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STATE OF UTAH
NATURAL RESOURCES & ENERGY
Oil, Gas & Mining

Scott M. Matheson, Governor
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February 2, 1983

Mr. Vernal Mortensen
Vice-President, Utah Operations
Coastal States Energy Company
411 West 7200 South
Midvale, Utah 84047

#2

RE: Apparent Completeness Review/
Technical Deficiency Document
Convulsion Canyon Mine
ACT/041/002
Sevier County, Utah

Dear Mr. Mortensen:

The Division of Oil, Gas and Mining staff has completed a review of Southern Utah Fuel Company's (SUFECO) response to the Apparent Completeness Review (ACR) for the Convulsion Canyon Mining and Reclamation Plan (MRP).

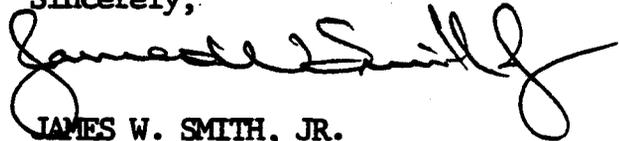
Enclosed is a combined document (Apparent Completeness Review and Technical Deficiencies Section) detailing information that is still needed by the Division before a final determination of completeness can be made for the mine permit application, as well as technical deficiencies that need to be further addressed prior to the Division completing a Technical Analysis document and granting a permit to mine. We hope that compiling both of these reviews into one document will expedite the permitting process.

We request that responses to both of these sections be submitted to this office within 60 days in order that the permitting process can be completed according to the Division's overall long range mine plan review schedule.

Mr. Vernal Mortensen
ACT/041/002
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If you have any questions about the enclosed document, or about the permitting process in general, please contact me, Susan Linner or Doug Maier of my staff. We would be more than glad to arrange a meeting to discuss any concerns you may have.

Sincerely,



JAMES W. SMITH, JR.
COORDINATOR OF MINED
LAND DEVELOPMENT

JWS/SCL:btb

Enclosures

cc: Allen Klein, OSM, Denver
Susan Linner, DOGM
Doug Maier, DOGM

APPARENT COMPLETENESS REVIEW
AND
TECHNICAL DEFICIENCY DOCUMENT

Southern Utah Fuel Company
Convulsion Canyon Mine
ACT/041/002, Sevier County, Utah

Apparent Completeness Review

UMC 771.23 Permit Application: General Requirements for Format and Contents

(e)(2) The applicant must distinguish those portions in the mine plan area in which underground coal mining activities occurred prior to and after August 3, 1977. Map 1B would adequately supply this information if the five mining phases were depicted separately.

UMC 771.25 Permit Fees

The applicant must provide proof that a \$5.00 permit fee was sent to the Division.

UMC 782.13 Identification of Interests

(e) Contiguous surface and subsurface owners to the mine permit area are not shown on Figure 80-1. Their addresses must also be given.

UMC 782.14 Compliance Information

(c) The applicant should update this section to include all violations issued since September 1981, and the abatement of such violations.

UMC 782.15 Right of Entry and Operation Information

(a) The operator is requested to provide the Division with documents regarding the legal access to lease U-47080.

UMC 782.16 Relationship to Areas Designated Unsuitable to Mining

(a) What is the status of the unsuitability study concerning Township 21 (V. 3, Comment 782.16a)?

UMC 782.18 Personal Injury and Property Damage Insurance Information

The applicant must submit proof that liability insurance is currently in effect as required.

UMC 783.14 Geology Description

(a)(2)(ii) The depth, classification and geologic structure of the overburden must be described adequately. The operator is requested to:

1. Extend cross-section A-A' to drill hole 79-8, or submit to the Division litologic information from this well;
2. Extend cross-section B-B' across Quitchupah Creek to drill hole 76-29-Y or 76-29-Z (or include both wells);
3. Provide indexes to these cross-sections more legible than what have been received;
4. Submit lithologic logs for drill holes that penetrate areas to be mined according to the five-year plan (Map 80-2);
5. Give depths for coal seams intersected by the drill holes presented on Maps 81-3 and 81-4, as well as the collar elevations.

