



STATE OF UTAH
NATURAL RESOURCES
Oil, Gas & Mining

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

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July 9, 1987

CERTIFIED RETURN RECEIPT REQUESTED
(P 402 458 604)

Ms. Barbara Filas
Summit Minerals, Inc.
435 Cedar Avenue
Grand Junction, Colorado 81501

Dear Ms. Filas:

Re: State Decision Package, Summit Minerals #1 (Blackhawk)
Mine, PRO/043/001, Summit County, Utah

Enclosed is a State Decision Package (includes a TA, a CHIA, Permit Stipulations, and Reclamation Bond Cost Estimate) enumerating the Division's assessment of Summit Minerals, Inc.'s Reclamation Plan for the Summit Mineral #1 Mine.

The Division is prepared to issue a stipulated reclamation permit subject to Summit Minerals posting a reclamation bond totalling \$229,000 (1989 dollars) with the Division and submitting to the Division proof of liability insurance for this property.

Summit Minerals presently has a subordinated agreement for a partial reclamation bond in the amount of \$120,300. At Summit Minerals' discretion, Summit Minerals may post a surety in the entire \$229,000 amount, and cancel the existing subordinated agreement, or Summit Minerals may post the difference between \$120,300 and \$229,000 (\$108,700) as a supplemental surety.

Page 2
Ms. Barbara Filas
PRO/043/001
July 9, 1987

Please provide the Division with an indication of Summit Minerals' response to the above within 30 days of receipt.

Best regards,



Dianne R. Nielson
Director

LPB/djh
Enclosures
cc: R. Hagen, OSMRE, Albuquerque
K. May
L. Braxton
S. Linner
0799R/30

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Reclamation Plan

Summit Minerals Inc.
Summit Minerals #1(Blackhawk) Mine
PRO/043/001
Summit County, Utah

July 2, 1987

Background

The Blackhawk Mine has been operated intermittently since 1879. In 1974 Utah Coal and Energy, Inc. (UC&E) began mining operations in the area. When the Utah Mined Land Reclamation Act became effective in 1977, UC&E was required to file a Notice of Intention to Commence Mining Activities, and post a reclamation bond along with all other existing operators. UC&E did not comply with this directive, which led to an order from the Board of Oil, Gas & Mining (Board) to halt all mining activities on February 28, 1979.

According to eyewitness accounts, actual mining of coal ceased on the property about November 10, 1978. UC&E continued to be out of compliance with the new Interim and then the Permanent Program Performance Standards associated with SMCRA, leading to the issuance of violations and further Board action.

In April 1984 Bennett Leasing Company took over a controlling interest in the assets of Utah Coal and Energy, Inc. In March and August of 1985, Bennett Leasing Company was issued Cessation Orders for conducting mining activities without a permit. This led to a hearing before the Board in December of 1985, as a result of which Bennett Leasing was ordered to file a reclamation bond and get a plan approved for reclamation of all previous disturbances. This Decision Package analyzes the Reclamation Plan submitted in response to the Board Order by Summit Minerals, Inc., a subsidiary of Bennett Leasing.

Public Participation

Summit Minerals, Inc. properly gave notice of a complete application as required by UMC 786.11. No comments were received during the public comment period. On April 28, 1987, the Division received a letter from Fern Boyer, a surface owner of a portion of the permit area, enumerating concerns relative to existing conditions and activities at the Blackhawk Mine. The Division responded by meeting with the applicant, with the landowner and by conducting a site inspection. After the inspection the Division again met with a representative of the applicant and advised her to meet with the landowner and jointly petition the Board to allow needed maintenance activities within the permit area.

Recommendation for Approval

Summit Minerals, Inc. has submitted a plan which adequately addresses reclamation of existing disturbances and provides baseline information on environmental resources in the permit and adjacent areas. The area to be reclaimed covers approximately 14 acres of fee surface in the SE1/4 NE1/4 of section 36, T. 3 north, R.6 East, Summit County, Utah.

Summit Minerals Inc. has also indicated to the Division an interest in receiving a mining and reclamation permit for the proposed Summit Minerals #1(Blackhawk) Mine. A plan to explore for more than 250 tons was filed with the Division in June of 1986. The Division notified the applicant that such a plan would not be reviewed until a reclamation permit was granted. On March 11, 1987 a Mining and Reclamation Plan was submitted. The applicant was again notified, by both the Division and the Board, that no review of this submittal would occur until after a permit was issued for the Reclamation Plan.

It is recommended that the Reclamation Plan be approved with the conditions delineated in attachment A to the permit. The conditions are further discussed in the Technical Analysis. Since the applicant has shown substantial interest in mining the property through the submittal of a Mining and Reclamation Plan, it is recommended that they be given a year to get a permit approval which would allow mining activities. Summit Minerals, Inc. will not be required to reclaim the site until the fall of 1988, and only then if a mining and reclamation permit has not been received.

pb
8860R/2-3

PERMITTING CHRONOLOGY

Reclamation Plan

Summit Minerals Inc.
Summit Minerals #1(Blackhawk) Mine
PRO/043/001
Summit County, Utah

July 2, 1987

- 12/6/85 The Board of Oil, Gas & Mining orders Summit Minerals, Inc. to post a reclamation bond and file a complete and adequate plan for reclamation of the Blackhawk Mine.
- 6/4/86 Summit Minerals provides collateral bond with an appraised value of \$120,300.00 for the Blackhawk Mine.
- 6/18/86 Summit Minerals files an application for coal exploration of more than 250 tons.
- 7/8/86 Division notifies Summit Minerals that the exploration plan will be reviewed as a reclamation plan in compliance with the Board order of 12/6/85.
- 8/13/86 Division sends an Initial Completeness Review (ICR) of the reclamation plan portion of the exploration plan to Summit Minerals.
- 11/7/86 Summit Minerals, Inc. provides the Division with a new submittal entitled "Reclamation Plan".
- 12/10/86 Division sends an ICR, identifying completeness and technical deficiencies, on the reclamation plan to Summit Minerals, Inc.
- 12/23/86 Summit Minerals submits information in response to the ICR review.
- 1/23/87 Division determines the reclamation plan to be apparently complete, notifies the applicant to publish and notifies all other agencies, in accordance with UMC 786.11.
- 2/20/87 Summit Minerals completes requirements for publication. Notice was published in the Summit County Bee on January 30, and February 6, 13, and 20, 1987.
- 3/12/87 Division transmits a Technical Deficiency review to Summit Minerals.
- 4/20/87 Summit Minerals responds to the Technical Deficiency review.

MINE PLAN INFORMATION

Mine Name: Summit Minerals #1(Blackhawk) State ID: PRO/043/001
 Operator: Summit Minerals, Inc. County: Summit
 Controlled By: Summit Minerals, Inc.
 Contact Person(s): Barbara Filas Position: Engineer
 Telephone: (801) 486-1861

New/Existing: Existing Mining Method: NA - Reclamation Permit

Federal Lease No(s): None
 Legal Description(s): _____

State Lease No(s): None
 Legal Description(s): _____

Other Leases (identify): Fee surface and coal
 Legal Description(s): Portion of SE1/4 NE1/4 section 36, T. 3 North, R. 6 East

Ownership Data:

<u>Surface Resources (acres)</u>	<u>Existing Permit Area</u>	<u>Proposed Permit Area</u>	<u>Total Life Of Mine Area</u>
Federal	_____	_____	_____
State	_____	_____	_____
Private	_____	14	_____
Other	_____	_____	_____
TOTAL	_____	_____	_____

Coal Ownership (acres):

Federal	_____	_____	_____
State	_____	_____	_____
Private	_____	_____	_____
Other	_____	_____	_____
TOTAL	_____	_____	_____

<u>Coal Resource Data</u>	<u>Total Reserves (1981)</u>	<u>Total Recoverable Reserves (1981)</u>
Federal	_____	_____
State	_____	_____
Private	_____	_____
Other	_____	_____
TOTAL	NA	NA

<u>Recoverable Reserve Data</u>	<u>Name</u>	<u>Thickness</u>	<u>Depth</u>
Seam	Wasatch Coal Bed	6-9 ft.	2,000 ft
Seam	_____	_____	_____
Seam	_____	_____	_____
Seam	_____	_____	_____
Seam	_____	_____	_____
Seam	_____	_____	_____

Mine Life: NA
Average Annual Production: NA Percent Recovery: NA
Date Projected Annual Rate Reached: NA
Date Production Begins: NA Date Production Ends: NA
Reserves Recoverable By: (1) Surface Mining: _____
(2) Underground Mining: _____
Reserves Lost Through Management Decisions: NA
Coal Market: NA

Modifications that have been approved: _____ Date: _____
None _____

FINDINGS

Reclamation Plan

Summit Minerals, Inc.
Summit Minerals #1 (Blackhawk) Mine
PRO/043/001
Summit County, Utah

July 2, 1987

1. The Reclamation Plan (RP) 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 (RP, part UMC 784.13). 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 RP (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 reclamation 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 (RP, part UMC 782.16). All surface in the permit area is fee. No additional disturbance will occur.
 - B. Not within an area under study for designated lands unsuitable for underground coal mining operations (RP, part UMC 782.16).
 - 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) (RP, page 783.24-2).
 - D. Not within 100 feet of the outside right-of-way line of a public road, except where the mine access road joins in the right of way line, as per UMC 761.12(d). See Figure 783.24-1.
 - E. Not within 300 feet of any occupied dwelling. See Figure 783.24-1.
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 December 29, 1986 attached to TA.

6. The applicant has the legal right to enter and begin surface reclamation activities in the permit area through a right of way attendant to the coal lease (see Figures 782.15-1 and 782.15-2)(UMC 786.19(f)).
7. The applicant has shown that prior violations of applicable law and regulations have been corrected (RP, part UMC 782.14; DOGM NOV/CO status report, June 17, 1987)(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. No coal has been mined by the applicant (UMC 786.19(h)).
9. The applicant does not control and has not controlled mining operations with a demonstrated pattern of willful violations of the Act of such nature, duration and with such resulting irreparable damage to the environment as to indicate an intent not to comply with the provisions of the Act (See April 16, 1987 memo from Joe Helfrich) (UMC 786.19(i)). The applicant has not been permitted for underground mining operations to date.
10. Surface reclamation operations to be performed under the permit will not be inconsistent with other mining operations anticipated to be performed in areas adjacent to the proposed permit area (UMC 786.19(j)). Summit Coal Company has received a permit to mine coal on leases to the north of the highway through underground methods.
11. A detailed analysis of the proposed bond had been made. The Division has determined that \$229,000 is adequate to cover the costs which would be incurred by the state if it was required to contract for final reclamation at the mine site. The applicant has posted a collateral bond in the form of property whose value has been appraised to be \$120,300.00. At this time the Division cannot make a finding that an adequate bond amount has been posted.
12. No lands designated as prime farmlands or alluvial valley floors occur on the permit area (RP, part UMC 783.27; TA sections UMC 822, 823)(UMC 786.19(l)).
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 specific conditions have been placed on the proposed postmining land use by the surface landowners (UMC 786.19(m)).
14. The regulatory authority has made all specific approvals required by the Act, and the approved State 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 (RP page 783.20-11, also see TA Section UMC 817.97). The Utah Division of Wildlife Resources has concurred with the Fish and Wildlife Plan (see March 10, 1987 letter attached to TA).

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.

Susan C. Livner
Permit Supervisor

Kenneth E. May
Associate Director, Mining
Division of Oil, Gas and Mining

Samuel P. Brafford
Administrator,
Mineral Resource Development
and Reclamation Program

Dennis R. Nielson
Director,
Division of Oil Gas and Mining

Barbara W. Roberts
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).

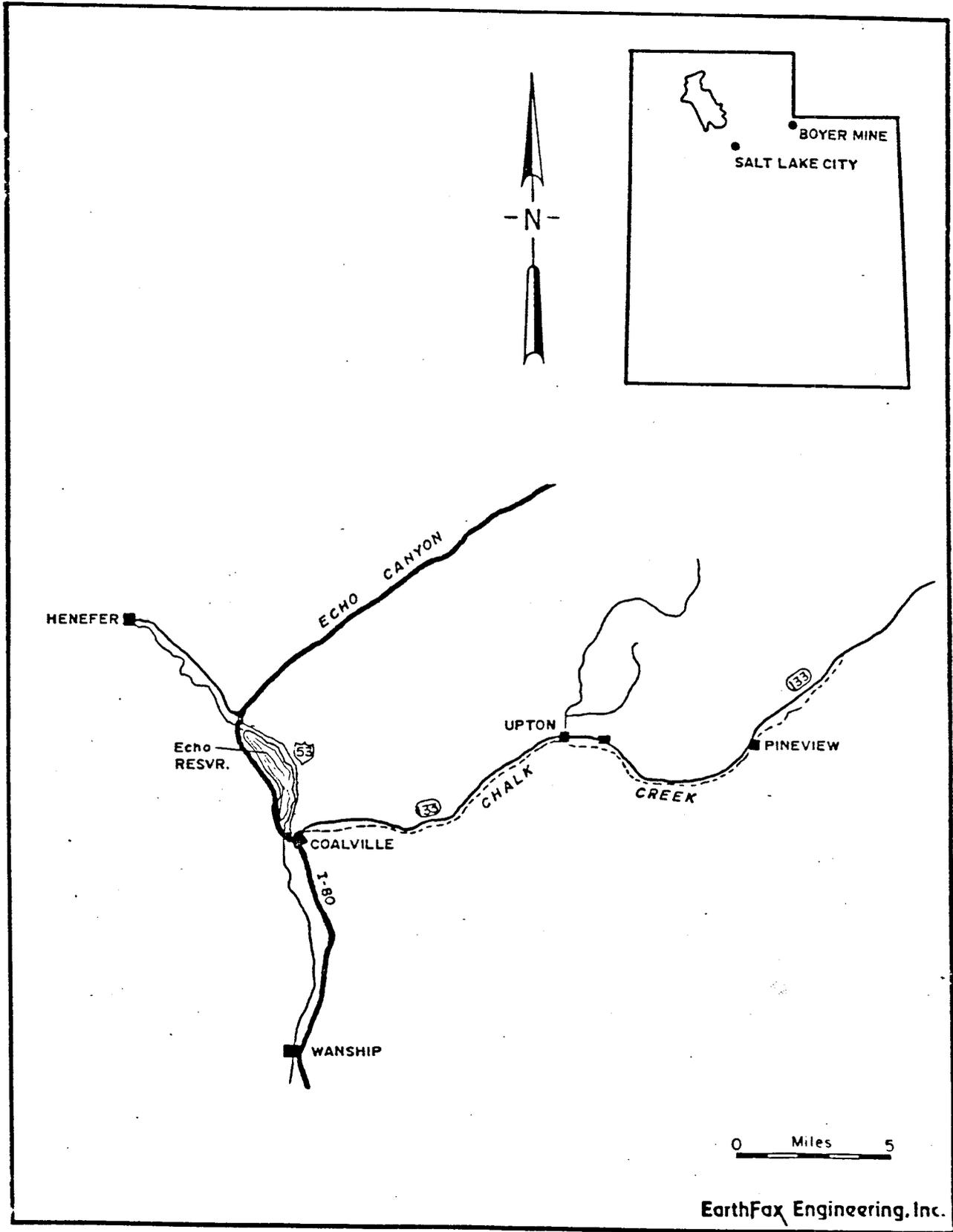


Figure 1. Boyer-Blackhawk CIA vicinity map.

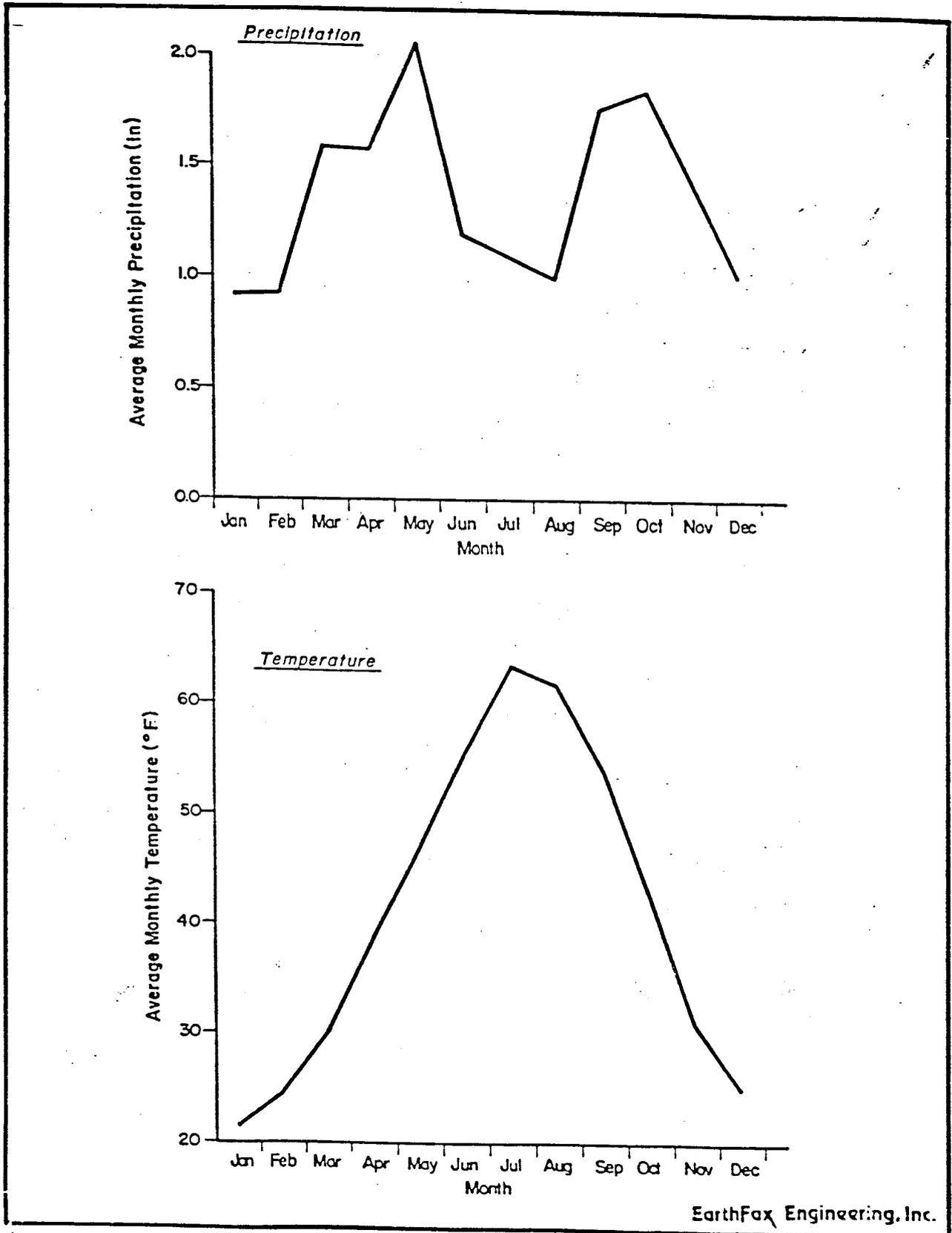


Figure 2. Average monthly precipitation and temperatures at the Coalville weather station.

