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State of Utah

DEPARTMENT OF NATURAL RESOURCES

MICHAEL R. STYLER
Executive Director

Division of Oil, Gas and Mining

JOHN R. BAZA
Division Director

July 28, 2011

Larry Crist, Field Supervisor
U. S. Fish and Wildlife Service
2369 West Orton Circle
West Valley City, Utah 84119

Subject: Section 7 Consultation for the Kinney #2 Application, Carbon Resources LLC, Kinney #2 Mine, C/007/047, Task ID #3860

Dear Mr. Crist:

The Utah Division of Oil, Gas and Mining (Division) has completed the review of the Kinney # 2 Application for Carbon Resources LLC. When the company posts a bond for reclamation a permit to conduct mining activities can be issued which should be some time in the near future.

The Kinney # 2 coal mining project is located in Carbon County, Utah, one half mile north of the town of Scofield and on the east side of State Highway 96. The proposed coal mine can be located on the Scofield 7.5 minuet quadrangle map in Section 32, Township 12 South, and Range 7 East. The proposed disturbed area footprint is 27.6 acres, with a permit area of 452 acres of leased coal.

The Division, acting through the authority of the Office of Surface Mining (OSM), would like to initiate formal consultation under section 7 of the Endangered Species Act (ESA) for the permitting of this application. In order to fulfill the requirements of the 1996 Biological Opinion for the four federally listed fishes in Utah the following information is provided:

Permit Application Package

The disturbed area foot print for the mine is located in Hydrologic Code Unit # 14 06 00 07.

The regional land use and zoning map #4 illustrates the disturbed area and permit area footprints for the proposed mining operation.

1594 West North Temple, Suite 1210, PO Box 145801, Salt Lake City, UT 84114-5801
telephone (801) 538-5340 • facsimile (801) 359-3940 • TTY (801) 538-7458 • *www.ogm.utah.gov*

UTAH DNR OIL, GAS & MINING

The proposed location of the mine is approximately 45 river miles from the nearest designated critical habitat reach.

The water right for the proposed mining operation is set forth in an agreement to provide water as needed between Carbon Resources and the Town of Scofield dated February 11, 2009 (exhibit 3 attached). Carbon Resources have estimated their mine water consumption to be approximately 61.4 acre feet per year, (Chapter 3 page 3-62).

According to the information in the application Carbon Resources does not anticipate encountering or discharging any mine water from the proposed miming operation. The attached Cumulative Hydrologic impact Assessment, (CHIA), provides a detailed description of potential impacts to the surface and ground waters associated with the proposed mining activities.

Threatened and Endangered Species

The proposed permit application package (PAP) or mining and reclamation plan (MRP) includes a list in chapter three, (Table 1), of federally listed species for Carbon County issued by the USFWS (updated June 24th, 2010). This list includes Uintah Basin Hookless cactus, bonytail chub, Colorado pikeminnow, humpback chub, razorback sucker, black-footed ferret, Greater sage grouse, (Candidate species), and Gray wolf.

The supporting documents in the MRP, Chapter three pages 3-6 through 3-15 (attached) show there have been no observations of Federally listed plant or animal species in the proposed project area, but that there is crucial brooding and winter habitat for the Greater sage grouse in the area. This determination is based on surveys for species of concern and high value habitats conducted by Mount Nebo Scientific in June of 2007, August of 2010 and June of 2011.

There is also suitable habitat for the bald eagle in the area. The Utah Division of Wildlife Resources (UDWR) overflight surveys have not shown bald eagle nests within, adjacent to or within ½ mile of the disturbed area. This species may use the area during the winter months, but the area is not considered critical habitat even as wintering range (DWR 8/16/05). For the black-footed ferret, there is no habitat within the permit area and there have been no confirmed sightings within or adjacent to the project area.

We are recommending a determination of no effect for these species based on the rationale in the MRP and site location visits.

Colorado Fish Recovery Program

The Permittee provided the total expected water loss from mining operations as 61.4 acre-feet per year based on the water right for the mine. Because of the water loss in the Upper Colorado River Basin, the project is likely to adversely affect the four endangered fish and their designated critical habitat. However, this volume of water is below the 100-acre foot threshold that requires a depletion fee. The Upper Colorado Endangered Fish Recovery Program will act as the conservation measure for this project. Based on our analysis, this water depletion is the only impact anticipated to the four endangered fish of the upper Colorado River Basin due to the great distance between the project area and suitable habitat for the species. Based on this information and rationale provided, we are requesting concurrence with our determination.

Sensitive and Other Species of Concern

Chapter three, table 2A of the MRP includes the survey results for the following eighteen sensitive species: Smooth greensnake, Western toad, White pelican, Northern goshawk, Ferriginous hawk, Bald eagle, Whooping crane, Long Billed curlew, Yellow Billed cuckoo, Burrowing owl, Black swift, Three Toed woodpecker, Fringed myotis Townsend's Big Eared bat, Spotted bat, White tailed Prairie dog, Kit fox and Canada lynx. These species are either not present or are not considered to be of high interest and the limited size of the disturbed area, 27 acres, reduces the potential for substantial impact from mining disturbance.

With the approval of the FWS the applicant placed orange cones in the one unoccupied raptor nest near the proposed disturbed area, (1400'). The cones will be removed after the nesting season and survey results of the area will be provided to the respective agencies. 3,000 dollars for additional mitigation is proposed along with three mitigation alternatives described in the exhibit 8 attachment.

The Division considers that the project will have "no effect" on TE species or critical habitat. Final decision concerning TE species and the proposed project will come after the Division receives a response from USFWS.

Your response is appreciated. If you have any questions about this project, please call me at (801) 538-5268 or Joe Helfrich at (801) 538-5290.

Sincerely,

Daron Haddock

Daron Haddock
Coal Program Manager

DRH/JCH/sqs
Attachments: Chapter 3, Exhibit 3, Exhibit 8, Map 4, CHIA
cc: Kenneth Walker
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Chapter 3

R645-301-300 Biology

Kinney No 2 Mine

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301.312 POTENTIAL MINING RELATED IMPACTS TO BIOLOGICAL RESOURCES

Most of the land proposed for new disturbance to construct and operate the Kinney No. 2 Mine has already been disturbed by historical mining and other activities. To the extent reasonably feasible, Carbon Resources (CR) plans to prevent or minimize potential mining related impacts on biological resources by minimizing new surface disturbance to native, undisturbed plant communities and wildlife habitat. Implementation of the following specific control and mitigation measures for those limited areas which represent re-disturbance or new disturbance will effectively minimize potential impacts for these areas. For more information refer to the OPERATION PLAN below (R645-301.330).

R645-301-321 Vegetation Information

Habitat Values, and Vegetation Communities

Comparison of the mining related surface disturbance with previous surface disturbance due to historic mining and related activities and more recent disturbances associated with construction of transportation and electric transmission facilities indicates that there is little potential for any significant vegetation impacts. This conclusion is based on the fact that most potentially significant terrestrial biological impacts have already occurred given the extent and nature of previous development in the surface disturbance areas. In addition, while Utah AML reclamation has been successful in re-establishing vegetative cover and some habitat values, the limited age of reclaimed vegetation and proximity to human activity continue to limit wildlife use. Most of the anticipated surface disturbance for mining and related activities will involve previously disturbed areas. Mining related disturbance of previously undisturbed areas will be negligible. The potential for aquatic impacts is very limited since there are no water sources in the immediate area of the proposed mining surface facilities area. The following s provide additional details relative to potential mining related impacts on individual biological resource values.

Potential Effects on Terrestrial Vegetation, (Includes Sensitive Species and Associated Habitat Values)

Potential impacts on terrestrial vegetation habitat values resulting from the mining and related operations may include:

- Redisturbance of approximately 20.7 acres of disturbed vegetation and habitat occurring on previously disturbed areas
- Temporary loss of approximately 6.9 acres of previously undisturbed vegetation and habitat
- Localized reduction or elimination of certain vegetation types

With regard to sensitive species of vegetation or terrestrial wildlife, no known threatened, endangered, or sensitive vegetation or wildlife species existing within or occupy or utilize surface disturbance areas for their basic life requisites. The potential, therefore, for any significant adverse mining related impacts would be limited to the unlikely situation of an accident involving a transitory animal.

The potential for significant adverse impacts due to redisturbance of previously disturbed areas is low due to existing vegetation and habitat conditions in the proposed disturbance areas. The Utah AML reclamation efforts have resulted in effective reestablishment of vegetation on portions of the previously disturbed areas. While these areas currently provide some cover and forage values, the area is close to Highway 96, and Scofield Town, with their noise, highway traffic, and human presence. These proximity factors and resulting level of human activity in the area are also important factors which tend to preclude significant long-term use by large mammals, raptors, and many other terrestrial wildlife species with current use being limited to opportunistic or seasonal migratory use. The temporary mining related impacts will be effectively mitigated by the comprehensive reclamation program including all surface disturbance areas which will be implemented when the mine facilities are no longer needed to support ongoing operations.

The potential impact of losses of existing vegetation and habitat in previously undisturbed areas will be minimized by the limited areal extent (approximately 6.9 acres) of any new disturbance. Areas of potential new disturbance are immediately adjacent to previously disturbed areas, and as such exhibit some inherent limitations relative to their value as wildlife habitat. Field surveys of potential new disturbance areas did not result in identification of any unique habitat characteristics. Minor vegetation and habitat impacts for any new disturbance areas will be a temporary result of the mining and related operations, however, proposed site reclamation measures will result in effective mitigation of any temporary impacts and in most cases offer the potential for overall enhancement of vegetation and habitat conditions.

321.100 Plant Communities

Refer to Exhibit 6, Vegetation Information

321.200 Productivity of Land

Productivity at the Kinney No. 2 Mine is an estimate of the annual biomass production of the plant communities at the site as follows:

Table 25
Annual Biomass Production of the Plant Communities At the Kinney No. 2 Mine Site

COMMUNITY TYPE	ANNUAL PRODUCTION (LBS/ACRE)
Sagebrush/Grass (Proposed Disturbance)	1200
Sagebrush/Grass (Reference Area)	1200
Rabbitbrush/Grass	500
Aspen	1100

R645-301-322 FISH & WILDLIFE INFORMATION

This chapter generally describes existing habitat conditions and potential fish and wildlife resources within the Kinney No. 2 permit and adjacent areas that could be affected or impacted by the mining and reclamation activities. Information presented in this chapter was developed in accordance with applicable regulatory requirements for coal mine permitting in the State of Utah.

R645-301-322.100 Sources of Information

Fish and wildlife resources and habitat values in the permit area and adjacent areas have been characterized in this using information from previous and ongoing baseline characterization and monitoring activities, principally by the State of Utah, Division of Wildlife Resources (UDWR). Existing available information was utilized to the extent possible. UDWR's Utah Conservation Data Center (UCDC) is the central repository for Utah's biodiversity information and has been used extensively to prepare this permit application . In addition, Utah's Sensitive Species List, as well as federally listed threatened (T), endangered (E), and candidate (C) species lists from the U.S. Fish & Wildlife Service (USFWS) have also been consulted. The information resources utilized are summarized below:

- County Lists of Utah's Federally Listed Threatened (T), Endangered (E), and Candidate (C) Plant Species – June 24, 2010.
- Dalton, L.B., J.S. Price, and L.A. Romin. 1990. Fauna of Southeastern Utah and Life Requisites Regarding Their Ecosystems. Publication No. 90-11. Utah Dept. of Nat. Res. Div. of Wildlife Resources. 326 pp.
- Falk, J.A. 1990, Landscape Level Raptor Habitat Association in Northwest Connecticut. M.S. Thesis, Virginia Polytechnic Inst. 127 pp
- Bosakowski, T. and R. Speiser. 1994. Macrohabitat selection by nesting northern goshawks: implications for managing eastern forests. Studies in Avian Biology (16): 46-49.
- Bosakowski. T. and D.G. Smith. 1997. Distribution and species richness of a forest raptor community in relation to urbanization. J. Raptor Res. 31(1):26-33.
- Ellsworth, E. and T. D. Reynolds. 2006. Snowshoe hare (*Lepus americanus*): A technical conservation assessment. USDA Forest Service, Rocky Mountain Region.
- Foresman, K. R. 2001. The wild mammals of Montana. American Society of Mammalogists, Special Publication No. 12. 278 pp. Parks Home Page.
- Hendricks, P., D. L. Genter, and S. Martinez. 2000. Bats of Azure Cave and the Little Rocky Mountains, Montana. Canadian Field-Naturalist 114 :89-97.
- Hendricks, P., and D. Kampwerth. 2001. Roost environments for bats using abandoned mines in southwestern Montana : a preliminary assessment. Report to the U.S. Bureau of Land Management. Montana Natural Heritage Program,
- Helena, Montana. 19 pp.
- Hendricks, P. 2000. Preliminary bat inventory of caves and abandoned mines on BLM lands, Judith Mountains, Montana. Montana Natural Heritage Program, Helena, Montana. 21 pp.
- Musclow, H.J. and L.B. Dalton. 1990. Wildlife Mitigation Technologies for Man-Made Impacts. Publication No. 90-3. Utah Dept. of Nat. Res. Div. of Wildlife Resources. 141 pp.

- Multiple historic site-specific investigations, principally by the UDWR. The latest available GIS data and information available from the UDWR has been included in this application.

- Occasional site-specific investigations, observations, and/or notes which have occurred intermittently over the previous two decades.

- Pekins, P.J., F. G. Lindzey, and J.A. Gessaman. 1991. Physical characteristics of blue grouse winter use-trees and roost sites. Great Basin Naturalist 51(3), 1991, pp. 244-248.

- Pelton, M.R. Alex B. Coley, Thomas H. Eason, Diana L. Doan Martinez, Joel A. Pederson, Frank T. van Manen, and Keith M. Weaver. American Black Bear Conservation Action Plan. IUCN Conservation Plans. URL: www.iucn.org/themes/ssc/actionplans/bears/bearsAPchapter8.pdf

- Personal Communications with UDWR Biologists, Wood, C. (Regional Habitat Manager), Beagley, K. (Regional Oil & Gas Biologist), Mead, L. (Regional Biologist) from June, 2007 - Sept., 2007.

- Speiser, R. and T. Bosakowski. 1987. Nest site selection by northern goshawks in northern New Jersey and southeastern New York. Condor 89:387-394

- Squires, J.R and R.T. Reynolds. 1997. Northern Goshawk, No. 298 in Birds of North America series. c/o Academy of Natural Sciences, 1900 Benjamin Franklin Parkway, Philidelphia, Pa. 31 pp.

- UDWR. 2000. Utah black bear management plan. Utah Division of Wildlife Resources. Salt Lake City, UT.

- UDWR. 2009. Utah moose statewide management plan. Utah Division of Wildlife Resources. Salt Lake City, UT.

- UDWR. 2010. Utah elk statewide management plan. Utah Division of Wildlife Resources. Salt Lake City, UT.

- UDWR Website: http://dwrcdc.nr.utah.gov/ucdc/
  Including: Utah's Federally (US F&EWS) Listed Threatened (T), Endangered (E), and Candidate (C) Plant Species – August 5, 2010.

- UDWR. 1999. Mule Deer. Wildlife Notebook Series No. 13. Utah Division of Wildlife Resources. Salt Lake City, UT.

- UDWR. 2009. Utah Greater Sage-Grouse Management Plan. Utah Division of Wildlife Resources. Salt Lake City, UT.

- UNHP, Lindsey, Sarah. 12 August 2010. Personal communications. State of Utah, Natural Heritage Program, Salt Lake City, UT.

- Utah Sensitive Species List, May 11, 2010.

- Utah's State Listed Species by County, June 24, 2010.

- USDI-BLM. 1983. Uintah - Southwestern Utah Coal Region. Round Two, Draft EIS.

- Vertebtate Animals, Southeastern Utah's Fish, Southeastern Utah's Reptiles, Southeastern Utah's Amphibians, & Southeastern Utah's Birds. Invertebrate Animals, Mollusks, & Insects.

- Worthington, D. J. 1991. Abundance, distribution, and sexual segregation of bats in the Pryor Mountains of south central Montana. M.A. Thesis, University of Montana, Missoula, Montana. 41 pp.

- www.fws.gov/r5gomp/gom/habitatstudy/metadata/northern_goshawk_model.htm

R645-301-322.200 Site Description of the Proposed Permit & Adjacent Areas

The Kinney No. 2 Mine and permit area are located in Pleasant Valley in central Utah, immediately northeast of the town of Scofield. Primary surface facilities will be located on the west-facing slope of Pleasant Valley within sight of the town, and adjacent to Utah Highway 96. Pleasant Valley contains Mud Creek to the west and approximately one-quarter mile from the closest point of the permit area boundary; it also contains Scofield Reservoir to the northwest, or approximately one-half mile at its closest point (at high water mark). Mud Creek is a tributary to Scofield Reservoir, which in turn flows to the Price River, ultimately reaching the Colorado River.

More than eighty percent of the surface disturbances related to mine development will be in areas which have already been disturbed by previous mining related activities, some of which were reclaimed by the State of Utah, Utah Division of Oil, Gas & Mining's (UDOGMs), Abandoned Mine Reclamation (AMR) program in the 1980's. This percentage may be higher since mining has been conducted in the area since the early 1900's. Historically, there were four mines in the area of the proposed surface facilities of the Kinney No. 2 Mine (Kinney Mine, Columbine Mine, Jones Mine, and the UP Mine). These four mines disturbed approximately 74% of the area estimated to be disturbed by the proposed Kinney No. 2 Mine.

The west-facing slopes of Pleasant Valley contain small, very shallow intermittent drainage channels and moderate pediments that slope gradually toward the bottom of the valley from the ridges to the east of the valley. Elevations in the proposed permit area range between 7,750 feet near the lower end of the facilities area up to about 8,800 feet at the ridge top at the south-central portion of the permit area. The proposed permit area encompasses a portion of the west-facing slope of Pleasant Valley and drains into Mud Creek.

Soils are generally shallow and skeletal in the steeper portions of the proposed permit area. Sandstone is the predominant parent material. As mentioned above, soils in approximately 74% of the surface facilities area have been disturbed by previous mining activities prior to the *Surface Mining Control and Reclamation Act* of 1977 (SMCRA) , and no topsoil salvage for reclamation was conducted. There are very limited areas of deeper and more well developed soils.

The vegetation of the region consists of predominantly sagebrush and rabbitbrush communities with small stands of quaking aspen. In descending order, these communities are encompassed by the montane (6,500 – 12,721 feet elevation), and submontane (5,500 – 8,500 feet elevation) zones.

Other than coal exploration and mining, the predominant land uses of the area include wildlife habitat, livestock rangeland and watershed. A wide variety of wildlife species may potentially utilize habitats within and adjacent to the mine plan area. Species of public interest or species which can also be economically important include moose, mule deer, elk, black bear, blue grouse, sage-grouse, snowshoe hare and several raptor species.

As a reflection of the arid climate and rugged topography of the region, runoff in the surface facilities area are characterized by narrow, high-gradient channels with very little evidence of erosion from the runoff events. Because these drainages receive runoff flows from limited surface areas, ephemeral flows fluctuate significantly, especially in response to spring thaw and major summer thunderstorms. Only one major drainage exists on the proposed permit area; it is located at the extreme east side of the permit block. This drainage, called Eagles Canyon, is a tributary to Scofield Reservoir, and is shown by USGS maps to be generally ephemeral in nature, with no significant flows with the exception of snowmelt runoff and where small springs and seeps surface near the bottom of the canyon. These seeps and springs generally flow in the springtime and early summer in response to snowmelt followed by a significant drop in flows as dry weather begins to predominate. The flows in the bottom of Eagles Canyon, a consequence of seeps and springs, disappear into the canyon alluvium after flowing a short distance.

R645-301-322.210 Threatened, Endangered and Sensitive Species

The Endangered Species Act of 1973 (ESA) requires federal agencies to "*insure that any action authorized, funded, or carried out by such agency is not likely to jeopardize the continued existence of any listed species or result in the destruction or adverse modification of critical habitat of such species*." 4 of the ESA (Determination of Endangered Species or Threatened Species) grants the Secretary of the Interior power to determine whether any species is considered threatened or endangered. While 7 of the Act (Interagency Cooperation) specifies that all other federal departments and agencies shall take such action necessary to insure that actions authorized, funded, or carried out by them (federal departments and agencies) do not jeopardize the continued existence of any listed species (pursuant to 4) or result in the destruction or modification of critical habitat of such species. It should be noted that all of the permit area is on private property and the coal reserves are either private or are controlled by Carbon County and therefore the only federal action in the Kinney No. 2 Mine operation is concurrence by the Office of Surface Mining and Reclamation, with primacy held by UDOGM.

The consultation process is designed to assist federal agencies when complying with the ESA, and authority of consultation has been delegated by the Secretary of the Interior to the Director of the USFWS. The consultation process involves several phases. First, a general description of the proposed action and a formal request for a listing of proposed and listed endangered and threatened species potentially affected by the proposed action is submitted to the USFWS by the affected agency (or entity). The USFWS responds with a list of proposed, candidate, and listed species within the proposed permit area. When the project is a construction project, the agency (or entity) then prepares a Biological Assessment (BA) which identifies the project, details the biology of the species on the list submitted by the USFWS, analyzes the cumulative effects of the project, and determines if there is likely to be an effect (either beneficial or adverse) on any listed or proposed species.

If a "may affect" determination is made, the responsible federal agency must request formal consultation with the USFWS.

Formal consultation involves USFWS consideration of the proposed project and how it may affect the biology of any listed threatened or endangered species, including the magnitude of such effects and potential cumulative effects. Based on this information, a Biological Opinion is issued by the USFWS which states one of three possible conclusions: the proposed action (1) may promote the continued existence of the species, (2) is not likely to jeopardize the continued existence of the species, or (3) is likely to jeopardize the continued existence of the species. Reasonable and prudent alternatives must be addressed by the USFWS as part of the Biological Opinion when a determination is made that the proposed project is likely to jeopardize the continued existence of the species.

The following table shows the most recent federally listed plant and animal species) for Carbon County, Utah (updated June 24, 2010).

Table 1: Federally listed threatened, endangered & candidate species in Carbon County, Utah and notes regarding potential impacts to them as a result of the proposed Kinney No. 2 Mine.

NOTE**: This list was compiled using known species occurrences and species observations from the Utah Natural Heritage Program's Biodiversity Tracking and Conservation System (BIOTICS). This list includes both current and historic records. (Last updated on November 9, 2010).**

Common Name	Scientific Name	Status*	Site-Specific Notes
Humpback chub	*Gila cypha*	E	Humpback chub in Utah are now confined to a few white-water areas in the Colorado, Green, and White Rivers. These rivers do not occur in the study area. The drainage control measures of the site limit impacts to the downstream drainage of the Colorado River system. There should be no impacts to this species as a result of construction and operation the proposed new mine.
Bonytail	*Gila elegans*	E	The bonytail is a very rare minnow originally native to the Colorado River system. These rivers do not occur in the study areas. The drainage control measures of the site limit impacts to the downstream drainage of the Colorado River system. There should be no impacts to this species as a result of construction and operation of the proposed new mine.

Table 1: Federally listed threatened, endangered & candidate species in Carbon County, Utah and notes regarding potential impacts to them as a result of the proposed Kinney No. 2 Mine.

NOTE**: This list was compiled using known species occurrences and species observations from the Utah Natural Heritage Program's Biodiversity Tracking and Conservation System (BIOTICS). This list includes both current and historic records. (Last updated on November 9, 2010).**

Black-footed ferret	*Mustela nigripes*	Ex	Black-footed ferret habitat is primarily prairie grasslands. The ferret has a diet consisting of almost 90% prairie dogs. This habitat and food source does not occur in the study areas. There should be no impacts to this species as a result of construction and operation the proposed new mine.
Colorado pikeminnow	*Ptychocheilus lucius*	E	The Colorado pikeminnow is a fish that prefers medium to large rivers. With the loss of habitat they are now restricted to the upper Colorado River system. These rivers do not occur in the study area. The drainage control measures of the site limit impacts to the downstream drainage of the Colorado River system. There should be no impacts to this species as a result of construction and operation the proposed new mine.

Table 1: Federally listed threatened, endangered & candidate species in Carbon County, Utah and notes regarding potential impacts to them as a result of the proposed Kinney No. 2 Mine.

NOTE**: This list was compiled using known species occurrences and species observations from the Utah Natural Heritage Program's Biodiversity Tracking and Conservation System (BIOTICS). This list includes both current and historic records. (Last updated on November 9, 2010).**

Uinta Basin hookless cactus	*Sclerocactus wetlandicus*	T	*Sclerocactus wetlandicus* generally occurs on cobblely, gravelly, or rocky surfaces on river terrace deposits along the White and Green Rivers of Utah. *S. wetlandicus* occurs on varying exposures, but is more abundant on south facing exposures, and on slopes to about 30 percent grade; it is most abundant at the point where terrace deposits break from level tops to steeper side slopes. Plant communities and species associated with this species are bud sage, shadscale, black sagebrush and horsebrush. These plant communities nor habitats associated with them occur in the study areas, therefore, there should be no impacts to this species as a result of construction and operation the proposed new mine.
Razorback sucker	*Xyrauchen texanus*	E	This species prefers slow backwater habitats and impoundments in the Colorado River system. UDWR distribution maps of this species for Carbon County shows to occur near the Green River in extreme eastern portion of the county. These rivers do not occur in the study areas. The drainage control measures of the site limit impacts to the downstream drainage of the Colorado River system. There should be no impacts to this species as a result of construction and operation the proposed new mine.

Table 1: Federally listed threatened, endangered & candidate species in Carbon County, Utah and notes regarding potential impacts to them as a result of the proposed Kinney No. 2 Mine.

NOTE**: This list was compiled using known species occurrences and species observations from the Utah Natural Heritage Program's Biodiversity Tracking and Conservation System (BIOTICS). This list includes both current and historic records. (Last updated on November 9, 2010).**

Greater sage-grouse	*Centrocerus urophasianus*	C	*Centrocercus urophasianus* habitat has been documented in and around the project area. UDWR biologists have mapped much of the area to be crucial brooding habitat as well as crucial winter habitat for this species (see Map 2F).
Gray Wolf	*Canus lupus*	E	Although once common in Utah, the gray wolf was extirpated (exterminated) from the state by early settlers. Although they have been reintroduced in adjacent states, and may move into the state, reintroduction to Utah has been planned to-date. There should be no impacts to this species as a result of construction and operation the proposed new mine.

* Status

C = Candidate
E = Endangered
T = Threatened
Ex = Extirpated

Utah Administrative Rule R657-48, Implementation of the Wildlife Species of Concern and Habitat Designation Advisory Committee, specifies designation of certain species categories including, Conservation Species, State Sensitive Species, Wildlife Species of Concern, and creation of the Utah Sensitive Species List. These categories and the Utah Sensitive Species List will be addressed in the following sections.

Conservation Agreement Species

The follow is the only species listed by the State of Utah as a "Conservation Agreement Species" that has the potential to be present within or adjacent to the Kinney No. 2 Mine permit area.

- Northern goshawk (*Accipiter gentilis)*

Species of Concern

The following species have been listed by the State of Utah as "Species of Concern" and have the potential to be present in the general area. These species along with the relevance to their presence in the Kinney No. 2 Mine permit and adjacent areas are discussed later in this chapter.

- Western toad (*Bufo boreas)*
- Smooth greensnake (*Opheodrys vernalis)*
- *Bald eagle (Halianetus leucocephalus)*
- Burrowing owl (*Athene cunicularia)*
- Ferruginous hawk (*Buteo regalis)*
- Black swift (*Cypseloides niger)*
- Long-billed curlew (*Numenius americanus)*
- American white pelican (*Pelecanus erythrorhynchos)*
- Three-toed woodpecker *(Picoides tridactylus)*
- Townsend's big-eared bat (*Corynorhinus townsendii)*
- Spotted bat (*Euderma maculatum)*
- Fringed myotis_(*Myotis thysanodes)*
- White-tailed prairie-dog_(*Cynomys leucurus)*
- Kit fox (*Vulpes macrotis)*

R645-301-220 High-Value Habitats

In 2006, DWR updated their habitat value definitions as described below.

Crucial Value was defined as "habitat on which the local population of wildlife species depends for survival because there are no alternative ranges of habitats available. Crucial Value habitat is essential for the life history requirements of a wildlife species".

Substantial Value was defined as "habitat that is used by a wildlife species but is not crucial for population survival. Degradation or unavailability of substantial value habitat will not lead to significant declines in carrying capacity and/or numbers of the wildlife species in question".

The following species have been described by UDWR geographic information system (GIS) database as having high value habitats. Information and maps about these species have been presented in the following s.

- Black Bear
- Blue Grouse
- Moose
- Mule Deer
- Rocky Mountain Elk
- Sage-Grouse
- Snowshoe Hare

The UDWR GIS database was consulted by project biologists in June 2007 and again in August 2010. The following critical or otherwise important habitats from the database were mapped for the Kinney No. 2 Mine project area.

Black Bear

First, substantial year-long habitat for black bear (*Ursus americanus*) has been mapped within and adjacent to the permit area. Additionally, critical year-long habitat has been designated within the project area by the UDWR database (Map 2A).

Blue Grouse

Next, year-long crucial habitat for blue grouse (*Dendragapus obscures*) has also been mapped within and adjacent to the project area (Map 2B).

Blue grouse, as year-long residents of the Wasatch Plateau, prefer open stands of conifers which serve as the principal source of forage. In the warmer months, blue grouse are found in the lower elevation sagebrush, pinyon-juniper, and mixed brush habitats where they can obtain newly developing buds and other tender vegetation. At various times during the breeding and brooding seasons, insects and berries become an important dietary component and habitats which supply these requisites are classified as high-priority. During the colder months, young needles and buds from Douglas-fir and spruce trees at higher elevations provide the necessary forage for survival. Therefore, high elevation coniferous stands rank as critical habitat during the months of December through February for blue grouse. Even though there are no conifer stands in the mine surface disturbance area, the UDWR database shows the permit and adjacent areas to be crucial year-long habitat for blue grouse.

Moose

Crucial winter habitat for moose (*Alces alces*) has also been designated within and outside the permit area. Additionally, crucial year-long habitat has been mapped within some of the riparian zones just outside the permit area (Map 2C).

Moose are listed by the UDWR as an uncommon inhabitant of the Wasatch Plateau. Moose have a strong affinity for riparian habitats, especially during the late spring through fall periods, and prefer aquatic vegetation. During the winter, moose will browse on twigs and bark of conifers in all areas of their habitat. Because they are strongly associated with riparian habitats during most of the year, they would be primarily found in the Mud Creek riparian area, and in the other riparian areas. Since the mine site is located very near the town of Scofield and Highway 96, moose presence is unlikely in the area. However, there is the possibility of the occasional moose passing through the area.

Mule deer

Mule deer *Odocoileus hemionus*) habitat has been mapped in the area by UDWR biologists. Mule deer (Herd Unit 17) are common year-long inhabitants of the Wasatch Plateau with crucial summer fawning habitat found in the mine and adjacent areas (Map 2D). Some vertical migration of mule deer occurs in response to seasonal changes, resulting in concentration of populations in lowland areas during winter months. These concentration areas, known as winter range, are variably utilized depending on the severity of the winter. In all cases, this winter range is defined as crucial for mule deer. During more severe winters and certain times of any given winter, the most concentrated use defines the most critical winter range for the general maintenance of the mule deer population. There is no critical winter range in the mine permit area, but there is crucial summer fawning habitat there. Although no specific areas are known, fawning grounds for this herd unit likely occur within the permit area. Use of fawning grounds during critical periods (June), would be considered to be of crucial value to the mule deer population. The mining operations area is in close proximity to the town of Scofield and Highway 96, and therefore may have less impact on mule deer than would otherwise.

Rocky Mountain elk

Rocky Mountain elk (*Cervus canadensis*) habitat has been mapped in the area. Crucial summer habitat was mapped throughout the entire area including the permit area (Map 2E).

Rocky mountain elk are inhabitants of the Wasatch Plateau with habitat spanning from the submontane through the montane regions. The local elk population does not exhibit as strong a vertical migration as mule deer; however, such a migration does exist resulting in some concentration during the winter months. These concentration areas, known as winter range, are variably utilized depending on the severity of the winter. In all cases, the summer range is defined as crucial for elk. Although no specific areas are known, calving grounds for this herd unit could possibly occur within the permit area. Use of calving grounds during critical periods (June), would be considered to be of critical value to the elk population. Since the mine operations area lies within close proximity to both the town of Scofield and Highway 96, it is unlikely that elk would use the area for calving due to current human activity.

Sage-grouse

Sage grouse (*Centrocercus urophasianus*) habitat has been documented in and around the project area. UDWR biologists have mapped much of the area to be crucial brooding habitat as well as crucial winter habitat for this species (Map 2F).

Sage-grouse are listed on the Utah Sensitive Species List as a species of concern, and are year-round residents of the high plateau and adjacent portions of the permit area which lie east of the mine site. However, within their crucial winter habitat at the site it is also crucial brooding habitat. Sage-grouse only occur in sagebrush dominated vegetation types or communities in close proximity to sagebrush types within the submontane life zone. Open areas (e.g., wet meadows) surrounded by sagebrush are often utilized as strutting grounds during the critical breeding period from March 15 through June 15. Sagebrush stands within a two-mile radius of such sites are also classified as crucial value areas due to their use as brooding habitat following nesting. Following the brooding period, the sage-grouse disperse over the entire substantial use area until about mid-November. No leks have been identified in the mine area.

Snowshoe hare

Snowshoe hare (*Lepus americanus*) also has year-long crucial habitat in a portion of the permit area as well as adjacent to it (Map 2F).

For more information about other species on the Wasatch Plateau, refer to "General Wildlife Occurrence and Use" (Table 2).

Two vegetation maps have been created for the Kinney No. 2 Mine and adjacent area. Map 1A, "Facilities Area Vegetation Map", is a contour map that shows the native plant communities as well as those areas that have been previously disturbed by historical mining and other activities. Map 1B is a general vegetation map shown on an aerial photograph. Both maps provide information about the habitat types for the wildlife species in the area.

R645-301-230 Other Wildlife Species & Habitat Information of the Permit & Adjacent Areas

There are a number of accepted approaches for habitat definition and evaluation, however, with respect to the proposed permit area and evaluation of potential mining related impacts, two basic approaches are of particular relevance. First, plant communities and physiognomic attributes of a given area can be described relative to habitat value as most species have particular affinities for certain features and conditions of their environment. Second, habitat values for certain geographical areas which correspond to a unique combination of plant community associations and other environmental variables can be described with respect to the necessary life requisites they provide for particular species of wildlife, especially during critical periods of their life cycles.

With respect to the first approach to habitat classification, the major plant communities have been described in R645-301-300, "Vegetation Information", for the permit area. The location and extent of these associations within the proposed permit area are illustrated by the "Regional Vegetation Map", (Map 1A) in the Vegetation Report included in Exhibit 7, Vegetation Information. As indicated in R645-301-300, three plant community types in the permit boundary have been described including Sagebrush/Grasslands Rabbitbrush/Grass (previously disturbed) and Aspen. In addition, there was also a riparian complex associated with Mud Creek. The riparian area was located within one mile of the permit boundary, as can be seen on the Regional & Site Vegetation Map, (Map 1A) in the Vegetation Report included in Exhibit 7, Vegetation Information. Between the permit area and the Mud Creek riparian complex lies an expanse of pastureland.

As mentioned, Scofield Reservoir is located approximately one-half mile from the closest point of the permit boundary. Scofield Reservoir with its associated riparian zone is an important habitat for numerous species of fishes, birds, mammals and amphibians. Relative utility of these habitats is dependent on each species of wildlife, but in general, the riparian bottomlands offer the highest level and greatest diversity of habitat values.

While the permit area occupies only a very small portion of the Wasatch Plateau, it has some of the same plant communities and wildlife habitats that are typical of the montane regions in central Utah. However, the proposed mine facilities area is located in an area that has been impacted by historical and recent mining activities, as well as residential development, commercial development, transportation corridor, and electrical power transmission facilities and operations. It should be noted that generally only three plant communities exist in the permit boundary, the Aspen, Sagebrush/Grass and Rabbitbrush/Grass (previously disturbed). In the general area of the mine site, and within a one mile radius around the permit boundary, there are other communities including a riparian complex along Mud Creek. Given the characteristics of these vegetation types, the permit area could provide potential habitat for approximately 329 species of vertebrate wildlife, including: 7 fish species, 8 amphibians, 17 reptile species, 231 birds, and 66 mammals. Table 2, Potential Wildlife Species of the Wasatch Plateau, identifies those species known to occur in this general area as well as the likelihood of occurrence in the permit area. Of the 329 species identified as occurring in the general area, 92 are known, have potential, or are likely inhabitants of the permit area, and 237 are considered unlikely, or not inhabitants based on known range or habitat preference. Included on this list are several species of wildlife considered to be of high interest to the State of Utah. High interest wildlife are defined as all game species, any economically important species, and any species of special aesthetic, scientific, or educational significance, and those species listed on the Utah Sensitive Species List. Included in this category are those species of wildlife that are federally listed as endangered or threatened or candidates for these designations.

Given the significant extent of previous and existing disturbance in the proposed surface facilities area and the very limited aerial extent of the new surface disturbance, initial site-specific wildlife baseline studies have been limited to review of available documentation on wildlife occurrence and habitat in the area, ground surveys and aerial raptor surveys. Any supplemental wildlife information requirements will be determined by UDOGM in consultation with state and federal wildlife agencies In order to address potential mining related wildlife impacts, the following discussion addresses important and/or typical species which may occur as inhabitants or transients in the permit area. An evaluation of the potential for impact is detailed in R645-301-312 and 313 of this application. Only those species of high interest as listed in the Utah Sensitive Species List will be specifically addressed in the following s of this application.

The following Table 2 shows a list of species that are present on the Wasatch Plateau of central Utah of which the Kinney No. 2 Mine is located. Also included about each species listed on the table is the occurrence status in the Wasatch Plateau and legal status.

Follow up information about the sensitive or special status species on the table specific to the project area has been described in another table.

TABLE 2 POTENTIAL WILDLIFE SPECIES OF THE WASATCH PLATEAU

(From Dalton et. Al., 1990, Fauna of Southeastern Utah and Life Requisites Regarding Their Ecosystems. UDWR Publication No.90-11).

* Status in Wasatch Plateau; K = Unknown; C = Common; U = Uncommon; R = Rare; O = Occasional; A = Accidental; L = Limited; P = Protected; N = Unprotected

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Life Form	Common Name	Scientific Name	Status in Wasatch Plateau *	Likelihood In Mine Plan Area **	T & E Status
Fishes - *42 species total in Price River, Scofield Reservoir and their tributaries (7 species). *Only those species in the Scofield Reservoir and its tributaries included in table (montane ecological associations).					
1	Cutthroat trout	Oncorhynchus	C	N	
2	Rainbow trout	Oncorhynchus my kiss	C	N	
3	Carp	Cyprinus carpio	C	N	
4	Utah chub	Gila atraria	L	N	
5	Red side shiner	Richardsonius balteatus	C	N	
6	Mountain sucker	Catostomus platyrhynchus	C	N	
7	Waleye	Stizostedion vitreum	O	N	
Reptiles - *17 species total in mine biogeographic area					
1	Leopard lizard	Crotaphytus wislizenii	C	U	
2	Eastern fence lizard	Sceloporus undulates	C	L	
3	Sagebrush lizard	Sceloporus graciosus	C	L	
4	Tree lizard	Urosaurus ornatus	C	U	
5	Side-blotched lizard	Uta stansburiana	C	P	
6	Short-horned lizard	Phrynosoma douglassi	C	P	

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Life Form	Common Name	Scientific Name	Status in Wasatch Plateau *	Likelihood In Mine Plan Area **	T & E Status
7	Rubber boa	Charina bottae	U	U	
8	Ring-necked snake	Diadophis punctatus	U	U	
9	Striped whipsnake	Masticophis taeniatus	C	U	
10	Sanoran mountain king	Lampropeltis pyromelana	R	U	
11	Racer	Coluber constrictor	U	U	
12	Smooth greensnake	Opheodrys vernalis	U	U	C3
13	Pine snake	Pituophis melanoleucus	C	P	
14	Milk snake	Lampropeltis triangulum	R	U	
15	Western terrestrial garter snake	Thamnophis elegans	C	U	
16	Common garter snake	*Thamnophis sirtalis*	C	U	
17	Night snake	*Hypsiglena torquata*	C	U	
Amphibians - * 8 species total in mine biogeographic area					
1	Tiger salamander	*Ambystoma tigrinum*	C	U	
2	Great Basin spadefoot toad	*Scaphiopus intermontanus*	C	P	

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Life Form	Common Name	Scientific Name	Status in Wasatch Plateau *	Likelihood In Mine Plan Area **	T & E Status
3	Western toad	*Bufo boreas*	U	U	C3
4	Woodhouse's toad	*Bufo woodhousei*	C	U	
5	Great Plains toad	*Bufo cognatus*	C	U	
6	Chorus frog	*Pseudacris triseriata*	C	U	
7	Spotted frog	*Rana pretiosa*	R	U	
8	Leopard frog	*Rana pipiens*	C	U	
Birds – * 231 species total in mine biogeographic area					
1	Common loon	*Gavia immer*	U	U	
2	Horned grebe	*Podiceps auritus*	C	U	
3	Eared grebe	*Podiceps nigricollis*	C	U	
4	Western grebe	*Aechmophorus occidentalis*	C	U	
5	Pied-billed grebe	*Pdoilymbus podiceps*	C	U	
6	White pelican	*Pelecanus erythrorhynchos*	C	U	C3
7	Double-crested cormorant	*Phalacrocorax auritus*	C	U	
8	Great blue heron	*Ardea herodias*	K	U	
9	Black-crowned night heron	*Nycticorax nycticorax*	U	U	
10	Snowy egret	*Egretta thula*	O	U	

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Life Form	Common Name	Scientific Name	Status in Wasatch Plateau *	Likelihood In Mine Plan Area **	T & E Status
11	White-faced ibis	*Plegadis chihi*	T	U	
12	Canada goose	*Branta Canadensis*	C	P	
13	Snow goose	*Chen caerulescens*	O	P	
14	Mallard	*Anas platyrhynchos*	C	P	
15	Wood duck	*Aix sponsa*	O	U	
16	Gadwall	*Anas strepera*	C	U	
17	Northern pintail	*Anas acuta*	C	P	
18	Green-winged teal	*Anas crecca*	C	P	
19	Blue-winged teal	*Anas discors*	U	P	
20	Cinnamon teal	*Anas cyanoptera*	C	P	
21	American wigeon	*Anas Americana*	C	P	
22	Northern shoveler	*Anas clypeata*	C	P	
23	Redhead	*Aythya mericana*	C	U	
24	Ring-necked duck	*Aythya collaris*	O	U	
25	Canvasback	*Aythya yallisineria*	O	U	
26	Greater scaup	*Aythya marila*	O	U	
27	Lesser scaup	*Aythya affinis*	O	U	
28	Common goldeneye	*Bucciphala clangula*	O	U	

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Life Form	Common Name	Scientific Name	Status in Wasatch Plateau *	Likelihood In Mine Plan Area **	T & E Status
29	Bufflehead	*Bucephala albeola*	U	U	
30	Hooded merganser	*Mergus cucullatus*	O	U	
31	Common merganser	*Mergus merganser*	O	U	
32	Red-breasted merganser	*Mergus serrator*	O	U	
33	Turkey vulture	*Cathartes aura*	C	K	
34	Northern goshawk	*Accipiter gentiles*	U	U	C2
35	Sharp-shinned hawk	*Accipiter striatus*	U	U	
36	Cooper's hawk	*Accipiter cooperii*	C	P	
37	Red-tailed hawk	*Buteo jamaicensis*	C	K	
38	Swainson's hawk	*Buteo swainsoni*	R	U	
39	Rough-legged hawk	*Buteau lagopus*	C	U	
40	Ferruginous hawk	*Buteo regalis*	R	U	C3
41	Golden eagle	*Aquila chrysaetos*	C	K	
42	Bald eagle	*Haliaeetus leucocephalus*	U	P	C3
43	Northern harrier	*Circus cvaneus*	C	U	
44	Osprey	*Pandion haliaetus*	U	U	
45	Prairie falcon	*Falco mexicanus*	C	U	

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Life Form	Common Name	Scientific Name	Status in Wasatch Plateau *	Likelihood In Mine Plan Area **	T & E Status
46	Peregrine falcon	*Falco peregrinus*	U	U	
47	American kestrel	*Falco sparverius*	C	U	
48	Blue grouse	*Dendragapus obscurus*	C	U	
49	Ruffed grouse	*Bonasa umbellus*	C	U	
50	Sage grouse	*Centrocercus urophasianus*	C	L	C
51	California quail	*Lophortyx californicus*	L	U	
52	Chukar	*Alectoris chukar*	C	U	
53	Common moorhen	*Gallinula chloropus*	A	U	
54	Sora	*Porzana Carolina*	U	U	
55	Virginia rail	*Rallus limicola*	C	U	
56	Whooping crane	*Grus Americana*	E	U	EXT
57	Sandhill crane	*Crus Canadensis*	U	U	
58	American coot	*Fulica Americana*	L	U	
59	Semipalmated plover	*Charadrius semipalmatus*	U	U	
60	Snowy plover	*Charadrius alexandrinus*	R	U	
61	Killdeer	*Charadrius vociferous*	C	U	
62	Mountain plover	*Charadrius montanus*	R	U	

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Life Form	Common Name	Scientific Name	Status in Wasatch Plateau *	Likelihood In Mine Plan Area **	T & E Status
63	Lesser golden plover	*Pluvialis dominica*	U	U	
64	Black-billed plover	*Pluvialis squatarola*	C	U	
65	Common snipe	*Capella gallinago*	C	U	
66	Long-billed curlew	*Numenius americanus*	R	U	C3
67	Willet	*Catoptrophorus semipalmatus*	U	U	
68	Spotted sandpiper	*Actitis macularia*	C	U	
69	Solitary sandpiper	*Tringa solitaria*	U	U	
70	Greater yellowlegs	*Tringa melanoleuca*	U	U	
71	Lesser yellowlegs	*Tringa flavipes*	C	U	
72	Pectoral sandpiper	*Calidris melanotos*	U	U	
73	Baird's sandpiper	*Calidris bairdii*	U	U	
74	Least sandpiper	*Calidris minutilloa*	C	U	
75	Western sandpiper	*Calidris mauri*	C	U	
76	Sanderling	*Calidris alba*	U	U	
77	Short-billed dowitcher	*Limnodromus griseus*	U	U	
78	Long-billed dowitcher	*Limnodromus scolopaceus*	C	U	
79	Marbled godwit	*Limosa fedoa*	C	U	

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Life Form	Common Name	Scientific Name	Status in Wasatch Plateau *	Likelihood In Mine Plan Area **	T & E Status
80	American avocet	*Recurvirostra Americana*	C	U	
81	Black-necked stilt	*Himantopus mexicanus*	U	U	
82	Red-necked phalarope	*Phalaropus labatus*	C	U	
83	Wilson's phalarope	*Phalaropus tricolor*	C	U	
84	Herring gull	*Larus argentuatus*	U	U	
85	California gull	*Larus californicus*	C	U	
86	Ring-billed gull	*Larus delawarensis*	C	U	
87	Franklin's gull	*Larus pipixcan*	C	U	
88	Bonaparte's gull	*Larus philidelphia*	U	U	
89	Foster's tern	*Sterna foresteri*	C	U	
90	Common tern	*Sterna hirundo*	U	U	
91	Black tern	*Childonias niger*	C	U	
92	Caspian tern	*Hydropprogne caspia*	R	U	
93	Bandtailed pigeon	*Columba fasciata*	O	P	
94	Rock dove	*Columba livia*	C	U	
95	Mourning dove	*Zeniada macroura*	C	L	
96	Yellow-billed cuckoo	*Coccyzus americanus*	R	U	C

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Life Form	Common Name	Scientific Name	Status in Wasatch Plateau *	Likelihood In Mine Plan Area **	T & E Status
97	Common barn-owl	*Tyto alba*	U	U	
98	Great-horned owl	*Bubo virginianus*	C	L	
99	Northern Pygmy owl	*Glaucidium gnoma*	C	P	
100	Burrowing owl	*Athene cunicularia*	L	U	C3
101	Long-eared owl	*Asio otus*	C	P	
102	Northern saw-whet owl	*Aegolius acadicus*	U	U	
103	Common nighthawk	*Chordeiles minor*	C	P	
104	Common poorwill	*Phalaehoptilus nuttallii*	C	U	
105	Black swift	*Cypseloides niger*	U	U	C3
106	Black-chinned hummingbird	*Archilochus alexandri*	C	P	
107	Broad-tailed hummingbird	*Selasphorus platycercus*	C	P	
108	Rufous hummingbird	*Selasphorus rufus*	C	P	
109	Calliope hummingbird	*Seellula calliope*	U	U	
110	Belted kingfisher	*Ceryle alcyon*	U	U	
111	Northern flicker	*Colaptes auratus*	C	P	
112	Red-headed woodpecker	*Melanerpes erythrocephalus*	U	U	

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Life Form	Common Name	Scientific Name	Status in Wasatch Plateau *	Likelihood In Mine Plan Area **	T & E Status
113	Williamson's sapsucker	*Sphryapicus thyroids*	R	N	
114	Yellow-bellied sapsucker	*Sphryapicus varius*	C	P	
115	Hairy woodpecker	*Picoides villosus*	C	P	
116	Downy woodpecker	*Picoides pubescens*	C	P	
117	Three-toed woodpecker	*Picoides tridactylus*	U	U	C3
118	Western kingbird	*Tyrannus verticalis*	C	U	
119	Cassin's kingbird	*Tyrannus vociferans*	U	U	
120	Eastern kingbird	*Tyrannus tyrannus*	C	U	
121	Ash-throated flycatcher	*Mylarchus cinerascens*	C	U	
122	Say's phoebe	*Savornis sava*	C	P	
123	Willow flycatcher	*Empidonax traillii*	C	U	
124	Hammond's flycatcher	*Empidonax hammondii*	U	U	
125	Dusky flycatcher	*Empidonax oberholderi*	C	P	
126	Gray flycatcher	*Empidonax wrightii*	U	U	

TABLE 2 POTENTIAL WILDLIFE SPECIES OF THE WASATCH PLATEAU

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Federal Status(updated to 2010 status); E = Endangered; EXP = Experimental; T = Threatened; C = Candidate;

Utah Status; C2 = Conservation Agreement; C3 = Species of Concern; EXT = Extirpated

Life Form	Common Name	Scientific Name	Status in Wasatch Plateau *	Likelihood In Mine Plan Area **	T & E Status
127	Olive-sided flycatcher	*Contopus borealis*	U	P	
128	Horned lark	*Eremophila alpestris*	C	U	
129	Cliff swallow	*Hirundo pyrrhonota*	C	U	
130	Barn swallow	*Hirundo rustica*	C	U	
131	Violet-green swallow	*Tachycineta thalassina*	C	P	
132	Tree swallow	*Tachycineta biocolor*	C	U	
133	Bank swallow	*Riparia riparia*	C	U	
134	Purple martin	*Progne subis*	R	U	
135	Northern rough-winged swallow	*Stelgidopteryx serripennis*	C	U	
136	Steller's jay	*Cyanocitta stelleri*	C	L	
137	Scrub jay	*Aphelocoma coerulescens*	C	U	
138	Gray jay	*Perisoreus Canadensis*	U	U	
139	Black-billed magpie	*Pica pica*	C	K	
140	Common raven	*Corvus corax*	C	K	
141	American crow	*Corvus brachyrhyncos*	O	U	
142	Pinyon jay	*Gymnorhinus cyanocephala*	C	U	

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Life Form	Common Name	Scientific Name	Status in Wasatch Plateau *	Likelihood In Mine Plan Area **	T & E Status
143	Clark's nutcracker	*Nucifraga Columbiana*	C	U	
144	Black-capped chickadee	*Parus atricapillus*	C	L	
145	Mountain chickadee	*Parus gambelli*	C	L	
146	Plain titmouse	*Parus lnorntus*	U	U	
147	Bushtit	*Psaltriparus minimus*	C	P	
148	White-breasted nuthatch	*Sitta carolinensis*	C	P	
149	Red-breasted nuthatch	*Sitta Canadensis*	C	U	
150	Pygmy nuthatch	*Sitta pygmaea*	C	P	
151	Brown creeper	*Certhia Americana*	C	U	
152	American dipper	*Cinclus mexicana*	C	N	
153	House wren	*Troglodytes aedon*	C	P	
154	Rock wren	*Salpinctes obsoletus*	C	U	
155	Canyon wren	*Catherpes mexicanus*	C	U	
156	Marsh wren	*Cistothorus palustris*	L	U	
157	Bewick's wren	*Thryomanes bewickii*	C	U	
158	Blue-gray gnatcatcher	*Polioptila caerulea*	C	U	
159	Sage thrasher	*Oreoscoptes montanus*	C	U	

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Life Form	Common Name	Scientific Name	Status in Wasatch Plateau *	Likelihood In Mine Plan Area **	T & E Status
160	American robin	*Turdus migratorius*	C	L	
161	Hermit thrush	*Catharus gattatus*	C	P	
162	Swainson's thrush	*Catharus ustulatus*	C	P	
163	Western bluebird	*Sialia mexicana*	R	U	
164	Mountain bluebird	*Sialia currucoides*	C	K	
165	Townsend's solitaire	*Myadestes townsendi*	C	P	
166	Golden-crowned kinglet	*Regulus satrapa*	U	P	
167	Ruby-crowned kinglet	*Regulus calendula*	C	P	
168	Veery	*Catharus fuscoscens*	U	U	
169	American robin	*Turdus migratorius*	C	L	
170	Gray catbird	*Dumetella carolinensis*	U	U	
171	Northern mockingbird	*Mimus polyglottos*	U	U	
172	Water pipet	*Anthus spinoletta*	C	U	
173	Cedar waxwing	*Bombycilla cedrorum*	C	U	
174	Bohemian waxwing	*Bombycilla garrulous*	U	U	
175	Northern shrike	*Lanius excubitor*	U	U	
176	Loggerhead shrike	*Lanius ludovicianus*	C	U	

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Life Form	Common Name	Scientific Name	Status in Wasatch Plateau *	Likelihood In Mine Plan Area **	T & E Status
177	European starling	*Sturnus vulgaris*	C	U	
178	Solitary vireo	*Vireo solitarius*	C	P	
179	Warbling vireo	*Vireo gilvus*	C	L	
180	Orange-crowned warbler	*Vermivora celata*	C	P	
181	Nashville warbler	*Vermivora ruficapilla*	U	U	
182	Yellow warbler	*Dendrioca petechia*	C	L	
183	Magnolia warbler	*Dendrocia magnolia*	R	N	
184	Yellow-rumped warbler	*Dendrocia coronata*	C	U	
185	Townsend's warbler	*Dendrocia townsendi*	U	U	
186	Black-throated gray warbler	*Dendroica nigrenscens*	C	U	
187	MacGilivray's warbler	*Oporomis tolmiei*	C	P	
188	Virginia's warbler	*Vermivora virginiae*	C	U	

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Life Form	Common Name	Scientific Name	Status in Wasatch Plateau *	Likelihood In Mine Plan Area **	T & E Status
189	Common yellowthroat	*Geothlypis trichas*	L	U	
190	American redstart	*Setophaga ruticilla*	C	U	
191	Yellow-breasted chat	*Lcteria virens*	R	U	
192	Wilson's warbler	*Wilsonia pusilla*	C	U	
193	House sparrow	*Passer domestious*	C	U	
194	Brown-headed cowbird	*Molothrus ater*	C	U	
195	Western tanager	*Piranga ludoviciana*	C	P	
196	Black-headed grosbeak	*Pheucticus melanocephalus*	C	P	
197	Rose-breasted grosbeak	*Pheucticus ludovicianus*	O	U	
198	Red-winged blackbird	*Agelaius hoeniceus*	C	U	
199	Rusty blackbird	*Euphagus carolinus*	O	U	

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Life Form	Common Name	Scientific Name	Status in Wasatch Plateau *	Likelihood In Mine Plan Area **	T & E Status
200	Brewer's blackbird	*Euphaqus cyanocephalus*	C	U	
201	Yellow-headed blackbird	*Xanthocephalus xanthocephalus*	C	U	
202	Northern oriole	*Icterus galbula*	C	U	
203	Lazuli bunting	*Passerian amoena*	C	U	
204	Indigo bunting	*Passerina cyanea*	U	U	
205	Lark bunting	*Calamospiza melanocorys*	O	U	
206	Green-tailed towhee	*Pipilo chlorurus*	C	L	
207	Rufous-sided townee	*Pipilo erythrophthalamus*	C	U	
208	Vesper sparrow	*Pooecetes gramineus*	C	P	

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Life Form	Common Name	Scientific Name	Status in Wasatch Plateau *	Likelihood In Mine Plan Area **	T & E Status
209	Dark-eyed junco	*Junco hyemalis*	C	L	
210	Tree sparrow	*Spizella arborea*	U	U	
211	Chipping sparrow	*Spizella passerine*	C	L	
212	White-crowned sparrow	*Zonotrichia leucophrys*	C	L	
213	Fox sparrow	*Passerella iliaca*	U	U	
214	Song sparrow	*Melospiza melodia*	C	U	
215	Sage sparrow	*Amphispiza belli*	U	U	
216	Black-throated sparrow	*Amphispiza bilineata*	U	U	
217	American tree sparrow	*Spizella arborea*	U	U	
218	Harris' sparrow	*Zonotrichia querula*	U	U	
219	Common grackle	*Ouiscalus quiscula*	A	U	

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Life Form	Common Name	Scientific Name	Status in Wasatch Plateau *	Likelihood In Mine Plan Area **	T & E Status
220	Evening grosbeak	*Coccothraustes vespertinus*	C	P	
221	Lincoln's sparrow	*Melosoiza lincolnii*	U	U	
222	Lesser goldfinch	*Cardvelis Psaltria*	C	U	
223	American goldfinch	*Cardvelis tristis*	C	U	
224	Cassin's finch	*Carpodacus cassinii*	C	U	
225	House finch	*Carpodacus mexicanus*	C	U	
226	Pine grosbeak	*Pinicola enucleator*	U	U	
227	Evening grosbeak	*Coccothraustes vespertinus*	C	U	
228	Rosy finch	*Leucosticte arctoa*	U	U	
229	Common redpoll	*Carduelis fl' ammea*	C	U	
230	Pine siskin	*Carduelis pinus*	C	U	

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Life Form	Common Name	Scientific Name	Status in Wasatch Plateau *	Likelihood In Mine Plan Area **	T & E Status
231	Red crossbill	*Loxia curvirostra*	U	N	
Mammals – * 66 species total in mine biogeographic area					
1	Dwarf shrew	*Sorex nanus*	L	P	
2	Water shrew	*Sorex palustris*	C	U	
3	Merriam's shrew	*Sorex merriami*	U	U	
4	Vagrant shrew	*Sorex vagrans*	U	U	
5	Masked shrew	*Sorex cinereus*	C	U	
6	Little brown myotis	*Myotis lucifugus*	C	P	
7	Fringed myotis	*Myotis thysanodes*	U	U	C3
8	Long-eared myotis	*Myotis evotis*	C	U	
9	Long-eared myotis	*Myotis volans*	C	U	
10	Yuma myotis	*Myotis yumanensis*	R	U	

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Life Form	Common Name	Scientific Name	Status in Wasatch Plateau *	Likelihood In Mine Plan Area **	T & E Status
11	Silver-haired bat	*Lasioncteris noctivagans*	C	P	
12	Big brown bat	*Eptesicus fuscus*	C	P	
13	Hoary bat	*Lasiurus cinereus*	C	P	
14	Townsend's big-eared bat	*Plecotus townsendii*	C	U	C3
15	Spotted bat	*Euderma maculatum*	U	U	C3
16	Pallid bat	*Antorozous pallidus*	U	U	
17	Pika	*Ochotona princes*	R	N	
18	White-tailed jackrabbit	*Lepus townsendii*	C	L	
19	Snowshoe hare	*Lepus americanus*	C	P	
20	Black-tailed jackrabbit	*Lepus californicus*	U	U	
21	Nuttall's cottontail	*Sylvilagus nuttallii*	C	P	

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Life Form	Common Name	Scientific Name	Status in Wasatch Plateau *	Likelihood In Mine Plan Area **	T & E Status
22	White-tailed prairie dog	*Cynomys leucurus*	C	N	C3
23	Red squirrel	*Tamiasciurus hudsonicus*	C	U	
24	Rock squirrel	*Spermophilus variegates*	C	U	
25	Uintah ground squirrel	*Spermophilus armatus*	C	U	
26	Golden-mantled ground squirrel	*Spermophilus lateralis*	C	L	
27	Whitetail antelope squirrel	*Ammospermophilus leucurus*	U	N	
28	Yellow-bellied marmot	*Marmota flaviventris*	C	L	
29	Northern flying squirrel	*Glaucomys sabrinus*	R	N	
30	Least chipmunk	*Tamias minimus*	C	K	
31	Uinta chipmunk	*Tamias umbrinus*	C	U	

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Life Form	Common Name	Scientific Name	Status in Wasatch Plateau *	Likelihood In Mine Plan Area **	T & E Status
32	Cliff chipmunk	*Eutamius dorsalis*	C	U	
33	Northern pocket gopher	*Thomomys talpoides*	C	L	
34	Botta pocket gopher	*Thomomys bottae*	U	U	
35	Ord kangaroo rat	*Dipodomys ordii*	U	U	
36	Beaver	*Castor Canadensis*	C	P	
37	Western harvest mouse	*Reithrodontomys megolotis*	C	P	
38	Canyon mouse	*Peromyscus crinitus*	U	U	
39	Deer mouse	*Peromyscus maniculatus*	C	L	
40	Brush mouse	*Peromyscus boylei*	C	L	
41	Piñon mouse	*Promyscus truei*	C	U	

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Life Form	Common Name	Scientific Name	Status in Wasatch Plateau *	Likelihood In Mine Plan Area **	T & E Status
42	Brushy-tailed woodrat	*Meotoma cinerei*	C	L	
43	Muskrat	*Ondatra zibethicus*	C	U	
44	Montane vole	*Microtus montanus*	C	L	
45	Long-tailed vole	*Microtus longicaudus*	C	L	
46	Porcupine	*Erethizon dorsatum*	C	P	
47	Coyote	*Canis latrans*	C	L	
48	Red fox	*Vulpes vulpes*	C	L	
49	Kit fox	*Vulpes macrotis*	R	U	C3
50	Black bear	*Ursus americanus*	C	L	
51	Ring-tailed cat	*Bassariscus astutus*	U	U	
52	Raccoon	*Procyon lotor*	K	U	
53	Short-tailed weasel	*Mustela erminea*	K	U	

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Life Form	Common Name	Scientific Name	Status in Wasatch Plateau *	Likelihood In Mine Plan Area **	T & E Status
54	Long-tailed weasel	*Mustela frenata*	C	L	
55	Mink	*Mustela vison*	L	U	
56	Black-footed ferret	*Mustela nigripes*	U	U	E – EXP
57	Marten	*Martes Americana*	R	U	
58	Badger	*Taxidea taxus*	C	L	
59	Striped skunk	*Mephitus mephitus*	C	L	
60	Bobcat	*Felis rufus*	U	P	
61	Canada lynx	*Felis lynx canadensis*	R	U	T
62	Mountain lion	*Felis concolor*	C	L	
63	Mule deer	*Odocoileus hemionus*	C	K	
64	Rocky mountain elk	*Cervus elaphus*	C	K	
65	Moose	*Alces alces*	U	U	

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Life Form	Common Name	Scientific Name	Status in Wasatch Plateau *	Likelihood In Mine Plan Area **	T & E Status
66	Northern river otter	*Lutra canadensis*	R	U	

Amphibians

Eight species of amphibians, as listed on Table 2, "Potential Wildlife Species of the Wasatch Plateau", are believed to be potential inhabitants of the biogeographic area in which the permit and adjacent areas are located. However, only one amphibious species is categorized as possible, or a likely inhabitant of the permit area. The western toad is the only species listed on the Utah Sensitive Species List that has the potential to inhabit the mine permit area. Refer to Table 2A for more detail about this species.

