

USGS Upton Quadrangle  
Scale: 1" = 2000'

Figure 783.24-1 Buildings within 1000 feet of the permit area.

UMC 783.25 CROSS-SECTIONS, MAPS, AND PLANS

UMC 783.25(a) - Locations of Test Borings

Coal exploration drilling is not a part of this plan.

UMC 783.25(b) - Monitoring Locations

The locations of water monitoring stations are shown on drawing number 783.16-1. Area topography is shown on this drawing so that approximate elevations of sampling points can be obtained.

UMC 783.25(c) and (d) - Coal Seam Characteristics

Coal mining activities are not a part of this plan.

UMC 783.25(e) - Location of Mine Workings

The location of known mine workings in and adjacent to the proposed permit area are shown on Plate numbers 771.23-1 and 771.23-2.

UMC 783.25(f) - Location and Extent of Subsurface Water

Drawing number 783.15-2 shows the springs and seeps recorded within a one mile radius of the reclamation area. Plate number 783.15-1 shows drill logs from water wells drilled in the vicinity of the reclamation area.

UMC 783.25(g) - Location of Surface Water Bodies

The location of all surface water bodies within the reclamation area is shown on drawing numbers 783.15-2 and 783.16-1.

UMC 783.25(h) - Location of Previously Surface-Mined Areas

The proposed permit area includes the disturbed area shown on plate number 784.23-1. The disturbance was made pursuant to underground coal mine activities by a previous owner/operator.

**UMC 783.25(i) - Location of Water Treatment Facilities**

The sedimentation pond is shown on plate number 784.23-2 in plan view and on plate number 784.23-3 in cross-section. The spoil pile from sedimentation pond excavation is also shown on those plates. No other spoil, waste, or air pollution control facilities are proposed in this plan.

**UMC 783.25(j) - Location of Wells**

There are no oil or gas wells within the permit area. The locations of water wells in the reclamation and adjacent areas are shown in section 783.15 on drawing number 783.15-2 of this document. Cross-sectional well logs are shown on plate number 783.15-1.

**UMC 783.25(k) - Slope Map**

Additional surface disturbance is not a part of this plan.

**UMC 783.25(l) - Certification**

All maps, plans, and cross-sections submitted pursuant to this section have been certified by a registered professional engineer or professional geologist.

**UMC 783.27 - PRIME FARMLAND INVESTIGATION**

The entire reclamation area is deemed unsuitable for prime farmland based on the following:

- (1) The land has not been historically used as cropland.
- (2) Portions of the land have slopes that are 10 percent or greater.
- (3) The land is not irrigated or naturally subirrigated. Furthermore, there are no available water rights of an agricultural nature in conjunction with the land within the reclamation area.
- (4) The soil is excessively rocky so as to prohibit most farming activities.
- (5) On the basis of soil surveys of the land within the reclamation area, there are no soil map units that have been designated prime farmland by the U. S. Soil Conservation Service.

Based on all of the above aspects, the only possible conclusion is that there are no Prime Farmlands within the reclamation area. See page 783.27-2 for a copy of the SCS Negative Declaration.



Soil  
Conservation  
Service

SUBJECT: Prime farmland

DATE: Dec. 15, 1986

TO:

Barbofilas  
221 W. 2100 S.  
Salt Lake City, Utah 84115

I can not find any prime farmland on the property on Chalk Creek. I have checked the soils maps and other data in the office.

Jim Watson

UMC 784.11 OPERATION PLAN: GENERAL REQUIREMENTS

Appropriate signs and markers have been placed to show the permit area boundary, property identification, and stream buffer zones. These signs and markers will remain in place through the bond release period.

UMC 784.11(b)(1) - Construction, Use, and Removal of Sedimentation Pond

The sedimentation pond proposed in this application is an incised pond. Construction techniques will include excavation using a rubber tired front end loader (see Reclamation Plan Appendix for a more detailed discussion of proposed excavation). Dewatering structures will be fabricated and installed as discussed in the Hydrologic Evaluation Appendix of this document.

The sedimentation pond has been designed for full containment of a 10 year - 24 hour precipitation event, and overflow structures have been designed to pass the 25 year - 24 hour event. Pond inflows will be contained a minimum of 24 hours prior to being manually discharged into Chalk Creek. Monitoring of sedimentation pond discharges will be as required by the approved NPDES permit. Results obtained through the NPDES monitoring will be provided to the Division within 90 days after they are received by the Applicant.

Sedimentation pond removal will be according to the plans provided in the Reclamation Plan Appendix on pages RP-23 and RP-24, and shown on plate number 784.23-2.

UMC 784.11(b)(5) - Removal of Mine Facilities

There are three buildings within the proposed permit area. Each is a steel structure built on a concrete foundation. Their locations are shown on Plate numbers 784.23-1 and 784.23-2. They are currently used as necessary to store equipment used in site maintenance. No maintenance or modification to any building is proposed in this plan.

Each building, along with access roads, will be left after reclamation for the surface owner to use to support his ranching operations.

The tipple shown on Plate number 784.23-1 is a concrete structure which was apparently once used as a coal loading facility. This structure will be demolished, disposed of on site, and backfilled according to the plans in section 784.13.

*where  
is  
permit?*

## UMC 784.13 RECLAMATION PLAN: GENERAL REQUIREMENTS

### UMC 784.13(a) - Plan Summary

The reclamation of the Summit Minerals, No. 1 Coal Mine is based on a total of 14.41 disturbed acres. Of those disturbed acres, 1.77 acres will be left to support the post mining land use, and the remaining 12.64 acres will be reclaimed according to this plan.

The reclamation project is expected to take approximately six weeks (1032 man hours) to complete. This includes three weeks of backfilling and grading, two weeks of planting in the fall, and one week of planting in the spring. The total cost of reclamation is expected to be \$99,822 (1986 dollars).

A general description of the proposed reclamation activities begins on page 1 of the Reclamation Plan and Bond Estimate Appendix in this section.

### UMC 784.13(b)(1) - Completion Timetable

The reclamation activities proposed in this plan will take six weeks to complete. A detailed timetable for the completion of each major step in the reclamation plan is included on page 5 of the Reclamation Plan and Bond Estimate Appendix in this section.

### UMC 784.13(b)(2) - Cost Estimate

The total cost of reclamation under this plan is \$99,822 (1986 dollars). A detailed estimate of the proposed reclamation activities, including calculations and assumptions is included in the Reclamation Plan and Bond Estimate Appendix in this section.

### UMC 784.13(b)(3) - Final Surface Configuration

Existing and reclaimed surface configurations are shown on Plate numbers 784.23-1, 784.23-2 and 784.23-3. The cross-sections shown on Plate number 784.23-3 show the proposed cut and fill areas required to achieve the final configuration. A material balance, surface grading and compacting methods, and discussions on soil stabilization is included in the Reclamation Plan and Bond Estimate Appendix in this section.

The proposed surface grading operations have been designed

to closely resemble the general surface configuration of surrounding terrain, while being capable of supporting the postmining land use.

The use of hazardous, toxic, or acid forming materials is not a part of this plan, so groundwater will not be impacted by reclamation activities.

The regraded slopes are shown on Plate number 784.23-2. The proposed slope is not uniform, but makes a transition from the steep, primarily undisturbed upslopes to the flatter reclaimed pad area. This transition is consistent with the configuration of the adjacent, undisturbed valley area. Regraded slopes have been designed for the most moderate slope possible while still maintaining a close resemblance to the surrounding area. No cut-and-fill terraces or permanent depressions are proposed in this plan.

Final grading and seed bed preparation will be accomplished along the contour to minimize any potential erosion or instability. Steep slopes will be prepared by hand as described in the Reclamation Plan and Bond Estimate Appendix of this section.

A discussion of highwalls is included in the Reclamation Plan and Bond Estimate Appendix of this section. No spoil, waste materials, debris, or equipment will be disposed of on the downslope of a steep slope.

A minor amount of coal and/or coal waste will be backfilled according to this plan. The use of acid forming or toxic materials is not proposed in this plan. As discussed in the Reclamation Plan and Bond Estimate Appendix of this section, any coal material will be backfilled using a bulldozer. Backfilling with a bulldozer inherently provides minimal lifts and constant compacting while manipulating the materials. Soil cover over the coal material will be a minimum of three feet thick, which should provide a suitable barrier for the establishment of vegetation.

The proposed backfilling and grading plan has been designed to minimize the erosion potential by controlling surface runoff, minimizing slope gradients, and minimizing the time required in executing the reclamation activities. In the event that rills or gullies exceeding 9 inches form in areas that have been regraded, they will be filled, graded, compacted as necessary, and revegetated according to the Revegetation Plan Appendix of this section.

#### UMC 784.13(b)(4) - Topsoil Handling Plan

The special handling of topsoils and subsoils is not a part of this plan. No topsoil or subsoil material was segregated at

the time of disturbance for use during reclamation activities. Based on soil sample analyses (section 783.21 of this document), existing disturbed soils are expected to be adequate to support revegetation with only a few soil amendments.

#### UMC 784.13(b)(5) - Revegetation Plan

A plan for revegetation as required in UMC 817.111 through 817.117 is included in the Revegetation Plan Appendix in this section.

#### UMC 784.13(c)(7) - Disposal of Waste

Because the disturbed area was once used to support underground coal mining activities, there is evidence of some surface spillage of coal and/or coal waste materials. This is addressed in the Reclamation Plan Appendix of this document. The Applicant will sample the material and have it analyzed for the following parameters: acid-base potential, pH, conductivity, boron, and selenium. Results will be provided to the Division when received by the Operator. Should it be necessary, appropriate revisions to the Reclamation Plan can be made based on the sample results.

#### UMC 784.13(b)(8) - Portal Sealing Plan

Subsequent to coal mining activities in the late 1970's by a previous owner/operator, two mine portals were left open. In October or November of 1984 during cleanup operations on site, the portals were sealed as per the mine superintendent's letter dated December 4, 1984 (Figure 784.13-1). The Operator feels that the placement and compaction of 27 feet of the incombustible sloughage material in and around the caved No. 1 portal area was the only practical way to seal the opening and that this method adequately meets the requirements of UMC 817.17 and 30 CFR 75.1711-2.

The No. 2 portal however, was basically in tact when fill material was introduced. The Operator proposes to excavate and remove the fill material during reclamation activities and permanently seal the opening as shown on drawing number 784.13-1, page 784.13-7 of this section.

#### UMC 784.13(b)(9) - Compliance with Health and Safety Standards

The Operator has applied for a National Pollutant Discharge Elimination System (NPDES) permit from the Environmental Protection Agency for the outfall from the sedimentation pond in compliance with the Clean Water Act (33 U.S.C. Sec. 1251 et seq.). A copy of this filing is included in this document as Figure 784.13-2.

December 5, 1984

Mr. Jack Higgins  
Summit Minerals

Dear Mr. Higgins:

On or about 10/15/84, at the Blackhawk Mine located approximately twelve miles east of Coalville, Utah, cleanup work was being performed by myself and two other employees at my direction.

At this time portals #1 and #2 were open, to the extent that neither had been properly sealed and both were caved. Number 2 was caved to within eight feet of a corrugated overcast type portal, extending underground eighteen feet. Number 1 portal was caved to surface and a similar portal structure was buckled by sluffage from the high wall directly above both portals.

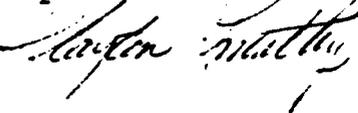
On returning to work after the weekend of 10/18/84 we noticed where children had been riding bicycles and playing in and around the old portals area.

Several families live in the immediate area of the mine site with children. It was then determined that the open portals were very hazardous.

At this time we sealed both portals using a bulldozer and the existing sluffage material from the high wall area. All the portal canopy structure was removed from portal #1 and material was dozed into the subsidence area and compacted by the dozer in 1 foot lifts or layers to a total of 27 feet of cover.

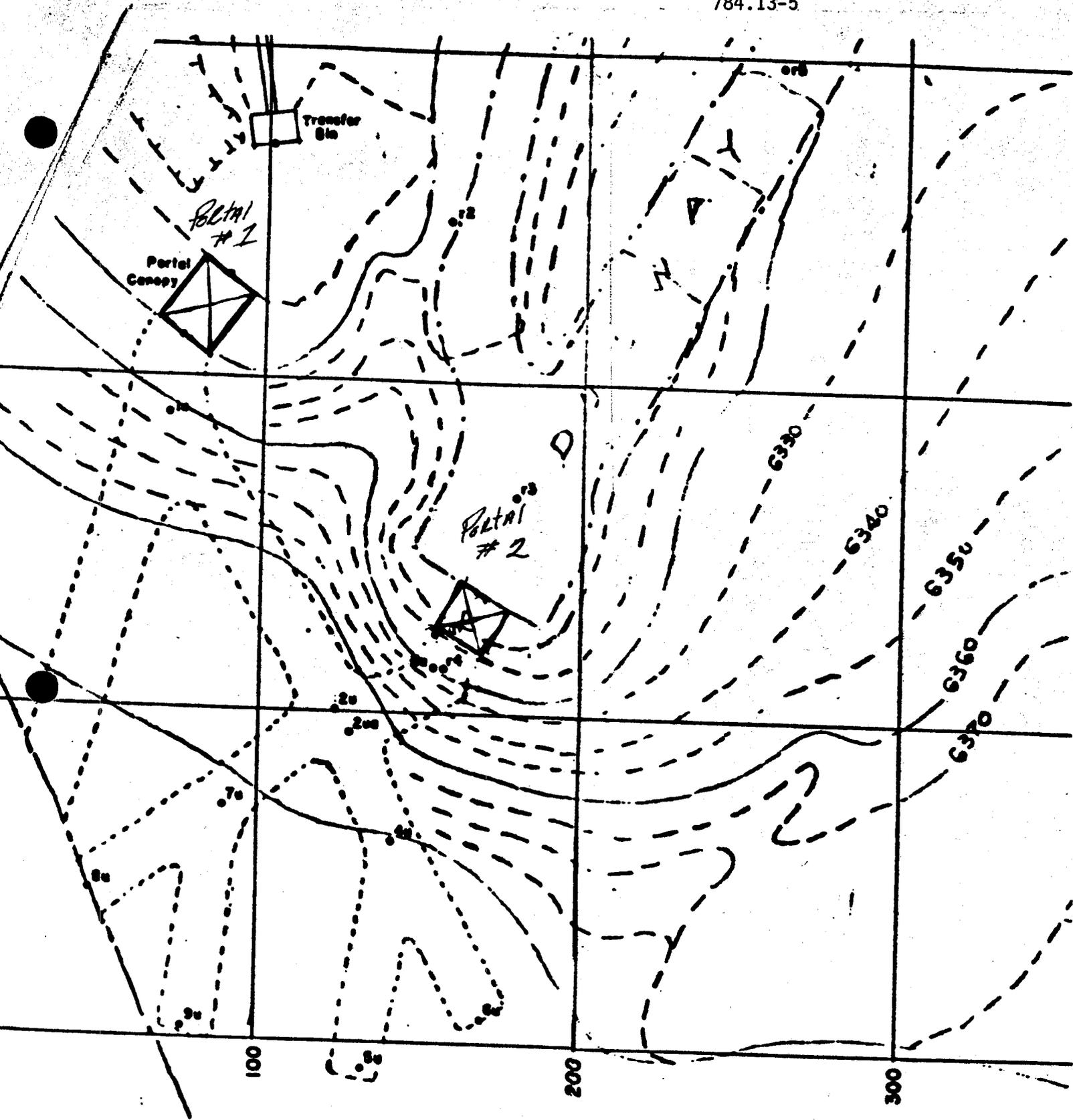
Portal 2 had relatively sound integrity, considering a future mining operation. We filled portal opening with sluffage material, making it inaccessible but still basically intact. This work has been completed as of 11/6/85.

Clayton Timothy  
Superintendent Summit Minerals



CT/cn

Figure 784.13-1a - Sealing of Portals at the Blackhawk Mine



Portal #1 PERMANENTLY SEALED  
Portal #2 INACCESSIBLE TEMPORARY SEAL

--- 6410 ---

Figure 784.13-1b - Sealing of Portals at the Blackhawk Mine

# SUMMIT MINERALS, INC.

784.13-6

221 West 2100 South  
Salt Lake City, Utah 84115  
(801) 486-1861

October 24, 1986

Mr. Bob Burm  
U. S. Environmental Protection Agency  
1 Denver Place  
999 18th Street  
Denver, CO 80202-2413

Dear Mr. Burm:

Please find enclosed EPA Form 3510-1, 3510-2C, and supporting information required for application for a National Pollutant Discharge Elimination System (NPDES) permit under the Clean Water Act, 33 U.S.C. 1251.

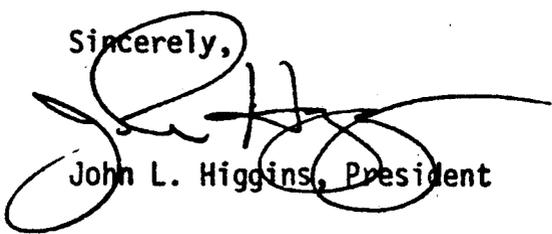
The NPDES application is made on behalf of Summit Minerals, Inc. No. 1 Coal Mine for the sole purpose of discharging contained surface runoff water from a sedimentation pond. Effluent waters from the operation of an underground coal mine are not a part of this application. Should it become necessary at some future date to discharge effluent waters from the underground operation, Summit Minerals, Inc. will apply for a separate outfall or an appropriate revision on this outfall in a timely manner which complies with the requirements for coal mining activities.

At your direction, Summit Minerals, Inc. requests that the Regulatory Authority waive all analyses required under Part V of Form 2C for the following reasons:

- 1) Runoff from the disturbed area is an existing condition resulting from a previous owner/operator. Installation of the sedimentation pond will only improve the existing runoff characteristics now entering the creek.
- 2) Because the pond is not yet constructed, there is no existing concentrated outfall location to sample which would provide meaningful data.

Should you have any questions or require additional information, contact Barbara Filas at (801) 486-1861. Your prompt consideration of this application would be appreciated.

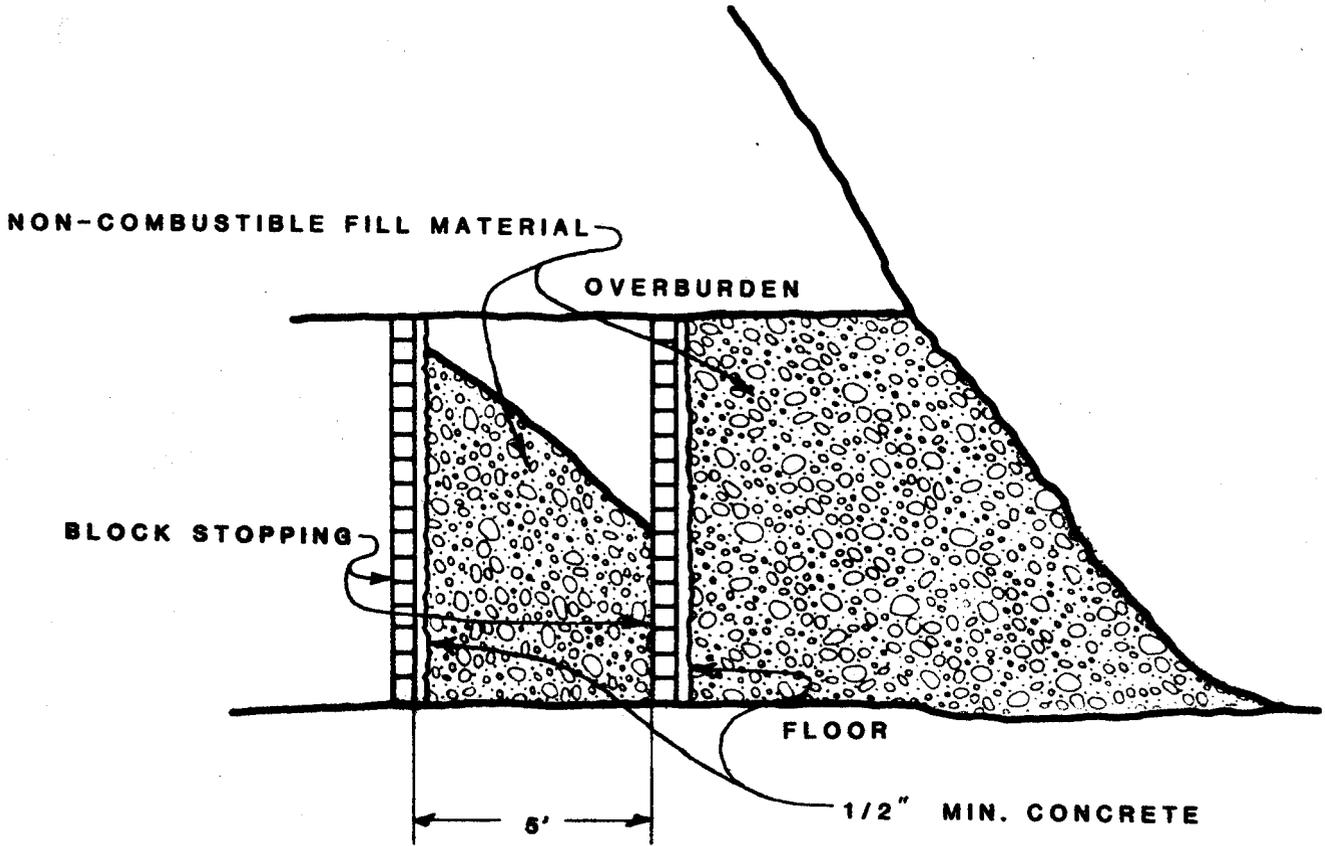
Sincerely,



John L. Higgins, President

**BILL OF MATERIALS:**

- 350 8" X 8" X 16" Solid Masonry Block at \$1.03/Block
- 6 80# Sacks Mortar Mix at \$3.10/Sack (1 sack:4cf)



NOTE: Prices and mortar volume assumptions are based on a 10/27/86 quote from Buener Block Co., 2800 South West Temple, Salt Lake City, Utah.

**SUMMIT MINERALS, INC.**

**PORTAL SEALING PLAN**

B.A.F. 10/27/86  
Scale: 1":4'  
Ref. Dwgs.

**784.13-1**

THIS DRAWING WAS PREPARED UNDER MY SUPERVISION:

*Barbara A. Filas*  
BARBARA A. FILAS

DATE

REGISTERED PROFESSIONAL ENGINEER, UTAH NO. 7007

RECLAMATION PLAN APPENDIX

RECLAMATION PLAN AND BOND ESTIMATE

TABLE OF CONTENTS

GENERAL	RP-1
RECLAMATION SCHEDULE	RP-5
DISTURBED AREA ACREAGES	RP-6
MATERIAL BALANCE	RP-7
SEDIMENTATION POND	RP-8
RECLAMATION EQUIPMENT	RP-9
BULLDOZER	RP-9
980 LOADER	RP-10
BACKHOE	RP-12
913 LOADER	RP-13
OTHER EQUIPMENT	RP-14
BACKFILLING & GRADING COST	RP-15
CULVERTS & DECANT COST	RP-16
EXISTING SED. POND RECLAMATION	RP-17
REVEGETATION EQUIPMENT	RP-18
REVEGETATION COST	RP-20
RECLAMATION BOND AMOUNT	RP-20
SEDIMENTATION POND RECLAMATION	RP-23
RIPRAP REQUIREMENTS	RP-25

REVISION 1 - 12/19/86

THE RECLAMATION OF THE SUMMIT MINERALS, INC. NO. 1 COAL MINE IS BASED ON A TOTAL OF 14.41 DISTURBED ACRES. OF THOSE DISTURBED ACRES, 1.77 ACRES WILL BE LEFT TO SUPPORT THE POST MINING LAND USE. THE REMAINING 12.64 ACRES WILL BE RECLAIMED ACCORDING TO THIS PLAN.

