NOTE:
SUPPLEMENTAL
STANDARDS

WM-39

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

Radiological and Engineering Assessment

Vicinity Property No. DUR 616

Remedial Actions
Contractor
for the
Uranium Mill Tailings
Remedial Actions
Project

MK-FERGUSON COMPANY
A MORRISON KNUDSEN COMPANY

Vicinity Property No. DUR 616

90-0315

Radiological and Engineering Assessment: Property DU-616S

ADDRESS: South of Highway 160
1/8 Mile West of
Highway 160/550
Durango, CO 81301

OWNER'S NAME: Colorado Department of Highways

OWNER'S ADDRESS (IF DIFFERENT)

TENANTS NAME: _____

TELEPHONE NUMBER _____
(if available)

TELEPHONE NUMBER _____
(if available)

PROPERTY DATA:

Structures and utilities are shown on Drawing DU-616-010.

Property Use: Single Residence _____; Commercial X ; School _____
Multiple Residence _____; Vacant Lot _____; Church _____; Open Land _____

Age of structures: Less than 50 years old _____;
Greater than 50 years old _____ (attach form _____)

Adjacent included/spillover vicinity properties:

North - V.P. # N/A
South - V.P. # N/A
East - V.P. # Mill Site
West - V.P. # N/A

Interior Involvement: Yes _____; No X

Major Structural _____; Minor Structural _____; Dislocation _____

RADIOLOGICAL DATA:

Summary

MK-Ferguson proposes that an application of supplemental standards be applied to a portion of this vicinity property. The remediation performed would consist of the removal of the top 18 inches of contaminated material. Surveys revealed that contamination is present to depths of 20 feet and this material would remain in place.

Gamma Exposure Rate Survey

Survey Method

An outdoor gamma survey was conducted in accordance with the RAC Procedure 011. This survey was conducted over the entire property, with particular attention to the areas identified in the inclusion survey, and in other areas as described in this document.

Survey Results

Surface gamma readings on the property range from 20 to 55 micro R/hr (Tables 3.1 and 3.4). This may be compared with the background for the Durango site of 14 micro R/hr.

This property is directly across Lightner Creek from the processing site and readings are elevated due to lateral gamma flux. Exterior areas suspected of being contaminated may be seen on Drawing DU-616-015 and DU-616-016.

Borehole Survey

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 010. In addition, a track hoe was used to dig test pits in several locations.

Survey Results

Contamination was found in 41 of the 64 outdoor holes augered and in 5 of the 7 test pits. The location and depth of the contamination are described in Tables 3.1 and 3.2 and are shown on Drawing DU-616-015 and DU-616-016.

Radon/Radon Daughter Survey

No radon/radon daughter surveys were performed inside buildings at the property, since the structures on the west end of the property are not permanent structures.

Soil Samples

A total of 76 outdoor soil samples were taken (Table 3.3); of the 64 soil samples collected from the top 6" layer of soil, 27 exceed EPA standards. The 12 remaining soil samples were collected from 6" layers at various depths and 7 of these exceed EPA standards.

JUSTIFICATION CHECKLIST FOR APPLICATION OF SUPPLEMENTAL STANDARDS

Application of Supplemental Standards (SS) is in accordance with 40 CFR 192.22 Subpart (x) (check appropriate Subpart)

_____ a) Risk injury to worker/public

_____ b) Environmental harm

__x__ c) High cost relative to long-term benefits

JUSTIFICATION CHECKLIST FOR APPLICATION OF SUPPLEMENTAL STANDARDS CONT'D.

_____ d) High cost of cleaning up building relative to benefits

_____ e) No known remedial action

_____ f) Radionuclides other than Ra226 exist

Brief Condition Description and Justification:

A portion of the property, Area A, is the steep slopes of the highway right-of-way between U.S. Hwy. 160 and Lightner Creek. Contamination on the north boundary of Area A extends to a depth of 20' and runs north under U.S. Hwy. 160. As local topography slopes off to the south in Area A, the average depth of contamination at the south boundary is 8'. Land usage in this area is not expected to change. With the top 18" of contaminated material removed and 18" of backfill on this area relative health risks are minimized.

Area B is the steep slopes of the Lightner Creek stream bank at the west end of the property. The presence of very large rip rap and the steepness of the slopes make remediation of this area extremely costly. Land use of this area is not expected to change and the contamination that would remain in place poses a minimal health hazard.

When remedial action is complete, surface exposure rates will range from 14 to 30 micro R/hr. Background for the Durango area is 14 micro R/hr. If a person spent 8 hours a day, 5 days a week, for 50 weeks in a 30 micro R/hr radiation field, he would receive about 60 millirem of gamma exposure in one year. This is about one-tenth the amount allowed the general public (10 CFR 20.105).

Additional cost without application of Supplemental Standards = $910,850.00 (further breakdown provided in Table 4.2 of this REA).

This is a 943 percent increase over the estimated remedial action cost for the preferred option.

Yes	No	If Supplemental Standards are Applied:
X		1. Open Land?
X		2. Occupied Building? (Occupational only)
	X	3. If yes to No. 2, is contaminated area beneath or within 10 ft. of building?
	X	4. Anticipated change of land use within next 5 years?

X	5.	If yes to No. 4, then will land use produce health risk?
X	6.	Is contamination in habitable area?
X	7.	Have owners comments been solicited? See Appendix B.

Estimated volume of contaminated material to remain = 16,250 (cy) in Area A and 208 (cy) in Area B.

Contaminated area to remain = 3,900 (sy) in Area A and 416 (sy) in Area B.

Range for contaminated areas = background in Area A, and background to 30 (micro R/h) in Area B [at 3 feet above surface].

Range Ra-226 concentration in soil in contaminated area= 1.3 to 234.7 (pCig/) in Area A and 1.3 to 28.3 (pCi/g) in Area B.

If tailings are below or within 10 feet of the structure, radon daughter concentration = N/A (WL).

Engineering Assessment

Work to be done is shown on Drawings DU-616-020, DU-550-021 and DU-550-022. Estimated quantities are shown in Table 4.1.

Occupant relocation: Required _____; Not Required ____X_____.

Application of Supplemental Standards

A portion of the property, Area "A", is the steep slope of the highway right-of-way between U.S. Highway 160 and Lightner Creek. Land usage in this area is not expected to change. With the top 18" of contaminated material removed and 18" of backfill on this area relative health risks are minimized.

Area "B" is the steep slope of the Lightner Creek stream bank at the west end of the property. The presence of very large riprap and the steepness of the slopes make remediation of this area extremely costly. Land use of this area is not expected to change and the contamination that would remain in place poses a minimal health hazard.

Remedial Action Option (Complex Properties Only)

N/A

Table 3.1
OUTDOOR GAMMA AND BOREHOLE SURVEY
Property DU-616

BOREHOLE	LOCATION	CONTAMINATION DEPTH	MICRO R/HR
1	4+20,17L	18"	27
2	4+21,22L	None	24
3	4+28,17L	Surface	26
4	4+20,11L	None	24
5	4+11,17L	None	22
6	2+34,27L	30"	24
7	2+34,22L	42"	28
8	2+35,38L	None	24
9	2+34,05L	18"	34
10	2+33,03R	Surface	29
11	2+49,20L	30"+	26
12	2+57,17L	None	25
13	2+62,05L	None	25
14	2+42,05L	None	23
15	2+29,22L	30"	29
16	2+24,25L	48"+	25
17	2+17,27L	48"+	24
18	2+05,30L	None	24
19	1+98,32L	42"+	23
20	1+90,33L	48"+	24

+Depth of contamination not reached.

Table 3.1 Cont'd.
OUTDOOR GAMMA AND BOREHOLE SURVEY
Property DU-616

BOREHOLE	LOCATION	CONTAMINATION DEPTH	MICRO R/HR
21	1+60,39L	48"+	22
22	1+28,41L	42"+	24
23	0+96,46L	54"	24
24	0+65,59L	None	23
25	0+83,56L	42"	24
26	2+13,04L	18"+	38
27	1+92,03L	42"	26
28	1+67,09L	42"+	22
29	1+59,00R	42"+	23
30	0+85,07L	30"+	32
31	0+55,15L	24"+	35
32	0+49,11L	48"+	55
33	0+23,06R	42"	29
34	0+04,35R	None	22
35	0+71,39L	36"+	40
36	4+35,17L	42"+	23
37	5+11,29L	None	21
38	5+39,14R	None	20
39	3+80,16R	None	21
40	3+70,04L	54"+	23

Table 3.1 Cont'd.
OUTDOOR GAMMA AND BOREHOLE SURVEY
Property DU-616

BOREHOLE	LOCATION	CONTAMINATION DEPTH	MICRO R/HR
41	3+47,08R	None	22
42	3+57,08R	Surface	29
43	3+44,31L	48"	23
44	3+88,27L	None	24
45	3+90,37L	None	25
46	4+45,40L	None	25
47	4+62,24L	30"+	24
48	4+75,25L	None	22
49	4+61,06R	None	25
50	4+20,00L	36"+	26
51	4+46,16L	30"+	25
52	4+31,00L	18"+	24
53	4+32,05R	24"+	25
54	4+41,01L	None	24
55	3+82,05L	36"	26
56	4+67,45L	None	24
57	4+62,08L	None	25
58	3+58,04L	None	24
59	3+00,02L	30"	22
60	2+93,09R	18"+	24

Table 3.1 Cont'd.
OUTDOOR GAMMA AND BOREHOLE SURVEY
Property DU-616

BOREHOLE	LOCATION	CONTAMINATION DEPTH	MICRO R/HR
61	-1+58,35R	24"	41
62	-0+55,38R	18"	32
63	-1+67,13R	12"	27
64	-1+59,13R	Surface	25

Table 3.2
OUTDOOR GAMMA AND TEST PIT SURVEY
Property DU-616

TEST PIT	LOCATION	CONTAMINATION DEPTH	MICRO R/HR
1	0+32,15L	20'+	N/A*
2	0+72,45L	20'+	N/A
3	2+00,35L	20'+	N/A
4	4+28,30L	20'	N/A
5	-1+00,38R	None	N/A
6	-0+50,75R	None	N/A
7	0+25,20L	6'	N/A

*Test pits, surface readings not taken.

Table 3.3
SURFACE SOIL SAMPLE SURVEY
Property DU-616

LOCATION	SAMPLE ID	DEPTH	Ra-226 CONCENTRATION (pCi/g)
4+20,17L	12657	0-6"	14.3
5+43,07R	12837	0-6"	1.9
4+81,05R	12838	0-6"	3.2
4+79,05R	12839	0-6"	2.3
4+20,03L	12840	0-6"	4.2
3+94,08L	12841	0-6"	2.8
4+20,31L	12842	0-6"	2.7
4+50,36L	12843	0-6"	2.4
2+33,16L	12853	0-6"	23.8
2+20,08L	12854	0-6"	14.1
1+97,07L	12855	0-6"	1.5
1+80,08L	12856	0-6"	4.0
1+20,08L	12857	0-6"	1.5
0+86,07L	12858	0-6"	6.9
0+54,14L	12859	0-6"	22.4
0+54,14L	12860	6-12"	33.8
0+36,08L	12861	0-6"	234.7
0+36,03R	12862	0-6"	4.0
-0+10,35R	12863	0-6"	4.3
-0+55,38R	12864	0-6"	5.3
-1+58,35R	12865	0-6"	15.0

Table 3.3 Cont'd.
SURFACE SOIL SAMPLE SURVEY
Property DU-516

LOCATION	SAMPLE ID	DEPTH	Ra-226 CONCENTRATION (pCi/g)
4+28,17L	12959	0-6"	6.6
3+44,07L	12960	0-6"	7.0
3+44,05R	12961	0-6"	13.5
2+34,38L	12962	0-6"	2.3
2+57,17L	12963	0-6"	2.7
2+29,22L	12964	0-6"	3.7
1+28,41L	12965	36-42"	8.7
2+13,04L	12969	12-18"	110.1
3+85,34L	12970	0-6"	2.0
3+60,30R	12971	0-6"	2.2
0+30,C6R	12972	0-6"	2.4
0+90,65L	12973	0-6"	1.4
4+35,17L	12977	0-6"	2.6
5+11,29L	12979	0-6"	2.3
5+39,14R	12985	0-6"	2.1
3+88,27L	13168	0-6"	2.5
4+52,05R	13185	0-6"	5.4
2+93,09R	13209	0-6"	4.5

Table 3.3 Cont'd.
SURFACE SOIL SAMPLE SURVEY
Property DU-616

LOCATION	SAMPLE ID	DEPTH	Ra-226 CONCENTRATION (pCi/g)
Test Pit 1	13207	17'	4.7
Test Pit 1	13210	18'	33.7
Test Pit 1	13208	20'	45.0
Test Pit 2	13216	17'	11.7
Test Pit 2	13217	20'	28.0
Test Pit 2	13215	20'	122.0
Test Pit 4	13220	18'	2.7
Test Pit 4	13221	11'	22.0
Test Pit 5	13226	17'	1.8
-1+58,35R	13255	0-6"	28.3
-0+55,38R	13256	0-6"	18.0
-1+67,13R	13260	0-6"	16.2
-1+63,30L	13263	0-6"	3.6
-1+59,75L	13264	0-6"	2.3
-1+61,47L	13265	0-6"	8.8
-0+50,29R	13266	0-6"	4.8
-0+84,40R	13262	0-6"	5.1
-1+59,00R	13270	0-6"	3.9
-1+59,13R	13271	0-6"	10.5
-1+39,30R	13272	0-6"	5.2
-1+45,25R	13273	0-6"	6.4

Table 3.3 Cont'd.
SURFACE SOIL SAMPLE SURVEY
Property DU-616

LOCATION	SAMPLE ID	DEPTH	Ra-226 CONCENTRATION (pCi/g)
-1+86,28R	13274	0-6"	10.4
-1+94,26R	13275	0-6"	2.9
3+66,20R	12654	0-6"	1.3
3+36,31L	12655	0-6"	4.5
3+45,10L	12656	0-6"	4.7
1+90,34L	12658	0-6"	3.0
0+36,08L	12659	0-6"	162.7
0+60,15L	12660	0-6"	15.3
1+69,10L	12661	0-6"	4.8
2+33,09L	12662	0-6"	13.6
2+35,18L	12704	0-6"	4.1
2+50,15L	12705	0-6"	2.6
2+15,02L	12706	0-6"	5.6
0+85,07L	12707	0-6"	9.5
0+65,30L	12708	0-6"	9.1
4+10,05L	12709	0-6"	3.3
-1+51,47L	13425	0-6"	3.4
-1+71,47L	13426	0-6"	3.0

Table 3.4
OUTDOOR GAMMA SCREENING
Property DU-616

LOCATION	CONTACT	1 METER
3+85,34L	24	24
4+80,36L	21	22
5+40,00R	22	23
3+60,30R	20	19
2+70,25R	26	26
1+50,06R	23	23
0+30,06R	26	27
0+30,30L	23	25
0+90,65L	24	26
2+10,54L	23	25

Table 4.1
Remedial Action Option Cost Estimates

RECOMMENDED OPTION

Activity No.	Activity	Unit Price	Quantity	Estimated Cost
1.3	Slope Excavation (Bulk)	9.60	2,335 cy	$22,416.00
2.0	Common Fill	15.96	567 cy	9,049.00
4.0	Top Soil	30.85	196 cy	6,047.00
6.0	Seeding	0.87	1,176 sy	1,023.00
7.0	Aggregate Base Course	20.46	89 cy	1,821.00
20.0	Replace Trees	125.00	28 ea	3,500.00
616.1	Remove Trees	558.00	LS	558.00
616.2	Riprap	25.90	854 cy	22,119.00
616.5	Filter Fabric	3.60	2,967 sy	10,681.00

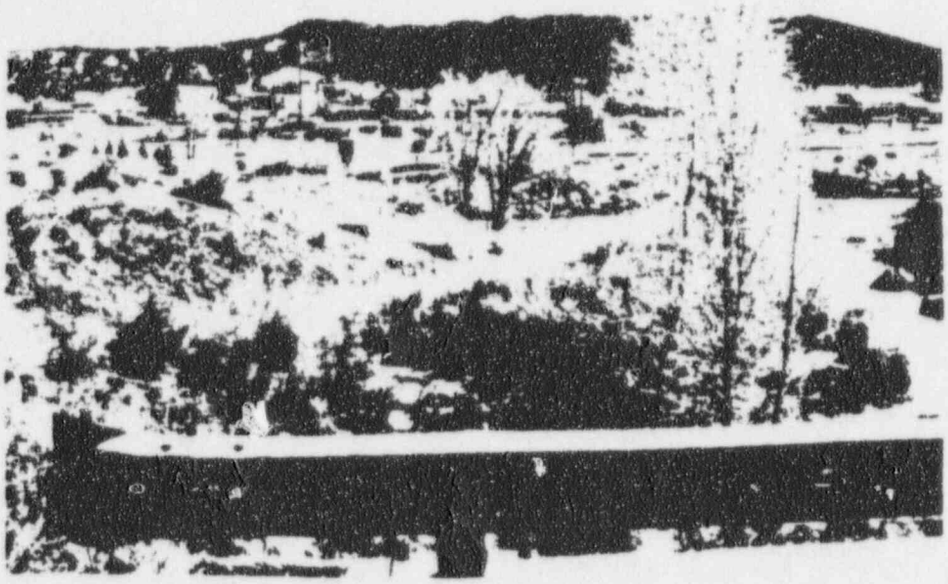
Subtotal	$ 77,214.00
5% Subcontractor's Contingency	3,861.00
20% Overhead & Profit	15,443.00
Total (Rounded)	$ 96,550.00

