~~Only 1 copy of~~
~~Stipulations~~

COAL PAP AMENDMENT/REVISION/NOV & EXPLORATION TRACKING FORM
(Revised: 9/14/87)

Type of Proposal:

PAP AMENDMENT ___
PAP REVISION ___
EXPLORATION ___
I. B. C. ___ (Incidental Boundary Change)

NOV #N ____ ____ ____ ____, # ____ OF ____
CO #C ____ ____ ____ ____, # ____ OF ____

Title of Proposal: Skyline Breakout - As Builts

Company Name: Utah Fuel Co.

Project or Mine Name:

File #: (INA / PRO / (ACT) / CEP) 007 / 005 -88 B 4 # New Acres:

Assigned Reviewers:

		Review Hours:	Tech Memo Drafted YES	NO
HYDROLOGY	RS / MD		( )	( )
BIOLOGY	LK		( )	( )
ENGINEER	JRH		(✓)	( )
SOILS	JSL	2	( )	( )
GEOLOGY	DD		( )	( )

*Please Check Appropriate Box!!

Dates:

(1) Initial Plan Received 04/28/88
Tech Review Due ~~08/04/88~~ operator to resubmit
Tech Review Complete
DOGM Response Sent
Optr. Response Due

(2) Optr. Response Rcvd. 7/19/88 - resubmittal
Tech Review Due 8/22/88
Tech Review Complete 8/22/88
DOGM Response Sent 8/26/88
Optr. Response Due

(3) Optr. Response Rcvd. 9/19/88
Tech Review Due 9/22/88
Tech Review Complete
DOGM Response Sent ~~9/26/88~~
Optr. Response Due

(4) Optr. Resubmission
Tech Review Due
Tech Review Compl.
DOGM Response Sent
Optr. Response Due

(5) Optr. Resp. Rcvd.
Tech Review Due
Tech Review Compl.
DOGM Response Sent
Optr. Response Due

Condtn'l Approval 9/30/88
Stipulations Due
Stips. Received 10/24/88
DOGM Response Sent 12/5/88
Final Apprvl. Sent

response due 11/1
response due 12/2
response received 1/30
review due 3/1/89

COMMENTS: BLM conc. 7/12/88
recvd 7/19 - archaeological survey need 8/1
REVISED MAPS RCVD 8/5/88 (deleting until FINAL APP in Box #4)

Norman H. Bangerter
Governor
Dee C. Hansen
Executive Director
Dianne R. Nielson, Ph.D.
Division Director

State of Utah
DEPARTMENT OF NATURAL RESOURCES
DIVISION OF OIL, GAS AND MINING

355 West North Temple
3 Triad Center, Suite 350
Salt Lake City, Utah 84180-1203
801-538-5340

February 2, 1989

TO: Susan C. Linner, Permit Supervisor

FROM: James Leatherwood, Reclamation Soil Specialist

RE: South Fork Break Out As-Builts, Utah Fuel Company, Skyline Mine, ACT/007/005, Folder #2, Carbon County, Utah

The As-built plans for the Skyline South Fork Breakout has been reviewed. The plan cannot be considered complete at this time. The following concern must be addressed.

UMC 817.25 Topsoil: Nutrients and Soil Amendments

The submittal does not include a soil nutrient or amendment plan. Nitrogen fertilizer must be distributed in those areas receiving straw mulch. Nitrogen and/or other specific amendments may need to be applied in the other areas to be revegetated. The plan must include the specific nutrient plan utilized and a fertilizer plan for future reclamation.

Reference & Fert TS. Plan.

cl
cc: R. Harden
L. Kunzler
BT51/46

3.2.11 South Fork Breakout Area

The Upper O'Connor seam required a breakout to improve ventilation. The breakout is on a south facing slope in a side canyon of the South Fork of Eccles Creek (see map 3.1.2-1).

Access to the breakout area is via an existing road up the South Fork of Eccles Creek to the Manti-LaSal National Forest boundary. From the Forest boundary on the road had been water barred and was reopened. Where the road leaves the main South Fork tributary it crosses two side drainages. Temporary 18" culverts were installed in these drainages during the construction period. The Forest Service road then continues up the side drainage. Approximately 600 feet up the side drainage a new class III life of project road was constructed for a distance of 75' across the drainage to the breakout area (see map 3.2.11-1). During installation of the culverts silt fence and/or straw bales dikes were placed downstream to control sediment in the stream.

As construction started on the project, the trees and brush were cleared from the road location. The top soil was then stripped from the road location and stored on the abandoned temporary Forest Service road above the construction area and on the small opening at the mouth of the canyon where the knob was removed. All of the topsoil was stored in lifts not to exceed 2' deep and then seeded to the approved seed mixture. After the top soil from the road location was removed, a 36" culvert was placed in the stream bed to provide a life of project crossing. The initial fill material over the culvert was hauled in from the mouth of the side canyon where a small knob was partially removed to help dress up an area. This also created a safe open area to burn slash created by the breakout construction. After the slash has been burned, the area will be dressed up and seeded with the approved seed mixture. No further activity is planned for this area unless there is fill material that was not used and is needed for final reclamation. The fill slopes of the fill covering the 36" culvert were seeded and covered with excelsior mats to help prevent erosion until the vegetation is

established. A flared inlet and a trash rack were installed on the culvert. The fill slope was rocked up to the high water line to also help protect the inlet and outlet. The culvert was bedded in washed gravel at the slope of the natural channel of 14.3%.

A track hoe removed the top soil from the breakout area so it could be stored in the storage area. As the subsoils were encountered, they were used to bring the new road up to grade. The new road was built with a 1-2% adverse grade from the existing road to the breakout area. Subsoil not used as road fill was stored on the small opening at the mouth of the canyon where the knob was removed. All of the stored soil was then seeded with the approved seed mix, and then a layer of straw mulch was applied.

The new road and the breakout area disturbed .42 acres, and the area where the knob was partially removed disturbed .19 acres, for a total new disturbance of .61 acres. The road that was reopened for access and to provide topsoil storage disturbed an additional .35 acres.

The breakout pad was constructed so that the surface drainage will drain into the mine where it will enter the normal mine drainage and will eventually enter the portal area sedimentation pond. A small seep was encountered during construction. A French drain was constructed to drain this seep into the creek drainage system.

A combination of silt fences and strawbales was used to treat the surface run-off from the disturbed area of the new road, the breakout pad and the topsoil and subsoil storage areas. The silt fences and strawbales were located as needed between the disturbed and undisturbed areas to treat run-off from the disturbed area. These silt fences and strawbales will be maintained until adequate vegetation is established.

The breakout portals are screened to prevent humans or animals from entering the mine. No exhaust fans or permanent activity is planned for this area once construction is finished.

Once the breakout portals were established, all of the disturbed areas were seeded and all of the roads on National Forest land were water barred and seeded. All seeding was done with the approved seed mixtures. One of the temporary 18" culverts was removed but left on site in case emergency access is needed back into the breakout area.

All slash created by the project was piled so it can be burned at a later date. All brush disposal will be in accordance with standard U.S. Forest Service requirements.

Once the breakout area has been faced up and the portals established, no further activities are planned or anticipated at the area until final reclamation begins, except for periodic inspections. The * culvert trash rack and portal high wall will be inspected at a minimum of three times a year: (1) early spring; (2) mid-summer at the beginning of the thunderstorm season, and (3) late fall before freeze-up.

4.6.5 SOUTH FORK BREAKOUT

Before any top soil was removed, all woody vegetation was removed from the project area. Soils are basically a sandy loam mixture and have been classified by the S.C.S. as Uinta Family loam/tozc Family fine Sandy loam. Core sampling in the area shows that the soils vary in depth from 24-36+" in depth.

After the vegetation had been removed, the A&B horizons of soil were removed using a track hoe. The track hoe stacked the soil where a front-end loader picked it up and transported it to the storage area on * the abandoned temporary Forest Service road and on the small opening at the mouth of the canyon where the knob was removed. The front-end loader spread the soil in approximately two foot lifts. By handling the soil in this manner, it will not be compacted in the storage area and the roots of the revegetation plants will penetrate the entire depth of the soil. This will allow the soil to maintain itself as viable top soil to be used during final reclamation. It is estimated that approximately 2990 cubic yards of topsoil was removed and stored.

As subsoils were encountered, they were used to bring the new access road up to grade. Subsoil not used as road was also stored on the * small opening at the mouth of the canyon where the knob was removed. It is estimated that approximately 2840 cubic yards of subsoil were removed. Approximately 1820 cubic yards of the subsoil were used in the road fill and the remaining 1020 cubic yards were stored for final reclamation.

As the coal in the coal seam was encountered, it was hauled out so as to eliminate the possibility of spontaneous combustion occurring.

Once the construction was complete, all of the disturbed areas were seeded and all the roads that are on National Forest Lands and the disturbed areas were water barred and seeded with the mixture shown on Table 4.6-1. A combination of silt fences and strawbales were used to

treat surface run-off from the disturbed area of the new road, the breakout pad and the topsoil-subsoil storage areas until adequate vegetation is established. The silt fences and strawbales were located as needed between the disturbed and undisturbed areas to treat run-off from the disturbed area.

At the end of the life of mine, the road into the breakout site will be reopened. The portals will be sealed as outlined in section 4.9. The area will then be returned to approximate original contour and the highwall eliminated by front end loaders and track hoe type equipment. First the subsoil from the storage area and road will be * uniformly placed in the breakout area. The top soil will then be uniformly distributed over the area. If additional fill material is needed, the remainder of the small knob at the mouth of the canyon may be used.

The soil will be spread in a manner to provide a roughened surface so that seed, fertilizer, and mulch can remain during germination and initial growth of the seedlings. Raking the surface prior to planting may also be needed to provide the necessary roughened surface.

Power transmission lines for underground mining and related activities in the permit area were designed and constructed to comply with the guidelines set forth in "Environmental Criteria for Electric Transmission System" (USDI, USDA (1970)). Power distribution was designed and constructed in accordance with REA Bulletin 61-10 "Powerline Contacts by Eagles and Other Large Birds."

If necessary, a wire fence will be erected and maintained around the perimeter of the portal area or portions thereof to protect grazing stock and wildlife. The fence design will be submitted to the regulatory authority prior to construction. Other ventilation shafts and structures will be similarly fenced, covered or otherwise protected if required. While the ponds contain no toxic-forming materials, the Permittee agrees to exclude wildlife from such ponds should it become necessary. No persistent pesticides will be used unless approved by the regulatory authority as part of a reclamation management plan.

The Permittee also agrees to participate in the prevention, suppression, and control of forest, range, and coal fires, even though these fires may not be part of an approved management plan. The Permittee on occasion conducts a conservation training program for mine employees. This program conducted by personnel of the Utah Division of Wildlife Resources has been included as part of the routine mine training schedule.

Additional information on wildlife can be found in this document in Section 2.9 - TERRESTRIAL WILDLIFE, and Section 2.10 - RAPTORS.

The South Fork Breakout is located in an Elk Calving area. Construction of the face up area should be done after calving season. The tributary to South Fork is a contributing stream for aquatic insect drift to the fishery in Eccles Creek. Construction operations will be done in a manner to minimize disturbances and influences on the stream.

4.19.7 DIVERSION CHANNEL AT ROCK DISPOSAL SITE

A diversion channel has been installed as shown on Map 4.16.1-13. The swale to redirect the drainage across the access road and into the original stream channel will be constructed of concrete as shown in Figure 4.19.7-1.

The swale outlet will be lined with 4 inch x 4 inch or larger rock to reduce exit velocity of water from the swale. Engineering calculations for the waste disposal site channel design are included in Appendix Volume A-3.

4.19.8 SOUTH FORK BREAKOUT

A new road was constructed which crossed a drainage way to the South Fork of Eccles Creek. This drainage way flows in all but extremely dry years. When the creek crossing was constructed, the top soil was removed with a track hoe to help minimize disturbance to the channel itself. The culvert was placed in the existing channel, and then the road fill placed over it.

During reclamation the fill material will be removed and then the culvert lifted out of the channel. Top soil will then be placed back on the disturbed area with a track hoe and the area reseeded. Although no permanent disturbance to the channel is planned or expected, if it should occur, it will be riprapped with a gradation of material from 4" to a maximum size of 38".

All culverts used for access to the area will be completely removed from the area during final reclamation.

This final reclamation plan outlines the minimum reclamation to be accomplished. At the time of final reclamation, a meeting will be held with the U.S. Forest Service to determine if additional reclamation work over-and-above that outlined in the plan is needed.

Riparian zones were revegetated with handset seedlings of yellow willow, blue spruce, Woods rose and American red raspberry at intervals of 1/2-1 meter. Table 4.7-3 lists the seed mixture spread on the inter-spaces. Steep slopes which have been rip-rapped were not revegetated.

4.7.2 Final Reclamation Seeding Tillage and Mulching, Portal Train Loadout Areas, and other small areas

Seed mixture for final reclamation are shown on Tables 4.7-4, 4.7-5, and 4.7-6.

Seeding of the south-facing slopes (1h:3v) or lower flat areas will be conducted using a cyclone spreader. For slopes less than 2h:1v, seeding will be accomplished using a hydro-seeder. Plantings of shrubs and trees will be hand-set to ensure a plant cover of a permanent nature. Slopes of 2h:1v or steeper will be revegetated by hand-set planting techniques.

Tillage practices on level ground and on slopes flatter than 10h:1v will include leveling and tilling. Slopes of 10h:1v up to 3h:1v will be mulched using 1,000 pounds per acre of straw or other inert mulch material which will be anchored by crimping. Slopes steeper than 3h:1v will be treated with hydro mulch. All hydro mulch will be applied at the rate of 2,000 pounds per acre plus 140 pounds of tacifer per acre.

Planting on slopes less than 10h:1v will be accomplished by drilling seed with a mechanical drill. Slopes between 10h:1v and 1.5h:1v will be seeded by hand broadcast and manually buried by raking. Mulch will be applied over the hand broadcast seed. The Permittee elects to revegetate areas with slopes greater than 1.5h:1v without topsoil; such areas will be treated to handset plantings in basins filled with topsoil and with hydromulch seeding in between. Where the substrate consists of outcroppings of stone, no attempt will be made to revegetate.

Replaces	Text
Section 4.7.2 Pg 4-30	Section 4.7.2 Pg 4-30 dtd 7/15/87

Table 4.7-7

The acreage and proportion of each disturbance area is as follows:

	Vegetation	Acreage	%
Loadout	Grass/Forb	6.8	76
	Spruce/Fir	2.2	24
		9.0	100
Portal Yard	Aspen	6.8	22
	Spruce/Fir	14.0	45
	Sagebrush	2.5	8
	Disturbed	7.8	25
		31.1	100
Water Tank and Well Pads	Aspen	.2	100
Conveyor Route	Sagebrush	3.8	63
	Aspen/Conifer	2.2	37
		6.0	100
Waste Rock Disposal	Already Disturbed	1.3	100
South Fork Breakout	Aspen	.3	31
	Spruce/Fir	.66	69
		.96	100

		48.6	

Mine Access Road

The mine access road is classified as a Class I road and runs from the Mine #3 portal to the maintenance complex area. Drawings 3.2.4-1 and 3.2.6-2A show a typical cross-section of the mine access road and related ditches. Since the length of the road is approximately 1,200 feet, no road culverts were installed. As shown in the design, the steepest portion of the access road is a 10.0% grade sustained for 250 feet. No other grades on the access road exceed 10.0%. There are no switchbacks on the access road. None of the access road cut exceeds 1h:1v in unconsolidated material and .025h:1v in rock. The access road is to be 20 feet wide with a 4 foot height berm at the shoulder. The road is flat with a drainage ditch against the highwall. The drainage ditch has been designed to safely pass the peak from a 10 year, 24 hour precipitation event. No trash racks and debris basins have been installed, as the ditch will be cleaned periodically. The road is surfaced with crushed gravel. Once mining is completed, the road will be topsoiled and terraces will be constructed to prevent soil erosion.

Water Tank Access Road

Access to the water tank area is via Utah State Highway SR-264.

Breakout Area Access Road

The road which was constructed to obtain access to the breakout area in the South Fork of Eccles Creek will be reopened during final reclamation. After the face up area has been reclaimed, the new temporary access road, the small opening at the mouth of the canyon and the road where the topsoil was stored, will be returned to the approximate original contour and seeded with the approved seed mixture.

*

Replaces	Text
Sec. 4.20.1, Pg 4-93, dtd	Sec. 4.20.1, Pg 4-93, dd 4/25/88

*Denotes change or addition

The access road up the side canyon will be reopened to accomplish final reclamation work at the breakout area. After reclamation work is completed at the breakout area, the road will be returned to approximate contour and seeded with the approved seed mixture. All culverts and the trash rack used in the project will be removed from the area. All disturbed areas will be seeded as outlined in section 4.7.2.

The road from the Forest boundary to the mouth of the side canyon will be ripped, outsloped, water barred, and blocked so that vehicle traffic cannot use the road.

4.20.2 Overland Conveyor Belt

The location of the upper two-thirds of the conveyor is on a bench on the north slope of Eccles Canyon, while the lower one-third will be supported by towers and trusses. The steepest portion of the conveyor is a negative 26.33 percent grade sustained for 430 feet. The average negative grade of the conveyor route is 9.39 percent and the average positive grade is 8.37 percent. Cut slopes along the route do not exceed 1h:1v in unconsolidated materials and 1h:4v in rock. As part of the air quality control program, the belt and transfer points will be enclosed to reduce fugitive dust.

Replaces	Text
	Sec. 4.10.1, Pg 4-93a, dtd 4/25/88

*Denotes change or addition

3.4 AREA AFFECTED BY EACH PHASE OF OPERATIONS

The area affected by the Skyline Mines project can be divided into two major categories:

(a) Surface acreage disturbed by construction/installation of coal handling and associated facilities, and
(b) Surface acreage overlying underground mine workings.

Disturbed Surface Acreage

The offices, bathhouse, workshop, portal, fans, and other necessary facilities utilize a site of 31.1 acres. Approximately .26 acres is used for water tank bench. The coal loading and handling facility at the mouth of Eccles Canyon utilizes approximately 9.0 acres, of which a sedimentation pond requires 0.6 acres. The enclosed conveyor belt, transporting material from the mining portals to loading points, has disturbed 6.0 acres. The Scofield waste rock disposal site utilizes 1.3 acres. The South Fork Breakout area has disturbed approximately .96 acres. In total, the surface acres disturbed are 48.6 acres. The disturbed permitted area and bonded area for the mine portal area and loadout area are shown on Maps 3.2.1-1 and 3.2.1-3, respectively.

The pre-mining phase of earth work and dirt removal commenced in the spring of 1980 and was completed in 1981. The actual construction and installation of facilities necessary for coal mining and handling began in early 1981.

Area Overlying Underground Mining

Interpretation of the available geological data and bore holes information indicates that certain portions of all three seams within the leasehold are non-mineable. Total acreage values for mineable acreage do not include such areas. Surface area to be affected by underground mining is shown in Section 4.17 Subsidence Control Plan.

TABLE 4.2-1 (cont'd)
RECLAMATION TIMETABLE

YEAR(S)	AREA DESCRIPTION/ACTIVITY	RECLAIMED ACRES
2016 (continued)	Lower Bench	
	-Crusher	
	-Rock and Coal Bypass	
	-Sampling Stations	
	-Conveyors	
	-Truck Loadout	
	-Substations	
	-Mine No. 3 Portal Areas	
	-Drainage Considerations	
	Culvert Removal or Filling	
	Ditch Filling	
	Drainage Reconstructing	9.8
	Scofield Disposal Site	
	Disposal Area	2.3
*	South Fork Breakout	.96
	Loadout Site	
	Parking Area	
	Silos	
	Substation	
	Drainage Considerations	
	-Culvert Removal or Filling	
	-Ditch Filling	
	-Drainage Reconstructing	8.7

Replaces	Text
Table 4.2-1 Page 4-8	Table 4.2-1 Page 4-8 dtd 7/18/88

*Denotes change or addition

TABLE 4.3-2 (continued)

ESTIMATED RECLAMATION COSTS

PHASE	Area Description	No. of Acres	Concrete and/or Blacktop Removal	Back-filling	Grading	Ripping	Topsoil Additions	Fertil-ization and/or Neutral-ization	Seeding and Tree Planting	Moisture Retention	Maintenance and Monitoring	TOTAL
ABANDONMENT	LOADOUT SITE	8.7	--	45,070	6,930	1,560	64,050	8,700	3,480	6,960	8,700	137,620
	Silos (4)		64,700	--	--	--	--	--	--	--	--	64,700
	Railcar Loadout		2,630	--	--	--	--	--	--	--	--	2,630
	Sedimentation Pond Backfill		1,540	--	--	--	--	--	--	--	--	1,540
	Paving		12,440	--	--	--	--	--	--	--	--	12,440
	Subtotal (Loadout - Abandonment Phase)		81,310	45,070	6,930	1,560	64,050	8,700	3,480	6,960	8,700	$218,930
	WASTE ROCK DISPOSAL SITE	2.3	--	--	11,400	870	43,060	230	920	1,840	2,300	60,620
	Subtotal (Waste Rock Abandonment Phase)		--	--	11,400	870	43,060	230	920	1,840	2,300	60,620
	SOUTH FORK BREAKOUT AREA	.96	--	8,500	3,400	600	3,700	300	360	750	1,600	19,210
	Subtotal (South Fork Abandonment Phase)		--	8,500	3,400	600	3,700	300	360	750	1,600	19,210
	Sub-Total Abandonment Phase		131,450	192,990	151,580	16,440	218,000	4,090	15,440	30,910	34,300	$804,625

TABLE 4.3-2 (continued)

ESTIMATED RECLAMATION COSTS

PHASE	Area Description	No. of Acres	Concrete and/or Blacktop Removal	Back-filling	Grading	Ripping	Topsoil Additions	Fertil-ization and/or Neutral-ization	Seeding and Tree Planting	Moisture Retention	Maintenance and Monitoring	TOTAL
	BUILDING AND EQUIPMENT REMOVAL		621,030	(Building removal)								621,030
ABANDONMENT	Subtotal (Removal-Abandonment Phase)		621,030									621,030
	TOTAL ABANDONMENT PHASE		752,480	192,990	151,380	16,440	218,020	4,090	15,440	30,910	34,300	1,416,050
	Contingency (10%)											141,605
	Sub Total											$1,557,655
	Inflation Factor (1.97% per year)											155,765
	PROJECT TOTAL											$1,713,420

3.2.11 South Fork Breakout Area

The Upper O'Connor seam required a breakout to improve ventilation. The breakout is on a south facing slope in a side canyon of the South Fork of Eccles Creek (see map 3.1.2-1).

Access to the breakout area is via an existing road up the South Fork of Eccles Creek to the Manti-LaSal National Forest boundary. From the Forest boundary on the road had been water barred and was reopened. Where the road leaves the main South Fork tributary it crosses two side drainages. Temporary 18" culverts were installed in these drainages during the construction period. The Forest Service road then continues up the side drainage. Approximately 600 feet up the side drainage a new class III life of project road was constructed for a distance of 75' across the drainage to the breakout area (see map 3.2.11-1). During installation of the culverts silt fence and/or straw bales dikes were placed downstream to control sediment in the stream.

As construction started on the project, the trees and brush were cleared from the road location. The top soil was then stripped from the road location and stored on the abandoned temporary Forest Service road above the construction area and on the small opening at the mouth of the canyon where the knob was removed. All of the topsoil was stored in lifts not to exceed 2' deep and then seeded to the approved seed
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As the coal in the coal seam was encountered, it was hauled out so as to eliminate the possibility of spontaneous combustion occurring.

Once the construction was complete, all of the disturbed areas were seeded and all the roads that are on National Forest Lands and the disturbed areas were water barred and seeded with the mixture shown on Table 4.6-1. A combination of silt fences and strawbales were used to

treat surface run-off from the disturbed area of the new road, the breakout pad and the topsoil-subsoil storage areas until adequate vegetation is established. The silt fences and strawbales were located as needed between the disturbed and undisturbed areas to treat run-off from the disturbed area.

At the end of the life of mine, the road into the breakout site will be reopened. The portals will be sealed as outlined in section 4.9. The area will then be returned to approximate original contour and the highwall eliminated by front end loaders and track hoe type equipment. First the subsoil from the storage area and road will be * uniformly placed in the breakout area. The top soil will then be uniformly distributed over the area. If additional fill material is needed, the remainder of the small knob at the mouth of the canyon may be used.

The soil will be spread in a manner to provide a roughened surface so that seed, fertilizer, and mulch can remain during germination and initial growth of the seedlings. Raking the surface prior to planting may also be needed to provide the necessary roughened surface.

Power transmission lines for underground mining and related activities in the permit area were designed and constructed to comply with the guidelines set forth in "Environmental Criteria for Electric Transmission System" (USDI, USDA (1970)). Power distribution was designed and constructed in accordance with REA Bulletin 61-10 "Powerline Contacts by Eagles and Other Large Birds."

If necessary, a wire fence will be erected and maintained around the perimeter of the portal area or portions thereof to protect grazing stock and wildlife. The fence design will be submitted to the regulatory authority prior to construction. Other ventilation shafts and structures will be similarly fenced, covered or otherwise protected if required. While the ponds contain no toxic-forming materials, the Permittee agrees to exclude wildlife from such ponds should it become necessary. No persistent pesticides will be used unless approved by the regulatory authority as part of a reclamation management plan.

The Permittee also agrees to participate in the prevention, suppression, and control of forest, range, and coal fires, even though these fires may not be part of an approved management plan. The Permittee on occasion conducts a conservation training program for mine employees. This program conducted by personnel of the Utah Division of Wildlife Resources has been included as part of the routine mine training schedule.

Additional information on wildlife can be found in this document in Section 2.9 - TERRESTRIAL WILDLIFE, and Section 2.10 - RAPTORS.

The South Fork Breakout is located in an Elk Calving area. Construction of the face up area should be done after calving season. The tributary to South Fork is a contributing stream for aquatic insect drift to the fishery in Eccles Creek. Construction operations will be done in a manner to minimize disturbances and influences on the stream.

4.19.7 DIVERSION CHANNEL AT ROCK DISPOSAL SITE

A diversion channel has been installed as shown on Map 4.16.1-13. The swale to redirect the drainage across the access road and into the original stream channel will be constructed of concrete as shown in Figure 4.19.7-1.

The swale outlet will be lined with 4 inch x 4 inch or larger rock to reduce exit velocity of water from the swale. Engineering calculations for the waste disposal site channel design are included in Appendix Volume A-3.

4.19.8 SOUTH FORK BREAKOUT

A new road was constructed which crossed a drainage way to the South Fork of Eccles Creek. This drainage way flows in all but extremely dry years. When the creek crossing was constructed, the top soil was removed with a track hoe to help minimize disturbance to the channel itself. The culvert was placed in the existing channel, and then the road fill placed over it.

During reclamation the fill material will be removed and then the culvert lifted out of the channel. Top soil will then be placed back on the disturbed area with a track hoe and the area reseeded. Although no permanent disturbance to the channel is planned or expected, if it should occur, it will be riprapped with a gradation of material from 4" to a maximum size of 38". REF. CALCS

All culverts used for access to the area will be completely removed from the area during final reclamation.

This final reclamation plan outlines the minimum reclamation to be accomplished. At the time of final reclamation, a meeting will be held with the U.S. Forest Service to determine if additional reclamation work over-and-above that outlined in the plan is needed.

Riparian zones were revegetated with handset seedlings of yellow willow, blue spruce, Woods rose and American red raspberry at intervals of 1/2-1 meter. Table 4.7-3 lists the seed mixture spread on the inter-spaces. Steep slopes which have been rip-rapped were not revegetated.

4.7.2 Final Reclamation Seeding Tillage and Mulching, Portal Train Loadout Areas, and other small areas

Seed mixture for final reclamation are shown on Tables 4.7-4, 4.7-5, and 4.7-6.

Seeding of the south-facing slopes (1h:3v) or lower flat areas will be conducted using a cyclone spreader. For slopes less than 2h:1v, seeding will be accomplished using a hydro-seeder. Plantings of shrubs and trees will be hand-set to ensure a plant cover of a permanent nature. Slopes of 2h:1v or steeper will be revegetated by hand-set planting techniques.

Tillage practices on level ground and on slopes flatter than 10h:1v will include leveling and tilling. Slopes of 10h:1v up to 3h:1v will be mulched using 1,000 pounds per acre of straw or other inert mulch material which will be anchored by crimping. Slopes steeper than 3h:1v will be treated with hydro mulch. All hydro mulch will be applied at the rate of 2,000 pounds per acre plus 140 pounds of tacifer per acre.

Planting on slopes less than 10h:1v will be accomplished by drilling seed with a mechanical drill. Slopes between 10h:1v and 1.5h:1v will be seeded by hand broadcast and manually buried by raking. Mulch will be applied over the hand broadcast seed. The Permittee elects to revegetate areas with slopes greater than 1.5h:1v without topsoil; such areas will be treated to handset plantings in basins filled with topsoil and with hydromulch seeding in between. Where the substrate consists of outcroppings of stone, no attempt will be made to revegetate.

Replaces	Text
Section 4.7.2 Pg 4-30	Section 4.7.2 Pg 4-30 dtd 7/15/87

Table 4.7-7

The acreage and proportion of each disturbance area is as follows:

	Vegetation	Acreage	%
Loadout	Grass/Forb	6.8	76
	Spruce/Fir	2.2	24
		9.0	100
Portal Yard	Aspen	6.8	22
	Spruce/Fir	14.0	45
	Sagebrush	2.5	8
	Disturbed	7.8	25
		31.1	100
Water Tank and Well Pads	Aspen	.2	100
Conveyor Route	Sagebrush	3.8	63
	Aspen/Conifer	2.2	37
		6.0	100
Waste Rock Disposal	Already Disturbed	1.3	100
South Fork Breakout	Aspen	.3	31
	Spruce/Fir	.66	69
		.96	100

		48.6	

Mine Access Road

The mine access road is classified as a Class I road and runs from the Mine #3 portal to the maintenance complex area. Drawings 3.2.4-1 and 3.2.6-2A show a typical cross-section of the mine access road and related ditches. Since the length of the road is approximately 1,200 feet, no road culverts were installed. As shown in the design, the steepest portion of the access road is a 10.0% grade sustained for 250 feet. No other grades on the access road exceed 10.0%. There are no switchbacks on the access road. None of the access road cut exceeds 1h:1v in unconsolidated material and .025h:1v in rock. The access road is to be 20 feet wide with a 4 foot height berm at the shoulder. The road is flat with a drainage ditch against the highwall. The drainage ditch has been designed to safely pass the peak from a 10 year, 24 hour precipitation event. No trash racks and debris basins have been installed, as the ditch will be cleaned periodically. The road is surfaced with crushed gravel. Once mining is completed, the road will be topsoiled and terraces will be constructed to prevent soil erosion.

Water Tank Access Road

Access to the water tank area is via Utah State Highway SR-264.

Breakout Area Access Road

The road which was constructed to obtain access to the breakout area in the South Fork of Eccles Creek will be reopened during final
* reclamation. After the face up area has been reclaimed, the new temporary access road, the small opening at the mouth of the canyon and the road where the topsoil was stored, will be returned to the approximate original contour and seeded with the approved seed mixture.

Replaces	Text
Sec. 4.20.1, Pg 4-93, dtd	Sec. 4.20.1, Pg 4-93, dd 4/25/88

*Denotes change or addition

The access road up the side canyon will be reopened to accomplish final reclamation work at the breakout area. After reclamation work is completed at the breakout area, the road will be returned to approximate contour and seeded with the approved seed mixture. All culverts and the trash rack used in the project will be removed from the area. All disturbed areas will be seeded as outlined in section 4.7.2.

The road from the Forest boundary to the mouth of the side canyon will be ripped, outsloped, water barred, and blocked so that vehicle traffic cannot use the road.

4.20.2 Overland Conveyor Belt

The location of the upper two-thirds of the conveyor is on a bench on the north slope of Eccles Canyon, while the lower one-third will be supported by towers and trusses. The steepest portion of the conveyor is a negative 26.33 percent grade sustained for 430 feet. The average negative grade of the conveyor route is 9.39 percent and the average positive grade is 8.37 percent. Cut slopes along the route do not exceed 1h:1v in unconsolidated materials and 1h:4v in rock. As part of the air quality control program, the belt and transfer points will be enclosed to reduce fugitive dust.

Replaces	Text
	Sec. 4.10.1, Pg 4-93a, dtd 4/25/88

*Denotes change or addition

3.4 AREA AFFECTED BY EACH PHASE OF OPERATIONS

The area affected by the Skyline Mines project can be divided into two major categories:

(a) Surface acreage disturbed by construction/installation of coal handling and associated facilities, and
(b) Surface acreage overlying underground mine workings.

Disturbed Surface Acreage

The offices, bathhouse, workshop, portal, fans, and other necessary facilities utilize a site of 31.1 acres. Approximately .26 acres is used for water tank bench. The coal loading and handling facility at the mouth of Eccles Canyon utilizes approximately 9.0 acres, of which a sedimentation pond requires 0.6 acres. The enclosed conveyor belt, transporting material from the mining portals to loading points, has disturbed 6.0 acres. The Scofield waste rock disposal site utilizes 1.3 acres. The South Fork Breakout area has disturbed approximately .96 acres. In total, the surface acres disturbed are 48.6 acres. The disturbed permitted area and bonded area for the mine portal area and loadout area are shown on Maps 3.2.1-1 and 3.2.1-3, respectively.

The pre-mining phase of earth work and dirt removal commenced in the spring of 1980 and was completed in 1981. The actual construction and installation of facilities necessary for coal mining and handling began in early 1981.

Area Overlying Underground Mining

Interpretation of the available geological data and bore holes information indicates that certain portions of all three seams within the leasehold are non-mineable. Total acreage values for mineable acreage do not include such areas. Surface area to be affected by underground mining is shown in Section 4.17 Subsidence Control Plan.

TABLE 4.2-1 (cont'd)

RECLAMATION TIMETABLE

YEAR(S)		AREA DESCRIPTION/ACTIVITY	RECLAIMED ACRES
2016 (continued)		Lower Bench	
		-Crusher	
		-Rock and Coal Bypass	
		-Sampling Stations	
		-Conveyors	
		-Truck Loadout	
		-Substations	
		-Mine No. 3 Portal Areas	
		-Drainage Considerations	
		Culvert Removal or Filling	
		Ditch Filling	
		Drainage Reconstructing	9.8
		Scofield Disposal Site	
		Disposal Area	2.3
	*	South Fork Breakout	.96
		Loadout Site	
		Parking Area	
		Silos	
		Substation	
		Drainage Considerations	
		-Culvert Removal or Filling	
		-Ditch Filling	
		-Drainage Reconstructing	8.7

Replaces	Text
Table 4.2-1 Page 4-8	Table 4.2-1 Page 4-8 dtd 7/18/88

*Denotes change or addition

TABLE 4.3-2 (continued)

ESTIMATED RECLAMATION COSTS

PHASE	Area Description	No. of Acres	Concrete and/or Blacktop Removal	Back-filling	Grading	Ripping	Topsoil Additions	Fertil-ization and/or Neutral-ization	Seeding and Tree Planting	Moisture Retention	Maintenance and Monitoring	TOTAL
ABANDONMENT	LOADOUT SITE	8.7	--	45,070	6,930	1,560	64,050	8,700	3,480	6,960	8,700	137,620
	Silos (4)		64,700	--	--	--	--	--	--	--	--	64,700
	Railcar Loadout		2,630	--	--	--	--	--	--	--	--	2,630
	Sedimentation Pond Backfill		1,540	--	--	--	--	--	--	--	--	1,540
	Paving		12,440	--	--	--	--	--	--	--	--	12,440
	Subtotal (Loadout - Abandonment Phase)		81,310	45,070	6,930	1,560	64,050	8,700	3,480	6,960	8,700	$218,930
	WASTE ROCK DISPOSAL SITE	2.3	--	--	11,400	870	43,060	230	920	1,840	2,300	60,620
	Subtotal (Waste Rock Abandonment Phase)		--	--	11,400	870	43,060	230	920	1,840	2,300	60,620
	SOUTH FORK BREAKOUT AREA	.96	--	8,500	3,400	600	3,700	300	360	750	1,600	19,210
	Subtotal (South Fork Abandonment Phase)		--	8,500	3,400	600	3,700	300	360	750	1,600	19,210
	Sub-Total Abandonment Phase		131,450	192,990	151,580	16,440	218,000	4,090	15,440	30,910	34,300	$804,625

TABLE 4.3-2 (continued)

ESTIMATED RECLAMATION COSTS

PHASE	Area Description	No. of Acres	Concrete and/or Blacktop Removal	Back-filling	Grading	Ripping	Topsoil Additions	Fertil-ization and/or Neutral-ization	Seeding and Tree Planting	Moisture Retention	Maintenance and Monitoring	TOTAL
ABANDONMENT	BUILDING AND EQUIPMENT REMOVAL		621,030	(Building removal)								621,030
	Subtotal (Removal-Abandonment Phase)		621,030									621,030
	TOTAL ABANDONMENT PHASE		752,480	192,990	151,380	16,440	218,020	4,090	15,440	30,910	34,300	1,416,050
	Contingency (10%)											141,605
	Sub Total											$1,557,655
	Inflation Factor (1.97% per year)											155,765
	PROJECT TOTAL											$1,713,420

~~Orig + 4 cpys of~~
~~stips received~~

COAL PAP AMENDMENT/REVISION/NOV & EXPLORATION TRACKING FORM
(Revised: 9/14/87)

Type of Proposal:

PAP AMENDMENT ↘
PAP REVISION ____
EXPLORATION ____
I. B. C. ____ (Incidental Boundary Change)

NOV #N ____ ____ ____ ____, # ____ OF ____
CO #C ____ ____ ____ ____, # ____ OF ____

Title of Proposal: Skyline Breakout

Company Name: Utah Fuel Co.

Project or Mine Name: ____

File #: (INA / PRO / (ACT) / CEP) 007 / 005 -88 B3 # New Acres: ____

Assigned Reviewers:		Review Hours:	Tech Memo Drafted YES	NO
HYDROLOGY	RS / MD		( )	( )
BIOLOGY	LK		( )	( )
ENGINEER	JRH		( )	( )
SOILS	JSL		( )	( )
GEOLOGY	DD		( )	( )

*Please Check Appropriate Box!!

Dates:

(1) Initial Plan Received 04/28/88
Tech Review Due ~~08/28/88~~ operator to resubmit
Tech Review Complete ____
DOGM Response Sent ____
Optr. Response Due ____

(2) Optr. Response Rcvd. 7/19/88 - resubmittal
Tech Review Due 8/22/88
Tech Review Complete 8/22/88
DOGM Response Sent 8/26/88
Optr. Response Due ____

(3) Optr. Response Rcvd. 9/19/88
Tech Review Due 9/30/88
Tech Review Complete ____
DOGM Response Sent ~~9/26/88~~
Optr. Response Due ____

(4) Optr. Resubmission ____
Tech Review Due ____
Tech Review Compl. ____
DOGM Response Sent ____
Optr. Response Due ____

(5) Optr. Resp. Rcvd. ____
Tech Review Due ____
Tech Review Compl. ____
DOGM Response Sent ____
Optr. Response Due ____

Condtn'l Approval 9/30/88
Stipulations Due ____
Stips. Received 10/24/88
DOGM Response Sent 12/5/88
Final Apprvl. Sent ____

response due 11/14
response due 12/20
response received 1/30
review due 3/1/89

COMMENTS: BLM concl. 7/12/88
review 7/19 - archaeological survey rec'd 8/1
REVISED MAPS RECD 9/5/88 (HOLDING UNTIL FINAL APP in BOX #4)

8946R-2

File ACT/007/005-88D
pending

Utah Fuel Company
a subsidiary of The Coastal Corporation
P.O. Box 719 • Helper, Utah 84526 • (801) 637-7925
Salt Lake (801) 596-7111

GLEN A. ZUMWALT
Vice President and
General Manager

January 26, 1989

Lowell P. Braxton
Reclamation Administrator
Division of Oil, Gas & Mining
355 West North Temple
3 Triad Center, Suite 350
Salt Lake City, Utah 84180-1203

Dear Mr. Braxton,

Enclosed are 14 copies of pages 3-64a, 3-64b, 3-64c, 3-67, 4-8, 4-26a, 4-26b, 4-84, 4-90, 4-30, 4-37, 4-93, 4-93a, table 4.3-2 and map 3.2.11-1 showing the "as built" for the South Fork Breakout area.

