Uranium Mill Tailings Remedial Action Project (UMTRAP) Slick Rock, Colorado

Calculations

Final Design for Construction

Volume IV

September 1995
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### UMTRA PROJECT - SLICK ROCK
### FINAL DESIGN FOR REVIEW
### CALCULATION INDEX

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<td>Radon Barrier Design - Design Thickness</td>
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<td>11-333-02-00</td>
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**VOLUME IV**

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12 September 1995
PROJECT

UMTRA - SLICK ROCK

FEATURE

BORROW AREAS

ITEM

SITE EVALUATION

SOURCES OF DATA

(see below)

SOURCES OF FORMULAE & REFERENCES


PRELIMINARY CALC. □ FINAL CALC. ☑ SUPERSEDES CALC. NO. 11-231-01-01
Table of Contents

1.0 SUMMARY OF RESULTS ............................................. 1
2.0 PURPOSE .......................................................... 1
3.0 METHOD ............................................................ 1
4.0 DOLORES RIVER BORROW SITE ................................. 2
5.0 DISAPPOINTMENT VALLEY BORROW SITE ..................... 4
Revision 15

The purpose of this revision is to delete the Disappointment Valley Borrow Site as a source of Radon Barrier Material. The Radon Barrier Material is expected to be obtained from the excavation of the disposal cell at the BC Site.

Details of Revision 1

Sheet 1 - Comment (2) of Summary of Results modified. Sheet 7 renumbered from 7.5 to 7.
1.0 SUMMARY OF RESULTS

(1) For riprap types A, B, & C, and bedding, the material will come from the Dolores River borrow site. The material available at this site is approximately 300,000 cubic yards.

Reference 4 shows that there will be about 55% material wastage at the Dolores River borrow site. Even with this 55% wastage there is twice the required amount of material for riprap types A, B, C, & bedding (Ref. 4). To reduce the 55% wastage at the Dolores River borrow site, large size ripraps from the U.C. site can be combined with the Dolores River borrow material (Ref. 1 & 4).

(2) Radon barrier material will come from the Disappointment Valley borrow area. This site has in excess of 500,000 cubic yards of material within the borrow area boundaries and over 300,000 cubic yards outside the boundaries.

2.0 PURPOSE

The purpose of this calculation is to determine the amount of material available at the following Borrow sites:

(1) Dolores River Borrow Site (Type A, B, & C riprap, and bedding material)

(2) Disappointment Valley Borrow Site (Radon barrier material)

3.0 METHOD

The average depths of available material at each site is established using Boring data from references 2 & 3. The amount of material is computed by estimating the plan area and multiplying this value with the average depths of material.
4.0 **DOLORES RIVER BORROW SITE**

A plan of the Dolores River borrow site is shown on sheet 3. The estimated plan area of the site, using a planimeter, is:

\[ A = 1,150,700 \text{ ft}^2 \]

The following is a summary table of the borehole data:

<table>
<thead>
<tr>
<th>Borehole</th>
<th>Depth</th>
<th>Soil Profile</th>
<th>Depth of Gravel/Cobbles [ft]</th>
</tr>
</thead>
<tbody>
<tr>
<td>EP1</td>
<td>0' – 2.5'</td>
<td>Clay</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td>2.5' – 8.5'</td>
<td>Gravel/Cobbles</td>
<td></td>
</tr>
<tr>
<td></td>
<td>&gt; 8.5'</td>
<td>Rock</td>
<td></td>
</tr>
<tr>
<td>EP2</td>
<td>0' – 5'</td>
<td>Clay</td>
<td>6.5</td>
</tr>
<tr>
<td></td>
<td>5' – 11.5'</td>
<td>Gravel/Cobbles</td>
<td></td>
</tr>
<tr>
<td></td>
<td>&gt; 11.5'</td>
<td>Rock</td>
<td></td>
</tr>
<tr>
<td>EP3</td>
<td>0' – 3'</td>
<td>Clay</td>
<td>7</td>
</tr>
<tr>
<td></td>
<td>3' – 10'</td>
<td>Gravel/Cobbles</td>
<td></td>
</tr>
<tr>
<td></td>
<td>&gt; 10'</td>
<td>Rock</td>
<td></td>
</tr>
<tr>
<td>EP4</td>
<td>0' – 3'</td>
<td>Clay</td>
<td>8.5</td>
</tr>
<tr>
<td></td>
<td>3' – 11.5'</td>
<td>Gravel/Cobbles</td>
<td></td>
</tr>
<tr>
<td></td>
<td>&gt; 11.5'</td>
<td>Rock</td>
<td></td>
</tr>
<tr>
<td>EP5</td>
<td>0' – 5'</td>
<td>Silty clay</td>
<td>4</td>
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<tr>
<td></td>
<td>5' – 9'</td>
<td>Gravel/Cobbles</td>
<td></td>
</tr>
<tr>
<td></td>
<td>&gt; 9'</td>
<td>Rock</td>
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<tr>
<td>TP503</td>
<td>0' – 2'</td>
<td>Silty sand</td>
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<tr>
<td></td>
<td>2' – 11.5'</td>
<td>Gravel/Cobbles</td>
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<tr>
<td>TP504</td>
<td>0' – 0.5'</td>
<td>Silty sand</td>
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<tr>
<td></td>
<td>0.5' – 10'</td>
<td>Gravel/Cobbles</td>
<td></td>
</tr>
</tbody>
</table>

**Average depth of gravels/cobbles**: 7 feet

Notes:
(1) From Ref. 2.
(2) From Ref. 3.

Therefore, the amount of material available is:

\[ \text{Vol} = 1,150,700 \times 7 = 298,300 \text{ cy} \]

The grain size distribution curves for the Dolores River material are shown on sheet 7.
This is taken from Ref. 1.
FIGURE 5

Dolores River Borrow Source Gradations

LOCATION:
REMARKS:

Designed: J. C. Kuo  Date: 1-22-93
Checked:  By O.  Date: 1-26-93
UMTRA PROJECT
CALCULATION COVER SHEET
CALC. NO. 11-330-02-PD

PROJECT
UMTRA - SLICK ROCK

FEATURE
TEMPORARY FACILITIES

ITEM
MATERIAL QUANTITIES

SOURCES OF DATA
See sheet 1

SOURCES OF FORMULAE & REFERENCES
See sheet 1

PRELIMINARY CALC. ☐ FINAL CALC. ☒ SUPERSEDES CALC. NO.

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<tr>
<td>1</td>
<td>Temporary facilities</td>
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</table>

<table>
<thead>
<tr>
<th>REV. NO</th>
<th>REVISION</th>
<th>CALCULATION BY</th>
<th>DATE</th>
<th>CHECKED BY</th>
<th>DATE</th>
<th>APPROVED BY</th>
<th>DATE</th>
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<tr>
<td></td>
<td></td>
<td>J.S. Randen</td>
<td>9/18/95</td>
<td>Cathy D. Shook</td>
<td>9/13/95</td>
<td>P. C. Ace</td>
<td>9/14/95</td>
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<tr>
<td></td>
<td></td>
<td>J.S. Randen</td>
<td>11/28/94</td>
<td>C. Li Zardo</td>
<td>1/25/95</td>
<td>P. C. Cogswell</td>
<td>1/28/95</td>
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<tr>
<td></td>
<td></td>
<td>H. Leung</td>
<td>11/26/94</td>
<td>Belinda Y. Wong</td>
<td>4/7/95</td>
<td>Ali M. Banani</td>
<td>4/15/95</td>
</tr>
</tbody>
</table>

Checking criteria listed in the MKES UMTRA Project Procedures Manual were used during the checking of all revisions of this calculation.
SOURCES OF DATA, FORMULAE, AND REFERENCES

1.) The following MKES Drawings:

SRK-PS-10-0310, Union Carbide Processing Site, Site Plan and Construction Facilities
SRK-PS-10-0312, Union Carbide Processing Site, Temporary Site Drainage Plan
SRK-PS-10-0313, Union Carbide Processing Site, Temporary Drainage Ditches, Sections, and Details
SRK-PS-10-0314, Union Carbide Processing Site, Access Control Area Plan, Sections, and Details
SRK-PS-10-0315, Union Carbide Processing Site, Wastewater Retention Basin Sections and Details
SRK-PS-10-0316, Union Carbide Processing Site, Contaminated Material Excavation Plan
SRK-PS-10-0318, Union Carbide Processing Site, Borings and Test Pits Location Plan
SRK-PS-10-0320, North Continent Processing Site, Site Plan and Construction Facilities
SRK-PS-10-0321, North Continent Processing Site, Access Roads and Facilities
SRK-PS-10-0323, North Continent Processing Site, Contaminated Material Excavation Plan
SRK-PS-10-0325, North Continent Processing Site, Borings and Test Pits Location Plan
SRK-DS-10-0330, Burro Canyon Disposal Site, Access Plan
SRK-DS-10-0331, Burro Canyon Disposal Site, Site Preparation and Temporary Drainage Facilities
SRK-DS-10-0332, Burro Canyon Disposal Site, Access Control Facilities and Wastewater Retention Basin Plan
SRK-DS-10-0333, Burro Canyon Disposal Site, Wastewater Retention Basin and Miscellaneous Section and Details
SRK-DS-10-0338, Burro Canyon Disposal Site, Borings and Test Pits Location Plan

All drawings are rev. A as of the date of this calculation

2.) Telecon with M.B. Leaf of TAC regarding wells to be sealed, 2/8/93, MKES Doc. No. 3885-SRK-T-01-02359-00

3.) Slick Rock sites well logs, MKES Doc. No. 3885-SRK-X-04-02293-00

4.) MKES-TAC meeting notes, 2/23/93, MKES Doc. No. 3885-SRK-X-02-02367-00

5.) Borehole, Test Pit, and Well Data, Burro Canyon Disposal Site, MKES Doc. No. 3885-SRK-X-04-02294-00

6.) MKES Doc. No. 3885-SRK-L-09-02376-00, 3/15/93, Message from TAC regarding well abandonment at Burro Canyon Disposal Site (attached, see sheet 100)
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<td>2.) Ditches 1, 2, and 3</td>
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<td>3.) Dikes 1 and 2</td>
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<td>5.) Fencing</td>
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<td>6.) Wells to be sealed</td>
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<td>B.) NC SITE (SUMMARY)</td>
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<td>2.) Access Road</td>
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<td>3.) Fencing</td>
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<td>4.) Wells to be sealed</td>
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<td>C.) BC SITE (SUMMARY)</td>
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<td>2.) Ditches</td>
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<td>3.) Berms 1, 2, and 3</td>
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<tr>
<td>4.) Access Control Facilities</td>
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<td>5.) New Culverts</td>
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<td>6.) Fencing</td>
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<td>7.) Wells to be sealed</td>
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</table>
The purpose of this revision is to update cut volume calls associated with a temporary ditch located SE of the proposed tailings pile embankment at BC site.

Sheets 82, 83, 84, 85 & 86 were replaced in entirety as sheets 82A, 83A, 84A, 85A & 86A.

Sheets 74 & 41 are affected and show connections.

Sheets 86 B & 86 C are added to include the profile and typical cross section of the ditch.

The excavation quantity of temporary ditch was calculated using the same method as described in Sheet 3.

The length of silt fences and barbed wire fences in the BC site have changed. Sheets 4, 74 and 98 have been revised. Sheets 69, 70 and 71 have been replaced with new sheets.
Revision 2

Purpose

(a) The chainlink fence gates have been changed to driveway gates and barbed wire fences have been changed to smooth wire fences. Deer fences have been added around all the basins at UC, NL and BC sites.

Shts 2B, 50A, 96A have been added.
Shts 4, 6, 13, 50, 57, 66, 74, 98 revised
Sht 9, 54, 71 replaced.
I. PURPOSE

The purpose of this calculation is to estimate the material quantities (cut, fill, concrete, aggregate, membrane liner, culvert, fencing, wells to be sealed) that will be required for construction facilities. Results of this calculation will be used to determine the bid schedule.

II. METHOD

Excavation quantities were determined by using the Average End Area Method:

\[ VOLUME = \frac{1}{2} (A_1 + A_2) \times (\Delta L) \]

area 1 = \( A_1 \)
area 2 = \( A_2 \)
distance between \( A_1 \) and \( A_2 \) = \( (\Delta L) \)

Where the end conditions for the computed volumes were such that the volumes became zero at a point, rather than a line, the Pyramid Volume Formula was used:

\[ VOLUME = \frac{1}{3} (A_1 + A_2) \times (\Delta L) \]

area 1 = \( A_1 \)
area 2 = \( A_2 \)
distance between \( A_1 \) and \( A_2 \) = \( (\Delta L) \)

All cross sectional areas were measured by planimeter.

Aggregate and concrete volumes were estimated using geometric methods and planimeter, as were the areas for the membrane liner. Sideslope areas for retention basins were estimated using an average perimeter length measured along the sideslope at one half the depth of the basin. This perimeter length was multiplied by the length of the sideslope to obtain the estimated area.

Lengths of fences, culverts, and roads were directly scaled off construction drawings. Cut and fill for roadwork are approximated using scaled dimensions and an assumed depth of one foot. Aggregate for road is approximated using scaled dimensions of road and assuming a thickness of six inches.
MORRISON KNUDSEN CORPORATION
ENVIRONMENTAL SERVICES DIVISION

Project: UMTRA - SRK
Feature: TEMPORARY FACILITIES
Item: MATERIAL QUANTITIES

Sheet 4
File No. 

Designed: HJL
Checked: J. S. R
Date: 4-27-93
Date: 4-30-93

III. SUMMARY OF RESULTS

A.) EARTHWORK

1.) Cut (cy)
   22,550  2,220  21,330

2.) Fill (cy)
   12,400  25    4,400  16,825 cy

TOTAL NET CUT = 28,645 cy

B.) OTHER QUANTITIES

1.) Concrete (cy) 150  50    150  350 cy
2.) Aggregate (cy) 250  0     390  640 cy
3.) Membrane Liner (sf) 112,620  8,130  59,210  179,960 sf
4.) Fencing
   a.) Slit Fence (lf) 0   2,190
   b.) Barbed Wire (lf) 3,920  1,160  7,040  12,120 lf
   c.) Chain Link (lf) 205  60  555  720 lf
   d.) Deer Fence (cy) 2,420  920  2,000  5,350

5.) Well Lengths to be sealed (lf) 680  110  1,914  2,704 lf
6.) New culvert length (ft) 0    0     190  190 ft

7.) Roadwork
   a.) Length (ft) 915  1,840  3,550  6,305 ft
   b.) Excavation qty (cy) 680  1,700  5,260  7,640 cy
   c.) Aggregate (cy) 338  850  2,630  3,818 cy

Total for

Rev 3 by JSR 8/12/94
Rev 4 by JSR 9/13/94
IV. CALCULATIONS - A. UC SITE
NOTES:
1. SUBCONTRACTOR SHALL OBTAIN ALL PERMITS TO WIDEN THE RC SITE MAINT ROAD FROM STATE HIGHWAY 141 TO W 56.700, AND FROM W 57.500 TO RC SITE ACCESS GATE.
2. SUBCONTRACTOR SHALL REPLACE OR EXTEND ALL EXISTING CULVERTS AS REQUIRED BY THE COUNTY AND THE CONTRACTOR.
3. SUBCONTRACTOR SHALL DETERMINE ALIGNMENT AND LOCATION OF TURNING RADIUS OF ACCESS ROAD TO THE RC SITE.
4. THE SECTIONS AND DETAILS OF THE WASH WATER RETENTION BASIN SHOWN ARE A SAMPLE DESIGN ONLY. THE SECTIONS AND DETAILS MAY BE ADJUSTED BY THE SUBCONTRACTOR AS REQUIRED FOR HIS OPERATIONS SUBJECT TO CONTRACTOR'S APPROVAL.
5. SEE Dwg NO. SRK-PS-10-034 FOR TYPICAL CONSTRUCTION AND CONTRACTION JOINT DETAILS FOR THE DECAY-TANKATION PAD. PAD.
6. STORAGE TANKS MAY BE USED IN LIEU OF MEMBRANE LINED RECIRCULATION BASIN.

REFERENCE DRAWINGS:
SRK-PS-10-0320 SITE PLAN AND CONSTRUCTION FACILITIES
SRK-PS-10-0314 ACCESS CONTROL AREA PLAN, SECTIONS AND DETAILS
SRK-PS-10-0315 WASTEWATER RETENTION BASIN, SECTIONS AND DETAILS

LEGEND:
- BURIED TELEPHONE LINE

PRELIMINARY REVIEW
C & D MANAGER CHIEF ENGINEER O & A MANAGER
ONLY ACTUAL CONSTRUCTION SHALL BE WITHIN PERMITTED AREAS.

4. SITE BOUNDARY AND COORDINATES ARE FROM THE SURVEY CONDUCTED BY M.H. SMITH R.P.S. 10758, ESTABLISHING HORIZONTAL AND VERTICAL CONTROL FOR THE SLICK ROCK SITES.

5. NO BELOW GRADE FENCE POSTS SHALL BE LOCATED ALONG GAS LINE R.O.W.

6. SEE INFORMATION FOR BORDERS FOR THE LIMITS OF SITE BOUNDARY AND FOR THE LOCATIONS OF BRASS SURVEY CAPS.

7. PROPERTY OWNERSHIP SHOWN ON DRAWINGS ARE AS OF FEB. 1993.

REFERENCE DRAWINGS:

SRK-PS-10-0322 TEMPORARY SITE DRAINAGE PLAN
SRK-PS-10-0314 ACCESS CONTROL AREA PLAN, SECTIONS AND DETAILS

LEGEND:

--- SITE BOUNDARY
--- APPROXIMATE LIMITS OF TAILINGS PILES
--- APPROXIMATE LIMITS OF WINDBLOWN/WATERBORN CONTAMINATED MATERIALS OUTSIDE SITE BOUNDARY FENCE
• AIR PARTICULATE (AP) STATION
▲ RADON GAS MONITOR (RG) STATION
○ BRASS SURVEY CAP SET IN CONCRETE (EXISTING)
--- PROPERTY LINE
--- PROPERTY OWNERSHIPS
SEE TABLE 1

PRELIMINARY REVIEW

E & D MANAGER
D & T ENGINEER
D & A MANAGER

U.S. DEPARTMENT OF ENERGY
ALBUQUERQUE, NEW MEXICO

SLICK ROCK SITE
SLICK ROCK, COLORADO
UNIT CARBIDE PROCESSING SITE
SITE PLAN AND CONSTRUCTION FACILITIES

DE-AC04-83AL18795

MORRISON KNUDSEN CORPORATION
DE-AC04-83AL18795

UMTRA PROJECT
UMTRA - SRK
PROJECT COORDINATOR
SRK-PS-10-0314
NOTES:

1. AREAS BETWEEN DITCH 1 AND Dike 1 THAT ARE LOWER THAN ELEVATION 5434.0 SHALL BE BACKFILLED AND GRADED TO DRAIN INTO THE RETENTION BASIN.

2. THE RETENTION BASIN BERM ON THE RIVER SIDE, BETWEEN DITCH 1 AND Dike 1, SHALL BE AT EL 5434.5. THE BERM ON THE PILE SIDE, BETWEEN DITCH 1 AND Dike 1, SHALL BE AT EL 5434.0.

3. SUBCONTRACTOR SHALL PROVIDE FOR POSITIVE DRAINAGE TOWARD THE RETENTION BASIN OR MAKE PROVISIONS FOR REMOVING WATER FROM POND AREA.

4. SUBCONTRACTOR SHALL PROVIDE FOR AND MAINTAIN POSITIVE DRAINAGE.

5. ALONG EXISTING COUNTY ROAD, BOTTOM OF DRAIN PATH SHALL BE 0.5 FEET BELOW TOP OF THE ROAD.

6. SUBCONTRACTOR SHALL GRADE ROAD TO PROVIDE POSITIVE DRAINAGE TOWARD TEMPORARY DITCHES.

7. ROAD SHALL BE TEMPORARILY CLOSED TO ALLOW FOR TEMPORARY DITCH CROSSING.

8. THE ACTUAL LOCATION MAY BE ADJUSTED BY THE CONTRACTOR TO BETTER FIT THE FIELD CONDITION.

9. EXISTING COUNTY ROAD CR-55 SHALL BE DETOURED TO LOCATE DITCHES UNTIL THE DRAINAGE SYSTEM IS REMEDIATED AND DETOUR OBLIGATIONS REMOVED.

10. DETAILED ROAD REMEDIES TO BE 20 FEET WIDE, GRADED AND MAINTAINED. NO SURFACE COURSE IS REQUIRED.

11. AFTER AREA SOUTH OF FENCE IS REMEDIATED, COUNTY ROAD CR-55 SHALL BE RECONSTRUCTED ALONG THE ORIGINAL ALIGNMENT.

REFERENCE DRAWINGS:

SRK-PS-10-0313 TEMPORARY DRAINAGE DITCHES SECTIONS AND DETAILS
SRK-PS-10-0314 ACCESS CONTROL AREA SECTIONS AND DETAILS
SRK-PS-10-0315 WASTEWATER RETENTION BASIN SECTIONS AND DETAILS

LEGEND:

DRAINAGE DITCH
SURFACE FLOWPATH

SCALE:
0 100 200 FEET

U.S. DEPARTMENT OF ENERGY
ALBUQUERQUE, NEW MEXICO
SLICK ROCK SITE
SLICK ROCK, COLORADO
UNION CARBIDE PROCESSING SITE
TEMPORARY SITE DRAINAGE PLAN

MORRISON KNUDSEN CORPORATION
DE-AC04-83AL18796
REFERENCE DRAWINGS:
- SRK-PS-10-0312: TEMPORARY SITE DRAINAGE PLAN
- SRK-PS-10-0315: WASTEWATER RETENTION BASIN SECTIONS AND DETAILS

TYPICAL SECTION A
DIKE AT DITCH 1
NOT TO SCALE

TYPICAL SECTION B
EXISTING GROUND SURFACE

DITCH 1
EXISTING GROUND SURFACE
NOT TO SCALE

REFERENCE DRAWINGS:
- SRK-PS-10-0312: TEMPORARY SITE DRAINAGE PLAN
- SRK-PS-10-0315: WASTEWATER RETENTION BASIN SECTIONS AND DETAILS

TYPICAL SECTION D
DITCH 1
EXISTING GROUND SURFACE

SECTION AND DETAILS

Preliminary Review

U.S. Department of Energy
Albuquerque, New Mexico

Temporary Drainage Ditches
Sections and Details

Morrison Knudsen Corporation
DE-AC04-83AL18796
PLAN
ACCESS CONTROL AREA
(SEE DWG. NO. SRK-PS-10-0330)

50 0 50 100
SCALE FEET

WMTRA - SRK
Temporary Facilities
Material Quantities

3885-76
ISR 8/11/94
CUR 9/13/94

RETENTION BASIN
(SEE DWG. SRK-PS-10-0312)

GRADE TO DRAIN

WASTEWATER RECYCLATION BIAS

OFFICE TRAILER

CONCRETE DECONTAMINATION DEPOT (40'x12')

ACCESS CONTROL TRAILER (60'x12')

CHANGE OUT TRAILER (60'x12')

N 58.000
E 59.000

N 58.957
E 59.973

N 58.951
E 60.033

N 58.339
E 60.059

N 58.715
E 60.259

5450
N 58.000
E 60.000

N 58.250
E 59.000

5250

34' (TYP.)

50' (TYP.)

3' (TYP.)

34' (TYP.)

STORAGE TRAILER (40'x12')

40' WIDE TWIN DRIVEWAY GATE

SEE DWG. SRK-CC-10-0301

MEET EXISTING PAVEMENT

SEE NOTE 10

E OF ACCESS RAMP

ACCESS RAMP

SEE NOTE 10

DOLORES RIVER

GAS PIPELINE R.O.W.
NOTES:
1. ACCESS CONTROL AREA SHALL BE CONSTRUCTED AFTER REMOVAL OF THE CONTAMINATED MATERIAL WITHIN THE AREA. CONTAMINATED MATERIAL SHALL ALSO BE REMOVED FROM ALL OFFICE FACILITIES AND TRAILER AREA PRIOR TO CONSTRUCTION OF THESE FACILITIES.
2. ALL EXCAVATED CUT SLOPES SHALL BE AS REQUIRED FOR STABILITY BUT NO STEEPER THAN 20:1 Hor, UNLESS OTHERWISE INDICATED.
3. ADJACENT AREAS SHALL BE GRADED TO PROVIDE DRAINAGE FOR ACCESS CONTROL AREA.
4. THE LOCATIONS AND DETAILS SHOWN MAY BE ADJUSTED BY THE SUBCONTRACTOR AS REQUIRED FOR HIS OR HER OPERATIONS, SUBJECT TO CONTRACTOR’S APPROVAL.
5. GUNNIE GROOVE JOINTS SHALL BE FORMED OR SAWED IN THE CONCRETE PAVEMENT FOR DRAIN PAD AT A MAXIMUM SPACING OF 15 FEET.
6. CONSTRUCTION JOINTS, IF REQUIRED, SHALL BE LOCATED AT GUNNIE GROOVE JOINTS ONLY. DOWEL BARS SHALL BE OBLITRATED BEFORE REMOVAL OF PAVING.
7. THE LOCATIONS AND DETAILS OF THE DECONTAMINATION PAD AND WASH WATER RECIRCULATION BASIN SHOWN ARE A SAMPLE DESIGN ONLY. SUBCONTRACTOR SHALL SUBMIT DETAILED DESIGN OF DECONTAMINATION FACILITIES FOR APPROVAL.
8. THE SUMP SHALL BE CONSTRUCTED OF REINFORCED CONCRETE AND BE DESIGNED SO A BACKHOE OR FRONT END LOADER CAN EASILY REMOVE THE SEDIMENTS.
9. LOCATION OF TRAILERS IN THE ACCESS CONTROL AREA SHALL BE SUBJECT TO THE CONTRACTOR’S APPROVAL.
10. CONTRACTOR MAY REVISE ALIGNMENT AND LOCATION OF ROUTES OF ACCESS RAMP.
11. SUBCONTRACTOR SHALL PROVIDE AND INSTALL DEER FENCE AND GATES AROUND ALL WATER RETENTION Ponds INCLUING RECIRCULATION Ponds AND CONSTRUCTION WATER STORAGE Ponds AS APPROVED BY THE CONTRACTOR.

