Table 3-1

Federal Listed and Proposed Endangered Species in Utah

September 2003 (Revised)

Plants		***Status***
Autumn Buttercup	Ranunculus acriformis var. aestivalis	E
Barneby Reed-Mustard	Schoenocrambe barnebyi	E
Barneby Ridge-Cress	Lepidium barnebyanum	E
Clay Phacelia	Phacelia argillacea	E
Clay Reed-Mustard	Schoenocrambe argillacea	E
Dwarf Bear-Poppy	Arctomecon bumilis	E
Heliotrope Milk-Vetch	Astragalus montii	T
Jones Cycladenia	Cycladenis humilis var. jonesii	T
Kodachrome Bladderpod	Lesquerella tumulosa	E
Last Chance Townsendia	Townsendia aprica	T
Maguire Daisy	Erigeron maguirei	T
Maguire Primrose	Primula maguirei	T

Novajo Sedge[5]	Carex specuicola	T
San Rafael Cactus	Pediocactus despainii	E
Shrubby Reed-Mustard	Schoencrambe suffrutescens	E
Siler Pincushion Cactus	Pediocactus sileri	T
Uinta Basin Hookless Cactus	Sclerocactus glaucus	T
Ute Ladies'-Tresses	Spiranthes diluvialis var. maguirei	T
Welsh's Milkweed	Asclepias welshii	T
Wright Fishhook Cactus	Sclerocactus wrightiae	E
Winkler Cactus	Pediocactus winkleri	T
Shivwitz Milk-vetch	Astragalus ampullarioides	E
Deseret Milk-vetch	Astragalus desereticus	T
Holmgen Milk-vetch	Astragalus holmgreniorum	E

Mammals

Black-Footed Ferret[1]	Mustela nigripes	E
Utah Prairie Dog	Cynomys parvidens	T

Gray Wolf	Canis lupus	T

Birds

California Condor	Gymnogups californianus	XN
Bald Eagle[4]	Haliaeetus leucocephalus	T
Mexican Spotted Owl	Strix occidentalis lucida	T
Southwest Willow Flycatcher	Empidonax traillii extimus	E
Whopping Crane[3]	Grus americanus	E

Fish

Bonytail Chub	Gila elegans	E
Colorado Squawfish	Ptychocheilus lucius	E
Humpback Chub	Gila cypha	E
June Sucker[5]	Chasmistes liorus	E
Lahontan Cutthroat Trout	Oncorhynchus Clarki henshawi	E
Razorback Sucker	Xyrauchen texanus	E

Virgin River Chub[6]	Gila robusta seminuda	E
Woundfin	Plagopterus argentissumus	E

Reptiles

Desert Tortoise[5] (Mojave population)	Gopherus agassizii	E

Snails

Kanab Ambersnail[7]	Oxyloma haydeni kanabensis	E
Utah Valvatasnail	Valvata utahensis	E

[1]Two confirmed sightings were made in Utah in 1982.

[2]Nests in Utah.

[3]Migrates through Utah, no resident population.

[4]Wintering populations (only two known nesting pairs in southeastern Utah).

[5]Critical habitat designated.

[6]Critical habitat proposed.

[7]Emergency listing.

E - Endangered PE - Proposed Endangered T - Threatened PT - Proposed Threatened

For additional information contact: U. S. Fish and Wildlife Service, 2078 Administration Building, 1745 West 1700 South, Salt Lake City, Utah 84204-5110
Telephone: Commercial (801) 524-5001

closed in the 1950's. Amphibians have not been reported in the area, possibly for the same reasons as those listed previously for the mollusks.

East Fork Of Box Canyon. Sufco intends to undermine portions of the East Fork of Box Canyon beginning in the Fall of 2003 as they extract coal from the 3LPE and 4LPE longwall panels. Prior to the initiation of undermining and subsidence, a pre-subsidence qualitative evaluation of vegetation and channel conditions will be conducted in the East Fork of Box Canyon from the Joe's Mill Ponds downstream to a location above the west gate roads associated with the 3LPE panel. The survey will consist of video taping the condition of the stream channel paying particular note to surface flows and ground water discharge, vegetation types and conditions, animal species in the area including documenting the absence or presence of macroinvertabrates in the stream channel by filming the turning over of rocks or debris, general soil conditions, and the general geomorphology of the area. A qualified botanist will be used to identify and report in the video tape the major representative plant species along the stream channel. This will include riparian and spring locations found along the stream channel. Major hanging gardens will be identified and discussed. The general stream morphology will be discussed in the video including the width and depth of pools, height of natural drops, existing joints, cracks, and fractures, locations where flows naturally diminish or increase, etc.

A video tape will be made of the same portion of the East Fork at the same time of the year on the third year following undermining. A comparison will be made of the two tapes using the parameters described above and any changes due to mining activities will be noted. The tapes will be submitted to the Division as part of the Annual Report; the Fall 2003 video tape will be submitted with the 2003 Annual Report and the comparison tape will presumably be submitted with the 2006 Annual Report.

Fourteen sites have been identified and established during the qualitative pre-subsidence survey for use in a quantitative evaluation of site-specific vegetative and hydrologic conditions (See Chapter 7 Section 7.3.1.2) The site locations have been mapped and identified in the field with

stakes and flagging. The sites include each of the springs found within the portion of the East Fork to be subsided and the Joe's Mill pond area.

A survey of the identified stream and spring monitoring sites will include a concentrated study of vegetative communities associated with the stream and spring sites. The vegetative survey of the East Fork will be conducted following the USFS and D.L. Rosgen stream channel survey protocol. The condition of the riparian vegetation flanking the channel at each of the sites will be described and the hillsides above the channels will also be monitored for changes in morphology. Maps of the surveyed areas will be prepared. The survey will be conducted before subsidence begins in the effected areas of Box Canyon Creek and will be repeated in 2004, 2005, 2006, and 2008.

The conditions of the vegetation at the spring sites will be monitored for the same parameters as the stream sites. The source and discharge area will be included in the survey. Photographs will be obtained at each of the monitoring stations of the vegetative communities along the stream channel, hillsides above the site, and at the spring locations. Permanent photo points will be established to allow for repeatability of photographing the vegetation.

Qualitative surveys of the vegetation at each monitoring station will be conducted twice per year, once at the beginning of the growing season and again at the end of the season, for the first three years as mining is commenced in the East Fork and then in the fifth year following undermining. The surveys will include observations of the conditions, types, notable changes, etc., of the vegetation in the Joe's Mill pond area vegetation and along stream banks and spring locations identified as monitoring sites.

Erosion of the hillsides will be monitored during the twice yearly quantitative vegetation survey using a numerical ranking system to identify the degree of erosion. The ranking system will be as follows:

4-Extreme erosion	deeply incised rills and gullies with unstable, actively slumping walls and loose material moving rapidly to the rill or gully floor, freshly exposed plant roots, no remaining topsoil, no vegetative litter, little to no vegetative cover.
3-High erosion	incised rills and gullies slightly unstable slopes, only occasional slumps of the rill or gully wall, some plant roots exposed, little to no topsoil remaining, little to no vegetative litter, poor vegetative cover.
2-Moderate erosion	small rills, no gullies, moderately stable slopes, very little to no exposed roots, most of the topsoil remains, moderate vegetative cover.
1-Slight erosion	occasional small rills, no significant channeling in the soils, no exposed roots, topsoil remains, most vegetative litter in place, good vegetative cover.
0-No erosion	Appears relatively undisturbed, essentially no rills, vegetative litter in-place, healthy vegetative cover.

