Ground Water
Base Line

	01	01	02	02	02	02	03	03	03	03	04	04	04	04	05
	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1
RS-2	7/3	10/10	3/26	6/4	8/13	10/14	3/21	6/16	9/11	11/2	3/30	5/10	8/11	11/3	3/31
L-6-G	7/3	10/10	3/26	6/4	8/13	10/14	No Access	6/16	9/11	11/2	No Access	Base Line Complete			3/31
L-7-G	7/3	10/10	3/26	6/4	8/13	10/15		6/16	9/11	11/2					3/31
L-8-G	7/3	10/10	3/26	6/4	8/13	10/15		6/16	9/11	11/2					3/31
L-9-G	7/3	10/10	3/26	6/4	8/13	10/15		6/16	9/11	11/2					3/31
L-10-G	7/3	10/10	3/26	6/4	8/13	10/14		6/16	9/11	11/2					3/31
L-11-G		10/10	3/26	6/4	8/13	10/14		6/16	9/11	11/2					3/31
L-12-G		10/10	3/26	6/4	8/13	10/15		6/16	9/11	11/2					3/31
L-16-G				6/15	8/14	10/16	3/21	6/16	9/11	11/2	3/30				3/31
L-17-G				6/15	8/14	10/16	3/21	6/16	9/11	11/2	3/30				3/31

Number of Samples By Quarter

Q1	Q2	Q3	Q4
2	2	3	3

Drainages
Intermitent by rule with
EPHEMERAL flow

	00 Dec	01 Jan	01 Feb	01 Mar	01 Apr	01 May	01 Jun	01 Jul	01 Aug	01 Sep	01 Oct	01 Nov	01 Dec	02 Jan	02 Feb	02 Mar	02 Apr	02 May	02 Jun	02 Jul	02 Aug	02 Sep	02 Oct	02 Nov
L-1-S				23	21	4	19	12	7	4	9	21			21	12	19	29	3	8	9	2	14	8
L-2-S				23	21	4	19	12	7	4	9	21			21	12	19	29	3	8	9	2	14	8
L-3-S				23	21	4	19	12	7	4	9	21			21	12	19	29	3	8	9	2	14	8
L-13-S	22					15		3		2	10			No Access		27	5	29	3	8	9	2	14	8
L-14-S	22					15		3		2	10					27	5	29	3	8	9	2	14	8
L-15-S	22					15		3		2	10					27	5	29	3	8	9	2	14	8
L-18-S				23	21	4	19	12	7	4	9	21			21	12	19	29	3-15	8	9-14	2	14-16	8

	02 Dec	03 Jan	03 Feb	03 Mar	03 Apr	03 May	03 Jun	03 Jul	03 Aug	03 Sep	03 Oct	03 Nov	03 Dec	04 Jan	04 Feb	04 Mar	04 Apr
L-1-S			10	12	15	21	16	22	21	10	16	3	18	31		31	21
L-2-S			10	12	15	21	16	22	21	10	16	3	18	31		31	21
L-3-S	No Access		10	12	15	21	16	22	21	10	16	3	18	31		31	21
L-13-S					15	21	16	22	21	10	16	3	18				21
L-14-S					15	21	16	22	21	10	16	3	18		No Access		21
L-15-S					15	21	16	22	21	10	16	3	18				21
L-18-S			10	12-21	15	21	16	22	21	10	16	3	18	31		31	21

Base Line Complete

L-1-S Lila Canyon
L-2-S RF Lila Above Disturbed Area
L-3-S RF Lila Below Disturbed Area & Sediment Pond
L-13-S Little Park Wash
L-14-S Wash Below L-12-G
L-15-S Williams Draw Wash
L-18-S Stinky Spring Wash

Piezometers
Depth Only

	94 Q3	94 Q3	95 Q2	95 Q3	96 Q2	00 Q4	01 Q2	01 Q3	01 Q4	02 Q1	02 Q2	02 Q3	02 Q4	03 Q1	03 Q2	03 Q3	03 Q4	04 Q1	04 Q2	04 Q3	04 Q4	05 Q1
IPA#1	7/28	8/4	5/22	8/8	4/29	12/22	5/15	9/2	10/10	3/27	6/4	8/13	10/15	No Access	6/16	8/29	11/2	No Access		Base Line Complete		3/29
IPA#2	7/28	8/4	5/22	8/8	4/29	12/22	5/15	9/2	10/10	3/27	6/4	8/13	10/15		6/16	8/29	11/2					3/29
IPA#3	7/28	8/4	5/22	8/8	4/29	12/22	5/15	9/2	10/10	3/27	6/4	8/13	10/15		6/16	8/29	11/2					3/29

Number of Samples By Quarter

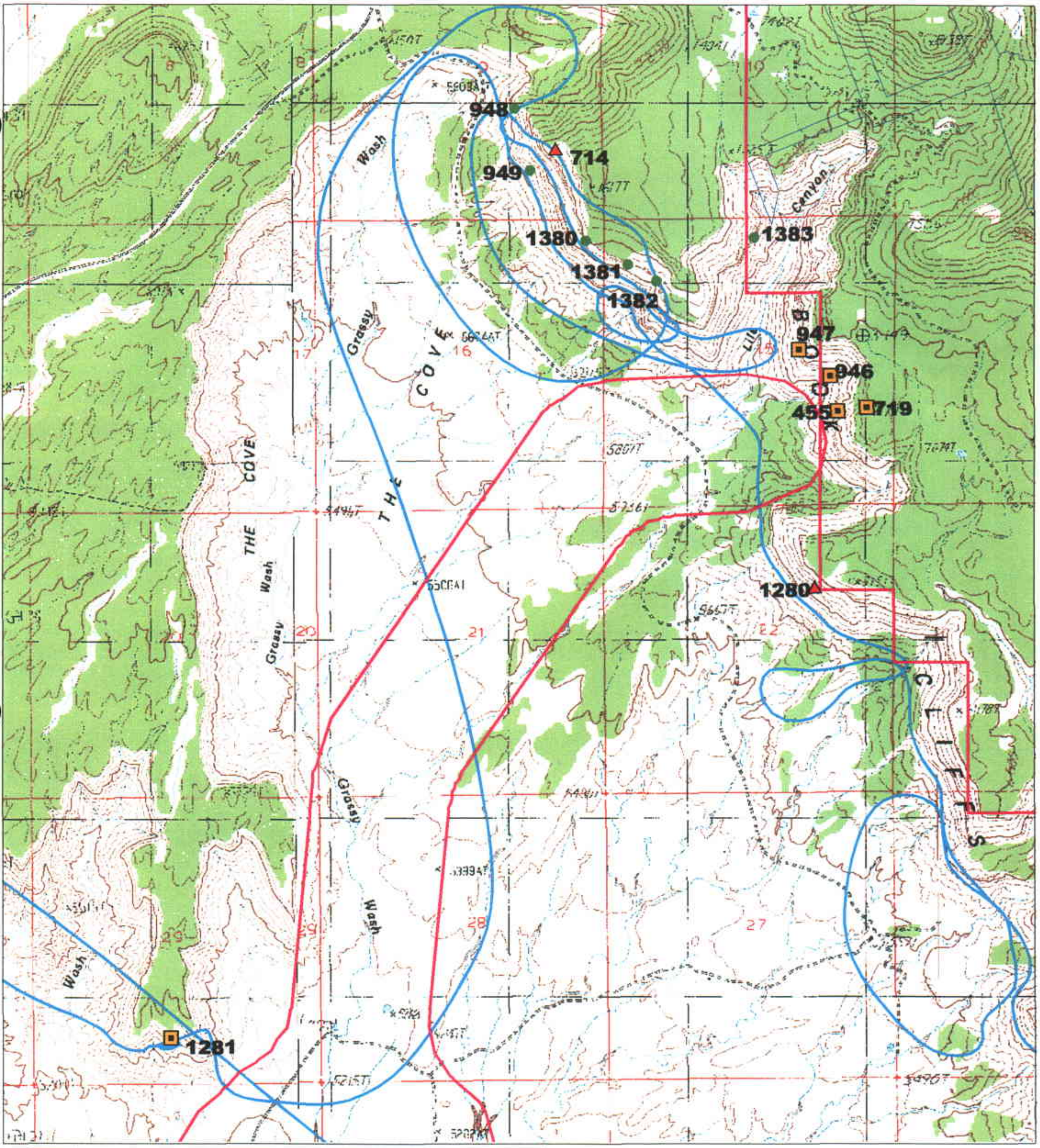
Q1	Q2	Q3	Q4
2	5	6	4

NPDES Sampling

		01 Jan	01 Feb	01 Mar	01 Apr	01 May	01 Jun	01 Jul	01 Aug	01 Sep	01 Oct	01 Nov	01 Dec	02 Jan	02 Feb	02 Mar	02 Apr	02 May	02 Jun	02 Jul	02 Aug	02 Sep	02 Oct	02 Nov	02 Dec
Horse	40013-001A	8	7	9	5	4	10	5	7	30	9	30	30	28	28	12	30	30	2	30	14	30	14	30	30
Horse	40013-002A	8	7	9	5	4	10	5	7	30	9	30	30	28	28	12	30	30	2	30	14	30	14	30	30
Lila	L-4-S			23	21	4	19	12	7	4	9	23	No Access		21	12	19	29	3	8	9	2	16	8	NA
Lila	L-5-G			23	21	4	19	12	7	4	9	23			21	12	19	29	3	8	9	2	16	8	

		03 Jan	03 Feb	03 Mar	03 Apr	03 May	03 Jun	03 Jul	03 Aug	03 Sep	03 Oct	03 Nov	03 Dec	04 Jan	04 Feb	04 Mar	04 Apr	04 May	04 Jun	04 Jul	04 Aug	04 Sep	04 Oct	04 Nov	
Horse	40013-001A	30	28	21	30	30	16	30	30	30	16	3	30	Site Reclaimed											
Horse	40013-002A	30	28	21	30	30	16	30	30	30	16	3	30	30	28	30	21	10	30	30	11	30	22	3	Continuing Monthly
Lila	L-4-S	28	10	12	15	21	16	22	21	10	21	2	18	31	29	31	21	31	30	31	31	30	30	30	
Lila	L-5-G	28	10	12	15	21	16	22	21	10	21	2	18	31	29	31	21	31	30	31	31	30	30	30	

L-4-S Lila Sediment Pond (Not Yet Constructed)
L-5-G Lila Mine Discharge (Not Yet Constructed)



Nest_no_	Species	Status05	Yng	Comments
455	Golden Eagle	Not Found	.	
714	Falcon	Not Surveyed	.	
719	Golden Eagle	Inactive	.	
946	Golden Eagle	Active	1	Chick could be dead
947	Golden Eagle	Inactive	.	
948	Raven	Not Surveyed	.	
949	Raven	Not Surveyed	.	
1280	Falcon	Inactive	.	
1281	Golden Eagle	Not Found	.	
1380	Raven	Not Surveyed	.	
1381	Raven	Not Surveyed	.	
1382	Raven	Not Surveyed	.	

Lilacanyonraptor05.shp
- Falcon
- Golden Eagle
- Raven

Projectarea.shp
Lmu.shp
Horse.shp
Flightlines05.shp

N

2000 0 2000 4000 Feet

App 3-5

Lila Canyon Extension

Chapter 1
Legal

Volume 1 of 7

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100. GENERAL CONTENTS.

110. Minimum Requirements

111. Intent

The information included within this chapter of the permit application is intended to satisfy the minimum requirements of R645-301-100. All relevant information on the ownership and control of persons who conduct coal mining and reclamation operations, the ownership and control of the property to be affected by the operation, the compliance status and history of those persons, and other important information is provided. The format for the permit application was used to facilitate expedient review and approval.

112. Identification of Interests.

112.100. The applicant, **UtahAmerican Energy, Inc.,** is a corporation organized and existing under the laws of Utah and qualified to do business in Utah.

112.200. The name, address, telephone number, and employer identification number of the applicant, resident agent, and person who will pay the abandoned mine land reclamation fee is as follows:

112.210. The Applicant **UtahAmerican Energy, Inc.,** will also be the operator.

UtahAmerican Energy, Inc.
P.O. Box 986
Price, Utah 84501

Employer Identification Number: 34-1874726

112.220. The resident agent of the applicant, UtahAmerican Energy, Inc., is:

R. Jay Marshall
UtahAmerican Energy, Inc.
P.O. Box 986
Price, Utah 84501

112.230. The abandoned mine land reclamation fee will be paid by:

Robert E. Murray
UtahAmerican Energy, Inc.
153 Highway 7 South
Powhatan Point, OH 43942

112.300. The person's name, address and employer identification number for each person who owns or controls the applicant is listed under Appendix 1-1. In addition Appendix 1-1 shows the persons ownership or control relationship to the applicant, percentage of ownership, and location in the organizational structure.

112.310. Persons who own or control names, address social security numbers and employer identification numbers can be found in Appendix 1-1.

112.320. Persons ownership or control relationship to the applicant can be found in Appendix 1-1.

112.330. Title of the person's position and date position was assumed can be found in Appendix 1-1.

112.340. **UtahAmerican Energy, Inc.,**
The American Coal Company
PennAmerican L.P.
Canterbury Coal Company
Energy Resources, Inc.
Oklahoma Coal Company
Ohio Valley Coal Company
MonValley Transportation Center, Inc.
KenAmerican Resources, Inc.

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

Bronco Coal Company:
P.O. Box 217
Cleveland, Utah 84518

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

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

Bronco Coal Company:
P.O. Box 217
Cleveland, Utah 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

Bronco Coal Company:
P.O. Box 217
Cleveland, Utah 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

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 conduct coal mining and reclamation operations suspended or revoked in the five years preceding the date of submission of the application.

113.110. No federal or state permits to conduct coal mining and reclamation operations has been suspended or revoked in the five years preceding the date of submission of the application.

113.120. Neither **UtahAmerican Energy, Inc.,** nor any subsidiary, affiliate, or persons controlled by or under common control with the applicant, have forfeited a performance bond or similar security deposited in lieu of bond.

113.200. Since no suspensions revocations, or forfeitures have taken place section 113.200 with subsections is not applicable.

113.300. A list of violations received by the applicant or any subsidiary, affiliate or persons controlled by or under common control with the applicant in connection with any coal mining and reclamation operation during the three year period proceeding the application date is provided in Appendix 1-3. MSHA numbers for the operations listed in Appendix 1-3 can be found in Appendix 1-2.

113.310. Violation information such as: Identifying numbers including Federal and State permit numbers, date issued, and name of issuing agency is included in Appendix 1-3.

113.320. A brief description of violations alleged in the notice is included in Appendix 1-3.

113.330. The date, location, and type of any administrative or judicial proceeding is included in Appendix 1-3.

113.340. The current status of violations is included in Appendix 1-3.

113.350. Actions taken to abate the violation is included in Appendix 1-3.

113.400. 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 R645-301-113.

114. Right-of-Entry Information.

A Right-of-Way application and the subsequent Environmental Assessment (EA) has been submitted to the BLM. The EA was issued for public comment in the summer of 2000. A Finding of No Significant Impact (FONSI) and record of decision were issued in October 2000. An appeal was filed and a stay requested. The stay was not acted on and an uninhibited Right-of-Way could be issued in the spring of 2003. Appendix 1-6 contains BLM correspondence in regards to Right-of-Entry as provided by the pending Right-of-Way and its related use.

114.100. **UtahAmerican Energy, Inc.,** currently holds 5,544.01 acres of federal coal contained in six federal leases, purchase in June 2000 from Intermountain Power Agency and assigned to UEI by the BLM. (See Table 1-1 and Plate 5-4). These leases are contained in the South Lease - North Block LMU filed May 1996. The leases as described in the North Block LMU are not under any pending litigation. **UtahAmerican Energy, Inc.,** bases its legal right to enter and conduct mining activities in the permit area pursuant to the language contained in the Federal Coal Lease, Part I Lease Rights Granted which reads as follows:

> "That the lessor, in consideration of the rents and royalties to be paid and the covenants to be observed as hereinafter set forth, does hereby grant and lease to the lessee the exclusive right and privilege to mine and dispose of all the coal in, upon, or under the following described tracts of land, situated in the State of Utah.... together with the right to construct all such works, buildings, plants, structures and appliances as may be necessary and convenient for the mining and preparation of the coal for market, the manufacture of coke or other products of coal, the housing and welfare of employees, and subject to the conditions herein provided, to use so much of the surface as may

reasonably be required in the exercise of the rights and privileges herein granted."

The surface right-of-entry is in the form of BLM right-of-ways. See Appendix 1-1 for a BLM letter assigning right-of-way numbers.

114.200. Since no private mineral estate is involved this section does not apply.

114.210. Since no private mineral estate is involved this section does not apply.

114.220. Since no private mineral estate is involved this section does not apply.

114.230. Since no private mineral estate is involved this section does not apply.

Table 1-1

Federal Coal Leases Held by Permittee (See Plate 5-4)

Federal Coal Lease	TownShip & Range	Section	Description	Acres
#SL-066490	*T16S, R14E*	*11*	*E1/2*	*2440.00*
	T16S, R14E	*12*	*W1/2*	
	T16S, R14E	*13*	*W1/2*	
	T16S, R14E	*14*	*E1/2,SW1/4*	
	T16S, R14E	*15*	*E1/2SE1/4*	
	T16S, R14E	*22*	*NE1/4NE1/4*	
	T16S, R14E	*23*	*N1/2,E1/2SW1/4,SE1/4*	
	T16S, R14E	*24*	*NW1/4,W1/2SW1/4*	
	T16S, R14E	*26*	N1/2NE1/4	
#U-014218	*T16S, R14E*	12	E1/2	320
#U-0126947	*T16S, R14E*	*13*	*E1/2*	*1059.81*
	T16S, R14E	*24*	*E1/2*	
	T16S, R14E	*25*	*N1/2NE1/4,SE1/4NE1/4*	

	T16S,R15E	19	*SE1/4SW1/4, Lots 3 & 4*	
	T16S,R15E	30	*E1/2NW1/4,SW1/4NE1/4, Lots 1 & 2*	
#U-014217	T16S,R14E	25	SW1/4NE1/4	40
#SL-069291	T16S,R14E	24	E1/2SW1/4	*280*
	T16S,R14E	25	NW1/4	
	T16S,R14E	26	SE1/4NE1/4	
#SL-066145	T16S,R14E	3	Lots 1-3, 7-11, Ne1/4SW1/4,SE1/4	1404.20
	T16S,R14E	10	E1/2	
	T16S,R14E	11	W1/2	
	T16S,R14E	14	NW1/4	
	T16S,R14E	15	N1/2NE1/4,SE1/4NE1/4	
Totals	Six Leases			5544.01

115. Status of Unsuitability Claims.

115.100. The proposed permit area is not within an area designated as unsuitable for mining. **UtahAmerican Energy, Inc.,** is not aware of any petitions currently in progress to designate the area as unsuitable for coal mining and reclamation activities.

115.200. Since no exemption is requested this section does not apply.

115.300. UtahAmerican Energy, Inc., will not conduct mining operations within 300 feet of a currently occupied dwelling. However, UtahAmerican Energy, Inc., will conduct mining or mining related activities within 100 feet of a public road. UtahAmerican Energy, Inc., has received permission from Emery County to construct facilities and operate coal mining activities within 100 feet of a public road. Refer to the Emery County letter found in Appendix 1-4.

116. Permit Term.

116.100. The anticipated starting and termination dates of the coal mining and reclamation operation are as follows:

Phase	Begin	Complete
Mining Pad, Support Structures, and Portals	June 2005	Dec. 2005
Begin Underground work	June 2005	
Terminate Mining	Dec. 2019	

Reclamation operation dates can be found in Table 3-3.

Approximately 5,992.07 surface acres, which include federal, state and private lands are included within the permit area. These surface acres are described in Table 4-2, and coal acres are shown on Table 4-2A.

The perimeter of the disturbed area contains approximately 42.6 surface acres within the disturbed area but only 25.3 acres will be disturbed leaving 17.3 acres of undisturbed islands within the disturbed area.

116.200. The initial permit application is for a five year term with anticipated successive five year permit renewals.

116.210 Since the initial permit application is for a term of five years this section does not apply.

116.220 Since the initial permit application is for a term of five years this section does not apply.

117. Insurance, Proof of Publication and Facilities or Structures Used in Common

117.100. The Certificate of Liability Insurance is included as Appendix 8-2.

117.200. A copy of the newspaper advertisement of the permit extension and proof of publication can be found in Appendix 1-5.

117.300. Since no structures are going to be shared by two or more separately permitted coal mining permit applications this section does not apply.

118. Filing Fee.

A filing fee of $5.00 has been submitted.

120. Permit Application Format and Contents.

121. The permit application contains current information and is written in a clear and concise manner in a format satisfactory to the Division.

122. Referenced materials not on file at the Division, or readily available to the Division, will be provided upon request of the Division by the applicant. On August 22, 2000 Dave Darby confirmed a copy of the R2P2 is on file at the Salt Lake City Division office.

123. A notarized statement, attesting to the accuracy of the information can be found in Appendix 1-5.

130. Reporting of Technical Data.

131. Persons or organizations that collected or analyzed data, the dates associated with the collection and/or analysis of the data, can be found in Appendix 1-5.

132. Resumes for the professional qualified persons who planned, directed the collection of or analyzed data can be found in Appendix 1-5.

140. Maps and Plans.

141. Maps have been presented in a consolidated format, to the extent possible, and include all the types of information that are set forth on U.S. Geological Survey of the 1:24,000 scale series. Maps of the permit area are to the scale of 1:6,000 or larger. Maps of the adjacent area will clearly show the lands and waters within those areas.

142. Maps and plans submitted with the permit application distinguish among each of the phases during which coal mining and reclamation operations were or will be conducted at any place within the life of operations.

150. Completeness

This permit extension to the existing Horse Canyon Permit ACT/007-013 to conduct coal mining and reclamation operations is complete and includes the minimum information required under R645-301 and, if applicable, R645-302. Plates 1-1 and 1-2 show the permittee area and proposed disturbed area boundaries.

This permit extension io intended to add the Lila Canyon Mine as part "B" to the existing permit and to leave unchanged the current approved Horse Canyon Mine as part "A". The Horse Canyon Mine "part A" is for reclamation only.

APPENDIX 1-3

VIOLATION INFORMATION

Information Can Also Be Found in Appendix 1-8 of Part "A" Horse Canyon.

Information updated to November 2005

Name of Operation	Identifying number for operation	Federal or State Permit Number	MSHA ID Number
Energy Resources, Inc.	470	License # 1465	3602695

Date Issued	Violation Number	Name of Issuing Agency	Person Issued To	Permit Number	Brief Description of Violation	Status (Abated, Term. etc.)	Abatement Action	Appeal Y or N
9/10/02	315947	PaDEP	ERI	24970102	Failure to Backfill 87.141.C	Abated	Corrected	N
9/10/02	315948	PaDEP	ERI	24970102	87.147	Abated	Corrected	N
11/5/02	328394	PaDEP	ERI	33901602	Discharge Not	Abated	Corrected	N
1/9/03	331957	PaDEP	ERI	17823701	Discharge Not	Abated	Corrected	N
2/10/03	334768	PaDEP	ERI	24970102	Failure to Backfill	Abated	Corrected	N
3/25/03	346473	PaDEP	ERI	33901602	Discharge Not	Abated	Corrected	N
4/22/03	347534	PaDEP	ERI	17823701	Discharge Not	Abated	Corrected	N
6/11/03	353486	PaDEP	ERI	17841607	89.52	Abated	Corrected	N
10/20/03	369187	PaDEP	ERI	17841607	89.52	Abated	Corrected	N
10/14/03	368528	PaDEP	ERI	17841607	87.64	Abated	Corrected	N
9/25/03	366121	PaDEP	ERI	17841607	87.64	Abated	Corrected	N
5/11/04	395229	PaDEP	ERI	17841607	87.147	Abated	Corrected	N
7/6/04	402114	PaDEP	ERI	17841607	89.52	Abated	Corrected	N
8/25/04	425162	PaDEP	ERI	17841607	87.140	Abated	Corrected	N
8/25/04	425946	PaDEP	ERI	17841607	87.147	Abated	Corrected	N
8/26/04	167665	PaDEP	ERI	24010101	8714	Abated	Corrected	N
8/30/04	168590	PaDEP	ERI	24970102	87.147	Abated	Corrected	N

Name of Operation	Identifying number for operation	Federal or State Permit Number	MSHA ID Number
TDK Coal Sales, Inc.	27182	17910124	3608867

Date Issued	Violation Number	Name of Issuing Agency	Person Issued To	Permit Number	Brief Description of Violation	Status (Abated, Term. etc.)	Abatement Action	Appeal Y or N
05/30/03	119597	PaDEP	TDK	33960109	87.96	Abated	Corrected	N
7/30/03	123260	PaDEP	TDK	33960109	87.148	Abated	Corrected	N
8/5/03	123485	PaDEP	TDK	24970104	87.101.	Abated	Corrected	N
8/7/03	123485	PaDEP	TDK	24970104	87.101.	Abated	Corrected	N
8/28/03	124332	PaDEP	TDK	24970104	87.141.	Abated	Waved	N
4/01/04	139281	PaDEP	TDK	24970104	86.102	Abated	Corrected	N
5/13/04	143257	PaDEP	TDK	24970104	87.147	Abated	Waved	N
6/1/04	144659	PaDEP	TDK	03940101	87.148	Abated	Corrected	N
9/15/04	169382	PaDEP	TDK	03940101	87.106	Abated	Corrected	N
9/20/04	169388	PaDEP	TDK	24970104	87.140	Abated	Corrected	N
10/7/04	170575	PaDEP	TDK	24970104	87.106	Abated	Corrected	N

Name of Operation	Identifying number for operation	Federal or State Permit Number	MSHA ID Number
The Ohio Valley Coal Co.	Powhatan No. 6 Mine	State – D-0360	D-0360

Date Issued	Violation Number	Name of Issuing Agency	Person Issued To	Permit Number	Brief Description of Violation	Status (Abated, Term. etc.)	Abatement Action	Appeal Y or N
8/2/04	19662	ODMR	Mine		Failure to maintain sediment control			N

Name of Operation	Identifying number for operation	Federal or State Permit Number	MSHA ID Number
The American Coal Co,	Galatia Mine & Millennium Portal	IDNR MINING PERMIT # 2 AND # 352	11 - 02752

Date Issued	Violation Number	Name of Issuing Agency	Person Issued To	Permit Number	Brief Description of Violation	Status (Abated, Term. etc.)	Abatement Action	Appeal Y or N
10-03-03	06-03	IDNR	DeNeal	Permit #2	Failure to abate Notice	Terminated		N
7/01/03	37-3-03	IDNR	DeNeal	Permit #2	Failure to submit subsidence plans	Terminated		N
5-21-03	37-2-03	IDNR	DeNeal	Permit #2	Failure to notify landowners of ug miing at six months	Terminated		N
9-27-04	37-1-04	IDNR	DeNeal	Permit #2	Failure to submit groundwater report on schedule	Terminited		N
4/13/05	37-01-05	IDNR	DeNeal	Permit #2	Failure to submit u/g mining maps	Terminited		N
5/12/05	37-02-05	IDNR	DeNeal	Shadow Area 9	failure to complete subsidence mitigation in contemporaneous manner.	Modified		N
6/01/05	37-03-05	IDNR	DeNeal	352	broken waterline-flalure to prevent minepumpage from passing through sediment pond before going offsite	Terminated		N

Name of Operation	Identifying number for operation	Federal or State Permit Number	MSHA ID Number
Belmont Coal Company		D-0241/D-1020	33-04397/33-03048