REFERENCE DRAWINGS:
SRR-QE-1-0305 FENCE AND GATE DETAIL
SRR-QS-10-0310 SITE PLAN AND CONSTRUCTION FACILITIES
SRR-QS-1-0312 TEMPORARY SITE DRAINAGE PLAN
SRR-QS-1-0315 WASTEWATER RETENTION BASIN SECTIONS AND DETAILS

LEGEND:
4" AGGREGATE COVERED SURFACE
CONCRETE PAVEMENT
SYNTHETIC MEMBRANE LINER
6" AGGREGATE BASE COURSE
3" CURB
8" CONCRETE PAVEMENT
EXISTING GROUND

TYPICAL SECTION A
NOT TO SCALE
RETENTION BASIN

SECTION A

TYPICAL ANCHOR TRENCH DETAIL

LIMIT OF MEMBRANE LINER

MEMBRANE LINER ANCHOR TRENCH (TYP)

RETENTION BASIN

SPILLWAY OUTLET BASIN

SECTION B

NOT TO SCALE

TYPICAL ANCHOR TRENCH

SECTION C

NOT TO SCALE
NOTES:
1. ALL CUTS SHALL BE 200' X 200' UNLESS OTHERWISE NOTED.

2. FINAL LIMITS OF WATERBORNE CONTAMINATION AT BOTTOM OF CORRAL DRAW WILL BE DETERMINED IN THE FIELD.

3. ALL CONTAMINATED SOIL ON EXPOSED OR EXCAVATED ROCK SURFACES SHALL BE REMOVED. THIS MAY REQUIRE HAND EXCAVATION OR WASHING DOWN TO REMOVE ALL SURFACE CONTAMINATION. THE LIMITS OF CONTAMINATED MATERIALS ON ROCK SURFACES WILL BE DETERMINED IN THE FIELD.

4. CONTAMINATION MATERIAL FROM AREA "A" SHALL BE PLACED IN THE DEGRADED ENCLOSURE WITH TAILINGS PRIOR TO OTHER OFF-PILE CONTAMINATED SOILS.


6. FINAL LIMITS TO BE DETERMINED IN THE FIELD.

7. EXCAVATIONS SHALL NOT DAMAGE OR ENDANGER THE PETROGLYPHS LOCATED ON THE CLIFF FACE, WEST OF THE COUNTY ROAD BRIDGE.

8. EXISTING COUNTY ROAD SHALL BE DETOURED TO LOCATION SHOWN UNTIL AREA SOUTH OF FENCE IS REMOVED AND DEMOLITION DEBRIS IS REMOVED. COUNTY ROAD SHALL THEN BE FULLY RESTORED TO ORIGINAL LOCATION.


REFERENCE DRAWINGS:

LEGEND:

- APPROXIMATE LIMIT AND DEPTH IN FEET OF IN-SITIUM CONTAMINATED MATERIAL
- AREA "A"
- EXPOSED ROCK OUTCROP

LOCATION POINTS SEE TABLE 1 FOR COORDINATES

---

TABLE 1
LOCATION POINT COORDINATES

<table>
<thead>
<tr>
<th>LOCATION</th>
<th>NORTH COORDINATE</th>
<th>EAST COORDINATE</th>
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<tbody>
<tr>
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<td>E 58.675</td>
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<td>2</td>
<td>N 39.815</td>
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<td>3</td>
<td>N 59.485</td>
<td>E 58.930</td>
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<td>4</td>
<td>N 59.350</td>
<td>E 58.330</td>
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<tr>
<td>5</td>
<td>N 59.600</td>
<td>E 59.000</td>
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<td>6</td>
<td>N 59.620</td>
<td>E 59.310</td>
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<td>N 59.480</td>
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<td>E 59.350</td>
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<tr>
<td>9</td>
<td>N 58.850</td>
<td>E 59.155</td>
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<tr>
<td>10</td>
<td>N 59.500</td>
<td>E 59.200</td>
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<tr>
<td>11</td>
<td>N 59.015</td>
<td>E 59.340</td>
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<tr>
<td>12</td>
<td>N 59.115</td>
<td>E 59.410</td>
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<tr>
<td>13</td>
<td>N 59.970</td>
<td>E 59.860</td>
</tr>
<tr>
<td>14</td>
<td>N 59.940</td>
<td>E 59.610</td>
</tr>
<tr>
<td>15</td>
<td>N 59.850</td>
<td>E 59.940</td>
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<tr>
<td>16</td>
<td>N 59.859</td>
<td>E 59.475</td>
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<td>17</td>
<td>N 59.910</td>
<td>E 59.000</td>
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<td>E 59.950</td>
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<td>19</td>
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<td>E 59.675</td>
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<td>N 59.560</td>
<td>E 59.140</td>
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<tr>
<td>22</td>
<td>N 59.115</td>
<td>E 59.260</td>
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<tr>
<td>23</td>
<td>N 59.115</td>
<td>E 59.670</td>
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<td>24</td>
<td>N 59.410</td>
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<td>25</td>
<td>N 59.395</td>
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<td>E 59.701</td>
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<td>N 58.644</td>
<td>E 59.822</td>
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<td>N 58.782</td>
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<td>37</td>
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<td>E 59.711</td>
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</table>
## SUMMARY FOR UC SITE

### A) EARTHWORK

<table>
<thead>
<tr>
<th>Item Description</th>
<th>Cut (cu yd)</th>
<th>Fill (cu yd)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1) RETENTION BASIN</td>
<td>2000.5</td>
<td>285.0</td>
</tr>
<tr>
<td>2) DITCH NO. 1</td>
<td>367.5</td>
<td>8772.0</td>
</tr>
<tr>
<td>DITCH NO. 2</td>
<td>592.2</td>
<td>14.4</td>
</tr>
<tr>
<td>DITCH NO. 3</td>
<td>523.1</td>
<td>0</td>
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<td>3) DIKE NO. 1</td>
<td>97.8</td>
<td>292.7</td>
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<tr>
<td>DIKE NO. 2</td>
<td>0</td>
<td>1003.8</td>
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<tr>
<td>4) RECIRCULATION BASIN</td>
<td>360.0</td>
<td>53.0</td>
</tr>
<tr>
<td>ACCESS RAMP</td>
<td>0</td>
<td>1971.0</td>
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<tr>
<td>DECON PAD AREA</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td>22,547.1</td>
<td>12,391.9</td>
</tr>
</tbody>
</table>

### B) OTHER QUANTITIES

| 1) MEMBRANE LINER - RET. BASIN | 109,249.2 sq ft |
| MEMBRANE LINER - RECIRC. BASIN | 3,372.0 sq ft |
| **TOTAL** | 112,621.2 sq ft |
| 2) CONCRETE - DECON PAD | 152,964 cu yd |
| 3) AGGREGATE - DECON PAD | 113,814 cu yd |
| ACCESS RAMP | 140,000 cu yd |
| **TOTAL** | 253,814 cu yd |

| 4) FENCING - CHAIN LINK | 390 L.F. |
| BARBED WIRE - SMOOTH | 3400 L.F. |
| **TOTAL WELL LENGTH** | 680 FT |
| **TOTAL COUNTY ROAD** | 915 FT |
| **EXCAVATION** | 677.8 cu yd |
| **AGGREGATE** | 3389 cu yd |
1) Retention Basin

a) Volume of contaminated material excavated for retention basin (refer to dwg no. SRK-FS-10-0316, SHE 11)

\[(120') \times (90') \times (10') = 10,800 \text{ cf} = 400 \text{ cy}\]

b) Volume of total material excavated (See sheets 17 to 21)

<table>
<thead>
<tr>
<th>Section</th>
<th>Distance (ft)</th>
<th>Cross Sect. Area (ft²)</th>
<th>Volume (cu)</th>
<th>Cross Sect. Area (ft²)</th>
<th>Volume (cu)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>59</td>
<td>Ø</td>
<td>1376.6</td>
<td>Ø</td>
<td>86.1</td>
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<td></td>
<td>100</td>
<td>1480.7</td>
<td>52-86.1</td>
<td>93.0</td>
<td>172.2</td>
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<tr>
<td>2</td>
<td>100</td>
<td>1367.8</td>
<td>6258.3</td>
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<tr>
<td>3</td>
<td>75</td>
<td>2011.7</td>
<td>4824.9</td>
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<td>4</td>
<td>90</td>
<td>Ø</td>
<td>2437.0</td>
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</tbody>
</table>

**Total Cut = 20,182.9 cu**  **Total Fill = 258.3 cu**
c) Spillway  (See Sec-PS10-0315, Sh+12)

i) Reduce fill by volume at spillway crest

\[(18 \times 20 \times 2) = 26.7 \text{ cu yd}\]

ii) Add to cut spillway ramp

- approximate volume by assuming a wedge

\[\text{Vol} = \frac{l \times w \times h}{2} = \frac{(35)(1.0005)(1)20\sqrt{2}}{2}\]

\[= 13.0 \text{ cu yd}\]

iii) Sump = (10\times10\times2.9) = 2.875 cu = 110.6 cu cut

Total cut for retention basin = 101829.4 + 13 + 10.6 = 10606.5 cu

Total fill for ret. basin = 258.3 + 26.7 = 285.0 cu
d) Membrane Liner

i) Bottom Area, neglecting slope

\[(250 \times 360) = 90,000 \text{ sf}\]

ii) Side Slope Area

\[\frac{5.9 + 4.5 + 3.6 + 4.5}{4} = 4.6\]

\[
\begin{align*}
4.6 & \quad 10.8 \\
9.2 & \quad 1.2
\end{align*}
\]

Average length of side slope = 10.8’

Perimeter length at approximate midpoint of side slope:

\[2(250 + 9.2) + 2(368 + 9.2) = 1256.8’\]

Area = \[(1256.8 \times 10.8) = 13,415.0 \text{ sf}\]

iii) Spill Way

Area = \[(25 + 0.5) \times 30\] = 900 sf

iv) Anchor Trenches (see SRK-P5-10-0315)

Area = \[\left(2(360 + 250 + 18.4)\right)(4.3) = 5404.2 \text{ sf}\]

Total Liner Area = 189,249.2 sf
Project: UNTRA - S RK
Feature: TEMPORARY FACILITIES
Item: MATERIAL QUANTITIES

Sheet: 20  
Contract No. 3865-76  
File No.  
Designed: APS  
Date: 2-4-73  
Checked: APS  
Date: 2-16-73

EXISTING
GEOLOGY

CUT = 1462.4 ft
FILL = 0

SEATION 4
RETENTION BASIN
UC SITE

S535  S530  S525
5. Along existing path shall be
6. Subcontractor's positive drain
   begin location approximate
   shall be determined
   subcontract
7. Road shall be
temporary
8. The actual contractor
9. Existing curve
   location shall
   be remediated
10. Temporary
    and maintain
11. After area
    road CR-S8
    original alignment

REFERENCE

SRK-PS-10-0

SRK-PS-10-C
2. Ditches

All ditch excavation will be beyond the boundary of contaminated areas.

DITCH NO 1 (See cuts 24 to 34.)

<table>
<thead>
<tr>
<th>Section</th>
<th>Distance (ft)</th>
<th>Cut</th>
<th>Fill</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Cross Sectional Area (ft^2)</td>
<td>Volume (cu)</td>
</tr>
<tr>
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<td></td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>1</td>
<td>25</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>2</td>
<td>150</td>
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<td>3</td>
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<td>0</td>
<td>0</td>
</tr>
<tr>
<td>4</td>
<td>150</td>
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<tr>
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<td>150</td>
<td>0</td>
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</tr>
<tr>
<td>6</td>
<td>150</td>
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<td>0</td>
</tr>
<tr>
<td>7</td>
<td>150</td>
<td>15.5</td>
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<td>150</td>
<td>15.6</td>
<td>82.5</td>
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<tr>
<td>11</td>
<td>160</td>
<td>0</td>
<td>48.5*</td>
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**Total Cut = 367.5 cu**  **Total Fill = 8772.0 cu**

*Indicated where pyramid volume formula was used
**DITCH NO. 2 - UC SITE** (See Sits 25 + 35)

<table>
<thead>
<tr>
<th>SECTION</th>
<th>DISTANCE (FT)</th>
<th>CUT</th>
<th>VOLUME (CY)</th>
<th>FILL</th>
<th>VOLUME (CY)</th>
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<td></td>
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<td>CROSS SECTIONAL AREA (FT²)</td>
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<td>CROSS SECTIONAL AREA (FT²)</td>
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</tr>
<tr>
<td>A</td>
<td>30</td>
<td>38.8</td>
<td>14.4*</td>
<td>Ø</td>
<td>Ø</td>
</tr>
<tr>
<td>B</td>
<td>100</td>
<td>10.3</td>
<td>90.9</td>
<td>Ø</td>
<td>Ø</td>
</tr>
<tr>
<td>C</td>
<td>100</td>
<td>5.1</td>
<td>28.5</td>
<td>3.9</td>
<td>7.2</td>
</tr>
<tr>
<td>D</td>
<td>100</td>
<td>7.8</td>
<td>23.9</td>
<td>Ø</td>
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<tr>
<td>H</td>
<td>40</td>
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**TOTAL CUT**: 592.2 CY  
**TOTAL FILL**: 14.4 CY

**DITCH NO. 3 - UC SITE** (See Sits 25 + 35)

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<td>15.5</td>
<td>202.9</td>
</tr>
<tr>
<td>I</td>
<td>100</td>
<td>40.0</td>
<td>102.8</td>
</tr>
<tr>
<td>J</td>
<td>.80</td>
<td>60.7</td>
<td>149.5</td>
</tr>
<tr>
<td>K</td>
<td>40</td>
<td>Ø</td>
<td>30.0*</td>
</tr>
</tbody>
</table>

**TOTAL CUT**: 523.1 CY  
**TOTAL FILL**: Ø  
* = PYRAMID VOL. FORMULA
SECTION 1

DITCH NO. 1 - UC SITE

SECTION 2

DITCH NO. 1 - UC SITE
**SECTION 3**

**DITCH NO. 1 - UC SITE**

**SECTION 4**

**DITCH NO. 1 - UC SITE**

<table>
<thead>
<tr>
<th>Project</th>
<th>UNTRA - SRE</th>
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</thead>
<tbody>
<tr>
<td>Feature</td>
<td>TEMPORARY FACILITIES</td>
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<tr>
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<td>MATERIAL QUANTITIES</td>
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<tr>
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<tr>
<td>Date</td>
<td>1/29/93</td>
</tr>
<tr>
<td>Date</td>
<td>2/16/93</td>
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</table>
SECTION 5
DITCH NO. 1 - UC SITE

SECTION 6
DITCH NO. 1 - UC SITE
**SECTION 7**

DITCH NO. 1 - UC SITE

**DITCH INVERT**

- FL. S435.1
- CUT: 15.5 ft
- FILL: 54.2 ft

**SECTION 8**

DITCH NO. 1 - UC SITE

**DITCH INVERT**

- FL. S434.3
- CUT: 14.2 ft
- FILL: 65.9 ft
SECTION 9
DITCH NO. 1 - UC SITE

SECTION 10
DITCH NO. 1 - UC SITE
**SECTION A**

Ditch No. 2 & 3 - UC SITE

**SECTION B**

Ditch No. 2 - UC SITE
SECTION C
DITCH NO. 2 - VC SITE

SECTION D
DITCH NO. 2 - VC SITE
SECTION E
DITCH NO. 2 - UC SITE

SECTION F
DITCH NO. 2 - UC SITE
SECTION I
DITCH NO. 3 - UC SITE

SECTION J
DITCH NO. 3 - UC SITE
3) Dikes 1 and 2

Dike 1 (See Suts 37 to 42)

<table>
<thead>
<tr>
<th>Section</th>
<th>Distance (ft)</th>
<th>Cut Area (ft²)</th>
<th>Vol. (cy)</th>
<th>Fill Area (ft²)</th>
<th>Vol (cy)</th>
</tr>
</thead>
<tbody>
<tr>
<td>L</td>
<td>80</td>
<td>6.45</td>
<td>9.6</td>
<td>Ø</td>
<td>Ø</td>
</tr>
<tr>
<td>M</td>
<td>100</td>
<td>Ø</td>
<td>11.9</td>
<td>36.2</td>
<td>67.0</td>
</tr>
<tr>
<td>N</td>
<td>100</td>
<td>11.6</td>
<td>21.5</td>
<td>11.6</td>
<td>88.5</td>
</tr>
<tr>
<td>O</td>
<td>100</td>
<td>9.0</td>
<td>38.1</td>
<td>7.8</td>
<td>35.9</td>
</tr>
<tr>
<td>P</td>
<td>100</td>
<td>Ø</td>
<td>16.7</td>
<td>Ø</td>
<td>38.3</td>
</tr>
<tr>
<td>Q</td>
<td>105</td>
<td>Ø</td>
<td>Ø</td>
<td>10.3</td>
<td>43.0</td>
</tr>
<tr>
<td>R</td>
<td></td>
<td>Ø</td>
<td>Ø</td>
<td>20.0</td>
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</tbody>
</table>

TOTAL CUT = 97.8 cy  TOTAL FILL = 292.7 cy

Dike 2 (See Suts 37 to 42)

<table>
<thead>
<tr>
<th>Section</th>
<th>Distance (ft)</th>
<th>Cut Area (ft²)</th>
<th>Vol. (cy)</th>
<th>Fill Area (ft²)</th>
<th>Vol (cy)</th>
</tr>
</thead>
<tbody>
<tr>
<td>S</td>
<td>200</td>
<td>Ø</td>
<td>Ø</td>
<td>Ø</td>
<td>103.3</td>
</tr>
<tr>
<td>T</td>
<td>200</td>
<td>Ø</td>
<td>Ø</td>
<td>Ø</td>
<td>232.6</td>
</tr>
<tr>
<td>U</td>
<td>200</td>
<td>Ø</td>
<td>Ø</td>
<td>Ø</td>
<td>227.4</td>
</tr>
<tr>
<td>V</td>
<td>200</td>
<td>Ø</td>
<td>Ø</td>
<td>Ø</td>
<td>196.3</td>
</tr>
<tr>
<td>W</td>
<td>200</td>
<td>Ø</td>
<td>Ø</td>
<td>Ø</td>
<td>186.7</td>
</tr>
<tr>
<td>X</td>
<td>200</td>
<td>Ø</td>
<td>Ø</td>
<td>23.9</td>
<td>57.5</td>
</tr>
<tr>
<td>Y</td>
<td>130</td>
<td>Ø</td>
<td>Ø</td>
<td>Ø</td>
<td></td>
</tr>
</tbody>
</table>

TOTAL CUT = Ø  TOTAL FILL = 1003.8 cy
**Sections for Dikes**

**Section L**

Dike 1 - UC Site

**Section M**

Dike 1 - UC Site

**Section N**

Dike 1 - UC Site
SECTION II
DIKE 2 - UC SITE

SECTION III
DIKE 2 - UC SITE

SECTION IV
DIKE 2 - UC SITE

SECTION V
DIKE 2 - UC SITE
SECTION W
DIKE 2 - UC SITE

SECTION X
DIKE 2 - UC SITE

FILL = 26.5 ft²
CUT = 0

FILL = 239 ft²
CUT = 0

EXISTING GROUND

5498
0 50 100

5488

5479

5474

MORRISON KNUDSEN CORPORATION
Project UMTRA - SRK
Feature TEMPORARY FACILITIES MATERIAL QUANTITIES
Contract No. 5885-76
File No. -
Designed Date 2.2.93
Checked Date 2/16/93
Item 1M70 RKL!
Sheet 40

ENG 375/91
SRK-PS-10-0812
SCALE 1" = 100'

N 59,740
E 58,525
(SEE NOTE 8)

N 59,670
E 58,475
(SEE NOTE 8)

END AT CORNER OF GAS PLANT FENCE

DIKE 2

TANKS
GAS PLANT

B 0313
4. ACCESS CONTROL FACILITIES
   a) Recirculation basin

   c) Approximate excavation quantity
      using basin dimensions
      (See SRK - PS: 10 - 0314, Sheet 9 and 49)

   Lengths of sides at midpoint are 45' and 28'.

   Cut Volume = \((10 \times 30 \times 5) + \frac{1}{2} (15 \times 5)(90 + 50)\)\(\text{ft}^3\) = 250\(\text{cy}\)

   Additional cut = \((3)(9)(50 + 30) + (5 \times 3)(50 + 50)\)\(\text{ft}^3\) = 110\(\text{cy}\)

   Fill Volume = \((1 \times 3)(50 + 30) + (5 \times 3)(50 + 80)\)\(\text{ft}^3\) = 53\(\text{cy}\)

   TOTAL CUT = 360\(\text{cy}\)
   TOTAL FILL = 53\(\text{cy}\)
b) **Access Ramp**

Access ramp includes area to section AA, as shown on SSS 49.

i) **Fill Volume**

(See SSS 47 & 49)

<table>
<thead>
<tr>
<th>Section</th>
<th>Distance (ft)</th>
<th>Gross Sectional Area (ft²)</th>
<th>Volume (cu ft)</th>
</tr>
</thead>
<tbody>
<tr>
<td>AA</td>
<td>50</td>
<td>0</td>
<td>101.0</td>
</tr>
<tr>
<td>BB</td>
<td>50</td>
<td>109.1</td>
<td>375.0</td>
</tr>
<tr>
<td>CC</td>
<td>50</td>
<td>295.8</td>
<td>810.0</td>
</tr>
<tr>
<td>DD</td>
<td>50</td>
<td>579.3</td>
<td>685.0</td>
</tr>
<tr>
<td>EE</td>
<td>50</td>
<td>160.2</td>
<td></td>
</tr>
</tbody>
</table>

**Total Fill = 1971 cu ft**

ii) **Aggregate - 4" thick layer (SSE - PS-10-0314)**

Ramp plan area = 11,302.1 ft²

Slope factor = 1.0012

Volume = \((11,302.1 \times \frac{4}{12}) \times 1.0012 \times (\frac{4}{27}) = 140.0\) cu ft

iii) **Length of County Road from SSE - PS-10-0316; Sheet 11**

- Is approximately 915 ft

Earthwork Volume = \((915 \times 1 \times \frac{4}{12}) = 6178\) cu ft

Aggregate Volume = \((915 \times 0.5 \times \frac{4}{12}) = 339.9\) cu ft
d) DECON PAD AREA

Assume earthwork quantities are negligible given the flat grade of the area.

Aggregate

4" thick: plain area = 5877.1
Volume = (5877.1) \left( \frac{4}{12} \times \frac{1}{2} \right) = 72.5 \text{ cu yd}

6" thick base:

Aggregate volume for pad = 2 \left[ \left( 26.3 \times 1,000 \times 100 \times 0.5 \right) \left( \frac{1}{27} \right) \right] = 92.3 \text{ cu yd}

3% slope correction

Fig A.