Photographic evidence of the state of erosion will be obtained each year at the East Fork monitoring sites for annual comparative and evaluation purposes. The climatic and overall vegetative conditions of the area will be noted. Particular attention will be paid to the effects of grazing on the vegetation and soils with respect to changes in the rank of erosion.

As part of the quantitative evaluation of the East Fork of Box Canyon, the locations of populations of the Link Canyon Columbine will be identified, mapped, and locations staked. The number of individuals in the populations will be counted or accurately estimated. All other populations of Threatened and Endangered and Sensitive Species found in the area of concern

will be identified. The population location will be mapped, if appropriate, and the number of individuals will be recorded. The surveys of the TEC and Sensitive Species, if found, will be repeated in 2004, 2005, 2006, and 2008.

A low level, colored infrared aerial survey will be conducted of the East Fork of Box Canyon in 2003 and in 2008. The survey will include the stream and spring monitoring points. The results of the survey will be reported to the Division in the mine's Annual Report in the year following the survey.

The vegetative, erosion, and colored infrared survey reports will be submitted to the Division as part of the annual report according to the schedule provided below. Two copies of the reports will be sent to the Division so that they may forward one copy to the Manti-LaSal National Forest.

1. 2003 Baseline Vegetation Report to be submitted with the mine's 2004 Annual Report. Also includes baseline colored infrared aerial photos and report of the monitored stream and spring areas within the east Fork of Box Canyon

2. Both 2004 Quantitative and Qualitative Vegetation Reports for the 1st year data collected following undermining will be submitted in the 2005 Annual Report.

3. 2005 Qualitative Vegetation Reports for the 2nd year following undermining will be submitted in the 2006 Annual Report. The Qualitative surveys only will be conducted.

4. 2006 Quantitative and Qualitative Vegetation Reports for the 3rd year following undermining will be submitted in the 2007 Annual Report.

5. 2008 Quantitative and Qualitative Vegetation Reports for the 5th year following undermining will be submitted in the 2009 Annual Report. Also includes the colored infrared aerial photos and report of the monitored stream and spring areas within the East Fork of Box Canyon.

If substantiated mining-induced changes occur in the vegetation within the affected areas of the East Fork of Box Canyon, a revegetation/enhancement mitigation plan will be created and submitted to the Division. The permittee understands that the mitigation plan will be approved only after the Division consults with the USFS on the proposed plan.

In addition to the East Fork of Box Canyon vegetative monitoring and mitigation plan, Sufco will implement a hydrologic monitoring plan as well as a stream channel subsidence crack mitigation plan. These plans are discussed in greater detail in Section 7.3.1.2 and Section 5.2.5.1 of this M&RP. Mitigation of cracks, if they occur, in the bottom of the stream channel requires the placement of bentonite grout to stop the diversion of surface flows. If mitigation is required during the critical elk and deer time periods of November 1st through April 1st and May 1st through July 1st, or during the raptor nesting and rearing season of Feburary 1st through August 31st, the Division will be contacted and the mitigation plans reviewed with the appropriate regulatory personnel. Mitigation work will be performed in such a manner as to minimize disturbance to wildlife.

3.2.2.3 Fish and Wildlife Service Review

If requested, the applicant authorizes the release of information pertaining to Section 3.2.2 and 3.3.3 to the U.S. Fish and Wildlife Service Regional and Field office for their review.

3.2.3 Maps and Aerial Photographs

The lease area was mapped by use of a mosaic of aerial photographs and assured by ground inspection. Vegetation sampling locations/reference areas are shown on Plate 3-1.

3.2.3.1 Location and Boundary of Proposed Reference Area

The locations of the vegetative reference areas are found on Plate 3-1. Area 13 shown on Plate 3-1 is to be used as a mapping unit only and not a reference area or validation site. Site 12 will be used as the reference area for the minesite sedimentation pond area.

3.2.3.2 Elevations and Locations of Monitoring Stations

Raptor nest locations and elk and deer range are shown on Plate 3-2 and 3-3. The permit area contains no fish monitoring stations.

3.2.3.3 Facilities for Protection and Enhancement

Sections 3.3.3.3 and 3.5.8.5 contain additional discussion pertaining to protective measures taken by the applicant in behalf of wildlife.

Power lines within the SUFCO Mine permit area were modified during the summer of 1981 to comply with the guidelines of REA Bulletin 61-10, "Power Line Contacts by Eagles and Other Large Birds" (see Plate 5-5 for the power pole locations).

3.2.3.4 Vegetation Type and Plant Communities

Vegetative types and plant communities are outlined on Plate 3-1 of this application.

Table 3-2

Native Utah Wildlife Species of Special Interest

September 2003 (Revised)

Mammals		***Status***
Grizzly Bear	Ursus arctos	EX
Fisher	Martes pennanti	EX
Gray Wolf	Canis lupus	EX
Black-footed Ferret	Mustela nigripes[1]	EN
Utah Prairie Dog	Cynomys parvidens[2]	T
Wolverine	Gulo gulo	T
Spotted Bat	Euderma maculatum	SP
Allen's Big-eared Bat	Idionycteris phyllotis	SD
Fringer Myotis	Myotis thysanodes	SD
Dwarf Shrew	Sorex nanus	SD
Desert Shrew	Notiosorex crawfordi	SD
Abert's Squirrel	Sciurus aberti navajo	SD

Belding ground Squirrel	Spermophilus beldingi	SD
Thirteen-lined Ground Squirrel	Spermophilus tridecemlineatus	SD
Spotted Ground Squirrel	Spermophilus spilosoma	SD
Wyoming Ground Squirrel	Spermophilus elegans	SD
Yellow Pine Chipmunk	Tamias amoenus	SD
Rock Pocket Mouse	Chaetodipus intermedius	SD
Olive-backed Pocket Mouse	Perognathus fasciatus	SD
Merriam's Kangaroo Rat	Dipodomys merriami	SD
Chisel-toothed Kangaroo Rat	Dipodomys microps celsus	SD
Cactus Mouse	Peromyscus eremicus	SD
Southern Grasshopper Mouse	Onychomys torridus	SD
Marten	Martes americana	SD
Pika	Ochotona princeps	SD
Ringtail	Bassariscus astutus	SD
Northern Flying Squirrel	Glaucomys sabrinus	SD

Western Red Bat	Lasiurus blossevillii	SP/SD
Big Free-tailed Bat	Nyctinomops macrotis	SP/SD
Brazilian Free-tailed Bat	Tadarida brasiliensis mexicana	SP/SD
Townsend's Big-eared Bat	Plecotus townsendii	SP/SD
Desert Kangaroo Rat	Dipodomys deserti	SP/SD
Northern Rock Mouse	Peromyscus nasutus	SP/SD
Stephen's Woodrat	Neotoma stephensi	SP/SD
Virgin River Montane Vole	Microtus montanus rivularis	SP/SD
Mexican Vole	Microtus mexicanus	SP/SD
Northern River Otto	Lutra canadensis	SP/SD
North American Lynx	Felis lynx canadensis	SP/SD

Birds

Passenger Pigeon	Ectopistes migratorius	E
Southern Willow Flycatcher	Empidonax traillii extimus[1]	EN

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The Applicant agrees, however, to notify the regulatory authority and the Utah State Historical Society of previously unidentified cultural resources discovered in the course of mining operations. The Applicant also agrees to have any such cultural resources evaluated in terms of National Register of Historic Places eligibility criteria. Protection of eligible cultural resources will be in accordance with regulatory authority and Utah SHPO requirements. The Applicant will also instruct its employees that it is a violation of federal and state laws to collect individual artifacts or to otherwise disturb cultural resources.

