



STATE OF UTAH  
NATURAL RESOURCES  
Oil, Gas & Mining

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May 15, 1987

Mr. Richard Blonquist  
Summit Coal Company  
P. O. Box 752  
Coalville, Utah 84017

Dear Mr. Blonquist:

Re: State Permit and Decision Document, Boyer Mine, ACT/043/008,  
Folder No. 3, Summit County, Utah

Enclosed is the five-year permanent program mining permit for the Boyer Mine. Two originals are included. Please read the special conditions in Attachment A, then sign both copies and return one to the Division.

Also enclosed is the state's Decision Document, including the Findings, Technical Analysis, and the Cumulative Hydrologic Impact Assessment.

Since there are a substantial number of stipulations, please read them carefully and note when responses are due. If you have questions about any of the stipulations please contact Susan Linner.

Thank you for your cooperation during the permitting process.

Best regards,

A handwritten signature in cursive script that reads "Dianne R. Nielson".

Dianne R. Nielson  
Director

SCL:jvb  
cc: R. Hagen  
L. Braxton  
B. Team  
0028R-52

## CONTENTS

FINDINGS

CUMULATIVE HYDROLOGIC IMPACT ASSESSMENT (CHIA)

STIPULATIONS

TECHNICAL ANALYSIS

FIGURES

APPENDIX

LETTERS OF CONCURRENCE

Division of State History, September 15, 1986  
Division of Wildlife Resources, April 6, 1987  
Summit County Health Dept., October 14, 1986

PERMIT

1177R

## FINDINGS

Summit Coal Company  
Boyer Mine  
PRO/043/008  
Summit County, Utah

May 15, 1987

1. The Mining and Reclamation Plan (MRP) is 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 (UMC 786.19[a]).
2. The applicant proposes acceptable practices for the reclamation of disturbed lands (MRP, Section 3.6). 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. Never the less, the regulatory authority has determined that reclamation, as required by the Act, can be feasibly accomplished under the 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 regulatory authority. 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.)
4. The proposed permit area is (UMC 786.19[d]):
  - A. Not included within an area designated unsuitable for underground coal mining operations (MRP, Section 2.5, pp. 2-6, 2-7).
  - B. Not within an area under study for designated lands unsuitable for underground coal mining operations (MRP, Section 2.5, p.2-6).
  - 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) (MRP, sections 1.2, 2.5).
  - D. Within 100 feet of the outside right-of-way line of a public road. The Division gave notice and opportunity for a public hearing as required by UMC 786.12(d). No requests for a hearing were received within the comment period. Therefore, the Division has determined that the interests of the public will be protected and hereby gives the applicant a variance to the prohibition of UMC 761.12(d).

- E. Not within 300 feet of any occupied dwelling. The applicant has provided Plate 2-1, showing the location of all buildings within 1000 feet of the permit area. This map shows no occupied dwellings to be within 300 feet of current or proposed surface facilities. The Division has confirmed this with a pace survey.
5. The 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 September 15, 1986 attached to TA.
  6. The applicant has the legal right to enter and begin underground activities in the permit area through two fee leases (MRP, Section 2.4, Appendix 2-3) (UMC 786.19[f]).
  7. The applicant has shown that prior violations of applicable law and regulations have been corrected (MRP, section 2-3; see attached memo from Joe Helfrich, DOGM Compliance Coordinator) (UMC 786.19[i]).
  8. Summit Coal Company is not considered delinquent at this time in payment of fees for the Abandoned Mine Reclamation Fund for its exploration operation (Personal communication, John Sender, OSM Fee Compliance Specialist, May 11, 1987) (UMC 786.19[h]).
  9. The applicant does not control and has not controlled exploration 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 (See attached memo from Joe Helfrich) (UMC 786.19[i]). The applicant has not been permitted for underground mining operations to date.
  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]). Summit Minerals Inc. has filed an application with the Division to reopen the old Blackhawk Mine. Leases to be mined would be south of the applicant's proposed workings. At the present time, Summit Coal Company does not propose to mine leases beneath Blackhawk Mine surface facilities.
  11. A detailed analysis of the proposed bond had been made. The Division has determined that \$100,900.00 is adequate to cover the costs which would be incurred by the state if it was required to contract for final reclamation at the minesite. The applicant has posted a collateral bond in the form of property whose value has been appraised to be greater than or equal to the required bond amount.

12. No lands designated as prime farmlands or alluvial valley floors occur on the permit area (MRP, Sections 7.3, 8.4, Appendix 9-2) (UMC 786.19[1]).
13. The proposed postmining land use of the permit area has been found to comply with local land use plans and to be compatible with long range land use objectives (see TA section UMC 817.133). No conditions have been placed on the proposed postmining land use by the surface landowner (UMC 786.19[m]).
14. The regulatory authority has made all specific approvals required by the Act, and the approved Sate Program (UMC 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 Section 10.3.3, also see TA Section UMC 817.97). The Utah Division of Wildlife Resources has concurred with the Fish and Wildlife Plan.
16. All procedures for public participation required by the Act, and the approved Utah State Program have been complied with (UMC 786.23(a)[2]).

Prior to the permit taking effect, the applicant must sign the permit, indicating its compliance with the special stipulations in the permit.

*ASusan C. Zinner*  
Permit Supervisor

*Deanne R. Nielson*  
Associate Director, Mining  
Division of Oil, Gas and Mining

*James P. Branta*  
Admirator,  
Mineral Resource Development  
and Reclamation Program

*Deanne R. Nielson*  
Director  
Division of Oil Gas and Mining

*Alan J. Bachman*  
Assistant Attorney General  
Approved as to Form

# Cumulative Hydrologic Impact Assessment

Summit Coal Company  
Boyer Mine  
PRO/043/008 #2  
Summit County, Utah

and

Summit Minerals, Inc.  
No. 1 Coal Mine (Blackhawk Mine)  
Reclamation Plan  
PRO/043/001  
Summit County, Utah

## I. Introduction

This report is a Cumulative Hydrologic Impact Assessment (CHIA) of the mining area encompassing Summit Coal Company's Boyer Mine and Summit Minerals Inc.'s # 1 Mine (Blackhawk) Reclamation Project in Summit County, Utah. This assessment depicts the probable cumulative impacts of the proposed coal mining activities on the hydrologic regime encompassing the general area of the above mentioned operations. The operations are designed to prevent damage to the hydrologic balance outside the proposed mine plan areas. The Permit Application Packages (PAP) submitted by the mining companies and this report comply with federal legislation promulgated under the Surface Mining Control and Reclamation Act (SMCRA) and subsequent Utah and federal regulatory programs outlined under UMC 786.19(c) and 30 CFR 784.14(f).

Mining activities currently taking place in the Coalville Field consist of a coal exploration operation being conducted by Summit Coal Company at the Boyer Mine and a mine reclamation operation proposed by Summit Minerals, Inc. at the Blackhawk minesite. No other operating mines or mining prospects exist in the Coalville Field at this time.

Mining has taken place in the Coalville Field since 1854. Doelling (1972) lists several abandoned minesites within the Coalville Field (Table 5, page 350) which were mostly small operations around the turn of the century. Two mines, the Wasatch and Chappell Mines, were substantially larger mines that operated until 1954 and 1970 respectively. These two mines lie approximately 7 miles west of the Boyer and Blackhawk minesites.

In 1879 the N. B. Morby Shaft was sunk near the present Blackhawk mine site. Additional entries were opened by subsequent operators and developed into the old Blackhawk mine. The old Blackhawk Mine workings encompassed about 16 acres. The mine was closed in the mid-1950's. A new Blackhawk Mine was developed east of the old site by Utah Coal and Energy, Inc. The old Blackhawk mine openings were buried during face preparation of the new mine site.

The Boyer and Blackhawk minesites are located approximately 12 miles east of the town of Coalville and about 30 miles northeast of Salt Lake City, Utah (Figure 1).

The mine sites are physiographically located near the western edge of the Central Rocky Mountains. The area is bounded on the west by the Wasatch Mountains and on the east by the Uinta Mountains. This transition zone reflects a topography characterized by high mountainous hills and well developed drainages. Relief in the vicinity of the proposed mines range from 6200 feet at Chalk Creek to 8270 feet on the crest of Porcupine Ridge. Bedrock structure in combination with faulting, erosion and landslides have created irregular drainage patterns and topographic features in the surrounding area.

The climate of the mine area is typically semiarid and continental. Average monthly temperatures vary from 32° in January to 79° in July. The temperatures are predominately cool with an average length of freeze-free period at the site of about 80 days each year (Jeppson et al., 1968). Most precipitation in the region of the mines occurs due to frontal activity during the winter months. Two-thirds of the annual average precipitation occurs during the months of October through April. Two periods of peak precipitation activity take place. During the fall months high precipitation occurs mainly in the form of snow, and in the spring precipitation occurs as mixed rain and snow events (Figure 2). Annual rainfall averages about 20 inches.

Two oil wells shown in Plate 1 ("S" #1 and "S" #2) have been drilled east of the CHIA on the axis of the Dry Canyon Anticline by AMOCO Production Co. The wells are located in T. 3N. R. 7E. Section 30. Well "S" #2 (in CIA) was drilled after part of the drill stem was lost in "S" #1 (east of CIA). Total depth in well "S" #2 was 13,041 feet. Neither well contacted oil or gas.

## II. Cumulative Impact Area (CIA)

The Cumulative Impact Area encompasses approximately 1580 acres and is shown in Plate 1. The CIA was established to incorporate potential mining areas adjacent to current proposed operations.

## III. Scope of Mining

The proposed operations are 1 mile east of Upton, Utah on the hillsides adjacent to the valley of Chalk Creek. The Boyer Mine is located on the south facing slope. The Blackhawk reclamation site and the proposed No. 1 Coal Mine are located on the north facing slope (Plate 1).

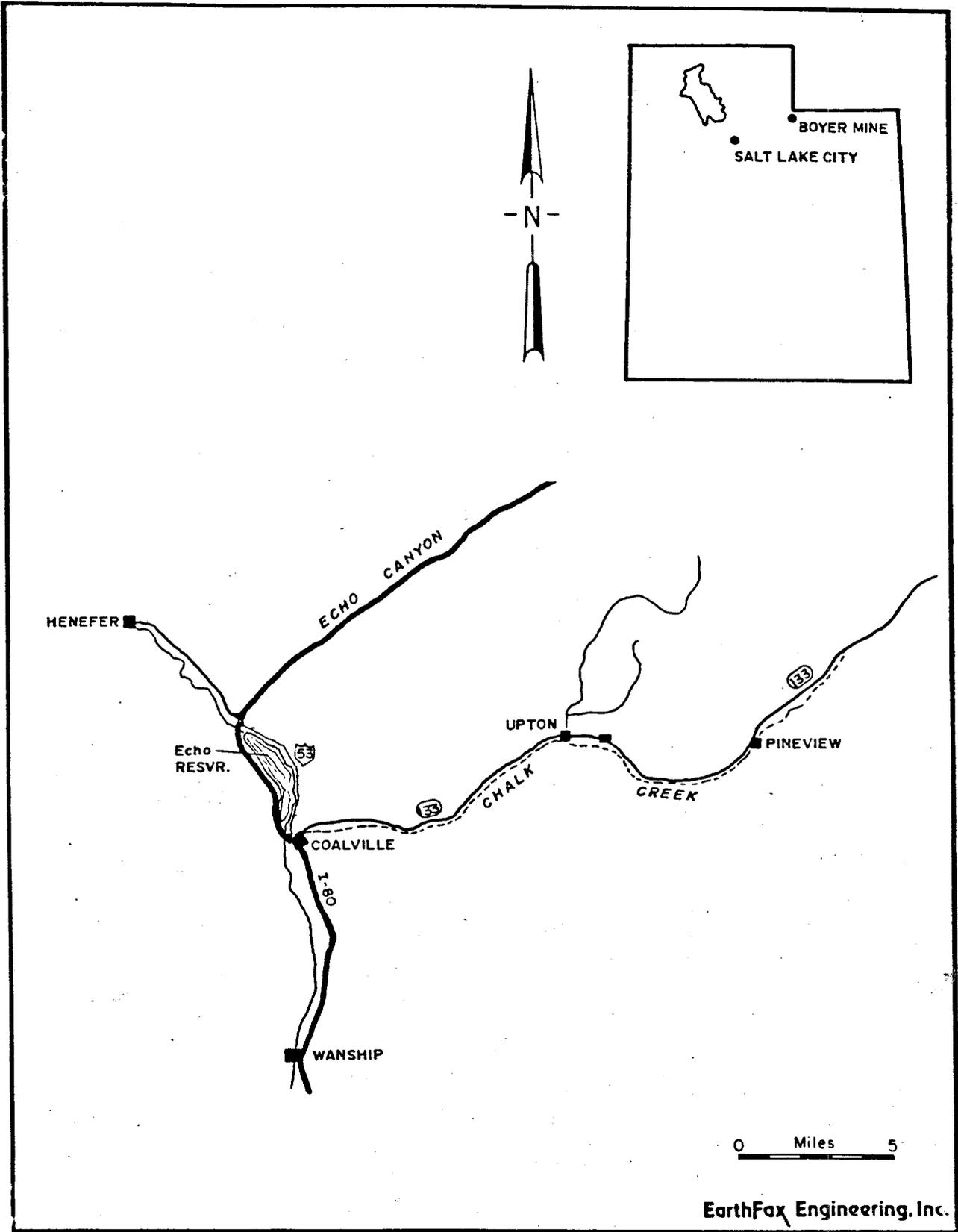


Figure 1. Boyer-Blackhawk CIA vicinity map.

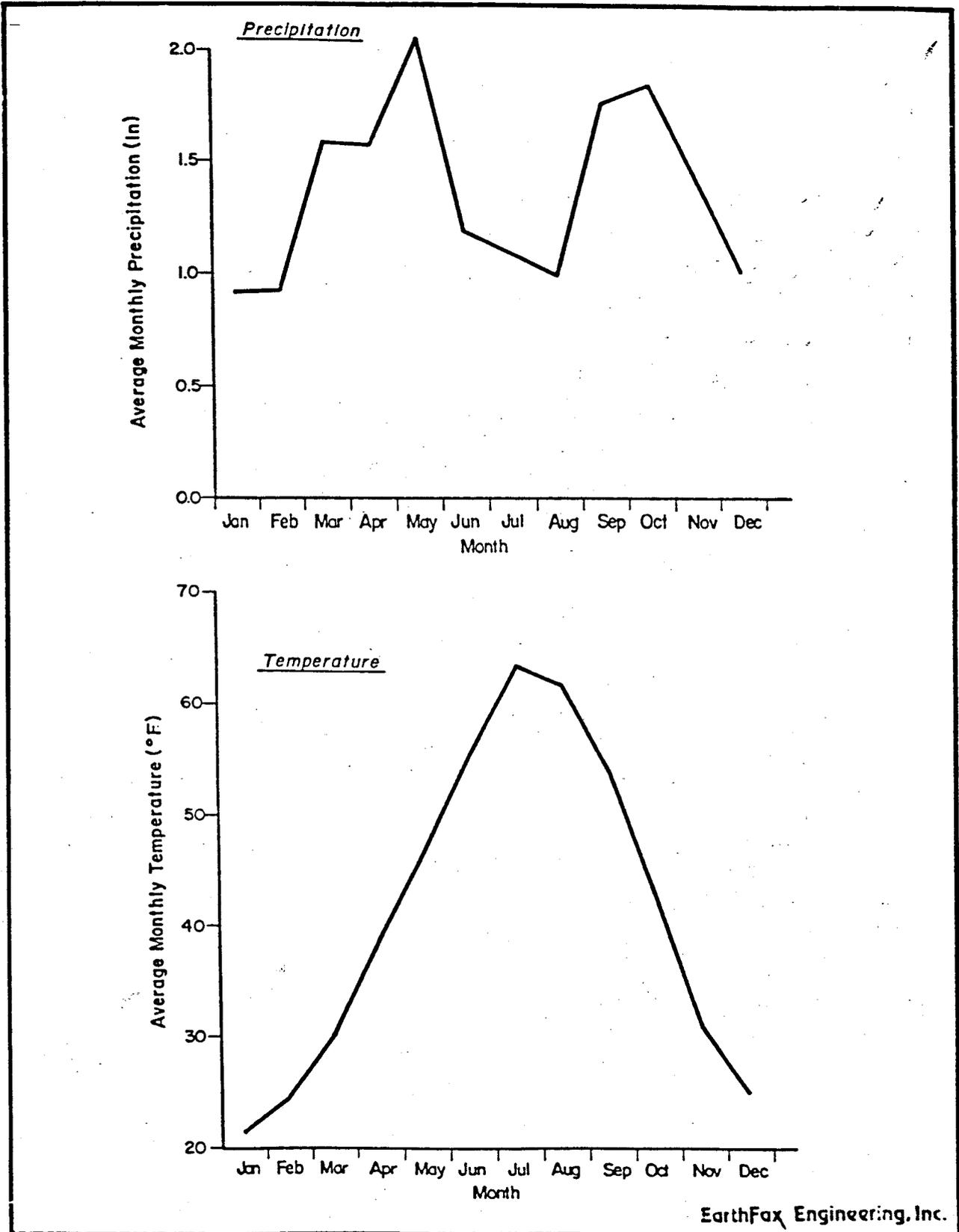


Figure 2. Average monthly precipitation and temperatures at the Coalville weather station.

The mines are being developed in the Wasatch Coal Bed of the Frontier Formation in an area where sporadic mining activities have occurred over the past 90 years.

A. Boyer Mine

Summit Coal Company received a coal exploration permit for the Boyer Mine on August 1, 1985. The permit entitled Summit Coal Company to extract 10,000 tons of coal for testing purposes. The permit was later modified (September 25, 1986) to allow another 15,000 tons or a total of 25,000 maximum tons of coal to be extracted for test purposes.

Recently, Summit Coal Company submitted a permit application to expand their mine workings to an area of about 170 acres. The mine is projected for room and pillar mining utilizing a continuous miner. The layout is typical with mains driven down dip and panels developed on the strike. The layout has been modified to parallel property boundaries and avoid old workings. The submains will be driven at 45 degrees to the dip to reduce the mine grade from the average dip grade of 17 degrees to 12 degrees. Mining projections show that mining will be limited to development of submains for the first two years through 1989 before the first panel will be driven southwest along the strike toward the outcrop.

B. Blackhawk Mine

Summit Minerals, Inc. is in the process of obtaining a Reclamation Permit for the Blackhawk Mine which consists of 17.7 acres of surface disturbance and a small amount of underground activity (Plate 1). Plans have also been submitted by Summit Minerals, Inc. to establish a new mine called the No. 1 Coal Mine which will encompass about 480 acres in the south 3/4 of Section 36, T.3N., R.6E. (Plate 1).

IV. Study Area

A. Geology

The CIA is located near the eastern border of the Coalville Coal Field. The Coalville Coal Field lies within the southern portion of the Idaho-Wyoming-Utah overthrust belt. Folds related to eastward thrusting associated with Cretaceous organic events are the dominant feature. The Coalville anticline is the largest feature within the Coalville Coal Field. It is an asymmetrical anticline 10 miles long and 6 to 8 miles wide. The axis trends northeast. The west limb is badly faulted and three predominately north striking normal faults have been mapped. The east limb of the anticline dips steeply and is sometimes vertical or overturned. About 1.5 miles to the east is the Clark Canyon syncline. Its east limb dips 15 to 25 degrees and forms the west limb of the Dry Canyon anticline, the structural feature of the CIA area.

The geology in the vicinity of the CIA consists of stratigraphic units of consolidated rock ranging in age from Late Cretaceous to Tertiary (Figures 3 and 4). The exposed Cretaceous formations were deposited during the Albian through Campanian Ages and consist of resistant sandstones, conglomerates, shales and interbedded coal seams. Angularly overlying all other beds are the redish conglomerates and variegated shales of the Knight Formation, Tertiary in age. Erosion has created long deep canyons that are filled with Quaternary alluvial gravels and remnant terraces.

The Cretaceous and Tertiary rocks make up at least 18,000 feet of strata in the vicinity of the coal field. There are three coal zones within the limits of the coal field, the Dry Hollow seam in the Wanship Formation and the Wasatch and Spring Canyon. All coal seams exist in the Frontier Formation.

Major disconformities exist in the area due to thrust faulting. These faults do not appear near the surface of the CIA, but exist several thousand feet below the surface and are the source of some oil reserves a few miles east of the property in the Pineview Oil Field. Folded Cretaceous strata and deposition of fluvial Tertiary strata (Wasatch Formation) created a significant unconformity seen on the mining property.

Faulting is prevalent in the coal field as a result of structural deformation from eastward thrusting. One fault is noted to the east of the Boyer Mine. Its throw is estimated to be from between 50 to 150 feet. Its presence should not have an influence on the current mine plan.

## V. Hydrologic Resources

### A. Ground water

Ground water exists in confined and unconfined states in the vicinity of the CIA. Snowmelt at higher elevations provides most of the source of ground water recharge, particularly where permeable lithologies are exposed at the surface. Vertical migration of ground water occurs through permeable rock units and/or along zones of faulting and fracturing. Lateral migration initiates when groundwater encounters impermeable rock and flows laterally until either the land surface is intersected creating a perched spring or until vertical movement can continue.

Unconfined aquifer conditions occur in the alluvial sediments that fill the valleys of Chalk Creek, Huff Creek and Josh Hollow adjacent to the mine plan areas. Other unconfined aquifers, actually a perched aquifers, exists within the nearly horizontal Knight Formation where shale beds act as aquatards to impede downward groundwater movement.



Figure 3. Geologic Map of the region surrounding the CIA.  
(Modified from Trexler, 1966)

**CONTACTS**

Contact (dashed where approximately located)

Contact (inferred)

**FAULTS**

High angle fault (U, upthrown side; D, downthrown side; dashed where approximately located, dotted, concealed)

Doubtful or probable fault

**FOLDS**

Anticline (Dashed where approximately located, dotted, concealed)

**EXPLANATION**

**RECENT**

Qal Valley alluvium (including slope-wash)

Qf Alluvial fans (including valley alluvium in canyons)

Qls Landslide

Qt Alluvial terraces (including dissected valley alluvium)

Qfd Dissected alluvial fans

Qgl Glacial deposits

**PLEISTOCENE (?)**

Qd Knight formation

**EDENE**

Pulpit conglomerate

Kh Hensler formation

**UPPER CRETACEOUS**

Kfu, Kfj, Kfm, Kf, Kfd, Kf, Kf, Kfg, Kf, Kfs

Frontier formation (Kfu, Upton sandstone member; Kfj, Judd shale member; Kfm, Meadow Creek sandstone member; Kfd, Dry Hollow sandstone member; Kf, Coalville conglomerate member; Kfd, Oyster Ridge sandstone member; Kfg, Grass Valley shale member; Kfc, Chalk Creek member; and Kfs, Skunk Point sandstone member)

**LOWER CRETACEOUS**

Kk Kelvin (?) formation

**QUATERNARY**

**TERTIARY**

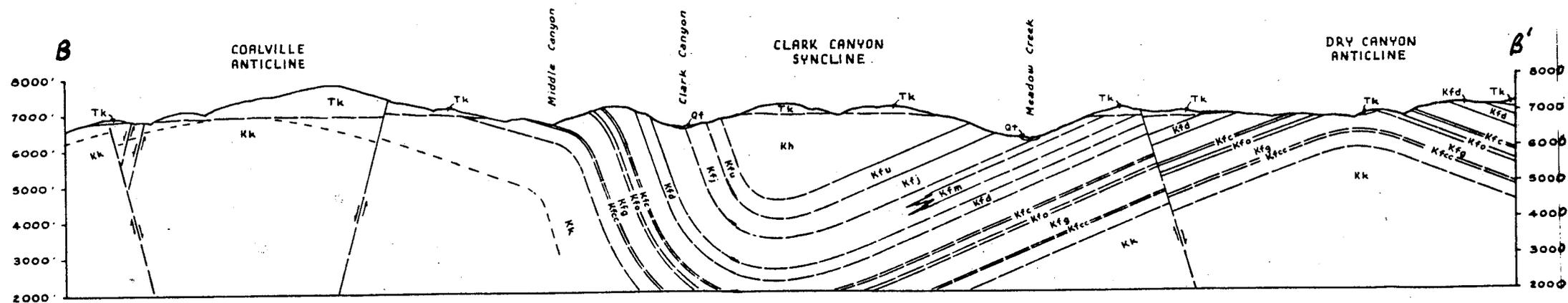
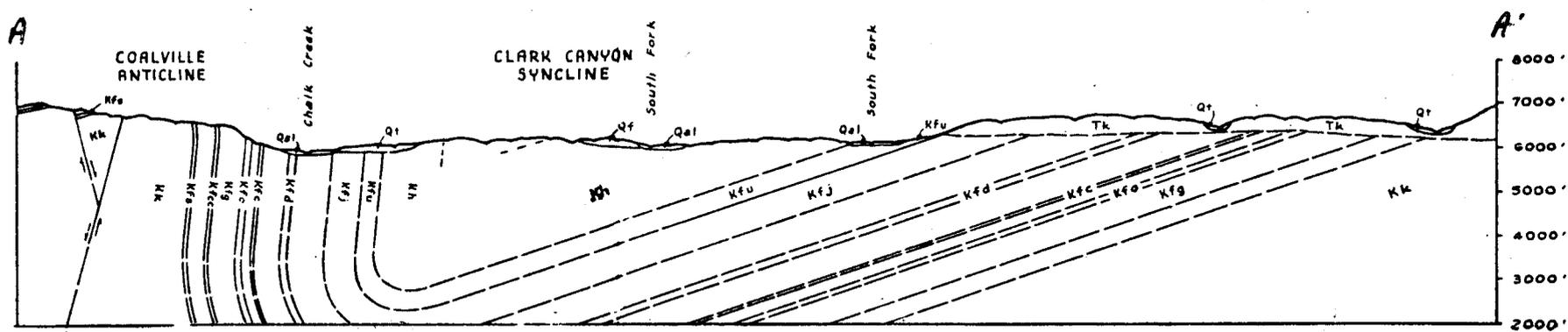


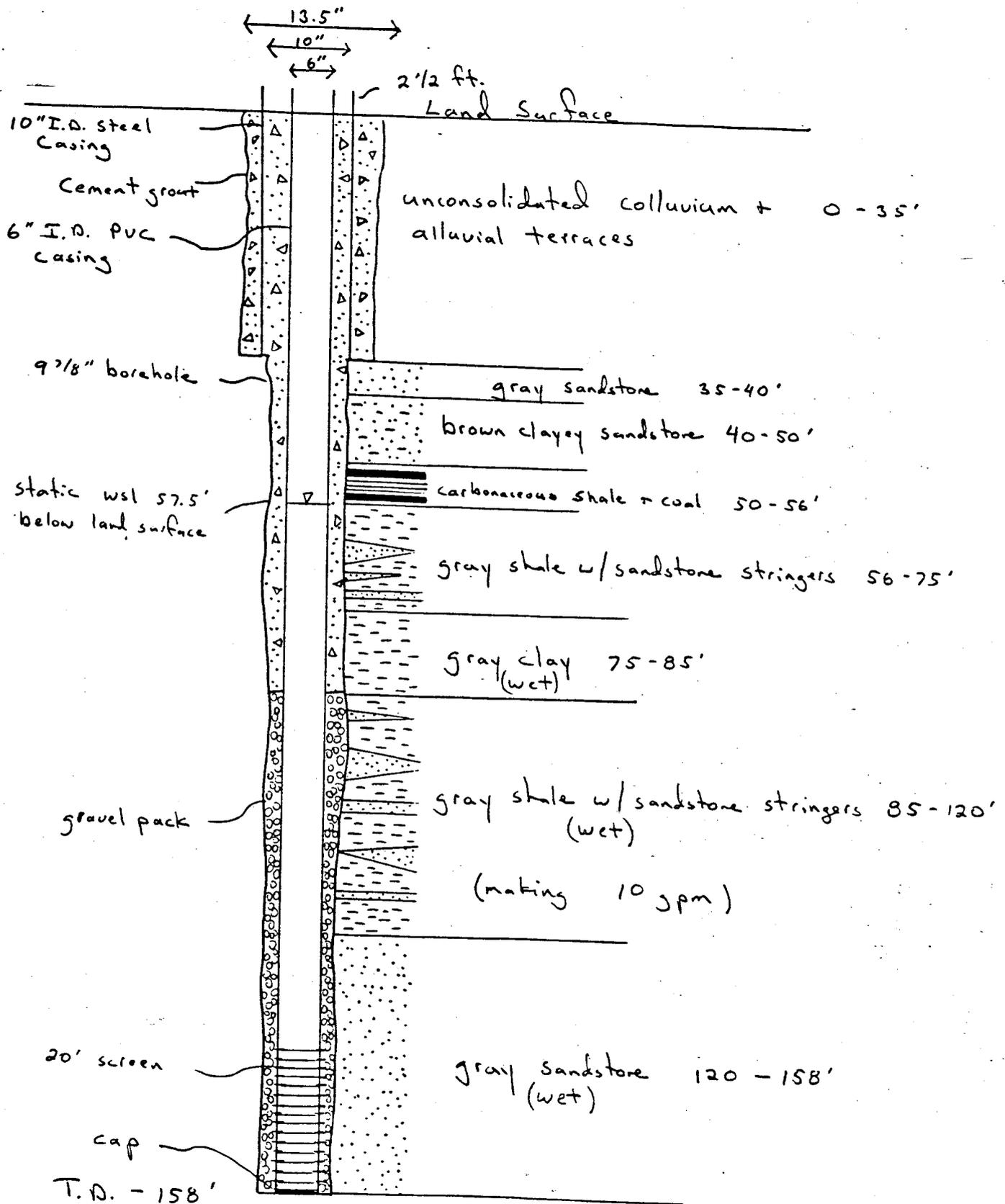
Figure 4. Geologic cross-sections showing structure south and north of CIA.  
 (Modified from Trexler, 1966)

While drilling a monitoring well on the Boyer Mine property Summit Coal Company contacted a confined aquifer in a gravel bed about 100 feet below the Wasatch coal seam (Figure 5).

The alluvium of Chalk and Huff Creeks comprises the major ground water source for the area. The water source that supplies these aquifers comes from the stream itself. The stream originates high up in the mountains from springs or direct runoff from snowmelt. The alluvium is quite permeable and can yield up to 2000 gallons per minute (gpm) in some areas. Only a few wells in the vicinity withdraw water from the alluvial aquifer at low rates (2 to 10 gpm) for culinary purposes.

Surveys were conducted by EarthFax Engineering, Inc. in June and October 1985 to identify the locations and characteristics of seeps and springs in the vicinity of the Boyer Mine permit area (Figure 6). Five springs are located within the CIA area and a total of thirty-four seeps and springs were found within one mile of the CIA boundary. Most issued near the contact between the Tertiary Knight Formation and the Quaternary alluvial gravels between the 6400 and 6600 foot elevation. During the June survey, 11 of the sources existed as seeps where no measurable flow was occurring, but water was visible. Maximum measured flows were 10 gallons per minute (gpm). By that October, 7 of the seeps and 7 of the springs were dry and flows at the other springs had decreased (Table 1).

There are 10 wells in the vicinity of the CIA (Figure 7, Table 2). Three wells were drilled near the town of Upton, the LDS well, the Boyer-2 well and the Orgill well. The Clark well lies west of Upton and has little bearing on the CIA. The LDS well was drilled to a depth of 517 feet, in a shale bed and did not contact water. The Boyer and Orgill wells are developed in the alluvium of Huff Creek to a depth of 183 feet and 160 feet. Water was contacted in both wells at about the 100 foot level. The Staley well and Old well lie along the southwest edge of the Boyer Mine property. Both wells appear to be developed in the same source aquifer and apparently receive water from a perched aquifer that discharges into the alluvium from the Knight Formation. The Morby and Boyer-1 wells are located on the eastern border of the CIA. The Morby well withdraws water from the alluvial gravels of Chalk Creek that seems to be a mixture of water from the Knight Formation and the alluvial aquifer of Chalk Creek. Whereas, the Boyer-1 well appears to withdraw water from the alluvial aquifer of Chalk Creek. A fault situated between the wells and the mine may obstruct the westward migration of water within the perched aquifer of the Knight Formation and cause it to discharge in the vicinity of the Morby well. This would account for the higher water level readings in the Morby well as compared to the Old and Staley wells. The Jones well is also located in the alluvial gravels of Chalk Creek. Its depth is 58 feet and static water level is 10 feet near the level of the creek. The Utah Coal and Energy well was drilled 325 feet deep and extends into the Frontier Formation. Unfortunately, no other information could be found concerning water levels or quality.