Date Issued	Violation Number	Name of Issuing Agency	Person Issued To	Permit Number	Brief Description of Violation	Status (Abated, Term. etc.)	Abatement Action	Appeal Y or N
2/24/04	24541	DMR		D-0241	Rills & Gullies exist in regraded, area	Terminated	repaired gullies & rills	N

Name of Operation	Identifying number for operation	Federal or State Permit Number	MSHA ID Number
Canterbury Coal Inc.	644	D-0241/D-1020	3600813/3605708

Date Issued	Violation Number	Name of Issuing Agency	Person Issued To	Permit Number	Brief Description of Violation	Status (Abated, Term. etc.)	Abatement Action	Appeal Y or N
08/05/03	123599	PADEP		03743701	90.122.M	Abated		N
08/05/03	123599	PADEP		03743701	90.122.P	Abated		N
09/04/03	125015	PADEP		03743701	90.102	Abated		N
09/15/03	125760	PADEP		03743701	87.106	Abated		N
12/11/03	130382	PADEP		03743701	90.124	Abated		N
05/13/04	143419	PADEP		03743701	90.124	Abated		N
07/29/04	165278	PADEP		03743701	90.106	Abated		N
07/29/04	165278	PADEP		03743701	90.152	Abated		N
07/29/04	169136	PADEP		03743701	90.152	Abated		N
7/29/04	165279	PADEP		03743701	89.68	Abated		N
7/29/04	165279	PADEP		03743701	89.83	Abated		N
08/13/04	169138	PADEP		03743701	90.124	Abated		N
9/07/04	169139	PADEP		03743701	89.81	Abated		N
5/13/04	143416	PADEP		03743701	86.13 CO	Abated		N
6/15/04	145872	PADEP		03743701	89.52 CO	Abated		N
02/08/05	182734	PADEP		03743701	90.124	Abated		N
08/05/05	199322	PADEP		03743701	90.159	Abated		N

Name of Operation	Identifying number for operation	Federal or State Permit Number	MSHA ID Number
UMCO Energy, Inc.	74645	PA 63921301	

Date Issued	Violation Number	Name of Issuing Agency	Person Issued To	Permit Number	Brief Description of Violation	Status (Abated, Term. etc.)	Abatement Action	Appeal Y or N
12/19/03	375946	DMRM		63921301	89.52	Abated		N
3/31/04	389724	DMRM		63921301	89.142a(b)(1)(iii)	Abated		N
9/29/03	366833	DMRM		63921301	89.52	Abated		N
3/31/04	389725	DMRM		63921301	89.142a(b)	No resolution		N
3/31/04	389720	DMRM		63921301	89.145a(a)(1)	No resolution		N
3/31/04	389721	DMRM		63921301	89.145a(a)(2)	No resolution		N
4/6/04	390148	DMRM		63921301	89.155(a)	Abated		N
4/6/04	390149	DMRM		63921301	89.142a(b)	Abated		N
4/6/04	390150	DMRM		63921301	89.145a(a)(1)	Abated		N
4/6/04	390151	DMRM		63921301	89.154(b)	Abated		N
4/6/04	390152	DMRM		63921301	89.145(d)	Abated		N
4/20/04	392488	DMRM		63921301	89.145a(a)(1)	Abated		N
4/20/04	392498	DMRM		63921301	89.145a(a)(2)	Abated		N
5/20/04	396472	DMRM		63921301	89	No resolution		N
9/1/04	426787	DMRM		63921301	86.13	No resolution		N
9/3/04	426786	DMRM		63921301	89.142a(b)	No resolution		N
9/20/04	427936	DMRM		63921301	89.142a(b)	No resolution		N
1/4/05	445603	Air Quality		63921301	25.127.25	ADM. Close Out		N
1/13/05	445603	Air Quality		63921301	25.127.25	ADM Close Out		N
3/18/05	445603	Air Quality		63921301	25.127.25	ADM Close Out		N
6/10/05	466153	DEP		63921301	25.89.21	No resolution		N
7/15/05	448412	DEP		63921301	25.89.68	Abated		N
7/15/05	448413	DEP		63921301	25.89.83(a)	Abated		N

Name of Operation	Identifying number for operation	Federal or State Permit Number	MSHA ID Number
American Energy Corp.		D-0425	33-01070

Date Issued	Violation Number	Name of Issuing Agency	Person Issued To	Permit Number	Brief Description of Violation	Status (Abated, Term. etc.)	Abatement Action	Appeal Y or N
3/5/03	21579	ODNR		D-0425	Const slurry line	Terminated	Incidental boundary revision	N
3/27/03	21590	ODNR		D-1159	Pond #18 not certified	Terminated	Pond changed to sump	N
3/27/03	21591	ODNR		D-1159	Not all drainage to pond	Terminated	Small area drainage exemption	N
4/3/03	21584	ODNR		D-1159	construction prior to certification of approval	Terminated	completed & certified Pond #16	N
4/30/03	24363	ODNR		D-1159	affected acreage beyond approved area	Terminated	revised permit	N
6/17/03	24404	ODNR		D-0425	landslide off permit area near internal road	Terminated	reclaimed area	N
7/2/03	24364	ODNR		D-0425	Did not submit 6 month notice letters ug mining to landowner	Non-remedial		N
12/09/03	24515	ODNR		D-0425	The Topsoil stockpiles within watershed of impoundment num. 016 are not protected from erosion	Terminated	Seed topsoil storage areas	N
1/25/05	21807	ODNR		D-0425	subsided residnet ran out of water	Terminated	filled tank with water	N
4/27/05	19696	ODNR		D-0425	Coal located outside stockpile area	Terminated	cleaned coal	N
4/29/05	19695	ODNR		D-0425	Maintenance on pond 018	Terminated	cleaned out pond	N
4/27/05	19697	ODNR		D-0425	drainage from property not entering sumps	Terminated	construct sumps	N

Name of Operation	Identifying number for operation	Federal or State Permit Number	MSHA ID Number
Maple Creek Mining, Inc.	4244	63723707	36-00970

Date Issued	Violation Number	Name of Issuing Agency	Person Issued To	Permit Number	Brief Description of Violation	Status (Abated, Term. etc.)	Abatement Action	Appeal Y or N
9/12/02	318807	MCM		63841302	Other.89	Abated		N
10/18/02	322598	MCM		63723707	90.102	Abated		N
10/18/02	322599	MCM		63723707	90.106	Abated		N
11/26/02	328538	MCM		63841302	Other.89	Abated		N
3/15/03	300907	MCM		63841302	89.52	Abated		N
6/4/03	353365	MCM		63841302	Other.89	Abated		N
2/24/04	383011	MCM		63841302	89.111	Abated		N
5/7/04	394440	MCM		63841302	89.142A.F.1	Abated		N
5/12/04	394880	MCM		63841302	89.142A.F.1	No resolution		N
5/13/04	395344	MCM		63841302	89.142A.F.1	No resolution		N
5/13/04	395345	MCM		63841302	89.142A.F.1V	No resolution		N
5/13/04	395346	MCM		63841302	89.142A.E	Abated		N
5/7/04	394440	MCM		63841302	89.142A.F.1	Abated		N
7/7/04	401714	MCM		63841302	89.142A.F.1	No resolution		N
7/30/04	421806	MCM		63841302	SMCRA.18.6	Abated		N
8/26/04	425804	MCM		63841302	89.142A.F.1	No resolution		N
8/13/04	426148	MCM		63723707	86.13	Abated		N
9/08/04	427302	MCM		63723707	90.102	Abated		N
9/10/04	427564	MCM		63723707	90.102	Abated		N
9/13/04	427565	MCM		63723707	90.102	Abated		N
9/14/04	427566	MCM		63723707	90.102	Abated		N
9/14/04	427567	MCM		63723707	90.112	Abated		N
10/19/04	432068	MCM		63723707	90.102	Abated		N
7/29/05	469866	DEP		63723707	89.142a(b)(1)(iii)	No Resolution		N

Name of Operation	Identifying number for operation	Federal or State Permit Number	MSHA ID Number
PENNAMERICAN COAL LP	93081	32951301	36-00970

Date Issued	Violation Number	Name of Issuing Agency	Person Issued To	Permit Number	Brief Description of Violation	Status (Abated, Term. etc.)	Abatement Action	Appeal Y or N
11/25/02	106178	MCM	Mine	32951301	89.68	Abated		N
11/25/02	106178	MCM	Mine	32951301	Other.89 Other bitum ug mining @ prep plant	Abated		N
7/11/03	122578	MCM	Mine	32951301	89.145A.B Failure to provide adeq replace water	Abated		N

The following companies either did not have any violations in the last three years or do not have permits.

Oklahoma Coal Company

KenAmerican Resources, Inc.

Onieda Coal, Inc.

UtahAmerican Energy, Inc.

MonValley Transportation Center, Inc.

Mill Creek Mining Co.

Spring Church Coal Co.

Pinski Corp

American Compliance Coal Inc.

Coal Resources Inc.

Penn American Coal Inc.

PA Transloading, Inc.

West Virginia Resources Inc.

American Coal Sales Co.

Hocking Valley Resources Co..

(2) Participate in a BLM habitat enhancement program on 70+ acres-conversion from Pinyon/Juniper to shrubs, forbs, and grasses.

The overseeing agency for the EA mitigation/enhancement will be the BLM. The implementation dates, and project locations will not be determined until the BLM notice to proceed is given, after permit approval. The Permittee will submit the BLM mitigation plan as an Appendix to this volume within one year of the initial mine construction. The BLM plan will include: project goal, expected benefits, project procedures, company commitment, implementation dates, project location and agencies contacts.

333.100. This section is addressed in 333. And 333.300.

333.200. This section is addressed in 333. And 333.300.

333.300 The goal of the mine is to construct all facilities and conduct mining in such a manner to minimize adverse impacts to wildlife. These measures will include but are not limited to:

1. Interim revegatation with desirable plant species for wildlife, with the exception of transportation corridors.

2. Speed limits on all roads to lesson potential for possible animal/vehicular collisions.

3. Wildlife awareness training to be incorporated into the annual safety training for all employees.

4. Possible restrictions on firearms on the mine site, and restrictions on off road vehicle usage to 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. (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.

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

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 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)	
		34					23.62 (2)	
							25.68 (4)	
							25.20 (3)	
16 S	14 E							
		2	248.30	0.76				
		3			127.03		204.30 (4)	
		4					189.00 (4)	
		5					20.00 (1)	
		8					40.00 (1)	
		9					120.00 (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) 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.

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.

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 per chapter 3. The total cover over the refuse area when considering the subsoil and topsoil will be a minimum of 4'.

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 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 well as others show the area for which the

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
Diesel
Belts and Terminal Groups

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

removed upon construction of the sediment pond this section does not apply. The County road and the culvert within the disturbed area boundary will be modified or reconstructed by the County.

526.115.1. Since the existing culvert is going to be removed upon construction of the sediment pond this section does not apply. See Appendix 5-4 for existing road details.

526.115.2. Since the existing culvert is going to be removed upon construction of the sediment pond this section does not apply. See Appendix 5-4 for existing road details.

526.115.3. Since the existing culvert is going to be removed upon construction of the sediment pond this section does not apply. See Appendix 5-4 for existing road details.

526.115.4. Since the existing culvert is going to be removed upon construction of the sediment pond this section does not apply. See Appendix 5-4 for existing road details.

526.116 The only coal mining and reclamation operations that are planed within 100 feet of the County Road are office complex, sediment pond, topsoil pile, and security shack. The permit area adjacent to the county road will be fenced to protect the public from the sediment pond and other mine associated buildings. Other than fencing no additional measures are planned after the construction phase. During construction measures to control 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

Appendix 6-2

Lila Fan Portal Floor Rock Analyses	
Parameter	Results
pH, saturated paste	5.0
Conductivity, saturated paste	2.32 mmhos/cm
Calcium, soluble	15.97 meq/l
Magnesium, soluble	20.40 meq/l
Sodium, soluble	1.13 meq/l
Sodium Absoption Ratio	.3
Boron, soluble	0.8 mg/kg
Selenium, soluble	0.05 mg/kg
Sulfur, organic	0.22%
Sulfur, pyritic	0.07%
Sulfur, total	0.30%
Sulfur, sulfate	0.01%
Neutralization Potential	2.2% as $CaCO_3$
Acid-Base Potential ($CaCO_3$	12 Tons/1000T

Lila Fan Portal Roof Rock Analyses	
Parameter	Results
pH, saturated paste	7.2
Conductivity, saturated paste	5.83 mmhos/cm
Calcium, soluble	15.47 meq/l
Magnesium, soluble	86.54 meq/l
Sodium, soluble	5.91 meq/l
Sodium Absoption Ratio	.8
Boron, soluble	5.6 mg/kg
Selenium, soluble	0.035 mg/kg
Sulfur, organic	0.09%
Sulfur, pyritic	0.01%
Sulfur, total	0.52%
Sulfur, sulfate	0.42%
Neutralization Potential	32.2% as $CaCO_3$
Acid-Base Potential ($CaCO_3$	306 tons/1000T

CHEMTECH

CHEMICAL AND BACTERIOLOGICAL ANALYSES

DATE: 11-07-90

Refuse Pile

TO: JBR Consultants
1952 E. Fort Union Blvd. STE 209
Salt Lake City, UT 84121

SAMPLE ID: Lab #U055883 - Horse Canyon - HC-101290-17.
Submitted 10-19-90

CERTIFICATE OF ANALYSIS

PARAMETER	DETECTED
pH Units	7.96
Conductivity, mmhos/cm	2.375
Saturation, %	32.5
SAR	0.035
Soluble Calcium as Ca, mg/Kg	115
Soluble Magnesium as Mg, mg/Kg	13.2
Soluble Sodium as Na, mg/Kg	1.5
Selenium as Se, mg/Kg	0.14
TKN (T), mg/Kg	3,690
Nitrate as NO_3-N, mg/Kg	1.4
Boron as B, mg/Kg	<5
Max. Acid Potential, Tons $CaCO_3$/Tons Soil	<.2
Neutral Potential, Tons $CaCO_3$/Tons Soil	56.8
Organic Carbon, %	>10
Sulfate as SO_4, mg/Kg	1.370
Available Water, in/in	0.18
Sieve:	
Rock, %	61.7
Sand, %	33.1
Silt/Clay, %	5.2

Rex Henderson

CHEMTECH

CHEMICAL AND BACTERIOLOGICAL ANALYSES

DATE: 11-07-90

TO: JBR Consultants
1952 E. Fort Union Blvd. STE 209
Salt Lake City, UT 84121

Refuse Pile

SAMPLE ID: Lab #U055882 - Horse Canyon - HC-101290-16.
Submitted 10-19-90

CERTIFICATE OF ANALYSIS

PARAMETER	DETECTED
pH Units	7.04
Conductivity, mmhos/cm	2.809
Saturation, %	34.9
SAR	0.014
Soluble Calcium as Ca, mg/Kg	457
Soluble Magnesium as Mg, mg/Kg	60.8
Soluble Sodium as Na, mg/Kg	1.2
Selenium as Se, mg/Kg	0.15
TKN, mg/Kg	2.800
Nitrate as NO_3-N, mg/Kg	8.9
Boron as B, mg/kg	<5
Max. Acid Potential, Tons $CaCO_3$/Tons Soil	<.2
Neutral Potential, Tons $CaCO_3$/Tons Soil	17.1
Organic Carbon, %	>10
Sulfate as SO_4, mg/Kg	3.900
Available Water, in/in	0.15
Sieve:	
Rock, %	85.9
Sand, %	12.6
Silt/Clay, %	1.5

Rex Henderson

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.

A small amount of acid- and toxic- drainage occurred at the base of the Sunnyside Mine refuse pile. The Lila Canyon refuse pile is not at all designed like the Sunnyside pile. Acidic water has seeped from the base of a refuse pile at Sunnyside. Even with the seepage there were no offsite problems or impacts because of the buffering environment. The refuse piles at Sunnyside contained reject material from the washing of coal. This reject would have an elevated sulfur content much higher than Lila. The Sunnyside piles were above ground, Lila is totally incised, below the surface. The events at Sunnyside that lead to the seepage of acidic water from the bottom of the refuse pile cannot happen at Lila.

Appendix 5-7 states: "Since coal washing is not proposed, the refuse will not contain consolidated reject, which is higher in sulfur. The refuse pile is completely incised and will be compacted and covered with 4' of material. Thus eliminating the potential of water percolation causing problems. Drainage over the compacted pile with 4' of cover will be diverted into the sediment pond."

Horse Canyon Extension
Lila Canyon Mine

Chapter 7
Hydrology

Volume 6 of 7

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Chapter 7

700. HYDROLOGY

710. Introduction

711. General Requirements

711.100 The existing hydrologic resources of the proposed Lila Canyon Mine area are detailed under section 720.

711.200 The proposed operations and potential impacts to the hydrologic balance are described in Sections 728 and 730.

711.300 All methods and calculations utilized to achieve compliance with hydrologic design criteria and plans are described in Section 740 and Appendix 7-4.

711.400 Applicable performance standards

711.500 Reclamation hydrology is described in Section 760 and in Appendix 7-4.

712. All cross sections, maps and plans required by R645-301-722 as appropriate, and R645-301-731.700 have been prepared and certified according to R645-301-512.

713. Impoundments will be inspected as described under Section 514.300:

A professional engineer or specialist experienced in the construction of impoundments will inspect the impoundment.

Inspections will be made regularly during construction, upon completion of the construction, and at least yearly until removal of the structure or release of the performance bond.

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 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 piezometers, and seep/spring inventory data of the proposed mine and adjacent areas. Plates 7-1 and 7-1A show the locations of the surface drainages, springs and seeps, and piezometers.

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 Piezometers 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, and mine inflow information from the abandoned Horse Canyon Mine. Appendices 7-1 and 7-6 provide data through the 2002 sampling period. All of these data and other recent data are available in the DOGM electronic database. The data, provided in Appendices 7-1 and 7-6 and the DOGM electronic data base, 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.

History of Data Collection. The U.S. Geological Survey conducted a water quality study in Horse Canyon from August 1978 until September 1979 during the time that U.S. Steel operated the mine. Samples were taken monthly from the Horse Canyon Creek and analyzed for most major ions and cations and field parameters. Metals, eight nitrogen species and other minor chemical constituents were taken on a quarterly basis or less.

Between January 1981 and April 1983, baseline water quality data was collected for four surface water/spring sites B-1, HC-1, RF-1 and RS-2, and 3 UPDES Discharge Points, 001 (Mine Discharge), 002 (Mine Discharge) and 003 (Sewer Plant), on the Horse Canyon permit area. Between 14 and 19 samples were taken and analyzed during the monitoring period depending on the site. The parameters that were analyzed were derived from Section 783.16 in the regulations. DOGM monitoring guidelines were not in force at that time.

Two other sites, RS-1, and RS-2, were sampled once a year during 1978, 1979, and 1980 and analyzed for most major chemical constituents. In addition, springs H-1, H-6, H-18, and H-21 were sampled once by JBR and analyzed for the major constituents in 1985. Third quarter data for 1989 were collected for B-1, HC-1, RF-1, and RS-2 and sampled for most of the parameters in DOGM's guidelines.

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 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-18-S are being used to determine flow characteristics of the Williams Draw Wash, Wash below L-12-G, 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 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 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 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 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.

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.

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

Table 7-1
1985 Spring and Seep Survey Results

Spring ID	Temp (C°)	pH	Conduct. (umhos.)	Flow (gpm)	Occurrence	Use	Sampled
H-1	7	8.1	950	2	SS over	wildlife	yes
H-2	10	8.0	1111	2	Colluvium	wildlife	no
H-3	-	-	-	<<1	Alluvium	wildlife	no
H-4	9	7.7	1229	1	Colluvium	wildlife	no
H-5	10.5	7.7	1359	1	Alluvium	wildlife	no
H-6	9	7.9	1366	10	SS over	cattle	yes
H-7	9.5	7.6	1985	<1	SS	cattle	no
H-8	12	7.8	1997	<1	SS	wildlife	no
H-9	11	7.7	1919	2	Alluvial	cattle	no
H-10	11	7.9	2150	1	Alluvial	cattle	no
H-11	9.5	7.8	1227	2.5	Alluvium	cattle	no
H-13	11	7.1	1596	4.5	Colluvium	cattle	no
H-14	7	7.5	2040	2	SS over	cattle	no
H-18	7	7.9	1381	9	Alluvium	wildlife	yes
H-19	8	8.2	645	3.5	SS over	developed	no
H-20	14	8.3	777	2.5	SS over	none	no
H-21	14	8.3	968	6	SS over	wildlife	yes
H-22	5	8.3	322	1	SS over	none	no
H-92	-	-	-	<<<1	SS over	none	no

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. Flows which issued from rock slopes and gob areas, where roof collapse may have occurred, were small, indicating that limited water inflow from overlying strata occurred.

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 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 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 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 of ground water in the Lila Canyon Mine are expected to be similar to the Geneva Mine (Horse Canyon). Inflows of water encountered while mining reduced to seeps or dried 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). These formations 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 along any fault or fracture or in any adjacent canyons. The lower zone is underlain by the Mancos Shale.

Geologic conditions in the permit and adjacent areas are described in detail in Chapter 6 of this P.A.P. 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 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.

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. In the lower zone groundwater occurs in saturated zones in the Blackhawk Formation. 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 hydraulic connection with surface recharge and that most of the annual recharge quickly drains out of the system.

Groundwater issuing from the Colton Formation has a total dissolved solids ("TDS") concentration of 300 to 600 mg/l (as measured by specific conductance and laboratory analyses of TDS). The pH of this water is slightly alkaline (7.5 to 8.1). Insufficient data are available to describe seasonal variations in these parameters.

The water is a calcium-magnesium-bicarbonate type (see Appendix 7-1). The data also indicated total iron concentrations of <0.04 to 4.89 mg/l. Total manganese concentrations ranged from <0.01 to 1.29 mg/l.

Undifferentiated Flagstaff-North Horn Formation. The Flagstaff-North Horn Formation outcrops across much of the northern and central portion of the permit area. This formation consists of an interbedded sequence of sandstone, mudstone, marlstone, and limestone. Most springs and a major portion of the volume of groundwater discharging from the permit and adjacent areas issue from the Flagstaff-North Horn Formation. According to Plates 7-1 and 7-1A and Appendices 7-1 and 7-6, 36 springs issue from the Flagstaff-North Horn Formation within the permit and adjacent areas.

Groundwater discharge rates for springs issuing from the Flagstaff-North Horn Formation are greatly influenced by seasonal variations in precipitation and snowmelt, with most discharge corresponding to the melting of the winter snow pack during the spring months. Discharge is highest following the spring snowmelt and decreases to a trickle by the fall (Appendices 7-1 and 7-6). Many springs issuing from the Flagstaff-North Horn Formation have been noted to dry up each year.

Waddell et al. (1986), found that most of the annual recharge to the Flagstaff-North Horn Formation drains out of the system within about two months, while the remainder of the annual recharge drains out prior to the next snowmelt recharge event.

The groundwater regime in the Flagstaff-North Horn Formation appears to be influenced predominantly by the combined effects of lithology and topographic expression. Because the Flagstaff-North 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 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 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. The gradient of the lower zone in the Horse Canyon/Lila Canyon area is probably less than 2 degrees.

The IPA monitoring 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 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 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 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 to water quality for data collected from leakage into 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 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 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 to the limited area of exposure of the formation on steep outcrops and the presence of low-permeability units in overlying North Horn and Price River Formations. Additionally, the clay layers in the upper Blackhawk, 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).

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 flow within the permit area. Lila Canyon and Little Park Wash, 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 by flow pattern and by rule.

Generally, 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, 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 springs do exist in the Little Park Wash drainage; however, the flows from the springs dry-up, dissipate or go underground 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.

Precipitation in the area generally consists of either high-intensity, localized thunderstorms or area wide, frontal storms. 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. Appendix 7-10 present the simulation calculation results. These peak flow results show that for short duration events with small return periods, there is little or no runoff from the watersheds. Likely, the localized character of the thunderstorms affect only a part of the watershed and the runoff that does occur is lost to channel losses within the portion of the watershed that is not affected by the rainfall event. As the return period increases, storms have a greater intensity and tend to be larger and likely affect most if not all of the watershed. Therefore, flows tend to increase. Intense rainfall may cause heavy flooding, but likely only affect small areas 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 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.

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, 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.

Table 7-1A

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

Watershed ID	Return Period	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	Return Period	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	Return Period	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

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 extremely long 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 <u>6 miles</u> 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 south, along the Price River.

Based on the thickness of the formations underlying the Range Creek channel in the area - the North Horn/Flagstaff (570 ft), the Price River (533ft), Castlegate Sandstone (160ft), and the upper Blackhawk (170ft) - there are approximately 1,400 feet of sediment between the coal seam and the channel. Of this strata, according to Fischer, et.al. (1960) more than half of this strata is shale, clays, siltstones, or mudstones.

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 (see Plate 7-1B), 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. A factor in the lack of data is a result of accessibility to the sites during the winter period and immediately after summer rain storm events is generally not possible, due to safety issues. However, the lack of flow is data in and of itself showing that the drainages do not have a base flow component. The sequence of sampling efforts have demonstrated that there is no long-term flow events occurring in the mine permit area or adjacent areas. Also, photographs show that for some years no flow occurred from the fall to spring measurement events. Further, 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.

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 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.

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.

As a result of these difficulties, it was determined that these methods 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

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.

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.
Average Max. Temp(F)	33.7	38.4	44.1	54.0	63.5	76.2	82.4	80.3	71.3	58.3	42.8	34.9	56.8
Average Min. Temp(F)	13.9	17.5	21.8	30.0	38.3	47.2	53.6	52.2	44.7	34.6	22.8	15.3	32.8
Average Total Precip (in.)	0.80	1.01	1.30	1.22	1.22	0.85	1.46	1.50	1.80	1.67	1.14	0.78	14.74

Unofficial values based on averages/sums of smoothed daily data, Information is computed from available daily data during the 1971-2000 period. Smoothing, missing data and observation-time changes may cause these 1971-2000 values to differ from official NCDC values. This table is presented for use at locations that don't have official NCDC data. No adjustments are made for missing data or time of observation. Check NCDC normals table for official data.

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 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 effecting the water supply. As a last resort UEI will replace the water by transferring water rights or construction of wells.

As noted in the table, the majority of rights are owned by UEI for industrial use. Other rights owned by the B.L.M. or individuals are primarily for stockwatering.

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 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 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.

Table 7-2

LILA CANYON MINE AREA
Water Rights

Water Right/Owner	cfs	gpm	ac.ft.	Source	Use	Point of Diversion
91-2537 BLM	0.0120	5	0	Spring	Stockwatering	SE 12, T. 16 S., R. 14 E.
91-2521 BLM	0.0110	5	0	Cottonwood Spring	Stockwatering	NE 13, T. 16 S., R. 14 E.
91-4648 BLM	0.00	-	0	Unnamed Wash	Stockwatering, Other	SW 14, T. 16 S., R. 14 E.
91-4649 BLM	0	-	0	Unnamed Wash	Stockwatering, Other	NE 23, T. 16 S., R. 14 E.
*91-810 IPA	0.050	22	0	Unnamed Spring	Mining, Other	SE 24, T. 16 S., R. 14 E.
91-2517 BLM	0.0110	5	0	Pine Spring		SE 24, T. 16 S., R. 14 E.
91-2618 BLM	0	-	0	Stream		NW 27, T. 16 S., R. 14 E.
91-2619 BLM	0	-	0	Stream		SE 28, T. 16 S., R. 14 E.
91-2620 BLM	0	-	0	Stream		SE 28, T. 16 S., R. 14 E.
91-2621 BLM	0	-	0	Stream		SW 28, T. 16 S., R. 14 E.
91-2617 BLM	0	-	0	Stream		SE 27, T. 16 S., R. 14 E.
91-4646 BLM	0	-	0	Wash	Stockwatering, Other	SW 33, T. 16 S., R. 14 E.
91-2518 BLM	0.110	5	0	Williams Spring		SE 8, T. 17 S., R. 15 E.
91-4516 BLM	0	-	0	Little Park Wash	Stockwatering, Other	SW 7, T. 17 S., R. 15 E.
91-4705 BLM	0	-	0	Bear Canyon	Stockwatering, Other	NW 7, T. 16 S., R. 15 E.

