

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

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# **Draft Radiological and Engineering Assessment**

Vicinity Property No. DUR 031

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**Remedial Actions  
Contractor  
for the  
Uranium Mill Tailings  
Remedial Actions  
Project**



MORRISON  
KNUDSEN

B507090287 B50404  
PDR WASTE  
WM-48 PDR

Vicinity Property No. DUR 031

DRAFT

THE RADIOLOGICAL AND ENGINEERING ASSESSMENT

AND FINAL DESIGN

FOR

DURANGO PROPERTY

DU-031

April 1, 1985

PREPARED FOR

URANIUM MILL TAILINGS REMEDIAL ACTION PROJECT OFFICE

UNITED STATES DEPARTMENT OF ENERGY

PREPARED BY

MORRISON-KNUDSEN COMPANY, INC.

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1.0 EXECUTIVE SUMMARY

1.1 Introduction

Property DU-031 is a private residence located at 128 Riverview Drive, Durango, CO.

1.2 Evaluation and Recommendation

1.2.1 Residual Radioactive Material Involvement

There three areas of contamination identified on this property.

1.2.2 Recommended Remedial Action Option

The recommended option is to remove the contaminated material.

1.2.3 Estimated Costs

The estimated cost for removal of the contaminated material and restoration of the property is \$57,000.00.

1.2.4 Schedule

The estimated duration of the remedial action effort is 40 to 45 days.

## 2.0 ENGINEERING FIELD SURVEY

### 2.1 Property Description

#### 2.1.1 Property Use and Occupancy

Property DU-031 is a private residence located at 128 Riverview Drive, Durango, Colorado and owned by Richard and Mary Thomas. 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. 436703 follows:

Lot Twenty Five (25), Block Three (3), RIVERVIEW HEIGHTS RESUBDIVISION, according to the recorded plat thereof, County of La Plata, State of Colorado.

#### 2.1.3 Bordering Properties

The lot is zoned R-1 Residential. It is located less than 2-1/2 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 vacant lot; on the south by a residence; and on the west by Riverview Drive.

### 2.2 Existing Facilities and Structures

#### 2.2.1 Structures

The residence is a single story wood frame structure with board and batting siding on a finished walkout basement. On the south side of the house there is an attached single car carport and uncovered concrete parking/storage area. The two car concrete driveway extends from the street to the carport and parking slab. Concrete sidewalks extend along the street outside the west lot line and along the east side of the walkout basement. A curved concrete ramp connects the southeast corner of the parking/storage space to the walk below. A set of wooden steps extends down to the walk from the rear of the carport. A covered concrete porch is located on the west side of the house. A concrete patio covered by a redwood deck is located on the east side of the house, and a wood balcony extends from the carport along the south and east sides of the house to the deck.

The lot slopes downward from west to east. The front yard is flat and fully landscaped. The side yards slope to a flat landscaped section of rear yard. A fenced dog run is located on the north side of the house. In the rear yard there is a large deciduous tree next to the deck and a clothesline. Wastewater from the basement is pumped from the basement sump to a drain pipe under the rear lawn. From the edge of the rear lawn to the east lot line the property is rocky, not landscaped, and slopes downward very steeply.

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 State 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 from utility pole on northeast corner of lot to east side of house.

Telephone - Overhead from utility pole on northeast corner of lot to east side of house.

Water - Underground from Riverview Drive.

Gas - Underground on north side of house.

Sewer - Underground from Riverview Drive.

#### 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 Figures 2.3, 2.4, 2.5, 2.6, and 2.7.

Table 2.1

PROPERTY SURVEY DATA

GENERAL:

Site Location: Durango

Property Address: 128 Riverview Drive

Owner's Name: Richard and Mary Thomas Address: Same

Lot No.: 25 Property Type: Residential

Occupancy Group: Adults: 3 Children: \_\_\_\_\_

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

Property Description - Exterior:

Dwelling: Sq. Ft.: 2,590

Levels: Single Story with Basement

Construction Type: Wood Frame with Board and Batting Siding; Wood  
Siding on East Side of Basement

Foundation: Concrete Basement

Garage: Single Car Attached Wood Frame Carport

Storage Bldg: Prefab: None

Other: \_\_\_\_\_

Improvement Additions: \_\_\_\_\_ Porches: Covered Conc. West Side

to Dwellings: Deck: Redwood on Side Patio: Conc. Covered by Deck

Other: Wood Frame Balcony to Deck Along Rear of House

Driveway: Concrete: Two Car from Street Paved: \_\_\_\_\_

Gravel: \_\_\_\_\_ Other: \_\_\_\_\_

Sidewalks: Concrete/Paved: As Noted on Drawing

Other: \_\_\_\_\_

Fences/Gates: Wood: \_\_\_\_\_ Other: Wire Mesh Dog Run on

Chain Link: \_\_\_\_\_ North Side Backyard

Radiological and Engineering Assessment: Property DU-031

Table 2.1 (cont'd)

PROPERTY SURVEY DATA

Site Location: Durango

Property Address: 128 Riverview Drive

Grounds: Lawn: Full Front Yard, Back Yard to Sloped Area

Trees: Numerous mature trees throughout the property

Shrubs: Numerous bushes and hedges along front of the house

Garden: Small Plot off Patio

Grading: 1 to 1 Slope from Edge of Rear Lawn to East Property  
Line; Front Yard About 8.0' Above Rear Lawned Area

Soil Type: Topsoil in Lawned Area; Sloped Area Rocky

Existing Survey Plot: Yes

Property Description - Interior: Interior Contamination Under Basement

<u>Basement</u>		<u>Walls</u>				<u>Ceiling</u>	<u>Comments</u>
<u>Room</u>	<u>Floor</u>	<u>E</u>	<u>W</u>	<u>N</u>	<u>S</u>		
<u>Recreation</u>	<u>Linoleum Tile</u>	<u>-Dry Wall-Wd Panel Dry Wall</u>				<u>Dry Wall</u>	<u>2-10"x10"*</u>
<u>Dark Rm/Bath</u>	<u>Linoleum Tile</u>	<u>----Dry Wall-----</u>				<u>Dry Wall</u>	
<u>Utility Room</u>	<u>Linoleum Tile</u>	<u>----Dry Wall-----</u>				<u>Acoustic Tile/Sump in Corner</u>	
<u>Office</u>	<u>Linol Tile/Carp</u>	<u>---Dry Wall-----</u>				<u>Acoustic Tile</u>	
<u>Storage</u>	<u>Concrete</u>	<u>(E) Unfinished-Concrete</u>				<u>Unfinished</u>	<u>Furnace &amp;</u>
		<u>Stud Wall (W,N,S)</u>					<u>Hot Water</u>
							<u>Heater</u>
							<u>Located in</u>
							<u>store room</u>

\*Wood Center Support Beams in Rec Room

Utilities:

Heating: Gas: X Electric: \_\_\_\_\_

Hot Water: Gas and Solar Other: Solar Panel on Roof

Air Cond: Gas: \_\_\_\_\_ Heat Pump: \_\_\_\_\_

Radiological and Engineering Assessment: Property DU-031

Table 2.1 (cont'd)

PROPERTY SURVEY DATA

Site Location: Durango

Property Address: 128 Riverview Drive

Electric Line Location: Overhead from Utility Pole on NE Corner of Lot

Gas Line Location: Underground on North Side of House

Water Line Location: Underground from Riverview Drive

Sewage Line Location: Underground from Riverview Drive

Telephone Line Location: Overhead from Utility Pole on NE Corner of Lot

Building Codes and Zoning:

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

Zoning District: City of Durango

Present Dwelling Zoning: R-1 Residence District

Setbacks: Front: \_\_\_\_\_

Rear: \_\_\_\_\_

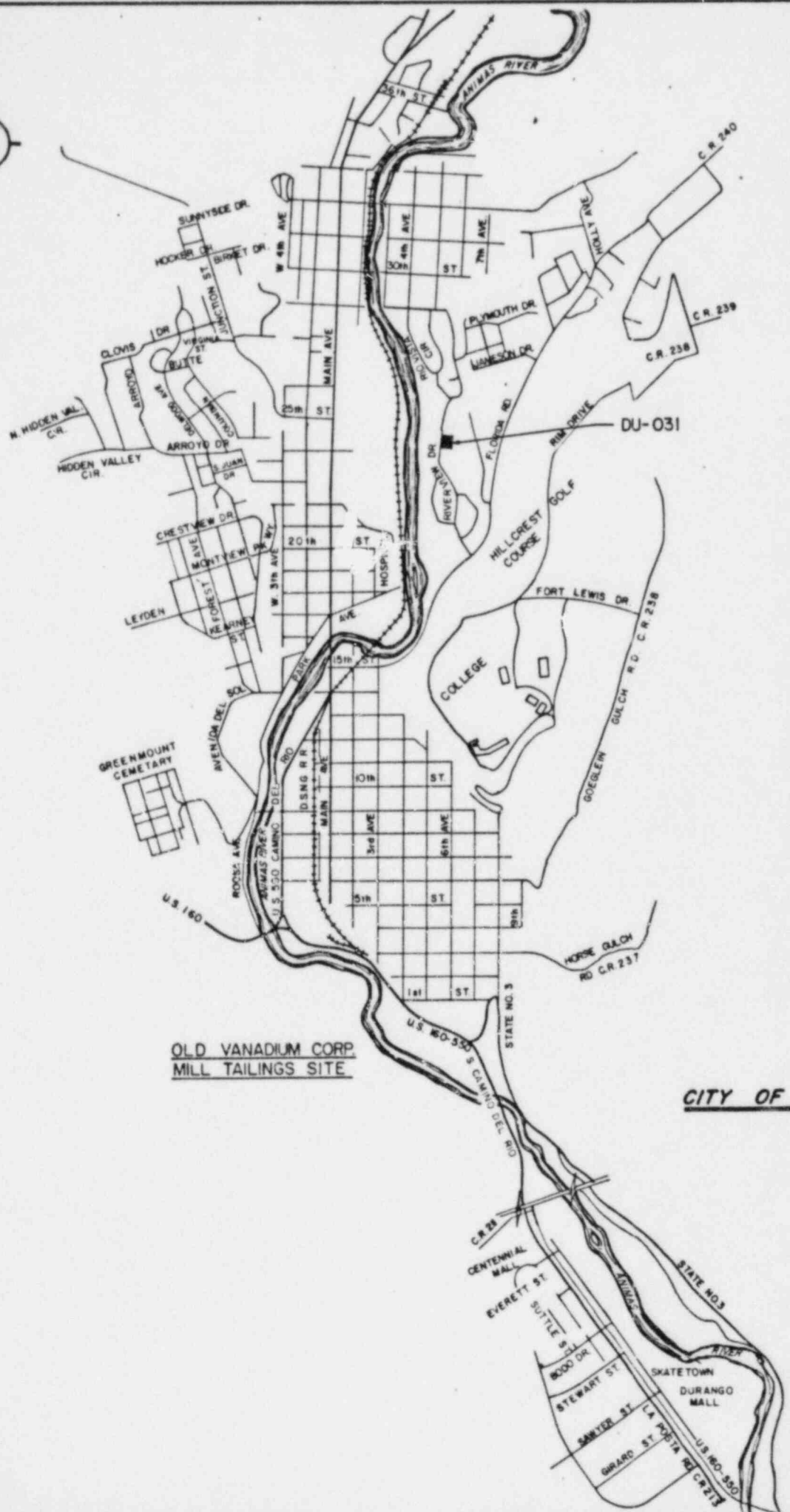
Side: \_\_\_\_\_

Other: \_\_\_\_\_

Photographs:

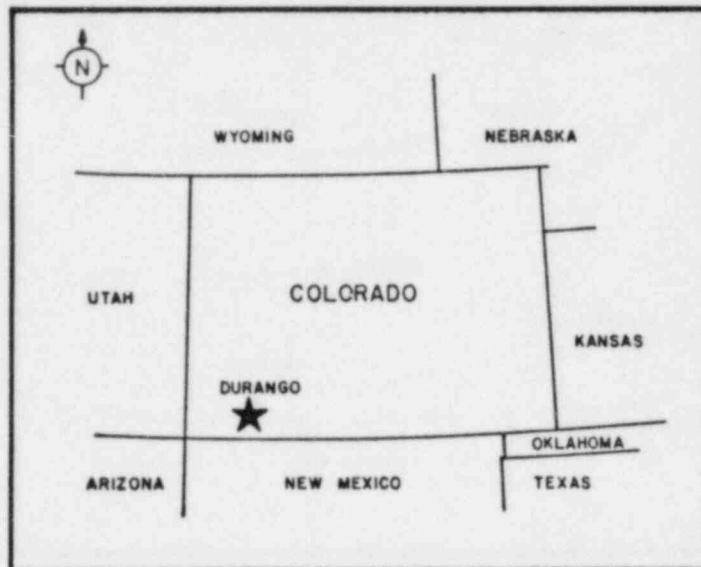
<u>Roll</u>	<u>Frame</u>	<u>Description</u>	<u>Direction</u>
<u>1</u>	<u>18</u>	<u>Front of House</u>	<u>Looking Southeast</u>
<u>1</u>	<u>15</u>	<u>South Side of House</u>	<u>Looking Northeast</u>
<u>1</u>	<u>13</u>	<u>Rear of Property</u>	<u>Looking Northwest</u>
<u>1</u>	<u>13</u>	<u>Rear of House</u>	<u>Looking Southwest</u>
<u>7</u>	<u>28</u>	<u>Basement Rec Room</u>	<u>Looking Northeast</u>
<u>1</u>	<u>35</u>	<u>Basement Storage Room</u>	<u>Looking Southwest</u>
<u>7</u>	<u>34</u>	<u>Basement Office</u>	<u>Looking Southeast</u>
<u>7</u>	<u>33</u>	<u>Basement Utility Room</u>	<u>Looking Southeast</u>





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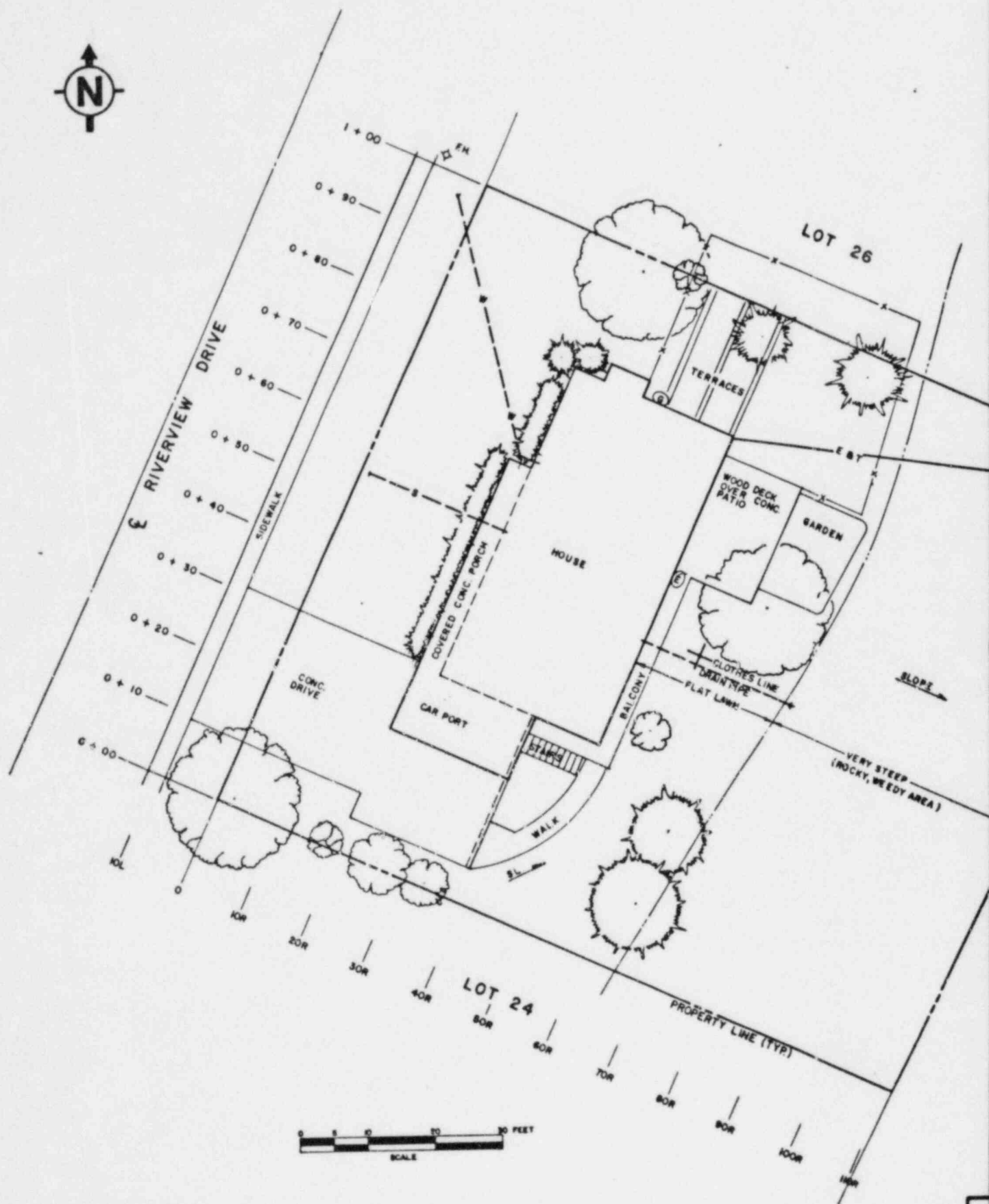
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DESIGNED 2/7/82 CAM		FIGURE 2-1									
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REVIEWED <i>[Signature]</i>		DURANGO, COLORADO									
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		DU-031-005									
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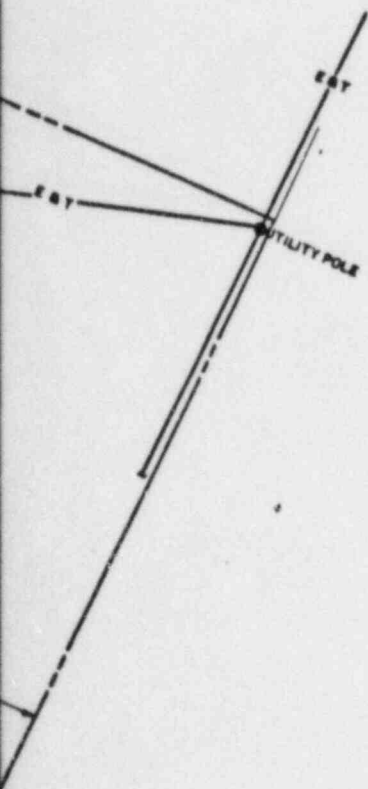




# LEGEND

— 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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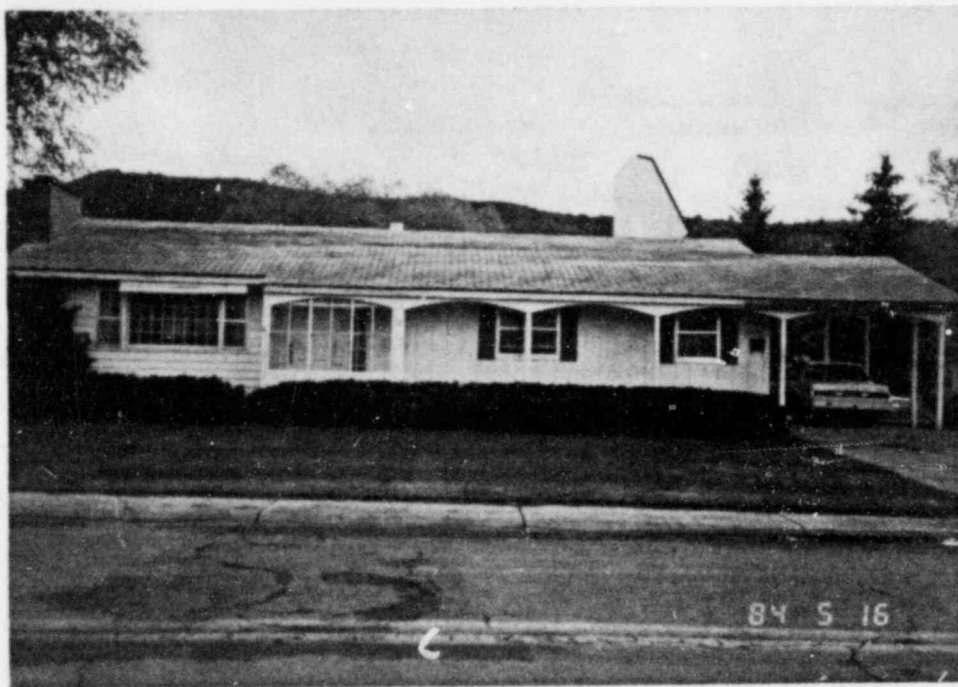
U. S. DEPARTMENT OF ENERGY									
ALBUQUERQUE, NEW MEXICO									
DESIGNED BY: CAM					FIGURE 2.2				
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REVIEWED BY: [Signature]					DURANGO, COLORADO				
RECOMMENDED BY: [Signature]					URANIUM MILL TAILINGS REMEDIAL ACTION PROJECT				
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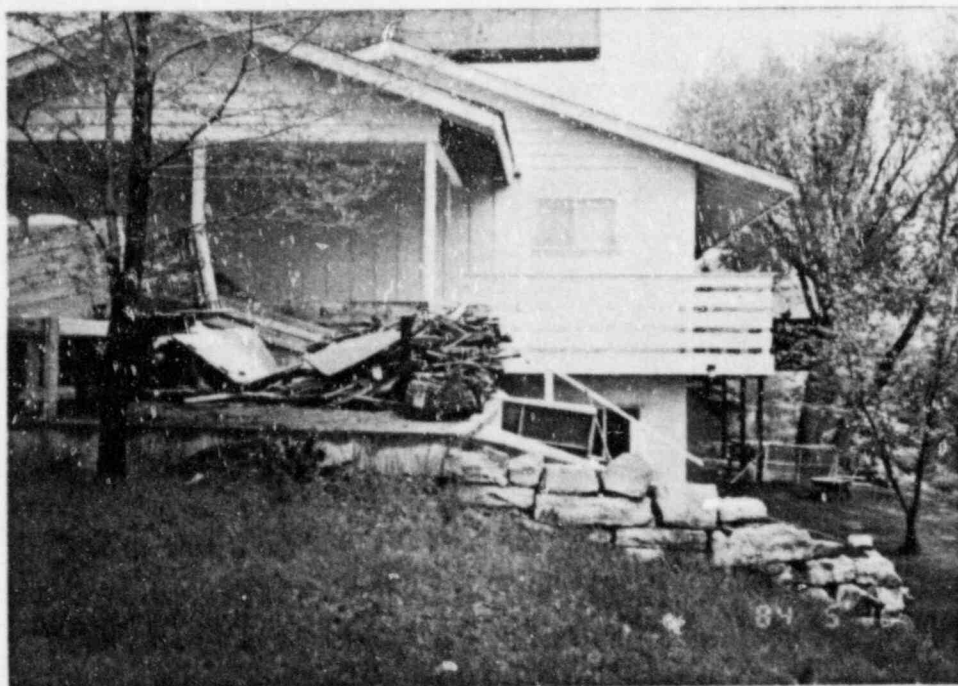
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Front of House Looking Southeast



South Side of House Looking Northeast

Figure 2.3 Property Photos



Rear of Property Looking Northwest



Rear of House Looking Southwest

Figure 2.4 Property Photos



Basement Recreation Room Looking Northeast



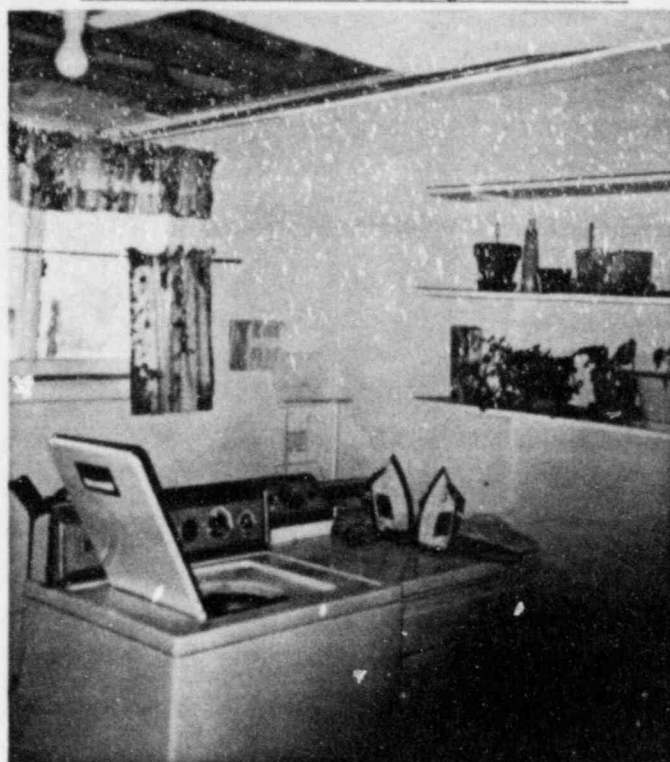
Basement Storage Room Looking Southwest

Figure 2.5 Property Photos





Basement Office Looking Southeast



Basement Utility Room Looking Southeast

Figure 2.6 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 Property DU-031, 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 conducted inside the house in areas identified in the inclusion survey. This indoor survey was not conducted on a grid.