If you need any additional information, please contact us.

Sincerely,

for Lamar Shuler

Glen A. Zumwalt
Vice President/General Manager

GAZ:KZ:lm

Enclosure

3.2.11 South Fork Breakout Area

The Upper O'Connor seam required a breakout to improve ventilation. The breakout is on a south facing slope in a side canyon of the South Fork of Eccles Creek (see map 3.1.2-1).

Access to the breakout area is via an existing road up the South Fork of Eccles Creek to the Manti-LaSal National Forest boundary. From the Forest boundary on the road had been water barred and was reopened. Where the road leaves the main South Fork tributary it crosses two side drainages. Temporary 18" culverts were installed in these drainages during the construction period. The Forest Service road then continues up the side drainage. Approximately 600 feet up the side drainage a new class III life of project road was constructed for a distance of 75' across the drainage to the breakout area (see map 3.2.11-1). During installation of the culverts silt fence and/or straw bales dikes were placed downstream to control sediment in the stream.

As construction started on the project, the trees and brush were cleared from the road location. The top soil was then stripped from the road location and stored on the abandoned temporary Forest Service road above the construction area and on the small opening at the mouth of the canyon where the knob was removed. All of the topsoil was stored in lifts not to exceed 2' deep and then seeded to the approved seed
* mixture. After the top soil from the road location was removed, a 36" culvert was placed in the stream bed to provide a life of project crossing. The initial fill material over the culvert was hauled in from the mouth of the side canyon where a small knob was partially removed to help dress up an area. This also created a safe open area to burn slash created by the breakout construction. After the slash has been burned, the area will be dressed up and seeded with the approved seed mixture. No further activity is planned for this area unless there is fill material that was not used and is needed for final reclamation. The fill slopes of the fill covering the 36" culvert were seeded and covered with excelsior mats to help prevent erosion until the vegetation is

established. A flared inlet and a trash rack were installed on the culvert. The fill slope was rocked up to the high water line to also help protect the inlet and outlet. The culvert was bedded in washed gravel at the slope of the natural channel of 14.3%.

A track hoe removed the top soil from the breakout area so it could be stored in the storage area. As the subsoils were encountered, they were used to bring the new road up to grade. The new road was built with a 1-2% adverse grade from the existing road to the breakout area. Subsoil not used as road fill was stored on the small opening at the mouth of the canyon where the knob was removed. All of the stored soil was then seeded with the approved seed mix, and then a layer of straw mulch was applied.

The new road and the breakout area disturbed .42 acres, and the area where the knob was partially removed disturbed .19 acres, for a total new disturbance of .61 acres. The road that was reopened for access and to provide topsoil storage disturbed an additional .35 acres.

The breakout pad was constructed so that the surface drainage will drain into the mine where it will enter the normal mine drainage and will eventually enter the portal area sedimentation pond. A small seep was encountered during construction. A French drain was constructed to drain this seep into the creek drainage system.

A combination of silt fences and strawbales was used to treat the surface run-off from the disturbed area of the new road, the breakout pad and the topsoil and subsoil storage areas. The silt fences and strawbales were located as needed between the disturbed and undisturbed areas to treat run-off from the disturbed area. These silt fences and strawbales will be maintained until adequate vegetation is established.

The breakout portals are screened to prevent humans or animals from entering the mine. No exhaust fans or permanent activity is planned for this area once construction is finished.

Once the breakout portals were established, all of the disturbed areas were seeded and all of the roads on National Forest land were water barred and seeded. All seeding was done with the approved seed mixtures. One of the temporary 18" culverts was removed but left on site in case emergency access is needed back into the breakout area.

All slash created by the project was piled so it can be burned at a later date. All brush disposal will be in accordance with standard U.S. Forest Service requirements.

Once the breakout area has been faced up and the portals established, no further activities are planned or anticipated at the area until final reclamation begins, except for periodic inspections. The * culvert trash rack and portal high wall will be inspected at a minimum of three times a year: (1) early spring; (2) mid-summer at the beginning of the thunderstorm season, and (3) late fall before freeze-up.

3.4 AREA AFFECTED BY EACH PHASE OF OPERATIONS

The area affected by the Skyline Mines project can be divided into two major categories:

(a) Surface acreage disturbed by construction/installation of coal handling and associated facilities, and
(b) Surface acreage overlying underground mine workings.

Disturbed Surface Acreage

The offices, bathhouse, workshop, portal, fans, and other necessary facilities utilize a site of 31.1 acres. Approximately .26 acres is used for water tank bench. The coal loading and handling facility at the mouth of Eccles Canyon utilizes approximately 9.0 acres, of which a sedimentation pond requires 0.6 acres. The enclosed conveyor belt, transporting material from the mining portals to loading points, has disturbed 6.0 acres. The Scofield waste rock disposal site utilizes 1.3 acres. The South Fork Breakout area has disturbed approximately .96 acres. In total, the surface acres disturbed are 48.6 acres. The disturbed permitted area and bonded area for the mine portal area and loadout area are shown on Maps 3.2.1-1 and 3.2.1-3, respectively.

The pre-mining phase of earth work and dirt removal commenced in the spring of 1980 and was completed in 1981. The actual construction and installation of facilities necessary for coal mining and handling began in early 1981.

Area Overlying Underground Mining

Interpretation of the available geological data and bore holes information indicates that certain portions of all three seams within the leasehold are non-mineable. Total acreage values for mineable acreage do not include such areas. Surface area to be affected by underground mining is shown in Section 4.17 Subsidence Control Plan.

TABLE 4.2-1 (cont'd)
RECLAMATION TIMETABLE

YEAR(S)	AREA DESCRIPTION/ACTIVITY	RECLAIMED ACRES
2016 (continued)	Lower Bench	
	-Crusher	
	-Rock and Coal Bypass	
	-Sampling Stations	
	-Conveyors	
	-Truck Loadout	
	-Substations	
	-Mine No. 3 Portal Areas	
	-Drainage Considerations	
	Culvert Removal or Filling	
	Ditch Filling	
	Drainage Reconstructing	9.8
	Scofield Disposal Site	
	Disposal Area	2.3
*	South Fork Breakout	.96
	Loadout Site	
	Parking Area	
	Silos	
	Substation	
	Drainage Considerations	
	-Culvert Removal or Filling	
	-Ditch Filling	
	-Drainage Reconstructing	8.7

Replaces	Text
Table 4.2-1 Page 4-8	Table 4.2-1 Page 4-8 dtd 7/18/88

*Denotes change or addition

4.6.5 SOUTH FORK BREAKOUT

Before any top soil was removed, all woody vegetation was removed from the project area. Soils are basically a sandy loam mixture and have been classified by the S.C.S. as Uinta Family loam/tozc Family fine Sandy loam. Core sampling in the area shows that the soils vary in depth from 24-36+" in depth.

After the vegetation had been removed, the A&B horizons of soil were removed using a track hoe. The track hoe stacked the soil where a front-end loader picked it up and transported it to the storage area on * the abandoned temporary Forest Service road and on the small opening at the mouth of the canyon where the knob was removed. The front-end loader spread the soil in approximately two foot lifts. By handling the soil in this manner, it will not be compacted in the storage area and the roots of the revegetation plants will penetrate the entire depth of the soil. This will allow the soil to maintain itself as viable top soil to be used during final reclamation. It is estimated that approximately 2990 cubic yards of topsoil was removed and stored.

As subsoils were encountered, they were used to bring the new access road up to grade. Subsoil not used as road was also stored on the * small opening at the mouth of the canyon where the knob was removed. It is estimated that approximately 2840 cubic yards of subsoil were removed. Approximately 1820 cubic yards of the subsoil were used in the road fill and the remaining 1020 cubic yards were stored for final reclamation.

As the coal in the coal seam was encountered, it was hauled out so as to eliminate the possibility of spontaneous combustion occurring.

Once the construction was complete, all of the disturbed areas were seeded and all the roads that are on National Forest Lands and the disturbed areas were water barred and seeded with the mixture shown on Table 4.6-1. A combination of silt fences and strawbales were used to

treat surface run-off from the disturbed area of the new road, the breakout pad and the topsoil-subsoil storage areas until adequate vegetation is established. The silt fences and strawbales were located as needed between the disturbed and undisturbed areas to treat run-off from the disturbed area.

At the end of the life of mine, the road into the breakout site will be reopened. The portals will be sealed as outlined in section 4.9. The area will then be returned to approximate original contour and the highwall eliminated by front end loaders and track hoe type equipment. First the subsoil from the storage area and road will be * uniformly placed in the breakout area. The top soil will then be uniformly distributed over the area. If additional fill material is needed, the remainder of the small knob at the mouth of the canyon may be used.

The soil will be spread in a manner to provide a roughened surface so that seed, fertilizer, and mulch can remain during germination and initial growth of the seedlings. Raking the surface prior to planting may also be needed to provide the necessary roughened surface.

Riparian zones were revegetated with handset seedlings of yellow willow, blue spruce, Woods rose and American red raspberry at intervals of 1/2-1 meter. Table 4.7-3 lists the seed mixture spread on the inter-spaces. Steep slopes which have been rip-rapped were not revegetated.

4.7.2 Final Reclamation Seeding Tillage and Mulching, Portal Train Loadout Areas, and other small areas

Seed mixture for final reclamation are shown on Tables 4.7-4, 4.7-5, and 4.7-6.

Seeding of the south-facing slopes (1h:3v) or lower flat areas will be conducted using a cyclone spreader. For slopes less than 2h:1v, seeding will be accomplished using a hydro-seeder. Plantings of shrubs and trees will be hand-set to ensure a plant cover of a permanent nature. Slopes of 2h:1v or steeper will be revegetated by hand-set planting techniques.

Tillage practices on level ground and on slopes flatter than 10h:1v will include leveling and tilling. Slopes of 10h:1v up to 3h:1v will be mulched using 1,000 pounds per acre of straw or other inert mulch material which will be anchored by crimping. Slopes steeper than 3h:1v will be treated with hydro mulch. All hydro mulch will be applied at the rate of 2,000 pounds per acre plus 140 pounds of tacifer per acre.

Planting on slopes less than 10h:1v will be accomplished by drilling seed with a mechanical drill. Slopes between 10h:1v and 1.5h:1v will be seeded by hand broadcast and manually buried by raking. Mulch will be applied over the hand broadcast seed. The Permittee elects to revegetate areas with slopes greater than 1.5h:1v without topsoil; such areas will be treated to handset plantings in basins filled with topsoil and with hydromulch seeding in between. Where the substrate consists of outcroppings of stone, no attempt will be made to revegetate.

Replaces	Text
Section 4.7.2 Pg 4-30	Section 4.7.2 Pg 4-30 dtd 7/15/87

Table 4.7-7

The acreage and proportion of each disturbance area is as follows:

	Vegetation	Acreage	%
Loadout	Grass/Forb	6.8	76
	Spruce/Fir	2.2	24
		9.0	100
Portal Yard	Aspen	6.8	22
	Spruce/Fir	14.0	45
	Sagebrush	2.5	8
	Disturbed	7.8	25
		31.1	100
Water Tank and Well Pads	Aspen	.2	100
Conveyor Route	Sagebrush	3.8	63
	Aspen/Conifer	2.2	37
		6.0	100
Waste Rock Disposal	Already Disturbed	1.3	100
South Fork Breakout	Aspen	.3	31
	Spruce/Fir	.66	69
		.96	100

		48.6	

Power transmission lines for underground mining and related activities in the permit area were designed and constructed to comply with the guidelines set forth in "Environmental Criteria for Electric Transmission System" (USDI, USDA (1970)). Power distribution was designed and constructed in accordance with REA Bulletin 61-10 "Powerline Contacts by Eagles and Other Large Birds."

If necessary, a wire fence will be erected and maintained around the perimeter of the portal area or portions thereof to protect grazing stock and wildlife. The fence design will be submitted to the regulatory authority prior to construction. Other ventilation shafts and structures will be similarly fenced, covered or otherwise protected if required. While the ponds contain no toxic-forming materials, the Permittee agrees to exclude wildlife from such ponds should it become necessary. No persistent pesticides will be used unless approved by the regulatory authority as part of a reclamation management plan.

The Permittee also agrees to participate in the prevention, suppression, and control of forest, range, and coal fires, even though these fires may not be part of an approved management plan. The Permittee on occasion conducts a conservation training program for mine employees. This program conducted by personnel of the Utah Division of Wildlife Resources has been included as part of the routine mine training schedule.

Additional information on wildlife can be found in this document in Section 2.9 - TERRESTRIAL WILDLIFE, and Section 2.10 - RAPTORS.

The South Fork Breakout is located in an Elk Calving area. Construction of the face up area should be done after calving season. The tributary to South Fork is a contributing stream for aquatic insect drift to the fishery in Eccles Creek. Construction operations will be done in a manner to minimize disturbances and influences on the stream.

4.19.7 DIVERSION CHANNEL AT ROCK DISPOSAL SITE

A diversion channel has been installed as shown on Map 4.16.1-1B. The swale to redirect the drainage across the access road and into the original stream channel will be constructed of concrete as shown in Figure 4.19.7-1.

The swale outlet will be lined with 4 inch x 4 inch or larger rock to reduce exit velocity of water from the swale. Engineering calculations for the waste disposal site channel design are included in Appendix Volume A-3.

4.19.8 SOUTH FORK BREAKOUT

A new road was constructed which crossed a drainage way to the South Fork of Eccles Creek. This drainage way flows in all but extremely dry years. When the creek crossing was constructed, the top soil was removed with a track hoe to help minimize disturbance to the channel itself. The culvert was placed in the existing channel, and then the road fill placed over it.

During reclamation the fill material will be removed and then the culvert lifted out of the channel. Top soil will then be placed back on the disturbed area with a track hoe and the area reseeded. Although no permanent disturbance to the channel is planned or expected, if it should occur, it will be riprapped with a gradation of material from 4" to a maximum size of 38".

All culverts used for access to the area will be completely removed from the area during final reclamation.

This final reclamation plan outlines the minimum reclamation to be accomplished. At the time of final reclamation, a meeting will be held with the U.S. Forest Service to determine if additional reclamation work over-and-above that outlined in the plan is needed.

Mine Access Road

The mine access road is classified as a Class I road and runs from the Mine #3 portal to the maintenance complex area. Drawings 3.2.4-1 and 3.2.6-2A show a typical cross-section of the mine access road and related ditches. Since the length of the road is approximately 1,200 feet, no road culverts were installed. As shown in the design, the steepest portion of the access road is a 10.0% grade sustained for 250 feet. No other grades on the access road exceed 10.0%. There are no switchbacks on the access road. None of the access road cut exceeds 1h:1v in unconsolidated material and .025h:1v in rock. The access road is to be 20 feet wide with a 4 foot height berm at the shoulder. The road is flat with a drainage ditch against the highwall. The drainage ditch has been designed to safely pass the peak from a 10 year, 24 hour precipitation event. No trash racks and debris basins have been installed, as the ditch will be cleaned periodically. The road is surfaced with crushed gravel. Once mining is completed, the road will be topsoiled and terraces will be constructed to prevent soil erosion.

Water Tank Access Road

Access to the water tank area is via Utah State Highway SR-264.

Breakout Area Access Road

The road which was constructed to obtain access to the breakout area in the South Fork of Eccles Creek will be reopened during final
* reclamation. After the face up area has been reclaimed, the new temporary access road, the small opening at the mouth of the canyon and the road where the topsoil was stored, will be returned to the approximate original contour and seeded with the approved seed mixture.

Replaces	Text
Sec. 4.20.1, Pg 4-93, dtd	Sec. 4.20.1, Pg 4-93, dd 4/25/88

*Denotes change or addition

The access road up the side canyon will be reopened to accomplish final reclamation work at the breakout area. After reclamation work is completed at the breakout area, the road will be returned to approximate contour and seeded with the approved seed mixture. All culverts and the trash rack used in the project will be removed from the area. All disturbed areas will be seeded as outlined in section 4.7.2.

The road from the Forest boundary to the mouth of the side canyon will be ripped, outsloped, water barred, and blocked so that vehicle traffic cannot use the road.

4.20.2 Overland Conveyor Belt

The location of the upper two-thirds of the conveyor is on a bench on the north slope of Eccles Canyon, while the lower one-third will be supported by towers and trusses. The steepest portion of the conveyor is a negative 26.33 percent grade sustained for 430 feet. The average negative grade of the conveyor route is 9.39 percent and the average positive grade is 8.37 percent. Cut slopes along the route do not exceed 1h:1v in unconsolidated materials and 1h:4v in rock. As part of the air quality control program, the belt and transfer points will be enclosed to reduce fugitive dust.

Replaces	Text
	Sec. 4.10.1, Pg 4-93a, dtd 4/25/88

*Denotes change or addition

TABLE 4.3-2 (continued)

ESTIMATED RECLAMATION COSTS

PHASE	Area Description	No. of Acres	Concrete and/or Blacktop Removal	Back-filling	Grading	Ripping	Topsoil Additions	Fertil-ization and/or Neutral-ization	Seeding and Tree Planting	Moisture Retention	Maintenance and Monitoring	TOTAL
	LOADOUT SITE	8.7	--	45,070	6,930	1,560	64,050	8,700	3,480	6,960	8,700	137,620
	Silos (4)		64,700	--	--	--	--	--	--	--	--	64,700
ABANDONMENT	Railcar Loadout		2,630	--	--	--	--	--	--	--	--	2,630
	Sedimentation Pond Backfill		1,540	--	--	--	--	--	--	--	--	1,540
	Paving		12,440	--	--	--	--	--	--	--	--	12,440
	Subtotal (Loadout - Abandonment Phase)		81,310	45,070	6,930	1,560	64,050	8,700	3,480	6,960	8,700	$218,930
	WASTE ROCK DISPOSAL SITE	2.3	--	--	11,400	870	43,060	230	920	1,840	2,300	60,620
	Subtotal (Waste Rock Abandonment Phase)		--	--	11,400	870	43,060	230	920	1,840	2,300	60,620
	SOUTH FORK BREAKOUT AREA	.96	--	8,500	3,400	600	3,700	300	360	750	1,600	19,210
	Subtotal (South Fork Abandonment Phase)		--	8,500	3,400	600	3,700	300	360	750	1,600	19,210
	Sub-Total Abandonment Phase		131,450	192,990	151,580	16,440	218,000	4,090	15,440	30,910	34,300	$804,625

TABLE 4.3-2 (continued)

ESTIMATED RECLAMATION COSTS

PHASE	Area Description	No. of Acres	Concrete and/or Blacktop Removal	Back-filling	Grading	Ripping	Topsoil Additions	Fertil-ization and/or Neutral-ization	Seeding and Tree Planting	Moisture Retention	Maintenance and Monitoring	TOTAL
ABANDONMENT	BUILDING AND EQUIPMENT REMOVAL		621,030	(Building removal)								621,030
	Subtotal (Removal-Abandonment Phase)		621,030									621,030
	TOTAL ABANDONMENT PHASE		752,480	192,990	151,380	16,440	218,020	4,090	15,440	30,910	34,300	1,416,050
	Contingency (10%)											141,605
	Sub Total											$1,557,655
	Inflation Factor (1.97% per year)											155,765
	PROJECT TOTAL											$1,713,420

1

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COAL PAP AMENDMENT/REVISION/NOV & EXPLORATION TRACKING FORM
(Revised: 9/14/87)

Type of Proposal:

PAP AMENDMENT ______
PAP REVISION _____
EXPLORATION _____
I. B. C. _____ (Incidental Boundary Change)

NOV #N ____ ____ ____ ____, # ____ OF ____
CO #C ____ ____ ____ ____, # ____ OF ____

Title of Proposal: SKYLINE BREAKOUT

Company Name: UTAH FUEL CO.

Project or Mine Name: _____

File #: (INA / PRO / (ACT) / CEP) 007 / 008 -88~~3~~2 # New Acres: _____

Assigned Reviewers:		Review Hours:	Tech Memo Drafted YES	NO
HYDROLOGY	RS / MD		( )	( )
BIOLOGY			( )	( )
ENGINEER	TRH		( )	( )
SOILS			( )	( )
GEOLOGY	DD		( )	( )

*Please Check Appropriate Box!!

Dates:

(1) Initial Plan Received 04/28/88
Tech Review Due ~~08/[illegible]/88~~ operator to resubmit
Tech Review Complete _____
DOGM Response Sent _____
Optr. Response Due _____

(2) Optr. Response Rcvd. 7/19/88 - resubmittal
Tech Review Due 8/22/88
Tech Review Complete 8/22/88
DOGM Response Sent 8/26/88
Optr. Response Due _____

(3) Optr. Response Rcvd. 9/19/88
Tech Review Due 9/32/88
Tech Review Complete _____
DOGM Response Sent ~~9/30/88~~
Optr. Response Due _____

(4) Optr. Resubmission _____
Tech Review Due _____
Tech Review Compl. _____
DOGM Response Sent _____
Optr. Response Due _____

(5) Optr. Resp. Rcvd. _____
Tech Review Due _____
Tech Review Compl. _____
DOGM Response Sent _____
Optr. Response Due _____

Condtn'l Approval 9/30/88
Stipulations Due _____
Stips. Received 10/24/88 resubmitted 10/24
DOGM Response Sent _____
Final Apprvl. Sent _____

COMMENTS: BLM conc. 7/12/88
resub. 7/19 - archaeological survey rec'd 8/1
REVISED MAPS RCVD 8/5/88 (HOLDING UNTIL FINAL APP in BOX #6)

8946R-2

ACT/007/005
#15

COAL PAP AMENDMENT/REVISION/NOV & EXPLORATION TRACKING FORM
(Revised: 9/14/87)

Type of Proposal:

PAP AMENDMENT ↘
PAP REVISION
EXPLORATION
I. B. C. (Incidental Boundary Change)

NOV #N ____ ____ ____ ____, # ____ OF ____
CO #C ____ ____ ____ ____, # ____ OF ____

Title of Proposal: SKYLINE BREAKOUT

Company Name: UTAH FUEL CO.

Project or Mine Name: _____

File #: (INA / PRO / (ACT) / CEP) 007 / 005 -88[illegible] # New Acres: _____

Assigned Reviewers:		Review Hours:	Tech Memo Drafted YES	NO
HYDROLOGY	RS / MD		(✓)	( )
BIOLOGY	LK		( )	( )
ENGINEER	JRH		( )	( )
SOILS	JSL		( )	( )
GEOLOGY	DD		( )	( )

*Please Check Appropriate Box!!

Dates:

(1) Initial Plan Received 04/28/88
Tech Review Due ~~04/[illegible]/88~~ operator to resubmit
Tech Review Complete
DOGM Response Sent
Optr. Response Due

(2) Optr. Response Rcvd. 7/19/88 - resubmittal
Tech Review Due 8/22/88
Tech Review Complete 8/22/88
DOGM Response Sent 8/26/88
Optr. Response Due

(3) Optr. Response Rcvd. 9/19/88
Tech Review Due 9/30/88
Tech Review Complete
DOGM Response Sent
Optr. Response Due

(4) Optr. Resubmission
Tech Review Due
Tech Review Compl.
DOGM Response Sent
Optr. Response Due

(5) Optr. Resp. Rcvd.
Tech Review Due
Tech Review Compl.
DOGM Response Sent
Optr. Response Due

Condtn'l Approval
Stipulations Due
Stips. Received
DOGM Response Sent
Final Apprvl. Sent

COMMENTS: BLM conc. 7/12/88
resub. 7/19 - archaeological survey rec'd 8/1
REVISED MAPS REC'D 8/5/88 (HOLDING UNTIL FINAL APP IN BOX #4)

8946R-2

HYDROLOGY STUDY
SOUTH FORK BREAKOUT AREA

SOIL TYPES

	PERCENT	TYPE	CN
VINTA FAMILY LOAM	50%	B	55
TOZE FAMILY FINE SANDY LOAM	35%	B	55
COMODORE BOULDERY LOAM	10%	D	77
MIDFORK FAMILY BOULDERY LOAM	5%	B	55

LAND USE IS WOOD AND FOREST LAND WITH GOOD COVER

$CN = [.5(55) + .35(55) + .10(77) + .05(55)]/(.5 + .35 + .10 + .05)$

$= (27.50 + 19.25 + 7.70 + 2.75)/(1)$

$= \underline{57.20}$

$S = 1000/CN - 10$

$= 1000/57.20 - 10$

$= 17.48 - 10$

$= \underline{7.48}$

AREA OF THE WATER SHED

PLANIMETER READING - 3,228

$443 \times .0149 \text{ in}^2 = 6.60 \text{ in}^2 \times 22.96 \text{ acres/in}^2 = \underline{151.55 \text{ acres}}$

$151.55 \text{ acres} \times 43,560 \text{ sq ft/acre} = \underline{6,601,608.26 \text{ sq ft}}$

Time Parameters

Concentration Time

$t_c = .0078\, L^{0.77} (L/H)^{0.385}$

$L = 3,850$ FT.

$H = 828$ FT.

$t_c = .0078\, (3,850)^{0.77} (3850/828)^{.385}$

$= .0078\ (576.51)\ (1.81)$

$= 8.13$ MIN. USE 8.00 MIN.

Lag Time

$t_L = L^{0.8}(S+1)^{0.7} / 1900\, Y^{0.5}$

$Y = \Sigma c_i \times i$ / AREA IN SQ FT

$i = 80$ FT

$A = 6,601,608.26$ SQ. FT.

ΣC_i		Contour
600	-	8,720
1,400	-	8,800
2,300	-	8,880
2,875	-	8,960
3,400	-	9,040
3,650	-	9,120
3,700	-	9200
3,300	-	9280
3,000	-	9360
2,200	-	9440
450	-	9.520
650	-	9.520
27,525 FT		

y: $27,525 \text{ FT} \times 80\text{FT} / 6,601,608.26$

$= 2,202,000 / 6,601,608.26$

$= 33\ \%$

$t_L = (3,850)^{.8}(7.48+1)^{.7} / 1900\,(33)^{.5}$

$= (738.53)(4.47) / 1900\,(5.74)$

$= 3,301.23 / 10,906$

$= .30$

$= 18.16$ MIN. USE 18 MINS.

$t_L = 0.6\, t_c$

$18. = .6\,(t_c)$

$t_c = 0.494$ HRS

PEAK FLOW USING SCS CURVE METHOD

EVENT	PEAK FLOW
2YR - 24 HR	7.1 CFS
10YR - 24 HR	3.8 CFS
25YR - 24 HR	12.5 CFS
50YR - 24 HR	24.6 CFS
100YR - 24 HR	39.1 CFS

CULVERT SELECTION

USE 100 YR - 24 HR EVENT - 39.1 CFS = Q

SIZE OF CULVERT - FLAT SLOPE

$Q = 2.58\ D^{2.5}$ Q.

$D = (Q/2.58)^{1/2.5}$

$= (39.1/2.58)^{.4}$

$= 2.97$ FT $\times 12$ IN/FT

$= 35.6$ IN

USE A 36 IN CULVERT

EFFECT OF SLOPE

$S = 2.04/D^{1/3}$ $S = .14$

$.14 = 2.04/D^{.33}$

$D^{.33} = 2.04/.14$

$D^{.33} = 14.57$

$= 2.42$ FT $\times 12$ IN/FT

$= 29.05$ IN

USE 30 IN CULVERT

USE A 36 IN CULVERT TO HANDLE PEAK FLOW

DESIGN

GIVEN

PIPE DIA. - 36"
COVER - 15"
LIVE LOAD - 0
WEIGHT OF SOIL - 100 lb/ft³

DETERMINE WALL THICKNESS AND CORRUGATION

1 BACKFILL SOIL DENSITY
90% COMPACTION

2 DESIGN PRESSURE

P_V = DL + LL DL = H × w
= 15ft × 100 lb/ft³ + 0 LL = NEGLIGIBLE FOR COVER
= 1500 lb/ft²

3 RING COMPRESSION

$C = P_V \times S/2$ S = SPAN IN FT = 3FT
= 1,500 lb/ft² × 3/2
= 1,500 lb/ft² × 1.5 ft
= 2,250 lb/ft

4 ALLOWABLE WALL STRESS
FIG 3-6 f_c = 22,500 lb/in²
FOR 2 2/3 × 1/2 IN. CORRUGATION

5 WALL CROSS-SECTIONAL AREA

$A = C/f_c$
= 2,250 lb/ft / 22,500 lb/in²
= .10 in²/ft

FROM TABLE 3-2, A SPECIFIED THICKNESS OF 0.064 IN. PROVIDES AN WALL AREA OF .775

6. $FF = D^2/EI$ = FLEXIBILITY FACTOR = .0433 MAX

D = DIA. = 36 in
E = 30×10^6 lb/in^2
I = .00109 in^4/FT

$FF = (36)^2 / 30 \times 10^6 \times .00109$

$= 1,296 / 56,700$

$= .02286$

$.02286 < .0433$ THEREFORE $2\frac{2}{3} \times \frac{1}{2}$ IN. CORRUGATION IS OK

PURCHASE A 36 IN. DIA. PIPE WITH $2\frac{2}{3} \times \frac{1}{2}$ IN CORRUGATIONS.

TEMPORARY CULVERT SELECTION

Q = >1 CFS USE 1 CFS 2 YR · 24 HR

SIZE OF CULVERT - FLAT SLOPE

$$Q = 2.58\ D^{2.5}$$

$$D = (Q/2.58)^{1/2.5}$$

$$= (1\ CFS/2.58)^{.4}$$

$$= .684\ FT \times 12\ IN/FT$$

$$= 8.21\ IN.$$

NEED A 12 IN CULVERT

USE A 18 IN. DIA. CULVERT

Channel Reconstruction

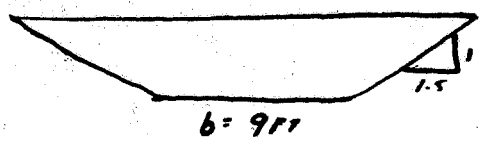
Trapezoidal Type Channel Design

TRAP Q

31.53 Q = 39.1 cfs

.143 S = .143 ft/ft

.04 n = .04



$Z = \frac{1.5}{1} = 1.5$

$$Q = VA = \frac{1.49}{n} R^{2/3} A$$

$$= \frac{1.49}{n} \left[\frac{bd + zd^2}{b + 2d\sqrt{z^2+1}}\right]^{2/3} S^{1/2} (bd + zd^2)$$

$$39.1 = 1.49/.04 \left[\frac{9d + 1.5d^2}{9 + 3.61d}\right]^{2/3} (.143)^{.5} (9d + 1.5d^2)$$

$$2.78 = \left[\frac{9d + 1.5d^2}{9 + 3.61d}\right]^{2/3} (9d + 1.5d^2)$$

1.0 1.14

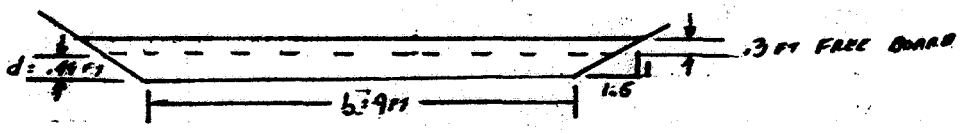
b = 9 ft

Trial d ft	Q
.2	.63
.3	.80
.35	1.08
.4	1.98
.42	2.15
.44	2.33
.46	2.51
.48	2.69
.49	2.79

d = .49 ft.

d = 0.43 FT

v = 7.58 FT/S ⇒ D_{50} = 9 IN.



A = .8 × 9

= 7.2 FT²

DETERMINE RIPRAP D_{50} AND DESIGN FOR SF = 1.20

$V = {}^{1.49}/_{n} \; R^{2/3} \; S^{1/2}$

$n = .04$

$S = .143$ FT/FT

$R = \frac{bd + 2d^2/b + 2d\sqrt{2^2+1}}{} = \frac{9(.99) + 1.5(.99)^2}{9 + (.99)(2)\sqrt{1.5^2+1}} = \frac{9.77}{10.767} = .993$

$V = {}^{1.49}/_{.04} \; (.993)^{.66} \; (.143)^{.5}$

$= (37.25)(.568)(.38)$

$= 8.27$ FT/SEC.

STONE $D_{50} = 7.5$ in $= .625$ FT.

CHECK n VALUE

$n = .0395 \; D_{50}^{.17}$

$= .0395 \; (.625)$

$= .036$

CHECK FOR STABILITY

$d = .99$ FT $\quad S = 14.3 \quad \gamma = 62.4$

$\tau = \gamma d s$

$= (62.4)(.99 \text{ FT})(.143) = 8.372 \text{ lb}/\text{ft}^2$

$n_b = {}^{21\tau}/_{\gamma(SG-1)} D_{50} \qquad SG = 2.36$

$n_b = {}^{21(8.372)}/_{(62.4)(2.36-1)(.625)}$

$= {}^{91.812}/_{53.469}$

$= 1.72$

SF MUST BE > 1

ϕ = 42° ANGULAR RIPRAP

14.3 % SLOPE

θ = 8°

$SF_b = \cos\theta \tan\phi / \sin\theta + n_b \tan\phi$

$= (\cos 8 \cdot 1)(\tan 42) / (\sin 8 \cdot 1) + (1.72)(\tan 42)$

$= (.990)(.904) / (.139) + 1.549$

$= .896 / 1.688$

$= .521$ UNDER DESIGNED RESIGN STREAM CHANNEL

D_{50} (FT)	MANNING'S n	ANGLE OF REPOSE (DEG)	DEPTH OF CONVEY FLOW	TRACTIVE FORCE	STABILITY FACTOR	SAFETY FACTOR
.63	.036	42°	.49	4.372	1.72	.521
1.26	.041	42°	.49	4.372	.859	.982
1.6	.043	42°	.49	4.372	.676	1.192

D_{50} = 1.6 FT.

DETERMINE RIPRAP FOR BANK SF = 1.2

D_{50} = 1.6 FT , n. = .043 , θ = 8°, d = .49 FT.

ASSUME

τ_{MAX} = .76 γ d s

= .76 (62.4)(.49)(.143) = 3.323 lb/FT²

$$n = (21)(\tau_{max}) / \gamma (SG - 1) D_{50}$$

$$= (21)(3326) / 62.4 (2.36 - 1) 1.6$$

$$= 69.783 / 135.782$$

$$= .514$$

ASSUME UNIFORM FLOW

$\lambda = \theta = 8°$

SLIDE SLOPE

$\alpha = \tan^{-1} \frac{1}{1.5}$

$= 33.69°$

$$\beta = \tan^{-1} \left[\cos\lambda / \frac{2 \sin\alpha}{n \tan\phi} + \sin\lambda \right]$$

$$= \tan^{-1} \left[.990 / 2(.555) / .514 (.900) + .139 \right]$$

$$= \tan^{-1} (.390)$$

$$= 21.32°$$

$$\eta' = n \left[\frac{1 + \sin(\lambda + \beta)}{2} \right]$$

$$= .514 \left[\frac{1 + \sin(8 + 21.32)}{2} \right]$$

$$= .514 \left[1.819 / 2 \right]$$

$$= .383$$

$$SF = \cos\alpha \tan\phi / n' \tan\phi + \sin\alpha \cos\beta$$

$$= \cos 33.69 \tan 42 / (.383)(\tan 42) + (\sin 33.69)(\cos 21.32)$$

$$= (.832)(.900) / .345 + (.555)(.932)$$

$$= .749 / .862$$

$$= .869$$

D_{50}	n	β	n'	SF
1.6	.514	21.32°	.383	.868
1.8	.456	19.21	.332	.90
2.0	.411	17.52	.294	.944
2.2	.374	16.09	.263	.979
2.5	.329	14.304	.227	1.009
2.7	.305	13.327	.208	1.03
3.0	.274	12.059	.184	1.06
3.5	.235	10.426	.155	1.09
4.0	.206	9.17	.133	1.12
5.0	.164	7.391	.104	1.17
5.5	.150	6.737	.094	1.18
6.0	.137	6.189	.085	1.19

USE 6 FT D_{50} FOR BOTH CHANNEL BOTTOM AND SIDES

BASED ON THE CALCULATION THE BOTTOM AND SIDESLOPE RIPRAP WILL BE 1.6 FT = D_{50} 9 IN.

RIPRAP GRADATION

	SIZE FT	PERCENT
$2D_{50}$	3.2	100
$1D_{50}$	1.6	50
$.5D_{50}$	.8	20
$.2D_{50}$	.32	0

OK

UNDERLYING FILTER

BASE MATERIAL

D85 D_{50} = .600 MM

D15 D_{85} = .15 MM

D50 D_{15} = .236 MM

RIPRAP

D_{100} : 3.2 FT : 975.36 MM

D_{50} : 1.6 FT : 487.68 MM

D_{85} : 2.9 FT : 883.92 MM

D_{15} : .24 FT : 73.15 MM

D_0 : .10 FT : 30.48 MM

FILTER BLANKET WITH RESPECT TO BASE MATERIAL

(1) $D_{50\,(FILTER)} / D_{50\,BASE} < 40$

D_{50} (FILTER) < 40 × .6 = 24 MM

(2) $D_{15\,(FILTER)} / D_{15\,(BASE)} > 5$

D_{15} (FILTER) > 5 × .236 = 1.18 MM

$D_{15\,(FILTER)} / D_{15\,(BASE)} < 40$

D_{15} (FILTER) < 40 × .236 = 9.44 MM

(3) $D_{15\,(FILTER)} / D_{85\,(BASE)} < 5$

D_{15} (FILTER) < 5 × .15 = .75 MM

∴ WITH RESPECT TO THE BASE THE FOLLOWING MUST BE SATISFIED

$1.18\ mm < D_{15}\ (FILTER) < 9.44\ mm$

$D_{50}\ (FILTER) < 24\ mm$

FILTER MUST BE SIZED TO THE RIPRAP

(1) $D_{50}\ (RIPRAP) / D_{50}(FILTER) < 40$

$D_{50}\ FILTER > 487.60/40 = 12.19\ mm$ OK

(2) $D_{15}\ (RIPRAP)/D_{15}\ FILTER > 5$

$D_{15}(FILTER) < 73.15\ mm/5 = 14.63\ mm$ OK

$D_{15}\ (RIPRAP)/D_{15}\ (FILTER) < 40$

$D_{15}\ (FILTER) > 73.15\ mm/40 = 1.83\ mm$ OK

(3) $D_{15}\ (RIPRAP)/D_{85}\ (FILTER) < 5$

$D_{85}\ (FILTER) > 73.15/5 = 14.63\ mm$ OK

∴ FILTER MUST MEET THESE

$D_{50}(FILTER) > 12.19\ mm$

$1.83\ mm < D_{15}(FILTER) < 14.65\ mm$

$D_{85}\ (FILTER) > 14.65\ mm$

FILTER BLANET MUST BE SIZED AS FOLLOWS

$12.19\ mm < D_{50}\ (FILTER) < 24\ mm$

1.83 $1.18\ mm < D_{15}\ (FILTER) < 14.65\ mm$ 9.44

$D_{85}\ (FILTER) > 14.65\ mm$

ENERGY DISSIPATOR FOR DISCHARGE END OF CULVERT.

