0047

Canyon Fuel Company, LLC.
Sufco Mine
A Subsidiary of Arch Western Bituminous Group, LLC.

Ken May, General Manager
397 South 800 West
Salina, UT 84654
(435) 286-4400 - Office
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Incoming
C0410002 gk
2325

September 1, 2005

Permit Supervisor
Utah Coal Regulatory Program
Utah Division of Oil, Gas and Mining
1594 West North Temple, Suite 1210
P. O. Box 145801
Salt Lake City, Utah 84114-5801

File in: C/041/002 Incoming
Refer to:
☐ Confidential
☐ Shelf
☒ Expandable
Date 0901 2005 For additional information

RECEIVED
SEP 06 2005
DIV. OF OIL, GAS & MINING

Re: Midterm Permit Review, Canyon Fuel Company, LLC, SUFCO Mine C/041/002, Task ID #2068

Dear Permit Supervisor:

In response to the Divisions Deficiency letter dated July 11, 2005. The enclosed eight copies of materials are being submitted to update the Mine Plan M&RP Permit. Attached are DOGM forms C-1 and C-2 and appropriate pages.

These new additions or replacement pages and Plates 5-2F and 5-6 have been revised to address the deficiencies in the Division letter dated July 11, 2005 received on July 22, 2005.

The deficiencies and responses to the Mine Plan MRP Permit are:

1. **R645-301-121.100**
   - ♦ An As-Built of the Link Canyon topsoil stockpile (Section 2.3.1.1) should be produced illustrating the stockpile configuration and providing "as built" salvaged volumes. • In addition, the plan should be revised where necessary if Oregon grape cuttings were not salvaged for planting on the stockpile as described on page 2-19 and 2-13. Protection of the Oregon grape described on page 2-24 should be verified. • Recent work conducted on the topsoil stockpiles (Inspection Report June 6, 2003) should be described in the MRP, including roughening techniques, mulch and seed list, and dates of work. (PWB)

Response:

Item #1 was addressed by updating the as-built Plate 5-2F Link Canyon Portal Facilities map and modifying the permit in chapter 2 on page 2-13.

Item #2 was addressed by removing references to salvaging Oregon grape for placement on the topsoil pile since the re-planting effort was unsuccessful. During construction of the topsoil piles, the Oregon grape cuttings that were salvaged were

placed on the top of the piles and within the upper-most soils. However, the grape did not take root and no new plants have appeared.

Item #3 was addressed through a telephone conference with Pricilla Burton of your staff in mid-August. During the telephone conference, we explained the work conducted on the topsoil stockpile was limited to an area 10 feet by 10 feet or less on the North slope of the pile. These areas were re-roughened and reseeded as per the methods described in the permit. This work was accomplished in 2003. It was agreed that since the area of revegetation work was so minor, a detailed description or modification to the permit was not warranted.

2. **R645-301-321.100**

- Section 3.3 and Map 4 of Volume 3 should be revised to illustrate the current status of reclaimed, active and topsoil salvage areas at the refuse site. The current volume of waste stored at the refuse site to date must also be indicated. (PWB)

Response:

Item #2 was addressed by modifying the permit in Volume 3, Section 3.3 and Map 4 in the MRP to include the requested information on pages WRDS 3-13, WRDS 4-1 and new WRDS 4-1A and revised Map 4.

3. **R645-301-121.100**

- Current volume of waste stored at the refuse site should be included in the MRP. The Division requests that the quarterly waste rock information be included with the annual report so that it can be quickly accessed. (PWB)

Response:

Item #3 was addressed by modifying the permit in Volume 3, Sections 3 & 4 in the MRP to include the requested information on pages WRDS 3-4, WRDS 3-13, WRDS 4-1 and new WRDS 4-1A.

4. **R645-301-121.200**

- The Permittee must state in the MRP: • when (specific years) the color inferred aerial photographs will be taken, • the location of where the color inferred aerial photographs can be found, • when (specific years) the bi-annual monitoring program for the West Fork of Box Canyon will be performed and • where the information from the bi-annual monitoring program for the West Fork of Box Canyon can be found. (WHW)

Response:

Item #4 was addressed by modifying the permit in chapter 5 on pages 5-29, 5-30 and 5-39.

5. **R645-301-333**

- Provide all equations and justifications with supporting documentation leading to the overall sum of water depletions or additions for all mining operations and explorations projects including dust control in the MRP section R645-301-333. (JAE)

Response:

Item #5 was addressed by modifying the permit in chapter 3 on pages 3-40 and 3-40A.

6. **R645-301-731.211, -751**

- Text in Section 7.2.8.3 PHC Determination, Sediment Yield, needs to be updated with the TSS limits for 7-day and 30-day average discharge (p. 7-28). (SMF)

Response:

Item #6 was addressed by modifying the permit in chapter 7 on page 7-28.

7. **R645-301-742.200**

- A review of the ASCA list in Section 7.4.2, Sediment Control Measures, of the MRP revealed three ASCA descriptions that need updating: 1) the topsoil stockpile near the mine site sediment pond (ASCA #2) should also note containment berms as part of the sediment control; 2) the 4 East portal site (ASCA #8) should also note gravel as part of the sediment control; and 3) the Link Canyon Substation #1 facility (ASCA #9) should note that the facility has been reclaimed and that sediment control consists of containment berms, silt fencing, and vegetation (no gravel). (SMF)

Response:

Item #7 was addressed by modifying the permit in chapter 7 on pages 7-63 and 7-63A.

8. **R64-301-742.300**

- The diversion ditch list in Section 7.3.2.3, Diversions, describes two diversion ditches in Link Canyon for the reclaimed Substation No. 1 ditch and road swell. These two ditch descriptions need to be updated to reflect the reclaimed status of the Substation No. 1 area. (SMF)

Response:

Item #8 was addressed by modifying the permit in chapter 7 on pages 7-78 and 7-79.

9. **R645-301-742.300**

- The culvert description list in Section 7.4.2.3 is missing the culverts for the East Spring Canyon and Mud Spring Hollow bypass system. These culverts need to be added to the list to be complete. (SMF)

Response:

Item #9 was addressed by modifying the permit in chapter 7 on page 7-78A

10. **R645-301-742.300**

- Section 7.4.2.3, Diversions, General Requirements, discusses drainages and diversions within the permit area. Drainage areas and diversions for the Link Canyon facilities are referenced to Plate 5-2D in this section. However, Plates 5-2E and 5-2F have been added to the MRP for the Substation No. 2 and the Link Canyon portal surface facilities, respectively. These plates also need to be referenced in Section 7.4.2.3. (SMF)

Response:

Item #10 was addressed by modifying the permit in chapter 7 on page 7-76.

11. R645-301-830.140

- The Permittee must give the Division updated copies of the detailed reclamation cost estimate. The Division will give the Permittee copies of the updated reclamation cost estimate upon request in either paper or electronic format. (WHW)

Response:

Item #11 has already been addressed in the permit. The reclamation cost estimate data was submitted in a previous submittal amendment for the Surface Facility Update on 6-29-05 and was incorporated into the permit on July 26, 2005.

In addition to the above permit modifications, Sections 7.2.8.3 and 7.3.1.5 Chapter 7 of the M&RP were changed to describe the current condition of the water discharge from the east and west portals of the old Link Canyon mine. Also a plan to monitor effects, if any, the reduction in discharge from the portals has on the vegetation in Link Canyon was described in Section 7.2.8.3.

If you have any questions or need additional information, please contact Chris Hansen at (435) 448-2669 or Mike Davis at (435) 286-4421.

Sincerely,
CANYON FUEL COMPANY, LLC
SUFCO Mine

Kenneth E. May
Mine Manager

Encl.

KEM/MLD:kb

cc: DOGM Price Office
DOGM Correspondence File

sufpub\govt2005\dogmmrp\midterm review ltr.doc

APPLICATION FOR COAL PERMIT PROCESSING

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

Permittee: CANYON FUEL COMPANY, LLC
Mine: SUFCO MINE **Permit Number:** C/041/002
Title: MRP Midterm Review
Description, Include reason for application and timing required to implement:
Division midterm review deficiency response.

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

☒ Yes ☐ No 1. Change in the size of the Permit Area? Acres: _____ Disturbed Area: 0.15 ☒ increase ☐ decrease.
☐ Yes ☒ No 2. Is the application submitted as a result of a Division Order? DO# _____
☐ Yes ☒ No 3. Does the application include operations outside a previously identified Cumulative Hydrologic Impact Area?
☐ Yes ☒ No 4. Does the application include operations in hydrologic basins other than as currently approved?
☐ Yes ☒ No 5. Does the application result from cancellation, reduction or increase of insurance or reclamation bond?
☐ Yes ☒ No 6. Does the application require or include public notice publication?
☐ Yes ☒ No 7. Does the application require or include ownership, control, right-of-entry, or compliance information?
☐ Yes ☒ No 8. Is proposed activity within 100 feet of a public road or cemetery or 300 feet of an occupied dwelling?
☐ Yes ☒ No 9. Is the application submitted as a result of a Violation? NOV # _____
☐ Yes ☒ No 10. Is the application submitted as a result of other laws or regulations or policies?
Explain: _____
☐ Yes ☒ No 11. Does the application affect the surface landowner or change the post mining land use?
☐ Yes ☒ No 12. Does the application require or include underground design or mine sequence and timing? (Modification of R2P2)
☐ Yes ☒ No 13. Does the application require or include collection and reporting of any baseline information?
☐ Yes ☒ No 14. Could the application have any effect on wildlife or vegetation outside the current disturbed area?
☐ Yes ☒ No 15. Does the application require or include soil removal, storage or placement?
☐ Yes ☒ No 16. Does the application require or include vegetation monitoring, removal or revegetation activities?
☐ Yes ☒ No 17. Does the application require or include construction, modification, or removal of surface facilities?
☐ Yes ☒ No 18. Does the application require or include water monitoring, sediment or drainage control measures?
☒ Yes ☐ No 19. Does the application require or include certified designs, maps or calculation?
☐ Yes ☒ No 20. Does the application require or include subsidence control or monitoring?
☐ Yes ☒ No 21. Have reclamation costs for bonding been provided?
☐ Yes ☒ No 22. Does the application involve a perennial stream, a stream buffer zone or discharges to a stream?
☐ Yes ☒ No 23. Does the application affect permits issued by other agencies or permits issued to other entities?

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

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

KENNETH E. MAY, MINE MANAGER — Kenneth E. May 9/1/05
Print Name — Sign Name, Position, Date

Subscribed and sworn to before me this 1st day of September, 2005

Ella Ruth Wayman
Notary Public

My commission Expires: _____, 20___
Attest: State of _____ } ss.
County of _____

ELLA RUTH WAYMAN
NOTARY PUBLIC • STATE of UTAH
30 NORTH 500 WEST • PO BOX 32
AURORA, UT 84620
COMM. EXP. MARCH 19, 2007

For Office Use Only:	Assigned Tracking Number:	Received by Oil, Gas & Mining
		RECEIVED SEP 06 2005 DIV. OF OIL, GAS & MINING

Form DOGM- C1 (Revised March 12, 2002)

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

Permittee: CANYON FUEL COMPANY, LLC
Mine: SUFCO MINE **Permit Number:** C/041/022
Title: MRP Midterm Review

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

			DESCRIPTION OF MAP, TEXT, OR MATERIAL TO BE CHANGED
☐ Add	☒ Replace	☐ Remove	Replace pages 1-11 and 1-12 in Chapter 1, Volume 1 of MRP.
☐ Add	☒ Replace	☐ Remove	Replace pages 2-13, 2-14, 2-19 and 2-24 in Chapter 2, Volume 1 of MRP.
☐ Add	☒ Replace	☐ Remove	Replace page 3-40 in Chapter 3, Volume 1 of MRP.
☒ Add	☐ Replace	☐ Remove	Add new pages 3-40A and 3-40B in Chapter 3, Volume 1 of MRP.
☐ Add	☒ Replace	☐ Remove	Replace pages 5-29, 5-30 and 5-39 in Chapter 5, Volume 1 of MRP.
☐ Add	☒ Replace	☐ Remove	Replace pages 7-28, 7-37, 7-38, 7-52, 7-53, 7-63, 7-63A, 7-74 to 7-79 in Chapter 7, Volume 2 of MRP.
☒ Add	☐ Replace	☐ Remove	Add new page 7-37A in Chapter 7, Volume 2 of MRP.
☐ Add	☒ Replace	☐ Remove	Replace pages WRDS 3-4 and 3-13 in Part 3, Volume 3 of MRP.
☐ Add	☒ Replace	☐ Remove	Replace page WRDS 4-1 in Part 4, Volume 3 of MRP.
☒ Add	☐ Replace	☐ Remove	Add new page WRDS 4-1A in Part 4, Volume 3 of MRP.
☐ Add	☒ Replace	☐ Remove	Plates 5-2F, and 5-6 in Chapter 5, Volume 1 of MRP.
☐ Add	☒ Replace	☐ Remove	Map 4 in Volume 3 of MRP.
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Any other specific or special instruction required for insertion of this proposal into the Mining and Reclamation Plan.

Received by Oil, Gas & Mining

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DIV. OF OIL, GAS & MINING

M&RP TEXT PAGES

REDLINE AND STRIKEOUT FORMAT

(These pages are for review only)

DO NOT INSERT
THESE TEXT PAGES
IN M&RP

Mine # C/041/0002
File Incoming
Record # 0047
Doc. Date 9.01.05
Recd. Date 9.06.05

Canyon Fuel Company, LLC does not propose to conduct coal mining or reclamation operations within 300 feet of any occupied dwelling. Coal mining and reclamation operations have been or will be conducted within 100 feet of a public road, see Section 5.2.1.1 for details. Forest Service approval to conduct coal mining and reclamation operations within 100 feet of the Link Canyon forest service road is located in Appendix 1-1 and the newspaper advertisement for public comment is located in Appendix 1-3.

116 Permit Term

The following information is presented to identify permit term requirements and stipulations. Canyon Fuel Company will be operating the SUFCO Mine with continuous miner and longwall mining methods. Although the Mining and Reclamation Permit Application covers the next five-year period of mining, information is presented below for the life of the mining operation.

1.	First coal produced	1941
2.	Termination of mining activity	December, 2016
3.	Horizontal extent of mine workings	26,767.14 acres (Life of mine)
4.	Vertical extent of mine workings	Surface to 2,000 feet deep (Life of mine)

The anticipated total acreage to be affected during the five years of operation by underground mining activities is 1,500 acres. The estimated number of total surface acres to be affected over the entire mining operation is 46.~~156~~306 acres.