Table 4.2

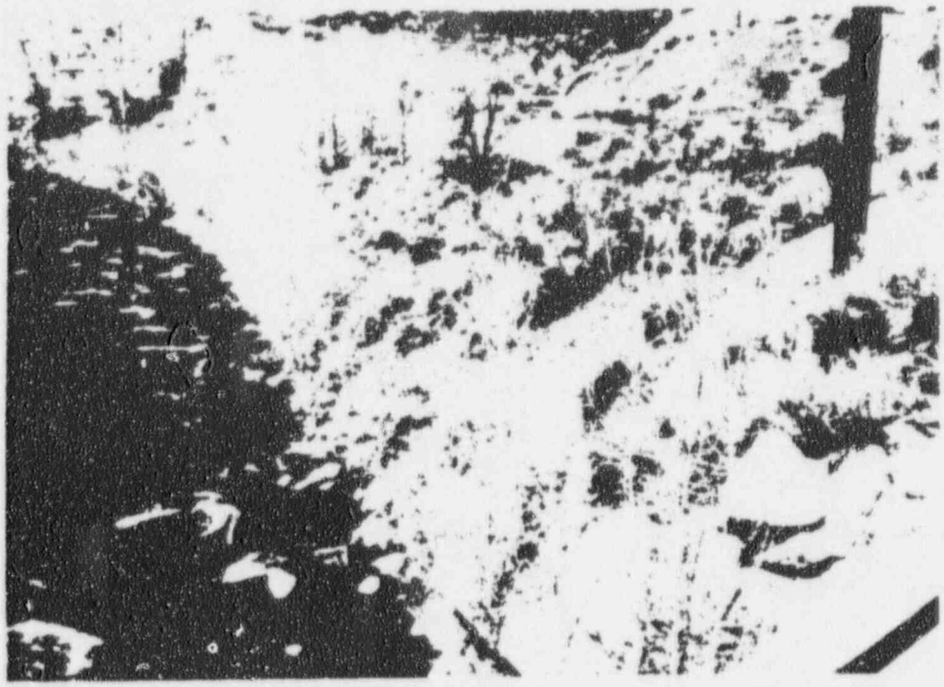
Cost For Not Applying Supplemental Standards

Activity No.	Activity	Unit Price	Quantity	Estimated Cost
1.3	Slope Excavation (Bulk)	9.60	31,554 cy	$302,918.00
2.2	Bulk Common Fill	11.06	24,509 cy	371,070.00
4.0	Top Soil	30.85	248 cy	7,651.00
6.0	Seeding	0.87	1,486 sy	1,293.00
7.0	Aggregate Base Course	20.46	89 cy	1,821.00
20.0	Replace Trees	125.00	28 ea	3,500.00
616.1	Remove Trees	558.00	LS	558.00
616.2	Riprap	25.90	1,708 cy	44,237.00
616.3	Steel Sheet Piling	8.87	18,080 sf	160,370.00
616.4	Remove, Salvage & Replace Shed	190.00	LS	190.00
616.5	Filter Fabric	3.60	3,415 sy	12,294.00

Subtotal	$805,902.00
5% Subcontractor's Contingency	40,295.00
20% Overhead & Profit	161,180.00
Total (Rounded)	$1,007,400.00



Looking East from North Access Bridge



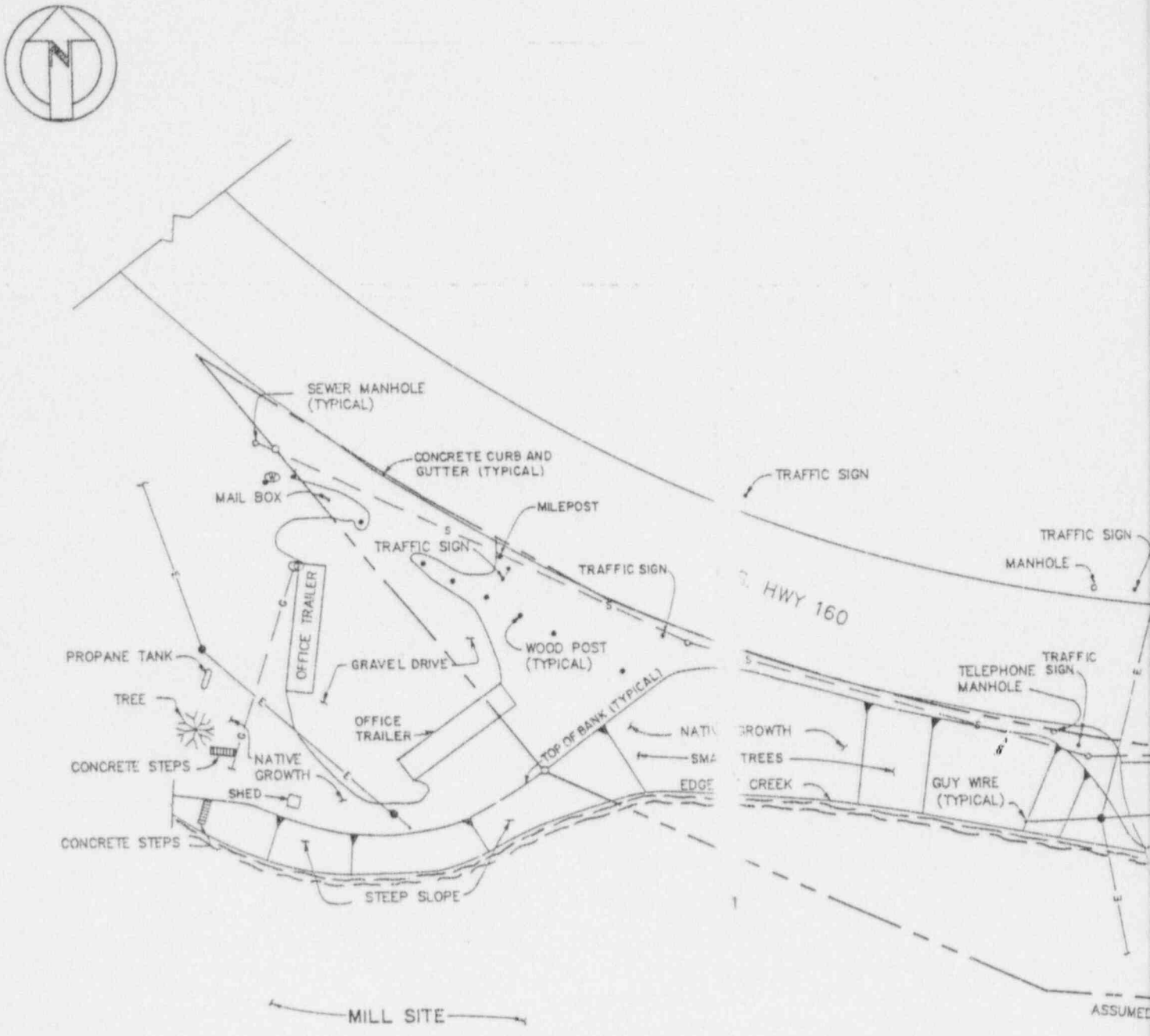
Looking West from North Access Bridge North of Lightner Creek

Figure 1 Property Photos

Looking East from West Property Corner

Looking Southeast from Southwest Property Pin

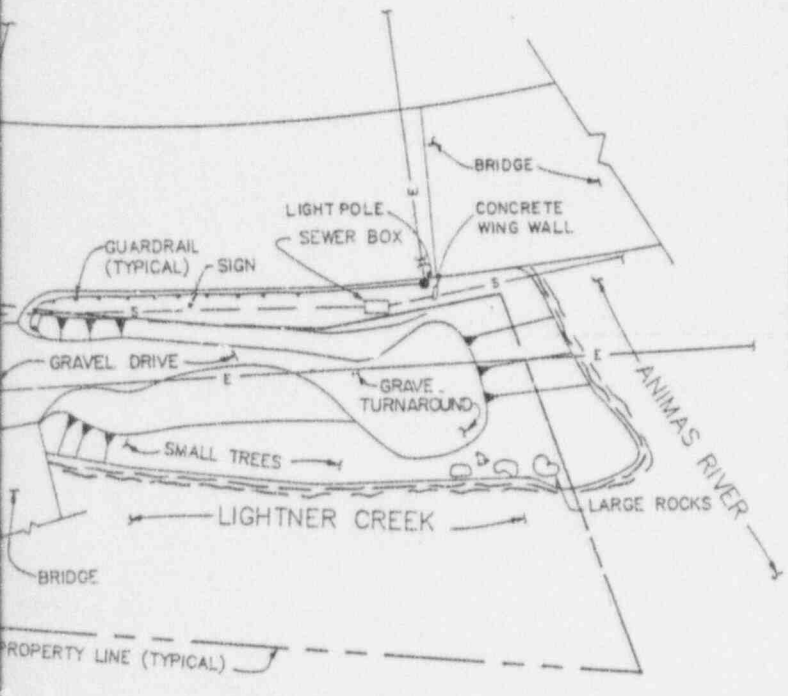
Figure 2 Property Photos


SEWER MANHOLE (TYPICAL)
CONCRETE CURB AND GUTTER (TYPICAL)
MAIL BOX
MILEPOST
TRAFFIC SIGN
TRAFFIC SIGN
TRAFFIC SIGN
TRAFFIC SIGN
MANHOLE
HWY 160
OFFICE TRAILER
PROPANE TANK
GRAVEL DRIVE
WOOD POST (TYPICAL)
TREE
OFFICE TRAILER
TOP OF BANK (TYPICAL)
TELEPHONE MANHOLE
TRAFFIC SIGN
CONCRETE STEPS
NATIVE GROWTH
SHED
TREES
CREEK
GUY WIRE (TYPICAL)
CONCRETE STEPS
STEEP SLOPE
MILL SITE
ASSUMED
0 20 40 80 120 FEET
SCALE

LEGEND

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

OVERHEAD SERVICE DENOTED BY SOLID LI
UNDERGROUND SERVICE DENOTED BY DASHED LIN



9707090114-01

12/JUN89	FINAL REA SUBMITTAL	CRW	[illegible]	SM	[illegible]	DAS	—
DATE	REVISIONS	DRAWN BY	CHECKED BY	APPRVL LOE	APPRVL DH	PROJ ENG	APPRVL DOE

U. S. DEPARTMENT OF ENERGY
ALBUQUERQUE, NEW MEXICO

DESIGNED	DRAWN
SM	S.M.

CHECKED [illegible]
REVIEWED [illegible]
RECOMMENDED [illegible]

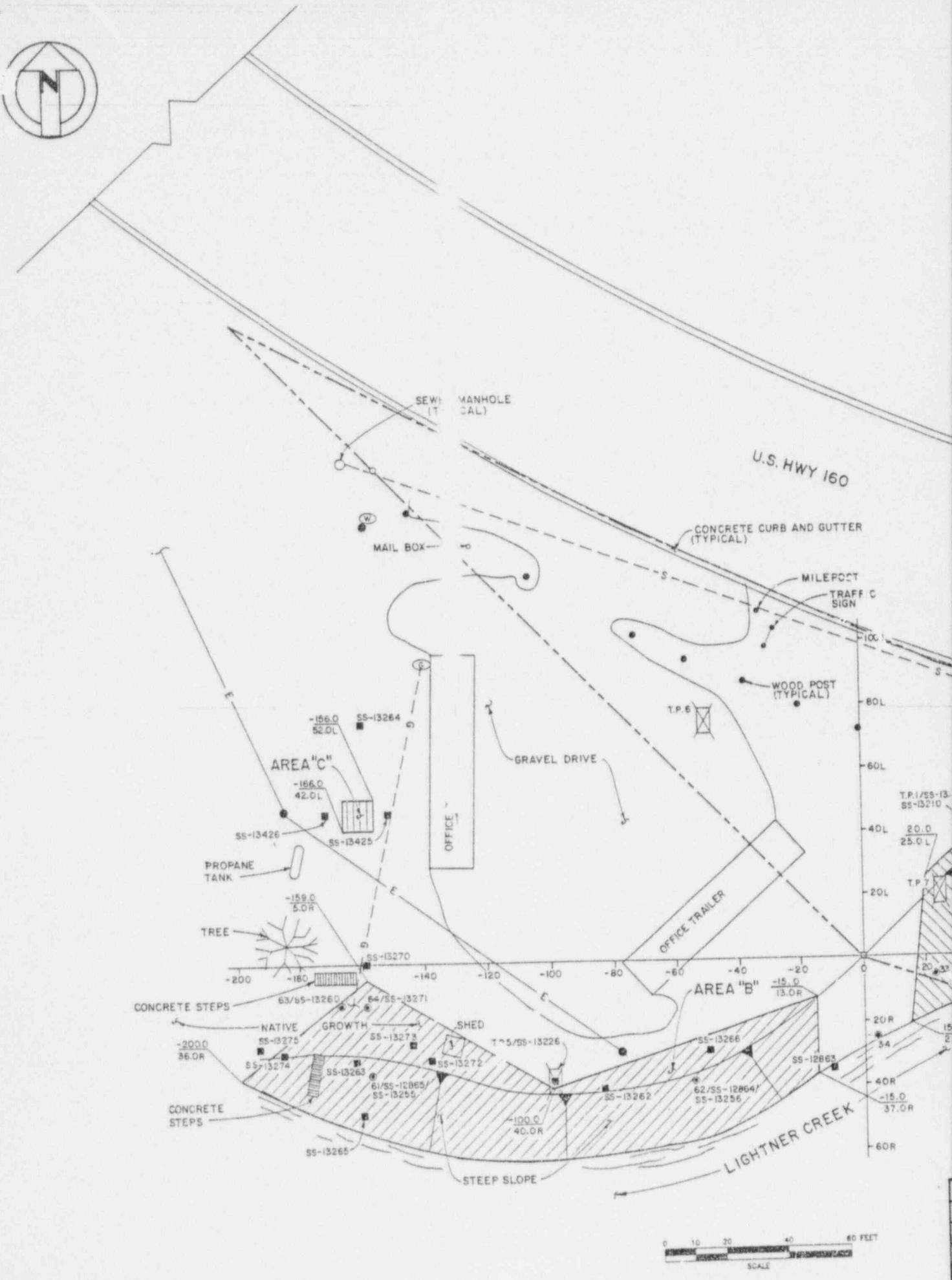
SITE PLAN
DU-616

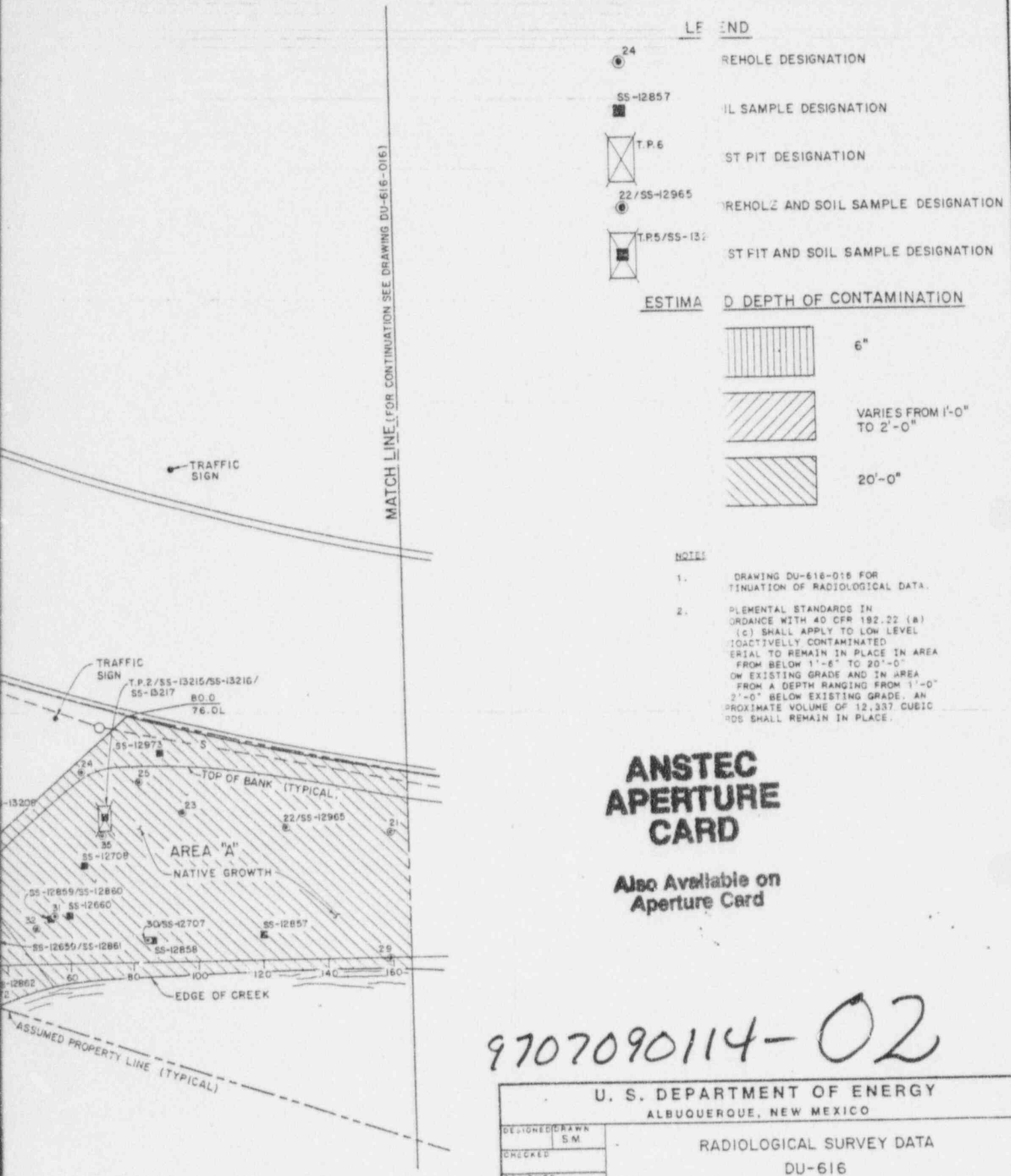
DURANGO, COLORADO
URANIUM MILL TAILINGS REMEDIAL ACTION PROJECT

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

MK-FERGUSON
A MORRISON KNUDSEN COMPANY

PROJECT NO. DE-AC04-83AL16796
DRAWING NO. DU-616-010 REV. A


N
SEWER MANHOLE (TYPICAL)
U.S. HWY 160
CONCRETE CURB AND GUTTER (TYPICAL)
MAIL BOX
MILEPOST
TRAFFIC SIGN
WOOD POST (TYPICAL)
T.P.6
GRAVEL DRIVE
-166.0 52.0L
SS-13264
AREA "C"
-166.0 42.0L
SS-13426
SS-13425
OFFICE
PROPANE TANK
-159.0 5.0R
TREE
OFFICE TRAILER
SS-13270
-200
-180
-140
-120
-100
-80
-60
-40
-20
0
AREA "B"
-15.0 13.0R
CONCRETE STEPS
63/SS-13260
64/SS-13271
NATIVE GROWTH
SHED
SS-13275
SS-13273
T.P.5/SS-13226
SS-13266
-200.0 36.0R
SS-13274
SS-13263
SS-13272
SS-12863
61/SS-12865/ SS-13255
62/SS-12864/ SS-13256
SS-13262
CONCRETE STEPS
-100.0 40.0R
SS-13265
STEEP SLOPE
LIGHTNER CREEK
100L
80L
60L
40L
20L
20.0 25.0L
T.P.7
20R
40R
-15.0 37.0R
60R
0 10 20 40 60 FEET
SCALE



