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RECEIVED
JAN 09 2006
DIV. OF OIL, GAS & MINING

Belmont Coal, Inc.
UMCO Energy, Inc.
Maple Creek Mining, Inc.
Onieda Coal, Inc.
Spring Church Coal Company

Permit numbers, regulatory authority and issuance dates are found in Appendix 1-2.

112.350. There are no pending coal mine permit applications in any State in the United States.

112.400. Miscellaneous information for coal mining and reclamation operations owned or controlled by the applicant or by any person who owns or controls the applicant follows.

112.410. The name, address, identifying numbers, including employer identification number, Federal or State permit numbers and MSHA number, with date of issuance and the regulatory authority issuing the permit can be found in Appendix 1-2.

112.420. Ownership or control relationship to the applicant is presented in Appendix 1-1.

112.500. The name and address of each legal owner of the surface and mineral property to be mined is shown on Plate 4-1 for surface ownership and Plate 5-4 for coal ownership, and is as follows:

Surface Owners:

Josiah K Eardley:
2433 S HWY 10
Route 1, Box 119
Price, Utah 84501

~~Robert K. Peper~~Bronco Coal Company:
~~975 W 600 S~~P.O. Box 217
~~Orem~~ Cleveland, Ut~~84058~~ah 84518

UTAHAMERICAN ENERGY, INC.:
~~Box 187~~ 153 Highway 7 South
St. Clairsville Powhatan Point, ~~Ohio~~ OH
439~~50~~42

UNITED STATES DEPARTMENT OF THE INTERIOR:
Bureau of Land Management
Utah State Office
324 South State
Salt Lake City, Utah 84111

STATE OF UTAH:
Utah School and Institutional Trust Lands Administration (SITLA)
675 East 500 South Suite 500
Salt Lake City, Utah 84114-5703

COLLEGE OF EASTERN UTAH FOUNDATION:
451 East 400 North
Price, Utah 84501

Subsurface Owners:

UTAHAMERICAN ENERGY, INC.:
153 Highway 7 South
Powhatan Point, OH 43942

~~**Robert K. Peper**~~**Bronco Coal Company**:
~~975 W 600 South~~
~~Orem~~P.O. Box 217
Cleveland, Utah ~~84058~~84518

STATE OF UTAH:
Utah School and Institutional Trust Lands Administration (SITLA)
675 East 500 South Suite 500
Salt Lake City, Utah 84114-5703

UNITED STATES DEPARTMENT OF THE INTERIOR:

Bureau of Land Management
Utah State Office
324 South State
Salt Lake City, Utah 84111

COLLEGE OF EASTERN UTAH FOUNDATION:
451 East 400 North
Price, Utah 84501

112.600. The name and address of each owner (surface and subsurface) of all property contiguous to the proposed permit area is shown on Plate 4-1 for surface, and Plate 5-4 for subsurface. Plate 1-1 is the official boundary map and it will be used to clarify any questions about the permit boundaries. Plate 1-2 shows the disturbed area.

Contiguous Surface Owners:

UNITED STATES DEPARTMENT OF THE INTERIOR:
Bureau of Land Management
Utah State Office
324 South State
Salt Lake City, Utah 84111

STATE OF UTAH:
Utah School and Institutional Trust Lands Administration (SITLA)
675 East 500 South Suite 500
Salt Lake City, Utah 84114-5703

Josiah K Eardley:
2433 S HWY 10
Route 1, Box 119
Price, Utah 84501

~~Robert K. Peper~~Bronco Coal Company:
~~975 W 600 S~~P.O. Box 217
~~Orem~~ Cleveland, Ut~~84058~~ah 84518

UTAHAMERICAN ENERGY, INC.:
153 Highway 7 South

Powhatan Point, OH 43942

WILLIAM MARSING LIVESTOCK INC.:
4330 E 8900 N
Price, Utah 84501
COLLEGE OF EASTERN UTAH FOUNDATION:
451 East 400 North
Price, Utah 84501

Contiguous Subsurface Owners:

UNITED STATES DEPARTMENT OF THE INTERIOR:
Bureau of Land Management
Utah State Office
324 South State
Salt Lake city, Utah 84111

STATE OF UTAH:
Utah School and Institutional Trust Lands Administration (SITLA)
675 East 500 South Suite 500
Salt Lake City, Utah 84114-5703

UTAHAMERICAN ENERGY, INC.:
153 Highway 7 South
Powhatan Point, OH 43942

~~**Robert K. Peper:**~~
~~**975 West 600 South**~~
~~**Orem, Utah 84058**~~**Bronco Coal Company:**
P.O. Box 217
Cleveland, Utah 84518

COLLEGE OF EASTERN UTAH FOUNDATION:
451 East 400 North

Price, Utah 84501

112.700. The following is a list of MSHA numbers associated with the permit.

MSHA ID Number: 42-00100 (Horse Canyon)
MSHA ID Number 42-02241 (Lila Canyon)
Refuse Pile I.D. Number: 1211-UT-09-02241-01

United States Department of Labor
Mine, Safety and Health Administration
P.O. Box 25367
Denver, Colorado 80225

112.800. In February 2002, UEI submitted a lease by application to the BLM. Four thousand acres were identified as an area of interest to the south and east of current UEI reserves. The LBA delineation and recoverable reserves has yet to be determined by the BLM. If the area of interest is offered for lease, and if UEI bids on the LBA, and if UEI is the successful bidder, then it could be anticipated that mining in the leased area would occur once current Lila reserves are exhausted. (Approximately in the year 2020)

112.900. After **UtahAmerican Energy, Inc.,** is notified that the application is approved, but before the permit is issued, **UtahAmerican Energy, Inc.,** will update, correct or indicate that no change has occurred in the information previously submitted under R645-301-112.100 to R645-301-112.800.

113. Violation Information.

113.100. Neither **UtahAmerican Energy, Inc.,** or any subsidiary, affiliate, or persons controlled by or under common control with the applicant, has had any federal or state permit to

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Assessment submitted in association with the Right-Of-Way applications.

The USFWS recognizes that the permit area is within range of endangered species, including the black-footed ferret, MSO, and the bald eagle (Letter dated February 4, 1998, Appendix 3-3).

Raptor surveys were initiated in 1998 and continued ~~through 2005~~ annually with the exception of 2004. These surveys were initiated before ground-breaking of the Lila project. The results of these surveys are in Appendix 3-5. The entire Book Cliffs escarpment within the permit area was inventoried for cliff nesting raptors. In addition, a 1-mile buffer zone was inventoried around areas of potential development.

None of the Eagle nests in the close proximity to the mines surface facilities (less than 1/4 mile). haved been active nor tended ~~in the last three years. However, historically~~from 1998 to 2003. In 2005 nest 946 contained a chick that was possibly dead. Historically one active and one tended Golden Eagle Nest is within close proximity to the mines surface facilities. After consultation with USFW, Laura Roma, UDWR, Chris Colt, and BLM, Dave Mills, it was determined that there was a high probability these nest sites would be abandoned. A cooperative agreement with the regulatory agencies and UEI was finalized and is made part of the mitigation for the Lila Canyon EA. One nest discussed above, also lies in an area of potential subsidence which is a mute point due to its close proximity to the mine site. Since the nests are located so close to the mine surface facility, their future potential use was deemed to be lost and were so mitigated by a prey base off-site vegetation treatment project approved by the USFWS, UDWR and BLM (See page 19 for BLM mitigation information).–

~~However, if this nest(s) or any future nest is lost as a result of mining activities (subsidence), UEI is committed to working with the Division who will then consult with USFWS and UDWR for mitigation requirements.~~

Prior to construction and during operations UEI will coordinate closely with USFWS, DWR, and the Division to avoid "take" of golden eagles.

The BLM-lead mitigation project is based on the premise that there is sufficient nest sites in the area to accommodate the population base. The limiting factors appears to be available prey base. Mitigation is designed to enhance the prey base while concurrently enhancing habitat for big game, deer, elk, and bighorn sheep.

In addition, there are a number of aquatic Threatened and Endangered (T&E) species associated with the Colorado drainage systems. In the Lila Canyon Permit Area, there are no perennial streams, or ephemeral drainages which are in close enough proximity to perennial streams which could pose a potential threat to any aquatic species.

322.230. All known species or habitats needing special protection under state or federal law have been addressed.

322.300. Adequate copies of the Mine Reclamation Plan have been submitted to the Division to allow for distribution to the Fish and Wildlife Service for their review.

323. Maps or aerial photographs of the permit area and adjacent areas have been provided. Plate 3-1 Wildlife Habitats, is a map that shows all critical habitat, raptor nests and all special habitat features. This plate will be updated on an as needed bases to reflect current conditions such as new raptor nests and/or changes in wildlife use.

~~the~~occurthe first desirable period following disturbance and/or abandonment.

332. The extent and degree of subsidence will be in large dependent on both the amount of overburden as well as the mining method. Employees and or consultants of the operator have numerous years of experience mining the Bookcliffs and Wasatch areas and none have observed nor are aware of any negative impacts on wildlife or vegetation, as a result of subsidence, with the exception of

1) Escarpment Failure which is not anticipated.

2) Disruption of Surface and / or Ground Water, which is not anticipated.

(1) Escarpments will be protected by implementing escarpment barriers. An escarpment barrier of a minimum of 200', within which no second mining will take place, will be used to protect all escarpments.

(2) Disturbance of Surface and / or Ground Water. Considering, the permit area has no surface water with the exception of intermittent or ephemeral flow associated with precipitation events and / or snow melt, subsidence should have no adverse effect. The ephemeral stream channels, in the area's of potential subsidence, will be monitored to insure there are no adverse impacts to the ephemeral flow.
No negative impacts to vegetation are anticipated. However, vegetation will be monitored in conjunction with subsidence monitoring, utilizing infrared aerial photography once every five years for those areas that are undermined. This will be done in accordance with the subsidence control plan. (See Section 525). Any loss of or diminished appearance of vegetation will be noted, confirmed on the ground, and a corrective plan to mitigate the loss will be submitted to the Division of Oil, Gas, and Mining for their approval and concurrence prior to implementation.

It is anticipated that the saturated zone will most certainly produce some water when intercepted in the course of mining. The effect could be positive in the event the mine were to discharge surplus water to the surface. Assuming the water

existing raptor nests from subsidence. All nests within a ½ mile radius of the surface facilities were assumed lost due to indirect disturbance associated with mine activities. The Lila Canyon EA # UT-070-99-22, outlines mitigation recommended through a cooperative effort between Utah Department of Wildlife Resources, Bureau of Land Management, U.S. Fish and Wildlife and UtahAmerican Energy, Inc. where mitigation would be implemented to increase prey base off-site. The construction of alternative nests was considered to be ineffective. Eagle distribution was not limited by suitable nest sites but by available prey.

An MSO two-year calling survey will be completed according to Appendix 3-4. Results as described in Appendix 3-4 will be reported to the Division, UDWR, and USFWS. This two-year survey will include four nigh time surveys with no more than one survey prior to end of April and at least three surveys prior to end of July. Results will be submitted to USFWS, DWR, and the Division immediately following of each nigh time survey. If owls are observed, the agencies will reopen the consultation process immediately following the nigh time survey that observed the owls.

Construction at the mine to upgrade drainage controls and to construct the road will have a minor impact on wildlife in the area. The impact will mainly be increased human activity associated with the construction and a small, less than 42.6 acre, loss of habitat for the mine site, roads and sedimentation pond. These impacts will have little or no affect on the wildlife because they will be completed in an environmentally sound manner.

UEI will instruct all personnel as to current regulations regarding the use of off-road vehicles, firearm regulations, and where current UDWR proclamations are available. This training will be part of the annual refresher offered to all employees. The company will encourage strict compliance with these regulations.

DWR will be notified of any road kills involving large game and request to have them removed to safeguard raptors. Mine personnel will be instructed to remove road kills a safe distance from the road way.

The Lila Canyon Mine has agreed to mitigate the loss of wildlife habitat as well as the potential loss of habitat use due to disturbance.

lesson disturbance.

5. The Operator will ensure that DWR surveys for cliff nesting raptors within proposed facilities areas at least two years prior and one year following construction. The Division, in consultation with DWR, cleared the two consecutive year requirement if the mine begins construction sometime between 2005 and February 2006. This clearance is because UEI already had eight years of data as well as data for spring 2005. The Operator will continue annual raptor surveys in 2006.

6. An active golden eagle nest, with young, was documented during the 1999 spring raptor survey. The nest is located in the left fork of Lila Canyon within the 1-mile buffer zone. (See Plate 3-1). A consultation with USF&W, BLM, and UDWR was held in the fall of 1999. Line of site and potential mitigation was addressed during this meeting. The results of this consultation are addressed in Sec 322.220 and the Lila Canyon EA. This nest was not active in 2000, 2001, 2002, or 2003. A survey was not done in 2004. In 2005 nest 946 contained a possibly dead chick. (See Appendix 3-5 for updated inventories)

7. The Operator will adhere to exclusionary periods when initiating construction and final reclamation projects. The exclusionary periods include: raptors (Feb 1 - July 1), Bighorn sheep lambing (May 1 - June 15), and Pronghorn (May15 - June 20).

The Applicant does not plan to monitor any wildlife species during the life of the operation with the exception of raptors. Helicopter spring raptor surveys will be conducted at a minimum of a 1-mile radius around any new or potentially disruptive mining activity, 2-years prior and annually after the proposed activity Permittee will contact the USFWS, DWR, and the Division immediately following raptor fly-over surveys if

raptors are observed nesting.

The mine will emphasize their commitment to legal requirements of firearm and off-road vehicle-use by employees. This type of program has been adopted by the operator and will continue throughout the operation. An education program aimed at minimizing potential negative impacts by employees will be presented during the Operators annual retaining programs. Employees will be informed about the wildlife in the area and about which species are protected. They will

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341.250. A reference area for the mine site disturbance was established adjacent to the proposed facilities during the summer of 2003 (Figure 1, Appendix 3-1). The reference area was chosen in an area which represents the natural premining conditions of the permit area. This reference area will facilitate the determination of successful revegetation and the resultant final bond release for the Applicant.

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Comparisons of the revegetated area and the reference area will be made using the data

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~~Comparisons of the revegetated area and the reference area will be made using the data~~ obtained from the ninth and tenth year sampling. This data will be used to obtain statistical information that will show the site meets the requirements for bond release.

341.300. The methods outlined have a proven performance based on the successful reclamation of the Horse Canyon Mine in the immediate drainage to the north (less than two miles) in like habitat and aspect.

The Operator will conduct a study to determine the optimum time for seeding warm seasons species (refer to page 29).

342. Fish and Wildlife. A fish and wildlife plan follows:

342.100. The sediment pond will be maintained through the life of the operation and will be removed when effluent criteria is met following reclamation.

342.200. Rangeland for domestic stock is the secondary intended postmining land use with wildlife habitat as the primary land use. Plant species appropriate for enhancing the wildlife habitat were selected on the basis of known wildlife requirements including nutritional value for fish and wildlife, use as cover for fish and wildlife and ability to support and enhance fish and wildlife habitat. The Pinyon/Juniper area will be enhanced and reclaimed to the Grass/Shrub community type. The habitat type provides excellent winter range for big game, as well as, an increase in rodent populations which in turn are beneficial to raptors The Lila Canyon EA has stipulated that in excess of 70 acres of wildlife habitat will be enhanced to offset negative impacts associated with the disturbance created by the mine-through the life of the mine and

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Table 4-1

ENTITY	OWNER	LAND USE
Federal Government	U.S. Bureau of Land Management	Range Valley Mountain Habitat Management Plan U-6-WHA-T4 Federal Coal Leases: U-0126947 U-014217 U-014218 SL-066145 SL-066490 SL-069291 *Federal Grazing Allotments*: Little Park Coon Spring Cove Icelander Range Creek *Areas of Wilderness Character* Turtle Canyon WSA
State Government	State of Utah	
County Government	Emery County*	
Private	Josiah and Etta Marie Eardley Intermountain Power Agency ~~Robert K. Peper~~Bronco Coal Company College of Eastern Utah Brent Davies* William Marsing Livestock, Inc.*	

*Close proximity to permit area

Table 4-2
Surface Ownership Permit Area Both Horse Canyon and Lila Canyon

Township	Range	Section	State Acres		Federal Acres		Private Acres	
			A	B	A	B	A	B
15 S	14 E							
		33					60.70 (2)	
							49.90 (4-4)	
		34					23.62 (2)	
							25.68 (4-4)	
							25.20 (3)	
16 S	14 E							
		2	248.30	0.76				
		3			127.03		204.30 (4-4)	
		4					189.00 (4-4)	
		5					20.00 (1)	
		8					40.00 (1)	
		9					120.00 (4-4)	
		10			28.20		30.85 (1)	76.00 (1)
		11			14.78	108.86	120.19 (2)	341.20 (2)
		12		40.00		600.00		
		13				640.00		
		14				640.00		
		15				157.50		120.00 (1)
		22				40.00		
		23				560.00		
		24				640.00		
		25				320.00		
		26				80		
16 S	15 E	19				110.00		
		30				190.00		
			State Acres		Federal Acres		Private Acres	
			A	B	A	B	A	B
SUB TOTAL			248.30	40.76	170.01	4086.36	909.44	537.20
Total "A" Horse Canyon			1327.75					
Total "B" Lila Canyon			4664.32					

GRAND TOTAL	5992.07

Table 4-2A
Coal Ownership Permit Area Both Horse Canyon and Lila Canyon
By Lease

Township	Range	Section	Federal Lease Number	State Acres		Federal Acres		Private Acres	
				A	B	A	B	A	B
15 S	14 E								
		33	SL-046512			60.70		49.90 (+3)	
		34	SL-046512			23.62		25.68 (+3)	
								25.20 (2)	
16 S	14 E								
		2		248.30	0.76				
		3	SL-066145			221.27		110.06 (+4)	
		4						189.00 (+4)	
		5						20.00 (1)	
		8						40.00 (1)	
		9						120.00 (1)	
		10	SL-066145			59.05	76.00		
		11	SL-066145			134.97	130.06		
			SL-066490				320.00		
		12	SL-066490				320.00		
			U-014218				320.00		
		13	U-0126947				320.00		
			SL-066490				320.00		
		14	SL-066145				160.00		
			SL-066490				480.00		
		15	SL-066490				80.00		
			SL-066145				120.00		
			BLM (No Coal)				77.50		
		22	SL-066490				40.00		
		23	SL-066490				560.00		
		24	SL-066490				240.00		
			SL-069291				80.00		

			U-0126947				320.00		
		25	SL-069291				160.00		
Table 4-2A Continued Coal Ownership Permit Area Both Horse Canyon and Lila Canyon									
			U-0126947				120.00		
			U-014217				40.00		
		26	SL-066490				40		
			SL-069291				40.00		
16 S	15 E	19	U-0126947				110.00		
		30	U-0126947				190.00		
				State Acres		Federal Acres		Private Acres	
				A	B	A	B	A	B
SUB TOTAL				248.30	0.76	499.61	4663.56	579.84	0.00
Total "A" Horse Canyon				1327.75					
Total "B" Lila Canyon				4664.32					
GRAND TOTAL				5992.07					

Please note:
(1) UEI
(2) Eardley
(3) ~~Peper~~Bronco Coal Company
(4) CEUF

Federal coal leases relative to the Lila Canyon Mine permit area are depicted on Plate 5-4. There are six federal coal leases comprising the permit area, all of which are assigned to Utah American Energy, Inc. The acreage for each lease is presented on Table 1-1.

Grazing allotments in the Lila Canyon Mine permit area are depicted on Plate 4-2. These grazing allotments have remained unchanged for the past 10 years. The permit area is located primarily within the Little Park Allotment and to a lesser extent within the Cove Allotment. Table 4-3 , along with Plate 4-2, describes the allotments, owners, acreage, and animal unit month (AUM's).

The boundary of the Turtle Canyon Wilderness Study Area (WSA) in relation to the permit area is shown on Plate 4-4.

County, Utah". This report was written in March 1986 by Don Southworth and Asa S. Nielson for the Mining and Reclamation Plan submitted to the Division by Intermountain Power Agency. A cultural Resource Inventory of the Kaiser Steel Corporation South Lease Mine Property and a Test Excavation (42EM1343 ~~in~~ Emery ~~Co~~County, East Central Utah. ~~B~~ conducted by Rebecca Rauch (1981). ~~A~~These and additional ~~inventories were conducted by Montgomery~~survey reports of the area are included in ~~1998 and 1999~~Appendix 4-1.

Detailed archeological ground surveys were conducted at the Lila Canyon mine site and associated disturbed area, by Montgomery Archaeological personnel. This survey was conducted in 1998 and 1999 and is included within Appendix 4-1~~, along with the previously mentioned reports. No additional sites were located during the 1998 or 1999 surveys which would be eligible for the National Register of Historic Places.~~

411.141. Historic resources All such sites are depicted on Plate 4-3.

411.141.1 The locations of listed or eligible cultural and historical resources ~~listed~~ in the ~~National Register of Historic Places have been discussed previously in Section 411.140. Detailed descriptions of such sites are presented~~area are discussed in Appendix 4-1~~. All sites are depicted in~~ and shown on Plate 4-3.

411.141.2 No cemeteries are located in or within 100 feet of the proposed permit area.

411.141.3. No land within the proposed permit area is within the boundaries of any units of the National System of Trails or the Wild and Scenic Rivers System.

411.142. Within ~~or adjacent to the permit~~ area there are five historic resources that are either on or eligible for listing on the National register. There is one listed site (42EM1222) 2.5 miles from the facility area. One eligible site (42EM1343) has been recovered and

another (42EM2517) will be recovered prior to construction. The other two eligible sites (42EM2255 and 42EM2256) are not expected to be impacted by operations.

SHPO concurs with the Division's determination of "No Historic Properties Affected" for 42Em2255 and 42Em2256. The SHPO is aware of the BLM recovery plan for 42Em2517 that will occur after mine plan approval and before construction.

No publicly owned parks or places listed on the National Register of Historic Places would be adversely affected by the proposed coal mine.

411.143. BLM will develop a BLM recovery plan for 42EM2517 that will occur after mine plan approval and before construction.

411.144 Of the ~~eighteen~~nineteen cultural and historical sites identified ~~within~~in the ~~Lila Canyon mine permit~~ area, only one, 42E~~m~~M1222, is listed on the National Register of Historic Places. This site is approximately 2.5 miles from the surface facility~~. N~~ and therefore, no impacts should occur at this site.

