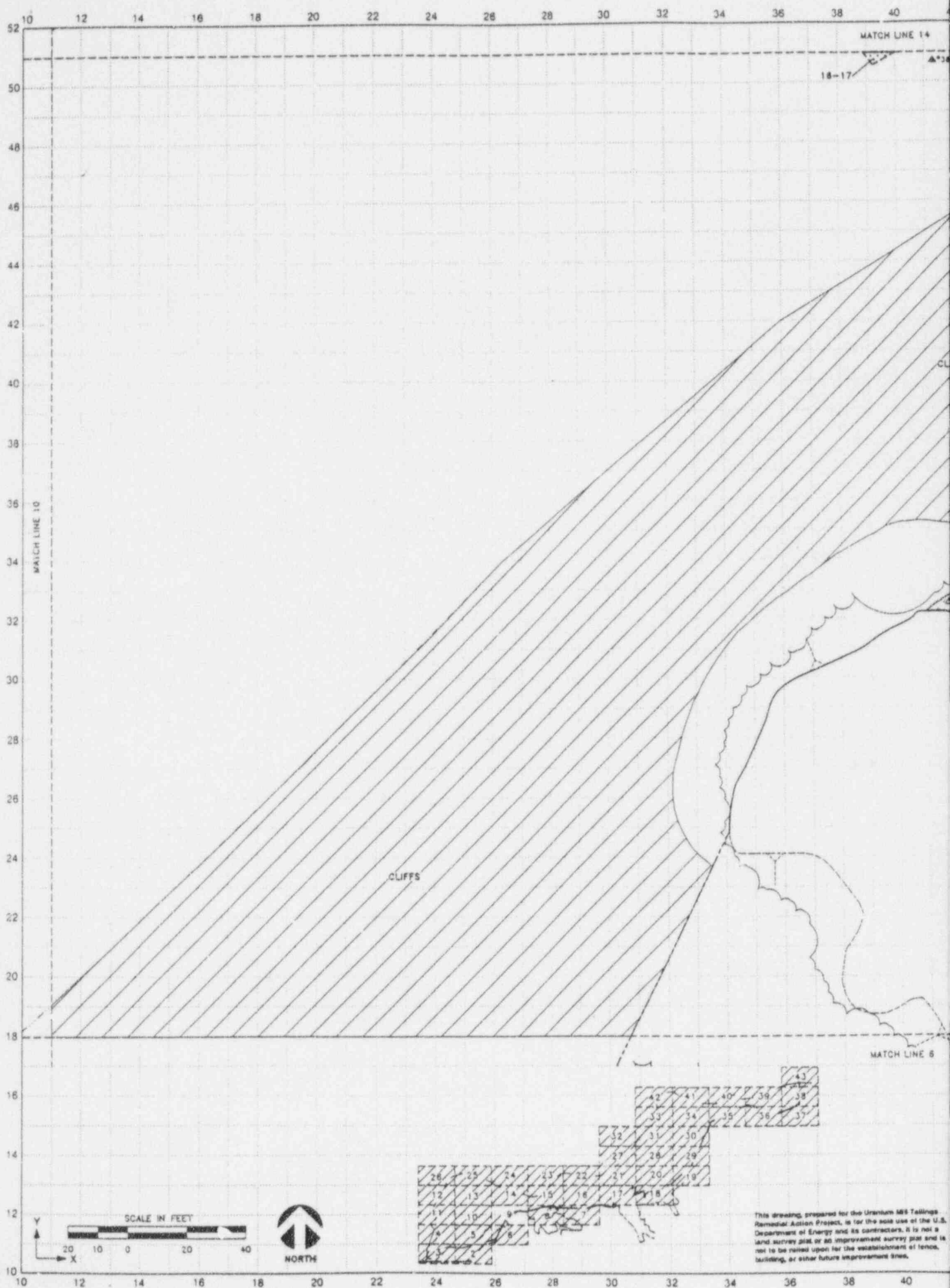
LEGEND

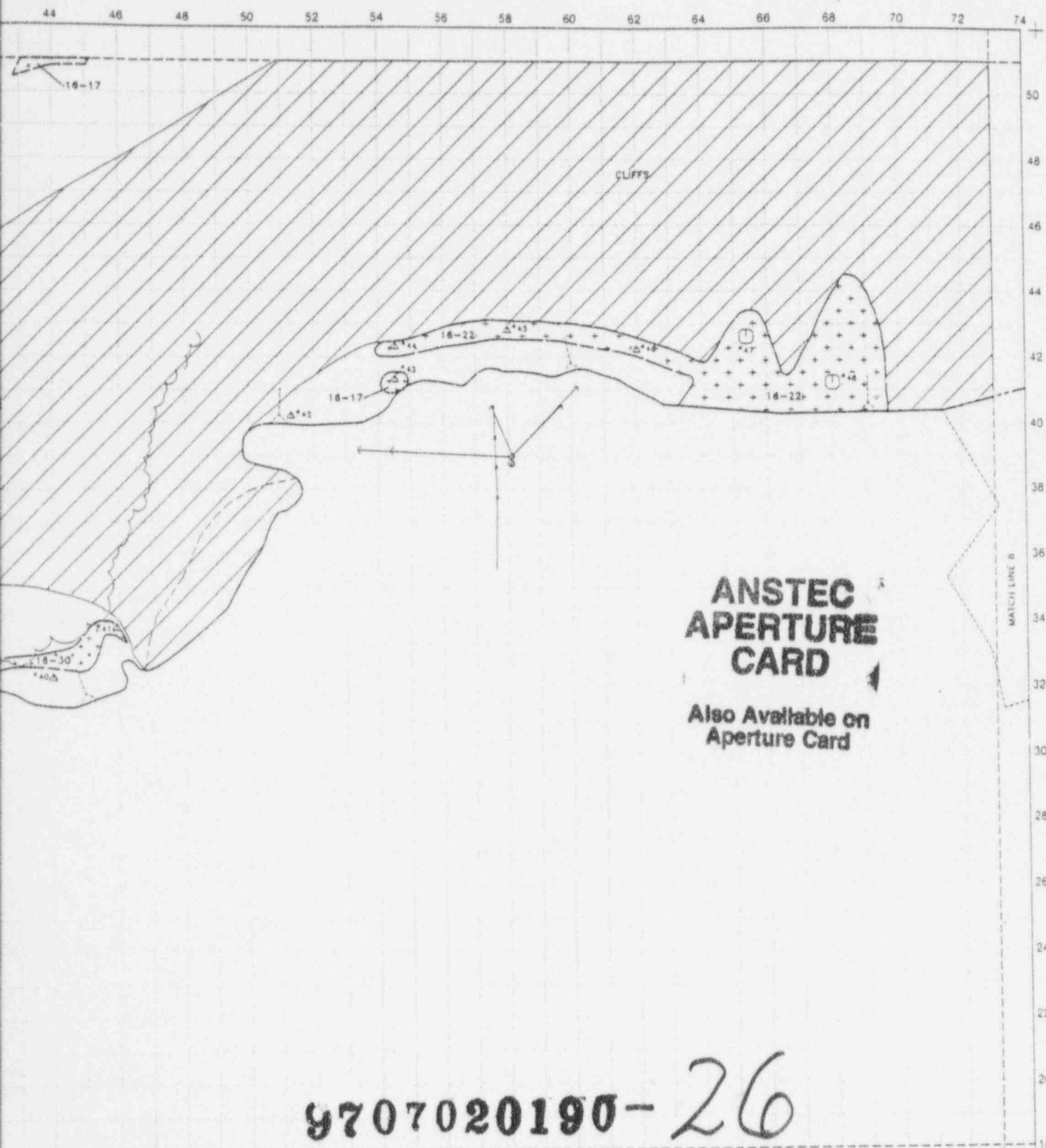
- *2 LOCATION NUMBER
- △ DELTA SCANNER
- BOREHOLE
- SOIL SAMPLE
- 19-25 GAMMA EXPOSURE RATES AT GROUND LEVEL IN $\mu\text{R}/\text{h}$
- BOUNDARY FOR AREA OF ELEVATED EXPOSURE RATES
- AREA OF ELEVATED GAMMA EXPOSURE RATES
- ▨ INACCESSIBLE (CLIFFS)

ALL GAMMA MEASUREMENTS ARE WITHIN THE RANGE OF NORMAL BACKGROUND UNLESS OTHERWISE NOTED.

FIGURE 2c
GAMMA EXPOSURE RATES/SAMPLE LOCATIONS

NO.	DATE	REVISIONS	BY	CK.	A.E.	APP.	NO.	DATE	REVISIONS	BY	CK.	A.E.	APP.
RESIDENCE—NO. OF OCCUPANTS													
NON-RESIDENCY—MAY-ARE. WK.													
<div style="display: flex; justify-content: space-between;"> <div> <p>INSTRUMENT NO. SURVEYOR</p> <p>Prepared By</p> <p>EL 6-12-91</p> </div> <div> <p>DESIGNED: DATE</p> <p>DRAWN: BKR 6/91</p> <p>CHECKED:</p> <p>PROJ. ENG.</p> <p>SUBMITTED: KAL 6/91</p> </div> <div> <p>APPROVAL</p> <p>DATE</p> <p>APPROVAL DOB</p> <p>DATE</p> </div> </div>													
<p>U.S. DEPARTMENT OF ENERGY</p> <p>GRAND JUNCTION PROJECTS OFFICE, COLORADO</p> <p>3012 G ROAD</p> <p>GRAND JUNCTION, COLORADO</p>													
<p>DRG ID NO. 04-45271</p> <p>DWG NO. 3-045271-04</p> <p>SHEET 4 OF 20</p>													
<p>Geotecn, Inc.</p>													



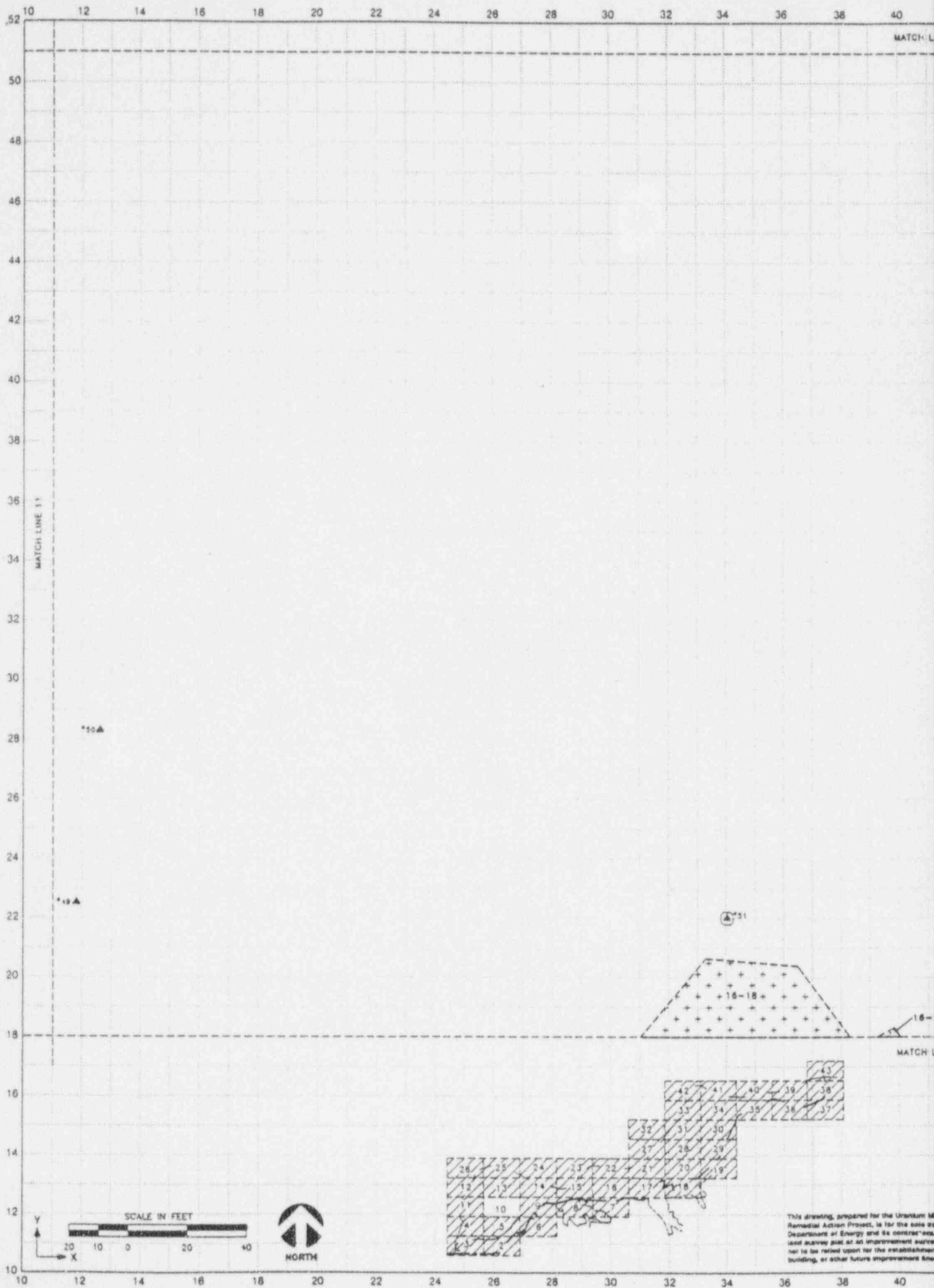


- LEGEND**
- +2 LOCATION NUMBER
 - Δ DELTA SCANNER
 - BOREHOLE
 - SOIL SAMPLE
 - 19-25 GAMMA EXPOSURE RATES AT GROUND LEVEL IN $\mu R/h$
 - BOUNDARY FOR AREA OF ELEVATED EXPOSURE RATES
 - AREA OF ELEVATED GAMMA EXPOSURE RATES
 - /// INACCESSIBLE (CLIFFS)

ALL GAMMA MEASUREMENTS ARE WITHIN THE RANGE OF NORMAL BACKGROUND UNLESS OTHERWISE NOTED.

FIGURE 2d
GAMMA EXPOSURE RATES/SAMPLE LOCATIONS

NO. DATE REVISIONS				BY CL. A.E. APP. NO. DATE REVISIONS				BY CL. A.E. APP.							
RESIDENCE--NO. OF OCCUPANTS								U.S. DEPARTMENT OF ENERGY GRAND JUNCTION PROJECTS OFFICE, COLORADO							
NON-RESIDENCE--MAX. HRS. WK.								3012 C ROAD GRAND JUNCTION, COLORADO							
INSTRUMENT NO.				SURVEYOR				DESIGNED: DATE				DATE			
Prepared By EL 6-3-91								DRAWN: BKR 5/91							
								CHECKED:							
								PROJ. ENG.							
								SUBMITTED: HAL 6/91				APPROVAL			
SURVEY DATE				TIME				DATE				APPROVAL FOR			
VERIFICATION				DATE				DATE				DATE			
								Geotech. Inc.				5 OF 20			



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ANSTEC APERTURE CARD

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MATCH LINE 9

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LEGEND

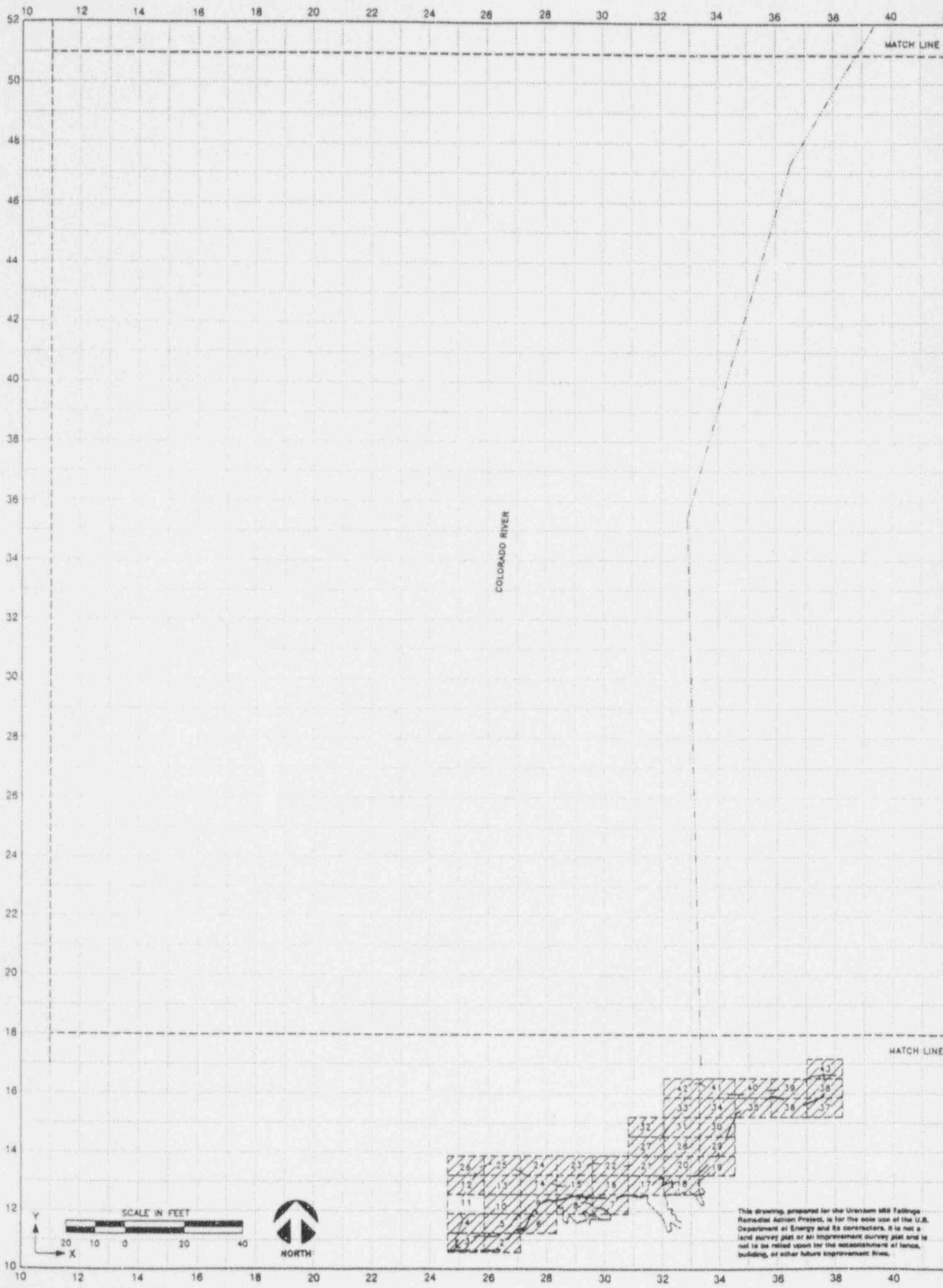
- *2 LOCATION NUMBER
- Δ DELTA SCANNER
- BOREHOLE
- SOIL SAMPLE
- 19-25 GAMMA EXPOSURE RATES AT GROUND LEVEL IN $\mu\text{R}/\text{H}$
- ~ BOUNDARY FOR AREA OF ELEVATED EXPOSURE RATES
- AREA OF ELEVATED GAMMA EXPOSURE RATES
- ▨ INACCESSIBLE (CLIFFS)

ALL GAMMA MEASUREMENTS ARE WITHIN THE RANGE OF NORMAL BACKGROUND UNLESS OTHERWISE NOTED.

