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Investigation of Surface and Ground-Water Systems in the Vicinity of Soldier Canyon Mine, Carbon County, Utah:

Probable Hydrologic Consequences of Coal Mining at the Alkali Creek and Dugout Canyon Tracts and Recommendations for Surface and Ground-Water Monitoring

Addendum

ACT/007/039

#2

Soldier Creek Coal Company, Soldier Canyon Mine, Wellington, Utah

16 September 1996

Mayo and Associates
Consultants in Hydrogeology

INTRODUCTION

This document is an addendum to:

> *Investigation of Surface and Ground-Water Systems in the Vicinity of Soldier Canyon Mine, Carbon County, Utah: Probable Hydrologic Consequences of Coal Mining at the Alkali Creek and Dugout Canyon Tracts and Recommendations for Surface and Ground-Water Monitoring*

prepared by Mayo and Associates, August 14, 1996.

This addendum contains three sections:

A. Additional information on coal mining near the Coal Creek drainage.

B. Calculations of the predicted volume of mine discharge water from the Soldier Canyon and Dugout Mines

C. Analysis of flooding or streamflow alteration (728.333) on Soldier Creek.

A. ADDITIONAL INFORMATION ON COAL MINING IN THE COAL CREEK DRAINAGE

Characteristics of Coal Creek

Coal Creek originates in upland areas immediately north of the Alkali Creek lease area and drains an area of 25.3 square miles (Waddell, 1986). The stream is 8.8 miles long with a mean altitude of 7,700 feet and a slope of 152 feet per mile. The USGS monitored Coal Creek (site no. S37.7, 09313975) from October 1979 to September 1981. During this period, the maximum recorded discharge was approximately 75 cfs during the peak of the spring runoff, and over 100 cfs during a summer thunderstorm event. The low flow measured during this period (which was significantly wetter than normal) was approximately 0.25 cfs. During periods of drought, Coal Creek is sometimes completely dry (Zobell, personal communication, 1996).

The discharge characteristics, solute chemistry, and groundwater - surface water interactions of Coal Creek are similar to those of Soldier and Dugout Creeks. Waddell (1986) reported that the chemical composition of waters discharging from Coal Creek are remarkably similar to those discharging from Soldier and Dugout Creeks. Waddell also reported that the slope of the recession, S1 (August 1996 report, section 2.8.2.1 for description), was similar for Coal, Soldier, and Dugout Creeks (Table A1).

Table A1 Recession characteristics for Coal, Soldier, and Dugout Creeks during 1980 (after Waddell, 1986).

	Slope of recession (S1) (days per log cycle)
Coal Creek	63
Soldier Creek	67
Dugout Creek	56

What this means is that the groundwater - surface water interactions of these three creeks are similar. Analysis of the hydrographs of these three streams (Figure A1) suggest similar discharge characteristics and responses to precipitation and snow-melt events.

Planned mining in Coal Creek drainage

A portion of Soldier Creek Coal Company's planned mining in the Alkali Creek lease lies in the Coal Creek drainage. The main fork of Coal Creek is not planned to be undermined, and no mining is planned west of Coal Creek. However, two of Coal Creek's eastern tributaries lie above areas which are to be mined. These two tributaries are dry during most of the year and contain water only during spring runoff and thunderstorm events (Zobell, Personal

Communication, 1996). No mine water discharges or surface disturbances are planned in the Coal Creek drainage.

Recommendation for monitoring of Coal Creek

It was demonstrated in the August 1996 report (sections 2,3,and 4) that Blackhawk Formation groundwater systems in the vicinity of the coal seams are not in hydraulic communication with groundwaters in the Price River Formation. It was also demonstrated that groundwater systems near the coal seams are not in hydraulic communication with overlying streams. We believe that the responses of Coal Creek to coal mining will be similar to those of Soldier and Dugout Creeks, which are well understood. For these reasons, and because there is no planned mining directly under or to the west of Coal Creek, and because there are no planned mine discharges into Coal Creek which could adversely impact water quality, we recommend no monitoring of Coal Creek.