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.

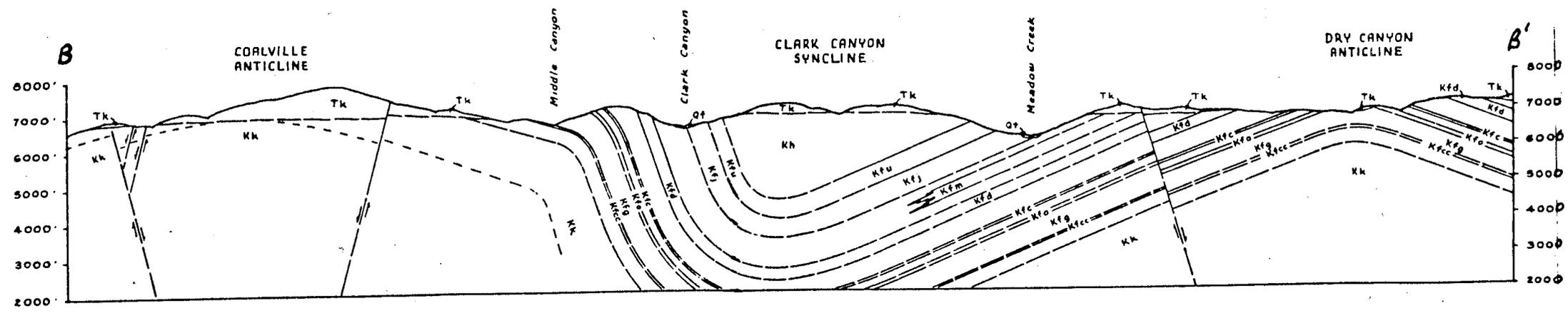
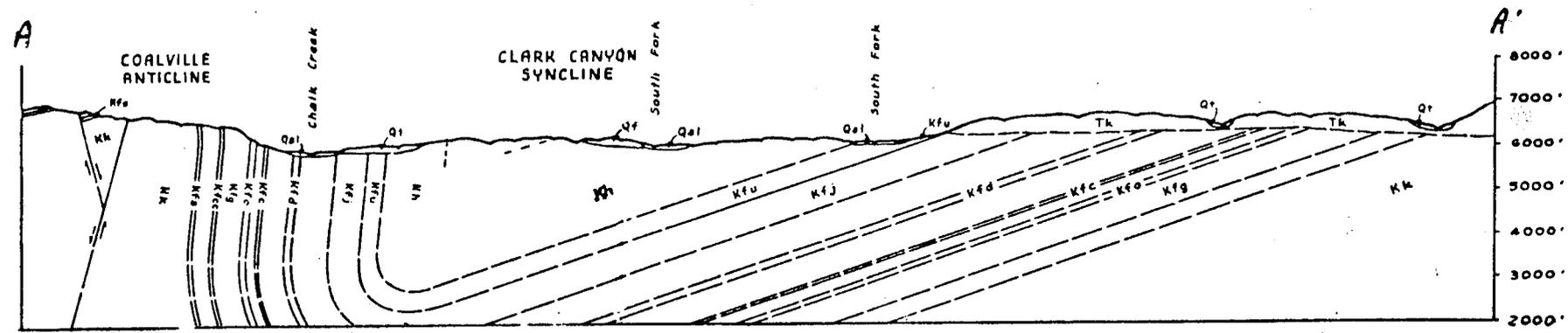


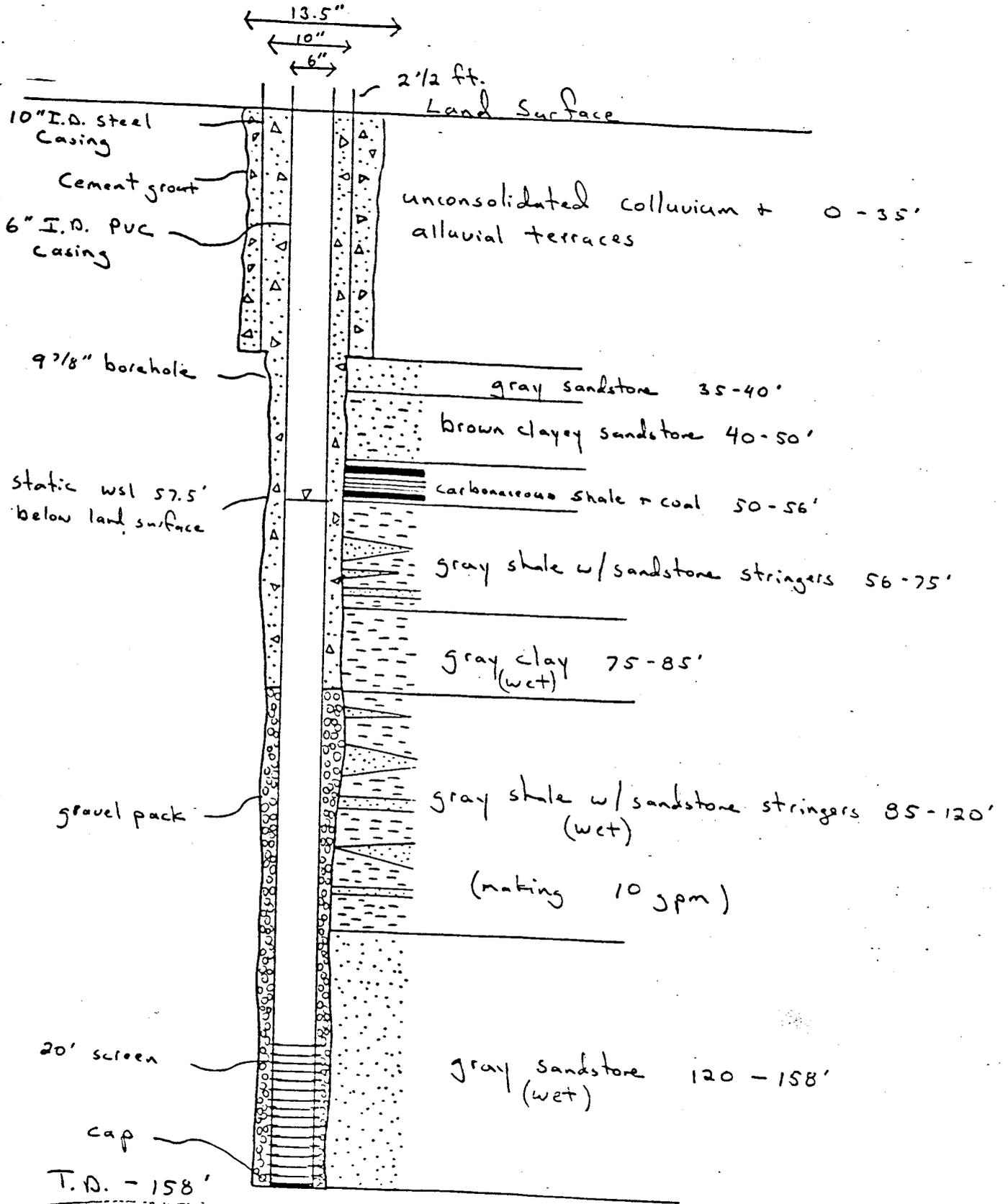
Figure 4. Geologic cross-sections showing structure south and north of CIA.
 (Modified from Trexler, 1966)

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.

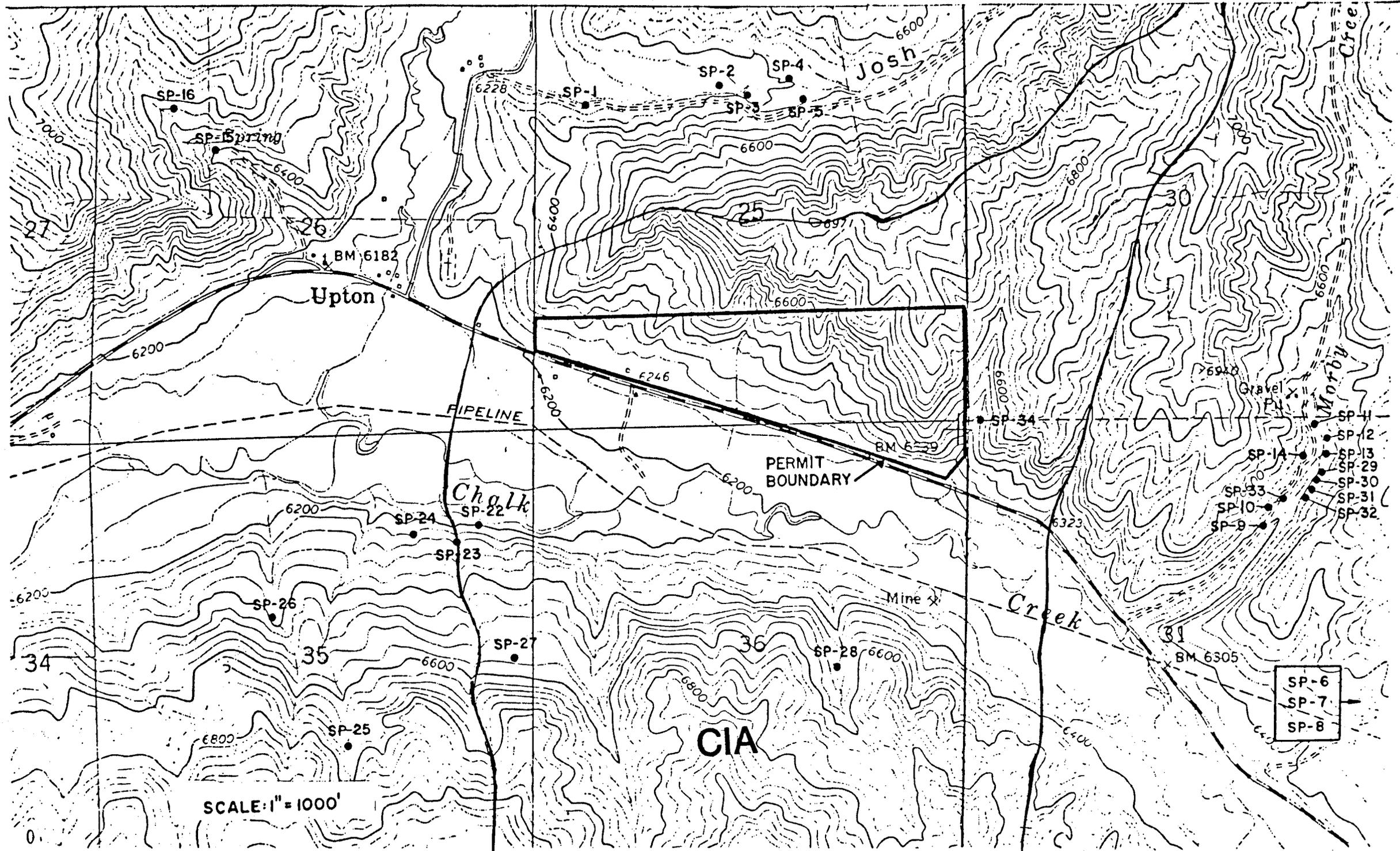


Figure 6. Spring and seep locations on and adjacent to the CIA.

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 (overflow)	7.66	920	8 (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

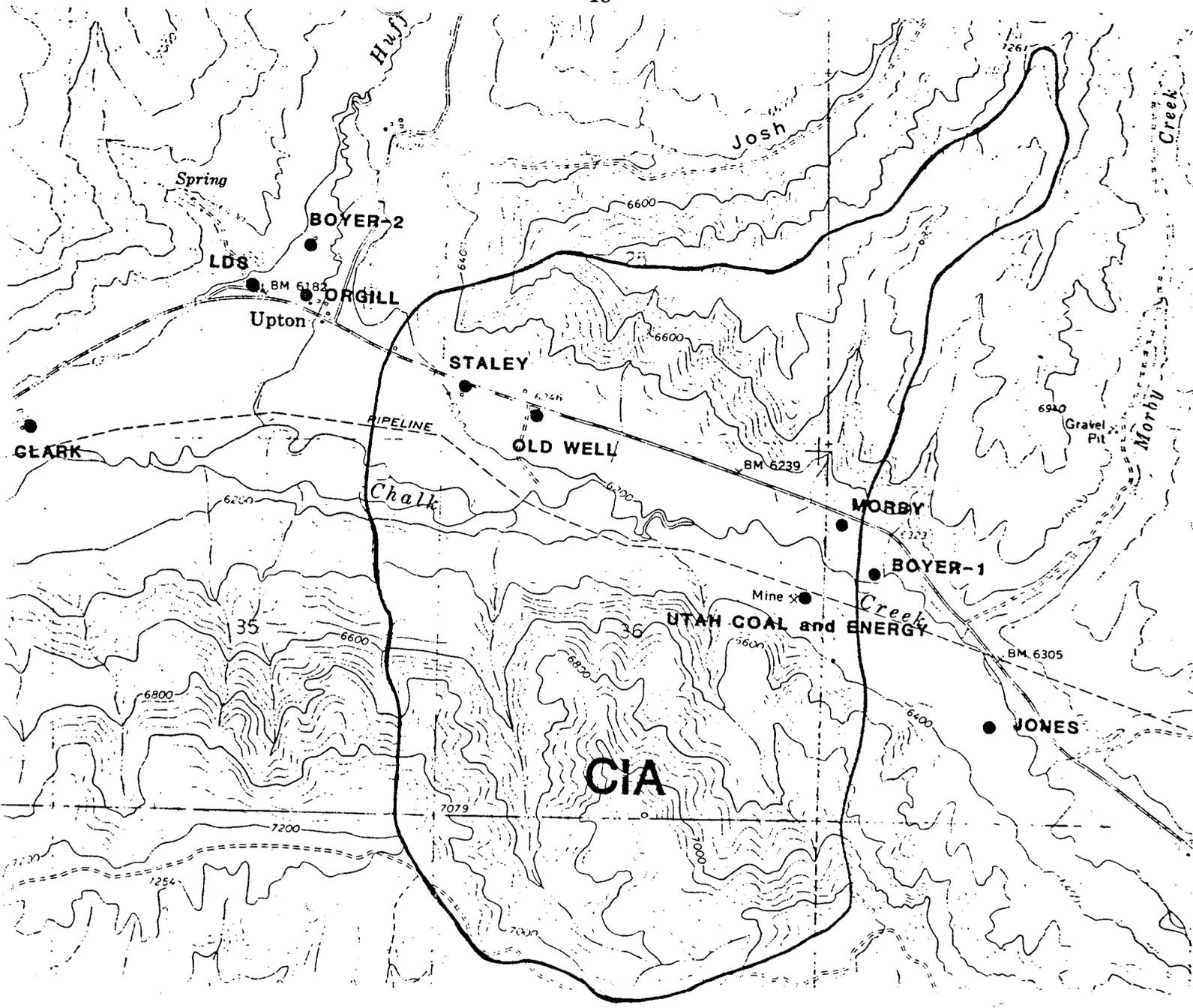


Figure 7. Location of water wells on and adjacent to the CIA.

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 (mi²). 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/mi² 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)

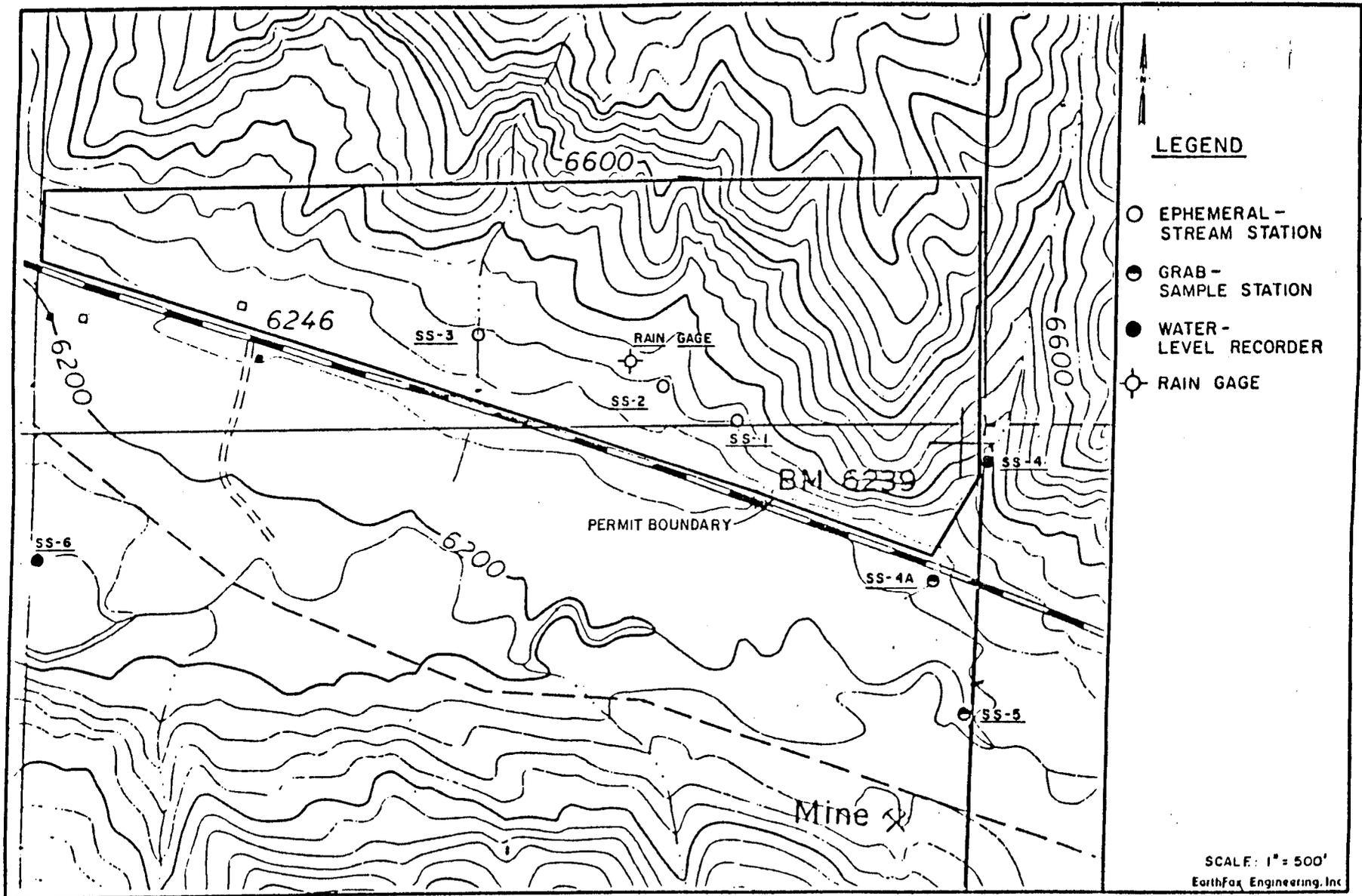


Figure 8. Surface water monitoring locations.