##### 3.1.2 Survey Results

Surface gamma readings on the property, as shown in Figure 1, range from 14 to 48 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 15 micro R/hr.

Indoor surface gamma readings range from 15 to 100 micro R/hr. The highest readings are in the basement, as described in Table 3.2.

#### 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. Holes were placed near the walls of the structure, in outdoor areas, and in the basement.

##### 3.2.2 Survey Results

Contamination was found in 4 of the 22 outdoor holes and in all of the 5 indoor holes augered. The location and depth of the contamination is described in Tables 3.3 and 3.4 and is shown in Figure 3.1. Large rocks prevented drilling through the vertical extent of contamination at all drilling

locations. Contamination extends more than 15 inches below the surface. Gamma readings in boreholes were not diminishing with increasing depth, suggesting that contamination may be 30 inches deep or more. The indoor boreholes demonstrate that contamination is underneath the basement floor.

### 3.3 Radon/Radon Daughter Survey

No radon/radon daughter surveys were performed inside the house at the property. The inclusion survey reported an instantaneous radon daughter concentration measurement of 0.09 WL in the basement.

### 3.4 Estimated Extent of Contamination

Three areas of contamination were identified in the survey. Area A consists of the entire area underneath the house and concrete walk east and south of the house. Contamination does not appear to be inside the house itself. The known depth of contamination is 15 inches; however, contamination may extend to 30 inches or more.

Area B is adjacent to the house and is actually an extension of Area A; it is treated separately here for convenience. As with Area A, the depth of contamination is at least 15 inches and may be 30 inches or more.

Area C consists of a small area at the back of the carport. The depth of contamination in this area is greater than 15 inches. (The retaining wall is approximately 3 feet high).



Table 3.1  
OUTDOOR SURFACE GAMMA SURVEY  
Property DU-031

POINT	Micro R/hr
0+50,00R	16
0+60,00R	18
0+70,00R	16
0+40,10R	16
0+50,10R	28
0+60,10R	37
0+70,10R	18
0+40,20R	16
0+50,20R	21
0+60,20R	48
0+70,20R	18
0+80,20R	16
0+83,30R	16
0+20,40R	18
0+30,40R	16
0+82,40R	16
0+90,40R	16
0+40,50R	17
0+45,50R	17

Table 3.1 - Cont'd.  
OUTDOOR SURFACE GAMMA SURVEY  
Property DU-031

POINT	Micro R/hr
0+50,50R	17
0+60,50R	18
0+70,50R	18
0+80,50R	16
0+40,60R	16
0+50,60R	16
0+90,60R	16
0+78,85R	16
0+50,90R	16
0+50,100R	16
0+81,95R	21

Table 3.2  
INDOOR SURFACE GAMMA SURVEY  
Property DU-031

ROOM	POINT	Micro R/hr
17	NW	100
	NE	23
	Center	15
	SW	44
	SE	15
15	NW	82
	NE	55
	Center	55
	SW	81
	SE	43
13	NW	38
	NE	25
	Center	47
	SW	78
	SE	23
18	NW	60
	NE	92
	Center	51
	SW	48
	SE	52

Table 3.2 - Cont'd.  
INDOOR SURFACE GAMMA SURVEY  
Property DU-031

ROOM	POINT	Micro R/hr
14	Center	77
16	NW	87
	NE	27
	Center	61
	SW	82
	SE	45
18A	NW	64
	NE	77
	Center	57
	SW	45
	SE	73

TABLE 3.3  
OUTDOOR BOREHOLE SURVEY  
PROPERTY DU-031

HOLE	LOCATION	CONTAMINATION DEPTH
1	0+40,14R	None
2	0+40,00R	None
3	0+60,10R	0-12"+
4	0+50,10R	0-12"+
5	0+60,05R	None
6	0+53,14R	0-12"+
7	0+50,00R	None
8	0+70,10R	None
9	0+80,18R	None
10	0+70,00R	None
11	0+60,00R	None
12	0+60,05L	None
13	0+80,00R	None
14	0+21,38R	0-15"+
15	0+23,34R	None
16	0+60,54R	None
17	0+80,50R	None
18	0+38,55R	None
19	0+33,18R	None
20	0+82,23R	None

TABLE 3.3 - Cont'd.  
OUTDOOR BOREHOLE SURVEY  
PROPERTY DU-031

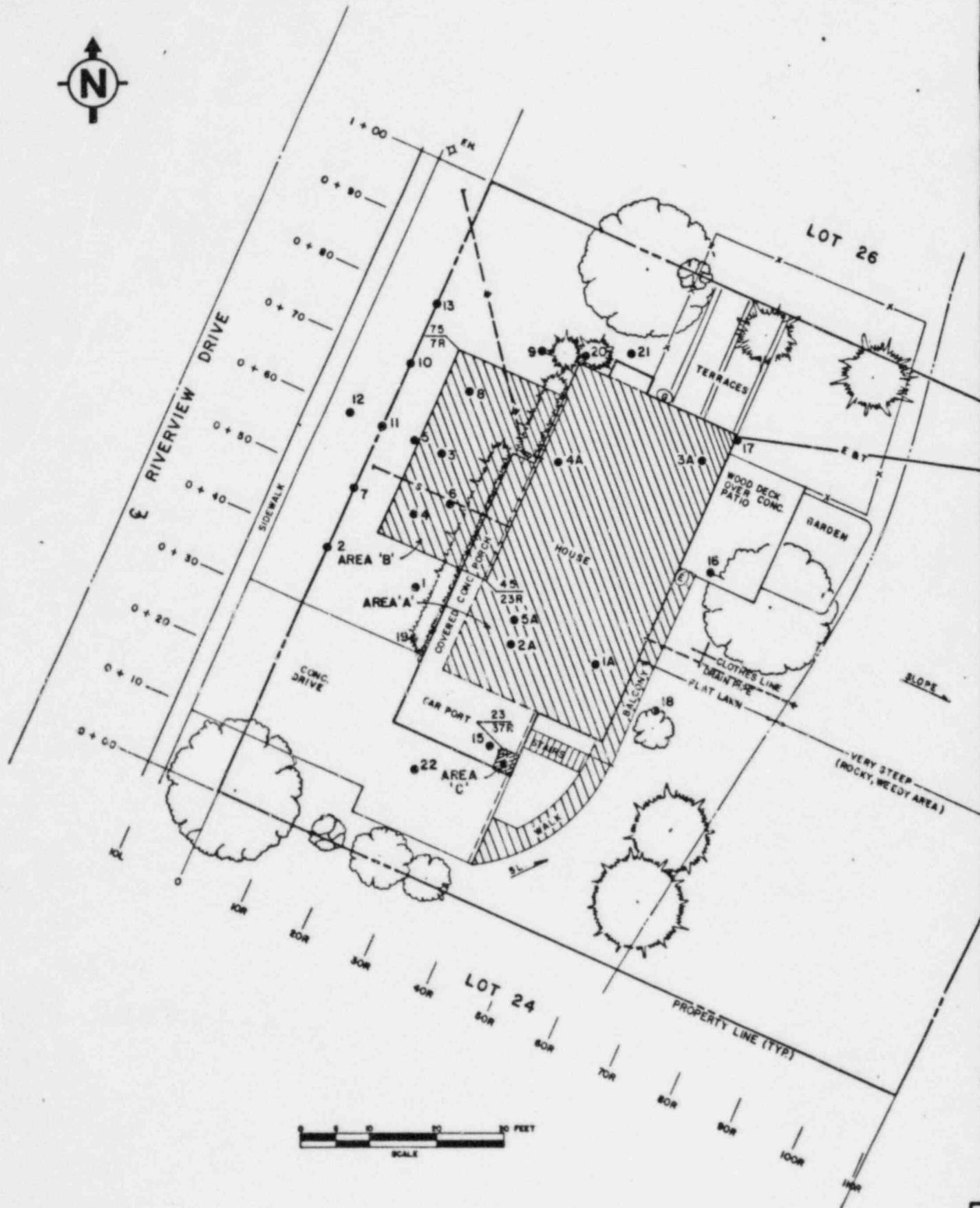
HOLE	LOCATION	CONTAMINATION DEPTH
21	0+85,30R	None
22	0+15,25R	None

NOTE: All holes drilled as deep as possible.

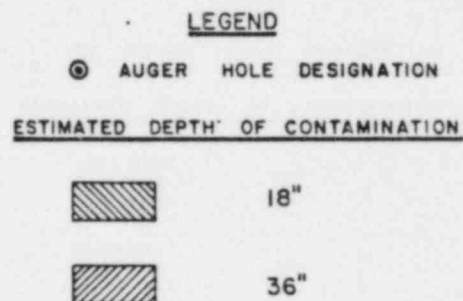
TABLE 3.4  
INDOOR BOREHOLE SURVEY  
PROPERTY DU-031

HOLE	LOCATION	CONTAMINATION DEPTH
1A	Office - Room 17	0-14"+
2A	Workshop, Room 18	0-8"+
3A	Room 13	0-15"+
4A	Closet Room, Room 18A	0-15"+
5A	Workshop # 2, Room 18	0-7"+

NOTE: All holes were bored through concrete and as deep as possible, until large rocks prevented drilling deeper or until loose sand was encountered so that the borehole would not hold together.








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										U. S. DEPARTMENT OF ENERGY ALBUQUERQUE, NEW MEXICO					
										DESIGNED CAM	FIGURE 3.1  RADIOLOGICAL SURVEY DATA DU-031  DURANGO, COLORADO URANIUM MILL TAILINGS REMEDIAL ACTION PROJECT				
										CHECKED					
										REVIEWED					
										RECOMMENDED					
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										 MORRISON KNUDSEN		PROJECT NO. DE-AC04-83AL18796			
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#### 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-031:

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 would include the following:

- o Remove and store furniture and miscellaneous items during excavation and replace when construction has been completed.
- o Demolish basement and front porch as illustrated in Figure 4.2.
- o Excavate contaminated material within the limits and depths as indicated in Figure 4.1.
- o Backfill excavated areas with common fill and top with structural fill in concrete areas and with topsoil and sod in lawn area.
- o Construct new basement and front porch as indicated in Figure 4.3 and 4.4
- o Dislocation of the occupants will be required for remedial action as per Vicinity Properties Management and Implementation Manual, Section 3.3.2, Option 2 as follows:

Option 2: Dislocation to living quarters of owner's or tenant's choice during remedial action. The owner or tenant pays the costs associated with this option and is reimbursed by DOE. Reimbursements include the actual cost, or a reasonable rental rate normally paid in the area for housing, whichever is less. Telephone and utility transfer costs are also reimbursed. No allowance for food costs are made. Expense report forms are supplied by DOE or its representative and submitted to the DOE on a monthly basis by the property owner or tenant.

