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orig mine file
cc S. Linner
L. Braxton
(cover letter only)

United States Department of the Interior

OFFICE OF SURFACE MINING
Reclamation and Enforcement
BROOKS TOWERS
1020 15TH STREET
DENVER, COLORADO 80202

APR 18 1986

ACT/015/032
#2

Dr. Dianne Nielson, Director
Division of Oil, Gas and Mining
355 West North Temple
3 Triad Center, Suite 350
Salt Lake City, Utah 84180-1203

Dear Dr. Nielson:

The Office of Surface Mining Reclamation and Enforcement (OSMRE) has reviewed the draft technical analysis (TA) prepared by your staff for the permit revision submitted by Genwal Coal Company for the Crandall Canyon mine. As agreed upon, enclosed is a copy of the draft TA with OSMRE comments.

If you have any questions, contact Ron Naten at (303) 844-2850.

Sincerely,

Richard E. Dawes
for Melvin L. Shilling, Chief
Mining Analysis Division

Enclosure

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Technical Analysis

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Utah Division of State History
Bureau of Land Management, Solid Minerals and Mining Law

0682R

Findings should reflect current analyses (problems, etc.) with tract 1 if we are revising that permit.

FINDINGS

Genwal Coal Company
Crandall Canyon Mine
Lease Tract 2
ACT/015/032
Emery County, Utah

February 21, 1986

1. The application for the Tract 2 permit area?, updated through January 7, 1986 is accurate and complete and all requirements of the Surface Mining Control and Reclamation Act, and the Utah State program have been complied with (as required by UMC 786.19(a)). However, the Tract 2 application relies upon information present in the Mining and Reclamation Plan (MRP) for Tract 1. Tract 1 is currently undergoing a mid-term review. A new updated MRP has been submitted, but has not yet been approved.

2. The DOGM has performed a Technical Analysis (TA) and concluded that:

   A. ? No additional surface reclamation is required since the new lease will be mined as an underground extension of the existing mine. There will be no new surface facilities (UMC 786.19[b]). not a new lease.

   B. A cumulative hydrologic impacts assessment by DOGM for the Tract 2 Lease reveals that the operations have been designed to prevent damage to the hydrologic balance outside the permit area (see Cumulative Hydrologic Impact Assessment [CHIA] attached). The details of the type and extent of impacts are included in the CHIA (UMC 786.19[c]).

3. After reviewing the description of the proposed permit area and the application (Sections 1.2 and 2.5), the DOGM has determined that the area is:

   A. Not included within an area designated unsuitable for coal mining operations.

   B. Not within an area under study for designating lands unsuitable for coal mining operations.

   C. Not on any land 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) (cemetery).

   D. Not within 100 feet of the outside right-of-way of public roads.

~~original approval says within 100 feet~~

E. Not within 300 feet of an occupied building (UMC 786.19[d]).

is this adequate?

4. The issuance of a permit and the Secretarial decision on the Mineral Leasing Act plan are in compliance with the National Historic Preservation Act and implementing regulations (October 2, 1984 letter from SHPO, and personal communication, Jim Dykman, Division of State History, February 14, 1986) (UMC 786.19[e]).

What about FS management plan conditions?

5. The applicant has the legal right to enter and begin (continue) underground mining activities in the permit area. The applicant has provided information required by UMC 782.15(b) (MRP Section 2.4) (UMC 786.19[f]).

6. The applicant has submitted proof and the DOGM records indicate that prior violations of applicable laws and regulations have been corrected (DOGM NOV/CO Status Report, personal communication, Dave Lof, February 21, 1986) (UMC 786.19[g]).

?

7. The OSM records confirm that all fees for the Abandoned Mine Reclamation Fund have been paid (personal communication, John Sender, OSM Fee Compliance Officer) (UMC 786.19[h]).

8. The DOGM records show that the applicant does not control and has not controlled mining operations with a demonstrated pattern of willful violations of the Act of such nature, duration and with such resulting irreparable damage to the environment as to indicate an intent not to comply with the provisions of the Act (UMC 786.19 [i]).

9. Coal mining and reclamation operations to be performed under the permit will not be inconsistent with other underground mines in the general vicinity. The only adjacent mine is the Huntington #4 Mine which has been closed and reclaimed (UMC 786.19 [j]).

updated or adjusted for 1986?

10. The applicant has posted a surety bond for the Crandall Canyon Mine in the amount of $136,729.00. No additional Surety will be required for this modification since there is no additional surface disturbance proposed (UMC 786.19[k]).

11. The applicant has provided evidence and the DOGM has found that there are no prime farmlands in the permit area (MRP Section 2.5) (UMC 786.19[l]).

12. The DOGM has determined that there are no Alluvial Valley Floors (AVF) existing within the proposed permit area. There are no AVF's which may be negatively impacted by mining of Tract 2 (UMC 786.19[l]).

13. The proposed postmining land-use for the permit area has been approved by the DOGM and is the same as the premining land use (UMC 786.19[m]).

14. All specific approvals required by the Act, the Utah State Program and the Federal Lands Program have been made (UMC 786.19[n]).

15. The proposed operation will not affect the continued existence of threatened or endangered species or result in the destruction or adverse modification of their critical habitats. No additional surface disturbance will occur (UMC 786.19[o]).

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 forward a letter stating its acceptance of the special stipulations in the permit.

Susan C. Linner
Permit Supervisor

Lowell P. Braxton
Administrator, Mineral Resource Development and Reclamation Program

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

Barbara W. Roberts
Approved as to Form
Assistant Attorney General

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

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CUMULATIVE HYDROLOGIC IMPACT ASSESSMENT
Genwal Coal Company
Crandall Canyon Mine
ACT/015/032
Emery County, Utah

February 25, 1986

I. Introduction

The purpose of this report is to provide a Cumulative Hydrologic Impact Assessment (CHIA) for Genwal Coal Company's Crandall Canyon Mine located in Emery County, Utah. The assessment encompasses the probable cumulative impacts of all anticipated coal mining in the general area on the hydrologic balance and a determination of whether the operations proposed under the application have been designed to prevent damage to the hydrologic balance outside the proposed mine plan area. This report complies with federal legislation passed under the Surface Mining Control and Reclamation Act (SMCRA) and subsequent Utah and federal regulatory programs under UMC 786.19(c) and 30 CFR 784.14(f), respectively.

Genwal Coal Company's Crandall Canyon Mine is located along the eastern margin of the Wasatch Plateau Coal Field approximately 15 miles west of Huntington, Utah (Figure 1). The eastern margin of the Wasatch Plateau forms a rugged escarpment that overlooks Castle Valley and the San Rafael Swell to the east. Elevations along the eastern escarpment of the Wasatch Plateau range from approximately 6,500 to over 9,000 feet.

Outcropping rocks of the Wasatch Plateau Coal Field range from Upper Cretaceous to Quaternary in age. The rock record reflects an overall regressive sequence from marine (Mancos Shale) through littoral and lagoonal (Blackhawk Formation) to fluvial (Castlegate Sandstone, Price River Formation and North Horn Formation) and lacustrine (Flagstaff Formation) depositional environments. Oscillating depositional environments within the overall regressive trend are represented by lithologies within the Blackhawk Formation. The major coal-bearing unit within the Wasatch Plateau Coal Field is the Blackhawk Formation.

Precipitation varies from 40 inches at higher elevations to less than 10 inches at lower elevations. The Wasatch Plateau may be classified as semiarid to subhumid.

