

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

Vicinity Property Completion Report

Remedial Actions
Contractor
for the
Uranium Mill Tailings
Remedial Actions
Project



MK-FERGUSON COMPANY
A MORRISON KNUDSEN COMPANY

9808050130 980722
PDR WASTE
WM-61 PDR

VICINITY PROPERTY COMPLETION REPORT

AT

GU-029

SOUTH 9TH STREET BETWEEN
RAILROAD AVENUE AND BIDWELL STREET
GUNNISON, COLORADO

AUGUST 26, 1997

FOR

URANIUM MILL TAILINGS REMEDIAL ACTION PROJECT OFFICE
ALBUQUERQUE OPERATIONS OFFICE
U.S. DEPARTMENT OF ENERGY
ALBUQUERQUE, NM

BY

MK-FERGUSON COMPANY

AND

RUST FEDERAL SERVICES

MK-Ferguson Company has been granted authorization to perform remedial action under the Uranium Mill Tailings Radiation Control Act of 1978, Public Law 95-604. Remedial action was done in accordance to the EPA Standards for Cleanup of Lands and Buildings Contaminated with Residual Radioactive Material from Inactive Uranium Processing Sites, 40 CFR 192.12, 192.20-2

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PROPERTY NUMBER:	GU-029
PROPERTY ADDRESS:	SOUTH 9TH STREET BETWEEN RAILROAD AVENUE AND BIDWELL STREET GUNNISON, COLORADO
PROPERTY OWNER:	ROBERT A. FILSON, CITY MANAGER CITY OF GUNNISON P.O. BOX 239 GUNNISON, COLORADO 81230 81602
PROPERTY CATEGORY:	STREET
REMEDIAL ACTION CONTRACTOR:	MK-FERGUSON COMPANY
CONSTRUCTION SUBCONTRACTOR:	GEARS, INC.
RADIOLOGICAL CONTRACTOR:	RUST FEDERAL SERVICES
REA APPROVED:	MARCH 21, 1991
REMEDIAL ACTION STARTED:	JUNE 27, 1991
REMEDIAL ACTION COMPLETED:	JULY 31, 1991
APPENDIX C SIGNED	AUGUST 7, 1991
VOLUME OF MATERIAL REMOVED:	OUTDOOR: 3436 CY INDOOR: N/A

1.0 SUMMARY

Remedial action was completed on Vicinity Property GU-029. A total of 3,426 cubic yards of soil were removed from the property. The Application of Supplemental Standards (Appendix C) is recommended for the soil left near the utility lines running beneath the length of the street.

Radiological surveys conducted following removal of contaminated material, but before property restoration, demonstrate that the property has been cleaned up to the EPA standards. This completion report recommends that DOE review the radiological data provided and award, with the Application of Supplemental Standards, the property final certification.

2.0 OPERATIONS SUMMARY

2.1 Remedial Action Plan

The basic remedial action on this property was performed according to the Remedial Action Plan. A total of 3,436 cubic yards of soil was removed from the property compared to the estimated amount of 541 cubic yards of soil.

2.2 Previously Unidentified Contamination

No new areas of contamination were identified during remedial action.

2.3 Unanticipated Items During Remedial Action

The area of contamination extended deeper than anticipated.

3.0 VERIFICATION SUMMARY

3.1 Radiological Survey Data

All survey data were acquired according to approved procedures.

3.1.1 Pre-Remedial Action Survey

The results of the survey defining the estimated contaminated area requiring remedial action are presented on Drawings GU-029-015 and GU-029-016.

3.1.2 Pre-Restoration Survey

Exterior:

After removal of contamination, and prior to backfilling, a soil sample survey was conducted in the excavated areas. Soil samples were aliquoted from 32 verification grids and analyzed by gamma spectroscopy with the opposed crystal system in accordance with Health Physics Procedure 015. The radium concentration in these soil samples ranged from -0.1 to 8.5 pCi/g, as summarized in Table 3.1 (see Appendix A for Radiological Survey Data).

Drawing GU-029-020 shows the actual areas of excavation.

These results confirm that exterior contamination has been reduced to levels below the EPA standards for radium in soil. Background for the Gunnison site is 1.0 pCi/g Ra-226.

Interior:

There are no structures on this property.

3.1.3 Post-Restoration Survey

In accordance with Supplemental Standards Guidelines, a post-restoration dose rate survey was performed. The street was surveyed at its surface above the utility lines. The measurements are summarized in Table 3.2. These measurements may be compared with the Gunnison background of 13 μ R/hr.

3.2 Recommendation for Certification

3.2.1 Exterior:

One area of contamination was identified and removed. Soil samples after excavation and prior to backfilling indicate that the limits of 5 pCi/g above background in the surface 15 cm., and 15 pCi/g above background in any 15 cm. layer below the surface are not exceeded. Based on this information and the supplemental standards information, we recommend that the exterior of this vicinity property be certified to be in compliance with EPA standards for the UMTRA Project.

3.2.2 Interior:

There are no structures on this property.

TABLE 3.1
VERIFICATION SOIL SAMPLE SURVEY
PROPERTY GU-029

GRID ID	SAMPLE ID	SAMPLE DEPTH	FINAL RA-226 CONCEN. (pCi/g)
1	GUN-SV-001-029	> 15	3.8
2	GUN-SV-002-029	> 15	4.3
3	GUN-SV-003-029	> 15	7.2
4	GUN-SV-004-029	> 15	4.3
5	GUN-SV-005-029	> 15	7.3
6	GUN-SV-006-029	> 15	5.0
7	GUN-SV-007-029	> 15	3.7
8	GUN-SV-008-029	> 15	3.1
9	GUN-SV-009-029	> 15	3.4
10	GUN-SV-010-029	> 15	1.1
11	GUN-SV-011-029	> 15	3.2
12	GUN-SV-012-029	> 15	2.2
13	GUN-SV-013-029	> 15	3.4
15	GUN-SV-016-029	> 15	4.4
16	GUN-SV-015-029	> 15	3.5
17	GUN-SV-017-029	> 15	8.4
18	GUN-SV-018-029	> 15	3.0
19	GUN-SV-019-029	> 15	7.3
20	GUN-SV-020-029	> 15	2.3
21	GUN-SV-021-029	> 15	2.7
22	GUN-SV-022-029	> 15	2.5
23	GUN-SV-023-029	> 15	8.5
24	GUN-SV-024-029	> 15	2.8
25	GUN-SV-025-029	> 15	4.5
26	GUN-SV-026-029	> 15	4.3
27	GUN-SV-027-029	> 15	5.5
28	GUN-SV-028-029	> 15	4.1
29	GUN-SV-029-029	> 15	7.8
30	GUN-SV-030-029	> 15	5.8
31	GUN-SV-031-029	> 15	6.4
32	GUN-SV-0001-029A	> 15	-0.1

TABLE 3.2
SUPPLEMENTAL STANDARDS
GAMMA SCREENING SURVEY
PROPERTY GU-029

<u>LOCATION</u>	<u>DOSE RATE (μR/hr)</u>
0+00	8
0+20	8
0+40	8
0+60	7
0+80	8
1+00	8
1+20	10
1+40	9
1+60	10
1+80	9
2+00	10
2+20	9
2+40	12
2+60	12
2+80	10
3+00	10
3+20	11
3+40	9
3+60	9
3+80	8
4+00	8
4+20	9
4+40	10
4+60	9

TABLE 3.3
SUPPLEMENTAL STANDARDS
BOREHOLE SURVEY
PROPERTY GU-029

BH #	LOCATION	* DEPTH OF CONTAMINATION	** μ R/HR
66	3+20,37L	0-66 + "	54
67	2+72,35L	0-66 + "	39
84	2+00,38L	0-84 + "	68
87	1+29,37L	0-84 + "	44
88	0+71,38L	0-78 + "	40

* Boreholes were augered before remediation, therefore; depth of contamination is also prior to remediation.

** μ R/HR is at a depth of 66" or greater. This gives a gamma rate in the supplemental standards area at the depth of contamination.

TABLE 3.4
SUPPLEMENTAL STANDARDS
SOIL SAMPLE SURVEY
PROPERTY GU-029

SAMPLE ID	LOCATION	DEPTH OF SAMPLE(cm)	FINAL Ra-226(pCi/g)
GUN-SS-039	Trench #2	*	187.3
GUN-SS-040	0+38,50L	*	321.2
GUN-SS-047	0+38,40L	195-210	36.6
GUN-SS-068	4+16,36L	210-225	60.9
GUN-SS-069	4+16,36L	195-210	28.5
GUN-SS-070	4+16,36L	180-195	59.8
GUN-SS-071	4+16,36L	165-180	19.0
GUN-SS-072	4+16,36L	150-165	41.0

* Field personnel failed to record the soil sample depth

For worst case scenario it is assumed that samples GUN-SS-039 and GUN-SS-040 are within the supplemental standards area.

TABLE 3.4
SUPPLEMENTAL STANDARDS
SOIL SAMPLE SURVEY
PROPERTY GU-029

<u>SAMPLE ID</u>	<u>LOCATION</u>	<u>DEPTH OF SAMPLE(cm)</u>	<u>FINAL Ra-226(pCi/g)</u>
4.0	REFERENCES		
4.1	Spillover Inclusion Request for Property GU-029; MK Ferguson; October 23, 1990.		
4.2	The Radiological and Engineering Assessment for Gunnison Property GU-029; MK-Ferguson Company/Rust Federal Services; Albuquerque, New Mexico; March 21, 1991.		
4.3	health Physics Procedures; Rust Federal Services, for MK-Ferguson Company, remedial Action Contractor; Albuquerque, New Mexico; October 1993.		
4.4	Vicinity Properties Management and Implementation Manual; UMTRAP, U.S. Department of Energy; Albuquerque, New Mexico; August 1986.		
4.5	Title 40, Code of Federal Regulations, Part 192.12-23; U.S. Environmental Protection Agency; Washington, D.C.; July 1983.		



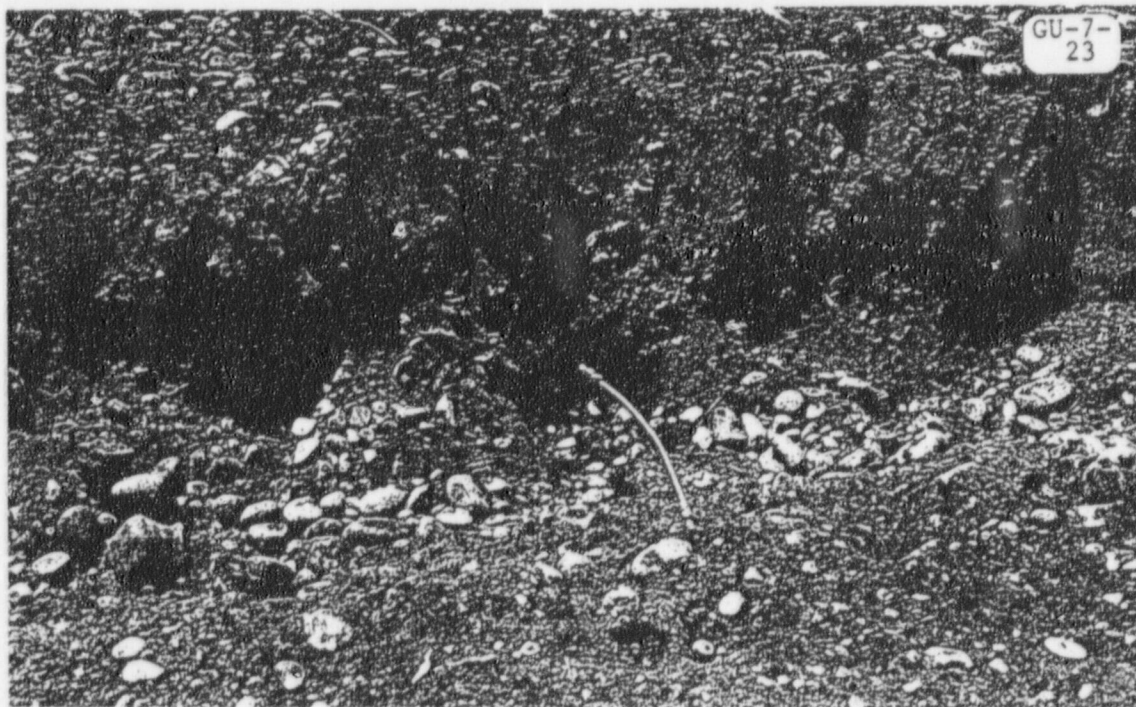
Broken Sewer Service Line to Wendell's Print Shop STA 1+50.



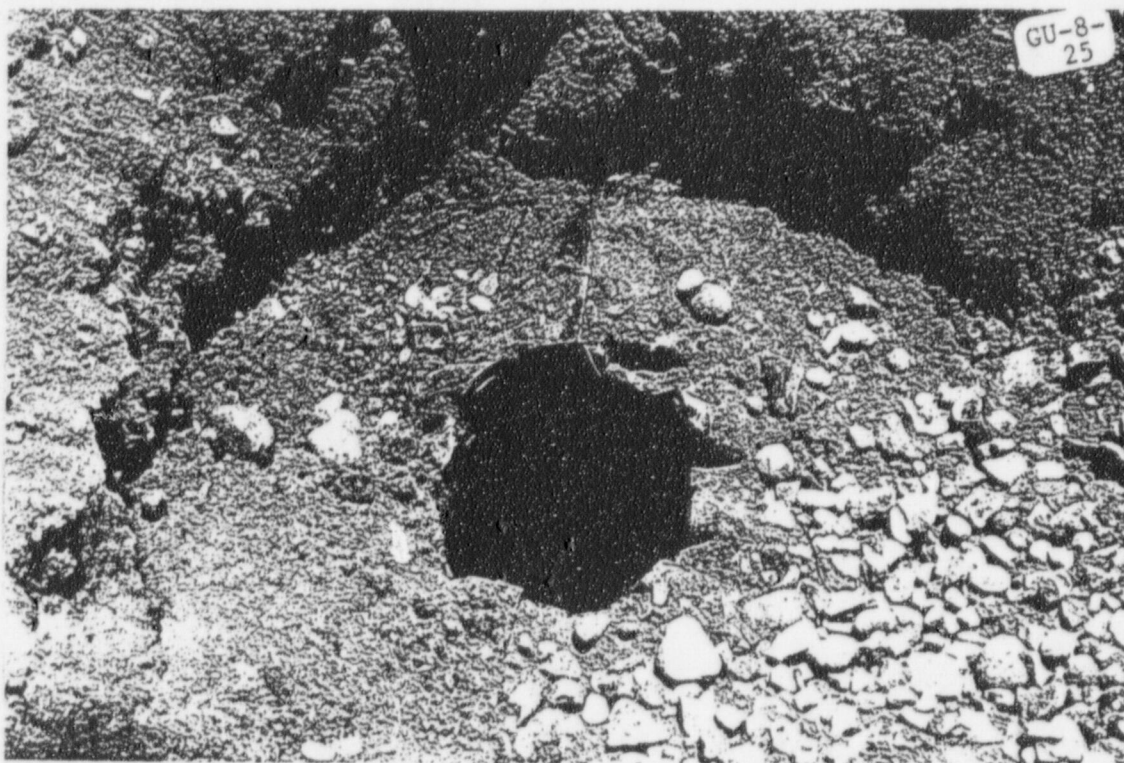
Sewer Service Line Repairs.



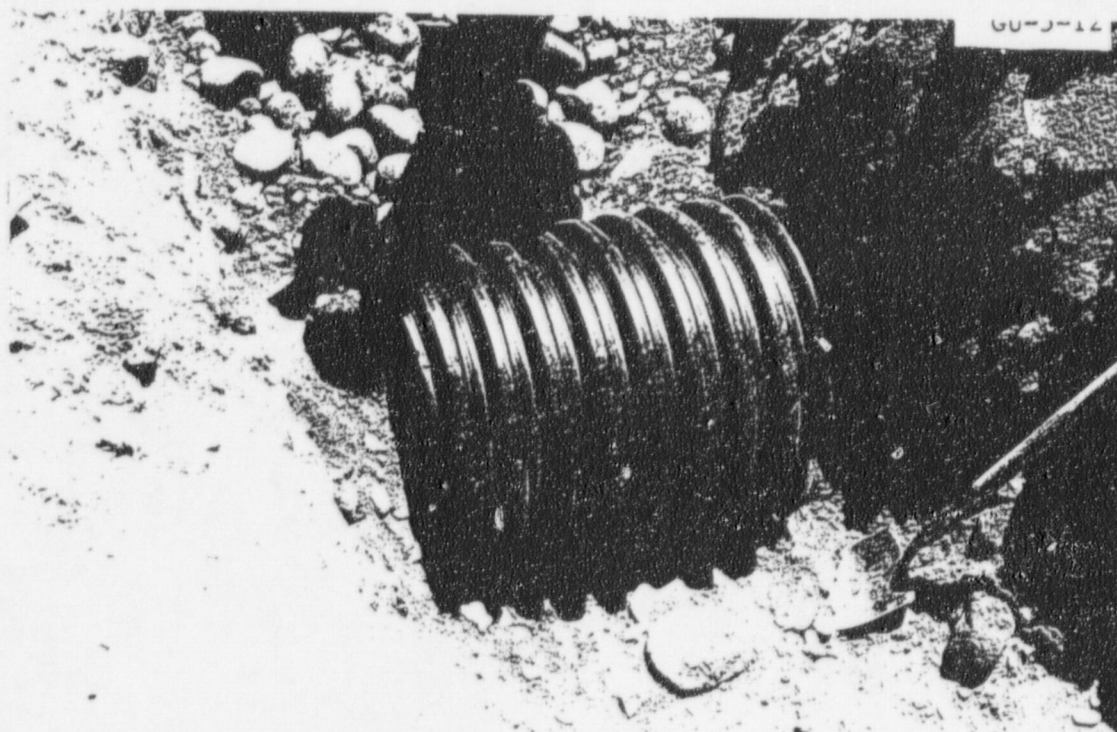
Broken Water Line at STA 3+30.