$Q = VA$

$Q = \frac{1.49}{n} R^{2/3} S^{1/2} A$

$391 = \frac{1.49}{n} \left(\frac{.5768\,D}{1.9578}\right)^{.66} (1\pi) \frac{\pi D^2}{4}$

$391 = 62.08\ (.295\,D)^{.66} (.143)(.785\,D^2)$

$391 = 8.877\ (295\,D)^{.66} (785\,D^2)$

$4.404 = (.295\,D)^{.66} (785\,D^2)$

D = TW = TAILWATER DEPTH

n = .024

S = .143

D	Q
1 FT	.351
2 FT	2.317
3 FT	6.518
2.5 FT	4.01
2.6 FT	4.45

$D = 2.6$ FT $= TW$

DESIGN FOR MINIMUM TAILWATER CONDITION

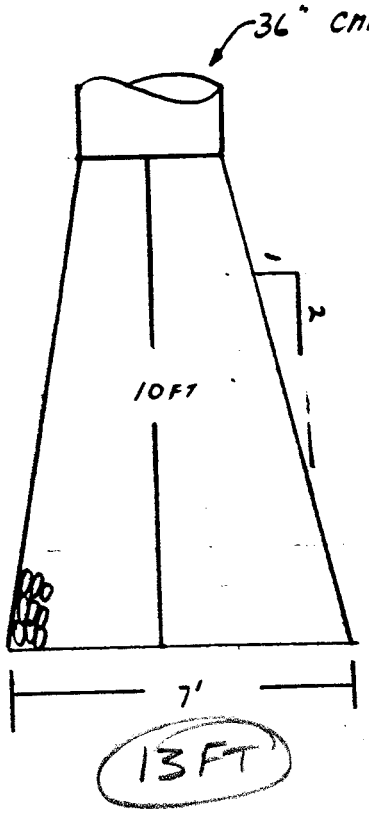
MAT ROCK SIZE $1.5 \times D_{50}$

$D_{50} \cong .33$ FT 0.4 FT

$Q = 39.1$ CFS 31.5 CFS $D = 3$ FT 2.9 FT $d_{50} = .33$ FT $L_A = 10$ FT 10 FT

$W_A = D + L_A = 3 + 10 = 13$ FT $d_{MAT} = 1.5 \times d_{50} = 1.5 \times .33 = .5$ FT 0.6 FT

ENERGY DISSIPATOR

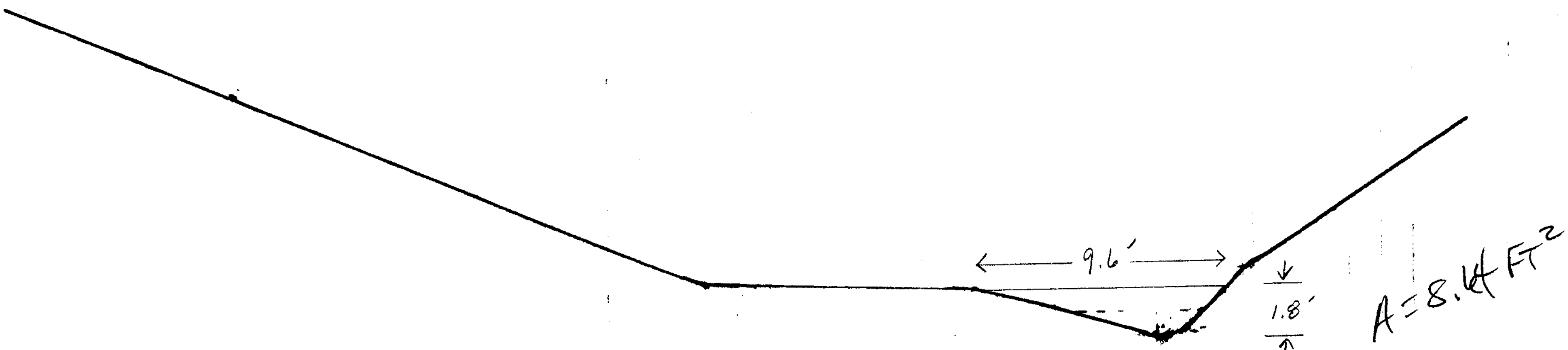


d_{50} = 4 IN.

d_{MAX} = 6 IN.

APPLICANT STATES ON PG. 16 DESIGN FOR TW < 0.5D.

STREAM RECLAIMATION



TYPCIAL STREAM BED PROFILE

SCALE 1"=6'

REFERENCE

1. BARFIELD, B. J., R.C. WARNER AND C. T. HAAN, 1985 APPLIED HYDROLOGY AND SEDIMENTOLOGY FOR DISTURBED AREAS. OKLAHOMA TECHNICAL PRESS, STILLWATER, OKLAHOMA.

2. HANDBOOK OF STEEL DRAINAGE AND HIGHWAY CONSTRUCTION PRODUCTS. AMERICAN IRON AND STEEL INSTITUTE. WASHINGTON D.C. THIRD EDITION

3. HYDRAULIC DESIGN OF STILLING BASINS AND ENERGY DISSIPATORS UNITED STATES DEPARTMENT OF THE INTERIOR, BUREAU OF RECLAMATION.

4. SOIL SURVEY OF CARBON AREA, UTAH, UNITED STATES DEPARTMENT OF AGRICULTURE, SOIL CONSERVATION SERVICE.

Utah Fuel Company
a subsidiary of The Coastal Corporation
P.O. Box 719 • Helper, Utah 84526 • (801) 637-7925
Salt Lake (801) 596-7111

GLEN A. ZUMWALT
Vice President and
General Manager

September 16, 1988

Lowell P. Braxton
Administrator, Reclamation Program
Division of Oil, Gas & Mining
355 West North Temple
3 Triad Center, Suite 350
Salt Lake City, Utah 84180-1203

Re: Deficiency Review, PAP Amendment, South Fork Breakout

Dear Mr. Braxton,

We have reviewed the deficiency document from your office and the U.S. Forest Service, and are submitting the following information to satisfy your review, along with 8 copies of pages 2-44, 3-42, 3-64a, 3-64b, 4-26a, 4-26b, 4-84, 4-90, map 3.2.11-1, and Engineering calculations.

COMMENTS BY MIKE DEWEESE AND RICK SUMMERS

UMC 783.23 (b) (12) Operation Plan: Maps And Plans - MD

The operator proposes to sample the creek above and below the disturbed site during construction on a weekly basis. The exact location of these monitoring sites must be included on an appropriate map of the area. The Division recommends that these sites be located no further than 100 feet from the disturbed area.

JK

Response: Sampling points have been indicated on Map 3.2.11-1.

UMC 784.24 (a) Transportation Facilities - MD

The plan requires construction of a new road section across the upper drainage. The plan presents adequate calculations for culvert sizing in this section but contains no designs for inlet protection or outlet structures. The application must include plans for inlet protection and designs for an adequate energy dissipator for the South Fork culvert outlet.

Additionally, due to the culvert length and impact to the existing channel, the Division requests that the following information be included in the submittal:

1. Plans to bed the culvert in washed gravel in order to minimize contributions of sediment to the stream during installation and removal.

2. A detailed reclamation plan for the channel crossing. This information should include a survey of the existing stream channel, plans to meet the requirements of UMC 817.44 subsections (b) and (d), plans demonstrating the restored channel will have a capacity at least equal to the upstream and downstream sections (i.e., channel cross-sections), plans to restore the channel with a channel slope approximating the pre-disturbance condition. The calculations presented in the submittl utilize the incorrect formula for the hydraulic radius. It appears the formula was used for a triangular channel to approximate the channel. The formula used was:

$$R = z\ d^{2}\ (z + 1)^{0.5}$$

The correct formula is:

$$R = z\ d^{2} / 2\ (z + 1)^{0.5}$$

However, the Division recommends using a trapezoidal type channel for the channel reconstruction.

The slope used in the calculations for the riprap size is not defined. Is this the existing natural channel slope or the culvert slope? The channel should be designed using the slope of the natural channel. A filter blanket should be designed and proposed for the crossing and a riprap gradation curve should be submitted.

The application states in the plan that 18 inch diameter temporary culverts will be installed in the existing road where it crosses two side drainages. However, the submitted calculations use a 12 inch diameter design at these areas. The applicant must correct this discrepancy and commit to one design size for these culverts.

Response:

A flared inlet will be used on the 36" pipe and the fill slope rocked up to the nigh water line (see p.3-64a).

An energy dissipator has been designed and is included in the engineering calculations.

Culvert will be bedded in washed gravel (see p.3-64a).

A trapezoid type channel is designed as well as new riprap side and filter blanket and is included in the engineering calculations.

It was calculated that we need 12" temporary culverts; however, we have elected to use 18" culverts. We show this now in the engineering calculations.

UMC 817.11 Signs and Markers OK

(e) The application should commit to installation of buffer zone signs between the edge of the disturbance and the South Fork of Eccles Creek.

Response: We have changed p. 3-42 of the M & RP to include the buffer zone signs at the South Fork Breakout area.

UMC 817.45 Hydrologic Balance: Sediment Control Measures - MD

Page 4-26a of the plan states that after road construction, straw bales and silt fences will be installed to treat runoff until adequate vegetative cover is established. The plan should include proposed locations (either on a map or in narrative) for these controls. There are no provisions in the plan for sediment control during construction of the facility (including culvert installation). The operator must submit an effective runoff treatment plan for the construction and reclamation phases of the project. These plans should include installation of straw bale dikes downstream of the culvert installation and a silt fence or straw bales between any construction disturbance and the stream channel.

as needed

Response: Pages 3-64b and 4-26a have been changed to include location of silt fences and/or straw bales. Page 3-64a has been changed to include installation of straw bales and/or silt fence dikes downstream during installation of culverts.

UMC 817.52 Hydrologic Balance: Surface and Ground Water Monitoring

The application should include a monitoring plan (with appropriate revised location map) for the South Fork of Eccles Creek. Due to the expected mining beneath the stream and the relatively low cover in the area, the data will be necessary to monitor potential impacts to the stream. An extensive data set exists for sample site CS-1; however, changes in stream yield cannot be performed using double-mass analysis techniques unless annual yield has been measured and established. Therefore, the upstream-downstream monitoring is our only option to adequately monitor the system. The data will also be useful in classifying the stream reach as losing or gaining. Baseline data should be collected for stations located upstream and downstream of any surface and underground mining activity. The quality samples should be collected as per the Division's Water Monitoring Guidelines baseline parameter list quarterly with flow and field parameters taken monthly. Flows should be measured using a meter or established flumes.

Response: We ult oh! are not responding to this item as the South Fork Breakout has no potential for impacts to the stream and springs except during construction. Impacts during construction have been covered. The Division's concerns are dealing with general mine planning for this area, not with the breakout.

COMMENTS BY JIM LEATHERWOOD

UMC 783.27 Prime Farmland Investigation - JSL

In accordance with part (a) of this section the operation must conduct an investigation to determine if the proposed area could be prime farmland. If the proposed area does not contain prime farmland then the applicant shall request for a negative determination based on the criteria outlined in part (b) of this section.

Response: We are requesting that a negative determination be declared as the South Fork Breakout area meets the criteria in UMC 783.27 paragraph b(1), (2), and (5).

UMC 817.23 Topsoil: Storage - JSL

The applicant must commit to revegetate the topsoil stockpile protection and viability.

Response: P.3-64a already states that the topsoil stockpile will be seeded with the approved seed mix.

COMMENTS BY RANDY HARDEN

UMC 817.13 - .15 Casing and Sealing of Exposed Underground Openings - JRH

The operator has not addressed the requirements of these sections. A commitment must be included in the reclamation plan for the temporary and permanent closure of the portal openings.

The operator must describe the methodology to be used in closure of the mine openings. The description is to include the method for installing bulkheads in the portals, backfilling, and highwall reduction of the face up for the portals. The reclamation plan section should also address the hydrologic balance requirements of this section, particularly treatment and discussion of drainage into or from the mine openings.

Response: Page 3-64b already addresses the temporary controls for entry into the mine. Page 4-26b addresses permanent closure of the portal entries. Page 3-64b also discusses drainage resulting from the breakout pad.

UMC 784.13 Backfilling and Grading - JRH

The operator has indicated that coal materials excavated from the portal breakout development will be removed from the site. Consequently, there may be a shortage of fill material available during reclamation. The operator shall commit to surveying the site upon completion of construction of the breakout facilities in order to determine if there is a shortage of fill material required for reclamation. Regrading of the site should call for the total elimination of the highwall caused by the portal face up.

Response: We have estimated that we will remove approximately 2700 tons of coal from the site. We feel that it is obvious that if we remove 2700 tons from the excavated site, that there will be a shortage of fill material for reclamation. We have changed page 4-26b to indicate that the highwall will be eliminated. Material to replace the coal volume will come from the slash disposal area as discussed on p.3-64a.

Delineation of the disturbed area has not been made on the drawings. The surface disturbed area boundaries and acreage shall be shown on the drawings. This disturbed area must include those areas to be disturbed during the construction, operation and reclamation of the site, including topsoil storage and borrow areas and areas which may have to be disturbed during reclamation work which may not have been disturbed during construction of the facilities.

Response: We have changed map 3.2.11-1 to delineate the disturbed areas and to show acreage involved.

UMC 800 Bonding - JRH

Bonding information provided by the operator is not considered to be adequate. Similarly, the general bonding and cost estimations provided for the entire mining and reclamation permit are not considered to be adequate. Since the addition of the portal breakout area is only a small percentage of the total bond amount, detailed calculations and cost estimates for bonding for South Fork will be deferred to the bonding and cost estimate information required for the entire permit as part of the permit renewal process rather than be required as part of this revision to the plan. Additionally, details for reclamation work required on the portal site will be more specific and accurate based on the facility as constructed rather than as proposed.

Response: Detailed calculations and cost estimates for the South Breakout area were included on pages 4-15 and 4-16. If additional information is needed we will cover them during the permit renewal process.

COMMENTS BY DAVID DARBY

UMC 817.41 and UMC 817.52

The operator will be required to conduct a complete inventory of springs in the South Fork of Eccles Canyon where mining will take place and establish the flow for at least one year of the tributary fed by the springs prior to conducting mining operations.

Response: In the summary discussion which proceeds this deficiency item, the main thrust deals with the general mining plan for the entire South Fork area. The Breakout area only affects less than 1/2 acre of area. There are no springs involved. We can not delay the breakout ("for at least one year"). The breakout will occur sometime in the next 60-90 days. We feel this deficiency item is inappropriate in relationship to the South Fork Breakout.

UMC 817.121 and UMC 817.124

The operator will be required to establish baseline subsidence information for the South Fork Area prior to conducting underground mining operations. This information will essentially consist of premining surface elevations obtained by either aerial photographs or transit surveys.

Response: The portals for the breakout will be fully supported and will therefore cause no subsidence. Our approved subsidence plan already requires us to establish baseline subsidence information in Section 4.17.5.

COMMENTS BY LYNN KUNZLER

Analysis

Construction has been timed to avoid conflict with special wildlife use periods and is acceptable. Plans to screen the entries to prevent wildlife access is appropriate.

Plans for final revegetation of the site and for interim stabilization of the topsoil pile and forest service road are acceptable. However, the proposed amendment does not discuss temporary (interim) stabilization of the remaining disturbed area between the construction period and final reclamation. Plans to vegetate or otherwise stabilize disturbed areas not actively needed for mining needs to be addressed.

Recommendations

The referenced amendment could be approved when this issue has been adequately addressed.

Response: We have changed pages 3-64a, 3-64b, and 4-26a to clarify interim stabilization of the disturbed areas.

Utah Fuel Company would appreciate your prompt review of our responses to the deficiencies. We submitted our request for a PAP amendment in April, and expected to have the construction phase of the project completed by now. Time is becoming critical if we are to construct this breakout with a minimum of disturbance. Our intentions are to do a good job as indicated in our proposed plan, and we are committed to do the best that conditions allow. The underground entries will be breaking out within the next 60-90 days, and therefore I am urgently requesting that you approve this permit amendment so that we can proceed immediately to face up the breakout area.

If additional information is needed for approval, I would like to suggest an immediate conference be held so as to avoid the delays of written correspondence. This would allow us to reach agreement on deficiencies, and then we could submit the agreed upon changes for your final approval.

Sincerely,

Glen A. Zumwalt
Vice-President/General Manager

GAZ:KZ:lm

Attachments

of sampling. The Permittee commits to the following surface water monitoring program when surface flow is present.

1. Four monitoring stations will be established: Two stations on the drainage from the east and two sites on the drainage from the south. Stations will be located both above and below the rock waste disposal site in each of the drainages.

2. When flow is present, these stations will be monitored, when accessible, at the same frequency and for the same constituents as the stations in Eccles Creek. The data will be tabulated and reported in the same manner as the Skyline water quality data.

3. The data from these stations will be evaluated for non-point source contribution from ground water aquifers. This procedure offers the best potential for detection of ground water contamination.

The Upper O'Connor seam will require a breakout to improve ventilation. The breakout will be on a south facing slope in a side canyon of the South Fork of Eccles Creek (see map no. 3.1.2-1). A new road will need to be built across this canyon to gain access to the breakout area. The canyon flows water in all but the driest of years. If the canyon is flowing water, the creek will be sampled above and below the construction site on a daily basis during the active construction period. The samples will be tested for total suspended solids and settleable solids.

values as the operator's procedure is correct. The riprap filter must be redesigned using the correct base material size distribution. The depth of the filter blanket, which should be at least 6 in., layer must also be included in the submitted design.

Details of the reclamation plan must be submitted including a survey of the existing stream channel demonstrating that the restored channel will have a capacity at least equal to the upstream and downstream sections (i.e., channel cross-sections) and plans to meet the requirements of 817.44 (d). The submitted channel cross-section ~~does not adequately demonstrate the existing channel capa~~ is inadequate for ~~deter~~ accurately determining channel capacity.

Calculations for the submitted culvert riprap apron design are stated to be for minimum tailwater conditions (page 16, engineering calculations section). The submitted apron riprap design is acceptable as the Division believes a filter layer is unnecessary for a riprap D_{50} of 4 inches. However, the riprap apron dimensions are incorrect. The apron width should be 13 feet for minimum tailwater conditions. The operator submitted a design width of 7 feet calculated using the formula for maximum tailwater conditions.

STIPULATIONS:
§17.44-(11) RR filter blanket design & thickness
" -(12)

September 28, 1988

TO: File

FROM: Mike DeWeese, Reclamation Hydrologist

RE: South Fork Eccles Creek Breakout, Utah Fuel Company, Skyline Mine #1, ACT/007/005-88B, Folder 2, Carbon County, Utah

SYNOPSIS

The response to the Division's deficiency document dated September 16, 1988 has been reviewed. Although most of the defiencies have been mitigated, the following items still must be addressed or corrected.

ANALYSIS

UMC 817.44 Hydrologic Balance: Stream Channel Diversions-MMD

The Operator has submitted riprap calculations demonstrating that the reclaimed stream channel design is adequate to convey the predicted runoff from the 100 year-24 hour storm at non-erosive velocities. However, the submitted riprap filter design is incorrect. Page 14 of the engineering calculations presents a size distribution for the base material. This distribution shows a D_{85} smaller than the D_{15} of the base material, which is physically impossible. This appears to be an inadvertant error in transposing

those points of the operation where public or employee access to the perennial is possible. Those points include the portal area on the southwest and middle forks of upper Eccles Creek, the pump houses along Eccles Creek and at the loadout facility near Eccles and Pleasant Valley Creeks, and South Fork Breakout area.

3.2.8 Plan for Disposal of Rock Waste

Coastal States Energy Company ("Coastal") has developed a rock waste disposal site at a location southeast of Scofield, Utah and approximately 3.6 air miles from the Skyline mine site (Map 4.16.1-1A). The rock waste disposal site is an abandoned strip mine pit which is accessed by an upgraded existing road (see Maps 4.16.1-1A and 3.2.8-1). The facility is required for the disposal of rock wastes to be generated from the Skyline from the Skyline Mines during mine's developmental and operational phases. Additional discussion on this disposal site can be found in Section 4.16.

Coastal hauls the rock wastes by truck from the Skyline mine site (portal area) and the unit train loadout facility to the waste disposal area. An operation plan has been developed to establish proper techniques for disposal of the rock waste. A reclamation plan provides for satisfactory final reclamation. The disposal site has been designed to facilitate proper management and operation of the overall disposal process as well as successful reclamation and revegetation. No sanitary waste will be disposed of at the site.

The rock disposal site and access road are located upon land owned by the Estate of George Telonis. The legal right of access and use of the lands for the disposal of rock waste has been granted to Coastal by the heirs of the Estate in a lease effective January 1, 1982 an expiring, unless renewed, on December 31, 2011 (see Exhibit A for photocopy of lease). The lands referred to in the lease include a 7.00 acre right of way for the disposal site access road and a 17.83 area tract of land containing the rock waste disposal site. The legal description of the leased lands is:

3.2.11 South Fork Breakout Area

The Upper O'Connor seam will require a breakout to improve ventilation. The breakout will be on a south facing slope in a side canyon of the South Fork of Eccles Creek (see map 3.1.2-1).

Access to the breakout area will be via an existing road up the South Fork of Eccles Creek to the Manti-LaSal National Forest boundary. From the Forest boundary on the road had been water barred and will need to be reopened. Where the road leaves the main South Fork tributary it crosses two side drainages. Temporary 18" culverts will be installed in these drainages during the construction period. The Forest Service road then continues up the side drainage. Approximately 600 feet up the side drainage a new class III life of project road will need to be constructed for a distance of 75' across the drainage to the breakout area (see map 3.2.11-1). During installation of the culverts silt fence and/or straw bales dikes will be placed downstream to control sediment in the stream.

As construction starts on the project, the trees and brush will be cleared from the road location. The top soil will then be stripped from the road location and stored on the abandoned temporary Forest Service road above the construction area. All of the topsoil will be stored on this abandoned road in a lift not to exceed 2' deep and then seeded to the approved seed mixture. After the top soil from the road location has been removd, a 36" culvert will be placed in the stream bed to provide a life of project crossing. The initial fill material over the culvert will be hauled in from the mouth of the side canyon where a small knob will be removed to help dress up an area. This will also create a safe open area to burn slash created by the breakout construction. The fill slopes of the fill covering the 36" culvert will be seeded and covered with excelsior mats to help prevent erosion until the vegetation is established. A flared inlet will be installed on the culvert. The fill slope will be rocked up to the high water line to also help protect the inlet. The culvert will be bedded in washed gravel at the slope of the natural channel of 14.3%.

A track hoe will then start removing the top soil from the breakout area so it can be stored in the storage area. As the subsoils are encountered they will be used to bring the new road up to grade. The new road will be built with a 1-2% adverse grade from the existing road to the breakout area. Subsoil not used as road fill will also be stored on the abandoned temporary Forest Service road below the topsoil storage area. All of the stored soil will then be seeded with the approved seed mix and then a layer of straw mulch will be applied.

It is estimated that the new road will disturb .11 acres and the breakout area .29 acres, for a total new disturbance of .40 acres.

The breakout pad will be constructed so that the surface drainage will drain into the mine where it will enter the normal mine drainage and will eventually enter the portal area sedimentation pond.

A combination of silt fences and strawbales will be used to treat the surface run-off from the disturbed area of the new road, the breakout pad and the topsoil and subsoil storage areas. The silt fences and strawbales will be located as needed between the disturbed and undisturbed areas to treat run-off from the disturbed area. These silt fences and strawbales will be maintained until adequate vegetation is established.

The breakout portals will be screened to prevent humans or animals from entering the mine. No exhaust fans or permanent activity is planned for this area once construction is finished.

Once the breakout portals have been established, all of the disturbed area will be seeded and all of the roads on National Forest land will be water barred and seeded. All seeding will be done with the approved seed mixtures. The two temporary 18" culverts will be removed but left on site in case emergency access is needed back into the breakout area.

All slash created by the project will be piled so it can be burned at a later date. All brush disposal will be in accordance with standard U.S. Forest Service requirements.

Once the breakout area has been faced up and the portals established, no further activities are planned or anticipated at the area until final reclamation begins.

4.6.5 SOUTH FORK BREAKOUT

Before any top soil is removed, all woody vegettion will be removed from the project area. Soils are basically a sandy loam mixture and have been classified by the S.C.S. as Uinta Family loam/tozc Family fine Sandy loam. Core sampling in the area shows that the soils vary in depth from 24-36+" in depth.

After the vegetation has been removed, the A&B horizons of soil will be removed using a track hoe. The track hoe will stack the soil where a front-end loader will pick it up and transport it to the storage area on the abandoned temporary Forest Service road. The front-end loader will spread the soil in approximately a two foot lift. By handling the soil in this manner, it will not be compacted in the storage area and the roots of the revegetation plants will penetrate the entire depth of the soil. This will allow the soil to maintain itself as viable top soil to be used during final reclamation. It is estimated that approximately 2990 cubic yards of topsoil will be removed and stored.

As subsoils are encountered, they will be used to bring the new access road up to grade. Subsoil not used as road will also be stored on the abandoned temporary Foret Service road on a section below the topsoil storage. It is estimated that approximately 2840 cubic yards of subsoil will be removed. Approximately 1820 cubic yards of the subsoil will be used in the road fill and the remaining 1020 cubic yards will be stored for final reclamation.

As the coal in the coal seam is encountered, it will be hauled out so as to eliminate the possibility of spontaneous combustion occurring.

Once the construction is complete, all of the disturbed area will be seeded and all the roads that are National Forest Lands and the disturbed areas will be water barred and seeded with the mixture shown on Table 4.6-1. A combination of silt fences and strawbales will be used to treat surface run-off from the disturbed area of the new road, the breakout pad and the topsoil-subsoil storage areas until adequate vegetation is established. The silt fences and strawbales will be located as needed between the disturbed and undisturbed areas to treat run-off from the disturbed area.

At the end of the life of mine, the road into the breakout site will be reopened. The portals will be sealed as outlined in section 4.9. The area will then be returned to approximate original contour and the highwall eliminated by front end loaders and track hoe type equipment. First the subsoil from the storage area and road will be uniformly placed in the breakout area. The top soil will then be uniformly distributed over the area.

The soil will be spread in a manner to provide a roughened surface so that seed, fertilizer, and mulch can remain during germination and initial growth of the seedlings. Raking the surface prior to planting may also be needed to provide the necessary roughened surface.

Power transmission lines for underground mining and related activities in the permit area were designed and constructed to comply with the guidelines set forth in "Environmental Criteria for Electric Transmission System" (USDI, USDA (1970)). Power distribution was designed and constructed in accordance with REA Bulletin 61-10 "Powerline Contacts by Eagles and Other Large Birds."

If necessary, a wire fence will be erected and maintained around the perimeter of the portal area or portions thereof to protect grazing stock and wildlife. The fence design will be submitted to the regulatory authority prior to construction. Other ventilation shafts and structures will be similarly fenced, covered or otherwise protected if required. While the ponds contain no toxic-forming materials, the Permittee agrees to exclude wildlife from such ponds should it become necessary. No persistent pesticides will be used unless approved by the regulatory authority as part of a reclamation management plan.

The Permittee also agrees to participate in the prevention, suppression, and control of forest, range, and coal fires, even though these fires may not be part of an approved management plan. The Permittee on occasion conducts a conservation training program for mine employees. This program conducted by personnel of the Utah Division of Wildlife Resources has been included as part of the routine mine training schedule.

Additional information on wildlife can be found in this document in Section 2.9 - TERRESTRIAL WILDLIFE, and Section 2.10 - RAPTORS.

The South Fork Breakout is located in an Elk Calving area. Construction of the face up area should be done after calving season. The road across the tributary to South Fork is a fishery, and is a contributing stream for aquatic insect drift to the fishery in Eccles Creek. Construction operations will be done in a manner to minimize disturbances and influences on the stream.

4.19.7 DIVERSION CHANNEL AT ROCK DISPOSAL SITE

A diversion channel has been installed as shown on Map 4.16.1-1B. The swale to redirect the drainage across the access road and into the original stream channel will be constructed of concrete as shown in Figure 4.19.7-1.

The swale outlet will be lined with 4 inch x 4 inch or larger rock to reduce exit velocity of water from the swale. Engineering calculations for the waste disposal site channel design are included in Appendix Volume A-3.

4.19.8 SOUTH FORK BREAKOUT

A new road will be constructed which will cross a drainage way to the South Fork of Eccles Creek. This drainage way flows in all but extremely dry years. When the creek crossing is constructed, the top soil will be removed with a track hoe to help minimize disturbance to the channel itself. The culvert will be placed in the existing channel, and then the road fill placed over it.

During reclamation the fill material will be removed and then the culvert lifted out of the channel. Top soil will then be placed back on the disturbed area with a track hoe and the area reseeded. Although no permanent disturbance to the channel is planned or expected, if it should occur, it will be riprapped with a gradation of material from 4" to a maximum size of 38".

All culverts used for access to the area will be completely removed from the area during final reclamation.

3.2.11 South Fork Breakout Area

The Upper O'Connor seam required a breakout to improve ventilation. The breakout is on a south facing slope in a side canyon of the South Fork of Eccles Creek (see map 3.1.2-1).

Access to the breakout area is via an existing road up the South Fork of Eccles Creek to the Manti-LaSal National Forest boundary. From the Forest boundary on the road had been water barred and was reopened. Where the road leaves the main South Fork tributary it crosses two side drainages. Temporary 18" culverts were installed in these drainages during the construction period. The Forest Service road then continues up the side drainage. Approximately 600 feet up the side drainage a new class III life of project road was constructed for a distance of 75' across the drainage to the breakout area (see map 3.2.11-1). During installation of the culverts silt fence and/or straw bales dikes were placed downstream to control sediment in the stream.

As construction started on the project, the trees and brush were cleared from the road location. The top soil was then stripped from the road location and stored on the abandoned temporary Forest Service road above the construction area and on the small opening at the mouth of the canyon where the knob was removed. All of the topsoil was stored in lifts not to exceed 2' deep and then seeded to the approved seed * mixture. After the top soil from the road location was removed, a 36" culvert was placed in the stream bed to provide a life of project crossing. The initial fill material over the culvert was hauled in from the mouth of the side canyon where a small knob was partially removed to help dress up an area. This also created a safe open area to burn slash created by the breakout construction. After the slash has been burned, the area will be dressed up and seeded with the approved seed mixture. No further activity is planned for this area unless there is fill material that was not used and is needed for final reclamation. The fill slopes of the fill covering the 36" culvert were seeded and covered with excelsior mats to help prevent erosion until the vegetation is

established. A flared inlet and a trash rack were installed on the culvert. The fill slope was rocked up to the high water line to also help protect the inlet and outlet. The culvert was bedded in washed gravel at the slope of the natural channel of 14.3%.

A track hoe removed the top soil from the breakout area so it could be stored in the storage area. As the subsoils were encountered, they were used to bring the new road up to grade. The new road was built with a 1-2% adverse grade from the existing road to the breakout area. Subsoil not used as road fill was stored on the small opening at the mouth of the canyon where the knob was removed. All of the stored soil was then seeded with the approved seed mix, and then a layer of straw mulch was applied.

The new road and the breakout area disturbed .42 acres, and the area where the knob was partially removed disturbed .19 acres, for a total new disturbance of .61 acres. The road that was reopened for access and to provide topsoil storage disturbed an additional .35 acres.

The breakout pad was constructed so that the surface drainage will drain into the mine where it will enter the normal mine drainage and will eventually enter the portal area sedimentation pond. A small seep was encountered during construction. A French drain was constructed to drain this seep into the creek drainage system.

A combination of silt fences and strawbales was used to treat the surface run-off from the disturbed area of the new road, the breakout pad and the topsoil and subsoil storage areas. The silt fences and strawbales were located as needed between the disturbed and undisturbed areas to treat run-off from the disturbed area. These silt fences and strawbales will be maintained until adequate vegetation is established.

The breakout portals are screened to prevent humans or animals from entering the mine. No exhaust fans or permanent activity is planned for this area once construction is finished.

Once the breakout portals were established, all of the disturbed areas were seeded and all of the roads on National Forest land were water barred and seeded. All seeding was done with the approved seed mixtures. One of the temporary 18" culverts was removed but left on site in case emergency access is needed back into the breakout area.

All slash created by the project was piled so it can be burned at a later date. All brush disposal will be in accordance with standard U.S. Forest Service requirements.

Once the breakout area has been faced up and the portals established, no further activities are planned or anticipated at the area until final reclamation begins, except for periodic inspections. The * culvert trash rack and portal high wall will be inspected at a minimum of three times a year: (1) early spring; (2) mid-summer at the beginning of the thunderstorm season, and (3) late fall before freeze-up.

3.4 AREA AFFECTED BY EACH PHASE OF OPERATIONS

The area affected by the Skyline Mines project can be divided into two major categories:

(a) Surface acreage disturbed by construction/installation of coal handling and associated facilities, and
(b) Surface acreage overlying underground mine workings.

Disturbed Surface Acreage

The offices, bathhouse, workshop, portal, fans, and other necessary facilities utilize a site of 31.1 acres. Approximately .26 acres is used for water tank bench. The coal loading and handling facility at the mouth of Eccles Canyon utilizes approximately 9.0 acres, of which a sedimentation pond requires 0.6 acres. The enclosed conveyor belt, transporting material from the mining portals to loading points, has disturbed 6.0 acres. The Scofield waste rock disposal site utilizes 1.3 acres. The South Fork Breakout area has disturbed approximately .96 acres. In total, the surface acres disturbed are 48.6 acres. The disturbed permitted area and bonded area for the mine portal area and loadout area are shown on Maps 3.2.1-1 and 3.2.1-3, respectively.

The pre-mining phase of earth work and dirt removal commenced in the spring of 1980 and was completed in 1981. The actual construction and installation of facilities necessary for coal mining and handling began in early 1981.

Area Overlying Underground Mining

Interpretation of the available geological data and bore holes information indicates that certain portions of all three seams within the leasehold are non-mineable. Total acreage values for mineable acreage do not include such areas. Surface area to be affected by underground mining is shown in Section 4.17 Subsidence Control Plan.

TABLE 4.2-1 (cont'd)
RECLAMATION TIMETABLE

YEAR(S)	AREA DESCRIPTION/ACTIVITY	RECLAIMED ACRES
2016 (continued)	Lower Bench	
	-Crusher	
	-Rock and Coal Bypass	
	-Sampling Stations	
	-Conveyors	
	-Truck Loadout	
	-Substations	
	-Mine No. 3 Portal Areas	
	-Drainage Considerations	
	Culvert Removal or Filling	
	Ditch Filling	
	Drainage Reconstructing	9.8
	Scofield Disposal Site	
	Disposal Area	2.3
*	South Fork Breakout	.96
	Loadout Site	
	Parking Area	
	Silos	
	Substation	
	Drainage Considerations	
	-Culvert Removal or Filling	
	-Ditch Filling	
	-Drainage Reconstructing	8.7

Replaces	Text
Table 4.2-1 Page 4-8	Table 4.2-1 Page 4-8 dtd 7/18/88

*Denotes change or addition

4.6.5 SOUTH FORK BREAKOUT

Before any top soil was removed, all woody vegetation was removed from the project area. Soils are basically a sandy loam mixture and have been classified by the S.C.S. as Uinta Family loam/tozc Family fine Sandy loam. Core sampling in the area shows that the soils vary in depth from 24-36+" in depth.

After the vegetation had been removed, the A&B horizons of soil were removed using a track hoe. The track hoe stacked the soil where a front-end loader picked it up and transported it to the storage area on * the abandoned temporary Forest Service road and on the small opening at the mouth of the canyon where the knob was removed. The front-end loader spread the soil in approximately two foot lifts. By handling the soil in this manner, it will not be compacted in the storage area and the roots of the revegetation plants will penetrate the entire depth of the soil. This will allow the soil to maintain itself as viable top soil to be used during final reclamation. It is estimated that approximately 2990 cubic yards of topsoil was removed and stored.

As subsoils were encountered, they were used to bring the new access road up to grade. Subsoil not used as road was also stored on the * small opening at the mouth of the canyon where the knob was removed. It is estimated that approximately 2840 cubic yards of subsoil were removed. Approximately 1820 cubic yards of the subsoil were used in the road fill and the remaining 1020 cubic yards were stored for final reclamation.

As the coal in the coal seam was encountered, it was hauled out so as to eliminate the possibility of spontaneous combustion occurring.

Once the construction was complete, all of the disturbed areas were seeded and all the roads that are on National Forest Lands and the disturbed areas were water barred and seeded with the mixture shown on Table 4.6-1. A combination of silt fences and strawbales were used to

treat surface run-off from the disturbed area of the new road, the breakout pad and the topsoil-subsoil storage areas until adequate vegetation is established. The silt fences and strawbales were located as needed between the disturbed and undisturbed areas to treat run-off from the disturbed area.

At the end of the life of mine, the road into the breakout site will be reopened. The portals will be sealed as outlined in section 4.9. The area will then be returned to approximate original contour and the highwall eliminated by front end loaders and track hoe type equipment. First the subsoil from the storage area and road will be * uniformly placed in the breakout area. The top soil will then be uniformly distributed over the area. If additional fill material is needed, the remainder of the small knob at the mouth of the canyon may be used.

The soil will be spread in a manner to provide a roughened surface so that seed, fertilizer, and mulch can remain during germination and initial growth of the seedlings. Raking the surface prior to planting may also be needed to provide the necessary roughened surface.

Riparian zones were revegetated with handset seedlings of yellow willow, blue spruce, Woods rose and American red raspberry at intervals of 1/2-1 meter. Table 4.7-3 lists the seed mixture spread on the inter-spaces. Steep slopes which have been rip-rapped were not revegetated.

4.7.2 Final Reclamation Seeding Tillage and Mulching, Portal Train Loadout Areas, and other small areas

Seed mixture for final reclamation are shown on Tables 4.7-4, 4.7-5, and 4.7-6.

Seeding of the south-facing slopes (1h:3v) or lower flat areas will be conducted using a cyclone spreader. For slopes less than 2h:1v, seeding will be accomplished using a hydro-seeder. Plantings of shrubs and trees will be hand-set to ensure a plant cover of a permanent nature. Slopes of 2h:1v or steeper will be revegetated by hand-set planting techniques.

Tillage practices on level ground and on slopes flatter than 10h:1v will include leveling and tilling. Slopes of 10h:1v up to 3h:1v will be mulched using 1,000 pounds per acre of straw or other inert mulch material which will be anchored by crimping. Slopes steeper than 3h:1v will be treated with hydro mulch. All hydro mulch will be applied at the rate of 2,000 pounds per acre plus 140 pounds of tacifer per acre.

Planting on slopes less than 10h:1v will be accomplished by drilling seed with a mechanical drill. Slopes between 10h:1v and 1.5h:1v will be seeded by hand broadcast and manually buried by raking. Mulch will be applied over the hand broadcast seed. The Permittee elects to revegetate areas with slopes greater than 1.5h:1v without topsoil; such areas will be treated to handset plantings in basins filled with topsoil and with hydromulch seeding in between. Where the substrate consists of outcroppings of stone, no attempt will be made to revegetate.

Replaces	Text
Section 4.7.2 Pg 4-30	Section 4.7.2 Pg 4-30 dtd 7/15/87

Table 4.7-7

The acreage and proportion of each disturbance area is as follows:

	Vegetation	Acreage	%
Loadout	Grass/Forb	6.8	76
	Spruce/Fir	2.2	24
		9.0	100
Portal Yard	Aspen	6.8	22
	Spruce/Fir	14.0	45
	Sagebrush	2.5	8
	Disturbed	7.8	25
		31.1	100
Water Tank and Well Pads	Aspen	.2	100
Conveyor Route	Sagebrush	3.8	63
	Aspen/Conifer	2.2	37
		6.0	100
Waste Rock Disposal	Already Disturbed	1.3	100
South Fork Breakout	Aspen	.3	31
	Spruce/Fir	.66	69
		.96	100

		48.6	

Power transmission lines for underground mining and related activities in the permit area were designed and constructed to comply with the guidelines set forth in "Environmental Criteria for Electric Transmission System" (USDI, USDA (1970)). Power distribution was designed and constructed in accordance with REA Bulletin 61-10 "Powerline Contacts by Eagles and Other Large Birds."

If necessary, a wire fence will be erected and maintained around the perimeter of the portal area or portions thereof to protect grazing stock and wildlife. The fence design will be submitted to the regulatory authority prior to construction. Other ventilation shafts and structures will be similarly fenced, covered or otherwise protected if required. While the ponds contain no toxic-forming materials, the Permittee agrees to exclude wildlife from such ponds should it become necessary. No persistent pesticides will be used unless approved by the regulatory authority as part of a reclamation management plan.