#### 4.1.2 Costs

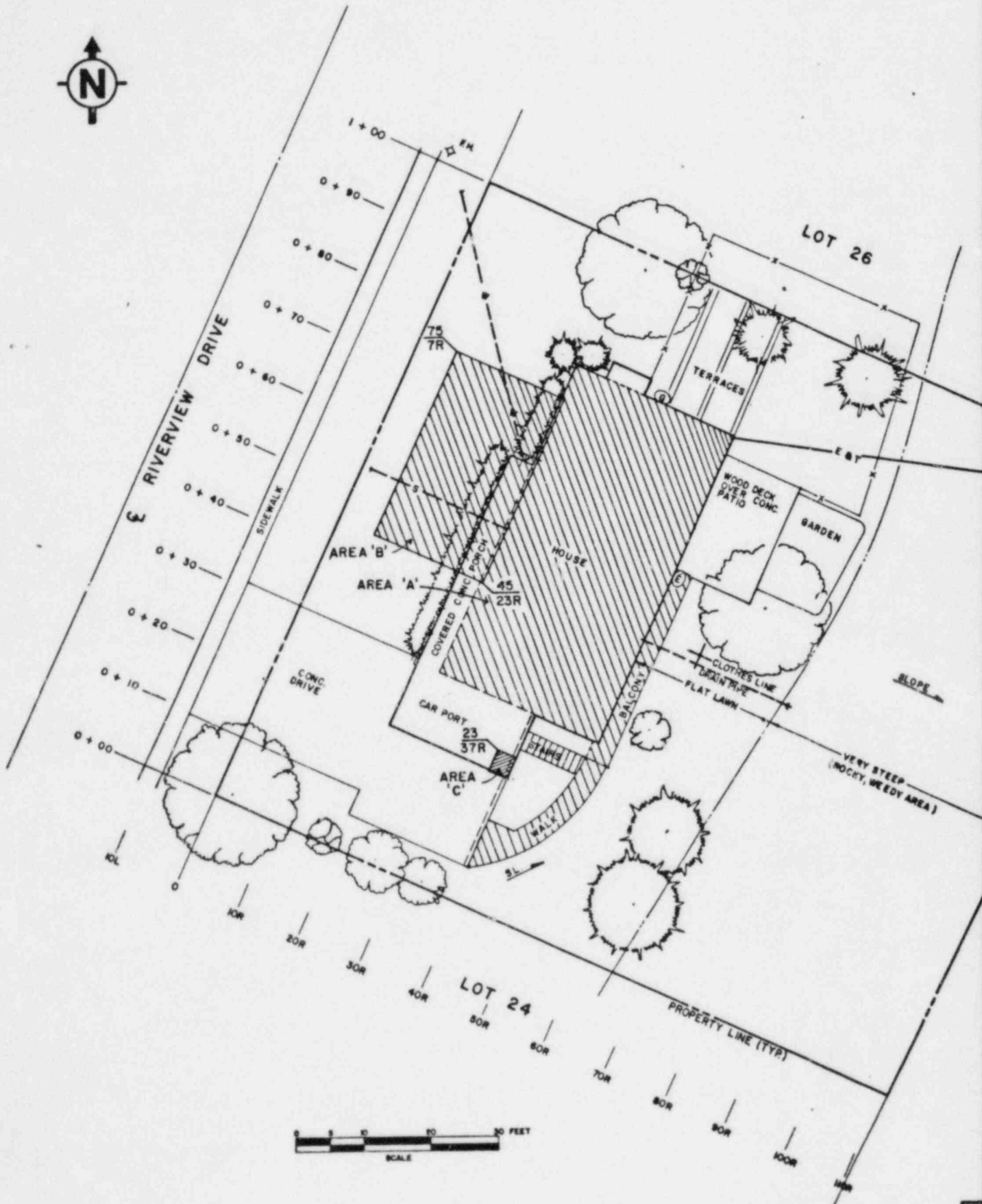
Estimated costs for the activities associated with Option 2 are detailed in Table 4.1. Costs include labor, insurance, material, equipment, supplies, overhead, profit, and contingency. All costs are listed in 1985 dollars. It is anticipated that the time required for the subcontractor to complete the work will be 40 to 45 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 \$57,000.00.

Table 4.1  
OPTION 2 COSTS

Activity	Unit Price	Quantity	Estimated Cost
Demolish and Remove Basement Framing and Stairs	1.05	1,360 sf	1,428.00
Shore Southeast Wall and Center of Basement		LS	3,000.00
Shore Front Porch and Remove Glass and Framing		LS	1,500.00
Remove Wood Deck		LS	617.00
Demolish Basement Slab	2.90	1,225 sf	3,553.00
Basement Excavation	56.04	85 cy	4,764.00
Demolish and Remove Sidewalk, Porch and Carport Slab	2.90	317 sf	920.00
Machine Excavation	8.30	41 cy	340.00
Backfill (Hand)	22.40	45 cy	1,008.00
Backfill (Machine)	7.20	26 cy	187.00
Structural Fill	26.40	30 cy	792.00
Topsoil	26.40	9 cy	237.00
Sod	3.00	52 sy	156.00
Hedges	50.00	20 ea	1,000.00
Basement Restoration Walls		LS	5,645.00
Front Porch		LS	1,235.00
Remove and Reinstall Mechanical Equipment		LS	1,430.00
Construct Concrete Slabs	3.50	1,550 sf	5,425.00
Wood Deck Restoration		LS	1,148.00
Electrical Work		LS	720.00
House Cleaning		LS	400.00
Dislocation Costs			
Packing, Moving, and Storage		LS	2,500.00
House Rental	700.00	month	1,400.00
Deposits (Non Refundable)			
Gas	\$ 75.00		
Electric	80.00		
Phone	100.00		
Water	30.00		
Total			285.00
<hr/>			
Subtotal			39,690.00
5% Subcontractor's Contingency			1,985.00
20% Overhead and Profit			<u>7,938.00</u>
Subtotal			49,613.00
15% Contengency			<u>7,442.00</u>
Total (Rounded)			57,000.00



Also Available On  
Aperture Card

# TI APERTURE CARD

## 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:

1. THE LATEST REVISION OF THE FOLLOWING TECHNICAL SPECIFICATIONS APPLY TO THE REMEDIAL ACTION WORK REQUIRED FOR PROPERTY NO. DU-031.

SECTION 02050  
DEMOLITION

SECTION 02110  
CLEARING AND GRUBBING

SECTION 02130  
CONTAMINATED MATERIAL REMOVAL

SECTION 02200  
EXCAVATION AND BACKFILL

SECTION 02480  
LANDSCAPING

SECTION 03300  
CAST-IN-PLACE CONCRETE

2. UTILITY LOCATIONS ARE FOR REFERENCE ONLY. ACTUAL LOCATIONS SHALL BE DETERMINED BY THE SUBCONTRACTOR PRIOR TO START OF CONSTRUCTION.
3. THE EXCAVATION LIMITS AND DEPTHS ARE BASED ON A LIMITED NUMBER OF BORINGS TAKEN DURING THE RADIOLOGICAL SURVEYS 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.
4. REMOVE ROCK AS INDICATED.

### SCOPE OF WORK:

NOTE: OWNER WILL BE RESPONSIBLE FOR REMOVING ALL ITEMS FROM THE RESIDENCE BEFORE CONSTRUCTION BEGINS.

#### AREA "A"

1. REMOVE AND SALVAGE WOOD DECK AND REPLACE WHEN CONSTRUCTION HAS BEEN COMPLETED.
2. PROVIDE VISQUEEN FOR DUST PROTECTION IN STAIRWELL ENTRANCE.
3. DEMOLISH AND REMOVE BASEMENT WALL AND INTERIOR WALLS AS INDICATED IN FIGURE 4.2.
4. DEMOLISH AND REMOVE CONCRETE SIDEWALK AND BASEMENT SLAB WITHIN THE LIMITS AS INDICATED IN FIGURE 4.1.
5. EXCAVATE CONTAMINATED MATERIAL WITHIN THE LIMITS OF EXCAVATION TO A DEPTH OF 18 INCHES.
6. BACKFILL EXCAVATED AREA WITH COMPACTED COMMON FILL AND TOP WITH 6 INCHES OF STRUCTURAL FILL.
7. CONSTRUCT NEW BASEMENT SLAB AS INDICATED IN FIGURE 4.4.
8. CONSTRUCT NEW 4 INCH THICK CONCRETE SIDEWALK TO SAME SIZE AND ELEVATION OF THAT REMOVED.
9. CONSTRUCT NEW INTERIOR AND EXTERIOR WALLS AS INDICATED IN FIGURES 4.3 AND 4.4.

#### AREA "B"

1. REMOVE AND SALVAGE FRONT PORCH ENTRANCE AS INDICATED IN FIGURE 4.2.
2. DEMOLISH AND REMOVE CONCRETE PORCH.
3. EXCAVATE AREA "B" TO A DEPTH OF 18 INCHES.
4. BACKFILL EXCAVATED AREA WITH COMMON BACKFILL AND TOP WITH 6 INCHES OF STRUCTURAL FILL IN CONCRETE AREA AND WITH 6 INCHES OF TOPSOIL AND 500 IN LAWN AREA.
5. CONSTRUCT NEW 4 INCH THICK CONCRETE PORCH TO SAME SIZE AND ELEVATION OF THAT REMOVED.
6. CONSTRUCT NEW PORCH ENTRANCE TO SAME SIZE AS THAT REMOVED.
7. REPLACE HEDGES REMOVED WITH SAME TYPE AND SIZE AS THAT REMOVED.

#### AREA "C"

1. REMOVE CARPORT SUPPORT AND SHORE ROOF AS REQUIRED.
2. SAWCUT CARPORT SLAB WITHIN THE LIMITS OF CONTAMINATION AND REMOVE.
3. HAND EXCAVATE AREA "C" TO A DEPTH OF 36 INCHES.
4. BACKFILL EXCAVATED AREA WITH COMPACTED COMMON FILL AND TOP WITH 6 INCHES OF STRUCTURAL FILL.
5. CONSTRUCT NEW CONCRETE SLAB TO COVER AREA REMOVED AND REPLACE SUPPORT.

U. S. DEPARTMENT OF ENERGY  
ALBUQUERQUE, NEW MEXICO

DESIGNED	DRONE
CHECKED	CAM
REVIEWED	
RECOMMENDED	
APPROVED	

EXCAVATION AND RESTORATION DU-031

DURANGO, COLORADO  
URANIUM MILL TAILINGS REMEDIAL ACTION PROJECT

NR

NR

NR

PROJECT NO.

DE-AC04-83AL18796

DRAWING NO. DU-031-020

REV.



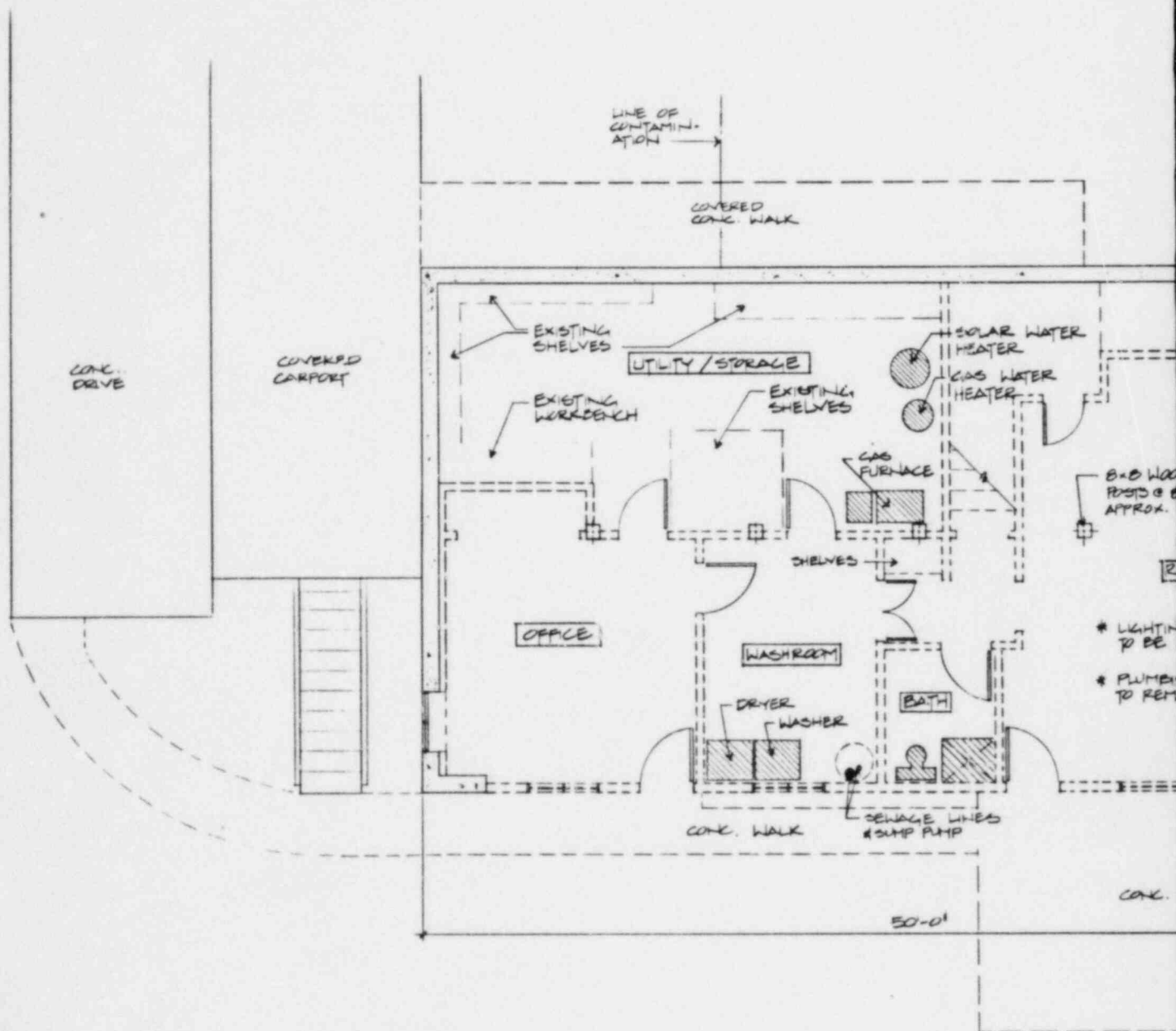
MORRISON  
KNUDSEN

FINAL REA SUBMITTAL

REVISIONS

DRAWN BY: [initials] CHECKED BY: [initials] APPROVAL: [initials] DATE: [initials]