FIGURE 2
GAMMA EXPOSURE RATES/SAMPLE LOCATIONS

NO.	DATE	REVISIONS	BY	CK	A.E.	APP	NO.	DATE	REVISIONS	BY	CK	A.E.	APP
RESIDENCE—NO. OF OCCUPANTS													
NON-RESIDENCE—MAGNETS, WEL													
U.S. DEPARTMENT OF ENERGY GRAND JUNCTION PROJECTS OFFICE, COLORADO													
INSTRUMENT NO.		SURVEYOR		DESIGNED		DATE		3012 C ROAD GRAND JUNCTION, COLORADO					
Prepared By		EC 6-3-91		DRAWN		BKR 5/91							
CHECKED				PROJ. ENG.									
SUBMITTED		KAC 6/91		APPROVAL		DATE		APPROVAL DOE		DATE			
SURVEY DATE		TIME		DOE IS NO.		CJ-45271		DOE NO.		3-043271-04		SMT 5 OF 10	
VERIFICATION		DATE		Geotech, Inc.									

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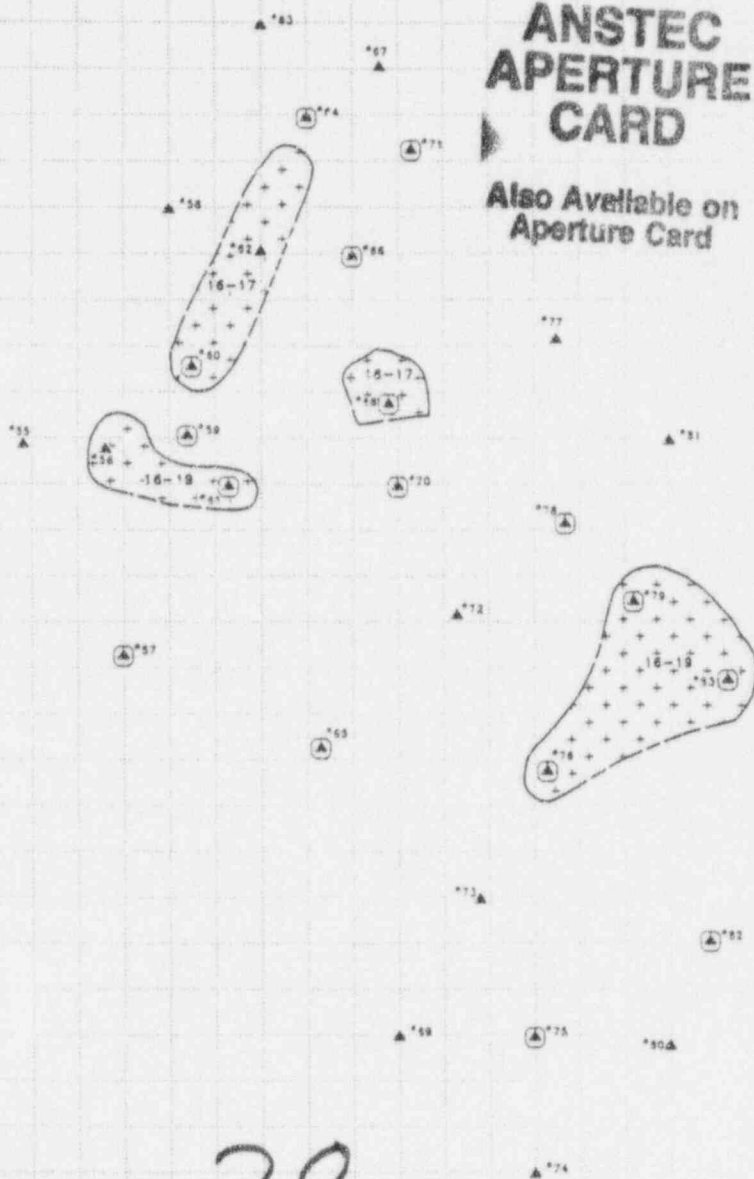
This drawing, prepared for the Uranium Mill Tailings Remedial Action Project, is for the sole use of the U.S. Department of Energy and its contractors. It is not a land survey plat or an improvement survey plat and is not to be relied upon for the establishment of lines, building, or other future improvements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

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ANSTEC APERTURE CARD

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9707020190-28

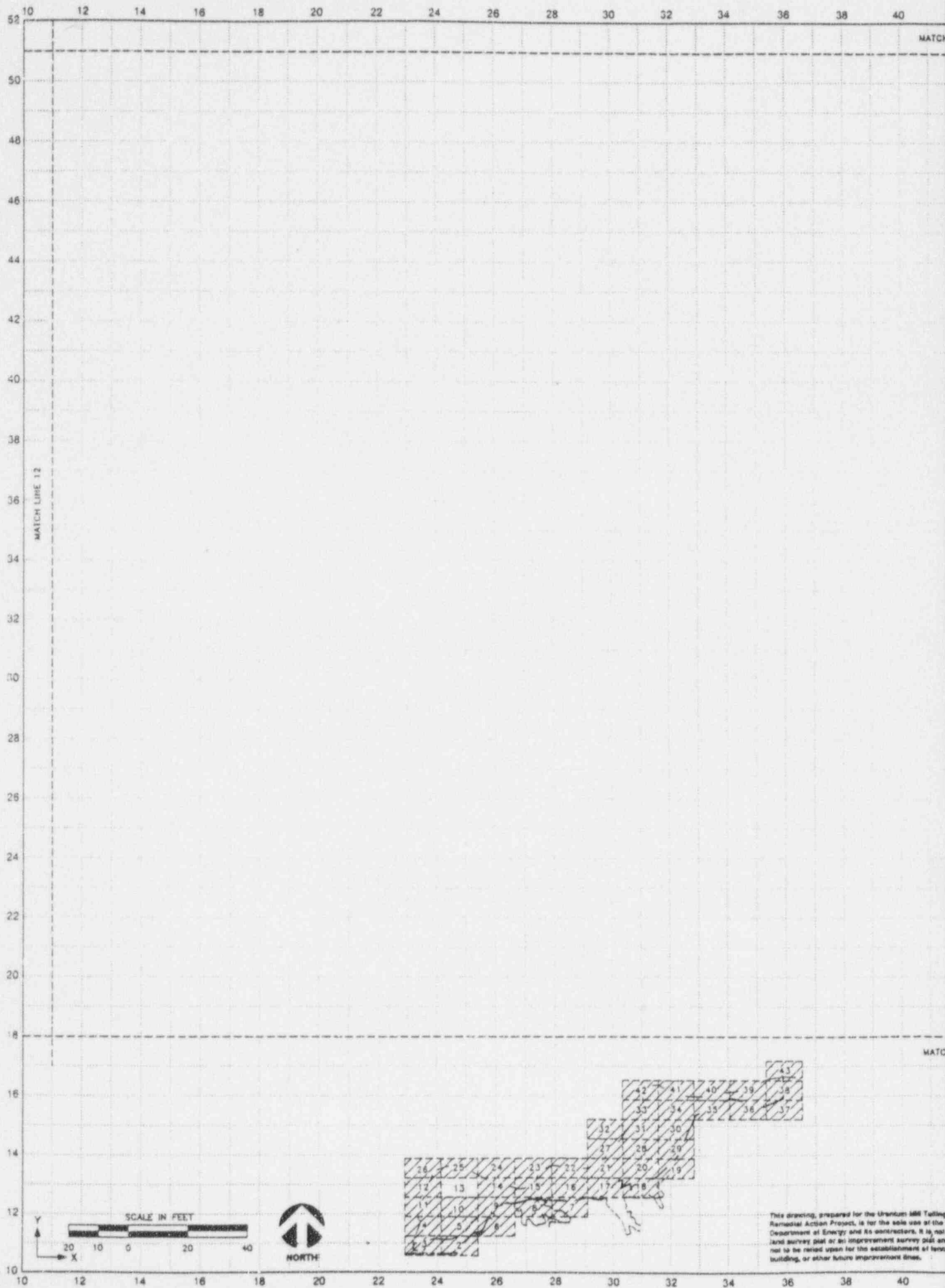
FIGURE 21
GAMMA EXPOSURE RATES/SAMPLE LOCATIONS

- LEGEND**
- *2 LOCATION NUMBER
 - Δ DELTA SCANNER
 - BOREHOLE
 - SOIL SAMPLE
 - 19-25 GAMMA EXPOSURE RATES AT GROUND LEVEL IN $\mu\text{R}/\text{h}$
 - ~ BOUNDARY FOR AREA OF ELEVATED EXPOSURE RATES
 - ☼ AREA OF ELEVATED GAMMA EXPOSURE RATES

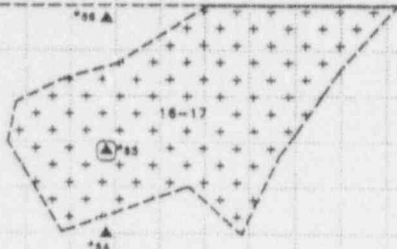
ALL GAMMA MEASUREMENTS ARE WITHIN THE RANGE OF NORMAL BACKGROUND UNLESS OTHERWISE NOTED.

NO. DATE		REVISIONS		BY	CL	A.E.	APP	NO. DATE		REVISIONS		BY	CL	A.E.	APP
RESIDENCE - NO. OF OCCUPANTS								U.S. DEPARTMENT OF ENERGY GRAND JUNCTION PROJECTS OFFICE, COLORADO							
NON-RESIDENCE - NAME(S), WL.								DESIGNED: DATE							
INSTRUMENT NO.				SURVEYOR				DRAWN: BKR 6/91				3012 C ROAD GRAND JUNCTION, COLORADO			
Prepared By EC 6-12-91				CHECKED:				DATE				DATE			
VERIFICATION				DATE				SUBMITTED: KAC 6/91				APPROVAL: DATE			
SURVEY DATE				TIME				DATE				DATE			
VERIFICATION				DATE				DATE				DATE			
Geotech, Inc.								Geotech, Inc.							
DWG. NO. 3-D43271-07								DWG. NO. 3-D43271-07							
SHT 7 OF 20								SHT 7 OF 20							

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44 46 48 50 52 54 56 58 60 62 64 66 68 70 72 74



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MATCH LINE 14



9707020190-29

LEGEND

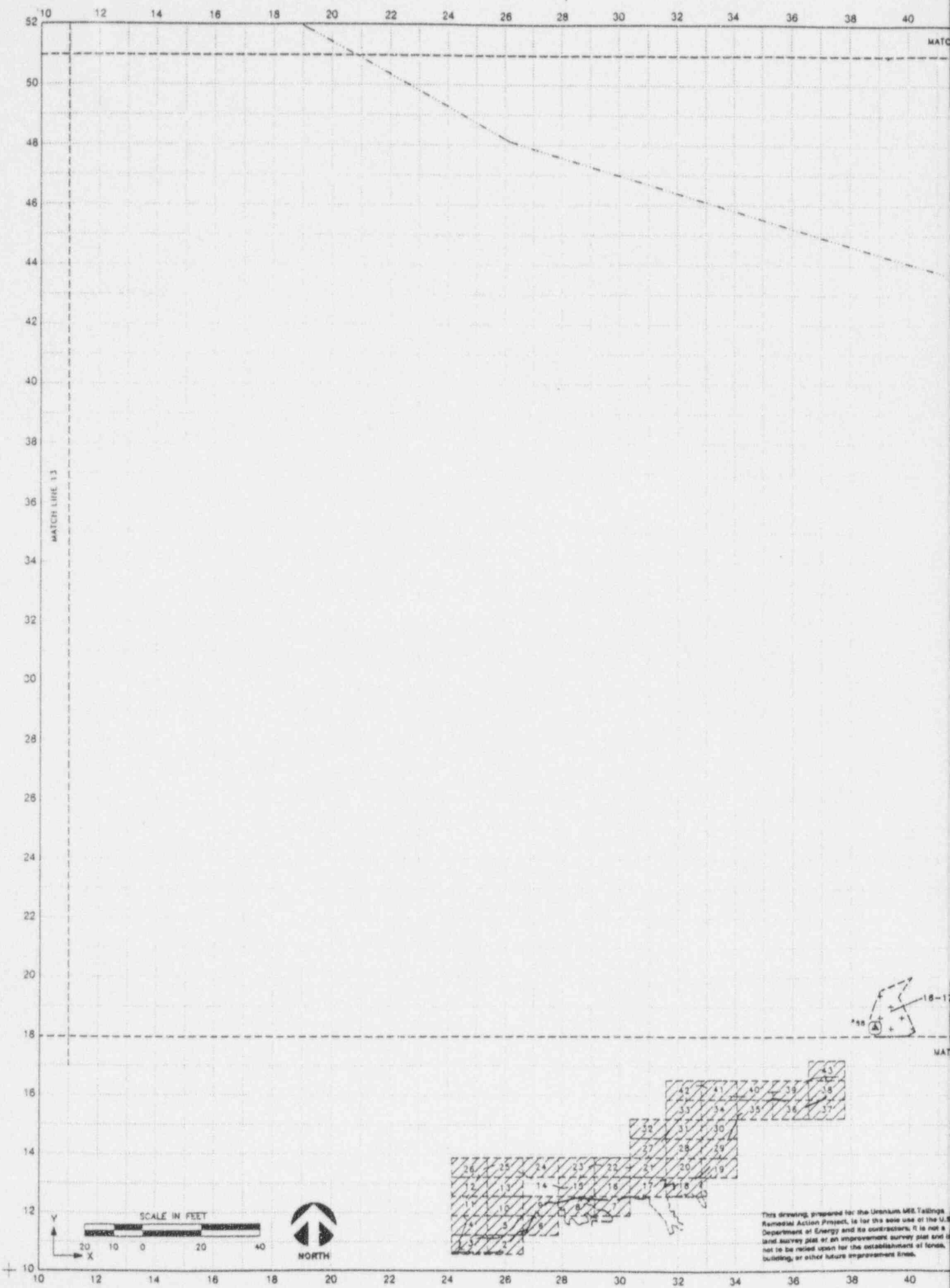
- *2 LOCATION NUMBER
- Δ DELTA SCANNER
- BOREHOLE
- SOIL SAMPLE
- 19-25 GAMMA EXPOSURE RATES AT GROUND LEVEL IN $\mu R/h$
- ~ BOUNDARY FOR AREA OF ELEVATED EXPOSURE RATES
- ✖ AREA OF ELEVATED GAMMA EXPOSURE RATES

ALL GAMMA MEASUREMENTS ARE WITHIN THE RANGE OF NORMAL BACKGROUND UNLESS OTHERWISE NOTED.

FIGURE 29
GAMMA EXPOSURE RATES/SAMPLE LOCATIONS

NO. DATE		REVISIONS		BY	CK.	A.E.	APP.	NO.	DATE	REVISIONS		BY	CK.	A.E.	APP.
RESIDENCE-NO. OF OCCUPANTS				U.S. DEPARTMENT OF ENERGY GRAND JUNCTION PROJECTS OFFICE, COLORADO											
NON-RESIDENCE-NAME-HIS/HER				DESIGNED:		DATE		3012 C ROAD GRAND JUNCTION, COLORADO							
INSTRUMENT NO.		SURVEYOR		DRAWN		5/91									
Prepared By		EC 6-3-91		CHECKED:											
SURVEY DATE		TIME		PAID ENG.											
VERIFICATION		DATE		SUBMITTED		6/91		APPROVAL		DATE		APPROVAL		DATE	
				Geotech, Inc.		5-045271-GR		5-045271-GR		5-045271-GR		5-045271-GR		5-045271-GR	

44 46 48 50 52 54 56 58 60 62 64 66 68 70 72 74



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LINE 24

COLORADO RIVER

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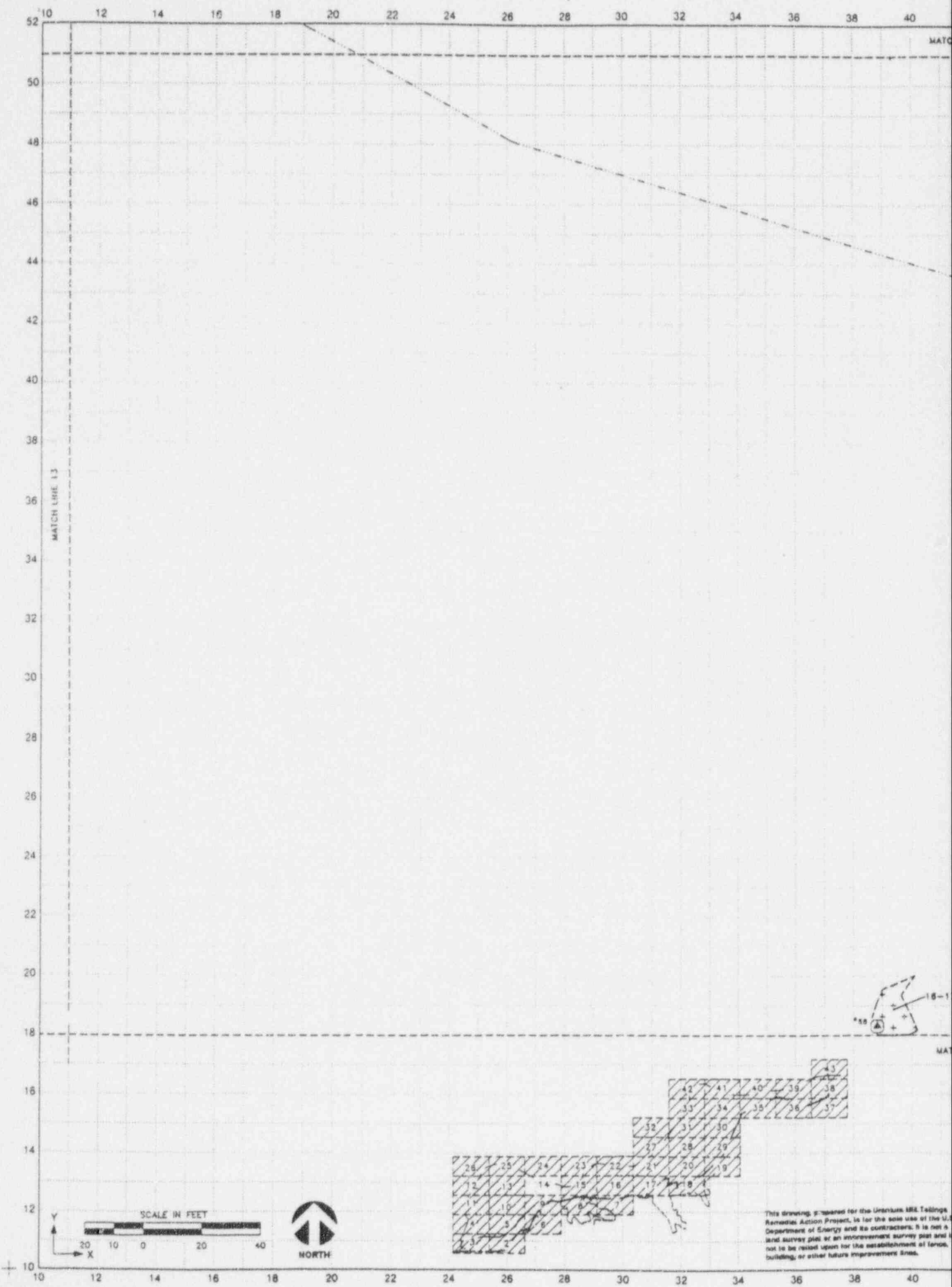
9707020190-30