411.200. Previous mining and exploration activities have occurred within the proposed permit area within the last twenty years. In the mid-1950's, the road along the bottom of Lila Canyon was constructed to allow exploration of the resources. The road intersects the Horse Canyon Highway approximately 1.4 miles to the north and loops back to the south to intersect Highway 191 and 6 to the south (see Plate 4-1). Two sealed breakouts (Plate II-2 of Horse Canyon Plan) are located in the left fork of Lila Canyon where the Lila Canyon fan was installed in the 1950's. The Lila Canyon fan was used until the closure of Horse Canyon post 1977, and therefore, the current Coal Regulatory Program has jurisdiction over this disturbance and it is included in the permit area.

411.210. Coal was removed from the outcrop of Horse Canyon and transported back through the Horse Canyon Mine.

postmining land uses, nor higher or better uses are being proposed.

413.300. No alternative post-mining land use is being proposed at this time.

414. Premining Land use: It is the operations intent to return the mine properties to its pre-mine use. The reclamation practices to be implemented as outlined in chapter five have a proven record of success.

420. Air Quality.

421. Compliance with the Clean Air Act: Mining and reclamation operations will be conducted in compliance with the requirements of the Clean Air Act and other applicable state, federal statues.

422. Compliance Efforts: Appendix 4-3 contains the "Intent to Approve" and the actual "Approval Order" for the air quality permit obtained from the Utah Bureau of Air Quality. The initial air quality permit is for 1.5 million tons. Revisions to the air quality permit will be made to accommodate future increases in production.

423. Since Lila Canyon Mine is an underground operation this section is not applicable.

423.100 Since Lila Canyon Mine is an underground operation this section is not applicable.

423.200 Since Lila Canyon Mine is an underground operation this section is not applicable.

424. Since Lila Canyon Mine is an underground operation this section is not applicable.

425. Since Lila Canyon Mine is an underground operation this section is not applicable.

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is not applicable.

521.140 Mine maps and permit area maps and or cross-sections will clearly indicate the following:

521.141 Plate 5-1 shows the permit boundary and Plate 5-2 shows the disturbed area boundary. Additional subareas ~~requiring~~that might require additional permits are addressed in Section 112.800 and 4-1B.

521.142 The underground workings are shown on Plate 5-5.

521.143 The proposed disposal site for placing the slope rock is shown on Plate 5-2 as well as other appropriate plates.

521.150 Plates 6-2, 6-3, and 6-4, show surface contours that represent the existing land surface configuration of the proposed permit area.

521.151 The Plates show the surface contours for all areas to be disturbed as well as over the total permit area. The Plates showing the surface contours has been prepared by or under the supervision of a registered engineer.

521.152 No previously mined areas are included within Part "B". Therefore this section does not apply.

521.160 The maps, plates, and cross sections associated with this chapter clearly show:

521.161 Proposed buildings, utility corridors, and facilities are shown on Plate 5-2 as well as others.

521.162 Area of land affected according to the sequence of mining and reclamation is shown on the appropriate plates.

521.163 Land for which a performance bond will be posted is shown on the appropriate plate. Plate 5-2 as

and will be modified as needed.

Ventilation of the mine will be by an exhaust type system. It has been estimated that 900,000 cfm will be required at full production. Intake air will be supplied by slopes and entries from the surface.

A water supply system will be installed. Potable water from an approved source will be hauled by truck and stored in a mine site storage tank located near the man and coal slope portals. Alternative sources for potable water are being considered. A treatment plant may be indicated. Process water will be hauled from the Price River or other approved source by truck and stored in another mine site storage tank. It is anticipated that once the old two entry development panel is encountered that adequate process water may be obtained from the old works. This process water will provide for dust control, water to the mine and fire suppression. Mine water will be used with the process water. See Appendix 7-3 (PHC) for water usage calculations.

Dust suppression will be accomplished by the use of sprays on all underground equipment as required. Sprays will also be used along sections of the conveyors and at transfer points.

No major de-watering concerns are anticipated at this property. The workings are expected to produce some water with more water being produced as the depth of mining increases. Part of this water will be used for dust suppression. The remainder will be collected in sumps and pumped to mined out sections of the mine or to the surface and treated when necessary.

Underground mining equipment to be used at Lila Canyon is typical of most room-and-pillar and longwall mine. A list of major equipment which may be used underground is listed below additional equipment not on the list may be used as needed.

Continuous Miners
Roof Bolters
Battery Shuttle Cars
Electric Shuttle Cars
Diesel Ram Cars
Feeder Breakers
Continuous Haulage Units
Battery Scoops
Diesel Scoops
Diesel Service Vehicles
Diesel Material Haulers

recorded on the blasting record.

524.748 The type and length of the stemming will be recorded on the blasting record.

524.749 Mats or other protections used will be recorded on the blasting record.

524.750 Since all structures are either owned by the permittee and not leased to another person or are located over six miles distance from the permit area a record of seismographic and airblast information is not required.

524.760 Since a blasting schedule is not required this section does not apply.

524.800 The operator will comply with the various appropriate State and Federal laws and regulations in the use of explosives.

525. Subsidence: The permittee will comply with the appropriate R645-301-525 requirements.

525.100 Subsidence Control Plan

525.110 Plate 5-3 shows the location of State appropriated water and 5-3 (Confidential) shows the eagle nests that potentially could be diminished or interrupted by subsidence.

525.120 SUBSIDENCE POTENTIAL (See also Section 5.4 of Part "A")

Subsidence from underground coal mines has been believed to affect overlying forest and grazing resource lands in the following ways:

- Formation of surface fissures which intercept near surface soil moisture thus draining the water away from the root zone with deleterious effects.
- Alterations in ground slope and destabilization of critical slopes and cliffs.

- Modification of surface hydrology due to the general downward migration of surface water through vertical fractures.

- Modification of groundwater hydrology including connection of previously separated aquifers and reduction in flows of seeps and springs which rely upon tight aquitards for their flow.

- Emissions of methane originating from the coal seam through open fissures to the surface or at least the base of the surficial soil which has been known to have deleterious effects on woody plants.

A great deal of baseline data is available from many mining settings to develop subsidence damage criteria for surface structures (Bhattacharya et al. 1984). The SME Mining Engineering Handbook suggests a limiting extension strain value of 5×10^{-3} for pasture, woodland, range or wildlife food and cover.

The formation of cracks and fissures can also have deleterious effects on groundwater resources without any fissuring to the surface. In the arid areas of Utah, impacts of modification of the groundwater regime can be disruption of flow from natural seeps and springs which rely on the permeability contrast of interbedded sandstones and shale for their flows. These water resources are essentially surface waters and subject to the same limiting damage criteria as surface water bodies. Subsidence damage to surface water bodies has been studied by a number of workers including Dunrud (1976), Wardell and Partners (1976), U.S. Bureau of Mines (1977), and Engineers International (1979). The results of the Wardell and Partners studies of subsidence effects in a number of countries indicates that the limiting strain for the onset of minor impacts to surface waters is approximately 5×10^{-3}.

Dr. Roy Sidle found in his study of Burnout Creek that subsidence impacts to streams are temporary and self healing. A Executive Summary of is study and published findings follows:

Title : Stream response to subsidence from underground coal mining in central Utah

2. Authors: Sidle-RC Kamil-I Sharma-A Yamashita-S

Short-term geomorphic and hydrologic effects of subsidence induced by longwall mining under Burnout Creek, Utah were evaluated. During the year after longwall mining, 0.3-1.5 m of subsidence was measured near impacted reaches of the mountain stream channel. The major channel changes that occurred in a 700-m reach of Burnout Creek that was subsided from 1992 to 1993 were: extent glides; (2) increases in pool length, numbers and volumes; (3) increase in median particle diameter of bed sediment in pools; and (4) some constriction in channel geometry. Most of the changes appeared short-lived, with channel recovery approaching pre-mining conditions by 1994. In a 300-m reach of the South Fork that was subsided from served, although any impacts an pool morphology may have been confounded by heavy grazing in the riparian reaches during the dry summer of 1994. Similar near-channel sedimentation and loss of pool volume between 1993 and 1994 were noted throughout Burnout Creek and in adjacent, unmined James Creek. Subsidence during the 3-year period had no effect on baseflows or near- channel landslides.

Engineers International (1979) concluded that the minimum safe cover required for total extraction of the coal resources under surface waters is approximately 60 times the seam thickness for coal beds at least 6 feet thick or approximately 450 feet. In their review of the foregoing, Singh and Bhattacharya (1984) recommended that the same limiting safe strain and cover thicknesses be used for protecting groundwater resources over coal mines.

The longwall panels will have dimensions of approximately 950 feet wide and up to 7,000 feet long and 2,000 feet deep. Using the methods described in the National Coal Board's *Subsidence Engineers' Handbook*, the S/m ratio for this geometry would be 0.38 where "S" is the maximum subsidence and "m" is the seam extraction thickness. For an average seam extraction thickness of 10.5 feet, the total subsidence would be 4.0 feet. However, as described above the major impacts of this subsidence are due to extension strains and not total vertical subsidence. The

prediction of average extension strain is accomplished with the use of the formula:

+E = 0.75 S/h where S=subsidence and h=depth of cover

The solution of this equation for the Lila Canyon Mine configuration discussed above produces a predicted, average extension strain of 1.5×10^{-3} which is less than the limiting strain of 5×10^{-3} for protecting surface waters, groundwater sources, pasture, woodland, range or wildlife food and cover. Thus it is unlikely that the gradual compression expected over much of the subsidence area will have any deleterious effects on the overlying renewable surface resources. The cover thickness of over 2,000 feet is also much greater than the limiting thickness of 450 feet recommended by International Engineers Inc. (1979). The table below shows the expected subsidence amount and expected extension strain for longwall panels at various mining depths.

Maximum Subsidence & Expected Extensive Strain (NCB 1975)

	Feet	Meters
Panel Width =	900	274
Seam Height =	10.5	3

Depth of Cover		Width to Depth (a)	Maximum Subsidence(S)		Extension Strain (E)
Feet	Meters	Ratio	Feet	Meters	x 10^{-3}
500	152	0.9	9.5	2.9	14.2
1000	305	0.75	7.9	2.4	5.9
1100	335	0.71	7.5	2.3	5.1
1200	366	0.68	7.1	2.2	4.5
1300	396	0.65	6.8	2.1	3.9
1400	427	0.59	6.2	1.9	3.3
1500	457	0.54	5.7	1.7	2.8
2000	610	0.38	4.0	1.2	1.5
2500	762	0.28	2.9	0.9	0.9

The pace at which subsidence occurs depends on many controls including the type and speed of coal extraction, the width, length and thickness of the coal removed, and the strength and thickness of the overburden. Observations of subsidence by Dunrud over the Geneva and Somerset Mines indicate that subsidence effects on the surface occurred within months after mining was completed, and the maximum subsidence was essentially completed within 2 years of the finishing of retreat mining.

No major impacts of subsidence to the surface caused by the underground mining methods proposed during the permit term are anticipated.

The coal seam is approximately 12.5 feet thick with only about 10.5 feet being extracted, and the depth of cover ranges from 0' to approximately 2,300'. The rocks overlaying the coal seam are sandstones and mudstones with some thin bands of coal. Due to the strength of the overburden, and depth of workings, even with full seam extraction, only minimal subsidence if any is anticipated.

Some surface expressions of tension cracks, fissures, or

Two areas of the permit have stream reaches with less than 1,000 feet of cover over the coal seam. As discussed in Section 525.120, it is not envisioned that subsidence will negatively impact these areas. However, during and following mining near these areas, special attention will be paid to these areas during the ground surveys.

The ground survey will consist of walking and photographing the various areas of the surface over the mine where subsidence might occur. If evidence of subsidence is identified, the area of subsidence will be surveyed and the extent of the disruption identified. Depending on the extent and location of the damage, mitigation measures will be reviewed and implemented. Due to the fact that mitigation options change with time as new technology and measures are developed, no specific measures are presented in the application. However, UAE provides a commitment that where subsidence damage affects uses of the surface, the land will be restored to a condition capable of maintaining the value and reasonable foreseeable uses which it was capable of supporting before the subsidence. The surface effects will be repairs as described in Section 525.500.

During construction measures to control traffic on the County Road will be taken to protect the public from construction related hazzards.

526.116.1. A cooperative agreement with Emery County as stated in Appendix 1-4 requires a six foot chain link fence to be constructed adjacent to the Lila Canyon Road to provide safety to the general public in the proximity to the mine site and mine related structures and activities.

526.116.2. At the current time there are no plans to relocate any public road.

526.200 Utility Installation and Support Facilities.

526.210 All coal mining and reclamation operations will be conducted in a manner which minimizes damage, destruction, or disruption of services provided by oil, gas, and water wells, oil, gas, and coal-slurry pipelines, railroads, electric and telephone lines, and water and sewage lines which may pass over, under, or through the permit area, unless otherwise approved by the owner of those facilities and the Division. Since no existing services are found within the projected disturbed area, no negative impact to any service is anticipated.

A BLM and State Lands Utility Right-of-Way has been applied for to contain an access road, rail from the existing main line near highway 10, electric power, phone lines, and gas service. ~~See ROW application in Appendix 1-4).~~ This ROW is not included within the MRP and will not fall under the R645 regulations.

Ground Preparation

Vegetation and topsoil will be removed from the proposed refuse site and stored in the topsoil pile as shown on Plate 5-2 and Figure 1, Appendix 5-7. Subsoil will then be removed from the area as shown on Figure1. The subsoil will be pushed to the side using the blade of a caterpillar. The hole that is made by pushing the subsoil to the side will be filled by refuse material, either from the rock slope development and or coal processing waste or underground development waste as per Figure 1.

Placement of Refuse

Refuse will be dumped into the hole created from the removal of the subsoil. The refuse will be placed in the hole as per Figure 1. The refuse will be placed in 12" lifts and compacted using a front end loader. Once the hole is filled to the level shown in Figure 1 the subsoil will then be placed over the top of the refuse in 12" lifts and compacted with a front end loader, then another hole will be constructed by removing subsoil adjacent to the previous hole. The topsoil removal and storage, subsoil removal, hole being filled with refuse, and subsoil replacement, procedure will be repeated as additional refuse disposal area is needed.

The dumping (placing) of refuse into a prepared hole is NOT the same as "end dumping". End Dumping is defined by the Bureau of Mines as "Process in which earth is pushed over the edge of a deep fill and allowed to roll down the slope."

Refuse Testing

Material from the rock slope portals will be tested five times during their development. The first test will be during the initial startup of the rock slopes. The second, third and fourth tests will be when the development reaches 1/4, ½, and 3/4 of the construction phase. The last test will be taken near the completion of the project.

Material placed in the refuse pile from normal mining operations will be tested approximately every 6,000 tons. Testing parameters for the rock slope material and normal mining refuse will be as per Table 2.

Spreading and Compaction

Compaction will take place using a wheeled loader during the filling operation. Upon final reclamation the topsoil will be redistributed over the refuse storage area and reclaimed as

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that must be remove is disposed of in dry areas underground and will never reach the surface. A minor amount will be included with the mine-run coal as dilution rock.

Results of acid and toxic testing completed on drill holes S-24 and S-25 can be found in Appendix 6-2. Testing was completed for the strata immediately above and below the coal seam as well as for the rock slope material. These tests were run on drill holes and at the original projected slope location. The present proposed slope location is approximately three miles to north but located in the same strata. Except that the present projected slopes will start at the top of the Mancos shale and will be driven up to the coal seam but not beyond as was originally proposed by Kaiser.

Analysis of the strata immediately above and below the seam being mined at the Lila Canyon fan portal, collected by BXG, and an analysis of the Horse Canyon refuse pile have been included in Appendix 6-2. None of the analysis have an acid-base potential that would indicate an acid-toxic problem.

Kaiser Steel's Sunnyside Mine mined coal in the same horizons as those in the Lila Extension. With over 100 years of mining experience at the Sunnyside Mine operation, there has been no proven problems with acid-forming alkaline or toxic materials in production or waste disposal. The above statement is made based on history, data substantiating this assertion is beyond the scope of this MRP and is not included.

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List of Appendices

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———The qualified, registered professional engineer will promptly, after each inspection, provide to the Division, a certified report that the impoundment has been constructed and maintained as designed and in accordance with the approved plan and the R645 Rules. The report will include discussion of any appearances of instability, structural weakness or other hazardous conditions, depth and elevation of any impounded waters, existing storage capacity, any existing or required monitoring procedures and instrumentation and any other aspects of the structure affecting stability. (See Appendix 5-2 for the inspection form).

———A copy of the report will be retained at or near the mine site.

———There are no impoundments at this site subject to MSHA, 30 CFR 77.216; therefore, weekly inspections are not required.

———Impoundments not subject to MSHA, 30 CFR 77.216 will be examined at least quarterly by a qualified person designated by the operator for appearance of structural weakness and other hazardous conditions.

720. Environmental Description

~~721.~~ **General**. The following information will present a description of the existing, pre-mining hydrologic resources within the proposed permit and adjacent areas. This information will be used to aid in determining if these areas will be affected or impacted by the proposed coal mining activities.

———The proposed Lila Canyon Mine is located, in the southwestern portion of the Book Cliffs in Emery County, Utah, approximately 2 miles south of the old Horse Canyon Mine, formerly operated by Geneva Steel Company. The proposed mining will be in the Upper (and possibly Lower) Sunnyside Seam of the Blackhawk Formation.

———Existing hydrologic resources of the area consist of: Surface water resources - intermittent by rule with ephemeral ~~acting~~flow streams; and Groundwater resources - springs and seeps and perched, isolated aquifers. These resources have been evaluated using hydrologic data from the Horse Canyon Mine, water level piezometers, and seep/spring inventory data of the proposed mine

722. Cross Sections and Maps

722.100 Subsurface Water. The locations where subsurface water, including springs and seeps, have been identified are presented on Plates 6-5 and 7-1 and data results are included in Appendix 7-1. Relevant cross sections of subsurface water, geology, and drill holes are shown on Plate 6-5. Where sufficient data are available, the seasonal head differences are presented on contour maps (see Figure 7-2A) and on a Piezometer hydro graph plot (see Figure 7-2B).

722.200 Surface Water. Location of all streams and stockwatering ponds or tanks in the area of the mine are shown on Plate 7-1. There are no perennial streams, lakes or ponds known to exist within the proposed permit or adjacent areas.

A new diversion work has recently been constructed by the BLM at the confluence of the Right Fork of Lila Canyon and Grassy Wash. Water from this diversion is directed to the stock pond located in Section 28, T. 16 S., R 14 E. Figure 1 in Appendix 7-9 shows the location of the diversion and the alignment of the diversion channel to the stock pond. Also, the location of the overflow channel back to Grassy Wash is also presented on the figure. No other ditches or drains are known to have been constructed in the area of the mine.

722.300 Baseline Data Locations. Locations of all baseline data monitoring points are shown on Plate 7-1. Baseline water quality and quantity data is included in Appendix 7-1.

722.400 Water Wells. Three wells and three piezometers have been identified in the permit and adjacent areas. Two wells are located within the alluvium of lower Horse Canyon Creek. Three water Ppiezometers were drilled in the area, IPA #1, IPA #2 and IPA #3, to monitor mine water levels. Drill hole S-32 was drilled and converted to a water monitoring hole by Kaiser in 1981. The details of these wells and piezometers are discussed in Section 724.100 of the application. The location of all these wells and piezometers is shown on Plate 7-1. No information on any other wells has been identified.

722.500 Contour Maps Contour Maps of the proposed disturbed area and mining areas are included as Plates 5-2A, 5-2B, 7-1 and 7-2. These maps use U.S.G.S. based contours and accurately represent the proposed permit and adjacent areas. Disturbed area maps present greater detail from low-level aerial photography, for greater detail, and are tied to relevant U.S.G.S. elevations to ensure correlation between the maps.

~~723.~~ Sampling and Analysis

All water quality analyses performed to meet the requirements of R645-301-723 through R645-301-724.300, R645-301-724.500, R645-301-725 through R645-301-731, and R645-301-731.210 through R645-301-731.223 will be conducted according to the methodology in the current edition of "Standard Methods for the Examination of Water and Wastewater" or the methodology in 40 CFR Parts 136 and 434. Water quality sampling performed to meet the requirements of R645-301-723 through R645-301-724.300, R645-301-724.500, R645-301-725 through R645-301-731, and R645-301-731.210 through R645-301-731.223 will be conducted according to either methodology listed above when feasible. "Standard Methods for the Examination of Water and Wastewater" is a joint publication of the American Water Works Association, and the Water Pollution Control Federation and is available from the American Public Health Association, 1015 Fifteenth Street, NW, Washington, D.C. 20036.

724. Baseline Information

This section presents a description of the groundwater and surface water hydrology, geology, and climatology resources to assist in determining the baseline hydrologic conditions which exist in the permit and adjacent areas. This information provides a basis to determine if mining operations can be expected to have a significant impact on the hydrologic balance of the area.

724.100 Ground Water Information. This section presents a discussion of baseline groundwater conditions in the permit and adjacent areas. The data set consists of piezometer, spring and seep inventory data, mine discharge, and mine inflow information from the abandoned Horse Canyon Mine. Appendices 7-1 and 7-6 provide data through the 2002

Sample sites B-1, HC-1, RF-1 and RS-2, along with the UPDES Discharge Points 001A and 001B, have been monitored quarterly since 1989 in accordance with the approved water monitoring plan for the Horse Canyon Mine (Part A). The results of this monitoring have been submitted to the Division each year with the Annual Report and or have been entered into the Divisions electronic data base.

Baseline monitoring was also conducted on the proposed Lila Canyon Mine extension area by Earthfax Engineering in 1993-1995. Some 60 sites were identified and monitored. This data is presented in Appendix 7-1.

The operational water monitoring program committed to the permit application was implemented in July, 2000. Data will be collected from new monitoring sites L-1-S through L-4-S. L-5-G has yet to be installed. These sites are typically dry and no quality data has been gathered as yet. Sites L-6-G through L-10-G have been monitored for baseline in 1993, 1994, and 1995. These sites, along with ~~P~~piezometers IPA-1, IPA-2 and IPA-3, were monitored in December 2000 to determine if they were still viable and to establish a current baseline that will be continuous with operational monitoring.