PERMITTED DISTURBED AREA BOUNDARY	ACTUAL AREA CURRENTLY DISTURBED TO BE RECLAIMED	SITE DESCRIPTION
28.084	16.758	Mine Site, East Spring Canyon
0.286	0.017	3 East Portals
1.774	0.70	4 East Portals
0.302	0.017	South Portals
0.396	0.017	Quitchupah Portals
0.967	0.39	Spring Collection Field, Convulsion Canyon
0.220	0.075	Pump House, Convulsion Canyon

0.784	0.40	Leach Field, Convulsion Canyon
1.595	0.193	Water Tank, East Spring Canyon
0.287	0.18	Substation, Link Canyon No. 1
0.245	0.12	Substation, Link Canyon No. 2
0.~~230~~380	0.1~~4~~8	Link Canyon Portal
10.986	8.733	Waste Rock Disposal Site
46.~~156~~306	27.7~~4~~080	Totals

The permit area, which is the same as the lease area legal descriptions in Section 114, includes 23,939.92 acres of Federal coal leases, 2,134.19 acres of Utah State coal leases, 640 acres of fee coal leases, the 40 acres waste rock disposal site and 13.03 acres under U.S. Forest Service special use permit for a total of 26,767.14 acres.

117 Insurance and Proof of Publication

Certificates of Insurance issued to Canyon Fuel Company, LLC are located in the General Chapter 1 binder prepared for the Dugout Canyon Mine, Soldier Canyon Mine, SUFCO Mine, Skyline Mines and Banning Loadout operations and in Appendix 8-1.

The newspaper advertisement appears in Appendix 1-3. Verification of the advertisement appearing in the appropriate newspapers will be added to Appendix 1-3 and submitted to the Division no later than 4 weeks after publication.

118 Filing Fee

A photocopy of the receipt is presented in Appendix 1-4 as proof of payment of the permit filing fee.

120 Permit Application Format and Contents

The permit application contains clear, concise, current information, in the format required by the UDOGM.

130 Reporting of Technical Data

The A and C horizons will be removed together from the topsoil salvage area and stored in the pile as a single soil resource. Type D soils, the overcast from the east side of the trolley road, will be recovered prior to construction of the substation pad. All available suitable soils encountered during site construction will be salvaged and stored for final reclamation. A person qualified to make soil salvaging determinations will be on site during construction.

Six soil types and waste coal were identified by Dan Larsen (EIS) during his investigation of the soils in the Link Canyon Mine Portal disturbed area. The soil types and thicknesses of salvageable topsoil are listed below:

Soil Map Unit		Approx. Thickness	Mapped Area(approx.)	Volume
WC	Waste Coal	0 inches	250 sf	0 CY
DR	Disturbed old access road	6 inches	1300 sf	24 CY
CU	Calcic Ustochrepts	6 inches	800 sf	15 CY
TUE	Typic Ustochrepts, eroded, carbonatic	4 inches	200 sf	3 CY
TUL	Typic Ustochrepts, light colored	6 inches	20 sf	1 CY
VS	Very stoney and bouldery area	0 inches	100 sf	0 CY
RP	Riparian sites	6 inches	2000	37 CY
				80 CY

All available suitable soils encountered during portal site construction will be salvaged and stored for final reclamation (Plate 5-2F). A person qualified to make soil salvaging determinations will be on site during construction. The ~~actual~~ volume of topsoil salvaged was 38 cubic yards. ~~and dimensions~~The location of the topsoil pile ~~will be provided~~is shown on ~~an~~the revised As-Built ~~map after construction is completed~~Plate 5-2F. The remaining excavated material will be used as fill material for the access road and the portal pad. A tracked vehicle, such as a trackhoe, will be used to remove the initial topsoil layers from the access road and pad area. As the site is constructed and space becomes available, a rubber-tired vehicle, such as a front end loader or backhoe, may be used to remove soils. During the topsoil removal process, a moisture level of at least 15% will

be maintained in the soils to reduce dust and loss of the resource. Maintaining soil moisture may be accomplished using a water truck equipped with pumps and hoses and personnel assigned to spraying the dry soils prior to and during salvage operations. ~~In areas where Creeping Oregon Grape is present, the soils will be removed and temporarily stored separately until the topsoil pile is constructed. At that time, the soils containing the grape will be placed as the top layer of soil, thus encouraging the establishment of oregon grape.~~

The sewer leach field for the mine site buildings will be expanded and two new water holding tanks will be buried in place at the existing pump house in the Fall of 2001. In both cases, the soils at these two locations have been disturbed in the past. A field investigation conducted

Topsoil from the Link Canyon Substation No. 1 will be placed and stored on the outslope of the pad. This storage area will be protected with berms and/or silt fences, a three-strand barbwire fence, and revegetated to control erosion. This soil will not be moved or disturbed until it is required for redistribution during final reclamation.

Soil from the Link Canyon Substation No. 2 will be placed in a soil stock pile located at the south end of the pad area. The storage area will be protected with berms and/or silt fences, a three strand barbwire fence, and revegetated to control erosion. This soil will not be moved or disturbed until it is required for redistribution during final reclamation.

Soil from the Link Canyon Mine Portal area will be placed in a topsoil pile located south of the disturbed portal pad area out of the floodplain (Plate 5-2F). The storage area will be protected by installing a topsoil storage sign at the base of the pile, berms and/or silt fences, a three strand barbwire fence, and protected from wind and water erosion by surface pitting the stockpile to retain moisture and reduce erosion and by being revegetated with a quick growing vegetative cover (standard seed mix in section 3.4.1.2 minus the shrubs and trees) to control erosion. This soil will not be moved or disturbed until it is required for redistribution during final reclamation. The surface of the topsoil pile will be pitted to reduce runoff and erosion. ~~Cuttings of Creeping Oregon Grape salvaged from the area during initial site construction will be buried in the top few inches of the pile. Establishment of this plant should reduce erosion of the pile. Additionally, v~~Vegetation removed during site construction, such as sage brush and other woody plants, will be placed on top of the pile.

Excess subsoil associated with construction of a run of mine coal stockpile is stored at SUFCO Mine's 40-acre waste rock disposal site (see Section 3.1.6 of Volume 3 of this M&RP). This material is segregated and will be available for fill during the reclamation phase of the mine site if needed. About 1,100 cubic yards of topsoil are stored immediately west of the subsoil pile.

Substation No. 2 will be stored in the soil stockpile as shown on Plate 5-2E. Topsoil removed from the Link Canyon Mine Portal area will be stored in the soil stockpile as shown on Plate 5-2F.

Protection from Contaminants and Compaction. Stockpiled topsoil shall be protected from contaminants and unnecessary compaction. To protect the topsoil from contaminants and unnecessary compaction that could interfere with vegetation, the sediment pond topsoil and the substation stockpiles are isolated with no means of access from the main surface area (Section 2.3.1.4). A topsoil storage sign was installed at the base of both stockpiles and will be placed on the Link Canyon Substations Nos. 1 and 2 and Link Canyon Mine Portal storage areas.

Wind and Water Erosion Protection. All topsoil stockpiles will be protected from wind and water erosion by prompt establishment and maintenance of a vegetative cover (standard seed mix in section 3.4.1.2 minus the shrubs and trees). The sediment pond and substation topsoil stockpiles are protected from wind and water erosion by the establishment of a protective vegetative cover. The Link Canyon Portal topsoil pile will be protected ~~by establishment of Creeping Oregon Grape and~~ by adding vegetative material removed during site construction. Grasses native to the area will be planted either through seeding or by obtaining and planting plugs from nearby undisturbed sites. A silt fence was installed below the stockpiles to help trap sediment runoff from the stockpiles.

Topsoil Redistribution. All stockpiled topsoil will not be moved until redistributed during reclamation operations unless approved by the UDOGM.

2.3.4.3 Topsoil Stockpile Relocation

Stockpiled topsoil in jeopardy of being detrimentally affected in terms of its quantity and quality by mine operations may be temporarily redistributed after approval from the UDOGM.

increase wildlife numbers, and attract wildlife away from impacted areas. Since much of the area is public domain, wildlife habitat enhancement is a viable management tool. However, any such effort should be carefully coordinated among appropriate regulatory agencies. Some examples of these measures include:

1. Development of springs, wells or other water supplies outside the mine area.
2. Fencing of developed water sources to restrict cattle trampling of vegetation, control erosion, and provide non-game habitat;
3. Altered livestock management policies, to avoid potential competition with wildlife.
4. Control of other human-related impacts, including recreation and timber harvest.

Revegetation of disturbed areas, as part of the reclamation effort, will include a mixture of grasses, forbs, shrubs and trees.

The total disturbed area acreage to be revegetated is small enough that fencing is considered to be an economically feasible means of protection, if deemed necessary. If grazing animals do prove detrimental to revegetation attempts, measures will be implemented following consultation with the regulatory authorities.

Water is perhaps the most limiting resource and as mentioned in the subsidence discussion, the present resources must not be decreased. The applicant herein commits to restore stream water resources in addition to previously identified springs which are contaminated, diminished, or interrupted as a result of the applicant's underground coal mining activities and which will not obviously be restored naturally within a reasonable period of time.

Potential water depletions from mining operations that may have an effect on endangered fish species identified in pertinent fish recovery programs of the USFWS have been evaluated by the Windy Gap Process as it applies to existing coal mines in the Upper Colorado River Basin.

Mining Consumption:

1. Culinary spring (Water Right 94-87) = 10.50 ac-ft (2004 consumption)
2. Ventilation Consumption/Evaporation:

33,068 gallons/day (05/02 ventilation survey)

33,068 x 365 = 12,069,820 gallons/yr = 37.05 ac-ft/yr

3. Coal Producing Consumption/Coal Moisture Loss:

Water added to coal produced –

8.34% inherent moisture - source Sufco Geologist

10.63% run-of-mine moisture - 2004 average

2.29% moisture added to coal by cutting & dust suppression operations

Projected Tonnage 2005	7,605,685 tons
Projected Tonnage 5 year average	7,510,217 tons
Tons water/yr	171,983
Pounds water/yr	343,967,938
Gallons water/yr	41,257,999 = 126.65 ac-ft/yr

4. Sediment Pond Evaporation:

Mine Site Pond	0.236 acres (surface area)
	18.1 in/yr (high estimate)
	0.35 ac/ft (inactive about 4 months)
Waste Rock Pond	0.219 acres (surface area)
	18.1 in/yr (high estimate)
	0.33ac/ft (inactive about 4 months)

Total Annual Pond Evaporation = 0.45 ac-ft/yr

5. Spring and Seeps Effects From Subsidence - Not Applicable
6. Alluvial Aquifer Abstractions into Mines - Not Applicable
7. Alluvial Well Pumpage - Not Applicable
8. Deep Aquifer Pumpage - Not Applicable
9. Postmining Inflow to Workings - Not Applicable
10. Direct Diversions: - Not Applicable
11. Dust Suppression - Included in Mining and Coal Producing Consumption above.

Mine Discharge:

2004 Average 4,948,260gpd = 1,806,114,900 gal/yr = 5544.3 ac-ft/yr.

Total mining operations net water gain/loss = 5369.65 ac-ft/yr gain.

Deer regularly migrate through and graze in the surface facilities and down the canyons to lower altitudes during severe winters. Numerous side canyons to Convulsion Canyon have been left undisturbed to allow uninterrupted big game movement.

Three longwall panels were completed in 1987 as part of the project. The area of proposed escarpment subsidence (the "Experimental Mining Practice" area) is shown on Plate 5-1. The north ends of two of the longwall panels extended beyond the escarpment toward the canyon. The third longwall panel was located entirely beyond the cliff beneath the canyon wall.

To date, monitoring efforts associated with the experimental mining practice have established that subsidence has occurred in a predictable manner varying from one foot to seven feet with minimal surface disturbance. One of the independent sandstone blocks fell from the escarpment during subsidence and a few tension cracks were created along the cliff face. No other visible signs of mining were found even though the surface elevations have dropped several feet in some areas of the experiment. Monitoring stations have moved horizontally from a few tenths of a foot to nearly three feet. Post-mining monitoring of the surface above the longwall panels is continuing. A report which describes the experimental project and its results in greater detail has been prepared for submittal to the UDOGM.

Subsidence Monitoring. In 1976 (i.e., prior to the onset of subsidence), SUFCO Mine began collecting baseline topographic data from the permit area using conventional survey methods. The use of conventional survey methods for subsidence monitoring continued until 1985 (i.e., at the beginning of longwall mining), when the permit area was flown to establish a set of baseline photography and a grid of surface elevations. Where possible, elevations were photogrammetrically determined from this baseline photography on an approximate 200-foot grid. These original horizontal and vertical data, together with the original conventional-survey data, serve as the comparative database for determining ground movement in subsequent years. A baseline was also established to monitor changes in vegetative cover with the use of color infrared aerial photography (CIR). The first baseline was done in 1987 for the existing leases. The baseline for the Quitchupah lease was flown in 1988 with CIR. The applicant will follow up with CIR coverage of the leases at least every five years. The CIR photographs are stored at the SUFCO Mine. CIR photography was taken in 1990, 1995, 1999, 2003 (East Fork Box Canyon only), and 2004. The next projected CIR flight dates will be in 2008, 2013, and 2018.

Additional aerial photography of the permit area is currently obtained on an annual basis. New elevations are then determined at each of the previously-selected horizontal coordinates and the differences between the original and the new elevation measurements are used to generate a subsidence contour map. This map and supporting narrative are submitted annually to the UDOGM in the form of a subsidence report. This subsidence report outlines the history of subsidence at SUFCO Mine as well as the status of subsidence during the previous year.

Numerous control points have been established within the permit area to assist in the subsidence surveys (see Plate 5-10). Current (1991) coordinates and elevations of these control points are provided in Table 5-2. Additional control points will be added as necessary when existing points become influenced by subsidence. Future points will typically consist of 3-foot lengths of No. 4 rebar embedded in concrete with a stamped brass cap for identification. Since geologic and mining uncertainties often force a change in planned mining sequences, future control points will be installed only after the mine panels are in their development phase.

All subsidence areas will be monitored and reported in the Annual Subsidence Report for a minimum of three years after no additional subsidence is detected within the area. The applicant will map and report areas 3 and 4 in the 1993 Subsidence Report as required by Division Order #93A issued May 11, 1993.