DEMOLITION PLAN - BASEMENT


Also Available On  
Aperture Card



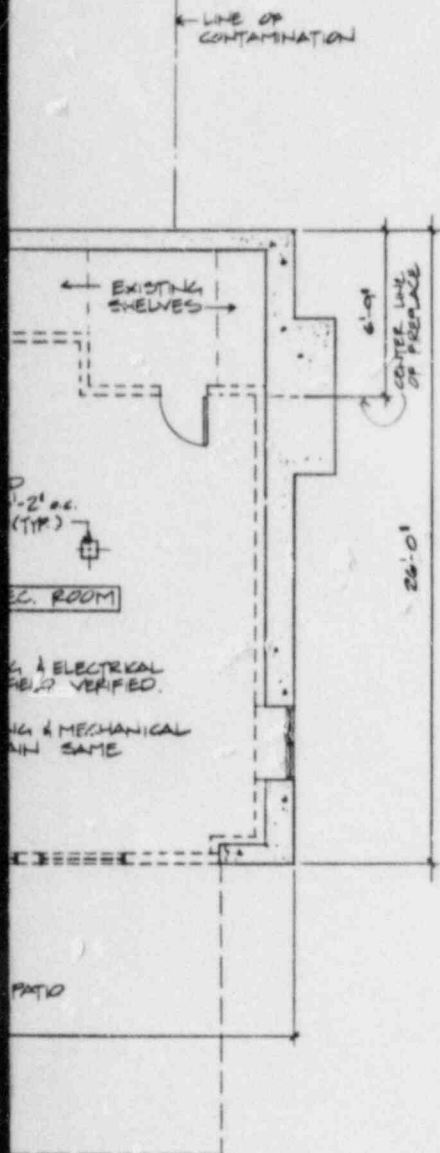
TI  
APERTURE  
CARD

# NOTES

----- INDICATES STRUCTURE TO BE TORN OUT & REMOVED EXCEPT SUMP PUMP.

 INDICATES ITEMS TO BE REMOVED & STORED DURING CONSTRUCTION

1. ALL STUD PARTITIONS IN BASEMENT AREA TO BE REMOVED SO AS EXCAVATION MAY BE DONE WITH MINIMAL OBSTRUCTION.
2. CONCRETE FOUNDATION TO REMAIN INTACT DURING ALL PHASES OF CONSTRUCTION.
3. WOOD POSTS TO REMAIN DURING START OF EXCAVATION. LEAVE A 2'-0" x 2'-0" FOOTHOLD UNDER POSTS, EXCAVATE REMAINING AREA.
4. PROVIDE POST & BEAM SUPPORT @ 8'-0" O.C. ALONG EAST WALL DURING EXCAVATION. FOOTHOLD SAME AS STMT. #3.
5. AFTER REMAINING EXCAVATION HAS BEEN COMPLETED PROVIDE TEMPORARY SUPPORTS PLACED BETWEEN EXISTING POSTS. REMOVE EXISTING SUPPORTS & EXCAVATE.
6. RESTORATION TO BE COMPLETED AS PER DU-031-022.
7. SALVAGE DOORS & WINDOWS FOR USE IN RESTORATION. INTERIOR AS WELL AS EXTERIOR.
8. SOME ELECTRICAL & MECHANICAL ALTERATIONS MAY BE REQUIRED. FIELD VERIFY.
9. ALL CONSTRUCTION TO COMPLY WITH STATE AND LOCAL CODES.
10. WEST ENTRANCE TO BE EXCAVATED AS PER DU-031-020.
11. SUPPORT PROVISIONS WILL BE NEEDED FOR ROOF OVER WEST ENTRANCE DURING EXCAVATION. SALVAGE EXISTING COLS, WINDOWS AND DECOR. TRIM FOR USE IN RESTORATION. RE-SEAL & PAINT TO MATCH EXISTING.
12. DEMOLISH & REMOVE CONC. WALK @ WEST ENTRANCE AS NEEDED. EXCAVATE AND RESTORE AS PER DU-031-020.
13. PROTECT SUMP PUMP & SEWAGE LINE DURING EXCAVATION & RESTORATION.
14. SALVAGE ALL ELECTRICAL & MECHANICAL FIXTURES, BOXES, & FACE PLATES. REPLACE ANY THAT DOES NOT MEET CODE REQUIREMENTS.



8507 090287-05

## U. S. DEPARTMENT OF ENERGY ALBUQUERQUE, NEW MEXICO

FIGURE 4.2  
DEMOLITION & RESTORATION PLAN DU-031

DURANGO, COLORADO  
URANIUM MILL TAILINGS REMEDIAL ACTION PROJECT

DESIGNED DRAWN  
CAM  
CHECKED  
REVIEWED  
RECOMMENDED  
APPROVED

NR

DATE DOE PROJECT MANAGER DATE DOE PROJECT ENGINEER DATE

NR

NR

FINAL REA SUBMITTAL

DATE REVISIONS  
DRAWN BY CHECKED BY APPROVAL LOC ON PROJ ENG APPROV DOE



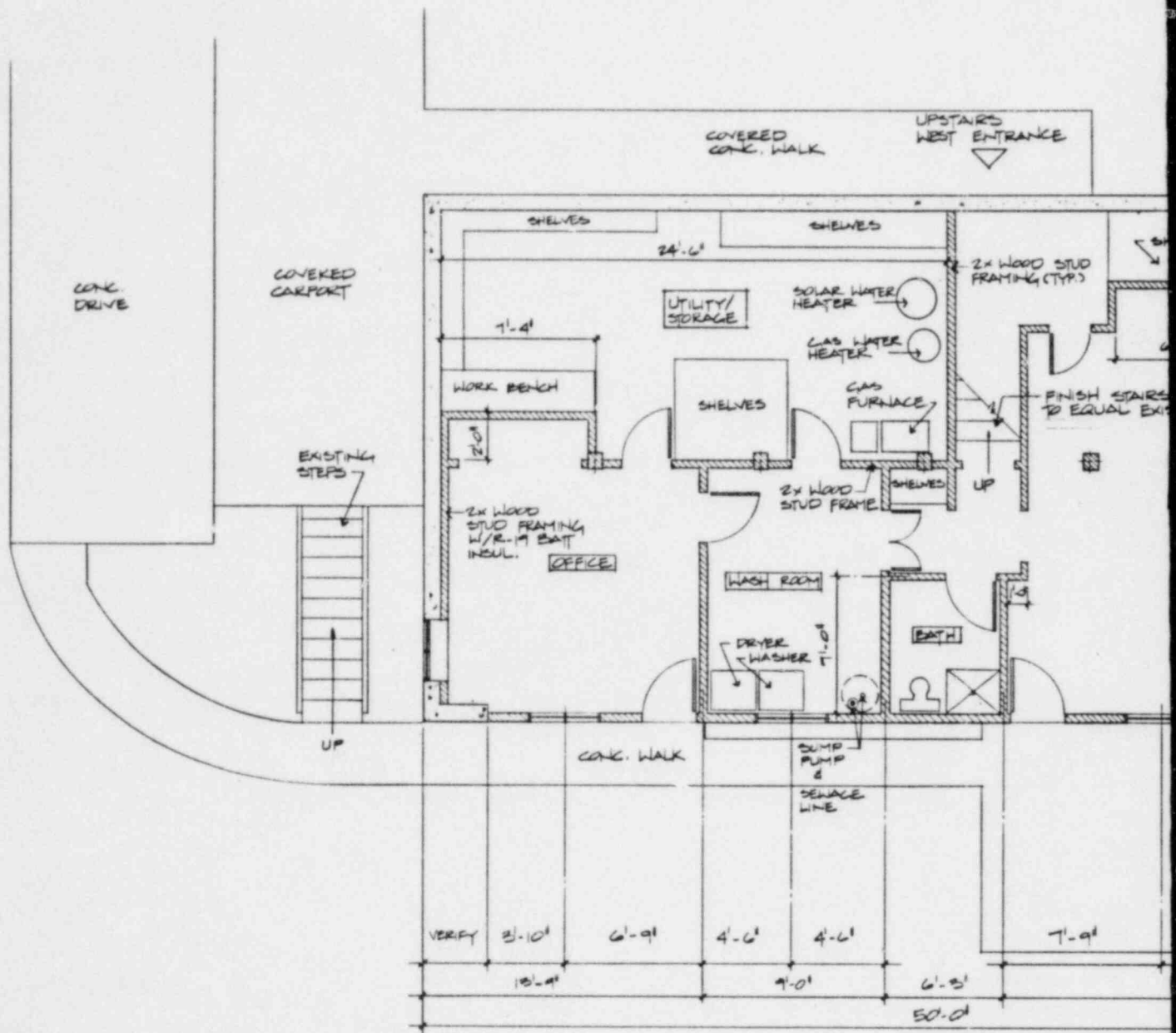
MORRISON  
KNUDSEN

PROJECT NO.  
DE-AC04-83AL18796

DRAWING NO.  
DU-031-021


REV.



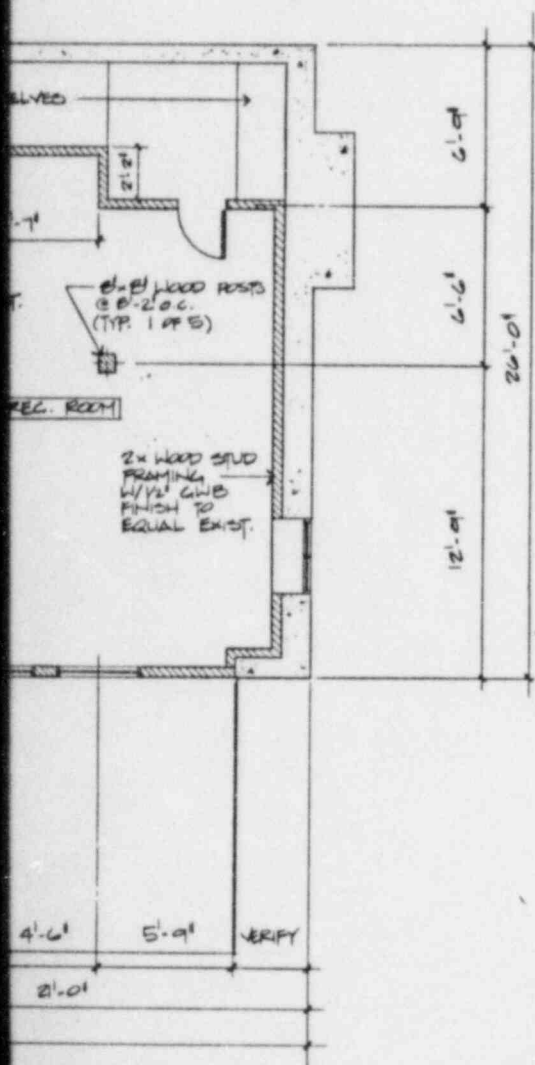


RESTORATION PLAN - BASEMENT



 INDICATES NEW WOOD FRAME STRUCTURE

1. WOOD FRAME TO BE 2x4 STUDS @ 16" O.C. - INSULATE ALL EXTERIOR WOOD FRAME W/ R-19 BATT INSUL.
2. REPLACE ALL APPLIANCES TO ORIGINAL PLACEMENT.



