0004

Canyon Fuel Company, LLC
Soldier Canyon Mine
P.O. Box 1029
Wellington, Utah 84542
(435) 637-6360 Fax: (435) 637-0108

COPY

April 4, 2003

Ms. Pamela Grubaugh-Littig
Department of Natural Resources
Division of Oil, Gas and Mining
1594 West North Temple
Suite 1210
Salt Lake City, UT 84114-5801

RE: Chapter 7, Water Monitoring Amendment, Canyon Fuel Company, LLC, Soldier Canyon Mine, C/007/018

Dear Ms. Grubaugh-Littig:

Enclosed please find four copies of the submittal to address a change in the water monitoring requirements for the Soldier Canyon Mine. These changes have been previously discussed with Gregg Galecki during his tenure as the inspector and hydrologist for the Soldier Canyon Mine.

An additional copy of the submittal has been delivered to the Price Field Office.

Please contact Vicky Miller at (435) 636-2869, if there are any questions concerning this submittal.

Sincerely yours,

Vicky S. Miller

Cc: Chris Hansen (no enclosures)
Dave Spillman (enclosures)
Price Field Office (enclosures)

File in:
☐ Confidential
☐ Shelf
☒ Expandable
Refer to Record No 0004 Date 04/04/2003
In C/007/018, 2003 Incoming
For additional information

RECEIVED
APR 04 2003
DIV. OF OIL, GAS & MINING

APPLICATION FOR COAL PERMIT PROCESSING

Permit Change ☒ New Permit ☐ Renewal ☐ Exploration ☐ Bond Release ☐ Transfer ☐ COPY

Permittee: Canyon Fuel Company, LLC
Mine: Soldier Canyon Mine **Permit Number:** C/007/018
Title: Chapter 7, Water Monitoring Amendment
Description, Include reason for application and timing required to implement:

Instructions: If you answer yes to any of the first eight (gray) questions, this application may require Public Notice publication.

☐ Yes ☒ No 1. Change in the size of the Permit Area? Acres: _____ Disturbed Area: _____ ☐ increase ☐ decrease.
☐ Yes ☒ No 2. Is the application submitted as a result of a Division Order? DO# _____
☐ Yes ☒ No 3. Does the application include operations outside a previously identified Cumulative Hydrologic Impact Area?
☐ Yes ☒ No 4. Does the application include operations in hydrologic basins other than as currently approved?
☐ Yes ☒ No 5. Does the application result from cancellation, reduction or increase of insurance or reclamation bond?
☐ Yes ☒ No 6. Does the application require or include public notice publication?
☐ Yes ☒ No 7. Does the application require or include ownership, control, right-of-entry, or compliance information?
☐ Yes ☒ No 8. Is proposed activity within 100 feet of a public road or cemetery or 300 feet of an occupied dwelling?
☐ Yes ☒ No 9. Is the application submitted as a result of a Violation? NOV # _____
☐ Yes ☒ No 10. Is the application submitted as a result of other laws or regulations or policies?
Explain: _____
☐ Yes ☒ No 11. Does the application affect the surface landowner or change the post mining land use?
☐ Yes ☒ No 12. Does the application require or include underground design or mine sequence and timing? (Modification of R2P2)
☐ Yes ☒ No 13. Does the application require or include collection and reporting of any baseline information?
☐ Yes ☒ No 14. Could the application have any effect on wildlife or vegetation outside the current disturbed area?
☐ Yes ☒ No 15. Does the application require or include soil removal, storage or placement?
☐ Yes ☒ No 16. Does the application require or include vegetation monitoring, removal or revegetation activities?
☐ Yes ☒ No 17. Does the application require or include construction, modification, or removal of surface facilities?
Yes ☐ No 18. Does the application require or include water monitoring, sediment or drainage control measures?
☐ Yes ☒ No 19. Does the application require or include certified designs, maps or calculation?
☐ Yes ☒ No 20. Does the application require or include subsidence control or monitoring?
☐ Yes ☒ No 21. Have reclamation costs for bonding been provided?
☒ Yes ☐ No 22. Does the application involve a perennial stream, a stream buffer zone or discharges to a stream?
☐ Yes ☒ No 23. Does the application affect permits issued by other agencies or permits issued to other entities?

Please attach four (4) review copies of the application. If the mine is on or adjacent to Forest Service land please submit five (5) copies, thank you. (These numbers include a copy for the Price Field Office)

I hereby certify that I am a responsible official of the applicant and that the information contained in this application is true and correct to the best of my information and belief in all respects with the laws of Utah in reference to commitments, undertakings, and obligations, herein.

David G. Spillman
Print Name

David G. Spillman, Engineering Manager 4/4/03
Sign Name, Position, Date

Subscribed and sworn to before me this 4 day of April, 2003

Notary Public

My commission Expires: 12-15, 2006
Attest: State of Utah } ss:
County of Carbon

DIONNE M. OMAN
NOTARY PUBLIC • STATE of UTAH
1015 EAST 2640 SOUTH
PRICE, UTAH 84501
COMM. EXPIRES 12-15-2006

For Office Use Only:	Assigned Tracking Number:	Received by Oil, Gas & Mining
		RECEIVED APR 04 2003 DIV. OF OIL, GAS & MINING

Form DOGM- C1 (Revised March 12, 2002)

APPLICATION FOR COAL PERMIT PROCESSING
Detailed Schedule Of Changes to the Mining And Reclamation Plan

COPY

Permittee: Canyon Fuel Company, LLC
Mine: Soldier Canyon Mine **Permit Number:** C/007/018
Title: Chapter 7, Water Monitoring Amendment

Provide a detailed listing of all changes to the Mining and Reclamation Plan, which is required as a result of this proposed permit application. Individually list all maps and drawings that are added, replaced, or removed from the plan. Include changes to the table of contents, section of the plan, or other information as needed to specifically locate, identify and revise the existing Mining and Reclamation Plan. Include page, section and drawing number as part of the description.

Add	Replace	Remove	DESCRIPTION OF MAP, TEXT, OR MATERIAL TO BE CHANGED
☐	☒	☐	Chapter 7, Table of Contents, Pages 7-i and 7-ii
☐	☒	☐	Chapter 7, Pages 7-1 through 7-7, 7-123 Through 7-126, 7-155 through 7-158, 7-161 through 7-175, 7-193, 7-195, 7-196, 7-198, 7-201 through 7-208
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Any other specific or special instruction required for insertion of this proposal into the Mining and Reclamation Plan.	Received by Oil, Gas & Mining
April 4, 2003	RECEIVED APR 04 2003 DIV. OF OIL, GAS & MINING

CANYON FUEL COMPANY, LLC

SOLDIER CANYON MINE
CHAPTER 7, WATER MONITORING AMENDMENT
C/007/018

APRIL 2003

Chapter 7
TABLE OF CONTENTS

Chapter 7

HYDROLOGY (~~R614~~R645-301-700)

7.10 Introduction

This chapter presents a description of the hydrologic considerations for permitting the Soldier Canyon Mine operations including an expansion to the west incorporating a new lease area known as the Alkali Creek tract.

The information contained in this section was prepared in 1993 by the staff of the Applicant and by Thomas J. Suchoski, Carol A. Bjork, and Richard B. White of EarthFax Engineering, Inc. located in Midvale, Utah. This chapter was modified in 1995 by Keith W. Welch with assistance of the applicant's staff. Section 7.28, Probable Hydrologic Consequences was extensively modified based on a new study by Mayo and Associates.

7.11 General Requirements

This chapter presents a description of:

- existing hydrologic resources within the permit and adjacent areas
- proposed operations and the potential impacts to the hydrologic resources
- methods and calculations used to achieve compliance with hydrologic plans and design criteria
- hydrologic reclamation plans for the Soldier Canyon Mine operations

7.12 Certification

All maps, plans and cross-sections presented in this chapter which deal with the design of facilities or the determination of watershed characteristics have been certified by a qualified registered professional engineer.

7.13 Inspection

Impoundments included in the runoff control plan will be inspected as described in Section 5.14 of this application.

7.20 Environmental Description

This section presents a description of the hydrologic resources within the expanded Soldier Canyon Mine permit area and LOM permit area and those adjacent areas that may be affected by the coal mining and reclamation operations.

7.21 General Requirements

This section presents a description of the hydrologic resources within the expanded Soldier Canyon Mine permit area and LOM permit area.

7.22 Cross Sections and Maps

Exhibit 7.21-1 presents the existing surface and groundwater monitoring stations within and adjacent to the Soldier Canyon Mine permit and LOM permit area. Exhibit 7.21-2 shows the topography, streams, springs, reservoirs and wells located in the LOM area associated with water rights within and adjacent to the permit area.

7.23 Sampling and Analysis

All water samples are collected and analyzed according to methods in either the current edition of "Standard Methods for the Examination of Water and Waste water" or the 40 CFR parts 136 and 434. Field measurements are conducted using instruments maintained and calibrated in accordance with the manufacture's recommendations. All laboratory analyses are done by certified laboratories.

7.24 Baseline Information

7.24.1 Groundwater Information

The groundwater information contained within this section summarizes several groundwater studies of the existing permit area, the Alkali Creek tract expansion and studies including the surrounding region. These studies, including monitoring data, were initiated in 1976 and are continuing on an as needed basis. The most recent study was a re-evaluation of the PHC by Mayo and Associates in 1995. A copy of Dr. Mayo's report is appended as Appendix 7M. This study forms the basis for an update of much of the background information presented in this chapter.

Other background information includes a compilation of data from permit applications that have been submitted to the Regulatory Authority for the Sage Point/Dugout Canyon (ACT/007/009) and Soldier Canyon Mines (ACT/007/018). In addition, other published and unpublished data on the geology and hydrology of the area were collected and reviewed. The other sources of information included U.S. Geological Survey (USGS) investigation reports and unpublished theses.

Previous submittals have included sections on a refuse disposal site. These references have been omitted from this document since this site is no longer proposed for the Soldier Creek Mining operation. The operational history has shown little need for such a site. Disposal, if any should occur, will be either at the Skyline or SUFCo disposal areas.

Data Acquisition

Water quality data were collected from springs, mine sumps, groundwater discharging into the mine and drill holes in the mine area. These data were used to augment the regional data available from literature. Data on the piezometric surface in the aquifers, as previously submitted, were also collected at selected drilling locations and wells. Assumptions of a regional aquifer as indicated by piezometric surface maps have been modified by the Mayo report. Information from test borings and field measurements was used to construct stratigraphic sections of mine lease area aquifers and estimate their physical characteristics.

Impact on Hydrology

Previous assessments of the potential impacts of mining operations on the quantity and quality of groundwater were made by (1) studying the likely directions of groundwater flow, (2) identifying the locations of potential contaminant sources, and (3) examining the likely response of the groundwater system to contamination. The assessments have been updated by an analysis of 1) solute and isotopic compositions of surface and groundwater, 2) surface and groundwater discharge data, and 3) a re-evaluation of geologic data.

Contributors

The data for the Sage Point/Dugout Canyon permit application came from Eureka Energy Company and Wahler Associates between 1980 and 1983. The Soldier Canyon data were obtained from a hydrology study performed by R & M Consultants, Inc. in 1983, for a mine permit application, and from a Hydrologic Inventory of the site released in January, 1980 by Vaughn Hansen Associates. Field reconnaissance of Sections 5 and 6, T13S, R12E, SLM was performed by Sergent, Hauskins & Beckwith (SHB) during October, 1985. At the request of UDOGM, to provide additional insight into the hydrogeologic conditions below the Gilson coal seam, SHB performed a field investigation during August of 1986. This program consisted of the drilling of 3 boreholes from the existing working mine level, through the Gilson seam and into the underlying strata. In-situ hydrologic tests were performed. These field data and subsequent interpretations, analyses and conclusions are presented in an SHB report, included in Appendix 7-I.

Data from the mine permit documents identified above were merged and placed in this application by Michael R. Hulpke under the supervision of Allon C. Owen, P.E., and Mr. Ralph Weeks of Sergent, Hauskins & Beckwith, Salt Lake City, Utah.

In 1995 a new study was contracted with Mayo and Associates to re-evaluate the hydrogeology of the mine area and to determine surface-groundwater interactions. Using the latest techniques, this study characterized the hydrogeologic systems on a regional basis and up-dated the analysis of the probable hydrologic consequences.

Existing Resources

Groundwater in the LOM area, like groundwater in other parts of the Price River drainage basin, occurs under both confined and unconfined conditions (USGS, 1979). Unconfined water exists primarily in

shallow alluvial or colluvial deposits along the largest perennial and intermittent streams. It also exists in the soil mantle and the upper few tens of feet of the underlying consolidated rocks where the rocks have been extensively weathered and fractured.

Waddell, et. al. (1986) originally identified the Blackhawk Formation as the regional aquifer. Based on the data collected by Waddell, et. al. (1986), USGS (1979), and Soldier Creek Coal Company (Appendix 7), groundwater in the regional aquifer occurs as confined and unconfined conditions. Confined water exists at greater depths where a relatively impermeable bed overlies a more permeable water-bearing bed. The unconfined zones of the regional aquifer occur along the outcrop of the Book Cliffs below the alluvial and weathered sections of the Blackhawk Formations.

Within the LOM area, there has been no development of groundwater in either the perched or regional aquifers other than within underground mine workings. Wells within or adjacent to the area have been drilled for the purpose of monitoring or investigation but have not been developed for use. Discharge occurs from natural sources such as springs, seeps, evapotranspiration, and from underground mine workings. The locations of springs, wells, and surface water sampling points in and adjacent to the LOM area are listed on Table 7.24-1 and are presented on Exhibit 7.21-5 and/or in Appendix 7N. Exhibit 7.21-5 shows the original Soldier Canyon permit boundary so the reviewer can see why sampling points were originally selected with reference to that boundary.

Groundwater

A search of the State Engineer's records was conducted, to determine the location of existing water rights. The search area included:

-Original Soldier Creek tract

- T13S, R11E, Sects. 23-26, 35 & 36
- T13S, R12E, Sects. 30 & 31
- T14S, R11E, Sects. 1 & 2
- T14S, R12E, Sect. 6

- Alkali Creek tract expansion

- T12S, R11E, Sect. 33-36
- T13S, R11E, Sect. 1-4, 9-12, 13-16, 21-24, 25-28

Two groundwater rights have been located in the area. Water right 203 is for mine water used by Soldier Canyon Mine for underground process water. Water right 4124 is for a shallow well which Iriarts installed near a cabin on their property.

The principal surface and groundwater water rights in the life of mine area and the adjacent area within one mile of the life of mine boundary are presented in Table 7.24-2. This table classifies water rights by owner, type of use, source, location, and quantity and duration of use. Seasonal use and quantity varies significantly over the year.

During the winter, there is little use of the surface or spring flows, while during the summer there is considerable use of the water for stock watering purposes. As none of the water rights encompass pumping from an aquifer, the principal impacts of mining on water rights will be limited to surface water/groundwater interactions.