Vegetation varies from the Sagebrush/Grass community type at lower elevations to the Douglas Fir/Aspen community at higher elevations. Other vegetative communities include Mountain Brush, Pinyon-Juniper, Pinyon-Juniper/Sagebrush and Riparian. These communities are primarily used for wildlife habitat and livestock grazing.

Crandall Canyon Creek which flows past the Crandall Canyon Mine is a perennial tributary to Huntington Creek which is a tributary to the San Rafael River. The upper drainage of Huntington Creek encompasses about 200 square miles of mountainous country in the Wasatch Plateau. About 90 percent of the area is higher than 8,000 feet. The average channel gradient along Huntington Creek is about 100 feet per mile. The lower reaches of the tributaries to Huntington Creek typically have surface relief between the stream channels and tops of adjacent canyon walls of 2,000 feet or more.

II. Cumulative Impact Area (CIA)

Figure 2 delineates the current Crandall Canyon Mine operations and CIA. The CIA includes the Crandall Canyon drainage and a portion of Huntington Creek. The CIA boundary is defined on the north, south and west by the Crandall Canyon drainage divide and on the east by Huntington Creek. A first level analysis was conducted using these boundaries to determine hydrologic impacts. Completion of the review at this level indicated that cumulative hydrologic impacts did not exist within these limits. Therefore, further analysis was not conducted beyond these limits and the CIA was determined to be complete. The CIA encompasses approximately 4,565 acres.

III. Scope of Mining

not a new lease

Genwal Coal Company controls approximately 162 acres in Emery County, Utah, 77.53 acres of which is a new lease and will be referred to as Tract 2. Mining was conducted historically near this site from November, 1939 to September 1955. Mining in Tract 1 began in 1983. Approximately 811,000 tons of coal in place are estimated to exist in the Hiawatha Seam within the Tract 2 area. Production during the first year will be approximately 327,000 tons, with an average yearly production of 360,000 tons per year.

recoverable?

see page 5

revised?

Access to the Tract 2 area will be by extending the existing Tract 1 North Main entries into the new permit area. All existing surface facilities on Tract 1 will be utilized to mine the Tract 2 lease and no new surface facilities will be constructed. Existing surface breakouts from the seam in Tract 1 for ventilation and haulage are made in Crandall Canyon and will be utilized for Tract 2 as well.

The current method of room and pillar mining in use on Tract 1 will be continued into Tract 2. Pillars will be removed upon abandonment of sections. Overall, an advance-retreat mining system is projected for Tract 2 with retreat mining employed prior to abandonment of each section.