Fishes

Seven (7) species of fishes, as listed on Table 2, "Potential Wildlife Species of the Wasatch Plateau", are believed to be potential inhabitants of the biogeographic area in which the permit area is located. There are 42 species of freshwater fish inhabiting southeastern Utah's streams and lakes, however, only the seven potential species listed in the UDWR database are included in this permit application. Since Pleasant Valley and its tributaries in the proposed mine's geographic area all drain into Scofield Reservoir, only those species in the UDWR database included for the Scofield Reservoir and its tributaries are included in Table 2. There are no species on the Utah Sensitive Species List that inhabit the mine permit area, or the Scofield drainage area. Because there are no streams or lakes within the permit boundary there is no potential for fish species to exist in the permit boundary.

Reptiles

Seventeen (17) species of reptiles, as listed on Table 2, “Potential Wildlife Species of the Wasatch Plateau”, are believed to be potential inhabitants of the biogeographic area in which the permit area is located. Only 5 reptile species are categorized as likely or possible inhabitants of the permit area. The other 12 species are considered unlikely to inhabit the permit area due to their affinity for riparian areas. The only species listed on the Utah Sensitive Species List that may inhabit the area is the smooth greensnake (*Opheodrys vernalis*), but it is considered uncommon to the area. This species prefers meadows and riparian areas and thus is unlikely to inhabit the mine operations area east of Highway 96. For more details about this species, refer to Table 3.

Birds

Two hundred thirty one (231) species of birds, as listed by Table 2, “Potential Wildlife Species of the Wasatch Plateau”, are believed to be potential inhabitants of the biogeographic area in which the permit area is located. However, only 92 bird species are categorized as potential, likely, or known inhabitants of the permit area. Of these 92 species, 11 are on the Utah Sensitive Species List, and have been discussed in Table 2A.

Waterfowl (ducks and geese), all of which are considered to be of high interest to the State of Utah due to their status as "gamebirds", are represented by 21 species that may, on occasion or seasonally, occur as minor inhabitants or transients in the general permit area. Of these, only nine (9) species could reasonably be expected to occur in the permit area, other than on an occasional basis. In general, the limited riparian and wetland vegetation types encompassed by the proposed permit area and adjacent areas provide marginally suitable habitat values for these nine (9) and possibly other waterfowl species. Each species has different life prerequisites. The nature and frequency of use of the riparian and wetland habitats found in the area may vary significantly. The importance, however, of these habitats for breeding purposes results in their being ranked as high-priority if utilized during the breeding period though such use is not expected.

The mine plan area provides substantial potential habitat for a variety of raptor species including the: turkey vulture, golden eagle, bald eagle, osprey, prairie falcon, peregrine falcon, American kestrel, northern goshawk, sharp-shinned hawk, Cooper’s hawk, red-tailed hawk, Swainson’s hawk, rough-legged hawk, ferruginous hawk, northern harrier, barn owl, great-horned owl, northern pygmy owl, long-eared owl, burrowing owl and northern saw-whet owl. Many of these species are of high federal interest pursuant to 43 CFR, 3461.1 (n-1), and all are considered of high interest to the State of Utah. There is some potential, though minimal, for incidental use of the permit area by bald eagles, which is considered a sensitive species in Utah. High-priority and/or critical habitat for certain raptor species exists within the permit area during the nesting/breeding period (February - July). For these species, construction activities within one-half mile of a nest site during the species specificing/breeding period should be avoided.

Because certain raptor species may be sensitive to disturbance during their active nesting periods, surveys of those portions of the permit area where surface disturbance has or is anticipated to occur have been implemented intermittently during the period from 2005 through 2007. As a result of these efforts several nest sites have been located in and near the permit area. Locations for these sites are provided on Map 2, Raptor Map. A table on the map shows the determination of species for each nest, and nesting activity if known. As indicted on Map 2, one nest (No 1541) was observed south of the proposed disturbed area in the southwest quarter of Section 33, T12S, R7E. This nest was categorized during the 2005 helicopter survey as being either goshawk or red-tailed hawk. As discussed further in this Chapter, goshawks prefer conifer stands for nesting and therefore nest No. 1541 is more likely a red-tailed hawk nest. No nesting activity was observed at this nest site during the 2007 nesting period.

Raptor Nest Deterrent

Carbon Resources has entered into consultation with the US Fish and Wildlife Service , the Utah Division of Wildlife Resources and the UDOGM regarding nest No. 1541.

Carbon Resources made application to the US Fish and Wildlife Service, for permission to conduct nesting deterrent actions at nest No. 1541 for the 2011 nesting season only (details of the deterrent plan are given below) . A copy of the application can be found in Exhibit 4, Other Permits. The UDOGM is a consulting agency along with the Utah Division of Wildlife Resources. Any mitigation plans will be approved by the US Fish and Wildlife Service, the Utah Division of Wildlife Resources and the UDOGM. Approval from the US Fish and Wildlife Service was received on April 26, 2011. In the approval letter, the USFWS made their approval contingent on approval from the Utah Department of Natural Resources (later qualified by phone conversation to be the Utah Division of Wildlife Resources). Verbal approval was given by Leroy Mead of the UDWR and later confirmed by email dated April 28, 2011. Copies of the USFWS approval and UDWR email approval are included in Exhibit 4, Other Permits.

As a condition to the nesting deterrent action approval CR commits to mitigation for the deterrent action including a plan approved by the Utah Division of Oil, Gas and Mining , U.S. Fish and Wildlife Service, and the Utah Division of Wildlife Resources. The mitigation plan will be limited to a total of $3000.00 as agreed by the agencies. The mitigation plan will consist of any one or a combination of the following, Purple martin nesting boxes, Osprey nesting platforms, purchasing non-lead hunting ammunition and making it available to hunters to help prevent raptor lead poisoning. The mitigation plan will be completed during the 2011 season (by the end of October), or in a time frame determined and approved by the agencies. Refer to details of the plan including the three alternatives with additional information on each alternative in Exhibit 8, Fish and Wildlife Information.

The final mitigation may include one or more of the alternatives discussed and presented. Details presented in Exhibit 8 provide the basis for preparing cost estimates for each alternative. From the cost estimates, the agencies and Carbon Resources will select the alternative or alternatives for implementation based on getting the most benefit from the money.

<u>Basis for Request for Deterrent Action</u>

Because the construction season at the mine site elevation is very short, and because nesting activity would delay start of construction until fledgelings leave the nest, Carbon Resources LLC petitioned the US Fish and Wildlife Service, for permission to conduct nesting deterrent actions to discourage the birds from nesting within a one-half mile buffer prior to the start of mining activity during the 2011 nesting season. It is believed that the birds will use other sites for nesting. There is ample opportunity for nesting in the general area. This will allow Carbon Resources LLC to start construction activities during the middle of the nesting season and reduce (or eliminate) the risk that the birds would abandon eggs or young at the nest.

After construction has started or at the end of the 2011 nesting season, Carbon Resources, LLC will remove the nest deterrents. It is our experience that Red-tailed Hawks are very adaptable to mining operations. For example, a pair of Red-tailed Hawks successfully nested for several years at the Star Point Mine in Carbon County, Utah within 30 feet of the main access road to the mine, and within 40 feet of an overland conveyor belt which ran for approximately 20 hours per day.

<u>Deterrent Plan</u>
The deterrent plan includes two components:

1. Preventing, or discouraging the birds from using this particular nest by placing one or more orange construction cones in the nest as long as no eggs are present. Carbon Resources LLC will obtain a Letter of Authorization from the U.S. Fish and Wildlife Services' Migratory Bird Permits office in Lakewood, Colorado before placing nest deterrents. If placing a construction cone is not possible, Carbon Resources will consult with the USFW Service and the Utah Division of Wildlife Resources to find another, non-destructive, method of deterrent.
2. If the birds decide to build another nest within the restricted one half mile zone placing orange construction cones (or other methods as above) in those nests also as long as no eggs are present.

The construction cone/s will be placed by using a long ladder, by climbing the tree, or other methods as needed. Every effort will be taken to avoid disturbing the nest.

Upon completion of the 2011 nesting season, the construction cone/s, or other deterrent methods will be removed so the birds will have use of the nest/s again.

<u>Monitoring Plan</u>

1. Monitoring nest #1541 and the area within the restricted one half mile zone for raptor activity during the 2011 nesting season from mid-March to mid-August (details to follow).

Monitoring will be conducted by observing any visible raptor activity in the nest #1541 area as well as observing activity in the general area that may indicate the raptors start constructing another nest. Observations will be conducted from Highway 96 at the entrance to the mine site using spotting scopes and binoculars or from the closest pad on the hillside across from the nest. Observations will be made from first light until 3 hours after daylight once per week from April 1, through May, 2011. After May, monitoring will be conducted every two weeks. This schedule is based on preliminary discussions with Nathan Darnall of the USFW Service and may be adjusted as necessary. Further monitoring may be necessary and will be determined in consultation with the agencies.

The observers will have a digital camera with a telephoto lens to take photos if possible of raptors in the area. The observers will also have raptor identification guide books at their disposal to help identify raptors.

A detailed record will be made during each monitoring session, including date, times, raptors observed, species, details of their movements, observers' name, and photographs taken. A report of weekly monitoring will be e-mailed to the U.S. Fish and Wildlife Service in Utah after each survey. A summary report will be provided to UDOGM at the end of the nesting season.

Schedule

Nesting activities can begin as early as March by Red-tailed Hawks, and April for Goshawks, however due to heavy snow cover this year no activity was observed during the first visit to the nest site by Mr. Greg Hunt of Carbon Resources LLC on March 3. During the first formal monitoring session conducted on March 30, 2011, no bird activity at the nest site was observed.

Future Mining Operations

Construction of the mine facilities and operation of the mine will proceed as planned and detailed in the Utah Division if Oil, Gas and Mining, Mining and Reclamation Plan. We believe that Red-tailed Hawks are particularly adaptable (refer to example given above) to disturbance by mining operations. It is very possible that the subject nest will be used in the future while mining activities are ongoing. Carbon Resources is committed to operating in an environmentally responsible manner. We commit to monitoring the subject nest in the future to document activity at the nest.

Noise will inevitably result from the mining operation, however, we believe noise levels will be acceptable. It should be noted that the town of Scofield is located only 1500 feet from the subject nest, as well as Utah Highway 96, which has a rather high volume of truck traffic.

Construction activities at the mine site will include earth moving and typical construction of buildings, conveyor belts, mine openings and associated mine facilities. Normal construction equipment will be used such as dozers, scrapers, track hoes, and cranes. Blasting may be necessary, but we believe it will be very minimal, if necessary at all.

Avoidance

Carbon Resources has a raptor proof power pole design included in the Utah Division of Oil, Gas and Mining, Mining and Reclamation Plan. Every effort will be made to minimize any risks to raptors in the area of the mine. Employees at the mine will be instructed to avoid harassment of all wildlife and particularly raptors.

For more information about raptor species of special status including the ferruginous hawk, bald eagle and northern goshawks, refer to Table 2A.

The long-billed curlew is listed by the UDWR as a species of concern, and is rare to the Wasatch Plateau. This species has a strong affinity for riparian and shoreline areas. For more information about this species, refer to Table 2A.

The whooping crane is listed by the UDWR as exterminated in the Wasatch Plateau. For more information about this species, refer to Table 2A.

The yellow-billed cuckoo is a federally listed Candidate species. It has also been described as rare in the Wasatch Plateau. This species prefers woodland areas, and is thought to nest primarily in the eastern United States. For more information about this species, refer to Table2A.

The burrowing owl is listed by the UDWR as limited in the Wasatch Plateau, sensitive and a Species of Concern. This species prefers open, dry grasslands, agricultural and range lands associated with burrowing animals, particularly prairie dogs, ground squirrels and badgers. For more information about this species, refer to the above (R645-301.220) and also Table 2A.

The black swift is listed by the UDWR as a Species ofConcern, and as uncommon in the Wasatch Plateau. For more information about this species and its presence in the project area, refer to Table 2A.

The three-toed woodpecker is listed by the UDWR as a Species of Concern, and as uncommon on the Wasatch Plateau. This species exhibits a strong preference for the bark insects of spruce trees, and inhabits coniferous forests at submontane and montane elevations, and therefore is considered to be uncommon to the mine plan area. For more information about this species and its presence in the project area, refer to Table 2A.

White pelicans can be found in and near Scofield Reservoir to the north of the mine site, however, due to this birds requirement to be very near water bodies, it is unlikely that they would be found in the mine area. For more information about this species and its presence in the project area, refer to Table 2A.

Mammals

Sixty six (66) species of mammals, as listed by Table 2, "Potential Wildlife Species of the Wasatch Plateau", are believed to be potential inhabitants of the biogeographic area in which the permit area is located. However, only 32 mammal species are classified as known, likely, or potential residents of the permit area. Of the 32 potential state high-interest species possible in the region, the occurrence of 17 are either known, likely, or possible in the permit area. Seven (7) species are listed by the UDWR on the Utah Sensitive Species List include: fringed myotis, Townsend's big-eared bat, spotted bat, white-tailed prairie-dog, kit fox, black-footed ferret, and Canada lynx. These species have been addressed in the above and also Table 2A.

Although not listed by the UDWR as sensitive species, mule deer, elk, and moose are very important species in the State of Utah and have been discussed above in "High-Value Habitats" (R645-301.220).

Special Status Wildlife Species of the Wasatch Plateau

Table 2 shows the species of the Wasatch Plateau and the likelihood of encountering these species in the Kinney No. 2 Mine project and adjacent areas. The table also lists the special status of these species, or whether they are threatened, endangered or otherwise sensitive by federal and state law. Finally, Table 2 shows potential habitat for fourteen (14) species that have been listed as "Wildlife Species of Concern" (C3), one (1) species listed as a "Conservation Agreement Species" (C2), two (2) as "Candidate" species (C), two (2) listed as extirpated (EXT) and one (1) listed as "threatened" (T) according to UDWR records and based on current listings. The following Table 2A lists these sensitive wildlife species and describes their relevance to the Kinney No. 2 Mine permit and adjacent areas.

Table 2A: Utah sensitive wildlife species of the Wasatch Plateau with notes regarding potential presence and impacts as a result of the proposed Kinney No. 2 Mine.			
Common Name	**Scientific Name**	**Status***	**Site-Specific Notes**
Smooth greensnake	Opheodrys vernalis	C3	Seventeen (17) species of reptiles, as listed on Table 2, "Potential Wildlife Species of the Wasatch Plateau", are believed to be potential inhabitants of the biogeographic area in which the permit area is located. Only 5 reptile species are categorized as likely or possible inhabitants of the permit area. The other 12 species are considered unlikely to inhabit the permit area due to their affinity for riparian areas. The only species listed on the Utah Sensitive Species List that may inhabit the area is the smooth greensnake (*Opheodrys vernalis*), but it is considered uncommon to the area. This species prefers meadows and riparian areas and thus is unlikely to inhabit the mine operations area east of Highway 96.
Western toad	*Bufo boreas*	C3	Eight species of amphibians, as listed on Table 2, "Potential Wildlife Species of the Wasatch Plateau", are believed to be potential inhabitants of the biogeographic area in which the permit and adjacent areas are located. However, only one amphibious species is categorized as possible, or a likely inhabitant of the permit area. The western toad is the only species listed on the Utah Sensitive Species List that has the potential to inhabit the mine permit area. The UDWR considers the western toad as uncommon in the Wasatch Plateau and it is unlikely to inhabit the mine permit area because of its affinity for riparian habitats. Since the mine site disturbance area is dry, with no permanent, or intermittent water areas, and no perennial or intermittent streams, the likelihood of significant numbers of amphibians inhabiting the area is low. The other amphibians included in Table 2 are potential residents of the mine site, however, these species are not considered to be of high interest and the limited size of the disturbed area reduces the potential for substantial impact from mining disturbance.
White pelican	*Pelecanus erythrorhynchos*	C3	White pelicans can be found in and near Scofield Reservoir to the north of the mine site, however, due to this birds requirement to be very near water bodies, it is unlikely that they would be found in the mine area. This bird only visits the area during the open-water seasons, and is not found in the area during the winter.

Table 2A: Utah sensitive wildlife species of the Wasatch Plateau with notes regarding potential presence and impacts as a result of the proposed Kinney No. 2 Mine.

Northern goshawk	*Accipiter gentiles*	C2	The UDWR lists the northern goshawk as an uncommon species in the Wasatch Plateau, and is listed on the Utah Sensitive Species List as a Conservation Agreement Species. Because this bird prefers the interiors of extensive, remote, mature and old-growth forests dominated by large trees, high canopy closure, on moderate slopes, with an open understory (Falk 1990, Speiser and Bosakowski 1987, Squires and Reynolds 1997) it is unlikely that nesting occurs in the mine disturbed area, or near it. According to Speiser and Bosakowski 1987, Basakowski and Speiser 1994, Bosakowski and Smith 1997 and Falk 1990, goshawks nest further from areas of human habitation than would be expected by chance. They found that the average distance to human habitation in New Jersey sites was about 1050 m or (3,445 feet), with a distance to the nearest paved road of about 1170 m (3,839 feet). The following Northern Goshawk Habitat Model is presented in the USFWS web site at http://www.fws.gov/r5gomp/gom/habitatstudy/metadata/northern_goshawk_model.htm: Several models were developed and the resulting habitat maps were compared to known goshawk occurrences in the study area. The best fit was achieved by regarding goshawk habitat as patches of forest, of adequate size, and which include areas likely to be suitable for nesting. Goshawk nesting areas were identified as: 1) having suitable forest cover; 2) situated at least 460 m (1,509 ft) from developed (based on Bosakowski and Speiser, 1994) average distance of nests from roads and dwellings of 1,100 m (3,609 ft), 1 s.d. of 640 m (2,099 ft); 3) situated within 500 m (1,640 ft) of a pond or shrub swamp, and; 4) having north, northeast, northwest, or flat aspect. These areas were scored 1.0. Other contiguous forest within 500 m, or (1,640 ft) of the nesting habitat was scored 0.5. The sizes of the habitat patches then was computed, and only clusters having at least some nesting habitat and an area of 8 ha (19.77 acres) or larger were retained. This model and the other factors presented above would seem to preclude goshawks from choosing to nest in the location of Nest No. 1451.

Table 2A: Utah sensitive wildlife species of the Wasatch Plateau with notes regarding potential presence and impacts as a result of the proposed Kinney No. 2 Mine.

Ferruginous hawk	*Buteo regalis*	C3	The ferruginous hawk is listed by the UDWR as rare in the Wasatch Plateau. This species may use the area in the summer, and inhabit submontane and desert elevations and therefore the mine area may be on the extreme upper end of their affinity area. They rarely nest in Utah and prefer open country, primarily prairies, plains and badlands. Because of the above factors, the ferruginous hawk is unlikely to be found in the mine plan area.
Bald eagle	*Haliaeetus leucocephalus*	C3	The bald eagle is listed sensitive by the UDWR and is uncommon in the Wasatch Plateau, however Scofield Reservoir is a favorite gathering place for this bird primarily during their southern migration during the winter. Many bald eagles can be seen near the reservoir during the winter, and may spend the entire winter in the area. It is unlikely that this species would spend a lot of time in the mine permit area, however, road killed deer and other large mammals may lure them to this food source along Highway 96 in the vicinity of the mine site. Although there are a few nesting pairs in Utah, there are no known bald eagle nest sites in the area of the mine site.
Sage-grouse	*Centrocercus urophasianus*	C	Sage-grouse are listed on the Utah Sensitive Species List as a species of concern, and are year-round residents of the high plateau and adjacent portions of the permit area which lie east of the mine site. However, within their crucial winter habitat at the site is also crucial brooding habitat. Sage-grouse only occur in sagebrush dominated vegetation types or communities in close proximity to sagebrush types within the submontane life zone. Open areas (e.g., wet meadows) surrounded by sagebrush are often utilized as strutting grounds during the critical breeding period from March 15 through June 15. Sagebrush stands within a two-mile radius of such sites are also classified as crucial value areas due to their use as brooding habitat following nesting. Following the brooding period, the sage-grouse disperse over the entire substantial use area until about mid-November. No leks have been identified in the mine area.
Whooping crane	*Grus americana*	EXT	The whooping crane is listed by the USFWS as extirpated, but formerly passed through eastern Utah. It is highly unlikely that this species would be found in the mine plan area.

Table 2A: Utah sensitive wildlife species of the Wasatch Plateau with notes regarding potential presence and impacts as a result of the proposed Kinney No. 2 Mine.

Long-billed curlew	*Numenius americanus*	C3	The long-billed curlew is listed by the UDWR as a species of concern, and as rare to the Wasatch Plateau. This species has a strong affinity for riparian and shoreline areas, but may forage in pastureland, and may nest in pastureland habitats. Because of these factors, this species is unlikely to inhabit the mine plan area.
Yellow-billed cuckoo	*Coccyzus americanus*	C	The yellow-billed cuckoo is a federally listed candidate species. It has also been described as rare in the Wasatch Plateau (Table 2), but it is not on the current Carbon County list of threatened, endangered and candidate species. This species prefers woodland areas, and is thought to nest primarily in the eastern United States. Due to the above factors, it is unlikely that this species can be found in the mine plan area.
Burrowing owl	*Athene cunicularia*	C3	The burrowing owl is listed by the UDWR as limited in the Wasatch Plateau, sensitive and a Species of Concern. This species prefers open, dry grasslands, agricultural and range lands associated with burrowing animals, particularly prairie dogs, ground squirrels and badgers. Because of these factors, this species is considered as unlikely to inhabit the mine plan area.

Table 2A: Utah sensitive wildlife species of the Wasatch Plateau with notes regarding potential presence and impacts as a result of the proposed Kinney No. 2 Mine.

Black swift	*Cypseloides niger*	C3	The black swift is listed by the UDWR as a Species of Concern, and as uncommon in the Wasatch Plateau. The Audubon Society states that the "black swift is considered primarily a mountainous species, occurring over a range of highland habitats, particularly over rugged terrain and coastal cliffs. Nests on canyon walls near water and sheltered by overhanging rock or moss, preferably near waterfalls or on sea cliffs. It occasionally occurs in lowlands during migration or in bad weather conditions. It breeds in California from May to September. Autumn migration from northern portions of the breeding range begins as early as late August. The species' wintering grounds are not definitively known. The nests are shallow cups made of moss bound with mud. Lays one to two eggs. Feeds on flying insects." Due to the above information, and the fact that no cliffs exist in the mine plan area, it is thought that this species in unlikely to inhabit the mine plan area.
Three-toed woodpecker	*Picoides tridactylus*	C3	The three-toed woodpecker is listed by the UDWR as a Species of Concern, and as uncommon on the Wasatch Plateau. This species exhibits a strong preference for the bark insects of spruce trees, and inhabits coniferous forests at submontane and montane elevations, and therefore is considered to be uncommon to the mine plan area. There is very limited conifier habitat in the mine plan area, with only a few isolated conifer trees interspersed within the aspen communities. For these reasons, it is very unlikely that this species can be found in the mine plan area.
Fringed myotis	*Myotis thysanodes*	C3	A small bat called the fringed myotis is listed by the UDWR as a Species of Concern on the Utah Sensitive Species List, and as uncommon on the Wasatch Plateau. This species prefers oak, pinyon, juniper forests and desert scrublands. It roosts in caves, mines, buildings, and other protected locations, and therefore is thought not to inhabit the mine plan area.

Table 2A: Utah sensitive wildlife species of the Wasatch Plateau with notes regarding potential presence and impacts as a result of the proposed Kinney No. 2 Mine.

Townsend's big-eared bat	*Plecotus townsendii*	C3	The Townsend's big-eared bat is also listed by the UDWR as a Species of Concern on the Utah Sensitive Species List, and as common to the Wasatch Plateau. Habitat use has not been evaluated in detail, but seems to be similar to other localities in the western United States. Caves and abandoned mines are used for maternity roosts and hibernacula (Worthington 1991, Hendricks et al. 1996, Hendricks 2000, Hendricks et al. 2000, Foresman 2001, Hendricks and Kampwerth 2001); use of buildings in late summer has also been reported (Swenson and Shanks 1979). Habitats in the vicinity of roosts include Douglas-fir and lodgepole pine forests, ponderosa pine woodlands, Utah juniper-sagebrush scrub, and cottonwood bottomland. Due to the preceding factors, this species is considered as unlikely to inhabit the mine plan area.
Spotted bat	*Euderma maculatum*	C3	The spotted bat is another species listed by the UDWR as a Species of Concern on the Utah Sensitive Species List, and as uncommon on the Wasatch Plateau. Spotted bats may be found in a variety of habitats, ranging from deserts to forested mountains; they roost and hibernate in caves and rock crevices. Spotted bats occur state-wide in Utah, but have probably never been abundant in any particular location. Current data suggest that the species may be becoming even more rare in Utah than it was in the past. Due to these factors, it is thought that this species is unlikely to inhabit the mine plan area.

Table 2A: Utah sensitive wildlife species of the Wasatch Plateau with notes regarding potential presence and impacts as a result of the proposed Kinney No. 2 Mine.

White-tailed prairie dog	*Cynomys leucurus*	C3	The white-tailed prairie-dog is listed by the UDWR as a Species of Concern on the Utah Sensitive Species List, and as common to the Wasatch Plateau. According to the UDWR publication, Species on the Edge, the white-tailed prairie-dog inhabits mountain valleys, semi-desert grasslands, agricultural areas, and open shrublands, but the map included in the publication does not show any populations in Pleasant Valley. There are no observed prairie dog populations in the mine plan area, and therefore it is thought that they do not inhabit the mine plan area.
Kit fox	*Vulpes macrotis*	C3	The kit fox is listed by the UDWR as a Sensitive Species on the Utah Sensitive Species List, and as rare on the Wasatch Plateau. The species most often occurs in open prairie, plains, and desert habitats, and therefore is thought to be uncommon in the mine plan area.
Black-footed ferret	*Mustela nigripes*	E-EXT	The black-footed ferret, a federally listed endangered species, is listed by the UDWR as endangered and extirpated, and is primarily dependent upon prairie-dogs as a prey source, therefore, crucial value use area for this species is restricted to prairie dog colonies which do not occur within the permit area. The re-introduced populations have been classified as "nonessential-experimental" by the U.S. Fish and Wildlife Service. In addition to Utah's re-introduced black-footed ferret population, unconfirmed sightings of naturally occurring ferrets persist throughout eastern Utah. Because there are no known prairie-dog populations in the mine plan area, it is highly unlikely that the Black-footed ferret is found in the area.

Table 2A: Utah sensitive wildlife species of the Wasatch Plateau with notes regarding potential presence and impacts as a result of the proposed Kinney No. 2 Mine.

Canada lynx	*Felis lynx canadensis*	T	The Canada lynx, is listed as a threatened species by the UDWR and the U.S. Fish and Wildlife Service. The range of the lynx extends from Canada and Alaska south to Maine, the Rocky Mountains, and the Great Lakes region. Although sightings of the Canada lynx in Utah over the past twenty years are exceedingly rare, the U.S.D.A. Forest Service recently announced that Canada lynx hair was found in the Manti-La Sal National Forest during 2002. Although sightings of the Canada lynx in Utah over the past twenty years are exceedingly rare, the U.S.D.A. Forest Service recently announced that Canada lynx hair was found in the Mani-La Sal National Forest during 2002. The preferred habitat of the Canada lynx is montane coniferous forest. The Canada lynx is listed by the UDWR as rare in the Wasatch Plateau, and therefore it is highly unlikely that it can be found in the mine plan area.
			STATUS E = Endangered C = Candidate C3 = Species of Concern T = Threatened C2 = Conservation Agreement EXT = Extirpated

R645-301.322.300 Fish & Wildlife Service Review

Project biologists have conducted onsite field studies on the vegetation and wildlife habitats of the Kinney No. 2 Mine. Additionally, the biologists have consulted with the State of Utah, Division of Oil, Gas & Mining (UDOGM) and the Utah Natural Heritage Program (UNHP) regarding the plants, wildlife and habitat of the Kinney No. 2 Mine. Upon request by the UDOGM the project biologist will also provide the resource information required under R645-301-322 and the protection and enhancement plan required under R645-301-333 to the U.S. Fish & Wildlife Service Regional or Field Office for their review. This information will be provided herein and can be provided to the USFWS within 10 days of receipt of the request from them.

For this document, UDOGM did, however request protection and enhancement plans as required under R645-301-333. These plans have been provided in that below.

Utah Division of Wildlife Resources Review

On August 9, 2007 a request was made to the UDWR for a list of T&E species for the mine plan area (See Exhibit 8, Fish, and Wildlife Information for this request and UDWR's response). The UDWR responded by letter dated August 13, 2007 with the following:

> *The Utah Division of Wildlife Resources (UDWR) has records for sandhill cranes and bald eagles within the project area noted above. In addition, in the vicinity there are records of occurrence for northern flying squirrels and northern river otters.*
>
> *The only species noted by the UDWR in this letter that is on the Utah Sensitive Species List is the bald eagle, which has been addressed previously. Since the UDWR indicated that records show occurrence of sandhill cranes, northern flying squirrels and northern river otters, they will be discussed below as species of high interest.*
>
> *The sandhill crane is listed by the UDWR as uncommon on the Wasatch Plateau. According to UDWR information:*
>
> *The sandhill crane breeds primarily in Alaska, northern Canada, and in the Great Lakes, but small, scattered breeding populations are also found in the northwestern United States (including northeastern Utah), the southeastern United States, and Cuba. With the exception of populations in the southeastern United States and Cuba, breeding populations migrate south to wintering grounds in the southern United States and northern Mexico.*
>
> *The sandhill crane is usually found foraging in open grasslands, meadows, and marshy portions of lakes, ponds, and rivers. Its diet is diverse, consisting of roots, tubers, seeds, grain, berries, small vertebrates, and invertebrates. At night, flocks roost in open expanses of shallow water.*
>
> *The sandhill crane is migratory bird and occurs primarily seasonally in Utah and as noted by the UDWR is usually found foraging in open grasslands, meadows and marshy areas. Occurances of sandhill cranes in the mine operations area would be very rare, and therefore no impact from mining is anticipated.*
>
> *The northern flying squirrel is a year-long resident of the Wasatch Plateau, however, its relative abundance is unknown, and listed as rare by the UDWR. Its substantial use area is restricted to spruce-fir or mixed conifer habitats of the montane ecological association. Critical use periods occur during the bi-modal breeding season, from April through May and from August to September. Since this species prefers mature conifer habitats it is not expected to occur in the mine operations area, or the mine general geographic area since there are no conifer stands in the area.*
>
> *The northern river otter is listed by the UDWR as being rare on the Wasatch Plateau. Since this species habitat is associated very closely with rivers, streams and water bodies, it is very unlikely that it would be found in the mine disturbed area, or the general mine area.*

It may be found along Mud Creek west of the mine area, and in or near Scofield Reservoir north and west of the mine permit area.

Utah Natural Heritage Review

On August 12, 2010 a response to a request by the Utah Natural Heritage Program (UNHP) for an updated list of threatened, endangered or otherwise sensitive (TES) plant and animal species for the mine plan area. GIS shape files for the following species were provided. The shape files show general locality data that were masked to within one square mile of the Kinney No. 2 Mine permit area. No plant species were within this range. The following wildlife species were within the one square mile area:

- Northern River Otter (*Lontra canadensis*)
- Bald Eagle (*Haliaeetus leucocephalus*)
- Sandhill Crane (*Grus canadensis*)
- Northern River Otter (*Lontra canadensis*)
- Osprey (*Pandion haliaetus*)
- Purple Martin (*Progne subis*)
- Northern Flying Squirrel (*Glaucomys sabrinus*)

With the exception of the purple martin, the potential of the species above to be present in the study area have been described previously.

The purple martin breeds throughout eastern North America, as well as on the Pacific coast and in parts of interior western North America and Mexico (UDWR). It winters in South America.

Although many populations now inhabit cities and towns, it is possible that this bird could be found within the permit area because its current breeding habitat in Utah are natural habitats such as aspen and coniferous forests near mountain lakes. As mentioned, the permit and adjacent areas have aspen communities (though very few conifer stands) and Scofield Reservoir is nearby.

Wildlife Summary

A review of the high interest wildlife species and their habitats that have been mapped by UDWR biologists was accomplished for the Kinney No. 2 Mine permit area. Seven (7) maps were created showing the following species' habitats:

- Black Bear
- Blue Grouse
- Moose
- Mule Deer
- Rocky Mountain Elk
- Sage-Grouse
- Snowshoe Hare

Additionally, a review of all species known to exist on the Wasatch Plateau was reviewed. A summary of those species that have the potential to occur within or adjacent to the Kinney No. 2 Mine site was also made. The permit area provides potential habitat for approximately 329 species of vertebrate wildlife, including; 7 fish species, 8 amphibians, 17 reptile species, 231 birds, and 66 mammals. Table 2, "Potential Wildlife Species of the Wasatch Plateau", identifies those species known to occur in this general area as well as the likelihood of occurrence in the permit area. Included on this list are several species of wildlife considered to be of high interest to the State of Utah, and/or are listed on the Utah Sensitive Species List. High interest wildlife are defined as all game species; any economically important species; and any species of special aesthetic, scientific, or educational significance. Included in this category are those species of wildlife listed as Federally Endangered or Threatened.

Although wildlife occurrence and habitat values in the general permit area may be typical for this part of Utah, the surface disturbance areas (main facilities area) have generally been extensively disturbed by previous mining and other related activities. Therefore, the value and utility of these areas to indigenous wildlife has already been somewhat reduced. Because the mine operations area is in very close proximity to both the town of Scofield and Highway 96, use of the area is likely affected and probably reduces to some degree. In effect, the potential for any adverse impacts to wildlife habitats in the previously disturbed areas has already been largely realized and re-disturbance of these areas is not expected to result in any significant incremental impacts.

R645-301.323 MAPS & AERIAL PHOTOGRAPHS

Maps or aerial photographs of the permit area and adjacent areas have been provided that delineate:

- The location and boundary of any proposed reference area for determining the success of revegetation;
- Elevations and locations of monitoring stations used to gather data for fish and wildlife, and any special habitat features;
- Each facility to be used to protect and enhance fish and wildlife and related environmental values; and
- Each vegetative type and plant community, including sample locations. Sufficient adjacent areas have been included to allow evaluation of vegetation as important habitat for fish and wildlife for those species identified under R645-301-322.

R645-301.330 OPERATION PLAN

Biological Resources Protection Plan

The following describes the operation plan to minimize impacts or protect the vegetation, fish and wildlife resources for the life of the mine.

- Provisions to Minimize Habitat Disturbance. Although the potential exists for indirect impacts on vegetation, fish, and wildlife due to equipment operations, noise and human activity associated with mining operations, mine related traffic, electrical equipment, and water discharges, habitat disturbance will be minimized because the mine facilities area will be the only area where direct surface disturbance will occur as a result of the mining and related activities. In other words, the smallest practicable footprint to conduct the mining operations has been designed to minimize habitat disturbance.

- New Disturbance to be Restricted to Previously Disturbed Areas. As previously noted, the majority of the mine facilities area has been extensively disturbed by previous historical mining and related activities. This disturbance has resulted in the elimination or significant modification of natural vegetation communities and fish and wildlife habitat values within the disturbed area. The operation of the mine will be conducted mostly in areas that have been disturbed previously. In other words, little new land disturbance will be made on native plant communities and wildlife habitat.

- Limit Wildlife Barriers. Mine site design, construction, and facility operations will minimize biological impacts including barriers that limit wildlife movement.

- Protection from Electrocution Hazards. Design and installation of electrical equipment will be made that minimize electrocution hazards.

- Control Water Discharges. Control and monitoring of surface water discharges for water quality will be implemented.

- Areas Hazardous to Wildlife. Exclusion of wildlife will be made from potentially hazardous areas on the mine site.

- Contemporaneous Reclamation. Reclamation and revegetation of disturbed areas will be conducted when they are no longer needed to support ongoing mining and related activities.

- Avoidance and/or Enhancement of Wetlands, Riparian Areas and Aquatic Habitat. No areas were identified as potential jurisdictional wetland areas (regulated by the U.S. Army Corps of Engineers) during the baseline field surveys of surface disturbance areas, therefore, the mining and related operations are not expected to impact any jurisdictional wetlands. Disturbance of riparian areas and aquatic habitat will not occur since none exist in the proposed mine disturbance area.
-
- Vegetation, Wildlife Habitats & Sensitive Species. Comparisons of the mining related surface disturbance with previous surface disturbance due to historic mining and related activities and more recent disturbances associated with construction of transportation and electric transmission facilities suggests that there is little potential for any significant new fish, wildlife habitat, vegetation or sensitive species impacts. This conclusion is based on the fact that most potentially significant terrestrial biological impacts have already occurred given the extent and nature of previous development in the surface disturbance areas.

  In addition, while Utah AML reclamation has been successful in re-establishing vegetative cover and some habitat values, but the limited age of reclaimed vegetation and proximity to human activity continue to limit wildlife use. As stated previously, most of the anticipated surface disturbance for mining and related activities will involve previously disturbed areas. Mining related disturbance of previously undisturbed areas will be negligible. Furthermore, the potential for aquatic impacts is very limited since there are no water sources in the immediate area of the proposed mining surface facilities area. The following sections provide additional details relative to potential mining related impacts on individual biological resource values.

Potential Impacts to the Biological Resources

Although attempts have been made to limit impacts on terrestrial vegetation, wildlife, and habitat values resulting from the mining and related operations, the following impacts are anticipated:

- Redisturbance of approximately 20.4 acres of disturbed vegetation and habitat occurring on previously disturbed areas.
- Temporary loss of approximately 6.9 acres of previously undisturbed vegetation and habitat.
- Displacement of mobile resident wildlife to nearby areas providing similar habitat and adequate carrying capacity.
- Direct mortality of less mobile wildlife.
- Increases in indirect wildlife disturbance due to increased human activity in the area.
- Increased potential for accidental wildlife losses traffic related mortality.
- Localized reduction or elimination of certain non-native vegetation types.

Impacts to Sensitive Species

With regard to sensitive species of vegetation or terrestrial wildlife, the only known species that have the potential to exist within or adjacent to the Kinney No. 2 Mine are the greater sage-grouse and bald eagle, both of which have been designated as “species of concern” by UDWR. No other known threatened, endangered, or otherwise sensitive plant or wildlife species exist within the study area.

Impacts to High Interest Species

Other species of high interest have been identified and described for the study area [see “Fish & Wildlife Information” (R645-301.322)]. The potential for specific species that may have any adverse mining related impacts has been explained in that section.

Discussion of the Impacts and Enhancement Measures to Upland Vegetation and Wildlife

The potential for significant adverse impacts to wildlife due to redisturbance of previously disturbed areas is low due to existing vegetation and habitat conditions in the proposed disturbance areas. The Utah AML reclamation efforts have resulted in effective reestablishment of vegetation on portions of the previously disturbed areas. These areas currently provide some cover and forage values, but the area is close to Highway 96 and the town of Scofield. The noise, highway traffic, and human presence currently impact resident wildlife species. These proximity factors and resulting level of human activity in the area are also important factors which tend to preclude significant long-term use by large mammals, raptors, and many other terrestrial wildlife species with current use being limited to opportunistic or seasonal migratory use. The temporary mining related impacts will be effectively enhanced by the comprehensive reclamation program including all surface disturbance areas which will be implemented when the mine facilities are no longer needed to support ongoing operations.

The potential impact of losses of existing vegetation and habitat in previously undisturbed areas will be minimized by the limited aerial extent (approximately 6.9 acres) of any new disturbance. Areas of potential new disturbance are immediately adjacent to previously disturbed areas, and as such exhibit some inherent limitations relative to their value as wildlife habitat.

Minor vegetation and habitat impacts for any new disturbance areas will be a temporary result of the mining and related operations, however, proposed site reclamation measures will result in effective enhancement of any temporary impacts and in most cases offer the potential for overall enhancement of vegetation and habitat conditions.

Field surveys of potential new disturbance areas did not result in identification of any unique habitat characteristics (e.g., nests, wetland pockets, bat roosts, etc.) within these areas, although one raptor nest (No. 1541) was identified approximately 650 feet southeast of the proposed disturbed area. This nest is likely a red-tailed hawk nest as discussed earlier in this chapter.

Displacement of mobile wildlife due to mining related surface disturbance will largely affect only those species and individual animals which utilize the limited area encompassed by the mine surface facilities area. At this time, terrestrial wildlife use of this area appears to be limited to rodent species and a number of bird and bat species with occasional opportunistic and migration use by mule deer and occasionally elk, although very few elk droppings were observed in the area. Most other terrestrial wildlife have already been displaced by prior disturbance and do not appear to have reestablished in the area due to reduced habitat values and existing levels of human activity. Given that the numbers of potentially displaced wildlife will be small due to limited populations and the small total surface disturbance area, the ability of the surrounding habitats to absorb these immigrants should be adequate. The greatest potential for significant impacts of this type may be associated with the displacement of any small mammals and birds utilizing the area. Disruption of raptor species will likely not be considered significant due to the close proximity of Highway 96 and the town of Scofield, with their associated noise, and other human activity.

During initial site earthwork and subsequent facility construction, less mobile wildlife which occupies previously disturbed and adjacent undisturbed habitats affected by the surface disturbance activities may be lost. Affected wildlife could include species groups such as lizards, snakes, small rodents, and younger or older individuals of other small mammal groups whose mobility may be limited by age. The loss, however, of a few individual animals within the much larger animal populations and distribution may not represent a significant impact. None of the affected species are known sensitive species and any resultant impacts will be compensated over the short and long term by normal animal reproduction.

Increased levels of human activity may result in indirect wildlife impacts including some alteration of diurnal and seasonal animal movements. Another impact frequently associated with mine development activities is the increased potential for illegal harvest of game animals due to localized human population increases. This impact is not anticipated for the proposed operations since the required workforce will be composed primarily of local employees who already live in the Scofield/Price/Helper area. There may be some increase in wildlife disturbance due to the noise, lights, and human activity levels required for surface support activities. Use of existing ancillary roads to access environmental monitoring sites may also result in minor localized wildlife disturbance.

Another potential mining related impact would be the direct mortality of individual wildlife due to contact with live electrical lines or other electrical equipment and traffic related mortality in either mine areas or due to mine related traffic on public roads. Both types of accidental occurrence are a potential impact of any large-scale development activity but the effectiveness of specific protective measures and a low overall incidence rate render any related impacts inconsequential.

Generally, the basic biological resource protection measures which will be implemented in conjunction with all mining and related activities outlined in this chapter will provide the necessary level of protection to achieve full compliance of state and federal regulations for the Kinney No. 2 Mine site.

Potential Impact on Aquatic, Riparian Resources & Sensitive Species

The primary potential impact on fish and aquatic species, aquatic habitat, and riparian vegetation which may result from the mining and related activities would be from drainage from the proposed sedimentation pond, or from alternative sediment control measures used where drainage from small areas does not report to the sedimentation pond.

Prior to reclamation, stormwater runoff from disturbed areas would be a potential source of additional sediment contributions to Mud Creek. Sediment contributions will be, however, effectively controlled by construction, operation, and maintenance of an integrated drainage and sediment control system including diversion and collection ditches, sedimentation ponds, and alternative sediment control measures. Implementation of drainage and sediment control measures as described in R645-301-731, "Hydrologic Resource Protection", will limit any increase in suspended sediments to levels corresponding to general background concentrations. Mining related sediment contributions would, therefore, result in little or no significant incremental impacts on fish and macroinvertebrate communities or aquatic habitat values in and near Mud Creek, and Scofield Reservoir.

Coal stockpiling and conveyor transport of coal will result in minor contributions of coal dust to both the atmosphere and area surface drainage which could potentially be transported to Mud Creek and Scofield Reservoir. Wind-blown dust from coal stockpiles could result in deposition of small amounts of coal dust near the mine site. Operating practices for stockpile areas including material placement in coal stockpiles and coal recovery have been designed to minimize dust generation. These practices, as described in R645-301-421, "Air Emission Controls", include controlled discharge to or placement in stockpiles (coal stacker tubes), the use of surfactants where necessary to control fugitive dust, and enclosed draw points and BACT dust controls on coal reclaim systems.

The conveyor system will be covered to minimize exposure and dispersion of coal fines during transport; all transfer points will be partially or fully enclosed and will incorporate BACT emission controls. Small amounts of coal dust or fines may escape from the conveyor system and minor spillage may occur in the area immediately adjacent to the conveyor. The Kinney No. 2 Mine has received Approval Order DAQE-AN0141180001-08 from the Utah Department of Environmental Quality to operate the Kinney No. 2 Mine and thus meets all applicable air regulations.

Mine water supply requirements for sanitary use, surface dust control, fire fighting reserve, and operational mine water amounting to 30.7 acre-feet per year depleted from the Colorado River system, from 61.4 acre-feet per year diverted from the Colorado River System. Depletion allowance for mining use at Scofield is 50% per personal communication with Mark Stilson, Utah Division of Water Rights. The water will be obtained primarily from the town of Scofield , and secondarily from water encountered in the mine. Depletion from collected water encountered during mining would remove a negligible amount of water from the system. For this reason, it is anticipated that the incremental mining related withdrawals will have no measurable effect relative to potential downstream surface water depletion in the Price River or Green River drainages.

A Section 7 consultation process under applicable USFWS regulations will be conducted as part of the inter-agency review of the UDOGM permit application. In the unlikely event that consultation results in a determination that the proposed water use represents a new depletion, a biological assessment of potential effects on endangered fish species and associated critical habitat designations in the Green and Colorado Rivers would be completed. Three fishes that are on Utah's Sensitive Species List (roundtail chub, leatherside chub, and flannelmouth sucker) for which the Price River may provide potential habitat would also be included in any biological assessment. However, since the mine area is a tributary to Mud Creek and then Scofield Reservoir, no incremental impact can be experienced in the Price, Green, and Colorado Rivers, because of the water retention in Scofield Reservoir. There are no T&E species in Mud Creek or Scofield Reservoir.

Measures to Stabilize and Minimize Erosion from Mine Disturbance Areas

All construction and operation activities will require the application of drainage and sediment control measures to minimize erosion, control surface runoff, and limit additional contributions of suspended solids to Mud Creek and Scofield Reservoir. Specific proposed drainage and sediment control methods and practices are discussed in detail in R645-301-731 , "Hydrologic Resource Protection". Temporary controls for construction activities will include the use of protective berms, silt fences, sediment traps, straw bales, and other suitable control measures. It should be noted that the designed operational drainage and sediment control systems and structures will be established prior to most surface disturbance and construction activities. These systems and structures will include diversions to route drainage from undisturbed areas around disturbance areas, collection ditches to intercept and route disturbed area drainage to the sedimentation pond, culverts, and sediment traps, , which will retain disturbed area runoff allowing settlement of suspended solids prior to discharge to area drainages. Drainage and sediment control structures will be operated and maintained until effective revegetation has occurred and surface drainage quality is restored to a condition comparable to baseline conditions. To assure the continuing effectiveness of the drainage and sediment control measures, water quality monitoring will be conducted during active operations, site reclamation, and the reclamation liability period.

Other erosion control and stabilization measures to be utilized for selected disturbance areas will include asphalt surfacing of the main access road and parking areas, surfacing of other roads and operation areas with gravel or similar material, and temporary revegetation or the use of synthetic erosion control materials on exposed cut/fill slopes. All active operating areas will be inspected on a periodic basis for evidence of erosion or instability and any significant problems will be addressed in a timely manner by modifying or repairing the area to eliminate or control the problem.

Subsidence Potential and Related Impacts on Renewable Resource Lands

Carbon Resources' (CR's) mining operations will use conventional room development mining, with no pillar extraction and thus no subsidence will occur. Coal outcrop barriers will prevent subsidence of near-surface shallow cover areas. Mine portals and entries have been designed to be stable, and to prevent subsidence. Portal and entries near the surface will be designed with steel, and concrete face-up materials, and tunnel support structures that will support the roof and near-surface overburden.

Baseline hydrologic field investigations during 2005 through 2010 included ground surveys designed to locate and characterize all existing surface and ground water resources. Prior to the field surveys, available topographic mapping and the Utah State Engineer's water rights records for the area were reviewed and water right locations plotted on the topographic maps. The surveys included site specific inspections of all areas shown on the topographic maps where either recorded water rights or surface or ground water occurrences were believed to exist. The surface and ground water resources identified as a result of the baseline field investigations are shown on the Map 7, Regional Hydrology Map. No material damage or diminution of values are anticipated due to the proposed mining activities.

Provisions to Minimize Raptor Electrocution Hazards

CR will design and construct any mine related power transmission lines as shown on Figure 22, "Typical Raptor Proof Power Pole Configuration" (or equivalent) for protection of raptors from potential electrocution hazards in accordance with the guidelines set forth in "Environmental Criteria for Electric Transmission Systems" (USDI, USDA, 1970) and/or REA Bulletin 61-10 "Powerline Contacts by Eagles and Other Large Birds". These guidelines specify pole and transmission line configurations which isolate the ground wire minimizing the potential for simultaneous contact with a live and ground wire by a raptor or other bird approaching or landing on the support poles or cross beams. An existing powerline traverses from south to north immediately east of the proposed mine facilities and belongs to Rocky Mountain Power.

Fish and Wildlife Monitoring

Terrestrial Wildlife

During the period of active operations, CR will work closely with UDWR biologists from the local Price office to develop and maintain a program for reporting any significant wildlife observations in the proposed permit area. As part of an ongoing employee training and communication program, CR employees will be instructed to report any incidents of accidental wildlife mortality or eagle sightings to the Kinney No. 2 Mine Environmental personnel. CR will also coordinate with UDWR and private sector biologists to perform periodic raptor monitoring surveys if it is determined that mining and related activities have significant potential to adversely affect raptor breeding in the area.

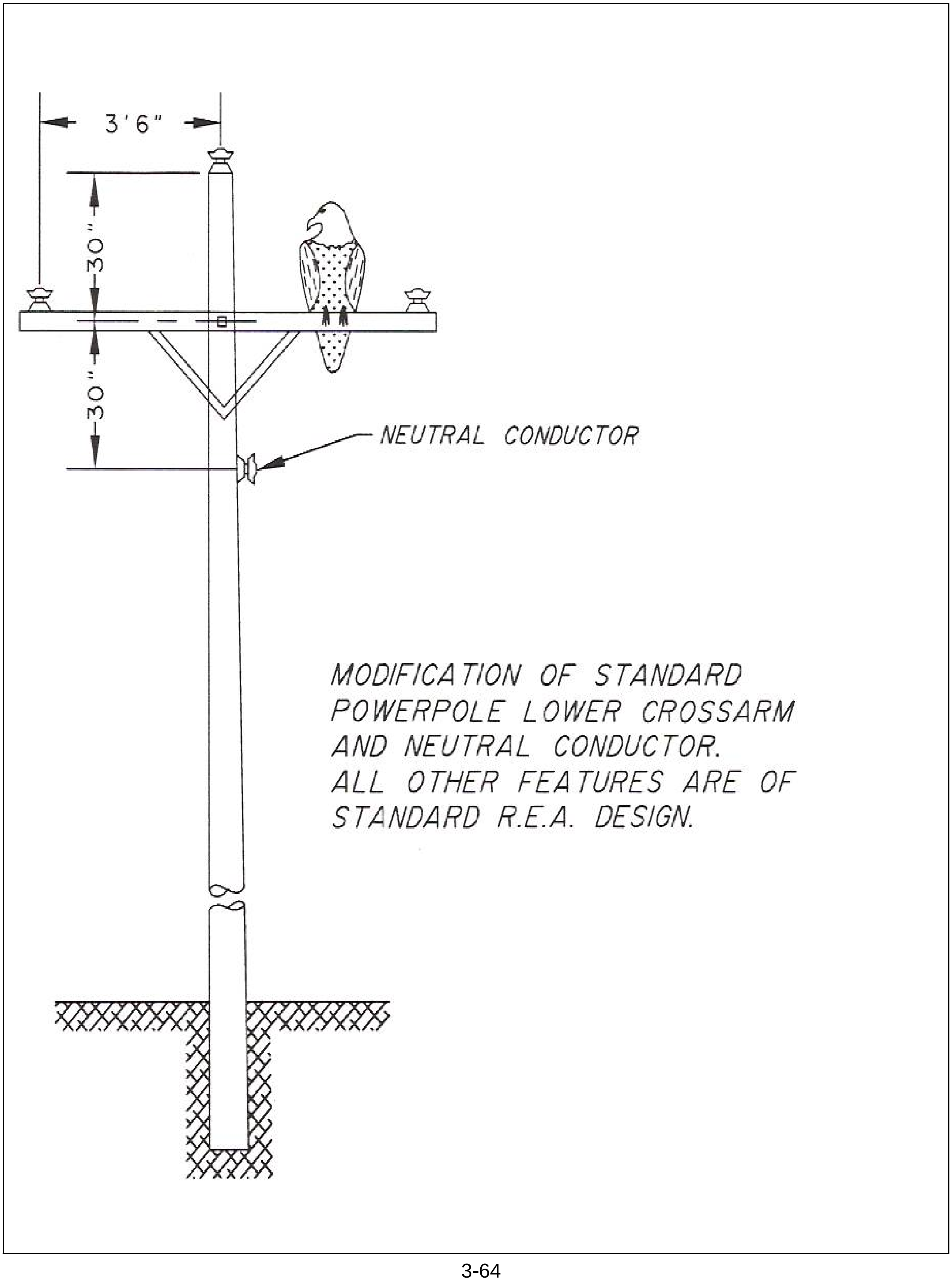
Aquatic Resources

Since no aquatic species have been found in the permit area, and since there is no riparian habitat, or standing water sources within the permit area, no aquatic resources will be impacted by mining operations.

Measures to Minimize Barriers to Large Mammal Movements

Site-specific evaluation of the facilities area resulted in the conclusion that the proposed conveyor location parallel to the base of the natural valley slope would not represent a significant barrier to large mammal movements. An additional important consideration relative to potential animal movements is the existence of Highway 96 and the city of Scofield which have probably already eliminated most large mammal movements in the mine facilities area. Although the likelihood of large mammal movements through the facilities area is small, CR has made provision for any potential movements by designing conveyor structures to provide a minimum clearance of approximately 40 inches and will establish a maximum speed limit for mine roads of 15 miles per hour. Several s of the conveyors will have clearances well over 40 inches where the conveyors are elevated for mechanical reasons or for vehicular underpasses as shown on the Map 13, Surface Facilities Map. These elevated s provide crossing areas for larger animals. In addition, the relatively short length of the overland conveyor system would allow animals to go around the site if they feel threatened.

Figure 22 Typical Raptor Proof Power Pole Configuration



Minimum clearance of approximately 40 inches and will establish a maximum speed limit for mine roads of 15 miles per hour. Several s of the conveyors will have clearances well over 40 inches where the conveyors are elevated for mechanical reasons or for vehicular underpasses as shown on the Map 13, Surface Facilities Map. These elevated s provide crossing areas for larger animals. In addition, the relatively short length of the overland conveyor system would allow animals to go around the site if they feel threatened.

<u>Protective Measures for the Facilities Area and Any Open Ponds Containing Potentially Hazardous or Toxic Materials</u>

CR has no plans to store, utilize, or generate any materials or wastes classified as hazardous or toxic in conjunction with the proposed operations. The surface facilities have been designed and will be operated in such a way that any materials such as petroleum products which would represent a potential hazard to wildlife will be contained within closed areas or containers. There will be no open ponds which would contain any potentially hazardous substances.

Potential petroleum related risks will be limited by operation of the drainage and sediment control system. The sedimentation pond has been designed with a decant structure which incorporates an oil skimmer to minimize the potential for discharge of any petroleum products which might accidentally enter the drainage control system. Regular pond and discharge monitoring will include visual inspection for any oil sheen. CR has designed the mine water handling system as a closed-loop system with recycled or underground storage of mine water and no discharge to surface systems or drainages. In the unlikely event that it becomes necessary to discharge excess mine water to the surface, the water will be sampled prior to discharge and will be routed through the sedimentation control system to assure that it will meet all applicable effluent limitations and standards. All construction activities, as well as future operational activities, will be managed and monitored consistent with an approved Spill Prevention, Control, and Countermeasures (SPCC) Plan to address the potential for accidental petroleum spills and petroleum-related contamination of surface waters.

<u>Provisions for Protection of Threatened, Endangered or Sensitive Species</u>

As discussed in previously, Threatened, Endangered, and Sensitive Species of this permit application to UDOGM will result in review of appropriate species by UDWR and the USFWS and issuance of a current listing of proposed and listed threatened and endangered species potentially affected by the proposed mining and related activities. These actions, which are part of the 7 consultation process of the Endangered Species Act of 1973, will be followed by a determination by the agencies of whether or not a biological assessment will be required to identify and evaluate the potential effects of the proposed action on threatened and endangered species. Given the nature and scope of the information presented in this permit application, the very limited amount of associated surface disturbance, and the absence of any known threatened, endangered, or sensitive species in the permit area, preparation of a biological assessment may not be necessary. Completion of the required procedural steps, as described above, and preparation of a biological assessment, if required, will assure full compliance under applicable provisions of the Endangered Species Act.

Compliance with the Bald Eagle Protection Act

The permit area provides minimal potential for wintering bald eagle roosts since there are no conifer trees, or typical roost trees that would be utilized by eagles in the area of the mine facilities. Summer eagle utilization in the immediate area of the mine facilities is unlikely since Scofield Reservoir, and Mud Creek would be preferred feeding habitat for bald eagles. There is little or no potential for nesting by golden eagles within the permit area since there are no cliffs, and very few large conifers in the area. Under applicable provisions of the Bald Eagle Protection Act, CR will either not initiate new activities including surface disturbance or exploration drilling within one-half mile of any active golden eagle nest during the spring breeding season or will, in consultation with UDOGM and UDWR, initiate appropriate mitigation measures. In addition, if golden eagle nesting activity is observed anywhere within the permit area but especially in close proximity to any mining related surface disturbance such activity will immediately be reported to the local UDWR office. If it is determined that the proposed mining activities have significant potential to adversely affect raptor breeding, CR as part of a cooperative program with the UDWR, will conduct periodic raptor surveys of any specific areas of concern.

Reporting and Consultation Procedures

Reporting procedures in conjunction with the consultation process under applicable state and federal wildlife protection laws and regulations will involve documentation of all contacts and correspondence regarding threatened, endangered or sensitive (TES) species. All telephone conversations and meetings regarding TES species will be documented in written form. If it is determined that preparation of a biological assessment is necessary, an outline will be developed and reviewed with the UDWR and the USFWS in order to establish the required organization and content of the report. The outline will incorporate any specific applicable requirements identified in the Endangered Species Act.

R645-301.322.333 Protection & Enhancement Plan

The **Protection Plan** for the current biological resources is part of the OPERATION PLAN above (R645-301.330). The **Enhancement Plan** will be implemented at the time of final RECLAMATION & REVEGETATION of the site.

The proposed mine facilities area is located in an area that has been impacted by historical and recent mining activities, as well as residential development, commercial development, transportation corridor, and electrical power transmission facilities and operations. Of the 27.6 acres proposed for disturbance by mine related activities, 20.6 acres (74%) has been disturbed previously. That means there will only be 6.9 acres (25%) of new disturbance by the proposed new mine. With 74% of the mine area currently disturbed, the vegetation and wildlife habitat have a great deal of potential for enhancement and improvement at the time of final reclamation. Thus, revegetation will be accomplished by establishing vegetative cover that is native to the area, diverse, effective and permanent. This will greatly improve the current wildlife habitat in the area

During a site visit in the growing season of 2011 that will include biologists representing Carbon Resources, DOGM, DWR and/or USFWS (see “Specific Resources Requiring Special Protection Measures” below), suggestions will be formulated about recommendations for planting tree species at the time of final reclamation near the remaining highwall for aesthetic reasons as well as to provide additional wildlife habitat and cover. Below is a summary of specific habitat that will be improved by successful revegetation.

Specific Resources Requiring Special Protection Measures

Within the general permit area, several areas have been designated in the UDWR GIS database as crucial or substantial habitat for black bear, blue grouse, moose, mule deer, Rocky Mountain elk, sage-grouse, snowshoe hare, and bald eagle. An onsite field investigation was conducted on June 1, 2011 by biologists representing Carbon Resources (Patrick Collins, Mt. Nebo Scientific), UDOGM (Joe Helfrich) and UDWR (Leroy Mead). The purpose of the field visit was to confirm or verify the general habitat assumptions made in the UDWR database (as described below) with a site-specific critique. With some follow-up communications suggested by Mr. Mead with his colleagues at UDWR regarding some minor components of the existing GIS data, the information below for each wildlife species appears appropriate and accurate.