From Fig A:

Vol_1 = \left( 100 \times 10.3 \times 0.5 \times 1,000 \right) \left( \frac{1}{27} \right) = 19.11 \text{ cu yd}

From Fig B:

Vol_2 = \left( \frac{1}{2} \times 100 \times 0.5 \times 1.0 \times \frac{1}{27} \right) = 0.92 \text{ cu yd}

Total aggregate volume = 113.8 \text{ cu yd}
ii) Concrete - 8" thick

Volume for pad = \[ 2 \left( 2 \times 6 \times 1.00 \times 0.8 \right) \frac{1}{27} \]

\[ = 128.5 \text{ cu yd} \]

Concrete for Sump

Volume = \( (100 \times 9.3) \left( \frac{8}{12} \times 1.00 \right) \frac{1}{27} \) + \( \frac{1}{2} (100 \times 9.3) \frac{1}{4} \left( \frac{1}{4} \right) \frac{1}{27} \) = 24.4 cu yd

**Total Concrete = 152.9 cu yd**

e) Membrane Liner for recirculation tank

i) Bottom Area = \( 10 \times 30 \) = 300 sq ft

ii) Side Slope

Width = 15.8'

Perimeter Length at midpoint of side slope = \( \frac{1}{2} (45 + 25) = 40' \)

Area = \( 15.8 \times 40 \) = 632 sq ft

iii) Anchor trenches

Length = \( 2 \times (60 + 40) = 200' \)

Width = \( 2 + 1.8 + 0.5 = 4.3' \)

Area = \( 4.3 \times 200 \) = 860 sq ft

**Total Linear Area** = 300 + 221.2 + 860 = 1381.2 sq ft
SECTION FOR ACCESS CONTROL

EXISTING GROUND

G RAMP
EL 5439.0

FILL = 0

SECTION AA

ACCESS RAMP - UC SITE

AGGREGATE

G RAMP
EL 5441.5

EXISTING GROUND

FILL = 109.1 ft^2

SECTION BB

ACCESS RAMP - UC SITE

AGGREGATE

G RAMP
EL 5444.0

FILL = 295.8 ft^2

SECTION CC

ACCESS RAMP - UC SITE
### Project: UTRFA - SRK

**Feature:** TEMPORARY FACILITIES

**Item:** MATERIAL QUANTITIES

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>5.) FENCING</td>
<td>Smooth Barbed Wire.</td>
<td>370 ft</td>
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<tr>
<td></td>
<td>Measured from N40,000 and E58,530 proceeding south and east as follows (FT):</td>
<td></td>
</tr>
<tr>
<td></td>
<td>585</td>
<td></td>
</tr>
<tr>
<td></td>
<td>395</td>
<td></td>
</tr>
<tr>
<td></td>
<td>275</td>
<td></td>
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<tr>
<td></td>
<td>970</td>
<td></td>
</tr>
<tr>
<td></td>
<td>60</td>
<td></td>
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<tr>
<td></td>
<td>60</td>
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<tr>
<td></td>
<td>790</td>
<td></td>
</tr>
<tr>
<td></td>
<td>230</td>
<td></td>
</tr>
<tr>
<td></td>
<td>185</td>
<td></td>
</tr>
<tr>
<td></td>
<td>160</td>
<td></td>
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<tr>
<td></td>
<td>170</td>
<td></td>
</tr>
<tr>
<td></td>
<td>392 + 3T40</td>
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</tr>
<tr>
<td></td>
<td>92</td>
<td>From SRK-PS-10-0310</td>
</tr>
<tr>
<td></td>
<td>158 + 20</td>
<td></td>
</tr>
<tr>
<td></td>
<td>3990 + 4095</td>
<td>Total linear feet</td>
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</table>

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<thead>
<tr>
<th>Item</th>
<th>Description</th>
<th>Quantity</th>
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</thead>
<tbody>
<tr>
<td>6.) Chain Link</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>10 for gate</td>
<td></td>
</tr>
<tr>
<td></td>
<td>10 + 370 Fence from Petrolyph Site</td>
<td></td>
</tr>
<tr>
<td></td>
<td>105 Total lin. ft., including 10 gate</td>
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</tr>
<tr>
<td></td>
<td>370</td>
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</table>
(c) Deer Fence

From SRK-PS-10-0312 (Sh. 7),

Perimeter of retention basin = 2(400+290) = 1380'

From SRK-PS-10-0314 (Sh. 7),

Perimeter of recirculation basin = 2(50+70) = 240'

Assume 200' x 200' basin for construction water

Perimeter of construction water basin = 2(200+200) = 800'

Length of Deer Fence @ UC Site

= 1380 + 240 + 800

= 2420 ft
### UC S.I.T.E. - Wells to be Sealed

<table>
<thead>
<tr>
<th>WELL NO.</th>
<th>NORTHING</th>
<th>EASTING</th>
<th>ELEVATION (ft)</th>
<th>DEPTH (ft)</th>
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<tr>
<td>505</td>
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<td>60065.7</td>
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<tr>
<td>506</td>
<td>59877.7</td>
<td>58875.7</td>
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<td>19</td>
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<td>58704.2</td>
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<td>58480.0</td>
<td>5523.0</td>
<td>80</td>
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<td>553</td>
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<td>5523.0</td>
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<td>58530.0</td>
<td>5498.0</td>
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<td>5500.0</td>
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<td>557</td>
<td>58560.0</td>
<td>58275.0</td>
<td>5525.0</td>
<td>45</td>
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<td>558</td>
<td>58110.0</td>
<td>58825.0</td>
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<td>559</td>
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<td>5490.0</td>
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<td>58700.0</td>
<td>5525.0</td>
<td>55</td>
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<td>704</td>
<td>59300.0</td>
<td>58900.0</td>
<td>5490.0</td>
<td>60</td>
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</tbody>
</table>

* 680 ft

Wells to be sealed from Ref. 8. Well locations and depths from logs (Ref. 9). Holes 561 and 562 are not wells as previously noted, and are excluded (Ref. 10).
IV. CALCULATIONS - B. NC SITE
NOTES:

1. SUBCONTRACTOR SHALL OBTAIN ALL PERMITS TO Widen THE NC SITE Haul ROAD TO TWO LINES FROM STATE HIGHWAY 141 TO N 56,700, AND FROM N 57,500 TO NC SITE ACCESS GATE.

2. SUBCONTRACTOR SHALL REPLACE OR EXTEND ALL EXISTING CLverts AS REQUIRED BY THE COUNTY AND THE CONTRACTOR.

3. SUBCONTRACTOR MAY ADJUST ALIGNMENT AND LOCATION OF TURNING RADIUS OF ACCESS ROAD TO THE NC SITE.

4. THE SECTIONS AND DETAILS OF THE WASH WATER RETENTION BASH SHOWN ARE SAMPLE DESIGNS ONLY. THE SECTIONS AND DETAILS MAY BE ADJUSTED BY THE SUBCONTRACTOR AS REQUIRED FOR HIS OR HER OPERATIONS SUBJECT TO CONTRACTOR'S APPROVAL.

5. SEE DWG NO. SRK-PS-10-0314 FOR TYPICAL CONSTRUCTION AND CONSTRUCTION JOINT DETAILS FOR THE DECONTAMINATION PAD.

6. STORAGE TANKS MAY BE USED IN LIEU OF A MEMBRANE LINED RECIRCULATION BASIN.

7. LOCATION OF TRAILERS IN THE ACCESS CONTROL AREA SHALL BE SUBJECT TO THE CONTRACTOR'S APPROVAL.

8. SUBCONTRACTOR SHALL PROVIDE AND INSTALL DEER FENCE AND GATES AROUND ALL WATER RETENTION PONDS INCLUDING RETENTION BASINS, RECIRCULATION PONDS, AND CONSTRUCTION WATER STORAGE PONDS AS APPROVED BY THE CONTRACTOR.

REFERENCE DRAWINGS:

SRK-PS-10-0314 ACCESS CONTROL AREA PLAN, SECTIONS, AND DETAILS
SRK-PS-10-0315 WASTEWATER RETENTION BASIN, SECTIONS AND DETAILS

SRK-PS-10-0320 SITE PLAN AND CONSTRUCTION FACILITIES

LEGEND:

- EXISTING BURIED TELEPHONE LINE

This sheet is entirely part of Rev 2.

U.S. DEPARTMENT OF ENERGY
ALBUQUERQUE, NEW MEXICO

ACCESS ROADS AND FACILITIES

SLICK ROCK SITE
SLICK ROCK, COLORADO
NORTH CONTINENT PROCESSING SITE

ISSUED FOR CONSTRUCTION

REVISION

DE-AC04-83AL18796
SRK-PS-10-0321

MORRISON KOUDENS CORPORATION
CONSTRUCTION, ENVIRONMENTAL, SHOP
UNIT PROJECT
5023 W 8TH ST. SAN FRANCISCO, CA 94134

PROJECT NO.

DRAWING NO.

SHEET

NUMBER

0
NOTES:
1. ALL CUTS SHALL BE DITCHING UNLESS OTHERWISE NOTED.
2. FINAL EXCAVATION LIMITS TO BE DETERMINED IN THE FIELD.
3. HEAVY EQUIPMENT SHALL OPERATE NO CLOSER THAN 5' TO POWER LINE POLES TO REMAIN CONTAMINATED MATERIAL.
AROUND THE POLES SHALL BE EXCAVATED BY HAND. POLES SHALL BE BRACED IF NECESSARY. THE AREA AROUND THE POLES SHALL BE RESTORED TO ORIGINAL GRADE FOR A MINIMUM DISTANCE OF 5' AROUND EACH POLE.
4. ALL REMOVAL OF CONTAMINATED MATERIALS SHALL BE DONE DURING THE MONTHS OF MAY AND JUNE ONLY.
5. IF GROUNDWATER IS ENCOUNTERED UNDER THE TAILINGS AT THE N.C.SITE, THE GROUNDWATER WILL BE CONSIDERED TO BE CONTAMINATED AND NO WATER WILL BE DISCHARGED PRIOR TO TREATMENT.
6. INSTALL A Silt FENCE ALONG THE COLOSOES RIVER AS APPROVED BY THE CONTRACTOR. THE FINAL LOCATION WILL BE DETERMINED IN THE FIELD. SEE SHEET NO. SRK-GE-10-0324, PRELIMINARY REVIEW, Silt Fence Details.
7. ROCK MAY BE ENCOUNTERED UNDER THE TAILINGS PILE AND OTHER AREAS. SEE NOTE B.
8. ALL CONTAMINATED SOIL ON EXPOSED OR EXCAVATED ROCK SURFACES SHALL BE REMOVED. THIS MAY REQUIRE HAND EXCAVATION OR WASHING DOWN TO REMOVE ALL SURFACE CONTAMINATION. THE LIMITS OF CONTAMINATED MATERIALS ON ROCK SURFACES WILL BE DETERMINED IN THE FIELD.
9. CONTAMINATED MATERIALS FROM THE N.C.SITE SHALL BE STOCKPILED AT A LOCATION AS DETERMINED BY THE CONTRACTOR IN THE B.C.SITE IF THE DISPOSAL CELL EXCAVATION IS NOT READY FOR PLACEMENT OF CONTAMINATED MATERIAL.

REFERENCE DRAWINGS:
SRK-GE-10-0325 FENCE AND GATE DETAILS
SRK-PS-10-0324 FINAL SITE GRAVING PLAN

LEGEND:

Silt Fence

APPROXIMATE LIMIT AND DEPTH IN FEET OF CONTAMINATED MATERIAL.

EXISTING POWER POLES TO REMAIN

PRELIMINARY REVIEW

E & O MANAGER

CHIEF ENGINEER

O & A MANAGER

SCALE

100' 0' 100' 200'

FEET

U.S. DEPARTMENT OF ENERGY
ALBUQUERQUE, NEW MEXICO

SLICK ROCK SITE
SLICK ROCK, COLORADO
NORTH CONTINENT PROCESSING SITE
CONTAMINATED MATERIAL
EXCAVATION PLAN

PROJECT MANAGER

DE-AC04-83AL18796

ISSUED FOR PRELIMINARY REVIEW
SUMMARY FOR NC SITE

A.) EARTHWORK

1) Recirculation Basin
AND DECON PAD = 2221.7

B.) OTHER QUANTITIES

1) Concrete for decon pad = 150.0 cu yd

2) Membrane Liner = 8180 s.f.

3) Road Improvement - Length = 1840 ft
Excavation = 1703.3 cu
Aggregate = 851.92 cu

4) Fencing
Silt Fence = 2190 L.F.
Smooth Barbed Wire = 1660 L.F.
Chain Link = 68 L.F.
Deer Fence = 2040 ft

5) Length of wells to be sealed = 110 ft.
1.) Access Control Facilities

a.) Recirculation Basin and decon pad: cut / fill?

(See Shs 61 to 65.)

<table>
<thead>
<tr>
<th>Section</th>
<th>Distance (ft)</th>
<th>Cut</th>
<th>Fill</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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<td>Cross sectional area (ft²)</td>
<td>Volume (cy)</td>
</tr>
<tr>
<td>1</td>
<td>25</td>
<td>39.4</td>
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</tr>
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<td>4</td>
<td>25</td>
<td>587.1</td>
<td>511.0</td>
</tr>
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<td>25</td>
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<td>371.7</td>
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</tr>
<tr>
<td>9</td>
<td>25</td>
<td>45.8</td>
<td></td>
</tr>
</tbody>
</table>

Total cut = 2221.8 cy
Total fill = 23.9 cy

b.) Concrete for decon pad

volume = \( \frac{20 \times 100 \times 1.0005 \times 8}{37 \times 27} \) = 49.4 cy

37. slope on mountain
a) Membrane Liner - recirculation basin and collection ditch

i) Bottom area = (30 x 75) = 2250 ft²

ii) Sideslope length = \sqrt{(19.4 - 5.9)^2 + (3(3.4))^2} = 10.8 ft

Perimeter of basin at midpoint of sideslope =

\[2(75 + 5.1) + 2(30 + 5.1) = 238.4 \text{ ft} \]

Area = (238.4 x 10.8) = 2548.3 ft²

iii) Anchor trenches (See SRK-PS-10-6315, Sec 10)

Anchor Trench Detail (n/s)

"Width" of liner for trench
= (2) + (1.8) + (0.5) = 4.3 ft

Length of liner = 2(75 + 10.8) + 2(30 + 10.2) + 100 = 1350.8 ft

Area = (1350.8 x 4.3) = 5808.4 ft²
IV.) Area of liner for underneath decon pad (see SK - PS-10-0321, Sht 53)

\[ = (2 \times 1,0000 \times 100) + \frac{8}{2} \times 100 = 266.8 \text{ ft}^2 \]

V.) Area of liner between anchor trench and decon pad.

\[ A = \frac{1}{2} \times \sqrt{(10 \times 100^2 - 10^2)} \]

Surface Area = \[ 2 \left( \frac{1}{2} \times 100 \times 11.2 \right) + \frac{1}{2} \sqrt{(10 \times 100^2 - 10^2)} \]

\[ = 1617.5 \text{ ft}^2 \]

Total Liner Area = 2250 + 2488.3 + 1508.4 + 266.8 + 1617.5

\[ = 8130.6 \text{ ft}^2 \]

2) ACCESS ROAD

From SK - PS-10-0321, Sht 53, approx. length of road to be widened = 1840 ft

Width = 25'; Excavation Volume = (1840 \times 25 \times \frac{1}{3}) = 1703.7 \text{ cu}\]

Aggregate = (1840 \times 0.5 \times 25 \times \frac{1}{3}) = 851.9 \text{ cu}\]
SECTION 4
NC SITE - ACCESS FACILITIES

SECTION 5
NC SITE - ACCESS FACILITIES
SECTION 6
NC SITE - ACCESS FACILITIES

CUT = 286.1 ft²
FILL = 0

SECTION 7
NC SITE - ACCESS FACILITIES

CUT = 170.5 ft²
FILL = 0
ACCESS CONTROL FACILITY

(SEE DWG SRK-PS-10-320)
3) Fencing

a) Silt Fence

From SRL - PS - 10 - 0323 (Sheet 55)
Silt fence is approx. 2100 linear ft

(Smooth) A

b) Barbed Wire

From SRL - PS - 10 - 0320 and - 0321 (Sheets 53 and 54) beginning from N57390 and E62315 and proceeding South East:

Length = 610 ft, including 15' gate

from N57,460 and E68,890 and proceeding North East:

525 6/0
Length = 285 (325 less 60' chain) + 525 6/0
+ 610 1
= 1220 LF, inc. 15' gate

C) Chain Link
(SRL - PS - 10 - 0321, Sht 54)

Length = 10 + 40 (gate) + 10 = 60 L.F.

1440' gate
(d) Deer Fenced

From SRK - PS-10-031 (sh. 65)

Perimeter of recirculation basin = 2(105+60) ft

= 330 ft

Assume a 150' x 150' construction water basin.

Perimeter of construction water basin

= 2(150+150) = 600'

Length of deer fence at NC site

= 330+600 = 930 ft
<table>
<thead>
<tr>
<th>EASTING</th>
<th>ELEVATION</th>
<th>DEPTH</th>
<th>SITE</th>
<th>NC SITE</th>
<th>WELLS TO BE SEALED</th>
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</thead>
<tbody>
<tr>
<td>6367.78</td>
<td>6370.00</td>
<td>22 ft.</td>
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<tr>
<td>6372.94</td>
<td>6370.00</td>
<td>19 ft.</td>
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<tr>
<td>6377.22</td>
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<td>20 ft.</td>
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<tr>
<td>5858.71</td>
<td>5858.20</td>
<td>110 ft.</td>
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<tr>
<td>5858.71</td>
<td>5858.20</td>
<td>110 ft.</td>
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<tr>
<td>5858.71</td>
<td>5858.20</td>
<td>110 ft.</td>
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Wells to be sealed are shown on drawings.
<table>
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<tr>
<th>Project</th>
<th>UMTRA - SRK</th>
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<tbody>
<tr>
<td>Feature</td>
<td>TEMPORARY FACILITIES</td>
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<tr>
<td>Item</td>
<td>MATERIAL QUANTITIES</td>
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<tr>
<td>Contract No.</td>
<td>3885-76</td>
</tr>
<tr>
<td>Designed</td>
<td>HJL</td>
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<td>Checked</td>
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<tr>
<td>Date</td>
<td>2-12-93</td>
</tr>
<tr>
<td>Date</td>
<td>2/16/93</td>
</tr>
</tbody>
</table>

**IV. CALCULATIONS - C. BC SITE**
2. Subcontractor SHALL REPLACE OR EXTEND EXISTING CULVERT.
3. Excavation LIMITS SHOWN ARE A MINIMUM SUBCONTRACTOR MAY EXCAVATE BELOW LIMITS SHOWN UPON APPROVAL OF CONTRACTOR.
4. SEE INFORMATION FOR BIDDERS FOR DESCRIPTION OF SITE.
5. All work from highway 141 R.O.W. IS ON BLM LAND.
6. Overhead electric lines within the disposal cell boundary shall be relocated by others as required.
7. See information for bidders for location of pipeline R.O.W.
8. The access road shall have a minimum width of 40 feet and a minimum surface course of 6" of gravel, as approved by contractor. The access road shall be within 50 feet of 6" of existing road. At the end of remediation the haul road shall be restored to original width and damaged areas regraded and resurfaced.

This entire sheet is part of sheet 1.

REFERENCE DRAWINGS:
SRK-DS-10-0331 SITE PREPARATION AND TEMPORARY DRAINAGE FACILITIES
SRK-DS-10-0332 ACCESS CONTROL FACILITIES AND WASTEWATER RETENTION BASIN
SRK-DS-10-0334 TAILINGS EMBANKMENT AND FINAL SITE GRADING PLAN

LEGEND:
—- Overhead electric line
\ : Archeological site (see note 4)

U.S. DEPARTMENT OF ENERGY
ALBUQUERQUE, NEW MEXICO
SLICK ROCK SITE
SLICK ROCK, COLORADO
BURRO CANYON
ACCESS PLAN

FINAL REVIEW
E & O MANAGER PM MANAGER QA MANAGER

PROJECT NO:
DE-AC04-83AL18796
SRK-DS-10-0330

MORRISON KNUDSEN CORPORATION
ENVIROTECHNICAL SERVICES DIVISION
UNTRAC PROJECT
1900 RAVEN DR, SAN FRANCISCO, CA 94109
This entire sheet is by 
11-2-84

Signed by 
J.G. 
11-2-84
NOTES:

1. LOCATION OF TRAILERS IN THE ACCESS CONTROL AREA AND OFFICE AREA SHALL BE SUBMITTED TO THE CONTRACTOR'S APPROVAL.

2. SEDIMENTATION FROM ALL OFF SITE FACILITIES SHALL BE COLLECTED USING SILT FENCES AS APPROVED BY THE CONTRACTOR. SEE DWG. NO. SRK-GE-10-0305 FOR SILT FENCE DETAIL.

3. THE TOTAL DEPTH BETWEEN TOP OF DITCH AND BOTTOM OF DITCH SHALL BE A MINIMUM OF 2'-6". ACTUAL HEIGHT OF DITCH MAY VARY, THE DITCH INVERT SHALL BE SLOPED TO DRAIN.

4. THE TOTAL DEPTH BETWEEN TOP OF ROAD BED AND BOTTOM OF DITCH SHALL BE A MINIMUM OF 3'-0" ON THE SOUTH WEST SIDE OF THE ROAD APPROXIMATELY BETWEEN E 21,025' AND E 22,330'.

5. SEE DWG. NO. SRK-GE-10-0305 FOR FENCE DETAILS.

6. THE SECTIONS AND DETAILS OF THE WASH WATER RECYCLING BASN SHOWN ARE A SAMPLE DESIGN ONLY. THE SECTIONS AND DETAILS MAY BE ADJUSTED BY THE SUBCONTRACTOR AS REQUIRED FOR HIS OPERATIONS SUBJECT TO THE CONTRACTOR'S APPROVAL.

7. SEE DWG. NO. SRK-PS-10-0314 FOR TYPICAL CONSTRUCTION AND CONTRACTOR JOINT DETAILS FOR THE DECONTAMINATION PAO.

8. ACCESS CONTROL FACILITY WITHIN THIS AREA SHALL BE CONSTRUCTED PRIOR TO 12/15/94. SUBCONTRACTOR SHALL PROVIDE ALL UTILITIES AND MAINTAIN ACCESS TO FACILITIES DURING THE WINTER.

REFERENCE DRAWINGS:

SRK-GE-10-0305 FENCE AND GATE DETAILS
SRK-PS-10-0314 ACCESS CONTROL AREA PLAN SECTIONS AND DETAILS
SRK-DS-10-0333 WASTEWATER RETENTION BASIN AND MISCELLANEOUS SECTIONS AND DETAILS

TABLE 1
TEMPORARY DRAINAGE DATA FOR DITCH NO. 1

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<thead>
<tr>
<th>STATION</th>
<th>APPROX. INVERT ELEV. (FT)</th>
<th>INVERT SLOPE</th>
<th>APPROX. BEAM ELEV. (FT)</th>
<th>REMARKS</th>
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This sheet is part of Rev 2.

U.S. DEPARTMENT OF ENERGY
ALBUQUERQUE, NEW MEXICO

ACCESS CONTROL FACILITIES AND WASTEWATER RETENTION BASIN PLAN

MORRISON KHARDEEN CORPORATION
DE-AC04-83AL18796
SRK-DS-10-0332

This sheet is part of Rev 2.

U.S. DEPARTMENT OF ENERGY
ALBUQUERQUE, NEW MEXICO

ACCESS CONTROL FACILITIES AND WASTEWATER RETENTION BASIN PLAN

MORRISON KHARDEEN CORPORATION
DE-AC04-83AL18796
SRK-DS-10-0332

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U.S. DEPARTMENT OF ENERGY
ALBUQUERQUE, NEW MEXICO

ACCESS CONTROL FACILITIES AND WASTEWATER RETENTION BASIN PLAN

MORRISON KHARDEEN CORPORATION
DE-AC04-83AL18796
SRK-DS-10-0332

This sheet is part of Rev 2.
REFERENCE DRAWINGS:

SRK-05-10-0315 WASTEWATER RETENTION BASSN
SECTIONS AND DETAILS

SRK-05-10-0332 ACCESS CONTROL FACILITIES AND
WASTEWATER RETENTION BASSN

SRK-05-10-0334 TAILINGS EMBANKMENT AND
FINAL SITE GRADING PLAN

TYPICAL NEW DISPLACEMENT MONUMENT DETAIL
(SRK-05-10-0334)

NOT TO SCALE

U.S. DEPARTMENT OF ENERGY
ALBUQUERQUE, NEW MEXICO

SLICK ROCK SITE
SLICK ROCK, COLORADO
BURLINGTON CANYON DISPOSAL SITE

WASTEWATER RETENTION BASIN
AND MISCELLANEOUS
SECTIONS AND DETAILS

PRELIMINARY REVIEW

<table>
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<tr>
<th>E &amp; D MANAGER</th>
<th>CHIEF ENGINEER</th>
<th>O &amp; A MANAGER</th>
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MK-ENVIRONMENTAL SERVICES
A DIVISION OF MK-FERGUSON

Project UMTA - SRK
Feature TEMPORARY FACILITIES
Item MATERIAL QUANTITIES

Contract No. 3685-76
Designed APS
Date 4-21-93
Checked APS
Date 4-23-93

INSTALLED IN 4'-0" SECTIONS. AS FILL CONSTRUCTION PROGRESSES,
RODS SHALL BE SECURELY FLUSH-COPLED AS REQUIRED. PIPES
SHALL BE SECURELY COUPLED SUCH THAT INSIDE DIAMETER IS NOT
LESS THAN 1'-0" AT ANY POINT. SUBCONTRACTOR SHALL MAKE
ELEVATION MEASUREMENTS OF TOP OF ROD IMMEDIATELY BEFORE
AND AFTER ADDITION OF EACH ROD SECTIO. PIPES SHALL BE CAPPED
AT ALL TIMES TO PREVENT ENTRY OF FOREIGN MATTER.