9707090114-02

U. S. DEPARTMENT OF ENERGY
ALBUQUERQUE, NEW MEXICO

DESIGNED	DRAWN S.M.
CHECKED	
REVIEWED	
RECOMMENDED	

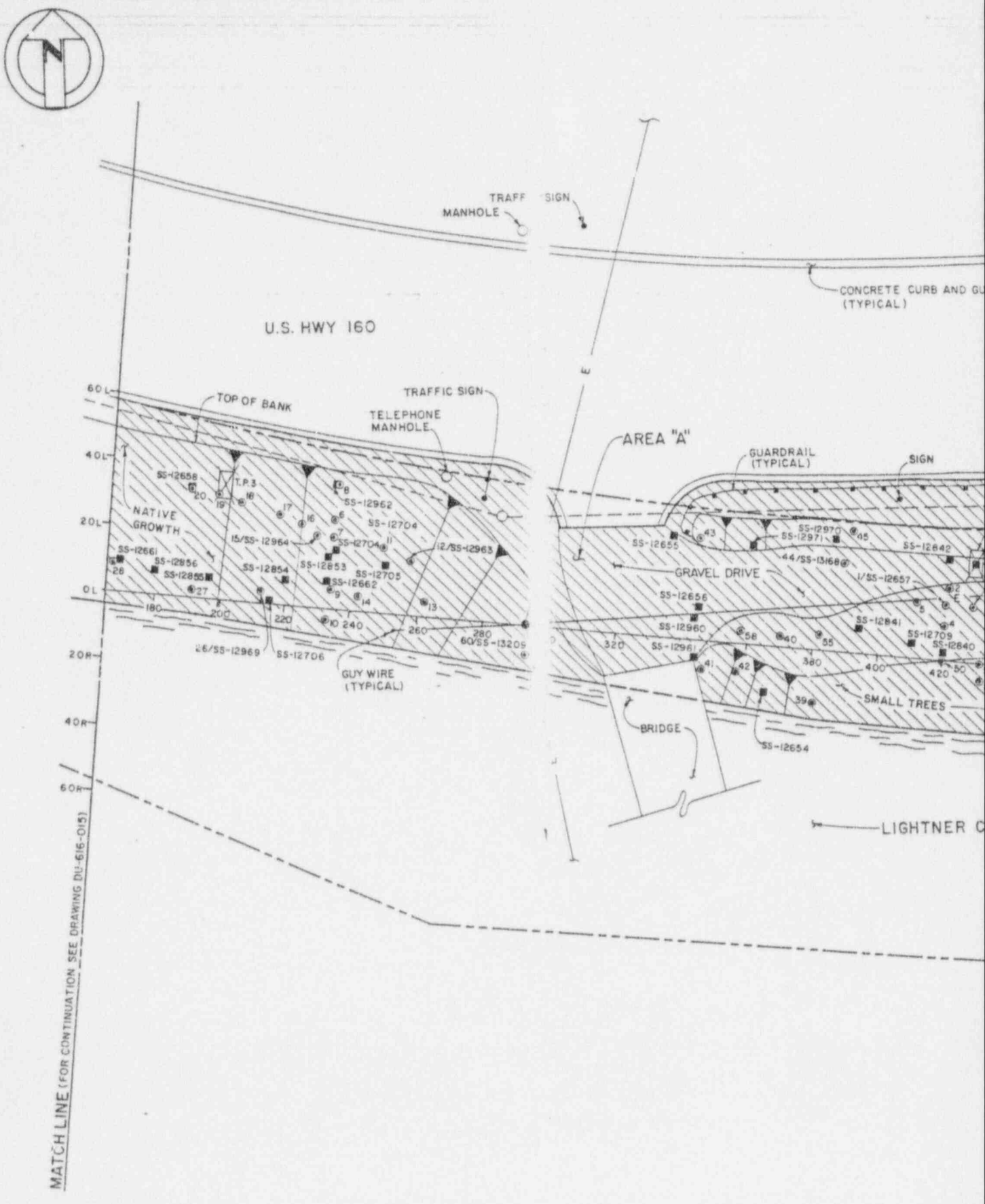
RADIOLOGICAL SURVEY DATA
DU-616
DURANGO, COLORADO
URANIUM MILL TAILINGS REMEDIAL ACTION PROJECT

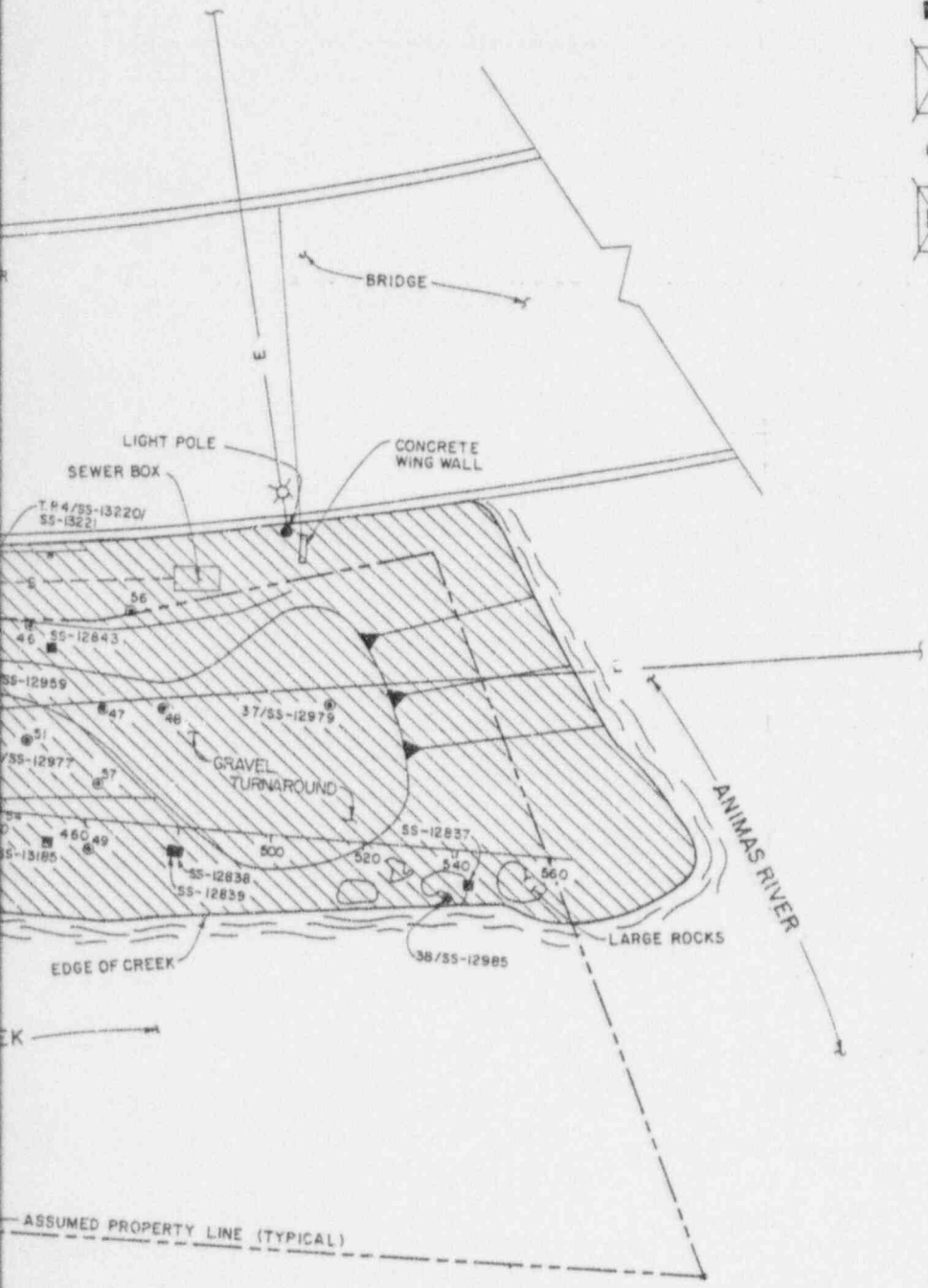
APPROVED	DATE	DOE PROJECT MANAGER	DATE	DOE PROJECT ENGINEER	DATE
NR		NR		NR	

MK-FERGUSON
A MORRISON KNUDSEN COMPANY

PROJECT NO. DE-AC04-83AL18796
DRAWING NO. DU-616-015 REV. A

NUMBER	REVISIONS	DRAWN BY	CHECKED BY	APPRVL DOE	APPRVL DH	PROJ ENG	APPRVL DOE
1	FINAL REA SUBMITTAL	CRW					
DATE							


N
TRAFF SIGN
MANHOLE
CONCRETE CURB AND GU
(TYPICAL)
U.S. HWY 160
60L
40L
20L
0L
20R
40R
60R
TOP OF BANK
TRAFFIC SIGN
TELEPHONE
MANHOLE
AREA "A"
GUARDRAIL
(TYPICAL)
SIGN
NATIVE
GROWTH
T.P.3
SS-12658
SS-12962
SS-12704
SS-12661
SS-12856
SS-12855
SS-12854
SS-12853
SS-12705
SS-12662
SS-12704
15/SS-12964
12/SS-12963
SS-12655
SS-12970
SS-12971
SS-12842
44/SS-13168
GRAVEL DRIVE
1/SS-12657
SS-12656
SS-12960
SS-12961
SS-12841
SS-12709
SS-12840
180
200
220
240
260
280
320
340
360
400
420
26/SS-12969
SS-12706
60/SS-13205
GUY WIRE
(TYPICAL)
SMALL TREES
BRIDGE
SS-12654
LIGHTNER C
MATCH LINE (FOR CONTINUATION SEE DRAWING DU-616-015)



LEGEND

- 17 — BOREHOL DESIGNATION
- SS-12843 — SOIL SA LE DESIGNATION
- T.P. 3 — TEST PIT ESIGNATION
- 36/SS-12977 — BOREHOL AND SOIL SAMPLE DESIGNATION
- T.P.4/SS-13220/ SS-13221 — TEST PIT ND SOIL SAMPLE DESIGNATION

ESTIMATED DE H OF CONTAMINATION

20'-0"

NOTES:

1. SEE DRAWIN -616-015 FOR GENERAL NOTES AND C INUATION OF RADIOLOGIC DATA.

9707090114-03

0 10 20 40 60 FEET

SCALE

NO.	DATE	REVISIONS	DRAWN BY	CHECKED BY	APPRVL LOE	APPRVL DK	PROJ ENG	APPRVL DOE
A	12JUN	FINAL REA SUBMITTAL	CRW					

U. S. DEPARTMENT OF ENERGY
ALBUQUERQUE, NEW MEXICO

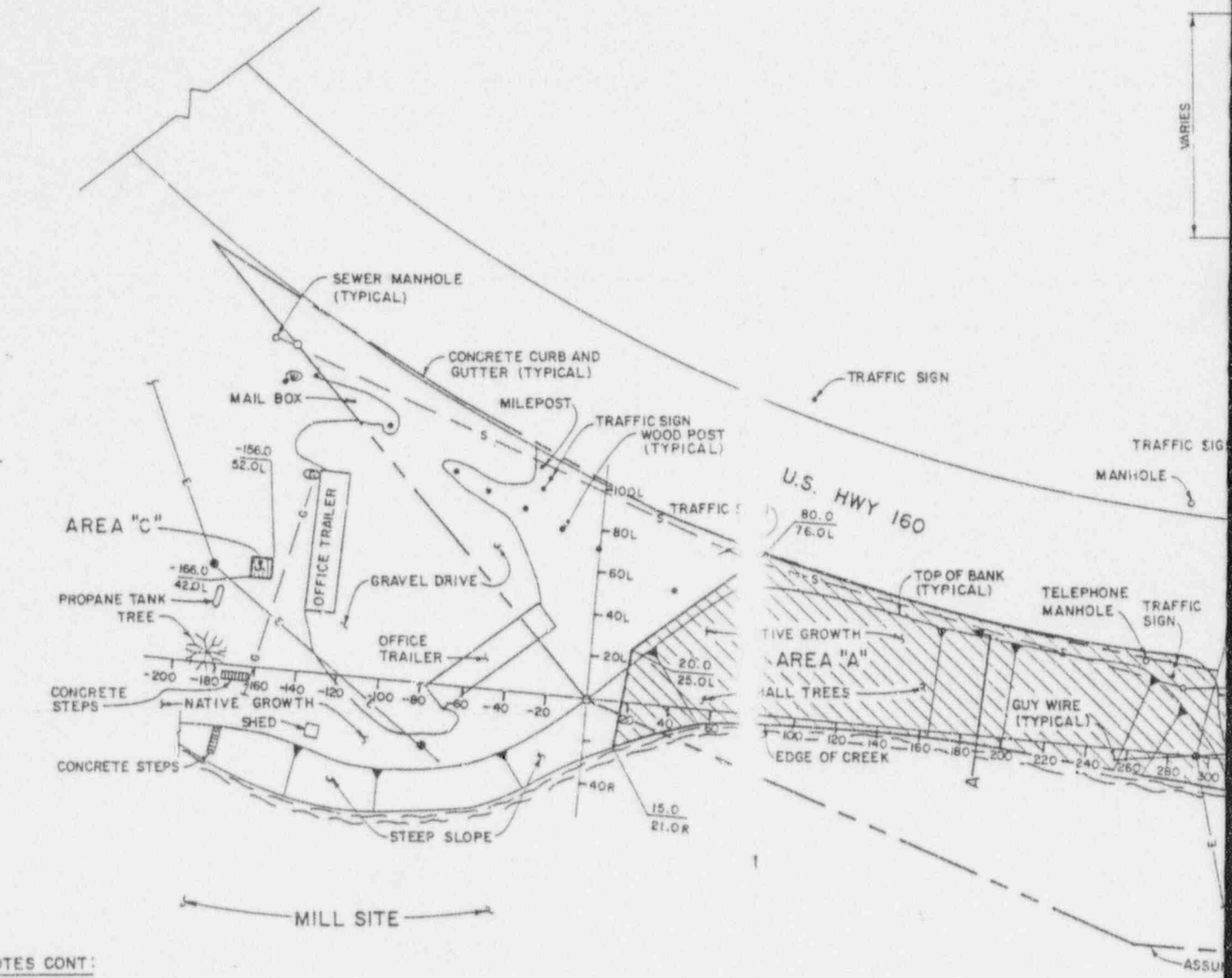
DESIGNED	DRAWN S.M.
CHECKED	
REVIEWED	
RECOMMENDED	

RADIOLOGICAL SURVEY DATA
DU-616
DURANGO, COLORADO
URANIUM MILL TAILINGS REMEDIAL ACTION PROJECT

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

MK-FERGUSON
A MORRISON KNUDSEN COMPANY

PROJECT NO. DE-AC04-83AL18796
DRAWING NO. DU-616-016 REV. A



NOTES CONT:

5. REMOVE TREES AND BUSHES AS REQUIRED BY REMEDIAL ACTION. AFTER COMPLETION OF REMEDIAL ACTION REPLACE TREES WITH NURSERY STOCK OF THE SAME TYPE AS THAT REMOVED. PLANT TREES AT 15' SPACING ON TOP OF LIGHTNER CREEK BANK ALONG EDGE OF U.S. HIGHWAY 160. THE SIZE OF REPLACEMENT STOCK SHALL BE DETERMINED BY THE CONTRACTOR'S REPRESENTATIVE.

6. REMOVE ROAD SIGNS IN REMEDIAL ACTION AREA. REPLACE IN ORIGINAL LOCATION AFTER REMEDIAL ACTION IS COMPLETE.

7. SEWER LINE MAY COINCIDE WITH EXCAVATION. SUBCONTRACTOR TO VERIFY SEWER MAIN LOCATION PRIOR TO START OF REMOVAL ACTION. SUBCONTRACTOR SHALL BE RESPONSIBLE FOR ANY DAMAGE AND REPAIR TO SEWER LINE DURING REMEDIAL ACTION.

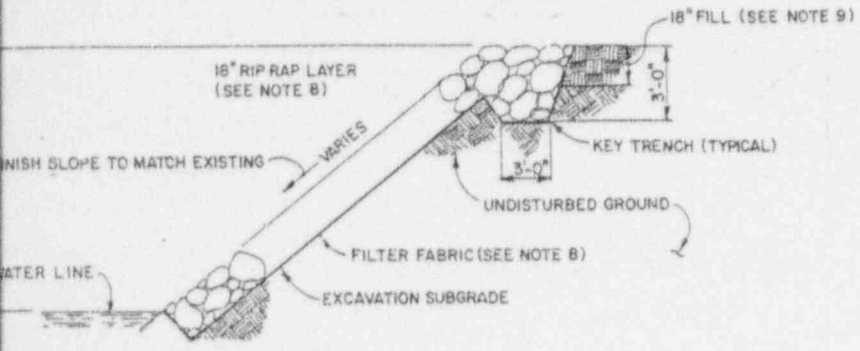
8. AFTER AREA "A" HAS BEEN EXCAVATED TO A DEPTH OF 1'-6", FILTER FABRIC SHALL BE INSTALLED ON THE FACE OF ALL SLOPES ALONG LIGHTNER CREEK AND THE ANIMAS RIVER AS SHOWN IN RESTORATION SECTION A. AN 18" LAYER OF WELL GRADED RIPRAP STONE CONFORMING TO THE STATE OF COLORADO STANDARD SPECIFICATION FOR ROAD AND BRIDGE CONSTRUCTION #506.02 SHALL BE PLACED AND SPREAD OVER THE FABRIC. FILTER FABRIC TO BE MIRAFI 700X OR APPROVED EQUAL, INSTALLED PER MANUFACTURER'S RECOMMENDATION.

