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

Draft
Radiological and Engineering Assessment

Vicinity Property No. DUR 026

Remedial Actions
Contractor
for the
Uranium Mill Tailings
Remedial Actions
Project

MORRISON
KNUDSEN

DRAFT

THE RADIOLOGICAL AND ENGINEERING ASSESSMENT

AND FINAL DESIGN

FOR

DURANGO PROPERTY

DU-026

February 12, 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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A. Survey Data Logs

1.0 EXECUTIVE SUMMARY

1.1 Introduction

Property DU-026 is a private residence located at 46 Rio Vista Circle, Durango, CO.

1.2 Evaluation and Recommendation

1.2.1 Residual Radioactive Material Involvement

Contaminated material was found in the front yard of the property. No interior contamination was found.

1.2.2 Recommended Remedial Action Option

The recommended option is to remove the contaminated material except that under the sidewalk and street. This material will be left in accordance with the criteria of 40 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 $5,550.00.

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-026 is a private residence located at 46 Rio Vista Circle, Durango, Colorado and owned by Carl and Colleen Lundberg. 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. 464801 follows:

Lot 10, Block 2, RIVERVIEW PARK SECOND RESUBDIVISION in the City of Durango, La Plata County, Colorado.

2.1.3 Bordering Properties

The lot is zoned R-1, residential area. It is located less than 3-1/2 miles northeast of the old Vandium 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, wood frame structure on a concrete foundation. An attached wood frame single car garage is located on the north side of the structure with a concrete driveway that extends from the garage to the street. Concrete sidewalk extends along the street just outside the west property line, along the driveway from the street to a covered concrete front porch, and along the east side of the house.

Front and side yards are grassed with four large mature conifers and one deciduous tree located in the front yard area. A brick planter extends from the porch to the end of the house on the west side of the house. The rear yard is grassed, fully landscaped, and fenced. Two concrete and one stone retaining wall extends the full width of the rear yard. The lot slopes upward steeply to the east from the first retaining wall to the back fence.

The residence is less than 50 years old and therefore meets the non-historical property 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 for which the DOE may proceed with remedial action without additional historical investigations.

2.2.2 Utilities

Utilities are serviced to the property as follows:

Electric power - Overhead to northeast corner of house.

Telephone - Overhead to southeast corner of 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: 46 Rio Vista Circle

Owner's Name: Carl and Coleen Lundberg Address: Same

Lot No.: 10 Property Type: Residential

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: Wood Frame; Stucco with 3' High Brick Veneer Exterior Wainscoting in front; Stucco with 3' High Exterior Wainscoting Sides and Back

Foundation: 38" High Concrete Perimeter Wall with Two Concrete Center Support Piers

Garage: Single Car Attached on North Side of House

Storage Bldg: Prefab: None

Other:

Improvement to Dwellings: Additions: None Porches: Covered Concrete on West Side of House

Deck: None

Other:

Driveway: Concrete: From Street to Garage Paved:

Gravel: Other:

Sidewalks: Concrete/Paved: As Noted on Drawing

Other:

Fences/Gates: Wood: 4' Ht on N Side Backyd From 1st Ret Wall & along E Side Lot

Chain Link: 3' Ht of N Side Backyd to 1st Ret Wall & on S Side Bkyd

Table 2.1 (cont'd)

PROPERTY SURVEY DATA

Site Location: Durango

Property Address: 46 Rio Vista Circle

Grounds:
- Lawn: Front and Back to First Retaining Wall
- Trees: As Noted on Drawing
- Shrubs: As Noted on Drawing
- Garden: None
- Grading: 20% Slope from 3rd Retaining Wall to Rear-(E) of Lot
- Other: Planter on W Side of House

Soil Type: Topsoil in Lawned Areas; Sloped Area Rocky

Existing Survey Plot: Yes

Property Description - Interior: No Interior Contamination

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

Utilities:

Heating: Gas: X Electric: ____

Hot Water: ____ Other: ____

Air Cond: Gas: ____ Heat Pump: ____

Table 2.1 (cont'd)

PROPERTY SURVEY DATA

Site Location: Durango

Property Address: 46 Rio Vista Circle

Electric Line Location: Overhead to Northeast 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 Southeast Corner of House

Building Codes and Zoning:

Codes	Local	State	Federal
Building Work	UBC		
Plumbing			
HVAC			
Electrical			
Other			

Zoning District: City of Durango

Present Dwelling Zoning: R-1 Residence District

Setbacks: Front:

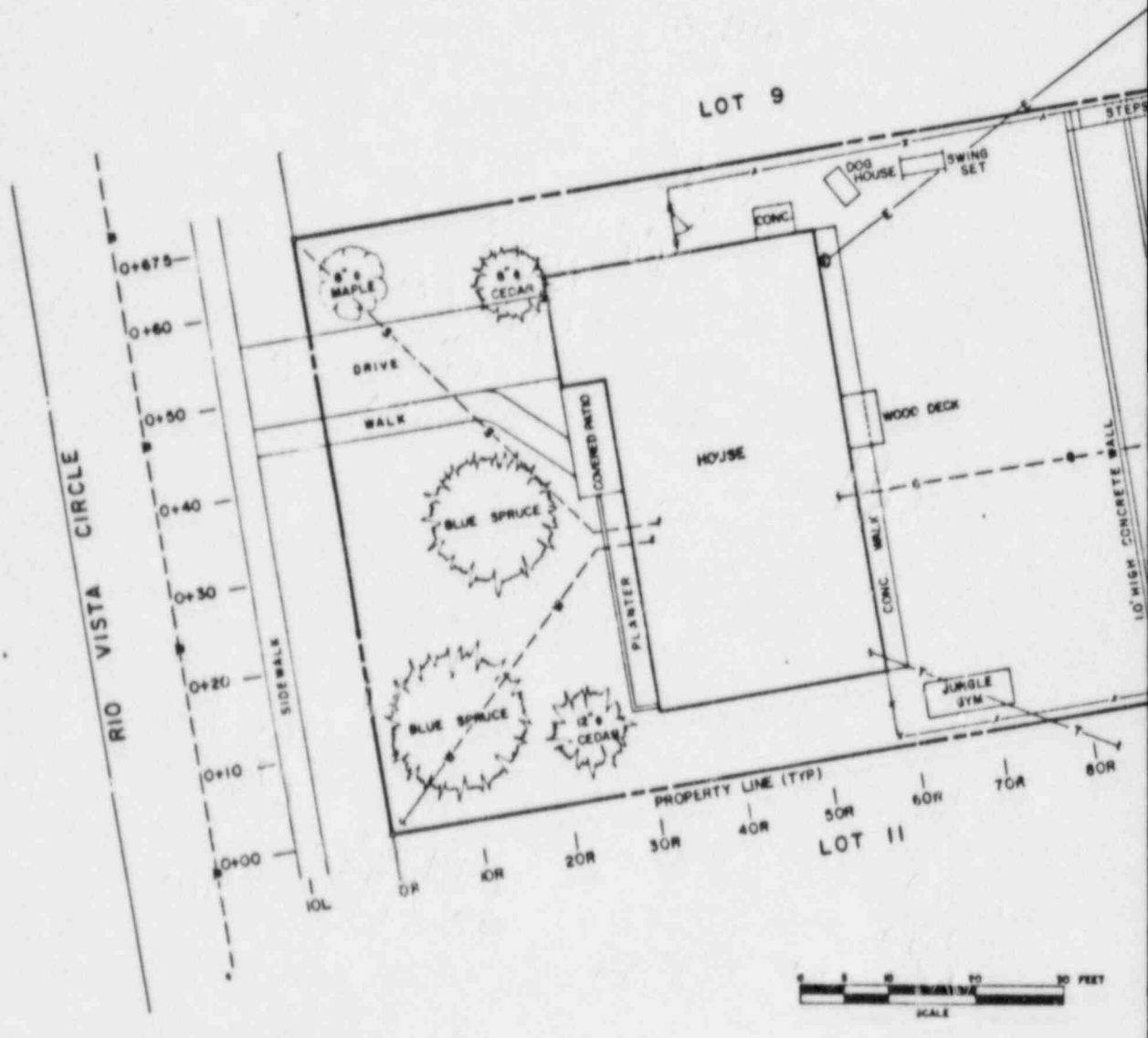
Rear:

Side:

Other:

Photographs:

Roll Frame	Description	Direction
2-15	Front of House	Looking East
2-13	Rear of House	Looking Northwest


N
LOT 9
RIO VISTA CIRCLE
0+675
0+60
0+50
0+40
0+30
0+20
0+10
0+00
SIDEWALK
10L
0R
10R
20R
30R
40R
50R
60R
70R
80R
PROPERTY LINE (TYP)
LOT 11
DRIVE
WALK
8" ø MAPLE
8" ø CEDAR
BLUE SPRUCE
BLUE SPRUCE
12" ø CEDAR
COVERED PATIO
PLANTER
HOUSE
CONC
DOG HOUSE
SWING SET
WOOD DECK
CONC WALK
JUNGLE GYM
10' HIGH CONCRETE WALL
STEPS
SCALE
FEET

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	G, W or E METER
X	G or W VALVE
	PROPERTY PIN
	POWER POLE

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

8507100094 - 01

DATE	REVISIONS	DRAWN BY	CHECKED BY	APPROVAL LOE	APPROVAL DH	PROJ ENG	APPROVAL DOE
2/1 1985	FINAL REA SUBMITTAL	GJW	MP	DP	VCD	VCD	-