Table 7-2

LILA CANYON MINE AREA
Water Rights

Water Right/Owner	cfs	gpm	ac.ft.	Source	Use	Point of Diversion
91-4621 BLM	0.0150	7	0	Kenna Spring	Stockwatering, Other	NE 8, T. 16 S., R. 15 E.
91-4701 BLM	0	--	0	Nelson Canyon	Stockwatering, Other	NW 17, T. 16 S., R. 15 E.
91-2519 BLM	0.0110	5	0	Unnamed Spring	Stockwatering, Other	SE 18, T. 16 S., R. 15 E.
*91-808 IPA	0.050	22	0	Unnamed Spring	Mining, Other	SW 18, T. 16 S., R. 15 E.
91-2538 State of Utah	0.0120	5	0	Unnamed Spring	Stockwatering	SW 18, T. 16 S., R. 15 E.
91-4701 BLM	0	-	0	Nelson Canyon	Stockwatering, Other	SE 17, T. 16 S., R. 15 E.
91-2539 BLM	0.0120	5	0	Pine Spring	Stockwatering	SW 19, T. 16 S., R. 15 E.
91-4703 BLM	0	-	0	Nelson Canyon	Stockwatering, Other	NW 21, T. 16 S., R. 15 E.
91-4703 BLM	0	-	0	Trib. to Nelson	Stockwatering, Other	NE 29, T. 16 S., R. 15 E.
91-4381 State of Utah	0.0150	7	0	Spring	Stockwatering,	NW 32, T. 16 S., R. 15 E.
91-2520 BLM	0.0110	5	0	Unnamed Spring	Stockwatering	NW 32, T. 16 S., R. 15 E.
*91-809 IPA	0.0500	22	0	Unnamed Spring	Mining, Other	SE 31, T. 16 S., R. 15 E.
91-2535 BLM	0.0120	5	0	Unnamed Spring	Stockwatering	SE 31, T. 16 S., R. 15 E.

UEI owns the rights to approximately 1.50 cfs in this area. Although the PHC (Appendix 7-3) indicates little, if any, adverse effects on water resources resulting from the operation, if such effects should become evident, lost water sources would be replaced from the rights owned by the company.

728. Probable Hydrologic Consequences (PHC) Determination

728.100 PHC The Probable Hydrologic Consequences (PHC) Determination is provided as a separate document in Appendix 7-3. This determination indicates minimal (or no) negative impacts of the mining or reclamation operation on the quality and quantity of surface and ground water under seasonal flow conditions for the proposed permit and adjacent areas.

728.200 Basis for Determination The PHC is based on baseline hydrologic, geologic and other information such as public records and adjacent mine plan data statistically representative of the site (see Appendix 7-3).

With underground mining, there always exists a potential for impacting surface or ground water resources; however, as indicated in Section 525, subsidence effects are expected to be minimal due to the amount of cover and massive rock stratas between the mining and the surface. Effects on underground water are also expected to be minimal, since this water is not presently issuing to the surface, and any necessary discharges of the water would be in accordance with U.P.D.E.S. requirements.

Water in this area is primarily used for stock or wildlife watering. Any impacts to the small surface springs or seeps as a result of mining would likely be offset by the emergence of new seeps or springs due to fracturing, mine water discharge or replacement of water rights as described under Sections 525, and 731.800.

728.300 Findings

728.310 Adverse Impacts. <u>Potential</u> adverse impacts of the operation on the hydrologic balance include:

(1) Increased sediment loading;

(2) Diminution or interruption of water supplies on water rights;

(3) Discharge (pumping) of contaminated ground water;

(4) Erosion and streamflow alteration;

(5) Deterioration of water quality.

Each of the above potential impacts has been evaluated in the PHC (Appendix 7-3). Based on information provided in this plan to mitigate or otherwise control these impacts, the Probable Hydrologic Consequences determination is that of minimal (or no) negative impacts. (see Appendix 7-3)

728.320 Acid/Toxic Forming Materials (see Appendix 7-3)

728.330 Impacts On:

728.331 Sediment Yield (see Appendix 7-3)

728.332 Water Quality Parameters (see Appendix 7-3)

728.333 Flooding and Streamflow Alteration In the event that sufficient volumes of water are encountered underground that necessitate pumping, the applicant will take the following steps:

(1) Water will be held in sumps as long as possible to promote settling;

(2) Water will be sampled prior to discharge to ensure compliance with UPDES standards;

(3) Prior to mining receiving channel morphology parameters and erosion impacts will be evaluated prior to discharging to any drainage and at least quarterly during pumping to determine what, if any, streamflow alteration is occurring;

(4) If adverse impacts to the receiving stream are noted, steps will be taken, with Division input and approval, to minimize or eliminate those impacts.

(Also see Appendix 7-3)

728.334 Water Availability (see Appendix 7-3)

728.335 Other Characteristics (see Appendix 7-3)

728.340 Surface Mining Activity N/A - Underground Mine

728.400 Permit Revision To be reviewed by the Division.

729. Cumulative Hydrologic Impact Assessment (CHIA)

729.100 CHIA Assessment provided by Division.

729.200 Permit Revision To be reviewed by the Division.

730. Operation Plan

731. General Requirements This will be an underground mine with approximately 42.6 acres of surface disturbance for mine site facilities and roads. Runoff from the disturbed minesite area is proposed to be controlled by a system of ditches and culverts which will convey all disturbed area runoff to a sediment pond for final treatment prior to discharge.

This permit application includes a plan, with maps and descriptions, indicating how the relevant requirements of R645-301-730, R645-301-740, R645-301-750 and R645-301-760 will be met. Each of these sections are addressed in this Chapter, along with relevant Maps and Appendices.

731.100 Hydrologic-Balance Protection

731.110 Ground-Water Protection In order to protect the hydrologic balance, coal mining and reclamation operations will be conducted according to the plan approved under R645-301-731 and the following:

731.111 Ground-Water Quality Ground-water quality will be protected by the plan described in Section 731 and the following:

(1) Minimizing surface disturbance and proper handling of earth materials to minimize acidic, toxic or other harmful infiltration to ground-water systems;

(2) Testing (as-necessary) to ensure stockpiled materials are non-acid and non-toxic;

(3) Controlling and treating disturbed area runoff to prevent discharge of pollutants into ground-water, by the use of diversions, culverts, silt fences, sediment ponds and by chemical treatment if necessary;

(4) Minimizing and/or treating mine water discharge to comply with U.P.D.E.S. discharge standards;

(5) Establishing where ground-water resources exist within or adjacent to the permit area through a Baseline Study (done) and monitoring quality and quantity of significant sources through impletation of a Water Monitoring Plan (proposed);

(6) Proper handling of potentially harmful materials (such as fuels, grease, oil, etc.) in accordance with an approved Spill Prevention Control and Countermeasure Plan (SPCC).

731.120 Surface-Water Protection In order to protect the hydrologic balance, coal mining and reclamation operations will be conducted according to the plan approved under 731 and the following:

731.121 Surface-Water Quality Surface-water quality will be protected by handling earth materials, ground-water discharges and runoff in a manner that minimizes the formation of acid or toxic drainage; prevents, to the extent possible using the best technology currently available, additional contributions of suspended solids to streamflow outside the permit area; and, otherwise prevent water pollution.

Surface-water quality protection is proposed to be accomplished by the plan described in Section 731 and the following methods:

(1) Minimizing surface disturbance and proper handling of earth materials to minimize acidic, toxic or other harmful infiltration to ground-water systems;

(2) Testing (as-necessary) to ensure stockpiled materials are non-acid and non-toxic;

(3) Controlling and treating disturbed area runoff to prevent discharge of pollutants into surface-water, by the use of diversions, culverts, silt fences, sediment ponds, and by chemical treatment if necessary;

(4) Minimizing and/or treating mine water discharge to comply with U.P.D.E.S. discharge standards;

(5) Establishing where surface-water resources exist within or adjacent to the permit area through a Baseline Study (done) and monitoring quality and quantity of significant sources through impletation of a Water Monitoring Plan (proposed);

(6) Proper handling of potentially harmful materials (such as fuels, grease, oil, etc.) in accordance with an approved Spill Prevention Control and Countermeasure Plan (SPCC).

731.122 Surface-Water Quantity Surface water quantity and flow rates will be protected as described in Section 731.

731.200 Water Monitoring The water monitoring program was implemented in July, 2000. Baseline data will be collected (as possible) from new monitoring sites L-1-S through L-4-S. 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 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.

Preceding each five year permit renewal, ground (springs) and surface waters will be sampled for baseline parameters. Baseline analysis on ground water will be collected at a low flow period. Analysis on surface waters will be conducted on samples collected at either high or low flow periods.

731.210 Ground-Water Monitoring The proposed ground-water monitoring plan is based on results of the Baseline Study and PHC determination. Based on results of these studies, the only ground water expected in the permit area is that which has been identified as springs or seeps, and that which may be expected from perched aquifers encountered by the proposed mining. Since no portals are presently discharging on, or adjacent to, the permit area, and since mining has not started, no underground water is presently available for sampling; selected springs are proposed for sampling under the Ground Water Monitoring Plan.

If ground water is encountered in the future mining of a quantity which requires discharge, the water will be monitored in accordance with requirements of this section and a monitoring plan will be proposed at that time.

For purposes of the water monitoring program, springs and seeps are considered ground water and will be monitored as such.

731.211 Ground-Water Monitoring Plan Based on information in the PHC determination (Appendix 7-3), and as indicated above, the only ground water resources on or adjacent to the permit area that can be monitored at this time; are springs and seeps. See Appendix 7-6 for a detailed description of the water monitoring locations.

There are a total of 11 ground water monitoring sites proposed for this property. (See Table 7-3). Station L-5-G is the potential mine discharge point, and will be monitored at least monthly, or as occurs, in accordance with U.P.D.E.S. Permit requirements. (See Table 7-4) Stations L-5-G, L-7-G, L-8-G, L-9-G, L-11-G, and L-12-G are significant springs or seeps located over the area of proposed mining. These springs will be monitored on a quarterly basis for parameters listed in Table 7-5.

Station L-6-G (Table 7-3) is in the vicinity of 2 listed springs, Mont Spring and Leslie Spring. These springs are within the same small drainage, and may in fact be the same spring. Close examination of spring/seep and baseline monitoring stations show only one site in this drainage with any consistent flows - site H-18; therefore, this site was originally chosen to monitor the Mont and Leslie Spring area. However in recent years L-6-G has been dry and Location L-11-G has been added to replace site L-6-G. Sampling at L-6-G will be suspended as of the First Quarter of 2003.

Monitoring site L-7-G is intended to monitor a listed site known as Cottonwood Spring. Once again, a close examination of water rights information along with spring/seep and baseline monitoring has shown only one site in this area with any consistency - site #9; therefore, this is the site chosen for monitoring of Cottonwood Spring.

L-8-G is an unnamed spring that matches Earthfax sample site 10.

L-9-G is known as Pine Spring. There have been numerous seep/spring notations in the immediate area, but the only consistent flowing site is Earthfax site 16(Z); this is the site that will be monitored for Pine Spring.

L-10-G is also an unnamed spring that matches Earthfax sample site 14. Since this site is located over 1 mile south of the permit area, it has been replaced with L-12-G which is a more appropriate site to monitor. Monitoring of site L-10-G will be suspended as of the First Quarter of 2003.

L-11-G is known as Mont/Leslie Spring located in the bottom of the upper reaches of Lila Canyon. In recent years L-6-G (H-18) has been dry. However, there has been some minimum flow observed approximately one hundred yards above L-6-G where L-11-G was established.

L-12-G is an unnamed spring which had been developed but is now abandoned. The seep/spring inventory data is shown in Appendix 7-1 and locations are shown on Plate 7-1. Proposed water monitoring sites are shown on Plate 7-4.

L-13-S, L-14-S, and L-15-S are sites being monitored to assist in characterization of the various drainages.

L-16-G and L-17-G are seeps being monitored in Stinky Spring Canyon. These sites were not identified during baseline surveys and are believed to exist intermittently and are not always evident. These two seeps appear to be an important source of water for Bighorn sheep specifically in the early spring.

It should be noted that data has been gathered on the various seeps/springs as part of the original baseline inventory for the South Lease by I.P.A. The data was gathered over the years 1993, 1994 and 1995 and was stopped. In the second quarter of 2001 water monitoring continued.

IPA-1, 2 and 3 are groundwater Piezometers in the Little Park Wash area. These holes will be checked quarterly for water depth only. Monitoring of these sites will continue until the mining or subsidence renders them unusable.

At a minimum, total dissolved solids or specific conductance corrected to 25 degrees C, pH, total iron, total manganese and water levels will be monitored, on all points except IPA-1, 2 and 3.

731.212 Monitoring Reports Ground-water will be monitored and data will be submitted at least every three months for each monitoring location. Monitoring submittals will include analytical results from each sample taken during the approved reporting period. When the analysis of any ground-water sample indicates noncompliance with the permit conditions, then the operator will promptly notify the Division and immediately take the actions provided for in 145 and 731.

731.213 Waiver of Monitoring N/A - No waiver is requested.

731.214 Ground-Water Monitoring Duration Ground-water monitoring will continue through mining and reclamation until bond release. If the ground water is a discharge strictly from the mining operations, monitoring will continue, or until the ground water source is no longer accessible. Other monitoring will continue until:

731.214.1 "The coal mining and reclamation operation has minimized disturbance to the prevailing hydrologic balance in the permit and adjacent areas and prevented material damage to the hydrologic balance outside the permit area; water quantity and quality are suitable to support approved postmining land uses"; or,

731.214.2 until "Monitoring is no longer necessary to achieve the purposes set forth in the monitoring plan approved under R645-301-731.211."

731.215 Monitoring Equipment equipment, structures and other devices used in conjunction with monitoring the quality of ground water on-site and off-site will be properly installed, maintained and operated and will be removed by the operator and will be removed by the operator when no longer needed.

731.220 Surface Water Monitoring Surface water monitoring will be conducted in accordance with the plan described in this section.

Based on results of the PHC determination, base-line study and other available information, numerous small springs and seeps exist within, and adjacent to, the permit area. In addition, ephemeral drainages in the area flow in response to snow melt and precipitation events. The proposed surface-water monitoring program will monitor the significant surface water sources, including drainages above and below the disturbed mine site area, and all point-source discharges (i.e. sediment pond). Seeps, springs and potential mine water discharge will be monitored in accordance with the Ground Water Monitoring Plan in the previous section.

It should be noted that field sheets in Appendix 7-2 refer to a point HC-2, while Bar Graphs and Spreadsheets refer to a station B-1. It has been determined that these are the same point. The site is designated B-1 on Plate 7-1, with a red HC-2 in parenthesis. The electronic data inventory (EDI) also shows both B-1 and HC-2 designations for this site.

Another HC-2 site is listed in the seep/spring inventories in Appendix 7-6 and in the baseline data in Appendix 7-1. This station is also occasionally referred to as H-2 in the seep/spring inventories (Appendix 7-6). It has been determined that the H-2 and HC-2 sites referred to in these 2 appendices are the same station. The station location is shown on Plate 7-1, where it is designated H-2 with a green (HC-2) in parentheses.

There is one other station with confusing designations in the data from Appendix 7-2 and 7-6 - station HCSW-1. This station has 3 different designations in the data - HCSW-1, HSW-1, and HC-1. The point is shown as HC-1 on Plates 7-1 and 7-4; however, a note has been added to Plate 7-1 to show the station is also called (HCSW-1), to eliminate confusion. It should also be noted that there is a seep/spring site designated as H-1 on Plate 7-1. This is not to be confused with any of the above listed HC, HSW or HCSW sites.

These are the only known duplication or wrong designation of sample site numbers. It appears that different samplers or companies conducting seep/spring inventories occasionally used different designations for the same sites - the main problem being the use of H-n or HC-n for the same location, in some instances. Every effort has been made to refine the station identifications and locations on Plate 7-1 to reflect the sampling data provided in Appendices 7-1, 7-2 and 7-6. Wherever a site has 2 different designations, both are shown with one in parentheses.

The following is a list of proposed monitoring sites:

Station No.	Location	Type
L-1-S	Lila Canyon	Intermittent by rule with ephemeral flow
L-2-S	Rt. Fork Lila (above mine)	Ephemeral Stream
L-3-S	Lila Canyon Below Mine	Intermittent by rule with ephemeral 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	Intermittent by rule with ephemeral flow
L-14-S	Section 25 Wash	Intermittent by rule with ephemeral flow
L-15-S (suspended)	**Sampling Suspended 1Qtr 2003**	Intermittent by rule with ephemeral 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-18-S will no longer be required once the washes have been characterized as Intermittent by rule with ephemeral 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.

731.221 Surface-Water Monitoring Plan The proposed surface-water monitoring plan is detailed in Section 731.220. This plan is based on PHC determination and analysis of all baseline hydrologic, geologic and other information in this permit application. The plan provides for monitoring of parameters that relate to the suitability of the surface water for current and approved postmining land uses and to the objectives for protection of the hydrologic balance as set forth in 751 (see Table 7-4).

731.222 Surface-Water Monitoring Parameters The surface-water monitoring parameters are shown in Table 7-4. Water monitoring locations and sample frequencies are described in Table 7-3 and on Plate 7-4 .

The plan will provide data to show impacts to potentially affected springs, seeps, impoundments and drainages within and adjacent to the permit area, by comparison with relevant baseline data and with applicable effluent limitations.

731.222.1 Non-point Source Locations The parameter list in Table 7-4 provides monitoring for all parameters required by this section. The monitoring locations and frequencies described in Table 7-3 show that all significant springs, seeps, impoundments and drainages that could potentially be impacted by the mining and reclamation operations will be monitored on a regular basis.

731.222.2 Point-source Discharges Point-source discharge monitoring will be conducted in accordance with 40 CFR Parts 122 and 123, R645-301-751 and as required by the Utah Division of Environmental Health for Utah Pollutant Discharge Elimination System (U.P.D.E.S.) permits. A U.P.D.E.S. discharge permit application has been submitted to the Division of Environmental Health for the proposed sediment pond and mine water for the Lila Canyon operation. Existing U.P.D.E.S. permit applications for the Lila Canyon Mine are provided in Appendix 7-5.

731.223 Reporting As indicated in Section 731.220, surface-water monitoring data will be submitted at least every 3 months for each monitoring location. When analysis of any surface water sample indicates non-compliance with the permit conditions, the company will promptly notify the Division and immediately take actions to identify the source of the problem, correct the problem and, if necessary, to provide warning to any person whose health and safety is in imminent danger due to the non-compliance.

731.224 Duration Surface-water monitoring will continue through mining and reclamation until bond release. Locations, parameters and/or sampling frequency (other than U.P.D.E.S. discharge points) may be modified by the Division if:

731.224.1 "The operator has minimized disturbance to the hydrologic balance in the permit and adjacent areas and prevented material damage to the hydrologic balance outside the permit area; water quantity and quality are suitable to support approved postmining land uses"; or,

731.224.2 "Monitoring is no longer necessary to achieve the purposes set forth in the monitoring plan approved under 731.221.

731.225 Monitoring Equipment Equipment, structures and other devices used in conjunction with monitoring the quality and quantity of surface water on-site and off-site will be properly installed, maintained and operated and will be removed by the operator when no longer needed.

731.300 Acid- and Toxic-Forming Materials Drainage from acid- and toxic-forming materials and underground development waste into surface water and ground water will be avoided by implementation of a Spill Prevention Control and Countermeasure (SPCC) Plan and by the following:

731.311 Identification/Burial of Acid- or Toxic-Forming Materials Potentially acid- or toxic-forming materials will be identified by use of Material Safety Data Sheets (MSDS), or by direct sampling and analysis in the case of underground development waste.

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.

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.

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-1-S	Lila Canyon	Int. Stream	Monthly	At mine Site
L-2-S	Rt. Fork Lila (above mine)	Ephemeral Stream	Monthly	RF Above Mine Site
L-3-S	Lila Canyon (below mine)	Int. Stream	Monthly	RF Below Mine Site
L-4-S	Sediment Pond	Discharge	Monthly or as occurs	Per UPDES Permit
L-5-G	Mine Water	Discharge	Monthly or as occurs	Per UPDES Permit
L-6-G	Lila Canyon	Spring	Sampling Suspended 1Qtr 2003	Replaced by L-11-G Water Right 91-617
L-7-G	Little Park	Spring	Quarterly	Cottonwood Spring Sample Site 9 Water Right 91-2521
L-8-G	Little Park	Spring	Quarterly	Unnamed Spring Sample Site 10 Water Right 91-2538
L-9-G	Little Park	Spring	Quarterly	Pine Spring Sample Site 16Z Water Right 91-2539
L-10-G	Williams Draw	Spring	Sampling Suspended 1Qtr 2003	Replaced by L-12-G Water Right 91-809
L-11-G	Lila Canyon	Spring	Quarterly	Mont/Leslie Spring Replaces L-6-G Water Right 91-618

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-18-S will no longer be monitored after the washes have been characterized.

Table 7-4
Lila Canyon Mine
Surface Water Monitoring Parameters
Operational and Post-Mining

Field Measurements	Reported As
Water Level or Flow	Depth, Flow
pH	Standard Units
Specific Conductivity (ohms/cm)	umhos/cm @ 25° C
Temperature	° C
Dissolved Oxygen	mg/l
Laboratory Measurements	Reported As
Total Dissolved Solids	mg/l
Total Settleable Solids	(UPDES)
Total Suspended Solids	mg/l
Total Hardness ($CACO_3$)	mg/l
Total Alkalinity	mg/l
Carbonate (CO_3^{-2})	mg/l
Bicarbonate ($(HC)_3^{-1}$)	mg/l
Calcium (Ca) (Dissolved)	mg/l
Chloride (Cl^-)	mg/l
Iron (Fe) (Dissolved)	mg/l
Iron (Fe) (Total)	mg/l
Magnesium (Mg) (Dissolved)	mg/l
Manganese (Mn) (Dissolved)	mg/l
Manganese (Mn) (Total)	mg/l
Potassium (K) (Dissolved)	mg/l
Sodium (Na) (Dissolved)	mg/l
Sulfate (SO_4^{-2})	mg/l
Oil and Grease (As required)	mg/l
Cations	meq/l
Anions	meq/l

Table 7-5
Lila Canyon Mine
Ground Water Monitoring Parameters
Operational and Post-Mining

Field Measurements	Reported As
Water Level or Flow	Depth, Flow
pH	Standard Units
Specific Conductivity	umhos/cm @ 25° C
Temperature	° C
Laboratory Measurements	**Reported As**
Total Dissolved Solids	mg/l
Total Hardness ($CACO_3$)	mg/l
Total Alkalinity	mg/l
Carbonate (CO_3^{-2})	mg/l
Bicarbonate ($(HC)_3^{-1}$)	mg/l
Calcium (Ca) (Dissolved)	mg/l
Chloride (Cl^-)	mg/l
Iron (Fe) (Dissolved)	mg/l
Iron (Fe) (Total)	mg/l
Magnesium (Mg) (Dissolved)	mg/l
Manganese (Mn) (Dissolved)	mg/l
Manganese (Mn) (Total)	mg/l
Potassium (K) (Dissolved)	mg/l
Sodium (Na) (Dissolved)	mg/l
Sulfate (SO_4^{-2})	mg/l
Oil and Grease (As required)	mg/l
Cations	meq/l
Anions	meq/l

731.400 Transfer of Wells There are presently three Piezometers on this permit. When these 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.

731.510 Discharges into an Underground Mine There are no plans to discharge any water into an underground mine. This section is not applicable.

731.512 Types of Discharge The only planned discharges from this site are water, in the form of sediment pond discharge or underground mine water discharge.

731.512.1 Water See Section 731.512.

731.512.2 Coal Processing Waste N/A - There are no plans to process coal or discharge coal processing waste from this site.

731.512.3 Fly Ash from a Coal-Fired Facility N/A - There are no plans for a coal-fired facility at this time.

731.512.4 Sludge from Acid-Mine-Drainage Treatment N/A There are no plans for an acid-mine-drainage treatment facility at this time.

731.512.5 Flue-gas Desulfurization Sludge N/A - There are no plans for flue-gas desulfurization at this site.

731.512.6 Inert Materials N/A - There are no plans to use or discharge inert materials used for stabilizing underground mines.

731.512.7 Any underground mine development wastes that cannot be left and permanently stored underground will be brought to the surface and stored in a controlled, designated location. Final disposal of such material will depend on its volume, physical and chemical characteristics and potential for use in reclamation. There are presently no plans to return such material underground; however, if this does become necessary in the future, complete plans will be submitted for disposal at that time.

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 Piezometers 1-3 will still be monitored quarterly if possible. The three 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 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 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 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.

If it became necessary to discharge water from the mine, this water would be discharged in accordance with the UPDES permit application in Appendix 7-5. The water would be discharged into the Right Fork of Lila Canyon. Refer to Plate 7-5.

731.520 Gravity Discharges Location of the proposed portal slopes are below the western (upper) exposure of the easterly dipping coal bed. In the area immediately around the proposed portals, no water is presently issuing from the strata above or below the coal outcrop; therefore, it is assumed any water encountered in the underground mining will not be under artesian pressure or with sufficient hydrostatic head to raise it to the portal site.

The coal seam to be mined dips away from the portal site at approximately 10%. If water is encountered in the mining, it will likely be at a static level far below the exposed outcrop or rock slopes. This may result in some possible mine discharge from pumping, but not from gravity.

731.521 Portal Location The proposed access portals are below the coal outcrop, as shown on Figure 7-1, Plates 5-5 and 7-5. The fan is to be located above, at the outcrop. The rock slopes will slope up to the east at approximately 12% to contact the coal seam; however, the coal seam is dipping down to the east in this area. The approximate point of contact between the rock slopes and the coal seam will be 1227' from the surface at an elevation of 6300'. Ground water levels in the mining area, based on the 3 water monitoring holes and other geologic data, appear to be nearly static at elevation 5990 in this area (see Figure 7-1).

Water level in the mine would have to raise approximately 310' to reach the rock slope/coal seam contact and result in a gravity discharge. Water monitoring results and other historical data in the area do not indicate this is likely to occur.

731.522 Surface Entries after January 21, 1981 This is not known to be an acid-producing or iron-producing coal seam; however, proposed portals are located to prevent gravity discharge from the mine (see Section 731.521).

731.600 N/A - There will be no 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.

731.760 Other Maps (See Section 731.700 for a complete list of maps provided in this section).

731.800 Water Rights and Replacement (See Section 727)

732. Sediment Control Measures

732.100 Siltation Structures The only proposed siltation structure for this site is the sediment pond. All disturbed area runoff is proposed to be directed to this pond for final treatment prior to discharge.

The sediment pond will be constructed and maintained in compliance with applicable regulations. Details of the proposed pond are discussed in the following section and in Appendix 7-4.

732.200 Sedimentation Ponds As discussed above, all disturbed area runoff is proposed to be directed to a sediment pond for final treatment prior to any discharge. The proposed sediment pond will be located at the low point of the disturbed area, as shown on Plate 7-5.