View of Repaired Water Line.



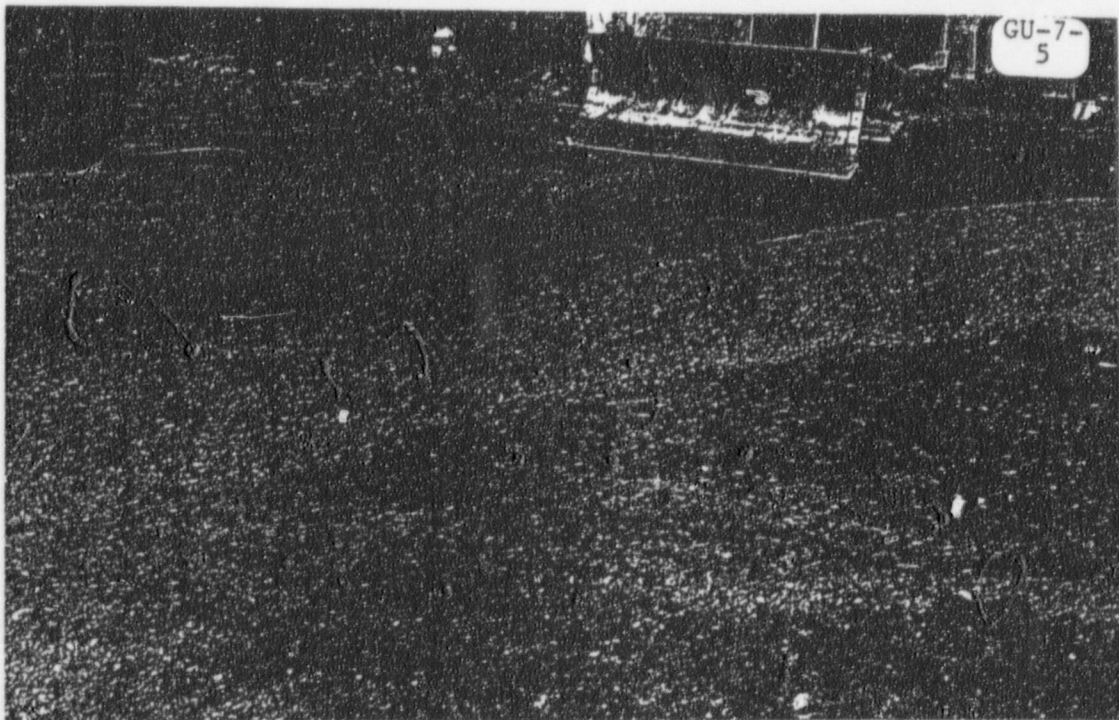
Broken Storm Drain.



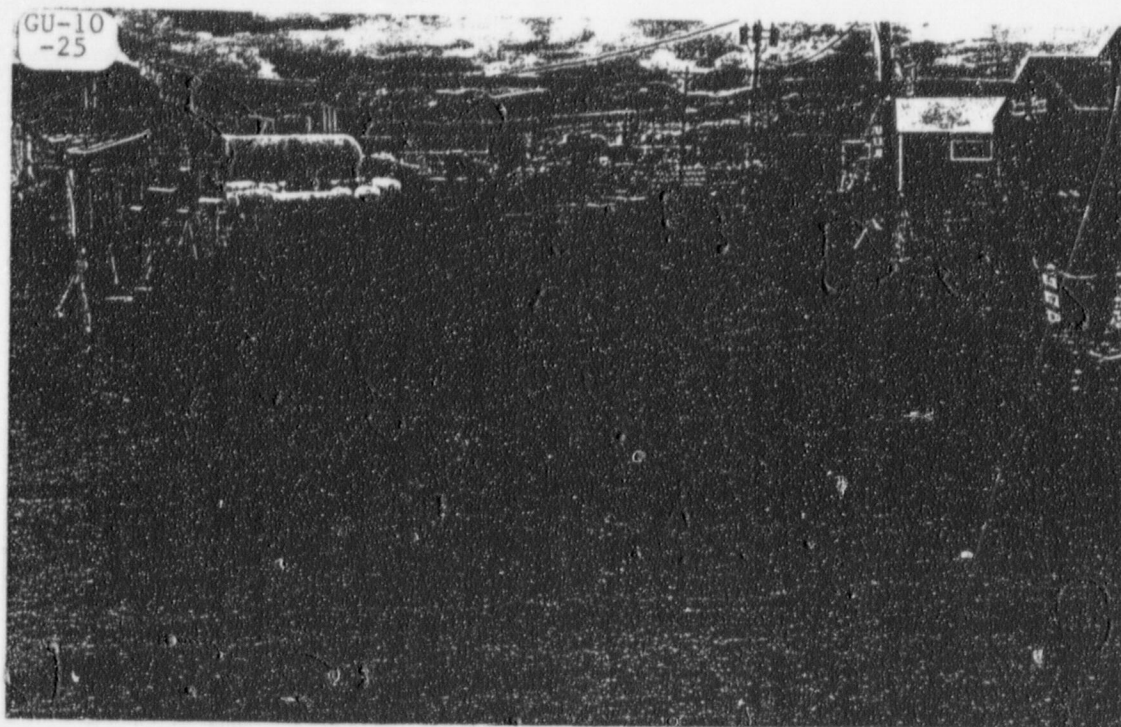
Replaced Section of Storm Drain.



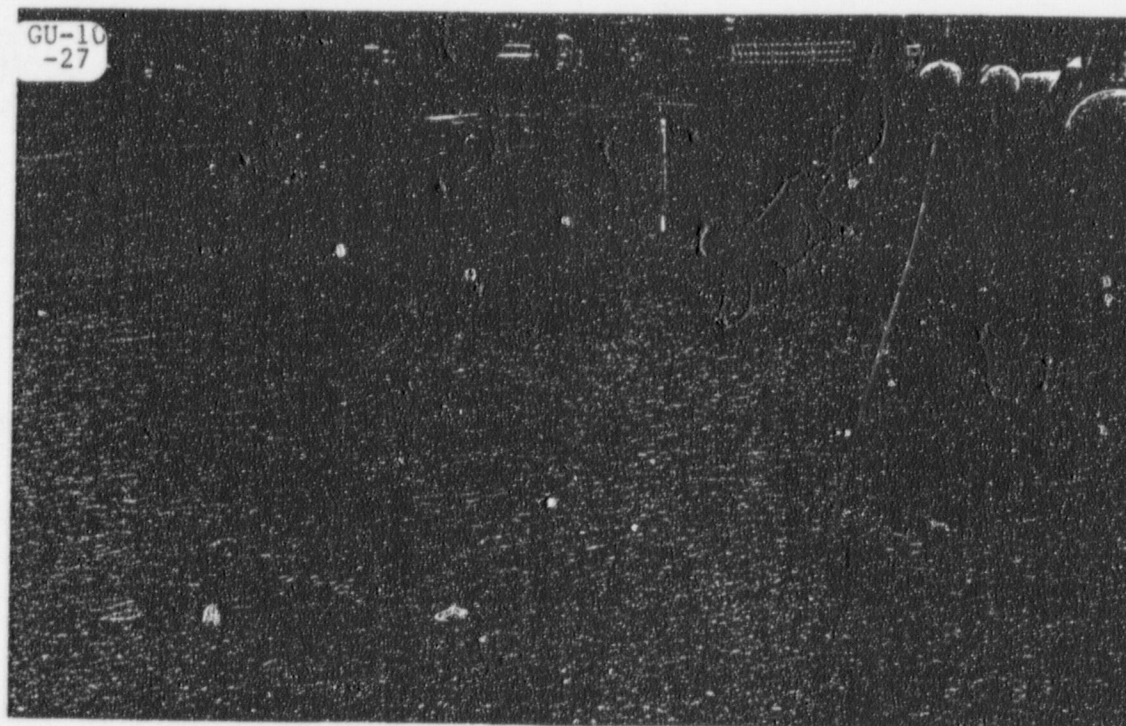
Backfill and Compaction Operation Around Storm Drain at STA 0+13.



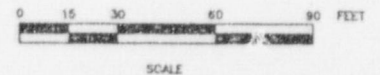
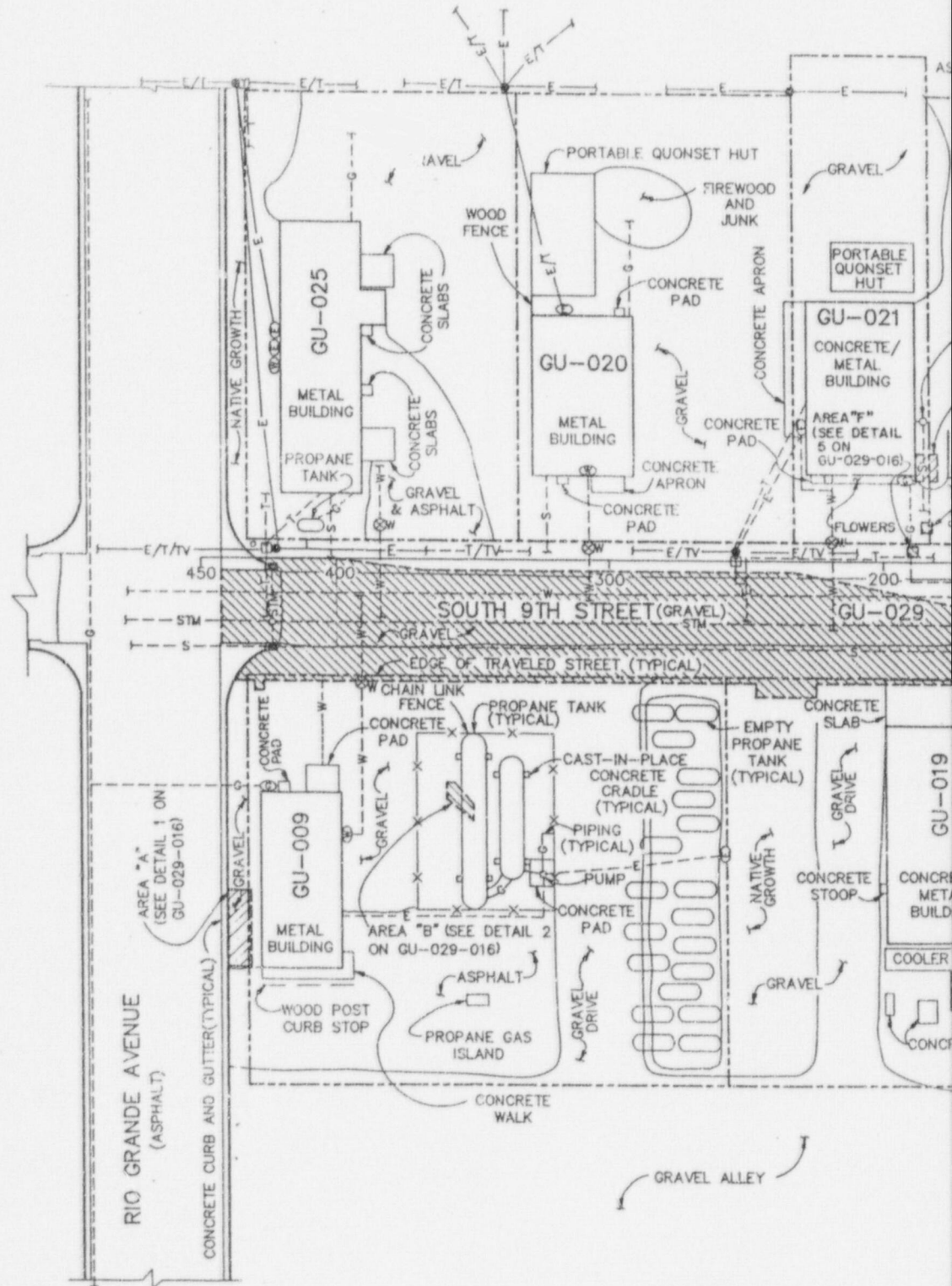
Aggregate Base Course Being Applied on Top of Backfill.



Looking North After Remedial Action.



Looking South After Remedial Action from GU-009.



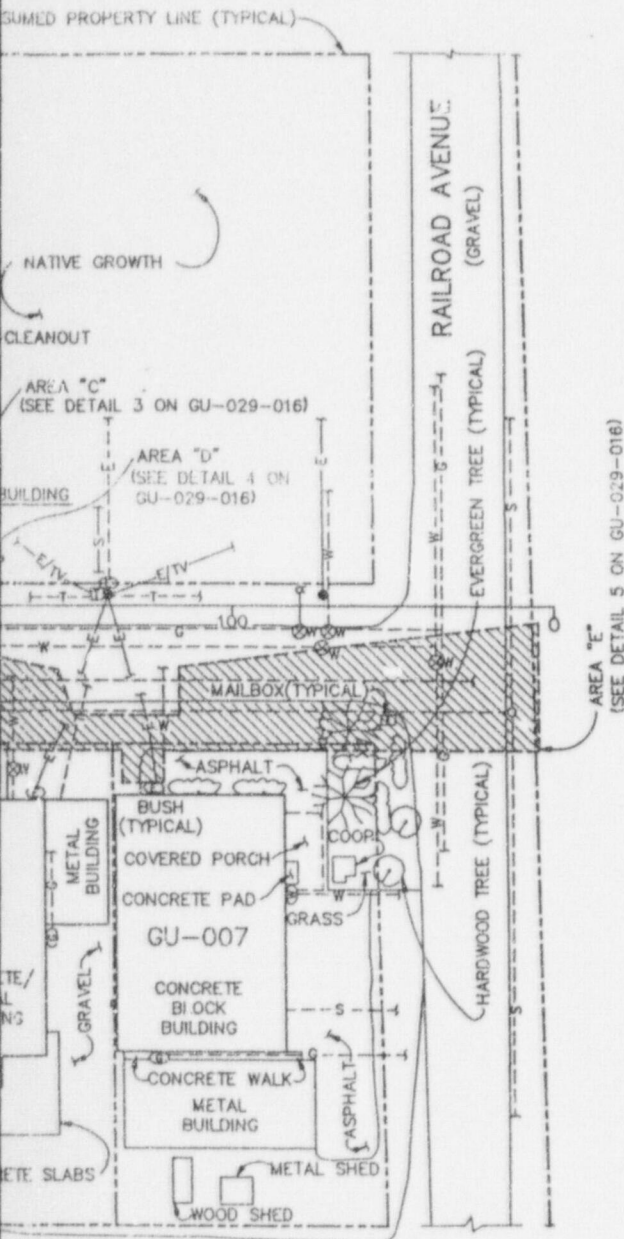
ESTIMATED DEPTH OF CONTAMINATION



12 INCHES



18 INCHES



NOTE: SEE DRAWING GU-029-016 FOR ENLARGED VIEWS OF CONTAMINATION LIMITS, BOREHOLES, AND SOIL SAMPLES.