1. PIPES SHALL BE SUPPORTED BY FULL COMPACTED LIGHT WEIGHT
TAPEERS WITHIN 3'-0" OF PIPES TO MEET SAME COMPACTION.
REQUIREMENTS AS FOR ADJACENT EMBANKMENT. CARE SHALL BE TAKEN
TO ENSURE THAT PIPES REMAIN HORIZONTALLY CENTERED AROUND RODS.

TYPICAL NEW DISPLACEMENT MONUMENT DETAIL
(SRK-05-10-0334)

NOT TO SCALE
## SUMMARY FOR BC SITE

### A) EARTHWORK

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<thead>
<tr>
<th>Description</th>
<th>Cut</th>
<th>Fill</th>
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</thead>
<tbody>
<tr>
<td>Retention Basin</td>
<td>732.0</td>
<td>12540.0</td>
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<tr>
<td>Spillway</td>
<td>228.7</td>
<td>7.4</td>
</tr>
<tr>
<td>South Side Ditch No 1 &amp; Beam</td>
<td>472</td>
<td>1745.8</td>
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### B) OTHER QUANTITIES

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<th>Description</th>
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<tr>
<td>Membrane Lining - Retention Basin</td>
<td>55,834.5 s.f.</td>
</tr>
<tr>
<td>Membrane Lining - Recycle Basin</td>
<td>3,372.0 s.f.</td>
</tr>
<tr>
<td>Concrete - Decon Pad</td>
<td>152.9 Cy</td>
</tr>
<tr>
<td>Aggregate - Access Facilities</td>
<td>386.9 Cy</td>
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<tr>
<td>New Culverts</td>
<td>190 L.F.</td>
</tr>
<tr>
<td>Fencing - Silt Fence</td>
<td>2150 L.F.</td>
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<tr>
<td>Chain Link</td>
<td>4055.5 L.F.</td>
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<tr>
<td>Deer Fence - 2000' Barbed Wire</td>
<td>Smooth</td>
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### TOTAL WELL LENGTH
- 1914 Ft

### ROADMORK
- 3550 FT 
- 5259.3 Cy 
- 2629.6 Cy
### Retention Basin

#### a) Excavation Quantities

#### Basin (See Sheets 79 to 81)

<table>
<thead>
<tr>
<th>Section</th>
<th>Distance (ft)</th>
<th>Gross Section Area (ft²)</th>
<th>Volume (cy)</th>
<th>Cross Sect Area (ft²)</th>
<th>Volume (cy)</th>
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**Total Cut = 12,540.0cy**  **Total Fill = 732.0cy**

#### b) Spillway (See Sheets 80 & 81)

<table>
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<tr>
<th>Section</th>
<th>Distance (ft)</th>
<th>Gross Section Area (ft²)</th>
<th>Volume (cy)</th>
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<td>J</td>
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<td>27.2</td>
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</table>

**Total Cut = 278.7cy**  **Total Fill = 0cy**

#### iii) Approximate excavation for Sump

**Cut Volume = (5815.0 - 5813.0) (10 x 10 x 3/4) = 7.4cy**
1) Bottom Area (neglect bottom slope)

Area = 0.120 (190 + 35) = 27,000 sf.

Subtract Sump Area = (22)(22) = 484 sf

Area = 20,516 sf.

2) Sump surface area

Area = (10)(10) + (6.3)(4)(16)

= 503.2 sf.

3) Sideslopes

Outside Area = (175)(240 + 47.5) = 50,312.5 sf.

Sideslope Area = (1.054)(50,312.5 - 27,000) = 24,511.4 sf.

4) Anchor Trench Area = (4.3)(240 + 370 + 188.5 + 188.5)

= 4243.9 sf.

Total Area = (20,516 + 503.2 + 24,511.4 + 4243.9) = 55,834.5 sf.
SECTION A
Ret. Basin - BC Site

CUT = 741.4 ft²
FILL = 0

SECTION B
Ret. Basin - BC Site

CUT = 1090.2 ft²
FILL = 142.1 ft²

SECTION C
Ret. Basin - BC Site

CUT = 625.2 ft²
FILL = 209.3 ft²
SECTION D
Ref. Basin - BC Site

CUT = 1159.9 ft²
FILL = 43.9 ft²

SECTION E
Ref. Basin - BC Site

CUT = 1273.6 ft²
FILL = 0

* SPILLWAY CALCULATED SEPARATELY
Project: UNTRA - SRK  
Contract No: 388S-76  
Material: TYPICAL FACILITIES  
Date: 2/4/93  
Item: MATERIAL QUANTITIES  
Featured: TEMPORARY FACILITIES  
Checked: AFS  
Date: 2/16/93

SECTION F
Ret. Basin - BC Site

EXISTING GROUND

CUT = 1627.5 ft²
FILL = 0

SECTION G
Ret. Basin - BC Site

EXISTING GROUND

CUT = 338.4 ft²
FILL = 0
2) Ditches

**c) Cut and Fill for dig and trench on South side of pile**

(See Sheets 83-86)

<table>
<thead>
<tr>
<th>Section</th>
<th>Distance (ft)</th>
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<th>Fill</th>
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<tr>
<td>10</td>
<td>130</td>
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**Total Cut = 1793.5 cu yd**

**Total Fill = 1745.8 cu yd**

*Pyramid Volume Formula Used*
2. DITCHES - SOUTH SIDE

<table>
<thead>
<tr>
<th>SECTION</th>
<th>DIST. (FT.)</th>
<th>CROSS-SECTION AREA (FT²)</th>
<th>VOL (FT³)</th>
<th>VOL (YD³)</th>
<th>FORMULA USED</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>1</td>
<td>50</td>
<td>8.5</td>
<td>1141.6</td>
<td>5</td>
<td>2</td>
</tr>
<tr>
<td>2</td>
<td>50</td>
<td>3.3</td>
<td>1334.5</td>
<td>39</td>
<td>2</td>
</tr>
<tr>
<td>3</td>
<td>50</td>
<td>200</td>
<td>2945</td>
<td>87</td>
<td>2</td>
</tr>
<tr>
<td>4</td>
<td>50</td>
<td>75</td>
<td>3395</td>
<td>126</td>
<td>2</td>
</tr>
<tr>
<td>5</td>
<td>50</td>
<td>60.8</td>
<td>3395</td>
<td>126</td>
<td>2</td>
</tr>
<tr>
<td>6</td>
<td>50</td>
<td>18.8</td>
<td>1998</td>
<td>74</td>
<td>2</td>
</tr>
<tr>
<td>7</td>
<td>65.1</td>
<td>0</td>
<td>407.3</td>
<td>15</td>
<td>1</td>
</tr>
</tbody>
</table>

(TOTALS: 365' of ditch - 472 cy. of cut)

FORMULAS

1. Pyramid: \((\text{Area} / 3) \times \text{Distance} = \text{Vol}\)

2. Prism: \((\text{Area}_1 + \text{Area}_2) / 2 \times \text{Distance} = \text{Vol}\)
This entire page is part of Revision 1

South Side Ditch - BC Site

Existing Grade (ft.)

Invert Elev. 5861.0

Section 1

(40' down the ditch)

E.E. = 5860.48

8.5' = cut

Section 2

(60' down the ditch)

E.E. = 5859.0

33' = cut
This entire sheet is part of Revision 1.

SECTION 3
(134' DUG THE DITCH)
658 ft² = CUT

SECTION 4
(133' DUG THE DITCH)
75 ft² = CUT

SECTION 5
(27' DUG THE DITCH)
60.8 ft² = CUT
This entire sheet is part of Revision 1

SECTION 6
(270' DOWN THE DITCH)
12' 8" = 1' of cut

SECTION 7
(20' DOWN THE DITCH)
No cut

I.E. = 535.7'
8. FOR CLARITY ACCORDINGLY RAMP SHALL BE CONSTRUCTED AS APPROVED BY THE

9. NO FILL SHALL BE FURNISHED.

REFERENCE DRAWINGS:
SRK-GE-10-0305 FENCE
SRK-DS-10-0332 ACCESS ROAD
SRK-DS-10-0333.portal WAS1
SRK-DS-10-0334 TAILING GRADATION

LEGEND:
UMTRK - SRK
3PP5-76
Temporary Facilities
Material Quantities
Doc. No. SRK-05-10-0333

Profile

SL Varies

Meet Existing Grades

SCALE
100 200
Feet

Feet

NO. 1 PROFILE
SRK-PS-10-0331

DBW 1/25/94
CFL 1/25/94
COMPACTED FILL

TYPICAL SECTION

NOT TO SCALE

BARBED WIRE FENCE

COMPACTED FILL

TYPICAL BERM SECTION

NOT TO SCALE
1) Ditch 2 and 3

Ditch 2 is located on the north side of the access road on Drawing SRK-PB-10-0331 (Sht 11) and Ditch 3 is located on the south side of the access road on Drawing SRK-PB-10-0332 (Sht 11).

Cross Sections from SRK-PB-10-0332 are shown below:

(Note: Length of Ditch 3 is 580 ft - see sht 11)

The term for ditch 2 is included in the next section. Excavation quantities for ditch 2 will be negligible and are not calculated.

For ditch 3 assume 3 different road elevations. Calculate cut/fill volumes plot elevations vs volume and find a balance, as follows:

i) Assume road is 6" above existing grade

Using a typical cross section, cut volume = \[\frac{1}{2}(2 \times 2) + \frac{1}{2}(2 \times 4.7) \times 580(\frac{1}{2}) = 358 \text{ cft}\]
and fill volume = \[\frac{1}{2}(40+42)(0.5)(580)(\frac{1}{2}) = 440 \text{ cft}\]
i) Assume road meets grade

\[ \text{Cut Volume} = \left[ 4.5 \times 2 \right] + \left( 2.5 \times 5 \right) = 580 \text{cy} \]
\[ \text{Fill Volume} = 0 \]
\[ = 376 \text{cy} \]

iii) Assume road is 3" above grade

\[ \text{Cut Vol} = \left[ (2.25 \times 2) + (2.25 \times 4.5) \right] = 580 \text{cy} \]
\[ \text{Fill Vol} = \frac{1}{2} \left[ 4 \times 4 \right] \times 0.25 \times 580 \left( \frac{1}{2} \right) = 218 \text{cy} \]

Road Elevation above grade (inches)

\[ \text{Road is } \frac{3}{4} \text{" above grade} \]

Check: \[ \text{Cut Volume} = \left[ (2 \times 2.2) + (2.4 \times 4.5) \times 580 \left( \frac{1}{2} \right) \right] \]
\[ = 293.9 \text{cy} \]
\[ \text{Fill Volume} = \frac{1}{2} \left[ 4 \times 4 \right] \left( \frac{4}{12} \right) \times 580 \left( \frac{1}{2} \right) \]
\[ = 290.6 \text{cy} \]

This fill volume is not included with total road excavation volume as calculated on Sheet 89.
3.1) Berm

<table>
<thead>
<tr>
<th>Fill Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 1/2 P</td>
</tr>
</tbody>
</table>

**Typical Section**

Includes three berms shown on SRK-PP-10-0331 (sheet 70)
and the term along the road, cross section shown on SRK-PP-10-0332
(same as above) (sheet 71)

Cross sectional area = \((2\times1.5) + (5\times2)\) = 18 s.f.

Total Berm Length = 140 + 1,000 + 240 + 750 = 2,730"

Fill Volume = \((2\times30\times18)\times\frac{1}{3}\) = 1420.0 cu

4.1) Access Control Facilities

a.1) Access Road Length to be widened, from SRK-PP-10-0330, sheet 69,

Approx. Length = 3550 ft
Width = 40'

Excavation Volume = \((3550\times40)(\frac{1}{3})\) = 529.3 cu
Aggregate = \((3550\times0.5\times40)(\frac{1}{3})\) = 2629.6 cu
b) Access Road along Highway 141

**Excavation Volume**
(from SRK - PS - 10 - 0330; see following sheets)

<table>
<thead>
<tr>
<th>Section</th>
<th>Distance (Ft)</th>
<th>Cross-Sectional Area (Ft²)</th>
<th>Cut Volume (CY)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>100</td>
<td></td>
<td>1489.4 *</td>
</tr>
<tr>
<td>R</td>
<td>100</td>
<td>1206.4</td>
<td>4008.9</td>
</tr>
<tr>
<td>S</td>
<td>80</td>
<td>958.4</td>
<td>946.6 *</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td><strong>TOTAL CUT: 6444.9 CY</strong></td>
</tr>
</tbody>
</table>

* by pyramid volume formula
HWY 141 SECTIONS

SECTION R
HWY 141 - BC SITE

CUT = 1206.4 ft²

CUT = 958.4 ft²
### Project: UNSTRA - SPEK
### Feature: TEMPORARY FACILITIES
### Item: MATERIAL QUANTITIES

#### Excavation Quantities (see sheets 95 to 97)

<table>
<thead>
<tr>
<th>Section</th>
<th>Distance (ft)</th>
<th>Cut</th>
<th>Fill</th>
</tr>
</thead>
<tbody>
<tr>
<td>K</td>
<td>25</td>
<td>290.7</td>
<td>134.6</td>
</tr>
<tr>
<td>L</td>
<td>25</td>
<td>231.2</td>
<td>120.8</td>
</tr>
<tr>
<td>M</td>
<td>25</td>
<td>29.7</td>
<td>13.8</td>
</tr>
<tr>
<td>N</td>
<td>25</td>
<td>0</td>
<td>67.2</td>
</tr>
<tr>
<td>O</td>
<td>25</td>
<td>0</td>
<td>86.6</td>
</tr>
<tr>
<td>P</td>
<td>25</td>
<td>0</td>
<td>91.7</td>
</tr>
<tr>
<td>Q</td>
<td>25</td>
<td>0</td>
<td>97.5</td>
</tr>
<tr>
<td>.75</td>
<td></td>
<td>0</td>
<td></td>
</tr>
</tbody>
</table>

- Total Cut = 510.8 cy
- Total Fill = 501.0 cy

#### Membrane Liner

1. **Bottom Area**
   - **Area** = \((10 \times 30) = 300\) sf

2. **Sideslopes**
   - **Angle** = 5°; **Length of sideslope** = 15.8 ft
   - **Perimeter at midpoint** = \(2(10 + 15.0 + 30 + 15.0) = 140.0\) ft
   - **Area** = \((140)(15.8) = 2212.4\) sf

3. **Anchor trench**
   - **Perimeter Length** = \(2(10 + 4(15.0) + 30) = 290.0\) ft
   - **Area** = \((290.0 \times 4.3) = 860.0\) sf
Total Membrane Liner = 237210 sq

TOTAL CONCRETE = 152.9 cu

 Aggregate (4” thick)

 Office Area

 Total Aggregate = 386.9 cu

 5) NEW CULVERTS

 New Culvert length = 130 + 35 + 25 = 190 ft
**ACCESS CONTROL SECTIONS**

**SECTION K**
Access Control - BC Site

- Existing Ground
- EL 5834
- Cut = 231.2 ft$^2$
- Fill = 50.4 ft$^2$

**SECTION L**
Access Control - BC Site

- Existing Ground
- EL 5834
- Cut = 29.7 ft$^2$
- Fill = 50.4 ft$^2$

**SECTION M**
Access Control - BC Site
a) Barbed Fence

Total length for 5 ft. fence = 2320 / 4 = 580 ft.

b) Smooth Wire: beginning at point N19,709 and E20,330 and proceeding counter-clockwise:

```
1020
15

950
80

750
350

650

310
250
300
180
750
530
830
350

210
270
260
610
740

5570
7040 Total Linear ft.
```

c) Chain Link: (Drawing - 0.332)

Office Area: (2 x 140) + (2 x 100) = 480 (incl. 20' gate)

Decon Pad Access:

- 10 ft (gate)
- 10 ft
- 75 ft (2 gates)
(d) Deer Fence

From SRK-DS-10-0332, Sh 71,

Perimeter of retention basin \( = (340 + 190 + 240 + 190) \)
\( = 960 \text{ ft} \)

Perimeter of recirculation basin \( = 2(50 + 70) \)
\( = 240 \text{ ft} \)

Assume 200' x 200' construction water pond,

Perimeter of construction water pond \( = 2(200 + 200) = 800' \)

Total length of Deer Fence \( = (960 + 240 + 800) \)
\( = 2000 \text{ ft} \)
### BC Site - Wells to Be Sealed

<table>
<thead>
<tr>
<th>WELL NO.</th>
<th>NORTHING</th>
<th>EASTING</th>
<th>ELEVATION</th>
<th>DEPTH (Ft.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>516</td>
<td>19099.0</td>
<td>21931.0</td>
<td>5864.4</td>
<td>227</td>
</tr>
<tr>
<td>518</td>
<td>19959.0</td>
<td>21745.0</td>
<td>5897.0</td>
<td>109</td>
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<tr>
<td>519</td>
<td>19960.0</td>
<td>21758.0</td>
<td>5897.1</td>
<td>338</td>
</tr>
<tr>
<td>520</td>
<td>19974.0</td>
<td>21748.0</td>
<td>5897.8</td>
<td>240</td>
</tr>
<tr>
<td>521</td>
<td>19621.0</td>
<td>22459.0</td>
<td>5875.0</td>
<td>352</td>
</tr>
<tr>
<td>522</td>
<td>19607.0</td>
<td>22470.0</td>
<td>5874.6</td>
<td>335</td>
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<tr>
<td>523</td>
<td>19620.0</td>
<td>22476.0</td>
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<tr>
<td>526</td>
<td>18859.0</td>
<td>22153.0</td>
<td>5833.8</td>
<td>207</td>
</tr>
<tr>
<td>527</td>
<td>18873.0</td>
<td>22141.0</td>
<td>5834.6</td>
<td>81</td>
</tr>
</tbody>
</table>

Wells to be sealed are those within the footprint of the proposed embankment and are listed in Ref. 12. Well locations and depths are from Ref. 11.
The following monitor wells should be **ABANDONED**, based on the revised (Option B) design plans (1\6\93):

<table>
<thead>
<tr>
<th>Monitor well</th>
<th>Stratigraphic unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>516</td>
<td>Middle Burro Canyon</td>
</tr>
<tr>
<td>518</td>
<td>Upper Burro Canyon</td>
</tr>
<tr>
<td>519</td>
<td>Lower Burro Canyon</td>
</tr>
<tr>
<td>520</td>
<td>Middle Burro Canyon</td>
</tr>
<tr>
<td>521</td>
<td>Lower Burro Canyon</td>
</tr>
<tr>
<td>522</td>
<td>Middle Burro Canyon</td>
</tr>
<tr>
<td>523</td>
<td>Upper Burro Canyon</td>
</tr>
<tr>
<td>526</td>
<td>Middle Burro Canyon</td>
</tr>
<tr>
<td>527</td>
<td>Upper Burro Canyon</td>
</tr>
</tbody>
</table>

The following monitor wells should **REMAIN IN-PLACE** at the proposed Burro Canyon disposal site:

<table>
<thead>
<tr>
<th>Monitor well</th>
<th>Stratigraphic unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>517</td>
<td>Lower Burro Canyon</td>
</tr>
<tr>
<td>524</td>
<td>Lower Burro Canyon</td>
</tr>
<tr>
<td>525</td>
<td>Middle Burro Canyon</td>
</tr>
<tr>
<td>528</td>
<td>Middle Burro Canyon</td>
</tr>
<tr>
<td>529</td>
<td>Upper Burro Canyon</td>
</tr>
<tr>
<td>551</td>
<td>Upper Burro Canyon</td>
</tr>
<tr>
<td>552</td>
<td>Upper Burro Canyon</td>
</tr>
</tbody>
</table>

If you have any questions, comments, or concerns please advise.
UMTRA PROJECT
CALCULATION COVER SHEET
CALC. NO. 11-333-01-00-07

PROJECT
UMTRA - SLICK ROCK

FEATURE
EMBANKMENT QUANTITIES

ITEM
EXCAVATION SEESEAGE BARRIER AND COVER MATERIALS

SOURCES OF DATA
Reference drawings #1-5

SOURCES OF FORMULAE & REFERENCES
1-5: MKES, 1996
UMTRA PROJECT, SLICK ROCK SITE DRAWINGS:
1. SRK-DS-10-0331 - Site Preparation and Temporary Drainage Facilities.
2. SRK-DS-10-0334 - Tailings Embankment and Final Site Grading Plan
3. SRK-DS-10-0335 - Tailings Embankment Sections and Details (Sheet 1 of 2)
4. SRK-DS-10-0336 - Tailings Embankment Sections and Details (Sheet 2 of 2)
5. SRK-DS-10-0337 - Tailings Embankment Erosion Protection


7. UMTRA-SRK Site Restoration - Earthwork Quantities and seeding, Gal No. 11-330-01

PRELIMINARY CALC. ☐ FINAL CALC. ☑ SUPERSEDES CALC. NO.

Checking criteria listed in the MKES UMTRA Project Procedures Manual were used during the checking of all revisions of this calculation.

<table>
<thead>
<tr>
<th>REV. NO</th>
<th>REVISION</th>
<th>CALCULATION BY</th>
<th>DATE</th>
<th>CHECKED BY</th>
<th>DATE</th>
<th>APPROVED BY</th>
<th>DATE</th>
</tr>
</thead>
<tbody>
<tr>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
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RIPRAP TYPE B IN COVER AND OTHER AREAS 12

RIPRAP TYPE C IN APRON AND COVER 12

BEDDING MATERIAL IN APRON, COVER AND OTHER AREAS 12

FROST PROTECTION MATERIAL IN COVER 15

RADON BARRIER MATERIAL IN COVER 15

SEEPAGE BARRIER MATERIAL IN EXCAVATION 15 Rev. 01

COPIES OF REFERENCE DRAWINGS

APPENDIX A

Riprap A, B and bedding in final grade 16 Rev. 01.

Volume of permanent stockpile 16
## SUMMARY OF QUANTITIES

<table>
<thead>
<tr>
<th>ITEM</th>
<th>DESCRIPTION</th>
<th>QUANTITY</th>
</tr>
</thead>
<tbody>
<tr>
<td>EMBANKMENT EXCAVATION (SHEET 3) (excl. topsoil)</td>
<td></td>
<td>526,950 cu yd</td>
</tr>
<tr>
<td>Topsoil in embankment area</td>
<td></td>
<td>980 cu yd</td>
</tr>
<tr>
<td>APRON EXCAVATION (SHEET 11)</td>
<td></td>
<td>3300 cu yd</td>
</tr>
<tr>
<td>RIPRAPH TYPE A IN COVER (SHEET 12)</td>
<td></td>
<td>2800 cu yd</td>
</tr>
<tr>
<td>RIPRAPH TYPE B IN COVER (SHEET 12)</td>
<td></td>
<td>12,930 cu yd</td>
</tr>
<tr>
<td>RIPRAPH TYPE C IN APRON (SHT. 12)</td>
<td></td>
<td>7370 cu yd</td>
</tr>
<tr>
<td>IN COVER</td>
<td></td>
<td>1040 cu yd</td>
</tr>
<tr>
<td>TOTAL</td>
<td></td>
<td>8410 cu yd</td>
</tr>
<tr>
<td>BEDDING MATERIAL IN APRON (SHT. 12)</td>
<td></td>
<td>980 cu yd</td>
</tr>
<tr>
<td>IN COVER</td>
<td></td>
<td>9430 cu yd</td>
</tr>
<tr>
<td>TOTAL</td>
<td></td>
<td>10,410 cu yd</td>
</tr>
<tr>
<td>FROST PROTECTION MATERIAL IN COVER (SHT. 15)</td>
<td></td>
<td>36,740 cu yd</td>
</tr>
<tr>
<td>RADON BARRIER MATERIAL IN COVER (SHT. 15)</td>
<td></td>
<td>35,170 cu yd</td>
</tr>
<tr>
<td>SEEPAGE BARRIER MATERIAL IN EXCAVATION (SHT. 15)</td>
<td></td>
<td>23,570 cu yd</td>
</tr>
<tr>
<td>Riprap A in final grade</td>
<td></td>
<td>510 cu yd</td>
</tr>
<tr>
<td>Riprap B in final grade</td>
<td></td>
<td>875 cu yd</td>
</tr>
<tr>
<td>Bedding material in final grade</td>
<td></td>
<td>700 cu yd</td>
</tr>
<tr>
<td>Volume of material to be placed in the permanent stock pile</td>
<td></td>
<td>376,500 cu yd</td>
</tr>
</tbody>
</table>
PURPOSE: THE PURPOSE OF THIS CALCULATION IS TO ESTIMATE THE FOLLOWING QUANTITIES FOR THE SLICK ROCK EMBANKMENT:

1. EMBANKMENT EXCAVATION
2. APRON EXCAVATION
3. RIPRAP TYPE A IN COVER
4. RIPRAP TYPE B IN COVER
5. RIPRAP TYPE C IN COVER AND APRON
6. BEDDING MATERIAL IN APRON AND COVER
7. FROST PROTECTION MATERIAL IN COVER
8. RADON BARRIER MATERIAL IN COVER AND SEEPAGE BARRIER MATERIAL ON EXCAVATION SIDE SLOPES

PROCEDURE: INFORMATION FROM SHEET A-1 IS ENTERED INTO THE INTERGRAPH INROADS PROGRAM (REF. #5) TO GENERATE A TRIANGULATED 3D NETWORK, OR "SURFACE". FOUR SURFACES ARE GENERATED:

1. TOP OF EMBANKMENT AND FINAL SITE GRADING (SEE SHEET 13),
2. TOP OF RADON BARRIER MATERIAL (SEE SHEET 14),
3. BOTTOM OF EXCAVATION BELOW EMBANKMENT (SEE SHEET 4), AND
4. BOTTOM OF APRON EXCAVATION

A COMPARISON OF THE INROADS CONTOURS DISPLAYED ON SHEETS 4 AND 13 WITH THE CONTOURS SHOWN ON SHEETS A-1 AND A-2, RESPECTIVELY SHOW THAT THE INROADS SURFACES ACCURATELY REPRESENT THE DESIGN.