MATCH LINE 15

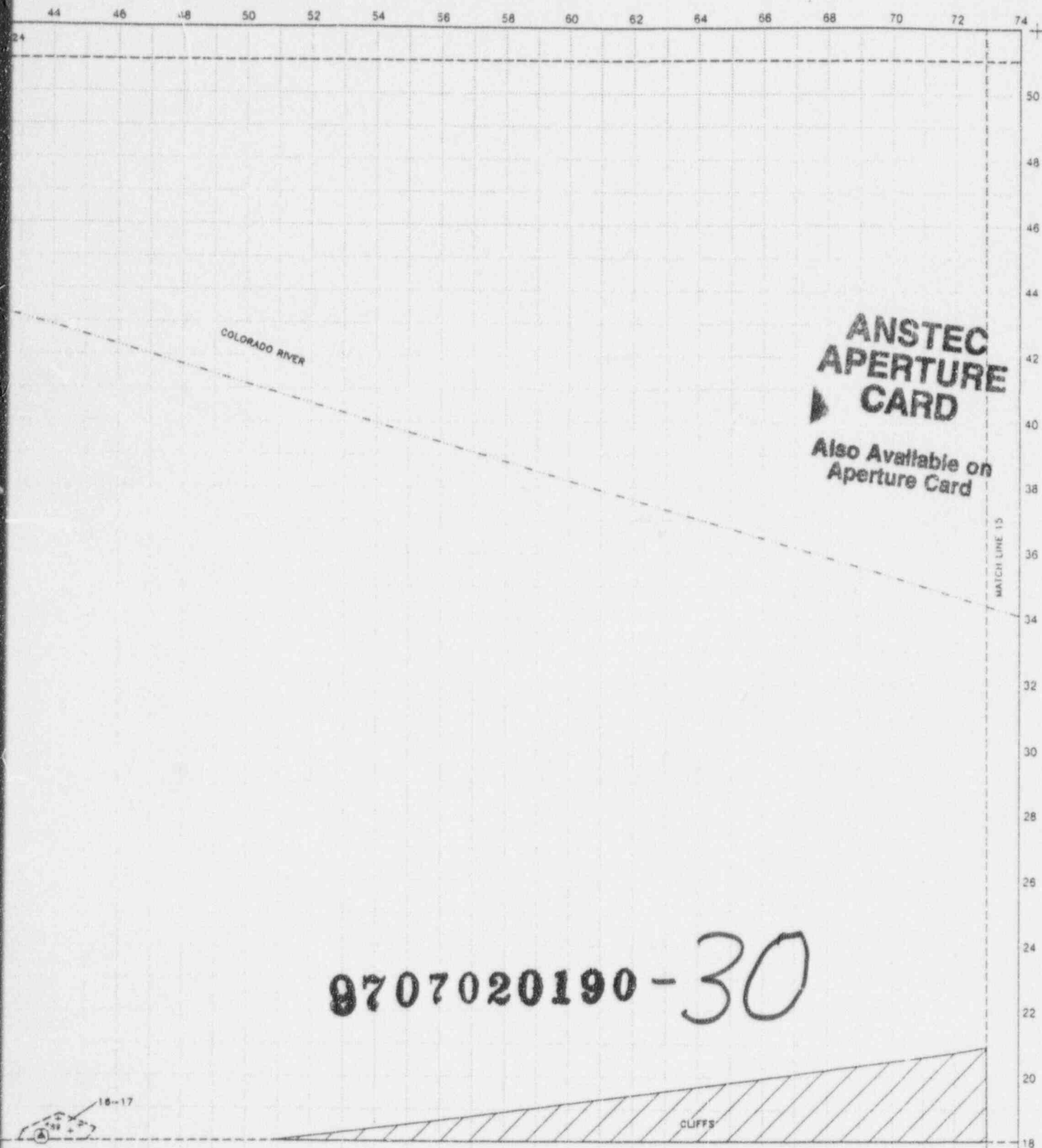
CLIFFS

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ED
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NO. DATE		REVISIONS		BY CR. A.E.		NO. DATE		REVISIONS		BY CR. A.E.	
RESIDENCE-NO. OF OCCUPANTS				GAMMA EXPOSURE RATES/SAMPLE LOCATIONS				FIGURE 2A			
NON-RESIDENCE-NO. OF OCCUPANTS				DESIGNED				U.S. DEPARTMENT OF ENERGY			
INSTRUMENT NO. SURVEYOR				CHECKED				GRAND JUNCTION PROJECTS OFFICE			
Prepared By EC 6-3-91				DATE				APR 59			
SURVEY DATE				PROJ. ENG.							
VERIFICATION											



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



**ANSTEC
APERTURE
CARD**
Also Available on
Aperture Card

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16-17

LEGEND

- *2 LOCATION NUMBER
- Δ DELTA SCANNER
- BOREHOLE
- SOIL SAMPLE
- 19-25 GAMMA EXPOSURE RATES AT GROUND LEVEL IN $\mu\text{R}/\text{h}$
- ~ BOUNDARY FOR AREA OF ELEVATED EXPOSURE RATES
- AREA OF ELEVATED GAMMA EXPOSURE RATES
- ▨ INACCESSIBLE (CLIFFS)

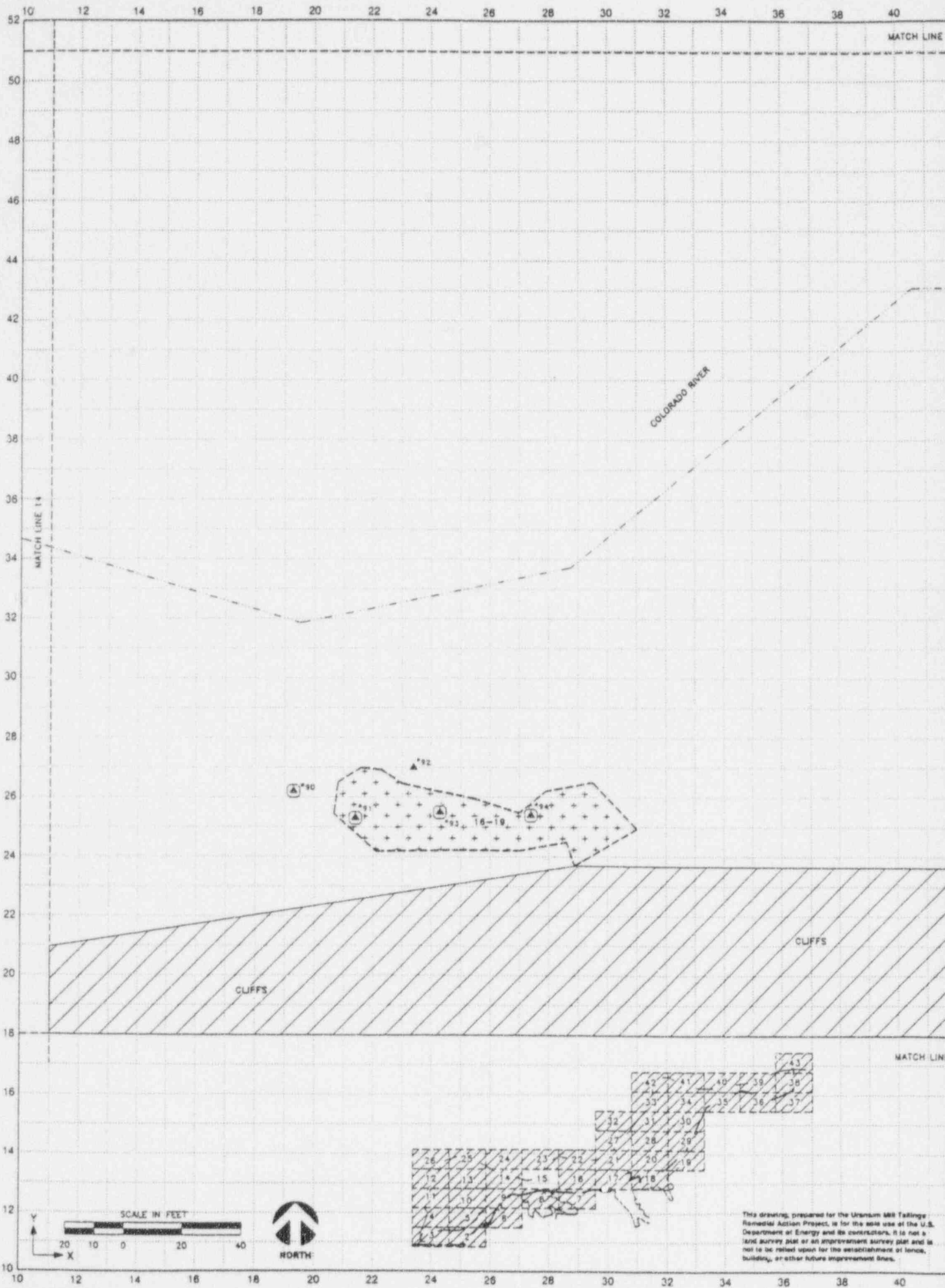
ALL GAMMA MEASUREMENTS ARE WITHIN THE RANGE OF NORMAL BACKGROUND UNLESS OTHERWISE NOTED.

FIGURE 24
GAMMA EXPOSURE RATES/SAMPLE LOCATIONS

NO.	DATE	REVISIONS	BY	CK.	A.E.	APP.	NO.	DATE	REVISIONS	BY	CK.	A.E.	APP.	
RESIDENCE—NO. OF OCCUPANTS			U.S. DEPARTMENT OF ENERGY GRAND JUNCTION PROJECTS OFFICE, COLORADO											
NON-RESIDENCE—MAN-HRS./WK.			DESIGNED		DATE		3012 C ROAD GRAND JUNCTION, COLORADO							
INSTRUMENT NO.			SURVEYOR		DRAWN		CHECKED		SUBMITTED					
Prepared By EL 6-3-91			MAR		6/91		APPROVAL		DATE		APPROVAL DOE		DATE	
SURVEY DATE			TIME		GEOLOGIC NO.		DOE ID NO.		DOE ID NO.		DOE ID NO.		DOE ID NO.	
VERIFICATION			DATE		GEOLOGIC NO.		DOE ID NO.		DOE ID NO.		DOE ID NO.		DOE ID NO.	

Geotech, Inc.

DOE ID NO. GJ-45271
DOE ID NO. 3-045271-09



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

ANSTEC APERTURE CARD

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9707020190-31



LEGEND

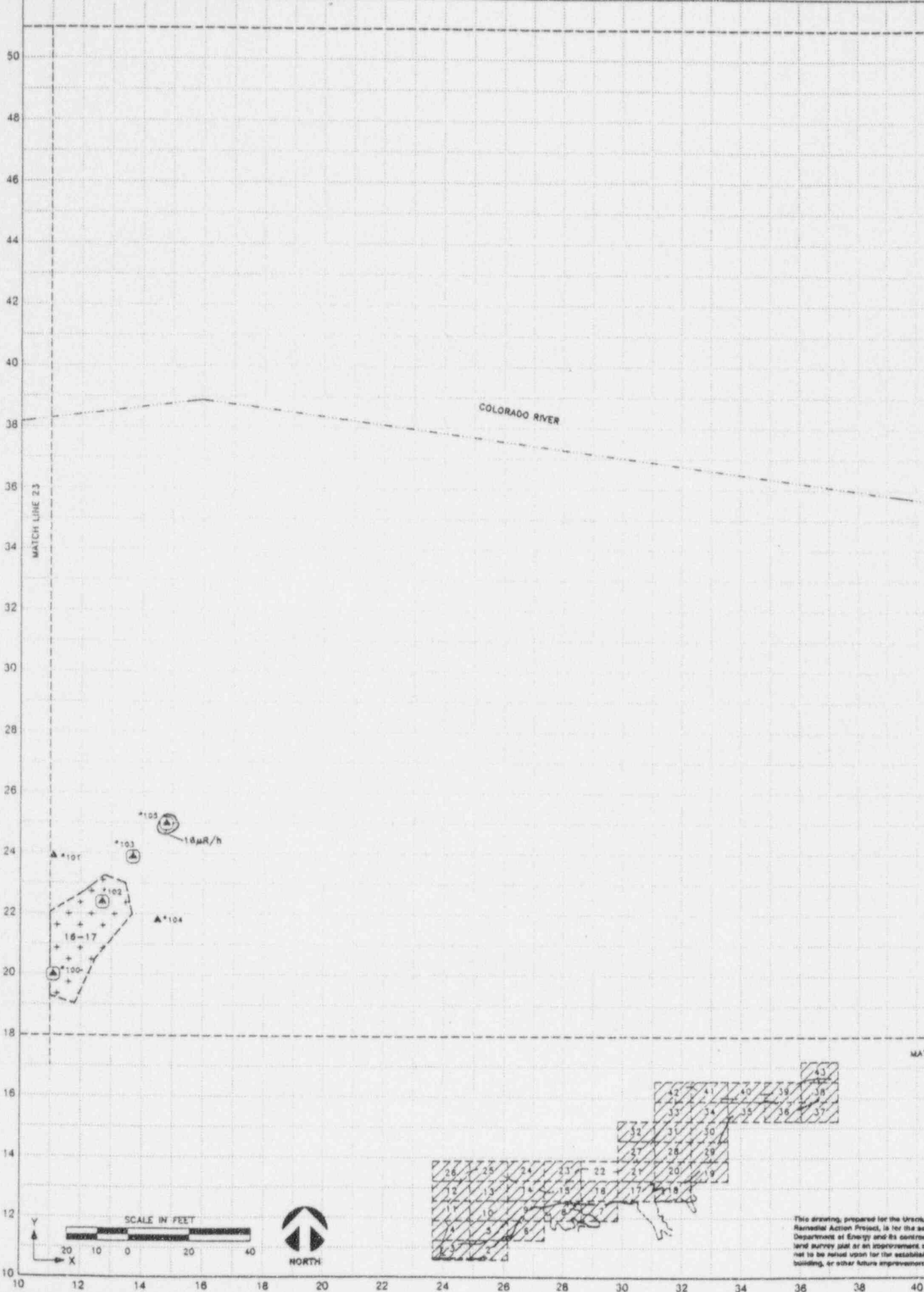
- *2 LOCATION NUMBER
- Δ DELTA SCANNER
- BOREHOLE
- SOIL SAMPLE
- 19-25 GAMMA EXPOSURE RATES AT GROUND LEVEL IN $\mu R/h$
- BOUNDARY FOR AREA OF ELEVATED EXPOSURE RATES
- AREA OF ELEVATED GAMMA EXPOSURE RATES
- ▨ INACCESSIBLE (CLIFFS)

ALL GAMMA MEASUREMENTS ARE WITHIN THE RANGE OF NORMAL BACKGROUND UNLESS OTHERWISE NOTED.

FIGURE 21
GAMMA EXPOSURE RATES/SAMPLE LOCATIONS

NO. DATE		REVISIONS		BY		CK.		A.E.		APP.		NO. DATE		REVISIONS		BY		CK.		A.E.		APP.	
U.S. DEPARTMENT OF ENERGY GRAND JUNCTION PROJECTS OFFICE, COLORADO																							
INSTRUMENT NO. SURVEYOR												DESIGNED DATE											
Prepared By EC 6-12-91												DRAWN BKR 6/91											
SURVEY DATE TIME												CHECKED											
VERIFICATION DATE												FIELD ENG.											
												SUBMITTED 5/91											
												APPROVAL DATE APPROVAL DOE DATE											
												DOE IS NO. 3012 C ROAD											
												GRAND JUNCTION, COLORADO											
												DWS NO. 3-045171-010											
												SHEET 10 OF 20											
												Geotech, Inc.											

10 12 14 16 18 20 22 24 26 28 30 32 34 36 38 40



This drawing, prepared for the Uranium Mill Tailings Remedial Action Project, is for the sole use of the 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 land, building, or other future improvements.