**APERTURE
CARD**

Also Available on
Aperture Card

9808050130-01

NO.	DATE	REVISIONS	PH
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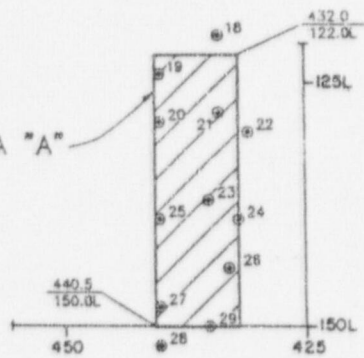
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REVIEWED	GU-007/009/019/020/021/025/029		
RECOMMENDED	URANIUM MILL TAILINGS REMEDIAL ACTION PROJECT		
APPROVED NR	DATE	DOE PROJECT MANAGER NR	DOE PROJECT ENGINEER NR
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DRAWING NO.		GU-029-015	
REV. A			



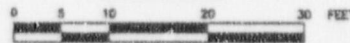
MK-FERGUSON
A MORRISON KNUDSEN COMPANY



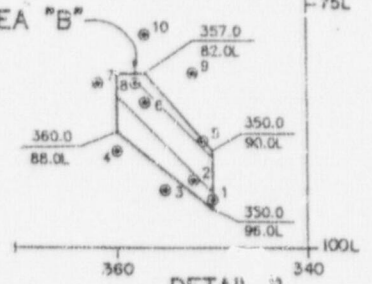
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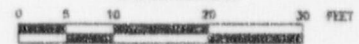
DETAIL 1



AREA "B"

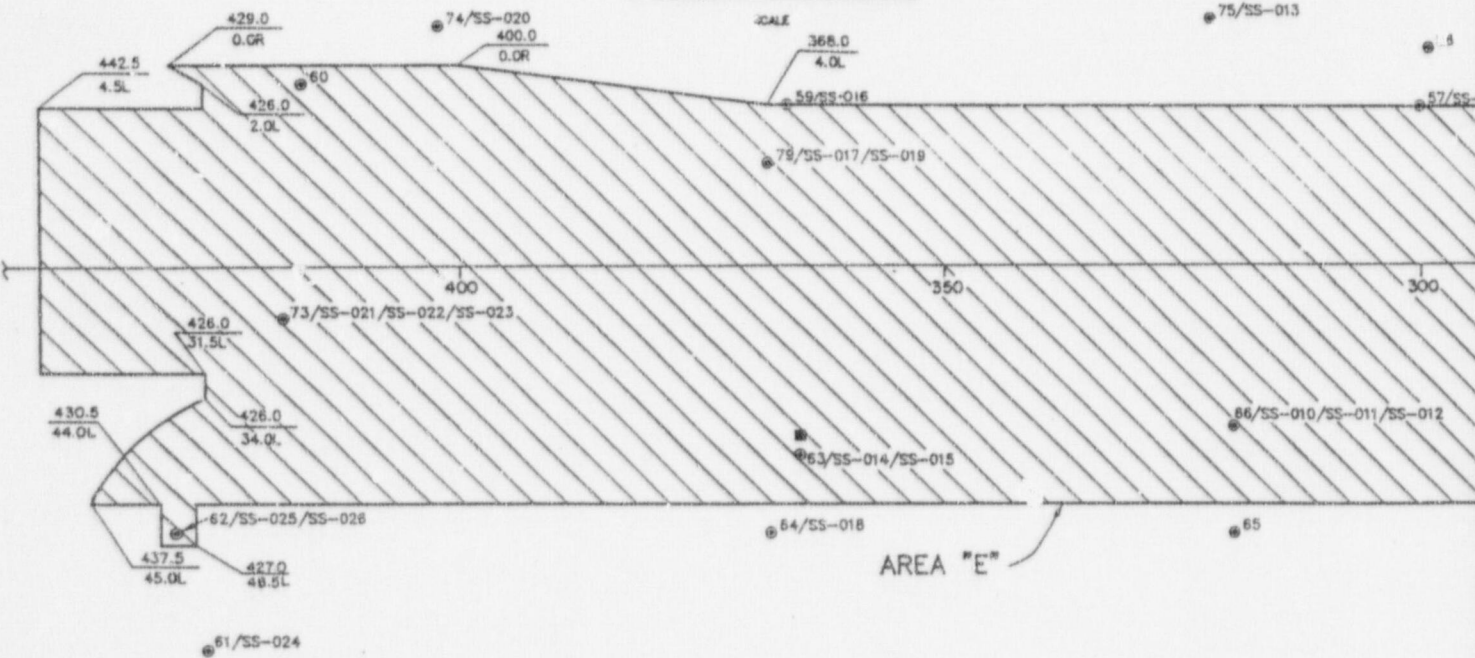


DETAIL 2



SCALE

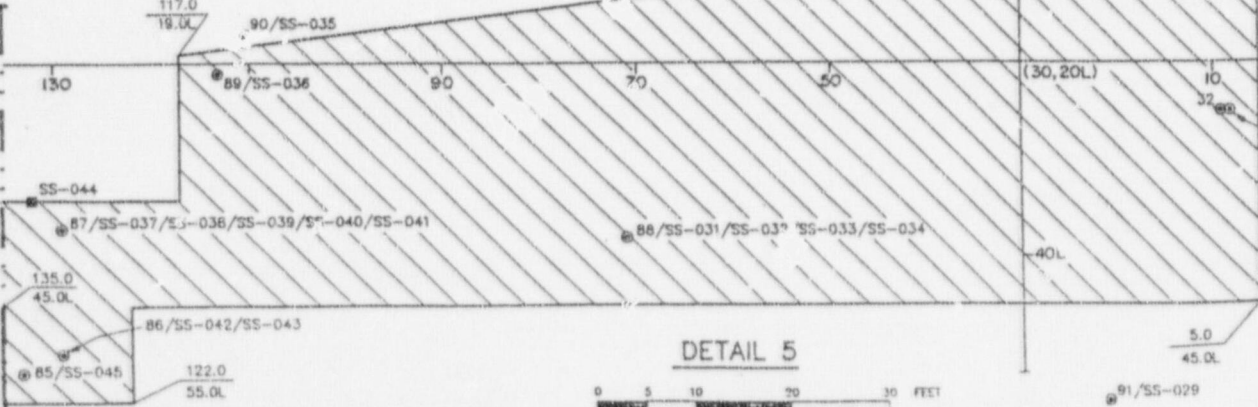
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AREA "E"

AREA "E"

MATCH LINE-AREA "E" CONTINUED

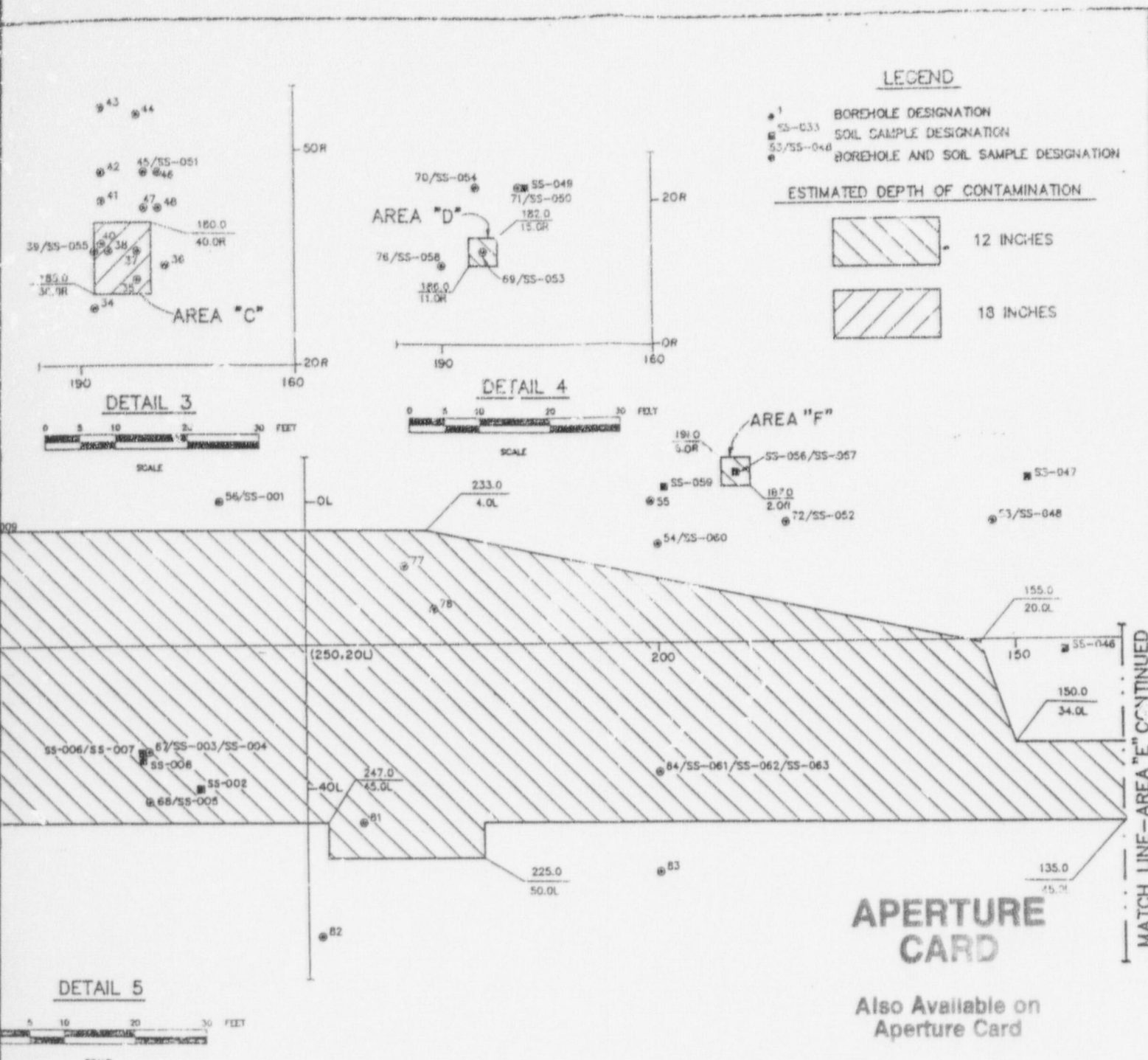


DETAIL 5



SCALE

91/SS-029

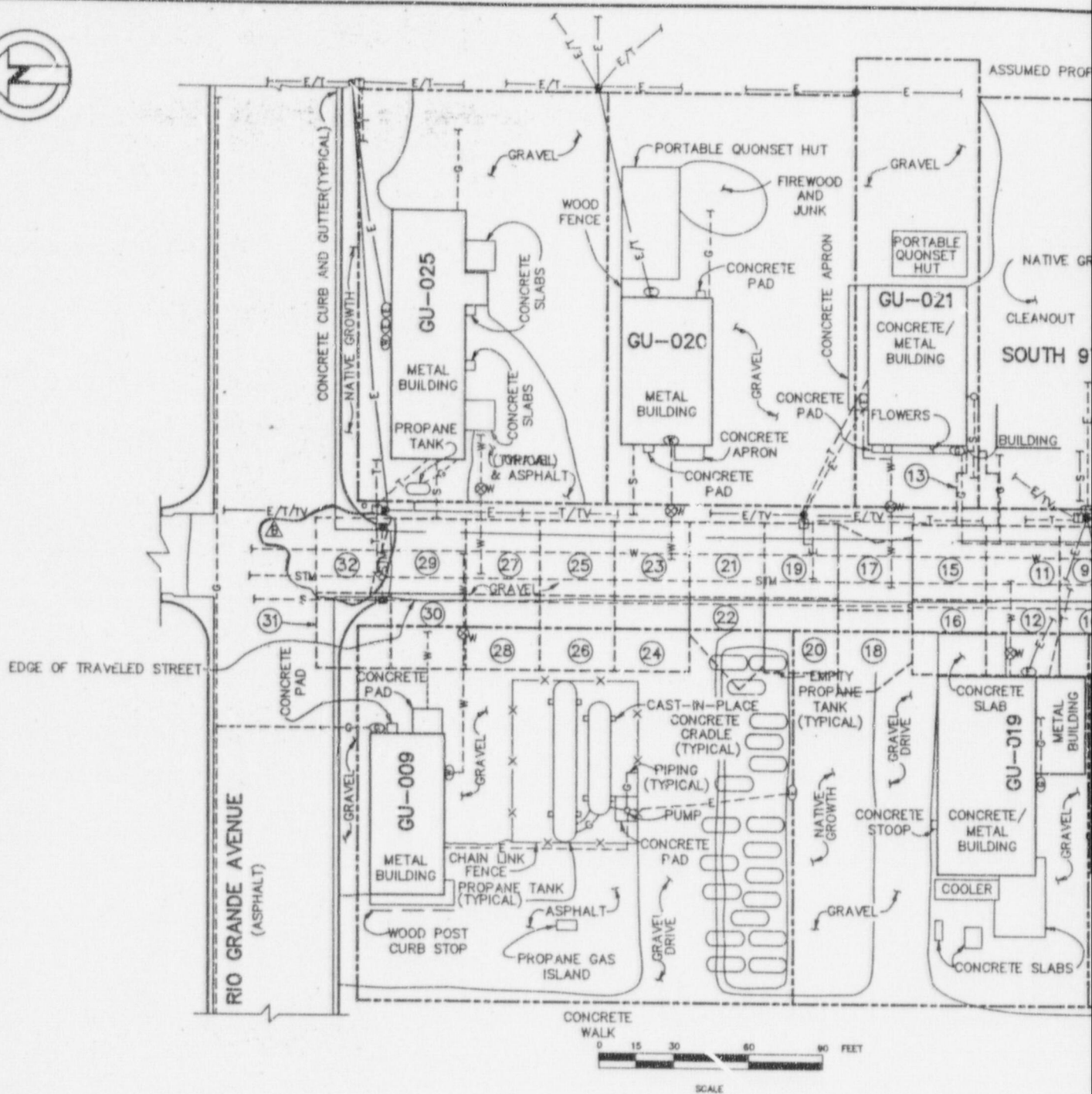


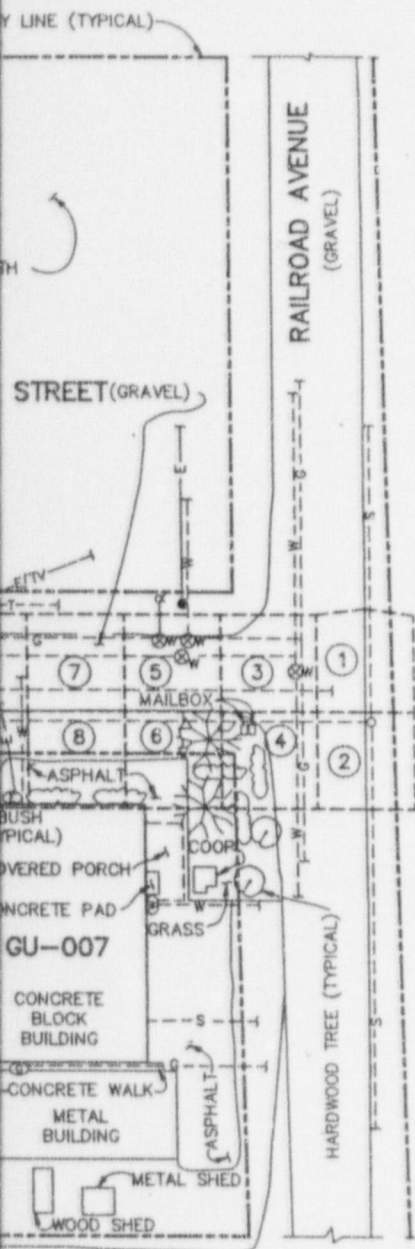
NOTE: SEE DRAWING GU-029-015 FOR LOCATION OF ENLARGED VIEWS.