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.

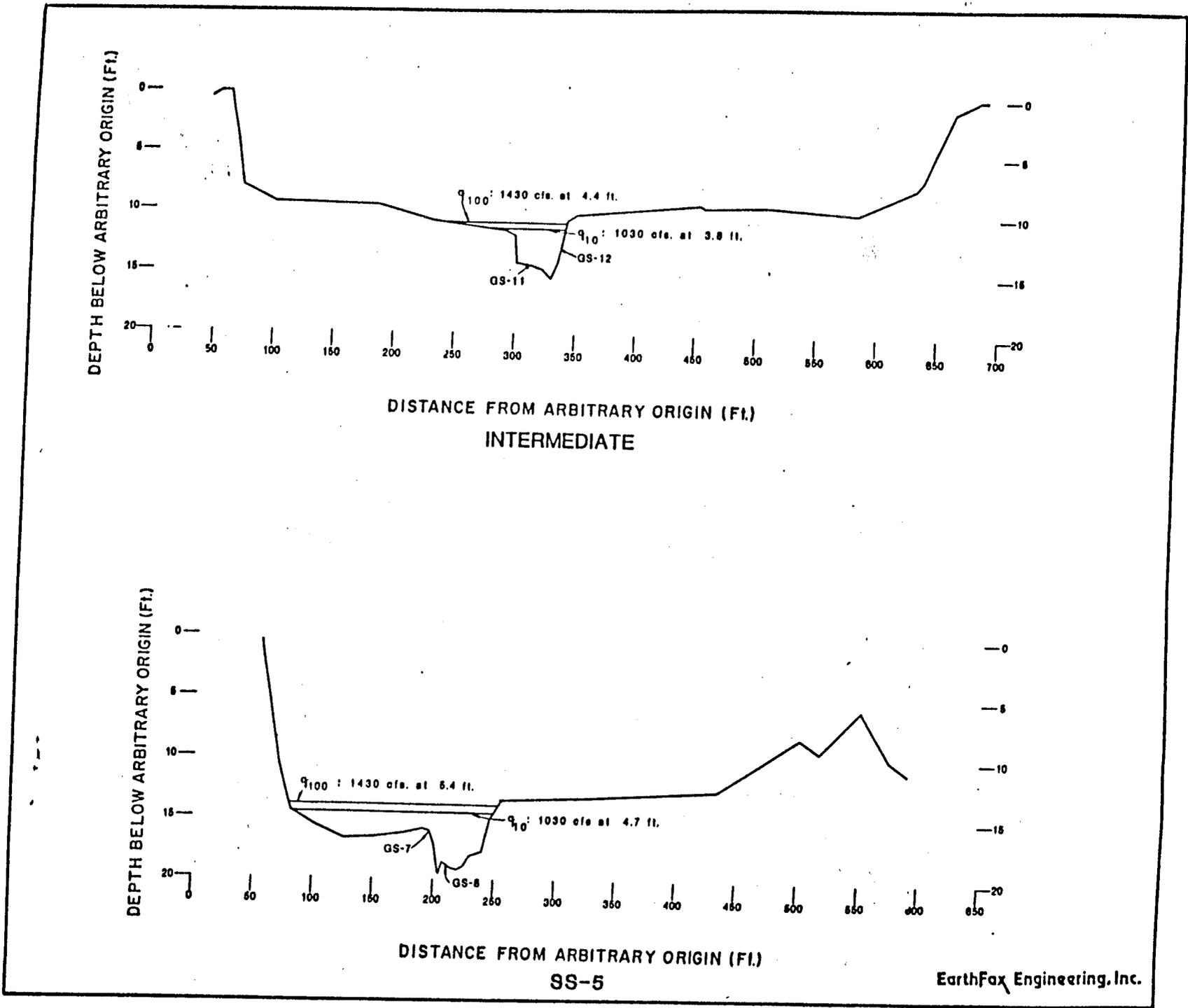
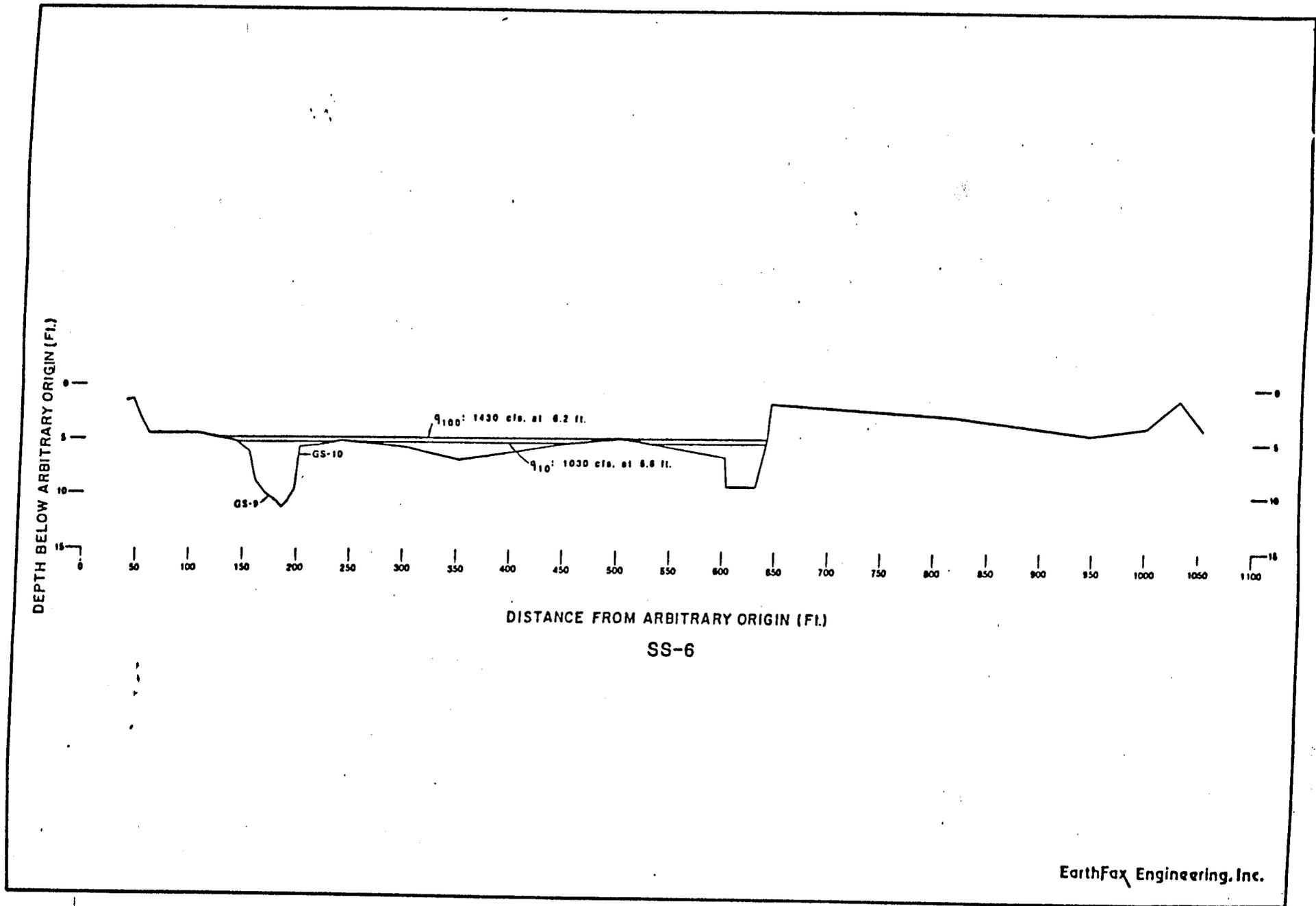
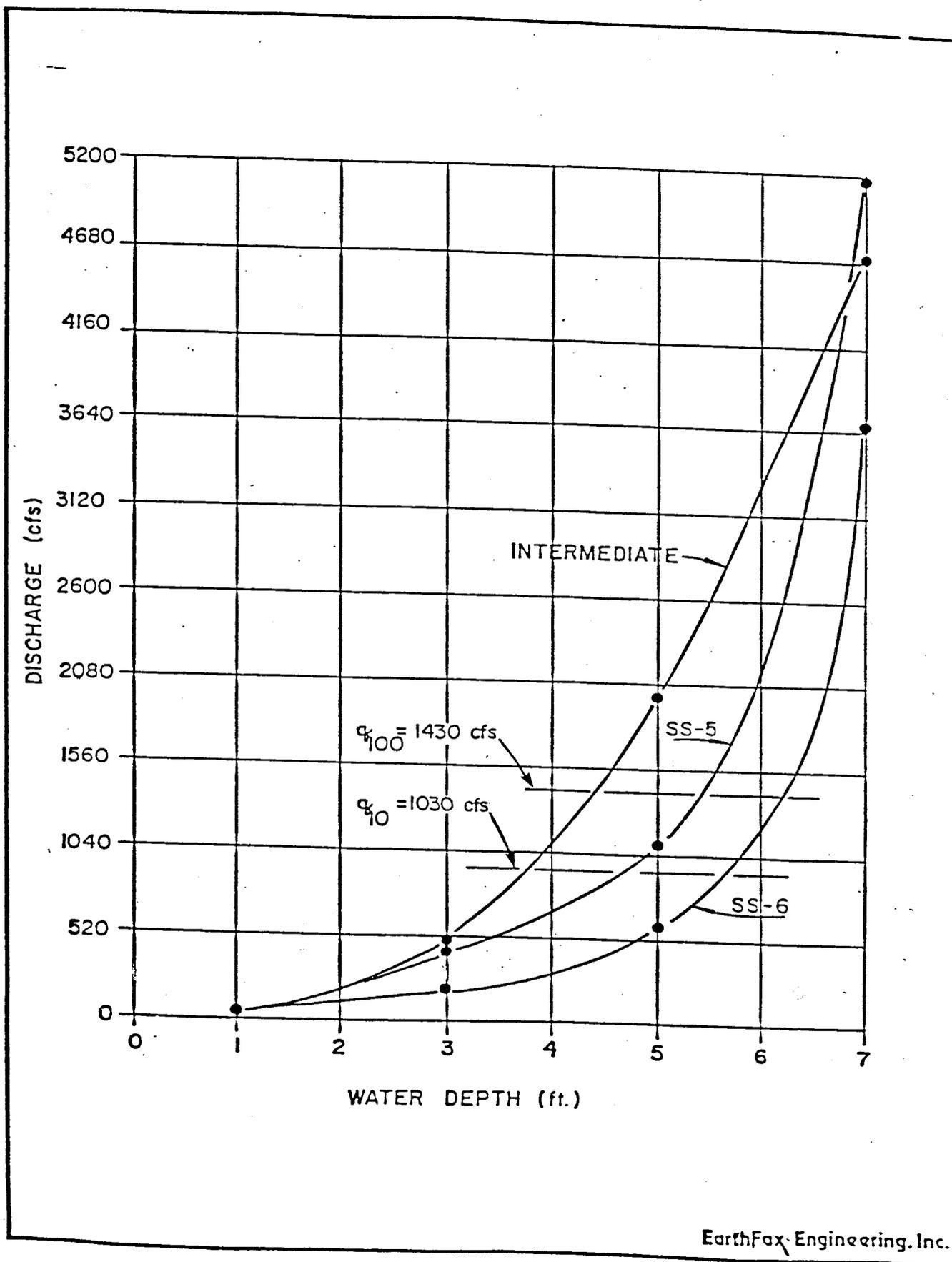


Figure 9. Stream channel cross sections through the Intermediate Station and SS-5 on Chalk Creek.



EarthFax Engineering, Inc.

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



EarthFox 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 characteristical 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 CaCO₃/1000 tons material equivalence. An ABP of less than or equal to -5 tons CaCO₃/1000 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 CaCO_3 /1000 Tons Material equivalence. The underground waste therefore requires 79.6 tons CaCO_3 . The soil has equivalence of 6.60 tons CaCO_3 . Therefore a total of 73.0 tons of CaCO_3 is required for the 1500 cyd (Bulk Density est. at 90 lb/ft³) 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 CaCO_3 with each one foot lift. Based on the estimated average acid production potential and soil neutralization potential, 33 tons of 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 CO₂ 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 CO₂. 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

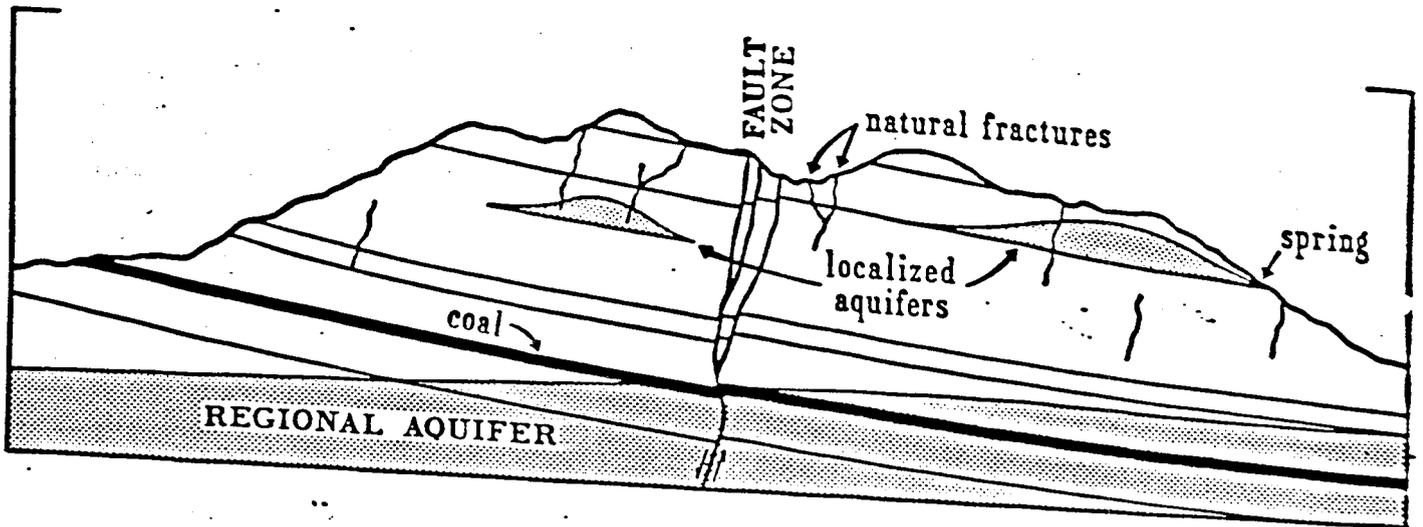
Subsidence impacts are largely related to extension and expansion of the existing fracture system and upward propagation of new fractures (Figure 12). No subsidence has been occurred over the Boyer or Blackhawk mines to date. Overburden thickness ranges from approximately 200 feet to over 1200 feet.

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.

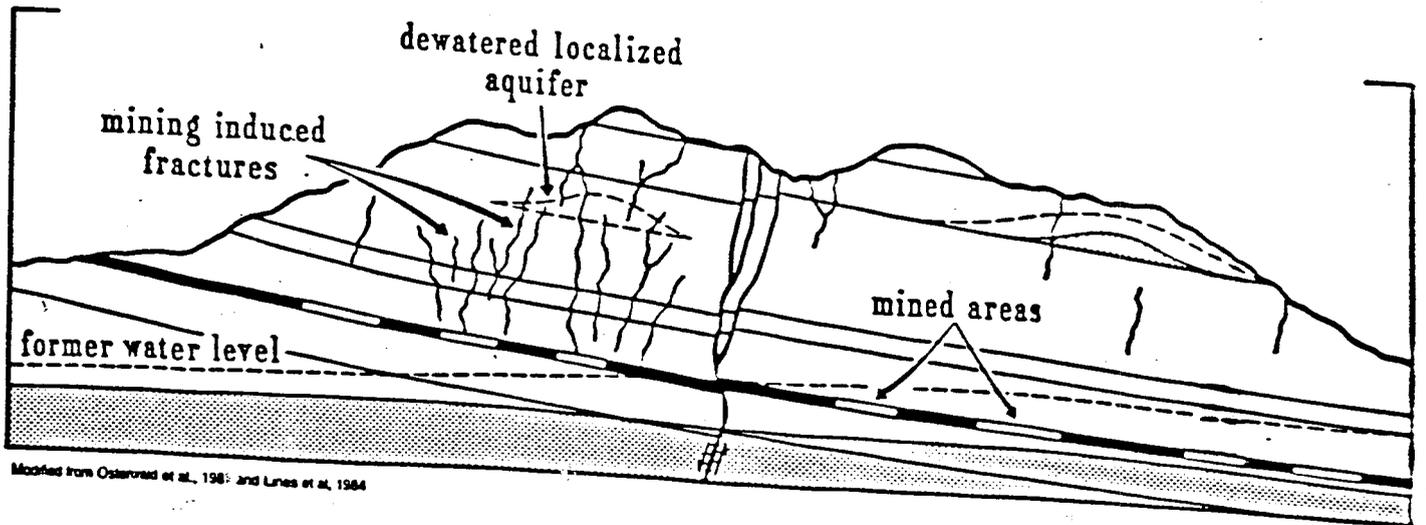
Gradual subsidence is expected over a long term where maximum extraction is planned. The surface land above the mining operation is fee and contains no structures. The lands are presently used for grazing and wildlife habitat. No springs are indicated above the mining operation. No known aquifer exists 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., 1981; 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

STIPULATIONS

Reclamation Plan

Summit Minerals Inc.
Summit Minerals #1(Blackhawk) Mine
PRO/043/001
Summit County, Utah

July 2, 1987

UMC 800. - (1-2) - JRH

1. Prior to permit approval, the operator shall obtain and provide evidence of adequate liability insurance as required under this section.
2. Prior to permit approval, the operator shall provide to the Division, bond in the form and amount as required.

UMC 817.25 - (1) - JSL

1. The in-situ topsoil substitute materials will be fertilized with 30 lbs/ac P₂O₅ at the same time the alfalfa is incorporated into the soil.

UMC 817.42 - (1-2) - RS

1. Prior to beginning any reclamation activities in the affected drainage area, the applicant must construct the sedimentation system as proposed in the RP and commit to the requirements of UMC 817.46.
2. Prior to initiation of regrading activities in the area of the out slopes at the northern boundary of the permit area, the applicant shall install adequate sedimentation control measures (i.e. straw bales and/or silt fencing) between the disturbed area and Chalk Creek. The control measures must be adequately maintained until revegetation success standards are met for these areas.

UMC 817.44 - (1) - RS

1. Within 60 days of permit issuance, the applicant shall contact the Division to arrange for an on site investigation of the drainage to the southwest of Watershed A (depicted on Exhibit 783.16-1).

Following that investigation, the Division will notify the applicant if plans meeting the requirements of UMC 817.44 will be required. If such plans are required, the applicant shall submit a complete and adequate proposal to meet the requirements of UMC 817.44 within 60 days of Division notification.

