

DEPARTMENT OF ENERGY
ALBUQUERQUE OPERATIONS OFFICE
CONTRACT NO. DE-AC04-83AL18796

Draft Radiological and Engineering Assessment

Vicinity Property No. DUR 024

Remedial Actions
Contractor
for the
Uranium Mill Tailings
Remedial Actions
Project



MORRISON
KNUDSEN

8507090354 850208
PDR WASTE
WM-48 PDR

Vicinity Property No. DUR 024

DRAFT

THE RADIOLOGICAL AND ENGINEERING ASSESSMENT

AND FINAL DESIGN

FOR

DURANGO PROPERTY

DU-024

February 5, 1985

PREPARED FOR

URANIUM MILL TAILINGS REMEDIAL ACTION PROJECT OFFICE

UNITED STATES DEPARTMENT OF ENERGY

PREPARED BY

MORRISON-KNUDSEN COMPANY, INC.

NOTE:

SUPPLEMENTAL STANDARDS

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1.0 EXECUTIVE SUMMARY

1.1 Introduction

Property DU-024 is a private residence located at 38 Rio Vista Circle, Durango, CO.

1.2 Evaluation and Recommendation

1.2.1 Residual Radioactive Material Involvement

The front yard of the property is contaminated. No interior contamination is present.

1.2.2 Recommended Remedial Action Option

The recommended option is to remove the contaminated material except for that under the sidewalk. This material will be left in accordance with the criteria of 10 CFR 192.21(c), "Criteria for Applying Supplemental Standards."

1.2.3 Estimated Costs

The estimated cost for removal of the contaminated material and restoration of the property is \$9,800.00.

1.2.4 Schedule

The estimated duration of the remedial action effort is 3 to 5 days.

2.0 ENGINEERING FIELD SURVEY

2.1 Property Description

2.1.1 Property Use and Occupancy

Property DU-024 is a private residence located at 38 Rio Vista Circle, Durango, Colorado and owned by Jerry and Sarah Davis. This house is used as a rental unit. The map in Figure 2.1 illustrates the property's vicinity location.

2.1.2 Legal Description

The legal description as recorded with the La Plata County Recorder's Office on Microfilm No. 497926 follows:

The Southerly 66-1/2 feet of Lot 8, adjoining Lot 9, Block 2, RIVERVIEW PARK SECOND RESUBDIVISION of the City of Durango according to the recorded plat thereof, La Plata County, Colorado.

2.1.3 Bordering Properties

The lot is zoned R-1, single family residence. It is located in a residential area less than 3-1/2 miles northeast of the old Vanadium Corporation of America mill tailings site. The property is bounded on the north by a residence; on the east by a residence; on the south by a residence; and on the west by Rio Vista Circle.

2.2 Existing Facilities and Structures

2.2.1 Structures

The residence is a single story brick veneered wood frame structure on a concrete foundation. There is an attached brick veneered wood frame single car garage on the south side of the house with a concrete driveway that extends to the street. A concrete sidewalk extends along the street outside the west property line. In the rear yard there is a concrete patio adjoining the house.

The yard is fully landscaped. The rear yard is fenced, and includes two wood retaining walls and a low stone retaining wall at the north end of the yard. From the retaining walls to the back fence line the lot slopes upward steeply to the east.

The residence is less than 50 years old and therefore meets the requirements of Stipulation I.a. of the Programmatic Memorandum of Agreement between the DOE, the Colorado Historic Preservation Officer, and the Advisory Council on Historic Preservation.

2.2.2 Utilities

Utilities are serviced to the property as follows:

Electric power - Overhead to the southeast corner of the house.

Telephone - Overhead to the east side of the house.

Water - Underground from Rio Vista Circle.

Gas - Underground from rear (east) of lot.

Sewer - Underground from Rio Vista Circle.

2.2.3 Site Plan and Survey Data

See Figure 2.2 for a site plan of the property. Property survey data and photos are presented in Table 2.1 and Figure 2.3.

Table 2.1

PROPERTY SURVEY DATA

GENERAL:

Site Location: Durango

Property Address: 38 Rio Vista Circle

Owner's Name: Jerry and Sarah Davis Address: 2755 County Road 250

Lot No.: 8 Property Type: Residence - Rental Unit

Occupancy Group: Adults: N/A Children: N/A

Survey Completed By: R. Livengood/C. Sanders-Meena Date: 5-16-84

Property Description - Exterior:

Dwelling: Sq. Ft.: N/A

Levels: Single Story with Crawl Space

Construction Type: Brick Veneered Wood Frame

Foundation: Poured concrete

Garage: Single Car Attached Brick Veneered Wood Frame

Storage Bldg: Prefab: None

Other: _____

Improvement Additions: None Porches: Concrete - West Side

to Dwellings: Deck: None Patio: Concrete - East Side

Other: _____

Driveway: Concrete: X Paved: _____

Gravel: _____ Other: _____

Sidewalks: Concrete/Paved: Along Street on East Side of Lot

Other: _____

Fences/Gates: Wood: 6' High Along Back (West) on Property Line

Chain Link: 5' High on N. Side Backyard/3' High S. Side Backyard

Radiological and Engineering Assessment: Property DU-024

Table 2.1 (cont'd)

PROPERTY SURVEY DATA

Site Location: Durango

Property Address: 38 Rio Vista Circle

Grounds: Lawn: Full Front; Back Yard Except in Terraced Area

Trees: As Noted on Drawing

Shrubs: As Noted on Drawing

Garden: In Terraced Area in Backyard

Grading: 50% Above Rock Retaining Wall/20% for SE Grassed Area

Other:

Soil Type: Rocky Area in SE Corner Next to Fence

Existing Survey Plot: Yes

Property Description - Interior: No Interior Contamination

Walls

Room	Floor	E	W	N	S	Ceiling	Comments
------	-------	---	---	---	---	---------	----------

Utilities:

Heating: Gas: X Electric:

Hot Water: _____ Other: _____

Air Cond: Gas: _____ Heat Pump: _____

Radiological and Engineering Assessment: Property DU-024

Table 2.1 (cont'd)

PROPERTY SURVEY DATA

Site Location: Durango

Property Address: 38 Rio Vista Circle

Electric Line Location: Overhead to SE Corner of House

Gas Line Location: Underground from Rear (East) of Lot

Water Line Location: Underground from Rio Vista Circle Main (See Drawing)

Sewage Line Location: Underground from Rio Vista Circle Main (See Drawing)

Telephone Line Location: Overhead to East Side of House

Building Codes and Zoning:

<u>Codes</u>	<u>!</u>	<u>Local</u>	<u>!</u>	<u>State</u>	<u>!</u>	<u>Federal</u>	<u>!</u>
<u>Building Work</u>	<u>!</u>	<u>UBC</u>	<u>!</u>		<u>!</u>		<u>!</u>
<u>Plumbing</u>	<u>!</u>		<u>!</u>		<u>!</u>		<u>!</u>
<u>HVAC</u>	<u>!</u>		<u>!</u>		<u>!</u>		<u>!</u>
<u>Electrical</u>	<u>!</u>		<u>!</u>		<u>!</u>		<u>!</u>
<u>Other</u>	<u>!</u>		<u>!</u>		<u>!</u>		<u>!</u>