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REVIEWED				GU-007/009/019/020/021/025/029							
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APPROVED				DATE		DOE PROJECT MANAGER		DATE		DOE PROJECT ENGINEER	
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DRAWING NO. GU-029-016											
REV. A											

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APPROVED				DOE				DOE			





VERIFICATION SOIL SAMPLES

LOCATION	SOIL SAMPLE NUMBER
1	GUN-SV-001-029
2	GUN-SV-002-029
3	GUN-SV-003-029
4	GUN-SV-004-029
5	GUN-SV-005-029
6	GUN-SV-006-029
7	GUN-SV-007-029
8	GUN-SV-008-029
9	GUN-SV-009-029
10	GUN-SV-010-029
11	GUN-SV-011-029
12	GUN-SV-012-029
13	GUN-SV-013-029
15	GUN-SV-015-029
16	GUN-SV-016-029
17	GUN-SV-017-029
18	GUN-SV-018-029
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20	GUN-SV-020-029
21	GUN-SV-021-029
22	GUN-SV-022-029
23	GUN-SV-023-029
24	GUN-SV-024-029
25	GUN-SV-025-029
26	GUN-SV-026-029
27	GUN-SV-027-029
28	GUN-SV-028-029
29	GUN-SV-029-029
30	GUN-SV-030-029
31	GUN-SV-031-029
32	GUN-VS-0001-29A

APERTURE CARD

Also Available on Aperture Card

9808050130-03

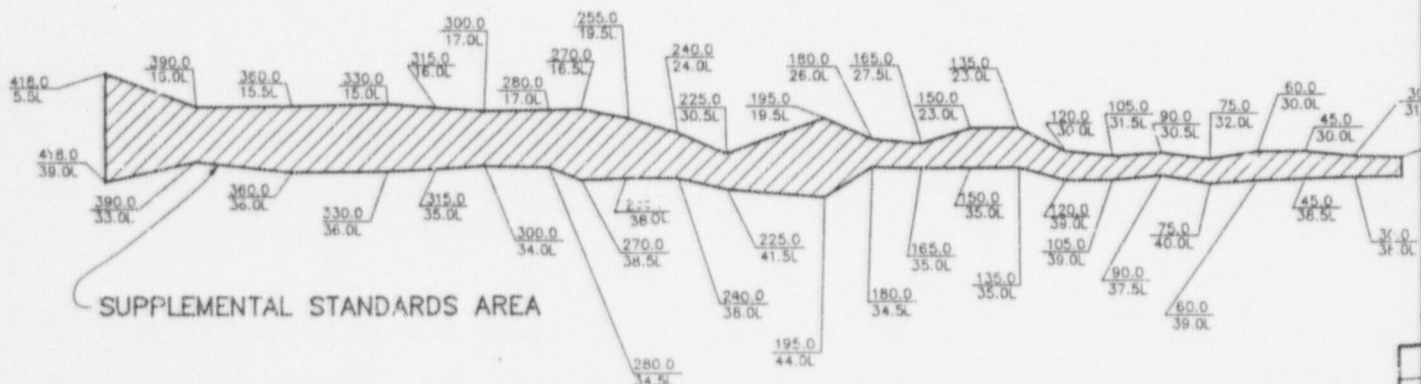
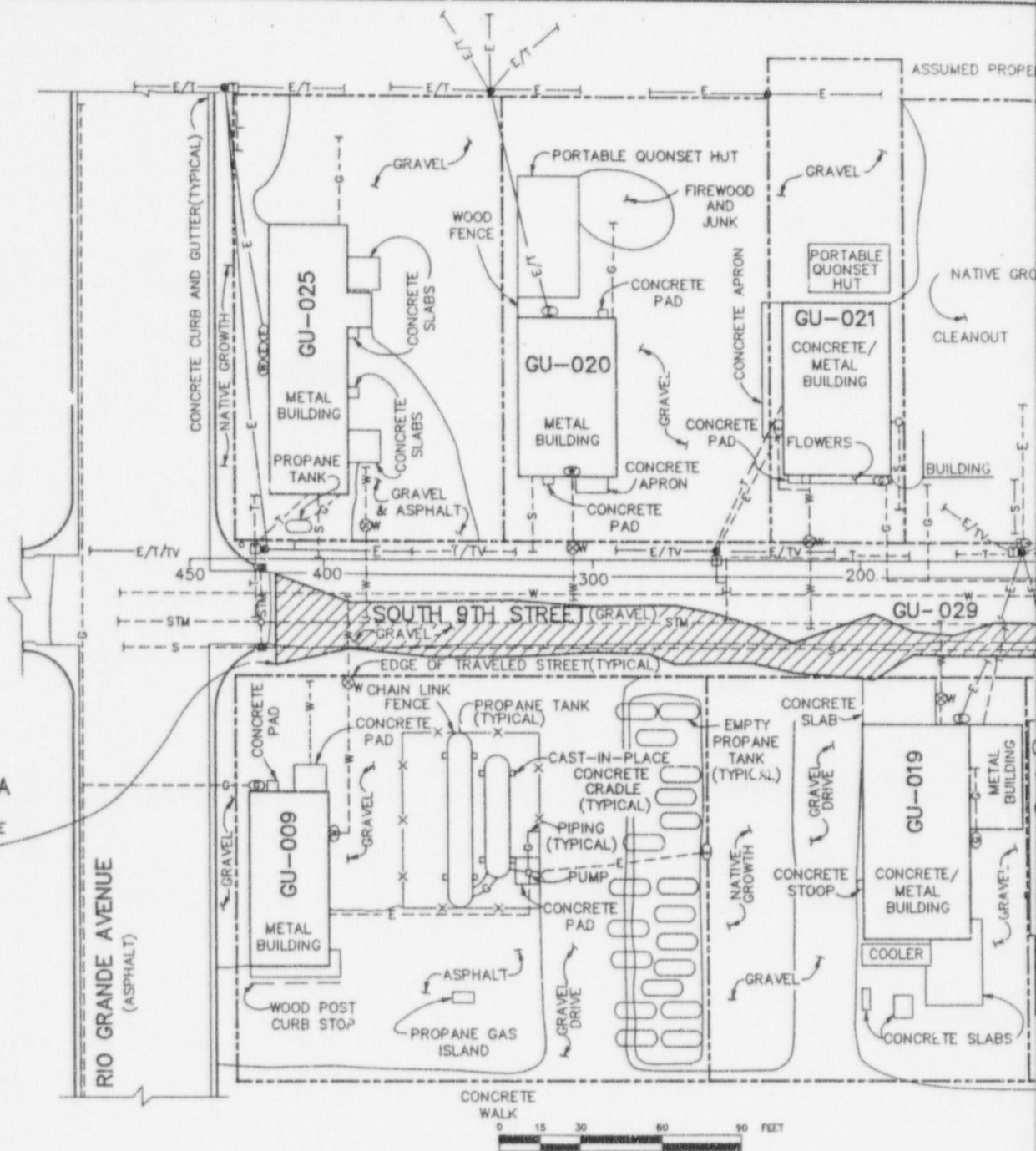
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REVIEWED		URANIUM MILL TAILINGS REMEDIAL ACTION PROJECT																							
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MORRISON KNUDSEN

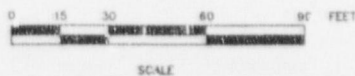


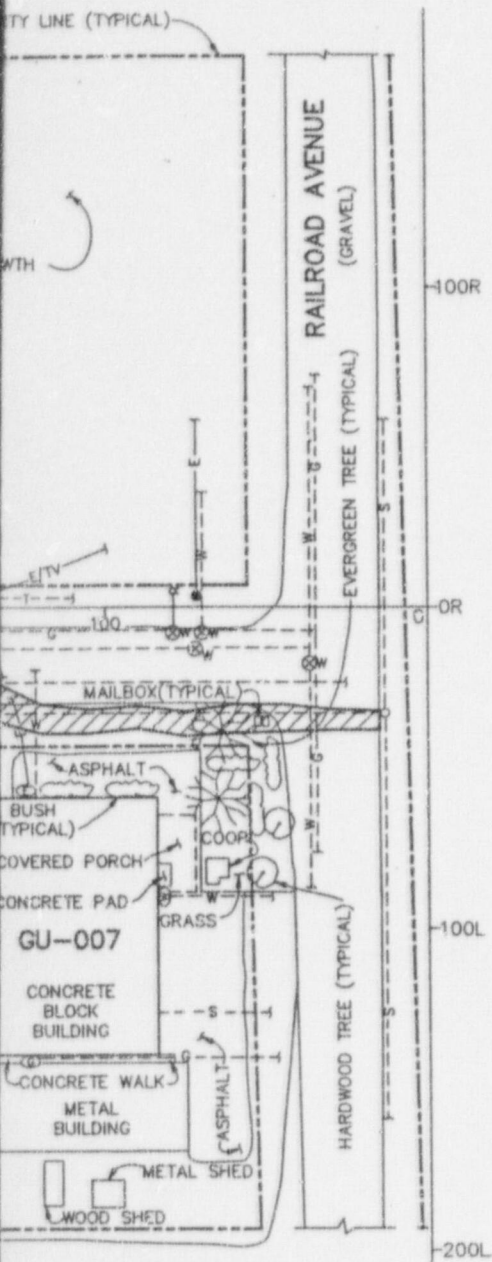
SUPPLEMENTAL
STANDARDS AREA
(SEE DETAIL 1 THIS
DRAWING FOR COORDINATE
LOCATIONS)



SUPPLEMENTAL STANDARDS AREA

DETAIL 1





NOTE:

- SUPPLEMENTAL STANDARDS IN ACCORDANCE WITH 40 CFR 192.21 (c) SHALL APPLY TO LOW LEVEL RADIOACTIVE MATERIAL TO REMAIN IN PLACE AROUND UNDERGROUND SEWER PIPES. APPROXIMATELY 340 CY COVERING 659 SY REMAINS IN PLACE. SUPPLEMENTAL STANDARDS MATERIAL IS COVERED BY AN AVERAGE THICKNESS OF 4.16 FEET OF COMPACTED COMMON FILL.

APERTURE CARD

Also Available on
Aperture Card

980 8050130-04

U. S. DEPARTMENT OF ENERGY
ALBUQUERQUE, NEW MEXICO

DESIGNED BY
CHECKED BY
REVIEWED BY
RECOMMENDED BY

PHC

SUPPLEMENTAL STANDARDS

GU-029

GUNNISON, 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.
GU-029-018

REV. A

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ISSUE FOR: SUPPLEMENTAL STANDARDS

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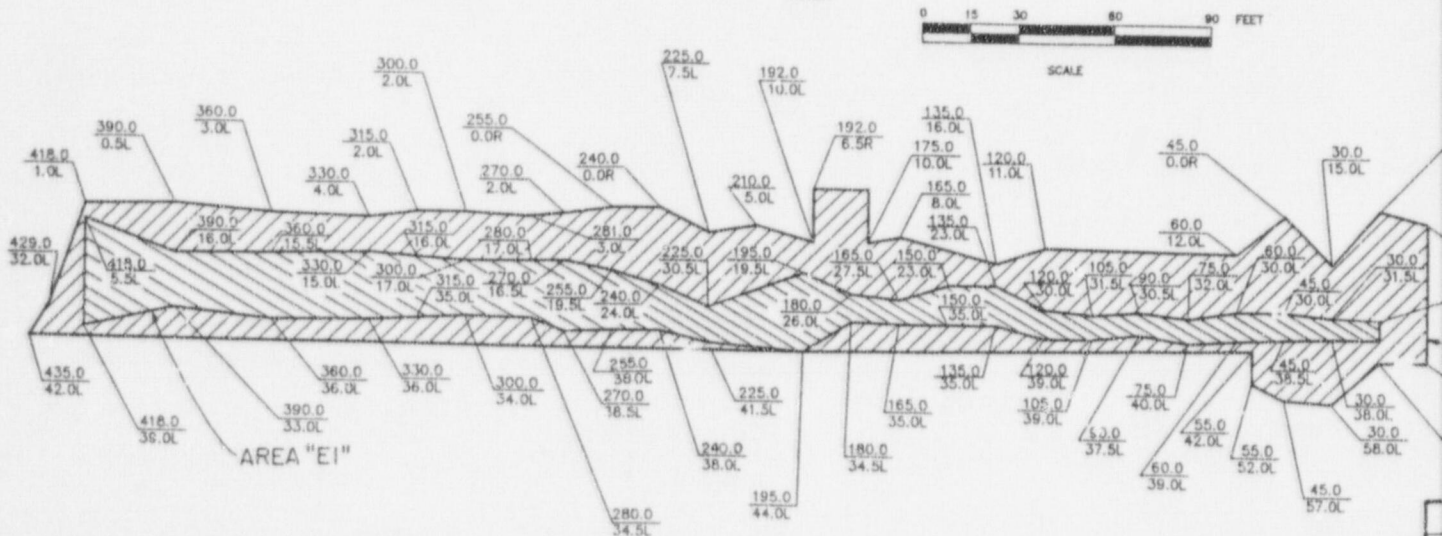
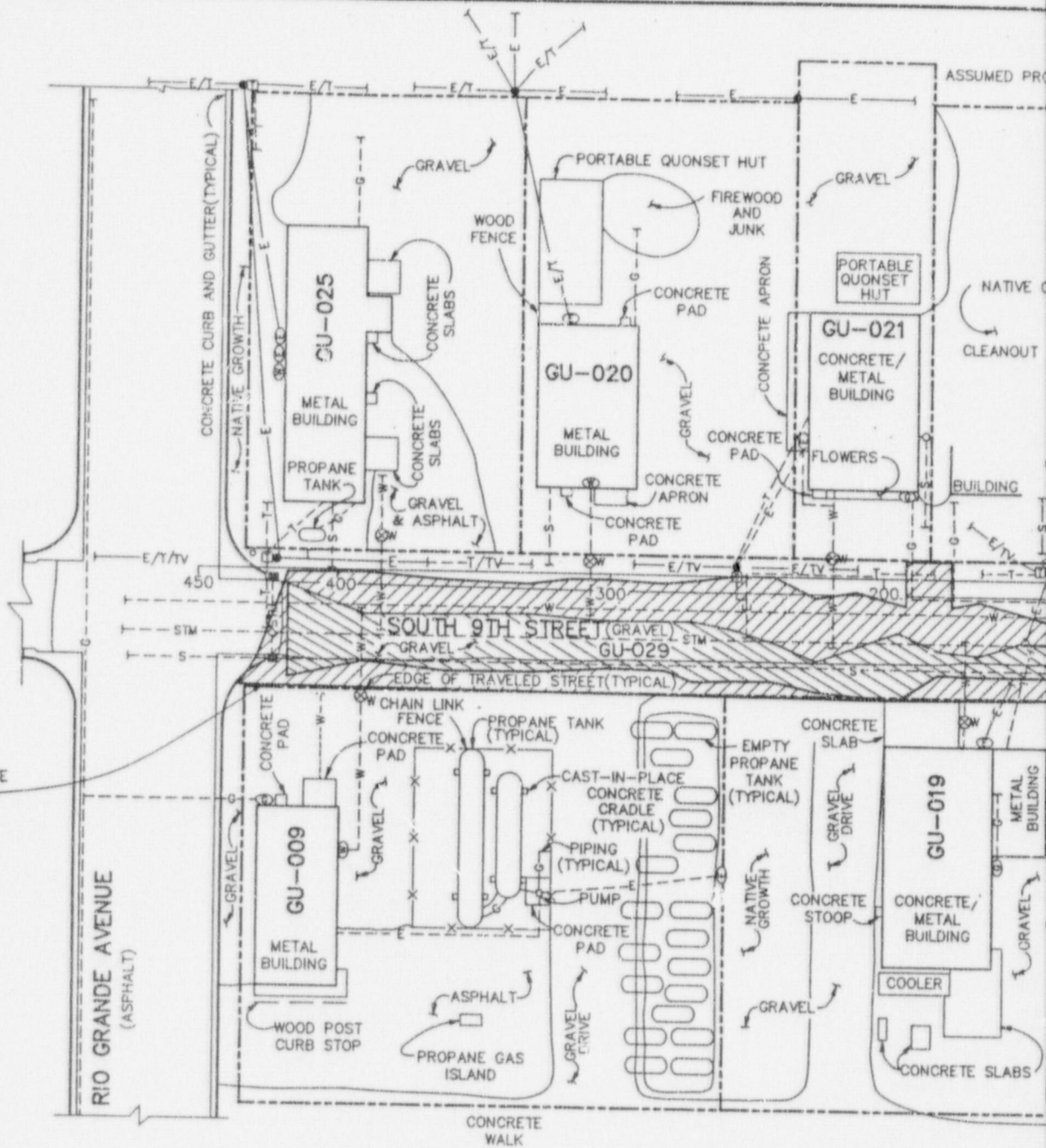
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REVISIONS

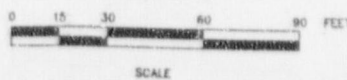
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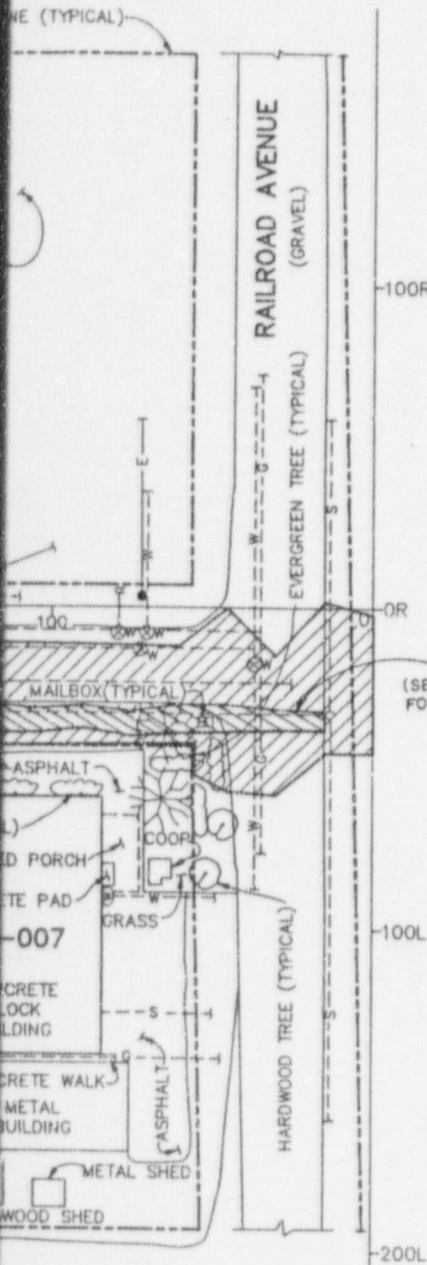


AREA "E"
(SEE DETAIL 1 THIS
DRAWING FOR COORDINATE
LOCATIONS)



DETAIL 1





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
P	PROPERTY LINE
X-X-X-X-X	FENCE LINE
⊙	METER
⊗	VALVE
○	PROPERTY PIN
●	POWER POLE

OVERHEAD SERVICE DENOTED BY SOLID LINE
UNDERGROUND SERVICE DENOTED BY DASHED LINE

NOTES:

- THE LATEST REVISION OF THE FOLLOWING TECHNICAL SPECIFICATIONS APPLY TO THE REMEDIAL ACTION WORK REQUIRED FOR PROPERTY NO. GU-007/009/018/020/021/025/029

SECTION 02110
CLEARING AND GRUBBING

SECTION 02130
CONTAMINATED MATERIAL REMOVAL

SECTION 02200
EXCAVATION AND BACKFILL

SECTION 02480
LANDSCAPING

SECTION 02500
PAVING AND SURFACING

- BACKFILL GRAVEL AREAS WITH 6 INCHES OF AGGREGATE BASE COURSE. GRADE TO MATCH ORIGINAL CONTOURS. WHERE EXCAVATION EXCEEDS 6 INCHES BACKFILL WITH COMPACTED COMMON FILL TO 6 INCHES BELOW ORIGINAL GRADE PRIOR TO PLACEMENT OF AGGREGATE BASE COURSE. MOISTURE CONTROL FOR COMMON FILL SHALL BE IN ACCORDANCE WITH SECTION 02500 PARAGRAPH 1.020.
- REPAIRED EXISTING UTILITY LINES AS REQUIRED.