U. S. DEPARTMENT OF ENERGY
ALBUQUERQUE, NEW MEXICO

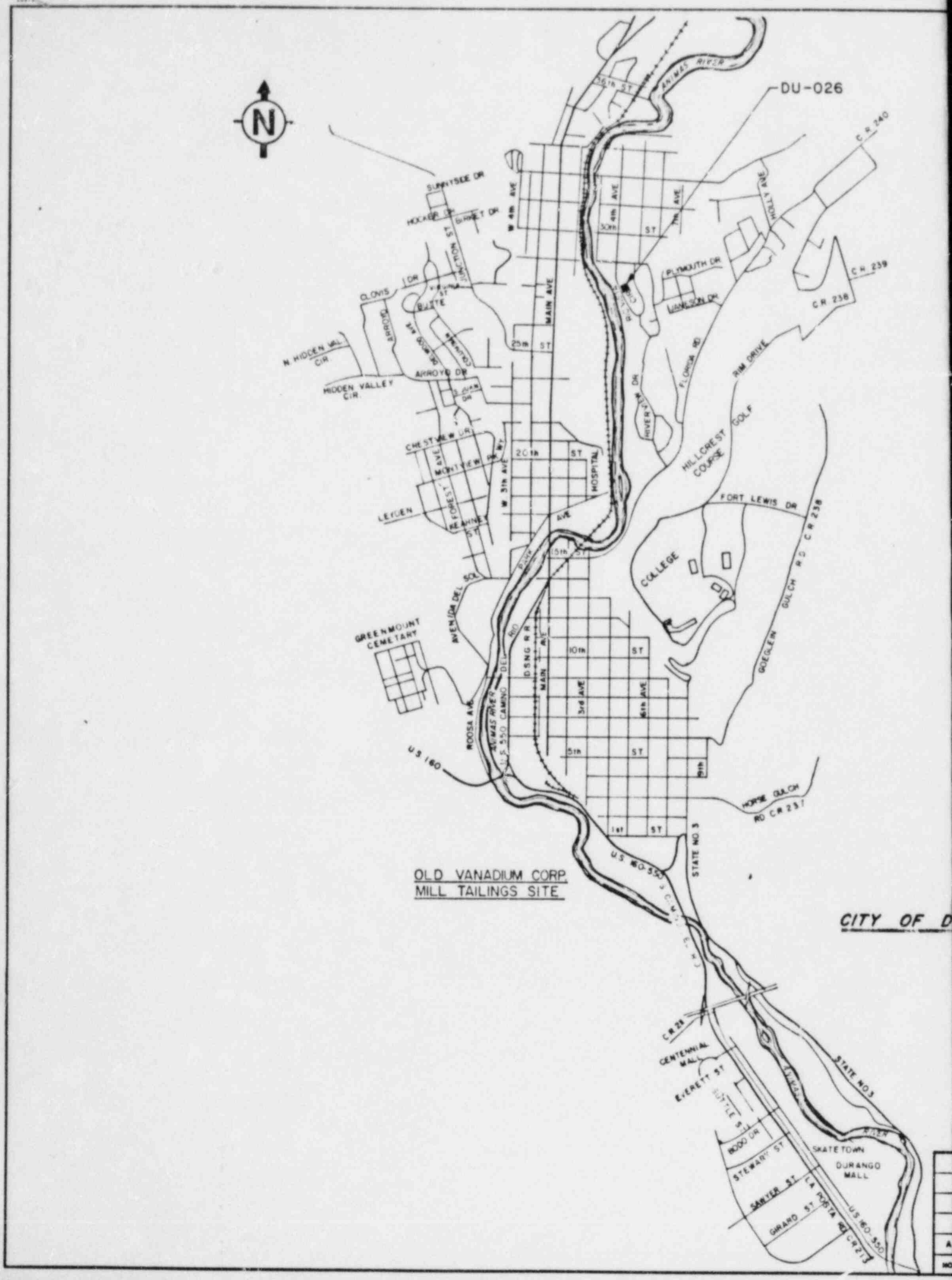
DESIGNED | DRAWN GJW
CHECKED
REVIEWED
RECOMMENDED
APPROVED NR

FIGURE 2.2
SITE PLAN DU-026
DURANGO, COLORADO
URANIUM MILL TAILINGS REMEDIAL ACTION PROJECT

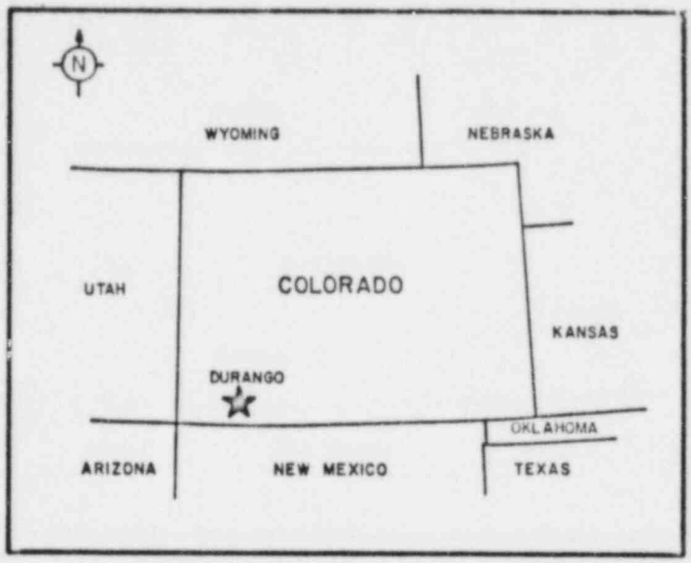
DATE	DOE PROJECT MANAGER	DATE	DOE PROJECT ENGINEER	DATE
	NR		NR	

MORRISON KNUDSEN

PROJECT NO. DE-AC04-83AL18796
DRAWING NO. DU-026-010 REV A



N
DU-026
ANIMAS RIVER
36th ST
SUNNYSIDE DR
HOCKER DR
SUNSET DR
JUNCTION ST
W 4th AVE
MAIN AVE
4th AVE
7th AVE
30th ST
HOLLY AVE
C.R. 240
C.R. 239
C.R. 238
PLYMOUTH DR
JUNCTION
CLOVIS DR
BUTTE
ARROYO
25th ST
N. HIDDEN VAL CIR.
HIDDEN VALLEY CIR.
ARROYO DR
FLORIDA RD
RIM DRIVE
RIVERVIEW DR
HILLCREST GOLF COURSE
CHESTVIEW DR
MONTVIEW
20th ST
HOSPITAL
FOREST AVE
W. 3rd AVE
LEYDEN
KEARNEY ST
FORT LEWIS DR
15th ST
AVE
COLLEGE
AVENIDA DEL SOL
GOEGLEIN GULCH RD C.R. 238
GREENMOUNT CEMETARY
CAMINO DEL RIO
D.S.N.G. R.R.
MAIN AVE
10th ST
3rd AVE
6th AVE
ROOSA AVE
U.S. 550
U.S. 160
5th ST
HORSE GULCH RD C.R. 237
1st ST
STATE NO. 3
U.S. 160-550
OLD VANADIUM CORP
MILL TAILINGS SITE
CITY OF D
C.R. 23
CENTENNIAL MALL
EVERETT ST
STATE NO. 3
SKATE TOWN
DURANGO MALL
STEWART ST
SAWYER ST
LA POSTA RD CR 213
GIRARD ST
U.S. 160-550



IRANGO, COLORADO

8507100094-02

3/1/1985	FINAL REA SUBMITTAL	GJW					—
DATE	REVISIONS	DRAWN BY	CHECKED BY	APPROVAL LOE	APPROVAL DH	PROJ ENG	APPROVAL DOE

U. S. DEPARTMENT OF ENERGY
ALBUQUERQUE, NEW MEXICO

DESIGNED	DRAWN GJW	FIGURE 2.1			
CHECKED		VICINITY MAP DU-026			
REVIEWED		DURANGO, COLORADO			
RECOMMENDED		URANIUM MILL TAILINGS REMEDIAL ACTION PROJECT			
APPROVED NR	DATE	DOE PROJECT MANAGER NR	DATE	DOE PROJECT ENGINEER NR	DATE

MORRISON KNUDSEN

PROJECT NO. DE-AC04-83AL18796

DRAWING NO. DU-026-005 REV. A

Front of House Looking East

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 Property DU-026, ORNL, May 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 contamination is not present in or under the house.