(a)(2)(iii) Clay content data for the stratum immediately below the coal seam to be mined are requested. This may be included with (4) above.

783.19 Vegetation Information

The vegetation map submitted in 1981 should be revised to show the location of all disturbed areas, including the mine facilities area, sedimentation ponds, breakouts and reference areas.

Also in 1981 a preliminary Emergency Lease Area Vegetation map was submitted. This map should be finalized and combined with the vegetation map for the rest of the permit area. Any sites of present or proposed disturbance should be shown.

The Pond Area Vegetation Map (Map C - 1980 submittal) should be revised to show the as-built situation.

Seventeen acres was given as the amount of land disturbed in the pinyon-juniper (P-J) community type, but no total acreage of the P-J type on the permit area has been submitted. This should be done along with submittal of total acreage of riparian habitat disturbed by the sedimentation pond, if any was disturbed, and the total acreage of riparian habitat present on the permit area.

Sampling to characterize the P-J reference area is not complete at this time, some determination of productivity of the ground cover layer must be made as well as a determination of the shrub density on the reference area. Table 33 indicates that browse species make up 42 percent of the composition of the ground cover, but no density figures for these species are given in Table 34.

If any riparian habitat was disturbed and the remaining riparian area is to be used as a reference area as indicated in the 1980 vegetation study, data must be collected on ground cover and productivity and shrub density. The size of this reference area should be indicated. The applicant must commit to doing this additional required sampling in the P-J and riparian reference areas during the 1983 field season.

The applicant must also document that the reference area(s) are permanently marked (all 4 corners staked) and will not be disturbed during minelife.

UMC 783.24 Maps: General Requirements and 784.18 Relocation or Use of Public Roads

The location of the P-J reference area cannot be found on any existing vegetation map. Both this location and the location of any riparian reference area should be shown on the revised vegetation map, as discussed under 783.19.

All maps, particularly surface facility maps, that are outdated, should be revised and resubmitted.

(b) The operator is requested to show boundaries of land upon which there is a legal right of entry.

(d) The applicant is requested to show the locations of buildings within 1,000 feet of lease U-47080 (if any).

(e) The applicant is requested to show the locations of surface and subsurface man-made features within, passing through or passing over lease U-47080.

The applicant submitted cross-sections of the East Side Road. A note should be made, however, of the maps and plans general requirements for this submittal (UMC 771.23). Please resubmit.

UMC 783.25 Cross-Sections, Maps and Plans

Cross-sections and maps numbered 5, 6 of Valley Engineering Report (Vol. 6) and Exhibits 9-2, 9-3, 9-4 of the Merrick and Company Report (Vol. 2 Addendum) are not certified as required under Section L.

UMC 784.13 Reclamation Plan: General Requirements and UMC 817.101 Backfilling and Grading

It is suggested that 1 1/2 to 2 pounds PLS of Oryzopsis hymenoides be included in the reclamation seed mix, as it is the most prevalent grass on the reference area. That would bring the total seeding rate to 18 - 18 1/2 lbs per acre, which would be a sufficient quantity for the hydromulching method.

It was also indicated that shrub seedlings would be planted at 3 foot spacing for approximately 5,000 per acre. This is considerably more than the 184 trees per acre indicated in Table 34. The addition of shrub densities should still not bring the figure up anywhere near 5,000. It is strongly suggested that, since wildlife habitat will be a major postmining land use, shrubs be planted in clumps of no more than 1,000 per acre. These clumps should be no more than an acre in size and should cover 33-50 percent of the area to be revegetated. A map showing proposed location of shrub clumps on the area to be finally revegetated should be submitted.

If any riparian habitat has been disturbed, a plan for revegetation of the riparian area, consistent with the existing riparian vegetation, should be submitted. This can be done after the area is more thoroughly characterized during 1983 sampling.