- UTILITY LOCATIONS ARE FOR REFERENCE ONLY. SUBCONTRACTOR SHALL BE SOLELY RESPONSIBLE FOR THE ACTUAL LOCATIONS OF UTILITIES PRIOR TO START OF CONSTRUCTION.

- 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 SHOWN ON THE DESIGN DRAWINGS SHALL BE AS DIRECTED BY THE CONTRACTOR'S REPRESENTATIVE.

- THE EXACT LOCATION AND EXTENT OF SUBSURFACE UTILITIES IS UNKNOWN. SUBCONTRACTOR SHALL EXERCISE EXTREME CAUTION DURING EXCAVATION ACTIVITIES. ANY DAMAGE TO SUBSURFACE UTILITIES SHALL BE REPAIRED AT THE SUBCONTRACTOR'S EXPENSE.

- REMOVE MISCELLANEOUS YARD ITEMS. REPLACE IN ORIGINAL LOCATION AS DIRECTED BY CONTRACTOR'S REPRESENTATIVE FOLLOWING OTHER WORK.

- REMOVE BUSHES LOCATED IN AREA 'E'. REPLACE WITH APPROVED NURSERY STOCK AS DIRECTED BY THE CONTRACTOR'S REPRESENTATIVE FOLLOWING OTHER WORK.

- EXCAVATE AREA 'E' AND AREA 'E1' TO THE LIMITS INDICATED ON THIS DRAWING TO AN AVERAGE DEPTH OF 4.61 FEET FOR AREA 'E' AND 4.16 FEET FOR AREA 'E1'.

APERTURE CARD

Also Available on Aperture Card

9808050130-05

AREA "E"

AS-BUILT DRAWING

U. S. DEPARTMENT OF ENERGY
ALBUQUERQUE, NEW MEXICO

EXCAVATION AND RESTORATION PLAN

GU-029

GUNNISON, COLORADO

URANIUM MILL TAILINGS REMEDIAL ACTION PROJECT

DESIGNED/DRAWN	PHC	PHC
CHECKED	PHC	PHC
REVIEWED	PHC	PHC
RECOMMENDED	PHC	PHC
APPROVED	PHC	PHC

NR

DATE

DOE PROJECT MANAGER

DATE

DOE PROJECT ENGINEER

DATE

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AS-BUILT DRAWING

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DRAWING REPLOTED

LAST REVISION NUMBER 0 DATED 4-15-91

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MORRISON KNUDSEN

PROJECT NO.

DE-AC04-83AL18795

DRAWING NO.

GU-029-020

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1

APPENDIX A
RADIOLOGICAL SURVEY DATA

GU-029

SOIL VERIFICATION DATA

GRID NUMBER	COORDINATES	SAMPLE #	APPROX. DEPTH	Ra-226 (pCi/g) CONCENTRATION		COMMENT
				INITIAL	FINAL	
1	0+00, 30.0L; 0+30, 30.0L; 0+30, 00.0L; 0+00, 00.0L	GUN-SV-001-029	12"-36"	2.8	3.8	Area "E"
2	0+00, 60.0L; 0+30, 60.0L; 0+30, 30.0L; 0+00, 30.0L	GUN-SV-002-029	36"	3.0	4.3	Area "E"
3	0+30, 30.0L; 0+60, 30.0L; 0+60, 00.0L; 0+30, 00.0L	GUN-SV-003-029	9"-78"	5.2	7.2	Area "E"
4	0+30, 60.0L; 0+60, 60.0L; 0+60, 30.0L; 0+30, 30.0L	GUN-SV-004-029	72"-78"	3.1	4.3	Area "E"
5	0+60, 30.0L; 0+90, 30.0L; 0+90, 00.0L; 0+60, 00.0L	GUN-SV-005-029	62"-72"	5.2	7.3	Area "E"
6	0+60, 60.0L; 0+90, 60.0L; 0+90, 30.0L; 0+60, 30.0L	GUN-SV-006-029	72"-84"	3.2	5.0	Area "E"
7	0+90, 30.0L; 1+20, 30.0L; 1+20, 00.0L; 0+90, 00.0L	GUN-SV-007-029	48"-78"	2.7	3.7	Area "E"
8	0+90, 60.0L; 1+20, 60.0L; 1+20, 30.0L; 0+90, 30.0L	GUN-SV-008-029	24"-78"	1.6	3.1	Area "E"
9	1+20, 30.0L; 1+50, 30.0L; 1+50, 00.0L; 1+20, 00.0L	GUN-SV-009-029	54"-78"	2.8	3.4	Area "E"
10	1+20, 60.0L; 1+50, 60.0L; 1+50, 30.0L; 1+20, 30.0L	GUN-SV-010-029	18"-72"	.62	1.1	Area "E"
11	1+50, 30.0L; 1+80, 30.0L; 1+80, 00.0L; 1+50, 00.0L	GUN-SV-011-029	54"-84"	3.0	3.2	Area "E"
12	1+50, 60.0L; 1+80, 60.0L; 1+80, 30.0L; 1+50, 30.0L	GUN-SV-012-029	18"-78"	1.5	2.2	Area "E"
15	1+80, 30.0L; 2+10, 30.0L; 2+10, 00.0L; 1+80, 00.0L	GUN-SV-016-029	48"-60"	3.1	4.4	Area "E"
16	1+80, 60.0L; 2+10, 60.0L; 2+10, 30.0L; 1+80, 30.0L	GUN-SV-015-029	18"-60"	2.7	3.5	Area "E"
17	2+10, 34.5L; 2+40, 34.5L; 2+90, 00.0L; 2+25, 7.5L; 2+10, 5.0L	GUN-SV-017-029	54"-60"	4.8	8.4	Area "E"
18	2+10, 55.0L; 2+25, 67.0L; 2+40, 68.0L; 2+40, 34.5L; 2+10, 34.5L	GUN-SV-018-029	12"-72"	2.9	3.0	Area "E"

SOIL VERIFICATION DATA

ID NUMBER	COORDINATES	SAMPLE #	APPROX. DEPTH	Ra-226 (pCi/g) CONCENTRATION		COMMENT
				INITIAL	FINAL	
13	1+76, 21.0F; 1+76, 00.0R; 1+90, 00.0R; 1+90, 21.0R 1+88, 21.0R; 1+88, 30.0R; 1+80, 30.0R; 1+80, 21.0R	GUN-SV-013-029	18"	2.1	3.4	Area "D" "F"
14	1+80, 30.0R; 1+88, 30.0R; 1+88, 52.0R; 1+80, 52.0R	MA GUN-SV-014-029	18"	1.5	2.8	Area "C"

GU-029

SOIL VERIFICATION DATA

NO.	COORDINATES	SAMPLE #	APPROX. DEPTH	Ra-226 (pCi/g) CONCENTRATION INITIAL - FINAL		COMMENTS
19	2+40, 30.0L; 2+70, 30.0L; 2+70, 00.0L; 2+40, 00.0L	GUN-SV-019-029	18"-66"	5.0	7.3	Area "E"
20	2+40, 60.0L; 2+70, 60.0L; 2+70, 30.0L; 2+40, 30.0L	GUN-SV-020-029	18"-66"	1.6	2.3	Area "E"
21	2+70, 30.0L; 3+00, 30.0L; 3+00, 00.0L; 2+70, 00.0L	GUN-SV-021-029	18"-60"	1.6	2.7	Area "E"
22	2+70, 57.0L; 2+80, 67.0L; 3+00, 45.0L; 3+00, 30.0L; 2+70, 30.0L	GUN-SV-022-029	9"-60"	1.7	2.5	Area "E"
23	3+00, 30.0L; 3+30, 30.0L; 3+30, 00.0L; 3+00, 00.0L	GUN-SV-023-029	60"	5.6	8.5	Area "E"
24	3+00, 60.0L; 3+30, 60.0L; 3+30, 30.0L; 3+00, 30.0L	GUN-SV-024-029	60"	2.3	2.8	Area "E"
25	3+30, 30.0L; 3+60, 30.0L; 3+60, 00.0L; 3+30, 00.0L	GUN-SV-025-029	60"	3.8	4.5	Area "E"
26	3+30, 60.0L; 3+60, 60.0L; 3+60, 30.0L; 3+30, 30.0L	GUN-SV-026-029	60"	2.8	4.3	Area "E"
27	3+60, 30.0L; 3+90, 30.0L; 3+90, 00.0L; 3+60, 00.0L	GUN-SV-027-029	66"	4.1	5.5	Area "E"
28	3+60, 60.0L; 3+90, 60.0L; 3+90, 30.0L; 3+60, 30.0L	GUN-SV-028-029	66"	2.3	4.1	Area "E"
29	3+90, 30.0L; 4+20, 30.0L 4+20, 00.0L; 3+90, 00.0L	GUN-SV-029-029	60"-66"	5.5	7.8	Area "E"
30	3+90, 60.0L; 4+20, 60.0L; 4+20, 30.0L; 3+90, 30.0L	GUN-SV-030-029	42"-60"	4.5	5.8	Area "E"
31	4+20, 60.0L; 4+50, 60.0L; 4+50, 30.0L; 4+20, 30.0L	GUN-SV-031-029	24"-60"	3.5	6.4	Area "E"
36	2+40, 69.0L; 2+55, 68.0L; 2+68, 60.0L; 2+40, 60.0L	GUN-SV-0070-029	12"	1.3	1.6	Area "E"
37	0+07, 30R; 0+30, 30R; 0+30, 30R; 0+06, 30R	GUN-SV-033-029	48"-54"	5.5	8.0	Area "E"
38	0+06, 30R; 0+30, 30R; 0+30, 37R; 0+06, 37R	GUN-SV-034-029	48"	2.6	3.9	Area "E"

<u>Acquisition Start</u>	NAT	
Live time(s):	Aug/12/1997	13:29:24
	500.000	
% Dead time:	0.019	
<u>Sample Gross counts</u>		
ROI #1	362	
ROI #2	169	
<u>Background:</u>		
Background has been subtracted		
Background filename:	c:\windows\laptec\bk100007.csv	
File date:	8/12/97	
File time:	11:47:45	
<u>Bkg. Gross counts</u>		
ROI #1	334	
ROI #2	135	
<u>Isotope</u>	<u>pCi/g</u>	
Th-232	1.15	
Bi efficiency:	0.046	
Th efficiency:	0.0055	ROI Ratio: 0.89
Correction factor:	N/A	Corrected Ra-226: N/A
<u>Data entry:</u>		
Initial?	N	
Sample:	GUN-VS-0001-29A	
MCard:	1	
Count date:	08/12/97	
Sample date:	7/10/97	
Seal date:	7/21/97	
pCi:	-16.768	
Mass (grams):	290	
Ra-226 pCi/g:	-.06	
Sample depth(cm.):	>15	
User:	WOOD	
Comments:	N/A	

Analyst: 

Reviewed by: _____



9th STREET

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GUN-029

Dose Rate Survey

Bicroo s/n

B194D

Calibrated 9-5-96

Readings were @
20' on center.

7-14-97

A. Clemons

S. Tinsley

BOREHOLE LOG

LOGGING CREW: J. Williams
D. Andrews

SHEET 5 OF 12 PAGE

DATE: 7-16-90

PROPERTY ID: 611-007609/619/620/621/625

INSTRUMENT ID NO. #31988W/#54970

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: <u>3+20,486</u>		HOLE ID: <u>3+20,376</u>		HOLE ID: <u>2+72,356</u>		HOLE ID: _____	
TIME DRILLED: _____		TIME DRILLED: _____		TIME DRILLED: _____		TIME DRILLED: _____	
TIME LOGGED: <u>1601</u>		TIME LOGGED: <u>1608</u>		TIME LOGGED: <u>1644</u>		TIME LOGGED: _____	
SOIL TYPE: <u>Sandy</u>		SOIL TYPE: <u>Sandy</u>		SOIL TYPE: <u>Sandy</u>		SOIL TYPE: _____	
DEPTH	COUNTS/1MIN	DEPTH	COUNTS/1MIN	DEPTH	COUNTS/1MIN	DEPTH	COUNTS/1MIN
SURFACE	<u>2107</u>	SURFACE	<u>3367</u>	SURFACE	<u>3445</u>	SURFACE	
0"	<u>2051</u>	0"	<u>8191</u>	0"	<u>5261</u>	0"	
6"	<u>2119</u>	6"	<u>10733</u>	6"	<u>10054</u>	6"	
12"	<u>2069</u>	12"	<u>10167</u>	12"	<u>11549</u>	12"	
18"	<u>2057</u>	18"	<u>10541</u>	18"	<u>9090</u>	18"	
24"	<u>2130</u>	24"	<u>11060</u>	24"	<u>8066</u>	24"	
30"	<u>2180</u>	30"	<u>11592</u>	30"	<u>7448</u>	30"	
36" <u>BOH</u>	<u>2190</u>	36"	<u>11486</u>	36"	<u>7375</u>	36"	
42"		42"	<u>11522</u>	42"	<u>7365</u>	42"	
48"		48"	<u>12210</u>	48"	<u>6547</u>	48"	
54"		54"	<u>10355</u>	54"	<u>5512</u>	54"	
60"		60"	<u>9341</u>	60"	<u>4896</u>	60"	
66"		66" <u>BOH</u> *	<u>7674</u>	66" <u>BOH</u> *	<u>5268</u>	66"	
72"		72"		72"		72"	
78"		78"		78"		78"	
84"		84"		84"		84"	
90"		90"		90"		90"	
96"		96"		96"		96"	

REMARKS: * Sample taken ** Sewer pipe found at 5.5 feet
Readings and samples taken from trenches.

BOREHOLE LOG

LOGGING CREW: J. Williams
D. Andrews

SHEET 10 OF 12 PAGE _____

DATE: 7-17-90

INSTRUMENT ID NO. #35647 w/ #17606

PROPERTY ID: 6U-007/009/019/020/021/022

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.

2+42, 81				82				83				** 84			
HOLE ID: 2+42, 45L		HOLE ID: 2+48, 61L		HOLE ID: 2+00, 52L		HOLE ID: 2+00, 38L									
TIME DRILLED: 0859		TIME DRILLED: 0906		TIME DRILLED: 0915		TIME DRILLED: 0931									
TIME LOGGED: 0859		TIME LOGGED: 0906		TIME LOGGED: 0915		TIME LOGGED: 0931									
SOIL TYPE: sandy		SOIL TYPE: sandy		SOIL TYPE: sandy		SOIL TYPE: sandy									
DEPTH		COUNTS/.1MIN		DEPTH		COUNTS/.1MIN		DEPTH		COUNTS/.1MIN		DEPTH		COUNTS/.1MIN	
SURFACE		5967		SURFACE		1848		SURFACE		1925		SURFACE		3196	
0"		13876		0"		1898		0"		2019		0"		4427	
6" *		32924		6"		2197		6"		2257		6"		4838	
12" *		35288		12"		2662		12"		2262		12"		5537	
18"		18982		18"		2552		18"		2038		18"		6452	
24"		9374		24"		2451		24"		2165		24"		6750	
30" BPH		6309		30"		2350		30" BPH		2163		30"		7005	
36"				36"		2306		36"				36"		6910	
42"				42"		2282		42"				42"		6798	
48"				48"				48"				48"		7133	
54"				54"				54"				54"		7573	
60"				60"				60"				60"		8544	
66"				66"				66"				66"		9155	
72"				72"				72"				72" *		9352	
78"				78"				78"				78"		9881	
84"				84"				84"				84" BPH		9708	
90"				90"				90"				90"			
96"				96"				96"				96"			

REMARKS: Readings and Samples were taken from trenches
* Visible tailings
** Encountered Sewer pipe at ~5 1/2'

BOREHOLE LOG

 LOGGING CREW: J. Williams
D. Andrews

 SHEET 11 OF 12 PAGE

 DATE: 7-17-90

 PROPERTY ID: GV-102/103/104/105/106/107/108/109/110/111/112/113/114/115/116/117/118/119/120/121/122/123/124/125

 INSTRUMENT ID NO. #35647 w/ #17606

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.