Sites L-11-G and L-12-G were added in October 2001 to replace sites L-6-G and L-10-G. Sites L-13-S, L-14-S, L-15-S, and L-158-S are being used to determine flow characteristics of the Williams Draw Wash, Wash below L-12-G, ~~and~~ Little Park Wash, and Stinky Springs Wash.

Sites L-6-G, L-10-G and L-15-S were determined to either provide no flow data or data that was less representative than the replacement sites and will be suspended from sampling in the 1st quarter of 2003.

Wells. The wells in the mine area consist of two water supply wells, three water ~~monitoring~~level piezometers, and an exploration borehole converted to a monitoring well.

Two wells are located within the alluvium of lower Horse Canyon Creek, near the Horse Canyon Mine. These wells area completed in the aerially small, alluvial aquifer at the

mouth of Horse Canyon which contains groundwater likely collect from infiltration of surface flows from the upper Horse Canyon area. As indicated in Section 722.400, the well located near the main Horse Canyon surface facilities, identified as Horse Canyon well on Plate 7-1A, is still open, although not operational at this time. The well was investigated and it was determined that it would not be useful as a ~~P~~piezometer. The pump is sitting on the top of a concrete cap encapsulating the top of the well. The site could not be used as a piezometer without removing the pump. This well will be donated to the College of Eastern Utah as part of the Post Mine Land Use Change. The well located near the road junction, identified as MDC well on Plate 7-1A, is an abandoned well owned by Minerals Development Corporation. This well has been sealed to the operator's best knowledge. No hydrologic data is presently available from either of these wells.

Three water level piezometers were drilled as part of plans to access the Kaiser South Lease by I.P.A. These piezometers were designated IPA-1, IPA-2 and IPA-3, and are located in the Lila Canyon Permit area (see Plate 7-1). IPA monitored these sites for water depth from 7/94 to 4/96. These monitoring results are included in Appendix 7-1 and monitoring points and measured water levels are shown on Plate 7-1. It should be noted that the monitoring of these holes was done over the 2 3/4 year period to provide baseline data for the South Lease by I.P.A. Monitoring of water depths at these points by UtahAmerican commenced in December 2000 and continued through present. As indicated by the data in Appendix 7-1, the water levels in the holes show very little fluctuation. Levels change from less than 1.2' to a maximum of 21.2' over an eight year monitoring period. Figure 7-2A and 7-2B present the seasonal fluctuations of the water levels as contour maps and hydrographs. Using these water levels, an estimate of the projected water level assuming that the zones from the individual piezometers are connected is shown on Plate 7-1 and the monitoring results are included in Appendix 7-1 - Baseline Monitoring.

The piezometers were installed to provide depth of water only. It is impossible to drop a bailer 1000 feet and withdraw a water sample without contaminating the sample. It has been suggested that sampling pumps be installed on these wells. Appendix 7-11

discusses the difficulties of using pumps and bailers in these wells. Due to limited pump capabilities in a 2-inch diameter well such sampling is not feasible. Therefore the depth and diameter of the piezometers holes make it impossible to use them for baseline quality.

Drill holes S-26, S-27, S-28, and S-31 were cased in 3" PVC pipe with bottom perforations for water monitoring; however, cement seals were faulty, allowing the PVC pipe to fill with cement. Drill hole S-26 was reported dry in the week prior to cementing.

It has been reported by Kaiser that holes within one and one-quarter miles east of the cliff face were drilled with air, mist and foam and did not detect any water in the subsurface with the exception of drill hole S-32. No apparent increase in fluid level could be attributed to groundwater inflow from these holes, some of which were open for two weeks. Exploration drill holes in the South Lease property south of Williams Draw did not encounter groundwater within 1 to 1.25 miles of the coal outcrop. Exploration drill holes in the South Lease property, south of Williams Draw, did not encounter groundwater within 1 to 1.25 miles of the coal outcrop.

S-32 is located approximately three miles south of Lila Canyon and is separated from Lila by at least two known fault systems. The drill log along with the Chronology of Development and Pump tests are included in Appendix 6-1. Water levels measured are shown in the `"Chronology of Development". Water quality analysis for S-32 is also included in Appendix 6-1. The location of S-32 is shown on Plate 7-1. The Permittee visited S-32 in 2002 and attempted to measure water levels, but found that piezometer S-32 was unusable.

Spring and Seep Data. JBR Consultants Group (1986) conducted a spring and seep inventory of the Horse Canyon area during the fall of 1985. During the study, no springs or seeps were located within the disturbed area or near the proposed surface facilities. Within and adjacent to the permit area, 19 springs and seeps were found. Flows occurred from either sandstone beds located over shales or from alluvium. The flow rates from the springs varied from less than 1 gpm to about 10 gpm. Table 7-1 shows the flow rates and field data for each site. Sample results are listed in Appendix 7-6.

Based on the data, nine of the springs occurred from alluvial deposits in the stream channels or in colluvium. Nine of the remaining springs discharge from sandstone located above less permeable shale. Spring (H-92) was developed by excavating into bedrock. The discharge from this spring is through a pipe.

An additional spring and seep survey was conducted in the area, including the proposed Lila Canyon Mine area, by Earthfax Engineering in 1993 through 1995. Results of this survey are included in Appendix 7-1 of this permit. This is the most consistent and most recent data; therefore, this data has been used for baseline monitoring in Appendix 7-1.

All of the spring and seep sites identified from the various surveys are presented on Plate 7-1A. The geologic source for the springs can be determined by comparing Plates 6-1 and 7-1 and 7-1A. Additionally, the elevation of the sampling points can be estimated from the topographic base map. All groundwater use (seeps and springs) within the permit and adjacent areas is confined to wildlife and stock watering.

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It should be noted that a number of sample sites and monitoring holes have been noted in previous submittals. Sites A-26 and A-31 were mentioned in the Horse Canyon Mine Plan; however, these sites were drilled in 1981, and no data is available as to location and/or water quality data. These sites are considered non-usable for this plan. Sites H-21A, H-21B, H-18A, H-18B, HC-1A and an unidentified spring 1000' southwest of HCSW-2 have been mentioned; however, no sample data or pertinent information is available for these sites, and they have been removed from Plates 7-1 and 7-1A. Plates 7-1 and 7-1A has therefore been revised to show only seep/spring and other pertinent hydrologic data points for which adequate, reliable data is available for the plan.

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Water rights for the mine and adjacent areas are addressed in Section 722.200 of this P.A.P.

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Water rights for the mine and adjacent areas are addressed in Section 722.200 of this P.A.P.

Mine Inflow Information. Based on the historic record, water was encountered underground in the Horse Canyon Mine, resulting in outflows from portal areas of approximately 0.2 cfs or 90 gpm. The size of the flows from pumping or from old portal discharges is more the result of the large size of the mine (approx. 1500 ac), rather than the result of intercepting a localized high flowing aquifer. If the flow is distributed over the mine area, the average inflow is about 0.6 gpm per acre. The water encountered was likely discharge from perched aquifers or saturated sandstone lenses encountered during mining, not uncommon in mines in the Blackhawk Formation.

According to mining records of U.S. Steel (previous owner), groundwater was monitored within the Horse Canyon mine in several locations. Generally, the underground flows occurred from roof drips or areas where entries encountered sandstone lenses. As discussed in the Blackhawk Formation description, the inflows were similar to inflows found in other mines along the Book Cliffs. This is thought to represent an interception of an isolated saturated zone in the subsurface. Generally, a saturated, perched sandstone lense which overlies the coal seam is intersected by the mining operation. This provides a flow path for the isolated water in the sandstone lense to drain into the mine. Over time as the volume of water in the sandstone lense decreases, the rate of discharge also decreases. Eventually, the inflow ceases as the available water in the lense is fully drained. This drying up of the inflow is indicative of a very limited recharge to the deep strata in area, which is consistent with the known horizontal and vertical hydraulic conductivity of the Blackhawk Formation.

Flows which issued from rock slopes and gob areas, where roof collapse may have occurred, were ~~small, indicating~~also small. These area would have exposed numerous points for inflow from sand stone lenses, roof bolts, and fractures within the formation. Therefore, it would be likely that if there were large amounts of water stored within the formation, the inflows from

these area would have been significantly greater. The lack of these flows from these areas of the mine are a further indication that limited water ~~inflow~~was stored in the formation and that the recharge to the formation from overlying strata ~~occurred~~was also limited.

During the period from 1957 to 1962, an exploration test entry was mined south from the Geneva Mine into the Lila Canyon Area. This entry encountered in-place water, which was allowed to collect in short cuts made into the down dip entry which was sufficient to keep excess water from working areas. The exploration entry was terminated when the Entry fault was encountered (see Plate 7-1). More than two months was spent drilling to ascertain the nature of the fault and locate the coal seam. During this period, there is no mention in the records of excess water or that water was encountered in the Entry fault area.

There is no estimate of water ~~quantity and~~ quality retrieved while mining the exploration entry other than mentioned above. However, water flow and seeps were reported to be in the range of 1 to 24gpm.

Only when the mine neared the Sunnyside Fault was significant water encountered. The water was initially pumped for use in the water supply system for the mine. When inflows increased beyond in-mine needs, to keep the workings near the Sunnyside Fault from flooding, the mine pumped water collected from this area from the workings during the period 1980 through 1983, prior to suspending operations. The development plan for the mining within the Lila Canyon extension is planned to avoid the Sunnyside Fault. Therefore, the amount of water to be encountered underground will be limited.

The rate of inflow into the ~~m~~Horse Canyon Mine is not precisely known. In U.S. Steel's Permit Application Package (PAP) (1983) they estimated the average discharge from the mine to be 0.2 cfs. Lines and Plantz (1981, p. 32) also estimated the discharge from the mine to be 0.2 cfs and mentioned that the discharge was intermittent. It is not known, however, if this represents a constant average flow or the average flow rate during discharge periods. The mine was using an unknown volume of water within the mine for dust suppression and other operational needs.

According to the I.P.A. Mining and Reclamation Plan for Horse Canyon, Kaiser Coal re-entered the mine in 1986. They found that at the intersection of the Main ~~s~~Slope and 3rd level, at the rotary car dump, there was water in the bottom of the dump. The water level in the dump was described in the Horse Canyon P.A.P. as being "about 30 feet below the floor (personnel communication, 1990)". U.S. Steel monitoring site 2 Dip, a sump where water collected, is very near this location and has an elevation of 5,827 feet. Therefore, the water level in the rotary dump would be at a level of about 5,800 feet. No other water levels were obtained during 1986.

In 1993, BXG also re-entered the Horse Canyon Mine. They reported water levels at the rotary car dump at approximately 5870. It is not known if this reported level was for the same locations, but it is assumed to be the close to the same location. Due to the extended period without pumping, this water level is probably representative of the level of water collected in the rest of the mine. Therefore, to be conservative, it is assumed that the Geneva exploration entries driven south from the Horse Canyon Mine into the proposed Lila Canyon mining area do contain water since the tunnels elevation is approximately 5855 feet.

The Horse Canyon Mine has been closed and the surface area reclaimed. With no significant inflow to the old workings, no discharges are occurring from any of the portal areas nor are expected in the future. It is known however, that water has collected in the old entries. As future mining activities, for the proposed Lila Canyon Mine, will be occurring near this area of collected water in the old exploration entry workings, it is likely that some ~~or all~~ of this water will be intercepted by the proposed Lila Canyon Mine (see Plate 7-1). Water may then have to be pumped from the mine. Because of ~~undulationing~~undulating floor and unknown void areas, it is impossible to determine the amount of water that would be pumped. The rate of pumping, if any, would be determined by the water discharge system design. All water discharged from the mine would be discharged at UPDES Site # 002A which is Site L-5-G, and will meet all UPDES standards. DOGM has specified planning to include a mine discharge of 500 gpm maximum.

An inspection of the Horse Canyon area following mining has shown no diminution of reasonably foreseeable use of aquifers. Since mining ceased in 1983, subsidence should have occurred within two

years. However, no deterioration of the aquifers in the area was identified. Mining has not yet begun on the Lila Canyon site; however, since the structure and groundwater regime is similar to the Horse Canyon area, no diminution or deterioration of groundwater resources is expected in this area.

~~Occurrences~~As the mining in the Lila Canyon Mine will be from the same seam and the adjacent strata are the same and the over and underburden are the same, occurrences of ground water in the Lila Canyon Mine are expected to be similar to the Geneva Mine (Horse Canyon). The water quality is expected to be the same as the water encounter in the Horse Canyon Mine. Samples taken underground from the Horse Canyon Mine to the north of the Lila Canyon Mine and from well S-32 by Kaiser to the south of the Lila Canyon Mine show the water from the level of the coal seam to be a calcium, sodium-sulfate type water. Therefore, it is likely that the water from the strata between these two points from the same strata will be very similar.

Inflows of water encountered while mining are expected to reduced to seeps or ~~dried~~dry up in a short period of time. If a significant water inflow is encountered, the water, which is not needed for underground operations, will be collected, treated as necessary, and pumped to the surface for discharge under the terms of the UPDES permit.

Groundwater Systems.

In the Lila Canyon Lease area, the groundwater regime consists of two separate and distinct multilayered zones. The upper zone consists of the Wasatch Group which consists of the Colton Formation, the undifferentiated Flagstaff Limestone-North Horn Formation, and the Price River Formation. These formations contain groundwater in perched aquifers. These perched zones are classified as aquifers because they supply groundwater in sufficient quantities for a specific use (as specified by R645-100-200). The lower zone consists of ~~the Castlegate Sandstone and~~ the Blackhawk Formation (where the coal seams are located). This formation consist of low-permeable strata which contain groundwater in isolated saturated zones. Based on the definition in the DOGM regulations (R645-100-200), there is no aquifer in the lower saturated zone, because the water is not developed for a specific use nor does the strata transmit sufficient water to supply water sources. Additionally, there is no discharge from this zone along any fault or fracture or in any adjacent canyons. The two zones are separated by the

Castlegate Sandstone. This zone is a porous, fairly clean sandstone. According to Fisher, et.al. (1960), the Castlegate Sandstone does not have any shales, clays, siltstones, or mudstones. The lower zone is underlain by the Mancos Shale, a very impermeable marine shale.

Geologic conditions in the permit and adjacent areas are described in detail in Chapter 6 of this P.A.P. ~~F~~Though discussed in several publications for the general Book Cliffs area, formal aquifer names have not been applied to any groundwater system in the permit and adjacent areas because the geometry, continuity, boundary conditions, and flow paths of the groundwater systems in the area ~~are not fully understood~~differ somewhat from the general published discussions. However, the data do suggest that groundwater systems in each of the bedrock groups are sufficiently different from each other to justify the informal designation of groundwater systems based on bedrock lithology. Thus, the informal designation of the Upper zone - Colton, Flagstaff/North Horn, and Price River and the Lower zone - Castlegate, Blackhawk, and Mancos groundwater systems is adopted herein.

~~G~~ The majority of groundwater in the permit and adjacent areas generally occurs within perched aquifers in the upper zone overlying the coal-bearing Blackhawk Formation ~~as well as withi~~ In the lower zone ~~of~~groundwater occurs in isolated saturated zones in the Blackhawk Formation ~~and Mancos~~. Hydrogeologic conditions within the permit and adjacent areas are summarized below:

Upper Zone

Colton Formation. The Colton Formation outcrops in the northeast portion of the permit and adjacent areas. This formation consists predominantly of fine-grained calcareous sandstone with occasional basal beds of conglomerates and interbeds of mudstone and siltstone. Data presented in Plates 7-1 and 7-1A and Appendices 7-1 and 7-6 indicate that 16 springs issue from the Colton Formation within the permit and adjacent areas.

Waddell et al. (1986) evaluated the discharge of springs in the formation for the period of June to September 1980. The measured discharge rate generally declined during the 4-month period of evaluation. This suggests that the groundwater system has a good

Horn Formation forms the upland plateau of the permit and adjacent areas, this formation is capable of receiving appreciable groundwater recharge from precipitation and snowmelt.

——— Waddell et al. (1986) concluded that the Flagstaff-North Horn groundwater system is perched. They indicate that approximately 9 percent of the average annual precipitation recharges the Flagstaff-North Horn groundwater system and that recharge water entering the Flagstaff-North Horn Formation moves downward until it encounters low permeability shale or claystone layers in the lower portion of the formation, where almost all of the water is forced to flow horizontally to springs.

——— Data presented in Appendices 7-1 and 7-6 indicate that groundwater issuing from the Flagstaff-North Horn Formation has a TDS concentration range of 400 to 700 mg/l. This water tends to be slightly alkaline and, similar to conditions encountered in the overlying Colton Formation, is of the calcium-magnesium-bicarbonate type.

——— The data presented in Appendices 7-1 and 7-6 indicate that the total iron concentration of groundwater discharging from springs in the Flagstaff-North Horn Formation is generally less than 0.04 to 0.15 mg/l. Total manganese concentrations in Flagstaff-North Horn groundwater are generally less than 0.03 mg/l. These data do not exhibit seasonal trends.

——— Price River Formation. The Price River Formation consists of interbedded mudstone and siltstone with some fine-grained sandstone and carbonaceous mudstone. Within the permit area, 17 springs have been found issuing from the Price River Formation as indicated based on data presented in Plates 7-1 and 7-1A and Appendices 7-1 and 7-6. Flows from these springs are limited in quantity and generally show a seasonal decrease with time, being high in the spring and reduce to very low or dry conditions in the summer. Such fluctuations indicate that these springs originate from limited recharge areas. Therefore, these springs are also part of a series of perched saturated zones and not part a regional aquifer system. Transmissivity in the Price River Formation is estimated by Waddell (1986) to be 0.07 ft^2/day or 0.00013 ft/day. Based on specific conductance measurements collected from these springs, the TDS concentration of water issuing from the Price River Formation

varies from about 750 to 850 mg/l. The water is slightly alkaline, with a pH of 7.9 to 8.9.

Lower Zone

Castlegate Sandstone. The Castlegate Sandstone consists of a fine- to medium-grained sandstone that is cemented with clay and calcium carbonate. The outcrops of this sandstone form prominent cliffs in the area. No springs were identified in this formation, suggesting that it is not a significant aquifer. The absence of springs is of great significance, since this formation is situated between the overlying Upper groundwater zone (in the Colton, Flagstaff/North Horn, and Price River Formations) and the underlying lower zone (in the Blackhawk Formation). This lack of springs indicates that there is separation between the upper and lower groundwater zones. Most likely this zone is the result of two factors: 1) clay horizons in overlying formations inhibit vertical recharge from groundwaters in the Flagstaff-North Horn Formations, and 2) the exposed recharge area of the ~~Price River Formation and~~ Castlegate Sandstone is limited primarily to areas of steep cliff faces.

Blackhawk Formation. The Blackhawk Formation underlies the Castlegate Sandstone and consists of interbedded sandstone, siltstone, shale, and coal. The lower Sunnyside coal seam, to be mined by UtahAmerican, is located in the upper portion of the Blackhawk Formation.

Across the formation some of the individual sandstone bodies are discontinuous. This results in areas that are saturated; i.e. sandstone lenses; and areas that are dry; i.e. siltstone and shale sections. This discontinuous nature results in the typical pattern found in the mines of the Wasatch Plateau and the Book Cliffs. As mining advances an isolated area of saturation (perched aquifer) is encountered by the entry or by roof bolting or fractures due to subsidence. As the water from the saturated zone drains into the mine it starts at an initially high rate and over time as the limited extent of the zone is emptied, the rate of flow decreases. Some zones which are laterally connected are able to reach a consistent inflow which is a balance for the recharge to the system with the outflow to the mine entry.

The hydraulic conductivity of the lower zone is believed to be about 0.01 to 0.02 ~~feet per day~~ft/day, similar to values reported by Lines (1985) from the Wasatch Plateau for similar lithologies. Structural dip in the Lila Canyon area is about 6 to 7 degrees to the east. The

gradient of the lower zone in the Horse Canyon/Lila Canyon area is probably less than 2 degrees.

The IPA ~~monitoring~~water level piezometers (Plate 7-1) were completed within the first formation with identifiable water below the coal seam, the Sunnyside Sandstone of the Blackhawk Formation. In all three piezometers, immediately below the coal seam, a mudstone layer was encountered. Above the mudstone layer no significant water had been identified. Below the mudstone layer, a sharp transition to a sandstone layer was encountered. This sandstone layer was identified as the Sunnyside Sandstone. Water was identified as occurring from the sandstone layer in each of the piezometers. According to the EarthFax completion logs, the screened zones in the piezometers were located within the Sunnyside Sandstone layer and a cement-bentonite seal was placed from the top of the sandstone layer to the ground surface of the piezometer. Thus, the water level measured in the piezometers is indicative of the conditions found within the sandstone layer.

Data collected from the piezometers (Appendix 7-1) indicate that the water in the sandstone is under pressure. In IPA 1, the water level is approximately 590 feet above the completion zone. In IPA 2, the water level is about 810 feet above the screened level. While, IPA 3 has a water level approximately 250 feet above the completion level.

Additionally, water levels in IPA 2 and 3 varied by approximately 2 feet during the period of July 1994 through April 1996, but showed no consistent trend. IPA 1 showed a rise of 5.6 feet over the same period. Measurements collected in 2001 indicated that the water levels in IPA 2 and 3 were 1 to 2 feet higher than the last time it was measured nearly 5 years earlier, while IPA 1 showed a rise of 16 feet. For the period since 2001, no trend has been identified for IPA 2 and 3, while IPA 1 has continued a slow increase. Although an increase in water levels has occurred during the period of record, this increase is not considered significant.

As the piezometers are completed in the same saturated zone, the piezometric surface shows that groundwater in the Sunnyside Sandstone to be moving to the northeast, into the Book Cliffs (see Plate 7-1). The gradient of the piezometric surface is approximately 0.011 ft/ft. The seasonal fluctuations between fall and spring are almost undistinguishable. Based on the tabulated data (Appendix 7-1), the fluctuation range is less than 0.5 feet between summer and fall

readings. Figures 7-1 and 7-2 attempt to show these variations in contour map and piezometer hydrographs.

The water ~~monitoring~~level piezometers show water levels above the lower zone containing the coal seam in area of the mine. However, as reported in the Castlegate Sandstone section, no springs or water bearing zones were identified in the spring and seep inventories or in the drilling of the water ~~monitoring~~level piezometers in the formation. Therefore, indicating that the piezometer monitored zones are under pressure and that the water identified in the upper zone is perched and isolated from the lower groundwater zone.