A once-every-other-year~~bi-annual~~ monitoring program ~~will be~~was developed to analyze the subsidence cracks related to undermining of the West Fork of Box Canyon. Mining in the area in 1999 did produce visible fracturing at the surface on both the northwest and southeast walls of the canyon in this area. The monitoring program ~~will~~ includes measuring the offset and/or width of portions of selected subsidence cracks. Similar data will also be collected from specified segments of subsidence cracks that have occurred away from the walls of the canyon and do not appear to be influenced by the lack of bedrock support created by the canyon. Information gathered from this monitoring program, along with previous studies that SUFCO has performed, will be used to predict the effects of subsidence within other areas of the Pines Tract and other areas of the

mine where similar geomorphologic and geologic conditions occur. This program ~~will be~~was developed and implemented by the Fall~~September~~of 2000. Subsidence cracks in the area of the West Fork of Box Canyon were surveyed for their location. However, in the year 2000 and 2002 the width and/or offset of the cracks were not measured or the records were not kept. Width and/or offset measurements were made in the Fall of 2004 and will again be made in the Fall of 2005 and every other year thereafter. The records are available at the mine.

Anticipated Effects of Subsidence. Future subsidence in the permit area is anticipated to be similar to that which has occurred in the past. Subsidence is expected to average about 4 feet above longwall panels, with a draw angle of about 15 degrees. Tension cracks are expected to occur in areas of subsidence with these cracks healing to some degree following formation. Tension cracks are anticipated to be less pronounced above longwall workings than above continuous-miner workings.

Previous surveys have indicated that no substantial damage has occurred to vegetation as a result of subsidence within the permit area. The only effects observed have been exposed plant roots where tension cracks have formed.

It is anticipated that subsiding under portions of East Fork Box Canyon will result in a slight flattening of the stream gradient, which will increase pooling of the stream through a stretch of several hundred feet of the stream. Cracks will also likely develop across the East Fork Box Canyon Creek directly above the longwall panels and along the gate roads. These crack zones will form shortly after undermining of the stream bed. They are anticipated to be 1 to 2 inches or less in width with these cracks healing to some degree following formation. Details of the expected location of the cracks are given in Appendix 7-19. If cracks do develop in the channel floor and appear to be taking surface water from the creek, sealing of these cracks will be done with bentonite grout. Use of bentonite grout for the sealing of the cracks in the channel floor is discussed in Section 3 of the Pines Tract FEIS (1999) and in more detail in the following section.

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.) have been installed to minimize this impact. These facilities are regularly inspected (see Section 5.1.4) and maintained.

Data on file with the Utah Department of Environmental Quality (formerly the Utah Division of Environmental Health) indicate that waters discharging from the mine have typically not exceeded the total suspended solids standards (40 CFR 434) of 70.0 mg/l maximum, 35.0 mg/l 7-day average, and the 25.0 mg/l average daily. Samples of sedimentation pond discharge have rarely exceeded the maximum standard with the exceedances ranging from ~~89.0~~26.0 to ~~693~~261 mg/l. ~~However,~~ Except under unusual circumstances, the average total suspended solids concentration of the sedimentation pond discharge ~~(30.3 mg/l)~~ is less than the average daily standards. Thus, although a limited number of exceedances of the standards have occurred, the sediment-control measures at the mine are considered effective at minimizing the impacts of increased sediment yield on adjacent streams.

Sediment yields may increase locally due to subsidence. Subsidence cracks which intersect ephemeral drainages with steep gradients could, for a short period of time, increase the sediment yield of the stream. However, this sediment increase would cause the crack to be quickly filled, recreating pre-subsidence stream channel conditions. Thus, the potential impact to sediment yield would be minor and of short duration.

An assessment of the Alternative Sediment Control Measures to be implemented during reclamation was performed as indicated in Appendix 7-15. These calculations indicate that the implementation of each sediment control measure substantially reduces the amount of sediment erosion from the reclaimed areas, to the point that the mulch theoretically inhibits soil loss more effectively than a baseline level of undisturbed ground cover. In fact, the combination of surface soil preparation, an application of wood fiber hydromulch at 2000 pounds per acre, and the use of silt fences results in a 37% to 85% reduction of soil erosion below that which would be expected from naturally vegetated grass/sage slopes. Thus, sediment control measures to be implemented during reclamation will preclude adverse impacts to the environment.

of time. A discussion of the potential impacts to water resources due to subsidence is provided in Section 7.2.8.3 of this M&RP and in Appendix 7-17. DeGraff (Appendix 5-4) indicates that tension cracks in the permit area typically heal quickly. There are no sustained above normal inflows in the mine due to mining or subsidence. Thus, most fractures in the permit area appear to become sealed in a relatively short period of time.

Intersection of locally perched aquifers by subsidence cracks could divert groundwater from a spring. Water will not be lost from a specific basin, but may become diverted within the basin.

The discharge from the abandoned Link Canyon Mine ~~will~~was to be maintained during and after utilization of the western portal for Sufco Mine access. The water naturally ~~discharged~~discharging from the abandoned mine is not considered to be a UPDES mine discharge point by the Utah Division of Water Quality so long as the water is not contaminated or comes in contact with Sufco mining related activities. The initial plan by Sufco ~~will design and implement a water collection system that will allow water in the abandoned sections~~was to maintain the flow of water from the ~~Link Canyon Mine to continue to discharge at both portals~~flooded old works to the abandoned eastern portal and out the rehabilitated western portal. ~~The system will isolate~~However, when the ~~water in the abandoned workings~~old works were accessed, both from ~~any water~~inside the Sufco Mine and the surface, very little water was encountered ~~in the active workings, thus allowing for~~and the ~~discharge of water only from the~~ old works did not appear to be flooded. ~~It is anticipated that only a portion~~The majority of ~~the~~ water ~~in the old Link Canyon Mine will need to be removed~~encountered during rehabilitation ~~of the portion of the mine utilized by Sufco~~efforts was located just inside the western portal. ~~Bulkheads or seals will be placed~~A small pond of water had formed behind a roof fall in ~~cross-cuts or entries between~~ the old mine ~~and the area used by Sufco~~. ~~This activity should maintain a flow~~It was apparent that shallow ground water or surface water entered the mine just in by the portals and upgradient of ~~water from the old works to the undisturbed east portal~~the roof fall, forming the small pond. ~~In addition to~~Once the ~~water naturally discharging from the east portal, a pipeline will be constructed underground to take a part of the water from the old works~~roof fall was removed and ~~discharge it at the rehabilitated west portal~~the water drained, water ceased discharging from the western portal. The ~~water discharge rate will be controlled to a rate~~volume of ~~about 1 gpm or less and care will be taken to maintain the flow~~water discharging from the ~~east~~eastern portal area also appeared to decrease. ~~This is the apparent rate~~It further appears that most of ~~discharge of~~the water

~~from the west~~that currently seeps into the old workings near the portal evaporates before it can accumulate and ~~east portals prior to disturbance~~discharge out the western portal. ~~The~~Small volumes of runoff and ground water ~~may gravity feed or may~~still accumulates in the eastern portal area and can be ~~pumped to~~seen in the ~~west portals~~spring and fall discharging over the rock ledges below the portal.

The riparian vegetation in the area of the ~~west portal~~Link Canyon portals is feed not only by the discharge from this portal but also by subsurface flow discharged by springs above the mine in the Castlegate Sandstone. Thus, ~~it is anticipated~~ the riparian vegetation above and below the west portal ~~will be~~was sustained during site construction by subsurface flows from the upgradient springs and flows from the east portal.

Water, if any, that enters the portion of the Link Canyon Mine utilized by Sufco will be discharged at UPDES discharge point 003.

~~Water from a portion of the old works removed during rehabilitation of the western Link Canyon Mine portal will be drained into the existing Sufco mine and discharged at its UPDES permitted discharge point 003. Water, if any, that enters the portion of the Link Canyon Mine utilized by Sufco during and after construction is complete will be discharged at UPDES discharge point 003. The Link Canyon Portal elevation is 7663 feet and the elevation where the old works will connect to the existing SUFCO Mine is 7658 feet with the mine average dip being 2% N45°W.~~

~~The activity related to reopening the western Link Canyon portal should not have a negative impact on surface water flows in Link Canyon Creek. As discussed above, water discharged from the Link Canyon Portals will be maintained to maintain the riparian vegetation that exists just below the old portals.~~ The Link Canyon Portal elevation is 7663 feet and the elevation where the old works will connect to the existing ~~SUFCO~~Sufco Mine is 7658 feet with the mine average dip being 2% N45°W.

~~The activity related to reopening the western Link Canyon portal should not have a negative impact on surface water flows in Link Canyon Creek. As discussed above~~of August 2005, water ~~discharged~~

~~from~~had not accumulated in the abandoned Link Canyon Mine and draining and discharging the water through the existing Sufuco Mine has not been necessary.

The activity related to reopening the western Link Canyon ~~Portals will be maintained to maintain the riparian vegetation that exists just below the old portals~~portal should not have a significant negative impact on surface water flows in Link Canyon Creek. While the creek has been designated as an intermittent stream under the R645 rules as a result of its drainage area size, the stream functions primarily as an ephemeral stream (Thiros and Cordy, 1991). As described in Section 7.2.4.2 of this chapter, the majority of the stream's reaches typically only flow as a result of runoff from significant precipitation events and during brief periods of snow melt runoff. The two surface water sites, Link 001 and Link 002 which are located above and below the portals (Plate 7-3), ~~have~~did not ~~had~~have measurable or monitorable flows during quarterly monitoring episodes ~~for the past three years~~from 1999 through 2002 (Erik Petersen, personnel communication, November 2002). Observable surface flows in the stream are generally limited to just below the developed springs *(Pines 100 and GW-21)* near the head of the canyon and just below and adjacent to the Link Canyon Portals. In both locations water flow or moist soils ~~are~~have been observable for only a few hundred feet below the source. Table 7-1A details the dates, flows, and monitoring personnel for sites Link 001, Link 002, Link Portal West and Link Portal East.

Vegetation in the Link Canyon channel below the mine will be photographically monitored on a quarterly basis, except in the winter months, to determine what, if any, impacts the reduction of discharge from the western portal has on the vegetative community. The vegetation monitoring was started in the summer of 2005 and will continue through the reclamation of the portals. The general health of the willows, Woods Rose, clematis, and wire grasses present in the vegetative community will be observed and the observations reported in the mine's annual report. If significant changes occur in the vegetation monitored, these changes will be reported to the Division, who will then notify the Forest. A plan may be developed and instigated at that time to mitigate any damages to the vegetation as a result of mining activities.

Flows from the Link Canyon portals have been measured periodically since 1977 with discharges ranging from 5 gpm (estimated by Hydrometrics, 1977) to no discharge (Petersen 2002). Samples

Three UPDES discharges are associated with the SUFCO mine. These include two mine water discharges and the sedimentation pond discharge. A description of these discharges is provided in Section 7.2.4.2.

The primary mine-water discharge consists of water from the underground mine workings that is diverted into mined-out areas now used as sumps. These sumps are used to settle out fines before discharge to the surface. This diversion is done in accordance with the requirements of R645-301-731.100 through R645-301-731.522 and R645-301-731.800. The clarified water flows through a box weir and pipeline to a point on an outcrop of Star Point Sandstone about 20 feet above the North Fork of Quitchupah Creek (see Plate 7-3). From there, the water flows directly into the creek. This discharge water is monitored for compliance with the UPDES permit standards prior to release from the mine.

An emergency mine-water discharge is also maintained. A description of this discharge point is provided in Section 7.2.4.2.

Water from the disturbed surface area in East Spring Canyon is collected and conveyed to the sedimentation pond. After the collected water is allowed time to settle-out the sediment, the water is discharged to the creek. The discharge water is monitored for compliance with the UPDES permit standards prior to release from the sedimentation pond.

No discharges of surface water are being made to underground mines and none are planned in the future.

~~The natural discharge of water from the old Link Canyon Portals will be maintained during use of the west portal and after reclamation of the site.~~ Upon abandonment of the mining area, the connection between the Sufco Mine and old Link Canyon Mine works will be sealed and made as water tight as possible. ~~The Link Canyon Mine works utilized by Sufco~~A low area that will ~~be allowed to fill and will discharge naturally at~~capture water will remain in the west portal, in the ~~west portal. None of the structures used to seal the old works from the rehabilitated works will be removed~~same area as the

~~mine is abandoned thus maintaining the~~roof fall that created the underground pond prior to rehabilitating the old Link Canyon Mine portal. The low area will be allowed to fill and will discharge naturally at the ~~east~~west portal.~~during reclamation~~ ~~It is possible~~Some structures used to seal the old works from the rehabilitated works ~~west~~may be removed as the mine is abandoned thus ensuring the ~~will result from gravity discharge of water from the undisturbed portion of the old mine established~~discharge at the east portal~~rehabilitation of the portion of the old mine utilized~~ during ~~Sufco~~reclamation. ~~If this is the case, that gravity system will remain inplace after abandonment of the works is complete. If a pump was used to maintain the flow of water from old works to the west portal, it may be necessary to flood the previously drained portion of the old Link Canyon Mine with water to reestablish the discharge from the west portal. If this is necessary, Sufco will investigate the possibility of using clean water from the active mine to fill the old works. Should this one time discharge of water to the old works be needed, it will be discussed with the Utah Division of Water Quality and will require approval.~~

7.3.1.6 Stream Buffer Zones

All perennial and intermittent streams in the mine area are protected by 100 foot stream buffer zones on either side of these streams. Coal mining and reclamation operations should not cause or contribute to the violation of applicable Utah or federal water standards and should not adversely effect the water quantity and quality or other environmental resources of the stream.

Stream Channel Diversions. Temporary or permanent stream channel diversions comply with R645-301-742.300.

Buffer Zone Designation. The areas surrounding the streams that are not to be disturbed are designated as buffer zones, and SUFCO has marked these as specified in R645-301-521.260.

7.3.1.7 Cross Sections and Maps

The locations of water rights for current users of surface water flowing into, out of, and within the permit and adjacent areas is provided on Plate 7-2. Discharges associated with the permit and adjacent areas are located as presented on Plate 7-3.

of routing runoff from disturbed areas into the mine with berms and insloping. The runoff is then treated using in mine settling ponds prior to discharge through approved UPDES points. The disturbed area associated with the South portals is 0.017 acre. The disturbed area associated with the 3 East portals is 0.017 acre. The disturbed area associated with the Quitchupah portals is 0.017 acre. A calculation demonstrating the insignificance of the inflow of surface water into the mine is included in Appendix 7-16.

Several alternate sediment control areas are defined within the mine site and are listed below (see Plates 5-2B,C,~~&~~D,E,~~&~~F):

- The original substation pad area and fire water tank above the office building. The sediment controls include a graveled pad area and silt fences. The disturbed area is 0.324 acre.

- The topsoil stockpile near the mine site sedimentation pond. The sediment control ~~is~~ consists of containment berms and silt fencing. The disturbed area is 0.105 acre.