9. ALL REMAINING AREAS SHALL BE BACKFILLED WITH COMPACTED COMMON FILL. 6 INCHES OF AGGREGATE BASE COURSE SHALL BE PLACED IN THE GRAVEL DRIVE AND TURNAROUND. ALL OTHER AREAS SHALL BE TOPPED WITH 6 INCHES OF TOPSOIL AND SEEDED WITH A NATIVE SEED MIX.

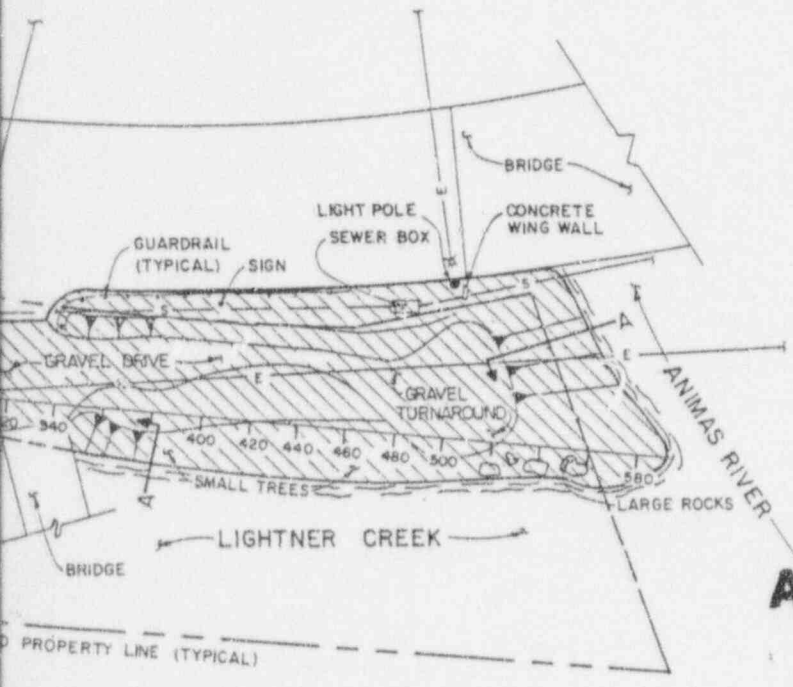
10. ALL GUARDRAILS ALONG U.S. HIGHWAY 160 IN THE EXCAVATION AREA MUST BE PROTECTED FROM DAMAGE BY THE SUBCONTRACTOR. SUBCONTRACTOR SHALL BE RESPONSIBLE FOR REPLACEMENT OF GUARDRAILS DAMAGED DURING REMEDIAL ACTION, AS DETERMINED BY CONTRACTOR'S REPRESENTATIVE.

0 20 40 80 120 FEET

SCALE



SECTION A
SLOPE RESTORATION (TYPICAL)
(NOT TO SCALE)



LEGEND

——W——	WATER LI
——G——	GAS LINE
——GM——	GAS MAIN
——S——	SEWER LI
——SM——	SEWER MA
——STM——	STORM SE R
——E——	ELECTRICA INE
——T——	TELEPHON INE
——TV——	CABLE TV
—— — — ——	PROPERTY INE
—X—X—X—X—	FENCE LI
⊕G,W or E	METER
⊗G or W	VALVE
o	PROPERTY IN
●	POWER P

OVERHEAD SERVICE DENOTED BY SC LINE
UNDERGROUND SERVICE DENOTED BY DASH INE

NOTES:

1. THE LATEST REVISION OF THE FO WING TECHNICAL SPECIFICATIONS APPI O THE REMEDIAL ACTION WORK REQUIRED R PROPERTY NO. DU-616

   SECTION 02050
   DEMOLITION

   SECTION 02110
   CLEARING AND GRUBBING

   SECTION 02130
   CONTAMINATED MATERIAL R VAL

   SECTION 02200
   EXCAVATION AND BACKFILL

   SECTION 02480
   LANDSCAPING

2. UTILITY LOCATIONS ARE FOR REF NCE ONLY. SUBCONTRACTOR SHALL BE SOLELY SPONSIBLE FOR THE ACTUAL LOCATION OF UT TIES PRIOR TO START OF CONSTRUCTION.

3. THE EXCAVATION LIMITS AND DE ARE BASED ON A LIMITED NUMBER OF RINGS TAKEN DURING THE RADIOLOGICAL RVEYS OF THIS PROPERTY. ADDITIONAL RADIOLOGICAL SURVEYS PERFORM DURING REMEDIAL ACTION MAY REQUIRE E OR LESS EXCAVATION TO BE TAKEN M THE DESIGNATED AREAS. ALL CHANGE TO THE LIMITS AND DEPTHS OF EXCAVATI AS SHOWN ON THE DESIGN DRAWINGS ALL BE AS DIRECTED BY THE CONTRACTO REPRESENTATIVE.

4. EXCAVATE THE FOLLOWING AREAS THE LIMITS INDICATED ON THIS DRA

   AREA "A" TO A DEPTH OF 1'-
   AREA "C" TO A DEPTH OF 6"

9707090114-04

U. S. DEPARTMENT OF ENERGY
ALBUQUERQUE, NEW MEXICO

DESIGNED	DRAWN
SM	S.M.
CHECKED	
REVIEWED	
RECOMMENDED	

EXCAVATION AND RESTORATION PLAN
DU-616
DURANGO, COLORADO
URANIUM MILL TAILINGS REMEDIAL ACTION PROJECT

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

MK-FERGUSON
A MORRISON KNUDSEN COMPANY

PROJECT NO. DE-AC04-83AL18796
DRAWING NO. DU-616-020 REV. A

NO.	DATE	REVISIONS	DRAWN BY	CHECKED BY	APPRVL LDE	APPRVL DH	PROJ ENG	APPRVL DOE
A	12/19/97	FINAL REA SUBMITTAL	CRW		SM			

APPENDIX A

RADIOLOGICAL SURVEY DATA

DU-616

Survey Notes

Introduction

This property is a backfilled abuttment to Highway 160 owned by the Colorado Dept. of Health and the Colorado Dept. of Highways. There are two mobile homes located on the graded, graveled west side of the property. The rest of the property is natural terrain covered with sage brush, scrub trees, and some large boulders. The southside of the property is bordered by Lightner Creek with an access bridge crossing the creek to the processing site.

Exterior Gamma Survey

A complete gamma scan of the property was performed where several areas showed anomalous readings. Because of the proximity to the tailings and the nature of the subsurface contamination, an open probe correlation was difficult to ascertain.

Subsurface Investigation

Test pits, boreholes, and soil samples support the presence of contamination at various levels throughout the property. Subsurface investigation at the edge of the creek was made impossible due to either the steep slope or the presence of large boulders. Borehole readings and samples indicated that further investigation was needed to find depth of contamination. Seven test pits were dug at various locations on the property. Samples and readings in Test Pits #1-#4 indicate contamination at levels between 3 and 20 feet below curb level. Test Pits #5 and #6 showed no elevated readings, whereas readings in Test Pit #7 show elevated readings 3 feet at the east end and 5 feet at the west end. Open probe readings were taken at the west end of the property, (backfilled and graveled area) where gamma readings were elevated because of the proximity to the tailings pile.

Spillover

Surface contamination runs over in the S.W. corner of the property. The approximate surface contamination is 200 square feet, as defined by soil sample and gamma scan. It appears to be windblown and does not extend deeper than 6 inches.

Derek Workman
4/25/89

BARRINGER LABORATORIES INC.

15000 W. 6TH AVE. SUITE 300
GOLDEN, COLORADO 80401
PHONE (303) 277 1687

1455 DEMING WAY, SUITE 15
SPARKS, NEVADA 89431
PHONE (702) 358 1168

MK-Ferguson
P.O. Box 9136
Albuquerque, NM 87119

ATTN: Helene Langlois

Client No. Durango Log No. 9619 Client PO No. 3050-511-9659, Req. #468

Sample Type: soil

Date Collected: 2/23/89 Date Received: 2/27/89 Date Reported: 4/4/89

RESULTS OF ANALYSIS

Sample Identification	Ra-226 pCi/gram ±Precision*	Th-230 pCi/gram ±Precision*	Uranium ug/gram
DU-SS-12654 LC #1	1.2 ± 0.6	1.2 ± 0.5	1.4
DU-SS-12655 LC #2	5.3 ± 1.1	5.1 ± 0.9	5.8
DU-SS-12656 LC #3	5.6 ± 1.2	6.7 ± 1.1	4.1
DU-SS-12657 LC #4	15 ± 2	17 ± 2	22.3
DU-SS-12658 LC #5	2.5 ± 0.9	3.1 ± 0.7	2.8
DU-SS-12659 LC #6	160 ± 10	190 ± 10	105
DU-SS-12660 LC #7	23 ± 3	34 ± 2	17.1
DU-SS-12661 LC #8	5.5 ± 1.2	6.5 ± 1.0	9.3
DU-SS-12662 LC #9	16 ± 2	29 ± 2	16.9

* Variability of the radioactive disintegration process (counting error) at the 95% confidence level, 2σ

Approved by Susan K Barbey

15000 W. 6th Avenue
Suite 300
Golden, CO 80401
(303) 277-1687

MK-Ferguson
P.O. Box 9136
Albuquerque, NM 87119

ATTN: Helene Langlois

LGN: 9619

QUALITY CONTROL DATA SHEET

Time Received: 9:30 Date: 2/27/89 By: Gina Reichert Via: UPS

Sample Container Type: can
Sample Type: soil

Preservative When Received: None

Additional Lab Preparation: 100 mesh

Parameter	Reference	LLD	Preservative	Analyst	Date(s) of Analysis
Radium 226	4,7	0.2 pCi/g	none	M. Howard	3/1-3/8/89
Thorium 230	11	0.2 pCi/g	none	J. Ortiz	3/17-3/22/89
Uranium	10,15	0.3 ug/g	none	B. Tonning	3/7-3/13/89

DUPLICATES

Sample Identification	Parameter	Result	Result	Relative Deviation From Mean
DU-SS-12661 LC #8	Radium 226	5.1 ± 1.1	5.9 ± 1.2	7.8%
DU-SS-12662 LC #9	Radium 226	17 ± 2	16 ± 2	3.0%
DU-SS-12662 LC #9	Thorium 230	29 ± 2	29 ± 2	0.0%
DU-SS-12662 LC #9	Uranium	17.1	16.6	1.5%

QUALITY CONTROL STANDARDS

Parameter	Result	Certified Result	Acceptable Target Range	Relative Deviation From Known
Radium 226	569 ± 26	604	574 - 634	5.8%
Thorium 230	285 ± 22	267	254 - 280	6.7%
Uranium	32	34	32 - 36	5.9%

Approved by Susan K Barkley

MK-FERGUSON COMPANY
A [illegible] COMPANY

LABORATORY SERVICES AUTHORIZATION FORM

R. FOSTER — Requisitioner
02 / 24 / 89 — Date

3/24/89 — Need Date
__ URGENT
__ Priority X Standard

DURANGO — Location
3050-511-9657 — P.O. No.
468 — Request No.

ATTENTION LABORATORY: ALL reports and invoices must reference P.O. and Request No.

Type of Sample: __ Water X Soil __ Air Particulate __ Urine __ Fecal __ Vegetation

Type of Analysis: X Ra-226 X Th-230 X Nat.U __ Gross Alpha __ Gross Beta __ Solubility __ Other (Specify under Special Instructions)

Special Instructions/Comments: _____

I.D. No.	Date Collected	Description	Volume
DU-SS-12654 LC#1	02 / 23 / 89	1990 cpm	523.2 g
DU-SS-12655 LC#2	02 / 23 / 89	2340 cpm	661.7 g
DU-SS-12656 LC#3	02 / 23 / 89	2760 cpm	602.5 g
DU-SS-12657 ~~LC#3~~ LC#4 (MP 2-24-89)	02 / 23 / 89	3630 cpm	578.5 g
DU-SS-12658 LC#5	02 / 23 / 89	2371 cpm Δ601	567.5 g
DU-SS-12659 LC#6	02 / 23 / 89	16639 cpm Δ7107	553.5 g
DU-SS-12660 LC#7	02 / 23 / 89	8645 cpm Δ2217	482.9 g
DU-SS-12661 LC#8	02 / 23 / 89	8760 cpm Δ865	520.0

MK-F USE ONLY

Mark O. Thomson
MK-F SITE MANGER

Bill Kelley
HEALTH PHYSICS SITE MANAGER

Shipping: 2 / 24 / 89 (Date Out) — Initials

Receiving: __ / __ / __ (Date In) — Initials

Technical Review: _____ __ / __ / __ (Date)

Ship to: Barringer Laboratories, Inc.
15000 West 6th Avenue
Suite 300
Golden, CO 80401

Copy to: Project Office
EDV Manager

(\DW4\FORMS\LAF-1)

MK-FERGUSON COMPANY
A MORRISON KNUDSEN COMPANY

LABORATORY SERVICES AUTHORIZATION FORM (CONTINUATION PAGE)

I.D. No.	Date Collected	Description	Volume
BU-SS-12662 LC#9	02 / 23 / 89	3508 cplm Δ 836	5635
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(\DW4\FORMS\LAF)

OUTDOOR GAMMA SCREENING
SURVEY DATA SHEET

LOGGING CREW: Ron Jacobs, Terry Herman
Jim Smith, Dave Reyer

SHEET _____ OF _____ PAGE 1

DATE: 3-28-89

PROPERTY ID: 1011-616

INSTRUMENT ID NO.: Ludl 2220 * 31975 / 44-10 * 019838

BACKGROUND CALCULATION:

#1 _____ + #2 _____ + #3 _____ = _____ ÷ 3 = _____ COUNTS/.1MIN

AREA: Contact		AREA: 1 meter		AREA:		AREA:	
POINT ID	READING COUNTS/.1MIN	POINT ID	READING COUNTS/.1MIN	POINT ID	READING COUNTS/.1MIN	POINT ID	READING COUNTS/.1MIN
#1 3+85.34L	2815 mR/hr 23.9		2842 mR/hr 24.1				
#2 4+80.36L	2385 20.8		2537 22.3				
#3 5+40.00R	2781 21.9		2675 23.1				
#4 3+40.30R	2158 20.0		2051 19.4				
#5 2+22.25R	3211 26.3		3130 25.8				
#6 1+50.06R	2609 22.7		2607 22.7				
#7 0+30.06R	3120 25.7		3391 27.3				
#8 0+30.20L	2723 23.4		2925 24.5				
#9 0+90.75L	2757 23.6		3106 25.6				
#10 2+10.54L	2718 23.3		2986 24.9				

REMARKS: _____

VP C4A

PIN-FERGUSON/CHEM-NUCLEAR
OPPOSED CRYSTAL SYSTEM RECORD

SITE NAME Durango
SITE AREA

OCS #B: 984369
OCS #A: 285411
OCS SERIAL NO. #S: 285403

COUNT DATE INITIAL / 20 DAY	SAMPLE NUMBER	SAMPLE LOCATION	DATE SAMPLED	DATE SEALED	OCS# INITIAL / 20 DAY	FUNCTION NO. INITIAL / 20 DAY	MASS WET / DRY	Ra 226 INITIAL / 20 DAY	QC SAMPLE	LABORATORY RESULT Ra 226	LABORATORY RESULT Th 230	DEPTH <15 cm / >15 cm	TECH INITIAL / 20 DAY	REMARKS
2-23-89 / 2-21-89	DU-SS-12654	616-LC-1	2-23		3 / 3	3.45 E02 / 393 E02	5804 / 5802	<MDA / <MDA				✓	RF	Rivers Edge Avg cptm 490 sent dried/counted/ Burn
2-23-89 / 2-24-89	DU-SS-12655	616-LC-2	2-23		4 / 4	216 E03 / 1.89 E03	294 / 286	294 / 286				✓	RF	dried/counted/sent to burn Lightner Creek 2240 cptm
2-23-89 / 2-24-89	DU-SS-12656	616-LC-3	2-23		3 / 3	2.12 E03 / 1.70 E03	6875 / 6225	308 / 282				✓	RF	NE Corner dried Bridge Area cated Sent to 2760 Burn
2-23-89 / 2-24-89	DU-SS-12657	616-LC-4	2-23		4 / 4	490 E03 / 371 E03	6175 / 5785	7.94 / 6.41				✓	RF	~ middle of dirt road east side of bridge dried/counted 3630 cptm
2-23-89 / 2-24-89	DU-SS-12658	616-LC-5	2-23-89		3 / 3	1.16 E03 / 9.40 E02	6220 / 5675	1.86 / 1.66				✓	RF	2371 cptm 4601
2-23-89 / 2-24-89	DU-SS-12659	616-LC-6	2-23-89		3 / 3	5.31 E04 / 5.44 E04	1640.5 / 553.5	82.9 / 98.3				✓	RF	16,639 cptm, Δ 707 dried/counted sent to Burn
2-23-89 / 2-24-89	DU-SS-12660	616-LC-7	2-23-89		4 / 4	4.62 E03 / 4.65 E03	549.1 / 489	8.41 / 9.63				✓	RF	5645 cptm - Δ 2217 dried/counted sent to Burn
2-23-89 / 2-24-89	DU-SS-12661	616-LC-8	2-23-89		3 / 3	1.90 E03 / 1.61 E03	595.8 / 500	3.19 / 3.10				✓	RF	3760 cptm Δ 865 dried/counted sent to Burn
2-23-89 / 2-24-89	DU-SS-12662	616-LC-9	2-23-89		3 / 3	4.76 E03 / 4.19 E03	6260 / 5635	7.60 / 7.44				✓	RF	3508 cptm counted Δ 806 dried sent to Burn
3-03-89	DU-SS-12704	616-LC-10	3-03-89		3	1.92 E03	2511	2.63				✓	RF	2+35, 15L 5446 cptm Th230 1.40
3-03-89	DU-SS-12705	616-LC-11	3-03-89		3	1.13 E03	2245	1.56				✓	RF	2+50, 15L 3153 cptm
3-03-89	DU-SS-12706	616-LC-12	3-03-89		3	2.31 E03	4582	3.80				✓	RF	2+15, 02L 4544 cptm

NOTE: All soil sample results are in pCi/gm

Site Correction Factor = 1.31(x)+.749 (10/21/88)
Count Time = 500 sec. unless noted otherwise.