A plan for reclamation of the break-outs should be submitted.

If grazing should prove detrimental to revegetation efforts, a plan for fencing or other protection of the revegetated area must be worked out with the regulatory authority.

Excavation and filling to approximate original contour is mentioned in the reclamation plan and shown in Exhibits 11 and 12. The question arises if the present fill is adequate as depicted on the drawings? The slope stability is mentioned, however, no other details are given. Please be more specific about the heavy equipment for compaction and what will be achieved, i.e., 80 percent compaction, 50 percent compaction, etc.

(b)(2) A revised bond estimate to reflect inflation and any additional disturbances should be included.

UMC 784.16 (a)(1)(1) and 784.23(e) Operation Plan: Maps and Plans

Maps, plans and cross-sections shall be prepared by, or under the direction of and certified by a qualified, professional engineer. The 1980 submittal of technical correspondence is referred to, but was unable to be located. Please resubmit.

The applicant needs to submit operation and maintenance requirements (i.e., sediment disposal plans, operation inspection schedules, etc.) for both sediment ponds.

The applicant needs to show compliance with Mine Safety and Health Administration (MSHA) requirements 30 CFR 77.216-1 and 77.216-2 to include:

1. A permanent pond identification marker.
2. MSHA identification number of pond(s).

3. Construction requirements pursuant to Section (a)(6).
4. Graphs showing area-capacity curves.
5. Factor of safety information (see [a][13]).
6. Maintenance and repair provision for structure.
7. Engineer certification of impoundment features listed under Section (a)(17).

The applicant needs to submit a stability analysis of the structure as the embankment is greater than 20 feet in height. Applicant has included a stability analysis of the sedimentation pond access road. The results of the geotechnical analysis mentioned on page 1-6, Section 22 of the 1981 submittal (Vol. 6) should also be submitted.

UMC 784.20 Subsidence Control Plan

(a)(i) Map 80-2 shows that nearly full recovery is planned near the southwest rim of Quitcupah Canyon and Map 80-10 indicates that some subsidence will occur on the canyon slopes. However, in Volume 2, Exhibit 3, page 24, it is stated that mining will be limited to room and pillar methods under steep canyon rims, and that 30 to 40 percent recovery is planned. Please clarify.

(a)(2) No maps are given which show the projected subsidence for lease U-47080. Please provide the Division with this information and state whether there will be more than two subsidence monitoring stations for this lease (as shown on Map 80-10).

(b)(3)(v) The applicant is requested to send to the Division copies of subsidence monitoring reports compiled subsequent to the filing of the mine plan application (November 1980) and to regularly submit to DOGM these reports when they are completed.

UMC 784.22 Diversions

The applicant needs to submit descriptions (maps and cross-sections) of existing and proposed diversions. These should probably include the CBE drainage diversion along east road, an indication of diversions along the western boundary of the surface facilities and at the toe of the east slope behind the warehouse and office facilities.

UMC 784.25 Return of Coal Processing Waste to Abandoned Underground Workings

(b) The applicant is requested to provide the Division with information regarding the source and quality of waste that is stored, areas that are backfilled, percent of the mine void that is and will be filled with waste,

method of constructing underground retaining walls, influence of the backfilling operation on active underground mine operations and the anticipated occurrence of surface effects following backfilling.

UMC 784.26 Air Pollution Control Plan

(a) Please submit to the Division the final air quality monitoring report that was due in July 1982.

Technical Deficiency Document

UMC 817.11 Signs and Markers

(e) The applicant is requested to address and show where buffer zone markers have been placed in the mine permit area.

UMC 817.14 Casing and Sealing of Underground Openings: Temporary

(a) Each mine entry which is temporarily inactive, but has a further projected useful service under the approved permit application shall be posted with signs to identify the hazardous nature of the opening.