85		86		* 87		* 88	
HOLE ID: <u>1+33, 52L</u>		HOLE ID: <u>1+29, 50L</u>		HOLE ID: <u>1+29, 37L</u>		HOLE ID: <u>0+71, 38L</u>	
TIME DRILLED:		TIME DRILLED:		TIME DRILLED:		TIME DRILLED:	
TIME LOGGED: <u>0956</u>		TIME LOGGED: <u>0957</u>		TIME LOGGED: <u>1012</u>		TIME LOGGED: <u>1059</u>	
SOIL TYPE: <u>Sandy</u>		SOIL TYPE: <u>Sandy</u>		SOIL TYPE: <u>Sandy</u>		SOIL TYPE: <u>Sandy</u>	
DEPTH	COUNTS/.1MIN	DEPTH	COUNTS/.1MIN	DEPTH	COUNTS/.1MIN	DEPTH	COUNTS/.1MIN
SURFACE	<u>1589</u>	SURFACE	<u>1969</u>	SURFACE	<u>3163</u>	SURFACE	<u>3770</u>
0"	<u>1876</u>	0"	<u>2487</u>	0"	<u>4287</u>	0"	<u>4370</u>
6"	<u>2195</u>	6"	<u>4571</u>	6"	<u>6706</u>	6"	<u>5031</u>
12"	<u>2283</u>	12"	<u>4844</u>	12"	<u>7564</u>	12"	<u>5764</u>
18"	<u>2371</u>	18"	<u>2247</u>	✓ 18"	<u>8061</u>	18"	<u>6134</u>
24" <u>BDH</u>	<u>2311</u>	24" <u>BDH</u>	<u>2262</u>	24"	<u>7113</u>	24"	<u>6186</u>
30"		30"		30"	<u>7429</u>	30"	<u>6127</u>
36"		36"		36"	<u>7345</u>	36"	<u>6915</u>
42"		42"		42"	<u>8002</u>	42"	<u>6126</u>
48"		48"		✓ 48"	<u>9263</u>	48"	<u>6093</u>
54"		54"		54"	<u>7517</u>	54"	<u>6811</u>
60"		60"		✓ 60"	<u>7312</u>	60"	<u>5998</u>
66"		66"		✓ 66"	<u>5996</u>	66"	<u>5410</u>
72"		72"		✓ 72"	<u>5251</u>	72"	<u>4562</u>
78"		78"		78"	<u>4638</u>	78"	<u>4075</u>
84"		84"		✓ 84" <u>BDH</u>	<u>4893</u>	84" <u>BDH</u>	<u>4000</u>
90"		90"		90"		90"	
96"		96"		96"		96"	

REMARKS: Readings and Samples were taken from trenches
Reading under Sewer Pipe at ~84" at 1+32, 34L - 3987 c/.1min
Sample taken at ~84" under Sewer Pipe at ~84"
* Sewer Pipe encountered at ~5 1/2'

HK-FERGUSON/CHEM NUCLEAR
 OPPOSED CRYSTAL SYSTEM RECORD

SITE NAME

SITE AREA

OCS SERIAL NO. 3871448

COUNT DATE	SAMPLE NUMBER	SAMPLE LOCATION	DATE SAMPLED	DATE SEALED	OCS #	FUNCTION NO.		MASS		RA-226	OC SAMPLE	VENDOR LAB RESULT		DEPTH	TECH	REMARKS
						INITIAL	20 DAY	WET	DRY			RA-226	TH-230			
6/19/91	GUN-SS-032	GU-029 EMBANK-IMENT SO. OF 9TH ST.	6/19/91	6/20/91	1	0.406E4	5.6	728.8	718.4	5.6				<15	kd	2582 CPTM (SURFACE)
7/10/91	-01					.5515E04	7.7							<15	NW	
6/19/91	GUN-SS-033	GU-029 TRENCH #1	6/19/91	6/20/91	1	0.1169E4	3.0	561.5	561.5	3.0				>15	kd	2882 CPTM (36") Ave west end
7/10/91						.30017E4	5.6	535.0	535.0	5.6				>15	NW	0+01, 23L
6/19/91	GUN-SS-034	GU-029 EMBANK. SO. OF 9TH ST.	6/19/91	6/20/91	1	0.528E4	8.3	633.1	633.1	8.3				>15	kd	2592 CPTM (SURFACE)
7/10/91	-03					.67204E4	11.0	612.5	612.5	11.0				>15	NW	4337 CPTM (12")
6/19/91	GUN-SS-035	GU-029 EMBANK. SO. OF 9TH ST.	6/19/91	6/20/91	1	0.398E4	6.3	631.5	631.5	6.3				<15	kd	2450 CPTM (SURFACE)
7/10/91	-04					.61398E4	9.9	619.7	619.7	9.9				<15	NW	3570 CPTM (6")
6/19/91	GUN-SS-036	GU-029 TRENCH #1	6/19/91	6/20/91	1	0.282E4	4.2	675.6	675.6	4.2				>15	kd	3255 CPTM (12-18")
7/10/91						.45163E4	6.9	654.8	654.8	6.9				>15	NW	0+01, 23L
6/19/91	GUN-SS-037	GU-029 TRENCH #1	6/19/91	6/20/91	1	0.504E4	8.3	607.0	607.0	8.3				>15	kd	4706 CPTM (48")
7/10/91						.8355E4	14.5	574.8	574.8	14.5				>15	NW	(0+01, 23L)
6/19/91	GUN-SS-038	GU-029 CENTER TRENCH #1 OVER SEWER DRAIN	6/19/91	6/20/91	1	0.380E4	6.1	627.1	627.1	6.1				>15	kd	4000 CPTM (36")
7/10/91						.57883E4	9.7	598.9	598.9	9.7				>15	NW	0+01, 23L
6/20/91	GUN-SS-039	GU-029 TRENCH #2	6/20/91	6/25/91	1	0.827E5	134.5	644.8	644.8	134.5					kd	16010 CPTM TAILINGS Supplemental Standards
7/15/91	-10					0.107E6	187.3	571.3	571.3	187.3					kd	
6/20/91	GUN-SS-040	GU-029 TRENCH #2	6/20/91	6/25/91	1	0.135E6	230.4	585.9	585.9	230.4					kd	26375 CPTM TAILINGS Supplemental Standards
	-11					0.174E6	321.2	541.7	541.7	321.2					kd	0+38, 50L Standards

NOTE: All soil sample results are in pCi/gm

MDA Calculation

REVIEWED BY:

SITE H.P. MANAGER

 Site Correction Factor = $\frac{\Lambda}{4.65 \sqrt{20}}$ / 10,000 sec. background cts.
 Count Time = $\frac{\Lambda}{4.65 \sqrt{20}}$, unless noted otherwise.
MDA = $\frac{\text{pCi/gm Ra-226}}{\text{(Ct. Time) (Eff.) (Sample Mass)}}$

*typically 500 gms

WK-FERGUSON/CHEM NUCLEAR
OPPOSED CRYSTAL SYSTEM RECORD

ATTACHMENT

SITE NAME

SITE AREA

OCS SERIAL NO. 3871448

COUNT DATE	SAMPLE NUMBER	SAMPLE LOCATION	DATE SAMPLED	DATE SEALED	OCS #	FUNCTION NO.		MASS		RA-226		OC SAMPLE	VENDOR LAB RESULT		DEPTH	TECH	REMARKS
						INITIAL	20 DAY	WET	DRY	INITIAL	20 DAY		Re-226	Th-230			
6/19/91	GUN-SS-032	GU-029 EMBANK-IMPROMENT SO. OF 9TH ST.	6/19/91	6/20/91	1	0.406E4		728.8		5.6					<15	kd	2582 CPTM (SURFACE)
7/10/91	GUN-SS-033	GU-029 TRENCH #1	6/19/91	6/20/91	1	.5515E04		718.4		7.7					<15	NW	
6/19/91	GUN-SS-034	GU-029 EMBANK SO. OF 9TH ST.	6/19/91	6/20/91	1	0.1169E4		561.5		3.0					>15	kd	2882 CPTM (36") Ave west end
7/10/91	GUN-SS-035	GU-029 TRENCH #1	6/19/91	6/20/91	1	.30017E4		535.0		5.6					>15	NW	0+01, 23L
6/19/91	GUN-SS-036	GU-029 EMBANK SO. OF 9TH ST.	6/19/91	6/20/91	1	0.528E4		633.1		8.3					>15	kd	2592 CPTM (SURFACE)
7/10/91	GUN-SS-037	GU-029 TRENCH #1	6/19/91	6/20/91	1	.67204E4		612.5		11.0					>15	NW	4337 CPTM (12")
6/19/91	GUN-SS-038	GU-029 EMBANK SO. OF 9TH ST.	6/19/91	6/20/91	1	0.398E4		631.5		6.3					<15	kd	2450 CPTM (SURFACE)
7/10/91	GUN-SS-039	GU-029 TRENCH #1	6/19/91	6/20/91	1	.61398E4		619.7		9.9					<15	NW	3570 CPTM (6")
6/19/91	GUN-SS-040	GU-029 EMBANK SO. OF 9TH ST.	6/19/91	6/20/91	1	0.282E4		675.6		4.2					>15	kd	3255 CPTM (12-18")
7/10/91	GUN-SS-041	GU-029 TRENCH #1	6/19/91	6/20/91	1	.45163E4		654.8		6.9					>15	NW	0+01, 23L
6/19/91	GUN-SS-042	GU-029 EMBANK SO. OF 9TH ST.	6/19/91	6/20/91	1	0.504E4		607.0		8.3					>15	kd	4706 CPTM (48")
7/10/91	GUN-SS-043	GU-029 TRENCH #1	6/19/91	6/20/91	1	.8355E4		574.8		14.5					>15	NW	(0+01, 23L)
6/19/91	GUN-SS-044	GU-029 EMBANK SO. OF 9TH ST.	6/19/91	6/20/91	1	0.380E4		627.1		6.1					>15	kd	4000 CPTM (36")
7/10/91	GUN-SS-045	GU-029 TRENCH #1	6/19/91	6/20/91	1	.57883E4		598.9		9.7					>15	NW	0+01, 23L
6/20/91	GUN-SS-046	GU-029 EMBANK SO. OF 9TH ST.	6/20/91	6/20/91	1	0.827E5		614.8		134.5					>15	kd	16010 CPTM TAILINGS
7/15/91	GUN-SS-047	GU-029 TRENCH #1	6/20/91	6/20/91	1	0.107E6		571.3		187.3						kd	supplemental standards
6/20/91	GUN-SS-048	GU-029 EMBANK SO. OF 9TH ST.	6/20/91	6/20/91	1	0.135E6		585.9		230.4					>15	kd	26375 CPTM TAILINGS
7/10/91	GUN-SS-049	GU-029 TRENCH #1	6/20/91	6/20/91	1	0.174E6		541.7		321.2						kd	supplemental standards

NOTE: All soil sample results are in pCi/gm

Site Correction Factor = $\frac{1}{4.65} \sqrt{\frac{10,000 \text{ sec. background cts.}}{20}}$, unless noted otherwise.
Count Time = $\frac{\text{pCi/gm Ra-226}}{\text{pCi/gm Ra-226}}$
MDA =

MDA Calculation

$$\frac{1}{4.65} \sqrt{\frac{10,000 \text{ sec. background cts.}}{20}}$$

(Ct. Time) (Eff.) (Sample Mass)*

*typically 500 gms

REVIEWED BY:

SITE H.P. MANAGER

07878

015-17

SITE NAME

SITE AREA

OCS SERIAL NO. 3871448

COUNT DATE	SAMPLE NUMBER	SAMPLE LOCATION	DATE SAMPLED	DATE SEALED	OCS #	FUNCTION NO.		MASS		RA-226		OC SAMPLE	VENDOR LAB RESULT		DEPTH	TECH	REMARKS
						INITIAL	20 DAY	WET	DRY	INITIAL	20 DAY		Re-226	Th-230			
6/20/91	GUN-SS-041		6/20/91	6/25/91	1		0.372E5	546.0		68.1						kd	26000 CPTM TAILINGS 2000 CPTM SOIL
7/15/91	GUN-SS-041		6/20/91	6/25/91	1		0.471E5	523.9		89.9						kd	2:1 RATIO
6/20/91	GUN-SS-042		6/20/91	6/25/91	1		0.280E5	623.5		44.9						kd	26000 CPTM TAILINGS 8000 CPTM SOIL
7/15/91	GUN-SS-042		6/20/91	6/25/91	1		0.367E5	599.3		61.2						kd	3:1 RATIO
6/20/91	GUN-SS-043			6/25/91	1		0.230E5	676.0		34.0						kd	26000 CPTM TAILINGS 2000 CPTM SOIL
7/15/91	GUN-SS-043		6/20/91	6/25/91	1		0.306E5	653.4		46.8						kd	4:1 RATIO
6/20/91	GUN-SS-044	GU-029 TRENCH #2 UNDER SERVICE LINE 25' E	6/20/91	6/25/91	1		0.572E3	625.8		0.9					>15	kd	3467 CPTM 3777 CPTM "shine" 72"
7/15/91	GUN-SS-044		6/20/91	6/25/91	1		0.146E4	566.0		2.6					>15	kd	3467 CPTM
6/20/91	GUN-SS-045	GU-029 TRENCH #2 10' E	6/20/91	6/25/91	1		0.447E3	729.9		0.6					>15	kd	3186 CPTM (60") (0+38,504)
7/15/91	GUN-SS-045		6/20/91	6/25/91	1		0.563E3	715.4		0.8					>15	kd	
6/20/91	GUN-SS-046	GU-029 TRENCH #2		6/25/91	1		0.942E5	500.1		188.4					>15	kd	14011 CPTM (12") (0+38,504)
7/15/91	GUN-SS-046		6/20/91	6/25/91	1		0.125E6	465.7		268.4					>15	kd	
6/20/91	GUN-SS-047	GU-029 TRENCH #2 22' EAST	6/20/91	6/25/91	1		0.145E5	622.8		23.3					>15	kd	10131 CPTM (78") (0+38,402) Supply mental standards
7/15/91	GUN-SS-047		6/20/91	6/25/91	1		0.198E5	541.3		36.6					>15	kd	
6/21/91	GUN-SS-048	GU-029 TRENCH #2 35' EAST		6/25/91	1		0.435E4	672.6		6.5					<15	kd	3772 CPTM (6") (0+38,234)
7/15/91	GUN-SS-048		6/20/91	6/25/91	1		0.595E4	558.8		9.0					<15	kd	
6/21/91	GUN-SS-049	GU-029 TRENCH #3		6/25/91	1		0.484E4	580.7		8.3					>15	kd	3797 CPTM (18") (0+38,204)
7/15/91	GUN-SS-049		6/20/91	6/25/91	1		0.621E4	561.2		11.1					>15	kd	

NOTE: All soil sample results are in pCi/gm

MOA Calculation

REVIEWED BY: SITE H.P. MANAGER

Site Correction Factor =
Count Time =
MOA =

$$\frac{\Lambda}{4.65 \text{ V}} \times \frac{10,000 \text{ sec. background cts.}}{20}$$

