See WM-48 3/15/85
TO: LOH
Document Transmittal

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

Draft
Radiological and Engineering Assessment

Vicinity Property No. DUR 202

Remedial Actions
Contractor
for the
Uranium Mill Tailings
Remedial Actions
Project

Vicinity Property No. DUR 202

MORRISON
KNUDSEN

Not in DCS
Orig. Not rtnd. by DCS

UEFO-7

NRC FILE CENTER COPY

DRAFT

THE RADIOLOGICAL AND ENGINEERING ASSESSMENT AND FINAL DESIGN FOR DURANGO PROPERTY

DU-202

March 14, 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-202 is an undeveloped park located on U.S. 550/160, Durango, CO.

1.2 Evaluation and Recommendation

1.2.1 Residual Radioactive Material Involvement

There are three areas of contamination located 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 $12,300.00.

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-202 is a undeveloped park located on U.S. 550/160 and owned by the City of Durango. 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 follows:

A tract or parcel of land No. ISR of the State Department of Highways, Division of Highways, State of Colorado, Project No. RF 019-2(14) Sec. 2 containing 2.869 acres, more or less, in the NE 1/4 of the NW 1/4 of Section 32, Township 35 North, Range 9 West, of the New Mexico Principal Meridian, in La Plata County, Colorado, said tract or parcel being more particularly described as follows:

Beginning at a point from which the N 1/4 corner of said Section 32 bears N. 70° 40' 43" E. a distance of 1188.02 feet;

1. Thence S. 88° 27' W. a distance of 202.87 feet, to a point on the West line of the NE 1/4 of the NW 1/4 of said Section 32;

2. Thence S. 00° 41' W., along said 1/16th Sec. line, a distance of 311.64 feet.

3. Thence S. 35° 48' E., a distance of 233.00 feet;

4. Thence N. 54° 12' E., a distance of 282.85 feet;

5. Thence N. 25° 03" W., a distance of 375.99 feet, more or less, to the point of beginning.

The above described parcel contains 2.869 acres (125,951 sq. ft.), more or less.

2.1.3 Bordering Properties

It is located in a commercial area less than one quarter mile south of the old Vanadium Corp. of America mill tailings site. The property is bounded on the north by a commercial property; on the east by U.S. 550/160; on the south by open land; and on the west by the Animas River.

2.2 Existing Facilities and Structures

2.2.1 Structures

An underground concrete sewer lift station is the only structure located on this property. The remainder of the property is weed covered. A few large trees are scattered throughout the property.

2.2.2 Utilities

Utilities are serviced to the property as follows:

Electric power - Overhead from US 550/160.

Telephone - None.

Water - None.

Gas - None.

Sewer - As noted on Figure 4.1.

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 and 2.4.

TABLE 2.1

COMMERCIAL/INSTITUTIONAL

PROPERTY SURVEY DATA

GENERAL:

Facility Name: Park

Address: US 550/160

Owner: City of Durango

Occupancy: Employees/Occupants (Full Time): _____

Employees/Occupants (Part Time): _____

Remarks: _____

PROPERTY DESCRIPTION:

Structure: (Identify) Pumping Station

: SQ FT _____ Levels _____

: Construction Type Concrete

: Foundation _____

Remarks: Pumping Station is an underground concrete vault type with a manhole

Structure: (Identify) _____

: SQ FT _____ Levels _____

: Construction Type _____

: Foundation _____

Remarks: _____

TABLE 2.1

COMMERCIAL/INSTITUTIONAL

PROPERTY SURVEY DATE

Facility Name: Park

PROPERTY DESCRIPTION:

Driveway/Access: Concrete: _____ Asphalt: _____ Gravel: X

Remarks: _____

Sidewalks: Concrete: _____ Asphalt: _____

Remarks: None

Fences: Chain link _____ Mesh _____ Wood _____

Remarks: None

Grounds: Lawn None

Trees Various Sizes

Shrubs None

Grading Rough

Soil Type _____

Remarks Area is an open field with large trees around the site

Existing Survey Plot: _____

TABLE 2.1

COMMERCIAL/INSTITUTIONAL

PROPERTY SURVEY DATA

Facility Name: _____

UTILITIES: Heating: Gas _____ Electric _____ Oil _____

Hot Water _____ Other _____

Remarks: None

Air Conditioning: Elec. Heating Pump _____ Gas _____

Evap. Cooler _____ Other _____

Remarks: None

Electric Line Location: Overhead

Gas Line Location: None

Water Line Location: None

Sewer Line Location: None

Telephone Line Location: None

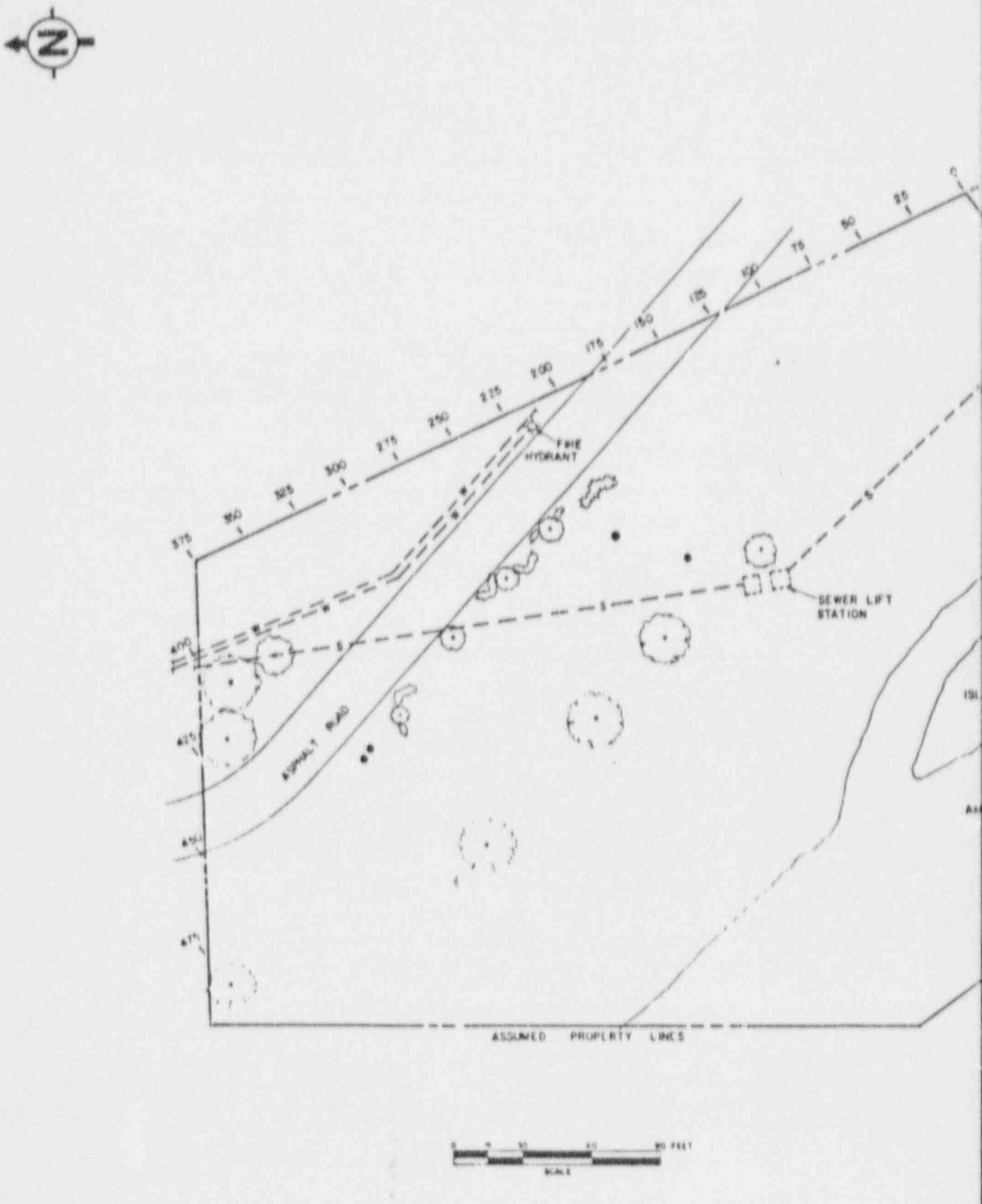
BUILDING CODES AND ZONING:

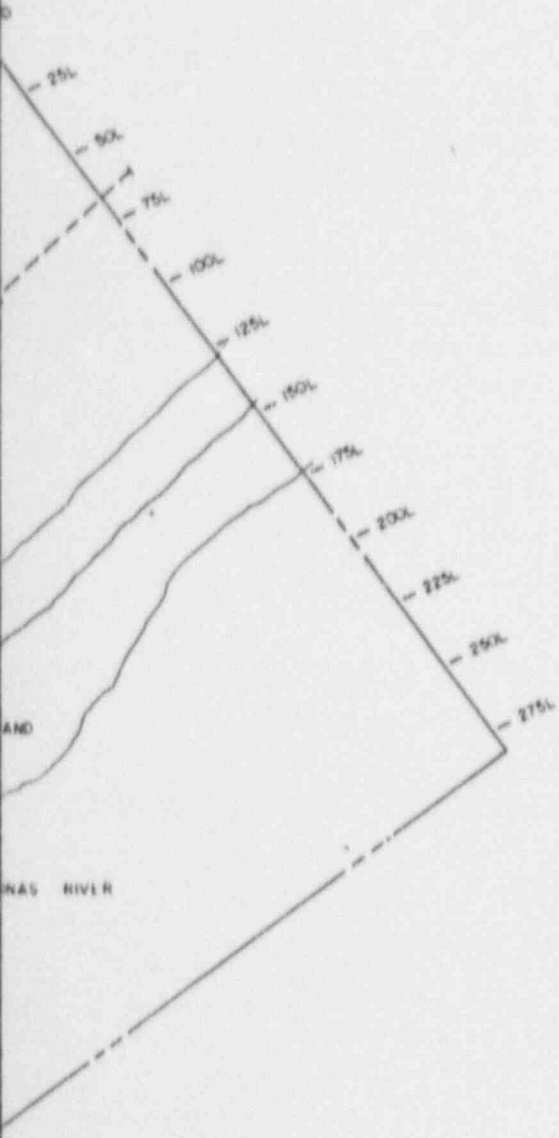
Building Code: UBC X BOCA _____

Remarks: _____

Zoning Jurisdiction: City of Durango

Present Facility Zoning: _____


N
0
25
50
75
100
125
150
175
200
225
250
275
300
325
350
375
400
425
450
475
FIRE HYDRANT
SEWER LIFT STATION
ASPHALT ROAD
ASSUMED PROPERTY LINES
0
30
60
90 FEET
SCALE



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
	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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NO.	DATE	REVISIONS	DRAWN BY	CHECKED BY	APPROVAL LSR	APPROVAL DH	PROJ. ENG.	APPROVAL DOE
A	[illegible]	FINAL REA SUBMITTAL	VDL	VDD	VDD	[illegible]	VDD	—

U. S. DEPARTMENT OF ENERGY
ALBUQUERQUE, NEW MEXICO

DESIGNED 10DF DRAWN 20DZ
CLERED [illegible]
APPROVED [illegible]
ENGINEERED [illegible]

FIGURE 2.2

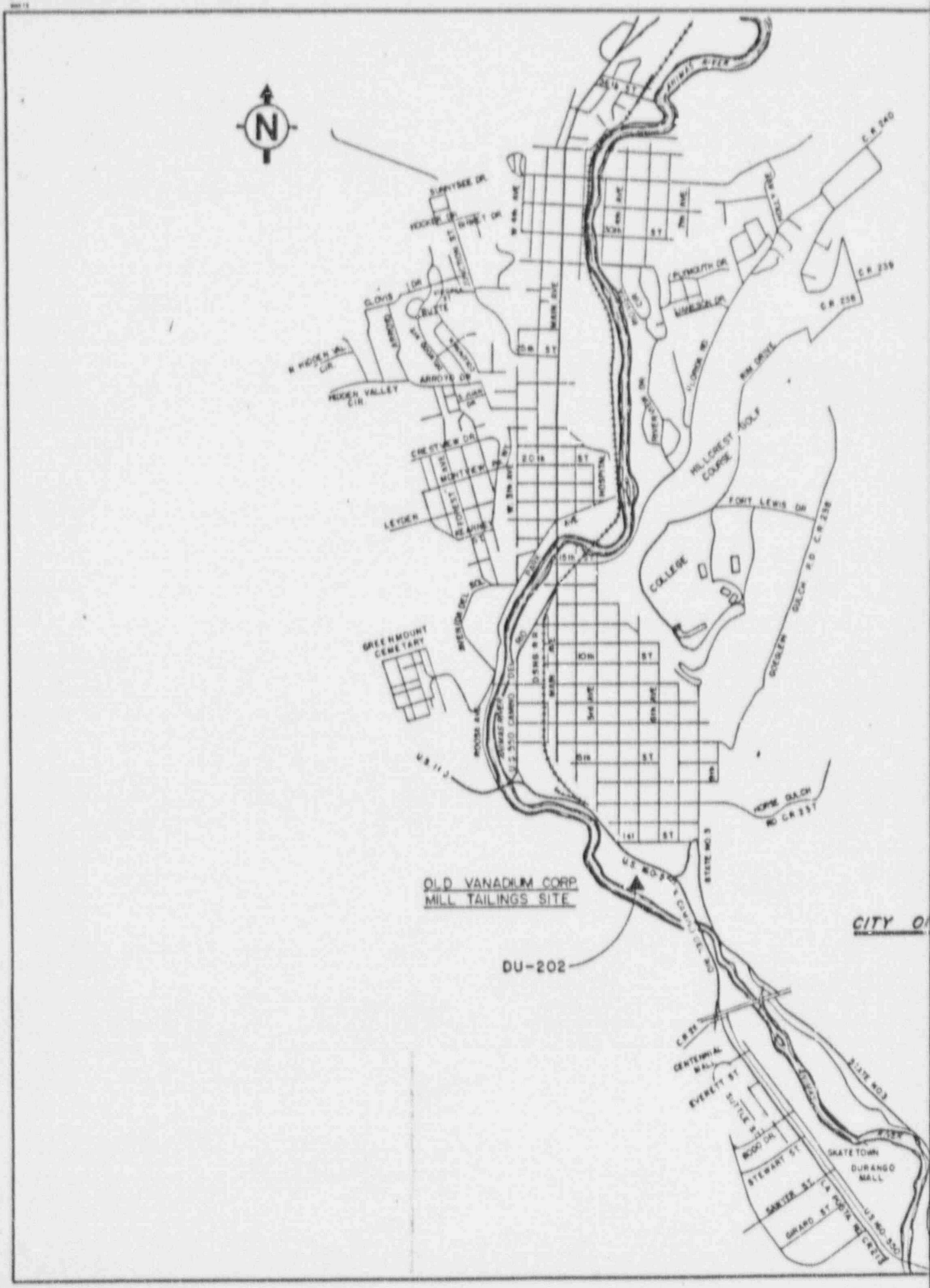
SITE PLAN DU-202
DURANGO, COLORADO
URANIUM MILL TAILINGS REMEDIAL ACTION PROJECT