3.1.2 Survey Results

Surface gamma readings on the property range from 14 to 57 micro R/hr (Table 3.1). 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.

Four shovel holes were dug, one at each wall of the house, to determine if contamination was underneath the house. The hole at the west wall was located at the point of entrance into the house of the main water line and very near to the sewer line. Each hole was dug vertically for 6 inches and then augered under the footing as far as possible. These holes were surveyed as closely as possible to the method described in RAC Procedure 018.

3.2.2 Survey Results

Contamination was found in 4 of the 8 outdoor holes augered. The location and depth of the contamination is described in Table 3.2 and is shown in Figure 3.1.

No contamination was found in any of the angle holes. The location and depth of these holes are described in Table 3.3 and are shown in Figure 3.1. The only contamination observed along the utility lines is within Area A, described below.

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 found a "grab sample" radon daughter concentration of 0.001 WL inside the house.

3.4 Estimated Extent of Contamination

Three areas of contamination were identified in the survey.

In Area, A the depth of contamination could not be determined because of the difficulty of drilling, but it is known to be greater than 27 inches. (A depth of 36 inches should be assumed for estimating purposes.) Area A includes the driveway. According to the present owner, the tailings have been removed from under the driveway. However, as shown on Figure 3.1, contamination has been identified to a depth of more than 2 feet on either side of the driveway. The depth at which any materials under the driveway may have been removed is unknown. It is not radiologically necessary to remove the two trees associated with Area A.

The west boundary of Area B is undefined since contamination is known to extend into the street. The depth of contamination is known to be more than 18 inches and is expected to be about 30 inches. (See Section 3.5 below).

Area C is a small area with an estimated depth of contamination of 12 inches. Area C consists only of low-level contamination and its surface area is much less than 100 m^2. However, since remedial action is indicated for this property anyway, it is prudent to clean up Area C along with Area A.

3.5 Supplemental Standards

Supplemental Standards apply to Area B (Figure 3.1) per 40 CFR 192.21(c), "Criteria for Applying Supplemental Standards," and, therefore, no excavation is required in this area.

Table 3.1
OUTDOOR GAMMA SURVEY
Property DU-026

POINT	uR/hr
0+00,10L	37
0+10	42
0+20	41
0+30	57
0+40	45
0+50	45
0+60	56
0+67.5,10L	39
0+00,00R	19
0+30,00R	21
0+60,00R	17
0+10+10R	17
0+00,20R	17
0+60,20R	17

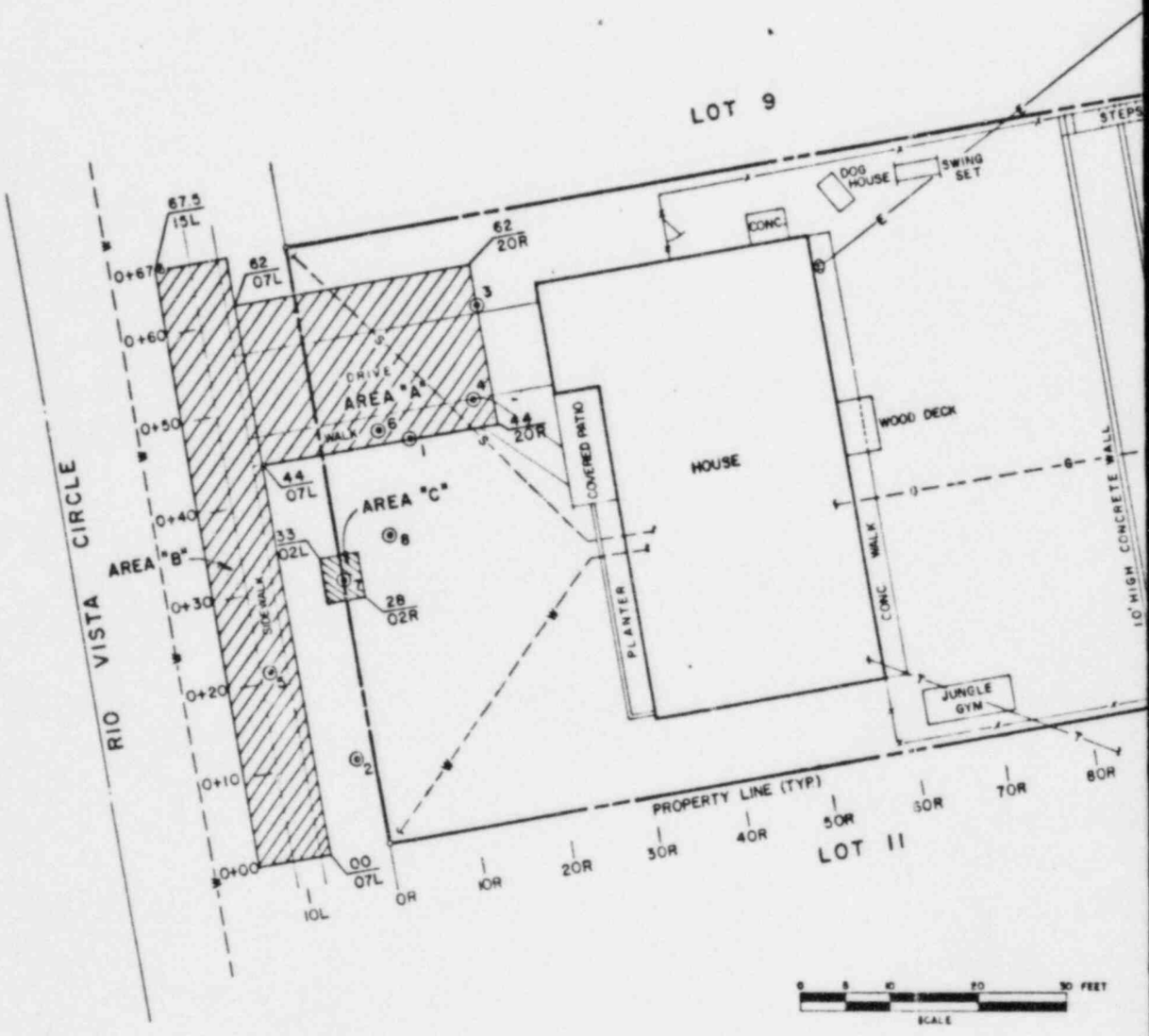
Table 3.2
BOREHOLE SURVEY
Property DU-026