UMC 817.46 - (1-2) - RS

1. The applicant must submit revised designs for the dewatering structure demonstrating that the elevation of the structure will be located at an elevation greater than the maximum sediment storage elevation (6251.25 ft.). The applicant must submit these complete and adequate revised designs within 30 days of permit issuance.
2. Within 30 days of permit issuance, the applicant must submit revised designs for the sedimentation pond sediment volume and clean out elevation.

UMC 817.49 - (1) - RS

1. Within 30 days of completion of the construction of the sedimentation pond, the permittee shall submit to the Division an inspection report demonstrating compliance with subsection (h) of 817.49

UMC 817.89 - (1) - JRH

1. Within 30 days from the date of approval, the operator shall submit to the Division, plans for the temporary and permanent disposal of non-coal waste materials currently on site or generated during reclamation construction activities.

UMC 817.99 - (1) - JRH

1. Within 30 days from the date of approval of the Reclamation Plan, the operator shall provide and incorporate into the text of the Reclamation Plan a commitment to notify the Division in the event of a slide or other damage as required by this section.

UMC 817.101 - (1-4) - JRH

1. Within 30 days from the date of permit approval, the operator shall provide to the Division, suitable design and stability analysis for the final backfilling and grading to be accomplished along the southeastern portion of the highwall in the region where only unconsolidated materials and gravels exist. Final reclamation design for this area shall include mass balance for earthwork as well as other information regarding reclamation that may be affected as a result of the modifications to the plan.

2. Within 30 days from the date of permit approval, the operator shall provide to the Division, suitable reclamation design for those disturbed areas to the south and above the highwall, including but not limited to, the exploration trench dug above the highwall and the drainage cutoff basin excavated above the highwall and the access road.
3. Within 90 days from the date of permit approval, the operator shall submit to the Division, plans for regrading and recontouring the sediment pond area upon final reclamation in a manner that will allow ingress and egress of livestock to Chalk Creek as part of the post mining land use and in accordance with the easement along the eastern edge of the property line.
4. Within 60 days from the date of permit approval, the operator shall submit to the Division, plans for regrading and re-contouring the outsoles of pad areas on the site in a manner that will blend in with the adjacent contours of the site in order to meet approximate original contour requirements. Slopes shall be regraded to not exceed 2h:1v and shall be rounded in appearance to blend in with the surrounding contours. In particular, the pad encroaching on Chalk Creek shall be regraded in order to conform with this section and with UMC 817.44.

UMC 817.181 - (1) - JRH

1. Without surface owner's consent and Division approval, surface facilities including the buildings, roads, culverts, bridge, etc. cannot remain as part of the post mining land use. Reclamation of the bridge shall be in accordance with UMC 817.44. The Division shall require reclamation of all of these facilities unless landowner consent and landowner assumption of liability for these facilities are made.

TECHNICAL ANALYSIS

Reclamation Plan

Summit Minerals Inc.
Summit Minerals #1(Blackhawk) Mine
PRO/043/001
Summit County, Utah

July 2, 1987

UMC 800. Bonding and Insurance - JRH

Existing Environment and Applicant's Proposal

The operator has submitted a letter from Bennett Insurance indicating that liability insurance can and will be purchased during the term of this permit.

Summit Minerals, Inc. has provided to the Division, bond in the amount of \$120,300 which was approved by the Division on June 4, 1986. The operator has estimated the costs for reclamation to be in the amount of \$99,624.00. The cost estimate for reclamation is found in the Appendix to section 784.13(b)(2) on page 784.13-20 of the Reclamation Plan (RP).

Compliance

The operator is not considered to be in compliance with the requirements of this section in as much as the operator does not have evidence of liability insurance. The operator must obtain liability insurance in order to be in compliance with the requirements of this section.

The bonding estimate found in the Reclamation Plan is complete with respect to the reclamation plans proposed in the plan. Revisions to the reclamation cost estimate shall be required due to changes or conditions to approval of the Reclamation Plan as stipulated in this document. The Division has reviewed the reclamation costs and has adjusted the amount required to incorporate, to a degree, those revisions required by stipulations to the Reclamation Plan approval. Bonding estimate and determination of the bond amount is found attached to this review document.

The operator is not considered to be in compliance with the requirements of this section.

Stipulations

UMC 800. - (1-2) - JRH

1. Prior to permit approval, the operator shall obtain and provide evidence of adequate liability insurance as required under this section.
2. Prior to permit approval, the operator shall provide to the Division, bond in the form and amount as required.

UMC 817.11 Signs and Markers - SCL

Existing Environment and Applicant's Proposal

The applicant has placed signs as required to show property identification, permit area boundaries and stream buffer zones (page 784.11-1).

There is currently no stockpiled topsoil and no need for surface blasting is anticipated.

Signs and markers will remain in place through the bond release period.

Compliance

The Reclamation Plan complies with this section.

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 addressed the requirements of this section starting on page 784.13-3 of the Reclamation Plan. Two portals exist on the site which were closed in the fall of 1984 during cleanup operations onsite. The No. 1 portal was filled with 27 feet of incombustible material in accordance MSHA requirements. The No. 2 portal has been left basically intact and has only been backfilled to the extent so as to prevent access. During reclamation activities, permanent sealing of this portal will be accomplished as per drawing 784.13-1.

As noted on page 784.14-1, relative to the prevailing dip of the coal seam in the abandoned mine workings, the portals are generally up-dip from the workings. There is no visible drainage from the sealed workings.

Compliance

The operator has addressed the requirements of these sections. The mine openings have or will be sealed in accordance with MSHA requirements and the operator has satisfactorily designed the closures to prevent discharge or inflow of water into or from the mine.

Stipulations

None.

UMC 817.21 - .25 Topsoil - JSL

Existing Environment and Applicant's Proposal

The Summit Minerals No. 1 Coal Mine soil resources are discussed in the November 7, 1986 submittal, section 783.21, pages 783.21-1 through 783.21-21. The soil survey was conducted in 1985 by the Soil Conservation Service (SCS) at an order one scale.

The soils at the No. 1 Coal Mine are derived from various parent materials. The soils in the lower valley are primarily glacial outwash and stream derived alluvium. The greater part of the surface disturbance lies in alluvium derived from sandstone, quartzite and shale. The soils at the higher elevations of the surface disturbance merge into residuum and colluvium derived primarily from andersite, sandstone and quartzite.

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 3 to 40 percent with inclusions up to 60 percent. Slopes range from convex to concave with a general north to west facing aspect. The capability subclass ranges from IVE and IVw irrigated to VIIs and VIIe nonirrigated.

Under native vegetation the erosion hazard associated with gentle and steep slopes vary from slight to severe, respectively. The largest portion of these soils are well drained while a small amount is poorly drained. The texture ranges from loam to clay loam and fine sandy loam. Permeability is moderately slow for all soils. The available water capacity ranges from 5 to 12 inches to a depth of 60 inches. Root growth is restricted in the wet soil due to high water table within 10-20 inches from the surface. Mottling, characteristic of high water tables and reductive conditions, is evident within this particular soil profile.

The native soils are medium textured and neutral in pH while the disturbed soils are cobbly, medium textured and alkaline in pH. The SCS indicates that five soil series, a complex of two of the series and two phases of a series exist in or adjacent to the disturbed area. These soils include: 1) Toehead loam, No. 76; 2) Kovich loam, No. 43; 3) Horrocks-Yeates Hollow Complex, No. 41; and, 4) Watkins Ridge loam, No. 82 and No. 83. The respective taxonomic

classifications are: 1) fine-loamy, mixed frigid, Cumulic Haploxerolls; 2) fine-loamy, mixed frigid, Cumulic Haplaquolls; 3) (Horricks) loamy-skeletal, mixed frigid, Typic Argixerolls, (Yeates Hollow) clayey-skeletal, montmorillonitic frigid, Typic Argixerolls; and, 4) fine-loamy, mixed frigid, Typic Calcixerolls.

Soil profile depths generally range from 42 to 60 inches. Topsoil pH ranges from 6.2 to 7.6 while the substratum pH ranges from 6.1 to 8.4. The disturbed soils pH ranges from 7.6 to 8.2. The electroconductivity ranges from 0.2 to 0.7 mmhos/cm. Percentage of rock fragments greater than two mm ranges from 14 percent in the topsoil to 41 percent in the substratum of the native soil material while the disturbed soils range from 34 to 60 percent. See table 783.21-2, page 783.21-14 for further soil analytical detail.

Removal

The surface disturbance occurred prior to the enactment of SMCRA in 1977 (Public Law 95-87). No topsoil was salvaged from the site. Of the 14.41 acres of disturbance, 1.77 acres will be left to support the post mining land use and the remaining 12.64 acres will be reclaimed with in-situ material. The suitability of the in-situ soil material as a substitute topsoil is discussed in section UMC 783.21(b), pages 783.21-11 through 783.21-15, and the soils appendix. Based on the submitted data and specified soil amendments no chemical problems are anticipated. Surface soils contaminated by coal will be scraped off and disposed of in the existing depression delineated on cross-section B-B', plate 784.23-3. The waste material will be buried under four feet of soil.

Compliance

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

Stipulations

None.

Storage

The site was disturbed prior to SMCRA. No topsoil was salvaged. In-situ soil materials will be utilized as substitute topsoil.

Compliance

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

Stipulations

None.

Redistribution

No topsoil was salvaged for final reclamation. The in-situ soil material will be utilized. This material will be ripped to an 18 inch depth and disk harrowed prior to seeding. Final configurations and topography are shown on plates 784.23-1, 784.23-2, and 784.23-3.

Compliance

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

Stipulations

None.

Nutrients and Amendments

The applicant had submitted analyses of both disturbed and undisturbed soil (Table 783.21-2) with a discussion of the amendments and fertilizers within pages 783.21-11 through 783.21-15 and the Soil Appendix. The disturbed soils tend to be low in phosphorus, potassium, and nitrogen and high in pH and percent rock fragments. During field inspection it was evident that the soil materials were also highly compacted. Two tons/acre of alfalfa will be incorporated into the soil to alleviate the compaction and increase the physiochemical characteristics, stability, and microbiological communities of the soil. The incorporated alfalfa will meet the nitrogen fertilizer requirement and maintain a proper C:N ratio within the soil solum.

Compliance

The applicant has not adequately addressed this section. Page one of the Revegetation Plan (Revegetation Appendix) states that no fertilizers or amendments are planned. The soils report conducted by Utah State University Soils Lab indicates that nitrogen and phosphorus should be applied to the substitute material. The Division concurs with this recommendation. The alfalfa amendment will satisfy the nitrogen requirement but will not satisfy the phosphorus requirement.

Stipulation

UMC 817.25 - (1) - JSL

1. The in-situ topsoil substitute materials will be fertilized with 30 lbs/ac P_2O_5 at the same time the alfalfa is incorporated into the soil.

UMC 817.41 Hydrologic Balance: General Requirements - DD/RPS

Existing Environment and Applicant's Proposal

Ground water

The applicant provided a description of the geology and hydrology including ground and surface water quality and quantity on all lands within the reclamation area, the adjacent area and the general area. The "general area", with respect to hydrology, is defined as that area which is a minimum of one mile from the area to be reclaimed and is shown on the Surface Watersheds Map (Plate 783.15-2).

Exploration and research projects in the vicinity of the proposed reclamation area have provided considerable information on the geology of the region. Details on the geology of the reclamation area and adjacent areas are set forth in Section 783.14, Geology Description. Information regarding the hydrology of the reclamation area and adjacent areas is given in Sections 783.15, 783.16, and 783.17.

The surface geology of the area is shown on the surface geology map (p. 783.14-1). This map shows the rock formations, the strike and dip of surface beds, surface traces of known faults and fold axis, location of oil test holes and wells, and oil fields.

Surface Water

The applicant proposes to control surface runoff from disturbed areas by using a combination of diversions, berms, culverts, and a sedimentation pond. At the main mine facility pad area, all undisturbed drainage from Watershed B (refer to Exhibit 783.16-1) will be routed from the disturbed area drainage utilizing the diversion identified as Ditch No. 1 (refer to Plate 784.23-2). All disturbed area drainage (except approved small area exemptions) will report to the sedimentation pond for treatment of the drainage prior to discharge from the site. The pond is adequately sized to contain the runoff expected from the 10 yr - 24 hr precipitation event (1.06 AF) and the design sediment volume (0.80 Acre - feet). Details of the sedimentation pond and diversions are discussed in Sections UMC 817.43, 817.44, and 817.46. Due to geographical constraints (i.e. areas unable to drain to the sedimentation pond or separated from the pond by Chalk Creek), the applicant proposes (p. HE-21) to treat 1.54 acres of disturbed drainage from the access road using alternative sediment treatment structures (straw bales or silt fencing).

Surface water monitoring for the permit area has been initiated to determine 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. Exhibit 783.16-1 depicts the proposed surface monitoring sites to be used to monitor potential impacts to the Chalk Creek system. Baseline water quality data (duration of one year) are included in the application on pages 783.16-3 through 783.16-18. The applicant has committed to continue baseline water monitoring for an additional year. Following completion of the collection of two years of baseline data, the

monitoring schedule will follow the Division's water monitoring guidelines for reclamation period monitoring (p. 784.14-2). To aid in interpretation of the seasonal variations in the water quantity and quality for Chalk Creek, the application contains graphs of the baseline data for the following parameters: flow, total dissolved solids, suspended solids, pH, total iron, and magnesium (Figure 783.16-1, page 783.16-19).

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.

Compliance

The applicant has provided sufficient information for conducting reclamation activities. Geologic and ground water information pertaining to the area surrounding the minesite has been submitted in the reclamation plans on pages 783.13-1 through 783.18-8.

The operator has proposed designs utilizing the 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 Division's Technical Analysis. The applicant's proposals will meet the general requirements for this section when the stipulations in the following sections are met.

Stipulation

None.

UMC 817.42 Hydrologic Balance: Water Quality Standards And Effluent Limitations - RPS/DD

Existing Environment and Applicant's Proposal

The applicant proposes to route all disturbed area drainage from the main mine facilities pad to a sedimentation pond (12.63 acres) for treatment prior to discharge off the permit area. Access road drainage (1.54 Acres) will be treated using straw bales or silt fencing. 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. 784.16-3 and p. RP-5 of the RP). The applicant proposes to add sampling stations to the monitoring schedule during the post-reclamation 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. 784.16-3). Single-stage samplers will be installed at each of the diversion outlets discharging into the pond (Plate 784.23-2 and p. 784.14-3) to demonstrate compliance with UMC 817.46 (u).

The applicant proposes to utilize the option presented under subsection (a)(3) of this regulation for the access road drainage. This regulation

essentially gives authority to the Division 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:

Area 1. The disturbed area for the access road north of Chalk Creek (refer to Plate 784.23-2).

Area 2. The access road area south of Chalk Creek (refer to Plate 784.23-2).

Area 3. The existing sedimentation pond area located in the flood plain of Chalk Creek.

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. The applicant proposes straw bales or silt fencing as the alternative sediment control measure for Areas 1 and 2 (refer to plate 783.24-2 for locations) and has committed to sample the discharge to demonstrate the drainage will meet effluent limitations (p. HE-21 and p. 784.14-2). The proposed series of straw bales will reduce the expected velocities (and consequentially sediment production) and treat discharge from these disturbed areas. Area 3 is scheduled for immediate reclamation and best management practices including regrading, mulching, and revegetation which will insure sediment contributions to Chalk Creek will be minimized.

The applicant has presented the runoff expected from the 10 yr - 24 hr precipitation event for Areas 1 and 2. Table A summarizes the results and the Division's Technical Analysis:

TABLE A
SMALL AREA EXEMPTIONS
EXPECTED RUNOFF

<u>Characteristic</u>	<u>DOGM</u>	<u>SUMMIT</u>
Drainage area	1.07 Ac	1.54 Ac
Curve number	90	90
Precipitation (10 yr -24 hr)	1.90 in.	1.90 in.
Runoff volume (10 yr - 24 hr)	0.09 AF	0.13 AF

The applicant supplied data and information that describes the ground water quality. Samples were collected from four wells adjacent to the property. No wells or spring occur on the permit area. No water was contacted in the mine workings.

Compliance

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 applicant has not committed to construction of the sedimentation system at the site prior to initiation of construction/reclamation activities. The reclamation timetable (p. RP-5) depicts backfilling and grading operations as occurring concurrently with the sedimentation pond excavation. This is not in compliance with the aforementioned regulation. Therefore, stipulation 817.42 - (1) - RS is necessary in order to insure compliance with this section.

The applicant has not proposed any sedimentation control for outslope areas of the pad that are to be regraded. Of specific concern is the outslope at the north end of the permit area (i.e. the outslope identified between X and E on Plate 784.23-2) that encroaches on the stream buffer zone for Chalk Creek. Stipulation UMC 817.42 - (2) - RS will insure applicant compliance with this regulation.

Stipulations

UMC 817.42- (1-2) - RS

1. Prior to beginning any reclamation activities in the affected drainage area, the applicant must construct the sedimentation system as proposed in the RP and commit to the requirements of UMC 817.46.
2. Prior to initiation of regrading activities in the area of the out slopes at the northern boundary of the permit area, the applicant shall install adequate sedimentation control measures (i.e. straw bales and/or silt fencing) between the disturbed area and Chalk Creek. The control measures must be adequately maintained until revegetation success standards are met for these areas.

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 single temporary diversion to divert the undisturbed (areas not affected by mining operations) drainage from the disturbed area and a mine yard drainage system (three diversions) which collects surface flow from the disturbed area and one undisturbed watershed and routes it to the sedimentation pond. This system is best depicted on Plate 783.24-2. Predicted peak flow values for each structure were analyzed utilizing the SCS Curve Number methodology (NEH-4, SCS, 1974). The results of this analysis are summarized in Tables B and C. Details of the Technical Analysis and assumptions are located in the Appendix of this document.

Table B
WATERSHED CHARACTERISTICS

DIVERSION	AREA (ac)		SLOPE %		HYDR LENGTH (ft)		CONC TIME (hr)	
	DOGM	SUMMIT	DOGM	SUMMIT	DOGM	SUMMIT	DOGM	SUMMIT
Ditch #1	10.85	10.75	43.0	45.3	1783	1726	0.18	0.17
Ditch #2	9.62	9.77	5.4	5.4	1185	1306	0.18	0.18
Ditch #3 ¹	1.06	****	7.0	****	450	****	0.07	****
Ditch #4	8.57	8.52	61.0	61.0	985	960	0.07	0.07

1) Ditch #3 area is a sub-watershed of Ditch #2
**** Not given in RP

Table C
PEAK DISCHARGE
(cfs)

DESIGN STORM	DITCH #1		DITCH #2		DITCH #3		DITCH #4	
	DOGM	SUMMIT	DOGM	SUMMIT	DOGM	SUMMIT	DOGM	SUMMIT
10-24	1.08	1.10	9.41	9.59	1.09	1.03	3.40	3.38
25-24	3.12	3.13	13.06	13.31	1.50	****	5.86	5.85

**** Not given in RP

These tables indicate that the applicant's proposed peak flow values are acceptable. Velocities and proposed channel protection measures are acceptable with the exception of three minor areas where calculations result in velocities less than 2.9 fps (Table D). Riprap sizes for these velocities are less than 2 inches and therefore, the Division feels channel linings are not warranted.