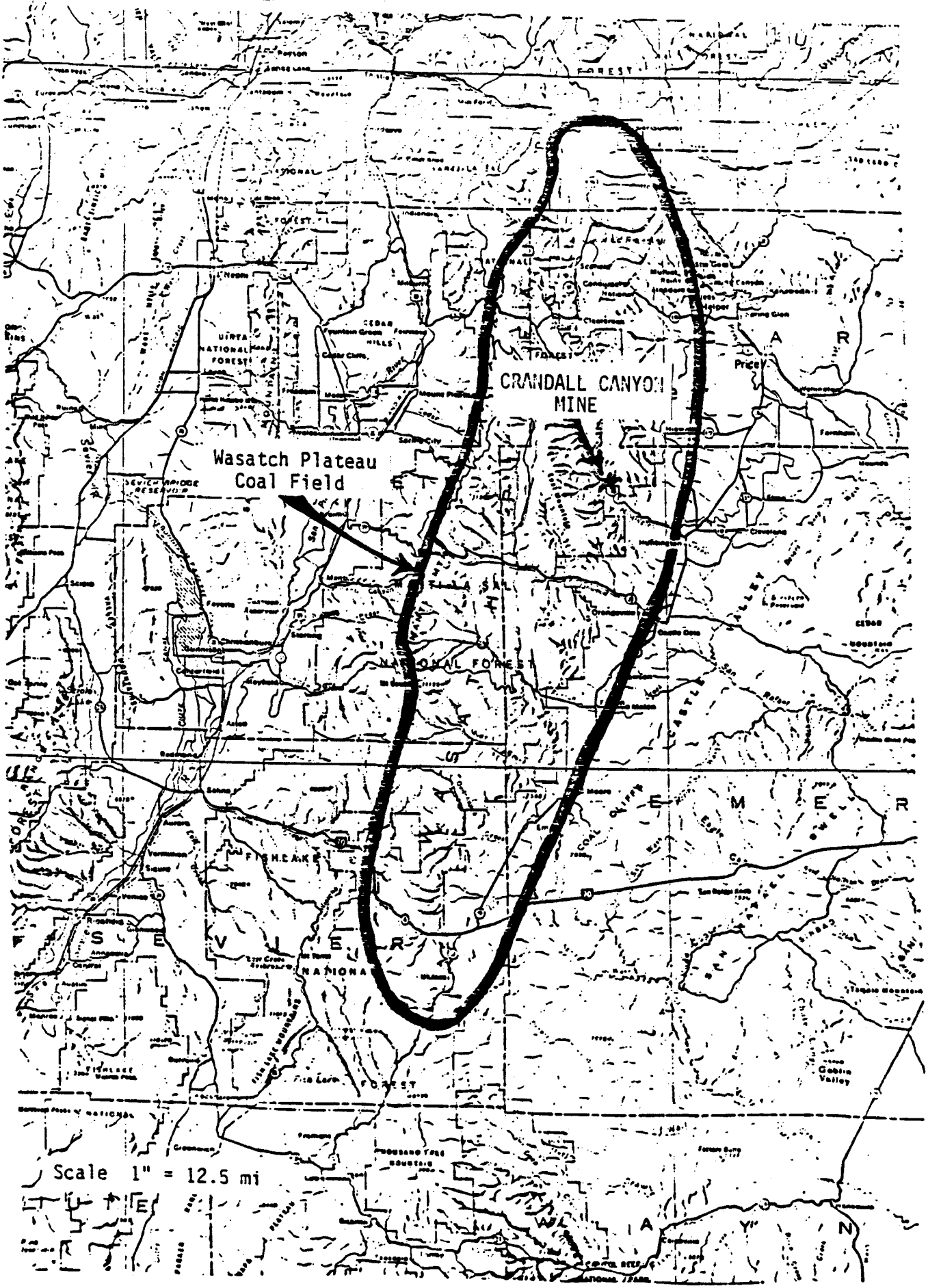

Figure 1. Wasatch Plateau Coal Field

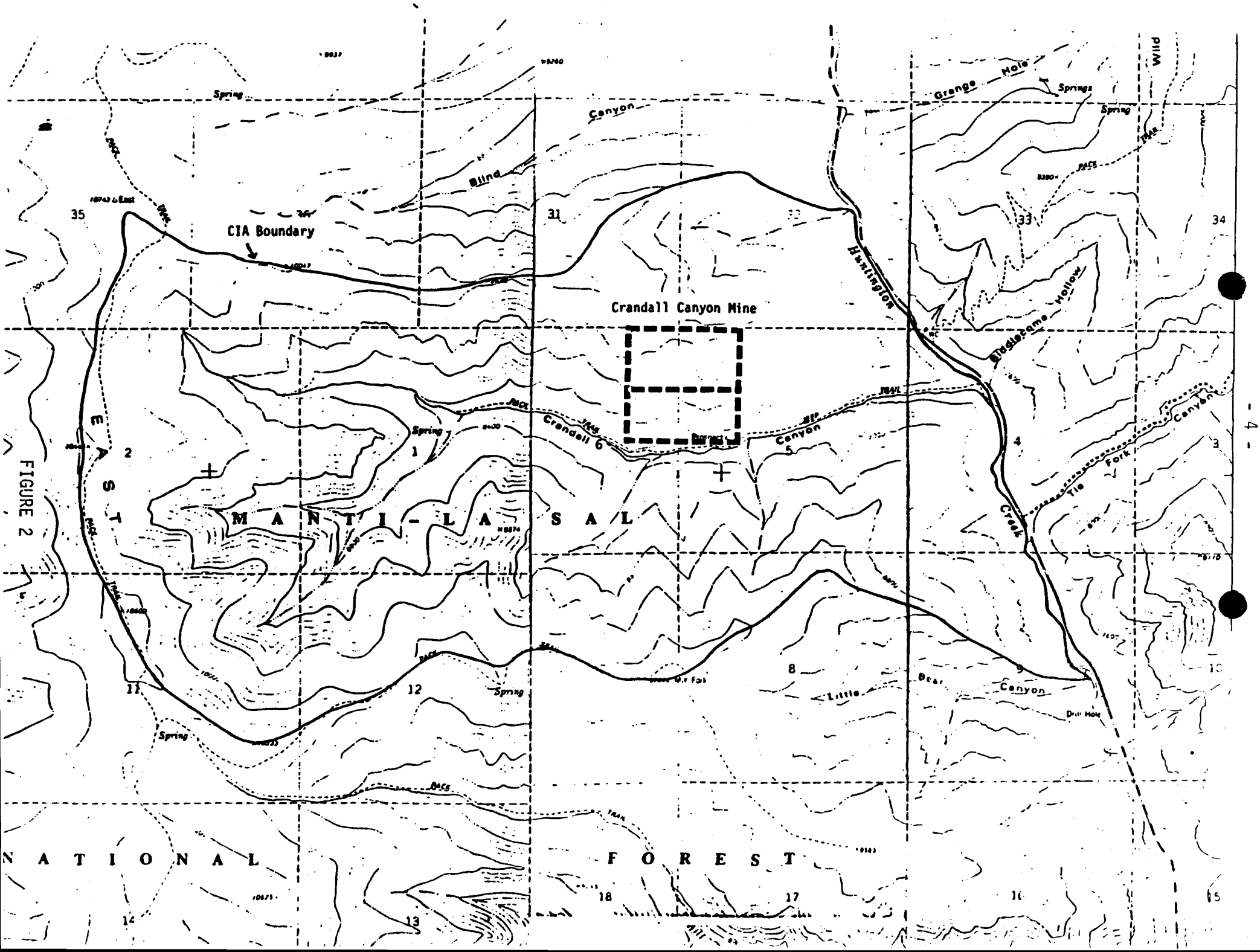
CIA Boundary
Crandall Canyon Mine
Spring
Blind Canyon
Grange Hole
Springs
Huntington Creek
Biddlecome Hollow
Tie Fork Canyon
Crandall Canyon
Little Bear Canyon
Drill Hole
Mill Fork
M A N T I - L A S A L
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FIGURE 2

The entire permit area, including the proposed [redacted] area, is comprised of coal lands leased by Genwal Coal Company from the United States Bureau of Land Management (BLM), under lease SL-062648. The surface lands are controlled by the United States Forest Service, Manti-LaSal National Forest.

don't need average page 2

The amount of reserves within the permit area is mineable within two years, however, access will be maintained through this permit area until all future reserves to the northwest and west are mined. At the present time Genwal Coal Company holds no further leases, however, an emergency lease application has been submitted for an additional 256 acres.

to the BLM ~~US Bureau of Land Management~~

IV. Study Area

A. Geology

The formations exposed in the Wasatch Plateau are Tertiary and Cretaceous-aged sedimentary units. These formations are of both continental and marine origin and are comprised principally of shale and sandstone. Siltstone, mudstone and limestone occur in lesser amounts. The formations in the Wasatch Plateau area generally dip one to three degrees westward off the west flank of the San Rafael Swell. Superimposed over the region are numerous synclines, anticlines and fault zones. The syncline and anticline areas have predominant east-west orientation, while the fault zones are generally oriented north-south.

Stratigraphic units outcropping within the study area include, from oldest to youngest, the Masuk Shale Member of the Mancos Shale, Starpoint Sandstone, Blackhawk Formation, Castlegate Sandstone, Price River Formation, North Horn Formation and Quaternary deposits. Lithologic descriptions and unit thicknesses are shown in Figure 3.

The Hiawatha Coal Seam, which is the coal seam to be mined in the Tract 2 area, occurs at the base of the Blackhawk Formation. The Hiawatha Coal Seam has been mined in the Tract 1 Lease and is exposed at an approximate elevation of 7900 feet. Maximum overburden is approximately 1500 feet in the northwest corner of the Tract 2 Lease with an average overburden of approximately 800-900 feet. The entire permit area is underlain by the Starpoint Sandstone.

B. Topography and Precipitation

Topography in the area is generally very steep and rugged with elevations ranging from approximately 7,200 feet to over 10,000 feet above sea level. Slopes vary from vertical cliffs to less than 2 percent. The CIA is characterized by Crandall Canyon Creek, which originates above 10,000 feet and drains east into Huntington Creek. The CIA also includes an unnamed ephemeral drainage to the west of the permit area that also drains to the east into Huntington Creek.

System	Series	Stratigraphic Unit	Thickness (feet)	Lithology and water-bearing characteristics
Quaternary	Holocene and Pleistocene	Quaternary deposits	0-100	Alluvium and colluvium; clay, silt, sand, gravel, and boulders; yields water to springs that may cease to flow in late summer.
Tertiary	Paleocene	North Horn Formation	800±	Variegated shale and mudstone with interbeds of tan-to-gray sandstone; all of fluvial and lacustrine origin; yields water to springs.
Cretaceous	Upper Cretaceous	Price River Formation	600-700	Gray-to-brown, fine-to-coarse, and conglomeratic fluvial sandstone with thin beds of gray shale; yields water to springs locally.
		Castlegate Sandstone	150-250	Tan-to-brown fluvial sandstone and conglomerate; forms cliffs in most exposures; yields water to springs locally.
		Blackhawk Formation	600-700	Tan-to-gray discontinuous sandstone and gray carbonaceous shales with coal beds; all of marginal marine and paludal origin; locally scour-and-fill deposits of fluvial sandstone within less permeable sediments; yields water to springs and coal mines, mainly where fractured or jointed.
		Star Point Sandstone	350-450	Light-gray, white, massive, and thin-bedded sandstone, grading downward from a massive cliff-forming unit at the top to thin interbedded sandstone and shale at the base; all of marginal marine and marine origin; yields water to springs and mines where fractured and jointed.
		Mancos Shale	600-800	Dark-gray marine shale with thin, discontinuous layers of gray limestone and sandstone; yields water to springs locally.

Figure 3. Stratigraphy of the Crandall Canyon Mine Area (modified from Danielson, et al 1981).

Precipitation in the Wasatch Plateau ranges from 10 inches to 40 inches annually. Average annual precipitation in the CIA is approximately 20 inches (Simons 1984).

C. Vegetation

intro/ists 6

There are five vegetative communities in the CIA including Sagebrush, Mountain Shrub/Grassland, Mixed Mountain Shrub, Conifer/Aspen and Spruce/Fir. Aspen are found on the north facing south slopes and higher up on the north slopes, on ridge tops. Spruce/Fir is also found on the north slopes and appears to be tied to both a moister site as well as areas with less sunlight. Mixed Mountain Shrub and Mountain Shrub/Grassland appear to be transitional and are predominant on the open exposed ridges at approximately mid-slope. The Sagebrush community follows primarily along the ridges and is more than likely climax in nature to the shrub/grass associations.