HOLE	COORDINATES	CONTAMINATION DEPTH
1	0+44,10R	None
2	0+10,02L	None
3	0+57,20R	0-27"+
4	0+47,18R	0-24"+
5	0+21,10L	0-18"+
6	0+46,07R	0-21"+
7	0+30,00R	0-12"*
8	0+34,06R	None

+Vertical extent of contamination not reached.
*Low-level contamination present.

Table 3.3
ANGLE HOLE SURVEY
Property DU-026

HOLE	LOCATION	CONTAMINATION DEPTH
H-1	West Wall Water pipe	None
H-2	East Wall	None
H-3	South Wall	None
H-4	North Wall	None


N
LOT 9
STEPS
DOG HOUSE
SWING SET
CONC.
67.5
15L
62
20R
62
07L
0+67.5
0+60
0+50
0+40
0+30
0+20
0+10
0+00
DRIVE
AREA "A"
WALK
3
6
1
44
20R
44
07L
AREA "C"
8
AREA "B"
33
02L
28
02R
SIDE WALK
5
2
00
07L
10L
0R
10R
20R
30R
40R
50R
60R
70R
80R
COVERED PATIO
HOUSE
WOOD DECK
CONC WALK
PLANTER
10' HIGH CONCRETE WALL
JUNGLE GYM
PROPERTY LINE (TYP)
LOT 11
RIO VISTA CIRCLE
0 5 10 20 30 FEET
SCALE

LEGEND

(5) AUGER HOLE DESIGNATION

ESTIMATED DEPTH OF CONTAMINATION

12"

30"

8507100094-03

DATE	REVISIONS	DRAWN BY	CHECKED BY	APPROV. DOE	APPROV. DH	PROJ. ENG	APPROV. DOE
8/1 1985	FINAL REA SUBMITTAL	GJW					

U. S. DEPARTMENT OF ENERGY

ALBUQUERQUE, NEW MEXICO

DESIGNED | DRAWN J Stevenson | CHECKED | REVIEWED | RECOMMENDED

FIGURE 3.1

RADIOLOGICAL SURVEY DATA DU-026

DURANGO, COLORADO

URANIUM MILL TAILINGS REMEDIAL ACTION PROJECT

APPROVED	DATE	DOE PROJECT MANAGER	DATE	DOE PROJECT ENGINEER	DATE
NR		NR		NR	

MORRISON KNUDSEN

PROJECT NO. DE-AC04-83AL18796

DRAWING NO. DU-026-015 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-026:

1. No action should be taken.

2. Complete decontamination of the property including retrieval of the contaminated material and restoration of the property.

Area B will not be addressed with this property. It will be excavated at a later date along with Rio Vista Circle.

Option 2 will include the following:

- Demolish and remove concrete sidewalk adjacent to the driveway.

- Remove and replace maple tree in contaminated area.

- Excavate Area A to the depth shown in Figure 4.1, except for the driveway. Resurvey to determine if further excavation is required, including removal of the driveway.

- Backfill excavated area with common fill and top with structural fill in sidewalk area and with topsoil and sod in lawn area.

- Excavate Area "C" to the depth shown in Figure 4.1. Backfill with common fill and top with topsoil and sod.

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 $5,550.00.

Table 4.1
OPTION 2 COSTS

Activity	Unit Price	Quantity	Estimated Cost
Demolish and Remove Concrete Driveway and Sidewalk	3.00	364 sf	1,092.00
Remove Tree	200.00	1 ea	200.00
Excavation (Machine)	8.30	46 cy	381.00
Common Backfill	7.20	35 cy	252.00
Structural Fill	26.40	7 cy	184.80
Topsoil	26.40	4 cy	105.60
Sod	3.00	20 sf	60.00
Replace Tree	300.00	1 ea	300.00
Concrete Driveway and Sidewalk	3.50	364 sf	1,274.00

Subtotal	$3,849.40
5% Subcontractor's Contingency	192.47
20% Overhead and Profit	769.88
Subtotal	$4,811.75
15% Engineer's Contingency	721.76
Total (Rounded)	$5,550.00

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.