2 h.p. submersible pump set at 151'

Figure 5. Boyer Mine well log.

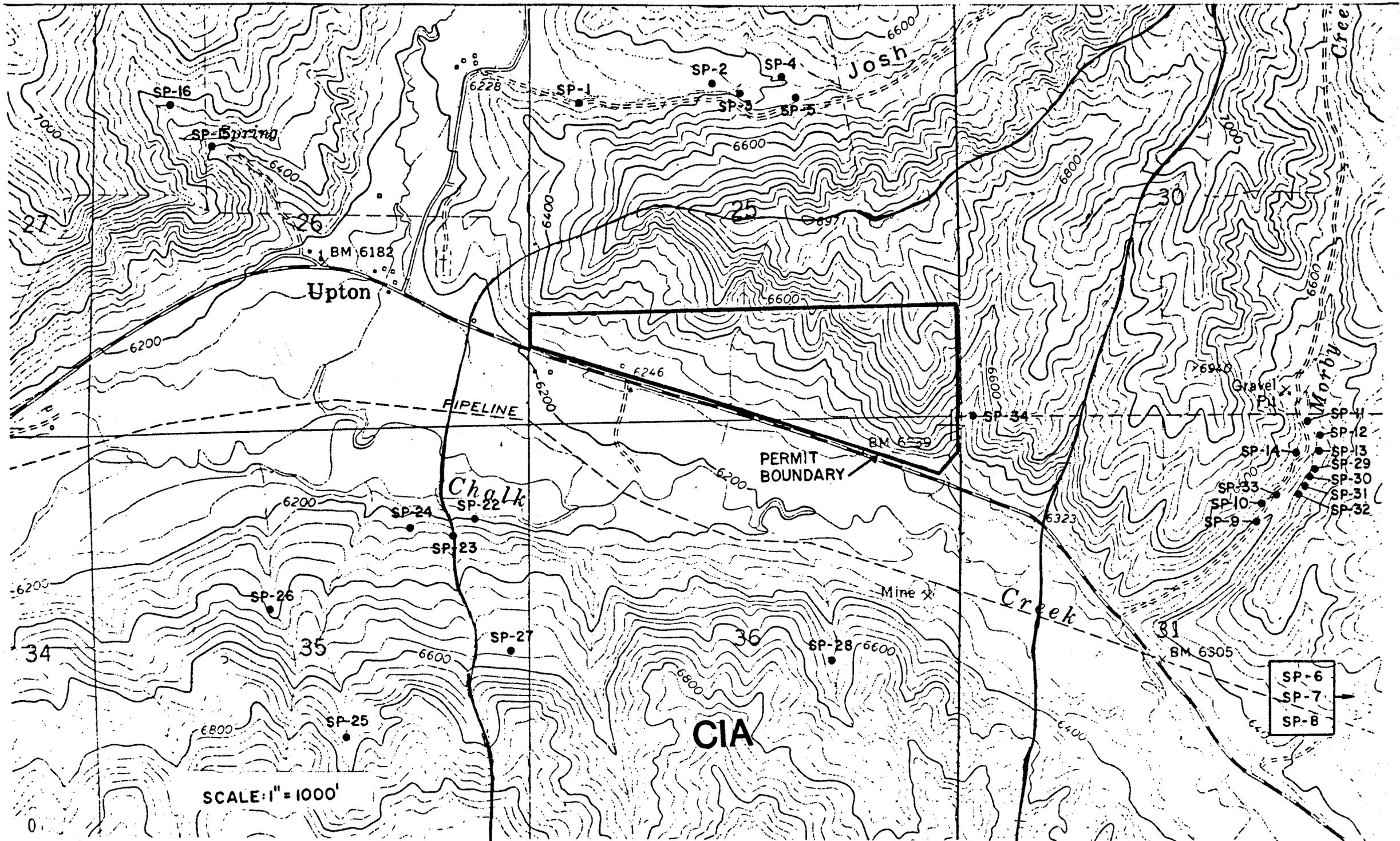


Figure 6. Spring and seep locations on and adjacent to the CIA.

Table 1.

## Characteristics of seeps and springs in the permit and adjacent areas.

| Field Number | May and June 1985 |            |               | October 1985    |            |               | Geologic Conditions          | Comments                     |
|--------------|-------------------|------------|---------------|-----------------|------------|---------------|------------------------------|------------------------------|
|              | Flow (gpm)        | pH (units) | Sp. Cond. (a) | Flow (gpm)      | pH (units) | Sp. Cond. (a) |                              |                              |
| SP-1         | 4                 | 6.48       | 850           | 4               | 7.5        | 850           | See comments                 | Flowing well                 |
| SP-2         | 1                 | 6.84       | 900           | <<1             | (b)        | (b)           | From alluvial terrace        | Diffuse seepage              |
| SP-3         | 5                 | 7.10       | 930           | Dry             | (b)        | (b)           | Alluvium (top of terrace)    | Diffuse seepage              |
| SP-4         | 0                 | (b)        | (b)           | Dry             | (b)        | (b)           | Alluvium (top of terrace)    | Diffuse seepage              |
| SP-5         | 0                 | (b)        | (b)           | Dry             | (b)        | (b)           | Alluvium (top of terrace)    | Diffuse seepage              |
| SP-6         | 4                 | 7.03       | 700           | Dry             | (b)        | (b)           | Soil over conglomerate       | Diffuse seepage              |
| SP-7         | 0                 | (b)        | (b)           | Dry             | (b)        | (b)           | Alluvium adjacent to channel | Diffuse seepage              |
| SP-8         | 3                 | 7.22       | 590           | Dry             | (b)        | (b)           | Alluvium from channel bottom | Stock usage                  |
| SP-9         | <1                | 7.21       | 510           | <1              | 8.6        | 550           | Colluvium over sandstone     | Hillside seepage             |
| SP-10        | 0                 | (b)        | (b)           | 0               | (b)        | (b)           | Colluvium over sandstone     |                              |
| SP-11        | 3                 | 7.36       | 650           | 5               | 7.3        | 950           | Alluvium in Morby Creek      | Several springs              |
| SP-12        | 3                 | 7.44       | 620           | 1               | 7.2        | 920           | Alluvium in Morby Creek      | Iron stains                  |
| SP-13        | 2                 | 7.88       | 1140          | <1              | 7.8        | 1060          | Alluvium in Morby Creek      | Several springs, stock usage |
| SP-14        | 1                 | 7.90       | 1000          | 2               | 7.9        | 1040          | Road fill over conglomerate  |                              |
| SP-15        | 10<br>(overflow)  | 7.66       | 920           | 8<br>(overflow) | 7.1        | 1050          | Sandstone over shale?        | Developed for domestic use   |
| SP-16        | <1                | 7.80       | 1110          | 1               | 7.2        | 1400          | Sandstone over shale?        | Developed for stockwatering  |
| SP-17        | 3                 | 7.25       | 550           | 1               | 7.9        | 550           | Sandstone over siltstone     | Developed with berm to pond  |

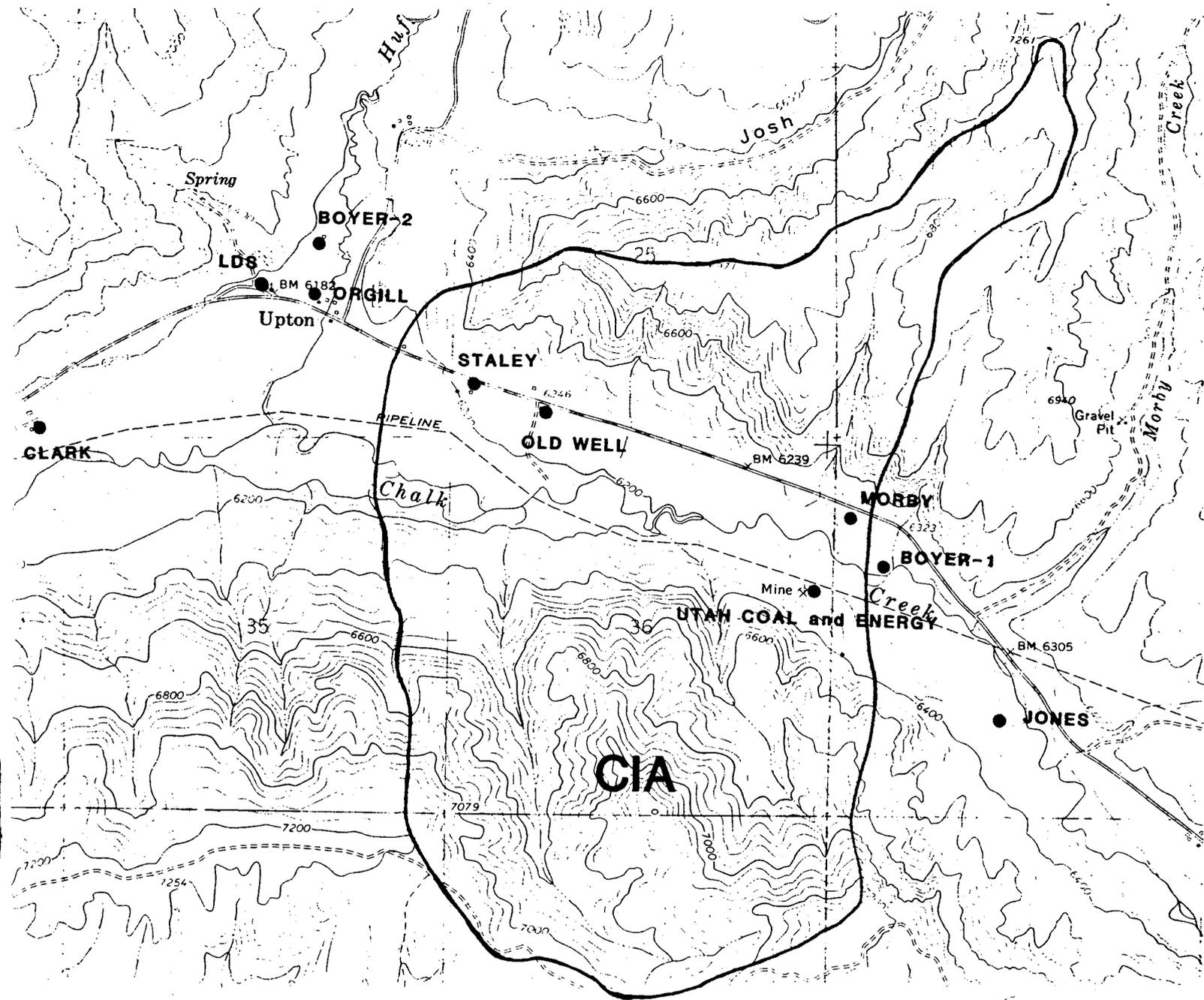


Figure 7. Location of water wells on and adjacent to the CIA.

Table 2. Selected information for water wells in the Upton area.

| Well Name | Diameter (in) | Total Depth (ft) | Screened Interval (ft) |     | Lithology (a)     | SWL (ft) | Date Measured | Estimated Flow Rate (gpm) (b) |
|-----------|---------------|------------------|------------------------|-----|-------------------|----------|---------------|-------------------------------|
|           |               |                  | From                   | To  |                   |          |               |                               |
| Boyer-1   | 6             | 170              | 110                    | 170 | SS                | 20       | 4/81          | 4.6                           |
| Boyer-2   | 8             | 183              | Open below 140         |     | Cg                | 110      | 11/76         | nd                            |
| Clark     | 6             | 45               | Not reported           |     | Cg                | 12       | 3/58          | nd                            |
| Jones     | 6             | 58               | None                   |     | Cg                | 10       | 3/50          | nd                            |
| LDS       | 6             | 517              | None                   |     | Reported dry hole |          | 9/80          | nd                            |
| Morby     | nd            | nd               | nd                     |     | nd                | nd       | nd            | nd                            |
| Old Well  | 6             | 120              | Not reported           |     | SS                | 50       | 4/58          | 10                            |
| Orgill    | 6             | 160              | 140                    | 160 | Sh                | 90       | 10/66         | nd                            |
| Staley    | 6             | 80               | Not reported           |     | SS                | 40       | 3/58          | nd                            |
| Utah Coal | 7.5           | 325              | 295                    | 325 | SS                | nd       | nd            | nd                            |

(a) SS=sandstone, Cg=conglomerate, Sh=shale

(b) Yield reported on drillers log (Attachment D)

nd = no data

Groundwater quality varies, depending on geology, physiography, and elevation. The best quality usually occurs in or near mountain recharge areas and the poorest quality in lowland areas. Major chemical concentrations in groundwater contained in bedrock near Chalk Creek consist of sodium, calcium and bicarbonate. Closer to the ridges on either side of Chalk Creek ground water contains higher concentrations of calcium, magnesium and chloride. The concentration of dissolved solids in water from the Old well which is thought to discharge from a perched aquifer of the Knight Formation ranges from 2580 to 2870 mg/l. Dissolved solid concentrations in water from the Boyer-1 well and the Morby well range about 380 mg/l and 1000 mg/l which are considered to be alluvial in nature. The higher concentration of dissolved solids in the Morby may be caused by mixing of water from a perched aquifer of the Knight Formation and alluvial aquifer. The dissolved solid concentration in the Mine well located in the Frontier Formation ranges about 370 mg/l.

#### B. Surface Water

The CIA is located in the Chalk Creek drainage. Chalk Creek is tributary to the Weber River. Their confluence lies near Coalville, Utah.

The Weber River Basin has a drainage area of approximately 2080 square miles (mi<sup>2</sup>). The Weber River heads in the Uinta Mountains and generally flows northwestward through the Wasatch Range and into the Great Salt Lake. Elevations in the Weber River basin range from approximately 4210 feet to 11,708 feet. There are five major tributaries to the Weber River; Ogden River and East Canyon, Lost, Chalk, and Beaver Creeks.

The CIA, as shown on Plate 1, consists of 1,580 acres of the Chalk Creek watershed. Topography in the area is gently sloping to steep with slopes ranging from 2 to 70 percent.

The CIA is divided by Chalk Creek flowing east to west with ephemeral tributaries that drain into Chalk Creek. Other water resources within or adjacent to the CIA include several low yielding springs and seeps. There are no major ponds, reservoirs or lakes within or adjacent to the CIA.

The estimated annual sediment yield is approximately 0.42 to 1.20 ac-ft/mi<sup>2</sup> for the Boyer Mine permit area (Earthfax Engineering, 1986). Due to the similarity of soil types over the entire CIA the average annual sediment yield of the CIA is estimated to be 1.09 to 2.96 ac-ft for undisturbed conditions.

#### Chalk Creek

The headwaters of Chalk Creek are located in the Chalk Creek Basin near the border of Utah and Wyoming. The creek flows for approximately 25 miles generally westward to its confluence with the Weber River near Coalville, Utah.

The Chalk Creek drainage area contains 250 sq. mi. above USGS gaging station 10131000, Chalk Creek at Coalville, Utah, which is approximately 0.3 mile from the confluence of Chalk Creek and the Weber River. The period of record for this station is 1904-1905 and 1927 to present. The extreme flows recorded include a maximum of 1570 cubic feet per second (cfs) on June 1, 1983 and a minimum of less than 1 cfs for several days in 1934. The average annual maximum discharge is 4.9 cfs (U.S.G.S, 1984).

Dissolved solids concentrations in Chalk Creek tend to be significantly higher than in the Weber River (Thompson, 1983). Near their junction, Thompson (1983) reported that the total dissolved solids concentrations of the Weber River varied from 163 to 256 mg/l during his investigations (September 1979 through August 1980), while Chalk Creek water varies from 237 to 446 mg/l. Additionally, the quality of water in Chalk Creek in the CIA is generally of better quality than at the mouth of the stream. Thompson (1983) reported that dissolved solids concentrations approximately three miles upstream from the mining operations varied from 202 to 234 mg/l during his investigation compared with the 237 to 446 mg/l at the mouth of Chalk Creek.

A hydrologic investigation of the Boyer Mine permit area was performed by Earthfax Engineering during 1985 and 1986. Several hydrologic characteristics of Chalk Creek were studied in detail near the permit area. The following discussion of Chalk Creek is based on the investigation performed by Earthfax.

Surface water monitoring stations were established on Chalk Creek at the locations shown on Figure 8. Table 3 contains several hydrologic parameters for Chalk Creek and the Chalk Creek drainage basin. Geomorphic parameters for Chalk Creek before and after spring (1986) runoff are listed in Table 4. These data indicate that selected reaches of Chalk Creek in the CIA underwent degradation (intermediate station and SS-6) while other reaches remained nearly stable (SS-5).

Storage discharge relations were developed for cross sections from Chalk Creek using the Manning equation and the continuity equation

$$v = \frac{1.486 R^{2/3} S^{1/2}}{n}$$

and

$$Q = AV$$

where

V = velocity (feet per second)  
n = Mannings roughness coefficient  
R = Hydraulic Radius (feet)  
S = Hydraulic Slope (feet per foot)  
Q = Discharge (cubic feet per second)  
A = Flow area (square feet)

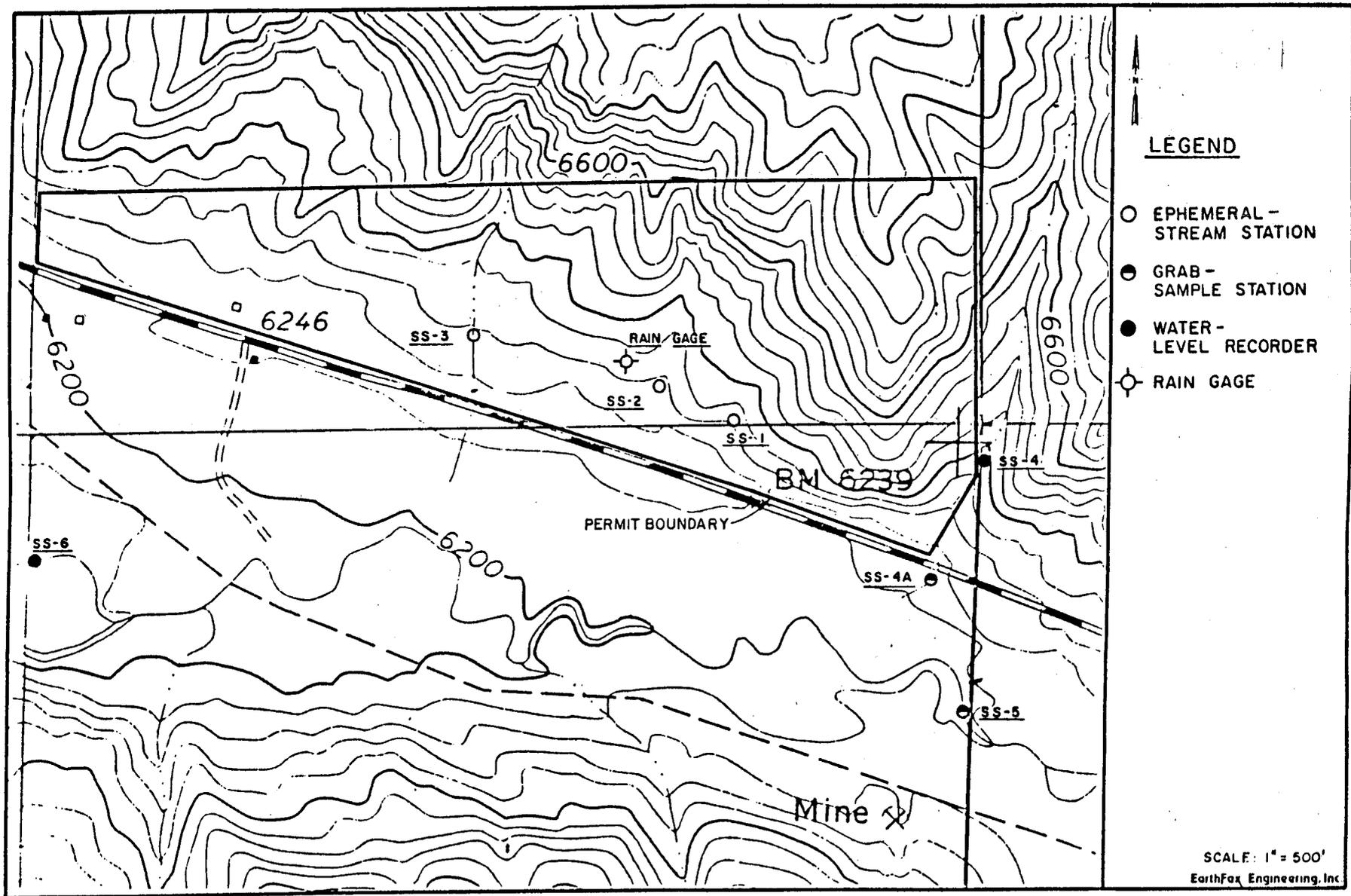


Figure 8. Surface water monitoring locations.

Table 3. Selected Characteristics of Chalk Creek Watershed

|                  |        |       |
|------------------|--------|-------|
| Area             | 83,500 | acres |
| Watershed Slope  | 16.3   | %     |
| Hydraulic length | 88,700 | feet  |
| Basin Relief     | 4,450  | feet  |
| Basin Width      | 41,000 | feet  |
| Curve Number     | 70     |       |

Table 4. Selected geomorphic characteristics of Chalk Creek.

| STATION | DATE SURVEYED | MAXIMUM CHANNEL DEPTH | MEAN CHANNEL DEPTH | CHANNEL WIDTH | CROSS-SECTIONAL AREA | CHANNEL SHAPE WIDTH/DEPTH RATIO |
|---------|---------------|-----------------------|--------------------|---------------|----------------------|---------------------------------|
| SS-5    | Dec 85        | 4.8                   | 3.1                | 36.9          | 115.6                | 11.9                            |
| SS-5    | Sept 86       | 3.5                   | 2.0                | 40.5          | 80.7                 | 20.3                            |
| Interm. | Dec 85        | 3.7                   | 2.3                | 34.7          | 79.0                 | 15.1                            |
| Interm. | Sept 86       | 3.7                   | 2.0                | 53.5          | 108.9                | 26.8                            |
| SS-6    | Dec 85        | 3.8                   | 2.7                | 37.8          | 102.1                | 14.0                            |
| SS-6    | Sept 86       | 5.7                   | 3.4                | 52.5          | 177.2                | 15.4                            |

By means of the above equations and the cross-sections of Chalk Creek at three sites (Figures 9 and 10) the stage discharge relations provided in Figure 11 was developed. Based on these relations, the flood levels noted were developed.

Results of gradation analysis conducted on the stream bank of Chalk Creek indicate that the bank materials are finer grained than the bed materials. This occurs due to greater velocities along and, therefore, increased scouring of the bed versus the bank in most channels. This scouring removes many of the fines from the channel beds and transports them downstream as suspended sediment.

Average annual flows at SS-6 was computed using equations developed by Fields (1975) for streams in Utah. According to Fields, the average annual streamflow of perennial streams in the Great Basin portion of Utah (e.g., the area including Chalk Creek in the CIA) can be estimated from the equation

$$Q_a = 50W^{1.48}(D+1)^{2.53}$$

Where

$Q_a$  = average annual streamflow (acre-feet per year)  
 $W$  = width of the channel bar cross section (feet)  
 $D$  = average depth of the channel bar cross section (feet)

Fields (1975) reported that this equation has a standard error of 34 percent.

Using this equation and the cross sections presented in Figures 9 and 10, average annual flows of 50,940, 53,660, and 63,140 acre-feet per year were calculated for SS-5, the intermediate section, and SS-6, respectively. The mean of these values (assumed to be most representative of the mean annual flow of Chalk Creek adjacent to the permit area) is 55,910 acre-feet per year.

The computed value for the mean annual flow of Chalk Creek in the CIA exceeds the measured mean of the stream at Coalville by 8170 acre-feet per year. Two factors probably contribute to this apparent inconsistency. First, streamflows in the region have been abnormally high during the past few years, resulting in erosion of stream banks and a subsequent increase in the width of channel bar cross sections. This change increases the calculated mean annual flow and affects the overall validity of the equation.

The second factor affecting the accuracy of the streamflow estimates is the error associated with the equation. As noted, the above has a standard error of 34 percent which, according to the definition of the standard error (Spiegel, 1961), indicates that the estimated value may vary by as much as 34 percent two out of three times. Thus, a more accurate estimate would require long-term gaging of Chalk Creek at the site.

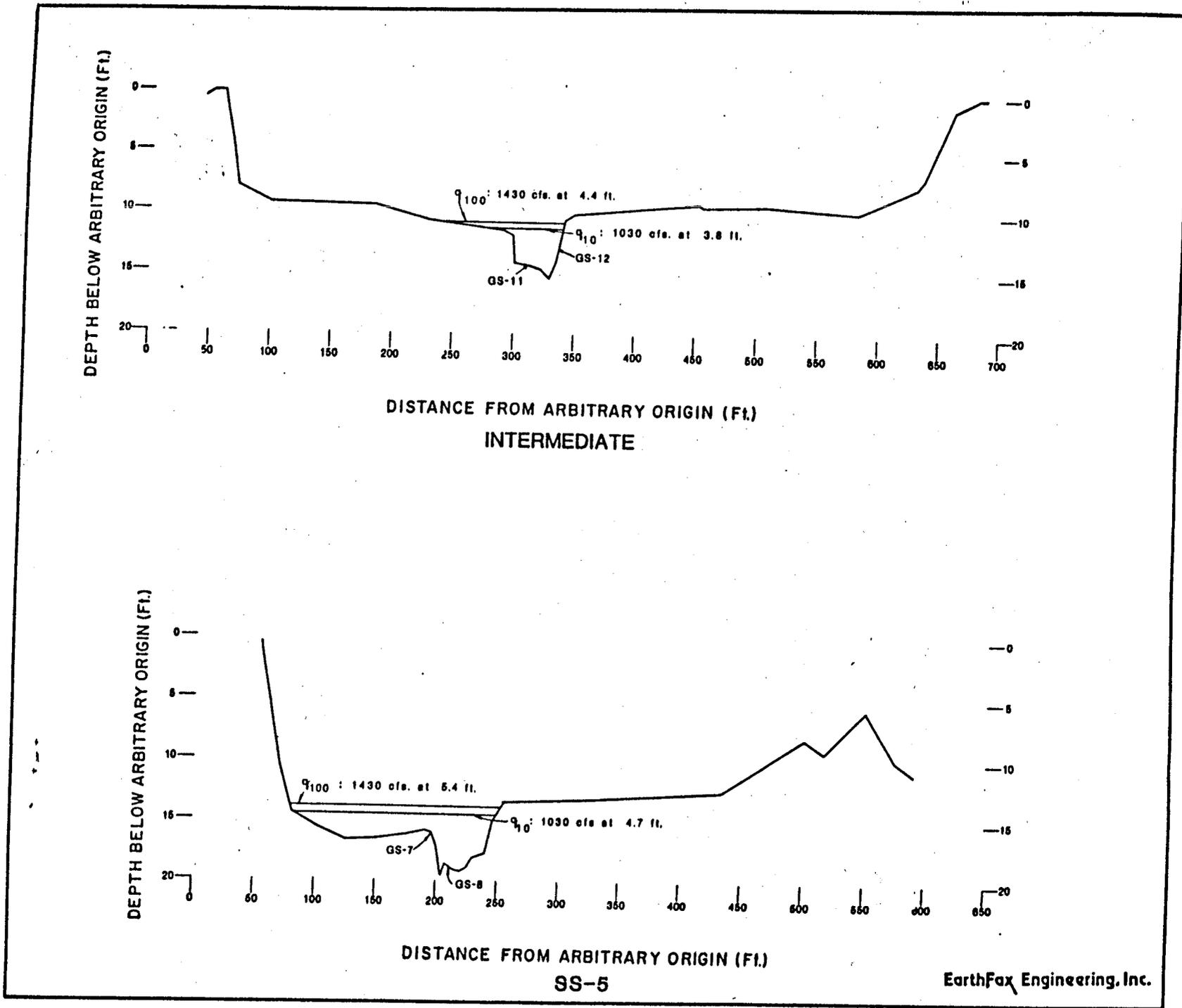
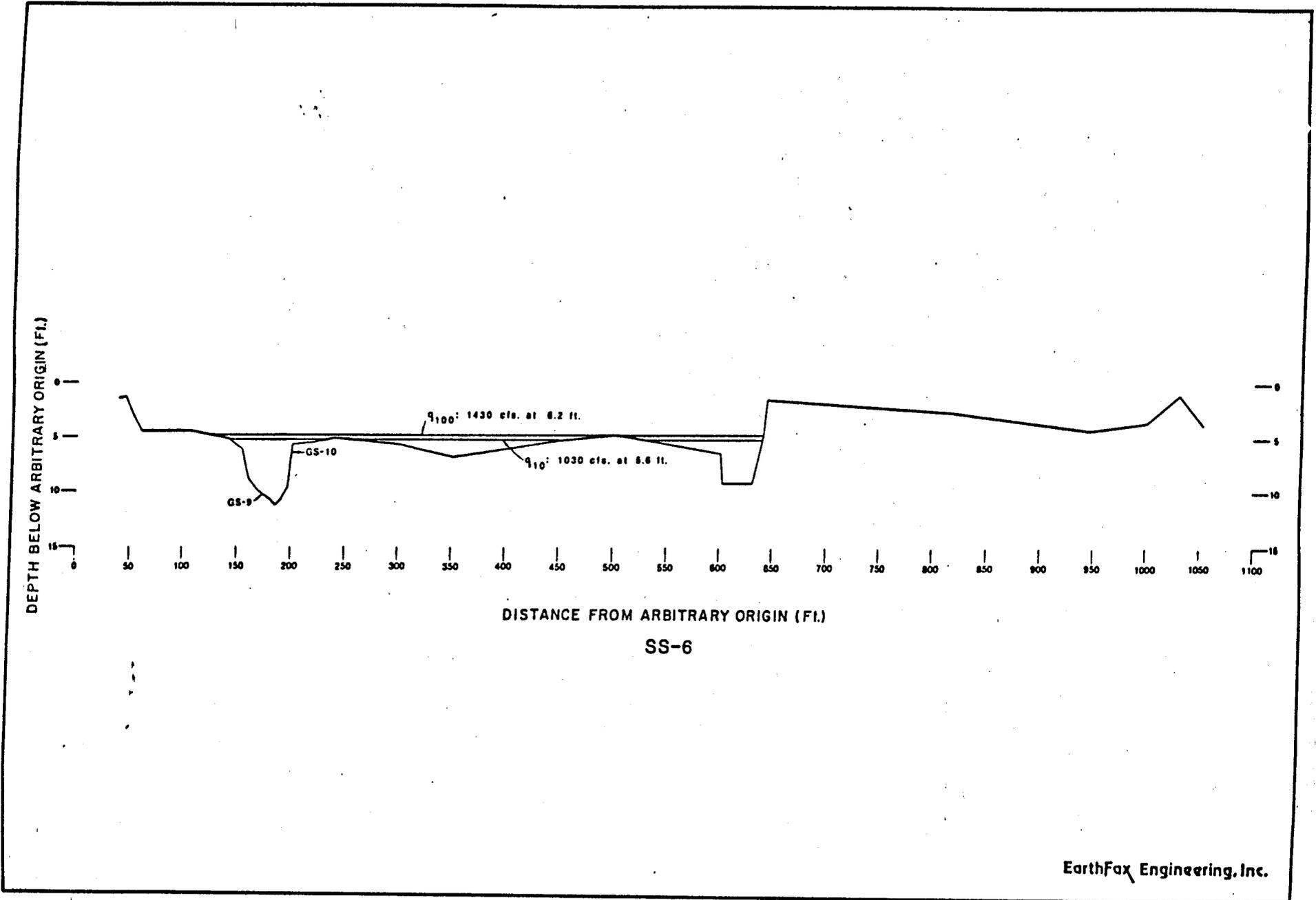
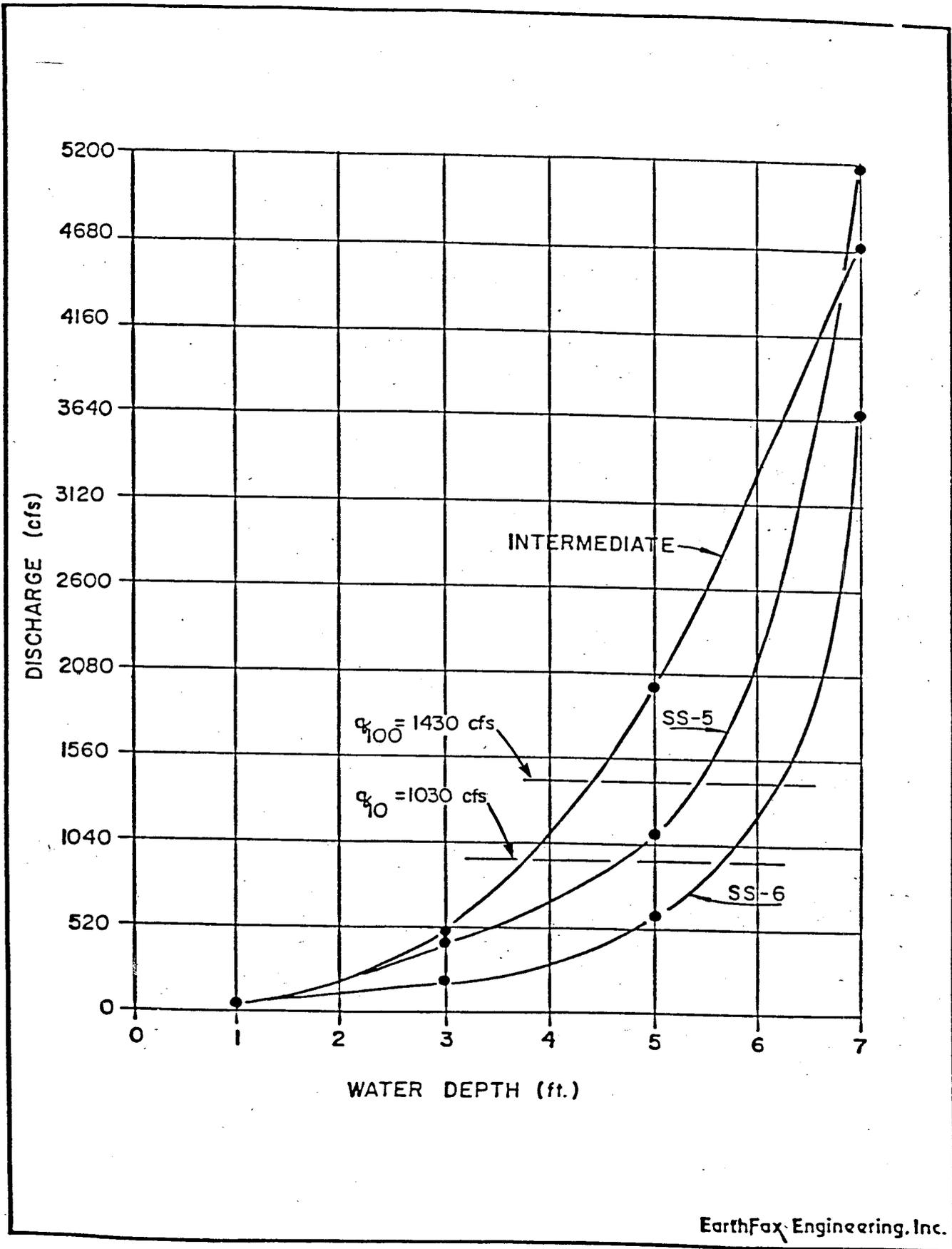


Figure 9. Stream channel cross sections through the Intermediate Station and SS-5 on Chalk Creek.