732.210 Sediment Pond Details The proposed sediment pond is considered temporary, and will be removed during final reclamation. The pond is designed in compliance with the requirements of the following sections, as required:

356.300 - The pond will be maintained until the disturbed area has been stabilized and revegetated. Removal shall not be any sooner than 2 years after the last augmented seeding;

356.400 - Upon removal, the pond area will be reclaimed and reseeded according to the reclamation plan;

513.200 - N/A - The proposed sediment pond does not meet the size or other qualifying criteria of MSHA, 30 CFR 77.216(a);

763 - Refer to this regulation addressed later in this chapter.

Design details for the sediment pond and site drainage control are addressed in Appendix 7-4 of this P.A.P.

732.220 MSHA Requirements This section does not apply since there are no plans for construction of coal processing waste dams or embankments at this site. The proposed pond does not meet the size or other qualifying criteria of MSHA, 30 CFR 77.216(a).

732.300 Diversions There is one undisturbed diversion planned for this site. This diversion consists of a bypass culvert beneath the sediment pond, which will allow undisturbed runoff to bypass the site without mixing with disturbed area runoff.

Other diversions planned consist of disturbed area ditches and culverts, as shown on Plate 7-5. Design details for all diversions are provided in Appendix 7-4.

All diversions will be constructed and maintained to comply with the requirements of R645-301-742.100 and R645-301-742.300. Details are described under those respective sections of this chapter.

732.400 Road Drainage All roads will be constructed, maintained and reconstructed to comply with R645-301-742.400. Specific information to road drainage is provided under that section of this chapter.

732.410 Alteration or Relocation of Natural Drainages There are no plans to construct roads which will require alteration or relocation of natural drainageways, other than by providing culverted crossings over ephemeral drainages. There are no plans to alter or relocate any intermittent or perennial drainages in conjunction with road construction.

Road construction and design details are provided in Chapter 5 of this P.A.P. Road drainage and culvert design details are provided in Appendix 7-4.

732.420 Culverts Culvert details are provided in Appendix 7-4. All undisturbed culvert inlets will be provided with headwall protection, consisting of inlet sections, rock or concrete.

733. Impoundments The only water impoundment proposed for this site is the sediment pond. Design details for the pond are provided in Appendix 7-4 and on Plate 7-6.

733.100 General Plans The general plan for this site is to drain runoff from the disturbed area into a single sedimentation pond for treatment prior to discharge. Site drainage and design details are described in Appendix 7-4. The general plan includes the following, at a minimum:

733.110 Certification The sediment control plan and proposed sediment pond designs have been prepared and certified by a Registered Professional Engineer, State of Utah.

733.120 Maps and Cross Sections Sediment pond locations, design plans and cross sections are provided on Plates 7-5 and 7-6, respectively.

733.130 Narrative A complete description of the proposed sediment pond along with volumes and design/construction details in provided in Appendix 7-4.

733.140 Survey The proposed sediment pond is not located within a potential subsidence area from past underground mining operations.

733.150 Hydrologic and Geologic Information Relevant hydrologic and geologic information for the sediment pond is provided in Appendix 7-4.

733.160 Certification Statement All proposed sediment pond structures are provided with this submittal. The structure will be constructed prior to construction of the mine site area, but not before receiving Division approval.

733.200 Permanent and Temporary Impoundments As indicated earlier, the proposed sediment pond is classed as temporary.

733.210 Design Requirements The proposed sediment pond is temporary; therefore, the pond is not designed to meet requirements of MSHA 30 CFR 77.216.

The proposed pond is not located where failure would expect to cause loss of life or serious property damage. As shown in Appendix 7-4, the proposed pond embankment will have a minimum of 3H : 1V on the inside slope and 2H : 1V on the outside. These slopes, along with the 95% compaction requirement, will ensure a static safety factor in excess of 1.3, as required.

733.220 Permanent Impoundment Section 733.220 is not applicable since the impoundment will be temporary.

733.230 Temporary Impoundment The proposed sediment pond is a temporary impoundment, and will be removed when reclamation sediment control and revegetation criteria are met, in accordance with Phase II Bond Release criteria.

733.240 Inspections/Potential Hazards As indicated under Section 515.200, if any examination or inspection shows a potential hazard exists, the person who examined the impoundment will promptly notify the Division of the finding and emergency procedures formatted for public protection and remedial action.

734. Discharge Structure All discharges from sedimentation ponds, diversions and culverts will be protected from erosion by the use of adequately sized rip-rap, concrete or other approved protection. Details for outlet protection for all drainage control structures are provided in appendix 7-4. All discharge structures have been designed according to standard engineering design procedures.

735. Disposal of Excess Spoil No excess spoil production is anticipated.

736. Coal Mine Waste Any areas designated for the disposal of coal mine waste will be constructed and maintained to comply with R645-301-746. Details are described under that section.

737. Noncoal Mine Waste Storage and final disposal of noncoal mine waste are described under section 747.

738. Temporary Casing and Sealing of Wells There are no wells proposed to be used to monitor ground water conditions associated with this permit or operation.

740. Design Criteria and Plans Design criteria and plans for this permit are detailed in Appendix 7-4. The following section will describe the general drainage and sediment control plan.

741. General Requirements The proposed operation is an underground mine with a relatively small surface disturbance for transportation, support and coal handling facilities. The proposed surface facilities will comprise a disturbed perimeter of approximately 42.6 acres. Access roads and utility lines will consist of approximately 10 acres of additional disturbance along a BLM Right-of-Way designated as a "Transportation Corridor".

The majority of undisturbed runoff from areas above the proposed mine site will be diverted beneath the site via an undisturbed diversion culvert. Runoff from the disturbed mine site area will be directed to a sediment pond, designed to contain and treat the runoff from a 10 year - 24 hour precipitation event for the contributing watershed. Disturbed area runoff will be directed to the sediment pond via a combination of properly sized ditches and culverts. The general drainage control plan for the mine site is shown on Plate 7-5. The complete Drainage Design and Control Plan is provided in Appendix 7-4 of this P.A.P.

742. Sediment Control Measures See Appendix 7-4 for Sediment Control Measure details.

742.100 General Requirements

742.110 Designed/Constructed/Maintained Appropriate sediment control measures will be designed, constructed and maintained using the best technology currently available to:

742.111 "Prevent, to the extent possible, additional contributions of sediment to stream flow or to runoff outside the permit area;"

This will be accomplished by the construction of undisturbed diversions to allow most undisturbed runoff to by-pass the site and by routing all disturbed runoff to a sediment pond for treatment prior to discharge.

742.112 "Meet the effluent limitations under R645-301-751;"

Any discharge from the sediment pond will be made in compliance with all Utah and federal water quality laws and regulations and with effluent limitations for coal mining promulgated by the U.S. Environmental Protection Agency set forth in 40 CFR Part 434.

742.113 "Minimize erosion to the extent possible:" This will be accomplished by proper routing of drainage, and by the use of energy dissipators and/or erosion protection at all sediment pond, ditch and culvert outlets and in ditches where erosive velocities are expected.

742.120 Sediment Control Measure Sediment control measures within and adjacent to the disturbed areas are detailed in Appendix 7-4. These measures include, but are not limited to:

742.121 As discussed in Appendix 7-4, runoff from the disturbed area will be captured in a sediment pond and/or treated as necessary to meet effluent limitations prior to discharge.

742.122 As discussed in Appendix 7-4, the majority of undisturbed drainage from above the mine site will be diverted via designed undisturbed diversions.

742.123 Undisturbed diversions will consist of properly designed and protected channels and/or culverts as described in Appendix 7-4.

742.124 The primary means of velocity reduction is planned to be the use of rip-rap; however, other methods such as straw dikes, check dams and/or vegetative filters may be employed during the operational or reclamation phases as determined necessary, and with Diversion approval.

742.125 There are no plans to treat runoff with chemicals. Based on extensive experience with runoff in this area, effluent requirements for discharge can normally be met by containment and settling in a sediment pond.

742.126 It is expected that water will be encountered in the underground mining; however, this water will be used for mining needs and only discharged when no further storage is available underground. Any discharge of mine water will meet applicable effluent limitations. Such water will be sampled (and treated if necessary) prior to discharge.

742.200 Siltation Structures As described in Appendix 7-4 the sediment pond will provide for sediment removal for most of the surface facility disturbance. An alternate sediment control method of berms and silt fences will be used at the fan site. The description of this alternate sediment control method is also described in Appendix 7-4. This is necessary due to its remote location and rough terrain. Other sediment structures that might be used around the surface facilities are temporary sediment traps such as straw dikes and/or catch basins.

742.210 General Requirements Siltation structures will be designed, constructed and maintained in accordance with the following regulations.

742.211 Siltation structures will be constructed using the best technology currently available to prevent additional contributions of suspended solids and sediment to streamflow outside the permit area to the extent possible. Sediment control structures and details are discussed in Appendix 7-4.

742.212 The siltation structures (i.e. sediment pond) will be constructed prior to any coal mining and reclamation operations. Upon construction, the pond and any other siltation structures will be certified by a qualified registered professional engineer to be constructed as designed and approved in the reclamation plan.

742.213 The sediment pond will be designed, constructed and maintained in accordance with all applicable regulations. See 732.200, 733.200 and Appendix 7-4 for details.

742.214 Any discharge of water from underground workings to surface waters will meet applicable effluent limitations of 751. If such water is found not to meet those requirements, the water will be treated underground prior to discharge, or passed through a siltation structure prior to leaving the permit area.

742.220 Sedimentation Ponds The sedimentation pond will meet the following criteria:

742.221.1 The pond will be used individually;

742.221.2 The pond is located at the lower end of the disturbed area and out of any perennial stream (See Plate 7-5);

742.221.3 The sediment pond will be designed, constructed and maintained to:

742.221.31 The pond is designed to contain the runoff from a 10 year - 24 hour precipitation event for the area in addition to a minimum of 2 years of sediment storage.

742.221.32 The pond is designed to provide a minimum of 24 hour retention of the runoff from a 10 year - 24 hour precipitation event.

742.221.33 The pond is designed to contain the runoff from a 10 year - 24 hour precipitation event plus a minimum of 2 years of sediment storage.

742.221.34 A nonclogging dewatering device is proved as described in Appendix 7-4.

742.221.35 This will be accomplished by proper design, construction and maintenance of the pond as described in Appendix 7-4.

742.221.36 As discussed in Appendix 7-4, sediment will be removed when the level reaches the 2 year storage level. Since the pond is oversized, this leaves adequate room for storage of the design event.

742.221.37 The sediment pond construction ensures against excessive settlement. See "Sediment Pond Construction Requirements" in Appendix 7-4.

742.221.38 Sediment pond will be free of sod, large roots, frozen soil, and acid- or toxic forming coal processing waste. See "Sediment Pond Construction Requirements" in Appendix 7-4.

742.221.39 The sediment pond will be compacted properly. See "Sediment Pond Construction Requirements" in Appendix 7-4.

742.222 Sediment Ponds Meeting MSHA Criteria The proposed pond does not meet the size or other qualifying criteria of MSHA, 30 CFR 77.216(a). Therefore, this section is not applicable.

742.223 Sediment Ponds Not Meeting MSHA Criteria As discussed in Appendix 7-4, the pond will be equipped with a principle spillway culvert and an open channel spillway each sized to safely discharge runoff from a 25 year - 6 hour precipitation event.

742.223.1 The Principle Spillway culvert is and the Emergency Overflow Culverts will be corrugated, metal pipe. Each one designed to carry sustained flows.

742.223.2 N/A - See 742.223.1

742.224 N/A - See 742.223.1

742.225 N/A - No exception requested.

742.225.1 N/A

742.225.2 N/A

742.230 Other Treatment Facilities No other treatment facilities are planned for this operation. Therefore, Section 742.230 is not applicable.

742.240 Exemptions No exemptions are requested at this time; however, since this is a new proposed operation, the need for Small Area Exemptions and/or Alternate Sediment Control Areas may arise in the future.

742.300 Diversions

742.310 General Requirements

742.311 All diversions are considered temporary, and will be removed upon final reclamation.

Diversions are designed to minimize adverse impacts to the hydrologic balance within the permit and adjacent areas, to prevent material damage outside the permit area and to assure the safety of the public detailed diversion designs are presented in Appendix 7-4 of this P.A.P.

742.312 See Appendix 7-4 for diversion designs.

742.313 As indicated, all diversions for the Lila Canyon Mine are temporary, and will be removed when no longer needed. Land disturbed by removal will be reclaimed in accordance with R645-301 and R645-302. Prior to diversion removal, downstream water treatment facilities will be modified or removed. See Reclamation Hydrology Section of Appendix 7-4.

742.320 Diversion of Perennial and Intermittent Steams Section 742.320 is not applicable since there are no diversions planned for perennial or intermittent streams within the permit area.

742.330 Diversion of Miscellaneous Flows All diversions within the permit area are of miscellaneous flows.

742.331 Certain miscellaneous undisturbed flows are proposed to be diverted around the disturbed area. Other flows are diverted within the disturbed area and to the sediment pond, as described in Appendix 7-4.

742.332 See Appendix 7-4.

742.333 All temporary diversions are designed to safely pass the peak runoff of a 10-year 6-hour event resulting in a more robust design that the required 2-year 6-hour precipitation event. See Appendix 7-4 for details.

742.400 Road Drainage

742.410 All Roads All roads are designed in accordance with requirements of 534. Drainage control for all roads is discussed in detail in Appendix 7-4. No part of any road is planned to be located in the channel of an intermittent or perennial stream. As shown on Plate 7-2, roads are located to minimize downstream sedimentation and flooding.

742.420 Primary Roads Primary road design is discussed under 534.

742.421 As described in Section 534, all primary roads are to be located, insofar as practical, on the most stable available surfaces.

742.422 There are no stream fords planned for this operation.

742.423 Drainage Control Road drainage control is discussed in Appendix 7-4.

742.423.1 Primary roads will be equipped with adequate drainage control, including ditches, culverts and relief drains. The drainage control system is designed, and will be constructed and maintained, to pass the peak runoff safely from a 10 year - 6 hour precipitation event, as described in Appendix 7-4.

742.423.2 Culvert design and installation details are described in Appendix 7-4. Inlets and outlets are protected from erosion. Undisturbed culvert inlets are to be equipped with trash racks.

742.423.3 Drainage ditch design details are provided in Appendix 7-4.

742.423.4 There are plans to alter the drainage channel on the south boundary of the disturbed area. This drainage is an ephemeral channel with no raparian habitat. A stream alteration permit will not be required for this channel. A 60 inch culvert and a sedimentation pond will be placed in this channel. Installation of this culvert and sedimentation control plans are described in Appendix 7-4. To ensure that state of the art technology is incorporated, the final reclamation plans for the sedimentation pond area will be submitted prior to commencement of final reclamation of this area.

742.423.5 Stream channel crossings will be provided by culverts designed, constructed and maintained using current, prudent engineering practice, as described in Appendix 7-4.

743. Impoundments

743.100 General Requirements All impoundments associated with this operation are considered temporary.

743.110 Not applicable there are no impoundments planned that meet the criteria of MSHA, 30 CFR 77.216 (a).

743.120 The design of impoundments have been prepared and certified by a qualified, registered professional engineer. As described in Appendix 7-4, the proposed sediment pond will have at least 2' of freeboard above the highest flow level in the emergency spillway, which is adequate to resist overtopping by waves and by sudden increases in storage volumes.

743.130 As described in Appendix 7-4, the sediment pond will be equipped with a culvert riser principal spillway and a culvert riser emergency overflow sized to safely pass the runoff from a 25 year - 6 hour precipitation event.

743.131 The principal spillway design is discussed below.

743.131.1 The principle spillway will be constructed of corrugated metal pipe. The emergency spillway will also be constructed of corrugated metal pipe.

744. Discharge Structures

744.100 The sediment pond emergency spillway will be a vertical corrugated metal pipe. It will flow into a 60" diameter C.M.P. beneath the pond and discharge onto an engineered rip-rap apron to prevent scouring or erosion. (See Appendix 7-4).

Diversions and culvert outlets that are expected to have flow velocities in excess of 5 fps will also be equipped with erosion and velocity controls as described in Appendix 7-4.

744.200 Discharge structures have been designed and certified according to standard engineering design procedures. (See Appendix 7-4).

745. Disposal of Excess Spoil Section 745 is not applicable since there are no plans for disposal of excess spoil at the Lila Canyon operation.

746. Coal Mine Waste The area designated for coal mine waste disposal is within an existing depression area which is located beneath and around the proposed coal storage pile area as shown on Plates 5-2, 7-2 and 7-5. This disposal area will be used for disposal of the rock slope material, reject from coal processing, coal contaminated waste from the mine (i.e. roof falls, etc.) and/or sediment pond waste.

The designated waste area will be within the disturbed area and drained to the sediment pond, and will be constructed according to Division and MSHA requirements. Coal mine waste disposal is discussed in detail under Section 536 of this permit.

746.100 General Requirements

746.110 All coal mine waste will be placed in a new disposal area within the permit area as discussed in Section 536 and 746.

746.120 The area selected for coal mine waste disposal will drain to the sediment pond for final treatment to minimize adverse effects on the surface and ground water quality and quantity. (See Plates 7-2 and 7-5).

746.200 Refuse Piles. The refuse area is described under Coal Mine Waste in Section 746 and detailed in Section 536. Rock slope material will be used as fill and is referred to as refuse. No coal refuse pile is anticipated. Other than described in Section 536.

746.210 In the event a refuse pile is needed for future operations the refuse piles would be designed to meet the requirements of the above listed Division regulations as well as applicable MSHA regulations. See Section 536 for details.

746.211 The coal mine waste disposal areas will not be located in an area containing springs, seeps or water courses. As shown on Plates 5-2 and 7-5 and described in Appendix 7-4, runoff from the areas will be drained to the sediment pond.

746.212 As described in Sections 536 and 746, the coal refuse will be placed within the mine workings, rock slope material will be placed in existing depression areas. These areas are below grade and will drain to the sediment pond.

Due to the location (below grade) no berms or diversion ditches are planned for the Coal Mine Waste Area. See Appendix 7-4 for hydrologic details.

746.213 Not applicable since there are no underdrains planned for this pile.

746.220 Surface Area Stabilization

746.221 The plan for revegetation of the area is discussed in Section 536.

746.222 There are no plans for any permanent impoundments on the refuse or Coal mine waste area. Small depressions may exist for a short time until regrading is completed. These depressions are normally less than one foot in depth and not left for more than 30 days.

746.300 This section is not applicable since there are no plans to construct any impounding structures of coal mine waste or to impound coal mine waste.

746.400 This section is not applicable since there are no plans to return coal processing waste to abandoned underground workings.

747. Disposal of Noncoal Waste. Disposal of non-coal mine waste is discussed under Section 528.330 of this permit.

747.100 As indicated in Section 528.330, non-coal mine waste will be stored in a controlled manner in a designated area on site. Final disposal of all noncoal mine waste , except concrete during reclamation, will be in a state-approved solid waste disposal area (E.C.D.C.).

747.200 As shown on Plates 5-2B and 7-5, the proposed noncoal mine waste storage area is in a designated site, free of springs or seeps, and drained to the sediment pond.

747.300 There are no plans to dispose of noncoal mine waste within the permit area, except concrete during reclamation. The concrete will be buried beneath a minimum of 2' of non-acid, non-toxic material, and will not degrade surface or ground water.

748. Casing and Sealing of Wells There are only three ground water 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.

750. Performance Standards

751. Water Quality Discharges of water from this operation will be made in compliance with all Utah and federal water quality laws and regulations and with effluent limitations for coal mining promulgated by the U. S. Environmental Protection Agency set forth in 40 CFR Part 434. See Sections 731 and 742.

752. Sediment Control Measures Sediment control measures will be located, maintained, constructed and reclaimed according to plans and designs described under Sections 732, 742, 760 and Appendix 7-4.

752.100 Siltation Structures Siltation structures and diversions will be located, maintained, constructed and reclaimed according to plans and designs described under Sections 732, 742, 763 and Appendix 7-4.

752.200 Road Drainage Roads will be located, designed, constructed, reconstructed, used, maintained and reclaimed as described under Sections 732.400, 742.400 and 762.

752.210 Control or Prevent Erosion See Section 742.400 and Appendix 7-4.

752.220 Control or Prevent Additional Disturbance See Section 742.400 and Appendix 7-4.

752.230 Effluent Standards See Section 742.400 and Appendix 7-4.

752.240 Degradation of Ground Water Systems See Section 742.400 and Appendix 7-4.

752.250 Altering Normal Flow of Water See Section 742.400 and Appendix 7-4.

753. Impoundments and Discharge Structures Impoundments and discharge structures will be located, maintained, constructed and reclaimed as described in Sections 733, 734, 743, 745, 760 and Appendix 7-4.

754. Disposal of Excess Spoil, Coal Mine Waste and Noncoal Mine Waste Disposal areas for excess spoil, coal mine waste and noncoal mine waste will be located, maintained, constructed and reclaimed to comply with Sections 735, 736, 745, 746, 747 and 760.

755. Casing and Sealing of Wells Not applicable since no wells are planned for this site.

760. Reclamation Reclamation hydrology is detailed in Appendix 7-4.

761. General Requirements Upon completion of operations, the disturbed area will be reclaimed. All drainage and sediment controls are considered temporary and will be removed when no longer required. The sediment pond will remain in place until Phase II Bond Release requirements have been met. At that time, the pond will be removed and the area will be reclaimed in accordance with the approved plan.

762. Roads All roads within the disturbed area are temporary, and will be removed and reclaimed upon completion of operations. An access road will be left in place to reach the sediment pond; however, this road will also be removed and reclaimed when the sediment pond is removed.

762.100 Upon removal of roads, culverts and diversions will also be removed and the natural drainage patterns will be restored.

762.200 Cut and fill slopes will be reshaped according to the approved reclamation plan. This reshaping will be compatible with the postmining land use and will complement the drainage pattern of the surround terrain. Road reclamation is described in Section 550.

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 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.

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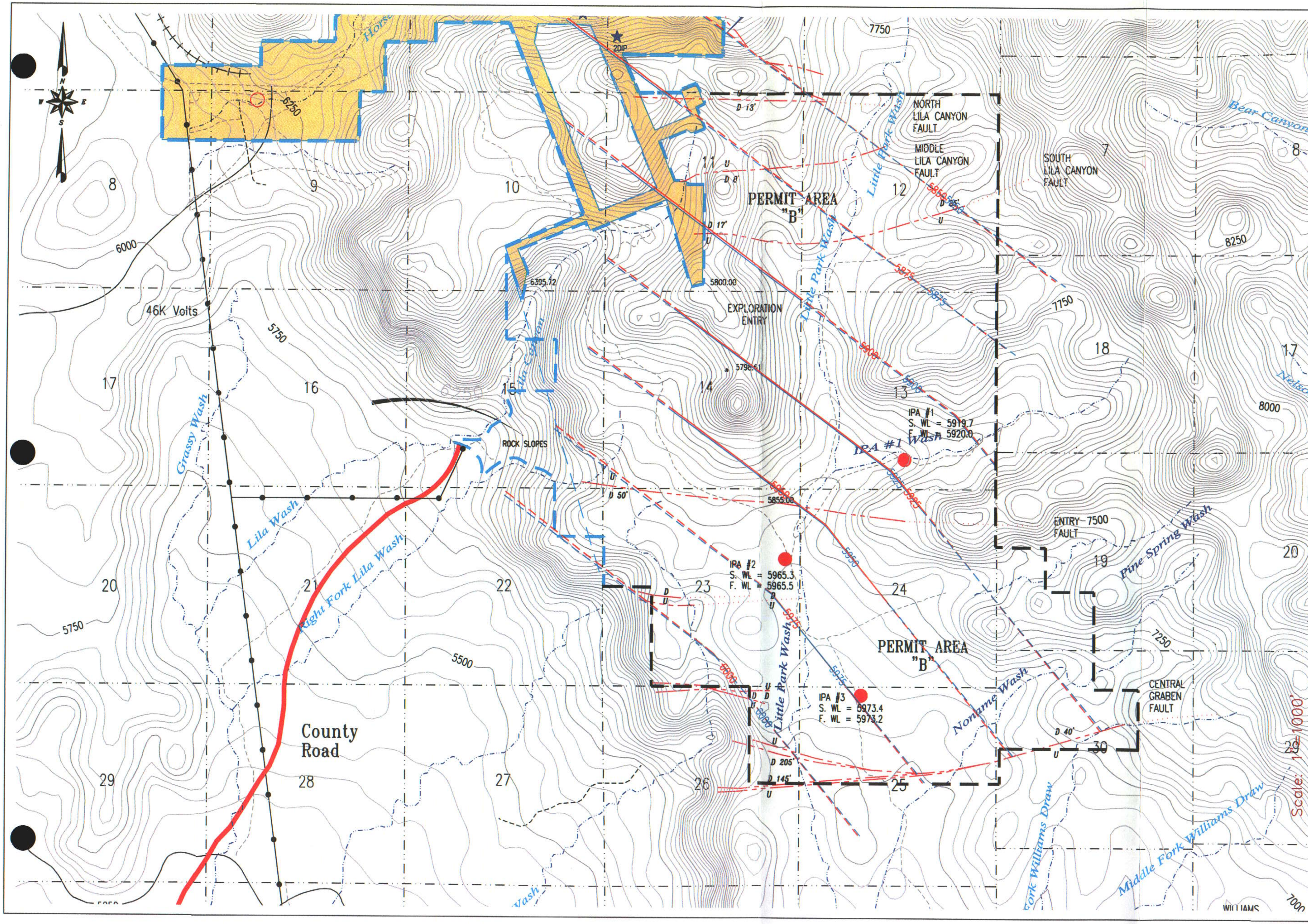

NAME.DWG PROJ DATE

LILA CANYON MINE
Price, Utah

UtahAmerican
Price, Utah

FIGURE 7-2A WATER LEVEL MAP
SPRING AND FALL 2002

LEGEND
Spring WL
Fall WL

Monitoring Point
L-18-S
Stinky Springs Wash

Originally Stinky Spring Wash was thought to have a drainage area of less than 1 square mile making it an ephemeral drainage. However, subsequent calculations have shown Stinky Spring Wash has a drainage area of 1.08 square miles making it intermittent by rule with ephemeral flow. Thus monitoring location L-18-S was identified.

To access L-1-S, L-2-S, and L-3-S, part of the access road travels adjacent to Stinky Spring Wash and L-18-S. Flow, or lack of, was observed during the same observation periods as L-1-S, L-2-S, and L-3-S.

In addition, on a quarterly basis, water samplers walk up the bottom of Stinky Spring Wash to obtain samples from L-16-G (Little Stink), and L-17-G Big Stink). Any flow in Stinky Spring Wash would have been noted.

The dates L-18-S was observed as "Dry No Flow" for 2001 were: 3/23/01, 4/21/01, 5/4/01, 6/19/01, 7/12/01, 8/7/01, 9/4/01, 10/9/01, and 11/21/01. For 2002: 2/21/02, 3/12/02, 4/19/02, 5/29/02, 6/15/02, 7/8/02, 8/14/02, 9/2/02, 10/16/02, and 11/8/02. For 2003: 2/10/03, 3/21/03, 4/15/03, 5/21/03, 6/16/03, 7/22/03, 8/21/03, 9/10/03, 10/16/03, 11/2/03, and 12/18/03. For 2004: 1/21/04, 3/30/04, and 4/21/04 when baseline was completed.

Appendix 7-3

Probable Hydrologic Consequences Determination

Updated January 2005

Probable Hydrologic Consequences Determination

General

The best available data to assist in making a determination of probable hydrologic consequences of the proposed operation comes from the adjacent Horse Canyon Mine, and Columbia Mines. The Columbia Mine has been closed since the late 1960's, and the Horse Canyon Mine has been closed since the mid-1980's. The Horse Canyon Mine has also been reclaimed under SMCRA.

Data gathered from these mines and the surrounding hydrologic regime has been used in this determination, as well as baseline data gathered in the area of the proposed Lila Canyon Mine Extension.