CROSS SECTIONS SHOWING EXISTING AND RECLAIMED SURFACES ARE SHOWN ON PLATE NO. 78A.243 AND REFERENCED ON PLATE NOS 78A.23-1; 78A.232. THE CUT-FILL BALANCE DEVELOPED PURSUANT TO THESE CROSS SECTIONS IS SHOWN ON PAGE 7 OF THIS APPENDIX. SOME 25,300 CY OF MATERIAL WILL BE MOVED TO ACHIEVE THE FINAL RECLAIMED CONFIGURATION SHOWN ON PLATE NO. 78A.232.

THE SURFACE OWNERS HAVE INDICATED THAT THEY WISH TO HAVE ALL SITE IMPROVEMENTS SUCH AS BUILDINGS, THE BRIDGE OVER CHALK CREEK, THE CULVERT (IRRIGATION DITCH ONLY), AND THE ACCESS ROAD LEFT IN PLACE FOLLOWING RECLAMATION TO SUPPORT THE LAND USE OF GRAZING. THE BUILDINGS WILL BE USED TO SUPPORT RANCHING OPERATIONS AND THE ACCESS ROAD AND BRIDGE PROVIDE SITE ACCESS.

EXCAVATING AND GRADING WILL BE ACCOMPLISHED USING A CATAPILLAR D9L BULLDOZER. THE CONCRETE TIPPLE STRUCTURE IS THE ONLY SIGNIFICANT STRUCTURE WHICH IS RECLAIMED UNDER THIS PLAN. BECAUSE THIS STRUCTURE WAS APPARENTLY USED AS A COAL LOADING FACILITY AT ONE TIME, SOME COAL AND/OR COAL WASTE MATERIAL WAS SPILLED IN THE VICINITY OF THE TIPPLE. THERE IS NO REASON TO BELIEVE THAT THE EXTENT OF THE COAL MATERIAL IS GREATER THAN SURFACE SPILLAGE.

UNDER THIS PLAN, THE TIPPLE STRUCTURE WILL BE BROKEN UP AND BACKFILLED. DURING SITE GRADING, ANY COAL (BLACK) MATERIAL EXPOSED WILL BE BACKFILLED WITH THE CONCRETE, PRIMARILY IN THE EXISTING DEPRESSION SHOWN ON CROSS SECTION B-B' (PLATE 78A.23-3). CONCRETE, COAL, AND ASPHALT WILL BE PLACED, THEN FILL MATERIAL PLACED ON TOP OF IT TO A MINIMUM THICKNESS OF FOUR FEET. BECAUSE FILL WILL BE PLACED WITH THE D9L, LIFTS WILL BE MINIMAL, AND SUCCESSIVE DOZING WILL COMPACT FILL MATERIAL INTO THE VOIDS CREATED BY BROKEN CONCRETE AND ASPHALT.

SHOULD THE EXTENT OF COAL MATERIAL IN THE TIPPLE AREA BE GREATER THAN ANTICIPATED, IT WILL STILL BE DISPOSED OF IN THE MANNER PREVIOUSLY DESCRIBED. CUT-FILL VOLUMES WILL INCREASE, BUT DUE TO THE CONSERVATIVE ASSUMPTIONS MADE IN THE BACKFILLING AND GRADING BOND ESTIMATE, THE TOTAL BOND AMOUNT OF \$106,312 SHOULD BE ADEQUATE TO COVER THE UNANTICIPATED VOLUMES.

THE HIGHWALL WHICH TRAVERSES MUCH OF THE SOUTHERN EXTENT OF THE DISTURBED AREA WILL NOT BE REGRADED. AS SHOWN ON PLATE No. 78A.23-2, THE TOE OF THE HIGHWALL WILL BE GRADED TO PROVIDE A UNIFORM CONTACT BETWEEN THE STEEP UNDISTURBED SLOPES AND THE MODERATE RECLAIMED SLOPES.

FIGURE RP-1 SHOWS THE SOUTHWESTERN END OF THE HIGHWALL. JUDGING BY THE APPARENTLY UNDISTURBED VEGETATION STAND ABOVE THE HIGHWALL, THIS HIGHWALL MAY BE A NATURALLY OCCURRING FEATURE.



FIGURE RP-1 : SOUTHWESTERN END OF HIGHWALL, LOOKING SOUTHWEST

FIGURE RP2 SHOWS THE SOUTHEASTERN EXTENT OF THE HIGHWALL. THE PHYSICAL GAP BETWEEN THE LEFT SIDE OF FIGURE RP1 AND THE RIGHT SIDE OF FIGURE RP-2 IS APPROXIMATELY 30-40 FEET. THERE IS OBVIOUSLY SOIL DISTURBANCE ABOVE THIS HIGHWALL, BUT VOLUNTEER VEGETATION IS FAIRLY WELL ESTABLISHED.

BEDDING PLANES IN THIS AREA DIP WESTERLY AT APPROXIMATELY  $17^{\circ}$  (783.14-4), AND THIS HIGHWALL TRENDS NW-SE. AS SUCH, THE SOIL-ROCK CONTACT ZONE IS DIPPING INTO THE MOUNTAINSIDE, LENDING STABILITY TO THE CONTACT. THIS

CONTACT IS WELL SHOWN IN FIGURE RP-2.



FIGURE RP-2: SOUTHEASTERN END OF HIGHWALL, LOOKING SOUTH

BY COMPARING THE UNDISTURBED SOIL CONTACT IN FIGURE RP-1 TO THE DISTURBED CONTACT IN FIGURE RP-2, SURFACE SLOPES OF THE DISTURBED CONTACT DO NOT APPEAR EXCESSIVE. UNDER THIS PLAN, THE DISTURBED CONTACT ZONE WILL BE REVEGETATED ACCORDING TO THE PLAN FOR SLOPES GREATER THAN 15% (ALL WORK IS DONE BY HAND). REVEGETATION HANDWORK CAN BE ACCOMPLISHED WITHOUT DESTROYING THE EXISTING STAND OF VEGETATION. AFTER FERTILIZER, SEED, MULCH, NETTING AND TRANSPLANTS ARE IN PLACE, THE SOIL IN THIS CONTACT ZONE, WITH THE ADDITIONAL VEGETATIVE COVER, WILL BE AT LEAST AS STABLE (PROBABLY MORE STABLE DUE TO THE LESSER SLOPE) AS THE UNDISTURBED CONTACT SHOWN IN FIGURE

REVEGETATION OF UNACCESSIBLE SLOPES GREATER THAN 15% WILL BE ACCOMPLISHED BY HAND IN ACCORD WITH THE REVEGETATION PLAN. THE DISTURBED UP-SLOPES OF THE SAND AND GRAVEL EXCAVATION (THE SOUTHERNMOST PORTION OF THE DISTURBED AREA) WILL BE MANIPULATED BY HAND ONLY. NO FORMAL GRADING IS PROPOSED EXCEPT FOR THE FILL IN THE TOE AREA. THE PRE-DISTURBANCE CONFIGURATION OF THIS AREA WAS AN ALLUVIAL FAN - I.E. STEEPLY SLOPING

UP-SLOPES, FANNING OUT TO A MORE GRADUAL SLOPE ON THE DOWN-SLOPES. BY LEAVING THE STEEPER UP-SLOPES, AND BACKFILLING THE DOWN-SLOPES TO ABOUT 3H:1V (PLATE No. 78A.23-2), THE ORIGINAL CONTOUR IS APPROXIMATED. THE MULCH AND POLYPROPELENE NETTING TO BE USED ON THE STEEPER SLOPES WILL PROVIDE FOR SOIL STABILIZATION UNTIL A STAND OF VEGETATION IS ESTABLISHED.

13 SHEETS 3 SQUARE  
23 SHEETS 3 SQUARE  
100 SHEETS 3 SQUARE  
MADE IN U.S.A.

REVISION 1 - 12/19/86

RECLAMATION SCHEDULE

END SEPTEMBER WEEK 1

BULLDOZER / BACKFILLING & GRADING  
 980 LOADER / SED. POND EXCAVATION  
 913 LOADER / REOPEN PORTAL, SCRAP  
 CUTTING TORCH / SCRAP STEEL  
 JACKHAMMER / CONCRETE DEMOLITION  
 LABORERS (2) / SCRAP, PORTAL SEAL  
 SUPERVISOR (1) / 7 MAN CREW

WEEK 2

BULLDOZER / BACKFILLING & GRADING  
 980 LOADER / SED. POND EXCAVATION  
 LABORERS (2) / SCARIFY SLOPES > 15%  
 SUPERVISOR (1) / 4 MAN CREW

WEEK 3

BULLDOZER / FINAL GRADING, ZIPPING  
 980 LOADER / SED. POND, RIPRAP  
 BACKHOE / DIVERSION DITCHES  
 LABORERS (2) / RIPRAP, FERTILIZE SLOPES  
 SUPERVISOR (1) / 5 MAN CREW

MID OCTOBER WEEK 4

TRACTOR / DISC, FERTILIZE, SEED, CRIMP  
 HELPER / FERTILIZE, SEED - TRACTOR  
 PICKUP TRUCK / HAYBLOWER  
 HELPER / HAYBLOWER  
 LABORERS (2) / HANDWORK, SEED, MULCH  
 SUPERVISOR (1) / 2-5 MAN CREW

WEEK 5

LABORERS (2) / HANDWORK, NET  
 SUPERVISOR (1) / 2 MAN CREW

EARLY SPRING WEEK 6

LABORERS / TRANSPLANT SEEDLINGS  
 SUPERVISOR / CREW AS REQUIRED

NOTE: FLOWS INTO THE SEDIMENTATION POND WILL BE MONITORED UNTIL SUCH TIME THAT THE WATER WILL MEET APPLICABLE STATE AND FEDERAL REQUIREMENTS FOR A RECEIVING STREAM. AT THAT TIME, THE POND AND DIVERSIONS WILL BE RECLAIMED ACCORDING TO THE PLAN (PP. PP-23, 24). VEGETATION WILL BE MONITORED AS DESCRIBED IN THE REVEGETATION APPENDIX CONTAINED IN THIS DOCUMENT.

REVISION 1 - 12/19/86

DISTURBED AREA ACRES (SEE DATE NO.)

C	9.77 AC		14.41 AC
2'	3.10 AC	Access(s)	(0.32 AC)
POND	0.29 AC	Access(1.)	(0.93 AC)
Access(s) of EROSION	0.32 AC	Access on SFS REF	(0.28 AC)
Access(s) of EROSION	0.93 AC	BLDGs	(0.24 AC)

TOTAL DISTURBED = 14.41 AC.

TOTAL TO RECLAIM = 12.64 AC

OF 12.64 ACRES:

3.61 ACRES > 15% SLOPES

9.03 ACRES < 15% SLOPES

AREA OF BUILDINGS:

So. BLDG	120 X 35	4200
	30 X 20 X 2	1200
	35 X 20	700
No. BLDG	135 X 25	3375
	15 X 20	300
	20 X 25	500
Sm. BLDG	10 X 15	150
		<hr style="width: 50%; margin-left: auto; margin-right: 0;"/>
		10,425 $\approx$ 0.24 AC

AREA OF ACCESS ROAD ON PAD AREA:

ACCESS ROAD	420 X 16	6720
HEADING EAST	250 X 10	2500
HEADING WEST	300 X 10	3000
		<hr style="width: 50%; margin-left: auto; margin-right: 0;"/>
		12,220 $\approx$ 0.28 AC



SECTION	C U T					F I L L		
	AREA (SQ IN)	ADJ (FT) <sup>(1)</sup>	BANK VOL (CY)	LOOSE VOL (CY) <sup>(3)</sup>	PLACED VOL (CY) <sup>(3)</sup>	AREA (SQ IN)	ADJ (FT) <sup>(2)</sup>	PLACED VOL (CY)
A-A'	2.41/5	80	3570	4463	3927	0.43/5	70	557
B-B'	5.15/5	80	7630	9538	8393	6.07/5	90	10117
C-C'	1.70/5	130	4093	5116	4502	0.78/5	120	1733
D-D'	—	—	—	—	—	2.24/5	85	3557
E-E'	—	—	—	—	—	0.61/5	95	1073
ASPHALT	30'X50'X1/2"		5	7	7			
CONCRETE	60'X50'X4'		444	622	622			
X-X'						0.19/5	50	176

TOTAL VOLUME = 17,450 PCY

TOTAL VOLUME = 17,213 PCY

(1) SECTION Y-Y', PLATE , THIS DOCUMENT

CLOSE ENOUGH...

(2) SECTION Z-Z', PLATE , THIS DOCUMENT

NOTE: SED. POND EVALUATED SEPARATELY, PAGE

(3) SURFACE MINING, E. P. PELEIDER, ED., 1968, TABLE 8.3-1, p 466.

MATERIAL BALANCE

SUMMIT MINERALS, INC. BACKFILLING & GRADING

BAF

10/3/86

PR-7

SEDIMENTATION POND

EXCAVATION REQUIRED = 9764 BCY (SEE PLATE NO. 784.23-3)

9764 BCY = 12205 LCY<sup>(3)</sup> = 10740 PCY<sup>(3)</sup>

ADJACENT SPOIL PILE = 5208 PCY (SEE PLATE NO. 784.23-3)

5208 PCY = 5918 LCY<sup>(3)</sup> 5532 PCY = 6287 LCY<sup>(3)</sup>

EXCESS SPOIL = 5532 PCY

EXCESS SPOIL WILL BE PLACED AT THE TOE OF THE GRAVEL PIT AND GRADED AT A 3:1 SLOPE. THIS WILL PROVIDE ADDITIONAL STABILIZATION OF THE PIT SLOPE, AS WELL AS APPROXIMATING THE CONTOUR OF THE ORIGINAL ALLUVIAL FAN.

EXISTING SLOPES ARE APPROXIMATELY 61.1% AND REGRADED SLOPES WILL BE APPROXIMATELY 5.6% (SEE 23 HYDROLOGIC EVALUATION). BACKFILL WILL BE PLACED AT A 3:1 SLOPE. THE SPAN OF THE FILL WILL BE ABOUT 80 FEET, SO:

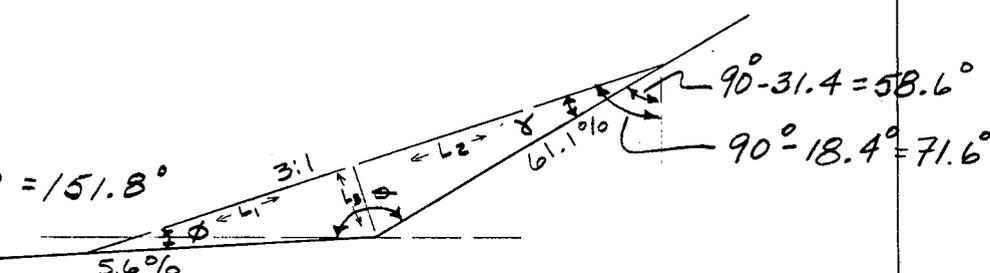
$\tan^{-1}(0.611) = 31.4^\circ$

$\tan^{-1}(0.056) = 3.2^\circ$

$\theta = 180^\circ - 31.4^\circ - 3.2^\circ = 151.8^\circ$

$\gamma = 71.6^\circ - 58.6^\circ = 13.0^\circ$

$\phi = 180^\circ - 151.8^\circ - 13.0^\circ = 15.2^\circ$



$5532 = \frac{(L_1 L_3 / 2 + L_2 L_3 / 2) 80}{27}$

$L_1 = L_3 / \tan \phi = 3.68 L_3$   $L_2 = L_3 / \tan \gamma = 4.33 L_3$

$5532(27) = 40(3.68)L_3^2 + 40(4.33)L_3^2$

$L_3 = 21.6 \text{ FT} \Rightarrow L_1 = 79.5 \text{ FT} \Rightarrow L_2 = 93.5 \text{ FT}$

HORIZ EXTENT =  $173 \cos(\tan^{-1}(1/3)) = 164 \text{ FT}$

(AS PLOTTED ON PLATE 784.23-4)

42,381 50 SHEETS 5 SQUARE  
42,382 100 SHEETS 5 SQUARE  
42,383 200 SHEETS 5 SQUARE



NATIONAL ENGINEERING AND CONSTRUCTION, INC.

RECLAMATION EQUIPMENT

- 1 CATERPILLAR D9L BULLDOZER w/ 3 SHANK REAR RIPPER
- 1 CATERPILLAR 980 WHEEL LOADER
- 1 EIMCO 913 PERMISSABLE - DIESEL - WHEEL LOADER
- 1 JACK HAMMER
- 1 ACETYLENE TORCH
- 1 48 HP BACKHOE

EARTHMOVING REQUIREMENT - BULLDOZER

FROM CUT-FILL BALANCE	19117	cy	(LOOSE)
ADDITIONAL FROM SED. POND	5532	cy	(LOOSE)
CONCRETE & ASPHALT	629	cy	(LOOSE)
	<u>25278</u>	cy	(LOOSE)

AVG HAUL DISTANCE  $\approx$  400 FT (SEE CROSS-SECTIONS,  
 PLATE )

THE FOLLOWING ASSUMPTIONS ARE BASED ON THE METHODS DESCRIBED IN "CATERPILLAR PERFORMANCE HANDBOOK", EDITION B, CATERPILLAR TRACTOR CO, PEORIA IL, OCTOBER 1977.

ESTIMATED DOZING PRODUCTION = 430 LCY/HR



JOB CONDITION CORRECTION FACTORS:

- AVERAGE OPERATOR 0.75
- MATERIAL SHOULD BE EASILY DOZED 1.00
- EFFICIENCY - 50 MIN/HR 0.84
- GRADE - 5.6% UPHILL 0.92

NOTE - "SURFACE MINING", PELEIDER, ED; 1968, TABLE 8.3-1, MATERIAL WEIGHT OF MOIST LOAM  $\approx$  2080-2250 LB/CY. LOOSE. CAT CURVES ASSUME A LOOSE DENSITY OF 2300 LB/CY. NO DENSITY CORRECTION WILL BE USED.

PRODUCTION CORRECTION:  $(430 \text{ LCY/HR})(0.75)(0.84)(0.92) = 249 \text{ LCY/HR}$

$\frac{25,278 \text{ LCY}}{(249 \text{ LCY/HR})(8 \text{ HR/DA})} = 12.7 \text{ DA}$

TO INCLUDE RIPPING TIME,

USE: 3 WEEKS - BULLDOZER REQUIREMENT

SEDIMENTATION POND EXCAVATION - 980 LOADER

VOLUME TO BE PLACED IN ADJACENT SPOIL PILE = 5918 LCY

VOLUME TO BE PLACED AT TOE OF GRAVEL PIT = 6287 LCY

AUG. HAUL DISTANCE TO ADJACENT SPOIL PILE  $\hat{=}$  300 FT

AUG. HAUL DISTANCE TO TOE OF GRAVEL PIT  $\hat{=}$  800 FT

USE: 6000 LCY AT 300 FT

USE: 6300 LCY AT 800 FT

42,381 50 SHEETS 3 SQUARE  
42,382 100 SHEETS 3 SQUARE  
42,383 200 SHEETS 3 SQUARE  
NATIONAL

THE FOLLOWING ASSUMPTIONS ARE BASED ON THE METHODS DESCRIBED IN "CATERPILLAR PERFORMANCE HANDBOOK", EDITION 8, CATERPILLAR TRACTOR CO., PEORIA IL, OCTOBER 1977.

BASIC CYCLE TIME	0.40 MIN
BANK MATERIAL	0.04
INCONSISTENT OPERATION	0.04

TOTAL MANEUVER, LOAD, DUMP TIME = 0.48 MIN

HAUL DISTANCE = 300 FT AT APPROX. 8% GRADE  
(DESIGN GRADE OF ROADWAY OUT OF SED. POND)

LOADED (8% GRADE)	0.38 MIN
EMPTY (USE MIN. CURVE)	0.27

TOTAL HAUL TIME TO SPOIL PILE = 0.65 MIN

HAUL DISTANCE = 800 FT AT APPROX. 6% GRADE  
(DESIGN GRADE OF ROADWAY OUT OF SED POND = 8%;  
RECLAIMED SURFACE APPROX. GRADE = 5.6%)

LOADED (6% GRADE)	0.77 MIN
EMPTY (USE MIN. CURVE)	0.53

TOTAL HAUL TIME TO BASE OF PIT = 1.30 MIN

USE: CYCLE TIME (300 FT) = 1.13 MIN

USE: CYCLE TIME (800 FT) = 1.78 MIN

EFFICIENCY FACTORS:

BUCKET FILL	0.95
AVG. OPERATOR	0.75
50 MIN. HRS.	0.83

USE 5.5 CY BUCKET

TIME REQUIRED :

$$\frac{(5.5 \text{ LCY/CYC})(0.95)(8 \text{ HR/DA})(0.83)(60 \text{ MIN/HR})(0.75)}{1.13 \text{ MIN/CYC}} = 1,382 \text{ LCY/DA}$$

$$\frac{6000 \text{ LCY}}{1,382 \text{ LCY/DA}} = 4.4 \text{ DA}$$

$$\frac{(5.5 \text{ LCY/CYC})(0.95)(8 \text{ HR/DA})(0.83)(60 \text{ MIN/HR})(0.75)}{1.78 \text{ MIN/CYC}} = 877 \text{ LCY/DA}$$

$$\frac{6300 \text{ LCY}}{877 \text{ LCY/DA}} = 7.2 \text{ DA}$$

INCLUDE TIME FOR RIPRAP PLACEMENT,

USE 3 WEEKS - 980 LOADER REQUIREMENT

DIVERSION DITCH EXCAVATION - 48 HP BACKHOE

<u>DITCH No.</u>	<u>LENGTH</u>	<u>VOL. OF EXC.</u>	<u>TOTAL VOL.</u>
No.1	928	3CF/F	103 CY
No.2	1075	4CF/F	159 CY
No.3	380	3CF/F	42 CY
No.4	655	3CF/F	73 CY / 377

1986 MEANS : 48 HP BACKHOE FOR DRAINAGE DITCH EXCAVATION - PRODUCTIVITY = 90 CY/DA ⇒ 4.2 DA

USE 1 WEEK - BACKHOE REQUIREMENT

42 SHEETS 3 SQUARE  
42 SHEETS 3 SQUARE  
42 SHEETS 3 SQUARE



SCRAP STEEL DISPOSAL - PERMISSIBLE LOADER

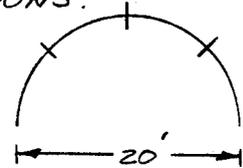
AN EIMCO 913 DIESEL POWERED PERMISSIBLE WHEEL LOADER WILL BE USED FOR SCRAP STEEL DISPOSAL. ALL SCRAP STEEL AND MISCELLANEOUS DEBRIS WILL BE PUT INSIDE THE REOPENED MINE PORTAL PRIOR TO ITS PERMANENT CLOSURE (SEE DESCRIPTION IN PART 784.13 OF THIS DOCUMENT). ALL STEEL WILL BE CUT TO MANEUVERABLE SIZES (NOMINAL 5' X 8' SECTIONS), LOADED INTO THE BUCKET, AND TRANSPORTED DIRECTLY INSIDE THE MINE PORTAL.

## AMOUNT OF CUTTING REQUIRED:

APPROX. 4 STEEL ARCHES

ASSUME EACH IS 20 FT DIA, 35 FT LONG  
CUT LENGTHWISE INTO 4 SECTIONS.

$$L\text{-cuts} - 35(3) = 105 \text{ LF}$$



$$4(105) = 420 \text{ LF}$$

## VERTICAL CONVEYORS

ASSUME EACH IS 40 FT LONG AND 3 FT DIA.

PROBABLY NO CUTTING REQUIRED

INCLUDING MISC. SCRAP AND CONTINGENCIES,

ASSUME: 1000 LF OF STEEL TO CUT

ASSUME WELDER AND TORCH ON SITE FOR 1-40 HR WEEK

$$\frac{1000 \text{ LF}}{(40 \text{ HR})(50 \text{ MIN/HR})} = 0.50 \text{ LF/MIN } \underline{ok}$$

VERY CONSERVATIVE!