Eagles and certain other raptors are known to inhabit or utilize portions of the permit area at various times of the year. High priority habitat areas and golden eagle or certain other raptor nesting sites may require special protection in compliance with applicable State and Federal laws and regulations. Generally, the basic biological resource protection measures which will be implemented in conjunction with the mining and related activities will provide the necessary level of protection to achieve full compliance.

Below is a description of some additional protection and enhancement plans for the wildlife species that have been described as occupying crucial or substantial habitat within and adjacent to the Kinney No. 2 permit area.

Black Bear

Substantial year-long habitat for black bear (*Ursus americanus*) has been mapped within and adjacent to the permit area. Additionally, critical year-long habitat has been designated within the project area by the UDWR database (Map 2A).

Understanding black bear biology, habitat and food requirements along with being cognizant of problems that may occur with their interactions with humans will be instrumental for construction and operation of the Kinney No. 2 Mine. The black bear is considered to be an omnivore and, depending on the season, food sources can be as diverse as grasses, forbs, insects, fruits, berries, carrion, aspen buds, pine seeds, acorns, rodents and new-born deer.

The proposed new Kenny No. 2 Mine will disturb very little land that has not already been disturbed by previous mining or other activities. Even though the previous disturbed area is shown to be substantial year-long habitat for black bear, the habitat is marginal at best. The area within the permit that has been outlined as critical year-long habitat has, for the most part, not been disturbed previously nor will it be disturbed by the current mine operation plan. Therefore, habitat protection of the critical area will be to disturb very little of it. Enhancement measures will be employed to restore those areas that have previously been disturbed and are currently planned for new disturbance to habitat that existed prior to disturbance. Plant species used for revegetation will include native grasses and forbs as well as woody species that provide hard and fleshy fruits to augment food source for the black bear.

Blue Grouse

Year-long crucial habitat for blue grouse (*Dendragapus obscures*) has also been mapped within and adjacent to the project area (Map 2B). Blue grouse are native to Utah and prefer stands of aspen and conifer for their habitat. Very few conifer stands are present in the permit area, but aspens are common. Winters are often spent in upper elevations in conifer stands, whereas in spring and summer they spend more time at lower elevations in meadows, brushlands and open timber stands for mating.

Mating of blue grouse in Utah occurs in April and nesting is in May and June. Food sources range from herbaceous vegetation, seeds, berries, buds and insects in the summertime to needles and buds of conifers in the winter.

The entire region including the permit area has been mapped as year-long habitat for this species. Most of the proposed new mine has already been disturbed by previous mining or other activities. Final revegetation will then enhance habitat for blue grouse by restoring native plant communities that were supported there before the area was disturbed. Plant species used for revegetation will include native grasses and forbs as well as woody species that will provide better more diverse forage for the blue grouse. This should also increase the amount and diversity of insects available as food for blue grouse.

Moose

Crucial winter habitat for moose (*Alces alces*) has also been designated within and outside the permit area. Additionally, crucial year-long habitat has been mapped within some of the riparian zones of Mud Creek and Woods Canyon just outside the permit area (Map 2C).

Moose are primarily browsers and depend often on woody vegetation such as shrubs and deciduous trees for their dietary needs. Moose in Utah are often associated with riparian plant communities, but have also done well in drier habitats such as those dominated by mountain mahogany, Gambel oak, serviceberry, quaking aspen and burned over coniferous forests (Utah Moose Management Plan, 2009, UDWR). The breeding season or rut for moose begins in early September and peaks near the end of that month. The gestation period is about eight months and calving reaches its high point in late May. The crucial riparian habitat mentioned above will not be disturbed by the Kinney No. 2 Coal Mine development and little, if any, impact will occur to them by subsequent coal mining activities and operations. Moreover, because habitat improvement projects favor early seral stages and increased shrub growth, which can be very beneficial to moose habitat, revegetation with native plants and restoration of favorable habitat on the currently disturbed areas at the site will increase and enhance the habitat for moose in the study area.

Mule Deer

The subspecies Rocky Mountain mule deer (*Odocoileus hemionus hemionus*) is the largest and only subspecies found in Utah. Its habitat has also been mapped within the permit and adjacent areas by UDWR biologists. The habitat has been classified as crucial summer fawning habitat. This designation included the entire permit area as well as those areas adjacent to it (Map 2D).

Deer are browsers, and rely on many different plant species in their diet. Woody plants such as sagebrush, bitterbrush, mountain mahogany, cliffrose, rabbitbrush, scrub oak and willow make up a major part of their diet, mule deer will eat a variety plants. Researchers have documented Rocky Mountain mule deer feeding on close to 800 different plant species (UDWR, Wildlife

Notebook Series No. 13, 1999). The same source states that of these, over 60% are forbs, 25% are shrubs or trees, and 12% are grasses.

In Utah, the mule deer breeding season is during the months of November and December. The fawning period is from late spring to early summer. The does (females) often produce one or two fawns.

Operations of the proposed Kinney No. 2 Mine may impact some fawning activities by moving them further from noise caused by the mining activity, but is not likely to have an overall negative impact on the resident deer populations. Like the species mentioned above, enhancement of the mule deer habitat will be realized once following final reclamation of the mine site by restoration of those plant communities that are currently in poor condition due to past mining and other activities. Plant species used for revegetation will include native grasses and forbs as well as woody species that provide important browse and fawning cover for the mule deer in the area.

Rocky Mountain Elk

Rocky Mountain elk (*Cervus canadensis*) habitat has been mapped in the area. Crucial summer habitat was mapped throughout the entire area including the permit area (Map 2E). Elk are ungulates but are "generalist" and have a diverse diet that consists of woody plants, forbs and grasses. Their flexible diet allows them to live in a variety of habitats but seem to prefer summers at higher elevations in aspen and coniferous forests and winter in lower elevations in plant communities such as mountain shrub and sagebrush. Elk in Utah are most closely tied to aspen communities than any other habitat type where they are provided forage and cover in the summer and are used for calving in the spring (Utah Elk Statewide Management Plan, UDWR, 2010). Relatively close proximity to a permanent water source is also an important component to elk habitat (e.g. within 0.33 miles). Although no permanent water source is available within the permit area, Mud Creek, Winter Quarters Creek, Wood's Canyon Creek and Scofield Reservoir are close by.

In Utah, the breeding season of elk begins in early September and continues through the middle of October. Calving usually occurs from mid May until early June, or after a gestation period of 8 or 8½ months. Calves are usually born in singles; twins are very rare.

Aspen is an important component within the Kinney No. 2 Mine permit area. Very little aspen stands will be disturbed associated with construction and operation of the mine. Noise and close proximity of the mining activities may impact calving activities in the nearby aspen stands, but elk will probably move during mining operations. The mining activities are not likely to have an overall negative impact on the elk population in the area. Like the species mentioned above, enhancement of the elk habitat enhancement and mitigation will be accomplished following final reclamation of the mine site by restoring of those plant communities that are currently in poor condition due to past mining and other activities. Plant species used for revegetation will include native grasses and forbs as well as woody species that provide important browse and fawning cover for the Rocky Mountain elk in the area.

Sage-Grouse

Greater sage-grouse (*Centrocercus urophasianus*) are native to Utah and have been listed as a sensitive species by the UDWR and are federally listed as a "candidate" species. Sage-grouse populations have been declining in western U.S. over the last 100 years as a result to loss of habitat, mainly the sagebrush steppe.

Sage-grouse habitat has been documented in and around the project area. UDWR biologists have mapped much of the area to be crucial brooding habitat as well as crucial winter habitat for this species (Map 2F). No leks are known to occur within a one mile radius.

Leks are areas where sage-grouse congregate to conduct courtship rituals and mating activities where the birds return to each year. It is common for sage-grouse to revisit the same leks for many decades. The mating activities are usually conducted from mid- March through late- April. For a few weeks prior to nesting and after mating, the birds move away from the lek and concentrate on foraging. Food sources during this time period are dominated by sagebrush leaves.

Nests are then selected, often within 2 miles of the lek. Female birds show a high fidelity rate for nest location relative to their leks (Utah Greater Sage-Grouse Management Plan, UDWR, 2009). Nesting primarily occurs under the cover of sagebrush plants and may occur until the first part of June. Clutch sizes are extremely variable, but the average size is 6.0 – 9.5 (Utah Greater Sage-Grouse Management Plan, UDWR, 2009). To survive, sage-grouse chicks must consume insects for at least 3 weeks following hatching, but their diet later consists of forbs, grasses, and shrub leaves.

The sagebrush community necessary for successful sage-grouse habitat is the most important plant community by extent within the Kinney No. 2 Mine permit and adjacent areas. That which has been described above as "previously disturbed by mining or other activities" was mostly within this community type. That said, most of revegetation for all disturbances (past and future) will occur within this community type. In other words, when the mine site is reclaimed, it will primarily be re-seeded to restore sagebrush communities with a good component of forbs and grasses also in the seed mixture. This will ultimately enhance and increase habitat for the greater sage-grouse of the area. This should also increase the amount and diversity of insects available as food for sage-grouse.

Snowshoe Hare

Not a threatened, endangered or sensitive species, the snowshoe hare (*Lepus americanus*) is included here because of public interest and its relevance as a primary food source for the federally listed threatened Canada lynx (*Lynx canadensis*). This species has year-long crucial habitat in a portion of the permit area as well as adjacent to it (Map 2G).

The snowshoe hares often occur in coniferous forests (there are very few stands in the permit area), but also occur in aspens (which is important in the permit area) and other woody plants such as alder, willow and other species.

No nests are built by snowshoe hares because the young are born with fur with their eyes open. Usually litter sizes are from two to four with three to four litters common from April through August. With very little disturbance planned in the existing aspen stands of the Kinney No. 2 Mine permit area, little or no impact is expected to occur to the resident snowshoe hare population.

R645-301.331 INTERIM RECLAMATION PLAN

To stabilize disturbed areas after initial construction, including stabilization during the life of the mine, all areas will be seeded with the temporary seed mixture included in Table 21 Temporary Seed Mixture. All temporary areas including cut slopes, fill slopes, and any other disturbed areas will generally be steeper than 3:1 and therefore will be seeded by hand or by spraying on the seed mixture with a hydroseeder, followed by spraying on an approved organic mulch at the rate of 1.5 tons per acre with an organic tackifier to stabilize the mulch. Any areas that have poor germination or that do not revegetate in the first year will be reseeded and mulched. The topsoil stockpiles will be seeded in the same manner, and in addition, alternative sediment controls as discussed in Chapter 7 will be implemented as necessary. These topsoil stockpile treatments may include, toe ditches, silt fences, straw bales, and additional silt fence rows along the contour at intervals up the topsoil stockpile slopes as may be warranted to control topsoil loss from the piles.

The interim reclamation will also provide browse, food, and habitat for wildlife during the life of the mine and will help offset the impacts of the mining operation on wildlife and birds.

R645-301.340 RECLAMATION PLAN

This section of the Kinney No. 2 Mine Permit Application provides both general and specific information relative to the plans and practices which will be utilized to reclaim and restore surface disturbance areas resulting from mining and related operations to a condition and productivity comparable to or better than their condition prior to the Kinney No. 2 Mine disturbance consistent with a postmining land use of wildlife habitat, and the Carbon County Land Use Zone designated “Watershed”. *Although this chapter address specifically coal exploration as it relates to wildlife and vegetation, the basic principles and practices of reclamation presented apply to general mining disturbances which are also addressed in Chapter 5, Engineering under R645-301-540, and in Chapter 200, Soils under R645-301-234.240.* Revegetation of the Kinney No. 2 Mine site will focus on re-establishing plant communities that were native to the area prior to disturbance by historical mining, future mining and other related activities. Simply stated, the revegetation plan will reestablish sagebrush and aspen communities that will include plant species that enhance habitat for high interest wildlife species as well as those other wildlife species that are associated with these plant communities. The high-interest wildlife habitat as described by findings from the State of Utah, Division of Wildlife Resource (UDWR) geographical information system (GIS) include:

- Black Bear (Crucial, Year-Long & Substantial Year-Long Habitat)
- Blue Grouse (Crucial, Year-Long Habitat)
- Moose (Crucial, Winter)
- Mule Deer (Crucial, Summer and Crucial Fawning Habitat)
- Rocky Mountain Elk (Crucial, Summer Habitat)
- Sage-Grouse (Crucial Brooding & Crucial Winter Habitat)
- Snowshoe Hare (Crucial, Year-Long Habitat)

Information sources utilized in developing the reclamation plans presented in this chapter include the baseline environmental investigations, detailed mining plans, conceptual and detailed facility layouts and designs, detailed drainage and sediment control plans, and any specific plans for control, monitoring, and mitigation of mining related impacts. The reclamation design information and discussions of reclamation practices presented in this chapter have been prepared in compliance with applicable provisions of the State of Utah Coal Mining Rules and are intended to provide a reasonable description of the nature, timing, and anticipated results of planned reclamation activities. The reclamation plans presented in this chapter reflect consideration of the environmental resource information presented in R645-301-200, 300, 400 and 700, Environmental Information, and the mining plans presented in R645-301-500, “Engineering Design and Operations Plans”, and are designed to effectively mitigate to the extent operationally practicable the potential effects of mining.

The various information categories addressed in the subsections which make up the Reclamation Plans are consistent with the information categories outlined in the State of Utah Coal Mining Rules. The following are the sub titles and designations included in this section:

- Reclamation of Exploration Disturbance
- Soil Replacement Plans
- Habitat Restoration Plans
- Reclamation of Mining Disturbance
- Hydrologic Restoration

Each subsection identifies the applicable regulatory provisions addressed and sources for the information presented and includes related supporting tables and figures. Other supporting documentation, including maps and exhibits, is referenced in the text and provided in the separate map and exhibit volumes.

Reclamation will be an integral part of any exploration and related activities. Reclamation of surface disturbance areas resulting from exploration activities will occur as soon as reasonably feasible following the completion of exploration drilling and other related activities.

Objectives of the planned reclamation activities will include stabilization of disturbed areas, minimizing erosion, limited potential surface water impacts, and restoring disturbed areas to a safe, stable condition. Plans for reclamation of exploration disturbance have been designed to successfully meet these objectives and will result in effective stabilization, and a reclaimed configuration which blends with the surrounding terrain and provides for effective surface and erosion control.

Reclamation will involve a logical sequence of activities designed to achieve the overall reclamation objectives in an organized progressive manner. The following represents the general steps for reclamation of any exploration disturbance areas:

- Completion of the borehole as a monitoring well or plugging and sealing the borehole
- Drainage and backfilling of any mud pits
- Collection and removal of any trash or debris
- Grading of pad areas to establish the final configuration
- Drainage reestablishment
- Road removal
- Soil replacement and stabilization
- Revegetation

These activities are discussed in detail in the following sections.

Reclamation Plans and Practices

The specific reclamation plans developed for exploration areas and the proposed reclamation practices reflect the overall reclamation objectives, site specific conditions and constraints, and the best current reclamation techniques and methods. The following sections describe the timing and sequencing of reclamation activities, general reclamation requirements, and specific reclamation practices.

CR will reclaim exploration related surface disturbance areas as soon as operationally practicable following completion of exploration activities. Typically, reclamation will be initiated immediately on completion of all exploration activities under a given exploration program to accommodate effective mobilization and use of reclamation equipment or an independent reclamation contractor. CR will normally schedule all exploration activities under a given exploration program during the same field season and reclamation would occur on completion of the program or at the end of the field season and no later than the next normal field season (typically May through October). It is anticipated that final reclamation of exploration areas would be completed within 3 to 6 months from the time exploration activities at any given site are completed.

Final reclamation will involve removal of all exploration equipment and materials, closure and sealing of any boreholes not completed as monitoring wells, backfilling and grading of pad areas and roads, drainage reestablishment, road removal, placement of soil materials, and revegetation. Generally, soil replacement and revegetation efforts will be coordinated so that soil materials are revegetated as soon as practically possible following placement. Normally this will involve placement of soil and immediate reseeding at the end of the exploration project or field season in late fall. This approach allows the seed to "winter over" with germination in the spring when soil moisture conditions are elevated due to winter snow accumulations and spring melt.

Reclamation Plans and Practices

The reclamation plans and practices described in this chapter reflect consideration of site reclamation potential and any important limitations, and application of the best current reclamation technology and both CR's and other coal operators extensive operating experience in this area. The following sections describe the specific reclamation practices proposed for exploration surface disturbance areas.

Completion as a Monitoring Well or Plugging and Sealing Boreholes

As described in R645-301-631, Casing and Sealing Exploration Holes and Boreholes, a determination will be made either prior to or during completion of any exploration holes or boreholes of whether or not the hole will be utilized for ground water monitoring purposes. If the hole is to be utilized for monitoring it will be cased, completed, and developed as a monitoring well consistent with Figure 21 Typical Well Completion Diagram, and as described in R645-301-225, 323.200, 325, 202-235, and 236, Completion as Ground Water Monitoring Wells. If the hole is not to be utilized as a monitoring well or when an existing well is no longer required for ongoing monitoring, it will be sealed by filling the borehole or casing with cement to form a plug from the bottom of the hole to at least 20 feet above any zone of completion or water-bearing zone;

filling the remainder of the hole to within 20 feet of the ground surface; and filling the remainder of the hole to the ground surface with cement to form a surface plug. A steel fence post will be placed in the center of the surface plug before the cement sets-up to provide a permanent marker for the hole location.

Drainage and Backfilling of any Mud Pits

If mud pits were utilized during Drilling, they will be allowed to dry out and will be backfilled with drill cuttings and/or the material originally excavated from the pits. Fill material will be placed and compacted by normal equipment traffic to minimize voids and provide and limit any potential future settlement. Any remaining excess drill cuttings will be spread over the drill pad surface.

Collection and Removal of any Trash or Debris

Any trash or debris resulting from drilling operations including used drill bits, mud or additive bags, core boxes and other materials will be collected and removed from the drill site for disposal in the local municipal landfill. In addition, all exploration equipment and related materials and supplies will be removed from the site.

Grading of pad areas to establish the final configuration

Drill pad surface areas will be regraded to their approximate original configuration. Grading will involve the use of a tracked dozer, wheel loader, or backhoe to move, place, and grade fill materials. Generally, the material utilized in constructing the pad will be pulled back onto the cut bench from downslope fill areas and the fill will be graded and contoured to blend with the surrounding terrain and provide for effective drainage. On completion of grading the regraded surface will be ripped along the contour to control drainage and provide a good bond with the replaced soil material. Fill slopes will be limited to a maximum slope of approximately 3H: I V and graded slopes in native material will vary dependent on material from less than 5H: I V to as much as O.5H: 1 V in competent rock.

Drainage Reestablishment

In conjunction with grading activities, CR will establish a drainage configuration which is compatible with the natural drainage pattern of the surrounding terrain. If upgradient drainage would pose a potential erosion hazard for the regraded area, drainage will be routed around the regraded surface or erosion control materials will be utilized as appropriate.

Road Removal

Where existing roads are utilized for exploration access, water bars will be constructed where appropriate to minimize erosion and natural drainage patterns will be reestablished. Any new road segments constructed specifically for exploration access will be reclaimed by ripping the road surface and grading to reestablish the approximate original configuration and drainage pattern. Cut/fill areas will be reclaimed by pulling the fill material upslope into the cut and grading any remaining cut slope, the fill material, and disturbed downslope areas to a stable configuration consistent with natural drainage patterns and blending with the surrounding terrain.

Soil Replacement

Following completion of backfilling, grading, and drainage reestablishment, available soil material will be replaced on the regraded areas as a growth medium for subsequent revegetation. Soil will be replaced as soon as operationally practicable following completion of the other necessary activities in the reclamation sequence, however, the timing of soil placement will also reflect the need to reestablish vegetation as soon as possible to stabilize and prevent loss or erosion of the soil. Soil bladed off the pad area and roads during construction will typically be windrowed along the perimeter of the disturbance areas. This material will be recovered and spread across the regraded areas to establish a relatively uniform thickness of growth medium.

As the final step in the reclamation process, all exploration surface disturbance areas will be revegetated. Typically revegetation seeding will occur immediately. Seeding may occur at other times where appropriate to minimize erosion due to location, aspect, or other site specific factors. Any required shrub or woody species transplanting will occur in late spring to minimize the potential for frost-kill.

Seedbed preparation will involve ripping, or deep gouging the resoiled surface to prepare the surface to receive seed. Seed may be placed using either a rangeland seed drill or broadcast methods. Following seed placement, weed free straw or native hay mulch or other erosion control materials will be placed and crimped or anchored to protect the soil, minimize erosion, prevent seed loss and help trap and retain moisture. Exploration areas will be seeded with the permanent seed mixture as discussed in R645-301-340, Habitat Restoration Plans.

General Habitat Restoration Requirements

The Kinney No. 2 Mine surface facilities area will be the only surface disturbance area resulting from the planned mining and related activities. As described in R645-301-312 and 313, General Biological Resource Protection Requirements, the majority of the mine facilities area has been extensively disturbed by previous mining related activities resulting in destruction, elimination, or significant modification of vegetation and habitat values. Beyond the practical limitations on habitat value and use relating to the previous disturbance, wildlife use of both existing and proposed surface disturbance areas is also limited by current levels of human activity in the immediate area due to the proximity of Highway 96, and Scofield Town.

From a practical standpoint, the mine surface facilities area because of the extensive previous disturbance and their proximity to other development activities are not particularly well suited for many uses other than mining. Given, however, that these areas and the surrounding lands were in all probability undeveloped lands utilized for wildlife habitat, CR will reclaim surface disturbance areas to a postmining land use of wildlife habitat and watershed, which is a Carobn County Zoning designation. Consistent with the proposed postmining use, backfilling and grading will focus on restoration of a land configuration consistent with applicable provisions for remining of previously disturbed areas with a preexisting highwall (R645-301-553.500 through 524) and the general configuration which existed prior to mine development, soil and substitute materials will be replaced to provide a vegetative growth media similar to the natural soils existing in the area, and planned revegetation efforts are designed to provide a self-sustaining postmining vegetation community which will effectively stabilize disturbed areas and provide suitable wildlife forage and browse. In addition to site revegetation measures, CR will also implement specific habitat mitigation and enhancement measures, as further described in this chapter, to effectively address potential mining related impacts and provide some long-term mining related benefits.

R645-301-341 Revegetation

CR's planned revegetation practices are specifically designed to provide or promote:

- Rapid vegetative reestablishment following completion of soil/substitute replacement
- Establishment of adequate plant density and cover to effectively control runoff and erosion
- Establishment of a reclaimed plant community consisting primarily of indigenous plant species with any introduced species having proven adaptability for site conditions
- Adequate plant species diversity and vigor to assure effective ongoing vegetative propagation and a self-sustaining vegetation community
- Palatable wildlife browse and forage species consistent with the postmining land use

Revegetation seed mixtures, and stabilization/management practices have all been selected and designed to achieve these objectives. Generally, revegetation methods will be similar for all surface disturbance areas and will typically include the following specific activities:

- Seedbed preparation
- Seeding
- Mulching and surface stabilization
- Management and revegetation success monitoring

Timing of Revegetation Activities

Interim revegetation has been addressed previously in this chapter. Generally, seeding of areas where soil/substitute materials have been replaced will occur as soon as practically possible following the cessation of mining activities in order to minimize the potential for both soil/substitute loss and erosion. Normally this will involve placement of soil/substitute and immediate reseeding, and soil stabilization.

Revegetation Practices

As previously described, revegetation of surface disturbance areas will involve a logical sequence of activities including seedbed preparation, seeding, woody species transplanting, mulching and surface stabilization, and management and revegetation success monitoring. Localized adaptations of specific revegetation practices will be utilized where appropriate to address any limiting site conditions and constraints such as steep slopes, rocky soils, increased erosion potential, and other factors.

Seedbed Preparation

Prior to seeding, CR will prepare regraded and resoiled areas to provide a firm but uncompacted seedbed. As described in R645-301-243, Soil Suitability and Testing, and in R645-301-542.300 through 800, 550 through 553.900, and 560, Reclamation Practices, under the sub-headings of Backfilling and Grading to Establish Final Configuration, Soil/Substitute Replacement, and Revegetation; backfilling, grading, and soil/substitute replacement activities will be conducted so as to minimize compaction.

Soil materials will be left in a roughened condition to control runoff, limit erosion and soil loss, and promote moisture infiltration. CR will also selectively apply alternative sediment control measures as described in R645-301-730, Hydrologic Resource Protection Plan. Revegetation seeding will occur immediately following soil material placement so additional stabilization measures will not be required prior to seeding. In conjunction with seeding operations, the soil material will be deep ripped (up to 3 feet deep), plowed or disked to prepare the seedbed in areas where the slopes are 3:1 or flatter. Where the slopes are steeper than 3:1, deep gouging, or plowing along the contour will done to prepare the seedbed. The reclaimed ground surface will be very similar in topography to the pre-mining surface as shown on Map 29, Mine Surface Facilities Area – Postmining Topography and Interim Drainage Control Map.

Reclaimed ground gradients can be seen on Map 29, Mine Surface Facilities Area – Postmining Topography and Interim Drainage Control Map. Deep gouging is the preferred method, with plowing along the contour as an alternative where slope angle allows. In all cases, UGOGM will be consulted prior to seedbed preparation to insure that the reclamation plan is being followed. Following seeding, the reseeded areas will be mulched with straw or native hay at a rate of two tons per acre and the mulch will be crimped, plowed, or disked into the soil on slopes at 3:1 or steeper to minimize wind loss. Another method of soil stabilization that may be used on areas with slopes steeper than 3:1 is spray on organic mulch at a rate of 2 tons per acre with a tackifier to stabilize the mulch and seeds. Again, UDOGM will be consulted prior to seeding and soil stabilization to insure the reclamation techniques used are the best for the particular slope, soil type and surface aspect, and that the application rates are appropriate for the slope and time of season when reclamation is done.

Hay purchases will be based on specifications which minimize the potential for introduction of any noxious weed species. While this treatment is intended primarily to increase soil organic content and provide soil biota, it will also be effective in alleviating compaction and promoting moisture infiltration and retention.

Given that seeding will normally follow soil/substitute replacement within a very short time period and that the soil/substitute surface will be left in a roughened condition, seedbed preparation requirements will be minimal. In order to limit mixing of soil/substitute and underlying backfilledmaterials, surface manipulations will be minimized and will generally be limited to appropriate gouging/roughening techniques.

Seeding

CR will generally use one of three seeding methods, either drill seeding, broadcast seeding, or hydromulching dependent on the nature and aspect of the area to be revegetated. Broadcast seeding using a conventional rangeland seed drill will be utilized for reseeding of most areas. For construction disturbance, roadcuts, ditches, sedimentation pond embankments, soil/substitute stockpiles and other areas which require temporary vegetation to stabilize the disturbed surface and control runoff, erosion, and sedimentation, the temporary seed mixture will be drill seeded at a rate of 20.4 pounds of pure live seed (PLS) per acre or broadcast seeded at twice this rate (40.8 lbs. PLS/acre). Similarly, for all areas to be revegetated on a permanent basis, the permanent seed mixture will be drill seeded at a rate of 46.33 pounds of PLS/acre or broadcast seeded at twice this rate (92.66 lbs. PLS/acre). To the extent operationally feasible, CR will drill seed along the contour on sloping areas.

Following deep gouging or other roughening process, the resoiled areas will be seeded with the appropriate seed mixture and rates. Shortly after the seeding, an additional 1 to 1.5 tons per acre of certified noxious weed free straw will be spread over the seeded growth media by mechanical blowers or hand spreading. This mulch will be sprayed with a tackifier and mulch mixture at a rate of 0.25 tons per acre or crimped with the track hoe bucket or shovel following spreading to retain it on the reseeded slopes. Commercial seed purchases will be based on specifications which minimize the potential for introduction of noxious weed species.

Woody Species

The proposed permanent seed mixture for the Kinney No. 2 Mine surface facilities area includes several woody plant species which can be effectively established from seed including Utah serviceberry, mountain big sagebrush, winterfat, antelope bitterbrush, and mountain snowberry.

Mulching and Surface Stabilization

Surface stabilization measures have been incorporated as an integral part of CR's specific reclamation procedures for backfilling and grading, drainage reestablishment, soil/substitute replacement, seedbed preparation, and revegetation seeding activities. In addition to specific surface stabilization measures, CR will also selectively apply alternative sediment control measures as appropriate to control erosion and apply weed-free straw or native hay mulch to most re-seeded surface disturbance areas and will utilize other surface protection/stabilization measures in conjunction with or as an alternative to mulching for any areas having increased erosion potential. A detailed description of specific surface stabilization and mulching practices is presented in R645-301-341, Mulching and Stabilization Practices.

Management and Revegetation Success Monitoring

Re-seeded areas will be managed to achieve the revegetation objectives previously noted in this chapter. Management practices will include regular periodic inspection of reseeded areas; appropriate erosion control or repair activities; weed/pest control operations; re-seeding, if required; and revegetation success sampling and evaluations.

As part of the postmining management program, reclaimed areas will be qualitatively inspected on a regular quarterly basis at a minimum for any indications of significant erosion, siltation, surface instability, drainage problems, seeding failure, weed infestations, or other conditions which could adversely impact reclamation success. Inspections will continue throughout the extended liability period to assure effective reclamation. Any problems identified as a result of these regular inspections will be addressed in a timely manner consistent with overall reclamation plans and practices.

The reclamation plan for the Kinney No. 2 Mine has been designed to prevent or minimize erosion and restore disturbed areas to a stable and productive condition. If despite CR's best efforts, inspection of the reclaimed areas indicates that natural erosional processes are creating significant rills or gullies, CR will implement appropriate remedial/protective measures. In order to minimize any associated surface disturbance, the proposed erosion mitigation measures reflect consideration of the nature and extent of erosional damage and are designed to be implemented in phases dependent on the severity of or potential for damage. Specific erosion mitigation measures are described in R645-301-542.300 through 800, 550 through 553.900, and 560, Reclamation Practices, under the sub-heading of Post-Reclamation Management and Monitoring.

Any seeding failures or weed infestations identified by the post-reclamation management inspections will be addressed during appropriate time periods to achieve optimal mitigation. Any areas where partial or complete seeding failure is indicated by limited vegetative reestablishment or excessive dominance of one or more species will be addressed by reseeding the effected areas during either the early spring or late fall. Essentially the same seeding methods will be utilized as for initial seeding with the exception of seedbed preparation. Any significant weed infestations will be addressed through consultation with UDOGM to determine appropriate control measures. A detailed description of specific weed and pest control measures is presented in R645-301-341.240 and 357.300, Irrigation and Pest Control.

In addition to regular periodic inspections of re-seeded areas, CR will also implement a revegetation success monitoring program to quantify and document the progression of vegetative reestablishment for all reclaimed areas. The ultimate objectives of the revegetation success monitoring program will be to allow timely identification and remediation of any vegetative reestablishment problems and to provide the verification required for a revegetation success determination and final bond release. A detailed discussion of the revegetation success monitoring program is provided in R645-301-341.250, 300, 353.100 through 300, 356100 through 400, and 357.100 through 300, Revegetation Success - Criteria and Evaluation Methods.

Revegetation Species and Amounts

CR will use two separate revegetation seed mixtures for the new Kinney No. 2 Mine surface facilities disturbance areas; one for temporary vegetative establishment on construction disturbance areas, roadcuts, ditches, sedimentation pond embankments, soil/substitute stockpiles and other areas requiring interim erosion control and stabilization, and one for permanent revegetation of reclaimed upland areas. The species selected for inclusion in both the temporary and permanent revegetation seed mixtures are native and adapted species which occur within the surface disturbance and adjacent areas and which have a proven adaptability and compatibility to site conditions. Selection of specific plant species for inclusion in the revegetation seed mixtures involve consideration of natural occurrence as documented by vegetative baseline studies, ease of establishment from seed, seed availability, adaptability and vigor, contribution to vegetative diversity, and forage and browse value for various wildlife species.

The proposed temporary seed mixture presented as Table 22, Temporary Seed Mixture, consists of adapted species which germinate rapidly, are effective sod formers, and so are well suited to establish an effective temporary vegetative cover. The temporary seed mixture will be used for those disturbed areas which will not be utilized on an ongoing basis as active operating areas but will be disturbed prior to or in conjunction with final site reclamation. The temporary seed mixture may also be used as a stubble mulch to stabilize areas which are particularly subject to potential erosion.

The proposed permanent seed mixture for the Sagebrush/Grass and Rabbitbrush/Grass Plant Communities is presented in Table 22, Final Revegetation Seed Misture for Sagebrush/Grass and Rabbitbrush/Grass Plant Communities. The permanent seed mixture consists of a variety of predominantly native grasses, forbs, and shrubs with proven site adaptability and good hardiness which have been specifically selected for their value as browse and forage species consistent with the postmining land use of wildlife habitat as recommended by the UDWR. The permanent mixture will be utilized for revegetation of all surface disturbance areas and includes a variety of species found in both the grass-sage and rabbitbrush-grass vegetation communities. Based on their occurrence in natural plant communities in the area, available agronomic and wildlife research, and actual operating experience at coal mines in the Price, Utah area, the selected species included in the permanent reclamation seed mixture will provide an effective self-sustaining vegetative cover which will control surface runoff and erosion, provide sufficient diversity to assure the long-term stability of the revegetated community, and is compatible with CR's wildlife habitat mitigation, restoration, and enhancement objectives.

To the extent reasonably feasible consistent with both site stabilization and reclamation objectives, CR has selected revegetation species which are native species. CR will assure acceptable purity and germination standards for all seed mixtures and will require that suppliers certify seed shipments as meeting the standard specifications and being free of noxious weed seed.

In order to assure that seeding and planting stocks are of suitable quality for effective revegetation, CR will attempt to obtain native seed material from those sources which most closely approximate site conditions and will deal only with established reputable seed suppliers. CR will assure acceptable purity and germination standards for all seed mixtures and will require that supplies certify seed shipments as meeting the standard specifications and being free of noxious weed seed.

TABLE 21 TEMPORARY SEED MIXTURE		
Group/Species	**PLS (Drill) lbs/acre***	**Number of Seeds/FT2**
Grasses Thickspike Wheatgrass (Elymus lanceolatus)	4.0	14.14
Western Wheatgrass (Elymus smithii)	5.0	14.46
Bluebunch Wheatgrass (Elymus spicatus)	6.0	19.28
Kentucky Bluegrass (Poa pratensis)	0.40	19.99
Forbs Utah Sweetvetch (Hedysarum boreale)	5.0	3.86
TOTALSTOTAL	20.40	71.74
* Based on drill seeding methods. Rates should be doubled in areas that are broadcast seeded.		

TABLE 22 FINAL REVEGETATION SEED MIXTURE FOR SAGEBRUSH/GRASS AND RABBITBRUSH/GRASS PLANT COMMUNITIES		
Species	**PLS (Drill) lbs/acre***	**Number of Seeds/FT2**
Grasses Bluebunch Wheatgrass (Elymus spicatus)	1.50	4.82
Kentucky Bluegrass (Poa pratensis)	2.00	4.0
Sandberg Bluegrass (Poa secunda)	0.20	4.25
Needle-and-thread (Stipa comata)	1.00	2.64
Forbs Common Yarrow (Achillea millefolium)	0.03	1.91
Utah Sweetvetch (Hedysarum boreale)	5.00	3.86
Lewis Flax (Linum lewisii)	0.70	4.47
Silky Lupine (Lupinus sericeus)	8.00	4.51
Meadow Penstemon (Penstemon rydbergii)	1.50	4.54
Goldeneye (Viguiera multiflora)	0.20	4.84

TABLE 22 FINAL REVEGETATION SEED MIXTURE FOR SAGEBRUSH/GRASS AND RABBITBRUSH/GRASS PLANT COMMUNITIES		
Shrubs Utah Serviceberry (Amelanchier utahensis)	6.00	3.55
Mountain Big Sagebrush (Artemisia tridentate vaseyana)	0.10	5.74
Winterfat (Ceratoides lanata)	4.00	5.05
Antelope Bitter Brush (Purshia tridentate)	15.00	5.17
Mountain Snowberry (Symphoricarpos oreophilus)	3.00	5.17
TOTALS	46.33	65.51
* Based on drill seeding methods. Rates should be doubled in areas that are broadcast seeded.		

In addition to the specific stabilization practices, following reclamation seeding, straw or native hay mulch will be applied to most re-seeded areas at a rate of approximately 2 tons per acre and crimped or anchored using a disk or similar agricultural implement to protect the soil, minimize erosion, prevent seed loss, and help trap and retain moisture. In certain areas where there may be increased potential for erosion and soil loss due to steep slopes or localized drainage conditions, other suitable stabilization materials and methods including alternative sediment control measures may be substituted for or combined with mulching.

Such methods may include dozer tracking, application of geotextiles, hydromulching (at a rate of approximately 1.5 tons per acre), or other suitable stabilization and erosion control measures.

341.230 Mulching Techniques

As described in R645-301-542.300 through 800, 550 through 553.900, and 560, Reclamation Practices, under the sub-heading of Backfilling and Grading to Establish Final Configuration, and Drainage Reestablishment; and in this chapter under R645-301-341 under the sub-heading of Seedbed Preparation; reclaimed areas will be graded to a stable configuration with reestablishment of effective surface drainage patterns. Prior to seeding, CR will prepare regraded and resoiled areas to provide a firm but uncompacted seedbed. Soil materials will be left in a roughened condition to control runoff, limit erosion and soil loss, and promote moisture infiltration. CR will also selectively apply alternative sediment control measures as described in R645-301-730, Hydrologic Resource Protection Plan. Revegetation seeding will occur immediately following soil material placement so additional stabilization measures will not be required prior to seeding. In conjunction with seeding operations, the soil material will be deep ripped (up to 3 feet deep), plowed or disked to prepare the seedbed in areas where the slopes are 3:1 or flatter. Where the slopes are steeper than 3:1, deep gouging, or plowing along the contour will be done to prepare the seedbed. The reclaimed ground surface will be very similar in topography to the pre-mining surface as shown on Map 29. Reclaimed ground gradients can be seen on Map 33, Slope Analysis Map. Deep gouging is the preferred method, with plowing along the contour as an alternative where slope angle allows. In all cases, UGOGM will be consulted prior to seedbed preparation to insure that the reclamation plan is being followed. Following seeding, the reseeded areas will be mulched with straw or native hay at a rate of two tons per acre and the mulch will be crimped, plowed, or disked into the soil on slopes at 3:1 or steeper to minimize wind loss. Another method of soil stabilization that may be used on areas with slopes steeper than 3:1 is spray on organic mulch at a rate of 2 tons per acre with a tackifier to stabilize the mulch and seeds. Again, UDOGM will be consulted prior to seeding and soil stabilization to insure the reclamation techniques used are the best for the particular slope, soil type and surface aspect, and that the application rates are appropriate for the slope and time of season when reclamation is done.

Hay purchases will be based on specifications which minimize the potential for introduction of any noxious weed species. While this treatment is intended primarily to increase soil organic content and provide soil biota, it will also be effective in alleviating compaction and promoting moisture infiltration and retention.

All of these reclamation practices contribute to effective stabilization of the reclaimed surface.

341.240 Irrigation

While irrigation can potentially facilitate initial vegetative establishment it is not a practical long-term management practice and may actually reduce long-term revegetation success. For these reasons, and because irrigation is incompatible with both the postmining land use of wildlife habitat and the objective of a self-sustaining vegetation community, CR does not to propose to utilize irrigation in conjunction with site revegetation efforts.

341.250 Determination of Revegetation Success Criteria and Evaluation Methods

In order to accurately and objectively evaluate the effectiveness of revegetation efforts and provide a quantitative determination of ultimate revegetation success, CR will conduct field revegetation success sampling and will evaluate the resulting field data. The following discussion outlines revegetation success monitoring practices and evaluation criteria for those new disturbance areas associated with the Kinney No. 2 Mine surface facilities area.

Sampling of revegetated areas will be conducted at intervals of four, eight, nine, and ten years following initial permanent revegetation seeding. Consistent with the baseline and reference area approaches for evaluation of revegetation success as outlined in the UDOGM Vegetation

Information Guidelines, and the baseline vegetation sampling program as discussed in R645-301-321.100, Vegetation Parameters, CR will sample cover and productivity for all permanently revegetated areas and will evaluate revegetation success on the basis of these two primary parameters.

Revegetation success sampling and evaluation methods for ground cover and productivity will be essentially the same as previously utilized for baseline data collection. These methods, as described in R645-301-321.100, and 200, Sources of Vegetation Information, will include the use of randomly located sampling transects, measurement of cover using an inclined ten-point frame, and measurement of productivity by clipping randomly located sample plots. For revegetation success evaluations, woody plant density will be measured by counting all woody plants rooted within one meter on either side of the 50 meter random transects utilized for cover sampling and extrapolating the corresponding woody plant density to determine density on a "stems per acre" basis. Sample adequacy for all revegetation success sampling will be evaluated using the formulae presented in Appendix A of the UDOGM Vegetation Information Guidelines and will be based on the objective of achieving a 90 percent confidence interval within 10 percent of the mean.

The purpose of revegetation sampling efforts during years three and seven of the extended liability period will be to determine and evaluate the effectiveness of site revegetation efforts and to determine trends for vegetative reestablishment. The resulting data and evaluation results will be utilized as appropriate to identify any potential areas of concern and to guide post-reclamation management efforts in order to meet specific requirements for a revegetation success determination and ultimately achieve the overall reclamation objectives. Revegetation success monitoring during years nine and ten of the extended liability period will focus on data collection and development of the necessary documentation to allow for effective comparison of reclaimed and baseline conditions as the basis for a revegetation success determination.

The original baseline sampling involved collection of cover and production data for two distinct vegetation types: 1) Previously Disturbed AMR (now Rabbitbrush/grass; 2) Native Sagebrush/grass. All reclaimed areas will be revegetated using essentially the same methods and seed mixture. In order to evaluate revegetation success for reclaimed areas, areas identified as Disturbed or Reclaimed and native Sagebrush/grass types will be sampled together as a unit.

Cover and production values resulting from the revegetation success monitoring for the areas will be compared with weighted average values based on the reference area values. Weighting will be based on the corresponding acreages of each of the vegetation type. The statistical comparison utilized to evaluate revegetation success will be based on the “t-test comparison” method. If the absolute values for cover and production for the reclaimed areas are greater than or equal to the calculated 90 percent confidence interval for the baseline data then the mean values for the designated revegetation success parameters can be considered to be statistically equivalent and it can be concluded that the applicable revegetation success criteria have been achieved.

For woody plant density, revegetation success monitoring data will be compared with a reclamation standard of 1,700 plants per acre for areas identified in the baseline sampling. Consistent with cover and production sampling, if the absolute values for woody plant density for the reclaimed areas are greater than or equal to the calculated 90 percent confidence interval for the numeric standards then the mean values for the designated revegetation success parameters can be considered to be statistically equivalent and it can be concluded that the applicable revegetation success criteria have been achieved.

General revegetation requirements under applicable UDOGM regulations include consideration of erosion control, and vegetative diversity, seasonality, and permanence. In order to address these secondary considerations relative to revegetation success, CR proposes the following secondary success standards:

> Erosion Control - Formation of rills and gullies on reclaimed areas will be limited to a maximum of 0.75 feet in depth. General erosion will be evaluated using Mark H. Humphrey's Erosion Condition Classification System (Draft 12/5/90) as adapted from BLM's Erosion Condition Classification System (BLM Technical Note - Number 346)
>
> Vegetative Diversity and Permanence - Premining and postmining values will be compared using Sorenson's Similarity Index as outlined in the UDOGM Vegetation Guidelines
>
> Seasonality - Seasonality of reclaimed plant communities relative to premining conditions will be evaluated by comparing percent composition of warm season plant species

Success evaluations for these secondary criteria will be based on the same weighting approach as previously discussed for the evaluation of the primary parameters of vegetative cover and production.

R645.301-342 Fish and Wildlife Reclamation Plan

Given the proposed postmining land use of wildlife habitat, watershed, and commercial and the extent of existing site disturbance with the related constraints on wildlife habitat values, CR as part of their overall reclamation plans will restore and enhance where reasonably possible site conditions and habitat values which will support and benefit wildlife use, watershed and commercial uses. In addition to the general reclamation measures and practices which will be implemented on completion of mining as described in the preceding s, CR will implement supplemental wildlife habitat enhancement measures as discussed in the following s.

Restoration of surface disturbance areas will ultimately be achieved by backfilling, grading, drainage reestablishment, soil/substitute replacement, and revegetation to a configuration and condition consistent with the postmining land uses. Plans for reclamation and revegetation activities are discussed in the preceding .

R645.301-350 Performance Standards

R645.301-351 General Requirements

The UDWR has developed a variety of seed mixes and seeding recommendations for various areas, conditions, and wildlife habitat restoration objectives. These recommendations were reviewed in developing the proposed permanent reclamation seed mixture and a number of the species selected for the proposed seed mix were included because of their value for habitat restoration as outlined by the UDWR recommendations.

Placement of Rock Piles - Piles of rocks and large boulders would be randomly placed on the reclaimed surface to serve as shelter for reptiles and small mammals and temporary perches for raptors and other birds.

R645.301-352 Contemporaneous Reclamation

The Kinney No. 2 Mine is an underground mine and the surface facilities areas are anticipated to be active through the duration of mining activities and as such there will be little need for contemporaneous reclamation. Any coal exploration sites will be reclaimed as discussed in other sections of this chapter when the drill sites are not longer in use, and in the case where a coal exploration hole is converted to a ground water monitoring well, the site will be prepared as discussed under R645-301-340 earlier in this chapter.

In the event any surface areas are no longer needed for continued operation of the mine, CR will reclaim those areas contemporaneously as discussed in this chapter.

R645.301-353 Revegetation General Requirements

Reclamation will be an integral part of the Kinney No. 2 Mine mining and related activities, however, because the mine will be an underground mine and the surface facilities and related surface disturbance areas will remain in place until the end of the mine life, mining and reclamation will not occur concurrently or, in the case of progressive mining activities, sequentially. Reclamation of surface disturbance areas will generally occur following the cessation of mining operations to complete the mining and reclamation cycle although CR will implement temporary stabilization measures in certain areas following initial construction or during ongoing operations.

Objectives of the planned reclamation activities will be twofold; 1) For construction disturbance, temporary stabilization and contemporaneous reclamation will serve to stabilize disturbance areas, minimize erosion, and limit potential surface water impacts; 2) For long-term use areas, final reclamation is designed to restore disturbed areas to a safe, stable condition and to reestablish the productivity of the land consistent with the postmining land use(s). The proposed postmining land uses of wildlife habitat, water shed, and commercial use reflects the predisturbance use of this and adjacent areas, existing land use plans and policies, the desires

of affected surface landowners, and practical constraints relative to land use capability and condition. Specific land use considerations and constraints are discussed in R645-301-400, Land Use Information. The Kinney No. 2 Mine reclamation plan has been designed to successfully meet these objectives and will result in effective temporary stabilization, and a postmining configuration which blends with the surrounding terrain and provides environmental values consistent with or superior to those which existed prior to mining.

The Kinney No. 2 Mine reclamation plan has been developed utilizing available information on the existing environmental resources as described in R645-301-200, 300, 400, 600, and 700, Environmental Information. In addition, CR has incorporated both available information on current successful reclamation technology and practices and their extensive operating experience in the area. the plans presented in this permit represent what CR feels to be the most effective reclamation practices for this site, it is important to note that successful reclamation must be a dynamic process, incorporating new information to optimize overall effectiveness. In order to meet the reclamation objectives these plans may be modified as appropriate to reflect changing conditions, revised regulatory requirements, advances in reclamation technology, and the results on ongoing research and experience relative to the long-term effectiveness of various reclamation practices. Any future plan modifications will be submitted for approval to the UDOGM through the normal permitting process.

Reclamation will involve a logical sequence of activities designed to achieve the overall reclamation objectives in an organized progressive manner. The following represent the general steps for reclamation of any mine or mine related surface disturbance areas:

- Facility Demolition and Removal
- Stabilization and Sealing of Mine Openings
- Disposal of Non-Coal Wastes, and Mine Waste Materials
- Backfilling and Grading to Establish the Final Design Configuration
- Drainage Reestablishment
- Road Removal
- Soil/Substitute Replacement
- Revegetation
- Post-Reclamation Management, Maintenance, and Monitoring
- Removal and Reclamation of Sedimentation Ponds and Associated Structures
- These activities are discussed in detail in this chapter, in Chapters 2, 3 and 5.

353.250 Noxious Weeds

Regular periodic inspections of revegetated areas will include inspection for any noxious weed infestations or insect damage. If noxious weed infestations or insect problems are identified which have the potential to adversely impact revegetation success, CR will consult with both UDOGM and Carbon County Weed Control to develop and implement appropriate control measures. If the controls determined through this consultation process involve the application of herbicides or insecticides, only those chemicals approved for use by the appropriate State and Federal agencies will be considered and control practices will be limited to spot application at the appropriate time period for best control of the problem species.

R645.301-354 Revegetation: Timing

Generally, seeding of areas where soil/substitute materials have been replaced will occur immediately after seedbed preparation. In areas where the slope is greater than 3:1 where deep gouging, or plowing along the contour is done, seeding, mulching, or other soil stabilization methods will immediately follow seedbed preparation.

While late fall plantings represent the preferred schedule for revegetation and will be implemented in most situations, there may be occasions where prompt revegetation of small construction or other disturbance areas may be desirable to minimize erosion and sedimentation potential. Cases where this exception may apply could include newly established soil/substitute stockpiles, road cuts, newly constructed diversion and collection ditches, and small areas where erosion or other repairs have occurred, and as discussed above. In such cases, revegetation activities may occur at any time provided that site and climatic conditions offer a reasonable potential for successful vegetative reestablishment.

R645.301-355 Revegetation: Mulching and Soil Stabilizing

Prior to seeding, CR will prepare regraded and resoiled areas to provide a firm but uncompacted seedbed. As described in R645-301-243, Soil Suitability and Testing, and in R645-301-542.300 through 800, 550 through 553.900, and 560, Reclamation Practices, under the sub-headings of Backfilling and Grading to Establish Final Configuration, Soil/Substitute Replacement, and Revegetation; backfilling, grading, and soil/substitute replacement activities will be conducted so as to minimize compaction. Soil materials will be left in a roughened condition to control runoff, limit erosion and soil loss, and promote moisture infiltration. CR will also selectively apply alternative sediment control measures as described in R645-301-730, Hydrologic Resource Protection Plan. Revegetation seeding will occur immediately following soil material placement so additional stabilization measures will not be required prior to seeding. In conjunction with seeding operations, the soil material will be deep ripped (up to 3 feet deep), plowed or disked to prepare the seedbed in areas where the slopes are 3:1 or flatter. Where the slopes are steeper than 3:1, deep gouging, or plowing along the contour will done to prepare the seedbed. The reclaimed ground surface will be very similar in topography to the pre-mining surface as shown on Map 29. Reclaimed ground gradients can be seen on Map 33, Slope Analysis Map. Deep gouging is the preferred method, with plowing along the contour as an alternative where slope angle allows. In all cases, UGOGM will be consulted prior to seedbed preparation to insure that the reclamation plan is being followed. Following seeding, the reseeded areas will be mulched with straw or native hay at a rate of two tons per acre and the mulch will be crimped, plowed, or disked into the soil on slopes at 3:1 or steeper to minimize wind loss. Another method of soil stabilization that may be used on areas with slopes steeper than 3:1 is spray on organic mulch at a rate of 2 tons per acre with a tackifier to stabilize the mulch and seeds. Again, UDOGM will be consulted prior to seeding and soil stabilization to insure the reclamation techniques used are the best for the particular slope, soil type and surface aspect, and that the application rates are appropriate for the slope and time of season when reclamation is done.

Incorporation of the mulch will occur either by plowing along the contour, deep gouging/roughening, or a combination of those methods. Hay purchases will be based on specifications which minimize the potential for introduction of any noxious weed species. While this treatment is intended primarily to increase soil organic content and provide soil biota, it will also be effective in alleviating compaction and promoting moisture infiltration and retention.

R645.301-356 Revegetation: Standards For Success

In order to accurately and objectively evaluate the effectiveness of revegetation efforts and provide a quantitative determination of ultimate revegetation success, CR will conduct field revegetation success sampling and will evaluate the resulting field data. The following discussion outlines revegetation success monitoring practices and evaluation criteria for those new disturbance areas associated with the Kinney No. 2 Mine surface facilities area.

Sampling of revegetated areas will be conducted at intervals of four, eight, nine, and ten years following initial permanent revegetation seeding. Consistent with the baseline and reference area approaches for evaluation of revegetation success as outlined in the UDOGM Vegetation

Information Guidelines, and the baseline vegetation sampling program as discussed in R645-301-321, Vegetation Parameters, CR will sample cover and productivity for all permanently revegetated areas and will evaluate revegetation success on the basis of these two primary parameters.

Revegetation success sampling and evaluation methods for ground cover and productivity will be essentially the same as previously utilized for baseline data collection. These methods, as described in R645-301-320, Sources of Vegetation Information, will include the use of randomly located sampling transects, measurement of cover using an inclined ten-point frame, and measurement of productivity by clipping randomly located sample plots. For revegetation success evaluations, woody plant density will be measured by counting all woody plants rooted within one meter on either side of the 50 meter random transects utilized for cover sampling and extrapolating the corresponding woody plant density to determine density on a "stems per acre" basis. Sample adequacy for all revegetation success sampling will be evaluated using the formulae presented in Appendix A of the UDOGM Vegetation Information Guidelines and will be based on the objective of achieving a 90 percent confidence interval within 10 percent of the mean.

The purpose of revegetation sampling efforts during years three and seven of the extended liability period will be to determine and evaluate the effectiveness of site revegetation efforts and to determine trends for vegetative reestablishment. The resulting data and evaluation results will be utilized as appropriate to identify any potential areas of concern and to guide post-reclamation management efforts in order to meet specific requirements for a revegetation success determination and ultimately achieve the overall reclamation objectives. Revegetation success monitoring during years nine and ten of the extended liability period will focus on data collection and development of the necessary documentation to allow for effective comparison of reclaimed and baseline conditions as the basis for a revegetation success determination.

The original baseline sampling involved collection of cover and production data for two distinct vegetation types: 1) Previously Disturbed AMR (now Rabbitbrush/grass; 2) Native Sagebrush/grass. All reclaimed areas will be revegetated using essentially the same methods and seed mixture. In order to evaluate revegetation success for reclaimed areas, areas identified as Disturbed or Reclaimed and native Sagebrush/grass types will be sampled together as a unit.

Cover and production values resulting from the revegetation success monitoring for the areas will be compared with weighted average values based on the reference area values. Weighting will be based on the corresponding acreages of each of the vegetation type. The statistical comparison utilized to evaluate revegetation success will be based on the “t-test comparison” method. If the absolute values for cover and production for the reclaimed areas are greater than or equal to the calculated 90 percent confidence interval for the baseline data then the mean values for the designated revegetation success parameters can be considered to be statistically equivalent and it can be concluded that the applicable revegetation success criteria have been achieved.

For woody plant density, revegetation success monitoring data will be compared with a reclamation standard of 1,700 plants per acre for areas identified in the baseline sampling. Consistent with cover and production sampling, if the absolute values for woody plant density for the reclaimed areas are greater than or equal to the calculated 90 percent confidence interval for the numeric standards then the mean values for the designated revegetation success parameters can be considered to be statistically equivalent and it can be concluded that the applicable revegetation success criteria have been achieved.

General revegetation requirements under applicable UDOGM regulations include consideration of erosion control, and vegetative diversity, seasonality, and permanence. In order to address these secondary considerations relative to revegetation success, CR proposes the following sec

> Erosion Control - Formation of rills and gullies on reclaimed areas will be limited to a maximum of 0.75 feet in depth. General erosion will be evaluated using Mark H. Humphrey's Erosion Condition Classification System (Draft 12/5/90) as adapted from BLM's Erosion Condition Classification System (BLM Technical Note - Number 346)

> Vegetative Diversity and Permanence - Premining and postmining values will be compared using Sorenson's Similarity Index as outlined in the UDOGM Vegetation Guidelines

> Seasonality - Seasonality of reclaimed plant communities relative to premining conditions will be evaluated by comparing percent composition of warm season plant species

Success evaluations for these secondary criteria will be based on the same weighting approach as previously discussed for the evaluation of the primary parameters of vegetative cover and production.

R645.301-357 Revegetation: Extended Responsibility Period

No extended responsibility period is anticipated, however, if an extended period is necessary, all of the requirements of the regulations will be complied with as set forth.

MUD CREEK BASIN AND UPPER HUNTINGTON CREEK BASIN CUMULATIVE HYDROLOGIC IMPACT ASSESSMENT (CHIA)

For

SKYLINE MINE
C/007/0005

WHITE OAK MINE
C/007/0001

BLAZON MINE
FOR/007/0021

KINNEY #2 MINE
C/007/0047

In

CARBON, EMERY, AND SANPETE COUNTIES, UTAH

June 27, 2011

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I. INTRODUCTION

The Skyline, White Oak, Blazon and Kinney #2 mines are located in the northern Wasatch Plateau Coal Field, approximately within a 5-mile radius of the Scofield Reservoir and 25 miles west of the city of Price, Utah. Castle Valley, where the cities of Price and Huntington are located, lies east of the Wasatch Plateau, and farther east is the San Rafael Swell. The Sanpete valley is west of the Wasatch Plateau (Figure 1, Appendix A).

Skyline

The Skyline Mine straddles the drainage divide between the upper Huntington Creek and Mud Creek basins. The Carbon - Emery County line follows this same divide. Though Skyline Mine has workings beneath both basins, the mine's only portals are in Eccles Canyon in the Mud Creek basin. Skyline's boundary stops at the Sanpete County line on the west.

The Skyline Mine has workings in three different seams, the Upper O'Connor Seam (Mine No. 1), the Lower O'Connor B Seam (Mine No. 2), and the Lower O'Connor A Seam (Mine No. 3). Construction of the Skyline Mine Facilities began in 1980, and the No. 3 Mine and No. 1 Mines began production in October 1981, and June 1982, respectively. Development of the #2 mine began in 1992. In addition to the mine offices, surface facilities include: a conveyor down Eccles Canyon, a loadout at the mouth of Eccles Canyon, a waste rock disposal site in UP. Canyon near the town of Scofield, and a ventilation portal opened by breakout from the #3 mine into the South Fork of Eccles Canyon.

The Skyline Mine was idle from May 2004 to January 2005, after completing mining in the southwest portion of the mine. During that time, Canyon Fuel Company continued to pump water from the mine, ventilate it, and perform maintenance duties on the surface and underground. In January 2005 they began development mining in the North Lease area, and began longwall mining in the North Lease in early 2006.

In 2009, with mine operations advancing northward, the Operator submitted plans to build a ventilation shaft, escape shaft, and access slope in Winter Quarters Canyon. The Winter Quarters Ventilation Fan facility will disturb approximately 8 acres near the center of Section 1, T. 13S, R. 6E.

White Oak

The White Oak Mine was located east of, and adjacent to, the Skyline Mine. This mine was previously known as Valley Camp and the Belina Complex. In addition to the mine site, surface facilities included a loadout in Pleasant Valley, just south of Scofield, and an office building just across the highway from the loadout. Access to the reclaimed White Oak Mine site is through Whisky Canyon, a side canyon to Eccles Canyon. Approximately 22 % (700 acres) of the White Oak permit area lies within the Huntington Creek basin, and the remainder is in the Mud Creek basin.

Construction of the White Oak Mine facilities began in 1975. The White Oak Mine operated underground from 1979 through September 2001. Lodestar Energy, Inc. surface mined much of the White Oak Mine portal area from November 2001 through April 2003. Lodestar went through bankruptcy proceedings during 2003 and 2004 and did not finish mining or reclaiming the portal area. Except for a few Utah Pollutant Discharge Elimination Systems (UPDES) reports in early 2003, water monitoring ended in September – October 2002. The Division of Oil, Gas, and Mining (the Division) completed reclamation of the mine and loadout sites in late 2005 with money from the surety company and a settlement with the owners and controllers of Lodestar.

Poor vegetative growth overall and deep erosion of the lower reach of the restored stream channel required the Division to pursue further reclamation. Plans finalized in July 2010 called for recontouring of the stream channel, construction of terraces on the north side for runoff and erosion control, mulch and biosolids for soil augmentation, and reseeding and planting of live trees and shrubs.

Blazon

The Blazon #1 Mine was located just south of the town of Clear Creek. Construction on the Blazon #1 Mine began in July 1980, and the mine produced coal from March 1981 through January 1982. North American Equities forfeited the reclamation bond on the site, and the Division has subsequently reclaimed it.

Kinney #2

The Kinney #2 Mine is a proposed underground mine located just east of the town of Scofield adjacent to State Road 96. The permit area covers approximately 448 acres with a disturbed area footprint of 38 acres. Mining is planned for the Hiawatha coal seam from the outcrop at the edge of Pleasant Valley. The coal seam is located at elevations between 7,800 and 7,900 feet above sea level. Entry will be achieved via an approximately 600 foot wide corridor between old abandoned mine workings. Coal will be extracted from multiple fault bounded reserve blocks. Maximum productions rates are estimated to be 800,000 tons annually utilizing continuous mining methods. Mining will be restricted to blocks of coal lying between faults. The project life of the mine is estimated to be 3 years with potential future expansion further to the south and east.

Historical mining activities have occurred in the area producing abandoned underground workings in the general vicinity of the Kinney #2 mine. The Utah Division of Oil, Gas and Mining's Abandoned Mine Reclamation program conducted a project in the 1980s reclaiming the historical workings.

CHIA Objectives

This cumulative hydrologic impact assessment (CHIA) is a findings document involving an assessment of the cumulative impact of all anticipated coal-mining operations on the hydrologic balance within the Cumulative Impact Area (CIA). The CHIA is a determination of whether or not there will be material damage resulting from the cumulative effects of adjoining mines outside of individual mine permit boundaries. This report complies with federal legislation passed under the Surface Mining Control and Reclamation Act (SMCRA, Public Law 95-87) and subsequent Utah and federal regulatory programs under R645-301-729 and 30 Code of Federal Regulations (CFR) 784.14(f), respectively.