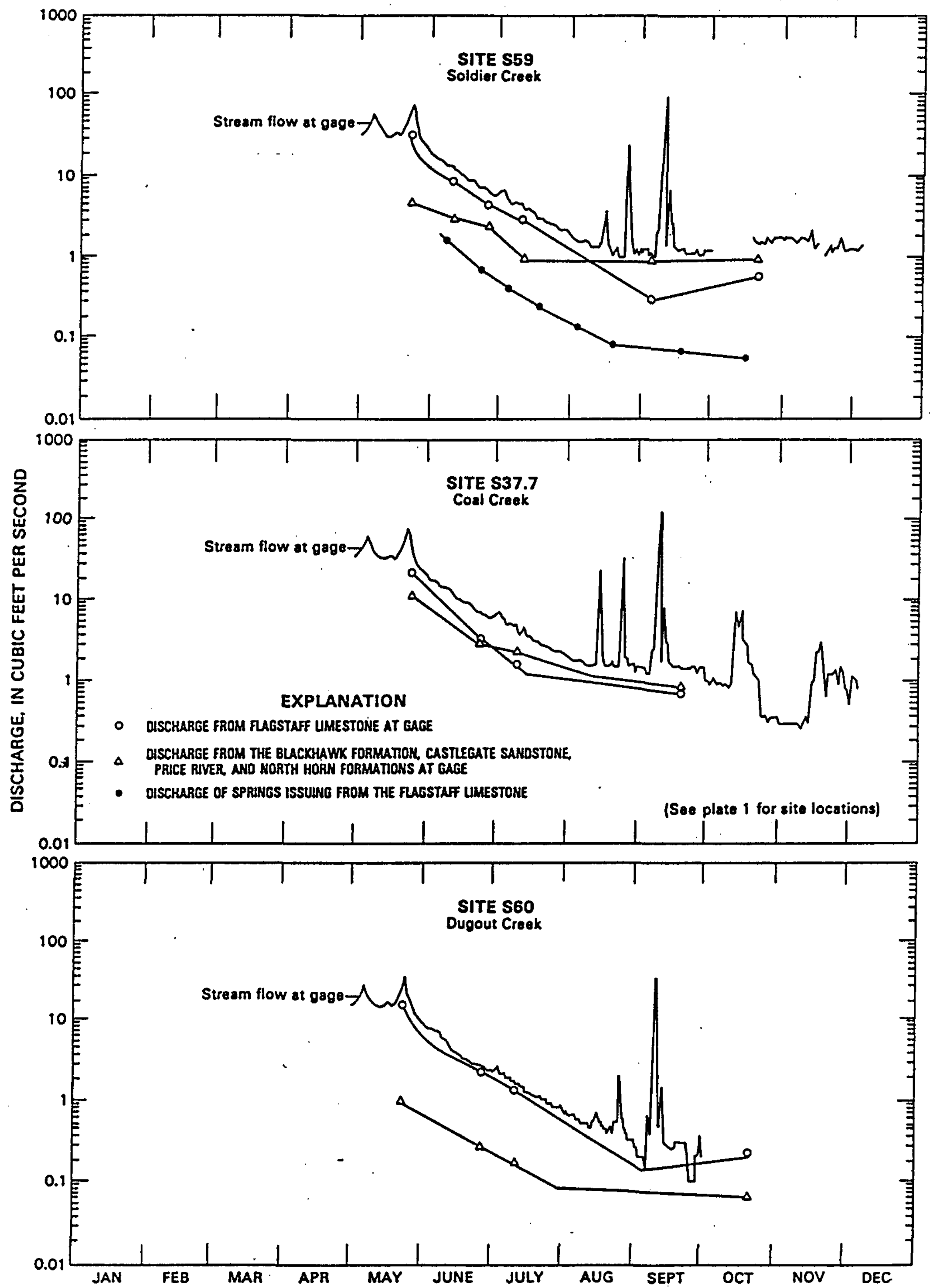

Figure A1 Discharge hydrographs of Soldier, Coal, and Dugout Creeks for the water year 1980 (After Waddell, 1986).

B. CALCULATIONS OF PREDICTED VOLUMES OF MINE DISCHARGE WATER FROM THE SOLDIER CANYON AND DUGOUT MINES

In section 3.1.2 of the August 1996 report, estimates of 800 gpm (1.78 cfs) were given for the anticipated mine water discharges from the Soldier Canyon and Dugout Mines. These estimates were based on (1) the nature of the groundwater systems in the Blackhawk Formation, and (2) and analysis of the historical, long-term mine water discharge and monthly coal production.

The rate of flow of groundwater into mine workings is directly related to the rate of coal mining. It was demonstrated in section 2.8.2.5 of the August 1996 report that groundwater in the Blackhawk Formation is partitioned. Near the coal seams there are isolated, discontinuous lenses of rock which contain water adjacent to other bodies of rock which contain no water. These pockets of groundwater are not in hydraulic connection with any overlying groundwater systems. When mining intercepts one of the water-bearing partitions, the finite volume of groundwater in the partition drains into the mine over a period ranging from a few weeks to many months until all of the water has drained and the point-source goes dry. Groundwaters encountered in major fracture zones exhibit similar recession characteristics, although their recession periods are typically longer. What this means is that the volume of water discharged from the mine during any period is directly related to the number of these isolated pockets of water drained during that period.

In order to quantify the relationship between mining rates and mine water discharge flow rates, a plot of discharge measured at MW-2 and a plot of monthly coal production was constructed (Figure B1).,The volume of storage of the sediment pond is small, and instantaneous discharge measurements made at MW-2 were largely dependent on whether or not the mine discharge pumps were operating at the time of measurement (Zobell, Personal communication, 1996). Additionally, the accuracy of the early flow data is believed to be poor (Spillman, Personal communication, 1995). In order to minimize these effects, the discharge plot was constructed using a 3-month running average.