EIMCO 913 LOADER IS RATED AT APPROX. 100 HP (PER EIMCO MINING MACHINERY INTERNATIONAL - 537 W 600 S, SALT LAKE CITY, UT). FOR COST PURPOSES, IT WILL BE COMPARED WITH A CATERPILLAR 930 WHEEL LOADER, WHICH ALSO HAS A 100 HP RATING.

THE LOADER WILL EASILY BE ABLE TO KEEP UP WITH THE CUTTING UP OF SCRAP STEEL, PRELIMINARY WORK WILL INCLUDE EXCAVATING (REOPENING) MINE PORTAL.

USE: 1 WEEK - LOADER REQUIREMENT

USE: 1 WEEK - ACETYLENE TORCH

IT IS EXPECTED THAT THE CONCRETE AND ASPHALT DEMOLITION CAN BE ACCOMPLISHED WITH THE HEAVY EQUIPMENT ALREADY DISCUSSED. FOR THE PURPOSE OF A PRUDENT ESTIMATE, WE WILL INCLUDE A COST FOR HAVING A JACKHAMMER FOR TWO DAYS...

USE: 2 DAYS - JACKHAMMER

AFTER ALL BACKFILLING AND GRADING IS ACCOMPLISHED, A 3 SHANK REAR RIPPER WILL BE USED ON THE D9U FOR SCARIFYING - SEED BED PREPARATION. IT IS EXPECTED THAT THE SOIL WILL BE EASILY RIPPED AND CAN BE DONE IN ONE OR TWO DAYS. DUE TO THE CONSERVATIVE ESTIMATE OF BULLDOZER TIME REQUIREMENT, THE 3 WEEK VALUE WILL NOT BE CHANGED. THE RIPPER IS ASSUMED ON SITE FOR ONE WEEK.

USE: 1 WEEK - RIPPER REQUIREMENT

BACKFILLING AND GRADING COST (INCL. SOIL SCARIFICATION)

EQUIPMENT	TIME REQ <sup>I</sup>	EQ. COST	OP. COST	OPERATOR <sup>(1)</sup>	TOTAL COST	COMMENTS
DOZER	3 WK	16,455/MO <sup>(2)</sup>	43.75/HR <sup>(2)</sup>	238.80/DA	25,287	
RIPPER	1 WK	705/WK <sup>(2)</sup>	3.00/HR <sup>(2)</sup>	INCLUDED	825	DOZER OPERATOR
BACKHOE	1 WK	171.60/DA <sup>(1)</sup>	INCLUDED <sup>(1)</sup>	238.80/DA	2,052	
TORCH	1 WK	18.00/WK <sup>(1)</sup>	0.05/HR <sup>(1)</sup>	272.80/DA	1,384	
J-HAMMER	2 DA	4.81/HR <sup>(1)</sup>	INCLUDED	22.19/HR	432	
PERM. LOADER	1 WK	1310/WK <sup>(2)</sup>	9.95/HR <sup>(2)</sup>	238.80/DA	2,902	
980 LOADER	3 WK	9855/MO <sup>(2)</sup>	28.40/HR <sup>(2)</sup>	238.80/DA	16,845	
LABORER <sup>(3)</sup>	6 WK			184.40/DA	5532	2 LABORERS SLOPES & RIPRAP
FOREMAN	3 WK			207.60/DA	3114	

42,381 50 SHEETS 3 SQUARE  
42,382 50 SHEETS 3 SQUARE  
42,383 200 SHEETS 3 SQUARE  
NATIONAL

TOTAL B & G COST = \$59,141

PORTAL SEAL MATERIALS<sup>(4)</sup> = \$379

- (1) MEANS COST DATA - 1986
- (2) RENTAL RATE BLUE BOOK - 1986
- (3) TWO GENERAL LABORERS FOR LOADING SCRAP AND MISC. DEBRIS. REOPENING AND BUILDING PERMANENT MINE SEALS WILL ALSO BE ACCOMPLISHED IN THIS TIME. RIPRAP, AVAILABLE ON SITE, WILL BE HAULED TO LOCATIONS ADJACENT TO DIVERSION DITCHES WITH THE 980 LOADER, AND HAND SPREAD IN THE DITCH CHANNELS. SEEDBED PREP. ON SLOPES > 15%
- (4)

CULVERTS AND DECANT

CORRUGATED PRICES PER R. LARSEN APR 20 725 N. 900 W.  
SALT LAKE CITY, QUOTE 10/22/85:

12"	\$ 5.69/FT	
18"	8.36/FT	
24"	11.07/FT	
36"	16.53/FT	
18X24 REDUCER	106.00 EA	(6' TOTAL LENGTH)
18" 90-ELBOW	40.00 EA	

DECANT:

18"	NEED 82 FT @	\$ 8.36/FT	686
24"	NEED 1 FT @	11.07/FT	11
36"	NEED 3 FT @	16.53/FT	50
18X24 REDUCER	NEED 1		106
18X18-90	NEED 1		40
4' (3) ANTI SEEP COLLAR	(ASSUME 20 EA)		60
			953

TOTAL PLUS 10% FABRICATION \$1048 DECANT

CULVERT

12"	NEED 140 FT @	\$ 5.69/FT	<u>\$ 797</u> CULVERT
-----	---------------	------------	-----------------------



EXISTING SEDIMENTATION POND RECLAMATION

THE EXISTING SEDIMENTATION POND, CONSTRUCTED BY A PREVIOUS OWNER/OPERATOR, IS LOCATED IN THE CHALK CREEK FLOOD PLAIN. IT APPEARS TO HAVE BEEN INCISED INTO THE SPILL BARRAGE WHICH USES AS THE IMPOUNDING STRUCTURE. IT DOES NOT APPEAR STRUCTURALLY OR VOLUMETRICALLY ADEQUATE FOR USE AS A SEDIMENTATION POND DURING RECLAMATION ACTIVITIES. THE OPERATOR DESIRES TO RECLAIM THIS POND CONCURRENTLY WITH SITE RECLAMATION (THIS AND THE OTHER POND SHOWN ON PLATE NO. 784.23-1 WILL BE RECLAIMED ONLY WITH THE SEDIMENTATION POND SHOWN ON PLATE NO. 784.23-2'S CONSTRUCTION AND USE HERE).

FIGURE 784.131 SHOWS THIS POND IN PLAN AND CROSS SECTION. IT IS EXPECTED THAT THIS STRUCTURE CAN BE BACKFILLED USING THE 27" EULLDOZER IN AN HOUR OR TWO. ALL THAT IS REQUIRED IS TO DOZE THE IMPOUNDING FILL MATERIAL INTO THE INCISED POND AREA. THIS IS A VERY MINOR JOB.

THE AREA OF THIS DISTURBANCE IS APPROXIMATELY 0.29 ACRES (REF. DRAWING NO. 783.16-1). BECAUSE IT IS LOCATED IN THE FLOOD PLAIN OF CHALK CREEK, NO SEDIMENTATION CONTROL STRUCTURES BEYOND THE EXISTING VEGETATIVE FILTER WILL BE USED. THIS AREA IS INCLUDED IN THE "SMALL AREA EXEMPTION" REQUEST ON PAGE 20 OF APPENDIX 784.14. THIS AREA IS INCLUDED AS A DISTURBED AREA SUBJECT TO REVEGETATION UNDER THE PLAN.

IT SHOULD BE NOTED THAT RECLAMATION OF THIS POND WILL INVOLVE BACKFILLING AND GRADING WITHIN THE STREAM BUFFER ZONE.

REVEGETATION EQUIPMENT

1 FORD 555A FARM TRACTOR WITH DISC, FERTILIZER DRILL, HAYBLOWER, etc.

TIME REQUIREMENT

TRACTOR / FERTILIZER SPREADER

ASSUME SPREAD WIDTH IS 8 FT, TRACTOR AT 4 MPH

$$\frac{8 \text{ FT}}{1 \text{ MI}} \left( \frac{5280 \text{ FT}}{1 \text{ MI}} \right) \left( \frac{4 \text{ MI}}{\text{HR}} \right) \left( \frac{1 \text{ AC}}{43560 \text{ FT}^2} \right) = 3.83 \text{ AC/HR}$$

$$\left( \frac{9.03 \text{ AC}}{3.83 \text{ AC/HR}} \right) \left( \frac{50 \text{ MIN}}{60 \text{ MIN}} \right) \left( \frac{\text{DA}}{8 \text{ HR}} \right) = \underline{\underline{0.24 \text{ DA}}}$$

PICKUP TRUCK / HAYBLOWER - FERTILIZER

ASSUME BLOWER RANGE IS 50 FT. AREA COVERED PER STOP =  $\pi(50)^2 \approx 7800 \text{ SF}$

$$\left( \frac{4000 \text{ LB}}{\text{AC}} \right) \left( \frac{1 \text{ AC}}{43560 \text{ SF}} \right) \left( \frac{7800 \text{ SF}}{\text{STOP}} \right) \left( \frac{3 \text{ FE}}{65 \text{ LB}} \right) = 11 \text{ BALES/STOP}$$

ASSUME 10 MIN TO BREAK UP 11 BALES AND FEED BLOWER AND MOVE 100 FT

ASSUME 50 MIN HOURS AND 8 HOUR DAY

$$\left( 9.03 \text{ AC} \right) \left( \frac{43560 \text{ FT}^2}{\text{AC}} \right) \left( \frac{\text{STOP}}{7800 \text{ FT}^2} \right) \left( \frac{10 \text{ MIN}}{\text{STOP}} \right) \left( \frac{1 \text{ HR}}{50 \text{ MIN}} \right) \left( \frac{\text{DA}}{8 \text{ HR}} \right) = \underline{\underline{1.26 \text{ DA}}}$$

TRACTOR / DISC

ASSUME DISC WIDTH IS 10 FT, TRACTOR AT 4 MPH

$$\left( \frac{10 \text{ FT}}{1 \text{ MI}} \right) \left( \frac{5280 \text{ FT}}{1 \text{ MI}} \right) \left( \frac{4 \text{ MI}}{\text{HR}} \right) \left( \frac{1 \text{ AC}}{43560 \text{ FT}^2} \right) = 4.85 \text{ AC/HR}$$

42 381 50 SHEETS 5 SQUARE  
42 382 100 SHEETS 5 SQUARE  
42 389 200 SHEETS 5 SQUARE  
NATIONAL

$$\left( \frac{9.03 \text{ AC}}{4.85 \text{ AC/HR}} \right) \left( \frac{50 \text{ MIN}}{60 \text{ MIN/HR}} \right) \left( \frac{\text{DA}}{8 \text{ HR}} \right) = \underline{\underline{0.19 \text{ DA}}}$$

TRACTOR / RANGELAND DRILL

ASSUME DRILL RANGE IS 10 FT, TRACTOR AT 5 MPH

= 0.19 DA

PICKUP TRUCK / AIRBLOWER - MULCH

$$\left( \frac{2000 \text{ LB/AC}}{1000 \text{ LB/BALE}} \right) \left( \frac{78000 \text{ FT}^2}{5000 \text{ FT}^2} \right) \left( \frac{\text{BALE}}{35} \right) = 5.5 \text{ BALES}$$

ASSUME 6 MIN TO BREAK UP 5.5 BALES AND FEEL SLOWED TIME TO BE 120 MIN. ALSO 50 MIN USE AND 8 HR DAY.

$$9.03 \text{ AC} \left( \frac{43500 \text{ FT}^2}{10000 \text{ FT}^2} \right) \left( \frac{5000 \text{ FT}^2}{78000 \text{ FT}^2} \right) \left( \frac{6 \text{ MIN}}{5000 \text{ FT}^2} \right) \left( \frac{\text{HR}}{50 \text{ MIN}} \right) \left( \frac{\text{DA}}{8 \text{ HR}} \right)$$

= 0.76 DA

TRACTOR / CRIMPER (DISC)

ASSUME CRIMPER IS 10 FT, TRACTOR AT 4 MPH

= 0.19 DA

IT IS ASSUMED THAT PICKUP TRUCKS ARE INCLUDED UNDER THE SITE CONTRACTORS OPERATING COST SINCE SITE ACCESS FOR LABORERS IS INCLUDED IN THIS COST.

TRACTOR REQUIREMENT = 0.81 DA

USE: 2 DA TRACTOR REQUIREMENT

42,381 50 SHEETS 5 SQUARE  
42,382 100 SHEETS 5 SQUARE  
42,389 200 SHEETS 5 SQUARE  
NATIONAL

REVEGETATION COST

ITEM	TIME REQ <sup>(1)</sup>	EQ. COST <sup>(2)</sup>	OPERATOR <sup>(1)</sup>	COMMODITY	COMM COST <sup>(5)</sup>	TOTAL COST
TRACTOR	2 DA	25.48/HR	225.60/DA			859
HELPER <sup>(6)</sup>	2 DA		184.40/DA			369
HELPER <sup>(7)</sup>	3 DA		184.40/DA			553
				FERTILIZER	120/AC	1517
				SEED	574.86/AC	7266
				MULCH	50/AC	632
				SEEDLINGS	800/AC	10,112
				CULVERT	797/UNIT <sup>(8)</sup>	797
				DECANT	1048/UNIT <sup>(8)</sup>	1048
				POLY. NET	640/AC <sup>(9)</sup>	2310
LACER	4 WK		184.40/DA			3688
SUPERVISOR	2 WK		207.60/DA			2076

TOTAL REVEGETATION COST = \$31,227

TOTAL B & G COST = 59,520 (P. RP-15)  
 RIPRAP = 3,423 (P. RP-25)

TOTAL PHASE I RECLAMATION = \$94,170

ADD 10% - ENGINEERING AND MONITORING 9,417

SEDIMENTATION POND & DITCH REMOVAL 2,725 (P. RP-24)

TOTAL RECLAMATION BOND AMOUNT = \$106,312

REVISION 1 - 12/19/86

5 SQUARE SHEETS 5 SQUARE SHEETS 5 SQUARE SHEETS 5 SQUARE SHEETS

(5) FERTILIZER COST: ASSUME \$50/TON ALFALFA MEAL  
\$20/AC PHOSPHATE

$$\left(\frac{2 \text{ TON}}{\text{AC}}\right) \left(\frac{\$50}{\text{TON}}\right) + \$20/\text{AC} = \underline{\$120/\text{AC FERTILIZER}}$$

SEED COST:

SPECIES	SEEDS/FT <sup>2</sup>	COST (\$/LBS)	TOTAL COST (\$/AC)
BLUEGRASS	3	6.00	18.00
SLENDER WHEATGRASS	2	2.20	4.40
MOUNTAIN BROME	2	3.00	6.00
KENTUCKY BLUEGRASS	0.25	2.00	0.50
NEEDLE & THREAD	2	46.00	92.00 / 120.90
YARROW	0.1	28.00	2.80
LEWIS FLAX	1	5.50	5.50
SILKY LUPINE	1	45.00	45.00
YELLOW SWEET CLOVER	0.5	0.65	0.33
PALMER PEPPERGRASS	0.5	35.00	17.50 / 71.13
SASK. SERVICEBERRY	2	80.00	160.00
SAGEBRUSH	0.2	45.00	9.00
BITTER BRUSH	3	6.00	18.00
SIDWEEBERRY	2	50.00	100.00 / 287.00

DRILL COST/ACRE = \$479.03/AC  
BROADCAST COST/ACRE = \$814.56/AC

$$(9.03 \text{ AC})(479.03) + (3.61)(814.56) = \$7266 \text{ TOTAL COST}$$

MULCH COST:

$$\left(\frac{1 \text{ TON}}{\text{AC}}\right) \left(\frac{\$50}{\text{TON}}\right) = \underline{\$50/\text{AC MULCH}}$$

SEEDLING COST:

ASSUME \$2.00/STEM - PRICE INCLUDES COMMODITY, LABOR, SURVIVALITY AND SURVIVABILITY.

$$(\$2.00/\text{STEM})(400 \text{ STEM}/\text{AC}) = \underline{\$800/\text{AC}}$$

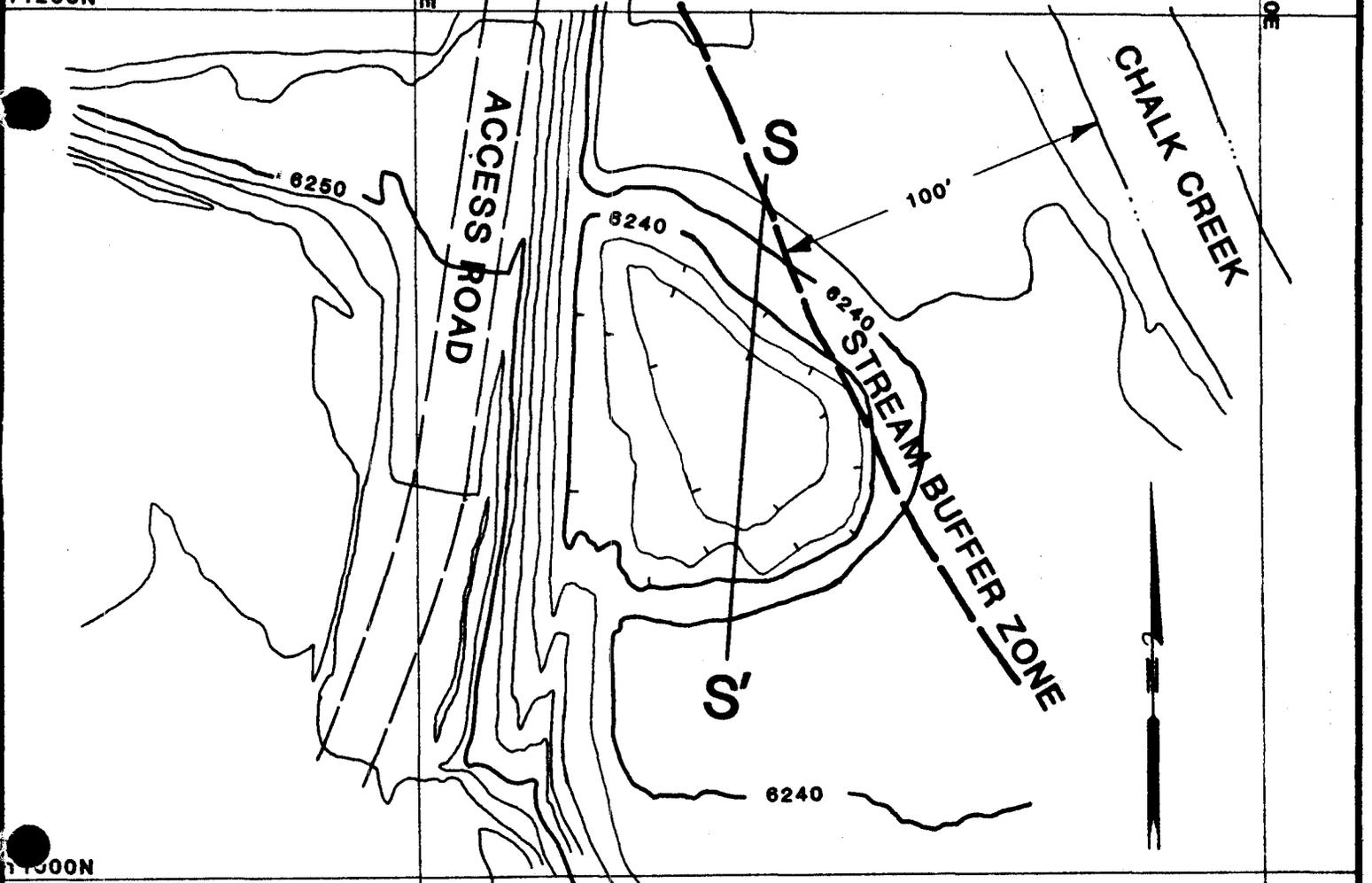
NOTE: COSTS AND ASSUMPTIONS VERIFIED PER L. KUNZLER, 10/27/86

- (6) TRACTOR HELPER - FEED FERTILIZER INTO SPACER, OPERATE RANGELAND DRILL - 0.81 DA REQ<sup>D</sup>, USE 2 DA.
- (7) HAYBLOWER HELPER - FEED HAY INTO BLOWER - 2.02 DA REQ<sup>D</sup>, USE 3 DA.
- (8) SEE COST DEVELOPMENT, PAGE 16 OF THIS APPENDIX.
- (9) POLYPROPYLENE NET - \$540/ROLL - ONE ROLL COVERS APPROXIMATELY ONE ACRE; \$100/AC STAPLE COST -  
TOTAL NET COST = \$640/AC.  
NOTE: COST AND ASSUMPTIONS VERIFIED PER L. KUNZLER, 10/27/86

11250N

9760E

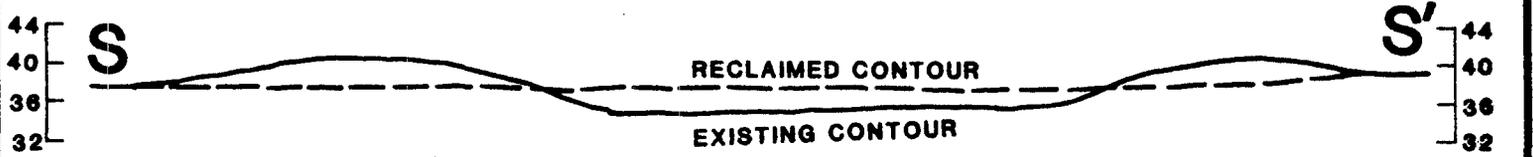
10000E



SEC 36 T3N R6

EXISTING CONTOUR

SCALE: 1" : 50'



PROPOSED RECLAMATION PLAN

SCALE: 1" : 20'

THIS DRAWING WAS PREPARED UNDER MY SUPERVISION:

*[Signature]* 7007 11/2/86

BARBARA A. FILAS DATE

REGISTERED PROFESSIONAL ENGINEER, UTAH NO. 7007

SUMMIT MINERALS, INC.	
EXISTING SEDIMENTATION POND RECLAMATION PLAN	
BAF 10/25/86	784.13-2
Scale: As Shown	
Ref. Dwgs.:	

SEDIMENTATION POND RECLAMATION

5208 PCY = 5918 LCY TO MOVE FROM SPOIL PILE  
AVG. HAUL DISTANCE  $\approx$  200 FT

CATERPILLAR DBK BULLDOZER

USING METHODOLOGY DESCRIBED IN "CATERPILLAR  
PERFORMANCE HANDBOOK", ED. 8, CATERPILLAR  
TRACTOR CO., PEORIA, IL, OCT. 1977.

FROM CHART: ESTIMATED DOBING PRODUCTION  
WITH UNIVERSAL BLADE = 670 LCY/HR

JOB CONDITION CORRECTION FACTORS:

- AVERAGE OPERATOR 0.75
- MATERIAL - STOKKALG 1.20
- EFFICIENCY - 50 MIN/HR 0.84
- GRADE - 10% DOWNHILL 1.14

$$\text{PRODUCTION CORRECTION} = (670 \text{ LCY/HR})(0.75)(1.20)(0.84)(1.14)$$

$$= 577 \text{ LCY/HR}$$

$$\frac{5918 \text{ LCY}}{(577 \text{ LCY/HR})(8 \text{ HR/DA})} = 1.28 \text{ DA}$$

USE: 2 DAYS (TO INCLUDE STRIKING OFF  
DIVERSION DITCHES)

REVISION 1 - 12/19/86

30 SHEETS 5 SQUARE  
100 SHEETS 5 SQUARE  
200 SHEETS 5 SQUARE

DBK: 2 DA @ \$895/DA PLUS \$28.60/HR OPERATING COST (1)  
 = \$2,247<sup>60</sup>

OPERATOR: 2 DA @ \$238<sup>80</sup>/DA (2)  
 = 477<sup>60</sup>

TOTAL COST = \$2,725

NOTE: REVEGETATION COST IS INCLUDED ON PAGE PP-20

- (1) 1986 RENTAL RATE BLUE BOOK
- (2) 1986 MEANS COST DATA

REVISION 1 - 12/19/86

12 381 30 SHEETS 3 SQUARE  
 42 382 100 SHEETS 3 SQUARE  
 NATIONAL

RIPRAP REQUIREMENT

STRUCTURE	WIDTH <sup>(1)</sup> (FT)	DEPTH <sup>(2)</sup> (FT)	LENGTH <sup>(3)</sup> (FT)	RIPRAP REQ <sup>(4)</sup> (CY)
DITCH No 1	1	1	480	30
DITCH No 2	2	1.5	1075	93
DITCH No 4	1	1	370	23
SPILLWAY	2	1	55	4
APICON	SEE DWG. P. HE-23 OF HYD. APICON			13

163 CY

$163 \text{ CY} @ 21^{00}/\text{CY}^{(5)} = 3423 \text{ RIPRAP COST}$

(1) DITCHES - BOTTOM WIDTH

(2) DITCHES - DITCH DEPTH; RIPRAP SURFACE =  $2\sqrt{2D+D}$  FOR 2:1 SIDE SLOPES ON ALL DITCHES

(3) SEE PAGE HE-17 OF HYDROLOGIC EVALUATION APPENDIX AND DRAWING NO. 784.23-4.