Also Available On  
Aperture Card

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APERTURE  
CARD

8507 090287-06

U. S. DEPARTMENT OF ENERGY  
ALBUQUERQUE, NEW MEXICO

FIGURE 4.3

DEMOLITION & RESTORATION PLAN DU-031

DURANGO, COLORADO  
URANIUM MILL TAILINGS REMEDIAL ACTION PROJECT

DESIGNED  
DRAWN  
CHECKED  
REVIEWED  
RECOMMENDED  
APPROVED

NR

DATE

DOE PROJECT MANAGER

NR

DATE

DOE PROJECT ENGINEER

NR

DATE



MORRISON  
KNUDSEN

PROJECT NO.

DE-AC04-83AL18796

DRAWING NO.

DU-031-022

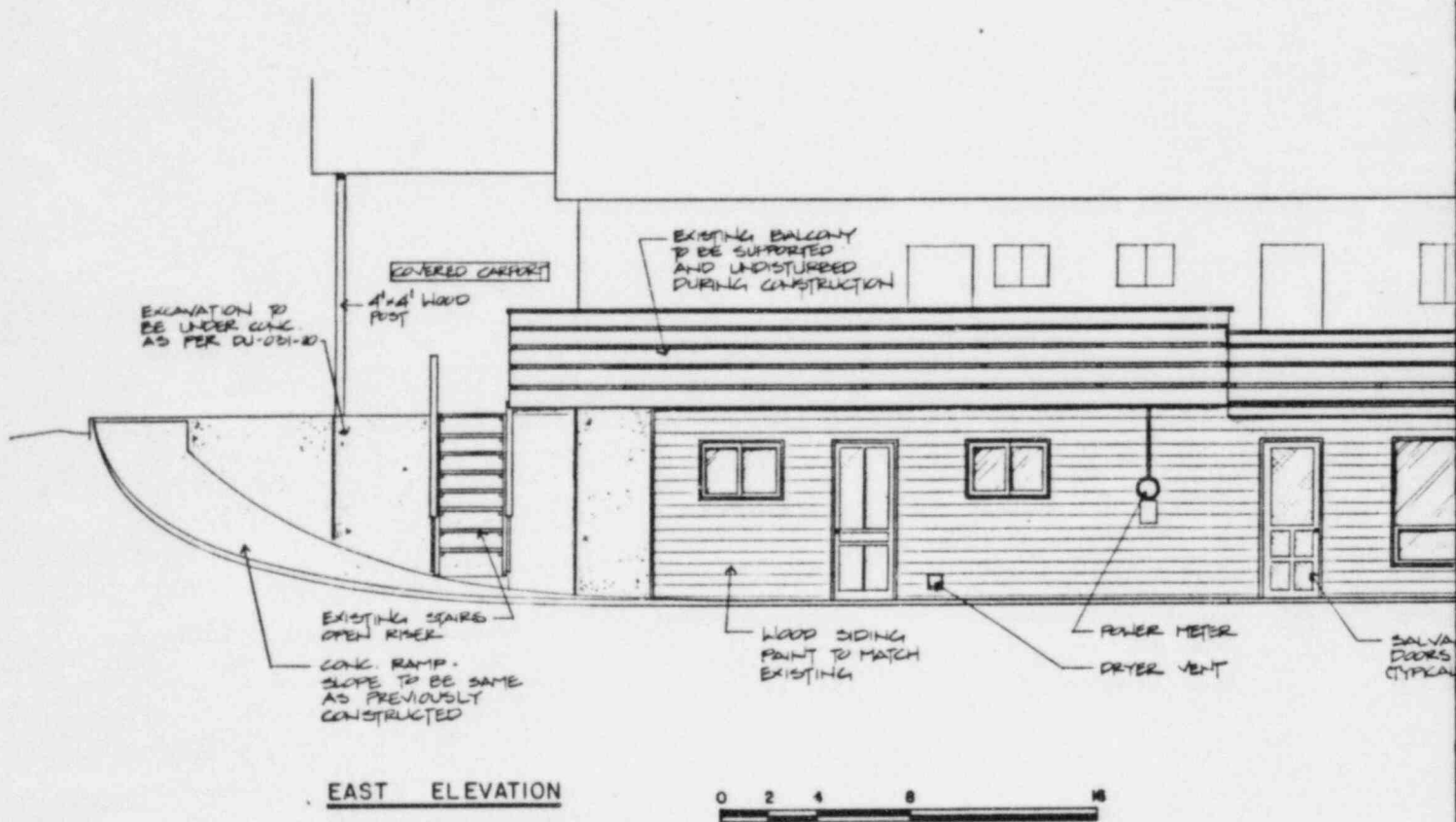
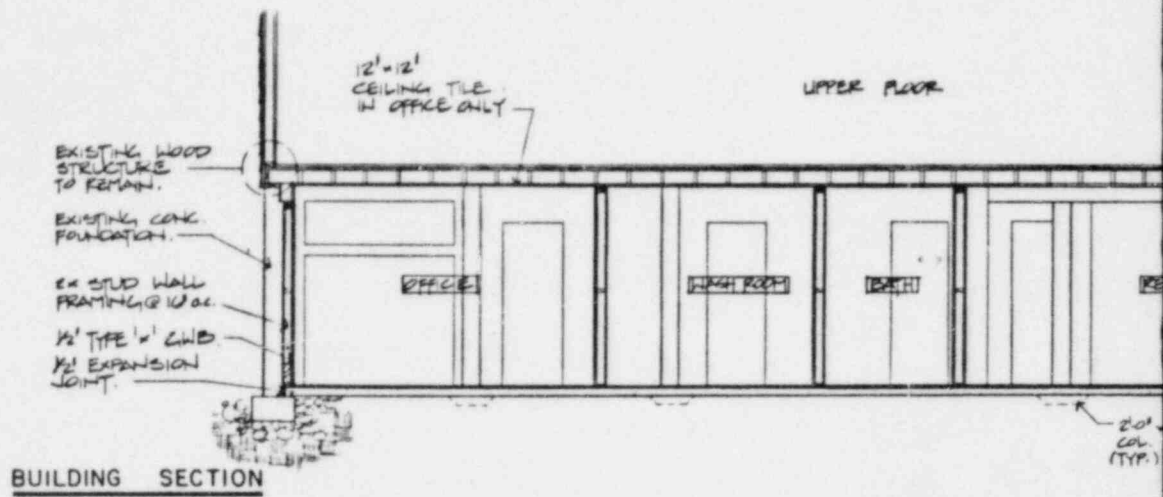
REV.

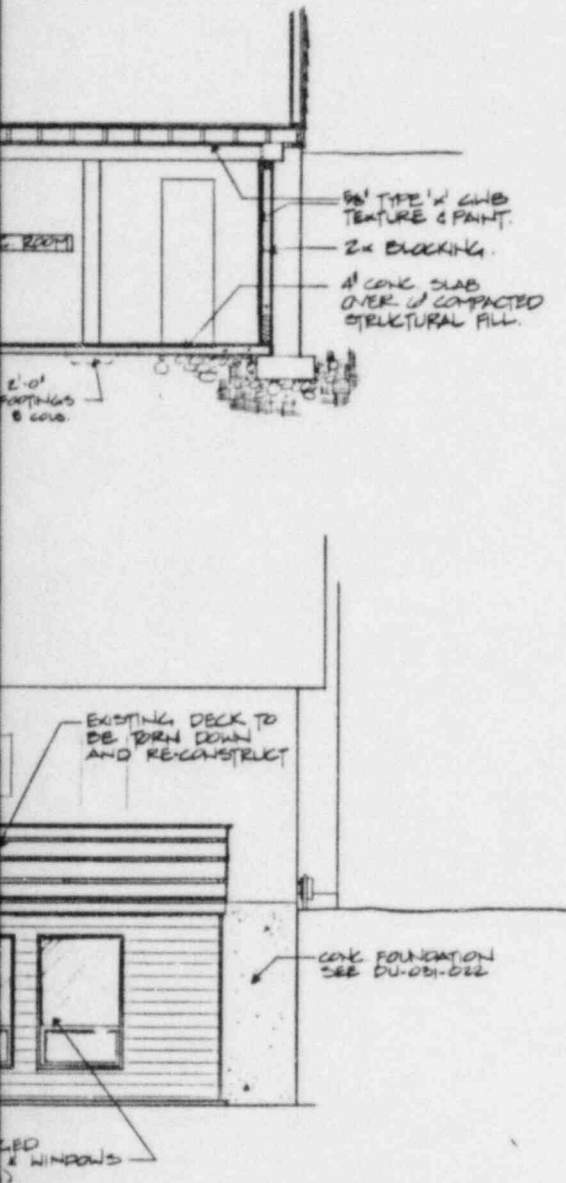
A

FINAL REA SUBMITTAL

REVISIONS

DRAWN BY CHECKED BY APPROVAL LDE DR PROJ ENG DOE





# NOTES

1. MECHANICAL & ELECTRICAL TO BE REPLACED AS PER PREVIOUS FUTURE LAYOUT.
2. WALL FINISHES TO MATCH OR EQUAL PREVIOUS FINISHES.
3. FLOOR FINISHES AS FOLLOWS:
  - OFFICE TO BE CARPET.
  - BATH, WASHROOM, & REC. ROOM TO BE RESILIENT LINOLEUM TILE.
  - STORAGE AREAS TO BE EXPOSED CONCRETE.
4. ALL STORAGE SHELVES TO BE RE-CONSTRUCTED AND PLACED IN POSITION AS PREVIOUS LAYOUT.
5. WOOD POSTS TO BE REPOSITIONED BACK TO ORIGINAL PLACEMENT.
6. CEILING FINISHES AS FOLLOWS:
  - OFFICE TO BE 2" x 2" TEXTURED TILE
  - BATH, WASHROOM, REC. ROOM TO BE 1/2" TYPE 'X' GWB. TEXTURE & PAINT
  - STORAGE TO REMAIN EXPOSED FLOOR JOISTS.

Also Available On  
Aperture Card

TI  
APERTURE  
CARD

8507 090287 - 07

## U. S. DEPARTMENT OF ENERGY ALBUQUERQUE, NEW MEXICO

DESIGNED  
CHECKED  
REVIEWED  
RECOMMENDED  
APPROVED

NR

DATE

DOE PROJECT MANAGER

NR

DATE

DOE PROJECT ENGINEER

NR

DATE



MORRISON  
KNUDSEN

PROJECT NO.  
DE-AC04-83AL18776

DRAWING NO.  
DU-031-023

REV.  
R

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REVISIONS

DRAWN BY  
CHECKED BY  
APPROVED BY  
DATE

DATE

## 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
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 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.