UMC 817.22 Topsoil Substitute

(e) The applicant must provide the source and the total volume of soil material needed to reclaim the total disturbed area. A six inch layer at the least should be spread over all graded and prepared areas. Any and all material that is to be used by the applicant for a topsoil substitute (plant growth medium), must be sampled and subjected to the same chemical and physical analysis as topsoil. This analysis will be used to judge the suitability of the proposed soil material to achieve the proposed postmining land-use.

UMC 817.23 Topsoil Storage

All proposed topsoil substitutes are subject to UMC 817.23. Therefore a plan to fulfill the requirement under this section must be submitted.

UMC 817.24 Topsoil: Redistribution

The applicant must submit a plan for topsoil redistribution. The plan should include the depth of topsoil and the type of equipment that will be used to prepare the topsoil for a proper seedbed.

UMC 817.41 Hydrologic Balance: General

The applicant shall conduct a study to determine the source of the TDS anomaly which contributes to the excess effluent limitations from the sedimentation pond, and provide mitigating methods to bring the discharge into acceptable effluent standards.

The applicant shall provide information (quality and quantity) concerning the spring under the repair shops.

UMC 817.42 Hydrologic Balance: Water Quality Standards and Effluent Limitations

Pursuant to Section (a)(1) of this code, the applicant must pass the drainage from the Coal Slide Area (CSA) through the sediment pond. An exemption may be granted under Section (a)(3)(i) if the applicant can demonstrate by the use of alternate sediment control measures that drainage will meet effluent limitations and meet other sections of this code.

The applicant needs to provide a map showing the location of the CSA and other disturbed areas outside the surface facilities map (Exhibit 9-2, Vol. 2, Addendum).

UMC 817.43 Hydrologic Balance: Diversions and Conveyance of Overland Flow, Shallow Ground Water Flow and Ephemeral Streams

The applicant must delineate all diversions (refer to comments of UMC 784.22) and present evidence they will pass the 10-year, 24-hour event with a design freeboard of no less than 0.3 feet. The information should include the area each diversion is draining and method and assumptions of calculating the design flow (e.g., curve number analysis).

The applicant should indicate the riprap size used in lining diversions and the design velocity calculations and assumptions used to determine that size.

UMC 817.45 Hydrologic Balance: Sediment Control Measures

The Division recommends that the applicant consider diverting the runoff draining the undisturbed contributing basin west (if, in fact, it is undisturbed) from the slope of fill area and the sedimentation pond.

UMC 817.46 Hydrologic Balance: Sediment Ponds

The applicant must state in the mine reclamation plan which sedimentation system (Merrick and Company or Valley Engineering Alternate #1) has been implemented.

The review of the sediment volume required that follows is based upon the assumption stated under the Division's comments found under UMC 817.46(c-g) conclusion #3.

The calculated 65 percent reduction in the area top of fill sediment volume required (1.2 acre-feet) due to the use of the concrete basin cannot be used due to the lack of available sediment storage volume in the concrete basin:

$$(1.2 \text{ ac-ft}) (0.65) = 0.78 \text{ ac-ft required}$$

Volume available in pond:

$$(1,400 \text{ ft}^3 / [43,560 \text{ ft}^3/\text{ac-ft}]) = 0.032 \text{ ac-ft}$$

Deficit:

$$0.78 - 0.032 = 0.748 \text{ ac-ft lacking}$$

The maximum that SUFCO will be allowed to reduce the required sediment volume will correspond to the available storage in the concrete basin or:

$$(0.032 \text{ ac-ft} / 1.2 \text{ ac-ft}) = 2.69\%$$

The applicant has not included any predicted sediment volume from the CBW area.