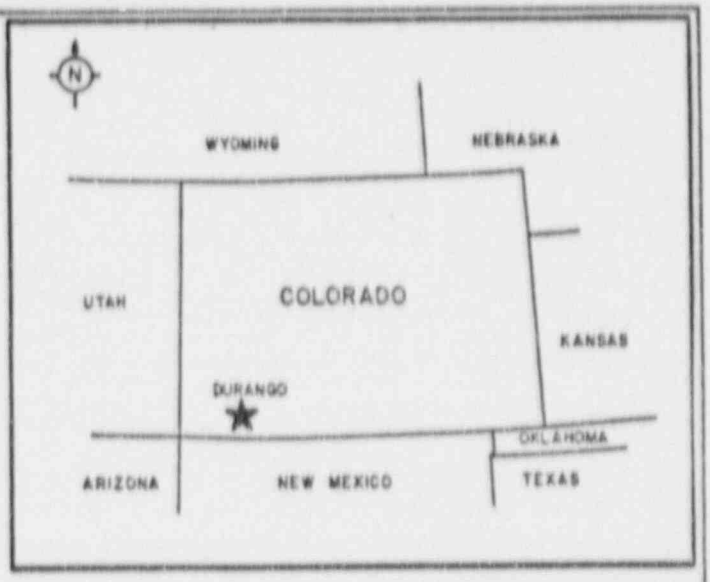
APPROVED	DATE	DOE PROJECT MANAGER	DATE	DOE PROJECT ENGINEER	DATE
NR		NR		NR	

MORRISON KNUDSEN

PROJECT NO. DE-AC04-83AL18796

DRAWING NO. DU-202-010 REV A


N
ANIMAS RIVER
HILLCREST GOLF COURSE
FORT LEWIS DR
HOSPITAL
COLLEGE
GREENMOUNT CEMETARY
CRESTVIEW DR
LEYDEN
HIDDEN VALLEY CIR
ARROYO DR
PLYMOUTH DR
RIM DRIVE
GOESLER GULCH RD C.R. 238
HORSE GULCH RD C.R. 237
STATE NO 3
OLD VANADIUM CORP
MILL TAILINGS SITE
DU-202
CENTENNIAL MALL
EVERETT ST
STEWART ST
SAWYER ST
GIRARD ST
SKATETOWN
DURANGO MALL
U.S. NO. 550
CITY O



DURANGO, COLORADO

9707090134-02

U. S. DEPARTMENT OF ENERGY
ALBUQUERQUE, NEW MEXICO

ORIGINATED VDL	DRAWN VDL	FIGURE 2.1			
CHECKED		VICINITY MAP DU-202			
REVIEWED		DURANGO, COLORADO			
RECOMMENDED		URANIUM MILL TAILINGS REMEDIAL ACTION PROJECT			
APPROVED NR	DATE	DOE PROJECT MANAGER NR	DATE	DOE PROJECT ENGINEER NR	DATE

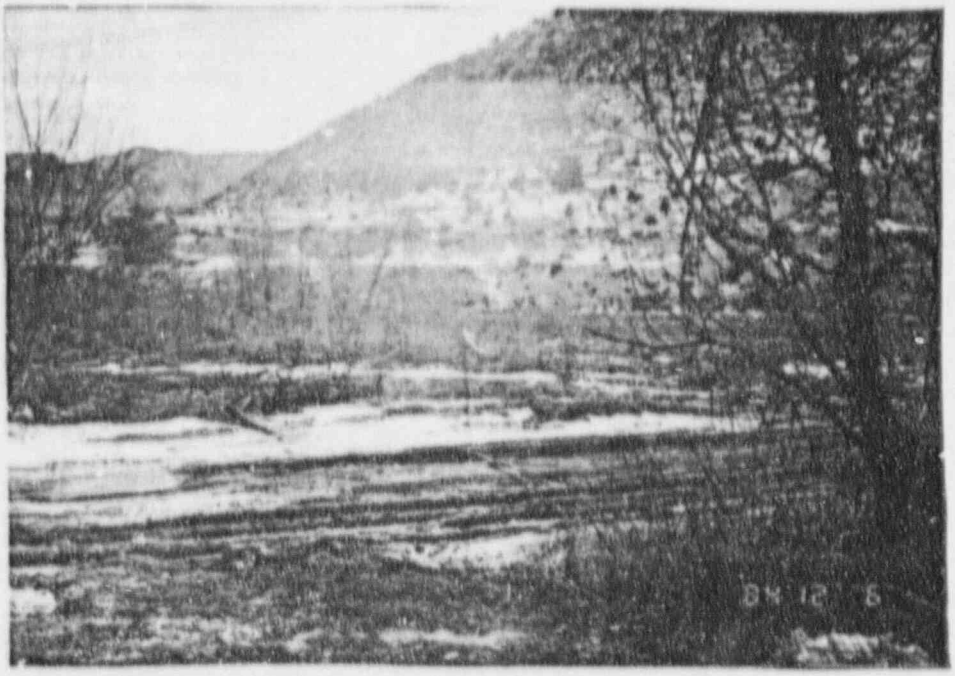
MORRISON KNUDSEN

PROJECT NO. DE-AC04-83AL18796

DRAWING NO. DU-202-005 REV. A

NO.	DATE	REVISIONS	DRAWN BY	CHECKED BY	APPROVAL LDE	APPROVAL DH	APPROVAL TMS	APPROVAL DOE
A	2/20/95	FINAL REA SUBMITTAL	VDL	LDE	LDE	DH	TMS	—

Park Area Looking Northwest



Park Area Looking West

Figure 2.3 Property Photos

Park Area Looking East

Park Area Looking South West

Figure 2.4 Property Photos

3.0 RADIOLOGICAL SURVEY AND ASSESSMENT

3.1 Introduction

A radiological survey of the proposed Gateway Park area was conducted to determine, before actual construction begins, if contaminated materials in excess of the EPA standards are present at this property. No buildings are presently on the property.

3.2 Gamma Exposure Rate Survey

3.2.1 Survey Method

The park area was surveyed in accordance with the RAC UMTRA Procedure 019. The survey was made on a 25' x 25' grid, with additional survey points in regions where elevated readings were found.

3.2.2 Survey Results

Surface gamma readings on the property, as shown in Figure 3.1, range from 15 to 35 micro R/hr. This may be compared with the background for the Durango site of about 12 micro R/hr.

3.3 Borehole Survey

3.3.1 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 monitored in compliance with the RAC UMTRA Procedure 019. Large rocks and trash were found in most of the holes augered; this made penetration below the contamination very difficult.

3.3.2 Survey Results

Contamination was found in 9 of the 21 holes augered. The location and depth of the contamination is described in Table 3.1 and is shown in Figure 3.1.

3.4 Estimated Extent of Contamination

Three distinct areas of contamination were identified in the survey. Area A has an estimated depth of contamination of 30 inches below the surface but it may be deeper closer to the river.

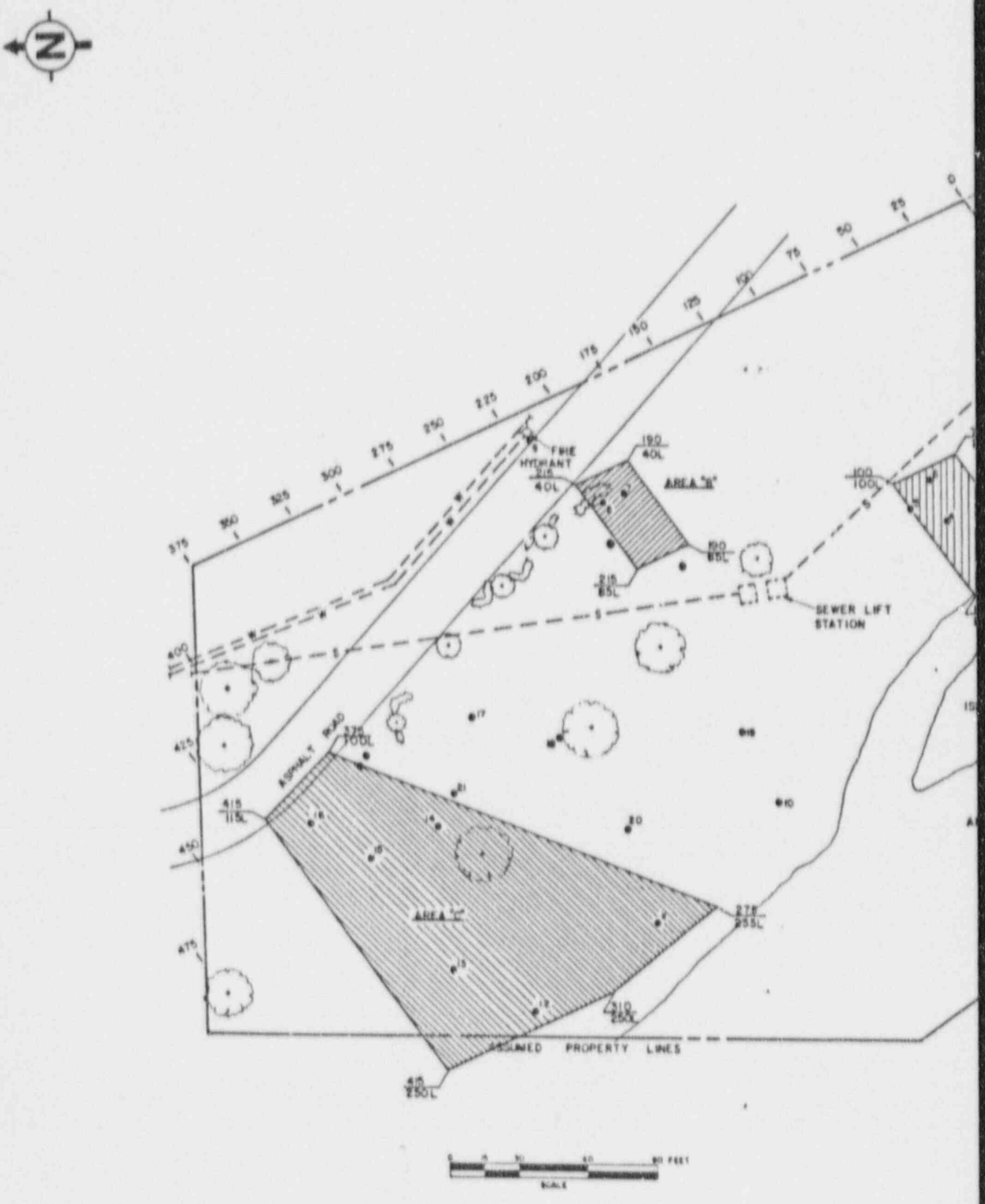
Area B has an estimated depth of 6 inches.

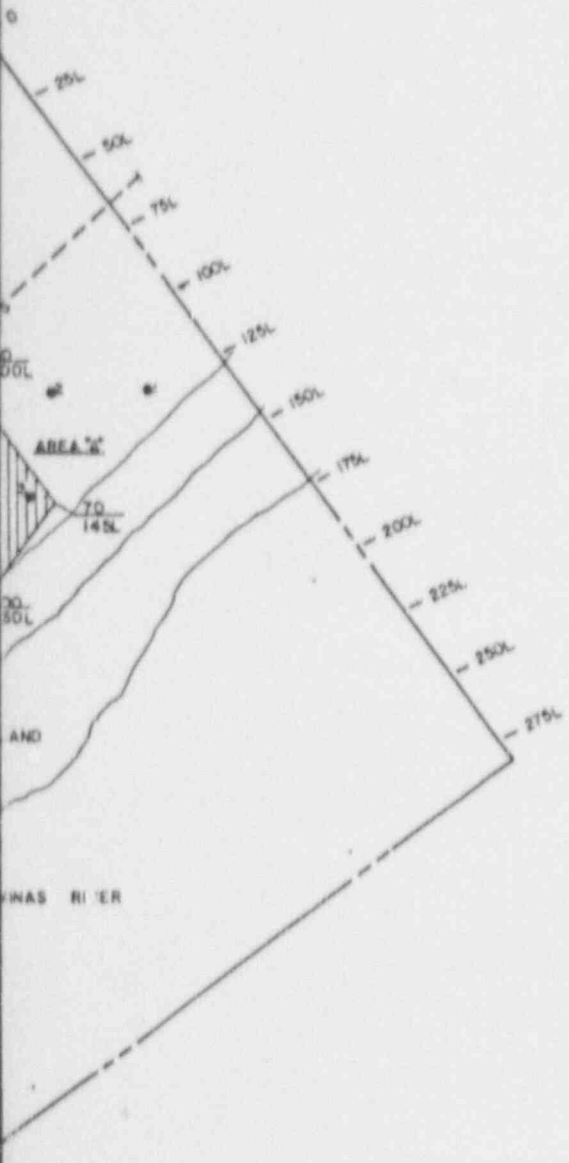
The largest of the three contaminated areas in the park region is Area C. The estimated depth of contamination in this Area is 12 inches, with possibly some pockets of contamination as deep as 24 inches.

It should be observed that the proposed building area of the Gateway Park is not in a contaminated area, so that construction there could proceed, if desired, before remedial action at the three areas of contamination is completed.

Table 3.1
BOREHOLE SURVEY
Property DU-202

HOLE	CONTAMINATION DEPTH
1	None
2	None
3	0-36"+*
4	0-24"*
5	None
6	12-30"*
7	0-12"*
8	None
9	None
10	None
11	12-24"
12	0-18"
13	None
14	0-12"
15	0-12"
16	0-18"
17	None
18	None
19	None
20	None
21	None

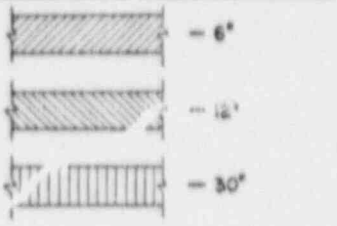

N
FIRE HYDRANT
AREA "B"
AREA "A"
SEWER LIFT STATION
ASPHALT ROAD
ASSUMED PROPERTY LINES
SCALE



LEGEND

@4 AUGER HOLE DESIGNATION

ESTIMATED DEPTH OF CONTAMINATION



9707090134-03

U. S. DEPARTMENT OF ENERGY

ALBUQUERQUE, NEW MEXICO

A	7/30/97	FINAL REA SUBMITTAL	VDL						
NO.	DATE	REVISIONS	DRAWN BY	CHECKED BY	APPROVAL LDE	APPROVAL DH	PROJ ENG	APPROVAL DOE	

DESIGNED / DRAWN: DK

CHECKED

REVIEWED

RECOMMENDED

FIGURE 3.1

RADIOLOGICAL SURVEY DATA DU-202

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-202-015 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-202:

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:

- Excavate contaminated materials to the depth shown in Figure 4.1.