- The subsoil and sedimentation pond topsoil stockpiles at the waste rock disposal site. The sediment controls include containment berms and silt fencing. The disturbed area of the subsoil stockpile is 0.51 acre. The disturbed area of the pond topsoil pile is 0.293 acre.

- The area above the mine fan in East Spring Canyon. The sediment control consists of silt fencing. The disturbed area is 0.122 acre.

- The pump house in Convulsion Canyon. The sediment control consists of containment berms and silt fencing. The disturbed area is 0.075 acre.

- The leach field in Convulsion Canyon. The sediment control consists of containment berms and silt fencing. The area is fenced to prevent grazing. The disturbed area is 0.40 acre.

- The new substation pad disturbed area is 0.287 acre. The sediment controls include gravel and silt fences.

- The 4 East portal site consists of a pad area where a mine fan has been built. The disturbed area associated with the two portal openings at this site is 0.70 acre. Alternate sediment control at this pad consists of a containment berm, gravel and silt fencing.

- The Link Canyon Substation No. 1 facility disturbed area is 0.18 acre. This substation pad area was reclaimed in 2000. The sediment control consists of containment berms, ~~gravel and~~ silt fencing, and vegetation.

- The Link Canyon Substation No. 2 facility disturbed area is 0.12 acre. The sediment control consists of containment berms, gravel and silt fencing.

- The Link Canyon Portal facility disturbed area is ~~0.14~~0.18 acre. The sediment control consists of containment berms, gravel and silt fencing.

The total area for Alternate Sediment Control Areas (ASCA) is ~~3.256~~3.296 acres. This is approximately ~~11.7~~11.9 percent of ~~27.740~~27.78 acres of total disturbed area at the mine site, Link Canyon Portal and Substation No. 1 and No. 2 facility sites, and waste rock disposal site (including ASCA's and SAE's).

From the final analysis of the 25-year, 6-hour storm event, the maximum inflow rate to the sediment trap from storm runoff is 2.0 cubic feet per second (cfs) and the maximum outflow rate from the basin is 2.1 cfs. The corresponding high water level in the sediment trap is 7440.0 feet, 1.6 feet below the top of the concrete structure.

The maximum inflow rate to the primary sedimentation pond is 2.65 cfs and the maximum outflow rate is 2.2 cfs. The corresponding high water level is 7418.35 feet, 0.2 feet above the primary spillway flowline, and 1.65 feet below the minimum embankment elevation of 7420.0.

Details for the concrete sediment trap spillway are presented in Appendix 7-8. Details for the primary and emergency spillways on the sedimentation pond can be found on Plate 7-5.

Waste Rock Disposal Site Sedimentation Pond. The sedimentation pond at the waste rock disposal site will adequately pass the 25-year, 6-hour precipitation event through the primary and emergency spillways. Details regarding the spillway design are located in Volume 3 of this M&RP.

Other Treatment Facilities. There are no other treatment facilities within the mine permit area.

Exemptions. Exemption areas are listed below (see Plate 5-2B):

- The south side of the original substation pad area above the office building. This area is classified as an "Exempt Area". The demonstration for this area is a SEDCAD computer program and is located in Appendix 7-16, Vol. 10. The disturbed area is 0.040 acre.
- The spring collection field in Convulsion Canyon. This area is classified as an "Exempt Area". The demonstration for this area is a SEDCAD computer program and is located in Appendix 7-16, Vol. 10. The area is fenced to prevent grazing. The disturbed area is 0.39 acre.
- The water tank area northeast of the mine site. This area is classified as an "Exempt Area". The demonstration for this area is a SEDCAD computer program and is located in Appendix 7-16, Vol. 10. The disturbed area is 0.193 acre.

The total disturbed area contributing to the East Spring Canyon sedimentation pond is 15.88 acres. The total disturbed area contributing to the waste rock disposal site sedimentation pond is 7.93 acres. The total area for Small Area Exemption (SAE) is 0.623 acres. This is 2.2 percent of ~~27.740~~27.78

acres of total disturbed area at the mine site, Link Canyon Portal and Substation No. 1 and No. 2 facility sites, and waste rock disposal site (including ASCA's and SAE's).

7.4.2.3 Diversions

General Requirements. The diversions within the permit area consist of drainage ditches and culverts. All diversions within the permit area have been designed to minimize adverse impacts to the hydrologic balance, to prevent material damage outside the permit area and to assure the safety of the public.

All diversions and diversion structures have been designed, located, constructed, maintained and used to:

- Be stable
- Provide protection against flooding and resultant damage to life and property
- Prevent, to the extent possible, additional contributions of suspended solids to stream flow outside the permit area
- Comply with all applicable local, state, and federal laws and regulations

All diversions within the permit area are temporary and will be removed when no longer needed. The diversions will be reclaimed in accordance with the reclamation plan defined in Chapter 5.

Peak discharge rates from the undisturbed and disturbed area drainages within the permit area were calculated for use in determining the adequacy of the existing diversion ditches and culverts. The storm runoff calculations for the temporary diversion structures were based on the 10-year, 6-hour precipitation event of 1.3 inches. Curve numbers were based on those defined in Appendix 7-9 and professional judgement. A description of the methods used to determine the peak discharge rates is presented in Appendix 7-10.

The disturbed and undisturbed drainage areas for the facilities area are presented on Plate 7-7. Those drainage areas too large to fit on Plate 7-7 can be found on Plate 7-8. A summary of watershed characteristics is presented in Table 7-6. The disturbed and undisturbed drainage areas

for the Link Canyon facilities area are presented on Plate 5-2D,E,&F. Link Canyon diversion calculations and designs are presented in Appendix 7-12.

The size and location of each existing diversion ditch and culvert were verified in the field. All diversions are located on Plates 7-6 and 5-2D,E,&F. The minimum capacity and freeboard of each diversion ditch was determined based on the minimum ditch slope, while the maximum velocity and minimum riprap protection was calculated based on the maximum ditch slope. The capacity of each culvert was determined using the minimum culvert slope, and the outlet velocity and riprap protection was verified using the culvert outlet slope. Slopes were measured either in the field or from a contour map with the scale of 1" = 50'. A description of the methods used to determine diversion capacities, flow velocities, and riprap sizes is presented in Appendix 7-10. All diversion calculations are presented in Appendices 7-12 and 7-13.

Diversion of Perennial and Intermittent Streams. Flows from the two tributary streams are diverted under the fill area by two large corrugated metal pipes. Both diversions are temporary, and can adequately pass the peak flows from the 10-year, 6-hour precipitation event.

Mud Spring Hollow flows into a 42-inch diameter CMP. The mitered inlet structure is constructed of concrete and has a headwall of approximately 4 feet. It discharges directly into the 72-inch East Spring Bypass culvert. Based on the calculations presented in Appendix 7-11, the peak flow rate from watershed MSH-1 is 38.06 cfs. The minimum culvert slope is 1.8% which results in a maximum flow depth of 1.79 feet. The existing culvert is adequate in size.

The flows in East Spring Canyon are diverted by a 72-inch diameter CMP. This pipe is large enough to handle the flows from East Spring Canyon and Mud Spring Hollow. This CMP extends under the fill area and discharges downstream below the primary sedimentation pond. The size of the bypass narrows to a 48-inch diameter CMP down the steep fill slope.

The peak flow from East Spring Canyon is 59.6 cfs. The concrete inlet structure was evaluated according to methods described in Appendix 7-10. The inlet structure is adequate to pass the design storm event.

An emergency diversion was constructed at the main mine fan for the East Spring Canyon bypass culvert. This 3.5 foot square drop drain with oil skimmer cap connects into a 48-inch culvert directed into the East Spring Canyon bypass culvert. This serves as an overflow system when the trash rack at the inlet to East Spring Canyon becomes plugged with debris.

The combined peak flow from East Spring Canyon and Mud Spring Hollow for the 10-year, 6-hour precipitation event is 97.9 cfs. The capacity of the culvert was evaluated based on this flow rate and a minimum culvert slope of 1.2%. The resulting maximum flow depth of 2.6 feet indicates that the existing culvert is adequate. The capacity of the 48-inch culvert was also verified. The resulting maximum flow depth, corresponding to the minimum slope of 10%, is 1.75 feet. The 48-inch culvert is adequate to pass the design storm.

The discharge velocity from the 48-inch culvert was determined to verify the adequacy of the existing riprap (D_{50} = 15 inches). The calculated outlet velocity, based on a culvert outlet slope of 10%, is 18.5 feet per second. Using methods defined in Appendix 7-10, the required average riprap size at the outlet is 15 inches. The existing riprap is acceptable.

Diversion of Miscellaneous Flows. Diversion ditches and culverts have been utilized within the permit area to divert miscellaneous flows from disturbed and undisturbed area drainages.

Diversion Ditches. A summary table of the minimum channel geometry, channel slope, peak discharge, minimum riprap requirements, maximum flow velocity and minimum freeboard values for each diversion ditch within the facilities area is presented in Table 7-9. All calculations are contained in Appendix 7-12. Each ditch was verified in the field and has adequate capacity and erosion protection to pass the 10-year, 6-hour precipitation event. A description of the diversion ditches within the facilities area is presented below:

- Interception ditch along the East Side Road which drains the undisturbed watershed CBE-5. This diversion drains into the CBE bypass culvert at the substation.
- Interception ditch along the East Side Road which drains the undisturbed watersheds CBE-1 through CBE-5. This diversion drains into the CBE continuance diversion.

- Substation pad upper interception ditch which drains the undisturbed watershed CBE-4. This diversion drains into the CBE bypass culvert at the substation.

- Substation pad lower undisturbed interception ditch which drains the watershed CBE-3. This diversion drains into a drop drain for the CBE bypass culvert at the substation and is part of the alternate sediment control measures defined in Section 7.4.2.1.

- Riprap diversion channel for CBE continuance diversion. This diversion carries flows from the lower interception ditch along the East Side Road to an adjacent ephemeral drainage.

- Interception ditch for the undisturbed watershed ESC-6 north of the ATOF. This diversion discharges to the inlet of the 6-inch pipe diversion which connects into the 72-inch East Spring Canyon bypass system.

- Interception ditch for the undisturbed watershed ESC-7 north of the ATOF. This diversion drains to the 6-inch pipe diversion which connects into the 72-inch East Spring Canyon bypass system.

- Interception ditch for the undisturbed watershed MSH-2 north of the ATOF. This diversion drains to the inlet of the 42-inch Mud Spring Hollow bypass.

- Interception ditch for the undisturbed watershed MSH-2A north of the ATOF. This diversion drains to the 6-inch pipe diversion which connects into the 72-inch East Spring Canyon bypass system.

- Interception ditch draining watershed DIS-1A. This diversion drains to one of the drop drain inlets of the 10-inch mine yard drain line.

- Sedimentation pond access road diversion ditch. This diversion drains the disturbed watershed DIS-3 and discharges to the sedimentation pond.

- Main access road diversion ditch which drains undisturbed watershed DWN-1. This ditch drains to the pipe number 5 diversion.

- Link Canyon Substation No. 1 ditch which drains the watersheds LINK and ASCA-1. This diversion diverts the upper undisturbed drainage around the substation and drains to the Link Canyon Substation No. 1 road swale. This diversion ditch was reclaimed in 2000.

- Link Canyon Substation No. 1 road swale which drains watersheds LINK, ASCA-1, and ASCA-3. This diversion carries flows from the Link Canyon Substation No. 1 ditch across the substation access road to the main Link Canyon road drainage. This diversion was reclaimed in 2000.

- Link Canyon Substation No. 2 ditch which drains the watersheds LINK No.2, ASCA-4 and ASCA-7. This diversion diverts the upper undisturbed drainage around the substation and drains to the main Link Canyon road drainage.

- Link Canyon Portal access road Channel No. 1 diversion ditch. This diversion diverts the access road disturbed drainage and the undisturbed drainage above the road to the Link Canyon drainage bypass culvert inlet.

- Link Canyon Portal Pad Channel No. 2 diversion ditch. This diversion diverts the pad area disturbed drainage and the undisturbed drainage above the pad to the Link Canyon drainage bypass culvert inlet.

A description of the diversion ditches within the waste rock disposal site can be found in Volume 3 of this M&RP.

Diversion Culverts. A summary table of the culvert size, slope, peak discharge, existing riprap at outlet, and outlet flow velocity for each culvert within the facilities area is presented in Table 7-10. All calculations are contained in Appendix 7-13. Each culvert has adequate capacity and outlet erosion protection to pass the 10-year, 6-hour precipitation event. A description of the diversion culverts within the facilities area is presented below:

- East Spring Canyon bypass culvert. This culvert drains the undisturbed watersheds ESC-1 through ESC-5 and extends under the fill area and discharges downstream below the primary sedimentation pond.

- Mud Spring Hollow bypass culvert. This culvert drains the undisturbed watershed MSH-1 and connects into the 72-inch East Spring Canyon bypass culvert system.

- CBE bypass culvert at the substation. This culvert drains the undisturbed watersheds CBE-2 through CBE-5 and discharges to the lower East Side Road interception ditch. Three drop drains direct the flows to the bypass culvert. The drop drains help reduce the time the runoff water will be on the pad area to reduce the chance of water migrating through the substation pad fill and lubricating the substation slide slip zone.

- Pipe No. 5 diversion culvert which drains the undisturbed area DWN-1. This culvert discharges below the sedimentation pond access road to the natural slope. It does not drain to the pond.

- 6-inch pipe diversion for undisturbed watersheds ESC-7, ESC-6, and MSH-2A. This pipe connects into the 72-inch East Spring Canyon bypass system.

- Link Canyon Portal bypass culvert. This culvert drains the undisturbed watersheds LCP-East and LCP-West and discharges back into the Link Canyon drainage.

- Main Mine Fan Diversion. The main mine fan is located in a depression which is nine feet below the adjacent mine yard drainage system. A sump pump with automatic float controls in front of the main fan will pump the runoff from this area into the 10-inch mine yard drain line.

- 10-inch mine yard drainage system. This drainage system was installed to handle normal surface flows in the mine yard and to reduce the occurrence of mud and erosion. The drainage system consists of drop inlets and a 10-inch pipeline discharging to the concrete sediment trap. It was not designed to pass the 10-year, 6-hour precipitation event. Instead, the surface area of the mine yard is graded to divert all runoff to the concrete sediment trap.