(4) ASSUMES  $D_{50} = 3"$  AND RIPRAP THICKNESS IS  $1.5D_{50} = 0.375 \text{ FT.}$

(5) 1986 MEANS COST DATA

42 SHEETS \$ SQUARE  
43 SHEETS \$ SQUARE  
44 SHEETS \$ SQUARE  
45 SHEETS \$ SQUARE

R E V E G E T A T I O N   A P P E N D I X

REVEGETATION PLAN FOR THE RECLAMATION  
OF THE SUMMIT NO. 1 COAL MINE

REVEGETATION PLAN FOR THE RECLAMATION  
OF THE SUMMIT NO. 1 COAL MINE

submitted to  
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Salt Lake City, Utah

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October 1986

TABLE OF CONTENTS

	<u>Page</u>
REVEGETATION SCHEDULE . . . . .	1
Contemporaneous Reclamation . . . . .	1
Final Reclamation . . . . .	1
SEEDBED PREPARATION . . . . .	1
Contemporaneous Reclamation . . . . .	1
Final Reclamation . . . . .	2
SPECIES SELECTION . . . . .	2
Contemporaneous Reclamation . . . . .	2
Final Reclamation . . . . .	3
SEEDING/PLANTING METHODS . . . . .	7
Contemporaneous Reclamation . . . . .	7
Final Reclamation . . . . .	7
MULCHING . . . . .	8
Contemporaneous Reclamation . . . . .	8
Final Reclamation . . . . .	8
IRRIGATION . . . . .	8
MONITORING . . . . .	8
Contemporaneous Reclamation . . . . .	8
Final Reclamation . . . . .	9
CONTINGENCY AND MAINTENANCE PLANS . . . . .	11
Contemporaneous Reclamation . . . . .	11
Final Reclamation . . . . .	11
REFERENCES . . . . .	14
APPENDIX A REVEGETATION MAP	

APPLICABLE REGULATORY CROSS INDEX

	<u>Page (s)</u>
UMC 784.13 (b) (5) (i) . . . . .	1
UMC 784.13 (b) (5) (ii) . . . . .	3
UMC 784.13 (b) (5) (iii) . . . . .	7
UMC 784.13 (b) (5) (iv) . . . . .	8
UMC 784.13 (b) (5) (v) . . . . .	8
UMC 784.13 (b) (5) (vi) . . . . .	9
UMC 817.100 . . . . .	1, 2, 7, 8, 11
UMC 817.111 (a), (b) (1), (2), (3) . . . . .	1, 11
UMC 817.112 (c), (d) . . . . .	3
UMC 817.113 (a) (1), (2) . . . . .	1
UMC 817.113 (b) . . . . .	see UMC 817.100
UMC 817.114 (a), (b) . . . . .	8
UMC 817.116 (a) . . . . .	9
UMC 817.116 (b) (1) (ii) . . . . .	9
UMC 817.116 (b) (3) . . . . .	11
UMC 817.116 (c) (1), (2) . . . . .	9, 11
UMC 817.117 (a), (b), (c) . . . . .	3, 7, 9

LIST OF TABLES

<u>Table</u>		<u>Page</u>
1	Temporary Seed Mix for Interim Reclamation . . . . .	2
2	Seed Species for Final Reclamation, Summit Minerals No. 1 Coal Mine . . . . .	4
3	Shrub Seedlings for Final Reclamation, Summit Minerals No. 1 Coal Mine . . . . .	6
4	Final Reclamation - Quantitative Monitoring Schedule . . . . .	9

The following revegetation plan for the reclamation of the Summit No. 1 Coal Mine has been formulated pursuant to the requirements of UMC 784.13 (b)(5), 817.100 and 817.111-.117, Utah Coal Mining and Reclamation Permanent Program and according to the Division of Oil, Gas and Mining's Draft Revegetation Guidelines for the Utah Coal Regulatory Program. This plan has been designed to achieve a permanent, diverse and effective vegetation cover on the 14 acre disturbed area of the mine site in order to realize the designated post mining land use as wildlife habitat and grazing land.

## I. REVEGETATION SCHEDULE

### Contemporaneous Reclamation

In order to control erosion and enhance soil viability, all areas requiring contemporaneous reclamation will be seeded during the appropriate planting time following disturbance, either late fall (October 1 until snow cover) or spring (after snow melt until June 1). Examples of such areas requiring contemporaneous reclamation are waste banks, road cuts and fills, embankments, outcrops, temporary diversion ditches and drainage ways (not riprapped). Species to be used in interim reclamation are discussed under Section III of this report.

### Final Reclamation (UMC 784.13 (b)(5)(i) and UMC 817.113)

Following cessation of mining, removal of facilities and final recontouring/regrading of the disturbed area, the seedbed will be prepared during the fall, within one week prior to seeding. Seeding will occur during mid October. It is anticipated that seedbed preparation, planting and mulching will take approximately two to three weeks and will be completed by the end of October.

Shrub seedlings will be planted the following spring, immediately after winter snows have melted. Spring planting will take approximately two to three weeks and should be completed by May 15.

## II. SEEDBED PREPARATION

### Contemporaneous Reclamation

The soil surface for these areas will be scarified by hand prior to seeding. No fertilizers or soil amendments are planned unless visual inspection (see Monitoring) indicates that interim vegetation is not becoming well established.

Final Reclamation (UMC 784.13 (b) (5))

Currently it is anticipated that in situ soil material will be suitable for reestablishment of a diverse and effective native vegetation cover. Please see section 783.21 of the Reclamation Plan. After final regrading of the disturbed area, the soil surface will be ripped on the contour to a depth of approximately 18 inches utilizing a D-9 Cat and ripper. Ripping will break up compacted soil allowing for improved water infiltration, drainage and root penetration. Following the addition of recommended soil nutrients and fertilizers (section 783.21), the soil surface will be disk-harrowed on the contour utilizing standard farm machinery. This will mix soil amendments with the soil as well as create a favorable, roughened surface for seed reception. As the majority of the area to be reclaimed will consist of final grades less than 15% (plate 784.23-2), and in view of the favorable precipitation received on the site (> 16 inches), additional physical manipulation of the soil surface (gouging, pitting, contour furrowing) is not planned. On steeper slopes (>15-20%) where use of machinery may be limited, soil will be loosened and the seedbed will be scarified by hand prior to seeding.

III. SPECIES SELECTION

Contemporaneous Reclamation

Species to be used for interim stabilization are presented in Table 1. 10.4 pounds per acre application (pure live seed) of these species will yield about 63 seeds per ft<sup>2</sup>.

---

Table 1. TEMPORARY SEED MIX FOR INTERIM RECLAMATION

---

<u>Species</u>	<u>Rate (PLS per acre)</u>
<u>Agropyron dasystachyum</u> Thickspike wheatgrass	7
<u>Melilotus officinalis</u> Yellow sweetclover	3
<u>Poa pratensis</u> Kentucky bluegrass	0.4

---

Final Reclamation (UMC 784.13 (b)(5)(ii), UMC 817.111,.112,.117)

Species to be used for final seeding of the disturbed area are presented in Table 2. All species selected are native and found in undisturbed areas surrounding the mine site (See section 783.19, Vegetation Report) with the exception of Kentucky bluegrass (Poa pratensis) and yellow sweetclover (Melilotus officinalis). Kentucky bluegrass is one of the major components of the herbaceous understory in the reference area and yellow sweetclover has been selected due to its rapid establishment, nitrogen-fixing capability and low persistence. The remainder of the native species have been selected for use due to their compatibility with the surrounding area and their ability to achieve the postmining land use of wildlife habitat and grazingland.

Five woody plant species (Table 3) have been selected for seedling transplant to enhance shrub establishment. As with the seeded species, these native seedlings have been selected on the basis of their compatibility with surrounding undisturbed communities, as well as their ability to achieve the desired postmining land use.

Seeding rates in Pure Live Seed (PLS) are also presented for each species in Table 2, as well as the percentage of the total mix that is comprised by each species and life form group (based on seeds per ft<sup>2</sup>). Rates indicated (19.55 lbs PLS per acre; 74 seeds per ft<sup>2</sup>) are for drill seeding, which will be done on the majority of the reclaimed area. Where seed is to be broadcast, the rates for grasses and forbs will be doubled (24.7 lbs per acre; 115 seeds per ft<sup>2</sup>) and the shrub seeding rate will be increased by a factor of 1.5 (14.4 lbs PLS per acres; 26 seeds per ft<sup>2</sup>).

The transplant stocking rate (containerized stock) will be 400 shrubs per acre. Due to the fairly evenly dispersed occurrence of shrubs in the surrounding undisturbed area (see section 783.19) all shrub seedlings will be planted in an evenly distributed manner on 10.5 ft. centers with the exception of gambel oak (Quercus gambelii), which will be clumped in groups of 25 seedlings (4 groups per acre) on slopes >15%. On these steeper slopes, the three additional shrub species will be evenly distributed on 12 ft. centers. Exact placement of the oak clumps will be determined in consultation with the Division of Oil, Gas and Mining prior to planting. Mountain big sagebrush (Artemisia Tridentata vaseyana) will be evenly planted on slopes <15% in place of gambel oak, along with the three other shrub species.

Although the shrub density in the reference areas is +11,000 shrubs per acre (>1 ft. in height), this is not a realistic or economical standard for reestablishment. Further, research has

Table 2 SEED SPECIES FOR FINAL RECLAMATION, SUMMIT MINERALS  
NO. 1 COAL MINE

Species	Pounds/acre † Drilling Rate (PLS)	Seeds/ft <sup>2</sup>	percent*
GRASSES			
<u>Agropyron spicatum</u> Bluebunch wheatgrass	3	7	9
<u>A. trachycaulum</u> var. primar Slender wheatgrass	2	7	9
<u>Bromus marginatus</u> Mountain brome	2	4	5
<u>Poa pratensis</u> Kentucky bluegrass	0.25	12	16
<u>Stipa comata</u> Needle & thread grass	2	5	7
	9.25	35	47
FORBS			
<u>Achillea millefolium</u> Yarrow	0.1	6	8
<u>Linum lewisii</u> Lewis flax	1	6	8
<u>Lupinus sericeus</u> Silky lupine	1	0.3	0.4
<u>Melilotus officinalis</u> Yellow sweetclover	0.5	3	4
<u>Penstemon palmeri</u> Palmer penstemon	0.5	7	9
	3.1	22.3	30

Table 2

CONTINUED

Species	Pounds/acre † Drilling Rate (PLS)	Seeds/ft <sup>2</sup>	percent*
SHRUBS			
<u>Amelanchier alnifolia</u> Saskatoon serviceberry	2	2	3
<u>Artemisia tridentata vaseyana</u> Mountain big sagebrush	0.2	11	15
<u>Purshia tridentata</u> Bitterbrush	3	1	1
<u>Symphoricarpos oreophilus</u> Snowberry	2	3	4
	7.2	17	23
Total	19.55	74.3	-

† Broadcast rate will be 2 X for grasses and forbs and 1.5 X for shrubs.

\* Percentage calculated on the basis of total seeds per ft<sup>2</sup>.

Table 3                      SHRUB SEEDLINGS FOR FINAL RECLAMATION, SUMMIT MINERALS  
NO. 1 COAL MINE

Species	Rate per acre	Spacing
<u>Amelanchier alnifolia</u> Saskatoon serviceberry	100	10.5'
<u>Artemisia tridentata vaseyana*</u> Mountain big sagebrush	100	10.5'
<u>Cerococarpus montanus</u> True mountain mahogany	100	10.5'
<u>Purshia tridentata</u> Bitterbrush	100	10.5'
<u>Quercus gambelii †</u> Gambel oak	100	clumped

\* This species will be planted on gentle slopes, <15%

† This species will be planted in clumps of 25 at upper reaches of reclaimed area on slopes >15%. Spacing for the three shrubs to be evenly distributed will then be on 12' centers.

indicated that reduction of gambel oak density increases wildlife use in dense gambel oak communities (Kunzler 1980 and as reported by Harper et.al. 1985). Therefore, a shrub density standard of 2000 viable shrubs per acre over 1 ft. in height is proposed. On fairly gentle slopes of northerly exposure in a favorable precipitation zone, fair success should be achieved through shrub seeding (+740,000 shrub seeds per acre will be planted). Assuming 0.2 to 0.3% survivability from seeding, and supplementation by planting 400 shrub seedlings per acre, the 2000 shrub per acre standard should be met within the 10 year bond release period. Natural shrub increase and invasion will also enhance post mining shrub density. This standard is a realistic goal for achieving the post mining land use of wildlife habitat and grazingland.

#### IV. SEEDING/PLANTING METHODS

##### Contemporaneous Reclamation

For interim revegetation, seed will be broadcast by hand or by use of a cyclone broadcast seeder. Seeded areas will then be hand raked to cover the seed with soil.

##### Final Reclamation (UMC 784.13 (b)(5)(iii), UMC 817.111)

On slopes less than 15% grade, seeding will be accomplished by use of a rangeland drill, seeding on the contour. Approximately 9.03 acres ( 71.4 % of the reclaimed area - see dwg. no. 784.23-2 ) will be seeded using this method. If, however, attempts to drill seed are found to be impractical or ineffective during actual revegetation, these areas will then be broadcast seeded using standard farm machinery at the previously indicated broadcast rate. On slopes greater than 15% where machinery access is limited, seed will be broadcast using a cyclone spreader. These areas comprise 28.6 % of the total area to be reclaimed ( 3.61 acres).

Where broadcast seeding is used, seed will be covered with soil using standard machinery (on slopes <15%) or will be hand raked (on slopes >15%).

Shrub seedlings will be comprised of containerized stock and will be hand planted. As previously discussed, all species will be planted on approximate 10.5' centers with the exception of gambel oak, which will be clumped in groups of 25 on slopes >15% (4 groups per acre). Mountain big sagebrush will replace the gambel oak on slopes <15% and will be evenly distributed on 10.5' centers as will the other shrub species.

## V. MULCHING

### Contemporaneous Reclamation

All temporary revegetation areas will be mulched using an aged native hay mulch at a rate of 2000 pounds per acre. On steep cuts (>20%), polypropylene netting will be laid over the hay mulch and stapled in place to stabilize the slope and anchor the mulch. On slopes <20%, the mulch will be hand crimped.

### Final Reclamation (UMC 784.13 (b)(5)(iv), UMC 817.114)

Immediately following seeding, all areas will be mulched with aged native hay at a rate of 2000 pounds per acre on slopes <15% and 3000 pounds per acre on slopes >15%. Mulch will be mechanically crimped into the soil using standard machinery on slopes <15%. Polypropylene netting, stapled in place, will be used to anchor the mulch on the steeper slopes (>15%).

As previously discussed, physical manipulation of the soil surface is not planned during final reclamation.

## VI. IRRIGATION (UMC 784.13 (b)(5) (v))

The area surrounding the Summit No. 1 Coal Mine receives about 16 inches precipitation per year on the average. This is sufficient to reestablish vegetation without supplemental watering. Therefore, no irrigation is planned during either interim or final reclamation.

## VII. MONITORING

### Contemporaneous Reclamation

All areas that have undergone temporary revegetation will be monitored on a reconnaissance or qualitative basis. Though casual observations will undoubtedly occur periodically during the growing season when problems may be noted, these areas will be formally monitored once per year during July when the following observations will be noted:

- species composition and survivability
- utilization of vegetation (by species) by wild-life or livestock
- erosion and problem areas (e.g. insect damage, weeds, poor plant development and potential need for fertilization and/or supplemental seeding)
- special conditions

Results obtained from these qualitative observations will be submitted in an annual monitoring report to DOGM during ongoing mining activities and will be used to evaluate contemporaneous reclamation success and make any necessary amendments.

Final Reclamation (UMC 784.13 (b)(5)(vi), UMC 817.116, UMC 817.117)

All permanently reclaimed/revegetated areas will be qualitatively assessed on an annual basis during July of each year after the first fall planting. Observations noted as per contemporaneous reclamation monitoring will be noted during the yearly qualitative monitoring of final revegetated areas. The reference area will also be qualitatively assessed each year during the 10 year bond release period.

In addition to the yearly qualitative assessment, final revegetation will also be accomplished quantitatively on a periodic basis as indicated in Table 4. Quantitative monitoring will be conducted during mid-July of each year as indicated.

---

TABLE 4            FINAL RECLAMATION - QUANTITATIVE MONITORING SCHEDULE

---

<u>Reclaimed Area</u>	Year									
	1	2	3	4	5	6	7	8	9	10
Cover		X	X		X				X	X
Frequency		X	X		X				X	X
Shrub Density		X	X		X				X	X
Transplant Survival	X*	X	X							
Productivity									X	X
<u>Reference Area</u>										
Cover					X				X	X
Frequency					X				X	X
Shrub Density					X				X	X
Productivity									X	X

---

\* This assessment will be made the first fall after the spring planting (late September) and in July thereafter, concurrent with other quantitative assessments.

---

Monitoring methodology will be as follows:

- During Year 2, sample points will be randomly located along transects designed for even coverage of the reclaimed area. These will be permanently marked using rebar stakes and survey flagging and their locations mapped. After establishment, the same sample points will be utilized thereafter during the bond release period. Sample points within the reference area will be randomly located during Year 5 and marked as per sample points in the reclaimed area.
- Cover will be determined utilizing 1m<sup>2</sup> square quadrats. Cover by species, major life form group and total vegetation cover will be recorded, as will cover by major ground surface category (rock, litter, bareground).
- Frequency will be determined from cover data species encountered within each quadrat.
- Shrub density will be determined by use of the point centered quarter method (utilizing the center of each 1m<sup>2</sup> quadrat).
- Transplant survivability will be quantitated by permanently tagging every 10th shrub seedling planted. These will be tagged when planted and a wooden stake will be driven next to each plant. Survival of each marked shrub will then be recorded during Years 1, 2 and 3 of the bond release period.
- Productivity will be quantitated during Years 9 and 10 by clipping each 1m<sup>2</sup> quadrat after cover data have been recorded. This will be accomplished as outlined in Appendix 1 of the DOGM Vegetation Information Guidelines for Permanent Program Submissions for Coal Mines.

Data from each year's qualitative and quantitative assessments will be formulated into an annual report for submittal to the regulatory authority. Following Year 3 data collection and interpretation, it will be determined in consultation with DOGM if augmented seeding or additional shrub transplants are necessary. (See Contingency and Maintenance Plans.)

Though statistically adequate sampling may be achieved prior to Year 9 (meeting a 90% statistical confidence level), this will not be a goal until Years 9 and 10. At that time, a statisti-

cally adequate number of samples will be taken regarding cover, density and productivity in both the reclaimed and reference areas. It is the goal of this sampling, and subsequent bond release, to demonstrate that the reclaimed area is at least 90% of the reference area standard with regards to cover and productivity, with 90% confidence, and that the shrub density standard of at least 2000 viable shrubs per acre has been achieved.

## VIII. CONTINGENCY AND MAINTENANCE PLANS

### Contemporaneous Reclamation

Through yearly monitoring of all areas revegetated under interim reclamation, problems will be identified and corrected. As indicated in Section VII, Monitoring, several observations will be noted annually. Correction of problems related to erosion (rills and gullies), weed control, disease/pest control and lack of vegetation establishment will occur on contemporaneously reclaimed areas and are further discussed in the following section.

### Final Reclamation

Annual qualitative and periodic quantitative monitoring of the revegetated areas and notation of observations as indicated under the Monitoring Section will identify actual and potential problems. Both qualitative and quantitative monitoring will be conducted by a qualified biologist or range conservationist. Should problems such as those outlined below be identified, these will be repaired and/or controlled as appropriate, in consultation with the Division of Oil, Gas and Mining.

#### 1. Rills and Gullies

Erosion problems will be identified through qualitative monitoring and will be repaired by hand due to probable limited access by machinery. Repair will occur immediately following identification of the problem. Should severe erosion due to a catastrophic precipitation event occur, DOGM will be immediately contacted for consultation and the need for augmented seeding will be assessed.

#### 2. Disease/Pest Control

The need for such measures will be identified through yearly monitoring. Following consultation with DOGM, approved chemical control will be implemented and the need for augmented seeding will be assessed after the following year's monitoring period. No persistent pesticides will be employed without prior approval from the Division.

3. Weed Control

Currently, disturbed areas in the vicinity of the mine have been invaded by thistle (Cirsium spp.). It is anticipated that this may be a problem during revegetation. Should this be indicated through monitoring during Years 1 and 2, and following consultation with the Division, spot spraying with 2, 4-D will be conducted during the late summer of Years 1 and 2. Annual spot spraying will continue thereafter should the problem persist. The need for augmented seeding in treated areas will also be assessed after the following year's monitoring period.

4. Overgrazing and/or Animal Depredation

Currently, the only domestic livestock grazing in the vicinity of the mine is by trespass sheep. Should monitoring during Year 1 indicate that grazing is retarding vegetation establishment, the reclaimed area will be fenced. Fencing will remain in place through bond release or prior to that if vegetation has become sufficiently established to withstand grazing pressure.

Should monitoring indicate that wildlife depredation is adversely affecting establishment of vegetation, particularly shrubs, Summit Minerals, Inc. will immediately consult with the Divisions of Oil, Gas and Mining and Wildlife Resources to determine which methods of prevention are suitable and practical for the problem. Implementation of recommended methods (e.g. fencing, protection of individual shrubs with netting, baiting for small mammals, etc.) will follow.

5. Lack of Vegetation Establishment

Periodic monitoring of contemporaneously reclaimed areas will serve to detect those sites in need of additional seeding and/or fertilizing. This will be done during the first appropriate planting season following detection.

Following final revegetation, yearly monitoring may indicate the presence of areas where vegetation growth is appreciably retarded (not due to problems as indicated above). Should this be the case, augmented seeding, and/or shrub planting will be conducted during the first appropriate season after Year 3 monitoring data have been assessed, in consultation with DOGM. It is understood that this may necessitate additional soil testing and application of amendments.

As previously indicated, the reference area will be qualitatively assessed annually. Should this monitoring detect degradation of the reference area through animal depredation or overgrazing, the area will be fenced. In addition, should the reference area show deterioration due to other causes (e.g. disease, natural erosion, etc.), DOGM will be contacted for the appropriate course of action.

REFERENCES:

- Harper, K. T., F. J. Wagstaff and L. M. Knuzler. 1985. Biology and mangement of the gambel oak vegetative type: a literature review. U.S.D.A. Forest Service, General Technical Report INT-179. 31pp.
- Kunzler, L. M. 1980. The biology and management of gambel oak in Utah. Masters Thesis, Brigham Young University, Provo, Utah. 99pp.

UMC 784.14 RECLAMATION PLAN: PROTECTION OF THE  
HYDROLOGIC BALANCE

UMC 784.14(a)(1) - Quality of Surface and Ground Water

Underground mining activities or the use of hazardous or toxic materials are not a part of this reclamation plan and therefore ground water cannot be adversely affected.