Although the correlation of monthly coal production with mine discharge is less than perfect, a general trend is observed. There was a consistent increase in coal production between about mid-1986 and late 1990. A corresponding general increase in mine discharge occurred over this same period. During 1990, there was a sharp decrease in coal production. The resulting decrease in discharge was seen during late 1990 and early 1991. During 1991, coal production was relatively constant, as was the mine discharge. In early 1992, coal production rapidly decreased to near zero by the middle of that year, and then rapidly increased to previous levels in late 1992. There is no corresponding decrease in mine water discharge during this period. This lack of any observed decrease in mine discharge rates is probably due to the short period of time during which coal production was decreased. This was an insufficient period of time for point discharge sources in the mine to go dry. The more constant discharge of groundwater from major fracture systems may have also helped sustain the flow during this period. During 1993, there was another significant decrease in coal production from the mine and a corresponding decrease in mine discharge.

We believe that this information from the Soldier Canyon Mine can be extrapolated to the Alkali Creek and Dugout Canyon areas. The data for Soldier Canyon Mine monthly coal production and mine discharge at MW-2 is given in Table B1. To quantify the relationship between these two parameters, mean values for production and discharge were calculated. These values may be used in conjunction with the anticipated coal production rates to calculate predicted mine water discharge rates.

Annual coal production from both the Soldier Canyon and Dugout Mines is predicted to be 1 million tons each. Using this prediction and the mean coal production and mine discharge from the Soldier Canyon Mine, a discharge of approximately 600 gpm to Dugout Creek and Soldier Creeks is anticipated. However, if only the more reliable 1992 and 1993 data are used, a value of approximately 1100 gpm is predicted. We believe that for planning purposes, an approximate value of 800 gpm is a reasonable estimate for discharge to each creek.

Table B1 Soldier Creek monthly coal production and mine discharge (at MW-2)
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Month	Production (tons)	Discharge (gpm)
1/86	94048	
2/86	83796	
3/86	77895	
4/86	40325	
5/86	41669	
6/86	44500	
7/86	30981	
8/86	28382	
9/86	30558	
10/86	26780	
11/86	28993	
12/86	30854	
1/87	34110	295
2/87	34938	320
3/87	36985	313
4/87	34180	300
5/87	36765	310
6/87	40528	310
7/87	38498	295
8/87	39335	325
9/87	36390	275
10/87	42647	635
11/87	40947	298
12/87	53152	250
1/88	54551	230
2/88	61534	620
3/88	66933	300
4/88	58972	300
5/88	62020	200
6/88	64403	200
7/88	58091	300
8/88	70053	300
9/88	77276	400
10/88	81379	300
11/88	77299	300
12/88	84891	300
1/89	73406	300
2/89	83899	300
3/89	96868	300
4/89	74784	260
5/89	92313	480
6/89	108269	480
7/89	87857	300
8/89	102773	300
9/89	94621	300
10/89	97163	300
11/89	98121	300
12/89	104942	300
1/90	109360	300
2/90	110924	300
3/90	114793	300
4/90	101049	550
5/90	110249	550
6/90	94472	510
7/90	76907	570
8/90	113202	340
9/90	101014	350
10/90	110582	630
11/90	88162	300
12/90	76718	720
1/91	55748	670
2/91	65979	700
3/91	72074	720
4/91	65503	612
5/91	65544	585
6/91	75353	197
7/91	84427	
8/91	80490	
9/91	77120	
10/91	78726	
11/91	67511	
12/91	65589	
1/92	70419	741
2/92	60531	540
3/92	17842	600
4/92	9708	600
5/92	4185	600
6/92	6142	600
7/92	0	300
8/92	33511	600
9/92	57960	600
10/92	52539	600
11/92	53096	448
12/92	56412	330
1/93	37432	655
2/93	56976	655
3/93	64873	684
4/93	50343	702
5/93	28196	210
6/93	43958	650
7/93	34549	684
8/93	34166	643
9/93	97251	180
10/93	22872	140
11/93	19910	661
12/93	22095	117
1/94	45333	
2/94	48708	
3/94	55071	
4/94	44986	
5/94	54954	
6/94	52067	
7/94	36075	
8/94	53360	
9/94	46576	
10/94	45829	
11/94	49214	
12/94	51523	
1/95	53653	
2/95	51604	
3/95	57859	
4/95	50437	
5/95	55811	
6/95	42975	
7/95	22238	
8/95	27026	
9/95	29385	
10/95	33406	
11/95	26841	
12/95	29660	
Mean	**58506**	**424**
Std Dev	**26996**	**176**