Pines Tract Area

Cultural and Historic Information. Cultural resource information and maps identifying cultural and historical study areas are located in Appendix 4-2. Dr. Richard Hauck of AERC made a record search at the State Historic Preservation office, National Register of Historic Places and conducted field investigations under state project numbers UT-96-AF-0443f and UT-97-AF-0598f. AERC coordinated the research and field investigations with SHPO.

Information concerning the potential of specific sites as to being either in the subsidence zone or out of the zone or being evaluated or unevaluated is contained in the Memorandum of Agreement between Federal and State agencies.

The monitoring, treatment plans and mitigation of the cultural resource sites will be in accordance with the Memorandum of Agreement (MOA) 00-MU-11041000-017, and any amendment to it, between the USFS - Manti-La Sal, USHPO, the Advisory Council on Historic Places, UDOGM, and the SUFCO Mine located in Appendix 4-5.

Sufco intends to undermine portions of the East Fork of Box Canyon beginning in the Fall of 2003 as they extract coal from the 3LPE and 4LPE longwall panels. This change in the mining plan will change the required monitoring schedule in accordance with the Memorandum of Agreement for site 42SV2430/ML-3446 - Elusive Peacock which will be undermined under the 3LPE longwall panel. In accordance with pages 11-12 of the MOA the required monitoring schedule of this site will change from Monitor Schedule A (Sites in areas that will be mined

using full-support methods) to Monitor Schedule B (Sites in areas which will be mined under and subsided) requiring the implementation of additional monitoring of the site. Monitoring results will be provided in DOGM Annual Reports. (2003, 2004, 2005, 2006, and indefinitely until movement ceases)

A proposed mine breakout located on the south wall of Muddy Canyon was inventoried and evaluated by Dr. Hauck and staff in June of 1999(AERC). No artifacts or paleoentological loci were observed or identified during the Muddy Canyon Breakout evaluation. The study concluded that no currently recorded significant or National Register eligible cultural resources will be affected by the development of the breakout (Appendix 4-2, AERC 1999).

Mining Methods. As noted in Section 5.2.3, both room-and-pillar and longwall mining methods are used in the SUFCO Mine. The size, sequence, and timing for the development of the underground workings are shown on Plates 5-7 and 5-8.

Physical Conditions Affecting Subsidence. A detailed description of the physical conditions in the permit area that influence subsidence (i.e., overburden lithology and thickness, coal seam thickness, etc.) is provided in Chapter 6.

Subsidence Control Measures. Most of the land within the permit area will eventually be affected by subsidence. Anticipated areas of subsidence and those areas planned for protection from subsidence are shown on Plate 5-10. The primary areas where subsidence is not anticipated are the areas overlying the pre-1977 workings in Lease SL-062583 shown on Plate 5-1 (referred to herein as the "Old Mine") and certain lease areas underlying Quitchupah Canyon, Box Canyon, and Muddy Creek.

The "Old Mine" area was mined in such a manner that coal pillars were left for support throughout the entire workings. Since these pillars are large enough to support the overburden and further mining is not anticipated in these workings, the surface area above the workings should not experience any subsidence.

Where perennial streams are not undermined they will be protected from subsidence by establishing stream buffer corridors within the mine from which only limited coal recovery will occur. Support pillars will be left in these locations to preclude subsidence. Underground stream buffers will only be crossed to the extent necessary to allow access to reserves. This access will consist of entries and cross cuts with support pillars. Entries that cross through the underground stream buffer corridors with less than 300 feet of cover will be sealed and/or backfilled upon abandonment using the best available technology to prevent disturbance of the overlying streams.

Protected cultural resource sites will be designed to include a buffer zone to protect the area from the effects of subsidence caused by underground full extraction mining. The width of the corridor will be calculated as follows: the depth of overburden to the coal seam will first be established. This depth will be multiplied by tan 15° to obtain the distance underground mining needs to be away from the area to not cause subsidence effects. An additional 25 foot buffer will be added to this calculated distance to account for minor irregularities in the course of the stream or cultural resource site.

Surface structures overlying the area to be subsided consist of trails, unimproved dirt roads, fences, runoff catchment ponds, and streams. The applicant will repair any subsidence caused damage to these or other structures to the extent economically and technically feasible, and will comply with R645-301-525.160 and R645-301-525.230. Additional mediation and remedial measures are described in Section 5.2.5.2 Subsidence Control.

Monitoring within the permit area has shown that subsidence rarely exceeds 50 percent of the mining height where the overburden thickness is greater than 800 feet. This overburden thickness is generally achieved above the rim of the Castlegate Sandstone (see Plate 5-10). Topography above the Castlegate Sandstone is gently sloping while that within and below the sandstone outcrop contains cliffs and steep slopes. With the exception of the experimental mining practice described below, future subsidence is typically planned only for those areas above the rim of the Castlegate Sandstone where the overburden thickness exceeds 800 feet.

Experimental Mining and Subsidence. To protect the environmental resources associated with escarpments, SUFCO Mine currently has a general policy of precluding subsidence below the rim of the Castlegate Sandstone. This requires that significant quantities of coal remain unrecovered.

Pillars were extracted from room-and-pillar workings beneath two areas of escarpment. The location of these areas is shown on Plate 5-1. These areas involved a 5,000-foot section of

escarpment on Federal lease (SL-062583) in East Spring Canyon (1977-78) and 2,000 feet of escarpment on Fee property (1983-88) on the east side of Quitchupah Canyon. The East

mine where similar geomorphologic and geologic conditions occur. This program will be developed and implemented by September 2000.

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.

<u>East Fork of Box Canyon Subsidence Monitoring and Mitigation</u>

Portions of the East Fork of Box Canyon will be undermined and subsided as longwall panels 3LPE and 4LPE are extracted in 2003 through 2005. A monitoring plan that is more intensive than the general permit area has been proposed for monitoring vegetation, surface and ground

water flows, and subsidence cracks and repair of the cracks in the portions of the East Fork to be undermined. The subsidence portion of the monitoring program is discussed in detail in the following text.

Prior to the initiation of undermining and subsidence, a presubsidence survey will be conducted in the East Fork of Box Canyon from the Joe's Mill Ponds downstream to a location above the west gate roads associated with the 3LPE panel. The survey will consist of video taping the condition of the stream channel paying particular note to surface flows and ground water discharge, vegetation types and conditions, animal life in the area including macroinvertabrates in the stream channel, soil conditions, and the general geomorphology of the area. A follow-up video survey will be made at the same time of year on the third year following undermining. A general comparison between the two tapes will be made to determine what, if any, effects to the parameters described above have occurred. The biological aspects of the video tape are discussed in greater detail in Section 3.2.2.2 while the monitoring of surface and ground water flows are discussed in Section 7.3.1.2.

The subsidence monitoring plan for the East Fork of Box Canyon will include frequent inspection of the stream channel during and after active subsidence. While mining is occurring under the stream channel and within the 15-degree angle-of-draw above the active longwall face, that area of the channel will be inspected twice a week for subsidence cracks or other related features. As the longwall face advances and the 15-degree angle-of-draw area follows, the portions of the channel that now lie outside the 15-degree angle-of-draw will be monitored for subsidence features on an every two week basis for eight weeks. Following the eight week period, the features will be monitored on a quarterly basis for two years following the cessation of subsidence related effects, if any, due to mining. Table 7-5A in Chapter 7 lists the schedule for water and subsidence monitoring frequency.