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ANSTEC APERTURE CARD

Also Available on
Aperture Card

COLORADO RIVER

MATCH LINE 21

9707020190-32

LEGEND

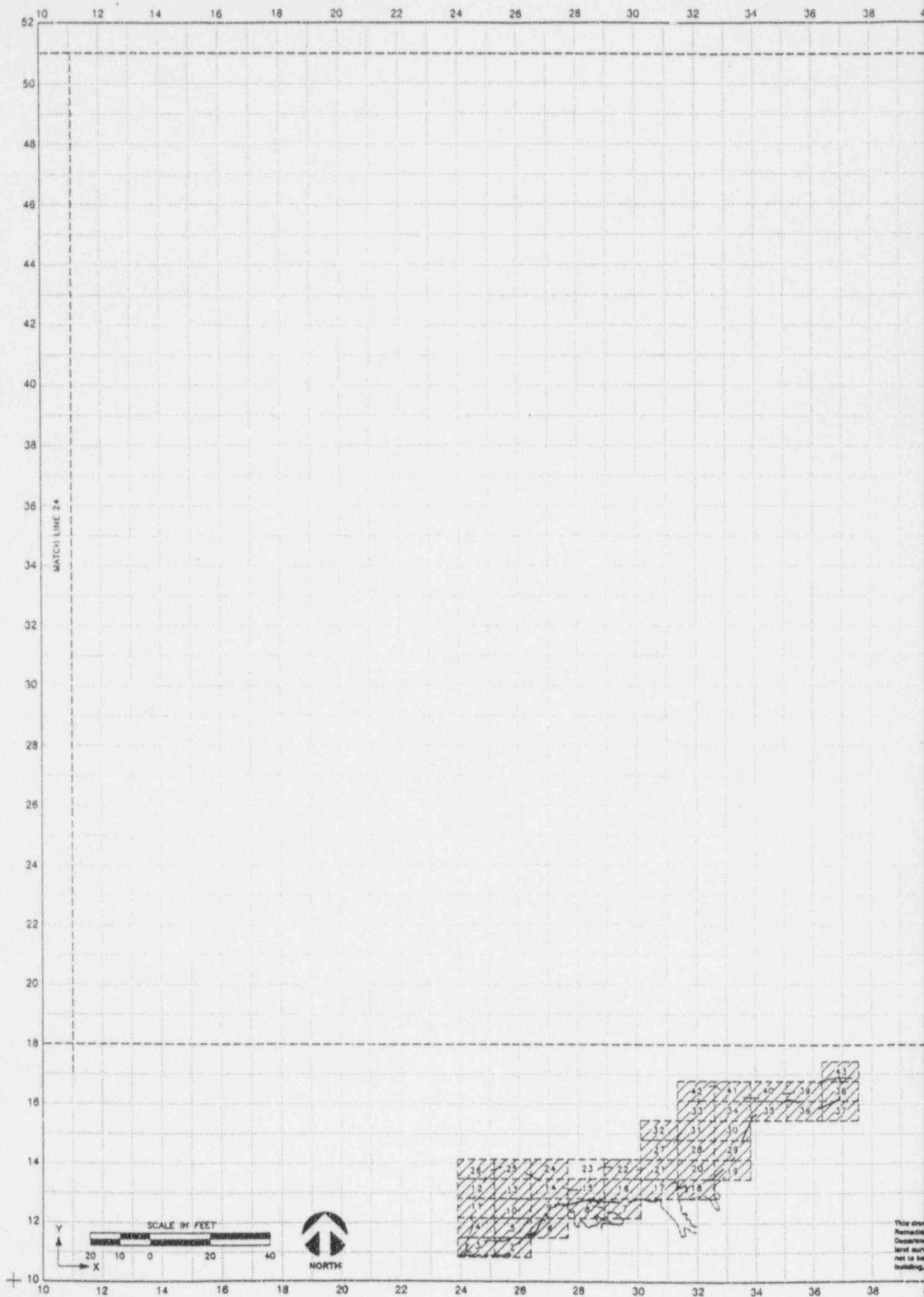
- 2 LOCATION NUMBER
- Δ DELTA SCANNER
- BOREHOLE
- SOIL SAMPLE
- 19-25 GAMMA EXPOSURE RATES AT GROUND LEVEL IN $\mu\text{R}/\text{h}$
- BOUNDARY FOR AREA OF ELEVATED EXPOSURE RATES
- • AREA OF ELEVATED GAMMA EXPOSURE RATES

ALL GAMMA MEASUREMENTS ARE WITHIN THE RANGE OF NORMAL BACKGROUND UNLESS OTHERWISE NOTED.

FIGURE 21
GAMMA EXPOSURE RATES/SAMPLE LOCATIONS

NO.	DATE	REVISIONS	BY	CK.	A.E.	APP.	NO.	DATE	REVISIONS	BY	CK.	A.E.	APP.
RESIDENCE—NO. OF OCCUPANTS													
U.S. DEPARTMENT OF ENERGY GRAND JUNCTION PROJECTS OFFICE, COLORADO													
NON-RESIDENCE—MAR./MIL. USE													
INSTRUMENT NO.		SURVEYOR		DESIGNED		DATE		3012 C ROAD GRAND JUNCTION, COLORADO					
Prepared By EL 6-3-91		DRAWN BKR 5/91		CHECKED									
				PROJ. ENG.									
SURVEY DATE		TIME		SUBMITTED KAC		6/91		APPROVAL		DATE		APPROVAL DATE	
VERIFICATION		DATE											
<div style="display: flex; justify-content: space-between;"> Geotech, Inc. DOW ID NO. 61-45271 DOW NO. 3-043271-011 </div>													

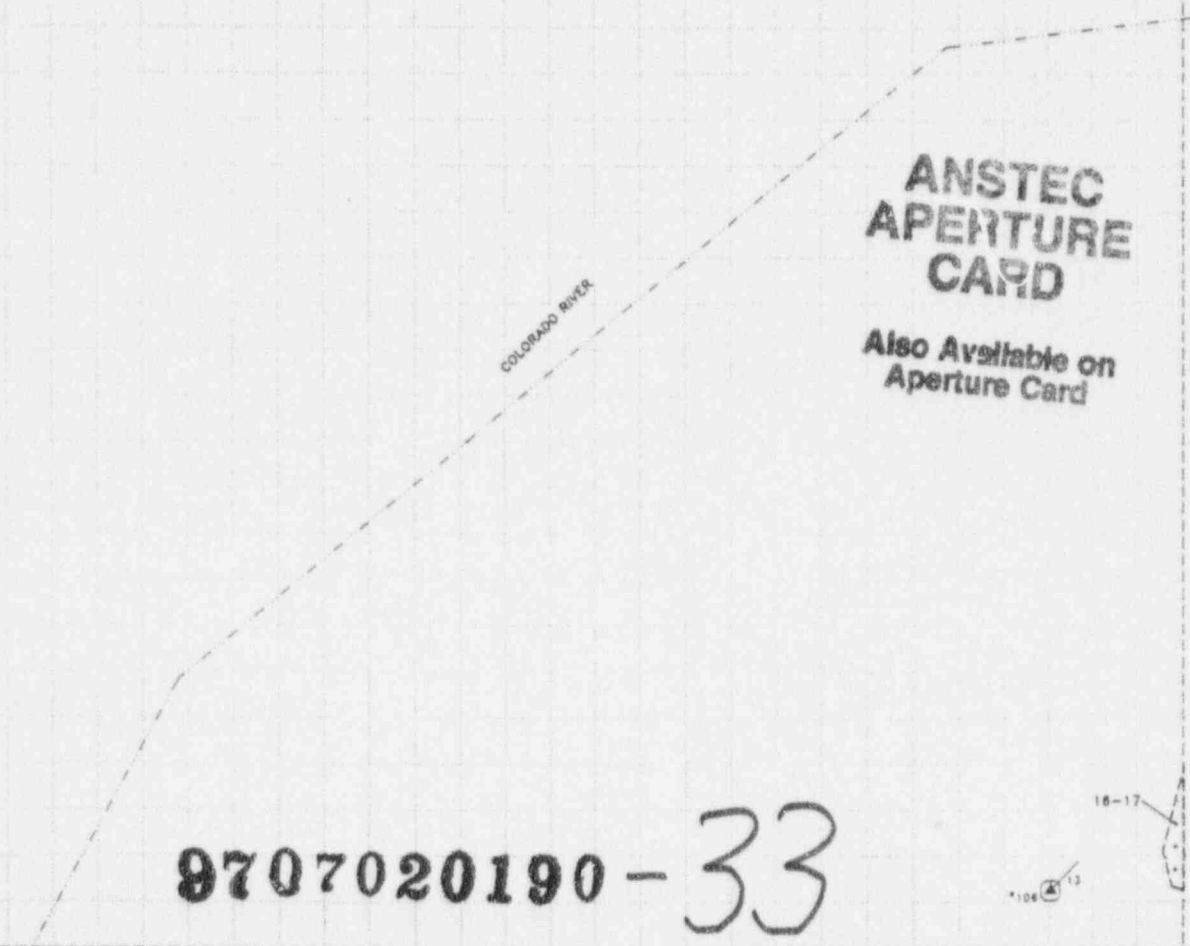
44 46 48 50 52 54 56 58 60 62 64 66 68 70 72 74



This drawing
Remains
Open to
be
used
in
the
future.

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APERTURE
CARD**

Also Available on
Aperture Card

9707020190-33

LINE 15

- LEGEND**
- #2 LOCATION NUMBER
 - Δ DELTA SCANNER
 - BOREHOLE
 - SOIL SAMPLE
 - / 16 GAMMA EXPOSURE RATE AT GROUND LEVEL
 - 19-25 ALL READINGS IN $\mu R/h$
 - 19-25 GAMMA EXPOSURE RATES AT GROUND LEVEL IN $\mu R/h$
 - ~ BOUNDARY FOR AREA OF ELEVATED EXPOSURE RATES
 - ☐ AREA OF ELEVATED GAMMA EXPOSURE RATES

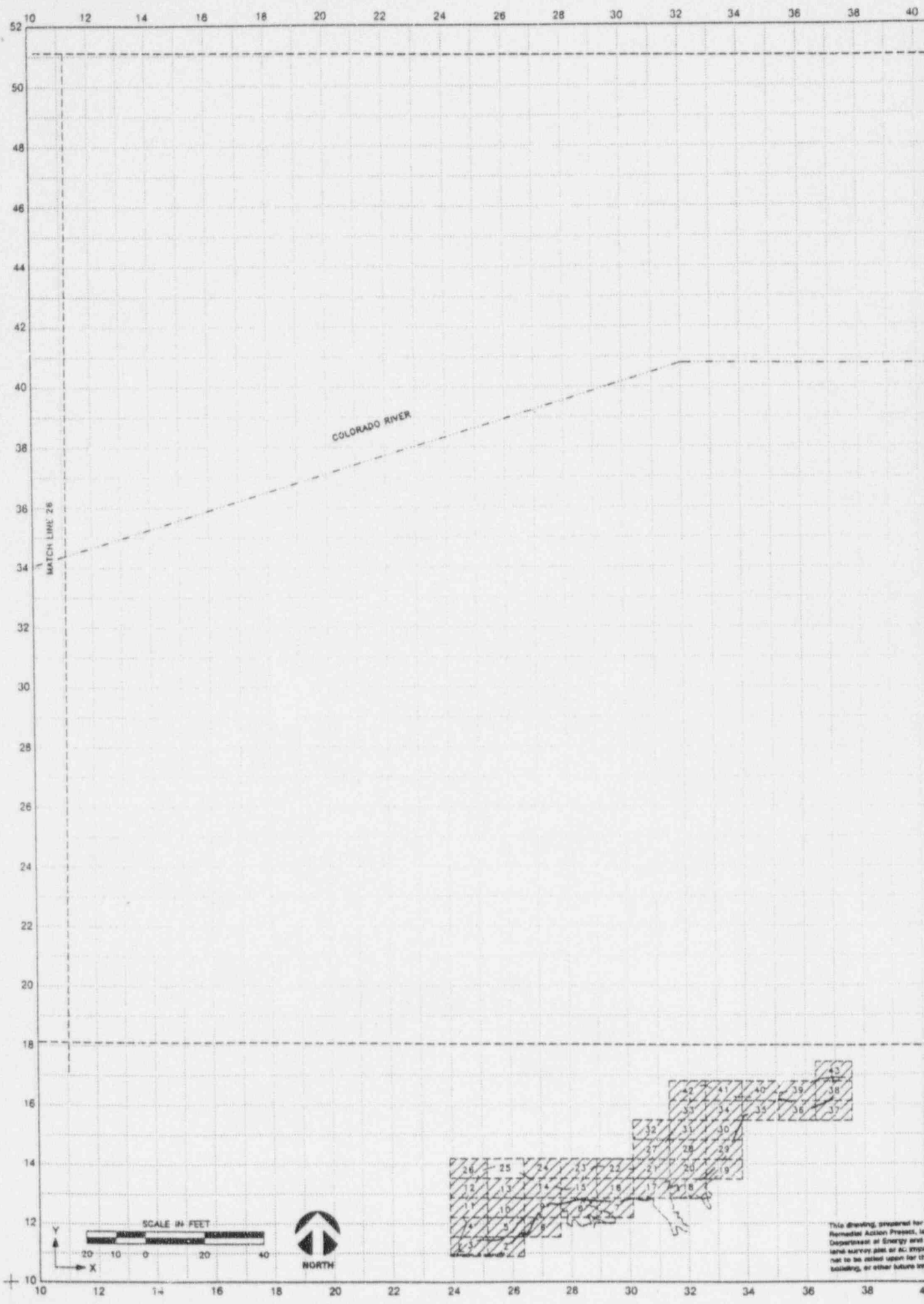
ALL GAMMA MEASUREMENTS ARE WITHIN THE RANGE OF NORMAL BACKGROUND UNLESS OTHERWISE NOTED.

**FIGURE 2K
GAMMA EXPOSURE RATES/SAMPLE LOCATIONS**

NO. DATE		EVS. DATE		BY CK. A.E. APP. NO. DATE		REVISIONS		BY CK. A.E. APP.	
RESIDENCE - NO. OF OCCUPANTS									
NON-RESIDENCE - NAME, HRS./WK.									
INSTRUMENT NO.		SURVEYOR		DESIGNED DATE		U.S. DEPARTMENT OF ENERGY GRAND JUNCTION PROJECTS OFFICE, COLORADO			
Prepared By		ETC. 6-3-91		BKR 5/91		3012 C ROAD GRAND JUNCTION, COLORADO			
SURVEY DATE		TIME		CHECKED		APPROVAL DATE APPROVAL DATE DATE			
VERIFICATION DATE				SUBMITTED KAC 6/91		DOE # NO. 01-49271 DWS NO. 3-045271-012			
				Geotech. Inc.		MIT 12 of 20			

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42 44 46 48 50 52 54 56 58 60 62 64 66 68 70 72 74



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Remedial Action Project, is the
Department of Energy and
Environmental Protection's
survey plot of the site.
It is not to be relied upon for the
building, or other future work.

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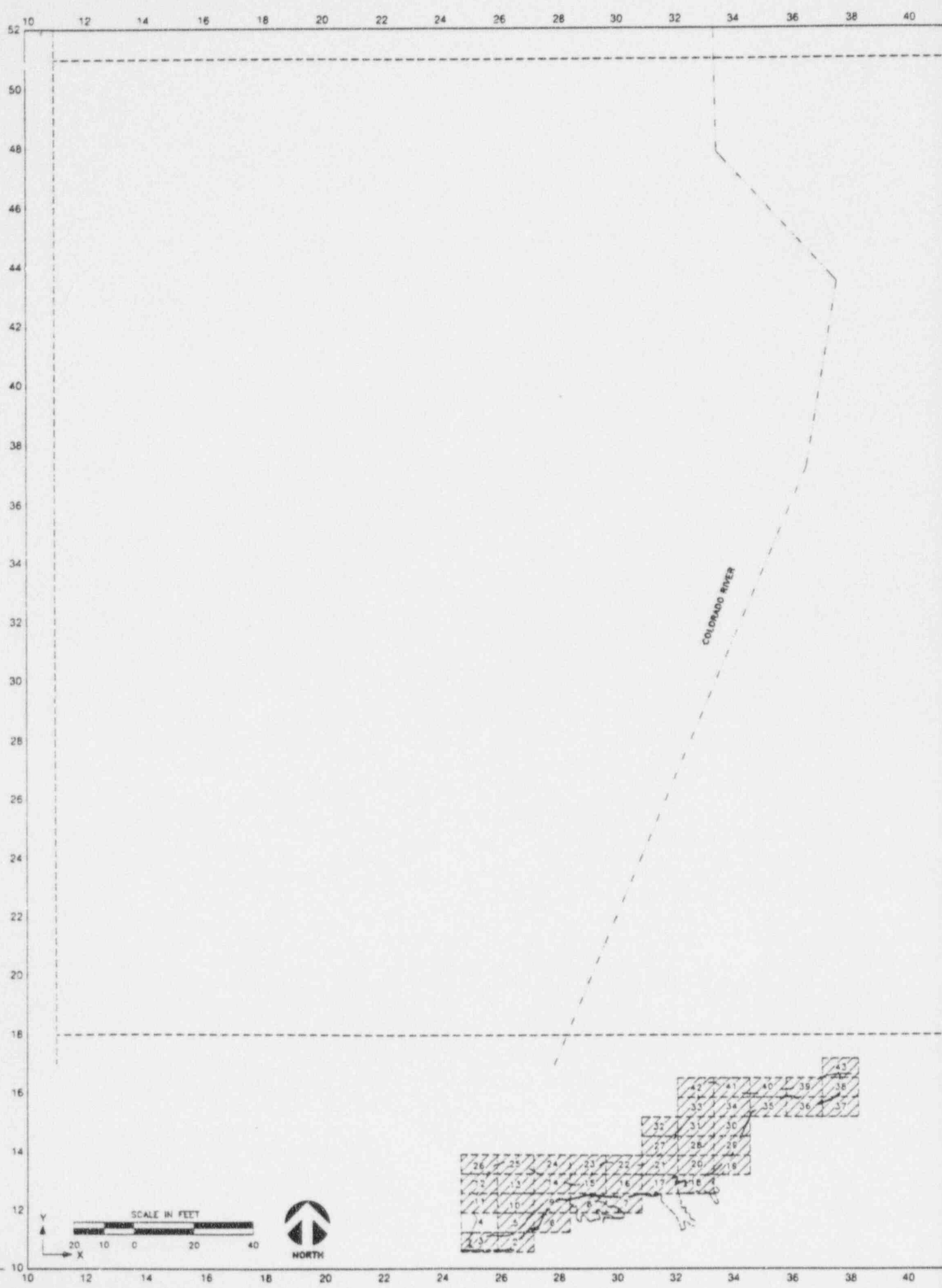
- *2 LOCATION NUMBER
- Δ DELTA SCANNER
- BOREHOLE
- SOIL SAMPLE
- 19-25 GAMMA EXPOSURE RATES AT GROUND LEVEL IN μR/h
- ~ BOUNDARY FOR AREA OF ELEVATED EXPOSURE RATES
- AREA OF ELEVATED GAMMA EXPOSURE RATES

ALL GAMMA MEASUREMENTS ARE WITHIN THE RANGE OF NORMAL BACKGROUND UNLESS OTHERWISE NOTED.