- Backfill excavated areas with common fill.

- Repave road in Area "C" with a 6 inch aggregate base course and a 4 inches of asphalt.

4.1.2 Costs

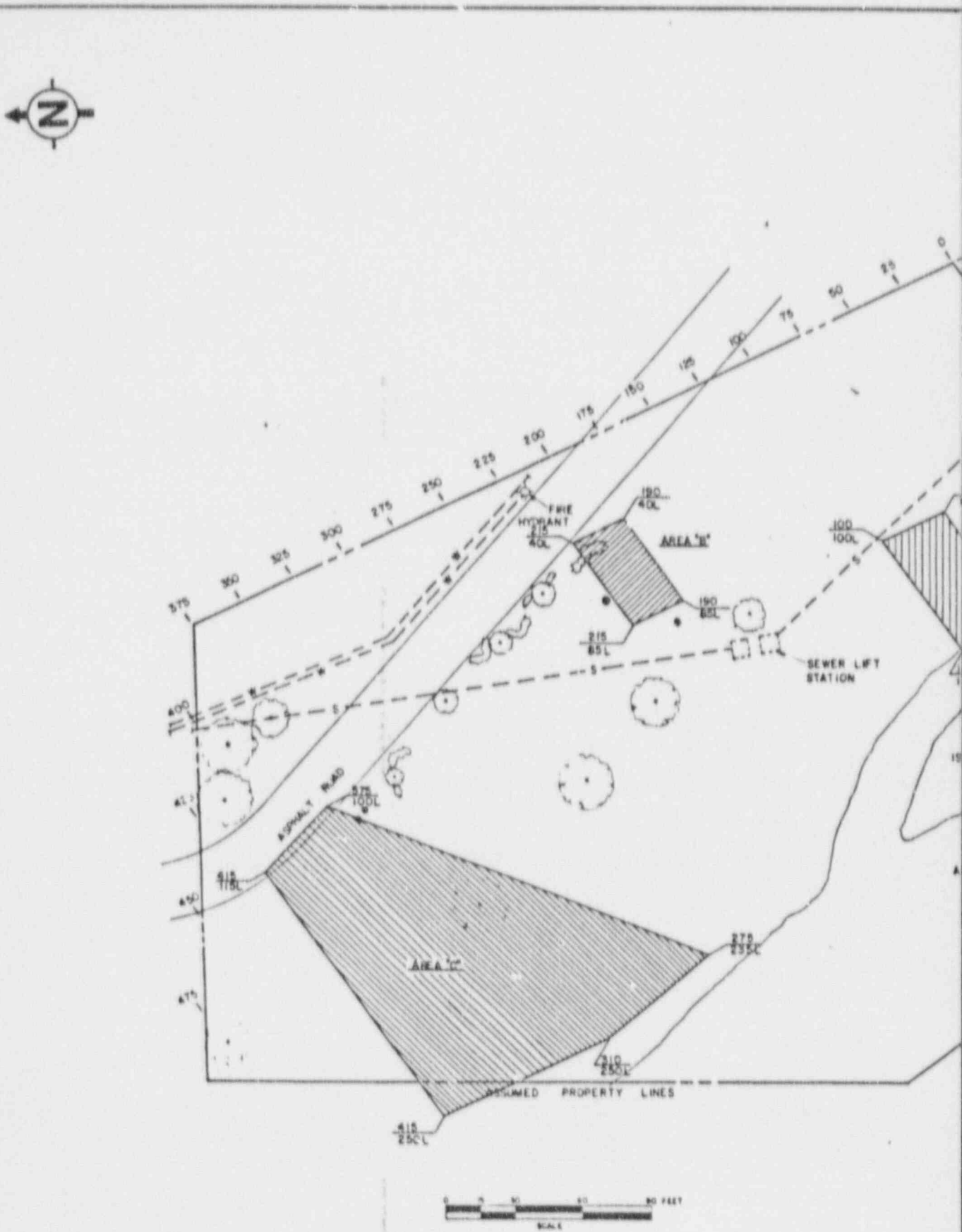
Estimated costs for the activities associated with Option 2 are detailed in Table 4.1. Costs include labor, insurance, material, equipment, supplies, overhead, profit, and contingency. All costs are listed in 1984 dollars. It is anticipated that the time required for the subcontractor to complete the work will be 3 to 5 days.

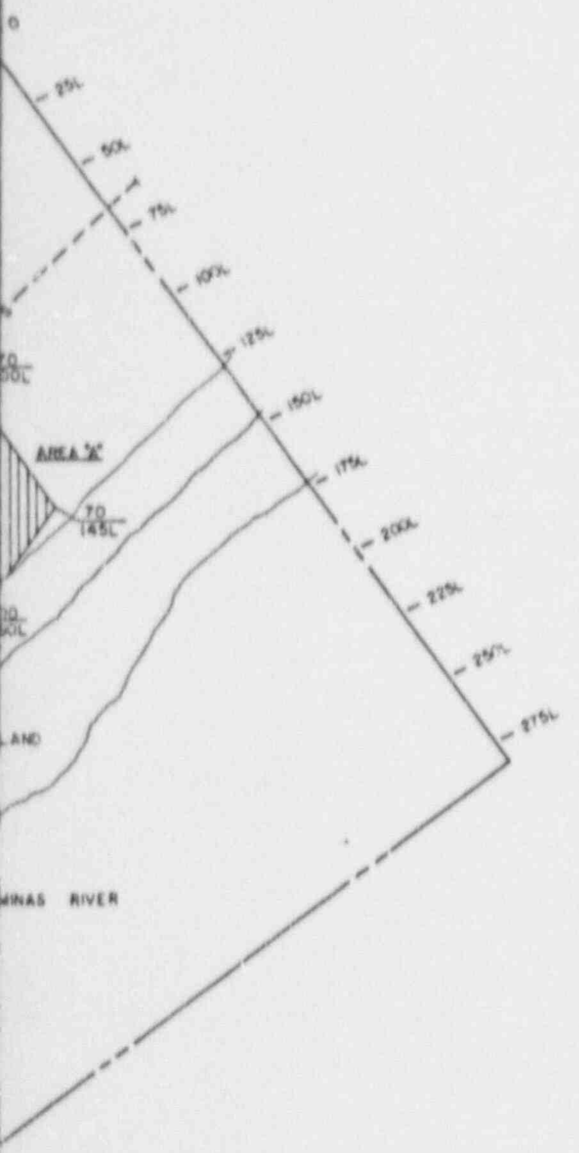
4.2 Recommendation

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 $12,300.00.

Table 4.1
OPTION 2 COSTS

Activity	Unit Price	Quantity	Estimated Cost
Excavation (Mass)	4.00	674 cy	2696.00
Remove Trees	100.00	2 ea	200.00
Common Backfill	7.20	670 cy	4824.00
Aggregate Base Course	13.05	4 cy	52.20
Asphalt	6.00	23 sy	138.00
Replace Tree	300.00	2 ea	600.00
Subtotal			8510.20
5% Subcontractor's Contingency			425.51
20% Overhead and Profit			1702.04
Subtotal			10637.75
15% Contingency			1595.66
Total (Rounded)			12300.00


N
FIRE HYDRANT
AREA "B"
AREA "C"
SEWER LIFT STATION
ASPHALT ROAD
ASSUMED PROPERTY LINES
SCALE



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-202:

   SECTION 02110
   CLEARING AND GRUBBING

   SECTION 02130
   CONTAMINATED MATERIAL REMOVAL

   SECTION 02200
   EXCAVATION AND BACKFILL

   SECTION 02500
   PAVING AND SURFACING

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"

- EXCAVATE AREA "A" TO A DEPTH OF 30 INCHES.
- BACKFILL EXCAVATED AREA WITH COMMON FILL AND REGRADE TO ORIGINAL CONDITION

AREA "B"

- REMOVE AND REPLACE TREE WITH SAME TYPE AND SIZE AS APPROVED BY CONTRACTOR'S REPRESENTATIVE.
- EXCAVATE AREA "B" TO A DEPTH OF 6 INCHES.
- BACKFILL EXCAVATED AREA WITH COMMON FILL AND REGRADE TO ORIGINAL CONDITION

AREA "C"

- REMOVE AND REPLACE TREE WITH SAME TYPE AND SIZE AS APPROVED BY CONTRACTOR'S REPRESENTATIVE.
- EXCAVATE AREA "C" TO A DEPTH OF 12 INCHES. CONTRACTOR'S REPRESENTATIVE TO RESURVEY. IF FURTHER CONTAMINATION EXISTS, EXCAVATE AS DIRECTED BY CONTRACTOR'S REPRESENTATIVE.
- BACKFILL EXCAVATED AREA WITH COMMON FILL. TOP WITH 6 INCHES OF AGGREGATE BASE COURSE IN ASPHALT AREA.
- REPAVE ASPHALT AREA WITH 4 INCH THICK ASPHALT.

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U. S. DEPARTMENT OF ENERGY
ALBUQUERQUE, NEW MEXICO

FIGURE 4.1

EXCAVATION & RESTORATION PLAN DU-202

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-202-020 REV. A

NO.	DATE	REVISIONS	DRAWN BY	CHECKED BY	APPRVL LOE	APPRVL DH	PROJ ENG	APPRVL DOE
A	2/5/09	FINAL REA SUBMITTAL	VDL	VCB	VCB		VCB	—

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 02110	CLEARING AND GRUBBING	X	
SECTION 02130	CONTAMINATED MATERIAL REMOVAL	X	
SECTION 02200	EXCAVATION AND BACKFILL	X	
SECTION 02500	PAVING AND SURFACING	X	

6.0 CONSTRUCTION DRAWINGS

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

Drawing Number	Drawing Title
DU-202-020	Excavation & Restoration DU-202

APPENDIX A

SURVEY DATA LOGS

MORRISON KNUDSEN

DU 202

OUTDOOR GAMMA SCREENING SURVEY DATA SHEET

LOGGING CREW: ERNEST COUCH
LEVEN BENALLY, JR
EDWARD SCHULTZ

SHEET 1 OF 4 PAGE 1

DATE: JUNE 12, 1984

PROPERTY ID: GATEWAY PARK

INSTRUMENT ID NO.: _____

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+00L	14740 / 18590	C+200+25L	18310 / 16160	00+100+75L	20300 / 18800	00+200+100L	18450 / 19410
C+00+00L	20570 / 21200	C+225+25L	17750 / 18520	00+225+75L	19940 / 19260	00+225+100L	20650 / 20750
C+50+00L	20000 / 19460	C+250+25L	18250 / 17760	00+250+75L	19250 / 18490	00+250+100L	23280 / 24840
C+75+00L	20450 / 21380	C+275+25L	19800 / 19750	00+275+75L	23250 / 22940	00+275+100L	24680 / 28370
C+100+00L	22620 / 21210	C+300+25L	16120 / 16330	00+300+75L	19540 / 18490	00+300+100L	22850 / 23890
C+125+00L	19430 / 20440	C+325+25L	16520 / 15780	00+325+75L	18140 / 18210	00+325+100L	16940 / 20540
C+150+00L	17940 / 17620	C+350+25L	17520 / 15810	01+150+75L	17310 / 17820	01+350+100L	18140 / 20470
C+175+00L	18550 / 17610	C+376+25L	16650 / 16250	00+175+75L	21060 / 19740	00+376+100L	16680 / 14850
C+200+00L	17630 / 17670	C+00+50L	18940 / 18640	00+200+75L	18890 / 19300	0+00+125L	18000 / 19170
C+225+00L	15460 / 16430	C+25+50L	23240 / 23690	00+225+75L	27970 / 25350	0+25+125L	28280 / 23610
C+250+00L	15410 / 15430	C+50+50L	22220 / 20640	00+250+75L	23650 / 23470	0+50+125L	36460 / 26290
C+275+00L	14690 / 15740	C+75+50L	23290 / 21540	00+275+75L	25850 / 24170	0+75+125L	31240 / 24390
C+300+00L	14890 / 15820	C+100+50L	17940 / 18610	00+300+75L	18130 / 19650	0+100+125L	23310 / 23260
C+325+00L	14790 / 14780	C+125+50L	19040 / 20210	00+325+75L	17340 / 16880	0+125+125L	21150 / 20850
C+350+00L	17080 / 16640	C+150+50L	21150 / 18580	00+350+75L	18140 / 17880	0+150+125L	19700 / 14320
C+376+00L	21820 / 20890	C+175+50L	19750 / 20630	00+376+75L	18540 / 18760	0+175+125L	21830 / 18650
C+00+25L	23460 / 21730	C+200+50L	27450 / 23390	00+00+100L	23620 / 23410	0+200+125L	14150 / 14440
C+25+25L	24490 / 20440	C+225+50L	26400 / 22470	00+25+100L	21040 / 23650	0+225+125L	30390 / 23700
C+50+25L	20050 / 20700	C+250+50L	20360 / 14460	00+150+100L	19430 / 23020	0+250+125L	34780 / 28230
C+75+25L	19840 / 19590	C+275+50L	17940 / 14370	00+175+100L	23560 / 27450	0+275+125L	33810 / 20630
C+100+25L	21360 / 20130	C+300+50L	17450 / 17900	00+200+100L	15200 / 19670	0+300+125L	26420 / 26470
C+125+25L	17820 / 18540	C+325+50L	18460 / 17600	00+125+100L	19110 / 18830	0+325+125L	21410 / 22290
C+150+25L	19250 / 18690	C+350+50L	17660 / 16520	00+150+100L	18770 / 18940	0+350+125L	24700 / 29810
C+175+25L	17210 / 18720	C+376+50L	18270 / 17480	00+175+100L	17870 / 18350	0+376+125L	35750 / 34780

REMARKS: ALL READINGS ARE IN COUNTS PER MINUTE (CPM). TOP - ARE CONTACT MEAS. BOTTOM - ARE 1 METER ABOVE GROUND LEVEL.