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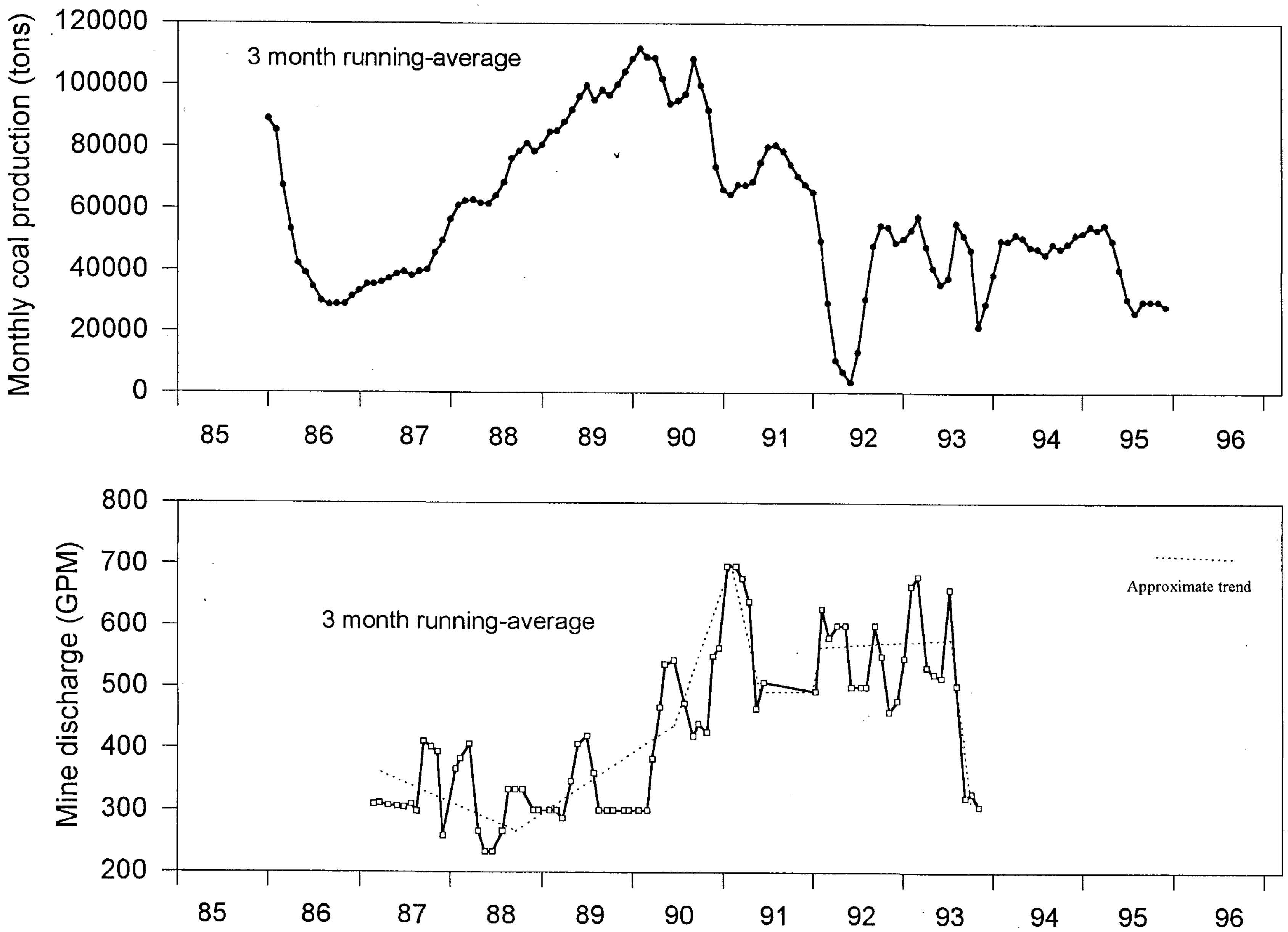

Figure B1 Monthly coal production and mine discharge for the Soldier Canyon Mine.

C. ANALYSIS OF FLOODING OR STREAMFLOW ALTERATION (728.333) ON SOLDIER CREEK.

The increased flow of Soldier Creek resulting from the addition of mine discharge water will not cause flooding or stream flow alteration.

Stream flow in Soldier Creek was monitored by the USGS between October 1979 and September 1981 (Waddell, 1986). During this time, the maximum snowmelt runoff discharge was 36,000 gpm and the maximum runoff from a thunderstorm event was 45,000 cfs. Historically, under natural conditions, Soldier Creek has completely dried up during the summer. The addition of mine discharge water has maintained low-flow stream discharges above approximately 200 gpm.

Discharge from Soldier Canyon Mine to Soldier Creek ranges from 117 to 720 gpm with a historical mean of 424 gpm (Table B1). As noted in the previous section, the anticipated discharge to Soldier Creek when the Alkali Creek Tract is mined is 800 gpm. The anticipated discharge of 800 gpm is an increase of approximately 400 gpm from current discharge from Solider Canyon Mine. This increase represents a 1.1% and 0.9% increase in the maximum snowmelt runoff and thunderstorm discharges, respectively. It is the opinion of Patrick Collins, Ph.D. of Mt. Nebo Scientific (1996, written communication) that this small increase will not significantly change sediment deposition or channel morphology, and wetland and riparian plant communities will not be impacted.

The addition of 400 gpm of increased discharge represents a three-fold increase in low-flow stream discharge. As is the case with increased flow to Dugout Creek, this additional water during low-flow periods may increase or sustain wetland and riparian plant species at the possible expense of more mesic and upland plants. In this area, riparian communities are much less common than upland communities and this change should have a positive impact (Collins, 1996, written communication).

Attachment I:

Statement of impacts to Soldier Creek by Mt. Nebo Scientific, Inc.

MT NEBO SCIENTIFIC, INC.
research & consulting

FAX MEMORANDUM

TO: Eric C. Petersen

FROM: Patrick Collins, Ph.D.

DATE: September 13, 1996

SUBJECT: Soldier Creek Discharge Changes & Plant Communities

CC: Keith Zobell

As you requested, the following provides my opinion of additional discharges to Soldier Creek from proposed new mining activities at the Soldier Creek Mine.