TABLE 7.24-1
HYDROLOGIC DATA COLLECTION SITES
SPRINGS

SITE NUMBER DESIGNATIONS*	LOCATION	GEOLOGIC UNIT	LAND SURFACE ELEVATION	SPRING NAME	OTHER
1	(D-12-11) 36aad	Flagstaff	7890		52[1]
2	(D-12-12) 30dcc	Flagstaff	7560		53[1]
3	" 33bcc	Flagstaff	7400		54[1]
4	" 34ccd	Flagstaff	7605		3[1]
5	(D-13-11) 1dab	Flagstaff	7930		CC-55[1], S31-1[2]
6	" 13acc	Blackhawk	6720	Drink	56[1]
7	(D-13-12) 4acd	Flagstaff	7480		57[1], G-87[2]
8	" 4bdc	North Horn	7410		2[1], G-88[2]
9	" 4cdd	Flagstaff	7910		33[1],
10	" 5cbc	Unknown	6980	Sulfur	8[1], G-89[2]
11	" 5cbc	North Horn	6980		24[1]
12	" 5ccb	North Horn	6970		9[1]
13	" 7aad	Price River	6880		10[1]
14	" 7cbb	North Horn	7600		S7-1[2]
15	" 8daa	Flagstaff	7900	Lower Little Pine	39[1]
16	" 8dad	North Horn	7840	Timber Road	38[1]
17	" 9cbb	Flagstaff	7940	Upper Little Pine	40[1], G-90/S8-1[2]
18	" 9dcc	Flagstaff	8120		31[1], G-91[2]
19	" 9dcc	North Horn	8090		32[1]
20	" 9ddc	Flagstaff	8090		30[1], G-92[2]
21	" 10abb	Flagstaff	7740	Water Hole	4[1]
22	" 10adb	Flagstaff	7870	Pine Canyon	42[1]
23	(D-13-11) 36cdc	Flagstaff	8180		CC-36[2]
24	" 12bba	Flagstaff	8040		CC-40[2]

*1. Sage Point/Dugout Canyon Permit Application; 2. Soldier Canyon Permit Application. ~~+ current water monitoring sites (as of approval of this amendment)~~

Note: ~~Sites 23 and 24 have been added to accommodate the addition of the Alkali tract.~~ Data for ~~these~~ sites 23 and 24 are included in Appendix 7N.

Following completing of the 1993 development, a sustained moist area was identified on the floor of the #5 entry, adjacent to well 5-1. Furthermore, subsequent monitoring of the water level indicated an increased rate of water level decline. The average rate of water level decline increased to approximately 0.09 ft/day between August 24, 1993 and November 1, 1995. This is an increase of 4 ½ times the previously observed rate, indicating the floor seep and drill hole are interconnected.

Mining operations in this area were again resumed in October, 1995. An increased frequency of well monitoring was also initiated since the planned development would pass directly beneath the surface collar location of drill hole 5-1. Results of this increased monitoring are presented in Figure 7.28-14. Subsequently, the October 1995 mine development did not encounter the actual drill hole/seam intersection point and no additional points of water inflow were observed. The monitoring information did indicate a slightly reduced rate of decline during the month.

Monitoring Well 6-1

Well 6-1 is continuously perforated over a 200 foot long interval which includes the Sunnyside seam. Because the perforated zone includes 80 feet below the seam and about 120 feet above the seam, measured water levels largely represent the composite hydraulic head of water bearing horizons above and below the Sunnyside Seam.

Initial water level measurements were believed to be associated with residual water remaining from drilling and casing operations. Water levels declined between November 1989 and August 1991 (Figures 7.28-13b). From August 1991 through August 1993 the water level had stabilized at a depth of approximately 425 feet. Monitoring on June 3, 1994 found the well to be dry and plugged at a depth of approximately 470 feet. All subsequent attempts to monitor this well have found the plugged/dry condition unchanged, therefore the monitoring of the well was discontinued following the 1st Quarter of 2003.

The cause of the approximately 50+ foot water level decline reported in 1994 has not been determined at present. The cause of the obstruction at approximately 470 feet below land surface is unknown.

Monitoring Well 32-1

Well 32-1 is perforated in the Blackhawk Formation through a 50 feet section located immediately above the Sunnyside seam. The well is located 0.5 miles north and is down dip of mine workings.

Water level monitoring information shows a fairly consistent rise in water elevation. From November 1994 through August 1995 the water level appears to have stabilized at a depth of approximately 291 feet (Figure 7.28-13c). There is no information at this time that would suggest that underground mining activities are affecting the water levels observed to date.

The increase in water level in the well are most likely the result of the combined factors of poor well construction (i.e. the perforated zone is not adequately isolated from the overlying well bore) and recharge to overlying aquifers.

Monitoring Well 10-2

Well 10-2 is continuously perforated for 250 feet in the middle part of the Castlegate Sandstone Member of the Price River Formation. The well is located about 2 miles east of mine workings and the perforated section occurs approximately along the strike of rock layers which occur above the mine.

Water levels declined about 400 feet within about one month after perforation in 1979 and reached a quasi-stabilization at about 710 feet below land surface (Table 7.28-7). The initial water level is attributed to well drilling fluid. Water levels remained relatively stable until a slug test was performed in November 1982. Slug test results indicate a transmissivity of about 1 gpd/ft (Wahler Associated, 1982; Table 7.28-8). Soldier Creek Coal Company began monitoring well 10-2 in June 1987 and discontinued following the 1st quarter of 2003 monitoring. The water depth monitored at this time was 716 feet. Subsequent monitoring has shown a gradual decline of about 10 feet.

Discussion

Water level declines in well 10-2 between 1979 and 1981 coincided with early expansion of the Soldier Canyon Mine workings, thus the effect of mine workings on the water levels was negligible. Because the rate of water level decline since 1987 is similar to the rate of

4) Ground water systems encountered in Soldier Canyon Mine are not in hydraulic connection with Soldier Creek or other surface waters.

5) Except for increasing the baseflow and changing the baseflow solute composition of Soldier Creek the effects of coal mining in the Soldier Canyon Mine within the Blackhawk Formation on overlying springs and surface waters is negligible. Similar effects to Soldier and Dugout Canyon Creeks are anticipated as a result of the proposed mining in the Alkali Creek and Dugout Canyon tracts.

7.29 Cumulative Hydrologic Impact Assessment (CHIA)

The Division has already prepared a CHIA for the original Soldier Canyon Mine permit area. Additional data are presented within this application to assist the Division in preparing an updated CHIA, which incorporates the Alkali Creek tract and adjacent areas.

7.30 Operation Plan

7.31 General Requirements

This section describes the groundwater and surface water protection plan and water quality monitoring program implemented within the existing permit area and to be implemented for the refuse disposal site. The purpose of the groundwater and surface water protection plan is to minimize the potential for water pollution and changes in water quality and flow for surface and groundwater within and adjacent to disturbed areas. The purpose of the water quality monitoring program is to identify the potential impacts of coal mining operations on the hydrologic balance. Should the mining operations have an impact on a water source, this information will be coordinated with the Utah Division of Water Rights.

7.31.1 Hydrologic Balance Protection

Surface and Groundwater Protection Plan

The Applicant includes in this application a plan to protect the surface and groundwater in the area of the mine facilities, topsoil storage site and refuse disposal site. The plan will ensure protection of the ground water and surface water resources of the sites by handling earth and refuse materials in a manner that prevents or controls, using the best technology currently available, the discharge of

pollutants to the hydrologic system. Additionally, the Applicant commits to properly handle acid and toxic forming materials, if any are found. If encountered a mitigation plan will be prepared and submitted to DOGM for approval within 30 days. The design details of the water protection plans are presented in Sections 5.33 and 7.42 of this application.

7.31.2 Water Monitoring

The ~~proposed~~ monitoring program for wells, springs and streams is summarized in Tables 7.31-1, 7.31-2, 7.31-3 and 7.31-4. The ~~proposed~~ monitoring locations are presented in Exhibit 7.21-1. This monitoring program has been specifically designed to evaluate the effects of mining on the anticipated hydrologic consequences.

Monitoring activities will concentrate on determining water level, discharge and water quality fluctuations in relevant aquifers in the mine area. ~~Data will be collected at approved locations within the LOM and adjacent areas~~. The objectives of the monitoring plan are to 1) identify potential impacts during and after mining, and 2) provide additional data on aquifer characteristics.

Flow

Stream flows are determined utilizing a flowmeter, ~~or~~ flumes or ~~as appropriate. When practical, some small flows are determined~~ by diverting and timing the flow as it fills a container of known volume.

pH, Specific Conductivity, Temperature and Dissolved Oxygen

The pH, specific conductivity and temperature will be taken with a probe device of high quality. Temperature reading may be taken directly with a thermometer.

Level

Water levels within monitoring wells are measured directly using a sealed electronic probe with a metered connecting cable. Dissolved oxygen will be measured with either a probe or by titration.

All test and measurement instruments are operated, maintained and calibrated in accordance with the manufacturers instructions. The results of all field measurements are recorded and reported to UDOGM ~~on special forms and are initialed by the sampler~~.

Table 7.31-1 Recommended Monitoring Program
Soldier Canyon Mine

Monitoring Wells	Protocol	Comments
6-1	A	~~(if blockage is removed)~~ Monitoring discontinued 1st Quarter 2003
10-2	A	Monitoring discontinued 1st Quarter 2003
32-1*	A	
Streams		
G-2	C	
G-5	B, 1, 2	
G-6	B, D, 1, 2, 6	~~(new permanent site)~~
G-7	D, 6	~~(new permanent site)~~
G-8	C	~~(new permanent site)~~
G-9	C	~~(new permanent site)~~
G-10*	B, 1, 2	~~(new permanent site)~~
Springs		
4	F, 4	
5 (CC-53)*	E, G, 3, 7	
8	F, 4	
10*	E, G, 3, 7	
23 (CC-36)*	E, G, 3, 7	~~(new permanent site)~~
24 (CC-40)*	E, G, 3, 7	~~(new permanent site)~~

* Monitoring of these sites will resume in the quarter the Soldier Canyon mine portals are reopened for active mining.

Note: There are no requirements for Water Quality protocol 5 "Spring: quarterly water quality operational laboratory measurements" as shown in Table 7.31-2. The justification for this begins on page 69 of Appendix 7M.

Table 7.31-2 Field and Laboratory Measurement Protocol

Water level and flow measurements

A Monitoring well: quarterly water level measurements

B Stream: quarterly discharge measurements

C Stream: quarterly discharge measurements; discontinue one year following the end of active mining in the vicinity of the spring area.

D Stream: ~~gain-loss hydrograph measurements of two or more stream sites performed during only both the first a wet and dry year to meet the defined criteria.~~ Flow measurements will be taken during the first wet year and first dry year to enable preparation of base-flow hydrographs of the monitoring sites. Wet and dry years are based on Soil Conservation Services snow pack measurements as of March 1 for the Price - San Rafael area. Dry year and wet years are defined as <70 and > 110 percent of normal, respectively as of March 1. Flow measurements will be taken weekly between April 1 and August 31 as conditions permit.

E Spring: quarterly discharge measurements

F Spring: quarterly discharge measurements; discontinue one year following the end of active mining in the vicinity of the spring area.

G Spring: ~~base flow hydrograph measurements of spring site performed during both a wet and dry year.~~ Flow measurements will be taken during the first wet year and first dry year to enable preparation of base-flow hydrographs of the monitoring sites. Wet and dry years are based on Soil Conservation Service snow pack measurements as of March 1 for the Price - San Rafael area. Dry year and wet years are defined as <70 and >110 percent of normal, respectively as of March 1. Flow measurements will be taken weekly between April 1 and August 31 as conditions permit.

Water Quality

1 Stream: quarterly water quality field measurements

2 Stream: quarterly water quality operational laboratory measurements. G-10 will not be sampled for Oil and Grease.

3 Spring: quarterly water quality field measurements

4 Springs: quarterly water quality field measurements; discontinue one year following the end of active mining in the vicinity of the spring area.

5 Spring: quarterly water quality operational laboratory measurements

6 Stream (wet and dry year only): semi-annual water quality field measurements, operational laboratory measurements and ^{3}H measurements during both a wet and dry year. Wet and dry years are based on Soil Conservation Service snow pack measurements as of March 1 for the Price - San Rafael area. Dry year and wet years are defined as <70 and > 110 percent of normal, respectively as of March 1. Semi-annual sampling will be performed in the high-flow and low-flow seasons in conjunction with quarterly sampling if applicable.

7 Spring (wet and dry year only): semi-annual water quality field measurements, operational laboratory measurements and ^{3}H measurements during both a wet and dry year. Wet and dry years are based on Soil Conservation Service snow pack measurements as of March 1 for the Price - San Rafael area. Dry year and wet years are defined as <70 and > 110 percent of normal, respectively as of March 1. Semi-annual sampling will be performed in the high-flow and low-flow seasons in conjunction with quarterly sampling if applicable.

Laboratory Analyses

When laboratory measurements are required, a specific set of sample bottles are pre-ordered from the laboratory. Bottles received from the laboratory are clean, pre-acidified and properly identified. Once the sample bottles are filled, they are individually labeled ~~with water-proof, smudge-proof labels~~, placed in ice chests, and in warm weather, cooled with ice packs prior to returning to the laboratory. Proper holding times are adhered to. Only certified laboratories are used. (See also Section 7.23 - Sampling and Analysis.)

7.31.2.1 Groundwater Monitoring

The groundwater monitoring program consists of monitoring of springs and seeps, water wells, and inflow points in-mine. These points were selected based on the proposed mine development and the understanding of the baseline data and hydrogeologic conditions of the site to provide a means of identifying any significant impact from the mining operations on the groundwater resources.

All NPDES permit sources will be monitored in accordance with permit conditions. Exceedances of these permit conditions will be reported as required by R645-300-700.212.

The refuse disposal site wells are no longer monitored since the site is not scheduled to be activated.

Data collected from wells MW-1M, MW-1C, MW-2M, and MW-3M were used to evaluate the conditions in the area of the proposed refuse pile and to determine if any problems are identified in either the shallow or deep aquifers of the Mancos Shale. No impacts to water quality or flow are anticipated from the operation. About 4.5 years of baseline data have been collected for this area. This provides a good description of the groundwater system in the area. Monitoring sites MW-1M, MW-1C, MW-2M and MW-3M ~~will be~~ have been discontinued.

Computerization of water quality data will enable a comparison of current data with that which has been previously obtained. The overall mine water quality will be assessed at the NPDES discharge point. Failure of this water to meet effluent limitations will trigger an appropriate underground investigation to establish cause. The timing of this investigation will coincide with placement on DWQ's chronic violator status.

The summarized monitoring results for each in-mine monitoring point was previously presented as Figures 7.31-12 through 7.31-23. Appendix 7I contain the complete monitoring results of historical monitoring data. These figures are now considered to be baseline data and have been placed in Appendix 7O. (See also the Appendices of the Mayo Report.)

In the event of any significant changes in water quantity resulting in non-compliance or any development of new water sources, the Regulatory Authority will be notified in accordance with the provisions of R645-301-145 and R645-301-731. Significant changes will be defined as increases in quantity of existing inflows or any new mine inflows in excess of 50 gal/min. In the event such changes occur, the Division will be notified and SCCC will develop a plan to evaluate the inflow to determine the source of the water. Such plans will be consistent with the findings of the PHC. Specific actions and plans can not be developed at this time due to the uncertainties of the site conditions which may be occurring at the time of the inflow. Therefore, a site-specific plan will be developed if and when an inflow is encountered.