VP Correction Factor= 1.35(x)+.505 MDA-3pCi/g (2/3/88) = 1.98(x)-1.40 5-15pCi/g

REVIEWED BY

3+66 20L
3+36 31L
3+44 10L
B#1
1+90 34L
2+30 08L
0+60 15L
1+69 10L
2+33 09L
2+35 18L
2+50 15L
2+15 02L

SITE NAME Durango
SITE AREA

MK-FERGUSON/CHEM-NUCLEAR
OPPOSED CRYSTAL SYSTEM RECORD

OCS #3: 984369
OCS #4: 285411
OCS SERIAL NO. #5: 285403

COUNT DATE INITIAL	COUNT DATE 20 DAY	SAMPLE NUMBER	SAMPLE LOCATION	DATE SAMPLED	DATE SEALED	OCS# INITIAL	OCS# 20 DAY	FUNCTION NO. INITIAL	FUNCTION NO. 20 DAY	MASS WET	MASS DRY	Ra 226 INITIAL	Ra 226 20 DAY	QC SAMPLE	LABORATORY RESULT Ra 226	LABORATORY RESULT Th 230	DEPTH <15 cm	DEPTH >15 cm	TECH INITIAL	TECH 20 DAY	REMARKS
3-03-89		DU-SS-12707	616-LC-13	3-03-81		4		319E03		5804		5.56					✓		RF		0+85, 7L 3817 cptm
3-03-89		DU-SS12708	616-LC-14	3-03-89		4		3.44E03		6461		5.32					✓		RF		0+65, 36L 4910 cptm
3-03-89		DU-SS-12709	616-LC-15	3-03-89		4		1.28E03		6143		2.08					✓		RF		4+10, 05L 3190 cptm
3-03-89		DU-SS-12837	616-1	3-16-89		4		6.16E02		5886		1.03					✓		DJW		C=2437 cptm 5W3 1m 2743 cptm 08L Δ 993 cptm
3-16-89		DU-SS-12838	616-2	3-16-89		4		9.83E02		4905		2.00					✓		DJW		C=3227 cptm 4+51 1m 3109 cptm 05L Δ 578 cptm
3-16-89		DU-SS-12839	616-3	3-16-89		4		6.30E02		4263		1.34					✓		DJW		C=3168 cptm 4+20/08L 1m 2431 cptm Δ 511 cptm
3-16-89		DU-SS-12840	616-4	3-16-89		4		1.31E03		5905		2.72					✓		DJW		C=8331 cptm 4+50 1m 389 cptm 03L Δ 782 cptm
3-16-89		DU-SS-12841	616-5	3-16-89		4		1.02E03		5913.0		2.72					✓		DJW		C=3436 cptm 3+44 1m 2896 cptm 08L Δ 540 cptm
3-16-89		DU-SS-12842	616-6	3-16-89		4		8.36E02		5906		1.64					✓		DJW		C=2842 cptm 4+20 1m 2346 cptm 81L Δ 613 cptm
3-16-89		DU-SS-12843	616-7	3-16-89		4		6.83E02		4884		1.41					✓		DJW		C=2537 cptm 4+50 1m 2459 cptm 36L Δ=678 cptm
3-16-89		DU-SS-12853	616-8	3-16-89		4		6.17E02		4850		1.22					✓		DJW		2+33 16L C=5357 1m 3817 cptm Δ 178
3-16-89		DU-SS-12854	616-9	3-16-89		4		3.37E03		4313		7.81					✓		DJW		2+20/08L C=4234 1m 4072 cptm Δ 110

NOTE: All soil sample results are in pCi/gm

Site Correction Factor = 1.31(x)+.749 (10/21/88)
Count Time = 500 sec, unless noted otherwise.

VP Correction Factor= 1.35(x)+.505 MDA-5pCi/g
(2/3/88) = 1.98(x)-1.40 5-15pCi/g

REVIEWED BY

MK-FERGUSON/CHEM-NUCLEAR

OPPOSED CRYSTAL SYSTEM RECORD

SITE NAME Durango

SITE AREA

OCS #3: 984369
OCS #4: 285411
OCS SERIAL NO. #5: 285403

COUNT DATE INITIAL / 20 DAY	SAMPLE NUMBER	SAMPLE LOCATION	DATE SAMPLED	DATE SEALED	OCS# INITIAL / 20 DAY	FUNCTION NO. INITIAL / 20 DAY	MASS WET / DRY	Ra 226 INITIAL / 20 DAY	QC SAMPLE	LABORATORY RESULT Ra 226	LABORATORY RESULT Th 230	DEPTH <15 cm / >15 cm	TECH INITIAL / 20 DAY	REMARKS
3-16-89	DU-SS-12855	616-10	3-16-89		4	3.88 E02	541.2	Lmdl				✓	DJW	1497/07L C=3267 1m3431 cptm Δ916
3-16-89	DU-SS-12856	616-11	3-16-89		4	1.21 E03	470.0	257				✓	DJW	1148 /08L C=3093 1m3261 cptm Δ=835
3-16-89	DU-SS-12857	616-12	3-16-89		4	4.06 E04	5225	Lmdl				✓	DJW	1tdo, 08L C=2644 1m2994 cptm Δ 495
3-16-89	DU-SS-12858	616-13	3-16-89		4	1.91 E03	4076	4.76				✓	DJW	0+54/07L C 4061 1m3187 cptm Δ 1095
3-16-89	DU-SS-12859	616-14	3-16-89		4	4.72 E03	7430	120				✓	DJW	0+51 C=6145 1m5187 cptm Δ 1204
3-17-89	DU-SS-12860	616-15	3-16-89		4	7.85 E03	4916	178				✓ ✓	DJW	0+54,14L C=6186 cptm Δ=1849
3-17-89	DU-SS-12861	616-16	3-16-89		4	4.12 E04	3924	193				✓	DJW	0+36,08L C 17710 1m 6445 cptm Δ 8957
3-17-89	DU-SS-12862	616-17	3-16-89		4	1.17 E03	4986	256				✓	DJW	0+36/03R C 4118 1m 4044 cptm Δ 1015
3-17-89	DU-SS-12863	616-18	3-16-89		4	1.24 E03	4484	279				✓	DJW	-0+10/35R C=3370 1m4067 cptm Δ 918
3-17-89	DU-SS-12864	616-19	3-16-89		4	1.68 E03	4765	352				✓	DJW	C=3124 cptm 1m2948 Δ 876
3-17-89	DU-SS-12865	616-20	3-16-89		4	4.15 E03	4991	831				✓	DJW	C=4440 cptm 1m 3905 Δ 1219
[illegible]	[illegible]	[illegible]	[illegible]		3	8.20 E03	3886	1.1				✓	DJW	10 End Sum 9904 cptm 5840 cptm

NOTE: All soil sample results are in pCi/gm

REVIEWED BY

Site Correction Factor = 1.31(x)+.749 (10/21/88)
Count Time = 500 sec, unless noted otherwise.

VP Correction Factor= 1.35(x)+.505 MDA-5pCi/g
(2/3/88) = 1.98(x)-1.40 5-15pCi/g

SITE NAME Durango
SITE AREA

MK-FERGUSON/CHEM-NUCLEAR
OPPOSED CRYSTAL SYSTEM RECORD

OCS #3: 984369
OCS #4: 285411
OCS SERIAL NO. #5: 285403

COUNT DATE INITIAL / 20 DAY	SAMPLE NUMBER	SAMPLE LOCATION	DATE SAMPLED	DATE SEALED	OCS# INITIAL / 20 DAY	FUNCTION NO. INITIAL / 20 DAY	MASS WET / DRY	Ra 226 INITIAL / 20 DAY	QC SAMPLE	LABORATORY RESULT Ra 226	LABORATORY RESULT Th 230	DEPTH <15 cm / >15 cm	TECH INITIAL / 20 DAY	REMARKS
3-28-89	DU-SS-129155	616-A-2	3-27-89		3	8.82E03	4991	18.0					DJW	4+29/17L BH #8 Δ680cptm /2881cptm
3-27-89	DU-SS-129156	616-A-3	3-27-89		3	3.16E03	3713	9.0						
3-27-89	DU-SS-129157	616-A-4	3-27-89		3	3.55E03	3[illegible]	1.01						
3-27-89	DU-SS-129158	616-A-5	3-27-89		3	1.63E03	3470	[illegible]						
3-27-89	DU-SS-129159	616 #21	3-27-89		3	2.88E03	6021	4.51					DJW	4+28/17L BH #8 Δ680cptm /2881cptm
3-27-89	DU-SS-129160	616-22	3-27-89		3	3.02E03	6244	4.84					DJW	3+44/07L Δ985 cptm c3470 1m 3035
3-27-89	DU-SS-129161	616-23	3-27-89		3	4.82E03	6381	7.55					DJW	3+44/05R Δ973 cptm c3479 1m 2831
3-27-89	DU-SS-129162	616 #24	3-27-89		3	8.56E03	6506	1.32					DJW	2+34/38L Δ758 cptm c2913 1m 3185
3-27-89	DU-SS-129163	616-25	3-27-89		3	1.09E3	6886	1.63					DJW	2+57/17L Δ786 BH #12 c3006 cptm 1m 3495
3-27-89	DU-SS-129164	616-26	3-27-89		3	1.35E3	5771	2.39					DJW	2+29/22L Δ933 BH #15 c3747 cptm 1m 3498
3-28-89	DU-SS-129165	616-27	3-27-89		3	2.84E3	5596	5.08					DJW	1+28,41L 36"-0" 6788 cptm BH #22
3-28-89	DU-SS-129166	616 #28	3-28-89		3	3.64E4	6468	563					DJW	2+13/04L 0"-18" BH26 23.071cptm

NOTE: All soil sample results are in pCi/gm

REVIEWED BY _____

Site Correction Factor = 1.31(x)+.749 (10/21/88)
Count Time = 500 sec, unless noted otherwise.

VP Correction Factor= 1.35(x)+.505 MDA-5pC1/g
(2/3/88) = 1.98(x)-1.40 5-15pC1/g

SITE NAME Durango
SITE AREA

MK-FERGUSON/CHEM-NUCLEAR
OPPOSED CRYSTAL SYSTEM RECORD

OCS #3: 984369
OCS #4: 285411
OCS SERIAL NO. #5: 285403

COUNT DATE INITIAL / 20 DAY	SAMPLE NUMBER	SAMPLE LOCATION	DATE SAMPLED	DATE SEALED	OCS# INITIAL / 20 DAY	FUNCTION NO. INITIAL / 20 DAY	MASS WET / DRY	Ra 226 INITIAL / 20 DAY	QC SAMPLE	LABORATORY RESULT Ra 226	LABORATORY RESULT Th 230	DEPTH <15 cm	DEPTH >15 cm	TECH INITIAL / 20 DAY	REMARKS
3-28-89	DU-SS-12970	6116 "29	3-28-89		3	7.24E2	672.8	1 MDA				✓		DJW	uR/hr 1 c2815 cptm 1m 2842
3-28-89	DU-SS-12971	6116 "30	3-28-89		3	7.27E2	589.1	1.23				✓		DJW	uR/hr #4 C2158 cptm 1m 2051
3-28-89	DU-SS-12972	6116-31	3-28-89		3	8.09E2	585.0	1.38				✓		DJW	uR/hr #7 C3100 cptm 1m 3391
3-28-89	DU-SS-12973	6116-32	3-28-89		3	3.64E02	572.6	1 MDA				✓		DJW	uR/hr #9 C2757 cptm 1m 3106
3-29-89	DU-SS-12977	6116-33	3-29-89		3	7.99E2	509.5	1.57				✓		DJW	#33 4+35/17L
3-29-89	DU-SS-12979	6116-34	3-29-89		3	7.91E2	587.2	1.35				✓		DJW	#34 5+11/29L
3-30-89	DU-SS-12985	6116-35	3-29-89		3	8.10E02	1685.5	1.16				✓		RE	5+39,14R
4-11-89	DU-SS-13163	6116-36	4-11-89		3	7.84E2	529.1	1.48				✓		DJW	Δ543 cptm op 2834
4-12-89	DU-SS-13183	6116-37	4-12-89		3	1.50E03	415.7	3.61				✓		KM	BH. #53 Δ786 op 3105 cptm
4-14-89	DU-SS-13209	6116-38	4-14-89		3	2.05E03	1672	2.94						KM	BH. #60 Δ725 op 2600 3491 cptm
4-14-89	DU-SS-13207	6116-39	4-14-89		3	2.07E3	1684	3.09				✓		KM	0+32/15L
4-14-89	DU-SS-13210	6116-40	4-14-89		4	9.26E03	567.1	1.653				✓		KM	Δ1455 cptm op 6316 18' deep

NOTE: All soil sample results are in pCi/gm

REVIEWED BY

Site Correction Factor = 1.31(x)+.749 (10/21/88)
Count Time = 500 sec, unless noted otherwise.

VP Correction Factor= 1.35(x)+.505 MDA-5pC1/g
(2/3/88) = 1.98(x)-1.40 5-15pC1/g

PR-FERGUSON/CHEM-NUCLEAR

OPPOSED CRYSTAL SYSTEM RECORD

SITE NAME Durango

SITE AREA

OCS #3: 984369
OCS #4: 285411
OCS SERIAL NO. #5: 285403

COUNT DATE INITIAL / 20 DAY	SAMPLE NUMBER	SAMPLE LOCATION	DATE SAMPLED	DATE SEALED	OCS# INITIAL / 20 DAY	FUNCTION NO. INITIAL / 20 DAY	MASS WET / DRY	Ra 226 INITIAL / 20 DAY	QC SAMPLE	LABORATORY RESULT Ra 226	LABORATORY RESULT Th 230	DEPTH <15 cm	DEPTH >15 cm	TECH INITIAL / 20 DAY	REMARKS
4-14-89	DU-SS-13208	6116-41	4-14-84		4	1.48E4	6317	23.43						KM	U+32/15L TP#1 Δ1178 20'Below Curb OP7103 Height OPTM
4-14-89	DU-SS-13216	6116-42	4-14-89		4	4.32E3	6503	6.68					✓	BG	Δ 2280 cptm OP 8943 cptm 12' deep MEAN
4-14-89	DU-SS-13217	6116-43	4-14-89		5	1.05E4	7067	14.86					✓	BG	Δ 1787 cptm TP#2 OP 7358 cptm 20' deep middle
4-14-89	DU-SS-13215	6116-44	4-14-84		3	4.60E4	7421	6.23					✓	BG	Δ 2976 cptm TP#2 OP 8205 cptm 20' deep S End
4-17-89	DU-SS13220	6116-45	4-17-89		3	7.83E02	4759	1.65					✓	KM	3655 cptm OP TP#4
4-17-89	DU-SS-13221	6116-46	4-17-89		4	5.99E03	5064	11.83					✓	KM	OP 5504 cptm
4-17-89	DU-SS-13226	6116-47	4-17-89		3	6.99E02	719.5	0.922					✓	KM	TP #5 wet - Soil B.G. lt. - 1000cpm at 3437cptm 7'deep
4-19-89	DU-SS-13255	6116-48	4-19-89		3	7.84 E03	522.8	14.99					✓	RF	~~1558~~ / ~~224~~ OPM 4-24-89 -1+38 / 35R
4-19-89	DU-SS13256	6116-49	4-1984		3	4.90E03	501	9.78					✓	RF	~~-0+35 / 32R~~ -55/38R OPM 4-24-89
4-20-89	DU-SS 13260	6116-50	4-19-84		3	3.80E03	426.5	8.91					✓		3424 OP cptm 900 Δ with Static Not Shed
4-20-89	DU-SS-13268	6116-51	4-19-89		3	1.12 E03	483	2.32					✓		2872 OP 22' WOF Δ 600 SW corner cptm Blue tape
4-20-84	DU-SS-13264	6116-52	4-19-89		4	1.45E02	495	1.31					✓		2355 OP 61' NNW 290 Δ of Red/Blk W end of prop

NOTE: All soil sample results are in pCi/gm

Site Correction Factor = 1.31(x)+.749 (10/21/88)
Count Time = 500 sec, unless noted otherwise.

VP Correction Factor = 1.35(x)+.505 MDA-5pCi/g (2/3/88) = 1.98(x)-1.40 5-15pCi/g

REVIEWED BY

MR-FERGUSON/CHEM-NUCLEAR

OPPOSED CRYSTAL SYSTEM RECORD

SITE NAME Durango

SITE AREA _____

OCS #3: 984369

OCS #4: 285411

OCS SERIAL NO. #5: 285403

COUNT DATE INITIAL / 20 DAY	SAMPLE NUMBER	SAMPLE LOCATION	DATE SAMPLED	DATE SEALED	OCS# INITIAL / 20 DAY	FUNCTION NO. INITIAL / 20 DAY	MASS WET / DRY	Ra 226 INITIAL / 20 DAY	QC SAMPLE	LABORATORY RESULT Ra 226	LABORATORY RESULT Th 230	DEPTH <15 cm / >15 cm	TECH INITIAL / 20 DAY	REMARKS
4-20-89	DU-SS-13265	6116-53	4-19-89		3	2.46 E03	4765	5.16				✓		2704 cp 32 min 670 Δ of Rad Ft 25731m RE of area
4-20-89	DU-SS-13266	6116-54	4-19-89		3	1.52 E3	4805	3.16				✓		4059 cp 32 Eq 835 Δ utility 38781m pole
4-20-89	DU-SS-13267	6116-55	4-19-89		4	1.32 E3	7704	3.38				✓		3621 cp 143 cf 765 Δ utility 3144 lm pole
4-20-89	DU-SS-13270	6116-56	4-20-89		3	1.16 E03	454.3	2.52				✓	KM	2816 cp cpm 651 Δ 1m 3727
4-20-89	DU-SS-13271	6116-57	4-20-89		3	1.87 E03	3103	6.03				✓	KM	3051 cpm 85 Δ 2710 lm
4-20-89	DU-SS-13272	6116-58	4-20-89		3	1.38 E03	3995	3.45				✓	RF	2936 cp -1.39 750 Δ 30R 2833 lm
4-20-89	DU-SS-13273	6116-59	4-20-89		3	202 E03	460	4.34				✓	KM	651 Δ cpm 2764 cp 2803 lm
4-20-89	DU-SS-13274	6116-60	4-20-89		5	2.97 E03	4975	5.97				✓	KM	3432 cp cpm 975 Δ 45 lm
4-20-89	DU-SS-13275	6116-61	4-20-89		4	8.54 E02	4722	1.81				✓	KM	2708 cp 534 Δ cpm 2508 lm cpm

NOTE: All soil sample results are in pCi/gm

REVIEWED BY _____

Site Correction Factor = 1.31(x)+.749 (10/21/88)

Count Time = 500 sec, unless noted otherwise.