Mitigation of cracks that would appear to interrupt or divert flows from the stream channel will be sealed immediately with bentonite. Sufco will use hand placement methods when sealing cracks with bentonite. The individual(s) conducting the survey will be equipped with an

adequate volume of bentonite, in powder, granular, and/or chip form, to seal small cracks. The bentonite may be placed by pouring it directly into the crack and hydrating with stream water or, if in an actively flowing portion of the stream, temporarily diverting the flow around successive portions of the crack using native soils and placing the bentonite in the exposed section of the crack until the crack is sealed. Sealing of the lower portions of the channel walls may also be required if the crack occurs where the channel is defined by bedrock. If cracks are present in channel walls defined by soil, the soil cracks will be hand filled using a native soil/bentonite mix. The sealing of the channel floor and walls will be accomplished with hand tools such as shovel, picks, trowels, etc. In the unlikely event that cracks too large to be sealed through the efforts of one or two persons in one day do occur and it appears there is a danger of water being diverted from the channel for an extended period of time, arrangements will be made to get additional help to the site as soon as possible.

Sufco will conduct longwall mining operations in such a manner as to minimize surface disturbance while mining within the 15-degree angle-of-draw area that includes the East Fork stream channel. This will be accomplished by advancing the longwall on a schedule where mining will not be suspended for a period to exceed 48 hours. This mining schedule has been discussed with the BLM. A similar mining schedule was successfully implemented at the Canyon Fuel Company Skyline Mine while the lower sections of Burnout Canyon were undermined. No damage to the stream channel or reduction in stream flows were noted as a result of undermining that portion of Burnout Canyon using the approved mining schedule.

A weekly report will be submitted via e-mail to the Division detailing the results of the inspections. The reports will include, but not necessarily be limited to: a map illustrating the current location of the longwall face; descriptions and dates of field activities; noted changes in stream and local geommorphology; location, width, frequency of cracks; and a description of repairs, if any, conducted. If the prescribed inspections cannot be conducted, the reason for the missed inspection and a record of the attempt to conduct the inspection will be submitted to the Division in the weekly report. The Division will be notified immediately after mining-induced cracks, if any, are found in the East Fork stream channel and the steps taken or planned

to be taken as mitigation. Thereafter, the Division will be advised of continuing mitigation efforts, if needed, in the weekly report.

Mining within the area of the East Fork of the Box Canyon will be conducted in accordance with State and Federal rules and regulations and the requirements and stipulations presented in the BLM's Conditions of Approval of the Resource Recovery and Protection Plan (July 31, 2003) located in Appendix 1-2.

5.2.5.2 Subsidence Control

Adopted Control Measures. As indicated above, SUFCO Mine has adopted subsidence-control measures in areas where surface resources are to remain protected. These controls consist primarily of leaving support pillars in place in those areas designated on Plate 5-10 as not planned for subsidence. Based on experience and data collected from the permit area, the design of support pillars for those areas where subsidence is not planned has been based on the following equations:

$$SF = SD/OS \qquad (5\text{-}1)$$

where SF = safety factor against pillar failure (fraction)

SD = support strength density (psi)
= $(Y_c)(1\text{-}ER)$

Y_c = average compressive yield strength of the coal (psi)
= 3090 psi for the Upper Hiawatha seam

ER = extraction ratio (fraction)
= $1\text{-}(A_p/A_t)$

A_p = pillar area (ft^2)

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Appendix

from the pad area when compared to the contribution of the in-place soils and shale bedrock will be insignificant.

Flooding or Streamflow Alteration. Runoff from all disturbed areas is treated through sedimentation ponds or other sediment-control devices prior to discharge to adjacent undisturbed drainages. Three factors indicate that these sediment-control devices minimize or preclude flooding impacts to downstream areas as a result of mining operations:

1. The sediment-control facilities have been designed and constructed to be geotechnically stable. Thus the potential is minimized for breaches of the sediment-control devices to occur that could cause downstream flooding.

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

3. By retaining sediment on site in the sediment-control devices, the bottom elevations of stream channels downstream from the disturbed areas are not artificially raised. Thus, the hydraulic capacity of the streams channels is not altered.

Following reclamation, stream channels will be returned to a stable state (see Section 5.4.2.2). The reclamation channels have been designed to safely pass the peak flow resulting from the 100-year, 24-hour storm. Thus, flooding in the reclaimed areas will be precluded. Interim sediment-control measures and maintenance of the reclaimed areas during the post-mining period will preclude deposition of significant amounts of sediment in downstream channels following reclamation, thus maintaining the hydraulic capacity of the channels and precluding adverse flooding impacts.

The mine has been designed to minimize subsidence impacts to perennial streams (see Section 5.2.5.1). Any material damage to the stream channel will be mitigated. Streamflow volume in the North Fork of Quitchupah Creek will, however, increase due to mine water discharge.

Mine water discharge to the North Fork of Quitchupah Creek has increased streamflow by over 1000 gpm (2.25 cfs). Waters encountered in the Pines Tract will be pumped to the Quitchupah discharge point. The worst case flow increase is estimated to be approximately 3.75 cfs. Once

mining has ceased, the mine will be sealed and no discharges will occur. The streamflow volume will return to pre-mining discharge levels. Increased flow to the North Fork of Quitchupah during seasonal flow conditions are addressed by Mayo in Appendix 7-17.

Subsidence tension cracks that propagate to the surface, will increase the secondary porosity of the formations overlying the SUFCO mine. Thiros and Cordy (1991) state that bentonitic shale and plastic flow in mudstone within the perching layers could possibly slow or stop the downward movement of groundwater. If these cracks do not become blocked with bentonite, recharge to aquifers that feed spring flow may increase. Thus, subsidence may contribute to increases in streamflow.

Subsidence may decrease spring flow if the perched aquifer which supplies the spring is intersected by tension cracks, allowing groundwater to drain to underlying strata (Thiros and Cordy, 1991). Subsidence has occurred beneath East Spring (monitoring station 001), but no major changes in flow rate or water quality have been detected from 1985 to 1986 (Thiros and Cordy, 1991). Groundwater monitoring data (Appendices 7-4 and 7-17) indicate that flow rates of this spring have declined from 1987 to 1995. This decline in flow, however, is likely due to the drought conditions of the last several years (Appendix 7-5). Flow rates from other springs currently monitored by SUFCO, but located in unsubsided areas (057A and FS-109), have also declined during the last several years (Appendices 7-4 and 7-17).

Subsidence will occur in areas occupied by ephemeral and perennial stream channels. According to Thiros and Cordy (1991), surface water flow to natural drainages has the potential of being intercepted by subsidence fractures that extend to the land surface. In addition, the broad depressions created by subsidence may locally retain runoff that would normally discharge from an area. Although surface cracks that result from subsidence in the permit area tend to heal with time (see Appendix 5-4), stream flows may be partially intercepted prior to completion of the healing process. However, the following factors indicate that the impact of subsidence on streamflow will be minimal:

1. Bentonitic shale and plastic flow in mudstone within perching layers could possibly slow or stop the downward movement of previously perched groundwater (Thiros and Cordy, 1991).

2. Field observations indicate that there are no sustained above normal inflows in the mine. Thus, flow along fractures is either from a relatively small source, or the conduits become sealed quickly.

3. Ephemeral streamflow in the area is sporadic, allowing significant periods of time which may allow for surface cracks to heal between flow events.

4. Ephemeral streamflow typically carries a high sediment load. During precipitation runoff events, perennial streams will also carry a high sediment load. This sediment will fill remaining cracks. As the cracks heal, the potential for interception of streamflow is minimized.