Surface water quality will be protected by the installation and proper usage of the sedimentation pond shown on plate number 784.23-2. Design information for this pond is included in the Hydrologic Evaluation Appendix of this section. Runoff from the disturbed area is the only potential impact to surface water quality from reclamation activities.

UMC 784.14(a)(2) - Rights of Present Users

Reclamation activities are not expected to impact the rights of present water users. Refer to section 783.17 of this document for a discussion on alternative water supplies.

UMC 784.14(a)(3) - Quantity of Surface and Ground Water

Underground coal mining activities are not a part of this reclamation plan, so there is no potential for a reduction in the quantity of surface or ground water.

UMC 784.14(a)(4) - Location of Mine Openings

Existing mine openings were excavated by a previous owner/operator and it is unknown to the Applicant what design parameters were used. Relative to the prevailing dip of the coal seam in the abandoned mine workings (reference section 783.14 of this document), the portals are generally up-dip from the workings. There is no visible drainage from the sealed portals, so it is concluded that there is no hydrostatic pressure on the seals (considering the method of portal closure - see section 784.13 of this document).

UMC 784.14(b)(1) - Drainage Control

Underground mining activities or the use of hazardous, toxic, or acid forming materials are not a part of this plan, so there will be no affect on the ground water. The Operator

proposes to neither control nor monitor groundwater activities in or near the reclamation site. Ground water information gained from the SOAP program at the adjacent Boyer mine is pertinent to the reclamation site due to the proximity of the two properties. Ground water quality data obtained from the Earth Fax draft report is included in this document as Table 783.15-2a through Table 783.15-4b.

Surface drainage and runoff control is shown on drawing number 783.16-1 and plate number 784.23-2. These drawings show the coursing of runoff waters into, around, through, and out of the reclamation site. Design criteria for the development of this drawing is presented in the Hydrologic Evaluation Appendix of this section.

#### UMC 784.14(b)(2) - Treatment of Pollutants

All runoff which traverses a disturbed surface will be treated by some means of sedimentation control. Drawing number 783.16 and plate number 784.23-2 show that the bulk of the runoff from the disturbed area is coursed into the sedimentation pond where it will be detained for at least 24 hours before discharging into Chalk Creek. An NPDES discharge application has been filed with the appropriate agencies for this outfall (Figure 784.13-2). The Operator will sample any discharges from this outfall and analyze the water as required in the NPDES permit - or for total iron, total manganese, total settleable solids, total dissolved solids, total suspended solids, and pH, - whichever is more stringent.

The Operator requests a small area exemption for those portions of the access road which are not located in the drainage area of the sedimentation pond. Anticipated runoff volumes and proposed treatment methods are detailed in Hydrologic Evaluation Appendix in this section. The Operator will sample any outfall from the sedimentation filter when it occurs. The water will be analyzed for total iron, total manganese, total suspended solids, and pH.

#### UMC 784.14(b)(3) - Collection of Water Data

Ground water monitoring is not a part of this plan.

The Operator will monitor surface water quality at the locations shown on drawing number 783.16-1. Samples will be obtained quarterly until adequate baseline data is obtained, and then twice a year, once during high flow and once during and once during low flow, for the duration of the bond period.

Revision 1: 12/19/86

Revision 2: 04/15/87

toxic, or acid forming materials are not a part of this plan. As such, the only probable hydrologic consequence resulting from this reclamation plan is the contribution of untreated sediment to surface waters from the disturbed area. A worst case scenario is presented in section 783.17 of this document. This scenario is assumed from a significant precipitation event (high flow) and would result in additional sediment loading (TSS) in Chalk Creek. Because runoff in this scenario would only course over reclaimed surface disturbances, it not expected to affect iron, manganese, or pH levels.

#### UMC 784.14(d) - Hydraulic Heads on Mine Openings

Section 784.13 of this document provides a description of the portal sealing methods already used, and to be used, under this plan. Section 783.14 describes the prevailing dip of stata in the reclamation area as westerly, which positions old underground mine workings generally down-dip from the portals.

The underground mine workings of Utah Coal and Energy, Inc. were excavated in the late 1970's. There was no known interception of water in those underground workings and, to date, there has been no known discharge from the sealed mine openings. Similarly, there has been no known interception of water in the underground workings at the adjacent Boyer Mine. It is therefore concluded that there will be no hydraulic head on the abandoned mine openings.

toxic, or acid forming materials are not a part of this plan. As such, the only probable hydrologic consequence resulting from this reclamation plan is the contribution of untreated sediment to surface waters from the disturbed area. A worst case scenario is presented in section 783.17 of this document. This scenario is assumed from a significant precipitation event (high flow) and would result in additional sediment loading (TSS) in Chalk Creek. Because runoff in this scenario would only course over reclaimed surface disturbances, it not expected to affect iron, manganese, or pH levels.

#### UMC 784.14(d) - Hydraulic Heads on Mine Openings

Section 784.13 of this document provides a description of the portal sealing methods already used, and to be used, under this plan. Section 783.14 describes the prevailing dip of stata in the reclamation area as westerly, which positions old underground mine workings generally down-dip from the portals.

The underground mine workings of Utah Coal and Energy, Inc. were excavated in the late 1970's. There was no known interception of water in those underground workings and, to date, there has been no known discharge from the sealed mine openings. Similarly, there has been no known interception of water in the underground workings at the adjacent Boyer Mine. It is therefore concluded that there will be no hydraulic head on the abandoned mine openings.

Surface water quality and quantity information gained through the SOAF program for the adjacent Boyer Mine is available and pertinent to the reclamation site due to the close proximity of the two properties. Data obtained from Earth Fax draft report is included on Tables 783.16-6a through 783.16-7b. Additional quality information is included on Tables 783.16-8 and 9.

Surface water samples will be analyzed for the parameters shown on Table 784.14-1 to establish a baseline, then those shown on Table 784.14-2 after baseline is established. During construction periods, weekly checks of the settleable and suspended solids will be conducted on Chalk Creek both upstream and downstream to demonstrate that the surface activities do not adversely affect the creek quality. Results of these monitoring programs, as well as the NPDES monitoring, will be provided to the Division within 90 days of its receipt by the Operator.

Outfall from the sedimentation pond which is regulated by the NPDES permit will be monitored in accordance with the permit. In the event that discharged water exceeds permit effluent limitations, the Operator will report the noncompliance to the appropriate regulatory authorities in a timely manner.

During the seventh year after reclamation activities, the Applicant will begin sampling surface runoff inflows entering the sedimentation pond to establish compliance with UMC 817.46(u). A single-stage sediment sampler (Guy and Norman, 1970) will be located at each of three diversion ditch outlets into the pond (see plate number 784.23-2). This type sampler will automatically collect a sample during a runoff event by siphoning water from the ditch into the collection bottle. The Applicant will make every effort to monitor the bottles following precipitation events where runoff may occur so that collected samples will not stagnate in the sample bottles.

A composite sample will be obtained from the ditches and analyzed for the parameters indicated on Table 784.14-2 (excluding the field measurements). Should the composite sample technique indicate repeated non-compliance, individual ditch samples will be analyzed to isolate the quality problem areas. This water monitoring program will continue through the remainder of the bond period.

#### UMC 784.14(c) - Consequences of Mining Activities

Underground mining activities or the use of hazardous,

Revision 1: 12/19/86

Revision 2: 04/15/87

## T A B L E 7 8 4 . 1 4 - 1

SURFACE WATER BASELINE QUALITY PARAMETER LIST  
Monitoring Frequency: Four Times Per Year

**RECEIVED**  
DEC 26 1986

Field Measurements:

**DIVISION OF  
OIL, GAS & MINING**

Flow (cfs)  
pH  
Specific Conductivity (umhos/cm)  
Temperature (degrees C or F)  
Dissolved Oxygen (ppm)

Laboratory Measurements: (mg/l) (Major, minor ions and trace elements will be analyzed in total and dissolved forms)

Total Settleable Solids  
Total Suspended Solids  
Total Dissolved Solids  
Total Hardness (as CaCO<sub>3</sub>)  
Acidity (CaCO<sub>3</sub>)  
Aluminum (Al)  
Arsenic (As)  
Barium (Ba)  
Boron (B)  
Carbonate (CO<sub>3</sub>)  
Bicarbonate (HCO<sub>3</sub>)  
Cadmium (Cd)  
Calcium (Ca)  
Chloride (Cl)  
Chromium (Cr)  
Copper (Cu)  
Fluorine (F)  
Iron (Fe)  
Lead (Pb)  
Magnesium (Mg)  
Total Manganese (Mn)  
Mercury (Hg)  
Molybdenum (Mo)  
Nickel (Ni)  
Nitrogen (NO<sub>3</sub>)  
Nitrate (NO<sub>2</sub>)  
Nitrite (NO<sub>3</sub>)  
Potassium (K)  
Phosphate (PO<sub>4</sub>)  
Selenium (Se)  
Sodium (Na)  
Sulfate (SO<sub>4</sub>)  
Sulfide (S)  
Zinc (Zn)  
Oil and Grease  
Cation - Anion Balance

## T A B L E 7 8 4 . 1 4 - 2

SURFACE WATER POSTMINING QUALITY PARAMETER LIST  
Monitoring Frequency: Two Times Per YearField Measurements:

Flow (cfs)  
pH  
Specific Conductivity (umhos/cm)  
Temperature (degrees C or F)  
Dissolved Oxygen (ppm)

Laboratory Measurements: (mg/l) (Major, minor ions and trace elements will be analyzed in total and dissolved forms)

Total Settleable Solids  
Total Suspended Solids  
Total Dissolved Solids  
Total Hardness (as CaCO<sub>3</sub>)  
Acidity (CaCO<sub>3</sub>)  
Carbonate (CO<sub>3</sub>)  
Bicarbonate (HCO<sub>3</sub>)  
Calcium (Ca)  
Chloride (Cl)  
Iron (Fe)  
Magnesium (Mg)  
Total Manganese (Mn)  
Potassium (K)  
Sodium (Na)  
Sulfate (SO<sub>4</sub>)  
Oil and Grease  
Cation - Anion Balance

HYDROLOGY APPENDIX

HYDROLOGIC EVALUATION

TABLE OF CONTENTS

GENERAL	HE-1
CURVE NUMBER DEVELOPMENT	HE-2
DESIGN STORM INTENSITIES	HE-2
DRAINAGE AREA CHARACTERISTICS	HE-3
PEAK FLOW EVALUATION	HE-4
RUNOFF EVALUATION	HE-5
SOIL LOSS EVALUATION	HE-6
SEDIMENTATION POND ADEQUACY	HE-7
OVERFLOW AND DEWATERING STRUCTURES	HE-8
DIVERSION DITCH DESIGN	HE-12
RIPRAP REQUIREMENTS	HE-17
CULVERT DESIGN	HE-19
SMALL AREA EXEMPTIONS	HE-21
DISCHARGE STRUCTURES	HE-22

GENERAL

THE DISTURBED AREA AT THE SUMMIT No. 1 COAL MINE IS APPROXIMATELY FOURTEEN ACRES. THE AREA WAS DISTURBED BY PREVIOUS COAL OPERATIONS MANY YEARS AGO. DISTURBED SURFACES APPEAR TO BE STABILIZED, WITH LITTLE EVIDENCE OF EROSION FROM THE PAD AREA.

EXCAVATION OF SAND AND GRAVEL IN THE AREA SOUTHEAST OF THE PAD AREA IS THE ONLY KNOWN ADDITIONAL SURFACE DISTURBANCE SINCE 1977. THERE IS EVIDENCE OF SOME EROSION FROM THE CUT SLOPES OF THE SAND AND GRAVEL OPERATION. TEMPORARY SEDIMENTATION PONDS ALREADY IN PLACE PROTECT RECEIVING WATERS FROM SEDIMENT CONTRIBUTIONS BY SURFACE RUNOFF FROM THE DISTURBED AREA.

THIS PLAN DOES NOT INCLUDE PROVISIONS FOR ADDITIONAL SURFACE DISTURBANCES. IT DOES NOT INCLUDE PROVISIONS FOR SUBSURFACE EXCAVATION OR MINING ACTIVITIES. IT DOES NOT INCLUDE PROVISIONS FOR THE USE OF HAZARDOUS, TOXIC, OR ACID FORMING MATERIALS. IMPACTS ON THE HYDROLOGIC REGIME FROM THIS DISTURBANCE HAVE ALREADY BEEN REALIZED, AND THE PROPOSALS CONTAINED IN THIS DOCUMENT CANNOT AFFECT GROUND-WATER IN ANY WAY, OR SURFACE WATER QUANTITIES. THIS SECTION ADDRESSES HYDROLOGIC EVALUATIONS PREPARED PURSUANT TO THE PROTECTION OF SURFACE WATER QUALITY.

THE SEDIMENTATION POND AND DIVERSION DITCHES ARE DESIGNED FOR A 10 YEAR - 24 HOUR PRECIPITATION EVENT. METHODOLOGIES FOR EACH EVALUATION ARE INCLUDED DIRECTLY OR AS FOOTNOTES THROUGHOUT THIS APPENDIX.

CURVE NUMBER DEVELOPMENT

UNDISTURBED AREAS

- % COVER = 42.5% (DISREGARDING ROCK, LITTER...) <sup>(1)</sup>
- SOIL GROUP = TOEHEAD, HORROCKS ⇒ USE C <sup>(2)</sup>
- VEGETATION TYPE = MOUNTAIN SAGE = OAK <sup>(1)</sup>

USE CN = 68 <sup>(3)</sup>

DISTURBED AREAS

USE CN = 90 <sup>(3)</sup>

DESIGN STORM INTENSITIES

RETURN	DURATION	INCHES
10 YEAR	24 HOUR	1.90
25 YEAR	24 HOUR	2.38
100 YEAR	24 HOUR	3.02

ESTIMATED RETURN PERIODS FOR SHORT DURATION PRECIPITATION IN UTAH - STATION: ECHO DAM, p. 22

(1) VEGETATION SURVEY AT THE SUMMIT No. 1 COAL MINE, MARY M. BOUCEK, SEPT. 1986. SEE APPENDIX OF THIS DOCUMENT.

(2) PLATE 783-21 OF THIS DOCUMENT; SCS-NEH, NOTICE 4-102, TABLE 7-1, 1972

(3) RANGELAND HYDROLOGY, F.A. BRANDSON, G.F. GIFFORD, K.G. RENARD, R.F. HADLEY, SOCIETY OF RANGE MANAGEMENT - RANGE SCIENCE SERIES No. 1, 1981.

DRAINAGE AREA CHARACTERISTICS

WATER-SHED <sup>(4)</sup>	AREA (AC) <sup>(4)</sup>	SUM OF <sup>(4)</sup> CONTOURS (FT)	CONTOUR <sup>(4)</sup> INTERVAL (FT)	HYDRAULIC LENGTH (FT) <sup>(4)</sup>	PERCENT SLOPE	COMMENTS
A	5.42			725		UNDISTURBED
B	10.73	4230	50	1726	45.3 <sup>(5)</sup>	UNDISTURBED
C	9.77			1305	5.6 <sup>(6)</sup>	PAD ONLY
C'	3.10			235		DISTURBED HIGHWALL
A+C'	8.52	4534	50	960	61.1 <sup>(5)</sup>	STEEP SLOPE AREA
A+C+C'	18.29			1764	32 <sup>(7)</sup>	TOTAL DRAINAGE

42,381 50 SHEETS 5 SQUARE  
42,382 100 SHEETS 3 SQUARE  
42,383 200 SHEETS 5 SQUARE



SMALL AREA EXEMPTIONS (SEE PAGE 21 OF THIS APPENDIX)

ROAD - SOUTH OF BRIDGE

AREA = 0.61 AC <sup>(4)</sup>

SLOPE = 3.3% (AVG. SLOPE OF ROADWAY)

ROAD - NORTH OF BRIDGE

AREA = 0.93 AC <sup>(4)</sup>

SLOPE = 3.6% (AVG. SLOPE OF ROADWAY)

(4) PLATE OF THIS DOCUMENT.

(5) % SLOPE =  $\frac{(\sum \text{CONTOURS})(\text{CONTOUR INTERVAL})}{\text{AREA}} \times 100$

(6) SLOPE CALCULATION IN REF. (5) GIVES ERRONEOUS RESULTS ON FLAT SLOPES - USE MAXIMUM SLOPE OF AN HYDRAULIC LENGTH

(7) WEIGHTED SLOPE =  $\left(\frac{8.52A}{18.29A}\right) 61.1 + \left(\frac{9.77A}{18.29A}\right) 5.6 = 31.44 \Rightarrow \text{USE } 32\%$

PEAK FLOW EVALUATION

PEAK FLOWS FOR WATERSHEDS ARE EVALUATED BELOW. FLOWS ENTERING THE SEDIMENTATION POND (W.S. - A, C, AND C') ARE EVALUATED BY TWO METHODS:

- A+C+C' ASSUMES THAT THE ENTIRE WATERSHED WILL PEAK AS A SINGLE HYDROLOGIC UNIT.
- A+C' AND C ASSUMES THAT THE STEEP WATERSHED AND THE FLATTER WATERSHED WILL PEAK AS TWO SEPARATE, ADDITIVE HYDROLOGIC UNITS.

RESULTS OF BOTH METHODS ARE VERY CLOSE, LENDING CREDIBILITY TO THE EVALUATION. THE ADDITIVE METHOD (A+C' AND C) APPEARS TO BE THE MORE CONSERVATIVE, AND WILL BE USED IN SUBSEQUENT DESIGN PARAMETERS.

WATER-SHED (4)	AREA (FT) (4)	HYD. (4) LENGTH (FT)	PERCENT SLOPE	CURVE NO.	TIME OF CONC (HR)	Q <sub>10-24</sub> PEAK <sup>(8)</sup> (CFS @ HRS)	Q <sub>25-24</sub> PEAK <sup>(8)</sup> (CFS @ HRS)
B	10.73	1726	45.3 <sup>(5)</sup>	68	0.1714 <sup>(6)</sup>	1.10 @ 12.59	3.13 @ 12.57
A+C+C'	18.29	1764	32 <sup>(7)</sup>	84 <sup>(9)</sup>	0.1294 <sup>(8)</sup>	12.75 @ 12.52	19.11 @ 12.52
A+C'	8.52	960	61.1 <sup>(5)</sup>	76 <sup>(9)</sup>	0.0739 <sup>(8)</sup>	3.38 @ 12.51	5.85 @ 12.50
C	9.77		5.6 <sup>(6)</sup>	90	0.178 <sup>(10)</sup>	7.59 @ 12.53	13.31 @ 12.53

Q<sub>10-24</sub> PEAK = 12.97

Q<sub>25-24</sub> PEAK = 19.16 cfs

(8) METHODOLOGY DESCRIBED IN SCS-NEH, NOTICE 4-102, CHAPTERS 15 AND 16, AUGUST 1972.

(9) WEIGHTED CURVE NUMBER:

$\left(\frac{5.42A}{18.29A}\right) 68 + \left(\frac{12.87A}{18.29A}\right) 90 = 83.48$ ;  $\left(\frac{5.42A}{8.52A}\right) 68 + \left(\frac{3.10A}{8.52A}\right) 90 = 76.00$   
 USE 84; USE 76

(10) FLOOD STUDIES IN DESIGN OF SMALL DAMS, D.L. MILLER, TRA. CLARK, S. SCHAMACH, USDI, BUREAU OF RECLAMATION, 1974, P. 67, KIRPITCH'S FORMULA  $T_c = \left(\frac{11.9 L^3}{H}\right)^{0.385}$ , T<sub>c</sub> IN HRS, L IN MI, H IN FT.

42 381 50 SHEETS 3 SQUARE  
 42 382 100 SHEETS 3 SQUARE  
 42 383 200 SHEETS 3 SQUARE  
 NATIONAL

RUNOFF EVALUATION

DIRECT RUNOFF INTO THE SEDIMENTATION POND IS ESTIMATED USING A WEIGHTED CURVE NUMBER, WEIGHTED AREA, AND A COMBINATION OF BOTH. THE THREE METHODS ARE:

- A+C+C' ASSUMES ENTIRE WATERSHED ACTS AS SINGLE HYDROLOGIC UNIT
- A+C' AND C ASSUMES A STEEP AND A FLATTER WATERSHED ACT AS TWO ADDITIVE HYDROLOGIC UNITS
- A AND C+C' ASSUMES A DISTURBED AND UNDISTURBED WATERSHED ACT AS TWO ADDITIVE HYDROLOGIC UNITS.

WATER SHED (A)	AREA (AC) (A)	CURVE NUMBER	S (S=1000/CN-10)	Q <sub>10-24</sub> (IN) (II)	VOLUME (CU FT)	POND RAT. (CU FT)
A+C+C'	18.29	84 <sup>(9)</sup>	1.90	0.676	44881	44881
A+C'	8.52	76 <sup>(9)</sup>	3.16	0.363	11227	47023
C	9.77	90	1.11	1.009	35796	
A	5.42	68	4.70	0.163	3207	50361
C+C'	12.87	90	1.11	1.009	47154	

USE: 50,361 CF

(II) METHODOLOGY DESCRIBED IN SCS-NEH, NOTICE 4-10Z, CHAPTER 10, AUGUST 1972, EQ<sup>N</sup>S 10.10 AND 10.12.

42 381 100 SHEETS 3 SQUARE  
42 380 200 SHEETS 3 SQUARE  
42 382 100 SHEETS 3 SQUARE  
MADE IN U.S.A.



SOIL LOSS EVALUATION

SOIL LOSS IS CALCULATED USING THE METHODOLOGY DESCRIBED IN "APPLIED HYDROLOGY AND SEDIMENTOLOGY FOR DISTURBED AREAS", B.J. BARFIELD, R.C. WARNER, CT HAAN, CHAPTER 5, 1981, FOR THE UNIVERSAL SOIL LOSS EQUATION. FOOTNOTES CITED ARE FOUND IN THIS REFERENCE.

WATER SHED (4)	AREA (AC) (4)	R (12)	K (13)	LS (14)	CP	TONS PER YR.
A	5.42	20	0.15	63.5 <sup>(17)</sup>	0.004 <sup>(15)</sup>	4.13
C+C'	12.87	20	0.20	9.0 <sup>(17)</sup>	1.0 <sup>(16)</sup>	463.32

TOTAL = 467.45 TON/YR

DESIGN LOSS:  $\frac{(467.45 \text{ T/YR})(3 \text{ YR})(2000 \text{ LB/T})}{100 \text{ LB/FT}^3 \text{ (18)}} = 28047 \text{ CUFT}$

$\frac{28047 \text{ CUFT}}{(43560 \text{ CF/AC})(12.87 \text{ AC})} = 0.050 \text{ AF/AC}$  OR FOR 817.46 (6)(2)

USE: 28,047 CF

(12) FIG. 5.3  $R \approx 30$ ;  $R = 27 P_{2.6}^{2.2}$  WHERE  $P_{2.6} \approx 0.85$  (FIG 5.4)  $\approx 19$   
USE  $R=20$

(13) PER TIM WATSON, SCS - COALVILLE UTAH, FOR MOUNTAIN GRAVELLY LOAM AT SUMMIT NO. 1 COAL MINE SITE. VALUE IS INCREASED BY % FOR DISTURBED AREAS.