The objectives of a CHIA document are to:

1. Identify the Cumulative Impact Area (CIA). (Part II)

2. Describe the hydrologic system – including geology, identify hydrologic resources and uses. (Part III)

3. Document the baseline conditions of surface and ground water quality and quantity. (Part IV)

4. Identify Hydrologic Concerns (Identify which hydrologic resources are likely to be impacted and determine which parameters are important for predicting future impacts to those hydrologic systems). (Part V)

5. Identify relevant standards against which predicted impacts can be compared. (Part VI)

6. Estimate probable future impacts of mining activity with respect to the parameters identified above. (Part VII)

7. Assess probable material damage. (Part VIII)

8. Make a statement of findings. (Part IX)

The original Belina (White Oak) Mine CHIA prepared by Engineering-Science (1984) and the Huntington Creek Basin CHIA prepared by Simons, Li, and Associates, Inc. (1984), for the U. S. Office of Surface Mining (OSM), provided much of the basic information used in this CHIA. The White Oak and Skyline Mine Reclamation Plans (MRP) have also been used. The original Technical Analysis (TA) for the Skyline Mine permit includes information similar to that required for a CHIA, but a complete CHIA was apparently not prepared at the time the original permit was approved in 1980.

II. CUMULATIVE IMPACT AREA (CIA)

Figure 2 (Appendix A) shows the boundaries of the Cumulative Impact Area (CIA). The Office of Surface Mining (OSM) defines the CIA as "an area where impacts from the proposed operation, in combination with other existing and anticipated operations may cause material damage." The Division determines the CIA boundaries based on existing mining activities, anticipated mining activities, knowledge of surface and ground water resources, and anticipated impacts of mining on those water resources.

The CIA boundary was last revised in June 2011 to incorporate the newly proposed Kinney #2 mine. The rationale for defining the CIA boundary is as follows:

On the west, the Gooseberry Fault runs north south, and is believed to form a barrier to groundwater flow. This would include the area between the west edge of the Huntington Creek drainage and Gooseberry Creek in the CIA. To also include springs along the fault escarpment, the boundary was extended west to Gooseberry Creek. Similarly, the Pleasant Valley Fault runs north south along the Mud Creek valley and is believed to form a boundary to groundwater flow. The Blazon, White Oak, and Skyline Mines (including the North Lease added in 2005, and possible future Flat Canyon Lease) lie between these two faults. Granger Ridge and Scofield Reservoir bound the northern end and the southern boundary was extended in 2002 to include Electric Lake. The CIA includes about 56,680 acres with about 29,200 acres in the Mud Creek drainage, about 21,146 acres in the Huntington Creek drainage, about 4,849 acres in the Gooseberry Creek drainage and 54 acres in the North Fork of Gordon Creek.

The CIA encompasses the entire Mud Creek basin; from Scofield Reservoir on the north, to the southern end at the Carbon/Emery County Line. This basin includes the ephemeral drainages on the east side of Pleasant Valley. East of the town of Scofield, these ephemeral channels include (from west to east): Eagle Canyon, Long Canyon, and Miller Canyon. The eastern boundary of the CIA incorporates UP Canyon where Skyline's waste rock disposal site is located and Eagle Canyon, which serves as the eastern permit boundary for the Kinney #2 mine. The CHIA boundary has been drawn to include the outfall of Miller Creek (approximately 2 miles north of the Kinney #2 permit boundary) as it drains into Scofield Reservoir and would be representative of the downstream drainage from the Kinney #2 permit area.

The north end of the Mud Creek drainage includes the Woods Canyon and Winter Quarters Canyon drainages. The White Oak Mine lies mostly in the Mud Creek Basin, and the Blazon Mine is included entirely within the Mud Creek drainage area. The Blazon Mine has been reclaimed, but remains within the Division's jurisdiction.

The mountain ridge on the west side of the Mud Creek drainage is also the east side of the Huntington Creek drainage. That ridge, or divide, forms part of the boundary between Carbon and Emery Counties. The north end of the CIA boundary in the Mud Creek drainage is

Granger Ridge. Granger Ridge connects the common ridge between Mud Creek and Huntington Creek, to Scofield Reservoir.

Scofield Reservoir is included in the CIA because Skyline mine-water discharges flow down Eccles Creek into Mud Creek, and then into Scofield Reservoir and is also considered the receiving body of any downstream drainage from the Kinney #2 mine via the perennial reach of Miller Creek. Scofield Reservoir will also be the receiving water body from any intermittent flows from Eagle Canyon draining the Kinney #2 permit boundary. Mud Creek is known to contribute 16 % of the water inflow to the reservoir, Fish Creek supplies approximately 75% (Waddell and others, 1983b, p. 43) and Pondtown, Lost/Dry Valley, and Miller Canyon Creeks account for the remaining 9%. Though Mud Creek supplies just 16% of the water to Scofield Reservoir, it contributes 18% of the total nitrogen and 24% of the total phosphorous inflows (Waddell et al., 1983a). The total phosphorous in Scofield Reservoir is of concern to the Utah Division of Water Quality, and they have set the Total Maximum Daily Load (TMDL) Target Load of 4,842 kg/yr (29 lb/day). The historical data suggest that the Mud Creek drainage has nutrient-rich soils, which are fairly easily eroded, and carried down stream. However, the increased flows from the Skyline mine-water discharge have not appreciably increased the amount of total phosphorous in Mud Creek through increased stream bank erosion (measured at MC-3; see Figure 12, Appendix A, EarthFax 2002, 2003, 2004). The Price River, which is used for irrigation in Castle Valley and provides the municipal water supply for the city of Price, flows from the reservoir. The increased flows (March 1999-Present) have increased the water volume in the reservoir and have provided considerably more water to the Price River drainage than natural runoff would have. Other than increased flows, no other hydrologic impacts have been noted downstream of Scofield Reservoir.

The CIA also encompasses all of the Huntington Creek drainage above the mouth of Valentines Gulch. The area immediately below Electric Lake dam, down to North Hughes Canyon, includes the Valentine Fault which runs through Valentines Gulch and continues north into the area of the CIA where mining has occurred. The CIA includes Electric Lake itself, which covers from 100 to 450 acres, depending on water level, and contains 31,500 acre-ft of active annual storage. The lake is a contributor to groundwater in the CIA. Roughly half of the Skyline Mine permit area lies within the Huntington Creek drainage. Drainages on the west side of Huntington Canyon that are part of the CIA include Bear Canyon, Little Eccles Canyon, Boulger Canyon, Flat Canyon, Swens Canyon, Little Swens Canyon, Brooks Canyon, and Upper Huntington Creek.

Electric Lake became a part of the CIA in November 2002 because records provided by PacifiCorp (owner and operator of the Lake) indicated a marked decline in storage volumes beginning in July 2001; the same time Skyline Mine had a significant increase in mine-water inflows. These records, and claims by PacifiCorp that the two events were related, prompted the Division to closely study all reports related to the mine in-flows and Electric Lake water losses. In September 2001, Skyline Mine developed a well and began pumping water into Electric Lake. Although not considered mine-water discharge because it is not drawing water directly from the mine workings, Well JC-1 pumped an average of approximately 3,000 gallons per minute (gpm) into Electric Lake from September 2001 through September 2004 (~400 acre-ft/month). Starting in July 2003, another well (JC-3) started pumping mine-water discharge water into Electric Lake. JC-3 pumped through July 2004, at an average of 2,550 gpm (~340 acre-ft/mo) of mine-water discharge to Electric Lake, at which time it encountered both mechanical and water quality problems and was shutdown. According to Storage Volume records provided by PacifiCorp (Hansen, Allen, and Luce, Inc. 2005, PacifiCorp 2003, 2004), the water provided to Electric Lake from the JC wells (~740 acre-ft/month at highest) has had little effect on the volume of water stored in the lake. JC-1 continues to consistently pump approximately 4,000 gpm (530 ac-ft/mo) into Electric Lake.

III. HYDROLOGIC SYSTEM

The CIA is located in both the Mud Creek and upper Huntington Creek basins, which are the headwater basins of the Price and San Rafael Rivers, respectively. The Price River flows generally southeast and passes through the city of Price. Huntington Creek flows generally east. It emerges from the Wasatch Plateau near the town of Huntington and joins with Cottonwood and Ferron Creeks on the east side of Castle Valley to form the San Rafael River. The Price and San Rafael Rivers are tributaries to the Green River, which in turn is tributary to the Colorado River.

Precipitation on the Wasatch Plateau varies from 40 inches at higher elevations to less than 10 inches at lower elevations and more than 30 inches per year on the higher ridges and in the upper Huntington Creek basin (Coastal, 1993; Simons, Li, and Associates, 1984). Seventy to eighty-percent of the total precipitation falls as snow between October and April. Skyline Mine has a weather reporting station, which averages between 22 and 26 inches of precipitation per year. SNOTEL meteorological reporting stations are also located in the area and include: Clear Creek #1, Clear Creek #2, Scofield Dam, and Price, Utah. Precipitation data measured from the SNOTEL station located at the Scofield Dam average totals 14.56 inches per year with average total snowfall as 115.8 inches per year. Actual and potential evapotranspiration rates are roughly equal (less than 18 inches per year) in the upper elevations of the Wasatch Plateau (Waddell and others, 1983b). Probably less than 5% of the precipitation recharges the ground water system (Price and Arnow, 1979). The Wasatch Plateau is classified as semiarid to sub-humid.

Vegetation varies from Sagebrush/Grass communities at lower elevations to Spruce/Fir/Aspen and Mountain Meadow communities at higher elevations. Other vegetative communities include Mountain Brush, Sagebrush, Ponderosa, and Riparian (Simons, Li, and Associates, 1984). These communities are generally used for wildlife habitat and livestock grazing. Even though slopes are steep, there is good vegetative cover, and soils with high organic content are well developed, providing an adequate medium for ground water recharge (Coastal, 1993, p. PHC2-5).

SURFACE WATER

<u>Mud Creek Drainage</u>

Mud Creek basin is an asymmetric watershed. Watersheds on the dominant west flank contain perennial and ephemeral streams that flow eastward to Mud Creek through straight, deeply incised canyons. Small, ephemeral watersheds drain to Mud Creek from the east flank of the basin (Fig. 5, Appendix A). Scofield Reservoir, a man-made structure, represents the northern limit of the Mud Creek Watershed.

Scofield Reservoir

Scofield Reservoir is approximately 2,815 acre body of water that was created in 1946 to serve a variety of purposes such as coal mining, agriculture, and recreational use. The reservoirs capability as a fishery has been impaired in recent decades due to the elevated amounts of phosphorus a entering the reservoir principally from Mud Creek and Fish Creek. Elevated concentrations of phosphorus have resulted in blue-green algal blooms leading to the loss of zooplankton, an important food source for trout. External sources of phosphorus entering the reservoir include: sediment, and livestock sewage. Other problems identified for Scofield Reservoir include: oxygen depletion that threatens fish populations and excessive sedimentation into the reservoir.

The reservoir's elevation is measured by a staff gauge located at the Scofield Dam by the Bureau of Reclamation real-time measuring station. The reservoirs elevation is listed on topographic maps as 7,618 feet above sea level.

Mud Creek

Mud Creek flows north through Pleasant Valley to Scofield Reservoir and normally contributes around 16% of the annual flow to that reservoir (Valley Camp, 1993, p. 40). Mud Creek drains an area of approximately 42 square miles. The headwaters of Mud Creek are located 9 miles to the south with a length of approximately 11.2 miles.

Since March 1999, inflows to Skyline Mine were pumped to abandoned underground workings and, after appropriate settling, pumped to Eccles Creek, a tributary to Mud Creek. Skyline measures and reports these discharges to Eccles Creek quarterly as CS-12 (Mine #3 discharge) and CS-14 (Mine #1 discharge). Until March 1999, the combined discharge to Eccles Creek never exceeded 795 gpm, and averaged just 285 gpm. Combined mine-water discharges to Eccles Creek have been recorded continuously and reported monthly since August 16, 2001 (data available at https://fs.ogm.utah.gov/pub/MINES/Coal/007/C0070005/DischargeInfo/07-26-2010Mine-James-%20Discharge.xls). Between August 2001 and December 2003, the average monthly discharge varied from 2,826 gpm (September 2003) to 9,846 gpm (March 2003), with an overall average discharge of 7,7,98 gpm. Since January 2004, Skyline has allowed some abandoned workings in the southwest portion of the mine to flood. The flooding, combined with decreased mine inflows, has reduced the overall monthly average discharge (January 2004 through June 2010) to Eccles Creek to 3,795 gpm, with a low of 860 gpm (July 2004) and a high of 4,914 (July 2006). The discharge rate increased slightly during the development of the North Lease due to discharges of stored water from Mine #3, averaging 4,170 gpm from October 2004 to December 2005. Discharge has been on a downward trend since 2005 (Exhibit 1), and in 2008 and 2009 the discharge averaged 3,400 gpm.

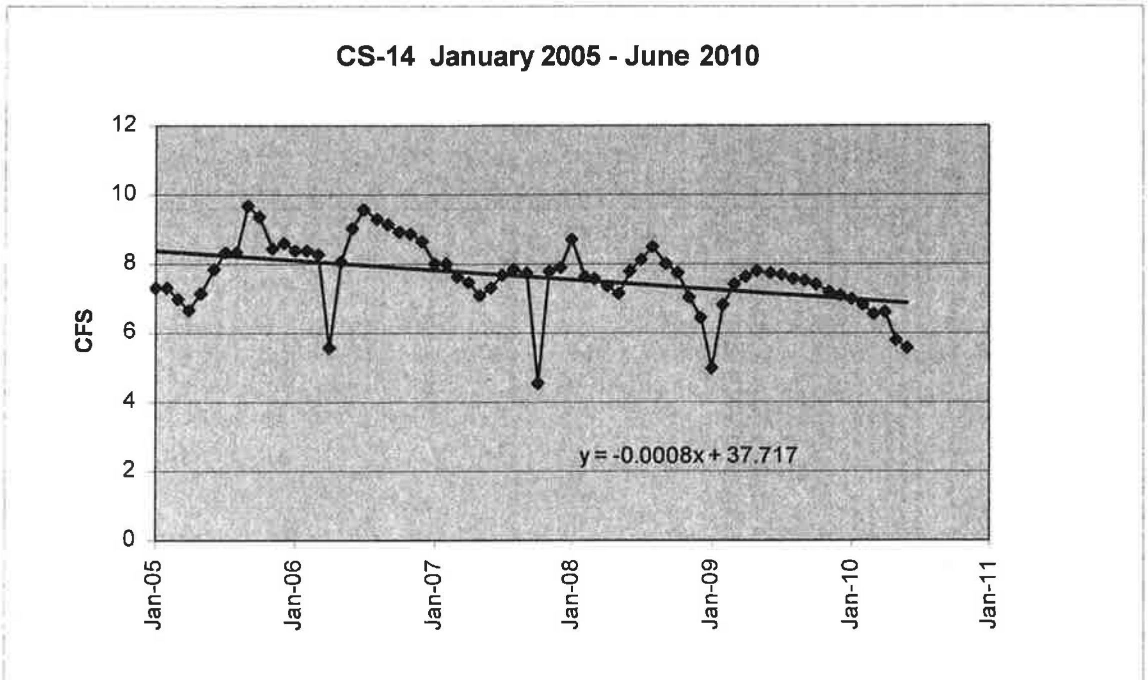


Exhibit 1 – The discharge from the mine, measured at CS-14, has been declining since 2005.

The mine workings in the southwest portion of the mine were completely flooded in September 2004. With the water in the mine workings at a static level, it is possible to measure mine inflows and the effects of increased head (if any) on the inflows with some accuracy.

The increased flow in Eccles Creek peaked at approximately 10 times the average pre-1999 annual amount, and flow in Mud Creek at about 1.2 times the average pre-1999 flow. At the same time, the peak monthly flows were only about 13% of spring runoff rates. A study (EarthFax 2002, 2003, 2004) to analyze the impacts to Eccles and Mud creeks indicated that the streams were well armored and that, so far, the increased flows have affected them very little.

Miller Creek

Miller Creek is a small tributary to Scofield Reservoir located in Section 21 T12S R7E and approximately two miles north of the Kinney #2 permit boundary. Miller Creek originates in Miller Canyon where it flows intermittently at the higher elevations. The creek becomes perennial at a lower elevation for approximately one and a half mile reach before it discharges to Scofield Reservoir from a point known as Miller Outlet. Miller Creek contributes approximately 9% of the annual flow to Scofield Reservoir. Surface water flow from Miller Outlet is measured from a culvert that discharges to the Scofield Reservoir. Typically, this location is frozen over during the months of November through March. When the stream is flowing, flow velocity averages around 141 gpm.

Upper Huntington Creek

Ephemeral and perennial streams drain the upper Huntington Creek Basin (approximately 20,000 acres; 18,000 acres in the CIA), and flow into Electric Lake, which is owned and operated by PacifiCorp (formerly Utah Power and Light Company). PacifiCorp also holds a significant portion of the water rights in the Huntington Creek basin, which they use to cool their coal-fired electric generating plant located downstream along Huntington Creek. Electric Lake has regulated the discharge of upper Huntington Creek since its construction in 1973.

Beginning in August 2001, PacifiCorp began noticing that the water level in Electric Lake was dropping faster than they were discharging it at the dam. The change in lake response is clearly seen in Figure 13, based on data that PacifiCorp provided. PacifiCorp has monitored the water levels in the lake and the amount of water being released from the dam on a monthly basis. Lake inflows were not measured, but estimated or 'imputed' by subtracting the amount of water released at the dam from the change in water volume of the lake. Over time these imputed numbers showed a fairly consistent performance of the reservoir. In August 2001, the imputed inflow numbers were consistently negative, implying that the lake was losing water at a significant rate. Traditionally, reservoirs such as Electric Lake have no need to collect accurate inflow numbers; as long as the reservoir holds sufficient water for uses downstream, there is no need to spend time and money investigating the exact nature of all inflows and outflows. Standard water-balance budgets for reservoirs generally assume both a groundwater inflow and groundwater outflow component (i.e. communication with bedrock, flow into faults, saturation of alluvial sediments, etc). However, because of the changed response in lake function, PacifiCorp began measuring the inflow into Electric Lake in July 2002 with a flume located on Huntington Creek above the Lake. The flume was recalibrated in June of 2003 and continues to collect flow data when not inundated. Because the lake level was rising in 2004, PacifiCorp installed a second flume further upstream, but still below Boulger Creek, in May of 2004. With these two flumes, measurement of inflow coming from Upper Huntington Creek has been continuous, with the exception of periods when the flumes were either washed-out or inundated. Side flows that occur during spring runoff and other high-flow periods have also been measured at least twice per year, and estimated as a percentage of total flow during months when not directly measured. Figure 14 illustrates both the calculated and measured inflows for Electric Lake (Hansen, Allen, & Luce, Inc.).

Intuitively, it may appear as though the increased losses noted at Electric Lake are associated with the increased mine inflows experienced at the Skyline Mine. However, despite the efforts of all parties, studies supplied by the Skyline Mine and PacifiCorp do not *conclusively* prove or disprove a direct connection. These studies will be discussed in more detail in Section VII of this CHIA, Surface Water Usage.

Hansen, Allen, and Luce, Inc. conducted a survey of water rights for Valley Camp of Utah in 1990. The survey covered most of the CIA. One hundred and ninety four surface water rights were found, 106 for stock watering, 25 for irrigation, 55 undeclared, and the remaining 8 for other uses. Skyline Mine conducted an updated survey of the water rights in their permit area in 2002, in conjunction with the addition of the Winter Quarters/North Lease. Most streams in the CIA have water rights filed on them.

Figure 15 graphically illustrates the Operation of Electric Lake compared with the amount of available water based on the Surface Water Supply Index for the San Rafael drainage basin for the 1983 – 2002 period. The graph generally reflects that when sufficient water is available, both Electric Lake Storage and Discharge are high. When water availability is low, storage is correspondingly lower. An interesting comparison is the1978-79 period to the 2001-02 period. In 1978, the average storage was 18,600 acre-ft while total discharge was 9,375 acre-ft. In 2001, the average storage was 16,397 acre-ft while discharge was 14,945 acre-ft. Surface Water Supply Index information is not available for 1979, however with total discharge being only approximately 50 percent of the average storage volume in 1978, the storage volume rose in 1979. The opposite effect was noted in 2001-02 when total discharge was 91 percent of the average storage volume in 2001. This was also compounded by the drought conditions experienced in the area since 1998, as illustrated by the Surface Water Supply index information. However, some of the effects of drought were negated with approximately 25 percent (4,480 acre-ft) of the water being pumped into Electric Lake from the JC-1 well.

Ground Water

Ground water is found principally in two configurations within the CIA: numerous small, localized perched systems related to discontinuous sandstone lenses in the Blackhawk Formation, and a continuous regional system in the coal seams and adjacent rocks of the lower Blackhawk Formation and the underlying Star Point Sandstone. A principal factor influencing the distribution and availability of ground water in these systems is the geology.

Geologic studies conducted for the Kinney #2 permit found that fault-block structure that forms the basin and range topography in the area is the result of faulting. These faults have been found to be a contributing influence on regional groundwater. Faulting in the Eastern Wasatch plateau will typically form a brecciated gouge zone. These fault gouge zones appear to act as both a barrier and a conduit for the movement of groundwater. As rainwater and snowmelt percolate in a downward trajectory toward the lower-lying grabens, water is both impaired by structural discontinuities and varying permeability of the material in the gouge zone. Once water percolates into the gouge zones, it is believed to then flow in a horizontal pathway following the path of least resistance.

Unlike other areas of the CIA, in the area of the Kinney #2 permit boundary, a saturated groundwater zone has not been found within the Hiawatha coal seam. Eleven wells were completed during the initial groundwater investigation for the Kinney #2 permit. Of the three groundwater monitoring wells drilled that intercepted the Hiawatha coal seam, only one well CR-06-09 has intercepted groundwater. This well is located approximately 2,000 feet northeast of the permit boundary and is separated by Eagles Canyon. Out of the remaining wells, only one other is currently producing water CR-06-03-ABV is located at the northeast corner of the permit boundary. This well was drilled in the Eagle Canyon graben, which is believed to be an active zone for the lateral transmission of groundwater migrating through the fault zone.

Geology

Stratigraphy

An offlap (regressive) sequence is exposed in the outcropping Cretaceous rocks within the CIA. Strata exposed in and adjacent to the CIA are shown on the regional geology map on Figure 3. A Mining and Geology map shown on Figure 3A presents the mine workings for the Skyline mine relative to the locations of faults. A regional geology map focused on the bedrock and surficial geology in the area of the Kinney #2 mine is presented as Figure 3b. Generalized cross-sections of the Skyline Mine and the Kinney #2 Mines are presented on Figure 4a and 4b. All figures are located in Appendix A. The geologic age of all the strata represented on the maps, with the exception of the alluvial/colluvial material in Pleasant Valley, range in age from Late Cretaceous to Tertiary (Eocene).

The oldest rocks exposed in or adjacent to the CIA are upper members of the Mancos Shale, which crops out in Huntington Canyon below Electric Lake and forms the surface of Castle Valley. The Mesaverde Group overlies the Mancos Shale and consists of the Star Point Sandstone, Blackhawk Formation, Castlegate Sandstone and Price River Formation. Overlying the Mesaverde Group are the North Horn and Flagstaff Limestone of the Wasatch Group, deposited in the very late Cretaceous and Tertiary periods. Except for well-developed soils in Pleasant Valley, quaternary sediments are generally limited to narrow, thin alluvium and colluvium deposits along valley bottoms.

The Mancos Shale consists of marine shales interbedded with sandstones and minor amounts of limestone. These shales are good aquicludes, with typically low horizontal and vertical permeability, even near faults. Information discussed later in this CHIA suggests that water may flow through some faults more readily than usually observed. The Mancos is a thick, regional aquiclude that hydrologically isolates deeper strata from the coal mining and reclamation operations considered in this CHIA. The Upper Blue Gate (formerly Masuk) Shale Member at the top of the Mancos grades upward into the Star Point Sandstone, and westward-thinning wedges of marine shale intertongue with and is considered part of the Star Point.

The Star Point Sandstone was deposited in a barrier-beach environment. It consists of three main tongues – from lowest to highest, the Panther, Storrs, and Spring Canyon - that thin eastward and are separated by tongues of marine shale. A report prepared by Kravits Geological

Services, LLC for the Skyline Mine identifies a Trail Canyon Tongue, just below the Panther Tongue, in the Skyline Mine area. Bedding in the sandstones is often massive. West of the outcrops, along the Wasatch Plateau escarpment, the sandstone tongues thicken and merge and then grade into the backbarrier, coastal plain and deltaic deposits of the Blackhawk Formation. Because of the regressive depositional sequence, the lowest Blackhawk coal seam – the Hiawatha or O'Connor - usually lies on, or just above, the top of the Star Point Sandstone. Within the Kinney #2 permit boundary east of the Pleasant Valley fault, the McKinnon seam, the Hiawatha seam, and the Columbine seam all outcrop along the Pleasant Valley graben. Additional seams in descending order that are at an elevation below the valley floor are the UP Seam and the Flat Canyon Seam (refer to cross section Figure 4b).

Doelling (1972) described the Star Point as almost devoid of shale in the Scofield area. Spieker (1931, p. 25) described the Star Point as uniformly 400 to 500 feet thick in exposures along the Wasatch Plateau escarpment, between Gordon Creek (west of Helper) and Ferron Canyon, but also noted the Star Point is 600 feet thick in central Huntington Canyon and over 1,000 feet thick along Mud Creek. A petroleum exploration well drilled just west of the Skyline Mine (in NE1/4 SE1/4 Sec 16, T. 13 S., R. 6 E) encountered a 1,200-foot thick sequence of Star Point Sandstone that consisted of sandstone layers, with a combined thickness of over 800 feet, inter-bedded with shale.

The Star Point is generally a poor aquifer, due in part to low permeability shale lenses, but water bearing characteristics are greatly enhanced by localized faulting, fracturing, and jointing. The large discharge and low seasonal variability of baseflow to Mud Creek and of springs along the Pleasant Valley fault zone indicate the Star Point has a large storage coefficient and relatively high transmissivity (Waddell, et al, 1983b, p. 78).

To better understand the geology of the Skyline area and to have better data for a numeric hydrologic groundwater model of the area, Kravits Geological Services, LLC compiled additional geologic information for the area in November 2003. The compilation consisted of drill hole information collected from 16 oil and gas wells and 73 coal exploration holes. The study focused on mapping the Star Point Sandstone, and primarily on the Storrs, Panther, and Trail Canyon Sandstone Tongues, which are likely the transgressive units supplying water to the Skyline Mine. The report states that the Trail Canyon Tongue is a more recently recognized tongue that lies just below the Panther Tongue. The sandstone tongues vary between 2 and 211 ft thick and average 44 ft thick. They are composed of relatively clean, fine to medium grained quartz sand, with sparse matrix, and 8 to 12% cement. The tongues have an average porosity of 16% and average permeability of 90 milli darcies based on work to the southeast.

The groundwater encountered by the Skyline Mine appears to be predominantly supplied by the underlying Star Point Sandstone. Although significant water has been discharged (56,000 acre-ft from January 2000 through October 2004), the Star Point Sandstone has a significant areal extent, reaching beyond the CIA, and does not appear to be affected in areas where the Star Point Sandstone water is being put to beneficial use.

The Blackhawk Formation consists of approximately 1,500 to 1,900 feet of lenticular claystones, siltstones, sandstones, and coal seams deposited in backbarrier, coastal plain, and deltaic environments. The claystones contain high percentages of montmorillonite and other swelling clays (Coastal, 1993, p. PHC2-3). The Blackhawk is the main coal bearing formation in the Wasatch Plateau. The important coal seams occur in the lower 350 feet, which is the section that inter-tongues with the Star Point Sandstone. The lower Blackhawk and upper Star Point are usually considered to be one continuous aquifer.

Fluvial channel sandstones are found in the lower Blackhawk but are more frequent toward the top of the formation. These sandstones are local in extent, generally fine grained, and well cemented. They have localized high clay content. The discontinuous character of these channel sandstones and the abundance of clay throughout the Blackhawk Formation produce perched aquifers and favor formation of local flow systems that discharge through numerous seeps and springs.

The Castlegate Sandstone, the basal part of the Price River Formation, is typically massive, resistant to erosion, and white to gray in color. It consists of fluvial pebble conglomerates and fine- to coarse-grained, argillaceous sandstones with some shale. It is carbonaceous in the Book Cliffs, but the coal is thin and lignitic. The Castlegate Sandstone is good aquifer material, with seeps and springs common at the Castlegate-Blackhawk contact.

The Price River Formation is light-colored, medium-grained and shaley sandstone interbedded with roughly an equal volume of darker, carbonaceous shale or mudstone. There are large point-bar sandstones, and also minor amounts of coal.

The Mesa Verde Group is overlain by the North Horn Formation, which is exposed along the top of the ridge in the western part of the CIA. The North Horn is composed of bentonitic, calcareous, silty, shales interbedded with thin limestones and fine-grained sandstones, and minor amounts of conglomerate. There are lenticular channel-sandstones throughout, enclosed by the fine-grained shales.

The Tertiary Flagstaff Limestone, which lies outside of the CIA to the west, is the youngest consolidated rock in the region. Fracturing and dissolution can produce good permeability in this lacustrine limestone, and it is an aquifer thick and extensive enough to receive and store adequate recharge.

Structure

Surface elevations vary from 7,600 feet to 10,400 feet within the CIA, with the Star Point Sandstone and Blackhawk Formation outcrops forming most of this relief.

The CIA is located near the north end of the Wasatch Plateau structural province and lies on the Clear Creek anticline, primarily on the west flank. Bedrock generally dips on the west flank range from three to six degrees, to the southwest at the south end of the CIA and to the northwest at the north end.

The Pleasant Valley fault zone, one segment of a regional fault zone that extends north south across the Wasatch Plateau, lies on the axis of the Clear Creek anticline. Total vertical displacement is 800 to 900 feet, down to the east. Intertongued Star Point Sandstone and Mancos Shale crop out west of the fault zone, but the Blackhawk Formation crops out on the east. Mud Creek flows north along the Pleasant Valley fault zone to Scofield Reservoir, where the fault zone broadens to become the Pleasant Valley Graben. UP. Canyon, where Skyline's waste rock disposal site is situated, also follows one of the faults of this zone. Strata east of the fault zone, but within the CIA, are generally flat lying - Figures 4a and 4b, Appendix A show geologic cross sections on either side of the Pleasant Valley fault.

Other major faults in the CIA are high-angle, normal faults that run north south to northeast southwest. Movement is dominantly down to the west. The largest of these faults, with up to 350 feet of displacement, is the O'Connor fault that obliquely transects the White Oak permit area. The Connelville Fault zone, up to 1,000 feet wide and with up to 250 feet cumulative vertical displacement, separates the Skyline and White Oak mines. Upper Huntington Creek and Electric Lake lie along the Upper Joe's Valley fault zone that includes the Diagonal fault, which is paralleled on the east by the Valentine fault. The Joe's Valley, Diagonal, Valentine, and smaller unnamed faults do not have significant vertical displacement within the CIA. All of these faults gradually die out to the north and do not extend beyond the northern CIA boundary. The O'Connor and Upper Joe's Valley faults continue southward outside the CIA. Very small displacement faults, oriented roughly east west, have been encountered in the White Oak Mine and mapped on the surface at the Skyline Mine (Figures 3a and 3b, Appendix A). Four major joint and fracture orientations have been mapped underground and at the surface.

Some of the smaller east-west trending faults have been intruded by magma that solidified to form dikes. A major dike passes through the White Oak Mine, extending from Mud Creek to the Connelville Fault. Coal has been coked adjacent to this dike and has a slightly increased metal content. There is evidence these dikes affect the movement of ground water in the shallow perched systems (Figures 3a, 3b, and 4, Appendix A). Most of the approximately north-south trending faults located west of the Connelville Fault die out, or terminate in the area of an east-west trending fault in Sections 22, 23, 24, Township 13 South, Range 6 East. North of this fault the majority of the faults and fractures trend east west. These faults appear to be sub-parallel to the Fish Creek Graben located a few miles north of the Winter Quarters/North Lease area. Canyon Fuel measured the in-situ stresses in the rocks of Mine No. 3 (generally to the north); the results indicated that the rocks were in compression in an east-west direction. Similar tests conducted in Skyline Mine No. 2 (generally to the south) indicated the rocks were in extension in an east-west direction.

The geologic history of faulting in this area has resulted in a geomorphology of north-south elongated fault-controlled structural blocks that form basin-range style topography. These uplifted blocks in some instances have enough coal reserve to mine while in other cases are too small and isolated to be economically viable to mine.

Aquifer Characteristics

In the CIA, the Star Point Sandstone, Blackhawk Formation, Castlegate Sandstone, Price River Formation, North Horn Formation, and Quaternary deposits all contain potential reservoirs or conduits for ground water. Reservoir lithologies are predominately sandstone. Sandstone reservoirs occur where there is sufficient intergranular porosity and permeability in lenticular fluvial-channel and tabular overbank deposits. Shale, siltstone, and cemented sandstone beds act as aquitards or aquicludes to impede ground-water movement. The Mancos Shale is a regional aquiclude that limits downward flow. Localized aquitards can occur within any of the more permeable formations. Ground water in the CIA occurs under both confined and unconfined conditions.

Shallow, perched ground water systems provide water to the seeps and springs issuing at the Castlegate Sandstone-Blackhawk Formation contact and from sandstone lenses of the Blackhawk Formation. The Blackhawk sandstone lenses are discontinuous and of local extent. Springs and seeps discharge on the slopes at an elevation considerably above nearby streambeds. The majority of seeps and springs daylight along the canyon sidewalls within the Blackhawk formation, often at a shale-sandstone interface. Flow is influenced by the dip of the strata and varies seasonally in response to precipitation and snowmelt. The perched systems may provide some flow directly to alluvial and colluvial fill in canyon bottoms, but they do not provide sufficient baseflow to sustain perennial streams. A total of 25 springs, 18 ground water wells, 38 stream sites, and 6 in-mine sites are continually monitored as part of the Skyline permit. A total of 4 springs, 11 groundwater monitoring wells, and 3 stream sites have been monitoring for baseline studies at the Kinney #2 mine since 2005. Figure 5 (Appendix A) illustrates all of the monitoring sites within the CIA.

Recharge percolates from the surface downward until shale, or another aquiclude is encountered. The water then moves down dip, and is channeled into discontinuous, but more permeable, sandstones creating isolated aquifers. Water in these isolated aquifers either continues to move down dip until it is discharged at the surface, or until it is able to resume vertical flow. Discharge from most seeps and springs in the CIA closely tracks precipitation rates, and recharge probably originates in the small surface depressions or basins in the immediate vicinity. The perched system of the Blackhawk Formation and regional Star Point Sandstone are separated by unsaturated rock. Flow along faults and fractures through the Blackhawk Formation appears minimal, due to the sealing ability of the clays (see section 2.3 of the Skyline Mine MRP), but some recharge does move below the perched systems to reach the deeper regional saturated strata or aquifer. Results from the age-dating techniques used at the Skyline Mine suggest that a portion of the water encountered at the mine has a modern component (i.e. in contact with the atmosphere post 1950's). PacifiCorp's tritium study also indicates a modern component.

Figure 5a provides flow data for selected springs around Electric Lake compared to the Surface Water Supply Index (SWSI). Though a few of the springs showed no reduction in flow with the 2000-2004 drought, those that did show reduced flow are consistent with the drought conditions.

Figure 5b provides flow data for selected stream locations in the Upper Huntington Creek basin. There have been no notable reductions in flow, except those attributed to the drought conditions experienced since 2000.

The Skyline Mine has encountered significant inflow along the faults solely from the floor of the mine. Any inflows encountered from the roof have been of limited duration, which is consistent with roof flows from the Blackhawk Formation at other mines.

In the area west of the Pleasant Valley fault, a regional ground water system is located in saturated coal and rock of the lower Blackhawk Formation and Star Point Sandstone. Observation wells show that the water in this deeper regional system resides beneath the headwater drainages in the CIA and has not shown influence on the seeps and springs of the shallower lenticular systems. The Skyline Mine has historically been a relatively dry mine, with occasional roof drips, and occasional channel sandstones that typically dry up immediately or flow for a brief period. The mine did not start producing significant amounts of water until 2001, when they started encountering fracturing and faults in the floor of the mine, which were the source of the large inflows. The theory that a large portion of the water is coming from a deep regional aquifer located in the Star Point Sandstone is supported by the performance of the JC-1 and JC-2 wells, and the drawdown noted in the areas surrounding JC-1. A potentiometric surface map of the regional aquifer provided by Canyon Fuel Company (Skyline MRP drawing 2.3.4-2, last updated October 4, 2007,) indicate that the gradient is generally from southwest to northeast in the Skyline permit area. Until March 1999, a long-term decline of water levels in the wells, typically less than 3 feet per year, was attributed to long-term decreases in precipitation and to dewatering of the aquifer by mining (Coastal, 1993, PHC2-4, Figure 3c). The long-term draw down of the aquifer was observed in wells W79-26-1 and W79-35-1B (Exhibit 2), which saw declines of 48 feet and 15 feet, respectively from 1982 through June 2003 (Figure 3c, Appendix A). Well W79-35-1A showed an 88-foot elevation drop from 1982 through 1998.

In the area east of the Pleasant Valley fault east of Scofield Reservoir, groundwater is characterized in the area underlying the Kinney #2 permit area as being limited to minor, localized perched aquifer systems in the Blackhawk formation. The Hiawatha coal seam to be mined has been found to be dry within the permit boundary. More significant sources of groundwater have been found east of the Kinney #2 permit area in the form of a series of springs, seeps, and spring-fed ponds that form along the axis of Eagle Canyon graben and the subsequent graben to the east Long Canyon. These springs, seeps and ponds are believed to be the result of a surface expression of groundwater from rain and snowmelt percolating through the more porous sandstone lenses in the Blackhawk and are impeded by the more impermeable lenses of siltstone and shales.

Eagle Canyon forms an intermittent channel that ultimately drains to the Scofield Reservoir. Long Canyon is intermittent for most of its length but turns into a perennial reach at a lower elevation where it joins with Miller Canyon and becomes Miller Creek. The source of the surface water for the perennial reach of Miller Creek is likely attributed to the cumulative volume from the numerous springs originating from the higher elevations in Long Canyon, any groundwater from the perched systems migrating in a down dip northwesterly direction of the bedrock, rain and snowmelt, and the fact that this Miller Creek intersects Miller Canyon and is a receiving channel for any intermittent flows from this canyon.

The most significant source of groundwater is from an area known as Sulfur Spring. This spring is located directly on the Pleasant Valley Graben East Boundary Fault. Sulfur spring is a natural sulfur spring that is anomalous in that it flows year round at an approximate rate of 80 gpm. The water quality is considered poor and is believed to either be discharging water from the Colombine coal seam or discharging groundwater that is moving horizontally along the Pleasant Valley fault system, or a combination of both. Baseline data is available for Sulfur Spring in Chapter 7 of the Kinney #2 MRP.

Pleasant Valley represents another aquifer system mostly comprised of alluvial/colluvial deposits that is distinct from the perched systems found in the higher mountainous elevations. The East Boundary fault that created Pleasant Valley has formed a floodplain at the confluence of Mud Creek and the Scofield Reservoir. The floodplain consists of shallow groundwater that is contained in the alluvial deposits associated with the Mud Creek drainage. The groundwater system within the alluvial deposits appears to be closely tied to the surface water system where recharge occurs during periods of high flow. Monitoring well data from two wells drilled in the floodplain on the western boundary of the Kinney #2 permit area have consistently detected groundwater at an approximate elevation of 7,648 ft above sea level (ASL). The average water level of Scofield Reservoir is 7,618. Not surprisingly, groundwater gradient in the south end of Pleasant Valley flows toward the reservoir.

Data were not available to draw a correlation between any hydrologic connection feeding the alluvial aquifer in Pleasant Valley and any form of a continuous regional aquifer system that exists at the base of the Blackhawk formation/Upper Starpoint Sandstone. The existence of a regional aquifer has been reported in the western portions of this CHIA, primarily containing water in the coal outcrops on the western side of the Pleasant Valley fault but no data presently exist confirming the presence of groundwater at lower elevations below the Hiawatha coal seam in the Kinney #2 permit area. Drilling activities during the initial exploration phase for the Kinney #2 mine found the Hiawatha coal seam to be dry in several borings drilled within the proposed permit boundary. It should be noted that the Hiawatha coal seam to be mined in the Kinney #2 permit area is located approximately 280 feet above the Scofield Reservoir surface level and is essentially truncated by the Eastern Boundary Fault of Pleasant Valley (see cross section 4b). There is no apparent hydrologic connection between the perched aquifer systems that exist in the Blackhawk sandstone above the Hiawatha coal seam and the alluvial aquifer that exists in Pleasant Valley.

The following tables represent the volume of water measured from United States Geological Survey (USGS) gauging station 09310700 Mud Creek Below Winter Quarters Canyon from surface water drainages discharging into the Scofield Reservoir since the year 2005:

YEAR	Table 1. Mud Creek Monthly Discharge Mean in cubic feet per second (cfs)											
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2005	12.1	13.2	15.5	20.3	138.5	48.8	13.6	12.9	12.3	13.9	14	12.9
2006	12.7	12	11.9	28	114.5	36.3	18.9	14.9	14.2	16.9	16	15
2007	14.9	15.3	17.8	21	34.5	18.8	14.3	13.8	14.9	12.4	13.4	12.7
2008	11.6	13.1	10.1	15.9	64.5	83.5	20	14.5	14.3	13.9	13.2	13.5
2009	12.4	12.3	13.1	18	56.9	23.8	14.3	12	14.4	14.1	12.3	13.3
Mean of monthly Discharge	13	13	14	21	82	42	16	14	14	14	14	13

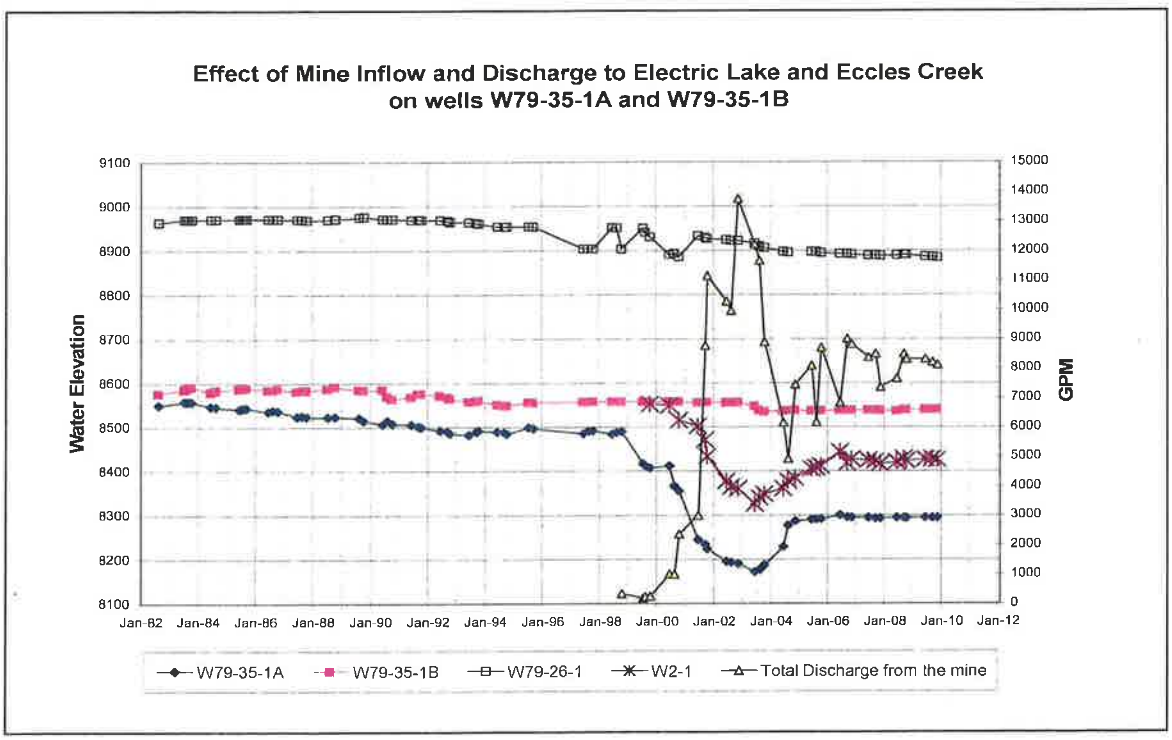


Exhibit 2 – Response of water levels in wells W2-1, W79-26-1, W79-35-1A, and W79-35-1B to mine water discharge (as an indicator of mine inflow).

From March 1999, until Canyon Fuel completed mining of the 12LB panel and allowed the southwestern portion of the mine to start flooding in January 2004, the Mine encountered significant water from fracture/fault zones (primarily from the Diagonal Fault), and systematically drew down the potentiometric head of the Star Point Sandstone. Two wells that illustrate the draw down are W79-35-1A and W2-1, where potentiometric surfaces dropped 318.26 feet and 226.1 feet, respectively, from 1998 through June 2003. Both wells have partially recovered since the southern portion began flooding in January 2004: 122.55 feet and 100.47 feet through November 2009. Although 19 ground water wells exist within the Skyline Mine permit area, well W79-35-1B is the only well completed in the Blackhawk Formation that does not penetrate the coal seam or the Star Point Sandstone. Figure 3c illustrates that the drawdown of the Star Point aquifer is focused primarily along fault and fracture lines.

Natural discharge from the regional groundwater system occurs as baseflow into Mud Creek and the lower reaches of its perennial tributaries, and into Huntington Creek downstream of Electric Lake. Natural discharge also occurs as seeps and springs at faults and along the outcrop of the impermeable Mancos Shale. The Mancos Shale outcrop delimits the lateral extent of this regional aquifer. Water is unable to flow downward through the Mancos at any significant rate, so prefers to flow laterally through more permeable overlying strata until it discharges at the surface. Little is known of the Blackhawk-Star Point aquifer to the west, but it does not crop out and is considered to extend beneath the Sanpete Valley.

As evidenced by Skyline's monitoring well at the waste rock disposal site, the regional aquifer continues to the east of Mud Creek in the Blackhawk-Star Point strata. Water supply wells in alluvium along Pleasant Valley produce from a shallow, unconfined aquifer interconnected with Mud Creek. The connection between this alluvial aquifer and the regional Blackhawk-Star Point aquifer is not uniform, but areas have been identified where ground water flows through the Pleasant Valley Fault from the regional aquifer to the alluvial aquifer and directly to Mud Creek. During periods of low flow, water in Mud Creek comes mainly from seepage from the regional aquifer (Waddell and others, 1983b, p. 34).

Faulting has only local importance in the Blackhawk Formation because clays tend to seal fractures and stop or restrict water movement. On the other hand the clay content of the Star Point Sandstone is low, therefore, fractures are not as readily sealed by clay as in the Blackhawk (see Section 2.3 of the Skyline Mine MRP), and secondary permeability created by fracturing increases the mobility of water through the regional system. Observations within the Skyline Mine suggest that sections of major faults (e.g. Diagonal and Connelville) where vertical displacement is less pronounced (0-200 ft), do not seal off, and do act as conduits for water to flow. Conversely, sections of faults with large vertical displacement result in gouge-filled, low permeability fault zones that do not produce significant amounts of water. This is evident in the performance of wells JC-1 and JC-2 located in James Canyon of the Skyline Mine permit area. Both wells were drilled as production wells to intercept water before it entered the mine. JC-1 is a 14 1/4-inch diameter well with a 60-foot screen-interval that is completed within the Diagonal Fault -fractured Star Point Sandstone approximately 70 feet below the Skyline Mine workings, and currently (July 2010) still pumps approximately 4,000 gpm. JC-2 is a 20-inch diameter well with a 60-foot screen drilled from the same site as JC-1, but at a different angle. Unfortunately, JC-2 was not completed within a fractured portion of the Star Point Sandstone and pump tests showed that it would only yield approximately 350 gpm. Due to the low yield, JC-2 was only pumped for a very short time, and no plans exist to pump it in the future. Because JC-2 had such a low yield, Canyon Fuel was forced to drill a third well, JC-3, to increase dewatering from the 10-Left area of the mine. JC-3 was completed in the mine workings near the 10-Left inflow. Between July 2003 and July 2004, JC-3 was pumped at rates varying from 600 gpm to 6,700 gpm, but because water quality is not satisfactory for discharge into Electric Lake, it has been pumped only once (October 2007) since July 2004.

In the case of the CIA area east of the Town of Scofield, groundwater was not found above or within the Hiawatha coal seam within the permit boundary of the Kinney #2 permit area; however, groundwater was present in a monitoring well advanced in Eagles Canyon graben. In Eagle Canyon graben, the Hiawatha seam has been dropped down approximately 170 feet below its elevation in the Kinney #2 permit boundary (refer to Figure 4B). It is interesting to note that groundwater is detected in the Hiawatha seam in the graben, but not at higher elevations of the Hiawatha seam in the permit area. Groundwater is either present as part of a regional water table located at this lower elevation, or it is present as a result of groundwater transmission via the fault gouge zone.

Core Laboratories, Inc. (Dallas, Texas) measured hydraulic conductivities in eight core-samples from the Star Point Sandstone and Blackhawk Formation (Lines, 1985, Table 3). The cores were collected from a well in NE/4SE/4NE/4 Sec 27, T. 17 S., R 6 W., approximately 30 miles south of the Skyline Mine. Values for both horizontal and vertical hydraulic conductivities in the Star Point Sandstone were on the order of 10^{-2} ft/day. In the Blackhawk Formation, horizontal hydraulic conductivities in the shales ranged from no measurable permeability to 10^{-8} ft/day, and in the siltstones from 10^{-9} to 10^{-7} ft/day; vertical hydraulic conductivities were typically within one order of magnitude of corresponding horizontal hydraulic conductivity values, although vertical hydraulic conductivity was greater than horizontal hydraulic conductivity in some samples and small in others..

A pair of drawdown/recovery tests conducted in a test well near the Skyline portal found the transmissivity of the Blackhawk to be approximately 18 gal/day/ft (2.4 ft^2/day). No significant difference was noted between the coal zone and sandstone tongue (Vaughn Hansen Associates, 1979, p. 85). Transmissivity of the entire Blackhawk-Star Point aquifer, based on pump tests and core analyses from the Trail Mountain area, ranges from 20 to 200 ft^2/day. The storage coefficient averages about 10^{-6} (ft/ft) for confined conditions and about 0.05 (ft/ft) for unconfined conditions (Lines, 1985, p. 15).

As part of the numeric hydrologic modeling conducted for Canyon Fuel Company, the estimated or bulk hydraulic conductivity (K) for the Star Point Sandstone, using several analytical techniques, was found to be approximately 2 ft/day, and the specific storage to be approximately 6 x 10^{-6} ft^{-1} in the vicinity of the Skyline Mine. Conversely, the modeling assumes K values of about 1 ft/day in the Star Point Sandstone outside of the zone of north-south fracturing, where historic inflows were much lower. Except as described below, the small-displacement faults are assigned K_h values of 0.001 ft/day in the upper portions of faults (within the overburden) and K_h values of 1.0 ft/day within the sandstone units below the Lower O'Connor B coal seam. The Diagonal Fault is assigned a K_h value in the sandstone of 10 ft/day generally, and 20 ft/day beneath the mine.

Seeps and Springs

Skyline

In 1978, 174 seeps and springs were identified on and adjacent to the Skyline permit area, of which 30% were seeps. This is roughly one spring or seep for every 40 acres. The seeps and springs exhibited higher flows in the springtime than at other times of the year. Many seeps and springs dried up completely during the summer, and by fall most of the remaining sources flowed less than 2 gpm; only four springs flowed more than 10 gpm in the fall. (Coastal, 1993, p. 2-24a and -25a). A survey of the White Oak mine area in 1978 and 1979 found 94 flowing, and 15 dry seeps and springs (Valley Camp, 1993, p. 700-7). In early summer, 8 of the sources had flows greater than 10 gpm, but by autumn most springs were flowing less than 1 gpm and many could not be located (Engineering-Science, 1984, p. 33). Another survey of the White Oak area in the summer of 1990 identified 81 flowing and 43 dry seeps and springs (Valley Camp, 1993, p. 700-7). Anticipating the addition of the Winter Quarters/North Lease tract, Canyon Fuel conducted another spring and seep survey in 1993, from which they selected monitoring sites to characterize the new lease area. The monitored springs have exhibited an overall decrease in flow (Coastal, 1993, p, PHC2-6; Valley Camp, 1993,p 700-6). The Skyline and White Oak surveys probably include duplicate information on some springs because the two permit areas abut.

Due to the significant inflows encountered in the Skyline Mine since August 2001, Canyon Fuel has increased monitoring of the seep and spring flows within the Skyline permit and adjacent area. All of the seeps and springs in the Skyline groundwater monitoring program are located within the Blackhawk Formation; none have indicated a draw down or an obvious decrease in flow that can be correlated to the mine inflows. No seeps or springs have been found at Skyline's waste rock disposal site (Coastal, 1993, p. 2-30a).

White Oak

According to the Seep and Spring survey conducted in the White Oak permit area in the summer of 1990, a total of three seeps/springs would be affected by surface mining that was planned at that mine. Seeps/springs S25-13, S25-14, and 30-1 are all located up gradient of the surface mining. Seep/spring S25-13 is the only site that provided consistent enough flow to be continually monitored. Recorded quarterly flow measurements from site S25-13 range from 0 to 60 gpm, and average <5 gpm. It was anticipated that any flow from the three seeps or springs would still report to Whisky Creek and not be significantly impacted by the surface mining. The Division completed reclamation of the White Oak Mine in late 2005, including a restoration of Whisky Creek and installation of French drains where necessary to conduct seep/spring flow to the creek.

Seeps and springs often issue at shale-sandstone interfaces. Flow along faults and fractures through the Blackhawk Formation appears minimal, due to the sealing ability of the clays abundant therein (see Section 2.3 of the Skyline Mine MRP).

Kinney #2

A spring and seep survey was conducted at and adjacent to the Kinney #2 permit boundary in 2006 by Rock Logic Consulting, LLC. As a result of the investigation, a total of 32 springs and seeps were identified in the permit and adjacent area. The majority of these springs and seeps were identified along the fault-related perched aquifer systems within Eagle Canyon and the subsequent canyons to the east including: Long Canyon, Miller Canyon, and Jump Creek Canyon. Springs and seeps were observed to be either discharging from rock ledges or expressed on the surface as spring-fed ponds. Most of these seeps reported flow rates on the order of less than 1 gallon per minute. Springs located further to the east in Long and Miller Canyons reported flow rates in select springs between 5 - 10 gpm. Sulfur spring, located to the north of the Kinney #2 permit boundary is located along the Pleasant Valley fault and has year-round flow rate of 80 gpm. This spring discharges into the Scofield Reservoir. The water quality from this spring is considered poor and the water was reported to have a strong sulfur odor to it.

One water right has been identified in the Kinney #2 permit area as WR-4026. This water right is listed as being on an "unnamed spring and used for stockwatering purposes" totaling 10.76 acre feet. Since there are several seeps and ponds in Eagle Canyon, the Permittee is in the process of field checking the precise location of this water right and verifying this information with the Utah Division of Water Rights.

Electric Lake Seepage (not updated in 2010)

Beginning in November 2002, Electric Lake (a man-made reservoir) has been included in the CHIA due to its proximity to the Skyline Mine. Skyline Mine comes within approximately 500 feet horizontally and approximately 850 feet vertically of Electric Lake. Information provided by PacifiCorp (owner/operator of Electric Lake Reservoir) suggests the reservoir has lost appreciable amounts of water coinciding with the major inflows encountered within Skyline Mine beginning in September 2001. Prior to June 2002, performance of the reservoir was based on reservoir elevation and discharge from the dam; inflow data to the reservoir was then back calculated (assuming no water was lost to infiltration). From June 2002 through spring runoff 2003, then June 2003 to present, actual inflow data has been collected for the reservoir, including the water pumped in via the James Canyon Wells. These provide additional hard data to include with the reservoir performance data, and to more readily quantify what volumes of water are being lost to the surrounding geologic formations. The data provided by PacifiCorp (PacifiCorp 2003, 2004; Hansen, Allen, & Luce, Inc. 2005) do show that the performance of the reservoir has changed substantially since 2001. However, none of the 16 springs and streams feeding into Electric Lake that are part of the Skyline Water Monitoring program have demonstrated the type of reduced water availability that has been recorded in the lake.

Seepage studies were done in Eccles Creek, South Fork of Eccles Creek, and Huntington Creeks. There is a significant increase of flow in Eccles Creek where the stream crosses onto the Star Point Sandstone outcrop. There is another significant increase at the O'Connor Fault where the fault conveys water through fractured Star Point Sandstone to the stream. In comparison, the Connelville Fault does not add significantly to flow in either the Main or South Fork of Eccles Creek because potential flow paths through the fractured Blackhawk Formation have apparently been sealed by clays. Observations within the Skyline Mine suggest that sections of major faults (e.g. Diagonal and Connelville) where vertical displacement is less pronounced (0-200 ft), do not seal off, and do act as conduits for water to flow. Conversely, sections of faults with large vertical displacement result in gouge-filled, low permeability fault zones that do not produce significant amounts of water.

Changes of stream flow in Huntington Creek can be largely accounted for by inflow from tributaries and hillside springs. Loss of flow just above Electric Lake is attributed to recharge into the alluvium (Vaughn Hansen Associates, 1979, pp. 68 - 80).

Water in Mines

The coal seams mined within the CIA are located in the lower Blackhawk Formation, within strata included in the Blackhawk-Star Point aquifer. The saturated conditions encountered in the White Oak and Skyline Mines have been along fracture and fault zones, and have persisted as mining has progressed down dip. Similar conditions were found in the Utah #2 Mine, a pre-SMCRA mine, while it operated in Pleasant Valley (near the White Oak Loadout). The Utah #2 Mine was located approximately one mile south of the proposed Kinney #2 mine.

Mining of the Hiawatha coal seam in the Kinney #2 will not occur in Eagle Canyon graben where appreciable amounts of groundwater would likely be encountered from the fault system. The Kinney #2 Permittee has proposed to monitor the groundwater quality within Eagle Canyon graben during the operational mining phase via an in-mine well. This well will have a horizontal completion and pierce the gouge zone of the West Boundary fault that forms the border of Eagle Canyon graben. Because mining will not cross any major faults, groundwater flowing laterally along fault lines is not likely to be encountered as inflows during mining. Groundwater from overlying perched lenses of fluvial sand channels within the Blackhawk formation are anticipated to be encountered. These lenses are recharged primarily by direct precipitation and groundwater reinfiltration and are considered limited in aerial extent.

Slight declines in the water levels of wells complete in the Blackhawk-Star Point aquifer in the vicinity of the Skyline Mine, (typically less than 3 ft per year) can be attributed to both decreases in precipitation (drought periods), and to dewatering of the aquifer by mining (Coastal, 1993, Figures PHC2-4, July 2002 Addendum to the PHC). Ground water flow into the mines can be characterized as:

- Seepage from the coal seams and associated channel sandstones,

- Flow from Blackhawk channel sandstones that have been fractured by faulting and folding, or
- Flow coming up from the Star Point Sandstone through the Blackhawk by way of faults and fractures.

Discharge from coal seams and channel sandstones average approximately 10 gpm per active mine face, but flow of 200 gpm was encountered at the Connelville Fault in the White Oak Mine. Water production in the mines typically declines rapidly over a short time. Most inflows dry up by the time mining has advanced 500 feet beyond them, but an occasional roof bolt dripper will continue to flow up to 2 gpm for an extended time (Coastal, 1993, p. 2-49). A 200 gpm flow from the Connelville Fault observed in the White Oak Mine decreased to 10 to 15 gpm over a four-day period. These observations indicate that permeability is most likely localized, and recharge to the saturated areas is not extensive. Permeable zones in the Blackhawk sandstones are capable of yielding large quantities of water from storage for a short period of time, but are not extensive enough to have sufficient storage or recharge to sustain flows. Seasonal fluctuations of inflow have been observed and are attributed to both seasonal recharge and to subsided areas that intercept surface runoff (Engineering-Science, 1984).

Faulting typically has only local importance in the Blackhawk Formation because the high clay content tends to seal fractures, and movement of water along most faults appears to be effectively blocked or restricted by these clays. Of the 44 individual fault planes encountered up to 1988 in the Skyline Mine, only 5 dripped water from the roof (4 of those where faults intersected sandstone paleochannels). During the same period of time, water discharged up through the floor from the Star Point Sandstone along two other faults (Coastal, 1993,p. 2-24).

Fracturing in the Star Point Sandstone is not as likely to be sealed by clays as in the Blackhawk and as a result, secondary permeability created by fracturing tends to increase the mobility of water through the Star Point. Flows of up to 450 gpm were measured from the Pleasant Valley Fault zone in the Utah #2 Mine. In the area of the Kinney #2 mine, the Hiawatha coal seam is truncated just east of the Pleasant Valley fault. Underground mining activities will advance up to this fault but will not cross the fault. At different times, flow from the Clear Creek Mine portal has been reported to be between 100 and 300 gpm (Waddell and others, 1983b; Engineering-Science, 1984). When Division personnel checked this portal in September 1993, water was still flowing at approximately the same rate, however as of 2003 water was no longer flowing from the portal. Most of the water that flowed into the Clear Creek Mine came from the Pleasant Valley fault. Water from Mud Creek was intercepted upstream of the mine and reached the fault by way of abandoned mine workings and through the Star Point Sandstone (Waddell, et al., 1983b). Because of the Pleasant Valley Fault zone, it is expected that mines east of Mud Creek will typically have larger, more persistent inflows than mines on the west side.

North Joes Valley Fault has little offset and is not a major structural feature within the CIA. Flow of water from the surface into the mine, through the Blackhawk Formation by way of the North Joe's Valley Fault zone, would not be anticipated because of the sealing clays in the

Blackhawk Formation (see section 2.3 of the Skyline Mine MRP). In addition, the no mining buffer zone should separate mine workings from main sections of the fault along Huntington Creek and Electric Lake. This will reduce the possibility of reactivation of faults by subsidence and subsequent downward flow along the reactivated faults.

Beginning in March 1999, Skyline Mine encountered a series of major water inflows that are summarized in Table 1. These inflows are cumulatively the largest ever to occur in an underground coal mine in Utah. However, as evidenced in Table 1, the flows have steadily decreased with time, especially once Canyon Fuel allowed the southwestern portion of the mine to flood. Until March 1999, the combined discharge to Eccles Creek never exceeded 795 gpm, and averaged just 285 gpm.