EarthFax Engineering, Inc.

Figure 10. Stream channel cross section through SS-6 on Chalk Creek.



EarthFax Engineering, Inc.

Figure 11. Stage-discharge relations on Chalk Creek.

Estimates of peak flows in Chalk Creek for the 10-yr and 100-yr streamflow event were made using equations developed by Thomas and Lindskov (1983). The equations developed for the flood region in which Chalk Creek is located are:

$$Q_{10} = 0.071A^{0.1815} E^{2.70}$$

and

$$Q_{100} = 0.078A^{0.795} E^{2.86}$$

where

$Q_{10}$  = peak flow from the 10 year runoff event (cfs)  
 $Q_{100}$  = peak flow from the 100 year runoff event (cfs)  
A = watershed area (square miles)  
E = mean basin elevation (thousands of feet)

Chalk Creek has a drainage area of approximately 130.5 square miles above the western boundary of the CIA and a mean basin elevation of 8000 feet. Therefore, peak flow estimates of 1030 cfs and 1430 cfs have been computed for the 10-year, and 100-year events, respectively.

Flow depths corresponding to these peak flows were determined for the Chalk Creek cross sections using the curves provided in Figure 11. These flow depths are plotted on the cross sections contained in Figures 9 and 10. Based on the estimated discharges presented herein, the 100-year flood event will generally exceed the bankfull capacity of Chalk Creek.

The stability of the stream bed materials was examined using the allowable-velocity approach developed by the U. S. Soil Conservation Service (1975). According to this methodology, basic allowable velocities are determined from the gradational characteristics of the bed material. These basic values are then modified to account for flow depth, bank steepness, and stream meandering.

The channel cross sections, stage discharge relations, and gradation curves were examined to determine maximum velocities that Chalk Creek could withstand without excessive erosion.

In Chalk Creek, maximum non-erosive velocities of 5.7 and 6.5 feet per second were calculated for SS-5 and SS-6, respectively. During the 10-year flood event, velocities of 4.3 and 4.1 feet per second will result at the respective stations. Hence, Chalk Creek is considered erosionally stable during the 10-year event. However, as noted previously, sections of the channel are considered erosionally unstable during floods with higher return periods.

Results of field and laboratory analysis of water samples in Chalk Creek performed by Earthfax Engineering during 1985 and 1986 show that calcium and bicarbonate are the primary ions. Total dissolved solids concentrations varied during the period of record from 295 to 450 mg/l, pH levels varied from 6.91 to 7.36 and dissolved iron concentrations varied from less than 0.03 mg/l to 0.46 mg/l. Suspended sediment concentration in Chalk Creek varied from 1 to 150 mg/l.

With one exception, samples collected in Chalk Creek are in compliance with the National Interim Drinking Water standards as promulgated by the U. S. Environmental Protection Agency. In February of 1986 selenium concentrations of 0.011 mg/l at SS-5 and 0.012 mg/l at SS-6 exceeded the selenium standard of 0.01 mg/l.

No consistently definitive seasonal trends in water quality are apparent with any of the constituents. However, the data indicate that dissolved concentrations are generally lower during high-flow periods and higher during low-flow periods. Suspended concentrations are typically directly proportional to flow.

#### Ephemeral drainages

Four major ephemeral drainages are tributary to Chalk Creek in the CIA (Plate 1). According to definitions provided by Bates and Jackson (1980), the streams that drain each of these watersheds are first order (having no significant tributaries). The stream draining the watershed in the Boyer permit area is ephemeral within most of the watershed but is considered intermittent from a point immediately above the proposed surface facilities to the north of the watershed.

Flows issuing from the intermittent channel in the Boyer permit area are generally more saline than Chalk Creek with total dissolved solids concentrations that varied from 560-600 mg/l during the Earthfax Engineering hydrologic investigation in 1985 and 1986.

#### C. Soils

##### Soil description

The soils within the CIA are gravelly, medium textured and neutral in pH. Three soil series have been identified within the Boyer permit area. These series include: 1) Bezzant gravelly loam, 25 percent to 40 percent slopes; 2) Moweba gravelly loam, 2 to 5 percent slopes; and, 3) Richville gravelly loam, 40 to 70 percent slopes. The respective taxonomic classifications are: 1) loamy-skeletal, mixed frigid Typic Calcixerolls; 2) loamy-skeletal, mixed frigid Pachic Ultic Haploxerolls; and 3) fine-loamy, mixed frigid Calcixerollic Xerochrepts. Under native vegetation the erosion hazard is slight to high. These soils are generally well drained and range in texture from sandy loam to clay loam. Permeability is moderate. The available water capacity ranges from 3.5 to 6.5 inches to a depth of 48 to 60 inches, respectively.

The remaining CIA soil series have been identified as: 1) Dunford organic surface-Dunford - Ayoub Complex; 2) Horrocks - Yeates Hollow Complex; 3) Sowcan Loam; 4) Kovich Loam; 5) Toehead Loam; 6) Watkins Ridge Loam 2-5% slopes; 7) Watkins Ridge Loam 5-8% slopes; 8) Watkins Ridge - Dennot Complex 15-35% slopes; and, 9) Richsum - Beguinn Family - Gridge Complex. The great group taxonomic classification includes: 1) typic Calcixerolls; 2) Typic Argixerolls; 3) Cumulic Haploxerolls; 4) Cumulic Haploborolls; and, 5) Cumulic Haplaquolls. The Cumulic Haploborolls and Cumulic Haplaquolls may potentially be characteristic of an AVF. These soils have a high water table within 10 to 20 inches from the surface. The potential AVF will be further evaluated at the time that future mining expansion proposed within this area.

The off permit area CIA soils have a slight to severe erosion hazard under native vegetation on gentle and steep slopes, respectively. Texture ranges from loam to clay loam and fine sandy loam. The potential AVF soils are poorly drained while most other soils are well drained. Permeability is moderately slow for all soils. The available water capacity ranges from 5 to 12 inches to a depth of 60 inches.

#### Underground development waste disposal

The Boyer Mine will maintain a waste disposal site between highway 133 and the powder magazine access road. The waste disposal site has a proposed capacity of 1500 cubic yards. The Acid-Base Potential of the waste material has been analyzed. By comparing the total quantity of bases that would be required to neutralize potential acidity as calculated by pyritic sulfur content, a balance can be determined. The seam floor and roof percent pyritic sulfur and neutralization potential have been reported in Appendix 6D. The percent pyrite for the roof and floor material is 2.08 and 1.12 percent respectively. The respective Acid-Base Potential (ABP) of the roof and floor were calculated to be -64.5 and -22.9  $\text{CaCO}_3/1000$  tons material equivalence. An ABP of less than or equal to -5 tons  $\text{CaCO}_3/1000$  tons material equivalence is defined as an acid- or toxic-forming material (ATFM). This material is classified as an ATFM. The ATFM will be disposed in a basin lined with a minimum eight inch layer of impervious material and buried under a minimum four foot soil depth. Disposal of the ATFM will be completed 30 days after it is first exposed on the minesite.

The potential of an ATFM being buried during initial pad construction has not been characterized. The operator has sampled various points within the pad. The operator will submit the acid-base potential of this material as soon as the laboratory results are received.

Due to the variability of the pyritic sulfur found within the roof and floor material the operator has committed to submit to the Division the following information for the roof, mid-seam, and floor geologic materials after every 1000 feet of mine entry for the five year permit term: pH, texture, hot water extract boron, total sulfates, pyritic sulfur, calcium carbonate percentage, acid-base potential, and electrical conductivity. After the five year permit term has expired the Division will work with the Boyer Mine operator to further develop adequate measures for proper waste disposal.

#### ... Effects to watershed

No water pollution associated with geochemical alterations within the underground development waste are expected. The surrounding soil does not contain significant quantities of bases required to neutralize the potential pyrite acidity. The soil neutralization potential data was submitted April 16, 1986 and inserted into Appendix 6D. The average neutralization potential is 4.62 Tons  $\text{CaCO}_3$ /1000 Tons Material equivalence. The underground waste therefore requires 79.6 tons  $\text{CaCO}_3$ . The soil has equivalence of 6.60 tons  $\text{CaCO}_3$ . Therefore a total of 73.0 tons of  $\text{CaCO}_3$  is required for the 1500 cyd (Bulk Density est. at 90 lb/ft<sup>3</sup>) of waste material.

A specific neutralization plan cannot be completed to date. The applicant and the Division are currently assessing the median pyritic sulfur content of the underground waste materials and will be working together to develop an effective ATFM waste disposal plan to insure that soil water drainage will not be adversely affected by the ATFM (stipulation 817.48 - (2) - JSL). Two options are being assessed at this time. One would be to incorporate  $\text{CaCO}_3$  with each one foot lift. Based on the estimated average acid production potential and soil neutralization potential, 33 tons of  $\text{CaCO}_3$  is required to be incorporated in each lift. The second option would require the operator to seal the waste materials from aerobic atmospheric conditions. This would significantly reduce any potential pyrite oxidation.

The effects of the strong acids resulting from oxidation and dissolution of the ATFM that has not been neutralized may weather and breakdown adjacent soil colloids. This will cause an increase in available elements. When the solubilized nutrients and metals come in contact with the alkaline soil the nutrients and metals will desolubilize through mineralization. Other available cations will attach to the associated soil cation exchange complex.

Soil placement will be designed to result in the best minesoil properties to effectively neutralize the potential generated acidity before the water has completely permeated the entire soil pedon and entered the surface or ground water transport system. Caruccio and Geidel (1978) found that in neutral to alkaline soils pyritic oxidation is reduced along with the neutralization of the generated

acidity. They have also calculated that an increase in partial pressure of CO<sub>2</sub> by soil mulch may increase the available alkalinity of infiltration waters by a factor of eight, further reducing the potential of any acid drainage from the disposal area. The post mining reclamation vegetation cover will be adequate to control erosion and maintain the high soil atmospheric concentrations of CO<sub>2</sub>. While microbiological processes are known to mediate the pyrite oxidation reaction, the acidophilic nature of the organisms involved limit their influence in a neutral to high pH soil environment.

## VI. Potential Hydrologic Impacts

### A. Ground Water

Dewatering and subsidence related to mining have the greatest potential for impacting ground water resources in the CIA.

Since the Boyer Mine is the only operating underground mine which currently has potential of affecting the ground water regime, and which is not grandfathered under the Surface Mine Control and Reclamation Act, only the impacts from their proposed operations will be discussed as related to the hydrologic balance. This CHIA will have to be revised to incorporate future mining development within the Coalville Coal Field.

#### Dewatering

It has been observed in some coal mining areas that underground mining removes the support to overlying rock causing caving and fracturing of the overburden. In areas where fracturing is extensive subsidence of the overburden becomes greater. Subsidence-induced caving and fracturing can expose ground water sources to lower pressures creating conduits of less resistance that allow ground water to flow into the mine. Dewatering from fracturing has decreased aquifer storage and flow to streams and springs.

The impacts cited above have been considered and evaluated for this CHIA. Currently, there is no water being discharged from the mine and thus no water is currently being withdrawn from the groundwater system.

It is expected that as mining progresses down dip that water will be contacted in the saturated zone of the regional aquifer. The amount of water should not be so significant as to dewater or effect renewable resources or cause external adverse effects to the surface water sources if mine water should be discharged from the mine.

Water generated while mining should come from the porous areas within the coal seam and the rock adjacent to the mine below the level of the regional water table. Ground water production should be relatively low due to the low intrinsic permeabilities of the adjacent rock matrix which contain interbedded siltstone, shale and sandstone units that overlie and underlie the coal seam.

Mining is not expected to intercept the perched or alluvial aquifers that are the source of wells and springs adjacent to CIA. This particularly refers to the Boyer-2 well, the Orgill well, the Staley well and Old well. The vertical and horizontal distances as well as the existence of shale beds between the coal seam and the aquifer create a buffer that will prevent interception of the ground water. Mining will not have any influence on the Morby well, the Boyer-1 well, the Mine well, the Jones well or the Utah Coal and Energy well, because all of these wells exist upgradient and stratigraphically below the coal seam to be mined.

Upon termination of mining operations any ground water interception will stop, the mine will flood and storage to the surrounding beds will reestablish.

The maximum lag time for mine flooding will depend on the amount of caving and the void space created from caving. Estimates can be made by making certain assumptions, however, without more information the estimates would be confusing. It should be noted that complete flooding may never be achieved because the hydraulic head generated as flooding expands will also increase until the hydraulic properties of the roof, floor and rib are exceeded and flow through the rocks is initiated.

In most mining areas it is unlikely that fractures will reach perched aquifers due to the thickness of the overburden. Dewatering of any aquifers will result in in-mine flow which is discharged to Chalk Creek. Water quality downstream from the mine could improve since water being discharged will be of better quality than natural streamflow.

Summit Coal Company will be required to establish an in-mine water monitoring plan that will be dynamic in nature to allow monitoring new source sites as mining progresses. The proposed groundwater monitoring program for Summit Minerals will, in the future, allow increasing discharge rates to be more precisely characterized and thereby, achieve a more accurate assessment of mining-related dewatering impacts.

#### B. Surface Waters

The main concern in terms of impact to surface water is water quality deterioration downstream from mining operations. The area influenced by surface disturbance is of limited areal extent and confined to approximately eight acres in the Boyer permit area and

17.7 acres undergoing reclamation at the Blackhawk Mine. Surface sediment controls currently are in place and will continue to be in place during reclamation. The water quality impacts associated with mining at the Boyer Mine and reclamation at the Blackhawk Mine will be minimal or nonexistent due to the fact that all drainage from the areas will be routed through sediment controls and treated prior to any release of water.

If large amounts of ground water are encountered during mining operations the discharge of such water into existing surface water may have an effect on the quantity and quality of the surface water. At this time little data is available to determine either the amount or quality of ground water in the area of projected mine workings. Therefore no conclusive predicted impacts can be determined. If large amounts of water are encountered during mining operations, a program to treat and release the water will be required by the Division based on available data at that time.

### C. Subsidence

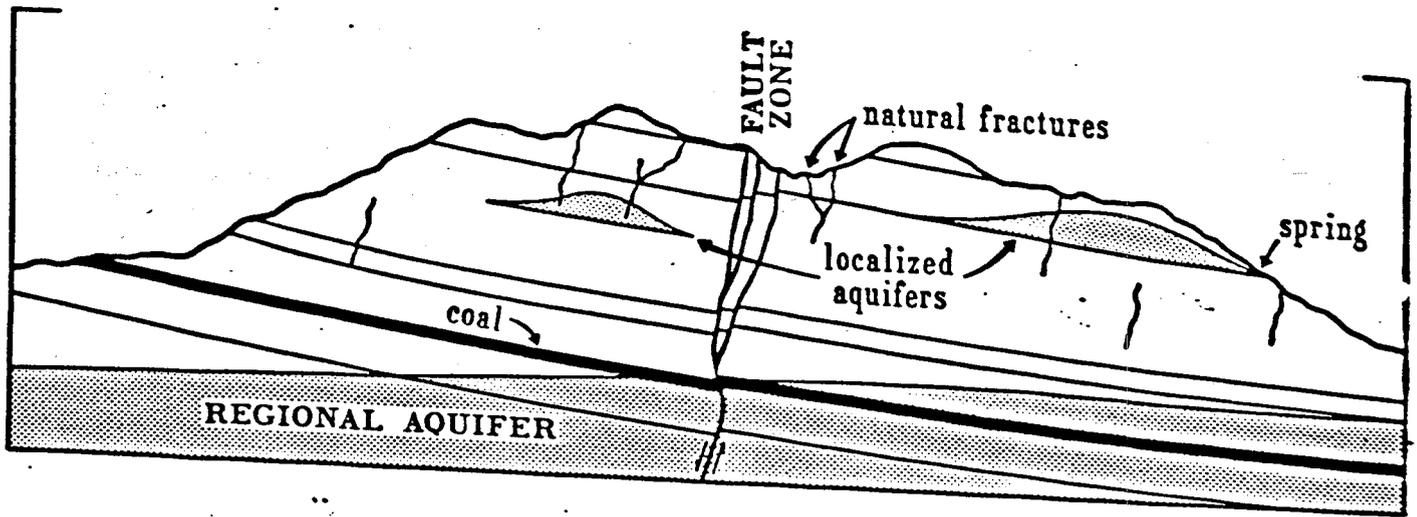
Subsidence impacts are largely related to extension and expansion of the existing fracture system and upward propagation of new fractures (Figure 12). No subsidence has been occurred over the Boyer or Blackhawk mines to date. Overburden thickness ranges from approximately 200 feet to over 1200 feet.

Summit Coal Company plans to mine only the Wasatch Coal Seam in the Chalk Creek Member of the Cretaceous Frontier Formation. The coal seam overburden is carbonaceous sandstone to shale. The mine is projected for room and pillar mining utilizing continuous miners. The layout is typical with mains driven down dip and panels developed on strike. The layout has been modified to parallel property boundaries and avoid the old workings. The submains will be turned off at 45 degrees to the dip to parallel the northern property boundary reducing the grade from 17% to 12%. Mining projections show that mining will be limited to development of submains for the first two years through 1989 before the first panel will be driven south west along strike toward the outcrop. The first pillar extraction will be begin under 200' of cover.

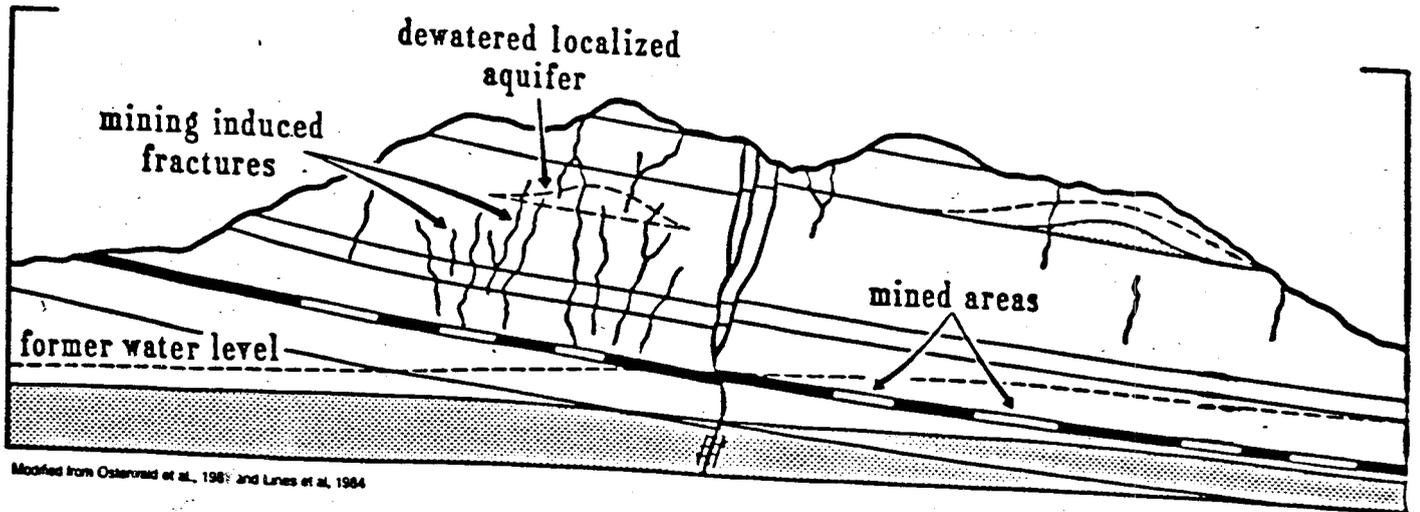
Gradual subsidence is expected over a long term where maximum extraction is planned. The surface land above the mining operation is fee and contains no structures. The lands are presently used for grazing and wildlife habitat. No springs are indicated above the mining operation. No known aquifer exists above the immediate coal zone.

Summit Coal Company proposes to mitigate subsidence impacts as they occur including (1) not pulling pillars in selected sensitive areas, and (2) uniform extraction to minimize impacts. Further the applicant includes mitigation to site specific impacts such as road repair and fence repair, conveyance and diversion of flows, filling cracks wider than 6 inches, and revegetation.

### A. Before Mining



### B. Following Mining



Modified from Osterwald et al., 1987; and Lines et al., 1984

Figure 12. Potential effects of mining to overlying aquifers and strata.

Summit Coal Company has established that no known structures, perennial streams or springs exist within the limits of mining, however since the lands are used for wildlife and grazing, the lands subject to subsidence are strictly speaking renewable resource lands. Assuming complete pillar recovery the surface would experience subsidence between 60 and 90% of the seam height. No inflows should be expected from the alluvium of Chalk Creek since this aquifer will not be subsided.

Summit Coal Company's plans are consistent with the standard methods of mining and with the clarifications and stipulations as referenced in the permit the applicant's subsidence control plan will comply to the extent "technologically and economically feasible to prevent subsidence from causing material damage to the surface and to maintain the value and reasonable foreseeable use of surface lands".

#### D. Alluvial Valley Floors

An Alluvial Valley Floor (AVF) has been identified within the CIA. The valleys of Chalk Creek and Huff Creek exhibit the characteristics to establish the existence of an AVF.

Current mining activities have provided information to affirmatively demonstrate that their proposed operations will not interrupt, discontinue or preclude farming. Nor will they materially damage the quantity or quality of water in surface or ground water systems which supply the AVFs.

Currently the limits of mining do not include the AVF or parts thereof within the proposed mining permits. Expansion of mining in the future could incorporate portions of the AVF. Prior to finalizing such permits a complete analysis will be made of the AVFs and potential impacts that could occur.

#### VII. Summary

The probable hydrologic impacts are summarized below under the headings entitled First Five Year Permit Term and Future Mining.

##### First Five Year Permit Term

The rate of dewatering will remain significantly less than the estimated recharge rate during the first five year permit term for the Boyer Mine. Overburden thickness will be sufficient (500-2,000 feet) to restrict surface manifestations of subsidence. The subsurface propagation of fractures is not expected to produce changes in groundwater flow that could affect localized aquifers and springs. Future monitoring will provide data applicable to documenting changes in the groundwater system.

Surface disturbance from mining and reclamation operations will not significantly degrade water quality in Chalk Creek. Sediment control measures have served to reduce contaminants and stabilize water quality at acceptable levels.

#### Future Mining

Drainage from future surface disturbance will be managed through appropriate sediment controls.

Any rates of dewatering may, in the future, result in depletion of groundwater storage. Depletion of storage should not have any effects on spring flow, recharge to wells and base flow recharge to streams. Upon cessation of mining, any mine water discharge to Chalk Creek via treatment facilities will be discontinued. This affect is considered reasonable because mine flooding will probably result in reestablishment of the preexisting groundwater system.

The operational designs proposed for the Boyer Mine and Blackhawk Reclamation operation are herein determined to be consistent with preventing damage to the hydrologic balance outside the mine plan area based on the accuracy of the information submitted in the mine plans and referenced literature.

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1171R

Stipulation Document

Summit Coal Company  
Boyer Mine  
PRO/043/008  
Summit County, Utah

May 15, 1987

Stipulation UMC 800-(1)-JRH

1. Within 90 days from the date of permit approval and concurrent with the submittal of information required in other stipulations contained within this document, the permittee shall provide to the Division, any revisions or modifications to the calculations and estimate for reclamation of the mine facilities.

Stipulations UMC 817.42-(1-3)-RS

1. The permittee shall submit revised designs for the catch basin proposed to treat drainage from the coal waste disposal area such that the final design must incorporate valid hydrologic assumptions and criteria and insure compliance with subsection (a)(3) of UMC 817.42. Designs must be submitted within 30 days of permit issuance and be approved by the Division prior to any further initiation of mining activity in the powder and cap magazine and coal waste disposal area.
2. The permittee shall within 30 days of permit issuance, submit revised appropriate sections and plates in the MRP to reflect a commitment to retain straw bale (or equivalent) treatment structures at the outlet of culvert C-6. Additionally, the permittee must commit, within 30 days of permit issuance, to sample all discharges from these structures and incorporate the analysis schedule proposed in Table 5-1 for all samples. A commitment to submit results of the analysis to the Division within 30 days of receipt must also be made.
3. Prior to beginning any underground coal mining activities under this permit in the affected drainage area, the applicant must construct the sedimentation system as proposed in the MRP.

Stipulation UMC 817.43-(1)-RPS

1. Within 60 days of permit issuance, the permittee shall submit a revised complete and technically adequate design plan for all diversions which incorporates correct hydrologic assumptions and meets the requirements of UMC 817.43.

Stipulation UMC 817.44-(1)-RPS

1. The permittee must submit complete and technically adequate designs for UD-1 that demonstrate compliance with subsections (b)(2) and (d) of this rule within 120 days of permit issuance.

Stipulations UMC 817.46-(1-6)-RPS

1. Within 30 days of permit issuance, the permittee shall submit to the Division a commitment to maintain a minimum detention time of 24 hours in the sedimentation pond for all 10-yr, 24-hr and lesser precipitation events.
2. Within 30 days of permit issuance, the permittee shall submit detailed information regarding the sediment pond clean out. This information should include elevation of 60% volume, elevation of maximum sediment storage volume, location of sediment marker in pond, and a commitment to clearly mark the referenced elevations on the stake.
3. Within 30 days of permit issuance, the permittee shall provide correct assumptions and peak flow values for design flows used for the design of the sedimentation pond.
4. Within 30 days of permit issuance, the permittee shall submit plans to the Division for the emergency spillway for the sedimentation pond. These plans should incorporate the 25-yr, 24-hr design event, a spillway lining of adequately sized riprap, a filter blanket design, and an adequately sized energy dissipator.
5. Within 30 days of permit issuance, the permittee shall submit to the Division a commitment to inspect the sedimentation pond during construction and submit certified as-built drawings of the structure. These must be conducted by a registered professional engineer.
6. Within 30 days of permit issuance, the permittee shall provide a correct Plate depicting the location of sampling station SS-7.

Stipulations UMC 817.46-(1-2)-JRH

1. Within 30 days from the date of the permit approval, the permittee shall provide a compliance plan for the reconstruction and modification of the sediment pond facilities. The compliance plan shall include the design specifications for the modification or reconstruction of the structure to meet the design and performance standards

of Subchapter K of the rules; a reconstruction schedule which shows anticipated dates for beginning and completing interim steps and final reconstruction; provisions for monitoring the structure during and after modification or reconstruction to ensure that the performance standards of Subchapter K of the rules are met; and, a showing that the risk or harm to the environment or to public health or safety is minimized during the period of modification or reconstruction.

2. Within 90 days from the date of the permit approval, the permittee shall provide to the Division, a design for the proposed catch basin which is in compliance with the performance standards of Subchapter K of the regulations.

Stipulation UMC 817.47-(1)-RS

1. Within 30 days of permit issuance, the permittee shall submit adequate designs for the energy dissipator for the primary spillway. These designs must be based upon the expected velocity for the discharge from a 10-yr, 24-hr precipitation event.

Stipulations UMC 817.48-(1-2)-JSL

1. Within 90 days of permit approval the permittee will provide the Acid-Base potential (ABP) data for the pad materials. If the ABP from the pad is found to be less than or equal to -5 Tons  $\text{CaCO}_3$ /1000 Tons Material, the permittee must submit to the Division within 90 days of permit approval a plan to abate the potential contamination of groundwater.
2. Within 90 days of permit approval the permittee must provide an acid- or toxic-forming material (ATFM) waste disposal plan that will effectively reduce pyrite oxidation. The permittee may amend the ATFM with  $\text{CaCO}_3$  at the required amounts or seal the material from any aerobic atmospheric conditions.

Stipulation UMC 817.49-(1)-RPS

1. Within 30 days of permit issuance, the permittee shall submit to the Division a commitment to conduct the inspection required by subsection (h) of UMC 817.49 and to submit the results of that inspection to the Division within 30 days following completion of construction of the proposed sedimentation pond.

Stipulation UMC 817.56-(1)-RS

1. Within 30 days of permit issuance, the permittee shall commit to renovating the permanent diversion labeled as UD-1 prior to final abandonment of the site. The commitment should include intent to ensure the capacity and stability criteria of the proposed design are adequately met and all necessary structural features are in good repair, functional and constructed as per the approved design.

Stipulation UMC 817.71-(1)-JRH

1. Within 90 days from the date of permit approval, the permittee shall provide to the Division, a plan for the location and disposal of excess spoil, mine development waste, sediment pond waste and other coal waste related materials anticipated on the site. The plan shall include a determination as to the total estimated amount of waste materials to be taken from the mine during the expected life of the operations so as to correctly size the facility; determination as to the nature, extent and treatment of acid- and toxic-forming materials which may have been utilized in the construction of the portal and mine facilities pads; analysis of the foundation and liner materials used to construct the waste facility; determination of the location of the waste facilities such that they are not constructed within surface drainages and will not potentially contaminate surface and groundwater; and plans for the amount and type of materials used to cover the waste material, topsoil requirements and revegetation requirements for the waste disposal facility.