The Permittee also agrees to participate in the prevention, suppression, and control of forest, range, and coal fires, even though these fires may not be part of an approved management plan. The Permittee on occasion conducts a conservation training program for mine employees. This program conducted by personnel of the Utah Division of Wildlife Resources has been included as part of the routine mine training schedule.

Additional information on wildlife can be found in this document in Section 2.9 - TERRESTRIAL WILDLIFE, and Section 2.10 - RAPTORS.

The South Fork Breakout is located in an Elk Calving area. Construction of the face up area should be done after calving season. The tributary to South Fork is a contributing stream for aquatic insect drift to the fishery in Eccles Creek. Construction operations will be done in a manner to minimize disturbances and influences on the stream.

4.19.7 DIVERSION CHANNEL AT ROCK DISPOSAL SITE

A diversion channel has been installed as shown on Map 4.16.1-13. The swale to redirect the drainage across the access road and into the original stream channel will be constructed of concrete as shown in Figure 4.19.7-1.

The swale outlet will be lined with 4 inch x 4 inch or larger rock to reduce exit velocity of water from the swale. Engineering calculations for the waste disposal site channel design are included in Appendix Volume A-3.

4.19.8 SOUTH FORK BREAKOUT

A new road was constructed which crossed a drainage way to the South Fork of Eccles Creek. This drainage way flows in all but extremely dry years. When the creek crossing was constructed, the top soil was removed with a track hoe to help minimize disturbance to the channel itself. The culvert was placed in the existing channel, and then the road fill placed over it.

During reclamation the fill material will be removed and then the culvert lifted out of the channel. Top soil will then be placed back on the disturbed area with a track hoe and the area reseeded. Although no permanent disturbance to the channel is planned or expected, if it should occur, it will be riprapped with a gradation of material from 4" to a maximum size of 38".

All culverts used for access to the area will be completely removed from the area during final reclamation.

This final reclamation plan outlines the minimum reclamation to be accomplished. At the time of final reclamation, a meeting will be held with the U.S. Forest Service to determine if additional reclamation work over-and-above that outlined in the plan is needed.

Mine Access Road

The mine access road is classified as a Class I road and runs from the Mine #3 portal to the maintenance complex area. Drawings 3.2.4-1 and 3.2.6-2A show a typical cross-section of the mine access road and related ditches. Since the length of the road is approximately 1,200 feet, no road culverts were installed. As shown in the design, the steepest portion of the access road is a 10.0% grade sustained for 250 feet. No other grades on the access road exceed 10.0%. There are no switchbacks on the access road. None of the access road cut exceeds 1h:1v in unconsolidated material and .025h:1v in rock. The access road is to be 20 feet wide with a 4 foot height berm at the shoulder. The road is flat with a drainage ditch against the highwall. The drainage ditch has been designed to safely pass the peak from a 10 year, 24 hour precipitation event. No trash racks and debris basins have been installed, as the ditch will be cleaned periodically. The road is surfaced with crushed gravel. Once mining is completed, the road will be topsoiled and terraces will be constructed to prevent soil erosion.

Water Tank Access Road

Access to the water tank area is via Utah State Highway SR-264.

Breakout Area Access Road

The road which was constructed to obtain access to the breakout area in the South Fork of Eccles Creek will be reopened during final reclamation. After the face up area has been reclaimed, the new temporary access road, the small opening at the mouth of the canyon and the road where the topsoil was stored, will be returned to the approximate original contour and seeded with the approved seed mixture.

*

Replaces	Text
Sec. 4.20.1, Pg 4-93, dtd	Sec. 4.20.1, Pg 4-93, dd 4/25/88

*Denotes change or addition

The access road up the side canyon will be reopened to accomplish final reclamation work at the breakout area. After reclamation work is completed at the breakout area, the road will be returned to approximate contour and seeded with the approved seed mixture. All culverts and the trash rack used in the project will be removed from the area. All disturbed areas will be seeded as outlined in section 4.7.2.

The road from the Forest boundary to the mouth of the side canyon will be ripped, outsloped, water barred, and blocked so that vehicle traffic cannot use the road.

4.20.2 Overland Conveyor Belt

The location of the upper two-thirds of the conveyor is on a bench on the north slope of Eccles Canyon, while the lower one-third will be supported by towers and trusses. The steepest portion of the conveyor is a negative 26.33 percent grade sustained for 430 feet. The average negative grade of the conveyor route is 9.39 percent and the average positive grade is 8.37 percent. Cut slopes along the route do not exceed 1h:1v in unconsolidated materials and 1h:4v in rock. As part of the air quality control program, the belt and transfer points will be enclosed to reduce fugitive dust.

Replaces	Text
	Sec. 4.10.1, Pg 4-93a, dtd 4/25/88

*Denotes change or addition

TABLE 4.3-2 (continued)

ESTIMATED RECLAMATION COSTS

PHASE	Area Description	No. of Acres	Concrete and/or Blacktop Removal	Back-filling	Grading	Ripping	Topsoil Additions	Fertil-ization and/or Neutral-ization	Seeding and Tree Planting	Moisture Retention	Maintenance and Monitoring	TOTAL
ABANDONMENT	LOADOUT SITE	8.7	--	45,070	6,930	1,560	64,050	8,700	3,480	6,960	8,700	137,620
	Silos (4)		64,700	--	--	--	--	--	--	--	--	64,700
	Railcar Loadout		2,630	--	--	--	--	--	--	--	--	2,630
	Sedimentation Pond Backfill		1,540	--	--	--	--	--	--	--	--	1,540
	Paving		12,440	--	--	--	--	--	--	--	--	12,440
	Subtotal (Loadout - Abandonment Phase)		81,310	45,070	6,930	1,560	64,050	8,700	3,480	6,960	8,700	$218,930
	WASTE ROCK DISPOSAL SITE	2.3	--	--	11,400	870	43,060	230	920	1,840	2,300	60,620
	Subtotal (Waste Rock Abandonment Phase)		--	--	11,400	870	43,060	230	920	1,840	2,300	60,620
	SOUTH FORK BREAKOUT AREA	.96	--	8,500	3,400	600	3,700	300	360	750	1,600	19,210
	Subtotal (South Fork Abandonment Phase)		--	8,500	3,400	600	3,700	300	360	750	1,600	19,210
	Sub-Total Abandonment Phase		131,450	192,990	151,580	16,440	218,000	4,090	15,440	30,910	34,300	$804,625

TABLE 4.3-2 (continued)

ESTIMATED RECLAMATION COSTS

PHASE	Area Description	No. of Acres	Concrete and/or Blacktop Removal	Back-filling	Grading	Ripping	Topsoil Additions	Fertil-ization and/or Neutral-ization	Seeding and Tree Planting	Moisture Retention	Maintenance and Monitoring	TOTAL
	BUILDING AND EQUIPMENT REMOVAL		621,030	(Building removal)								621,030
ABANDONMENT	Subtotal (Removal-Abandonment Phase)		621,030									621,030
	TOTAL ABANDONMENT PHASE		752,480	192,990	151,380	16,440	218,020	4,090	15,440	30,910	34,300	1,416,050
	Contingency (10%)											141,605
	Sub Total											$1,557,655
	Inflation Factor (1.97% per year)											155,765
	PROJECT TOTAL											$1,713,420

COAL PAP AMENDMENT/REVISION/NOV & EXPLORATION TRACKING FORM
(Revised: 9/14/87)

Type of Proposal:

PAP AMENDMENT ↘ NOV #N ____ ____ ____ ____, # ____ OF ____
PAP REVISION ____ CO #C ____ ____ ____ ____, # ____ OF ____
EXPLORATION ____
I. B. C. ____ (Incidental Boundary Change)

Title of Proposal: Skyline Breakout

Company Name: Utah Fuel Co.

Project or Mine Name: ____

File #: (INA / PRO / (ACT) / CEP) 007 / 005 -88 B3 # New Acres: ____

Assigned Reviewers:		Review Hours:	Tech Memo Drafted YES	NO
HYDROLOGY	RS / MD		( )	( )
BIOLOGY	LK	(1)	(✓)	( )
ENGINEER	JRH		( )	( )
SOILS	JSL		( )	( )
GEOLOGY	DD	4 hrs	(✓)	( )

*Please Check Appropriate Box!!

Dates:

(1) Initial Plan Received 04/28/88
Tech Review Due ~~04/28/88~~ operator to resubmit
Tech Review Complete ____
DOGM Response Sent ____
Optr. Response Due ____

(2) Optr. Response Rcvd. 7/19/88 - resubmittal
Tech Review Due 8/22/88
Tech Review Complete 8/22/88
DOGM Response Sent 8/26/88
Optr. Response Due ____

(3) Optr. Response Rcvd. 9/19/88
Tech Review Due 9/30/88
Tech Review Complete ____
DOGM Response Sent ____
Optr. Response Due ____

(4) Optr. Resubmission ____
Tech Review Due ____
Tech Review Compl. ____
DOGM Response Sent ____
Optr. Response Due ____

(5) Optr. Resp. Rcvd. ____
Tech Review Due ____
Tech Review Compl. ____
DOGM Response Sent ____
Optr. Response Due ____

Condtn'l Approval ____
Stipulations Due ____
Stips. Received ____
DOGM Response Sent ____
Final Apprvl. Sent ____

COMMENTS: BLM concl. 7/12/88
results 7/19 - archaeological survey rec'd 8/1
REVISED MAPS RECD 9/15/88 (HOLDING UNTIL FINAL APP IN BOX #4)

8946R-2

Utah Fuel Company
a subsidiary of The Coastal Corporation
P.O. Box 719 • Helper, Utah 84526 • (801) 637-7925
Salt Lake (801) 596-7111

GLEN A. ZUMWALT
Vice President and
General Manager

September 16, 1988

Lowell P. Braxton
Administrator, Reclamation Program
Division of Oil, Gas & Mining
355 West North Temple
3 Triad Center, Suite 350
Salt Lake City, Utah 84180-1203

Re: Deficiency Review, PAP Amendment, South Fork Breakout

Dear Mr. Braxton,

We have reviewed the deficiency document from your office and the U.S. Forest Service, and are submitting the following information to satisfy your review, along with 8 copies of pages 2-44, 3-42, 3-64a, 3-64b, 4-26a, 4-26b, 4-84, 4-90, map 3.2.11-1, and Engineering calculations.

COMMENTS BY MIKE DEWEESE AND RICK SUMMERS

UMC 783.23 (b) (12) Operation Plan: Maps And Plans - MD

The operator proposes to sample the creek above and below the disturbed site during construction on a weekly basis. The exact location of these monitoring sites must be included on an appropriate map of the area. The Division recommends that these sites be located no further than 100 feet from the disturbed area.

Response: Sampling points have been indicated on Map 3.2.11-1.

UMC 784.24 (a) Transportation Facilities - MD

The plan requires construction of a new road section across the upper drainage. The plan presents adequate calculations for culvert sizing in this section but contains no designs for inlet protection or outlet structures. The application must include plans for inlet protection and designs for an adequate energy dissipator for the South Fork culvert outlet.

Additionally, due to the culvert length and impact to the existing channel, the Division requests that the following information be included in the submittal:

1. Plans to bed the culvert in washed gravel in order to minimize contributions of sediment to the stream during installation and removal.

2. A detailed reclamation plan for the channel crossing. This information should include a survey of the existing stream channel, plans to meet the requirements of UMC 817.44 subsections (b) and (d), plans demonstrating the restored channel will have a capacity at least equal to the upstream and downstream sections (i.e., channel cross-sections), plans to restore the channel with a channel slope approximating the pre-disturbance condition. The calculations presented in the submittl utilize the incorrect formula for the hydraulic radius. It appears the formula was used for a triangular channel to approximate the channel. The formula used was:

$$R = z\, d^{2}\, (z + 1)^{0.5}$$

The correct formula is:

$$R = z\, d^{2} / 2\, (z + 1)^{0.5}$$

However, the Division recommends using a trapezoidal type channel for the channel reconstruction.

The slope used in the calculations for the riprap size is not defined. Is this the existing natural channel slope or the culvert slope? The channel should be designed using the slope of the natural channel. A filter blanket should be designed and proposed for the crossing and a riprap gradation curve should be submitted.

The application states in the plan that 18 inch diameter temporary culverts will be installed in the existing road where it crosses two side drainages. However, the submitted calculations use a 12 inch diameter design at these areas. The applicant must correct this discrepancy and commit to one design size for these culverts.

Response:

A flared inlet will be used on the 36" pipe and the fill slope rocked up to the nigh water line (see p.3-64a).

An energy dissipator has been designed and is included in the engineering calculations.

Culvert will be bedded in washed gravel (see p.3-64a).

A trapezoid type channel is designed as well as new riprap side and filter blanket and is included in the engineering calculations.

It was calculated that we need 12" temporary culverts; however, we have elected to use 18" culverts. We show this now in the engineering calculations.

UMC 817.11 Signs and Markers

(e) The application should commit to installation of buffer zone signs between the edge of the disturbance and the South Fork of Eccles Creek.

Response: We have changed p. 3-42 of the M & RP to include the buffer zone signs at the South Fork Breakout area.

UMC 817.45 Hydrologic Balance: Sediment Control Measures - MD

Page 4-26a of the plan states that after road construction, straw bales and silt fences will be installed to treat runoff until adequate vegetative cover is established. The plan should include proposed locations (either on a map or in narrative) for these controls. There are no provisions in the plan for sediment control during construction of the facility (including culvert installation). The operator must submit an effective runoff treatment plan for the construction and reclamation phases of the project. These plans should include installation of straw bale dikes downstream of the culvert installation and a silt fence or straw bales between any construction disturbance and the stream channel.

Response: Pages 3-64b and 4-26a have been changed to include location of silt fences and/or straw bales. Page 3-64a has been changed to include installation of straw bales and/or silt fence dikes downstream during installation of culverts.

UMC 817.52 Hydrologic Balance: Surface and Ground Water Monitoring

The application should include a monitoring plan (with appropriate revised location map) for the South Fork of Eccles Creek. Due to the expected mining beneath the stream and the relatively low cover in the area, the data will be necessary to monitor potential impacts to the stream. An extensive data set exists for sample site CS-1; however, changes in stream yield cannot be performed using double-mass analysis techniques unless annual yield has been measured and established. Therefore, the upstream-downstream monitoring is our only option to adequately monitor the system. The data will also be useful in classifying the stream reach as losing or gaining. Baseline data should be collected for stations located upstream and downstream of any surface and underground mining activity. The quality samples should be collected as per the Division's Water Monitoring Guidelines baseline parameter list quarterly with flow and field parameters taken monthly. Flows should be measured using a meter or established flumes.

Response: We are not responding to this item as the South Fork Breakout has no potential for impacts to the stream and springs except during construction. Impacts during construction have been covered. The Division's concerns are dealing with general mine planning for this area, not with the breakout.

COMMENTS BY JIM LEATHERWOOD

UMC 783.27 Prime Farmland Investigation - JSL

In accordance with part (a) of this section the operation must conduct an investigation to determine if the proposed area could be prime farmland. If the proposed area does not contain prime farmland then the applicant shall request for a negative determination based on the criteria outlined in part (b) of this section.

Response: We are requesting that a negative determination be declared as the South Fork Breakout area meets the criteria in UMC 783.27 paragraph b(1), (2), and (5).

UMC 817.23 Topsoil: Storage - JSL

The applicant must commit to revegetate the topsoil stockpile protection and viability.

Response: P.3-64a already states that the topsoil stockpile will be seeded with the approved seed mix.

COMMENTS BY RANDY HARDEN

UMC 817.13 - .15 Casing and Sealing of Exposed Underground Openings - JRH

The operator has not addressed the requirements of these sections. A commitment must be included in the reclamation plan for the temporary and permanent closure of the portal openings.

The operator must describe the methodology to be used in closure of the mine openings. The description is to include the method for installing bulkheads in the portals, backfilling, and highwall reduction of the face up for the portals. The reclamation plan section should also address the hydrologic balance requirements of this section, particularly treatment and discussion of drainage into or from the mine openings.

Response: Page 3-64b already addresses the temporary controls for entry into the mine. Page 4-26b addresses permanent closure of the portal entries. Page 3-64b also discusses drainage resulting from the breakout pad.

UMC 784.13 Backfilling and Grading - JRH

The operator has indicated that coal materials excavated from the portal breakout development will be removed from the site. Consequently, there may be a shortage of fill material available during reclamation. The operator shall commit to surveying the site upon completion of construction of the breakout facilities in order to determine if there is a shortage of fill material required for reclamation. Regrading of the site should call for the total elimination of the highwall caused by the portal face up.

Response: We have estimated that we will remove approximately 2700 tons of coal from the site. We feel that it is obvious that if we remove 2700 tons from the excavated site, that there will be a shortage of fill material for reclamation. We have changed page 4-26b to indicate that the highwall will be eliminated. Material to replace the coal volume will come from the slash disposal area as discussed on p.3-64a.

Delineation of the disturbed area has not been made on the drawings. The surface disturbed area boundaries and acreage shall be shown on the drawings. This disturbed area must include those areas to be disturbed during the construction, operation and reclamation of the site, including topsoil storage and borrow areas and areas which may have to be disturbed during reclamation work which may not have been disturbed during construction of the facilities.

Response: We have changed map 3.2.11-1 to delineate the disturbed areas and to show acreage involved.

UMC 800 Bonding - JRH

Bonding information provided by the operator is not considered to be adequate. Similarly, the general bonding and cost estimations provided for the entire mining and reclamation permit are not considered to be adequate. Since the addition of the portal breakout area is only a small percentage of the total bond amount, detailed calculations and cost estimates for bonding for South Fork will be deferred to the bonding and cost estimate information required for the entire permit as part of the permit renewal process rather than be required as part of this revision to the plan. Additionally, details for reclamation work required on the portal site will be more specific and accurate based on the facility as constructed rather than as proposed.

Response: Detailed calculations and cost estimates for the South Breakout area were included on pages 4-15 and 4-16. If additional information is needed we will cover them during the permit renewal process.

COMMENTS BY DAVID DARBY

UMC 817.41 and UMC 817.52

The operator will be required to conduct a complete inventory of springs in the South Fork of Eccles Canyon where mining will take place and establish the flow for at least one year of the tributary fed by the springs prior to conducting mining operations.

Response: In the summary discussion which proceeds this deficiency item, the main thrust deals with the general mining plan for the entire South Fork area. The Breakout area only affects less than 1/2 acre of area. There are no springs involved. We can not delay the breakout ("for at least one year"). The breakout will occur sometime in the next 60-90 days. We feel this deficiency item is inappropriate in relationship to the South Fork Breakout.

UMC 817.121 and UMC 817.124

The operator will be required to establish baseline subsidence information for the South Fork Area prior to conducting underground mining operations. This information will essentially consist of premining surface elevations obtained by either aerial photographs or transit surveys.

Response: The portals for the breakout will be fully supported and will therefore cause no subsidence. Our approved subsidence plan already requires us to establish baseline subsidence information in Section 4.17.5.

COMMENTS BY LYNN KUNZLER

Analysis

Construction has been timed to avoid conflict with special wildlife use periods and is acceptable. Plans to screen the entries to prevent wildlife access is appropriate.

Plans for final revegetation of the site and for interim stabilization of the topsoil pile and forest service road are acceptable. However, the proposed amendment does not discuss temporary (interim) stabilization of the remaining disturbed area between the construction period and final reclamation. Plans to vegetate or otherwise stabilize disturbed areas not actively needed for mining needs to be addressed.

Recommendations

The referenced amendment could be approved when this issue has been adequately addressed.

Response: We have changed pages 3-64a, 3-64b, and 4-26a to clarify interim stabilization of the disturbed areas.

Utah Fuel Company would appreciate your prompt review of our responses to the deficiencies. We submitted our request for a PAP amendment in April, and expected to have the construction phase of the project completed by now. Time is becoming critical if we are to construct this breakout with a minimum of disturbance. Our intentions are to do a good job as indicated in our proposed plan, and we are committed to do the best that conditions allow. The underground entries will be breaking out within the next 60-90 days, and therefore I am urgently requesting that you approve this permit amendment so that we can proceed immediately to face up the breakout area.

If additional information is needed for approval, I would like to suggest an immediate conference be held so as to avoid the delays of written correspondence. This would allow us to reach agreement on deficiencies, and then we could submit the agreed upon changes for your final approval.

Sincerely,

Glen A. Zumwalt
Vice-President/General Manager

GAZ:KZ:lm

Attachments

of sampling. The Permittee commits to the following surface water monitoring program when surface flow is present.

1. Four monitoring stations will be established: Two stations on the drainage from the east and two sites on the drainage from the south. Stations will be located both above and below the rock waste disposal site in each of the drainages.

2. When flow is present, these stations will be monitored, when accessible, at the same frequency and for the same constituents as the stations in Eccles Creek. The data will be tabulated and reported in the same manner as the Skyline water quality data.

3. The data from these stations will be evaluated for non-point source contribution from ground water aquifers. This procedure offers the best potential for detection of ground water contamination.

The Upper O'Connor seam will require a breakout to improve ventilation. The breakout will be on a south facing slope in a side canyon of the South Fork of Eccles Creek (see map no. 3.1.2-1). A new road will need to be built across this canyon to gain access to the breakout area. The canyon flows water in all but the driest of years. If the canyon is flowing water, the creek will be sampled above and below the construction site on a daily basis during the active construction period. The samples will be tested for total suspended solids and settleable solids.

those points of the operation where public or employee access to the perennial is possible. Those points include the portal area on the southwest and middle forks of upper Eccles Creek, the pump houses along Eccles Creek and at the loadout facility near Eccles and Pleasant Valley Creeks, and South Fork Breakout area.

3.2.8 Plan for Disposal of Rock Waste

Coastal States Energy Company ("Coastal") has developed a rock waste disposal site at a location southeast of Scofield, Utah and approximately 3.6 air miles from the Skyline mine site (Map 4.16.1-1A). The rock waste disposal site is an abandoned strip mine pit which is accessed by an upgraded existing road (see Maps 4.16.1-1A and 3.2.8-1). The facility is required for the disposal of rock wastes to be generated from the Skyline from the Skyline Mines during mine's developmental and operational phases. Additional discussion on this disposal site can be found in Section 4.16.

Coastal hauls the rock wastes by truck from the Skyline mine site (portal area) and the unit train loadout facility to the waste disposal area. An operation plan has been developed to establish proper techniques for disposal of the rock waste. A reclamation plan provides for satisfactory final reclamation. The disposal site has been designed to facilitate proper management and operation of the overall disposal process as well as successful reclamation and revegetation. No sanitary waste will be disposed of at the site.

The rock disposal site and access road are located upon land owned by the Estate of George Telonis. The legal right of access and use of the lands for the disposal of rock waste has been granted to Coastal by the heirs of the Estate in a lease effective January 1, 1982 an expiring, unless renewed, on December 31, 2011 (see Exhibit A for photocopy of lease). The lands referred to in the lease include a 7.00 acre right of way for the disposal site access road and a 17.83 area tract of land containing the rock waste disposal site. The legal description of the leased lands is:

3.2.11 South Fork Breakout Area

The Upper O'Connor seam will require a breakout to improve ventilation. The breakout will be on a south facing slope in a side canyon of the South Fork of Eccles Creek (see map 3.1.2-1).

Access to the breakout area will be via an existing road up the South Fork of Eccles Creek to the Manti-LaSal National Forest boundary. From the Forest boundary on the road had been water barred and will need to be reopened. Where the road leaves the main South Fork tributary it crosses two side drainages. Temporary 18" culverts will be installed in these drainages during the construction period. The Forest Service road then continues up the side drainage. Approximately 600 feet up the side drainage a new class III life of project road will need to be constructed for a distance of 75' across the drainage to the breakout area (see map 3.2.11-1). During installation of the culverts silt fence and/or straw bales dikes will be placed downstream to control sediment in the stream.

As construction starts on the project, the trees and brush will be cleared from the road location. The top soil will then be stripped from the road location and stored on the abandoned temporary Forest Service road above the construction area. All of the topsoil will be stored on this abandoned road in a lift not to exceed 2' deep and then seeded to the approved seed mixture. After the top soil from the road location has been removd, a 36" culvert will be placed in the stream bed to provide a life of project crossing. The initial fill material over the culvert will be hauled in from the mouth of the side canyon where a small knob will be removed to help dress up an area. This will also create a safe open area to burn slash created by the breakout construction. The fill slopes of the fill covering the 36" culvert will be seeded and covered with excelsior mats to help prevent erosion until the vegetation is established. A flared inlet will be installed on the culvert. The fill slope will be rocked up to the high water line to also help protect the inlet. The culvert will be bedded in washed gravel at the slope of the natural channel of 14.3%.

A track hoe will then start removing the top soil from the breakout area so it can be stored in the storage area. As the subsoils are encountered they will be used to bring the new road up to grade. The new road will be built with a 1-2% adverse grade from the existing road to the breakout area. Subsoil not used as road fill will also be stored on the abandoned temporary Forest Service road below the topsoil storage area. All of the stored soil will then be seeded with the approved seed mix and then a layer of straw mulch will be applied.

It is estimated that the new road will disturb .11 acres and the breakout area .29 acres, for a total new disturbance of .40 acres.

The breakout pad will be constructed so that the surface drainage will drain into the mine where it will enter the normal mine drainage and will eventually enter the portal area sedimentation pond.

A combination of silt fences and strawbales will be used to treat the surface run-off from the disturbed area of the new road, the breakout pad and the topsoil and subsoil storage areas. The silt fences and strawbales will be located as needed between the disturbed and undisturbed areas to treat run-off from the disturbed area. These silt fences and strawbales will be maintained until adequate vegetation is established.

The breakout portals will be screened to prevent humans or animals from entering the mine. No exhaust fans or permanent activity is planned for this area once construction is finished.

Once the breakout portals have been established, all of the disturbed area will be seeded and all of the roads on National Forest land will be water barred and seeded. All seeding will be done with the approved seed mixtures. The two temporary 18" culverts will be removed but left on site in case emergency access is needed back into the breakout area.

All slash created by the project will be piled so it can be burned at a later date. All brush disposal will be in accordance with standard U.S. Forest Service requirements.

Once the breakout area has been faced up and the portals established, no further activities are planned or anticipated at the area until final reclamation begins.

4.6.5 SOUTH FORK BREAKOUT

Before any top soil is removed, all woody vegettion will be removed from the project area. Soils are basically a sandy loam mixture and have been classified by the S.C.S. as Uinta Family loam/tozc Family fine Sandy loam. Core sampling in the area shows that the soils vary in depth from 24-36+" in depth.

After the vegetation has been removed, the A&B horizons of soil will be removed using a track hoe. The track hoe will stack the soil where a front-end loader will pick it up and transport it to the storage area on the abandoned temporary Forest Service road. The front-end loader will spread the soil in approximately a two foot lift. By handling the soil in this manner, it will not be compacted in the storage area and the roots of the revegetation plants will penetrate the entire depth of the soil. This will allow the soil to maintain itself as viable top soil to be used during final reclamation. It is estimated that approximately 2990 cubic yards of topsoil will be removed and stored.

As subsoils are encountered, they will be used to bring the new access road up to grade. Subsoil not used as road will also be stored on the abandoned temporary Foret Service road on a section below the topsoil storage. It is estimated that approximately 2840 cubic yards of subsoil will be removed. Approximately 1820 cubic yards of the subsoil will be used in the road fill and the remaining 1020 cubic yards will be stored for final reclamation.

As the coal in the coal seam is encountered, it will be hauled out so as to eliminate the possibility of spontaneous combustion occurring.

Once the construction is complete, all of the disturbed area will be seeded and all the roads that are National Forest Lands and the disturbed areas will be water barred and seeded with the mixture shown on Table 4.6-1. A combination of silt fences and strawbales will be used to treat surface run-off from the disturbed area of the new road, the breakout pad and the topsoil-subsoil storage areas until adequate vegetation is established. The silt fences and strawbales will be located as needed between the disturbed and undisturbed areas to treat run-off from the disturbed area.

At the end of the life of mine, the road into the breakout site will be reopened. The portals will be sealed as outlined in section 4.9. The area will then be returned to approximate original contour and the highwall eliminated by front end loaders and track hoe type equipment. First the subsoil from the storage area and road will be uniformly placed in the breakout area. The top soil will then be uniformly distributed over the area.

The soil will be spread in a manner to provide a roughened surface so that seed, fertilizer, and mulch can remain during germination and initial growth of the seedlings. Raking the surface prior to planting may also be needed to provide the necessary roughened surface.

Power transmission lines for underground mining and related activities in the permit area were designed and constructed to comply with the guidelines set forth in "Environmental Criteria for Electric Transmission System" (USDI, USDA (1970)). Power distribution was designed and constructed in accordance with REA Bulletin 61-10 "Powerline Contacts by Eagles and Other Large Birds."

If necessary, a wire fence will be erected and maintained around the perimeter of the portal area or portions thereof to protect grazing stock and wildlife. The fence design will be submitted to the regulatory authority prior to construction. Other ventilation shafts and structures will be similarly fenced, covered or otherwise protected if required. While the ponds contain no toxic-forming materials, the Permittee agrees to exclude wildlife from such ponds should it become necessary. No persistent pesticides will be used unless approved by the regulatory authority as part of a reclamation management plan.

The Permittee also agrees to participate in the prevention, suppression, and control of forest, range, and coal fires, even though these fires may not be part of an approved management plan. The Permittee on occasion conducts a conservation training program for mine employees. This program conducted by personnel of the Utah Division of Wildlife Resources has been included as part of the routine mine training schedule.

Additional information on wildlife can be found in this document in Section 2.9 - TERRESTRIAL WILDLIFE, and Section 2.10 - RAPTORS.

The South Fork Breakout is located in an Elk Calving area. Construction of the face up area should be done after calving season. The road across the tributary to South Fork is a fishery, and is a contributing stream for aquatic insect drift to the fishery in Eccles Creek. Construction operations will be done in a manner to minimize disturbances and influences on the stream.

4.19.7 DIVERSION CHANNEL AT ROCK DISPOSAL SITE

A diversion channel has been installed as shown on Map 4.16.1-1B. The swale to redirect the drainage across the access road and into the original stream channel will be constructed of concrete as shown in Figure 4.19.7-1.

The swale outlet will be lined with 4 inch x 4 inch or larger rock to reduce exit velocity of water from the swale. Engineering calculations for the waste disposal site channel design are included in Appendix Volume A-3.

4.19.8 SOUTH FORK BREAKOUT

A new road will be constructed which will cross a drainage way to the South Fork of Eccles Creek. This drainage way flows in all but extremely dry years. When the creek crossing is constructed, the top soil will be removed with a track hoe to help minimize disturbance to the channel itself. The culvert will be placed in the existing channel, and then the road fill placed over it.

During reclamation the fill material will be removed and then the culvert lifted out of the channel. Top soil will then be placed back on the disturbed area with a track hoe and the area reseeded. Although no permanent disturbance to the channel is planned or expected, if it should occur, it will be riprapped with a gradation of material from 4" to a maximum size of 38".

All culverts used for access to the area will be completely removed from the area during final reclamation.

HYDROLOGY STUDY
SOUTH FORK BREAKOUT AREA

SOIL TYPES

	PERCENT	TYPE	CN
VINTA FAMILY LOAM	50%	B	55
TOZE FAMILY FINE SANDY LOAM	35%	B	55
COMODORE BOULDERY LOAM	10%	D	77
MIDFORK FAMILY BOULDERY LOAM	5%	B	55

LAND USE IS WOOD AND FOREST LAND WITH GOOD COVER

$CN = [.5(55) + .35(55) + .10(77) + .05(55)] / (.5 + .35 + .10 + .05)$

$= (27.50 + 19.25 + 7.70 + 2.75) / (1)$

$= \underline{57.20}$

$S = 1000/CN - 10$

$= 1000/57.20 - 10$

$= 17.49 - 10$

$= \underline{7.48}$

AREA OF THE WATER SHED

PLANIMETER READING - 3,228

$443 \times .0149 \text{ in}^2 = 6.60 \text{ in}^2 \times 22.96 \text{ ACRES/in}^2 = \underline{151.55 \text{ ACRES}}$

$151.55 \text{ ACRES} \times 43,560 \text{ SQ FT/ACRE} = \underline{6,601,608.26 \text{ SQ FT}}$

TIME PARAMETERS

CONCENTRATION TIME

$$t_c = .0078\, L^{0.77} (L/H)^{0.385}$$

$L = 3,850$ FT.

$H = 828$ FT.

$$t_c = .0078\, (3,850)^{0.77} (3850/828)^{.385}$$

$$= .0078\, (576.51)(1.81)$$

$= 8.13$ MIN. USE **8.00** MIN.

LAG TIME

$$t_L = L^{0.8}(S+1)^{0.7} / 1900\, Y^{0.5}$$

$Y = \Sigma c_i \times i$ / AREA IN SQ. FT

$i = 80$ FT

$A = 6,601,608.26$ SQ. FT.

ΣC_i		CONTOUR
600	-	8,720
1,400	-	8,800
2,300	-	8,880
2,875	-	8,960
3,400	-	9,040
3,650	-	9,120
3,700	-	9200
3,300	-	9280
3,000	-	9360
2,200	-	9440
450	-	9.520
650	-	9.520
27,525 FT		

y: $27,525 \text{ FT} \times 80 \text{ FT} / 6,601,608.26$

$= 2,202,000 / 6,601,608.26$

$= 33\%$

t_L: $(3,850)^{.8}(7.48+1)^{.7} / 1900\,(33)^{.5}$

$: (738.53)(4.47) / 1900\,(5.74)$

$: 3,301.23 / 10,906$

$: .30$

$: 18.16 \text{ MIN.}$ USE 18 MINS.

$t_L = 0.6\, t_c$

$18. = .6\,(t_c)$

$t_c = 0.494 \text{ HRS}$

PEAK FLOW USING SCS CURVE METHOD

EVENT	PEAK FLOW
2YR - 24 HR	7.1 CFS
10YR - 24 HR	3.8 CFS
25YR - 24 HR	12.5 CFS
50YR - 24 HR	24.6 CFS
100YR - 24 HR	39.1 CFS

CULVERT SELECTION

USE 100 YR - 24 HR EVENT - 39.1 CFS = Q

SIZE OF CULVERT - FLAT SLOPE

$Q = 2.58\ D^{2.5}$

$D = (Q/2.58)^{1/2.5}$

$= (39.1/2.58)^{.4}$

$= 2.97$ FT $\times 12$ IN/FT

$= 35.6$ IN

USE A 36 IN CULVERT

EFFECT OF SLOPE

$S = 2.04/D^{1/3}$ $\quad S = .14$

$.14 = 2.04/D^{.33}$

$D^{.33} = 2.04/.14$

$D^{.33} = 14.57$

$= 2.42$ FT $\times 12$ IN/FT

$= 29.05$ IN

USE 30 IN CULVERT

USE A 36 IN CULVERT TO HANDLE PEAK FLOW.

DESIGN

GIVEN

PIPE DIA. - 36"
COVER - 15"
LIVE LOAD - 0
WEIGHT OF SOIL - 100 lb/ft³

DETERMINE WALL THICKNESS AND CORRUGATION

1 BACKFILL SOIL DENSITY
90% COMPACTION

2 DESIGN PRESSURE

$P_V = DL + LL$ $\quad DL = H \times \omega$
$= 15 ft \times 100 lb/ft^3 + 0$ $\quad LL$ = NEGLIGIBLE FOR COVER
$= 1500 lb/ft^2$

3 RING COMPRESSION

$C = P_V \times S/2$ $\quad S$ = SPAN IN FT = 3FT
$= 1,500 lb/ft^2 \times 3/2$
$= 1,500 lb/ft^2 \times 1.5 ft$
$= 2,250 lb/ft$

4 ALLOWABLE WALL STRESS
FIG 3-6 $f_c = 22,500 lb/in^2$
FOR $2\frac{2}{3} \times \frac{1}{2}$ IN. CORRUGATION

5 WALL CROSS-SECTIONAL AREA

$A = C/f_c$
$= 2,250 lb/ft / 22,500 lb/in^2$
$= .10 in^2/ft$

FROM TABLE 3-2, A SPECIFIED THICKNESS OF 0.064 IN. PROVIDES AN WALL AREA OF .775

6. $FF = D^2/EI$ = FLEXIBILITY FACTOR = .0433 MAX

D = DIA. = 36 in
E = 30×10^6 lb/in^2
I = .00189 in^4/FT

$FF = (36)^2 / 30 \times 10^6 \times .00189$

$= 1,296 / 56,700$

$= .02286$

$.02286 < .0433$ THEREFORE $2\frac{2}{3} \times \frac{1}{2}$ IN. CORRUGATION IS OK

PURCHASE A 36 IN. DIA. PIPE WITH $2\frac{2}{3} \times \frac{1}{2}$ IN CORRUGATIONS.

TEMPORARY CULVERT SELECTION

Q = >1 CFS USE 1 CFS 2 YR · 24 HR

SIZE OF CULVERT - FLAT SLOPE

$$Q = 2.58\ D^{2.5}$$

$$D = (Q/2.58)^{1/2.5}$$

$$= (1\ CFS/2.58)^{.4}$$

$$= .684\ FT \times 12\ IN/FT$$

$$= 8.21\ IN.$$

NEED A 12 IN CULVERT

USE A 18 IN. DIA. CULVERT

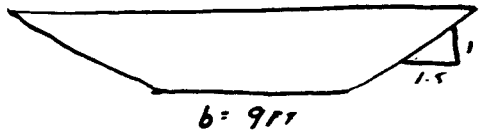
Channel Reconstruction

Trapezoidal Type Channel Design

$Q = 39.1$ cfs

$S = .143$ ft/ft

$n = .04$



$Z = \frac{1.5}{1} = 1.5$

$$Q = VA = \frac{1.49}{n} R^{2/3} A$$

$$= \frac{1.49}{n}\left[\frac{bd + zd^2}{b + 2d\sqrt{z^2+1}}\right]^{2/3} S^{1/2}(bd + zd^2)$$

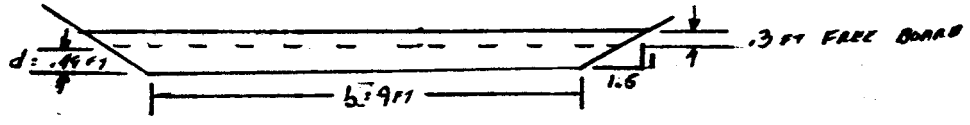
$$39.1 = \frac{1.49}{.04}\left[\frac{9d + 1.5d^2}{9 + 3.61d}\right]^{2/3}(.143)^{.5}(9d + 1.5d^2)$$

$$2.78 = \left[\frac{9d + 1.5d^2}{9 + 3.61d}\right]^{2/3}(9d + 1.5d^2) \qquad 1.0 \qquad 1.24$$

$b = 9$ ft

Trial d ft	Q
.2	.63
.3	.80
.35	1.08
.4	1.98
.42	2.15
.44	2.33
.46	2.51
.48	2.69
.49	2.79

$d = .49$ ft.



DETERMINE RIPRAP D_{50} AND DESIGN FOR SF = 1.20

$V = 1.49/n \; R^{2/3} \; S^{1/2}$

$n = .04$

$S = .143$ FT/FT

$R = \frac{bd + 2d^2/b + 2d\sqrt{2^2+1}}{} = \frac{9(.49) + 1.5(.49)^2}{9 + (.49)(2)\sqrt{1.5^2+1}} = \frac{4.77}{10.767} = .443$

$V = 1.49/.04 \; (.443)^{.66} \; (.143)^{.5}$

$= (37.25)(.568)(.38)$

$= 8.27$ FT/SEC.

STONE $D_{50} = 7.5$ in $= .625$ FT.