Table 2 - Water Inflows to Skyline Mine

Inflow Location	**Date**	**Estimated Initial Flow, gpm**	**Estimated March 2003 Flow, gpm**	**Estimated March 2004 Flow, gpm**	**Estimated December 2004 Flow, gpm**	**2008 - 2009 Average Flow, gpm**
14-Left HG	03/1999	1,600	300	300	14, 15, 16L	
16-Left HG	12/1999	1,200	300	300	Combined 600	
W. Submains (now referenced as Diagonal Fault)	03/2000	1,000	300	209		
10-Left	08/2001	6,500	3,200	3,200		
E. Submain XC5	10/2001	1,000	370	380		
11-Left HG XC24	02/2002	1,000	900	500	All other flows	
11-Left HG XC40	02/2002	1,000	1,000	700	In SW portion	
11-Left Setup Rm.	03/2002	1,500	1,300	700	Combined 2,500	
CS-14 discharge						**3,400**
	Totals	**14,800**	**9,300**	**6,289**	**3,100**	**3,400**
	% of initial flow		63%	42%	21%	23%

These inflows prompted considerable investigations by the mine and outside consultants in an attempt to find out where they were coming from and how to alleviate them. They also necessitated a revision to this CHIA in November 2002. All of the inflows were in Mine 2, which proceeded further west than Mines 1 or 3. All of these inflows are associated with faults, and enter the mine through the floor. The investigations by HCI and Petersen (Appendices C, G, and H of July 2002 Addendum to the Probable Hydrologic Consequences (PHC), PHC Addendum Appendix J) suggest that the water source is the Star Point Sandstone located beneath the coal seam. The Star Point in the mine area is believed to consist of 14 different sandstone layers totaling 743 feet in thickness. As discussed earlier, this formation has a large storage coefficient and relatively high transmissivity. The large numbers of fracture planes that make up the regional fracture network provide the surface area necessary to drain the water stored in the matrix of the Star Point Sandstone. Based on ^{14}C age dating and tritium analysis, the water in the Star Point Sandstone is believed to be of ancient origin and represents an isolated groundwater storage volume that is not in direct connection with the surface.

Immediately after the 6,500-gpm inflow in 10L began in late 2001, the mine drilled 2 wells into the fault that intercepted the 10-Left inflow. The intent was to remove ground water before it entered the mine and thus reduce inflows. Only one well, JC-1, produced appreciable water and as of July 2010 it was still pumping approximately 4,000 gpm. This pumping was only marginally successful at reducing inflow waters and was estimated to reduce the inflow no more than 800 gpm while the well was pumping 2,200 gpm (HCI).

Though information provided by PacifiCorp (PacifiCorp 2003, 2004) suggests that Electric Lake is losing water at an "alarming" rate; water chemistry, stable and unstable isotope analysis of the water, and dye tracer studies to date do not confirm a direct connection between the mine and lake (see Section VII). Based on observations within the mine, as well as other studies and data, the Star Point seems to be the source of the majority of the inflows. However, there is a component of modern water in the inflows, which may be coming from Electric Lake or other surface water storage by way of the Star Point Sandstone and related fractures.

Ground- and surface-water monitoring of streams, springs, and seeps conducted by the mine has not indicated any impacts due to the increased in-mine flows. The springs and seeps respond rapidly to seasonal and climatic cycles, indicating that the springs are fed by discharge from a shallow groundwater system. Appendix A of the Skyline Mine July 2002 Addendum to the PHC graphically outlines the flow of the springs and their response to the Palmer Hydrologic Drought Index (PHDI). Age dating of numerous springs also supports the recharge being fed from a shallow groundwater system. Based on water-monitoring data, springs, seeps, and streams entering Electric Lake do not appear to be impacted by the volume of water being discharged from the mine.

Most of the monitoring wells available for analysis are either completed in the Star Point Sandstone or through the coal seam in the Blackhawk Formation. The one exception is well W79-35-1B, which is immediately adjacent to W79-35-1A but is completed within the Blackhawk Formation above the coal seam. Exhibit 2 shows the response of these two wells to the total mine discharge, which is an indicator of the total flow into the mine. During the initial dewatering of the mine in September 2001- November 2002, the water level in Well W79-35-1B remained fairly constant, but it dropped approximately 20 feet over the period when discharge from the mine was at its greatest, from November 2002 and December 2003. Since October 2003 up through the end of 2009, the water level in this well has shown little change. The water level in Well W79-35-1A (screened below the coal seam) began to drop concurrent with the increased mine inflow and discharge; the water level dropped from 8489.9 on October 17, 1998; to 8411.6 on June 20, 2000; and to 8171.64 feet on June 11, 2003 (Figure 3c, 4a, and 5, Appendix A, data from the Division's Coal Water Monitoring Database). As mine discharge decreased in 2003, the water level in W79-35-1A recovered over 100 feet and has remained at the higher elevation since. This difference in the timing and magnitude of the responses of these two wells to the mine discharge (as an indicator of mine inflow) is evidence of the effectiveness of the Blackhawk Formation in impeding vertical migration of water through the formation.

Beginning in late July 2003, Well JC-3 began pumping water directly from the Skyline mine-workings into Electric Lake at a rate of approximately 5,100 gpm. The well represented no net increase in the amount of mine-water being discharged, only a change in the point of discharge. Due to equipment failure and high TDS (limit set at 255 mg/L for discharge into Electric Lake), JC-3 ceased operation in July 2004.

The Winter Quarters Ventilation Fan decline slope portal, at an elevation 8,120 feet, will be at a lower elevation than portions of the mine workings; the Trespass Portal, at an elevation of 8,580 feet, is currently the next lowest portal. Because of this lower elevation, gravity discharge from the Winter Quarters Ventilation Fan portal would be a possibility at the time mine dewatering were to cease and reclamation begin. To safeguard against such gravity discharge, the Permittee will seal and backfill both the shafts and slope at the Winter Quarters Ventilation Fan facility to prevent discharge (MRP Sections 4.9 and 4.11.9).

Ground Water Usage

Hansen, Allen, and Luce, Inc. conducted a survey of water rights for the White Oak Mine in 1990. The survey covered most of the area in the CIA. A total of 135 ground water rights were found, 112 on springs and 23 on wells or tunnels. Stock watering was the declared use on 62 of the water rights, 41 were for other uses, and the remaining 32 were undeclared. The information is summarized in Table 724.100a in the White Oak MRP, and the locations are shown on Map 724.100a. Skyline Mine updated the water rights information in their MRP with the addition of the Winter Quarters/North Lease area in 2002. Water Rights information for the Kinney #2 mine can be found on pages 35 and 53 and on Maps 30 and 31 and in Exhibit 13 of the Chapter 7 of the Kinney #2 MRP.

Both the Skyline and White Oak mines utilize water from wells in Eccles Canyon that were drilled into fault zones in the Star Point Sandstone. Wells near the Skyline and White Oak loadouts in Pleasant Valley produce water from both alluvium and the Star Point Sandstone. Water from these wells is for domestic, stock watering, and other uses. Potable and sanitary water supply for the Kinney #2 mine will be provided by the Town of Scofield via a connection from Mud Creek. Any groundwater inflows to the mine works will also be captured to meet water supply needs at the mine. Water will be stored in a storage tank to be constructed within the facilities area at the Kinney #2 mine.

From the startup of well JC-1 in September 2001 through September 2005, approximately 62,700 acre-ft of water were discharged from the Skyline Mine. Of that, approximately 37,400 acre-ft reported to Scofield Reservoir via Eccles and Mud Creeks, and approximately 25,300 acre-ft reported directly to Electric Lake via the JC-1, JC-2, and JC-3 wells. As of June 2010, these numbers were, respectively, 125,300; 69,100; and 56,200. Monthly discharge data provided by Skyline Mine are available at https://fs.ogm.utah.gov/pub/MINES/Coal/007/C0070005/DischargeInfo/07-26-2010Mine-James-%20Discharge.xls). The discharged water is generally of good quality and has been put to beneficial use in both drainages. As of July 2010, no proven adverse effects to the existing surface or groundwater resource usage have been observed.

The major mine inflows that necessitate discharge are slowly decreasing with time. Canyon Fuel completed the mining of the southern portion of the Skyline Mine in May 2004. At that time they allowed the mine-workings in that area to flood to an elevation of 8,280 feet, which took approximately four months.

JC-1 and JC-3 are both considered as mine-dewatering wells, but only JC-3 has an associated UPDES discharge permit. JC-1 is related to mining because it encounters water that would otherwise enter the mine. It does not have an associated UPDES discharge permit because the water does not enter the mine and comes from the formation in its natural state. When mining ceases permanently, the operation of JC-1 will be terminated. JC-3 has an associated UPDES permit, held by PacifiCorp, because it can pump water directly from the mine-workings. It is the understanding of the Division that the UPDES permit for JC-3 will also be terminated once mining ceases permanently. Neither JC-1 nor JC-3 has an associated water-right.

IV. BASELINE CONDITIONS OF SURFACE AND GROUND WATER QUALITY AND QUANTITY.

Surface Water – Baseline Conditions

Surface water is monitored for quantity and quality at various stations operated by the USGS and the coal mine operators. Locations are shown on Figure 5 (Appendix A) and analysis results are found in the Skyline, White Oak, and Kinney #2 MRPs, the Mud Creek /Huntington Creek CHIA, the Division's Coal Water Quality Database (http://linux1.ogm.utah.gov/cgi-bin/appx-ogm.cgi) and USGS publications. Graphs of selected springs and streams comparing historic flow to the Palmer Hydrologic Drought Index (PHDI) are provided in Appendix A of the July 2002 Addendum to the Skyline PHC, and were last updated with data from the 1st quarter (calendar year) of 2003. These graphs illustrate how the springs in the Blackhawk Formation respond rapidly to seasonal and climatic cycles, indicating that the springs are fed by discharge from a groundwater system that is in good communication with the surface, and with annual recharge events. Also, to assist in quantifying any potential effects to Electric Lake, PacifiCorp provided the Division with graphs and information illustrating the performance of the lake dating back to 1974. Monitoring has been infrequent or irregular at some stations. With the addition of the Winter Quarters-North Lease tract, additional studies were conducted in Winter Quarters Creek and Woods Creek due to their perennial nature and importance of fishery habitat.

Surface Water Quantity

Average annual yield from the 22,000-acre Mud Creek drainage, as determined from continuous USGS measurements from 1978 to 2010 at station 09310700, was 16 cfs (equal to 6.3 inches of rain over the entire drainage per year, or 11,600 acre-ft/yr). Discharge rates are summarized in Table 3 and shown graphically in Exhibit 3. The highest discharges result from spring snowmelt (Price and Plantz, 1987). A comparison of the flows encountered between 1982 through 1986 (a naturally high flow period) and 1998 through 2002 (increased mine discharge with drought conditions) indicate that the increased mine inflows were only higher than natural conditions for approximately a 6-month period (See Figure 10a). With the addition of Well JC-3, Canyon Fuel anticipated that the flow rate would decrease significantly during 2004 and stay there. However, as JC-3 is no longer operating and all excess water must be pumped to Eccles and Mud Creek, the discharge is still averaging around 9 cfs (4,000 gpm) and total flow at the gauging station since 2005 has averaged 22 cfs. From September 2001 through June 2010, an additional 69,100 acre-ft of mine-water discharge (11 cfs) has been added to Scofield Reservoir (https://fs.ogm.utah.gov/pub/MINES/Coal/007/C0070005/DischargeInfo/07-26-2010Mine-James-%20Discharge.xls).

Table 3 - Daily Mean Discharge of Mud Creek measured near the town of Scofield.

Gauging Station	Water Years	Daily Average	Maximum	Minimum
USGS 09310700 (Continuous)	1979 - 2010	17 cfs	300 cfs	1.6 cfs
	2005 – 2009	22 cfs	290 cfs	8.6 cfs

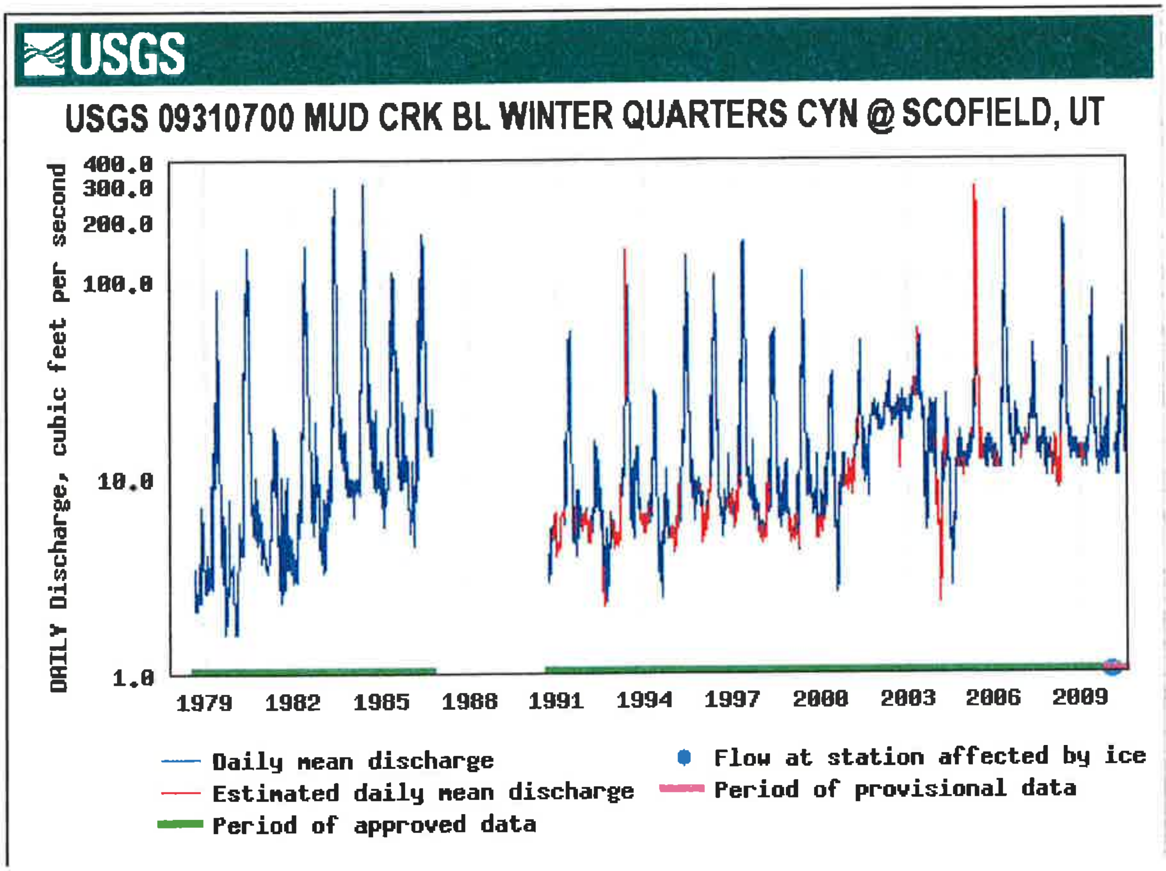


Exhibit 3 – Daily Mean Discharge of Mud Creek measured at USGS flow monitoring station 09310700 at Scofield, Utah.

Eccles, Winter Quarters, Boardinghouse, and Finn Creeks are the principal tributaries to Mud Creek. Based on continuous measurements by the USGS from 1980 to 1984 at station 09310600 (Price and Plantz, 1987), average annual yield from the 3,500 acre watershed in Eccles Canyon is 3,412 acre-feet/yr (equivalent to 11.7 inches rainfall per year over the entire watershed). The maximum-recorded peak flow was 71 cfs in May 1984. Skyline recorded high peak flows in 1983 through 1986. Discharge rates are summarized in Table 4.

Table 4 - Discharge measured near the mouth of Eccles Creek.

Gauging Station	Date	Average	Maximum	Minimum
USGS 09310600	1980 - 1984 (Continuous)	4.70 cfs	66 cfs	0.62 cfs
Skyline CS-6	1981 - 1999	6.09 cfs	71.2 cfs	0.54 cfs
	2000 – March 2010	12.29 cfs	22.75 cfs	1.00 cfs

Skyline's data indicate that water began to be discharged from the #3 Mine (CS-12) in 1983, and from 1984 to 1992 discharge averaged 0.5 cfs. Discharge from Skyline Mine #1 (CS-14) began in 1989 and averaged 0.28 cfs from 1989 to 1992. Minimum measured discharges from #1 and #3 were 0.08 cfs and 0.13 cfs and maximums were 0.69 cfs and 1 cfs. In late summer to early autumn when streamflow is naturally low, discharge from the Skyline Mine has been estimated to have accounted for as much as 60% to 70% of flow in Eccles Creek.

The 12 cfs discharged from August 2001 through March 2010 represents approximately 2 times the average flow encountered in Eccles Creek at water monitoring site CS-6 (Table 4) from 1981 through 1999. To monitor the impacts of this additional water to the physical characteristics of Eccles and Mud Creek, a study was initiated in the summer of 2002 and continued in the summers of 2003 and 2004. Field observations indicate the additional water makes the flow at or just below bankfull capacity of Eccles Creek; however, Eccles Creek appears to be well armored and able to handle the additional flow. Mud Creek is larger than Eccles Creek and flows there are approximately 4-times larger than normally seen; however, the flow is not as close to bankfull capacity. Results from the study indicate no significant impacts to the stream morphology have been observed. The details of the study are outlined in Appendix D of the July 2002 Addendum to the PHC, and copies of the reports are located in the Division's Public Information Center (PIC).

Prior to the breakout of the ventilation portal in South Fork of Eccles Creek in 1989, maximum measured flow at station VC-10 was 14.7 cfs. Periods of no-flow were observed in 1981, 1984, 1995, 2001, and 2002 but never during the third or fourth quarter of the calendar year (July-December). Average measured flow from 1978 to 1990 was 1.39 cfs (Table 5).

Construction of the road to the White Oak Mine in Whisky Canyon began in 1975. Monitoring of Whisky Creek began the same year, so there are no data on conditions prior to disturbance of the drainage. Periods of no-flow have been recorded at least once in each of the four calendar quarters (Table 5). Although not as consistently dry, Whisky Creek was periodically dry from 1982 through 2000.

During average flow conditions, Whisky Creek (at VC-5) accounts for approximately 8.1 percent of the flow in Eccles Creek, and 2.4 percent of the flow in Mud Creek. Upper Whisky

Creek at VC-4 accounts for approximately 15.8 percent of the flow of VC-5. The surface mining at the White Oak Mine and reconstruction of Upper Whisky Creek has impacted the area immediately surrounding site VC-4. However, any flow lost due to infiltration into the reclaimed fill should surface further downstream in Whisky Creek. Although a significant loss in flow at VC-4 would impact flows at VC-5, minimal cumulative impacts would be seen at Eccles Creek and Mud Creek.

The location of sample site VC-4 was moved upstream approximately 280 ft. due to disturbance created by the surface mining. VC-4 represents undisturbed drainage of Whisky Creek. Although moved upstream, only one small ephemeral draw was eliminated from the drainage basin resulting in an insignificant change in flow.

Lodestar Energy, Inc. declared bankruptcy and discontinued mining and water monitoring at the White Oak Mine. Except for a few UPDES reports in early 2003, water monitoring ended in September – October 2002.

Table 5 - Discharges measured at South Fork of Eccles Creek and Whisky Creek

Gauging Station	Date	Average	Maximum	Minimum
South Fork White Oak VC-10	1978 - 2002	1.39 cfs	14.7 cfs	0 cfs (2 of 4 quarters)
Whisky Creek White Oak VC-5	1976 – 2002	0.38cfs	3.70 cfs	0 cfs (4 of 4 quarters)
Whisky Creek White Oak VC-4	1977 – 2002	0.06 cfs	1.0 cfs	0 cfs (4 of 4 quarters)

Boardinghouse and Finn Creeks were not directly affected by surface mining at the White Oak Mine, but were monitored by White Oak and results are summarized in Table 6 (Valley Camp, 1993, p. 700-23). The Permittee reported no-flow for each of the five times that they were able to observe Finn Creek during a first calendar quarter.

Table 6 - Discharges measured at Boardinghouse and Finn Creeks

Gauging Station	Date	Average	Maximum	Minimum
Boardinghouse White Oak VC-11	1980 - 2002	1.6 cfs	12.8 cfs	0.02 cfs
Finn Creek White Oak VC-12	1980 - 2002	0.47 cfs	4.20 cfs	0 cfs (4 of 4 quarters)

Waddell and others monitored Winter Quarters Creek in 1979-1980 and Skyline did so in 1981 and 2002-present (CS-20: CS-24 was added in November 2009). Results are summarized in Table 7.

Table 7 - Discharges measured at Woods (CS-19) and Winter Quarters (CS-20) Creeks

Gauging Station	Date	Average	Maximum	Minimum
35*	1979-1980	0.405 cfs	0.51 cfs	0.30 cfs
CS-19	2002-2009	0.76 cfs	3.92 cfs	0.05 cfs
CS-20	Nov. 1981	0.07 cfs		
	2002-2009	1.37 cfs	6.24 cfs	0.24 cfs

* (Waddell and others, 1982)

Skyline monitors upper Huntington Creek where it discharges into Electric Lake, at station UPL-10. Flow is measured periodically when the site is accessible, mainly from May to October. Skyline's data in the Division's database indicate that from July 1984 to November 2009, average flow has been 6.9 cfs. Utah Power and Light monitored Huntington Creek above Burnout Creek prior to completion of Electric Lake in 1973, and the information is found in the report by Vaughn Hansen Associates (1979). Discharge of upper Huntington Creek is summarized in Table 8.

Average flow of Burnout Creek at station CS-7 from 1981 to 2002 was 1.2 cfs, with minimum and maximum measured flows of 0.1 and 10.7 cfs. Average flow from June 2003 to November 2009 was 0.6 cfs, with minimum 0.002 cfs (1.3 gpm) and maximum of 3.7 cfs. Flows from Swens (CS-16), Little Swens (CS-17), Boulger (CS-18), and James (F-10) Canyons have been monitored since June 2001: respective average flows have been 0.4, 3.8, 0.2, and 0.9 cfs. Flow from Electric Lake is regulated for the benefit of downstream users and does not accurately characterize the hydrologic system.

Table 8 - Discharge of Huntington Creek above Burnout Creek

Gauging Station	Date	Average	Maximum	Minimum
Utah Power & Light	1971 – 1973	-	>170 cfs	□0.5 cfs
Skyline UPL-10	1981 – 2005	6.9 cfs	79 cfs	0.32 cfs
	2006 - 2009	4.8 cfs	22 cfs	0.58 cfs

Predicted average discharge for Eccles Creek, based on flow duration curves for water years 1976 through 1978, is 5.43 cfs, corresponding to a yield of 13.4 inches of rainfall over the watershed. Flow duration curves from Huntington Creek above Burnout Creek for water years 1972 and 1973, before Electric Lake was filled; indicate an average annual discharge of 13 cfs and a yield of 16 inches of rainfall over the entire watershed per year (Vaughn Hansen Associates, 1979). The predictions are based on data from different periods, but the higher predicted yield from the upper Huntington Creek basin in comparison to that from the Eccles watershed may be a consequence of the relative impermeability of the Blackhawk Formation that forms or immediately underlies the surface over most of the upper Huntington Creek basin (Coastal States, 1993, p. 2-42), and the westward dip of the strata.

Burnout and Huntington Creeks drain 8,240 acres (42% of the upper Huntington Creek basin located above the dam), and their combined average discharge has been 6,500 acre feet per year (9 cfs). Estimating from the Burnout and Huntington Creek data, discharge from the entire 19,854 acres of the upper Huntington Creek basin located above the dam would be 16,000 acre feet per year (22 cfs). Comparing the continuous flow recorded at the mouth of Eccles Creek (Table 4) and using the same flow volume per acre of land for the Upper Huntington basin supports this estimated number. Using the same volume per acre number from the Eccles Creek drainage for the 19,854 acres, the average flow for the Upper Huntington basin is 21.2 cfs or 15,350 acre-ft/yr. Subtracting a calculated 800 acre-ft of evaporation per year, based on PacifiCorp data, the Upper Huntington drainage basin receives an average of approximately 14,500 acre-ft/yr.

The surface water hydrologic regime in the Kinney #2 permit and adjacent area are strongly influenced by geologic structure, stratigraphy, lithology, topography, and climatic conditions. The mine is located within the Mud Creek Subwatershed. The major perennial streams in the vicinity are Mud Creek and Miller Creek. Both of these water sources drain into Scofield Reservoir, the headwater source of the Price River.

Table 9 - Discharge of Miller Creek to Scofield Reservoir

Gauging Station	Dates	Average	Maximum	Minimum
Miller Outlet	2005 – 2010	133 gpm	545 gpm	18 gpm

No other perennial sources of surface water exist in this area. Several ephemeral washes bisect the Kinney #2 permit area in a west-east direction. None of these small washes have been observed to be flowing during the baseline monitoring period for the Kinney #2 mine, which began in 2006. Eagle Canyon and UP Canyon are adjacent ephemeral channels that have been observed to flow in response to heavy precipitation or snowmelt events. Drainages west of Pleasant Valley are considered to be hydrologically disconnected from potential impacts to mining activities. A few stock watering ponds have been identified along the Eagle Canyon Graben east of the Kinney #2 Permit boundary. These ponds are believed to be spring-fed systems that are influenced by climatic cycles of wet and dry periods.

Electric Lake

Electric Lake, with a storage capacity of 31,500 acre-ft, began filling in 1974. PacifiCorp owns water shares in Electric Lake, and uses approximately 12,000 acre-ft of water annually. Since 1974, PacifiCorp (formerly Utah Power and Light) has monitored the water within the Upper Huntington drainage basin using imputed flow data, discharge records, lake levels, and precipitation and evaporation data. Since June 19, 2002, they have measured actual flow data in the Upper Huntington basin, with the exception of tributaries located below Boulger Creek, which are estimated to contribute approximately 1 cfs on average.

In July 2003, PacifiCorp submitted a report to the Division suggesting Electric Lake has been losing a disproportionate amount of water since August 2001, based primarily on the reaction of the lake (PacifiCorp – Investigation of Technical Issues related to the Electric Lake and Huntington Creek Controversy June 25, 2003). No calculation reflecting the purported volume lost from Electric Lake was provided in the original report. The report provided numerous graphs illustrating how Electric Lake intuitively appeared to be losing water. Regardless, and though much of PacifiCorp's inflow data were 'back-calculated' and hard monitoring numbers were lacking at the time, the data showed a change in the reservoir performance. PacifiCorp has since started to monitor inflow into the lake and they update and provide a detailed spreadsheet with measurable inflows and outflows, as well as lake performance data to the Division monthly. Stage volumes, natural leakage of Electric Lake, and the effects of the drought all contribute to the response being seen in the lake elevations. Whether the inflows encountered in the Skyline Mine are associated with this apparent loss of water, and to what degree, is still being evaluated (see Section VII).

Discharge of Mine Inflows to Surface Drainages

As discussed earlier, Skyline Mine encountered considerable groundwater inflows beginning in March 1999. In an attempt to reduce inflows, wells were drilled in James Canyon to pump ground water from the fracture system 70 feet below the mine (JC_1 and JC-2), and directly from the mine workings (JC-3) into Electric Lake. From September 2001 until September 2002 water was pumped at about 2,200 gpm from Well JC-1. In October 2002, the pumping rate in JC-1 increased to about 4,200 gpm by installing a higher capacity pump. In late July 2003, Well JC-3 began pumping directly from the mine workings at approximately 5,100 gpm and continued pumping until July 2004. JC-1 currently (Jan. 2006) operates at around 4,000 gpm. Through July 2010, approximately 56,200 acre-ft of water have been pumped from the James Canyon wells into Electric Lake and therefore, the Huntington Creek drainage. None of the 16 springs and streams feeding into Electric Lake that are part of the Skyline Water monitoring program have demonstrated the type of reduced water availability that has been recorded in the lake.

A portion of the mine inflows has also been pumped out of the mine into Eccles Creek. Between August 2001 and September 2005, these flows varied from 0 to 10,500 gpm and averaged about 5,700 gpm. At the peak, this increased the average flow in Eccles Creek by 3 times normal amounts (pre-1999) and increased the average flow in Mud Creek by 1.2 times normal amounts. From October 2005 through July 2010, discharges to Eccles Creek (measured at CS-14) have been between 2,048 and 4, 303 gpm and averaged 3,400 gpm. The trend since 2005 has been downward (Exhibit 1)

The Division anticipates that the addition of the Winter Quarters / North Lease area will have minimal, if any effect on the water quantity being discharged to either drainage. This conclusion is based on past mining in the area, differences in geology from the southern portion of the mine, and an apparent lack of communication between groundwater wells located in the northern and southern portions of the permit area. The Division anticipates that any inflow to the North Lease will be infrequent, and short-term in nature.

Mine inflows into the Kinney #2 workings are anticipated to be minimal primarily originating from any isolated perched aquifer systems that are characteristic in the Blackhawk Sandstone. During exploration activities and during the baseline monitoring period, groundwater was not encountered in the coal seam. Historic mining has occurred in this region from coal seams located stratigraphically below the Hiawatha coal seam. There is a possibility that water may be stored in these underground mine workings. However, due to these coal seams being stratigraphically lower in the geologic section, these old workings will not be encountered during planned mining activities.

Surface Water Quality

Water within the CIA is used for watering livestock and wildlife, mining coal, domestic use, fisheries, and recreation. Downstream, the water is additionally used for irrigation and industrial needs. Land within the CIA is used for wildlife habitat, grazing, recreation, and mining coal. Anticipated post-mining uses are for wildlife habitat, grazing, and recreation.

The Utah Division of Water Quality classifies (latest classification December 7, 2001) Scofield Reservoir as:

- 1C - protected for domestic purposes with prior treatment by treatment processes as required by the Utah Division of Drinking Water.
- 2B - protected for secondary contact recreation such as boating, wading, or similar uses.
- 3A - protected for cold-water species of game fish and other cold-water aquatic life, including the necessary aquatic organisms in their food chain.
- 4 - protected for agricultural uses including irrigation of crops and stock watering.

The total phosphorous in Scofield Reservoir is of concern to the Utah Division of Water Quality, and they have set the TMDL Target Load of 4,842 kg/yr (29 lb/day). Blue/green algal blooms are linked to high phosphorus concentrations in the reservoir.

Scofield Reservoir:

- Is a culinary water source,
- Is one of the top four trout fishing lakes in Utah, and
- Has an annual recreational fishing value of more than 1 million dollars.

(E-mail from Louis Berg, Utah Division of Wildlife Resources, to Division dated February 4, 2002).

The Utah Division of Water Quality classifies (latest classification December 7, 2001) Electric Lake as:

- 2B - protected for secondary contact recreation such as boating, wading, or similar uses.
- 3A - protected for cold-water species of game fish and other cold-water aquatic life, including the necessary aquatic organisms in their food chain.
- 4 - protected for agricultural uses including irrigation of crops and stock watering.

Electric Lake:

- Provides cooling water for the Huntington Power Plant, and
- Is a major source of agricultural water for the Huntington Cleveland Irrigation Company.

Streams in both basins are classified as 1C, 3A, and 4.

In addition, surface waters located within the outer boundaries of a USDA National Forest, with specific exceptions, are designated by the Utah Division of Water Quality as High Quality Waters - Category 1 and are subject to the state's antidegradation policy. This antidegradation policy states that waters shall be maintained at existing high quality, and new point source discharges of wastewater (treated or otherwise) are prohibited (Utah Administrative Code, R317-2-3.2 and R317-2-12.1). All of the upper Huntington Creek drainage, and most of the headwater drainages of east flowing tributaries to Mud Creek- including the Skyline Mine disturbed area -are within USDA Forest Service boundaries and are therefore protected by this policy. The White Oak Mine, both loadouts, and the waste rock disposal site are outside forest boundaries. The Kinney #2 mine is located on private land.

The Utah Water Quality Board agreed in their September 24, 2001 meeting to reclassify Electric Lake as High Quality Waters – Category 2. Category 2 is defined as "...designated surface water segments which are treated as High Quality Waters – Category 1; except that a point source discharge may be permitted, provided that the discharge does not degrade existing water quality." Both the effluent from Skyline Mine (JC-3), and the lake were to be sampled for a period of two years for a full suite of metals and nutrients to ensure that the mine water is not of a lower quality of water than exists in Electric Lake. Due to equipment failure and high TDS, the JC-3 well, which discharged directly from the Skyline Mine into Electric Lake, is no longer pumping. Canyon Fuel and PacifiCorp have continued to sample the quality of water from the lake and the JC-1 well.

Total Dissolved Solids (TDS)

Water quality in the CIA is considered good, most being of calcium bicarbonate type. TDS levels normally vary between 100 and 400 mg/L in the headwaters regions. Higher TDS levels correspond to low flows. Calcite and aragonite are at or near saturation in the streams flowing into Scofield Reservoir and precipitation of calcium carbonate in the reservoir is indicated by the water chemistry (Waddell and others, 1983a).

At Well JC-3 (discharging to Electric Lake) TDS is limited to a daily maximum of 255 mg/L with no daily tonnage or flow limitation. Canyon Fuel had a difficult time meeting this standard, even when blending the JC-3 and JC-1 water. For this reason they discontinued pumping from JC-3 after one year.

Skyline's monitoring station CS-6 is at the same location as USGS gauging station 09310600 near the mouth of Eccles Canyon. Skyline and USGS measurements of TDS are summarized in Table 10. Skyline measured higher concentrations of TDS between 1981 and 2002 than were measured by the USGS between 1980 and 1984. The USGS analyzed samples more frequently than Skyline. TDS concentrations had been increasing from year to year at this location and others along Eccles Creek below the Skyline Mine (Figure 6a, Appendix A). Due to the increased mine inflows and necessary discharge of them at high rates, Skyline was exceeding their UPDES daily tonnage limit for TDS (7.1 tons/day). Canyon Fuel worked closely with Utah Division of Water Quality (UDWQ) to remedy the situation, and after much study and effort, UDWQ modified the Skyline Mine UPDES permit in May of 2003 to remove the 7.1 ton per day limit for TDS, unless the 30-day average were to exceed 500 mg/L.

UDWQ issued the current UPDES discharge permit UT0023540 effective December 1, 2009. It allows for a daily maximum of TDS of 1,200 mg/L and a 30-day average of 500 mg/L. There is no tonnage per day (tpd) daily maximum unless the 30-day average exceeds 500 mg/L; then a 7.1-tpd limit is imposed. The permit also states:

> *Upon determination by the Executive Secretary that the Permittee is not able to meet the 500 mg/L 30-day average or the 7.1 tons per day loading limit, the Permittee is required to participate in and/or fund a salinity offset project to include TDS offset credits, within six (6) months of the effective date of this permit.* [Section I,D,2,c]

In September of 2004, Skyline's mine discharge began averaging 850-950 mg/L TDS, and due to the volume of water pumped (approx 3,500 gpm), they were routinely exceeding the tons per day limit. Because the conditions at the mine will require such pumping for quite some time, Canyon Fuel Company prepared a salinity offset plan and submitted it as required to UDWQ. The Division of Water Quality approved the plan on January 5, 2005, but it is retroactive to September 2004.

USGS gauging station 09310700, on Mud Creek near the mouth of Winter Quarters Canyon and just upstream of the town of Scofield, was operated continuously during water years 1979 through 1984. TDS measurements averaged 315 mg/L with a minimum of 170 mg/L and a maximum of 390 mg/L (Price and Plantz, 1987). Monitoring station VC-1 is approximately one mile upstream of 09310700 and just below the White Oak loadout. At VC-1, the average TDS from 1975 to 2002 was 320 mg/L, with a maximum of 730 and a minimum of 156 mg/L.

The Kinney #2 mine will operate under UPDES permit #UTG040028 effective July 1, 2010 and due to expire on April 30, 2013. One outfall location has been assigned for the single sediment pond that will discharge to Mud Creek. TDS limitations cited on the permit require that the outfall achieve a 30-day average of 500 mg/L or one ton (2000 lbs) per day as a sum from all outfalls. The Permittee for the Kinney #2 mine will also monitor Mud Creek as part of their quarterly water monitoring program. Baseline TDS data from the Kinney #2 mine is also shown on Table 10. Figure 7B (Appendix A) illustrates the TDS levels in Mud Creek as monitored during the Kinney #2 baseline period have actually showed a decreasing trend in the past 5 years.

Table 10 - TDS in Eccles and Mud Creeks

Gauging Station	Date	Average	Maximum	Minimum
Eccles Creek just above confluence with Mud Creek				
USGS 09310600	1980 - 1984	294 mg/L	492 mg/L	161 mg/L
Skyline CS-6	1981 - 2005	471 mg/L	1282 mg/L	198 mg/L
	February 2006 – March 2010	532 mg/L	752 mg/L	419 mg/L

Gauging Station	Date	Average	Maximum	Minimum
Mud Creek below White Oak Loadout				
USGS 09310700	1979 - 1984	315 mg/L	390 mg/L	170 mg/L
White Oak VC-1	1975 - 2002	320 mg/L	730 mg/L	156 mg/L
Mud Creek (Kinney #2)	2005 – 2010	458 mg/L	720 mg/L	230 mg/L

There is a shift from calcium toward sulfate and magnesium cations as the water flows toward Scofield Reservoir, probably due to the dissolution of evaporites in Mancos Shale tongues exposed in Pleasant Valley (Coastal, 1993, p. 33).

Figures 6 through 8 (Appendix A) show TDS concentrations from 1977 through 2002 from data submitted by Skyline and White Oak to the Division. Linear regressions of TDS concentration as a function of time were calculated, providing a rough representation of ongoing coal mining activities such as production, storage, and hauling of coal and discharge of water from the mines. Representative linear regressions are plotted on the figures. Data from the initial period of road construction during 1975 and 1976 were not used in the regression calculations because they are not representative of ongoing mine operations. Road improvement and additional construction were ongoing from 1980 to 1984, but there was not a noticeable change in TDS concentrations during this period. Other specific data omitted from regression calculations are indicated on the figures.

TDS levels in water discharged from Skyline's sediment pond began exceeding the UPDES maximum of 1,000 mg/L (753 mg/L annual average) on a regular basis in November 1990. Sulfate concentrations also exceeded the 500 mg/L UPDES limit in most of these high TDS samples. Leaching of sulfate from rock dust in flooded, abandoned areas of the Skyline Mine was the source (ERI, 1992). In May 1994, the Utah Division of Water Quality raised the daily limits to 1,600 mg/L TDS and 1,000 mg/L sulfate on an interim basis through September 1994, with TDS and sulfate levels to meet requirements of the regular UPDES permit at the end of the interim period. The current daily maximum UPDES limit for TDS is 1,200 mg/L, with a limit of 500 mg/L averaged over 30 days. There is no limit for sulfate in the current UPDES permit.

TDS concentrations in lower Eccles Creek are diluted between CS-2 and VC-9 by inflow from South Fork and Whisky Creek and baseflow from the Star Point-Blackhawk aquifer. Further dilution occurs when Eccles Creek flows into Mud Creek, but still TDS concentrations have increased at VC-1 and VC-2 (Figure 7, Appendix A).

TDS concentrations have remained nearly constant at CS-9 above the Skyline Mine, but data from CS-3, CS-4 (discontinued), and CS-11 above the Skyline Mine indicate TDS concentrations have generally increased with time, even though at a lower rate than in the samples taken downstream of the Skyline Mine. TDS concentrations at VC-10 and CS-1 (both discontinued) in the South Fork of Eccles Creek decreased between 1981 and 2005.

In Whisky Creek, TDS concentrations steadily increased at VC-5 below the White Oak Mine from approximately 300 mg/L in 1978 to close to 1,200 mg/L in 2001 (Figure 6d, Appendix A). The rate of increase is similar to that in lowermost Eccles Creek. Because Whisky Creek accounts for approximately 8% of the flow of the Eccles Creek, this is a minor contribution to the overall balance of Eccles. White Oak reported 4,000 mg/L TDS at VC-5 on June 27, 1986, a singular anomaly possibly caused by road salt getting into the stream (Valley Camp of Utah, 1993). At VC-4 (Figure 6d, Appendix A) above the White Oak Mine, TDS concentrations declined over the same period of time..

The surface-mining methods that the White Oak Mine employed had little impact on the TDS reporting into Eccles Creek. Acid and Toxic-forming testing of the geology in the area demonstrated a high neutralizing potential of the sediments, and low toxicity. Geologic units containing elevated levels of selenium and metals were buried with at least 4 feet of cover, and were placed outside of the floodplain of Whisky Creek.

The TDS in Huntington Creek at UPL-10, above Electric Lake, varied from 80 to 442 mg/L, and averaged 185.9 mg/L from 1981 to 2005. Figure 8 (Appendix A) shows TDS concentrations for stations upstream of Electric Lake. TDS concentrations appear to have changed little with time in this drainage.

At UPL-3 just below the outlet from Electric Lake, TDS averaged 156.7 mg/L from 1981 to 1991 and ranged from 130 to 210 mg/L (Coastal, 1993, Volume 4). TDS in Huntington Creek at USGS gauging station 09318000 near the town of Huntington was 165 to 345 mg/L between June 1977 and September 1979. TDS in the Price and San Rafael Rivers where they flow into the Green River is 1,500 to 4,000 mg/L.

TDS measured at CS-20 on Winter Quarters Creek appears to have an upward trend, but the data are limited (2002 to 2009, 23 samples) and R^2 is only 0.03.

As shown on Table 11, TDS baseline values from each of the surface water inlets (Mud Creek, Miller Outlet, and RES-1) entering Scofield Reservoir from streams draining the Kinney #2 mine have been reported between 96 – 720 mg/L. Baseline TDS values from the springs were reported between 120 – 440 mg/L. These levels are consistent with historical TDS concentrations reported from headwater regions in the Scofield area.

Table 11 – Baseline TDS into Scofield Reservoir

Monitoring Station	Date	Average	Maximum	Minimum
Miller Outlet	2005 - 2010	299 mg/L	620 mg/L	200 mg/L
Mud Creek	2005 - 2010	458 mg/L	720 mg/L	230 mg/L
RES-1	2005 - 2010	336 mg/L	620 mg/L	96 mg/L

Iron and Manganese - Dissolved

From 1979 to 1984, measurements of dissolved iron at USGS gauging station 09310700 in Mud Creek above Scofield ranged from 0.003 to 0.21 mg/L.

Water analyses done for the White Oak Mine only sporadically included dissolved iron, and only included dissolved manganese from 1995 to 2003. The highest value for dissolved iron reported by the White Oak Mine is 6.65 mg/L at VC-13, a sampling station in Long Canyon. The highest value measured in Whisky Creek, below the White Oak Mine at VC-5, was 1.45 mg/L (October 1982). The highest dissolved iron found in Eccles Creek by White Oak was 0.76 mg/L at VC-6 in August 1980. With the exception of a one-time dissolved iron value of 7.65 mg/L at VC-4 in 1982, Whisky Creek had very low dissolved Iron and Manganese values.

Maximum dissolved iron (in surface water) reported by Skyline, between 1980 and 2009, was 0.36 mg/L (1992) at CS-2 in Eccles Creek just below the Skyline Mine. Maximum dissolved manganese was 0.2 mg/L, also at CS-2 (1995).

Dissolved iron in Huntington Creek at station UPL-10 above Electric Lake varied from 0.03 to 0.16 mg/L, and averaged 0.08 mg/L from 1981 to 2009. Dissolved manganese varied from 0.006 to 0.02 mg/L and averaged 0.011 mg/L.

At Winter Quarters Creek (CS-20), there is only one recorded value for dissolved iron, 0.02 mg/L. The four dissolved manganese values range from 0.005 to 0.009 mg/L and average 0.007 mg/L.

Maximum dissolved iron concentrations from dissolved iron detection in the Kinney #2 permit area from the springs reported a maximum of 2 mg/L and 1 mg/L for surface water from Miller Outlet. Baseline monitoring of dissolved iron illustrate that dissolved iron detections occur more frequency in the spring samples than in the surface water samples.

Iron and Manganese - Total

Total iron averaged 2.7 mg/L and total manganese averaged 0.15 mg/L at sites monitored for the White Oak Mine from 1975 through 2002. The highest reported concentration of total iron was 88.5 mg/L, and for total manganese it was 7.15 mg/L. Both samples were from VC-5 on Whisky Creek, but were collected at different times. High total iron concentrations have been reported by Skyline at several locations, the highest being 45.10 mg/L at CS-9, above the Skyline Mine in the north fork of Eccles Creek. Total manganese concentrations reported by Skyline have ranged from 0.01 to 1.06 mg/L. Price and Plantz (1987) do not report total iron or total manganese concentrations.

For steam sites monitored by the Skyline Mine, total iron ranged up to 45 mg/l, and total manganese up to 1.05 mg/L.

Data from CS-6, near the mouth of Eccles Creek, show that total iron ranged between <0.05 and 24.5 mg/L from 1981 to 2009, and averaged 1.06 mg/L. Total manganese was up to 0.74 mg/L and averaged 0.10 mg/L

At monitoring station VC-1 on Mud Creek, just below the White Oak Loadout, average total iron from 1977 to 2002 was 1.11 mg/L. The maximum was 7.66 mg/L and the minimum was 0.015 mg/L.

Total iron in Huntington Creek at station UPL-10 above Electric Lake has varied from 0.09 to 12.2 mg/L and averaged 0.49 mg/L from 1981 to 2009. Total manganese varied from 0.009 to 0.12 mg/L and averaged 0.03 mg/L. At UPL-3, just below Electric Lake, total iron averaged 0.2 mg/L from 1981 to 1991 and ranged from 0 to 1 mg/L. Total manganese was below detection limits (Coastal, 1993, Volume 4).

At Winter Quarters Creek (CS-20), maximum total iron values reported is 0.37 mg/L, and the average is 0.11 mg/L. Total manganese values range up to 0.016 mg/L and average 0.01 mg/L.

Total iron and manganese concentrations from baseline data collected at the Kinney #2 mine showed maximum concentrations of 25.8 from Aspen Spring and 6.5 from Miller Outlet (stream) for total iron. The total iron result of 25.8 for Aspen Spring was anomalous as compared to the rest of the data with the concentrations averaging 2.3 mg/L. Total manganese baseline data report from the springs and streams did not exceed 1 mg/L in any of the baseline samples collected.

Nickel

The Skyline Mine PHC states that nickel concentrations have reached as high as 40 µg/L in the water that they discharge to Eccles Creek. This level is greater than the 15-µg/L known to inhibit the reproductive capabilities of Ceriodaphnia dubia, an invertebrate biologic indicator species, but below the chronic and acute criteria, for both aquatic wildlife and human health, in the Standards of Quality for Waters of the State. As the flows increased from 1999 through 2001, there initially were indications of toxicity from high nickel concentrations and high TDS. The significant inflow to the mine from the 10-Left area and changes of how water is handled underground resulted in a decline in TDS and dissolved nickel over time.

The source of this nickel is not identified. Nickel is not typically found in the Wasatch Plateau; neither is it commonly associated with the other atypical metals (copper, lead, and zinc) that are sometimes detected in water and sediment samples from the Eccles and Mud Creek drainages. Monitoring results from ongoing sampling will be checked to see if nickel values rise in the future. The Skyline Mine has been working with the Utah Division of Water Quality and the Division to track nickel values.

Nickel was not monitored as a baseline parameter metal at the Kinney #2 mine site.

Other Metals

Trace metals were below U. S. EPA maximum contaminant levels (MCL) in water samples collected from Mud and Eccles Creeks in 1979 through 1980 (Waddell and others, 1983b). Simons, Li, and Associates (1984) found the water at USGS gauging station 09318000, on Huntington Creek near the town of Huntington, met EPA drinking water standards.

Surface water quality data in the Skyline MRP show metal concentrations have generally met Utah Division of Water Quality criteria for class 1C, 2B, 3A, and 4 waters (The Utah Division of Water Quality revised the standards on February 16, 1994; to be based on dissolved metal concentrations, instead of acid-soluble metal concentrations). Dissolved selenium in water discharged from the Utah #2 Mine and monitored at VC-3 and VC-3a from 1973 to 1978 frequently exceeded the current Class 1C water quality standard of 0.01 mg/L and exceeded the Class 4 standard of 0.05 mg/L several times (Valley Camp, 1993, Appendix 722.100a).

There are no applicable standards for total metals in water, but what appear to be elevated concentrations of total copper (0.03 mg/L up to 24.5 mg/L) were found between 1981 and 1991 in samples from most of Skyline's sampling stations, including CS-7 and CS-10 in upper Huntington Canyon. High total lead (up to 0.74 mg/L) and total zinc (up to 0.062 mg/L) also were found in several samples (Coastal, 1993, Volume 4). Data from the White Oak Mine contain several analyses with similarly high total lead, copper, and zinc concentrations. The igneous dikes crossed during mining may be the source of these metals.

pH

The range of the average pH of surface water in the Mud Creek and Huntington Creek basins is 7.2 to 8.0 based on measurements at numerous locations. Extremes of 6.0 to 9.2 have been reported. Where both acidity and alkalinity have been determined, alkalinity is typically at least 25 times acidity.

Solids

The estimated annual sediment yield of the Skyline permit area is approximately 0.44 acre-ft per square mile, which would indicate total annual yield to the Price River is 1.25 acre-ft and to the San Rafael River it is 3.07 acre-ft. The majority of this is suspended sediment, with only a small percentage carried as bed load (Coastal, 1993, p. PHC3-2). Using the same estimated yield of 0.44 acre-ft per square mile for the White Oak permit area, approximate total annual yield to the San Rafael drainage is 0.5 acre-ft and to the Price River drainage is 1.7 acre-ft.

TSS measured at CS-3 and CS-11 in the headwaters of Eccles Creek averages 14 and 39 mg/L, respectively, when taking into account values under the detection limit by using half the detection limit (otherwise, the values are 19 mg/L and 49 mg/L). Average TSS is 76 (81) mg/L at station CS-6 on Eccles Creek, just above the confluence with Mud Creek. The maximum TSS at this location has been 3,190 mg/L, and the minimum 1.4 mg/L. TSS averages 85 (90) mg/L at VC-9, at the confluence with Mud Creek; the maximum was 4,166 mg/L in 1983. As measured by the White Oak Mine operator, the average TSS at VC-5 on Whisky Creek ws454 mg/L, and the minimum 1.0 mg/L, and the annual average TSS at VC-1 on Mud Creek below the White Oak Loadout was 183 mg/L.

TSS in Huntington Creek at station UPL-10, above Electric Lake, have varied from below detection limits to 41mg/L (May 1983), and averaged 4.4 (7.5) mg/L from 1981 to 2009. Suspended sediment loads reported by the USGS for undisturbed areas of the Huntington Creek drainage are typically less than 100 mg/L at low flow, but during high flows can be between 500 mg/L and 1000 mg/L. In lower Huntington Creek, suspended sediment loads in excess of 10,000 mg/L can be expected from thunderstorms, and major floods could produce even higher levels. Construction, mining, and traffic on unpaved roads have produced increases in suspended sediment load in streams, but these are minor, temporary conditions that have not been quantified (Simons, Li, and Associates, 1984, p. 2.33).

The naturally reproducing population of cutthroat trout in Eccles Creek was virtually eliminated from Eccles Creek between 1975 and 1983 as road and mine construction increased the sediment load in the stream. Up to 18 inches of fine sediment had accumulated over the natural substrate. However, habitat improvement initiated in 1981 resulted in significant recovery of the trout population, totaling 93% of pre-disturbance levels by 1986 (Donaldson and Dalton, Utah Division of Wildlife Resources (UDWR) in Appendix Volume A-3, Coastal States, 1993).

Landslides occurred at approximately 1,500 locations in the Wasatch Plateau during the 1983-1984 water year due to higher than average precipitation. One of these slides occurred in the North Fork of Eccles Canyon, where the creek is normally diverted beneath Skyline's topsoil stockpile. Debris blocked the entry to the diversion, water overtopped the stockpile, and mud and other debris were flushed into Eccles Creek. TSS was measured at up to 9,800 mg/L in

Eccles Creek by Division personnel. During this same period, mud was flowing into Whisky Creek from the unpaved road to the White Oak Mine. TSS levels were not documented in Whisky Creek, but the deterioration of water quality from suspended solids was visibly evident to Division personnel who investigated.

In 1987, a tunnel was advanced through an igneous dike in the Skyline #3 Mine. A dark mica mineral, phlogopite, was carried from this tunnel to the sedimentation pond by the mine discharge water. The phlogopite did not settle-out in the pond and was discharged into Eccles Creek, where algae entrapped it. The phlogopite and algae, along with bacteria and mold, produced a marked discoloration of stream substrate, described as "slime", as far as the White Oak Loadout on Mud Creek. The fine sediment did not seem to be having any direct effect on the fish in July 1987, but macro invertebrates were substantially fewer in number and less diverse in Eccles Creek below the mine in comparison to Eccles Creek above the mine, South Fork, and Mud Creek. Elevated concentrations of nitrite, nitrate, and phosphate were found in water below the mine, and coliform bacteria in the sediment pond were elevated (UDWR, 1987).

Rerouting underground drainage around the dike, and adding a flocculent to the sedimentation pond solved the suspended phlogopite problem, but the slime was still in the streambed in late 1988 when sudsing was observed in Eccles Creek. Further water analyses found a surfactant in addition to continuing high levels of nitrogen and phosphorus. The sudsing and elevated phosphate were found to be caused by detergents used in the shop and offices. Mop water was being disposed of into floor drains, which empty into the 72-inch bypass culvert by way of the sedimentation pond. Skyline solved the problem by replacing detergents with low sudsing, non-phosphate types and revising procedures so that mop water is now discarded into the sanitary sewer (Utah Fuel Company, 1988). The elevated nitrogen was harder to remedy, but the source was determined to be the water-oil emulsion that was being used in the longwall hydraulic system to meet Mine Safety and Health Administration (MSHA) fire protection requirements: in addition to occasional leaks and spills, as much as 4,000 gallons of this emulsion can be released each time the longwall unit is moved. Oil is captured and removed from the mine water discharge system by skimming and flocculation, but nitrites and nitrates from the hydraulic oil were going into solution and being discharged from the mine. Skyline replaced the emulsion oil with one that contained no nitrites or nitrates as soon as the connection was realized. Since 1988 an extensive no-spill program has been part of the longwall operations, and if a spill does occur the water and oil emulsion is to be pumped into abandoned sections of the mine rather than being discharged to the surface (Utah Fuel Company, 1988).

A survey of Eccles Creek in August and October 1989 by the UDWR found coal fines were accumulating behind beaver dams, particularly in the stretch downstream of the Skyline Mine, to the confluence with South Fork. Entrapment of the coal in the ponds was causing a loss of trout habitat in upper Eccles Creek, but it was also having a positive effect by preventing migration of the fines downstream to lower Eccles Creek, Mud Creek, and Scofield Reservoir. Fish were almost absent from Eccles Creek at the South Fork confluence, but downstream numbers of fish increased and young fish were evidence of successful spawning. In addition to coal fines, gravel chips from the highway had completely covered the substrate in places (Report dated June 26, 1990 by UDWR in Appendix Volume A-3, Coastal States, 1993).

Studies of macro invertebrates and sediment in Eccles Creek done for Skyline by Ecosystems Research Institute (ERI, 1992) found that the mean number of individuals, total number of taxa, and aquatic plant biomass decreased immediately below the mine and then increased downstream. Water below the mine was not acutely toxic, but the effects of chronic toxicity and sediment transport were not determined. The streambed immediately below the Skyline Mine was extremely embedded and 0.5 mm to 2 mm diameter particles made up approximately 15% to 25% of the sediment, compared to 5% to 10% in other reaches of the stream.

Benthic invertebrate studies conducted in Eccles Creek after the Skyline mine water discharge increased the streamflow to bankfull (Mt. Nebo Scientific 2005) show that the increased discharges were having a cumulative effect on the macro invertebrate populations. The October 2003 study (Mt. Nebo Scientific 2005) did show that there is an apparent trend toward recovery, though far from where it needs to be. Skyline is required to repeat these benthic invertebrate studies in the spring and fall of 2006. Skyline Mine conducted macroinvertebrate studies in Eccles Creek in September of 2007 and July of 2008 to monitor changes caused by the increased water discharge into the stream. In the Skyline Mine 2009 Annual Report, the Division biologist made the following comment regarding the results of these surveys: "Some measures …indicate a considerable improvement in habitat quality of a few sites between 2001 and 2007. However, all other measures indicated that Eccles Creek has not yet recovered from the increased flow. Due to the gradient of the stream channel and the increased discharge … the stream cannot return to its previous state. The stream would only possibly recover with a reduction of flow or an increased input of loose, coarse material into the stream."

Baseline macroinvertebrates data were gathered in Winter Quarters and Woods Canyons in 2003, 2007, and 2008, and studies will be done every three years. The area adjacent to the Winter Quarters Ventilation Fan pad has too low of a gradient and too much fine sediment for meaningful macroinvertebrate study, so an electo-fishing evaluation will be done on this section of the stream (MRP, Section 2.8.1). In the Skyline Mine 2009 Annual Report, the Division biologist commented on these surveys: "Between 2003 and 2008 … there has been some variation in data. These variations could be due to stream side grazing, increased surface runoff, or other environmental factors. This variation will be important to note when looking at future studies during and after undermining."

Winget (1980) noted that sheep and cattle grazing, recreation, unpaved roads, mines, and fires had all contributed to previous degradation and erosion of these watersheds. The results were increased sedimentation and reduction or loss of fish and invertebrate populations. Improved range management along Huntington Creek in the late 1970's allowed some recovery of riparian habitat and bank stability.

Nitrogen and Phosphorus

Waddell (1983a) concluded that Scofield Reservoir might become highly eutrophic unless measures are taken to limit the inflow of nutrients. Winget (1980) attributed nutrient input to Scofield Reservoir to recreation, cattle and sheep grazing, and domestic sources. Waddell's study during the 1979 and 1980 water years found that Mud Creek was providing 16% of the inflow to the reservoir but 18% of the total nitrogen and 24% of the total phosphorus. Waddell attributed elevated nutrient levels in 1979 and 1980 to the clearing of 27 acres of forested land for fire prevention around the Skyline Mine portals and roads in 1979.

Fish Creek and Mud Creeks account for 52 % and 29 % of the nutrient input to Scofield Reservoir, respectively. Only providing 16% of the inflow, Mud Creek contributes a disproportionately high amount of the nutrients. Total phosphorus in particular has been directly correlated with sediment load, and phosphorous loads in Scofield Reservoir have been directly attributed to the erosion and transport of soils during spring runoff. Peaks in nitrate and phosphate during spring runoff have been measured in Mud Creek (Clyde and others, 1981).

The Mud Creek drainage has nutrient-rich soils that are fairly erodable, but increased flows from the mine have not substantially changed stream morphology (EarthFax, 2002, 2003, and 2004), nor have they increased the total phosphorous in the reservoir (measured at MC-3; see Figure 12, Appendix A).

Inflows to Skyline Mine have been pumped into Eccles Creek since 1983. Since March 1999, inflows to Skyline Mine have been pumped to abandoned underground workings, allowed to settle, and then pumped to Eccles Creek. Discharges have been continuously recorded since August 16, 2001, and from then through September 2005 have varied from 0 to 10,500 gpm, with an average of about 5,666 gpm. Based on the monthly reports provided by Skyline Mine, the volume of water pumped to Eccles Creek (and subsequently Mud Creek, and Scofield Reservoir) from September 2001 through June 2010 is 69,100 acre-ft (11 cfs). This has increased the average flow in Eccles Creek to about 3 times the normal average flow (pre-1999), and increased flow in Mud Creek to about 1.2 times the normal average flow. Flows are still only about 13% of spring runoff rates.

TSS and flow at sample locations CS-6 on Eccles Creek, VC-9 on Mud Creek, and VC-1 on Mud Creek show that the average sediment yield carried by Eccles and Mud Creeks prior to 1999 was 2,710 Tons/yr. The average sediment yield carried by Eccles and Mud Creeks between 1999 and 2002 was 2,908 Tons/yr, which is an increase of 7% annually.

Five new monitoring sites were added to Mud Creek and two on Eccles Creek to determine if the significantly increased mine discharge flows are having a negative impact on Mud Creek or Scofield Reservoir. These sites are monitored for total flow, TDS, TSS, and total phosphorous, and for changes to stream morphology.

There is no water quality standard for nitrite, but concentrations in excess of 0.06 mg/L produce mortality in cutthroat trout (UDWR, 1988). The nitrate numeric standard for groundwater and surface water in Utah should not exceed 10 mg/L in Class 1C water, and levels above 4 mg/L are considered an indicator of pollution, usually from sewage. Levels of phosphate in excess of 0.04 mg/L are not toxic to trout, but are excessive and promote eutrophication (UDWR, 1988). By state standards for Class 2A, and 2B waters, phosphate in excess of 0.05 mg/L is a pollution indicator. The recommended limit for MBAS, a surfactant, is 0.2 mg/L (Steve McNeil, Utah Dept. of Health, personal communication with the Division, 1988).

At the Kinney #2 mine, surface water stations Miller Outlet, RES-1 and Mud Creek reported orthophosphate concentrations ranging from non-detect to 0.13 mg/L. Orthophosphate is one form of phosphate and may not be an accurate representation of the total phosphate present in a sample (Personal Communication with Kyle Gross, Lab Manager America West Analytical Laboratories). Despite the lack of baseline data for total phosphate, the orthophosphate component alone exceeds the Class 2A and 2B standards for phosphate in surface water (0.05 mg/L). As mentioned previously, total phosphorus data in Mud Creek are available from 2001 – 2006. These data have shown that total phosphorus loading has been on the increase on the order of 1.5 to 2 pounds per day over that time period. .Since total phosphate is a listed TMDL pollutant for Scofield Reservoir by the UDEQ (http://www.waterquality.utah.gov/TMDL/Scofield_Res_TMDL.pdf), Kinney #2 mine will be required to modify their water monitoring plan to begin monitoring for total phosphate instead of orthophosphate.

Nitrate did not exceed concentrations above 1.5 mg/L in surface water samples from Kinney #2, significantly below the 4 mg/L pollution indicator. Groundwater samples from the monitoring wells CR-10-11 and CR-10-12 did show exceedances in the pollution indicator for nitrate concentrations ranging from 2.4 to 6.7 mg/L but not the groundwater numeric standard of 10 mg/L. The two wells are screened in the shallow alluvial/colluvial groundwater system that is hydrologically connected to the Scofield Reservoir system where nitrate has been identified as a pollutant.