Pertinent water monitoring data for the Horse Canyon Mine and Lila Canyon Extension is included in Appendices 7-1, 7-2, and 7-6 of this application and Appendix VII-1 of the Horse Canyon MRP. Additional recent monitoring data area available from the DOGM electronic database. Baseline geologic information is presented in Chapter 6 of this P.A.P. Baseline hydrologic information is presented in Sections 724.100 and 724.200 of this P.A.P.

Mining in the Horse Canyon area began in the late 1930's. Detailed hydrologic information was first gathered in the late 1970's. It is impossible to precisely describe the area's pre-mining hydrology. The conditions represented by these data help to define the hydrology about the time SMCRA was passed.

Analysis of Data

Potential impacts of coal mining on the quality and quantity of surface and groundwater flow may include:

- Contamination from acid- or toxic-forming materials;
- Increased sediment yield from disturbed areas;
- Increased total dissolved solids concentrations;
- Flooding or stream flow alteration;
- Impacts to groundwater or surface water availability;

- Hydrocarbon contamination from above ground storage tanks or from the use of hydrocarbons in the permit area;
- Contamination of surface and groundwater from road salting; and
- Contamination of surface water from coal spillage due to hauling operations.

Potential Impacts to the Hydrologic Balance. Potential impacts of the Lila Canyon Mine on the hydrologic balance of the permit and adjacent areas are addressed in the following sections:

Acid- or Toxic- Forming Materials. Information on acid-and toxic-forming materials is presented in Chapter 6. These data show that no acid- or toxic-forming materials are present at the Lila Canyon Mine.

Additionally, rocks of the Mesa Verde Group are carbonaceous, resulting in persistence of acids and related toxins in water in the mine and adjacent strata unlikely. Also, the design of the refuse pile will prevent any acid or toxic potential from material removed from the mine. Based upon the hydrology, geology, and climate of the area probability of acid or toxic impacts from materials removed from the mine or from mine water discharge is unlikely. Thus, no significant potential exists for the contamination of surface and groundwater in the permit and adjacent areas by acid- or toxic-forming materials.

Sediment Yield. The potential impact of mining and reclamation on sediment yield is an increase in sediment in the surface waters downstream from disturbed areas. Sediment-control measures (such as sedimentation ponds, diversions, etc.) will be installed to minimize this impact. These facilities will be regularly inspected (see Section 514) and maintained to ensure that they remain in proper operating condition.

The implementation of sediment control measures are mandated to minimize the erosion hazard associated with mining operations. Argument has been presented that reducing the sediment load, while the sediment carrying capacity of the stream remains the same, can result in increased stream bed and stream bank erosion. This would be true, if the flow rate released to the stream remained the same. However, the use of sediment control structures results in the peak flow released from the site to be reduced. Therefore, the sediment carrying capacity of the stream is correspondingly reduced. Additionally, the duration of the lower rate controlled release from the sediment control structures aids in enhancing the 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 cracks which intersect stream channels with steep gradients could, for a short period of time, cause an increase in the sediment yield of the stream. However, this sediment increase would 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. 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 are used by wildlife and livestock. Most of these sources are locate upstream of the proposed discharge point. Therefore, there would be no impact to these existing sources. Additionally, the quality of water discharge from the mine is expected to be significantly better than the other waters which occurs from the Mancos Shale which downstream agriculture currently uses (TDS ranging from 2200 to 4800 mg/l).

Concerns have been raised that there might be impacts of increased salinity from the solution of salts from the Mancos Shale. While it is likely that a small increase in TDS from salts picked up from the Mancos Shale, this is not expected to be a significant problem. Appendix 7-9 includes a calculation of how far mine discharge of 500 gpm would be expected to flow. This flow rate is thought to be higher than the expected discharge amount, but it does provide a worse case estimate. Because of infiltration, evapotranspiration, and diversion runoff from the channel to which the mine discharges to a stock pond, the mine discharge is not expected to reach the Price River. Therefore, it is not expected that any salinity increase would affect downstream waters.

It should also be noted that the dissolved iron standard for class 3C water is 1.0 mg/l. No dissolved iron standard exists for class 2B or 4 waters. The data presented above indicate that potential discharge water from the mine will not exceed the dissolved iron standard of Lila Canyon. No standards exist in the R317 regulations for total iron, dissolved manganese, or total manganese. However, the data presented above indicate that potential discharges from the mine to the Right Fork of Lila Canyon will meet the effluent limitations of 40 CFR 434.

No hydrologic impacts have been noted at the adjacent Horse Canyon Mine due to subsidence. Although tension cracks may locally divert water into deeper formations, resulting in increased leaching of the formation and increased TDS concentrations, the potential of this occurring is considered minimal. This conclusion is based on experience at the Horse Canyon Mine and on the fact that the shale content of the North Horn Formation, the Price River Formation, and the Blackhawk Formation should cause these subsidence cracks to heal quickly where they are saturated by groundwater flow. Thus, potential impacts on TDS concentrations would be minor and not of significant concern.

Flooding or Streamflow Alteration. Runoff from all disturbed areas will flow through a sedimentation pond or other sediment-control device prior to discharge to the Right Fork of Lila Canyon. Three factors indicate that these sediment-control devices will minimize or preclude flooding impacts to downstream areas as a result of mining operations:

1. The sedimentation pond has been designed and will be constructed to be geotechnically stable. Thus, the potential is minimized for breaches of the sedimentation pond to occur that could cause downstream flooding.

2. The flow routing that occurs through the sedimentation pond and other sediment-control devices reduces peak flows from the disturbed areas. This precludes flooding impacts to downstream areas.

3. By retaining sediment on site in the sediment-control devices, the bottom elevations of the Right Fork of Lila Canyon downstream from the disturbed area will not be artificially raised. Thus, the hydraulic capacity of the stream channel will not be altered.

The volume of streamflow will increase in the Right Fork of Lila Canyon if water is discharged from the mine to the drainage. Potential impacts to the drainage channel could include the displacement of fines on the channel bottom, and minor widening of the channel. However, the degree of widening will likely be minimized by the increased vigor and quantity of vegetation which will be sustained along the stream channel by the increased availability of water. In particular, it is anticipated that a phreatophyte streambank vegetative community will develop as a result of mine-water discharges. This effect will occur for the distance downstream that surface flows can be sustained above channel transmission losses. Based on the maximum anticipated estimate of mine water discharge, it is unlikely that any flooding will occur to the downstream channel as the flow (1.1cfs) is significantly below the anticipated 2-year flood (37 cfs). Care will be taken during discharge of this water to avoid erosion at the discharge point or flooding of downstream areas. Once mining ceases, the mine will be sealed and no discharges will occur. The streamflow in the Right Fork of Lila Canyon will then return to pre-mining discharge levels.

Following reclamation, stream channels which have been altered by mining operations will be returned to a stable state (see Section 762.100). The reclamation channels have been designed to safely pass the peak flow resulting from the 10-year, 6-hour or the 100-year, 6-hour precipitation event as appropriate for the channel and in accordance with the R645 regulations. Thus, flooding in the reclaimed areas will be minimized. Interim sediment-control measures and maintenance of the reclaimed areas during the post-mining period will preclude deposition of significant amounts of sediment in downstream channels following reclamation, thus maintaining the hydraulic capacity of the channels and precluding adverse, off-site flooding impacts.

Subsidence tension cracks that appear on the surface will increase the secondary porosity of the formations overlying the Lila Canyon Mine. During the period prior to healing of these cracks, this increased percolation will decrease runoff during the high-flow season (when the water would have rapidly entered the stream channel rather than flowing into the groundwater system). During low-flow periods, the result of this increased percolation will be an increase in the base flow of the stream. Hence, the net result will be a decrease in the flooding potential of the affected stream.

An additional flooding issue is the potential for flooding of the mine following mining and the discharge of water from the portals. Since the regional geology and hydrologic regimes of the Horse Canyon and Lila Canyon Mines are so similar, data has been extrapolated from the Horse Canyon Mine to the proposed Lila Canyon Mine. The proposed Lila Canyon Mine portals are located up-dip from areas in the mine where water may be expected; therefore, the only mine water expected to reach the surface is that which is pumped. Mine water is not expected to reach the portal level or flow from the reclaimed portal level or flow from the reclaimed portals of either the reclaimed Horse Canyon Mine or the Lila Canyon Mine based on the following information:

1) Mine water level information gathered in 1986 and 1993 indicates that there has been little rise in the water level since mining activities ceased.

2) The Sunnyside Fault is not a large producer of water. As an example, the Columbia Mine located north of the Horse Canyon Mine also encountered the Sunnyside Fault zone and has been closed since the late 1960's. If water inflow rates were high, the mine workings would have flooded, developing a head differential between the Columbia Mine and the Horse Canyon Mine (pumped). If the fault zone were a good conductor of water, the inflow to the Horse Canyon Mine would have been high, driven by the head from the flooded Columbia Mine Workings. However this was not the case and the water levels have not flooded much beyond the water levels in the Horse Canyon Mine while it was pumped. Suggesting that there is no head to cause a flooding rise and that the Sunnyside Fault is not a significant conduit for water flow.

3) Sieler and Baskins (1986) showed that the water quality for natural waters generally drops significantly when exposed to mine workings (gob, etc). The water quality of the mine water samples from the Horse Canyon Mine sump locations (2 Dip, Main Slope, 2E-B) as compared to the water quality of springs in the lower stratigraphic section of the Horse Canyon permit area show little difference in TDS. This indicates that majority of the water in the mine is not the result of inflow along the fault zone from the Columbia Mine. Suggesting that the fault zone is a poor conductor of water for the poorer quality water expected from the flooded

Columbia Mine workings or that the Columbia Mine workings have not flooded much beyond the water levels in the Horse Canyon Mine while it was pumped.

4) The three Piezometers, IPA-1, 2 and 3 shown on Plate 7-1, suggest that the gradient is down dip away from the portal area. The Piezometer readings can be found in Appendix 7-1.

5) The coal mined at Horse Canyon (as well as that at Lila Canyon) is underlain by a marine sheet sandstone (Sunnyside, see Geology, Chapter VI). Lines (1985) did extensive petrographic work on porosity and permeability in the formation (see Table 1). If the water level in the mine were to ever approach the level of the portal, the Sunnyside marine sandstone would likely discharge water, preventing any head development behind the portal closures.

6) Much of the Horse Canyon Mine floor has been fractured by the effects of pillar removal, especially near the outcrop. Fracturing develops secondary porosity and enhances the permeability of the underlying Sunnyside marine sandstone. This would function as a means to dissipate any head which might otherwise develop on the portals. The proposed longwall mining in the Lila Canyon Mine is also expected to produce floor fracturing.

7) There is a difference in elevation of about 400 to 500 feet between the lowest portal and the approximate water level in the Horse Canyon mine (1986 and 1993). If the water level in the mine continues to rise, the head differential between the discharging aquifer and the mine will decrease. The 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 in the rock units overlying the mined coal seams. Given the limited number of springs and limited groundwater resources of the 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.

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 do not extend into the Price River Formation and from thence into the overlying active groundwater systems of the North Horn and 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 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 formation or aquifer is 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 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 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 <u>6 miles</u> 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 subsidence fractures could effect Range Creek or any contributing watershed to Range Creek.

Due to the large distance from the proposed permit area, and the 1,000 feet or more of low permeability strata between the coal seam containing Blackhawk formation, and the Colton Formation where Range Creek lies, there is little possibility of groundwater from the Blackhawk Formation being pressurized to supply water to the Range Creek drainage. Additionally, based on the permeability (0.02 ft/day), porosity (0.1) of the the formation and the hydraulic gradient (0.06), the average linear velocity would be 0.012 ft/day. Therefore, for a minimum distance of 5 miles, between the mine and Range Creek, the time of travel would be a minimum of about 6,000 years. Therefore, no baseline or other sampling has been gathered nor 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 are the limits of the areal extent of the recharge or source area to the springs. The 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 the 500 gpm estimate is considered to be conservatively high. The adjacent Horse Canyon Mine had a maximum discharge of 90 gpm. While the Soldier Canyon Mine farther to the north in the Book Cliffs, the rate of water 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 minimized to avoid loss of an economically valuable product. Finally, the Spill Prevention Control and Countermeasure Plan which will be developed for the site will provide inspection, training, and operation measures to minimize the extent of contamination resulting from the use of hydrocarbons at the site. This plan is not required to be submitted. However, a copy will be maintained at the mine site as required by the Utah Division of Water Quality.

Road Salting. No salting of roads will occur within the permit area. Hence, this impact is not a significant concern.

Coal Haulage. Coal will be hauled over the county road from the mine portal area to Utah Highway 6 and thence to its ultimate destination. In the event of an accident which causes coal to spill from the trucks, residual coal following cleanup of the spill may wash into local streams during a runoff event. Possible impacts to the surface water are increased total suspended solids concentrations and turbidity from the fine coal particulates. The probability of a spill occurring in an area sufficiently close to a stream channel to introduce coal to the stream bed is considered small.

In addition to spills, wind may carry coal dust or small pieces of coal from the open top of the coal trucks into drainages near the roads. The impact from fugitive coal dust is considered to be insignificant due to the small amounts lost during haulage in the permit and adjacent areas.

Water Consumption. The USFWS have identified that water consumption by underground coal mining operations could jeopardize the continued existence of and/or adversely modify the critical habitat of the Colorado River endangered fish species: Colorado pikeminnow, humpback chub, bonytailed chub, and razor back sucker. The USFWS has determined that water consumption by underground operations could potentially have adverse effects on the Colorado River basin. The USFWS considers consumption to include: evaporation from ventilation, coal preparation, sediment pond evaporation, subsidence on springs, alluvial aquifer abstractions into mines, postmining inflow to workings, coal moisture loss, and direct diversions. These consumption process are discussed below.

Bath House/Office
It has been estimated that the Bath House/Office will consume approximately 35 gallon per day per person for shower and human consumption. This estimate results in a usage of 1,260,000 gal/yr or 3.86 ac.ft.yr.

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, the springs cannot be adversely effected by subsidence because of their physical location (off the permit area) or because of the amount of cover, 1000 feet or more. 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 encountered underground would take approximately 1,736 years to travel one mile. This water is considered relatively immobile. The water encountered and used underground would not reach the Colorado Drainage in any reasonable time, if ever, and thus water consumed underground cannot negatively effect the Colorado River Basin.

Surface Dust Suppression It has been estimated that usage on the surface for dust suppression will be approximately 10,000 gallon per day or 3,650,000 gallons per year. This results in a usage of 11.20 acre feet per year.

Direct Diversions - no consumption.

Adding the four losses due to mining equals to 80.81 acre feet which is below the mitigation level of 100 acre feet. UEI does hold 362.76 acre feet of underground water rights to offset any consumption. Therefore, it is the opinion of UtahAmerican Energy, Inc. that water consumption by underground coal mining operation will NOT jeopardize the existence of or adversely modify the critical habitat of the Colorado River endangered fish species.

Conclusion

Based on available data and expected mining conditions, the proposed mining and reclamation activity is not expected to proximately result in contamination, diminution or interruption of an underground or surface source of water within the proposed permit or adjacent areas which is used for domestic, agricultural, industrial, wildlife or other legitimate purpose.

It should be noted that the determination of no known depletion of flow or quality is based on available data, which is primarily post-mining.

Table 2
Projected Water Usage (Quantitative Water Consumption Impact Assessment)

1- Bath House/Office a. 150 @ 35 gpd/ea. = 5250 x 240	1,260,000 gal./yr.
2- Mining(Coal moisture loss) a. 2 Sections (1) 4.5 M Ton @ 4.5 gal./ton	20,250,000 gal./yr.
3- Fan (Evaporation from ventilation) a. Evaporation (1) 900,000 cfm @ 473,040 M cf/yr. (2) 2.5 gal./M c.f.	1,183,600gal./yr.
4. Surface Dust Suppression 10,000 gallon per day	3,650,000 gal/yr.
Total Usage	26,343,600 gal./yr. (80.81 ac.ft./yr.)

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APPENDIX 7-7

Surface Water Characterizations

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INTRODUCTION:

The following data was collected to characterize the channels and flow patterns within each drainage basin within the Lila Canyon Permit Area. Surface waters in or adjacent to the permit area were characterized as perennial, intermittent or ephemeral.

The classifications are based on water table elevations (with respect to channel surface) and biologic (flora and aquatic) communities present, or the established classification established in the definitions under R645-301-100. The major drainage basins have been broken down into channel reaches. Tables 1 and 2 along with Figure 1 combines and condenses the information presented. Photographs were taken of the stream reaches to help visualize the conditions within the various reaches. The photographs are presented in Attachment #1 to this Appendix.

General:

The mine extension area is situated in two distinct sub-basins on the Price River basin. The surface of the underground workings described in the MRP, is drained by Little Park Wash and Stinky Spring Wash (See Plate 7-3 in the MRP and Figure 1 of this Appendix). The major surface facilities will be located in the Cove area below the cliffs. The Cove area is drained by Grassy Wash.

The Little Park Wash drainage occupies approximately 48 square miles of the eastern dip slope of the Book Cliffs escarpment between Horse Canyon and the Price River 15 miles to the south. Several east-west tributaries from the steep western slope of the Roan sub-cliffs join the main Little Park Wash.

LITTLE PARK WASH: Reaches 1, 2, 3 and 8

Since the Main Little Park Wash watershed drains at least one square mile, it is considered "intermittent" by DOGM definition. However, the main Little Park Wash channel is a dry ephemeral acting stream. No springs or seeps have been noted to date in the main Little Park Wash. The east-west tributaries to the Main Little Park Wash do contain springs and are discussed as individual reaches.

Table 1

Drainage Basins
in
Square Miles

Drainage	Above Permit Extension (Sq. Miles)	Within Permit Extension (Sq. Miles)	Total Above & On Permit Ext. (Sq. Miles)
Little Park Wash (Less Tributaries) Reaches #1, #2, & #3	1.26	2.08	3.34
Reach #4 Cottonwood Spring	.31	.63	0.94
Reach #5 IPA #1 Wash	1.06	.75	1.81
Reach #6 Pine Spring Wash	.44	.99	1.43
Reach #7 No Name Wash	.70	.71	1.41
Reach #8 Williams Draw Wash	.2	.08	0.28
Little Park Wash Drainage Total	**3.97**	**5.24**	**9.21**
Coves			
Reach #9 Stinky Spring Wash	0	1.08	1.08
Lila (Cannot be effected, previously mined)	1.14	.57	1.71
Right Fork Lila (Drainage Less than 1Square Mile (Ephemeral)	0	.40	0.4
Coves Drainage Total	**1.14**	**2.05**	**3.19**
TOTAL PERMIT EXTENSION	**5.11**	**7.29**	**12.4**

The Main Little Park Wash is broken down into four Reaches. Reach #1, identified by the Operator, can be described as being the Left Fork of the Left Fork of Little Park Wash. Reach #2, identified by the Operator, can be described as being the Right Fork of the Left Fork of Little Park Wash. Reach #3, identified by the Operator, can be described as being the Right Fork of Little Park Wash. The main Little Park Wash has been identified by the operator as Reach #8. All reaches with associated photograph numbers and locations are shown on Figure 1. The photographs can be found in Attachment #1 to this Appendix.

Reach #1

Reach #1 can be described as being the Left Fork of the Left Fork of Little Park Wash. Reach #1 starts at the north boundary of the permit area at an elevation of 7480 feet and drops at a grade of 6.58 % to an elevation of 7,360 feet where it converges with Reach #2 forming the Main Little Park Wash. The 1,800 foot long channel is comprised mostly of sand and gravel with the sides being pinyon-juniper and sagebrush grass associations, with no riparian vegetation present. The full 1,800 feet has been classified as ephemeral acting. Fish and macro invertebrates are non existing within this reach.

There are no water shares associated with Reach #1. Reach #1 can not be impacted by mining do to the coal seam depth being over 2,000 feet.

Photographs 18 and 25, found in Attachment #1, depict the conditions found in reach #1.

Reach #2

Reach #2, identified by the Operator, can be described as being the Right Fork of the Left Fork of Little Park Wash (Figure 1). Reach #2 starts at the north boundary of the permit area at an elevation of 7,500 feet and flows at a grade of 7.56 % to an elevation of 7360 feet where it converges with Reach #1 forming the Main Little Park Wash. The 1,900 foot long channel is comprised mostly of sand and gravel with the vegetation being mostly pinyon-juniper and sagebrush grass associations, with no riparian vegetation present. The full 1,900 feet has been classified as ephemeral acting. Fish and macro invertebrates are non existing within this reach.

There are no water shares associated with Reach #2. Reach #2 can not be impacted by mining do to the coal seam depth being over 2,000 feet.

Photographs 20,21,22, and 26, found in Attachment #1, depict the conditions found in Reach #2.

Reach #3

Reach #3, identified by the Operator, can be described as being the Right Fork of Little Park Wash. Reach #3 starts at the north east boundary of the permit area at an elevation of 7,750 feet and flows at a grade of 10.2% to an elevation of 7,270 feet where it converges with the Main Little Park Wash, Reach #8 (Table 2). The 4,800 foot long channel is comprised mostly of sand and gravel with the upper sections being Douglas Fir and transgressing into pinyon-juniper and sagebrush grass associations, with no riparian vegetation present. The full 4,800 feet has been classified as ephemeral acting. Fish and macro invertebrates are non existing within this reach.

There are no water shares associated with Reach #3. Reach #3 can not be impacted by mining do to the coal seam depth being over 2,000 feet.

Photographs 38, 39, 40, 41, 42, 44, 46, and 47, found in Attachment #1, depict the conditions found in Reach #3.

Reach #8

Reach #8 identified by the Operator as the Main Little Park Wash. Reach #8 starts at the confluence of Reach #1 and Reach #2.

Reach #8, the Main Little Park Wash with its tributaries, drain approximately 9.21 square miles of the Lila Canyon Permit Extension. (See Table 1). Elevation of the wash at Price River is 4,800 feet and south of Horse Canyon is 7,500 feet. The eastern slope rises to an elevation of over 9,000 feet while the western lower Book Cliffs ridge is about 6,000 to over 8,000 feet. The channel starts at an elevation of 7350 feet and flows at a grade of 3.3 % to an elevation of 6,700 feet where it leaves the permit area. The channel meanders through Holocene stream alluvium in the upper reaches and has incised a meandering channel through underlying Cretaceous rocks in the lower region below Williams Draw fault. The

INSERT

TABLE 2

Channel Characterizations

11 X 17

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 7-8 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 has been observed between monitoring dates. Flow was not observed from the melting of snow cover in the spring of 2001, 2002, or 2003 as might be expected.

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. Fish and macro invertebrates are non existing within this reach, with no riparian vegetation present.

The chance of subsidence negatively effecting this ephemeral channel is minimal. However, in the unlikely event that cracks, fissures or sink holes are observed as a result of subsidence the channel will be regraded, filling in the cracks, fissures or sinkholes by hand methods or light equipment depending upon inaccessibility. UEI will use the best available techniques available at the time of repair. Significant repairs may require seeding. UEI will notify the Division prior to any repair of seeps, springs, or drainages.

Photographs 23, 27, 29, 30, 31, 33, 34, 36, 56, 57, 63, 81, 82, 83, and 84, found in Attachment #1, depict the conditions found in Reach #8.

(Reach #4) Cottonwood Spring Wash

Cottonwood Spring Wash is an east-west tributary to the Main Little Park Wash. Cottonwood Spring Wash drains approximately .94 square miles. Of the total drainage .63 square miles of drainage is within the permit area (Tables 1 & 2).

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 7,200 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 2,000 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.

Seasonal flash floods can be expected and tend to obliterate any human activity which has occurred in the washes. The sediment laden water from Cottonwood Spring Wash reaches Little Park Wash only in the most 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 7-8 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.

Water share 91-399, associated with L-7-G, is held by the operator and has been designated for mining use. The 250 foot length of Reach #4B can be considered either intermittent or perennial.

The intermittent flow of water from L-7-G probably never reaches the main channel of Little Park Wash even in years of high precipitation.

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

Photographs 8, 9, 10, 50, and 51, found in Attachment #1, depict the conditions found in Reach #4B.

Reach #4C

Reach #4C (Table 2) is described as the area from L-7-G to the confluence of Little Park Wash. Reach #4C is shown on Figure 1. Fish and macro invertebrates are non existing within this reach.

Reach #4C starts near photo 51 at an elevation of 7,300 feet and drops to an elevations of 7,180 feet and has a minor slope (4.5%) over its 2,575 foot length. The reach runs mostly through pinyon juniper transgressing a sagebrush grass type vegetation at the confluence with Little Park Wash. 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 #4C. This reach is considered ephemeral. Reach #4C can not be impacted by mining do to the coal seam depth being over 1,500 feet.

Photograph 32, found in Attachment #1, depicts the conditions found in Reach #4C.

(Reach #5) IPA#1 Wash

IPA#1 Wash is an east-west tributary to the main Little Park Wash (Figure 1). IPA#1 drains approximately 1.81 square miles. Of the total drainage .75 square miles of drainage is within the permit area (Table 1).

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 7-8 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 7-8 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.

Fish and macro invertebrates are non existing within this reach.

Seasonal flash floods can be expected and tend to obliterate any human activity which has occurred in the washes. The sediment laden water from IPA#1 reaches Little Park Wash only in the most extreme situation.

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 #5C can not be impacted by mining do to the coal seam depth being over 1,000 feet.

Photographs 54, 55, and 35 found in Attachment #1, depicts the conditions found in Reach #5C.

(Reach #6) Pine Spring Wash

Pine Spring Wash is an east-west tributary to the main Little Park Wash (Figure 1). Portions of this stream reach immediately adjacent to Pine Spring can be considered intermittent by definition.

Pine Spring Wash drains approximately 1.43 square miles. Of the total drainage .99 square miles of drainage is within the permit area (Table 1).

The channel cuts through the Flagstaff/North Horn, and the Upper Price River formations, from an elevation of 8,900 feet to an elevation of 6,800 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 3,000 feet above the coal seam. At this depth there is no chance that underground mining can adversely effect the channel.

Vegetation transgresses from spruce-fir in the very most upper reaches, to pinion-juniper, and then finally 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 7-8 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 7-8 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 7-8 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 7-8 contains a description of the monitoring point. One hundred feet below L-12-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. Flow has been observed at the road crossing, L-14-S, in some wet years but it is currently dry. The intermittent flow of water from the springs probably never reaches the main channel of Little Park Wash even in years of high precipitation.

Vegetation transgresses from Spruce -fir in the very most upper reaches, to pinion-juniper, and then finally to a sagebrush grass type vegetation at the confluence with Little Park Wash. The reach does not contain any riparian vegetarian. Fish and macro invertebrates are non existing within this reach.

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.

No water shares are associated with #7. 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 #7 can not be impacted by mining do to the coal seam depth being over 1,000 feet.

Photographs 61, 87, and 88 found in Attachment #1, depicts the conditions found in Reach #7.

The Cove Drainage:

Because it drains a watershed of at least one square mile, the Cove Drainage is considered "intermittent" by DOGM definition. However the Cove Drainage channel is a dry ephemeral acting stream.

The Cove Drainage, south of Horse Canyon, reaches its highest elevation of 8,500 feet at the head of Lila Canyon. Coleman Wash drains the upper reaches, joining Grassy Wash, which together with Stinky Springs Wash drains the Book cliffs escarpment in the Mine Permit Extension Area. Grassy and Stinky Spring Washes join with Marsh Flat Wash. The major dry 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 7-8 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, Bighorn sheep have been observed with lambs in the spring.

(Reach #9A) Above the Escarpment

Reach #9A (Table 2) is described as the area of Stinky Spring Wash above the escarpment. Reach #9A is shown on Figure 1.