Stipulation UMC 817.95-(1)-SCL

1. The permittee is not authorized to construct new facilities or make modifications to existing facilities, if such activities would become a source of air pollution or increase air pollution, until an Air Quality Approval Order is received.

Stipulation UMC 817.106-(1)-JSL

1. The permittee must commit to regrade, stabilize and revegetate according to performance standards UMC 817.111 through 817.116 all rills and gullies greater than nine inches deep.

Stipulations UMC 817.121-.126-(1-3)-DD

1. Within 30 days of permit approval the permittee shall include and commit to the following additions to the subsidence control plan to minimize impacts to surface lands from subsidence:

- A. To protect the Highway 133 and utilities the surface permit boundary will be maintained no less than 60 feet from the center line of highway 133. Along this southern boundary, due to the uncertainty of the angle of draw and in the interest of prudence, the permittee will utilize an angle of draw of 25 degrees (from the vertical) to determine the underground limit of second mining (pillar recovery). Before any secondary mining begins and then each year following the permittee shall submit a certified mine map of his underground workings to verify compliance.
- B. Until the permittee can otherwise justify stable pillar design for partial extraction, partial extraction may be conducted beyond the second mining limit as follows:

Development mining assuming 18' roof spans and not more than the following extraction may be conducted.

| <u>Depth</u>  | <u>Maximum Extraction</u> | <u>Centers</u> |
|---------------|---------------------------|----------------|
| 150' to 300'  | 51%                       | 60' X 60'      |
| 400' to 600'  | 45%                       | 70' X 70'      |
| 600' to 800'  | 40%                       | 80' X 80'      |
| 800' to 1000' | 36%                       | 90' X 90'      |

Barrier pillars of a minimum of 150' width should be maintained for protection of main entries.

- C. Due to the hazards and damage to the surface caused by plug caving, the applicant shall not pull any pillars under a minimum overburden depth of 150'.
- D. Prior to initiating second mining and in the interest of protecting the highway and power line, the permittee shall be required to install monuments between the line projected by a 65 degree angle of draw from the limit of second mining to the surface and 30 feet from the center line of the highway. The line of monuments shall be spaced at 0.1d and be maintained 1.4d ahead of second mining (where d is the overburden depth). Both horizontal and vertical measurements shall be taken. A certified survey of the monuments shall be provided to the Division prior to second mining and then thereafter annually until subsidence is complete.

- E. Pillar extraction should be as uniform, complete, and rapid as safety allows to minimize fracturing of strata.
2. The permittee shall within 30 days of permit approval, commit to restoring areas impacted by subsidence-caused surface cracks or other subsidence features such as escarpments (not to include naturally occurring escarpments which are not a result of mining) which are of a size or nature that could, in the Division's determination, either injure or harm grazing livestock or wildlife. Restoration shall include recontouring of the affected land surface including measures to prevent rilling, and revegetation in accordance with the approved permanent revegetation plan in the MRP. Restoration shall be undertaken after annual subsidence survey data indicate that the surface has stabilized, but in all cases restoration and revegetation shall be completed prior to bond release.
  3. The permittee shall distribute a notice by mail at least 6 months in advance of mining beneath a property to all owners of property that could be affected by subsidence. The notification shall contain, as a minimum:
    - (a) Identification of specific areas in which mining will take place;
    - (b) Dates of underground operations that could cause subsidence and affect specific structures; and
    - (c) Measures to be taken to prevent or control adverse surface effects.

Stipulation UMC 817.150-.156-(1)-JRH

1. Within 30 days from the date of permit approval the permittee shall be required to incorporate into the text of the mining and reclamation plan, specific plans regarding the operation of the haul roads. This would include a commitment that the west haul road shall not be utilized for loaded coal trucks leaving the site. Due to the steep gradient of the road as it leaves the site and enters onto the county road, loaded vehicles could pose a safety hazard during poor road conditions and in the event of equipment (brake) failure. The permittee should also include other appropriate measures to be taken such as the installation of one way signs or other such signs directing the traffic on the road for proper use.

Stipulation UMC 817.180-(1)-JRH

1. Within 30 days from the date of permit approval, the permittee shall provide to the Division, a complete plan for the coal handling and storage facilities proposed to be utilized at the mine site. The plan shall include, but not be limited to the following: capacities for the raw and clean coal stockpiles, materials handling flow sheet, waste handling and materials rehandling requirements, temporary and permanent storage locations and capacities for coal and coal-related waste materials.

1187R

## Technical Analysis

Summit Coal Company  
Boyer Mine  
PRO/043/008  
Summit County, Utah

May 15, 1987

### Introduction

Summit Coal Company proposes to operate a small underground mine in Summit County, approximately 11 miles east of Coalville, Utah on Chalk Creek road. The applicant controls 129 acres of privately owned surface and minerals. Surface facilities will affect approximately 6 acres.

Mining has been conducted historically on site, beginning as early as 1897. The applicant estimates that 1,426,272 tons of mineable coal remain in the Wasatch bed within the permit area. The applicant projects a 67% recovery in the areas to be mined. Current plans are for a five-year production of 330,000 tons, with full capacity of 72,000 tons per year reached in the fourth year of mining. If adjacent leases are obtained production could reach 100,000 tons per year.

The soils at the Boyer Mine are primarily from colluvium and alluvium derived from sandstone, quartzite and shale. The soils are gravelly and stony in the interbedded sandstone and quartzite and flaggy in the substratum overlying the shale.

A xeric moisture with a frigid temperature regime prevail. Average annual precipitation is between 16 and 25 inches, with the average annual soil temperature lower than eight degrees centigrade. The topography of the area is gently sloping to steep with slopes ranging from 2 to 70 percent. The aspect is generally south to southeastern. The capability class ranges from VI to VIII.

Under native vegetation the erosion hazard associated with these soils vary from slight to high. These soils are generally well drained and range in texture from sandy loam to clay loam. Permeability is moderate. The available water capacity ranges from 3.5 to 6.5 inches to a depth of 48 to 60 inches, respectively. Nutritional supplying power is fair and no soil relative reclamation problems are anticipated.

## Background

The applicant filed a permanent program permit application on January 27, 1984. A plan for exploration of greater than 250 tons was filed on February 29, 1984. It was determined that the exploration plan review would take priority over the Mining and Reclamation Plan (MRP) review. Tentative approval for the exploration plan was given on December 28, 1984. On August 1, 1985 approval was granted for exploration of 10,000 tons with the provision that approval for additional tonnage could be obtained with adequate documentation. On September 25, 1986, approval for an additional 15,000 tons was granted.

In the application of January 27, 1984, the applicant had requested funding for collection of base line data through the Small Operator Assistance Program (SOAP). In the spring of 1985 the applicant was determined eligible and the Division let a contract for the first year of data collection. In June of 1986 the contract was extended for an additional year of data collection.

On August 29, 1986, an Initial Completeness Review (ICR) on the MRP was sent to the applicant. On September 25, 1986, the applicant responded to the ICR review. The application was still determined to be incomplete. The Division sent the applicant Determination of Completeness Reviews on November 12 and December 15, 1986. The applicant responded on November 8 and December 23, 1986. Notice of a complete application was published as required on January 2, 9, 16, and 23, 1987. The final SOAP report for the first year's data was submitted January 23, 1987 as Volume II.

Technical Deficiency review documents were forwarded to the applicant on February 10 and April 10, 1987. Responses were received February 20, and April 20, 1987.

Although no public comments were received within 30 days of the last date of publication, letters were subsequently received from two adjacent landowners, Ward Morby and the Fern Boyer family. On April 15, 1987 an informal conference was held to discuss the concerns of the landowners.

## UMC 800 Bonding - JRH

### Existing Environment and Applicant's Proposal

The applicant has provided a cost estimate for reclamation construction of the facilities in part 3.6 of the mining and reclamation plan. The applicant has estimated that the reclamation cost for bonding is approximately \$78,000. Currently, and in conjunction with the exploration plan, the applicant has a bond in place with the Division for \$100,900 in the form of a subordination agreement.

### Compliance

The applicant has submitted sufficient information such that the Division can determine the bond amount required for the operation and this section is considered complete. The current bond amount is considered to be sufficient for the proposed mining facilities. However, due to the number and type of stipulations presented with this approval, the Division shall not determine the final bond amount until the stipulations contained within this document are met by the applicant. Changes in design or conditions at the site due to stipulations could effect the amount to be determined by the Division. Upon submittal of revised or updated information as required in the stipulations, the Division shall determine the final bond amount required for the applicant.

### Stipulation UMC 800-(1)-JRH

1. Within 90 days from the date of permit approval and concurrent with the submittal of information required in other stipulations contained within this document, the permittee shall provide to the Division, any revisions or modifications to the calculations and estimate for reclamation of the mine facilities.

### UMC 817.11 Signs and Markers - SCL

#### Existing Environment and Applicant's Proposal

Signs used on the property will be constructed of suitable material, employ uniform and standard designs and conform to local ordinances and codes. They will be maintained during the conduct of all activities to which they pertain (MRP, Section 3.4.6.1).

The gate at the main entrance will be posted with an appropriate identification sign. Perimeter markers will be placed around the disturbed area. Access roads will be posted with speed, direction and traffic information signs. Topsoil stockpiles will be appropriately marked.

No stream buffer zones occur in the permit area. No surface blasting is planned for.

### Compliance

The applicant has adequately addressed the requirements of this regulation.

### Stipulations

None.

UMC 817.13 Casing and Sealing of Exposed Underground Openings: General Requirements - JRH

UMC 817.14 Casing and Sealing of Exposed Underground Openings: Temporary - JRH

UMC 817.15 Casing and Sealing of Exposed Underground Openings: Permanent - JRH

Existing Environment and Applicant's Proposal

The Operator has provided general plans for the permanent closure of mine openings in part 3.6.3.1 of the MRP. Exploratory bore holes and wells are to be grouted for their entire length. Shafts will be filled with non-combustible material and a 6" thick concrete cap shall be placed over the shaft as a seal. The Operator has further committed to comply with other applicable requirements of MSHA and other agencies during permanent closure of these mine openings.

Temporary cessation of mining operations with regard to mine openings shall be in accordance with UMC 817.13 and applicable 30 CFR regulations.

The water well located within the permit area is described in part 3.3.1 of the mining and reclamation plan. Upon cessation of mining operations the operator shall completely fill the well with crushed gravel and concrete the top ten feet of the well casing.

Compliance

The operator has addressed the requirements of these sections. Closure of the mine opening shall be in accordance with local, state and federal regulations.

Stipulations

None.

UMC 817.21-.25 Topsoil - JSL

Existing Environment and Applicants Proposal

The Boyer Mine soil resources are discussed in the MRP submittal, chapter eight, section 8.3, pages 8-4 through 8-11. The soil survey is at the order 1 scale.

The soils at the Boyer Mine are gravelly, medium textured and neutral in pH. Three soil series have been identified within the permit area. These series include: 1) Bezzant gravelly loam, 25 percent to 40 percent slopes; 2) Moweba gravelly loam, 2 to 5 percent slopes; and, 3) Richville gravelly loam, 40 to 70 percent slopes. The respective taxonomic classifications are: 1) loamy-skeletal, mixed frigid Typical Calcixerolls; 2) loamy-skeletal, mixed frigid Pachic Ultic Haploxerolls; and, 3) fine-loamy, mixed, frigid, Calcixerollic Xerochrepts. Soil profile depths generally range from 48 to 60 inches. Topsoil pH ranges from 6.6 to 7.0 while the substratum pH ranges from 6.8 to 7.8. The electrical conductivity ranges from 0.27 to 0.48 mmhos/cm with sodium adsorption ratios less than one (Appendix 8-1).

### Removal

A small area was previously disturbed (area C, Plate 8-1a) prior to the enactment of SMCRA in 1977 (Public Law 95-87). The remaining disturbance was developed after the enactment of SMCRA. Topsoil was salvaged from the area of disturbance after the enactment of SMCRA. Total disturbance at the Boyer Mine site is currently six acres. Topsoil removal plans are presented in section 8.7. The total volume of topsoil removed is equal to 6333 cubic yards (cyd). Plate 8-1a delineates the amount of topsoil removed from each corresponding soil type.

### Compliance

The applicant's proposal adequately addresses the requirements of this section.

### Stipulation

None.

### Storage

Approximately 6333 cyd of topsoil has been removed and stockpiled (plate 3-1). The topsoil stockpile has been constructed to minimize erosion (pg. 8-13). Slopes will not exceed a 2.5:1 slope (cross section plate 3-1), and a tackifier agent and a natural hay mulch will be incorporated into the material. The stockpile will then be seeded with a quick growing vegetation (Table 3-1 and appendix 8-2). Topsoil signs will be posted (fig. 3.3) and the establishment of noxious plants will be prevented.

### Compliance

The applicant's proposal adequately addresses the requirements of this section.

### Stipulations

None.

### Redistribution

The applicant provides a plan which details topsoil redistribution procedures on pages 3-72 through 3-73, 3-79 through 3-82, 3-84, and 8-14 through 8-15. Prior to topsoil redistribution regraded land will be scarified to a 35 cm depth, thereby increasing topsoil adherence and promoting root growth. The topsoil will be redistributed to a depth of six inches. After topsoil has been redistributed compaction will be reduced with a dryland chisel plow. The plow depth will approximate six inches in depth. Travel on reclaimed areas will be limited. Alfalfa at 0.75 tons per acre will be tilled into the redistributed soil at a six inch depth. This amendment will enhance

the aeration, water holding capacity, microbiological communities and stabilize a favorable nutrient cycle within the topsoil. Topsoil will be seeded within one week after redistribution (pg. 3-89).

Compliance

The applicant's proposal adequately addresses the requirements of this section.

Stipulation

None.

Nutrients and Amendments

The applicant provides a nutrient management plan on pages 3-83, 8-11 and 8-15 through 8-16. Chemical data is presented in appendix 8-1. The applicant commits to sample at the time of redistribution in section 8.5 and 8.9. Parameters for analysis are listed on page 8-16. Prior to discing the topsoil the following will be applied on a per acre basis:

| <u>Fertilizer</u>    | <u>Analysis</u> | <u>Rate (lb/acre)</u> |               |
|----------------------|-----------------|-----------------------|---------------|
|                      |                 | <u>Fall</u>           | <u>Spring</u> |
| Urea                 | 45-0-0          | 111                   |               |
| Diammonium Phosphate | 21-53-0         | 142                   | 47            |
| Potassium Sulfate    | 0-0-52          | 75                    | 25            |

Compliance

The applicant's proposal adequately addresses the requirements of this section.

Stipulation

None.

UMC 817.41 Hydrologic Balance: General Requirements - DD/RPS

Existing Environment and Applicant's Proposal

Underground mining activities are planned to minimize changes to the prevailing hydrologic balance in the mine plan and adjacent area.

The applicant has provided information and data to characterize the geology, ground and surface water in the vicinity of the mine.

Hydrologic structures have been proposed by the applicant to divert and control surface water flow on and away from the mine site. Studies have been conducted to help establish baseline hydrologic characteristics. A monitoring plan has been drafted and implemented to detect changes in water quality and quantity.

Reclamation practices will be conducted by the operator which will ensure stabilization of disturbed areas through land shaping, contemporaneous and permanent revegetation and runoff control.

Environmental protection measures will be conducted to prevent adverse effects from acid-forming and toxic-forming materials, gravity drainage of acid waters and subsidence. All mine openings will be sealed after cessation of mining operations to prevent access and interconnection of mine and surface environments.

The applicant proposes to control surface runoff from disturbed areas by using a combination of diversions, berms, channels, culverts, a catch basin and a sedimentation pond. At the main mine facility pad area, all undisturbed drainage will be routed from the disturbed area drainage utilizing four diversions (UD-1, UD-2, UD-3, and UD-4) and two culverts (CC-1 and CC-2). All disturbed area drainage will report to the sedimentation pond which is conservatively oversized. The pond is adequately sized to contain the runoff expected from the 100-yr, 24-hr precipitation event and the design sediment volume (1.05 Acre - feet). Details of the sedimentation pond and diversions are discussed in Sections UMC 817.43, 817.44, and 817.46. The applicant proposes to treat 2.9 acres of disturbed and undisturbed drainage in a small catch basin located in the coal waste disposal area.

Surface and ground water monitoring has been initiated at the site to establish the baseline conditions of the hydrologic balance for the current condition of the permit area. The applicant has proposed to continue monitoring the hydrologic system with a sampling scheme that is consistent with Division guidelines. Figures 4-1 and 4-2 depict the proposed surface and ground water monitoring sites to be used to monitor potential impacts to the system. Baseline water quality data are submitted in Appendix 7A of Volume 2.

Diversion channels proposed for the site are adequate to pass, at a minimum, the expected peak flow from a 10-yr, 24-hr precipitation event. Channel linings of riprap are proposed where necessary to reduce channel velocities and provide channel erosion protection. Exceptions to the proposal are noted in Section UMC 817.43 where some diversions are shown to be erosive and no channel protection is proposed. Upon implementation of the stipulation for that Section, the applicant will be in compliance with this regulation.

### Compliance

The operator has proposed designs utilizing best technology available to minimize water pollution in the permit and adjacent areas. Sections UMC 817.42, 817.43, 817.44, 817.46, and 817.47 discuss details of the applicant's proposal and the Regulatory Authority's Technical Analysis. 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 Hydrologic Balance: Water Quality Standards and Effluent Limitations - RPS

Existing Environment and Applicant's Proposal

The applicant proposes to route all disturbed area drainage (4.82 acres) from the main mine facilities pad to a sedimentation pond for treatment prior to discharge off the permit area. The applicant commits to retaining the sedimentation system at the site until the revegetation and drainage requirements of UMC 817.46 (u) are met (p. 3-89a and p. 7-9 of the MRP). The applicant proposes to add sampling station SS-7 to the monitoring schedule during the post-mining phase of the operation to demonstrate that drainage entering the pond will meet State and Federal water quality limitations existing at the time of final reclamation (p. 7-9). The applicant references Plate 7-1 for the location of SS-7. This plate does not depict the sampling point as stated. Therefore, stipulation UMC 817.46-(6)-RPS will be necessary in order for the applicant to be in compliance with subchapter K.

During the course of the technical analysis performed by the Regulatory Authority, it became evident that the applicant proposes to utilize the option presented under subsection (a)(3) of this regulation. This regulation essentially gives authority to the Regulatory Authority to grant an exemption for small areas from the requirement that all disturbed area drainage must report to a sedimentation pond. Three areas exist for the proposed plan that fall under this criteria. These are as follows:

1. The disturbed area for the powder and cap magazines and coal waste disposal area (refer to Plate 7-1).
2. The entrance haul road area downslope from culvert C-3 (refer to Plate 7-1).
3. The exit haul road and associated pad area downslope from the drop drain adjacent to station 3+00 (refer to Plate 7-1).

UMC 817.42(a)(3) requires that the applicant utilize alternative sediment control measures for these areas and the applicant must demonstrate that the drainage will meet all applicable effluent limitation standards.

For area #1 above, the applicant has proposed a catch basin which is sized to contain the runoff expected from the 10-yr, 24-hr precipitation event. Due to computational errors and assumption differences, the basin as proposed is undersized. Table A summarizes the differences.

Table A

| Characteristic                | DOGM      | BOYER      |
|-------------------------------|-----------|------------|
| Drainage area                 | 2.99 Acre | 0.787 Acre |
| Curve number                  | 82        | 90         |
| Precipitation (10 yr -24 hr)  | 1.89 in.  | 1.89 in.   |
| Runoff volume (10-yr, 24-hr ) | 0.14 AF   | 0.083 AF   |

Due to these differences, the application should be revised to reflect the necessary discrepancies. Upon meeting the requirements of stipulation UMC 817.42-(1)-RPS, the application will comply with the requirements of this section. The following assumes that the stipulation will be completed adequately and the revised catch basin design will be implemented prior to further disturbance in this area.

It is expected that runoff volume collected in the basin will simply infiltrate and evaporate and no discharge off the permit area is to be expected for 10-yr, 24-hr and lesser events. In the event of sequential 10-yr, 24-hr or larger precipitation events, the applicant has proposed an open channel overflow to maintain structure integrity. The applicant further proposes to provide continuing demonstration of the quality of the treated runoff by installation of a sampling pipe located near the crest of the basin (refer to Plate 7-3) to facilitate sample collection. The applicant has committed to sample all discharges from this catch basin and conduct an analysis according to the operational parameters given in Table 5-1 of Appendix 7A of Volume 2 (section 7.2.4.3.1).

For areas #2 and #3 above the applicant has proposed utilizing a series of straw bales to reduce expected velocities (and consequently sediment production) and treat discharge from these disturbed areas. The MRP depicts these strawbales as temporary (plate 7-1). It is unknown if the intent of this is temporary relative to life of mine or temporary within the life of the mine. Stipulation UMC 817.42-(2)-RPS is necessary to correct this interpretation and ensure the applicant demonstrates compliance with limitations through monitoring techniques.

A sedimentation system which was approved under the exploration permit is currently in use at the site. The requirements of (a)(5) of this section require that the sedimentation pond "shall be constructed in accordance with Section UMC 817.46.....before beginning any underground coal mining activities". The sediment pond currently at the site must undergo a minor revision to meet the specifications proposed in the permit application. Therefore, stipulation UMC 817.42-(3)-RPS is necessary in order to insure compliance with this section.

### Compliance

Discrepancies in design assumptions used by the applicant and those used by the Regulatory Authority for the catch basin proposed for the coal waste disposal area resulted in errors in that design. The Regulatory Authority recognizes the coal waste disposal area is currently only a proposal and delay of the permit will be unnecessary to correct the design. Stipulation UMC 817.42-(1)-RPS insures the applicant will be in compliance with this section prior to initiation of activities in this area.

Plate 7-1 depicts the straw bales proposed to treat drainage from culverts C-5 and C-6 as temporary structures. Interpretation of temporary status is questionable. Stipulation UMC 817.42-(2)-RPS will insure the straw bales will be maintained throughout the mining operation and will insure drainage from those treatment structures will comply with effluent limitations.

UMC 817.42 (a)(5) requires that the sediment pond is to be constructed pursuant to UMC 817.46 prior to mining activity on the site. The application currently contains no commitment for timing of installation of the proposed sediment pond. Therefore, Stipulation UMC 817.42-(3)-RPS is necessary to insure compliance with this regulation.

### Stipulations UMC 817.42-(1-3)-RS

1. The permittee shall submit revised designs for the catch basin proposed to treat drainage from the coal waste disposal area such that the final design must incorporate valid hydrologic assumptions and criteria and insure compliance with subsection (a)(3) of UMC 817.42. Designs must be submitted within 30 days of permit issuance and be approved by the Division prior to any further initiation of mining activity in the powder and cap magazine and coal waste disposal area.
2. The permittee shall within 30 days of permit issuance, submit revised appropriate sections and plates in the MRP to reflect a commitment to retain straw bale (or equivalent) treatment structures at the outlet of culvert C-6. Additionally, the permittee must commit, within 30 days of permit issuance, to sample all discharges from these structures and incorporate the analysis schedule proposed in Table 5-1 for all samples. A commitment to submit results of the analysis to the Division within 30 days of receipt must also be made.
3. Prior to beginning any underground coal mining activities under this permit in the affected drainage area, the applicant must construct the sedimentation system as proposed in the MRP.

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

Existing Environment and Applicant's Proposal

The control of drainage at the site is achieved using a system of temporary diversions and culverts to divert undisturbed (areas not affected by mining operations) drainage from the disturbed area, a mine yard drainage system which collects surface flow from the disturbed area and routes it to the sedimentation system, and a 36 inch culvert /open channel diversion proposed to divert flows from WS-4 (an intermittent drainage) to the East of the disturbed area. This system is best depicted on Plate 7-1 of Volume 2. Predicted peak flow values for each structure were analyzed utilizing the SCS Curve Number methodology (NEH-4, SCS, 1974). Table B summarizes input assumptions. The results of that analysis are summarized in Table C with the values presented by the applicant in the MRP. Details of the technical analysis and assumptions are located in the Appendix of this document.

Table B

| WATERSHED | AREA  |       | SLOPE % |       | HYDR LENGTH |       | CONCENTRATION TIME |       |
|-----------|-------|-------|---------|-------|-------------|-------|--------------------|-------|
|           | DOGM  | BOYER | DOGM    | BOYER | DOGM        | BOYER | DOGM               | BOYER |
| UD-1      | 220.0 | 220.0 | 35.9    | 35.9  | 7600'       | 7600' | 0.60               | 0.60  |
| UD-2      | 10.76 | 8.61  | 49.63   | 20.4  | 1750'       | 300'  | 0.157              | 0.06  |
| UD-3      | 1.57  | 1.01  | 78.40   | *     | 665'        | 90'   | 0.058              | 0.02  |
| UD-4      | 0.99  | 0.75  | 75.47   | *     | 460'        | 175'  | 0.044              | 0.02  |
| Disturbed | 3.66  | 4.82  | 4.0     | *     | 635'        | *     | 0.037              | 0.02  |
| DD-3      | 2.99  | 0.40  | 34.4    | *     | 955'        | *     | 0.116              | 0.02  |

\*Not stated in MRP

Table C indicates that the applicant's peak flow values are acceptable with the expectation of DD-3 and the Disturbed area reporting to the pond. It is expected that assumption differences between the applicant and the Regulatory Authority and computation errors account for the different results for these two areas. Stipulation UMC 817.43-(1)-RPS will insure compliance with this regulation.

Table C  
Peak Discharge  
(cfs)

| WATERSHED | Q10-24 |       | Q25-24 |       | Q100-24 |       |
|-----------|--------|-------|--------|-------|---------|-------|
|           | DOGM   | BOYER | DOGM   | BOYER | DOGM    | BOYER |
| UD-1      | 16.0   | 16.0  | *      | *     | 76.0    | 76.0  |
| UD-2      | 1.67   | 2.49  | 3.35   | *     | 6.71    | 7.46  |
| UD-3      | 0.31   | 0.32  | 0.59   | *     | 1.12    | 0.95  |
| UD-4      | 0.20   | 0.23  | 0.38   | *     | 0.71    | 0.70  |
| DD-3      | 0.51   | 0.13  | 1.00   | *     | 1.97    | 0.38  |
| Disturb   | 5.02   | 0.36  | 6.42   | *     | 8.77    | 0.607 |

\*Not given in application

The second stage of analysis consisted of calculation of culvert or diversion capacity. USBR culvert nomographs or Manning's Equation at minimum slope were used for this analysis. Table D summarizes the input assumptions and the results of the analysis for the diversions. The Appendix of this report summarizes the available capacity for all the culverts.

From this table and the USBR charts located in the Appendix of this document, we can see that all diversions and culverts proposed in the MRP are significantly oversized with respect to capacity.

Third stage analysis consisted of verifying the calculation of maximum expected velocity (or exit velocity for culverts) which occurs at maximum slope for the diversion. All culverts were assumed to behave as an open channel at the design flow (10-yr, 24-hr) due to HW/D values all less than 1.0. Tables D and E summarize the results of this analysis.

TABLE E

| CULVERT<br>ID | VELOCITY (fps) @ Q (cfs) |               | RIPRAP<br>inches |       |
|---------------|--------------------------|---------------|------------------|-------|
|               | DOGM                     | BOYER         | DOGM             | BOYER |
| 1             | 12.16 @ 15.5             | 13.49 @ 16.00 | 15"              | 12"   |
| 2             | 10.2 @ 2.03              | 20.5 @ 2.49   | 13"              | 9"    |
| 3             | 6.83 @ 5.18              | 8.37 @ 0.2    | 7"               | 6"    |
| 5             | 4.81 @ 5.34              | 6.49 @ 16.00  | 3.5"             | None. |
| 6             | 6.22 @ 7.7               | 6.49 @ 18.49  | 5.5              | 6"    |

It must be noted that the riprap proposed by the applicant is based upon a  $D_{50}$  criteria (median diameter) and the Regulatory Authority's values are for  $D_{max}$  (maximum diameter). The  $D_{50}$  value which corresponds to the Regulatory Authority's value will approximate the applicant's proposed size. Therefore, the values for C-1, C-2, C-3 and C-6 will be acceptable. The applicant has proposed no energy dissipator for C-5. To facilitate technical analysis for this culvert, it was conservatively assumed by the Regulatory Authority that all the drainage for the disturbed area would report to this culvert. In fact, the drainage will be less than 10 percent of that value. At that design event, the expected discharge will have a velocity of some value less than 4.8 fps. The expected velocity of the flow from C-5 will as a result be non-erosive and no dissipator is necessary.

Tables D & E depict that the proposed riprap is acceptable for all diversions except UD-2 (no riprap section) and DD-3. Stipulation UMC 817.43-(1)-RPS will rectify the discrepancies and ensure compliance with this section.

The applicant proposes no diversions designed to divert water into the underground mine.

### Compliance

Discrepancies in design values between the applicant and the Regulatory Authority have resulted in insufficient designs for riprap protection for UD-2 and DD-3. Additionally, some intermediate values for the design of the diversions on the site may be error. The Regulatory Authority's Technical Analysis resulted in the conclusion that the errors are not significant, but should be corrected to insure a consistent and logical permit. The applicant will be in compliance with this regulation when stipulation 817.43 - 1 - RS is adequately addressed.

### Stipulation UMC 817.43-(1)-RPS

1. Within 60 days of permit issuance, the permittee shall submit a revised complete and technically adequate design plan for all diversions which incorporates correct hydrologic assumptions and meets the requirements of UMC 817.43.

### UMC 817.44 Hydrologic Balance: Stream Channel Diversions - RPS

#### Existing Environment and Applicant's Proposal

The applicant has proposed a 36 inch culvert and an open channel diversion to divert the flows from WS-4 to the East of the disturbed area (Plates 7-1 and 4-1, Vol. 2). The flow from this watershed is determined to be intermittent in nature (SOAP report, Boyer Mine, Earthfax Engineering, Inc., 1986). Essentially, the same procedural analysis as described for the diversions under UMC 817.43 of this report was followed for the verification of the design for this stream channel diversion. In order to facilitate reader review, the information and results of that analysis were presented in UMC 817.43. The design event of 16 cfs for a 10-yr, 24-hr precipitation event (SOAP report, Boyer Mine, Earthfax Engineering, Inc., 1986) was used in the design work. Technical analysis of the design resulted in the conclusion that the design is adequate with respect to capacity and stability (reference analysis tables under section UMC 817.43). With the use of a culvert and the proposed 12 inch D<sub>50</sub> riprap, additional contributions of suspended solids outside the permit area will be minimized.

The application has presented designs for the reclamation of the channel identified as UD-1 that incorporate the 100-yr, 24-hr peak flow as the design event. Preliminary technical analysis of these designs demonstrate that reclamation of the channel is technically feasible. However, the application must contain more detail to demonstrate that the requirements of this section will be met upon final reclamation. Specifically, the applicant is requested to 1) demonstrate that the capacity of the reclaimed channel will be equal to the capacity of the existing channel, 2) submit plans for riparian vegetation establishment, and 3) submit plans to restore a natural meander and gradient

pattern. Information on the required detail and suggestions for compilation of the response will be available from the Regulatory Authority. Detailed analysis of the final design calculations will not be presented in this document as the design may change due to considerations required above.

#### Compliance

The proposed diversion UD-1 (refer to Plate 7-1) is in compliance with this section relative to life of mine (temporary) criteria. Reclamation designs are adequate to demonstrate that reclamation of the channel is technically feasible. Design details are required to demonstrate compliance with subsections (b)(2) and (d) of this regulation. The applicant will be in compliance with this regulation when the following stipulation has been adequately addressed.

#### Stipulation UMC 817.44-(1)-RPS

1. The permittee must submit complete and technically adequate designs for UD-1 that demonstrate compliance with subsections (b)(2) and (d) of this rule within 120 days of permit issuance.

#### UMC 817.45 Hydrologic Balance: Sediment Control Measures - RPS

##### Existing Environment and Applicant's Proposal

The disturbed area drainage will be controlled and treated using an oversized sedimentation pond system, berms, diversions, and straw bales. Erosion of diversions and exit point of culverts will be minimized as adequate riprap protection has been proposed (refer to section UMC 817.43 of this document). Disturbed area drainage that is unable to report to the sedimentation pond due to geographical constraints will be treated in treatment structures (catch basins and straw bales) in order to minimize sediment contribution off the permit area.