VP-04A

MORRISON KNUDSEN

OUTDOOR GAMMA SCREENING
SURVEY DATA SHEET

LOGGING CREW: E Couch
E Schultz
L Benally

SHEET 2 OF 4 PAGE 2

DATE: 6-13-84

PROPERTY ID: Gate Way Park
Durango, Co.

INSTRUMENT ID NO.: Ludlum 2220 #31972 4/4410

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
0+400+125	36410 / 31790	0+400 +175L	20340 / 23280	0+425 +250L	24010 / 23860	0+90 +120L	28200
0+75 +145L	26490 / 32750	0+200 +200L	18200 / 17700	0+30 +125L	[illegible] / 28620	0+85 +120L	28550
0+100 +150L	30520 / 28200	0+225 +200L	19510 / 19530	0+35 +125L	29700	0+80 +120L	33860
0+125 +150L	20670 / 18460	0+250 +200L	22120 / 23330	0+40 +125L	27080	0+80 +115L	23360
0+150 +150L	20340 / 19980	0+275 +200L	32170 / 30950	0+25 +120L	28150	0+85 +115L	22520
0+175 +150L	19480 / 18920	0+300 +200L	38370 / 32750	0+30 +120L	25450	0+90 +115L	21030
0+200 +150L	26280 / 22720	0+325 +200L	35760 / 31160	0+35 +120L	27280	0+100 +115L	23860
0+225 +150L	26280 / 22720	0+350 +200L	52520 / 37500	0+40 +120L	32430	0+100 +110L	21500
0+250 0+150L	24530 / 28070	0+376 +200L	44850 / 34160	0+50 +120L	29240	0+95 +110L	23930
0+275 +150L	47490 / 32010	0+400 +200L	29140 / 27920	0+55 +125L	27090	0+90 +180L	26310
0+300 +150L	26340 / 25810	0+225 +225L	17370 / 18490	0+60 +125L	26710	0+85 +110L	23020
0+325 +150L	24750 / 27110	0+250 +225L	20310 / 20130	0+65 +125L	24070	0+75 +110L	22670
0+350 +150L	41340 / 34160	0+275 +225L	21530 / 20850	0+65 +120L	23840	0+200 +45L	24770
0+376 +150L	35540 / 34790	0+300 +225L	21800 / 21630	0+60 +120L	21780	0+200 +55L	20730
0+400 +150L	32410 / 30360	0+325 +225L	23440 / 23820	0+55 +120L	28710	0+200 +60L	20380
0+175 +175L	21810 / 19710	0+350 +225L	32320 / 32900	0+50 +120L	31910	0+205 +50L	27980
0+200 +175L	18360 / 18210	0+375 +225L	44410 / 38180	0+50 +115L	31500	0+210 +50L	33870
0+225 +175L	22320 / 22720	0+400 +225L	34090 / 31470	0+55 +115L	21120	0+210 +45L	21310
0+250 +175L	30400 / 29450	0+425 +225L	33380 / 27860	0+60 +115L	20630	0+210 +60L	19760
0+275 +175L	46370 / 32860	0+300 +250L	19640 / 18730	0+65 +115L	20107	0+210 +65L	21520
0+300 +175L	25010 / 26030	0+325 +250L	19440 / 20370	[illegible]		[illegible] +35L	21490
0+325 +175L	30340 / 29180	0+350 +250L	21090 / 21950	0+80 +125L	23550	0+230 +75L	20960
0+350 +175L	32660 / 29720	0+375 +250L	22620 / 24410	0+65 +125L	30410	0+3375 +75L	21520
0+376 +175L	30270 / 29870	0+400 +250L	23440 / 26530	0+40 +125L	21310	0+262.5 +75L	24470

REMARKS: ALL READINGS ARE IN COUNTS PER MINUTE (CPM) TOP - ARE CONTACT MEASUREMENTS. BOTTOM - ARE 1 METER ABOVE GROUND LEVEL.

VP-04A

MORRISON KNUDSEN

OUTDOOR GAMMA SCREENING
SURVEY DATA SHEET

LOGGING CREW: E Couch
L Beasley
E Schultz

SHEET 3 OF 4 PAGE 3

DATE: 6-13-84

PROPERTY ID: Gateway Park
Durango, Co.

INSTRUMENT ID NO.: Ludlum 222 #3922 w/4410

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
0+262.5 +87.5L	28090	0+325 +167.5L	53730	0+225 +137.5L	21150	0+217.5 +200L	18200
0+250 +87.5L	22480	0+337.5 +167.5L	34640	0+237.5 +175L	29020	0+237.5 +200L	26620
0+237.5 +87.5L	18780	0+350 +167.5L	35540	0+262.5 +175L	35270	0+262.5 +200L	23080
0+225 +87.5L	19400	0+362.5 +167.5L	32000	0+281.5 +175L	28080	0+287.5 +200L	46400
0+237.5 +100L	21104	0+375 +167.5L	36090	0+312.5 +175L	30140	0+312.5 +200L	50870
0+267.5 +100L	29750	0+387.5 +167.5L	26640	0+331.5 +175L	25910	0+337.5 +200L	36170
0+267.5 +112.5L	29170	0+400 +167.5L	22470	0+362.5 +175L	41070	0+362.5 +200L	42080
0+250 +112.5L	27470	0+387.5 +150L	46690	0+387.5 +175L	21540	0+387.5 +200L	35300
0+237.5 +112.5L	26200	0+400 +137.5L	39410	0+387.5 +187.5L	25410	0+375 +212.5L	19050
0+225 +112.5L	22280	0+387.5 +137.5L	35740	0+375 +187.5L	22580	0+375 +212.5L	45710
0+237.5 +125L	29650	0+375 +137.5L	39360	0+362.5 +187.5L	42580	0+362.5 +212.5L	31300
0+262.5 +125L	25080	0+362.5 +137.5L	34810	0+350 +187.5L	39800	0+350 +212.5L	25090
0+262.5 +137.5L	32830	0+362.5 +150L	41180	0+337.5 +187.5L	31080	0+337.5 +212.5L	31930
0+250 +137.5L	23790	0+350 +137.5L	40880	0+325 +187.5L	39760	0+325 +212.5L	31590
0+237.5 +137.5L	21620	0+337.5 +137.5L	33130	0+312.5 +187.5L	32270	0+312.5 +212.5L	27910
0+225 +137.5L	21410	0+312.5 +150L	35900	0+300 +187.5L	22080	0+300 +212.5L	31540
0+225 +162.5L	27730	0+325 +137.5L	20980	0+287.5 +187.5L	33580	0+287.5 +212.5L	29720
0+287.5 +162.5L	35630	0+312.5 +137.5L	23700	0+275 +187.5L	33140	0+275 +212.5L	34130
0+250 +162.5L	35220	0+300 +137.5L	30990	0+262.5 +187.5L	28650	0+267.5 +212.5L	23870
0+262.5 +162.5L	39920	0+287.5 +137.5L	33480	0+250 +187.5L	30220	0+250 +212.5L	24360
0+275 +162.5L	26430	0+275 +137.5L	40440	0+231.5 +187.5L	25260	0+237.5 +212.5L	24220
0+287.5 +162.5L	27510	0+267.5 +137.5L	34230	0+225 +187.5L	24220	0+225 +212.5L	23240
0+300 +162.5L	26720	0+250 +137.5L	26040	0+262.5 +187.5L	21000	0+237.5 +225L	19380
0+312.5 +162.5L	29980	0+237.5 +137.5L	28090	0+200 +187.5L	18390	0+262.5 +225L	31400

REMARKS: ALL READINGS ARE IN COUNTS PER MINUTE (CPM)
TOP - ARE CONTACT MEASUREMENTS
BOTTOM - ARE 1 METER ABOVE GROUND LEVEL.

VP-04A

MORRISON KNUDSEN

OUTDOOR GAMMA SCREENING
SURVEY DATA SHEET

LOGGING CREW: Couch, Kemally, Schultz

SHEET 4 OF 4 PAGE 4

DATE: 6-13-84

PROPERTY ID: Gateway Park

INSTRUMENT ID NO.: Eberline 2220 # 31972

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
0+287.5 +2.5L	26600	0+25.0 +12.5L	21770				
0+312 +2.5L	24920	0+62.5 +12.5L	19860				
0+337.5 +2.5L	30570	0+75 +12.5L	32080				
0+362.5 +2.5L	29780	0+87.5 +12.5L	25090				
0+387.5 +2.5L	76640	0+75 +62.5L	26490				
0+387.5 +37.5L	36390	0+87.5 +62.5L	17230				
0+375 +237.5L	42480	0+75 +87.5L	18650				
0+362.5 +237.5L	31260	0+62.5 +125L	21850				
0+350 +237.5L	35650						
0+337.5 +237.5L	25340						
0+325 +237.5L	24190						
0+312.5 +237.5L	27790						
0+300 +237.5L	21430						
0+287.5 +237.5L	19080						
0+275 +237.5L	20280						
0+287.5 +2.5L	19060						
0+312.5 +2.5L	22060						
0+337.5 +2.5L	22810						
0+362.5 +2.5L	26900						
0+387.5 +2.5L	23510						
0+00 +12.5L	21170						
0+12.5 +12.5L	33500						
0+25 +12.5L	17870						
0+37.5 +12.5L	22010						

REMARKS: All readings are in counts per minute (cpm) Top - are contact measurements Bottom - are 1 meter above ground level.

VP-04A

MORRISON KNUDSEN

BOREHOLE LOG

LOGGING CREW: ERNIE COUCH
LEVON BENALLY, JR
EDWARD SCHULTZ

INSTRUMENT ID NO. LUDLUM 2220 # 31982

SHEET 1 OF 6 PAGE 1

DATE: 6-13-84

PROPERTY ID: GATEWAY PARK

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.

(1)		(2)		(3)		(4)	
HOLE ID: C+25+125L		HOLE ID: C150+112.5L		HOLE ID: C+75+140L		HOLE ID: C+90+125L	
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"	27880	0"	32290	0"	31450	0"	31250
6"	35500	6"	39840	6"	43950	6"	45130
12"	42220	12"	35980	12"	54580	12"	51630
18"	36190	18"	28380	18"	64290	18"	4 80
24" 22	34570	24"	23750	24"	55620	24"	36130
30"		30"		30"	54190	30"	
36"		36"		36"	53530	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 HOLES DRILLED AS DEEP AS POSSIBLE
TRASH AND ROCKS PROHIBITED DRILLING TO DEPTH
BACKGROUND MEASUREMENTS = 23,000 CPM

MORRISON KNUDSEN

BOREHOLE LOG

LOGGING CREW: ERNIE CLICH
LEVON BENALLY, JR
EDWARD SCHULTZ

SHEET 2 OF 6 PAGE 2

DATE: 6-13-84

PROPERTY ID: GATEWAY PROJ

AREA: Durango, Colorado

INSTRUMENT ID NO. EG&G GM-220 #31982

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: C+LC +112.5L
TIME DRILLED:
TIME LOGGED:
SOIL TYPE:

(6) HOLE ID: C+85+165L
TIME DRILLED:
TIME LOGGED:
SOIL TYPE:

(7) HOLE ID: C+200+52L
TIME DRILLED:
TIME LOGGED:
SOIL TYPE:

(8) HOLE ID: C+210+52L
TIME DRILLED:
TIME LOGGED:
SOIL TYPE:

DEPTH	COUNTS/.1MIN	DEPTH	COUNTS/.1MIN	DEPTH	COUNTS/.1MIN	DEPTH	COUNTS/.1MIN
SURFACE		SURFACE		SURFACE		SURFACE	
0"	28580	0"	23710	0"	28040	0"	20590
6"	37380	6"	32020	6"	44500	6"	23990
12"	31870	12"	29840	12"	40980	12"	22880
18"	26660	18"	48640	18" 14	30880	18"	21540
24"	24210	24"	48490	24"		24"	
30"		30"	46350	30"		30"	
36"		36" 34	29170	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 HOLES DRILLED UNTIL LARGE ROCK OR BOULDERS AND TRASH PREVENTED FURTHER DRILLING BACKGROUND MEASUREMENTS ≈ 23,000 CPM

MORRISON KNUDSEN

BOREHOLE LOG

LOGGING CREW: Ernest Couch
Levon Benally, Jr
Edward Schultz

INSTRUMENT ID NO. Ludlum 2220 ft 31982

SHEET 3 OF 6 PAGE 3

DATE: June 13, 1984

PROPERTY ID: Gateway Park

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.

(9)
HOLE ID: C+220+23C
TIME DRILLED:
TIME LOGGED:
SOIL TYPE:

DEPTH	COUNTS/.1MIN
SURFACE	
0"	19630
6"	22100
12"	20970
~~18"~~ 13	20180
24"	
30"	
36"	
42"	
48"	
54"	
60"	
66"	
72"	
78"	
84"	
90"	
96"	

(10)
HOLE ID: C+225+205C
TIME DRILLED:
TIME LOGGED:
SOIL TYPE:

DEPTH	COUNTS/.1MIN
SURFACE	
0"	21180
6"	26740
12"	37700
18"	35470
24"	24040
~~30"~~ 27	19350
36"	
42"	
48"	
54"	
60"	
66"	
72"	
78"	
84"	
90"	
96"	

(11)
HOLE ID: C+300+230C
TIME DRILLED:
TIME LOGGED:
SOIL TYPE:

DEPTH	COUNTS/.1MIN
SURFACE	
0"	21170
6"	24160
12"	35620
18"	52840
24"	45990
30"	36020
36"	
42"	
48"	
54"	
60"	
66"	
72"	
78"	
84"	
90"	
96"	

(12)
HOLE ID: C+367.5+237.5C
TIME DRILLED:
TIME LOGGED:
SOIL TYPE:

DEPTH	COUNTS/.1MIN
SURFACE	
0"	29880
6"	43790
12"	52810
18"	36810
24"	26530
30"	
36"	
42"	
48"	
54"	
60"	
66"	
72"	
78"	
84"	
90"	
96"	

REMARKS: All Holes Drilled until Large Rock or Boulders and trash prevented further drilling. Background Measurements = 23,000 cpm.

MORRISON KNUDSEN

BOREHOLE LOG

LOGGING CREW: Ernest Gulch
Levon Bennett, Jr.
Edward Schultz

INSTRUMENT ID NO. Ludlum 2220 # 31982

SHEET 4 OF 6 PAGE 4

DATE: June 13, 1984

PROPERTY ID: Gateway Park

AREA: Dunning, 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.