Table D
DIVERSION DESIGN

Diversion	Qp (cfs)	S	n	Side Slope (v/h)	b (ft)	d (ft)	v (ft/s)	Dmax (in)
<u>DOGM</u>								
<u>Ditch #1</u>								
Upper	1.08	0.22	0.033	0.5	1	0.15	5.24	4.0
Middle	1.08	0.07	0.029	0.5	1	0.20	3.72	2.0
Lower	1.08	0.01	0.025	0.5	1	0.29	2.33	0.75
<u>Ditch #2</u>								
	9.41	0.02	0.031	0.5	2	0.74	3.66	1.75
<u>Ditch #3</u>								
	1.09	0.02	0.025	0.5	1	0.27	2.50	1.0
<u>Ditch #4</u>								
Upper	3.40	0.13	0.034	0.5	1	0.34	5.88	5.0
Middle	3.40	0.01	0.027	0.5	1	0.55	2.92	1.25
Lower	3.40	0.12	0.034	0.5	1	0.35	5.66	5.0
<u>SUMMIT</u>								
<u>Ditch #1</u>								
Upper	1.10	0.22	0.039	0.5	1	0.17	5.22	4.0
Middle	1.10	0.07	0.029	0.5	1	0.22	3.75	2.0
Lower	1.10	0.01	0.025	0.5	1	0.31	2.36	----
<u>Ditch #2</u>								
	9.59	0.02	0.031	0.5	2	0.76	3.64	3.0
<u>Ditch #3</u>								
	1.03	0.02	0.025	0.5	1	0.28	2.48	----
<u>Ditch #4</u>								
Upper	3.38	0.13	0.034	0.5	1	0.34	5.88	5.0
Middle	3.38	0.01	0.025	0.5	1	0.54	3.11	----
Lower	3.38	0.12	0.034	0.5	1	0.35	5.67	5.0

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 at this stage. Ditches no. 1, 3, and 4 are trapezoidal with 1 ft. bottom width and 1 ft. depth. Ditch no. 2 has a 2 ft. bottom width and is 1 1/2 ft. in depth. Table D summarizes the results of the diversion analysis. The Appendix of this report contains the nomograph verifying the culvert capacity. Calculations demonstrate that all diversions and the culvert proposed in the RP are sufficiently designed with respect to capacity. The diversions are all designed to allow for adequate freeboard (0.3 ft.).

Third stage analysis consisted of verifying the calculation of maximum expected velocity (or exit velocity for the culvert) which occurs at maximum slope for the diversion. The culvert was assumed to behave as an open channel at the design flow (10 yr - 24 hr) due to an HW/D value less than 1.0. Table D summarizes the results of this analysis. This table demonstrates that the applicant has proposed adequate channel stabilization measures appropriate for the site conditions. The applicant proposes no diversions designed to divert water into an underground mine.

Compliance

The applicant has proposed adequate channel stabilization measures for all diversions on the reclamation site. Some sections of the diversions were shown to have velocities that were less than 3 fps and no channel linings were proposed. It is the Division's opinion that these sections are insignificant and the inherent error used in the review methodology warrant approval of the proposal.

Stipulations

None.

UMC 817.44 Hydrologic Balance: Stream Channel Diversions - RPS

Existing Environment and Applicant's Proposal

The application does not propose nor does the current disturbed area divert any perennial or intermittent streams. The ephemeral drainage to the southwest of Watershed A (refer to Exhibit 783.16-1) which is located adjacent to the disturbed area appears to bypass the disturbed area. However, the complexity of the drainage and the scale of Exhibit 783.16-1 prevent a conclusive determination of the drainage pattern for this watershed. Determination of this can only be made following a site investigation of the drainage. The Division hydrologist will accompany company officials on this investigation. The Division's intent is to insure that this undisturbed ephemeral drainage will not be routed to and across the proposed backfilling.

Compliance

Following the aforementioned site investigation, the Division will determine if designs for routing undisturbed drainage away from the reclaimed site will be necessary. Therefore, stipulation UMC 817.44 - (1) - RS will be required in order to insure compliance with this regulation.

Stipulation

UMC 817.44 - (1) - RS

1. Within 60 days of permit issuance, the applicant shall contact the Division to arrange for an on site investigation of the drainage to the southwest of Watershed A (depicted on Exhibit 783.16-1). Following that investigation, the Division will notify the applicant if plans meeting the requirements of UMC 817.44 will be required. If such plans are required, the applicant shall submit a complete and adequate proposal to meet the requirements of UMC 817.44 within 60 days of Division notification.

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 a sedimentation pond system, berms, diversions, and straw bales. Erosion of diversions and exit points of culverts will be minimized as adequate riprap protection has been proposed (refer to UMC 817.43 section of this document). Disturbed area drainage that is unable to report to the sedimentation pond due to geographical constraints will be treated using treatment structures (straw bales or silt fencing) 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

Existing Environment and Applicant's Proposal

The proposed sedimentation pond at the Summit Minerals #1 (Blackhawk) Mine is an incised (excavated) type basin with a capacity of 1.87 AF at the elevation of the primary spillway (6255 ft.). The spillway system consists of a drop inlet type primary spillway (morning glory) and an open channel emergency spillway. The pond is located adjacent to the mine facilities and is as near as possible to the disturbed area. A sedimentation pond currently exists at the site which is scheduled for immediate reclamation. The existing pond is located within the flood plain and buffer zone for Chalk Creek and does not currently meet the specifications of UMC 817.46. The requirements of UMC 817.46 (a) specify that the sedimentation pond is to be located out of perennial streams and as near as possible to the disturbed area. Reclamation of the existing pond and construction of the proposed sedimentation pond will insure compliance with this regulation. The proposed sediment pond design is presented in the Hydrology Appendix (pps. HE-1 through HE-11) of the RP. This information and plates 784.23-2 and 783.16-1 can assist the reader with interpretation of the following discussion.

Drainage from 12.63 Acres of disturbed area and 5.42 Acres of undisturbed area is routed to the pond for treatment prior to discharge off the permit

area. A mine yard drainage system collects the drainage via three diversions and a single 12 inch culvert and routes the flow to the sedimentation pond for treatment. This system collects overland flow, controls the flow with stable (riprapped) channels and minimizes erosion and sediment production from the disturbed area.

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). Drainage area for the disturbed area was digitized, a representative curve number was selected and appropriate rainfall depths were selected for the storms. Table E summarizes the watershed characteristics used for determining the expected runoff volumes.

TABLE E
RUNOFF PARAMETERS

	<u>DOGM</u>		<u>SUMMIT</u>
Watershed A + C'			
	AREA (AC)	8.57	8.52
	Precipitation (in)		
	10 yr-24 hr	1.90	1.90
	25 yr-24 hr	2.38	2.38
	CN	76	76
Watershed C			
	AREA (AC)	9.62	9.77
	Precipitation (in)		
	10 yr-24 hr	1.90	1.90
	25 yr-24 hr	2.38	2.38
	CN	90	90

The SCS curve number methodology was used to determine the expected runoff volumes for the design precipitation events. The results of those calculations are presented in the Table F.

TABLE F
RUNOFF RESULTS
Ac - Ft

	<u>DOGM</u>	<u>SUMMIT</u>
10 yr - 24 hr	1.06	1.08
25 yr - 24 hr	1.58	***

***Not presented in RP

These two tables show that the applicant's calculated expected runoff volumes are acceptable.

Phase two of the analysis was to determine the appropriate design volume for accumulated sediment from the disturbed area. The Universal Soil Loss Equation (USLE) was used in the analysis. Details of the Division's technical analysis are included in the Appendix of this document. Tables G and H summarize the results of the technical analysis and the values proposed by the applicant.

TABLE G
USLE PARAMETERS

<u>PARAMETER</u>	<u>DOGM</u>	<u>SUMMIT</u>
WATERSHED A (undisturbed)		
AREA (Ac)	5.56	5.42
R	20	20
K	0.25	0.15
LS	64.67	63.5
CP	0.01	0.004
WATERSHED C and C' (disturbed)		
AREA (Ac)	12.63	12.87
R	20	20
K	0.25	0.20
LS	9.2	9.0
CP	0.9	1.0

TABLE H
NET EROSION

VOLUME	DOGM	SUMMIT
CUBIC FEET	34660	28047
ACRE-FEET	0.80	0.64

The discrepancies in this analysis essentially result in a larger predicted sediment volume than those proposed in the RP. Using the Division's values, the sedimentation pond is still in compliance with the runoff and sediment storage requirements of this regulation. The stage - volume curve calculated by the Division demonstrates that the pond is adequately sized to contain the larger sediment yield (0.80 AF).

Based upon plate 784.23-2, the regulatory authority calculated a stage-volume curve for the proposed pond. The curve is presented in the Appendix of this document and demonstrates that the pond is sufficiently designed with respect to ability to contain the runoff volume and required sediment volume for the drainage reporting to the pond. The applicant's values differed less than 10 percent from the Division's calculated values and therefore are acceptable. The applicant presented a calculated pond volume of 1.80 AF, while the Division's technical analysis demonstrated the volume to be 1.87 AF. The volume of the pond is sufficient to contain the expected runoff from a 10 yr - 24 hr precipitation event and the design sediment volume at an elevation lower than the primary spillway.

The dewatering system for the pond consists of a two inch nipple welded to the 24 inch standpipe for the drop inlet primary spillway. A 2 inch gate valve will be used to control the proposed manual dewatering of the pond (p. HE-8). The elevation of the dewatering device is 6249 ft. (p. HE-24) which is above the sediment clean out level. However, subsection (d) of this regulation requires that the dewatering device be located above the elevation of maximum sediment storage. The Division's technical analysis demonstrates this elevation to be 6251.25 feet. Stipulation UMC 817.46 - (1) - RS will be necessary to insure compliance with this regulation. The applicant states that manual dewatering of the pond will only be performed following a minimum of 24 hours detention time for all precipitation events (page 784.14-2).

The applicant has proposed a visual sediment marker in the pond and commits to clean out of the pond when sediments accumulate to 60 percent of the design volume. Discrepancies in the calculation of the predicted sediment volume (see above) require that the proposed clean out elevation be revised. The Division's technical analysis resulted in a sediment volume (3 year) of 0.80 AF. Sixty percent of that value is 0.48 AF which corresponds to an elevation of 6249.5 ft. in the sediment pond. The RP states that the value for sediment clean out is 0.39 AF which will occur at an elevation of 6248.7 feet (p. HE-7). Stipulation UMC 817.46 - (2) - RS will insure compliance with this regulation.

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 0.25 feet. The resulting stage - discharge curve is presented in the Appendix of this document. From this curve we can conclude that the primary spillway is sufficiently designed to pass the 10 yr - 24 hr peak flow event. The primary spillway has the capacity to discharge the 10 yr - 24 hr event (12.75 cfs) at an elevation of 6255.75 ft. which is 0.25 ft. below the elevation of the emergency spillway. The primary spillway has a discharge capacity of 16.8 cfs at the elevation of the crest of the emergency spillway (6256.0 ft.). Results of the peak flow evaluations can be found in the discussion of UMC 817.43.

The emergency spillway was technically reviewed to verify the capacity (in conjunction with the primary spillway) to discharge safely the 25 yr - 24 hr precipitation event. The capacity of the primary spillway is 16.8 cfs, therefore the emergency spillway must be designed to handle the excess 2.12 cfs of the 18.92 cfs for the 25 yr - 24 hr peak flow event. The applicant designed the flow capacity for the emergency spillway across the crest using a 6% slope. Plate 784.23-2 is of inadequate scale to verify this value (i.e. 2 ft. contour intervals), but the Division will accept the commitment to construct the spillway at this slope. The spillway is designed with a 1.5 ft. depth (i.e. crest elevation of 6257.5 ft. and the crest elevation of the spillway is 6256.0 ft.) which will pass the design flow with adequate freeboard (1.26 ft.). The applicant has proposed an energy dissipator designed correctly to dissipate the flow for a 25 yr - 24 hr precipitation event from the primary and emergency spillway. The dissipator consists of a rock apron 30 ft. in length, 13.5 ft. in width, with D50 riprap of 4 inches (P. HE-22).

The crest of the emergency spillway is 1.0 ft. above the crest of the primary spillway (p. HE-7 and 9). The design flow depth of the emergency spillway (25 yr - 24 hr) is 0.24 feet. The elevation of the crest of the sediment pond is 1.26 ft. above the elevation of the water surface with the emergency spillway flowing at that depth. The top width of 15 ft. meets the criteria of $(H + 35)/5$ where H = height of the embankment (11.5 ft.). The applicant has committed to the requirements of UMC 817.46 (r) relative to inspection and certification of the pond following construction by a registered professional engineer (p. 784.16-3).

The applicant has committed to inspection of the pond on a quarterly basis and has provided a sample inspection form to be used (p. 784.16-3 and Figure 784.16-3). The applicant has committed to leave the sedimentation pond and all associated diversions at the site until the requirements of 817.46 (u) are met (p. 784.16-3).

Compliance

Upon successful completion of the following stipulations, the applicant will be in compliance with this regulation.

Stipulation

UMC UMC 817. 46 - (1-2) - RS

1. The applicant must submit revised designs for the dewatering structure demonstrating that the elevation of the structure will be

located at an elevation greater than the maximum sediment storage elevation (6251.25 ft.). The applicant must submit these complete and adequate revised designs within 30 days of permit issuance.

2. Within 30 days of permit issuance, the applicant must submit revised designs for the sedimentation pond sediment volume and clean out elevation.

UMC 817.47 Hydrologic Balance: Discharge Structures - RPS

Existing Environment and Applicant's Proposal

The applicant has proposed to install energy dissipators for diversions 2, 3 and 4 at the outlet to the sedimentation pond (pps. HE-14 and HE-16). An adequate energy dissipator has been designed and proposed for the primary and emergency spillway (p. HE -21).

Compliance

The proposal is in compliance with this regulation.

Stipulation

None.

UMC 817.48 Hydrologic Balance: Acid-Forming and Toxic-Forming Materials - JSL

Existing Environment and Applicant's Proposal

The applicant has submitted analytical results of the coal waste material from the tipple area (table 783.21-3). The limited data does not indicate that the material will be detrimental to vegetation or adversely affect water quality. The material will be buried under four feet of soil material.

Compliance

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

Stipulation

None.

UMC 817.49 Hydrologic Balance: Permanent And Temporary Impoundments - RPS

Existing Environment and Applicant's Proposal

There are no permanent ponds or embankments proposed for the site. Interior sideslopes for the proposed sedimentation pond are 2:1 or less. Runoff from diversions 2, 3 and 4 will enter the sedimentation pond. Subsection (c) of this regulation requires that the side slopes of the impoundment be protected against erosion at these discharge points. Page HE-14 and HE-16 of the RP proposes riprap to be placed at these discharge

points as necessary to minimize erosion. The applicant is in compliance with subsection (c) of this regulation. The applicant has committed to removal of the sedimentation pond (p. 784.16-3 and p. RP-5 of the RP). The applicant has not committed to submit the inspection report required by 817.49 (h).

Compliance

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

Stipulation

UMC 817.49 - (1) - RS

1. Within 30 days of completion of the construction of the sedimentation pond, the permittee shall submit to the Division an inspection report demonstrating compliance with subsection (h) of 817.49

UMC 817.50 Underground Mine Entry and Access Discharge - DD

Proposal

Ground water has not been encountered during exploration of the coal deposits in and around the Summit Minerals reclamation area. Mining in the Black Hawk coal mine has no record of producing water which caused any problems. (P. 783.14 - .15).

Compliance

It is most likely that significant amounts of ground water will not discharge from mine portals P #1 and P #2 (Plate 783.14-4). A total of 570 feet of mine workings are part of the reclamation plan. The workings drift only 220 feet into the mountain side. No water was contacted in the mine and the areas above the mine workings are not considered a significant recharge zone.

Stipulation

None.

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

Existing Environment and Applicant's Proposal

The applicant has conducted surveys to identify water resources, collected and submitted baseline ground and surface water information and data 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 fills the valley of Chalk Creek adjacent to the reclamation permit area. While drilling a monitoring well at the Boyer Mine site (north of the Summit Minerals permit area), a confined aquifer was found to exist in a gravel bed about 100 feet below the Wasatch coal seam.

The alluvium of Chalk Creek 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 exist in the vicinity which withdraw water from the alluvial aquifer and at low rates (approximately 2-10 gpm).

Pump tests were conducted on two wells in the vicinity of the mine (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 Boyer Mine well (April 21, 1987 by EarthFax Engineering, Inc.) of the Mining And Reclamation Plan, Summit Coal Co., Boyer Mine, ACT/043/008. Water quality and quantity from a few wells is available.

Surveys have been conducted 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 seeps and springs found during this survey were located on the north side of Chalk Creek in the vicinity of the Boyer Mine permit area. 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, Mining And Reclamation Plan, Summit Coal Co., Boyer Mine, ACT/043/008, DOGM offices).

Major chemical concentrations in the groundwater contained in bedrock near Chalk Creek consist of sodium (Na), calcium (Ca) and bicarbonate (HCO_3^-). Closer to the ridges on either side of Chalk Creek groundwater contains higher concentrations of calcium, magnesium and chloride.

The reclamation plan and practices that the applicant has proposed preclude any potential impact to the ground water system in the permit and adjacent areas. The reclamation activities will essentially consist of surface disturbances (backfilling, regrading, and revegetation) with no required disposal or burial of toxic- or acid-forming materials. Therefore, the monitoring of the ground water system at the reclamation site is not warranted and will not be required.

Surface Water

Surface water sources in the adjacent area exist as perennial flow in Chalk Creek. Except for the potential ephemeral drainage discussed under UMC 817.44 of this document, there are no other intermittent or ephemeral drainages within or adjacent to the permit area. There are no springs located within the reclamation permit area (Exhibit 783.15-2).

No surface water impacts are expected to occur from mining. Implementation of a sedimentation pond equipped with an oil and grease skimmer at the lower end of the mine property will contain runoff from the disturbed surface facilities. The applicant has proposed alternative treatment

structures for treatment of drainage from small areas geographically unable to report to the sediment pond. Thus, discharges of sediments, oils, and greases from the permit area will be minimized during the project life.