#### Compliance

The applicant is in compliance with this regulation.

#### Stipulations

None.

#### UMC 817.46 Hydrologic Balance: Sedimentation Ponds - RPS/JRH

##### Existing Environment and Applicant's Proposal

The proposed sedimentation pond at the Boyer mine is an embankment type basin with a capacity of 1.41 acre feet (AF) at the elevation of the primary spillway (6286 ft.). The spillway system consists of a drop inlet type primary spillway (morning glory) and an open channel emergency spillway. The

sediment pond was designed by Blackhawk Engineering, Inc. and is presented in Chapter 7 of Volume 2 of the MRP. A sedimentation pond currently exists at the site which was approved under the exploration permit. The pond is located adjacent to the mine facilities and is as near as possible to the disturbed area. Plates 7-1 and 7-2 can assist the reader with interpretation of the following discussion.

Drainage from 4.82 acres (Regulatory authority value is 3.66) of disturbed area is routed to the pond for treatment prior to discharge off the permit area. A mine yard drainage system collects the drainage through a series of drop drains and 18 inch culverts. This system reduces the flow length for surface flow for drainage on the mine pad and therefore will minimize erosion and sediment production from the disturbed area. The embankment is 10 ft. in height as measured from the upstream toe and is 10 ft. in width across the crest.

The first phase of the regulatory authority's technical analysis of the pond design involved determining the expected runoff volumes for different design storms (10-yr, 24-hr, 25-yr, 24-hr, 100-yr, 24-hr). Drainage area for the disturbed area was digitized, a representative curve number was selected and appropriate rainfall depths were selected for the storms. Tables F and G summarize these assumptions.

TABLE F

| INPUT         | DOGM    | APPLICATION |
|---------------|---------|-------------|
| Drainage Area | 3.66 Ac | 4.82 Ac.    |
| Ppt 10-24     | 1.89 "  | 1.89 "      |
| Ppt 25-24     | 2.25 "  | 2.25 "      |
| Ppt 100-24    | 2.85 "  | 2.85 "      |
| CN (Undist)   | 90      | 90          |
| CN (Distr)    | Type II | Type II     |

Using SCS curve number methodology, the expected runoff volumes for the design precipitation events were calculated. The results of those calculations are presented in Table G.

TABLE G

| WATERSHED      | VOLUME (AF) |              |             |              |             |              |
|----------------|-------------|--------------|-------------|--------------|-------------|--------------|
|                | Q10-24      |              | Q25-24      |              | Q120-24     |              |
|                | <u>DOGM</u> | <u>BOYER</u> | <u>DOGM</u> | <u>BOYER</u> | <u>DOGM</u> | <u>BOYER</u> |
| Disturbed Area | 0.305       | 0.402        | 0.400       | 0.526        | 0.563       | 0.567        |
| Catch Basin    | 0.144       | 0.083        | 0.204       | *            | 0.314       | *            |

\* Values not given by applicant.

From these two tables we can see that the applicant has correctly calculated the expected volumes. Additionally, the applicant is conservative in the estimate of the amount of disturbed area draining to pond.

Phase two of the analysis was to determine the appropriate design volume for accumulated sediment from the disturbed area. To facilitate and speed the analysis, the Regulatory Authority utilized the option presented in 817.46 (b)(3) and applied a 0.1 AF of sediment storage volume for each acre of disturbed area proposed by the applicant (4.82 acres). Again, this is a conservative approach as the Regulatory Authority's value for the disturbed area is lower at 3.66 acres. A design volume for sediment was determined to be 0.482 AF. The applicant does not propose any discharge from the mine to the pond.

Based upon plate 7-2, the regulatory authority calculated a stage- volume curve for the proposed pond. The curve that is presented in Figure 1 demonstrates that the pond is significantly oversized with respect to ability to contain the runoff volume and required sediment volume from the disturbed area. The volume of the pond is sufficient to contain the 100-yr, 24-hr precipitation event runoff and the design sediment volume at an elevation one foot lower than the primary spillway. UMC 817.46 only requires containment of the expected runoff from the 10-yr, 24-hr precipitation event and design sediment volume.

The dewatering system for the pond consists of a head gate valve on the 24 inch primary spillway. A series of 8 rows of 1/4" holes on 4" centers on the riser pipe of the spillway have been provided to facilitate pond dewatering. These holes will minimize the expected turbulence and resultant resuspension of settled sediments commonly associated with pond dewatering operations. The applicant states that the head gate will remain closed to provide for maximum storm detention time. That value is not defined, but must be greater than 24 hours to meet requirements of subsection (c) of this regulation. Stipulation 817.46-(1)-RPS will ensure compliance with this regulation.

The applicant has proposed a sediment marker in the pond and commits to clean out of the pond when sediments accumulate to 60 percent of the design volume. The regulatory authority calculates this value to be 0.289 AF which will occur at an elevation of 6280 feet. The applicant has not presented specific values for this marker and clean out level, therefore Stipulation UMC 817.46-(2)-RPS is required.

A technical analysis of the spillway system was conducted utilizing hydraulic theory applicable to drop inlet type structures. Values of weir, orifice, and pipe flow were calculated for incremental changes of head of 0.2 feet. The resulting stage - discharge curve is presented as Figure 2. From this curve we can conclude that the spillway is significantly oversized. The primary spillway has the capacity to discharge the 100-yr, 24-hr event (8.77 cfs) at an elevation of 6286.6 ft. which is 0.4 ft. below the elevation of the emergency spillway. Results of the peak flow evaluations can be found in the discussion of UMC 817.43. The applicant's presented values for the peak flow for the disturbed area are in error. Stipulation UMC 817.46-(3)-RPS will correct this deficiency and ensure compliance with this regulation.

The emergency spillway was not technically reviewed at this stage of the permit due to changes necessary in the design determined as the result of a field tour of the pond. Due to the head gate system on the primary spillway, the emergency spillway at the Boyer mine sediment pond must be a sound hydrologic design. Currently, the spillway is constructed of grouted gravel. Embankment settlement has resulted in the potential for piping beneath the spillway. The Division recommends that the spillway be reconstructed during the implementation of the proposed sedimentation pond. Stipulation UMC 817.46-(4)-RPS will ensure compliance with subsection (i) of this regulation.

The crest of the emergency spillway is 1.0 ft. above the crest of the primary spillway (Plate 7-2). The top width of 10 ft meets the criteria of  $(H + 35)/5$  where H = height of the embankment (9.0 ft.). Plate 7-2 depicts 2:1 and 3:1 slopes for the embankment. The applicant has not committed to the requirements of UMC 817.46 (r) relative to inspection and certification of the pond by a registered professional engineer. Stipulation UMC 817.46-(5)-RPS will insure compliance with this regulation.

The applicant has committed to inspection of the pond on a quarterly basis and has provided a sample inspection form to be used (Figure 7-2 of Chap. 7, Vol. 2). The applicant has committed to leave the sedimentation pond and all associated diversions at the site until the requirements of UMC 817.46 (u) are met. The applicant discusses the addition of sampling point SS-7 during the postmining phase of the operation in order to demonstrate compliance with subsection (u) of this regulation (p. 7-9). The narrative states that this station is located on Plate 7-1. That plate does not depict this station, therefore Stipulation UMC 817.46-(6)-RPS will be necessary in order to ensure compliance with this subsection.

### Compliance

The applicant is not in compliance with this regulation. Information submitted was adequate to determine that the sedimentation pond design is technically oversized and feasible. Assumption and computational errors have resulted in discrepancies in the application. Therefore, the applicant will be in compliance with this regulation when the following stipulations are met.

### Stipulations UMC 817.46-(1-6)-RPS

1. Within 30 days of permit issuance, the permittee shall submit to the Division a commitment to maintain a minimum detention time of 24 hours in the sedimentation pond for all 10-yr, 24-hr and lesser precipitation events.
2. Within 30 days of permit issuance, the permittee shall submit detailed information regarding the sediment pond clean out. This information should include elevation of 60% volume, elevation of maximum sediment storage volume, location of sediment marker in pond, and a commitment to clearly mark the referenced elevations on the stake.

3. Within 30 days of permit issuance, the permittee shall provide correct assumptions and peak flow values for design flows used for the design of the sedimentation pond.
4. Within 30 days of permit issuance, the permittee shall submit plans to the Division for the emergency spillway for the sedimentation pond. These plans should incorporate the 25-yr, 24-hr design event, a spillway lining of adequately sized riprap, a filter blanket design, and an adequately sized energy dissipator.
5. Within 30 days of permit issuance, the permittee shall submit to the Division a commitment to inspect the sedimentation pond during construction and submit certified as-built drawings of the structure. These must be conducted by a registered professional engineer.
6. Within 30 days of permit issuance, the permittee shall provide a correct Plate depicting the location of sampling station SS-7.

#### Compliance

The operator is not considered to be in compliance with slope requirements of this regulation. The sediment pond currently has an inslope of approximately 2h:1v and an outslope of 1.5h:1v as measured in the field by the Division. The currently approved exploration plan provides for inslopes and outslopes for the sediment pond at 1.5h:1v which does not meet the 5h:1v combined slope criteria, part (m) of this section. Additionally, each slope is not to be less than 2h:1v as also required under this section. The approved embankment width for the exploration plan sediment pond is 5 feet, which is approximately the width of the existing embankment, which again is not in compliance with the performance standards which would require an embankment width of approximately 10 feet. The proposed catch basin on the west side of the site has 1h:1v inslopes in its design which is in excess of the requirements of this section. Hydrologic design of the catch basin indicates that the catch basin is intended to function as a sediment pond structure and design criteria is based on sediment pond design. The applicant should ensure that the catch basin complies with all of the conditions as set forth in UMC 817.46.

In as much as the current sediment pond is an existing structure and must meet the performance standards of Subchapter K of the regulations, the applicant must provide a compliance plan for each existing structure proposed to be modified or reconstructed for use in connection with or to facilitate the underground coal mining activities.

#### Stipulations UMC 817.46-(1-2)-JRH

1. Within 30 days from the date of the permit approval, the permittee shall provide a compliance plan for the reconstruction and modification of the sediment pond facilities. The compliance plan shall include the design specifications for the modification or reconstruction of the structure to meet the design and performance

standards of Subchapter K of the rules; a reconstruction schedule which shows anticipated dates for beginning and completing interim steps and final reconstruction; provisions for monitoring the structure during and after modification or reconstruction to ensure that the performance standards of Subchapter K of the rules are met; and, a showing that the risk or harm to the environment or to public health or safety is minimized during the period of modification or reconstruction.

2. Within 90 days from the date of the permit approval, the permittee shall provide to the Division, a design for the proposed catch basin which is in compliance with the performance standards of Subchapter K of the regulations.

UMC 817.47 Hydrologic Balance: Discharge Structures - RPS

Existing Environment and Applicant's Proposal

The applicant has proposed to install energy dissipators for culverts C-1 through C-4 and C-6. Expected exit velocities for the design event of 10-yr, 24-hr were technically verified for all structures. Tables H and I summarize the Regulatory Authority's results and the values presented by the applicant:

TABLE H  
DOGM Values

| Culvert | Slope (%) | Q10-24 (cfs) | Depth (in) | X Sec Area (ft sq) | WP (ft) | Velocity (fps) @ Discharge (cfs) |
|---------|-----------|--------------|------------|--------------------|---------|----------------------------------|
| 1       | 12.31%    | 16.00        | 8.5"       | 1.28               | 3.04    | 12.16 @ 15.5 cfs                 |
| 2       | 35.71%    | 2.00         | 2.75"      | 0.20               | 1.38    | 10.19 @ 2.03 cfs                 |
| 3       | 5.00%     | 5.02         | 8.00"      | 0.76               | 2.19    | 6.83 @ 5.18 cfs                  |
| 5       | 3.00%     | 5.02         | 16.00"     | 1.11               | 3.69    | 4.81 @ 5.34 cfs                  |
| 6       | 3.00%     | 7.0          | 10.00"     | 1.239              | 2.81    | 6.22 @ 7.70 cfs                  |

TABLE I  
BOYER Values

| Culvert | Slope (%) | Q10-24 (cfs) | Depth (in) | X Sec Area (ft sq) | WP (ft) | Velocity (fps)      |
|---------|-----------|--------------|------------|--------------------|---------|---------------------|
| 1       | 12.31%    | 16.00        | *          | *                  | *       | 13.5 fps @ 16.0 cfs |
| 2       | 30.00     | 2.49         | *          | *                  | *       | 20.5 fps @ 2.5 cfs  |
| 3       | 5.00      | 0.20         | *          | *                  | *       | 8.4 fps @ 0.2 cfs   |
| 5       | 3.00      | 16.00        | *          | *                  | *       | 6.5 @ 16.0 cfs      |
| 6       | 3.00      | 18.49        | *          | *                  | *       | 6.5 @ 18.5 cfs      |

\* Not presented in application

Although intermediate values may be in error, the tables demonstrate that an adequate velocity estimate has been presented by the applicant. All applicant values exceed the Regulatory Authority values.

The adequacy of the size of riprap protection was technically analyzed and the results presented in Table J.

TABLE J

| CULVERT<br>ID | VELOCITY (fps) @ Q (cfs) |               | RIPRAP<br>inches |       |
|---------------|--------------------------|---------------|------------------|-------|
|               | DOGM                     | BOYER         | DOGM             | BOYER |
| 1             | 12.16 @ 15.5             | 13.49 @ 16.00 | 15"              | 12"   |
| 2             | 10.2 @ 2.03              | 20.5 @ 2.49   | 13"              | 9"    |
| 3             | 6.83 @ 5.18              | 8.37 @ 0.2    | 7"               | 6"    |
| 5             | 4.81 @ 5.34              | 6.49 @ 16.00  | 3.5"             | None. |
| 6             | 6.22 @ 7.7               | 6.49 @ 18.49  | 5.5              | 6"    |

The values presented for riprap size by the applicant are based on a D<sub>50</sub> (median diameter) whereas, the Regulatory Authority values are D<sub>maximum</sub>. Therefore, all energy dissipators are adequately sized for the expected exit velocities.

The energy dissipator for the primary spillway was not technically reviewed at this time. The primary spillway outlet discharges directly onto the emergency spillway. Revisions to the emergency spillway (required by Stipulation UMC 817.46-(4)-RPS) will result in a modification of the emergency spillway characteristics. The applicant must insure that the spillway riprap material is adequate to dissipate the energy from the primary spillway design flow. Therefore, stipulation UMC 817.47-(1)-RPS will insure compliance with this regulation.

#### Compliance

The applicant is generally in compliance with this regulation. Adequate energy dissipators have been proposed as required with the exception of the primary spillway. Changes in the emergency spillway will dictate new designs for this energy dissipator. The applicant will be in compliance with this regulation when the following stipulation has been addressed.

#### Stipulation UMC 817.47-(1)-RS

1. Within 30 days of permit issuance, the permittee shall submit adequate designs for the energy dissipator for the primary spillway. These designs must be based upon the expected velocity for the discharge from a 10-yr, 24-hr precipitation event.

UMC 817.48 Hydrologic Balance: Acid-Forming and Toxic-Forming Materials - JSL  
Existing Environment and Applicants Proposal

The coal floor and roof percent pyritic sulfur and neutralization potential have been presented (appendix 6D). The Acid-Base Potential (ABP) of the floor and roof were calculated to be -22.9 and -64.5 respectfully. An ABP of less than or equal to -5 tons  $\text{CaCO}_3$ /1000 tons material equivalence is defined by the Division as an acid-forming or toxic-forming material. Therefore this material has been determined to be an acid-forming or toxic-forming material. The operator has submitted an acid-forming or toxic-forming waste material disposal plan on page 3-66-b-1, -1a, and -2. The location of this disposal area is presented on plate 3-1.

The disposal area will be lined with a minimum 8" of impervious material prior to the disposal of waste materials. Disposal of the acid-forming or toxic-forming material will be completed 30 days after it is first exposed on the minesite. The acid-forming or toxic-forming materials will be buried under a minimum four foot soil depth.

Due to the variability of the sulfur found within the roof and floor materials the applicant has committed to submit to the Division the following information relative to the roof, mid-seam, and floor materials after every 1000 feet of mine entry for the five (5) year permit term: pH, texture, boron, total sulfates, pyritic sulfur, calcium carbonate percentage, acid-base potential, electrical conductivity and selenium.

Compliance

The applicant's proposal does not adequately address the requirements of this section. Due to the potential burial of acid-forming or toxic-forming materials during previous pad construction the pad materials must also be characterized. This determination will be based upon: 1) the volume of rock material removed during portal face development and buried within the pad; 2) the volume of soil constituents within the pad; and, 3) the acid-base potential of the pad materials. The acid-base potential analysis will consist at a minimum of 2 sample sites with the following sampling depths: 0-12", 12-36", 36-60", 60-84", and 84-108". The samples will not be composited. The sample must be characteristic of the sampling depth. If both rock and soil are incorporated within a specific depth both materials will be analyzed separately. The applicant has committed to submit this information prior to April 15, 1987 (pg. 3-66-b-1-a).

The average soil neutralization potential, submitted April 16, 1986 is 4.62 Tons  $\text{CaCO}_3$ /1000 Tons Material equivalence. The underground waste disposal area was planimetered to be 8,800 square feet. The four feet of soil removed for waste disposal will equal 1,822 tons of material or an equivalence of 6.6 tons  $\text{CaCO}_3$ . An estimated 1500 cyd of underground waste material, with a bulk density of approximately 90 lb/ft<sup>3</sup> will equal 1,822 tons of material or an (average between roof and floor) equivalence of -79.6 tons of  $\text{CaCO}_3$ . Total  $\text{CaCO}_3$  equals a deficit of 73 tons of  $\text{CaCO}_3$  for the approximate 1,822 tons of underground waste material.

Two options will effectively stabilize the acid- or toxic-forming material (ATFM). One option is to incorporate  $\text{CaCO}_3$  with each one foot lift. Based on the estimated average acid production potential and soil neutralization potential, 33 tons of  $\text{CaCO}_3$  is required to be incorporated in each lift. Each lift would be equal to 456 tons of waste material. The second option would require the operator to seal the waste materials from aerobic atmospheric conditions. This would significantly reduce any potential pyritic oxidation. The exact amount of  $\text{CaCO}_3$  required to neutralize the acid production potential will be dependent upon the acid-base potential (ABP) of the waste materials. The ABP will be determined from roof, mid-seam and floor samples after every 1000 feet of mine entry.

Stipulations UMC 817.48-(1-2)-JSL

1. Within 90 days of permit approval the permittee will provide the Acid-Base potential (ABP) data for the pad materials. If the ABP from the pad is found to be less than or equal to -5 Tons  $\text{CaCO}_3$ /1000 Tons Material, the permittee must submit to the Division within 90 days of permit approval a plan to abate the potential contamination of groundwater.
2. Within 90 days of permit approval the permittee must provide an acid- or toxic-forming material (ATFM) waste disposal plan that will effectively reduce pyrite oxidation. The permittee may amend the ATFM with  $\text{CaCO}_3$  at the required amounts or seal the material from any aerobic atmospheric conditions.

UMC 817.49 Hydrologic Balance: Permanent And Temporary Impoundments - RPS

Existing Environment and Applicant's Proposal

The applicant has committed to removal of the sedimentation pond and catch basin (p. 3-89a). There will be no permanent ponds or embankments at the site. The applicant has not committed to submit the inspection report required by 817.49 (h).

Compliance

The applicant is not in compliance with this regulation. The applicant has not discussed the inspection report required by subsection (h) of this regulation. Therefore, stipulation UMC 817.49-(1)-RPS is necessary in order to ensure compliance with this regulation.

Stipulation UMC 817.49-(1)-RPS

1. Within 30 days of permit issuance, the permittee shall submit to the Division a commitment to conduct the inspection required by subsection (h) of UMC 817.49 and to submit the results of that inspection to the Division within 30 days following completion of construction of the proposed sedimentation pond.

UMC 817.50 Hydrologic Balance: Underground Mine Entry and Access  
Discharge - DD

Existing Environment and Applicant's Proposal

No gravity discharge of water from the mine is planned at this time. Any water generated in the mine will be collected in sumps and used in the mine for spray at the working face, at belt heads and transfer points for dust suppression.

No water has been contacted in the Boyer Mine workings to date. There have been no reports of water contact within the Blackhawk Mine workings adjacent to the property which exhibits a structure and lithofacies similar to the Boyer Mine.

No gravity discharge of mine water should occur after cessation of mining operations. The mine workings shown on Plate 3-2 of the MRP show entries down dip from the strike of the seam. The average dip of the coal seam is 17 degrees. If water is contacted in the mine it is expected below the elevation of the adits.

If in the future it is necessary to pump water from the mine the applicant has committed to acquire an NPDES permit.

Compliance

The applicant complies with this section.

Stipulation

None.

UMC 817.52 Hydrologic Balance: Surface and Ground Water Monitoring - DD

Existing Environment and Applicant's Proposal

Water resources are prevalent in the area surrounding the mine. The applicant has conducted surveys to identify water resources, collected and submitted baseline ground water and surface water information and data (Attachment 1, Vol. 2) which depicts water quality and quantity of selected sites.

Ground water

Ground water exists in confined and unconfined states in the vicinity of the mine property. Unconfined aquifer conditions occur in the alluvial sediments that fill the valleys of Chalk Creek, Huff Creek and Josh Hollow adjacent to the mine plan area. Another unconfined aquifer exists at the unconformity formed by the dipping Cretaceous formations and the nearly horizontal Knight Formation. While drilling a monitoring well at the site a confined aquifer was found to exist in a gravel bed about 100 feet below the Wasatch coal seam.

The alluvium of Chalk and Huff Creeks comprises the major ground water source for the area. The alluvium is quite permeable and can yield up to 2000 gallons per minute (gpm). Only a few wells in the vicinity withdraw water from the alluvial aquifer and at low rates (approximately 2-10 gpm).

Pump tests were conducted on the Old well and the Mine well. During the pumping period water level data were collected using an electric water level indicator. Flow data were collected volumetrically using a one gallon bucket. Analyses describing the drawdown rates, recovery rates and transmissivities are described on pages 101-109, Attachment K and Addendum to mine plan for Mine well April 21, 1987 by EarthFax. Water quality and quantity from a few wells is available.

The applicant will continue to monitor the Morby well, the Old well, the Boyer Well and the Mine well. Monitoring of the wells will consist of monthly water level measurements at the Old well and Mine well for the baseline monitoring period. Four (quarterly) water quality samples will be collected annually from the four wells. Well samples will be analyzed for dissolved constituents listed in Table 5-2, MRP. Operational monitoring will continue until 2 years following cessation of mining activities. During the post mining period, water level measurements will be taken and samples collected annually until bond release.

Surveys were conducted in June 1985 and October 1985 to identify the locations and characteristics of seeps and springs in the vicinity of the permit area. Thirty-four seeps and springs were found within one mile of the permit boundary. Most issued from alluvium or colluvium overlying bedrock at shallow depth. During the June survey, 11 of the sources existed as seeps with water visible. Maximum measured flows were 10 gallons per minute (gpm). In October of 1985 seven of the seeps and seven of the springs were dry and flows at the other springs were unmeasurable (see spring and seep Table 4-19, p. 100, Vol. 2).

Major chemical concentration in groundwater contained in bedrock near Chalk Creek consist of sodium, calcium and bicarbonate. Closer to the ridges on either side of Chalk Creek ground water contains higher concentrations of calcium, magnesium and chloride.

### Surface Water

Surface water sources exist as perennial flow in Chalk Creek and Huff Creek with intermittent and ephemeral flows for their tributaries. Tributaries in the permit and adjacent areas are either intermittent, fed by springs through part of the year, or ephemeral, flowing only in direct response to precipitation events.

No surface water impacts are expected to occur from mining. Implementation of a sedimentation pond at the lower end of the mine property will contain runoff from the disturbed surface facilities. Thus no sediments, oils, greases or coal fines will be discharged from the permit area into Chalk Creek.

A set of stations have been established to monitor the quantity and quality of surface waters above and below the mine site to gage impacts from mining activities (Figure 4-1, Boyer MRP). The applicant will monitor locations SS-4, SS-4A, SS-5 and SS-6 for quantity on a monthly basis and collect water quality samples quarterly on Chalk Creek and monthly on intermittent streams during the baseline monitoring period.

Water quality samples will be analyzed for both total and dissolved constituents as outlined in DOGM guidelines for the operational phase of the mine. Every fifth year samples will be collected during high and low flow periods and analyzed for baseline parameters as outlined in Table 5-1, MRP.

Operational monitoring will continue until one year following cessation of mining activities. During the postmining period, measurements shall be taken and samples collected twice each year from the Chalk Creek stations. Samples will be collected once each year during the low flow and once during high flow. The intermittent streams (SS-4 and SS-4A) will be monitored twice each year during the runoff period. Monitoring during the postmining period shall continue until termination of bonding.

Calcium and bicarbonate are the principal ions in surface water in the mine plan and adjacent areas. Total dissolved solids concentrations are less than 500 mg/l in Chalk Creek and less than 600 mg/l in the intermittent streams. Concentrations of trace metals in the area are within drinking water standards.

#### Compliance

The applicant is in compliance with this section.

#### Stipulations

None.

#### UMC 817.53 Hydrologic Balance: Transfer of Wells - DD

##### Existing Environment and Applicant's Proposal

The Operator has provided general plans for the permanent closure of all drilled holes. Boreholes are to be cemented with an approved slurry. The slurry mixture will consist of 5.2 to 5.5 gallons of water per bag of cement. An appropriate slurry device will be lowered to the bottom of the hole and sufficient slurry pumped to completely fill the hole from within 3 feet of the collar. A monument will be erected over the sealed hole.

The water well located within the permit area is described in part 3.3.1 of the mining and reclamation plan. Upon cessation of mining operations the operator shall completely fill the well with crushed gravel and concrete the top ten feet of the well casing.

Compliance

The applicant complies with this section.

Stipulation

None.

UMC 817.55 Hydrologic Balance: Discharge of Water Into An Underground Mine - RPS

Existing Environment and Applicant's Proposal

The operator does not propose to divert any water into the underground mine. The applicant has provided designs for diversions that divert all drainage from the mine openings.

Compliance

The applicant is in compliance with this regulation.

Stipulations

None.

UMC 817.56 Hydrologic Balance: Postmining Rehabilitation of Sedimentation Ponds, Diversions, Impoundments, and Treatment Facilities - RPS

Existing Environment and Applicant's Proposal

The applicant proposes to remove all sedimentation ponds and associated diversions following compliance with the criteria of UMC 817.46 (u) (p. 3-89a). The applicant proposes to dispose of accumulated sediments in the pond if they are found to be unsuitable prior to reclamation of the pond. Diversion UD-1 (Plate 7-1) is the single permanent hydrologic structure proposed for the mine site. The applicant has not committed to renovating this structure upon final abandonment of the site (i.e., following sediment system removal).

Compliance

The applicant will be in compliance when stipulation UMC 817.56-(1)-RPS is adequately addressed.

Stipulation UMC 817.56-(1)-RS

1. Within 30 days of permit issuance, the permittee shall commit to renovating the permanent diversion labeled as UD-1 prior to final abandonment of the site. The commitment should include intent to ensure the capacity and stability criteria of the proposed design are adequately met and all necessary structural features are in good repair, functional and constructed as per the approved design.

UMC 817.57 Hydrologic Balance: Stream Buffer Zones - RPS

Existing Environment and Applicant's Proposal

The applicant does not propose any mining activity within 100 ft. of an intermittent or perennial stream that meets the criteria of subsection (a) of this regulation. Activity will occur within 100 ft. of the drainage labeled as WS-4. This drainage is classified as an intermittent system and no aquatic community has been identified for this system.

Compliance

The applicant is in compliance with this regulation.

Stipulations

None.

UMC 817.59 Coal Recovery - JRH

Existing Environment and Applicant's Proposal

In section 3.4.3.2.5, the applicant indicates that the potential reserves lie to the north and the west of the mine permit area. The location and orientation of the main entries are such that if left intact, can allow for the entry into and the recovery of those adjacent coal reserves. In the event that the applicant is not successful in obtaining mineral rights to the adjacent coal reserves, the applicant shall leave an open access to such reserves or shall extract and eliminate access to the reserves based on the consensus of the owner of the adjacent mineral reserves.

Compliance

The applicant is considered to be in compliance with the requirements of this section. The applicant has committed to maintain and protect access to adjacent reserves until such time as the mineral owners consent to the use or the removal of mains to be left for such access.

Stipulations

None.

UMC 817.61-68 Use of Explosives - JRH

Existing Environment and Applicant's Proposal

The applicant has addressed this section in part 3.4.6.3 of the mining and reclamation plan. Explosives are to be stored on the surface in magazines designed to conform to MSHA regulations and are located as shown on plate 3-1. All surface blasting as may be required for site preparation shall

conform to applicable federal and state regulations for surface work. Underground blasting shall be employed for fault crossings, dikes or other rock structures encountered in the mine and will be in accordance with appropriate regulations.

### Compliance

The applicant is considered to be in compliance with the requirements of this section.

### Stipulations

None.

### UMC 817.71 Disposal of Excess Spoil and Underground Development Waste: General Requirements - JRH

#### Existing Environment and Applicant's Proposal

The applicant has addressed the requirements of this section in part 3.5.9 of the mining and reclamation plan. It has been determined by the operator that the roof and floor materials within the mine have acid- and toxic-forming materials. All waste material brought to the surface will be spread and dried if necessary, compacted in lifts not to exceed 18" in the disposal area. Disposal shall be accomplished within 30 days after first exposed on the minesite. Upon completion of the disposal facility, the waste material shall be covered with four feet of non-toxic material. The capacity for the proposed waste disposal site is 1500 cubic yards. A clay liner shall be installed beneath the waste dump in order to prevent ground water contamination. In the event that the capacity of the disposal area is insufficient, the applicant proposes to provide another similarly designed facility on the site. Such a modification shall be subject to the approval of the Division.

Surface drainage from the waste disposal facility shall be collected in a catch basin adjacent to the waste dump. Analysis and possible treatment of the discharge for the catch basin is detailed in the hydrology section of the mining and reclamation plan.

Mine development waste was used by the applicant in the construction of the portal and mine facilities pads. The materials used for the construction of the facilities shall be analyzed and a determination as to the acid- or toxic- forming potential shall be determined. The acid-base potential of the sample pits shall be used to determine if the possibility for potential ground water contamination exists. Based on the results of the sampling and analysis, a plan for the final disposal and groundwater protection will be provided to the Division.

There are no plans to return coal waste or coal processing waste to underground workings.

### Compliance

The applicant is in compliance with the requirements of this section. However the analysis used in the determination of the acid- and toxic- forming potential of the excess spoils and mine development waste used to develop the surface pads and facilities must be provided as required by stipulation UMC 817.48-(1)-JSL and a plan for the final treatment and disposal of such materials must be included in the mining and reclamation plan. Further analysis must be provided to the Division to show that the materials used in the construction of the coal waste disposal facilities are suitable and the design of the coal waste disposal facilities are commensurate with such analysis.

The applicant has not provided justification as to the sizing requirements of the waste facilities. The applicant should provide some methodology in determination of the capacity of the waste disposal facility. It also appears that the facility is located in or near the ephemeral drainage of that particular area. The applicant should evaluate the location of the facility such that it will not be constructed within surface drainage areas.