All of the measurements made of the hydrologic regime will be reported quarterly to the Regulatory Authority within 90 days of the end of the quarter. A report will be made to the Authority within five days if the concentration of any dissolved constituent upon discharge into surface water should indicate noncompliance with an NPDES permit condition. A copy of the current NPDES Discharge Permit can be found in Section 5. An annual report will be submitted to the Regulatory Authority that summarizes pertinent monitoring results. Summarized annual information will also be provided for the 5 year permit renewal.

Equipment, structures and other devices used in conjunction with monitoring the quality and quantity of ground water will be properly installed, maintained and operated in accordance with manufactures instructions and will be removed by operator when no longer needed.

Monitoring Well 5-1

Most water within the drill hole is believed to be residual water related to the 1977 drilling operations and additional water injected into the casing during a November, 1982 slug test. The water level declines during the past 16 years appear to be the result of the slow acceptance of water into the relatively dry and nearly impermeable coal seams. A slight lowering of the water level accompanied mining in the immediate vicinity of the well; however about 1,300 feet of hydrostatic head remains in the well. It now

appears that quarterly, routine water level monitoring of this site will result in only little additional information. It is, therefore, recommended that routine monitoring of this site be discontinued.

Monitoring Well 6-1

Unlike well 5-1, well 6-1 monitors a 200 foot section of the Blackhawk Formation and is not specifically isolated at just the coal seams. During the June 1994 monitoring, it was discovered that there was an obstruction in the well-casing at depth. As a result of this obstruction, the well ~~is~~ was not ~~currently~~ available for monitoring. The monitoring of Well 6-1 will be discontinued after the 1st quarter of 2003 due to the continued obstruction within the casing. Although it is inconclusive what effects, if any, mining has had on the observed water level declines at well 6-1, further monitoring of well 6-1 may yield meaningful information in characterizing any underground mining effects on the groundwater system. Therefore, an unsuccessful attempt ~~will be~~ was made to remove the obstruction within the casing using a hand line and fishing tool. ~~and, if successful, routine monitoring of water levels be continued. If this attempt to reopen the casing fails, final reclamation of the well will be completed.~~

Monitoring Well 10-2

Mining operations at the Soldier Canyon Mine have demonstrated the dry nature of the coal seams. Although roof drips and floor seeps are not uncommon within the mine, those that are believed to originate from near the coal seam are typically short-lived and insignificant. All significant inflows of groundwater into the Soldier Canyon Mine appear to be associated with features that create a connection with overlying rock formations (i.e., drill holes, faults and joints, secondary mining areas).

Because the Castlegate Sandstone Member immediately overlies the Blackhawk Formation, underground mining effects on this formation are possible. However, consideration must be given to the fact that drill hole 10-2 is located nearly two miles from the workings of the Soldier Canyon Mine. While the observed drawdown cannot be conclusively associated with mining activities at this time, monitoring of this site will be continued in association with the Dugout Canyon Mine and continue to be recorded as site GW-10-2. ~~should be continued.~~

Monitoring Well 32-1

Routine monitoring of this site should continue, particularly now that it appears that the water level has stabilized.

Springs

The water monitoring program is designed based on the following conclusions resulting from analysis of data collected previously:

1) ground-water systems in the Flagstaff and North Horn Formations operate independently of ground water in Blackhawk Formation,
2) the temporal variability of spring discharges from the Flagstaff and North Horn Formations are due to climatic variability (i.e. wet and dry years),
3) mining will not affect ground-water systems in the Flagstaff and North Horn Formations.

Previous base line and quarterly monitoring of springs located above the mine have provided valuable information regarding the chemical composition and discharge characteristics of ground water systems. The existing quarterly sites are:

Spring	Formation
3	Flagstaff
4	Flagstaff
5	Flagstaff
8	North Horn (contact with Price River Formation)
10	North Horn (Sulfur Spring)
15	Flagstaff
18	Flagstaff
21	Flagstaff

The proposed spring monitoring program includes four springs from the existing program and the addition of two springs not currently monitored. Some of the existing sites have been discontinued for the following reasons:

1) the chemical character, both spatial and temporal, of the ground-water systems are well established,
2) the data strongly suggest that the chemical characteristics of ground waters in the Flagstaff and North Horn Formations will not be affected by mining operations,
3) most of the existing spring sampling sites are in the Flagstaff Formation and therefore many of the sites are redundant, and
4) results of this investigation demonstrate that the Flagstaff and North Horn ground-water systems are not in active hydraulic communication with ground-water systems in the Blackhawk Formation.

The specific proposed monitoring program and the rational for each site follows. Continued monitoring of springs 4, 8 and 30 (associated with the Dugout Application) will provide information regarding the potential effects of mining on springs in the Pine Creek area. Monitoring these springs should terminate 1 year after mining in the areas ceases. Spring 10 should continue as a permanent monitoring site because it provides information regarding fault controlled ground water systems. Springs 5(cc-53), CC-36 and CC-40 will provide information regarding the effects of wet and dry periods on spring discharges as well as monitor the possible effects of mining on ground waters in overlying ground-water systems.

7.31.2.2 Surface Water Monitoring

Historical surface water quality monitoring data are presented in Appendix 7-I and in Figures 7.31-24 through 7.31-27. The surface water monitoring locations have been modified to accommodate the expanded boundaries of the LOM area.

Water quality data for all sites will be recorded into the UDOGM electronic database ~~submitted~~ on a quarterly basis within 90 days of the end of the quarter. ~~The surface water annual monitoring report will contain a map showing all locations that are being monitored. The Applicant will submit an annual report summarizing the water quality data.~~

Equipment, structures and other devices used in conjunction with monitoring the quality and quantity of ground water will be properly installed, maintained and operated in accordance with manufactures instructions and will be removed by operator when no longer needed.

Streams

The proposed stream monitoring program is designed to:

1) further evaluate the potential for hydraulic connection between the Blackhawk Formation and Streams. Stream gauging by Waddell and other (9186) suggests that there is a net contribution of water from the Blackhawk Formation to Soldier Creek. However, the work of Waddell and others was performed during a wet period. Follow-up measurements during a dry cycle are warranted, and

2) continue monitoring the effects of mine discharge waters on Soldier Creek. Quarterly stream flow measurements and water quality samples are currently collected at Soldier Creek sites G-1, G-2, and G-5. We recommend discontinuing G-1, after 2 years of data have been collected at G-6, because the site is located too far upstream to permit evaluation of mine water discharges on Soldier Creek. We also recommend discontinuing G-2 one year after coal mining beneath Pine Creek area ceases for a similar reason. We recommend the continued monitoring of site G-5. The establishment of three(3) new temporary and two (2) new permanent sites is recommended. Permanent site G-6 is located just upstream of G-5 and will permit the evaluation of the effects of mine discharge waters on Soldier Creek. Temporary sites G-7 through G-9 will permit the evaluation of the effects of mining on surface flow in Pine Creek and the relationship between the Blackhawk Formation and creek flows. The new stream site G-10, located where spring site CC-57 has previously been monitored, is recommended because it will monitor any effect of mining on the drainage located west of Soldier Creek. The monitoring of G-10 will be discontinued (2003) while the mine is in temporary cessation, but monitoring will resume when the mine is reopened for coal extraction. Because of the location of G-10 there is no potential impact for contamination by oil and grease therefore a water sample will not be collected for the analysis of oil and grease.

7.31.3 Acid and Toxic Forming Materials

Drainage from acid and toxic forming materials and underground development waste into surface water and ground water will be avoided by:

1. Identifying and burying and/or treating, when necessary, materials which may adversely affect water quality, or be detrimental to vegetation or to public health and safety if not buried and/or treated.

2. Storing materials in a manner that will protect surface water and ground water by preventing erosion, the formation of polluted runoff and the infiltration of polluted water. Storage will be limited to the period until burial and/or treatment first become feasible, and so long as storage will not result in any risk of water pollution or other environmental damage.

   Storage, burial or treatment practices will be consistent with the relevant provisions for material handling and disposal as outlined in R645-301-521 and R645-301-528 rules. Monitoring for parameters defining acid and toxic forming materials will continue as described in R645-301-700.300. (See also procedures of Section 5.23)

7.31.4 Transfer of Wells

Before final release of bond, exploratory or monitoring wells will be sealed in a safe and environmentally sound manner in accordance with R645-301-631, R645-301-738 and R645-301-765. Ownership of wells will be transferred only with prior approval of UDOGM. The conditions of such a transfer will comply with State and local laws. Soldier Creek will remain responsible for the management of the well until bond release in accordance with R645-301-529, R645-301-551, R645-301-631, R645-301-738 and R645-301-765.

7.31.5 Discharges

The Applicant will not discharge into the underground mine, unless specifically approved by the Division and meets the approval of MSHA. Discharges will be limited to the following:

1. Water
2. Coal processing waste
3. Sludge from an acid-mine-drainage treatment facility
4. Inert materials used for stabilizing underground mines
5. Underground development waste

The angle at which the coal bed is inclined from the horizontal (dip) prevents any gravity discharge of water from the surface entries.

7.31.6 Stream Buffer Zones

As shown on Exhibit 5.21-1, several areas of the central mine facilities lie within 100 feet of Soldier Creek, a perennial stream. Specifically, these areas include the No. 2 exhaust fan, main storage and facility yard, coal handling facilities, parking lot, sediment pond and a small topsoil storage area. The Applicant has provided protection to the stream adjacent to these facilities, via the installation of approximately 885 feet of stream culvert and sediment control measures (Exhibit 7.32-1). These preventative measures will ensure that the water quantity and quality or other environmental resources of the stream are not adversely affected.

The implementation of these activities were approved by the Division through permit amendments and a stream alteration permit (Appendix 10) through the Division of Water Rights. All stream channel diversions comply with the provisions of R645-301-742.300.

The areas not to be disturbed will be designated as a buffer zone, and will be properly marked.

7.31.7 Cross Sections and Maps

Cross sections and maps, as required for R614-301-731.700, are presented within this document on exhibit 7.21-1, 7.21-2 and 7.24-1. Other relevant cross sections on maps are discussed in Section 5. See also Sections 7.12 and 7.24.

7.31.8 Water Rights and Replacement

In the event that the monitoring program identifies an impact to the water source in the permit and adjacent areas, the replacement of water rights will be addressed as described in Section 7.27 of this application. A listing of water rights for the Soldier Creek tract and for the Alkali Creek tract expansion may be found in Table 7.24-2 of this document.

7.32 Sediment Control Measures

The sediment control measures for the Soldier Canyon Mine operations are discussed in Section 7.42 of this application. The structures to be used for the runoff-control plan for the facilities are; undisturbed area diversion channels, disturbed area diversion channels, sedimentation ponds, containment berms, riprap, strawbales and/or silt fence, revegetation and mulching, road diversions and culverts, stream channel by-pass culvert, and natural drainage channels. ~~like the ephemeral drainage channel at the refuse disposal site which acts as a disturbed area collection ditch.~~

The undisturbed area diversion channels are sized to handle the 10 year-6 hour precipitation event, except for those undisturbed diversions located at the ~~refuse disposal site and~~ topsoil storage site, which are sized to handle the 100 year-6 hour precipitation event.

Road diversions and culverts are sized to handle the 10 year-6 hour event, except for those located at the topsoil storage site, which were designed for the 100 year-6 hour event. The Applicant commits to maintain all diversions and culverts during the life of the facilities.

Sediment control for the existing temporary topsoil storage area will be provided by a containment berm and disturbed and undisturbed area diversion ditches. The design of the existing structures is currently approved by the DOGM (see Appendix 7G). If facility expansion occurs, construction of these facilities will be increased to encompass more of the 4.5 acre area. As this event occurs, SCCC will submit design plans covering the modification of the runoff control facilities.

The central mine ~~and refuse disposal~~ site sediment ~~ponds are~~ pond is designed to handle the 10 year-24 hour precipitation event. Exhibit 7.32-1 provides a graphical depiction of the "as-built" runoff control plan for the central mine area.

The Soldier Creek by-pass culvert has been designed to handle a 100 year-24 hour precipitation event. The placement of this culvert was approved by the Division through amendments to the permit and by obtaining a stream alteration permit through the Division of Water Rights (Appendix 10).

7.33 Impoundments

7.33.1 General Plans

The only impoundment associated with the Soldier Creek Mine is the sedimentation pond located immediately below the portal area facilities.

Certification

All maps and cross sections the sedimentation ponds have been prepared by, or under the direction of, and certified by a qualified registered professional engineer.

Maps and Cross Sections

Design details for these sites are presented in Appendices 7A and 7J respectively.

Narrative

A description of each sedimentation pond is presented in Section 7.42.2.

Subsidence Survey Results

No underground coal mining will occur beneath either impoundment and therefore, there will be no impacts from subsidence.

Hydrologic Impacts

The hydrologic information required to assess the hydrologic impacts on the impoundments can be found in or referenced in Section 7.24.

Design Plans and Construction Schedule

The mine site sedimentation pond was originally designed by Vaughn Hansen Associates, Salt Lake City, Utah. The pond was constructed in the fall of 1979 and modified in 1986.

7.33.2 Permanent and Temporary Impoundments

Requirements. All impoundments have, or will be, designed and constructed using current, prudent engineering practices. Specific foundation design construction criteria are presented or referenced in Section 5. Design details can be found in Appendix 7 parts A and J.

Permanent Impoundments. There are no permanent impoundments associated with the mine facilities.

Temporary Impoundments. The Division has authorized the construction of the existing temporary impoundment at the mine site.

7.34 Discharge Structures

Discharge from the sediment pond is conveyed by a CMP culvert acting as the principal and emergency spillway. The outlet of the spillways is protected by riprap as described and presented in Appendix 7. This design will comply with the requirements of standard engineering design procedures as required by R614-301-744.

7.35 Disposal of Excess Spoil

No significant excess spoil will be developed by the underground mine. The only anticipated spoil will be from materials collected in the sediment ponds. This limited volume of material will be removed from the ponds and transported to ~~the~~ a refuse disposal site.

In the event spoil is generated during the facilities expansion, this too will be transported to the refuse disposal site.

The handling of these materials will comply with R614-301-745.

7.36 Coal Mine Waste

The refuse will be disposed of in accordance with the designs presented in Chapter 5 and Section 7.46 of this application.

7.37 Noncoal Mine Waste

Noncoal mine waste will be stored and final disposal of noncoal waste will comply with R614-301-747 and will be in accordance with the operation plan identified in Section 5.42.72.

7.38 Temporary Casing and Sealing of Wells

Each well which has been identified in the approved permit application to be used to monitor ground water conditions will comply with R614-301-748 and be temporarily sealed before use and for the purposes of SURFACE COAL MINING AND RECLAMATION ACTIVITIES protected during use by barricades, fences or other protective devices approved by the Division. These devices will be periodically inspected and maintained in good operating condition by the operator conducting SURFACE COAL MINING AND RECLAMATION ACTIVITIES.

7.40 Design Criteria and Plans

7.41 General Requirements

The runoff control plans for the Soldier Canyon Mine facilities include the diversion of the undisturbed runoff from areas contributing to the facilities, the collection of all runoff from disturbed areas associated with the sites and the containment and treatment of this disturbed runoff through the use of sediment ponds, strawbales, silt fence, riprap, mulches and revegetation. Plans for these activities are presented and discussed in the following sections.

7.42 Sediment Control Measures

7.42.1 General Requirements

Appropriate sediment control measures will be designed, constructed and maintained using the best technology currently available to:

1. Prevent, to the extent possible, additional contributions of sediment to stream flow or to runoff outside the permit area,
2. Meet the effluent limitations under R614-301-751, and
3. Minimize erosion to the extent possible.