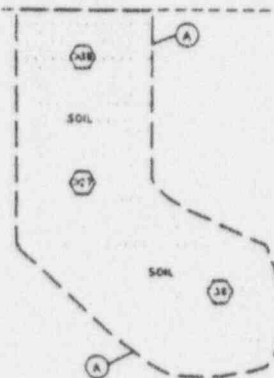
FIGURE 21
GAMMA EXPOSURE RATES/SAMPLE LOCATIONS

NO. DATE				REVISIONS				BY CK. A.E. APP. NO. DATE				REVISIONS				BY CK. A.E. APP.							
RESIDENCE - NO. OF OCCUPANTS								U.S. DEPARTMENT OF ENERGY GRAND JUNCTION PROJECTS OFFICE, COLORADO															
NON-RESIDENCE - MAN-HRS./WK.								DESIGNED: DATE															
INSTRUMENT NO.				SURVEYOR				DRAWN: <i>BKR 5/91</i>															
				<i>Prepared By</i>				CHECKED:															
				<i>EC 6-5-91</i>				PROJ. ENG.															
SUBMITTER				DATE				APPROVAL				DATE				APPROVAL							
SURVEY DATE				TIME																			
VERIFICATION				DATE																			

Geotech, Inc. 3-045271-013 BMT 120P 20



LINE 11



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LINE 3

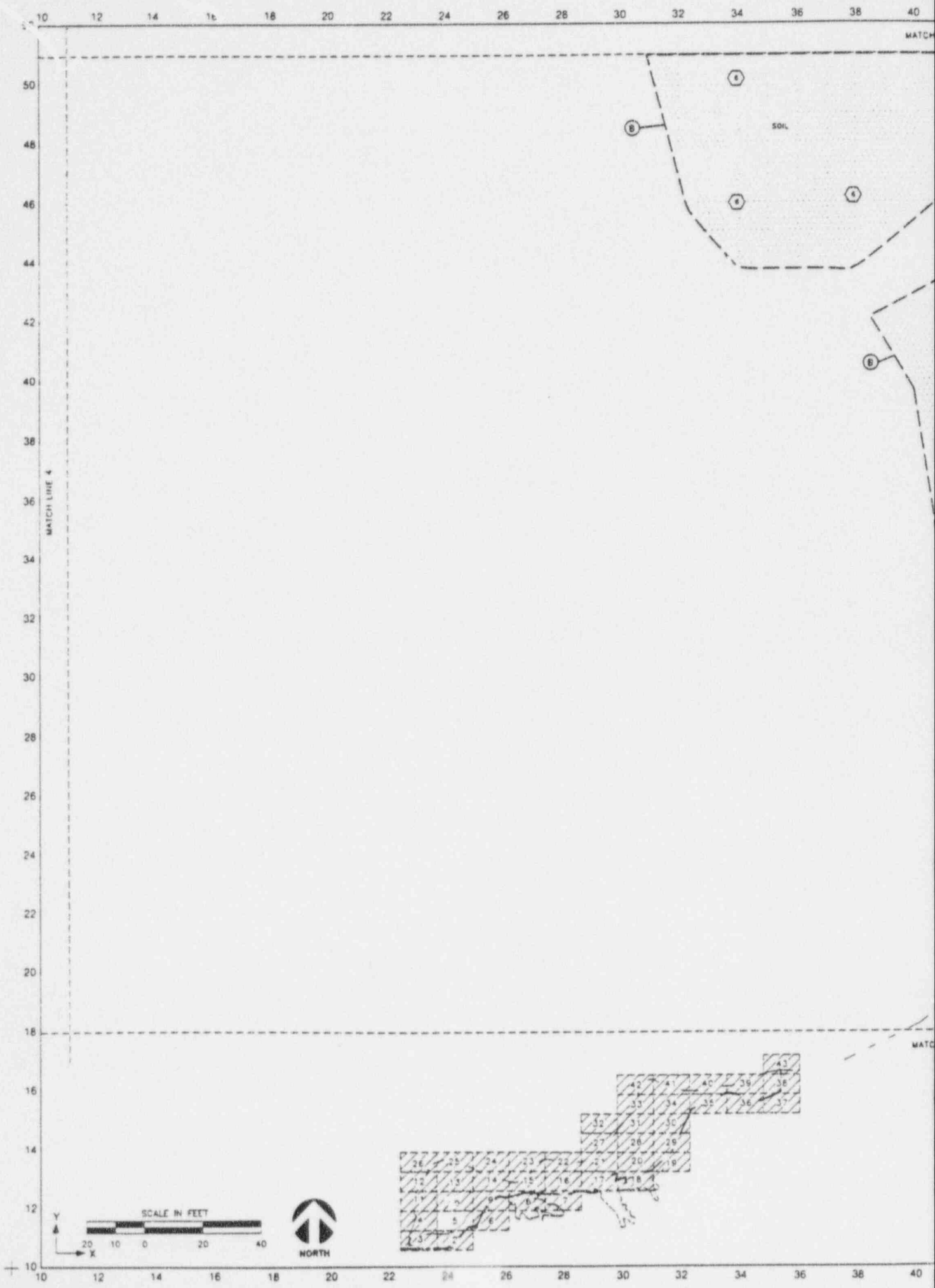
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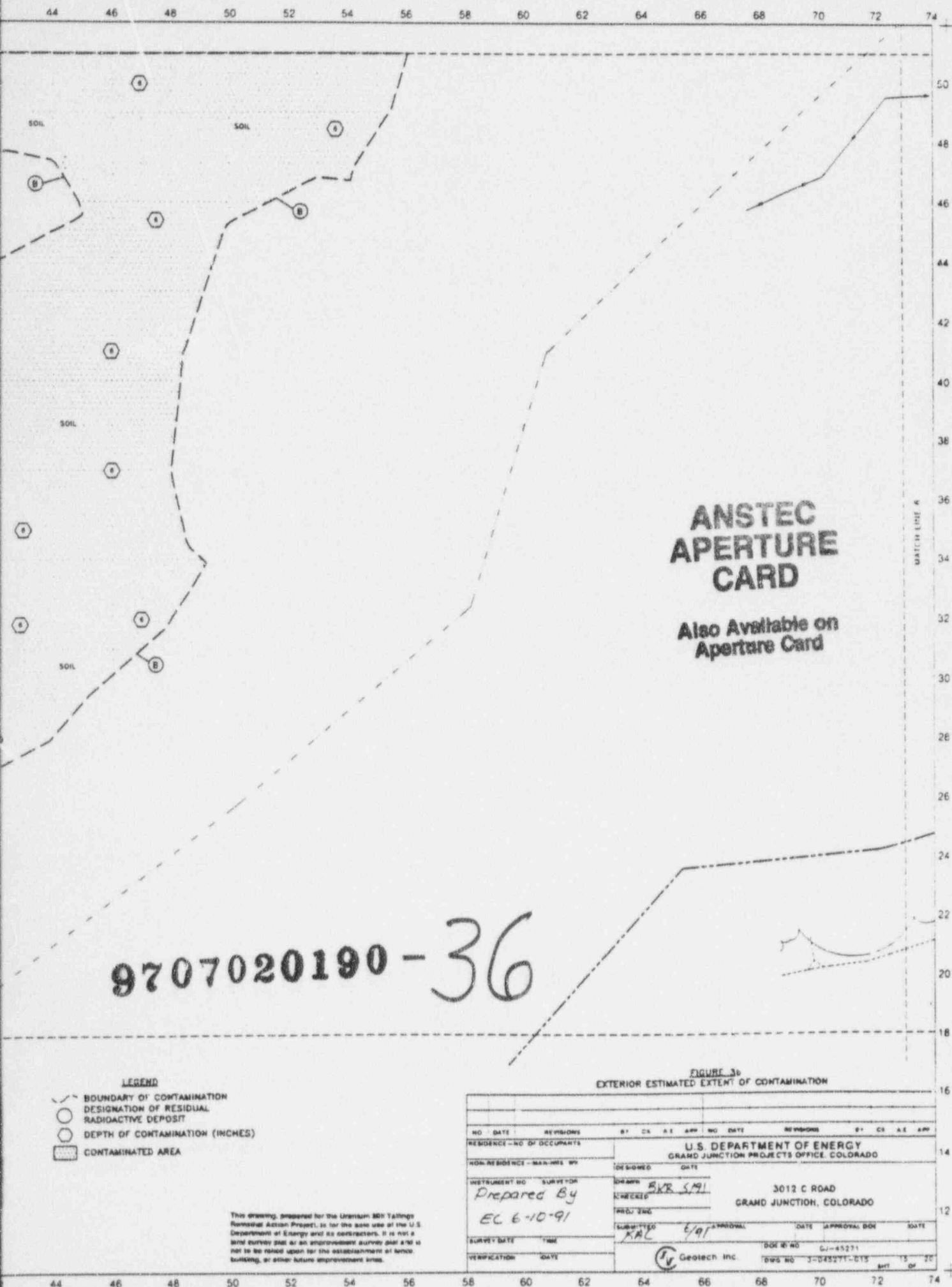
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- DESIGNATION OF RESIDUAL RADIOACTIVE DEPOSIT
- DEPTH OF CONTAMINATION (INCHES)
- CONTAMINATED AREA

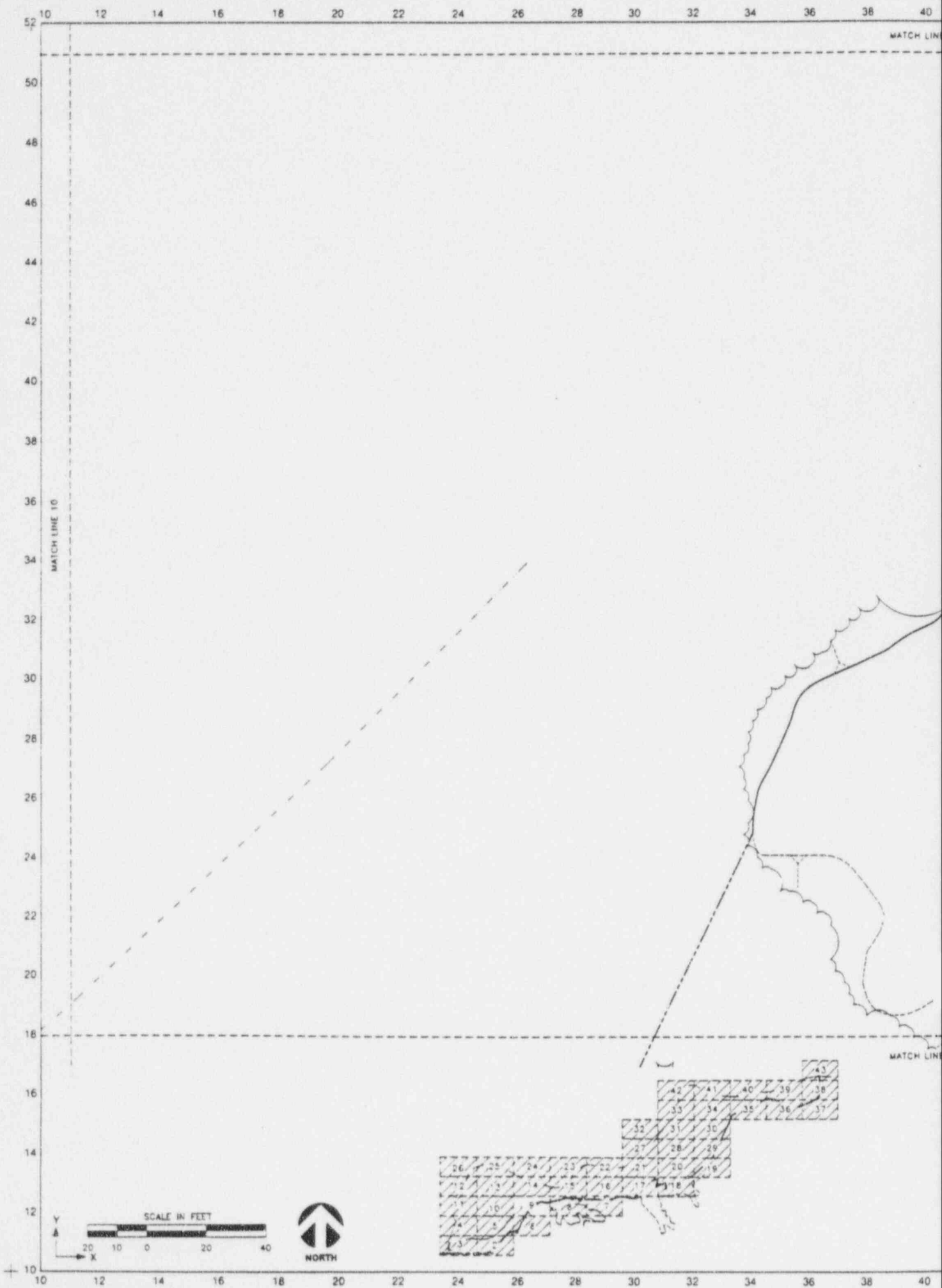
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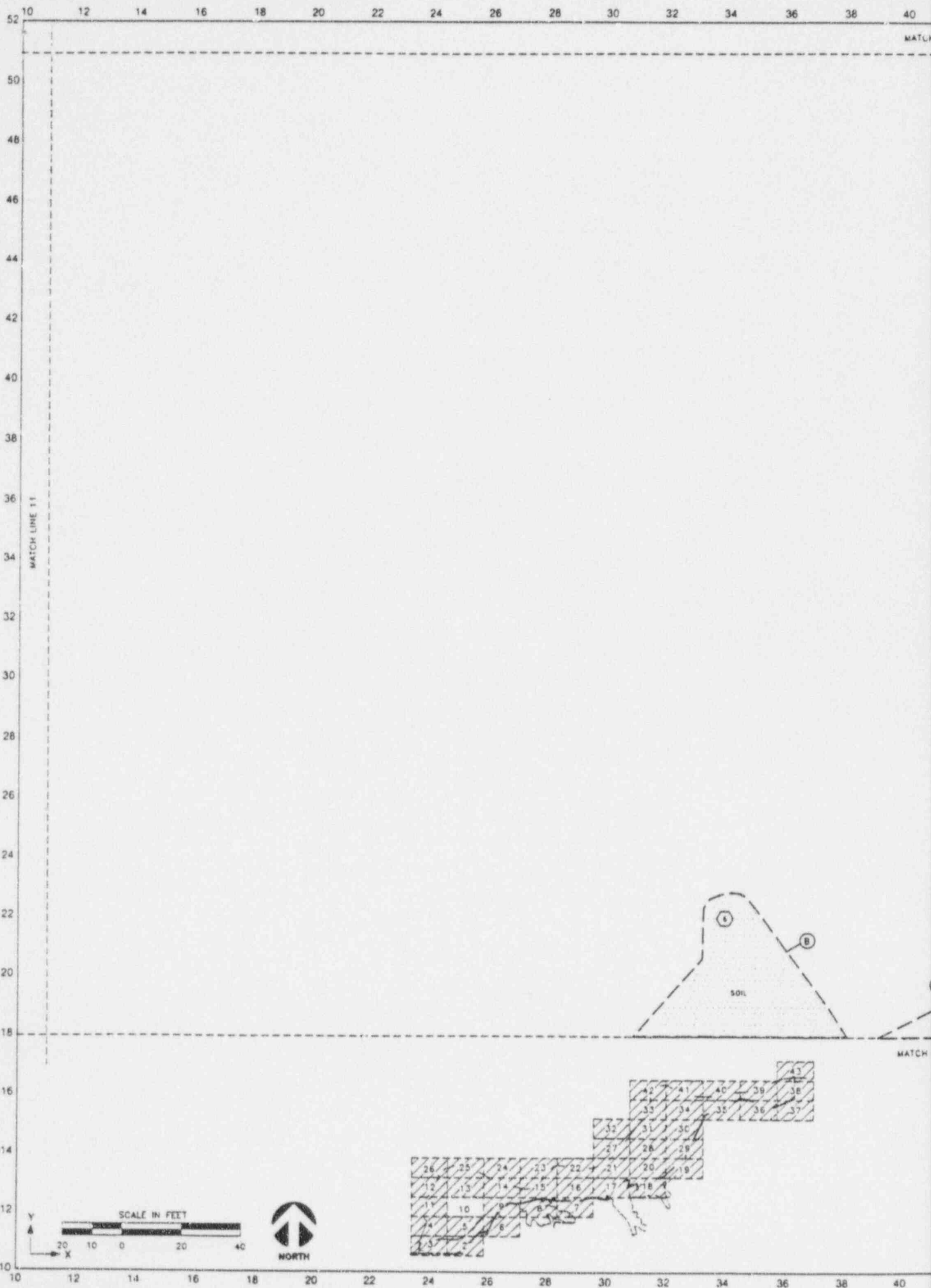
FIGURE 3a
EXTERIOR ESTIMATED EXTENT OF CONTAMINATION

NO. DATE		REVISIONS		BY	CA	AE	APP	NO	DATE	REVISIONS		BY	CA	AE	APP
RESIDENCE - NO. OF OCCUPANTS															
NON-RESIDENCE - MAN-HRS. WKS.															
INSTRUMENT NO.		SURVEYOR		DRAWN		CHECKED		DATE		3012 C ROAD GRAND JUNCTION, COLORADO					
Prepared By		EL 6-10-91		BKR SM											
SURVEY DATE		TIME		SUBMITTED		APPROVAL		DATE		DATE					
VERIFICATION		DATE		KMC		6/91									
Geotech, Inc.															
DOW NO. 61-45271															
DWE NO. 3-543771-014															
SHT. OF 20															