5. The depressions created by subsidence are sufficiently broad that changes in slope are not typically of an ample magnitude to cause ponding in anything other than local areas. If ponding does occur, the shallow depressions will fill with sediment quickly due to the periodic high sediment load of streams and the drainage will return to the previous pattern.

Groundwater and Surface Water Availability. The potential impacts of mining on reductions in surface-water availability are discussed above. As indicated, these impacts are not considered to be significant.

As noted in Section 7.2.4.2, groundwater is encountered in the SUFCO mine and pumped to the surface, generally into the North Fork of Quitchupah Creek at UPDES station 003.

According to Mayo (Appendix 7-17), the rate of discharge from the mine has increased since 1987 from approximately 1.0 cfs (450 gpm) to about 3.56 cfs (1,600 gpm).

The increase in flow into and out of the mine is considered to be the result of increased coal production. The primary method of mining converted from room-and-pillar to longwall in October 1985. As a result of this change, production in the mine increased (see Figure 7-6). With the increase in production, new areas were mined at an increasingly higher rate. According to Mayo (Appendix 7-17), the mine discharge hydrograph shows that the rate of mine water discharge does not increase as the total area of the mine increases, but rather, the rate of discharge is related to the amount of recently mined areas.

Prior to disturbing the portals, additional samples have been obtained from both the east and west portals in October and November 2002. One sample from each portal was obtained for four consecutive weeks. No surface flow was present in the summer of 2002 at either of the portals. However, a small pool of standing water was present at the mouth of the west portal through most of the year. The samples were obtained by first excavating a depression near the mouth of the east portal and allowing water to gradually fill the depression and by sampling the standing water at the mouth of the western portal. These samples were obtained as baseline samples in compliance with a request from the Forest. The samples have been analyzed according to the Division's guidelines for baseline water monitoring samples. Copies of the sample analyses results for samples obtained on October 26, October 30, November 6, and November 15, 2002 are included in Appendix 7-4. Included in Appendix 7-4 is a brief report by Erik Petersen of Petersen Hydrologic, Inc. that discusses the various sampling events, the results of the sample analyses, and an interpretation of the data as it relates to the origin of the water in the Link Canyon Mine.

Mr. Petersen discusses in his report that water issuing from the Link Canyon portals is likely not sourced from the springs at the head of the canyon but probably from surface water that enters the mine through the weathered bedrock near the surface. It appears that during periods of normal or greater than normal precipitation, the water discharged from the mine has a TDS level of near 500 mg/l. However, in drought years, as has occurred in the area beginning in 1999 and continuing through 2002, the TDS levels in the water naturally rises due to a lack of fresh water flushing of the abandoned mine workings water. Hence, the samples obtained in the fall of 2002 had TDS concentrations greater than 1400 mg/l.

A hydrograph of the discharges from the Link Canyon Mine is provided in the USGS report by Thiros and Cordy (1991). This hydrograph, along with the additional data collected by Mayo and Associates and Erik Petersen suggest the discharge from the mine is influenced by seasonal changes in precipitation. Significantly, the flow from the mine has nearly ceased as a result of the area drought which began in 1999 and has continued through at least 2002.

Water discharged from the mine will continue to be monitored at sites Link Portal West and Link Portal East, as part of the quarterly water monitoring program. Significant changes in water chemistry and the apparent causes will be reported to the Division.

The only actual loss of groundwater from the hydrologic balance is that water which is the difference between the average as-shipped moisture minus the inherent moisture or in-situ moisture of the coal and leaves the basin upon mining. Based on an average coal moisture loss of groundwater content of 1.8 percent and a long-term coal production rate of 6 million tons per year, approximately 80 AF/yr of groundwater is removed from the basin. This represents about 2 percent of the average annual flow of Quitchupah Creek above Link Canyon.

Several springs and stream locations in the permit area are monitored for quantity and quality as prescribed by the M&RP water monitoring program. Analysis of the monitored flows indicated that very little impact has occurred to springs and streams. Erik Petersen of Petersen Hydrologic, Inc evaluated the flow data collected from several springs and surface flows in the Box Canyon drainage. His evaluation was forwarded to Sufco in the form of a letter report dated August 14, 2003 and is included in Appendix 7-19. Mr. Petersen determined that since mining began in the Pines Tract, a few the area springs have exhibited an increase in flow during a period of prolonged drought. He also concluded that perhaps one spring, Pines 303, in the lower portion of the Box Canyon, may have experienced reduced flows as a result of mining activities. However, because of the prolonged drought in the area that began in 1998, it is not possible to determine with certainty whether mining activities, drought conditions, or both have resulted in the loss of spring flow. A loss in flow from this spring was a predicted possibility described in the Pines Tract EIS. The loss of flow from this spring(less than 4 gpm) has apparently not adversely affected area vegetation or wildlife. Because of the increased discharge of springs farther up canyon, the loss of the less than the 4 gpm contribution of ground water from Pines 303 to Box Canyon Creek is insignificant to the total flow of the creek. No water rights were found to have been filed on this spring discharge.

Mr. Petersen has noted an increase in the flow of springs Pines 209 and 212 and in the flow of the Main Fork of Box Canyon Creek that appears to coincide with mining in the western portion of the Pines Tract. He reasons that the increase in spring flow is related to subsidence enhanced recharge or hydraulic conductivity of the aquifers sourcing the springs. The increase in spring flow has resulted in the increase in flow in the Main Fork of Box Canyon Creek. This has been noted as a positive impact to the creek during a time of drought. Analysis of the flow data presented by Petersen suggests the increase in flow from these springs may be short lived.

He has also indicated that flow from these springs will not cease but should return to near pre-mining rates. In fact, the data presented in his August 14, 2003 letter report suggests the flow rates may already be beginning to return to pre-mining rates.

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

The probable future extent of the contamination caused by diesel and oil spillage is expected to be small for three reasons. First, because the tanks are located above ground, leakage from the tanks can be readily detected and repaired. Second, spillage during filling of the storage or vehicle tanks is minimized to avoid loss of an economically valuable product. Finally, the Spill Prevention Control and Countermeasure Plan presented in Appendix 7-6 provides inspection, training, and operation measures to minimize the extent of contamination resulting from the use of hydrocarbons at the site.

The potential for hydrocarbon contamination of the environment at the Link Canyon Substation or the reopened Link Canyon Mine Portal is minimal since no fuels or lubricants will be stored at this site. If a catastrophic failure of the transformers at the substation occurred, the minimal volume of oil would be contained behind the berm to be built around the equipment.

Periodically due to difficult recovery conditions or roof collapse, mining equipment is abandoned underground. Abandoned mining equipment locations are shown on Figure 7-7. Prior to leaving equipment underground, lubricating and hydraulic fluids are removed to the extent possible. Since the equipment is steel and not too different compositionally from the roof support throughout the mine, contamination to ground water from abandoned equipment will cause minimal, if any, disturbance to the hydrologic balance within the permit and adjacent areas and is not expected to cause material damage outside the permit area. Assuming the mine were to flood and the abandoned equipment were to be covered with water, several probable results and impacts can be evaluated:

1. Flooding of the abandoned mine might be relatively rapid, but once flooded, flow of ground water into, through, and out-of the void spaces of the mine should be slow.

2. If steel or other metals in the equipment were to oxidize, it would be at a very slow rate and the amount of iron and other metals added to the ground water at any one time would be very small.