It is my understanding from your facsimile (September 6, 1996) that an addition of 0.9 cfs may be discharged into the Soldier Creek channel. The information that you sent also reported that the current maximum flows in the channel are 80 cfs from Spring runoff and 100 cfs from summer thunderstorms. Moreover, the Soldier Creek channel is sometimes completely dry the summer, but water from the Soldier Creek Mine usually keeps the flows to at least 0.5 cfs.

I made a brief visit to the study site on September 9, 1996. Riparian and wetland plant species are supported along the stream channel but are somewhat limited by low water flows during much of the year.. An increase of 0.9 cfs would increase the maximum Spring and thunderstorm runoffs by only 1.13% and 0.90%, respectively. The small increase in discharge would therefore not significantly change sediment deposition or channel morphology the could impact riparian and wetland plant communities.

The proposed increased discharge does, however, increase the minimum flows from 0.5 cfs to 0.9 cfs -- a 180% increase. This change may impact the existing plant communities by increasing or sustaining more wetland and riparian plant species. Conversely, this change may be at the expense of some of the more mesic and upland plants. However, because riparian communites are much less common in this area than upland plant communities, the net impact should be a positive one.

Please do not hesitate to call me if you have additional questions or comments.

Patrick

Formation ground-waters which occur deep underground. Although not identical, the solute compositions of creek and spring waters are similar to each other (Figures 2 and 3; Table 2). The δ^2H and $\delta^{18}O$ compositions of the waters are statistically indistinguishable from each other (Figure 11). Differences in the reported isotopic compositions are within the possible laboratory error ($\delta^2H = \pm 1$ and $\delta^{18}O = \pm 0.1$). Both creek and spring waters plot along the MWL and are also isotopically similar to other modern waters in the study area. The stable isotopic compositions of the spring and creek waters are statistically different than ground water sampled from the Blackhawk Formation inside Soldier Canyon Mine. A recent source of water for spring 6 was also verified by its ^3H content of 12.4 TU (Table 2).

An attempt was made to sample Spring G100, which was reported by Waddell and others (1986) as discharging from the Blackhawk Formation. However, we are unable to confirm that the spring issues from the Blackhawk Formation or that it is a bedrock spring. After two trips to the spring location and discussions with Mr. Kid Waddell, we determined that as a result of bank erosion along Dugout Creek, the spring site has been eroded away and the spring now likely discharges into the creek bottom.

Springs G100 and CC-14 were each sampled only once. The discharge from the two springs had a mean TDS of 600 Mg L-1. The waters are of the Ca^{2+}-Mg^{2+}-HCO_3^- -SO_4^{2-} type (Table 6). The solute compositions of these two waters are chemically distinct from all other ground waters in the study area. They have elevated SO_4^{2-} contents relative to overlying ground water and can be distinguished from Blackhawk Formation ground water associated with coal seams inside Soldier Canyon Mine by their relatively low Na^+ and HCO_3^- contents (Table 6). The solute compositions of waters issuing from springs G100 and CC-14 are consistent with the dissolution of calcite and dolomite in the presence of soil zone CO_2 and the dissolution of appreciable amounts of gypsum (Eqs. 2, 3, 4, 5, and 7).

2.8.2.5.2 Blackhawk Formation Wells

Five wells have been constructed which are open to the Blackhawk Formation (Figure 9). Two of the wells, located in Deadman Canyon near the portal of the Tower Mine, were constructed as water supply wells (Vaughn Hansen Associates, 1981), and three of the wells are water level monitoring wells. A fourth water level monitoring well was completed in the Castlegate Sandstone of the Price River Formation.

Water Supply Wells Near Tower Mine Portals

Water well #1 was 130 feet deep and had an initial static water level of 58 feet. After four hours of pumping at 50 gpm, the water level had been lowered to 67 feet. Recharge was meager and the well has been destroyed. Water well #3 was 280 feet deep and had an

Water level declines in monitoring wells 5-1 and 6-1 are attributed to three factors: 1) the slow loss of drilling and slug test water to the perforated horizons, 2) a general and small decline in water levels due to long-term cycles, and 3) dewatering of the Blackhawk Formation in the vicinity of mined coal seams as mining approaches the monitoring wells. The rapid loss of production capacity of water wells #1 and #3 (which is described at the beginning of this section) and the response of water levels in monitoring wells 5-1 and 6-1 suggest that the ground water in the Blackhawk Formation is vertically and horizontally compartmentalized. The slow rates of water level stabilization after well construction and slug testing indicates that the coal seams and adjacent horizons have limited ability to transmit water. The water level response in well 32-1 suggests that coal mining has not resulted in the dewatering of overlying rock units and that overlying ground waters are not in good hydraulic connection with ground waters encountered in Soldier Canyon Mine.

Soldier Canyon Mine

Underground workings in the Soldier Canyon Mine provide the best opportunity to study the Blackhawk ground-water system. Although the area available for investigation is limited, mine workings are particularly useful because 1) they contain ground water which definitely discharges from the Blackhawk Formation, and 2) they provide direct evidence regarding the response of the Blackhawk ground-water system to mining.