V. Hydrologic Resources

A. Ground Water

The principle factor controlling the occurences and availability of ground water in any area is geology. The ground water regime within the CIA is dependent upon geologic and climatic parameters that establish systems of recharge, movement and discharge.

Snowmelt at higher elevations provides most of the groundwater recharge, particularly where permeable lithologies or faults/ fractures 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 ground water encounters impermeable rocks and continues until either the land surface is intersected (and spring discharge occurs) or other permeable lithologies or zones are encountered that allow further vertical flow.

A seep and spring survey conducted by Earthfax Engineering in June and October of 1985 revealed the following information concerning the geology and aquifer characteristics in the vicinity of the mine.

Six formations outcrop in and adjacent to the Tract 2 area. According to Doelling (1972), the Masuk Shale Member of the Mancos Shale is a light gray to blue-gray marine sandy shale in the mine vicinity. This unit is exposed at the mouth of Crandall Canyon and in adjacent areas along Huntington Creek. The Masuk Shale Member yields water locally to seeps and springs but does not serve as a regionally important aquifer (Danielson et al., 1981).

The Star Point Sandstone is predominantly a light gray massive sandstone with minor interbedded layers of shale and siltstone near its base (Doelling, 1972). In the vicinity of the mine, the Star Point Sandstone is approximately 300 feet thick. The Star Point serves as an important regional aquifer (Danielson et al., 1981), yielding water to several minor and some major springs where fractured and jointed.

The Blackhawk Formation is the principal coal-bearing unit in the region (Doelling, 1972). This formation consists of interbedded layers of sandstone, siltstone, shale, and coal, all of marine origin. The Blackhawk is approximately 700 feet thick in the mine area, with the principal coal seam (the Hiawatha seam) occurring near the bottom of the formation. The formation yields water to springs and coal mines when fractured. Where it is locally interbedded with the Star Point Sandstone, the lower portion of the Blackhawk Formation is considered an aquifer (Danielson et al., 1981).

The Castlegate Sandstone overlies the Blackhawk Formation and consists of tan to brown cliff-forming sandstones of fluvial origin. The sandstones are massive and medium- to coarse-grained. In the area of the mine, the Castlegate yields water locally to seeps and springs but does not serve as an important regional aquifer because it is commonly drained within short distances from its recharge area due to deeply incised canyons (Danielson et al., 1981).

The Price River Formation consists predominantly of friable limey sandstone interbedded with pebbly conglomerates and shales. It forms steep receding slopes and reaches a maximum thickness of about 500 feet in the mine area (Doelling, 1972). This formation yields water locally to seeps and springs (Danielson et al., 1981). However, like the Castlegate Sandstone, deeply incised canyons in the area prevent the Price River Formation from being an important regional aquifer.

The uppermost formation that outcrops within the area adjacent to the mine plan area is the North Horn Formation. This formation consists of interbedded limestones, sandstones, and shales (Doelling, 1972). Due to high topographic presence, the North Horn Formation in the CIA serves primarily as a recharge unit to underlying formations rather than as an important source of water itself.

Investigations by Danielson et al. (1981) indicated that most, if not all, ground water in the region is derived from snowmelt. Recharge tends to be limited in areas underlain by the Price River Formation and older rocks (relative to recharge in areas underlain by younger rocks) due to slope steepness and relative imperviousness (both of which promote runoff rather than infiltration of snowmelt).

Detailed potentiometric surface data are not available for the CIA, however, the deeply incised canyons interrupt the flow of ground water in much of the area. Danielson et al. (1981) suggest that goundwater generally moves from high areas of recharge to low areas of drainage, principally along stream channels. This flow pattern is altered locally where geologic structure plays a dominant role.

The predominant chemical constituents in most springs in the region are calcium and bicarbonate (Danielson et al., 1981). Dissolved solids concentrations generally range from about 50 to 750 milligrams per liter. Regionally, the concentrations of major dissolved constituents in water from individual geologic units is highly variable, due to the complex lithologic nature of the area (Danielson et al., 1981).

Over 50 percent of the seeps and spring discovered during the June inventory issued from the Blackhawk Formation. However, flow rates at these points were normally minimal (less than one gallon per minute), with seepage issuing predominantly at the interface between sandstone lenses above and less permeable shale layers below. Most of these seeps and springs had dried up prior to the October survey. Useage at these points of seepage is minimal, due to the low flow rate and inaccessibility of the seeps.

The low seepage rates measured in most of the seeps and springs issuing from Blackhawk Formation are due to the low hydraulic conductivity of the formation in its unfractured state. Laboratory permeability data provided by Lines (1985) from a core sample collected in Section 27, T. 17 S., R. 6 E. (approximately 10 miles south of the mine permit area) indicate that sandstone units within the Blackhawk Formation have an average horizontal hydraulic conductivity of 1.3×10^{-2} feet per day and an average vertical hydraulic conductivity of 3.8×10^{-3} feet per day. Shales and siltstones within the Blackhawk Formation were found to have maximum horizontal and vertical hydraulic conductivities of 1.0×10^{-7} and 1.2×10^{-6} feet per day, respectively.

The relatively large hydraulic conductivity of the sandstones of the Blackhawk Formation compared with the siltstone and shales indicates that the fine grained sediments of the formation serve as barriers to the downward movement of water. In simple terms, as water recharges the Blackhawk Formation (either through snowmelt, rainfall, or subsurface seepage from an adjacent formation), it is permitted to percolate downward within the sandstone beds. However, upon reaching a less permeable siltstone or shale layer, the water is forced to flow horizontally to the surface, issuing at the interface between the two units.

Notable exceptions to the above generality concerning the Blackhawk Formation occur at a few springs that issue from fractured sandstone within the formation. Examples of this phenomenon were found in the western portion of the survey area, where flow rates of up to 15 gallons per minute were encountered during both the June and October inventories. Travertine deposits are common at these springs, suggesting that the recharge area for these springs is dominated by limestone (probably the North Horn Formation on the ridges to the north and west). The Blackhawk Formation apparently serves more as a conveyance body rather than a significant source of water to these springs.

Several seeps and springs issue at the site from colluvium overlying sandstone of the Blackhawk Formation and the Castlegate Sandstone. These seeps normally occur in drainage bottoms where shallow subsurface water collects at topographic lows. Nearly all flows from seeps of this type were insignificant in both June and October, suggesting (together with the topographic position) that these seeps are intermittent in nature.

Most seeps and springs issuing within the survey area from the Castlegate and Star Point Sandstones flow from bedding planes within these formations. Flows issuing in this manner were generally low during the June inventory (less than one gallon per minute) and nonexistent during the October inventory.

As noted, flow rates measured during the October survey were generally significantly less than those found during the June survey. In June, a total of 80 seeps or springs were found, 34 of which had sufficient flow to sample (the remaining 46 were seeps that could not be sampled). In October, 55 of the sources originally discovered were dry. An additional 7 sources existed only as seeps, with only 18 of the original sources containing sufficient flow to sample.

The results of the seep and spring inventory tend to support the conclusion of Danielson et al. (1981) that groundwater occurs in most geologic formations at the site (all but the Masuk Shale Member of the Mancos Shale), but none of the units are saturated everywhere. No continuous zones of saturation appear to be present at the site, indicating that potentiometric surface maps would be difficult to prepare. Based on the conclusions of Danielson et al. (1981), it is assumed that groundwater within the permit and adjacent areas flows toward the main canyons (Crandall, Blind, and Huntington) and then along Huntington Canyon to the valley bottom.