Sediment control measures include practices carried out within and adjacent to the disturbed area. The sedimentation storage capacity of practices in and downstream from the disturbed areas will reflect the degree to which successful mining and reclamation techniques are applied to reduce erosion and control sediment. Sediment control measures consist of the utilization of proper mining and reclamation methods and sediment control practices, singly or in combination. Sediment control methods include, but are not limited to:

1. Retaining sediment within disturbed areas,
2. Diverting runoff away from disturbed areas,
3. Diverting runoff using protected channels or pipes through disturbed areas so as not to cause additional erosion,
4. Using straw dikes, riprap, check dams, mulches, vegetative sediment filters, dugout ponds and other measures that reduce overland flow velocities, reduce runoff volumes or trap sediment,
5. Treating with chemicals, and
6. For the purposes of UNDERGROUND COAL MINING AND RECLAMATION ACTIVITIES, treating mine drainage in underground sumps.

7.42.2 Siltation Structures

7.42.2.1 General Requirements

Additional contributions of suspended solids and sediment to streamflow or runoff outside the permit area will be prevented to the extent possible using the best technology currently available as required by R645-301-742.200.

Alternative Sediment Control Areas (ASCA)

There are nine ASCAs within the Applicant's permit area which do not drain to a sediment pond with two locations approximately 2 and 2.5 miles south of the central mine facilities (Exhibit 7.32-1). Appropriate measures have been taken to ensure that all runoff leaving these sites shall comply with State and Federal effluent limitation standards. The total area within the Applicant's permit area designated for ASCAs is 4.90 acres. Therefore, the total ASCAs per total disturbed area of 21.82 acres ~~(not including the proposed refuse disposal site)~~ is 22%. The ASCA's are listed on Table 7.42.2.1-1.

Table 7.42.2.1-1

Alternative Sediment Control Areas

ASCA	Description	Drainage Area (Acres)	10 yr-24h Precipitation	Curve Number	Runoff (Acre Ft.)
ASCA 1	REI storage area	0.42	1.9	75	0.012
ASCA 2	Parking lot outslope	0.27	1.9	75	0.01
ASCA 3	No. 2 exhaust	0.35	1.9	78	0.013
ASCA 4	North of No. 2 fan	0.02	1.9	75	0.0006
ASCA 5	Portal bench disturbance	0.43	1.9	75	0.012
ASCA 6	Sewage lagoons	0.46	1.85	75	0.01
ASCA 7	Topsoil storage site	2.30	1.85	85	0.132
ASCA 8	By-pass culvert inlet	0.04	1.9	85	0.002
ASCA 9	#3 Fan Exploration Road	0.61	1.85	78	0.020
TOTAL	ASCA disturbed	4.90			

Specific details concerning these sites are as follows:

ASCA #1

R.E.I. Storage Area

The R.E.I. storage area lies immediately southwest of the central mine facility sedimentation pond (Figure 7.42-1). It is utilized on a casual basis by Resource Enterprises, Inc. (R.E.I.), for storage of equipment and small parts. The total drainage area, as shown in Figure 7.42-1 is approximately 0.42 acres. Of this total drainage area only 0.18 acres are utilized for fenced storage with access to the county road.

The expected runoff volume from a design storm can be determined using the runoff curve number technique, as defined by the U.S. Soil Conservation Service (see the Soldier Canyon Mine Runoff Control Plan, Appendix 7). Using the 10-yr., 24-hr. precipitation depth of 1.9" and a curve number of 75 the direct runoff was calculated to be 0.33". This results in a total design runoff volume of 0.012 ac-ft.

The Applicant has provided several alternative sediment control methods in order to ensure that all runoff from the site meets effluent limitations. A description of the sediment control methods which have been implemented is as follows:

1. The entire storage area, including access, has been covered with gravel. This gravel, which is one to two inches in diameter has effectively stabilized the surface.

2. A substantial berm has been constructed along the southern boundary of the storage pad. This berm helps direct runoff towards a single treatment facility while protecting the topsoil storage pile from excess runoff.

3. The topsoil storage pile has been revegetated and is being monitored as a revegetation field trial test site.

4. The small channel which directs drainage off the storage pad outslope towards the straw bales has been protected by lining it with cobble size stones.

5. All runoff is passed through a set of straw bales before returning to the natural drainage. Straw bales have also been placed around the topsoil storage area to provide additional protection. (Note: The natural drainage where the treated runoff enters is a relatively flat, grassy area. Since a point source is difficult to identify here, monitoring is not considered practical.)

7.42.2.2 Sedimentation Pond

Located just North of R.E.I. storage area. The central facilities sedimentation pond was initially designed by Vaughn Hansen Associates, Salt Lake City, Utah; approved by the regulatory agencies; and constructed during October-November 1979. A portion of the sedimentation pond was subsequently reconstructed during August, 1986. During November 1990, EarthFax Engineering, Inc. was contracted to evaluate the runoff control and treatment facilities for the Central Mine Facilities Expansion. EarthFax's runoff control plan, as well as the sediment pond modifications and final construction report, are presented in Appendix 7-A. Sediment pond modifications according to Appendix 7-A, were completed on November 22, 1991 and are shown on the "as-built" Drawing B-127.

As indicated in Appendix 7-A, the facilities area will contribute 1.62 acre-feet of runoff to the sedimentation pond during the 10 year-24 hour storm. Based on the current configuration, the pond is slightly oversized and will handle an additional 0.27 acre-feet of water.

The total disturbed area contributing to the pond totals 14.7 acres. The sediment storage required to be provided in the pond for this area of disturbance is 1.47 acre-feet. This will result in the maximum sediment storage being at an elevation of 6649.6 feet. The sediment collected in the pond will be removed when 60 percent of the maximum storage volume (0.88 acre-feet) has been deposited. This cleanout level corresponds to an elevation of 6647.6 feet. With the decant elevation at 6649.6 feet, the clean out level will be at least 2.0 feet below the decant level, thus meeting previous requirements that the Utah Division of Water Quality placed on operation of the pond.

When sediment reaches the cleanout level it will be analyzed for potential acid-forming, toxic-forming or alkalinity producing materials prior to removal. Tests will be conducted in accordance to "Guidelines for Management of Topsoil and Overburden for Underground and Surface Coal Mining." Division approval on the suitability of the material will be obtained prior to disposal.

presented in Appendix 7-A indicate that this riprap is adequate for controlling erosion at the outfall.

Refuse Disposal Site

The sediment control measures for the proposed refuse disposal site are presented in the EarthFax Engineering, Inc. report presented in Appendix 7J. The proposed refuse disposal site will not be constructed, therefore reference to the site was removed from Chapter 7 of the M&RP in 2003. ~~structures to be used for the runoff-control plan for the site are two undisturbed area diversion channels, a sedimentation pond, road diversions and culverts, and the natural drainage channel acting as a disturbed drainage area collection ditch.~~

~~The sediment pond will be located in the ephemeral drainage at the toe of the proposed ultimate extent of the refuse disposal area. This will allow a single pond to be constructed which will be in place and functional from the start of the operations through the reclamation of the facility. The pond is designed to contain the 10 year 24 hour precipitation event from the entire upstream watershed and a 5-year sediment storage volume.~~

~~Once the runoff from a storm event has been detained for a period sufficient to allow the water to meet effluent limitations, the water will be discharged via a decant valve. The decant valve will be mounted on the side of the principle spillway and will be operated by an extension handle on the embankment crest.~~

~~A principle spillway and an emergency spillway are included in the design of the sediment pond. These spillways will consist of two 2.5 foot diameter CMP culverts and will be able to handle the 25 year-6 hour peak flow from the drainage above the pond location.~~

~~The disturbed runoff from the disposal area will be collected by the existing ephemeral drainage channel and conveyed to the sediment pond. This channel is incised in the colluvial fill on the underlying Mancos Shale bedrock. As this channel will ultimately be disturbed by the refuse disposal pile, no erosion protection measures are planned for the channel. All sediment produced within the drainage will be collected in the sediment pond and will be returned to the refuse pile for disposal.~~

~~Refuse Disposal Site~~

~~Design of all diversion structures for the refuse disposal site were done by EarthFax Engineering, Inc., and are presented in Appendix 7J. The undisturbed area diversion channels are sized to handle the 100 year-6 hour precipitation event. These diversions will consist of triangular channels which will collect any runoff from the undisturbed areas above the diversions and convey this water around the refuse disposal facility.~~

~~Drainage from the access road and the sediment pond road will be controlled by a series of diversion ditches and culverts. The diversion channels and culverts are sized to handle the 10 year-6 hour precipitation event. The diversions will collect the water along the upstream side of the road and divert it to a downstream culvert to be conveyed under the road.~~

~~The disturbed runoff from the disposal area will be collected by the existing ephemeral drainage channel and conveyed to the sediment pond. This channel is incised in the colluvial fill on the underlying Mancos Shale bedrock. As this channel will ultimately be disturbed by the refuse disposal pile, no erosion protection measures are planned for the channel. All sediment produced within the drainage will be collected in the sediment pond and will be returned to the refuse pile for disposal.~~

Topsoil Storage Site

The runoff control and sediment control structures have been designed to adequately handle a 10 year-6 hour precipitation event. Results of these analyses are contained in Appendix 7G. Only the data pertinent to the storage of topsoil and substitute topsoil was used in the construction of the site.

For the diversion ditch channel design, the 10 yr-6 hr peak flows were used. A flow velocity of less than five feet per second was considered nonerosive. The channel design calculations are presented in Appendix VII and are summarized in Table 3-3 of Appendix 7G. The undisturbed diversion channels are proposed to be triangular ditches constructed in natural earth materials. These diversions will be located above the topsoil stockpile site to divert the undisturbed changes around the site. As shown in Table 3.3, the peak flow for UD #1 and UD #2 are calculated at be 0.21 cfs and 0.02 cfs, respectively. In the steepest portion of these channels, the anticipated velocity

basin. Details of the proposed inlet and outlet conditions are contained in Appendix 7D.

Information contained in Appendix 7D indicates that the exit velocity from the riprap basin will be approximately 16.2 feet per second. Previous water-surface profile analyses of Soldier Creek presented in Appendix 7E indicate that, under natural conditions, velocities near the proposed culvert outlet are in excess of 18 feet per second. Thus, the outflow from the riprap basin will be less than the stream would experience during the design event under natural conditions, indicating that the basin design is adequate.

Also included in Appendix 7D is the design certification and in Appendix 10, the Division of Water Rights stream alteration permit with their follow-up compliance inspection report.

7.42.3.2 Diversions of Miscellaneous Flows

The design, location, construction, maintenance, and removal of diversions of miscellaneous flows are addressed in Section 7.42.30 and meet all of the performance standards set forth in R614-301-742.310.

7.42.4 Road Drainage

All of the Applicants roads have been designed, located and constructed as required by the regulations R614-301-742.410 through R614-301-742.423.5.

7.43 Impoundment

There are no permanent impoundments associated with the Applicant's facilities, nor are any planned ~~for the refuse disposal site~~. Temporary impoundments of water collected for runoff control will occur in the sediment ponds. The physical design of the sediment ponds are certified designs as required in R614-301-512 and are presented in Section 5.33 of this application. The sediment ponds do not meet the criteria for MSHA regulations. The hydrologic design for the sediment ponds are presented in the EarthFax reports (see Appendix 7A and 7J). Follow the cessation and reclamation of mining and disposal activities, the sediment ponds will be removed.

7.44 Discharge Structures

Central Mine Facilities

Discharge from the sediment pond spillways will be conveyed by two 1.5 foot diameter CMP culverts acting and the principal and emergency spillways. The principal spillway will also have a dewatering valve mounted on the side of the riser pipe. The outlet of both of these culverts will be protected by riprap as described in the EarthFax design report presented in Appendix 7A. This design will minimize the erosion which might result from the discharge of clean water from the pond. All sediment pond modifications were completed on November 22, 1991 and are shown on the "as-built" Drawing B-127.

~~Refuse Disposal Site~~

~~Discharge from the sediment pond spillways will be conveyed by two 2.5 foot diameter CMP culverts acting as the principle and emergency spillways. The principle spillway will also have a dewatering valve mounted on the side of the riser pipe. The outlet of both of these culverts will be protected by riprap as described in EarthFax design report presented in Appendix 7J. This design will minimize the erosion which might result from the discharge of clean water from the pond.~~

7.45 Disposal of Excess Spoil

No significant excess spoil will be developed by the underground mine. The only anticipated spoil will be from the materials collected in the sediment ponds. This limited volume of material will be removed from the ponds and transported to ~~the~~ a refuse disposal area. Disposal plans are detailed in Section 5.28.

~~In the event spoil is generated during the facilities expansion, this too will be transported to the refuse disposal site.~~

The handling of these materials will comply with R614-301-745.

There are no valley fills or head-of-hollow associated with this project.

7.46 Coal Mine Waste

The disposal and placement of the refuse materials will be conducted in accordance with the plans presented in Chapter 5 of this application. No impoundment will be allowed within the refuse materials as indicated in Section 7.43 of this chapter.

No naturally occurring springs or seeps were identified in the disposal area. As indicated in Section 7.24, some surface drainage from a breached irrigation ditch has been identified in the disposal area. This water flows down the small drainage channel and is the source of two seeps which were identified immediately adjacent to the stream channel. Test pits above and below the inflow point of the breached irrigation ditch were unsaturated to bedrock. Additionally, several adjacent drainage channels, incised to the same depth as the channel conveying the irrigation flows, were inspected during the field investigations conducted in the area and were found to be dry. These results indicate that no naturally occurring groundwater is found within the upper portion of the drainage. Once the breach in the irrigation ditch is repaired and the flow in the drainage channel ceases, the seeps identified along the drainage channel are expected to dry up.

Surface precipitation within the small drainage will be limited mainly to that which fall directly on the surface of the refuse. All possible surface drainage from undisturbed areas above the site will be diverted around the disposal area using diversion ditches sized to handle the 100-year, 6-hour precipitation event. Design criteria for the site diversion ditches are presented in Section 7.42. There will be some undisturbed areas, below the undisturbed area diversions, which will contribute runoff to the refuse pile, however, this area is limited. Diversion channels and associated disturbances that are not riprapped or otherwise protected, will be revegetated upon completion of construction.

Therefore, based on the lack of naturally occurring springs or seeps, topographic configuration, and open-graded nature of the refuse fill, no underdrains or rock core chimney drains will be required.

Both the disturbed and undisturbed runoff from the site will be channeled to a sediment pond located downgradient from the refuse disposal area. This pond is capable of handling the 10-year, 24-hour precipitation event and a 5-year sediment storage volume. Design criteria for the pond are presented in Section 7.42

Temporary Storage of Coal Mine Waste

In the event that weather conditions preclude removal of any coal refuse, the Applicant has designated a temporary storage site at the central mine facilities (Exhibit 5.21-1a). It will be placed in a control manner to minimize adverse effects of leachate and surface water runoff on surface and groundwater quality and quantity. All runoff will report to the sediment pond.

Material that will be stored longer than 3 months will be sampled and analyzed according to Table 6 of the "Utah Guidelines for Management of Topsoil and Overburden". In the event that acid or toxic forming materials are identified, the Division will be notified and additional sampling of the material will be performed to define the extent of the problem material.