At the upper end Stinky Spring Wash begins at what has been identified as a stock pond but is actually a alluvial fan composed of mostly sand. The channel starts in the Upper Price River formation and cuts through the Castle Gate Sandstone.

Reach #9A starts at an elevation of 7,080 feet and drops to an elevations of 6,560 feet and has a minor slope (7.0%) over its 7,400 foot length. The reach runs mostly through pinyon-juniper and sagebrush grass associations. 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 #9A.

The channel ranges from 1,000 to under 500 feet above the coal seam. The channel is located above the proposed mine but is above either a long term bleeder systems, mains, or barriers. The bleeders and the mains are designed to be mined in such a way that subsidence will not take place.

The chance of subsidence negatively effecting this ephemeral channel is minimal. However, in the unlikely event that cracks, fissures or sink holes are observed as a result of subsidence the channel will be regraded, filling in the cracks, fissures or sinkholes by hand methods due to its inaccessibility. UEI will use the best available techniques available at the time of repair. Significant repairs may require seeding. UEI will notify the Division prior to any repair of seeps, springs, or drainages.

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.

Photograph 93, 94, 95, 96, 97, 98, 99, and 100, found in Attachment #1, depicts the conditions found in Reach #9A.

Reach #9B Escarpment to Stinky Springs

Reach #9B (Table 2) is described as the area of Stinky Spring Wash from the escarpment to Stinky Springs. Reach #9B is shown on Figure 1 Reach #9B starts at the top of the escarpment and then drops of the face of the Book Cliffs into the Black Hawk formation and then through the Mancos Shale to Stinky Springs.

Reach #9B starts at an elevation of 6,560 feet and drops to an elevations of 5,840 feet and has a slope (38.1%) over its 1,800 foot length. The 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.

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 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 chance of subsidence negatively effecting this ephemeral channel is minimal since a outcrop barrier of 200 feet is required at the escarpment, and at the bottom of the escarpment the channel is approximately 600 feet below the coal seam. The outcrop barriers, and physical location of the coal seam in respect to the channel result in a minimal chance of subsidence negatively effecting the channel.

Reach #9C Stinky Springs

Reach #9C (Table 2) is described as the area of Stinky Springs. Reach #9C is shown on Figure 1.

Reach #9C starts at an elevation of 5,840 feet and drops to an elevations of 5,760 feet and has a slope (15%) over its 535 foot length. The 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 7-8 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 7-8 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 7-8 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 Llla 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.

Appendix 7-7

Figure 1

All Stream Reaches

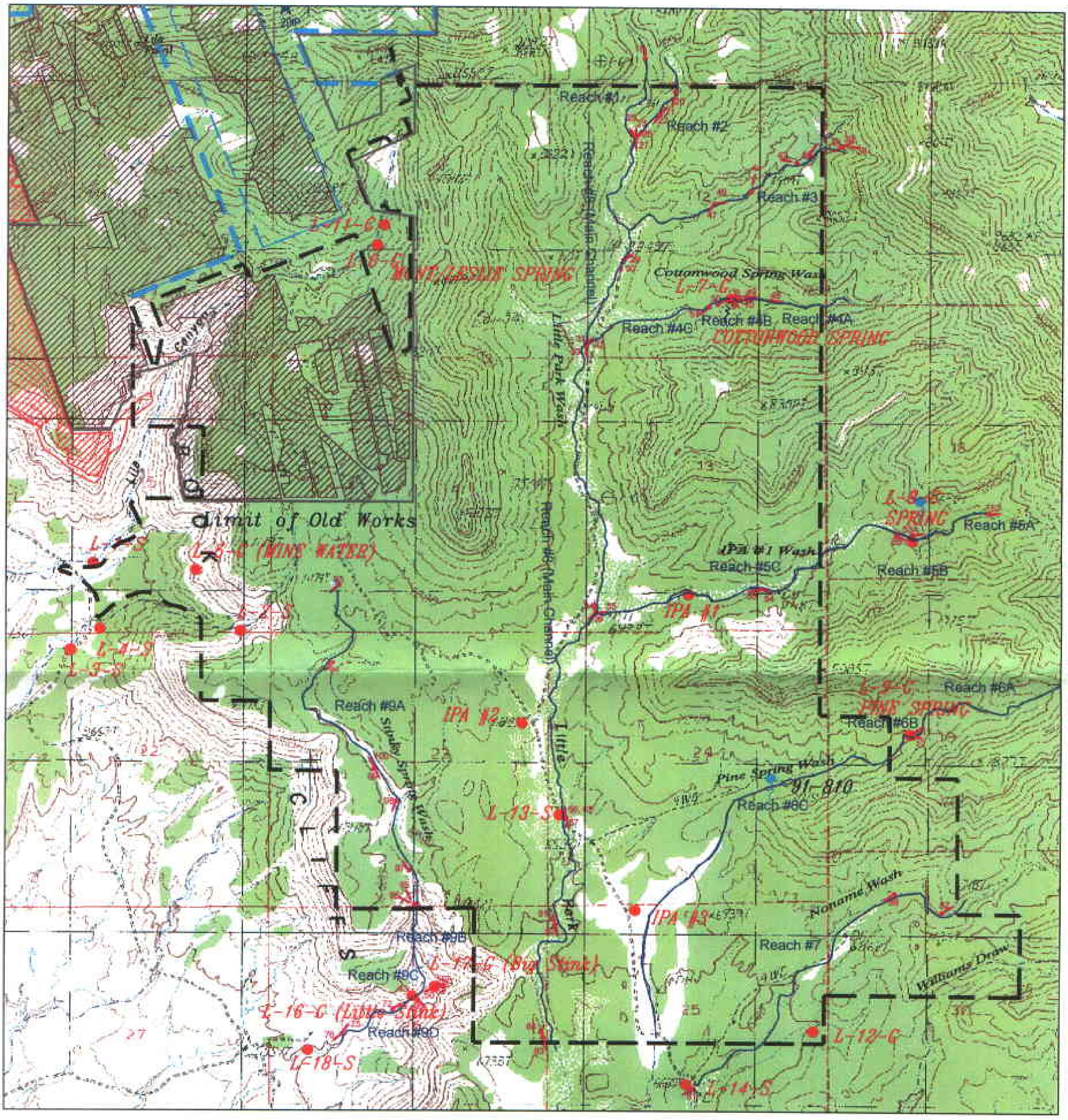


Photo Locations in Magenta

REVISIONS

RJM	01/10/04		
RJM	1/2005		

UTAH REGISTERED PROFESSIONAL ENGINEER #152606 C. Jay Marshall

N

SCALE
1000' 0' 2000'

Lila Canyon Mine

Appendix 7-7
Figure 1

L-18-S
Stinky Springs Wash

PHOTO NOT AVAILABLE

Location: L-18-S is located adjacent to the existing Lila access road (County road 126). Located in the Mancos Shale at an elevation of 5500 feet. The stream reach is intermittent by definition but is ephemeral acting (See Appendix 7-7 & Plate 7-4). The drainage above and below this monitoring location flows only as a result of spring run-off or storm events.

General: The coal seam does not exist at this location. This site is located 1.1 miles south-west of the permit boundary. As a result of Its location, there is no potential for Lila Canyon Mine to negatively impact this monitoring location. The permittee has never observed amphibians at or near this location.

Vegetation description: The area surrounding the dry wash monitoring site consists primarily of isolated sagebrush, and needle and thread grass.

APPENDIX 7-10

Peak Flow Simulation Results

UtahAmerican Energy, Inc.

R. Jay Marshall P.E.

INTRODUCTION:

The following simulation was prepared to provide a characterization of the variation of flow as a result of differing rainfall return periods within each drainage basin within the Lila Canyon Permit Area. Surface waters in or adjacent to the permit area have not exhibited flow on a long term basis and therefore were characterized as intermittent or ephemeral in nature.

General:

Figure 1 for Appendix 7-10 presents the nine drainage basins that were evaluated as part of the simulations. These drainages include: Noname Wash (WS1), Pine Spring Wash (WS2), Little Park Wash (WS 3 through 6), Stinky Spring Wash (WS 7), Lila Canyon (WS 9), and a smaller tributary (WS 8).

The drainages were simulated for the 6-hour and 24-hour rainfall events. This provides an assessment of the drainages response to different types of rainfall events. The 6-hour events are typical of local, isolated high intensity thunderstorms, while the 24-hour events are typical of large, frontal type storms. Rainfall data were obtained from the precipitation frequency data server from the NOAA (see Attachment 1)

The simulation was conducted using the Hydroflow program prepared by Intelisolve. This program uses the NRCS unit hydrograph method with selected rainfall distributions to simulate peak flows. It also incorporates channel routing and hydrograph addition to allow multiple watersheds to be simulated and modeled to determine the effect on combined watershed flows.

For the simulation, the watersheds were modeled using a weighted curve number value to cover the entire watershed. This value was determined based on professional judgement using soils and vegetation information from the watershed areas. For the watersheds, the curve number was based on a hydrologic soil group of 'B' due to the sandy soils predominant in the higher elevations and a combination of sage-grass and juniper-grass vegetation with a ground and canopy cover percentage of 40 (see Figure 9.6 from NEH-4 Attached). Hydraulic length and slope values were determined from the topographic maps of the area. Watershed inputs are presented in Table 1.

Channel routing parameters were determined from field observation and from topographic maps of the area. Channel routing inputs are presented in Table 2.

Simulations were prepared for the 2-, 5-, 10-, 25-, 50-, and 100-year, 6-hour and 24-hour rainfall events for each watershed. The results of these simulations are presented in Table 3. Graphs of the combined hydrographs of each watershed are presented in Attachment 2.

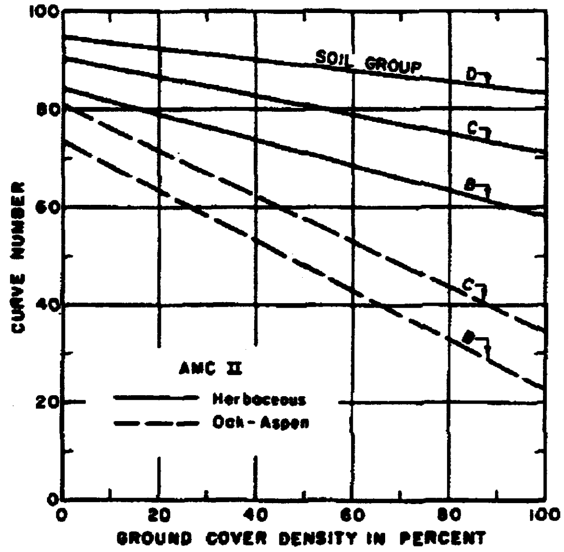


Figure 9.5.--Graph for estimating runoff curve numbers of forest-range complexes in western United States: herbaceous and oak-aspen complexes.

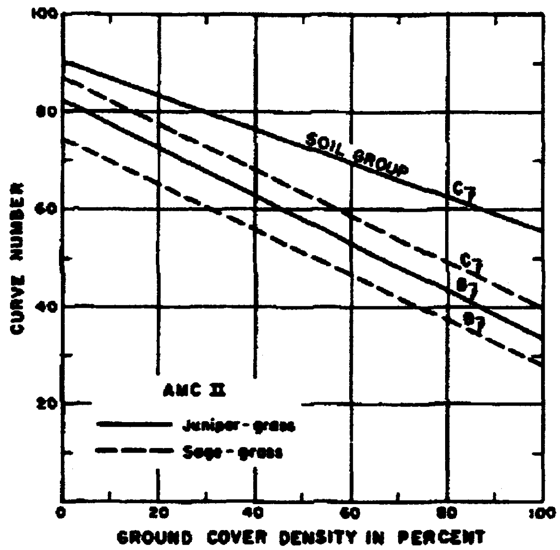


Figure 9.6.--Graph for estimating runoff curve numbers of forest-range complexes in western United States: juniper-grass and sage-grass complexes.

Table 1

PEAK FLOW SIMULATION WATERSHED INPUTS

Watershed ID	Drainage Area (ac)	Curve Number	Hydraulic Length (ft)	Basin Slope (%)	Time of Concentration (min)
WS1.1	427	65	7290	21.8	50.88
WS1.2	566	65	7520	4.3	118.03
WS2.1	272	65	7810	22.0	57.80
WS2.2	317	65	8560	4.7	135.00
WS7.1	849	65	12880	19.7	84.30
WS8.1	278	65	9670	21.1	64.80
WS9.1	1317	65	13900	20.0	89.00
Little Park 6.1	499	65	7930	20.8	55.70
Little Park 6.2	285	65	6790	19.3	51.10
Little Park 6.3	94	65	2170	4.2	44.20
Little Park 5.1	77	65	2230	44.8	13.70
Little Park 5.2	213	65	4550	13.2	44.80
Little Park 4.1	189	65	3850	31.3	25.40
Little Park 4.2	232	65	5010	10.4	54.60
Little Park 6.4	67	65	2370	4.2	47.00
Little Park 6.5	276	65	6770	17.5	53.50
Little Park 6.6	383	65	5730	3.3	107.50
Little Park 3.1	687	65	7090	24.2	47.20
Little Park 3.2	379	65	4980	4.4	83.30
Little Park 6.7	760	65	10770	2.9	191.30

Table 2

PEAK FLOW SIMULATION CHANNEL INPUTS

Channel ID	Reach Length (ft)	Mannings n	Side Slope (xH:1V)	Bottom Width (ft)	Channel Slope (%)
WS1 Channel	7520	0.030	2	8	4.3
WS2 Channel	8560	0.030	2	8	4.7
WS6.3 Channel	2170	0.030	2	8	4.2
WS5.2 Channel	4550	0.030	2	8	13.2
WS6.4 Channel	2370	0.030	2	8	4.2
WS4.2 Channel	5010	0.030	2	8	10.4
WS6.6 Channel	5730	0.030	2	8	3.3
WS3.2 Channel	4980	0.030	2	8	4.4
WS6.7 Channel	10770	0.030	2	8	2.9

Table 3

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

Watershed ID	Return Period	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 3

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

Watershed ID	Return Period	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 3

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

Watershed ID	Return Period	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

ATTACHMENT 1

PRECIPITATION DATA

POINT PRECIPITATION FREQUENCY ESTIMATES FROM NOAA ATLAS 14

Utah 39.43 N 110.35 W 6397 feet

from "Precipitation-Frequency Atlas of the United States" NOAA Atlas 14, Volume 1, Version 3
G.M. Bonnin, D. Todd, B. Lin, T. Parzybok, M.Yekta, and D. Riley
NOAA, National Weather Service, Silver Spring, Maryland, 2003
Extracted: Tue Nov 22 2005

Confidence Limits | Seasonality | Location Maps | Other Info. | GIS data | Maps | Help | Docs | U.S. Map

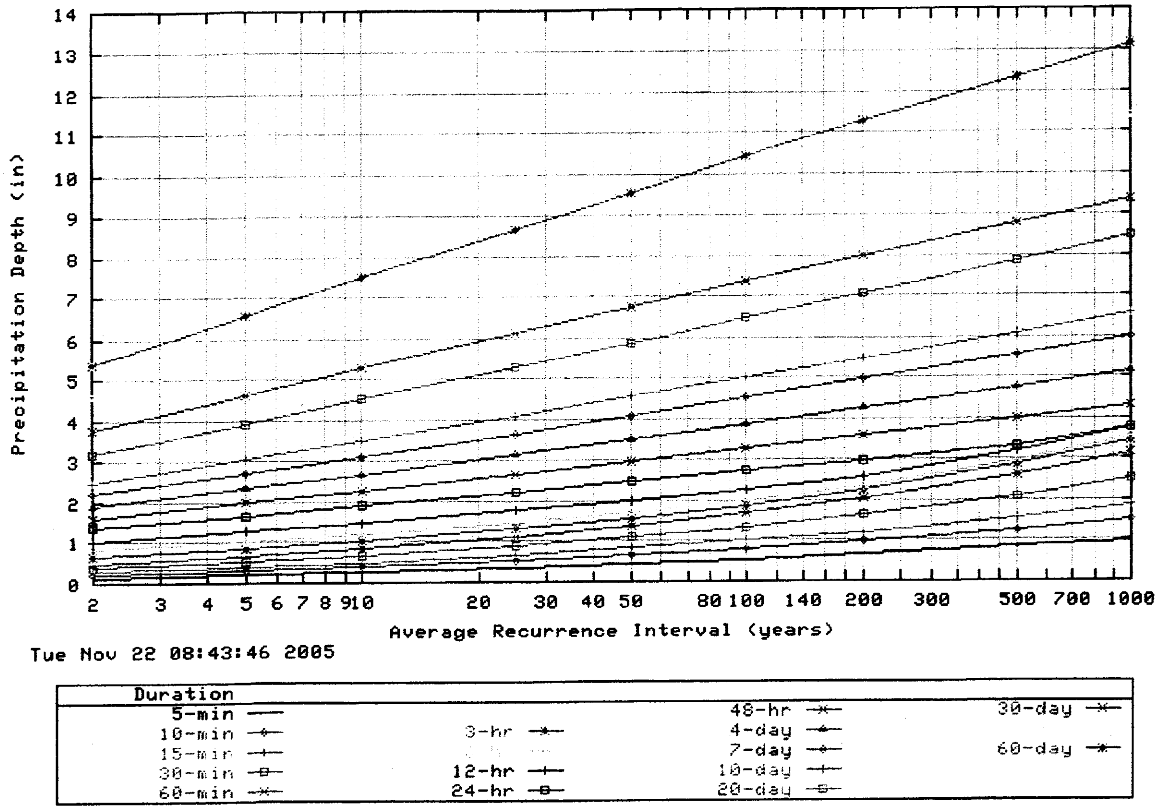
Precipitation Frequency Estimates (inches)

ARI* (years)	5 min	10 min	15 min	30 min	60 min	120 min	3 hr	6 hr	12 hr	24 hr	48 hr	4 day	7 day	10 day	20 day	30 day	45 day	60 day
2	0.15	0.23	0.29	0.39	0.49	0.58	0.66	0.83	1.03	1.36	1.62	1.91	2.21	2.50	3.19	3.79	4.59	5.38
5	0.22	0.33	0.41	0.55	0.68	0.78	0.85	1.04	1.27	1.66	1.98	2.33	2.71	3.07	3.93	4.63	5.61	6.59
10	0.27	0.41	0.51	0.69	0.85	0.96	1.03	1.22	1.49	1.91	2.27	2.68	3.11	3.52	4.52	5.28	6.40	7.50
25	0.36	0.54	0.67	0.91	1.12	1.25	1.31	1.49	1.77	2.23	2.66	3.15	3.67	4.11	5.29	6.12	7.42	8.69
50	0.44	0.67	0.82	1.11	1.37	1.51	1.57	1.72	2.01	2.48	2.96	3.51	4.09	4.57	5.89	6.75	8.18	9.56
100	0.53	0.81	1.00	1.35	1.67	1.83	1.88	2.00	2.26	2.74	3.27	3.89	4.53	5.02	6.49	7.38	8.93	10.43
200	0.65	0.98	1.22	1.64	2.03	2.21	2.26	2.37	2.58	3.00	3.58	4.27	4.97	5.49	7.09	7.99	9.67	11.27
500	0.83	1.26	1.56	2.10	2.60	2.82	2.88	2.99	3.19	3.34	4.00	4.78	5.57	6.10	7.88	8.79	10.64	12.35
1000	1.00	1.52	1.88	2.54	3.14	3.39	3.46	3.56	3.76	3.79	4.32	5.16	6.02	6.56	8.48	9.39	11.36	13.15

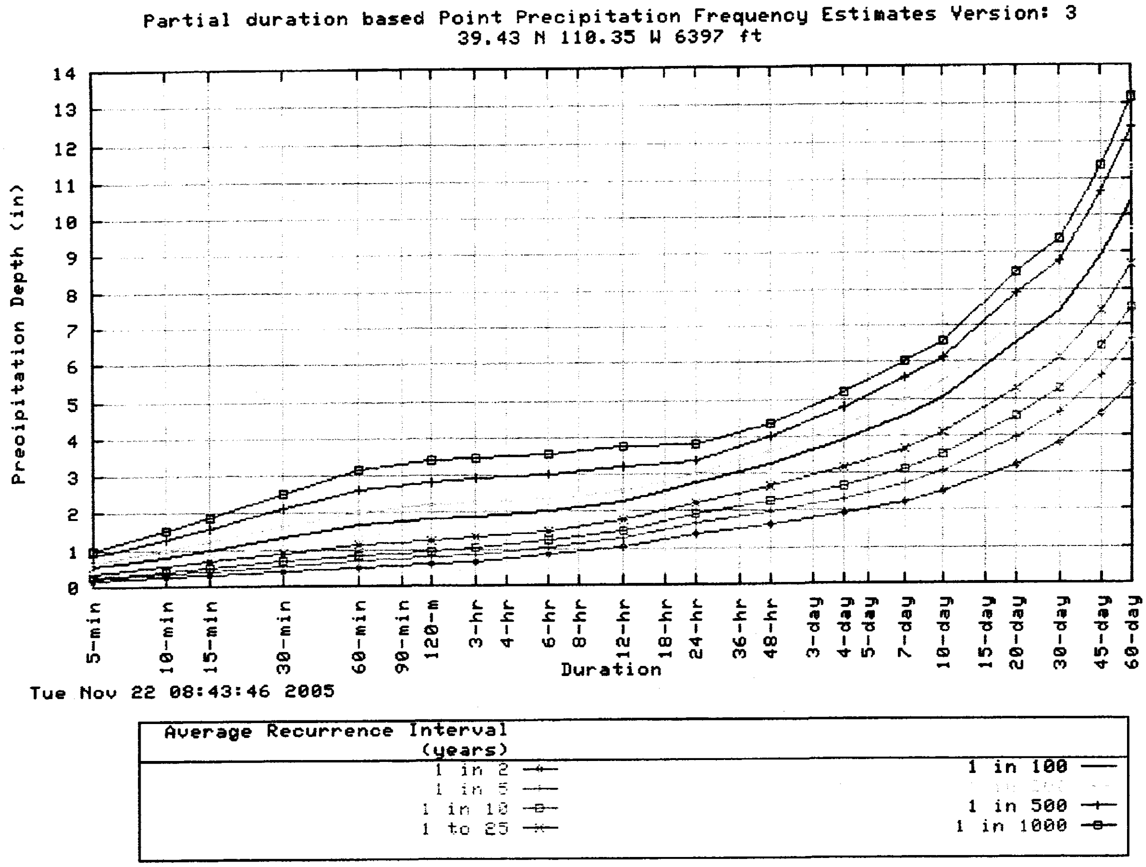
Text version of table

* These precipitation frequency estimates are based on a partial duration series. ARI is the Average Recurrence Interval. Please refer to the documentation for more information. NOTE: Formatting forces estimates near zero to appear as zero.

Partial duration based Point Precipitation Frequency Estimates Version: 3
39.43 N 110.35 W 6397 ft



Tue Nov 22 08:43:46 2005



Confidence Limits -

*** Upper bound of the 90% confidence interval**
Precipitation Frequency Estimates (inches)

ARI** (years)	5 min	10 min	15 min	30 min	60 min	120 min	3 hr	6 hr	12 hr	24 hr	48 hr	4 day	7 day	10 day	20 day	30 day	45 day	60 day
2	0.18	0.28	0.35	0.47	0.58	0.67	0.75	0.94	1.16	1.49	1.77	2.09	2.43	2.73	3.47	4.12	4.99	5.83
5	0.26	0.39	0.48	0.65	0.80	0.90	0.97	1.17	1.43	1.82	2.16	2.55	2.98	3.34	4.27	5.02	6.08	7.12
10	0.32	0.48	0.60	0.81	1.00	1.11	1.18	1.38	1.66	2.08	2.46	2.92	3.42	3.82	4.90	5.71	6.92	8.11
25	0.42	0.64	0.80	1.07	1.33	1.45	1.51	1.71	2.00	2.45	2.89	3.42	4.01	4.46	5.74	6.61	8.02	9.38
50	0.52	0.79	0.98	1.32	1.63	1.77	1.82	1.99	2.28	2.74	3.21	3.82	4.49	4.96	6.39	7.32	8.85	10.35
100	0.63	0.96	1.20	1.61	1.99	2.15	2.21	2.35	2.62	3.04	3.56	4.24	4.97	5.48	7.06	8.02	9.67	11.32
200	0.78	1.18	1.47	1.97	2.44	2.63	2.69	2.82	3.04	3.35	3.91	4.66	5.46	5.99	7.74	8.71	10.49	12.28
500	1.02	1.55	1.92	2.58	3.19	3.44	3.52	3.62	3.83	3.87	4.40	5.24	6.17	6.68	8.67	9.63	11.58	13.55
1000	1.25	1.90	2.36	3.18	3.93	4.21	4.29	4.38	4.60	4.65	4.79	5.71	6.70	7.23	9.37	10.34	12.43	14.49

* The **upper** bound of the confidence interval at 90% confidence level is the value which 5% of the simulated quantile values for a given frequency are **greater** than.

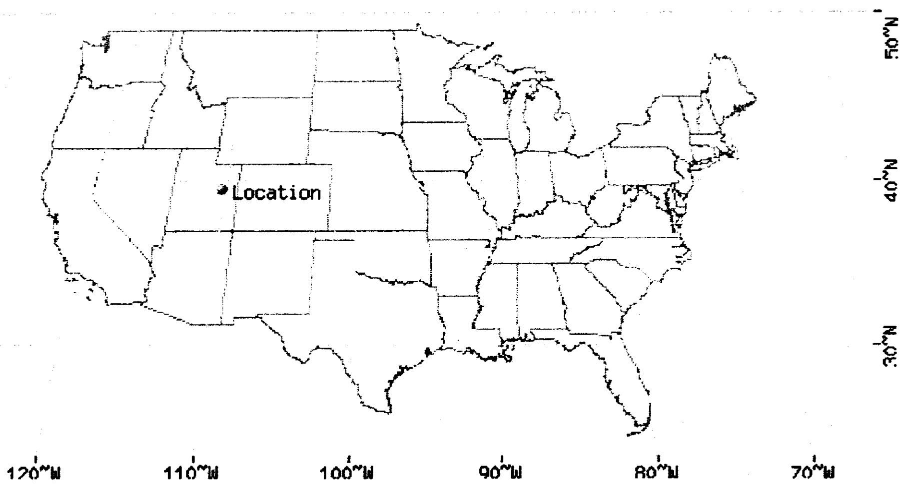
** These precipitation frequency estimates are based on a partial duration series. **ARI** is the Average Recurrence Interval.
Please refer to the documentation for more information. NOTE: Formatting prevents estimates near zero to appear as zero.

