

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

TABLE 2
Channel Characterizations

Reach	Description	Photos (See Attachment #1)	Length	Gradient	Bed type	Flora Channel Embankment	Fauna (Fish and Macro Invertebrates)	Use	Effects from Mining	Length Ephemeral (Feet)	Length Intermittent or Perennial (Feet)
1	Left Fork of the Left Fork of Little Park Wash	18, 25	1823	6.6%	Sand, Gravel	Pinyon Juniper and sagebrush grass associations, no Riparian Vegetation.	Non Existing	No water shares associated with this reach	None do to depth of coal seam (over 2,000')	1823	
2	Right Fork of the Left Fork of Little Park Wash	20, 21, 22, 26	1917	7.6%	Sand, Gravel	Pinyon Juniper and sagebrush grass associations, no Riparian Vegetation.	Non Existing	No water shares associated with this reach	None do to depth of coal seam (over 2,000')	1917	
3	Right Fork of Little Park Wash	38, 39, 40, 41, 42, 44, 46, 47	4780	10.2%	Sand, Gravel	Douglas Fir in upper sections, Pinyon Juniper and sagebrush grass associations in lower sections., no Riparian Vegetation.	Non Existing	No water shares associated with this reach	None do to depth of coal seam (over 2,000')	4780	
4A	Cottonwood Spring Wash Above L-7-G	48, 49	2420	6.6%	Sand, Gravel	Douglas Fir in upper sections, no Riparian Vegetation.	Non Existing	No water shares associated with this reach	None do to depth of coal seam (over 2,000')	2420	
4B	L-7-G to 51 ₃	8, 9, 10, 50 51	456	4%	Sand, Gravel	Douglas Fir, no Riparian Vegetation.	Non Existing	91-399 Mining (UEI)	None do to depth of coal seam (over 2,000')	205	250
4C	51 to Confluence of Little Park Wash	32	2576	4.6%	Sand, Gravel	Douglas Fir in upper sections, Pinyon Juniper and sagebrush grass associations in lower sections., no Riparian Vegetation.	Non Existing	No water shares associated with this reach	None do to depth of coal seam (over 1,500')	2576	
5A	IPA #1 Wash above L-8-G	52	1729	7.8%	Sand, Gravel	Douglas Fir in upper sections, Pinyon Juniper in lower sections, no Riparian Vegetation.	Non Existing	No water shares associated with this reach	None do to depth of coal seam (over 3,000') and location off permit area.	1729	
5B	L-8-G ₃	53, 53A	300	10.4%	Sand, Gravel	Douglas Fir, no Riparian Vegetation.	Non Existing	91-2538 Stock Watering (State)	None do to depth of coal seam (over 2,500') and location off permit area.		300
5C	L-8-G to Confluence of Little Park Wash	54, 55, 35	6713	4.5%	Sand, Gravel	Douglas Fir in upper sections, Pinyon Juniper and sagebrush grass associations in lower sections, no Riparian Vegetation.	Non Existing	No water shares associated with this reach	None do to depth of coal seam (over 1,000')	6713	
6A	Above L-9-G		3840	14.6%	Sand, Gravel	Douglas Fir in upper sections, Pinyon Juniper in lower sections, no Riparian Vegetation.	Non Existing	No water shares associated with this reach	None do to depth of coal seam (over 2,000')	3840	
6B	L-9-G (Pine Spring) ₃	11, 12	300	6.7%	Sand, Gravel	Douglas Fir, no Riparian Vegetation.	Non Existing	91-2539 Stock Watering (BLM)	None do to depth of coal seam (over 2,000') and location off permit area.		300
6C	Pine Spring to Property boundary		8977	3.7%	Sand, Gravel	Douglas Fir in upper sections, Pinyon Juniper and sagebrush grass associations transgressing into a mature sagebrush habitat in lower sections, no Riparian Vegetation.	Non Existing	No water shares associated with this reach	None do to depth of coal seam (over 1,000')	8977	
7	No Name Wash	61, 87, 88	7540	5.7%	Sand, Gravel	Pinyon Juniper and sagebrush grass associations, no Riparian Vegetation.	Non Existing	No water shares associated with this reach	None do to depth of coal seam (over 1,000')	7540	
8	Main channel Little Park	23, 27, 29, 30, 31, 33, 34, 36, 56, 57, 63, 81, 82, 83, 84	20077	3.3%	Sand, Gravel	Pinyon Juniper and sagebrush grass associations transgressing into a mature sagebrush habitat in lower sections, no Riparian Vegetation.	Non Existing	No Water Shares anywhere in the Main Channel all the way to the Price River	None do to depth of coal seam (small area <500' most >1,000')	20077	
9A	Stinky Spring Wash Above Escarpment	93, 94, 95, 96, 97, 98, 99, 100	7432	7%	Sand, Gravel	Pinyon Juniper and sagebrush grass associations, no Riparian Vegetation.	Non Existing	No water shares associated with this reach	None do to barriers and location of the mains.	7432	
9B	Escarpment to Stinky Springs		1829	38.1%	Sand, Gravel	Pinyon Juniper and sagebrush grass associations, no Riparian Vegetation.	Non Existing	No water shares associated with this reach	None do to outcrop barrier and outside the permit area.	1829	
9C	L-16-G & L-17-G Stinky Springs ₃	42,43, 50, 52, 50A	535	15%	Sand, Gravel	Grasses and salt desert shrub, no Riparian Vegetation.	Non Existing	No water shares associated with this reach	None, outside the permit area and below the coal outcrop.	460	75
9D	Stinky Spring to Mouth	72, 75, 76	1787	8.9%	Sand, Gravel	Grasses and salt desert shrub, no Riparian Vegetation.	Non Existing	No water shares associated with this reach	None, reach is outside the permit area and beyond the outcrop.	1787	
Total Length										74105	925
Percent of Total Length										98.77%	1.23%