Zoning District: City of Durango

Present Dwelling Zoning: R-1 Residence District

Setbacks: Front: _____

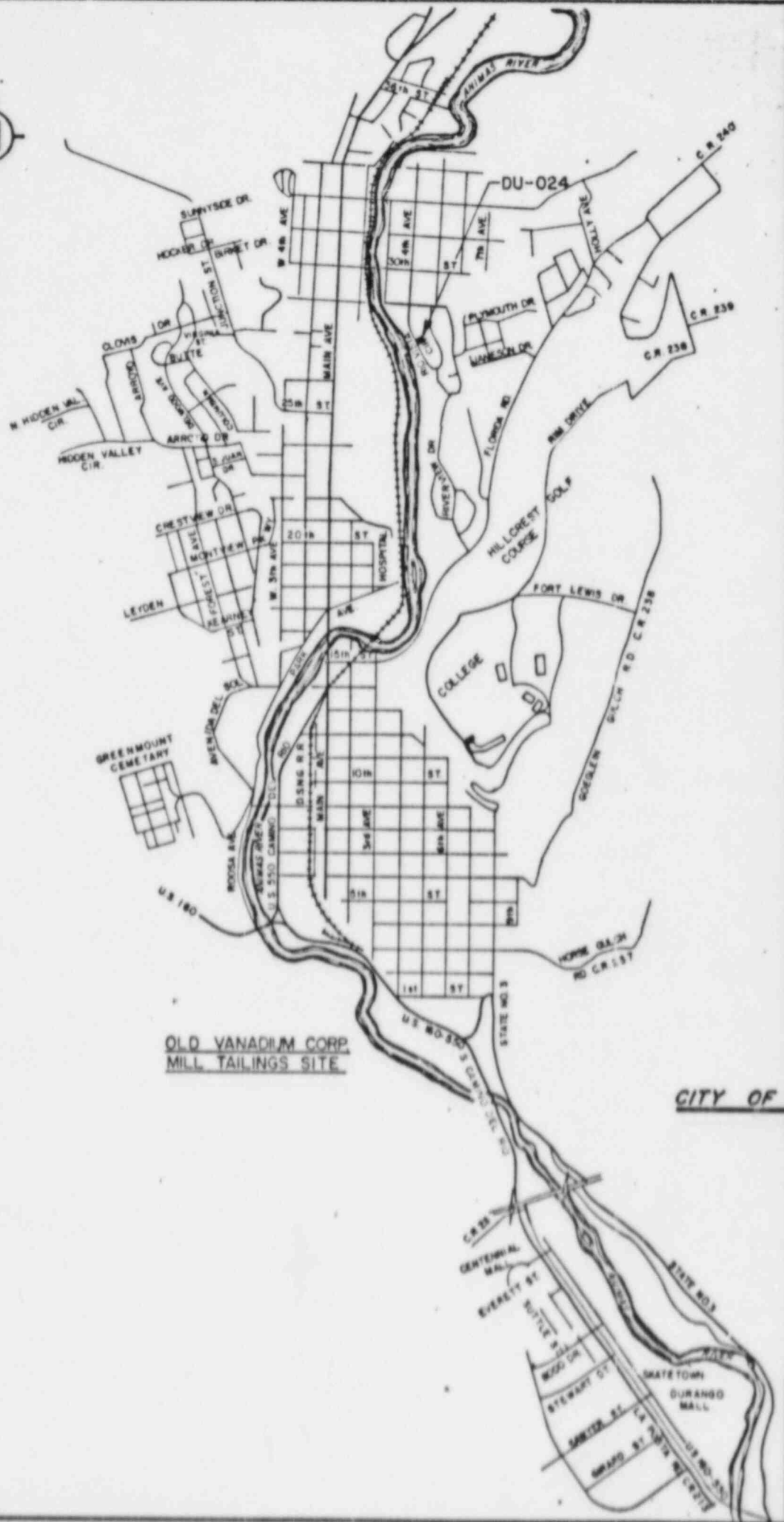
Rear: _____

Side: _____

Other: _____

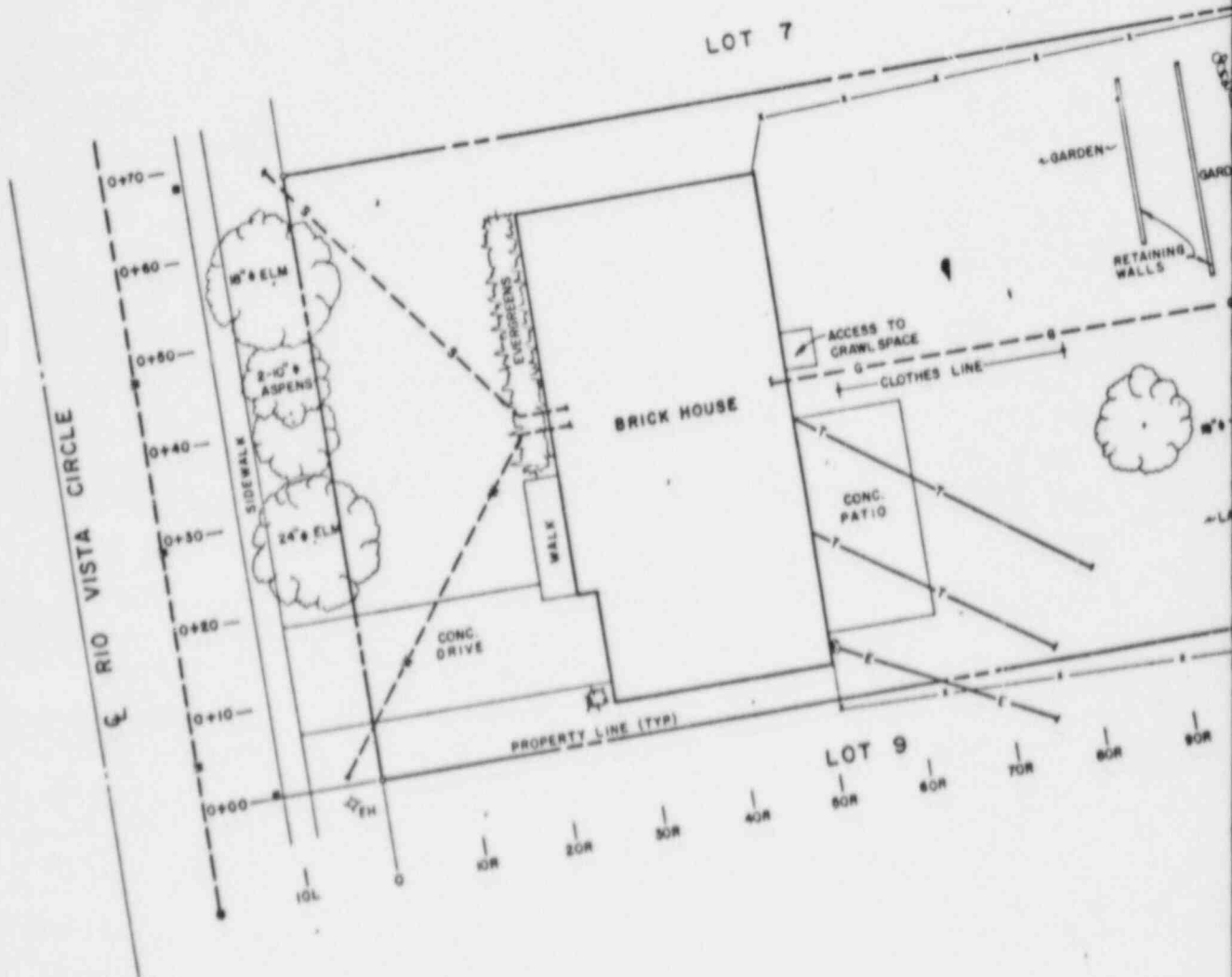
Photographs:

<u>Roll Frame</u>	<u>Description</u>	<u>Direction</u>
<u>2-21</u>	<u>Front of House</u>	<u>Looking Southeast</u>
<u>2-18</u>	<u>Rear of House</u>	<u>Looking Northwest</u>



OLD VANADIUM CORP
MILL TAILINGS SITE

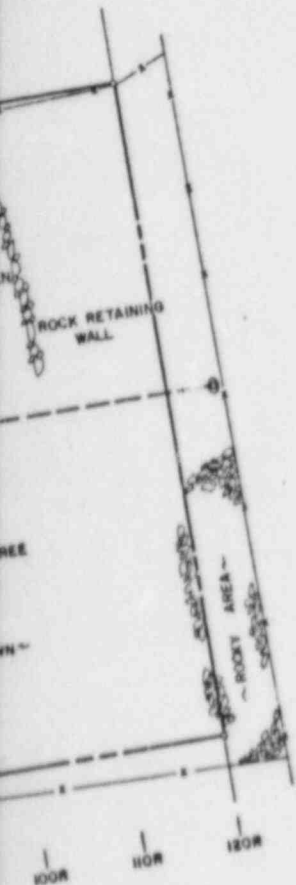
CITY OF



LEGEND

— W —	WATER LINE
— G —	GAS LINE
— GM —	GAS MAIN
— S —	SEWER LINE
— SM —	SEWER MAIN
— STM —	STORM SEWER
— E —	ELECTRICAL LINE
— T —	TELEPHONE LINE
— TV —	CABLE TV
— — —	PROPERTY LINE
— x — x — x —	FENCE LINE
⊙ G, W or E	METER
⊗ G or W	VALVE
⊙	PROPERTY PIN
⊙	POWER POLE

NOTE: OVERHEAD SERVICE DENOTED BY SOLID LINE.
UNDERGROUND SERVICE DENOTED BY DASHED LINE.



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DESIGNED BY
CHECKED BY
APPROVED BY
DATE

FIGURE 2.2
SITE PLAN DU-028
DURANGO, COLORADO
URANIUM MILL TAILINGS REMEDIAL ACTION PROJECT

DATE NR DATE NR DATE NR

MORRISON
KNUDSEN

PROJECT NO.
DE-AC04-83AL18796
DRAWING NO. DU-024-010
REV. A

124	FINAL REA SUBMITTAL	RR	AP	AP	LM	VED	—
DATE	REVISIONS	BY	BY	DATE	DATE	DATE	DATE



Front of House Looking Southeast



Rear of House Looking Northwest

Figure 2.3 Property Photos

3.0 RADIOLOGICAL SURVEY AND ASSESSMENT

3.1 Gamma Exposure Rate Survey

3.1.1 Survey Method

The outdoor contaminated areas identified in the inclusion survey (results of the Radiological Survey at Vicinity Property DU-024, ORNL, June 1983) were surveyed in accordance with the RAC UMTRA Procedure 019. The survey was made on a 10' x 10' grid. A surface scan was made of the entire gridded yard with a gamma scintillometer to identify the boundary of the contamination.

An indoor gamma survey was not conducted inside the house, since the inclusion survey indicated that no contamination is present in or under the structure. The crawl space was surveyed and found to be clean.

3.1.2 Survey Results

Surface gamma readings on the property range from 13 to 62 micro R/hr. This may be compared with the background for the Durango site of 14 micro R/hr. Table 3.1 lists surface gamma readings greater than 16 micro R/hr.

3.2 Borehole Survey

3.2.1 Survey Method

A gasoline-powered hand auger was used to drill 4-inch diameter holes in and around the regions identified as contaminated during the gamma survey. The holes were surveyed in compliance with the RAC UMTRA Procedure 018.

3.2.2 Survey Results

Contamination was found in 7 of the 10 outdoor holes augered. The location and depth of the contamination is described in Table 3.2 and is shown in Figure 3.1.

Four shovel holes were dug east of the house, as shown in Figure 3.1. Three of these holes were in a small area just north of the concrete patio, where the Colorado Department of Health had previously reported elevated gamma readings. One small patch of low-level contamination was identified, but this is well below standards for removal.

The possibility that contamination could be underneath the house was investigated by digging four holes, one on each side of the house, and then augering an angled hole underneath the house. These holes are shown in Figure 3.1. One hole was dug at the point where the main water line and the sewer line enter the house. No contamination was found in any of these holes. It is concluded that no contamination is found underneath the house on this property.

3.3 Radon/Radon Daughter Survey

No radon/radon daughter surveys were performed inside buildings at the property, since the inclusion survey reported that no contamination is present in or under the structures.

The inclusion survey reported a "grab measurement" radon daughter concentration of 0.004 WL inside the house.

3.4 Estimated Extent of Contamination

As shown on Figure 3.1, the front yard is contaminated to an approximate depth of 18 inches. Pockets of contamination may extend to 30 inches deep. Because of the extreme difficulty of drilling in this area, the depth could not be completely defined, and a resurvey of the property after initial excavation will be indicated.

3.5 Supplemental Standards

Supplemental Standards, per 40 CFR 192.21(c), apply to the contamination under the sidewalk and, therefore, no excavation is required in this area.