### Stipulation UMC 817.71-(1)-JRH

1. Within 90 days from the date of permit approval, the permittee shall provide to the Division, a plan for the location and disposal of excess spoil, mine development waste, sediment pond waste and other coal waste related materials anticipated on the site. The plan shall include a determination as to the total estimated amount of waste materials to be taken from the mine during the expected life of the operations so as to correctly size the facility; determination as to the nature, extent and treatment of acid- and toxic-forming materials which may have been utilized in the construction of the portal and mine facilities pads; analysis of the foundation and liner materials used to construct the waste facility; determination of the location of the waste facilities such that they are not constructed within surface drainages and will not potentially contaminate surface and groundwater; and plans for the amount and type of materials used to cover the waste material, topsoil requirements and revegetation requirements for the waste disposal facility.

|                   |  |
|-------------------|--|
| <u>UMC 817.81</u> | <u>Coal Processing Waste Banks: General Requirements - JRH</u>                 |
| <u>UMC 817.82</u> | <u>Coal Processing Waste Banks: Site Inspection - JRH</u>                      |
| <u>UMC 817.83</u> | <u>Coal Processing Waste Banks: Water Control Measures - JRH</u>               |
| <u>UMC 817.85</u> | <u>Coal Processing Waste Banks: Construction Requirements - JRH</u>            |
| <u>UMC 817.86</u> | <u>Coal Processing Waste: Burning - JRH</u>                                    |
| <u>UMC 817.87</u> | <u>Coal Processing Waste: Burned Waste Utilization - JRH</u>                   |
| <u>UMC 817.88</u> | <u>Coal Processing Waste: Return to Underground Workings - JRH</u>             |
| <u>UMC 817.91</u> | <u>Coal Processing Waste: Dams and Embankments: General Requirements - JRH</u> |
| <u>UMC 817.92</u> | <u>Coal Processing Waste: Dams and Embankments: Site Preparation - JRH</u>     |

UMC 817.93 Coal Processing Waste: Dams and Embankments: Design and Construction - JRH

Existing Environment and Applicant's Proposal

The applicant has not proposed coal processing facilities within the permit area. The above sections are considered to be not applicable.

Compliance

The applicant is in compliance with the above sections.

Stipulations

None.

UMC 817.89 Disposal of Non-Coal Wastes - JRH

Existing Environment and Applicant's Proposal

Plans for the disposal of non-coal wastes are found in part 3.5.9 of the mining and reclamation plan. All non-coal waste material will be hauled off-site to the approved Summit County Disposal Area. The applicant has included a letter of approval from the county for the disposal of these waste materials at the facility. Non-coal waste materials shall be temporarily stored on the site in garbage bins and removed as needed. Other waste materials generated on the site, including mine development waste, spoils, and sediment pond waste shall be disposed of within the permit area at the proposed coal waste disposal area.

Oil and greas, liquid wastes, hazardous wastes and other such materials shall be disposed of in accordance with local, state and federal regulations. Proof of compliance of the disposal site will be furnished on an individual basis if such disposals become necessary.

Compliance

The applicant has provided plans for the disposal of all waste materials in accordance with local, state and federal regulations. The applicant is considered to be in compliance with the requirements of this section.

Stipulations

None.

UMC 817.95 Air Resources Protection - SCL

Existing Environment and Applicant's Proposal

The applicant has identified the following as sources of fugitive dust during mining operations: 1) topsoil removal and storage, 2) roads and, 3) coal handling facilities (MRP, Section 11.4).

A water spray program will be implemented during topsoil removal and stockpiling operations. Stockpile areas will be revegetated after topsoil has been replaced.

Unpaved roads in the permit area will be treated with water and/or non-toxic chemical dust suppressants. Maximum vehicle speed will be limited to 20 mph (MRP, Section 3.5.7.2). A road grader will be used to remove any coal spilled on the roadways.

Conveyors will be covered. Transfer points will contain water sprays or other dust control methods. Conveyor discharge height will be minimized. The coal storage pile will be sprayed with water and/or nontoxic dust suppressants. The pile will be oriented away from the prevailing wind direction.

Since the total annual controlled emissions of particulate matter are expected to be well under the 250 tons/year classified as a major source under PSD regulations, no air quality monitoring is anticipated or proposed.

Compliance

The applicant complies with the requirements of UMC 817.95 to submit a fugitive dust plan. The applicant has submitted this plan and other information on facility construction in an application for an Air Quality Approval Order from the state Bureau of Air Quality. Approval has not yet been received. The applicant is required to comply with fugitive dust requirements of the Utah Air Conservation Regulations and is subject to inspection by the Bureau of Air Quality and DOGM. No new construction or modification of existing installations which might cause an increase in air pollution will be allowed, however, until an Air Quality Approval order is received.

Stipulation UMC 817.95-(1)-SCL

1. The permittee is not authorized to construct new facilities or make modifications to existing facilities, if such activities would become a source of air pollution or increase air pollution, until an Air Quality Approval Order is received.

UMC 817.97 Protection of Fish, Wildlife, and Related Environmental Values - LK

Existing Environment and Applicant's Proposal

The mine plan area provides potential habitat for ca. 130 wildlife species, including 52 mammals, 63 birds, 3 amphibians and 12 reptiles (page 10-7). Results of low level studies and habitat affinities for these species are discussed on pages 10-6 thru 10-23. Of interest, the northern portions of the permit area are used as summer range and fawning/calving areas for deer and elk, and the lower foothills are high-priority winter ranges for deer (page 10-20). The American Bald Eagle winters adjacent to the permit area along Chalk Creek and the Peregrine Falcon could potentially use the permit area. There are, however, no known roosting trees or nests sites for these species within the permit area (page 10-19).

Impacts to wildlife species of interest are discussed on pages 3-59 thru 3-62 and 10-19 thru 10-24. Plans to mitigate wildlife impacts are discussed on pages 3-62 thru 3-63 and 10-24 thru 10-26.

Compliance:

The applicant has provided a plan which minimizes the extent of disturbance to wildlife habitat and provides for lost forage due to disturbance by excluding domestic grazing from a ten acre area and through contemporaneous revegetation of areas not needed for active operations. The final reclamation was designed to enhance the forage and/or cover features of the area for wildlife.

There are no known plant or animal species listed as threatened or endangered (except the American Bald Eagle as discussed above) by the Secretary of the Interior within or adjacent to the mine plan area. The applicant has provided a commitment to report any future sitings which he may become aware of (page 3-62-a).

The conclusion of a joint DOGM and Utah Division of Wildlife Resources inspection on March 5, 1987 showed that the existing power lines at the mine site were constructed according to acceptable raptor protection technology (See March 12, 1987 Memo to File).

Structures that pose a barrier or hazard will be provided with passageways, buffers, fences, or other necessary protection.

The applicant will protect water sources for wildlife on the permit area or provide alternative sources of water should they be disrupted by mining activities.

The applicant has provided a commitment not to use persistent pesticides on the permit area without the approval of the Division (page 3-62-a).

The applicant will conduct an annual employee wildlife awareness training to educate employees of potential wildlife impacts and impact avoidance measures.

The applicant is in compliance with UMC 817.97.

Stipulations

None.

UMC 817.100 Contemporaneous Reclamation - LK

Existing Environment and Applicant's Proposal

The applicant has provided plans for interim stabilization of all disturbed areas not needed for active operations during the fall season following disturbance (pages 3-57, 3-69 and 3-80). Final revegetation will occur during the first favorable season (fall) following abandonment of the operation. A seed mix of native grasses, two introduced, nitrogen fixing forbs and one native forb for interim stabilization is provided in Table 3-1.

Compliance

The applicant has provided plans to reclaim disturbed areas as contemporaneously as practicable. The interim seed mix consists of quick-growing species that are commonly used for stabilization. The applicant's proposal is in compliance with UMC 817.100.

Stipulations

None.

UMC 817.101 Backfilling and Grading: General Requirements - JSL/JRH

Existing Environment and Applicants Proposal

The applicant has addressed this section of the regulations in parts 3.6.4 and part 4.5 of the mining and reclamation plan. The final topography map and cross sections are presented on plate 3-3 and 3-4. Backfilling and grading operations shall utilize conventional earthwork equipment. Grading and compaction of all areas shall be conducted in a manner that will stabilize all filled holes and depressions. Portals are to be back filled using non-combustible materials for a minimum distance of 25 feet from the portal entrance.

Slopes are to be recontoured in a manner that will achieve stability to prevent slides and other related erosional damages. Stability can be achieved without extensive backfilling and return the site to approximate original contours. This configuration will conform to the drainage pattern of the surrounding area.

A mass balance table of the cut and fills required during reclamation operations is found in part 3.6.4.1 of the MRP. This mass balance reflects the post mining contours of the site as shown on plate 3-3. The estimated volumes of total cut and fill are 10,380 cyd and 10,450 cyd, respectively.

Highwalls will be reduced to the extent as is practicable to develop a static factor of safety of 1.3. Erosional control measures shall be specific for each area. Mulching will be utilized to initially control erosion over most of the affected area.

Prior to distribution of topsoils over the recontoured areas, the applicant shall rip or disk the materials in order to reduce surface compaction and promote root penetration.

Grading and backfilling will be done to achieve a final contour suitable for the wildlife/grazing habitat specified as the post mining land use. All redistributed materials will be compacted to 95 percent of the original or adjacent undisturbed soil. All final grading will be parallel to the contour. To increase water storage capacity a crawler tractor will be run perpendicular to the slope, creating indentations parallel to the contour.

#### Compliance

The applicant has sufficiently addressed this section of the regulations and it is considered to be technically adequate.

#### Stipulations

None.

#### UMC 817.103 Backfilling and Grading: Covering Coal and Acid- and Toxic-Forming Materials - JSL

#### Existing Environment and Applicant's Proposal

Based on the data in appendix 6D, the Division has determined the underground waste material to be an acid-forming or toxic-forming material. A waste disposal plan is presented in section 3.5.9. The applicant has proposed a disposal area (plate 3-1) between Highway 133 and the powder magazine access road. The waste disposal site has a proposed total capacity of 1500 cyd. All waters from storage area will be diverted to a catch basin installed directly west of the disposal area. The floor of the disposal site will be lined with eight (8) inches of impervious materials (bentonite clay or equivalent) prior to disposal of waste materials. Acid-forming or toxic-forming materials will be spread and compacted. The acid-forming or toxic-forming material will be covered with a minimum of four (4) feet of soil.

#### Compliance

The applicants proposal adequately addresses the requirements of this section. Refer to sections UMC 817.48 and UMC 817.71 for further review and stipulations.

#### Stipulations

None.

UMC 817.106 Regrading and Stability of Rills and Gullies - JSL

Existing Environment and Applicant's Proposal

Under native vegetation the erosion hazard associated with these soils vary from slight to high. The soils are generally well drained and range in texture from sandy loam to dry loam.

Compliance

The applicant's proposal does not adequately address the requirements of this section. There is no commitment to regrade, stabilize and revegetate all rills and gullies greater than nine inches in depth.

Stipulation UMC 817.106-(1)-JSL

1. The permittee must commit to regrade, stabilize and revegetate according to performance standards UMC 817.111 through 817.116 all rills and gullies greater than nine inches deep.

UMC 817.111 - .117 Revegetation - LK

Existing Environment and Applicant's Proposal

Vegetation studies were conducted at the Boyer Mine site in March of 1983 to delineate and describe range sites and in October of 1986 to establish a vegetation reference area since the area did not meet all criteria for using the range site method. Results of these studies are included as Chapter 9 of the MRP. Plate 9-1 delineates the four range sites that occur within the permit area.

Mixed mountain shrub and pinyon juniper are the predominant vegetation types on the permit area with most of the disturbance occurring in the mixed mountain shrub type. Since data collected to describe the range sites indicated the area is in poor range condition, a reference area was established in 1986 to provide a standard for revegetation success. Vegetation cover for the reference area will be reevaluated in July of 1987 (Appendix 9-1) since the data was not collected in the reference area location. Shrub density of the reference area was determined by an exact count of trees (45/acre) and shrubs (1264/acre) (appendix 9-1). Annual production for the mixed mountain shrub type as reported by the Soil Conservation Service is 975 pounds dry weight (page 9-5).

Revegetation plans are detailed on pages 3-57 thru 3-59 and in section 3.6 of the MRP. The seed mix (Table 3-2) will be drilled on ca. 4.5 acres and hydroseeded on ca. 1.5 acres (page 3-83). Seeding will occur in the fall (October thru November). All seeded areas will be mulched with 2-3000 lbs/acre of wood-fiber hydromulch (depending on slope) and tackified with 120 pounds of tac/ton of mulch (page 3-83). Planting of bare root or containerized stock will be done in early spring two years following the seeding if monitoring shows insufficient woody plant establishment (pages 3-84 & 85).

Monitoring of reclaimed areas will consist of a reconnaissance survey the first two years (shrubs will be counted during these two years). Cover and density will be measured beginning year 3 and will continue every other year. Productivity will not be sampled until the end of the liability period. The reference area will also be sampled for cover and density during the monitoring periods. Sampling of cover, density and productivity will occur during the last two years of the liability period in both the reclaimed and reference areas using acceptable methodology (pages 3-85 thru 3-86a).

#### Compliance

#### Revegetation

The revegetation plans have been designed to encourage a permanent diverse vegetative cover which will restore or enhance the pre-mine land use of wildlife habitat. The applicant is in compliance with this section.

#### Use of Introduced Species

All species utilized for final reclamation are native species with the exception of Melilotus officinalis (yellow sweetclover). This species is being used because of its erosion control and nitrogen fixing properties. It is a short-lived biennial plant, it is not noxious or poisonous and is compatible with the plant and animal species of the region. The applicant is in compliance with this section.

#### Timing

Final seeding will be done during the first favorable planting season following regrading (October - November). The applicant is in compliance with this section.

#### Mulching and Other Soil Stabilizing Practices.

All revegetated areas will be mulched with 2000 to 3000 pounds per acre of wood-fiber hydromulch, depending on slope. Mulch will be anchored by using 120 pounds tac/ton of mulch. The applicant is in compliance with this section.

#### Standards for Success

The applicant has established a reference area for determining revegetation success for the entire disturbed area. The corners of the reference area have been permanently marked in the field with metal posts. Plate 9-1 (range site map) shows the location of the reference area.

The reference area was determined to be in poor range condition, however, it is within the 10 acres that will be fenced to exclude domestic grazing. The operator will monitor the range condition during the 1987 field season and then every five years thereafter during the field season prior to resubmitting a permit renewal application to demonstrate that the condition of the reference area is improving.

Sampling methods and sample adequacy formulas to determine revegetation success are described on pages 3-86 & 87, and are acceptable to the Division, however, the application has incorrectly identified the confidence level for shrub and forest lands. All sampling must be done at the 90% confidence level. Monitoring frequency during the liability period is acceptable.

The applicant's proposal is in compliance with this section.

#### Tree and shrub stocking

The applicant has provided a seeding plan to re-establish the premining woody plant density as well as a contingency plan to plant seedlings to assure woody plant density standards are met. The applicant is in compliance with UMC 817.117.

#### Stipulations

None.

#### Determination of Reclamation Feasibility:

The applicant has provided a revegetation plan that utilizes standard acceptable methods. The species selected for revegetation are highly recommended for re-establishing vegetation on native ranges in Utah. The plan provides for seeding and planting during the seasons which are best suited for revegetation success for the area where the mine is located. The permit area is located in an area which receives over 20 inches average annual precipitation, which is also favorable for establishing vegetation. While there is no site-specific data from past plantings or test plots, reclamation is determined to be feasible under the plan for the reasons discussed above.

#### UMC 817.121-.126 Subsidence Control: General Requirements - DD

#### Existing Environment and Applicant's Proposal

The applicant plans to mine the Wasatch Coal Seam from the Chalk Creek Member of the Cretaceous Frontier Formation. The coal seam overburden is carbonaceous sandstone to shale. The mine is projected for room and pillar mining utilizing continuous miners. The layout is typical with mains driven down dip and panels developed on strike. The layout has been modified to parallel property boundaries and avoid the old workings. The submains will be turned off at 45 degrees to the dip to parallel the northern property boundary reducing the grade from 17% to 12%. Mining projections show that mining will be limited to development of submains for the first two years through 1989 before the first panel will be driven south west along strike toward the outcrop. The first pillar extraction will be begin under 200' of cover.

The applicant expects subsidence over a long term and has indicated maximum extraction. The applicant indicates no structures and no renewable resource lands on the surface above the mining operation. The lands are presently used for grazing and wildlife habitat. No springs are indicated above the mining operation. No known aquifer exists above the immediate coal zone.

The applicant projects that there does not appear to be any structures or renewable resources in existence above the potential mining area, within or adjacent to the permit area, that would suffer material damage or diminution.

On the applicant's projection map, Plate 3-2, the applicant has provided for a maximum angle of draw to within 10' of the power line running parallel and 50' north of the center line of Highway 133. The angle of draw projected from the vertical is 18 degrees.

The applicant proposes to mitigate subsidence impacts as they occur including (1) Not pulling pillars in selected sensitive areas, (2) Uniform extraction to minimize impacts. Further the applicant includes mitigation to site specific impacts by road repair and fence repair, conveyance and diversion of flows, filling cracks wider than 6 inches, and revegetation.

Impacts will be monitored by an annual visual field survey to identify observable subsidence.

#### Compliance

The applicant has established that no known structures, perennial streams or springs exist within the limits of mining, however since the lands are used for wildlife and grazing, the lands subject to subsidence are strictly speaking renewable resource lands. Assuming complete pillar recovery the surface would experience subsidence between 60 and 90% of the seam height. No inflows should be expected from the alluvium of Chaik Creek since this aquifer will not be subsided.

The applicant's plans are consistent with the standard methods of mining and with acceptance of the following clarifications and stipulations the applicant's subsidence control plan will comply to the extent "technologically and economically feasible to prevent subsidence from causing material damage to the surface and to maintain the value and reasonable foreseeable use of surface lands".

#### Stipulations UMC 817.121-.126-(1-3)-DD

1. Within 30 days of permit approval the permittee shall include and commit to the following additions to the subsidence control plan to minimize impacts to surface lands from subsidence:
  - A. To protect the Highway 133 and utilities the surface permit boundary will be maintained no less than 60 feet from the center line of highway 133. Along this southern boundary, due to the uncertainty of the angle of draw and in the interest of prudence, the permittee will utilize an angle of draw of 25 degrees (from the vertical) to determine the underground limit of second mining (pillar recovery). Before any secondary mining begins and then each year following the permittee shall submit a certified mine map of his underground workings to verify compliance.

- B. Until the permittee can otherwise justify stable pillar design for partial extraction, partial extraction may be conducted beyond the second mining limit as follows:

Development mining assuming 18' roof spans and not more than the following extraction may be conducted.

| <u>Depth</u>  | <u>Maximum Extraction</u> | <u>Centers</u> |
|---------------|---------------------------|----------------|
| 150' to 300'  | 51%                       | 60' X 60'      |
| 400' to 600'  | 45%                       | 70' X 70'      |
| 600' to 800'  | 40%                       | 80' X 80'      |
| 800' to 1000' | 36%                       | 90' X 90'      |

Barrier pillars of a minimum of 150' width should be maintained for protection of main entries.

- C. Due to the hazards and damage to the surface caused by plug caving, the applicant shall not pull any pillars under a minimum overburden depth of 150'.
- D. Prior to initiating second mining and in the interest of protecting the highway and power line, the permittee shall be required to install monuments between the line projected by a 65 degree angle of draw from the limit of second mining to the surface and 30 feet from the center line of the highway. The line of monuments shall be spaced at  $0.1d$  and be maintained  $1.4d$  ahead of second mining (where  $d$  is the overburden depth). Both horizontal and vertical measurements shall be taken. A certified survey of the monuments shall be provided to the Division prior to second mining and then thereafter annually until subsidence is complete.
- E. Pillar extraction should be as uniform, complete, and rapid as safety allows to minimize fracturing of strata.
2. The permittee shall within 30 days of permit approval, commit to restoring areas impacted by subsidence-caused surface cracks or other subsidence features such as escarpments (not to include naturally occurring escarpments which are not a result of mining) which are of a size or nature that could, in the Division's determination, either injure or harm grazing livestock or wildlife. Restoration shall include recontouring of the affected land surface including measures to prevent rilling, and revegetation in accordance with the approved permanent revegetation plan in the MRP. Restoration shall be undertaken after annual subsidence survey data indicate that the surface has stabilized, but in all cases restoration and revegetation shall be completed prior to bond release.

3. The permittee shall distribute a notice by mail at least 6 months in advance of mining beneath a property to all owners of property that could be affected by subsidence. The notification shall contain, as a minimum:
  - (a) Identification of specific areas in which mining will take place;
  - (b) Dates of underground operations that could cause subsidence and affect specific structures; and
  - (c) Measures to be taken to prevent or control adverse surface effects.

UMC 817.131 - .132 Cessation of Operations - SCL

Existing Environment and Applicant's Proposal

The applicant has committed to submit a notice of intention to cease operations when it is known that operations are to be temporarily ceased for more than 30 days. This notice will describe measures to be employed during temporary cessation of operations, as required by UMC 817.131. Underground openings which will remain inactive for longer than 90 days will be temporarily closed off with chain link or wire mesh fence (MRP, Section 3.6.3.1, pp. 3-74a and b).

The complete plan for reclamation of the site after final closure has been filed as section 3.6 of the MRP.

Compliance

The applicant is in compliance with these regulations.

Stipulations

None.

UMC 817.133 Post-Mining Land Use - LK

Existing Environment and Applicant's Proposal

The applicant has provided land use information in the MRP on pages 3-46 thru 3-49 and in chapter 4.

The premining land use of the permit area was mining, cattle grazing, recreation and wildlife. Recreational use is primarily hunting, camping and picnicing (page 4-4). Summit County has zoned the area for residential and agricultural uses (page 4-1). This zoning also allows mining activities. The applicant has provided a discussion of the potential and historic land uses of the region and how they relate to the mine site (pages 4-4 thru 4-21).

The applicant has proposed to restore the premining land use of grazing and wildlife habitat after mining is completed (page 4-14).

#### Compliance

The applicant's proposal to restore the premining land use of grazing and wildlife habitat is acceptable to the Division. It is compatible with local land use plans and long-range land use objectives (pages 4-16 thru 4-21). The applicant has provided a discription of how the reclamation plan will achieve the postmining land use (pages 3-46 thru 3-49). The applicant is in compliance with UMC 817.133.

#### Stipulations

None.

#### UMC 817.150-.156 Class I Roads - JRH

#### Existing Environment and Applicant's Proposal

The applicant intends on utilizing roads which currently exist as a result of coal exploration activities on the site. Two roads on the site are considered to be Class I Roads. These roads join at the loading facilities area of the site to form a haulage loop for the coal trucks. The west road is approximately 300 feet in length and the east road is approximately 400 feet long. These roads are low speed and are essentially used to ramp on and off of the highway adjacent to the property.

The applicant has noted that the design and construction of the Class I roads are in accordance with the regulations with respect to cuts, fills, slopes, compaction, surfacing, maintenance, erosion control and revegetation.

#### Compliance

The roads are constructed in accordance with the requirements of the regulations with the exception of the grade of the west haul road. Portions of the gradient of the west haul road are in excess of 15% for approximately 200 feet of the roadway. The applicant has referenced the conditional approval provided by the Division for the exploration plan but the approval regarding the construction of the road was not found in appendix 3-2. The applicant needs to address the conditions of the road use in order to obtain approval by the Division for the west haul road.

The applicant is considered to be in compliance with the requirements of this section with the exception of the maintenance and operation of the haul road. The applicant needs to incorporate into the mining and reclamation plan, the conditions which the operator was subject to in the approval for the construction of the haul road in the exploration plan.

Stipulation UMC 817.150-.156-(1)-JRH

1. Within 30 days from the date of permit approval the permittee shall be required to incorporate into the text of the mining and reclamation plan, specific plans regarding the operation of the haul roads. This would include a commitment that the west haul road shall not be utilized for loaded coal trucks leaving the site. Due to the steep gradient of the road as it leaves the site and enters onto the county road, loaded vehicles could pose a safety hazard during poor road conditions and in the event of equipment (brake) failure. The permittee should also include other appropriate measures to be taken such as the installation of one way signs or other such signs directing the traffic on the road for proper use.

UMC 817.160-.166 Class II Roads - JRH

Existing Environment and Applicant's Proposal

The portal access road is the only road found on the site which is considered to be a Class II road. The road is 150 feet long and is previously constructed under the company's exploration permit. This road has also been modified under the exploration permit due to a slide that has occurred on the east side of the property. The road shall be removed and reclaimed in accordance with the provisions of the reclamation plan. The road has a vertical grade of 17% which is in accordance with the regulations because it does not exceed the limit of 300 feet as mandated. The slide area, which is the cut slope embankment for the road has been laid back to an average slope of 1.5h:1v which is in accordance with the regulations. Due to the short length of the access road, drainage of the road is within the confines of the disturbed area drainage and sediment from the road reports to the sediment pond for the mine facilities. The road has been surface with 4 inches of 3/4 inchs crushed gravel. The road shall be maintained in a manner so as to control erosion, maintain the road surface and repair drainage structures.

Compliance

The applicant is considered to be in compliance with the requirements of this section.

Stipulations

None.

UMC 817.170-.176 Class III Roads - JRH

Existing Environment and Applicant's Proposal

Information regarding this section is found in part 3.3.3 of the mining and reclamation plan. The applicant proposes to utilize a previously permitted exploration road as a Class III road. The function of the road will

be to facilitate the storage of explosives for the mining operations. The applicant has committed to reconstruct the road to meet Class III road requirements. The proposed road is 670 feet long with an average grade of 13.3% and meanders to conform to the existing trail and topography. The road shall be surfaced with gravel and the road shall be maintained to minimize erosion. The road shall be reclaimed as part of the reclamation plan in accordance with the provisions found under the topsoil and revegetation sections of the plan.

#### Compliance

The applicant is considered to be in compliance with the requirements of these sections.

#### Stipulations

None.

#### UMC 817.180 Other Transportation Facilities - JRH

##### Existing Environment and Applicant's Proposal

The applicant addresses this section in part 3.2 of the mining and reclamation plan. Coal is carried from the mine by a 36" belt conveyor which terminates at the top of a stacking tube of the belt portal pad. From there the coal is drawn at a controlled rate onto a 24" belt conveyor and fed into the screening plant for size distribution and final stockpiling. These systems were all installed in 1986, with the exception of the screening plant, which was installed in 1985 in conjunction with the exploration permit. A general flow sheet of the system is referenced as appendix 3-1. Plans and profiles of the conveyor systems are shown on plate 3-1b, Transportation Facilities. The coal is sprayed with water during the cutting process and leaves the mine via a covered conveyor, discharging into stacking tube to control dust. The handling system is covered wherever practicable for additional dust control. The handling system will be maintained to provide for maximum dust control by the use of covers and sprays as designed. Upon completion of mining, all structures will be removed, and any concrete will be broken up and buried along the highwall. Drainage from the coal handling system is directed to the sedimentation pond.

#### Compliance

The general flowsheet for the coal handling system is not found in appendix 3-1 as described in the plan. The applicant must include the referenced flowsheet. The applicant does not reference the coal stockpiles that are planned for use in the facilities. The only reference to coal stockpiles is found on Plates 3-1 and 3-1b which locates the raw coal stockpile and the clean coal stockpile. No provisions are made in the plan for the handling or treatment of waste or under/oversized materials from the screening plant. The applicant does not indicate the capacity for surface storage of raw and clean coal on the site. The applicant needs to identify in the materials handling process, a flow and mass balance for the coal and waste handling system from the mine.

Stipulation UMC 817.180-(1)-JRH

1. Within 30 days from the date of permit approval, the permittee shall provide to the Division, a complete plan for the coal handling and storage facilities proposed to be utilized at the mine site. The plan shall include, but not be limited to the following: capacities for the raw and clean coal stockpiles, materials handling flow sheet, waste handling and materials rehandling requirements, temporary and permanent storage locations and capacities for coal and coal-related waste materials.

UMC 817.181 Support Facilities and Utility Installations - JRH

Existing Environment and Applicant's Proposal

The applicant describes other surface facilities and utility installations in parts 3.2 and 3.3 of the mining and reclamation plan. The office and dry facilities consist of trailers currently located on the site. A 50,000 gallon water tank is presently used to supply water for dust suppression, fire protection and showering. A well has been drilled on the site and the applicant intends on utilizing this well for water use on the site. Currently trucks are used to supply water to the tank. A state approved septic tank and drainfield sewage system was constructed on the site in 1986 in conjunction with exploration activities. The applicant references that complete plans for the sewage system are found in Appendix 3-1. Power is supplied to the mine through a 25 kva transmission line. The applicant indicates that the power system was installed and used in accordance with applicable electrical and MSHA safety standards. Power poles are considered to be of raptor proof design. All support facilities are to be removed upon completion of mining operations.

Compliance

Plans for the sewage system are not found in appendix 3-1 as referenced by the applicant. There is however a copy of an approval letter from the county health department regarding the wastewater disposal system (attached to TA). Surface Facilities Map 3-1 provides for the location of all the existing and proposed facilities for the operation. Plate 3-3 provides for the post mining topography of the site, indicating the removal of all of these facilities. The applicant is considered to be in compliance with the requirements of this section.

Stipulations

None.

UMC 822 Alluvial Valley Floors - JSL

Existing Environment and Applicant's Proposal

Information concerning alluvial valley floors in the permit area of the Boyer Mine can be found in section 7.3. According to the Soil Conservation Service Negative Determination of Prime Farmland (appendix 9-2) no irrigation water is available to the permit area. The Boyer Mine area is steep, gravelly and stony, making the area unsuitable for subirrigation or flood irrigation agricultural activities. The proposed mine area is adjacent to the Chalk creek alluvium. The current mine plan does not include any disturbance within the Chalk creek alluvial valley floor.

Compliance

The applicant is in compliance with this section.

Stipulations

None.

UMC 823 Prime Farmlands - JSL

Existing Environment and Applicant's Proposal

The proposed Boyer mine area is too steep, gravelly, and stony, making the area unsuitable for subirrigation or flood irrigation agricultural activities. The Soil Conservation Service has determined the proposed mine area is not a Prime Farmland (appendix 9-2). The applicant addresses prime farmland in section 8.4.

Compliance

The applicant's proposal adequately addresses the requirements of this section.

Stipulation

None.