TABLE 7-9
Summary of Diversion Ditches

Diversion	Minimum Bottom Width (ft.)	Minimum Top Width (ft.)	Minimum Depth (ft.)	Side Slopes (H:V)	Minimum riprap D_{50} (in.)	Min. Slope (%)	Max. Slope (%)	Peak Flow[a] (cfs)	Minimum Free-board (ft.)	Existing ditch geometry and riprap OK?
Upper East Side Road diversion draining CBE-5	1.0	2.2	0.4	1.5:1	not required	16.0	38.0	0.09	0.36	yes
Lower East Side Road diversion draining CBE-1 through CBE-5 (lower and upper sections of ditch)	Lower 1.0 Upper 1.0	Lower 2.2 Upper 2.5	Lower 0.5 Upper 0.5	Lower 1.2:1 Upper 1.5:1	Lower 2.0 Upper not required	Upper 3.0	Lower 24.0	0.79	Lower 0.36 Upper 0.29	Lower yes Upper yes
Substation pad upper interception ditch draining CBE-4	1.0	1.6	0.4	0.8:1	not required	1.0	18.0	0.07	0.33	yes
Substation pad lower interception ditch draining CBE-3	1.0	1.6	0.4	1:1	not required	1.0	10.0	0.03	0.35	yes
CBE continuance diversion	1.0	2.5	0.5	1.5:1	3.0	33.0	38.0	0.79	0.37	yes
Interception ditch draining ESC-6 north of ATOF	1.0	1.8	0.4	1:1	not required	1.0	1.0	0.13	0.30	yes
Interception ditch draining ESC-7 north of ATOF	1.0	2.2	0.4	1.5:1	not required	21.0	32.0	0.08	0.37	yes
Interception ditch draining MSH-2 north of ATOF	1.0	2.2	0.4	1.5:1	not required	1.0	20.0	0.08	0.32	yes
Interception ditch draining MSH-2A north of ATOF	1.0	2.2	0.4	1.5:1	not required	1.0	20.0	0.03	0.32	yes
Interception ditch draining DIS-1A	1.0	2.0	.61	1.5:1	not required	1.0	1.0	0.06	0.30	yes
Sedimentation pond access road diversion ditch draining DIS-3	1.0	2.2	0.4	1.5:1	1.0	21.0	31.0	0.35[b]	0.31	yes
Main access road diversion ditch draining DWN-1	2.0	4.0	0.5	2:1	not required	1.0	3.0	0.85	0.30	yes
Link Canyon Substation No. 1 ditch draining LINK and ASCA-1 [Reclaimed in 2000]	2.0	2.81	0.41	1:1	not required	1.0	9.82	0.87	0.30	yes
Link Canyon Substation No. 1 road swale draining LINK, ASCA-1, and ASCA-3 [Reclaimed in 2000]	Parabolic	10.0	0.398	Parabolic	not required	1.0	2.0	0.89	0.30	yes
Link Canyon Substation No. 2 ditch draining Link No.2, ASCA-4, and ASCA-7	0.0	1.52	.51	Left 2:1 Right 1:1	not required	1.0	6.7	0.20	0.30	yes
Link Canyon Portal Access Road Channel No. 1	0.0	0.97	0.48	1:1	not required	7.69	11.0	0.10[b]	0.30	yes
Link Canyon Portal Pad Channel No. 2	0.0	0.90	0.45	1:1	not required	5.21	8.3	0.06[b]	0.30	yes

[a] Peak discharge resulting from the 10-year, 6-hour precipitation event.

[b] Peak discharge resulting from the 25-year, 24-hour precipitation event.

materials such as cinder block, however, will be deposited at the disposal site.

Any slide or other damage at the disposal site which may have a potential adverse affect on public property, health, safety, or the environment will be reported to the Division by the fastest available means and will be remediated in compliance with Division instructions.

3.1.5 Acid and Toxic Forming Materials

Based on analyses of material that has been placed in the waste rock disposal site to date, no acid forming problems are anticipated. There is a potential for borderline toxicity problems from boron. Samples of the waste material will be collected quarterly when the site is receiving material and will be analyzed for acid or toxic forming potential. Should a problem be identified, a mitigation plan will be prepared and submitted to the Division for approval within 30 days of receipt of the analysis. All identified potential acid or toxic forming materials will be buried or otherwise treated within 30 days after the mitigation plan is approved by the Division.

Copies of laboratory reports on toxicity/acid-base accountability from representative waste samples are included in Volume 8 of the M&RP and starting in 2005 will be included in the annual report.

3.1.6 Subsoil Stockpile

Excess subsoil material and a small amount of topsoil from the minesite is stockpiled at the Waste Rock Disposal Site for possible use during final reclamation of SUFCO minesite facilities. The location of the subsoil and topsoil material is shown on Map 2. Total acreage of the subsoil stockpile and associated topsoil piles is 0.51 acres. Approximately 2,224 cubic yards of subsoil material and approximatly 56 cubic yards of topsoil material are stockpiled at the site. The associated topsoil pile removed from the subsoil stockpile area contains about 1,100 cubic yards. The top 24 inches of soil material was removed from the subsoil stockpile area as described in Section 3.1.2, Site Preparation. This topsoil was stored along the westerly boundary of the subsoil stockpile as shown on Map 2. Topsoil handling procedures complied with those described in Section 3.2.3, Topsoil Handling. This topsoil stockpile will be stored and seeded using the grasses and forbes of the

3.3 Timing of Operation

Since the waste rock disposal area is relatively small and relatively small volumes of fill are placed annually, the fill will be constructed in segments. The 200 feet wide strips will be placed beginning along the southern boundary and extend between the drainage diversion ditches. The eastern half of the disposal area will be completed first. The original Map 4 showeds the areas that would be completed based on a waste rock volume of 10,000 tons per year. The average fill volume from 1996 through 2003 was 3,200 tons per year and ranged from 1,400 to 6,800 tons per year. It should be noted that the active fill area will extend beyond the area shown for each year. This is best seen in cross-section G-G' of Figure 2 which shows the active fill areas in relation to the reclaimed area, topsoil removal area, and undisturbed area. The waste rock disposal pile was surveyed in August 2005 and contains an estimated 163,748 tons of waste rock. Map 4 has been revised to illustrate the current status of the reclaimed, active and undisturbed areas of the waste rock disposal area as of August 2005.

3.4 Area Affected by Each Phase of Operation

The eastern half of the waste rock disposal site will be built up first. Approximately 4.5 acres will be disturbed. Once the eastern portion is to design height, the fill will be extended to the western boundary by extending the fill in segments. As each segment of the fill is brought to final design height, it will be contoured to the approximate contours shown on Map 2. Once this has been accomplished, topsoil will be distributed and revegetation will proceed as indicated in the Revegetation Plan contained in Section 4.6.

3.5 Major Equipment List

The waste rock will be loaded at the mine by a front-end loader, such as a 988 Cat. Transport to the disposal site will be by dump trucks. Two types may be utilized, ~~25~~10 ton end-dumps or 40 ton bottom-dumps. The waste rock will be spread and compacted by a self powered compactor of suitable size, a dozer of a suitable size, or with a large front-end loader such as a 988 Cat.

PART 4 RECLAMATION PLAN

4.1 Introduction

The operation of the waste rock disposal site is designed for minimal areal disturbance at any given time. The waste material will be placed in compacted lifts and will be covered with topsoil and revegetated in the first available growing season following completion. Routes required for access to active disposal areas will be revegetated as soon as practical. The final contours will be as shown on Map 2.

4.2 Time Table

The waste rock disposal site will be used on an infrequent basis as required to dispose of rock generated during mining. The fill area will eventually encompass about 8 acres and contain an estimated 204,700 tons of waste rock. Because of the irregularity of use, the fill will be constructed in segments envisioned to be about 300 feet long by 150 feet wide. As segments are complete, they will be graded and vegetated as set forth in Sections 4.4-4.6. Final grading, topsoil application, seeding and other revegetation activities will be done in the Fall, preferably during late September or early October. The waste rock disposal pile was surveyed in August 2005 and contains an estimated 163,748 tons of waste rock. Map 4 has been revised to illustrate the current status of the reclaimed, active and undisturbed areas of the waste rock disposal area as of August 2005.

The original fill volume ~~is~~was estimated at 10,000 tons or 8,200 cubic yards per year. The average fill volume from 1996 through 2003 was 3,200 tons per year and ranged from 1,400 to 6,800 tons per year. At this projected rate, once the fill bench-slope configuration is established about ~~0~~1.5 acres should be filled and reclaimed ~~each~~ every six to nine years. The fill is expected to be completed in ~~2008~~2016.

After vegetation and monitoring requirements have been fulfilled, the sediment pond will be leveled. This is expected to occur in 20~~18~~26. This Phase II reclamation will consist of dozing the embankment into the pond and re-establishing the original contour as shown on Map 5. Topsoil will be placed over the area from the dedicated stockpile prior to reseeding according to Section 4.6.

The monitoring bore holes will also be closed as part of the Phase II reclamation. The shallow pipes will be pulled from the ground and the wells buried. These well areas will then be reseeded by hand broadcasting and raking.

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Canyon Fuel Company, LLC does not propose to conduct coal mining or reclamation operations within 300 feet of any occupied dwelling. Coal mining and reclamation operations have been or will be conducted within 100 feet of a public road, see Section 5.2.1.1 for details. Forest Service approval to conduct coal mining and reclamation operations within 100 feet of the Link Canyon forest service road is located in Appendix 1-1 and the newspaper advertisement for public comment is located in Appendix 1-3.

116 Permit Term

The following information is presented to identify permit term requirements and stipulations. Canyon Fuel Company will be operating the SUFCO Mine with continuous miner and longwall mining methods. Although the Mining and Reclamation Permit Application covers the next five-year period of mining, information is presented below for the life of the mining operation.

1.	First coal produced	1941
2.	Termination of mining activity	December, 2016
3.	Horizontal extent of mine workings	26,767.14 acres (Life of mine)
4.	Vertical extent of mine workings	Surface to 2,000 feet deep (Life of mine)

The anticipated total acreage to be affected during the five years of operation by underground mining activities is 1,500 acres. The estimated number of total surface acres to be affected over the entire mining operation is 46.306 acres.

PERMITTED DISTURBED AREA BOUNDARY	ACTUAL AREA CURRENTLY DISTURBED TO BE RECLAIMED	SITE DESCRIPTION
28.084	16.758	Mine Site, East Spring Canyon
0.286	0.017	3 East Portals
1.774	0.70	4 East Portals
0.302	0.017	South Portals
0.396	0.017	Quitchupah Portals
0.967	0.39	Spring Collection Field, Convulsion Canyon
0.220	0.075	Pump House, Convulsion Canyon

0.784	0.40	Leach Field, Convulsion Canyon
1.595	0.193	Water Tank, East Spring Canyon
0.287	0.18	Substation, Link Canyon No. 1
0.245	0.12	Substation, Link Canyon No. 2
0.380	0.18	Link Canyon Portal
10.986	8.733	Waste Rock Disposal Site
46.306	27.780	Totals

The permit area, which is the same as the lease area legal descriptions in Section 114, includes 23,939.92 acres of Federal coal leases, 2,134.19 acres of Utah State coal leases, 640 acres of fee coal leases, the 40 acres waste rock disposal site and 13.03 acres under U.S. Forest Service special use permit for a total of 26,767.14 acres.

117 Insurance and Proof of Publication

Certificates of Insurance issued to Canyon Fuel Company, LLC are located in the General Chapter 1 binder prepared for the Dugout Canyon Mine, Soldier Canyon Mine, SUFCO Mine, Skyline Mines and Banning Loadout operations and in Appendix 8-1.

The newspaper advertisement appears in Appendix 1-3. Verification of the advertisement appearing in the appropriate newspapers will be added to Appendix 1-3 and submitted to the Division no later than 4 weeks after publication.

118 Filing Fee

A photocopy of the receipt is presented in Appendix 1-4 as proof of payment of the permit filing fee.

120 Permit Application Format and Contents

The permit application contains clear, concise, current information, in the format required by the UDOGM.

130 Reporting of Technical Data

The A and C horizons will be removed together from the topsoil salvage area and stored in the pile as a single soil resource. Type D soils, the overcast from the east side of the trolley road, will be recovered prior to construction of the substation pad. All available suitable soils encountered during site construction will be salvaged and stored for final reclamation. A person qualified to make soil salvaging determinations will be on site during construction.

Six soil types and waste coal were identified by Dan Larsen (EIS) during his investigation of the soils in the Link Canyon Mine Portal disturbed area. The soil types and thicknesses of salvageable topsoil are listed below:

Soil Map Unit		Approx. Thickness	Mapped Area(approx.)	Volume
WC	Waste Coal	0 inches	250 sf	0 CY
DR	Disturbed old access road	6 inches	1300 sf	24 CY
CU	Calcic Ustochrepts	6 inches	800 sf	15 CY
TUE	Typic Ustochrepts, eroded, carbonatic	4 inches	200 sf	3 CY
TUL	Typic Ustochrepts, light colored	6 inches	20 sf	1 CY
VS	Very stoney and bouldery area	0 inches	100 sf	0 CY
RP	Riparian sites	6 inches	2000	37 CY
				80 CY

All available suitable soils encountered during portal site construction will be salvaged and stored for final reclamation (Plate 5-2F). A person qualified to make soil salvaging determinations will be on site during construction. The volume of topsoil salvaged was 38 cubic yards. The location of the topsoil pile is shown on the revised As-Built Plate 5-2F. The remaining excavated material will be used as fill material for the access road and the portal pad. A tracked vehicle, such as a trackhoe, will be used to remove the initial topsoil layers from the access road and pad area. As the site is constructed and space becomes available, a rubber-tired vehicle, such as a front end loader or backhoe, may be used to remove soils. During the topsoil removal process, a moisture level of at least 15% will be maintained in the soils to reduce dust and loss of the resource. Maintaining soil

moisture may be accomplished using a water truck equipped with pumps and hoses and personnel assigned to spraying the dry soils prior to and during salvage operations.

The sewer leach field for the mine site buildings will be expanded and two new water holding tanks will be buried in place at the existing pump house in the Fall of 2001. In both cases, the soils at these two locations have been disturbed in the past. A field investigation conducted

Topsoil from the Link Canyon Substation No. 1 will be placed and stored on the outslope of the pad. This storage area will be protected with berms and/or silt fences, a three-strand barbwire fence, and revegetated to control erosion. This soil will not be moved or disturbed until it is required for redistribution during final reclamation.

Soil from the Link Canyon Substation No. 2 will be placed in a soil stock pile located at the south end of the pad area. The storage area will be protected with berms and/or silt fences, a three strand barbwire fence, and revegetated to control erosion. This soil will not be moved or disturbed until it is required for redistribution during final reclamation.