While the water in the Sunnyside Sandstone is under pressure, there was no indication during drilling that the coal seam was saturated. Similar conditions have been identified in other mines in the Wasatch Plateau and the Book Cliffs. It is likely that the water within the Sunnyside Sandstone will not affect mining unless the confining mudstone layer is breached.

It is possible that mining will intercept some water as it progresses down dip. However, as discussed previously regarding mine water inflows to the Horse Canyon Mine, it is expected that water quantities and quality will be similar to that encountered in the Horse Canyon Mine. While some pumping is likely for water from the isolated saturated zones within the lower groundwater zone; since the water in the upper groundwater zone appears to be perched aquifers 200 to 500 feet above the coal seams, no adverse effects on usable surface sources are expected.

No springs have been identified as issuing from the Blackhawk Formation (see Appendices 7-1 and 7-6 and Plates 7-1 and 7-1A).

The quality of groundwater in the Blackhawk Formation is ~~assumed to be similar~~characterized by t~~o~~he water quality ~~for~~of data collected from ~~leakage into~~inflows to the Horse Canyon Mine. These data indicate that Blackhawk Formation groundwater has a mean TDS concentration range of 1400 to 2400 mg/l and is of the ~~sodium-bicarbonate~~calcium, sodium-sulfate type. These waters are chemically distinct from groundwater in overlying groundwater systems.

Quality and quantity of underground water is the most difficult to ascertain due to geologic variables such as faults, fractures, channel sands and isolation of these particular features when water is

encountered in order to gain reliable samples. Underground water tends to be co-mingled with water from other places in the mine and water pumped through the mines for mine equipment and dust suppression. Thus, care needs to be taken to obtain representative samples. Specific undisturbed water samples of the subsurface inflows are not known to have been collected. However, the quality results reported in the Horse Canyon records are consistent with in-mine samples from adjacent mines.

The dissolved iron concentration of groundwater flowing into the Horse Canyon Mine has historically been less than 0.5 mg/l and is generally less than 0.1 mg/l (see Appendices 7-1 and 7-6). The total iron concentration of this water has historically been less than 0.7 mg/l and generally less than 0.1 mg/l. The total manganese concentration of Blackhawk Formation water (as measured in the Horse Canyon Mine) has historically been less than 0.05 mg/l and is typically less than 0.03 mg/l (see Appendices 7-1 and 7-6).

Mancos Shale. The Mancos Shale is exposed south and west of the permit area. This formation is a relatively impermeable marine shale and is not considered to be a regional or local aquifer. Groundwater samples collected from two monitoring sites located in Stinky Spring Canyon approximately 2 miles southeast of Lila Canyon Mine have a TDS concentration in the range of 2200 to 4200 mg/l and are of the sodium-sulfate-chloride type (Appendix 7-1). The flow rate for these two springs is less than 1 gpm, indicating the impermeable nature of the source formation. In the 1981 baseline study for the Kaiser Steel south lease permit document, Kaiser indicated that no springs were identified below the coal seam along the face of the Book Cliffs. Therefore, at that time, these springs were not flowing. Total iron concentrations ranged from 0.35 to 11.8 mg/l. Total manganese concentrations ranged from 0.05 to 0.29 mg/l. Chemical compositions of other parameters are consistent with waters from the Mancos Shale in the Book Cliffs area. The ~~springs~~change in water type, from sodium-bicarbonate in the overlying Blackhawk Formation to sodium-sulfate-chloride in the Mancos, and the increased iron and manganese concentrations indicate that the Big and Little Stink spring waters are not from the same source, but are isolated waters from different recharge sources.

The two springs, which are located stratigraphically near the top of the Mancos Shale, appear to be fault related.

As shown on Plate 7-1a, there is an east-west trending fault zone that is located within the canyon where Big and Little Stink Springs are located, referred to as the Central Graben. These two springs are located on the southern side of the northern fault of the graben. Due to the isolated nature of this graben block, being down dropped relative to the surrounding strata, within the highly impermeable Mancos Shale, it is unlikely that these springs are connected to any other water sources within the permit area. Further, the water quality and flow of the these springs, as discussed above, also indicate an isolated nature of the waters. Based on these results, the waters from Big and Little Stinky Springs are considered are from a localized, isolated saturated zone, but not part of a regional aquifer or an extensive saturated zone.

Recharge and Discharge Relations

Recharge in the permit and adjacent areas occurs from precipitation to the exposed strata. Plate 7-1a shows the major zone of recharge. This recharge area corresponds to the outcrop of the Colton/Flagstaff-North Horn formations. No perennial surface water streams or surface water bodies exist within the permit or adjacent areas which contribute water to the groundwater systems. Any infiltration is a near surface occurrence into the alluvial fills within the drainages. The deeper sediments underlying the drainages (Blackhawk and Mancos) consist of low transmissivity strata which would prohibit the vertical movement of groundwater.

Recharge rates were calculated by Waddell and others (1986, p. 43) for an area in the Book Cliffs. Waddell estimated recharge at about 9 percent of annual precipitation. Lines and others (1984) indicate the mean annual precipitation along the Book Cliffs in the area of the Horse Canyon Mines is about 12 inches, indicating a recharge rate of just over 1 inch per year.

The recharge and discharge areas for local perched aquifers in the upper zone (Colton, Flagstaff-North Horn and Price River Formations) generally lie within the drainage areas of Horse and Lila Canyons. These local systems are complex and highly dependent on topography. Recharge water from precipitation or snow melt enters the Colton or Flagstaff-North Horn Formations and moves downward until it encounters low permeability shale or claystone layers in the formations, where almost all of the water is forced to flow horizontally to springs. The springs exhibits substantial variability in discharge in response both to spring snowmelt events and to drought and wet years. Discharge rates as great as 20 gpm have been

recorded from the springs during the high-flow season, and discharge rates as low as 1 gpm are not uncommon during late summer. The effects of the drought occurring in the late 1980s and early 1990s are clearly evident in the flow records.

Recharge to the lower zone including the Castlegate Sandstone, Blackhawk Formation, and Mancos Shale is of limited magnitude, due ~~primarily~~ to the limited area of exposure of the formation on steep outcrops and the presence of low-permeability units in overlying fNorth Horn and Price River Formations. ~~C~~Additionally, the clay layers in the upper Blackhawk ~~and Price River Formations and undifferentiated Flagstaff-North Horn Formations~~, which contain approximately 80 percent clays, siltstones, mudstones, and shales, are all highly restrictive to vertical groundwater movement (Fisher and others, 1960). Further, no surface water bodies are present to act a supply sources to the deep ground water system.

Recharge to the lower zone probably occurs primarily from vertical movement of water through the overlying formations and is probably greatest where surface fractures intersect the topographic highs where the upper zone formations outcrop. The rate of recharge to the lower zone is very slow. The lack of a significant recharge source results in limited discharge areas. The largest portion of recharge to the lower zone is in the Castlegate Sandstone and upper member of the Blackhawk Formation with some leakage from the upper zone where the greatest number of springs are identified.

The Sunnyside fault zone is the major feature throughout much of the Sunnysdie Mining District. Having a north-northwest strike, the fault zone extends from West Ridge to the Horse Canyon Mine. South of the Horse Canyon Mine the faults are not mapped at the surface. South of Horse Canyon, the faults are believed to be east of the Lila Canyon extension.

At the south end of the Lila Canyon Extension, a series of east-west trending faults have been mapped. These faults form the structure known as the Central Graben. The graben is a down dropped block relative to the adjacent strata.

Faults may effect flow, direction and magnitude of both lateral and vertical flows. However, the area is abundant with plastic or swelling clays that can seal faults and fractures inhibiting both lateral and vertical flows. As discussed in the mine inflow section, significant groundwater was only

encountered in the Horse Canyon Mine as mining approached the Sunnyside fault zone. To prevent such inflows at the Lila Canyon extension, the mining plan attempts to avoid the fault zone. Also, exploratory mining by U.S. Steel, during the period 1952 to 1960, encountered the east-west trending Entry fault in the proposed Lila Canyon area. After extensive exploration, no significant water was encountered from the east-west trending fault.

Assuming mass-balance and stable hydrologic conditions, recharge will equal discharge over the long term. The relatively rapid groundwater discharge from the upper zone formations as compared with the underlying lower zone formations suggest that the stratigraphically-higher water discharges are local and are not hydraulically connected with the lower zone. Waddell et al. (1986) conclude that the perched nature of the upper zone formations protect them from the influence of dewatering of the coal-bearing zone unless the upper zone is influenced by subsidence.

Groundwater resources in the permit area are limited due to the small surface area and low recharge rates. There is not enough base flow from groundwater discharge to maintain a perennial flow in Horse Canyon Creek or Lila Canyon.

The upper groundwater zone produces low volume spring flows from up-dip exposures of bedrock and overlying alluvium. Some spring discharges from this zone have been developed and are used for livestock and wildlife. The lower groundwater zone has very limited discharges that are used for wildlife, generally during the early spring. Based on the location of these lower zone points and the vertical separation (500 feet) between the coal seam and the points, there is no possibility of mining impacting the springs.

724.200 Regional Surface Water Resources. The permit area exists entirely within the Horse Canyon, Lila Canyon, and Little Park Wash watersheds. The regional drainage patterns are generally north-south with steep canyons which are incised in the Book Cliffs escarpment. Stream flows within the region, generally, are the result of snowmelt runoff or summer thunderstorms. Water is not abundant as evapotranspiration exceeds precipitation.

Permit Area Surface Water Resources

Within the permit area, the surface water resources consist of three main drainages: Horse Canyon Creek, Little Park Wash, and Lila Canyon. Horse Canyon flows to Icelander Wash which, in turn, flows to Grassy Trail Creek and the Price River. Little Park Wash flows southward to Trail Canyon and the Price River. Lila Canyon flows southwest to Grassy Wash, then south to the Marsh Flat Wash and the Price River. (see Plate 7-1)

Surface water sampling data are available in Appendix 7-2 and in the DOGM electronic database. The data were obtained from multiple sources, including (but not limited to) on-site sampling efforts, the Horse Canyon Mine P.A.P. filed by Geneva Steel and annual reports, U.S. Geological Survey publications, and various consultant reports. Since not all monitoring parties were required to adhere to UDOGM or SMCRA rules, the laboratory parameters varied between reports. However, the data are still considered valid and appropriate for determining baseline conditions within the permit and adjacent areas. The location of the sampling points are presented on Plates 7-1 and 7-1A.

Based on field observations (described in Appendix 7-7) and flow data obtained during the collection of water-quality samples within the permit and adjacent areas, Horse Canyon Creek is considered intermittent by rule with ephemeral ~~acting~~flow within the permit area. Lila Canyon and Little Park Wash ~~appear to be ephemeral in and adjacent to the permit area.~~, based on the size of the drainage area (greater than 1 sq. mi.), are defined by regulation as intermittent but have been shown to be intermittent by rule with ephemeral flow (see Appendix 7-7). Several smaller tributaries of these streams within the permit and adjacent areas are ephemeral. ~~However, based on the size of the drainage area (greater than 1 sq. mi.), by regulation these drainages are defined as intermittent but have been shown to be ephemeral acting not intermittent.~~

~~Generally,~~ by flow pattern and by rule.

Horse Canyon, Little Park and Lila Canyon flow during the spring snowmelt runoff period and also as a result of isolated summer thunderstorms. Due to the limited drainage area and elevation of Lila Canyon, the duration of the snowmelt flows is quite short and is limited to the very early spring. Flows in Horse Canyon, generally, are limited to the early spring period (Lines and

Plantz, 1981). By mid to late spring ~~to early summer~~, usually no flow is evident in Horse Canyon Creek, below the minesite or Lila Canyon.

Over the period of record, 1981 through present, there have been both wet and dry periods. From 1983 through 1984, the area had high precipitation. In the late 1990's through the present, a drought has been evident in the area. Over this period of record, the flows in the streams have increased and decreased based on the available water. Also, during both of these periods, flows in Horse Canyon Creek during the summer and fall are generally not evident below the mine site. Only flows from summer thunderstorms upstream of the site have resulted in flows below the mine. This indicates that ~~the~~ while surface water resources may fluctuate, the fluctuations are not great enough to change the response of the stream to overcome the hydraulic and geologic characteristics of the area.

During most years, the snowmelt peak is the highest peak flow for the drainages. Under certain circumstances, when a significant summer thunderstorm occurs over the drainages, the runoff event can be quite large.

There are no indications that any of the reaches of Lila Canyon or Little Park Wash are perennial. Since the spring of 2000, both areas have been observed numerous times (at least quarterly) and no flow has even been noted in either drainage. Normally, this would indicate an ephemeral drainage, however, since the drainage areas are greater than one square mile and exhibit no consistent flows, they are classified by regulation as intermittent.

~~A number of~~ The ephemeral nature of the streams make it difficult to document the high and low flow periods. Generally, the flow pattern for the drainages consists of dry channels until a thunderstorm or rapid snowmelt occurs. Then there is a short duration of flow within a portion of the channel. Following the passing of the storm or melting of the snow the runoff quickly decreases and the channel is again dry until the next event.

A number of perched springs do exist in the tributaries of the Little Park Wash drainage; however, the flows from the springs dry-up ~~, dissipate or go underground~~ or infiltrate into the alluvial fill of the canyons within 50 to 200

feet of the source, before reaching the main drainage channel. The springs and seeps in the area have been sampled, as indicated in this application, as part of the baseline and spring/seep inventories. Therefore, they provide an estimate of the quality of the flow within the dranages.

Precipitation in the area generally consists of either high-intensity, localized thunderstorms or area wide, frontal storms. ~~The frontal precipitation events produce only limited amounts of flow in the local ephemeral washes~~Table 7-1A presents rainfall-runoff model simulation results of both the 6-hour and 24-hour rainfall events of the drainages in the site area, to simulate each kind of storm. Appendix 7-10 present the simulation calculation results. These peak flow results show that for short duration events with small return periods (5 years or less), there is little or no runoff from the watersheds. Additionally, due to the localized character of the thunderstorms, the storms affect only a part of the watershed and the limited runoff that does occur is lost to channel losses (infiltration, evaporation, transpiration) within the portion of the watershed that is not affected by the rainfall event. As the return period of the storm increases, storms have greater intensity and tend to cover larger areas, which likely affects most if not all of the watershed. Therefore, flows tend to increase. Intense rainfall may cause heavy flooding, but likely only ~~affecting~~affect small areas. ~~The highest concentrations of suspended sediment will occur during high-intensity runoff from thunderstorms, and the lowest concentrations will occur during base flow or snow melt events. It is anticipated that only during longer duration, high-intensity thunderstorms that flow from the ephemeral drainages within the permit area would reach the Price River. The sediment pond at the mine site is designed to contain disturbed area flows, up to the 10-yr, 24-hr event.~~

~~Surface waters in this part of the Book Cliffs drain to the Price River. The Price River flows to the Green River which, in turn, flows to the Colorado River.~~

~~Lines and Plantz (1981, p. 33) conducted three seepage surveys of Horse Canyon Creek in 1978 and 1979. The results of the surveys show no consistent trends through time. Mine discharges create difficulties in interpretation of the data because there is no indication~~

~~of whether the mine was or was not discharging water at the time of the surveys.~~

~~The Lila Canyon drainage is normally dry, flowing only in response to precipitation runoff or rapid snowmelt.~~

~~The mine facilities will be located in the Right Fork of Lila Canyon. In January 2004, an assessment of the geomorphic character of the channel was conducted to address DOGM comments. A series of channel cross-section measurements were taken and the bed and bank materials visually observed. During this evaluation, it was discovered that a diversion structure had been installed just above the confluence of the Right Fork of Lila Canyon and Grassy Wash (see Appendix 7-9 and Figure 7-3). This diversion structure will divert all flow from the drainage and convey it by diversion channel to a stock pond located in the SW/4, SW/4 of Section 28, T. 16 S., R. 14 E. Subsequently, it was determined that the improvements were part of a BLM range improvement project. This structure has significantly modified the drainage pattern for this area. Flows that previously would have flowed into Grassy Wash will now be detained in the stock pond.~~

~~The closest perennial stream to the permit area is Range Creek. The drainage is located approximately 6 miles east of the proposed Lila Canyon permit area. Range Creek is in a broad, south-southeast oriented drainage that has been eroded into the Roan Cliffs. A western extension of the Roan Cliffs (Patmos Ridge) lies between Range Creek and the Book Cliffs. The proposed Lila Canyon operation is on the west side of Patmos Ridge. The Colton Formation is exposed at the surface from Patmos Ridge east to the main body of the Roan Cliffs, and between these two escarpments Range Creek has eroded into but not through the Colton Formation. Approximately eleven miles southeast of the permit area, just upstream of Turtle Canyon, Range Creek has eroded through the Colton, Flagstaff, and North Horn Formations, but it reaches the Green River without having eroded through the Upper Price River Formation. The nearest Blackhawk outcrop is 10 miles south, along the Price River.~~

~~As a result of the six miles horizontal distance from proposed permit area to Range Creek and the isolating effects of the over 1,000 feet of low-permeability, isolating strata, it is not likely that the Lila Canyon Mine will adversely effect Range Creek. Due to these conditions, no~~

baseline or other sampling has been gathered nor anticipated on Range Creek.

The Horse Canyon drainage is monitored in accordance with the approved monitoring plan for the permit. There have been no samples taken in the Lila Canyon or Little Park Wash drainages because no flow has been observed.

U.S. Steel conducted water quality monitoring of the Horse Canyon drainage. These monitoring efforts were conducted prior to the development of DOGM's present Water Monitoring Guidelines, and as a result the data is quite limited. The most recent results of these water monitoring efforts are presented in Appendix 7-2 and historic results are included in the DOGM electronic database.

724.300 Geologic Information Detailed geologic information of the permit and adjacent areas is included in Section 600, with specific strata analyses, as required, in Section 624.

724.310 Probable Hydrologic Consequences. The geologic data indicate that no toxic- or acid-forming materials are known to exist in the coal or rock strata immediately below or above the seam (see Section 624.300). The probable hydrologic consequences of the proposed operation will be discussed in Section 728 and Appendix 7-3 of this application.

724.320 Feasibility of Reclamation. The geologic data in Section 600 provides sufficient detail to allow: the evaluation of whether toxic- or acid-forming materials are expected to be encountered in mining; subsidence impacts; whether surface disturbed areas are designed to be constructed in a manner that will allow for reclamation to approximate original contour; and whether the operation plans have been design to ensure that material damage to the hydrologic balance does not occur outside of the permit area. These issues are evaluated in the R645 rules and discussed in Section 728 of this application.

724.400 Climatological Information

724.410 Climatological Factors

~~**724.411 Precipitation** The closest weather recording station to the Lila Canyon Mine is located at Sunnyside, Utah. Based on the relatively close proximity and similar locations (west exposure of the Book Cliffs) the data from this station will be used to verify precipitation amounts and other weather conditions for the Lila Canyon Mine.~~

~~Precipitation data from the Sunnyside station has been gathered from 1971 to 2000, showing an average annual~~ and do not result in large volumes of runoff.

For the long duration, frontal type storms, the entire watershed is covered for each event. The frontal precipitation ~~of 14.74 inches. The information was downloaded from the Western Regional Climate Center, as shown on Table 7-1A.~~

~~A rain gauge will be installed at the site, once construction and operations start, to comply with the reporting requirements of the air quality permit.~~

~~**724.412 Winds.** The average direction of the prevailing winds is West to East, and the average velocity is 2.74 knots.~~

~~**724.413 Temperature.** Mean temperatures in the proposed mine area range from a high of 58.0 degrees F to a low of 33.4 degrees F. See Table 7-1A.~~

~~**724.420 Additional Data.** Additional data will be supplied if requested by the Division to ensure compliance with the requirements of R645-301 and R645-302.~~

~~**724.500 Supplemental Information** N/A - The determination of the PHC in Section 728 does not indicate that adverse impacts on or off the proposed permit area may occur to the hydrologic balance, or that acid-forming or toxic-forming material is present that may result in the contamination of ground-water or surface-water supplies.~~

724.700 Valley/Stream N/A - The proposed plan does not include mining or reclamation operations within a valley holding a stream or in a location where the permit area or adjacent area includes a stream which meets the requirements of R645-302-320.

725. Baseline Cumulative Impact Area Information

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725.200 Other Data Sources As indicated above, additional information is available for the cumulative impact area. In addition to the base line data for the proposed mining, additional pertinent hydrologic data is available from adjacent mines and permits and government reports.

725.300 Available Data Necessary hydrologic and geologic information is assumed to be available to the Division in this P.A.P.

events tend to produce only limited amounts of flow in the local ephemeral washes for the short return periods. With the increase in the return period, the flow events tend to be larger. This is due to the contribution from the entire watershed.

Each flow event in an ephemeral channel is separate and distinct. The stream flow is directly proportional to the amount of precipitation or snow-melt runoff, and the water quality varies greatly depending on the amount of flow. The duration of these runoff events is generally short. For thunderstorm events, the flow is generally less than a few hours. Duration of runoff from the frontal runoff events is moderate in length, generally on the order of 11 to 14 hours. Based on the end of rainfall from the watershed model simulations, the runoff would generally end within 3 to 5 hours. Therefore, if a sampler were not on-site during the event, it is unlikely that any flow would be observed.

There are no specified water uses for the stream flows. No water rights exist on the surface streams, due to the overall general lack of flow for these drainages.