1177R

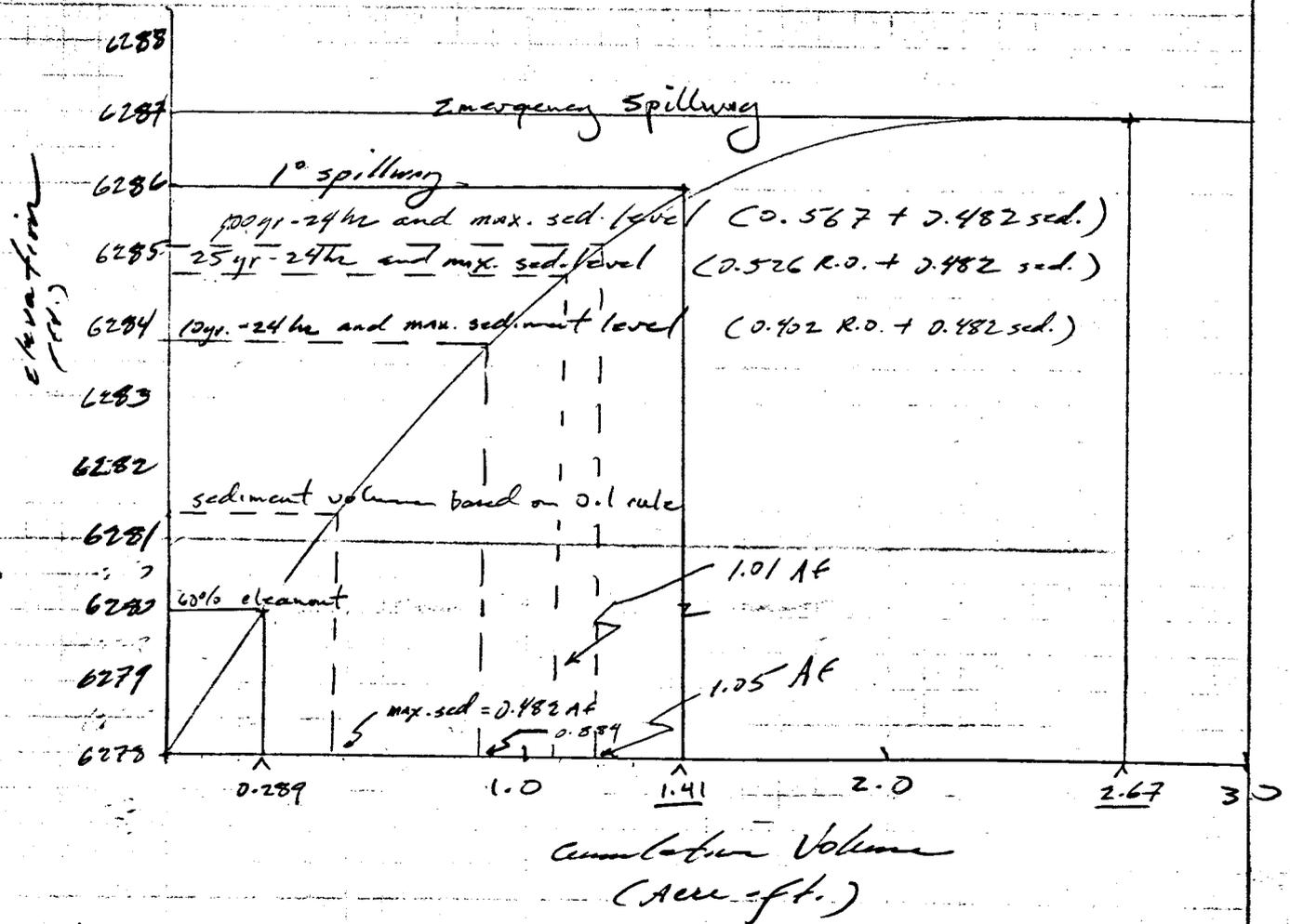
FIGURE 1

Project: Sediment Pond Summary, Boyer Mine

Date: 4/19/84

Reviewer: R. Summers, Hydrology

I. Stage-Volume Curve:



Summary:

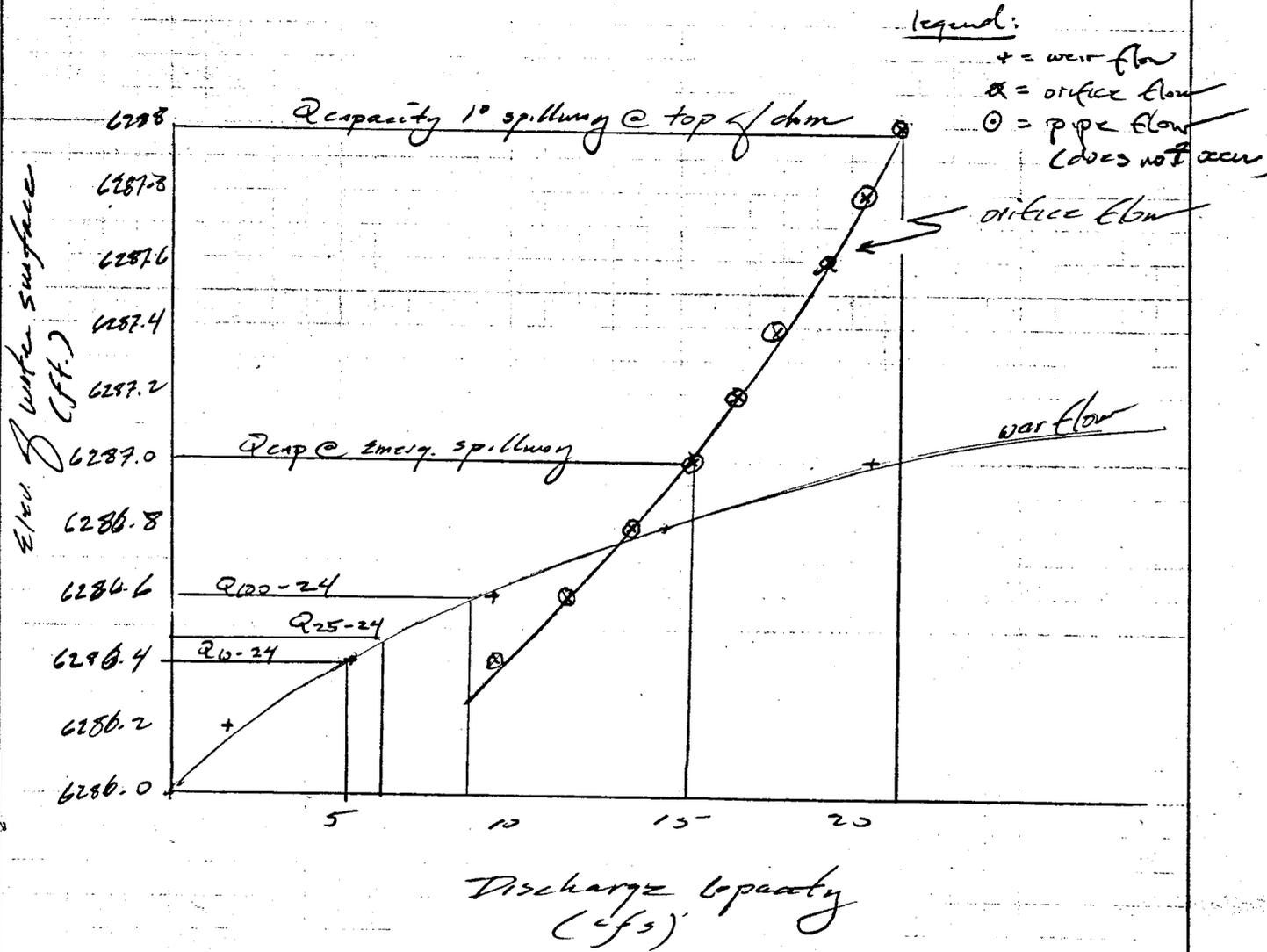
(U-F)

|      | DOCM | Boyer |
|------|------|-------|
| 6280 | 0.27 | 0.117 |
| 6286 | 1.41 | 1.205 |
| 6287 | 2.67 | 1.31  |

∴ approve all Boyer values are conservative.

FIGURE 2

II Stage - Discharge Curve:



conclusions:

- 1) approx. 1<sup>st</sup> spillway alone is overdesigned
- 2) no need to review emergency spillway, 1<sup>st</sup> spillway will handle in excess of 100 cfs - 24 ft.

42,381 30 SHEETS 5 SQUARE  
42,382 100 SHEETS 5 SQUARE  
42,389 200 SHEETS 5 SQUARE  
NATIONAL

APPENDIX

Project: Diversion sizing, Boyer Min

Date: 4/18/87

Reviewer: R. Summers,

All are 1:1 sides by

| Diversion Id                          | Slope   |          | Q <sub>10-24 hr.</sub> |              | max. depth | Bott. WIDTH | Velocity |       |
|---------------------------------------|---|----------|------------------------|--------------|------------|-------------|----------|-------|
|                                       | DOGMA   | BOYER    | DOGMA                  | Boyer        |            |             | DOGMA    | Boyer |
| UD-1<br>(n=0.0395)                    | 13.95%<br>(30'/215')                                | 12.3%    | 16<br>(SOAP)           | 16<br>(SOAP) | 2.5        | 1.0         |          |       |
| UD-2<br>upper reach<br>n=0.038        | 17.8<br>(6370-6350/225')                            | 8.87     | 1.67                   | 2.49         | 2.0        | 0.0         |          |       |
| lower reach<br>n=0.038<br>(9" riprap) | 17.5<br>(6350-6300/285')                            | 2.89     | "                      | "            | 2.0        | 0.0         |          |       |
| UD-3                                  | Maps aren't<br>of scale<br>to<br>determine<br>these | 6.25     | 0.31                   | 0.32         | 1.5        | 0.0         |          |       |
| UD-4                                  |   | 5.5      | 0.20                   | 0.23         | 1.5        | 0.0         |          |       |
| DD-3<br>max<br>min.                   |   | 15<br>12 | 0.51<br>0.51           | 0.13<br>0.13 | 0.5<br>0.0 |             |          |       |
| UD-2<br>to UD-1                       | 14.05%<br>(6395-6370/178')                          | n.b.     | 1.67*                  | 2.49         | 2.0        | 0.0         |          |       |

\*conservatively assume 1.6 cfs to this diversion also.

SEE ATTACHED

43 SHEETS 3 SQUARE  
43 SHEETS 3 SQUARE  
43 SHEETS 3 SQUARE  
NATIONAL  
MANUFACTURING

| Division<br>Id     | n-value                                      |        | R <sub>0-24</sub> |       | (Et/Et)<br>Slope 2  |        | Nail depth<br>(FF)<br>Bottom width<br>(FF) |        | Depth<br>(ft) |       | Velocity (ft/s)     |       | Riprap proposed                         |
|--------------------|--|--------|-------------------|-------|---------------------|--------|--|--------|---------------|-------|---------------------|-------|---|
|                    | DGM  | Boyer  | DGM               | Boyer | DGM                 | Boyer  | Top  | Bottom | DGM           | Boyer | DGM                 | Boyer |   |
| UD-1               | 0.395<br>(Based on 12" rap)                  | 0.7395 | 16                | 16    | 1139 <sup>3</sup>   | 1123   | 2.5  | 1.0    | 0.936         | 0.50  | 8.83                | 13.49 | 12"<br>(DGM:<br>11" Dmax)               |
| UD-2<br>no rap sec | 0.030<br>(Table 6-8<br>Gravel,<br>Luv. Form) | 0.038  | 1.67              | 2.49  | 0.178 <sup>3</sup>  | 0.089  | 2.0  | -      | 0.502         | 0.53  | 6.63                | 8.89  | none <sup>3)</sup><br>(7" max<br>req'd) |
| rap section        | 0.038  | 0.038  | 1.67              | 2.49  | 0.175 <sup>2)</sup> | 0.089  | 2.0  | -      | 0.550         | 0.53  | 5.512               | 8.59  | 9" α<br>(11" max<br>req'd)              |
| UD-3               | 0.03   | 0.035  | 0.31              | 0.32  | 0.0625 <sup>3</sup> | 0.0625 | 1.5  | -      | 0.325         | 0.26  | 2.933               | 4.86  | none<br>(α < 1"<br>req'd)               |
| UD-4               | 0.03   | 0.035  | 0.20              | 0.23  | 0.055 <sup>3</sup>  | 0.055  | 1.5  | -      | 0.283         | 0.22  | 2.505               | 4.55  | none<br>(α < 1"<br>req'd)               |
| DD-3               | 0.03   | 0.04*  | 0.51              | 0.13  | 0.15 <sup>**</sup>  | 0.1375 | 0.5  | -      | 0.332         | 0.16  | 4.618 <sup>3)</sup> | 4.81  | none <sup>1)</sup><br>(3.5"<br>max req) |

need add 1' treeboard for 0.3'

Rip rap check using S&S Isbach curve exhibit 16-1

- \*) no riprap for DD-3 proposed, 0.04 is too high.
- \*\*) from Plate 7-2
- 1) velocity too high for n=0.03, require riprap here → use 3.5" Dmax.
- 2) slopes from previous page (generally from Plate 7-2)
- 3) Disapprove this section - need riprap entire UD-2

42 381 50 SHEETS 3 SQUARE  
 42 382 50 SHEETS 3 SQUARE  
 42 383 50 SHEETS 3 SQUARE  
 42 384 50 SHEETS 3 SQUARE  
 42 385 50 SHEETS 3 SQUARE  
 42 386 50 SHEETS 3 SQUARE  
 42 387 50 SHEETS 3 SQUARE  
 42 388 50 SHEETS 3 SQUARE  
 42 389 50 SHEETS 3 SQUARE  
 42 390 50 SHEETS 3 SQUARE



Project: Boyce Mine T.A., Digitize Areas, R.O. Vols, WS slopes, Stage Vol.

Reviewer: Rick Summers, Hydrologist

Date: April 14, 1987

F. Sediment Pond

Runoff Volume:

| Input                | 200m     | Boyce              | Comment               |
|----------------------|----------|--------------------|-----------------------|
| Area                 | 3.66     | 4.82 Ac            | - see below           |
| ppt-24 ppt.          | 1.89"    | 1.89"              | - SAMP-NJMM atlas     |
| CN                   | 90       | 90                 | - Table 7-1.          |
| Ppt. 25yr-24hr       | 2.25     | 2.25               |                       |
| R.O. vol. 12yr       | 0.305 AF | 0.402 <sup>x</sup> |                       |
| R.O. vol. 25yr       | 0.400 AF | Not submitted      | Closed on 2.85" ppt.) |
| R.O. vol. 100yr-24hr | 0.563    | 0.567              |                       |

Area digitized (4/14/87)

|   | Acres  |                             |
|---|--------|-----------------------------|
| Drainage to Catch Basin (add. to Catch B. Area) | 2.71   | } 2.99 Ac.                  |
| Drainage to topsoil (there)                     | 0.28   |                             |
| " " (mine)                                      | 0.81   |                             |
| use → " " mine larger                           | (1.24) |                             |
| Topsoil Area                                    | (1.57) |                             |
| Main Yard w/o slide area (to ponds)             | 0.62   |                             |
| " " " "   | 3.34   |                             |
| " " " "   | 3      | include ponds to mid-embank |
| Entire Disturbed (possible to ponds)            | 3.66   |                             |
| slide area (there)                              | 0.96   |                             |

from Plate 3-1 stamped March 11, 1987

4/19/87

Unstacked Slope inputs

| WS   | Contour Interval                             | Σ contours (ft.) | Area (Acres) | Slope (%) |
|------|--|------------------|--------------|-----------|
| UD-1 | - use SOAP report value, previously verified |                  |              |           |
| UD-2 | 40   | 5815.3'          | 10.76        | 49.63     |
| UD-3 | 40   | 1340.55'         | 1.57         | 78.4      |
| UD-4 | 40   | 818.04'          | 0.99         | 75.87     |
| OD-3 |  | 1120.6'          | 2.99         | 34.4      |

Stage - Volume Data:

| Elev. Contour             | Δ elev. | Area (ft <sup>2</sup> ) | Σ Area    | Vol (ft <sup>3</sup> ) | cum Vol (ft <sup>3</sup> ) |
|---------------------------|---------|-------------------------|-----------|------------------------|----------------------------|
| Pond Bottom (6278.0')     |         | 4863.4                  |           |                        | 0.0                        |
| Sediment (6280.0')        | 2'      | 6778.7                  | 5821.05   | 11,642.1               | 11,642.1                   |
| Spillway (6286.0')        | 6'      | 9859.8                  | 8319.25   | 49,965.5               | 61,557.6                   |
| Emergency Spill (6287.0') | 1.0'    | 11,128.5                | 54,844.15 | 54,844.15              | 116,401.7                  |
| Top (6288.0')             | 1.0'    | 12,726.4                | 11,927.45 | 11,927.45              | 128,329.2                  |

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



# Slope Calculations

## Dimensions

$$\text{slope} = \frac{h \cdot L - \sum \text{lengths}}{A - \text{area}}$$

1) Topsoil (slope UD-3)

|      | <u>ft</u> |
|------|-----------|
| 6220 | 250.72    |
| 6360 | 247.49    |
| 6400 | 238.21    |
| 6440 | 219.31    |
| 6480 | 171.15    |
| 6520 | 128.19    |
| 6560 | 65.33     |
| 6600 | 20.14     |

CI = 40'

plate 7-1

$$S = \frac{(40)(1340.55)}{(43560)(1.57)} = 78.477\%$$

$$\Sigma = 1340.55'$$

2) Side Division UD-4

CI = 40'

|           |        |
|-----------|--------|
| 6260      | 221.74 |
| 6400      | 216.12 |
| 6440      | 184.36 |
| 6480      | 148.32 |
| 6520      | 47.04  |
| (implied) |        |

$$S = \frac{(40)(818)}{(0.99)(43560)} = 75.87\%$$

$$\Sigma = 818.04'$$

3) Catch Basin 4 DD-3

CI = 40'

|      |        |
|------|--------|
| 6320 | 367.41 |
| 6360 | 335.73 |
| 6400 | 220.48 |
| 6440 | 143.83 |
| 6480 | 53.15  |

$$\Sigma = 1,120.6'$$

$$S = \frac{(40)(1120.6)}{(2.99)(43560)} = 34.4\%$$

4) UD-2

ft

40' CI

plate 2

|      |        |
|------|--------|
| 6320 | 174.65 |
| 6360 | 244.42 |
| 6400 | 372.32 |
| 6440 | 632.06 |
| 6480 | 660.19 |
| 6520 | 678.07 |
| 6560 | 627.75 |
| 6600 | 566.45 |

cont.

110-2

ft

|      |        |
|------|--------|
| 6640 | 523.15 |
| 6680 | 482.21 |
| 6720 | 415.70 |
| 6760 | 307.64 |
| 6800 | 130.69 |

$$\Sigma = 5,815.8''$$

$$S = \frac{(40)(5815.8)}{(10.76)(13560)} =$$

$$= 49.63\%$$

### III. Sediment Volume:

assume 4.82 Acres, conservation digitized area = 3.66 Ac.

$$1) (4.82 \text{ Ac})(.1 \text{ Ae/Ac}) = 0.482 \text{ Ae}$$

2) use 0.482 Ae. since pond is large enough

culverts

C-1

| <u>Depth</u> | <u>V</u> | <u>Q</u>                             |
|--------------|----------|--------------------------------------|
| 5"           | 8.8      | 5.25                                 |
| 7"           | 10.846   | 10.484                               |
| 11"          | 14.059   | 25.                                  |
| 8"           | 11.737   | 13.728                               |
| > 8.5"       | 12.158   | <u>15.498</u> < close enough 16 cfs. |

C-2

| <u>Depth</u> | <u>Vel</u> | <u>Q</u>                             |
|--------------|------------|--------------------------------------|
| 3"           | 10.5       | 2.439                                |
| 2.5"         | 9.59       | 1.66                                 |
| 2.75"        | 10.187     | <u>2.034</u> < close enough to 2 cfs |

C-3

| <u>Depth</u> | <u>Vel</u> | <u>Q</u>                               |
|--------------|------------|--|
| 4"           | 4.712      | 1.378                                  |
| 10"          | 6.551      | 6.083                                  |
| 12"          | 6.397      | 5.735                                  |
| 14"          | 6.133      | 5.875                                  |
| 9"           | 7.2        | 6.361                                  |
| 8"           | 6.832      | <u>5.18</u> < close enough to 5.02 cfs |
| 7"           | 6.405      | 4.07                                   |

C-5 (18")

| <u>Depth</u> | <u>Vel</u> | <u>Q</u>                        |
|--------------|------------|---------------------------------|
| 10"          | 5.33       | 4.71                            |
| 12"          | 4.947      | 4.442                           |
| 16"          |            | 5.34 < close enough to 5.02 cfs |

C-6 (24")

| <u>Depth</u> | <u>Vel</u> | <u>Q</u> | <u>Depth</u> | <u>Vel</u> | <u>Q</u>                      |
|--------------|------------|----------|--------------|------------|-------------------------------|
| 14"          | 6.323      | 9.95     | 9"           | 5.901      | 6.35                          |
| 11"          | 6.502      | 9.131    | 10"          | 6.218      | 7.7 < close enough to 7.0 cfs |
| 7"           | 5.163      | 3.735    |              |            |                               |

Project: SOAP PEAK FLOWS

Date: 11-28-86

Drawn: R. Ammann

42.381 50 SHEETS 5 SQUARE  
42.382 100 SHEETS 5 SQUARE  
42.383 200 SHEETS 5 SQUARE  
M.S. & S.E.



| Drainage    | Area (in <sup>2</sup> ) (Acres) | Contours                       | Hydraulic Length ft. | 0.56pc (calc.) | T <sub>c</sub> * (hr) calc. |
|-------------|---------------------------------|--------------------------------|----------------------|----------------|-----------------------------|
| WS-1        | 33.74<br>(84)                   | 85.75<br>29,256.2 <sup>⊗</sup> | 2154.3<br>(2180)     | 31.3<br>(28.4) | .1859                       |
| WS-2        | 2.18<br>(49)                    | 50.15<br>20,383.1 <sup>⊗</sup> | 2538.4<br>(2620)     | 37.3<br>(40.3) | .2182                       |
| WS-3        | 2.87<br>(65)                    | 66.0<br>15,191 *               | 2,901.9<br>(3000)    | 42.3<br>(41.0) | .2479                       |
| WS-4        | 9.57<br>(220)                   | 219.72<br>29,485 <sup>**</sup> | 7597.4<br>(7600)     | 36.9<br>(35.9) | .5892                       |
| Chalk Creek | (220)                           |                                | (80,300)             | (14.9)         |                             |

⊗ CI = 40'

\* CI = 80'

\*\* CI = 120'

Applicant's values are in ( ). None given for T<sub>c</sub>.

W1117:

$$Pp_{10-24} = 1.89''$$

$$Pp_{100-24} = 2.85''$$

Output

|       | Q <sub>10-24</sub> | Q <sub>100-24</sub> |
|-------|--------------------|---------------------|
| WS-1  | 34.50<br>(32)      | 86.43<br>(80)       |
| WS-2  | 12.41<br>(12)      | 38.3<br>(36)        |
| WS-3  | 9.96<br>(7)        | 39.36<br>(37)       |
| WS-4  | 16.02<br>(16)      | 77.74<br>(76)       |
| CHALK | (1770)             | (6350)              |

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



Project: Stage-Discharge Curve, Boyer mine

DATE: 4/18/87

Reviewed: R. Summers, Reclamation Hydrologist

I. Inputs & Assumptions

| <u>Input</u>                              | <u>DOGIR</u> | <u>Boyer</u>  | <u>comment</u>               |
|---|--------------|---------------|------------------------------|
| Ht. Riser                                 | 8 ft.        | not submitted |                              |
| DIA. Riser                                | 2 ft.        |               |                              |
| Co inlet                                  | 0.6          |               |                              |
| Total head<br>(top of riser<br>to outlet) | 9.0 ft       |               | 6086' - 6077'                |
| Length Barrel                             | 78'          |               | scaled from<br>A-A', Plate 7 |
| Total length<br>of system                 | 86'          |               |                              |
| DIA. Barrel                               | 2 ft.        |               |                              |
| n-value                                   | 0.024        |               |                              |
| $K_b$                                     | 0.5          |               |                              |
| $K_c$                                     | 1.0          |               |                              |
| $K_f$                                     | 3.63         |               |                              |

$K_f = 184.6 \approx 4/0^{4/3}$

II. Results

| Elev.  | Head<br>(above 1°) | Q <sub>Weir</sub> | Q <sub>Orifice</sub><br>(cfs) | Q <sub>Pipe</sub> |
|--------|--------------------|-------------------|-------------------------------|-------------------|
| 6286   | 0                  | 0                 | 0                             | 0                 |
| 6286.2 | 0.2                | 1.84              | 6.76                          | 28.8              |
| 6286.4 | 0.4                | 5.23              | 9.57                          | 29.16             |
| 6286.4 | 0.4                | 9.64              | 11.72                         | 29.51             |
| 6286.5 | 0.8                | 14.88             | 13.53                         | 29.86             |
| 6287.0 | 1.0                | 20.84             | 15.13                         | 30.21             |
| 6287.2 | 1.2                | -                 | 16.57                         | -                 |
| 6287.4 | 1.4                | 34.56             | 17.90                         | 30.59             |
| 6287.6 | 1.6                | -                 | 19.13                         | -                 |
| 6287.8 | 1.8                | -                 | 20.29                         | -                 |
| 6288.0 | 2.0                | 59.59             | 21.37                         | 31.88             |

\* note: no need to check emergency spillway sizing - 1° with  
 1° elevation = 6286'  
 emergency elev. = 6287'  
 top elev. = 6288'  
 pass 100yr-24hr event (8.77 cfs)

42-381 50 SHEETS 5 SQUARE  
 42-382 100 SHEETS 5 SQUARE  
 42-383 200 SHEETS 5 SQUARE  
 NATIONAL  
 MANUFACTURING

3012, RDS, 4/15/87  
C-1

4. HYDRAULICS

HYDRAULICS OF CULVERTS

s satisfactory for the full 100-year headwater is too high, a larger size maximum permissible headwater follows.

d for inlet control enter Fig. 4-22, ater depth in outlet control. If the control, the culvert is assumed to be plies.

d on the flow charts. For other ngth,  $L'$ , calculated by the formula

(14)

on chart.

ts, adjust the result for the Man-

r the entrance condition desired. e, page 156.

headwater exceeds the allowable, g to acceptable headwater depth. be considered for corrugated steel s. See Table 4-10. A smaller size actory.

idered. It may be economical to if a size difference results. Check

ming's  $n$  for Structural Plate Pipe urements reported in Table 4-11 and 4-25 together with the corre- data was not a part of the Fed- were published in 1963.

100-year flood discharge. Ob- s importance which do not war- sign discharges for less critical ear floods. This is a matter of A of this chapter. But, whatever harge, the rationale presented nced by requiring no static ge than the design dis-

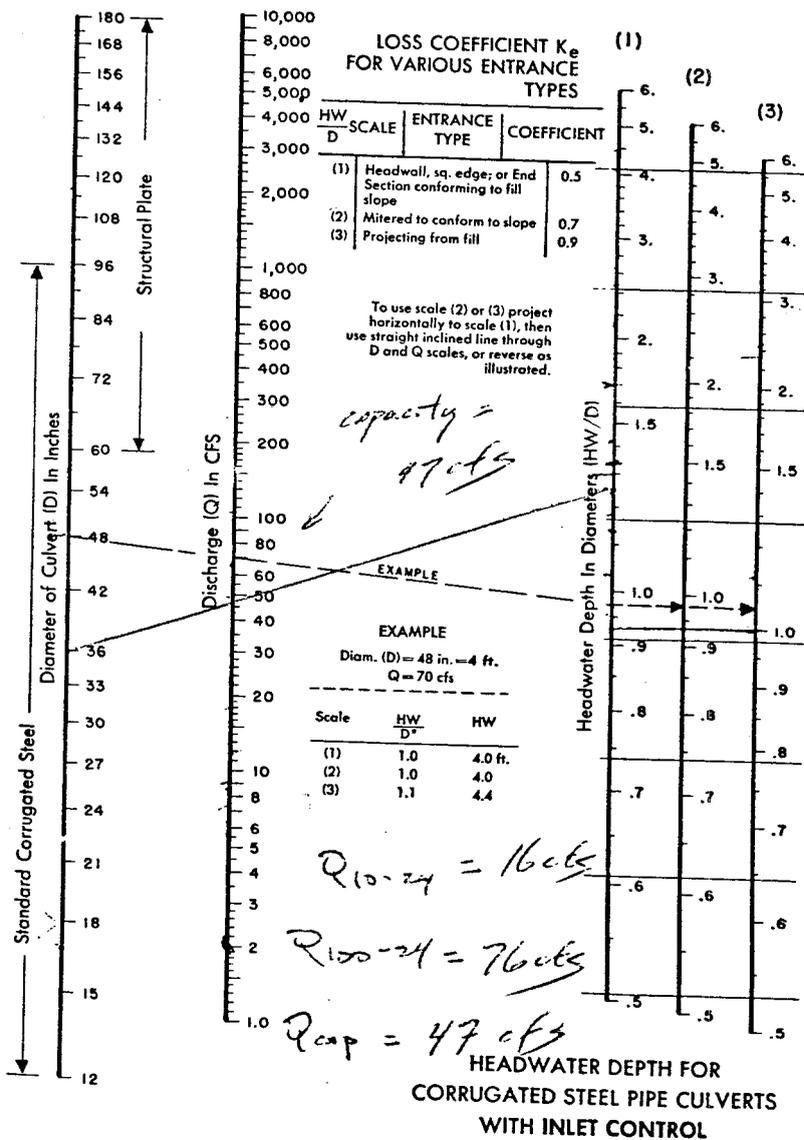


Fig. 4-18. Inlet control nomograph for corrugated steel pipe culverts. The manufacturers recommend keeping  $HW/D$  to a maximum of 1.5 and preferably to no more than 1.0.

Boyer, RPS, 11/13/97  
C-2

4. HYDRAULICS

HYDRAULICS OF CULVERTS

is satisfactory for the full 100-year headwater is too high, a larger size maximum permissible headwater. follows.

ed for inlet control enter Fig. 4-22, water depth in outlet control. If the control, the culvert is assumed to be plies.

ed on the flow charts. For other length,  $L'$ , calculated by the formula

..... (14)

$n$  on chart.

arts, adjust the result for the Man-

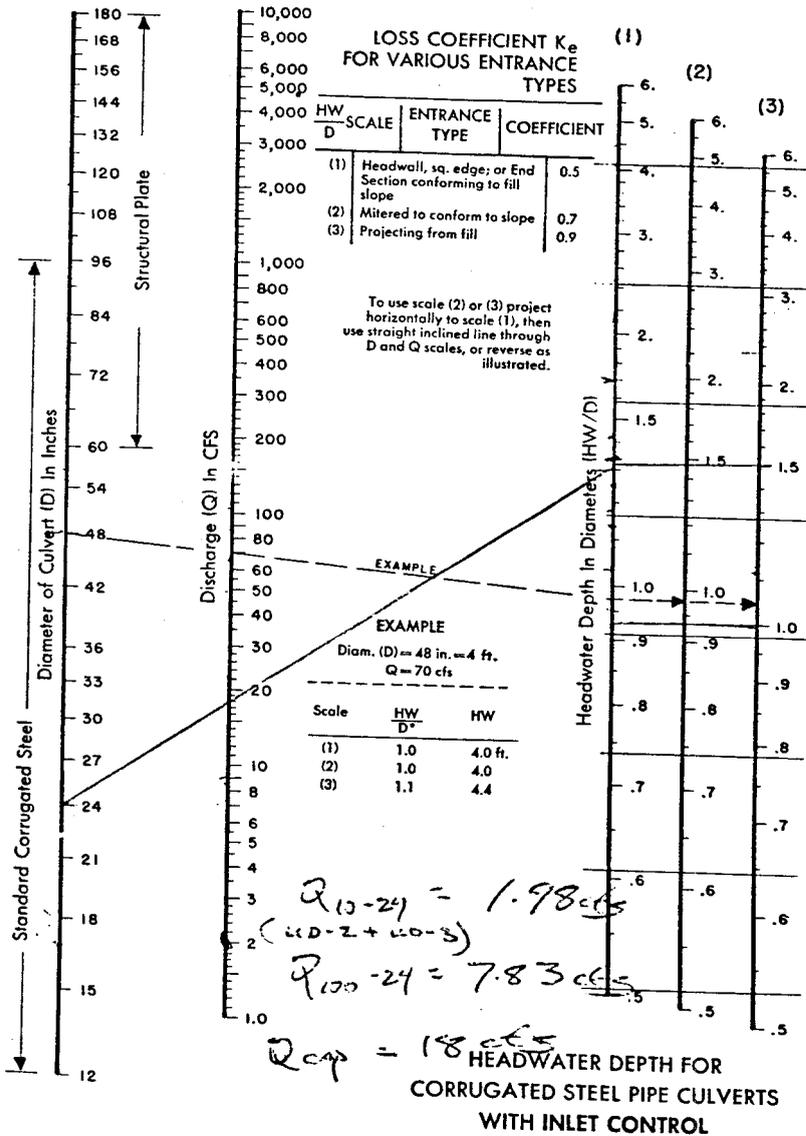
or the entrance condition desired. -9, page 156.

ne headwater exceeds the allowable, ng to acceptable headwater depth. be considered for corrugated steel ts. See Table 4-10. A smaller size ifactory.

nsidered. It may be economical to if a size difference results. Check

inning's  $n$  for Structural Plate Pipe asurements reported in Table 4-11 and 4-25 together with the corre- is data was not a part of the Fed- h were published in 1963.

ed 100-year flood discharge. Ob- less importance which do not war- design discharges for less critical -year floods. This is a matter of n A of this chapter. But, whatever discharge, the rationale presented be balanced by requiring no static od discharge than the design dis-



AHW = 3'  
HW/D = 1.5

Fig. 4-18. Inlet control nomograph for corrugated steel pipe culverts. The manufacturers recommend keeping  $HW/D$  to a maximum of 1.5 and preferably to no more than 1.0.

*Boyer, RPS, 4/10/57  
C-3*

satisfactory for the full 100-year headwater is too high, a larger size maximum permissible headwater follows.

For inlet control enter Fig. 4-22, water depth in outlet control. If the outlet control, the culvert is assumed to be inlet control.

For other conditions on the flow charts. For other conditions, length,  $L'$ , calculated by the formula

(14)

on chart.

For inlet control, adjust the result for the Manning's  $n$ .