Radiological and Engineering Assessment: Property DU-024

Table 3.1
OUTDOOR SURFACE GAMMA SURVEY
Property DU-024

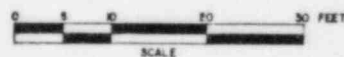
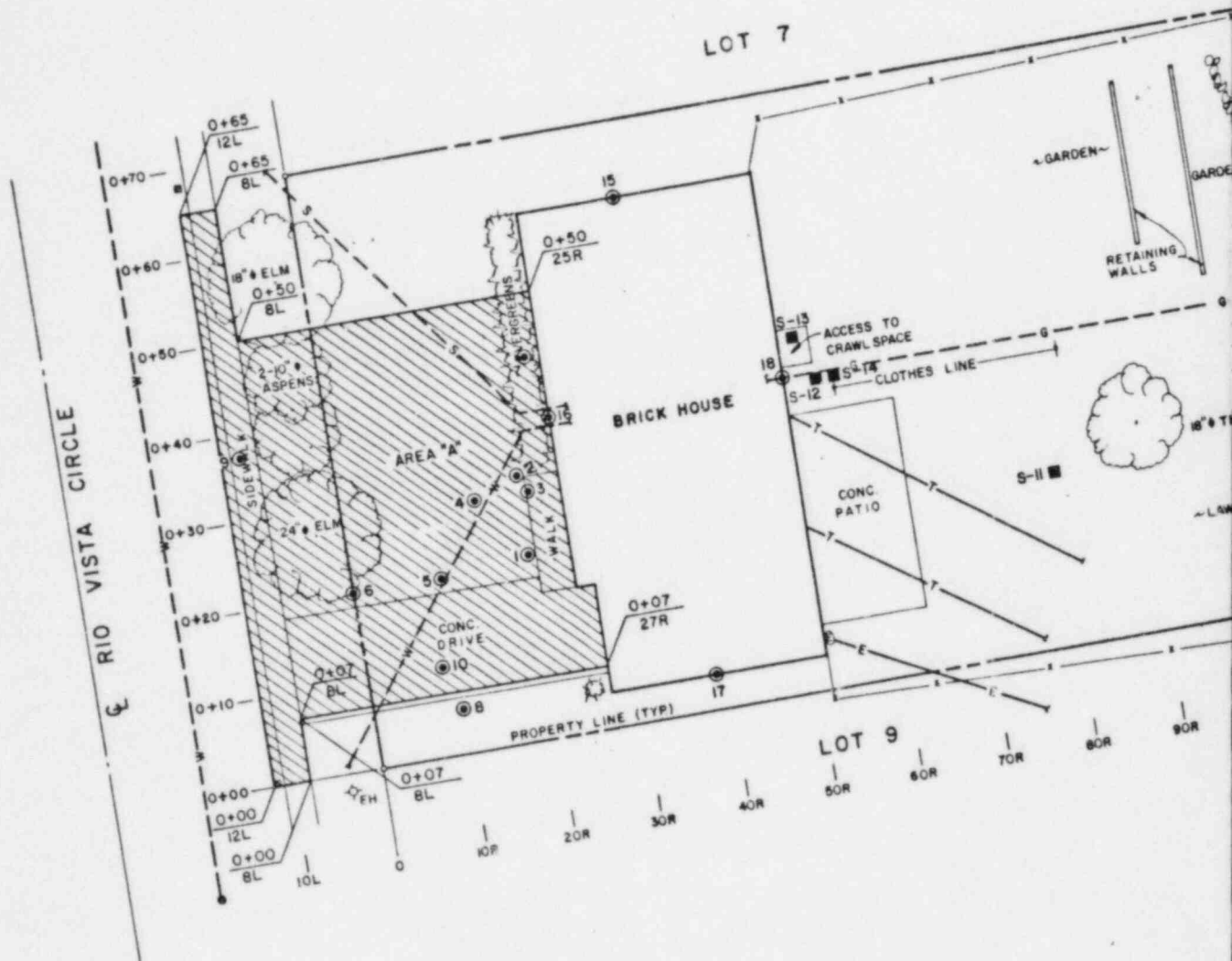
POINT	MICRO R/hr
0+00,10L	25
0+10,10L	62
0+20,10L	38
0+30,10L	29
0+40,10L	47
0+50,10L	28
0+60,10L	23
0+67.5,10L	18
0+00,00R	17
0+10,00R	51
0+20,00R	28
0+30,00R	17
0+00,10R	17
0+10,10R	49
0+20,10R	25
0+30,10R	18
0+10,20R	23
0+20,20R	49
0+30,20R	49
0+40,20R	19
0+20,25R	20

Table 3.1 - Cont'd.
OUTDOOR SURFACE GAMMA SURVEY
Property DU-024

POINT	MICRO R/hr
0+30,25R	18
0+40,25R	29
0+50,25R	17
0+00,40R	17
0+05,40R	17
0+30,54R	17
0+40,54R	17
0+20,80R	17

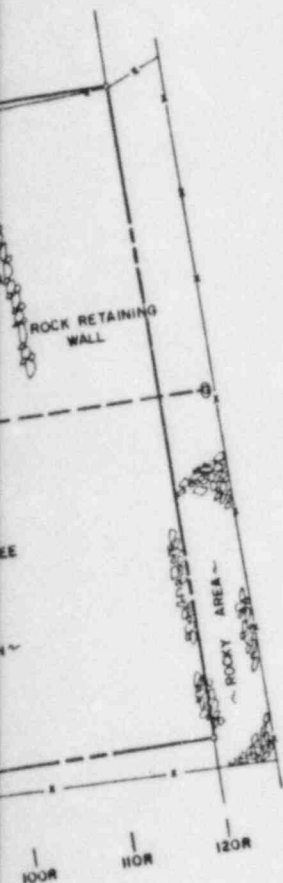
Table 3.2
BOREHOLE SURVEY
Property DU-024

HOLE	COORDINATE	CONTAMINATION DEPTH
1	0+21,20R	0-18"
2	0+30,20R	0-18"
3	0+28,21R	0-15"+
4	0+28,15R	None
5	0+20,10R	0-24"
6	0+20,00R	0-18"
7	0+43,23R	None
8	0+05,10R	None
9	0+37,10L	0-12"+
10	0+10,8.5R	0-30"+



④ 4 AUGER HOLE DESIGNATION
■ S-13 SHOVEL HOLE DESIGNATION

A cross-sectional diagram of a pipe. The central core is a rectangle with diagonal hatching. This core is surrounded by a thin, uniform layer. The outermost boundary is a solid line. To the right of the diagram, the text "x 16''" is written.



LOT 24

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U. S. DEPARTMENT OF ENERGY ALBUQUERQUE, NEW MEXICO											
DESIGNED CHAWN CHECKED GUM REVIEWED RECOMMENDED		FIGURE 3.1 RADIOLOGICAL SURVEY DATA DU-024 DURANGO, COLORADO UHANKUM MILL TAILINGS REMEDIAL ACTION PROJECT									
APPROVED NR		DATE		DOE PROJECT MANAGER NR		DATE		DOE PROJECT ENGINEER NR		DATE	
PROJECT NO.		DE-ACO4-83AL18796									
DRAWING NO.		DU-024-015									
REV.		A									

4.0 ENGINEERING ASSESSMENT

Engineering options were formulated and evaluated based on the radiological and engineering assessment for this property. Factors forming the basis of the evaluation were: the extent and location of the contamination, construction costs, and required demolition and constructibility for the various options. Results of the evaluation are detailed below.

