



0040

STATE OF UTAH  
NATURAL RESOURCES  
Oil, Gas & Mining

Scott M. Matheson, Governor  
Temple A. Reynolds, Executive Director  
Dr. G. A. (Jim) Shirazi, Division Director

4241 State Office Building • Salt Lake City, UT 84114 • 801-533-5771

October 25, 1983

Mr. Allen D. Klein, Administrator  
Western Technical Center  
Office of Surface Mining  
Brooks Towers  
1020 Fifteenth Street  
Denver, Colorado 80202

ATTENTION: Mr. Lou Hamm

RE: Draft Technical Analysis and  
Decision Document  
Southern Utah Fuel Company  
Convulsion Canyon Mine  
ACT/041/002, Folder No. 2  
Sevier County, Utah

Dear Mr. Klein:

The Division of Oil, Gas and Mining has completed a Draft Technical Analysis (TA) and Decision Document for Southern Utah Fuel Company's Convulsion Canyon Mine. A copy of the document is enclosed for your review and comment. The Division has found that the mine plan should be approved with stipulations as detailed in the TA.

Your staff's prompt review of the enclosed document and submittal of written comments to the Division will allow us to stay on schedule for Final Permit Approval of this mine plan by mid-December 1983.

Please contact myself or Susan Linner of my staff with further questions.

Sincerely,

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

JWS/SCL:btb

cc: Vernal Mortensen, Coastal States

DRAFT

MINE PLAN INFORMATION

Mine Name: Convulsion Canyon Mine State ID: ACT/041/002

Operator: Southern Utah Fuel Company County: Sevier

Controlled By: Coastal States Energy Company

Contact Person(s): Vernal Mortensen Position: Vice-President, Utah Operations

Telephone:: (801) 566-7111

New/Existing: Existing Mining Method: Room and Pillar; Longwall

Federal Lease No(s):: U-28297, U-062453, U-0149084, SL-062583, U-47080

Legal Description(s): (see attached page)

State Lease No(s):: None  
Legal Description(s): \_\_\_\_\_

Other Leases (identify): Fee Property

Legal Description(s): T. 21 S., R. 5 E., SIM, Utah: Sec. 30, E1/2 SE1/4, S1/2 NE1/4; Sec. 29, W1/2, W1/2 SE1/4, W1/2 NE1/4

Ownership Data:

| <u>Surface Resources (acres)</u> | <u>Existing Permit Area</u> | <u>Proposed Permit Area</u> | <u>Total Life Of Mine Area</u> |
|----------------------------------|-----------------------------|-----------------------------|--------------------------------|
| Federal                          | <u>6,716</u>                | <u>N/A</u>                  | <u>Unknown</u>                 |
| State                            |                             |                             |                                |
| Private                          | <u>640</u>                  |                             |                                |
| Other                            |                             |                             |                                |
| TOTAL                            | <u>7,355</u>                |                             |                                |

Coal Ownership (acres)

|         |              |            |                |
|---------|--------------|------------|----------------|
| Federal | <u>6,716</u> | <u>N/A</u> | <u>Unknown</u> |
| State   |              |            |                |
| Private | <u>640</u>   |            |                |
| Other   |              |            |                |
| TOTAL   | <u>7,355</u> |            |                |



Legal Description of Federal LeasesLease No. U-28297

- T. 21 S., R. 5 E., SLM, Utah  
Sec. 32, Lots 1-4, N1/2 S1/2;  
Sec. 33, Lot 1, NW1/4 SW1/4.
- T. 22 S., R. 5 E., SLM, Utah  
Sec. 4, Lot 4, SW1/4 NW1/4, W1/2, SW1/4;  
Sec. 5, all;  
Sec. 7, S1/2 NE1/4, E1/2 SW1/4, SE1/4;  
Sec. 8, all;  
Sec. 17, NE1/4, N1/2 NW1/4;  
Sec. 18, NE1/4, E1/2 NW1/4.

Lease No. U-062453

- T. 21 S., R. 5 E., SLM, Utah  
Sec. 28, SW1/4 SW1/4;  
Sec. 29, SE1/4 SE1/4;  
Sec. 32, N1/2;  
Sec. 33, W1/2 NW1/4.

Lease No. U-0149084

- T. 22 S., R. 4 E., SLM, Utah  
Sec. 12, NE1/4, N1/2 SE1/4.

Lease No. SL-062583

- T. 21 S., R. 4 E., SLM, Utah  
Sec. 36, S1/2.
- T. 21 S., R. 5 E., SLM, Utah  
Sec. 31, all.
- T. 22 S., R. 4 E., SLM, Utah  
Sec. 1, Lots 1-4, S1/2 N1/2, S1/2;  
Sec. 12, NW1/4.
- T. 22 S., R. 5 E., SLM, Utah  
Sec. 6, all;  
Sec. 7, N1/2 NE1/4, E1/2 NW1/4.

Lease No. U-47080

- T. 21 S., R. 4 E., SLM, Utah  
Sec. 25, all;  
Sec. 36, N1/2.
- T. 21 S., R. 5 E., SLM, Utah  
Sec. 30, Lots 2-4, W1/2 SE1/4

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FINDINGS DOCUMENT

SOUTHERN UTAH FUEL COMPANY  
Convulsion Canyon Mine  
ACT/041/002, Sevier County, Utah

1. The plan and the permit application are accurate and complete and all requirements of the Surface Mining Control and Reclamation Act (the "Act"), and the approved Utah State Program have been complied with (786.19[a]).
2. The applicant proposes acceptable practices for the reclamation of disturbed lands. These practices have been shown to be effective in the short-term; there are no long-term reclamation records utilizing native species in the western United States. Nevertheless, the Utah Division of Oil, Gas and Mining (DOGM) staff has determined that reclamation, as required by the Act, can be feasibly accomplished under the Mining and Reclamation Plan (MRP) (see Technical Analysis [TA], Section UMC 817.111-.117) (UMC 786.19[b]).
3. The assessment of the probable cumulative impacts of all anticipated coal mining in the general area on the hydrologic balance has been made by the DOGM. The mining operation proposed under the application has been designed to prevent damage to the hydrologic balance in the permit area and in the associated off-site areas (UMC 786.19[c]). (See Cumulative Hydrologic Impact Analysis (CHIA) Section, attached to this Findings Document.) (Note: the CHIA is not available at this time.)
4. The proposed permit area is:
  - A. Not included within an area designated unsuitable for underground coal mining operations (MRP, Volume 2, page 12).
  - B. Not within an area under study for designated lands unsuitable for underground coal mining operations (MRP, Volume 2, page 12).
  - C. Not on any lands subject to the prohibitions or limitations of 30 CFR 761.11(a) (national parks, etc.), 761.11(f) (public buildings, etc.) and 761.11(g) (cemeteries).
  - D. Within 100 feet of the outside right-of-way line of a public road, however, the mine was in operation prior to August 3, 1977 (UMC 761.11) (MRP, Volume 2, page 12).
  - E. Not within 300 feet of any occupied dwelling (MRP, Volume 2, page 12) (UMC 786.19[d]).
5. DOGM's issuance of a permit is in compliance with the National Historic Preservation Act and implementing regulations (36 CFR 800) (UMC 786.19[e]). See letter from SHPO dated January 13, 1982 attached to TA.

6. The applicant has the legal right to enter and begin underground activities in the permit area through five Federal leases and one fee lease (see MRP, Volume 2, page 9; Volume 8, page 5) (UMC 786.19[f]).
7. The applicant has shown that prior violations of applicable law and regulations have been corrected (MRP, Volume 3, page 16; Volume 8, page 4) (UMC 786.19[g]).
8. Southern Utah Fuel Company (SUFCO) is not delinquent in payment of fees for the Abandoned Mine Reclamation Fund for its active mining operation (UMC 786.19[h]).
9. The applicant does not control and has not controlled mining operations with a demonstrated pattern of willful violations of the Act of such nature, duration and with such resulting irreparable damage to the environment as to indicate an intent not to comply with the provisions of the Act (UMC 786.19[i]).
10. Underground coal mining and reclamation operations to be performed under the permit will not be inconsistent with other such operations anticipated to be performed in areas adjacent to the proposed permit area (UMC 786.19[j]). No other mines are operational or have been proposed for the immediate vicinity.
11. A detailed analysis of the proposed bond had been made. The bond estimate is attached to the TA. The DOGM has made appropriate adjustments to reflect costs which would be incurred by the State, if it was required to contract the final reclamation activities for the minesite. The bond shall be posted (UMC 786.19[k]) with DOGM prior to final permit issuance. A preliminary bond in the amount of \$138,950.00 is currently on file.
12. No lands designated as prime farmlands or alluvial valley floor occur on the permit area (MRP, Volume 4, 80 submittal, pages 67-71; 81 submittal, page 11, Volume 3, pages 197-199) (UMC 786.19[l]).
13. The proposed postmining land-use of the permit area has been approved by DOGM (see TA, Section UMC 817.133) (UMC 786.19[n]).
14. The DOGM has made all specific approvals required by the Act, and the approved State Program (786.19[n]).
15. The proposed operation will not affect the continued existence of any threatened or endangered species or result in the destruction or adverse modification of their critical habitats (MRP, Volume 5, Vegetation and Soils Report, page 12; 1981 Supplement, page 5, Wildlife Assessment; 1981 Supplement, Exhibits 1 and 2, Volume 6, Avifauna, pages 8-9) (786.19[o]).
16. All procedures for public participation required by the Act, and the approved Utah State Program have been complied with (741.21[a][2][ii]).

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Prior to the permit taking effect, the applicant must forward a letter stating its compliance with the special stipulations in the permit and post the performance bond for reclamation activities.

\_\_\_\_\_  
DOGM Lead Reviewer

  
\_\_\_\_\_  
Coordinator of Mined Land Development

**DRAFT**

TECHNICAL ANALYSIS

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

October 25, 1983

Introduction

The Convulsion Canyon Mine is an existing underground mine operated by Southern Utah Fuel Company (Sufco), a subsidiary of Coastal States Energy Company of Houston, Texas. The mine is located approximately 30 miles east of Salina, Utah, with the surface facilities and access portal on U. S. Forest Service (USFS) land in East Spring Canyon, within Section 12, Township 22 South, Range 4 East, Salt Lake Baseline and Meridian. Coal is being mined from the Upper Hiawatha coal seam.

The mine commenced operation in 1941, mining Federally-owned coal. The applicant currently holds five Federal and one Fee lease, for a total of 7,355 acres, of which 91 percent are Federally-owned. Total surface disturbance is approximately 17 acres, with no additional disturbances planned.

The original mine plan was submitted to the U. S. Geological Survey (USGS) and the Utah Division of Oil, Gas and Mining (DOG M) in 1977. Additional information was submitted, and the mine plan was approved by DOGM pursuant to the Utah Mined Land Reclamation Act on September 14, 1977. The USGS approved the plan on February 3, 1978. In October of 1979, Sufco submitted additional information to comply with the regulations of the newly implemented Surface Mine Control and Reclamation Act. The Office of Surface Mining (OSM) sent an Apparent Completeness Review (ACR) to the applicant in May 1980, which Sufco responded to in November 1980. A joint ACR was prepared by DOGM and OSM and sent to the applicant in June of 1981. The applicant responded to the review and submitted baseline data on a new Federal Lease (U-47080) in September 1981. DOGM submitted requests for additional completeness and technical information in March and June of 1983 to which the operator responded in April and July of 1983. The mine plan application was declared complete on July 18, 1983. Newspaper advertisement of the application has been published in the Salina Sun and Richfield Reaper beginning on August 3, 1983.

Projected life of the mine is 26 years, with an average annual production of two million tons per year. Room and pillar mining is the predominant mining method, but longwall mining will also be used on Lease U-47080. Coal is moved by underground conveyor from the face to the portal. From there it is shipped by truck to Salina or Levan, where it is further shipped to buyers by truck or rail. Current employment is approximately 300, with three times that number employed in support services in the surrounding area.

### Existing Environment

The lease area is in the Wasatch Plateau coal field which underlies a major portion of the Wasatch Plateau, the northeasternmost high plateau in Utah. The major geologic formations of the permit area are the Price River, Blackhawk and North Horn formations. The majority of the area is gentle rolling surface that ends abruptly to the east and the south at steep cliffs cut by Convulsion Canyon and the North Fork of Quitchupah Canyon. Small scale faulting occurs throughout the permit area. Subsidence of the surface above areas that have been mined has occurred and will continue to occur, with no damage to structures or property expected. Tension cracks have also occurred in subsidence areas, but appear to have healed themselves within a year or two.

The mine permit area is in the drainage basin of Muddy Creek and ultimately tributary to the Colorado River. Muddy Creek receives runoff from the lease area by way of Convulsion Canyon and Quitchupah Creek. Several springs, seeps and runoff catchment basins also occur on the permit area. Mine water is discharged into the North Fork of Quitchupah Creek at a rate of 600,000-750,000 gallons per day. Vegetation community types present include pinyon/juniper, ponderosa pine, fir, aspen, sagebrush/grass, black sagebrush and mountain brush. Surface facilities are located in former pinyon/juniper habitat.