CHECK n VALUE

$n = .0395 \; D_{50}^{.17}$

$= .0395 \; (.625)$

$= .036$

CHECK FOR STABILITY

$d = .49$ FT $\quad S = 14.3 \quad \gamma = 62.4$

$\tau = \gamma d s$

$= (62.4)(.49)(.143) = 4.372$ lb/ft^2

$n_b = 21\tau/(\gamma_{GG} - 1) D_{50} \qquad SG = 2.36$

$n_b = 21(4.372)/(62.4)(2.36 - 1)(.625)$

$= 91.812/53.466$

$= 1.72$

SF MUST BE > 1

ϕ = 42° ANGULAR RIPRAP

14.3 % SLOPE

θ = 8°

$SF_b = \cos\theta \tan\phi / \sin\theta + n_b \tan\phi$

$= (\cos 8°)(\tan 42°) / (\sin 8°) + (1.72)(\tan 42°)$

$= (.990)(.904) / (.139) + 1.599$

$= .896 / 1.682$

$= .521$ UNDER DESIGNED RESIGN STREAM CHANNEL

D_{50} (FT)	MANNING'S n	ANGLE OF REPOSE (DEG)	DEPTH OF CONVEY FLOW	TRACTIVE FORCE	STABILITY FACTOR	SAFETY FACTOR
.63	.036	42°	.49	4.372	1.72	.521
1.26	.041	42°	.49	4.372	.859	.982
1.6	.043	42°	.49	4.372	.676	1.192

D_{50} = 1.6 FT.

DETERMINE RIPRAP FOR BANK SF = 1.2

D_{50} = 1.6 FT, n = .043, θ = 8°, d = .49 FT.

ASSUME

$\tau_{MAX} = .76\,\gamma\,d\,s$

$= .76\,(62.4)(.49)(.143) = 3.323\ lb/FT^2$

$n = (21)(\tau_{max}) / \gamma\,(SG-1)\,D_{50}$

$= (21)(.3326) / 62.4\,(2.36-1)\,1.6$

$= 69.783 / 135.782$

$= .514$

ASSUME UNIFORM FLOW

$\lambda = \theta = 8°$

SLIDE SLOPE

$\alpha = TAN^{-1}\ 1/1.5$

$= 33.69°$

$\beta = TAN^{-1}\left[\cos\lambda / \frac{2\sin\alpha}{n\ TAN\phi} + \sin\lambda\right]$

$= TAN^{-1}\left[.990 / 2(.555)/.514\,(.900) + .139\right]$

$= TAN^{-1}(.390)$

$= 21.32°$

$\eta' = \eta\left[\frac{1 + \sin(\lambda+\beta)}{2}\right]$

$= .514\left[\frac{1 + \sin(8 + 21.32)}{2}\right]$

$= .514\left[1.819/2\right]$

$= .383$

$SF = \cos\alpha \tan\phi / n' \tan\phi + \sin\alpha \cos\beta$

$= \cos 33.69 \tan 42 / (.383)(\tan 42) + (\sin 33.69)(\cos 21.32)$

$= (.832)(.900) / .345 + (.555)(.932)$

$= .749 / .862$

$= .869$

D_{50}	n	β	n'	SF
1.6	.514	21.32°	.383	.86
1.8	.456	19.21	.332	.90
2.0	.411	17.52	.294	.944
2.2	.374	16.09	.263	.979
2.5	.329	14.304	.227	1.009
2.7	.305	13.327	.208	1.03
3.0	.274	12.059	.184	1.06
3.5	.235	10.426	.155	1.09
4.0	.206	9.17	.133	1.12
5.0	.164	7.391	.104	1.17
5.5	.150	6.737	.094	1.18
6.0	.137	6.189	.085	1.19

USE 6 FT D_{50} FOR BOTH CHANNEL BOTTOM AND SIDES

BASED ON THE CALCULATION THE BOTTOM AND SIDESLOPE RIPRAP WILL BE 1.6 FT = D_{50}

RIPRAP GRADATION

	SIZE FT	PERCENT
$2D_{50}$	3.2	100
$1D_{50}$	1.6	50
$.5D_{50}$	.8	20
$.20D_{50}$	.32	0

UNDERLYING FILTER

BASE MATERIAL

D_{50} = .600 MM

D_{85} = .15 MM

D_{15} = .236 MM

RIPRAP

D_{100} : 3.2 FT : 975.36 MM

D_{50} : 1.6 FT : 487.68 MM

D_{85} : 2.9 FT : 883.92 MM

D_{15} : .24 FT : 73.15 MM

D_0 : .10 FT : 30.48 MM

FILTER BLANKET WITH RESPECT TO BASE MATERIAL

(1) $D_{50\,(FILTER)} / D_{50\,BASE} < 40$

D_{50} (FILTER) < 40 × .6 = 24 MM

(2) $D_{15\,(FILTER)} / D_{15\,(BASE)} > 5$

D_{15} (FILTER) > 5 × .236 = 1.18 MM

$D_{15\,(FILTER)} / D_{15\,(BASE)} < 40$

D_{15} (FILTER) < 40 × .236 = 9.44 MM

(3) $D_{15\,(FILTER)} / D_{85\,(BASE)} < 5$

D_{15} (FILTER) < 5 × .15 = .75 MM

∴ WITH RESPECT TO THE BASE THE FOLLOWING MUST BE SATISFIED

$1.18\ mm < D_{15}\ (FILTER) < 9.44\ mm$

$D_{50}\ (FILTER) < 24\ mm$

FILTER MUST BE SIZED TO THE RIPRAP

(1) $D_{50}\ (RIPRAP) / D_{50}(FILTER) < 40$

$D_{50}\ FILTER > 487.66/40 = 12.19\ mm$

(2) $D_{15}\ (RIPRAP)/D_{15}\ FILTER > 5$

$D_{15}(FILTER) < 73.15\ mm/5 = 14.63\ mm$

$D_{15}\ (RIPRAP)/D_{15}\ (FILTER) < 40$

$D_{15}\ (FILTER) > 73.15\ mm/40 = 1.83\ mm$

(3) $D_{15}\ (RIPRAP)/D_{85}(FILTER) < 5$

$D_{85}\ (FILTER) > 73.15/5 = 14.63\ mm$

∴ FILTER MUST MEET THESE

$D_{50}(FILTER) > 12.19\ mm$

$1.83\ mm < D_{15}(FILTER) < 14.65\ mm$

$D_{85}(FILTER) > 14.65\ mm$

FILTER BLANKET MUST BE SIZED AS FOLLOWS

$12.19\ mm < D_{50}\ (FILTER) < 24\ mm$

$1.18\ mm < D_{15}\ (FILTER) < 14.65\ mm$

$D_{85}\ (FILTER) > 14.65\ mm$

ENERGY DISSIPATOR FOR DISCHARGE END OF CULVERT.

$Q = VA$

$Q = \frac{1.49}{n} R^{2/3} S^{1/2} A$

$39.1 = \frac{1.49}{n} \left(\frac{.5768\,D}{1.9578}\right)^{.66} (.143) \frac{\pi D^2}{4}$

D = TW = TAILWATER DEPTH
n = .024
S = .143

$39.1 = 62.08\,(.295\,D)^{.66}(.143)(.785\,D^2)$

$39.1 = 8.877\,(.295\,D)^{.66}(.785\,D^2)$

$4.404 = (.295\,D)^{.66}(.785\,D^2)$

D	Q
1 FT	.351
2 FT	2.317
3 FT	6.518
2.5 FT	4.01
2.6 FT	4.45

$D = 2.6$ FT $= TW$

DESIGN FOR MINIMUM TAILWATER CONDITION

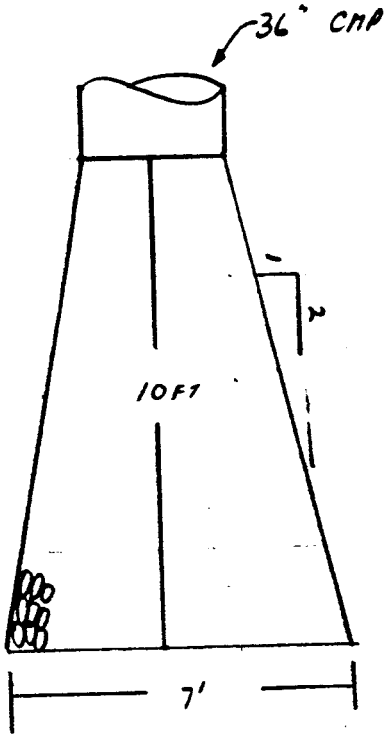
MAX ROCK SIZE $1.5 \times D_{50}$

$D_{50} \cong .33$ FT

$Q = 39.1$ CFS $\quad D = 3$ FT $\quad d_{50} = .33$ FT $\quad L_A = 10$ FT

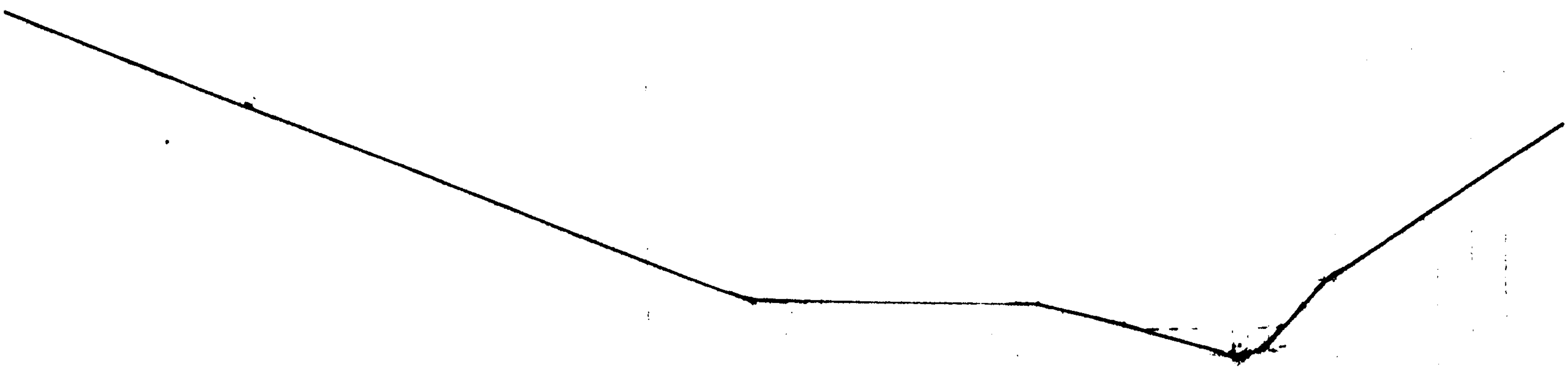
$W_A = D + L_A = 3 + 10 = 13$ FT $\quad d_{MAX} = 1.5 \times d_{50} = 1.5 \times .33 = .5$ FT

ENERGY DISSIPATOR



d_{50} = 4 IN.

d_{MAX} = 6 IN.



Typcial Stream Bed Profile

Scale 1" = 6'

REFERENCE

1. BARFIELD, B. J., R.C. WARNER AND C. T. HAAN, 1985 APPLIED HYDROLOGY AND SEDIMENTOLOGY FOR DISTURBED AREAS. OKLAHOMA TECHNICAL PRESS, STILLWATER, OKLAHOMA.

2. HANDBOOK OF STEEL DRAINAGE AND HIGHWAY CONSTRUCTION PRODUCTS. AMERICAN IRON AND STEEL INSTITUTE. WASHINGTON D.C. THIRD EDITION

3. HYDRAULIC DESIGN OF STILLING BASINS AND ENERGY DISSIPATORS UNITED STATES DEPARTMENT OF THE INTERIOR, BUREAU OF RECLAMATION.

4. SOIL SURVEY OF CARBON AREA, UTAH, UNITED STATES DEPARTMENT OF AGRICULTURE, SOIL CONSERVATION SERVICE.

United States Department of the Interior

[redacted]

Moab District
Price River Resource Area
900 North 700 East
Price, Utah 84501

3400
(U-073120)
(U-066)

JUL 07 1988

Glen A. Zumwalt
Vice President/General Manager
Utah Fuel Company
P. O. Box 719
Helper, UT 84526

Re: Breakout for ventilation purposes in Mine No. 1

Dear Mr. Zumwalt:

Your proposal for minor modification of your No. 1 Mine plan submitted to DOGM April 28, 1988, has been reviewed by this office.

A breakout for ventilation purposes will assist in proper ventilation and is in the best interest of obtaining maximum economic recovery of coal resources in the Skyline No. 1 Mine.

Modification of your mine plan is granted to allow for mining up to the outcrop in the First Left Bleeder section. Actual breakout approval must come from Utah Division of Oil, Gas, and Mining.

This office also requests a copy of your ventilation map for Skyline Mine No. 1 to be submitted at your earliest convenience.

If you have any questions regarding this modification, please contact Jeff Cundick, staff engineer, at 637-4584.

Sincerely yours,

Mark E. Bailey

Area Manager

cc: DM, Moab (U-065)
SD, Utah (U-921)
DOGM

Utah Fuel Company
a subsidiary of The Coastal Corporation
P.O. Box 719 • Helper, Utah 84526 • (801) 637-7925
Salt Lake (801) 596-7111

July 18, 1988

Lowell P. Braxton
Administrator, Reclamation Program
Division of Oil, Gas & Mining
355 West North Temple
3 Triad Center, Suite 350
Salt Lake City, Utah 84180-1203

Re: M&RP Permit Amendment, Breakout in South Fork of Eccles Creek, Mine #1

Dear Mr. Braxton:

On April 27, 1988 we submitted information for an amendment for the proposed breakout in the South Fork of Eccles Creek. Since that time we have had a field review of the project by the U.S. Forest Service, Utah Division of Wildlife Resources, and people from the technical staff from DOGM. As a result of this field review, we are now resubmitting eight (8) copies of a complete permit package for this permit amendment request. We have enclosed pages 2-44, 2-115, 2-117, 2-117a, 3-3, 3-3a, 3-64a, 3-64b, 3-67, 4-8, 4-15, 4-16, 4-26a, 4-26b, 4-30, 4-37, 4-38, 4-41a, 4-56, 4-84, 4-90, 4-93, and 4-93a to the M&RP renewal applications, Maps no. 3.1.2-1 and 3.2.11-1, and engineering calculations for your review. Discard pages and maps submitted with our April 27th correspondence.

During the field review, it was brought out that we would need an archaeological survey for the area. A 100% survey of the area has been done. However, as of this date we have not received the write-up of the survey. We will forward copies of it to you as soon as we receive it. We would appreciate an early review of this proposal as the end of the construction season at this elevation is fast approaching. We anticipate the mining crew to advance at a rate that will require the breakout this fall.

We have attached a copy of the approval letter from the U.S. Department of Interior changing our ventilation plan so as to provide for the breakout. We are also in the process of making permit application to Utah State Division of Water Rights for the stream crossings for access to the breakout area.

If you need any additional information, please contact us.

Sincerely,

Glen A. Zumwalt
Vice President/General Manager

Enclosure

GAZ:KZ:lm

of sampling. The Permittee commits to the following surface water monitoring program when surface flow is present.

1. Four monitoring stations will be established: two stations on the drainage from the east and two sites on the drainage from the south. Stations will be located both above and below the rock waste disposal site in each of the drainages.

2. When flow is present, these stations will be monitored, when accessible, at the same frequency and for the same constituents as the stations in Eccles Creek. The data will be tabulated and reported in the same manner as the Skyline water quality data.

3. The data from these stations will be evaluated for non-point source contribution from ground water aquifers. This procedure offers the best potential for detection of ground water contamination.

The Upper O'Connor seam will require a breakout to improve ventilation. The breakout will be on a south facing slope in a side canyon of the South Fork of Eccles Creek (see map no. 3.1.2-1). A new road will need to be built across this canyon to gain access to the breakout area. The canyon flows water in all but the driest of years. If the canyon is flowing water, the creek will be sampled above and below the construction site on a weekly basis during the active construction period. The samples will be tested for total suspended solids and suspended solids.

st.p: monitor sites on map w/ 5 gr. or revision

TABLE 2.11-1

Seeded Vegetation	Acres	Minimum Inches	Yards^3	Recommended Depth/in.	Yards^3
Grass/Forb	17.7	6	14,278	12	28,556
Spruce/Fir	15.3	12	24,683	12	24,683
Aspen/Snowberry	15.0	24	48,700	30	60,500
TOTAL	**48.0**		**86,232**		**113,739**

TABLE 2.11-2 (continued)
TOPSOIL VOLUMES

Area	Mapping Unit	Vegetation	Acreage	Good (Ave Depth/ft)	Poor (Ave Depth/ft)	Useable Soil, yd^3	Unsuitable Soil, yd^3
Conveyor Route	2	Grass/Forb	0.8	4.5	0.5	5,808	645
	5	Sagebrush/ Grass	2.1	0.5	0.-	1,694	--
	6	Aspen/ Snowberry	0.1	2.5	2.5	403	403
	7	Sagebrush/ Grass	0.3	--	--	--	--
	8	Aspen	.3	2.0	3.0	968	1,452
	9	Rock Outcrops	0.3	--	--	--	--
	10	Aspen	0.5	2.5	1.0	2,017	807
	11	Aspen	0.8	2.5	1.5	3,227	1,936
	12	Grass/Forb Elderberry	0.3	2.5	--	1,210	--
	13	Spruce/Fir	0.5	1.0	2.5	806	2,016
Total - Conveyor			**6.0**			**16,133**	**7,259**

TABLE 2.11-2 (continued)
TOPSOIL VOLUMES

Area	Mapping Unit	Vegetation	Acreage	Good (Ave Depth/ft)	Poor (Ave Depth/ft)	Useable Soil, yd^3	Unsuitable Soil, yd^3
Waste Rock Disposal		Sagebrush/ Grass	1.3	0	0	0	0
Water Tank and Wells		Aspen	.2				
South Fork Breakout		Aspen	.3	4.5	4.4	2,242	2,133
		Spruce/Fir	.1	4.5	4.4	747	711
	GRAND TOTAL		48.0			134,731	127,535

reasonable proximity to railroad transportation facilities available in Pleasant Valley and the availability of at least some relatively flat acreage adjacent to the outcrop. The Lower O'Connor "B" seam will be reached via underground rock slopes from entries in the Upper O'Connor or Lower O'Connor "A" seams.

Two to four entry portals will be used at each mine drift entry location for the intake of air and the transportation of mining crews and materials, and one to three portals will be used to exhaust air. The number of entries will increase within the mine in order to reduce the velocity of the air and to facilitate a reduction of air resistance losses. One additional entry portal in each mine will be used for the conveyance of coal from the mine.

* The Upper O'Connor seam will also require a breakout to improve the ventilation. The breakout will be on a south facing slope in a side canyon of the South Fork of Eccles Creek (see map no. 3.1.2-1). No exhaust fans or permanent activity is planned for this area once construction is finished.

The size of portals vary to conform to the mineable height of the Upper O'Connor seam and the Lower O'Connor "A" seam.

A series of parallel underground openings called entries, separated by blocks of coal providing support, called pillars, are driven from the portal location and are called "main entries," or "mains." These entries are comparable to the main avenues of a city, and allow access for the provision of power, piping, haulage, ventilation, and support services. The design of the mains and the layout of the mines for the Skyline project have been engineered after careful review of the many conditions that can affect the mining operations.

A large number of parallel headings has been determined necessary to maintain air velocities within required acceptable limits (usually less than 800 ft/min. for the 406 tons of air required to be circulated through

Replaces	Text
Sec. 3.1, Pg 3-3, dtd 7/15/87	Sec. 3.1, Pg 3-3, dtd 4/25/88

*Denotes change or addition

the mine for every ton of coal mined). The final number of developed entries will be based on the requirements of the mine area to be accessed.

Since the Permittee considers five feet to be the minimum seam height which can be economically extracted, maps show mining

Replaces	Text
	Section 3.1, Pg 3-3a, dtd 4/25/88

3.2.11 South Fork Breakout Area

The Upper O'Connor seam will require a breakout to improve ventilation. The breakout will be on a south facing slope in a side canyon of the South Fork of Eccles Creek (see map 3.1.2-1).

Access to the breakout area will be via an existing road up the South Fork of Eccles Creek to the Manti-LaSal National Forest boundary. From the Forest boundary on the road has been water barred and will need to be reopened. Where the road leaves the main South Fork tributary it crosses two side drainages. Temporary 18" culverts will be installed in these drainages during the construction period. The Forest Service road then continues up the side drainage. Approximately 600 feet up the side drainage a new class III life of project road will need to be constructed for a distance of 75' across the drainage to the breakout area (see map 3.2.11-1).

As construction starts on the project, the trees and brush will be cleared from the road location. The top soil will then be stripped from the road location and stored on the abandoned temporary Forest Service road above the construction area. All of the topsoil will be stored on this abandoned road in a lift not to exceed 2' deep and then seeded to the approved seed mixture. After the top soil from the road location has been removed, a 36" culvert will be placed in the stream bed to provide a life of project crossing.

A track hoe will then start removing the top soil from the breakout area so it can be stored in a storage area. As the subsoils are encountered they will be used to bring the new road up to grade. The new road will be built with a 1-2% adverse grade from the existing road to the breakout area. Subsoil not used as road fill will also be stored on the abandoned temporary Forest Service road.

It is estimated that the new road will disturb .11 acres and the breakout area .29 acres, for a total new disturbance of .40 acres.

The breakout pad will be constructed so that the surface drainage will drain into the mine where it will enter the normal mine drainage and will eventually enter the portal area sedimentation pond.

A combination of silt fences and strawbales will be used to treat the surface run-off from the disturbed area of the new road, the topsoil and subsoil storage area. These silt fences and strawbales will be maintained until adequate vegetation is established.

The breakout portals will be screened to prevent humans or animals from entering the mine. No exhaust fans or permanent activity is planned for this area once construction is finished.

Once the breakout portals have been established, all of the roads on National Forest land will be water barred and seeded with the approved seed mixture. The two temporary 18" culverts will be removed but left on site in case of emergency access is needed back into the breakout area.

All slash created by the project will be piled so it can be burned at a later date. All brush disposal will be in accordance with standard U.S. Forest Service requirements.

Once the breakout area has been faced up and the portals established, no further activities are planned or anticipated at the area until final reclamation begins.

3.4 AREA AFFECTED BY EACH PHASE OF OPERATIONS

The area affected by the Skyline Mines project can be divided into two major categories:

(a) Surface acreage disturbed by construction/installation of coal handling and associated facilities, and
(b) Surface acreage overlying underground mine workings.

Disturbed Surface Acreage

The offices, bathhouse, workshop, portal, fans, and other necessary facilities utilize a site of 31.1 acres. Approximately .26 acres is used for water tank bench. The coal loading and handling facility at the mouth of Eccles Canyon utilizes approximately 9.0 acres, of which a sedimentation pond requires 0.6 acres. The enclosed conveyor belt, transporting material from the mining portals to loading points, has disturbed 6.0 acres. The Scofield waste rock disposal site utilizes 1.3 acres. The South Fork breakout area has disturbed approximately .4 acres. In total, the surface acres disturbed are 48.0 acres. The disturbed permitted area and bonded area for the mine portal area and loadout area are shown on Maps 3.2.1-1 and 3.2.1-3, respectively.

The pre-mining phase of earth work and dirt removal commenced in the spring of 1980 and was completed in 1981. The actual construction and installation of facilities necessary for coal mining and handling began in early 1981.

Area Overlying Underground Mining

Interpretation of the available geological data and bore holes information indicates that certain portions of all three seams within the leasehold are non-mineable. Total acreage values for mineable acreage do not include such areas. Surface area to be affected by underground mining is shown in Section 4.17 Subsidence Control Plan.

TABLE 4.2-1 (cont'd)

RECLAMATION TIMETABLE

		YEAR(S)	AREA DESCRIPTION/ACTIVITY	RECLAIMED ACRES
		2016 (continued)	Lower Bench	
			-Crusher	
			-Rock and Coal Bypass	
			-Sampling Stations	
			-Conveyors	
			-Truck Loadout	
			-Substations	
			-Mine No. 3 Portal Areas	
			-Drainage Considerations	
			Culvert Removal or Filling	
			Ditch Filling	
			Drainage Reconstructing	9.8
			Scofield Disposal Site	
			Disposal Area	2.3
	*		South Fork Breakout	.4
			Loadout Site	
			Parking Area	
			Silos	
			Substation	
			Drainage Considerations	
			-Culvert Removal or Filling	
			-Ditch Filling	
			-Drainage Reconstructing	8.7

Replaces	Text
Table 4.2-1 Page 4-8	Table 4.2-1 Page 4-8 dtd 7/18/88

*Denotes change or addition

TABLE 4.3-2 (continued)

ESTIMATED RECLAMATION COSTS

PHASE	Area Description	No. of Acres	Concrete and/or Blacktop Removal	Back-filling	Grading	Ripping	Topsoil Additions	Fertil-ization and/or Neutral-ization	Seeding and Tree Planting	Moisture Retention	Maintenance and Monitoring	TOTAL
ABANDONMENT	LOADOUT SITE	8.7	--	45,070	6,930	1,560	64,050	8,700	3,480	6,960	8,700	137,620
	Silos (4)		64,700	--	--	--	--	--	--	--	--	64,700
	Railcar Loadout		2,630	--	--	--	--	--	--	--	--	2,630
	Sedimentation Pond Backfill		1,540	--	--	--	--	--	--	--	--	1,540
	Paving		12,440	--	--	--	--	--	--	--	--	12,440
	Subtotal (Loadout - Abandonment Phase)		**81,310**	**45,070**	**6,930**	**1,560**	**64,050**	**8,700**	**3,480**	**6,960**	**8,700**	**$218,930**
	WASTE ROCK DISPOSAL SITE	2.3	--	--	11,400	870	43,060	230	920	1,840	2,300	60,620
	Subtotal (Waste Rock Abandonment Phase)		--	--	**11,400**	**870**	**43,060**	**230**	**920**	**1,840**	**2,300**	**60,620**
	SOUTH FORK BREAKOUT AREA	.4		4,250	1,700	300	1,850	150	180	375	800	9,605
	Sub-Total (South Fork Abandonment Phase)		--	**4,250**	**1,700**	**300**	**1,850**	**150**	**180**	**375**	**800**	**9,605**
	Sub-Total Abandonment Phase		131,450	188,740	149,680	16,140	216,170	3,940	15,260	30,535	33,500	$785,415

TABLE 4.3-2 (continued)

ESTIMATED RECLAMATION COSTS

PHASE	Area Description	No. of Acres	Concrete and/or Blacktop Removal	Back-filling	Grading	Ripping	Topsoil Additions	Fertil-ization and/or Neutral-ization	Seeding and Tree Planting	Moisture Retention	Maintenance and Monitoring	TOTAL
	BUILDING AND EQUIPMENT REMOVAL		621,030	(Building removal)								621,030
ABANDONMENT	Subtotal (Removal-Abandonment Phase)		621,030									621,030
	TOTAL ABANDONMENT PHASE		752,480	188,740	149,680	16,140	216,170	3,940	15,260	30,535	33,500	1,406,445
	Contingency (10%)											140,645
	Sub Total											$1,547,090
	Inflation Factor (1.97% per year)											$154,709
	PROJECT TOTAL											$1,701,799

4.6.5 SOUTH FORK BREAKOUT

Before any top soil is removed, all woody vegetation will be removed from the project area. Soils are basically a sandy loam mixture and have been classified by the S.C.S. as Uinta Family loam/tozc Family fine Sandy loam. Core sampling in the area shows that the soils vary in depth from 24-36+" in depth.

After the vegetation has been removed, the A&B horizons of soil will be removed using a track hoe. The track hoe will stack the soil where a front-end loader will pick it up and transport it to the storage area on the abandoned temporary Forest Service road. The front-end loader will spread the soil in approximately a two foot lift. By handling the soil in this manner, it will not be compacted in the storage area and the roots of the revegetation plants will penetrate the entire depth of the soil. This will allow the soil to maintain itself as viable top soil to be used during final reclamation. It is estiamted that approximately 2990 cubic yards of topsoil will be removed and stored.

As subsoils are encountered, they will be used to bring the new access road up to grade. Subsoil not used as road will will also be stored on the abandoned temporary Forest Service road on a section below the topsoil storage. It is estimated that approximately 2840 cubic yards of sub-soil will be removed. Approximately 1820 cubic yards of the sub-soil will be used in the road fill and the remaining 1020 cubic yards will be stored for final reclamation.

As the coal in the coal seam is encountered, it will be hauled out so as to eliminate the possibility of spontaneous combustion occurring.

Once the construction is complete, all the roads are National Forest Lands will be water barred and seeded with the mixture shown on Table 4.6-1. A combination of silt fences and strawbales will be used to treat surface runoff until adequate vegetation is established.

At the end of the life of mine, the road into the breakout site will be reopened. The portals will be sealed as outlined in section 4.9. The area will then be returned to approximate original contour by front end loaders and track hoe type equipment. First the subsoil from the storage area and road will will be uniformly placed in the breakout area. The top soil will then be uniformly distributed over the area.

The soil will be spread in a manner to provide a roughened surface so that seed, fertilizer, and mulch can remain during germination and initial growth of the seedlings. Raking the surface prior to planting may also be needed to provide the necessary roughened surface.

Riparian zones were revegetated with handset seedlings of yellow willow, blue spruce, Woods rose and American red raspberry at intervals of 1/2-1 meter. Table 4.7-3 lists the seed mixture spread on the inter-spaces. Steep slopes which have been rip-rapped were not revegetated.

4.7.2 Final Reclamation Seeding Tillage and Mulching, Portal Train Loadout Areas, and other small areas

Seed mixture for final reclamation are shown on Tables 4.7-4, 4.7-5, and 4.7-6.

Seeding of the south-facing slopes (1h:3v) or lower flat areas will be conducted using a cyclone spreader. For slopes less than 2h:1v, seeding will be accomplished using a hydro-seeder. Plantings of shrubs and trees will be hand-set to ensure a plant cover of a permanent nature. Slopes of 2h:1v or steeper will be revegetated by hand-set planting techniques.

Tillage practices on level ground and on slopes flatter than 10h:1v will include leveling and tilling. Slopes of 10h:1v up to 3h:1v will
* be mulched using 1,000 pounds per acre of straw or other inert mulch material which will be anchored by crimping. Slopes steeper than 3h:1v will be treated with hydro mulch. All hydro mulch will be applied at the rate of 2,000 pounds per acre plus 140 pounds of tacifer per acre.

Planting on slopes less than 10h:1v will be accomplished by drilling seed with a mechanical drill. Slopes between 10h:1v and 1.5h:1v will be seeded by hand broadcast and manually buried by raking. Mulch will be applied over the hand broadcast seed. The Permittee elects to revegetate areas with slopes greater than 1.5h:1v without topsoil; such areas will be treated to handset plantings in basins filled with topsoil and with hydromulch seeding in between. Where the substrate consists of outcroppings of stone, no attempt will be made to revegetate.

Replaces	Text
Section 4.7.2 Pg 4-30	Section 4.7.2 Pg 4-30 dtd 7/15/87

*Denotes change or addition

Table 4.7-7

The acreage and proportion of each disturbance area is as follows:

	Vegetation	Acreage	%
Loadout	Grass/Forb	6.8	76
	Spruce/Fir	2.2	24
		9.0	100
Portal Yard	Aspen	6.8	22
	Spruce/Fir	14.0	45
	Sagebrush	2.5	8
	Disturbed	7.8	25
		31.1	100
Water Tank and Well Pads	Aspen	.2	100
Conveyor Route	Sagebrush	3.8	63
	Aspen/Conifer	2.2	37
		6.0	100
Waste Rock Disposal	Already Disturbed	1.3	100
South Fork Breakout	Aspen	.3	75
	Spruce/Fir	.1	25
		.4	100

		48.0	

4.7.4 Irrigation, Portal & Train Loadout Areas

Since the species used for reclamation were known for their survival characteristics, it was felt that application of additional water will not be needed. Should 50 percent lower than average precipitation occur following the initiation of reclamation procedures, irrigation may be needed on a short-term basis. If irrigation is needed, an irrigation plan will be developed at that time and submitted to the Division of Oil, Gas and Mining for approval.

4.7.5 Monitoring Procedures, Portal, Train Loadout, Waste Rock Disposal Site, and South Fork Breakout Areas

The Permittee re-evaluated vegetative data collected and resubmitted data using a monitoring method designed to give empirical values sufficient to detect a 10 percent change in vegetative cover at a 90 percent statistical confidence interval. These data are from those communities disturbed and for established reference areas which will be used for comparison (aspen & sagebrush, reference area for south slopes; spruce-fir, reference area for north slopes; riparian, reference area for the riparian zone). Vegetative parameters to be measured are: cover, density, productivity and species composition. Minimum sample size will be 10 and maximum will be 40. Sampling of the approved reference area and revegetated area will occur for the last two years of the liability period.

A minimum of the following data will be provided: 1) canopy cover by species and total canopy cover excluding trees, 2) productivity by life form, and 3) density of woody species by life form (trees and shrubs). The Permittee will provide results of statistical analyses showing similarity between disturbance areas and reference areas.

Replaces	Text
Section 4.7.5 Page 4-38	Section 4.7.5 Pg 4-36 dtd 7/18/88

*Denotes change or addition

4.7.8 South Fork Breakout

After the area has had the soils redisturbed, as outlined in section 4.6.5, the site will be revegetated. The aspen site will use the seed mixture shown on table 4.7-4 while the spruce-fir site will use the mixture shown on Table 4.7-5. The area will be seeded by hydro-seeding. After the area has been seeded, it will be hydro-mulched at the rate of 2,000 pounds per acre plus 140 pounds of Tacifer.

Fertilizer rates and applications are discussed in the soil preparation and fertilizer plan (Section 4.5).

TABLE 4.12-1

PROPOSED POSTMINING LANDUSE

Area	Present Ownership	Premining Landuse	Proposed Postmining Use	Alternative Use	Capacity To Support Proposed Use	Relationship To Existing Landuse Policies
Mine Site and Exploratory Excavations	USFS	Wildlife/ Grazing Habitat	Wildlife/ Grazing Habitat	Picnic Area	Adequate	Compatible
Conveyor and Pipeline	Private	Grazing	Grazing	Wildlife Habitat	Adequate	Compatible
Main Access Road	State	Forest Access and Service Road	State Road	None	Adequate	Compatible
Loadout	Private	Grazing, Picnic, and Stock Pens	Grazing, Picnic, and Stock Pens	Wildlife Habitat	Adequate	Compatible
Waste Rock Disposal	Private	Grazing	Grazing	Wildlife Habitat	Adequate	Compatible
South Fork Breakout	USFS	Wildlife/ Grazing Habitat	Wildlife/ Grazing Habitat	Wildlife Habitat	Adequate	Compatible

Power transmission lines for underground mining and related activities in the permit area were designed and constructed to comply with the guidelines set forth in "Environmental Criteria for Electric Transmission System" (USDI, USDA (1970)). Power distribution was designed and constructed in accordance with REA Bulletin 61-10 "Powerline Contacts by Eagles and Other Large Birds."

If necessary, a wire fence will be erected and maintained around the perimeter of the portal area or portions thereof to protect grazing stock and wildlife. The fence design will be submitted to the regulatory authority prior to construction. Other ventilation shafts and structures will be similarly fenced, covered or otherwise protected if required. While the ponds contain no toxic-forming materials, the Permittee agrees to exclude wildlife from such ponds should it become necessary. No persistent pesticides will be used unless approved by the regulatory authority as part of a reclamation management plan.

The Permittee also agrees to participate in the prevention, suppression, and control of forest, range, and coal fires, even though these fires may not be part of an approved management plan. The Permittee on occasion conducts a conservation training program for mine employees. This program conducted by personnel of the Utah Division of Wildlife Resources has been included as part of the routine mine training schedule.

Additional informatoin on wildlife can be found in this document in Section 2.9 - TERRESTRIAL WILDLIFE and Section 2.10 - RAPTORS.

The South Fork Breakout is located in an Elk Calving area. Construction of the face up area should be done after calving season. The road across the tributary to South Fork is not a fishery, but it is a contributing stream for aquatic insect drift to the fishery in Eccles Creek. Construction operations will be done in a manner to minimize disturbances and influences on the stream.

4.19.7 Diversion Channel at Rock Disposal Site

A diversion channel has been installed as shown on Map 4.16.1-1B. The swale to redirect the drainage across the access road and into the original stream channel will be constructed of concrete as shown in Figure 4.19.7-1.

The swale outlet will be lined with 4 inch x 4 inch or larger rock to reduce exit velocity of water from the swale. Engineering calculations for the waste disposal site channel design are included in Appendix Volume A-3.

4.19.8 South Fork Breakout

A new road will be constructed which will cross a drainage way to the South Fork of Eccles Creek. This drainage way flows in all but extremely dry years. When the creek crossing is constructed, the top soil will be removed with a track hoe to help minimize disturbance to the channel itself. The culvert will be placed in the existing channel, and then the road fill placed over it. Sed control during const?

During reclamation the fill material will be removed and then the culvert lifted out of the channel. Top soil will then be placed back on the disturbed area with a track hoe and the area reseeded. Although no permanent disturbance to the channel is planned or expected if it should occur it will be riprapped with a full gradation of material with a maximum size of 14½". DMAV

All culverts used for access to the area will be completed removed from the area during final reclamation.

Mine Access Road

The mine access road is classified as a Class I road and runs from the Mine #3 portal to the maintenance complex area. Drawings 3.2.4-1 and 3.2.6-2A show a typical cross-section of the mine access road and related ditches. Since the length of the road is approximately 1,200 feet, no road culverts wwere installed. As shown in the design, the steepest portion of the access road is a 10.0% grade sustained for 250 feet. No other grades on the access road exceed 10.0%. There are no switch-backs on the access road. None of the access road cut exceeds 1h:1v in unconsolidated material and .025h:1v in rock. The access road is to be 20 feet wide with a 4 foot height berm at the shoulder. The road is flat with a drainage ditch against the highwall. The drainage ditch has been designed to safely pass the peak from a 10 year, 24 hour precipitation event. No trash racks and debris basins have been installed, as the ditch will be cleaned periodically. The road is surfaced with crushed gravel. Once mining is completed, the road will be topsoiled and terraces will be constructed to prevent soil erosion.

Water Tank Access Road

Access to the water tank area is via Utah State Highway SR-264.

Breakout Area Access Road

The road which was constructed to obtain access to the breakout area in the South Fork of Eccles Creek will be reopened during final reclamation. After the face up area has been reclaimed, the new temporary access road will be returned to the approximate original contour and seeded with the approved seed mixture.

The access road up the side canyon will be reopened to accomplish final reclamation work at the breakout area. After reclamation work is completed at the breakout area, the road will be ripped, water barred and seeded

Replaces	Text
Sec. 4.20.1, Pg 4-93, dtd	Sec. 4.20.1, Pg 4-93, dtd 4/25/88

with the approved seed mixture. All culverts used in the project will be removed from the area.

4.20.2 Overland Conveyor Belt

The location of the upper two-thirds of the conveyor is on a bench on the north slope of Eccles Canyon, while the lower one-third will be supported by towers and trusses. The steepest portion of the conveyor is a negative 26.33 percent grade sustained for 430 feet. The average negative grade of the conveyor route is 9.39 percent and the average positive grade is 8.37 percent. Cut slopes along the route do not exceed 1h:1v in unconsolidated materials and 1h:4v in rock. As part of the air quality control program, the belt and transfer points will be enclosed to reduce fugitive dust.

Replaces	Text
	Sec. 4.10.1, Pg 4-93a, dtd 4/25/88

HYDROLOGY STUDY
SOUTH FORK BREAKOUT AREA

SOIL TYPES 4.