(14)  $LS = \left(\frac{\lambda}{72.6}\right)^m \left(\frac{430 \lambda^2 + 30 \lambda + 0.43}{6.613}\right)$  WHERE  $\lambda = \text{HYD. LENGTH (FT)}$   
 $m = 0.5$  ( $S > 5\%$  ALWAYS)  
 $\lambda = \text{SIN (ANGLE OF SLOPE (DEG))}$

(15) TABLE 5.A.4 FOR 42.5% LANDPY AND 85% LITER

(16) TABLE 5.A.1 FOR BARE SOIL (CONSERVATIVE)

(17)  $\lambda_A = 725$ ,  $\lambda_A = \text{SIN}(\text{TAN}^{-1} \frac{61.1}{100})$ ;  $\lambda_{C-C} = 1039$ ,  $\lambda_{C-C} = \text{SIN}(\text{TAN}^{-1} (\frac{6420 - 6255}{1039}))$   
↑ SLOPE OF T<sub>C-C</sub>

42 SHEETS 3 SQUARE  
100 SHEETS 3 SQUARE  
42 SHEETS 3 SQUARE  
200 SHEETS 3 SQUARE  
NATIONAL

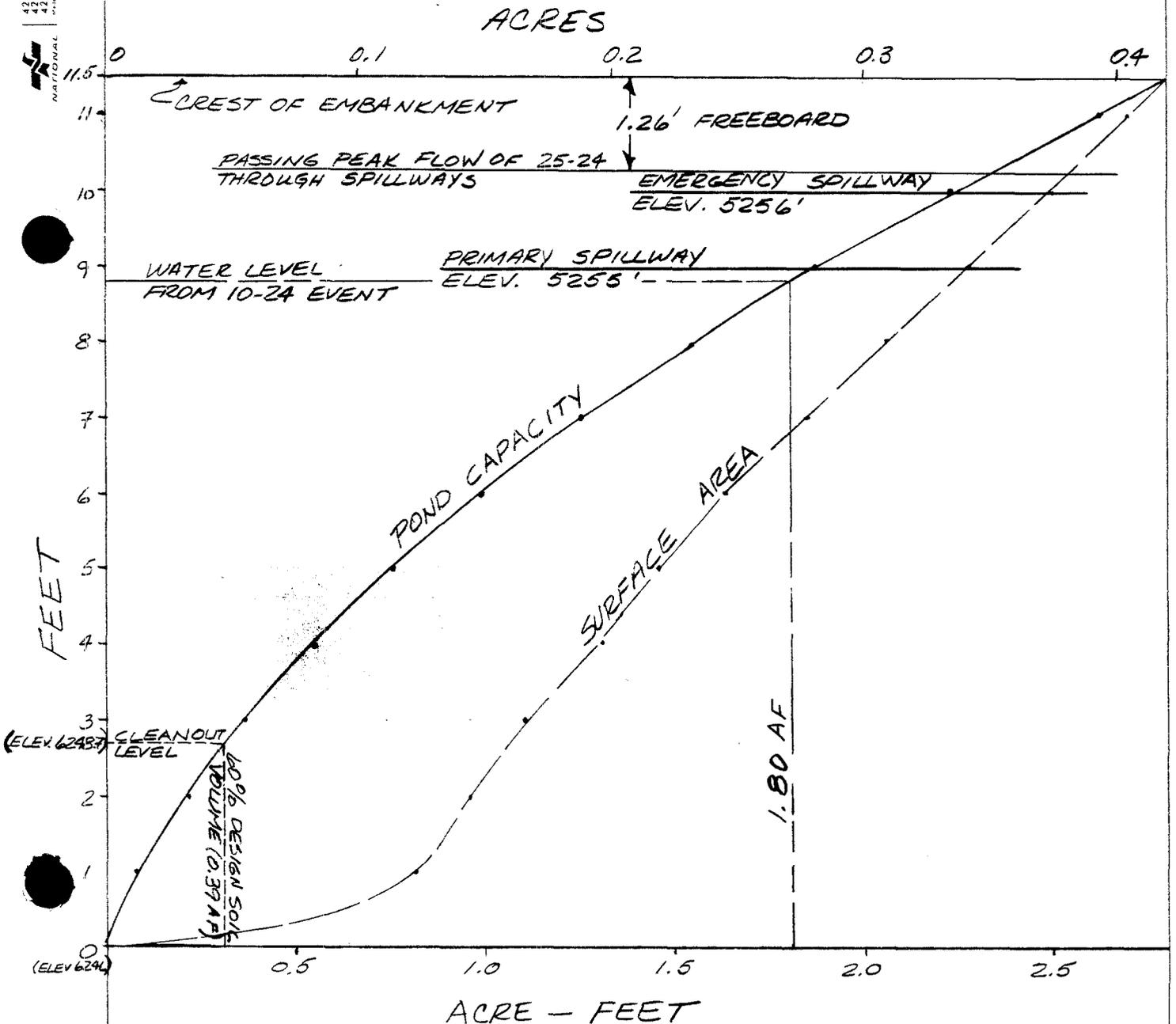
SEDIMENTATION POND ADEQUACY

RUNOFF REQUIREMENT = 50,361 CF = 1.16 AF

SOIL LOSS REQUIREMENT = 28,047 CF = 0.64 AF

TOTAL REQUIREMENT = 78,406 CF = 1.80 AF

AREA-CAPACITY CURVE (REF. PLATE 784.23-2)



42 381 50 SHEETS 5 SQUARE  
42 382 50 SHEETS 5 SQUARE  
42 383 50 SHEETS 5 SQUARE  
42 384 50 SHEETS 5 SQUARE  
42 385 50 SHEETS 5 SQUARE  
42 386 50 SHEETS 5 SQUARE  
42 387 50 SHEETS 5 SQUARE  
42 388 50 SHEETS 5 SQUARE  
42 389 50 SHEETS 5 SQUARE  
42 390 50 SHEETS 5 SQUARE  
42 391 50 SHEETS 5 SQUARE  
42 392 50 SHEETS 5 SQUARE  
42 393 50 SHEETS 5 SQUARE  
42 394 50 SHEETS 5 SQUARE  
42 395 50 SHEETS 5 SQUARE  
42 396 50 SHEETS 5 SQUARE  
42 397 50 SHEETS 5 SQUARE  
42 398 50 SHEETS 5 SQUARE  
42 399 50 SHEETS 5 SQUARE  
42 400 50 SHEETS 5 SQUARE



## OVERFLOW AND DEWATERING STRUCTURES

THE SEDIMENTATION POND WILL BE EQUIPPED WITH A DEWATERING SYSTEM, A PRIMARY SPILLWAY, AND AN EMERGENCY SPILLWAY.

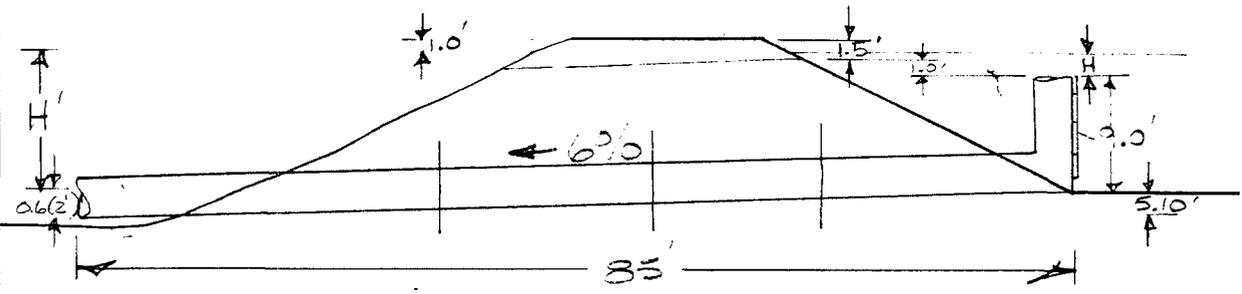
THE PRIMARY SPILLWAY AND DEWATERING SYSTEM ARE SHOWN ON PAGE 9 OF THIS SECTION. THE SPILLWAY CONSISTS OF TWO FOOT DIAMETER DROP INLET CORRUGATED STEEL CONDUIT. THE DEWATERING DEVICE CONSISTS OF A TWO INCH STEEL-THREADED NIPPLE WELDED TO THE STAND PIPE. A TWO INCH GATE VALVE WILL BE PLACED IN THE CLOSED POSITION ON THE NIPPLE. A LONG VALVE STEM WILL BE STABILIZED INSIDE STEEL CONDUIT AND EXTENDED TO THE TOP OF THE RISER. A GRATED STEEL WALKWAY FROM THE EMBANKMENT TO THE TOP OF THE RISER WILL PROVIDE ACCESS FOR DEWATERING PURPOSES. THE VALVE HANDLE WILL BE LOCKED OR REMOVED AT ALL TIMES WHEN DEWATERING IS NOT REQUIRED TO MINIMIZE TAMPERING BY UNAUTHORIZED PERSONS.

THE EMERGENCY SPILLWAY IS A TRAPEZOIDAL SHAPED OPEN CHANNEL DITCH. A COMBINATION OF THE PRIMARY AND EMERGENCY SPILLWAYS WILL ADEQUATELY PASS THE PEAK FLOW FROM A 25 YEAR - 24 HOUR EVENT WHILE MAINTAINING APPROXIMATELY 1.25 FT OF FREEBOARD.

THE METHODOLOGY USED IN EVALUATING THESE DEWATERING STRUCTURES IS DETAILED IN "APPLIED HYDROLOGY AND SEDIMENTOLOGY FOR DISTURBED AREAS" B.J. BARFIELD, T.C. WAZNER AND C.T. HAAN, 1981, CHAPTERS 3 AND 4. FIGURES, TABLES, AND PAGE NUMBERS CITED IN THIS SECTION ARE FOUND IN THIS REFERENCE - UNLESS OTHERWISE NOTED.

- (18) SURFACE MINING, E.P. PFLEIDER, ED, 1968, TABLE B.3-1, P. 466 FOR "WET LOAM".

CREST ELEV. = 5257.5'    BOTTOM ELEV. = 5246.0'  
 EMERGENCY SPILLWAY ELEV. = 5256.0'  
 PRINCIPAL SPILLWAY ELEV. = 5253.0'  
 MAX. WATER ELEV. = 5256.5'



CORRUGATED 2'  $\phi$  PIPE INLET, REDUCE TO 18"  $\phi$

WIER FLOW:  $Q = CLH^{1.5}$  (p. 230 EQ<sup>N</sup> 4.1)

WHERE  $C = \text{WIER COEF} = 3.27 + 0.4 H/W$  (FIG. 4.3)  
 $= 3.27 + 0.4 H/9 = 3.27 + 0.044 H$

$L = \text{WIER LENGTH} = \pi(2) = 6.28$

$$Q = (22.55 + 0.279 H) H^{1.5}$$

ORIFICE FLOW:  $Q = C' A \sqrt{2gH}$  (p. 230 EQ<sup>N</sup> 4.2)

WHERE  $C' = \text{ORIFICE COEF.} = 0.6$  (p. 230)

$A = \text{AREA} = \pi(2^2)/4 = 3.14$

$g = \text{GRAV. CONST} = 32.2$

$$Q = 15.13 \sqrt{H}$$

42 SHEETS 3 SQUARE  
 42 SHEETS 3 SQUARE  
 42 SHEETS 3 SQUARE  
 NATIONAL

PIPE FLOW :  $Q = \frac{A(2gH')^{1/2}}{(1 + K_e + K_b + K_c L)^{1/2}}$  (P. 232, EON 4.4)

WHERE A = AREA = 1.77 ft<sup>2</sup>

g = GRAV. CONST. = 32.2

K<sub>e</sub> = ENTRANCE LOSS = 1.0 (p. 232)

K<sub>b</sub> = BEND LOSS = 0.5 (p. 232)

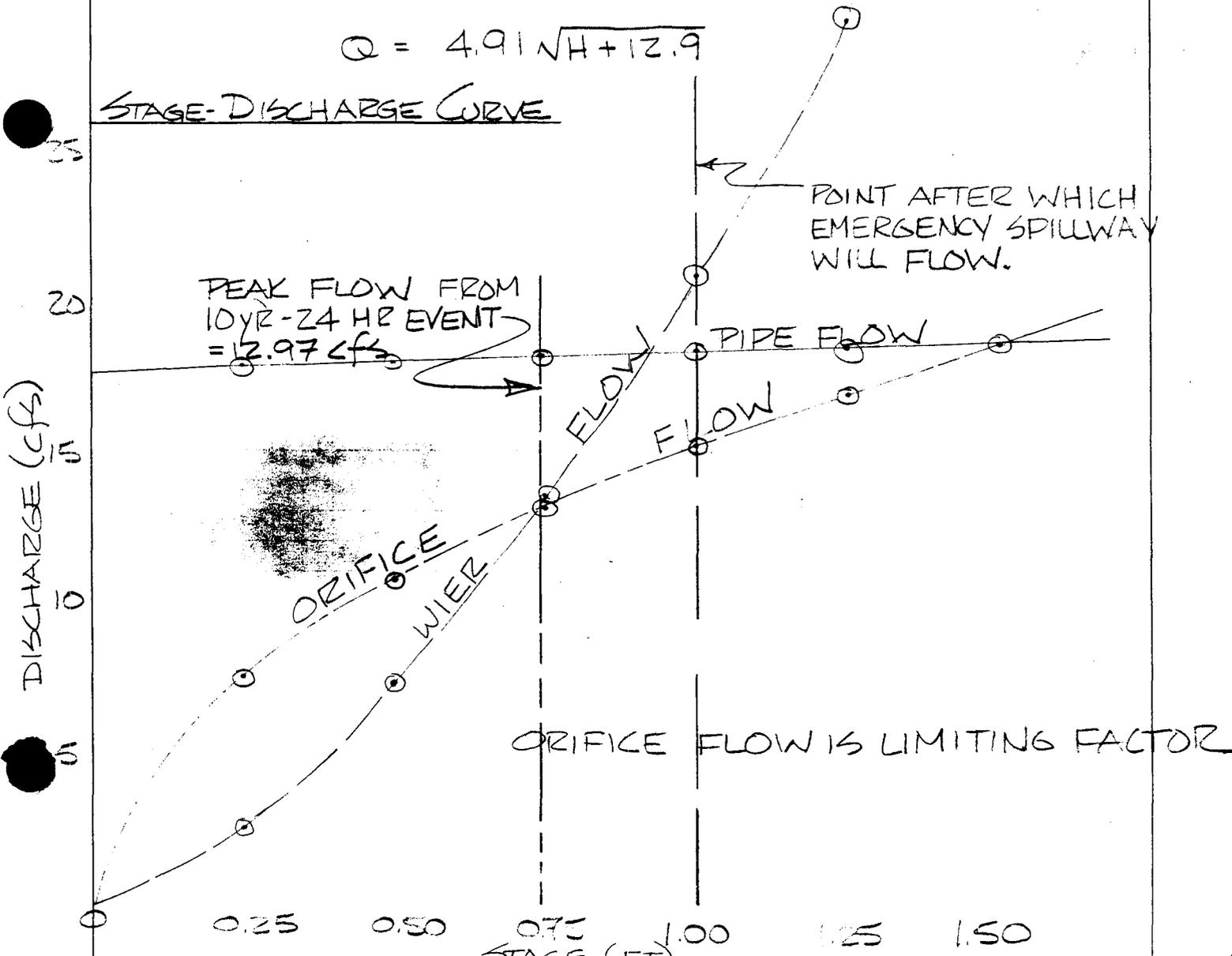
K<sub>c</sub> = FRICTION LOSS = 0.0621 (TAB 4.1, AT 18" φ PIPE & η = 0.024)

L = PIPE LENGTH = 85 + 9 = 94

H' = H + 9 + 5.1 - 0.6( $\frac{1.5}{2}$ ) = H + 12.9

$Q = 4.91 \sqrt{H + 12.9}$

STAGE-DISCHARGE CURVE



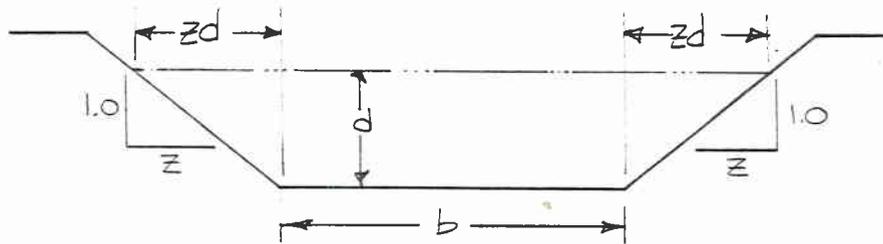
PEAK FLOW FROM 25YR 24 HR EVENT = 19.16 cfs

EMERGENCY SPILLWAY WILL BEGIN TO FLOW AT H = 1.0 FT.

MANNING EQ<sup>N</sup>:  $V = \frac{1.49}{n} R^{2/3} S^{1/2}$  ;  $Q = AV$   
 (P157, EQ<sup>N</sup> 3.21)

FOR TRAPEZOIDAL DITCH:

- b = BOTTOM WIDTH = 2.0
- z = CHANNEL SIDE SLOPE = 2:1
- S = CHANNEL GRADE = 0.06 (6%)
- n = 0.0314 FOR 3 IN DIA AVG. RIPRAP SIZE IN SPILLWAY CHANNEL (19)(20)
- d = DEPTH OF FLOWING WATER IN CHANNEL



$$R = \frac{bd + zd^2}{b + 2dn\sqrt{z^2 + 1}}$$

MANNING EQ <sup>N</sup> FOR EMERGENCY			ORIFICE FORMULA FOR PRIMARY		
EMERGENCY SPILLWAY d (ft)	VELOCITY (fps)	VOLUME (cfs)	PRIMARY SPILLWAY H = d + 1.0	VOLUME (ORIFICE FL) (cfs)	COMBINED VOLUME (cfs)
0.20	3.51	1.69	1.20	16.57	18.26
0.23	3.80	2.15	1.23	16.78	18.93
0.24	3.90	2.32	1.24	16.85	19.17
0.25	3.99	2.49	1.25	16.92	19.41

Q<sub>PEAK</sub> = 19.16 cfs  
25-24

(19) SURFACE MINING WATER DIVERSION DESIGN MANUAL, US DEPT. OF INTERIOR - OFFICE OF SURFACE MINING, SEPTEMBER 1982, EQ<sup>N</sup> 4.18.

(20) SEE PAGE 17 OF THIS SECTION FOR RIPRAP SIZE JUSTIFICATION.

42 381 30 SHEETS 3 SQUARE  
42 386 200 SHEETS 3 SQUARE



## DIVERSION DITCH DESIGN

ALL DIVERSION DITCHES ARE TEMPORARY, AND WILL BE RECLAIMED CONCURRENTLY WITH THE SEDIMENTATION POND. EACH DITCH IS DESIGNED TO SAFELY PASS THE PEAK FLOW FROM A 10 YEAR - 24 HOUR PRECIPITATION EVENT WHILE MAINTAINING NO LESS THAN 0.3 FEET OF FREEBOARD.

ALL MATERIAL SPOILED FROM DIVERSION DITCH EXCAVATION WILL BE PLACED ALONG THE DOWNSTREAM BANK AS CLOSE AS IS PRACTICAL TO ITS POINT OF EXCAVATION. ANY FILL REQUIRED IN A DIVERSION CHANNEL TO ACHIEVE THE GRADE SPECIFICATION WILL BE COMPACTED USING A PNEUMATIC JACK-HAMMER WITH A FLAT PLATE (APPROX. 5" X 8") ON THE BASE, OR EQUALLY SUITABLE COMPACTING EQUIPMENT. ALL SPOILED MATERIAL WILL BE SEEDED WITH EITHER THE TEMPORARY OR PERMANENT SEED MIX (SEE REVEGETATION PLAN, THIS DOCUMENT), DEPENDING ON WHICH IS MORE READILY AVAILABLE. (IF THE DIVERSIONS ARE CONSTRUCTED CONCURRENTLY WITH PERMANENT RECLAMATION BACK-FILLING AND GRADING ACTIVITIES, THE PERMANENT MIX WILL BE USED WHEN AREA SEEDING IS ACCOMPLISHED. IF DITCHES ARE CONSTRUCTED PRIOR TO GRADING, THE TEMPORARY MIX WILL BE USED.)

THE METHODOLOGIES USED IN THIS SECTION ARE THOSE DESCRIBED IN "SURFACE MINING WATER DIVERSION DESIGN MANUAL", U.S. DEPT. OF THE INTERIOR - OFFICE OF SURFACE MINING, TR-82/2, SEPTEMBER 1982, PART 1. UNLESS OTHERWISE NOTED, ALL PAGE NUMBERS, FIGURES AND TABLES CITED IN THIS SECTION CORRESPOND TO THIS REFERENCE.

DITCHES DESIGNED IN THIS SECTION ARE SHOWN ON PLATE NO. 784.23-2. DITCH NUMBERS SHOWN ON THE DRAWING CORRESPOND TO THE DITCH NUMBERS REFERENCED IN THIS SECTION.

OPEN CHANNEL FLOW: MANNING EQ<sup>N</sup>

$$V = \frac{1.49}{\eta} R^{2/3} S^{1/2} \quad (\text{p 4.8, EQ}^N \text{ 4.13})$$

$$Q = AV \quad (\text{p 4.5, EQ}^N \text{ 4.9})$$

ALL DITCHES WILL BE TRAPEZOIDAL. VARIABLES REFERENCED IN THIS SECTION CORRESPOND TO THE CROSS-SECTION SHOWN FOR SPILLWAY DESIGN ON PAGE 11 OF THIS APPENDIX.

DITCH No. 1

THE GRADIENT OF DITCH NO 1 IS SHOWN ON PLATE NO. 78A.234 TO CONSIST OF THREE SEGMENTS: STEEP, TRANSITIONAL AND FLAT. VARIABLES FOR EACH SEGMENT ARE AS FOLLOWS:

VARIABLE	STEEP	TRANS.	FLAT
b	1.0	1.0	1.0
z	2.0	2.0	2.0
s	0.217	0.066	0.013
$\eta$	0.0329 <sup>(21)</sup>	0.0293 <sup>(21)</sup>	0.025 <sup>(22)</sup>

Q<sub>10-24</sub> PEAK = 1.10 cfs  
(SEE P. 4 OF THIS APPENDIX)

MANNING EQ<sup>N</sup>:

STEEP			TRANSITIONAL			FLAT		
d(ft)	V(fps)	Q(cfs)	d(ft)	V(fps)	Q(cfs)	d(ft)	V(fps)	Q(cfs)
0.15	5.04	0.98	0.20	3.65	1.02	0.29	2.32	1.06
0.16	5.22	1.10	0.21	3.75	1.12	0.30	2.36	1.13
0.17	5.40	1.23	0.22	3.85	1.22	0.31	2.40	1.21

DITCH WILL BE CONSTRUCTED ONE FOOT DEEP FOR ENTIRE LENGTH.

(21) p. 4.10, EQ<sup>N</sup> 4.18 AS DEVELOPED ON P. 17 OF THIS APPENDIX

(22) TABLE 4.2, MAX. VALUE FOR STRAIGHT, UNIFORM, EARTH

42 381 50 SHEETS 5 SQUARE  
 42 382 100 SHEETS 5 SQUARE  
 42 389 200 SHEETS 5 SQUARE  
 NATIONAL

DUE TO THE FLAT SLOPES, LOW VELOCITIES, AND VEGETATION STAND AT THE LOCATION OF DISCHARGE, NO ENERGY DISSIPATORS ARE PROPOSED.

NOTE: FROUDE NUMBERS (p. 4.5, EQ<sup>N</sup> 4.7) ARE LESS THAN 2.5 FOR ALL THREE SEGMENTS.

DITCH No. 2

THE GRADIENT OF DITCH No. 2 IS SHOWN ON PLATE No. 784.23-4. THE CHANNEL WILL REQUIRE EXCAVATION IN SOME LOCATIONS AND BACKFILLING IN OTHERS TO ACHIEVE THE DESIGN GRADE.

VARIABLES:  $b = 2.0$   
 $z = 2.0$   
 $s = 0.015$   
 $\eta = 0.0314 (21)$

$Q_{10-24} \text{ PEAK} = 9.59 \text{ cfs}$   
(SEE P. 4 OF THIS APPENDIX)

MANNING EQ<sup>N</sup>

d (ft)	V (fps)	Q (cfs)
0.74	3.59	9.24
0.75	3.61	9.49
0.76	3.64	9.74

DITCH WILL BE CONSTRUCTED 1.5 FEET DEEP FOR ENTIRE LENGTH. AT LOCATION WHERE DITCH CROSSES THE ACCESS ROAD, A WATER BAR WILL BE CONSTRUCTED IN THE ROAD A MINIMUM OF 1.1 FEET IN HEIGHT SO THAT THE DITCH CHANNEL CAN BE FORDED WITHOUT DAMAGING ITS INTEGRITY.