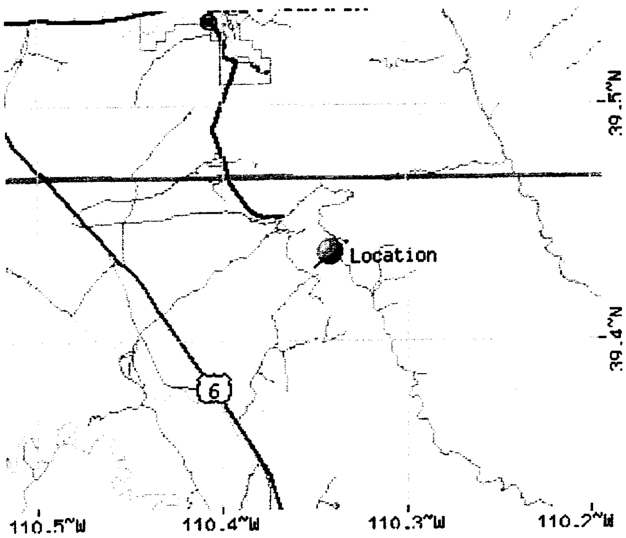
*** Lower bound of the 90% confidence interval**
Precipitation Frequency Estimates (inches)

ARI** (years)	5 min	10 min	15 min	30 min	60 min	120 min	3 hr	6 hr	12 hr	24 hr	48 hr	4 day	7 day	10 day	20 day	30 day	45 day	60 day
2	0.14	0.21	0.26	0.34	0.42	0.51	0.58	0.74	0.93	1.26	1.49	1.77	2.02	2.31	2.95	3.52	4.25	4.99
5	0.19	0.28	0.35	0.47	0.58	0.68	0.75	0.92	1.14	1.53	1.82	2.15	2.49	2.82	3.63	4.29	5.19	6.09
10	0.23	0.35	0.43	0.59	0.72	0.83	0.90	1.08	1.32	1.75	2.08	2.46	2.83	3.21	4.16	4.87	5.88	6.91
25	0.30	0.45	0.56	0.76	0.94	1.05	1.12	1.30	1.56	2.05	2.42	2.86	3.31	3.72	4.85	5.62	6.77	7.95
50	0.35	0.54	0.67	0.90	1.12	1.25	1.31	1.48	1.75	2.27	2.67	3.16	3.66	4.10	5.36	6.16	7.43	8.70
100	0.42	0.64	0.80	1.07	1.33	1.47	1.54	1.70	1.95	2.49	2.93	3.47	4.01	4.46	5.86	6.68	8.05	9.43
200	0.49	0.75	0.93	1.26	1.56	1.72	1.80	1.97	2.19	2.71	3.17	3.76	4.34	4.83	6.34	7.18	8.65	10.11
500	0.60	0.92	1.14	1.53	1.90	2.09	2.21	2.41	2.66	3.00	3.49	4.13	4.78	5.27	6.95	7.81	9.39	10.96
1000	0.70	1.06	1.32	1.78	2.20	2.41	2.55	2.80	3.08	3.22	3.72	4.40	5.08	5.59	7.39	8.25	9.93	11.55

* The **lower** bound of the confidence interval at 90% confidence level is the value which 5% of the simulated quantile values for a given frequency are **less** than.
** These precipitation frequency estimates are based on a partial duration maxima series. **ARI** is the Average Recurrence Interval.
Please refer to the documentation for more information. NOTE: Formatting prevents estimates near zero to appear as zero.

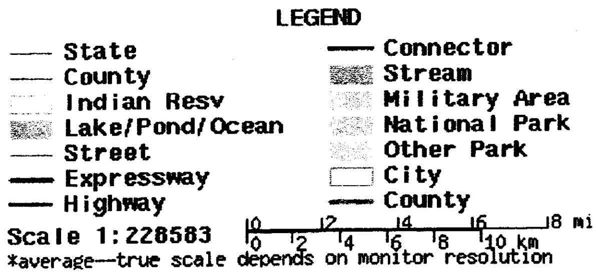
Maps -





These maps were produced using a direct map request from the U.S. Census Bureau Mapping and Cartographic Resources Tiger Map Server.

Please read disclaimer for more information.



Other Maps/Photographs -

View USGS digital orthophoto quadrangle (DOQ) covering this location from TerraServer; **USGS Aerial Photograph** may also be available
from this site. A DOQ is a computer-generated image of an aerial photograph in which image displacement caused by terrain relief and camera tilts has been removed. It combines the image characteristics of a photograph with the geometric qualities of a map. Visit the USGS for more information.

Watershed/Stream Flow Information -

Find the Watershed for this location using the U.S. Environmental Protection Agency's site.

Climate Data Sources -

Precipitation frequency results are based on data from a variety of sources, but largely NCDC. The following links provide general information
about observing sites in the area, regardless of if their data was used in this study. For detailed information about the stations used in this study,
please refer to our documentation.

Using the National Climatic Data Center's (NCDC) station search engine, locate other climate stations within: +/-30 minutes ...OR... +/-1 degree of this location (39.43/-110.35). Digital ASCII data can be obtained directly from NCDC.

Find Natural Resources Conservation Service (NRCS) SNOTEL (SNOwpack TELemetry) stations by visiting the Western Regional Climate Center's state-specific SNOTEL station maps.

Hydrometeorological Design Studies Center
DOC/NOAA/National Weather Service
1325 East-West Highway
Silver Spring, MD 20910
(301) 713-1669
Questions?: HDSC.Questions@noaa.gov

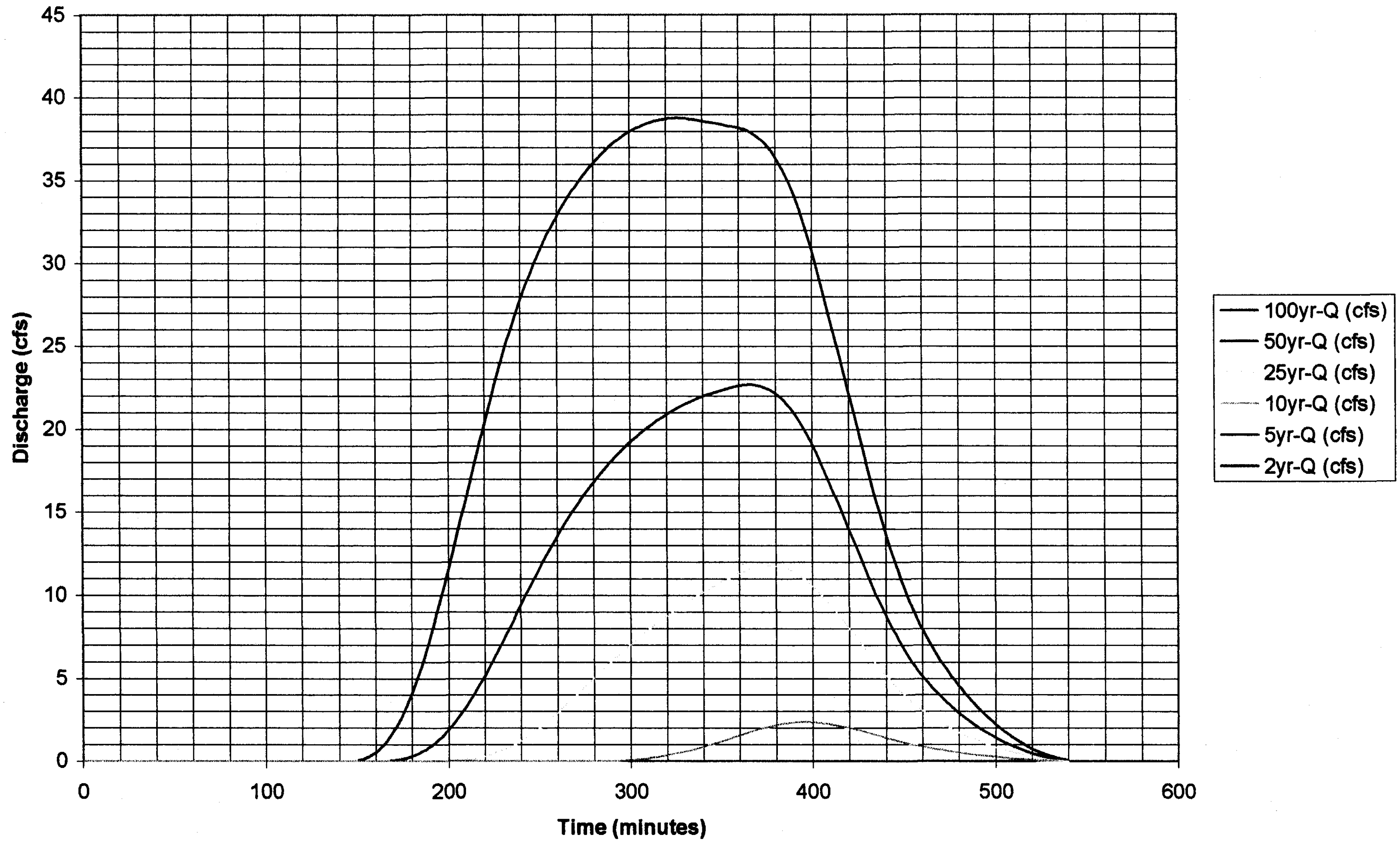
Disclaimer

ATTACHMENT 2

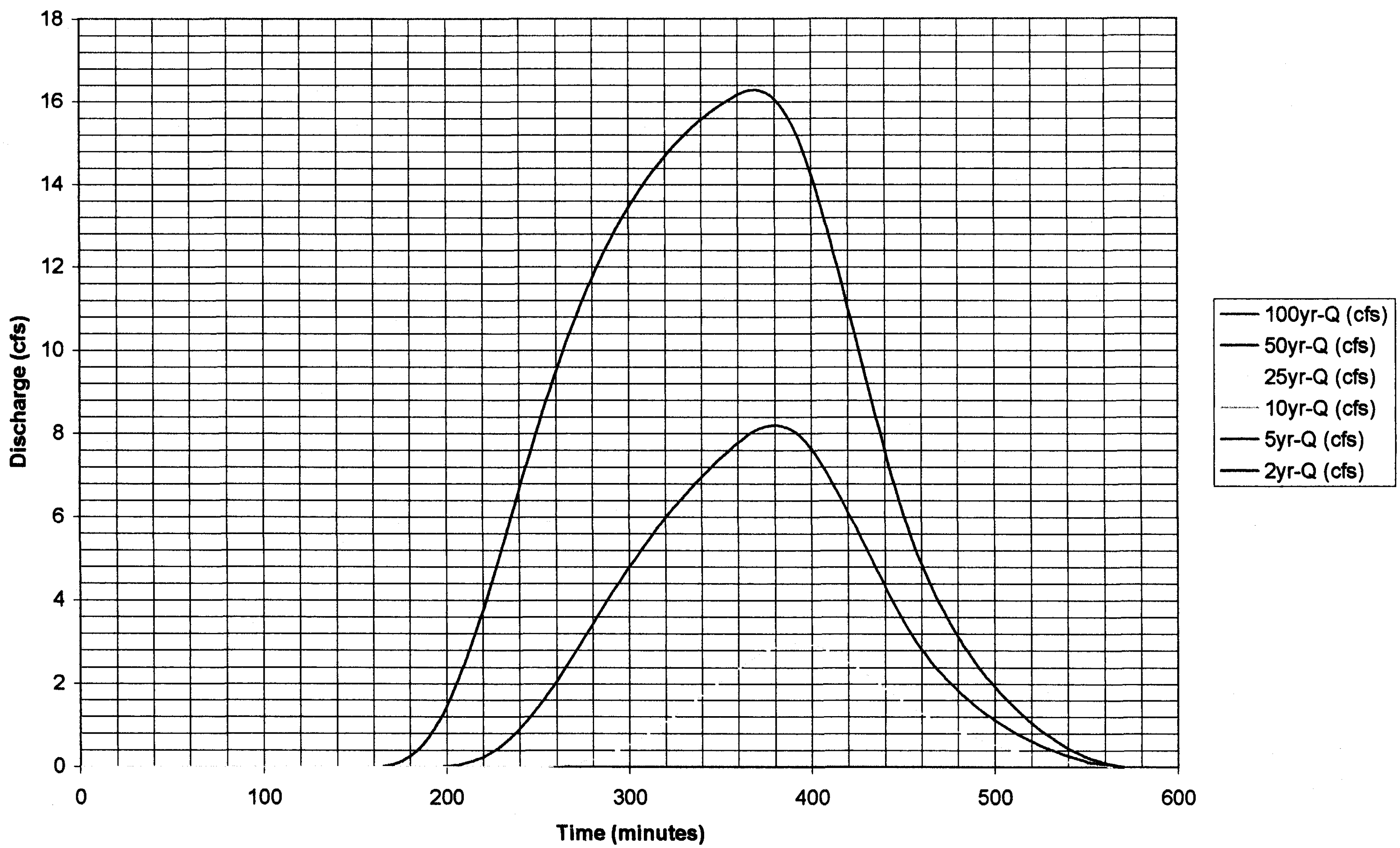
SIMULATION HYDROGRAPHS

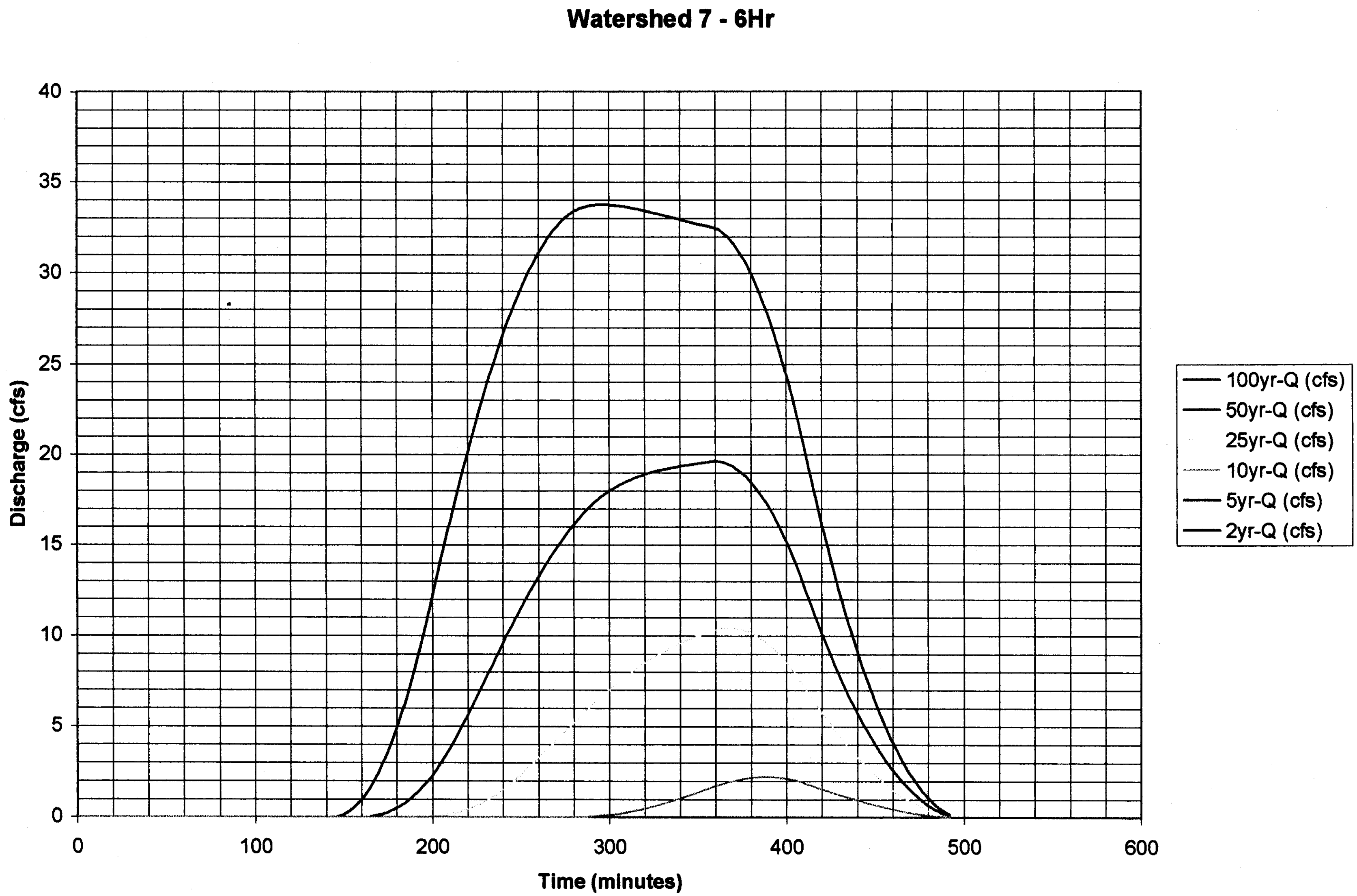
6-HOUR SIMULATION RESULTS

Watershed 1 - 6 Hr

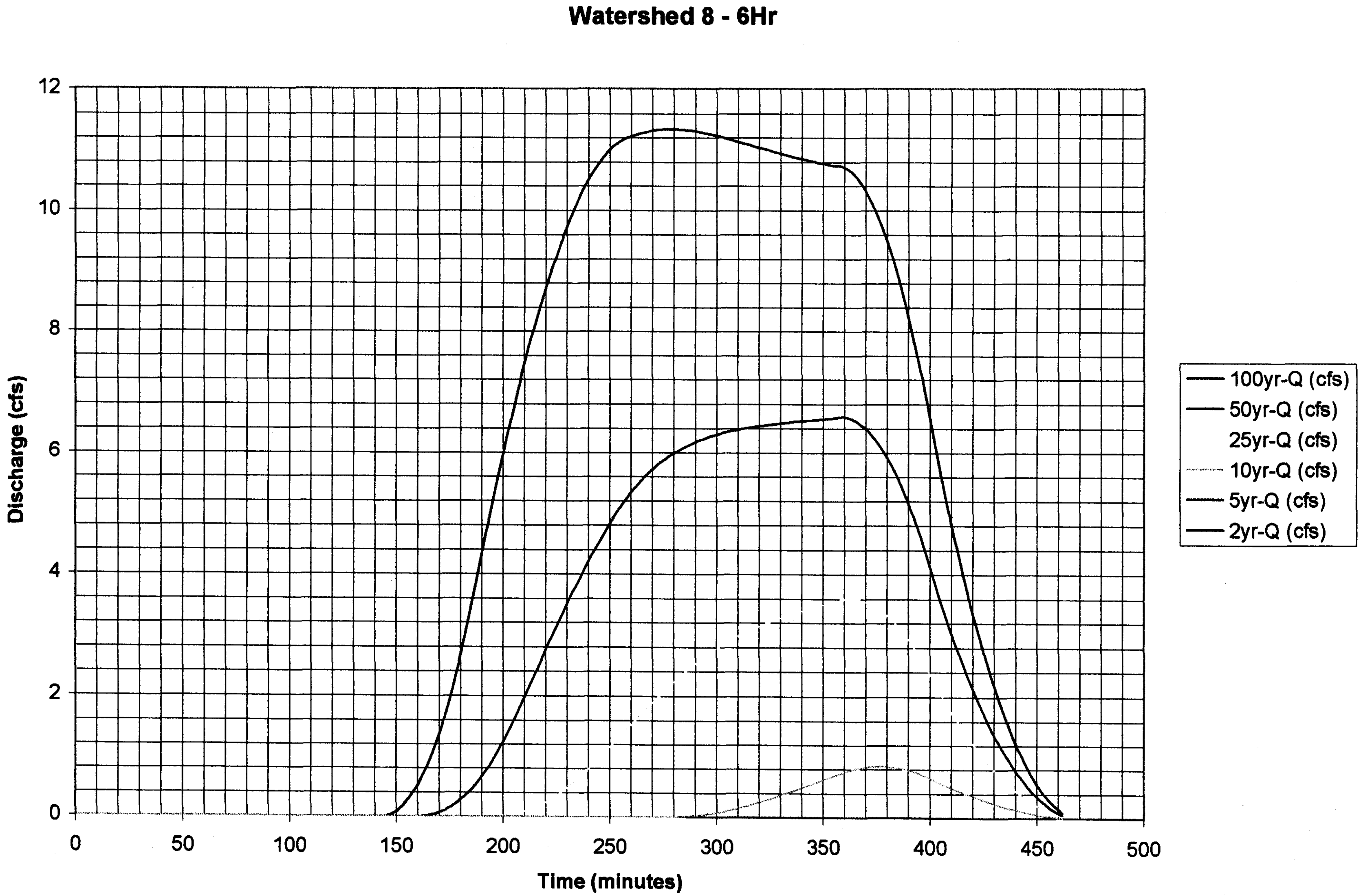


Watershed 2 - 6Hr

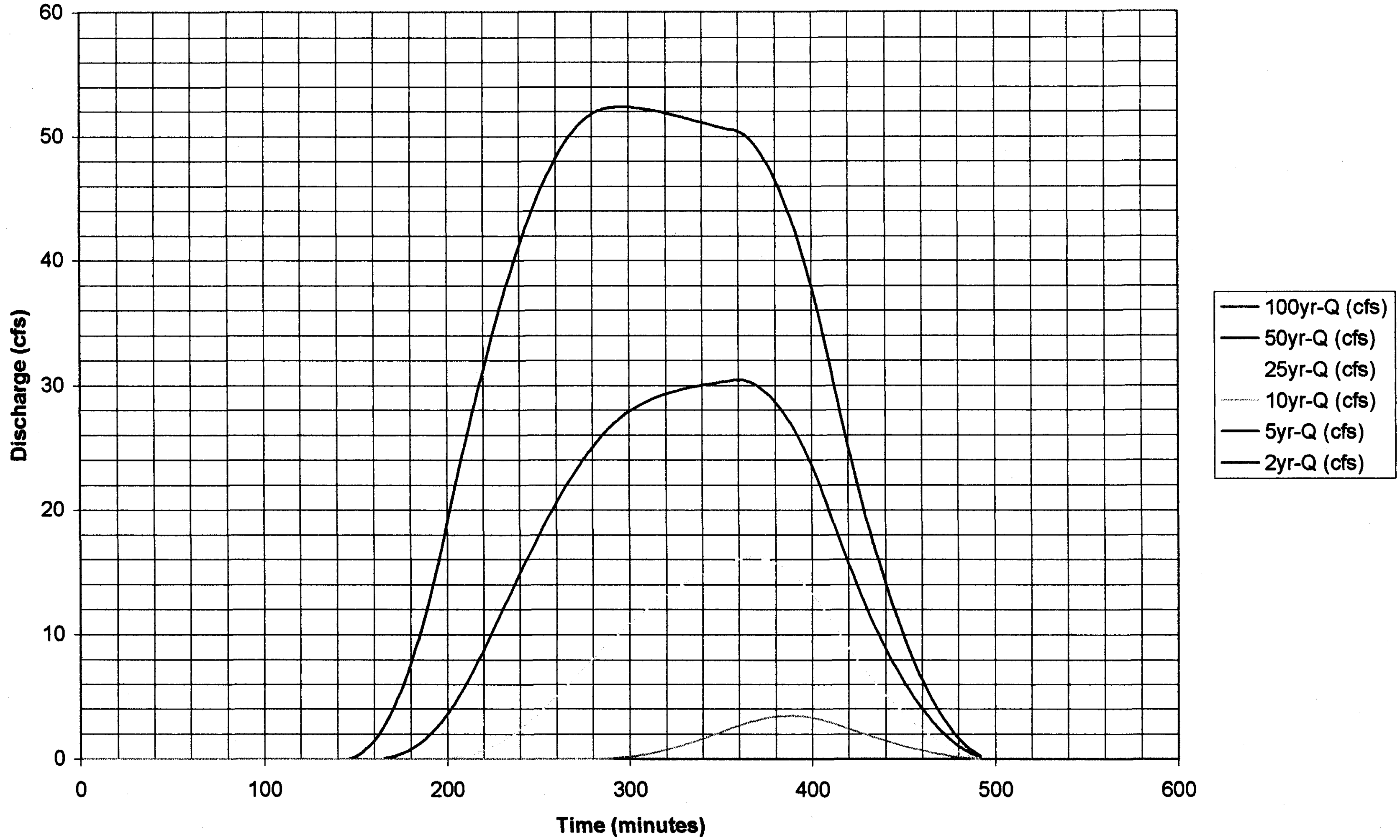


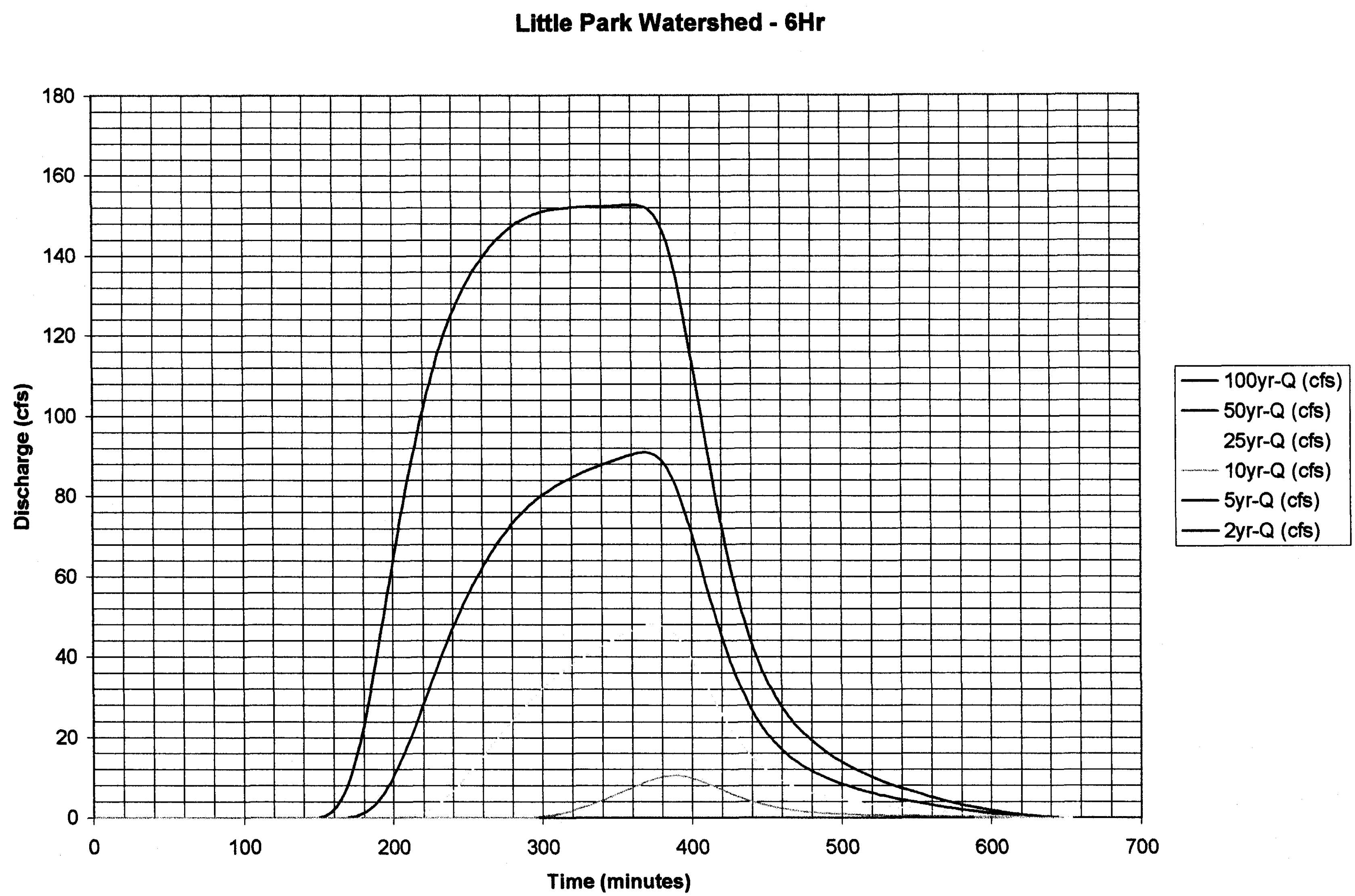


Watershed 7 - 6Hr
Discharge (cfs)
40
35
30
25
20
15
10
5
0
0
100
200
300
400
500
600
Time (minutes)
100yr-Q (cfs)
50yr-Q (cfs)
25yr-Q (cfs)
10yr-Q (cfs)
5yr-Q (cfs)
2yr-Q (cfs)


Watershed 8 - 6Hr
Discharge (cfs)
12
10
8
6
4
2
0
0
50
100
150
200
250
300
350
400
450
500
Time (minutes)
100yr-Q (cfs)
50yr-Q (cfs)
25yr-Q (cfs)
10yr-Q (cfs)
5yr-Q (cfs)
2yr-Q (cfs)