Soil from the Link Canyon Mine Portal area will be placed in a topsoil pile located south of the disturbed portal pad area out of the floodplain (Plate 5-2F). The storage area will be protected by installing a topsoil storage sign at the base of the pile, berms and/or silt fences, a three strand barbwire fence, and protected from wind and water erosion by surface pitting the stockpile to retain moisture and reduce erosion and by being revegetated with a quick growing vegetative cover (standard seed mix in section 3.4.1.2 minus the shrubs and trees) to control erosion. This soil will not be moved or disturbed until it is required for redistribution during final reclamation. The surface of the topsoil pile will be pitted to reduce runoff and erosion. Vegetation removed during site construction, such as sage brush and other woody plants, will be placed on top of the pile.

Excess subsoil associated with construction of a run of mine coal stockpile is stored at SUFCO Mine's 40-acre waste rock disposal site (see Section 3.1.6 of Volume 3 of this M&RP). This material is segregated and will be available for fill during the reclamation phase of the mine site if needed. About 1,100 cubic yards of topsoil are stored immediately west of the subsoil pile.

Substation No. 2 will be stored in the soil stockpile as shown on Plate 5-2E. Topsoil removed from the Link Canyon Mine Portal area will be stored in the soil stockpile as shown on Plate 5-2F.

Protection from Contaminants and Compaction. Stockpiled topsoil shall be protected from contaminants and unnecessary compaction. To protect the topsoil from contaminants and unnecessary compaction that could interfere with vegetation, the sediment pond topsoil and the substation stockpiles are isolated with no means of access from the main surface area (Section 2.3.1.4). A topsoil storage sign was installed at the base of both stockpiles and will be placed on the Link Canyon Substations Nos. 1 and 2 and Link Canyon Mine Portal storage areas.

Wind and Water Erosion Protection. All topsoil stockpiles will be protected from wind and water erosion by prompt establishment and maintenance of a vegetative cover (standard seed mix in section 3.4.1.2 minus the shrubs and trees). The sediment pond and substation topsoil stockpiles are protected from wind and water erosion by the establishment of a protective vegetative cover. The Link Canyon Portal topsoil pile will be protectedby adding vegetative material removed during site construction. Grasses native to the area will be planted either through seeding or by obtaining and planting plugs from nearby undisturbed sites. A silt fence was installed below the stockpiles to help trap sediment runoff from the stockpiles.

Topsoil Redistribution. All stockpiled topsoil will not be moved until redistributed during reclamation operations unless approved by the UDOGM.

2.3.4.3 Topsoil Stockpile Relocation

Stockpiled topsoil in jeopardy of being detrimentally affected in terms of its quantity and quality by mine operations may be temporarily redistributed after approval from the UDOGM.

increase wildlife numbers, and attract wildlife away from impacted areas. Since much of the area is public domain, wildlife habitat enhancement is a viable management tool. However, any such effort should be carefully coordinated among appropriate regulatory agencies. Some examples of these measures include:

1. Development of springs, wells or other water supplies outside the mine area.
2. Fencing of developed water sources to restrict cattle trampling of vegetation, control erosion, and provide non-game habitat;
3. Altered livestock management policies, to avoid potential competition with wildlife.
4. Control of other human-related impacts, including recreation and timber harvest.

Revegetation of disturbed areas, as part of the reclamation effort, will include a mixture of grasses, forbs, shrubs and trees.

The total disturbed area acreage to be revegetated is small enough that fencing is considered to be an economically feasible means of protection, if deemed necessary. If grazing animals do prove detrimental to revegetation attempts, measures will be implemented following consultation with the regulatory authorities.

Water is perhaps the most limiting resource and as mentioned in the subsidence discussion, the present resources must not be decreased. The applicant herein commits to restore stream water resources in addition to previously identified springs which are contaminated, diminished, or interrupted as a result of the applicant's underground coal mining activities and which will not obviously be restored naturally within a reasonable period of time.

Potential water depletions from mining operations that may have an effect on endangered fish species identified in pertinent fish recovery programs of the USFWS have been evaluated by the Windy Gap Process as it applies to existing coal mines in the Upper Colorado River Basin.

Mining Consumption:

1. Culinary spring (Water Right 94-87) = 10.50 ac-ft (2004 consumption)
2. Ventilation Consumption/Evaporation:

33,068 gallons/day (05/02 ventilation survey)

33,068 x 365 = 12,069,820 gallons/yr = 37.05 ac-ft/yr

3. Coal Producing Consumption/Coal Moisture Loss:

Water added to coal produced –

8.34% inherent moisture - source Sufco Geologist

10.63% run-of-mine moisture - 2004 average

2.29% moisture added to coal by cutting & dust suppression operations

Projected Tonnage 2005	7,605,685 tons
Projected Tonnage 5 year average	7,510,217 tons
Tons water/yr	171,983
Pounds water/yr	343,967,938
Gallons water/yr	41,257,999 = 126.65 ac-ft/yr

4. Sediment Pond Evaporation:

Mine Site Pond	0.236 acres (surface area)
	18.1 in/yr (high estimate)
	0.35 ac/ft (inactive about 4 months)
Waste Rock Pond	0.219 acres (surface area)
	18.1 in/yr (high estimate)
	0.33ac/ft (inactive about 4 months)

Total Annual Pond Evaporation = 0.45 ac-ft/yr

5. Spring and Seeps Effects From Subsidence - Not Applicable
6. Alluvial Aquifer Abstractions into Mines - Not Applicable
7. Alluvial Well Pumpage - Not Applicable
8. Deep Aquifer Pumpage - Not Applicable
9. Postmining Inflow to Workings - Not Applicable
10. Direct Diversions: - Not Applicable
11. Dust Suppression - Included in Mining and Coal Producing Consumption above.

Mine Discharge:

2004 Average 4,948,260gpd = 1,806,114,900 gal/yr = 5544.3 ac-ft/yr.

Total mining operations net water gain/loss = 5369.65 ac-ft/yr gain.

Deer regularly migrate through and graze in the surface facilities and down the canyons to lower altitudes during severe winters. Numerous side canyons to Convulsion Canyon have been left undisturbed to allow uninterrupted big game movement.

Three longwall panels were completed in 1987 as part of the project. The area of proposed escarpment subsidence (the "Experimental Mining Practice" area) is shown on Plate 5-1. The north ends of two of the longwall panels extended beyond the escarpment toward the canyon. The third longwall panel was located entirely beyond the cliff beneath the canyon wall.

To date, monitoring efforts associated with the experimental mining practice have established that subsidence has occurred in a predictable manner varying from one foot to seven feet with minimal surface disturbance. One of the independent sandstone blocks fell from the escarpment during subsidence and a few tension cracks were created along the cliff face. No other visible signs of mining were found even though the surface elevations have dropped several feet in some areas of the experiment. Monitoring stations have moved horizontally from a few tenths of a foot to nearly three feet. Post-mining monitoring of the surface above the longwall panels is continuing. A report which describes the experimental project and its results in greater detail has been prepared for submittal to the UDOGM.

Subsidence Monitoring. In 1976 (i.e., prior to the onset of subsidence), SUFCO Mine began collecting baseline topographic data from the permit area using conventional survey methods. The use of conventional survey methods for subsidence monitoring continued until 1985 (i.e., at the beginning of longwall mining), when the permit area was flown to establish a set of baseline photography and a grid of surface elevations. Where possible, elevations were photogrammetrically determined from this baseline photography on an approximate 200-foot grid. These original horizontal and vertical data, together with the original conventional-survey data, serve as the comparative database for determining ground movement in subsequent years. A baseline was also established to monitor changes in vegetative cover with the use of color infrared aerial photography (CIR). The first baseline was done in 1987 for the existing leases. The baseline for the Quitchupah lease was flown in 1988 with CIR. The applicant will follow up with CIR coverage of the leases at least every five years. The CIR photographs are stored at the SUFCO Mine. CIR photography was taken in 1990, 1995, 1999, 2003 (East Fork Box Canyon only), and 2004. The next projected CIR flight dates will be in 2008, 2013, and 2018.

Additional aerial photography of the permit area is currently obtained on an annual basis. New elevations are then determined at each of the previously-selected horizontal coordinates and the differences between the original and the new elevation measurements are used to generate a subsidence contour map. This map and supporting narrative are submitted annually to the UDOGM in the form of a subsidence report. This subsidence report outlines the history of subsidence at SUFCO Mine as well as the status of subsidence during the previous year.

Numerous control points have been established within the permit area to assist in the subsidence surveys (see Plate 5-10). Current (1991) coordinates and elevations of these control points are provided in Table 5-2. Additional control points will be added as necessary when existing points become influenced by subsidence. Future points will typically consist of 3-foot lengths of No. 4 rebar embedded in concrete with a stamped brass cap for identification. Since geologic and mining uncertainties often force a change in planned mining sequences, future control points will be installed only after the mine panels are in their development phase.

All subsidence areas will be monitored and reported in the Annual Subsidence Report for a minimum of three years after no additional subsidence is detected within the area. The applicant will map and report areas 3 and 4 in the 1993 Subsidence Report as required by Division Order #93A issued May 11, 1993.

A once-every-other-year monitoring program was developed to analyze the subsidence cracks related to undermining of the West Fork of Box Canyon. Mining in the area in 1999 did produce visible fracturing at the surface on both the northwest and southeast walls of the canyon in this area. The monitoring program includes measuring the offset and/or width of portions of selected subsidence cracks. Similar data will also be collected from specified segments of subsidence cracks that have occurred away from the walls of the canyon and do not appear to be influenced by the lack of bedrock support created by the canyon. Information gathered from this monitoring program, along with previous studies that SUFCO has performed, will be used to predict the effects of subsidence within other areas of the Pines Tract and other areas of the

mine where similar geomorphologic and geologic conditions occur. This program was developed and implemented by the Fall of 2000. Subsidence cracks in the area of the West Fork of Box Canyon were surveyed for their location. However, in the year 2000 and 2002 the width and/or offset of the cracks were not measured or the records were not kept. Width and/or offset measurements were made in the Fall of 2004 and will again be made in the Fall of 2005 and every other year thereafter. The records are available at the mine.

Anticipated Effects of Subsidence. Future subsidence in the permit area is anticipated to be similar to that which has occurred in the past. Subsidence is expected to average about 4 feet above longwall panels, with a draw angle of about 15 degrees. Tension cracks are expected to occur in areas of subsidence with these cracks healing to some degree following formation. Tension cracks are anticipated to be less pronounced above longwall workings than above continuous-miner workings.

Previous surveys have indicated that no substantial damage has occurred to vegetation as a result of subsidence within the permit area. The only effects observed have been exposed plant roots where tension cracks have formed.

It is anticipated that subsiding under portions of East Fork Box Canyon will result in a slight flattening of the stream gradient, which will increase pooling of the stream through a stretch of several hundred feet of the stream. Cracks will also likely develop across the East Fork Box Canyon Creek directly above the longwall panels and along the gate roads. These crack zones will form shortly after undermining of the stream bed. They are anticipated to be 1 to 2 inches or less in width with these cracks healing to some degree following formation. Details of the expected location of the cracks are given in Appendix 7-19. If cracks do develop in the channel floor and appear to be taking surface water from the creek, sealing of these cracks will be done with bentonite grout. Use of bentonite grout for the sealing of the cracks in the channel floor is discussed in Section 3 of the Pines Tract FEIS (1999) and in more detail in the following section.

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.) have been installed to minimize this impact. These facilities are regularly inspected (see Section 5.1.4) and maintained.

Data on file with the Utah Department of Environmental Quality (formerly the Utah Division of Environmental Health) indicate that waters discharging from the mine have typically not exceeded the total suspended solids standards (40 CFR 434) of 70.0 mg/l maximum, 35.0 mg/l 7-day average, and the 25.0 mg/l average daily. Samples of sedimentation pond discharge have rarely exceeded the maximum standard with the exceedances ranging from 26.0 to 261 mg/l. Except under unusual circumstances, the average total suspended solids concentration of the sedimentation pond discharge is less than the average daily standards. Thus, although a limited number of exceedances of the standards have occurred, the sediment-control measures at the mine are considered effective at minimizing the impacts of increased sediment yield on adjacent streams.

Sediment yields may increase locally due to subsidence. Subsidence cracks which intersect ephemeral drainages with steep gradients could, for a short period of time, increase the sediment yield of the stream. However, this sediment increase would cause the crack to be quickly filled, recreating pre-subsidence stream channel conditions. Thus, the potential impact to sediment yield would be minor and of short duration.

An assessment of the Alternative Sediment Control Measures to be implemented during reclamation was performed as indicated in Appendix 7-15. These calculations indicate that the implementation of each sediment control measure substantially reduces the amount of sediment erosion from the reclaimed areas, to the point that the mulch theoretically inhibits soil loss more effectively than a baseline level of undisturbed ground cover. In fact, the combination of surface soil preparation, an application of wood fiber hydromulch at 2000 pounds per acre, and the use of silt fences results in a 37% to 85% reduction of soil erosion below that which would be expected from naturally vegetated grass/sage slopes. Thus, sediment control measures to be implemented during reclamation will preclude adverse impacts to the environment.

of time. A discussion of the potential impacts to water resources due to subsidence is provided in Section 7.2.8.3 of this M&RP and in Appendix 7-17. DeGraff (Appendix 5-4) indicates that tension cracks in the permit area typically heal quickly. There are no sustained above normal inflows in the mine due to mining or subsidence. Thus, most fractures in the permit area appear to become sealed in a relatively short period of time.
Intersection of locally perched aquifers by subsidence cracks could divert groundwater from a spring. Water will not be lost from a specific basin, but may become diverted within the basin.

The discharge from the abandoned Link Canyon Mine was to be maintained during and after utilization of the western portal for Sufco Mine access. The water naturally discharging from the abandoned mine is not considered to be a UPDES mine discharge point by the Utah Division of Water Quality so long as the water is not contaminated or comes in contact with Sufco mining related activities. The initial plan by Sufco was to maintain the flow of water from the flooded old works to the abandoned eastern portal and out the rehabilitated western portal. However, when the old works were accessed, both from inside the Sufco Mine and the surface, very little water was encountered and the old works did not appear to be flooded. The majority of water encountered during rehabilitation efforts was located just inside the western portal. A small pond of water had formed behind a roof fall in the old mine. It was apparent that shallow ground water or surface water entered the mine just in by the portals and upgradient of the roof fall, forming the small pond. Once the roof fall was removed and the water drained, water ceased discharging from the western portal. The volume of water discharging from the eastern portal area also appeared to decrease. It further appears that most of the water that currently seeps into the old workings near the portal evaporates before it can accumulate and discharge out the western portal. Small volumes of runoff and ground water still accumulates in the eastern portal area and can be seen in the spring and fall discharging over the rock ledges below the portal.