A set of stations have been established to monitor the quantity and quality of surface waters above and below the mine site to gage any impacts from reclamation activities to Chalk Creek (Figure 783.16-1). The applicant has proposed to monitor locations up and downstream of the permit area on Chalk Creek for water quantity and quality quarterly until baseline monitoring requirements are met (i.e. two years of data). Division guidelines specify that flow measurements are to be collected monthly during the baseline monitoring period. A variance to this requirement is warranted due to a current study being conducted by a Division contracted consultant for the Boyer Mine (Summit Coal Co., ACT/043/008) under the Small Operator's Assistance Program (SOAP). The Boyer Mine is adjacent (north and across highway 133) from the reclamation site. Data collected for that study is directly applicable to the proposed reclamation site (i.e. sampling locations are identical for both monitoring programs). Following completion of the baseline data period, the applicant proposes to comply with Division guidelines and monitor the stations twice a year until termination of the bond.

Water quality samples will be analyzed for parameters as outlined in DOGM guidelines for the baseline and postmining phases of the mine. These parameters are presented in Tables 784.14-1 and 784.14-2 of the RP.

The applicant has proposed to monitor Chalk Creek up and downstream of the reclamation site during construction periods for settleable and total suspended solids (p. 784.14-3) to demonstrate that surface activities will not adversely affect the water quality of that stream system.

The applicant has committed to submitting the results of all samples to the Division within 90 days of receipt (quarterly reports). The applicant has committed to reporting the results that exceed the effluent limitations to the Division (p. 784.14-3).

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 Transfer of Wells - DD

Existing Environment and Applicant's Proposal

Records from the Utah Division of Water Rights show a well developed by Utah Coal and Energy exists on the property, but no well could be found after a thorough search of the minesite. No wells will be transferred.

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 develop any underground openings nor are there any current openings on the reclamation site.

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. 784.16-3 and p. RP-5 of the RP). No permanent hydrologic structures are proposed for the mine site.

Compliance

The application is in compliance with this regulation.

Stipulations

None.

UMC 817.57 Hydrologic Balance: Stream Buffer Zones - RPS

Existing Environment and Applicant's Proposal

The applicant proposes to reclaim the existing sedimentation pond which is located within 100 ft. of Chalk Creek. Chalk Creek is classified as a perennial stream and contains a biological community that meets the specification of subsection (c) of this regulation. The reclamation of the pond will insure compliance with subsection (a)(1) of this regulation (restoration of original stream channel). Best management practices including regrading, mulching, and revegetation will insure sediment contributions to Chalk Creek during the reclamation of this area will be minimized.

Past disturbances at the site have resulted in surface disturbance within 100 ft. of Chalk Creek at the access road and at the northern portion of the permit area near the existing building.

Compliance

Due to the extent of past disturbances at the site, a variance to the buffer zone requirements of this regulation are warranted. Reclamation of the above mentioned areas will result in stabilization of the site. The applicant is in compliance with this regulation.

Stipulations

None.

UMC 817.59 Coal Recovery - JRH

Coal recovery is not considered to be part of this plan. Only minimal initial development of the portals was made during operations and no significant amount or extent of coal reserves were affected. This section of the regulations is not considered to be applicable to the operator's Reclamation Plan.

UMC 817.61- .68 Use of Explosives - JRH

The operator has indicated on page 784.23-2 of the reclamation plan that no blasting activities have been planned as part of this reclamation plan. Therefore this section is considered to be not applicable.

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

Existing Environment and Applicant's Proposal

As indicated on page 784.13-3 of the reclamation plan, there is evidence of some surface spillage of coal and or coal waste materials. The appendix of the reclamation plan addresses the handling of these materials. Page RP-1 states that because a coal tipple has been used in the past on the site and was used as a coal loading facility that there is coal/coal waste spillage in the vicinity of the tipple. There is no reason to believe that the extent of the coal material is greater than this surface coal spillage. During grading, any coal or coal waste material will be used as backfill in a depression as

shown on section B-B' on plate 784.23-3. Suitable cover material will be compacted and placed over the coal waste material to a minimum depth of four feet. Should the extent of the coal material in the tipple area be greater than expected, it will be disposed of in a manner similar to that previously described.

Compliance

The operator has suitably addressed the requirements of this section. A commitment to cover coal and coal waste material with a minimum of four feet of material has been made by the operator. The location of the coal waste materials is such that this waste material shall be used in the backfilling and grading process of the site to the extent as needed to achieve approximate original contours.

Stipulations

None.

- UMC 817.81 Coal Processing Waste Banks: General Requirements - JRH
- UMC 817.82 Coal Processing Waste Banks: Site Inspection - JRH
- UMC 817.83 Coal Processing Waste Banks: Water Control Measures - JRH
- UMC 817.85 Coal Processing Waste Banks: Construction Requirements - JRH
- UMC 817.86 Coal Processing Waste: Burning - JRH
- UMC 817.87 Coal Processing Waste: Burned Waste Utilization - JRH
- UMC 817.88 Coal Processing Waste: Return to Underground Workings - JRH
- UMC 817.91 Coal Processing Waste: Dams and Embankments:
General Requirements - JRH
- UMC 817.92 Coal Processing Waste: Dams and Embankments: Site Preparation - JRH
- UMC 817.93 Coal Processing Waste: Dams and Embankments:
Design and Construction - JRH

The operator has indicated on page 784.23-2 of the reclamation plan that coal processing and coal processing waste is not considered to be part of this reclamation plan and therefore is not applicable.

- UMC 817.89 Disposal of Non-Coal Wastes - JRH

Existing Environment and Applicant's Proposal

Concrete foundations and asphalt materials are to be disposed of in conjunction with backfilling operations on the site. Scrap from the dismantling of the portal support is to be disposed of in the mine workings.

Compliance

The operator has not completely addressed the disposal of non-coal wastes in the reclamation plan. The operator needs to identify and commit to the disposal of other non-coal wastes such as wood, building debris, garbage and other miscellaneous materials that are or will be generated on the site. The plan should include a means for temporarily storing such materials on site and for permanent disposal such as to an approved sanitary landfill.

Stipulations

UMC 817.89 - (1) - JRH

1. Within 30 days from the date of approval, the operator shall submit to the Division, plans for the temporary and permanent disposal of non-coal waste materials currently on site or generated during reclamation construction activities.

UMC 817.95 Air Resources Protection - SCL

Existing Environment and Applicant's Proposal

The applicant proposes the following measures to control fugitive dust during reclamation (page 784.26-1):

1. The application of water when surface regrading and soil manipulation cause a significant increase in fugitive dust.
2. Restricting vehicular speed.
3. Promptly revegetating, mulching or otherwise stabilizing the surface of regraded areas.
4. Restricting travel off established roads.
5. Minimizing the amount of time required for reclamation.

Compliance

The applicant has proposed an acceptable fugitive dust control plan. No Air Quality Approval Order is required since no new facilities will be constructed. The applicant complies with this section.

Stipulations

None.

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. 129 wildlife species, including 52 mammals, 62 birds, 3 amphibians and 12 reptiles (page 783.20-4). Results of low level studies and habitat affinities for these species are discussed in Section UMC 783.20 and on page 14, Vegetation Appendix. Of interest, the reclamation area is within the critical winter range for mule deer. The American Bald Eagle winters adjacent to the reclamation area along Chalk Creek and the Peregrine Falcon could potentially use the site. There are, however, no known roosting trees or nests sites for these species within the reclamation area (page 10-19).

Impacts to wildlife species of interest are discussed in section UMC 783.20, which are generally positive due to habitat restoration and enhancement of the site through the proposed reclamation plan. Plans to

minimize disturbances and adverse impacts and to enhance the wildlife values of the reclamation area are discussed in section UMC 784.21.

Compliance

The reclamation plan (see TA section UMC 817.111 - .117) is designed to enhance wildlife habitat values in the area by providing vegetation on an area that has been disturbed for over 100 years, and by creating shrub islands to increase edge effect. Species selection was based on their known value for wildlife. Reclamation activities are scheduled for the summer and fall, which is not within critical life cycle periods for wildlife species of interest.

Impacts to bald eagles are not expected since reclamation activities will occur during times when the eagles normally do not inhabit the area. Since this is a reclamation activity and no new disturbance will occur, impacts are not expected for any other threatened or endangered species.

The applicant will not use persistent pesticides during the reclamation and liability period without prior approval of the Division (page 11, Revegetation Appendix).

The proposal is in compliance with the reclamation standards of UMC 817.97.

Stipulations

None.

UMC 817.99 Slides and Other Damage - JRH

Existing Environment and Applicant's Proposal

No indication or reference to the requirements of this section could be found in the Reclamation Plan.

Compliance

The operator needs to provide in the Reclamation Plan, a commitment to notify the Division at any time a slide occurs which may have potential adverse effect on the public, property, health, safety, or the environment.

Stipulations

UMC 817.99 - (1) - JRH

1. Within 30 days from the date of approval of the Reclamation Plan, the operator shall provide and incorporate into the text of the Reclamation Plan a commitment to notify the Division in the event of a slide or other damage as required by this section.

UMC 817.100 Contemporaneous Reclamation - LK

Existing Environment and Applicant's Proposal

Interim stabilization plans for disturbed areas requiring such have been provided on pages 1-2, 7-9 and 11 in the Revegetation Appendix. A seed mix of quick-growing, non-noxious species for interim stabilization is provided on Table 1. Final revegetation will occur during the fall (mid to late October). Interim stabilization will occur either in the fall or early spring.

Compliance

The applicant has provided plans to revegetate disturbed areas as contemporaneously as possible during times normally accepted for revegetation. The applicant is in compliance with UMC 817.100.

Stipulation

None.

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

Existing Environment and Applicant's Proposal

The regraded surface configuration for the site is shown on plates 784.23-2 and 784.23-3. Approximately 25,000 cubic yards of material will be moved to achieve the final reclamation configuration. Backfilling and grading will be accomplished using a Cat D9U bulldozer. The highwall which traverses across the southern extent of the disturbed area will not be regraded. The toe of the highwall will be regraded however, to provide a uniform contact between the steep undisturbed slopes and the moderate reclaimed slopes.

A backfilling and grading plan is presented on pages 784.13-1 through 784.13-2. The material balance, surface grading and compacting methods, and discussion on soil stabilization is included in the Reclamation Plan and Bond Estimate Appendix in section 784.13. All final grading will be parallel to the contour where practical. Slopes greater than 15 percent will be prepared by hand. Exposed coal materials will be backfilled in the existing depression shown on cross-section B-B', plate 784.23-3 and covered with four feet of soil material.

Compliance

The highwall formed along the southern end of the disturbed area is either a naturally occurring phenomena or was a result of pre-law mining activities. Cliff forming members are found adjacent to the mine site. Total mitigation of this highwall is not considered to be either practical or economically feasible. The appearance of the highwall is such that it would tend to blend in with surrounding landscape. To achieve total reduction of the highwall, a significant amount of currently undisturbed area would also have to be affected, as the slope immediately above the highwall is so steep so as to not allow any cutting back of the ridge of the highwall. Steep slope conditions above the highwall also preclude the hillside immediately above the highwall for use as grazing and no livestock should encroach on or above the highwall.

The highwall consists of a massive sandstone formation topped by a varying thickness of unconsolidated alluvial gravels and soils. Natural vegetative invasion of the slopes cutting into this material is occurring and disturbing the area further is not warranted. However, contours over the No. 2 portal area indicate a highwall of approximately 20 feet of unconsolidated gravel material. From the nature of the materials, it is apparent that this configuration is not stable. The operator needs to provide more design and detail in this area such that the slopes are reclaimed in a stable condition.

To the south of the disturbed area indicated on the drawings, additional disturbances have been found which are also considered to be part of the disturbed area. These areas include an exploration trench cut above the highwall and a catch basin located above the access road to the southern portion of the landowner's property. These areas must be incorporated into the Reclamation Plan.

Final contours and grading of the sediment pond does not allow for the ingress and egress of sheep on the property as part of the post mining land use. Side slopes of the pad to be left where the sediment pond is to be located are sufficiently steep so as not to allow access by livestock to Chalk Creek.

The outslopes of pads and fills as proposed in the Reclamation Plan have not been reduced. These areas include but are not limited to, the outslopes of the pad surrounding the sediment pond, the outslopes of the pad to the north and west of the north building, including those areas which encroach into Chalk Creek, removal of fill used to construct the access road and the bridge abutments (if no landowner approval is received), and the outslopes following along ditch no. 2 on the western portion of the site. At a minimum, these slopes should be reduced to 2h:1v to ensure stability and to be sufficiently moderate in slope to promote revegetation. Fill or pad areas encroaching on the stream channel should be reclaimed in accordance with UMC 817.44.

The operator is not considered to be in compliance with the requirements of this section.

Stipulations

UMC 817.101 - (1-4) - JRH

1. Within 30 days from the date of permit approval, the operator shall provide to the Division, suitable design and stability analysis for the final backfilling and grading to be accomplished along the southeastern portion of the highwall in the region where only unconsolidated materials and gravels exist. Final reclamation design for this area shall include mass balance for earthwork as well as other information regarding reclamation that may be affected as a result of the modifications to the plan.

2. Within 30 days from the date of permit approval, the operator shall provide to the Division, suitable reclamation design for those disturbed areas to the south and above the highwall, including but not limited to, the exploration trench dug above the highwall and the drainage cutoff basin excavated above the highwall and the access road.
3. Within 90 days from the date of permit approval, the operator shall submit to the Division, plans for regrading and recontouring the sediment pond area upon final reclamation in a manner that will allow ingress and egress of livestock to Chalk Creek as part of the post mining land use and in accordance with the easement along the eastern edge of the property line.
4. Within 60 days from the date of permit approval, the operator shall submit to the Division, plans for regrading and re-contouring the outslopes of pad areas on the site in a manner that will blend in with the adjacent contours of the site in order to meet approximate original contour requirements. Slopes shall be regraded to not exceed 2h:1v and shall be rounded in appearance to blend in with the surrounding contours. In particular, the pad encroaching on Chalk Creek shall be regraded in order to conform with this section and with UMC 817.44.

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

Existing Environment and Applicant's Proposal

A minimal quantity of coal materials surrounding the area adjacent to the tipple will be removed and buried. The data presented in table 783.21-3 indicates that the coal material is not acid- or toxic- forming. The material will be buried under four feet of soil material. Refer to TA section UMC 817.101 for further discussion on backfilling and grading.

Compliance

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

Stipulation

None.

UMC 817.106 Regrading Or Stabilization Of Rills And Gullies - JSL

Existing Environment and Applicant's Proposal

The applicant commits to fill, regrade, stabilize and revegetate rills and gullies greater than nine inches deep (page 784.13-2).

Compliance

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

Stipulation

None.

UMC 817.111 - .117 Revegetation - LK

Existing Environment and Applicant's Proposal

Vegetation studies were conducted at the Summit Minerals #1 Mine site during August of 1986 to establish a vegetation reference area to characterize the surrounding vegetation and to use as a standard for revegetation success. Results of these studies are included in Section UMC 783.19 of the RP.

A mountain shrub complex surrounds the reclamation site and is presumed to have existed prior to mining (map 783.19-1). A reference area was located to the southwest of the disturbed area and quantitatively sampled for total plant cover and woody plant density using acceptable methodology and achieving adequate statistical sample adequacy (pages 1-3 & 12-13, Vegetation Appendix) Productivity and range condition was assessed by the Soil Conservation Service in September, 1986 (SCS report). Results of sampling indicated a 42.5% total vegetation cover (page 8-11), woody plant density of 11,869 plants/acre and productivity ranging from 1100-1200 lbs dry wt./ac on the sagebrush dominated sites to 1900-2300 lbs dry wt./ac on the oak dominated sites. Range condition of the reference area is 'good' (SCS report). No threatened or endangered species were found on the reclamation site or in the reference area (pages 3 & 13).

Revegetation plans are detailed in the Revegetation Appendix. The seed mix (Table 2) will be drilled on ca. 9.0 acres and broadcast on ca. 3.6 acres at the appropriate drill or broadcast rate (page 7). Seeding will occur in the fall (mid to late October). All seeded areas will be mulched with 2000 lbs/acre and 3000 lbs/acre of native hay on slopes less than 15% and greater than 15% respectively. Mulch will be anchored by crimping or by stapling polypropylene netting over the hay on the steep slopes (page 8). In addition to seeding, 400 containerized shrubs/acre will be planted in the early spring following seeding as identified on Table 3.

Monitoring of reclaimed areas will consist of an annual qualitative assessment and quantitative sampling as outlined on Table 4. The monitoring plan will assure an adequate statistical sample for cover, woody plant density and productivity for both the reference area and the reclaimed area during years 9 and 10 of the liability period (pages 9 & 10). The applicant has proposed a contingency and maintenance plan which includes fencing both the reclaimed area and the reference area, if needed, to correct any problems that may develop and are identified through monitoring (pages 11 - 13).

Compliance

UMC 817.111 Revegetation: General Requirements

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 UMC 817.111.

UMC 817.112 Revegetation: Use of Introduced Species

All species to be utilized for reclamation are native species with the exception of Melilotus officinalis (yellow sweetclover) and Poa pratensis (Kentucky bluegrass). M. officinalis 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. Poa pratensis is included because it is an important component of the adjacent lands, 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.

UMC 817.113 Revegetation: Timing

Final seeding will be done during the first favorable planting season following regrading (mid to late October). The applicant is in compliance with UMC 817.113.

UMC 817.114 Revegetation: Mulching and Other Soil Stabilizing Practices.

All revegetated areas will be mulched with 2000 to 3000 pounds per acre of native hay, depending on slope. Mulch will be anchored by crimping or polypropylene netting stapled in place. The applicant is in compliance with UMC 817.114.

UMC 817.116 Revegetation: 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. The location of the reference area is shown on map 783.19-1.

The reference area was determined to be in good range condition by the SCS (letter dated 9/9/86). The reference area will be qualitatively monitored annually and quantitatively sampled during years 5, 9 and 10 of the liability period.

Sampling methods to determine revegetation success are described on page 10 and are acceptable to the Division. Monitoring frequency during the liability period is acceptable. The applicant is in compliance with UMC 817.116.

UMC 817.117 Revegetation: Tree and Shrub Stocking - LK

The applicant has provided a seeding and planting plan to establish a woody plant density that is compatible with and should enhance the postmining land use of grazing and wildlife habitat. The applicant has requested a variance to establishing the reference area woody plant density of 11,869 and has requested an alternative standard of 2000 shrubs per acre. The applicant has provided documentation to support the variance (pages 3-7). The Division has found the variance acceptable in providing adequate woody plants to enhance the wildlife use after reclamation as per UMC 817.97(a).

An adequate monitoring plan will be implemented to assure woody plant density standards are being 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, and 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.

UMC 817.121 - .124 Subsidence Control - DD

Existing Environment and Applicant's Proposal

Mine development has occurred at the site. No secondary mining has taken place. Regulations governing advance mining are not applicable.

The surface land above the mine is owned by one Fern J. Boyer who will be informed if adverse effects from subsidence should occur.

Compliance

The applicant has committed to perform annual visual inspections of the surface area above the mine workings to determine any effects from subsidence during the reclamation period.

The applicant complies with this section.

Stipulation

None.