FROM THE LIST ABOVE, QUANTITIES ARE CALCULATED AS FOLLOWS:

1. THE INROADS TRIANGLE METHOD OF COMPUTING VOLUMES TO COMPARE THE BOTTOM-OF-EXCAVATION SURFACE WITH THE EXISTING GROUND SURFACE. FOR CHECKING PURPOSES, CROSS-SECTIONS ARE TAKEN THROUGH THE EXCAVATION SURFACE. INROADS PRODUCES BOTH A DRAWING OF EACH CROSS-SECTION AND A LIST OF CROSS-SECTIONAL AREAS. SIX INCHES OF TOPSOIL WILL BE STOCKPILED SEPARATELY. THIS VOLUME WILL BE SUBTRACTED FROM TOTAL EXCAVATION.

2. THE APRON SECTION IS PLACED EVERY 10 FEET ALONG THE EMBANKMENT TOE. INROADS USES A CROSS-SECTIONAL AREA METHOD TO COMPUTE THE TOTAL EXCAVATION. AS AN APPROXIMATE CHECK, THE LENGTH OF THE ALIGNMENT IN CUT ALONG THE EMBANKMENT TOE IS MULTIPLIED BY THE AREA OF EXCAVATION IN THE TYPICAL APRON SECTION.

3. INROADS IS USED TO COMPUTE THE SURFACE AREA OF THE TOP-OF-EMBANKMENT SURFACE WITHIN THE LIMIT OF TYPE A RIPRAP. VOLUME = S.A. × THICKNESS.

4. INROADS COMPUTES THE SURFACE AREA OF THE TOP-OF-EMBANKMENT SURFACE WITHIN TYPE B RIPRAP LIMITS. VOLUME = S.A. × THICKNESS.
PURPOSE OF REV 01

1. Excavation for the disposal cell sideslopes has changed from 2.5 H:1 V to 1 H:1 V. Therefore the excavation quantity has been revised.

2. There is a erosion protection layer in the west of the disposal cell. Riprap Type A, B and bedding quantities have been calculated for this area.

3. The topsoil in the BC site has to be stockpiled for later use as the topsoil in the seeding areas.

4. Permanent stockpile volume from the embankment excavation and the volume of the design stockpile were also calculated.

Sheets i, ii, 1, 2 and 15 have been revised.
Sheets 3-10, 13 and A-1 thru A-5 have been replaced with new sheets.
Sheets 1A and 16 were added.

Purpose of Rev 02

1. The source of the radon barrier material is no longer the Disappointment Valley borrow area. Radon barrier material is now coming from the required excavation at BC disposal site.

2. Based on calculations 11-340-01-00 and 11-340-02-00, the required radon barrier thickness has been changed from 2' to 1.5'.

Sheets ii, 11, and 15 have been revised.
Sheets A-3 and A-4 have been replaced with new sheets.
5. A typical cross-section through the embankment toe and apron gives the cross-sectional area of riprap type C. This is multiplied by the length of the embankment toe.

6. INROADS computes the surface area of the top-of-radon barrier surface. Volume = S.A. x thickness. A small volume is added for the amount of bedding which extends beyond the radon barrier toe.

7. Surface area x thickness is used to compute the volume of frost protection material in the cover. The top-of-radon barrier INROADS surface is used, and the volume of frost protection beyond the radon barrier limits is added.

8. INROADS computes the surface area of the top-of-radon barrier surface. Volume = S.A. x thickness. A small volume is subtracted, because the surface area is taken from the top of the radon barrier layer, not the bottom.

9. The surface area of the excavation side slopes is multiplied by the thickness of seepage barrier material. Riprap A, B and bedding materials are multiplied by thicknesses to get quantities.

ALL INROADS SURFACES HAVE BEEN GIVEN FILE NAMES WITH THE EXTENSION ".ttn" AND STORED ON THE MKES-SFO CADD SERVER IN THE DIRECTORY D:\388576\.

10. Volume of topsoil in the BC site is calculated by multiplying the disturbed area by 6'. It is assumed only 6' of topsoil is needed to be stockpiled separately to be used in disturbed areas which include the pile area, finish grade, access control areas, and retention basin area.

11. Volume of material in permanent stockpile is excavated material from embankment excluding topsoil minus material needed in finish grading and frost barrier.
EMBANKMENT EXCAVATION:

The inroads surface for the excavation is called "TOTALEXCA.TTN". The contours of this surface are displayed on Sheet 4. The bottom of the trench slopes +7% to the northwest, and the side slopes are 1H:1V (see Ref. Dwg. #). Sheets 5-9 show sections through the excavation. The cross-sectional area of the excavation is written on each section.

<table>
<thead>
<tr>
<th>SECTION NO.</th>
<th>DISTANCE (ft)</th>
<th>CUT AREA (ft)</th>
<th>VOLUME (cu ft)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>100</td>
<td>0</td>
<td>202,000</td>
</tr>
<tr>
<td>2</td>
<td>100</td>
<td>6,060</td>
<td>1,436,500</td>
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<tr>
<td>3</td>
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<td>22,670</td>
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</tr>
<tr>
<td>4</td>
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<td>2,307,200</td>
</tr>
<tr>
<td>5</td>
<td>100</td>
<td>22,188</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>100</td>
<td>20,193</td>
<td>2,119,050</td>
</tr>
<tr>
<td>7</td>
<td>100</td>
<td>17,765</td>
<td>1,897,900</td>
</tr>
<tr>
<td>8</td>
<td>100</td>
<td>15,673</td>
<td>1,400,250</td>
</tr>
<tr>
<td>9</td>
<td>100</td>
<td>12,332</td>
<td>885,000</td>
</tr>
<tr>
<td>10</td>
<td>49</td>
<td>5368</td>
<td>87,677</td>
</tr>
<tr>
<td>11</td>
<td></td>
<td>0</td>
<td></td>
</tr>
</tbody>
</table>

Total Volume (cu ft) = 14,338,777

Xsec Area Method Total Excavation = 531,066 cy
From Inroads, Total Excavation = 536,750 cy

Plan Area of Topsoil in Excavation = 526,840 sq. ft
Volume of Topsoil = 526843*.5/27 cy = 9756 cy = 9800 cy

Excavation without Topsoil = 536,750 - 9800 cy = 526,950 cy
SECTION 1  
Excavation Area = 0

SECTION 2  
Excavation Area = 6060 sq. ft

Existing Ground

Excavation sideslopes
SECTION 3
Excavation Area = 22,670 sq. ft

SECTION 4
Excavation Area = 23,956 sq. ft
SECTION 5

Excavation Area = 22,188 sq ft

SECTION 6

Excavation Area = 20,193 sq ft
SECTION 7

Excavation Area = 17,765 sq ft

SECTION 8

Excavation Area = 15,673 sq ft

This entire sheet is part of Rev 01
SECTION 9
Excavation Area = 12,332 sq ft

SECTION 10
Excavation Area = 5368 sq ft
APRON EXCAVATION:

Sheet 10 shows an alignment along the toe of the embankment side slopes. The total length of the alignment, including changes in elevation, is 2724 ft. The typical apron section is shown below. Inroads is used to place the bottom of "excavation" every 10 ft along the alignment in order to generate the actual excavation quantity. (The typical excavation x apron length cannot be used, because in some areas the apron is in fill.)

FROM INROADS, TOTAL APRON EXCAVATION = 3304 cu yd

FOR USE IN RIPRAP TYPE C VOLUME CALC., SHEET 12:

SECTION THROUGH COVER MATERIALS AT EMBANKMENT TOE
(APRON NOT SHOWN)
RIPRAP TYPE A IN COVER:

Sheet 13 shows the inroads contours used to compute the surface area of riprap. From inroads, the surface area of riprap type A (see sheet 10) is 113,560 ft². From sheet A-3, the thickness of riprap type A is 8 in.

\[
VOLUME = 113,560 \times \frac{8}{12} = 75,707 \text{ ft}^3 = 2800 \text{ cu yd}
\]

RIPRAP TYPE B IN COVER:

From inroads, the surface area of the top-of-embankment surface within riprap type B limits is 349,050 ft². From sheet A-3, the thickness of riprap type B is 1 ft.

\[
VOLUME = 349,050 \times 1 = 349,050 \text{ ft}^3 = 12,930 \text{ cu yd}
\]

RIPRAP TYPE C IN COVER AND APRON:

From sheet 11, the total length of embankment toe is 2724 ft. Sheet 11 also shows that the area of riprap type C in the typical apron section is 73.08 ft².

\[
VOLUME = 2724 \times 73.08 = 199,070 \text{ ft}^3 = 7300 \text{ cu yd}
\]

Sheet 11 shows that the area of riprap type C on the cover is 10.32 ft².

\[
VOLUME = 2724 \times 10.32 = 28,112 \text{ ft}^3 = 1040 \text{ cu yd}
\]

Total volume riprap type C = 7370 + 1040 = 8410 cu yd

BEDDING MATERIAL IN APRON AND COVER:

Sheet 11 shows that the typical apron section has 9.74 ft² of bedding-material. From sheet 11, the total length of apron is 2724 ft.

\[
VOLUME = 2724 \times 9.74 = 26,532 \text{ ft}^3 = 980 \text{ cu yd}
\]

Sheet 14 shows the inroads contours for the top-of-radon barrier surface. The total surface area of this surface is 485,370 ft². Ref. dwg. #3 shows that the bedding layer is 6 in. thick.

\[
VOLUME = 485,370 \times 0.5 = 242,685 \text{ ft}^3
\]

The length of the radon barrier toe, including changes in elevation, is 2642 ft. The section through the bedding toe on sheet 11 shows that S.A. radon barrier thickness does not include a typical area of 4.51 ft² of bedding.

Total volume = 242,685 + 4.51 \times 2642 = 254,600 \text{ ft}^3 = 9430 \text{ cu yd}

Total volume bedding = 9430 + 983 = 10,410 \text{ cu yd}
Impacts contours for top of embankment & grading
TOTAL SURFACE AREA = 485.370 sq. ft

LENGTH OF R.B. TOE = 2642 ft

INROADS CONTOURS FOR TOP OF RADON BARRIER MATERIAL
FROST PROTECTION MATERIAL IN COVER:

FROM SHEET 14, S.A. TOP OF RADON BARRIER = 485,370 ft². REF. DWG. #3 SHOWS THAT THE FROST PROTECTION LAYER IS 2 ft THICK.

VOLUME = 485,370 x 2 = 970,740 ft³

FROM SHEET 12, LENGTH OF RADON BARRIER TOE = 2642 ft. ON SHEET 11 THE SECTION THROUGH THE FROST PROTECTION TOE SHOWS THAT 8.00 ft² OF FROST PROTECTION MATERIAL EXTENDS BEYOND THE RADON BARRIER TOE.

TOTAL VOLUME = 970,740 + 2642 x 8.00 = 991,876 ft³ = 36,740 cy = FROST PROTECTION

RADON BARRIER MATERIAL IN COVER:

THE RADON BARRIER SURFACE AREA ON SHEET 14 IS MEASURED WITHIN THE LIMITS OF THE TOE OF RADON BARRIER SHOWN ON THE SECTION ON SHEET 11. THEREFORE, AN OVERLAP VOLUME OF (8.00 ft² x LENGTH OF R.B. TOE) IS INCLUDED IN THE VOLUME S.A. THICKNESS. THE LENGTH OF R.B. TOE IS 2642 ft.

VOLUME = 485,370 x 2 - (8.00 x 2642) = 849,504 ft³ = 35,170 cy = RADON BARRIER

SEEPAGE BARRIER MATERIAL ON EXCAVATION SIDE SLOPES:

THE EXCAVATION PLAN IS SHOWN ON SHEET 4. FROM INROADS, THE SURFACE AREA OF THE EXCAVATION SIDE SLOPES IS 214,210 ft². THE SECTIONS ON REF. DWGS. #3 AND #4 SHOW THAT THE SEEPAGE BARRIER MATERIAL WILL BE PLACED HORIZONTALLY, 8 ft WIDE. THE SKETCH BELOW SHOWS THAT THE MATERIAL WILL THEN BE 2.9711 ft THICK.

VOLUME = 214,210 x 2.9711 = 636,439 ft³ = 23,570 cy = SEEPAGE BARRIER

\[ x = 8 \cdot \sin \left[ \tan^{-1} \left( \frac{2.5}{1} \right) \right] = 2.9711 \text{ ft} \]
RIPRAP A, B AND BEDDING MATERIAL WEST OF DISPOSAL CELL

Riprap A west of cell
Plan area of Riprap A (From sheet A-5) = 13,750 sq. ft
Thickness of Riprap A (From sec. A, sht A-5 and sec. C, sht A-3) = 1 ft
Volume of Riprap A = 509 cy ≈ 510 cy

Riprap B west of cell
Plan area of Riprap B (From Sheet A-5) = 23,625 sq. ft
Thickness of Riprap B (From section A, sht A-5) = 1 ft
Volume of Riprap B = 875 cy

Bedding west of cell
Plan area of bedding material (From Sheet A-5) = 37,375 sq. ft
Thickness of bedding material (From section A, sht A-5) = 6 in
Volume of bedding material = 692 cy ≈ 700 cy

STOCKPILES
Temporary topsoil stockpile
Total disturbed area (See item 10 of sht 2) = 1,343,250 sq. ft
Thickness of topsoil = 6 in
Volume of temporary topsoil stockpile = 24,875 cy
Volume of topsoil needed for finish grading (from sht iii, Ref 7) = 15,100 cy

Permanent stockpile
Volume of materials from 1:1 excavation (from sht 3) = 526,950 cy
Volume of material from apron excavation (from sht 11) = 3,300 cy
Total excavated material from embankment = 526,950 + 3300 = 530,250 cy
Material needed for frost barrier (from sht 15) = 36,750 cy
Material needed for final grading (from sht iii, Ref. 7) = 117,000 cy
Volume of excess material = 530,250 - 36750 - 117,000 cy
= 376,500 cy
Volume of design stockpile (sht A-5) (from inroads) = 413,200 cy
Therefore design stockpile has a 10% contingency.
NOTES:
1. LOCATIONS OF THE DITCHES ARE APPROXIMATE AND SHALL BE APPROVED BY THE CONTRACTOR.
2. EXCAVATED MATERIALS FROM UNDERNEATH THE CELL SHALL BE FIRST PLACED IN THIS AREA. REMAINING EXCESS MATERIAL SHALL BE STOCKPILED IN THE DESIGNATED AREAS. SEE DWG. NO. SRK-05-10-0334 FOR GRADING REQUIREMENTS.
3. SEGMENTATION FROM STOCKPILE SHALL BE CONTROLLED USING SILT FENCES AS APPROVED BY THE CONTRACTOR. SEE DWG. NO. SRK-GE-10-0305 FOR SILT FENCE DETAIL.
4. SPOIL PILE AND STOCK PILE SHALL BE COMPILED TO AREA SHOWN ON PLAN. SLOPE OF SPOIL STOCK PILE SHALL BE APPROXIMATELY 5.0H:1.0V BUT NO STEEPER THAN 3.0H:1.0V. FINAL SLOPES SHALL AVOID ANGLES AND LONG STRAIGHT SECTIONS AS SHOWN ON THE DRAWING. SRK-05-10-0334 AND AS DIRECTED BY THE CONTRACTOR.
5. FILL FOR FINAL SITE GRADING AFTER EMBANKMENT CONSTRUCTION SHALL COME FROM MATERIAL PLACED WITHIN SPOIL STOCK PILE AREA.
6. BM'S SHALL BE CONSTRUCTED PRIOR TO HAULING CONTAMINATED MATERIAL TO THE SITE.
7. BOTTOM OF DISPOSAL CELL EXCAVATION SHOWN IS MAXIMUM. ACTUAL BOTTOM ELEVATION MAY BE HIGHER THAN SHOWN AS DETERMINED BY THE CONTRACTOR.
8. FOR CLARITY ACCESS AND EXIT RAMPS ARE NOT SHOWN. RAMPS SHALL BE CONSTRUCTED BY THE SUBCONTRACTOR AS APPROVED BY THE CONTRACTOR.
9. NO FILL SHALL BE PLACED BEYOND THE FENCE LINE.

This entire sheet is part of Rev 01

by JSE 1/27/94

REFERENCE DRAWINGS:
SRK-GE-10-0305 FENCE AND GATE DETAILS
SRK-05-10-0332 ACCESS CONTROL FACILITIES AND WASTEWATER RETENTION BASIN PLAN
SRK-05-10-0333 WASTE WATER RETENTION BASIN AND MISCELLANEOUS SECTIONS AND DETAILS
SRK-05-10-0334 TAILINGS EMBANKMENT AND FINAL SITE GRADING PLAN

LEGEND:
- T.O.B. TOP OF BM
- SURVEY MONUMENTS
- SILT FENCE
- EXISTING FENCE

FINAL REVIEW

U.S. DEPARTMENT OF ENERGY
ALBUQUERQUE, NEW MEXICO
SLICK ROCK SITE
SLICK ROCK, COLORADO
BURRO CANYON SITE
SITE PREPARATION AND TEMPORARY DRAINAGE FACILITIES

PROJECT NO:
DE-AC04-83AL18796

MORRISON KNUDSEN CORPORATION
UNITRA PROJECT
1300 MCKINLEY ST, SAN FRANCISCO, CA 94111

DEAC04-83AL18796
1. Slopes beyond embankment area shall be uniformly graded as directed by the contractor to promote sheet flow away from the embankment.

2. Restore retention basin access control, stockpile and other disturbed areas to original grade as directed by the contractor.

3. For displacement monument detail, see Dwg. No. SRK-DS-10-0333.

4. Typical radius shown is for embankment top and sideslope.

5. Final slopes of spoil pile shall be graded to blend into surrounding terrain as directed by the contractor. Angles and long straight sections shall be avoided. Final slopes shall be approximately 5%:1 @ RV, but no steeper than 30%:1 @ RV.

6. All disturbed areas beyond the spoil pile shall be seeded in accordance with the specifications.

7. No final site grading will be permitted east of existing fence.

UNITRA-5EK by JSR 1/27/94
COFL 1/20/94

Reference drawings:
SRK-DS-10-0333 Wastewater Retention Basin and Miscellaneous Sections and Details
SRK-DS-10-0335 Tailings Embankment Sections and Details (Sheet 1 of 2)
SRK-DS-10-0336 Tailings Embankment Sections and Details (Sheet 2 of 2)

This entire sheet is part of Rev 0.

Legend:
- Displacement Monument
- 5650 = Finish grade contours
- X = Existing fence

Final Review
E & D Manager
Eng. Manager
Q A Manager

U.S. Department of Energy
Albuquerque, New Mexico

Slick Rock Site
Slick Rock, Colorado
Burro Canyon

Tailings Embankment and Final Site Grading Plan
NOTES:
1. CONTAMINATED MATERIAL FROM UC SITE, AREA "A," SHALL BE PLACED WITH NORTH CONTINENT SITE CONTAMINATED MATERIAL.
2. PILE HEIGHT VARIES DEPENDING UPON THE VOLUME OF CONTAMINATED MATERIAL. THE SECTION SHOWN INCLUDES CONTINGENCY.
3. SLOPE IS 2:1 UNLESS SHOWN OTHERWISE ON ORG. NO. SRK-DS-10-0334.
4. UC TAILINGS SHALL BE PLACED AT LEAST 15' FROM THE RAOLON BARRIER AS SHOWN.
5. LIMITS OF CONTAMINATED MATERIALS ARE APPROXIMATE.
6. DEPTH OF BENCH TO BE DETERMINED IN THE FIELD.
7. BOTTOM OF DISPOSAL CELL EXCAVATION SHOWN IS MAXIMAL. ACTUAL BOTTOM ELEVATION MAY VARY AS DETERMINED BY THE CONTRACTOR.
8. TRACK WALKING OR OTHER COMPRESSION OF BEDDING MATERIAL IN DITCHES IS NOT REQUIRED.

REFERENCE DRAWINGS:
SRK-DS-10-0334 TAILINGS EMBANKMENT AND FINAL SITE GRADING PLAN

UMTRA-SRK
This entire sheet is part of Revision 02 - By DSS 8/29/95
checked:
ND 9/2/95

QA REVIEWED FOR QUALITY REQUIREMENTS
BY G. DOYLE 6/2/94

U.S. DEPARTMENT OF ENERGY
ALBUQUERQUE, NEW MEXICO

SLICK ROCK SITE
SLICK ROCK, COLORADO
BURRO CANYON

TAILINGS EMBANKMENT SECTIONS AND DETAILS (SHEET 1 OF 2)

PROJECT NO. DE-AC04-83AL18796

SRK-DS-10-0335
NOTES:
1. LIMITS OF CONTAMINATED MATERIALS ARE APPROXIMATE.
2. SLOPE IS 2:1 UNLESS OTHERWISE NOTED ON DWG. NO. SRK-05-10-0333.
3. SUBCONTRACTOR SHALL LOCATE CONSTRUCTION ACCESS AND EXIT RAMPS AS REQUIRED AND APPROVED BY THE CONTRACTOR. RAMPS WILL REMAIN IN PLACE DURING BACKFILL.
4. SOIL AND LOOSE ROCK SHALL BE EXCAVATED DOWN TO NON-RIPPLABLE ROCK.
5. CHAIN LINK FENCE SHALL BE INSTALLED TO PREVENT FALLING MATERIAL AS REQUIRED.
6. SPALLING ROCK SHALL BE REMOVED AS REQUIRED.
7. LOOSE FRACTURED ROCK THAT MAY BE DISLOODED DURING EXCAVATION SHALL BE REMOVED.
8. SEE SLOPE EXCAVATION MUST BE AT OR BELOW LIMITS SHOWN. ADDITIONAL EXCAVATION PAST THIS LIMIT MAY BE REQUIRED FOR STABILITY AND CONSTRUCTION.
9. TRACK WALKING OR OTHER COMPACTION OF BEDDING MATERIAL IN DITCHES IS NOT REQUIRED.

REFERENCE DRAWINGS:
SRK-05-10-0334 TAILINGS EMBANKMENT AND FINAL GRAADING PLAN
SRK-05-10-0333 TAILINGS EMBANKMENT SECTIONS AND DETAILS
(SHEET 1 OF 2)

UMTRA-SRK
This entire sheet is part of Revision 02.

Checked:
WD 9/12/95

QA REVIEWED FOR QUALITY REQUIREMENTS
BY: P. DOYLE 8/24/94

U.S. DEPARTMENT OF ENERGY
ALBUQUERQUE, NEW MEXICO

SLICK ROCK SITE
SLICK ROCK, COLORADO
BURRO CANYON
TAILINGS EMBANKMENT SECTIONS
AND DETAILS (SHEET 2 OF 2)
NOTES:
1. FOR FINAL SITE GRADING REQUIREMENTS, SEE DWG SRK-DS-10-0334.
2. MEET TOE OF APRON AT ELEVATION 5888.

This entire sheet is part of Rev 01.

by JSR 1/27/94
ACF 1/29/94

REFERENCE DRAWINGS:
SRK-DS-10-0334 TAILINGS EMBANKMENT AND FINAL SITE GRADING PLAN
SRK-DS-10-0335 TAILINGS EMBANKMENT SECTIONS AND DETAILS (SHEET 1 OF 2)

LEGEND:
- RIPRAP TYPE A
- RIPRAP TYPE B
- RIPRAP TYPE C
- COMMON FILL/SPOIL PILE

FINAL REVIEW
E & S MANAGER ENG MANAGER QA MANAGER

U.S. DEPARTMENT OF ENERGY
ALBUQUERQUE, NEW MEXICO

TAILINGS EMBANKMENT EROSION PROTECTION
SLICK ROCK SITE
SLICK ROCK, COLORADO
BURRO CANYON

MORRISON KHUDESEN CORPORATION
PROJECT NO. DE-AC04-83AL18796
UMTRA PROJECT
DRAWING NO. SRK-DS-10-0337
**UMTRA PROJECT**

**CALCULATION COVER SHEET**

**CALC. NO. 11-333-02-00**

**CONTRACT NO.** 3885-76  
**DISCIPLINE** CIVIL  
**NO. OF SHEETS** 17

**PROJECT**  
UMTRA - SLICK ROCK

**FEATURE**  
BC SITE - EXCAVATION QUANTITIES

**ITEM**  
RIPPABLE AND UNRIPPABLE MATERIALS

**SOURCES OF DATA**

Ref. 1  (Topography and excavation plan)  
MKES Dwg No. SRK-DS-10-0331, Revision B.