(Ct. Time) (Eff.) (Sample Mass)*

* Mixing Ratio

*typically 500 gms

HK-FERGUSON/CHEN NUCLEAR
OPPOSED CRYSTAL SYSTEM RECORD

SITE NAME _____
SITE AREA _____

OCS SERIAL NO. 3871448

COUNT DATE	SAMPLE NUMBER	SAMPLE LOCATION	DATE SAMPLED	DATE SEALED	OCS #	FUNCTION NO.		MASS	RA-226		OC SAMPLE	VENDOR LAB RESULT		DEPTH	TECH	REMARKS
						INITIAL	20 DAY		INITIAL	20 DAY		Re-226	Th-230			
6/21/91	GUN-SS-068	CU-029 TRENCH#5 (4H16, 36L)	6/21/91	6/25/91	1	0.251E5		601.9	41.7					>15	kd	15302 CPTM (84") Supplemental Standards
7/15/91	GUN-SS-069	CU-029 TRENCH#5 (4H16, 36L)	6/21/91	6/25/91	1	0.335E5		550.3	60.9					>15	kd	15062 CPTM (78") Supplemental Standards
6/21/91	GUN-SS-070	CU-029 TRENCH#5 (4H16, 36L)	6/21/91	6/25/91	1	0.107E5		528.3	20.3					>15	kd	13799 CPTM (72") Supplemental Standards
7/15/91	GUN-SS-071	CU-029 TRENCH#5 (4H16, 36L)	6/21/91	6/25/91	1	0.137E5		480.6	28.5					>15	kd	10508 CPTM (66") Supplemental Standards
6/21/91	GUN-SS-072	CU-029 TRENCH#5 (4H16, 36L)	6/21/91	6/25/91	1	0.204E5		484.1	42.1					>15	kd	9170 CPTM (60") Supplemental Standards
7/15/91	GUN-SS-073	CU-029 TRENCH#5 (4H16, 36L)	6/21/91	6/25/91	1	0.266E5		445.0	59.8					>15	kd	6879 CPTM (42")
6/21/91	GUN-SS-074	CU-029 TRENCH#5 (4H16, 36L)	6/21/91	6/25/91	1	0.736E4		580.1	12.7					>15	kd	3832 CPTM (24")
7/15/91	GUN-SS-075	CU-029 TRENCH#5 (4H16, 36L)	6/21/91	6/25/91	1	0.105E5		552.8	19.0					>15	kd	4553 CPTM (42")
6/21/91	GUN-SS-076	CU-029 TRENCH#5 (4H16, 36L)	6/21/91	6/25/91	1	0.229E5		558.9	41.0					>15	kd	5220 CPTM (48")
7/15/91	GUN-SS-077	CU-029 TRENCH#5 (4H16, 36L)	6/21/91	6/25/91	1	0.273E4		537.7	5.1					>15	kd	
6/21/91	GUN-SS-078	CU-029 TRENCH#5 (4H16, 36L)	6/21/91	6/25/91	1	0.366E4		505.8	7.2					>15	kd	
7/15/91	GUN-SS-079	CU-029 TRENCH#5 (4H16, 36L)	6/21/91	6/25/91	1	0.330E4		614.2	5.4					>15	kd	
6/21/91	GUN-SS-080	CU-029 TRENCH#5 (4H16, 36L)	6/21/91	6/25/91	1	0.511E4		598.0	8.6					>15	kd	
7/15/91	GUN-SS-081	CU-029 TRENCH#5 (4H16, 36L)	6/21/91	6/25/91	1	0.446E4		618.8	7.2					>15	kd	
6/21/91	GUN-SS-082	CU-029 TRENCH#5 (4H16, 36L)	6/21/91	6/25/91	1	0.686E4		590.3	11.6					>15	kd	
7/15/91	GUN-SS-083	CU-029 TRENCH#5 (4H16, 36L)	6/21/91	6/25/91	1	0.272E4		577.4	4.7					>15	kd	
6/21/91	GUN-SS-084	CU-029 TRENCH#5 (4H16, 36L)	6/21/91	6/25/91	1	0.391E4		548.4	7.1					>15	kd	

REVIEWED BY: SITE H.P. MANAGER

MDA Calculation

$$\frac{1}{4.65} \sqrt{\frac{10,000 \text{ sec. background cts.}}{20}}$$

(Ct. Time) (Eff.) (Sample Mass)*

*typically 500 gms

NOTE: All soil sample results are in pCi/gm

Site Correction Factor = _____
Count Time = _____, unless noted otherwise.
MDA = _____ pCi/gm Ra-226

APPENDIX C

OWNER ACCEPTANCE FORM

The undersigned Owner(s) of the Vicinity Property subject to DOE Vicinity Property Remedial Action Agreement No. DE-R004-91AL72039 acknowledge(s) that the remedial action described in the Vicinity Property Remedial Action Plan (Appendix B) of said Agreement has been satisfactorily performed and the DOE and the State have no further obligation under said Agreement except:

1. DOE must officially certify, in accordance with DOE policy implementing Public Law 95-604, that remedial actions on the Vicinity Property are in compliance with applicable radiation standards promulgated by the U.S. Environmental Protection Agency for the protection of the public health, safety and environment.
2. DOE, for the benefit of the Owner(s), shall use its best efforts to enforce any warranties or guarantees, express or implied, which the Government or its prime contractors are entitled to in connection with failure of remedial action work caused by omission of materials, defective materials or poor workmanship, or improper workmanship.

3. *soft areas located at or near the intersection of 9th and Railroad shall be recompactd at the contractors expense if not stabilized by mid in one year or by August 1992*

OWNER *Tyler*

OWNER _____

DATE *Aug 7, 1991*

DATE _____

APPENDIX B
LEGAL DESCRIPTION

LEGAL DESCRIPTION

The property which is the subject of this Completion Report, the address of which is South 9th Street between Railroad Avenue and Bidwell Street, is more particularly described in the County Recorder's Office, as follows:

A legal description is not available.

APPENDIX C
RECOMMENDATION FOR THE APPLICATION
OF SUPPLEMENTAL STANDARDS

APPENDIX C

RECOMMENDATION FOR APPLICATION OF SUPPLEMENTAL STANDARDS

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- C.T2 Cost Estimate for Alternative 1 - Complete Remediation
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DRAWINGS

GU-029-018: Supplemental Standards

EXHIBITS

Request for Comments from the Owner

C.1 Applicable EPA Criteria

Supplemental Standards Recommendation is in accordance with the regulations set by the Environmental Protection Agency (EPA) in 40 CFR 192. The potential and applicable criteria as stated in 40 CFR 192.21 are as follows:

- ☐ a) Remedial action would pose a clear and present risk of injury to workers or to members of the public
- ☐ b) Remedial action would directly cause excessive environmental harm
- ☒ c) The cost of remedial action at the vicinity site is unreasonably high relative to long-term benefits
- ☐ d) The cost of remedial action for cleanup of a building is unreasonably high relative to benefits
- ☐ e) There is no known remedial action
- ☐ f) Radionuclides other than Radium-226 and its decay products are present

An "X" indicates the appropriate subsection(s) for this recommendation.

C.2 Introduction

This Supplemental Standards Recommendation pertains to the mill tailings contamination under the utility and sewer lines beneath the street. Drawing GU-029-018 depicts the deposits of tailings in the areas for which Supplemental Standards is being considered.

C.2.1 Common Location and Legal Description

The Supplemental Standards Recommendation areas are under the utility and sewer lines beneath the street. The extent of contamination left beneath the street covers approximately 659 square yards.

There is not a legal description available for this property. However, it can be best described as follows: South 9th Street between Railroad Avenue and Bidwell Street.

C.2.2 Major Physical Features

This property is a street, there are no structures, and the street is topped with gravel.

C.2.3 Land Use

To the best of MK-Ferguson's knowledge, the land use in this area is not expected to change in the near future. The contaminated material left in place may be disturbed if extensive road work or utility line repair is performed in this area. Tailings migration due to wind, erosion, or other forces, is not viewed as an immediate threat to the area.

C.2.4 Owner's Input

A letter notifying the owner of the Application of Supplemental Standards on the property was mailed on August 21, 1997. It has been more than six months and the owner has not responded. Therefore, it is assumed that the owner has no comments.

C.3 Radiological Data

Appendix A contains the radiological data that is relevant to the verification grids and the Supplemental Standards Recommendation. The Appendix A consists of the Borehole logs and the OCS Logs.

The radiological conditions within the Supplemental Standards Recommendation areas are summarized as follows:

- a. Dose equivalent range at ground level in the contaminated area - 7 to 12 $\mu\text{R/hr}$.
- b. Average dose equivalent at ground level above the contaminated area - 9 $\mu\text{R/hr}$.
- c. Dose equivalent range at the depth of contaminated material - 39 to 68 $\mu\text{R/hr}$.
- d. Average dose equivalent at the depth of contaminated material - 49 $\mu\text{R/hr}$.
- e. Range of Ra-226 concentration at the depth of contaminated material - 19.0 to 321.2 pCi/g
- f. Average Ra-226 concentration at the depth of contaminated material - 94.3 pCi/g.

These measurements may be compared with the background in Gunnison of 13 $\mu\text{R/hr}$ and 1.0 pCi/g Ra-226. All surveys values reported include background.

C.3.1 Health Risk Analysis

The analysis of health risks is presented in Table C.T1. Exposure potentials are compared with two criteria as follows:

- a. Long-term exposures are examined based on an allowable exposure rate of 100 mrem per year above background.
- b. Short-term unusual exposures are examined based on an allowable exposure rate of 500 mrem per year above background.

The maximum gamma dose rate at waist level recommended by the International Commission on Radiological Protection (ICRP, 1977, 1978) in DOE ORDER 5400.5 (March 1990) is 100 mrem dose above background. This is the dose limit for an individual member of the general public. Doses which exceed 100 mrem/year above background are acceptable when the higher exposures do not persist for long periods and when the average annual dose over an individual's lifetime is expected to be less than 100 mrem/year above background. The ICRP and the DOE suggest that dose rates be reduced to "as low as is reasonably achievable", but also state that no annual dose shall exceed 500 mrem above background. The health risk analysis presented in this Recommendation for Supplemental Standards has compared the dose rates measured at ground level with the recommendation of the ICRP and DOE regarding waist level exposures. This procedure ensures a conservative evaluation.

The long-term exposure analysis considers three scenarios showing the following:

- a. The required number of hours of continuous exposure to obtain the 100 mrem/yr dose due to external gamma. This scenario is intended to model the exposure received by an individual residing on the site in the extreme case where no time away from the site is considered.
- b. The hours per day of exposure during a continuous one year period required to receive the 100 mrem/yr dose due to external gamma. This scenario is intended to represent a maximum allowable daily exposure by an individual who occupies the point where the high gamma reading occurs.
- c. The hours per day of exposure during a one year period utilizing week days only (260 days) required to receive the 100 mrem/yr dose due to external gamma. This scenario models the potential exposure that could be received by an individual working in the area the indicated number of hours daily for one year.

The short-term unusual exposure analysis also considers three potential scenarios as follow:

- a. The required number of hours of continuous exposure to obtain the 500 mrem/yr dose due to external gamma. The intent of this scenario is to allow examination of the estimated time of continuous exposure required to receive the allowable dose.
- b. The number of 48-hour temporary occupancy periods in one year necessary to receive a 500 mrem/yr dose due to external gamma. This scenario represents the case where an individual occupies the site for repair work or other short-term purposes.
- c. The number of 24-hour periods of exposure in one year necessary to receive a 500 mrem/yr dose due to external gamma. This scenario considers emergency operations to perform repair work at the site.

The worst case scenario is based on zero background and maximum surface gamma rates that were measured without consideration of the relative physical location of each.

In every case, the scenarios presented above can be described as unlikely, but possible. The scenarios do not create a model of likely situations, but present data that can be used to evaluate the potential for a health hazard if this Supplemental Standards Recommendation is approved.

The maximum known gamma exposure rate occurring along the center of the street at the approximate coordinates of 2+40 to 2+60 in the Supplemental Standards area is equal to the worst case scenario for a member of the general public. The worst case scenario is defined to be the amount of time per day that an individual would have to occupy the maximum dose rate location to receive 100 mrem in one year. It is highly unlikely for this situation to occur due to both the length of time required and the remote location of the exposure rates.

It is unlikely that a member of the general public would ever be exposed to the RRM in the future. The most likely situation where individuals would be exposed to the RRM is in an occupational scenario. Future repair on the utility lines would most likely expose the contamination. The highest gamma rate in the contamination is 68 μ R/hr. The nature of this work makes the "short-term, unusual" exposure analysis more appropriate than a long-term exposure analysis. This scenario depicts continuous occupation at the point of highest gamma for 7,353 hours in one year to reach the 500 mrem limit. This equates to 153 48-hour repair or 306 24-hour emergency repair scenarios. It is unlikely for this scenario to occur due to the length of time required and the physical location of the exposure rates.

C.4 Remediation Alternatives

Three alternatives are available for all properties. Each alternative may have several methods. The evaluation of an alternative action in any area of tailings contamination logically includes consideration of the cost and health risk associated with the available choice. Three alternatives - Complete Remediation, Partial Remediation, or Application of Supplemental Standards (No Remediation) - are considered.

C.4.1 Alternative 1 - Complete Remediation (All Contaminated Material)

C.4.1.1 Work Description

The work required for this alternative is to remove all of the contaminated soil even the soil under the utility and sewer lines. The utility and sewer lines would have to be removed for excavation and then replaced for restoration.

This would require a substantial amount of work and monies comparable to the amount of benefits received from remediation.

C.4.1.2 Health Risk Analysis

Health risks in the Supplemental Standards Application area, due to tailings contamination, would be reduced to within the EPA standards.

C.4.1.3 Construction Parameters

Construction of this alternative would be to excavate down to the utility and sewer lines. Remove the utility and sewer lines. Excavate farther down until soil is clean. Backfill to the level of utility and sewer lines. Replace utility and sewer lines. Backfill and restore the surface of the street to its original condition.

C.4.1.4 Engineering Data

No areas of contamination which exceed the EPA standards will remain in place. The estimated Subcontractor cost of remedial action work required for this alternative is \$331,800.00. A tabulation of the cost estimate is presented in Table C.T2. The estimated volume of contaminated materials to be removed is 4665 cubic yards. The average cost to remove the tailing would be \$71.13 per cubic yard.

C.4.2 Alternative 2 - Partial Remediation (Supplemental Standards Application-Remediate Deposits above and on either side of the utility and sewer lines)

C.4.2.1 Work Description

The work involved in this alternative would be to remediate down to the utility and sewer lines. Remediate on either side of the lines but not under them. This alternative will remove all the contamination above and on both sides of the utility and sewer lines, but will leave the contamination under the lines.

C.4.2.2 Health Risk Analysis

Health risks above the utility and sewer lines due to tailings contamination would be reduced to within the EPA standards. Contamination would remain in place under the lines.

C.4.2.3 Construction Parameters

The Construction Parameters would be to remove the contamination above and on either side of the utility and sewer lines, only. Backfill and restore the street to its original condition.

C.4.2.4 Engineering Data

No areas of contamination which exceed the EPA standards will remain in place above or on either side of the utility and sewer lines. The amount of contamination exceeding EPA standards remaining in place is 340 cubic yards. The Subcontractor cost of remedial action work required for this alternative is \$173,000.00.

A tabulation of the cost estimate elements is presented in Table C.T3. The estimated volume of contaminated materials removed is 3446 cubic yards. The average cost to remove the tailings would be \$50.20 per cubic yard.

C.4.3 Alternative 3 - No Remediation (Supplemental Standards Application)

C.4.3.1 Work Description

No work is required for this alternative.

C.4.3.2 Health Risk Analysis

The health risks associated with this alternative are approximated in Table C.T1. There is a very low probability that allowable gamma dose rates will be exceeded based on the data present in Table C.T1.

C.4.3.3 Construction Parameters

Construction is not required for this alternative.

C.4.3.4 Engineering Data

No cost is associated with this alternative. All areas of contamination which exceed the EPA standards will remain in place. The amount of contamination exceeding EPA standards to be left in place is 3776 cubic yards.

C.5 Summary

The data in Table C.T1 suggests that there are no identifiable significant health risks if this Supplemental Standards Recommendation (Partial Remediation) is approved. In the worst case, a member of the general public would most likely not be exposed to the RRM. It is more likely that a utility worker will someday encounter the contamination. This would qualify for the short-term dose limit of 500 mrem. A worker would have to occupy the point of high gamma exposure for a continuous period of 7,353 hours to receive a 500 mrem dose. It is highly unlikely for an individual to be exposed for the amount of time necessary to exceed the recommended annual maximum dose of 100 mrem due to the length of time required.

Each alternative examined by this Recommendation can be summarized as follows:

Alternative I - Complete Remediation (All Contaminated Material)

Health Risk - Reduced to within EPA standards

Estimated Construction Cost - \$331,800.00.

Approximate Volume of Contaminated Materials Removed - 4665 cubic yards

Approximate Volume of Contaminated Materials Remaining - 0 cubic yards

Vicinity Property GU-029

Alternative 2 - Partial Remediation (Supplemental Standards Application - Remediate Deposits above and on either side of the utility and sewer lines)

Health Risk - Reduced to within EPA standards above and on either side of the lines. Contamination remains underneath the lines.