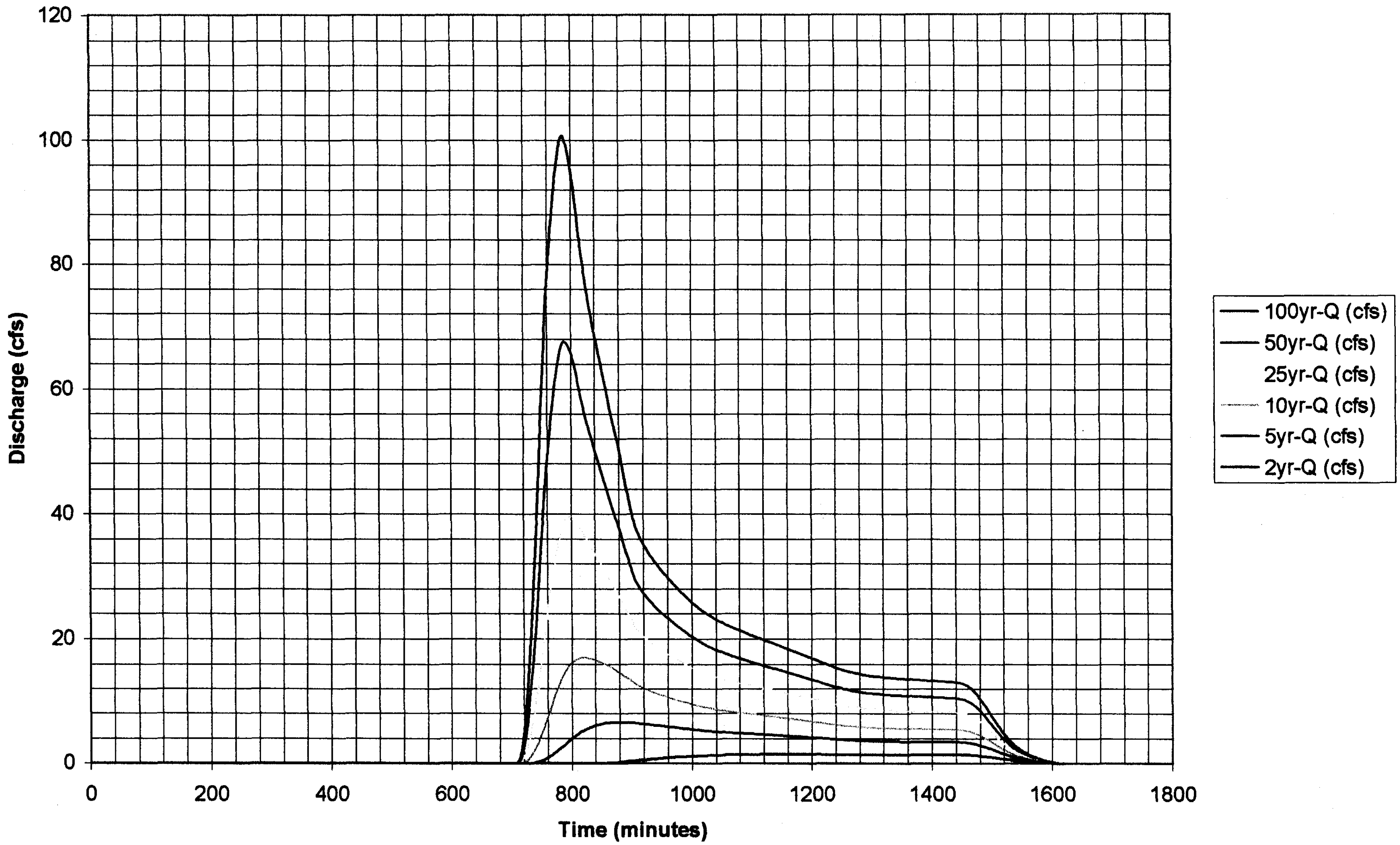
Watershed 9 - 6Hr



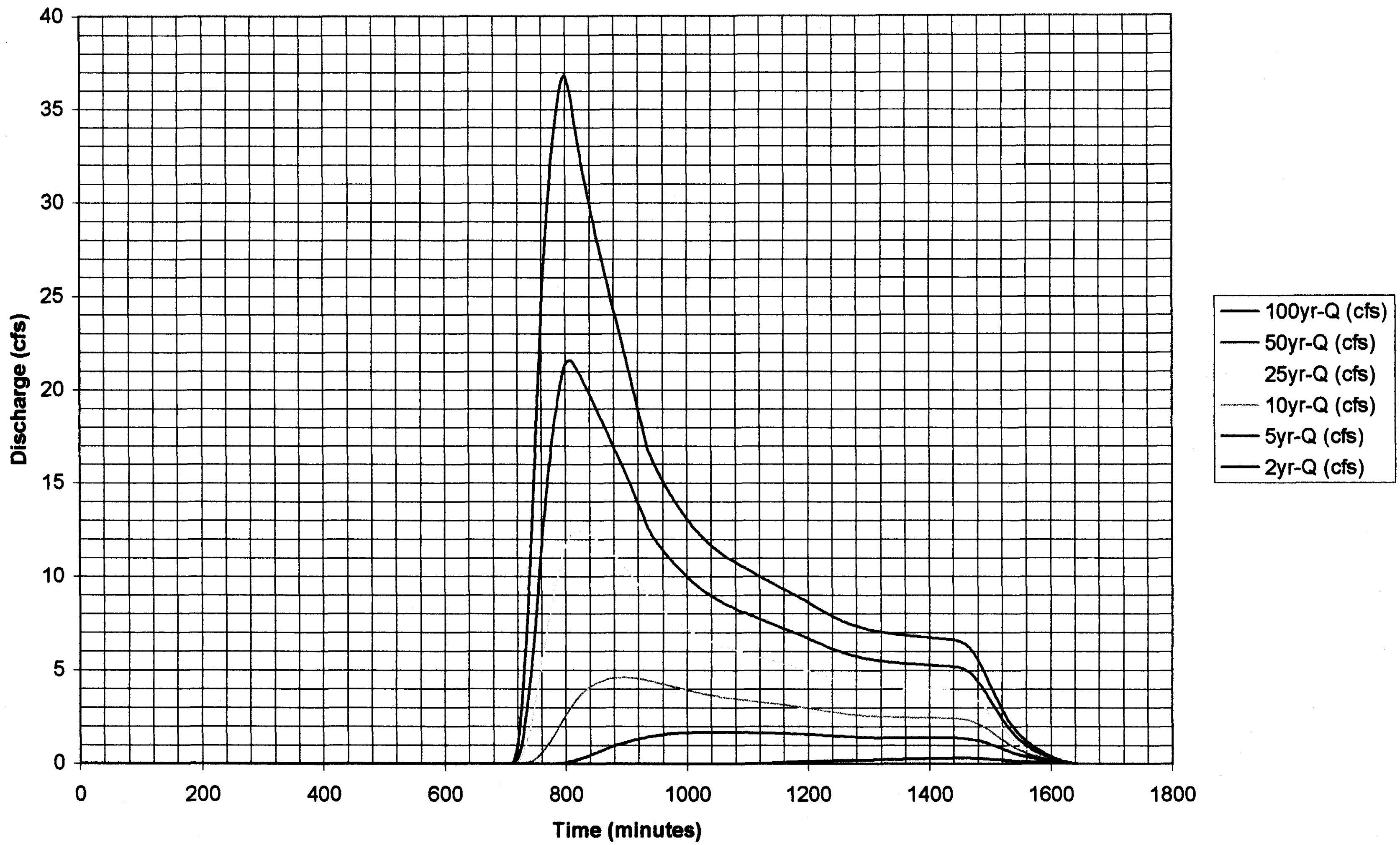

Little Park Watershed - 6Hr
Discharge (cfs)
180
160
140
120
100
80
60
40
20
0
0
100
200
300
400
500
600
700
Time (minutes)
100yr-Q (cfs)
50yr-Q (cfs)
25yr-Q (cfs)
10yr-Q (cfs)
5yr-Q (cfs)
2yr-Q (cfs)

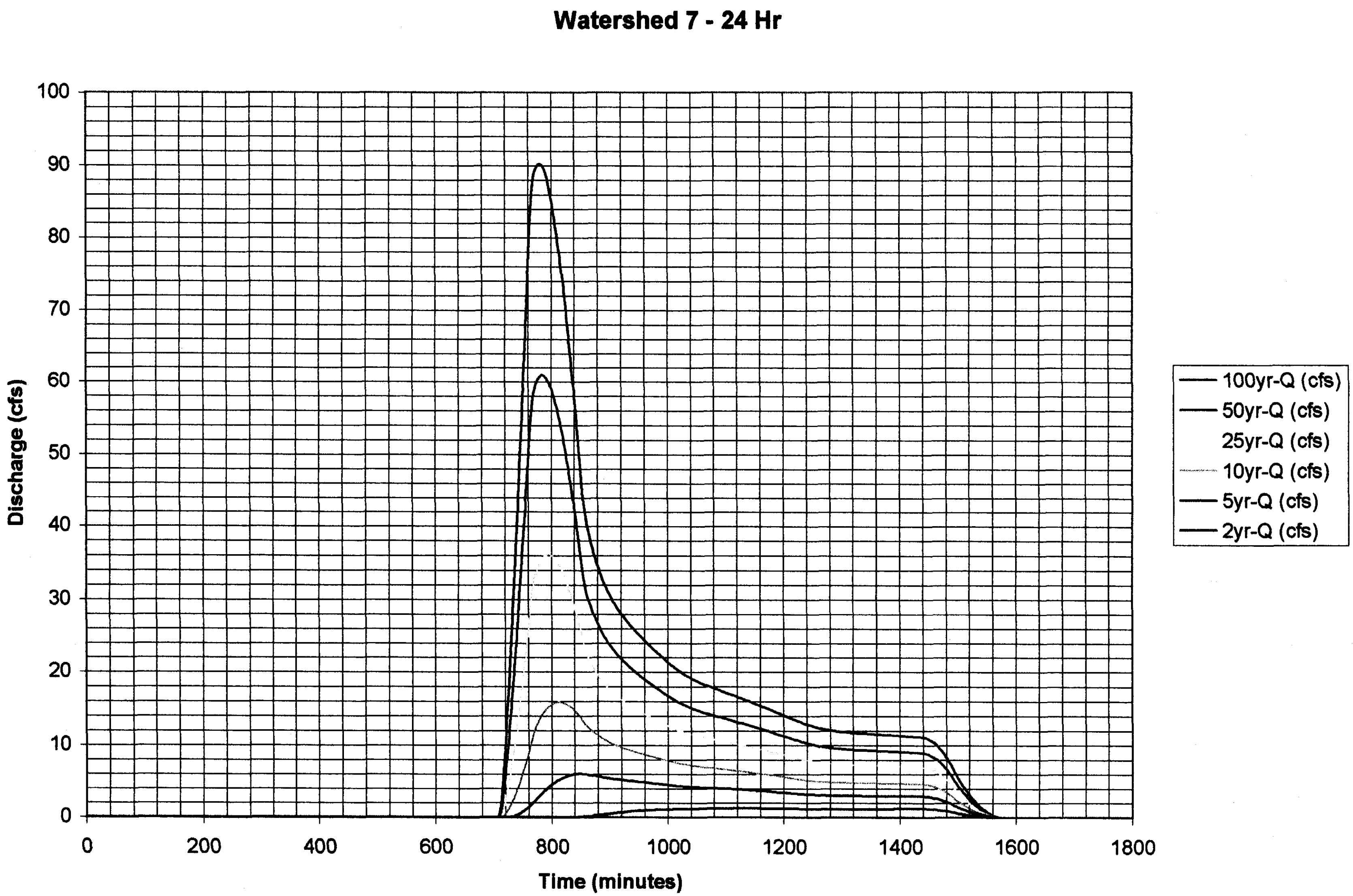
24-HOUR SIMULATION RESULTS

Watershed 1 - 24 Hr

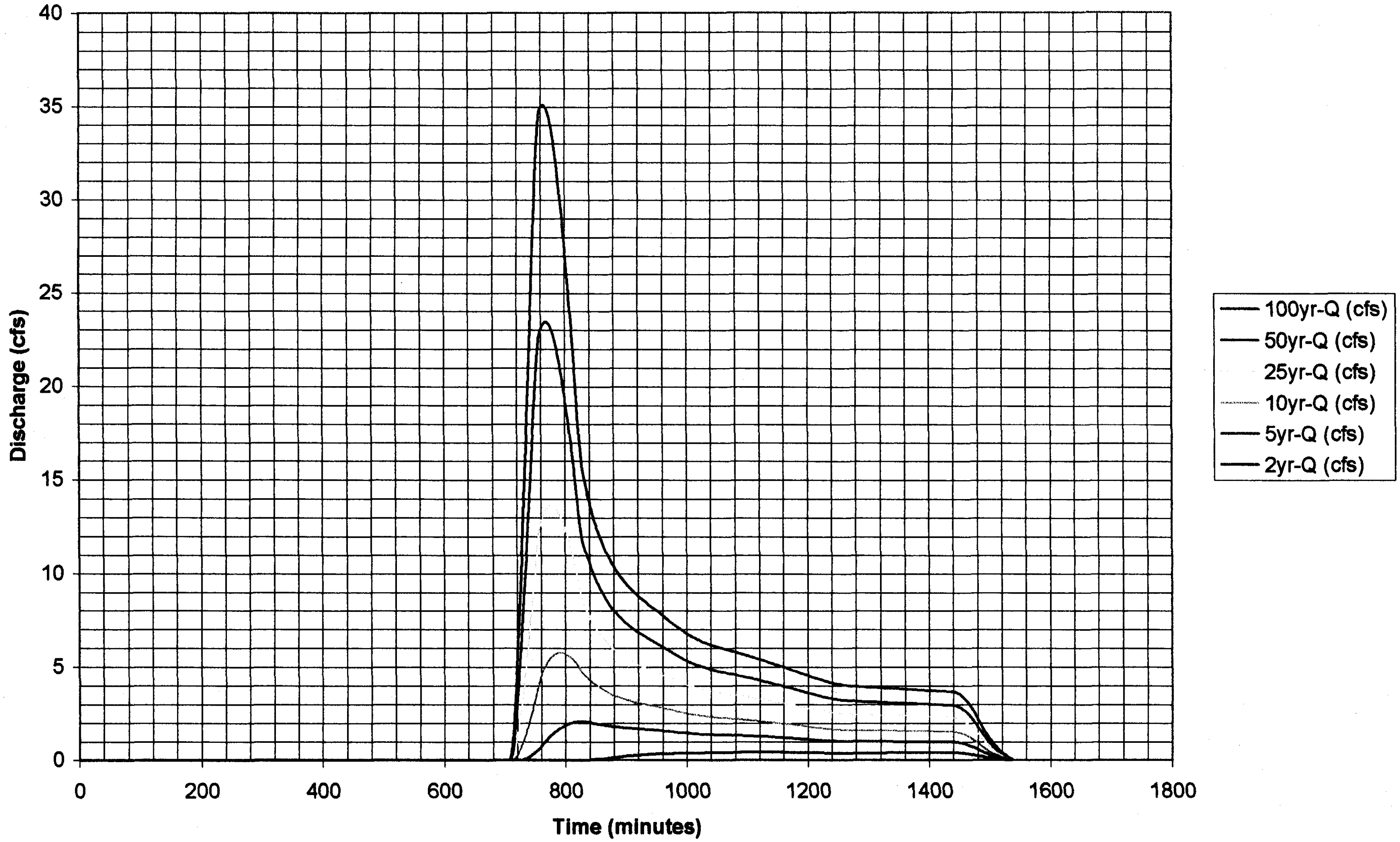


Watershed 2 - 24 Hr

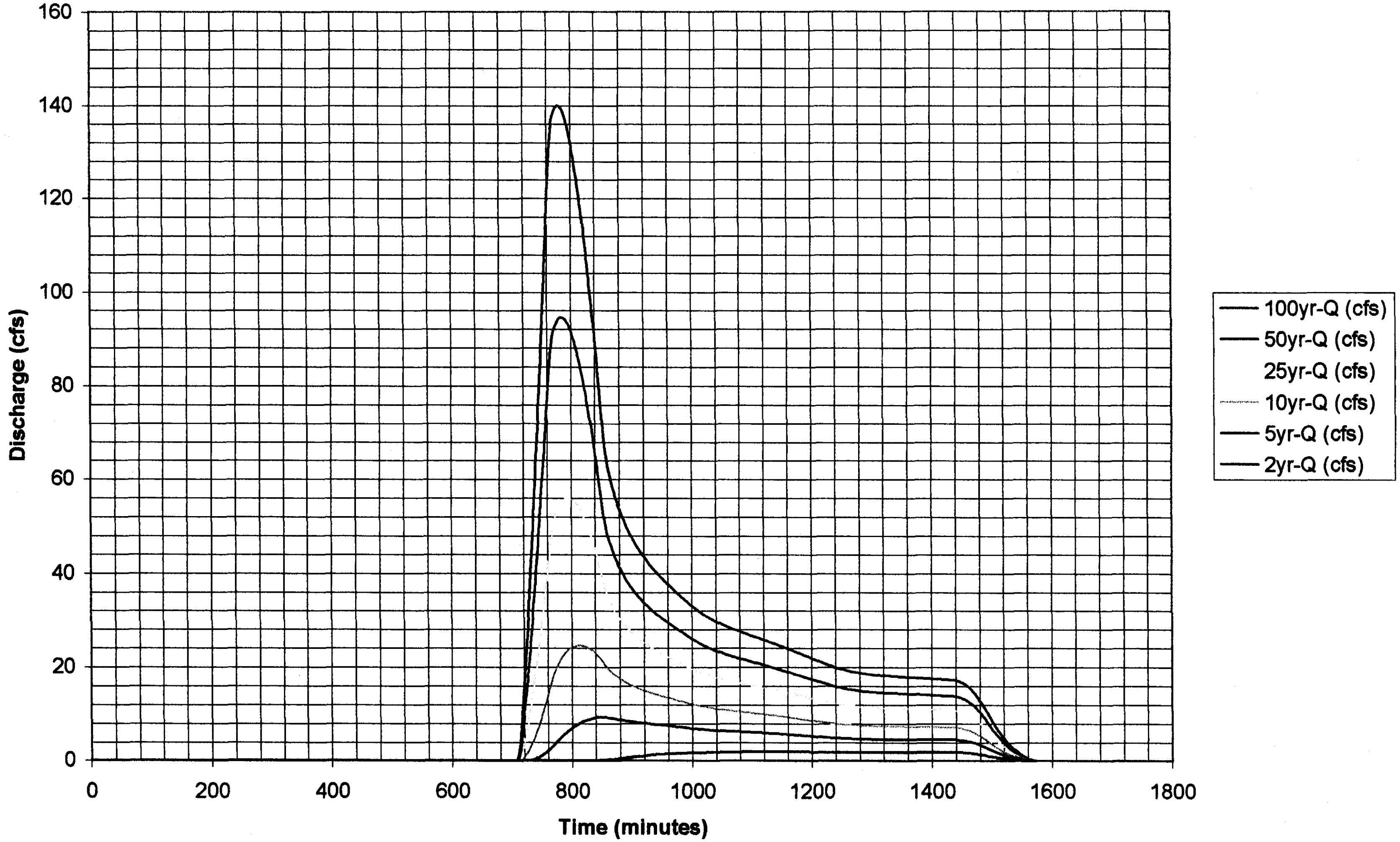



Watershed 7 - 24 Hr
100
90
80
70
60
50
40
30
20
10
0
Discharge (cfs)
0
200
400
600
800
1000
1200
1400
1600
1800
Time (minutes)
100yr-Q (cfs)
50yr-Q (cfs)
25yr-Q (cfs)
10yr-Q (cfs)
5yr-Q (cfs)
2yr-Q (cfs)

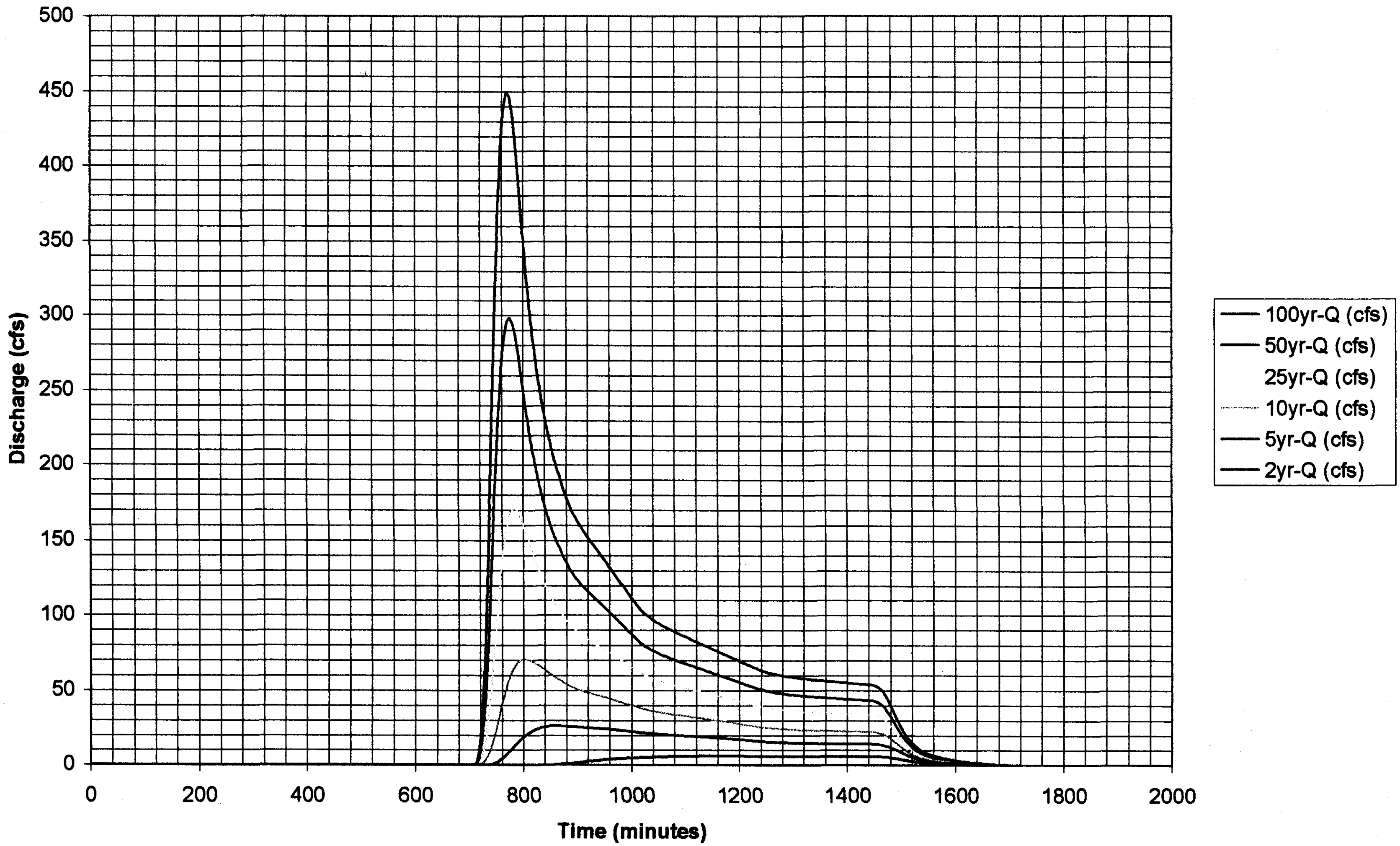
Watershed 8 - 24 Hr

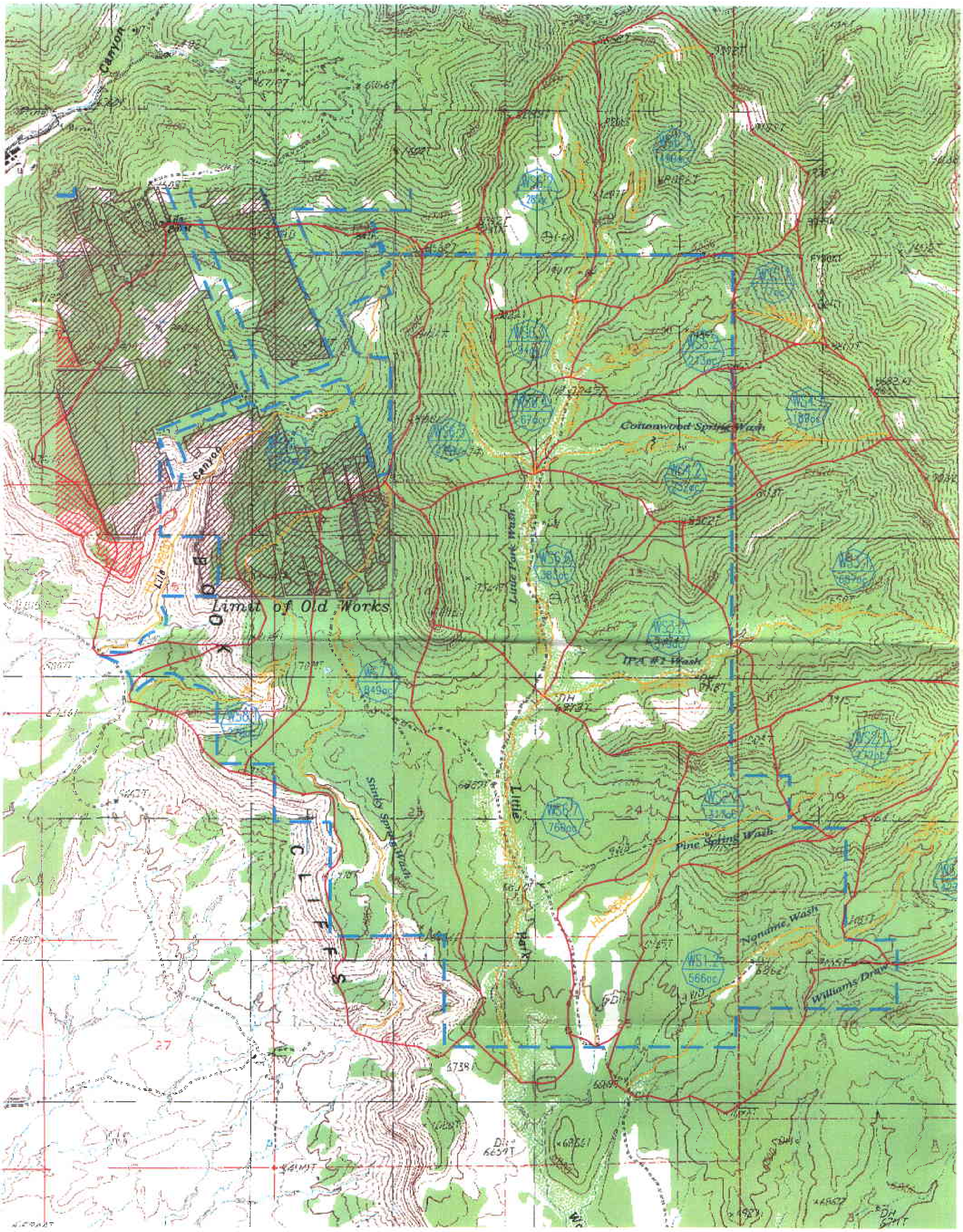


Watershed 9 - 24 Hr



Little Park Watershed - 24 Hr




Limit of Old Works
Cottonwood Spring Wash
Little Park Wash
IPA #1 Wash
Pine Spring Wash
Nonaine Wash
Williams Draw
Sandy Spring Wash
Little
Park
B
O
O
K
C
L
I
F
F
S
Canyon