Ref. 2  (Pre-1993 boring and test pit logs)  
MKES Doc. No. 3885-SRK-01-00338-01, 041493  
(Information for Bidders, Volume III).

Ref. 3  (1993 Boring logs)  
MKES Doc. No. 3885-SRK-X-01-02554-00 (Boring Logs).

Ref. 4  (1993 Test Pit logs)  
MKES Doc. No. 3885-SRK-X-01-02541-00 (Test Pit Logs).

Ref. 5  (Locations and elevations of test pits and 1993 borings)  
MKES Doc. No. 3885-SRK-Z-09-02538-00 (Facsimile Record).

**SOURCES OF FORMULAE & REFERENCES**

1. Formulae for rectangles are common knowledge and are not referenced.

<table>
<thead>
<tr>
<th>PRELIMINARY CALC.</th>
<th>FINAL CALC.</th>
<th>SUPERSEDES CALC. NO. NA</th>
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</table>

"Checker confirms that checking criteria listed in the MKES UMTRA Project Procedures Manual were used during the checking of each revision of this calculation."
CONTENTS:

Purpose
Method
   Cross Sections
      Rippability
      Volume Calculations
Volumes (table)
Excavation and Idealized Cells (Sketch)
Site Topography, Excavation Plan, Traces of Geologic
Cross Sections and Locations of Geologic Control Points
Cross Section AA'
Cross Section BB'
Cross Section CC'
Basal Areas of Cells A, B and C
Simplified Cross Section AA'
Simplified Cross Section BB'
Simplified Cross Section CC'
Volumes of 1:1 slope Wedges
Volume of Near-Surface Bench
Volume & Rock Types of Bench and Wedges
Summing of Volumes
PURPOSE:

This calculation provides an estimate of the in-place volumes of non-rippable material and rippable material to be encountered during excavation of the disposal cell at the Burrow Canyon site. This calculation does not address the efficiency of actually separating rippable and unrippable or suitable and unsuitable materials.

METHOD:

Cross Sections

Three cross-sections were made for the purpose of determining volumes of materials. The three sections (AA', BB' and CC') are parallel to one another and trend along the long axis of the disposal cell, from northwest to southeast. Cross sections incorporate all boring and test pit data from locations within and close to the excavation. Lithologic correlation amongst pits and borings are made assuming that geologic strata generally dip gently to the southeast.

Each geologic cross section was then modified, to simplify calculation of volumes.

Rippability:

Sandstone was assumed to be unrippable for the following reasons:
- It could not be penetrated by Standard Penetration Testing or by a truck-mounted auger drill.
- It caused refusal in most of the test pit excavations (both 1990 and 1993).
- Both unweathered and weathered pieces of sandstone were barely scratchable with the point of a knife.
- Sandstone pieces observed in outcrop on several sides of the site 'mesa' were observed to be as thick as 8 feet.

Mudstone and shale were assumed to be rippable for the following reasons:
- They could be penetrated by the backhoes used in both 1990 and 1993 test pit excavation.
- They were relatively brittle and sometimes easy to fracture or crush, even where closely-spaced horizontal joints were not apparent.

Siltstone was or was not assumed to be rippable in the following situations:
- Where it was dark colored and stratigraphically equivalent to mudstone or shale, it was assumed to be a facie variant of mudstone or shale and therefore rippable.
- Where it was light colored and occurred at the base of a sandstone it was assumed to be a subfacie of sandstone and therefore unrippable.

Sandstones were designated as either the bottom or the top unit. Mudstones/shales were designated as either the bottom, top or isolated unit. The bottom and top unit of each lithology are present on each cross section. The isolated mudstone unit is shown only in boring 607 on cross section CC'.
Volume Calculations:

Volumes of material to be excavated were calculated in three steps. The steps were:

1. Constructing three parallel, idealized cells to determine the area directly above the floor of the disposal cell (volume to be excavated outward of the floor area, due to the 1:1 slope and top bench, are calculated in steps 5 and 6).
2. Constructing three simplified cross sections from the more detailed sections, and determining the average thickness of each geologic unit within each of the simplified sections.
3. Multiplying the average thickness (of each geologic unit within each simplified cross section) by the basal area of the corresponding idealized cell, to get the volume of each unit within each cell, and adding those volumes.
4. Estimating the volume of material to be excavated outside the basal footprint of the disposal cell, due to sloped back, rather than vertical sides (the 'Wedge' volumes).
5. Estimating the volume of material to be excavated at the top of the side slopes for construction of a 10-foot wide bench, estimated to be 5 feet below previous grade, with a back slope of 2:1 up to preexisting grade (the 'bench' volume).
6. Adding together the Wedge and Bench volumes and assigning geologic units to these volumes (done by arbitrary assignment, after construction of an idealized average side wall cross section).
7. Adding together the volumes from the three idealized cells (step 3) and the volumes from the Wedge and Bench (step 6).

Haul ramps are neglected in the calculation.

Volumes (from sheet 16)

<table>
<thead>
<tr>
<th>Material</th>
<th>Cubic Yards (in place)</th>
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<tbody>
<tr>
<td>Rippable (soil, mudstone)</td>
<td>324,872</td>
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<tr>
<td>Nonrippable (sandstone)</td>
<td>205,067</td>
</tr>
<tr>
<td>Total</td>
<td>529,939</td>
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Excavation and Idealized Cells

Excavation

Planes of geologic cross sections AA', BB', and CC'

MORRISON KNUDSEN CORPORATION

Project UMTA - SRK
Feature BC Site - Excavation Quantities
Item Rippable / Unrippable

Sheet 3

Contract No. 3885
Designed by
Date 12/30/93
Checked by
Date 1/18/94

EN 375/91
PLANIMETER AREAS:

- Nonriplable (Sandstone): 1565 ft² (top), 4805 ft² (bottom)
- Riprable (Soil): 1355 ft²
- Rippable (Lcable Mudstone & Shale): 3850 ft² (top), 11765 ft² (bottom)
- Nonriplable (B-533): 1535 ft²
The footprint area of each cell (ft²) is:

**Cell A:**

\[ 70,855 \text{ ft}^2 = 7876 \text{ yd}^2 \]

**Cell B:**

\[ 156,950 \text{ ft}^2 = 17,772 \text{ yd}^2 \]

**Cell C:**

\[ 96,475 \text{ ft}^2 = 10,779 \text{ yd}^2 \]
Cross Section AA' (Simplified)

Soil: 67 yd thick x 7876 yd² = 5277
Top SS: .67 x 7876 = 5277
Top MDT: 1.8 x 7876 = 14177
Bott SS: 2.2 x 7876 = 17327
Bott MDT: 3.0 x 7876 = 23628
3.2 x 7876 = 25203

Cell Subtotal: 90891 cu
Simplified Cross-Section BB'

Cross Section BB' (Simplified)

Volumes in Cell B (cubic yd)

- Soil: 1.5 yd thick \( \times 17,772 \text{ yd}^2 = 26,658 \text{ cy} \)
- Top SS: 2.3 yd \( \times 17,772 \text{ = 40,876} \)
- Top MDT: 2.8 yd \( \times 17,772 \text{ = 49,762} \)
- Bottom SS: 2.3 yd \( \times 17,772 \text{ = 40,876} \)
- Bottom MDT: 3.9 yd \( \times 17,772 \text{ = 60,425} \)

Total Volume: \( 218,597 \text{ yd}^3 \)
Simplified Cross Section CC'

Cross Section CC' (simplified)

Volumes in C U C (yd^3)

Soil : 1.2 yd thick x 10,719 yd^2 = 12,863 cy
Top SS : 4.3 x 10,719 = 46,082
Top Mdst : 2.3 x 10,719 = 24,654
Bott SS : 2 x 10,719 = 21,438
Bott Mdst : 3.7 x 10,719 = 39,660

Cell Subtotal = 144,707 cy
Volume of 1:1 slope "Wedges"

Volume to calculate:

\[ V = (\text{length}) \times (\text{cross-sectional area}) \times (\text{height}) \]

Because its 1:1

\[ \text{EF: } 490' \times \frac{(28' + 52')^2}{2} = 662,480 \text{ ft}^3 \div 27 = 24,536 \text{ CY} \]

\[ \text{FG: } 370' \times \frac{(39' + 57')^2}{2} = 426,240 \text{ ft}^3 \div 27 = 15,787 \text{ CY} \]

\[ \text{EH: } 300' \times \frac{(35' + 39')^2}{2} = 205,350 \text{ ft}^3 \div 27 = 7,606 \text{ CY} \]

\[ \text{HI: } 210' \times \frac{(28' + 35')^2}{2} = 124,186 \text{ ft}^3 \div 27 = 3859 \text{ CY} \]

\[ \text{ID: } 260' \times \frac{(28' + 31')^2}{2} = 81,250 \text{ ft}^3 \div 27 = 3009 \text{ CY} \]

Estimated total vol. slope "wedges" = 69,565 CY
Vol. of rock type of wedges

Soil

Top SS

Top Mdst

Idealized

Average

Section

From Sheet 12

Vol. of wedge
area = 69,565 cy

Top SS

Top Mdst

Bott Mdst

Arbitrary Assignment:

Soil = 160% x 69,565 cy = 11,130 cy

Top SS = 310% x 69,565 cy = 21,565 cy

Top Mdst = 238% x 69,565 cy = 16,000 cy

Bott SS = 150% x 69,565 cy = 10,435 cy

Bott Mdst = 150% x 69,565 cy = 10,435 cy

Σ = 69,565
Vol. of near-surface bench = 2670 ft^2 length × 62 1/2 ft^2 = 2670 × 62 1/2 = 168,875 ft^3 = 6181 cu y

Assume of 6181 cu y (5000 cu y = soil, 1181 cu y = sandstone)

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<th>Bench (Sheet 1b)</th>
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### Table: Site Excavation Quantities

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**TOTAL:**

- Rippable: 205,067 CY
- Non-Rippable: 324,872 CY
- Total: 529,939 CY
**UMTRA PROJECT**

**CALCULATION COVER SHEET**

**CALC. NO.** 11-330-01-08

**CONTRACT NO.** 3885-76  **DISCIPLINE** CIVIL

**PROJECT**  
UMTRA - SLICK ROCK

**FEATURE**  
SITE RESTORATION

**ITEM**

EARTHWORK QUANTITIES AND SEEDING

**SOURCES OF DATA**

REFERENCES 1-9 AND 11-17 (SEE SHEET ii)

**SOURCES OF FORMULAE & REFERENCES**

SEE SHEET ii.

---

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**REV. NO**

**REVISION**

**CALCULATION BY**

**DATE**

**CHECKED BY**

**DATE**

**APPROVED BY**

**DATE**
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PURPOSE ((Rev 01)) ...........................................................................................................................................1

PROCEDURE ..................................................................................................................................................1

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EXCAVATION FOR GRADING/CONTOURING - ALL SITES .........................................................18

SEEDING ACREAGE - ALL SITES ...........................................................................................................22
REFERENCES


Purpose of Revision 03:
Disappointment Valley Borrow Site is no longer used for borrow material. The excavation of the disposal cell at the BC site provides clean material. All references to Disappointment valley are hence taken out.

Relevant sheets affected:

Sheet III - Delete Disappointment Valley references & re-total the quantities.

Sheet 20 - Delete Disappointment Valley volume & adjust the total volume of excavation.

Sheet 25 - Delete Disappointment Valley references & adjust the total seeding area.
SUMMARY OF QUANTITIES

1. COMMON FILL
   UC Site -------------------------- 20,700 cy (sheet 7)
   NC Site -------------------------- 6,500 cy (sheet 9)
   BC Site -------------------------- 148,000 cy (sheet 14)

   Disappointment Valley -- 102,500 cy
   Dolores River -- 40,500 cy
   UC Borrow Area -- 7,000 cy
   Potential 4th Site -- 6,400 cy
   Total Borrow Areas -- 158,500 cy (sheet 20)

2. EXCAVATION FOR GRADING/CONTOURING
   UC Site -------------------------- 23,500 cy (sheet 18)
   NC Site -------------------------- 11,100 cy (sheet 18)
   BC Site -------------------------- 0 cy (sheet 19)
   Disappointment Valley -- 102,500 cy
   Dolores River -- 40,500 cy
   UC Borrow Area -- 7,000 cy
   Potential 4th Site -- 6,400 cy
   Total Borrow Areas -- 158,000 cy (sheet 20)

3. SEEDING
   UC Site -------------------------- 58 acres (sheet 22)
   NC Site -------------------------- 27 acres (sheet 22)
   BC Site -------------------------- 17 acres (sheet 25)
   Disappointment Valley -- 64 acres
   Dolores River -- 25 acres
   UC Borrow Area -- 4 acres
   Potential 4th Site -- 4 acres
   Total Borrow Areas -- 98 acres (sheet 25)
   Stockpile area -- 14 acres (sheet 25)
PURPOSE:

The purpose of this calculation is to determine:

1. The quantity of fill required for site restoration at the UC, NC and BC sites.
2. The quantities of materials excavated for grading and contouring at all sites, including borrow areas, and
3. The required seeding acreage at all sites.

PROCEDURE:

1. According to Ref. 1, common backfill will be used in certain areas to fill excavations that are below adjacent grade to match adjacent grades. Information from references 2 and 4 (contaminated material excavations) is used to determine the amount of backfill required at the UC and NC sites. For the BC site, an InRoads (Ref. 4) surface has been generated for the final grading contours around the embankment (See Ref. 3). InRoads computes the volume of fill between the design surface and the existing ground surface for the area outside the embankment and apron.

2. Rough estimates of the depths of grading are used to determine the approximate amount of grading required at each site.

3. According to Ref. 1, seeding is required over all graded, excavated, or similarly disturbed soil surfaces. The acreage of disturbed areas shown in references 5, 6, and 9 is measured using the CADD drawings and the Intergraph Microstation "measure area" command. Intergraph uses the coordinates of points along the perimeter of an area to compute the acreage within the perimeter defined by those points.
Purpose of Rev. 01

1. Final site grading in BC disposal site has changed. Sheet 14 has been revised. Sheets 15, 16, and 17 have been replaced with new sheets. Sheet 19 has been revised.

2. Permanent stockpile has been changed. Therefore, seeding areas of stockpile is revised. Seeding areas of final grade is also revised. Sheet 22 and 25 have been revised. Sheets 23 and 26 have been replaced with new sheets.

Purpose of Rev. 2

1. During all foundation excavation, material will be placed directly on the finished grading area as shown on drawing BX-DS-10-0331. The rest will be placed in the stockpile. These quantities are added on Sh. 19. Sh. 11, 11, 19 are revised.
Common Backfill

UC Site:

The area marked (1) on Sheet 3 is an area of contaminated material excavation which must be backfilled to the final grade. The quantity of backfill equals the quantity of excavated contaminated material. Contaminated material excavation quantities are calculated in Reference 2.

Area #1 corresponds to Sub-area #XIX from Ref. 2, Sheet 45A. Quantity to be removed = 867 cu (Ref. 2, Sh. 42B)

Volume in area "A" (on Sheet 4) corresponds to Sub-areas XXIII + XXII + XXIV in Ref. 2, Sheets 42D & 42E

\[ \text{Vol A} = (13292 \times 5 + 2644 \times 10 + 8300 \times 2)/27 = 4056 \text{ cu} \]

Section through Retention Basin (See Sheet 6)

Retention basin is 360' long (Ref. 7), with the last ~9 ft sloping up 2H:1V to meet final grade.

Area of cross-section = \(4.5 \times 250 + 2 \times (4.5 \times 9)\)

\[ = 1165.5 \text{ ft}^2\]
EXCAVATIONS THAT ARE BELOW ADJACENT GRADE SHALL BE BACKFILLED TO MATCH ADJACENT GRADES.

CONTAMINATED MATERIALS FROM TEMPORARY DITCHES AND RETENTION BASINS SHALL BE REMOVED AND PLACED IN THE DISPOSAL EMBANKMENT. TEMPORARY DITCHES SHALL BE BACKFILLED TO MATCH ADJACENT GRADES. DRIES FOR THESE DITCHES SHALL BE LEVELED.

FOUR LOCATION OF DITCHES AND RETENTION BASIN SEE DWG. NO. SRK-PS-10-031.

NO REGRADING SHALL BE DONE WITHIN GAS PLANT BOUNDARIES.

FINAL SLOPES FOR ROCK CUTS SHALL BE NO STEEPER THAN 1H:1V UNLESS NOTED OTHERWISE. FINAL SLOPES FOR ROCK CUTS SHALL BE NO STEEPER THAN 1H:1V UNLESS NOTED OTHERWISE. ROCK SLOPES MAY BE LEFT IN NATURAL CONDITION.

UNCERTIFIED COMMON BACKFILL MAY COME FROM REQUIRED EXCAVATIONS AT THE UC AND NC SITES.

TEMPORARY DRIES SHALL BE LEVELLED TO MATCH ADJACENT GRADES.

IF MATERIAL IS REMOVED FROM THE UC SITE BORROW AREA THE SITE SHALL BE GRADED TO AVOID FLOW CONCENTRATION AND AS DIRECTED BY THE CONTRACTOR.

AREA OF OUTCROP 120,800 ft²

AREA WITHIN LIMIT OF CONTAM.
MATERIAL 2,655,500 ft²

U.S. DEPARTMENT OF ENERGY
ALBUQUERQUE, NEW MEXICO

SLICK ROCK SITE
SLICK ROCK, COLORADO
UNION CARBIDE PROCESSING SITE

FINAL SITE GRADING PLAN

REFERENCE DRAWINGS:
SRK-PS-10-030 TEMPORARY SITE DRAINAGE PLAN
SRK-PS-10-031 CONTAMINATED MATERIAL EXCAVATION PLAN

LEGEND:
AREA OF OUTCROP 120,800 ft²
AREA WITHIN LIMIT OF CONTAM. MATERIAL 2,655,500 ft²

PRELIMINARY REVIEW

E & O MANAGER: JSR
HEAD ENGINEER: JSR
PROJECT MANAGER: JSR

SHEET 3
REF. #5
NOTES:
1. FINISHED GRADE CONTOURS ARE APPROXIMATE AND MAY BE ADJUSTED BASED ON FINAL CONTOURS AFTER REMOVAL OF CONTAMINATED MATERIAL.
2. EXCAVATIONS THAT ARE BELOW ADJACENT GRADE SHALL BE BACKFILLED TO MATCH ADJACENT GRADES.
3. CONTAMINATED MATERIALS FROM TEMPORARY DITCHES AND RETENTION BASINS SHALL BE REMOVED AND PLACED IN THE DISPOSAL EMBANKMENT. TEMPORARY DITCHES SHALL BE BACKFILLED TO MATCH ADJACENT GRADES. DRIES FOR THESE DITCHES SHALL BE LEVELED.
4. FOR LOCATION OF DITCHES AND RETENTION BASIN SEE DWG. NO. SRK-PS-10-031.
5. NO REGRADING SHALL BE DONE WITHIN GAS PLANT BOUNDARIES.
6. FINAL SLOPES FOR ROCK CUTS SHALL BE NO STEEPER THAN 1H:1V UNLESS NOTED OTHERWISE. FINAL SLOPES FOR ROCK CUTS SHALL BE NO STEEPER THAN 1H:1V UNLESS NOTED OTHERWISE. ROCK SLOPES MAY BE LEFT IN NATURAL CONDITION.
7. UNCERTIFIED COMMON BACKFILL MAY COME FROM REQUIRED EXCAVATIONS AT THE UC AND NC SITES.
8. TEMPORARY DRIES SHALL BE LEVELLED TO MATCH ADJACENT GRADES.
9. IF MATERIAL IS REMOVED FROM THE UC SITE BORROW AREA THE SITE SHALL BE GRADED TO AVOID FLOW CONCENTRATION AND AS DIRECTED BY THE CONTRACTOR.

check: JSR
4/23/93

U.S. DEPARTMENT OF ENERGY
ALBUQUERQUE, NEW MEXICO
SLICK ROCK SITE
SLICK ROCK, COLORADO
UNION CARBIDE PROCESSING SITE

FINAL SITE GRADING PLAN

REFERENCE DRAWINGS:
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LEGEND:
AREA OF OUTCROP 120,800 ft²
AREA WITHIN LIMIT OF CONTAM. MATERIAL 2,655,500 ft²

PRELIMINARY REVIEW

E & O MANAGER: JSR
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check: JSR
4/23/93
TABLE 1
LOCATION POINT COORDINATES

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NOTES:

REFERENCE # G

1. ALL CUTS SHALL BE 2000 FEET UNLESS OTHERWISE NOTED.
2. FINAL LIMITS OF WATERSHED CONTAMINATION AT BOTTOM OF CORRAL DRAW WILL BE DETERMINED IN THE FIELD.
3. ALL CONTAMINATED SOIL ON EXPOSED OR EXCAVATED ROCK SURFACES SHALL BE REMOVED. THIS MAY REQUIRE HAND EXCAVATION OR WASHING DOWN TO REMOVE ALL SURFACE CONTAMINATION. THE LIMITS OF CONTAMINATED MATERIALS ON ROCK SURFACES WILL BE DETERMINED IN THE FIELD.
4. CONTAMINATION MATERIAL FROM AREA "A" SHALL BE PLACED IN THE DISPOSAL EMBANKMENT WITH TAILINGS PRIOR TO OTHER OFF-PILE CONTAMINATED SOILS.
6. FINAL LIMITS TO BE DETERMINED IN THE FIELD.
7. EXCAVATIONS SHALL NOT DAMAGE OR ENDANGER THE PETROLEUM SITE LOCATED ON THE CLIFF FACE, WEST OF THE COUNTY ROAD BRIDGE.
8. EXISTING COUNTY ROAD SHALL BE DETOUR TO LOCATION SHOWN UNTIL AREA SOUTH OF FENCE IS REMOVED AND DEMOLITION DEBRIS IS REMOVED. COUNTY ROAD SHALL THEN BE FULLY RESTORED TO ORIGINAL LOCATION.

REFERENCE DRAWINGS:

LEGEND:

- Approximate limit and depth in feet of windblown contaminated material
- Area "A"
- Exposed rock outcrop
- Location points see Table 1 for coordinates

SCALE:

200 0 200 400
FEET

U.S. DEPARTMENT OF ENERGY
ALBUQUERQUE, NEW MEXICO

SLICK ROCK SITE
SLICK ROCK, COLORADO
UNION CARBIDE PROCESSING SITE
CONTAMINATED MATERIAL EXCAVATION PLAN

PROJECT NO. DE-AC04-83AL18796
SRK-PS-10-0316
CEMEX CORPORATION
MP-RED-308
ENVIRONMENTAL SERVICES ADVANCEMENT
SILVER TRAC PROJECT
2000 PINE ST. SAN FRANCISCO, CA 94108
COMMON BACKFILL - UC SITE, CONT'D

Volume of trapezoid-like shapes in last 9 ft of the ends of the retention basin:

\[ V = \frac{1}{3} (1165.5 \, \text{ft}^2 \times 9') = 3496.5 \, \text{ft}^3 \]

ret. basin ends,

side view

Volume of retention basin backfill:

\[ \frac{[1165.5 \times (360-18) + 2(3496.5)]}{27} = 15,022 \, \text{cu yd} \]

Excavations in the pipeline corridor correspond to sub-areas VII + XXV + XXVI in ref. 2, shs 420+42E = \frac{1}{2}(14820+6840+17135)/27 = 718 \, \text{cu yd}

\[ \therefore \text{Volume of backfill @ UC site } = 867 + 4056 + 15,022 + 718 = 20,700 \, \text{cu yd} \]

NC SITE:

The areas marked 2 through 7 and x on sheet 8 are areas of contaminated material excavation. They correspond to sub-areas labeled on sheet 13E of ref. 2. The quantity of backfill required equals the quantity of excavated contaminated material, calculated in ref 2.

<table>
<thead>
<tr>
<th>Area No. (Sheet 8)</th>
<th>Corresponding Sub-Area (Ref. 2, Sh. 13E)</th>
<th>Common Backfill Qty = Contamin. Matl. Qty. (Ref 2, Shs 13A &amp; 13B)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>XVIII</td>
<td>(2500 ft^3 x 6') = 15,000 ft^3</td>
</tr>
<tr>
<td>3</td>
<td>XVII</td>
<td>(3250 ft^4 x 4') = 13,000 ft^3</td>
</tr>
<tr>
<td>4</td>
<td>XIX</td>
<td>(10,500 ft^4 x 3') = 31,500 ft^3</td>
</tr>
<tr>
<td>5</td>
<td>XVI</td>
<td>(2500 ft^4 x 4') = 10,000 ft^3</td>
</tr>
<tr>
<td>6</td>
<td>XX</td>
<td>(3000 ft^4 x 8') = 24,000 ft^3</td>
</tr>
<tr>
<td>7</td>
<td>IX</td>
<td>(900 ft^4 x 1.5') = 1350 ft^3</td>
</tr>
<tr>
<td>x</td>
<td>N.A.</td>
<td>(See Sheet 6)</td>
</tr>
</tbody>
</table>

Total = 147,350 ft^3 + x
3. All excavated areas shall be graded to drain. Final slopes shall be no steeper than 3:1 (V:1) except for rock cuts.