VP Correction Factor= 1.35(x)+.505 MDA-5pCi/g (2/3/88) = 1.98(x)-1.40 5-15pCi/g

KNUDSEN

PROPERTY SURVEY SKETCH

Sheet _____ of _____

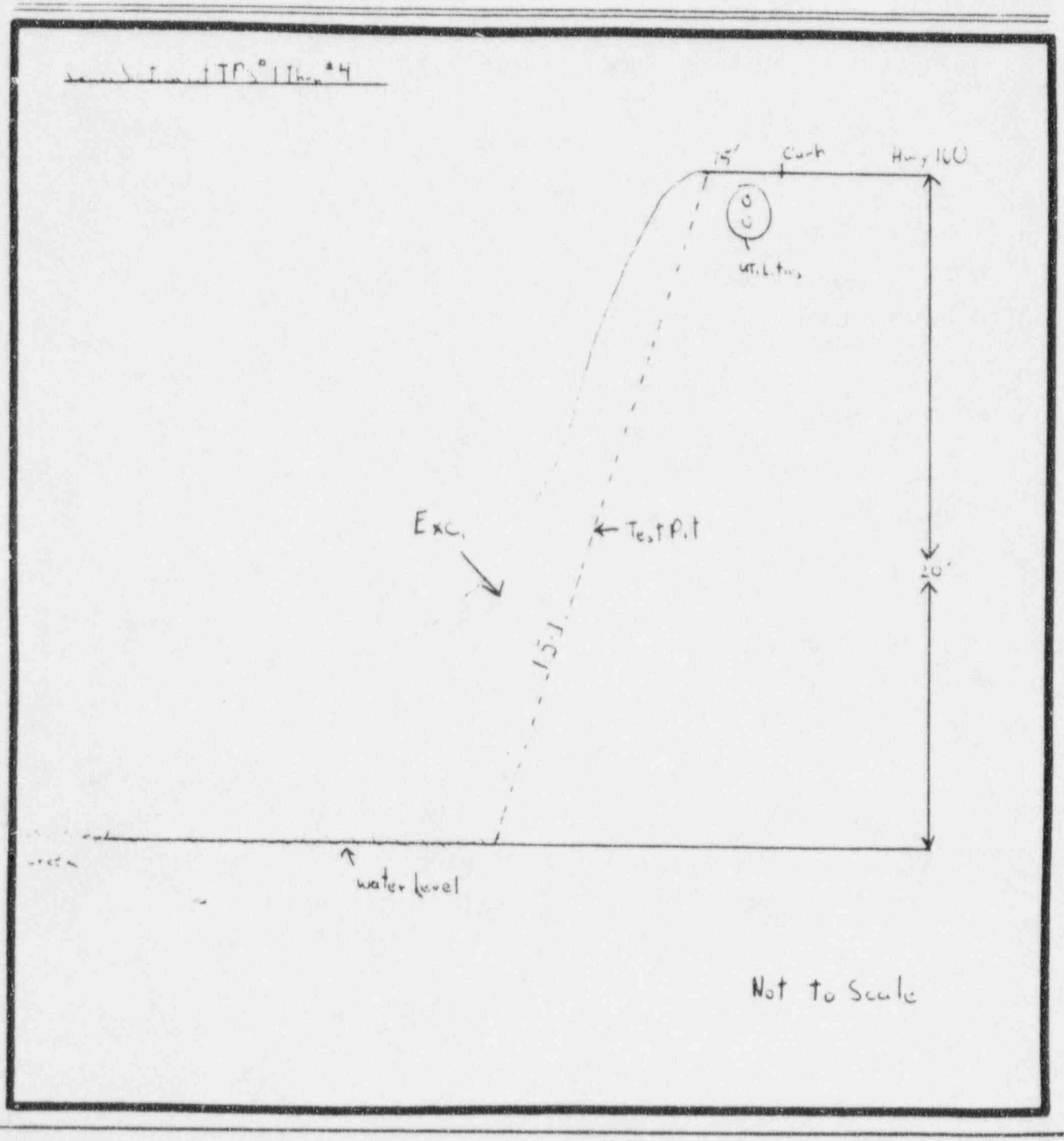
SITE LOCATION Cr-616

ADDRESS Cranmore Hwy 160

PROPERTY TYPE Backfilled abutment to Hwy. LOT NO. _____

OWNER CDH * CC JH.

SKETCH COMPLETED BY Derek J. Workman DATE 4-25-89



Test Pit Samples

MK-FERGUSON/CHEM-NUCLEAR
OPPOSED CRYSTAL SYSTEM RECORD

SITE NAME Durango
SITE AREA 04-616

OCS #3: 984369
OCS #4: 285411
OCS SERIAL NO. #5: 285403

COUNT DATE INITIAL / 20 DAY	SAMPLE NUMBER	SAMPLE LOCATION	DATE SAMPLED	DATE SEALED	OCS# INITIAL / 20 DAY	FUNCTION NO. INITIAL / 20 DAY	MASS WET / DRY	Ra 226 INITIAL / 20 DAY	QC SAMPLE	LABORATORY RESULT Ra 226	LABORATORY RESULT Th 230	DEPTH <15 cm / >15 cm	TECH INITIAL / 20 DAY	REMARKS
4-14-89	DU-SS-13207	616-39	4-14-89		3	2.07E3	668.4	2.09				✓	KM	0+32/15L Δ850 OP 3632 TP=1 cpm
4-14-89	DU-SS-13210	616-40	4-14-89		4	7.46E3	367.1	16.5				✓	KM	0+32/15L Δ455 TP=1 OP 6326 18' below curb height cpm
4-14-89	DU-SS-13208	616-41	4-14-89		4	1.48E4	631.7	23.4				✓	KM	0+32/15L TP=1 Δ1778 20' Below curb height OP 7103 cpm
4-14-89	DU-SS-13216	616-42	4-14-89		4	4.32E3	650.3	6.64				✓	BG	0+72/45L TP=2 Δ2280 cpm 17' Below curb height OP 8443 NEXT
4-14-89	DU-SS-13217	616-43	4-14-89		5	1.04E4	706.7	14.9				✓	BG	0+72/45L TP=2 Δ1782 cpm 20' Below curb height OP 7358
4-14-89	DU-SS-13215	616-44	4-14-89		3	1.62E4	742.1	62.3				✓	BG	0+72/5R TP=2 Δ2476 cpm 20' Below curb height OP 8205 SEND
4-17-89	DU-SS-13220	616-45	4-17-89		3	7.33E3	475.9	1.65				✓	KM	4+28/15L TP=4 OP 3655 cpm 18' Below curb height
4-17-89	DU-SS-13221	616-46	4-17-89		4	5.99E3	504.7	11.8				✓	KM	4+28/2R TP=4 OP 3509 cpm 5' Below curb height
4-17-89	DU-SS-13226	616-47	4-17-89		3	6.19E3	719.5	.972				✓	KM	4+00/18R TP=3 OP 2037 cpm 17' Below Curb

NOTE: All soil sample results are in pCi/gm

Site Correction Factor = 1.31(x)+.749 (10/21/88) VP Correction Factor= 1.35(x)+.505 MDA-5pCi/g
Count Time = 500 sec, unless noted otherwise

REVIEWED BY _____

0318

015-16

MK-FERGUSON/CHEM-NUCLEAR
OPPOSED CRYSTAL SYSTEM RECORD

SITE NAME Durango
SITE AREA DU-616

OCS #3: 984369
OCS #4: 285411
OCS SERIAL NO. #5: 285403

COUNT DATE INITIAL / 20 DAY	SAMPLE NUMBER	SAMPLE LOCATION	DATE SAMPLED	DATE SEALED	OCS# INITIAL / 20 DAY	FUNCTION NO. INITIAL / 20 DAY	MASS WET / DRY	Ra 226 INITIAL / 20 DAY	QC SAMPLE	LABORATORY RESULT Ra 226	LABORATORY RESULT Th 230	DEPTH <15 cm / >15 cm	TECH INITIAL / 20 DAY	REMARKS
5-1-89	DU-SS-13425	616-62	5-1-89		3	1.11E3	513.2	2.16				✓	JC	2491 OP -1451/472 Im·2421 CPTM
5-1-89	DU-SS-13426	616-63	5-1-89		3	8.76E2	465.2	1.88				✓	JC	OP2382 -1471/472 Im 2473

NOTE: All soil sample results are in pCi/gm

REVIEWED BY _____

Site Correction Factor = 1.31(x)+.749 (10/21/88)
Count Time = 500 sec, unless noted otherwise.

VP Correction Factor= 1.35(x)+.505 MDA-5pCi/g
(2/3/88) = 1.98(x)-1.40 5-15pCi/g

KNUDSEN

PROPERTY SURVEY COORDINATES

Sheet ____ of ____

SITE LOCATION DU-616

ADDRESS DURANGO, HWY 160

PROPERTY TYPE Back filled abutment to Hwy LOT NO. ____

OWNER C.O.H. & C.D.O.H.

SKETCH COMPLETED BY Derek J. Wakeman DATE 4-25-84

Test Pt #1	~~COORDINATES~~
Op. CPTM	Depth Below Grade
7103	20'
4371	18'
6326	16'
7783	15'
17441	13'
15178	11'
10304	9'

GAMMA SCAN BOUNDARY			
	COORDINATES	POINT	COORDINATES

VP 03A

KNUDSEN

PROPERTY SURVEY COORDINATES

Sheet _____ of _____

SITE LOCATION DU-616

ADDRESS DURANGO, Hwy 160

PROPERTY TYPE Backfilled abutment to Hwy LOT NO. _____

OWNER C.OH + C.D.OH

SKETCH COMPLETED BY Derek J. Waesman DATE 7-25-89

Test #2	COORDINATES
or CPTM 5450	Depth Below Curb 20'
14435	18'
10850	16'
4619	14'
4452	12'
3028	10'
2421	8'

GAMMA SCAN BOUNDARY			
	COORDINATES	POINT	COORDINATES

VP 03A

KNUDSEN

PROPERTY SURVEY COORDINATES

Sheet _____ of _____

SITE LOCATION DIA-6116

ADDRESS DURANGO, HWY 160

PROPERTY TYPE Backfilled abutment to Hwy LOT NO. _____

OWNER C.D.H - C.D.O.H.

SKETCH COMPLETED BY Derek J. Workman DATE 4-25-89

Test Pit #3	~~COORDINATES~~
or - CPTM 8370	Depth Below Curb NORTH END 20'
9870	18'
5940	16'
3413	14'
4786	12'
5360	South End 20'
18641	18'
9720	16'
9027	15'

GAMMA SCAN BOUNDARY			
	COORDINATES	POINT	COORDINATES

VP 33A

KNUDSEN

PROPERTY SURVEY COORDINATES

Sheet _____ of _____

SITE LOCATION DU-616

ADDRESS DURANGO, HWY 160

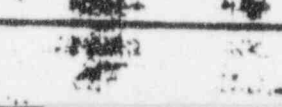
PROPERTY TYPE Backfilled abutment to Hwy LOT NO. _____

OWNER C.O.H. - C.D.O.H.

SKETCH COMPLETED BY Derek J. Workman DATE 4-25-89

Test P.T #4	~~COORDINATES~~
Or - CPTM	Depth Below Curb
1961	20'
3655	18'
3960	14'
5345	12'
5504	11'

GAMMA SCAN BOUNDARY			
	COORDINATES	POINT	COORDINATES



VP 33A

KNUDSEN

PROPERTY SURVEY COORDINATES

Sheet _____ of _____

SITE LOCATION DM-6116

ADDRESS DURANGO, HWY 160

PROPERTY TYPE Backfilled abutment to [illegible] LOT [illegible]

OWNER CDH + CDOH

SKETCH COMPLETED BY Derek J Workman DATE 4-25-89

Test Pit #5	~~COORDINATES~~
DP-CPTM 2037	Depth Below Curb 17'
2101	16'
2315	15'
2702	14'
2782	13'
2292	12'
2343	11'
2308	10'
2259	9'
2462	8'
2410	7'
2338	6'
2337	5'
2288	4'
2357	3'
2456	2'
2405	1'

[illegible] GAMMA BEAM BOUNDARY			
	COORDINATES	POINT	COORDINATES

VP-03A

KNUDSEN

PROPERTY SURVEY COORDINATES

Sheet ____ of ____

SITE LOCATION Du-Valle

ADDRESS DURANGO, HWY 160

PROPERTY TYPE Backfilled abutment to Hwy. 5 LOT NO. ____

OWNER CDH + CDOH

SKETCH COMPLETED BY Derek J. Workman DATE 4-25-89

Test Pit #6	COORDINATES
OP-CPTM 2319	Depth Below Grade 16'
2403	15'
2413	14'
2247	13'
2193	12'
2236	11'
2469	10'
2636	9'
2669	8'
2566	7'
2625	6'
2604	5'
2630	4'
2648	3'
2531	2'
2523	1'

GAMMA SCAN BOUNDARY			
	COORDINATES	POINT	COORDINATES

VP-03A

KNUDSEN

PROPERTY SURVEY COORDINATES

Sheet _____ of _____

SITE LOCATION Dgo-6116

ADDRESS DURANGO - HWY 160

PROPERTY TYPE Backfilled abutment to Hwy LOT NO. _____

OWNER CDH + C.D.O.H.

SKETCH COMPLETED BY Derek J. Workman DATE 4-25-89

Test Pit #7	~~COORDINATES~~
or - CPTM	Depth Below Grade E. End
2333	10'
2287	11'
2356	9'
2371	8'
3157	7'
2911	6'
2699	5'
2984	4'
3407	3'
3293	2'
3147	1'
2178	W. End 10'
2326	9'
2200	8'
2163	7'
2549	6'
4153	5'
2882	4'
2622	3'
2508	2'
2616	1'

GAMMA SCAN BOUNDARY			
	COORDINATES	POINT	COORDINATES

V1-33A

KNUDSEN

BOREHOLE LOG

LOGGING CREW: Ron Jacobs, Terry Herman
Jim Smith, Dave Beyer

SHEET _____ OF _____ PAGE 2

DATE: 3-27-89

PROPERTY ID: DU-616

INSTRUMENT ID NO. Lud 2220 #31975 / 44-10 #19878

AREA: _____

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

HOLE ID: #1 4+20,176 TIME DRILLED: _____ TIME LOGGED: _____ SOIL TYPE: _____		HOLE ID: #2 4+21,226 TIME DRILLED: _____ TIME LOGGED: _____ SOIL TYPE: _____		HOLE ID: #3 4+28,176 TIME DRILLED: _____ TIME LOGGED: _____ SOIL TYPE: _____		HOLE ID: #4 4+20, 116 TIME DRILLED: _____ TIME LOGGED: _____ SOIL TYPE: _____	
DEPTH	COUNTS/.1MIN	DEPTH	COUNTS/.1MIN	DEPTH	COUNTS/.1MIN	DEPTH	COUNTS/.1MIN
SURFACE	3403	SURFACE	2771	SURFACE	3181	SURFACE	2871
0"	3101	0"	2924	0"	3085	0"	2796
6"	3409	6"	2778	6"	3230	6"	2629
12"	3541	12"	2841	12"	3248	12"	2775
18"	3204	18"	27	18"	3161	18"	2838
24"		~~24~~ 21"	2704	24"		24"	2495
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: _____

VP-04B

KNUDSEN

BOREHOLE LOG

LOGGING CREW: Ron Jacobs, Terry Herman
Jim Smith, Dave Beyer

SHEET _____ OF _____ PAGE 3

DATE: 3-27-89

PROPERTY ID: 04-616

INSTRUMENT ID NO. L.L 2220* 31975 */44-10 *9878

AREA: _____

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

HOLE ID: *5 4+11,172 TIME DRILLED: TIME LOGGED: SOIL TYPE:		HOLE ID: *6 2+34,276 TIME DRILLED: TIME LOGGED: SOIL TYPE:		HOLE ID: *7 2+34,221 TIME DRILLED: TIME LOGGED: SOIL TYPE:		HOLE ID: *8 2+35,381 TIME DRILLED: TIME LOGGED: SOIL TYPE:	
DEPTH	COUNTS/.1MIN	DEPTH	COUNTS/.1MIN	DEPTH	COUNTS/.1MIN	DEPTH	COUNTS/.1MIN
SURFACE	2443	SURFACE	2903	SURFACE	3493	SURFACE	2913
0"	2366	0"	2926	0"	4043	0"	3001
6"	2355	6"	2671	6"	5114	6"	2510
12"	2317	12"	2998	12"	8593	12"	2631
18"	2229	18"	3115	18"	11533	18"	3095
24"	2212	24"	3854	24"	5341	24"	w.t.
30"	2218	30"	2982	30"	4300	30"	
36"		36"		36"	4454	36"	
42"		42"		42"	3108	42"	
48"		48"		48"	2284	48"	
54"		54"		54"	2235	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: _____