Ground-Water Flow into the Mine

Ground water enters the mine through one of three pathways: 1) roof drips, 2) floor seeps, and 3) fracture inflow. Attempts to quantify the inflow from each source have not been successful; however, mine personnel estimate that long-term mine inflows are as follows: roof drips ≈80%, floor seeps ≈5%, fracture flow ≈15% (Spillman, personal communication, 1995).

Roof drip waters enter the mine by gravity drainage through roof-bolt holes and fractured roof rock. The greatest volume of roof drip discharge occurs in areas which have undergone secondary pillar mining. The increase in discharge after pillar mining results from the fracturing of water-saturated rock layers located immediately above the pillared area. Mayo and Associates (1993, 1994) found similar discharge increases accompanying longwall mining in the Wasatch Range, Utah.

Floor seeps demonstrate that rock layers underlying mined coal seams also support ground-water flow. Some of this water is under considerable artesian pressure, as evidenced by the well at SC-12G. The well penetrates about 150 feet below the Rock Canyon Seam and has a shut-in pressure of 115 psi. Coal mining typically does not disturb the bedrock beneath the mined layer to the extent that it does the overlying layer.

Considerable ground water has entered the mine from northwest trending fractures located along the east side of the mine. Initial discharge rates from fractures vary greatly, and the discharge declines substantially over time (Figure 19). One fracture flow site, UG-11E dewatering of water wells #1 and #3 near the Tower Mine portal, 3) the δ^2H, $\delta^{18}O$, ^3H compositions and ground-water age of water in Soldier Canyon Mine, which are consistent with paleo-recharge and which are isotopically dissimilar to modern water encountered in the creeks and overlying ground-water systems, (isotopic differences which are especially important in that they are observed in those portions of the mine where dewatering is essentially complete), and 4) the zones of elevated SO_4^{2-} encountered in ground water in Soldier Canyon Mine (Figure 20).

Coal mining in Soldier Canyon Mine has not decreased the discharge or changed the solute composition of any known spring, including spring 10 which has a hydraulic connection with ground water of the type encountered in Soldier Canyon Mine. Spring 10 is of particular significance, in that it is partially fed by the upward flow along a major fracture which extends through mined coal seams. The source of this water remains problematic.

The strong vertical gradients in Blackhawk Formation rock layers underlying actively mined coal seams and the absence of significant discharge into the mine from these layers means that mining does not draw ground water from the underlying Mancos Shale. Additionally, Mancos Shale ground water has elevated TDS and is chemically distinct from Blackhawk ground water (Table 5). The distinctive solute composition of Mancos Shale ground water has not been observed inside Soldier Canyon Mine.

From the above discussion it is evident that the Soldier Canyon Mine has not affected ground-water discharge or solute composition in overlying or underlying ground-water systems, and it is unlikely that coal mining will effect ground-water discharges or solute compositions of any spring as a result of mining in the Alkali Creek or Dugout Canyon tracts. This conclusion is based on the facts that such effects do not occur at the Soldier Canyon Mine and the three mine areas will be contiguous and have similar geologic and hydrogeologic conditions.

3.1.2 Potential for Increasing Creek Flows

Historical discharge data show that the baseflow of Soldier Creek responds to climatic variability upstream of the Blackhawk Formation and Soldier Canyon Mine. At site G-4 (Figure 10a, Appendix A) the creek flow was less than 5 gpm during the summer of the drought year 1977, whereas the low flow during the summer of the wet year 1979 was about 140 gpm. Waddell and others (1986) demonstrated that the Blackhawk ground-water system discharged about 50 gpm to Soldier Creek during the summers of 1979 and 1980. However, the long-term contribution of the Blackhawk Formation to the baseflow remains problematic because 1979 and 1980 were wet years (Figure 10a). Assuming the 50 gpm discharge from the Blackhawk Formation is valid for drought years, the drought year baseflow below Soldier Canyon Mine could be as low as 50 gpm. It is more likely that the contribution of Blackhawk Formation ground water to Soldier Creek is less than 50 gpm during drought years. Evidence for smaller drought year contributions can be seen in the baseflow of the creek containing spring 6 (west of Soldier Creek). Even