Soils on the Wasatch Plateau are generally very shallow, sand to silty sand in texture, with high percolation rates. These soils are highly susceptible to wind erosion, but only slightly susceptible to water erosion. Mancos shale dominates the canyon bottoms.

The majority of the land surface on the Sufco permit area is managed by the USFS under the multiple use concept. Current land uses include livestock grazing, wildlife habitat, timber and recreation.

### UMC 817.11 Signs and Markers

#### Applicant's Proposal

The applicant states that three identification signs are placed on the only possible vehicle access routes to the mine surface facilities area, two on a secondary road, the other on the main access road.

Perimeter markers are placed in the mine plan area.

Three stream buffer zones are marked with signs according to the plan--at the north ventilation entries for Quitchupah Creek near the portal area as well as near the pumphouse and leachfield for East Spring Canyon. The signs identify the areas as buffer zones and prohibit dumping.

No blasting is anticipated for the remainder of the mine life, so no signs or markers are required.

Compliance

Signs on access routes to the mine surface facilities are located properly, although one is labeled incorrectly (Ken Wyatt, verbal communication).

Although perimeter markers are placed around the areas affected by surface operations or facilities, spacing is inadequate for delineation (Ken Wyatt, verbal communication) and some are obscured by vegetation (DOGM file memo, 1982).

According to the plan, East Spring Canyon Creek and Quitcupah Creek are sufficiently marked as buffer zones where the surface disturbances are within 100 feet of the drainages.

The operator's proposal for marking the future topsoil area is adequate.

Stipulations 817.11-(1, 2)-SL

1. The identification sign on the main access route must be changed to show the correct State ACT number.
2. Perimeter markers must be located so that each may be seen on the ground connectively from another marker.

UMC 817.13 Casing and Sealing of Exposed Underground Openings: GeneralApplicant's Proposal

Drill holes are cemented from bottom to top with a slurry mixture of 5.2-5.5 gallons of water per bag of cement upon abandonment of drilling operations.

Seals will be installed in all entries as soon as mining is completed (see UMC 817.15). Inactive openings (ventilation entries) are fenced and posted (see UMC 817.14).

Compliance

Completely plugged drill holes prevent vertical fluid migration.

No acid or other toxic drainage enters surface or subsurface drainage from the mine openings. Fencing and "Danger" signs ensure the safety of people, livestock, fish, wildlife and machinery in the mine plan and adjacent area.

Stipulations

None.

UMC 817.14 Casing and Sealing of Underground Openings: TemporaryApplicant's Proposal

Mine entries which are temporary openings are used to facilitate air flow to mine workings. They are protected by locked steel mesh gates and are posted with "Danger" signs. They are periodically inspected by mine personnel to ensure proper maintenance.

No drill holes, shafts or exposed underground openings for underground development waste exist on the property as temporary (or permanent) openings.

Compliance

Mine entries for ventilation purposes prevent access into the mine and are identified as hazardous.

Stipulations

None.

UMC 817.15 Casing and Sealing of Underground Openings: PermanentApplicant's Proposal

Seals will be installed in all entries as soon as mining is completed and the mine is to be abandoned, to be located at least 25 feet inside the portal mouth entry. Proximal loose material will be removed prior to installation and the seals will be made of solid concrete blocks and mortar. The construction technique will be to build vertically succeeding layers of blocks in a pattern perpendicular to that of the proceeding row. An interlaced pilaster will be constructed in the center for support. The entry will then be backfilled with noncombustible material and sloped to match the cut slope at the portal entry.

Compliance

Access to the mine workings will be prevented and acid or other toxic drainage will be prevented from entering ground or surface waters.

Stipulations

None.

UMC 817.21-.25 TopsoilApplicant's Proposal

The soils found in the Sufco permit area were formed from weathering of clay sandstone and limestone at an elevation of approximately 6,900 to 9,100 feet. The topography is steep V-shaped canyons with horizontal sandstone ledges.

Four soil orders were found to exist in the area. They are Alfisols, Entisols, Inceptisols and Mollisols. Alfisols were formed on side slopes ranging from 15 to 35 percent. Predominant vegetation consists of Douglas fir, spruce, black sagebrush and wildrye. Entisols and Inceptisols were formed on steep slopes of 60 percent or greater. Predominant vegetation is pinyon-juniper, black sagebrush, grasses and mountain mahogany. Mollisols are found on lesser slopes ranging from 0-15 percent. Typical vegetation is ponderosa, aspen, mountain mahogany, rabbitbrush and pinyon- juniper.

The pH and EC of the soil range from approximately 6 to 8 and 0.4 to 1.35 mill mhos, respectively. Soil textures are from sandy loam to clay.

Erosion hazards range from slight to severe for both disturbed and undisturbed soils depending on the degree of slope and the type and extent of disturbance.

The A horizon (topsoil) ranges from as little as two inches thick in the Alfisols, Entisols and Inceptisols to as deep as 12 inches thick in the Mollisols.

The area of disturbance consists of 17 acres of which all but the sedimentation pond occurred prior to the enactment of Public Law 95-87. Due to this fact only topsoil from the sedimentation pond area was removed and stockpiled for use at the time of final reclamation. To supplement the topsoil available on-site, the applicant has proposed to purchase approximately 13,713 cubic yards of topsoil from the Sevier Valley area. Prior to purchasing and transporting to the minesite, samples will be taken to allow chemical and physical analysis to be conducted. This will insure that the topsoil supplemental material is of high enough quality to achieve reclamation.

Prior to topsoil redistribution, regraded land will be scarified by a ripper-equipped tractor. The surface will be ripped to a suitable depth in order to reduce surface compaction, provide a roughened surface assuring topsoil adherence and to promote vegetational root penetration. After grading, topsoil will be redistributed in a manner that will insure a uniform thickness of six inches. Before seeding, the topsoil will be allowed to settle and attain equilibrium with its natural environment. Compaction of the redistributed topsoil will be minimized by discing and/or ripping to a suitable depth, after which travel on the prepared seedbeds will be restricted.

Compliance

Applicant will be in compliance if the following stipulation is met.

Stipulation 817.21-.25-(1)-EH

1. The applicant must provide the source of topsoil substitute. This information is needed to assess the offsite impact of mining.

UMC 817.41 Hydrologic Balance: General RequirementsApplicant's Proposal

The applicant has proposed mining activities to minimize changes to the existing hydrologic balance throughout the mine plan and adjacent areas.

The applicant proposes to control surface runoff from disturbed and undisturbed areas by using a combination of diversions, berms, channels, culverts and sedimentation ponds. Undisturbed drainage will be separated from disturbed area drainage, except where precipitous slopes make it impractical to utilize diversion structures. Under these circumstances, undisturbed drainage will be routed through a sedimentation pond prior to being discharged from the mine plan area.

A surface water monitoring plan has been implemented and will continue to operate to detect any impacts from mining operations on the surface water system.

Minimal impacts to the ground-water system are proposed. Analyses of in-mine and spring water quality sampling should detect any changes to ground-water quality that could result from mining. Operations will be conducted underground to prevent diminution to ground-water quality.

All discharges to receiving streams should be in compliance with applicable State and Federal water quality regulations and effluent limitations.

Channel velocities will be controlled by utilizing appropriate riprap sizing in diversion and channel sections where velocities are excessive.

Any acid- or toxic-forming materials will be prevented from entering and contaminating the hydrologic system.

Compliance

The operator has proposed designs utilizing best technology control practices to minimize changes to the prevailing hydrologic balance in both the mine plan and adjacent areas. The following sections (UMC 817.42-.57) describe specific design details for the hydrologic facilities proposed.

Reclamation practices will also be instituted to minimize changes to the hydrologic regime.

The applicant's proposals will meet the general requirements for this section when the stipulations in the following sections are met.

### Stipulations

None.

### UMC 817.42 Water Quality Standards and Effluent Limitations

#### Applicant's Proposal

The applicant proposes to meet water quality standards and effluent limitations by routing and treating, in approved treatment facilities, all drainage from the disturbed surface and from the underground workings prior to discharge off the permit area. A two-stage sedimentation pond system will treat the drainage from the 12.7 acres of disturbed area upon which the surface facilities are located. Three small areas for which alternative control measures are proposed are as follows:

| Area                        | Acres | 10-Year, 24 Hour   |                 | Alternative Treatment   |
|-----------------------------|-------|--------------------|-----------------|-------------------------|
|                             |       | Runoff Volume (AF) | Peak Flow (cfs) |                         |
| 1. South End of Parking Lot | 0.97  | 0.09               | 1.10            | Silt Fence & Berm       |
| 2. Main Mine Fan Area       | 0.23  | 0.02               | 0.24            | Silt Fence & Straw Bale |
| 3. Substation Pad           | 0.39  | 0.03               | 0.40            | Silt Fence & Straw Bale |

These data quantify the small runoff volume expected from the 10-year, 24-hour precipitation event (i.e., 0.14 ac-ft). Areas 1 and 2 would require extensive regrading to route the drainage to the pond and area 3 is a very unstable area with a history of slumping which necessitates draining the area rapidly to reduce this potential for failure. Drainage from all three areas will be monitored monthly during the snowmelt runoff season and during major precipitation events to continually demonstrate the effectiveness of the alternate treatment facilities. Reports will be submitted quarterly to the Division for review.

The ponds are currently installed and the applicant has committed to installing the alternative control facilities before the end of the 1983 construction season.

Due to site constraints, the ponds must be removed and reclaimed prior to the completion of final reclamation. The applicant has proposed a conceptual plan of contour trenches to provide sediment control during reclamation. See discussion under Section UMC 817.56.

Drainage from underground workings is treated prior to discharge using an underground collection and sump system and does not flow to the sedimentation pond system. The mine water is discharged into the North Fork of Quitcupah Creek. The discharges from the sedimentation pond outlet and the mine discharge points are monitored monthly and are currently permitted under NPDES permit number UT-0022918.

Drainage from the undisturbed area west of the surface facilities is not diverted from the disturbed area due to site constraints and results in the mixing of the two flows. These are treated and monitored at the sedimentation pond with quarterly reports submitted to the Division to insure compliance with the limitations of UMC 817.42(a)(7).

#### Compliance

Although historically there have been instances of discharges from the sedimentation system exceeding limitations, several design changes and improvements in the drainage plan at the minesite have been made. These are discussed more completely under UMC 817.46. It is the Division's opinion that these changes have the potential to reduce or eliminate any exceedance of the limitations that were seen in the past. The only demonstration that these changes will succeed, however, is monitoring the discharge at the sedimentation system outlet during coming snowmelt and precipitation events. Therefore, the applicant's proposal will be in compliance with this section when the stipulation of this section has been met.

#### Stipulation 817.42-(1)-RS

1. The applicant must demonstrate by monitoring that the proposed sedimentation system is capable of treating the runoff for a 10-year, 24-hour event and the discharges from all affected areas will meet all applicable State and Federal water quality limitations. If this cannot be demonstrated and the system fails to function correctly, the applicant must submit plans to the Division to increase the capacity of the sedimentation system within 120 days.

UMC 817.43 Diversions and Conveyance of Overland Flow, Shallow Ground-Water  
Flow and Ephemeral Streams

Applicant's Proposal

The applicant's description of the drainage system at the minesite contained in the mine plan can often be confusing due to the inclusion of outdated maps, plans not implemented at the site, and the large volume of material in the MRP. Therefore, a brief summary of the system will be presented in the following sections.

The control of the drainage at the site is achieved using a system of temporary diversions and culverts to divert undisturbed drainage from the disturbed area, a mine yard drainage system which collects surface flow and route to the sedimentation system, and two large culverts that ultimately connect to divert the two major drainages (East Spring Canyon and Mud Spring Hollow) beneath the fill. The system is best depicted on Map 83-2 of Volume 8. Basins draining to the respective structures can also be found on Exhibit 9-9 of Volume 2. The predicted peak flow was calculated for each diversion using University of Kentucky's SEDIMOT II computer model. The results of these analyses are summarized below with the values presented by Sufco in the MRP. Output copies from the model are included in the appendix.

| Diversion   | Drainage Area (ac) |       | 10-year, 24-hour Peak Flow (cfs) |       | Discharge Capacity of Diversion Ditch A Culvert (cfs) |
|---|--------------------|-------|----------------------------------|-------|---|
|   | DOGM               | SUFCA | DOGM                             | SUFCA |   |
| 1. Contributing Basin West (CBW)                        | 25.8               | 25.4  | 10.8                             | 9.5   | Ditch = 15.0<br>20" pipe = 9.1                        |
| 2. Contributing Basin East (CBE)                        | 16.1               | 14.9  | 4.1                              | 5.5   | 6.3   |
| 3. Substation Pad Undisturbed Ditch                     | 6.9                | 6.9   | 1.75                             | 1.44  | 1.72  |
| 4. Substation Pad                                       | 0.39               | 0.19  | 0.40                             | 0.6   | 6.3   |
| 5. South Parking Lot                                    | 0.95               | 0.97  | 1.1                              | 1.65  | 8.81  |
| 6. CBW to Pipe #5                                       | 11.48              | 11.5  | 5.81                             | 8.71  | 8.2   |
| 7. Undisturbed Area North of ATOF to ESC Bypass Culvert | 1.8                | 1.88  | 0.91                             | 0.91  | 1.26  |

| Diversion   | Drainage Area (ac) |       | 10-year, 24-hour Peak Flow (cfs) |       | Discharge Capacity of Diversion Ditch A Culvert (cfs) |
|---|--------------------|-------|----------------------------------|-------|---|
|   | DOGM               | SUFCO | DOGM                             | SUFCO |   |
| 8. Undisturbed Area North of ATOF to MSH Bypass Culvert | 18.4               | 18.4  | 3.78                             | 5.67  | 5.67  |
| 9. Main Mine Fan Diversion to 6" Pipe                   | 0.197              | 0.23  | 0.194                            | 0.176 | 1.26  |

The capacity for each diversion was determined using either USBR culvert nomographs or Manning's Equation at minimum slope. All diversions were sized using a 10-year, 24-hour precipitation design event and include at least 0.3 foot freeboard. There are no proposed permanent diversions at the site. From the above table, we can see that in nearly all cases the diversions are oversized for capacity. It should be noted that the drainage from CBW does not all drain to the 20 inch pipe or the sediment pond access ditch, but rather a significant amount flows across the yard and is collected in the mine yard drainage system. The apparently underdesigned 20 inch pipe is, therefore, more than adequate to handle the expected flow. The Division feels the calculation for the substation undisturbed diversion ditch capacity of 1.72 cfs is within acceptable error (two percent).