NOTE:

- 1) The Lila Canyon channel cannot be effected by mining from the Lila Canyon Mine. The Lila Canyon channel was previously undermined by the Horse Canyon Mine with out any negative effects.
- 2) The Right fork of Lila has a drainage area of less than one square mile and is considered ephemeral by definition.
- 3) Additional information can be found in Appendix 7-8.

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 vegetation. 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 vegetation. 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 vegetation. 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 vegetation. 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 vegetation. 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 vegetation. 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 vegetation. 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 vegetation. 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 vegetation. 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 off 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 elevation 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 vegetation. 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 affecting this ephemeral channel is minimal since an 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 affecting 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 elevation 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 vegetation. 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 Lila reaches Grassy Wash only in the most extreme situation.

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

Appendix 7-7
Figure 1
All Stream Reaches

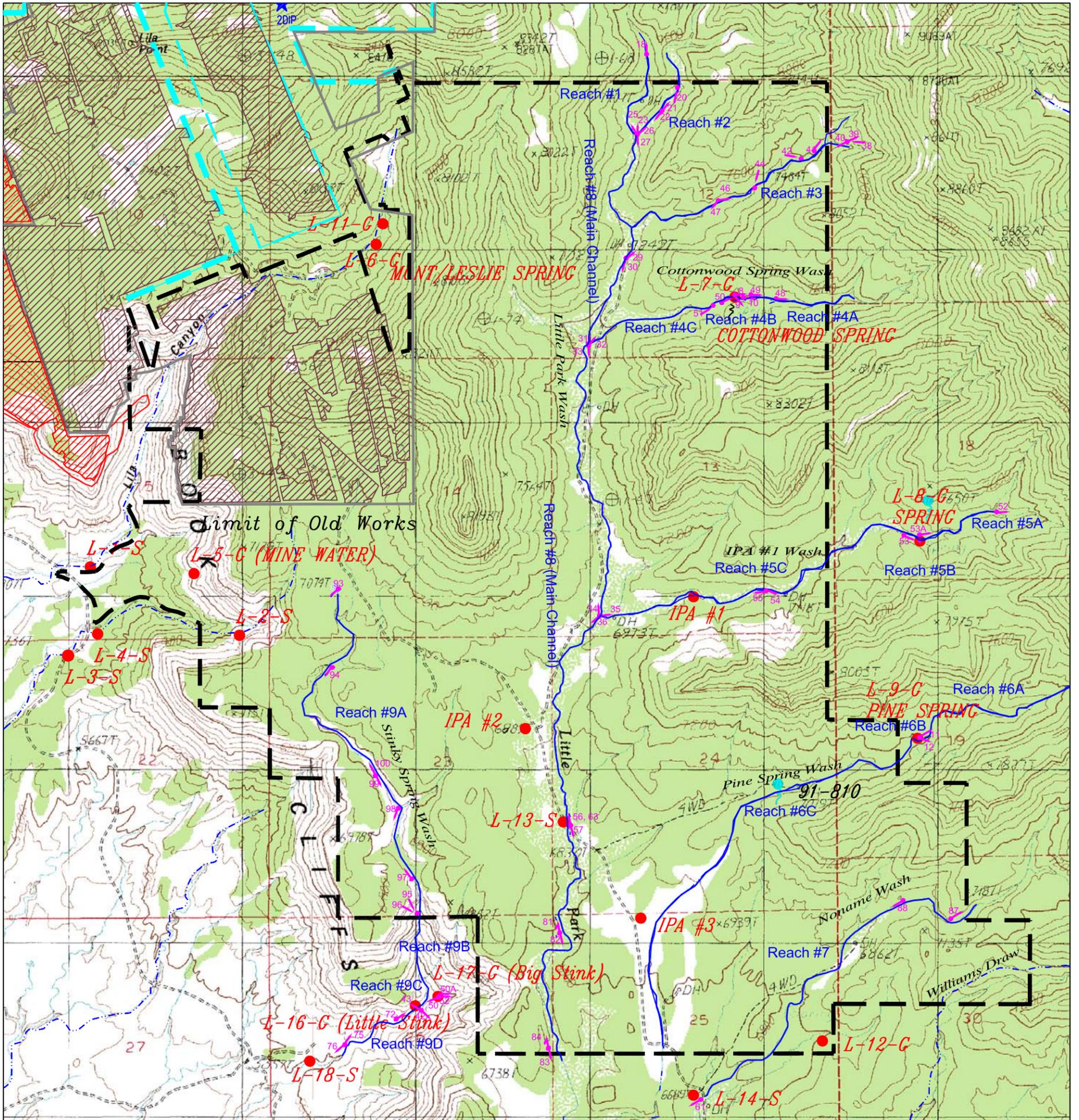


Photo Locations in Magenta



Photo #18



Photo #25



Photo #20



Photo #21



Photo #38

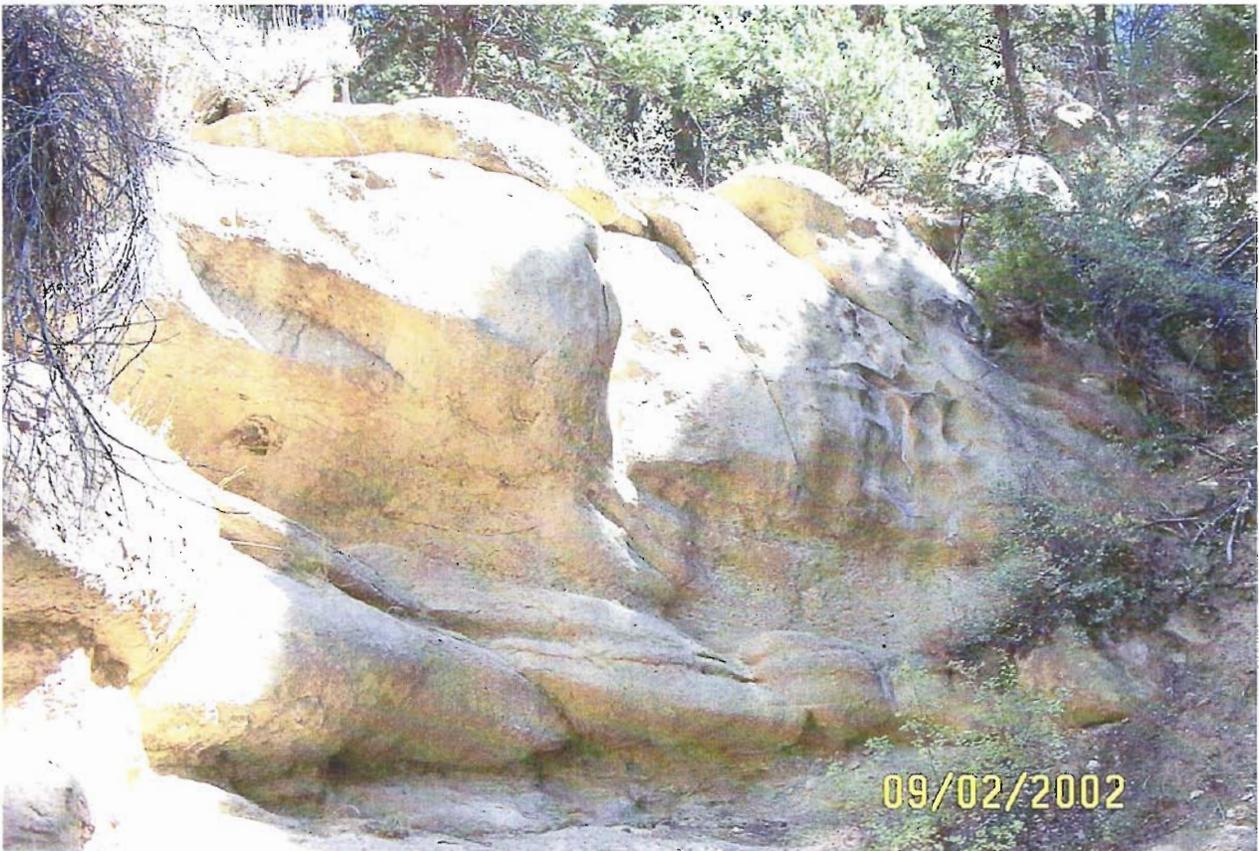


Photo #39



Photo #40



Photo #41

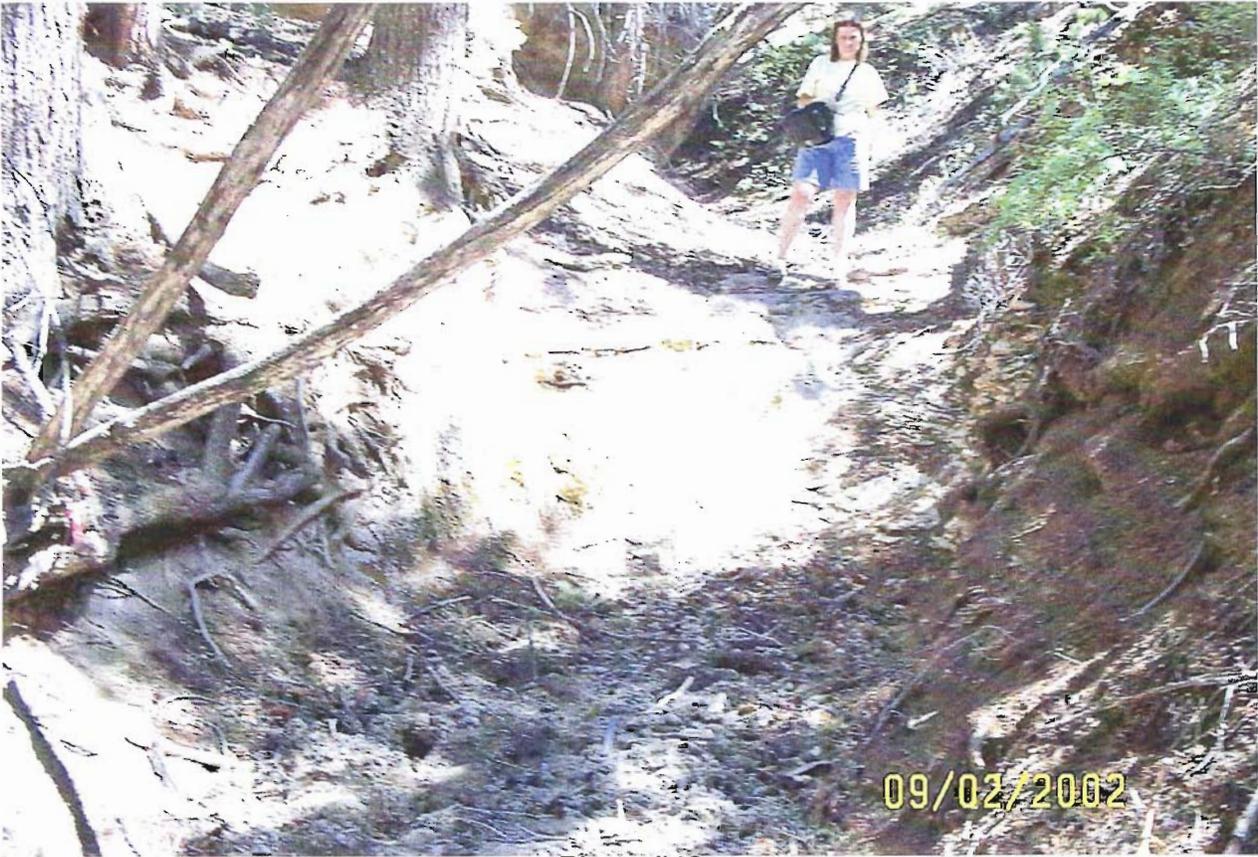


Photo #42



Photo #44

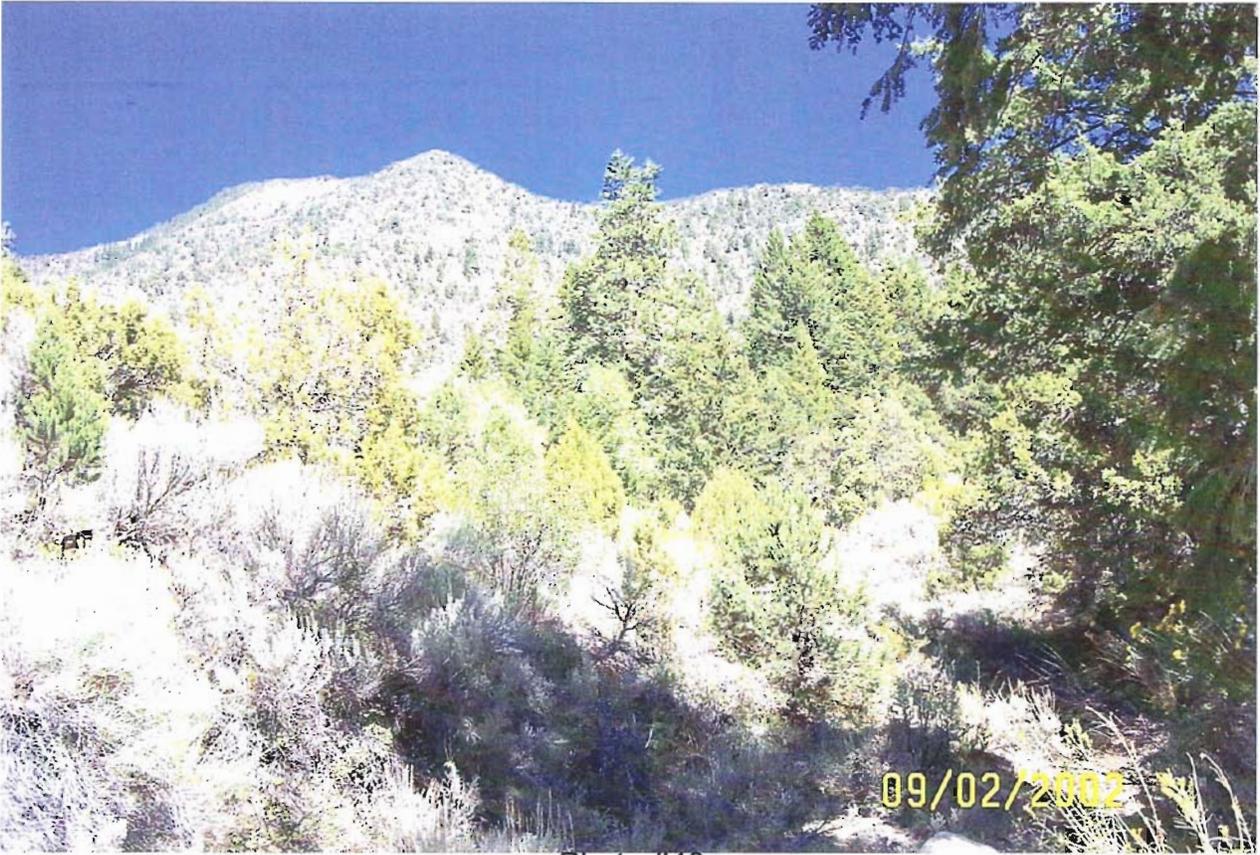