The storage and handling of any acid or toxic forming material will comply until R614-301-731.300. The coal mine waste will be transported to ~~the~~ a refuse disposal site for permanent disposal~~, upon construction of the site~~.

7.47 Disposal of Noncoal Mine Waste

Garbage

Solid waste generated from mining activities, such as garbage and paper products, is disposed of in large trash "dumpsters" located near the portal. A contract garbage hauling service empties the contents of the dumpsters on a weekly basis and hauls the garbage to a nearby dump or landfill.

Unusable Equipment

All salvageable mining equipment is sold to local scrap dealers: items such as broken bolts, worn out engine parts, and items which might be recycled. Any machinery or large parts are placed in a stockpile near the No. 1 Fan storage area or the main mine facilities for periodic salvage by local scrap dealers. No mining equipment will be merely abandoned.

Petroleum Products

Oil and grease wastes are collected in sumps and returned to distributors for re-fining or used as heating fuel. The used oil and grease are consumed in an outside vented multi-oil fueled heater unit.

The heating unit is exempt under hazardous waste regulations (50 FR 49169; 11/29/85) if the used oil and grease are generated on-site. In case of spills, a spill control plan has been developed and is located at the mine site.

7.48 Casing and Sealing of Wells

Following completion of reclamation, the monitoring wells for the mine ~~and refuse disposal site~~ will be plugged and abandoned in accordance with R614-301-631, R614-301-748 and Section 73-3-25 of the Utah Code. This will prevent the potential for disturbance to the hydrologic balance.

7.50 Performance Standards

All coal mining and reclamation operations will be conducted to minimize disturbance to the hydrologic balance within the permit and adjacent areas, to prevent material damage to the hydrologic balance outside the permit area and support approved postmining land uses in accordance with the terms and conditions of the approved permit

Chapter 7
TABLE OF CONTENTS

Chapter 7
HYDROLOGY (R645-301-700)

7.10 Introduction

This chapter presents a description of the hydrologic considerations for permitting the Soldier Canyon Mine operations including an expansion to the west incorporating a new lease area known as the Alkali Creek tract.

The information contained in this section was prepared in 1993 by the staff of the Applicant and by Thomas J. Suchoski, Carol A. Bjork, and Richard B. White of EarthFax Engineering, Inc. located in Midvale, Utah. This chapter was modified in 1995 by Keith W. Welch with assistance of the applicant's staff. Section 7.28, Probable Hydrologic Consequences was extensively modified based on a new study by Mayo and Associates.

7.11 General Requirements

This chapter presents a description of:

- existing hydrologic resources within the permit and adjacent areas
- proposed operations and the potential impacts to the hydrologic resources
- methods and calculations used to achieve compliance with hydrologic plans and design criteria
- hydrologic reclamation plans for the Soldier Canyon Mine operations

7.12 Certification

All maps, plans and cross-sections presented in this chapter which deal with the design of facilities or the determination of watershed characteristics have been certified by a qualified registered professional engineer.

7.13 Inspection

Impoundments included in the runoff control plan will be inspected as described in Section 5.14 of this application.

7.20 Environmental Description

This section presents a description of the hydrologic resources within the expanded Soldier Canyon Mine permit area and LOM permit area and those adjacent areas that may be affected by the coal mining and reclamation operations.

7.21 General Requirements

This section presents a description of the hydrologic resources within the expanded Soldier Canyon Mine permit area and LOM permit area.

7.22 Cross Sections and Maps

Exhibit 7.21-1 presents the existing surface and groundwater monitoring stations within and adjacent to the Soldier Canyon Mine permit and LOM permit area. Exhibit 7.21-2 shows the topography, streams, springs, reservoirs and wells located in the LOM area associated with water rights within and adjacent to the permit area.

7.23 Sampling and Analysis

All water samples are collected and analyzed according to methods in either the current edition of "Standard Methods for the Examination of Water and Waste water" or the 40 CFR parts 136 and 434. Field measurements are conducted using instruments maintained and calibrated in accordance with the manufacture's recommendations. All laboratory analyses are done by certified laboratories.

7.24 Baseline Information

7.24.1 Groundwater Information

The groundwater information contained within this section summarizes several groundwater studies of the existing permit area, the Alkali Creek tract expansion and studies including the surrounding region. These studies, including monitoring data, were initiated in 1976 and are continuing on an as needed basis. The most recent study was a re-evaluation of the PHC by Mayo and Associates in 1995. A copy of Dr. Mayo's report is appended as Appendix 7M. This study forms the basis for an update of much of the background information presented in this chapter.

Other background information includes a compilation of data from permit applications that have been submitted to the Regulatory Authority for the Sage Point/Dugout Canyon (ACT/007/009) and Soldier Canyon Mines (ACT/007/018). In addition, other published and unpublished data on the geology and hydrology of the area were collected and reviewed. The other sources of information included U.S. Geological Survey (USGS) investigation reports and unpublished theses.

Previous submittals have included sections on a refuse disposal site. These references have been omitted from this document since this site is no longer proposed for the Soldier Creek Mining operation. The operational history has shown little need for such a site. Disposal, if any should occur, will be either at the Skyline or SUFCo disposal areas.

Data Acquisition

Water quality data were collected from springs, mine sumps, groundwater discharging into the mine and drill holes in the mine area. These data were used to augment the regional data available from literature. Data on the piezometric surface in the aquifers, as previously submitted, were also collected at selected drilling locations and wells. Assumptions of a regional aquifer as indicated by piezometric surface maps have been modified by the Mayo report. Information from test borings and field measurements was used to construct stratigraphic sections of mine lease area aquifers and estimate their physical characteristics.

Impact on Hydrology

Previous assessments of the potential impacts of mining operations on the quantity and quality of groundwater were made by (1) studying the likely directions of groundwater flow, (2) identifying the locations of potential contaminant sources, and (3) examining the likely response of the groundwater system to contamination. The assessments have been updated by an analysis of 1) solute and isotopic compositions of surface and groundwater, 2) surface and groundwater discharge data, and 3) a re-evaluation of geologic data.

Contributors

The data for the Sage Point/Dugout Canyon permit application came from Eureka Energy Company and Wahler Associates between 1980 and 1983. The Soldier Canyon data were obtained from a hydrology study performed by R & M Consultants, Inc. in 1983, for a mine permit application, and from a Hydrologic Inventory of the site released in January, 1980 by Vaughn Hansen Associates. Field reconnaissance of Sections 5 and 6, T13S, R12E, SLM was performed by Sergent, Hauskins & Beckwith (SHB) during October, 1985. At the request of UDOGM, to provide additional insight into the hydrogeologic conditions below the Gilson coal seam, SHB performed a field investigation during August of 1986. This program consisted of the drilling of 3 boreholes from the existing working mine level, through the Gilson seam and into the underlying strata. In-situ hydrologic tests were performed. These field data and subsequent interpretations, analyses and conclusions are presented in an SHB report, included in Appendix 7-I.

Data from the mine permit documents identified above were merged and placed in this application by Michael R. Hulpke under the supervision of Allon C. Owen, P.E., and Mr. Ralph Weeks of Sergent, Hauskins & Beckwith, Salt Lake City, Utah.

In 1995 a new study was contracted with Mayo and Associates to re-evaluate the hydrogeology of the mine area and to determine surface-groundwater interactions. Using the latest techniques, this study characterized the hydrogeologic systems on a regional basis and up-dated the analysis of the probable hydrologic consequences.

Existing Resources

Groundwater in the LOM area, like groundwater in other parts of the Price River drainage basin, occurs under both confined and unconfined conditions (USGS, 1979). Unconfined water exists primarily in

shallow alluvial or colluvial deposits along the largest perennial and intermittent streams. It also exists in the soil mantle and the upper few tens of feet of the underlying consolidated rocks where the rocks have been extensively weathered and fractured.

Waddell, et. al. (1986) originally identified the Blackhawk Formation as the regional aquifer. Based on the data collected by Waddell, et. al. (1986), USGS (1979), and Soldier Creek Coal Company (Appendix 7), groundwater in the regional aquifer occurs as confined and unconfined conditions. Confined water exists at greater depths where a relatively impermeable bed overlies a more permeable water-bearing bed. The unconfined zones of the regional aquifer occur along the outcrop of the Book Cliffs below the alluvial and weathered sections of the Blackhawk Formations.

Within the LOM area, there has been no development of groundwater in either the perched or regional aquifers other than within underground mine workings. Wells within or adjacent to the area have been drilled for the purpose of monitoring or investigation but have not been developed for use. Discharge occurs from natural sources such as springs, seeps, evapotranspiration, and from underground mine workings. The locations of springs, wells, and surface water sampling points in and adjacent to the LOM area are listed on Table 7.24-1 and are presented on Exhibit 7.21-5 and/or in Appendix 7N. Exhibit 7.21-5 shows the original Soldier Canyon permit boundary so the reviewer can see why sampling points were originally selected with reference to that boundary.

Groundwater

A search of the State Engineer's records was conducted, to determine the location of existing water rights. The search area included:

-Original Soldier Creek tract

- T13S, R11E, Sects. 23-26, 35 & 36
- T13S, R12E, Sects. 30 & 31
- T14S, R11E, Sects. 1 & 2
- T14S, R12E, Sect. 6

- Alkali Creek tract expansion

- T12S, R11E, Sect. 33-36
- T13S, R11E, Sect. 1-4, 9-12, 13-16, 21-24, 25-28

Two groundwater rights have been located in the area. Water right 203 is for mine water used by Soldier Canyon Mine for underground process water. Water right 4124 is for a shallow well which Iriarts installed near a cabin on their property.

The principal surface and groundwater water rights in the life of mine area and the adjacent area within one mile of the life of mine boundary are presented in Table 7.24-2. This table classifies water rights by owner, type of use, source, location, and quantity and duration of use. Seasonal use and quantity varies significantly over the year.

During the winter, there is little use of the surface or spring flows, while during the summer there is considerable use of the water for stock watering purposes. As none of the water rights encompass pumping from an aquifer, the principal impacts of mining on water rights will be limited to surface water/groundwater interactions.

TABLE 7.24-1
HYDROLOGIC DATA COLLECTION SITES
SPRINGS

SITE NUMBER DESIGNATIONS*	LOCATION	GEOLOGIC UNIT	LAND SURFACE ELEVATION	SPRING NAME	OTHER
1	(D-12-11) 36aad	Flagstaff	7890		52[1]
2	(D-12-12) 30dcc	Flagstaff	7560		53[1]
3	" 33bcc	Flagstaff	7400		54[1]
4	" 34ccd	Flagstaff	7605		3[1]
5	(D-13-11) 1dab	Flagstaff	7930		CC-55[1], S31-1[2]
6	" 13acc	Blackhawk	6720	Drink	56[1]
7	(D-13-12) 4acd	Flagstaff	7480		57[1], G-87[2]
8	" 4bdc	North Horn	7410		2[1], G-88[2]
9	" 4cdd	Flagstaff	7910		33[1],
10	" 5cbc	Unknown	6980	Sulfur	8[1], G-89[2]
11	" 5cbc	North Horn	6980		24[1]
12	" 5ccb	North Horn	6970		9[1]
13	" 7aad	Price River	6880		10[1]
14	" 7cbb	North Horn	7600		S7-1[2]
15	" 8daa	Flagstaff	7900	Lower Little Pine	39[1]
16	" 8dad	North Horn	7840	Timber Road	38[1]
17	" 9cbb	Flagstaff	7940	Upper Little Pine	40[1], G-90/S8-1[2]
18	" 9dcc	Flagstaff	8120		31[1], G-91[2]
19	" 9dcc	North Horn	8090		32[1]
20	" 9ddc	Flagstaff	8090		30[1], G-92[2]
21	" 10abb	Flagstaff	7740	Water Hole	4[1]
22	" 10adb	Flagstaff	7870	Pine Canyon	42[1]
23	(D-13-11) 36cdc	Flagstaff	8180		CC-36[2]
24	" 12bba	Flagstaff	8040		CC-40[2]

*1. Sage Point/Dugout Cany on Permit Application; 2. Soldier Cany on Permit Application.

Note: Data for sites 23 and 24 are included in Appendix 7N.

Following completing of the 1993 development, a sustained moist area was identified on the floor of the #5 entry, adjacent to well 5-1. Furthermore, subsequent monitoring of the water level indicated an increased rate of water level decline. The average rate of water level decline increased to approximately 0.09 ft/day between August 24, 1993 and November 1, 1995. This is an increase of 4 ½ times the previously observed rate, indicating the floor seep and drill hole are interconnected.

Mining operations in this area were again resumed in October, 1995. An increased frequency of well monitoring was also initiated since the planned development would pass directly beneath the surface collar location of drill hole 5-1. Results of this increased monitoring are presented in Figure 7.28-14. Subsequently, the October 1995 mine development did not encounter the actual drill hole/seam intersection point and no additional points of water inflow were observed. The monitoring information did indicate a slightly reduced rate of decline during the month.

Monitoring Well 6-1

Well 6-1 is continuously perforated over a 200 foot long interval which includes the Sunnyside seam. Because the perforated zone includes 80 feet below the seam and about 120 feet above the seam, measured water levels largely represent the composite hydraulic head of water bearing horizons above and below the Sunnyside Seam.

Initial water level measurements were believed to be associated with residual water remaining from drilling and casing operations. Water levels declined between November 1989 and August 1991 (Figures 7.28-13b). From August 1991 through August 1993 the water level had stabilized at a depth of approximately 425 feet. Monitoring on June 3, 1994 found the well to be dry and plugged at a depth of approximately 470 feet. All subsequent attempts to monitor this well have found the plugged/dry condition unchanged, therefore the monitoring of the well was discontinued following the 1st Quarter of 2003.

The cause of the approximately 50+ foot water level decline reported in 1994 has not been determined at present. The cause of the obstruction at approximately 470 feet below land surface is unknown.