Table 7-1A

PEAK FLOW SIMULATIONS OF UNDISTURBED DRAINAGES IN THE LILA CANYON MINE AREA

Watershed ID	Duration (hr)	Return Period Flows (cfs)					
		2yr	5yr	10yr	25yr	50yr	100yr
WS1.1	6 hr	0	0	1.39	5.54	9.98	17.18
	24 hr	0.65	3.22	9.31	22.68	39.50	59.77
WS1.2	6 hr	0	0	1.21	6.43	12.77	22.18
	24 hr	0.86	3.82	9.45	20.66	33.99	49.70
WS1 Total	6 hr	0	0	2.37	11.78	22.68	38.79
	24 hr	1.50	6.62	16.96	39.59	67.46	100.70
WS2.1	6 hr	0	0	0	1.84	4.30	7.79
	24 hr	0.17	0.81	2.54	7.96	14.23	24.90
WS2.2	6 hr	0	0	0	1.43	4.14	8.55
	24 hr	0.18	0.91	2.52	6.47	10.70	17.34
WS2 Total	6 hr	0	0	0	2.98	8.20	16.27
	24 hr	0.32	1.67	4.62	12.41	21.56	36.83
WS7.1	6 hr	0	0	2.23	10.43	19.63	33.75
	24 hr	1.29	6.04	15.85	36.15	60.94	90.24
WS8.1	6 hr	0	0	0.85	3.60	6.59	11.34
	24 hr	0.43	2.09	5.76	13.64	23.46	35.09
WS9.1	6 hr	0	0	3.46	16.17	30.46	52.36
	24 hr	2.01	9.38	24.59	56.08	94.53	139.99

Table 7-1A

PEAK FLOW SIMULATIONS OF UNDISTURBED DRAINAGES IN THE LILA CANYON MINE AREA

Watershed ID	Duration (hr)	Return Period Flows (cfs)					
		2yr	5yr	10yr	25yr	50yr	100yr
Little Park 6.1	6 hr	0	0	1.63	6.48	11.66	20.08
	24 hr	0.76	3.76	10.88	26.5	46.16	69.84
Little Park 6.2	6 hr	0	0	0.93	3.70	6.66	11.47
	24 hr	0.44	2.15	6.21	15.14	26.36	39.89
Little Park 6	6 hr	0	0	2.56	10.18	18.33	31.54
	24 hr	1.20	5.91	17.09	41.63	72.52	109.74
Little Park 6.3	6 hr	0	0	0.32	1.21	2.15	3.70
	24 hr	0.14	0.70	2.17	5.47	9.75	14.92
Little Park 5.1	6 hr	0	0	0.31	1.00	1.73	2.93
	24 hr	0.11	0.59	2.41	7.85	15.16	23.59
Little Park 5.2	6 hr	0	0	0.73	2.75	4.87	8.38
	24 hr	0.32	1.59	4.92	12.40	22.10	33.82
Little Park 5	6 hr	0	0	2.82	11.34	20.41	35.22
	24 hr	1.77	8.54	24.80	61.16	107.32	163.42
Little Park 4.1	6 hr	0	0	0.75	2.58	4.47	7.65
	24 hr	0.29	1.49	5.31	14.72	28.04	43.72
Little Park 4.2	6 hr	0	0	0.76	3.01	5.42	9.33
	24 hr	0.36	1.75	5.06	12.32	21.46	32.47
Little Park 6.4	6 hr	0	0	0.23	0.86	1.53	2.64
	24 hr	0.10	0.50	1.55	3.90	6.95	10.64

Table 7-1A

PEAK FLOW SIMULATIONS OF UNDISTURBED DRAINAGES
IN THE LILA CANYON MINE AREA

Watershed ID	Duration (hr)	Return Period Flows (cfs)					
		2yr	5yr	10yr	25yr	50yr	100yr
Little Park 6.5	6 hr	0	0	0.90	3.58	6.45	11.10
	24 hr	0.42	2.08	6.02	14.66	25.53	38.63
Little Park 4	6 hr	0	0	6.17	24.81	44.74	77.12
	24 hr	2.93	14.01	40.73	101.08	178.91	269.04
Little Park 6.6	6 hr	0	0	0.87	4.44	8.64	14.92
	24 hr	0.58	2.60	6.58	14.58	24.18	35.52
Little Park 3.1	6 hr	0	0	2.35	8.86	15.72	27.03
	24 hr	1.03	5.13	15.87	40.00	71.27	109.07
Little Park 3.2	6 hr	0	0	1.00	4.65	8.76	15.07
	24 hr	0.58	2.70	7.08	16.14	27.20	40.29
Little Park 3	6 hr	0	0	9.73	42.29	77.65	133.01
	24 hr	5.08	23.46	65.66	162.22	284.24	430.10
Little Park 6.7	6 hr	0	0	1.12	6.47	14.50	26.85
	24 hr	1.14	4.69	10.58	21.76	34.48	49.42
Little Park	6 hr	0	0	10.48	47.97	90.92	152.74
	24 hr	6.19	26.34	70.46	170.78	298.11	448.73

Surface waters in this part of the Book Cliffs drain to the Price River. The Price River flows to the Green River which, in turn, flows to the Colorado River. It is anticipated that only during extremely long duration, high-intensity thunderstorms that flow from the ephemeral drainages within the permit area would reach the Price River. Due to the length of channel and the limited volume of runoff, the majority of flow is lost to channel losses, as indicated in Appendix 7-9.

Lines and Plantz (1981, p. 33) conducted three seepage surveys of Horse Canyon Creek in 1978 and 1979. The results of the surveys show no consistent trends through time. Mine discharges created difficulties in interpretation of the data because there was no indication of whether the mine was or was not discharging water at the time of the surveys. However, Horse Canyon Creek below the mine is believed to be a losing stream, due to the visual observation of low flows decreasing downstream of the mine (professional observations, Thomas Suchoski, 1979-1980 & 1984-86). Flow in the channel adjacent to the mine facility entry portal on several occasions during mine inspections during the spring period were approximately 4 to 6 inches deep, with a flow width of 15 to 20 feet. Downstream of the mine in the area of the roadside refuse pile, the flow would be 2 to 3 inches deep with a flow width of 10 to 12 feet. Channel slopes in both areas were similar. No diversions are present along this reach of the channel to reduce the flow. Therefore, the channel flow decrease is the result of infiltration and evaporation of the water within the channel.

The Lila Canyon drainage is normally dry, flowing only in response to precipitation runoff or rapid snowmelt. The mine facilities will be located in the Right Fork of Lila Canyon.

In January 2004, an assessment of the geomorphic character of the Lila Canyon channel, downstream of the proposed mine site, was conducted to address DOGM comments. A series of channel cross-section measurements were taken and the bed and bank materials visually observed. During this evaluation, it was discovered that a diversion structure had been installed just above the confluence of the Right Fork of Lila Canyon and Grassy Wash (see Appendix 7-9 and Figure 7-3). This diversion structure will divert all flow from the drainage and convey it by diversion channel to a stock pond located in the SW/4, SW/4 of Section 28, T. 16 S., R. 14 E. Subsequently, it was determined that the improvements were part of a BLM range improvement project. This structure has significantly modified the drainage pattern for this area. Flows that previously would have flowed into Grassy Wash will now be detained in the stock pond.

The closest perennial stream to the permit area is Range Creek. The drainage is located approximately 6 miles east of the proposed Lila Canyon permit area boundary (see Plate 7-1a).

Range Creek is in a broad, south-southeast oriented drainage that has been eroded into the Roan Cliffs. A western extension of the Roan Cliffs (Patmos Ridge) lies between Range Creek and the Book Cliffs. The proposed Lila Canyon operation is on the west side of Patmos Ridge. The Colton Formation is exposed at the surface from Patmos Ridge east to the main body of the Roan Cliffs, and between these two escarpments Range Creek has eroded into but not through the Colton Formation. Approximately eleven miles southeast of the permit area, just upstream of Turtle Canyon, Range Creek has eroded through the Colton, Flagstaff, and North Horn Formations, but it reaches the Green River without having eroded through the Upper Price River Formation. The nearest Blackhawk outcrop is 10 miles further south, along the Price River.

Argument has been made that Range Creek receives recharge from a regional aquifer which is likely from the lower saturated zone that the Lila Canyon Mine will be mining or that the overlying perched upper zone might be drained by the mining activities and affect the flows contributing and in Range Creek.

To address these concerns, the following issues were evaluated. An evaluation of the elevation difference between the saturated ground-water zone in the Blackhawk Formation and stream flows in the Range Creek drainage was conducted, especially for the reaches nearest the permit area. Also, the thickness and composition of the strata between the coal seam and the creek was conducted. Further, the potential for diminishment of the spring and tributary flows resulting from subsidence impacts within the recharge area to Range Creek was evaluated.

If the deeper ground water in the Blackhawk Formation were to flow following either the gradient indicated by the piezometers (see Figure 7-1) or geologic dip (see Plate 7-1B), the water would flow well below Range Creek (800 to 1,200 feet) in the reaches nearest the Lila Canyon Mine and for many miles downstream.

Additionally, the thick section of strata between Range Creek and the Blackhawk Formation would impede hydraulic interaction between any deep ground water and the surface (Plates 7-1A and 7-1B). It is estimated that the vertical separation between the Blackhawk and Range Creek at the base of the Colton would be about 1,200 feet.

A review of U.S. Geological Professional Paper by D.J. Fisher, C.E. Reeside and J.B. Erdman, 1960, **Cretaceous and Tertiary Formation of the Book Cliffs, Carbon and Emery Counties, Utah,** which evaluates the composite stratigraphy in the Horse Canyon area, was conducted. The lithology descriptions were reviewed and a total of the percentage of shale, siltstone and mudstone (less permeable layers), for each strata identified by the authors, was generated to get an idea of the ability of each strata to restrict flow throughout the stratigraphic column.

Colton Formation		
Upper Sandstone Unit	1,300 ft.	
% Shale		23.1
Shale Unit	960 ft.	
% Mudstone	82.9	
Lower Sandstone Unit	1,128 ft.	
% Shale and Mudstone		34.8
North Horn–Flagstaff, Undifferentiated		
Shale beds	237 ft.	
Mudstone	181 ft.	
Limestone	21 ft.	
Siltstone	25 ft.	
Clay	7 ft.	
Sandstone beds	99 ft.	
%Shale, Clay, Siltstone, and Mudstone		79.0
Price River Formation		
Upper Unit	299 ft.	
% Shale		43.8
Lower Unit	234 ft.	
% Shale and Siltstone		43.8
Castlegate Sandstone	160 ft.	
% Shales, Clays, Siltstones or Mudstones		0
Blackhawk Formation		
Upper Shale Unit	170 ft.	
Middle Sandstone Unit	0 ft.	
Middle Shale Unit	102 ft.	
Lower Sandstone Unit	200 ft.	
% Shale		52.5

Based on the stratigraphic column in the area, the overall percentage of less permeable strata is 47 percent. Looking at the distribution of the less permeable strata, the majority is in the upper lithographic units. The Colton and North Horn-Flagstaff contain about 1940 feet of less permeable units, while the Price River and Blackhawk contain about 480 feet. Therefore, there is little potential for water to move vertically between the upper and lower zones. The main direction of water movement will be horizontally within the strata.

Further, the elevation of Range Creek in the area of concern ranges from 6890 to 5740 feet (see Plate 7-1A). The coal seam exposure along the Book Cliffs ranges from 5,500 to 6,000 feet. Therefore, for water to flow from the coal seam to Range Creek the flow would need to overcome a hydraulic head difference of 200 plus feet, just based on the initial elevation and not accounting for dip of the formations. There is insufficient head and no source of water to provide the driving head for such conditions.

In regard to subsidence affecting the potential recharge to the springs and tributaries to Range Creek, as described in Chapter 5, Section 525, the subsidence limits from the proposed mining are required to be limited to the area of the permit boundary. Therefore, the recharge area to Range Creek that could be affected is within the permit boundary.

In reviewing the permit area, as shown on Plate 7-1A, Little Park drainage has eroded through the Colton, North Horn-Flagstaff and part of the Price River formations. While Range Creek, in the reaches nearest to the proposed mine, has not eroded through the Colton Formation and the high percentage of low permeable strata within the Lower Colton and North Horn-Flagstaff formations limited potential for recharge to the springs and tributaries from areas below the bottom of the Colton Formation. The potential impact area from the mine is that portion of the permit area that is east of the Horse Canyon and Little Park drainages and that portion which is above the Colton - North Horn-Flagstaff contact.

Based on a review of Plate 7-1A, the portion of the permit boundary that meets these criteria is approximately 510 acres. Based on a projection of the direction of dip (N68°E), the area of the Range Creek drainage that might be affected would be from just north of Little Horse Canyon south to Cherry Meadow Canyon. This projection represents the area with recharge potential along the west side of the Range Creek drainage. Thus, the total recharge area to this portion of the drainage would be approximately 21,100 acres. Therefore, the percentage of the recharge area that might be intercepted by catastrophic

subsidence is 2.4 percent. As catastrophic subsidence is unlikely due to the cover over the coal seam for most of this area (2,000ft +), this percentage is conservatively high. Such a small percentage would not be measurable within the Range Creek drainage.

If such an occurrence were to happen, based on the hydraulic conductivity (0.1gpd/ft^2)and porosity (0.25) of the formation and the anticipated gradient (0.1ft/ft), the average linear velocity of flow through the formation would be about 0.006ft/day. This results in an estimated duration, for the reduced recharge to move laterally through the Colton Formation and reach the Range Creek drainage, to be about 8,700 to 11,300 years.

As a result of the five to six miles horizontal distance from proposed permit area to Range Creek (see Plate 7-1a) and the isolating effects of the over 1,000 feet of low-permeability, isolating strata between the coal seam and the creek elevation (see Plate 7-1B and Table above) and the limited potential and impact of subsidence damage to the recharge area, it is not likely that the Lila Canyon Mine will adversely effect Range Creek. Due to these conditions, no baseline or other sampling has been gathered nor is anticipated on Range Creek.

The Horse Canyon drainage is monitored in accordance with the approved monitoring plan for the permit. There have been no samples taken in the Lila Canyon or Little Park Wash drainages because no flow has been observed during the monitoring activities. Factors that contribute to the lack of data are: accessibility to the sites during the winter period and immediately after summer rain storm events is generally not possible, due to safety issues and a physical lack of flow.

Access and Safety. Safety issues have hampered field work on several projects in the area. When the soils in the area get wet they become very slick and pose access and safety issues. During the IPA drilling, EarthFax had significant difficulty in getting equipment and vehicles up and down the access road following several small rain storms. In one case they had one of their vehicles slide into the embankment rocks along the Horse Canyon access road (drop in the area was about 400 feet).

Access during rainstorms through the channels in the area is dangerous. During the avian study for the Westridge mine, Mel Coonrod (EIS) and Frank Howe (DWR) were caught in a channel during a rainstorm and lost their vehicle to flooding.

During winter and early spring periods, there have been times when the access road has been blocked with several feet of snow making access with the field equipment impossible.

UAE's position is that collection of environmental data is not worth of the loss of life or limb. Therefore, when the conditions are unsafe, the site is labeled inaccessible. At all other times, the sites are visited and if no flow is encountered it is reported as such.

Physical Lack of Flow. The lack of flow data in the sampling effort is not a failure of the sampling effort. The lack of flow at these sample sites is data which documents the normal conditions in the site area. If the streams were flowing 50 percent of the time, it is likely that the sampling efforts would encounter flow on an infrequent basis. However, if the flow for the short return periods is extremely small or none existence, it will be difficult to obtain and provide samples of these events. This lack of flow shows that the drainages do not have a base flow component and there is no regional aquifer discharging to the deeply incised canyons and drainages in the area. The sequence of sampling efforts have demonstrated further, that there is no long-term flow events occurring in the mine permit area or adjacent areas. Also, spring photographs show disturbances in the stream channels from the previous falls sampling efforts indicating that for some years no flow occurred from the fall to spring measurement events. Additionally, the peak flow simulation results show that the duration of any flow events would be of extremely limited duration.

Therefore, a pattern has been identified of a set of drainages that only flow in direct response to precipitation or rapid snow melt. The flow events are localized, sporadic events with no consistent sequence and timing and are extremely limited in duration.

U.S. Steel conducted water quality monitoring of the Horse Canyon drainage. These monitoring efforts were conducted prior to the development of DOGM's present Water Monitoring Guidelines, and as a result the data is quite limited. The most recent results of these water monitoring efforts are presented in Appendix 7-2 and historic results are included in the DOGM electronic database.

The data collected from Horse Canyon follows the same pattern documented by Waddell, et.al. (1986). The pattern shows that the TDS concentrations for surface waters on the lower Blackhawk and out onto the Mancos Shale range from 1000 mg/l and increase to 2,000 to 2,500 mg/l. Additionally, the highest concentrations of suspended sediment will occur during high-intensity runoff

from thunderstorms, and the lowest concentrations will occur during low flow or snow melt events.

Therefore, because of the similarity of the water quality data, the water quality expected from the drainages in the area of the proposed mine will be similar to the water quality found in the Horse Canyon drainage.

Monitoring efforts did not include remote or automatic sampling efforts because of inherent problems attempting to implement these methods for this application. It has been suggested that crest-staff gauges, single-stage samplers, ISCO instruments, etc. could be used to collect samples. These are methods that the USGS uses for developed remote sampling sites. However, none of the UEI sampling sites are developed. In the case of crest gauges, for these methods to be feasible, the sites need to be developed with concrete or bedrock lined channel sections. For the channel configurations at the UEI sites, the channel bottoms consist of movable beds. These are channels that change configuration from storm to storm. As a result of channel erosion and deposition, the stage discharge relationship of the channel changes with each storm event. Therefore, while the crest gauge would indicate that a flow event may have occurred, the ability to determine what the flow rate was is greatly compromised. To be able to overcome this, it would be necessary to construct lined channel sections in remote channel areas. In some cases, this would require the construction of access way and cement trucks to haul in the materials necessary. This would likely cause more damage than it is worth.

For the use of single stage and ISCO samplers, with sampling limited to monthly and quarterly readings, the holding time on many water samples would be exceeded. Therefore, the water quality data would not be usable for determining the baseline or impact conditions.

Several samplers were installed as apart of the Westridge Mine sampling efforts. After several abortive attempts at utilizing them for flow and quality measurements, they were removed because the data was unreliable and suspect.

Remote sensing equipment has also been considered. However, as most of the monitoring sensors require line of sight and these sites are in remote, incised canyons or drainages, that is not possible.

As a result of these difficulties, it was determined that these methods would not provide any better data than was already being collected and would not be used.

724.300 Geologic Information Detailed geologic information of the permit and adjacent areas is included in Section 600, with specific strata analyses, as required, in Section 624.

724.310 Probable Hydrologic Consequences. The geologic data indicate that no toxic- or acid-forming materials are known to exist in the coal or rock strata immediately below or above the seam (see Section 624.300). The probable hydrologic consequences of the proposed operation will be discussed in Section 728 and Appendix 7-3 of this application.

724.320 Feasibility of Reclamation. The geologic data in Section 600 provides sufficient detail to allow: the evaluation of whether toxic- or acid-forming materials are expected to be encountered in mining; subsidence impacts; whether surface disturbed areas are designed to be constructed in a manner that will allow for reclamation to approximate original contour; and whether the operation plans have been design to ensure that material damage to the hydrologic balance does not occur outside of the permit area. These issues are evaluated in the R645 rules and discussed in Section 728 of this application.

724.400 Climatological Information

724.410 Climatological Factors

724.411 Precipitation The closest weather recording station to the Lila Canyon Mine is located at Sunnyside, Utah. Based on the relatively close proximity and similar locations (west exposure of the Book Cliffs) the data from this station will be used to verify precipitation amounts and other weather conditions for the Lila Canyon Mine.

Precipitation data from the Sunnyside station has been gathered from 1971 to 2000, showing an average annual precipitation of 14.74 inches. The information was downloaded from the Western Regional Climate Center, as shown on Table 7-1B.

A rain gauge will be installed at the site, once construction and operations start, to comply with the reporting requirements of the air quality permit.

724.412 Winds. The average direction of the prevailing winds is West to East, and the average velocity is 2.74 knots.

724.413 Temperature. Mean temperatures in the proposed mine area range from a high of 58.0 degrees F to a low of 33.4 degrees F. See Table 7-1B.

724.420 Additional Data. Additional data will be supplied if requested by the Division to ensure compliance with the requirements of R645-301 and R645-302.

724.500 Supplemental Information N/A - The determination of the PHC in Section 728 does not indicate that adverse impacts on or off the proposed permit area may occur to the hydrologic balance, or that acid-forming or toxic-forming material is present that may result in the contamination of ground-water or surface-water supplies.

724.700 Valley/Stream N/A - The proposed plan does not include mining or reclamation operations within a valley holding a stream or in a location where the permit area or adjacent area includes a stream which meets the requirements of R645-302-320.

725. Baseline Cumulative Impact Area Information

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725.100 Hydrologic and Geologic Information Hydrologic and geologic information for the mine area is provided in Sections 600, 724 and in the PHC Determination in Appendix 7-3. This information includes the available information gathered by the applicant. Additional information is available for the areas adjacent to the proposed mining and adjacent areas from state and federal agencies.

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Table 7-1B

Sunnyside, Utah (428474)
Period of Record Monthly Climate Summary

Period of Record: 1971 - 2000

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Ann.

725.200 Other Data Sources As indicated above, additional information is available for the cumulative impact area. In addition to the base line data for the proposed mining, additional pertinent hydrologic data is available from adjacent mines and permits and government reports.

725.300 Available Data Necessary hydrologic and geologic information is assumed to be available to the Division in this P.A.P.

726. Modeling Where ever possible actual surface and ground water information is supplied in this application. However, the following models were used to supplement the data.

Storm 6.2, a program to calculate runoff flows was used to calculate runoff from some disturbed area drainage areas.

Hydroflow Hydrograph program by Intelisolve was used to simulate the runoff and routing from the undisturbed drainages above the proposed mine.

A simulation of transmission losses to determine potential impacts from mine water discharge to the Price River and fishery ~~will be completed prior to Mining.~~

was completed using a spreadsheet based on the NRCS channel loss evaluation.

727. Alternate Water Source Information A search was conducted of the State of Utah Water Rights files for all rights occurring within, and adjacent to, the permit area for a distance of one mile. The location of those rights are shown on Plate 7-3. A description of each of the rights is tabulated in Table 7-2.