THE TRAPEZOIDAL DITCH CONFIGURATION WILL RESUME AFTER CROSSING THE ROAD, SHORTLY AFTER WHICH IT ENTERS THE SEDIMENTATION POND.

LARGER RIPRAP WILL BE PLACED AS NECESSARY ON THE DOWNSLOPE OF THE SEDIMENTATION POND TO MINIMIZE EROSION.

42 381 50 SHEETS 3 SQUARE  
42 382 100 SHEETS 3 SQUARE  
42 389 200 SHEETS 3 SQUARE  
NATIONAL

DITCH No. 3

THE GRADIENT OF DITCH No. 3 IS SHOWN ON PLATE No. 784.234  
 A 100 FOOT LONG CULVERT WILL BE INSTALLED UNDER THE ROAD WHICH DISCHARGES NEAR THE BOTTOM OF THE SEDIMENTATION POND.

THE PEAK FLOW FOR THE DISTURBED PAD AREA IS 9.59 CFS FOR A 10 YEAR - 24 HOUR EVENT. THE PEAK FLOW FROM THIS AREA IS ESTIMATED TO BE PROPORTIONAL TO THIS PEAK.

$$\frac{9.59 \text{ cfs}}{9.77 \text{ AC}} = \frac{x}{1.05 \text{ AC}}$$

$$Q_{10-24 \text{ PEAK}} = 1.03 \text{ cfs}$$

- VARIABLES:
- b = 1.0
  - z = 2.0
  - s = 0.016
  - n = 0.025 (22)

MANNING EQN

d (ft)	V (fps)	Q (cfs)
0.26	2.43	0.96
0.27	2.48	1.03
0.28	2.53	1.10

DITCH WILL BE CONSTRUCTED ONE FOOT DEEP FOR ENTIRE LENGTH (APPROX. 290 FT). THE DITCH WILL DISCHARGE INTO A 12"  $\phi$  CULVERT WHICH DISCHARGES INTO THE SEDIMENTATION POND. (SEE PAGE 19 OF THIS SECTION)

42-381 50 SHEETS 5 SQUARE  
 42-382 100 SHEETS 5 SQUARE  
 42-389 200 SHEETS 5 SQUARE  
 NATIONAL

DITCH No. 4

THE GRADIENT OF DITCH NO. 4 IS SHOWN ON PLATE No. 78A-23-4 TO CONSIST OF THREE SEGMENTS: STEEP, FLAT AND STEEP. VARIABLES FOR EACH SEGMENT ARE:

VARIABLE	STEEP (U)	FLAT	STEEP (D)
b	1.0	1.0	1.0
n	2.0	2.0	2.0
s	0.131	0.012	0.118
m	0.0341 <sup>(21)</sup>	0.025 <sup>(22)</sup>	0.034 <sup>(21)</sup>

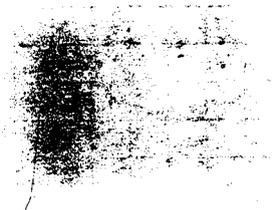
Q<sub>PEAK</sub> = 3.38 cfs  
10-24  
(SEE P. 4 OF THIS APPENDIX.)

MANNING EQN:

STEEP (UPSTREAM)			FLAT			STEEP (DOWNSTREAM)		
d(ft)	V(fps)	Q(cfs)	d(ft)	V(fps)	Q(cfs)	d(ft)	V(fps)	Q(cfs)
0.33	5.79	3.17	0.52	3.05	3.23	0.34	5.58	3.19
0.34	5.88	3.36	0.53	3.08	3.36	0.35	5.67	3.37
0.35	5.97	3.55	0.54	3.11	3.49	0.36	5.75	3.56

DITCH WILL BE CONSTRUCTED ONE FOOT DEEP FOR ENTIRE LENGTH.

RIPRAP PLACED IN STEEP DOWNSTREAM SECTION WILL EXTEND ONTO THE DOWNSLOPE ENTERING THE SEDIMENTATION POND.



42.381 50 SHEETS 5 SQUARE  
42.382 100 SHEETS 5 SQUARE  
42.389 200 SHEETS 5 SQUARE  
NATIONAL

RIPPRAP REQUIREMENTS

EMERGENCY SPILLWAY ON SEDIMENTATION POND

DIVERSION DITCHES - No. 1, No. 2, No. 3, No. 4

STRUCTURE	VELOCITY	RIPPRAP DIA.
SPILLWAY	3.90	3" (23)
No. 1 - STEEP	5.22	4" (23)
No. 1 - TRANS	3.75	2" (23)
No. 1 - FLAT	2.36	— (24)
No. 2	3.61	3" (23)
No. 3	2.48	— (24)
No. 4 - STEEP	5.88	5" (23)
No. 4 FLAT	3.08	— (24)
No. 4 STEEP	5.67	5" (23)

NOTE: THE NOMOGRAPH (23) PROVIDES MAXIMUM STONE SIZES WHICH CORRESPONDS TO  $2D_{50}$  (FIGURE 3.17 (24))

CALCULATION OF MANNING  $n$  VALUES USE THE MAXIMUM STONE SIZE AS THE  $D_{50}$  SIZE, WHICH RESULTS IN A CONSERVATIVE ESTIMATE.

THE OPERATOR WILL USE RIPRAP OF A  $D_{50}$  VALUE GREATER THAN OR EQUAL TO ONE HALF THE RIPRAP DIAMETER SHOWN ABOVE, DEPENDING ON AVAILABILITY AND PRACTICALITY.

(23) HYDRAULIC DESIGN OF STILLING BASINS AND ENERGY DISSIPATORS, US. DEPT OF THE INTERIOR - BUREAU OF RECLAMATION, ENGINEERING, NOMOGRAPH No. 25, SECTION II, FIGURE 165.

(24) APPLIED HYDROLOGY AND SEDIMENTOLOGY FOR DISTURBED AREAS, B.J. BARFIELD, R.C. WARNER, C. THAAN, 1981, TABLE 3.2 FOR LOAM.

IN THE AREAS WHERE CHANNEL GRADIENT CHANGES IN DIVERSION DITCHES 1 & 4, THE LARGER SIZED RIPRAP MATERIAL WILL BE EXTENDED A MINIMUM OF 15 FEET PAST THE TRANSITION TO MINIMIZE SCOURING. WITH FROUDE NUMBERS ALL LESS THAN 2.5, SCOURING IS NOT EXPECTED TO BE A PROBLEM.

42-381 50 SHEETS 3 SQUARE  
42-382 100 SHEETS 3 SQUARE  
42-389 200 SHEETS 3 SQUARE



CULVERT DESIGN

ONE TEMPORARY CULVERT WILL BE INSTALLED TO  
COURSE DIVERSION DITCH NO. 3 INTO THE SEDIMENTATION  
POND. A 12 INCH  $\phi$  CORRUGATED STEEL CULVERT  
APPROXIMATELY 140 FEET LONG WILL BE INSTALLED  
AT A 3.5% GRADE, TO INTERSECT THE POND AT  
ABOUT ELEVATION 5250.

NOMOGRAPHS FOUND IN "HANDBOOK OF STEEL DRAINAGE  
& HIGHWAY CONSTRUCTION PRODUCTS", 2ND ED, AMERICAN  
IRON AND STEEL INSTITUTE, PUB. 1971, WERE USED TO  
DETERMINE CULVERT ADEQUACY. THE FIGURES CITED  
IN THIS SECTION ARE FOUND IN THIS REFERENCE.

$$\text{DIVERSION DITCH No 1} - Q_{10-24} \text{ PEAK} = 1.03 \text{ cfs}$$

$$\text{INLET CONTROL (FIG 4-18)} \Rightarrow HW/D = 0.6 \therefore HW = 0.6 \text{ FT}$$

NOTE: TRAPEZOIDAL DITCH CONFIGURATION IS  
DESIGNED AT A DEPTH OF ONE FOOT. THIS  
WILL STILL MAINTAIN AT LEAST 0.3 FT  
OF FREEBOARD

$$\text{OUTLET CONTROL (FIG 4-22)} \quad \text{WHERE } L' = 140(0.21) = 29.4'$$

- NO OUTLET CONTROL

SINCE INLET IS LESS THAN PIPE DIAMETER, CHECK  
OPEN CHANNEL FLOW (MANNING) THROUGH PIPE  
AT 0.6 FT DEPTH:

$$\left( \frac{1.49}{0.024} \right) \left( \frac{45(0.6)}{\pi(360-156.9)} \right) \left( \frac{2\pi - \pi(156.9)}{180} + \sin(156.9) \right)^{2/3} 0.035^{1/2}$$

(SEE OSM/TR-82/2 TABLE 4.1, p.4.3 FOR R & A)

$$V = 3.03 \text{ fps} \quad Q = 1.19 \text{ cfs} > 1.03 \text{ cfs}$$

CULVERT WILL FLOW AS AN OPEN CHANNEL A LITTLE  
MORE THAN HALF FULL.

THIS CULVERT WILL BE REMOVED CONCURRENTLY WITH THE SEDIMENTATION POND AND DIVERSION DITCHES. SIMPLE GRADING AFTER REMOVAL WILL RESULT IN A RECLAIMED CONTOUR CONSISTANT WITH THE REMAINDER OF THE RECLAIMED SITE.

THERE IS AN EXISTING CULVERT WHICH ALLOWS THE IRRIGATION DITCH, SHOWN ON PLATE NO 784.232, PASSAGE BENEATH THE SITE ACCESS ROAD NORTH OF CHALK CREEK. BECAUSE FLOWS IN THIS DITCH ARE MANUALLY REGULATED AND NOT CONTROLLED BY THIS OPERATOR, AN EVALUATION FOR CULVERT ADEQUACY FOR PEAK FLOWS IS NOT INCLUDED. THE CULVERT IS APPROXIMATELY 36"  $\phi$  AND APPEARS TO BE ADEQUATE FOR ITS PURPOSE.

SMALL AREA EXEMPTIONS

BECAUSE THE SITE ACCESS ROAD CROSSES CHALK CREEK, IT IS NOT PRACTICAL TO PROVIDE SEDIMENTATION CONTROL WITH PONDS FOR ALL DISTURBED AREAS. RUNOFF FROM ALL OF THE PAD AREA, AND MOST OF THE ROADWAYS, IS CONTAINED IN THE SEDIMENTATION POND. THOSE PORTIONS OF THE ACCESS ROAD WHICH DESCEND TOWARD THE BRIDGE SPANNING CHALK WILL NOT DRAIN INTO THE SEDIMENTATION POND (SEE DWG 784.164, SECTION 16). THIS ROAD HAS BEEN IN THIS LOCATION FOR MANY YEARS AND APPEARS TO BE WELL STABILIZED. PONDS FOR CONTAINING RUNOFF FROM THESE AREAS WOULD HAVE TO BE CONSTRUCTED ADJACENT TO THE CREEK (IN THE FLOOD PLAIN), INSIDE THE BUFFER ZONE. THE OPERATOR BELIEVES THAT DISTURBANCE FOR POND CONSTRUCTION IN THESE AREAS WOULD RESULT IN INCREASED SEDIMENT CONTRIBUTIONS OVER THE TREATMENT STRUCTURES PROPOSED HEREIN.

A BERM WILL BE CONSTRUCTED DOWN BOTH SIDES OF THE SITE ACCESS ROAD, ON BOTH SIDES OF THE CREEK, TO CHANNEL RUNOFF DOWN THE ROADWAY. AT THE LOCATIONS SHOWN ON PLATE No 784.23-2 RUNOFF WILL COURSE OFF THE DISTURBED AREA AND THROUGH A SEDIMENT FILTER SUCH AS STRAW BALES, SILT FENCE, OR EQUAL PRIOR TO DISCHARGE INTO CHALK CREEK. THERE IS A GOOD STAND OF VEGETATION IN THE AREA TO FURTHER FILTER DISTURBED AREA RUNOFF.

USING THE METHODS DESCRIBED IN FOOTNOTE (11) OF THIS APPENDIX, THE RUNOFF FROM THE AREAS IS APPROXIMATELY 3407 CF AND 2235 CF FOR THE NORTH AND SOUTH SIDES OF THE CREEK, RESPECTIVELY.

DISCHARGE THROUGH THE SEDIMENT FILTERS WILL BE SAMPLED AND ANALYZED FOR THE SAME PARAMETERS AS A SEDIMENTATION POND DISCHARGE (SEE SECTION OF THIS DOCUMENT). DURING SMALL PRECIPITATION EVENTS, IT MAY NOT BE PRACTICAL TO OBTAIN A DISCHARGE SAMPLE DUE TO SLOW FILTERING RATES, SMALL VOLUMES, AND SHORT DURATION. THE OPERATOR WILL MAKE ALL REASONABLE ATTEMPTS TO OBTAIN A REPRESENTATIVE DISCHARGE SAMPLE DURING OR FOLLOWING ANY PRECIPITATION EVENT WHERE RUNOFF OCCURS.

(25)  $CN=90$ ,  $A_n=0.93AC$ ,  $A_s=0.61AC$  - SEE REFERENCE (11)

DISCHARGE STRUCTURE ON SEDIMENTATION POND OUTLET

PLATE NO 784.23-2 SHOWS BOTH THE PRIMARY OVERFLOW AND EMERGENCY SPILLWAY DISCHARGE AT THE SAME LOCATION. BECAUSE OF THE DITCH CONFIGURATION, VOLUMES AND VELOCITIES, THE RIPRAP APRON WILL BE DESIGNED BASED ON THE PIPE DISCHARGE.

CALCULATIONS ON PAGE 11 OF THIS APPENDIX SHOW THAT THE PRIMARY SPILLWAY PASSES 16.35 CFS AND THE EMERGENCY SPILLWAY PASSES 2.32 CFS TO DEWATER THE PEAK FLOW FROM A 25YR-24HR EVENT. THE STAGE-DISCHARGE CURVE ON PAGE 10 IS VERY NEARLY PIPE FLOW FLOWING FULL, SO THE TAILWATER CONDITION ON THIS STRUCTURE WILL BE GREATER THAN HALF THE PIPE DIAMETER.

USING BARFIELD, WARNER & HAAN (24), FIG. 7.26, AND TO BE CONSERVATIVE, ASSUMING  $Q = 19.16$  CFS (PEAK FLOW-25-24), THE MINIMUM APRON LENGTH = 30 FT. THE  $D_{50}$  RIPRAP SIZE IS 4". FOR MAXIMUM TAILWATER CONDITIONS, AND REFERRING TO FIG. 7.24, WIDTH = 13.5 FT.

VELOCITIES ASSOCIATED WITH THE EMERGENCY SPILLWAY ARE AS FOLLOWS (REF. P. 11 OF THIS APPENDIX FOR METHODOLOGY)

SPILLWAY - 6% FOR 20 FT (PLAN) (CONTROL FOR Q)  
40% FOR 35 FT (PLAN) (CONTROL FOR V)

## TRAPEZOIDAL DITCH:

$b$  = BOTTOM WIDTH = 2.0 FT

$z$  = SIDE SLOPE = 2:1

$s$  = SLOPE = 0.40

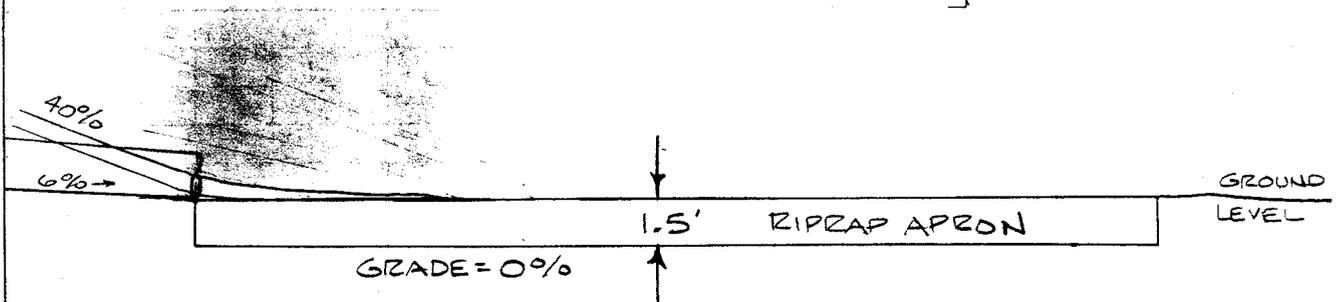
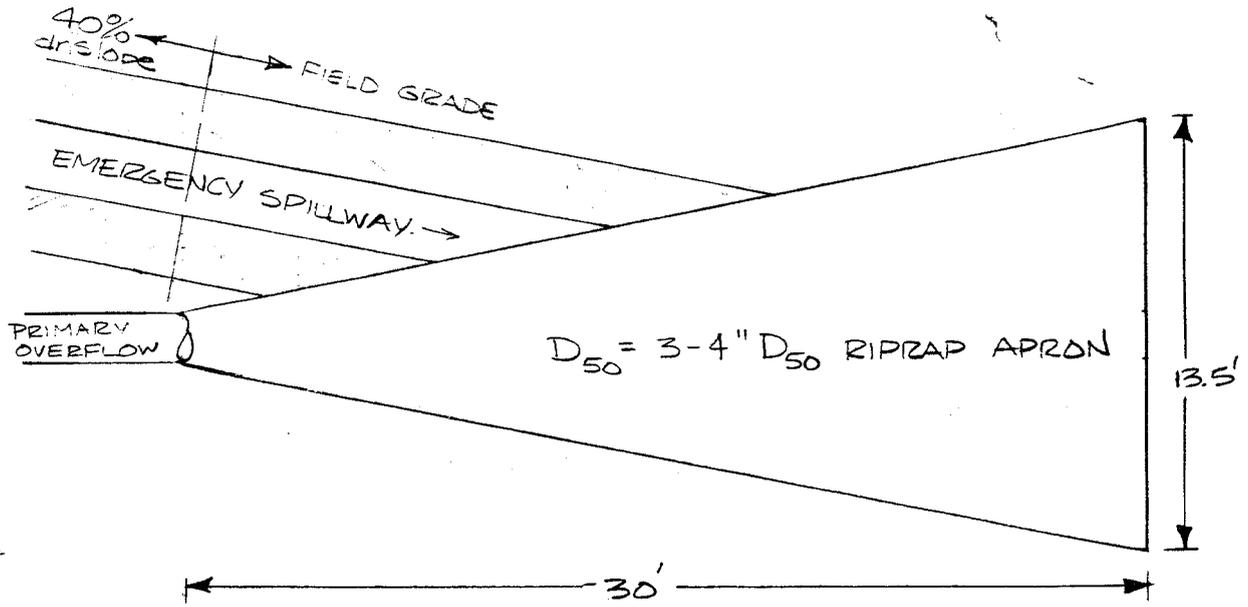
$n$  = 0.0352 (AT 6" =  $D_{50}$  RIPRAP (19))

$Q = 2.32$  CFS WHEN  $d \approx 0.15$  FT AND  $V \approx 6.84$  FPS

RIPRAP NOMOGRAPH (23) INDICATES AT  $V = 6.84$  FPS.  
 $D_{MAX} \approx 6.5$  INCHES. THE 3.4" RIPRAP IN APRON IS ADEQUATE TO DISSIPATE VELOCITIES, SINCE  
 $D_{MAX} = 2D_{50}$  (24)

### SEDIMENTATION POND OVERFLOW DISCHARGE STRUCTURE

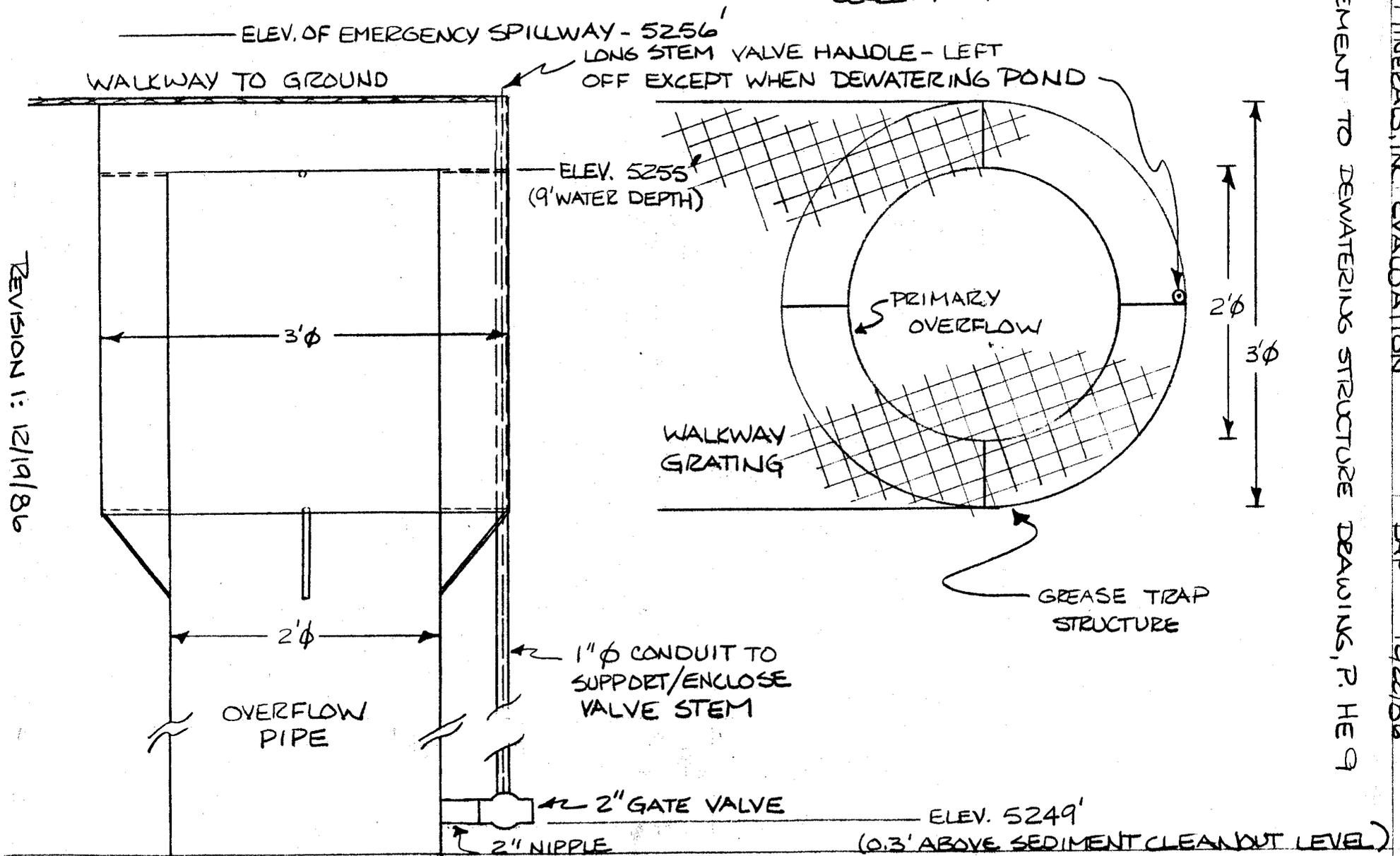
SCALE: 1" = 6'



42,381 50 SHEETS 5 SQUARE  
42,382 100 SHEETS 5 SQUARE  
42,383 200 SHEETS 5 SQUARE  
NATIONAL  
MUNICIPAL ENGINEERS

# GREASE TRAP/DECANT DETAIL

SCALE: 1" = 1'



REVISION 1: 12/19/86

SUPPLEMENT TO DEWATERING STRUCTURE DRAWING, P. HE 9  
 HYDROLOGIC  
 SUMMIT MINERALS, INC EVALUATION  
 BAF 12/22/86  
 HE-2A

**UMC 784.15 RECLAMATION PLAN: POSTMINING LAND USE****UMC 784.15(a) - Summary of Postmining Land Use**

The postmining land use for the reclaimed disturbed area is grazing and wildlife habitat. These land uses are consistent with what is believed to be the premining land use (mining on this property began as early as the late 1800's, so there is no known documentation referring to the premining land use).