4.1 Evaluation of Options

4.1.1 Options

Two options were evaluated for property DU-024:

1. No action should be taken.
2. Complete decontamination of the property including retrieval of the contaminated material and restoration of the property.

Option 2 includes the following:

- o Excavate contaminated materials in areas shown in Figure 4.1.
- o Backfill with common fill. Top with topsoil and sod in lawn areas. Top with structural fill in driveway and porch area.
- o Excavate Area "A" to the edge of the concrete sidewalk along Rio Vista Circle. The sidewalk will be excavated at a later date along with Rio Vista Circle.
- o Remove, salvage and replace wood railing around front porch.
- o Remove and replace shrubs.
- o Hand excavate around trees.

4.1.2 Costs

Estimated costs for the activities associated with Option 2 are detailed in Table 4.1. Costs include labor, insurance, material, equipment, supplies, overhead, profit, and contingency. All costs are listed in 1985 dollars. It is anticipated that the time required for the subcontractor to complete the work will be 3 to 5 days.

4.2 Recommendation

The limited cost and amount of remedial action work precluded evaluating any more than these two options. The results of the radiological assessment concluded that contamination levels on the property exceeded EPA guidelines. Therefore, based on these guidelines, it is recommended that Option 2, decontamination of the property, be pursued. The total estimated cost for Option 2 is \$9,800.00.

Table 4.1
OPTION 2 COSTS

Activity	Unit Price	Quantity	Estimated Cost
Remove Porch Rail	1s		220.00
Demolish Concrete Driveway and Porch	3.00	530 sf	1,590.00
Excavation (Hand)	59.05	13 cy	768.00
Excavation (Machine)	8.30	70 cy	581.00
Tree Removal	100.00	3 ea	300.00
Backfill Common (Machine)	7.20	47 cy	338.00
Backfill Common (Hand)	22.40	9 cy	202.00
Topsoil	26.40	17 cy	449.00
Structural Fill	26.40	10 cy	264.00
Sod	3.00	103 sy	309.00
Concrete Driveway and Porch	3.50	59 sy	207.00
Hedges	50.00	10 ea	500.00
Replace Porch Railing	1s		140.00
Replace Trees	300.00	3 ea	900.00

Subtotal	\$6,768.00
5% Subcontractor Contingency	338.00
20% Overhead & Profit	<u>1,354.00</u>
Subtotal	\$8,460.00
15% Engineer's Contingency	<u>1,269.00</u>
Total (Rounded)	\$9,800.00

5.0 TECHNICAL SPECIFICATIONS

Technical specifications applicable to this property are indexed in Table 5.1 . Specifications previously approved by the Department of Energy (DOE) are noted in the table. Also listed are specifications not previously submitted to the DOE which require approval. The text for these additional specifications follow the table.

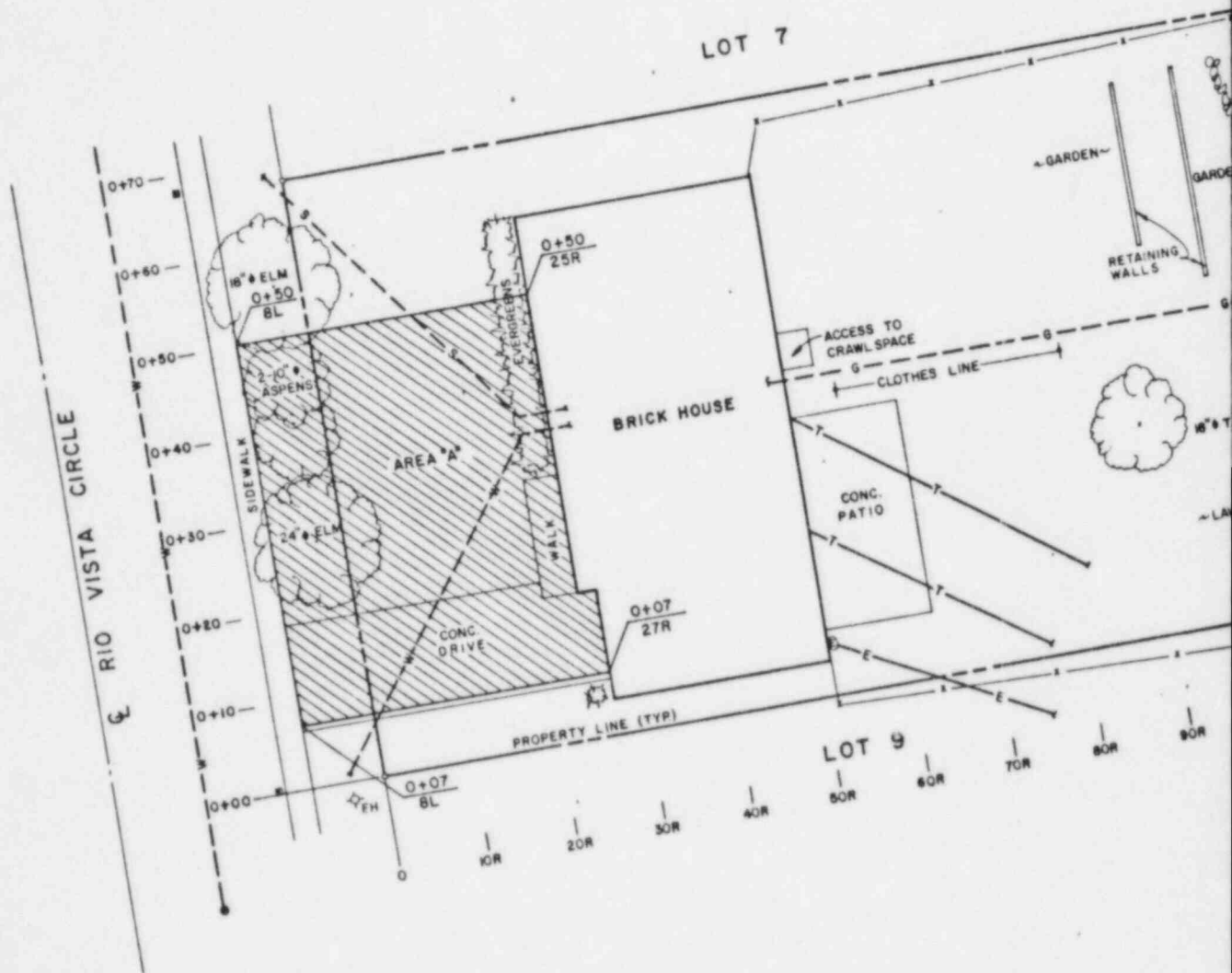
Table 5.1
INDEX OF TECHNICAL SPECIFICATIONS

Description	Specifications	
	Previously Approved	Specifications Requiring DOE Approval
Division 2 - Site Work		
SECTION 02050	DEMOLITION	X
SECTION 02110	CLEARING AND GRUBBING	X
SECTION 02130	CONTAMINATED MATERIAL REMOVAL	X
SECTION 02200	EXCAVATION AND BACKFILL	X
SECTION 02480	LANDSCAPING	X
SECTION 02700	UNDERGROUND PIPING	X
SECTION 03300	CAST IN PLACE CONCRETE	X

6.0 CONSTRUCTION DRAWINGS

Listed below is an index of the construction drawings required for remedial action on this property. Copies of the drawings follow this section.