5-1close.spw 15 Dec 95

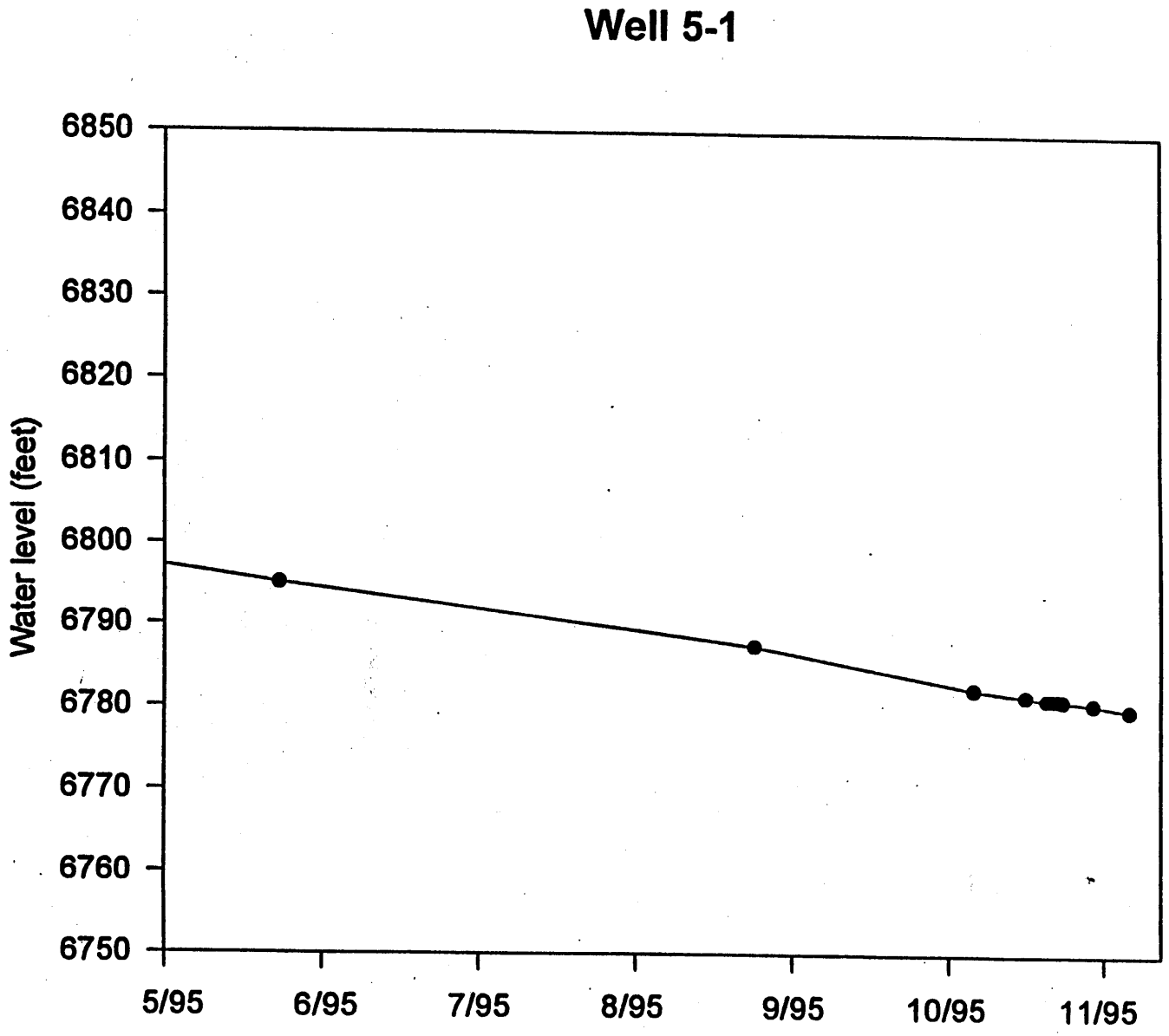

Figure 7.28-14 Water levels in Well 5-1 during 1995

Monitoring Well 32-1

Well 32-1 is perforated in the Blackhawk Formation through a 50 feet section located immediately above the Sunnyside seam. The well is located 0.5 miles north and is down dip of mine workings.

Water level monitoring information shows a fairly consistent rise in water elevation. From November 1994 through August 1995 the water level appears to have stabilized at a depth of approximately 291 feet (Figure 7.28-13c). There is no information at this time that would suggest that underground mining activities are affecting the water levels observed to date.

The increase in water level in the well are most likely the result of the combined factors of poor well construction (i.e. the perforated zone is not adequately isolated from the overlying well bore) and recharge to overlying aquifers.

Monitoring Well 10-2

Well 10-2 is continuously perforated for 250 feet in the middle part of the Castlegate Sandstone Member of the Price River Formation. The well is located about 2 miles east of mine workings and the perforated section occurs approximately along the strike of rock layers which occur above the mine.

Water levels declined about 400 feet within about one month after perforation in 1979 and reached a quasi-stabilization at about 710 feet below land surface (Table 7.28-7). The initial water level is attributed to well drilling fluid. Water levels remained relatively stable until a slug test was performed in November 1982. Slug test results indicate a transmissivity of about 1 gpd/ft (Wahler Associated, 1982; Table 7.28-8). Soldier Creek Coal Company began monitoring well 10-2 in June 1987 and discontinued following the 1st quarter of 2003 monitoring. The water depth monitored at this time was 716 feet. Subsequent monitoring has shown a gradual decline of about 10 feet.

Discussion

Water level declines in well 10-2 between 1979 and 1981 coincided with early expansion of the Soldier Canyon Mine workings, thus the effect of mine workings on the water levels was negligible. Because the rate of water level decline since 1987 is similar to the rate of

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4) Ground water systems encountered in Soldier Canyon Mine are not in hydraulic connection with Soldier Creek or other surface waters.

5) Except for increasing the baseflow and changing the baseflow solute composition of Soldier Creek the effects of coal mining in the Soldier Canyon Mine within the Blackhawk Formation on overlying springs and surface waters is negligible. Similar effects to Soldier and Dugout Canyon Creeks are anticipated as a result of the proposed mining in the Alkali Creek and Dugout Canyon tracts.

7.29 Cumulative Hydrologic Impact Assessment (CHIA)

The Division has already prepared a CHIA for the original Soldier Canyon Mine permit area. Additional data are presented within this application to assist the Division in preparing an updated CHIA, which incorporates the Alkali Creek tract and adjacent areas.

7.30 Operation Plan

7.31 General Requirements

This section describes the groundwater and surface water protection plan and water quality monitoring program implemented within the existing permit area and to be implemented for the refuse disposal site. The purpose of the groundwater and surface water protection plan is to minimize the potential for water pollution and changes in water quality and flow for surface and groundwater within and adjacent to disturbed areas. The purpose of the water quality monitoring program is to identify the potential impacts of coal mining operations on the hydrologic balance. Should the mining operations have an impact on a water source, this information will be coordinated with the Utah Division of Water Rights.

7.31.1 Hydrologic Balance Protection

Surface and Groundwater Protection Plan

The Applicant includes in this application a plan to protect the surface and groundwater in the area of the mine facilities, topsoil storage site and refuse disposal site. The plan will ensure protection of the ground water and surface water resources of the sites by handling earth and refuse materials in a manner that prevents or controls, using the best technology currently available, the discharge of

pollutants to the hydrologic system. Additionally, the Applicant commits to properly handle acid and toxic forming materials, if any are found. If encountered a mitigation plan will be prepared and submitted to DOGM for approval within 30 days. The design details of the water protection plans are presented in Sections 5.33 and 7.42 of this application.

7.31.2 Water Monitoring

The monitoring program for wells, springs and streams is summarized in Tables 7.31-1, 7.31-2, 7.31-3 and 7.31-4. The monitoring locations are presented in Exhibit 7.21-1. This monitoring program has been specifically designed to evaluate the effects of mining on the anticipated hydrologic consequences.

Monitoring activities will concentrate on determining water level, discharge and water quality fluctuations in relevant aquifers in the mine area.. The objectives of the monitoring plan are to 1) identify potential impacts during and after mining, and 2) provide additional data on aquifer characteristics.

Flow

Stream flows are determined utilizing a flowmeter, flumes or by diverting and timing the flow as it fills a container of known volume.

pH, Specific Conductivity, Temperature and Dissolved Oxygen

The pH, specific conductivity and temperature will be taken with a probe device of high quality. Temperature reading may be taken directly with a thermometer.

Level

Water levels within monitoring wells are measured directly using a sealed electronic probe with a metered connecting cable. Dissolved oxygen will be measured with either a probe or by titration.

All test and measurement instruments are operated, maintained and calibrated in accordance with the manufacturers instructions. The results of all field measurements are recorded and reported to UDOGM .

Table 7.31-1 Recommended Monitoring Program
Soldier Canyon Mine

Monitoring Wells	Protocol	Comments
6-1	A	
		Monitoring discontinued 1st Quarter 2003
10-2	A	Monitoring discontinued 1st Quarter 2003
32-1*	A	
Streams		
G-2	C	
G-5	B, 1, 2	
G-6	B, D, 1, 2, 6	
G-7	D, 6	
G-8	C	
G-9	C	
G-10*	B, 1, 2	
Springs		
4	F, 4	
5 (CC-53)*	E, G, 3, 7	
8	F, 4	
10*	E, G, 3, 7	
23 (CC-36)*	E, G, 3, 7	
24 (CC-40)*	E, G, 3, 7	

* Monitoring of these sites will resume in the quarter the Soldier Canyon mine portals are reopened for active mining.

Note: There are no requirements for Water Quality protocol 5 "Spring: quarterly water quality operational laboratory measurements" as shown in Table 7.31-2. The justification for this begins on page 69 of Appendix 7M.

Table 7.31-2 Field and Laboratory Measurement Protocol

Water level and flow measurements

A Monitoring well: quarterly water level measurements

B Stream: quarterly discharge measurements

C Stream: quarterly discharge measurements; discontinue one year following the end of active mining in the vicinity of the spring area.

D Stream: Flow measurements will be taken during the first wet year and first dry year to enable preparation of base-flow hydrographs of the monitoring sites. Wet and dry years are based on Soil Conservation Services snow pack measurements as of March 1 for the Price - San Rafael area. Dry year and wet years are defined as <70 and > 110 percent of normal, respectively as of March 1. Flow measurements will be taken weekly between April 1 and August 31 as conditions permit.

E Spring: quarterly discharge measurements

F Spring: quarterly discharge measurements; discontinue one year following the end of active mining in the vicinity of the spring area.

G Spring: Flow measurements will be taken during the first wet year and first dry year to enable preparation of base-flow hydrographs of the monitoring sites. Wet and dry years are based on Soil Conservation Service snow pack measurements as of March 1 for the Price - San Rafael area. Dry year and wet years are defined as <70 and >110 percent of normal, respectively as of March 1. Flow measurements will be taken weekly between April 1 and August 31 as conditions permit.

Water Quality

1 Stream: quarterly water quality field measurements

2 Stream: quarterly water quality operational laboratory measurements. G-10 will not be sampled for Oil and Grease.

3 Spring: quarterly water quality field measurements

4 Springs: quarterly water quality field measurements; discontinue one year following the end of active mining in the vicinity of the spring area.

5 Spring: quarterly water quality operational laboratory measurements

6 Stream (wet and dry year only): semi-annual water quality field measurements, operational laboratory measurements and ^{3}H measurements during both a wet and dry year. Wet and dry years are based on Soil Conservation Service snow pack measurements as of March 1 for the Price - San Rafael area. Dry year and wet years are defined as <70 and > 110 percent of normal, respectively as of March 1. Semi-annual sampling will be performed in the high-flow and low-flow seasons in conjunction with quarterly sampling if applicable.

7 Spring (wet and dry year only): semi-annual water quality field measurements, operational laboratory measurements and ^{3}H measurements during both a wet and dry year. Wet and dry years are based on Soil Conservation Service snow pack measurements as of March 1 for the Price - San Rafael area. Dry year and wet years are defined as <70 and > 110 percent of normal, respectively as of March 1. Semi-annual sampling will be performed in the high-flow and low-flow seasons in conjunction with quarterly sampling if applicable.

Laboratory Analyses

When laboratory measurements are required, a specific set of sample bottles are pre-ordered from the laboratory. Bottles received from the laboratory are clean, pre-acidified and properly identified. Once the sample bottles are filled, they are individually labeled, placed in ice chests, and in warm weather, cooled with ice packs prior to returning to the laboratory. Proper holding times are adhered to. Only certified laboratories are used. (See also Section 7.23 - Sampling and Analysis.)

7.31.2.1 Groundwater Monitoring

The groundwater monitoring program consists of monitoring of springs and seeps, water wells, and inflow points in-mine. These points were selected based on the proposed mine development and the understanding of the baseline data and hydrogeologic conditions of the site to provide a means of identifying any significant impact from the mining operations on the groundwater resources.

All NPDES permit sources will be monitored in accordance with permit conditions. Exceedances of these permit conditions will be reported as required by R645-300-700.212.

The refuse disposal site wells are no longer monitored since the site is not scheduled to be activated.

Data collected from wells MW-1M, MW-1C, MW-2M, and MW-3M were used to evaluate the conditions in the area of the proposed refuse pile and to determine if any problems are identified in either the shallow or deep aquifers of the Mancos Shale. No impacts to water quality or flow are anticipated from the operation. About 4.5 years of baseline data have been collected for this area. This provides a good description of the groundwater system in the area. Monitoring sites MW-1M, MW-1C, MW-2M and MW-3M have been discontinued.

Computerization of water quality data will enable a comparison of current data with that which has been previously obtained. The overall mine water quality will be assessed at the NPDES discharge point. Failure of this water to meet effluent limitations will trigger an appropriate underground investigation to establish cause. The timing of this investigation will coincide with placement on DWQ's chronic violator status.

The summarized monitoring results for each in-mine monitoring point was previously presented as Figures 7.31-12 through 7.31-23. Appendix 7I contain the complete monitoring results of historical monitoring data. These figures are now considered to be baseline data and have been placed in Appendix 7O. (See also the Appendices of the Mayo Report.)

In the event of any significant changes in water quantity resulting in non-compliance or any development of new water sources, the Regulatory Authority will be notified in accordance with the provisions of R645-301-145 and R645-301-731. Significant changes will be defined as increases in quantity of existing inflows or any new mine inflows in excess of 50 gal/min. In the event such changes occur, the Division will be notified and SCCC will develop a plan to evaluate the inflow to determine the source of the water. Such plans will be consistent with the findings of the PHC. Specific actions and plans can not be developed at this time due to the uncertainties of the site conditions which may be occurring at the time of the inflow. Therefore, a site-specific plan will be developed if and when an inflow is encountered.

All of the measurements made of the hydrologic regime will be reported quarterly to the Regulatory Authority within 90 days of the end of the quarter. A report will be made to the Authority within five days if the concentration of any dissolved constituent upon discharge into surface water should indicate noncompliance with an NPDES permit condition. A copy of the current NPDES Discharge Permit can be found in Section 5. An annual report will be submitted to the Regulatory Authority that summarizes pertinent monitoring results. Summarized annual information will also be provided for the 5 year permit renewal.

Equipment, structures and other devices used in conjunction with monitoring the quality and quantity of ground water will be properly installed, maintained and operated in accordance with manufactures instructions and will be removed by operator when no longer needed.

Monitoring Well 5-1

Most water within the drill hole is believed to be residual water related to the 1977 drilling operations and additional water injected into the casing during a November, 1982 slug test. The water level declines during the past 16 years appear to be the result of the slow acceptance of water into the relatively dry and nearly impermeable coal seams. A slight lowering of the water level accompanied mining in the immediate vicinity of the well; however about 1,300 feet of hydrostatic head remains in the well. It now appears that quarterly, routine water level monitoring of this site will result in only little

additional information. It is, therefore, recommended that routine monitoring of this site be discontinued.

Monitoring Well 6-1

Unlike well 5-1, well 6-1 monitors a 200 foot section of the Blackhawk Formation and is not specifically isolated at just the coal seams. During the June 1994 monitoring, it was discovered that there was an obstruction in the well-casing at depth. As a result of this obstruction, the well was not available for monitoring. The monitoring of Well 6-1 will be discontinued after the 1st quarter of 2003 due to the continued obstruction within the casing. Although it is inconclusive what effects, if any, mining has had on the observed water level declines at well 6-1, further monitoring of well 6-1 may yield meaningful information in characterizing any underground mining effects on the groundwater system. Therefore, an unsuccessful attempt was made to remove the obstruction within the casing using a hand line and fishing tool.