Sediment Volume Conculsions

As design is proposed:

1. SUFCO has not provided for any sediment storage from the contributing basin west (CBW).
2. The 65 percent reduction in sediment storage required from the area top of fill (ATOF) is not valid as the concrete basin does not have this storage volume available.
3. SUFCO must provide for total sediment storage volume calculated and not reduce that value by proposing to remove 50 percent sediment volume by cleaning as cleaning is required under Section (h) of this code.
4. Because the primary discharge structure is at 7,411; the maximum storage volume for sediment at 7,411 feet-3 feet = 7,408 feet elevation (State Health requirement) is 0.328 ac-ft. This is inadequate for predicted sediment volume provided.
5. Although the settling assumption of page 11 (Valley Engineering Report) was not reviewed in great depth, it was noted that a typographical error exists as particles larger than 58 microns not 0.58 microns as stated are removed according to Stoke's Law. The application should be corrected.
6. The applicant must provide data including location map, discharge rates and planned diversion of the spring located near the washroom on the ATOF. This discharge must be included in the design of the sediment pond if this discharge is to be passed through the sedimentation system.

Runoff Volume Review

The Division feels that a curve number of 80 used in the SCS methodology for the 10-year, 24-hour runoff calculation is in error. Using the Site Plan Map (Exhibit 9-2, Volume II, Mine Plan Addendum), the proportion of ATOF area in different categories was digitized and the following table developed:

Runoff Volume

ATOF	% Area	CN	CN Reference	Q ¹	Q ac-ft
Concrete	.067	98	Dunn 1978 ²	1.655"	0.131
Roads, Pads, Parking	.163	91	Dunn 1978 ³	1.059	0.203
Hillslopes	.283	85	Branson 1981 ⁴	0.708	0.236
Dirt Compacted Fill	<u>.487</u>	89	NEH-4 ⁵	<u>0.929</u>	<u>0.531</u>
	1.00			0.936"	1.101

¹Q calculated using a design precipitation of 1.88".

²Table 10.8; concrete and pavement, all CN = 98.

³Table 10.8; gravel roads, soil group D.

⁴Table 11-10; annual grass, 50% cover, soil group C.

⁵Table 9.1; roads, dirt, hydrologic group D.

Adding in the slope of fill (SOF) and contributing basin west (CBW) values, we find:

Runoff Volume

Area	CN	CN Reference	<u>DOGM Calculation</u>	<u>Valley Engineering</u>
			Q ac-ft	Calculation Q ac-ft
ATOF	*	*	1.10	0.49
SOF	12.0	85	Branson 1981 ⁴ **	0.25
CBW	25.4	79	NEH-4 ⁶	<u>0.51</u>
				2.21

*See prior Table.

**See prior Table's footnotes.

⁶Table 9.1; rangeland, fair condition, soil group C.

Note: Determination of soil group is result of analysis of soil type sites 24 and 22: "60 percent steep colluvium and residuum, 30 percent rock outcrop, 30-60 percent rock fragments." (Soils W, O, T)

Conclusions:

1. SUFCO has not justified the use of the chosen CN values (80 for disturbed and 72 for undisturbed). What AMC conditions, hydrologic soil groups and hydrologic conditions were used in the determination?
2. SUFCO needs to provide current drainage map (i.e., Exhibit 9-9, Merrick Report not valid) identifying drainage to sediment pond(s), particularly CBW drainage boundaries.
3. The Division assumes that SUFCO has chosen to demonstrate that effluent limitations will be achieved using a total detention of the sediment and runoff volume from a 10-year, 24-hour precipitation event (Valley Engineering Report 1980, page 1). A review of the adequacy of the sedimentation system to provide this storage resulted in the conclusion that the system is undersized and inadequate. The following points were used to reach this conclusion:
 - A. Runoff volume was under-estimated (see prior justification).
 - B. Sediment volume cannot be reduced by 76 percent using settling assumption and proposed cleaning (see prior justification).