	PERCENT	TYDE	CN
VINTA FAMILY LOAM	50%	B OK	55
TOZE FAMILY FINE SANDY LOAM	35%	B OK	55
COMODORE BOULDERY LOAM	10%	D OK	77
MIDFORK FAMILY BOULDERY LOAM	5%	B OK	55

LAND USE IS WOOD AND FOREST LAND WITH GOOD COVER

$CN = [.5(55) + .35(55) + .10(77) + .05(55)] / (.5 + .35 + .10 + .05)$

$= (27.50 + 19.25 + 7.70 + 2.75) / (1)$

$= 57.20$ OK

$S = 1000/CN - 10$

$= 1000/57.20 - 10$

$= 17.48 - 10$

$= 7.48$

AREA OF THE WATER SHED

PLANIMETER READING - 3,228

142.82

$443 \times .0149 \text{ in}^2 = 6.60 \text{ in}^2 \times 22.96 \text{ acres/in}^2 =$ 151.55 ACRES OK

151.55 ACRES $\times$ 43,560 SQ FT/ACRE = 6,601,608.26 SQ FT

TIME PARAMETERS

CONCENTRATION TIME

$$t_c = .0078\, L^{0.77} (L/H)^{0.385}$$

$L = 3,850$ FT.

$H = 828$ FT.

$$t_c = .0078\, (3,850)^{0.77} (3850/828)^{.385}$$

$$= .0078\, (576.51)\, (1.81)$$

$= 8.13$ MIN. USE 8.00 MIN. .133 hr

LAG TIME

$$t_L = L^{0.8}(S+1)^{0.7} / 1900\, Y^{0.5}$$

$Y = \Sigma c_i \times i /$ AREA IN SQ. FT

$i = 80$ FT

$A = 6,601,608.26$ SQ. FT.

ΣC_i		CONTOUR
600	-	8,720
1,400	-	8,800
2,300	-	8,880
2,875	-	8,960
3,400	-	9,040
3,650	-	9,120
3,700	-	9200
3,300	-	9280
3,000	-	9360
2,200	-	9440
460	-	9,520
650	-	9,520
27,525 FT		

y: 27,525 FT × 80FT / 6,601,608.26

= 2,202,000 / 6,601,608.26

= 33 % 37.5 %

t_L = $(3,850)^{.8}(7.48+1)^{.7} / 1900\,(33)^{.5}$

= (738.53)(4.47) / 1900 (5.74)

= 3,301.23 / 10,906

= .30 t_L = 0.29hr (NEH-4)

= 18.16 MIN. USE 18 MINS.

$t_L = 0.6\,t_c$

18. = .6 (tc) ok t_c = 0.483 hr

t_c 0.494 HRS

PEAK FLOW USING SCS CURVE METHOD

EVENT	POGM PPT	PEAK FLOW
2YR - 24 HR	1.7 in	7.1 CFS
10YR - 24 HR	2.5 in	3.8 CFS
25YR - 24 HR		12.5 CFS
50YR - 24 HR		24.6 CFS
100 YR - 24 HR	3.6 in	39.1 CFS

CULVERT SELECTION[2]

USE 100 YR - 24 HR EVENT - 39.1 CFS = Q

SIZE OF CULVERT - FLAT SLOPE

$Q = 2.58\ D^{2.5}$ [2]

$D = (Q/2.58)^{1/2.5}$

$= (39.1/2.58)^{.4}$

$= 2.97$ FT $\times 12$ IN/FT

$= 35.6$ IN

USE A 36 IN CULVERT

LENGTH? Map Length = 84 Ft

EFFECT OF SLOPE

$S = 2.04/D^{1/3}$ $S = .14$

$.14 = 2.04/D^{.33}$

$D^{.33} = 2.04/.14$

$D^{.33} = 14.57$

$= 2.42$ FT $\times 12$ IN/FT

$= 29.05$ IN

USE 30 IN CULVERT

USE A 36 IN CULVERT TO HANDLE PEAK FLOW

DESIGN

GIVEN

PIPE DIA. - 36"
COVER - 15"
LIVE LOAD - 0
WEIGHT OF SOIL - 100 lb/ft³

DETERMINE WALL THICKNESS AND CORRUGATION

1 BACKFILL SOIL DENSITY
90% COMPACTION

2 DESIGN PRESSURE

$P_V = DL + LL$ DL = H × w
$= 15 ft \times 100 lb/ft^3 + 0$ LL = NEGLIGIBLE FOR COVER
$= 1500 lb/ft^2$

3 RING COMPRESSION

$C = P_V \times S/2$ S = SPAN IN FT = 3FT
$= 1,500 lb/ft^2 \times 3/2$
$= 1,500 lb/ft^2 \times 1.5 ft$
$= 2,250 lb/ft$

4 ALLOWABLE WALL STRESS
FIG 3-6 $f_c = 22,500 lb/in^2$
FOR $2\frac{2}{3} \times \frac{1}{2}$ IN. CORROGATION

5 WALL CROSS-SECTIONAL AREA

$A = C/f_c$
$= 2,250 lb/ft / 22,500 lb/in^2$
$= .10 in^2/ft$

FROM TABLE 3-2, A SPECIFIED THICKNESS OF 0.064 IN. PROVIDES AN WALL AREA OF .775

6. $FF = D^2/EI$ = FLEXIBILITY FACTOR = .0433 MAX

D = DIA. = 36 in
E = 30×10^6 lb/in^2
I = .00189 in^2/FT

$FF = (36)^2 / 30 \times 10^6 \times .00189$

$= 1,296 / 56,700$

$= .02286$

$.02286 < .0433$ THEREFORE $2\frac{2}{3} \times \frac{1}{2}$ in. CORRUGATION IS OK

PURCHASE A 36 in. DIA. PIPE WITH $2\frac{2}{3} \times \frac{1}{2}$ in CORRUGATIONS.

RIPRAP SIZE TO HANDLE 100 YR - 24 HR EVENT

MANNING'S EQUATION

TRY - 1"

$V = \frac{1.49}{n} R^{.67} S^{.5}$ 1

V = FPS

n = MANNING NUMBER = .040

R = HYDRAULIC RADIUS, FT

S = SLOPE FT/FT.

$S = \frac{11.9}{83.2} = .143$ FT/FT

$R = \frac{2d}{2\sqrt{2^2+1}}$

$= \frac{3(1)}{2\sqrt{3^2+1}}$

$= .474$

$V = \frac{1.49}{.040} (.474)^{.67} (14)^{.5}$

$= 37.25 (.606)(.374)$

$= 8.442$ FPS

$Q = VA \qquad A = 2d^2$

$Q = (8.442 \text{ FPS})(3(1)^2)$

$= 25.327$ CFS < 39.1 CFS

TRY 2'

$R = \frac{(1.5)(2)}{2\sqrt{(1.5)^2+1}}$

$= \frac{3}{3.606}$

$= .832$

$V = \frac{1.49}{.04} (.832)^{.67} (.143)^{.5}$

$= 37.250 (.884)(.374)$

$= 12.316$ FPS

$Q = VA$

$= (12.316 \text{ FPS})(1.5(2)^2)$

$=$

TRY 1'-6" OR 1.5 FT

$$R = \frac{(2)(1.5)}{2\sqrt{(2)^2+1}}$$
$$= 3/4.472$$
$$= .671$$

$$V = \frac{1.49}{.04}(.671)^{.67}(.143)^{.5}$$
$$= 37.250\ (.765)(.378)$$
$$= 10.658\ FPS$$

$$Q = VA$$
$$= 10.658[(2)(1.5)^2]$$
$$= 47.957\ CFS$$

TRY 1'-5" OR 1.417 FT

$$R = \frac{(2.117)(1.417)}{2\sqrt{(2.117)^2+1}}$$
$$= 3.0/4.603$$
$$= .641$$

$$V = \frac{1.49}{.04}(.641)^{.67}(.143)^{.5}$$
$$= 37.250\ (.742)(.378)$$
$$= 10.452\ FPS$$

$$Q = VA$$
$$= 10.452[(2.117)(1.417)^2]$$
$$= 44.438\ CFS$$

TRY 1'-4" OR 1.33 FT.

$$R = \frac{(2.256)(1.33)}{2\sqrt{(2.256)^2+1}}$$
$$= 3/4.935$$
$$= .608$$

$$V = \frac{1.49}{.04}(.608)^{.67}(.143)^{.5}$$
$$= 37.250\ (.717)(.378)$$
$$= 10.10\ FPS$$

$$Q = VA$$
$$= 10.10((2.256)(1.33^2)$$
$$= 40.305$$

TRY 1'-3" OR 1.25 FT.

$$R = \frac{(2.40)(1.25)}{2\sqrt{(2.40)^2+1}}$$

$$= 3.0 / 5.20$$

$$= .577$$

$$V = \frac{1.49}{.04}(.577)^{.67}(.193)^{.5}$$

$$= 37.250\,(.692)(.378)$$

$$= 9.74 \text{ FPS}$$

$$Q = VA$$

$$= (9.74)[(2.40)(1.25)^2]$$

$$= 36.525 \text{ CFS}$$

TRY 1'-3½" OR 1.292 FT.

$$R = \frac{(2.322)(1.292)}{2\sqrt{(2.322)^2+1}}$$

$$= 3.0 / 5.056$$

$$= .593$$

$$V = \frac{1.49}{.04}(.593)^{.67}(.193)^{.5}$$

$$= 37.250\,(.705)\,(.378)$$

$$= 9.925 \text{ FPS}$$

$$Q = VA$$

$$= 9.925[(2.322)(1.292)^2]$$

$$= 38.47 \text{ CFS}$$

TRY 1'-3¾" OR 1.313

$$R = \frac{(2.206)(1.313)}{2\sqrt{(2.206)^2+1}}$$

$$= 3 / 4.990$$

$$= .601$$

$$V = \frac{1.49}{.04}(.601)^{.67}(.193)^{.5}$$

$$= 37.250\,(.711)\,(.378)$$

$$= 10.013 \text{ FPS}$$

$$Q = AV$$

$$= 10.013[(2.322)(1.292)^2]$$

$$= 38.811 \text{ CFS}$$

TRY 1'- 3 7/8" OR 1.323 FT

$R = (2.268)(1.323)/2\sqrt{(2.268)+1}$

$= 3/4.957$

$= .605$

$V = 1.99/.04\ (.605)^{.67}(.143)^{.5}$

$= 37.250\ (.714)(.378)$

$= 10.050$ FPS

$Q = VA$

$= 10.058\ ((2.268)(1.323)^2)$

$= 39.928$ CFS

39.928 CFS IS CLOSE TO THE PEAK FLOW OF 39.1 CFS

BOTTOM VELOCITY IS 10.058 FPS

What Curve?

USING CURVE TO DETERMINE MAXIMUM STONE SIZE FOR RIPRAP [3].

MAXIMUM SIZE IS 14 1/2 IN.

SEDCAD

Z = 2
b = 3 ft
S = 14.3%
SF = 1.0

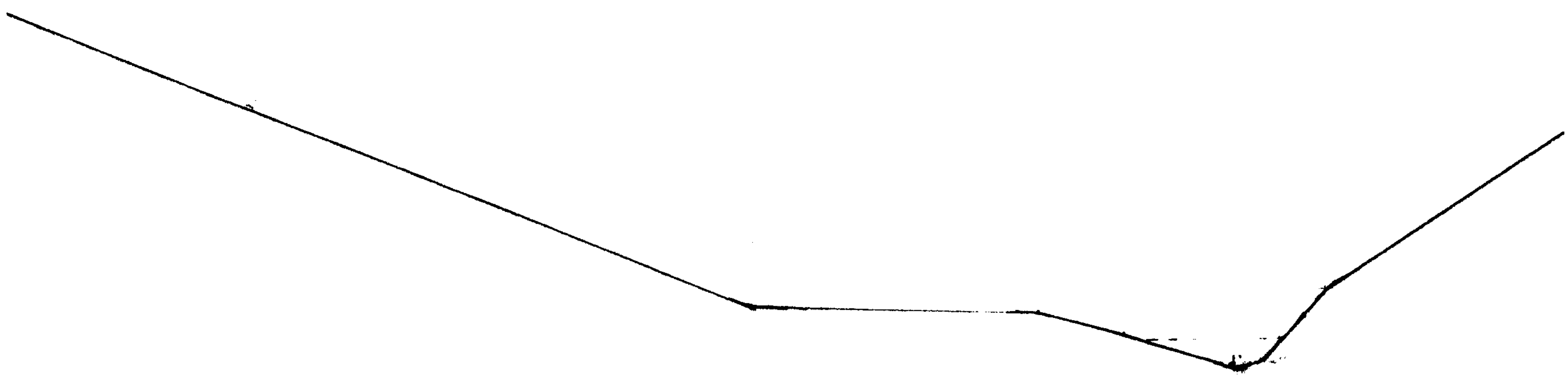
⇓

V = 8.166 Ft/s
B D_{50} = 1.73 Ft
BANK D_{50} = 1.90 Ft

USM MANUAL

D_{50} = 0.8 Ft.

STREAM RECLAMATION



TYPCIAL STREAM BED PROFILE

SCALE 1" = 6'

REFERENCE

1. BARFIELD, B. J., R.C. WARNER AND C. T. HAAN, 1985 APPLIED HYDROLOGY AND SEDIMENTOLOGY FOR DISTURBED AREAS. OKLAHOMA TECHNICAL PRESS, STILLWATER, OKLAHOMA.

2. HANDBOOK OF STEEL DRAINAGE AND HIGHWAY CONSTRUCTION PRODUCTS. AMERICAN IRON AND STEEL INSTITUTE. WASHINGTON D.C. THIRD EDITION

3. HYDRAULIC DESIGN OF STILLING BASINS AND ENERGY DISSIPATORS UNITED STATES DEPARTMENT OF THE INTERIOR, BUREAU OF RECLAMATION.

4. SOIL SURVEY OF CARBON AREA, UTAH, UNITED STATES DEPARTMENT OF AGRICULTURE, SOIL CONSERVATION SERVICE.

TEMPORARY CULVERT SELECTION

$Q = \cancel{4}$ 1 CFS USE 1 CFS 2 YR - 24 HR

SIZE OF CULVERT - FLAT SLOPE

$Q = 2.58\ D^{2.5}$

$D = (Q/2.58)^{1/2.5}$

$= (1\text{ cfs}/2.58)^{.4}$

$= .684$ FT $\times$ 12 IN/FT

$= 8.21$ IN.

USE A 12 IN CULVERT

$Q_{2,24} = 0.14$ cfs

12 IN CULVERT WILL CARRY Q_{10} SO DESIGN IS ADEQUATE

Utah Fuel Company
a subsidiary of The Coastal Corporation
P.O. Box 719 • Helper, Utah 84526 • (801) 637-7925
Salt Lake (801) 596-7111

GLEN A. ZUMWALT
Vice President and
General Manager

September 16, 1988

Lowell P. Braxton
Administrator, Reclamation Program
Division of Oil, Gas & Mining
355 West North Temple
3 Triad Center, Suite 350
Salt Lake City, Utah 84180-1203

Re: Deficiency Review, PAP Amendment, South Fork Breakout

Dear Mr. Braxton,

We have reviewed the deficiency document from your office and the U.S. Forest Service, and are submitting the following information to satisfy your review, along with 8 copies of pages 2-44, 3-42, 3-64a, 3-64b, 4-26a, 4-26b, 4-84, 4-90, map 3.2.11-1, and Engineering calculations.

COMMENTS BY MIKE DEWEESE AND RICK SUMMERS

UMC 783.23 (b) (12) Operation Plan: Maps And Plans - MD

The operator proposes to sample the creek above and below the disturbed site during construction on a weekly basis. The exact location of these monitoring sites must be included on an appropriate map of the area. The Division recommends that these sites be located no further than 100 feet from the disturbed area.

Response: Sampling points have been indicated on Map 3.2.11-1.

UMC 784.24 (a) Transportation Facilities - MD

The plan requires construction of a new road section across the upper drainage. The plan presents adequate calculations for culvert sizing in this section but contains no designs for inlet protection or outlet structures. The application must include plans for inlet protection and designs for an adequate energy dissipator for the South Fork culvert outlet.

Additionally, due to the culvert length and impact to the existing channel, the Division requests that the following information be included in the submittal:

1. Plans to bed the culvert in washed gravel in order to minimize contributions of sediment to the stream during installation and removal.

2. A detailed reclamation plan for the channel crossing. This information should include a survey of the existing stream channel, plans to meet the requirements of UMC 817.44 subsections (b) and (d), plans demonstrating the restored channel will have a capacity at least equal to the upstream and downstream sections (i.e., channel cross-sections), plans to restore the channel with a channel slope approximating the pre-disturbance condition. The calculations presented in the submittl utilize the incorrect formula for the hydraulic radius. It appears the formula was used for a triangular channel to approximate the channel. The formula used was:

$$R = z\, d^{2}\, (z + 1)^{0.5}$$

The correct formula is:

$$R = z\, d^{2} / 2\, (z + 1)^{0.5}$$

However, the Division recommends using a trapezoidal type channel for the channel reconstruction.

The slope used in the calculations for the riprap size is not defined. Is this the existing natural channel slope or the culvert slope? The channel should be designed using the slope of the natural channel. A filter blanket should be designed and proposed for the crossing and a riprap gradation curve should be submitted.

The application states in the plan that 18 inch diameter temporary culverts will be installed in the existing road where it crosses two side drainages. However, the submitted calculations use a 12 inch diameter design at these areas. The applicant must correct this discrepancy and commit to one design size for these culverts.

Response:

A flared inlet will be used on the 36" pipe and the fill slope rocked up to the high water line (see p.3-64a).

An energy dissipator has been designed and is included in the engineering calculations.

Culvert will be bedded in washed gravel (see p.3-64a).

A trapezoid type channel is designed as well as new riprap side and filter blanket and is included in the engineering calculations.

It was calculated that we need 12" temporary culverts; however, we have elected to use 18" culverts. We show this now in the engineering calculations.

UMC 817.11 Signs and Markers

(e) The application should commit to installation of buffer zone signs between the edge of the disturbance and the South Fork of Eccles Creek.

Response: We have changed p. 3-42 of the M & RP to include the buffer zone signs at the South Fork Breakout area.

UMC 817.45 Hydrologic Balance: Sediment Control Measures - MD

Page 4-26a of the plan states that after road construction, straw bales and silt fences will be installed to treat runoff until adequate vegetative cover is established. The plan should include proposed locations (either on a map or in narrative) for these controls. There are no provisions in the plan for sediment control during construction of the facility (including culvert installation). The operator must submit an effective runoff treatment plan for the construction and reclamation phases of the project. These plans should include installation of straw bale dikes downstream of the culvert installation and a silt fence or straw bales between any construction disturbance and the stream channel.

Response: Pages 3-64b and 4-26a have been changed to include location of silt fences and/or straw bales. Page 3-64a has been changed to include installation of straw bales and/or silt fence dikes downstream during installation of culverts.

UMC 817.52 Hydrologic Balance: Surface and Ground Water Monitoring

The application should include a monitoring plan (with appropriate revised location map) for the South Fork of Eccles Creek. Due to the expected mining beneath the stream and the relatively low cover in the area, the data will be necessary to monitor potential impacts to the stream. An extensive data set exists for sample site CS-1; however, changes in stream yield cannot be performed using double-mass analysis techniques unless annual yield has been measured and established. Therefore, the upstream-downstream monitoring is our only option to adequately monitor the system. The data will also be useful in classifying the stream reach as losing or gaining. Baseline data should be collected for stations located upstream and downstream of any surface and underground mining activity. The quality samples should be collected as per the Division's Water Monitoring Guidelines baseline parameter list quarterly with flow and field parameters taken monthly. Flows should be measured using a meter or established flumes.

Response: We are not responding to this item as the South Fork Breakout has no potential for impacts to the stream and springs except during construction. Impacts during construction have been covered. The Division's concerns are dealing with general mine planning for this area, not with the breakout.

COMMENTS BY JIM LEATHERWOOD

UMC 783.27 Prime Farmland Investigation - JSL

In accordance with part (a) of this section the operation must conduct an investigation to determine if the proposed area could be prime farmland. If the proposed area does not contain prime farmland then the applicant shall request for a negative determination based on the criteria outlined in part (b) of this section.

Response: We are requesting that a negative determination be declared as the South Fork Breakout area meets the criteria in UMC 783.27 paragraph b(1), (2), and (5).

UMC 817.23 Topsoil: Storage - JSL

The applicant must commit to revegetate the topsoil stockpile protection and viability.

Response: P.3-64a already states that the topsoil stockpile will be seeded with the approved seed mix.

COMMENTS BY RANDY HARDEN

UMC 817.13 - .15 Casing and Sealing of Exposed Underground Openings - JRH

The operator has not addressed the requirements of these sections. A commitment must be included in the reclamation plan for the temporary and permanent closure of the portal openings.

The operator must describe the methodology to be used in closure of the mine openings. The description is to include the method for installing bulkheads in the portals, backfilling, and highwall reduction of the face up for the portals. The reclamation plan section should also address the hydrologic balance requirements of this section, particularly treatment and discussion of drainage into or from the mine openings.

Response: Page 3-64b already addresses the temporary controls for entry into the mine. Page 4-26b addresses permanent closure of the portal entries. Page 3-64b also discusses drainage resulting from the breakout pad.

UMC 784.13 Backfilling and Grading - JRH

The operator has indicated that coal materials excavated from the portal breakout development will be removed from the site. Consequently, there may be a shortage of fill material available during reclamation. The operator shall commit to surveying the site upon completion of construction of the breakout facilities in order to determine if there is a shortage of fill material required for reclamation. Regrading of the site should call for the total elimination of the highwall caused by the portal face up.

Response: We have estimated that we will remove approximately 2700 tons of coal from the site. We feel that it is obvious that if we remove 2700 tons from the excavated site, that there will be a shortage of fill material for reclamation. We have changed page 4-26b to indicate that the highwall will be eliminated. Material to replace the coal volume will come from the slash disposal area as discussed on p.3-64a.

Delineation of the disturbed area has not been made on the drawings. The surface disturbed area boundaries and acreage shall be shown on the drawings. This disturbed area must include those areas to be disturbed during the construction, operation and reclamation of the site, including topsoil storage and borrow areas and areas which may have to be disturbed during reclamation work which may not have been disturbed during construction of the facilities.

Response: We have changed map 3.2.11-1 to delineate the disturbed areas and to show acreage involved.

UMC 800 Bonding - JRH

Bonding information provided by the operator is not considered to be adequate. Similarly, the general bonding and cost estimations provided for the entire mining and reclamation permit are not considered to be adequate. Since the addition of the portal breakout area is only a small percentage of the total bond amount, detailed calculations and cost estimates for bonding for South Fork will be deferred to the bonding and cost estimate information required for the entire permit as part of the permit renewal process rather than be required as part of this revision to the plan. Additionally, details for reclamation work required on the portal site will be more specific and accurate based on the facility as constructed rather than as proposed.

Response: Detailed calculations and cost estimates for the South Breakout area were included on pages 4-15 and 4-16. If additional information is needed we will cover them during the permit renewal process.

COMMENTS BY DAVID DARBY

UMC 817.41 and UMC 817.52

The operator will be required to conduct a complete inventory of springs in the South Fork of Eccles Canyon where mining will take place and establish the flow for at least one year of the tributary fed by the springs prior to conducting mining operations.

Response: In the summary discussion which proceeds this deficiency item, the main thrust deals with the general mining plan for the entire South Fork area. The Breakout area only affects less than 1/2 acre of area. There are no springs involved. We can not delay the breakout ("for at least one year"). The breakout will occur sometime in the next 60-90 days. We feel this deficiency item is inappropriate in relationship to the South Fork Breakout.

UMC 817.121 and UMC 817.124

The operator will be required to establish baseline subsidence information for the South Fork Area prior to conducting underground mining operations. This information will essentially consist of premining surface elevations obtained by either aerial photographs or transit surveys.

Response: The portals for the breakout will be fully supported and will therefore cause no subsidence. Our approved subsidence plan already requires us to establish baseline subsidence information in Section 4.17.5.

COMMENTS BY LYNN KUNZLER

Analysis

Construction has been timed to avoid conflict with special wildlife use periods and is acceptable. Plans to screen the entries to prevent wildlife access is appropriate.

Plans for final revegetation of the site and for interim stabilization of the topsoil pile and forest service road are acceptable. However, the proposed amendment does not discuss temporary (interim) stabilization of the remaining disturbed area between the construction period and final reclamation. Plans to vegetate or otherwise stabilize disturbed areas not actively needed for mining needs to be addressed.

Recommendations

The referenced amendment could be approved when this issue has been adequately addressed.

Response: We have changed pages 3-64a, 3-64b, and 4-26a to clarify interim stabilization of the disturbed areas.

Utah Fuel Company would appreciate your prompt review of our responses to the deficiencies. We submitted our request for a PAP amendment in April, and expected to have the construction phase of the project completed by now. Time is becoming critical if we are to construct this breakout with a minimum of disturbance. Our intentions are to do a good job as indicated in our proposed plan, and we are committed to do the best that conditions allow. The underground entries will be breaking out within the next 60-90 days, and therefore I am urgently requesting that you approve this permit amendment so that we can proceed immediately to face up the breakout area.

If additional information is needed for approval, I would like to suggest an immediate conference be held so as to avoid the delays of written correspondence. This would allow us to reach agreement on deficiencies, and then we could submit the agreed upon changes for your final approval.

Sincerely,

Glen A. Zumwalt
Vice-President/General Manager

GAZ:KZ:lm

Attachments

3.2.11 South Fork Breakout Area

The Upper O'Connor seam will require a breakout to improve ventilation. The breakout will be on a south facing slope in a side canyon of the South Fork of Eccles Creek (see map 3.1.2-1).

Access to the breakout area will be via an existing road up the South Fork of Eccles Creek to the Manti-LaSal National Forest boundary. From the Forest boundary on, the road had been water barred and will need to be reopened. Where the road leaves the main South Fork tributary, it crosses two side drainages. Temporary 18" culverts will be installed in these drainages during the construction period. The Forest Service road then continues up the side drainage. Approximately 600 feet up the side drainage a new class III life of project road will need to be constructed for a distance of 75' across the drainage to the breakout area (see map 3.2.11-1). During installation of the culverts silt fence and/or straw bales, dikes will be placed downstream to control sediment in the stream.

As construction starts on the project, the trees and brush will be cleared from the road location. The topsoil will then be stripped from the road location and stored on the abandoned temporary Forest Service road above the construction area. All of the topsoil will be stored on this abandoned road in a lift not to exceed 2' deep, and then seeded to the approved seed mixture. After the topsoil from the road location has been removed, a 36" culvert will be placed in the stream bed to provide a life of project crossing. The initial fill material over the culvert will be hauled in from the mouth of the side canyon where a small knob will be removed to help dress up an area (see map no. 3-2-11-1). This will also create a safe open area to

burn slash created by the breakout construction. After the slash has been burned, the area will be dressed up and seeded with the approved seed mixture. No further activity is planned for this area. The fill slopes of the fill covering the 36" culvert will be seeded and covered with excelsior mats to help prevent erosion until the vegetation is established. A flared inlet will be installed on the culvert. The fill slope will be rocked up to the high water line to also help protect the inlet. The culvert will be bedded in washed gravel at the slope of the natural channel of 14.3%.

A track hoe will then start removing the topsoil from the breakout area so it can be stored in the storage area. As the subsoils are encountered, they will be used to bring the new road up to grade. The new road will be built with a 1-2% adverse grade from the existing road to the breakout area. Subsoil not used as road fill will also be stored on the abandoned temporary Forest Service road below the topsoil storage area. All of the stored soil will then be seeded with the approved seed mix, and then a layer of straw mulch will be applied.

It is estimated that the new road will disturb .11 acres and the breakout area .29 acres, for a total new disturbance of .40 acres.

The breakout pad will be constructed so that the surface drainage will drain into the mine where it will enter the normal mine drainage and will eventually enter the portal area sedimentation pond.

A combination of silt fences and strawbales will be used to treat the surface run-off from the disturbed area of the new road, the breakout pad and the topsoil and subsoil storage areas. The silt fences and strawbales will be

located as needed between the disturbed and undisturbed areas to treat run-off from the disturbed area. These silt fences and strawbales will be maintained until adequate vegetation is established.

The breakout portals will be screened to prevent humans or animals from entering the mine. No exhaust fans or permanent activity is planned for this area once construction is finished.

Once the breakout portals have been established, all of the disturbed area will be seeded and all of the roads on National Forest land will be water barred and seeded. All seeding will be done with the approved seed mixtures. One of the temporary 18" culverts will be removed but left on site in case emergency access is needed back into the breakout area.

All slash created by the project will be piled so it can be burned at a later date. All brush disposal will be in accordance with standard U.S. Forest Service requirements.

Once the breakout area has been faced up and the portals established, no further activities are planned or anticipated at the area until final reclamation begins.

File ACT/007/005-88B
Folder #15

Utah Fuel Company
a subsidiary of The Coastal Corporation
P.O. Box 719 • Helper, Utah 84526 • (801) 637-7925
Salt Lake (801) 596-7111

GLEN A. ZUMWALT
Vice President and
General Manager

October 20, 1988

Lowell P. Braxton
Administrator, Reclamation Program
Division of Oil, Gas & Mining
355 West North Temple
3 Triad Center, Suite 350
Salt Lake City, Utah 84180-1203

Dear Mr. Braxton:

Re: Stipulation for Conditional Approval for South Fork Breakout

We are responding to the various stipulations to the approval for the South Fork Breakout in your September 30th approval letter.

Comments by Mike Deweese:

Stipulations 817.44-(1-4) - MMD

1. The operator must submit a revision of the proposed amendment to the M&RP within 30 days of approval containing a correctly designed filter blanket size distribution and depth of the filter blanket layer.

2. An accurate cross-section of the existing upstream and downstream channel configuration, and a cross-section of the existing channel configuration at the midpoint of the culvert location, must be submitted to the Division within 30 days of approval. These cross-sections must be of scale 1"-2' or less.

3. Plans to meet the requirements of UMC 817.44 (d) must be submitted to the Division within 30 days of approval.

4. A corrected riprap apron design for the spillway culvert energy dissipator must be submitted to the Division within 30 days of approval. The design dimensions and riprap size must be determined using one tailwater depth criteria.

Response:

1. We have enclosed one copy of the Engineering design for the filter blanket.

2. One copy of maps is enclosed showing the requested cross sections.

3. Utah Fuel comments to the following items when the 36" culvert is removed.

   a. Restore the natural riparian vegetation on the banks of the stream.

b. Restore the stream to a natural shape and environmentally acceptable gradient.

c. Restore the stream to a longitudinal profile and cross section that approximates the natural stream channel characteristics.

4. One copy of corrected riprap design is enclosed.

Comments by Dave Darby:

UMC 817.41 and UMC 817.52

Stipulation - UMC 817.41A and B - DWD

1. The operator will be required to conduct a complete inventory of springs within and adjacent to the South Fork Breakout Area. The spring inventory should consist of spring location, geologic unit from where the spring flows, and discharge rate. Field and water quality parameters should be obtained (quarterly) from springs that yield sufficient flow. Water quality parameters for spring monitoring are enclosed. This information should be submitted by October 30, 1988.

2. The applicant should ensure that the topsoil stockpile is protected from spring flows. The applicant should evaluate spring sources in the vicinity of the proposed topsoil stockpile and provide methodologies for adequate drainage in accordance with UMC 817.23. As-built plans and drawings should be submitted 30 days after the first load of topsoil is deposited on the proposed site.

Response: No seeps or springs were found in the breakout area. Two seep areas were found in the topsoil stockpile area and are shown on map 3.2.11-1. Neither of the seep areas had sufficient flow to obtain a sample for water quality parameters. The flows appear to be coming from the Blackhawk geologic unit. French drains were built in the seep areas to protect the topsoil storage. Two seeps were also found in the access road. French drains were installed in these seeps, also.

Two copies of map no. 3.2.11-1 are enclosed.

Comments by Randy Harden:

Stipulation UMC 817.101-(1) - JRH

The operator shall be required to revise the mining and reclamation plan to incorporate those sections of the South Fork Access Road and the slash area to be utilized as a borrow area for the portal breakout into the disturbed area boundaries for the permit. The operator shall submit revised drawings incorporating these facilities into the plan and modify the mining and reclamation plan to include this area. Inclusion of these facilities shall be accomplished in conjunction with the five-year permit review and shall be submitted to the Division with information required by the November 1, 1988 deadline.

Response:

Page 3-64a and map no. 3.2.11-1 have been revised to show the requested information. We have enclosed two copies of these changes for your review. We will also include this and all other information regarding the South Fork Breakout in our November 1st submission for the M&RP renewal.

If you need any additional copies of information, please let us know.

Sincerely,

Glen A. Zumwalt
Vice-President/General Manager

GAZ:KZ:lm

Enclosures

UNDERLYING FILTER

BASE MATERIAL

D_{50} = .600 MM

D_{85} = 2.36 MM

D_{15} = .150 MM

RIPRAP

D_{100} : 3.2 FT : 975.36 MM

D_{50} : 1.6 FT : 487.68 MM

D_{85} : 2.9 FT : 883.92 MM

D_{15} : .24 FT : 73.15 MM

D_0 : .10 FT : 30.48 MM

FILTER BLANKET WITH RESPECT TO BASE MATERIAL

(1) $D_{50\,(FILTER)} / D_{50\,BASE} < 40$

D_{50} (FILTER) < 40 × .6 = 24 MM

(2) $D_{15\,(FILTER)} / D_{15\,(BASE)} > 5$

D_{15} (FILTER) > 5 × .150 = .75 MM

$D_{15\,(FILTER)} / D_{15\,(BASE)} < 40$

D_{15} (FILTER) < 40 × .15 = 6.00 MM

(3) $D_{15\,(FILTER)} / D_{85\,(BASE)} < 5$

D_{15} (FILTER) < 5 × 2.36 = 11.80 MM

∴ WITH RESPECT TO THE BASE THE FOLLOWING MUST BE SATISFIED

$$.75 \text{ mm} < D_{15} \text{ (FILTER)} < 6.00 \text{ mm}$$

$$D_{50} \text{ (FILTER)} < 24 \text{ mm}$$

FILTER MUST BE SIZED TO THE RIPRAP

(1) D_{50} (RIPRAP) / D_{50} (FILTER) < 40

D_{50} FILTER > $487.68/40 = 12.19$ mm

(2) D_{15} (RIPRAP) / D_{15} FILTER > 5

D_{15} (FILTER) < $73.15 \text{ mm}/5 = 14.63$ mm

D_{15} (RIPRAP) / D_{15} (FILTER) < 40

D_{15} (FILTER) > $73.15 \text{ mm}/40 = 1.83$ mm

(3) D_{15} (RIPRAP) / D_{85} (FILTER) < 5

D_{85} (FILTER) > $73.15/5 = 14.63$ mm

∴ FILTER MUST MEET THESE

D_{50} (FILTER) > 12.19 mm

1.83 mm < D_{15} (FILTER) < 14.65 mm

D_{85} (FILTER) > 14.65 mm

FILTER BLANKET MUST BE SIZED AS FOLLOWS

12.19 mm < D_{50} (FILTER) < 24 mm

.75 mm < D_{15} (FILTER) < 14.63 mm

D_{85} (FILTER) > 14.65 mm

THE FILTER BLANKET WILL BE AT LEAST 6 INCHES IN THICKNESS

ENERGY DISSIPATOR FOR DISCHARGE END OF CULVERT 100YR- 24 HR

$Q = VA$

$Q = \frac{1.49}{n} R^{2/3} S^{1/2} A$

D = TW = TAILWATER DEPTH

$n = .024$

$S = .143$

$39.1 = \frac{1.49}{.024} \left(\frac{.5768D}{1.957D}\right)^{.66} (.143) \frac{\pi D^2}{4}$

$39.1 = 62.08 (.295D)^{.66} (143)(.785D^2)$

$39.1 = 8.877 (.295D)^{.66} (785D^2)$

$4.404 = (.295D)^{.66} (785D^2)$

D	Q
1 FT	.351
2 FT	2.317
3 FT	6.518
2.5 FT	4.01
2.6 FT	4.45

$D = 2.6 \text{ FT} = TW$

CALCULATE APORN WIDTH

$W_A = D + La \quad (TW < .5D)$

$W_A = D + .4 La \quad (TW \geq .5D)$

$TW = 2.6 > .5D = 1.50$

$Q = 39.1$ CFS $\quad D = 3$ FT $\quad d_{50} = .33$ FT. $\quad LA = 10$ FT

$W_A = D + .4 LA$

$= 3 \text{ FT} + .4 (10)$

$= 3 \text{ FT} + 4 \text{ FT}$

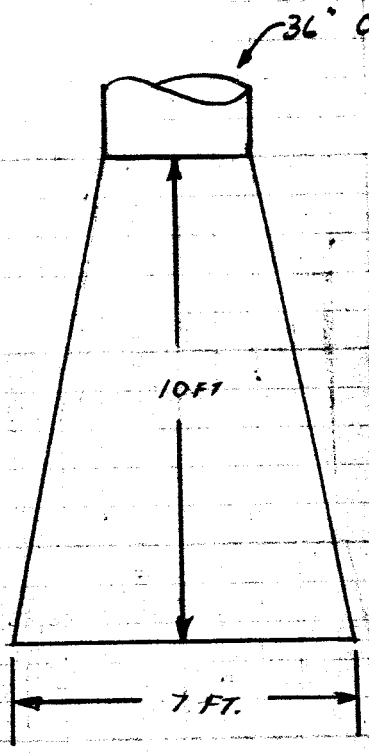
$= 7 \text{ FT}$

$d_{MAX} = 1.5 \times D_{50}$

$= 1.5 \times .33$

$= .50 \text{ FT} = 6''$

ENERGY DISSIPATOR.



d_{50} · 9 in.

d_{max} · 6 in.

Utah Fuel Company
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Salt Lake (801) 596-7111

GLEN A. ZUMWALT
Vice President and
General Manager

September 16, 1988

Lowell P. Braxton
Administrator, Reclamation Program
Division of Oil, Gas & Mining
355 West North Temple
3 Triad Center, Suite 350
Salt Lake City, Utah 84180-1203

Re: Deficiency Review, PAP Amendment, South Fork Breakout

Dear Mr. Braxton,

We have reviewed the deficiency document from your office and the U.S. Forest Service, and are submitting the following information to satisfy your review, along with 8 copies of pages 2-44, 3-42, 3-64a, 3-64b, 4-26a, 4-26b, 4-84, 4-90, map 3.2.11-1, and Engineering calculations.

COMMENTS BY MIKE DEWEESE AND RICK SUMMERS

UMC 783.23 (b) (12) Operation Plan: Maps And Plans - MD

The operator proposes to sample the creek above and below the disturbed site during construction on a weekly basis. The exact location of these monitoring sites must be included on an appropriate map of the area. The Division recommends that these sites be located no further than 100 feet from the disturbed area.

Response: Sampling points have been indicated on Map 3.2.11-1.

UMC 784.24 (a) Transportation Facilities - MD

The plan requires construction of a new road section across the upper drainage. The plan presents adequate calculations for culvert sizing in this section but contains no designs for inlet protection or outlet structures. The application must include plans for inlet protection and designs for an adequate energy dissipator for the South Fork culvert outlet.

Additionally, due to the culvert length and impact to the existing channel, the Division requests that the following information be included in the submittal:

1. Plans to bed the culvert in washed gravel in order to minimize contributions of sediment to the stream during installation and removal.

2. A detailed reclamation plan for the channel crossing. This information should include a survey of the existing stream channel, plans to meet the requirements of UMC 817.44 subsections (b) and (d), plans demonstrating the restored channel will have a capacity at least equal to the upstream and downstream sections (i.e., channel cross-sections), plans to restore the channel with a channel slope approximating the pre-disturbance condition. The calculations presented in the submittl utilize the incorrect formula for the hydraulic radius. It appears the formula was used for a triangular channel to approximate the channel. The formula used was:

$$R = z\ d^{2}\ (z + 1)^{0.5}$$

The correct formula is:

$$R = z\ d^{2} / 2\ (z + 1)^{0.5}$$

However, the Division recommends using a trapezoidal type channel for the channel reconstruction.

The slope used in the calculations for the riprap size is not defined. Is this the existing natural channel slope or the culvert slope? The channel should be designed using the slope of the natural channel. A filter blanket should be designed and proposed for the crossing and a riprap gradation curve should be submitted.