The data indicates that the specific conductance of water issuing from springs in June generally increased with increasing stratigraphic depth. This is in agreement with findings of Danielson et al. (1981). Springs issuing from the Price River

Formation typically had a specific conductance during the June survey that varied from 150 to 450 umhos/cm at 25°C while those issuing from the Blackhawk Formation and Star Point Sandstone had a specific conductance varying from 500 to 1000 umhos/cm at 25°C. This increase in specific conductance is indicative of leaching of minerals by the groundwater as it flows through increasing distances of bedrock to the lower stratigraphic positions.

The pH of water issuing from springs in the survey area showed no trends within or between formations. Values varied from 6.80 to 8.57, averaging 7.74. Hence, spring water in the study area is slightly alkaline.

In those springs with sufficient water to sample, pH generally increased slightly between June and October. Increases normally amounted to 0.1 to 0.5 pH unit. Specific conductance showed no consistent pattern between the June and October data, with approximately as many increases as decreases between June and October.

Inflow to the existing underground workings amounts to approximately 100 gallons per minute. These inflows originate primarily in gob sections near the working face of the mine. Currently, water encountered in the mine is used underground in the mining process.

B. Surface Water

Crandall Canyon Creek is an east-flowing tributary of Huntington Creek, one of the major tributaries of the San Rafael River. Huntington Creek had annual flows near Huntington ranging from 25,000 to 150,000 acre-feet during the period of October 1931 through September 1973, averaging 65,000 acre-feet per year (Waddell et al., 1981). Variations in the annual flow of Huntington Creek near Huntington are portrayed graphically in Figure 4.

Approximately 50 to 70 percent of streamflow in the mountain streams of the region occurs during May through July (Waddell et al., 1981). Streamflow during this late spring/early summer period is the result of snowmelt runoff. Such seasonal variations are common for streams in the area (Waddell et al., 1981).

The quality of water in Huntington Creek and other similar streams in the area varies significantly with distance downstream. Waddell et al. (1981) found that concentrations of dissolved solids varied from 125 to 375 milligrams per liter in reaches above major diversions to 1600 to 4025 milligrams per liter in reaches below major irrigation diversions and population centers. The major ions at the upper sites were found to be calcium, magnesium, and bicarbonate, whereas sodium and sulfate became more dominant at the

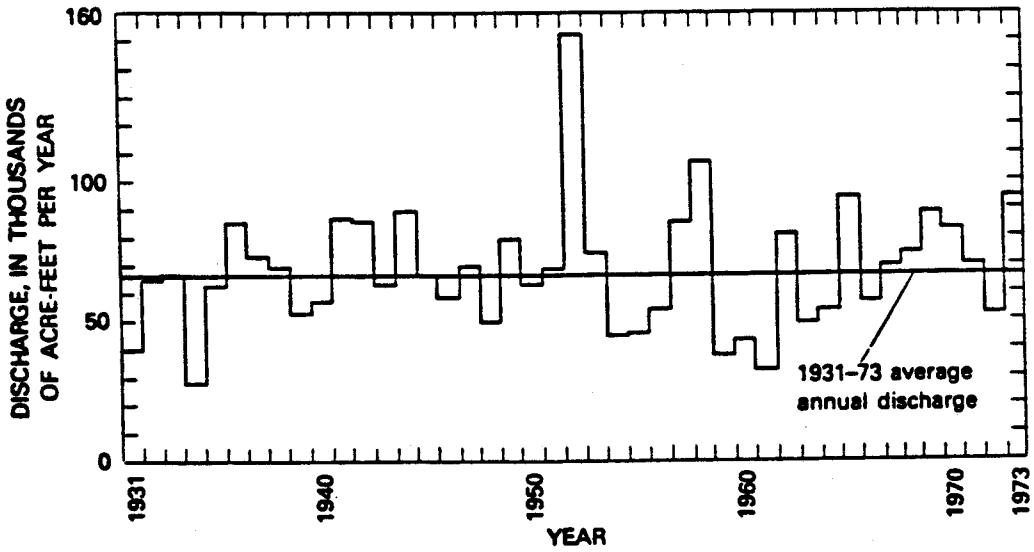


Figure 4 Annual discharge of Huntington Creek near Huntington (from Waddell et al., 1981).

lower sites. They attributed these changes to (1) diversion of water containing low dissolved solids concentrations, (2) subsequent irrigation and return drainage from moderate to highly saline soils, (3) groundwater seepage, and (4) inflow of sewage and pollutants from population centers.

Average annual sediment yields within the Huntington Creek drainage basin range from approximately 0.1 acre-feet per square mile in the headwaters area to about 3.0 acre-feet per square mile near the confluence with the San Rafael River (Waddell et al., 1981). Increases in sediment yield with increasing distance downstream is generally the result of increasing amounts of shale and sandstone in the downstream direction (Waddell et al., 1981).

The U. S. Geological Survey established a gaging station at the mouth of Crandall Creek in 1978. Flow data collected at the gaging station are not complete for the winter in most years, due presumably to data acquisition problems. However, the limited data indicate that most of the flow of Crandall Creek occurs in the period of May through July, in keeping with the conclusions of Waddell et al. (1981). Assuming an average of 30 acre-feet per month for the period of missing record, the average annual flow for the six year period of data was 2740 acre-feet.

Surface water quality data collected from Crandall Creek by Genwal for the Tract 1 Lease from 1985 indicate that the dominant ions in Crandall Creek are calcium and bicarbonate. Total dissolved solids concentrations in the stream have varied from 180 to 286 milligrams per liter, with lower concentrations normally occuring during the high flow season. Total suspended solids concentrations in Crandall Creek have varied during the period of record from /0.5 to 208.0 milligrams per liter. As expected, the highest suspended solids concentrations generally occur during periods of highest flow.

Vi. Potential Hydrologic Impacts

A. Ground Water

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

Dewatering

Inflow into the existing underground workings amounts to approximately 100 gallon per minute. These inflows originate primarily in gob sections near the working face of the mine. Currently, water encountered in the mine is used underground in the mining process. Continued interception of mine inflow may potentially dewater certain

localized aquifers not only during the first five year permit term but also throughout the life-of-mine as the workings are further developed.

What is life of mine? 2 years?

Subsidence

Subsidence impacts are largely related to extension and expansion of the existing fracture system and upward propagation of new fractures. Inasmuch as vertical and lateral migration of water appears to be largely controlled by fracture conduits, readjustment or realignment in the conduit system may potentially produce changes in the configuration of ground-water flow. Potential changes include increased flow rates along fractures that have "opened" and diverting flow along new fractures or permeable lithologies. Subsurface flow diversions may cause the depletion of water in certain localized aquifers, whereas increased flow rates along fractures would reduce ground-water residence time and potentially improve water quality.

Therefore, mining in the Tract 2 Lease may dewater certain localized aquifers and affect flow rates along existing or new subsidence related fractures. However, these impacts will be localized near the mine permit area. No other ground water disturbances exist within the CIA and cumulative hydrologic impacts are not expected.

B. Surface Water

The main concern in terms of impact to surface water is water quality deterioration downstream from the minesite, primarily in the form of suspended sediments. Typically the suspended sediment concentration in Crandall Canyon Creek since 1983 varied from approximately 205 mg/l to 0.5 mg/l. The low suspended sediment values are associated with natural climatic and geologic process although a proportion may be attributed to surface disturbances from roads and the mine pad area. Sediment controls do exist for the disturbed surface areas. Therefore, the impact associated with mining in Crandall Canyon is minimized by surface controls (i.e., sediment pond, diversions, etc.). No other surface disturbances due to mining occur within the CIA and therefore cumulative hydrologic impacts are not expected.