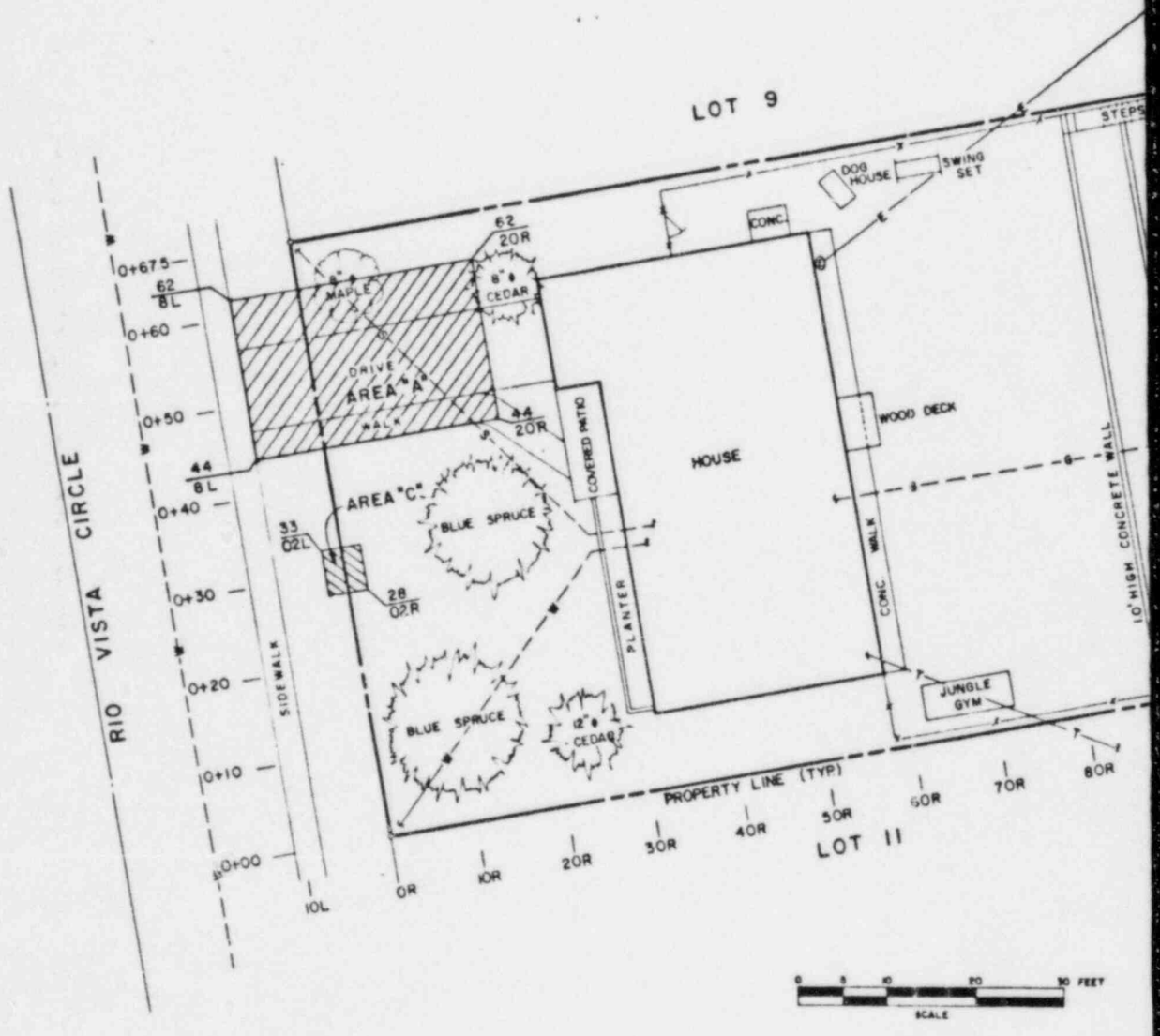
Table 5.1
INDEX OF TECHNICAL SPECIFICATIONS

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 02500	PAVING AND SURFACING	X	
Division 3 - Concrete			
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.

Drawing Number	Drawing Title
DU-026-020	Excavation & Restoration DU-026


N
LOT 9
LOT 11
RIO VISTA CIRCLE
SIDEWALK
PROPERTY LINE (TYP)
HOUSE
WOOD DECK
COVERED PATIO
PLANTER
CONC. WALK
CONC.
DRIVE
AREA "A"
AREA "C"
WALK
DOG HOUSE
SWING SET
JUNGLE GYM
STEPS
10' HIGH CONCRETE WALL
8" MAPLE
8" CEDAR
12" CEDAR
BLUE SPRUCE
BLUE SPRUCE
62 20R
62 8L
44 20R
44 8L
33 02L
28 02R
0+67.5
0+60
0+50
0+40
0+30
0+20
0+10
0+00
10L
0R
10R
20R
30R
40R
50R
60R
70R
80R
0 5 10 20 30 FEET
SCALE
A
NO.

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) G, W or E	METER
(X) 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-026.

   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.

SCOPE OF WORK

AREA "A"

- DEMOLISH AND REMOVE CONCRETE SIDEWALK ADJACENT TO THE DRIVEWAY AND REMOVE MAPLE TREE NORTH OF THE DRIVEWAY.
- PROTECT DRIVEWAY DURING EXCAVATION.
- EXCAVATE AREA "A" TO A DEPTH OF 30 INCHES. RESURVEY THE AREA INCLUDING THE THE DRIVEWAY FOR ADDITIONAL CONTAMINATION. FURTHER EXCAVATION WILL BE APPROVED BY THE CONTRACTOR'S REPRESENTATIVE.
- BACKFILL SIDEWALK AREA WITH 20 INCHES OF COMMON FILL AND TOP WITH 6 INCHES OF STRUCTURAL FILL. BACKFILL LAWN AREA WITH 24 INCHES OF COMMON FILL, 6 INCHES OF TOPSOIL AND SOD.
- CONSTRUCT NEW 6 INCH THICK CONCRETE SIDEWALK TO SAME SIZE AND ELEVATION OF THAT REMOVED.
- REPLACE TREE WITH SIMILAR TYPE AND SIZE AS APPROVED BY THE CONTRACTOR'S REPRESENTATIVE.