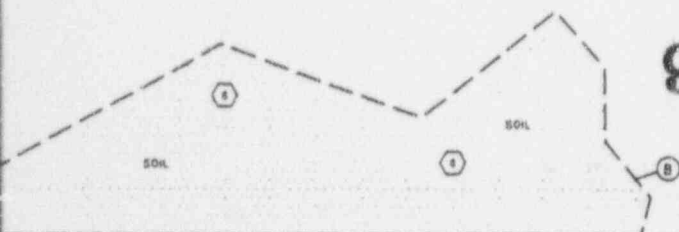




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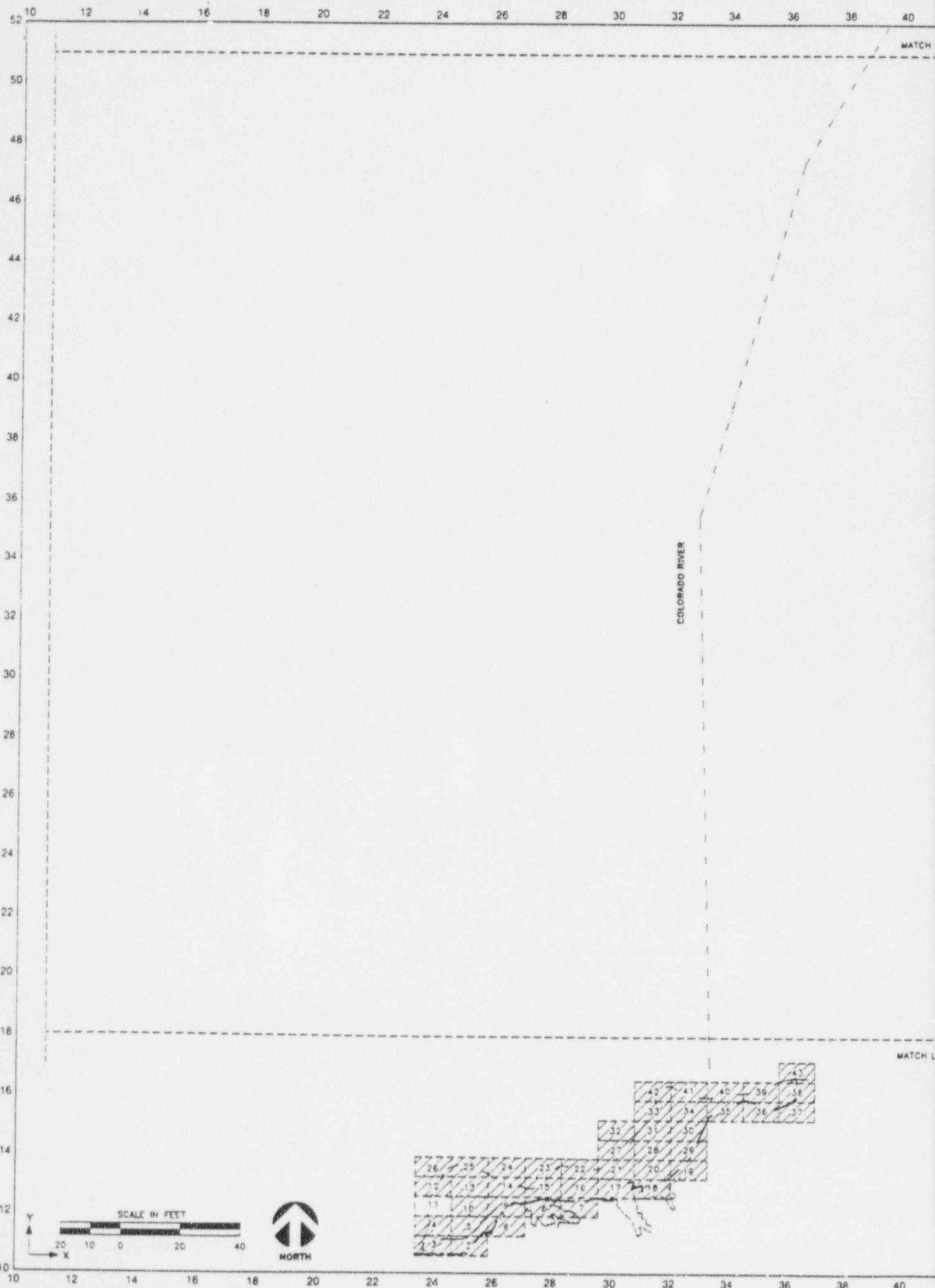
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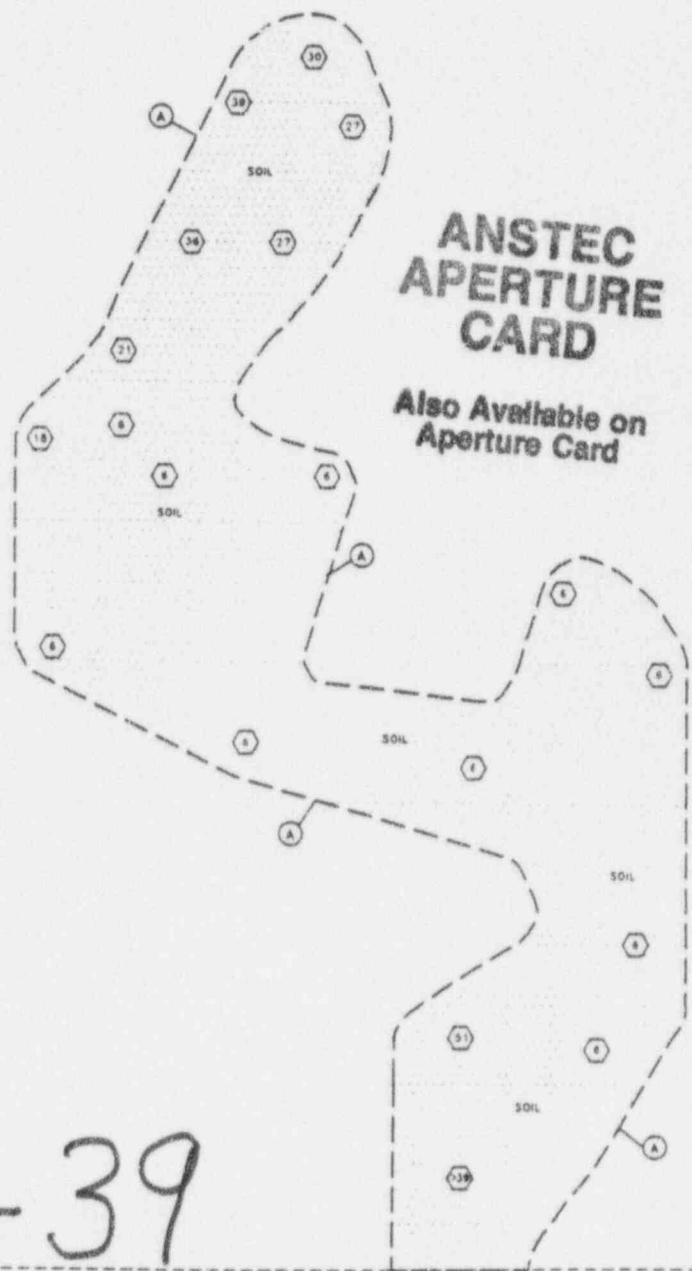
- BOUNDARY OF CONTAMINATION
- DESIGNATION OF RESIDUAL RADIOACTIVE DEPOSIT
- DEPTH OF CONTAMINATION (INCHES)
- CONTAMINATED AREA

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FIGURE 3d
EXTERIOR ESTIMATED EXTENT OF CONTAMINATION

NO.	DATE	REVISIONS	BY	US	AE	APP	NO	DATE	REVISIONS	BY	US	AE	APP
RESIDENCE - NO. OF OCCUPANTS			U.S. DEPARTMENT OF ENERGY GRAND JUNCTION PROJECTS OFFICE, COLORADO										
NON-RESIDENCE - MAX. HRS. OF			ON SHOWN		DATE		3012 C ROAD GRAND JUNCTION, COLORADO						
INSTRUMENT NO.			SURVEYOR		DRAWN BY		CHECKED BY		DATE				
SURVEY DATE			TIME		SUBMITTED		APPROVAL		DATE				
VERIFICATION			DATE		Geotech, Inc.		DOE NO.		GW-45271				
							BWS NO.		3-085271-617				





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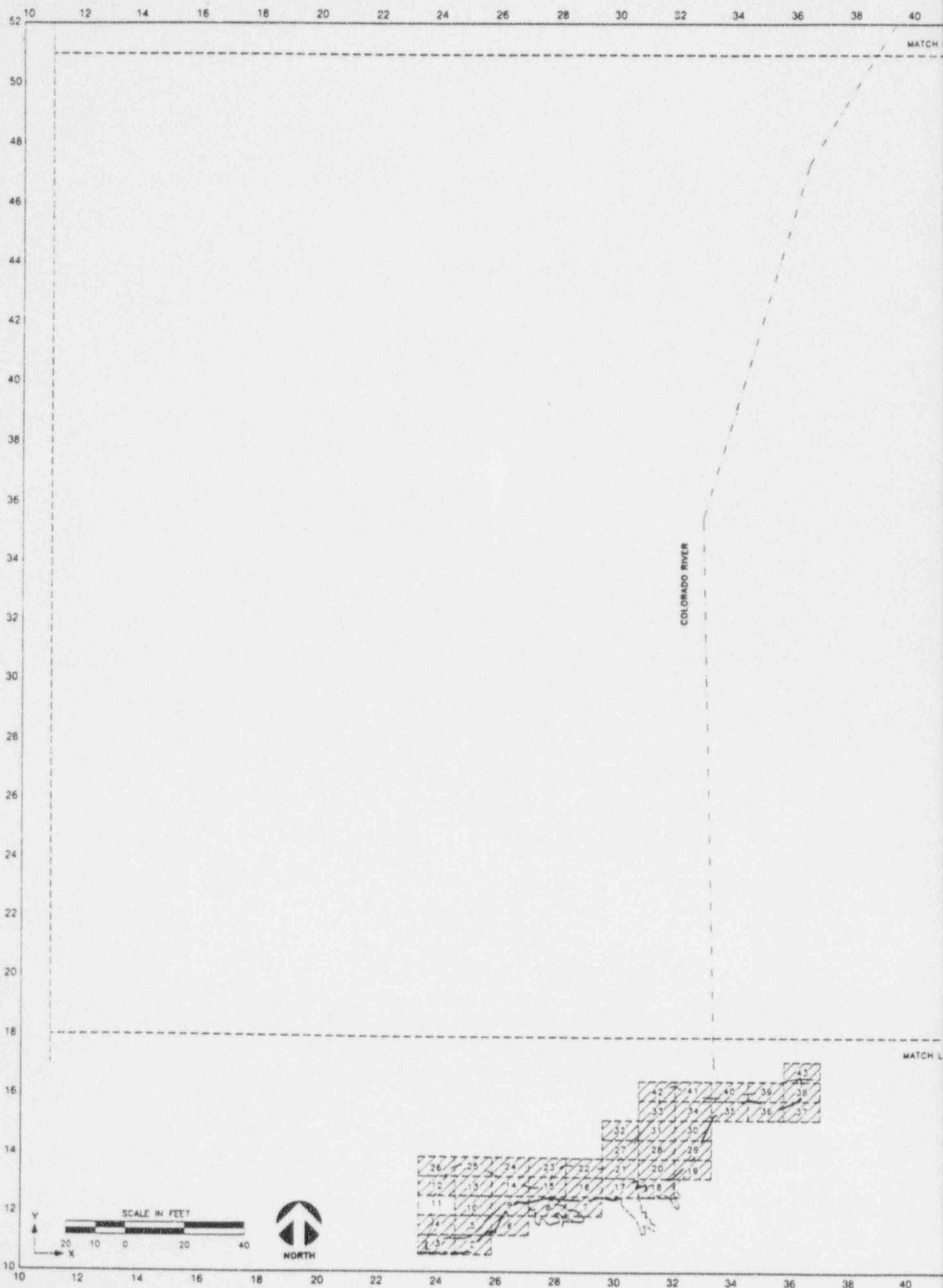
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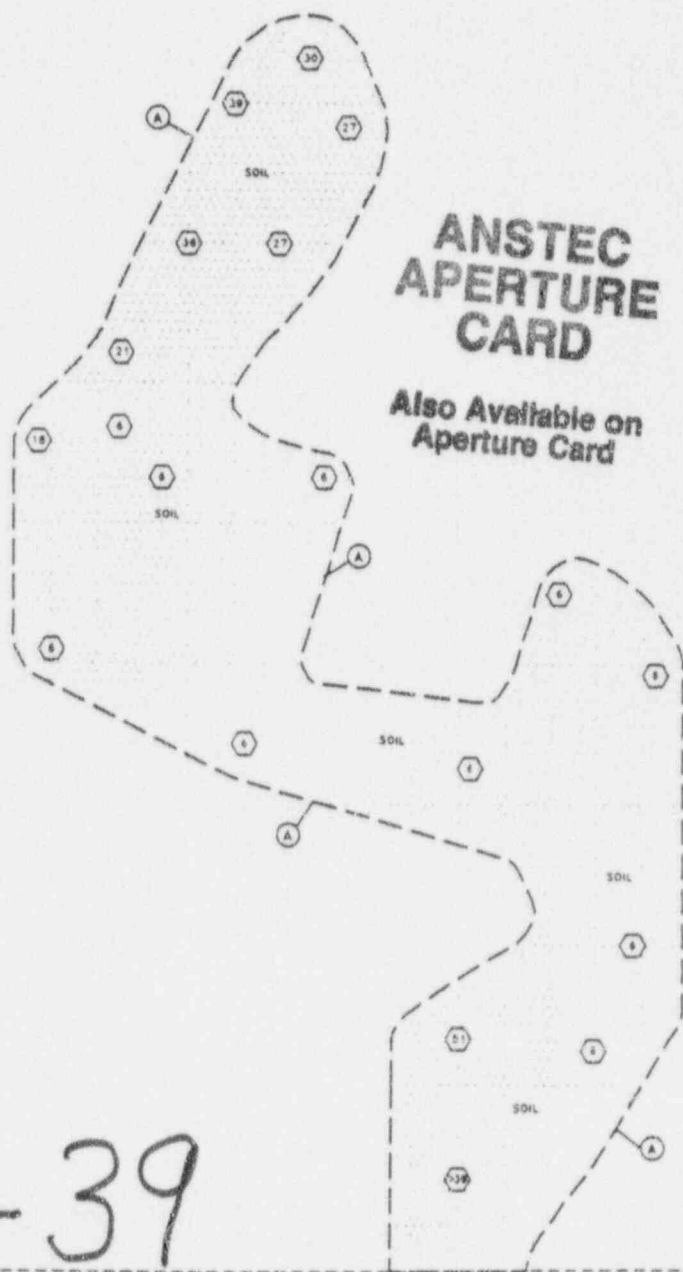
- BOUNDARY OF CONTAMINATION
- DESIGNATION OF RESIDUAL RADIOACTIVE DEPOSIT
- DEPTH OF CONTAMINATION (INCHES)
- CONTAMINATED AREA

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

FIGURE 3a
EXTERIOR ESTIMATED EXTENT OF CONTAMINATION

NO. DATE REVISIONS		BY CR A-E APP NO. DATE REVISIONS		BY CR A-E APP	
RESIDENCE - NO. OF OCCUPANTS		U.S. DEPARTMENT OF ENERGY GRAND JUNCTION PROJECTS OFFICE, COLORADO			
NON-RESIDENCE - MAN-HRS. WK.		DESIGNED DATE		3012 C ROAD GRAND JUNCTION, COLORADO	
INSTRUMENT NO. SURVEYOR		DRAWN		DATE	
Prepared By		CHECKED		DATE	
EC 6-10-71		PROD. ENG.		DATE	
SURVEY DATE		SUBMITTED		APPROVAL	
TIME		DATE		DATE	
VERIFICATION		DATE		DATE	
		Geotech, Inc.		DOE NO. 01-45271	
				FORM NO. 3-245271-018	





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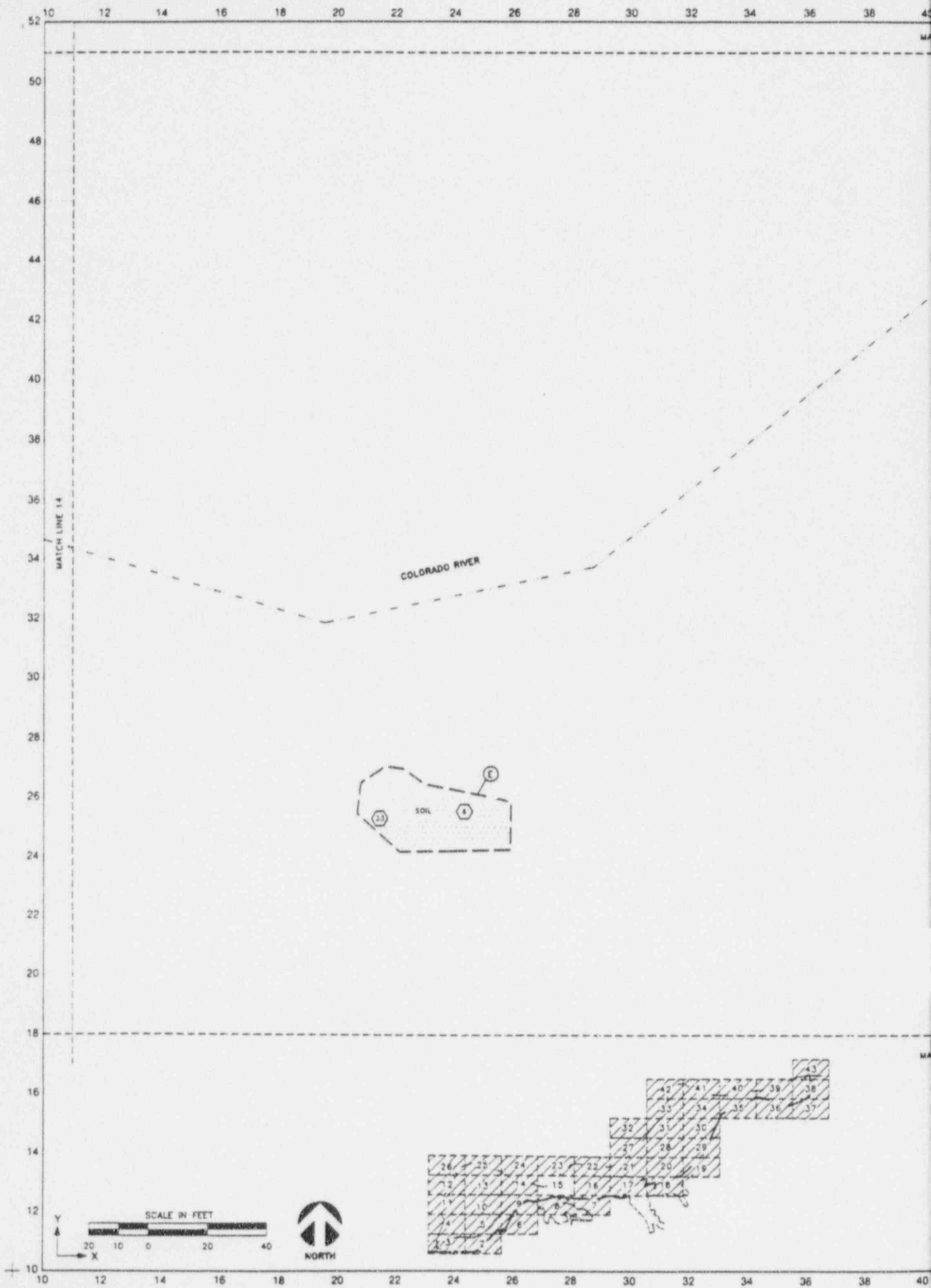
LEGEND

- BOUNDARY OF CONTAMINATION
- DESIGNATION OF RESIDUAL RADIOACTIVE DEPOSIT
- DEPTH OF CONTAMINATION (INCHES)
- CONTAMINATED AREA

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

FIGURE 3a
EXTERIOR ESTIMATED EXTENT OF CONTAMINATION

NO. DATE REVISIONS		BY CH. A.E. APP. NO. DATE REVISIONS		BY CH. A.E. APP.	
RESIDENCE - NO. OF OCCUPANTS		U.S. DEPARTMENT OF ENERGY GRAND JUNCTION PROJECTS OFFICE, COLORADO			
NON-RESIDENCE - MAN-HRS. IN		DESIGNED DATE		3012 C ROAD GRAND JUNCTION, COLORADO	
INSTRUMENT NO. SURVEYOR		CHECKED		DATE APPROVAL DATE	
Prepared By EL 6-10-91		KAL 6/91			
SURVEY DATE TIME		SUBMITTED		DATE APPROVAL DATE	
VERIFICATION DATE		P. Geotech Inc.		DOE NO. 45271 DWS NO. 3-045271-018	



42 44 46 48 50 52 54 56 58 60 62 64 66 68 70 72 74

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COLORADO RIVER

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NE 8

LEGEND

- BOUNDARY OF CONTAMINATION
- DESIGNATION OF RESIDUAL RADIOACTIVE DEPOSIT
- DEPTH OF CONTAMINATION (INCHES)
- CONTAMINATED AREA

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FIGURE 3'
EXTERIOR ESTIMATED EXTENT OF CONTAMINATION

NO. DATE REVISIONS		SY. CR. A.E. APP. NO. DATE	NEW YORK	SY. CR. A.E. APP.
RESIDENCE—NO. OF OCCUPANTS		U.S. DEPARTMENT OF ENERGY GRAND JUNCTION PROJECTS OFFICE, COLORADO		
NON-RESIDENCE—MAN-FEB. MR.		DESIGNED	DATE	
INSTRUMENT NO. SURVEYOR		RECHECKED	DATE	
Prepared By EC 6-10-91		PROJ. ENG.		
SURVEY DATE		SUBMITTED	DATE	APPROVAL
YEAR/CEATION		DATE	DATE	DATE
		3012 C ROAD GRAND JUNCTION, COLORADO		
		DOE ID NO. GJ-45271		
		DOW ID 3-045271-018		
		Geotech, Inc.		