VP-04B

MORRISON KNUDSEN

BOREHOLE LOG

LOGGING CREW: Ron Jacobs, Terry Herman
Jim Smith, Dave Beyer

SHEET _____ OF _____ PAGE 4

DATE: 3-27-89

PROPERTY ID: D&S-Cell 6

INSTRUMENT ID NO. Lud 2220 31975 W/4420 #19878

AREA: _____

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

HOLE ID: #9 2+34,06L TIME DRILLED: _____ TIME LOGGED: _____ SOIL TYPE: _____		HOLE ID: #10 2+33,03R TIME DRILLED: _____ TIME LOGGED: _____ SOIL TYPE: _____		HOLE ID: #11 2+49,20L TIME DRILLED: _____ TIME LOGGED: _____ SOIL TYPE: _____		HOLE ID: #12 2+57,17L TIME DRILLED: _____ TIME LOGGED: _____ SOIL TYPE: _____	
DEPTH	COUNTS/.1MIN	DEPTH	COUNTS/.1MIN	DEPTH	COUNTS/.1MIN	DEPTH	COUNTS/.1MIN
SURFACE	4562	SURFACE	3710	SURFACE	3124	SURFACE	3006
0"	4638	0"	3225	0"	3428	0"	2940
6"	5350	6"	3122	6"	3732	6"	2547
12"	3717	12"	3059	12"	4406	12"	2506
18"	2839	18"	2589	18"	3522	18"	2581
24"	3043	24"	2459	24"	3249	24"	2624
30"	3131	30"	2728	30"	4905	30"	2698
36"	A.R	36"	A.R.	36"	A.R.	36"	2536
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: _____

KNUDSEN

BOREHOLE LOG

LOGGING CREW: Ron Jacobs, Terry Herman
Jim Smith, Dave Beyer

SHEET _____ OF _____ PAGE 5

DATE: 3-27-89

PROPERTY ID: DU-616

AREA: _____

INSTRUMENT ID NO. Lud # 2220 # 31975 4/44-10 # 19888

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

HOLE ID: #13 2+62,05L TIME DRILLED: _____ TIME LOGGED: _____ SOIL TYPE: _____		HOLE ID: #14 2+42,05L TIME DRILLED: _____ TIME LOGGED: _____ SOIL TYPE: _____		HOLE ID: #15 2+29,22L TIME DRILLED: _____ TIME LOGGED: _____ SOIL TYPE: _____		HOLE ID: #16 2+24,25L TIME DRILLED: _____ TIME LOGGED: _____ SOIL TYPE: _____	
DEPTH	COUNTS/.1MIN	DEPTH	COUNTS/.1MIN	DEPTH	COUNTS/.1MIN	DEPTH	COUNTS/.1MIN
SURFACE	2974	SURFACE	26663	SURFACE	3747	SURFACE	3075
0"	3225	0"	2876	0"	4248	0"	3118
6"	2652	6"	2301	6"	5711	6"	3014
12"	2608	12"	2404	12"	6383	12"	3889
18"	2615	18"	2473	18"	4828	18"	4969
24"	2665	24"	2593	24"	3545	24"	3893
30"	2677	30"	2636	30"	3177	30"	4024
36"	2666	36"	2728	36"	AR	36"	5917
42"		42"		42"		42"	6328
48"		48"		48"		48"	6695
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: _____

VP-04B

KNUDSEN

BOREHOLE LOG

LOGGING CREW: Ron Jacob, Jerry Herman
Jim Smith, Dave Beyer

SHEET _____ OF _____ PAGE 6

DATE: 3-27-89

PROPERTY ID: DU-616

INSTRUMENT ID NO. Lud 2220 #3 1975 4/44-10 #1987

AREA: _____

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

HOLE ID: #17 2+17,22L TIME DRILLED: _____ TIME LOGGED: _____ SOIL TYPE: _____		HOLE ID: #18 2+05 30L TIME DRILLED: _____ TIME LOGGED: _____ SOIL TYPE: _____		HOLE ID: #19 1+98,32L TIME DRILLED: _____ TIME LOGGED: _____ SOIL TYPE: _____		HOLE ID: #20 1+90,33L TIME DRILLED: _____ TIME LOGGED: _____ SOIL TYPE: _____	
DEPTH	COUNTS/.1MIN	DEPTH	COUNTS/.1MIN	DEPTH	COUNTS/.1MIN	DEPTH	COUNTS/.1MIN
SURFACE	2836	SURFACE	2782	SURFACE	2732	SURFACE	2836
0"	3098	0"	2697	0"	2974	0"	2654
6"	2716	6"	2238	6"	2706	6"	2381
12"	2859	12"	2279	12"	2640	12"	2479
18"	2948	18"	2296	18"	2392	18"	2299
24"	3001	24"	2184	24"	2706	24"	2196
30"	3563	30"	2102	30"	3398	30"	2268
36"	5919	36"	2138	36"	5028	36"	2681
42"	7336	42"	AR	42"	8834	42"	3510
48"	4383	48"		48"	out of reach	48"	3662
54"		54"		54"		54"	out of reach
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: _____

VF-016B

KNUDSEN

BOREHOLE LOG

LOGGING CREW: Ron Jacobs, Terry Herman, Jim Smith, Dave Beyer

SHEET _____ OF _____ PAGE 7

DATE: 3-27-89

PROPERTY ID: DL-616

INSTRUMENT ID NO. Lud 2220* 31975/44-10* 19878

AREA: _____

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

HOLE ID: #21 1160,396
TIME DRILLED: _____
TIME LOGGED: _____
SOIL TYPE: _____

DEPTH	COUNTS/.1MIN
SURFACE	2535
0"	2933
6"	2482
12"	2740
18"	2557
24"	2902
30"	4024
36"	4571
42"	4955
48"	4773
54"	out of reach
60"	
66"	
72"	
78"	
84"	
90"	
96"	

HOLE ID: #22 1088,416
TIME DRILLED: _____
TIME LOGGED: _____
SOIL TYPE: _____

DEPTH	COUNTS/.1MIN
SURFACE	2797
0"	2826
6"	2532
12"	2843
18"	2674
24"	3102
30"	4954
36"	6788
42"	6922
48"	out of reach
54"	
60"	
66"	
72"	
78"	
84"	
90"	
96"	

HOLE ID: #23 0896,466
TIME DRILLED: _____
TIME LOGGED: _____
SOIL TYPE: _____

DEPTH	COUNTS/.1MIN
SURFACE	2786
0"	2783
6"	2339
12"	2381
18"	2174
24"	2677
30"	3852
36"	6130
42"	6394
48"	3813
54"	2461
60"	2208
66"	
72"	
78"	
84"	
90"	
96"	

HOLE ID: #24 0765,596
TIME DRILLED: _____
TIME LOGGED: _____
SOIL TYPE: _____

DEPTH	COUNTS/.1MIN
SURFACE	2716
0"	2779
6"	2440
12"	2436
18"	2103
24"	1908
30"	1971
36"	1923
42"	1973
48"	2020
54"	2004
60"	2190
66"	2210
72"	out of reach
78"	
84"	
90"	
96"	

REMARKS: _____

KNUDSEN

BOREHOLE LOG

LOGGING CREW: Ron Jacobs, Terry Herman, Jim Smith, Dave Beyer

SHEET _____ OF _____ PAGE 8

DATE: 3-27-89

PROPERTY ID: DU-616

INSTRUMENT ID NO. MD 2220 # 31975/44-10 1988

AREA: _____

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

HOLE ID: #25 0783,561		HOLE ID: #26 ,213,041		HOLE ID: #27 1+92 036		HOLE ID: #28 1767,092	
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	2772	SURFACE	5146	SURFACE	3100	SURFACE	2528
0"	2762	0"	16435	0"	4045	0"	3093
6"	2211	6"	12325	6"	6795	6"	3098
12"	2046	12"	23071	12"	11680	12"	4352
18"	1932	18"	31022	18"	24389	18"	8341
24"	2376	24"	A.R	24"	36314	24"	15506
30"	2713	30"		30"	22444	30"	19483
36"	3857	36"		36"	13440	36"	21036
42"	2967	42"		42"	12119	42"	24065
48"	2131	48"		48"	AR.	48"	Out of reach
54"	1980	54"		54"		54"	
60"		60"		60"		60"	
66"		66"		66"		66"	
72"		72"		72"		72"	
78"		78"		78"		78"	
84"		84"		84"		84"	
90"		90"		90"		90"	
96"		96"		96"		96"	

REMARKS: _____

BOREHOLE LOG

LOGGING CREW: Ron Jacobs, Terry Herman, Jim Smith, Dave Beyer

SHEET _____ OF _____ PAGE 9

DATE: 3-27-89

PROPERTY ID: DU-1616

INSTRUMENT ID NO. Lud 2220 #31975 / 44-10 #19876

AREA: _____

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

HOLE ID: #29 1159000R TIME DRILLED: _____ TIME LOGGED: _____ SOIL TYPE: _____		HOLE ID: #30 0+85,07L TIME DRILLED: _____ TIME LOGGED: _____ SOIL TYPE: _____		HOLE ID: #31 0+55,15L TIME DRILLED: _____ TIME LOGGED: _____ SOIL TYPE: _____		HOLE ID: #32 0+49,11L TIME DRILLED: _____ TIME LOGGED: _____ SOIL TYPE: _____	
DEPTH	COUNTS/.1MIN	DEPTH	COUNTS/.1MIN	DEPTH	COUNTS/.1MIN	DEPTH	COUNTS/.1MIN
SURFACE	2541	SURFACE	4188	SURFACE	4727	SURFACE	8000
0"	2479	0"	6394	0"	3380	0"	7211
6"	1993	6"	13904	6"	4010	6"	9555
12"	2488	12"	17567	12"	5892	12"	11797
18"	3429	18"	30824	18"	7949	18"	12880
24"	5202	24"	42287	24"	8808	24"	13844
30"	8744	30"	59880	30"	AR	30"	12892
36"	9306	36"	A.R	36"		36"	12468
42"	9515	42"		42"		42"	11621
48"	AR	48"		48"		48"	11820
54"		54"		54"		54"	out of reach
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: _____

VP-045

BOREHOLE LOG

LOGGING CREW: Ron Jacobs, Terry Herman
Jim Smith, Dave Beyer

SHEET _____ OF _____ PAGE 10

DATE: 3-27-89

PROPERTY ID: DU-1616

INSTRUMENT ID NO. Lud 2220, #31975 44-10 #19878

AREA: _____

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

HOLE ID: #33 0+23,66R TIME DRILLED: _____ TIME LOGGED: _____ SOIL TYPE: _____		HOLE ID: #34 0+4,35R TIME DRILLED: _____ TIME LOGGED: _____ SOIL TYPE: _____		HOLE ID: #35 0+71,39L TIME DRILLED: _____ TIME LOGGED: _____ SOIL TYPE: _____		HOLE ID: #36 4+35,17L TIME DRILLED: _____ TIME LOGGED: _____ SOIL TYPE: _____	
DEPTH	COUNTS/.1MIN	DEPTH	COUNTS/.1MIN	DEPTH	COUNTS/.1MIN	DEPTH	COUNTS/.1MIN
SURFACE	3664	SURFACE	2534	SURFACE	5526	SURFACE	2642
0"	31696	0"	2744	0"	62662	0"	2966
6"	4844	6"	2328	6"	12123	6"	2809
12"	5663	12"	2554	12"	19788	12"	2984
18"	6027	18"	2761	18"	27246	18"	3340
24"	66683	24"	2756	24"	42435	24"	3586
30"	5305	30"	2441	30"	54890	30"	3466
36"	3970	36"	A.R	36"	55398	36"	3568
42"	3223	42"		42"	AR	42"	4402
48"	out of reach	48"		48"		48"	AR
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: _____

VP-04B

BOREHOLE LOG

LOGGING CREW: Ron Jacobs, Terry Herman, Jim Smith, Dave Beyer

SHEET _____ OF _____ PAGE 11

DATE: 3-29-89

PROPERTY ID: DU-616

INSTRUMENT ID NO. Lud 2220 #31975/44-10 #PR8

AREA: _____

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

HOLE ID: #37 5+11, 24L TIME DRILLED: _____ TIME LOGGED: _____ SOIL TYPE: _____		HOLE ID: #38 5+39, 14R TIME DRILLED: _____ TIME LOGGED: _____ SOIL TYPE: _____		HOLE ID: #39 3+89 16R TIME DRILLED: _____ TIME LOGGED: _____ SOIL TYPE: _____		HOLE ID: #40 3+20, 04L TIME DRILLED: _____ TIME LOGGED: _____ SOIL TYPE: _____	
DEPTH	COUNTS/.1MIN	DEPTH	COUNTS/.1MIN	DEPTH	COUNTS/.1MIN	DEPTH	COUNTS/.1MIN
SURFACE	2382	SURFACE	2203	SURFACE	2310	SURFACE	2666
0"	2439	0"	2570	0"	2398	0"	2891
6"	2282	6"	2304	6"	1954	6"	2702
12"	2208	12"	2694	12"	1643	12"	3296
18"	2199	18"	2803	18"	1478	18"	3374
24"	2267	24"	2277	24"	AR	24"	3434
30"	2452	30"	AR	30"		30"	3413
36"	2575	36"		36"		36"	3362
42"	2561	42"		42"		42"	3124
48"	AR	48"		48"		48"	2495
54"		54"		54"		54"	3696
60"		60"		60"		60"	AR
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: _____

VP-04B

BOREHOLE LOG

LOGGING CREW: Ron Jacobs, Terry Herman, Jim Smith, Dave Beyer

INSTRUMENT ID NO. Lud 2220 #31975 / 4440 #8678

SHEET _____ OF _____ PAGE 12

DATE: 3-29-88

PROPERTY ID: D4-616

AREA: _____

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

HOLE ID: #41 3+47,025R TIME DRILLED: _____ TIME LOGGED: _____ SOIL TYPE: _____		HOLE ID: #42 3+57,025R TIME DRILLED: _____ TIME LOGGED: _____ SOIL TYPE: _____		HOLE ID: #43 3+44,31L TIME DRILLED: _____ TIME LOGGED: _____ SOIL TYPE: _____		HOLE ID: #44, 3+88,27L TIME DRILLED: _____ TIME LOGGED: _____ SOIL TYPE: _____	
DEPTH	COUNTS/.1MIN	DEPTH	COUNTS/.1MIN	DEPTH	COUNTS/.1MIN	DEPTH	COUNTS/.1MIN
SURFACE	2561	SURFACE	3645	SURFACE	2638	SURFACE	2834
0"	1470	0"	3079	0"	2481	0"	2812
6"	2283	6"	2218	6"	2203	6"	2262
12"	2043	12"	2145	12"	2402	12"	2206
18"	1901	18"	1989	18"	2457	18"	2056
24"	1943	24"	1839	24"	2607	24"	1980
30"	1964	30"	1801	30"	2636	30"	2047
36"	1728	36"	1889	36"	3263	36"	2148
42"	1733	42"	AR	42"	3998	42"	2136
48"	AR	48"		48"	2709	48"	2179
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: _____

VP-04B

BOREHOLE LOG

LOGGING CREW: Ron Jacobs, Derek Workman

SHEET _____ OF _____ PAGE 13

DATE: 4-11-89

PROPERTY ID: DU 616

INSTRUMENT ID NO. Ludl 2220 #31975 / 44-10 19878

AREA: _____

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

HOLE ID: #45 3490,376 TIME DRILLED: TIME LOGGED: SOIL TYPE:		HOLE ID: #46 4146,406 TIME DRILLED: TIME LOGGED: SOIL TYPE:		HOLE ID: #47 4162,246 TIME DRILLED: TIME LOGGED: SOIL TYPE:		HOLE ID: #48, 4175,256 TIME DRILLED: TIME LOGGED: SOIL TYPE:	
DEPTH	COUNTS/.1MIN	DEPTH	COUNTS/.1MIN	DEPTH	COUNTS/.1MIN	DEPTH	COUNTS/.1MIN
SURFACE	2989	SURFACE	2941	SURFACE	2757	SURFACE	2573
0"	2601	0"	2813	0"	2846	0"	2632
6"	2225	6"	2254	6"	2570	6"	2327
12"	2186	12"	2298	12"	2631	12"	2369
18"	2238	18"	2266	18"	2628	18"	2427
24"	2347	24"	2261	24"	3095	24"	2510
30"	2212	30"	2377	30"	3400	30"	2588
36"	1969	36"	2246	36"	A.B	36"	2716
42"	1993	42"	2376	42"		42"	2706
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: _____

VP-04B

BOREHOLE LOG

LOGGING CREW: Ron Jacobs, Derek Workman

SHEET _____ OF _____ PAGE 14

DATE: 4-11-89

PROPERTY ID: DU 616

INSTRUMENT ID NO. Lud 2220 31975/44-10 19878

AREA: _____

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

HOLE ID: #49 4461,068 TIME DRILLED: TIME LOGGED: SOIL TYPE:		HOLE ID: #50 4620,006 TIME DRILLED: TIME LOGGED: SOIL TYPE:		HOLE ID: #51 4446,161 TIME DRILLED: TIME LOGGED: SOIL TYPE:		HOLE ID: #52 4431,006 TIME DRILLED: TIME LOGGED: SOIL TYPE:	
DEPTH	COUNTS/.1MIN	DEPTH	COUNTS/.1MIN	DEPTH	COUNTS/.1MIN	DEPTH	COUNTS/.1MIN
SURFACE	2950	SURFACE	3093	SURFACE	2917	SURFACE	2796
0"	2985	0"	2633	0"	3109	0"	3285
6"	2528	6"	2951	6"	2712	6"	3224
12"	2893	12"	3564	12"	2622	12"	3483
18"	3219	18"	4241	18"	2662	18"	3713
24"	3215	24"	4378	24"	2535	24"	AR
30"	2866	30"	4577	30"	3541	30"	
36"	AR	36"	3774	36"	AR	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: _____

VP-04B

BOREHOLE LOG

LOGGING CREW: Ron Jacobs, Derek Workman

INSTRUMENT ID NO. Ludl 2220 # 31975 / 44-10 19878

SHEET _____ OF _____ PAGE 15

DATE: 4-11-89

PROPERTY ID: DX-616

AREA: _____

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

HOLE ID: #53 4132,05R TIME DRILLED: _____ TIME LOGGED: _____ SOIL TYPE: _____		HOLE ID: #54 4141,01L TIME DRILLED: _____ TIME LOGGED: _____ SOIL TYPE: _____		HOLE ID: #55 3152,55 TIME DRILLED: _____ TIME LOGGED: _____ SOIL TYPE: _____		HOLE ID: #56 4167,45L TIME DRILLED: _____ TIME LOGGED: _____ SOIL TYPE: _____	
DEPTH	COUNTS/.1MIN	DEPTH	COUNTS/.1MIN	DEPTH	COUNTS/.1MIN	DEPTH	COUNTS/.1MIN
SURFACE	3081	SURFACE	2848	SURFACE	3151	SURFACE	2815
0"	3091	0"	3135	0"	3242	0"	2746
6"	3167	6"	2732	6"	2855	6"	2318
12"	3657	12"	2817	12"	3121	12"	2310
18"	3724	18"	2924	18"	3286	18"	2423
24"	3358	24"	2931	24"	3487	24"	2521
30"	AR	30"	3034	30"	3390	30"	2372
36"		36"	2867	36"	3060	36"	2854
42"		42"		42"	2908	42"	
48"		48"		48"	2907	48"	
54"		54"		54"	2902	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: _____