AREA "C"

- EXCAVATE AREA "C" TO A DEPTH OF 12 INCHES.
- BACKFILL WITH 6 INCHES OF COMMON FILL AND 6 INCHES OF TOPSOIL AND SOD.

8507100094-04

DATE	REVISIONS	DRAWN BY	CHECKED BY	APPROVAL LGE	APPROVAL DH	PROJ ENG	APPROVAL DOE
2/1 1985	FINAL REA SUBMITTAL	GJW					

U. S. DEPARTMENT OF ENERGY
ALBUQUERQUE, NEW MEXICO

DESIGNED / DRAWN / CHECKED / REVIEWED / RECOMMENDED

FIGURE 4.1
EXCAVATION & RESTORATION PLAN DU-026
DURANGO, COLORADO
URANIUM MILL TAILINGS REMEDIAL ACTION PROJECT

APPROVED	DATE	DOE PROJECT MANAGER	DATE	DOE PROJECT ENGINEER	DATE
NR		NR		NR	

MORRISON KNUDSEN

PROJECT NO. DE-AC04-83AL18796
DRAWING NO. DU-026-020 REV. A

APPENDIX A

SURVEY DATA LOGS

MORRISON KNUDSEN

OUTDOOR GAMMA SCREENING
SURVEY DATA SHEET

LOGGING CREW: ERNEST COUCH
EDWARD SCHULTZ
LEVON BENALLY

SHEET 1 OF 4 PAGE 1

DATE: 6-21-84

PROPERTY ID: DU-026

INSTRUMENT ID NO.: LUD 2220 #31972 W/4410 #16527

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
0+00 +10L	33570 / 54440	0+00 +20R	20386 / 23460	0+00 +60R	16470 / 13900	0+00 +90R	14140 / 13500
0+10 +10L	96180 / 48610	0+10 +20R	18650 / 18420	0+10 +60R	14230 / 13280	0+10 +90R	14420 / 13850
0+20 +10L	93806 / 46340	0+20 +20R	17360 / 15890	0+20 +60R	14160 / 14210	0+20 +90R	15121 / 14590
0+30 +10L	138670 / 64180	0+30 +20R	16610 / 16250	0+30 +60R	13860 / 13240	0+30 +90R	14520 / 13740
0+40 +10L	102800 / 55010	0+40 +20R	16300 / 17760	0+40 +60R	12630 / 13360	0+40 +90R	14140 / 13450
0+50 +10L	102610 / 58260	0+50 +20R	14920 / 20750	0+50 +60R	13980 / 13110	0+50 +90R	13720 / 13870
0+60 +10L	131250 / 65570	0+60 +20R	19150 / 19220	0+60 +60R	13730 / 13560	0+60 +90R	13010 / 13740
0+67.5 +10L	90230 / 58330	0+67.5 +20R	16410 / 16450	0+67.5 60R	14110 / 14040	0+67.5 +90R	13800 / 12190
0+00+00	27066 / 25630	0+00 +30R	18640 / 18310	0+00 +70R	14140 / 14960	0+00 +100R	14440 / 13770
0+10+00	14840 / 24260	0+10 +30R	17780 / 17140	0+10 +70R	14730 / 13510	0+10 +100R	16610 / 13200
0+20+00	16820 / 21480	0+20 +30R	16380 / 15740	0+20 +70R	15170 / 13650	0+20 +100R	15210 / 13760
0+30+00	35290 / 25910	0+30 +30R	16740 / 14630	0+30 +70R	14170 / 14120	0+30 +100R	13960 / 12640
0+40+00	16860 / 21580	0+40 +30R	16960 / 14930	0+40 +70R	14830 / 13880	0+40 +100R	14270 / 12140
0+50+00	16960 / 24440	0+50 +30R	17810 / 17380	0+50 +70R	14000 / 13440	0+50 +100R	14450 / 12950
0+60+00	22320 / 28340	0+60 +30R	16430 / 14200	0+60 +70R	13720 / 13870	0+60 +100R	15120 / 12460
0+67.5 +00	19040 / 28910	0+67.5 +30R	15790 / 15000	0+67.5 +70R	14320 / 13960	0+67.5 100R	14110 / 12450
0+00+ 10R	19270 / 21500	0+00+ 40R	17270 / 17320	0+80 +80R	16030 / 14670	0+00 +110R	13330 / 13360
0+10+ 10R	22110 / 20260	0+00+ 40R	14920 / 14940	0+10 +80R	13950 / 14340	0+10 +110R	13650 / 12490
0+20 +10R	16040 / 18320	0+60+ 40R	10780 / 10930	0+20 +80R	14050 / 14457	0+20 +110R	13920 / 13250
0+30 +10R	16370 / 17700	0+67.5 +40R	14350 / 14980	0+30 +80R	14550 / 13820	0+30 +110R	13490 / 13480
0+40 10R	14070 / 17340	0+00+ 50R	17020 / 15990	0+40 +80R	13740 / 14000	0+40 +110R	13400 / 13030
0+50 +10R	13770 / 21130	0+00+ 50R	14460 / 14780	0+50 +80R	14000 / 13240	0+50 +110R	13320 / 13650
0+60 +10R	17620 / 21640	0+60+ 50R	16320 / 14390	0+60 +80R	15250 / 13400	0+60 +110R	13300 / 13430
0+67.5 10R	16340 / 17140			0+67.5 +80R	13120 / 13190	0+67.5 +110R	13080 / 13000

REMARKS: ALL MEASUREMENTS ARE IN COUNTS PER MINUTE (cpm) TOP - CONTACT MEASUREMENT BOTTOM - ARE MEASUREMENTS TAKEN 1 METER GROUND LEVEL