<u>Drawing Number</u>	<u>Drawing Title</u>
DU-031-020	Excavation & Restoration DU-031
DU-031-021	Excavation & Restoration Plan DU-031
DU-031-022	Demolition & Restoration Plan DU-031
DU-031-023	Building Section & Elevations DU-031



APPENDIX A  
SURVEY DATA LOGS

**OUTDOOR GAMMA SCREENING  
SURVEY DATA SHEET**

LOGGING CREW:

*Ernest Lauch  
Edward DeWitt  
Leon Benally*

SHEET

OF

PAGE

1

DATE:

*July 6, 1984*

PROPERTY ID:

*DU-031*

INSTRUMENT ID NO.:

*400 2220 31972 1144 165.27*

BACKGROUND CALCULATION:

#1 \_\_\_\_\_ + #2 \_\_\_\_\_ + #3 \_\_\_\_\_ = \_\_\_\_\_ - 3 = 11,500 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
C+00	13660	C+20	13110	C+83	16550	C+20	13710
+10L	12660	+10R	13080	+30R	16170	+60R	14220
C+10	13050	C+30	13470	C+90	14860	C+30	14470
+10L	12760	+10R	14860	+30R	13240	+60R	15120
C+20	13040	C+40	17280	C+100	12300	C+40	17240
+10L	13290	+10R	21470	+20R	11910	+60R	17080
C+30	13020	C+50	55730	C+60	13580	C+50	16910
+10L	13620	+10R	42280	+40R	12860	+60R	16750
C+40	12970	C+60	84860	C+10	13380	C+60	15360
+10L	13850	+10R	57530	+40R	12180	+60R	16040
C+50	12560	C+70	22360	C+20	13300	C+70	15860
+10L	14810	+10R	23290	+40R	20750	+60R	14780
C+60	12740	C+80	15950	C+30	15370	C+80	15380
+10L	13740	+10R	15550	+40R	19570	+60R	14630
C+70	12440	C+90	13300	C+80	18680	C+90	17240
+10L	13730	+10R	14590	+40R	16220	+60R	14460
C+80	12590	C+100	13870	C+90	16630	C+100	14880
+10L	12480	+10R	12470	+40R	14800	+60R	13860
C+90	13130	C+100	13780	C+100	13310	C+100	14210
+10L	12340	+20R	13650	+40R	13540	+70R	13860
C+100	12960	C+10	15270	C+00	13730	C+10	13750
+10L	12470	+20R	13350	+50R	12760	+70R	14140
C+00	11460	C+20	13280	C+10	13210	C+20	12910
+CCR	11760	+20R	14460	+50R	12870	+70R	12670
C+10	12760	C+30	13660	C+20	13960	C+30	14770
+CCR	13120	+20R	16040	+50R	12520	+70R	13570
C+20	13160	C+40	18830	C+30	15320	C+40	14480
+CCR	12570	+20R	24510	+50R	15370	+70R	13790
C+30	12580	C+50	34480	C+40	21030	C+50	14330
+CCR	15710	+20R	46210	+50R	21780	+70R	13250
C+40	14870	C+60	112020	C+45	19890	C+60	13750
+CCR	15880	+20R	78180	+50R	24350	+70R	13430
C+50	16640	C+70	24150	C+50	20690	C+70	13920
+CCR	14880	+20R	26480	+50R	27580	+70R	14030
C+60	12170	C+80	16570	C+60	23850	C+80	14020
+CCR	21760	+20R	17560	+50R	30960	+70R	13020
C+70	16620	C+90	15150	C+70	22890	C+90	13860
+CCR	17160	+20R	13490	+50R	33000	+70R	12980
C+80	14430	C+100	12590	C+80	17180	C+100	14120
+CCR	14290	+20R	12420	+50R	16090	+70R	14200
C+90	13450	C+00	13480	C+90	14160	C+00	13800
+CCR	13040	+30R	12980	+50R	14330	+80R	13990
C+100	12450	C+10	12660	C+100	13040	C+10	13660
+CCR	12510	+30R	12320	+50R	12230	+80R	13210
C+00	13280	C+20	13890	C+60	12720	C+20	12270
+CCR	13360	+30R	16490	+80R	13400	+70R	11920
C+10	13760	C+30	15840	C+10	13360	C+30	11910
+CCR	13530	+30R	14110	+60R	13590	+80R	12750

REMARKS:

*For numbers are contact bottom  
number is 1 meter reading all counts  
in CPM*

**OUTDOOR GAMMA SCREENING  
SURVEY DATA SHEET**

LOGGING CREW:

*Ernest Couch  
Allard Schultz  
Lewis Benally*

SHEET

OF

PAGE

*2*

DATE:

*July 6, 1984*

PROPERTY ID:

*DU-031*

INSTRUMENT ID NO:

*600 2220 #31972 441016527*

BACKGROUND CALCULATION:

#1 \_\_\_\_\_ + #2 \_\_\_\_\_ + #3 \_\_\_\_\_ = \_\_\_\_\_ - 3 = *11,500* 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
<i>0+40 +80R</i>	<i>1350 12820</i>	<i>0+30 +100R</i>	<i>12410 12760</i>	<i>0+81 +95R</i>	<i>33500 14100</i>		
<i>0+50 +80R</i>	<i>12690 12900</i>	<i>0+40 +100R</i>	<i>13210 12970</i>				
<i>0+60 +80R</i>	<i>13180 12560</i>	<i>0+50 +100R</i>	<i>17760 13190</i>				
<i>0+70 +80R</i>	<i>13180 12960</i>	<i>0+60 +100R</i>	<i>11740 12460</i>				
<i>0+80 +80R</i>	<i>13810 13050</i>	<i>0+70 +100R</i>	<i>12050 11960</i>				
<i>0+90 +80R</i>	<i>12730 12420</i>	<i>0+80 +100R</i>	<i>13280 11920</i>				
<i>0+100 +80R</i>	<i>14460 13580</i>	<i>0+90 +100R</i>	<i>11980 12470</i>				
<i>0+70 +85R</i>	<i>12460 12690</i>	<i>0+100 +100R</i>	<i>15240 14630</i>				
<i>0+78 +85R</i>	<i>18850 13660</i>	<i>0+100 +110R</i>	<i>12270 12570</i>				
<i>0+80 +90R</i>	<i>13110 13400</i>	<i>0+10 +10R</i>	<i>12830 13010</i>				
<i>0+10 +90R</i>	<i>11660 15570</i>	<i>0+20 +110R</i>	<i>13780 13240</i>				
<i>0+20 +90R</i>	<i>12780 12140</i>	<i>0+30 +110R</i>	<i>14680 13250</i>				
<i>0+30 +90R</i>	<i>12590 12400</i>	<i>0+40 +110R</i>	<i>13080 13080</i>				
<i>0+40 +90R</i>	<i>14150 12671</i>	<i>0+50 +110R</i>	<i>12280 12510</i>				
<i>0+50 +90R</i>	<i>17160 12540</i>	<i>0+60 +110R</i>	<i>8970 11730</i>				
<i>0+60 +90R</i>	<i>12480 12290</i>	<i>0+70 +110R</i>	<i>11920 12450</i>				
<i>0+70 +90R</i>	<i>12250 12660</i>	<i>0+80 +110R</i>	<i>12500 12690</i>				
<i>0+80 +90R</i>	<i>12300 12980</i>	<i>0+90 +110R</i>	<i>11860 13060</i>				
<i>0+90 +90R</i>	<i>11240 12980</i>	<i>0+100 +110R</i>	<i>12270 13410</i>				
<i>0+100 +90R</i>	<i>13740 13770</i>						
<i>0+80 +95R</i>	<i>13350 12920</i>						
<i>0+80 +100R</i>	<i>11760 12220</i>						
<i>0+10 +100R</i>	<i>11600 12890</i>						
<i>0+20 +100R</i>	<i>13550 12770</i>						

*NOTE E. 10016*

*Rock-as rock  
is moved readings  
go to background*

REMARKS:

*top number is contact bottom  
number is 1 meter readings all counts  
in CFM*

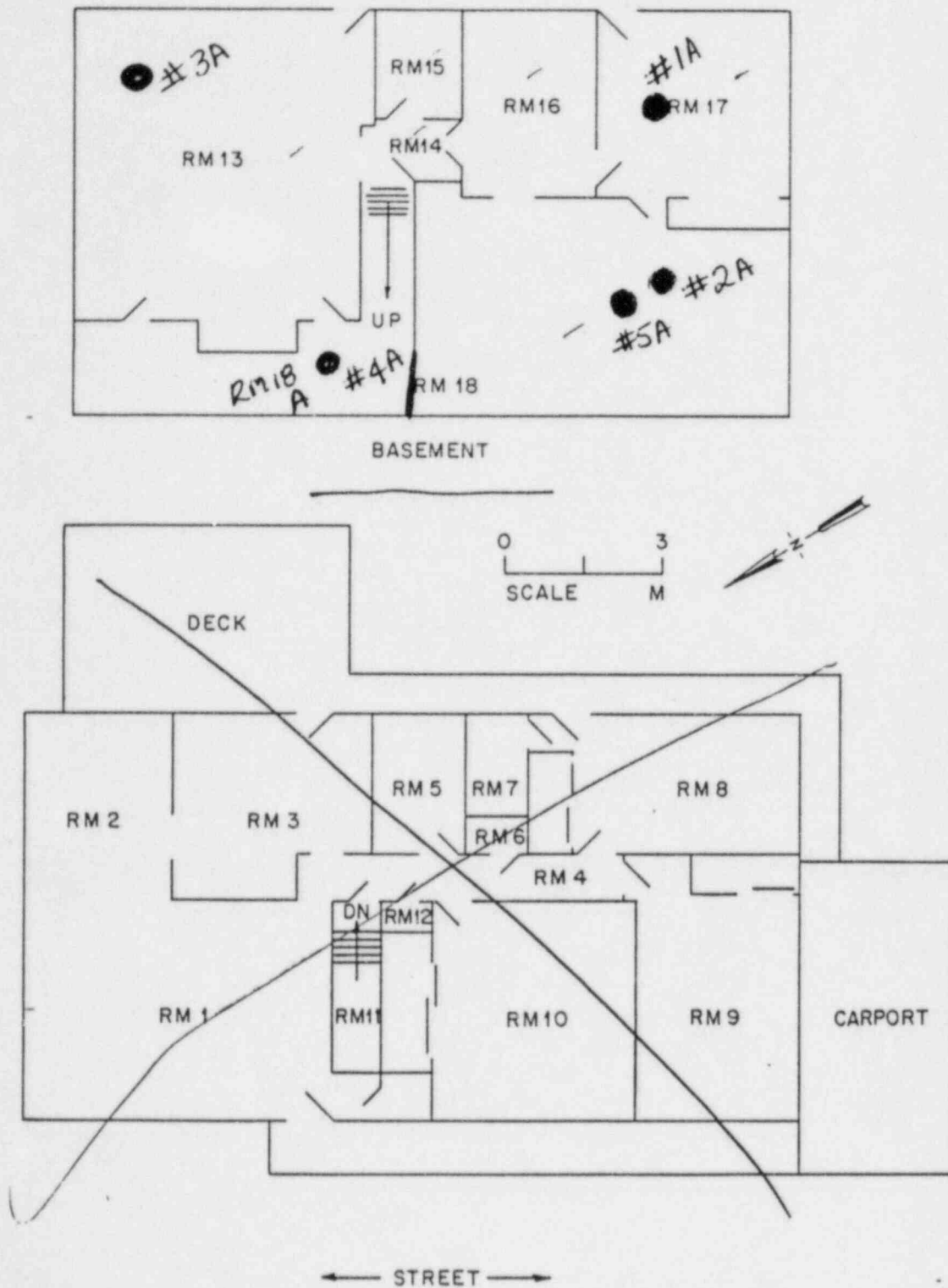


Fig. 4. Floor plan of residence at property DU031.

INTERIOR SURVEY DATA LOG/HOT SPOT

SURVEY CREW E. CORICH  
L. BENALLY, JR  
E. SCHULTZ

SHEET 4 OF 12 PAGE 4  
 DATE JULY 9, 1984  
 PROPERTY ID # DH-031  
 PROJECT Durango, Colorado

GAMMA SCINTLLATOR HOT SPOT DATA

2220 INSTRUMENT ID # 31982 u410/#16528 UR/h CONVERSION CURVE # \_\_\_\_\_ (ATTACHED)

- NOTES: 1) RECORD SPOT ID LOCATIONS ON INTERIOR SURVEY SKETCH AND ATTACH COPY.  
 2) INCLUDE DISCUSSION OF ANOMALIES, SUGGESTIONS, OBSERVATIONS, MATERIAL SAMPLES INFORMATION, SOURCES OF NATURAL RADIOACTIVITY, ETC., IN COMMENTS.

HOT SPOT ID #	COUNTS /0.1MIN	RATE UPM
LOCATION: <u>Room #17</u>		
NW	217010	136480
NE	33890	46150
CENTER	12870	93350
SW	87440	56360
SE	12470	73640

LOCATION: <u>Room #15</u>		
NW	186210	123280
NE	118010	73030
CENTER	118250	96570
SW	183270	123520
SE	84790	69980

LOCATION: <u>Room 13</u>		
NW	74260	50990
NE	40790	44320
CENTER	96850	104580
SW	179150	139420
SE	36920	47170

HOT SPOT ID #	COUNTS /0.1MIN	RATE UPM
LOCATION: <u>Room #18</u>		
NW	131680	105420
NE	203450	135320
CENTER	105690	98860
SW	99170	63820
SE	106790	75400

LOCATION: <u>Room #14</u>		
NW		
NE		
CENTER	177240	142460
SW		
SE		

LOCATION:		

HOT SPOT ID #	COUNTS /0.1MIN	RATE UPM
LOCATION: <u>Room #16</u>		
NW	197340	134700
NE	45300	52870
CENTER	132310	113560
SW	187270	148800
SE	89200	77210

LOCATION: <u>Room 18A</u>		
NW	142230	83300
NE	177710	117500
CENTER	123610	108230
SW	92400	83300
SE	164630	103700

LOCATION:		

COMMENTS: At each location 1<sup>st</sup> measurement is a contact reading  
and 2<sup>nd</sup> measurement are reading taken 1 meter above  
the floor level. Back ground measurement 11,500 CPM  
all measurement are counts per minute  
Rooms are numbered same as ORNL map



# BOREHOLE LOG

LOGGING CREW:

*Edmund Schultz*  
*Leon Penally*  
*John Davis*

SHEET

5 OF 12 PAGE 5

DATE:

*July 6, 1984*

PROPERTY ID:

*BU-031*

INSTRUMENT ID NO.