VP-04B

BOREHOLE LOG

LOGGING CREW: Ron Jacobs, Derek Workman

INSTRUMENT ID NO. Gud 2220 #31975/44-10 #19878

SHEET _____ OF _____ PAGE 16

DATE: 4-11-89

PROPERTY ID: DU 6116

AREA: _____

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

HOLE ID: #57 4462,84 TIME DRILLED: _____ TIME LOGGED: _____ SOIL TYPE: _____		HOLE ID: #58 3458,04L TIME DRILLED: _____ TIME LOGGED: _____ SOIL TYPE: _____		HOLE ID: #59 3300,24 TIME DRILLED: _____ TIME LOGGED: _____ SOIL TYPE: _____		HOLE ID: #60 2743,04R TIME DRILLED: _____ TIME LOGGED: _____ SOIL TYPE: _____	
DEPTH	COUNTS/.1MIN	DEPTH	COUNTS/.1MIN	DEPTH	COUNTS/.1MIN	DEPTH	COUNTS/.1MIN
SURFACE	2934	SURFACE	2767	SURFACE	2487	SURFACE	2822
0"	2581	0"	2795	0"	3074	0"	3491
6"	2500	6"	2617	6"	2159	6"	3237
12"	2700	12"	2463	12"	2347	12"	3303
18"	2712	18"	2620	18"	2964	18"	3325
24"	2918	24"	2504	24"	3384	24"	AR
30"	2946	30"	2194	30"	3161	30"	
36"	3004	36"	A.R.	36"	AR	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: _____

VP-04B

BOREHOLE LOG

LOGGING CREW: Ron Jacobs, Derek Workman

SHEET _____ OF _____ PAGE 17

DATE: 4-19-89

PROPERTY ID: DU 6116

INSTRUMENT ID NO. Lud 2220 #31975/44-46 1987B

AREA: _____

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

HOLE ID: #61 -1+73.3R		HOLE ID: #62 -1+55/38R		HOLE ID: #63 -1+62.13R		HOLE ID: #64 -1+71.15R	
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	5732	SURFACE	4130	SURFACE	3424	SURFACE	3051
0"	5350	0"	4415	0"	3603	0"	2762
6"	5752	6"	4229	6"	3738	6"	2355
12"	5756	12"	3688	12"	3244	12"	2324
18"	4446	18"	3198	18"	2566	18"	1832
24"	3220	24"	2782	24"	2350	24"	2152
30"	2635	30"	2695	30"	AR	30"	2061
36"	2251	36"	2104	36"		36"	2296
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: _____

VP-04B

No Deed Exists For This Property

(State Owned Property)

APPENDIX B

OWNER AND STATE COMMENTS

Owner and States comments will be transmitted when available.

ENGINEERS
AND
CONSTRUCTORS

MK-FERGUSON COMPANY
A MORRISON KNUDSEN COMPANY

HEADQUARTERS OFFICE
ONE ERIEVIEW PLAZA
CLEVELAND, OHIO U.S.A. 44114
PHONE (216) 523-5600 TELEX 985542

REPLY TO MK-FERGUSON COMPANY
REMEDIAL ACTIONS
CONTRACTOR-UMTRA PROJECT
P.O. BOX 9136
ALBUQUERQUE, NEW MEXICO U.S.A. 87119

June 7, 1989

Edward L. Bischoff
UMTRAP Program Manager
Colorado Department of Health
4210 East 11th Avenue
Denver, CO 80220

SUBJECT: Use of Supplemental Standards - DU-616

Dear Mr. Bischoff:

In accordance with the Uranium Mill Tailings Radiation Control Act (UMTRA) of 1978, Public Law 95-604, the Department of Energy (DOE) included property (DU-616), a portion of which you own, for remedial action. Further evaluation of the contamination on your property has been performed and a recommendation has been proposed to excavate the contaminated material on the east half of the property, between Lightner Creek and U.S. Highway 160 to a depth of 18" and backfill over the remaining contaminated material. On the west half of the property a recommendation has been proposed to leave the contaminated material on the steep banks of Lightner Creek in place. These recommendations are proposed per the Code of Federal Regulations 40 CFR 192, Supplemental Standards. We are basing the recommendation on the criteria presented below. A Radiological and Engineering Assessment (REA) for DU-616 has been included for your use in solicitation of CDH comments/concurrence.

The Radiological and Engineering Assessment (REA) performed on the property (DU-616) has revealed that radioactive contaminated materials are present over the entire areal extent of the east half of the property. Contamination in this area is present in most areas to a depth of 20'. The contamination on the bank of Lightner Creek, on the west half of the property varies in depth from 6 to 24".

Because of the cost involved in cleaning up the material, coupled with the low health hazard, we are recommending that the contaminated material in these areas be left in place. This action is permitted under Title 40, Code of Federal Regulations, Section 192.21 and 22. The sections of the EPA Standards, which are established for the cleanup of Uranium mill tailings, allow residual radioactive materials to remain in place when certain conditions are met. The criteria defining when remedial action need not take place (Supplemental Standards) are as follows:

(1) The estimated cost of remedial action is unreasonably high relative to the long-term benefits, and the residual radioactive materials do not pose a clear present or future hazard.

The application of Supplemental Standards requires that the remedial action remove as much of the contaminated material as is reasonably possible. To meet this goal, contaminated materials on the east half of the property will be excavated to a depth of 18" and backfilled. Also a small area on the west property line will be excavated and backfilled.

After the proposed remedial action occurs and the eastern area has been covered with 18" of backfill general area radiation levels will range from 14 to 30 micro R/hr. Background for the Durango area is 14 micro R/hr. If a person spent 8 hours a day, 5 days a week, for 50 weeks in a 30 micro R/hr radiation field, he would receive about 60 millirem of gamma exposure in one year. This is about one-tenth the amount allowed the general public (10 CFR 20.105). The actual amount of contaminated material that will remain in place after remedial action is approximately 16,500 cubic yards.

In compliance with the EPA regulations found in the Code of Federal Regulations 40 192.21, we solicit your comments concerning this action. We are attaching a copy of the applicable sections of the Code of Federal Regulations for your convenience in responding to this proposed action. To comply with EPA regulations, we must receive a written response with your concurrence/comments. We have included a self-addressed, postage-paid envelope for your convenience. We request your response by June 23, 1989.

If you have any questions or need additional information concerning this matter, please call either Rob Pommerening of my staff at 1-800-443-4379, or Ms. Jolene Garcia of the U.S. Department of Energy at (505) 846-1238.

Sincerely,

MK-Ferguson Company

For J.G. Oldham
Project Director

JGO/RAP/RDJ/ss
Enclosures
cc: w/o enclosures:
G.A. Franz, CDH
J. Garcia, DOE/UMTRA
C. Moore, TAC/UMTRA
Document Control

bcc: w/o enclosures:
M. Thomson - DUR
R. Stearns
R. Cooney
R. Pommerening
R. Jacobs
File - EDT

ENGINEERS
AND
CONSTRUCTORS

MK-FERGUSON COMPANY
A MORRISON KNUDSEN COMPANY

HEADQUARTERS OFFICE
ONE ERIEVIEW PLAZA
CLEVELAND, OHIO U.S.A. 44114
PHONE (216) 523-5600/TELEX 985542

REPLY TO MK-FERGUSON COMPANY
REMEDIAL ACTIONS
CONTRACTOR-UMTRA PROJECT
P.O. BOX 9136
ALBUQUERQUE, NEW MEXICO U.S.A. 87119

June 7, 1989

Alfred A. Shablo
District Engineer
Colorado Department of Highways
214 West 6th Street
Durango, CO 81301

SUBJECT: Use of Supplemental Standards - DU-616

Dear Mr. Shablo:

In accordance with the Uranium Mill Tailings Radiation Control Act (UMTRA) of 1978, Public Law 95-604, the Department of Energy (DOE) included property (DU-616), a portion of which you own, for remedial action. Further evaluation of the contamination on your property has been performed and a recommendation has been proposed to excavate the contaminated material on the east half of the property, between Lightner Creek and U.S. Highway 160 to a depth of 18" and backfill over the remaining contaminated material. On the west half of the property a recommendation has been proposed to leave the contaminated material on the steep banks of Lightner Creek in place. These recommendations are proposed per the Code of Federal Regulations 40 CFR 192, Supplemental Standards. We are basing the recommendation on the criteria presented below. Your comments/concurrence are requested.

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In compliance with the EPA regulations found in the Code of Federal Regulations 40 192.21, we solicit your comments concerning this action. We are attaching a copy of the applicable sections of the Code of Federal Regulations for your convenience in responding to this proposed action. To comply with EPA regulations, we must receive a written response with your concurrence/comments. We have included a self-addressed, postage-paid envelope for your convenience. We request your response by June 23, 1989.

If you have any questions or need additional information concerning this matter, please call either Rob Pommerening of my staff at 1-800-443-4379, or Ms. Jolene Garcia of the U.S. Department of Energy at (505) 846-1238.

Sincerely,

MK-Ferguson Company

R F Stearns

For J.G. Oldham
Project Director

JGO/RAP/RDJ/ss
Enclosures
cc: w/o enclosures:
J. Garcia, DOE/UMTRA
C. Moore, TAC/UMTRA
Document Control

bcc: w/o enclosures:
M. Thomson - DUR
R. Stearns
R. Cooney
R. Pommerening
R. Jacobs
File - EDT

MK-FERGUSON COMPANY
A MORRISON KNUDSEN COMPANY
UMTRA PROJECT OFFICE
P.O. BOX 9136
ALBUQUERQUE, NEW MEXICO 87119

APPENDIX A

SPECIFICATIONS

- Material Specifications
- Construction Specifications For Earthwork Operations
- Site Engineering Inspection

LICENSE NUMBER SUA-1470

DOCKET NUMBER 40-8902

APPENDIX A

The basic outline of proposed material and construction specifications for the Bluewater reclamation plan are included below.

MATERIAL SPECIFICATIONS

RIP RAP MATERIALS

Rock Properties

Rock source material used for rip rap shall meet the following criteria:

Property	Standard	Criteria
Specific Gravity	ASTM C-127-84	2.5 or greater
Absorption	ASTM C-127-84	2.3% or less
L.A. Abrasion loss (500 revolutions)	ASTM C-131-81	19% or less
Na_2SO_4 Loss	ASTM C-88-83	1% or less
Tensile Strength	ASTM D-3967	485psi or greater

Rock shall have a overall score of 65 or greater in accordance with "Appendix D, Staff Technical Position, Design of Erosion Protection, U. S. Nuclear Regulatory Commission", August 1989. Oversizing adjustments shall be made if rock cannot meet the above criteria.

Test series shall be performed on the material at the quarry. Tests will be made for each 20,000 cubic yards of material placed and at least once a day.

Rock Gradations

Rock used for revetment on the project shall meet the following minimum gradation criteria.

D_{50} = 1/2"	1 3/4" = 100% 1" = 60 - 85% 1/2" = 25 - 65% #4 = 10 - 30% #8 = 0 - 10%
D_{50} = 1 1/2"	4" = 100% 2 1/2" = 60 - 85% 1 1/2" = 25 - 65% 1/2" = 0 - 15% 3/8" = 0 - 10%
D_{50} = 2-1/2"	5" = 100% 3" = 60 - 90% 2-1/2" = 25 - 50% 1-1/2" = 15 - 40% 1" = 0 - 15%

D_{50} = 8"

16" = 100%
12" = 60% - 85%
8" = 25% - 65%
1/2" = 0 - 10%

GEOTEXTILE

The geofabric used over the slimes area shall be a woven-type fabric and shall have a 300 lb. grab strength. Quality assurance shall be by manufacture certification and random field testing. The geofabric will be over lapped a minimum of 3 feet at all seams or field double sewn with a "J" seam six to eight loops per inch. Thread shall be polyester with a tensile strength per manufactures recommendation.

BORROW USED AS RADON COVER

Gradation of borrow material to be used for radon cover shall meet the following minimum gradations and classifications .

Material shall have a Unified Soil Classification of SM, SC, ML, CL or a combination of these groups.

Maximum particle size <3"
Minimum passing #200 sieve 20%

Borrow material shall be tested every 20,000 cubic yards or sooner as required due to a change in soil visual and textural properties.

CONSTRUCTION SPECIFICATIONS FOR EARTHWORK FILL OPERATIONS

RELOCATED TAILINGS SANDS, EVAPORATION POND RESIDUES AND WINDBLOWN MATERIALS

Sequencing

Sequencing of relocated materials into the slimes area of the main impoundment shall be as follows:

- Contaminated sands material shall be excavated from Main Tailings impoundment dikes and placed as the first lift over the slimes. Remaining relocated sand material shall be placed in uniform lifts over the slimes area prior to placement of any other materials on the surface.

- Relocated evaporation pond material shall be placed over sand tailings in uniform lifts.

- Windblown material shall be placed over relocated evaporation pond material in uniform lifts.

Placement

- The initial lift of relocated sand tails shall be placed directly atop the geofabric to a depth of approximately 24 inches. Subsequent relocated materials shall be placed

in lifts not to exceed twelve inches in loose lift thickness.

- The placement moisture content of this material shall be within three percent of the optimum as determined by ASTM-D698 (AASHTO-T99).

- The initial lift placed on the geofabric shall be compacted through the trafficking of hauling and spreading equipment. Each lift subsequent to the initial lift shall be compacted by traffic and compaction equipment until the material achieves a dry density equal to, or greater than 90 percent of the maximum dry density as determined by ASTM D-698 (AASHTO T-99).

RADON COVER MATERIAL

The borrow material used for radon cover shall be placed in lifts not to exceed twelve inches in loose thickness.

The moisture content of this material shall be within three percent of the optimum moisture content as determined by ASTM D-698 (AASHTO T-99).

Each lift will be compacted by traffic and other compaction equipment as required to achieve a dry density of 95 percent or greater of maximum dry density as determined by ASTM D-698 (AASHTO T-99)

Soil surfaces will be protected from freezing during winter operations. Any frozen areas which do occur shall have all frozen material removed prior to the construction of the next lift.

ROCK

Rip rap materials shall be placed in a manner which prevents degradation of material.

Filter materials shall be end dumped and dozed to the specified depth. Dozed material shall not be pushed more than 50 feet from dumped location.

Riprap materials shall be end dumped and dozed to the specified depth.

SITE ENGINEERING AND INSPECTION

QUALITY ASSURANCE REPORTING

All earthwork operations will be performed under review of a registered professional engineer with experience in geotechnical engineering. The engineer will prescribe field control testing procedures, methods and frequency to assure that the specified degree of compaction is a achieved using the specified materials. The engineer will evaluate material placement to assure that design grades, slopes and material thicknesses are constructed to the required plans.

The Engineer will, at the completion of the work, prepare a construction summary report documenting the work, reporting the results of control testing and presenting a set of as-built drawings. These records will become a permanent part of the records for the reclamation project.

Daily inspection reports will be prepared that address the adequacy, progress and details of

construction activity and decisions made. The report will include results of tests measurements and visual inspection. The report shall indicate clearly corrective action and retesting of all areas as required to meet contract specifications. Weekly reports will summarize the volume of placed materials along with the number of field and laboratory tests performed on the material.

FIELD LABORATORY TESTING

A field soil testing laboratory shall be maintained on site to facilitate index and compaction testing of borrow soils. Moisture-density relationships (ASTM D-698) (AASHTO T-99) for borrow soils shall be established for each 20,000 cy of soil placed initially and may be relaxed to each 30,000 cy after the first 20,000 cy are placed. Additional testing will be completed as required whenever there is a change in visual and textural soil properties. A grain-size analysis shall be performed in accordance with ASTM D-422 for each moisture-density relationship developed.

Prior to the beginning of construction additional testing shall be completed in the borrow area. Testing shall include soil classification and moisture-density relationship for each type of soil to a depth of fifteen feet. Tests pits shall be excavated at a minimum of one per ten acres and at distinct geologic formations.

IN-PLACE TESTING

All fill areas shall have a two hundred foot grid system established for purposes of identifying testing locations during construction. Grid systems shall be tied to the existing ARCO control monumentation at the site. All tests shall have an I.D. number and approximate X-Y coordinates based on the grid system. Any retesting completed shall be clearly identified by I.D. number and X-Y coordinate.

Soils

The primary method for compaction testing shall be by nuclear densimeter (ASTM D-2922) correlated with the Sand Cone test and oven drying (ASTM D-1556)(ASTM D-2216). One field density test shall be performed for every 1,500 cubic yards (no less than one per 40,000 square feet) of fill material placed or, at a minimum, at least three test per shift. More tests may be taken as often as there is a concern for the quality of moisture control or the effectiveness of compaction. One sand cone test shall be performed in conjunction with nuclear density testing for every fiftieth test or at a minimum of one test every day as a means of calibration.

If verification tests performed by sand cone methods indicate that specified compaction previously accepted using nuclear gauge methods has not been achieved, two additional sand cone tests shall be performed. If the average of these three sand cone tests indicates non-compliance with the specification, the sand cone tests results shall be accepted and the area in question shall be disked, moisture conditioned and recompacted until specification is achieved and confirmed by the sand cone method.

Rock

Rock depth shall be tested following placement on a ongoing basis. Rock shall be inspected for uniform gradation, depth and proper gradation.

Soil Rock Matrix

The soil rock matrix will be field tested for depth by use of the grid previously described. Measurements of rock and soil depths will be made from small test holes. Rock gradation will be verified as per design prior to soil placement. Soil will be laid over the rock layer at four to six inches and roller packed into the rock. A minimum of three passes will be completed to consolidate the soil into the rock layer.