(13) HOLE ID: C+387.5+210C
TIME DRILLED:
TIME LOGGED:
SOIL TYPE:

(14) HOLE ID: C+354+150C
TIME DRILLED:
TIME LOGGED:
SOIL TYPE:

(15) HOLE ID: C+387.5+150C
TIME DRILLED:
TIME LOGGED:
SOIL TYPE:

(16) HOLE ID: C+400+125C
TIME DRILLED:
TIME LOGGED:
SOIL TYPE:

DEPTH	COUNTS/.1MIN	DEPTH	COUNTS/.1MIN	DEPTH	COUNTS/.1MIN	DEPTH	COUNTS/.1MIN
SURFACE		SURFACE		SURFACE		SURFACE	
0"	29400	0"	46490	0"	43030	0"	40330
6"	34760	6"	59460	6"	48710	6"	55880
12"	33960	12"	43950	12"	43070	12"	55600
18"	31290	18"	30370	~~18~~ 15	33960	18"	51070
~~24~~ 21	29990	~~24~~ 21	26990	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 Holes Drilled until large Rock or Boulders and trash prevented further Drilling. Background Measurements ≈ 23,000 cpm.

MORRISON KNUDSEN

BOREHOLE LOG

LOGGING CREW: Ernest Couch
Levon Benally, Jr
Edward Schultz

INSTRUMENT ID NO. Ludlum 2220 # 31482

SHEET 5 OF 6 PAGE 5

DATE: June 13, 1984

PROPERTY ID: Gateway Proj.

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.

(17)
HOLE ID: 0+312.5+113.5
TIME DRILLED:
TIME LOGGED:
SOIL TYPE:

DEPTH	COUNTS/.1MIN
SURFACE	
0"	23120
6"	33390
12"	43330
18"	35790
24"	30160
30"	
36"	
42"	
48"	
54"	
60"	
66"	
72"	
78"	
84"	
90"	
96"	

(18)
HOLE ID: 287.5+137.5
TIME DRILLED:
TIME LOGGED:
SOIL TYPE:

DEPTH	COUNTS/.1MIN
SURFACE	
0"	27040
6"	34780
12"	31210
18"	25410
24" 20	23560
30"	
36"	
42"	
48"	
54"	
60"	
66"	
72"	
78"	
84"	
90"	
96"	

(19)
HOLE ID: 0+220+70L
TIME DRILLED:
TIME LOGGED:
SOIL TYPE:

DEPTH	COUNTS/.1MIN
SURFACE	
0"	27240
6"	25910
12"	25240
18"	23040
24" 20	22740
30"	
36"	
42"	
48"	
54"	
60"	
66"	
72"	
78"	
84"	
90"	
96"	

(20)
HOLE ID: 0+287+137L
TIME DRILLED:
TIME LOGGED:
SOIL TYPE:

DEPTH	COUNTS/.1MIN
SURFACE	
0"	26950
6"	26680
12"	26630
18"	
24"	
30"	
36"	
42"	
48"	
54"	
60"	
66"	
72"	
78"	
84"	
90"	
96"	

REMARKS: All Holes Drilled until Large Rock or Boulders and Trash prevented Further Drilling. Background Measurements ≈ 23,000 cpm.

MORRISON KNUDSEN

BOREHOLE LOG

LOGGING CREW: Ernest Couch
Leven Bennett, Jr.
Edward Schultz

INSTRUMENT ID NO. Ludlum 2220 #31982

SHEET 6 OF 6 PAGE 6

DATE: June 13, 1984

PROPERTY ID: Gateway Proj.

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.

(21)

HOLE ID: CB340HOL		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		SURFACE		SURFACE		SURFACE	
0"	27190	0"		0"		0"	
6"	29590	6"		6"		6"	
12"	27990	12"		12"		12"	
18"	22600	18"		18"		18"	
~~24~~ 20	21900	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 Holes Drilled until large Rock or Boulders and trash prevented further Drilling. Background measurement ≈ 23,000 cpm

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

Draft
Radiological and Engineering Assessment

Vicinity Property No. DUR 076

Remedial Actions
Contractor
for the
Uranium Mill Tailings
Remedial Actions
Project

MORRISON
KNUDSEN

Vicinity Property No. DUR 076

DRAFT

THE RADIOLOGICAL AND ENGINEERING ASSESSMENT AND FINAL DESIGN FOR DURANGO PROPERTY

DU-076

March 13, 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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FIGURES

TABLES

APPENDIX

1.0 EXECUTIVE SUMMARY

1.1 Introduction

Property DU-076 is a residential property located at 390 East 12th Street, Durango, Colorado.

1.2 Evaluation and Recommendation

1.2.1 Residual Radioactive Material Involvement

There is one area of contamination located 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 $650.00.

1.2.4 Schedule

The estimated duration of the remedial action effort is 5 to 7 days.

2.0 ENGINEERING FIELD SURVEY

2.1 Property Description

2.1.1 Property Use and Occupancy

Property DU-076 is a residential property located at 390 East 12th Street and owned by Donald and Pauline Whalen. The house and apartment building on the property are rental units. 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. 415275 follows:

Lots 11, 12 and 13, Block 83, City of Durango, La Plata County, Colorado.

2.1.3 Bordering Properties

The lot is zoned R-2, multi-family residential. It is located in a residential area less than 1-1/2 miles northeast of the old Vanadium Corporation of America mill tailings site. The property is bounded on the north by 12th Street; on the east by East Fourth Avenue; on the south by a residence; and on the west by an alley.

2.2 Existing Facilities and Structures

2.2.1 Structures

The primary structure is a two-story apartment with a basement. The secondary structures consist of a detached single family dwelling, a detached two car metal garage, and a free standing metal carport. The apartment and single family dwelling are of wood frame construction with concrete foundations; the garage is constructed of corrugated metal siding on a concrete foundation. Adjacent to the garage is a wood fenced storage area which is the location of the contaminated materi The balance of the property is fully landscaped.

All structures on the property ar ess than 50 years old and therefore satisfy Stipulati .a. of the Programmatic Memorandum of Agreement bet the DOE, the Colorado State Historic Preservation Office and the Advisory Council on Historic Preservation.

2.2.2 Utilities

Utilities are serviced to the property as follows:

Electric power - Overhead from the utility pole in the alley.

Telephone - Overhead from the uti ity pole in the alley.

Water - Underground from Fourth Avenue.

Gas - Underground from the alley.

Sewer - Underground from main in the alley.

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: 390 East 12th Street

Owner's Name: Donald F. & Pauline S. Whalen Address: 1911 Delwood Avenue

Lot No.: 11, 12, 13 Property Type: Residential-Apartmnt Bldg. & Rental House

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

Survey Completed By: R. Livengood/C. Sanders-Meena Date: 5-22-84

Property Description - Exterior:

Dwelling: Sq. Ft.: N/A

Levels: Single story house; two story apartment building

Construction Type: The house is wood framed stucco; the apartment is wood framed stucco

Foundation: The house is on conc. fdn.; Apt is on conc. basemt

Garage: Two car corrugated metal siding; Two car carport between garage and apartment building

Storage Bldg: Prefab: None

Other:

Improvement to Dwellings: Additions: None Porches: Covered conc entry to apartment on north side

Deck: None

Other:

Driveway: Concrete: Small pad on alley in front of garage doors

Gravel: As approach to carport

Sidewalks: Concrete/Paved: As noted on drawing

Other:

Fences/Gates: Wood: 6' high on north side of garage

Other: 30" wire mesh south of carport and north & east of apts.

Table 2.1 (cont'd)

PROPERTY SURVEY DATA

Site Location: Durango

Property Address: 390 East 12th Street

Grounds:
- Lawn: On south side of lot
- Trees: As noted on drawing
- Shrubs: As noted on drawing
- Garden: On terraces; on alley side of single story house
- Grading: 5% downward from east to west; 25% in terraced area
- Other: Scoria rock in NE corner of lot between ret wall & bld

Soil Type:

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: 390 East 12th Street

Electric Line Location: As Noted on drawing

Gas Line Location: Underground from alley

Water Line Location: Underground from 4th Avenue main

Sewage Line Location: Underground from main in alley

Telephone Line Location: As noted on drawing

Building Codes and Zoning:

Codes	Local	State	Federal
Building Work	UBC		
Plumbing			
HVAC			
Electrical			
Other			

Zoning District: City of Durango

Present Dwelling Zoning: R-2 Residence District

Setbacks: Front:

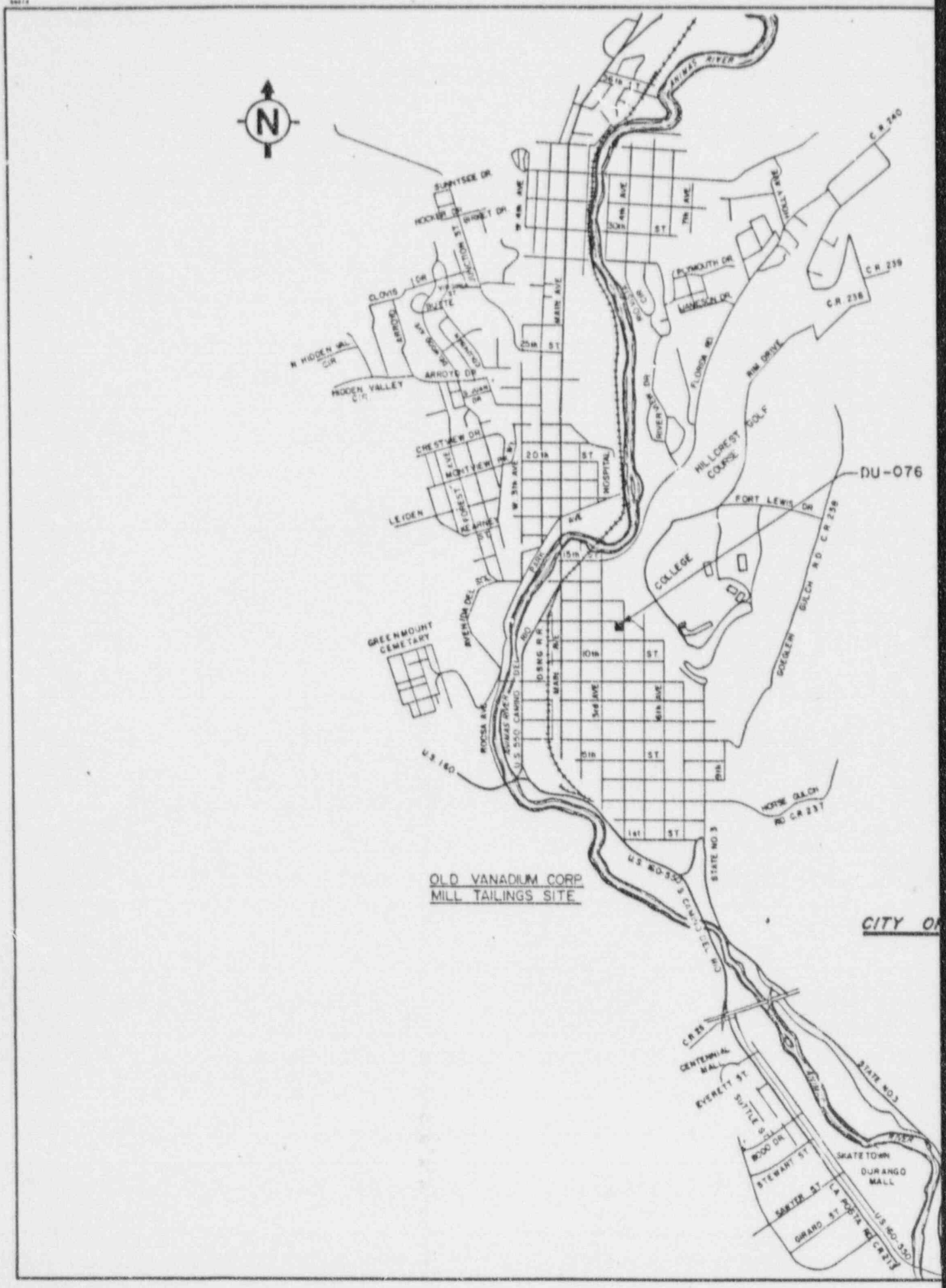
Rear:

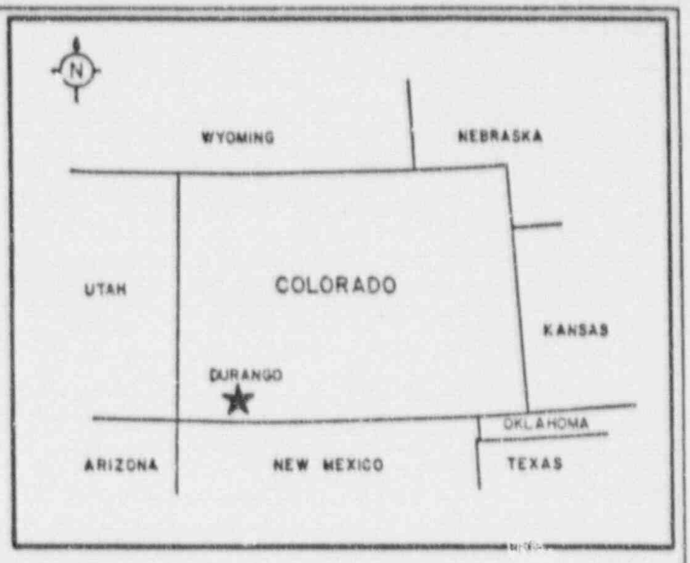
Side:

Other:

Photographs:

Roll Frame	Description	Direction
1-6	Garage and Storage Area	Looking East
1-7	Fences Storage Area	Looking West


N
ANIMAS RIVER
SUNNYSIDE DR
HOOKER DR
SUNSET DR
GLOVIS DR
ARROYO DR
HIDDEN VALLEY CIR
CRESTVIEW DR
LEIDEN
GREENMOUNT CEMETARY
RIVERSIDE DR
RIVERVIEW DR
FLORIDA RD
RIM DRIVE
HILLCREST GOLF COURSE
DU-076
FORT LEWIS DR
COLLEGE
GOEGLEIN GULCH RD CR 238
HORSE GULCH RD CR 237
OLD VANADIUM CORP
MILL TAILINGS SITE
CITY OF
CR 240
CR 239
CR 238
CR 236
CR 235
CENTENNIAL MALL
EVERETT ST
SUTTLE ST
WOOD DR
STEWART ST
SAWYER ST
GIRARD ST
LA PLATA RD CR 213
SKATE TOWN
DURANGO MALL
STATE HWY 3
US HWY 160
US HWY 550
US HWY 550 CAMINO DEL RIO
RIOSA AVE
MAIN AVE
9TH AVE
10TH AVE
20th ST
15th ST
10th ST
5th ST
1st ST
HOSPITAL



DURANGO, COLORADO

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A	03/06	FINAL REA SUBMITTAL	VDL	VDL	VDL		VDL	-