Any State-Appropriated water supply that may be damaged by mining operations will either be repaired or replaced. As soon as practical, after proof of damage by mining in Lila Canyon, of any State-Appropriated water supply, UEI will replace the water. Water replacement may include sealing surface fractures, piping, trucking water, transferring water rights, or construction of wells. The preferable method of replacement will be sealing of surface fractures

Table 7-2

LILA CANYON MINE AREA
Water Rights

Water Right/Owner	cfs	gpm	ac.ft.	Source	Use	Point of Diversion
91-557 Eardley, Joseph K.	0	-	0	So. Fork Horse Canyon Creek	Stockwatering	SW 34, T. 15 S, R. 14 E.
91-557 Eardley Joseph K.	0	-	0	So. Fork Horse Canyon Creek	Stockwatering	NE 34, T. 15 S, R. 14 E.
91-1903 State of Utah	0.08	36	0	Spring	Stockwatering	SE 35, T. 15 S, R. 14 E.
*91-148 IPA	0.30	135	0	U. G. Tunnel	Other	NW 3, T. 16 S., R. 14 E.
*91-149 IPA	0.10	45	0	U. G. Tunnel	Other	NW 3, T. 16 S., R. 14 E.
*91-150 IPA	0.10	45	0	U. G. Tunnel	Other	NW 3, T. 16 S., R. 14 E.
*91-4959 ~~IPA~~CEUF	0.00	-	5.00	Redden Spring	Mining	NE 3, T. 16 S., R. 14 E.
91-2616 BLM	0	-	0	Stream	Stockwatering	NW 3, T. 16 S., R. 14 E.
*91-183 ~~IPA~~CEUF	0.8	359	0	Horse Canyon Creek	Domestic, Other	SE 1/4 3, T.. 16 S., R. 14 E.
91-185 Minerals Devel. Co.	0.0190	9	0	Well	Domestic, Other	NW 9, T. 16 S., R. 14 E.
91-618 Mont Blackburn	0.0110	5	0	Mont Spring	Stockwatering	NE 11, T. 16 S., R. 14 E.
91-2615 BLM	0	-	0	Stream	Stockwatering	NW 10, T. 16 S., R. 14 E.
91-617 Mont Blackburn	0.0110	5	0	Leslie Spring	Stockwatering	NW 11, T. 16 S., R. 14 E.
91-4650 BLM	0	-	0	Tributary to Flat Wash	Stockwatering, Other	SW 9, T. 16 S., R. 14 E.
*91-399 IPA	0.050	22	0	Unnamed Spring	Mining, Other	SE 12, T. 16 S., R. 14 E.

L-1-S	Lila Canyon	~~E~~Intermittent by rule with ephemeral ~~acting~~flow
L-2-S	Rt. Fork Lila (above mine)	~~E~~phemeral Stream
L-3-S	Lila Canyon Below Mine	~~E~~Intermittent by rule with ephemeral ~~acting~~flow
L-4-S	Sediment Pond Discharge	UPDES
L-5-G	Mine Water Discharge	UPDES (Groundwater)
L-6-G (suspended)	**Sampling Suspended 1Qtr 2003**	Spring
L-7-G	Cottonwood Spring	Spring
L-8-G	Unnamed Spring	Spring
L-9-G	Pine Spring	Spring
L-10-G (suspended)	**Sampling Suspended 1Qtr 2003**	Spring
L-11-G	Lila Canyon Wash	Spring
L-12-G	Section 25 Wash	Spring
L-13-S	Little Park Wash	~~E~~Intermittent by rule with ephemeral ~~acting~~flow
L-14-S	Section 25 Wash	~~E~~Intermittent by rule with ephemeral ~~acting~~flow
L-15-S (suspended)	**Sampling Suspended 1Qtr 2003**	~~E~~Intermittent by rule with ephemeral ~~acting~~flow
L-16-G	Stinky Spring Wash	Seep
L-17-G	Stinky Spring Wash	Seep
L-~~18~~-S	Stinky Spring Wash	Intermittant by rule with ephemeral flow
IPA-1	Little Park Wash	Borehole
IPA-2	Little Park Wash	Borehole
IPA-3	Little Park Wash	Borehole

Sampling at Locations L-13-S, L-14-S, L-15-S, and L-1~~5~~8-S will no longer be required once the washes have been characterized as ~~E~~Intermittent by rule with ephemeral ~~acting~~flow or Ephemeral.

Locations of all monitoring sites are shown on Plate 7-4 , "Water Monitoring Location Map".

Proposed monitoring methods, parameters and frequencies are described in Table 7-3, "Water Monitoring Stations", Table 7-4, "Surface Water Monitoring Parameters", and Table 7-5 "Ground Water Monitoring Parameters".

In any one quarter a minimum of three unsuccessful attempts will be made by using either 4 wheel drive vehicles or ATV's to access all water monitoring sites prior to reporting any site as "No Access". However, safety and common sense will prevail while making these attempts.

Monitoring reports will be submitted to the Division at least every 3 months, within 30 days following the end of each quarter.

———Any material which exhibits acid- or toxic-forming characteristics will be properly stored, protected from runoff, removed to an approved disposal site or buried on site beneath a minimum of 4' of non-acid, non-toxic material.

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731.312 Storage of Acid- or Toxic-Forming Materials Storage of potentially acid- or toxic-forming materials, such as fuel, oils, solvents and non-coal waste will be in a controlled manner, designed to contain spillage and prevent runoff to surface or ground water resources.

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All oils and solvents will be stored in proper containers within enclosed structures. Fuels will be stored in appropriate tanks, enclosed within concrete or earthen bermed areas designed to contain any spillage.

Non-coal waste (garbage) will be stored in a designated location, in dumpsters, and removed to an approved landfill (East Carbon Development Contractors - ECDC) on a regular, as-needed basis.

Unused or obsolete equipment or supplies will be stored in a designated area. Drainage from the storage area will be directed to the sediment pond as shown on the Sediment Control Map, Plate 7-5.

Underground development waste (if any) will also be stored in a designated area. Such waste will be tested for acid- or toxic-forming potential, and if found to be acid- or toxic-forming, the waste site will be protected from surface runoff by the use of earthen berms.

731.320 Storage, Burial, Treatment All storage, burial and treatment practices will be as described in this permit, and consistent with applicable material handling and disposal provisions of the R645-Rules.

Table 7-3
Lila Canyon Mine
Water Monitoring Stations

Station	Location	Type	Frequency	Remarks
L-12-G	Section 25 Spring	Spring	Quarterly	Replaces L-10-G
L-13-S	Little Park Wash	Dry Wash	Monthly	At Road Crossing
L-14-S	Section 25 Wash	Dry Wash	Monthly	At Road Crossing
L-15-S	Williams Draw Wash	Dry Wash	Sampling Suspended 1Qtr of 2003	At Road Crossing
L-16-G	Stinky Spring Wash	Seep	Quarterly	Top of Mancos
L-17-G	Stinky Spring Wash	Seep	Quarterly	Top of Mancos
L-18-S	Stinky Springs Wash	Dry Wash	Monthly	Adjacent to Access Road
IPA-1	Little Park	Borehole	Quarterly	Water Level Only
IPA-2	Little Park	Borehole	Quarterly	Water Level Only
IPA-3	Little Park	Borehole	Quarterly	Water Level Only

NOTE: Sites L-13-S, L-14-S, L-15-S, and L-158-S will no longer be monitored after the washes have been characterized.

~~Text Was Moved From Here: 4~~

~~All oils and solvents will be stored in proper containers within enclosed structures. Fuels will be stored in appropriate tanks, enclosed within concrete or earthen bermed areas designed to contain any spillage.~~

~~Non-coal waste (garbage) will be stored in a designated location, in dumpsters, and removed to an approved landfill (East Carbon Development Contractors - ECDC) on a regular, as-needed basis.~~

~~Unused or obsolete equipment or supplies will be stored in a designated area. Drainage from the storage area will be directed to the sediment pond as shown on the Sediment Control Map, Plate 7-5.~~

~~Underground development waste (if any) will also be stored in a designated area. Such waste will be tested for acid- or toxic-forming potential, and if found to be acid- or toxic-forming, the waste site will be protected from surface runoff by the use of earthen berms.~~

~~**731.320 Storage, Burial, Treatment** All storage, burial and treatment practices will be as described in this permit, and consistent with applicable material handling and disposal provisions of the R645-Rules.~~

731.400 Transfer of Wells There are presently three ~~P~~piezometers on this permit. When these ~~P~~piezometers are no longer required, they will be sealed in a safe, environmentally sound manner in accordance with regulations (see Section 631.200). The Horse Canyon Well will be donated to the College of Eastern Utah as part of the Post Mine Land use Change

731.500 Discharges The only proposed discharges from this operation will be from the sediment pond and/or underground mine water. Each of these potential discharges would be monitored and controlled within requirements of approved U.P.D.E.S. Discharge Permits.

731.513 Water from Underground Workings Based on historical data from other mines in the area, some mine water can be expected to be encountered during the mining operation. Typically, such water is stored in "sumps" or designated areas in the mine and used for mining operations or discharged to the surface. A sump is an underground storage area that is used to temporarily store water before it is used underground or pumped to the surface for discharge. The main purpose of a sump is to remove sediments. The sump will also remove oil/grease if they were to get into the water. The size of a sump can vary from a few hundred gallons to several thousand gallons. The size normally depends on the space available and the amount of water needed for mining operations.

In order to more accurately define the potential impact of the mine on ground water, underground usage discharge amounts, if they were to occur, would be documented. This information along with the surface monitoring program will provide the best information available as to the potential impact of the mine on ground water.

IPA ~~P~~piezometers 1-3 will still be monitored quarterly if possible. The three ~~P~~piezometers were monitored on December 22, 2000. The water level probe during this period was unable to reach the depth required to measure the water level of IPA-1 and IPA -3. Another attempt will be made to enter these ~~P~~piezometers when the sites are accessible.

The water level of IPA-2 was very consistent with the last reading taken on April 29, 1996. This piezometer (IPA-2) is the farthest west of the three ~~P~~piezometers and is up dip from the other two. Any impact to ground water would be noticed very quickly at IPA-2. This information from IPA-2 along with the past baseline data on the three ~~P~~piezometers and the in mine water monitoring program mentioned above, would provide an accurate evaluation of potential ground water impacts.

At the present time, there are no plans to divert water from the underground workings of this operation to any other underground workings.

proposed portals are located to prevent gravity discharge from the mine (see Section 731.521).

731.600 N/A - There ~~are~~will be no ~~proposed coal mining~~surface disturbing or reclamation operations_ within 100 feet of a perennial or intermittent stream. All streams within the permit area are either ephemeral or intermittent by rule with ephemeral flow. However, the Operator will install stream buffer zone signs in locations shown on Plate 5-2. Since all streams within the permit area are either ephemeral or intermittent by rule with ephemeral flow. Section 731.600 is not applicable.

731.700 Cross Sections and Maps The following is a list of cross-sections and maps provided in this section of the P.A.P.

Plate 7-1	Permit Area Hydrology Map
Plate 7-2	Disturbed Area Hydrology/Watershed
Plate 7-3	Water Rights Locations
Plate 7-4	Water Monitoring Location Map
Plate 7-5	Proposed Sediment Control Map
Plate 7-6	Proposed Sediment Pond
Plate 7-7	Post-Mining Hydrology

All required maps and cross-sections have been prepared by, or under the supervision of, and certified by a Registered Professional Engineer, State of Utah.

731.710 General Area Hydrology Plate 7-1.

731.720 Plate 7-2.

731.730 Water Monitoring Map Plate 7-4.

731.740 Sediment Pond Map Plate 7-6.

731.750 Plate 7-6.

~~763. Siltation Structures.~~ See Appendix 7-4 for details on removal of siltation structures.

~~763.100~~ Siltation Structures will be Maintained. As indicated in Section 761, the sediment pond will remain in place until the stability and vegetation requirements for Phase II Bond Release are met. This will be a minimum of 2 years after the last augmented seeding. At this time, the pond will be removed and the area reclaimed.

~~763.200~~ Structure is Removed Upon removal of the sediment pond, the area will be regraded and revegetated in accordance with the approved reclamation plan and Sections 358, 356 and 357.

~~764. Structure Removal~~ A timetable for reclamation activities is provided in Section 542.100.

~~765. Permanent Casing and Sealing of Wells~~ There are only three ground water ~~P~~piezometers on the site IPA-1, IPA-2 and IPA-3. They will be reclaimed according to the requirements of the Division's Performance Standards. If any additional wells are required in the future, requirements of this section will be met.

References

Balsley, John K., 1980. Cretaceous wave-dominated delta systems: Book Cliffs, east-central Utah, AAPG Field Guide, 163 p.

Croley, Thomas W. III, 1977. Hydrologic and hydraulic computations on small programmable calculators, Iowa Institute of Hydraulic Research, Univ. of Iowa, Iowa City, Iowa.

Fischer, et.al., 1960. Cretaceous and Tertiary Formation of the Book Cliffs, Carbon and Emery Counties, Utah. U.S. Geological Survey Professional Paper 332. Washington, D.C.

Goldman, et.al., 1986. Erosion and Sediment Control Handbook, McGraw-Hill Book Company, N.Y.

Intermittent Power Agency, Horse Canyon Mining and Reclamation Plan, Carbon County, Utah, ACT/007/013.

JBR Consultants Group, 1986. Field notes and maps for the spring and seep survey of the Horse Canyon area, Fall, 1985.

Kaiser Coal Corporation, 1985. Mining and Reclamation Plan for the South Lease. Submitted to DOGM.

Kaiser Coal Corporation, 1986. Mining and Reclamation Plan for the Sunnyside Mines. Submitted to DOGM.

Lines, G. C., 1985. The groundwater system and possible effects of underground coal mining in the Trail Mountain area, central Utah. U.S. Geological Survey Water-Supply Paper 2259, 32 p.

Lines, G. C. and others, 1984. Hydrology of Area 56, Northern Great Plains and Rocky Mountain coal provinces, Utah: U.S. Geological Survey Water-Resources Investigations Open-File Report 83-38, 69 p.

Lines, G. C. and Plantz, G. G., 1981. Hydrologic monitoring in the coal fields of central Utah, August 1978- September 1979: U.S. Geological Water-Resources Investigations Open-File Report 81-138, 56 p.

WordPerfect Document Compare Summary

Original document: C:\Lila\APPROVED LILA MRP\Word Perfect\WPChapter 7\Appendix 7-3Rev5.wpd
Revised document: @PFDesktop\:MyComputer\C:\Lila\APPROVED LILA MRP\December_30_05\Appendix 7-3\Appendix 7-3 Dec31.wpd
Deletions are shown with the following attributes and color:
~~Strikeout~~, Blue RGB(0,0,255).
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Insertions are shown with the following attributes and color:
Double Underline, Redline, Red RGB(255,0,0).

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Appendix 7-3

Probable Hydrologic Consequences Determination

Updated ~~January~~December 2005

development of vegetation along the stream banks aiding in the additional stabilization of the channel banks and bed. While these impacts are not anticipated, the applicant has agreed to monitor the conditions of the channel downstream of the site for geomorphic and erosional change as a result of mine discharges.

All construction and upgrading activities will be undertaken during periods of dry weather, commencing in late spring and lasting through fall. For both the mining and reclamation periods, it is expected that construction, upgrading, or regrading activities would cause an increase in sediment load to the stream. Temporary sediment controls will be used whenever possible to lessen the impact of construction activities.

Stream buffer zones have been delineated upstream and downstream of the disturbed area of the mine facilities. These buffer zones will aid in ensuring that no disturbance occurs within the area of the unprotected channel.

Sediment yields may increase locally due to subsidence. Subsidence tends to cause a warping or sagging of the surface in the area of the mined out area. Within the stream channel that crosses a subsided area, at the upstream boundary of the subsidence, the stream channel is steepened, resulting in the potential for additional erosion in the steepened reach. As the stream crosses the sagged subsided area, the channel gradient decreases below the pre-subsided slope. This results in increased glides and extended pools in intermittent and perennial streams or areas of increase deposition in ephemeral streams. Subsidence cracks which intersect stream channels with steep gradients could, for a short period of time, ~~cause an~~result in a local increase in the sediment yield of the stream. However, this sediment increase would also cause the crack to quickly fill, recreating pre-subsidence stream channel conditions. Thus, the potential impact to sediment yield from subsidence in the permit area would be minor and of short duration.

Various sediment-control measures will be implemented during reclamation as the vegetation becomes established. As discussed in Section 542.200 of this P.A.P., these measures will include installation of silt fences and straw-bale dikes in appropriate locations to minimize potential contributions of sediment to the Right Fork of Lila Canyon. These measures will reduce the amount of erosion from the reclaimed areas, thereby precluding adverse impacts to the environment.

Acidity, Total Suspended Solids, and Total Dissolved Solids. Probable impacts of mining and reclamation operations on the acidity and total suspended solids concentrations of surface and groundwater in the permit and adjacent areas were

addressed previously in this section. Since the proposed Lila Canyon Mine has not started, there is no specific data available on Lila mine water. Therefore, quality information was obtained from the adjacent Horse Canyon Mine workings.

Data presented in Appendices 7-1 and 7-6 and summarized in Section 724.100 of this P.A.P. indicate that the TDS concentration of water in the Blackhawk Formation (as measured in inflow to the nearby Horse Canyon Mine) ranged from approximately 1400 to 2400 mg/l and is of the sodium-bicarbonate type. As noted in Section 724.200, the TDS concentration of water in the Right Fork of Lila Canyon is unknown, but likely to be similar to the flows in Horse Canyon Creek which are in the range from 1200 to 1500 mg/l. The dominant ions in this water are calcium and bicarbonate during high-flow periods, whereas the dominant ions during low-flow periods are sodium, magnesium, sulfate, and bicarbonate.

These data suggest that the TDS concentration of water in the Right Fork of Lila Canyon can be expected to increase by a factor of 1.5 for the water discharged from the mine to the drainage. This concentration is similar to concentrations found in other streams along the Book Cliffs are described by Waddell, et. Al. (1986). It should be noted that it is anticipated that the Lila Canyon Mine will use powdered limestone or dolomite (i.e., calcium-magnesium-carbonate) for rock dust. It is not anticipated that gypsum rock dust (calcium-sulfate) will be used in the mine. Hence, dissolution of rock dust by water in the mine should not influence the chemical type of water in the drainage if mine water is discharged to the Right Fork of Lila Canyon.

As indicated in the P.A.P., the total iron and manganese concentrations in discharges from the mine are not significantly elevated to an effect downstream uses. Also, as discussed in Appendix 7-9, the mine water discharge is expected to affect only the 3.4 mile downstream from the mine.

Lila Canyon drainage, as part of the lower Price River basin, is classified according to Section R317-2-13 of the Utah Administrative Code (Standards of Quality for Waters of the State) as a class 2B (secondary contact recreation use), 3C (nongame fish and other aquatic life use), and 4 (agricultural use) water. No TDS standards exist for class 2B and 3C water. The TDS standard for class 4 water is 1,200 mg/l. Hence, if discharges occur from the Lila Canyon Mine to the Right Fork of Lila Canyon, the data indicate that the TDS concentration of these discharges will slightly exceed the agricultural use water-quality standard.

As there is limited agricultural use in the area, this TDS exceedance is not considered significant. The major usable water resources in the area that could potentially be affected are springs and ephemeral channels. These water sources

decrease in head will have the direct effect of decreasing the inflow rate into the mine. Additionally, the volume of water required to "fill the mine" would also have to fill the strata above the mine, which has been dewatered throughout the history of the mine.

Based on these factors it is unlikely that the groundwater level in the lower groundwater zone will ever rise to the level of the portal, at any portal location for either the Horse Canyon or Lila Canyon Mines. Hence, there should be no natural discharge of groundwater through any of the sealed portals. To verify this, stand pipes will be incorporated into the grading plans for the portals so that water levels can be checked annually.

Groundwater and Surface Water Availability. Potential impacts to the availability of surface and groundwater from the Lila Canyon Mine operations include both decreased and increased stream flows and spring discharges caused by mine-related subsidence, bedrock fracturing, and aquifer dewatering. These potential impacts are discussed below.

Potential for Decreased Spring and Stream Flows

To date, while surface subsidence has been identified as a result of coal mining in the nearby Horse Canyon Mine, no impact or disruption of spring and seep of stream flows have been identified. Bedrock fracturing routinely occurs, depending on the overburden thickness, in the rock units overlying ~~the~~ mined coal seams. Given the limited number of springs and limited groundwater resources of the ~~Blackhawk and~~ Castlegate Sandstone and Blackhawk Formations in the permit and adjacent areas, subsidence or fracturing would affect the hydrologic balance in the area only if zones of increased vertical hydraulic conductivity were created which extended through the Price River Formation into the North ~~Horn and Flagstaff Formations.~~ Horn-Flagstaff and Colton Formations.

When subsidence occurs as a result of mining, there are four zones that occur above the mined out area. As shown in Figure 1, the zones are: a caved zone that occurs in the 6 to 10 times the thickness of the coal seam, a fractured zone which occurs 10 to 30 time the thickness of the coal seam, and deformation zone which occurs 30 to 60 time the thickness of the coal seam, and finally, a soil zone which occurs on the ground surface. Damage to surface and groundwater resources generally occur in the caved and fractured zones. Little or no damage occurs in the deformed zone. With only localized effects felt in the soil zone. As

discussed in Section 525.120, the strains for the rock in the proposed mine area, as a result of mining, should limit subsidence deformation to those areas where the overburden is less than 450 feet.

Where surface disruption or cracks appear, the general mechanism is extension of the soil mantle. Natural processes will heal these crack over time. Runoff and snowmelt will wash sediments into the crack and fill any voids created. As this process progresses, the crack disappear and the surface runoff and snowmelt return to normal courses. In the Wasatch Plateau and Book Cliffs area, the clays in the area are expansive and tend to seal these cracks very rapidly. Sidel, et.al. (1996) found that minor surface changes in the area of Burnout Creek recovered within two years.

Several lines of evidence suggest that mining-related subsidence and bedrock fracturing have not resulted in decreased stream flows or groundwater discharge in the vicinity of the nearby Horse Canyon Mine. Although considerable seasonal and climatic variability are noted in the hydrographs of springs in the permit and adjacent areas, data for both Horse Canyon Creek and springs which overlie the Horse Canyon Mine workings do not show discharge declines which may be attributed to either subsidence or bedrock fracturing (see Appendices 7-1 and 7-6).

Active groundwater systems in the Colton, Flagstaff-North Horn, and Price River Formations are separated from the Blackhawk Formation by the Castlegate Sandstone. As discussed in Section 724.100, this formation contains no springs and is not considered to be a major groundwater resource. Past mining in the Horse Canyon Mine has not increased the rate of spring discharge from the Price River Formation, indicating that groundwater is not being diverted into this formation. The absence of increased saturation in the Price River Formation ~~due to coal mining~~ indicates that vertical zones of artificially-increased hydraulic conductivity or secondary porosity do not extend into the Price River Formation and from thence into the overlying active groundwater systems of the North ~~Horn and Flagstaff~~Horn-Flagstaff Formations.

Data presented in Appendices 7-1 and 7-6 and summarized in Section 724.100 indicate that the low-permeability lower groundwater system, in the vicinity of mined coal seams, contains groundwater which is compartmentalized both vertically and horizontally. Coal mining locally dewaters isolated, overlying saturated rock layers in the Blackhawk Formation but does not appear to draw significant additional recharge from overlying or underlying zones.