UMC 817.126 Subsidence Control: Buffer Zone - DD

Existing Environment and Applicant's Proposal

The Summit Minerals Mine does not violate the buffer zone standards. No perennial streams overly or exist adjacent to the mine that will be affected by subsidence. Chalk Creek, a perennial stream, is 900 feet from portal P #1 (Plate 783.14-4). Chalk Creek lies down slope from the mine and away from the drift of the mine.

Compliance

The applicant complies with this section.

Stipulation

None.

UMC 817.131 - .132 Cessation of Operations - SCL

These sections are not applicable to a reclamation plan.

UMC 817.133 Post-Mining Land Use - LK

Existing Environment and Applicant's Proposal

The applicant has provided land use information and plans in sections UMC 783.22 and UMC 784.15 of the RP.

The premining land use of the permit area is believed to be grazing and wildlife habitat. Summit County has zoned the area for residential and agricultural grazing (page 784.15-1). The applicant has provided a discussion of the potential and historic land uses of the region and how they relate to the mine site. Mining for coal and sand & gravel has occurred since 1879 (Section UMC 783.22).

The applicant has proposed to restore the assumed premining land use of grazing and wildlife habitat after mining is completed (page 784.15-1).

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 (page 784.15-1). The revegetation plan is designed to achieve the postmining land use (Revegetation Appendix). The applicant is in compliance with UMC 817.133.

Stipulations

None.

UMC 817.150-.156 Class I Roads - JRH
UMC 817.160-.166 Class II Roads - JRH
UMC 817.170-.176 Class III Roads - JRH

Existing Environment and Applicant's Proposal

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

The access road will not be significantly regraded during reclamation activities. The road configuration after reclamation is completed is shown on plate 784.23-2. The main access road and secondary roads to the buildings will be left after reclamation to support the post mining land use of grazing. The access road adjoins an east-west road which serves to join other roads to grazing and a gas pipeline to the west and roads servicing grazing areas to the southwest of the site. All of these roads are to be left for post mining land use to serve as access roads.

Compliance

The roads facilitated by the operator in conjunction with the site were pre-existing roads as a consequence of grazing access and pre-law mining activities on the site. These roads have not been previously approved in accordance with the requirements of this section and no designation or classification of these roads exist with regard to this section of the regulations. These roads, however, have been upgraded by the operator during the course of activities on the site. The roads and bridge serve not only the disturbed area for post mining land use, but are also needed for access for adjacent land use. The retention of these facilities for post mining land use is considered to be in accordance with the requirements of this section. This section is considered to be technically adequate.

Stipulations

None.

UMC 817.180 Other Transportation Facilities - JRH

Existing Environment and Applicant's Proposal

No other transportation facilities exist on the site as a result of activities by this operator. Foundations, and remnants of an old tipple and conveyor exist on the site and the operator has committed to reclaim these facilities in conjunction with other reclamation activities on the site. This section is considered to be not applicable with regard to the Reclamation Plan presented by the operator and therefor the operator is in compliance with this section of the regulations.

UMC 817.181 Support Facilities and Utility Installations - JRH

Existing Environment and Applicant's Proposal

In the Reclamation Plan appendix on page RP-1, it is indicated that the surface landowners wish to have all site improvements such as the bridge over Chalk Creek, the culvert crossing for the irrigation ditch, the access roads, and the two metal buildings left in place following reclamation to support the post mining land use of grazing.

Compliance

No surface owner consent for the facilities to remain as a post mining land use is found within the plan. The operator has indicated to the Division that they have requested but did not receive such landowner consent for post mining land use.

Stipulations

UMC 817.181 - (1) - JRH

1. Without surface owner's consent and Division approval, surface facilities including the buildings, roads, culverts, bridge, etc. cannot remain as part of the post mining land use. Reclamation of the bridge shall be in accordance with UMC 817.44. The Division shall require reclamation of all of these facilities unless landowner consent and landowner assumption of liability for these facilities are made.

UMC 822 Alluvial Valley Floors - JSL

The submitted application is for reclamation operations only. The permit application does not propose any underground coal mining activities.

Compliance

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

Stipulation

None.

UMC 823 Prime Farmland - JSL

The Soil Conservation Service has submitted a negative determination of Prime Farmland for the No. 1 Coal Mine (page 783.27-2). Prime farmlands are addressed within the permit application on page 783.27-1.

Compliance

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

Stipulation

None.

pb
8860R/10-44

RECEIVED
JAN 02 1987

DIVISION OF
OIL, GAS & MINING

December 29, 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

Attn: Susan C. Linner

RE: Reclamation Plan, Summit Minerals, Inc., No. 1 Mine (Blackhawk Mine),
INA/043/001, Summit County, Utah

In Reply Please Refer To Case No. J447

Dear Mr. Braxton:

The Utah Preservation Office has received for consideration the above referenced project. After review of the material, our office notes that no archeological sites were found in the cultural resource survey, and this update indicates no change in plan. Therefore, we have no comments about this portion of the mine plan.

The above is provided on request for 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,

Max J. Evans

Max J. Evans
Director and
State Historic Preservation Officer

JLD:jrc:J447/3677V

Mine File
S. Linner



NORMAN H. BANGERTER
GOVERNOR



STATE OF UTAH
DEPARTMENT OF COMMUNITY AND
ECONOMIC DEVELOPMENT

Division of
State History
(UTAH STATE HISTORICAL SOCIETY)

MAX J. EVANS, DIRECTOR
300 RIO GRANDE
SALT LAKE CITY, UTAH 84101-1152
TELEPHONE 801/533-5755



STATE OF UTAH
NATURAL RESOURCES
Oil, Gas & Mining

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

355 W. North Temple • 3 Triad Center • Suite 350 • Salt Lake City, UT 84180-1203 • 801-538-5340

April 16, 1987

TO: Kenneth E. May, Associate Director, Mining
FROM: Joseph C. Helfrich, Compliance Coordinator
RE: Tracking System Review for Determination of Pattern
of Violations

Pursuant to UMC 843.13, Suspension or Revocation of Permits, and the Division's "Procedure for Determination of Pattern of Violations," a review of mining operations with three-or-more same or similar violations in a 12-month period has been conducted for the months of July 1, 1986 through December 31, 1986 consecutively. During this period, there were no operations with a demonstrated pattern of violations in the state of Utah.

re

cc: D. J. Griffin
D. R. Nielson
L. P. Braxton
J. C. Helfrich

0719Q



STATE OF UTAH
NATURAL RESOURCES
Wildlife Resources

PRO/043/e
001.1

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

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

10 March 1987

RECEIVED
MAR 18 1987

Mr. Lynn Kunzler, Reclamation Spec.
Division of Oil, Gas & Mining
355 West North Temple
Triad Center, Suite 350
Salt Lake City, Utah 84180

DIVISION OF
OIL, GAS & MINING

Dear Lynn:

Based on our field tour of the Black Hawk Coal Mine site near, Upton, Summit County on March 5, 1987, I have formulated the following wildlife issues and concerns which need to be addressed in the mining permit:

1. I have no objections with the existing sedimentation pond located within the flood plain. However, the wash leading into the pond needs to be stabilized to control gully washing. Any B.M.P. would be adequate with me.
2. Revegetation of all disturbance sites should involve a seed mixture consisting of forbs and browse - not just grasses.
3. I think impacts to big game will be minimal with the proposed project. However, I think it would be good to show employees the "wildlife-mining" film annually at the mine safety meeting. If deer-haul truck accidents increase significantly, we feel reflective roadside mirrors should be installed along high impact areas.

Appreciate all your cooperation in scheduling the field tour. If you have additional questions, please notify our Ogden office (801) 479-5143.

Sincerely,

George Wilson
Reg. Resource Analyst

GWW/ss

APPENDIX

1/1

B Ditch #1

Area	10.85		
HL	17.83	10-24	RO Depth 0.1615 in
%	43%		
CN	68	22 24	RO Depth 0.3356
Tc	0.18		
Precip	10-24		
	23-24		

Qp 10-24	1.08
Qp 23-24	3.12

Appendix
for
Blockhawk

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

C Ditch 2

Area	9.62		
HL	11.85	10-24	RO 1.0074
%	5.4%		
CN	90	25-24	1.4218
Tc	0.18		
Precip	10-24		
	25-24		

Qp 10-24	9.41
Qp 23-24	13.06

Volume of RO

$$\begin{array}{r}
 10-24 \text{ ac} \quad 0.8075 \\
 + \\
 \hline
 \text{AC} \quad 0.2572 \\
 \hline
 1.06 \text{ AC-FT}
 \end{array}$$

Ditch 3

Area	1.06	
HL	4.50	
%	7%	
CN	90	
Tc	0.0741	
Precip	10-24	1.90
	23-24	2.38

Qp 10-24	1.07
Qp 23-24	1.50

$$\begin{array}{r}
 25-24 \\
 \text{C} \quad 1.1398 \\
 \text{AC} \quad 0.4415 \\
 \hline
 \boxed{1.5813}
 \end{array}$$

A Ditch 4

Area	8.57
HL	9.85
%	61
CN	76
Tc	0.075
Qp 10-24	3.40

$$\begin{array}{r}
 \text{RO}_{10-24} \quad 0.3602 \\
 \text{RO}_{23-24} \quad 0.6182
 \end{array}$$

2.38

1.90
2.38

Comparison of Predicted Peak Flows

DOGM

Blackhawk-

Watershed A+C

AREA (Ac)	8.57	8.52
Hydraulic Length (ft)	985	960
Percent Slope	6.4	61.1
CN	76	76
$Q_{P 10Y-24hr}$ (cfs)	3.40	3.38
$Q_{P 25YR 24hr}$	5.86	

Watershed B

AREA (Ac)	10.85	10.73
Hydraulic Length (ft)	1783	1726
Percent Slope	43.9%	45.3
CN	68	68
$Q_{P 10YR-24hr}$ (cfs)	1.08	1.10
$Q_{P 25YR 24hr}$	3.12	

Watershed C

Area (Ac)	9.62	9.77
Hydraulic Length (ft)	1,185	
Percent Slope	5.4%	5.6
CN	90	90
$Q_{P 10YR-24hr}$ (cfs)	9.41	9.59
$Q_{P 25YR-24hr}$	13.06	

42-381 50 SHEETS 5 SQUARE
42-382 100 SHEETS 5 SQUARE
42-383 200 SHEETS 5 SQUARE6229
6229

550 ft

Project: Diversion Ditch Calculations Blackhawk TA

Date 6-24-87

Reviewer Kw

Diversion	Qp	slope	Mannings n	SIDESLOPE Rise/Run	Depth of flow	velocity f/s	Dmax inches	
Ditch 1	upper	1.08	0.22	0.033	0.5	0.15	5.24	4.0
	middle	1.08	0.065	0.029	0.5	0.20	3.72	2.0
	Lower	1.08	0.013	0.025	0.5	0.29	2.33	0.75
Ditch 2	9.91	0.015	0.031	0.5	0.79	3.66	1.75	
Ditch 3	1.09	0.016	0.025	0.5	0.27	2.50	1.0	
Ditch 4	upper	3.40	0.131	0.034	0.5	0.34	5.88	5.0
	middle	3.40	0.012	0.027	0.5	0.55	2.92	1.25
	lower	3.40	0.118	0.034	0.5	0.35	5.66	5.0

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



Project - Net Erosion - Blackhawk TA

Date - 6-23-87

Reviewer KW

GROSS EROSION

- Mine site divided into disturbed (C+C') and undisturbed (A) AREAS

AREA

A 5.56 ACRES

C+C' 12.63 ACRES

USLE COMPONENTS

Watershed	R	K	LS	CP	T/A.YR
A	20	0.25	67.67	0.01	3.23 T/A.YR
C+C'	20	0.25	9.2	0.9	41.40 T/A.YR

Watershed	AREA	Volume of Sediment			GROSS EROSION
		Gross Erosion	Length of Accumulation	Conversion Factor	
A	5.56 A	$3.23 \frac{T}{A \cdot Y}$	3 yr	$\frac{2000 \frac{lb}{T}}{1.5 (62.4 lb)}$	1,150 ft ³
C+C'	12.63 A	$41.40 \frac{T}{A \cdot Y}$	3 yr	$\frac{2000 \frac{lb}{T}}{1.5 (62.4 lb)}$	33516 ft ³

Total Gross Erosion 34,660 ft³

SDR = 1

Net Erosion 34660 ft³
OR 0.8 Acre-ft

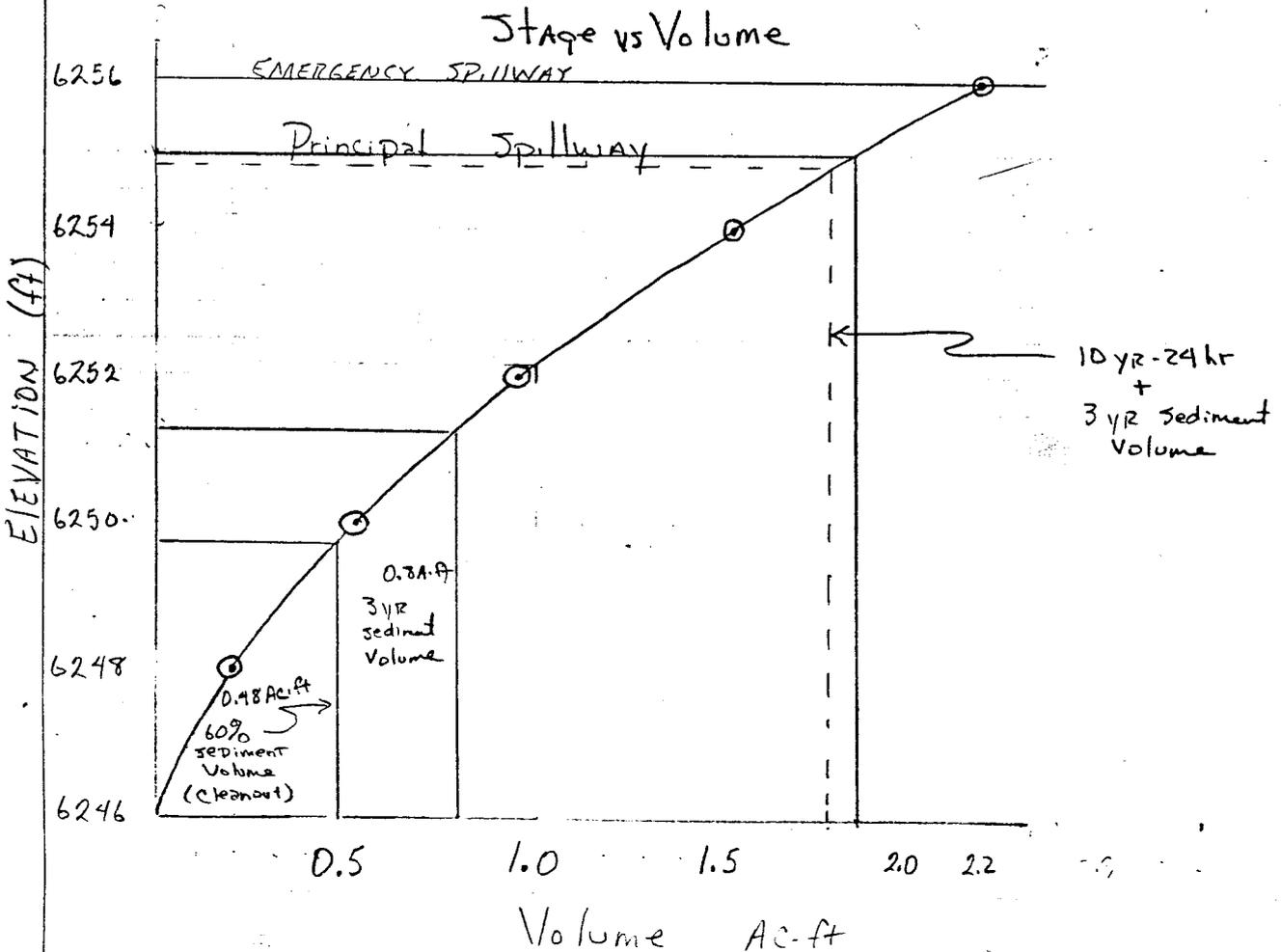
Project - Sediment Pond Design - Blackhawk TA

Date 6-23-87

Reviewer - Ku

Stage Volume Relationship for Blackhawk TA

Elevation ft	Stage ft	Δ Stage ft	X sectional Area ft ²	Average Area ft ²	Incremental Volume ft ³	Total Volume ft ³	Total Volume Ac-ft
6246	0		2039	0	0	0	0
6248	2	2	6333	4186	8372	8372	0.19
6250	4	2	8318	7326	14652	23024	0.53
6252	6	2	10842	9580	19160	42184	0.97
6254	8	2	13598	12220	24400	66584	1.53
6256	10	2	16309	14954	29907	96491	2.22



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

6255

Project - Sediment Pond Design - Blackhawk T.A.

Date - 6-23-87

Reviewer - KN

Stage Discharge Relationship

Wier Flow

Pipe diameter = 2.0' Reduced to 1.5' at outlet

$$Q = C b H^{3/2}$$

where

$$b = 2 \pi r = 6.28$$

Height of Pipe = W = 9'

$$C = 3.27 + 0.4 H/W$$

$$Q = (20.54 + 0.28 H) (H)^{3/2}$$

Stage (ft)	Q (cfs)
0.0	0.0
0.25	2.58
0.50	7.31
0.75	13.47
1.00	20.82

Orifice Flow

$$Q = C' A \sqrt{2gH}$$

where

$$C' = 0.6$$

$$A = \pi r^2 = 3.14$$

$$g = 32.2$$

$$Q = 15.12 \sqrt{H}$$

Stage (ft)	Q (cfs)
0.50	10.69
0.75	13.09
1.00	15.12
1.25	16.90
1.50	18.52
1.75	20.0

Sed pond
0.30 ACRES

Road South
0.30 ACRES

Road North
0.77 ACRES

Pad
1.06 ACRES

Σ CI 1,507 ft 2 ft

7 % slope

1.09 cfs

42-381 100 SHEETS SQUARE
42-382 100 SHEETS SQUARE
42-383 200 SHEETS SQUARE
42-384 200 SHEETS SQUARE
42-385 200 SHEETS SQUARE
42-386 200 SHEETS SQUARE
42-387 200 SHEETS SQUARE
42-388 200 SHEETS SQUARE
42-389 200 SHEETS SQUARE
42-390 200 SHEETS SQUARE
42-391 200 SHEETS SQUARE
42-392 200 SHEETS SQUARE
42-393 200 SHEETS SQUARE
42-394 200 SHEETS SQUARE
42-395 200 SHEETS SQUARE
42-396 200 SHEETS SQUARE
42-397 200 SHEETS SQUARE
42-398 200 SHEETS SQUARE
42-399 200 SHEETS SQUARE
42-400 200 SHEETS SQUARE



NATIONAL
MADE IN U.S.A.