U. S. DEPARTMENT OF ENERGY
ALBUQUERQUE, NEW MEXICO

DESIGNED	DRAWN
VDL	VDL

CHECKED

REVIEWED

RECOMMENDED

FIGURE 2.1

VICINITY MAP DU-076

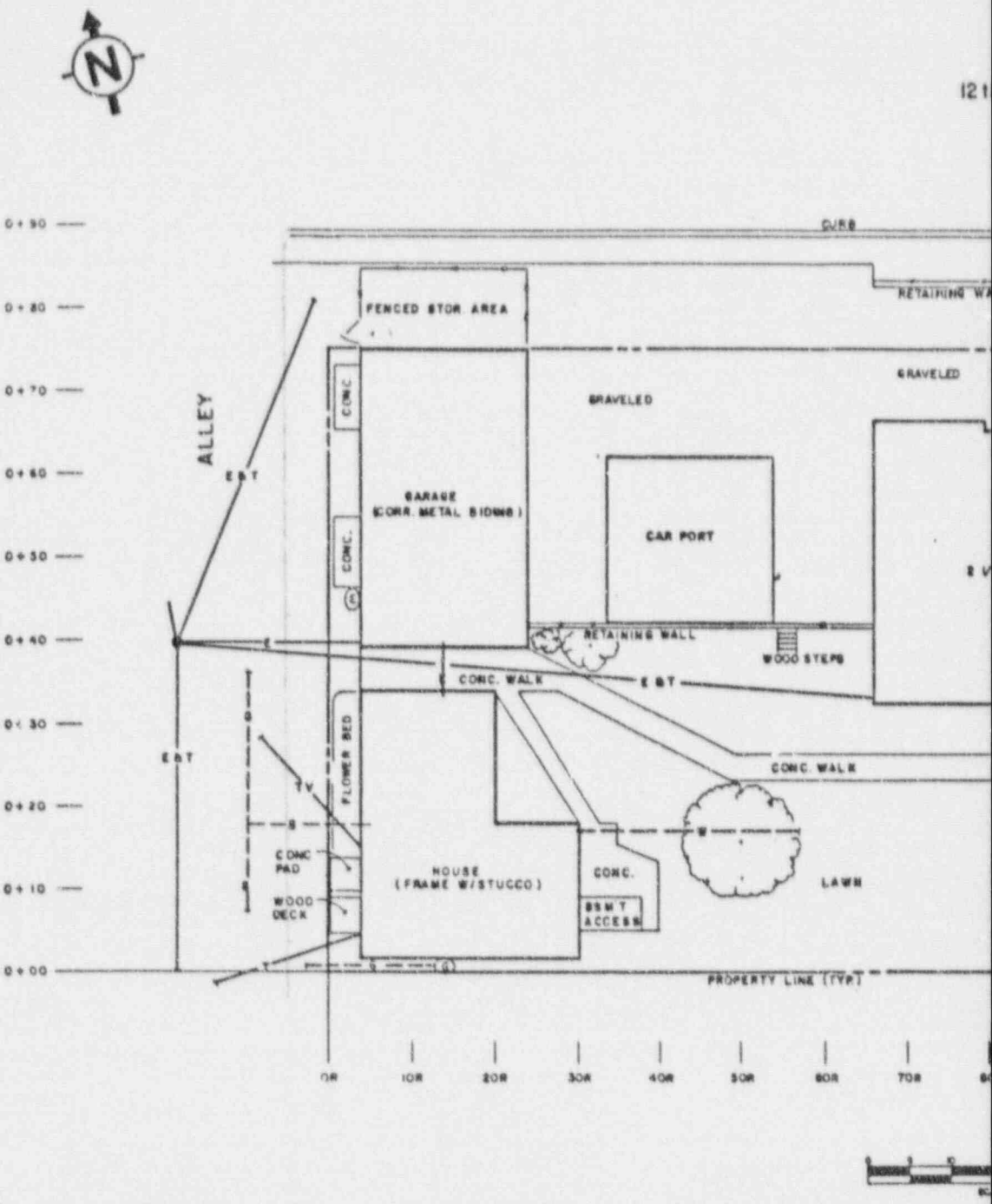
DURANGO, COLORADO
URANIUM MILL TAILINGS REMEDIAL ACTION PROJECT

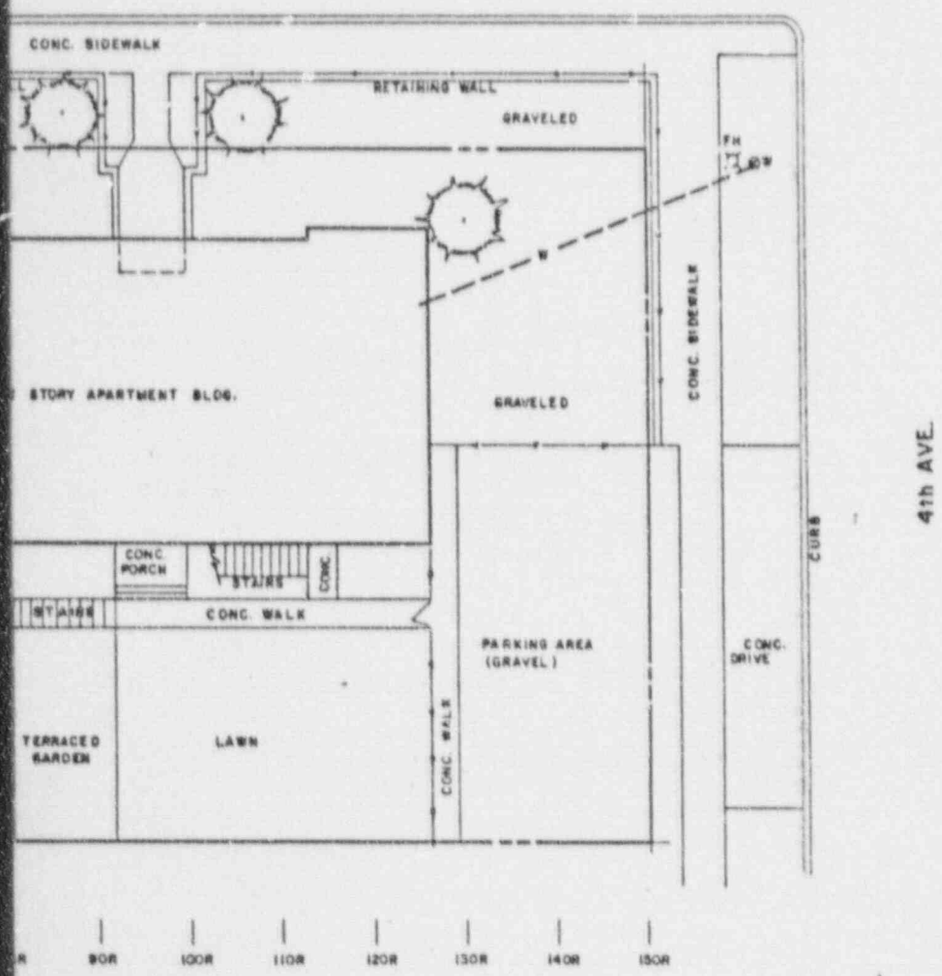
APPROVED	DATE	DOE PROJECT MANAGER	DATE	DOE PROJECT ENGINEER	DATE
NR		NR		NR	

MORRISON KNUDSEN

PROJECT NO. DE-AC04-83AL18796

DRAWING NO. DU-076-005 REV. A


N
0+90
0+80
0+70
0+60
0+50
0+40
0+30
0+20
0+10
0+00
CURB
RETAINING WA
FENCED STOR. AREA
GRAVELED
GRAVELED
ALLEY
E & T
CONC.
CONC.
GARAGE
(CORR. METAL SIDING)
CAR PORT
RETAINING WALL
WOOD STEPS
E & T
CONC. WALK
CONC. WALK
FLOWER BED
E & T
TV
S
CONC PAD
WOOD DECK
HOUSE
(FRAME W/STUCCO)
CONC.
BSMT ACCESS
LAWN
PROPERTY LINE (TYP.)
0R
10R
20R
30R
40R
50R
60R
70R



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
	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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NO.	DATE	REVISIONS	DRAWN BY	CHECKED BY	APPROVAL QA	APPROVAL ON	PROJ ENG	APPROVAL DOE
A	12/3/96	FINAL REA SUBMITTAL	VDL	VDL	VDL		VDL	—

U. S. DEPARTMENT OF ENERGY
ALBUQUERQUE, NEW MEXICO

DESIGNED	DRAWN
VDL	GJW

CHECKED
REVIEWED
RECOMMENDED

FIGURE 2.2
SITE PLAN DU-076
DURANGO, COLORADO
URANIUM MILL TAILINGS REMEDIAL ACTION PROJECT

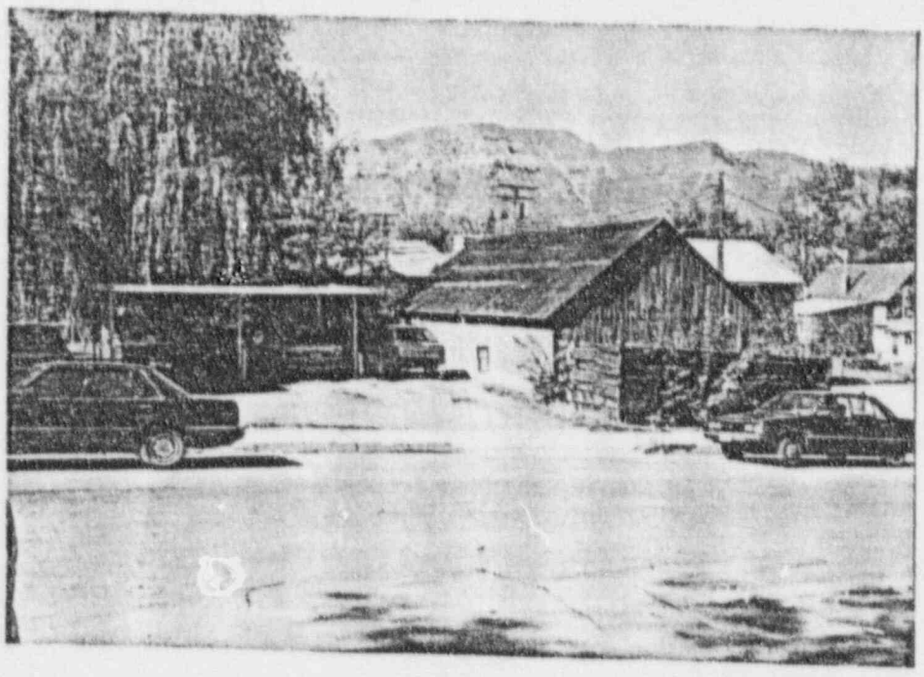
APPROVED	DATE	DOE PROJECT MANAGER	DATE	DOE PROJECT ENGINEER	DATE
NR		NR		NR	

MORRISON KNUDSEN

PROJECT NO. DE-AC04-83AL18796

DRAWING NO. DU-076-010 REV. A

Garage and Storage Area Looking East



Fenced Storage Area Looking West

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-076, ORNL, March 1984) 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 property with a gamma scintillometer to identify the boundary of the contamination. The survey included measurements within one foot of all sides of each structure.

An indoor gamma survey was conducted inside the lower level of the apartment. This survey was not conducted on a grid.

3.1.2 Survey Results

Outdoor surface gamma readings on the property range from 14 to 350 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 15 micro R/hr.

Indoor gamma readings range from 15 to 20 micro R/hr, as listed in Table 2. The maximum levels are in contact with concrete block and brick walls, which contain natural radioactivity.

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. Shovel holes were dug in several locations where the rocky soil prevented augering. These holes were surveyed as nearly as possible in compliance with the RAC Procedure 018.

Auger holes were not placed deliberately near to utility lines or to buildings, since no evidence exists that contamination is near the structures, either from the inclusion survey or from the present survey.

3.2.2 Survey Results

Contamination was found in 2 of the 4 outdoor holes augered. The location and depth of the contamination is described in Table 3.3 and is shown in Figure 3.1. Contamination was also found in one of the 7 shovel holes. Table 4 describes the location and depth of the contamination and of all shovel holes; these holes are shown in Figure 3.1.

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 an instantaneous radon daughter measurement in the apartment building of 0.006WL.

3.4. Estimated Extent of Contamination

One area of contamination was identified in the survey. Large rocks prevented drilling deeper than 18 inches; contamination is present at least to that depth.

Table 3.1
OUTDOOR GAMMA SURVEY
Property DU-076

POINT	MICRO R/hr
0+75,00R	17
0+85,00R	20
0+40,40R	16
0+40,60R	16
0+00,80R	16
0+30,90R	16
0+70,90R	16
0+20,100R	17
0+70,100R	16
0+70,110R	17
0+75,110R	16
0+75,120R	16
0+50,130R	16
0+60,130R	16
0+75,130R	16
0+50,150R	16
0+60,150R	16
0+70,150R	16
0+75,150R	16
0+80,05R	350
0+80,15R	17
0+85,10R	17
0+85,20R	19