3. Oxides of most metals are insoluble or slightly soluble in water. At temperatures expected in the mine, metal oxides would tend to precipitate as solids within the mine rather than flow in solution in the ground water. If any metal were to go into solution, concentrations would be highest near the abandoned equipment, but the volume of water in the flooded mine would dilute concentrations outside the immediate vicinity of the equipment.

4. Because of dilution and dispersion, natural seasonal fluctuations, changes in water quality would not be expected to be large enough to be detected at the surface at springs, ground-water baseflows to streams, or in discharges from the mine.

Road Salting. No salting of the mine road occurs within the permit area. This impact is not a significant concern.

Coal Haulage. Coal is hauled over the paved county road from the mine portal area to Interstate Highway 70. Past experience has indicated that approximately one truck load of coal (43 tons) is spilled annually. Residual coal following cleanup of the spill may wash into local streams during a runoff event. Possible impacts to the surface water are increased total suspended solids and turbidity from the fine coal particulates. The probability of a spill occurring in an area sufficiently close to a stream channel to introduce coal to the stream bed is considered small.

In order to minimize fugitive coal dust haulage trucks are either covered or modified to reduce the amount of coal dust blown off the trucks. The impact from fugitive coal dust is therefore considered to be insignificant due to the small amounts lost during haulage in the permit and adjacent areas.

7.2.9 Cumulative Hydrologic Impact Assessment (CHIA)

A Cumulative Hydrologic Impact Assessment to include the permit and adjacent areas is to be prepared by the UDOGM.

7.30 Operation Plan

7.3.1 General Requirements

This permit application includes an operation plan which addresses the following:

- Groundwater and Surface Water Protection and Monitoring Plan;
- Sediment Pond Sludge Sampling and De-watering Plan;
- Design Criteria and Plans;
- Performance Standards; and
- Reclamation Plan.

7.3.1.1 Hydrologic-Balance Protection

Groundwater Protection. To protect the hydrologic balance, coal mining and reclamation operations will be conducted to handle earth materials and runoff in a manner that minimizes acidic, toxic, or other harmful infiltration to the groundwater system. Additionally, SUFCO will manage excavations and disturbances to prevent or control discharges of pollutants to the groundwater. SUFCO commits to replace loss of any surface water identified for protection in this M&RP that are impacted by mining at the SUFCO mine.

Surface Water Protection. To protect the hydrologic balance, coal mining and reclamation operations will be conducted to handle earth materials and runoff in a manner that minimizes acidic or toxic drainage, prevents, to the extent possible, additional contributions of suspended solids to streamflow outside the permit area, and otherwise prevents water pollution. Additionally, SUFCO will maintain adequate runoff- and sediment-control facilities to protect local surface waters. SUFCO commits to mitigating any material damage resulting from subsiding perennial streams in the permit area as indicated in Chapter 5 of this M&RP. The plan for protection of the perennial streams meets the BLM requirements for protection of their water rights (BLM, 1992).

Sedimentation Pond Sludge Plan. Sludge contained in the sediment ponds will be cleaned from the ponds and temporarily stockpiled upstream of the pond to allow water to drain from the sludge back into the pond. The sludge will be sampled for acid and toxic forming substances prior to be transported to the waste rock disposal site. Sedimentation pond sludge will be incorporated into the fill as described in Part 3.2.6 of Volume 3.

7.3.1.2 Water Monitoring

Groundwater Monitoring. Groundwater monitoring is proposed to be conducted in the SUFCO permit and adjacent areas according to the water monitoring plans presented in Tables 7-2 through 7-5A and for the rock waste disposal site in Section 4.7.2 in Volume 3 of this M&RP. These tables are based on the studies done by Mayo and Associates (Appendices 7-17 and 7-18) and supersede previous plans.

The location of the monitoring points are presented on Plate 7-3. The location of the monitoring wells for the rock waste disposal site are presented on Map 2, Volume 3 of this M&RP. The monitoring plans were developed based on information presented in the PHC determinations, the baseline hydrologic data, and the geology chapter of this M&RP.

The monitoring programs provide data that are reviewed and compared to the baseline data. Any significant changes are evaluated to determine their impact on the hydrologic balance. These comparisons have taken the form of reports prepared by Hydrometrics early in the permit term (1978-1987). Results of these evaluations are submitted periodically to the UDOGM. The annual Water Quality Report submitted to the Division contains the monitoring data.

Baseline data collected for the Pines Tract area included performing field surveys to identify existing springs. Additionally, springs identified in the USGS publication "Hydrology and Effects of Mining in the Quitchupah and Pines -Coal Lease Tracts, Central Utah " (Thiros and Cordy, 1991) were searched for and, when found, included in the baseline survey. Those springs identified and found within the Pines Tract in the above referenced publication are labeled on Plate 7-3 with the prefix "GW - ". During the baseline surveys, several springs identified in the publication could not be found as illustrated on the document maps or by using the printed location descriptions. It is assumed the springs that could not be found have a) stopped flowing; b) were miss mapped; or c) were in close proximity to springs found during the baseline surveys but could not be positively identified as USGS located springs and were therefore given new number designations.

Sampling for the SUFCO Mine and adjacent areas is accomplished in accordance with the schedule outlined on Tables 7-2 through 7-5A. Sampling for the waste rock disposal site is

photographing the condition of each pond, observe the pond for evidence of cracking, estimate the depth and surface area of water contained in the pond, inspect the immediate drainage area for evidence of surface cracking, note general soil moisture conditions, and note the general condition of the pond. Additional monitoring visits will be made in the late summer (late July to early August) and in the fall (late September to early October) of each year.
This information will be kept on file at the mine.

It is assumed a new monitoring plan can be agreed upon by the State, USFS, and rancher's association and will be in place prior to the end of 2000. This plan will include the afore mentioned monitoring efforts, as well as determining the functionality and water holding capacity of each potentially affected pond and the determination of the water shed area for each pond. Mitigation requirements in the event of proven mine related effects will also be agreed upon as part of the new monitoring plan.

East Fork of Box Canyon Monitoring and Mitigation Plan

Sufco anticipates undermining and subsiding a portion of the East Fork of Box Canyon beginning in November of 2003 when the mine starts longwalling panel 3LPE. Additional subsidence under the East Fork will occur when the 4LPE panel is mined in 2005. A surface and ground water monitoring and mitigation program more intensive than the general monitoring plan described previously in this Section will be initiated in this area prior to subsidence occurring within the 15-degree angle-of-draw of the stream channel. This monitoring program has included conducting a pre-mining subsidence survey of the East Fork of Box Canyon over the 3LPE and 4LPE panels that incorporated video taping the stream channel from Joe's Mill Ponds downstream to a point above the western-most gate road of the 3LPE panel. The purpose of the video will be to provide a visual record of the stream channel prior to subsidence. Fourteen sites were identified within the portion of the East Fork video taped where the monitoring of surface and/or ground water flows, channel width, channel substrate, vegetation, soils, and general geomorpholgy will occur. The general area in which these sites will be located are illustrated on Figure 7-8.