The second stage of analysis included calculation of maximum expected velocity (or exit velocity for culverts which occurs at maximum slope for the diversion). From these values a riprap size required can be determined to prevent scour and excessive erosion. The following table summarizes the expected velocities with corresponding riprap sizes required and the proposed sizes by the applicant. Again, the reader is referred to Map 83-2 for location of diversions.

| Diversion               | Velocity (cfs) @ Maximum Slope | Riprap Size (inches)        |       |
|-------------------------|--------------------------------|-----------------------------|-------|
|                         |                                | DOGM                        | SUFCO |
| 1. CBE Road             | 6.2                            | 5"                          | 1/2"  |
| 2. CBW 20" Culvert      | 11.5                           | Not included in application |       |
| 3. Sediment Pond Access | 10.7                           | 14"                         | 3"    |
| 4. Pipe #5              | 4.6                            | 4"                          | 4"    |

| Diversion                              | Velocity (cfs)<br>@ Maximum Slope | Riprap Size (inches)        |        |
|--|-----------------------------------|-----------------------------|--------|
|  |                                   | DOGM                        | SUFCCO |
| 5. Undisturbed Area<br>North of ATOF   | 3.9                               | 2"                          | 2"     |
| 6. CBE 18" Bypass<br>Culvert           | 5.7                               | Not included in application |        |
| 7. Substation Pad<br>Undisturbed Ditch | 2.15                              | 1"                          | 1"     |
| 8. South Parking Lot                   | 5.1                               | 4"                          | 1 1/2" |
| 9. East Road Continuance               | 6.1                               | 5"                          | 4"     |

The discrepancy evident between riprap sizes is due to the applicant's use of the minimum slope of the diversion in calculating the expected velocity from Mannings Equation. Maximum velocity will occur at maximum slope, and therefore, the proposed riprap will not be adequate to prevent score at the steeper slopes.

#### Compliance

The applicant has oversized the diversion's capacity in most instances and has proposed adequate riprap protection for three of the diversions on-site. The applicant has, therefore, generally complied with this section and will comply adequately when the following stipulation has been met.

#### Stipulation 817.43-(1)-(RS)

1. The applicant must provide scour protection for all diversions for the maximum expected velocities. Plans for the design of channel protection measures must be submitted to the Division within 120 days.

#### UMC 817.44 Stream Channel Diversions

#### Applicant's Proposal

The placement of the fill upon which the surface facilities are located required the diversion of two intermittent streams. These are the East Spring Canyon Creek (drainage area of 4.8mi<sup>2</sup>) to the northeast and Mud Spring Hollow Creek (drainage area of 3.08 mi<sup>2</sup>) to the northwest of the minesite. Both are temporary diversions and were sized to pass the 10-year, 24-hour event as required by (b)(2) of this section.

Drainage from these two basins is diverted by means of a culvert system placed in the fill. The East Spring Canyon drainage (ESC) is diverted into a 72 inch CMP culvert. The Mud Spring Hollow (MSH) drainage is collected by a 42 inch culvert which connects to the 72 inch culvert at a distance of 180 feet forming a junction near the Washbay. The reader is referred to Map 83-2 for clarification. The 72 inch culvert runs the length of the fill to the top of the fill slope where a transition to a 48 inch culvert occurs. The dramatically increased slope of this culvert (135 percent slope) results in the necessary capacity to handle the flow from the 72 inch culvert. This 42 inch culvert is located along the slope of fill and beneath the sedimentation pond and embankment. The discharge velocity of the outlet (25.8 fps) is dissipated by the use of a stilling basin with an embankment of Class I (30 inch) riprap.

The analysis for this system included calculation of this peak runoff from the two basins using SEDIMOT II. Copies of the model output are included in the appendix. The culverts were then checked for capacity with existing headwater depth. The ESC 72 inch culvert was found to be significantly oversized with a capacity of approximately 360 cfs at a headwall of 12.0 feet. The applicant's peak flow was calculated to be 247 cfs, while SEDIMOT II predicted 161 cfs. The MSH culvert was determined to have a capacity of 150.5 cfs using a headwater depth of 11.2 feet and paving in the pipe to improve the culvert efficiency. The applicant's peak flow value (147 cfs) was determined to be within nine percent of the SEDIMOT II calculation and, therefore, appears to be acceptable to the Division.

#### Compliance

The applicant appears to comply with the requirements of this section.

#### Stipulations

None

#### UMC 817.45 Sediment Control Measures

#### Applicant's Proposal

The disturbed area drainage will be controlled and treated using a two stage sedimentation system, berms, diversions, silt fences and strawbales. Erosion of ditches and exit points of culverts will be minimized as riprap or channel linings have been proposed for all of these structures. Revegetation by seeding, shrub planting and hydromulching of four disturbed areas, when successful, will further minimize sediment contributions to the Quitchupah Creek drainage system. These four areas include the slope of the facilities fill adjacent to the sediment pond, the slope between the substation road and the surface facilities fill, the coal slide areas and the downstream face of the sediment pond embankment. Undisturbed drainage will be diverted from the disturbed area for all but one area. Site constraints (steep unstable slope)

preclude the construction of a diversion to divert the undisturbed slope immediately west of the surface facilities. This slope drainage will flow across the disturbed area and consequently to the sedimentation system which has been designed to include and treat this runoff.

The placement of gravel and a drainage system consisting of two drop inlets and 12 inch culverts at the substation pad will reduce the overland flow length and minimize sediment production at that site.

#### Compliance

The applicant's proposal is sufficient to make compliance with this section probable.

#### Stipulations

None

#### UMC 817.46 Hydrologic Balance: Sedimentation Ponds

##### Applicant's Proposal

The sedimentation pond system at the Convulsion Canyon Mine consists of a small concrete primary settling basin in series with a sedimentation pond. The description of this system contained in the mine plan can be confusing due to the inclusion of designs for two proposed systems, outdated maps, and design information scattered throughout the eight volume plan. Therefore, a consolidation description of the system will be presented herein.

The sedimentation system designed by Valley Engineering and presented in Volume 6 was implemented at the site. The plan by Merrick and Company presented in Volume 2 was not used and is presumably included in the plan for background calculations utilized by Valley Engineering in their design. Map 83-2 in Volume 8 can also assist the reader with interpretation of this discussion.

The drainage from 12.6 acres of disturbed area and 25.4 acres of undisturbed area is routed to the lower sediment pond located at the base of the surface facilities fill. The 9.8 acres of surface facilities fill and the majority of the 25.4 acres of CBW drainage are also routed to a concrete settling basin at the south end of the fill prior to discharge to the sediment pond. The drainage from that area of the top of fill (ATOF) where the surface facilities are located is collected by a mine yard drainage system consisting of well spaced drop drains and 10 inch corrugated metal pipe and routed to the concrete settling basin. This system reduces the flow length for the drainage on the fill and will, therefore, minimize erosion and production of sediment from the fill. The concrete settling basin has a capacity of 0.032 ac-ft and has a sloping bottom to facilitate removal of sediment by a front-end loader. Discharge from this basin is through 9 four-inch PVC pipes in connection with a wein which acts as an oil and grease skimmer. The discharge is then routed to the lower sediment pond by a 24 inch CMP for additional detention time and treatment.

The drainage from the slope of the fill (SOF) adjacent to the sediment pond and a portion of the undisturbed flow from the CBW is routed to the sediment pond by a ditch along the sediment pond access road. Discussion of the adequacy of this ditch is found under Section UMC 817.43.

The sedimentation pond is an embankment type with the embankment height 22 feet to the top and 18 feet to the crest of the emergency spillway. The pond was cleaned and resurveyed in August 1983. Using these data, the Division developed a Stage-Storage curve for the pond (see Appendix). This curve shows a volume of 1.56 ac-ft to the elevation of the primary spillway, 1.79 ac-ft to the crest of the emergency spillway and 2.29 ac-ft to a point two feet below the top of the embankment.

The pond is equipped with a 12 inch drop inlet (morning glory) spillways at an elevation of 7,417 feet. This discharge structure is equipped with an oil skimmer at the inlet and a decanting valve at an elevation of 7,412 feet which is above the predicted maximum sediment storage volume. A trapezoidal emergency spillway three feet deep with a bottom width of 11 feet and 2:1 slide slopes is located on the east side of the embankment at an elevation of 7,418 feet which results in a 1.0 foot difference between the two spillways. The primary spillway 12 inch pipe discharges directly into this heavily ripped spillway.

No mine water is routed to the sediment pond, but rather is treated in a separate sump system within the mine and discharged into the drainage basin to the east of the surface facilities.

The top width of the embankment is 12 feet and the combined slopes are 1:5 with the upstream slope 1:3 and the downstream 1:2. Properly designed antiseep cutoff collars are installed on the primary discharge pipe and the East Spring Canyon - Mud Spring Hollow diversion culvert which both extend through the dam embankment. The pond has been certified by a registered professional engineer (M. Cloward, #4522, Utah) and the applicant has committed to quarterly inspections of the pond with reports submitted to the Division for review in February, May, August and November.

The sediment pond was technically analyzed by the Division as described in the following narrative. The peak flows for the 10-year, 24-hour and 25-year, 24-hour precipitation events were calculated for the three areas draining to the sediment pond using the SEDIMOT II computer model. Copies of the output results are included in the appendix. The capacity of the primary and emergency spillways were calculated using the minimum value for weir, orifice and pipe flow equations and broad crested spillway hydraulics, respectively. The procedure followed was outlined by Haan, 1981. The following table summarizes the results:

|       | 10-year, 24-hour<br>Peak Flow (cfs) |       | 25-year, 24-hour<br>Peak Flow (cfs) |       | Primary <sup>1</sup><br>Spillway<br>Capacity<br>(cfs) | Emergency <sup>1</sup><br>Spillway<br>Capacity<br>(cfs) |
|-------|-------------------------------------|-------|-------------------------------------|-------|---|---|
|       | DOGM                                | SUFCA | DOGM                                | SUFCA |   |   |
| ATOF  | 8.1                                 | 9.2   | 10.9                                | 13.6  | NA  | NA  |
| SOF   | 2.2                                 | 1.9   | 3.0                                 | 2.8   | NA  | NA  |
| CBW   | 10.8                                | 9.5   | 16.5                                | 15.8  | NA  | NA  |
| TOTAL | 21.1                                | 20.6  | 30.4                                | 32.2  | 3.78  | 96.04   |

<sup>1</sup> At water elevation 7,418 feet (or one foot head).

<sup>2</sup> At water elevation 7,420 feet (or two feet head).

As we can see from this table, the combined primary and emergency spillways are significantly oversized to handle the 25-year, 24-hour event. The applicant has presented calculations that predict the 10-year, 24-hour event runoff to be 1.10 ac-ft. The capacity of the pond at the inlet of the primary spillways is 1.58 ac-ft and 60 percent of the maximum sediment storage is 0.408 ac-ft. Therefore, at such time when the 60 percent sediment level is reached, the pond capacity is still sufficient to contain the predicted runoff (1.58 AF - 0.41 AF = 1.17 AF) and preclude outflow through the emergency spillway as required under subsection (g). The applicant has installed sediment level markers to indicate this level and has committed to clean out as required under subsection (h).

The applicant proposes a sediment storage volume of 0.035 ac-ft for each acre of disturbed area that passes through the concrete settling basin and 0.1 ac-ft per acre of disturbed area that does not pass through this additional sediment control measure. Although it is difficult to quantify and predict that this basin does indeed remove a volume of sediment equal to the reduction to 0.035 AF/ac as required by subsection (b)(2), the Division feels this additional sediment control measure does have a significant influence on the quantity of sediment that eventually reaches the sediment pond. This basin facilitates the settling of the larger particles and easy removal for disposal. The applicant proposes to mix the accumulated sediment (consisting primarily of coal fines) with coal for shipment and sale. The reclamation of the area and sedimentation ponds and subsequent sediment control is discussed under UMC 817.42.