Table 3.2
INDOOR GAMMA SURVEY
Property DU-076

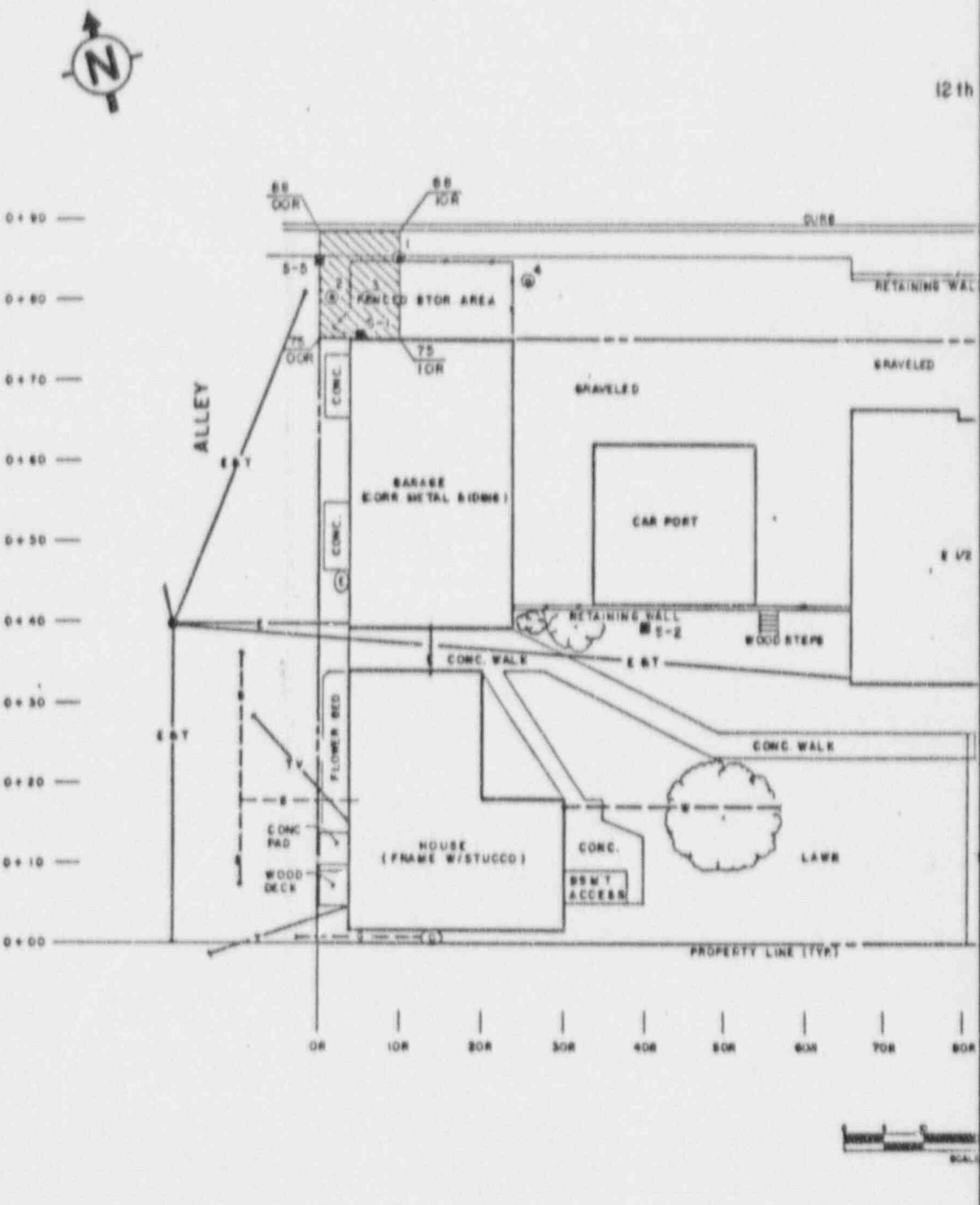
ROOM	LOCATION	MICRO R/hr
Laundry	SE	16
	SW	16
	NE	15
	NW	15
	Center	15
Storage I	SE	19
	NE	19
	SW	17
	Center	18
Sauna	Center	19
	SE	18
Storage II	Center	18
	E	19
Crawl Space	North of entry	17
	Front of entry	17
	South of entry	18
Sauna	Wall - 3 ft.	19
	Wall - 6 ft.	18
Storage II	Wall - 3 ft.	18
	Wall - 6 ft.	20

Table 3.3
BOREHOLE SURVEY
Property DU-076

HOLE	LOCATION	CONTAMINATION DEPTH
1	(0+85,10R)	None
2	(0+80,02R)	0-6"
3	(0+80,6R)	0-18"+
4	(0+82,25R)	None

Table 3.4
SHOVEL HOLE SURVEY
Property DU-076

HOLE	LOCATION	CONTAMINATION DEPTH
S-1	(0+76,05R)	0-6"
S-2	(0+40,40R)	None
S-3	(0+70,100R)	None
S-4	(0+70,110R)	None
S-5	(0+85,00R)	None
S-6	(0+60,148R)	None
S-7	(0+20,100R)	None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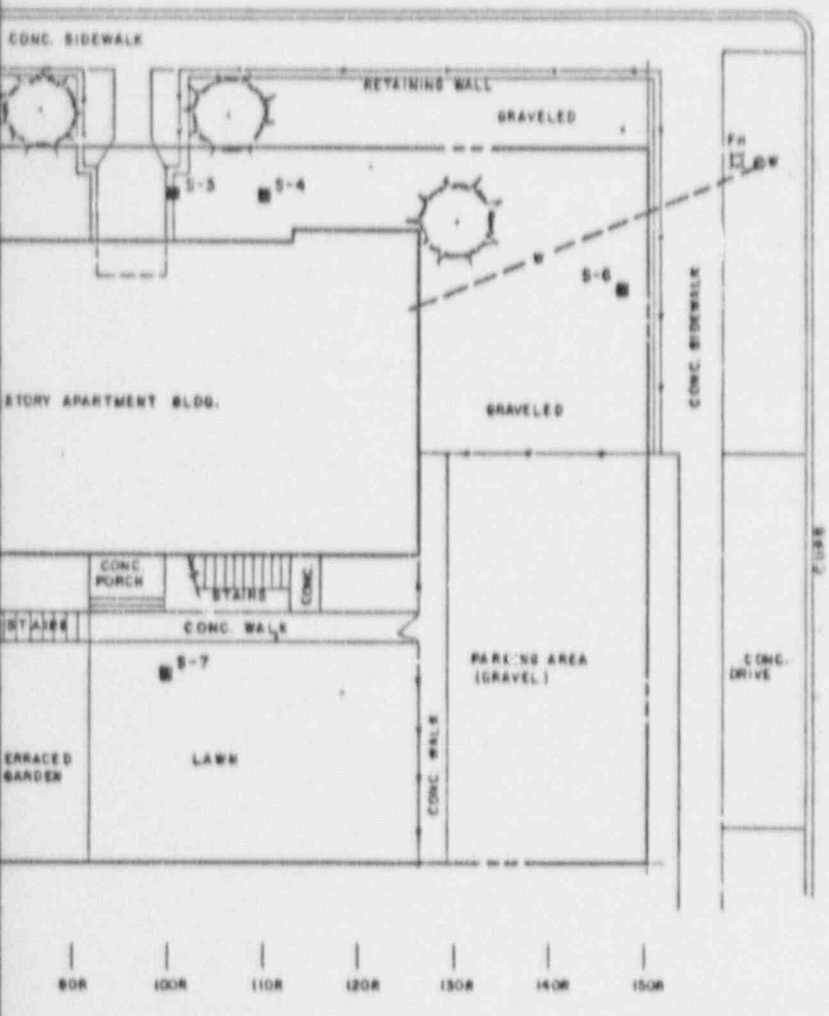
50R
60R
70R
80R
55 OOR
55 10R
75 OOR
75 10R
S-5
S-1
S-2
S-3
S-4
ALLEY
E & T
CONC.
CONC.
GARAGE (CORR METAL & CONC)
FENCED STOR AREA
GRAVELED
GRAVELED
CAR PORT
E 1/2
RETAINING WALL
RETAINING WALL
WOOD STEPS
CONC WALK
E & T
CONC WALK
FLOWER BED
T.V.
CONC PAD
WOOD DECK
HOUSE (FRAME W/STUCCO)
CONC.
BSMT ACCESS
LAWN
PROPERTY LINE (TYP.)

STREET



LEGEND

$\oplus^{2}$ AUGER HOLE DESIGNATION

$\blacksquare^{C\text{-}2}$ SHOVEL HOLE DESIGNATION

TIMATED DEPTH OF CONTAMINATION

18"

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U. S. DEPARTMENT OF ENERGY

ALBUQUERQUE, NEW MEXICO

DESIGNED VDL	DRAWN EJW
CHECKED	
REVIEWED	
RECOMMENDED	

FIGURE 3.1

RADIOLOGICAL SURVEY DATA DU-076

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-076-015 REV. A

NO.	DATE	REVISIONS	DRAWN BY	CHECKED BY	APPROVED LDR	APPROVED DH	PROJ ENG	APPROVED DOE
A	[illegible]	FINAL REA SUBMITTAL	VDL					

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-076:

Option 1 - No action should be taken.

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

Contamination of this property is localized in the northwest corner of the property adjacent to the garage and is approximately eighteen to thirty inches in depth.

The remedial action for this property consists of the removal and salvage of the wooden fence, excavating the contaminated area to a depth of eighteen inches. Resurvey the area and excavate in six inch increments until the limits of contamination have been reached. Replace excavated material with clean backfill, reinstall wooden fence and clean up area.

4.1.2 Costs

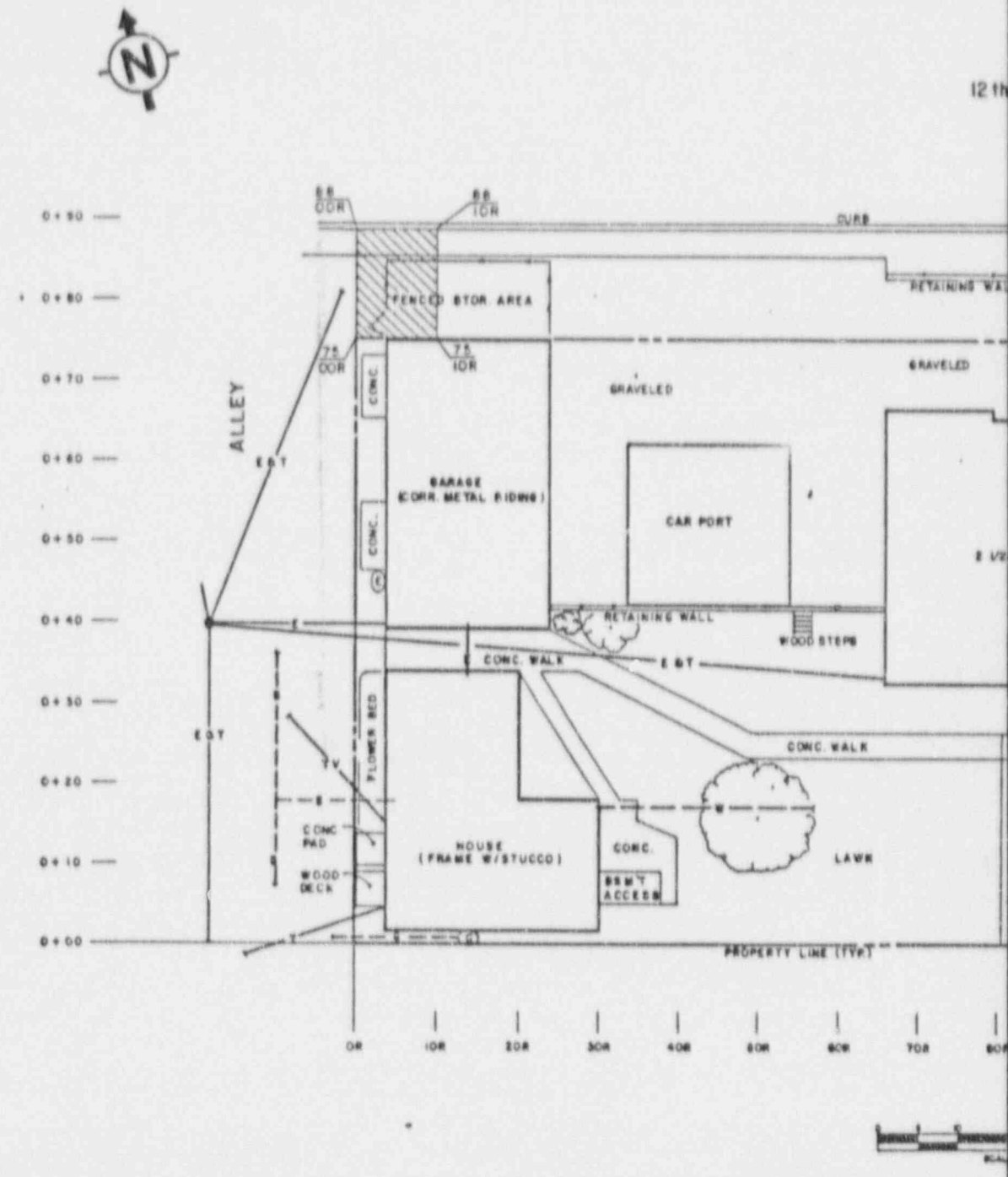
Estimated costs for the activities associated with Option 2 are detailed in Table 4.1. Costs include labor, insurance, material, equipment, supplies, overhead, profit, and contingency. All costs are listed in 1985 dollars. It is anticipated that the time required for the subcontractor to complete the work will be 5 to 7 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 $650.00.

Table 4.1
OPTION 2 COSTS

Activity	Unit Price	Quantity	Estimated Cost
Decontamination			
Remove and Salvage Fence	2.75	20 lf	55.00
Excavation (machine)	8.30	14 cy	116.20
Restoration			
Backfill	7.20	14 cy	100.80
Re-install Fence	8.20	20 lf	164.00
Subtotal			436.00
5% Contractor Contingency			21.80
20% Contractor Overhead & Profit			87.20
Subtotal			545.00
15% Contingency			81.75
Total (Rounded)			650.00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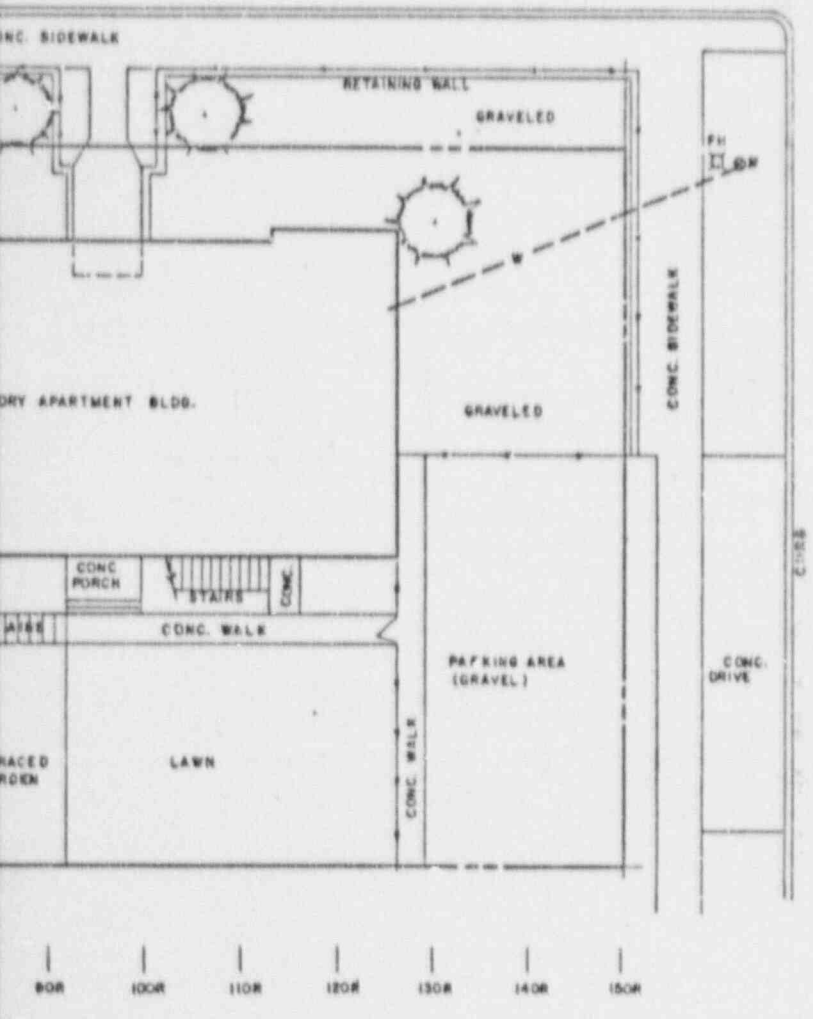
0+90
0+80
0+70
0+60
0+50
0+40
0+30
0+20
0+10
0+00
66 COR
66 IOR
CURB
RETAINING WA
FENCED STOR. AREA
75 COR
75 IOR
GRAVELED
ALLEY
CONC.
E & T
GARAGE (CORR. METAL SIDING)
CAR PORT
RETAINING WALL
WOOD STEPS
CONC. WALK
FLOWER BED
TV
CONC PAD
WOOD DECK
HOUSE (FRAME W/STUCCO)
CONC.
BSMT ACCESS
LAWN
PROPERTY LINE (TYP.)
0R
10R
20R
30R
40R
50R
60R
70R

STREET



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-076.