- C. Sediment storage volume available in lower pond was over-estimated because the primary discharge conduit is not equipped with a valve or gate, the volume available for storage before outflow occurs is less than that calculated for an elevation of 7,418 feet. In order to provide total containment of the 10-year, 24-hour event, sediment storage volume must be calculated at an elevation of three feet below the top of the discharge structure (State Health requirement). This value is only 0.328 ac-ft.
- D. Predicted sediment volume from CBW was not included in design.
- E. The total storage volume available in lower pond was over-estimated. Again, due to the lack of value on the primary discharge structure, total storage volume available before outflow begins must be calculated at stage 7,411 feet. This value is 0.596 ac-ft. When combined with the volume available in the concrete basin, this total storage becomes 0.628 ac-ft.
- F. A review of the water quality data from the sediment pond discharge indicates that the pond is not functioning properly and effluent limitations have been exceeded. TSS limitations were exceeded with 50 percent of the samples and TDS limitations have been exceeded with 86 percent of the samples. Iron, manganese and pH values have all been within effluent limitations.

(e) The applicant must "design, construct and maintain sedimentation ponds to prevent short-circuiting to the extent possible." Using an EPA 1976 methodology outlined by Haan (1978), both ponds were checked for potential short-circuiting as follows:

L:W ratio = L/W_e Where: L = length of flow path

EPA recommends the L:W ratio be greater than 2.0 to minimize short-circuiting.

W_e = surface area/L

Concrete basin: surface area = 1,068.78 ft². For ratio of 2.0, find L: $L = (2.0A)^{1/2} = [(2.0)(1069)] = 46.24$ ft.

Since pond has nine discharge pipes, find the discharge pipe such that distance from inflow point is greater than 46.3 ft (Pythagorean Theorem):

Distance = $D = (a^2 - b^2)^{1/2}$, $D = [(46.3)^2 - (225)^2]^{1/2}$, D = 40.5 feet.

Thus, L:W ratio is less than two and short-circuiting likely for discharge pipes 1-7.

Sediment pond: Area = 97.5 ft². L:W = 82.4 ft / (97.5 ft² / 82.4 ft) = 0.70.

Conclusions:

1. Both ponds are not designed to minimize short-circuiting.
2. The Division recommends that any future major construction or modification to these ponds incorporate (to the extent possible) designs to help minimize the potential short-circuiting (i.e., install baffles, relocate inflow point, etc.).

(g) SUFCO must provide evidence that ensures "no outflow through emergency spillway during . . . 10-year, 24-hour event . . ." using flood routing techniques if pond is not modified for total containment of the 10-year, 24-hour runoff and sediment volume.

(h) SUFCO must provide a plan for sediment disposal cleaned out of both the concrete and the lower sedimentation ponds.

It will be helpful for further review if SUFCO will indicate the frequency of cleaning for each pond experienced in the past.

(k) SUFCO has not indicated if a five percent increase in design height was accounted for during construction. If not, statements on all affected drawings noting a five percent decrease for all relevant measurements will bring plan into compliance.

(q) The sediment pond must comply with this section as it meets the criteria of a height greater than 20 feet.

(l)(a) refer to estimation of point rainfall (Merrick Report, Vol. II, Addendum). The section titled "conversion factor for areal correction for entire basin" is mislabeled. It should read "conversion factor for correction of partial duration series to annual series data."

(b) Applicant needs to supply method and calculation for the determination of the following (Merrick Report, Appendix: Runoff) for the 10- and 100-year, 24-hour storms:

1. Time of concentration (T_c).
2. Velocity.
3. q_p (discharge peak).

4. Method of peak flow determination for ATOF, SOF and CBW. If equation 16.6 (NEH-4) was used: $q = 484AQ/Tp$, value for and determination of Tp must be presented.

(c) Refer to Valley Engineering Report, Vol. 6, page 5. It appears that the peak flow of 62.4 cfs was taken from Merrick and Company and includes peaks from the CSA and ATTP. Do these areas drain to ponds? Please clarify.

The Manning Equation check assumes a rectangular spillway, whereas the constructed spillway is trapezoidal in shape. This results in an under-estimation of two and, therefore, will be acceptable, but a comment should be included in MRP in order to improve readability of this section.