Compliance

The sedimentation system at the Convulsion Canyon Mine has had a history of failure with several samples exceeding effluent limitations in the past. During the course of this review, however, several changes have been made or proposed to upgrade the system. These changes are:

1. Increase the elevation of the primary spillway from an elevation of 7,411 feet to 7,417 feet. This has increased the storage capacity of the pond nearly one ac-ft and will accordingly increase the detention time in the pond before outflow begins.
2. Routed nearly 22 acres of undisturbed drainage away from the disturbed area and sediment system that previously contributed to the pond which was not designed to contain that drainage. With the flow from these areas (calculated at 0.45 ac-ft) contributing to the pond, the pond was certain not to perform as expected.
3. Treat three small areas with alternative sediment control measures which reduce the disturbed area drainage the pond must treat. These areas are discussed under Section UMC 817.42.

It is the Division's opinion that these changes have the potential to reduce the problems of discharge samples exceeding limitations that have been seen in the past. The only demonstration that these changes will succeed, however, is demonstration of the performance and efficient function of the system in the future. It is the opinion of the hydrologist that performed the technical analysis for the system that the calculations for predicted runoff submitted by the applicant, although calculated by acceptable techniques, are in the lower range of acceptability. Again, the burden of proof of acceptability of the system lies on the performance of the pond during the future. If the system fails to meet the standards and function correctly, expansion of the capacity of the system (or other techniques to increase detention time) must be done. Upon satisfaction of the following stipulation and Stipulation 817.42-(1)-RS, the applicant's proposal will be sufficient to make compliance with this section probable.

Stipulation 817.46-(1)-RS

1. The applicant must present plans as required by subsection (b)(2) to the Division for a study which will adequately demonstrate the reduction in sediment storage from 0.1 ac-ft per acre to 9.035 ac-ft per acre is achievable using the concrete basin settling facility. These plans must be submitted within 120 days after final permit approval.

**DRAFT**

UMC 817.47 Hydrologic Balance: Discharge Structures

Applicant's Proposal

All diversions at the minesite were fully discussed under Section UMC 817.43. Discharges for the sedimentation system are controlled by energy dissipators, stilling basins or riprapped channels. Velocities were calculated using Manning's Equation for open channel flow using the slope of the structure just prior to the discharge point. The following table summarizes the expected maximum velocities and the proposed energy dissipator for these structures. The reader is referred to Sheet 2, Volume 6, Valley Engineering report for location of these discharge points.

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| Structure                            | Velocity (fps) | Required Riprap Size   | Proposed Riprap Size or Structure                    |
|--------------------------------------|----------------|------------------------|--|
| 1. Emergency Spillway                | 10.44          | 14 inches              | Stilling basin and 30 inch riprap with filter layer. |
| 2. Primary Spillway                  | 9.3            | 12 inches              | 30 inch riprap.                                      |
| 3. 24 inch CMP from Concrete Basin   | 28.4           | greater than 48 inches | Eight foot boulder energy dissipator.                |
| 4. ESC-MSH 48 inch Diversion Culvert | 25.8           | greater than 48 inches | Stilling basin and 30 inch riprap with filter layer. |

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The values in the above table demonstrates the applicant has overdesigned in all cases and adequate scour protection is provided.

Compliance

When the applicant adequately satisfies Stipulation 817.43-(1)-RS, the proposal will be sufficient to make compliance with this section probable.

Stipulations

None (see Stipulation 817.43-(1)-RS).

UMC 817.48 Acid-forming and Toxic-forming MaterialsApplicant's Proposal

Mining practices will be carried out in such a manner as to avoid pollution of ground-waters and surface waters from acid-forming materials.

All unforeseen instances will be abated by implementing diversions, slope shaping and impoundments. Samples will be taken in accordance with an approved monitoring program at all point source discharge outlets to insure that effluent limitations are met. The results of chemical analyses for overburden and coal samples are presented on pages 68 through 147, Section I, Volume 3 of the MRP.

Water sample analyses for underground and surface monitoring sites are shown on page 73 of the Hydrometrics Report in Volume 4 of the MRP and Exhibit 9 - 1979, Volume 2.

Compliance

The applicant has had roof, floor and coal samples chemically analyzed which would indicate a low potential for contamination problems due to acid- or toxic-forming materials. Other coal mining operations in the region have not identified significant problems with any acid- or toxic-forming materials to date.

The applicant has submitted chemical analyses from underground discharge sites in accordance with NPDES permit requirements. These analyses show the discharged water to be of high quality, much better than the receiving streams.

Stipulations

None.

UMC 817.49 Hydrologic Balance: Permanent and Temporary ImpoundmentsApplicant's Proposal

The sedimentation pond at the site is considered a temporary impoundment and will be removed during reclamation. There will be no permanent impoundments left at the site. The sediment pond has been discussed under Section UMC 817.46 for compliance. The certification report required by subsection (h) is complete and found in Volume 8, page 51b.

Compliance

The applicant's proposal is sufficient for compliance with UMC 817.49.

**DRAFT**

Stipulations

None.

UMC 817.50 Underground Mine Entry and Access Discharge

Applicant's Proposal

The applicant submits (page 51c, Volume 8) that no ground-water discharge is anticipated during postmining operations. All entries and breakouts are located on the up-dip side of the mine and will be sealed to prevent gravity drainage.

In the unlikely event that some discharge should occur, it would be similar to a natural spring due to the settling effect of underground ponding and the good quality of the water.

At present, some 600 gallons per minute (gpm) of water is intercepted in the mining area and is being discharged via gravity flow from the Quitchupah breakouts (NPDES discharge point 003) after being pumped to a higher elevation than the elevation of the breakouts and allowed to flow through a settling pond constructed in old underground mine workings. At the cessation of mining, water will no longer be pumped to the underground settling pond. Instead, the water will fill the lower workings. It is not anticipated that the water level in the mine will reach either the breakouts or the entry ways. After the ground-water fills the voids to its natural hydrostatic head, normal ground-water movement will continue.

Compliance

The applicant has submitted plans which illustrate how the breakouts and mine entrances will be sealed. Also, the applicant has shown that the quality of water intercepted in the mine is of good quality in the unforeseen event that discharge should occur.

Stipulations

None.

UMC 817.52 Surface and Ground-Water Monitoring

Applicant's Proposal

Ground-Water Monitoring

Sufco has provided water quantity and quality data for surface and ground-water sites on and adjacent to the mine permit area which are above and below the mining operations.

Monitoring for most springs and streams was initiated in July of 1975. Since then, monitoring has continued on an annual and semi-annual basis at several locations. Discharge and field data (pH, specific conductivity and temperature) were obtained at several sites during this time period.

Ground-water samples were collected and analyzed for seven sites (East Spring [site 001], pumphouse effluent [site 047], mine discharge [site 021] and selected underground workings) to establish ground water quality above, below and within the coal seam. No water quality information was collected at any of the seven monitoring wells that were established because of the contamination caused by drilling fluids. Water levels have been established from the monitoring wells.

Minesites were selected for collection of baseline surface water quality. A limited number of water quality samples were collected at other sites characterized by field measurements.

A NPDES permit has been applied for and issued to Sufco, #UT-0022918, for the discharges from the sedimentation pond and mine effluent.

Based on the examination of baseline water quality data collected at and adjacent to the minesite, conclusions have been established that water quality in the general area is generally of fair to good quality, is a calcium-magnesium, bicarbonate type, usually meets Federal primary and secondary drinking water standards--except at one site where iron and magnesium concentrations are higher--downstream water becomes progressively poorer with increasing total dissolved solids. No significant adverse mining related impacts to water quality of the mine plan and adjacent area have been observed.

### Compliance

Sufco has presented monitoring information sufficient to establish the general characteristics and type of water within and adjacent to the mine area. The applicant has also submitted water quality information for point source discharge sites on a monthly basis as required in their monitoring schedule for NPDES discharges.

The applicant has not supplied sufficient information to establish seasonal trends in water quality and quantity at selected monitoring sites. The sampling referenced in the mine plan is sufficient for general interpretation, but to establish baseline data so that significant impacts or changes can be determined, the applicant must supply more information with an established frequency.

On December 16, 1982, plans were discussed with Dave Winget (page 52, Volume 8) to establish a water monitoring program where seasonal variations and complete baseline data could be established. The applicant has agreed to implement the following program.

Flow measurements will begin in May, or as early as conditions permit, and will continue at two week intervals through August and then on a monthly basis at least through October. This frequency will continue until it is mutually agreed between the applicant and DOGM that the hydrograph has been defined after which measurements will be made seasonably.

Flow measurements will be a combination of continuous recorders where conditions permit and field measurements at those locations that have a history of gaging station washouts.

Water quality parameters shall continue to be evaluated seasonally, June, August and October with a list of constituents to remain as outlined in Volume 4, 1981 Submittal, Table 4. Conductance, turbidity, pH and water temperature will continue to be measured with each flow determination.

Stipulation 817.52-(1)-DD

1. The applicant shall submit verification that the monitoring plan has been implemented by submitting the data collected and analyzed thus far. This information must be received by the Division no later than 120 days after approval of the mine permit.

UMC 817.53 Transfer of Wells

Applicant's Proposal

The applicant plans to use the observation wells on the mine plan property as monitoring sites during mining. It is not anticipated that the applicant will transfer these wells in the near future. Upon cessation of operation and monitoring requirements, the wells will be plugged or transferred according to the applicable State and Federal regulations.

Compliance

The applicant's proposal will comply with the general requirements of this section.

Stipulations

None.

UMC 817.54 Water Rights and Replacement

Applicant's Proposal

It is anticipated that mining will not diminish or interfere with the hydrologic regime to the extent that it causes degradation to the environment or effects surrounding water rights.

Coastal States will provide alternate water supplies if surface springs are dried up as a result of mining (page 32, Volume 2).

#### Compliance

The applicant's plan will comply with the general requirements of this section when the following stipulation is met.

#### Stipulation 817.54-(1)-DD

1. The applicant must show the possession of all appropriated water rights.

#### UMC 817.55 Discharge of Water Into An Underground Mine

##### Applicant's Proposal

The applicant does not plan to introduce surface waters into underground workings.

##### Compliance

The applicant has provided control methods to ensure that surface waters do not enter the mine.

##### Stipulations

None.

#### UMC 817.56 Postmining Rehabilitation of Sedimentation Ponds, Diversions, Impoundments and Treatment Facilities

##### Applicant's Proposal

Upon cessation of mining, all utilities and coal handling structures will be removed from the site. Structures which cannot be sold will be disposed of in private and municipal landfills. Concrete foundations that will not interfere with final grading will be buried on-site.

Other than the access road to the minesite, all hydrologic structures will be dismantled and reclaimed along with the mining pad, which is intended to be excavated and filled to approximate original contour. During this time, pipes and culverts will be removed or plugged with a minimum of 10 feet of concrete plug. The main drainage culverts from Mud Spring Hollow and East Spring Canyon will be plugged in the upper yard during the excavation process.

To return the present mine pad to approximate original contour after the cessation of mining operations, the operator has maintained that the present large sedimentation structure below the mining pad will have to be abandoned, filled and contoured and the smaller cement settling pond will need to be removed along with the other mining facilities.

In place of using sedimentation ponds to control sedimentation loading into streams, Sufco has proposed emplacement of erosion control terraces, page 15b, Volume 8. The terraces will be excavated into the contoured slope as indicated on Map 83-3. The terraces will be 15 feet wide with the outer slope edge four feet higher than the in-slope edge and having approximately a one percent grade toward undisturbed slopes. The terraces will control erosion by retaining sediment and directing runoff away from revegetated (disturbed) areas.

Topsoil will be replaced and revegetation implemented according to standards.

#### Compliance

In recontouring the mine pad, all exposed hydrologic structures should be reclaimed.

Plans to plug the stream channel do not take into account any surface disturbance caused along the stream channel after the culvert has deteriorated and collapsed. It is recommended that the culverts either be removed or backfilled to mitigate this concern.

The plans the applicant has submitted do not completely show how sediment control will be established after sloping and contouring of the mine pad. The applicant will have to explain how sediment reaching the terraces will be retained instead of being transported along the terrace to undisturbed areas. There are areas below some terraces in Map 83-3 that will allow runoff and sediment to enter the stream channel. Riprap sizing should be calculated for the rebuilt stream channel to ensure stability during a storm equal to a 10-year, 24-hour event. Design plans for terraces should be submitted which depict cross-sections, transportability and capacity to settle sediments. Also, a monitoring plan should be presented so postmining water quality and effluent limitations can be established from disturbed areas.

#### Stipulation 817.56-(1, 2)-DD

1. The applicant must submit the complete and adequate information stated in the compliance section to DOGM within 120 days after approval of the mine permit.
2. The applicant shall submit a statement which obligates them to burying any inert material at least four (4) feet deep during reclamation.

UMC 817.57 Stream Buffer ZonesApplicant's Proposal

The North Fork of Quitchupah Creek and Quitchupah Creek have been determined to contain a biologic community and, therefore, must be protected and a buffer zone established.