Construction Cost - \$173,000.00

Approximate Volume of Contaminated Materials Removed - 3446 cubic yards

Approximate Volume of Contaminated Materials Remaining - 340 cubic yards

Alternative 3 - No remediation (Supplemental Standards Application)

Health Risk - See Appendix C. Table C.T1

Estimated Construction Cost - \$0

Approximate Volume of Contaminated Materials Removed - 0 cubic yards

Approximate Volume of Contaminated materials Remaining - 3776 cubic yards

C.6 Recommendations

Supplemental Standards (Partial Remediation) should be applied in accordance with 40 CFR 192.21 Criteria C (see Section C.1).

TABLE C.T1
HEALTH RISK ANALYSIS
PROPERTY GU-029

SCENARIO	RESULTS
100 mrem Dose using 12 μ R/hr on the surface of the road. These scenarios represent the general public.	
A. Required number of hours of continuous exposure to obtain the 100 mrem dose.	8,333 hours
B. The hours per day of exposure during a continuous one year period required to receive the 100 mrem dose.	23 hours per day
C. The hours per day of exposure during a one year period utilizing week days only (260 days) required to receive the 100 mrem dose.	The 100 mrem could not be reached standing at the point of the highest gamma continuously in one year.
500 mrem Dose using 68 μ R/hr at the level of contamination. These scenarios represent a utility line worker.	
A. The required number of hours of continuous exposure to obtain the 500 mrem dose.	7,353 hours
B. The number of 48-hour temporary occupancy periods in one year necessary to receive a 500 mrem dose.	153 48-hour occupancy periods
C. The number of 24-hour periods of exposure in one year necessary to receive a 500 mrem dose.	306 24-hour occupancy periods

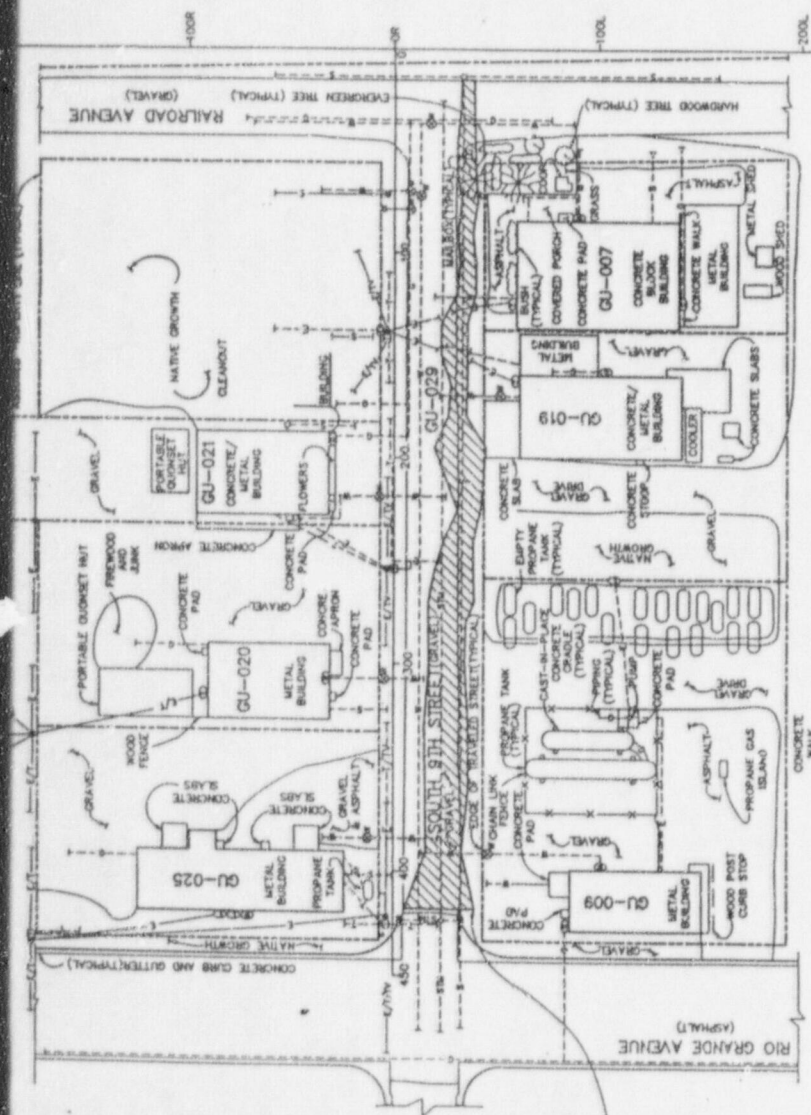
The results are figured from using the point of the highest gamma. A person would have to lay on the point continuously to achieve the dose given.

TABLE C.T2
COST ESTIMATE FOR ALTERNATIVE 1
COMPLETE REMEDIATION

ACTIVITY NO.	ACTIVITY	UNIT PRICE	QUANTITY	ESTIMATED COST
1.0	Machine Excavation	21.00	3436 cy	\$72,156.00
2.0	Compacted Common Fill	16.00	3004 cy	48,064.00
7.0	Aggregate Base Course	18.00	432 cy	7,776.00
	Modification # 01 SCN-01			
1.	Excavate & Backfill Trench	803.38	10 cy	8,034.00
	Modification # 06 SCN-07			
1.	4" Sewer Line Replacement	20.00	84 lf	1,680.00
2.	10" Storm Drain Replacement	238.28	ls	238.00
3.	1" Water Line Replacement	432.50	ls	433.00
	Additional Cost for not Applying Supplemental Standards			
1.0	Machine Excavation	18.40	340 cy	6,256.00
1.1	Clean Material Excavation	15.00	879 cy	16,174.00
2.0	Common Fill	17.80	340 cy	6,052.00
2.1	Replace Clean Material	15.00	879 cy	13,185.00
0.29.1	R/R Sewer Lines	71,000.00	ls	71,000.00
3.0	R/R Aggregate Base Course	14.00	110 cy	1,540.00
4.0	Haul Contaminated Material to Cheney	37.80	340 cy	12,852.00
Subtotal				\$265,440.00
5% Subcontractor's Contingency				13,272.00
20% Overhead & Profit				<u>53,088.00</u>
Total (Rounded)				\$331,800.00

TABLE C.T3
COST ESTIMATE FOR ALTERNATIVE 2
PARTIAL REMEDIATION

ACTIVITY NO.	ACTIVITY	UNIT PRICE	QUANTITY	ESTIMATED COST
1.0	Machine Excavation	21.00	3436 cy	\$72,156.00
2.0	Compacted Common Fill	16.00	3004 cy	48,064.00
7.0	Aggregate Base Course	18.00	432 sy	7,776.00
	Modification # 01 SCN-01			
1.	Excavate & Backfill Trench	803.38	10 cy	8,034.00
	Modification # 06 SCN-07			
1.	4" Sewer Line Replacement	20.00	84 lf	1,680.00
2.	10" Storm Drain Replacement	238.28	1 ls	238.00
3.	1" Water Line Replacement	432.50	1 ls	433.00
Subtotal				\$138,381.00
5% Subcontractor's Contingency				6,919.00
20% Overhead & Profit				<u>27,676.00</u>
Total (Rounded)				\$173,000.00



ENGINEERS
AND
CONSTRUCTORS



MK-FERGUSON COMPANY
A MORRISON KNUDSEN COMPANY

HEADQUARTERS OFFICE
1500 WEST 3RD STREET
CLEVELAND, OHIO U.S.A. 44113-1406
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

August 21, 1997

Attn: City Manager
City of Gunnison
P.O. Box 239
Gunnison, CO 81230

**SUBJECT: Recommendation for Supplemental Standards for GU-029:
Gunnison, Colorado**

Dear City Manager:

This letter is to formally inform you that MK Ferguson Company is proceeding with a Recommendation for the Application for Supplemental Standards on the contaminated material left under the sewer and utility lines beneath South 9th Street between Railroad Avenue and Bidwell Street. We assume that the city manager was informed of this action during remediation. Our files do not contain any formal written documentation on this subject. Drawing GU-029-018 (attached) shows one area of contamination beneath the street.

This action is authorized under Title 40, Code of Federal Regulations, Section 192.21 (attached). Basically, this section 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 (called Supplemental Standards) are as follows:

- (1) The Environmental Protection Agency allows tailings deposits to remain in place when the cost of land cleanup is excessive relative to long-term benefits.

This Recommendation for Supplemental Standards addresses the tailings deposits which are under the street and are covered with compacted common fill to an average thickness of 1.33 yards. The area covers approximately 659 square yards. Removal of the contamination would involve excavation and stockpiling of all the clean common fill material above the contaminated area, removal of the sewer line, and excavation of the contaminated material. The contaminated material would be loaded into trucks and hauled to an open disposal cell. The restoration would consist of backfilling to the level of the sewer and utility lines, replacing the lines, and backfilling the area to its original grade.

To the best of MK-Ferguson's knowledge, the land use in this area is not expected to change in the near future. The contaminated material left in place may be disturbed if extensive road work is performed in this area. Tailings migration due to wind, erosion, or other forces, is not viewed as an immediate threat to the area.

Attn: City Manager
City of Gunnison
August 21, 1997

Page 2

After remediation the street was restored to its original grade. With the 1.33 yards of material on top of the contamination, a person standing on the surface of the street would have to be located at the highest gamma point (12 μ R/hr) 23 hours a day for 365 days to receive a 100 mrem dose. The probability of this occurring is extremely low if not impossible.

If the lines were in need of repair and the compacted common fill was removed from above the line and a worker spent 8 hours a day 5 days a week for 50 weeks in a 58 μ R/hr radiation field, he would receive about 116 mrem of gamma exposure in one year. Background gamma radiation in the Gunnison area is 13 μ R/hr. Twenty-Three (23) mrem of the received dose is attributable to natural background radiation at Gunnison. Therefore, the amount of dose a worker might receive from UMTRA material in the Supplemental Standards area is 93 mrem per year. The occurrence of this happening is also very improbable if not impossible.

This letter extends the opportunity for you to comment or express any concerns that you may have about this Supplemental Standards Recommendation. It is requested that your response:

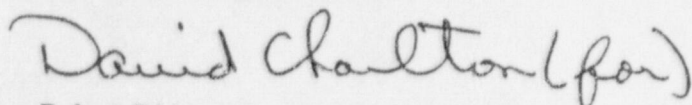
1. Acknowledges that this Supplemental Standards Recommendation has been explained to you.
2. Indicates any proposed construction or land use changes in this area in the foreseeable future; and
3. Includes any other questions or comments you may have regarding this Supplemental Standards Recommendation.

Your response in writing is requested by September 5, 1997.

If you have any questions regarding this Supplemental Standards Recommendation, please call Johnny Ethridge of my staff at (505) 246-2536.

Sincerely,

MK-FERGUSON COMPANY



Robert D'Arezzo
Vicinity Property Manager

RD/JDE/eg

Enclosure

bcc: w/ attachments.
File VP
w/o attachments:
D. Charlton

for consideration of the various factors affecting the longevity of control and stabilization methods and their costs. These factors have different levels of predictability and may vary for the different sites.

(2) Protection of water should be considered in the analysis for reasonable assurance of compliance with the provisions of § 192.02. Protection of water should be considered on a case-specific basis, drawing on hydrological and geochemical surveys and all other relevant data. The hydrologic and geologic assessment to be conducted at each site should include a monitoring program sufficient to establish background ground water quality through one or more upgradient wells, and identify the presence and movement of plumes associated with the tailings piles.

(3) If contaminants have been released from a tailings pile, an assessment of the location of the contamination and the rate and direction of movement of contaminated ground water, as well as its relative contamination, should be made. In addition, the assessment should identify the attenuative capacity of the unsaturated and saturated zone to determine the extent of plume movement. Judgments on the possible need for remedial or protective actions for ground-water aquifers should be guided by relevant considerations described in EPA's hazardous waste management system (47 FR 32274, July 26, 1982) and by relevant State and Federal Water Quality Criteria for anticipated or existing uses of water over the term of the stabilization. The decision on whether to institute remedial action, what specific action to take, and to what levels an aquifer should be protected or restored should be made on a case-by-case basis taking into account such factors as technical feasibility of improving the aquifer in its hydrogeologic setting, the cost of applicable restorative or protective programs, the present and future value of the aquifer as a water resource, the availability of alternative water supplies, and the degree to which human exposure is likely to occur.

(b)(1) Compliance with Subpart B, to the extent practical, should be dem-

onstrated through radiation surveys. Such surveys may, if appropriate, be restricted to locations likely to contain residual radioactive materials. These surveys should be designed to provide for compliance averaged over limited areas rather than point-by-point compliance with the standards. In most cases, measurement of gamma radiation exposure rates above and below the land surface can be used to show compliance with § 192.12(a). Protocols for making such measurements should be based on realistic radium distributions near the surface rather than extremes rarely encountered.

(2) In § 192.12(a), "background level" refers to the native radium concentration in soil. Since this may not be determinable in the presence of contamination by residual radioactive materials, a surrogate "background level" may be established by simple direct or indirect (e.g., gamma radiation) measurements performed nearby but outside of the contaminated location.

(3) Compliance with § 192.12(b) may be demonstrated by methods that the Department of Energy has approved for use under Pub. L. 92-314 (10 CFR 712), or by other methods that the implementing agencies determine are adequate. Residual radioactive materials should be removed from buildings exceeding 0.03 WL so that future replacement buildings will not pose a hazard (unless removal is not practical—see § 192.21(c)). However, sealants, filtration, and ventilation devices may provide reasonable assurance of reductions from 0.03 WL to below 0.02 WL. In unusual cases, indoor radiation may exceed the levels specified in § 192.12(b) due to sources other than residual radioactive materials. Remedial actions are not required in order to comply with the standard when there is reasonable assurance that residual radioactive materials are not the cause of such an excess.

§ 192.21 Criteria for applying supplemental standards.

The implementing agencies may (and in the case of Subsection (f) shall) apply standards under § 192.22 in lieu of the standards of Subparts A

or B if they determine that any of the following circumstances exists:

(a) Remedial actions required to satisfy Subparts A or B would pose a clear and present risk of injury to workers or to members of the public, notwithstanding reasonable measures to avoid or reduce risk.

(b) Remedial actions to satisfy the cleanup standards for land, § 192.12(a), or the acquisition of minimum materials required for control to satisfy § 192.02(b), would, notwithstanding reasonable measures to limit damage, directly produce environmental harm that is clearly excessive compared to the health benefits to persons living on or near the site, now or in the future. A clear excess of environmental harm is harm that is long-term, manifest, and grossly disproportionate to health benefits that may reasonably be anticipated.

(c) The estimated cost of remedial action to satisfy § 192.12(a) at a "vicinity" site (described under Sec. 1016(b) of the Act) is unreasonably high relative to the long-term benefits, and the residual radioactive materials do not pose a clear present or future hazard. The likelihood that buildings will be erected or that people will spend long periods of time at such a vicinity site should be considered in evaluating this hazard. Remedial action will generally not be necessary where residual radioactive materials have been placed semi-permanently in a location where site-specific factors limit their hazard and from which they are costly or difficult to remove, or where only minor quantities of residual radioactive materials are involved. Examples are residual radioactive materials under hard surface public roads and sidewalks, around public sewer lines, or in fence post foundations. Supplemental standards should not be applied at such sites, however, if individuals are likely to be exposed for long periods of time to radiation from such materials at levels above those that would prevail under § 192.12(a).

(d) The cost of a remedial action for cleanup of a building under § 192.12(b) is clearly unreasonably high relative to the benefits. Factors that should be included in this judgment are the anticipated period of occupancy, the incremental radiation level that would

be affected by the remedial action, the residual useful lifetime of the building, the potential for future construction at the site, and the applicability of less costly remedial methods than removal of residual radioactive materials.

(e) There is no known remedial action.

(f) Radionuclides other than radium-226 and its decay products are present in sufficient quantity and concentration to constitute a significant radiation hazard from residual radioactive materials.

§ 192.22 Supplemental standards.

Federal agencies implementing Subparts A and B may in lieu thereof proceed pursuant to this section with respect to generic or individual situations meeting the eligibility requirements of § 192.21.

(a) When one or more of the criteria of § 192.21(a) through (e) applies, the implementing agencies shall select and perform remedial actions that come as close to meeting the otherwise applicable standard as is reasonable under the circumstances.

(b) When § 192.21(f) applies, remedial actions shall, in addition to satisfying the standards of Subparts A and B, reduce other residual radioactivity to levels that are as low as is reasonably achievable.

(c) The implementing agencies may make general determinations concerning remedial actions under this Section that will apply to all locations with specified characteristics, or they may make a determination for a specific location. When remedial actions are proposed under this Section for a specific location, the Department of Energy shall inform any private owners and occupants of the affected location and solicit their comments. The Department of Energy shall provide any such comments to the other implementing agencies. The Department of Energy shall also periodically inform the Environmental Protection Agency of both general and individual determinations under the provisions of this section.

§ 192.23 Effective date.

Subparts A, B, and C shall be effective March 7, 1983.