Additionally, the springs which supply most of the local flow discharge from the Flagstaff-North Horn or Colton Formations. ~~This~~These formations or aquifer ~~is~~are perched from the underlying lower groundwater zone and the intervening formations contains swelling clays which tend to heal small fractures. Also, since the perched aquifer materials are isolated and lenticular, there is a greater probability that fractures in one area will not drain all the different perched aquifers because they are not interconnected.

The ~~strong~~very low permeability and vertical gradients in Blackhawk Formation rock layers underlying actively mined coal seams in the Horse Canyon Mine and the absence of significant discharge into the mine from these layers indicates that mining does not draw groundwater from the underling portions of the Blackhawk and Mancos Shale. Additionally, the distinctive solute composition of Mancos Shale groundwater has not been observed inside the Horse Canyon Mine indicating that the saturated zones in the Blackhawk and Mancos are separate.

From the above discussion, it appears that the Horse Canyon Mine has not decreased groundwater discharge in overlying or underlying groundwater systems. Hence, it is unlikely that coal mining will effect the discharges of any spring as a result of mining in the Lila Canyon permit and adjacent areas.

~~The closest perennial stream to the permit area is Range Creek. The drainage is located approximately 6 miles east of the proposed Lila Canyon permit area (see Plates 6-1 and 7-1B). Range Creek is in a broad, south-southeast oriented drainage that has been eroded into the Roan Cliffs. A western extension of the Roan Cliffs (Patmos Ridge) lies between Range Creek and the Book Cliffs. The proposed Lila Canyon operation is on the west side of Patmos Ridge. The Colton Formation is exposed at the surface from Patmos Ridge east to the main body of the Roan Cliffs, and between these two escarpments Range Creek has eroded into but not through the Colton Formation. Approximately eleven miles southeast of the permit area, just upstream of Turtle Canyon, Range Creek has eroded through the Colton, Flagstaff-North Horn Formations, but it reaches the Green River without having eroded through the Upper Price River Formation. The nearest Blackhawk outcrop is 10 miles south, along the Price River (see Plate 7-1B).~~

~~The maximum extent of subsidence is within the permit boundary making it improbable that it could effect Range Creek or any contributing watershed to Range Creek.~~

~~Due to the large distance from the~~As discussed in Section 724.200, as a result of the five to six miles horizontal distance from proposed permit area~~, and the 1,000 feet or more of low permeability~~ to Range Creek (see Plate 7-1a) and the isolating effects of the over 1,000 feet of low-permeability, isolating strata between the coal seam ~~containing Blackhawk formation, and the Colton Formation where Range Creek lies~~and the creek elevation (see Plate 7-1B and Table above) and the limited potential and impact of subsidence damage to the recharge area, it is not likely that the Lila Canyon Mine will adversely effect Range Creek. Due to these conditions, no baseline or other sampling has been gathered nor is anticipated on Range Creek. For the above reasons Lila Canyon extension does not present any Probable Hydrologic Consequences to Range Creek.

The contamination, diminution, or interruption of any water resources would not likely occur within the mine permit or adjacent areas. Since surface water flows only a limited part of year and will be provided protection by use of sediment controls, the major usable water resources that could potentially be effected in the area would be springs that are currently in use by wildlife and livestock. Most of these springs are located upstream of the permit area or are in areas where subsidence resulting from post-1977 mining is not documented or expected. To date no known depletion of flow and quality of surveyed springs in the Horse Canyon permit area exists, and none are expected in the Lila Canyon area, based on available data from the Horse Canyon Mine. Although pre-mining data is not available for Horse Canyon, depletion problems from subsidence are not known to have been filed and are not indicated by sampling results in Appendices 7-1 and 7-2. Therefore, it is unlikely an alternative water supply will be needed, although they have been identified in Section R645-301-727.

L-16-G and L-17-G are seeps being monitored in Stinky Spring Canyon. These two seeps appear to be an important source of water for Bighorn sheep specifically in the early spring.

Flows from these springs are historically less than 0.5 gpm and show a general seasonal decrease throughout the season. These sites were not identified during baseline surveys and are believed to exist intermittently and are not always evident. The low flow rates and intermittent nature of these springs suggest that they are local in nature.

These springs are located within the Central Graben, which is a block that has been downdropped between 145 and 250 feet relative to the adjacent bedrock. They occur near the contact between the Mancos Shale and the overlying

Blackhawk Formation. The fractured nature of the bedrock along the edges of the Central Graben, as a result of the faulting, likely ~~limit~~are the limits of the areal extent of the recharge or source area to the springs. The ~~fractures~~low-permeability of the surrounding Mancos Shale likely isolate the graben block from groundwater in the surrounding bedrock. Thus, the recharge to the springs is likely limited to the area of the consolidated graben block.

As indicated previously, there is no evidence that mining in the Horse Canyon Mine had any influence on the underlying formations. Therefore it is likely that the Lila Canyon Mine would have similar affects. Due to the springs location and lateral separation from the mine, outside the permit area, outside the limit of subsidence, being separated from the mine block by faulting within the Central Graben, and being 500 to 600 feet below the coal seam, there is no potential for Lila Canyon Mine to negatively impact this spring or recharge sources.

Potential for Increased Stream Flows

If sufficient water is encountered in the Lila Canyon Mine workings to require discharge of that water to the surface, the flow of the Right fork of Lila Canyon will be increased. This flow would be ultimately to the Price and Green Rivers. The impact of such discharge by the development of the Lila canyon extension would be quite limited.

The majority of water discharged from the mine would be water held in storage in the saturated zones above the coal seam. It is unlikely that any water below the coal seam would be affected or drained by the mine workings.

It is difficult to estimate the maximum potential discharge from the mine, however, DOGM has determined that a maximum discharge rate of -500 gpm should be used for design purposes. Based on this discharge, during the life of the operation the water extracted would be 22,600 ac-ft of water. This would be approximately 800 ac-ft per year. Discharge for the Price River at Woodside has a mean annual flow of 88,000 ac-ft/yr. Discharge for the Green River at Green River has a mean annual flow of 4,484,000 ac-ft/yr. Therefore the average discharge at 500 gpm from the mine would be 0.9% of the Price River flow volume and 0.02% of the Green River flow volume. Given the standard fluctuations in the stream flows, this small flow addition would have little effect on the streams.

It should be emphasized that ~~this~~the 500 gpm estimate is considered to be conservatively high. The adjacent Horse Canyon Mine had a maximum discharge of 90 gpm. ~~Also, the amount of water which will be discharged from~~

~~the mine will equal the inflow minus that which is consumed in the mining operation (dust suppression and evaporation). Based on experience at~~While the Soldier Canyon Mine farther to the north in the Book Cliffs, the rate of water ~~to be consumed in the Lila Canyon Mine is~~discharged was estimated to be 15,000,000 gallons per year (approximately 30 gpm).

If water does need to be discharged, it will be sampled and discharged in accordance with the approved UPDES Discharge Permit. If the quality parameters of the mine water do not meet UPDES standards, the water will be treated prior to discharge. Treatment may include holding/settling in the mine, pumping to retaining or sediment ponds, chemical treatment or other approved means to prevent non-compliant discharge.

Based on the results of the evaluation presented in Appendix 7-9, the discharge of this amount of water from the mine is not expected to have a significant impact on the downstream resources. Based on the results from Appendix 7-9, the mine discharge flow will be lost due to transmission losses and percolation within 3.4 miles from the discharge point. Therefore, the discharge will not reach the Price, Green, or Colorado Rivers. The discharge of the water will have a positive impact on the vegetation and wildlife of the area by providing a fairly constant supply of water along this limited reach of the channel.

Based on comparison of upstream and downstream data gathered on Horse Canyon Creek which incorporates the analysis from past mine discharges to the channel, water quality will not be drastically affected in the intermittent drainage in the event of discharge of mine water into the channel. The expected impacts to the channels of the Lila Canyon area are very likely to be similar to those at Horse Canyon due to the close proximity, and similarities of mining and drainage conditions.

Potential Hydrocarbon Contamination. Diesel fuel, oils, greases, and other hydrocarbon products will be stored and used at the site for a variety of purposes. Diesel and oil stored in above-ground tanks at the mine surface facilities may spill onto the ground during filling of the storage tank, leakage of the storage tank, or filling of vehicle tanks. Similarly, greases and other oils may be spilled during use in surface and underground operations.

The probable future extent of the contamination caused by diesel and oil spillage is expected to be small for three reasons. First, because the tanks will be located above ground, leakage from the tanks will be readily detected and repaired. Second, spillage during filling of the storage or vehicle tanks will be

Evaporation from Ventilation - evaporation rates have been estimated at 2.5 gallons per million cubic feet of ventilated air. This number is dependent on temperature and relative humidity. It is estimated that with the projected usage of 473,040 million cf/yr of air and a loss of 2.5 gallons per million c.f. Therefore, the water consumption for evaporation would be approximately 1,183,600 gallons per year or 3.63 acre feet of water.

Coal Preparation - The operator does not anticipate any coal preparation that would result in water usage.

Sediment Pond Evaporation - The sediment pond is used to hold rain and snow runoff that flows over disturbed areas of the coal mining and reclamation operations until accumulated sediment has dropped out. At that point the water is discharged into a receiving stream. The holding time for this water is planned to be short, therefore, no significant evaporation loss is expected. This would not be considered a consumption mechanism.

Subsidence on Springs - As shown in Appendix 7-8 and discussed in Section 525.120 of the application, the majority of springs cannot be adversely effected by subsidence because of their physical location (off the permit area and outside the area of potential subsidence) or for those within the permit area because of the amount of cover, 1000 feet or more, which as discussed in Section 525.120 are not expected to experience any significant deformation for covers over 450 feet. In the adjacent Horse Canyon mine, which was mined for over 45 years, there have been no reported effects on springs due to subsidence.

Alluvial Aquifer Abstractions into Mines - There will be no water infiltrations from alluvial systems into the mine.

Postmining Inflow to Workings - Postmining all openings will be sealed and backfilled. The proposed mine openings for Lila Canyon are at an elevation where no surface inflow is possible. This coupled with the sealing plan for the portals makes postmining inflows virtually impossible.

Coal Moisture Loss - It has been estimated that coal moisture loss or usage to be estimated at 4.5 gallons per ton of coal mined (see Table 2). Using the estimated usage for mining with an estimated production of 4.5 Million tons per year a usage of 20,250,000 gal per year or 62.12 acre feet can be estimated. It should be noted that due to the extremely low hydraulic conductivity rates measured in the general area, that groundwater movement is very slow. Using the average hydraulic conductivity measured for Blackhawk Sandstone (3.0×10^{-6} cm/sec) (see Table 1) which is equal to .1 inch per day. Therefore, water

References

Croley, Thomas W. III, 1977. Hydrologic and hydraulic computations on small programmable calculators, Iowa Institute of Hydraulic Research, Univ. of Iowa, Iowa City, Iowa.

Goldman, et.al., 1986. Erosion and Sediment Control Handbook, McGraw-Hill Book Company, N.Y.

Intermittent Power Agency, Horse Canyon Mining and Reclamation Plan, Carbon County, Utah, ACT/007/013.

JBR Consultants Group, 1986. Field notes and maps for the spring and seep survey of the Horse Canyon area, Fall, 1985.

Kaiser Coal Corporation, 1985. Mining and Reclamation Plan for the South Lease. Submitted to DOGM.

Kaiser Coal Corporation, 1986. Mining and Reclamation Plan for the Sunnyside Mines. Submitted to DOGM.

Lines, G. C., 1985. The groundwater system and possible effects of underground coal mining in the Trail Mountain area, central Utah. U.S. Geological Survey Water-Supply Paper 2259, 32 p.

Lines, G. C. and others, 1984. Hydrology of Area 56, Northern Great Plains and Rocky Mountain coal provinces, Utah: U.S. Geological Survey Water-Resources Investigations Open-File Report 83-38, 69 p.

Lines, G. C. and Plantz, G. G., 1981. Hydrologic monitoring in the coal fields of central Utah, August 1978- September 1979: U.S. Geological Water-Resources Investigations Open-File Report 81-138, 56 p.

Sidle, R.C., I. Kamil, A. Sharma, and S. Yamashita. 1996. Stream Response to Subsidence from Underground Coal Mining in Central Utah. U.S. Forest Service. Manti-La Sal National Forest/ Rocky Mountain Experiment Station.

United States Department of Agriculture Soil conservation Service. National Engineering Handbook Section 4 - Hydrology, 1985.

WordPerfect Document Compare Summary

Original document: C:\Lila\APPROVED LILA MRP\Word Perfect\WPChapter 7\Appendix 7-7 Rev3.wpd
Revised document: @PFDesktop\:MyComputer\C:\Lila\APPROVED LILA MRP\Nov_23_Supp_Inf\Appendix 7-7 Dec 05.wpd
Deletions are shown with the following attributes and color:
~~Strikeout~~, Blue RGB(0,0,255).
Deleted text is shown as full text.
Insertions are shown with the following attributes and color:
Double Underline, Redline, Red RGB(255,0,0).

The document was marked with 32 Deletions, 38 Insertions, 0 Moves.

channel varies in width from 50 to several hundred feet wide. The adjacent slopes are of moderate to vertical gradient. The stream has cut an irregular channel into the underlying rock formation to a depth of 50 feet in places. The gradient is moderate (3.3%), with mostly gravel, sand and silt filling the channel in the upper reaches and large boulders predominate in the vicinity of the Price River.

The 20,100 foot long channel flows from a pinyon-juniper and sagebrush grass associations transgressing into a mature sagebrush habitat in the lower sections, with no riparian vegetation present.

Known springs and seeps occur along the east side tributaries. (See Appendix 7-68 for Spring Descriptions) The tributaries are of moderate to steep gradients in narrow canyons, with mostly gravel to occasional rocky beds, with silt and sand where the gradient is reduced. The intermittent tributaries have headwaters in the Colton Formation outcrop in the sub-Roan cliffs, passing over the lower moderate slope-forming Flagstaff Limestone and North Horn Formations. The present known springs and seeps are associated with alluvium, sandstone and thin limestone beds of these geologic formations of Upper Cretaceous to Eocene age. (Plate 6-1) Observations of intermittent water flow associated with the springs indicate flows of 5 gallons per minute or less (Appendix 7-2). The intermittent flow of water from the springs probably never reaches the main channel of Little Park Wash even in years of high precipitation.

Seasonal flash floods can be expected and tend to obliterate any human activity which has occurred in the washes. The sediment laden water from the upper reaches of Little Park Wash are probably absorbed by the stream alluvium prior to reaching the Price River except in the most extreme situation.

No water shares are associated with the Main Little Park Wash anywhere within the permit area, or downstream, all the way to the confluence with the Price River.

Precipitation occurs mainly as summer showers and winter snow and ranges averages approximately 14.74 inches per year (Table 7-1A).

Two water monitoring stations are located in Little Park Wash (less tributaries). L-13-S is located at the road crossing of Lila Park Wash. Data collected at L-13-S, since December of 2000, has not reported any flow (Appendix 7-1). Indications of flow as a direct result of precipitation events

extreme situation.

Reach #4 has been broken into three distinct sub-reaches, 4A, 4B, and 4C, each with its own characteristics. Cottonwood Spring Wash by definition and classification by the Permittee is ephemeral.

Reach #4A

Reach #4A (Table 2) has been identified as flowing from the eastern edge of the permit area to water monitoring location L-7-G. Reach #4A is shown on Figure 1.

Reach #4A starts at an elevation of 7,500 feet near the eastern edge of the permit area and drops to an elevation of 7,350 feet near L-7-G. The average grade for the 2,400 foot reach is 6.6%. The reach runs mostly through spruce-fir and contains no riparian vegetarian. The channel bed is mostly sand and gravel.

No water monitoring locations or water shares are associated with this reach. Fish and macro invertebrates are non existing within Reach #4A. This reach by definition and classification by the Permittee is ephemeral.

Reach #4A can not be impacted by mining do to the coal seam depth being over 2,000 feet.

Photographs 48 and 49 depict the conditions found in Reach #4A.

Reach #4B

Reach #4B (Table 2) is described as the area immediately adjacent to and including L-7-G. Reach #4B is shown on Figure 1. Appendix 7-1 contains flow data and quality information, and Appendix 7-68 contains a description for L-7-G. The intermittent flow of water from the springs probably never reaches the main channel of Little Park Wash even in years of high precipitation.

Reach #4B starts at an elevation of 7,350 feet and has a minor slope over the 450 feet to where the next reach begins. The reach runs mostly through Douglas Fir with some pinyon juniper. The reach does not contain any riparian vegetarian. The channel bed is mostly sand and gravel. Fish and macro invertebrates are non existing within this reach.

Because IPA#1 Wash drains more than one square mile it can be considered intermittent by definition.

The channel cuts through the Flagstaff/North Horn, and the Upper Price River formations, from an elevation of 9,000 feet to an elevation of 7,000 feet. The channel varies in width from 10 to nearly 100 feet wide. The adjacent slopes are of moderate to vertical gradient. The channel ranges from 1,400 to over 3,000 feet above the coal seam. At this depth there is no chance that underground mining can adversely effect the channel.

The gradient is extremely steep in the upper reaches and moderate in the lower reaches, with mostly gravel, sand and silt filling the channel.

Two monitoring locations, L-8-G and Piezometer IPA#1, can be found in this reach. Appendix 7-1 contains flow data, quality information, and water depth. Appendix 7-68 contains a description of both monitoring points.

Reach #5 has been broken into three distinct sub-reaches, 5A, 5B, and 5C, each with its own characteristics. IPA #1 Wash, Reach #5, by definition and classification by the Permittee is ephemeral.

Reach #5A

Reach #5A (Table 2) is described as IPA#1 Wash above L-8-G. Reach #5A is shown on Figure 1.

Reach #5A starts at an elevation of 7,450 feet and drops to an elevations of 7,300 feet and has a minor slope (7.8%) over its 1729 foot length. The reach runs mostly through Douglas Fir in the upper sections and transgresses to pinyon juniper. The reach does not contain any riparian vegetarian. The channel bed is mostly sand and gravel. Fish and macro invertebrates are non existing within this reach.

No water shares are associated with #5A. This reach is considered ephemeral. Reach #5A can not be impacted by mining do to the coal seam depth being over 3,000 feet and location off the permit area.

Photograph 52, found in Attachment #1, depicts the conditions found in Reach #5A.

Reach #5B

Reach #5B (Table 2) is described as IPA#1 Wash at L-8-G. Reach #5B is shown on Figure 1.

Reach #5B starts at an elevation of 7,300 feet and drops to an elevations of 7,270 feet and has a minor slope (10.4%) over its 300 foot length. L-8-G is located in Douglas Fir. It flows off and on for approximately 300 feet where it either evaporates or is absorbed into the alluvium The intermittent flow of water from the spring probably never reaches the main channel of Little Park Wash even in years of high precipitation. The reach does not contain any riparian vegetarian. The channel bed is mostly sand and gravel. Fish and macro invertebrates are non existing within this reach.

L-8-G has water share 91-2638 owned by the State, and designated for stock watering, associated with it. This 300 foot reach, #5B, is considered intermittent/perennial. Appendix 7-1 contains flow data and quality information. Appendix 7-68 contains a description of the water monitoring site.

Reach #5B can not be impacted by mining do to the coal seam depth being over 2,500 feet and location off the permit area.

Photographs 53 and 53A found in Attachment #1, depicts the conditions found in Reach #5B.

Reach #5C

Reach #5C (Table 2) is described as IPA#1 Wash from L-8-G to the confluence with Little Park Wash. Reach #5C is shown on Figure 1. Two hundred feet below L-8-G is where the channel changes from intermittent to ephemeral. From this point downstream the water table, with respect to the channel surface, could not be located using an 18" spade. The intermittent flow of water from the springs never reaches the main channel of Little Park Wash even in years of high precipitation.

Reach #5C starts at an elevation of 7,270 feet and drops to an elevations of 6,970 feet and has a minor slope (4.5%) over its 6,700 foot length. The reach does not contain any riparian vegetarian. The channel bed is mostly sand and gravel. Vegetation transgresses pinion-juniper, to a sagebrush grass type vegetation at the confluence with Little Park Wash.

The Permittee has classified this drainage or stream reach as "Ephemeral" because of its vegetation types, tendency to flow only in response to storm events, and location above the local water table.

The gradient is extremely steep in the upper reaches and moderate in the lower reaches, with mostly gravel, sand and silt filling the channel. Seasonal flash floods can be expected and tend to obliterate any human activity which has occurred in the washes. The sediment laden water from Pine Spring Wash reaches Little Park Wash only in the most extreme situation.

Three monitoring locations, L-9-G, IPA #3, and L-13-S, can be found within this reach. Appendix 7-1 contains flow data, quality information, and water depths for the monitoring locations. Appendix 7-68 contains a description of the monitoring points.

Reach #6 has been broken into three distinct sub-reaches, 6A, 6B, and 6C, each with its own characteristics. Pine Spring Wash, Reach #6, by definition and classification by the Permittee is ephemeral.

Reach #6A

Reach #6A (Table 2) is described as Pine Spring Wash above L-9-G. Reach #6A is shown on Figure 1.

Reach #6A starts at an elevation of 7,750 feet and drops to an elevations of 7,190 feet and has a slope of (14.8%) over its 3,840 foot length. The reach runs mostly through Douglas Fir in the upper sections and transgresses to pinyon juniper in the lower section. The reach does not contain any riparian vegetarian. The channel bed is mostly sand and gravel. Fish and macro invertebrates are non existing within this reach.

No water shares are associated with #6A. This reach is considered ephemeral. Reach #6A can not be impacted by mining do to the coal seam depth being over 2,000 feet.

Reach #6B

Reach #6B (Table 2) is described as Pine Spring at L-9-G. Reach

#6B is shown on Figure 1.

Reach #6B starts at an elevation of 7,190 feet and drops to an elevations of 7,170 feet and has a minor slope (6.7%) over its 300 foot length. L-9-G is located in Douglas Fir. It flows off and on for approximately 300 feet where it either evaporates or is absorbed into the alluvium The intermittent flow of water from the spring probably never reaches the main channel of Little Park Wash even in years of high precipitation. The reach does not contain any riparian vegetarian. The channel bed is mostly sand and gravel. Fish and macro invertebrates are non existing within this reach.

L-9-G has water share 91-2638 owned by the BLM, and designated for stock watering, associated with it. This 300 foot reach, #6B, is considered intermittent/perennial. Appendix 7-1 contains flow data and quality information. Appendix 7-68 contains a description of the water monitoring site.