The application states in the plan that 18 inch diameter temporary culverts will be installed in the existing road where it crosses two side drainages. However, the submitted calculations use a 12 inch diameter design at these areas. The applicant must correct this discrepancy and commit to one design size for these culverts.

Response:

A flared inlet will be used on the 36" pipe and the fill slope rocked up to the nigh water line (see p.3-64a).

An energy dissipator has been designed and is included in the engineering calculations.

Culvert will be bedded in washed gravel (see p.3-64a).

A trapezoid type channel is designed as well as new riprap side and filter blanket and is included in the engineering calculations.

It was calculated that we need 12" temporary culverts; however, we have elected to use 18" culverts. We show this now in the engineering calculations.

UMC 817.11 Signs and Markers

(e) The application should commit to installation of buffer zone signs between the edge of the disturbance and the South Fork of Eccles Creek.

Response: We have changed p. 3-42 of the M & RP to include the buffer zone signs at the South Fork Breakout area.

UMC 817.45 Hydrologic Balance: Sediment Control Measures - MD

Page 4-26a of the plan states that after road construction, straw bales and silt fences will be installed to treat runoff until adequate vegetative cover is established. The plan should include proposed locations (either on a map or in narrative) for these controls. There are no provisions in the plan for sediment control during construction of the facility (including culvert installation). The operator must submit an effective runoff treatment plan for the construction and reclamation phases of the project. These plans should include installation of straw bale dikes downstream of the culvert installation and a silt fence or straw bales between any construction disturbance and the stream channel.

Response: Pages 3-64b and 4-26a have been changed to include location of silt fences and/or straw bales. Page 3-64a has been changed to include installation of straw bales and/or silt fence dikes downstream during installation of culverts.

UMC 817.52 Hydrologic Balance: Surface and Ground Water Monitoring

The application should include a monitoring plan (with appropriate revised location map) for the South Fork of Eccles Creek. Due to the expected mining beneath the stream and the relatively low cover in the area, the data will be necessary to monitor potential impacts to the stream. An extensive data set exists for sample site CS-1; however, changes in stream yield cannot be performed using double-mass analysis techniques unless annual yield has been measured and established. Therefore, the upstream-downstream monitoring is our only option to adequately monitor the system. The data will also be useful in classifying the stream reach as losing or gaining. Baseline data should be collected for stations located upstream and downstream of any surface and underground mining activity. The quality samples should be collected as per the Division's Water Monitoring Guidelines baseline parameter list quarterly with flow and field parameters taken monthly. Flows should be measured using a meter or established flumes.

Response: We are not responding to this item as the South Fork Breakout has no potential for impacts to the stream and springs except during construction. Impacts during construction have been covered. The Division's concerns are dealing with general mine planning for this area, not with the breakout.

COMMENTS BY JIM LEATHERWOOD

UMC 783.27 Prime Farmland Investigation - JSL

In accordance with part (a) of this section the operation must conduct an investigation to determine if the proposed area could be prime farmland. If the proposed area does not contain prime farmland then the applicant shall request for a negative determination based on the criteria outlined in part (b) of this section.

Response: We are requesting that a negative determination be declared as the South Fork Breakout area meets the criteria in UMC 783.27 paragraph b(1), (2), and (5).

UMC 817.23 Topsoil: Storage - JSL

The applicant must commit to revegetate the topsoil stockpile protection and viability.

Response: P.3-64a already states that the topsoil stockpile will be seeded with the approved seed mix.

COMMENTS BY RANDY HARDEN

UMC 817.13 - .15 Casing and Sealing of Exposed Underground Openings - JRH

The operator has not addressed the requirements of these sections. A commitment must be included in the reclamation plan for the temporary and permanent closure of the portal openings.

The operator must describe the methodology to be used in closure of the mine openings. The description is to include the method for installing bulkheads in the portals, backfilling, and highwall reduction of the face up for the portals. The reclamation plan section should also address the hydrologic balance requirements of this section, particularly treatment and discussion of drainage into or from the mine openings.

Response: Page 3-64b already addresses the temporary controls for entry into the mine. Page 4-26b addresses permanent closure of the portal entries. Page 3-64b also discusses drainage resulting from the breakout pad.

UMC 784.13 Backfilling and Grading - JRH

The operator has indicated that coal materials excavated from the portal breakout development will be removed from the site. Consequently, there may be a shortage of fill material available during reclamation. The operator shall commit to surveying the site upon completion of construction of the breakout facilities in order to determine if there is a shortage of fill material required for reclamation. Regrading of the site should call for the total elimination of the highwall caused by the portal face up.

Response: We have estimated that we will remove approximately 2700 tons of coal from the site. We feel that it is obvious that if we remove 2700 tons from the excavated site, that there will be a shortage of fill material for reclamation. We have changed page 4-26b to indicate that the highwall will be eliminated. Material to replace the coal volume will come from the slash disposal area as discussed on p.3-64a.

Delineation of the disturbed area has not been made on the drawings. The surface disturbed area boundaries and acreage shall be shown on the drawings. This disturbed area must include those areas to be disturbed during the construction, operation and reclamation of the site, including topsoil storage and borrow areas and areas which may have to be disturbed during reclamation work which may not have been disturbed during construction of the facilities.

Response: We have changed map 3.2.11-1 to delineate the disturbed areas and to show acreage involved.

UMC 800 Bonding - JRH

Bonding information provided by the operator is not considered to be adequate. Similarly, the general bonding and cost estimations provided for the entire mining and reclamation permit are not considered to be adequate. Since the addition of the portal breakout area is only a small percentage of the total bond amount, detailed calculations and cost estimates for bonding for South Fork will be deferred to the bonding and cost estimate information required for the entire permit as part of the permit renewal process rather than be required as part of this revision to the plan. Additionally, details for reclamation work required on the portal site will be more specific and accurate based on the facility as constructed rather than as proposed.

Response: Detailed calculations and cost estimates for the South Breakout area were included on pages 4-15 and 4-16. If additional information is needed we will cover them during the permit renewal process.

COMMENTS BY DAVID DARBY

UMC 817.41 and UMC 817.52

The operator will be required to conduct a complete inventory of springs in the South Fork of Eccles Canyon where mining will take place and establish the flow for at least one year of the tributary fed by the springs prior to conducting mining operations.

Response: In the summary discussion which proceeds this deficiency item, the main thrust deals with the general mining plan for the entire South Fork area. The Breakout area only affects less than 1/2 acre of area. There are no springs involved. We can not delay the breakout ("for at least one year"). The breakout will occur sometime in the next 60-90 days. We feel this deficiency item is inappropriate in relationship to the South Fork Breakout.

UMC 817.121 and UMC 817.124

The operator will be required to establish baseline subsidence information for the South Fork Area prior to conducting underground mining operations. This information will essentially consist of premining surface elevations obtained by either aerial photographs or transit surveys.

Response: The portals for the breakout will be fully supported and will therefore cause no subsidence. Our approved subsidence plan already requires us to establish baseline subsidence information in Section 4.17.5.

COMMENTS BY LYNN KUNZLER

Analysis

Construction has been timed to avoid conflict with special wildlife use periods and is acceptable. Plans to screen the entries to prevent wildlife access is appropriate.

Plans for final revegetation of the site and for interim stabilization of the topsoil pile and forest service road are acceptable. However, the proposed amendment does not discuss temporary (interim) stabilization of the remaining disturbed area between the construction period and final reclamation. Plans to vegetate or otherwise stabilize disturbed areas not actively needed for mining needs to be addressed.

Recommendations

The referenced amendment could be approved when this issue has been adequately addressed.

Response: We have changed pages 3-64a, 3-64b, and 4-26a to clarify interim stabilization of the disturbed areas.

Utah Fuel Company would appreciate your prompt review of our responses to the deficiencies. We submitted our request for a PAP amendment in April, and expected to have the construction phase of the project completed by now. Time is becoming critical if we are to construct this breakout with a minimum of disturbance. Our intentions are to do a good job as indicated in our proposed plan, and we are committed to do the best that conditions allow. The underground entries will be breaking out within the next 60-90 days, and therefore I am urgently requesting that you approve this permit amendment so that we can proceed immediately to face up the breakout area.

If additional information is needed for approval, I would like to suggest an immediate conference be held so as to avoid the delays of written correspondence. This would allow us to reach agreement on deficiencies, and then we could submit the agreed upon changes for your final approval.

Sincerely,

Glen A. Zumwalt
Vice-President/General Manager

GAZ:KZ:lm

Attachments

of sampling. The Permittee commits to the following surface water monitoring program when surface flow is present.

1. Four monitoring stations will be established: Two stations on the drainage from the east and two sites on the drainage from the south. Stations will be located both above and below the rock waste disposal site in each of the drainages.

2. When flow is present, these stations will be monitored, when accessible, at the same frequency and for the same constituents as the stations in Eccles Creek. The data will be tabulated and reported in the same manner as the Skyline water quality data.

3. The data from these stations will be evaluated for non-point source contribution from ground water aquifers. This procedure offers the best potential for detection of ground water contamination.

The Upper O'Connor seam will require a breakout to improve ventilation. The breakout will be on a south facing slope in a side canyon of the South Fork of Eccles Creek (see map no. 3.1.2-1). A new road will need to be built across this canyon to gain access to the breakout area. The canyon flows water in all but the driest of years. If the canyon is flowing water, the creek will be sampled above and below the construction site on a daily basis during the active construction period. The samples will be tested for total suspended solids and settleable solids.

those points of the operation where public or employee access to the perennial is possible. Those points include the portal area on the southwest and middle forks of upper Eccles Creek, the pump houses along Eccles Creek and at the loadout facility near Eccles and Pleasant Valley Creeks, and South Fork Breakout area.

3.2.8 Plan for Disposal of Rock Waste

Coastal States Energy Company ("Coastal") has developed a rock waste disposal site at a location southeast of Scofield, Utah and approximately 3.6 air miles from the Skyline mine site (Map 4.16.1-1A). The rock waste disposal site is an abandoned strip mine pit which is accessed by an upgraded existing road (see Maps 4.16.1-1A and 3.2.8-1). The facility is required for the disposal of rock wastes to be generated from the Skyline from the Skyline Mines during mine's developmental and operational phases. Additional discussion on this disposal site can be found in Section 4.16.

Coastal hauls the rock wastes by truck from the Skyline mine site (portal area) and the unit train loadout facility to the waste disposal area. An operation plan has been developed to establish proper techniques for disposal of the rock waste. A reclamation plan provides for satisfactory final reclamation. The disposal site has been designed to facilitate proper management and operation of the overall disposal process as well as successful reclamation and revegetation. No sanitary waste will be disposed of at the site.

The rock disposal site and access road are located upon land owned by the Estate of George Telonis. The legal right of access and use of the lands for the disposal of rock waste has been granted to Coastal by the heirs of the Estate in a lease effective January 1, 1982 an expiring, unless renewed, on December 31, 2011 (see Exhibit A for photocopy of lease). The lands referred to in the lease include a 7.00 acre right of way for the disposal site access road and a 17.83 area tract of land containing the rock waste disposal site. The legal description of the leased lands is:

3.2.11 South Fork Breakout Area

The Upper O'Connor seam will require a breakout to improve ventilation. The breakout will be on a south facing slope in a side canyon of the South Fork of Eccles Creek (see map 3.1.2-1).

Access to the breakout area will be via an existing road up the South Fork of Eccles Creek to the Manti-LaSal National Forest boundary. From the Forest boundary on the road had been water barred and will need to be reopened. Where the road leaves the main South Fork tributary it crosses two side drainages. Temporary 18" culverts will be installed in these drainages during the construction period. The Forest Service road then continues up the side drainage. Approximately 600 feet up the side drainage a new class III life of project road will need to be constructed for a distance of 75' across the drainage to the breakout area (see map 3.2.11-1). During installation of the culverts silt fence and/or straw bales dikes will be placed downstream to control sediment in the stream.

As construction starts on the project, the trees and brush will be cleared from the road location. The top soil will then be stripped from the road location and stored on the abandoned temporary Forest Service road above the construction area. All of the topsoil will be stored on this abandoned road in a lift not to exceed 2' deep and then seeded to the approved seed mixture. After the top soil from the road location has been removd, a 36" culvert will be placed in the stream bed to provide a life of project crossing. The initial fill material over the culvert will be hauled in from the mouth of the side canyon where a small knob will be removed to help dress up an area. This will also create a safe open area to burn slash created by the breakout construction. The fill slopes of the fill covering the 36" culvert will be seeded and covered with excelsior mats to help prevent erosion until the vegetation is established. A flared inlet will be installed on the culvert. The fill slope will be rocked up to the high water line to also help protect the inlet. The culvert will be bedded in washed gravel at the slope of the natural channel of 14.3%.

A track hoe will then start removing the top soil from the breakout area so it can be stored in the storage area. As the subsoils are encountered they will be used to bring the new road up to grade. The new road will be built with a 1-2% adverse grade from the existing road to the breakout area. Subsoil not used as road fill will also be stored on the abandoned temporary Forest Service road below the topsoil storage area. All of the stored soil will then be seeded with the approved seed mix and then a layer of straw mulch will be applied.

It is estimated that the new road will disturb .11 acres and the breakout area .29 acres, for a total new disturbance of .40 acres.

The breakout pad will be constructed so that the surface drainage will drain into the mine where it will enter the normal mine drainage and will eventually enter the portal area sedimentation pond.

A combination of silt fences and strawbales will be used to treat the surface run-off from the disturbed area of the new road, the breakout pad and the topsoil and subsoil storage areas. The silt fences and strawbales will be located as needed between the disturbed and undisturbed areas to treat run-off from the disturbed area. These silt fences and strawbales will be maintained until adequate vegetation is established.

The breakout portals will be screened to prevent humans or animals from entering the mine. No exhaust fans or permanent activity is planned for this area once construction is finished.

Once the breakout portals have been established, all of the disturbed area will be seeded and all of the roads on National Forest land will be water barred and seeded. All seeding will be done with the approved seed mixtures. The two temporary 18" culverts will be removed but left on site in case emergency access is needed back into the breakout area.

All slash created by the project will be piled so it can be burned at a later date. All brush disposal will be in accordance with standard U.S. Forest Service requirements.

Once the breakout area has been faced up and the portals established, no further activities are planned or anticipated at the area until final reclamation begins.

4.6.5 SOUTH FORK BREAKOUT

Before any top soil is removed, all woody vegettion will be removed from the project area. Soils are basically a sandy loam mixture and have been classified by the S.C.S. as Uinta Family loam/tozc Family fine Sandy loam. Core sampling in the area shows that the soils vary in depth from 24-36+" in depth.

After the vegetation has been removed, the A&B horizons of soil will be removed using a track hoe. The track hoe will stack the soil where a front-end loader will pick it up and transport it to the storage area on the abandoned temporary Forest Service road. The front-end loader will spread the soil in approximately a two foot lift. By handling the soil in this manner, it will not be compacted in the storage area and the roots of the revegetation plants will penetrate the entire depth of the soil. This will allow the soil to maintain itself as viable top soil to be used during final reclamation. It is estimated that approximately 2990 cubic yards of topsoil will be removed and stored.

As subsoils are encountered, they will be used to bring the new access road up to grade. Subsoil not used as road will also be stored on the abandoned temporary Foret Service road on a section below the topsoil storage. It is estimated that approximately 2840 cubic yards of subsoil will be removed. Approximately 1820 cubic yards of the subsoil will be used in the road fill and the remaining 1020 cubic yards will be stored for final reclamation.

As the coal in the coal seam is encountered, it will be hauled out so as to eliminate the possibility of spontaneous combustion occurring.

Once the construction is complete, all of the disturbed area will be seeded and all the roads that are National Forest Lands and the disturbed areas will be water barred and seeded with the mixture shown on Table 4.6-1. A combination of silt fences and strawbales will be used to treat surface run-off from the disturbed area of the new road, the breakout pad and the topsoil-subsoil storage areas until adequate vegetation is established. The silt fences and strawbales will be located as needed between the disturbed and undisturbed areas to treat run-off from the disturbed area.

At the end of the life of mine, the road into the breakout site will be reopened. The portals will be sealed as outlined in section 4.9. The area will then be returned to approximate original contour and the highwall eliminated by front end loaders and track hoe type equipment. First the subsoil from the storage area and road will be uniformly placed in the breakout area. The top soil will then be uniformly distributed over the area.

The soil will be spread in a manner to provide a roughened surface so that seed, fertilizer, and mulch can remain during germination and initial growth of the seedlings. Raking the surface prior to planting may also be needed to provide the necessary roughened surface.

Power transmission lines for underground mining and related activities in the permit area were designed and constructed to comply with the guidelines set forth in "Environmental Criteria for Electric Transmission System" (USDI, USDA (1970)). Power distribution was designed and constructed in accordance with REA Bulletin 61-10 "Powerline Contacts by Eagles and Other Large Birds."

If necessary, a wire fence will be erected and maintained around the perimeter of the portal area or portions thereof to protect grazing stock and wildlife. The fence design will be submitted to the regulatory authority prior to construction. Other ventilation shafts and structures will be similarly fenced, covered or otherwise protected if required. While the ponds contain no toxic-forming materials, the Permittee agrees to exclude wildlife from such ponds should it become necessary. No persistent pesticides will be used unless approved by the regulatory authority as part of a reclamation management plan.

The Permittee also agrees to participate in the prevention, suppression, and control of forest, range, and coal fires, even though these fires may not be part of an approved management plan. The Permittee on occasion conducts a conservation training program for mine employees. This program conducted by personnel of the Utah Division of Wildlife Resources has been included as part of the routine mine training schedule.

Additional information on wildlife can be found in this document in Section 2.9 - TERRESTRIAL WILDLIFE, and Section 2.10 - RAPTORS.

The South Fork Breakout is located in an Elk Calving area. Construction of the face up area should be done after calving season. The road across the tributary to South Fork is a fishery, and is a contributing stream for aquatic insect drift to the fishery in Eccles Creek. Construction operations will be done in a manner to minimize disturbances and influences on the stream.

4.19.7 DIVERSION CHANNEL AT ROCK DISPOSAL SITE

A diversion channel has been installed as shown on Map 4.16.1-1B. The swale to redirect the drainage across the access road and into the original stream channel will be constructed of concrete as shown in Figure 4.19.7-1.

The swale outlet will be lined with 4 inch x 4 inch or larger rock to reduce exit velocity of water from the swale. Engineering calculations for the waste disposal site channel design are included in Appendix Volume A-3.

4.19.8 SOUTH FORK BREAKOUT

A new road will be constructed which will cross a drainage way to the South Fork of Eccles Creek. This drainage way flows in all but extremely dry years. When the creek crossing is constructed, the top soil will be removed with a track hoe to help minimize disturbance to the channel itself. The culvert will be placed in the existing channel, and then the road fill placed over it.

During reclamation the fill material will be removed and then the culvert lifted out of the channel. Top soil will then be placed back on the disturbed area with a track hoe and the area reseeded. Although no permanent disturbance to the channel is planned or expected, if it should occur, it will be riprapped with a gradation of material from 4" to a maximum size of 38".

All culverts used for access to the area will be completely removed from the area during final reclamation.

HYDROLOGY STUDY
SOUTH FORK BREAKOUT AREA

SOIL TYPES

	PERCENT	TYDE	CN
VINTA FAMILY LOAM	50%	B	55
TOZE FAMILY FINE SANDY LOAM	35%	B	55
COMODORE BOULDERY LOAM	10%	D	77
MIDFORK FAMILY BOULDERY LOAM	5%	B	55

LAND USE IS WOOD AND FOREST LAND WITH GOOD COVER

$CN = [.5(55) + .35(55) + .10(77) + .05(55)]/(.5 + .35 + .10 + .05)$

$= (27.50 + 19.25 + 7.70 + 2.75)/(1)$

$= \underline{57.20}$

$S = 1000/CN - 10$

$= 1000/57.20 - 10$

$= 17.48 - 10$

$= \underline{7.48}$

AREA OF THE WATER SHED

PLANIMETER READING - 3,228

$443 \times .0149 \text{ in}^2 = 6.60 \text{ in}^2 \times 22.96 \text{ ACRES/in}^2 = \underline{151.55 \text{ ACRES}}$

$151.55 \text{ ACRES} \times 43,560 \text{ SQ FT/ACRE} = \underline{6,601,608.26 \text{ SQ FT}}$

TIME PARAMETERS

CONCENTRATION TIME

$$t_c = .0078\, L^{0.77} (L/H)^{0.385}$$

$L = 3,850$ FT.

$H = 828$ FT.

$$t_c = .0078\, (3,850)^{0.77} (3850/828)^{.385}$$

$$= .0078\ (576.51)\ (1.81)$$

$= 8.13$ MIN. USE 8.00 MIN.

LAG TIME

$$t_L = L^{0.8}(S+1)^{0.7} / 1900\, Y^{0.5}$$

$Y = \Sigma c_i \times i$ / AREA IN SQ. FT

$i = 80$ FT

$A = 6,601,608.26$ SQ. FT.

ΣC_i		CONTOUR
600	-	8,720
1,400	-	8,800
2,300	-	8,880
2,875	-	8,960
3,400	-	9,040
3,650	-	9,120
3,700	-	9200
3,300	-	9280
3,000	-	9360
2,200	-	9440
450	-	9.520
650	-	9.520
27,525 FT		

y: $27,525 \text{ FT} \times 80\text{AC} / 6,601,608.26$

$= 2,202,000 / 6,601,608.26$

$= 33\ \%$

t_L: $(3,850)^{.8}(7.48+1)^{.7} / 1900\ (33)^{.5}$

$: (738.53)(4.47) / 1900\ (5.74)$

$: 3,301.23 / 10,906$

$: .30$

$: 18.16$ MIN. USE 18 MINS.

$t_L = 0.6\ t_c$

$18. = .6(t_c)$

$t_c = 0.494$ HRS

PEAK FLOW USING SCS CURVE METHOR

EVENT	PEAK FLOW
2YR - 24 HR	7.1 CFS
10YR - 24 HR	3.8 CFS
25YR - 24 HR	12.5 CFS
50YR - 24 HR	24.6 CFS
100 YR - 24 HR	39.1 CFS

CULVERT SELECTION

USE 100 YR - 24 HR EVENT - 39.1 CFS = Q

SIZE OF CULVERT - FLAT SLOPE

$Q = 2.58\ D^{2.5}$ R.

$D = (Q/2.58)^{1/2.5}$

$= (39.1/2.58)^{.4}$

$= 2.97$ FT $\times 12$ IN/FT

$= 35.6$ IN

USE A 36 IN CULVERT

EFFECT OF SLOPE

$S = 2.04/D^{1/3}$ $S = .14$

$.14 = 2.04/D^{.33}$

$D^{.33} = 2.04/.14$

$D^{.33} = 14.57$

$= 2.42$ FT $\times 12$ IN/FT

$= 29.05$ IN

USE 30 IN CULVERT

USE A 36 IN CULVERT TO HANDLE PEAK FLOW.

DESIGN

GIVEN

PIPE DIA. - 36"
COVER - 15"
LIVE LOAD - 0
WEIGHT OF SOIL - 100 lb/ft³

DETERMINE WALL THICKNESS AND CORRUGATION

1 BACKFILL SOIL DENSITY
90% COMPACTION

2 DESIGN PRESSURE

$P_V = DL + LL$ DL = H x w
$= 15 ft \times 100 lb/ft^3 + 0$ LL = NEGLIGIBLE FOR COVER
$= 1500 lb/ft^2$

3 RING COMPRESSION

$C = P_V \times S/2$ S = SPAN IN FT = 3FT
$= 1,500 lb/ft^2 \times 3/2$
$= 1,500 lb/ft^2 \times 1.5 ft$
$= 2,250 lb/ft$

4 ALLOWABLE WALL STRESS
FIG 3-6 $f_c = 22,500 lb/in^2$
FOR $2\frac{2}{3} \times \frac{1}{2}$ IN. CORRUGATION

5 WALL CROSS-SECTIONAL AREA

$A = C/f_c$
$= 2,250 lb/ft / 22,500 lb/in^2$
$= .10 in^2/ft$

FROM TABLE 3-2, A SPECIFIED THICKNESS OF 0.064 IN. PROVIDES AN WALL AREA OF .775

6. $FF = D^2/EI$ = FLEXIBILITY FACTOR = .0433 MAX

D = DIA. = 36 in
E = 30×10^6 lb/in^2
I = .00189 in^4/FT

$FF = (36)^2 / 30 \times 10^6 \times .00189$

$= 1,296 / 56,700$

$= .02286$

$.02286 < .0433$ THEREFORE $2\frac{2}{3} \times \frac{1}{2}$ IN. CORRUGATION IS OK

PURCHASE A 36 IN. DIA. PIPE WITH $2\frac{2}{3} \times \frac{1}{2}$ IN CORRUGATIONS.

TEMPORARY CULVERT SELECTION

Q = >1 CFS USE 1 CFS 2 YR · 24 HR

SIZE OF CULVERT - FLAT SLOPE

$$Q = 2.58\ D^{2.5}$$

$$D = (Q/2.58)^{1/2.5}$$

$$= (1\ CFS/2.58)^{.4}$$

$$= .684\ FT \times 12\ IN/FT$$

$$= 8.21\ IN.$$

NEED A 12 IN CULVERT

USE A 18 IN. DIA. CULVERT

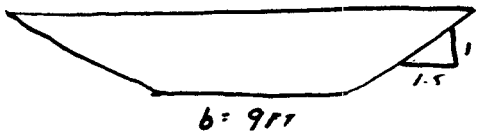
Channel Reconstruction

Trapezoidal Type Channel Design

Q = 39.1 cfs

S = .143 ft/ft

n = .04



$Z = \frac{1.5}{1} = 1.5$

$$Q = VA = \frac{1.49}{n} R^{2/3} A$$

$$= \frac{1.49}{n} \left[\frac{bd + zd^2}{b + 2d\sqrt{z^2+1}}\right]^{2/3} S^{1/2} (bd + zd^2)$$

$$39.1 = \frac{1.49}{.04} \left[\frac{9d + 1.5d^2}{9 + 3.61d}\right]^{2/3} (.143)^{.5} (9d + 1.5d^2)$$

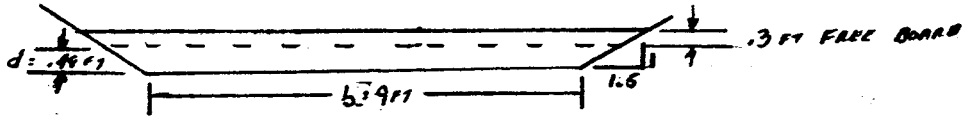
$$2.78 = \left[\frac{9d + 1.5d^2}{9 + 3.61d}\right]^{2/3} (9d + 1.5d^2)$$

4.0 4.14

$b = 9$ FT

Trial d FT	Q
.2	.63
.3	.80
.35	1.08
.4	1.98
.42	2.15
.44	2.33
.46	2.51
.48	2.69
.49	2.79

d = .49 FT.



DETERMINE RIPRAP D_{50} AND DESIGN FOR SF = 1.20

$V = 1.49/n \; R^{2/3} \; S^{1/2}$

$n = .04$

$S = .143$ FT/FT

$R = \frac{bd + 2d^2}{b + 2d\sqrt{2^2+1}} = \frac{9(.99) + 1.5(.99)^2}{9 + (.99)(2)\sqrt{1.5^2+1}} = \frac{9.77}{10.767} = .443$

$V = 1.49/.04 \; (.443)^{.66} \; (.143)^{.5}$

$= (37.25)(.568)(.38)$

$= 8.27$ FT/SEC.

STONE $D_{50} = 7.5$ in $= .625$ FT.

CHECK n VALUE

$n = .0395 \; D_{50}^{.17}$

$= .0395 \; (.625)$

$= .036$

CHECK FOR STABILITY

$d = .49\frac{1}{2}$ FT $\quad S = 14.3 \quad \gamma = 62.4$

$\tau = \gamma d s$

$= (62.4)(.49\frac{1}{2})(.443) = 8.372$ lbs/ft^2

$n_b = 21\tau/\gamma(SG-1)D_{50} \qquad SG = 2.36$

$n_b = 21(8.372)/(62.4)(2.36-1)(.625)$

$= 91.812/53.469$

$= 1.72$

SF MUST BE > 1

ϕ = 42° ANGULAR RIPRAP

14.3 % SLOPE

θ = 8°

$SF_\theta = \cos\theta \tan\phi / \sin\theta + n_s \tan\phi$

$= (\cos 8°)(\tan 42°) / (\sin 8°) + (1.72)(\tan 42°)$

$= (.990)(.904) / (.139) + 1.599$

$= .896 / 1.682$

$= .521$ UNDER DESIGNED RESIGN STREAM CHANNEL

D_{50} (FT)	MANNING'S n	ANGLE OF REPOSE (DEG)	DEPTH OF CONVEY FLOW	TRACTIVE FORCE	STABILITY FACTOR	SAFETY FACTOR
.63	.036	42°	.49	4.372	1.72	.521
1.26	.041	42°	.49	4.372	.859	.982
1.6	.043	42°	.49	4.372	.676	1.192

D_{50} = 1.6 FT.

DETERMINE RIPRAP FOR BANK SF = 1.2

D_{50} = 1.6 FT , n = .043 , θ = 8°, d = .49 FT.

ASSUME

$\tau_{max} = .76 \gamma d S$

$= .76 (62.4)(.49)(.143) = 3.323$ LB/FT²

$n = (21)(\tau_{max}) / \gamma (SG - 1) D_{50}$

$= (21)(.3326) / 62.4 (2.36 - 1) 1.6$

$= 69.783 / 135.782$

$= .514$

ASSUME UNIFORM FLOW

$\lambda = \theta = 8°$

SLIDE SLOPE

$\alpha = TAN^{-1} \frac{1}{1.5}$

$= 33.69°$

$\beta = TAN^{-1} \left[\cos\lambda / \frac{2 \sin\alpha}{n \tan\phi} + \sin\lambda \right]$

$= TAN^{-1} \left[.990 / 2(.555) / .514 (.900) + .139 \right]$

$= TAN^{-1} (.390)$

$= 21.32°$

$n' = n \left[\frac{1 + \sin(\lambda + \beta)}{2} \right]$

$= .514 \left[\frac{1 + \sin(8 + 21.32)}{2} \right]$

$= .514 \left[1.019 / 2 \right]$

$= .383$

$$SF = \cos\alpha \tan\phi / n' \tan\phi + \sin\alpha \cos\beta$$

$$= \cos 33.69 \tan 42 / (.383)(\tan 42) + (\sin 33.69)(\cos 21.32)$$

$$= (.832)(.900) / .345 + (.555)(.932)$$

$$= .749 / .862$$

$$= .869$$

D_{50}	n	β	n'	SF
1.6	.514	21.32°	.383	.869
1.8	.456	19.21	.332	.90
2.0	.411	17.52	.294	.944
2.2	.374	16.09	.263	.979
2.5	.329	14.304	.227	1.009
2.7	.305	13.327	.208	1.03
3.0	.274	12.059	.184	1.06
3.5	.235	10.426	.155	1.09
4.0	.206	9.17	.133	1.12
5.0	.164	7.391	.104	1.17
5.5	.150	6.737	.094	1.18
6.0	.137	6.189	.085	1.19

USE 6 FT D_{50} FOR BOTH CHANNEL BOTTOM AND SIDES

BASED ON THE CALCULATION THE BOTTOM AND SIDESLOPE RIPRAP WILL BE 1.6 FT = D_{50}

RIPRAP GRADATION

	SIZE FT	PERCENT
$2D_{50}$	3.2	100
$1D_{50}$	1.6	50
$.5D_{50}$	.8	20
$.2D_{50}$	.32	0

UNDERLYING FILTER

BASE MATERIAL

D_{50} = .600 MM

D_{85} = .15 MM

D_{15} = .236 MM

RIPRAP

D_{100} : 3.2 FT : 975.36 MM

D_{50} : 1.6 FT : 487.68 MM

D_{85} : 2.9 FT : 883.92 MM

D_{15} : .24 FT : 73.15 MM

D_0 : .10 FT : 30.48 MM

FILTER BLANKET WITH RESPECT TO BASE MATERIAL

(1) $D_{50\,(FILTER)} / D_{50\,BASE} < 40$

D_{50} (FILTER) < 40 × .6 = 24 MM

(2) $D_{15\,(FILTER)} / D_{15\,(BASE)} > 5$

D_{15} (FILTER) > 5 × .236 = 1.18 MM

$D_{15\,(FILTER)} / D_{15\,(BASE)} < 40$

D_{15} (FILTER) < 40 × .236 = 9.44 MM

(3) $D_{15\,(FILTER)} / D_{85\,(BASE)} < 5$

D_{15} (FILTER) < 5 × .15 = .75 MM

∴ WITH RESPECT TO THE BASE THE FOLLOWING MUST BE SATISFIED

$1.18\ mm < D_{15}\ (FILTER) < 9.44\ mm$

$D_{50}\ (FILTER) < 24\ mm$

FILTER MUST BE SIZED TO THE RIPRAP

(1) $D_{50}\ (RIPRAP) / D_{50}(FILTER) < 40$

$D_{50}\ FILTER > {}^{487.6}/_{40} : 12.19\ mm$

(2) $D_{15}\ (RIPRAP)/D_{15}\ FILTER > 5$

$D_{15}(FILTER) < {}^{73.15\ mm}/_{5} : 14.63\ mm$

$D_{15}\ (RIPRAP)/D_{15}\ (FILTER) < 40$

$D_{15}\ (FILTER) > {}^{73.15\ mm}/_{40} : 1.83\ mm$

(3) $D_{15}\ (RIPRAP)/D_{85}(FILTER) < 5$

$D_{85}\ (FILTER) > {}^{73.15}/_{5} : 14.63\ mm$

∴ FILTER MUST MEET THESE

$D_{50}(FILTER) > 12.19\ mm$

$1.83\ mm < D_{15}(FILTER) < 14.65\ mm$

$D_{85}(FILTER) > 14.65\ mm$

FILTER BLANKET MUST BE SIZED AS FOLLOWS

$12.19\ mm < D_{50}\ (FILTER) < 24\ mm$

$1.18\ mm < D_{15}\ (FILTER) < 14.65\ mm$

$D_{85}\ (FILTER) > 14.65\ mm$

ENERGY DISSIPATOR FOR DISCHARGE END OF CULVERT.

$Q = VA$

$Q = \frac{1.49}{n} R^{2/3} S^{1/2} A$

$39.1 = \frac{1.49}{n} \left(\frac{.5768\,D}{1.9578}\right)^{.66} (.143)^{1/2} \frac{\pi D^2}{4}$

$39.1 = 62.08\,(.295\,D)^{.66}(.143)(.785\,D^2)$

$39.1 = 8.877\,(.295\,D)^{.66}(.785\,D^2)$

$4.404 = (.295\,D)^{.66}(.785\,D^2)$

D: TW = TAILWATER DEPTH
$n = .024$
$S = .143$

D	Q
1 FT	.351
2 FT	2.317
3 FT	6.518
2.5 FT	4.01
2.6 FT	4.45

$D = 2.6$ FT $= TW$

DESIGN FOR MINIMUM TAILWATER CONDITION

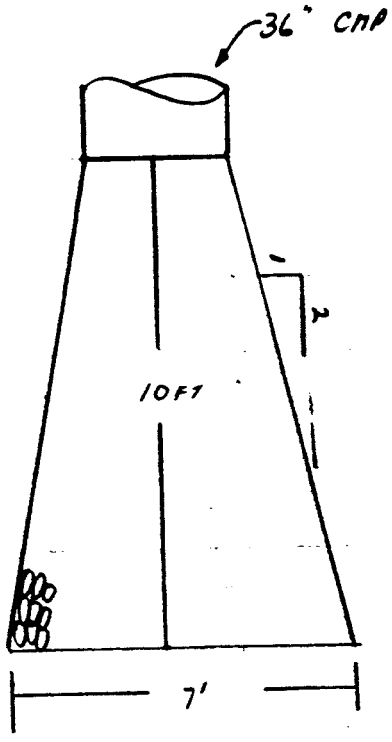
MAX ROCK SIZE $1.5 \times D_{50}$

$D_{50} \cong .33$ FT

$Q = 39.1$ CFS $\quad D = 3$ FT $\quad d_{50} = .33$ FT $\quad L_A = 10$ FT

$W_A = D + L_A = 3 + 10 = 13$ FT $\quad d_{MAX} = 1.5 \times d_{50} = 1.5 \times .33 = .5$ FT

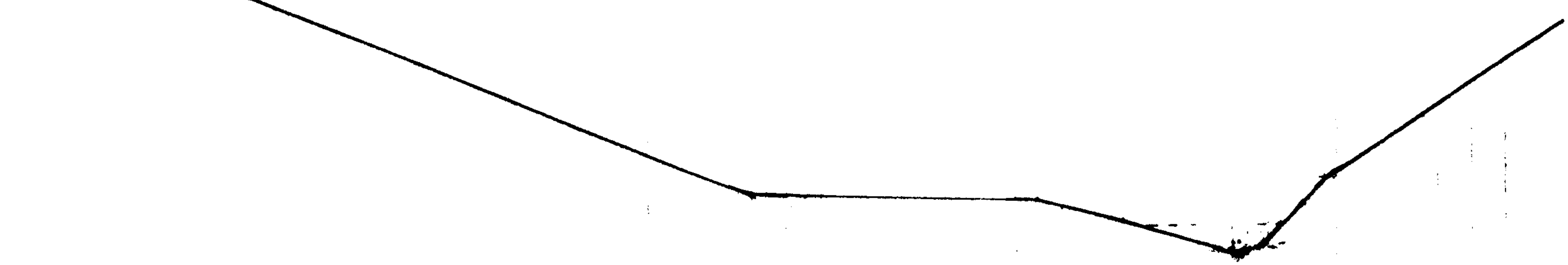
ENERGY DISSIPATOR



d_{50} = 4 IN.

d_{MAX} = 6 IN.

STREAM RECLAIMATION



TYPCIAL STREAM BED PROFILE

SCALE 1" = 6'

REFERENCE

1. BARFIELD, B. J., R.C. WARNER AND C. T. HAAN, 1985 APPLIED HYDROLOGY AND SEDIMENTOLOGY FOR DISTURBED AREAS. OKLAHOMA TECHNICAL PRESS, STILLWATER, OKLAHOMA.

2. HANDBOOK OF STEEL DRAINAGE AND HIGHWAY CONSTRUCTION PRODUCTS. AMERICAN IRON AND STEEL INSTITUTE. WASHINGTON D. C. THIRD EDITION

3. HYDRAULIC DESIGN OF STILLING BASINS AND ENERGY DISSIPATORS UNITED STATES DEPARTMENT OF THE INTERIOR, BUREAU OF RECLAMATION.

4. SOIL SURVEY OF CARBON AREA, UTAH, UNITED STATES DEPARTMENT OF AGRICULTURE, SOIL CONSERVATION SERVICE.

Utah Fuel Company
a subsidiary of The Coastal Corporation
P.O. Box 719 • Helper, Utah 84526 • (801) 637-7925
Salt Lake (801) 596-7111

GLEN A. ZUMWALT
Vice President and
General Manager

September 16, 1988

Lowell P. Braxton
Administrator, Reclamation Program
Division of Oil, Gas & Mining
355 West North Temple
3 Triad Center, Suite 350
Salt Lake City, Utah 84180-1203

Re: Deficiency Review, PAP Amendment, South Fork Breakout

Dear Mr. Braxton,

We have reviewed the deficiency document from your office and the U.S. Forest Service, and are submitting the following information to satisfy your review, along with 8 copies of pages 2-44, 3-42, 3-64a, 3-64b, 4-26a, 4-26b, 4-84, 4-90, map 3.2.11-1, and Engineering calculations.

COMMENTS BY MIKE DEWEESE AND RICK SUMMERS

UMC 783.23 (b) (12) Operation Plan: Maps And Plans - MD

The operator proposes to sample the creek above and below the disturbed site during construction on a weekly basis. The exact location of these monitoring sites must be included on an appropriate map of the area. The Division recommends that these sites be located no further than 100 feet from the disturbed area.