To reach coal reserves on the north side of Quitchupah Creek, Sufco has established entry ways under the creek where overburden above the coal seam varied from 50 to 100 feet thick. Crossing under the stream channel where overburden thickness is greater would have made mine operations less efficient and elevated mining costs.

In implementing the stream crossings Sufco has supplied plans and cross-sections which demonstrate mining practices and precautions so that the stream channel integrity will be protected.

The buffer zone markers have been placed at the north ventilation portal entries at Quitchupah Creek and will be placed at the pump station and leachfield area by July 15, 1983.

The sign dimensions are 12 inches X 18 inches. The wording used is "Stream Buffer Zone - No Disturbing Beyond This Point."

Compliance

The applicant has complied with this section.

Stipulations

None.

UMC 817.59 Coal RecoveryApplicant's Proposal

Coal recovery will be maximized by the utilization of continuous and conventional (standby) mining machinery, as well as longwall equipment (anticipated for Lease U-47080) where conditions allow. Maximum extraction of coal will be nearly full where favorable, 50 percent where overburden is excessive and 30-40 percent under steep canyon rims.

Compliance

The coal resource will be conserved while using the best technology available for mining and maintaining environmental integrity.

Stipulations

None.

UMC 817.61 Use of Explosives: General RequirementsApplicant's Proposal

Surface blasting is not expected for the remaining life of the mine. A blasting plan will be submitted to the proper authorities for approval prior to using explosives, should this be anticipated.

Compliance

Prior to using explosives on the surface, the Division will be notified and grant approval for the plan.

Stipulations

None.

UMC 817.62-.68 Use of Explosives

See UMC 817.61.

UMC 817.71-.74 Disposal of Underground Development Waste and Excess Spoil and Nonacid- and Nontoxic-forming Coal Processing WasteApplicant's Proposal

The applicant returns the underground development waste and excess spoil to underground workings. Any waste rock made in the mine is left and will be left in the mine.

Compliance

The applicant complies with this section.

Stipulations

None.

UMC 817.81-.88 Coal Processing Waste Banks

Not applicable.

UMC 817.89 Disposal of Noncoal WastesApplicant's Proposal

The trash from the operation is stored in a protected temporary storage area, protected from the wind by highwalls on three sides (access to the area is sloped inward to prevent water runoff from the pile). When enough waste is accumulated (about two weeks), the trash is loaded and hauled to the Salina City Municipal Sanitary Landfill 30 miles away. Sufco has a cooperative agreement with the city to use the disposal area on a set fee-per-ton basis that was signed July 10, 1977.

Compliance

The applicant complies with this section.

Stipulations

None.

UMC 817.91-.93 Coal Processing Waste: Dams and Embankments

Not applicable.

UMC 817.95 Air Resources ProtectionApplicant's Proposal

The following control practices are employed by the applicant to limit air pollution which may result from the operation: paving the haulage road; busing employees (reducing vehicular traffic); applying water to the loadout area; covered conveyor belts, lifts and drop points, protecting drop points from the prevailing wind direction; limiting the loading of temporarily stored material by front-end loader; using scrubbers on diesel equipment; watering and dusting within the mine (to limit that dust which is exhausted into the atmosphere); oiling stoker coal; and, cleaning the haulage road.

The air monitoring program was conducted by Radian Corporation from September 1, 1980 to August 31, 1981 in order to gather representative samples of total suspended particulates and meteorological data.

Compliance

In addition to the efforts by Sufco to reduce air pollution, the coal has a high moisture content (average over eight percent) which will effectively minimize dust while it is handled.

Results of the monitoring by Radian suggest that the operator's methods of controlling atmospheric pollutants are effective.

Stipulations

None.

UMC 817.97 Fish, Wildlife and Related Environmental Values

Applicant's Proposal

The mine plan area is comprised of a variety of habitat types (see Section UMC 817.111-.117) and, therefore, supports a wide variety of wildlife species. Economically important and high interest species include elk, mule deer, black bear, coyote, mountain lion, mountain cottontail and several furbearing species. Bird species of high interest that are present in the area include the golden eagle, blue grouse, ruffed grouse, western bluebird and Grace's warbler. Golden eagle, prairie falcon and Cooper's hawk nests have been found on or near the permit area.

None of the surface waters in the mine plan area support game fish, due either to small size, intermittent flows or poor habitat and water quality. A three-year study to characterize the aquatic macroinvertebrate populations of the mine area surface waters has been done. These data were correlated with physical and chemical characteristics of the streams to determine potential of these waters to support a fishery. It was concluded that due to natural factors, water quality and quantity are not suitable for a fishery (see Aquatic Resources Section, Volume 6, Sufco MRP). Stream buffer zones have been implemented in areas where mine disturbance approaches stream channels.

Elk utilize portions of the lease area on a seasonal basis. The area is mainly used for winter range, but elk calving areas also occur on Duncan Mountain. However, since surface facilities have existed for approximately 40 years and no additional disturbances are planned in critical elk wintering or calving areas, disturbance due to mining should be minimal.

None of the raptor nests located by Sufco's consultants or by the U. S. Fish & Wildlife Service (UFWS) are located near surface facilities, so no impacts to breeding birds are anticipated.

During the summer, mule deer utilize habitats near watering areas away from the surface facilities, but with the onset of winter they move lower into sage and pinyon-juniper areas in the vicinity of the mine haul and access road, which makes them susceptible to traffic mortality. Other potential impacts to wildlife include human harassment and poaching, and potential effects of subsidence on ground and surface waters.

No species officially designated as threatened or endangered have been found to reside in the mine plan area. Bald eagles may pass through the area going to or from known winter roosting areas to the south of the minesite. The applicant has submitted a plan to mitigate the adverse effects of the project on wildlife (pages 58c and d, Volume 8, MRP) to reduce the chance of

deer-vehicle collisions, the applicant has posted the access road with appropriate speed limits and implemented employee commuter buses to minimize highway traffic. All power poles on the minesite were modified for raptor protection in accordance with REA Bulletin 61-10, Powerline Contacts by Eagles and Other Large Birds, in 1981. Sufco restricts use of firearms by company personnel and has committed to implement an employee education program on wildlife values. Revegetation of the surface facilities area will be accomplished using a diverse variety of native grasses, forbs and shrubs. Since the original habitat type of this area was pinyon-juniper, reclamation should enhance the area for wildlife utilization.

### Compliance

The applicant has shown compliance with Section UMC 817.97 for the most part. However, concerns about the effects of subsidence on surface waters have not been adequately addressed. The applicant's subsidence reports (Volume 5, MRP) show that subsidence and tension cracks have occurred above areas where pillars have been pulled. Given the importance of water sources to wildlife, particularly to mule deer, the applicant should monitor all surface waters potentially subject to subsidence and commit to a plan to mitigate any diminished flows.

### Stipulation 817.97-(1)-SL

1. The applicant shall implement a program to monitor surface flowing water (streams, springs) to determine if any diminished flows occur from mine-related subsidence. In addition, the applicant shall commit to replace any waters that are diverted from the surface by subsidence or related tension cracks. A complete plan, describing a monitoring system and replacement of any lost water, dispersed in a pattern similar and the original sources, shall be submitted to the regulatory authority within 90 days of final permit approval.

### UMC 817.99 Slides and Other Damage

#### Applicant's Proposal

The applicant has committed in the text of the mine permit that the Sufco mine general manager or his designated representative will promptly notify DOGM of the occurrence of a slide which has potential for adverse effect on public property, health, safety or the environment. The applicant will comply with remedial measures required by the regulatory authorities to reduce or eliminate the potential adverse effect of such a slide.

#### Compliance

Applicant complies with this section.

#### Stipulations

None.

UMC 817.101 Backfilling and GradingApplicant's Proposal

Backfilling operations utilizing dozers, scrapers, front-end loaders and dump trucks will be conducted in portal and shop areas as well as the sediment pond area. The compaction will be 75-80 percent until the fill reaches one-two feet of final grade.

Prior to topsoil redistribution, regraded land will be scarified by a ripper-equipped tractor. Topsoil redistribution will ensure an approximate uniform thickness of six inches and be redistributed at a time of year suitable for seeding permanent revegetation. To minimize compaction of the topsoil following redistribution, travel on reclamation areas will be limited. The applicant will exercise care to guard against erosion during and after application of topsoil and will employ necessary measures to ensure the stability of topsoil on graded slopes.

Compliance

The applicant complies with this section.

Stipulations

None.

UMC 817.103 Covering of Acid- and Toxic-forming MaterialsApplicant's Proposal

There is no coal processing done at this mine permit area, so no coal wastes are produced. All waste rock from the roof and floor of the mine are disposed of underground.

No single underground area will be used exclusively for waste. The underground waste disposal usually involves placing noncombustible rock waste material in unused crosscuts between entries to the current mining areas. Underground waste disposal will be conducted in accordance with 30 CFR 75.400 such that the waste storage will not contain more than the maximum allowed combustible material. It is in the operator's best interest to avoid wasting material with potential heat content since this material can be sold as product. Disposal will be placed such that it: (1) is convenient with regards to cost; (2) does not obstruct ventilation; (3) does not obstruct current mining; and (4) will not be a hazard or impede future retreat mining.

Compliance

The applicant is in compliance with this section.

Stipulations

None.

UMC 817.106 Regrading or Stabilizing Rills and GulliesApplicant's Proposal

The applicant will exercise care to guard against erosion during and after application of topsoil and will employ the necessary measures to ensure the stability of topsoil on graded slopes. Erosion control measures will include surface roughing and matting of slope areas thought to be unstable.

Graded slopes showing instability tendencies will have topsoil anchored with matting during revegetation. The applicant will fill, regrade or otherwise stabilize any rills or gullies deeper than nine (9) inches which form in areas which have been regraded and topsoiled. The areas adjacent to any rills or gullies which have been filled, regraded or otherwise stabilized, will be reseeded or stabilized accordingly.

Compliance

The applicant is in compliance with this section.

Stipulations

None.

UMC 817.111-.117 RevegetationApplicant's Proposal

Vegetation habitat types contained within the Sufco properties and adjacent areas include the pinyon-juniper, ponderosa pine, fir and aspen types of the boreal forest biome and the sagebrush/grass, black sagebrush and mountain brush types of the desert shrub biome.

The surface facilities for the mine occur in an area which was formerly of the pinyon-juniper type and cover approximately 17 acres. The pinyon-juniper type occupies about 26 percent of the lease area, or 1,611 acres. This type occurs mostly on steep canyon slopes, between 7,000 and 9,000 foot elevation.

Three ventilation breakouts were punched out from the inside into the steep canyon walls above the North Fork of Quitcupah Creek in 1982. Total disturbance of each breakout is less than one acre. They occur within the pinyon-juniper and fir habitat types.

The pinyon-juniper habitat type was sampled for total cover, cover by species, shrub density, productivity and characteristics of the tree-component, including density, average height and average diameter. Adequate sampling as per DOGM's vegetation information guidelines was achieved for percent cover and shrub density data. The sampling method used was the modified reference area method for mines with existing (pre-Law) disturbance, whereby a reference area is set up and fully characterized in a community type thought to be as similar as possible to the natural one in the area previously disturbed. A permanent reference area has been staked and will be used to judge the adequacy of revegetation efforts.

No species federally listed as Threatened or Endangered (T&E) has been found to occur on the permit area, nor has a literature survey indicated the potential for any such occurrences.

The applicant has submitted a complete revegetation plan for both the surface facilities and breakout sites (MRP Volume 5, pages 35a-37 and Volume 8 pages 12n through 12o). This plan adequately addresses timing of revegetation, revegetation species and seeding and stocking rates, tillage and mulching practices, fertilization, irrigation and grazing management. No introduced species are included in the seed mix. Shrubs will be seeded and also planted in random clumps of 200 with at least 5 clumps per acre on the surface facilities area. This planting program is designed to enhance postmining land-use of wildlife habitat. Breakout areas will be regraded, covered with soil and seeded with the same seed mix as the surface facilities area. Interim reclamation will be accomplished similarly to final reclamation with the exception that no shrubs will be planted.

An adequate plan for monitoring the success of revegetated areas has also been submitted.

#### Feasibility of Reclamation

The Convulsion Canyon Mine site receives 12-16 inches of precipitation annually. This amount is sufficient to establish many of the native species of the area. There are no other mines in the area that have implemented reclamation procedures; however, the USFS has set up successful revegetation test plots in the Emery Coal Field approximately 10 miles east of the minesite. This area receives less precipitation than the minesite does.

#### Compliance

The applicant complies with these sections.

#### Stipulations

None.

UMC 817.121 Subsidence Control: General Requirements

Applicant's Proposal

Land use will remain virtually the same before, during and after mining. The effect of underground mining on surface use, primarily cattle grazing and big game hunting (there is also some snowmobiling and timber cutting of over-mature ponderosas), will be infinitesimal. Subsidence will be gradual and eventually even over most of the lease, too imperceptible to affect general land-use.