Monitoring Well 10-2

Mining operations at the Soldier Canyon Mine have demonstrated the dry nature of the coal seams. Although roof drips and floor seeps are not uncommon within the mine, those that are believed to originate from near the coal seam are typically short-lived and insignificant. All significant inflows of groundwater into the Soldier Canyon Mine appear to be associated with features that create a connection with overlying rock formations (i.e., drill holes, faults and joints, secondary mining areas).

Because the Castlegate Sandstone Member immediately overlies the Blackhawk Formation, underground mining effects on this formation are possible. However, consideration must be given to the fact that drill hole 10-2 is located nearly two miles from the workings of the Soldier Canyon Mine. While the observed drawdown cannot be conclusively associated with mining activities at this time, monitoring of this site will be continued in association with the Dugout Canyon Mine and continue to be recorded as site GW-10-2.

Monitoring Well 32-1

Routine monitoring of this site should continue, particularly now that it appears that the water level has stabilized.

Springs

The water monitoring program is designed based on the following conclusions resulting from analysis of data collected previously:

1) ground-water systems in the Flagstaff and North Horn Formations operate independently of ground water in Blackhawk Formation,
2) the temporal variability of spring discharges from the Flagstaff and North Horn Formations are due to climatic variability (i.e. wet and dry years),
3) mining will not affect ground-water systems in the Flagstaff and North Horn Formations.

Previous base line and quarterly monitoring of springs located above the mine have provided valuable information regarding the chemical composition and discharge characteristics of ground water systems. The existing quarterly sites are:

Spring	Formation
3	Flagstaff
4	Flagstaff
5	Flagstaff
8	North Horn (contact with Price River Formation)
10	North Horn (Sulfur Spring)
15	Flagstaff
18	Flagstaff
21	Flagstaff

The proposed spring monitoring program includes four springs from the existing program and the addition of two springs not currently monitored. Some of the existing sites have been discontinued for the following reasons:

1) the chemical character, both spatial and temporal, of the ground-water systems are well established,
2) the data strongly suggest that the chemical characteristics of ground waters in the Flagstaff and North Horn Formations will not be affected by mining operations,
3) most of the existing spring sampling sites are in the Flagstaff Formation and therefore many of the sites are redundant, and
4) results of this investigation demonstrate that the Flagstaff and North Horn ground-water systems are not in active hydraulic communication with ground-water systems in the Blackhawk Formation.

The specific proposed monitoring program and the rational for each site follows. Continued monitoring of springs 4, 8 and 30 (associated with the Dugout Application) will provide information regarding the potential effects of mining on springs in the Pine Creek area. Monitoring these springs should terminate 1 year after mining in the areas ceases. Spring 10 should continue as a permanent monitoring site because it provides information regarding fault controlled ground water systems. Springs 5(cc-53), CC-36 and CC-40 will provide information regarding the effects of wet and dry periods on spring discharges as well as monitor the possible effects of mining on ground waters in overlying ground-water systems.

7.31.2.2 Surface Water Monitoring

Historical surface water quality monitoring data are presented in Appendix 7-I and in Figures 7.31-24 through 7.31-27. The surface water monitoring locations have been modified to accommodate the expanded boundaries of the LOM area.

Water quality data for all sites will be recorded into the UDOGM electronic database on a quarterly basis within 90 days of the end of the quarter.

Equipment, structures and other devices used in conjunction with monitoring the quality and quantity of ground water will be properly installed, maintained and operated in accordance with manufactures instructions and will be removed by operator when no longer needed.

Streams

The proposed stream monitoring program is designed to:

1) further evaluate the potential for hydraulic connection between the Blackhawk Formation and Streams. Stream gauging by Waddell and other (9186) suggests that there is a net contribution of water from the Blackhawk Formation to Soldier Creek. However, the work of Waddell and others was performed during a wet period. Follow-up measurements during a dry cycle are warranted, and

2) continue monitoring the effects of mine discharge waters on Soldier Creek. Quarterly stream flow measurements and water quality samples are currently collected at Soldier Creek sites G-1, G-2, and G-5. We recommend discontinuing G-1, after 2 years of data have been collected at G-6, because the site is located too far upstream to permit evaluation of mine water discharges on Soldier Creek. We also recommend discontinuing G-2 one year after coal mining beneath Pine Creek area ceases for a similar reason. We recommend the continued monitoring of site G-5. The establishment of three(3) new temporary and two (2) new permanent sites is recommended. Permanent site G-6 is located just upstream of G-5 and will permit the evaluation of the effects of mine discharge waters on Soldier Creek. Temporary sites G-7 through G-9 will permit the evaluation of the effects of mining on surface flow in Pine Creek and the relationship between the Blackhawk Formation and creek flows. The new stream site G-10, located where spring site CC-57 has previously been monitored, is recommended because it will monitor any effect of mining on the drainage located west of Soldier Creek. The monitoring of G-10 will be discontinued (2003) while the mine is in temporary cessation, but monitoring will resume when the mine is reopened for coal extraction. Because of the location of G-10 there is no potential impact for contamination by oil and grease therefore a water sample will not be collected for the analysis of oil and grease.

7.31.3 Acid and Toxic Forming Materials

Drainage from acid and toxic forming materials and underground development waste into surface water and ground water will be avoided by:

1. Identifying and burying and/or treating, when necessary, materials which may adversely affect water quality, or be detrimental to vegetation or to public health and safety if not buried and/or treated.

2. Storing materials in a manner that will protect surface water and ground water by preventing erosion, the formation of polluted runoff and the infiltration of polluted water. Storage will be limited to the period until burial and/or treatment first become feasible, and so long as storage will not result in any risk of water pollution or other environmental damage.

   Storage, burial or treatment practices will be consistent with the relevant provisions for material handling and disposal as outlined in R645-301-521 and R645-301-528 rules. Monitoring for parameters defining acid and toxic forming materials will continue as described in R645-301-700.300. (See also procedures of Section 5.23)

7.31.4 Transfer of Wells

Before final release of bond, exploratory or monitoring wells will be sealed in a safe and environmentally sound manner in accordance with R645-301-631, R645-301-738 and R645-301-765. Ownership of wells will be transferred only with prior approval of UDOGM. The conditions of such a transfer will comply with State and local laws. Soldier Creek will remain responsible for the management of the well until bond release in accordance with R645-301-529, R645-301-551, R645-301-631, R645-301-738 and R645-301-765.

7.31.5 Discharges

The Applicant will not discharge into the underground mine, unless specifically approved by the Division and meets the approval of MSHA. Discharges will be limited to the following:

1. Water
2. Coal processing waste
3. Sludge from an acid-mine-drainage treatment facility
4. Inert materials used for stabilizing underground mines
5. Underground development waste

The angle at which the coal bed is inclined from the horizontal (dip) prevents any gravity discharge of water from the surface entries.

7.31.6 Stream Buffer Zones

As shown on Exhibit 5.21-1, several areas of the central mine facilities lie within 100 feet of Soldier Creek, a perennial stream. Specifically, these areas include the No. 2 exhaust fan, main storage and facility yard, coal handling facilities, parking lot, sediment pond and a small topsoil storage area. The Applicant has provided protection to the stream adjacent to these facilities, via the installation of approximately 885 feet of stream culvert and sediment control measures (Exhibit 7.32-1). These preventative measures will ensure that the water quantity and quality or other environmental resources of the stream are not adversely affected.

The implementation of these activities were approved by the Division through permit amendments and a stream alteration permit (Appendix 10) through the Division of Water Rights. All stream channel diversions comply with the provisions of R645-301-742.300.

The areas not to be disturbed will be designated as a buffer zone, and will be properly marked.

7.31.7 Cross Sections and Maps

Cross sections and maps, as required for R614-301-731.700, are presented within this document on exhibit 7.21-1, 7.21-2 and 7.24-1. Other relevant cross sections on maps are discussed in Section 5. See also Sections 7.12 and 7.24.

7.31.8 Water Rights and Replacement

In the event that the monitoring program identifies an impact to the water source in the permit and adjacent areas, the replacement of water rights will be addressed as described in Section 7.27 of this application. A listing of water rights for the Soldier Creek tract and for the Alkali Creek tract expansion may be found in Table 7.24-2 of this document.

7.32 Sediment Control Measures

The sediment control measures for the Soldier Canyon Mine operations are discussed in Section 7.42 of this application. The structures to be used for the runoff-control plan for the facilities are; undisturbed area diversion channels, disturbed area diversion channels, sedimentation ponds, containment berms, riprap, strawbales and/or silt fence, revegetation and mulching, road diversions and culverts, stream channel by-pass culvert, and natural drainage channels.

The undisturbed area diversion channels are sized to handle the 10 year-6 hour precipitation event, except for those undisturbed diversions located at the topsoil storage site, which are sized to handle the 100 year-6 hour precipitation event.

Road diversions and culverts are sized to handle the 10 year-6 hour event, except for those located at the topsoil storage site, which were designed for the 100 year-6 hour event. The Applicant commits to maintain all diversions and culverts during the life of the facilities.

Sediment control for the existing temporary topsoil storage area will be provided by a containment berm and disturbed and undisturbed area diversion ditches. The design of the existing structures is currently approved by the DOGM (see Appendix 7G). If facility expansion occurs, construction of these facilities will be increased to encompass more of the 4.5 acre area. As this event occurs, SCCC will submit design plans covering the modification of the runoff control facilities.

The central mine site sediment pond is designed to handle the 10 year-24 hour precipitation event. Exhibit 7.32-1 provides a graphical depiction of the "as-built" runoff control plan for the central mine area.

The Soldier Creek by-pass culvert has been designed to handle a 100 year-24 hour precipitation event. The placement of this culvert was approved by the Division through amendments to the permit and by obtaining a stream alteration permit through the Division of Water Rights (Appendix 10).

7.33 Impoundments

7.33.1 General Plans

The only impoundment associated with the Soldier Creek Mine is the sedimentation pond located immediately below the portal area facilities.

Certification

All maps and cross sections the sedimentation ponds have been prepared by, or under the direction of, and certified by a qualified registered professional engineer.

Maps and Cross Sections

Design details for these sites are presented in Appendices 7A and 7J respectively.

Narrative

A description of each sedimentation pond is presented in Section 7.42.2.

Subsidence Survey Results

No underground coal mining will occur beneath either impoundment and therefore, there will be no impacts from subsidence.

Hydrologic Impacts

The hydrologic information required to assess the hydrologic impacts on the impoundments can be found in or referenced in Section 7.24.

Design Plans and Construction Schedule

The mine site sedimentation pond was originally designed by Vaughn Hansen Associates, Salt Lake City, Utah. The pond was constructed in the fall of 1979 and modified in 1986.

7.33.2 Permanent and Temporary Impoundments

Requirements. All impoundments have, or will be, designed and constructed using current, prudent engineering practices. Specific foundation design construction criteria are presented or referenced in Section 5. Design details can be found in Appendix 7 parts A and J.

Permanent Impoundments. There are no permanent impoundments associated with the mine facilities.

Temporary Impoundments. The Division has authorized the construction of the existing temporary impoundment at the mine site.

7.34 Discharge Structures

Discharge from the sediment pond is conveyed by a CMP culvert acting as the principal and emergency spillway. The outlet of the spillways is protected by riprap as described and presented in Appendix 7. This design will comply with the requirements of standard engineering design procedures as required by R614-301-744.

7.35 Disposal of Excess Spoil

No significant excess spoil will be developed by the underground mine. The only anticipated spoil will be from materials collected in the sediment ponds. This limited volume of material will be removed from the ponds and transported to a refuse disposal site.

In the event spoil is generated during the facilities expansion, this too will be transported to the refuse disposal site.

The handling of these materials will comply with R614-301-745.

7.36 Coal Mine Waste

The refuse will be disposed of in accordance with the designs presented in Chapter 5 and Section 7.46 of this application.

7.37 Noncoal Mine Waste

Noncoal mine waste will be stored and final disposal of noncoal waste will comply with R614-301-747 and will be in accordance with the operation plan identified in Section 5.42.72.

7.38 Temporary Casing and Sealing of Wells

Each well which has been identified in the approved permit application to be used to monitor ground water conditions will comply with R614-301-748 and be temporarily sealed before use and for the purposes of SURFACE COAL MINING AND RECLAMATION ACTIVITIES protected during use by barricades, fences or other protective devices approved by the Division. These devices will be periodically inspected and maintained in good operating condition by the operator conducting SURFACE COAL MINING AND RECLAMATION ACTIVITIES.

7.40 Design Criteria and Plans

7.41 General Requirements

The runoff control plans for the Soldier Canyon Mine facilities include the diversion of the undisturbed runoff from areas contributing to the facilities, the collection of all runoff from disturbed areas associated with the sites and the containment and treatment of this disturbed runoff through the use of sediment ponds, strawbales, silt fence, riprap, mulches and revegetation. Plans for these activities are presented and discussed in the following sections.

7.42 Sediment Control Measures

7.42.1 General Requirements

Appropriate sediment control measures will be designed, constructed and maintained using the best technology currently available to:

1. Prevent, to the extent possible, additional contributions of sediment to stream flow or to runoff outside the permit area,
2. Meet the effluent limitations under R614-301-751, and
3. Minimize erosion to the extent possible.

Sediment control measures include practices carried out within and adjacent to the disturbed area. The sedimentation storage capacity of practices in and downstream from the disturbed areas will reflect the degree to which successful mining and reclamation techniques are applied to reduce erosion and

control sediment. Sediment control measures consist of the utilization of proper mining and reclamation methods and sediment control practices, singly or in combination. Sediment control methods include, but are not limited to:

1. Retaining sediment within disturbed areas,
2. Diverting runoff away from disturbed areas,
3. Diverting runoff using protected channels or pipes through disturbed areas so as not to cause additional erosion,
4. Using straw dikes, riprap, check dams, mulches, vegetative sediment filters, dugout ponds and other measures that reduce overland flow velocities, reduce runoff volumes or trap sediment,
5. Treating with chemicals, and
6. For the purposes of UNDERGROUND COAL MINING AND RECLAMATION ACTIVITIES, treating mine drainage in underground sumps.

7.42.2 Siltation Structures

7.42.2.1 General Requirements

Additional contributions of suspended solids and sediment to streamflow or runoff outside the permit area will be prevented to the extent possible using the best technology currently available as required by R645-301-742.200.

Alternative Sediment Control Areas (ASCA)

There are nine ASCAs within the Applicant's permit area which do not drain to a sediment pond with two locations approximately 2 and 2.5 miles south of the central mine facilities (Exhibit 7.32-1). Appropriate measures have been taken to ensure that all runoff leaving these sites shall comply with State and Federal effluent limitation standards. The total area within the Applicant's permit area designated for ASCAs is 4.90 acres. Therefore, the total ASCAs per total disturbed area of 21.82 acres is 22%. The ASCA's are listed on Table 7.42.2.1-1.