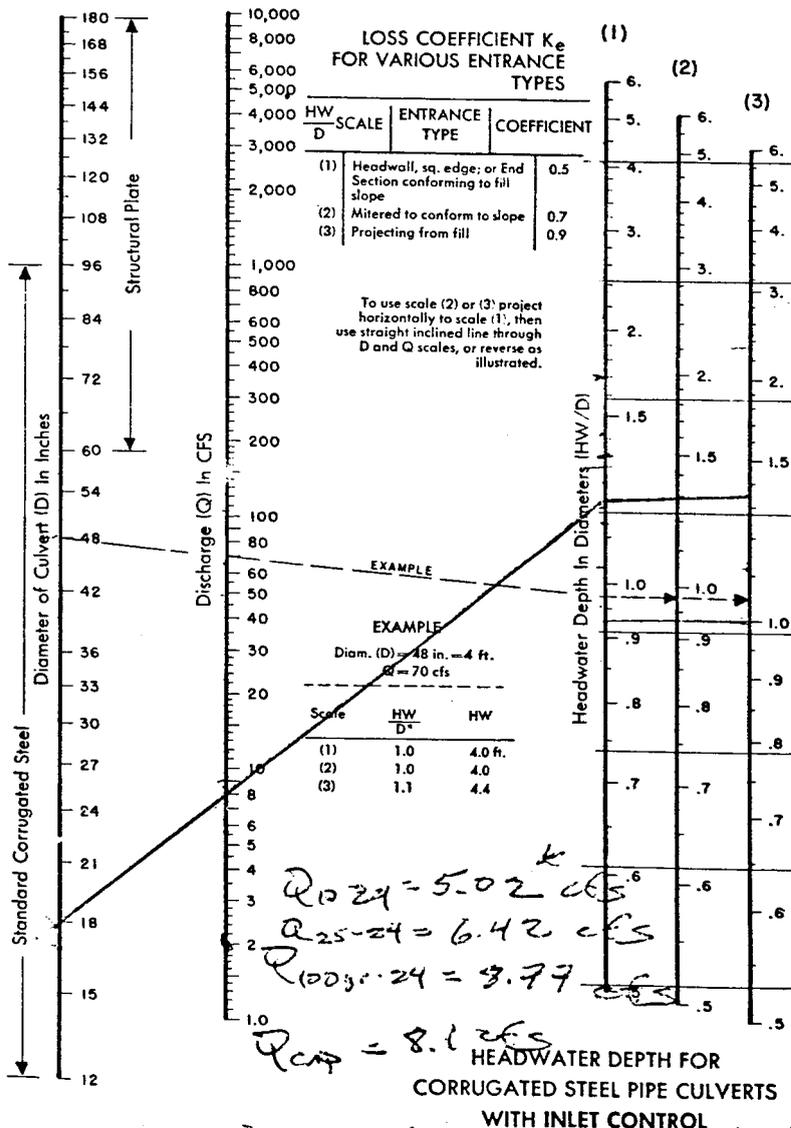
For the entrance condition desired. See page 156.

If the headwater exceeds the allowable, the culvert should be designed to acceptable headwater depth. This may be considered for corrugated steel pipe culverts. See Table 4-10. A smaller size culvert may be considered. It may be economical to increase the size if a size difference results. Check the manufacturer's data.

It may be economical to increase the size if a size difference results. Check the manufacturer's data.

Manning's  $n$  for Structural Plate Pipe measurements reported in Table 4-11 and 4-25 together with the correction factors. This data was not a part of the Federal Highway Administration's data which were published in 1963.

For 100-year flood discharge. Observe the importance which do not warrant design discharges for less critical floods. This is a matter of judgment. But, whatever the discharge, the rationale presented should be balanced by requiring no static headwater discharge than the design discharge.



*Handwritten notes:*  
 $AHW = 2'$   
 $HW/D = 1.3$

*Handwritten note:* \* conservative, used entire disturbed (pad) area peaks

Fig. 4-18. Inlet control nomograph for corrugated steel pipe culverts. The manufacturers recommend keeping  $HW/D$  to a maximum of 1.5 and preferably to no more than 1.0.

note: C-4 is 1" spelling  
- see stage - Q review

Boyer, RPS, 4/15/57  
C-5, C-6

satisfactory for the full 100-year headwater is too high, a larger size maximum permissible headwater follows.

For inlet control enter Fig. 4-22, water depth in outlet control. If the control, the culvert is assumed to be inlet control.

on the flow charts. For other length, L', calculated by the formula

18" (plate 7-2)  
C-5  
AWH = 3'  
HW/D = 2.0

(14)

on chart.

parts; adjust the result for the Man-

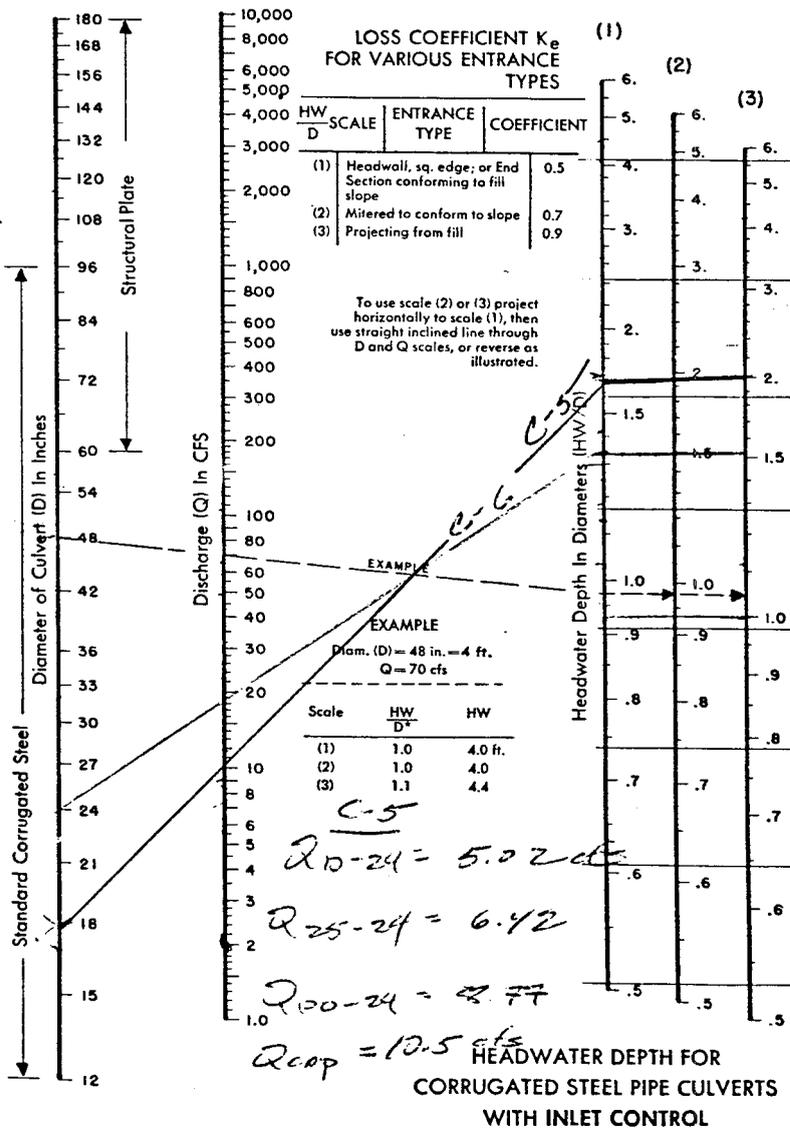
or the entrance condition desired. See page 156.

if the headwater exceeds the allowable, going to acceptable headwater depth. This can be considered for corrugated steel pipe culverts. See Table 4-10. A smaller size culvert may be considered. It may be economical to check if a size difference results. Check

considered. It may be economical to check if a size difference results. Check

Manning's *n* for Structural Plate Pipe measurements reported in Table 4-11 and 4-25 together with the correction data was not a part of the Federal Highway Administration's publications in 1963.

and 100-year flood discharge. Obvious importance which do not warrant design discharges for less critical 100-year floods. This is a matter of judgment in A of this chapter. But, whatever the design discharge, the rationale presented should be balanced by requiring no static flood discharge than the design dis-



(2.4")  
C-6  
AWH = 3'  
HW/D = 1.5  
  
C-6  
7.0 cfs  
10.36 cfs  
16.6 cfs  
Q<sub>cop</sub> = 19 cfs

C-5: use peaks for DISTR. area (pad) note 40-1  
C-6: use C-5, and add 40-2 and 40-3  
4 MILUMY DRAINAGE leaves @ culvert crossing highway.

Fig. 4-18. Inlet control nomograph for corrugated steel pipe culverts. The manufacturers recommend keeping HW/D to a maximum of 1.5 and preferably to no more than 1.0.

None file  
See Linner



NORMAN H. BANGERTER  
GOVERNOR



STATE OF UTAH  
DEPARTMENT OF COMMUNITY AND  
ECONOMIC DEVELOPMENT

September 15, 1986

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

Division of  
State History  
(UTAH STATE HISTORICAL SOCIETY)

MAX J. EVANS, DIRECTOR  
300 RIO GRANDE  
SALT LAKE CITY, UTAH 84101-1182  
TELEPHONE 801/533-5755

**RECEIVED**  
OCT 01 1986

**DIVISION OF  
OIL, GAS & MINING**

Attn: Susan C. Linner

RE: Summit Coal Company, Boyer Mine, Permit Application, PRO/043/002, Folder  
No. 2, Summit County, Utah

In Reply Please Refer To Case No. J260

Dear Mr. Braxton:

The Utah Preservation Office has received for consideration the above referenced project. As outlined in the memorandum of understanding with your Division, our office has reviewed the mine plan and we have the following technical comments for consideration.

1. It appears that the archeological report meets standards outlined by the Secretary of the Interior's "Standards for Archeology and Historic Preservation."
2. Our office concurs that site 42Sm99 is non-significant, and therefore there would be no effect on cultural resources by this project.
3. One technical comment is that there is a statement that there were 8 person days used to survey ten acres and write up the report. We are somewhat concerned about the length of time it took to do that.

The above is provided on request as assistance as outlined by 36 CFR 800 or Utah Code, Title 63-18-37. If you have questions or need additional assistance, please contact Jim Dykman at 533-7039.

Sincerely,

*M J Evans*

Max J. Evans  
Director and  
State Historic Preservation Officer

JLD:jrc:J260/3373V



STATE OF UTAH  
NATURAL RESOURCES  
Wildlife Resources

Northern Region • 515 East 5300 South • Ogden, UT 84405-4599 • 801-479-5143

Mine file  
S. Linn

Norman H. Bangerter, Governor  
Dee C. Hansen, Executive Director  
William H. Geer, Division Director

6 April 1987

RECEIVED  
APR 08 1987

DIVISION OF  
OIL, GAS & MINING

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

Dear Mr. Braxton:

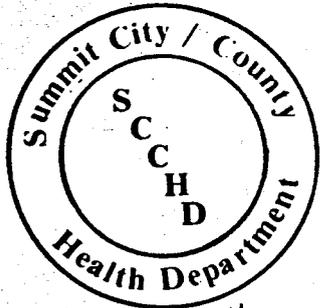
We have reviewed the MRP review response, dated February 20, 1987 for the Boyer Mine, Summit Coal Company, Summit County, Utah and have no objections with the fish and wildlife plan submitted by Summit Coal Company.

We would like to be notified if the U.S. Fish and Wildlife Service inspection determines that powerlines and poles within the permit area are unacceptable for raptor protection. }

Sincerely,

Jack A. Rensel  
Regional Supervisor

JAR/GWW/ss



S. Swensen  
Mine Feb

Steve Jenkins  
Health  
Director

Ruth Richins  
Nursing  
Director

Bob Swensen  
Environmental  
Director

Louise Pace  
Administrative  
Assistant

copy

October 14, 1986

OFFICES

COALVILLE

P.O. Box 128  
Coalville, Ut.  
84017

336-4451  
Ext. 350

PARK CITY

P.O. Box 680166  
Park City, Ut.  
84068

649-9072

KAMAS

P.O. Box 698  
Kamas, Ut.  
84036

783-4374

Bill Blonquist  
Summit Coal Company  
Coalville, Utah 84017

Dear Mr Blonquist,

I have made an onsite inspection of your wastewater disposal system located at Summit Coal Company in Chalk Creek, Summit County.

It appears from information gathered and from an onsite inspection that this system meets with the minimum state and local requirements and has been approved.

From the information gathered it appears that the solid wastes generated at Summit Coal Company can be disposed of in the Summit County Landfills.

If you have further questions, feel free to call.

Sincerely,

Robert Swensen R.S.  
Environmental Health Specialist  
Summit City/County Health Department

RECEIVED  
APR 16 1987

DIVISION OF  
OIL, GAS & MINING

NONFEDERAL  
(April 1987)

Permit Number ACT/043/008, May 15, 1987

STATE OF UTAH  
DEPARTMENT OF NATURAL RESOURCES  
DIVISION OF OIL, GAS AND MINING  
355 West North Temple  
3 Triad Center, Suite 350  
Salt Lake City, Utah 84180-1203  
(801) 538-5340

This permit, ACT/043/008, is issued for the state of Utah by the Utah Division of Oil, Gas and Mining (DOGGM) to:

Summit Coal Company  
P. O. Box 646  
Coalville, Utah 84017  
(801) 336-2653

for the Boyer Mine. Summit Coal Company is the lessee of certain fee-owned parcels. A collateral bond with a value of \$100,900.00 has been filed with DOGM. DOGM must receive a copy of this permit signed and dated by the permittee.

- Sec. 1 STATUTES AND REGULATIONS - This permit is issued pursuant to the Utah Coal Mining and Reclamation Act of 1979, Utah Code Annotated (UCA) 40-10-1 et seq, hereafter referred to as the Act.
- Sec. 2 PERMIT AREA - The permittee is authorized to conduct underground coal mining activities on the following described lands (as shown on the map appended as Attachment B) within the permit area at the Boyer Mine situated in the state of Utah, Summit County, and located:

Township 3 North, Range 6 East, SLBM

Section 25: S 1/2 S 1/2

Section 36: Portions of N 1/2 NE 1/4 and SE 1/4 NE 1/4

This legal description is for the permit area (as shown on Attachment B) of the Boyer Mine. The permittee is authorized to conduct underground coal mining activities connected with mining on the foregoing described property subject to the conditions of the leases, and all other applicable conditions, laws and regulations.

- Sec. 3 PERMIT TERM - This permit expires on May 16, 1992.
- Sec. 4 ASSIGNMENT OF PERMIT RIGHTS - The permit rights may not be transferred, assigned or sold without the approval of the Director, DOGM. Transfer, assignment or sale of permit rights must be done in accordance with applicable regulations, including but not limited to 30 CFR 740.13(e) and UMC 788.17-.19.
- Sec. 5 RIGHT OF ENTRY - The permittee shall allow the authorized representative of the DOGM, including but not limited to inspectors, and representatives of the Office of Surface Mining Reclamation and Enforcement, without advance notice or a search warrant, upon presentation of appropriate credentials, and without delay to:
- A. have the rights of entry provided for in 30 CFR 840.12, UMC 840.12, 30 CFR 842.13 and UMC 842.13; and,
  - B. be accompanied by private persons for the purpose of conducting an inspection in accordance with UMC 842.12 and 30 CFR 842, when the inspection is in response to an alleged violation reported by the private person.
- Sec. 6 SCOPE OF OPERATIONS - The permittee shall conduct underground coal mining activities only on those lands specifically designated as within the permit area on the maps submitted in the permit application and approved for the term of the permit and which are subject to the performance bond.
- Sec. 7 ENVIRONMENTAL IMPACTS - The permittee shall minimize any adverse impact to the environment or public health and safety through but not limited to:
- A. accelerated monitoring to determine the nature and extent of noncompliance and the results of the noncompliance;
  - B. immediate implementation of measures necessary to comply; and
  - C. warning, as soon as possible after learning of such noncompliance, any person whose health and safety is in imminent danger due to the noncompliance.

- Sec. 8 DISPOSAL OF POLLUTANTS - The permittee shall dispose of solids, sludge, filter backwash or pollutants in the course of treatment or control of waters or emissions to the air in the manner required by the approved Utah State Program which prevents violation of any applicable state or federal law.
- Sec. 9 CONDUCT OF OPERATIONS - The permittee shall conduct its operations:
- A. in accordance with the terms of the permit to prevent significant, imminent environmental harm to the health and safety of the public; and
  - B. utilizing methods specified as conditions of the permit by DOGM in approving alternative methods of compliance with the performance standards of the Act and the approved Utah State Program.
- Sec. 10 AUTHORIZED AGENT - The permittee shall provide the names, addresses and telephone numbers of persons responsible for operations under the permit to whom notices and orders are to be delivered.
- Sec. 11 COMPLIANCE WITH OTHER LAWS - The permittee shall comply with the provisions of the Water Pollution Control Act (33 USC 1151 et seq,) and the Clean Air Act (42 USC 7401 et seq), UCA 26-11-1 et seq, and UCA 26-13-1 et seq.
- Sec. 12 PERMIT RENEWAL - Upon expiration, this permit may be renewed for areas within the boundaries of the existing permit in accordance with the Act and the approved Utah State Program.
- Sec. 13 CULTURAL RESOURCES - If during the course of mining operations, previously unidentified cultural resources are discovered, the permittee shall ensure that the site(s) is not disturbed and shall notify DOGM. DOGM shall inform the permittee of necessary actions required. The permittee shall implement the mitigation measures required by DOGM within the time frame specified by DOGM.
- Sec. 14 APPEALS - The permittee shall have the right to appeal as provided for under UMC 787.

Sec. 15 SPECIAL CONDITIONS - In addition to the general obligations and/or requirements set out in the leases and this permit, the permittee shall comply with the conditions appended hereto as Attachment A.

The above conditions (Secs. 1-15) are also imposed upon the permittee's agents and employees. The failure or refusal of any of these persons to comply with these conditions shall be deemed a failure of the permittee to comply with the terms of this permit and the leases. The permittee shall require his agents, contractors and subcontractors involved in activities concerning this permit to include these conditions in the contracts between and among them. These conditions may be revised or amended, in writing, by the mutual consent of DOGM and the permittee at any time to adjust to changed conditions or to correct an oversight. DOGM may amend these conditions at any time without the consent of the permittee in order to make them consistent with any new federal or state statutes and any new regulations.

THE STATE OF UTAH

By:

Date:

Dianne R. Nielson  
May 15, 1987

I certify that I have read and understand the requirements of this permit and any special conditions attached.

\_\_\_\_\_  
Authorized Representative of  
the Permittee

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

Page 5  
NONFEDERAL

APPROVED AS TO FORM:

By: Alan J. Bachman  
Assistant Attorney General

Date: May 15, 1987

1178R

ATTACHMENT A

SPECIAL PERMIT CONDITIONS

Stipulation UMC 800-(1)-JRH

1. Within 90 days from the date of permit approval and concurrent with the submittal of information required in other stipulations contained within this document, the permittee shall provide to the Division, any revisions or modifications to the calculations and estimate for reclamation of the mine facilities.

Stipulations UMC 817.42-(1-3)-RS

1. The permittee shall submit revised designs for the catch basin proposed to treat drainage from the coal waste disposal area such that the final design must incorporate valid hydrologic assumptions and criteria and insure compliance with subsection (a)(3) of UMC 817.42. Designs must be submitted within 30 days of permit issuance and be approved by the Division prior to any further initiation of mining activity in the powder and cap magazine and coal waste disposal area.
2. The permittee shall within 30 days of permit issuance, submit revised appropriate sections and plates in the MRP to reflect a commitment to retain straw bale (or equivalent) treatment structures at the outlet of culvert C-6. Additionally, the permittee must commit, within 30 days of permit issuance, to sample all discharges from these structures and incorporate the analysis schedule proposed in Table 5-1 for all samples. A commitment to submit results of the analysis to the Division within 30 days of receipt must also be made.
3. Prior to beginning any underground coal mining activities under this permit in the affected drainage area, the applicant must construct the sedimentation system as proposed in the MRP.

Stipulation UMC 817.43-(1)-RPS

1. Within 60 days of permit issuance, the permittee shall submit a revised complete and technically adequate design plan for all diversions which incorporates correct hydrologic assumptions and meets the requirements of UMC 817.43.

Stipulation UMC 817.44-(1)-RPS

1. The permittee must submit complete and technically adequate designs for UD-1 that demonstrate compliance with subsections (b)(2) and (d) of this rule within 120 days of permit issuance.

Stipulations UMC 817.46-(1-6)-RPS

1. Within 30 days of permit issuance, the permittee shall submit to the Division a commitment to maintain a minimum detention time of 24 hours in the sedimentation pond for all 10-yr, 24-hr and lesser precipitation events.
2. Within 30 days of permit issuance, the permittee shall submit detailed information regarding the sediment pond clean out. This information should include elevation of 60% volume, elevation of maximum sediment storage volume, location of sediment marker in pond, and a commitment to clearly mark the referenced elevations on the stake.
3. Within 30 days of permit issuance, the permittee shall provide correct assumptions and peak flow values for design flows used for the design of the sedimentation pond.
4. Within 30 days of permit issuance, the permittee shall submit plans to the Division for the emergency spillway for the sedimentation pond. These plans should incorporate the 25-yr, 24-hr design event, a spillway lining of adequately sized riprap, a filter blanket design, and an adequately sized energy dissipator.
5. Within 30 days of permit issuance, the permittee shall submit to the Division a commitment to inspect the sedimentation pond during construction and submit certified as-built drawings of the structure. These must be conducted by a registered professional engineer.
6. Within 30 days of permit issuance, the permittee shall provide a correct Plate depicting the location of sampling station SS-7.

Stipulations UMC 817.46-(1-2)-JRH

1. Within 30 days from the date of the permit approval, the permittee shall provide a compliance plan for the reconstruction and modification of the sediment pond facilities. The compliance plan shall include the design specifications for the modification or reconstruction of the structure to meet the design and performance standards

of Subchapter K of the rules; a reconstruction schedule which shows anticipated dates for beginning and completing interim steps and final reconstruction; provisions for monitoring the structure during and after modification or reconstruction to ensure that the performance standards of Subchapter K of the rules are met; and, a showing that the risk or harm to the environment or to public health or safety is minimized during the period of modification or reconstruction.

2. Within 90 days from the date of the permit approval, the permittee shall provide to the Division, a design for the proposed catch basin which is in compliance with the performance standards of Subchapter K of the regulations.

Stipulation UMC 817.47-(1)-RS

1. Within 30 days of permit issuance, the permittee shall submit adequate designs for the energy dissipator for the primary spillway. These designs must be based upon the expected velocity for the discharge from a 10-yr, 24-hr precipitation event.

Stipulations UMC 817.48-(1-2)-JSL

1. Within 90 days of permit approval the permittee will provide the Acid-Base potential (ABP) data for the pad materials. If the ABP from the pad is found to be less than or equal to -5 Tons  $\text{CaCO}_3$ /1000 Tons Material, the permittee must submit to the Division within 90 days of permit approval a plan to abate the potential contamination of groundwater.
2. Within 90 days of permit approval the permittee must provide an acid- or toxic-forming material (ATFM) waste disposal plan that will effectively reduce pyrite oxidation. The permittee may amend the ATFM with  $\text{CaCO}_3$  at the required amounts or seal the material from any aerobic atmospheric conditions.

Stipulation UMC 817.49-(1)-RPS

1. Within 30 days of permit issuance, the permittee shall submit to the Division a commitment to conduct the inspection required by subsection (h) of UMC 817.49 and to submit the results of that inspection to the Division within 30 days following completion of construction of the proposed sedimentation pond.

Stipulation UMC 817.56-(1)-RS

1. Within 30 days of permit issuance, the permittee shall commit to renovating the permanent diversion labeled as UD-1 prior to final abandonment of the site. The commitment should include intent to ensure the capacity and stability criteria of the proposed design are adequately met and all necessary structural features are in good repair, functional and constructed as per the approved design.

Stipulation UMC 817.71-(1)-JRH

1. Within 90 days from the date of permit approval, the permittee shall provide to the Division, a plan for the location and disposal of excess spoil, mine development waste, sediment pond waste and other coal waste related materials anticipated on the site. The plan shall include a determination as to the total estimated amount of waste materials to be taken from the mine during the expected life of the operations so as to correctly size the facility; determination as to the nature, extent and treatment of acid- and toxic-forming materials which may have been utilized in the construction of the portal and mine facilities pads; analysis of the foundation and liner materials used to construct the waste facility; determination of the location of the waste facilities such that they are not constructed within surface drainages and will not potentially contaminate surface and groundwater; and plans for the amount and type of materials used to cover the waste material, topsoil requirements and revegetation requirements for the waste disposal facility.

Stipulation UMC 817.95-(1)-SCL

1. The permittee is not authorized to construct new facilities or make modifications to existing facilities, if such activities would become a source of air pollution or increase air pollution, until an Air Quality Approval Order is received.

Stipulation UMC 817.106-(1)-JSL

1. The permittee must commit to regrade, stabilize and revegetate according to performance standards UMC 817.111 through 817.116 all rills and gullies greater than nine inches deep.

Stipulations UMC 817.121-.126-(1-3)-DD

1. Within 30 days of permit approval the permittee shall include and commit to the following additions to the subsidence control plan to minimize impacts to surface lands from subsidence:

A. To protect the Highway 133 and utilities the surface permit boundary will be maintained no less than 60 feet from the center line of highway 133. Along this southern boundary, due to the uncertainty of the angle of draw and in the interest of prudence, the permittee will utilize an angle of draw of 25 degrees (from the vertical) to determine the underground limit of second mining (pillar recovery). Before any secondary mining begins and then each year following the permittee shall submit a certified mine map of his underground workings to verify compliance.

B. Until the permittee can otherwise justify stable pillar design for partial extraction, partial extraction may be conducted beyond the second mining limit as follows:

Development mining assuming 18' roof spans and not more than the following extraction may be conducted.

| <u>Depth</u>  | <u>Maximum Extraction</u> | <u>Centers</u> |
|---------------|---------------------------|----------------|
| 150' to 300'  | 51%                       | 60' X 60'      |
| 400' to 600'  | 45%                       | 70' X 70'      |
| 600' to 800'  | 40%                       | 80' X 80'      |
| 800' to 1000' | 36%                       | 90' X 90'      |

Barrier pillars of a minimum of 150' width should be maintained for protection of main entries.

C. Due to the hazards and damage to the surface caused by plug caving, the applicant shall not pull any pillars under a minimum overburden depth of 150'.

D. Prior to initiating second mining and in the interest of protecting the highway and power line, the permittee shall be required to install monuments between the line projected by a 65 degree angle of draw from the limit of second mining to the surface and 30 feet from the center line of the highway. The line of monuments shall be spaced at 0.1d and be maintained 1.4d ahead of second mining (where d is the overburden depth). Both horizontal and vertical measurements shall be taken. A certified survey of the monuments shall be provided to the Division prior to second mining and then thereafter annually until subsidence is complete.

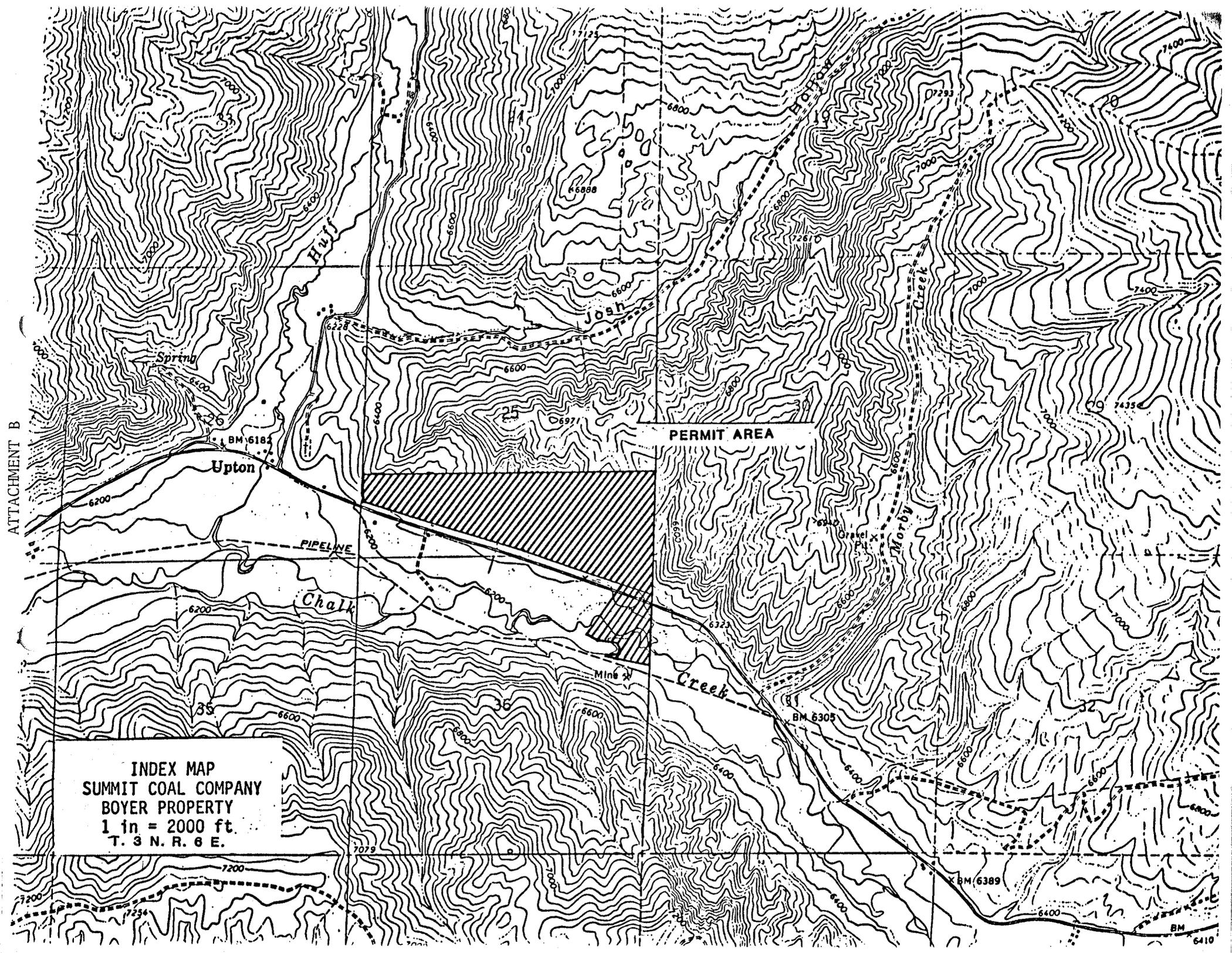
- E. Pillar extraction should be as uniform, complete, and rapid as safety allows to minimize fracturing of strata.
2. The permittee shall within 30 days of permit approval, commit to restoring areas impacted by subsidence-caused surface cracks or other subsidence features such as escarpments (not to include naturally occurring escarpments which are not a result of mining) which are of a size or nature that could, in the Division's determination, either injure or harm grazing livestock or wildlife. Restoration shall include recontouring of the affected land surface including measures to prevent rilling, and revegetation in accordance with the approved permanent revegetation plan in the MRP. Restoration shall be undertaken after annual subsidence survey data indicate that the surface has stabilized, but in all cases restoration and revegetation shall be completed prior to bond release.
3. The permittee shall distribute a notice by mail at least 6 months in advance of mining beneath a property to all owners of property that could be affected by subsidence. The notification shall contain, as a minimum:
- (a) Identification of specific areas in which mining will take place;
  - (b) Dates of underground operations that could cause subsidence and affect specific structures; and
  - (c) Measures to be taken to prevent or control adverse surface effects.

Stipulation UMC 817.150-.156-(1)-JRH

1. Within 30 days from the date of permit approval the permittee shall be required to incorporate into the text of the mining and reclamation plan, specific plans regarding the operation of the haul roads. This would include a commitment that the west haul road shall not be utilized for loaded coal trucks leaving the site. Due to the steep gradient of the road as it leaves the site and enters onto the county road, loaded vehicles could pose a safety hazard during poor road conditions and in the event of equipment (brake) failure. The permittee should also include other appropriate measures to be taken such as the installation of one way signs or other such signs directing the traffic on the road for proper use.

Stipulation UMC 817.180-(1)-JRH

1. Within 30 days from the date of permit approval, the permittee shall provide to the Division, a complete plan for the coal handling and storage facilities proposed to be utilized at the mine site. The plan shall include, but not be limited to the following: capacities for the raw and clean coal stockpiles, materials handling flow sheet, waste handling and materials rehandling requirements, temporary and permanent storage locations and capacities for coal and coal-related waste materials.



PERMIT AREA

INDEX MAP  
SUMMIT COAL COMPANY  
BOYER PROPERTY  
1 in = 2000 ft.  
T. 3 N. R. 6 E.