Refer to page 6, Valley Engineering Report (Pond Outlet). Again, applicant must provide information outlined under q(b) comments of this section for Q_{10} and Q_{25} .

The value for Q_{10} appears to include peak flow values from CBW, ATOF and SOF, while the value for Q_{25} appears to also include the CSA and ATTP areas. The calculation of $Q_{25} = 72 + .15 + .85 + .07$ appears to also include ATTP and possibly CSA areas. Again, please clarify the ATTP and CSA drainage and correct these calculations for consistency.

The design peak of Q_{25} calculated by dividing the predicted runoff volume in ac-ft by 24 hours is in error. Peak flows are dependent on several factors including timing of rainfall and rainfall excess and characteristics of the drainage catchment. If the applicant is not designing for the total containment of the 10-year, 24-hour precipitation event as stated in the narrative of this report, the peak flow for the 10-year storm must be calculated by accepted methods and routed through the sediment system using flood routing techniques to find the design size for the primary discharge in order to comply with Section (g) of UMC 817.46.

Using the equation for orifice controlled flow:

$$Q = C_o A (2 g H)^{0.5} \quad (\text{reference: Haan 1978})$$

A = area of pipe ft^2

H = design head

C_o = Coefficient based upon type of structure.

We find the 12-inch pipe design flow is:

$$Q = (0.61) (0.785 \text{ ft}^2) [(64.4 \text{ ft/sec}^2)(7.0 \text{ ft})]^{0.5} = 10.2 \text{ cfs}$$

The applicant must show that this is sufficient for the expected peak flow.

The reference to Table 20-17 Seelye should be complete or Table 20-17 should be provided (preferably include both).

(q) (2) The application must address whether the sediment pond embankment was designed and constructed with a static safety factor of 1.5 or greater and present calculations or evidence of this design criteria.

(3) In compliance.

(4) The applicant should be aware that the sediment pond embankment must meet the criteria of the Mine Safety and Health Administration (MSHA) 30 CFR 77.216 due to the 22 foot height of the embankment. Has MSHA reviewed and approved this design?

(r) The applicant must provide certification of the constructed pond by a registered, professional engineer.

(s) The applicant must provide details on the extent of embankment stabilization. The 1981 submittal in Sections 18, 19 and 20 mentions several times the areas to be stabilized by vegetation, etc., will be shown on plans, yet no plans of this nature were found.

(t) The applicant must provide a program for carrying out paragraphs (a) and (b) of 30 CFR 77.216-3 or evidence of approval from the District Manager of MSHA.

UMC 817.47 Hydrologic Balance: Discharge Structures

"Discharge shall be controlled by energy dissipators . . . riprap channels . . . designed according to standard engineering procedures." SUFCO must provide:

1. Riprap size around eight foot boulder at end of 24-inch culvert (Sheet 5).
2. Clarification of emergency spillway design. Sheet 4 section c-c' shows spillway as bank of embankment, whereas Sheet 3 D-D' shows spillway partially cut into natural ground.

Cross section D-D' on Sheet 3 of the Valley Engineering Report shows the emergency spillway built partially on natural ground and partially on dam fill. Has any problem concerning differential settling developed at spillway crest?

3. Spillway riprap size and velocity calculation.
4. Class of riprap size used on energy dissipator depicted on Sheet 5.
5. Clarification of design flow. A design flow of 23.2 cfs was reported in Valley Engineering Report on page 7 for use in page 9 calculation of energy dissipator size. This value appears to have been taken from Table 6 of Merrick which includes Q peak from CSA and ATTP.

This value should be supported with all design calculations and assumptions. CSA and ATTP areas are not designed to pass through concrete pond.

See comments concerning peak flow calculations and design of discharge structures under UMC 817.46(g) comments.

A discrepancy exists between the Merrick and Company and Valley Engineering reports. Runoff for Q_{10} for SOF is given as 0.25 ac-ft, on page 4 of the Valley report and 0.10 ac-ft in the Merrick report. It appears the Valley Engineering Report is in error. Please clarify.