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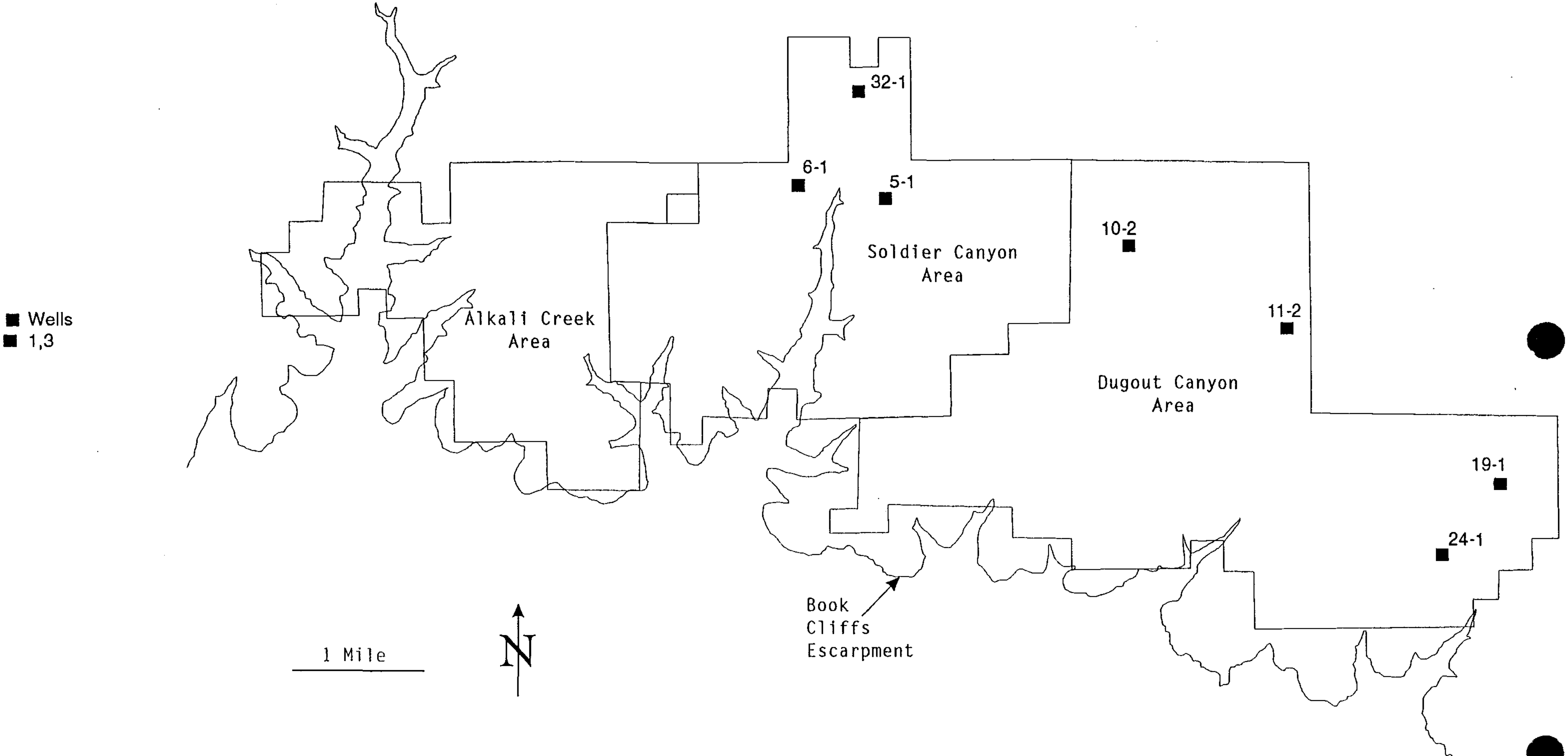

Figure 9 Location of monitoring and water production wells in the study area.

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State of Utah
DEPARTMENT OF NATURAL RESOURCES
DIVISION OF OIL, GAS AND MINING

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Governor
Ted Stewart
Executive Director
James W. Carter
Division Director

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Salt Lake City, Utah 84114-5801
801-538-5340
801-359-3940 (Fax)
801-538-7223 (TDD)

April 3, 1997

RECEIVED
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DIVISION OF OIL
GAS & MINING PRICE UTAH

Reed W. Olsen, General Manager
Canyon Fuel Company, LLC
Skyline Mines
P.O. Box 719
Helper, Utah 84526

RE: Dugout Canyon Exploration, EXP/007/018-95A, File #2, Carbon County, Utah

Dear Mr. Olsen,

Your one year extension request for the referenced exploration permit dated February 11, 1997, is hear by approved effective April 3, 1997.

If you have any questions please call.

Sincerely,

Joseph C. Helfrich
Permit Supervisor

tt
cc: Keith Zobell
Barry Barnum
Steve Demczak
O:\APDUGOUT.WPD

PW

Canyon Fuel Company LLC
6955 Union Park Center
Suite 540
Midvale, Utah 84047
Telephone 801-569-4700
Facsimilie 801-569-4799

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DIVISION OF OIL
GAS & MINING PRICE UTAH

February 13, 1997

Mary Ann Wright, Associate Director
Division of Oil, Gas & Mining
1594 West North Temple, Suite 1210
PO Box 145801
Salt Lake City, UT 84114-5801

Re: Delegation of Authorization to Act on behalf of Mining Permit No. ACT/007/018 #2
for the Soldier Canyon Mine.

Copy PAM & PFO

Dear Ms. Wright:

Canyon Fuel Company, LLC is the holder of Mining Permit ACT/007/018 for the Soldier Canyon Mine. As identified in our November 13, 1996, Application for Permit Transfer which was approved by your office December 20, 1996, I am the Chief Executive Officer of Canyon Fuel Company.

In the interest of efficient management of the Mining Permit, I hereby authorize Rick Olsen, General Manager of the Soldier Canyon Mine, to act for and on behalf of Canyon Fuel Company's day-to-day operation and administration activities related to Mining Permit ACT/007/018 including permit revisions and amendments to the Mining and Reclamation Plan.