The riparian vegetation in the area of the Link Canyon portals is feed not only by the discharge from this portal but also by subsurface flow discharged by springs above the mine in the Castlegate Sandstone. Thus, the riparian vegetation above and below the west portal was sustained during site construction by subsurface flows from the upgradient springs and flows from the east portal.

Water, if any, that enters the portion of the Link Canyon Mine utilized by Sufco will be discharged at UPDES discharge point 003. The Link Canyon Portal elevation is 7663 feet and the elevation where the old works will connect to the existing Sufco Mine is 7658 feet with the mine average dip being 2% N45°W. As of August 2005, water had not accumulated in the abandoned Link Canyon Mine and draining and discharging the water through the existing Sufuco Mine has not been necessary.

The activity related to reopening the western Link Canyon portal should not have a significant negative impact on surface water flows in Link Canyon Creek. While the creek has been designated as an intermittent stream under the R645 rules as a result of its drainage area size, the stream functions primarily as an ephemeral stream (Thiros and Cordy, 1991). As described in Section 7.2.4.2 of this chapter, the majority of the stream's reaches typically only flow as a result of runoff from significant precipitation events and during brief periods of snow melt runoff. The two surface water sites, Link 001 and Link 002 which are located above and below the portals (Plate 7-3), did not have measurable or monitorable flows during quarterly monitoring episodes from 1999 through 2002 (Erik Petersen, personnel communication, November 2002). Observable surface flows in the stream are generally limited to just below the developed springs *(Pines 100 and GW-21)* near the head of the canyon and just below and adjacent to the Link Canyon Portals. In both locations water flow or moist soils have been observable for only a few hundred feet below the source. Table 7-1A details the dates, flows, and monitoring personnel for sites Link 001, Link 002, Link Portal West and Link Portal East.

Vegetation in the Link Canyon channel below the mine will be photographically monitored on a quarterly basis, except in the winter months, to determine what, if any, impacts the reduction of discharge from the western portal has on the vegetative community. The vegetation monitoring was started in the summer of 2005 and will continue through the reclamation of the portals. The general health of the willows, Woods Rose, clematis, and wire grasses present in the vegetative community will be observed and the observations reported in the mine's annual report. If significant changes occur in the vegetation monitored, these changes will be reported to the Division, who will then notify the Forest. A plan may be developed and instigated at that time to mitigate any damages to the vegetation as a result of mining activities.

Flows from the Link Canyon portals have been measured periodically since 1977 with discharges ranging from 3 gpm (estimated by Hydrometrics, 1977) to no discharge (Petersen 2002). Samples of the water discharged from the west portal have been obtained and analyzed by Thiros and Cordy (1991), Mayo and Associates during the Pines Tract EIS process (1998), and recently by Petersen (2002, Appendix 7-4).

Three UPDES discharges are associated with the SUFCO mine. These include two mine water discharges and the sedimentation pond discharge. A description of these discharges is provided in Section 7.2.4.2.

The primary mine-water discharge consists of water from the underground mine workings that is diverted into mined-out areas now used as sumps. These sumps are used to settle out fines before discharge to the surface. This diversion is done in accordance with the requirements of R645-301-731.100 through R645-301-731.522 and R645-301-731.800. The clarified water flows through a box weir and pipeline to a point on an outcrop of Star Point Sandstone about 20 feet above the North Fork of Quitchupah Creek (see Plate 7-3). From there, the water flows directly into the creek. This discharge water is monitored for compliance with the UPDES permit standards prior to release from the mine.

An emergency mine-water discharge is also maintained. A description of this discharge point is provided in Section 7.2.4.2.

Water from the disturbed surface area in East Spring Canyon is collected and conveyed to the sedimentation pond. After the collected water is allowed time to settle-out the sediment, the water is discharged to the creek. The discharge water is monitored for compliance with the UPDES permit standards prior to release from the sedimentation pond.

No discharges of surface water are being made to underground mines and none are planned in the future.

Upon abandonment of the mining area, the connection between the Sufco Mine and old Link Canyon Mine works will be sealed and made as water tight as possible. A low area that will capture water will remain in the west portal, in the same area as the roof fall that created the underground pond prior to rehabilitating the old Link Canyon Mine portal. The low area will be allowed to fill and will discharge naturally at the west portal. Some structures used to seal the old works from the rehabilitated works

may be removed as the mine is abandoned thus ensuring the discharge at the east portal during reclamation.

7.3.1.6 Stream Buffer Zones

All perennial and intermittent streams in the mine area are protected by 100 foot stream buffer zones on either side of these streams. Coal mining and reclamation operations should not cause or contribute to the violation of applicable Utah or federal water standards and should not adversely effect the water quantity and quality or other environmental resources of the stream.

Stream Channel Diversions. Temporary or permanent stream channel diversions comply with R645-301-742.300.

Buffer Zone Designation. The areas surrounding the streams that are not to be disturbed are designated as buffer zones, and SUFCO has marked these as specified in R645-301-521.260.

7.3.1.7 Cross Sections and Maps

The locations of water rights for current users of surface water flowing into, out of, and within the permit and adjacent areas is provided on Plate 7-2. Discharges associated with the permit and adjacent areas are located as presented on Plate 7-3.

The locations of each water diversion, collection, conveyance, treatment, storage, and discharge facility to be used in the East Spring Canyon area are presented on Plate 7-6. Similar information for the waste-rock disposal site is presented in Volume 3 of this M&RP. Similar information for the Link Canyon Substation No. 1 and No. 2 facility areas is presented on Plates

of routing runoff from disturbed areas into the mine with berms and insloping. The runoff is then treated using in mine settling ponds prior to discharge through approved UPDES points. The disturbed area associated with the South portals is 0.017 acre. The disturbed area associated with the 3 East portals is 0.017 acre. The disturbed area associated with the Quitchupah portals is 0.017 acre. A calculation demonstrating the insignificance of the inflow of surface water into the mine is included in Appendix 7-16.

Several alternate sediment control areas are defined within the mine site and are listed below (see Plates 5-2B,C,D,E,&F):

- The original substation pad area and fire water tank above the office building. The sediment controls include a graveled pad area and silt fences. The disturbed area is 0.324 acre.

- The topsoil stockpile near the mine site sedimentation pond. The sediment control consists of containment berms and silt fencing. The disturbed area is 0.105 acre.

- The subsoil and sedimentation pond topsoil stockpiles at the waste rock disposal site. The sediment controls include containment berms and silt fencing. The disturbed area of the subsoil stockpile is 0.51 acre. The disturbed area of the pond topsoil pile is 0.293 acre.

- The area above the mine fan in East Spring Canyon. The sediment control consists of silt fencing. The disturbed area is 0.122 acre.

- The pump house in Convulsion Canyon. The sediment control consists of containment berms and silt fencing. The disturbed area is 0.075 acre.

- The leach field in Convulsion Canyon. The sediment control consists of containment berms and silt fencing. The area is fenced to prevent grazing. The disturbed area is 0.40 acre.

- The new substation pad disturbed area is 0.287 acre. The sediment controls include gravel and silt fences.

- The 4 East portal site consists of a pad area where a mine fan has been built. The disturbed area associated with the two portal openings at this site is 0.70 acre. Alternate sediment control at this pad consists of a containment berm, gravel and silt fencing.

- The Link Canyon Substation No. 1 facility disturbed area is 0.18 acre. This substation pad area was reclaimed in 2000. The sediment control consists of containment berms, silt fencing, and vegetation.

- The Link Canyon Substation No. 2 facility disturbed area is 0.12 acre. The sediment control consists of containment berms, gravel and silt fencing.

- The Link Canyon Portal facility disturbed area is 0.18 acre. The sediment control consists of containment berms, gravel and silt fencing.

The total area for Alternate Sediment Control Areas (ASCA) is 3.296 acres. This is approximately 11.9 percent of 27.78 acres of total disturbed area at the mine site, Link Canyon Portal and Substation No. 1 and No. 2 facility sites, and waste rock disposal site (including ASCA's and SAE's).

From the final analysis of the 25-year, 6-hour storm event, the maximum inflow rate to the sediment trap from storm runoff is 2.0 cubic feet per second (cfs) and the maximum outflow rate from the basin is 2.1 cfs. The corresponding high water level in the sediment trap is 7440.0 feet, 1.6 feet below the top of the concrete structure.

The maximum inflow rate to the primary sedimentation pond is 2.65 cfs and the maximum outflow rate is 2.2 cfs. The corresponding high water level is 7418.35 feet, 0.2 feet above the primary spillway flowline, and 1.65 feet below the minimum embankment elevation of 7420.0.

Details for the concrete sediment trap spillway are presented in Appendix 7-8. Details for the primary and emergency spillways on the sedimentation pond can be found on Plate 7-5.

Waste Rock Disposal Site Sedimentation Pond. The sedimentation pond at the waste rock disposal site will adequately pass the 25-year, 6-hour precipitation event through the primary and emergency spillways. Details regarding the spillway design are located in Volume 3 of this M&RP.

Other Treatment Facilities. There are no other treatment facilities within the mine permit area.

Exemptions. Exemption areas are listed below (see Plate 5-2B):

- The south side of the original substation pad area above the office building. This area is classified as an "Exempt Area". The demonstration for this area is a SEDCAD computer program and is located in Appendix 7-16, Vol. 10. The disturbed area is 0.040 acre.
- The spring collection field in Convulsion Canyon. This area is classified as an "Exempt Area". The demonstration for this area is a SEDCAD computer program and is located in Appendix 7-16, Vol. 10. The area is fenced to prevent grazing. The disturbed area is 0.39 acre.
- The water tank area northeast of the mine site. This area is classified as an "Exempt Area". The demonstration for this area is a SEDCAD computer program and is located in Appendix 7-16, Vol. 10. The disturbed area is 0.193 acre.

The total disturbed area contributing to the East Spring Canyon sedimentation pond is 15.88 acres. The total disturbed area contributing to the waste rock disposal site sedimentation pond is 7.93 acres. The total area for Small Area Exemption (SAE) is 0.623 acres. This is 2.2 percent of 27.78 acres of

total disturbed area at the mine site, Link Canyon Portal and Substation No. 1 and No. 2 facility sites, and waste rock disposal site (including ASCA's and SAE's).

7.4.2.3 Diversions

General Requirements. The diversions within the permit area consist of drainage ditches and culverts. All diversions within the permit area have been designed to minimize adverse impacts to the hydrologic balance, to prevent material damage outside the permit area and to assure the safety of the public.

All diversions and diversion structures have been designed, located, constructed, maintained and used to:

- Be stable
- Provide protection against flooding and resultant damage to life and property
- Prevent, to the extent possible, additional contributions of suspended solids to stream flow outside the permit area
- Comply with all applicable local, state, and federal laws and regulations

All diversions within the permit area are temporary and will be removed when no longer needed. The diversions will be reclaimed in accordance with the reclamation plan defined in Chapter 5.

Peak discharge rates from the undisturbed and disturbed area drainages within the permit area were calculated for use in determining the adequacy of the existing diversion ditches and culverts. The storm runoff calculations for the temporary diversion structures were based on the 10-year, 6-hour precipitation event of 1.3 inches. Curve numbers were based on those defined in Appendix 7-9 and professional judgement. A description of the methods used to determine the peak discharge rates is presented in Appendix 7-10.

The disturbed and undisturbed drainage areas for the facilities area are presented on Plate 7-7. Those drainage areas too large to fit on Plate 7-7 can be found on Plate 7-8. A summary of watershed characteristics is presented in Table 7-6. The disturbed and undisturbed drainage areas

for the Link Canyon facilities area are presented on Plate 5-2D,E,&F. Link Canyon diversion calculations and designs are presented in Appendix 7-12.

The size and location of each existing diversion ditch and culvert were verified in the field. All diversions are located on Plates 7-6 and 5-2D,E,&F. The minimum capacity and freeboard of each diversion ditch was determined based on the minimum ditch slope, while the maximum velocity and minimum riprap protection was calculated based on the maximum ditch slope. The capacity of each culvert was determined using the minimum culvert slope, and the outlet velocity and riprap protection was verified using the culvert outlet slope. Slopes were measured either in the field or from a contour map with the scale of 1" = 50'. A description of the methods used to determine diversion capacities, flow velocities, and riprap sizes is presented in Appendix 7-10. All diversion calculations are presented in Appendices 7-12 and 7-13.

Diversion of Perennial and Intermittent Streams. Flows from the two tributary streams are diverted under the fill area by two large corrugated metal pipes. Both diversions are temporary, and can adequately pass the peak flows from the 10-year, 6-hour precipitation event.

Mud Spring Hollow flows into a 42-inch diameter CMP. The mitered inlet structure is constructed of concrete and has a headwall of approximately 4 feet. It discharges directly into the 72-inch East Spring Bypass culvert. Based on the calculations presented in Appendix 7-11, the peak flow rate from watershed MSH-1 is 38.06 cfs. The minimum culvert slope is 1.8% which results in a maximum flow depth of 1.79 feet. The existing culvert is adequate in size.

The flows in East Spring Canyon are diverted by a 72-inch diameter CMP. This pipe is large enough to handle the flows from East Spring Canyon and Mud Spring Hollow. This CMP extends under the fill area and discharges downstream below the primary sedimentation pond. The size of the bypass narrows to a 48-inch diameter CMP down the steep fill slope.

The peak flow from East Spring Canyon is 59.6 cfs. The concrete inlet structure was evaluated according to methods described in Appendix 7-10. The inlet structure is adequate to pass the design storm event.

An emergency diversion was constructed at the main mine fan for the East Spring Canyon bypass culvert. This 3.5 foot square drop drain with oil skimmer cap connects into a 48-inch culvert directed into the East Spring Canyon bypass culvert. This serves as an overflow system when the trash rack at the inlet to East Spring Canyon becomes plugged with debris.

The combined peak flow from East Spring Canyon and Mud Spring Hollow for the 10-year, 6-hour precipitation event is 97.9 cfs. The capacity of the culvert was evaluated based on this flow rate and a minimum culvert slope of 1.2%. The resulting maximum flow depth of 2.6 feet indicates that the existing culvert is adequate. The capacity of the 48-inch culvert was also verified. The resulting maximum flow depth, corresponding to the minimum slope of 10%, is 1.75 feet. The 48-inch culvert is adequate to pass the design storm.

The discharge velocity from the 48-inch culvert was determined to verify the adequacy of the existing riprap (D_{50} = 15 inches). The calculated outlet velocity, based on a culvert outlet slope of 10%, is 18.5 feet per second. Using methods defined in Appendix 7-10, the required average riprap size at the outlet is 15 inches. The existing riprap is acceptable.

Diversion of Miscellaneous Flows. Diversion ditches and culverts have been utilized within the permit area to divert miscellaneous flows from disturbed and undisturbed area drainages.