Stream monitoring sites will be monitored specifically for stream flow, channel width, channel substrate changes, and channel convergence. The geology of spring sources will be identified

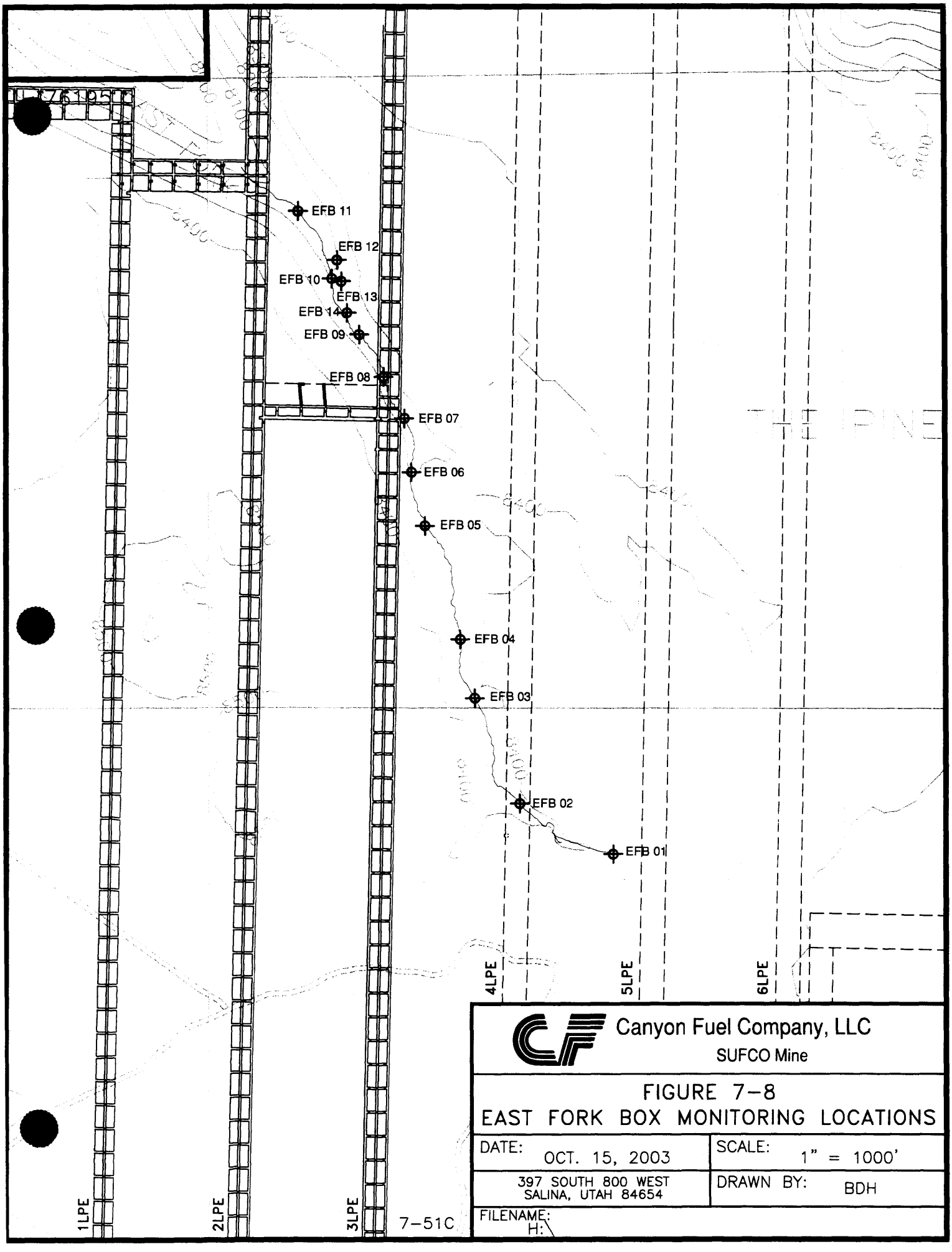
and described. The substrate of the spring tributary where water discharged from the spring converges with other flows and forms a tributary to the East Fork creek will be described. The width of the spring tributary at the location where the vegetation survey is conducted will be monitored.

Some of the site locations have been identified using a survey grade GPS. However, the locations of sites deeper in the Canyon could not be located with a GPS due to the restrictive nature of the narrow canyon when trying to locate satellites with which to triangulate a location.

The vegetation and soil monitoring program is discussed in greater detail in Section 3.2.2.2 of this M&RP. The surface and/or ground water flows and channel width at these stations will be monitored on a weekly basis while mining is occurring within the 15 degree angle-of-draw of the stream channel. Once mining has been completed within the angle-of draw, the sites will be monitored once every two weeks for a period of eight weeks after mining has progressed past the 15 degree angle-of-draw. Table 7-5A presents the monitoring site numbers, monitoring parameters, and the frequency of monitoring. The fourth quarter 2003 water monitoring will be conducted prior to mining within the area of concern in the East Fork of Box Canyon. If new springs are created as a result of subsiding the East Fork, the spring flows will be monitored two times per week until the 15 degree angle-of-draw area above the longwall face has advanced beyond the new spring. Thereafter, the spring flows will be monitored once every week for a period of eight weeks followed by monitoring the springs once every two weeks for eight weeks. A report on the impacts, if any, to the stream or ground water flows, vegetation, soils, general geomorphology, location of the longwall, etc., will be provided via e-mail to the Division on a weekly basis.

One goal of monitoring the stream sites in the East Fork of Box Canyon Creek will be to determine the portion of the stream that is perennial and where the stream is gaining or losing flow prior to, during, and after subsidence. In addition to the monitoring stations, the Thalweg of the stream channel between the lower-most monitoring station and Upper Joe's Mill pond will be surveyed. Also, two pools near monitoring sites EFB-9 and EFB-11, will be monitored before during and after subsidence. The criteria for monitoring the two pools will be width and depth of the pool and the height of the fall structure.

Monitoring for subsidence cracks within the stream channel of the East Fork of Box Canyon Creek will also be part of this intensive monitoring and mitigation plan. The details of the mitigation plan are discussed in greater detail in Section 5.2.5.1 of this M&RP. However, in an effort to compile as much of the monitoring requirements for the East Fork of Box Canyon in a single location within the M&RP, the parameters and frequency of monitoring for subsidence have been included in Table 7-5A. The subsidence monitoring program will consist of inspecting the stream channel floor within the active 15 degree angle-of-draw on a twice-a-week basis. Mining induced subsidence effects, such as cracks, slumps, offsets, etc., will be identified, mapped, and a brief narrative of the effects will be recorded and forwarded to the Division on a weekly basis. The portions of the stream within the active angle-of-draw will also be measured weekly for stream flow and channel convergence. The portions of the channel where the longwall shear has moved beyond the 15 degree angle-of-draw will then be monitored for subsidence effects, flow, and channel convergence on a once every two weeks basis for a period of eight weeks. Following the eight week period, monitoring will be conducted on a quarterly basis for a two year period after no subsidence, interception of water, or diversions of water are identified. This monitoring program will result in a moving zone of "high intensity" or twice a week channel monitoring occurring within an area defined by the 15 degree angle-of-draw above the active longwall face. As the longwall face advances, the "high intensity" zone advances and is followed by the "moderate intensity" once-a-week monitoring zone for eight weeks that is then followed by the "less intense" once every two week monitoring zone. A weekly report will be provided via e-mail to the Division on the results of the subsidence monitoring and mitigation activities. A summary report to the Division documenting the pre- and post-mining conditions of springs and stream channel will be submitted 90 days after subsidence monitoring is complete for the 3LPE and 4LPE panels. This report will include a description of all activities and work conducted by Sufco for stream channel evaluation and mitigation. All identified impacts and mitigation efforts will be documented. The results of mitigation, if performed, will be discussed.