BREAKDOWN OF RECLAMATION ACTIVITIES

JOB	MATERIAL	EQUIPMENT	ACRES	QUANTITY	UNITS	PROD.	UNITS	COST /UNIT	TOTAL COST
DEMOLITION AND REMOVAL									
BUILDINGS AND SURFACE STRUCTURES									
SOUTH BUILDING (1.)				1807	YD3		1.00	\$4.59 /YD3	\$8,296.00
NORTH BUILDING (1.)				1237	YD3		1.00	\$4.59 /YD3	\$5,678.00
SMALL BUILDING (1.)				44	YD3		1.00	\$4.59 /YD3	\$204.00
BRIDGE REMOVAL (1.)				1.00	LUMP SUM		1.00	\$8,000.00 /LUMP SUM	\$8,000.00
CONCRETE AND ASPHALT				629.00	YD3		1.00	\$5.94 /YD3	\$3,736.26
MISC. EQUIPMENT AND MATERIALS				100	YD3		1.00	\$4.59 /YD3	\$459.00
NOTE (1.) - DEMOLITION COSTS ADDED DUE TO NO LANDOWNER APPROVAL FOR FACILITIES.									
TOTAL FOR DEMOLITION AND REMOVAL -									\$26,373.26
PORTAL CLOSURES									
REMOVE ARCH AND BACKFILL PORATAL									
TORCH & LABOR		INCLUDING LABOR		40.00	HOURS		1.00	\$31.45 /HOUR	\$1,258.00
PERMISSIBLE LOADER		(EQUIV. CAT 930)		40.00	HOURS		1.00	\$69.38 /HOUR	\$2,775.00
JACKHAMMER		INCLUDING LABOR		16.00	HOURS		1.00	\$26.48 /HOUR	\$423.68
AIR COMPRESSOR				16.00	HOURS		1.00	\$11.52 /HOUR	\$184.24
TOTAL FOR PORTAL CLOSURES -									\$4,033.00
BACKFILLING AND GRADING									
D9U DOZER				120.00	HOURS		1.00	\$213.98 /HOUR	\$25,677.00
D9U DOZER W/RIPPER				40.00	HOURS		1.00	\$234.60 /HOUR	\$9,384.00
BACKHOE				40.00	HOURS		1.00	\$55.98 /HOUR	\$2,239.00
980 LOADER				120.00	HOURS		1.00	\$135.28 /HOUR	\$16,233.00
LABORERS				240.00	HOURS		1.00	\$23.65 /HOUR	\$5,676.00
FOREMAN				120.00	HOURS		1.00	\$33.65 /HOUR	\$4,038.00
SOIL ANALYSIS(TOXICITY)				5.00	SAMPLES		1.00	\$100.00 /HOUR	\$500.00
D9U DOZER (2.)				80.00	HOURS		1.00	\$213.98 /HOUR	\$17,118.00
D9U DOZER W/RIPPER (2.)				20.00	HOURS		1.00	\$234.60 /HOUR	\$4,692.00
BACKHOE (2.)				40.00	HOURS		1.00	\$55.98 /HOUR	\$2,239.00
980 LOADER (2.)				80.00	HOURS		1.00	\$135.28 /HOUR	\$10,822.00
LABORERS (2.)				160.00	HOURS		1.00	\$23.65 /HOUR	\$3,784.00
FOREMAN (2.)				80.00	HOURS		1.00	\$33.65 /HOUR	\$2,692.00
NOTE (2.) - ESTIMATED ADDITIONAL COSTS AS PER BACKFILLING AND GRADING STIPULATION.									
TOTAL FOR EARTHWORK -									\$105,094.00
REVEGETATION									
SOIL TESTING			12.64	12.64	ACRES		1.00	\$100.00 /SAMPLE	\$1,264.00
FERTILIZER			12.64	12.64	ACRES		1.00	\$120.00 /ACRE	\$1,516.80
SEED MIX									
DRILL SEED			9.03	9.03	ACRES		1.00	\$480.00 /ACRE	\$4,334.40
BROADCAST SEED			3.61	3.61	ACRES		1.00	\$315.00 /ACRE	\$2,942.15
STRAW MULCH			12.64	12.64	ACRES		1.00	\$50.00 /TON	\$632.00
STEM PLANTINGS (LABOR INCL)			12.64	12.64	ACRES	0.0025	AC/STEM	\$2.00 /STEM	\$10,112.00
DRILL SEEDING		TRACTOR	9.03	9.03	ACRES	0.50	AC/HR	\$70.35 /HR	\$1,270.52
BROADCAST SEEDING(INCL. LABOR)			3.61	3.61	ACRES	0.50	AC/HR	\$47.30 /HR	\$341.51
NETTING INCL. LABOR			3.61	3.61	ACRES	0.50	AC/HR	\$94.60 /HR	\$683.01
CRIMPING		TRACTOR	9.03	9.03	ACRES	0.50	AC/HR	\$70.35 /HR	\$1,270.52
FOREMAN				80.00	HOURS		1.00	\$33.65 /HR	\$2,692.00
RE-PLANTING(20% OF ABOVE)									\$5,411.78
SOIL TESTING (3.)			1.77	1.77	ACRES		1.00	\$100.00 /SAMPLE	\$177.00
FERTILIZER (3.)			1.77	1.77	ACRES		1.00	\$120.00 /ACRE	\$212.40
SEED MIX (3.)									
DRILL SEED (3.)			1.77	1.77	ACRES		1.00	\$480.00 /ACRE	\$849.60
STRAW MULCH (3.)			1.77	1.77	ACRES		1.00	\$50.00 /TON	\$89.50
STEM PLANTINGS (LABOR INCL) (3.)			1.77	1.77	ACRES	0.0025	AC/STEM	\$2.00 /STEM	\$1,416.00
DRILL SEEDING (3.)		TRACTOR	1.77	1.77	ACRES	0.50	AC/HR	\$70.35 /HR	\$249.04
CRIMPING		TRACTOR	1.77	1.77	ACRES	0.50	AC/HR	\$70.35 /HR	\$249.04
FOREMAN				24.00	HOURS		1.00	\$33.65 /HR	\$807.60
RE-PLANTING(20% OF ABOVE)									\$809.84
NOTE (3.) - COSTS ADDED DUE TO NO LANDOWNER APPROVAL FOR FACILITIES.									
SUBTOTAL REVEGETATION -									\$37,329.71

DRAINAGE RESTORATION

DITCH/CHANNEL CONSTRUCTION	TRACTOR				
#1		103.00 YD3	11.25 YD3/HOUR	\$61.73 /HOUR	\$565.13
#2		159.00 YD3	11.25 YD3/HOUR	\$61.73 /HOUR	\$872.38
#3		42.00 YD3	11.25 YD3/HOUR	\$61.73 /HOUR	\$230.44
#4		73.00 YD3	11.25 YD3/HOUR	\$61.73 /HOUR	\$400.53
RIPRAP MATERIAL					
#1		30.00	1.00	\$22.00 /YD3	\$660.00
#2		93.00	1.00	\$22.00 /YD3	\$2,046.00
#3		23.00	1.00	\$22.00 /YD3	\$506.00
SPILLWAY & APRON		17.00	1.00	\$22.00 /YD3	\$374.00
FILTER BED MATERIAL		40.00 YD3	1.00	\$12.00 /YD3	\$480.00
FOREMAN		40.00 HOURS	1.00	\$33.65 /HOUR	\$1,346.00
CHALK CREEK CHANNEL RESTORATION					
BRIDGE AREA (4.)		1.00 LUMP SUM	1.00	\$2,500.00 /LUMP SUM	\$2,500.00
PAD AREA (5.)		1.00 LUMP SUM	1.00	\$3,500.00 /LUMP SUM	\$3,500.00

NOTE (4.) - COSTS ADDED DUE TO NO LANDOWNER APPROVAL FOR FACILITIES.
 NOTE (5.) - ESTIMATED ADDITIONAL COSTS AS PER BACKFILLING AND GRADING STIPULATION.

DRAINAGE RESTORATION -	\$13,480.47
SUBTOTAL FOR ALL ACTIVITIES -	\$182,277
10% MAINTENANCE AND MONITORING COSTS	\$18,228
10% CONTINGENCY AND ENGINEERING COSTS	\$20,051
SUBTOTAL IN 1987 DOLLARS	\$229,556
SUBTOTAL WITH ESCALATION @ 1.97% /YR FOR 2 YEARS (1989 DOLLARS) -	\$229,331

TOTAL BOND AMOUNT ESTIMATED TO THE NEAREST \$1,000 IN 1992\$ -	\$229,000

LABOR UNIT COSTS(INCL. O&P)	UNIT COST	LABEL
LABORER	\$23.65	LABORER
LIGHT EQUIPMENT OPERATOR	\$28.65	LT OPERATOR
MEDIUM EQUIPMENT OPERATOR	\$30.35	MD OPERATOR
FOREMAN (OUTSIDE)	\$33.65	FOREMAN
TRUCK DRIVER	\$24.60	TRUCK DR
CRANE OPERATOR	\$31.00	CRANE OPER

EQUIPMENT DESCRIPTION	ADJUSTED HOURLY RATES FOR EQUIPMENT INCLUDING OPERATOR							
	MONTHLY RATE \$/HOUR	LABEL NAME	WEEKLY RATE \$/HOUR	LABEL NAME	DAILY RATE \$/HOUR	HOURLY RATE \$/HOUR	LABEL NAME	
CAT D4E	\$52.61	MCATD4	\$60.40	WCATD4	\$73.15	DCATD4	\$80.65	HCATD4
RIPPER D4	\$1.49	MRIPPERD4	\$2.11	WRIPPERD4	\$3.10	DRIPPERD4	\$3.85	HRIPPERD4
CAT D5B	\$65.34	MCATD5	\$77.75	WCATD5	\$98.38	DCATD5	\$110.00	HCATD5
RIPPER D5	\$2.85	MRIPPERD5	\$4.05	WRIPPERD5	\$5.89	DRIPPERD5	\$6.95	HRIPPERD5
CAT D6D	\$78.27	MCATD6	\$95.15	WCATD6	\$123.53	DCATD6	\$139.15	HCATD6
RIPPER D6	\$3.68	MRIPPERD6	\$5.20	WRIPPERD6	\$7.58	DRIPPERD6	\$8.95	HRIPPERD6
CAT D7G	\$100.19	MCATD7	\$124.48	WCATD7	\$164.85	DCATD7	\$188.60	HCATD7
RIPPER D7	\$15.10	MRIPPERD7	\$6.58	WRIPPERD7	\$9.61	DRIPPERD7	\$11.35	HRIPPERD7
CAT D8K	\$114.80	MCATD8K	\$142.45	WCATD8K	\$188.33	DCATD8K	\$213.95	HCATD8K
RIPPER D8	\$11.00	MRIPPERD8	\$15.38	WRIPPERD8	\$22.25	DRIPPERD8	\$26.55	HRIPPERD8
CAT D8L	\$135.12	MCATD8L	\$171.20	WCATD8L	\$231.20	DCATD8L	\$264.95	HCATD8L
CAT D9	\$167.59	MCATD9	\$213.98	WCATD9	\$290.98	DCATD9	\$334.10	HCATD9
RIPPER D9	\$14.79	MRIPPERD9	\$20.63	WRIPPERD9	\$30.50	DRIPPERD9	\$35.75	HRIPPERD9
CAT D10 (STRAIGHT)	\$256.05	MCATD10	\$333.10	WCATD10	\$461.23	DCATD10	\$533.10	HCATD10
RIPPER D10	\$20.79	MRIPPERD10	\$29.08	WRIPPERD10	\$42.95	DRIPPERD10	\$50.45	HRIPPERD10
LOADER CAT. 988B	\$135.92	MCAT988B	\$166.65	WCAT988B	\$217.65	DCAT988B	\$246.40	HCAT988B
LOADER CAT. 980C	\$569.70	MCAT980C	\$135.28	WCAT980C	\$177.65	DCAT980C	\$201.40	HCAT980C
LOADER CAT. 966D	\$93.51	MCAT966D	\$114.58	WCAT966D	\$149.70	DCAT966D	\$168.45	HCAT966D
LOADER CAT. 950B	\$80.32	MCAT950B	\$97.20	WCAT950B	\$125.58	DCAT950B	\$141.20	HCAT950B
LOADER CAT. 955L	\$69.84	MCAT955L	\$83.58	WCAT955L	\$106.58	DCAT955L	\$119.20	HCAT955L
LOADER CAT. 953	\$68.76	MCAT953	\$82.00	WCAT953	\$103.88	DCAT953	\$116.50	HCAT953
LOADER CAT. 930	\$60.38	MCAT930	\$69.38	WCAT930	\$84.13	DCAT930	\$92.75	HCAT930
GRADER CAT 12G	\$77.73	MCAT12G	\$94.50	WCAT12G	\$122.50	DCAT12G	\$138.25	HCAT12G
GRADER CAT 14G	\$96.22	MCAT14G	\$119.63	WCAT14G	\$158.38	DCAT14G	\$181.50	HCAT14G
GRADER CAT 16G	\$122.10	MCAT16G	\$154.30	WCAT16G	\$207.30	DCAT16G	\$237.30	HCAT16G
10YD TRUCK	\$63.25	MTRUCK10YD	\$70.55	WTRUCK10YD	\$77.43	DTRUCK10YD	\$84.30	HTRUCK10YD
FARM TRACTOR DEERE 310B	\$46.50	MDEERE310B	\$52.23	WDEERE310B	\$61.73	DDEERE310B	\$67.35	HDEERE310B
DISC ATTACHMENT	\$1.71	MDISK	\$2.06	WDISK	\$2.69	DDISK	\$3.00	HDISK
DRILL ATTACHMENT	\$1.71	MDRILL	\$2.06	WDRILL	\$2.69	DDRILL	\$3.00	HDRILL
CRIMPER ATTACHMENT	\$1.71	MCRIMP	\$2.06	WCRIMP	\$2.69	DCRIMP	\$3.00	HCRIMP
LOADER BACKHOE DEERE 410B	\$49.13	MDEERE410B	\$55.98	WDEERE410B	\$67.23	DDEERE410B	\$73.60	HDEERE410B
LOADER BACKHOE CASE 580E CK	\$48.65	MCASE580E	\$55.30	WCASE580E	\$66.55	DCASE580E	\$72.55	HCASE580E
EXCAVATOR LINK-BELT LS-3400	\$88.50	MLINKLS3400	\$107.53	WLINKLS3400	\$138.28	DLINKLS3400	\$156.40	HLINKLS3400
GROVE MODEL 68 CRANE	\$75.96	MGROVE68	\$89.03	WGROVE68	\$99.65	DGROVE68	\$109.90	HGROVE68
TRACTOR-TRAILER 40TON CAP.	\$66.90	MTRACK-TRAIL	\$77.35	WTRACK-TRAIL	\$88.60	DTRACK-TRAIL	\$98.25	HTRACK-TRAIL
MULCH BLOWER (W/3 LABORERS)	\$110.36	MMULCHER	\$112.50	WMULCHER	\$115.48	DMULCHER	\$118.10	HMULCHER
HYDRO SEEDER W/LABORER	\$83.12	MHYDROSEED	\$89.40	WHYDROSEED	\$98.15	DHYDROSEED	\$105.65	HHYDROSEED

UNIT COST REFERENCE FOR BOND ESTIMATE:

JOB	RANGE NAM	COST /UNIT	MEANS # OR REF.
MISC. DEMOLITION & REMOVAL	MISC	\$4.59 /YD3	2.20400100
CONCRETE	CONC	\$5.94 /YD3	2.20400050
FOUNDATIONS/PADS (6" THK)	SLAB	\$3.77 /FT2	2.21800440
PAVEMENT	PAVEMENT	\$1.48 /YD2	2.14501700
POWERLINES	POWERLINE	\$3.62 /FT	[OSM EST.]
FENCE REMOVAL	FENCE	\$1.22 /FT	2.14500700
GUARDRAIL REMOVAL	GUARDRAIL	\$4.45 /FT	2.14500800
OFF-SITE DISPOSAL	DISPOSAL	\$8.80 /YD3	2.14505600
ON-SITE DISPOSAL	ON SITE	\$5.10 /YD3	2.14505500
DRILL SEED COST	SEED DR	\$480.00 /ACRE	[DOGM EST.]
BROADCAST SEED COST	SEED BR	\$815.00 /ACRE	[DOGM EST.]
HAY MULCH	HAY	\$50.00 /TON	[DOGM EST.]
HYDRO MULCH	HYDRO	\$225.00 /TON	[DOGM EST.]
FERTILIZER	FERTILIZE	\$120.00 /ACRE	[DOGM EST.]
MULCH NETTING(INCL. LABOR)	NETTING	\$1,050.00 /ACRE	[DOGM EST.]
SEEDLINGS INCL. LABOR	SEEDLINGS	\$2.00 /STEM	[DOGM EST.]
CUTTINGS INCL. LABOR	CUTTINGS	\$1.50 /STEM	[DOGM EST.]
SOIL ANALYSIS	SOIL SAMP	\$100.00 /SAMPLE	[DOGM EST.]
WATER ANALYSIS	WATER SAM	\$100.00 /SAMPLE	[DOGM EST.]
RIPRAP MATERIALS	RIPRAP	\$22.00 /YD3	2.33600100
FILTER BED GRAVEL	FILTER	\$12.00 /YD3	[DOGM EST.]
PORTALS	PORTAL	\$2,700.00 /EACH	[DOGM EST.]
SHAFTS - SMALL VENTILATION	VENT SHAF	\$3,200.00 /EACH	[DOGM EST.]
SHAFTS - LARGE SERVICE	SERVICE S	\$4,500.00 /EACH	[DOGM EST.]
AIR COMPRESSOR 160 CFM	ATRCOMP	\$11.52 /HOUR	1.51500300
BREAKER(INCL LABOR)	BREAKER	\$26.48 /HOUR	1.51500940
TORCH, CUTTING(INCL LABOR)	TORCH	\$31.45 /HOUR	1.51506360



PENALTY FOR PRIVATE USE TO AVOID PAYMENT OF POSTAGE, \$300.

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PS Form 3841, Dec. 1980 RETURN RECEIPT, REGISTERED, INSURED AND CERTIFIED MAIL. 1. The following service is requested (check one). 2. RESTRICTED DELIVERY. 3. ARTICLE ADDRESSED TO: Mr. Barbara Filas. 4. TYPE OF SERVICE: REGISTERED, INSURED. 5. DATE OF DELIVERY: JUL 15 1987. 6. ADDRESSEE'S ADDRESS: Summit Minerals, 435 Cedar Avenue, Grand Junction CO 81501. 7. UNABLE TO DELIVER BECAUSE: (blank)

P 402 458 604

RECEIPT FOR CERTIFIED MAIL. Sent to: Mr. Barbara Filas, Summit Minerals, 435 Cedar Avenue, Grand Junction CO 81501. Postage: \$4.02. Certified Fee: \$0.45. Special Delivery Fee: \$0.00. Restricted Delivery Fee: \$0.00. Return Receipt Fee: \$0.00. Total: \$4.47.

4th PRO/643/1001