Response: Sampling points have been indicated on Map 3.2.11-1.

UMC 784.24 (a) Transportation Facilities - MD

The plan requires construction of a new road section across the upper drainage. The plan presents adequate calculations for culvert sizing in this section but contains no designs for inlet protection or outlet structures. The application must include plans for inlet protection and designs for an adequate energy dissipator for the South Fork culvert outlet.

Additionally, due to the culvert length and impact to the existing channel, the Division requests that the following information be included in the submittal:

1. Plans to bed the culvert in washed gravel in order to minimize contributions of sediment to the stream during installation and removal.

2. A detailed reclamation plan for the channel crossing. This information should include a survey of the existing stream channel, plans to meet the requirements of UMC 817.44 subsections (b) and (d), plans demonstrating the restored channel will have a capacity at least equal to the upstream and downstream sections (i.e., channel cross-sections), plans to restore the channel with a channel slope approximating the pre-disturbance condition. The calculations presented in the submittl utilize the incorrect formula for the hydraulic radius. It appears the formula was used for a triangular channel to approximate the channel. The formula used was:

$$R = z\ d^{2}\ (z + 1)^{0.5}$$

The correct formula is:

$$R = z\ d^{2} / 2\ (z + 1)^{0.5}$$

However, the Division recommends using a trapezoidal type channel for the channel reconstruction.

The slope used in the calculations for the riprap size is not defined. Is this the existing natural channel slope or the culvert slope? The channel should be designed using the slope of the natural channel. A filter blanket should be designed and proposed for the crossing and a riprap gradation curve should be submitted.

The application states in the plan that 18 inch diameter temporary culverts will be installed in the existing road where it crosses two side drainages. However, the submitted calculations use a 12 inch diameter design at these areas. The applicant must correct this discrepancy and commit to one design size for these culverts.

Response:

A flared inlet will be used on the 36" pipe and the fill slope rocked up to the nigh water line (see p.3-64a).

An energy dissipator has been designed and is included in the engineering calculations.

Culvert will be bedded in washed gravel (see p.3-64a).

A trapezoid type channel is designed as well as new riprap side and filter blanket and is included in the engineering calculations.

It was calculated that we need 12" temporary culverts; however, we have elected to use 18" culverts. We show this now in the engineering calculations.

UMC 817.11 Signs and Markers

(e) The application should commit to installation of buffer zone signs between the edge of the disturbance and the South Fork of Eccles Creek.

Response: We have changed p. 3-42 of the M & RP to include the buffer zone signs at the South Fork Breakout area.

UMC 817.45 Hydrologic Balance: Sediment Control Measures - MD

Page 4-26a of the plan states that after road construction, straw bales and silt fences will be installed to treat runoff until adequate vegetative cover is established. The plan should include proposed locations (either on a map or in narrative) for these controls. There are no provisions in the plan for sediment control during construction of the facility (including culvert installation). The operator must submit an effective runoff treatment plan for the construction and reclamation phases of the project. These plans should include installation of straw bale dikes downstream of the culvert installation and a silt fence or straw bales between any construction disturbance and the stream channel.

Response: Pages 3-64b and 4-26a have been changed to include location of silt fences and/or straw bales. Page 3-64a has been changed to include installation of straw bales and/or silt fence dikes downstream during installation of culverts.

UMC 817.52 Hydrologic Balance: Surface and Ground Water Monitoring

The application should include a monitoring plan (with appropriate revised location map) for the South Fork of Eccles Creek. Due to the expected mining beneath the stream and the relatively low cover in the area, the data will be necessary to monitor potential impacts to the stream. An extensive data set exists for sample site CS-1; however, changes in stream yield cannot be performed using double-mass analysis techniques unless annual yield has been measured and established. Therefore, the upstream-downstream monitoring is our only option to adequately monitor the system. The data will also be useful in classifying the stream reach as losing or gaining. Baseline data should be collected for stations located upstream and downstream of any surface and underground mining activity. The quality samples should be collected as per the Division's Water Monitoring Guidelines baseline parameter list quarterly with flow and field parameters taken monthly. Flows should be measured using a meter or established flumes.

Response: We are not responding to this item as the South Fork Breakout has no potential for impacts to the stream and springs except during construction. Impacts during construction have been covered. The Division's concerns are dealing with general mine planning for this area, not with the breakout.

COMMENTS BY JIM LEATHERWOOD

UMC 783.27 Prime Farmland Investigation - JSL

In accordance with part (a) of this section the operation must conduct an investigation to determine if the proposed area could be prime farmland. If the proposed area does not contain prime farmland then the applicant shall request for a negative determination based on the criteria outlined in part (b) of this section.

Response: We are requesting that a negative determination be declared as the South Fork Breakout area meets the criteria in UMC 783.27 paragraph b(1), (2), and (5).

UMC 817.23 Topsoil: Storage - JSL

The applicant must commit to revegetate the topsoil stockpile protection and viability.

Response: P.3-64a already states that the topsoil stockpile will be seeded with the approved seed mix.

COMMENTS BY RANDY HARDEN

UMC 817.13 - .15 Casing and Sealing of Exposed Underground Openings - JRH

The operator has not addressed the requirements of these sections. A commitment must be included in the reclamation plan for the temporary and permanent closure of the portal openings.

The operator must describe the methodology to be used in closure of the mine openings. The description is to include the method for installing bulkheads in the portals, backfilling, and highwall reduction of the face up for the portals. The reclamation plan section should also address the hydrologic balance requirements of this section, particularly treatment and discussion of drainage into or from the mine openings.

Response: Page 3-64b already addresses the temporary controls for entry into the mine. Page 4-26b addresses permanent closure of the portal entries. Page 3-64b also discusses drainage resulting from the breakout pad.

UMC 784.13 Backfilling and Grading - JRH

The operator has indicated that coal materials excavated from the portal breakout development will be removed from the site. Consequently, there may be a shortage of fill material available during reclamation. The operator shall commit to surveying the site upon completion of construction of the breakout facilities in order to determine if there is a shortage of fill material required for reclamation. Regrading of the site should call for the total elimination of the highwall caused by the portal face up.

Response: We have estimated that we will remove approximately 2700 tons of coal from the site. We feel that it is obvious that if we remove 2700 tons from the excavated site, that there will be a shortage of fill material for reclamation. We have changed page 4-26b to indicate that the highwall will be eliminated. Material to replace the coal volume will come from the slash disposal area as discussed on p.3-64a.

Delineation of the disturbed area has not been made on the drawings. The surface disturbed area boundaries and acreage shall be shown on the drawings. This disturbed area must include those areas to be disturbed during the construction, operation and reclamation of the site, including topsoil storage and borrow areas and areas which may have to be disturbed during reclamation work which may not have been disturbed during construction of the facilities.

Response: We have changed map 3.2.11-1 to delineate the disturbed areas and to show acreage involved.

UMC 800 Bonding - JRH

Bonding information provided by the operator is not considered to be adequate. Similarly, the general bonding and cost estimations provided for the entire mining and reclamation permit are not considered to be adequate. Since the addition of the portal breakout area is only a small percentage of the total bond amount, detailed calculations and cost estimates for bonding for South Fork will be deferred to the bonding and cost estimate information required for the entire permit as part of the permit renewal process rather than be required as part of this revision to the plan. Additionally, details for reclamation work required on the portal site will be more specific and accurate based on the facility as constructed rather than as proposed.

Response: Detailed calculations and cost estimates for the South Breakout area were included on pages 4-15 and 4-16. If additional information is needed we will cover them during the permit renewal process.

COMMENTS BY DAVID DARBY

UMC 817.41 and UMC 817.52

The operator will be required to conduct a complete inventory of springs in the South Fork of Eccles Canyon where mining will take place and establish the flow for at least one year of the tributary fed by the springs prior to conducting mining operations.

Response: In the summary discussion which proceeds this deficiency item, the main thrust deals with the general mining plan for the entire South Fork area. The Breakout area only affects less than 1/2 acre of area. There are no springs involved. We can not delay the breakout ("for at least one year"). The breakout will occur sometime in the next 60-90 days. We feel this deficiency item is inappropriate in relationship to the South Fork Breakout.

UMC 817.121 and UMC 817.124

The operator will be required to establish baseline subsidence information for the South Fork Area prior to conducting underground mining operations. This information will essentially consist of premining surface elevations obtained by either aerial photographs or transit surveys.

Response: The portals for the breakout will be fully supported and will therefore cause no subsidence. Our approved subsidence plan already requires us to establish baseline subsidence information in Section 4.17.5.

COMMENTS BY LYNN KUNZLER

Analysis

Construction has been timed to avoid conflict with special wildlife use periods and is acceptable. Plans to screen the entries to prevent wildlife access is appropriate.

Plans for final revegetation of the site and for interim stabilization of the topsoil pile and forest service road are acceptable. However, the proposed amendment does not discuss temporary (interim) stabilization of the remaining disturbed area between the construction period and final reclamation. Plans to vegetate or otherwise stabilize disturbed areas not actively needed for mining needs to be addressed.

Recommendations

The referenced amendment could be approved when this issue has been adequately addressed.

Response: We have changed pages 3-64a, 3-64b, and 4-26a to clarify interim stabilization of the disturbed areas.

Utah Fuel Company would appreciate your prompt review of our responses to the deficiencies. We submitted our request for a PAP amendment in April, and expected to have the construction phase of the project completed by now. Time is becoming critical if we are to construct this breakout with a minimum of disturbance. Our intentions are to do a good job as indicated in our proposed plan, and we are committed to do the best that conditions allow. The underground entries will be breaking out within the next 60-90 days, and therefore I am urgently requesting that you approve this permit amendment so that we can proceed immediately to face up the breakout area.

If additional information is needed for approval, I would like to suggest an immediate conference be held so as to avoid the delays of written correspondence. This would allow us to reach agreement on deficiencies, and then we could submit the agreed upon changes for your final approval.

Sincerely,

Glen A. Zumwalt
Vice-President/General Manager

GAZ:KZ:lm

Attachments

of sampling. The Permittee commits to the following surface water monitoring program when surface flow is present.

1. Four monitoring stations will be established: Two stations on the drainage from the east and two sites on the drainage from the south. Stations will be located both above and below the rock waste disposal site in each of the drainages.

2. When flow is present, these stations will be monitored, when accessible, at the same frequency and for the same constituents as the stations in Eccles Creek. The data will be tabulated and reported in the same manner as the Skyline water quality data.

3. The data from these stations will be evaluated for non-point source contribution from ground water aquifers. This procedure offers the best potential for detection of ground water contamination.

The Upper O'Connor seam will require a breakout to improve ventilation. The breakout will be on a south facing slope in a side canyon of the South Fork of Eccles Creek (see map no. 3.1.2-1). A new road will need to be built across this canyon to gain access to the breakout area. The canyon flows water in all but the driest of years. If the canyon is flowing water, the creek will be sampled above and below the construction site on a daily basis during the active construction period. The samples will be tested for total suspended solids and settleable solids.

those points of the operation where public or employee access to the perennial is possible. Those points include the portal area on the southwest and middle forks of upper Eccles Creek, the pump houses along Eccles Creek and at the loadout facility near Eccles and Pleasant Valley Creeks, and South Fork Breakout area.

3.2.8 Plan for Disposal of Rock Waste

Coastal States Energy Company ("Coastal") has developed a rock waste disposal site at a location southeast of Scofield, Utah and approximately 3.6 air miles from the Skyline mine site (Map 4.16.1-1A). The rock waste disposal site is an abandoned strip mine pit which is accessed by an upgraded existing road (see Maps 4.16.1-1A and 3.2.8-1). The facility is required for the disposal of rock wastes to be generated from the Skyline from the Skyline Mines during mine's developmental and operational phases. Additional discussion on this disposal site can be found in Section 4.16.

Coastal hauls the rock wastes by truck from the Skyline mine site (portal area) and the unit train loadout facility to the waste disposal area. An operation plan has been developed to establish proper techniques for disposal of the rock waste. A reclamation plan provides for satisfactory final reclamation. The disposal site has been designed to facilitate proper management and operation of the overall disposal process as well as successful reclamation and revegetation. No sanitary waste will be disposed of at the site.

The rock disposal site and access road are located upon land owned by the Estate of George Telonis. The legal right of access and use of the lands for the disposal of rock waste has been granted to Coastal by the heirs of the Estate in a lease effective January 1, 1982 an expiring, unless renewed, on December 31, 2011 (see Exhibit A for photocopy of lease). The lands referred to in the lease include a 7.00 acre right of way for the disposal site access road and a 17.83 area tract of land containing the rock waste disposal site. The legal description of the leased lands is:

3.2.11 South Fork Breakout Area

The Upper O'Connor seam will require a breakout to improve ventilation. The breakout will be on a south facing slope in a side canyon of the South Fork of Eccles Creek (see map 3.1.2-1).

Access to the breakout area will be via an existing road up the South Fork of Eccles Creek to the Manti-LaSal National Forest boundary. From the Forest boundary on the road had been water barred and will need to be reopened. Where the road leaves the main South Fork tributary it crosses two side drainages. Temporary 18" culverts will be installed in these drainages during the construction period. The Forest Service road then continues up the side drainage. Approximately 600 feet up the side drainage a new class III life of project road will need to be constructed for a distance of 75' across the drainage to the breakout area (see map 3.2.11-1). During installation of the culverts silt fence and/or straw bales dikes will be placed downstream to control sediment in the stream.

As construction starts on the project, the trees and brush will be cleared from the road location. The top soil will then be stripped from the road location and stored on the abandoned temporary Forest Service road above the construction area. All of the topsoil will be stored on this abandoned road in a lift not to exceed 2' deep and then seeded to the approved seed mixture. After the top soil from the road location has been removd, a 36" culvert will be placed in the stream bed to provide a life of project crossing. The initial fill material over the culvert will be hauled in from the mouth of the side canyon where a small knob will be removed to help dress up an area. This will also create a safe open area to burn slash created by the breakout construction. The fill slopes of the fill covering the 36" culvert will be seeded and covered with excelsior mats to help prevent erosion until the vegetation is established. A flared inlet will be installed on the culvert. The fill slope will be rocked up to the high water line to also help protect the inlet. The culvert will be bedded in washed gravel at the slope of the natural channel of 14.3%.

A track hoe will then start removing the top soil from the breakout area so it can be stored in the storage area. As the subsoils are encountered they will be used to bring the new road up to grade. The new road will be built with a 1-2% adverse grade from the existing road to the breakout area. Subsoil not used as road fill will also be stored on the abandoned temporary Forest Service road below the topsoil storage area. All of the stored soil will then be seeded with the approved seed mix and then a layer of straw mulch will be applied.

It is estimated that the new road will disturb .11 acres and the breakout area .29 acres, for a total new disturbance of .40 acres.

The breakout pad will be constructed so that the surface drainage will drain into the mine where it will enter the normal mine drainage and will eventually enter the portal area sedimentation pond.

A combination of silt fences and strawbales will be used to treat the surface run-off from the disturbed area of the new road, the breakout pad and the topsoil and subsoil storage areas. The silt fences and strawbales will be located as needed between the disturbed and undisturbed areas to treat run-off from the disturbed area. These silt fences and strawbales will be maintained until adequate vegetation is established.

The breakout portals will be screened to prevent humans or animals from entering the mine. No exhaust fans or permanent activity is planned for this area once construction is finished.

Once the breakout portals have been established, all of the disturbed area will be seeded and all of the roads on National Forest land will be water barred and seeded. All seeding will be done with the approved seed mixtures. The two temporary 18" culverts will be removed but left on site in case emergency access is needed back into the breakout area.

All slash created by the project will be piled so it can be burned at a later date. All brush disposal will be in accordance with standard U.S. Forest Service requirements.

Once the breakout area has been faced up and the portals established, no further activities are planned or anticipated at the area until final reclamation begins.

4.6.5 SOUTH FORK BREAKOUT

Before any top soil is removed, all woody vegettion will be removed from the project area. Soils are basically a sandy loam mixture and have been classified by the S.C.S. as Uinta Family loam/tozc Family fine Sandy loam. Core sampling in the area shows that the soils vary in depth from 24-36+" in depth.

After the vegetation has been removed, the A&B horizons of soil will be removed using a track hoe. The track hoe will stack the soil where a front-end loader will pick it up and transport it to the storage area on the abandoned temporary Forest Service road. The front-end loader will spread the soil in approximately a two foot lift. By handling the soil in this manner, it will not be compacted in the storage area and the roots of the revegetation plants will penetrate the entire depth of the soil. This will allow the soil to maintain itself as viable top soil to be used during final reclamation. It is estimated that approximately 2990 cubic yards of topsoil will be removed and stored.

As subsoils are encountered, they will be used to bring the new access road up to grade. Subsoil not used as road will also be stored on the abandoned temporary Foret Service road on a section below the topsoil storage. It is estimated that approximately 2840 cubic yards of subsoil will be removed. Approximately 1820 cubic yards of the subsoil will be used in the road fill and the remaining 1020 cubic yards will be stored for final reclamation.

As the coal in the coal seam is encountered, it will be hauled out so as to eliminate the possibility of spontaneous combustion occurring.

Once the construction is complete, all of the disturbed area will be seeded and all the roads that are National Forest Lands and the disturbed areas will be water barred and seeded with the mixture shown on Table 4.6-1. A combination of silt fences and strawbales will be used to treat surface run-off from the disturbed area of the new road, the breakout pad and the topsoil-subsoil storage areas until adequate vegetation is established. The silt fences and strawbales will be located as needed between the disturbed and undisturbed areas to treat run-off from the disturbed area.

At the end of the life of mine, the road into the breakout site will be reopened. The portals will be sealed as outlined in section 4.9. The area will then be returned to approximate original contour and the highwall eliminated by front end loaders and track hoe type equipment. First the subsoil from the storage area and road will be uniformly placed in the breakout area. The top soil will then be uniformly distributed over the area.

The soil will be spread in a manner to provide a roughened surface so that seed, fertilizer, and mulch can remain during germination and initial growth of the seedlings. Raking the surface prior to planting may also be needed to provide the necessary roughened surface.

Power transmission lines for underground mining and related activities in the permit area were designed and constructed to comply with the guidelines set forth in "Environmental Criteria for Electric Transmission System" (USDI, USDA (1970)). Power distribution was designed and constructed in accordance with REA Bulletin 61-10 "Powerline Contacts by Eagles and Other Large Birds."

If necessary, a wire fence will be erected and maintained around the perimeter of the portal area or portions thereof to protect grazing stock and wildlife. The fence design will be submitted to the regulatory authority prior to construction. Other ventilation shafts and structures will be similarly fenced, covered or otherwise protected if required. While the ponds contain no toxic-forming materials, the Permittee agrees to exclude wildlife from such ponds should it become necessary. No persistent pesticides will be used unless approved by the regulatory authority as part of a reclamation management plan.

The Permittee also agrees to participate in the prevention, suppression, and control of forest, range, and coal fires, even though these fires may not be part of an approved management plan. The Permittee on occasion conducts a conservation training program for mine employees. This program conducted by personnel of the Utah Division of Wildlife Resources has been included as part of the routine mine training schedule.

Additional information on wildlife can be found in this document in Section 2.9 - TERRESTRIAL WILDLIFE, and Section 2.10 - RAPTORS.

The South Fork Breakout is located in an Elk Calving area. Construction of the face up area should be done after calving season. The road across the tributary to South Fork is a fishery, and is a contributing stream for aquatic insect drift to the fishery in Eccles Creek. Construction operations will be done in a manner to minimize disturbances and influences on the stream.

4.19.7 DIVERSION CHANNEL AT ROCK DISPOSAL SITE

A diversion channel has been installed as shown on Map 4.16.1-1B. The swale to redirect the drainage across the access road and into the original stream channel will be constructed of concrete as shown in Figure 4.19.7-1.

The swale outlet will be lined with 4 inch x 4 inch or larger rock to reduce exit velocity of water from the swale. Engineering calculations for the waste disposal site channel design are included in Appendix Volume A-3.

4.19.8 SOUTH FORK BREAKOUT

A new road will be constructed which will cross a drainage way to the South Fork of Eccles Creek. This drainage way flows in all but extremely dry years. When the creek crossing is constructed, the top soil will be removed with a track hoe to help minimize disturbance to the channel itself. The culvert will be placed in the existing channel, and then the road fill placed over it.

During reclamation the fill material will be removed and then the culvert lifted out of the channel. Top soil will then be placed back on the disturbed area with a track hoe and the area reseeded. Although no permanent disturbance to the channel is planned or expected, if it should occur, it will be riprapped with a gradation of material from 4" to a maximum size of 38".

All culverts used for access to the area will be completely removed from the area during final reclamation.

HYDROLOGY STUDY
SOUTH FORK BREAKOUT AREA

SOIL TYPES

	PERCENT	TYPE	CN
VINTA FAMILY LOAM	50%	B	55
TOZE FAMILY FINE SANDY LOAM	35%	B	55
COMODORE BOULDERY LOAM	10%	D	77
MIDFORK FAMILY BOULDERY LOAM	5%	B	55

LAND USE IS WOOD AND FOREST LAND WITH GOOD COVER

$CN = [.5(55) + .35(55) + .10(77) + .05(55)]/(.5 + .35 + .10 + .05)$

$= (27.50 + 19.25 + 7.70 + 2.75)/(1)$

$= \underline{57.20}$

$S = 1000/CN - 10$

$= 1000/57.20 - 10$

$= 17.49 - 10$

$= \underline{7.48}$

AREA OF THE WATER SHED

PLANIMETER READING = 3,228

$443 \times .0149 \text{ IN}^2 = 6.60 \text{ IN}^2 \times 22.96 \text{ ACRES/IN}^2 = \underline{151.55 \text{ ACRE}}$

$151.55 \text{ ACRES} \times 43,560 \text{ SQFT/ACRE} = \underline{6,601,608.26 \text{ SQ. FT.}}$

TIME PARAMETERS [1]

CONCENTRATION TIME

$$t_c = .0078\, L^{0.77} (L/H)^{0.385}$$

$L = 3,850$ FT.

$H = 828$ FT.

$$t_c = .0078\, (3,850)^{0.77} (3850/828)^{.385}$$

$$= .0078\, (576.51)\, (1.81)$$

$= 8.13$ MIN. USE **8.00** MIN.

LAG TIME

$$t_L = L^{0.8}(S+1)^{0.7} / 1900\, Y^{0.5}$$

$Y = \Sigma c_i \times i$ / AREA IN SQ. FT

$i = 80$ FT

$A = 6,601,608.26$ SQ. FT.

ΣC_i		CONTOUR
600	-	8,720
1,400	-	8,800
2,300	-	8,880
2,875	-	8,960
3,400	-	9,040
3,650	-	9,120
3,700	-	9200
3,300	-	9280
3,000	-	9360
2,200	-	9440
450	-	9,520
650	-	9,520
27,525 FT		

y: $27,525 \text{ FT} \times 80\text{FT} / 6,601,608.26$

$= 2,202,000 / 6,601,608.26$

$= 33\%$

t_L: $(3,850)^{.8}(7.48+1)^{.7} / 1900\,(33)^{.5}$

$= (738.53)(4.47) / 1900\,(5.74)$

$= 3,301.23 / 10,906$

$= .30$

$= 18.16$ MIN. USE 18 MINS.

$t_L = 0.6\, t_c$

$18. = .6\,(t_c)$

$t_c = 0.494$ HRS

PEAK FLOW USING SCS CURVE METHOD

EVENT	PEAK FLOW
2YR - 24 HR	7.1 CFS
10YR - 24 HR	3.8 CFS
25YR - 24 HR	12.5 CFS
50YR - 24 HR	24.6 CFS
100YR - 24 HR	39.1 CFS

CULVERT SELECTION

USE 100 YR - 24 HR EVENT - 39.1 CFS = Q

SIZE OF CULVERT - FLAT SLOPE

$Q = 2.58\ D^{2.5}$ Q

$D = (Q/2.58)^{1/2.5}$

$= (39.1/2.58)^{.4}$

$= 2.97$ FT $\times 12$ IN/FT

$= 35.6$ IN

USE A 36 IN CULVERT

EFFECT OF SLOPE

$S = 2.04/D^{1/3}$ $S = .14$

$.14 = 2.04/D^{.33}$

$D^{.33} = 2.04/.14$

$D^{.33} = 14.57$

$= 2.42$ FT $\times 12$ IN/FT

$= 29.05$ IN

USE 30 IN CULVERT

USE A 36 IN CULVERT TO HANDLE PEAK FLOW

DESIGN

GIVEN

PIPE DIA. - 36"
COVER - 15"
LIVE LOAD - 0
WEIGHT OF SOIL - 100 lb/ft³

DETERMINE WALL THICKNESS AND CORRUGATION

1 BACKFILL SOIL DENSITY
90% COMPACTION

2 DESIGN PRESSURE

$P_V = DL + LL$ $\quad DL = H \times w$
$= 15 ft \times 100 lb/ft^3 + 0$ $\quad LL$ = NEGLIGIBLE FOR COVER
$= 1500 lb/ft^2$

3 RING COMPRESSION

$C = P_V \times S/2$ $\quad S$ = SPAN IN FT = 3FT
$= 1,500 lb/ft^2 \times 3/2$
$= 1,500 lb/ft^2 \times 1.5 ft$
$= 2,250 lb/ft$

4 ALLOWABLE WALL STRESS
FIG 3-6 $f_c = 22,500 lb/in^2$
FOR $2\frac{2}{3} \times \frac{1}{2}$ IN. CORRUGATION

5 WALL CROSS-SECTIONAL AREA

$A = C/f_c$
$= 2,250 lb/ft / 22,500 lb/in^2$
$= .10 in^2/ft$

FROM TABLE 3-2, A SPECIFIED THICKNESS OF 0.064 IN. PROVIDES AN WALL AREA OF .775

6. $FF = D^2/EI$ = FLEXIBILITY FACTOR $= .0433$ MAX

D = DIA. = 36 in
E = 30×10^6 lb/in^2
I = .00189 in^4/FT

$FF = (36)^2 / 30 \times 10^6 \times .00189$

$= 1,296 / 56,700$

$= .02286$

$.02286 < .0433$ THEREFORE $2\frac{2}{3} \times \frac{1}{2}$ in. CORRUGATION IS OK

PURCHASE A 36 in. DIA. PIPE WITH $2\frac{2}{3} \times \frac{1}{2}$ in CORRUGATIONS.

TEMPORARY CULVERT SELECTION

Q = >1 CFS USE 1 CFS 2 YR · 24 HR

SIZE OF CULVERT - FLAT SLOPE

$$Q = 2.58\ D^{2.5}$$

$$D = (Q/2.58)^{1/2.5}$$

$$= (1\ CFS/2.58)^{.4}$$

$$= .684\ FT \times 12\ IN/FT$$

$$= 8.21\ IN.$$

NEED A 12 IN CULVERT

USE A 18 IN. DIA. CULVERT

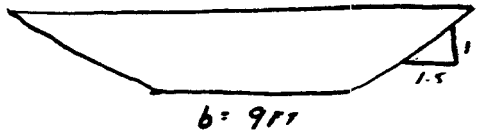
Channel Reconstruction

Trapezoidal Type Channel Design

Q = 39.1 cfs

S = .143 ft/ft

n = .04



$Z = \frac{1.5}{1} = 1.5$

$$Q = VA = \frac{1.49}{n} R^{2/3} A$$

$$= \frac{1.49}{n} \left[\frac{bd + zd^2}{b + 2d\sqrt{z^2+1}}\right]^{2/3} S^{1/2} (bd + zd^2)$$

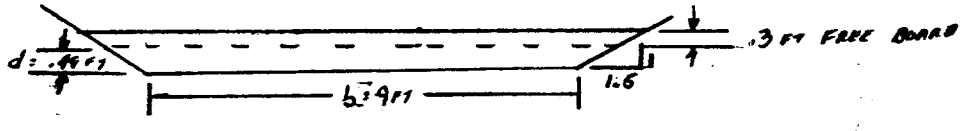
$$39.1 = \frac{1.49}{.04} \left[\frac{9d + 1.5d^2}{9 + 3.61d}\right]^{2/3} (.143)^{.5} (9d + 1.5d^2)$$

$$2.78 = \left[\frac{9d + 1.5d^2}{9 + 3.61d}\right]^{2/3} (9d + 1.5d^2) \qquad 4.0 \qquad 4.14$$

b = 9 ft

Trial d ft	Q
.2	.63
.3	.80
.35	1.08
.4	1.98
.42	2.15
.44	2.33
.46	2.51
.48	2.69
.49	2.79

d = .49 ft.



DETERMINE RIPRAP D_{50} AND DESIGN FOR SF = 1.20

$V = 1.49/n \; R^{2/3} \; S^{1/2}$

$n = .04$

$S = .143$ FT/FT

$R = \frac{bd + 2d^2}{b + 2d\sqrt{2^2+1}} = \frac{9(.98) + 1.5(.98)^2}{9 + (.98)(2)\sqrt{1.5^2+1}} = \frac{9.77}{10.767} = .913$

$V = 1.49/.04 \; (.913)^{.66} \; (.143)^{.5}$

$= (37.25)(.588)(.38)$

$= 8.27$ FT/SEC.

STONE $D_{50} = 7.5$ in $= .625$ FT.

CHECK n VALUE

$n = .0395 \; D_{50}^{.17}$

$= .0395 \; (.625)$

$= .036$

CHECK FOR STABILITY

$d = .98$ FT $\quad S = 14.3 \quad \gamma = 62.4$

$\tau = \gamma d s$

$= (62.4)(.98 \text{ ft})(.143) = 8.372$ lb/ft^2

$n_b = 21\tau/\gamma(G-1)D_{50} \qquad SG = 2.36$

$n_b = 21(8.372)/(62.4)(2.36-1)(.63)$

$= 91.820/53.464$

$= 1.72$

SF MUST BE > 1

ϕ = 42° ANGULAR RIPRAP

14.3 % SLOPE

θ = 8°

$SF_b = \cos\theta \tan\phi / \sin\theta + n_b \tan\phi$

$= (\cos 8°)(\tan 42°) / (\sin 8°) + (1.72)(\tan 42°)$

$= (.994)(.904) / (.139) + 1.599$

$= .896 / 1.682$

$= .521$ UNDER DESIGNED RESIGN STREAM CHANNEL

D_{50} (FT)	MANNING'S n	ANGLE OF REPOSE (DEG)	DEPTH OF CONVEY FLOW	TRACTIVE FORCE	STABILITY FACTOR	SAFETY FACTOR
.63	.036	42°	.49	4.372	1.72	.521
1.26	.041	42°	.49	4.372	.859	.982
1.6	.043	42°	.49	4.372	.676	1.192

D_{50} = 1.6 FT.

DETERMINE RIPRAP FOR BANK SF = 1.2

D_{50} = 1.6 FT, n = .043, θ = 8°, d = .49 FT.

ASSUME

$\tau_{MAX} = .76 \gamma d s$

$= .76 (62.4)(.49)(.143) = 3.323 \text{ lb/FT}^2$

$n = (21)(\tau_{max}) / \gamma (SG - 1) D_{50}$

$= (21)(3326) / 62.4 (2.36 - 1) 1.6$

$= 69.783 / 135.782$

$= .514$

ASSUME UNIFORM FLOW

$\lambda = \theta = 8°$

SLIDE SLOPE

$\alpha = \tan^{-1} 1/1.5$

$= 33.69°$

$\beta = \tan^{-1} \left[\cos\lambda / \frac{2 \sin\alpha}{n \tan\beta} + \sin\lambda \right]$

$= \tan^{-1} \left[.990 / 2(.555)/.514 (.900) + .139 \right]$

$= \tan^{-1} (.390)$

$= 21.32°$

$n' = n \left[\frac{1 + \sin(\lambda + \beta)}{2} \right]$

$= .514 \left[\frac{1 + \sin(8 + 21.32)}{2} \right]$

$= .514 \left[1.819/2 \right]$

$= .383$

$SF = \cos\alpha \tan\phi / n' \tan\phi + \sin\alpha \cos\beta$

$= \cos 33.69 \tan 42 / (.383)(\tan 42) + (\sin 33.69)(\cos 21.32)$

$= (.832)(.900) / .345 + (.555)(.932)$

$= .749 / .862$

$= .869$

D_{50}	n	β	n'	SF
1.6	.514	21.32°	.383	.869
1.8	.456	19.21	.332	.90
2.0	.411	17.52	.294	.944
2.2	.374	16.09	.263	.979
2.5	.329	14.304	.227	1.009
2.7	.305	13.327	.208	1.03
3.0	.274	12.059	.184	1.06
3.5	.235	10.426	.155	1.09
4.0	.206	9.17	.133	1.12
5.0	.164	7.391	.104	1.17
5.5	.150	6.737	.094	1.18
6.0	.137	6.189	.085	1.19

USE 6 FT D_{50} FOR BOTH CHANNEL BOTTOM AND SIDES

BASED ON THE CALCULATION THE BOTTOM AND SIDESLOPE RIPRAP WILL BE 1.6 FT = D_{50}

RIPRAP GRADATION

	SIZE FT	PERCENT
$2D_{50}$	3.2	100
$1D_{50}$	1.6	50
$.5D_{50}$	.8	20
$.2D_{50}$	.32	0

UNDERLYING FILTER

BASE MATERIAL

D_{50} = .600 MM

D_{85} = .15 MM

D_{15} = .236 MM

RIPRAP

D_{100} : 3.2 FT : 975.36 MM

D_{50} : 1.6 FT : 487.68 MM

D_{85} : 2.9 FT : 883.92 MM

D_{15} : .24 FT : 73.15 MM

D_0 : .10 FT : 30.48 MM

FILTER BLANKET WITH RESPECT TO BASE MATERIAL

(1) $D_{50\,(FILTER)} / D_{50\,BASE} < 40$

D_{50} (FILTER) < 40 × .6 = 24 MM

(2) $D_{15\,(FILTER)} / D_{15\,(BASE)} > 5$

D_{15} (FILTER) > 5 × .236 = 1.18 MM

$D_{15\,(FILTER)} / D_{15\,(BASE)} < 40$

D_{15} (FILTER) < 40 × .236 = 9.44 MM

(3) $D_{15\,(FILTER)} / D_{85\,(BASE)} < 5$

D_{15} (FILTER) < 5 × .15 = .75 MM

∴ WITH RESPECT TO THE BASE THE FOLLOWING MUST BE SATISFIED

$1.18\ mm < D_{15}\ (FILTER) < 9.44\ mm$

$D_{50}\ (FILTER) < 24\ mm$

FILTER MUST BE SIZED TO THE RIPRAP

(1) $D_{50}\ (RIPRAP) / D_{50}(FILTER) < 40$

$D_{50}\ FILTER > 487.60/40 : 12.19\ mm$

(2) $D_{15}\ (RIPRAP)/D_{15}\ FILTER > 5$

$D_{15}(FILTER) < 73.15\ mm/5 : 14.63\ mm$

$D_{15}\ (RIPRAP)/D_{15}\ (FILTER) < 40$

$D_{15}\ (FILTER) > 73.15\ mm/40 : 1.83\ mm$

(3) $D_{15}\ (RIPRAP)/D_{85}\ (FILTER) < 5$

$D_{85}\ (FILTER) > 73.15/5 : 14.63\ mm$

∴ FILTER MUST MEET THESE

$D_{50}(FILTER) > 12.19\ mm$

$1.83\ mm < D_{15}(FILTER) < 14.65\ mm$

$D_{85}(FILTER) > 14.65\ mm$

FILTER BLANET MUST BE SIZED AS FOLLOWS

$12.19\ mm < D_{50}\ (FILTER) < 24\ mm$

$1.18\ mm < D_{15}\ (FILTER) < 14.65\ mm$

$D_{85}\ (FILTER) > 14.65\ mm$

ENERGY DISSIPATOR FOR DISCHARGE END OF CULVERT.

$Q = VA$

$Q = \frac{1.49}{n} R^{2/3} S^{1/2} A$

$39.1 = \frac{1.49}{n} \left(\frac{.5768\,D}{1.5768}\right)^{.66} (.143) \frac{\pi D^2}{4}$

D = TW = TAILWATER DEPTH
n = .024
S = .143

$39.1 = 62.08\ (.295\,D)^{.66} (.143)(.785\,D^2)$

$39.1 = 8.877\ (.295\,D)^{.66} (.785\,D^2)$

$4.404 = (.295\,D)^{.66} (.785\,D^2)$

D	Q
1 FT	.351
2 FT	2.317
3 FT	6.518
2.5 FT	4.01
2.6 FT	4.45

$D = 2.6$ FT $= TW$

DESIGN FOR MINIMUM TAILWATER CONDITION

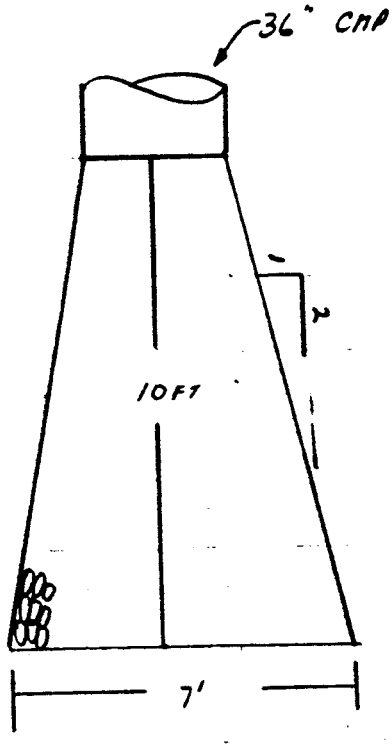
MAX ROCK SIZE $1.5 \times D_{50}$

$D_{50} \cong .33$ FT

$Q = 39.1$ CFS $\quad D = 3$ FT $\quad d_{50} = .33$ FT $\quad L_A = 10$ FT

$W_A = D + L_A = 3 + 10 = 13$ FT $\quad d_{MAX} = 1.5 \times d_{50} = 1.5 \times .33 = .5$ FT

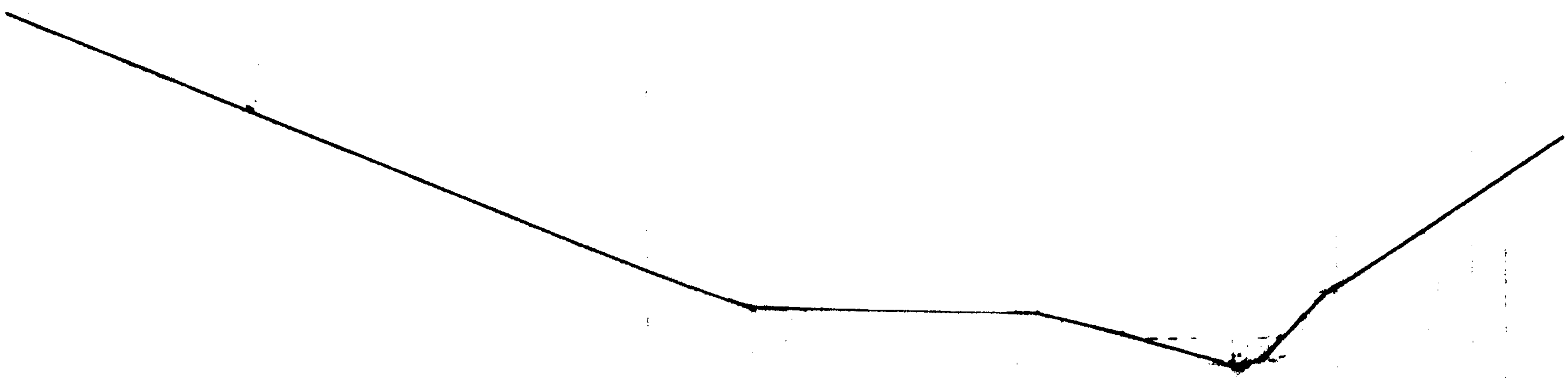
ENERGY DISSIPATOR



d_{50} = 4 IN.

d_{MAX} = 6 IN.

STREAM RECLAMATION



TYPCIAL STREAM BED PROFILE

SCALE 1" = 6'

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