Canyon Fuel Company, LLC
SUFCO Mine

FIGURE 7-8
EAST FORK BOX MONITORING LOCATIONS

DATE: OCT. 15, 2003	SCALE: 1" = 1000'
397 SOUTH 800 WEST SALINA, UTAH 84654	DRAWN BY: BDH
FILENAME: H:\	

TABLE 7-5A

East Fork of Box Canyon Monitoring and Mitigation

Monitoring Sites		Protocol	Comments
EFB -1	A	Monitor flows, vegetation, soils, geomorphology, etc.	
EFB -2	A	Monitor flows, vegetation, soils, geomorphology, etc.	
EFB -3	A	Monitor flows, vegetation, soils, geomorphology, etc.	
EFB -4	A	Monitor flows, vegetation, soils, geomorphology, etc.	
EFB -5	A	Monitor flows, vegetation, soils, geomorphology, etc.	
EFB -6	A	Monitor flows, vegetation, soils, geomorphology, etc.	
EFB -7	A	Monitor flows, vegetation, soils, geomorphology, etc.	
EFB -8	A	Monitor flows, vegetation, soils, geomorphology, etc.	
EFB -9	A, C	Monitor flows, vegetation, soils, geomorphology, etc.	
EFB -10	A	Monitor flows, vegetation, soils, geomorphology, etc.	
EFB -11	A, C	Monitor flows, vegetation, soils, geomorphology, etc.	
EFB -12	A	Monitor flows, vegetation, soils, geomorphology, etc.	
EFB -13	A	Monitor flows, vegetation, soils, geomorphology, etc.	
EFB -14	A	Monitor flows, vegetation, soils, geomorphology, etc.	
EFB-***	B	Subsidence Feature - Monitor location, type, frequency, repairs, etc.	

*** Site numbers and quantity of sites will be dependant upon the number of features created due to subsidence. The weekly report to the Division will include all identified sites once mining begins in the area.

Protocol

A Monitor sites for flow and channel width weekly while site is within the 15 degree angle of draw of the longwall face. Once area is outside angle of draw, monitor on a once every two week basis for eight weeks. Note any changes due to mine-induced subsidence to flows, soils, vegetation, geomorphology, etc. and provide a weekly report via e-mail to the Division of Oil, Gas and Mining. Spring sites will be measured for changes in the substrate conditions and width of spring tributary channel in area of vegetation study will be monitored.

B Monitor subsidence features, such as cracks, and repairs (if needed) on twice a week basis while features are within the 15 degree angle-of-draw of the active longwall face. These sites will be monitored for location, type of subsidence feature, frequency, repairs needed, type of repairs, and success of repairs. After the features are outside the angle-of-draw, monitor features on a weekly basis for eight weeks followed by monitoring of the features once every two weeks for an eight week period and then once quarterly for a two year period after observed subsidence effects are no longer active. Provide a weekly report via e-mail to the Division of Oil, Gas and Mining.

C Monitor fall structures closely associated with these stream sites. The related pool will be monitored for width and depth while the fall structure will be monitored for changes in height.

A rain and temperature monitoring station will be established in the area of the East Fork of Box Canyon as soon as permitting allows. The data collected from the station will be used in combination with data collected from local water monitoring stations to aid in determining what, if any, impacts have occurred to surface runoff, stream flows, and local springs as a result of mining activities.

Prior to implementation of any mining-induced subsidence mitigation efforts in the stream channel as described in Chapter 5, a Stream Alteration Permit will be obtained from the Utah Division of Water Rights. Sufco will have the alteration permit(s) prior to undermining the East Fork stream channel since the mitigation efforts will occur as soon as possible after a need for mitigation is determined.

Every reasonable attempt will be made by Sufco to implement and follow the monitoring program schedule. However, mining of 3LP panel under the East Fork of Box Canyon will begin in the late fall of 2003 and continue through early winter of 2003 and 2004. If access is limited due to snow or inclement weather, the mine's effort to access the area will be documented in the weekly report to the Division. The time of the access attempt, weather conditions, and reason(s) for failing to monitor the East Fork sites will be provided in the report.

7.3.1.3 Acid- and Toxic-Forming Materials

Results of monitoring of mine discharge, surface, and groundwater, indicate that no impact to these waters from acid- and toxic-forming materials has been found in the permit and adjacent areas (Section 7.2.8.3). Parameters defining acid- and toxic-forming materials continue to be monitored as described in Volume 3 of this M&RP. In the event that acid- or toxic-forming materials are identified, they will be disposed of in the waste rock disposal area. The treatment of these materials will be handled as indicated in Volume 3 of this M&RP.

7.3.1.4 Transfer of Wells

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

7.3.1.5 Discharges

5-2D and 5-2E. Similar information for the Link Canyon Portal facility area is presented on Plate 5-2F.

Locations and elevations of each station to be used for water monitoring during coal mining and reclamation operations are presented on Plate 7-3.

The construction details and cross sections for the concrete sediment trap are located in the "Alternate #1 Drainage Facilities and Sediment Control Plan" (Appendix 7-8). The existing topography and cross sections for the main sedimentation pond are located on Plates 7-4 and 7-5. The design topography and cross sections for the waste rock disposal site sedimentation pond are located in Volume 3 of this M&RP.

Other Cross Sections and Maps. Other relevant cross sections or maps are presented and discussed in Chapter 5 of this M&RP.

7.3.1.8 Water Rights and Replacement

Ground and surface water rights do exist within the Sufco Mine permit area. Mitigation has been performed at stock pond locations where claims have been made that the available surface water has been impacted by subsidence. Mitigation at these locations has been performed by the placement of bentonite in the bottom of stock ponds and by hauling replacement water to the ponds for livestock use during summer months.

The Permittee will replace the water supply of any land owner if such a water supply proves to be contaminated, diminished or interrupted as a result of mining operations. First, a determination will be made by the Division in accordance with R645-301-731.800 as to whether or not material damage has occurred. Then, in accordance with Regulation R645-301-525.510, the operator will correct any material damage resulting from subsidence caused to surface lands (which includes water rights), to the extent technologically and economically feasible. Negotiations will be held immediately with the impacted party to determine the appropriate mitigation activities. The restoration of water flows to impacted sources will be accomplished using the Best Technology Currently Available (BTCA). These activities may include, but not necessarily be limited to: piping or trucking water to the location of the loss; sealing surface fractures to prevent further losses (i.e., stream floors on bed rock or in shallow

alluvium), and; construction of a ground water well and the installation of pumps to restore flows. If the above efforts are not successful, then the operator will explore the transferring of water rights to the injured party in flow equal to the determined loss and/or monetary reimbursement for proven material damages.

The water supply in the East Fork of Box Canyon is of special concern to Sufco and the regulatory authorities. In an effort to protect the minimal surface flows in this area, an intense monitoring and mitigation plan will be implemented prior to full extraction mining taking place under the East Fork. If changes in the quantity and quality of the water in the East Fork are noted, the Division will be immediately notified. A determination of the amount of water, if any, that is lost due to mining activities will be made using surface and ground water flow and climatic data. If a loss of flow is confirmed, the loss will be addressed as described in the proceeding text of this section.

7.3.2 Sediment Control Measures

The existing sediment control measures within the permit area have been designed, constructed, and maintained to prevent additional contributions of sediment to streamflow or to runoff outside the permit area. In addition, they have been designed to meet applicable effluent limitations, and minimize erosion to the extent possible.

The structures to be used for the runoff-control plan for the permit area include disturbed and undisturbed area diversion channels, sedimentation ponds, containment berms, silt fences, and road diversions and culverts.

7.3.2.1 Siltation Structures

The siltation structures within the permit area consist of the sedimentation ponds described in Section 7.3.2.2.