The operational design proposed for the Crandall Canyon Mine is herein determined to be consistent with preventing damage to the hydrologic balance outside the mine plan area.

0689R

REFERENCES

Danielson, T. W., M.D. ReMillard, and R. H. Fuller. 1981 Hydrology of the Coal-Resource Areas in the Upper Drainages of Huntington and Cottonwood Creeks, Cental Utah. U. S. Geological Survey Water-Resources Investigations Open-File Report 81-539. Salt Lake City, Utah

Doelling, H. H. 1972. Central Utah Coal Fields: Sevier-Sanpete, Wasatch Plateau, Book Cliffs, and Emery. Utah Geological and Mineral Survey Monograph Series No. 3. Salt Lake City, Utah.

Lines, G. C. 1983. Water Resources Division, U. S. Geological Survey, Salt Lake City, Utah. Personal communication.

Simons, Li and Associates. 1984. Cumulative Hydrologic Impact Assessment Huntington Creek Basin, Emery County, Utah. Fort Colline, Colorado

Waddell, K. M., P. K. Contrato, C. T. Sumsion, and J. R. Butler. 1981. Hydrologic Reconnaissance of the Wasatch Plateau-Book Cliffs Coal-Fields Area, Utah. U. S. Geological Survey Water Supply Paper 2068. Washington, D. C.

STIPULATIONS

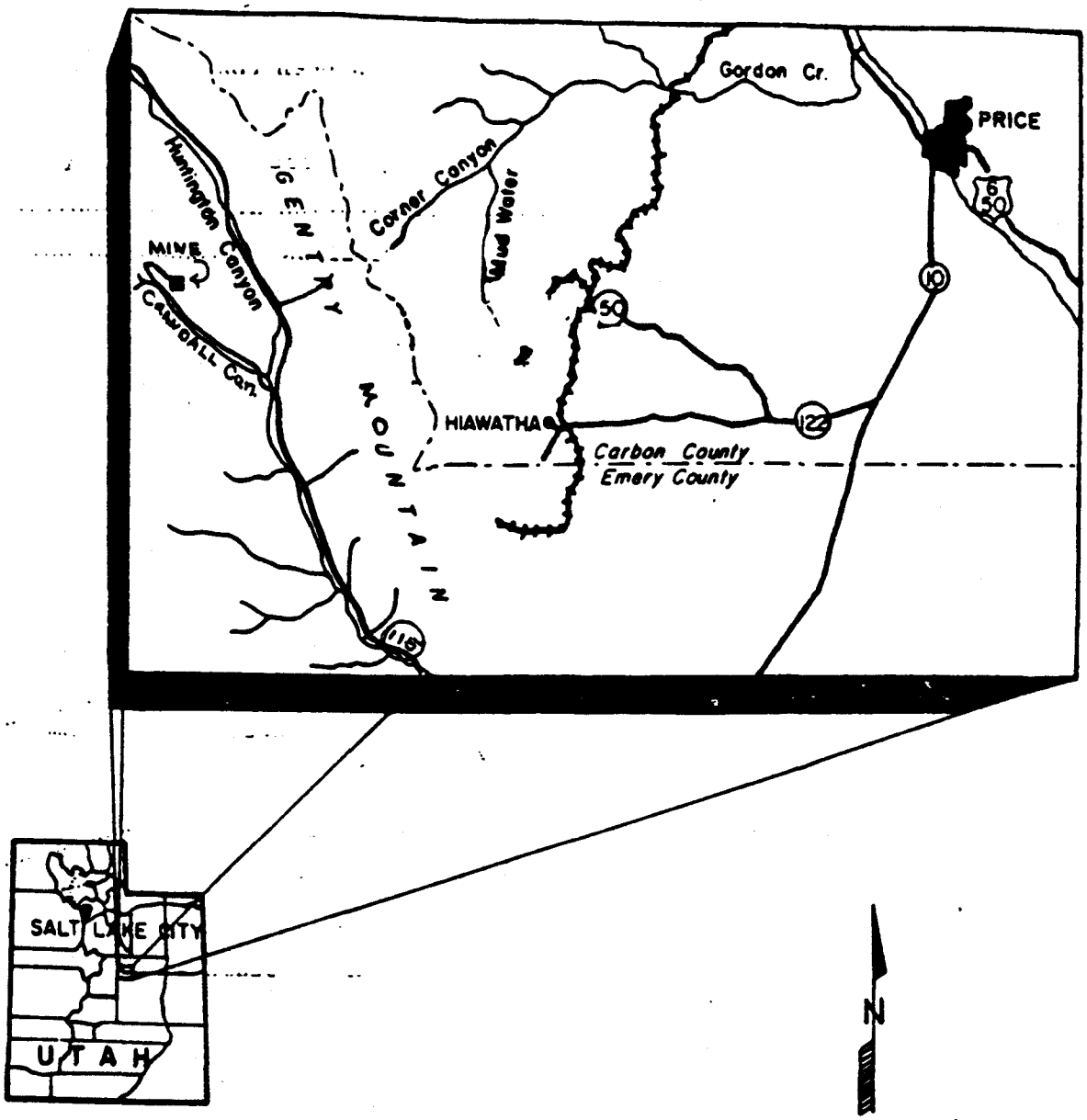
Genwal Coal Company
Crandall Canyon Mine
Lease Tract 2
ACT/015/032
Emery County, Utah

February 24, 1986

Stipulation 817.97-(1)-LK

1. Within 60 days of final permit approval, the applicant must finalize a mitigation plan for impacted seeps and springs that is acceptable to the DWR and submit this plan to DOGM for review and approval.

0682R-9



0 4 8
Scale in Miles
(ENLARGED VIEW)

FIGURE 1-1

LOCATION MAP

Genwal Coal Company
Crandall Canyon Mine
Emery County, Utah

TECHNICAL ANALYSIS

Genwal Coal Company
Crandall Canyon Mine, Lease Tract 2
ACT/015/032, Emery County, Utah

February 24, 1986

Introduction

Genwal Coal Company proposes to add 77.53 acres to its currently approved permit area for the Crandall Canyon Mine. The additional acreage comprises a portion of Federal Lease SL-062648. The surface lands are controlled by the U. S. Forest Service (USFS), Manti-LaSal National Forest.

The Mining and Reclamation Plan (MRP) for the Crandall Canyon Tract 1 permit, which comprises the remainder of Federal Lease SL-062648, a small fee lease and a USFS Special Use Area for a total of 86.84 acres, was approved by the Office of Surface Mining (OSM) November 24, 198 and by the Division of Oil, Gas and Mining (DOGM) May 13, 1983.

The new permit application area is estimated to contain 811,000 tons of coal in place in the Hiawatha seam. Access to this area will be gained by extending the North Main entries underground from the Tract 1 permit area. The current method of room-and-pillar mining will continue to be used. Mining of the new tract will be accomplished through use of the surface facilities built or approved to be built for the Tract 1 permit area. No additional surface disturbance will be required to mine Tract 2.

Genwal Coal Company (Genwal) submitted a permit application for Lease Tract 2 on July 18, 1984. Due to repermitting efforts, DOGM did not complete its Initial Completeness Review (ICR) until July 10, 1985. Genwal submitted a revised Lease Tract 2 application on August 16, 1985. DOGM responded with a Determination of Completeness (DOC) review on September 27, 1985. Genwal submitted additional information on November 6, 1985 which DOGM responded to with another DOC review letter on November 25, 1985. Genwal submitted additional information on December 26, 1985 and January 7, 1986. The plan was determined complete on January 10, 1986.