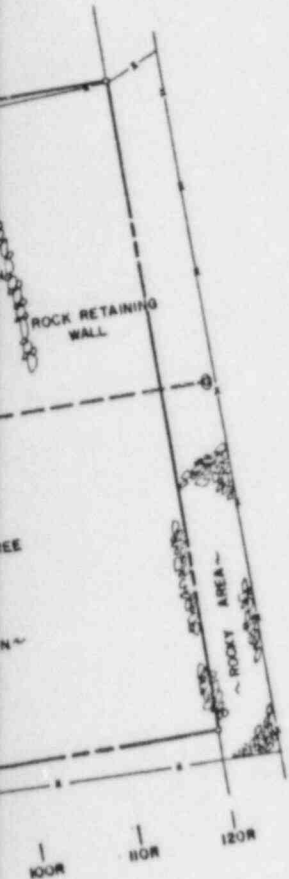
<u>Drawing Number</u>	<u>Drawing Title</u>
DU-024-020	Excavation and Restoration Plan DU-024



LEGEND

— W —	WATER LINE
— G —	GAS LINE
— GM —	GAS MAIN
— S —	SEWER LINE
— SM —	SEWER MAIN
— STM —	STORM SEWER
— E —	ELECTRICAL LINE
— T —	TELEPHONE LINE
— TV —	CABLE TV
— — —	PROPERTY LINE
— X — X — X —	FENCE LINE
⊙ G, W or E	METER
⊗ G or W	VALVE
⊙	PROPERTY PIN
⊙	POWER POLE

NOTE: OVERHEAD SERVICE DENOTED BY SOLID LINE.
UNDERGROUND SERVICE DENOTED BY DASHED LINE.



NOTES:

- THE LATEST REVISION OF THE FOLLOWING TECHNICAL SPECIFICATIONS APPLY TO THE REMEDIAL ACTION WORK REQUIRED FOR PROPERTY NO. DU-024.

SECTION 02050
DEMOLITION

SECTION 02110
CLEARING AND GRUBBING

SECTION 02130
CONTAMINATED MATERIAL REMOVAL

SECTION 02200
EXCAVATION AND BACKFILL

SECTION 02480
LANDSCAPING

SECTION 02700
UNDERGROUND PIPING

SECTION 03300
CAST-IN-PLACE CONCRETE

- UTILITY LOCATIONS ARE FOR REFERENCE ONLY. ACTUAL LOCATIONS SHALL BE DETERMINED BY THE SUBCONTRACTOR PRIOR TO START OF CONSTRUCTION.

- THE EXCAVATION LIMITS AND DEPTHS ARE BASED ON A LIMITED NUMBER OF BORINGS TAKEN DURING THE RADIOLOGICAL SURVEY OF THIS PROPERTY. ADDITIONAL RADIOLOGICAL SURVEYS PERFORMED DURING REMEDIAL ACTION MAY REQUIRE MORE OR LESS EXCAVATION TO BE TAKEN FROM THE DESIGNATED AREAS. ALL CHANGES TO THE LIMITS AND DEPTHS OF EXCAVATION AS SHOWN ON THE DESIGN DRAWINGS SHALL BE AS DIRECTED BY THE CONTRACTOR'S REPRESENTATIVE.

SCOPE OF WORK - DU-024

- REMOVE AND SALVAGE WOOD HANDRAIL AROUND FRONT PORCH.
- REMOVE HEDGES AS NECESSARY FOR EXCAVATION. REPLACE HEDGES WITH SIMILAR TYPE AND SIZE.
- HAND EXCAVATE AROUND THE TREES TO A DEPTH OF 18 INCHES TAKING EXTREME CARE SO AS NOT TO DAMAGE THE TREES OR THE ROOT SYSTEM. AFTER INITIAL EXCAVATION, THE CONTRACTOR'S REPRESENTATIVE WILL RESURVEY AND NOTIFY THE SUBCONTRACTOR IF FURTHER EXCAVATION AND/OR TREE REMOVAL IS REQUIRED. IF TREES ARE TO BE REMOVED, REPLACE WITH SIMILAR TYPE AND SIZE AS PRACTICAL.
- DEMOLISH AND REMOVE DRIVEWAY AND FRONT PORCH.
- EXCAVATE REMAINING AREA TO A DEPTH OF 18 INCHES AND RESURVEY.
- BACKFILL ENTIRE AREA WITH 12 INCHES OF COMMON FILL. TOP WITH 6 INCHES OF STRUCTURAL FILL IN DRIVEWAY AND PORCH AREA AND WITH 6 INCHES OF TOPSOIL IN LAWN AREA AND SOO.
- CONSTRUCT NEW 4 INCH THICK DRIVEWAY TO ORIGINAL SIZE AND ELEVATION. REINFORCE DRIVEWAY WITH WWF 6 x 6 MI 4 x MI 4.
- CONSTRUCT NEW CONCRETE PORCH TO ORIGINAL SIZE AND ELEVATION AND REPLACE WOOD HANDRAIL.

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DESIGNED	DRWN
CHECKED	BY
APPROVED	DATE
REVIEWED	DATE
APPROVED	DATE

FIGURE 4.1 EXCAVATION & RESTORATION PLAN DU-024

DURANGO, COLORADO
URANIUM MILL TAILINGS REMEDIAL ACTION PROJECT

APPROVED	DATE	FOR PROJECT MANAGER	DATE	FOR PROJECT ENGINEER	DATE
NR		NR		NR	
PROJECT NO.					
DE-ACO4-83AL18796					
DRAWING NO. DU-024-020					
REV. A					



MORRISON
KNUDSEN

DATE	REVISIONS	BY	CHKD	APPRD	DATE	BY	CHKD	APPRD	DATE	BY	CHKD	APPRD	DATE
1/24/1983	FINAL REA SUBMITTAL	RR	TP	TP		RR	TP	TP					

APPENDIX A
SURVEY DATA LOGS

OUTDOOR GAMMA SCREENING SURVEY DATA SHEET

LOGGING CREW: E. CONCH
L. BENALLY, JR
E. SCHULTZ

SHEET 1 OF 5 PAGE 1

DATE: JUNE 21, 1984

PROPERTY ID: DM-024

INSTRUMENT ID NO.: LUCILLY 2220 #31972 #4410 #16527

BACKGROUND CALCULATION:

#1 _____ + #2 _____ + #3 _____ = _____ + 3 = 11500 COUNTS/1MIN

AREA: _____		AREA: _____		AREA: _____		AREA: _____	
POINT ID	READING COUNTS/1MIN	POINT ID	READING COUNTS/1MIN	POINT ID	READING COUNTS/1MIN	POINT ID	READING COUNTS/1MIN
0100+10L	45530 43170	0100+20R	18170 20140	0120+54R	15610 15920	0120+80R	14580 14570
0110+10L	148320 88740	0110+20R	39370 43710	0130+54R	21140 16510	0130+80R	15720 14080
0120+10L	86910 73230	0120+20R	112340 63200	0140+54R	20110 16310	0140+80R	17310 14280
0130+10L	59750 51380	0130+20R	115640 61510	0150+54R	16280 16530	0150+80R	16800 15480
0140+10L	108880 5570	0140+20R	26900 29190	0160+54R	16650 15270	0160+80R	15340 13550
0150+10L	53910 33400	0150+20R	18680 18700	0165+54R	15360 15620	0165+80R	12960 13180
0160+10L	39110 25690	0160+20R	16560 17360	0100+60R	14860 13530	0100+90R	13270 12640
0165+10L	25240 27180	0165+20R	19170 18140	0110+60R	15030 14020	0110+90R	14080 13480
0100+60R	22040 28780	0100+25R	18420 18540	0120+60R	14650 14650	0120+90R	12320 12070
0110+60R	120810 76220	0110+25R	17910 28060	0130+60R	14690 15030	0130+90R	12790 12060
0120+60R	57960 62180	0120+25R	38540 42150	0140+60R	14300 13970	0140+90R	18060 12830
0130+60R	19770 24480	0130+25R	25880 37080	0150+60R	14880 14880	0150+90R	17590 14480
0140+60R	17750 21380	0140+25R	61350 32480	0160+60R	14030 14010	0160+90R	18550 18470
0150+60R	16720 18900	0150+25R	20080 18160	0165+60R	14780 14530	0165+90R	18740 17430
0160+60R	15530 17070	0160+25R	17670 18530	0100+70R	13220 13330	0100+100R	13010 12340
0165+60R	14990 17220	0165+25R	19440 17110	0110+70R	14240 13170	0110+100R	12590 11440
0100+70R	19270 22530	0100+30R	17850 17640	0120+70R	14900 18300	0120+100R	12110 12210
0110+70R	113260 61380	0105+30R	18710 18680	0130+70R	14930 14420	0130+100R	11670 10660
0120+70R	47160 58230	0100+40R	22350 17520	0140+70R	13290 14070	0140+100R	12840 12560
0130+70R	24090 31880	0105+40R	20400 17940	0150+70R	14820 13720	0150+100R	14360 12350
0140+70R	17980 20810	0100+50R	17770 16120	0160+70R	13840 14120	0160+100R	13680 12230
0150+70R	16030 17320	0105+50R	17420 17610	0165+70R	13440 13300	0165+100R	18980 12160
0160+70R	16120 16170	0100+50R	15410 15720	0100+80R	13810 12180	0100+110R	12150 12240
0165+70R	15820 16470	0110+50R	14840 15650	0110+80R	14800 15570	0110+110R	12490 11560

REMARKS: ALL MEASUREMENTS ARE IN COUNTS PER MINUTE (CPM)

TOP - CONTACT MEASUREMENT

BOTTOM - ARE MEASUREMENTS TAKEN 1 METER GROUND LEVEL

L. BENALLY, JR

OUTDOOR GAMMA SCREENING SURVEY DATA SHEET

BOREHOLE LOG

LOGGING CREW: E. COUCH
L. BEAMLEY, JR
E. SCHWITZ
 INSTRUMENT ID NO. _____

SHEET 3 OF 5 PAGE 3
 DATE: JUNE 21, 1984
 PROPERTY ID: DU-024
 AREA: DURANGO, Colorado

NOTES: 1. ALL HOLES ARE 4" DIA. UNLESS OTHERWISE NOTED.
 2. RECORD UNUSUAL CONDITIONS, SUCH AS THE PRESENCE OF WATER IN BOREHOLES AND DEPTH, CASING TYPE AND THICKNESS IF USED, CONCRETE CORES AND THICKNESS, OBSTRUCTIONS, UTILITIES, ETC., IN THE REMARKS SECTION.

①		②		③		④	
HOLE ID: <u>0121120K</u>		HOLE ID: <u>0130120K</u>		HOLE ID: <u>0128121K</u>		HOLE ID: <u>0128115K</u>	
TIME DRILLED: _____		TIME DRILLED: _____		TIME DRILLED: _____		TIME DRILLED: _____	
TIME LOGGED: _____		TIME LOGGED: _____		TIME LOGGED: _____		TIME LOGGED: _____	
SOIL TYPE: _____		SOIL TYPE: _____		SOIL TYPE: _____		SOIL TYPE: _____	
DEPTH	COUNTS/.1MIN	DEPTH	COUNTS/.1MIN	DEPTH	COUNTS/.1MIN	DEPTH	COUNTS/.1MIN
SURFACE		SURFACE		SURFACE		SURFACE	
0"	111490	0"	119320	0"	106590	0"	21860
6"	151980	6"	189450	6"	147340	6"	25320
12"	86800	12"	84470	12"	133880	12"	26860
18"	35810	18"	38020	18/15"	93140	18"	23090
24"	29150	24"	28590	24"		24/21"	22740
30/21"	28830	30/26"	29530	30"		30"	
36"		36"		36"		36"	
42"		42"		42"		42"	
48"		48"		48"		48"	
54"		54"		54"		54"	
60"		60"		60"		60"	
66"		66"		66"		66"	
72"		72"		72"		72"	
78"		78"		78"		78"	
84"		84"		84"		84"	
90"		90"		90"		90"	
96"		96"		96"		96"	

REMARKS: BACKGROUND BORE HOLE AVG 23,000 CPM
ALL READINGS ARE IN COUNTS PER MINUTE (CPM)
ALL HOLES WERE DRILLED UNTIL ROCK PREVENTED FURTHER DRILLING

BOREHOLE LOG

LOGGING CREW: E. CONCH
L. BENALLY JR
E. SCHULTZ
 INSTRUMENT ID NO. _____

SHEET 4 OF 5 PAGE 4
 DATE: JUNE 21, 1984
 PROPERTY ID: D11-024
 AREA: DURANGO, Colorado

NOTES: 1. ALL HOLES ARE 4" DIA. UNLESS OTHERWISE NOTED.
 2. RECORD UNUSUAL CONDITIONS, SUCH AS THE PRESENCE OF WATER IN BOREHOLES AND DEPTH, CASING TYPE AND THICKNESS IF USED, CONCRETE CORES AND THICKNESS, OBSTRUCTIONS, UTILITIES, ETC. IN THE REMARKS SECTION.