Diversion Ditches. A summary table of the minimum channel geometry, channel slope, peak discharge, minimum riprap requirements, maximum flow velocity and minimum freeboard values for each diversion ditch within the facilities area is presented in Table 7-9. All calculations are contained in Appendix 7-12. Each ditch was verified in the field and has adequate capacity and erosion protection to pass the 10-year, 6-hour precipitation event. A description of the diversion ditches within the facilities area is presented below:

- Interception ditch along the East Side Road which drains the undisturbed watershed CBE-5. This diversion drains into the CBE bypass culvert at the substation.
- Interception ditch along the East Side Road which drains the undisturbed watersheds CBE-1 through CBE-5. This diversion drains into the CBE continuance diversion.

- Substation pad upper interception ditch which drains the undisturbed watershed CBE-4. This diversion drains into the CBE bypass culvert at the substation.

- Substation pad lower undisturbed interception ditch which drains the watershed CBE-3. This diversion drains into a drop drain for the CBE bypass culvert at the substation and is part of the alternate sediment control measures defined in Section 7.4.2.1.

- Riprap diversion channel for CBE continuance diversion. This diversion carries flows from the lower interception ditch along the East Side Road to an adjacent ephemeral drainage.

- Interception ditch for the undisturbed watershed ESC-6 north of the ATOF. This diversion discharges to the inlet of the 6-inch pipe diversion which connects into the 72-inch East Spring Canyon bypass system.

- Interception ditch for the undisturbed watershed ESC-7 north of the ATOF. This diversion drains to the 6-inch pipe diversion which connects into the 72-inch East Spring Canyon bypass system.

- Interception ditch for the undisturbed watershed MSH-2 north of the ATOF. This diversion drains to the inlet of the 42-inch Mud Spring Hollow bypass.

- Interception ditch for the undisturbed watershed MSH-2A north of the ATOF. This diversion drains to the 6-inch pipe diversion which connects into the 72-inch East Spring Canyon bypass system.

- Interception ditch draining watershed DIS-1A. This diversion drains to one of the drop drain inlets of the 10-inch mine yard drain line.

- Sedimentation pond access road diversion ditch. This diversion drains the disturbed watershed DIS-3 and discharges to the sedimentation pond.

- Main access road diversion ditch which drains undisturbed watershed DWN-1. This ditch drains to the pipe number 5 diversion.

- Link Canyon Substation No. 1 ditch which drains the watersheds LINK and ASCA-1. This diversion diverts the upper undisturbed drainage around the substation and drains to the Link Canyon Substation No. 1 road swale. This diversion ditch was reclaimed in 2000.

- Link Canyon Substation No. 1 road swale which drains watersheds LINK, ASCA-1, and ASCA-3. This diversion carries flows from the Link Canyon Substation No. 1 ditch across the substation access road to the main Link Canyon road drainage. This diversion was reclaimed in 2000.

- Link Canyon Substation No. 2 ditch which drains the watersheds LINK No.2, ASCA-4 and ASCA-7. This diversion diverts the upper undisturbed drainage around the substation and drains to the main Link Canyon road drainage.

- Link Canyon Portal access road Channel No. 1 diversion ditch. This diversion diverts the access road disturbed drainage and the undisturbed drainage above the road to the Link Canyon drainage bypass culvert inlet.

- Link Canyon Portal Pad Channel No. 2 diversion ditch. This diversion diverts the pad area disturbed drainage and the undisturbed drainage above the pad to the Link Canyon drainage bypass culvert inlet.

A description of the diversion ditches within the waste rock disposal site can be found in Volume 3 of this M&RP.

Diversion Culverts. A summary table of the culvert size, slope, peak discharge, existing riprap at outlet, and outlet flow velocity for each culvert within the facilities area is presented in Table 7-10. All calculations are contained in Appendix 7-13. Each culvert has adequate capacity and outlet erosion protection to pass the 10-year, 6-hour precipitation event. A description of the diversion culverts within the facilities area is presented below:

- East Spring Canyon bypass culvert. This culvert drains the undisturbed watersheds ESC-1 through ESC-5 and extends under the fill area and discharges downstream below the primary sedimentation pond.

- Mud Spring Hollow bypass culvert. This culvert drains the undisturbed watershed MSH-1 and connects into the 72-inch East Spring Canyon bypass culvert system.

- CBE bypass culvert at the substation. This culvert drains the undisturbed watersheds CBE-2 through CBE-5 and discharges to the lower East Side Road interception ditch. Three drop drains direct the flows to the bypass culvert. The drop drains help reduce the time the runoff water will be on the pad area to reduce the chance of water migrating through the substation pad fill and lubricating the substation slide slip zone.

- Pipe No. 5 diversion culvert which drains the undisturbed area DWN-1. This culvert discharges below the sedimentation pond access road to the natural slope. It does not drain to the pond.

- 6-inch pipe diversion for undisturbed watersheds ESC-7, ESC-6, and MSH-2A. This pipe connects into the 72-inch East Spring Canyon bypass system.

- Link Canyon Portal bypass culvert. This culvert drains the undisturbed watersheds LCP-East and LCP-West and discharges back into the Link Canyon drainage.

- Main Mine Fan Diversion. The main mine fan is located in a depression which is nine feet below the adjacent mine yard drainage system. A sump pump with automatic float controls in front of the main fan will pump the runoff from this area into the 10-inch mine yard drain line.

- 10-inch mine yard drainage system. This drainage system was installed to handle normal surface flows in the mine yard and to reduce the occurrence of mud and erosion. The drainage system consists of drop inlets and a 10-inch pipeline discharging to the concrete sediment trap. It was not designed to pass the 10-year, 6-hour precipitation event. Instead, the surface area of the mine yard is graded to divert all runoff to the concrete sediment trap.

TABLE 7-9
Summary of Diversion Ditches

Diversion	Minimum Bottom Width (ft.)	Minimum Top Width (ft.)	Minimum Depth (ft.)	Side Slopes (H:V)	Minimum riprap D_{50} (in.)	Min. Slope (%)	Max. Slope (%)	Peak Flow[a] (cfs)	Minimum Free-board (ft.)	Existing ditch geometry and riprap OK?
Upper East Side Road diversion draining CBE-5	1.0	2.2	0.4	1.5:1	not required	16.0	38.0	0.09	0.36	yes
Lower East Side Road diversion draining CBE-1 through CBE-5 (lower and upper sections of ditch)	Lower 1.0 Upper 1.0	Lower 2.2 Upper 2.5	Lower 0.5 Upper 0.5	Lower 1.2:1 Upper 1.5:1	Lower 2.0 Upper not required	Upper 3.0	Lower 24.0	0.79	Lower 0.36 Upper 0.29	Lower yes Upper yes
Substation pad upper interception ditch draining CBE-4	1.0	1.6	0.4	0.8:1	not required	1.0	18.0	0.07	0.33	yes
Substation pad lower interception ditch draining CBE-3	1.0	1.6	0.4	1:1	not required	1.0	10.0	0.03	0.35	yes
CBE continuance diversion	1.0	2.5	0.5	1.5:1	3.0	33.0	38.0	0.79	0.37	yes
Interception ditch draining ESC-6 north of ATOF	1.0	1.8	0.4	1:1	not required	1.0	1.0	0.13	0.30	yes
Interception ditch draining ESC-7 north of ATOF	1.0	2.2	0.4	1.5:1	not required	21.0	32.0	0.08	0.37	yes
Interception ditch draining MSH-2 north of ATOF	1.0	2.2	0.4	1.5:1	not required	1.0	20.0	0.08	0.32	yes
Interception ditch draining MSH-2A north of ATOF	1.0	2.2	0.4	1.5:1	not required	1.0	20.0	0.03	0.32	yes
Interception ditch draining DIS-1A	1.0	2.0	.61	1.5:1	not required	1.0	1.0	0.06	0.30	yes
Sedimentation pond access road diversion ditch draining DIS-3	1.0	2.2	0.4	1.5:1	1.0	21.0	31.0	0.35[b]	0.31	yes
Main access road diversion ditch draining DWN-1	2.0	4.0	0.5	2:1	not required	1.0	3.0	0.85	0.30	yes
Link Canyon Substation No. 1 ditch draining LINK and ASCA-1 [Reclaimed in 2000]	2.0	2.81	0.41	1:1	not required	1.0	9.82	0.87	0.30	yes
Link Canyon Substation No. 1 road swale draining LINK, ASCA-1, and ASCA-3 [Reclaimed in 2000]	Parabolic	10.0	0.398	Parabolic	not required	1.0	2.0	0.89	0.30	yes
Link Canyon Substation No. 2 ditch draining Link No.2, ASCA-4, and ASCA-7	0.0	1.52	.51	Left 2:1 Right 1:1	not required	1.0	6.7	0.20	0.30	yes
Link Canyon Portal Access Road Channel No. 1	0.0	0.97	0.48	1:1	not required	7.69	11.0	0.10[b]	0.30	yes
Link Canyon Portal Pad Channel No. 2	0.0	0.90	0.45	1:1	not required	5.21	8.3	0.06[b]	0.30	yes

[a] Peak discharge resulting from the 10-year, 6-hour precipitation event.

[b] Peak discharge resulting from the 25-year, 24-hour precipitation event.

materials such as cinder block, however, will be deposited at the disposal site.

Any slide or other damage at the disposal site which may have a potential adverse affect on public property, health, safety, or the environment will be reported to the Division by the fastest available means and will be remediated in compliance with Division instructions.

3.1.5 Acid and Toxic Forming Materials

Based on analyses of material that has been placed in the waste rock disposal site to date, no acid forming problems are anticipated. There is a potential for borderline toxicity problems from boron. Samples of the waste material will be collected quarterly when the site is receiving material and will be analyzed for acid or toxic forming potential. Should a problem be identified, a mitigation plan will be prepared and submitted to the Division for approval within 30 days of receipt of the analysis. All identified potential acid or toxic forming materials will be buried or otherwise treated within 30 days after the mitigation plan is approved by the Division.

Copies of laboratory reports on toxicity/acid-base accountability from representative waste samples are included in Volume 8 of the M&RP and starting in 2005 will be included in the annual report.

3.1.6 Subsoil Stockpile

Excess subsoil material and a small amount of topsoil from the minesite is stockpiled at the Waste Rock Disposal Site for possible use during final reclamation of SUFCO minesite facilities. The location of the subsoil and topsoil material is shown on Map 2. Total acreage of the subsoil stockpile and associated topsoil piles is 0.51 acres. Approximately 2,224 cubic yards of subsoil material and approximately 56 cubic yards of topsoil material are stockpiled at the site. The associated topsoil pile removed from the subsoil stockpile area contains about 1,100 cubic yards. The top 24 inches of soil material was removed from the subsoil stockpile area as described in Section 3.1.2, Site Preparation. This topsoil was stored along the westerly boundary of the subsoil stockpile as shown on Map 2. Topsoil handling procedures complied with those described in Section 3.2.3, Topsoil Handling. This topsoil stockpile will be stored and seeded using the grasses and forbes of the

3.3 Timing of Operation

Since the waste rock disposal area is relatively small and relatively small volumes of fill are placed annually, the fill will be constructed in segments. The 200 feet wide strips will be placed beginning along the southern boundary and extend between the drainage diversion ditches. The eastern half of the disposal area will be completed first. The original Map 4 showed the areas that would be completed based on a waste rock volume of 10,000 tons per year. The average fill volume from 1996 through 2003 was 3,200 tons per year and ranged from 1,400 to 6,800 tons per year. It should be noted that the active fill area will extend beyond the area shown for each year. This is best seen in cross-section G-G' of Figure 2 which shows the active fill areas in relation to the reclaimed area, topsoil removal area, and undisturbed area. The waste rock disposal pile was surveyed in August 2005 and contains an estimated 163,748 tons of waste rock. Map 4 has been revised to illustrate the current status of the reclaimed, active and undisturbed areas of the waste rock disposal area as of August 2005.

3.4 Area Affected by Each Phase of Operation

The eastern half of the waste rock disposal site will be built up first. Approximately 4.5 acres will be disturbed. Once the eastern portion is to design height, the fill will be extended to the western boundary by extending the fill in segments. As each segment of the fill is brought to final design height, it will be contoured to the approximate contours shown on Map 2. Once this has been accomplished, topsoil will be distributed and revegetation will proceed as indicated in the Revegetation Plan contained in Section 4.6.

3.5 Major Equipment List

The waste rock will be loaded at the mine by a front-end loader, such as a 988 Cat. Transport to the disposal site will be by dump trucks. Two types may be utilized, 10 ton end-dumps or 40 ton bottom-dumps. The waste rock will be spread and compacted by a self powered compactor of suitable size, a dozer of a suitable size, or with a large front-end loader such as a 988 Cat.

PART 4 RECLAMATION PLAN

4.1 Introduction

The operation of the waste rock disposal site is designed for minimal areal disturbance at any given time. The waste material will be placed in compacted lifts and will be covered with topsoil and revegetated in the first available growing season following completion. Routes required for access to active disposal areas will be revegetated as soon as practical. The final contours will be as shown on Map 2.

4.2 Time Table

The waste rock disposal site will be used on an infrequent basis as required to dispose of rock generated during mining. The fill area will eventually encompass about 8 acres and contain an estimated 204,700 tons of waste rock. Because of the irregularity of use, the fill will be constructed in segments envisioned to be about 300 feet long by 150 feet wide. As segments are complete, they will be graded and vegetated as set forth in Sections 4.4-4.6. Final grading, topsoil application, seeding and other revegetation activities will be done in the Fall, preferably during late September or early October. The waste rock disposal pile was surveyed in August 2005 and contains an estimated 163,748 tons of waste rock. Map 4 has been revised to illustrate the current status of the reclaimed, active and undisturbed areas of the waste rock disposal area as of August 2005.

The original fill volume was estimated at 10,000 tons or 8,200 cubic yards per year. The average fill volume from 1996 through 2003 was 3,200 tons per year and ranged from 1,400 to 6,800 tons per year. At this projected rate, once the fill bench-slope configuration is established about 1.5 acres should be filled and reclaimed every six to nine years. The fill is expected to be completed in 2016.

After vegetation and monitoring requirements have been fulfilled, the sediment pond will be leveled. This is expected to occur in 2026. This Phase II reclamation will consist of dozing the embankment into the pond and re-establishing the original contour as shown on Map 5. Topsoil will be placed over the area from the dedicated stockpile prior to reseeding according to Section 4.6. The

monitoring bore holes will also be closed as part of the Phase II reclamation. The shallow pipes will be pulled from the ground and the wells buried. These well areas will then be reseeded by hand broadcasting and raking.