*100 2220 #31982 "44" 16528*

AREA:

*Nuranga 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: <i>0+40+14R</i>		HOLE ID: <i>0+40+00R</i>		HOLE ID: <i>0+60+10R</i>		HOLE ID: <i>0+50+10R</i>	
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"	<i>20210</i>	0"	<i>14640</i>	0"	<i>88460</i>	0"	<i>56290</i>
6"	<i>21690</i>	6"	<i>15550</i>	6"	<i>127980</i>	6"	<i>76410</i>
12"	<i>23620</i>	12"	<i>17850</i>	12"	<i>96580</i>	<i>1210</i>	<i>89730</i>
18"	<i>20520</i>	<i>1815</i>	<i>10990</i>	18"		18"	
24"		24"		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:

*Shallow holes are due to rocky soil*  
*All measurements are in counts per minute*  
*(cpm) Background measurements 23,000 cpm.*



# BOREHOLE LOG

LOGGING CREW:

*Ernest Caych*  
*Edward Liberty*  
*Leon Benally*

SHEET

6 OF 12 PAGE 6

DATE:

*July 6, 1984*

PROPERTY ID:

*DV-231*

AREA:

*Albany, Cal.*

INSTRUMENT ID NO.

*LUD 2220 #3982*  
*N 4410 / #16528*

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.

③		⑥		⑦		⑧	
HOLE ID: <i>0+60+05R</i>		HOLE ID: <i>0+53+14R</i>		HOLE ID: <i>0+58+06R</i>		HOLE ID: <i>0+70+10R</i>	
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"	<i>29690</i>	0"	<i>95020</i>	0"	<i>16280</i>	0"	<i>23800</i>
6"	<i>33840</i>	6"	<i>170270</i>	6"	<i>17700</i>	6"	<i>29800</i>
12"	<i>27130</i>	12"	<i>142550</i>	12"	<i>19840</i>	12"	<i>34330</i>
<i>18" 1/2</i>	<i>21980</i>	<i>18" 1/4</i>	<i>102730</i>	<i>18" 1/4</i>	<i>18740</i>	18"	<i>35940</i>
24"		24"		24"		24"	<i>35930</i>
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:

*All measurement are in counts per minute (cpm) background measurements 23,000 cpm all holes were drilled until large rock or debris was encountered.*

# BOREHOLE LOG

LOGGING CREW:

*Ernest Couch*  
*Edward Schultz*  
*Kevin Benally*

SHEET

7

OF

12

PAGE

7

DATE:

*July 5, 1984*

PROPERTY ID:

*DU-031*

AREA:

*Surgey Lb.*

INSTRUMENT ID NO.

*LWD 220 #31852*

*W 4410 #16528*

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: <i>QF50+182</i> <sup>(9)</sup>		HOLE ID: <i>QF70+00R</i> <sup>(10)</sup>		HOLE ID: <i>QF60+00R</i> <sup>(11)</sup>		HOLE ID: <i>QF60+05L</i> <sup>(12)</sup>	
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"	<i>16800</i>	0"	<i>16050</i>	0"	<i>20850</i>	0"	<i>16530</i>
6"	<i>18860</i>	6"	<i>17700</i>	6"	<i>25230</i>	6"	<i>17480</i>
12"	<i>21080</i>	<i>12-8</i> 12"	<i>17990</i>	<i>12-10</i> 12"	<i>25400</i>	<i>12-9</i> 12"	<i>19550</i>
18"		18"		18"		18"	
24"		24"		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:

*All measurements are in counts per minute (cpm) background measurements 23,000 cpm*  
*all holes were drilled until rocks or debris was encountered.*

# BOREHOLE LOG

LOGGING CREW:

*Edward Schultz*  
*Ernest Couch*  
*Levon Genally*

SHEET

8 OF 12 PAGE 8

DATE:

*July 6, 1984*

PROPERTY ID:

*W-031*

AREA:

*Orange Lake*

INSTRUMENT ID NO.

*LOD 2220 # 31982*
*W 4410 # 1652B*

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: *0+50+00R*

TIME DRILLED:

TIME LOGGED:

SOIL TYPE:

HOLE ID:

TIME DRILLED:

TIME LOGGED:

SOIL TYPE:

HOLE ID:

TIME DRILLED:

TIME LOGGED:

SOIL TYPE:

HOLE ID:

TIME DRILLED:

TIME LOGGED:

SOIL TYPE:

DEPTH	COUNTS/.1MIN	DEPTH	COUNTS/.1MIN	DEPTH	COUNTS/.1MIN	DEPTH	COUNTS/.1MIN
SURFACE		SURFACE		SURFACE		SURFACE	
0"	<i>14540</i>	0"		0"		0"	
6"	<i>15510</i>	6"		6"		6"	
12"	<i>16680</i>	12"		12"		12"	
18"	<i>16890</i>	18"		18"		18"	
24"	<i>16110</i>	24"		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:

*All measurements are in counts per minute (cpm) background measurements 23,000 cpm all holes were drilled until rocks or debris was encountered.*

**BOREHOLE LOG**

LOGGING CREW: E. COUCH  
L. BENNALLY, JR  
E. SCHULTZ  
 INSTRUMENT ID NO. Indium 222c #31482  
W 4410 # 1652B

SHEET 9 OF 12 PAGE 9  
 DATE: July 9, 1984  
 PROPERTY ID: AM-031  
 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: 0121+38R HOLE ID: 0123+34R HOLE ID: OFFICE HOLE ID: WORKSHEET #1  
 TIME DRILLED: TIME DRILLED: 2:00 PM 19 TIME DRILLED: 2:00 PM 18  
 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	46760	SURFACE	16870	SURFACE	134720	SURFACE	124270
0"	110930	0"	17580	0"	140790	0"	173290
6"	325420	6"	22210	6"	424410	6"	462180
10"	324530	12"	22560	12"	332690	12"	525470
18" 12	278940	18" 15"	20400	18" 14"	270840	18"	
24" 15"	219410	24"		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: ALL MEASUREMENTS ARE IN COUNTS PER MINUTE (CPM)  
BACK GROUND MEASUREMENT 23,000 CPM. ALL HOLES WERE  
DRILLED UNTIL WE ENCOUNTERED LARGE ROCKS OR BOULDERS.  
\* DRILLED INTO LOOSE SAND, HOLE WOULD SLURF IN AS SOON AS AUGER  
WAS PULLED OUT. ESTIMATE TAILINGS 3'-3 1/2' (F) DEEP.  
THESE HOLES WAS BORED THROUGH CONCRETE



**BOREHOLE LOG**

LOGGING CREW: E. Couch  
L. BENALLY, JR.  
E. SCHULTZ  
 INSTRUMENT ID NO. Lullum 2270 #31982  
W 4410 / #16523

SHEET 10 OF 12 PAGE 10  
 DATE: July 9, 1984  
 PROPERTY ID: DU-031  
 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.

(3A)		(4A)		(5A)		(16)	
HOLE ID: <u>ROOM 13</u>		HOLE ID: <u>CLOSET ROOM</u>		HOLE ID: <u>WICKS HALL</u>		HOLE ID: <u>OT 40+54R</u>	
TIME DRILLED: _____		TIME DRILLED: <u>PM 18</u>		TIME DRILLED: <u>PM 18</u>		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>116540</u>	SURFACE	<u>118840</u>	SURFACE	<u>135200</u>	SURFACE	<u>28500</u>
0"	<u>162500</u>	0"	<u>152700</u>	0"	<u>184000</u>	0"	<u>19540</u>
6"	<u>402550</u>	6"	<u>342050</u>	6"	<u>481200</u>	6"	<u>20290</u>
12"	<u>366050</u>	12"	<u>271140</u>	12"	<u>55256</u>	12"	<u>21250</u>
18" 15"	<u>295240</u>	18" 15"	<u>125260</u>	18"		18"	<u>20900</u>
24"		24"		24"		24" 20"	<u>21840</u>
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: ALL MEASUREMENTS ARE IN COUNTS PER MINUTE (CPM)  
BACK (GROUND) MEASUREMENT 23,000 CPM. ALL HOLES WERE  
DRILLED UNTIL WE ENCOUNTERED LARGE ROCKS AND DEBRIS  
THESE HOLES BORED THROUGH CONCRETE

# BOREHOLE LOG

LOGGING CREW:

E. Leach  
L. BENALLY, JR  
E. SCHILLTZ

SHEET

11 OF 12 PAGE 11

DATE:

July 9, 1984

PROPERTY ID:

111-031

AREA:

DURANGO, COLORADO

INSTRUMENT ID NO.

LUD/UM 2220 # 31982  
w/4410 # 16528

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>0180150R</u>		HOLE ID: <u>C138155R</u>		HOLE ID: _____		HOLE ID: _____	
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>16370</u>	SURFACE	<u>17270</u>	SURFACE		SURFACE	
0"	<u>17390</u>	0"	<u>17280</u>	0"		0"	
6"	<u>18480</u>	6"	<u>17940</u>	6"		6"	
12"	<u>20110</u>	12"	<u>20970</u>	12"		12"	
18"	<u>20740</u>	18"	<u>22790</u>	18"		18"	
24"		24"		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:

ALL MEASUREMENT ARE IN COUNTS PER MINUTE (CPM)  
BACKGROUND MEASUREMENT 23,000 CPM. ALL HOLES WERE  
DRILLED UNTIL WE ENCOUNTERED LARGE ROCKS AND DEBRIS.



**BOREHOLE LOG**

LOGGING CREW: JOHN INNIS  
L. BENALLY

SHEET 12 OF 12 PAGE 12  
DATE: 7/10/84

PROPERTY ID: DV-031

INSTRUMENT ID NO. LVD 2220 # 31982  
W14410 # 16528

AREA: DURANGO, COLO.

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.

(19)		(20)		(21)			
HOLE ID: <u>0133+18R</u>		HOLE ID: <u>0182+23R</u>		HOLE ID: <u>0185+30R</u>		HOLE ID: _____	
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>17010</u>	SURFACE	<u>17120</u>	SURFACE	<u>16690</u>	SURFACE	
0"	<u>16920</u>	0"	<u>17190</u>	0"	<u>16990</u>	0"	
6"	<u>20220</u>	6"	<u>21130</u>	6"	<u>21390</u>	6"	
12"	<u>21840</u>	12"	<u>24580</u>	12"	<u>24420</u>	12"	
<u>18"</u>	<u>21350</u>	18"		18"	<u>23250</u>	18"	
24"		24"		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: All measurements are in counts per minute (cpm) background measurements 23000 cpm all holes were drilled until rocks or debris was encountered.

**BOREHOLE LOG** *Supplemental Data*

LOGGING CREW: *Ernest Couch*  
*Edward Schults*  
*Julius Betzley*

SHEET 1 OF 1 PAGE 1

DATE: *October 29, 1984*

PROPERTY ID: *DU-031*

INSTRUMENT ID NO *WD 2220 #31982 7440 "K" 28*

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.

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HOLE ID: <u>C+15+25R</u>		HOLE ID: _____		HOLE ID: _____		HOLE ID: _____	
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>13990</u>	SURFACE		SURFACE		SURFACE	
0"	<u>14380</u>	0"		0"		0"	
6"	<u>18390</u>	6"		6"		6"	
12"	<u>21260</u>	12"		12"		12"	
18"		18"		18"		18"	
24"		24"		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: *Shovel hole, background is 23000 cpm, all counts in CPM.*



**MORRISON-KNUDSEN COMPANY, INC.**

UMTRA PROJECT OFFICE  
P.O. BOX 9136  
ALBUQUERQUE, NEW MEXICO 87119