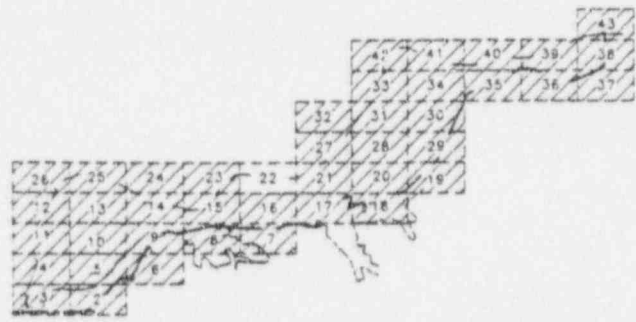
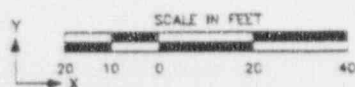
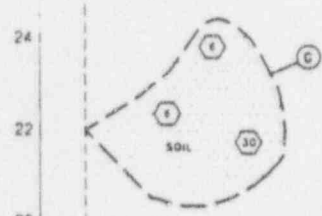
42 44 46 48 50 52 54 56 58 60 62 64 66 68 70 72 74

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MATCH LINE 23

COLORADO RIVER



MATCH

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COLORADO RIVER

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LEGEND

- ✓ BOUNDARY OF CONTAMINATION
- DESIGNATION OF RESIDUAL RADIOACTIVE DEPOSIT
- DEPTH OF CONTAMINATION (INCHES)
- CONTAMINATED AREA

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FIGURE 36
EXTERIOR ESTIMATED EXTENT OF CONTAMINATION

NO.	DATE	REVISIONS	BY	CHK	APP	NO.	DATE	REVISIONS	BY	CHK	APP
RESIDENCE - NO. OF OCCUPANTS			U.S. DEPARTMENT OF ENERGY GRAND JUNCTION PROJECTS OFFICE, COLORADO								
NON-RESIDENCE - BARN-HOUSE - SHED			DESIGNED DATE								
INSTRUMENT NO. SURVEYOR			DRAWN BY			3012 C ROAD GRAND JUNCTION, COLORADO			DATE		
SURVEY DATE			CHECKED			6/91			DATE		
VERIFICATION DATE			PREP. ENG.			KAC			DATE		
			APPROVAL			DATE			APPROVAL		
			DOE ID NO.			61-45271			DATE		
			DWS NO.			3-04271-020			DATE		
			Geotech, Inc.						DATE		

42 44 46 48 50 52 54 56 58 60 62 64 66 68 70 72 74

APPENDIX B

APPLICATION FOR SUPPLEMENTAL STANDARDS DOE ID NO. GJ-07332-MR (INCLUDES A PORTION OF: GJ-45271-VL)

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- B.2.5 Owner's Input

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 - B.4.3.4 Alternative Specific Issues
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EXHIBITS

Request for Comments from the Owner of 3010 C Road (Mr. Rozman)
Request for Comments from the Owner of 3012 C Road (Mr. Griffith)
Comments from the Owner of 3010 C Road (Mr. Rozman)
Comments from the Owner of 3012 C Road (Mr. Griffith)

B.1 Applicable EPA Criteria

Supplemental Standards Application is in accordance with the regulations set by the Environmental Protection Agency (EPA) in 40 CFR 192. The potential and applicable criteria as stated in 40 CFR 192.21 are as follows:

- ☒ a) Remedial action would pose a clear and present risk of injury to workers or to members of the public
- ☒ b) Remedial action would directly cause excessive environmental harm
- ☐ c) The cost of remedial action at the vicinity site is unreasonably high relative to long-term benefits
- ☐ d) The cost of remedial action for cleanup of a building is unreasonably high relative to benefits
- ☐ e) There is no known remedial action
- ☐ f) Radionuclides other than Radium-226 and its decay products are present

An "X" indicates the appropriate subsection(s) for this application.

B.2 Introduction

This Supplemental Standards Application pertains to the mill tailings contamination along the north facing bank of a steep cliff/hillside above the Colorado River. Supplemental Standards Appendix A Figure 3 and Appendix B Figure BF.1 depict the assessed deposits of tailings in the areas for which Supplemental Standards is being considered. Remediation, as well as assessment, of the tailings deposits at 3010 C Road was performed to the maximum extent possible; the excavation was stopped as close to the edge of the cliff as possible without endangering workers or destabilizing the slope. Figure 3 and Figure BF.1 only depict the assessed tailings that were left in place; all other assessed areas were remediated to EPA Standards. The exact extent of contamination could not be obtained since the steep terrain prevented a complete assessment of the cliff/hillside.

B.2.1 Common Location and Legal Description

The Supplemental Standards Application is within the County of Mesa, Colorado. The area is along the steep slopes of a cliff encompassing approximately 4 acres on the boundary line between two adjoining parcels.

The legal description of the Southern parcel, 3010 C Road, is as follows: All that part of Lot 4, Section 20, and Lot 4, Section 21, in Township 1 South, Range 1 East of the Ute Meridian, which lies South of the crest of the bluff which drops over the Colorado River Basin, EXCEPT Beginning 1142 feet East of the Southwest Corner of Lot 4 of said Section 21, thence West to the point of beginning, ALSO EXCEPT Beginning at a point whence the Southeast Corner of said Section 20 bears South 20.00 feet, thence North 10.00 feet, thence East 16.70 feet, thence North 332.10 feet, thence South 84° 32' West 66.90 feet, thence South 41° 54' West 304.35 feet, thence South 18° 57' West 61.90 feet, thence South 32° 31' East 60.07 feet, thence East 239.00 feet to point of beginning, as recorded in Book 1744, Pages 645 and 646 of the Mesa County Clerk's Records.

The legal description for the northern parcel, 3012 C Road, is as follows: All the land between the Colorado River and the crest of the bluff in Lots 4, 5, and 6, Section 21, T.1S, R.1E, Ute Meridian, and Lot 4, Section 20, T.1S, R.1E, Ute Meridian, Mesa County, Colorado.

B.2.2 Major Physical Features

3010 C Road includes a residential structure, out buildings, horse arena, and fenced pasture. 3012 C Road is a vacant lot. The area considered for Application of Supplemental Standards is a vacant steep cliff/hillside containing trees, shrubs, grass, and barren soil. 3012 C Road, the adjacent property directly to the south, is vacant agricultural land used for cattle grazing.

B.2.3 General Assumptions and Parameters

The inclusion boundaries applied towards this Supplemental Standards Application include the area of the steep slopes of the cliff/hillside from the top of the cliff to the toe of the slope.

B.2.4 Land Use

This Application considers a strip of land along the northerly facing slopes of a cliff/hillside. Due to the steep, unstable nature of the site, no structures can be built. Therefore, a change in land usage should not result in buildings being erected over this area.

B.2.5 Owner's Input

The Department of Energy (DOE) requested that Chem-Nuclear Geotech, Inc. (Geotech) consider Supplemental Standards for the deposits of tailings along the steep hillside between 3010 C Road and 3012 C Road. From a literal reading of the legal description, this hillside appears to be owned by Mr. Griffith, the owner of 3012 C Road; comments from the owner of 3010 C Road, Mr. Rozman, were obtained because he insisted that he was the true owner of some of the land in question. Since Geotech is not in the position to adjudicate property disputes, the comments of both land owners were solicited. Geotech submitted a Request for Formal Comments to each of the owners. A separate meeting was conducted with the owner of each property to explain the data and evaluation of alternatives. Copies of relevant correspondence are attached as exhibits.

Mr. L.O. Griffith, the owner of 3012 C Road, approved the proposed Application of Supplemental Standards. During the meeting Geotech had with him, Mr. Griffith stated that he could not foresee any future development on the steep hillside or the land which lies below it. Although Mr. Griffith approved of the proposed use of supplemental standards, he also expressed concern about future government regulations regarding tailings which were left in place. He did not wish to be held liable for disposal costs should future regulations mandate removal of the tailings. Geotech stated that they understood his concern, but could not predict what future government regulations would be.

Mr. Rozman was quite adamant in his opposition to the proposed use of supplemental standards. He demanded that he be guaranteed that the use of supplemental standards: 1) not adversely affect property owners; 2) not affect the rights of the property owners:

- 3) not affect any possible development and/or use of the area; and
- 4) not incur future financial obligations on the property owner for clean up. Neither Geotech nor the DOE can make such guarantees to Mr. Rozman.

Mr. Rozman's written and verbal comments did not state that he had any future development plans for the area where tailings are proposed to be left in place. Although future development (mining existing gravel beds, residential building sites, farm use, or a pond for future wildlife habitat) is a remote possibility, it is not possible without significant site work (i.e. building a retaining wall, cutting back the slope to a more stable angle, altering drainage in the area, or installing geotextile membranes). The area being considered for the use of Supplemental Standards is a steep hillside is difficult to walk up, much less construct on top of. Although Geotech understands Mr. Rozman's concerns, Supplemental Standards are still recommended for the hillside; the low health risk from the remaining tailings, the risk of injury to workers removing tailings and re-vegetating the slope, and the environmental harm to the hillside makes remediation an inappropriate choice.

Future management and control of mill tailings was raised as an issue on this application. It has also been an issue on previous supplemental standards applications. Geotech recognizes this concern and has recommended development of a long-term control plan. Resolution of this issue, however, is beyond the scope of this application.

B.3 Radiological Data

The Supplemental Standards Appendix A contains the radiological data that is relevant to this Supplemental Standards Application. The Appendix A consists of an Executive Summary, tables which summarize radiological data, and the Appendix As for 3010 and 3012 C Road.

The radiological conditions within the Supplemental Standards Application area are summarized as follows:

- a. Exposure rate range at ground level over contaminated areas = 16 to 30 uR/h
- b. Average exposure rate at ground level over contaminated area(s) = 23 uR/h

The steep slopes prevented adequate assessment of radiologic contamination. Only those areas that were safe to enter were assessed. The policy of Geotech and the DOE is to not endanger personnel.

B.3.1 Health Risk Analysis

The analysis of health risks is presented in Table B.T1. Exposure potentials are compared with two criteria as follows:

- a. Long-term exposures are examined based on an allowable exposure rate of 100 mRem per year above background (hereinafter referred to as 100 mRem dose).
- b. Short-term unusual exposures are examined based on an allowable exposure rate of 500 mRem per year above background (hereinafter referred to as 500 mRem dose).

TABLE B.11
HEALTH RISK ANALYSIS
GJ-07332-MR
3010 C ROAD
(INCLUDES A PORTION OF
GJ-45271-VL, 3012 C ROAD)

AREA DESCRIPTION	GAMMA (uR/h)				LONG-TERM EXPOSURE ANALYSIS			SHORT-TERM "OCCUPATIONAL" EXPOSURE ANALYSIS		
	BACKGROUND	SURFACE		EXPOSURE RATE ABOVE BACKGROUND	REQUIRED NUMBER OF HOURS OF CONTINUOUS EXPOSURE TO RECEIVE 100 mRem DOSE	REQUIRED NUMBER OF HOURS PER DAY OVER ONE YEAR TO RECEIVE 100 mRem DOSE	REQUIRED NUMBER OF HOURS PER DAY OVER 200 DAYS TO RECEIVE 100 mRem DOSE	REQUIRED NUMBER OF HOURS OF CONTINUOUS EXPOSURE TO RECEIVE 500 mRem DOSE	REQUIRED NUMBER OF 48-HOUR "REPAIR" SCENARIOS TO RECEIVE 500 mRem DOSE	REQUIRED NUMBER OF 24-HOUR "EMERGENCY" SCENARIOS TO RECEIVE 500 mRem DOSE
		MAX.	MIN.							
HILLSIDE	13	30	16	17	5,882	16	23	29,412	613	1,225
Worst Case Scenario:	13	30		17	5,882	16	23	29,412	613	1,225

Note: Worst Case Scenario is based on the lowest background and highest surface gamma measurements, regardless of whether they were found in the same approximate location.

The maximum gamma dose rate at waist level recommended by the International Commission on Radiological Protection (ICRP, 1977, 1978) in DOE ORDER 5400.5 (March 1990) is 100 mRem dose. This is the dose limit for an individual member of the general public. Doses which exceed 100 mRem dose are acceptable when the higher exposures do not persist for long periods and when the average annual dose over an individual's lifetime is expected to be less than 100 mRem dose. The ICRP and the DOE suggest that dose rates be "reduced as low as is reasonably achievable", but also state that no annual dose shall exceed 500 mRem dose. The health risk analysis presented in this Application for Supplemental Standards has compared the dose rates measured at ground level with the recommendations of the ICRP and DOE regarding waist level exposures. This procedure ensures a conservative evaluation.

The long-term exposure analysis considers three scenarios showing the following:

- a. The required number of hours of continuous exposure to obtain the 100 mRem dose. This scenario is intended to model the exposure received by an individual residing on the site in the extreme case where no time away from the site is considered.
- b. The hours per day of exposure during a continuous one year period required to receive the 100 mRem dose. This scenario is intended to represent a maximum allowable daily exposure by an individual who occupies the point where the high gamma reading occurs.
- c. The hours per day of exposure during a one year period, utilizing week days only (260 days), required to receive the 100 mRem dose. This scenario models the potential exposure that could be received by an individual working in the area the indicated number of hours daily for one year.

The short-term unusual exposure analysis also considers three potential scenarios as follow:

- a. The required number of hours of continuous exposure to obtain the 500 mRem dose. The intent of this scenario is to allow examination of the estimated time of continuous exposure required to receive the allowable dose.
- b. The number of 48-hour temporary occupancy periods, in one year, necessary to receive a 500 mRem dose. This scenario represents the case where an individual occupies the site for repair work or other short-term purposes.
- c. The number of 24-hour periods of exposure, in one year, necessary to receive a 500 mRem dose. This scenario considers emergency operations to perform repair work at the site.

The worst case scenario is based on the minimum background and maximum surface gamma rates that were measured, without consideration of the relative physical location of each. In every case, the scenarios presented above can be described as unlikely but possible. The scenarios do not create a model of likely situations, but present data that can be used to evaluate the potential for a health hazard if this Supplemental Standards Application is approved.

The maximum known gamma exposure rate, above background, occurring along the northwestern portion of the Supplemental Standards area, is equal to the worst case scenario. The worst case scenario depicts occupation of a site for an average of 16 hours per day during a one year period to receive the 100 mRem dose. It is highly unlikely for this situation to occur, due to both the length of time required and the physical location of the exposure rates.

B.4 Remediation Alternatives

Supplemental Standards Application is only one of the available alternatives for compliance with the EPA regulations. Evaluation of an alternative action in any area of tailings contamination logically includes consideration of the cost and health risk associated with the available choice. Three alternatives, Complete Remediation, Partial Remediation, or Application of Supplemental Standards (No Remediation), are considered.

B.4.1 Alternative 1 - Complete Remediation (All Contaminated Material - Assessed and Unassessed Areas)

B.4.1.1 Work Description

The work required for this Alternative is unknown since the exact extent of contamination is unknown. If only isolated surface contamination exists, as the radiological assessment of the area shows, the work description would be the same as Alternative 2 (Partial Remediation). The other possibility is that deep deposits of tailings exist throughout the cliff/hillside; although the probability of this scenario occurring is low, the potential still exists. If extensive deposits of tailings exist on the hillside, Geotech would recommend excavating the entire hillside back to a 1.5 (horizontal) to 1 (vertical) in order to remove all of the tailings and maintain a stable slope. This would require a substantial amount of work and result in a loss of usable (i.e. flat) land from the 3010 C Road property.

B.4.1.2 Health Risk Analysis

Health risks in the Supplemental Standards Application area, due to tailings contamination, would be reduced to within the EPA standards.

B.4.1.3 Construction Parameters

Construction of this alternative consists of removing material with an extended boom backhoe or drag line. If only minor surface deposits are removed, the tailings would be excavated and backfilled with topsoil, the area would be re-vegetated, and erosion control geotextiles would be installed. If significant deposits of tailings were uncovered, the entire hillside would be sloped back to a stable slope, topsoil would be placed, and the area would be re-vegetated. In either of these cases, additional maintenance, including watering the area, would be required to insure the regrowth of vegetation.

B.4.1.4 Alternative Specific Issues

The exact scope of complete remedial action is unknown at this time. The slopes are too steep to safely perform an adequate radiological assessment of the cliff hillside.

B.4.1.5 Engineering Data

No areas of contamination which exceed the EPA standards will remain in place. The estimated Subcontractor cost, volume of contaminated materials to remain, and volume of contaminated materials to be removed is known because the complete extent of contamination is unknown.

B.4.2 Alternative 2 - Partial Remediation (Supplemental Standards Application-Remediate Deposits in Assessed Areas)**B.4.2.1 Work Description**

The work required for this alternative includes but is not limited to removing contaminated material from the steep slopes of the cliff/hillside, backfilling with topsoil, re-vegetating the disturbed areas, and installing erosion protection geotextiles. This alternative would remove all the tailings which were assessed on the hillside but would not include remediation of the areas which were not assessed.

B.4.2.2 Health Risk Analysis

Health risks in the assessed areas, due to tailings contamination, would be reduced to within the EPA standards.