   SECTION 02110
   CLEARING AND GRUBBING

   SECTION 02130
   CONTAMINATED MATERIAL REMOVAL

   SECTION 02200
   EXCAVATION AND BACKFILL

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 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:

- REMOVE AND SALVAGE WOOD FENCE.
- EXCAVATE AREA "A" TO A DEPTH OF 18 INCHES. CONTRACTOR'S REPRESENTATIVE TO RESURVEY. IF FURTHER CONTAMINATION EXISTS, EXCAVATE IN 6 INCH INCREMENTS AS DIRECTED BY CONTRACTOR'S REPRESENTATIVE.
- BACKFILL WITH COMMON FILL AND REGRADE TO ORIGINAL GRADE.
- SET FENCE POST IN CONCRETE AND REINSTALL WOOD FENCE.

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NO.	DATE	REVISIONS	DRAWN BY	CHECKED BY	APPROVED LDE	APPROVED DH	PROJ ENG	APPROVED DATE
A	2/20/95	FINAL REA SUBMITTAL	VDL	VCD	VCD		VCD	-

U. S. DEPARTMENT OF ENERGY
ALBUQUERQUE, NEW MEXICO

DESIGNED	DRAWN
VDL	GJW

CHECKED
RECOMMENDED
APPROVED

FIGURE 4.1
EXCAVATION & RESTORATION PLAN DU-076
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-076-020 REV. A

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 02110	CLEARING AND GRUBBING	X	
SECTION 02130	CONTAMINATED MATERIAL REMOVAL	X	
SECTION 02200	EXCAVATION AND BACKFILL	X	

6.0 CONSTRUCTION DRAWINGS

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

Drawing Number	Drawing Title
DU-076-020	Excavation & Restoration Plan DU-076

APPENDIX A

SURVEY DATA LOGS

MORRISON KNUDSEN

OUTDOOR GAMMA SCREENING
SURVEY DATA SHEET

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

SHEET 1 OF 3 PAGE 1

DATE: JUNE 27, 1984

PROPERTY ID: DU-076

INSTRUMENT ID NO.: Ludlum 2220 #319112 W/ 4416 # 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+00R	13410 / 12800	0+60+40R	13060 / 11370	0+00+70R	13870 / 12230	0+30+100R	11810 / 11170
0+10+00R	12640 / 12090	0+70+40R	13450 / 13150	0+10+70R	13900 / 12080	0+70+100R	18700 / 12560
0+20+00R	13110 / 12606	0+75+40R	13100 / 13290	0+20+70R	14340 / 13170	0+75+100R	15860 / 14390
0+30+00R	12870 / 11920	0+85+40R	14340 / 14260	0+30+70R	15500 / 14320	0+85+100R	13340 / 12420
0+40+00R	12740 / 11030	0+00+50R	13080 / 12770	0+40+70R	15480 / 13070	0+00+110R	13680 / 13120
0+50+00R	13280 / 12710	0+10+50R	13910 / 12600	0+75+70R	13610 / 12940	0+10+110R	18420 / 12080
0+60+00R	13630 / 13196	0+20+50R	13530 / 12150	0+85+70R	14010 / 12330	0+20+110R	13110 / 12830
0+70+00R	14930 / 24010	0+30+50R	14510 / 13450	0+00+80R	16010 / 16000	0+30+110R	14810 / 12680
0+75+00R	19440 / 51500	0+40+50R	15226 / 12560	0+10+80R	14160 / 12300	0+70+110R	26020 / 14540
0+85+00R	31280 / 65900	0+50+50R	13230 / 12100	0+20+80R	13760 / 13890	0+75+110R	15760 / 14480
0+20+30R	13780 / 12350	0+60+50R	13270 / 12700	0+30+80R	13390 / 13730	0+85+110R	13240 / 12370
0+30+30R	14050 / 12450	0+70+50R	13910 / 13650	0+70+80R	15850 / 14480	0+00+120R	15080 / 13120
0+40+30R	15680 / 13780	0+75+50R	13300 / 13830	0+75+80R	15190 / 13850	0+10+120R	14380 / 12060
0+50+30R	12140 / 14630	0+85+50R	13930 / 12820	0+85+80R	13160 / 11870	0+20+120R	13380 / 12460
0+60+30R	12440 / 12090	0+60+60R	15410 / 15560	0+00+90R	15070 / 13450	0+30+120R	13680 / 12050
0+70+30R	14250 / 14910	0+10+60R	15540 / 12680	0+10+90R	15410 / 18380	0+70+120R	15250 / 18920
0+75+30R	14790 / 15580	0+20+60R	13680 / 14030	0+20+90R	14510 / 12710	0+75+120R	16710 / 15080
0+85+30R	14650 / 17780	0+30+60R	14030 / 13940	0+30+90R	16600 / 15590	0+00+130R	14210 / 12790
0+00+40R	13220 / 13490	0+40+60R	16700 / 13560	0+70+90R	17450 / 15110	0+10+130R	12580 / 12350
0+10+40R	13260 / 11790	0+50+60R	13770 / 12100	0+75+90R	15640 / 14830	0+20+130R	15130 / 11620
0+20+40R	12930 / 13880	0+60+60R	13640 / 11470	0+85+90R	13250 / 14820	0+30+130R	13420 / 11800
0+30+40R	12070 / 12590	0+70+60R	13100 / 13370	0+00+100R	15710 / 12140	0+40+130R	13550 / 12880
0+40+40R	17000 / 12960	0+75+60R	14490 / 13550	0+10+100R	13110 / 12350	0+50+130R	17850 / 14810
0+50+40R	12630 / 9990	0+85+60R	14280 / 13200	0+20+100R	18930 / 12720	0+60+130R	17370 / 16030

REMARKS: ALL MEASUREMENTS ARE IN COUNTS PER MINUTE (CPM)
TOP- ARE CONTACT MEASUREMENTS
BOTTOM- MEASUREMENTS TAKEN 1 METER ABOVE GROUND LEVEL.
L. BENALLY, JR.

VP.044

MORRISON KNUDSEN

OUTDOOR GAMMA SCREENING
SURVEY DATA SHEET

LOGGING CREW: E. Couch
L. Benally, Jr.
E. Schulte

SHEET 2 OF 3 PAGE 2.

DATE: Jun. 27, 1984

PROPERTY ID: DU-076

INSTRUMENT ID NO.: Ludlum 2220 #31972 / 44-10 #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+70+130R	13920 / 13480	0+80 105R	78754 / 31102				
0+78+130R	17050 / 16210	0+80+15R	19230 / 38040				
0+85+130R	13030 / 12560	0+85+10R	20660 / 46750				
0+00+140R	14280 / 12660	0+85+20R	28130 / 40890				
0+10+140R	13360 / 11870						
0+20+140R	12098 / 10410	0+85+120R	12760 / 12820				
0+30+140R	12900 / 11520						
0+40+140R	14260 / 14320						
0+50+140R	16220 / 12240						
0+60+140R	15150 / 14060						
0+70+140R	15300 / 14800						
0+75+140R	16400 / 15270						
0+85+140R	13040 / 13030						
0+00+150R	13350 / 12300						
0+10+150R	13440 / 12480						
0+20+150R	13610 / 12740						
0+30+150R	13950 / 12190						
0+40+150R	14080 / 12770						
0+50+150R	17220 / 13970						
0+60+150R	18030 / 14260						
0+70+150R	17420 / 13450						
0+75+150R	18000 / 13850						
0+85+150R	15260 / 12390						
0+85+160R	13690 / 11870						

REMARKS: ALL MEASUREMENTS ARE IN COUNTS PER MINUTE (CPM)
TOP- ARE ALL CONTACT MEASUREMENTS
BOTTOM- MEASUREMENTS TAKEN 1 METER ABOVE GROUND LEVEL.
L. BENALLY, JR.

VP-04A

MORRISON KNUDSEN

BOREHOLE LOG

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

SHEET 3 OF 3 PAGE 3

DATE: JUNE 27, 1984

PROPERTY ID: DH-076

INSTRUMENT ID NO. Ludlum 2220 # 31982 #1440 # 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.

(1) HOLE ID: 0185710R TIME DRILLED: TIME LOGGED: SOIL TYPE:		(2) HOLE ID: 0180102R TIME DRILLED: TIME LOGGED: SOIL TYPE:		(3) HOLE ID: 0180106R TIME DRILLED: TIME LOGGED: SOIL TYPE:		(4) HOLE ID: 0182175R TIME DRILLED: TIME LOGGED: SOIL TYPE:	
DEPTH	COUNTS/.1MIN	DEPTH	COUNTS/.1MIN	DEPTH	COUNTS/.1MIN	DEPTH	COUNTS/.1MIN
SURFACE		SURFACE		SURFACE		SURFACE	
0"	39400	0"	72330	0"	1483680	0"	17150
6"	26210	6"	27550	6"	1513560	6"	17700
12"	21360	12"	21070	12"	1294650	12"	20020
18"	20630	18"	22620	18"	726390	18"	20080
24" 22"	20780	24" 22"	21210	24"		24" 22"	20530
30"		30"		30"	Area X	30"	
36"		36"		36"	3' square	36"	
42"		42"		42"	encountered	42"	
48"		48"		48"	Yellow Cake'	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 MEASUREMENT 23,000 CPM
ALL MEASUREMENTS ARE IN COUNTS PER MINUTE (CPM)
ALL HOLES WERE DRILLED UNTIL LARGE ROCKS WERE ENCOUNTERED AND PREVENTED FURTHER DRILLING.

MORRISON KNUDSEN

BOREHOLE LOG Supplemental Data

LOGGING CREW: Ernest Gooch
Edward Schultz
Julian Bitzilly

INSTRUMENT ID NO. 40220 #3988 7440 #16578

SHEET 1 OF 3 PAGE 1

DATE: October 16, 1984

PROPERTY ID: DU 076

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: 0+76+50R TIME DRILLED: TIME LOGGED: SOIL TYPE:		HOLE ID: 0+40+46R TIME DRILLED: TIME LOGGED: SOIL TYPE:		HOLE ID: 0+70+160R TIME DRILLED: TIME LOGGED: SOIL TYPE:		HOLE ID: 0+70+110R TIME DRILLED: TIME LOGGED: SOIL TYPE:	
DEPTH	COUNTS/.1MIN	DEPTH	COUNTS/.1MIN	DEPTH	COUNTS/.1MIN	DEPTH	COUNTS/.1MIN
SURFACE		SURFACE	17600	SURFACE	18700	SURFACE	20200
0"	6098C	0"	14830	0"	14690	0"	16310
6"	34410	6"	17470	6"	16530	6"	17800
12"	23380	12" 11	19000	12"	18340	12"	20270
18" 16	20000	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 Holes, shallow holes are due to rocky soil encountered. Background is 23600 cpm, all counts in CPM.

MORRISON KNUDSEN

INTERIOR SURVEY DATA LOG/HOT SPOT Supplemental Data

SURVEY CREW Ernest Cowch
Edward Schultz
Julius Estrella

SHEET 2 OF 3 PAGE 2
DATE October 18, 1984
PROPERTY ID # DV-076
PROJECT

GAMMA SCINTLLATOR HOT SPOT DATA

2220 INSTRUMENT ID # #1/#4410 #16539 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.

Contact 3' 6'

HOT SPOT ID #	COUNTS /0.1MIN	RATE uR/h
LOCATION: Training Room		
SG	15526 / 15570	16
SW	14544 / 2010	16
NE	13110 / 16170	15
NW	13940 / 11680	15
C	13594 / 16650	15
LOCATION: Storage Room W.Side 3' 6'		
C	21070 / 22480	18
E	24268 / 24840	25340 / 23670
	19	20 / 19
LOCATION:		

HOT SPOT ID #	COUNTS /0.1MIN	RATE uR/h
LOCATION: Storage Room		
SE	22270 / 22470	19
NE	22020 / 23910	17
SW	18810 / 16810	17
C	21000 / 18870	18
LOCATION: Sm Crawl Space		
N. End Entry	17400	17
Front of Entry	17730	17
S. End Entry	20250	18
all contact readings		
LOCATION:		

HOT SPOT ID #	COUNTS /0.1MIN	RATE uR/h
LOCATION: Sauna		
C	22220 / 22080	19
E ES		
E. WALL	19 / 18	24280 / 21870
LOCATION:		
LOCATION:		

COMMENTS: 3' and 6' reading were taken on walls in Sauna & Storage Rooms. Top readings are contact, lower readings are 1 meter distance. background is 1500. all counts in CPM. Note walls are concrete and brick which would account for the elevated readings

VP-002R

MORRISON KNUDSEN

BOREHOLE LOG Supplemental Data

LOGGING CREW: Ernest Couch
Edward Schultz
Julius Estrella

SHEET 3 OF 3 PAGE 3

DATE: October 18, 1984

PROPERTY ID: DU-076

INSTRUMENT ID NO: 220 2220 #3982 #440 #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.

(5) (6) (7)

HOLE ID: 0+85+11E		HOLE ID: 6+60+14S		HOLE ID: 0+20+11E		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		SURFACE	14750	SURFACE		SURFACE	
0"	27670	0"	16380	0"	13250	0"	
6"	19360	6"	19070	6"	15920	6"	
~~18~~ 9	20170	12"	21160	12"	18490	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: Around Hole, shallow holes run due to rocky soil encountered, background is 23000 cpm, all counts in cpm