The following technical sections include an analysis of how Genwal Coal Company will comply with specific performance standards applicable to the MRP proposed for the Tract 2 permit area. Compliance with all other performance standards was determined to be the same as in the previously approved MRP and associated Technical Analysis (TA).

UMC 817.48 Hydrologic Balance: Acid-forming and Toxic-forming Materials - PGL

Existing Environment and Applicant's Proposal

The applicant stated on page 1-5 that development waste will not be brought to the surface. Therefore, no drainage from acid-forming and toxic-forming underground development waste will be exposed at the surface.

Compliance

The applicant complies with this section.

Stipulations

None.

UMC 817.50 Underground Mine Entry and Access Discharges - DC

Existing Environment and Applicant's Proposal

The applicant has stated that inflow to the existing underground workings in the Tract 1 Lease amounts to approximately 100 gallons per minute. The mine water inflow originates primarily in gob sections near the working face of the mine. Currently, water encountered in the mine is used underground in the mining process. The applicant is currently in the process of obtaining a NPDES permit to cover discharge from the mine in the event that larger quantities of ground water are encountered than can be utilized underground.

Compliance

The applicant's proposal meets the general requirements of this section.

Stipulations

None.

UMC 817.52 Surface and Ground Water Monitoring - DC

Existing Environment and Applicant's Proposal

Surface Water

The applicant has provided U. S. Geological Survey (USGS) surface water flow and quality data for Crandall Canyon Creek to establish baseline conditions for this area (Section UMC 783.16, items M and N, "Response to Apparent Completeness Review," September 1981). Tract 1 approval?

Two 36-inch Parshall flumes were installed in July 1985 on Crandall Canyon Creek as indicated on Figure 7-7, Tract 2 MRP, August 16, 1985 (one upstream from the surface facilities and one downstream). These flumes have been equipped with Stevens Type-F water level recorders to allow the collection of continuous flow data.

Water quality samples will be collected from the flume locations quarterly (normally in January, April, July and October) and analyzed according to the list contained in Table 7-6, Tract 2 MRP, August 16, 1985. Every fifth year (1985, 1990, etc.), the samples collected during the low flow period will be analyzed according to Table 7-7 (Tract 2 MRP, August 16, 1985). Surface water monitoring data will be submitted to DOGM on a quarterly basis. At the end of each calendar year, an annual summary describing variations in flows and quality will be submitted.

Discharges from the sedimentation pond will be analyzed in accordance with the NPDES permit for the facility.

Compliance

The applicant's plan to monitor surface water in Crandall Canyon Creek will be adequate to identify significant changes and impacts to the existing surface water regime due to mining in the Tract 2 Lease. The surface facility configuration will not change due to the mining in the Tract 2 Lease. Additionally, the surface water monitoring program proposed by the applicant adheres to the Guidelines for Establishment of Surface and Ground Water Monitoring Programs as prepared by DOGM. Therefore, the applicant is in compliance with this section.

Stipulations

None.

Existing Environment and Applicant's Proposal

Ground Water

The applicant has proposed a ground water monitoring program based on the results of a seep and spring survey conducted in June and October of 1985, Tract 2 MRP, August 16, 1985. Only one spring was found during the June 1985 survey within the area of potential subsidence with a flow rate of at least one gallon per minute. This spring is located above the Tract 1 Lease and should not be affected by mining in the Tract 2 Lease. All major springs (flows of at least five gallons per minute) found during the June 1985 survey were located outside the area of potential subsidence.

Ground water monitoring for the Crandall Canyon Mine area will consist of collecting water quality and quantity data from six springs located within and adjacent to the mine permit area as well as points of significant inflow to the underground workings. The proposed locations of the springs are shown on Figure 7-2, Tract 2 MRP, August 16, 1985.

The monitoring points are located both within the area of potential subsidence and at a distance from the mine to serve as indicators of long-term changes in ground water issuing from the Blackhawk Formation. In addition, one spring issuing from the overlying Castlegate Sandstone will be monitored because of its close proximity to the mine workings and because a water right has been filed on this spring by the U. S. Forest Service (USFS).

Four samples will be collected from the monitored springs annually. With the exception of the spring located within the area of potential subsidence, each spring will be monitored at monthly increments during the accessible portion of the year (generally June through September). Samples will be analyzed according to the list of parameters on Table 7-3, Tract 2 Lease MRP, August 16, 1985. The spring located within the area of potential subsidence is accessible year-round and will, therefore, be monitored quarterly (January, April, July and October) according to Table 7-3, Tract 2 Lease MRP, August 16, 1985. Every fifth year (1985, 1990, etc.), samples collected during the low flow period will be analyzed according to the list of parameters contained in Table 7-4, Tract 2 Lease MRP, August 16, 1985.

On a quarterly basis (normally January, April, July and October) an inventory will be conducted of the active portion of the mine to identify the location and geologic occurrence of mine inflows that exceed three gallons per minute. In consultation with DOGM, certain of these inflows will be selected for continued monitoring. After selection of the inflow points to be monitored, data will be collected on a quarterly basis and analyzed according to Table 7-3, Tract 2 Lease MRP, August 16, 1985.

At the end of each year, ground water monitoring data will be summarized and submitted to DOGM. The report will include an analysis of mine working water balance, accounting for mine inflows, outflows, consumptive uses and sump storage.

Compliance

The applicant's plan to monitor ground water in the mine permit and adjacent areas will be adequate to identify significant changes or impacts to the existing hydrologic balance due to mining activities in the Tract 2 Lease area. Additionally, the ground

water monitoring program proposed by the applicant adheres to the Guidelines for Establishment of Surface and Ground Water Monitoring Programs as prepared by DOGM. Therefore, the applicant is in compliance with this section.

Stipulations

None.

UMC 817.59 Coal Recovery - PGL

Existing Environment and Applicant's Proposal

The applicant states that the mining recovery is projected to be greater than 50 percent of the total in-place coal (Section 3.3.3.1, page 3-3).

Compliance

811,000 tons?

The applicant outlined the projected 50 percent recovery of the in-place coal. The Bureau of Land Management (BLM) approved the mining plan and the Resource Recovery and Protection Plan on October 11, 1985 (See letter attached to TA).

Stipulations

None.

UMC 817.71 Underground Development Waste and Excess Spoil and Nonacid and Nontoxic-forming Coal Processing - PGL

Existing Environment and Applicant's Proposal

The applicant states that all underground development waste in Tract 2 will be disposed of underground (Section 3.5.9, page 3-1 and Section 1.2, page 1-5). Therefore, this section is not applicable.

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

Existing Environment and Applicant's Proposal

check CHIA discussion for consistency

The Tract 2 area is on a south facing, steep slope in Crandall Canyon and major vegetation types occurring on the area include sagebrush, mountain shrub/grassland and aspen (Plate 9-1). The entire Tract is within high priority deer and elk summer range (Plate 10-1). Several springs occur within and adjacent to the Tract 2 area which have been identified as being of critical value to wildlife.

by whom

Is this consistent with CHIA discussion on subsidence

The applicant has identified that the only additional impacts to wildlife from mining this area will come from subsidence (no additional surface disturbance planned) (Chapter 10, page 1). Proposed mitigation includes an employee education program presenting potential wildlife impacts and admonishing employees to avoid unnecessary disturbance and harassment of wildlife. In addition, the applicant is currently working on a mitigation plan with the Utah Division of Wildlife Resources (DWR) to mitigate impacts for losses of critical springs due to subsidence (Chapter 10, page 2).