UMC 817.52 Hydrologic Balance: Surface and Ground Water Monitoring

The applicant will be required to submit surface and ground water monitoring information to depict the seasonal variation. The procedures, frequency and parameters to define the seasonal variation has been submitted to Dave Winget of SUFCO.

UMC 817.57 Hydrologic Balance: Stream Buffer Zone

(a) Since the North Fork of Quitcupah Creek and Quitcupah Creek have been determined to contain a biological community (Vol. 6, Environmental Consultants Report), a 100-foot stream buffer zone shall be in effect. The applicant must address the proximity of all disturbances to the stream, especially breakouts planned and/or completed to date.

The applicant should supply information which details long-term protection to the stream channel, where mining has accrued under the stream.

UMC 817.59 Coal Recovery

What is the current status of the southern portion of lease U-28297 regarding coal recovery?

Will the Duncan seam be mined on the Convulsion Canyon property?

817.97 Protection of Fish, Wildlife and Related Environmental Values

(b) The applicant must commit to promptly notify the Division of the presence in the permit area of any critical habitat of a threatened or endangered species, any plant or animal listed as threatened or endangered, or any Bald or Golden eagle, which has not been previously reported.

(c) The applicant must reply to the Division's February 26, 1982, letter regarding raptor protection on power lines. Two options were listed for poles constructed prior to 1977: Sufco must choose and pursue one of these. Plans for pole modification should be approved in advance by the Division.

(d)(5) Any Riparian vegetation disturbed must be restored. Sampling of the remaining riparian vegetation must be done as outlined under section 783.19.

(d)(6) An aquatic resources study, with stations to be monitored for a period of three years, was begun in 1980. Only the preliminary report was submitted. Please submit yearly reports for 1981 and 1982.

(d)(7) The applicant must commit to not use persistent pesticides on the mine area. Any pesticide program must be approved by the Division prior to implementation.

(d)(9) Since the postmining land use is wildlife habitat, shrubs should be grouped and distributed in a manner which optimizes edge effect, cover, and other benefits for wildlife.

The applicant must develop and commit to a specific wildlife mitigation plan prior to permit approval being granted. This can be done in conjunction with the U. S. Forest Service and Division of Wildlife Resources. There are several suggested mitigation measures in the Wildlife and Aquatic Resources Studies which could form the nucleus of such a plan.

UMC 817.99 Slides and Other Damage

A commitment by SUFCO is needed so that any time a slide occurs which may have a potential adverse effect on public property, health, safety or the environment, SUFCO shall notify the Division by the fastest available means and comply with any remedial measures required by the Division.

UMC 817.100 Contemporaneous Reclamation

Applicant should file a plan for contemporaneous (interim) reclamation, including seeding and other land stabilization techniques.

UMC 817.106 Rills and Gullies

Applicant must include in the backfilling and grading plan, methods that will be used to fill, grade or otherwise stabilize rills and gullies should they occur.

UMC 817.122 Subsidence Control: Public Notice

The mining schedule shall be distributed by mail to all owners of property and residents within the area above the underground workings and adjacent areas that would be affected by subsidence if it occurred.

LITERATURE CITED

- Branson, F. A., Gifford, G. F., Renard, K. G., and Hadley, R. F. 1981. Rangeland Hydrology. Society for Range Management, Range Science Series No. 1, second edition. Kendall/Hurt Publishing Co., Dubuque, Iowa. 340 pp.
- Dume, T., and Leopold L. B. 1978. Water in Environmental Planning. W. H. Freeman and Company, San Francisco, California 818 pp.
- Haan, C. T., and Barfield, B. J. 1978. Hydrology and Sedimentology of Surface Mined Lands. University of Kentucky, Lexington, Kentucky. 286 pp.
- U. S. Soil Conservation Service. 1972. National Engineering Handbook. Sec. 4, Hydrology. U. S. Department of Agriculture, Soil Conservation Service, Washington, D. C.