The property is divided into two zones, the first zone where supportive pillars are left to provide surface stability and the second where pillars are extracted to allow surface subsidence. The first mining zone forms a band contiguous to the southerly Convulsion and easterly Quitchupah canyon rims where subsidence is not expected and erosion will not be facilitated. Subsidence above the second mining zone is planned to be systematic and gradual, to be restricted to the interior of the leases and away from outcrops. An uneven arching effect is expected over "full" extraction areas during mining operations, which will stabilize in uniform subsidence once the entire area is mined. This is not expected to affect general land-use.

Subsidence is monitored regularly with survey points located where settling is anticipated. A semi-annual report will be provided to State and Federal authorities, which tabulates horizontal and vertical displacements at each of the monitoring stations.

On-the-ground examinations of subsidence panels from 1977-80 showed essentially no mining-related impacts to hydrologic systems. Subsidence cracks in soil surfaces usually were filled or healed by the following year. Springs in upper East Spring Canyon and in a tributary drainage to the southeast (sites 001 and 033 on Plate H-II) could be impacted as subsidence progresses. This may also occur for other canyon seeps and ephemeral drainages in the mine plan area. No evidence to this effect has been found to date, except for a crack located on the flank of Corral Knoll; the impact of this disturbance on a small ephemeral stream bottom with indications of little past stream flow is not considered significant. Although subsidence could also adversely affect ground-water movement, silts and shales often flow and seal fractures within a short time. This may explain the uninterrupted seeps in the mine plan area, despite nearby subsidence activity.

If spring 001 (East Spring Canyon) is disrupted by mining subsidence, alternatives to supplying the stock water which it supports are proposed, including: (1) drilling a water well into abandoned mine workings; (2) constructing a surface water impoundment north of the spring; (3) developing ground-water from upper Duncan Draw. If necessary, the third option given appears to be the most feasible.

Although some predictions regarding subsidence profiles are being developed, more investigations are needed. As an indicator of the rate to be expected in the permit area, 80 percent of maximum subsidence occurred above the Five Left-One West panel within five months of pillar extraction, then another two feet subsided in the following one year period. Subsidence varies inversely with overburden depth, as indicated by Figure 4 (graph) in Volume 5 of the mine plan. A tentative estimation of  $12^{\circ}$  for the limit angle will be evaluated for various overburden depths on the property. Surveys will be conducted to further define the overburden/subsidence curve, the effect of subsidence on the environment and to locate exact positions of tension cracks.

The only lands that will not be affected by future subsidence in the proposed permit area are above the old workings, along the steep sides of Convulsion and Quitchupah canyons, and the bottom of Quitchupah Canyon. Canyon rims will be protected by support pillars, the draw angle from the full extraction area to be intersected with the canyon rim. Also, support pillars will be left in workings under the bottom of Quitchupah Canyon.

#### Compliance

No material damage to the surface is expected as the value and foreseeable use of surface lands will not be degraded or interrupted.

#### Stipulation 817.121-(1)-DM

1. According to discussions with the operator and copies of correspondence between Sufco and the USFS and Minerals Management Service (MMS) (now BLM), certain experimental mining may commence beneath the slope on the southwest side of Quitchupah Canyon in order to maximize coal recovery. Also, as shown on Map 80-10B of the MRP, subsidence is anticipated on the northeast rim of Quitchupah Canyon. Full-extraction mining of these canyon slopes has been determined to fall under UMC 785.13 (Experimental Practices Mining), and as such, a separate proposal will be submitted to the Division for approval at least 60 days prior to commencement of these activities. Approval will also be contingent upon the Director of OSM's determination (see UMC 785.13[d]).

#### UMC 817.122 Subsidence Control: Public Notice

#### Applicant's Proposal

A map showing the projected sequence of mining for the operation has been mailed to all property owners and residents within the area which could potentially be affected by subsidence caused by underground coal mining.

Compliance

Owners of property and residents within the area above the underground workings and adjacent areas are sufficiently informed of the dates of underground operations and specific areas in which mining will take place.

Stipulations

None.

UMC 817.124 Subsidence Control: Surface Owner ProtectionApplicant's Proposal

Subsidence will be gradual and eventually even over most of the lease, too imperceptible to affect general land use. To date, only a small ephemeral stream near Corral Knoll may have been impacted by surface subsidence.

Compliance

The operator has a \$1,000,000 (per each occurrence) property damage insurance policy. No lessening of surface property value is anticipated, although should material damage occur, owners are indemnified.

Stipulations

None.

UMC 817.126 Subsidence Control: Buffer ZonesApplicant's Proposal

The North Mains mining section passed beneath Quitchupah Creek as an accessway to reserves on the northeast side of the property. Overburden in this crossing varies between 50 to 100 feet, consisting of interbedded siltstone, sandstone and shale. Full roof support is planned by the use of minimum-size 66 X 100 foot pillars. A 100-foot buffer zone, where there will be no second (full extraction) mining, will be maintained on either side of Quitchupah Creek. Hydrologic monitoring for changes in flow is conducted both on the surface and underground. Should a disruption occur, the nature of the problem will be investigated and a solution determined through consultation with the Division of Oil, Gas and Mining

Compliance

The Division approved Sufco's Quitchupah Creek crossing on November 4, 1982. Pillar support appears adequate and field investigations indicate no structural problems or discharges within the mine in this immediate area. Lithology favors competency as well as non-transmissivity of water from the creek into the mine through the overburden.

Stipulations 817.126-(1, 2)-DM

1. A statement must be submitted to the Division ensuring that the highest level of economically feasible technology will be used to provide appropriate protection to the stream crossing at the time of abandonment.
2. Mining within the 100-foot buffer zone and full extraction between the buffer zone and the 800-foot overburden isopach is subject to approval after a proposal is submitted as outlined in UMC 785.13.

UMC 817.131-.132 Cessation of Operations

Not applicable at this time.

UMC 817.133 Postmining Land-UseApplicant's Proposal

The Sufco lease area is predominantly U. S. Forest Service land managed under multiple use and sustained yield concepts. Present management emphasizes livestock grazing, wildlife, timber and watershed development.

The majority of the mine area is within the Old Woman Management Area, Salina Planning Unit, Fishlake National Forest. Current grazing intensity averages seven acres per AUM (animal unit month) for combined sheep and cattle grazing.

Selective timber harvesting of ponderosa pine occurs on and around the lease area. Other timber uses include posts and poles from aspen and Christmas-tree cutting.

Hunting is a major recreational use of the area, with the majority of hunter-use days for big game hunting. Other recreational uses of the area include dispersed camping, winter sports and fishing.

No other mining operations occur in the immediate vicinity. Some oil and gas exploration occurs in the area, but there are currently no producing wells.

A land-use map for the permit area (Map 80-3, Volume 3, MRP) has been provided.

Land uses will continue to be the same, under USFS management, after mining ends. Final reclamation activities will be completed so as to provide land uses consistent with those required by USFS land use plans. All mining structures and facilities will be removed or reclaimed following the closure of operations. The main access road (a county road) will remain open.

Compliance

Applicant complies with this section.

Stipulations

None.

UMC 817.150-.176 RoadsApplicant's Proposal

There are three roads that will be used in connection with the applicant's mine facilities: Mine Access Road; East Side Road; and the Old Woman Plateau Road. The main Mine Access Road is a paved Sevier County Road (Class B) which extends from Interstate Highway 70 to the minesite. Sufco is responsible for the maintenance of the road on the permit area which is 350 feet from the guard shack north to the surface facilities area. Runoff water from this unpaved section is routed into the disturbed surface facilities area and through the main sediment control structures. The gradient of the road is 1.2 percent from the permit boundary down the disturbed area. A berm on the downhill side of the road channels water flow to the sedimentation pond.

The East Side Road existed prior to mining activities for the purpose of providing access from the bottom of Convulsion Canyon to the upper plateau for herding livestock. Sufco uses the road for access to the mining operation's electrical and water supply systems. No relocation of the road is planned. Mining activities are conducted within 100 feet of the right-of-way line and the road is shown on the Sevier County Class D System as a public road. The activities include the underground entry system underneath the road. No impact to the road due to these entries should occur as Sufco will ensure that no subsidence or caving operations will be conducted as to affect any portion of the right-of-way. Surface activities will be conducted in a manner which will not block the road. The grade of the road averages between 7.7 percent to 13 percent. Sufco has constructed water bars in the road approximately every 200 feet from Convulsion Canyon to the water tank.

The Old Woman Plateau Road is an unpaved Sevier County Class D road. There are no surface activities planned which will relocate or disrupt the public use of this road. As part of the subsidence monitoring program, the roads will be regularly inspected for such damage and, if such damage is evident, the road will be repaired by Sufco.

About 1,000 feet of road exists on the lease at the mine. The company does not plan on closing the road or revegetating it since it could be used for livestock driving or fighting forest fires. At the time of abandonment, the road will be closed off, depending on U. S. Forest Service (USFS) wishes. The county access road will be left at the conclusion of mining.

Compliance

The applicant complies with this section.

Stipulations

None.

UMC 817.180 Other Transportation FacilitiesApplicant's Proposal

A conveyor is used to transport coal underground to the crusher. The conveyor system will be removed after cessation of the operation in a way that will minimize environmental degradation.

Compliance

The applicant complies with this section.

Stipulations

None.

UMC 817.181 Support Facilities and Utility InstallationsApplicant's Proposal

The central facilities are shown on map ID. The power is received from Utah Power & Light Company (shown on Map 80-4A, 4B, 4C).

Compliance

The applicant complies with this section.

Stipulations

None.

UMC 822.1-.14 Alluvial Valley FloorsApplicant's Proposal

The applicant has examined the potential for Alluvial Valley Floors (AVF) in and adjacent to the mine plan and contends that there is no adverse effects to potential AVF's within the area caused by mining activities.

The area within and adjacent the mine permit area consists of plateaus and precipitous canyons as shown on topographic map submitted in the mine plan (Plate H-II).

Unconsolidated standard deposits are present in the following drainages.

Within the Mine Plan Area:

1. North Fork Quitchupah Creek. This drainage is deep and very steep and is narrow at the bottom. Streamlaid deposits are present only in small, discontinuous narrow patches. Bedrock is exposed in much of the canyon bottom and the stream cascades over exposed bedrock outcrops.
2. East Spring Canyon. Characteristics of unconsolidated alluvium are the same as in North Fork Quitchupah Canyon.
3. Duncan Draw. This drainage within the permit boundary is narrow and steep with a few small (less than one acre) patches of alluvium present. Bedrock is exposed in much of the drainage.
4. Unnamed tributary to Duncan Draw. (T. 21 S., R. 5 E., Sec 31 31/2). This drainage is steep, but contains narrow patches of unconsolidated alluvium. This drainage has not been investigated in detail, but areas underlain by unconsolidated alluvium are estimated to aggregate a few acres in size.
5. Unnamed tributaries to East Spring Canyon. These small drainages are east of Sec. 1, T. 22 S., R. 4 E., and are tributaries to East Spring Canyon (Plate H-II). These drainages are narrow and steep, but have a few scattered patches of unconsolidated alluvium. No detailed investigation of these drainages has been made, but areas underlain by unconsolidated alluvium are estimated to aggregate only a few acres in size.

Adjacent Area:

1. North Fork Quitchupah Creek downstream from mine permit area. While the canyon is steep and narrow, there are unconsolidated alluvial deposits toward the lower end. Similarly, in the adjacent area at the upper end of North Fork Quitchupah Canyon and its South Fork tributary there are small narrow areas underlain by consolidated alluvium. None of these deposits have been mapped in detail.
2. Duncan Draw and Mud Springs Hollow. The segments of Duncan Draw and Mud Spring Hollow in the adjacent area contain some small area underlain by unconsolidated alluvium. Both these canyons are narrow and steep, and probably there are no areas in the canyon where unconsolidated alluvium underlies more than 10 acres.

3. Convulsion Canyon and Quitchupah Creek. These drainages contain narrow deposits of unconsolidated alluvium. The canyon bottoms are narrow, but alluvium may be as much as 75 feet thick. Streams are deeply incised into the alluvium creating steep banks with a narrow stream channel in the bottoms. These unconsolidated deposits have not been mapped in detail.

There is no flood irrigation in the mine plan area or the adjacent area, and no evidence of historical use of flood irrigation.

Due to small size, steepness, water availability, land ownership and short growing season, these areas are not practical for flood irrigation. In this region, flood irrigation is not practiced in such high mountain drainages.

No historic farming or flood irrigation has occurred in the area except for two areas. These areas lie outside the adjacent area several miles downstream from the mine where no disturbance has taken place. Approximately 110 acres where flood irrigation is practiced and another approximately 25 acres that may have been irrigated in the past. The areas are along Quitchupah Creek from which they would receive their irrigation water. Quitchupah Creek in this segment is deeply incised into the alluvium creating steep banks with a narrow stream channel. Thickness of the alluvium is unknown, but probably is greater than 50 feet.

During mining activities, additional water will be supplied to the streams from mine discharge that meets State and Federal water quality guidelines. When mining activities cease and streamflows will once again flow at their natural rates.

#### Compliance

The applicant has sufficiently described the area and potential AVF potential.

It is the Division's opinion that the potential for an AVF does not exist in or adjacent to the mine plan area and that there is no potential for adverse effects for irrigated lands downstream.

#### Stipulations

None.