CHIA doesn't reflect this problem.

Compliance

The applicant has provided sufficient wildlife information to identify potential impacts and has proposed acceptable mitigation ~~with the exception of~~ impacted seeps and springs. Even though the applicant is currently working on a mitigation plan with DWR, until this plan is finalized and included in the plan, the applicant is not in compliance. Therefore, the following stipulation is necessary for compliance.

Stipulation 817.97-(1)-LK

is this realistic?

1. Within 60 days of final permit approval, the applicant must finalize a mitigation plan for impacted seeps and springs that is acceptable to the DWR and submit this plan to DOGM for review and approval.

UMC 817.121 Subsidence Control: General Requirements - DD

Existing Environment and Applicant's Proposal

why?

The applicant has submitted complete plans (MRP Chapter 12) consistent with known technology to prevent subsidence from causing material damage to surface features and renewable resources, to the extent technologically and economically feasible. Subsidence is planned and will be maintained in a controlled manner. No adverse effects from subsidence will occur. Subsidence will be monitored annually in accordance with the USFS subsidence monitoring schedule (Item 12-12, MRP).

Compliance

The applicant complies with this section.

Stipulation

None.

UMC 817.122 Subsidence Control: Public Notice - DD

Existing Environment and Applicant's Proposal

The mine is located on and adjacent to federal lands and leases. Information concerning the mining sequence and subsidence potential has been submitted to the respective federal agencies.

Compliance

The applicant complies with this section.

Stipulation

None.

UMC 817.124 Subsidence Control: Surface Owner Protection - DD

Existing Environment and Applicant's Proposal

The applicant has submitted plans to conduct subsidence in a controlled manner (Chapter 12 Tract 2 MRP) to prevent reduced value or loss of reasonable forseeable use of surface lands. A survey completed by the applicant shows no buildings or other facilities in the area that can be affected by subsidence.

Compliance

The applicant has not completely addressed remedial action needed in the event surface features such as springs and wildlife habitat should become affected.

not mentioned in wildlife section as a problem.

Stipulation 817.124-(1)-DD

Same as Stipulation UMC 817.97-(1)-LK.

UMC 817.126 Subsidence Control: Buffer Zone - DD

Existing Environment and Applicant's Proposal

Subsidence plans submitted by the applicant allow for buffer zones adjacent to perennial streams or significant water sources (public water supply). Plans show that aquifers will not be disrupted by subsidence and that no buildings, impoundments or facilities exist on the area to be undermined.

Compliance

The applicant is in compliance with this section.

Stipulation

None.

FILE: ACT/015/032 #2,3/4

RECEIVED
OCT 2 1984
DIVISION OF OIL GAS & MINING

SCOTT M. MATHESON
GOVERNOR

STATE OF UTAH
DEPARTMENT OF COMMUNITY AND ECONOMIC DEVELOPMENT

Division of State History
(UTAH STATE HISTORICAL SOCIETY)

MELVIN T. SMITH, DIRECTOR
300 RIO GRANDE
SALT LAKE CITY, UTAH 84101-1182
TELEPHONE 801/533-5755

September 27, 1984

James W. Smith, Jr.
Administrator
Mineral Resource Development
And Reclamation Program
Division of Oil, Gas & Mining
4241 State Office Building
Salt Lake City, Utah 841114

Attn: D. Wayne Hedberg

RE: Permit Application for Genwal Coal Company's Crandall Canyon Mine, Lease Tract #2, ACT/015/032, Folder No. 2, Emery County

In Reply Refer To Case No. H407

Dear Mr. Smith:

The Utah Preservation Office has received your letter of September 12, 1984, regarding the permit application for the Genwal Coal Company's Crandall Canyon Mine, Lease Tract #2.

After review of the documentation provided concerning cultural resources in the project area, our office would advise the Division of Oil, Gas & Mining that the approved Forest Service report would be adequate to include as evidence of a survey being completed of the project area, and that this report is complete and could be transmitted to the Office of Surface Mining.

Since no formal consultation request concerning eligibility, effect or mitigation as outlined by 36 CFR 800 was indicated by you, this letter represents a response for information concerning location of cultural resources. If you have any questions or concerns, please contact me at 533-7039.

Sincerely,

James L. Dykman
Cultural Resource Advisor
Office of State Historic
Preservation Officer

JLD:jrc:H407/0885V

State History Board: Milton C. Abrams, Chairman • Thomas G. Alexander • Phillip A. Bullen • J. Eldon Dorman • Elizabeth Griffith
Wayne K. Hinton • Dean L. May • David S. Monson • William D. Owens • Helen Z. Papanikolas • Anand A. Yang

UT0067

United States Department of the Interior

BUREAU OF LAND MANAGEMENT
UTAH STATE OFFICE
324 SOUTH STATE, SUITE 301
SALT LAKE CITY, UTAH 84111-2303

IN REPLY REFER TO
3482
SL-062648
U-921

October 11, 1985

Betty - file

To: Richard Holbrook, OSM Senior Project Manager, State of Utah, Denver

Attn: Ron Naton

From: Chief, Solid Minerals and Mining Law

Subject: Genwal Coal Company, Crandall Canyon Mine, Emery County, Utah, Approved Mining Plan

The following subject information has been received in this office for review:

Two volumes forwarded with your letter dated September 12, 1985, and identified as "Mining and Reclamation Plan, Tract 2, Crandall Canyon Mine."

Pages forwarded with your letter dated September 20, 1985, and identified as "09/05/85 UT DOGM Transmittal of MRP amendment plans to increase coal production."

The above information has been reviewed for compliance with 43 CFR 3482.1(c), particularly the resource recovery and protection plan (R2P2) or underground mining part of the subject plan. We were also requested to note any conflicts with future recovery of coal resources.

The two-volume submittal appears to be a complete resubmittal of the volume identified as Lease Tract 2, reviewed in this office and commented on by our memorandum dated October 30, 1984.

The following are our comments on the new submittals listed above:

1. The two new Tract 2 volumes provide adequate information for the requirements of 43 CFR 3482.1(c) rules and regulations and to satisfy the concerns of our subject memorandum dated October 30, 1984.

2, The mining plan as submitted does not conflict with future recovery of coal resources.

3. Plate 3-2, "Mining Sequence by Future Permit." This print is not approved as submitted. At this time, the only coal lands that Genwal Company has a legal right to mine coal from are Tract 1 and Tract 2 as shown. All other lands shown will require that additional coal leases be issued. The emergency lease has been filed and is being considered.

4. Plate 3-1, "Crandall Canyon Mine Tract 2 Mining Plan Hiawatha Seam." Property barriers as shown are too large. These discrepancies can be adjusted and approved by BLM as mining progresses.

5. Plate XII-5, "Subsidence Limit." The angles of draw used on this drawing are larger than the angle of draw generally accepted for this coal field. Minable coal reserves, that are reduced because of an angle of draw involment, must have BLM participation and approval.

We have determined that the total plan submission, Tracts 1 and 2, are adequate for BLM administration of the associated Federal coal lease(SL-062648) and that maximum recovery can be achieved within the limits of the equipment and technology presented in the plan. We recommend approval of the underground mining part of the permit application for Tract 2 and the included parts of Tract 1 with reservations to negotiate, if necessary, barrier pillar sizes and angle of draw.

Jackson H. Moffitt