MORRISON KNUDSEN

OUTDOOR GAMMA SCREENING
SURVEY DATA SHEET

LOGGING CREW: ERNEST COUCH
EDWARD SCHULTZ
LEVON BENALLY

SHEET 2 OF 4 PAGE 2

DATE: 6-21-84

PROPERTY ID: DU-026

INSTRUMENT ID NO.: LUD 2220# 31922/4410# 16527

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
0+00 +120R	13860 / 13110						
0+10 +120R	13430 / 13050						
0+20 +120R	13260 / 13050						
0+30 +120R	13660 / 12960						
0+40 +120R	12960 / 12580						
0+50 +120R	13210 / 13490						
0+60 +120R	13280 / 12680						
0+67.5 +120R	12130 / 12500						

REMARKS: ALL MEASUREMENTS ARE IN COUNTS PER MINUTE (cpm) TOP - CONTACT MEASUREMENT BOTTOM - ARE MEASUREMENTS TAKEN 1 METER GROUND LEVEL.

VP-04A

MORRISON KNUDSEN

BOREHOLE LOG

LOGGING CREW: Schultz, Renalfy, Couch

SHEET 3 OF 4 PAGE 3

DATE: 6-21-84

PROPERTY ID: DU-026

INSTRUMENT ID NO. Ludlum #31982

AREA: Durango, Co

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) HOLE ID: 07+44+10R TIME DRILLED: TIME LOGGED: SOIL TYPE:		(2) HOLE ID: 07+10+24 TIME DRILLED: TIME LOGGED: SOIL TYPE:		(3) HOLE ID: 07+57+20R TIME DRILLED: TIME LOGGED: SOIL TYPE:		(4) HOLE ID: 07+47+18R TIME DRILLED: TIME LOGGED: SOIL TYPE:	
DEPTH	COUNTS/.1MIN	DEPTH	COUNTS/.1MIN	DEPTH	COUNTS/.1MIN	DEPTH	COUNTS/.1MIN
SURFACE	18860	SURFACE	20570	SURFACE	99950	SURFACE	155020
0"	—	0"	—	0"	—	0"	—
6"	26720	6"	22790	6"	216960	6"	394590
12"	27360	12"	21780	12"	310010	12"	446160
18"	28100	~~18"~~ 15"	18410	18"	322500	18"	428940
24"	27370	24"		24"	59180	~~24"~~ 23"	64550
30"		30"		~~30"~~ 27"	51700	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 readings in cpm

Bkgd Bare Hole ave 23,000 cpm

All holes drilled to rock

JOHNSON KNUDSEN

BOREHOLE LOG

LOGGING CREW: Schultz, Benally, Couch

SHEET 4 OF 4 PAGE 4

DATE: 6-21-84

PROPERTY ID: DU-026

INSTRUMENT ID NO. Ludlum #31982

AREA: Durango, Co.

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.

(5)

HOLE ID: 0+21+10L
TIME DRILLED: Sidewalk
TIME LOGGED: "
SOIL TYPE: Front of house

DEPTH	COUNTS/.1MIN
SURFACE	166120
0"	—
6"	522240
12"	399840
~~18~~ 16"	174870
24"	
30"	
36"	
42"	
48"	
54"	
60"	
66"	
72"	
78"	
84"	
90"	
96"	

(6)

HOLE ID: 0+46+7R
TIME DRILLED: Sidewalk
TIME LOGGED: "
SOIL TYPE: House

DEPTH	COUNTS/.1MIN
SURFACE	63050
0"	—
6"	188670
12"	135490
18"	59120
~~24~~ 21"	43720
30"	
36"	
42"	
48"	
54"	
60"	
66"	
72"	
78"	
84"	
90"	
96"	

(7)

HOLE ID: 0+30+0V
TIME DRILLED: _____
TIME LOGGED: _____
SOIL TYPE: _____

DEPTH	COUNTS/.1MIN
SURFACE	32900
0"	—
6"	37400
12"	33660
18"	23590
~~24~~ 20"	22250
30"	
36"	
42"	
48"	
54"	
60"	
66"	
72"	
78"	
84"	
90"	
96"	

(8)

HOLE ID: 0+34+6R
TIME DRILLED: _____
TIME LOGGED: _____
SOIL TYPE: _____

DEPTH	COUNTS/.1MIN
SURFACE	16470
0"	—
6"	19920
12"	20950
18"	21830
24"	21810
~~30~~ 26"	22880
36"	
42"	
48"	
54"	
60"	
66"	
72"	
78"	
84"	
90"	
96"	

REMARKS: All Readings in cpm
Bkgd. Bore hole ave 23,000 cpm
All holes drilled to rock

VP-04B

MORRISON KNUDSEN

BOREHOLE LOG

Supplemental Information

LOGGING CREW: Ernest Couch
Edward Schultz
Julius Cutcliffe

SHEET 1 OF 1 PAGE 1

DATE: October 16, 1984

PROPERTY ID: DU-024

INSTRUMENT ID NO. LVD 2220 #31982 #4410 #16578

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.

H-1		H-2		H-3		H-4	
HOLE ID: Water pipe		HOLE ID: E. WALL		HOLE ID: S. WALL		HOLE ID: N. WALL	
~~TIME DRILLED:~~ to WALL		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	15720	SURFACE	16390	SURFACE	17150	SURFACE	16090
H 0"6"	19120	0"	15740	0"	18700	0"	18150
H 6"12"	18640	6"	18320	6"	20030	6"	18540
H 12"15"	19870	H 12"4"	18450	H 12"6"	19950	H 12"3"	19510
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: H = horizontal, H & number equals the hole and # of inches angled under spread footing. Background is 23000 cpm, all counts in CPM. (in crawl space)

VP.04B

MORRISON-KNUDSEN COMPANY, INC.

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