Table 7.42.2.1-1

Alternative Sediment Control Areas

ASCA	Description	Drainage Area (Acres)	10 yr-24h Precipitation	Curve Number	Runoff (Acre Ft.)
ASCA 1	REI storage area	0.42	1.9	75	0.012
ASCA 2	Parking lot outslope	0.27	1.9	75	0.01
ASCA 3	No. 2 exhaust	0.35	1.9	78	0.013
ASCA 4	North of No. 2 fan	0.02	1.9	75	0.0006
ASCA 5	Portal bench disturbance	0.43	1.9	75	0.012
ASCA 6	Sewage lagoons	0.46	1.85	75	0.01
ASCA 7	Topsoil storage site	2.30	1.85	85	0.132
ASCA 8	By-pass culvert inlet	0.04	1.9	85	0.002
ASCA 9	#3 Fan Exploration Road	0.61	1.85	78	0.020
TOTAL	ASCA disturbed	4.90			

Specific details concerning these sites are as follows:

ASCA #1

R.E.I. Storage Area

The R.E.I. storage area lies immediately southwest of the central mine facility sedimentation pond (Figure 7.42-1). It is utilized on a casual basis by Resource Enterprises, Inc. (R.E.I.), for storage of equipment and small parts. The total drainage area, as shown in Figure 7.42-1 is approximately 0.42 acres. Of this total drainage area only 0.18 acres are utilized for fenced storage with access to the county road.

The expected runoff volume from a design storm can be determined using the runoff curve number technique, as defined by the U.S. Soil Conservation Service (see the Soldier Canyon Mine Runoff Control Plan, Appendix 7). Using the 10-yr., 24-hr. precipitation depth of 1.9" and a curve number of 75 the direct runoff was calculated to be 0.33". This results in a total design runoff volume of 0.012 ac-ft.

The Applicant has provided several alternative sediment control methods in order to ensure that all runoff from the site meets effluent limitations. A description of the sediment control methods which have been implemented is as follows:

1. The entire storage area, including access, has been covered with gravel. This gravel, which is one to two inches in diameter has effectively stabilized the surface.

2. A substantial berm has been constructed along the southern boundary of the storage pad. This berm helps direct runoff towards a single treatment facility while protecting the topsoil storage pile from excess runoff.

3. The topsoil storage pile has been revegetated and is being monitored as a revegetation field trial test site.

4. The small channel which directs drainage off the storage pad outslope towards the straw bales has been protected by lining it with cobble size stones.

5. All runoff is passed through a set of straw bales before returning to the natural drainage. Straw bales have also been placed around the topsoil storage area to provide additional protection. (Note: The natural drainage where the treated runoff enters is a relatively flat, grassy area. Since a point source is difficult to identify here, monitoring is not considered practical.)

7.42.2.2 Sedimentation Pond

Located just North of R.E.I. storage area. The central facilities sedimentation pond was initially designed by Vaughn Hansen Associates, Salt Lake City, Utah; approved by the regulatory agencies; and constructed during October-November 1979. A portion of the sedimentation pond was subsequently reconstructed during August, 1986. During November 1990, EarthFax Engineering, Inc. was contracted to evaluate the runoff control and treatment facilities for the Central Mine Facilities Expansion. EarthFax's runoff control plan, as well as the sediment pond modifications and final construction report, are presented in Appendix 7-A. Sediment pond modifications according to Appendix 7-A, were completed on November 22, 1991 and are shown on the "as-built" Drawing B-127.

As indicated in Appendix 7-A, the facilities area will contribute 1.62 acre-feet of runoff to the sedimentation pond during the 10 year-24 hour storm. Based on the current configuration, the pond is slightly oversized and will handle an additional 0.27 acre-feet of water.

The total disturbed area contributing to the pond totals 14.7 acres. The sediment storage required to be provided in the pond for this area of disturbance is 1.47 acre-feet. This will result in the maximum sediment storage being at an elevation of 6649.6 feet. The sediment collected in the pond will be removed when 60 percent of the maximum storage volume (0.88 acre-feet) has been deposited. This cleanout level corresponds to an elevation of 6647.6 feet. With the decant elevation at 6649.6 feet, the clean out level will be at least 2.0 feet below the decant level, thus meeting previous requirements that the Utah Division of Water Quality placed on operation of the pond.

When sediment reaches the cleanout level it will be analyzed for potential acid-forming, toxic-forming or alkalinity producing materials prior to removal. Tests will be conducted in accordance to "Guidelines for Management of Topsoil and Overburden for Underground and Surface Coal Mining." Division approval on the suitability of the material will be obtained prior to disposal.

presented in Appendix 7-A indicate that this riprap is adequate for controlling erosion at the outfall.

Refuse Disposal Site

The sediment control measures for the proposed refuse disposal site are presented in the EarthFax Engineering, Inc. report presented in Appendix 7J. The proposed refuse disposal site will not be constructed, therefore reference to the site was removed from Chapter 7 of the M&RP in 2003.

7.42.3 Diversions

Central Mine Facilities

The control of runoff at the main mine facilities is achieved through a system of ditches, berms, culverts and alternative sediment controls. This system provides routing for both disturbed and undisturbed drainages. The drainage control system is depicted on Exhibit 7.32-1.

Initial design of the runoff control system was prepared in July 1979, by Vaughn Hansen Associates. Since then, several improvements have been made to the runoff system and design parameters have been modified by the regulatory agencies. Therefore, the entire runoff control system has been previously modified.

All diversions at the main mine facilities have been reevaluated and designed by EarthFax Engineering, Inc. for their ability to safety convey the peak flow from a 10 year-24 hour design precipitation event. The specific design details and design methodology utilized for runoff analysis are presented in Appendix 7-A and Figure 7.42-7.

Analyses contained in Appendix 7-A indicate that the existing runoff conveyance system is adequate to handle the runoff flow expected from the yard areas during a 10-year, 6-hour storm.

Runoff generated from the yard/portal area will be conveyed under the access roads and county road via culverts. The culverts which drain beneath the access roads were designed by EarthFax Engineering, Inc., (Appendix 7-A). The design indicates that these 18-inch diameter and 24-inch diameter culverts, as depicted on Exhibit 7.32-1, are adequate to convey the runoff from the design storm without overtopping. The culvert system which conveys runoff from the portal area, underneath the county road, was also designed by EarthFax Engineering, Inc., (Appendix 7-B). This system has been installed in accordance with the approved design (see Exhibit 7.32-1).

Topsoil Storage Site

The runoff control and sediment control structures have been designed to adequately handle a 10 year-6 hour precipitation event. Results of these analyses are contained in Appendix 7G. Only the data pertinent to the storage of topsoil and substitute topsoil was used in the construction of the site.

For the diversion ditch channel design, the 10 yr-6 hr peak flows were used. A flow velocity of less than five feet per second was considered nonerosive. The channel design calculations are presented in Appendix VII and are summarized in Table 3-3 of Appendix 7G. The undisturbed diversion channels are proposed to be triangular ditches constructed in natural earth materials. These diversions will be located above the topsoil stockpile site to divert the undisturbed changes around the site. As shown in Table 3.3, the peak flow for UD #1 and UD #2 are calculated at be 0.21 cfs and 0.02 cfs, respectively. In the steepest portion of these channels, the anticipated velocity

basin. Details of the proposed inlet and outlet conditions are contained in Appendix 7D.

Information contained in Appendix 7D indicates that the exit velocity from the riprap basin will be approximately 16.2 feet per second. Previous water-surface profile analyses of Soldier Creek presented in Appendix 7E indicate that, under natural conditions, velocities near the proposed culvert outlet are in excess of 18 feet per second. Thus, the outflow from the riprap basin will be less than the stream would experience during the design event under natural conditions, indicating that the basin design is adequate.

Also included in Appendix 7D is the design certification and in Appendix 10, the Division of Water Rights stream alteration permit with their follow-up compliance inspection report.

7.42.3.2 Diversions of Miscellaneous Flows

The design, location, construction, maintenance, and removal of diversions of miscellaneous flows are addressed in Section 7.42.30 and meet all of the performance standards set forth in R614-301-742.310.

7.42.4 Road Drainage

All of the Applicants roads have been designed, located and constructed as required by the regulations R614-301-742.410 through R614-301-742.423.5.

7.43 Impoundment

There are no permanent impoundments associated with the Applicant's facilities, nor are any planned. Temporary impoundments of water collected for runoff control will occur in the sediment ponds. The physical design of the sediment ponds are certified designs as required in R614-301-512 and are presented in Section 5.33 of this application. The sediment ponds do not meet the criteria for MSHA regulations. The hydrologic design for the sediment ponds are presented in the EarthFax reports (see Appendix 7A and 7J). Follow the cessation and reclamation of mining and disposal activities, the sediment ponds will be removed.

7.44 Discharge Structures

Central Mine Facilities

Discharge from the sediment pond spillways will be conveyed by two 1.5 foot diameter CMP culverts acting and the principal and emergency spillways. The principal spillway will also have a dewatering valve mounted on the side of the riser pipe. The outlet of both of these culverts will be protected by riprap as described in the EarthFax design report presented in Appendix 7A. This design will minimize the erosion which might result from the discharge of clean water from the pond. All sediment pond modifications were completed on November 22, 1991 and are shown on the "as-built" Drawing B-127.

7.45 Disposal of Excess Spoil

No significant excess spoil will be developed by the underground mine. The only anticipated spoil will be from the materials collected in the sediment ponds. This limited volume of material will be removed from the ponds and transported to a refuse disposal area. Disposal plans are detailed in Section 5.28.

The handling of these materials will comply with R614-301-745.

There are no valley fills or head-of-hollow associated with this project.

7.46 Coal Mine Waste

Temporary Storage of Coal Mine Waste

In the event that weather conditions preclude removal of any coal refuse, the Applicant has designated a temporary storage site at the central mine facilities (Exhibit 5.21-1a). It will be placed in a control manner to minimize adverse effects of leachate and surface water runoff on surface and groundwater quality and quantity. All runoff will report to the sediment pond.

Material that will be stored longer than 3 months will be sampled and analyzed according to Table 6 of the "Utah Guidelines for Management of Topsoil and Overburden". In the event that acid or toxic forming materials are identified, the Division will be notified and additional sampling of the material will be performed to define the extent of the problem material.

The storage and handling of any acid or toxic forming material will comply until R614-301-731.300. The coal mine waste will be transported to a refuse disposal site for permanent disposal.

7.47 Disposal of Noncoal Mine Waste

Garbage

Solid waste generated from mining activities, such as garbage and paper products, is disposed of in large trash "dumpsters" located near the portal. A contract garbage hauling service empties the contents of the dumpsters on a weekly basis and hauls the garbage to a nearby dump or landfill.

Unusable Equipment

All salvageable mining equipment is sold to local scrap dealers: items such as broken bolts, worn out engine parts, and items which might be recycled. Any machinery or large parts are placed in a stockpile near the No. 1 Fan storage area or the main mine facilities for periodic salvage by local scrap dealers. No mining equipment will be merely abandoned.

Petroleum Products

Oil and grease wastes are collected in sumps and returned to distributors for re-fining or used as heating fuel. The used oil and grease are consumed in an outside vented multi-oil fueled heater unit. The heating unit is exempt under hazardous waste regulations (50 FR 49169; 11/29/85) if the used oil and grease are generated on-site. In case of spills, a spill control plan has been developed and is located at the mine site.

7.48 Casing and Sealing of Wells

Following completion of reclamation, the monitoring wells for the mine will be plugged and abandoned in accordance with R614-301-631, R614-301-748 and Section 73-3-25 of the Utah Code. This will prevent the potential for disturbance to the hydrologic balance.

7.50 Performance Standards

All coal mining and reclamation operations will be conducted to minimize disturbance to the hydrologic balance within the permit and adjacent areas, to prevent material damage to the hydrologic balance outside the permit area and support approved postmining land uses in accordance with the terms and conditions of the approved permit and the performance standards of R614-301 and R614-302. For the purposes of SURFACE COAL MINING AND RECLAMATION ACTIVITIES, operations will be conducted to ensure the protection or replacement of water rights in accordance with the terms and conditions of the approved permit and the performance standards of R614-301 and R614-302.

7.51 Water Quality Standards and Effluent Limitations

Discharges of water from areas disturbed by coal mining and reclamation operations will be made in compliance with all Utah and federal water quality laws and regulations and with effluent limitations for coal mining promulgated by the U.S. Environmental Protection Agency set forth in 40 CFR Part 434. Effluent limitations are established by an NPDES Discharge Permit.

7.52 Sediment Control Measures

Sediment control measures must be located, maintained, constructed and reclaimed according to plans and designs given under R614-301-732, R614-301-742 and R614-301-760.

7.52.1 Siltation Structures

Siltation structures and diversions will be located, maintained, constructed and reclaimed according to plans and designs given under R614-301-732, R614-301-742 and R614-301-763.

7.52.2 Road Drainage

Roads will be located, designed, constructed, reconstructed, used, maintained and reclaimed according to R614-301-732.400, R614-301-742.400, and R614-301-762 and to achieve the following:

1. Control or prevent erosion, siltation and the air pollution attendant to erosion by vegetating or otherwise stabilizing all exposed surfaces in accordance with current, prudent engineering practices.

2. Control or prevent additional contributions of suspended solids to stream flow or runoff outside the permit area.

3. Neither cause nor contribute to, directly or indirectly, the violation of effluent standards given under R614-301-751.

4. Minimize the diminution to, or degradation of, the quality or quantity of surface and ground water systems.

5. Refrain from significantly altering the normal flow of water in streambeds or drainage channels.

7.53 Impoundments and Discharge Structures

Impoundments and discharge structures will be located, maintained, constructed and reclaimed to comply with R614-301-733, R614-301-734, R614-301-743 and R614-301-745 and R614-301-760.

7.54 Disposal of Excess Spoil, Coal Mine Waste and Noncoal Mine Waste

Disposal areas for excess spoil, coal mine waste and noncoal mine waste will be located, maintained, constructed and reclaimed to comply with R614-301-735, R614-301-736, R614-301-745, R614-301-746, R614-301-747 and R614-301-760.

7.55 Casing and Sealing of Wells

All wells will be managed to comply with R614-301-748, R614-301-765 and Section 73-3-25 of the Utah Code. Water monitoring wells will be managed on a temporary basis according to R614-301-738.

7.60 Reclamation

7.61 General

The hydrologic reclamation plan is presented within this section in its entirety. Included herein are discussions of present, future and reclaimed hydrology; the phased reclamation plan; design methodologies used; and details related to specific design considerations. Because of the nature of the material to be presented, it appears most effective to organize the data according to the following topics within this section of the permit.

- o General Overview
- o Hydrologic Structure Removal Plan
- o Design Methodologies
- o Reclamation Design

Information not presented under any of the preceding topics will be addressed within Sections 761 through 765 as requested.

General Overview

It is the intent of the applicant to remove all structures and facilities associated with the coal mining operation, return the landscape to as close an approximation of the original predisturbed contour as

feasiblely possible, and to maintain properly all surface diversion structures as required. Table 7.61 presents a summary of the hydrologic reclamation sequence. The hydrologic structures which will require removal include the newly installed bypass diversion structure for Soldier Creek, miscellaneous bypass culverts which tie into the main bypass structure, undisturbed area bypass ditches and surface water conveyance ditches which presently divert disturbed area waters into the sedimentation pond located south of the surface facilities. In order to provide the best possible long term success of the reclamation effort, all possible undisturbed area waters have been diverted around reclaimed surfaces.

As part of the reclamation process it is also the intent to provide reclamation facilities capable of diverting and controlling surface area runoff for two basic time periods. The first period is considered a temporary period which is designed for the 10 year, 6 hour precipitation and runoff event. The second period is considered permanent and is designed for the 100 year, 6 hour precipitation and runoff event. The temporary period is intended to cover the time period required under the regulations to revegetate and re-establish disturbed areas and covers the time between cessation of operations and final abandonment and bond release.

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