At station UPL-10, on Huntington Creek above Electric Lake, total nitrogen averaged 0.23 mg/L from July 1981 to June 2005, with highs of 1.0 mg/L ammonia and 0.68 mg/L nitrate and lows of <0.01, and <0.02 mg/L, respectively. Total phosphate averaged 0.040 mg/L with a high of 0.06 and a low of <0.01 mg/L. At UPL-3, just below Electric Lake, total nitrogen averaged 0.6 mg/L from 1981 to 1991, with highs of 1 mg/L as ammonia and 2 mg/L as nitrate and lows of 0 mg/L for both. Total phosphate averaged 0.2 mg/L with a high of 2 and a low of 0 mg/L (Coastal, 1993).

Data collected by Winget (1980) from 1976 to 1978 indicated that phosphate in Electric Lake was below the minimum concentration needed by aquatic life, and nitrate was just above the limit. These nutrient concentrations reflected the mesotrophic nature of the streams feeding the reservoir. Eccles Creek had nitrate concentration adequate for algal growth at most times, but low phosphate.

Discharge weighted average concentrations for nitrogen and phosphorus at Station S-29 in Eccles Canyon (same as USGS gauging station 09310600 and Skyline's station CS-6) during water years 1979-1980 were 11 and 2.2 mg/L. Concentrations of suspended and dissolved nitrogen combined reached 21 mg/L in May 1980, and phosphorus reached 4.3 mg/L. These nutrient levels apparently resulted from the clearing of 27 acres of forested land for fire prevention around the Skyline mine portals and roads in 1979 (Waddell et al., 1983a). In Mud Creek, downstream of the confluence with Eccles Creek, at S-36 (near Winter Quarters Canyon and USGS gauging station 09310700), discharge weighted average concentrations were 1.3 mg/L nitrogen and 0.1 mg/L phosphorus. The downstream decrease is attributed to the nutrients from Eccles Creek being mostly in suspended form that settles out in the slower flow of Mud Creek. About 50% of the nitrogen and 25% of the phosphorus in Mud Creek in 1980 came from Eccles Creek, but only 20% of the flow. Concentrations of nutrients in Mud Creek peaked at about the same time as those in Eccles Creek (Waddell and others, 1983a; Waddell and others, 1983b).

At CS-6, on Eccles Creek, total nitrogen averaged 0.6 mg/L and phosphate averaged 0.14 mg/L between 1981 and 2002. Highs and lows for nitrogen were 2.5 and 0.01 mg/L nitrate and 3.5 and 0.01 mg/L ammonia; for phosphate they were 0.76 and 0.01 mg/L. Data from 1976 to 1979 from several stations along Eccles Creek indicate a high for nitrate of 2.70 mg/L and for phosphate of 0.22 mg/L (Vaughn Hansen Associates, 1979).

High, low, and mean nitrate concentrations at VC-1 on Mud Creek were 0.38 mg/L, 0.01 mg/L, and 0.07 mg/L between 1975 and 2002, but analyses for nitrates have been infrequent since 1988. Maximum phosphate was 4.55 mg/L in June 1984 and minimum was 0.01 mg/L in September 1987. No phosphate analyses were done at VC-1 after 1999.

In 1987 a dark mica mineral, phlogopite, was being discharged from Skyline Mine #3 into Eccles Creek by way of the sediment pond (as discussed above). The phlogopite was entrapped in algae, which combined with bacteria and fungi to produce slime on the stream substrate as far as the White Oak Loadout on Mud Creek. The fine sediment did not seem to be having any direct effect on the fish in July 1987, but macro invertebrates were substantially fewer in number and less diverse in Eccles Creek below the mine in comparison to Eccles Creek above the mine, South Fork, and Mud Creek. Analyses of water samples taken by UDWR (Table 9) found 0.46 mg/L total nitrogen in the stream below the Skyline Mine, 0.11 mg/L nitrite (24% of total nitrogen), and 0.34 mg/L nitrate (76% of total nitrogen). Total nitrogen measured above the mines, was 0.29 mg/L, with no nitrite. Phosphate levels in the Skyline sediment pond and Eccles Creek were 0.045 mg/L, but no phosphate was detected above the mine. UDWR subsequently found elevated total and fecal coliform bacteria in the sediment pond. Because of the bacteria and nitrites, UDWR suspected that the sewage tank was backing up into manhole connections and leaking into the sediment pond. UDWR recommended chlorination of the sediment pond and other procedures to avoid recurrence of the suspected sewage backup (UDWR, 1987).

Table 12

	Nitrite	Nitrate	Ammonia	Phosphorus Total[a]	MBAS Detergent
Above Skyline Mine*	not detected	0.29	**	not detected	**
Below Skyline Mine*	0.11	0.34	**	0.045	**
Miller Outlet	0.042	0.92	0.16	0.13	**
RES-1	0.039	0.37	0.02	0.045	**
Mud Creek	0.0	1.5	0.57	0.69	**
Sulfur Spring	0.022	0.10	0.44	0.02	**

*Sampled by UDWR July 1987 (UDWR, 1987)** Analysis not reported, probably not done
(a) RES-1, Mud Creek and Sulfur Spring phosphorus data were analyzed for orthophosphate

The phlogopite was eliminated from the pond discharge by rerouting flow in the mine, and using a flocculent. The UDWR recommendations for reducing pollution from sewage were also implemented, but slime persisted in the streambed through the summer of 1988. Random checks by UDWR indicated that the water quality was acceptable. Fish were abundant, and macro invertebrate populations appeared normal in lower Eccles Creek, however in late September of 1988, foaming was observed in Eccles and Mud Creeks along the same reaches where the slime was found. The slime appeared to be covering more surface area, and extending deeper into the substrate. Division personnel took water samples on Eccles Creek above and below the mines in September and October 1988 at several locations within the 72-inch bypass culvert, including at the discharge of the sedimentation pond (Table 10). Analysis of these samples revealed that high nitrite levels persisted. In September, nitrite concentration was 0.64 mg/L in the outfall of the 72-inch culvert, which carries undisturbed drainage beneath the disturbed area, and also receives the discharge from the sedimentation pond. Ammonia and organic nitrogen concentrations were also elevated in comparison to undisturbed drainage (The Division, 1988). Samples taken from the pond outfall by UDWR in October 1988 had 14 mg/L nitrate and 0.09 mg/L nitrite (UDWR, 1988). Results of analyses from several different sources during September and October are summarized in Table 10.

Total phosphate was 0.50 mg/L in one sample of the discharge from the Skyline shop (Utah Fuel Company, 1988). Another sample from the shop sump reportedly approached 13 mg/L (Keith Zobell, personal communication, The Division, 1988). Samples taken from the sedimentation pond by UDWR personnel in July and October of 1988 had phosphate levels of

0.045 mg/L and 0.06 mg/L (UDWR, 1988). Water analyses also detected a detergent, MBAS, in the sediment pond, and in the outfall (see Table 13).

In addition to the laboratory analyses, Skyline used a field kit to check nitrate levels at various times and locations. On October 5, 1988, nitrate levels were 8 to 9 mg/L in Eccles Creek below the mine and 13 mg/L in the discharge from the #3 mine (CS-12). Other flows into the sediment pond showed no nitrate, indicating that the sewage holding tanks were not the source of the nitrate. On October 6, water coming off the longwall section of the #3 mine had 5 mg/L nitrate, return water had 3 mg/L, and overflow from the emulsion pump had 2 mg/L. Water from mined out areas had no nitrate (Utah Fuel Company, 1988).

Trout and invertebrates had not been checked in upper Eccles Creek in mid-September 1988 when lower Eccles Creek was monitored, because lower Eccles Creek was supporting healthy populations even with the slime present. However, an intensive sampling of fish and macroinvertebrate populations in early October 1988 revealed that the trout population and biomass in upper Eccles Creek had declined over 90%. Macroinvertebrates were essentially gone in upper Eccles Creek downstream from the sediment pond outfall, but taxa and numbers increased downstream, as did numbers and biomass of fish. High concentrations of nutrients were producing both toxic and eutrophic conditions. Nitrite in the water was a contributing and probable primary cause of mortality of macroinvertebrates in upper Eccles Creek and had forced trout to migrate downstream to where dilution produced a tolerable habitat. Trout spawning had not been successful in 1987 and 1988 in any section of the stream: either the slime precluded successful spawning, the nitrites were fatal to the eggs and fry, or both (UDWR, 1988). Refer to the section Fish and Invertebrates for more information.

Table 13

	Nitrite	Nitrate	Ammonia	Organic Nitrogen	Phosphorus Total	MBAS Detergent
Sampled by UDWR July 1988 (UDWR, 1988)						
Sed. Pond Effluent	**	**	**	**	0.045	**
Sampled by the Division 28 September, 1988						
North Fork	<0.05	1.20	<0.05	<1.00	<0.05	<0.03
Middle Fork	<0.05	0.59	<0.05	<1.00	<0.05	<0.03
South Fork	<0.05	0.21	<0.05	<1.00	<0.05	<0.03
72" Bypass Outfall	0.64	0.38	0.19	1.30	<0.05	0.28
Sampled by the Division 03 October, 1988						
Sed. Pond at 3'	*	0.26	0.14	*	<0.05	0.75
Sed. Pond at 6'	*	0.37	0.14	*	<0.05	0.50
Sed. Pond at 9'	*	0.32	0.14	*	<0.05	0.83

Sed. Pond at 10.5'	*	0.3	0.16	*	<0.05	*
72" Bypass Outfall	*	0.33	0.25	*	<0.05	*
Pond Spillway in Bypass	*	0.41	0.18	*	<0.05	0.80
Middle and South Fork Confluence in Bypass	*	0.25	*	*	<0.05	0.1
28" Pipe in Bypass	*	*	*	*	<0.05	0.09
Sampled by UDWR October 1988 (UDWR, 1988)						
Sed. Pond Effluent	0.09	14.0	**	**	0.06	**
Sampled by Skyline October 1988 (Utah Fuel Company, 1988)						
Eccles Creek	**	**	**	**	0.04	***0.90
Mine #3 Discharge (CS-12)	0.08	2.28	**	**	0.04	***0.87
Sed. Pond Discharge	0.04	3.39	**	**	0.06 and 0.04	***1.33
Shop Discharge	0.03	3.18	**	**	0.50 and 0.36	***1.33

* Analysis not done
** Analysis not reported, probably not done
*** Unspecified surfactant, not identified as MBAS

Elevated nitrites were traced to emulsion oil used in the longwall system in the #3 mine. In the 1:20 dilution that was used at the time, nitrite concentration was 182 mg/L and nitrate was 872 mg/L. As much as 4,000 gallons of this emulsion was released each time the longwall unit was moved, which had occurred six times from 1986 to 1988. There were also occasional spills and leaks when the longwall operated. The oil was captured and removed from the water by skimming, and flocculation before it left the mine, but the nitrogen compounds went into solution in the water and passed through the sediment pond into Eccles Creek. Skyline replaced the emulsion oil with one that contained no nitrites or nitrates as soon as the connection was realized. Field kit test results submitted to the Division by Skyline in late 1988 indicated that the nitrate and nitrite levels were dropping in discharges from Mine #3 (CS-12) and the sediment pond (Utah Fuel Company, 1988). Samples taken by the Division in December 1988 (Table 14) detected no nitrite or nitrate in discharges from the #3 mine, or the pond; but elevated levels were found in the discharge from the #1 mine. Field kit results from January to May 1989 showed consistent nitrite and nitrate levels, 0.03 mg/L and 1.07 mg/L respectively, in both the sediment pond and the Mine #3 discharge (CS-12). In 1989 the longwall unit was moved from Mine #3 to Mine #1. Nitrate and nitrite were within acceptable limits by August 1989 (Table 14).

Sudsing and elevated phosphate turned out to be unrelated to the nitrogen compounds, and were caused by detergents used in the shop and offices. Mop water was being disposed of into floor drains, which empty into the 72-inch bypass culvert by way of the sedimentation pond. Skyline has solved the problem by replacing detergents with low sudsing, non-phosphate types and revising procedures so that mop water is now discarded into the sanitary sewer (Utah Fuel Company, 1988).

Table 14

	Nitrite				Nitrate			
Sampled by the Division	**12/14/88**	**3/29/89**	**4/18/89**	**8/31/89**	**12/14/88**	**3/29/89**	**4/18/89**	**8/31/89**
Mine #1 Discharge (CS-14)	0.83	?	*	0.05	5.2	0.034	*	0.075
Mine #3 Discharge (CS-12)	<0.05	0.013	0.14	*	<0.05	0.039	2.0	*
Pond Discharge	<0.05	0.032	0.24	<0.05	<0.05	0.033	1.76	1.48
72" Bypass Outfall	*	*	<0.05	<0.05	*	*	<0.05	1.11

* Analysis was not done

Oil and Grease

There is no water quality standard for oil and grease, but the UPDES permit limit for the White Oak, Kinney #2, and Skyline Mines is 10 mg/L. However, a 10 mg/L oil and grease limit does not protect fish and benthic organisms from soluble oils, such as those used in longwall hydraulic systems. The UDWR has recommended soluble oils be limited to 1 mg/L (Darrell H. Nish, Acting Director UDWR, letter dated April 17, 1989 to Dianne R. Nielsen, Director of the Division). For water being discharged to Electric Lake from the JC wells, the limit is also 10 mg/L.

Baseline data collected from the surface water and spring samples in and adjacent to the permit area of the Kinney #2 mine have shown oil and grease detections ranging from concentrations of 3-4 mg/L from springs and 2-3 mg/L for the stream samples. The explanation offered for this phenomenon in the text of the MRP was the possibility that oil and grease could be present in the historic abandoned mine workings.

Oil and grease in water discharged from Skyline Mine #1 (CS-14) is typically below detection limits, with a maximum of 23.4 mg/L measured in June of 1993. The maximum at Mine #3 (CS-12) 12.5 mg/L, recorded in 1987. Discharge from the sediment pond has only occasionally (10 of 880 samples as of June 2010) exceeded the 10 mg/L UPDES limit (3 times in the 1980's, 6 times in the early 1990's, and once in 2002).

The principal source of oil discharged from Mine #3 appears to be the longwall unit that was installed in 1986. A water-oil emulsion (5% oil) is used in the longwall hydraulic system to meet MSHA fire protection requirements. As much as 4,000 gallons of this emulsion can be released each time the longwall unit is moved. The unit was moved six times between 1986 and October 1988. There are also occasional spills and leaks when the longwall is operating. Oil is captured and removed from the mine water discharge system by skimming and flocculation before it leaves the mine. Since 1988 an extensive no-spill program has been part of the longwall operations, and if a spill does occur the water and oil emulsion is to be pumped into abandoned sections of the mine rather than being discharged to the surface (Utah Fuel Company, 1988). If there is flocculated oil in the sediment pond sludge, it is a potential source of recontamination that will eventually require proper removal and disposal.

Although Well JC-3 discharged water directly from the mine workings, it was pumped from a portion of the mine that is flooded and not accessible. No evidence of contact with oil and grease, emulsion fluids, or any other contaminants was ever measured.

Prior to 1985, oil and grease in water discharged from the White Oak Mine was generally less than 0.5 mg/L, with a maximum of 2.2 mg/L. Between September 1985 and June 1989, measurements exceeding 0.5 mg/L increased, and the February 21, 1986 sample exceeded 10 mg/L. Longwall mining equipment was never used in the White Oak Mine. Reasons for the increase in oil and grease in the mine discharge have not been identified.

Temperature

Water temperatures in the streams fluctuate greatly, because low flows and turbulence act to quickly equilibrate water temperatures with air temperatures. Winget (1980) found daily fluctuations of 12 to 15° C during warmer months, but fairly constant temperatures (0 to 2° C) from November to March. The Division found that the temperature of Eccles Creek increased, from 43° F to 54° F, as it passed through the 72 inch bypass culvert and joined with the sediment pond discharge (The Division, 1988). Since the streams within the CIA have steep gradients and rocky beds, entrainment of air and transfer of oxygen, and equilibration with air temperature should be sufficient to eliminate temperature as a factor in habitat quality.

The maximum allowable temperature change for Class 3A waters is 2° C (3.6° F). The water temperature of the combined discharges of the JC wells is approximately 14°C. Since the temperature of the receiving waters, Electric Lake, varies from 0.5° - 19.7°C at the surface (winter to summer, respectively) the temperature of the discharge is satisfactory. No mine water discharges from underground workings are planned for the Kinney #2 mine that would have the potential to discharge to Scofield Reservoir.

Fish and Invertebrates

Upper Huntington and Eccles Creeks have naturally reproducing populations of cutthroat trout. Rainbow and brown trout were reported in upper Huntington Creek prior to 1979, but

UDWR's work to eliminate these trout species from this fishery has apparently been successful. Rainbow trout have been planted in Scofield Reservoir, and cutthroat trout are recruited from inflowing streams. Speckled dace, mountain suckers, and mottled Sculpin are also found in area streams. Macroinvertebrate communities in both drainages have considerable species diversity (Winget, 1980).

James Creek

The Skyline Mine MRP (page 2-71) commits to conducting macroinvertebrate studies and fish studies in James Creek for 2 years beginning in October 2001 and then every three years thereafter. Sampling should identify any slow degradation of the creek due to sedimentation. Unfortunately, only one year of baseline data was obtained prior to mining activities. Mt. Nebo Scientific, Inc. collected the data for the first two years, and Dr. Dennis Shiozawa conducted the surveys. The October 17, 2000 and 2001 (2001 Annual Report) reports found James Creek to be in excellent condition despite the large decrease in macroinvertebrate and fish numbers, Table 15 summarizes the sampling. James Canyon and Burnout Creek were surveyed in September of 2007 and July 2008: there was evidence of possible reinvasion and successful reproduction of trout.

Table 15 - Summary of Aquatic Resource Sampling on James Creek in 2000 and 2001

Date	**Macroinvertebrate $\#/m^2$**	**Biomass (g/m^2)**	**Total Fish**
Fall 2000	378,510*	272	587
Spring 2001**	335,000		
Fall 2001	127,875	256	93

*Used summary data from Fall 2001 report, because Fall 2000 report indicates $34{,}757/m^2$.
** Spring 2001 report not found; used summary data from Fall 2001 report.

The 2001 report provides several explanations for the decrease in macroinvertebrate and fish numbers, and cannot directly attribute the decrease to mining activities. The large amount of drilling fluids that spilled into the Creek while drilling the James Canyon Wells was not mentioned, or accounted for in this study. However, a subsequent conversation between Susan White of the Division and Dr. Shiozawa indicated that the drilling fluids could have influenced the fish numbers. The James Canyon well drilling was carried out under an exploration permit administered by the Bureau of Land Management (BLM).

Because of the lack of adequate baseline data, and the dramatic decrease in numbers of macros and fish for fall 2001, studies are ongoing in James and Burnout Creeks. The spring 2002 report concluded, "Both streams can be considered to be in good condition. The impact recorded in the fall of 2001 in James Canyon appears to have been temporary." The Skyline Mine MRP includes a commitment to sample macroinvertebrates in the perennial streams in

Woods, Eccles, Burnout and James Canyons in the fall and spring every three years, beginning in 2007. Sampling was done in 2007 and 2008, and the next sampling date is fall 2011.

Eccles Creek

UDWR ranks Eccles Creek as a valuable trout stream, mainly as a spawning stream for wild cutthroat trout that are eventually harvested in Scofield Reservoir. Data the UDWR collected in 1971, prior to coal development, identified Eccles Creek as a somewhat pristine fishery. The stream sustained an estimated 1,272 wild cutthroat trout along 2.5 miles of habitable stream. Adult trout comprised only 4% of this population (Donaldson and Dalton). Although not officially documented by UDWR, local sportsmen have reported catching "some of the largest cutthroat out of Eccles Creek" that they have seen out of any stream on the Wasatch Plateau. This is attributed to the increased flows in Eccles Creek due to the increased mine discharge observed beginning in August 2001.

Benthic invertebrate studies were done by the USGS at three sites on Mud Creek and two in Eccles Canyon in July and September 1979, and July and October 1980. There were consistent downstream and seasonal trends. Diversity decreased downstream in Eccles Canyon, probably because Skyline Mine was relocating the stream at the time (Waddell and others, 1983b).

Winget (1980) collected data on invertebrates and sediments in Eccles and Huntington Creeks prior to construction of the Skyline Mine. Skyline studied benthic communities and sediment composition of gravel beds in Eccles Creek from 1979 to 1985. Fishery habitat studies were also done (Coastal, 1993, p. 2-70).

In conjunction with the Skyline study, UDWR conducted fish surveys the first week of August from 1979 to 1986 (Donaldson and Dalton). UDWR found that the fishery began to decline after 1975 in the 1.75 mile stretch of Eccles Creek below the turnoff to the White Oak Mine. The construction of roads and mines caused high sedimentation in the stream, depositing up to 18 inches of fine sediment above the natural substrate. In 1979, the fish population along the entire 2.5 miles of habitable stream was down to 40% of 1971 pre-mining levels, and 18% of the fish were adults compared to 4% in 1971. Construction of the Skyline Mine began in 1980. Mitigation started in 1981, but deterioration of the stream continued. By 1983, most of the road through Eccles Canyon was asphalted, and disturbed areas were revegetating. Still, only 27 fish were found in Eccles Creek, a 98% reduction compared to 1971. There were no young-of-year or 1-year juveniles. A reduction of sedimentation was evident by 1985, and by 1986 the cutthroat population had recovered to 93% of the 1971 levels and 1-year juveniles were present (Donaldson and Dalton).

The UDWR conducted fish surveys and macroinvertebrate inventories in 1988 as part of the investigation of the problems with foam and slime in Eccles Creek (discussed above). Fish population had been estimated in 1986 to be 600 fish per mile. In mid September 1988, fish in lower Eccles Creek were abundant and macroinvertebrate populations appeared normal.

However, when Upper Eccles Creek was assessed in October 1988, only 20 fish per mile were found. It was also found that one and two-year old fish were absent from the population. Macroinvertebrate diversity dropped from 6 - 7 families per square foot above the Skyline Mine, to 1 family present below the mines. Diversity in Mud Creek was 8. Toxicity from nitrites and eutrophication from nitrates and phosphates were the causes of these population losses (UDWR, 1988; The Division, 1988).

R. W. Baumann (1985) and Ecosystems Research Institute (ERI, 1992) performed studies of macroinvertebrates and sediment in Eccles Creek for Skyline. Benthic invertebrates in the stream below the mines indicated stress in the 1984 - 1985 surveys, but showed recovery from the conditions that existed in 1981. In 1991, mean number of individuals, total number of taxa, and aquatic plant biomass decreased immediately below the mine; then increased further downstream. The zone of impact appeared to extend to the confluence of Eccles Creek with Mud Creek, but parameters there were similar to those in Mud Creek. It was determined that the water below the mine was not acutely toxic, but the effects of chronic toxicity and sediment transport were not determined. The streambed immediately below the mine was extremely embedded, and the percentage of sediment 0.5 to 2 mm in size was significantly higher than elsewhere in the streams. Electrical conductivity of the water was highest directly below the mine and decreased further downstream. Sulfate leached from gypsum in the limestone rock dust in flooded, abandoned areas of the mine was identified as the reason TDS levels in mine water discharges were exceeding UPDES standards. TDS in the discharge returned within UPDES limits after application of contaminated rock dust ceased and continuing flow diluted or flushed residual contamination.

Skyline Mine conducted macroinvertebrate studies in Eccles Creek in September of 2007 and July of 2008 to monitor changes caused by the increased water discharge into the stream. In the Skyline Mine 2009 Annual Report, the Division biologist made the following comment regarding the results of these surveys: "Some measures …indicate a considerable improvement in habitat quality of a few sites between 2001 and 2007. However, all other measures indicated that Eccles Creek has not yet recovered from the increased flow. Due to the gradient of the stream channel and the increased discharge … the stream cannot return to its previous state. The stream would only possibly recover with a reduction of flow or an increased input of loose, coarse material into the stream."

Upper Huntington Creek

After the spillway gates of Electric Lake were closed in 1973, and the reservoir began to fill, UDWR measured increasing numbers of cutthroat trout in Huntington Creek above the lake. Numbers increased from 104 fish per 0.1 mile in 1974 to 263 fish per 0.1 mile in 1977. Also, smaller fish made up increasing percentages of this population, indicating increased reproduction, resident fish, and increasing recruitment stock for the reservoir (Winget, 1980).

Benthic invertebrate studies were done by the USGS at seven sites in Huntington Creek from 1977 through 1979. Diversity indices had a large variability that was attributed to variations, possibly natural, in water quality and stream environment. Simons, Li, and Associates (1984) concluded several years' worth of additional data would be required to establish baseline conditions.

Winter Quarters and Woods Creeks

Winter Quarters Creek was surveyed by UDWR in 1968 and 1971. In 1968, 70 cutthroat trout were found along a 0.1 mile reach, with a maximum size of 14 inches. Winget (1980) does not report the numbers for 1971, but maximum size was 9 inches and the presence of young fish indicated successful spawning. Banks were stable along 70% of the stream. Spawning gravels composed 38-42% of the substrate, but low flows limited fish production. Caddisflies, stoneflies, and mayflies were common and water quality was high (Winget, 1980).

Baseline macroinvertebrates data were gathered in Winter Quarters and Woods Canyons in 2003, 2007, and 2008, and studies will be done every three years. The area adjacent to the Winter Quarters Ventilation Fan pad has too low of a gradient and too much fine sediment for meaningful macroinvertebrate study, so an electo-fishing evaluation will be done on this section of the stream (MRP, Section 2.8.1). In the 2009 Skyline Mine Annual Report, the Division's biologist made the following comment on the surveys of Winter Quarters and Woods Creeks: "Between 2003 and 2008 … there has been some variation in data. These variations could be due to stream side grazing, increased surface runoff, or other environmental factors. This variation will be important to note when looking at future studies during and after undermining".

Kinney #2 Permit Area

The Kinney #2 permit adjacent area provides potential habitat for approximately 7 fish species. This area includes all Pleasant Valley and its tributaries that drain into Scofield Reservoir. The UDWR database included for Scofield Reservoir and its tributaries apply. According to Table 2 – Potential Wildlife Species of the Wasatch Plateau (Dalton, 1990) in the Kinney #2 MRP, fish species listed as common include: cutthroat trout, rainbow trout, carp, Utah chub, red side shiner, mountain sucker and walleye. None of these fish are listed on the Utah Sensitive Species list. Because there are no streams or lakes with the permit boundary, there is no potential for fish species to exist within the permit boundary. The Kinney #2 mine is designed to control runoff in the disturbed area by directing all drainage to a sediment pond. The effect of the sediment pond may show decreases in runoff and flow in the natural drainages to receiving water bodies. Effects to downstream surface water bodies that do provide habitat for fish populations is anticipated to be negligible given the relatively small (38-acre) surface disturbance footprint.

The Colorado River Fish Recovery Act is a multi-agency partnership to recover endangered fish in the upper Colorado River basin while water development proceeds in compliance with state and federal law. Four species of fish native to the Colorado River basin are in danger of becoming extinct: the Colorado pike minnow, the razorback sucker, the bony tail, and the humpback chub. The goal of the program is to stem further reductions in numbers of these species and, eventually, to create self-sustaining populations, while water development proceeds in compliance with state and federal law. Water usage from mining activities has the potential to intercept the amount of water in the Colorado River thereby impacting these endangered fish populations. According to the Act, any mine removing over 100 acre feet/year of water per year is subject to a mitigation fee paid to the Fish and Wildlife Service. Because the Kinney #2 mine is anticipating an estimated water usage of a maximum of 66 acre feet /year, the requirements of the Act and the associated fees do not apply.

Stream Channel Alteration, Alluvial Valley Floor, and Land Use

The Division's March 1984 Technical Analysis written for the Valley Camp - White Oak Mine provides a summation of the history of the alluvial valley floor determination. The Division stated that Whisky Canyon and Pleasant Valley (above the Utah #2 facilities) were observed by the Office of Surface Mining in August of 1983 to be too narrow for flood irrigation or sub irrigation agricultural activities. Also in 1984, it was noted that the pastures are flood irrigated and the grasses on the valley bottom may be subirrigated.

Since August 2001, Skyline Mine has been discharging an average of 4,800 gpm (9 cfs) into Eccles Creek. These waters flow down Eccles Creek and then to Mud Creek. Mud Creek flows through Pleasant Valley, which is an alluvial valley floor below the Utah #2 Mine. This flow has *increased* water availability in, and has not caused material damage to the quality of, water supplying the alluvial valley floor.

The historical record of flow in Mud Creek is graphed in Exhibit 3, as recorded at USGS station 09310700 just downstream of the confluence with Winter Quarter's Creek. Ordinarily, high flows of approximately 100 – 150 cfs occur for a short duration during the months of May and June. Flows quickly subside after snow melt, back to the baseline flow of approximately 6 – 12 cfs. The highest daily mean flow during the period from 1974 – 2005 was 300 cfs during the month of May 1984. The lowest daily mean flow was 1.6 cfs during January 1980. The mine discharge is constantly contributing additional water to the baseline flow.

Measurements of flows taken on November 26, 2001 (Appendix D, Skyline Mine MRP) recorded 18.4 cfs in Mud Creek after the confluence with Eccles Creek and 24.44 cfs after the confluence with Winter Quarters Creek. The gain in flow downstream is attributed to contributions from springs and side streams (2 – 3 cfs) and re-emerging baseflow from the alluvium of 3 – 4 cfs (Section 2.12 and Appendix D July 2002 Addendum to the Skyline Mine PHC).

The mine waters being discharged to Eccles Creek had an average TDS level of 600 mg/L in July of 2000. As of July 2010, the Eccles Creek mine discharge water reported TDS ranges of 380-550 mg/L. In Eccles Creek above the mine, the average concentration of TDS is 360 mg/L (2008-2009).

As part of the alluvial valley floor determination, cross sections of the Mud Creek channel were measured at six different stations. The potentiometric surface was measured at four of those stations. At Station 7300, in the vicinity of Green Canyon, the groundwater is four feet below the surface. In the area of Station 14480, the groundwater level is eight feet below the surface, reflecting the rolling nature of the land and the incised nature of the stream channel. The ground water rises back up to four feet below the surface at Station 17340. Station 17340 is located at the site of an irrigation diversion; so as a result, the depth to groundwater at a point 400 feet distant from the stream is closer to the surface than that along the stream channel. This is due to irrigation return flow as well as stream channel entrenchment (Section 2.12 of the Skyline Mine MRP).

The land along Mud Creek is owned by four different landowners, and is used for grazing. Ray Jensen, Range Specialist for the BLM describes the area as sub-irrigated, grazed land with an historical yield of 4,000-6,000 pounds/acre. The predominant vegetation type is grass. The number of animals grazed on the pastures by each landowner is variable with time.

Canyon Fuel Company has evaluated the value of the pasture ground in terms of the replacement cost for feed. At a consumption rate of 0.5 tons per month, and a cost of $100 per ton of hay; the replacement cost is $50 per animal per month. The need for replacement of feed is not likely, however, since grazing will not be impeded by high flows along Mud Creek, and the reduction in available grazing area is limited to stream banks that may be eroded by the high water.

Dr. Patrick Collins of Mt. Nebo Scientific assessed the vegetation along the Mud Creek stream channel in December 2001 (Appendix A of Appendix D, July 2002 Addendum to the Skyline Mine PHC). He conducted a level II investigation using the methods of the USDA Forest Service. Two reaches were located on Mud Creek. Reach #4 is located just below the confluence of Eccles and Mud Creeks. The riparian community was approximately 91 feet wide and consisted of willows, sedge and rush grasses. Approximately 80% of the banks were vegetated and stable. Downstream, at Reach #5, the width of the riparian community broadened to 120 feet and consisted mostly of willows growing in both riparian and wetland communities. Approximately 60% of the bank was vegetated and stable (February 27, 2002, EarthFax report in Appendix D of the July 2002 Addendum to the PHC). Additional fieldwork observations were conducted in the summers of 2002 and 2003. The results of these observations did not provide any definitive alteration of the riparian or wetland communities.

The gradient of Mud Creek is approximately 0.0091 ft/ft with a sinuosity ratio of 1.6. These figures were derived from aerial photographs (personal communication, November 15, 2002, Rich White, Earth Fax Engineering, with Priscilla Burton of the Division). The channel flattens on approach to Scofield Reservoir with an average gradient of 0.02 to 0.1 ft/ft. Channel subsoils are silty sands and clayey silts, classified by the 1988 Carbon County Soil Survey as Silas and Silas Brycan series. The results of laboratory analysis on the physical properties of the soils in the creek are found in Appendix B of Appendix D of the July 2002 Addendum to the Skyline Mine PHC. Cross sections of the channel describe a channel bed that is 96% cobbles and gravels and side slopes that are 100% sand, silt and clay (Appendix E of Appendix D of the July 2002 Addendum to the Skyline Mine PHC). Low flow terraces are limited in extent and the channel is incised. There is no broad flood plain.

The current stream flows do not approach natural bankfull discharge (Table 5 of Appendix D July 2002 Addendum to the Skyline Mine PHC). The erosional stability of the Mud Creek channel beds and banks was evaluated and found to fall within the allowable velocity using the techniques of evaluation described by the Soil Conservation Service (Table 3 of Appendix D July 2002 Addendum to the Skyline Mine PHC).

A stability evaluation of the channel concluded that well vegetated slopes (grasses and willows) are able to handle the increased flow without erosion (Appendix D of the July 2002 Addendum to the Skyline Mine PHC). There are channel banks of Mud Creek that are not well vegetated and the landowners of these lands should avail themselves of programs that would provide assistance to armor the bank and divert flow to allow the eroding banks an opportunity to reclaim. In an effort to stabilize the stream bank in critical areas and prevent erosion before it began, Canyon Fuel Company obtained a stream alteration permit from the Division of Water Rights and planted trees in 22 locations along the stream bank in cooperation with the landowner.

The July 2002 Addendum to the Skyline Mine PHC (page PHC A-21) commits to armoring stream channel banks, planting of stream bank stabilizing vegetation, or redirection of some flows; should monitoring reveal that deterioration of stream chemistry or stream morphology or vegetative community is related to mine water discharge. To help mitigate any potential erosion of the stream banks in Mud Creek, Canyon Fuel Company has provided time and materials to a private landowner owning land on Mud Creek to establish additional armoring along the steeper cut banks located along the creek.

The location of the Kinney #2 mine is directly adjacent east of the Pleasant Valley alluvial valley floor created by Mud Creek draining into Scofield Reservoir. Mining will occur well above the regional water table (as presented in Chapter 7 of the Kinney #2 MRP). The coal seam to be mined is located well above the water table present in Pleasant Valley. As a result, the potential for ground water interception of the water table within Pleasant Valley is considered negligible. In addition, the irrigation water that supplies the alluvial valley floor (AVF) is derived from Mud Creek at a diversion point upstream of the proposed mine site. Based upon a Utah Department of Environmental Quality TMDL analysis of Scofield Reservoir, 87% of the inflow to the Scofield reservoir comes from Fish and Mud Creek. The proposed mining activity poses a minimal potential for interrupting or impacting these drainages due to it's proximity to the drainages and the utilization of first mining practices only (i.e. no planned subsidence). Additional ground water investigations will be conducted as mining progresses eastward. Surface runoff will be controlled via the Kinney #2 mine proposed storm water drainage system. All surface runoff generated during snowmelt and precipitation events will be routed to Sediment Pond No. 1 located within the surface disturbance area of the Kinney #2 permit boundary. A Utah Pollutant Discharge Elimination System has been obtained by the Permittee and establishes water quality/effluent standards for any discharge from the sediment pond that could potentially enter the AVF area.

In conclusion, additional contributions of flow from the Kinney #2 mine are not expected to Mud Creek due to the lack of a hydrologic connection elevation of the coal seam and the general northwest dip direction of the strata influencing any gradient. The potential negative impact to Mud Creek from the increased flows originating from the Skyline Mine is not the interruption of agricultural activity, but the acceleration of instability in the channel banks and increased erosion of the stream channel in reaches of the channel that are not well vegetated. The area impacted would be very small in relation to the acreage being pastured and would be negligible to the total production of the pastures.

Stations along Mud Creek will be monitored four times a year (seasonally) for a period of one year following a reduction in mine discharge to 350 gpm or less. Sediment loading in Mud Creek will be computed from the TSS and flow data collected. Annual evaluations of the stream will be summarized in a report to be submitted to the Division with the Skyline Mine Annual Report. The monitoring plan will also evaluate the changes in stream morphology and vegetation at the stations over the same time period. For the Kinney Mine, operational monitoring stations designed to monitor impacts to Pleasant Valley and the Scofield Reservoir includes: Mud Creek, RES-1, Miller Outlet, Sulfur Spring and monitoring wells CR-10-11 and CR-10-12.

Ground Water - Baseline Conditions

<u>Ground Water Quality - General</u>

With few exceptions, ground water in the CIA is a calcium bicarbonate type. Spring water is generally of better quality than well or mine discharge water. Quality is usually highest in the second quarter of the year when flows are greatest. At Skyline, samples are rarely taken during the first quarter because of snow cover. Locations of seeps and springs sampled for the Skyline, Kinney #2 and White Oak Mines are shown on Figure 5 (Appendix A). The Division feels these sampling locations adequately characterize the hydrologic regime. Except for a few UPDES reports in early 2003, water monitoring at the White Oak Mine ceased in September – October 2002.

The USGS analyzed water from 140 springs in the Huntington and Cottonwood Creek basins between July 1977 and September 1980. None of the analyses found concentrations over U. S. EPA drinking water standards (Engineering-Science, 1984, p. 2.39). TDS content of the ground water from springs and seeps ranges from less than 125 mg/L in the Skyline permit area to 4,000 mg/L at the confluence of the Price and San Rafael Rivers with the Green River.

Ground Water Quality - Castlegate Sandstone

Spring S10-1, which is the only monitored spring that discharges from the Castlegate, or near the Castlegate-Blackhawk contact, has had an average TDS concentration of 99 mg/L, and a maximum of only 165 mg/L. This low TDS is attributed to the lack of shale in the Castlegate. The water is low in nutrients and metals. The pH averages 7.3 and alkalinity is typically 25 times acidity. Total and dissolved iron average 0.28 and 0.08 mg/L and total and dissolved manganese average 0.04 and 0.06 mg/L. Springs issuing from the Castlegate Sandstone typically have less than 180 mg/L TDS (Engineering-Science, 1984, p. 27).

Ground Water Quality - Blackhawk and Star Point Formations

Total Dissolved Solids

Springs and seeps monitored for the White Oak Mine typically have TDS values in the range of 200 to 300 mg/L. Quarterly average values go from a low of 96 mg/L in the second quarter at S25-13 to a high of 363 mg/L during the fourth quarter at S24-12. The highest TDS reported is 9,187 mg/L at S36-19.

Skyline's data show that spring waters from perched aquifers in the Blackhawk Formation typically have TDS levels of 240 mg/L (Coastal, 1993, p. PHC2-6). The highest TDS measured by the Skyline Mine operator is 668 at S17-2, next to Eccles Creek just above the Skyline Loadout. Average TDS at this spring is 365 mg/L. High TDS is also found S13-2, in the north fork of Eccles Creek near the mine and at S24-12 at the head of South Fork.

Kinney #2 data from the springs and groundwater monitoring wells indicate a range of TDS values from 120 mg/l to 620 mg/l with an average of 339 mg/l. There was no significant variance of TDS values from groundwater monitoring well CR-03-ABV screened in the Blackhawk formation above the coal seam as compared to CR-10-10 and CR-10-12 which are screened in the alluvial/colluvial material in Pleasant Valley. All springs within the Kinney #2 permit area originate in the Blackhawk sandstone. There does not appear to be significant variance in the TDS values for these springs. Eagle Spring appeared to have the best water quality with an average TDS of 152 mg/L; however, this was also the spring location with the least amount of data points collected during baseline monitoring.

As part of the permitting process, the Division has requested that additional baseline data be collected on the Eagle springs and seeps clustered within the Eagle Canyon graben located along the eastern margin of the permit area. These springs originate from the perched fault-controlled aquifer system that is present in Eagle Canyon. As a result, there are also a few spring-fed ponds in this same area. Because these springs likely have a water right associated with them, they will need to gauged for a period of 12 months in order to estimate volume of any potential water loss that could occur from mining to these springs and seeps, then monitored for an additional 2 years. Furthermore, the Permittee has committed to measuring water levels in the ponds with a staff gauge to record any potential water loss that is attributed to mining activities.

Water discharged from the White Oak Mine and well water from the Blackhawk-Star Point aquifer had TDS levels of 180 to 480 mg/L in 1979 (Engineering-Science, 1984, Table 1). Average TDS in water discharged from the White Oak Mine from 1981 to 2000 was 674 mg/L, but TDS values as high as 1,340 mg/L were measured (Valley Camp, 1993, p. 700-22).

Water discharged from the Skyline Mine contained an average of 467 mg/L TDS in 1984, but this had increased to an average of 1,273 mg/L in 1991. The average had reduced to 520 mg/L in 2001, and then rose to 850 to 950 mg/L in late 2004. In 2008-2009, the Eccles Creek mine discharge water (CS-14) has a TDS of 380-550 mg/L. Average sulfate levels went from 150 mg/L in 1984, to 673 mg/L in 1991, and down to 126 in 2008-2009. TDS in the waste-rock-disposal-site monitoring-well averaged 552 mg/L in 1992-1993, and 325 mg/L in 2008-2009.

Iron and Manganese

Waddell (1982) measured dissolved iron concentrations of 0.720 mg/L at the Clear Creek Mine. At the spring near the mouth of Eccles Canyon, which is the same as Skyline's S17-2, Waddell measured 0.860 mg/L. Skyline's 26 measurements of dissolved iron at S17-2 between 1981 and 2009 (November 19) averaged 0.42 mg/L. Both of these groundwater sources issue from faults or fractures in the Star Point Sandstone.

For spring waters from perched aquifers in the Blackhawk Formation, total and dissolved iron average 0.71 and 0.10 mg/L, respectively, and total and dissolved manganese both average 0.02 mg/L. Concentrations of total iron were a little higher in the springs originating from the Blackhawk near the area of the Kinney #2 mine. Total iron averaged between 0 – 2 mg/L and dissolved iron averaging between 0 – 1 mg/L. Total and dissolved manganese from the Kinney #2 area springs averaged at non-detectable concentrations.

Groundwater concentrations from the Kinney #2 mine from the three monitoring wells that are capable of furnishing data indicated that total iron was elevated in one of the two wells screened in the alluvial material of Pleasant Valley. CR-10-12 has showed spikes in iron concentrations since December of 2010. This well, along with CR-10-11 were recently installed in July 2010 in order to better characterize groundwater in Pleasant Valley to the west of the Kinney #2 permit area. The reason for the elevated total iron detections in CR-10-12 is unknown at this time. Dissolved iron for all wells averaged between non-detectable to 0.02 mg/L. Total and dissolved manganese for the wells averaged between 0.01 and 0.8 mg/L for total and non-detect to 0.04 mg/L for dissolved.

In water discharged from the Skyline Mine, total and dissolved iron averaged 1.4 and 0.09 mg/L, respectively. Total and dissolved manganese levels averaged 0.1 and 0.07 mg/L at the Mine # 1 and 0.07 and 0.08 mg/L at Mine # 3. Water from wells is generally similar to mine discharge water (Engineering-Science, 1984, p. 27). For samples collected at waste rock disposal site monitoring well 92-91-03 between September 1993 and December 2009, total iron averaged 1.7 mg/L, but this average is heavily skewed by four samples from 2003-2004 with values of 4, 5, 10, and 16 mg/L (taking into account values under the detection limit by using half the detection limit, the average value is 1.3 mg/L). Total manganese was 0.17 mg/L (0.11 mg/L accounting for values below the detection limit), and there were no high manganese values corresponding to the high iron values..

Water discharged from the White Oak Mine between 1981 and 1989 contained an average total iron concentration of 0.56 mg/L. Total iron exceeded 1.0 mg/L 25 times from 1981 to 1985, with a maximum of 4.60 mg/L, but from 1985 to 1989 levels exceeded 1.0 mg/L only 3 times and the maximum for that period was 2.2 mg/L. From 1989 through 2000, Total iron exceeded 1.0 mg/L/day 6 times with the last exceedance in April 1998 being the highest reported value of 7.27 mg/L. From 1985 through 2000 the 30-day maximum of 70 mg/L Total Iron was exceeded 6 times, with the maximum being 155 mg/L in April 1985 and the last being 108 mg/L in May 1997.

Other Metals

Dissolved copper exceeded the 1 hour average criterion for Class 3A waters in the four samples from monitoring well 92-91-03 at Skyline's waste rock disposal site (1993 Annual Report), although the few analysis results for dissolved copper that are in the Division's database are below the detection limit. There are no applicable standards for total metals in water, but concentrations of total copper up to 0.42 mg/L (S22-5, 8/28/1985) were found in the springs sampled by Skyline. Total lead up to 0.05 mg/L and total zinc up to 0.185 mg/L were also reported by the Skyline Mine operator (Coastal, 1993, Volume 4), but the highest values in the Division's database are 0.017 mg/L total lead (SS14-4, 8/22/1984) and 0.76 mg/L total manganese (S12-1, 8/22/1983). Data from the White Oak Mine show concentrations of total lead up to 0.17 mg/L and of total zinc up to 0.135 mg/L, however, total copper values are all 0.02 mg/L or lower. Analyses were not done for dissolved copper, lead, and zinc (Valley Camp, 1993, Appendix 722.100a). The igneous dikes in the area may be the source of these metals.

To monitor the addition of mine-water discharge from JC-3 into Electric Lake, trivalent arsenic, cadmium, trivalent chromium, copper, iron, lead, mercury, nickel, selenium, silver, and zinc were to be monitored in both the effluent discharge into the lake and Electric Lake itself for a period of two years; there are no values for these parameters for JC-3 in the Division's database. This will continue if the pumping resumes, to provide adequate baseline information and ensure no degradation of Electric Lake is occurring.

In the area of the Kinney #2 mine, dissolved arsenic concentrations were detected in monitoring well CR-06-03ABV but did not exceed the Utah groundwater quality standard of 0.05 mg/L. Trace amounts of aluminum were detected in Eagle Spring at concentrations ranging from 0.94 to 3.9 mg/L. These concentrations have the potential to exceed the aluminum standard for aquatic wildlife of a Class 3A water body, which Scofield Reservoir is classified as. However, this spring during the baseline monitoring period for the Kinney #2 mine has only demonstrated flow three times at and therefore these concentrations of aluminum are unlikely to affect the downstream conditions at the reservoir.

pH

The average pH range of ground water from monitored seeps and springs in the Mud Creek and Huntington Creek basins is 7.1 to 8.0, based on measurements at numerous locations. Extremes of 6.0 to 9.5 have been reported. Where both acidity and alkalinity have been determined, alkalinity is typically at least 25 times acidity (Coastal, 1993, p. PHC2-6).

The average pH of water discharged from the Skyline Mine (1983-2005) is 7.5 with a high of 9.0 in May of 1987 and a low of 6.5 in September 1989 (Division's Coal Water Quality Database). Water discharged from the White Oak Mine had an average pH of 7.7, with measured high and low of 9.7 and 6.7 (Valley Camp, 1993). The average pH measured at the Skyline Mine waste rock disposal site was 6.6 in 1992-1993, ranging from 6.51 to 6.84 (1993 Annual Report). The UPDES permit for Well JC-3 does not allow for it to change the average pH of water being discharged to Electric Lake. During its short operation time the average pH at JC-3 was 7.6. The average pH at the JC-1 well has been 7.8 (Division's Coal Water Quality Database). Baseline pH ranges for all groundwater samples from wells and springs at the Kinney #2 mine were within neutral ranges.

Temperature

Temperature variances become a potentially significant parameter when comparing potential sources of water. As outlined in Appendix G of the October 2002 Addendum to the PHC, water encountered in in-mine roof sources have been 8.9 °C, while the temperature of water extracted from Well JC-1 and originating below the mine in the Star Point Sandstone has a temperature range of 13.2 to 15.6 °C. The temperature from JC-1 suggests a source at-depth (geothermal gradient) necessary to produce the temperatures. Baseline data collected for temperature from springs and groundwater wells for the Kinney #2 mine are presented on Table 16. It is interesting to note the temperature differences in the monitoring wells illustrating the 24 C water temperature originating from CR-06-03ABV screened in the Blackhawk sandstone above the coal seam versus the lower water temperatures from the wells in the alluvial/colluvial material in Pleasant Valley. The data were collected over a one year time span and the differences in temperature were not the result of a seasonal effect.

Dissolved Oxygen

Although not typically analyzed in groundwater samples, dissolved oxygen has been useful in characterizing differences between water encountered within the mine and Electric Lake water. The dissolved oxygen content of Electric Lake water is over 10 times greater than that of mine inflow waters. While dissolved oxygen can be readily removed from groundwater, it seems unlikely that would occur while moving large volumes of water rapidly through fractures, as some have hypothesized.

Table 16. Kinney #2 Groundwater Baseline Field Parameter Data Summary

SPRINGS	Estimated Flow (gpm)	pH	Dissolved Oxygen (ppm)	Specific Conductivity (Us)	Temp (C)
Eagle Spring (Miller Spring)	2-10	7.51	5.40	67.13	24.47
Angle Spring	0.62	6.66	4.71	436.08	18.34
Aspen Spring	9.01	7.58	7.58	388.20	21.50
Sulfur Spring	83.12	7.21	3.52	535.63	20.46
WELLS	**Water Elev. (ft above sea level)**				
CR-06-03-ABV	7798.29	7.06	-	504.83	24.38
CR-10-11	7647.89	6.92	-	579.83	8.65
CR-10-12	7651.05	7.12	-	570.33	8.59

Ground Water Quantity – Baseline Conditions

Flow of springs and seeps issuing from the perched aquifers varies seasonally, indicating local systems. Recharge for most of these springs and seeps probably originates in the small surface depressions or basins in the immediate vicinity. Higher flows occur during spring snowmelt, and flows in the autumn are often lower by an order of magnitude. Some seeps dry completely during the summer. Sustained flows from springs are low; only 4 springs on the Skyline permit area were flowing at 10 gpm or more during the 1978 autumn inventory, and most flowed at 2 gpm or less. Flows are also sensitive to the amount of precipitation during the winter. OSM contract staff surveyed springs on the Skyline property in 1983 following a very wet winter. One unidentified spring was flowing at 300 gpm in late June, but by early August it was flowing only 4 gpm. A nearby spring flowed 100 gpm in June and could not be located, apparently because it was dry, in August (Engineering Science, 1984, p. 34). An additional Seep and Spring survey was conducted by the Skyline Mine in the Winter Quarters / North Lease area in 1992 and 1993, which was used in determining the current water monitoring locations. Graphs of selected groundwater wells, springs and streams comparing historic flow to the Palmer Hydrologic Drought Index (PHDI) are provided in Appendix A of the July 2002 Addendum to the PHC in the Skyline MRP, and were last updated with data from the 1st quarter of 2003. These graphs illustrate how the springs in the Blackhawk Formation respond rapidly to seasonal and to climatic cycles. This indicates that the springs are fed by discharge from a groundwater system that is in good communication with the surface and annual recharge events. Similar to the Skyline mine, the springs that originate from the Blackhawk sandstone seem to exhibit the same flow behavior. Through the 3rd quarter of 2005, no obvious changes in flow in the springs, seeps, or elevations in the groundwater wells located in the Blackhawk Formation have been noted; despite the significant mine inflows encountered in the Skyline Mine since 2001. This determination is based on the groundwater monitoring sites outlined in the Skyline MRP, for which data is available in the Division's Coal Water Quality Database.

According to the Seep and Spring survey conducted in the White Oak area in the summer of 1990, a total of three seeps/springs are affected by the 2001 Surface mining in the area. Seeps/springs S25-13, S25-14, and 30-1 are all located up gradient of the surface mining. Seep/Spring S25-13 is the only site that provided consistent enough flow to be continually monitored. Recorded quarterly flow measurements from site S25-13 ranged from 0 to 60 gpm, and averaged <5 gpm. Any flow from the three seeps or springs still reported to Whisky Creek and were not impacted by the surface mining.

The Blackhawk-Star Point aquifer provides baseflow to Mud Creek and the lower reaches of Eccles Creek, but the volume of ground water discharged from the regional Blackhawk-Star Point aquifer has not been quantified. Vaughn Hansen Associates (1979) estimated that 64% of the flow of Eccles Creek was from ground water discharge, with the major portion of this flow entering the stream from the Star Point Sandstone. The Star Point can be presumed to provide baseflow to lower reaches of other Mud Creek tributaries where it is exposed. Low flows of Mud Creek are sustained principally by ground water flowing up from the regional Blackhawk-Star Point aquifer (Waddell, 1983b). Discharge through fractures such as the O'Connor fault and the Pleasant Valley fault zone has been documented. Some baseflow also probably occurs directly through un-fractured but permeable zones in the Star Point Sandstone. The Star Point Sandstone does not crop out in the headwater drainages of Mud and Huntington Creeks and the regional Blackhawk-Star Point aquifer does not discharge from springs, or otherwise contribute to surface flow in these areas.

V. IDENTIFICATION OF HYDROLOGIC CONCERNS

(IDENTIFY HYDROLOGIC RESOURCES THAT ARE LIKELY TO BE AFFECTED AND DETERMINE WHICH PARAMETERS ARE OF IMPORTANCE FOR PREDICTING FUTURE IMPACTS TO THOSE HYDROLOGIC SYSTEMS.)

The Class 3A streams in the CHIA are protected for cold-water species of game fish and other cold-water aquatic life, including the necessary aquatic organisms in their food chain. The drainages of upper Huntington Creek and Mud Creek have both been identified as habitat for naturally reproducing populations of cutthroat trout. Scofield Reservoir is stocked with rainbow trout, but contains cutthroat trout that have reproduced in tributary streams, including Mud, Eccles, Winter Quarters, and possibly Boardinghouse Creeks.

Burnout Creek has been identified as a spawning habitat for the native Yellowstone cutthroat trout population in Electric Lake. Cutthroat trout have been observed in large numbers in James Creek, just south of Burnout Creek, during spawning season. Boulger Creek has been studied as a stream that could be developed for spawning, and Skyline has provided funds to the USDA Forest Service for construction of a fish ladder to bypass Boulger Reservoir. Utah UDWR is concerned about the potential loss or alteration of these and other important fish habitats in and around Electric Lake as a result of coal mining activities.

There are 194 surface water rights in the CIA; 106 for stock watering, 25 for irrigation, 55 undeclared, and the remaining 8 for other uses. Most streams in the CIA have water rights filed on them. Water rights have been filed on 112 springs and 23 wells or tunnels. Stock watering was the declared use on 62 of the water rights, 41 were for other uses, and the remaining 32 were undeclared. Springs and seeps are important to wildlife, though there are no filed rights that declare this as a use. Specific water rights information for the North Lease was updated in October 2002 (second binder volume 4- Water Rights).

Electric Lake is a reservoir owned and operated by PacifiCorp. PacifiCorp also owns roughly one-third of the water shares in the reservoir, and uses approximately 12,000 acre-ft annually, to cool their coal-fired electric generating plant in Huntington Canyon. The Utah Division of Wildlife Resources typically requires minimum flows of 12 cfs in winter and 15 cfs in summer below the lake to maintain a quality aquatic habitat. In 2002, the minimum flow requirement was reduced to 6 cfs because of low storage levels in Electric Lake. PacifiCorp also purchased the majority of remaining water shares in the irrigation company to maintain plant operations. For those reasons, the agricultural needs of the Huntington Cleveland area were at a minimum, or were not met during the 2003 growing season, since little water was delivered downstream of the Huntington Power Plant. Hydrologic impacts to Electric Lake affect everything from wildlife, to agriculture, to power generation along the Wasatch Front. Whether the possible connection of water entering the Skyline Mine is impacting Electric Lake continues to be studied by all parties.

Both the Skyline and White Oak Mines utilize water from wells in Eccles Canyon that were drilled into fault zones in the Star Point Sandstone. Wells near the Skyline and White Oak Loadouts in Pleasant Valley produce water from both alluvium and the Star Point Sandstone. Water from these wells is for domestic, stock watering, and other uses.

During the 1979-1980 water year, Mud Creek contributed approximately 16% of the inflow to the Scofield Reservoir. Scofield Reservoir discharges into the Price River, which is used for irrigation in Castle Valley and provides the municipal water supply for the city of Price. The Upper Huntington Creek drainage contributes an unknown amount to the total discharge of Huntington Creek, but estimates indicate it could be 25% or more.

Table 17 lists potential impacts to the hydrologic resources, indicates where there is a possibility for cumulative impact outside the permit areas, and identifies analytical parameters or other indicators that need to be monitored to track potential impacts of the permitted mines.

Seasonal periods of high suspended-solid loads in the streams, and periods of high runoff are typical. Therefore, fine sediments alternately settle in, and later are flushed from, the streambed. The high flows leave clean gravel beds for trout spawning. Sediment cleared from the streambed simply moves downstream, eventually accumulating in Electric Lake or Scofield Reservoir. When runoff is low, fine sediments may remain, and spawning gravels become unavailable. Fine sediments increase trout egg and fry mortality through suffocation. Invertebrates are also impacted by sedimentation through loss of habitat or mortality. Invertebrate diversity may decrease, since resistant or adaptive species will remain. Impacts on invertebrates may reduce the supply of food for the trout. Construction, mining, and other activities produce the same negative impacts that nature does by decreasing flow, or increasing sedimentation beyond the capacity of the stream to flush itself.

Fine sediments, including coal fines, have covered portions of the streambed below the Skyline Mine and have been trapped behind beaver dams in Eccles Creek. Some beaver dams have been removed in an attempt to increase access from Scofield Reservoir to Eccles Creek for spawning cutthroat trout, and to facilitate the flushing of fine sediments from the streambed. Sediment traps along Mud Creek have been suggested by UDWR as a solution that would maintain access to the stream for spawning trout while reducing sedimentation in Scofield Reservoir. The increased flow in Eccles and Mud Creeks, resulting from the pumping from the Skyline Mine, has had a beneficial impact by flushing more fine sediment from these streams.

Temperature increases can reduce dissolved oxygen in a stream. Changes in temperature may also directly influence algae growth rates. Winget (1980) found that water temperatures in upper Huntington and Eccles Creeks equilibrated quickly with air temperatures because of the turbulence from rough channels and low flows. However, the Division found that the temperature of Eccles Creek increased, from 43° F to 54° F, as it passed through the 72-inch bypass culvert and joined with the sediment pond discharge (The Division, 1988). However, since the streams within the CIA have steep gradients and rocky beds, the entrainment of air and transfer of oxygen, and equilibration with air temperature should be sufficient to eliminate temperature as a factor in habitat quality.

Toxic materials in the water will reduce trout and invertebrate populations through mortality or avoidance. Nitrite concentrations in excess of 0.06 mg/L result in trout mortality. The long term LC_{50} exposure level for trout to nitrate is 1060 mg/L. Phosphorus in excess of 0.04 mg/L is not toxic to trout, but does lead to eutrophication of the stream. The UDWR identified toxic levels of nitrite, and eutrophication from excessive nitrogen and phosphorus as causes of fish and invertebrate declines in Eccles Creek in 1987 - 1988. None of the baseline results for surface water nitrite from the Kinney #2 mine were in exceedance of the 0.06 mg/L standard.

Increased TDS has not been identified as a problem in any of the fisheries. There is no water quality standard for TDS for aquatic wildlife, but 1200 mg/L is the limit for agricultural use. There is a possibility of cumulative effect outside of individual permit boundaries in the Mud Creek drainage, but none has been noted. TDS and sulfate exceeded UPDES limits at the Skyline Mine in the past, because of gypsum contamination in the limestone used for dust control. The discharge returned within UPDES limits after application of contaminated rock dust ceased, and continuing flow diluted or flushed residual contamination. At the Kinney #2 mine, the surface facilities disturbance square footage area is estimated to be approximately 38.1 acres. The Kinney #2 surface area disturbed footprint will be constructed with the proper drainage controls and graded roads and equipped with a sediment pond at the downgradient end of the disturbed area. Thereby limiting the amount of TDS from the disturbed area that could potentially make its way into surface water bodies' downgradient of the permit boundary.

Sediment, total nitrate, phosphorous, and dissolved oxygen have been identified as water quality concerns for Scofield Reservoir. High nitrogen and phosphorus levels lead to increases in algae and aquatic vegetation (eutrophication), which in turn leads to a deterioration of water quality. The reservoir may become eutrophic, unless measures are taken to limit nutrient inflow (Waddell and others, 1983a). The increased flow in Eccles and Mud Creeks, resulting from the pumping from the Skyline Mine, may have had a beneficial impact by increasing the inflow of low TDS water into the reservoir; however, the volume of all nutrients being added by this flow has not been determined yet. The increased flows have not appreciably increased the amount of total phosphorous in Mud Creek (measured at MC-3; see Figure 12, Appendix A).

During the 1979-1980 water years, Mud Creek contributed approximately 16% of the inflow to the reservoir, 18% of the TDS, 28% of the TSS, 18% of the total nitrogen, and 24% of the total phosphorous. During snowmelt, concentrations of nitrogen and phosphorus reached 21 and 4.3 mg/L at the Eccles Canyon gauging station. Most of this was in suspended form, and these unusually high concentrations were probably due to flushing of residual debris from 27 acres of forested land cleared in 1979 for fire protection around the mine portal and road right-of-ways. (Waddell and others, 1983a)

Perched systems in the Blackhawk formation have limited storage and recharge capacities, and when they are intercepted by mining operations the resulting in-mine flows decline rapidly. Draining of these perched systems may cause individual springs or seeps to disappear, but should have little impact on the hydrologic balance of the area. Flows into the mines that persist for more than 30 days are typically considered as *possibly* intercepting surface water through a natural, or subsidence induced fracture system. In the case of the Skyline Mine, the majority of inflow water is encountered in the floor and along fracture zones, and has been characterized by Canyon Fuel as likely coming from a deeper regional aquifer, but including a component of surface recharge. Studies carried out by Canyon Fuel Company and PacifiCorp have not confirmed the source of this inflow water. The studies are discussed in more detail elsewhere in this CHIA.

In the case of the Kinney #2 mine, only limited amounts of groundwater have been encountered within the permit boundary. All but three of the monitoring wells drilled were dry. Groundwater inflows similar to conditions observed in other perched groundwater systems within the Blackhawk formation are expected to be encountered at the Kinney #2 mine during the operational phase of mining. The Eagle Canyon springs and seeps and two small ponds are located on the eastern margin of the Kinney #2 permit boundary. There exists approximately 500 feet of cover between the surface and where the Hiawatha coal seam is located. Furthermore, the dip of the coal seam is to the northwest, providing additional overburden cover between the springs/seeps/ponds.