HOLE ID: <u>DT 20 + 101K</u> ⁽⁵⁾		HOLE ID: <u>DT 20 + 100K</u> ⁽⁶⁾		HOLE ID: <u>DT 43 + 23K</u> ⁽⁷⁾		HOLE ID: <u>DT 05 + 101K</u> ⁽⁸⁾	
TIME DRILLED: _____		TIME DRILLED: _____		TIME DRILLED: _____		TIME DRILLED: _____	
TIME LOGGED: _____		TIME LOGGED: _____		TIME LOGGED: _____		TIME LOGGED: _____	
SOIL TYPE: _____		SOIL TYPE: _____		SOIL TYPE: _____		SOIL TYPE: _____	
DEPTH	COUNTS/.1MIN	DEPTH	COUNTS/.1MIN	DEPTH	COUNTS/.1MIN	DEPTH	COUNTS/.1MIN
SURFACE		SURFACE		SURFACE		SURFACE	
0"	55580	0"	40510	0"	29240	0"	18800
6"	84920	6"	87590	6"	31240	6"	19950
12"	80580	12"	68340	12"	28120	12"	23710
18"	53140	18"	36180	18"	26500	18"	23610
24"	40750	24"		24"		24"	23880
30"		30"		30"		30"	22150
36"		36"		36"		36"	
42"		42"		42"		42"	
48"		48"		48"		48"	
54"		54"		54"		54"	
60"		60"		60"		60"	
66"		66"		66"		66"	
72"		72"		72"		72"	
78"		78"		78"		78"	
84"		84"		84"		84"	
90"		90"		90"		90"	
96"		96"		96"		96"	

REMARKS: _____

BOREHOLE LOG

BOREHOLE LOG

Supplemental Information

LOGGING CREW: Ernest Couch
Edward Schultz
Julius Bittilly

SHEET 1 OF 2 PAGE 1

DATE: October 16, 1984

PROPERTY ID: DU-024

INSTRUMENT ID NO. LVD 2230 #4982 #4410 #16528

AREA: Durango, Colorado

- NOTES: 1. ALL HOLES ARE 4" DIA. UNLESS OTHERWISE NOTED.
2. RECORD UNUSUAL CONDITIONS, SUCH AS THE PRESENCE OF WATER IN BOREHOLES AND DEPTH, CASING TYPE AND THICKNESS IF USED, CONCRETE CORES AND THICKNESS, OBSTRUCTIONS, UTILITIES, ETC., IN THE REMARKS SECTION.

HOLE ID: <u>0+20+80R</u>		HOLE ID: <u>0+35+55R</u>		HOLE ID: <u>0+40+53R</u>		HOLE ID: <u>0+35+57R</u>	
TIME DRILLED: _____		TIME DRILLED: _____		TIME DRILLED: _____		TIME DRILLED: _____	
TIME LOGGED: _____		TIME LOGGED: _____		TIME LOGGED: _____		TIME LOGGED: _____	
SOIL TYPE: _____		SOIL TYPE: _____		SOIL TYPE: _____		SOIL TYPE: _____	
DEPTH	COUNTS/.1MIN	DEPTH	COUNTS/.1MIN	DEPTH	COUNTS/.1MIN	DEPTH	COUNTS/.1MIN
SURFACE	<u>22740</u>	SURFACE	<u>27500</u>	SURFACE	<u>15600</u>	SURFACE	<u>16950</u>
0"	<u>19200</u>	0"	<u>25500</u>	0"	<u>17210</u>	0"	<u>18590</u>
6"	<u>25910</u>	6"	<u>35630</u>	6"	<u>16540</u>	6"	<u>23040</u>
<u>12" 10</u>	<u>27930</u>	12"	<u>35300</u>	<u>12" 8</u>	<u>15130</u>	<u>12" 9</u>	<u>23896</u>
<u>18" 12</u>	<u>27420</u>	<u>18" 15</u>	<u>33610</u>	18"		18"	
<u>24" 13</u>	<u>25410</u>	<u>24" 18</u>	<u>30410</u>	24"		24"	
30"		<u>30" 20"</u>	<u>28220</u>	30"		30"	
36"		36"		36"		36"	
42"		42"		42"		42"	
48"		48"		48"		48"	
54"		54"		54"		54"	
60"		60"		60"		60"	
66"		66"		66"		66"	
72"		72"		72"		72"	
78"		78"		78"		78"	
84"		84"		84"		84"	
90"		90"		90"		90"	
96"		96"		96"		96"	

REMARKS: Shallow holes, shallow holes are due to
rocky ground, background is 23000 cpm,
all counts in CPM.

BOREHOLE LOG

Supplemental Information

LOGGING CREW: Ernest Couch
Edward Schultzy
Julius Butzily
 INSTRUMENT ID NO. 110220 #31982 #4410 #16528

SHEET 2 OF 2 PAGE 2
 DATE: October 16, 1984
 PROPERTY ID: DU-024
 AREA: Ourango, Colorado

NOTES: 1. ALL HOLES ARE 4" DIA. UNLESS OTHERWISE NOTED.
 2. RECORD UNUSUAL CONDITIONS, SUCH AS THE PRESENCE OF WATER IN BOREHOLES AND DEPTH, CASING TYPE AND THICKNESS IF USED, CONCRETE CORES AND THICKNESS, OBSTRUCTIONS, UTILITIES, ETC., IN THE REMARKS SECTION.

15		16		17		18	
HOLE ID: <u>N. WALL</u>		HOLE ID: <u>WATER PIPE</u>		HOLE ID: <u>S. WALL</u>		HOLE ID: <u>E. WALL</u>	
TIME DRILLED: _____		TIME DRILLED: <u>W. WALL</u>		TIME DRILLED: _____		TIME DRILLED: _____	
TIME LOGGED: _____		TIME LOGGED: _____		TIME LOGGED: _____		TIME LOGGED: _____	
SOIL TYPE: _____		SOIL TYPE: _____		SOIL TYPE: _____		SOIL TYPE: _____	
DEPTH	COUNTS/.1MIN	DEPTH	COUNTS/.1MIN	DEPTH	COUNTS/.1MIN	DEPTH	COUNTS/.1MIN
SURFACE	<u>19040</u>	SURFACE	<u>18870</u>	SURFACE	<u>20700</u>	SURFACE	<u>17910</u>
0"	<u>20190</u>	0"	<u>19790</u>	0"	<u>20700</u>	0"	<u>18880</u>
6"	<u>21430</u>	6"	<u>19690</u>	6"	<u>23320</u>	6"	<u>21350</u>
12"		H12" 6	<u>21540</u>	H12" 11"	<u>22520</u>	H12" 8"	<u>21340</u>
18"		H18" 12	<u>23710</u>	18"		H18" 12"	<u>21200</u>
24"		H24" 16	<u>26160</u>	24"		24"	
30"		30"		30"		30"	
36"		36"		36"		36"	
42"		42"		42"		42"	
48"		48"		48"		48"	
54"		54"		54"		54"	
60"		60"		60"		60"	
66"		66"		66"		66"	
72"		72"		72"		72"	
78"		78"		78"		78"	
84"		84"		84"		84"	
90"		90"		90"		90"	
96"		96"		96"		96"	

REMARKS: H = Horizontal, H # number equals the
hole was angled and # of inches under
spread footing, background is 23000 cpm, all
counts in CPM. (in crawl space)



MORRISON-KNUDSEN COMPANY, INC.

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