4. All natural drainage courses that existed prior to removal of contaminated soils shall be restored.

5. Finished grade contours are approximate and may be adjusted based on final contours after removal of contaminated materials.

6. Road and grading shall be restored in the access control area as directed by contractor.

7. Uncontaminated common backfill may come from required excavations at the UC and NC sites.

REFERENCE DRAWINGS:
SRK-PS-10-0323 CONTAMINATED MATERIAL EXCAVATION PLAN

LIMIT OF DISTURBED SOIL

LEGEND:
- Limit of contaminated material removal
- 5500 Finshed grade contour

PRELIMINARY REVIEW

AREA = 234,200 ft²
(Common Backfill - NC Site, Cont’d).

Area of (X) = 70' x 110' = 7,700 ft² (scaled off Sheet 8).

Bottom of excavation of area (X) = 5443 ft³ (see Sheet 10);
Avg. final grade at area (X) = 5446.5 ft (see Sheet 8);
Avg. depth of backfill @ area (X) = 5446.5 - 5443 = 3.5 ft.

Volume = 7,700 ft² x 3.5 = 26,950 ft³

→ Volume of backfill in excavated areas = (147,350 + 26,950)/27

= 6456 cy

The NC Site also has 5 corrugated steel pipe manholes and 3 former outhouses or cesspools which must be removed. The holes must be backfilled (see Ref. 11, or Sheet 11).

The dimensions of the C.S.P. manholes are approximately 18” dia., 3’H to 4’H deep.

Volume C.S.P. MH. = \(\pi \frac{9}{12}^2 \times 4 = 7 \text{ ft}^3\)

The dimensions of the cesspools are approximately 10’H x 6’H x 6’H deep.

Volume Cesspools = 10 x 6 x 6 = 360 ft³

→ Volume of manholes & cesspools = (5 x 7 ft³ + 3 x 360 ft³)/27 ft³/y

= 41 cy

∴ Total backfill @ NC Site = 6456 + 41 = 6497 cy

= 6500 cy
REFERENCE DRAWINGS:
SRK-GE-10-0305 FENCE AND GATE DETAILS
SRK-PS-10-0324 FINAL SITE GRADING PLAN

LEGEND:

--- SLT FENCE

APPROXIMATE LIMIT AND DEPTH IN FEET OF CONTAMINATED MATERIAL

EXISTING POWER POLES TO REMAIN

PRELIMINARY REVIEW

E & S MANAGER									CHIEF ENGINEER									QA MANAGER

U.S. DEPARTMENT OF ENERGY
ALBUQUERQUE, NEW MEXICO

SLICK ROCK, COLORADO
SOUTH CONTINENT PROCESSING SITE

CONTAMINATED MATERIAL
EXCAVATION PLAN

DE-AC04-83AL8796

MORRISON KNUDSEN CORPORATION

UMTRA PROJECT

ISSUED FOR PRELIMINARY REVIEW

PROJECT NO.

DE-AC04-83AL8796

UMTRA PROJECT

IS Approved Date
REFERENCE DRAWINGS:

REFERENCE #11
SHEET 11

NOTES:
1. C.S.P. MANHOLES ARE APPROXIMATELY 3 FEET TO 4 FEET DEEP APPARENTLY INTERCONNECTED WITH TERRA COTTA PIPE. THE C.S.P. SHALL BE REMOVED AND THE HOLES BACKFILLED WITH UNCONTAMINATED MATERIAL.

2. UNDERGROUND UTILITIES MAY BE LEFT IN PLACE IF UNCONTAMINATED.

3. ALL ABANDONED OVERHEAD ELECTRICAL LINES AND POLES BETWEEN POLES AT N 58°17', E 62°46' AND N 58°57', E 64°05' SHALL BE REMOVED. EXISTING POLES AT THESE LOCATION SHALL BE BRACED OR GUYED BEFORE REMOVING LINES.

LEGEND:

- CSP M.H.
- Abandoned Pole
- Abandoned Water and Sewage Lines
- Former Outhouses or Cesspools
- Former Sites, No Apparent Material

Preliminary Review

E & D Manager
Chief Engineer
O & D Manager

U.S. Department of Energy
Albuquerque, New Mexico

Slick Rock Site
Slick Rock, Colorado
North Continent Processing Site
Existing Utilities and Demolition Plan
(COMMON FILL, CONT'D)

BC SITE:

Sheet 13 (REF. #12) SHOWS THE RETENTION BASIN AT THE BC SITE. IT MUST BE BACKFILLED.

THE AVERAGE DEPTH TO BOTTOM IS

$$\frac{5824 + 5825.5}{2} - 5815.5 = 9.25 \text{ ft}$$ (SEE SHT. 13)

VOLUME IN MIDDLE = \((190 \times 120 + 35 \times 120)(9.25) = 249,750 \text{ ft}^3\)

\[
\text{Length of Side Slopes} = 3(9.25) = 27.75 \text{ ft}
\]

PERIMETER AROUND MIDPOINT OF SIDE SLOPES
\[ P = 260 + 2(18.5) + 2(120 + 18.5 + 4.05) + 190 + 2(4.05) \]
\[ P = 780.2 \text{ ft} \]

AREA OF SIDE SLOPE SECTION
\[ A = \frac{1}{2}(3)(9.25^2) = 128 \text{ ft}^2 \]

TOTAL VOLUME TO BACKFILL = 249,750 + 780.2 \times 128 = 349,616 \text{ ft}^2 = 12,949 \text{ cy} \]
NOT TO SCALE

TYPICAL SECTION A

TYPICAL SECTION B

TYPICAL SECTION C
NOTES:

1. LOCATION OF TRAILERS IN THE ACCESS CONTROL AREA AND OFFICE AREA SHALL BE SUBJECT TO THE CONTRACTOR'S APPROVAL.

2. SEDIMENTATION FROM ALL OFF SITE FACILITIES SHALL BE CONTROLLED USING SILT FENCES AS APPROVED BY THE CONTRACTOR. SEE DWG. NO. SRX-GE-10-0305 FOR SILT FENCE DETAIL.

3. THE TOTAL DEPTH BETWEEN TOP OF DRIKE AND BOTTOM OF DITCH SHALL BE A MINIMUM OF 2' APPROXIMATELY BETWEEN E 21,050 AND E 24,090. ACTUAL HEIGHT OF DRIKE MAY VARY. THE DITCH INVERT SHALL BE SLOPED TO DRAW.


REFERENCE DRAWINGS:

SRX-GE-10-0305 - FENCE AND GATE DETAILS
SRX-GE-10-0306 - ACCESS CONTROL AREA PLAN
SRX-GE-10-0334 - WASTEWATER RETENTION B/Y SHEET AND MISCELLANEOUS SECTIONS AND DETAILS

LEGEND:

- AGGREGATE COVERED SURFACE
- SILT FENCE

PRELIMINARY REVIEW

E & D MANAGER
CHEF ENGINEER
O & A MANAGER

SCALE

U.S. DEPARTMENT OF ENERGY
ALBUQUERQUE, NEW MEXICO

SLICK ROCK SITE
SLICK ROCK, COLORADO

BURRO CANYON DISPOSAL SITE

ACCESS CONTROL FACILITIES AND WASTEWATER RETENTION BASIN PLAN

MORRISON KWNSDEN CORPORATION
UMTRA PROJECT
3650 A MURDO ST., SAN FRANCISCO, CA 94118

PROJECT NO. DE-AC04-83AL18796
DRAWING NO. SRK-DS-10-0332
REV. A
MORRISON KNUDSEN CORPORATION

Sheet L.

Project UMTRA - SRK
Feature SITE RESTORATION
Item EARTHWORK QUANTITIES
Contract No. 3885-76
Designed AFS
Checked JNR
File No. 
Date 4/8/93

Sheet 15 shows the contours of the inroads-generated surface that represents the embankment and final site grading. A comparison of these contours and the contours shown on sheet 16 (Ref. Dwg. #13)

Inroads is used to compute the fill volume between the design surface and the existing ground surface for the areas outside the apron. The resulting volume is:

\[ V_f = \frac{103,880 \text{ cu yd}}{135,113 \text{ cu yd}}, \text{ say } 103,900 \text{ cu yd} \]

As a check, Sheet 17 defines 3 separate areas of grading / contouring.

Area 1 (~65,900 ft²) requires an avg. of about 2 ft of fill
Area 2 (~415,000 ft²) " " " " " 6 ft of fill
Area 3 (~101,000 ft²) " " " " " 1 ft of fill

\[ \text{TOTAL VOLUME} = (65,900 \times 2) + (415,000 \times 6) + (101,000 \times 1) \]
\[ = 2,575,080 \text{ ft}^3 \]
\[ = 355,706 \text{ cu yd} \]
\[ \approx 132,000 \text{ cu yd} \text{ (2% difference)} \]

\[ \text{TOTAL COMMON FILL REQUIRED AT BC SITE:} \]
\[ 103,900 \text{ cu yd} \]
\[ 12,949 + 135,113 = 148,062 \approx 148,062 \text{ cu yd} \]

Since 6 ft of topsoil is removed from access control, retention basin and finish grading areas, that 6 ft has to be replaced.

\[ \text{Area that needed topsoil replacement} = 816,480 \text{ ft}^2 \]
\[ \text{Vol. of material needed} = 816,480 \times \frac{3}{27} \text{ cu yd} = 15,119 \text{ cu yd} \]
Inroads on area for Top of Embankment & Grading

This entire sheet is part of Rev 01
NOTES:

1. SLOPES BEYOND EMBANKMENT AREA SHALL BE UNIFORM GRADED AS DIRECTED BY THE CONTRACTOR TO PROMOTE SHEET FLOW AWAY FROM THE EMBANKMENT.

2. RESTORE RETENTION BASIN, ACCESS CONTROL, STOCKPILE AND OTHER DISTURBED AREAS TO ORIGINAL GRADE AS DIRECTED BY THE CONTRACTOR.

3. FOR DISPLACEMENT MONUMENT DETAIL, SEE DWG. NO. SRK-DS-10-0333.

4. TYPICAL RADIUS SHOWN IS FOR EMBANKMENT TOP AND SLOPE.

5. FINAL SLOPES OF SPILL PILE SHALL BE GRADED TO BLEND INTO SURROUNDING TERRAIN AS DIRECTED BY THE CONTRACTOR. ANGLES AND LONG STRAIGHT SECTIONS SHALL BE AVOIDED. FINAL SLOPES SHALL BE APPROXIMATELY 5% - 10% BUT NO STEEPER THAN 5%.

6. ALL DISTURBED AREAS BEYOND THE RIPRAP SHALL BE SEeded IN ACCORDANCE WITH THE SPECIFICATIONS.

7. NO FINAL SITE GRADING WILL BE PERMITTED EAST OF EXISTING FENCE.

Checked: AMB 1-28-94

REFERENCE DRAWINGS:

- SRK-DS-10-0333 WASTEWATER RETENTION BASIN AND MISCELLANEOUS SECTIONS AND DETAILS
- SRK-DS-10-0335 TAILINGS EMBANKMENT SECTIONS AND DETAILS (SHEET 1 OF 2)
- SRK-DS-10-0336 TAILINGS EMBANKMENT SECTIONS AND DETAILS (SHEET 2 OF 2)

Limit of seeding around embankmenthead (Stockpile Area must also be seeded)

This entire sheet is part of Rev 01

FINAL REVIEW

E & O MANAGER | ENG MANAGER | O & A MANAGER

U.S. DEPARTMENT OF ENERGY
ALBUQUERQUE, NEW MEXICO

TAILINGS EMBANKMENT AND FINAL SITE GRADING PLAN
EXCAVATION FOR GRADING/CONTOURING

UC SITE AND NC SITES

From sheets 3 & 4 (UC Site) and 8 (NC Site), the total areas of graded, excavated, or otherwise disturbed soil surfaces at the UC & NC Sites are:

UC Site: 2,055,500 ft² - 120,800 ft² = 2,535,000 ft² (from rock outcrop)

Note: Sheet 3 shows no grading in Corral Draw, and indicates that no grading is required on rock surface.

NC Site: 961,900 + 234,200 = 1,196,000 ft²

(Measured by planimeter on Sheet 4)

From sheets 3 & 4 it is estimated that on the average approximately half of the disturbed areas will require excavation for regrading, and that the average depth of excavation will be approx. 0.5 ft at both the UC and NC Sites.

Volume grading excav. = \( \frac{1}{2} \) (disturbed area)(0.5')

<table>
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<tr>
<th>Site</th>
<th>Disturbed Soil Area</th>
<th>Volume (cu)</th>
</tr>
</thead>
<tbody>
<tr>
<td>UC</td>
<td>2,534,000 ft²</td>
<td>23,470 ( \approx ) 23,500 cu</td>
</tr>
<tr>
<td>NC</td>
<td>1,196,000 ft²</td>
<td>11,074 ( \approx ) 11,100 cu</td>
</tr>
</tbody>
</table>
**BC SITE.**

**AMOUNT OF EXCAVATION AVAILABLE FOR FILL AT BC SITE:**

530,950

514,700 cu yd (REF. 3, sheet ii)

**AMOUNT OF FILL REQUIRED FOR GRADING/CONTOURING:**

117,000

+35,000 cu yd (from sheet 14)

530,950 - 117,000

413,950 cu yd > 35,000 cu yd

:: NO EXCAVATION IS REQUIRED FOR GRADING/CONTOURING AT THE 'BC SITE.'

According to SRK-DS10-031 Sh. 23, area south of embankment will be filled using the material from the excavation.

Amount of material required for fill = 48,000 CY

(from Sh. 14, total common fill required = 117,000 CY

including 48,000 CY)

:: Material required double handling = 69,000 CY

Amount of topsoil to be replaced = 15,100 CY (Sh. 14)

:: Material required from stockpile = 84,100 CY
Borrow Areas

The areas of the UC borrow area, Delores River borrow area, and potential third borrow area are scaled off Sheet 21. It is estimated that an area equivalent to the total borrow area at each borrow site will require excavation for regrading purposes.

It is assumed that the average depth of excavation for regrading will be 1.0 ft.

Borrow Areas:

<table>
<thead>
<tr>
<th>Site</th>
<th>Area Requiring Regrading (ft²)</th>
<th>Volume of Excavation (cy)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Delores River</td>
<td>1,093,250</td>
<td>40,500</td>
</tr>
<tr>
<td>UC Borrow Area</td>
<td>189,300</td>
<td>7,000</td>
</tr>
<tr>
<td>Disappointment Val</td>
<td>2,167,500</td>
<td>102,500</td>
</tr>
<tr>
<td>(Potential 4th site)</td>
<td>(172,000)</td>
<td>(6400)</td>
</tr>
</tbody>
</table>

TOTAL = 156,400 CY or 156,400 CY

Say 156,000 CY

Revised: ND 9/7/95
SOS 9/11/95

Stockpile Area

Sheet 16 shows a plan of the stockpile. It is estimated that no excavation for regrading will be required in this area (it will require only seeding).
UC & DOLORES RIVER BORROW SITES
RIRAP AND BEDDING MATERIALS

POTENTIAL BORROW SITE
(SEE NOTE 1, ON SMS-BR-10-0303
AND NOTE 8)

PROPOSED
UG BORROW SITE
(SEE NOTE 8)

AREA = 172,000 ft²

AREA = 189,300 ft²

NOTE: This sheet is a "C" scale in the state of CA. 1" = 1' unless the ORCA Benchmark IF/OF applies. 1/3.67
NOTES:

1. RADON BARRIER MATERIAL SHALL BE OBTAINED FROM THE BURRO CANYON DISPOSAL SITE AS SPECIFIED.

2. ASSUMED COORDINATE SYSTEM IS TAKEN FROM THE SURVEY CONDUCTED BY M. L. SMITH, P.S. 10735, ESTABLISHING HORIZONTAL AND VERTICAL CONTROL FOR THE SLICK ROCK SITES.

3. AT THE DOLORES RIVER BORROW SITE THE TOPSOIL SHALL BE STRIPPED AND STOCKPILED WITHIN THE SITE BOUNDARIES.

4. AFTER REMOVAL OF MATERIAL, THE BORROW SITE SHALL BE REGRADED TO DRAIN, FINAL SLOPES SHALL NOT BE STEEPER THAN FIVE (5) HORIZONTAL TO 1 VERTICAL, THE FINAL GRADE AT THE DOLORES RIVER SITE SHALL DRAIN TOWARD THE RIVER.

5. AFTER FINAL GRADING AT THE DOLORES RIVER SITE, TOPSOIL SHALL BE REPLACED IN UNIFORM THICKNESS AND SEEDED. THE DOLORES RIVER SITE SHALL BE PLANTED WITH COMMERCIAL CRESTED-WHEAT SEED IN ACCORDANCE WITH SUPPLIERS RECOMMENDATION.

6. A POWER LINE CROSSES THE DOLORES RIVER BORROW AREA, EXCAVATIONS SHALL BE AT LEAST 20 FEET AWAY FROM THE BASE OF THE UTILITY POLES.

7. EXISTING ROADS ADJACENT TO THE BORROW AREAS SHALL BE MAINTAINED AND KEPT OPEN TO THE PUBLIC.

8. UC BORROW AREA CONTAINS LARGE COBBLES AND GRAVEL THAT MAY BE COMBINED WITH MATERIAL FROM THE DOLORES RIVER BORROW SITE TO PRODUCE THE REQUIRED RIPRAPP SIZE. SEE EXHIBIT NO. SRK-PS-10-0308 FOR BORING AND TEST PIT LOCATIONS.

9. NO MORE THAN 3,000 CY MAY BE REMOVED FROM THE UC SITE FOR USE AS RIPRAPP AND BEDDING MATERIAL.

REFERENCE DRAWINGS:
SRK-GE-10-0303 PROCESSING SITES, DISPOSAL SITE AND BORROW SITES LOCATION MAP
SRK-PS-10-0318 BORINGS AND TEST PITS LOCATION PLAN

LEGEND:
- ESTIMATED CONTOURS
- FLOW LINE
SEEDING ACREAGE

UC SITE

As stated on Sheet 1, all graded, excavated, or otherwise disturbed soil areas will require seeding.

Disturbed area = 2,535,000 ft² (from Sheet 18)

UC SITE seeding area = 58 acres

NC SITE

Disturbed area = 1,196,000 ft² (from Sheet 18)

NC SITE seeding area = 27 acres

BC SITE

Sheet 27 (Ref. 15) shows the location of riprap in the BC site final grading plan, where riprap is not used over disturbed soil, the area must be seeded. Limits of seeding are drawn on Sheet 16. The “surface area” option of the Inroads (Ref. 4) software is used to compute the seeding area of the surface shown on seeding Sheet 15, within the limits drawn on Sheet 16. By JSR

Seeding area = 14.8 acres

In addition, the access control and water retention basin areas must be seeded. These areas are shown on sheets 23, 24, and 13.
1. Locations of the ditches are approximate and shall be approved by the contractor.

2. Excavated materials from underneath the cell shall be first placed in this area. Remaining excess material shall be stockpiled in the designated areas. See DWG NO. SRK-DS-10-0334 for grading requirements.

3. Sedimentation from stockpile shall be controlled using SILT fences as approved by the contractor. See DWG NO. SRK-GE-10-0301 for SILT fence detail.

4. Spill-pile and stock pile shall be confined to area shown on plan. Side slopes of spill-pile/stock pile shall be approximately 50:1:1 (50’ H:1’ V) but no steeper than 60:1:1. Final slopes shall avoid angles and long straight sections as shown on the drawing SRK-DS-10-0334 and as directed by the contractor.

5. Fill for final site grading after embankment construction shall come from material placed within spoil stock pile area.

6. Berm shall be constructed prior to hauling contaminated material to the site.

7. Bottom of disposal cell excavation shown is maximum. Actual bottom elevation may be higher than shown as determined by the contractor.

8. For clarity access and exit ramps are not shown. Ramps shall be constructed by the subcontractor as approved by the contractor.

9. No fill shall be placed beyond the fence line.

By: JSP 1/27/94
ABB 1-28-94

REFERENCE DRAWINGS:
SRK-GE-10-0301 FENCE AND GATE DETAILS
SRK-DS-10-0332 ACCESS CONTROL FACILITIES AND WASTEWATER RETENTION BASIN PLAN
SRK-DS-10-0333 WASTE WATER RETENTION BASIN AND MISCELLANEOUS SECTIONS AND DETAILS
SRK-DS-10-0334 TILINGS EMBANKMENT AND FINAL SITE GRADING PLAN

LEGEND:
This entire Sheet is part of Level 01

FINAL REVIEW

U.S. DEPARTMENT OF ENERGY
ALBUQUERQUE, NEW MEXICO
SLICK ROCK SITE
SLICK ROCK, COLORADO
BURRO CANYON SITE

SITE PREPARATION AND TEMPORARY DRAINAGE FACILITIES

DEPARTMENT OF ENERGY
UNITRA PROJECT

MORRISON KNUDSEN CORPORATION
ENVIRONMENTAL SERVICES DIVISION
UNITRA PROJECT

DE-AC04-83AL18796
SRK-DS-10-0331

PROJECT NO.

REVIEWED

ISUED FOR FINAL REVIEW

ISUED FOR PRELIMINARY REVIEW

DATED

PUBLIC PROJECT ENGINEER

DEPARTMENT OF ENERGY

WILSON B. KUHL

OWNER OF RECORD

DATE

REVISION

ISSUED FOR PROJECT ENGINEER

DEPARTMENT OF ENERGY

WILSON B. KUHL

OWNER OF RECORD

DATE

REVISION

ISSUED FOR PROJECT ENGINEER

DEPARTMENT OF ENERGY

WILSON B. KUHL

OWNER OF RECORD

DATE

REVISION
5. EXCAVATION LIMITS SHOWN ARE A MINIMUM. SUBCONTRACTOR MAY EXCAVATE DEEPER.

4. SEE INFORMATION FOR BORDERS FOR LOCATION OF PIPELINE R.O.W. AND ARCHAEOLOGICAL BOUNDARIES.

5. ALL WORK FROM 141 R.O.W. IS ON BLM LAND.

6. OVERHEAD ELECTRIC LINES WITHIN THE DISPOSAL CELL BOUNDARY SHALL BE RELOCATED BY OTHERS AS REQUIRED.

REFERENCE DRAWINGS:
SRK-05-10-0331 SITE PREPARATION AND TEMPORARY DRAINAGE FACILITIES
SRK-05-10-0332 ACCESS CONTROL FACILITIES AND WASTEWATER RETENTION BASIN
SRK-05-10-0334 TAILINGS EMBANKMENT AND FINAL SITE GRADING PLAN

LEGEND:
- — OVERHEAD ELECTRIC LINE

ARCHEOLOGICAL BOUNDARY (SEE NOTE 4)

PRELIMINARY REVIEW
E & D MANAGER
CHIEF ENGINEER
O & A MANAGER

U.S. DEPARTMENT OF ENERGY
ALBUQUERQUE, NEW MEXICO

SLICK ROCK SITE
SLICK ROCK, COLORADO
BURRO CANYON

ACCESS PLAN
Area of access control facilities: \(68,500 \text{ ft}^2 = 1.6 \text{ acres}\)  
(scaled off sheet 23)

Area of water retention basin: \(32,000 \text{ ft}^2 = 0.7 \text{ acres}\)  
(scaled off sheet 24)

Total seeding at BC site: \(14.8 + 1.6 + 0.7 = 17 \text{ acres}\)

Stockpile area:

permanent

Sheet 23 shows the limits of the stockpile area.