STIPULATIONS

SOUTHERN UTAH FUEL COMPANY  
Convulsion Canyon Mine  
ACT/041/002, Sevier County, Utah

Stipulations 817.11-(1, 2)-SL

1. The identification sign on the main access route must be changed to show the correct State ACT number.
2. Perimeter markers must be located so that each may be seen on the ground connectively from another marker.

Stipulation 817.21-.25-(1)-EH

1. The applicant must provide the source of topsoil substitute. This information is needed to assess the offsite impact of mining.

Stipulation 817.42-(1)-RS

1. The applicant must demonstrate by monitoring that the proposed sedimentation system is capable of treating the runoff for a 10-year, 24-hour event and the discharges from all affected areas will meet all applicable State and Federal water quality limitations. If this cannot be demonstrated and the system fails to function correctly, the applicant must submit plans to the Division to increase the capacity of the sedimentation system within 120 days.

Stipulation 817.43-(1)-(RS)

1. The applicant must provide scour protection for all diversions for the maximum expected velocities. Plans for the design of channel protection measures must be submitted to the Division within 120 days.

Stipulation 817.46-(1)-RS

1. The applicant must present plans as required by subsection (b)(2) to the Division for a study which will adequately demonstrate the reduction in sediment storage from 0.1 ac-ft per acre to 9.035 ac-ft per acre is achievable using the concrete basin settling facility. These plans must be submitted within 120 days after final permit approval.

Stipulation 817.52-(1)-DD

1. The applicant shall submit verification that the monitoring plan has been implemented by submitting the data collected and analyzed thus far. This information must be received by the Division no later than 120 days after approval of the mine permit.

Stipulation 817.54-(1)-DD

1. The applicant must show the possession of all appropriated water rights.

Stipulation 817.56-(1, 2)-DD

1. The applicant must submit the complete and adequate information stated in the compliance section to DOGM within 120 days after approval of the mine permit.
2. The applicant shall submit a statement which obligates them to burying any inert material at least four (4) feet deep during reclamation.

Stipulation 817.97-(1)-SL

1. The applicant shall implement a program to monitor surface flowing water (streams, springs) to determine if any diminished flows occur from mine-related subsidence. In addition, the applicant shall commit to replace any waters that are diverted from the surface by subsidence or related tension cracks. A complete plan, describing a monitoring system and replacement of any lost water, dispersed in a pattern similar and the original sources, shall be submitted to the regulatory authority within 90 days of final permit approval.

Stipulation 817.121-(1)-DM

1. According to discussions with the operator and copies of correspondence between Sufco and the USFS and Minerals Management Service (MMS) (now BLM), certain experimental mining may commence beneath the slope on the southwest side of Quitchupah Canyon in order to maximize coal recovery. Also, as shown on Map 80-10B of the MRP, subsidence is anticipated on the northeast rim of Quitchupah Canyon. Full-extraction mining of these canyon slopes has been determined to fall under UMC 785.13 (Experimental Practices Mining), and as such, a separate proposal will be submitted to the Division for approval at least 60 days prior to commencement of these activities. Approval will also be contingent upon the Director of OSM's determination (see UMC 785.13[d]).

Stipulations 817.126-(1, 2)-DM

1. A statement must be submitted to the Division ensuring that the highest level of economically feasible technology will be used to provide appropriate protection to the stream crossing at the time of abandonment.
2. Mining within the 100-foot buffer zone and full extraction between the buffer zone and the 800-foot overburden isopach is subject to approval after a proposal is submitted as outlined in UMC 785.13.



SCOTT M. MATHESON  
GOVERNOR

*MS*

STATE OF UTAH  
DEPARTMENT OF COMMUNITY AND  
ECONOMIC DEVELOPMENT

OIL, GAS & MINING

January 13, 1982

Division of  
State History  
(UTA - STATE HISTORICAL SOCIETY)

MELVIN T. SMITH, DIRECTOR  
300 E. I. GRANDE  
SALT LAKE CITY, UTAH 84101  
TELEPHONE 601-533-5755

Division of Oil, Gas & Mining  
Mr. Gilbert L. Hunt  
1588 North West Temple  
Salt Lake City, Utah 84116

RE: Review of Mine Plan, Southern Utah Fuel Company - Convulsion  
Canyon Mine, ACT/041/002, Addendum, Sevier County, Utah

Dear Mr. Hunt:

The staff of the Utah State Historic Preservation Officer has received the addendum information concerning cultural resources for the Convulsion Canyon Mine, owned and operated by Southern Utah Fuel Company.

Our staff has reviewed the information. The addendums furnished by the contractor for Southern Utah Fuel Company meet all questions that were originally brought forth by the Office of Surface Mining. Therefore, the documentation appears to be complete enough to satisfy the Office of Surface Mining.

Our office has one observation concerning site (42Su1435). This site has been recommended for excavation by the cultural resource contractor, however, the site has been badly vandalized. Therefore, if there is no direct impact by the mining operation on the site, there would be no effect on this site. This information may be used by Oil, Gas, & Mining in determining, with the Office of Surface Mining, whether excavation is essential or not.

If you have any questions or concerns, please contact this office at 533-7039.

Sincerely,

Melvin T. Smith  
Director and  
State Historic Preservation Officer

JLD:jr:D829/1844c

FINAL RECLAMATION OF MINE SITE

Total number of acres to be disturbed requiring reclamation: 20.88 acres

|   |               |
|---|---------------|
| Ripping - 20.88 acres x \$4,760/acre                  | \$ 99,389     |
| Topsoil addition - 20.88 acres x \$5,236/acre         | 109,328       |
| Fertilization - 20.88 acres x \$364/acre              | 7,600         |
| Seeding - 20.88 acres x \$640/acre                    | 13,363        |
| Moisture retention - 20.88 acres x \$1,144/acre       | 23,887        |
| Maintenance & Monitoring - 20.88 acres x \$1,200/acre | <u>25,056</u> |
|   | \$278,623     |

TOTAL COST

|                         |                |
|-------------------------|----------------|
| Demolition and Dirtwork | \$732,168      |
| Reclamation Activities  | <u>278,623</u> |
|                         | \$1,010,791    |
| 10% Contingency         | <u>101,079</u> |
|                         | \$1,111,870    |

\$48,409/Acre

The following information is a list of the estimated reclamation costs for the Southern Utah Fuel Company mine:

Demolition and Dirtwork

| <u>Description</u>            | <u>Amount</u>                     | <u>Unit Cost</u>                | <u>Subtotal</u> |
|-------------------------------|-----------------------------------|---------------------------------|-----------------|
| Concrete                      |                                   |                                 |                 |
| Foundation Removal            | 950/yd <sup>3</sup><br>(estimate) | \$55/yd <sup>3</sup>            | \$ 52,250       |
| Building Removal              |                                   |                                 |                 |
| Shop                          | 11,000/ft <sup>2</sup>            | \$1.60/ft <sup>2</sup><br>story | 17,600          |
| Warehouse                     | 4,500/ft <sup>2</sup>             |                                 | 7,200           |
| Offices                       | 9,000/ft <sup>2</sup>             |                                 | 14,400          |
| Garage                        | 580/ft <sup>2</sup>               |                                 | 928             |
| Storage Shed                  | 2,000/ft <sup>2</sup>             |                                 | 3,200           |
| Miscellaneous Structures      | 5,000/ft <sup>2</sup>             |                                 | 8,000           |
| Coal Handling Structures      | 375/ton                           | \$10/ton                        | 3,750           |
| (Steel and equipment removal) |                                   |                                 |                 |
| Asphalt Removal               | 1,780/yd <sup>2</sup>             | \$3/yd <sup>2</sup>             | 5,340           |
| Dirtwork-Cut and Fill         | 413,000/yd <sup>3</sup>           | \$1.50/yd <sup>3</sup>          | <u>619,500</u>  |
| TOTAL                         |                                   |                                 | \$732,168       |

RECLAMATION COST AND TIME TO RECLAIM ONE ACRE

Ripping:

|           |                         |            |          |
|-----------|-------------------------|------------|----------|
| Equipment | 40 hours x \$100/hour = | \$ 4,000   |          |
| Labor     | 40 hours x \$19/hour =  | <u>760</u> |          |
|           |                         |            | \$ 4,760 |

Topsoil Addition:

|           |                         |            |          |
|-----------|-------------------------|------------|----------|
| Equipment | 44 hours x \$100/hour = | \$ 4,400   |          |
| Labor     | 44 hours x \$19/hour =  | <u>836</u> |          |
|           |                         |            | \$ 5,236 |

Fertilization:

|          |                        |           |        |
|----------|------------------------|-----------|--------|
| Labor    | 32 hours x \$10/hour = | \$ 320    |        |
| Material |                        | <u>44</u> |        |
|          |                        |           | \$ 364 |

Seeding:

|           |                        |            |        |
|-----------|------------------------|------------|--------|
| Equipment | 8 hours x \$60/hour =  | \$ 480     |        |
| Labor     | 16 hours x \$10/hour = | <u>160</u> |        |
|           |                        |            | \$ 640 |

Moisture Retention

|          |                        |            |          |
|----------|------------------------|------------|----------|
| Labor    | 72 hours x \$10/hour = | \$ 720     |          |
| Material |                        | <u>424</u> |          |
|          |                        |            | \$ 1,144 |

Maintenance and Monitoring

|          |                         |            |          |
|----------|-------------------------|------------|----------|
| Labor    | 100 hours x \$10/hour = | \$ 1,000   |          |
| Material |                         | <u>200</u> |          |
|          |                         |            | \$ 1,200 |

TOTAL COST FOR ONE ACRE

\$13,344

\$13,344 x 20.88 acres = \$278,623

SuFCO: Underwood CBE above  
 Substation Pack

\*\*\* HYDRAULIC INPUT VALUES FOR SUBWATERSHEDS \*\*\*

| WATERSHED | AREA ACRES | CUPLE NUMBER | TC HR | TT HR | ROUTING COEFFICIENTS K-HRS | X    | UNIT HYDRO |
|-----------|------------|--------------|-------|-------|----------------------------|------|------------|
| 1         | 6.90       | 12.00        | .117  | 0.000 | 0.000                      | 0.00 | 0.0        |

\*\*\* LISTED VALUES FOR INDIVIDUAL WATERSHEDS \*\*\*

| WATERSHED | PEAK FLOW (CFS) | RUNOFF (INCHES) |
|-----------|-----------------|-----------------|
| 1         | 1.75            | .24             |

NOTE: ELEMENT DOES NOT INCLUDE POSSIBLE DEPOSITION BY DELIVERY RATIO 2

\*\*\*\*\* SUMMARY TABLE FOR TOTAL WATERSHED \*\*\*\*\*

|                        |   |        |         |
|------------------------|---|--------|---------|
| RUNOFF VOLUME          | = | .1400  | ACRE-FT |
| PEAK DISCHARGE         | = | 1.7549 | CFS     |
| AREA                   | = | 6.9000 | ACRES   |
| TIME OF PEAK DISCHARGE | = | 12.00  | HRS     |

\*\*\*\*\*  
 NULL STRUCTURE  
 \*\*\*\*\*

Area South of Constructing Basin West  
 Inverted to Pipe #50  
 Page - 24th event

\*\*\*\*\*  
 JUNCTION 1 BRANCH 1 STRUCTURE 1  
 \*\*\*\*\*

\*\*\* HYDRAULIC INPUT VALUES FOR SUBWATERSHEDS \*\*\*

| WATER SHED | AREA ACRES | CURVE NUMBER | TC HR | TT HR | ROUTING COEFFICIENTS K-HRS | UNIT HYDRO |
|------------|------------|--------------|-------|-------|----------------------------|------------|
| 1          | 11.48      | 79.00        | .121  | 0.000 | 0.000 0.00                 | 0.0        |

\*\*\* COMPUTED VALUES FOR INDIVIDUAL WATERSHEDS \*\*\*

| WATERSHED | PEAK FLOW (CFS) | RUNOFF (INCHES) |
|-----------|-----------------|-----------------|
| 1         | 5.81            | .45             |

NOTE: SEDIMENT DOES NOT INCLUDE POSSIBLE DEPOSITION BY DELIVERY RATIO 2

\*\*\*\*\* SUMMARY TABLE FOR TOTAL WATERSHED \*\*\*\*\*

|                        |   |         |         |
|------------------------|---|---------|---------|
| RUNOFF VOLUME          | = | .4341   | ACRE-FT |
| PEAK DISCHARGE         | = | 5.8127  | CFS     |
| AREA                   | = | 11.4800 | ACRES   |
| TIME OF PEAK DISCHARGE | = | 12.00   | HRS     |

SUFLO CBE Drainage 10 yr. - 24 hr peak  
Contributing Basin East

\*\*\* HYDRAULIC INPUT VALUES FOR SUBWATERSHEDS \*\*\*

| WATER SHED | AREA ACRES | CURVE NUMBER | TC HR | TT HR | ROUTING COEFFICIENTS K-HRS | X    | UNIT HYDRO |
|------------|------------|--------------|-------|-------|----------------------------|------|------------|
| 1          | 16.07      | 72.00        | .121  | 0.000 | 0.000                      | 0.00 | 0.0        |