Section 783.21 of this document discusses the capability of the soils to support the proposed revegetation plan (section 784.13 - Revegetation Appendix). Species proposed in the Revegetation Plan have been selected to provide a variety of forage to enhance the habitat for wildlife as well as domestic animals.

Because of the limited water supply, the possibility of managing this land for other uses is limited. As of September, 1986, this area was closed to new applications according to the State of Utah - Division of Water Rights. Water flowing in the surface drainages is the only available water. The surface owner of the property holds water rights for stockwatering so domestic grazing is consistent with water availability.

The Summit County Planning Commission has classified the reclamation area as Agricultural Grazing. This classification is obviously consistent with the proposed use of grazing and wildlife habitat.

**UMC 784.15(a)(1) - How to Achieve the Postmining Land Use**

Reclamation activities are detailed in section 784.13 of this document. The Revegetation Plan was developed utilizing species which will enhance forage for grazing and browsing of both domestic and wild animals. Methods for monitoring the success of the plan are detailed in the Revegetation Appendix (section 784.13).

**UMC 784.15(a)(2) - Proposed Alternative Use**

The proposed postmining land use is believed to be consistent with the premining land use.

**UMC 784.15(a)(3) - Consistence with Mining Activity**

Underground coal mining activities are not a part of this plan.

**UMC 784.15(b) - Comments of Surface Owner**

Conversations with legal council for the surface owner on 11/6/86 indicate that discussions with the surface owner were to proceed on 11/7/86 regarding the consistency of the proposed postmining land use of the property and their long range plans. Their comments will be provided when available.

**UMC 784.16 RECLAMATION PLAN: PONDS, IMPOUNDMENTS,  
BANKS, DAMS, AND EMBANKMENTS**

**UMC 784.16(a) - Plans**

This reclamation plan involves only one sedimentation pond which falls under the requirements of this section.

**UMC 784.16(a)(1)(i)**

All plans submitted pursuant to this section have been certified as having been prepared by, or under the direction of, a registered professional engineer or professional geologist.

**UMC 784.16(a)(1)(ii) - Description of Structures**

A description and design criteria for the sedimentation pond are included in the Hydrologic Evaluation Appendix in section 784.14 of this document. Plate number 784.23-2 shows the pond design in plan view. Cross sections referenced on that drawing are included on Plate number 784.23-3.

**UMC 784.16(a)(1)(iii) - Hydrologic Impact Assessment**

The sedimentation pond will be incised at the location shown on Plate number 783.23-2. This area has been disturbed for some time and appears well compacted and stabilized. It is not expected to adversely affect the hydrologic impact of this structure.

**UMC 784.16(a)(1)(iv) - Potential Subsidence**

Underground mining activities are not a part of this plan. There are no potential subsidence affects.

**UMC 784.16(a)(1)(v) - Certification Statement**

Design plans for sedimentation pond construction submitted in this document are complete. No construction will begin on the sedimentation pond until written approval from the Division is received.

**UMC 784.16(a)(2) - Meeting MSHA Size Criteria**

The sedimentation pond does not meet the size or other criteria of 30 CFR 77.216(a).

**UMC 784.16(3) - Not Meeting MSHA Size Criteria****UMC 784.16(3)(i) - Certification**

Design plans for the sedimentation pond have been certified by a registered professional engineer.

**UMC 784.16(3)(ii) - Geotechnical Information**

Design and construction requirements are included in the Hydrologic Evaluation Appendix in section 784.14 of this document.

**UMC 784.16(3)(iii) - Operation and Maintenance**

Operation and maintenance of the sedimentation pond is discussed in part (b) of this section.

**UMC 784.16(3)(iv) - Removal Plans**

A timetable for sedimentation pond removal is included in part (b) of this section.

**UMC 784.16(b)(1) - Sedimentation Pond Design**

The sedimentation pond included in this plan is a temporary structure and will be constructed prior to any reclamation activities. The sedimentation pond is located outside of the apparant Chalk Creek flood plain, and is shown in Plate number 784.23-2.

Design parameters are detailed in the Hydrologic Evaluation Appendix in section 784.14 of this document. Those parameters include: capacity to contain a 10 year - 24 hour precipitation event plus three years of anticipated sediment accumulation, a minimum of 24 hours detention time, the installation of a dewatering device and the capacity to pass the runoff from a 25 year - 24 hour event through the emergency spillway.

Plate number 784.23-2 illustrates that the pond has been designed to prevent short circuiting to the extent possible.

Sediment will be removed from the pond when the accumulated

volume reaches 60 percent of the design sediment volume. This level will be marked in the pond for visible inspection.

The sedimentation pond is an incised pond. No side slope into the pond will exceed 1V:2H.

The sedimentation pond has been designed, will be monitored during construction, and certified within 30 days after construction by a registered professional engineer. The pond will be inspected a minimum of four times per year for structural weakness, erosion, and other hazardous conditions. A copy of the inspection form is included as Figure 784.16-1.

The sedimentation pond will not be removed until the disturbed area has been restored to the vegetation success standards detailed in the revegetation plan and the drainage entering the pond meets the applicable State and Federal water quality requirements for the receiving stream. Water entering the sedimentation pond will be sampled at the pond inlet and analyzed as necessary to determine if the quality requirements can be met. When the sedimentation pond is removed, it will be graded to the configuration shown on drawing number 784.16-1, and revegetated in accordance with the revegetation plan contained in this document.

#### UMC 784.16(b)(2) - MSHA Compliance

The sedimentation pond does not meet the size requirements of 30 CFR 77.216-1 or 77.216-2.

#### UMC 784.16(c) - Impoundments

Permenant or temporary impounding structures are not a part of this plan.

#### UMC 784.16(d) - Coal Processing Waste Banks

Coal processing waste banks are not a part of this plan.

#### UMC 784.16(e) - Coal Processing Waste Dams and Embankments

Coal processing waste dams or embankments are not a part of this plan.

**UMC 784.16(f) - Stability Analysis**

The proposed incised sedimentation pond structure does not impound more than 20 acre feet.

SEDIMENTATION POND QUARTERLY INSPECTION

Structural Weakness: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Erosion: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Other Hazardous Conditions: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Pond Freeboard: \_\_\_\_\_

Inspected by: \_\_\_\_\_

Date: \_\_\_\_\_

UMC 784.20 SUBSIDENCE CONTROL PLAN

Underground mining activities and the excavation of coal related products are not a part of this plan.

Coal was excavated from the reclamation area by previous owners and operators as shown on Plate 783.14-4. Most of the underground excavation was completed prior to the 1950's and, considering the shallow overburden, the affects of subsidence have probably already been realized. Excavations made in the 1970's by Utah Coal and Energy, Inc. are not extensive, but could potentially develop some surface cracking.

The Applicant will visually monitor mined out areas within the permit area for surface displacement during the bond release period. Should cracking occur to the extent that it becomes hazardous to area inhabitants, the Applicant will, after consulting the Division of Oil, Gas, and Mining, develop and implement appropriate remedial action.

**UMC 784.21 - FISH AND WILDLIFE PLAN****UMC 784.21(a) - MINIMIZE DISTURBANCES & ADVERSE IMPACT**

Summit Minerals plans to implement a fish and wildlife plan which will contain several measures to limit impacts to fish and wildlife during the initial phases of the reclamation project when activities will be at the highest level. The net overall effect of the reclamation work and revegetation will be to increase and enhance habitats for the wildlife of the area.

**AQUATIC WILDLIFE**

Because no impact to Chalk Creek is expected due to reclamation activities, no special mitigation plan is presented here. Chalk Creek will be monitored for water quality twice a year during the 10-year liability period to make sure that water quality is not being impacted by the reclamation efforts. During the initial phases of the reclamation work, particular care will be taken to minimize any disturbance to the stream channel and adjacent buffer zone because of work performed by equipment.

During the 10-year reclamation liability period, all drainage from the reclaimed area will pass through a sedimentation pond before being discharged into Chalk Creek. Therefore, the impact on the quality of the water in Chalk Creek will be minimal and there will be little, if any, affect on the biological community in the creek.

**TERRESTRIAL WILDLIFE**

The area to be reclaimed is basically devoid of vegetation and habitats for most types of wildlife. Therefore, the reclamation project and revegetation efforts can only have a positive affect on the wildlife of the area. The overall impact on the wildlife will be very positive and will more than compensate for any short term negative impacts to a few animals during the initial phases of the reclamation work.

### **Birds**

No impacts are expected on the birds of the area because of the reclamation project. Throughout the area, there are large areas of similar habitats, and because of the transient nature of birds they will not be stressed during the reclamation activities. The overall effect of the reclamation project on the birds will be to enlarge and enhance their habitats in the reclamation area.

### **Mammals**

Impacts on mammals could occur during sensitive periods in their life cycle. Two sensitive periods are common to most mammals; (1) when the young are born, and (2) when the young accompany their mother on initial foraging or hunting expeditions in order to learn how to survive. In general, these sensitive periods occur from late February to mid-August. Therefore, most of the reclamation work and revegetation will take place during late summer and early fall which commonly are not sensitive periods for the wildlife.

Small mammals may suffer some impacts during the initial phases of the reclamation efforts because of the work of equipment. There is a chance that burrows will be caved or their continuity changed because of fracturing of the strata. However, this will cause only a temporary alteration in the population density and age structure. With reduced human activity and increases and enhancement of favorable habitats, their recovery would be imminent and very rapid.

### **Amphibians**

Because of the wide range and distribution pattern of the amphibian species that may inhabit the reclamation area, it is doubtful that the reclamation and revegetation activities will seriously impact even a small portion of the population.

### **Reptiles**

The reptiles likely to be found in the reclamation area are found in many similar habitats and any impacts caused by the reclamation efforts will not seriously damage the population. However, if any denning sites are discovered during the reclamation activities, they will be preserved until proper procedures are implemented by UDWR personnel to either move the den site to a new location or the reclamation plan is modified so as not to disturb the den.

**UMC 784.21(a) - ENHANCEMENT OF FISH AND WILDLIFE**

The reclamation and revegetation plans have been formulated so as to enhance the wildlife habitat of the area. Areas will be reseeded and revegetated with native species that are proven for their value as winter browse for mule deer and as a bird habitat. Shrub islands will be created to provide new habitats for the wildlife. Revegetation rates for the woody plant species will be adequate to support the proposed post-mining land use of wildlife habitat. The most successful methods known at the time the reclamation begins will be used to reclaim the land.

**UMC 784.21(b) - MEASURES FOR PROTECTION OR ENHANCEMENT****UMC 784.21(b)(1) - Endangered Species (1973 Act)**

There are no known threatened or endangered species of mammals, reptiles, amphibians, fish, or plants in the reclamation area or in the immediate surrounding areas.

Two species of endangered raptors could be found in the reclamation area. These are the bald eagle and peregrine falcon. However, there are no known roosting trees or nesting sites within the reclamation area. Therefore, the reclamation project should not have any adverse affects on those raptors.

**UMC 784.21(b)(2) - Other Species**

Except as noted in this report, there are no other migratory birds, other animals, or habitats which are protected by State or Federal laws which occur within or near the reclamation site.

**UMC 784.21(b)(3) - Unusually High Value Habitats**

There are no known habitats of unusually high value for fish and wildlife currently in the reclamation area. The reclamation area does not currently contain any wet lands, riparian areas, cliff supporting raptors, areas which offer special shelter or protection, reproduction and nursery areas, or wintering areas.

The reclamation area has the potential for being a high value habitat for mule deer during the winter. However, at the present time

the area is of little value because of the lack of an adequate vegetative cover. The reclamation and revegetation efforts will, after plant life becomes fully established, provide new habitats for the mule deer during the winter. In order to fully establish such habitats it may be necessary to provide protective measures to limit the use of the area until it becomes stabilized.

## UMC 784.22 DIVERSIONS

### UMC 784.22 - Diversions

All diversions included in this reclamation plan are for the purpose of either diverting runoff away from or into the sedimentation pond. All diversions are therefore designed to pass a 10 year - 24 hour event. All diversions are temporary, and have been designed to minimize additional sediment contributions by minimizing gradients and stabilizing side slopes. Design criteria and details are included in the Hydrologic Evaluation Appendix in section 784.14 of this document. Channel profiles are shown on plate number 784.23-4 and referenced on plate number 784.23-2.

All diversions will be reclaimed at the time that the sedimentation pond is reclaimed, and in accordance with the revegetation plan included in this document.

No diversion has been designed to divert water into abandoned underground workings.

Stream channel diversions are not a part of this plan.

**UMC 784.23 OPERATION PLAN: MAPS AND PLANS**

**UMC 784.23(a) - Affected Lands**

The proposed permit area and disturbed area are shown on Plate number 784.23-1. This drawing shows the area as it exists now, including buildings, structures, and runoff control features. No changes to the facilities or features shown on this drawing are proposed in the interim period between submittal of this application and the proposed reclamation activities included in this document.

**UMC 784.23(b)(1) - Buildings and Facilities**

Buildings and facilities are shown on Plate number 784.23-1.

**UMC 783.23(b)(2) - Affected Lands**

See UMC 784.23(a).

**UMC 783.23(b)(3) - Bonded Land**

All land for which the performance bond is posted is shown on Plate number 784.23-1.

**UMC 784.23(b)(4) - Coal Storage, Cleaning, and Loading Areas**

Coal excavation is not a part of this plan.

**UMC 784.23(b)(5) - Topsoil, Spoil, and Waste**

The spoil pile from sedimentation pond excavation is shown on Plate number 784.23-2 in plan view and Plate number 784.23-3 in cross section.

**UMC 784.23(b)(6) - Water Diversion, Treatment, or Storage Facility**

Water diversions, treatment structures, and the sedimentation pond are shown on Plate number 784.23-2 in plan view and Plate numbers 784.23-3 and 784.23-4 in cross section.

**UMC 784.23(b)(7) - Coal Processing Waste**

Coal processing is not a part of this plan.

**UMC 784.23(b)(8) - Facilities for Fish and Wildlife Enhancement**

Facilities for the enhancement of fish and wildlife are not a part of this plan. Plant species selected for revegetation enhance wildlife forage.

**UMC 784.23(b)(9) - Explosive Storage Facilities**

The use of explosives is not a part of this plan.

**UMC 784.34(b)(10) - Location of Ponds, Impoundments, Waste Banks, and Embankments**

The sedimentation pond is shown on Plate number 784.23-2. Impoundments, waste banks and embankments are not a part of this plan.

**784.23(b)(11) - Regraded Surface Configuration**

The regraded surface configuration is shown on Plate number 784.23-2 in plan and Plate 784.23-3 in cross section.

**UMC 784.23(b)(12) - Monitoring Locations**

Water monitoring locations are shown on drawing number 783.16-1 on page 783.16-6 of this document. Subsidence monitoring is not a part of this plan.

**UMC 784.23(b)(13) - Location of Permanent Features and Facilities**

Permanent features and facilities are shown on Plate number 784.23-2.

**UMC 784.23(c) - Certification**

All maps, plans and cross sections submitted pursuant to this section have been certified by a registered professional engineer or professional geologist. Sedimentation pond and spoil pile maps, plans and cross-sections have been certified by a registered professional engineer.

**UMC 784.24 - TRANSPORTATION FACILITIES****UMC 784.24(a) - Specifications**

Road width, gradient, and surface material is shown in cross section on drawing number 784.24-1. Plan views are shown on Plate number 784.23-2. Plate number 784.23-2 shows the locations of drainageways in and around the roads.

**UMC 784.24(b) - Geotechnical Analysis**

The design of new roadways is not a part of this plan.

**UMC 784.24(c) - Alteration of Natural Drainageways**

The alteration or relocation of natural drainageways is not a part of this plan.

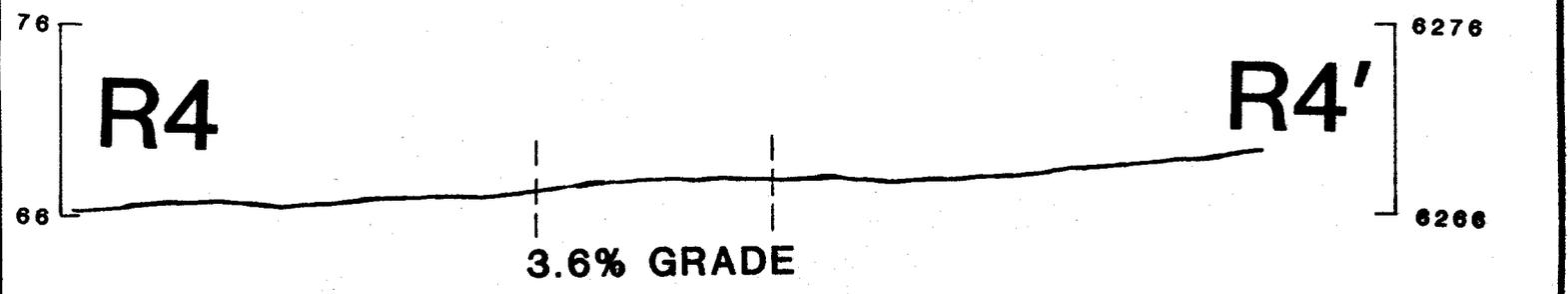
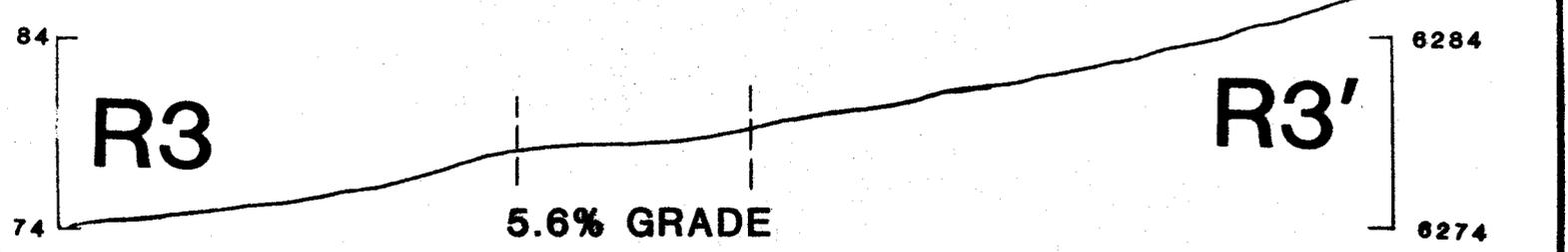
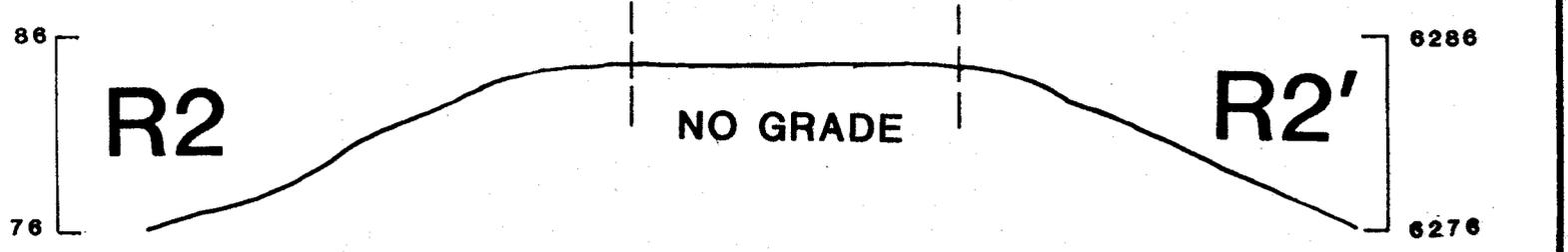
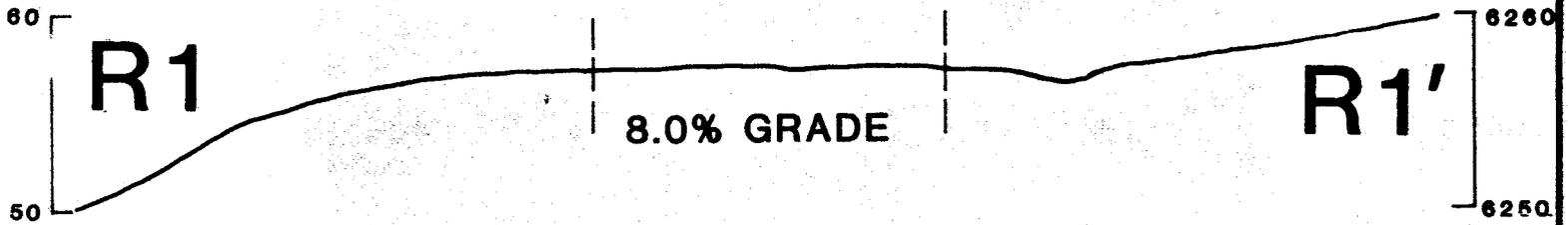
**UMC 784.24(d) - Ditch Relief**

Ditch relief culverts are not a part of this plan.

**UMC 784.24(e) - General Description**

The access road shown of Plate number 784.23-1 will not be significantly regraded during reclamation activities. The road configuration after reclamation is completed is shown on Plate number 784.23-2. Cross-sections, referenced on plate 784.23-2, are shown on drawing number 784.24-1.

The main access road accesses the buildings, which will be left after reclamation to support the post mining land use of grazing. The access road adjoins an east-west road which accesses the back country to the east and the natural gas pipeline and grazing land to the west. This road will also be left after reclamation to provide access to grazing lands.



WORK COPY VOL. 1 - 1986

NOTE: All roads are constructed of a gravelly loam soil type.  
 There are no significant pitch grades.  
 Erosion control measures are shown on the reference drawing.

THIS DRAWING WAS PREPARED UNDER MY SUPERVISION:

*[Signature]* #7007 11/6/86

BARBARA A. FILAS DATE  
 REGISTERED PROFESSIONAL ENGINEER, UTAH NO. 7007

<b>SUMMIT MINERALS, INC.</b>	
<b>ROAD CROSS SECTIONS</b>	
BAF 11/6/86	<b>784.24-1</b>
Scale: 1" : 10' H&V	
Ref.: 784.23-2	

**UMC 784.26 AIR POLLUTION CONTROL PLAN****UMC 784.26(a) - Monitoring Program**

The reclamation area is designated as a Class II area for preventing significant air quality deterioration. The proposed reclamation plan is not expected to significantly impact the air quality in the area. Fugitive dust is the only anticipated impact to air quality, and it will be minimized as described in part (b) of this section.

It is estimated (Aero-Vironment, 1977) that the average annual background level for total suspended particles (TSP) in northern rural Utah is 30 micrograms per cubic meter. This is significantly below the Federal secondary standard of 60 micrograms per cubic meter. Reclamation activities, using dust control methods described in section (b) as necessary, are not expected to cause TSP levels to exceed Federal standards, or exceed 20 percent opacity.

**UMC 784.26(b) - Fugitive Dust Control Plan**

Measures to control fugitive dust include, but will not be limited to:

1. The application of water when surface regrading and soil manipulation cause a significant increase in fugitive dust.
2. Restricting vehicular speed to reduce fugitive dust caused by travel.
3. Promptly revegetating, mulching, or otherwise stabilizing the surface of regraded areas.
4. Restricting the travel of unauthorized vehicles on other than established roads.
5. Minimizing the amount of time required for execution of reclamation activities.

**REFERENCE**

Aero-Vironment, Inc., 1977, Assemblage of Data on the Air Quality in Central and Southeastern Utah and Assessing the Impact of Coal Development in this Region on the Air Quality: Pasadena, California, Final Report.