Photo #46



Photo #47



Photo #23



Photo #27



Photo #29



Photo #30



Photo #31



Photo #33



Photo #34



Photo #36



Photo #56



Photo #57



Photo #63



Photo #81



Photo #82



Photo #83



Photo #84



Photo #48



Photo #49



Photo #8



Photo #9



Photo #50



Photo #10



Photo #51



Photo #32



Photo #52



Photo #53A



Photo #53



Photo #54



Photo #55



Photo #35



Photo #11



Photo #12



Photo #87



Photo #88



Photo #61



Photo #93



Photo #94



Photo #95



Photo #96

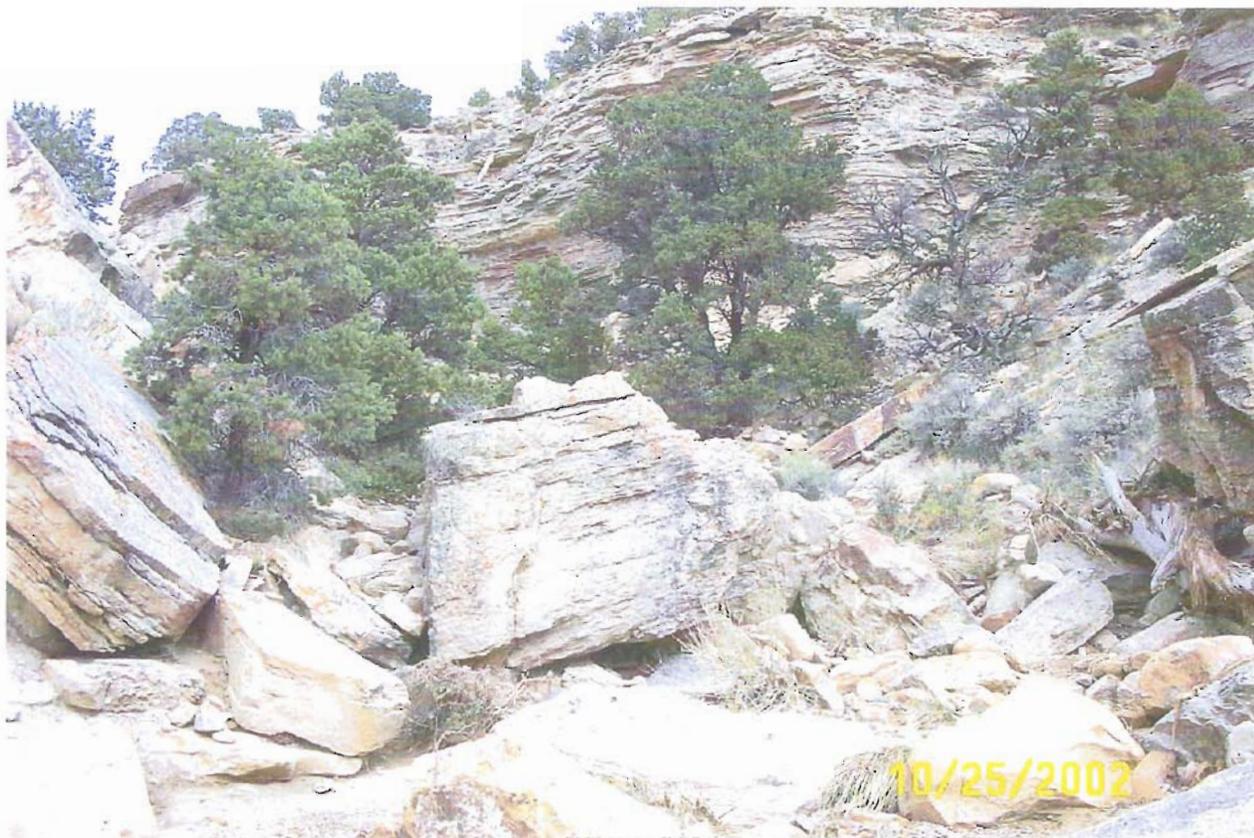


Photo #97



Photo #98



Photo #99



Photo #100



Photo #42



Photo #43



Photo #50



Photo #52



Photo #50A



Photo #72



Photo #75



Photo #76

Appendix 7-7

Figure 1

All Stream Reaches

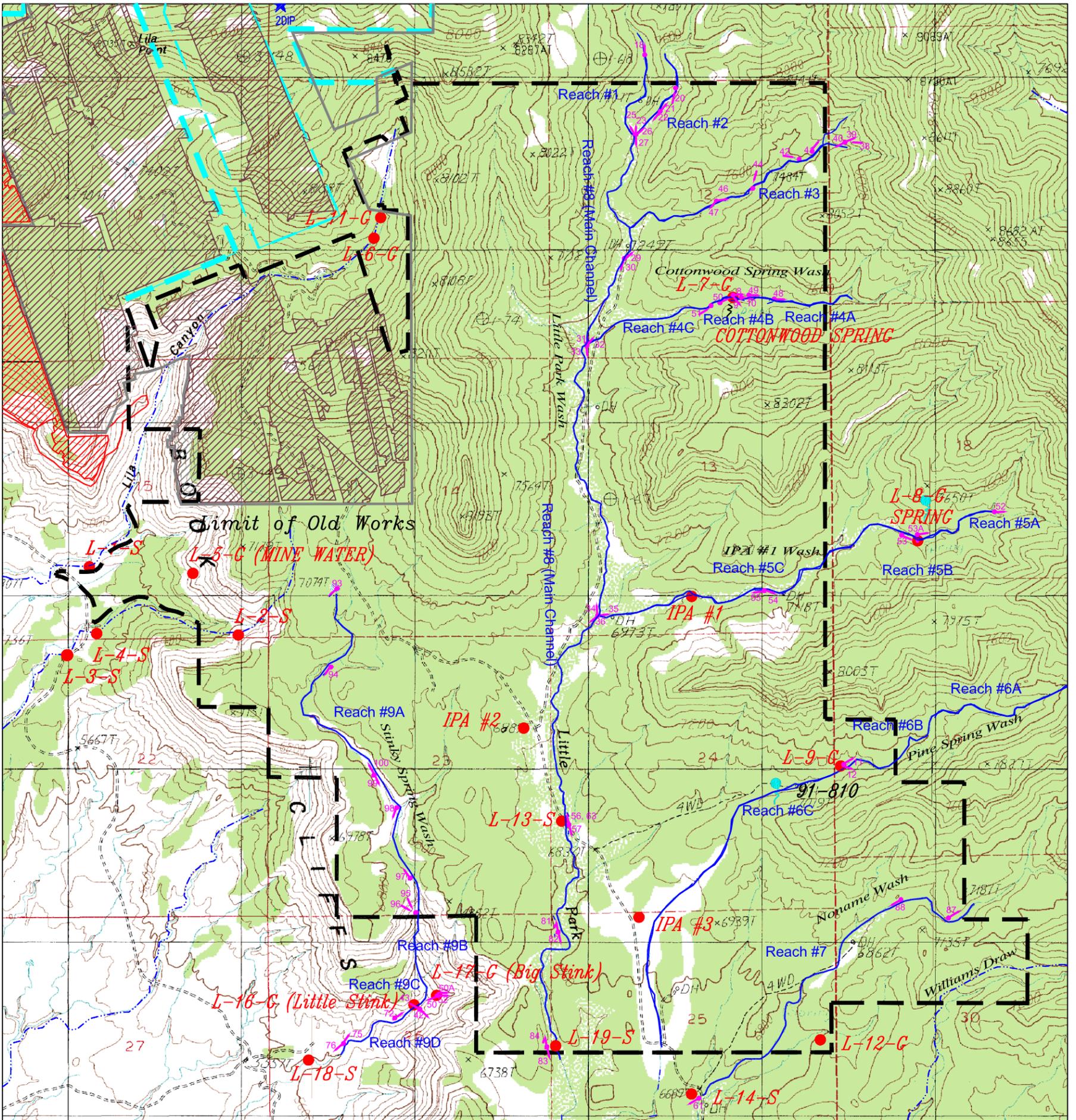
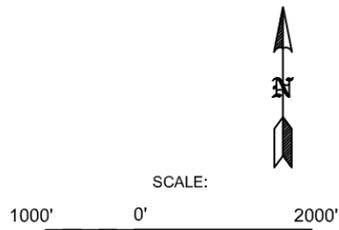


Photo Locations in Magenta



REVISIONS			
RJM	01/10/04		
RJM	12/05		
TJS	11/06		





Lila Canyon Mine

Appendix 7-7
Figure 1