Surface-mining methods employed at the White Oak mine temporarily disrupted the shallow groundwater and diverted surface flows in the area. Seeps and surface flows that formerly reported to Whisky Creek have been re-established in the reclamation of the mine site. The Division (AMR section) constructed several French drains to ensure that the flow from significant seeps reports to the surface, and eventually to the Whisky Creek drainage.

Operations at the Skyline Mine have drawn down the potentiometric surface of the Star Point regional aquifer, and to a much lesser degree in the Blackhawk. This drawdown can induce increased recharge and downward flow through the overlying unsaturated zone through fracture zones. This would have a minimal, probably undetectable effect on perched aquifers or soil moisture because of the generally low hydraulic conductivity of the Blackhawk Formation. Since Canyon Fuel finished mining in the southwestern portion of the mine, the Star Point potentiometric surface has started to recover.

Groundwater flow patterns have the potential to be interrupted at the Kinney #2 mine based on mining operations advancing through the coal seam and draining any small perched systems in the Blackhawk formation. Most of these springs and seeps located in Eagle Canyon do not have a water right associated with them, with the exception of the small spring-fed ponds located in the higher elevations of Eagle Canyon. The mine is not anticipating any subsidence activities based on the fact that only first mining practices will be employed. However, the Permittee has put forth a plan to actively monitor the water levels in the spring-fed ponds located in Eagle Canyon. If any diminution of the water resource of this pond does occur, the Permittee has committed to providing a contingency plan to provide water replacement for the estimated volume of water lost due to mining activities.

Water users have expressed concerns that water intercepted underground may be discharged into a watershed other than the one where the ground water was originally destined. According to the Utah Coal Mining and Reclamation Act and rules, a mine may divert water underground and discharge to the surface, if material damage to the hydrologic balance outside of a permit area is prevented; and disturbance to the hydrologic balance within the permit area is minimized (R645-301-731.214.1). Furthermore, any state-appropriated water affected by contamination, diminution, or interruption resulting from underground mining must be replaced (R645-301-731.530). The Division evaluates a mine's Probable Hydrologic Consequences Determination (PHC) and updates the CHIA prior to permitting, and reviews water monitoring data during mining and post-mining reclamation to determine if adverse hydrologic impacts, *as defined by the rules*, can be demonstrated. Underground mining may result in some diversions of intercepted ground water into drainages that are not topographically within (above) the area where the water was encountered. The PHCs of the mines in the Mud Creek / Upper Huntington Creek CIA have demonstrated that the large quantities of water intercepted underground are *mostly* ancient. Therefore, the inflow water is hydrologically isolated from surface expression of springs, seeps, and streams. Water monitoring activities in the area show no change to water quantity in streams, springs, or wells located in the Blackhawk Formation; except those quantity changes that can be directly attributed to the drought. If it is subsequently demonstrated that the mining has caused, or will cause a diminution, contamination, or interruption of an *appropriated* water right, or a material impact to the hydrologic balance (either within or outside of the permit area), the Permittee will be required by the Division to minimize the impact and replace any appropriated water right.

Table 17

Parameters of Importance and Other Indicators for Predicting Future Impacts	M Sediments M Fish and Macroinvertebrates	M Flow M Sediments M Fish and Macroinvertebrates	M Sediments M TDS M pH M Nutrients M Specific cations and anions M Oil and Grease M Fish and Macroinvertebrates	M Flow M Sediments M Fish and Macroinvertebrates	M Flow M Sediments M Fish and Macroinvertebrates M TDS M pH M Nutrients M Specific cations and anions	M Flow Age dating Tracer dye Geophysics Groundwater monitoring Age dating	M Flow
Possible Cumulative Effect Outside Permit Areas	YES	YES	YES	YES	YES	YES	YES
POTENTIAL HYDROLOGIC IMPACTS	M *Increased sediment yield from disturbed areas* - Alteration or loss of fisheries in streams and reservoirs. Increased rate of sedimentation in reservoirs. Coal spillage from hauling operations and storage. Loss of riparian habitat.	M *Flooding or streamflow alteration* - increase or decrease in streamflow.	M *Contamination of ground and surface water from acid- or toxic-forming or toxic materials* - Contamination of surface water from coal hauling operations and storage. Hydrocarbon contamination from above-ground storage tanks or from the use of hydrocarbons in the permit area. Contamination from road salting. Gypsum used in dust control contaminating mine discharge. Nutrients in mine discharge.	M *Subsidence damage to springs and streams* - increased sediment load, diminution of flow, physical barrier to fish migration.	M *Alteration or destruction of fisheries and aquatic habitats* - loss of flow, loss of access to stream, loss of fish spawning habitat, increased sediment load, acute or chronic toxicity, eutrophication, loss of food supply.	M *Loss of ground water or surface water availability* - water rights, wildlife uses.	M *Reduction of flow due to inte-rbasin transport of intercepted water.*

VI. MATERIAL DAMAGE CRITERIA - RELEVANT STANDARDS AGAINST WHICH PREDICTED IMPACTS CAN BE COMPARED

Water within the CIA is used for watering livestock and wildlife, mining coal, domestic use, fisheries, and recreation. Downstream, the water is additionally used for irrigation and domestic and industrial needs. Land within the CIA is used for wildlife habitat, grazing, recreation, and mining coal. Anticipated post-mining uses are for wildlife habitat, grazing, and recreation.

Quality

Water quality standards for the State of Utah are found in R317-2, Utah Administrative Code. The standards are intended to protect the waters against controllable pollution. Waters, and the applicable standards, are grouped into classes based on beneficial use designations.

The Utah Division of Water Quality has classified (latest classification December 7, 2001) Scofield Reservoir as:

1C - protected for domestic purposes with prior treatment by treatment processes as required by the Utah Division of Drinking Water.
2B - protected for secondary contact recreation such as boating, wading, or similar uses
3A - protected for cold-water species of game fish and other cold-water aquatic life, including the necessary aquatic organisms in their food chain.
4 - protected for agricultural uses including irrigation of crops and stock watering.

Scofield Reservoir:

- Is a culinary water source.
- Is one of the top four trout fishing lakes in Utah.
- Has over a one million dollar annual recreational fishing value.

E-mail from Louis Berg, UDWR, to Division dated February 4, 2002).

The Utah Division of Water Quality has classified (latest classification December 7, 2001) Electric Lake as:

2B - protected for secondary contact recreation such as boating, wading, or similar uses
3A - protected for cold-water species of game fish and other cold-water aquatic life, including the necessary aquatic organisms in their food chain.
4 - protected for agricultural uses including irrigation of crops and stock watering.

Electric Lake:

- Provides cooling water for the Huntington Power Plant, and
- Is a major source of agricultural water for the Huntington Cleveland Irrigation Company.

Streams in both basins are classified as: 1C, 3A, and 4.

In addition, surface waters located within the outer boundaries of a USDA National Forest, with specific exceptions, are designated by the Utah Division of Water Quality as High Quality Waters - Category 1 and are subject to the state's antidegradation policy. This antidegradation policy states that waters shall be maintained at existing high quality, and new point source discharges of wastewater (treated or otherwise) are prohibited (Utah Administrative Code, R317-2-3.2 and R317-2-12.1). All of the upper Huntington Creek drainage and most of the headwater drainages of east flowing tributaries to Mud Creek, (including the Skyline Mine disturbed area) are within USDA Forest Service boundaries and are therefore protected by this policy. The White Oak Mine, both loadouts, the Skyline mine waste rock disposal site and the Kinney #2 mine are outside forest boundaries.

The Utah Water Quality Board agreed in their September 24, 2001 meeting to reclassify Electric Lake as High Quality Waters – Category 2. Category 2 is defined as "...designated surface water segments which are treated as High Quality Waters – Category 1; except that a point source discharge may be permitted, provided that the discharge does not degrade existing water quality." Both the effluent and the lake were to be sampled for a period of two years for a full suite of metals and nutrients to ensure that the mine water is not of a lower quality of water than exists in Electric Lake. Unfortunately, due to equipment failure and high TDS, the JC-3 well (which discharged directly from the mine into Electric Lake) is no longer pumping. Canyon Fuel and PacifiCorp have continued to sample the water quality of Electric Lake and the JC-1 well.

The Utah Department of Environmental Quality, Division of Water Quality can authorize a coal mine to discharge into surface waters under the Utah Pollutant Discharge Elimination System (UPDES). The permits for the mines contain site-specific limitations on TDS, total suspended solids (or total settleable solids for precipitation events), iron, oil and grease, and pH. The Skyline Mine UPDES permit has an additional limitation on sulfate for discharges into Eccles Creek, and a whole suite of metals and nutrients for discharges into Electric Lake. The

Kinney #2 UPDES has the standard site-specific limitations on TDS, total suspended solids (or total settleable solids for precipitation events), iron, oil and grease, and pH with additional limitations of total phosphorus and dissolved oxygen. The compounds have been identified as constituents of concern for the Scofield Reservoir.

The water quality standard for nitrate in Class 1C waters is 10 mg/L. Nitrate levels above 4 mg/L are considered an indicator of pollution, usually from sewage, in all waters. For trout, the long term LC_{50} exposure level to nitrate is 1,060 mg/L.

There is no water quality standard for nitrite, but concentrations in excess of 0.06 mg/L produce mortality in cutthroat trout (UDWR, 1988).

The water quality standard for Class 3A waters for phosphorus is 0.05 mg/L. Levels in excess of 0.04 mg/L are not toxic to trout, but are excessive and promote eutrophication (UDWR, 1988). By state standards for Class 1C, 2A, 3A, and 3B waters, phosphate in excess of 0.05 mg/L is a pollution indicator.

The recommended limit for MBAS, a detergent or surfactant, is 0.2 mg/L (Steve McNeil, Utah Dept. of Health, personal communication in the Division, 1988). This surfactant was detected in the sediment pond effluent at the Skyline mine. No surfactant use is anticipated at the Kinney #2 mine.

There is no water quality standard for oil and grease, but the UPDES permit limit for the White Oak, Skyline and Kinney #2 Mines is 10 mg/L. A 10 mg/L oil and grease limit does not protect fish and benthic organisms from soluble oils such as those used in longwall hydraulic systems, and UDWR has recommended soluble oils be limited to 1 mg/L (Darrell H. Nish, Acting Director UDWR, letter dated April 17, 1989 to Dianne R. Nielsen, Director the Division of Oil, Gas, and Mining).

Increased TDS has not been identified as a problem in any of the fisheries. There is no water quality standard for TDS for aquatic wildlife, but 1,200 mg/L is the established limit for Class 4, agricultural use.

Physical or chemical indicators alone do not fully evaluate water quality in streams. Macroinvertebrates are excellent indicators of stream quality and can be used to evaluate suitability of a stream to support a trout fishery and other aquatic life. Baseline studies of invertebrates by the USGS (Waddell, 1982) and Winget (1980) and studies done in conjunction with mine operations (Coastal States, 1993; ERI, 1992) provide standards against which actual stream conditions can be evaluated. Cutthroat trout populations are also excellent indicators of stream quality. UDWR surveys of trout populations in Eccles, Winter Quarters, and Huntington Creeks have established baseline conditions.

The maximum temperature for Class 3A waters is 20° C (68° F). The maximum allowable change for Class 3A waters is 2° C (3.6° F).

Sedimentation

Sedimentation of reservoirs and the eventual loss or diminution of their value is inevitable. Waddell and others (1983a and b) examined sedimentation in Scofield Reservoir. A bathymetric survey was done to:

a) Estimate total sediment yield from inflowing streams; and
b) Provide detailed bathymetric measurements at selected cross sections to allow more accurate evaluation of future deposition.

The rate of sediment accumulation and deposition was estimated by using ^{210}lead to determine the relative ages of sediment samples from cores. Increased sedimentation in the reservoirs due to mining in the adjacent drainages might be detectable using such techniques, but direct monitoring of inflowing streams is probably more effective.

Changes in sediment size distribution in streams can be determined by comparison with past studies (Winget, 1980; Coastal States, 1993, Table 2.8-3). Winget identified 15% or more of materials finer than 0.85 mm in diameter as a critical measure of biotic potential, in other words whether or not fish eggs and fry and many macroinvertebrates would be suffocated.

Quantity

There are no prescribed standards to assess impacts to water quantity as there are for water quality. It has been determined that the flow regime in the Mud Creek – Upper Huntington Creek, the Pleasant Valley fault and Eagle Canyon graben may be complicated with preferential fracture-flow and flow along faults. A component also related to quantity is the mixing of water from more than one source. To help assess and evaluate any impacts to the flow regime, the waters need to be characterized with as many unique identifiers as possible. As outlined earlier in this report, they include, but are not limited to the following: significant reduction in historic flows that cannot be attributed to drought conditions; age-dating, solute water analysis, field parameters, tracer-dye, geophysics, hydrologic modeling, and routine surface- and ground-water monitoring all contribute to identifying the origin of waters. The Division will use measurements of flow (both receiving and source waters), characterizing the water, and impacts to the receiving and source waters in assessing impacts to quantity.

Based on correlations of low flows in several streams in the southern Wasatch Plateau, Wadell (Waddell et al., 1983b) found that with 5 years of continuous discharge records, monthly flows for August, September, and October could be estimated with a standard deviation of 20%. From measurements taken in 1979 and 1980, it was calculated that the average ratio of the low flows of Mud and Fish Creeks was 0.42 (calculated for October, the low-flow month with the least variation).

Waddell (Waddell et al., 1983b, p. 129) approximated the amount of water that would need to be diverted from, or to the Mud Creek basin, before it could be detected. Assuming the following:

1) A 20% standard error,
2) An average flow ratio of 0.42 between Mud Creek and Fish Creek, and
3) An average flow of Fish Creek in October of 330 acre-ft/year (5.4 cfs).

He calculated the amount as follows:

$$(\pm 0.20)(330 \text{acrefeet})(0.42) = \pm 28 \text{acrefeet} = \pm 0.45 \text{cfs}.$$

A long-term increase or decrease of flow in Mud Creek of at least 0.45 cfs would be detected 68% of the time, by correlating the October flows of Mud and Fish Creeks. The USGS had a stream-gauging station on Eccles Creek during 1979 and 1980. They have had stream gauging stations on Mud, and Fish Creeks since 1978 and 1931, respectively; and as of January 2011, continued to monitor them on a regular basis.

Eccles Creek and Mud Creek have obviously received excessive amounts of mine discharge water since 2001. Most of this water appears to originate from the Star Point Sandstone. This is at least partially supported by the fact that streams and springs in the Upper Huntington, Upper Eccles, and Upper Mud Creek drainages do not appear to be depleted as a result of the increased mine discharge.

Unfortunately, long-term flow data for Burnout, Boulger, and Huntington Creeks draining into Electric Lake are not available. In June 2002, PacifiCorp began monitoring cumulative inflow. This was at a time when the lake was at a historic low. The monitoring continued through mid-April 2003, using a flume located in the lake bottom immediately opposite James Canyon. This flume also measures mine water discharge input from the James Canyon wells to the lake. Based on measured data, PacifiCorp estimates the flows of unmeasured side tributaries below James Canyon to be approximately 14% of the Huntington Creek flow during times when it is not possible to measure them. The flume opposite James Canyon was installed in June 2002 and became non-functional in April 2003 due to the spring runoff, which was still far from "normal" levels, but higher than in the previous "extreme" drought year. The flume was recalibrated in June of 2003 and continues to collect flow data when not inundated. Because the lake level was rising, PacifiCorp installed a second flume further upstream, but still below Boulger Creek. Estimated discharge from the upper Huntington Creek basin is 16,000 acre feet per year (22 cfs) based on the measured discharges from Burnout and Huntington Creeks. This estimated number is supported by comparing the continuous flow recorded at the mouth of Eccles Creek (Table 3) and using the same flow volume per acre of land for the Upper Huntington basin.

The flow data being collected in the upper Huntington drainage will document the flow information necessary to make a quantifiable determination of whether any quantity of water is being lost from the basin. Other crucial information will be the data supplied by PacifiCorp in regards to Electric Lake such as discharge records from the dam, long-term precipitation data, long-term evaporation data, and long-term stage-volume records for the lake.

VII. ESTIMATE OF THE PROBABLE FUTURE IMPACTS OF MINING ON THE HYDROLOGIC RESOURCES

Quality

Mine discharges of water to both Eccles Creek and Electric Lake are being closely monitored to ensure that the mixing of mine water does not create any degradation of the existing hydrologic regime.

In 2009, with operations of the Skyline mine advancing northward, the Operator submitted plans to build a ventilation shaft, escape shaft, and access slope in Winter Quarters Canyon. The Winter Quarters Ventilation Fan facility will disturb approximately 8 acres near the center of Section 1, T. 13S, R. 6E. The Winter Quarters Ventilation Fan facility will operate under the Skyline Mine UPDES permit. A sedimentation pond and other sediment control measures are designed to prevent additional contributions of sediment to stream flow or to runoff to Winter Quarters Creek and to prevent the violation of applicable water quality standards or effluent limitations. The Winter Quarters Ventilation Fan decline slope portal will be at a lower elevation than portions of the mine workings. To prevent gravity discharge from the Winter Quarters Ventilation Fan, the Permittee will seal and backfill both the shafts and slope (MRP Sections 4.9 and 4.11.9).

Water quality standards are outlined in Section VI. Any future estimates of impacts will be based on the outlined criteria. As of January 2006, no adverse impacts are being observed for the Skyline mine, but any possible adverse trends are being documented.

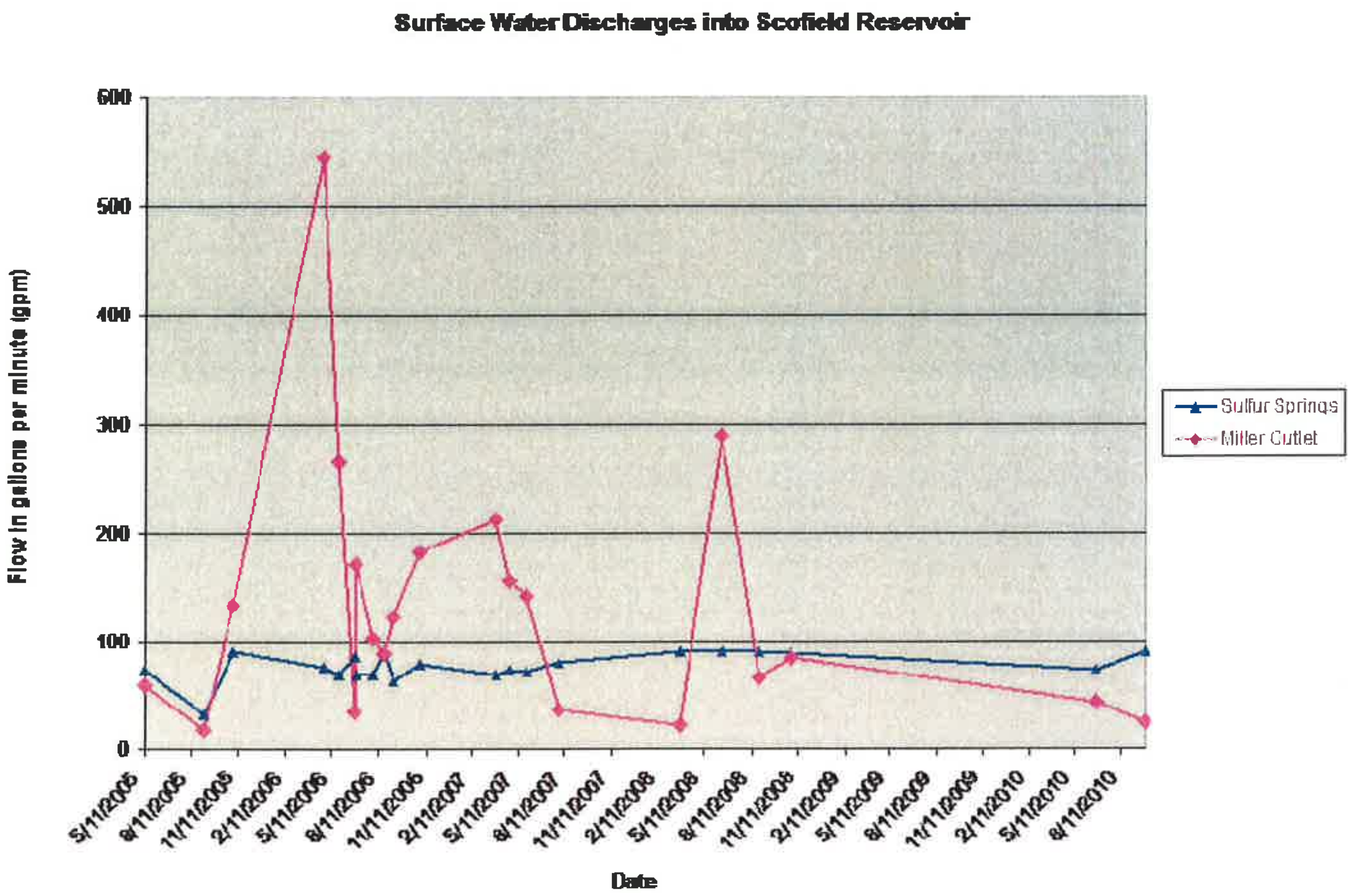
Quantity

<u>Increased Streamflow</u>

Average discharge from the White Oak #1 Mine between 1981 and 1989 was 0.19 cfs (Table 724.100a). No water had been discharged from the White Oak #2 Mine as of 1993. Discharge from Pond 004 was sporadic from 1995 through 2000 with no discharges after August 1999. Average discharge flow from 1995 through 1999 was 74 gpm/day. Coal production from both mines has averaged approximately 0.5 million tons per year, so a very rough estimate of water production is 0.4 cfs per million tons of coal mined. Records indicate that only sporadic flows were encountered. Water is no longer being discharged from the White Oak Mine.

Skyline's records show that Mine #3 (CS-12) first discharged water in 1983, and Mine #1 (CS-14) first discharged water in 1989. Through the end of 2000, the average discharge from Mine #1 was 0.47 cfs, and 0.58 cfs from Mine #3. This water was always discharged into Eccles Creek through the sediment pond. When streamflow was naturally low in the late summer to early autumn, the discharge from the Skyline Mine was estimated to account for as much as 60% to 70% of the baseflow in Eccles Creek.

An increase of flow to the Miller Creek approximately one and one half miles north of the Kinney #2 permit boundary is possible due to the northward progress of mining in the Hiawatha coal seam that could potentially be opening up voids that drain isolated perched aquifer systems. The flow from these systems could migrate down dip to the north/northwest and ultimately reach Miller Creek. Low flow and high flow periods measured from Miller Outlet have varied quite a bit over the 2005-2010 baseline monitoring period with flow measurements recorded between 17 gpm up to 545 gpm.



In October of 2003, pumping of mine inflow waters from Skyline Mine into Eccles Creek increased the streamflow from normal amounts of approximately 300 gpm, to as high as 10,500 gpm. From August 2001 to December 2005, the average discharge to Eccles Creek has been 5,601 gpm. Eccles Creek is well armored and has shown little or no visual indication of erosional impacts. These increased mine-water discharge flows have increased the average flow in Mud Creek to about 1.2 times normal (pre-1999) amounts. Mud Creek has always shown some minor visual indication of stream bank erosion, and very little has changed with the increased flows. Both streams are being continuously monitored to determine possible impacts.

Studies carried out on Eccles and Mud Creeks so far show that there have been no significant morphological changes to the creeks (EarthFax 2002, 2003, 2004). Discharge into Eccles and Mud Creeks dropped to approximately 3,500 gpm with the addition of the JC-3 Well. Since JC-3 was shut down, the flow has averaged just 3,856 gpm. This is mostly because the southwest portion of the mine was allowed to fill, and steady-state inflows are much decreased. Based on the current information and conditions, the observed and estimated impacts due to increased streamflow from mine-water discharges are minimal.

The Winter Quarters Ventilation Fan decline slope portal, at an elevation 8,120 feet, will be at a lower elevation than portions of the mine workings. Because of this lower elevation, gravity discharge from the Winter Quarters Ventilation Fan portal would be a possibility at the time mine dewatering were to cease and reclamation begin. To safeguard against such gravity discharge, the Permittee will seal and backfill both the shafts and slope at the Winter Quarters Ventilation Fan facility to prevent discharge (Skyline MRP Sections 4.9 and 4.11.9).

Mine In-flows

Prior to January 2000, mine discharge from the Skyline Mine was typically below 500 gpm. Additional waters (any flows above the 500 gpm) encountered in the mine were used in the operation of the mine. Figure 10 (Appendix A) illustrates the amount of water discharged from the mine and how it has increased with time. As outlined earlier, these inflows appear to be originating predominantly from faults and the fractured Star Point Sandstone located below the mine. Figure 11 (Appendix A) illustrates the cumulative discharge of water from the mine since 1999. As outlined in Table 1, mine-inflows most recently totaling on the order of 3,100 gpm are of concern to the Division because of the potential impact to the surface- and ground-water being used in the Mud Creek and Huntington drainages. The Division is concerned that these increased flows may have an adverse impact on the receiving streams/reservoirs and any waters that are being used within the basin. The Division must ensure that existing waters and water rights are not being diminished. Other than making a determination on impacts to the receiving streams\reservoirs, and surface- and ground-water being used in the basin, the Division does not regulate the use or distribution of mine-discharged waters. Current information indicates the water being discharged is not adversely impacting the receiving streams/reservoirs, or diminishing flows within the respective basins.

For the foreseeable future, Well JC-1 is anticipated to discharge approximately 4,000 gpm of groundwater to Electric Lake, providing about 530 acre-ft of water per month to Electric Lake. Photos 1 through 3 (Appendix B) illustrate the armoring provided by PacifiCorp to minimize any impacts to the lake bottom at the point of discharge. The ability to provide high quality water at a significant rate to the lake is considered a positive impact on the hydrologic resource of Electric Lake.

Underground mining may result in some diversion of intercepted ground water into drainages that are not topographically within (above) the area where the water was encountered. If it is *demonstrated* that mining has caused or will cause a diminution, contamination, or interruption of an *appropriated* water right, or a material impact either within or outside of the permit area, the Permittee will be required by the Division to address means of minimizing the impact and replacing any appropriated water rights. Evaluations of PHCs and the preparation of this CHIA do not indicate that there is any convincing direct evidence that such impacts have or will result from the mining in the Mud Creek / Upper Huntington Creek CIA. As a consequence, there is no reason to require operators to propose alternatives for disposing of the displaced water or other possible actions as part of the MRP at this time. The MRP does contain a water replacement plan for those State-Appropriated Water Rights that may be impacted by mining.

With no apparent adverse impacts to the receiving stream, the increased discharge of mine in-flows to the Mud Creek and Huntington Creek drainages are considered to have a positive impact, providing additional water to the Scofield and Electric Lake reservoirs.

Studies Related to Mine Inflows

I. PacifiCorp has conducted several geophysical studies in an attempt to establish a flow path along the known faults trending from Electric Lake to the Skyline Mine. These studies have proven to be inconclusive. A Resistivity/IP survey indicated that the faults contained water, however it also indicated saturation *above* the elevation of the lake. In addition, it suggested that portions of the saturated zones contain saline water. There are several reasons why this study does not help to conclusively prove a connection between the lake and the mine:

- The depth of the survey was at least 350-feet above the elevation of the Mine,
- The studies were conducted approximately one year after the Mine began encountering significant water from the faults. If the portion of the fault associated with both the lake and mine had a direct connection, the faults would be devoid of water above the elevation of the Lake by that time,
- The only significant fault-related inflow that Skyline Mine has encountered has come from the floor of the mine. Any inflows encountered from the roof have been of limited duration, consistent with Blackhawk formation function, and
- No saline water has been encountered within the Mine.

II. PacifiCorp also conducted an induced-electrical geophysical survey (AquaTrack – Sunrise Engineering, Inc.), which showed a potential flow path from Electric Lake to the Skyline Mine. However, the preferential flow path did not follow known fault lines, and the survey does not indicate a flow direction, or whether there is flow at all. The presence of water with little flow is consistent with known Blackhawk geology. Also, the faults that were the focus of the study also trend through Electric Lake to the south – no study was conducted on the other side of the Lake to see if conditions were consistent throughout the faults. A study less-biased toward one preconceived solution would be more in line with the Scientific Method. In any case, the Division, as an unbiased arbiter, must take into account the big picture, and investigate all reasonable possibilities for Electric Lake's water loss and the Skyline Mine inflows. The Division has scrutinized all of the information available, from all possible resources in an attempt to fully understand the situation. Unfortunately, none of the studies done to date can *conclusively* show what is happening.

III. Canyon Fuel Company commissioned a numeric groundwater model of the Skyline area in an effort to define the outer limit of where the water is being drawn (HCI 2002, 2003, 2004). This model concluded that:

- The majority of the inflow water comes from the Star Point Sandstone,
- The water flows through the fractured fault system in faults with less than 50 ft. displacement,
- The groundwater gradient in the Star Point Sandstone is from south to north, and
- The system is confined by faults with large displacements (>100 ft.)

The Division has several reservations about this model, and is skeptical about the reliability of the results. Among the reasons the Division cannot solely rely on the results of this model are:

- The model is based on just 20 wells to model a 140 mi^2 area,
- Half of the data was acquired after the inflows began,
- Many assumptions had to be made to complete the model, including critical parameters, and,
- The model was generated using proprietary software, therefore the Division was unable to attempt to repeat the experiment and do sensitivity testing.

IV. Canyon Fuel also studied the chemical composition of the inflow water vs. that of the lake (Skyline PHC, Appendix G). The findings indicated that:

- The chloride content of Electric Lake waters is nearly four times that of mine inflow waters. Chloride is considered a conservative species, meaning that it is not attenuated from a groundwater system, other than by dilution (Fetter, 1988)

- Mine inflow waters contain about 50% greater bicarbonate concentrations than lake waters, and over 3 times the magnesium content of lake waters. Since the Electric Lake waters are supersaturated with respect to calcite and dolomite, they cannot dissolve carbonates to "pick-up" bicarbonate or magnesium without an external source of CO_2. The $\delta^{13}C$ composition of the groundwater shows that it has not been influenced by external sources of CO_2.

- The temperature of the major mine inflows (issuing from the floor) ranges from 56-60 °F; mine inflows from the roof (Blackhawk) have a temperature range of 48-50 °F.

- The dissolved oxygen in the inflows is 10 times less than that of the lake water. It is possible to lose the dissolved oxygen, but more unlikely if there is a direct connection.

V. To better characterize the origin/residence of waters, significant study of the age of water has been conducted by both PacifiCorp and Canyon Fuel Company.

Va. Canyon Fuel Company continues to collect information on tritium and other age-dating parameters. Using tritium analysis, which functions as an indicator of modern water (in contact with the atmosphere post 1950's), Figure 9 (Appendix A) outlines the relative ages of waters sampled in-mine. The presence of tritium suggests that there is some percentage of modern water present in the water being discharged from Well JC-1. Tritium unit values (TU) for samples collected in Electric Lake to date range from 7.00 to 12.6 TU, and average 8.02 TU for samples collected in 2002 and 2003. The tritium levels in Electric Lake continue to be monitored, however with the significantly lower-tritium water of JC-1 continually being added to the Lake (4.01 TU below the James Canyon flume), the lake numbers appear to be getting lower. Tritium values for springs located within the permit area (Blackhawk Formation) range from 10.6 to 21.6 TU and average 16.1 TU. The only mine inflow where trace amounts of tritium were measured is the 10L inflow.

Other age-dating methods used include radiocarbon and environmental tracers (CFC's, He, Ne, N_2, Ar). ^{14}C dating shows the 10-Left inflow waters to be 4,600 years old and JC-1 well waters (in the same fault as 10-Left) to be 6,300 years old. Helium isotope ratios suggest a percentage of the water located in the 10-Left area of the Skyline Mine is about 5 years old $\pm$ 3 years. The studies and analyses (Petersen, 2002; Appendix G of October 2002 Addendum to the PHC) suggest a component of the water being discharged from the Skyline Mine is of modern origin (20 to 35%). The report (Petersen 2002) goes on to say that with existing data Canyon Fuel cannot determine the source of the modern component of the water. They do not say if further studies could reveal the source. They posit that: "*…the modern water is likely derived from either 1) leakage from shallow or intermediate depth, active groundwater systems that surround the coal seams in the vicinity of the fault inflow, 2) losses from nearby surface water systems that contain abundant tritium, or 3) a combination of both of these sources … Although the precise origin of the small modern water component has not been determined, it is clearly evident that Electric Lake water cannot be a primary source of the fault-inflows." (Petersen 2002)*

Vb. PacifiCorp completed their own draft analysis of the tritium and environmental tracers in July of 2005. The study concluded that:

- "The tritium, dissolved gas, and dye tracer results are consistent with a model of *rapid* fluid flow along fractures with mass exchange via diffusion with the surrounding porous matrix",
- "The systematic increase in tritium in JC 1 and other underground monitoring points is strong evidence for a fracture controlled flow system that is conveying water (5,000 gpm from lake) from surface sources towards underground workings and dewatering wells",
- "Water discharging from well JC 1 is currently a mixture of approximately 22 to 45 % modern water that is derived from surface sources,"
- "The tritium content of JC 1 will continue to increase, but will approach a value that is less than the modem value of surface water … more than 10 years are required before the tritium value will stabilize", and
- Just 365 fractures with an aperture of 0.25 mm would be needed to carry the 5,000 gpm from the lake to the underground workings.

Some of the Division's concerns with this report include:

- The "cubic law" seems to have been applied incorrectly (used vertical gradient instead of gradient along fracture length– instead of the 350 (0.25 mm aperture) fractures the report says are needed to move the 5,000 gpm between the lake and the mine, the calculation along the fracture shows that 3,727 fractures of that size would be needed to move that volume),
- JC-1 is not a 1:1 surrogate for the mine,
- Wells are hardly ever completed in such a manner that surface water does not leak into them from above, and therefore one cannot assume that 100% of the tritium measured in JC-1 is coming from the aquifer,
- The inputs to the CRAflush model were not measured or calibrated, and
- No drawdown has been measured in wells completed in the Blackhawk Formation, while considerable drawdown was measured in wells completed in the Star Point Sandstone.

VI. In February 2003, PacifiCorp initiated a tracer dye study in Electric Lake to help determine whether water from the lake is flowing into and being discharged from the Skyline Mine. A very minor amount of Eocene and Fluorescein dye were used at the time. In April 2003, an additional 50 pounds of Eocene dye was placed along the Diagonal fault in the lake and 35 pounds of Fluorescein dye was placed along the Connelville Fault in the lake. So far, Canyon Fuel Company indicates that no trace of either dye has been encountered in collection packets inside the mine, or the mine-water discharge; nor has their laboratory found any in collection packets located at the JC-1 well. However, they have noted numerous positive dye signatures downstream of the dam. PacifiCorp states that they found small traces of dye in 3 of 5 non-consecutive samples taken from JC-1 between May 29 and July 14, 2003 (Aley, 2005). Prior to the first dye hit, they had sampled 12 collection packets with no hits between February 27 and May 29, 2003. Though they continued sampling, they did not find any other hits after the July 7-July14 packet. PacifiCorp added more dye to the lake in February 2004 (75 pounds of Fluorescein dye along the Diagonal Fault, and 125 pounds of Fluorescein dye along the Connelville Fault). They report small concentrations of the dye in 10 of 13 non-consecutive samples taken at JC-1 from December 28, 2004 to May 12, 2005. They also had hits in Huntington Creek below Dam 1, below Dam 2, above the Left Fork of the Huntington Confluence, and at Little Bear Campground. This study shows that there *may* be a connection between the lake and the mine, but the Division cannot fully accept the conclusions. Some of the Division's reservations about this report include:

- No attempt to quantify the flow, or develop a mass balance is made,
    - The Benchmark study, which is used to explain why no mass balance study can be done, used freshly crushed, dry rock, which would behave quite differently than saturated fractures,

- Also in relation to the Benchmark Study, and their reasoning for not being able to conduct a mass balance analysis, Mr. Aley states on page 3 of appendix B that "*Unfortunately, neither I nor anyone else with whom I am familiar has a good suite of data on dye detection rates through a lake similar to Electric Lake. As a result, we are in the realm of opinions without a highly relevant data base to support the opinions*", which indicates that a good baseline knowledge is lacking in regard to dye adsorption and travel-rates,

- During the early phase of the study (2003) the Ozark lab was sampling dye packets for both PacifiCorp and Canyon Fuel Company. Canyon Fuel has stated that they submitted the samples to the lab "blind" (labeled by number code, not as JC-1), and the lab indicated no hits for the same period of time that is now reported to have hits in 3 of 5 samples at JC-1. This is a serious concern, and
- This study and others attempt to use the JC-1 well as a 1:1 surrogate for the mine, which it is not since it is drilled into the fracture system 70 feet below the mine.

Though the majority of the water seems to be coming from the Star Point Sandstone (Canyon Fuel observations, age-dating data, and chemical composition studies), there seems to be a component of modern water (tritium studies) that ***may*** be coming from Electric Lake. The connection with Electric Lake, though a possibility, has not yet been shown in a manner that the Division can fully accept. In order to make such a conclusion, the Division's concerns with the various reports would have to be answered in a satisfactory manner.

Thus far, no one has attempted to provide a mass balance of where the Electric Lake losses are going – such a study would be of tremendous value. Also of great value would be to gauge what happens to the "lost" water quantity, the mine inflow rate, and the reservoir function during a test shut-down of JC-1 for a period of several months. PacifiCorp planned such a test, and shut down the JC-1 pump on September 15, 2005. Because of underground pumping problems and other in-mine concerns, Canyon Fuel asked PacifiCorp to turn the JC-1 pump back on just 15 days later (Sept. 30). Because the inflow sites are now inaccessible, it is unclear how much the inflow to the Skyline Mine increased with the JC-1 shutdown.

Subsidence

Especially where overburden is minimal or fracturing is extensive, there is potential for the capture of ground water or surface water by subsidence cracks (Engineering-Science, 1984; Valley Camp, 1993, Appendix R645-301-724.600). Subsidence impacts are largely related to extension and expansion of existing fracture systems and upward propagation of new fractures. Because vertical and lateral movement of ground water in the permit area appears to be largely controlled by fracture conduits, readjustment or realignment of the conduit system may potentially produce changes such as increased flow along fractures that are opened and diversion of flow along new fractures. Increased flow rates would potentially reduce residence time and improve water quality. Some of the perched, localized aquifers could be dewatered. Ground water diverted from seeps or springs fed by such systems would most likely emerge nearby at another surface location rather than drain down into the mine. Sealing of subsidence cracks by clays in the Blackhawk is expected to minimize long-term effects of subsidence on the hydrologic systems (see section 2.3 of the Skyline Mine MRP).

Mines are designed to restrict subsidence to the permit areas. Because the perched aquifers of the Blackhawk Formation are lenticular and localized, there is little potential for the effects from dewatering these aquifers to extend beyond the permit area. Where mining and subsidence occur within the saturated rocks of the regional aquifer there will be a large increase in permeability locally. With time, permeability will decrease as fractures close and the potentiometric surface will establish a new equilibrium. Residual impacts should be restricted to the previously mined area and will probably be negligible. The addition of the Winter Quarters / North Lease area has been a source of concern because portions of Winter Quarters and Woods Creeks are perennial in nature and support aquatic life. However, the combination of extensive overburden, the sealing and pliability of the overlying Blackhawk Formation (see section 2.3 of the Skyline Mine MRP), and the proposed mining of only one (1) coal seam drastically reduces the potential for any adverse impacts to occur due to subsidence.

In 2009, with mine operations at Skyline advancing northward, the Operator submitted plans to build a ventilation shaft, escape shaft, and access slope in Winter Quarters Canyon. These will not result in any subsidence.

The Kinney #2 mine will employ first mining practices only and therefore the depth of mining, the coal seam thickness and the mine design are anticipated to have negligible subsidence effects to water supplies that exist on the surface.

VIII. MATERIAL DAMAGE DETERMINATION

Mine In-flows

Most of the major inflow water encountered by mining at the Skyline Mine is most likely generated from the deeper Star Point Sandstone. Studies done to date have not been able to conclusively prove or disprove a connection to Electric Lake, though a percentage of the inflow is of modern origin. The deep Star Point Sandstone does not contribute directly to the water budget of the Mud Creek or Upper Huntington Creek basins. However, changes in the potentiometric surface in the Star Point Sandstone may influence recharge and movement of ground water through the overlying unsaturated zone. Because the potentiometric surface is expected to recover to approximate pre-mining conditions after mining ceases, the overlying unsaturated zone should also be expected to recover to approximate pre-mining conditions.

Current information suggests no adverse impacts are being observed in Eccles Creek/Mud Creek or Electric Lake due to the increased discharges of water. Monitoring of mine in-flows, groundwater, and surface water within the Mud Creek – Upper Huntington Creek basins is being conducted to adequately identify any future impacts. Information is continually being updated and re-assessed to evaluate any impacts.

The Kinney #2 mine has encountered only limited amounts of groundwater resources based on initial drilling activities. Data collected from the springs and seeps in and around the permit area have not demonstrated a significant amount of groundwater recharge based upon seasonal collection of data. Furthermore, the presence of low permeable geologic strata between the coal seam to be mined indicates a lack of significant groundwater movement in the subsurface. Greater groundwater movement is observed along the faults that bound the Kinney #2 mine to the east and the west; however mining is not anticipated to cross these faults. As a result, there appears to be little potential to encounter significant volumes of in-mine water.

Loss of Habitats for Cutthroat Trout and Invertebrates

The critical spawning habitat for Yellowstone cutthroat trout in Burnout Creek is entirely within the Skyline permit area. Upper Huntington Creek and several of its tributaries are within the permit area, with the uppermost reaches of Huntington Creek extending upstream beyond the permit boundary. Large numbers of cutthroat trout have been seen in James Creek during spawning season, and it functions as a spawning stream when there is enough water for the fish to move through the culvert below the land bridge, or over the top of the land bridge. Lower Burnout Creek is a spawning stream, and Boulger Creek has been modified to facilitate access by spawning trout (installation of a fish ladder), but it has not been officially determined whether fish are now able to move upstream of the dam.

Subsidence could produce physical barriers or loss of water flow sufficient to block fish from reaching spawning areas. Sedimentation caused by subsidence or other mine related activities could bury gravels used for spawning. These effects would probably be mitigatable by removal of barriers; restoration of flow, or sediment control and no material damage would result. A study done in Burnout Creek indicates that any impacts to the streams would be temporary and minimal. The study was conducted while mining two different seams under Burnout Creek for a number of years. Subsidence in the area was found to be on the order of 7 feet, and the DOGM/OSM Evaluation Team found no observable effects in 2005.

Cutthroat trout are found in Eccles Creek and other streams of the Mud Creek drainage. This trout population has been heavily decimated by sedimentation, eutrophication, or toxicity several times in the past. These negative impacts generally have been caused by human activity in Eccles Canyon, namely road construction and coal mining. Beaver dams, which are natural traps for fine sediment, have interacted with the additional fine sediments produced by human activities to further reduce trout habitat in Eccles Creek. Trout populations have recovered when the impacting activities have ceased, been modified, or otherwise mitigated, although recovery has not been determined to be 100%.

No material damage to habitats for trout or invertebrates is anticipated for current or planned mining and reclamation, and monitoring is ongoing.

Increase or Decrease in Stream-flow

There should be no noticeable change of flow in streams in the Huntington Creek drainage. In Electric Lake however, the JC-1 and JC-3 wells have a potential to provide roughly 46 percent of the total volume of the lake on an annual basis, should pumping continue. With the drought conditions experienced from 1999 thorough 2003 the added water is appreciated downstream. When the current drought conditions reverse, and if mine-water discharges continue, excessive flows entering the lower Huntington drainage could potentially cause erosional impacts to the stream channel.

The impacts of mine inflows being pumped to Eccles Creek are minimal to that stream. It's well armored and shows little sign of degradation. The impacts to Mud Creek have a potential to be greater than those to Eccles, but these are also minimal. As indicated previously, the potential negative impact to Mud Creek from the increased flows is not the interruption of agricultural activity but the acceleration of instability in the channel banks and increased erosion of the stream channel in reaches of the channel that are not well vegetated. The area impacted would be very small in relation to the acreage being pastured and would be negligible to the total production of the pastures. As discussed previously, there appears to be no hydrologic connection between the perched isolated groundwater systems in the Kinney #2 permit boundary and Mud Creek due to the difference in elevation of the coal seam to be mined. The presence of the Pleasant Valley fault essentially acts a barrier to the alluvial/colluvial groundwater system that is present in the Mud Creek drainage. Mud Creek and Eccles Creek are being monitored continuously and possible impacts should be detected.

At the cessation of mining, flows in Eccles Creek should return to pre-mining levels because mine discharges will cease. Though the mine will most likely fill with water, no gravity discharge is expected because the natural potentiometric surface is much lower than the mine portals. Less flow during drought periods would be the most noticeable of the possible effects. Future expansion plans for the Kinney #2 mine will call for the operation to move further eastward and therefore away from Pleasant Valley. There is no present or foreseen material damage resulting from changes in flow due to present or projected discharge from the mines.

Water Quality

Historically, sulfate and TDS have increased in Eccles and Mud Creeks as a direct result of mining activities. UPDES limits were exceeded for a time at the Skyline sedimentation pond. The suspected source of the problem, gypsum used for dust control, was eliminated and water quality began to recover.

Prior to the 2001 inflows, Whisky Creek contributed approximately 6 percent of the flow in Eccles Creek and 2 percent of Mud Creek, respectively. Because it is such a small percentage of total flows, and the channel has been restored, Whisky Creek will have a minimal impact on the water quality within the Mud Creek basin.

In the late 80's and early 90's excessive nitrogen and phosphorous compounds were introduced into Eccles Creek by mining activities. Sewage was suspected as the source of the contamination at one time, but emulsified oil from longwall hydraulic systems and detergents were determined to be the sources. Fish and invertebrate populations were greatly reduced or eliminated from much of the stream, either because of avoidance or toxicity. Populations recovered after the causes of the contamination were eliminated. The possibility that excessive nitrogen and phosphorous nutrients in inflowing streams could lead to eutrophication of Scofield Reservoir is a possible concern, but has not been an issue since the emulsified oil and detergents were changed. Water Quality problems arising from operations at the Kinney #2 mine are expected to be negligible. The approximate one square mile size of the permit boundary and a 38-acre surface disturbance area will limit the amount of pollutants that could ultimately discharge to sensitive water resources in the region. Furthermore, the surface facilities disturbance will comply with the Surface Mining Control and Reclamation Act with all disturbed drainage being directed to a sediment pond. Discharge from the sediment pond will be permitted through the Kinney #2 UPDES minor industrial permit No. UTG040028 which regulates the amounts of oil and grease, TDS, total iron, total suspended solids, dissolved oxygen and total phosphorus.

The increased flows in Eccles and Mud Creeks, resulting from the pumping from the Skyline Mine, may have had a beneficial impact by diluting normal in-stream levels of dissolved solids with lower-TDS water. The impacts on sedimentation and nutrient loading in Scofield Reservoir have not been fully determined. However, in the short term, the increased flow has been beneficial in maintaining water above the dead-storage level during the recent four years of drought.

Water quality problems have so far proven to be mitigatable. No material damage to water quality is expected, but water quality must continue to be monitored diligently to avoid even short-term problems.

The quality of water entering Electric Lake will be closely monitored both at the discharge and within the lake, to ensure that no degradation of water occurs.

Erosion and Sedimentation

Fine sediments in Eccles Creek have increased as a result of road construction and coal mining related activities. Coal fines are a notable addition to the fine sediment load. One impact of the increase in fine sediment has been reduced trout and invertebrate populations because of suffocation of trout eggs and fry, burial of gravel used for trout spawning, and loss of suitable invertebrate habitats.

Reconstruction of Upper Whisky Creek and reclamation of the area of the White Oak Mine that was surface mined was completed in late 2005. A reclamation project undertaken the by Division of Oil, Gas and Mining beginning in 2010 seeks to repair a segment of Whiskey Creek that was damaged by severe storm activity that occurred in the late 2000s. Fine sediments and runoff associated with that work were mitigated by having all flows report to sedimentation ponds until surface roughening and seeding of all areas was complete. Native stream channel sediments in Upper Whisky Creek were removed and stockpiled for later reconstruction of the channel. Long-term effects to the Mud Creek drainage system should be minimal.

A long-term concern is the loss of water storage capacity in Scofield Reservoir from sedimentation. In the past, sediment traps have been suggested as a means of removing the fine sediments originating in the Eccles Creek drainage. The increased flow in Eccles and Mud Creeks, resulting from the pumping from the Skyline Mine, may have had a beneficial impact by flushing more fine sediment from these streams. The impacts to sedimentation in Scofield Reservoir have not been determined yet.

Sedimentation has not been a problem in the Huntington Creek drainage. To ensure the discharge of the JC wells did not scour the lake bottom and create a suspended solids problem, PacifiCorp supplied extensive armoring of the lake bottom at the point where the discharge enters the lake. Photos 1 through 3 illustrate the armoring of the lake bottom and the channel constructed to carry the discharge water from the pipe to the Huntington Creek channel.

Material damage from erosion or sedimentation is not anticipated in Mud Creek, Miller Creek, or Huntington Creek, but monitoring is ongoing and will continue until mining and reclamation are complete.

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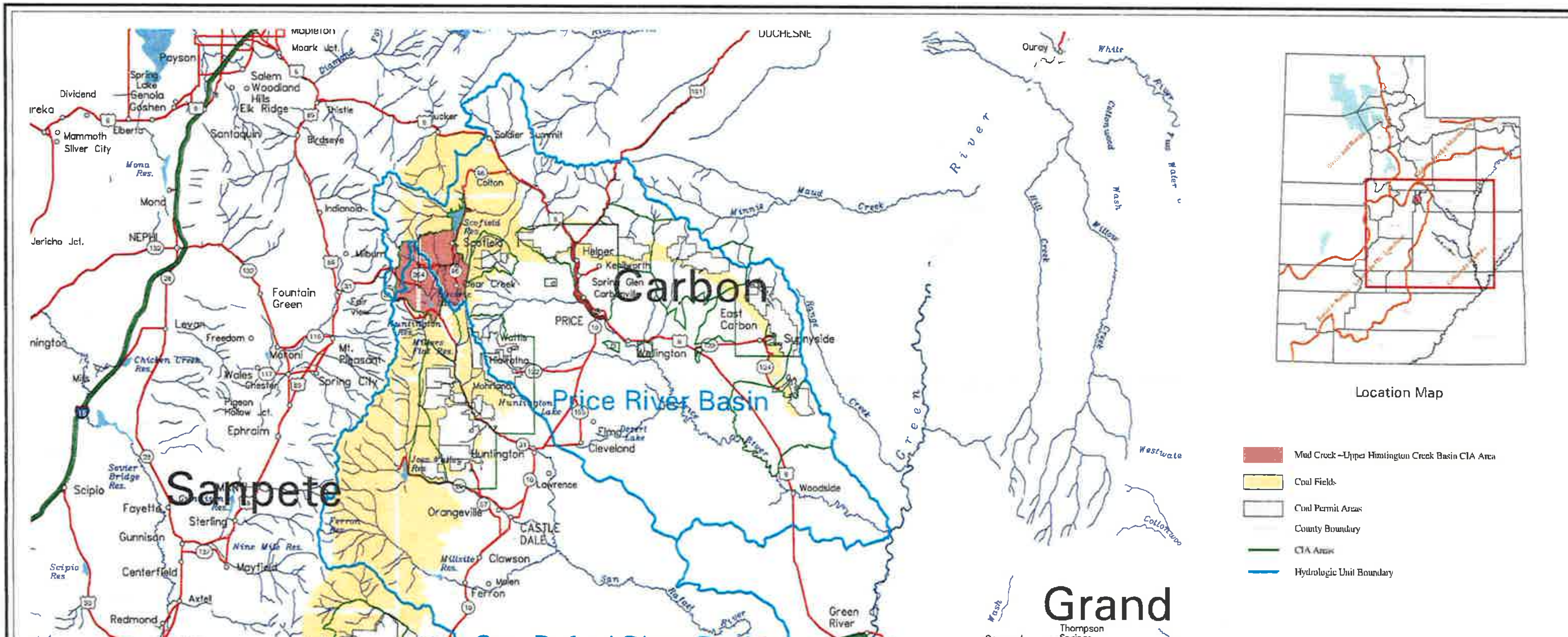
Appendix A



State of Utah
Department of Natural Resources
Division of Oil, Gas and Mining

Cumulative Hydrologic Impact Assessment
Mud Creek - Upper Huntington Creek Basin

Figure 1
LOCATION MAP

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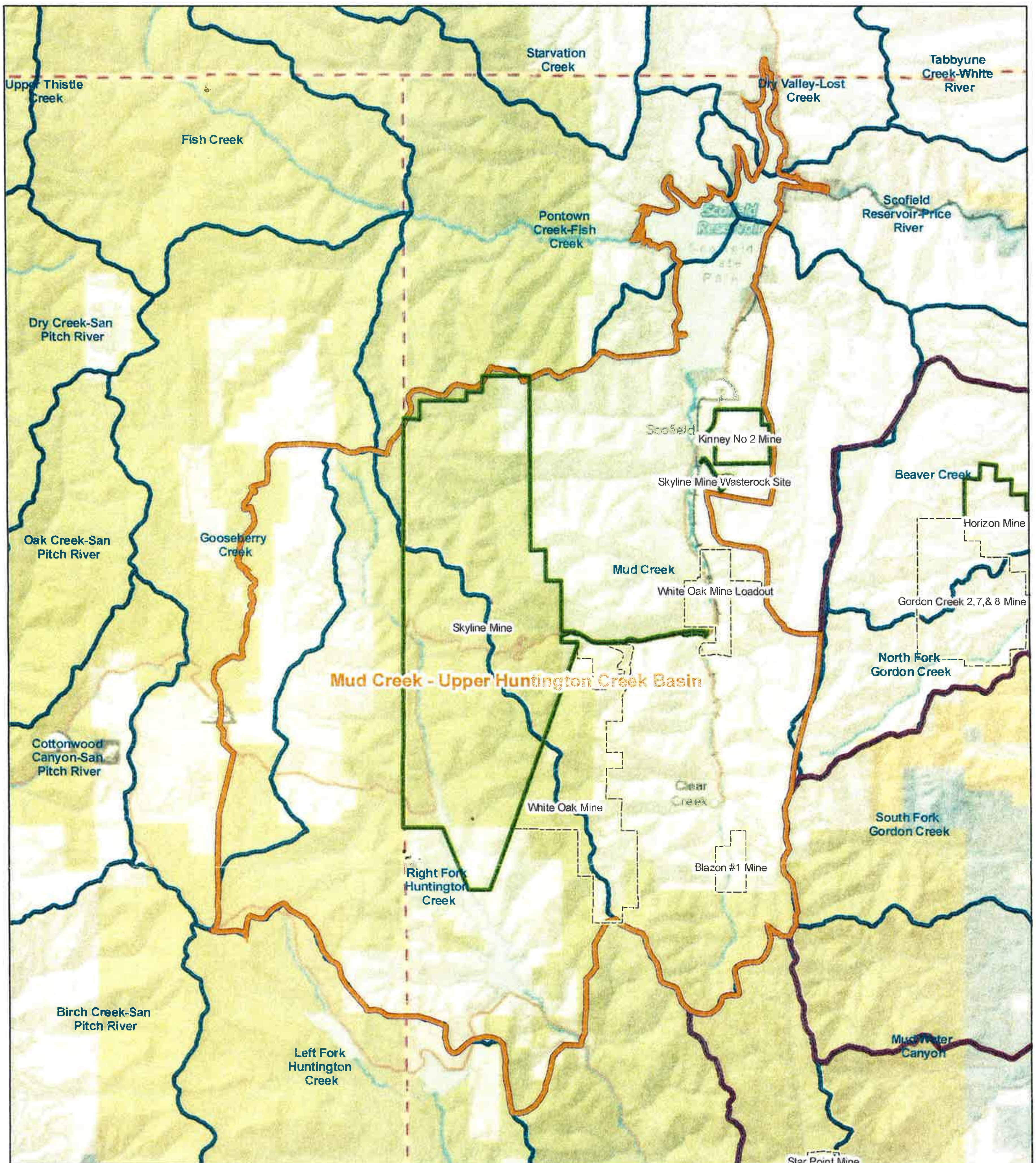
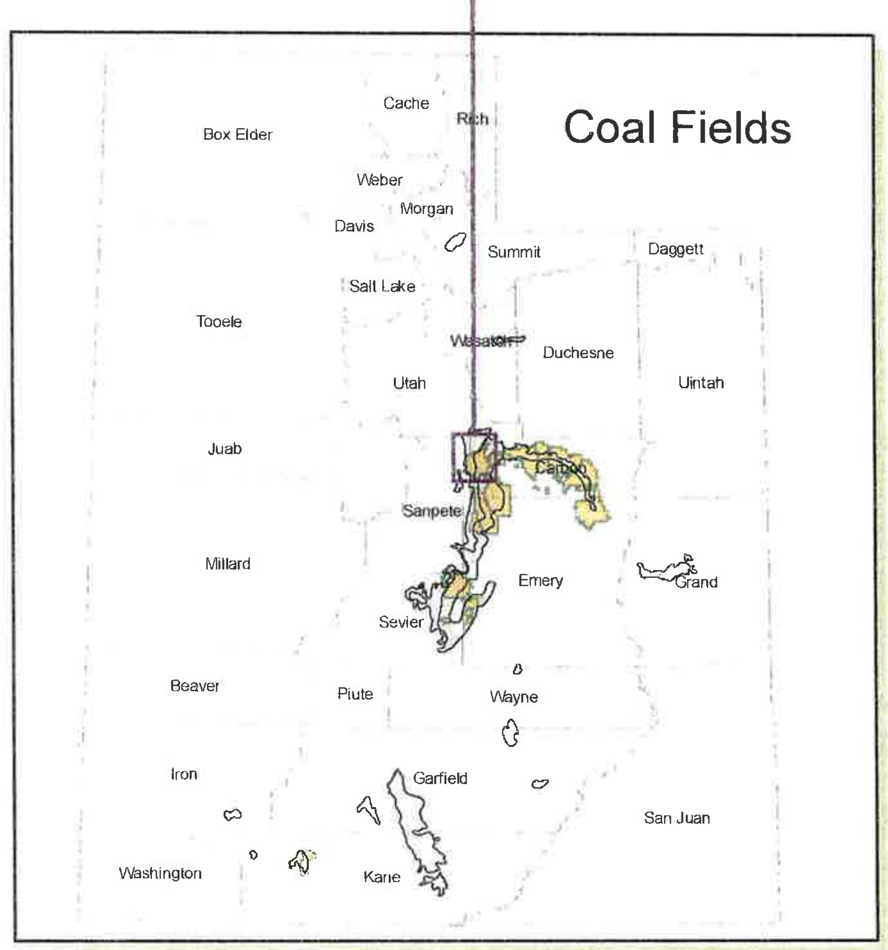
Compiled by: Dan Smith Date: August 21, 2003





Cumulative Impact Area Mud Creek - Upper Huntington Creek Basin

Figure 2

Location Map

May 2011

File Location: N:\GIS\coal\ciamaps\mudcreek

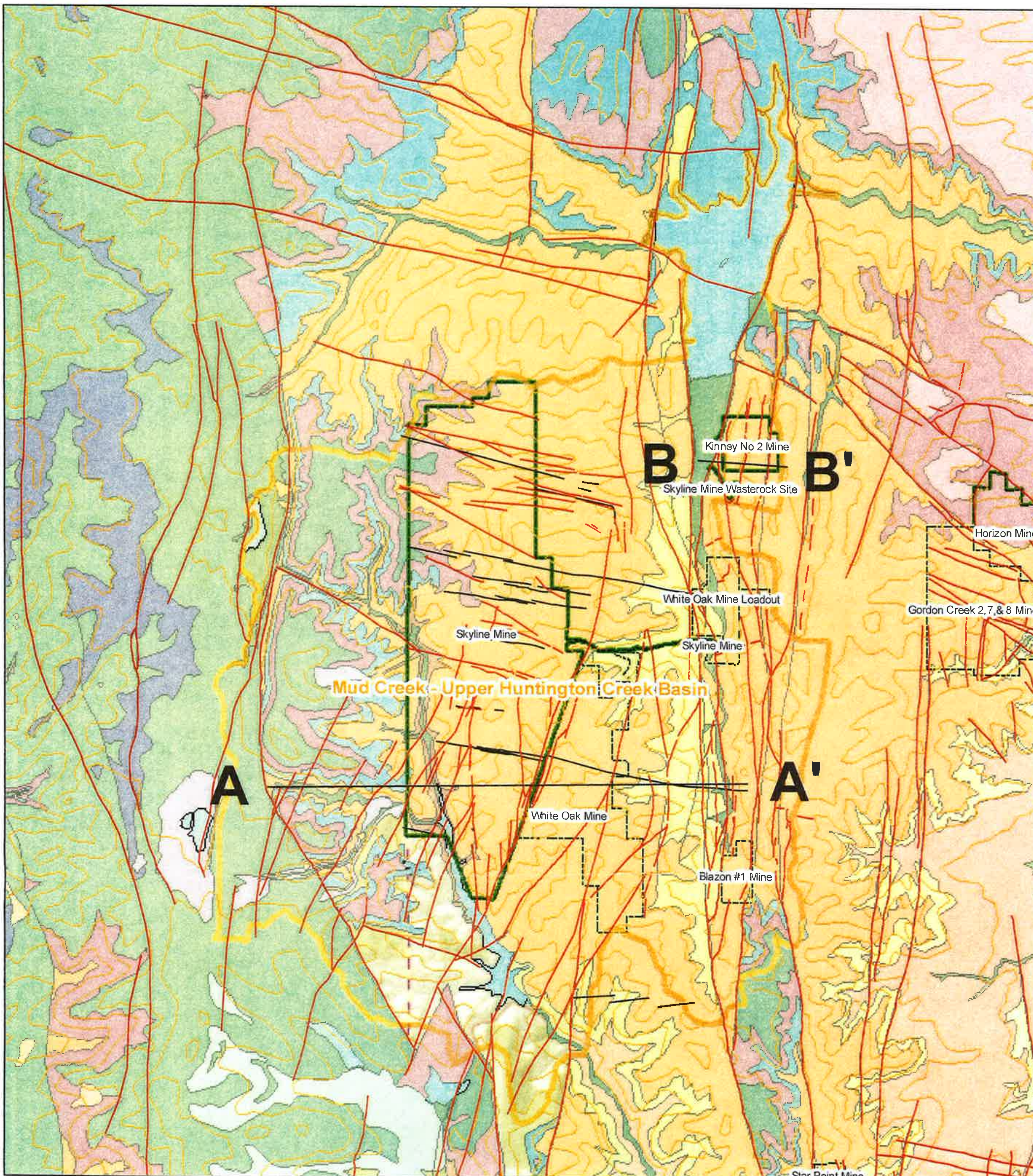
Mine Area

STATUS

- Active
- In Reclamation
- Mud Creek - Upper Huntington Creek Basin
- Other CIA Areas
- Subwatersheds