Seeding: \(13 + 3 = 16 \text{ acres}\)  
(scaled off sheet 23)

Borrow areas:

The seeding acreage is equal to the area disturbed for grading/contouring at these sites. From sheet 20, the areas are:

- Delores River: \(1,093,250 \text{ ft}^2 = 25 \text{ acres}\)
- UC Borrow area: \(189,300 \text{ ft}^2 = 4 \text{ acres}\)
- (Potential 4th site): \(172,000 \text{ ft}^2 = 4 \text{ acres}\)
- Disappointment Valley: \(2,767,500 \text{ ft}^2 = 64 \text{ acres}\)

Total: \(98 \text{ acres}\)

Rev. 03 ND 9/7/95  
SOS 9/13/95
1. FOR FINAL SITE GRADING REQUIREMENTS, SEE DWG SRK-DS-10-0334.
2. MEET TOE OF APRON AT ELEVATION 5888.

by: TSR 1/27/94
AMB 1-28-94

REFERENCE DRAWINGS:
SRK-DS-10-0334 TAILINGS EMBANKMENT AND FINAL SITE GRADING PLAN

This entire sheet is part of B0101

LEGEND:
- Riprap Type A
- Riprap Type B
- Riprap Type C
- Common Fill/Spoil Pile
- Topsoil Pile

FINAL REVIEW

U.S. DEPARTMENT OF ENERGY
ALBUQUERQUE, NEW MEXICO

Slick Rock Site
Slick Rock, Colorado
Burro Canyon
Tailings Embankment Erosion Protection

MORRISON KNUDSEN CORPORATION
DE-AC04-83AL18796

SRK-DS-10-0337

Drawing No.
UMTRA PROJECT
CALCULATION COVER SHEET
CALC. NO. 11-334-01-08-02

CONTRACT NO. 3885  DISCIPLINE CIVIL

PROJECT
UMTRA - SRK

FEATURE
BID SCHEDULE

ITEM
QUANTITIES AND MATERIAL BALANCE

SOURCES OF DATA
(SEE SHEET ii)

SOURCES OF FORMULAE & REFERENCES
(SEE SHEET ii)

PRELIMINARY CALC. □  FINAL CALC. □  SUPERSEDES CALC. NO.

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<td>1/14/93</td>
<td>Ali M. Banani</td>
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<td>4/30/93</td>
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</tbody>
</table>

Checking criteria listed in the MKES UMTA Project Procedures Manual were used during the checking of all revisions of this calculation.
| References | ii |
| PURPOSE | 1 |
| MATERIAL BALANCE CHART | 2 |
| 000 MOBILIZATION | 3 |
| 200 SITE PREPARATION | 4 |
| 400 TAILINGS PILE | 8-9 |
| 500 COVER | 10-11 |
| 600 EROSION PROTECTION | 12 |
| 700 DECONTAMINATION | 12-13 |
| 800 SITE RESTORATION | 13-14 |
| 900 FENCING | 14-15 |
References

1. MKES, UMTRA-SRK, Calculation No. 11-330-02-00, Temporary Facilities - Material Quantities, April 1993
   Jan 1994 - Sep 1995

2. MKES, UMTRA-SRK, Calculation No. 11-333-01-00, Embankment Quantities - Excavation, Seepage Barrier & Cover Materials, March 1993
   Jan 1994 - Sep 1995

3. MKES, UMTRA-SRK, Calculation No. 11-212-01-02, NC and UC Site Contaminated Materials - Excavation Quantities, April 1993
   Sep 03

4. MKES, UMTRA-SRK, Calculation No. 11-330-01-00, Site Restoration - Earthwork Quantities and Seeding, March 1993
   Jan 1994 - Sep 1995

5. MKES, UMTRA-SRK, Calculation No. 11-310-02-00, Embankment Design - Excavation Stability, Jan 1994.

Rev 02 - By JSR 9/14/95
AMB 9/14/95
PURPOSE

The purpose of this calculation is to summarize the bid schedule quantities which will be the basis of the engineer's estimate. The quantities have been obtained from previously completed calculations. Quantities for "Lump Sum" items are not estimated in this calculations.

Rev 01 Purpose  by JSR 1/28/94
AMB 1/28/94

Shits 4-12, 14 and 15 have been replaced with new sheets.

Shits 2, 12, 14, 15 have been revised.

Some of the quantities have been revised as per revision B of drawings.

Rev 02 Purpose

(a) Some quantities have been revised as per final design.

shits 2, 4-10, 13-15 have been revised. Shit 10A added.

(b) Radon Barrier thickness has been changed.

Sheet 11 has been revised.  Rev 02 by JSR 9/14/95
AMB 9/14/95
This entire sheet is part of Rev02.

FILL

By: ISR 9/14/95
AMB 9/14/95

PROJECT - SLICK ROCK
ACT NO. 3885-76
BALANCE SUMMARY

84,800 CY
445,900 CY
85,000 CY
2,600 CY
3,000 CY
14,100 CY

635,400 CY

BURRO CANYON EMBANKMENT
(EMBANKMENT CAPACITY= 887,000 CY)
000 - MOBILIZATION

SUMMARY

<table>
<thead>
<tr>
<th>Item No</th>
<th>Description</th>
<th>Sheet No.</th>
<th>Unit</th>
<th>Approx. Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>001</td>
<td>Mobilization</td>
<td>3</td>
<td>L.S.</td>
<td>N/A</td>
</tr>
<tr>
<td>002</td>
<td>Payment for Bond Premium</td>
<td>3</td>
<td>L.S.</td>
<td>N/A</td>
</tr>
</tbody>
</table>

001 - Mobilization

Bid item mobilization consists of subcontractor's mobilization of forces, materials, and equipment onto the job site. Also it includes the furnishings, installation, construction, maintenance, operation and subsequent removal and disposal of construction facilities not paid for separately under other sections of Subcontract documents. Bid item 001 is a lump sum quantity and therefore will not be estimated in this calculation.

002 - Payment for Bond Premium

Bid item 002 is a lump sum quantity and therefore will not be estimated in this calculation.
**SUMMARY**

<table>
<thead>
<tr>
<th>Item No</th>
<th>Description</th>
<th>Sheet No.</th>
<th>Unit</th>
<th>Approx. Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>201</td>
<td>Temporary Offices</td>
<td>5</td>
<td>L.S.</td>
<td>N/A</td>
</tr>
<tr>
<td>202</td>
<td>Temporary Roads &amp; Parking Areas</td>
<td>5</td>
<td>L.S.</td>
<td>N/A</td>
</tr>
<tr>
<td>203</td>
<td>Temporary Sanitary Facilities</td>
<td>5</td>
<td>L.S.</td>
<td>N/A</td>
</tr>
<tr>
<td>204</td>
<td>Temporary Electric Power</td>
<td>5</td>
<td>L.S.</td>
<td>N/A</td>
</tr>
<tr>
<td>205</td>
<td>Temporary Water</td>
<td>6</td>
<td>L.S.</td>
<td>N/A</td>
</tr>
<tr>
<td>206</td>
<td>Maintenance and Janitorial Services</td>
<td>6</td>
<td>MONTH</td>
<td>18’ 24</td>
</tr>
<tr>
<td>207</td>
<td>Construction of diagram facilities at UC, NC and BC Sites</td>
<td>6</td>
<td>L.S.</td>
<td>N/A</td>
</tr>
<tr>
<td>208</td>
<td>Furnish and install silt Fence</td>
<td>6</td>
<td>L.F.</td>
<td>4510</td>
</tr>
<tr>
<td>209</td>
<td>Demolition and Disposal of Existing Structures and Facilities</td>
<td>6</td>
<td>L.S.</td>
<td>N/A</td>
</tr>
<tr>
<td>210</td>
<td>Sealing of Monitor Wells</td>
<td>6</td>
<td>L.F.</td>
<td>2700</td>
</tr>
<tr>
<td>211</td>
<td>Excavation of Uncontaminated Material for Access Control, Temporary</td>
<td>6</td>
<td>C.Y.</td>
<td>38,820</td>
</tr>
<tr>
<td></td>
<td>Drainage Ditches, Dikes &amp; wastewater Retention Basin At UC, NC &amp; BC Sites</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>212</td>
<td>Excavation of Uncontaminated Material from the tailings Embankment Foundation and Placement in Spoil/Stock Pile and finish grading at BC site.</td>
<td>7</td>
<td>C.Y.</td>
<td>330,720</td>
</tr>
<tr>
<td>213</td>
<td>Rock excavation from tailings embankment formation and placement in stockpile or for finish grading at the BC site.</td>
<td>7</td>
<td>C.Y.</td>
<td>209,330</td>
</tr>
<tr>
<td>214</td>
<td>Pavement Reflection Tests</td>
<td>7</td>
<td>L.S.</td>
<td>N/A</td>
</tr>
<tr>
<td>215</td>
<td>Construction of County Road SB _ at the UC Site</td>
<td>7</td>
<td>L.F.</td>
<td>920</td>
</tr>
</tbody>
</table>

The entire sheet is part of Rev 01

Rev 02 By: JSR 9/14/95

AMF 9/14/95
### Feature BID SCHEDULE

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
<th>Quantity</th>
<th>Unit</th>
<th>Note</th>
</tr>
</thead>
<tbody>
<tr>
<td>216</td>
<td>Construct Access Roads to the NC and BC Sites including earthwork and Culverts</td>
<td>8</td>
<td>L.S.</td>
<td>N/A</td>
</tr>
<tr>
<td>217</td>
<td>Excavation (Rock) at Junction of BC Access Road and State Highway 141</td>
<td>8</td>
<td>C.Y.</td>
<td>6450</td>
</tr>
<tr>
<td>218</td>
<td>Furnish and install Membrane Liner</td>
<td>8</td>
<td>L.S.</td>
<td>N/A</td>
</tr>
</tbody>
</table>

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**201 - Temporary Offices**

The subcontractor shall furnish and install temporary trailers for the office staff as approved by the contractor. The locations and sizes are given in subcontract drawings and in information for bidders.

Each trailer shall be provided with running water, power and shall be properly lighted and temperature conditioned for summer and winter use.

Bid item 201 is a lump sum quantity and thus will not be estimated in this calculation.

**202 - Temporary Roads and Parking Areas**

Subcontractor shall provide temporary roads and parking areas at each of the three sites. This item is a lump sum quantity and thus will not be estimated in this calculation.

**203 - Temporary Sanitary Facilities**

Subcontractor shall provide sanitary facilities including toilets and wash basins. This item is a lump sum quantity and thus will not be estimated in this calculation.

**204 - Temporary Electric Power**

Subcontractor shall provide and maintain all electric power and wiring requirements to facilitate the work. This item is a lump sum quantity and thus will not be estimated in this calculation.

**205 - Temporary Water**

All temporary water for potable and construction use shall be provided. This item is a lump sum quantity and thus will not be estimated in this calculation.
Subcontractor shall provide silt fences at NC and BC sites to control sediments. The calculated length of silt fences from Ref 1 is 4510 linear feet.

209 - Demolition and Disposal of Existing Structures and Facilities

Bid item 209 consists of existing structures and facilities to be demolished including decontamination pads, membrane liners, temporary fences and temporary foundations. This item is a lump sum quantity and thus will not be estimated in this calculation.

210 - Sealing of Monitor Wells

Measurement for sealing of monitor wells at UC, NC and BC sites will be by the linear feet of wells sealed as measured from the bottom of well to the top of the completed well. The calculated linear footage is 2700 LF from Ref 1.

211 - Excavation of Uncontaminated Material for Access Control, Temporary Drainage Ditches, Dikes and wastewater Retention Basin At UC, NC and BC Sites

This item will be measured by the cubic yard of material excavated. The earthwork volume from Ref 1 is 45,270 for UC, NC and BC sites. This includes the rock excavation at HWY 141 and BC access road which is 6450 CY. Since bid item 215 covers that quantity, the total excavation for this bid item is 38,820 CY.
212 - Excavation of Uncontaminated Material from the tailings Embankment Foundation and Placement in Spoil/Stock pile or for finish grading at BC site

This item will be measured in cubic yard of material excavated for the embankment and for the toe apron at the BC disposal site and includes excavating, hauling, and placing the excavated materials in temporary stock piles or in spoil areas if excess or unsuitable for use as fill as required, including all clearing, stripping, shaping and compacting such stock piles.

The total embankment excavation including rock is 536,750 CY (from Ref. 2). According to Ref. 5, 61% of total excavation is soil. Therefore 327,420 CY of soil will be excavated from the embankment area. Also 3,300 CY of soil will be excavated from the apron area (Ref. 2). Therefore total estimated embankment and apron excavation at the BC site is 330,720 CY.

213 - Rock excavation from Tailings embankment formation and placement in stockpile or for finish grading at the BC site

This item will be measured in cubic yard of rock excavated for the embankment at the BC disposal site and includes excavating, hauling, and placing the excavated materials in temporary stock piles or in spoil areas if excess or unsuitable for use as fill as required, including all clearing, stripping, shaping and compacting such stock piles.

The total embankment excavation including rock is 536,750 CY (from Ref. 2). According to item 215, 327,420 CY will be soil. Therefore 209,330 CY of Rock will be excavated from the embankment area.

214 - Pavement Deflection Tests

Bid item 214 is a lump sum quantity and thus will not be estimated in this calculation.

215 - Reconstruction of County Road S8 at the UC Site

This item consists of reconstruction of the county Road to its original alignment and will be measured by the linear foot. The calculated length of the road is 920 LF.
216 - Construct Access Roads to the NC and BC Sites including earthwork and Culverts

This item is measured as a lump sum and thus will not be calculated in this calculation.

217 - Excavation (Rock) at Junction of BC Access Road and State Highway 141

The line of sight at the intersection of the BC Access Road and State Highway 141 shall be improved by excavating the rock ridge northeast of the intersection. The Total estimated Rock excavation is 6450 CY from Ref 1.

218 - Furnish and install Membrane Liner

This item consists of membrane liners for wastewater retention basins and spillways and will be measured by the square yard. It includes all labor, materials, tools, equipment, installation supervisor, incidentals and for performing all work including, but limited to, installation, seaming, installation of gas vents and liner hold-downs, excavating, backfilling of anchor trenches and maintaining the liner.

The total membrane liner required for UC and BC sites is 20,000 SY from Ref 1.
### BID SCHEDULE

<table>
<thead>
<tr>
<th>Item No</th>
<th>Description</th>
<th>Sheet No.</th>
<th>Unit</th>
<th>Approx. Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>401</td>
<td>Excavation of Contaminated Materials from Tailings Pile and Windblown/waterborne areas at NC Site and Placement in Tailings Embankment</td>
<td>10</td>
<td>C.Y.</td>
<td>84,800</td>
</tr>
<tr>
<td>402</td>
<td>Excavation of Contaminated Materials from Tailings Pile at UC Site and Placement in Tailings Embankment</td>
<td>10</td>
<td>C.Y.</td>
<td>445,900</td>
</tr>
<tr>
<td>403</td>
<td>Excavation of Contaminated Materials from Windblown/waterborne areas at UC Site and Placement in Tailings Embankment</td>
<td>10</td>
<td>C.Y.</td>
<td>85,000</td>
</tr>
<tr>
<td>404</td>
<td>Excavation of Contaminated Materials from Gas line Right-of-way at UC Site and Placement in Tailings Embankment</td>
<td>10</td>
<td>C.Y.</td>
<td>2,600</td>
</tr>
<tr>
<td>405</td>
<td>Cleanup of Rock surfaces at UC and NC sites</td>
<td>10</td>
<td>S.Y.</td>
<td>46,480-25,000</td>
</tr>
<tr>
<td>406</td>
<td>Demolition, Handling, Removal and Disposal of Asbestos and Non-Hazardous Waste Materials</td>
<td>10</td>
<td>L.S.</td>
<td>N/A</td>
</tr>
<tr>
<td>407</td>
<td>Furnish and Install Displacement Monuments</td>
<td>10</td>
<td>Ea.</td>
<td>3</td>
</tr>
<tr>
<td>408</td>
<td>Furnish, Install and Seal stand pipes including concrete base and backfill filter</td>
<td>10A</td>
<td>L.F.</td>
<td>325</td>
</tr>
<tr>
<td>409</td>
<td>Operate and Maintain Monitoring &amp; Dewatering System in tailings Embankment</td>
<td>10A</td>
<td>Month</td>
<td>12</td>
</tr>
</tbody>
</table>
401 - Excavation of Contaminated Materials from Tailings Pile and Windblown/waterborne areas at NC Site and Placement in Tailing Embankment

The measurement for this item will be by the cubic yard of material excavated. The tailings, subpile and Windblown/waterborne materials at the NC Site is 84,800 CY from Ref 3.

402 - Excavation of Contaminated Materials from Tailings Pile at UC Site and Placement in Tailing Embankment

The measurement for this item will be by the cubic yard of material excavated. This item includes tailings pile A (274,600 CY) & B (21,400 CY), subpile A (88,200 CY) & B (15,900 CY) and 2' additional material on both piles (45,800 CY) at UC site from Ref 3. Therefore total excavation is 445,900 CY. Assume 14,100 CY from vicinity property stockpile. Therefore total contaminated material is 460,000 CY.

403 - Excavation of Contaminated Materials from Windblown/waterborne areas at UC Site and Placement in Tailing Embankment

The measurement for this item will be by the cubic yard of material excavated. The total off pile excavation at UC site is 87,600 CY from Ref 3. This quantity includes the material from gas line R.O.W. (2,600 CY) which is item 404. Therefore windblown/waterborne material at UC Site is 85,000 CY.

404 - Excavation of Contaminated Materials from Gas line Right-of-way at UC Site and Placement in Tailing Embankment

The measurement for this item will be by the cubic yard of material excavated. The windblown/waterborne materials from Gas line Right-of-way at UC Site is 2,600 CY from Ref 3.

405 - Cleanup of Rock surfaces at UC and NC sites

The measurement of this item will be by the sq. ft. The rock surface to be cleaned is 46,460 sq. ft. 25,000 sq. ft.

406 - Demolition, Handling, Removal and Disposal of Asbestos and Non-Hazardous Waste Materials

The measurement for this item will be by the lump sum and thus will not be estimated in this calculation.

407 - Furnish and Install Displacement monuments

The measurement of this item will be by the number of monuments. There are 3 displacement monuments at the BC site.
408 - Furnish, Install and Seal Stand Pipes Including Concrete Base and Geotextile Filter for Monitoring and Dewatering System. The measurement for this item will be by the linear feet. Length of the stand pipes are 325 ft.

409 - Operate and Maintain Monitoring & Dewatering System in tailings Embankment, Provide Pumps and piping, and Pump Excess water to Waste Water Retention Basin as required. The measurement for this item will be by the months. The estimated number of months are 12.
### SUMMARY

<table>
<thead>
<tr>
<th>Item No</th>
<th>Description</th>
<th>Sheet No.</th>
<th>Unit</th>
<th>Approx. Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>501</td>
<td>Furnish and Place Radon Barrier Materials</td>
<td>11</td>
<td>C.Y.</td>
<td>35,200 C.Y.</td>
</tr>
<tr>
<td>502</td>
<td>Furnish and Place Frost Protection Materials</td>
<td>11</td>
<td>C.Y.</td>
<td>36,750 C.Y.</td>
</tr>
</tbody>
</table>

**501 - Furnish and Place Radon Barrier Materials**

The measurement for this item will be by the cubic yard of material placed in fills. The total quantity of Radon Barrier Materials is 35,200 C.Y. from Ref 2.

**502 - Furnish and Place Frost Protection Materials**

The measurement for this item will be by the cubic yard of material placed in fills. The total quantity of Frost Protection Materials is 36,750 C.Y. from Ref 2.
600 - EROSION PROTECTION

SUMMARY

<table>
<thead>
<tr>
<th>Item No</th>
<th>Description</th>
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<th>Unit</th>
<th>Approx. Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>601</td>
<td>Furnish and Place Riprap Material, Type A</td>
<td>12</td>
<td>C.Y.</td>
<td>3,300</td>
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<tr>
<td>602</td>
<td>Furnish and Place Riprap Material, Type B</td>
<td>12</td>
<td>C.Y.</td>
<td>13,800</td>
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<tr>
<td>603</td>
<td>Furnish and Place Riprap Material, Type C</td>
<td>12</td>
<td>C.Y.</td>
<td>8,400</td>
</tr>
<tr>
<td>604</td>
<td>Furnish and Place Bedding Material</td>
<td>12</td>
<td>C.Y.</td>
<td>11,100</td>
</tr>
</tbody>
</table>

601 - Furnish and Place Riprap Material, Type A

The measurement for this item will be by the cubic yard of material placed. The quantity of Riprap Material, Type A required on the embankment is 2,800 CY (from Ref 2) and 500 CY on the finish grading (from Ref 4). Therefore total quantity is 3,300 CY.

602 - Furnish and Place Riprap Material, Type B

The measurement for this item will be by the cubic yard of material placed. The quantity of Riprap Material, Type B required on the embankment is 12,900 CY (from Ref 2) and 875 CY on the finish grading (from Ref 4). Therefore total quantity is 13,800 CY.

603 - Furnish and Place Riprap Material, Type C

The measurement for this item will be by the cubic yard of material placed. The total quantity of Riprap Material, Type C is 8,400 CY from Ref 2.

604 - Furnish and Place Bedding Material

The measurement for this item will be by the cubic yard of material placed. The quantity of bedding Material required on the embankment is 10,400 CY (from Ref 2) and 700 CY on the finish grading (from Ref 4). Therefore total quantity is 11,100 CY.
### 700 - DECONTAMINATION

#### SUMMARY

<table>
<thead>
<tr>
<th>Item No</th>
<th>Description</th>
<th>Sheet No.</th>
<th>Unit</th>
<th>Approx. Quantity</th>
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</thead>
<tbody>
<tr>
<td>701</td>
<td>UC, NC and BC Sites Decontamination Facilities</td>
<td>28/12</td>
<td>L.S.</td>
<td>N/A</td>
</tr>
</tbody>
</table>

The subcontractor shall furnish, install, operate, and maintain decontamination facilities. This item is a lump sum and thus will not be estimated in this calculation.

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Rev 02 by: ISR 8/10/94

AMB 9/14/95
### 800 - SITE RESTORATION

#### SUMMARY

<table>
<thead>
<tr>
<th>Item No</th>
<th>Description</th>
<th>Sheet No.</th>
<th>Unit</th>
<th>Approx. Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>801</td>
<td>Common Fill from Stock pile for Finish Grading of BC Site</td>
<td>14</td>
<td>C.Y.</td>
<td>132,700</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>84,100</td>
</tr>
<tr>
<td>802</td>
<td>Common Fill for Finish Grading at UC and NC sites</td>
<td>14</td>
<td>C.Y.</td>
<td>61,800</td>
</tr>
<tr>
<td>803</td>
<td>Seeding</td>
<td>14</td>
<td>acre</td>
<td>211</td>
</tr>
</tbody>
</table>

**801 - Common Fill from Stock Pile for Finish Grading of BC Site**

The measurement for this item will be by the cubic yard of material placed for finish grading from stock pile at BC site. The quantity required for fill is 117,000 CY and 15,100 CY of topsoil replacement (from Ref 4). The total quantity is 132,100 CY.

Total common fill required is 117,000 CY. Rev 4. 48,000 CY will be directly placed from the excavation. Therefore, common fill from stockpile is 69,000 CY. 15,100 CY of topsoil will be replaced. Therefore total common fill from stockpile is 84,100 CY.

**802 - Common Fill for Finish Grading at UC and NC Sites**

The measurement for this item will be by the cubic yard of material placed for finish grading at UC and NC sites. The quantities of fill required are 23,500 CY for grading and 20,700 CY for backfilling at UC site and 11,100 CY for grading and 6,500 CY for backfilling at NC Site (from Ref 4). Therefore total quantity of fill is 61,800 CY.

**803 - Seeding**

This item consists of seeding at UC, NC, BC sites and Borrow sites which is measured in acres. The calculated area of seeding is 58 acres for UC site, 27 acres for NC site, 15 acres for BC site, 13 acres for BC stock pile and 88 acres for borrow sites from Ref 4. Therefore total seeding area is 211 acres.
## BID SCHEDULE

### Item Quotations and Material Balance

<table>
<thead>
<tr>
<th>Item No</th>
<th>Description</th>
<th>Sheet No.</th>
<th>Unit</th>
<th>Approx. Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>901</td>
<td>Furnish and Install Chain Link Fence including Gates at Petroglyph Site</td>
<td>15</td>
<td>L.F.</td>
<td>720</td>
</tr>
<tr>
<td></td>
<td>and remove smooth</td>
<td></td>
<td>L.F.</td>
<td>370</td>
</tr>
<tr>
<td>902</td>
<td>Furnish and Install Deer Fence and Gates at UC Site</td>
<td>15</td>
<td>L.F.</td>
<td>10,720</td>
</tr>
<tr>
<td>903</td>
<td>Furnish and Install Barbed Wire Fence and Gates</td>
<td>15</td>
<td>L.F.</td>
<td>10,960</td>
</tr>
</tbody>
</table>

### SUMMARY

This item consists of 6'-0 high chain link fences at UC, NC and BC Access Control Facilities including gates. This item will be measured in linear feet. The calculated length of chain link fence is 720 L.F. from Ref 1. There are two 40'- wide double swing gates one each at UC and BC sites, and one 20'- wide double swing gate at NC site.

### Notes

- Item 902: Furnish, install and remove deer fence and gates, L.F. 6000
- Item 903: Furnish and Install Barbed Wire Fence and Gates, L.F. 10,960

This item consists of 3'-0 high barbed wire fences at UC, NC and BC sites and gates at NC site. This item will be measured in linear feet. The calculated length of barbed wire fence is 10,960 L.F. from Ref 1. There is a 45'- wide single swing gate at NC site.

There are two 40'- wide twin driveway gates, one each at UC & BC sites and one 20'- wide twin driveway gate at NC site.

### Review

Revised by JSR 9/19/95

This entire sheet is part of Rev 01.