\* \* \* COMPUTED VALUES FOR INDIVIDUAL WATERSHEDS \* \* \*

| WATERSHED | PEAK FLOW (CFS) | RUNOFF (INCHES) |
|-----------|-----------------|-----------------|
| 1         | 4.09            | .24             |

NOTE: SEDIMENT DOES NOT INCLUDE POSSIBLE DEPOSITION BY DELIVERY RATIO 2

\*\*\*\*\* SUMMARY TABLE FOR TOTAL WATERSHED \*\*\*\*\*

|                        |   |         |         |
|------------------------|---|---------|---------|
| RUNOFF VOLUME          | = | .3260   | ACRE-FT |
| PEAK DISCHARGE         | = | 4.0872  | CFS     |
| AREA                   | = | 16.0700 | ACRES   |
| TIME OF PEAK DISCHARGE | = | 12.00   | HRS     |

\* \* \* \* \*  
NULL STRUCTURE  
\* \* \* \* \*

SUFCO: 250 PEAK FLOW 10yr - 24 hr  
 East Spring Flow

UNCTION 1, BRANCH 1, STRUCTURE  
 \* \* \* \* \*

\*\*\* HYDRAULIC INPUT VALUES FOR SUBWATERSHEDS \*\*\*

| WATER SHED | AREA ACRES | CURVE NUMBER | TC HR | TT HR | ROUTING COEFFICIENTS K-HRS | X    | UNIT HYDRO |
|------------|------------|--------------|-------|-------|----------------------------|------|------------|
| 1          | *****      | 72.00        | 1.824 | 0.000 | 0.000                      | 0.00 | 1.0        |

\* \* \* COMPUTED VALUES FOR INDIVIDUAL WATERSHEDS \* \* \*

| WATERSHED | PEAK FLOW (CFS) | RUNOFF (INCHES) |
|-----------|-----------------|-----------------|
| 1         | 161.22          | .24             |

NOTE: SEDIMENT DOES NOT INCLUDE POSSIBLE DEPOSITION BY DELIVERY RATIO 2

\*\*\*\*\* SUMMARY TABLE FOR TOTAL WATERSHED \*\*\*\*\*

|                        |   |           |         |
|------------------------|---|-----------|---------|
| RUNOFF VOLUME          | = | 62.8326   | ACRE-FT |
| PEAK DISCHARGE         | = | 161.2236  | CFS     |
| AREA                   | = | 3097.6000 | ACRES   |
| TIME OF PEAK DISCHARGE | = | 13.30     | HRS     |

\* \* \* \* \*  
 NULL STRUCTURE

SUFCO: MSH 10 yr. 24 hr. event  
 Mud Spring Hollow

\*\*\* - HYDRAULIC INFILT. VALUES FOR SUBWATERSHEDS \*\*\*

| WATER SHED | AREA ACRES | CURVE NUMBER | T1 HR | T2 HR | ROUTING COEFFICIENTS K-HRS | K    | UNIT HYDRO |
|------------|------------|--------------|-------|-------|----------------------------|------|------------|
| 1          | *****      | 72.00        | .310  | 0.000 | 0.000                      | 0.00 | 1.0        |

\* \* \* COMPUTED VALUES FOR INDIVIDUAL WATERSHEDS \* \* \*

| WATERSHED | PEAK FLOW (CFS) | RUNOFF (INCHES) |
|-----------|-----------------|-----------------|
| 1         | 161.91          | .24             |

NOTE: SEDIMENT DOES NOT INCLUDE POSSIBLE DEPOSITION BY DELIVERY RATIO 2

\*\*\*\*\* SUMMARY TABLE FOR TOTAL WATERSHED \*\*\*\*\*

|                        |   |           |         |
|------------------------|---|-----------|---------|
| RUNOFF VOLUME          | = | 38.8505   | ACRE-FT |
| PEAK DISCHARGE         | = | 161.9082  | CFS.    |
| AREA                   | = | 1915.3000 | ACRES   |
| TIME OF PEAK DISCHARGE | = | 12.50     | HRS     |

\* \* \* \* \*  
 FULL STRUCTURE  
 \* \* \* \* \*

J4Co: Mine fan SME *24 hr peak*

\* \* \* COMPUTED VALUES FOR INDIVIDUAL WATERSHEDS \* \* \*

| WATERSHED | PEAK FLOW<br>(CFS) | RUNOFF<br>(INCHES) |
|-----------|--------------------|--------------------|
| 1         | .24                | .99                |

NOTE: SEDIMENT DOES NOT INCLUDE POSSIBLE DEPOSITION BY DELIVERY RATIO 2

\*\*\*\*\* SUMMARY TABLE FOR TOTAL WATERSHED \*\*\*\*\*

|                        |   |       |         |
|------------------------|---|-------|---------|
| RUNOFF VOLUME          | = | .0190 | ACRE-FT |
| PEAK DISCHARGE         | = | .2352 | CFS     |
| AREA                   | = | .2300 | ACRES   |
| TIME OF PEAK DISCHARGE | = | 12.00 | HRS     |

\*\*\*\*\* GENERATED DATA FOR INPUT INTO STRUCTURE 1 \*\*\*\*\*

\*\*\* HYDROGRAPH AND SEDIMENT GRAPH \*\*\*  
(TWO CONSECUTIVE VALUES PER LINE)

| TIME<br>(HR) | DISCHARGE<br>(CFS) | *****<br>* | TIME<br>(HR) | DISCHARGE<br>(CFS) |
|--------------|--------------------|------------|--------------|--------------------|
| 0.00         | 0.000              | *          | .10          | 0.000              |

54660 - ATOT 25 gr. - 21 hr peak  
 Area top of fill

WATERSHED IDENTIFICATION CODE  
 -----  
 SINGLE WATERSHED PEAK FLOW BATCH FILE

\*\*\*\*\*

\*\*\*\*\*  
 JUNCTION 1 BRANCH 1 STRUCTURE 1  
 \*\*\*\*\*

\*\*\* HYDRAULIC INPUT VALUES FOR SUBWATERSHEDS \*\*\*

| WATER SHED | AREA ACRES | CURVE NUMBER | TC HR | TT HR | ROUTING COEFFICIENTS K-HRS | X    | UNIT HYDRO |
|------------|------------|--------------|-------|-------|----------------------------|------|------------|
| 1          | 9.90       | 86.00        | .090  | 0.000 | 0.000                      | 0.00 | 0.0        |

\*\*\* COMPUTED VALUES FOR INDIVIDUAL WATERSHEDS \*\*\*

| WATERSHED | PEAK FLOW (CFS) | RUNOFF (INCHES) |
|-----------|-----------------|-----------------|
| 1         | 10.39           | 1.04            |

NOTE: SEDIMENT DOES NOT INCLUDE POSSIBLE DEPOSITION BY DELIVERY RATIO 2

*Area Top of Hill*  
*10 yr - 24 hr PEAK EVENT*

WATERSHED IDENTIFICATION CODE

SINGLE WATERSHED PEAK FLOW BATCH FILE

\*\*\*\*\*

\*\*\*\*\*  
 JUNCTION 1, BRANCH 1, STRUCTURE 1  
 \*\*\*\*\*

\*\*\* HYDRAULIC INPUT VALUES FOR SUBWATERSHEDS \*\*\*

| WATER SHED | AREA ACRES | CURVE NUMBER | TC HR | TT HR | ROUTING K-HRS | COEFFICIENTS X | UNIT HYDRO |
|------------|------------|--------------|-------|-------|---------------|----------------|------------|
| 1          | 9.90       | 86.00        | .090  | 0.000 | 0.000         | 0.00           | 0.0        |

\*\*\* COMPUTED VALUES FOR INDIVIDUAL WATERSHEDS \*\*\*

| WATERSHED | PEAK FLOW (CFS) | RUNOFF (INCHES) |
|-----------|-----------------|-----------------|
| 1         | 3.09            | .76             |

NOTE: SEDIMENT DOES NOT INCLUDE POSSIBLE DEPOSITION BY DELIVERY RATIO 2

*Slope of Hill*  
*15 yr 24 hr Peak Flow Event*

WATERSHED IDENTIFICATION CODE

SINGLE WATERSHED PEAK FLOW BATCH FILE

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\*\*\*\*\*  
JUNCTION 1, BRANCH 1, STRUCTURE 1  
\*\*\*\*\*

\*\*\* HYDRAULIC INPUT VALUES FOR SUBWATERSHEDS \*\*\*

| WATER SHED | AREA ACRES | CURVE NUMBER | TC HR | TT HR | ROUTING COEFFICIENTS K-HRS | X    | UNIT HYDRO |
|------------|------------|--------------|-------|-------|----------------------------|------|------------|
| 1          | 2.90       | 85.00        | .060  | 0.000 | 0.000                      | 0.00 | 0.0        |

\*\*\* COMPUTED VALUES FOR INDIVIDUAL WATERSHEDS \*\*\*

| WATERSHED | PEAK FLOW (CFS) | RUNOFF (INCHES) |
|-----------|-----------------|-----------------|
| 1         | 3.03            | .98             |

NOTE: SEDIMENT DOES NOT INCLUDE POSSIBLE DEPOSITION BY DELIVERY RATIO 2

Slope of fill  
10 yr - 24 hr Peak Flow Event

WATERSHED IDENTIFICATION CODE

SINGLE WATERSHED PEAK FLOW BATCH FILE

\*\*\*\*\*

\*\*\*\*\*  
JUNCTION 1, BRANCH 1, STRUCTURE 1  
\*\*\*\*\*

\*\*\* HYDRAULIC INPUT VALUES FOR SUBWATERSHEDS \*\*\*

| WATER SHED | AREA ACRES | CURVE NUMBER | TC HR | TT HR | ROUTING COEFFICIENTS K-HRS | X    | UNIT HYDRO |
|------------|------------|--------------|-------|-------|----------------------------|------|------------|
| 1          | 2.90       | 85.00        | .060  | 0.000 | 0.000                      | 0.00 | 0.0        |

\*\*\* COMPUTED VALUES FOR INDIVIDUAL WATERSHEDS \*\*\*

| WATERSHED | PEAK FLOW (CFS) | RUNOFF (INCHES) |
|-----------|-----------------|-----------------|
| 1         | 2.23            | .71             |

NOTE: SEDIMENT DOES NOT INCLUDE POSSIBLE DEPOSITION BY DELIVERY RATIO 2

SURCO: CBW PENT 10yr.-24 hr  
 Contributing Basin West

JUNCTION : BRANCH : STRUCTURE

\*\*\*\*\*

\*\*\* HYDRAULIC INPUT VALUES FOR SUBWATERSHEDS \*\*\*

| WATER SHED | AREA ACRES | CURVE NUMBER | TC HR | TT HR | ROUTING COEFFICIENTS K-HRS | X    | UNIT HYDRO |
|------------|------------|--------------|-------|-------|----------------------------|------|------------|
| 1          | 25.40      | 79.00        | .143  | 0.000 | 0.000                      | 0.00 | 1.0        |

\*\*\* COMPUTED VALUES FOR INDIVIDUAL WATERSHEDS \*\*\*

| WATERSHED | PEAK FLOW (CFS) | RUNOFF (INCHES) |
|-----------|-----------------|-----------------|
| 1         | 10.82           | .45             |

NOTE: SEDIMENT DOES NOT INCLUDE POSSIBLE DEPOSITION BY DELIVERY RATIO 2

\*\*\*\*\* SUMMARY TABLE FOR TOTAL WATERSHED \*\*\*\*\*

|                        |   |         |         |
|------------------------|---|---------|---------|
| RUNOFF VOLUME          | = | .9605   | ACRE-FT |
| PEAK DISCHARGE         | = | 10.8228 | CFS     |
| AREA                   | = | 25.4000 | ACRES   |
| TIME OF PEAK DISCHARGE | = | 12.10   | HRS     |

\*\*\*\*\*

NULL STRUCTURE

30 ECR : CBU 25 yr.  
 Contributing Basin West 25 yr. - 24 hr  
 Peak Flow

WATERSHED IDENTIFICATION CODE  
 -----  
 SINGLE WATERSHED PEAK FLOW BATCH FILE

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\*\*\*\*\*  
 JUNCTION 1 BRANCH 1 STRUCTURE 1  
 \*\*\*\*\*

\*\*\* HYDRAULIC INPUT VALUES FOR SUBWATERSHEDS \*\*\*

| WATER SHED | AREA ACRES | CURVE NUMBER | TC HR | TT HR | ROUTING COEFFICIENTS K-HRS | X    | UNIT HYDRO |
|------------|------------|--------------|-------|-------|----------------------------|------|------------|
| 1          | 25.40      | 79.00        | .143  | 0.000 | 0.000                      | 0.00 | 1.0        |

\*\*\* COMPUTED VALUES FOR INDIVIDUAL WATERSHEDS \*\*\*

| WATERSHED | PEAK FLOW (CFS) | RUNOFF (INCHES) |
|-----------|-----------------|-----------------|
| 1         | 16.47           | .67             |

NOTE: SEDIMENT DOES NOT INCLUDE POSSIBLE DEPOSITION BY DELIVERY RATIO 2

SHFCO  
 REVISED (Resurveyed  
 Sediment Profile  
 8-11-83  
 R. Summers