Reach #6B can not be impacted by mining do to the coal seam depth being over 2,000 feet and location off the permit area.

Photographs 11 and 12 found in Attachment #1, depicts the conditions found in Reach #6B.

Reach #6C

Reach #6C (Table 2) is described as Pine Spring Wash from L-9-G to the confluence with Little Park Wash. Reach #6C is shown on Figure 1.

Four hundred feet below L-9-G is where the channel changes from intermittent to ephemeral. From this point downstream the water table, with respect to the channel surface, could not be located using an 18" spade. The intermittent flow of water from the springs never reaches the main channel of Little Park Wash even in years of high precipitation.

Reach #6C starts at an elevation of 7,170 feet and drops to an elevations of 6,840 feet and has a minor slope (3.7%) over its 8,975 foot length. The reach does not contain any riparian vegetarian. The channel bed is mostly sand and gravel. Fish and macro invertebrates are non existing within this reach. Vegetation transgresses pinion-juniper, to a sagebrush grass type vegetation at the confluence with Little Park Wash.

Seasonal flash floods can be expected and tend to obliterate any human activity which has occurred in the washes. The sediment laden water from Pine Spring Wash reaches Little Park Wash only in the most extreme situation.

IPA #3, and L-13-S, can be found within this reach. Appendix 7-1 contains flow data, quality information, and water depths for the monitoring locations. Appendix 7-68 contains a description of the monitoring points

No water shares are associated with #5C. And the Permittee has classified this drainage or stream reach as "Ephemeral" because of its vegetation types, tendency to flow only in response to storm events, and location above the local water table.

Reach #6C can not be impacted by mining do to the coal seam depth being over 1,000 feet.

(Reach #7) No Name Wash

No Name Wash is an east-west tributary to the main Little Park Wash. Portions of this stream reach can be considered intermittent by definition. No Name Wash is shown on Figure 1.

No Name Wash drains approximately 1.41 square miles. Of the total drainage .71 square miles of drainage is within the permit area (Tables 1 and 2).

The channel cuts through the Flagstaff/North Horn, and the Upper Price River formations, from an elevation of 7,120 feet to an elevation of 6,690 feet. The channel varies in width from 10 to several hundred feet wide. The adjacent slopes are of moderate to vertical gradient. The channel ranges from 1,100 to over 2,500 feet above the coal seam. At this depth there is no chance that underground mining can adversely effect the channel.

The gradient is extremely steep in the upper reaches and moderate in the lower reaches, with mostly gravel, sand and silt filling the channel.

Two monitoring locations, L-12-G and L-14-S can be found in this reach. Appendix 7-1 contains flow data, quality information, and water depth. Appendix 7-68 contains a description of the monitoring point. One

wash, Marsh Flat Wash, enters the Price River (elevation 4,700 feet) in Section 6, T18S, R14E, and drains approximately 31 square miles.

The major surface facilities are located in the upper portion of The Cove drainage area. The washes have cut Holocene gravels and Pleistocene pediment deposits overlying the eastern dipping Mancos Shale. The pediments are poorly to firmly cemented with caliche near the top. Sediments of silt, sand, and large boulders can be as much as 50 feet thick. The meandering V-Shaped washes incised into the Mancos Shale are narrow with a thin veneer of sand and silt. The wash slopes are moderate to steep near the cliff escarpment. The stock ponds are replenished by local rainfall. Water flowing into the pediments near the cliff escarpment probably seeps out at lower elevations above the dry washes and, therefore, is not stored.

(Reach #9) Stinky Spring Wash

Stinky Spring Wash is a north-south tributary to Grassy. The drainage can be considered intermittent by definition. Because it drains slightly more than one square mile. For the purpose of this report Stinky Spring Wash is broken down into four reaches. Reach #9A is the area above the escarpment. Reach #9B is from the escarpment to Stinky Springs. Reach #9C is Stinky Springs and Reach #9D is from Stinky Springs to the mouth of the canyon. Information on Stinky Springs Wash can be found on Figure 1.

Stinky Spring Wash drains approximately 1.08 square miles all of which is within the permit area (Table 1 and 2). Vegetation transgresses from Pinyon Juniper in the very most upper reaches, a sagebrush grass type vegetation near the escarpment to a Salt Desert Shale from the bottom of the escapement to the confluence of Grassy Wash.

Two monitoring locations, L-16-G and L-17-G, can be found within this reach. Appendix 7-1 contains flow data, quality information, and water depths for the monitoring locations. Appendix 7-68 contains a description of the monitoring points. The reach does not contain any riparian vegetarian. Fish and macro invertebrates are non existing within this reach.

Very little signs of wildlife use of this channel exists above the escarpment. However, on the escarpment and at the seep locations,

reach runs mostly through pinyon-juniper and sagebrush grass associations. The reach does not contain any riparian vegetarian. The gradient is steep in the upper reaches and moderate in the lower reaches, with mostly gravel, sand and silt filling the channel. Fish and macro invertebrates are non existing within this reach. No water shares are associated with this reach.

Two monitoring locations, L-16-G and L-17-G can be found in this reach in an area of the Central and Cliff's Grabens. The seeps are located at the contact of Blackhawk and Mancos Shale formations. Appendix 7-1 contains flow data and quality information, and Appendix 7-68 contains a description for L-16-G and L-17-G. The intermittent flow of water from the springs never reach the main channel of Grassy Wash even in years of high precipitation. No water shares are associated with #9A.

The chance of subsidence negatively effecting this ephemeral channel is minimal since the channel is approximately 600 feet below the coal seam. Stinky Springs are also located off the permit area. The physical location of the coal seam in respect to the springs results in a minimal chance of subsidence negatively effecting the channel.

Seasonal flash floods can be expected and tend to obliterate any human activity which has occurred in the washes. The sediment laden water from Stinky Springs Wash reaches Marsh Flat Wash only in the most extreme situation.

The Permittee has classified 75 feet of this stream reach as "Intermittent/perennial" .

Photograph 42, 43, 50, 52, and 50A, found in Attachment #1, depicts the conditions found in Reach #9C.

Reach #9D

Reach #9D (Table 2) is described as the channel below Stinky Springs to the mouth of the canyon. Reach #9D is shown on Figure 1.

Reach #9D starts at an elevation of 5,760 feet and drops to an elevations of 5,600 feet and has a slope (8.9%) over its 1,787 foot length. The reach runs mostly through grasses and salt desert shrub communities.

The reach does not contain any riparian vegetarian. The channel is filled with mostly gravel, sand and silt. Fish and macro invertebrates are non existing within this reach. No water shares are associated with this reach.

L-18-S can be found within this reach. Appendix 7-1 contains flow data. Appendix 7-8 contains a description of the monitoring point.

The chance of subsidence negatively effecting this ephemeral channel is minimal since the channel is approximately 600 feet below the coal seam and off the permit area. The physical location of the coal seam in respect to the channel results in a minimal chance of subsidence negatively effecting the channel.

Seasonal flash floods can be expected and tend to obliterate any human activity which has occurred in the washes. The sediment laden water from Stinky Springs Wash reaches Marsh Flat Wash only in the most extreme situation.

The Permittee has classified this stream reach as "Ephemeral" because of its vegetation types, tendency to flow only in response to storm events, and location above the local water table.

Photograph 72, 75, and 76, found in Attachment #1, depicts the conditions found in Reach #9D.

Lila Canyon

Lila Canyon is an east-west tributary to Grassy Wash within the Cove drainage. Portions of this stream above Lila Canyon can be considered intermittent by definition.

Lila Canyon drains approximately 1.71 square miles. Of the total drainage .57 square miles of drainage is within the permit area (Table 1).

The channel starts in Colton formation then cuts the Upper Price River formation then through the Castle Gate Sandstone and then finally drops of the face of the Book Cliffs into the Black Hawk formation and then through the Mancos Shale where it converges with Grassy Wash. The channel elevation ranges from an elevation of 8,500 feet to an elevation of 5,400 feet. The channel varies in width from 10 to several hundred feet

wide. The adjacent slopes are of moderate to vertical gradient. The channel has been previously undermined by the Horse Canyon mine with out any known negative impacts.

The gradient is extremely steep in the upper reaches and moderate in the lower reaches, with mostly gravel, sand and silt filling the channel.

Three monitoring locations, L-1-S, L-6-G, and L-11-G can be found in this reach. Appendix 7-1 contains flow data, quality information, and water depth. Appendix 7-68 contains a description of the monitoring points. Fifty feet below L-11-G is where the channel changes from intermittent to ephemeral. From this point downstream there are several wet spots but no flow. The water table, with respect to the channel surface, could not be located using an 18" spade in most places. The intermittent flow of water from the springs reaches the main channel of Grassy Wash only in years of high precipitation.

Vegetation transgresses from Spruce Fir in the very most upper reaches to Pinyon Juniper and finally to a sagebrush grass type vegetation near the escarpment to a Salt Desert Shale from the bottom of the escapement to the confluence of Grassy Wash.

Seasonal flash floods can be expected and tend to obliterate any human activity which has occurred in the washes. The sediment laden water from No Name Wash reaches Little Park Wash only in the most extreme situation.

The Permittee has classified this drainage or stream reach as "Ephemeral" because of its vegetation types, tendency to flow only in response to storm events, and location above the local water table.

This channel has been previously extensively under mined by the Horse Canyon Mine without any negative effects. No additional undermining of Lila Canyon is anticipated with the new Lila Canyon Permit. Since minimal additional undermining of Lila Canyon is anticipated, the Lila Canyon Mine cannot have a negative effect of Lila Canyon due to subsidence.

Right Fork of Lila Canyon

The Right Fork of Lila Canyon is an east-west tributary to Grassy Wash within the Cove drainage. All portions are considered ephemeral by

definition. The Right Fork of Lila Canyon drains approximately .4 square miles. Of drainage all within the permit area (Table 1).

The channel starts in the Castle Gate sandstone then drops over the Bookcliffs escarpment and then drains into Grassy Wash. The gradient is nearly vertical in the upper reaches and extremely steep in the lower reaches, with mostly gravel, sand and silt filling the channel.

Two monitoring locations, L-2-S, and L-3-S can be found in this reach. Appendix 7-1 contains flow data, quality information, and water depth. Appendix 7-68 contains a description of the monitoring points. The water table, with respect to the channel surface, could not be located using an 18" spade.

Vegetation transgresses from pinion-juniper in the upper reaches to a sagebrush grass type vegetation at the confluence with Grassy Wash.

Seasonal flash floods can be expected and tend to obliterate any human activity which has occurred in the washes. The sediment laden water from the Right Fork of LIla reaches Grassy Wash only in the most extreme situation.

Fish and macro invertebrates are non existing within this reach. No water shares are associated with this reach and no riparian habitat can be found in the Right Fork of Lila.

Response to the 11/23/05 and 12/30/05 requests for additional information.

1) UEI must show flow modeling of ephemeral streams. The modeling must demonstrate different size events (such as 2 - year, 6 - hour event, 10 - year, 6 - hour event, and 25 - year, 6 - hour event.
See new Appendix 7-10.

2) UEI must address limitations with sampling ephemeral streams for establishing baseline water quality and flow data, including such factors as access, holding times, and applicability to the Lila Canyon Project. UEI must also discuss why they have not used remote or automatic sampling methods (crest-staff gauges, single stage samplers, ISCO instruments, etc.)
See Section 724-200 page 29 of the text in chapter 7.

3) UEI must remove the phrase "ephemeral acting" from the Mining and Reclamation Plan (MRP) and replace with "intermittent by rule with ephemeral flow."
Text throughout Chapter 7 has been revised replacing "ephemeral acting" with "intermittent by rule with ephemeral flow".

4) UEI must redo the map of the potentiometric surface on Plate 7-1 and Plate 7-2a:

a) Use a larger contour interval that more realistically reflects the accuracy of the data over the area mapped (such as 25 - 50- or 100foot contours).
Plates 7-1 and 7-2a have been revised.

b) Consider using the water level at the Horse Canyon Mine sump as a fourth data point to improve accuracy.
Plates 7-1 and 7-2a have been revised

c) Consider the area that can realistically be covered by extrapolating the data.
Plates 7-1 and 7-2a have been revised

5) UEI must include additional information about renewable resources:

a) Section 525.110 of the MRP must list all maps that show renewable resources such as grazing, wildlife habitat, and areas of aquifer recharge. The maps must be at a scale of 1:12,000.
Grazing allotments are shown on Plate 4-2, wildlife habitat is shown on Plate 3-1, spring recharge areas are shown on Plate 7-1A.

b) Section 525.120 of the MRP must give a detailed narrative of the types of renewable resources in and around the permit area and what potential impact subsidence could have. UEI must also address the possibility of timbering in the area.
See Sections 525.120 and 525.130.

c) UEI must also state that since renewable resources exist, a subsidence control plan is needed.
See Sections 525.120 and 525.130

6) UEI must address the 100-foot stream buffer zone issues

a) Show the 100-foot stream buffer zones in Lila Canyon Wash and the Right Fork of Lila Canyon Wash on all appropriate maps.
Plate 5-2 shows where stream buffer zone signs will be posted near Lila Canyon Wash. Lila Canyon Wash is intermittent by rule with Ephemeral Flow.

b) Explain why there will be no impacts to Lila Canyon or the Right Fork of Lila Canyon Wash if mining and reclamation activities occur within the 100-foot buffer zone.
Plate 5-2 shows where stream buffer zone signs will be posted near Lila Canyon Wash. Lila Canyon Wash is intermittent by rule with Ephemeral Flow. The Right Fork of Lila Canyon is Ephemeral and stream buffer zones do not apply

c) Explain why no buffer zones are needed on any of the other drainages on and adjacent to the permit area other than the Lila Canyon Wash and the Right Fork of Lila Canyon Wash.
See Section 731.600

7) UEI must provide additional information on the Stinky Springs:

a) Show the springs on Plate 7-1 and other maps.
Stinky Springs have been added to Plates 7-1A and 7-4.

b) Describe if the springs are related to a fault.
See Section 704-100 Pages 18-19.

c) Describe if the springs are in a saturated zone of if they are part of a regional aquifer.
See Pages 18-19 of Chapter 7 Text.

d) UEI must define the aquifers in and around the permit area:
See Section 724-100 of Chapter 7 Text.

8) Show that there is or is not a regional aquifer in the area.

a) Show the relationship of faults to ground water resources.
See Page 20 of Chapter 7.

b) UEI must discuss the possibility of mining - related impacts to Range Creek, Price River Basin and Green River.
See PHC and pages 27, 28 of the Text in chapter 7.

9) UEI must explain the relationship between overburden thickness and subsidence impacts.

a) UEI must not rely on blanket statements about the overburden thickness being sufficient to protect resources.
See section 525.120.

b) UEI must cite studies that show that streams can be subsided with no significant impacts. (for example, Burnout Canyon Study)
See section 525.120.

c) UEI must clearly describe the mitigation measures that will be employed if fractures or if any other subsidence-related features impact the lands on or adjacent to the permit area.
See section 525.120.

10) UEI must show the extent of spring and seep surveys performed by JBR and Earthfax on maps. The Earthfax report must be included in the MRP or made public.
See Plate 7-1A. Only summary sheet remain of the Earhfax report and are included in the MRP.

11) UEI must include and describe the Stinky Spring Wash surface water monitoring site on Plate 7-1 and other applicable maps as well as in Appendix 7-7.
L-18-S has been added to Plates 7-1A, 7-4 and to Fig1 of Appendix7-7, Appendix 7-1 Appendix 7-8 and to the Text in Chapter 7.

12) UEI must correct the water consumption calculations to reflect 4.5 million tons not 4 million tons in Table 2 of Appendix 7-3. UEI must clarify the difference between the estimated 15 million gallons of consumption cited in Appendix 7-3 and the estimate of consumption cited in Table 2 of Appendix 7-3.
Appendix 7-3 (PHC) has been revised reflecting 4.5 million tons being produced. The 15 million gallons is discussed in the PHC.

13) UEI must define and explain the groundwater recharge source.
See Page 19 of Chapter 7.

14) UEI must be more specific about their sources for potable and process water.
See page 27 Chapter 5.

15) UEI must update the wildlife habitat boundaries and ranking to include the pronghorn on Plate 3-1 (Confidential).
Wildlife habitat boundaries and ranking are current within the permit area.

16) UEI must explain the proposed construction techniques for the refuse pile:

a) Define "end dumping".
See Appendix 5-7.

b) Explain why "end dumping" will not be used.
See Appendix 5-7.

17) UEI must show all future expansion project proposals that are mentioned in the MRP on the affected area maps (R645-301-521.141), such as:

a) Rail spur.
See new Plate 4-1B.

b) Coal load out.
See new Plate 4-1B.

c) Conveyor belts.
See new Plate 4-1B.

18) UEI must update the surface ownership information and maps to show the areas that were recently transferred to CEU.
Various plates and Text in Chapters 1 and 4 has been revised to reflect the new ownership for CEU as well as Bronco Coal Company.

19) UEI must state in Section 420 of the MRP, Air Quality, that the current air quality permit is for 1.5 million tons of coal per year. UEI should commit that they will obtain a new air quality permit to accommodate future increases in production.
Page 15 of Chapter 4 has been revised.

20) UEI must include analytical data about the Horse Canyon Waste Rock Site and include the pertinent information in the MRP.
Additional information has been added to Apppendix 6-2 which includes additional acid-toxic information specific to the Lila Canyon portals.

21) In a cover letter, UEI should explain and redo SUWA's Exhibit 1 that implies there are gaps in the data.
This was submitted with a previous cover letter

Raptor & Archeological

1. RAPTORS: Include the 2005 raptor survey results (Remember to submit this document as confidential. Mark the document/map "Confidential". Separate the document from the rest of the submittal in a separate folder marked "Confidential". Locate the document in Confidential Binder, Appendix 3-5.)
The 2005 raptor results have been added to the Confidential Binder appendix 3-5.

2. RAPTORS: Change any wording in the narrative portions of Chap. 3 (e.g., pg 10, 20 and possibly in Chap 5) that relates to raptors, raptor nest activity, or raptor surveys to agree with the 2005 survey. (Suggested search words: raptor, nest, and survey.)

Pages 10 and 19 have been revised to reflect the 2005 raptor survey.

3. RAPTORS: Remove the sentence in the narrative portions of Chap. 3 (e.g., pg 10/11): *However, if this nest(s).....mitigation requirements.*

Paragraph was removed from pages 10 and 11.

4. RAPTORS: Include wording in the narrative portions of Chap. 3, pg 10 (just below the para "None of the .....mitigation information).") that relates to the five-raptor nest located just above the surface facilities site. The USFWS and I suggest that you include something like the following: "Prior to construction and during operations UEI will coordinate closely with USFWS, DWR, and the Division to avoid 'take' of golden eagles."

Paragraph was added to pages 10 and 11.

5. RAPTORS: Change any wording in the narrative portions of Chap. 3 (possibly Chap 5) that discusses contacting agencies if raptors are observed nesting during raptor fly-over surveys. The contact order should read something like: *The Permittee will contact the USFWS, DWR, and the Division immediately following raptor fly-over surveys if raptors are observed nesting.* As it reads now, you'd contact the Division who would contact the other agencies. (Suggested search words: raptor, nest, and survey, USFWS, DWR.)

Paragraph was added to page 20.

6. MSO: Add wording in the narrative in Chap. 3, pg. 18 that relates to Mexican Spotted Owl. The USFWS and I suggest that you include something like the following: *An MSO two-year calling survey will be completed according to Appendix 3-4. This two-year calling survey will include four nighttime surveys with no more than one survey prior to end of April and at least three surveys prior to end of July. Results will be submitted to USFWS, DWR, and the Division immediately following of each nighttime survey. If owls are observed, the agencies will reopen the consultation process immediately following the nighttime survey that observed the owls.* Make sure that this same wording is included and agrees with the wording in Appendix 3-4. (Suggested search words: MSO, Mexican, owl, survey, calling, USFWS, DWR.)

Text has been revised on page 17.

7. ARCH: Change wording in the narrative portions of Chap. 4, pg 11 and 12 to read something like the following suggested paragraphs:

> County, Utah". This report was written in March 1986 by Don Southworth and Asa S. Nielson for the Mining and Reclamation Plan submitted to the Division by Intermountain Power Agency. A cultural Resource Inventory of the Kaiser Steel Corporation South Lease Mine Property and a Test Excavation (42EM1343 ~~in~~ Emery County~~,~~ East Central Utah~~). By~~ conducted by Rebecca Rauch (1981). ~~Additional inventories were conducted by Montgomery in 1998 and 1999.~~ These and additional survey reports of the area are included in Appendix 4-1.

Chapter 4 has been revised.

Detailed archeological ground surveys were conducted at the Lila Canyon mine site and associated disturbed area, by Montgomery Archaeological personnel. This survey was conducted in 1998 and 1999 and is included within Appendix 4-1.~~, along with the previously mentioned reports. No additional sites were located during the 1998 or 1999 surveys which would be eligible for the National Register of Historic Places~~

Chapter 4 has been revised.

411.141. ~~All such sites~~ Historic resources are depicted on Plate 4-3.

Chapter 4 has been revised.

411.141.1 The locations of listed or eligible cultural and historical resources in the area are ~~listedin the National Register of Historic Places have been~~ discussed in Appendix 4-1 and illustrated on Plate 4-3.~~previously in Section 411.140. Detailed descriptions of such sites are presented in Appendix 4-1. All sites are depicted in Plate 4-3.~~

Chapter 4 has been revised.

411.142. Within ~~or adjacent to the permit~~ area there are five historic resources that are either on or eligible for listing on the National register. There is one listed site (42EM1222) 2.5 miles from the facility area. One eligible site (42EM1343) has been recovered and another (42EM2517) will be recovered prior to construction. The other two eligible sites (42EM2255 and 42EM2256) are not expected to be impacted by operations.

Chapter 4 has been revised.

410.143 BLM will develop a BLM recovery plan for 42Em2517 that will occur after mine plan approval and before construction.

Chapter 4 has been revised.

411.144 Of the ~~eighteen~~nineteen cultural and historical sites identified ~~within the Lila Canyon mine permit~~ in the area, only one, 42Em1222, is listed on the National Register of Historic Places. This site is approximately 2.5 miles from the surface facility~~. No~~ and therefore, no impacts should occur at this site.

Chapter 4 has been revised.

Pump Data has been added as Appendix 7-11