Written correspondence regarding the Soldier Canyon Mine Permit should be addressed to:

Rick Olsen, General Manager
Soldier Canyon Mine
Canyon Fuel Company, LLC
P.O. Box 1029
Wellington, UT 84542

Notary Public
ANNETTE E KENNETT
175 East 400 South, Suite 800
Salt Lake City, Utah 84111
My Commission Expires
December 16, 1999
State of Utah

Very truly yours,

Richard D. Pick
President and CEO

Signed before me this 13th day of February, 1997

Annette E Kennett
Notary Public

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State of Utah
DEPARTMENT OF NATURAL RESOURCES
DIVISION OF OIL, GAS AND MINING

Michael O. Leavitt
Governor
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September 3, 1997

To: File

Thru: Joe Helfrich, Permit Supervisor-Compliance

From: Peter Hess, Reclamation Specialist III PH

RE: Questions on Monitoring Points, Revised/Approved PHC for Soldier Canyon and Dugout Canyon Mines, ACT/007/018 and PRO/007/039, Folder #2, Carbon County, Utah

Keith Zobell of Mayo and Associates met with me yesterday to discuss some questions that he has regarding some monitoring points that may or may not still be required as part of the water monitoring regime for the Soldier Canyon Mine and the proposed Dugout Canyon Mine. Several of the points mentioned in the MRP are no longer referred to in this revised PHC for the two aforementioned mines. The copy of map 7.21-1 (Surface Water Monitoring Locations for the Soldier Canyon Mine)which is on file at the PFO is stamped as received by the DOGM on 5/31/96; there is no "approved" stamp. I don't know if the sites on this map are approved or not.

A conversation with Mr. Jim Smith on 9/2 indicated that the monitoring point for the waste rock site had been deleted, but it is still shown on the aforementioned map below the four monitoring wells (MW-1M, 2M, 3M and MW-1C) at Anderson Reservoir. These four monitoring wells and their required monitoring parameters are not listed in the revised "approved" PHC; as indicated above, they are shown on map 7.21-1. Are they required to be monitored? The wells listed in the "approved" PHC (6-1, 10-2, 32-1) only require quarterly water level measurements. What wells are required to be monitored for ground water operational parameters, if any?

Monitoring well 5-1 (as mentioned in the SC3 MRP) was mined through or past in 10/95. Has the Division required the permittee to install a new well to replace the information which has been lost from this deletion, or is it felt that this information is no longer beneficial? Is the deletion documented/approved?

Stream monitoring location G-1 is still referred to in the Soldier Canyon MRP; it has been replaced by what is listed as a "new permanent site" known as G-6. Has G-1 and its required monitoring been officially deleted from the Soldier Canyon MRP, as of today? If not, an amendment to do so may be required. Stream monitoring location G-6 is located downstream of UPDES mine water discharge points MW-2 and MW-3 (UPDES points #003 and #004).

Springs 3, 15, 18, and 21 are still referred to in the SC3 MRP as requiring monitoring but they are not mentioned in the recently approved PHC submitted by Mayo and Associates. According to Mr. Jim Smith, Barry Barnum wanted to delete the monitoring of these springs. Should the permittee still desire to delete these, they must submit an amendment and receive Division approval in order to do so. Mr. Zobell informed me that he has monitored these springs during the 3rd quarter.

According to Jim Smith on 9/2/97, the surface water monitoring point for the waste rock site has been deleted. What appears to be a "proposed surface water sampling location-currently monitored" still appears on the P.E. certified map 7.21-1 below the four ground water monitoring wells at Anderson Reservoir mentioned above. What the map shows appears to be some sort of surface facility; I'm assuming it is the referred to proposed waste rock site.

It appears that enough questions exist that a meeting should be scheduled to hammer out these issues, plus any more that may arise. I have already discussed this possibility with Jim Smith and Keith Zobell. Messrs. Dave Spillman and Mike Suflita should also be included as they are directly involved.

On 9/3/97, Jim Smith informed me that he was in the process of forwarding information regarding the questions that have arisen. Also, he was investigating some other issues, with regard to this memo.

I will follow this through and keep you informed. I will probably go ahead and try to set up a meeting with all individuals concerned. I definitely believe some documentation will be required if all involved can come to an agreement(s) on the issues. This hopefully will prevent confusion with the monitoring regime in the future.

sd
cc: Keith Zobell, Mayo & Associates
Dave Spillman, Canyon Fuel Company, Wellington
Jim Smith, DOGM, SLC

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May 15, 1997

To: File

From: Peter Hess, Reclamation Specialist III PHH

RE: 1996 Annual Report, Canyon Fuel Company, LLC, Soldier Canyon Mine,ACT/007/018, Folder #6 , Carbon County, Utah

Completeness:

The 1996 Annual Report for Canyon Fuel Company's Soldier Canyon Mine appears to meet the requirements for completeness with regard to the guidelines established by the Division.

Engineering Analysis:

The permittee has met the requirements for inspection and engineering certification of the inspections for the Mine's impoundments. The annual reporting requirements of the R645 rules have been met.

sd
cc: Joe Helfrich, DOGM, SLC