B.4.2.3 Construction Parameters

Construction of this alternative consists of removing material with an extended boom backhoe or drag line. All contaminated material in assessed areas is to be removed and backfilled with topsoil. The area would then be re-vegetated and erosion control geotextiles would be installed. Additional maintenance, including watering the area, would be required to insure the regrowth of vegetation.

B.4.2.4 Alternative Specific Issues

This alternative entails excavation on extremely steep terrain. Construction presents a hazard to workers as well as the environment. Excavation will destroy the root structure of existing vegetation currently limiting erosion. Stabilization of the slopes after construction will be very difficult. The slopes are too steep to safely perform an adequate radiological assessment.

B.4.2.5 Engineering Data

No areas of contamination which exceed the EPA standards will remain in place in areas where Geotech was able to assess contamination. An unknown amount of contamination exceeding EPA standards will remain in place; the estimated amount of contaminated material to remain is unknown since Geotech could not safely perform a radiological assessment in some steep areas of the

cliff/hillside. The estimated Subcontractor cost of remedial action work required for this alternative is \$8,175. A tabulation of the cost estimate elements is presented in Table B.T2. The estimated volume of contaminated materials to be removed is 75 cubic yards. The average cost to remove the tailings would be \$87.20 per cubic yard (based upon no contingency for quantity or cost).

B.4.3 Alternative 3 - No Remediation (Supplemental Standards Application)

B.4.3.1 Work Description

No work is required for this alternative.

B.4.3.2 Health Risk Analysis

The health risks associated with this alternative are approximated in Table B.T1. There is a low probability that allowable gamma dose rates will be exceeded, based on the data presented in Table B.T1.

B.4.3.3 Construction Parameters

Construction is not required for this alternative.

B.4.3.4 Alternative Specific Issues

Surface runoff from precipitation may erode the existing slope and cause tailings left in place to migrate down the hillside. Although this possibility exists, the erosion potential is somewhat minimized by the existing vegetation on the hillside. Additional vegetation might further stabilize the hillside and therefore reduce the erosion potential. Geotech did not formally address this stabilization alternative for four reasons: 1) the vegetation effort, if done properly, would expose the workers to the same risks as remediation; 2) the vegetative effort would require a great deal of post-remedial action maintenance; 3) the 'construction' effort to increase vegetation could disturb the surrounding soil and end up creating more harm than good; and, 4) after all this effort, the tailings would still be left on a steep slope whose long-term stability is not assured.

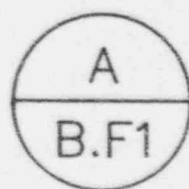
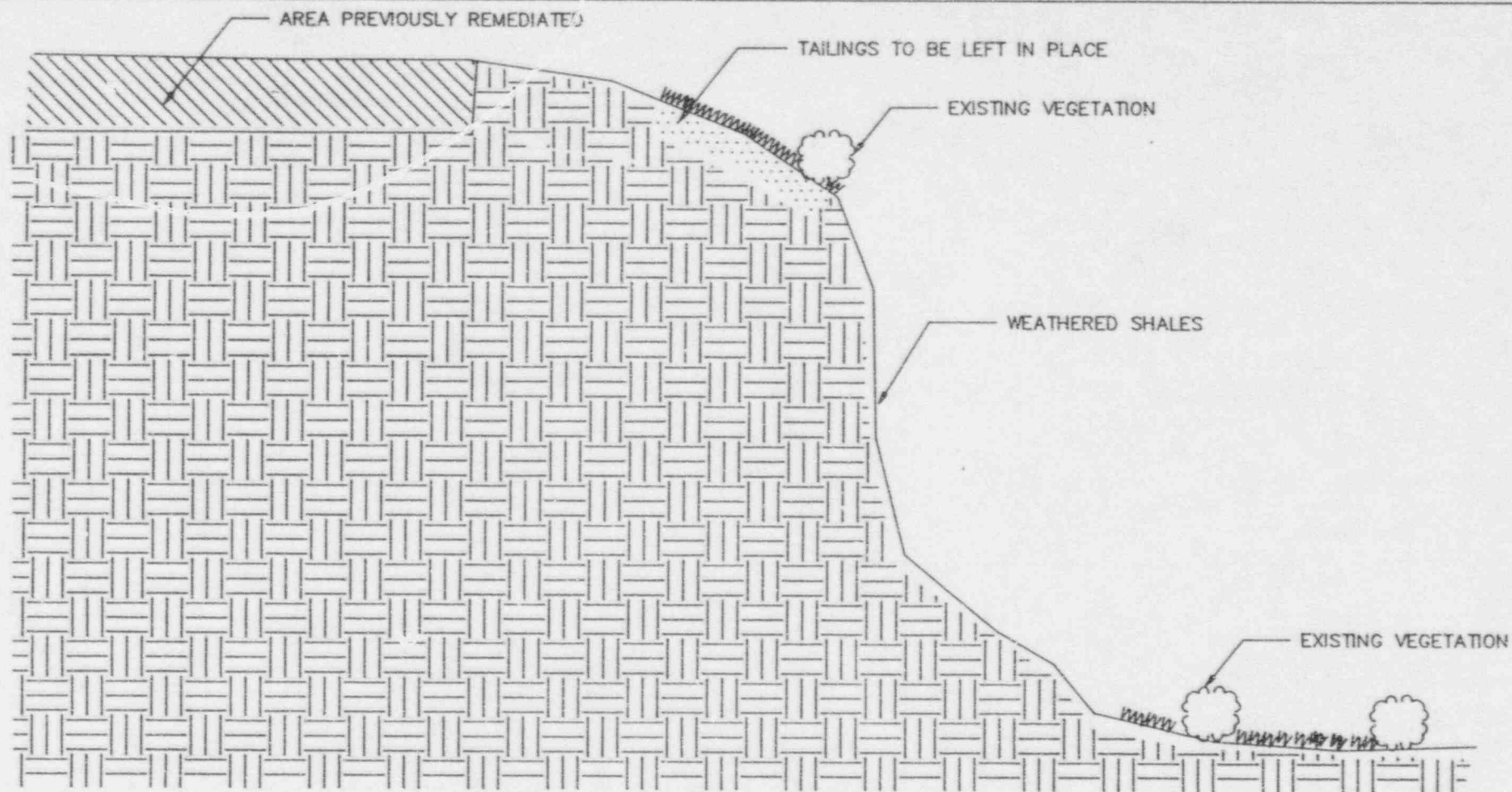
In the event that tailings did erode down the hillside, the small quantity of tailings involved, combined with their low levels of radioactivity, should not create a health risk to the public. This is especially true at this location since the land below (3012 C Road) is pasture land which is situated in the floodplain of the Colorado River. Since the land below is located in a floodplain, there is a low potential that any habitable structures will be constructed near deposits of tailings that migrate down the hillside.

TABLE B.T2

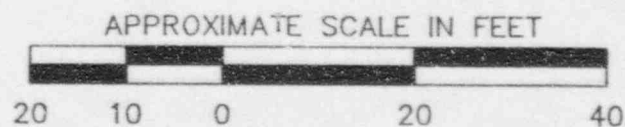
GJ-07332-MR
 3010 C ROAD
 (INCLUDES A PORTION OF
 GJ-45271-VL, 3012 C ROAD,

COST ESTIMATE FOR PARTIAL REMEDIATION - ALTERNATIVE 2

ITEM NO.	ITEM	QUANTITY	UNIT COST/UNITS	AMOUNT (\$)
1.	REMOVE TAILINGS AND REPLACE WITH TOPSOIL	75	\$40.00 CY \$	3000
2.	PLANT SHRUBS AND GRASS TO PREVENT EROSION	4100	0.40 SF	1640
3.	MINIMUM CHARGE FOR 40 T CRAWLER CRANE WITH DRAGLINE BUCKET(WITH CREW)	1	1300.00 DAY	1300
4.	PERIODIC VISITS TO REWATER AND ENSURE VEGETATION GROWTH	24	25.00 HR	600
5.	INSTALL EROSION PROTECTION FABRIC ON HILLSIDE	500	4.00 CY	2000
SUBTOTAL:				\$6,540
CONTINGENCY(25%):				\$1,635
TOTAL COST:				\$8,175



SECTION OF HILLSIDE



INCLUDES A PORTION OF GJ-45271-VL
LOCATED AT 3012 C ROAD

U.S. DEPARTMENT OF ENERGY

3010 C ROAD
GRAND JUNCTION, CO

DOE ID NO. GJ-07332-MR

FIGURE B.F1

B.4.3.5 Engineering Data

No cost is associated with this alternative. The approximate volume of contaminated materials that will be left in place, based on the extent of contamination shown in Figure BF.1, is 75 cubic yards. The actual amount of tailings to be left in place is not known since much of the hillside area was not assessed due to the steep terrain.

B.5 Summary

The data in Table B.T1 suggests that there are no identifiable significant health risks if this Supplemental Standards Application (No Remediation) is approved. In the worst case, a person would have to occupy the point of high gamma exposure for a continuous period of 5,882 hours to receive a 100 mRem dose. It is highly unlikely for an individual to be exposed for the amount of time necessary to exceed the recommended annual maximum dose of 100 mRem, due to both the length of time required and the physical location of those exposure rates.

Each alternative examined by this Application can be summarized as follows:

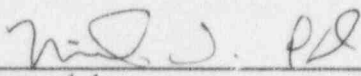
Alternative 1 - Complete Remediation (All Contaminated Material - Assessed and Unassessed Areas)
 Health Risk - Reduced to within EPA standards
 Estimated Construction Cost - Unknown (Due to Incomplete Assessment Data)
 Approximate Volume of Contaminated Materials Removed - Unknown (Due to Incomplete Assessment Data)
 Approximate Volume of Contaminated Materials Remaining - 0 cy

Alternative 2 - Partial Remediation (Supplemental Standards Application - Remediate Deposits in Assessed Areas)
 Health Risk - Reduced to within EPA standards in assessed areas
 Estimated Construction Cost - \$8,175
 Approximate Volume of Contaminated Materials Removed - 75 cy
 Approximate Volume of Contaminated Materials Remaining - Unknown (Due to Incomplete Assessment Data)

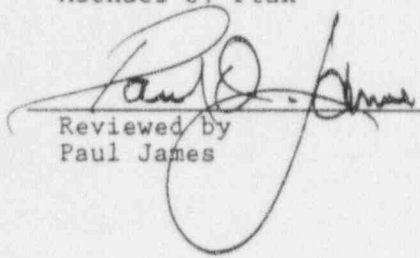
Alternative 3 - No Remediation (Supplemental Standards Application)
 Health Risk - See Appendix B, Table B.T1
 Estimated Construction Cost - \$0
 Approximate Volume of Contaminated Materials Removed - 0 cy
 Approximate Volume of Contaminated Materials Remaining - Unknown (Due to Incomplete Assessment Data)

B.6 Recommendations

Supplemental Standards (No Remediation) should be applied under 40 CFR 192.21 Criteria A and B (see Section B.1). A long-term tailings management, disposal, and migration control plan should be developed and implemented as required in the Romer-Twining UMTRA Management Agreement.


Prepared by
Michael J. Ptak

4/8/92
Date


Reviewed by
Paul James

4/8/92
Date

MP040792
G07332B.APX:CROAD:DZ



Geotech, Inc.

P.O. Box 14000
Grand Junction, Colorado 81502
303 243-6038

Shipping Dept. 314, P.O. Box
Grand Junction, Colorado 81502

June 14, 1991

Mr. Edward Rozman
3010 C Road
Grand Junction, Colorado 80503

SUBJECT: SUPPLEMENTAL STANDARDS APPLICATION FOR DOE ID NO. GJ-07332-MR

Dear Mr. Rozman:

This letter is to inform you that Chem-Nuclear Geotech, Inc. is proceeding with an Application for Supplemental Standards on the hillside on the north of your property at 3010 C Road. We believe that part of this hillside is owned by you and part is owned by Mr. McManaman, your neighbor to the north.

The Environmental Protection Agency supplemental standards allow tailings deposits to remain in place when one or more of the following situations exist: a) clear and present risk to workers and/or the general public; b) excessive environmental harm; c) excessive cost of land cleanup relative to long-term benefits; d) excessive cost of building cleanup relative to benefits; e) there is no known remedial action; or f) radionuclides other than Ra-226 exist.

This Application for Supplemental Standards is to be applied to the tailings deposits which are in an approximately 5 acre hillside between 3010 C Road and 3012 C Road. The depth of the tailings in this area is 6 inches. Items "a" and "b" of the above mentioned criteria are used as justification for this Supplemental Standards Application.

This letter extends the opportunity for you to comment or express any concerns that you may have about this Supplemental Standards Application. It is requested that your response:

1. Acknowledges that this Supplemental Standards Application has been explained to you.
2. Indicates any proposed construction or land use changes in this area in the foreseeable future; and
3. Includes any other questions or comments you may have regarding this Supplemental Standards Application.

If you have any questions regarding this Supplemental Standards Application, please contact me at 243-6038.

Sincerely,

John E. Elmer
Supplemental Standards Coordinator

:dz



Geotech, Inc.

P.O. Box 14000
Grand Junction, Colorado 81502
303/248-6000

Shipping: 2597 B 1/4 Road
Grand Junction, Colorado 81503

July 16, 1991

Mr. L.O. Griffith
2052 South Broadway
Grand Junction, Colorado 81501

SUBJECT: SUPPLEMENTAL STANDARDS APPLICATION FOR DOE ID NO. GJ-O7332-MR
AND GJ-45271-VL

Dear Mr. Griffith:

This letter is to inform you that Chem-Nuclear Geotech, Inc. is proceeding with an Application for Supplemental Standards on the hillside on the south side of your property at 3012 C Road. We believe that part of this hillside is owned by you and part is owned by Mr. Rozman, your neighbor to the south.

The Environmental Protection Agency supplemental standards allow tailings deposits to remain in place when one or more of the following situations exist: a) clear and present risk to workers and/or the general public; b) excessive environmental harm; c) excessive cost of land cleanup relative to long-term benefits; d) excessive cost of building cleanup relative to benefits; e) there is no known remedial action; or f) radionuclides other than Radium-226 exist.

This Application for Supplemental Standards is to be applied to the tailings deposits which are in an approximately 5 acre hillside between 3010 C Road and 3012 C Road. The depth of the tailings in this area is 6 inches. Items "a" and "b" of the above mentioned criteria are used as justification for this Supplemental Standards Application.

This letter extends the opportunity for you to comment or express any concerns that you may have about this Supplemental Standards Application. It is requested that your response:

1. Acknowledges that this Supplemental Standards Application has been explained to you.
2. Indicates any proposed construction or land use changes in this area in the foreseeable future; and
3. Includes any other questions or comments you may have regarding this Supplemental Standards Application.

Mr. L.O. Griffith
July 16, 1991
Page 2

If you have any questions regarding this Supplemental Standards Application,
please contact me at 248-6469.

Sincerely,



Michael Ptak
Project Engineer

:dz

Attachment 1 Location Plan
Attachment 2 Topographic Map
Attachment 3 Extent of Contamination
Attachment 4 Radiological Map
Attachment 5 Section of Hillside

cc: Records Management
Joe Virgona, DOE
Engineering Property Folder
Mike Madson, Program Manager

G07332LE.2:CROAD:CP



Ed Rozman
3010 C Road
Grand Junction, Co. 81503
303-434-5927

January 14, 1992

Geotech, Inc.
P.O. Box 14000
Grand Junction, Colorado 81503

Dear Mr. Michael Ptak:

I signed the initial agreement to start remedial action March 5, 1990. After numerous delays, by Geotech, the project still has not been completed. Working with D. O. E. (Robert Ivey) and Geotech, has been a frustrating experience.

June of 1990 I had an on sight meeting with Robert Ivey. A promise was made to provide an overall design and scheduled construction completion. I informed Mr. Ivey I would respond to the request for supplemental standards upon completion of construction. A copy of Mr. Ivey's letter is enclosed. Please note the accuracy of his schedule. It is Jan. 14, 1992 and a final inspection is scheduled for 1p.m.

I resent the insinuation that I have been unresponsive to your request for written comments. You refer to numerous phone calls. How about making reference to content discussed in those phone calls. If you recall my statement would be sent when construction on my residence was completed, which you understood. My concerns were totally ignored by D. O. E. and Geotech. I had to request assistance from the Colorado Department of Health. Only with the help of Bud Franz and Jim Hams did I receive a satisfactory engineering design.

The final inspection did not take place. The contractor did not show up. Construction is not complete as per contract design.

My comments are as follows:

STATEMENT OF OPPOSITION

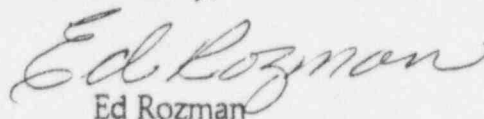
Concerning The Application For Supplemental Standards Of:

Department Of Energy ID No. GJ-07332-MR

I disagree with my property being considered for supplemental standards. Areas included are too general in nature. Some areas to be included do not meet the criteria set forth by the Environmental Protection Agency.

1. Opposers are the owners and users of private property which could be adversely affected by the granting of the application.
2. Applicants must be put on strict proof that the requested decree can be issued without affecting the rights of the opposers, otherwise the applicants application must be dismissed.
3. Applicants must be put on strict proof that the requested decree will not affect the use of opposers property for, but not limited to, additional residential building sites, farm use, installation of a pond for wildlife habitat, and commercial, i.e. mining of existing gravel beds.
4. Applicants must be put on strict proof that the opposers will not incur future financial obligations for clean up if decree is granted.
5. Opposers reserve the right to raise additional points of opposition based upon information not readily ascertainable from the application.
6. This Statement of Opposition shall be of continuing force and effect and apply to all amendments to the application.

Sincerely,


Ed Rozman

pc: Hank Brown -- U. S. Senator
Robert Ivey -- DOE
Bud Franz -- CDOH
Jim Hams -- CDOH

LOG Investments

P.O. BOX 3329
GRAND JUNCTION COLO 81502

(303) 243-5880

July 16, 1991

Michael Ptak
UNC Geotech, Inc.
P.O. Box 14000
Grand Jct., CO. 81502

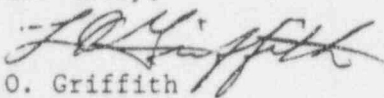
Re: Letter dated July 16, 1991, Supplement Standards Application for DOE
ID NO. GJ-07332-MR And GJ-45271-VL

Dear Michael:

I hereby acknowledge that the supplemental standards application has been explained to me concerning the subject property.

I concur with the decision to make application to leave the tailings in place on subject property.

Yours truly,


L.O. Griffith

SEE APERTURE CARD FILES

ACCESSION NUMBERS OF OVERSIZE PAGES:

9707020190-43