0 0.35 0.7 1.4 2.1 2.8 Miles

1:110,000



Cumulative Impact Area Mud Creek - Upper Huntington Creek Basin

Figure 3

Geology Map

May 2011

File Location: N:\GIS\coal\ciamaps\mudcreek

Faults
Dikes
Mud Creek - Upper Huntington Creek Basin
Main Road
Graded Road
Dirt Road
Contours

Mine Area

STATUS
Active
In Reclamation

Geology

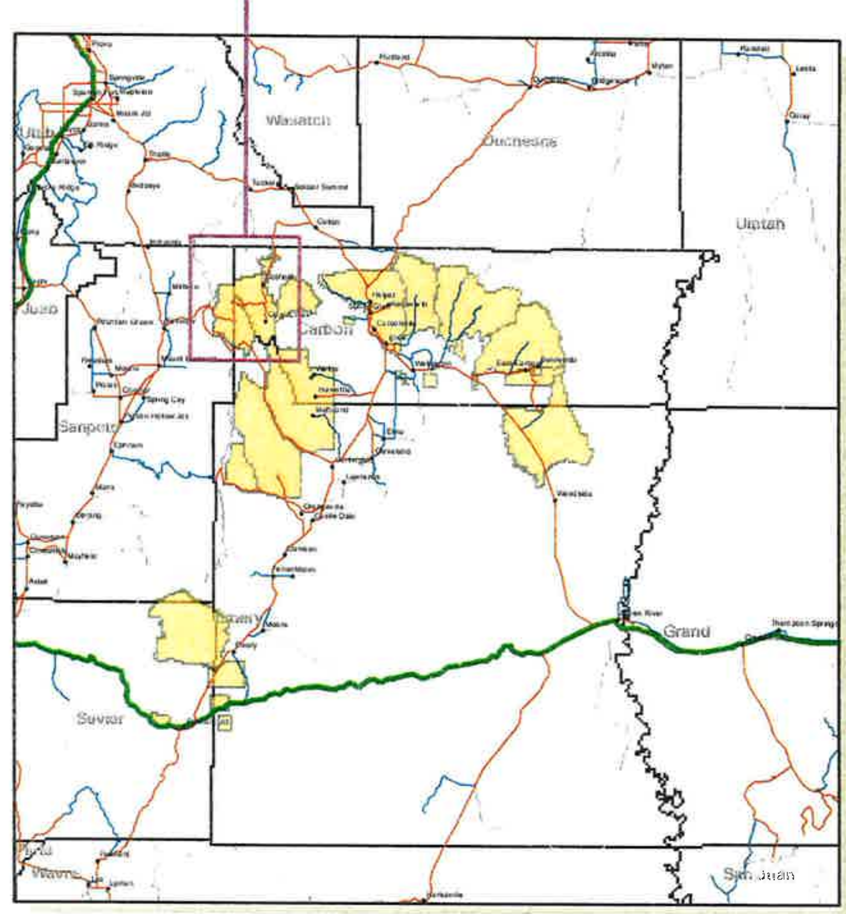
UNITNAME
Alluvium
Blackhawk Formation
Castlegate Sandstone
Coalesced alluvial-fan deposits
Colluvium
Colton Formation
Colton Formation and Flagstaff Limestone, undivided
Emery Sandstone Member of the Mancos Shale
Flagstaff Limestone
Flagstaff Limestone and North Horn Formation, undivided
Green River Formation
Indianola Group, undivided
Landslide deposits
Landslide blocks of the Green River Formation
Mass-wasting deposits
Morainic deposits
North Horn Formation
Pediment mantle
Price River Formation
Star Point Sandstone
Terrace deposits
Upper part of the Blue Gate Member of the Mancos Shale
water

A-A' Location approximate

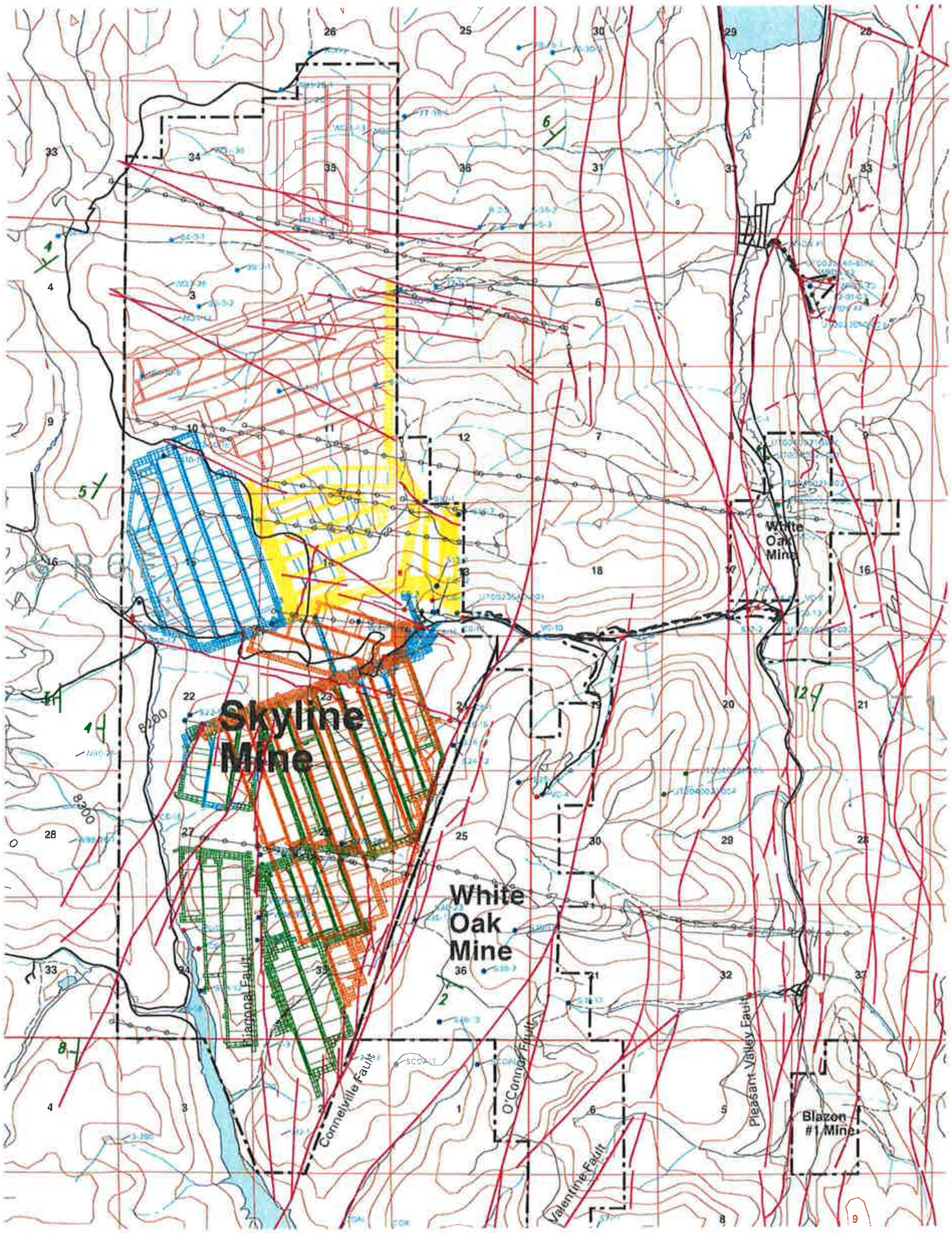
UTAH DNR OIL, GAS & MINING

0 0.25 0.5 1 1.5 2 Miles

1:110,000



CIA Areas



Pre-SMCRA, Pre-1977 Mining
Streams
Major Faults
Piezometric Surface Oct 2001
Piezometric Surface Infered Oct 2001
Dikes
Ground Mont.
Surface Water Mont. Site
UPDES Mont. Site

Cumulative Hydrologic Impact Assessment
Mud Creek - Upper Huntington Creek Basin

Figure 3a - Skyline Mine
Mining and Geology

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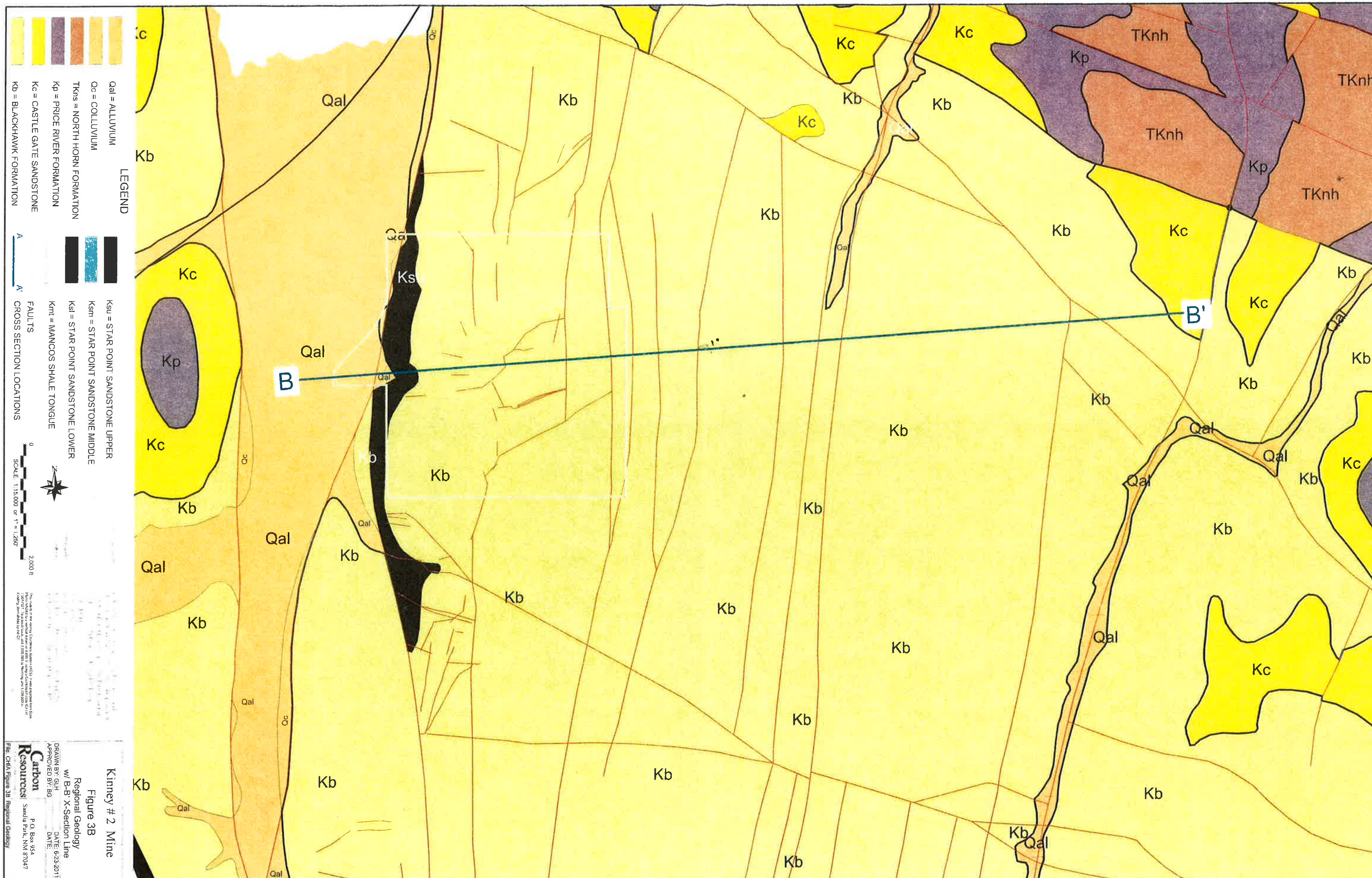
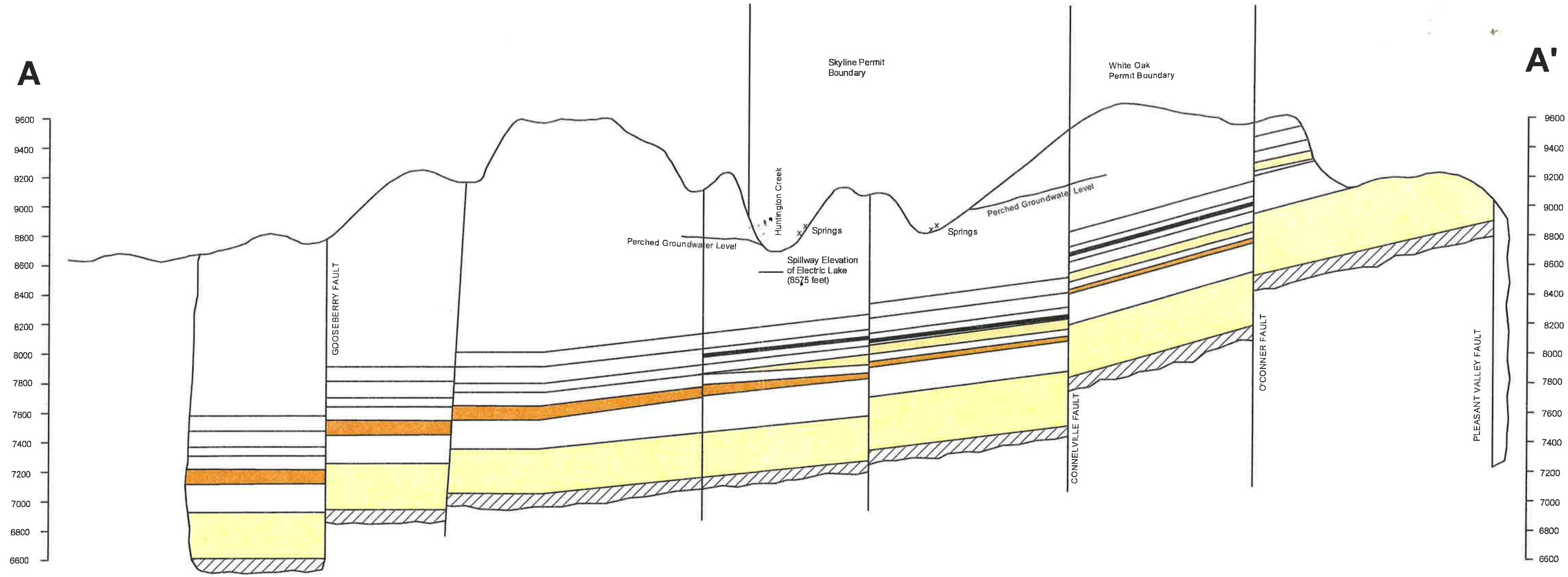
Compiled by: Dan Smith Date: October 24, 2005

State of Utah
Department of Natural Resources
Division of Oil, Gas and Mining

N

Location Map


LEGEND
Qal = ALLUVIUM
Qc = COLLUVIUM
TKns = NORTH HORN FORMATION
Kp = PRICE RIVER FORMATION
Kc = CASTLE GATE SANDSTONE
Kb = BLACKHAWK FORMATION
Ksu = STAR POINT SANDSTONE UPPER
Ksm = STAR POINT SANDSTONE MIDDLE
Ksl = STAR POINT SANDSTONE LOWER
Kmt = MANCOS SHALE TONGUE
FAULTS
A A'
CROSS SECTION LOCATIONS
N
0
2,000 ft
SCALE: 1:15,000 or 1" = 1,250'
B
B'
Qal
Qc
Kb
Kc
Kp
TKnh
Ksl
Kinney # 2 Mine
Figure 3B
Regional Geology
w/ B-B' X-Section Line
DRAWN BY: GLH
DATE: 6-23-2011
APPROVED BY: BG
DATE:
Carbon Resources
P.O. Box 954
Sandia Park, NM 87047
File: CHIA Figure 3B Regional Geology



Hydrogeologic Cross-Section

No Flow Boundary | Panther Sandstone | Starpoint Sandstone | Storrs Sandstone

Cumulative Impact Area Mud Creek - Upper Huntington Creek Basin

Figure 4a

May 2011

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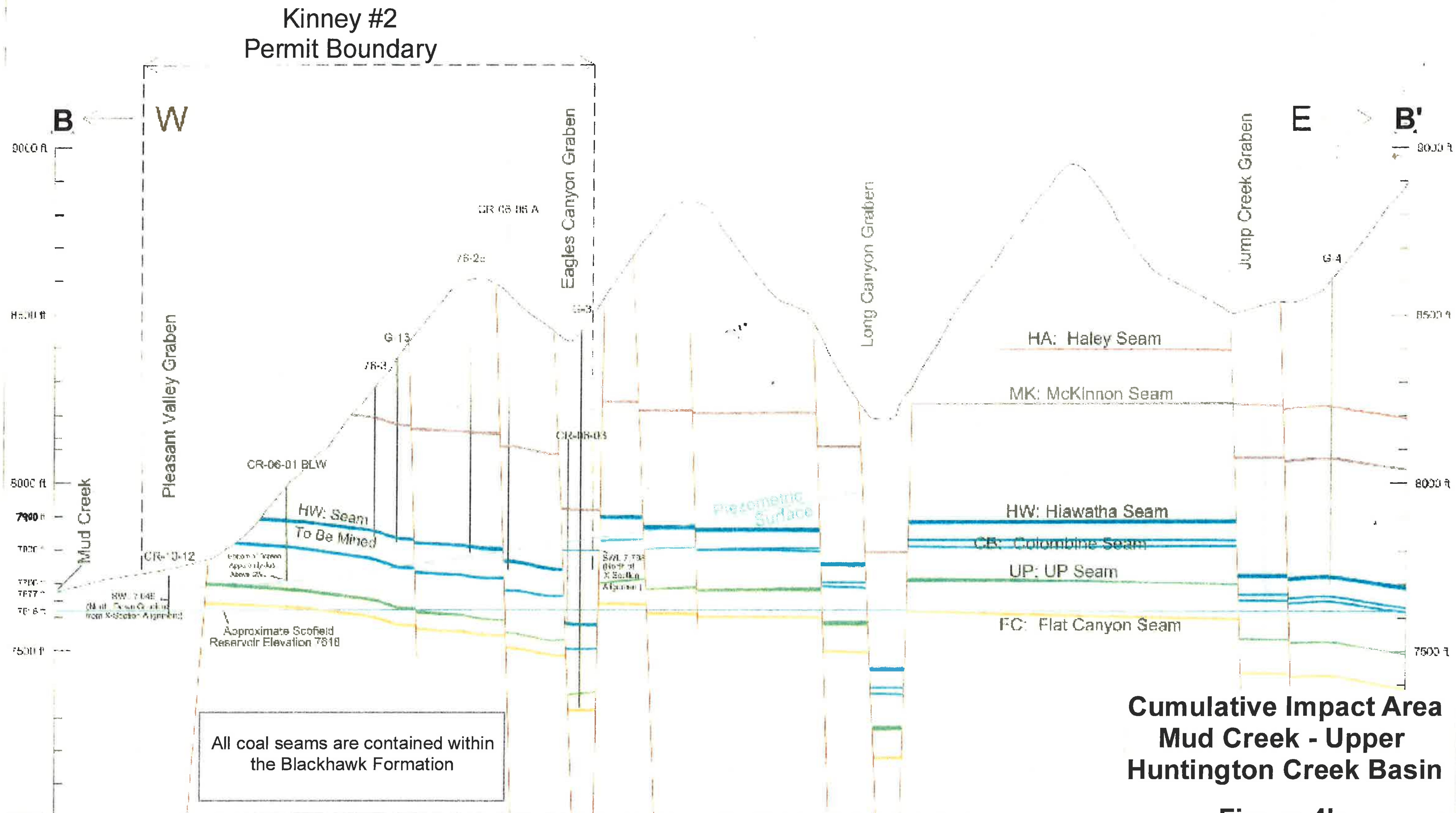


Cumulative Impact Area Mud Creek - Upper Huntington Creek Basin

Figure 4b

May 2011

File Location: N:\GIS\coal\ciamaps\mudcreek

E 36,269
N 73,734

End Point Coordinates of this X-Section are in KCS (Kinney Coordinate System). They are projected from State Plane NAD83 to a vertical datum of 8,000 ft using a CF (Combined Factor) of 1.0047927. To project back, add 7,000,000 to Northing and 1,700,000 to Easting, then divide by the CF.

Cumulative Impact Area Mud Creek - Upper Huntington Creek Basin

Figure 5

Hydrology Map

May 2011

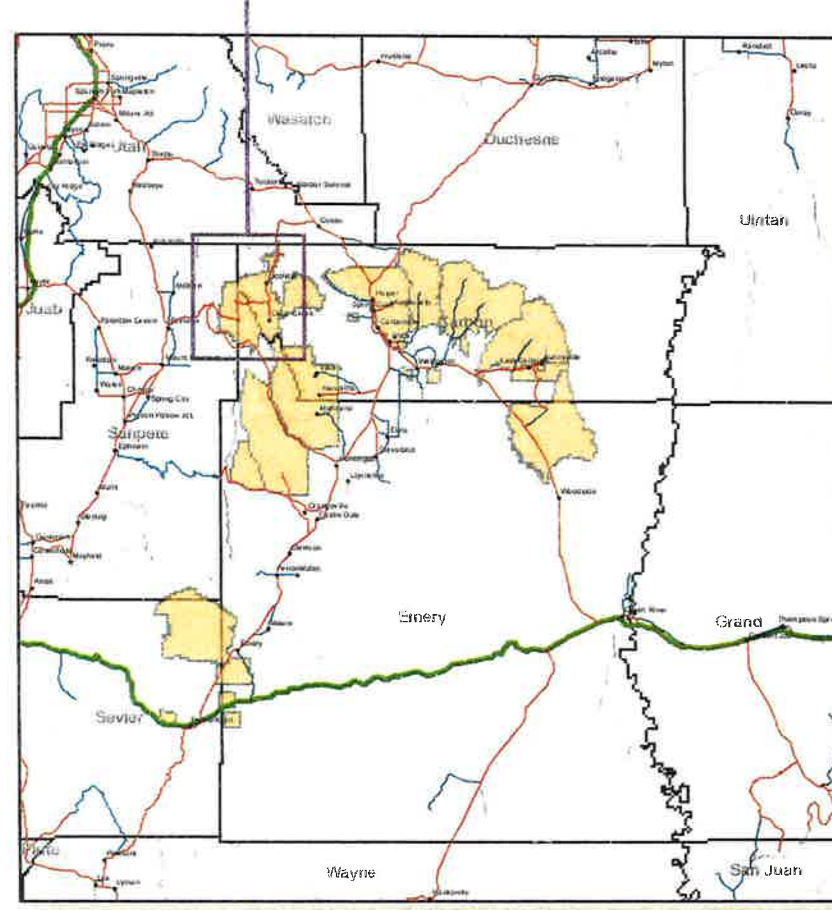
File: N:/gis/coal/ciamaps/QuitchupahMuddyCk/Hydrology.pdf

Water Monitoring Sites
- Spring
- Well
- Stream
- UPDES

Drainage
Mud Creek - Upper Huntington Creek Basin
Subwatersheds
Water Body

0 0.25 0.5 1 1.5 2 Miles

1:110,000



CIA Areas

Figure 4a - Star Point Formation / Blackhawk Formation Well Comparison

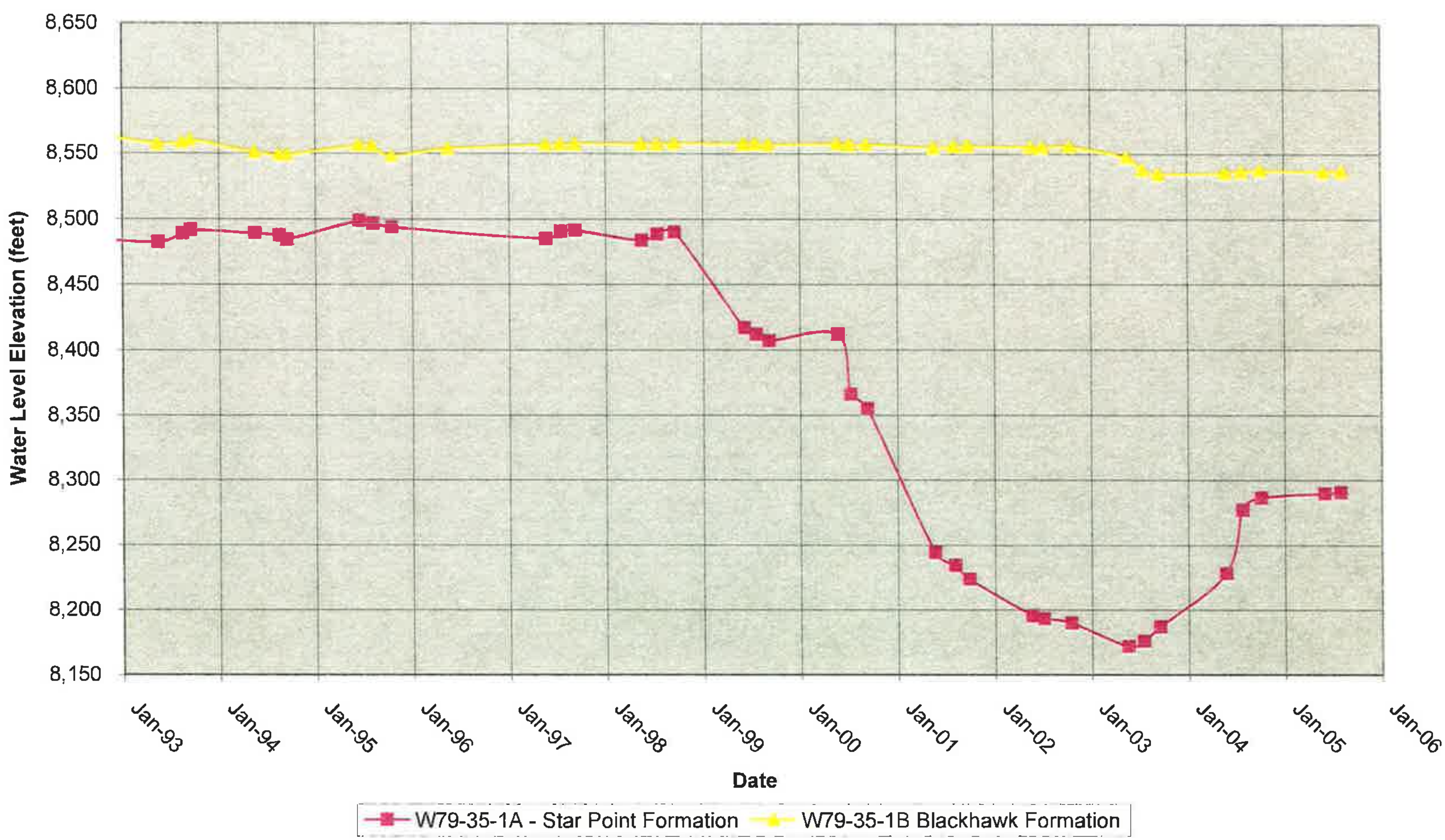


Figure 5a - Springs vs. SWSI

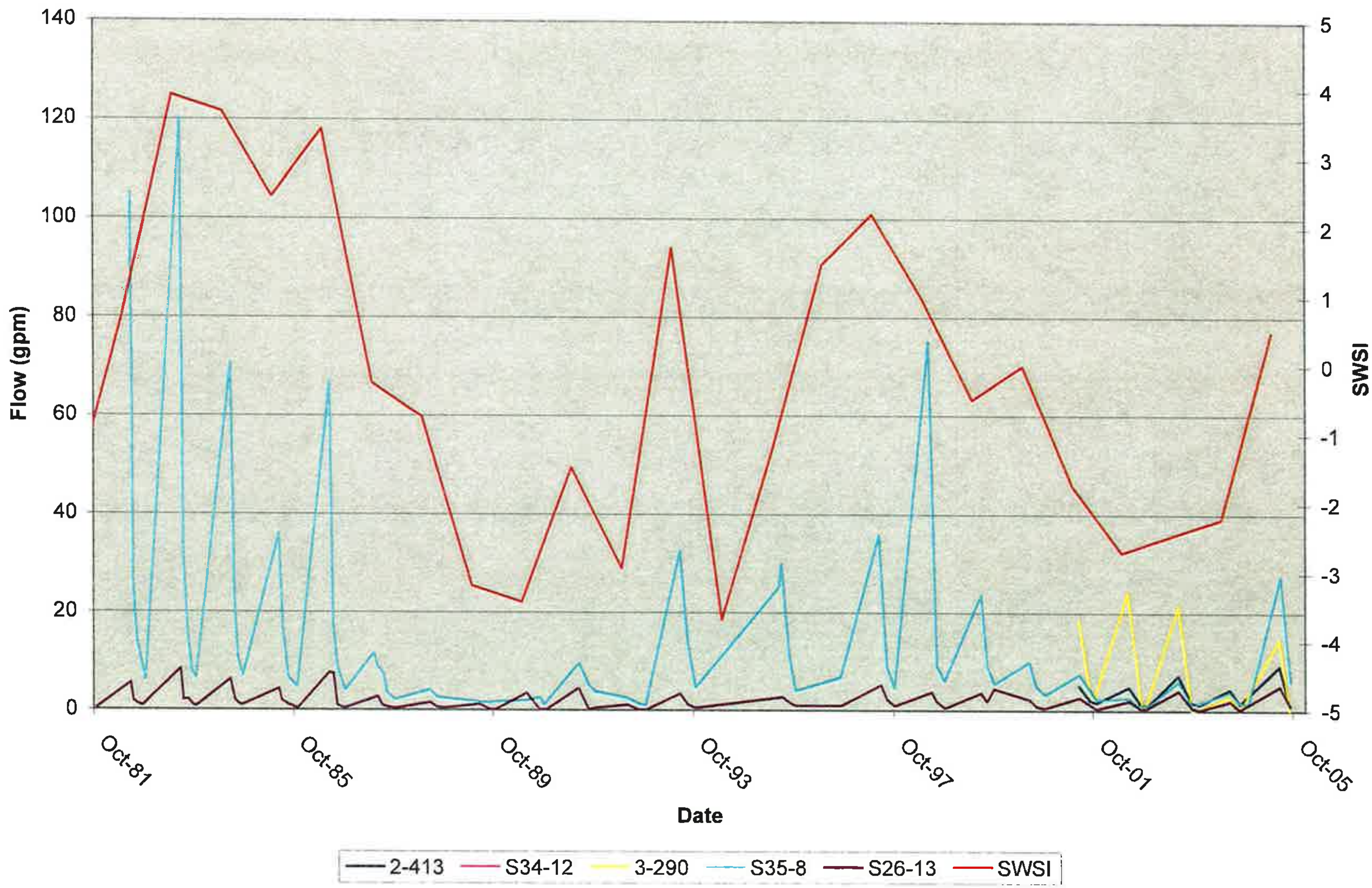


Figure 5b - Streams vs. SWSI

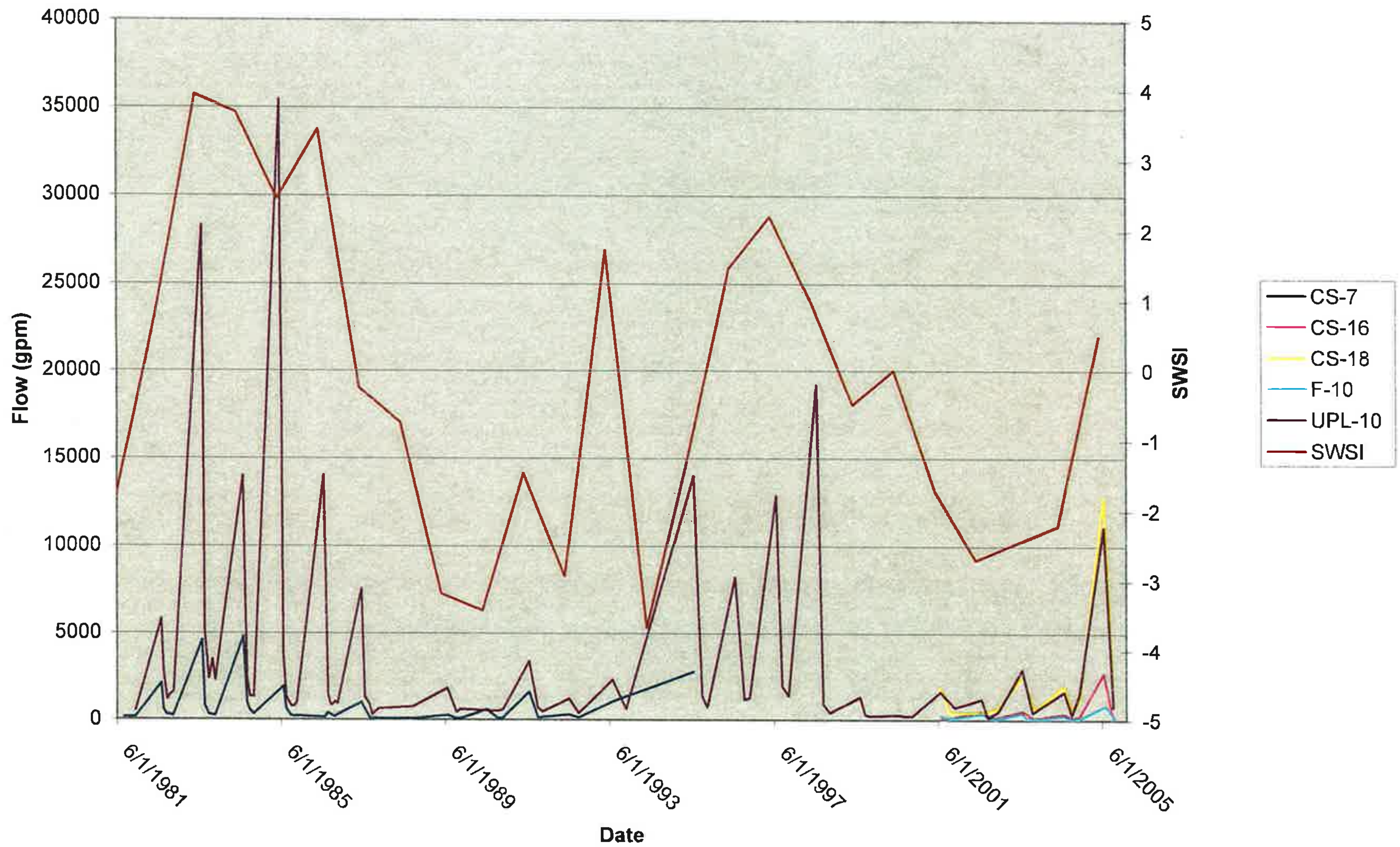


FIGURE 6A

TDS in Lower Eccles Creek

CS-2, VC-6, CS-6, &VC-9 1981-2002

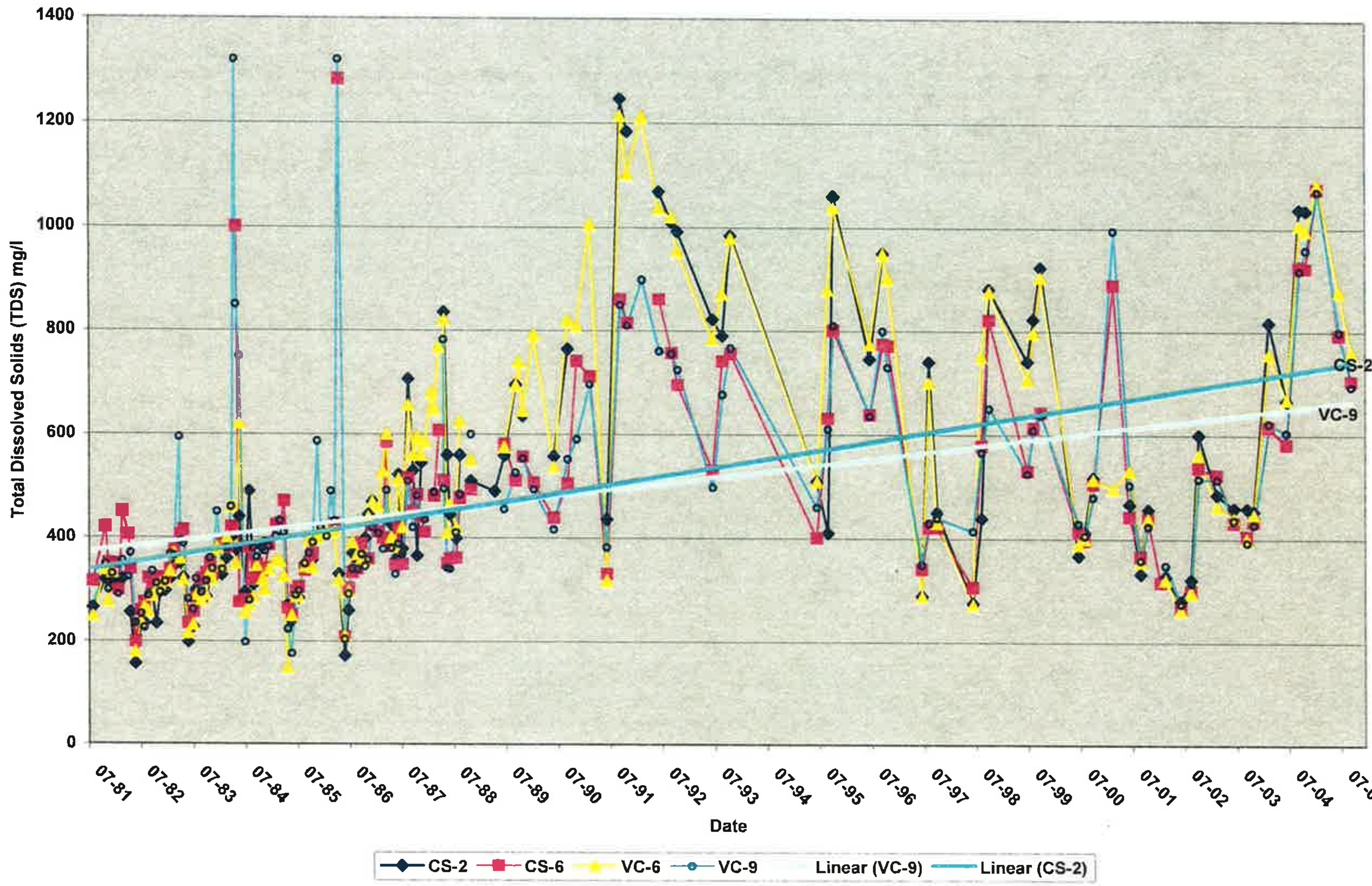


FIGURE 6B
TDS in Upper Eccles Creek
CS-3, CS-4, CS-9, &CS-11 1978-2002

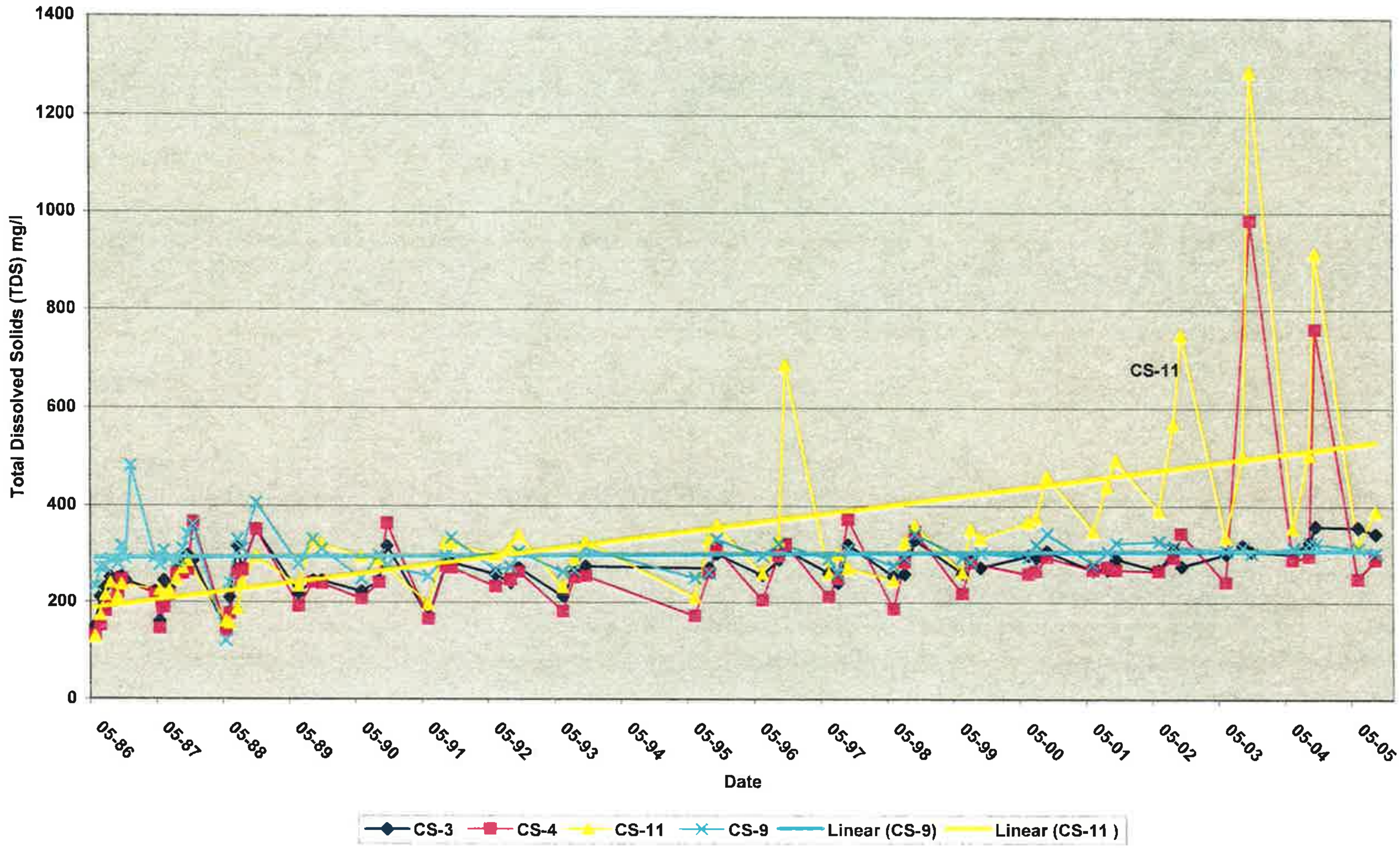


FIGURE 6C
TDS in South Fork of Eccles Creek
CS-1 & VC-10 1978-2002

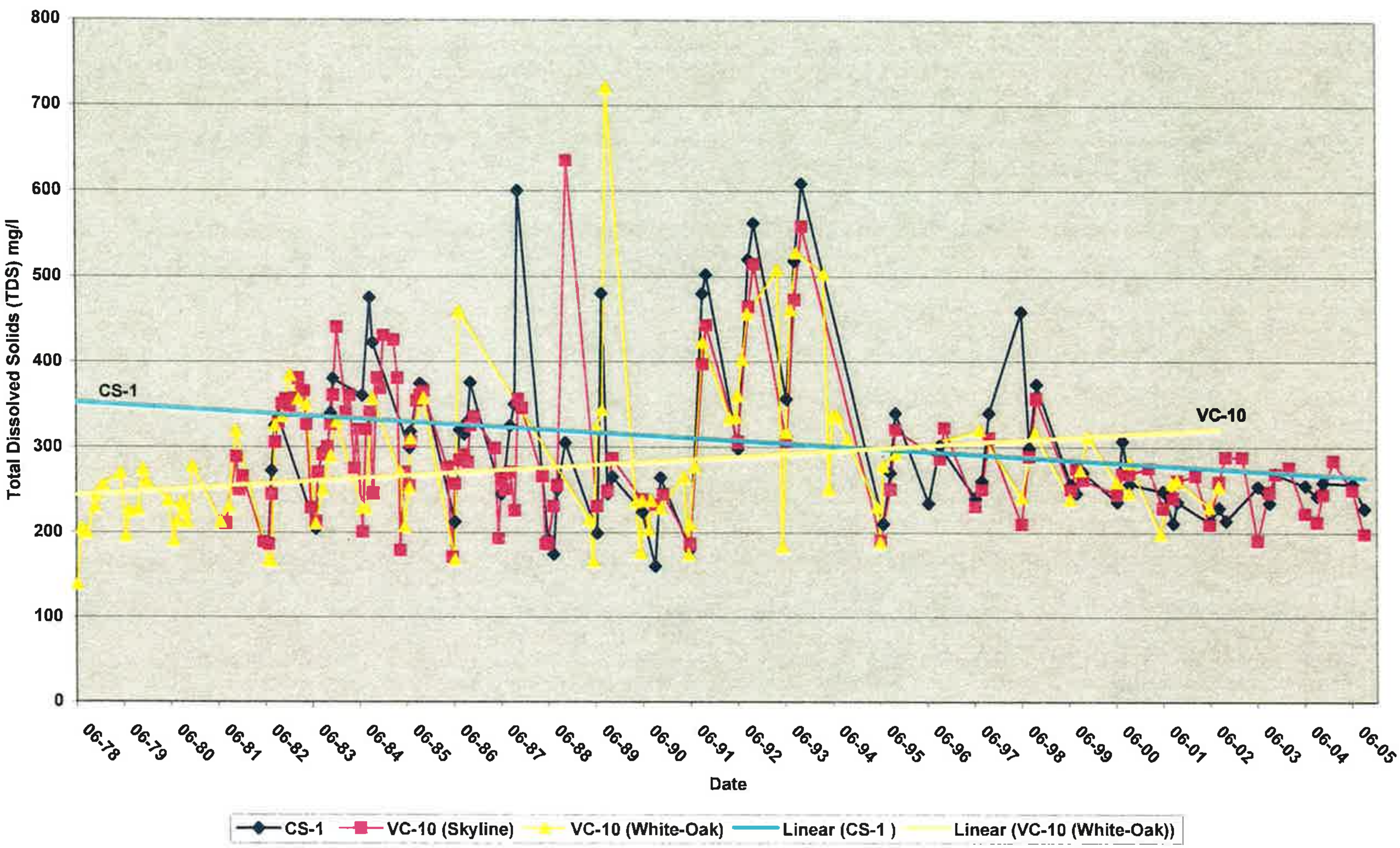


FIGURE 6D
TDS in Whiskey Creek
VC-4 & VC-5 1977-2001

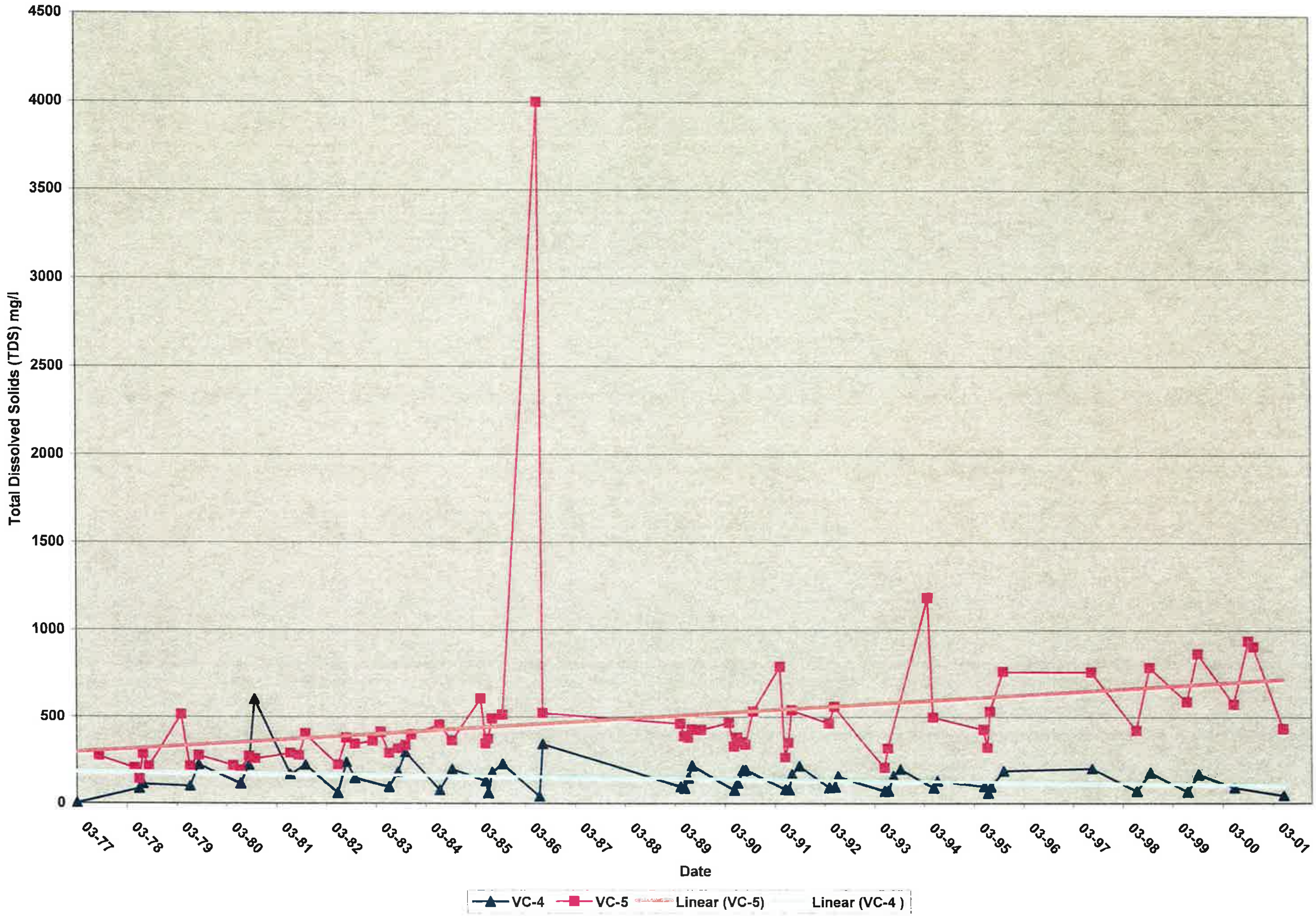


FIGURE 7A

TDS in Mud Creek Below Eccles

VC-1 &VC-2 1977-2002

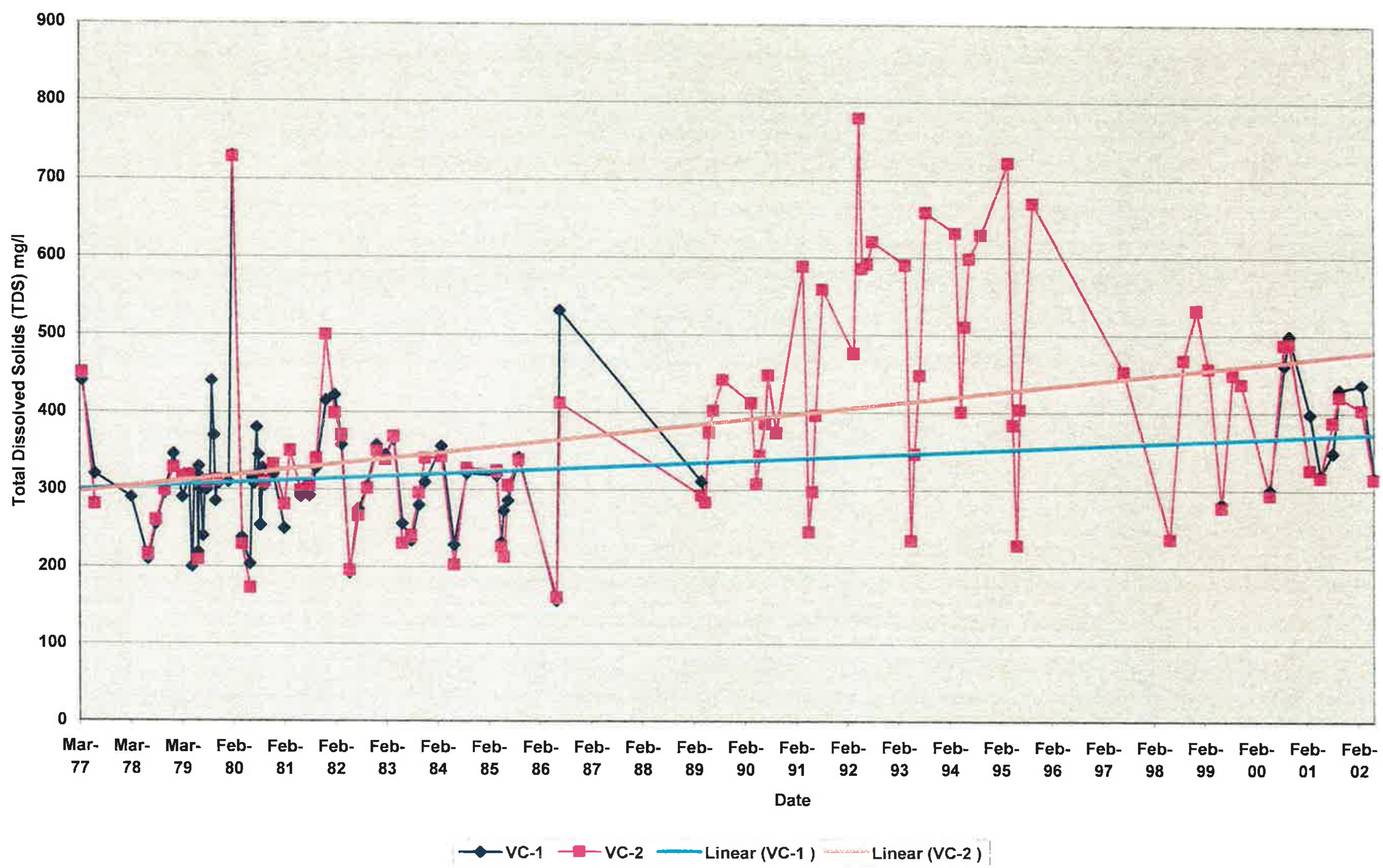


Figure 7B
TDS Baseline Monitoring In Mud Creek - Kinney #2 Mine

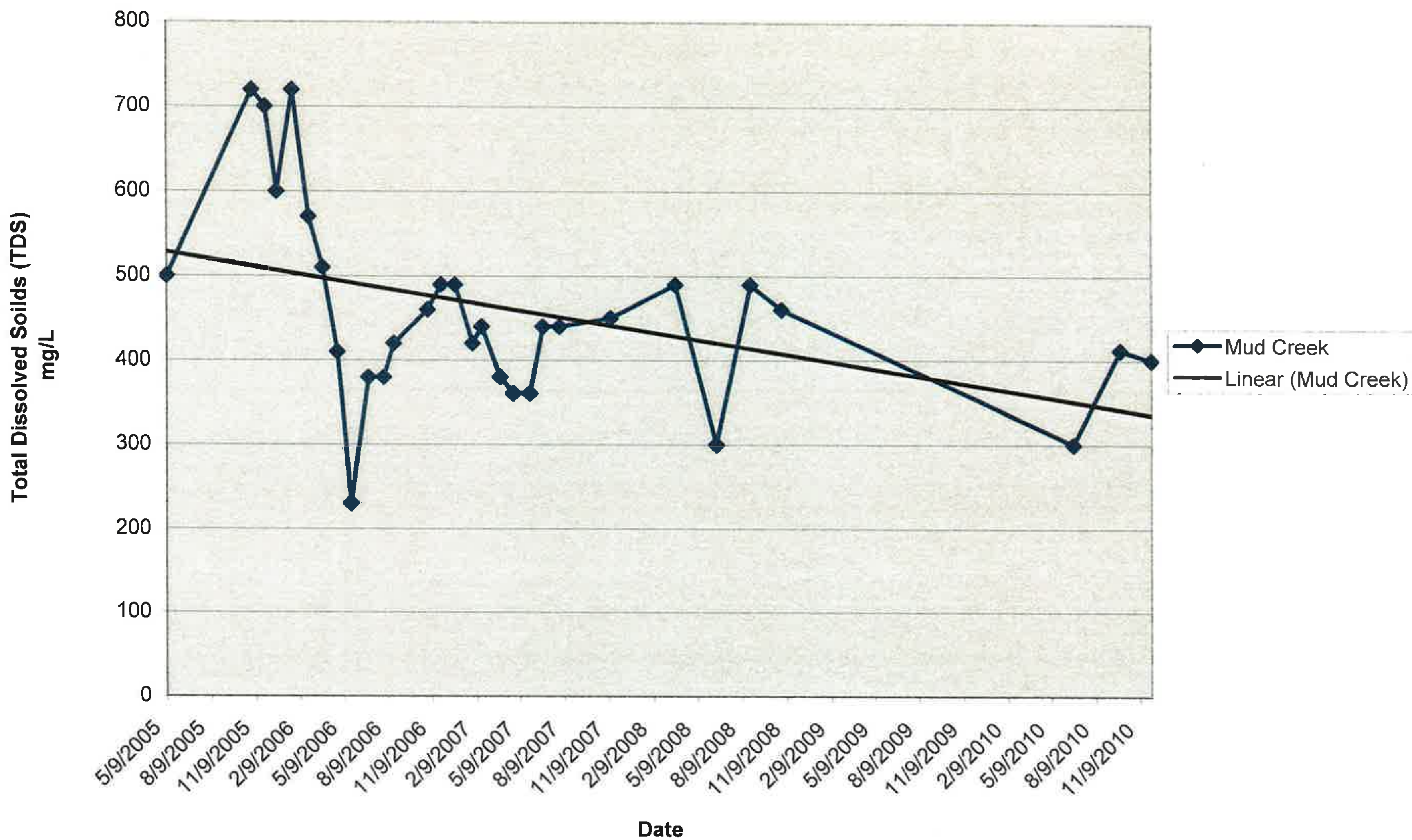


FIGURE 8

TDS in Upper Huntington Creek

CS-7, CS-8, CS-10 & UPL-10 1981-2002

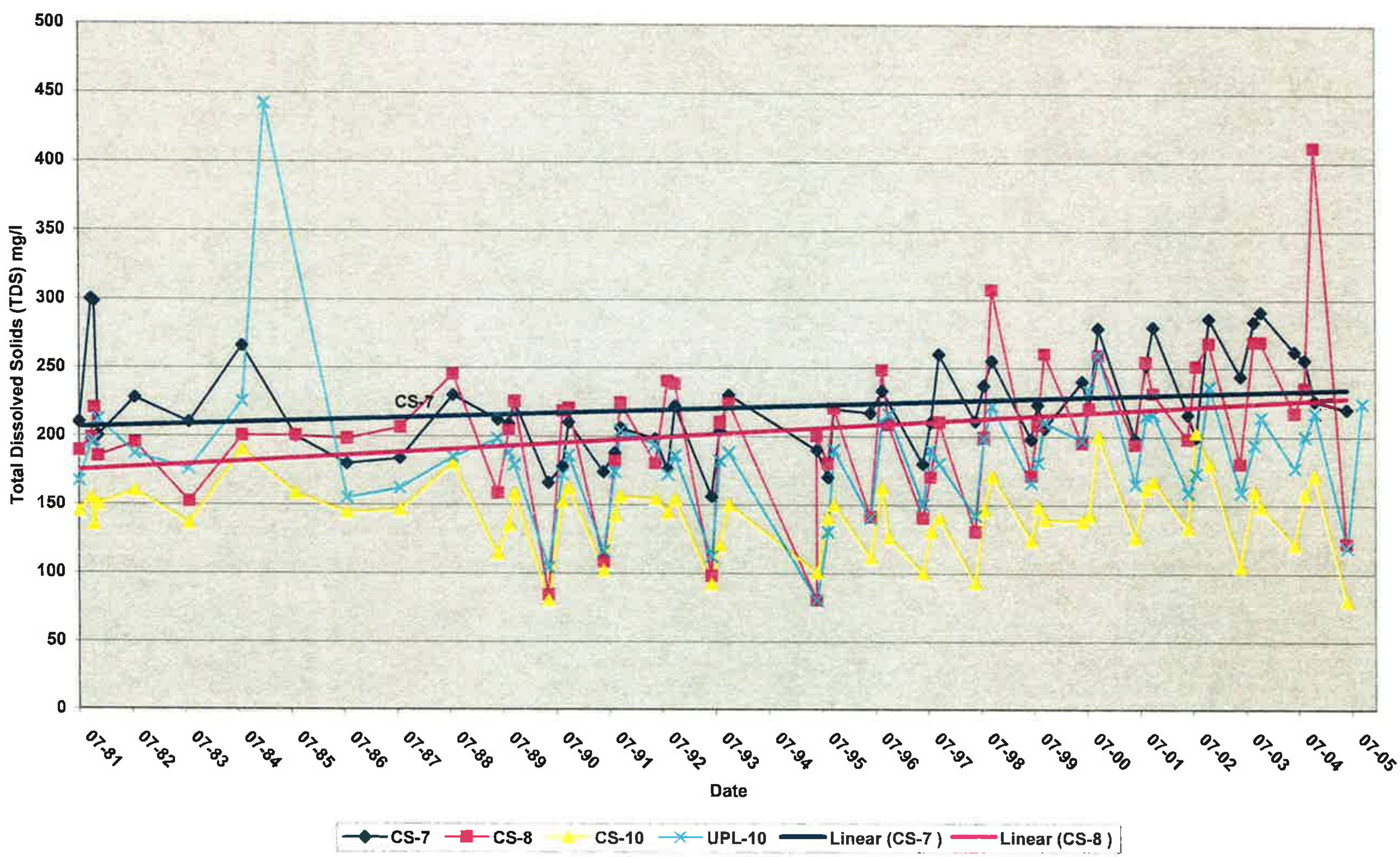


Figure 9 - Tritium Analysis

Note: Electric Lake Tritium Ranges from 7.67 to 13 TU and averages 9.85 TU

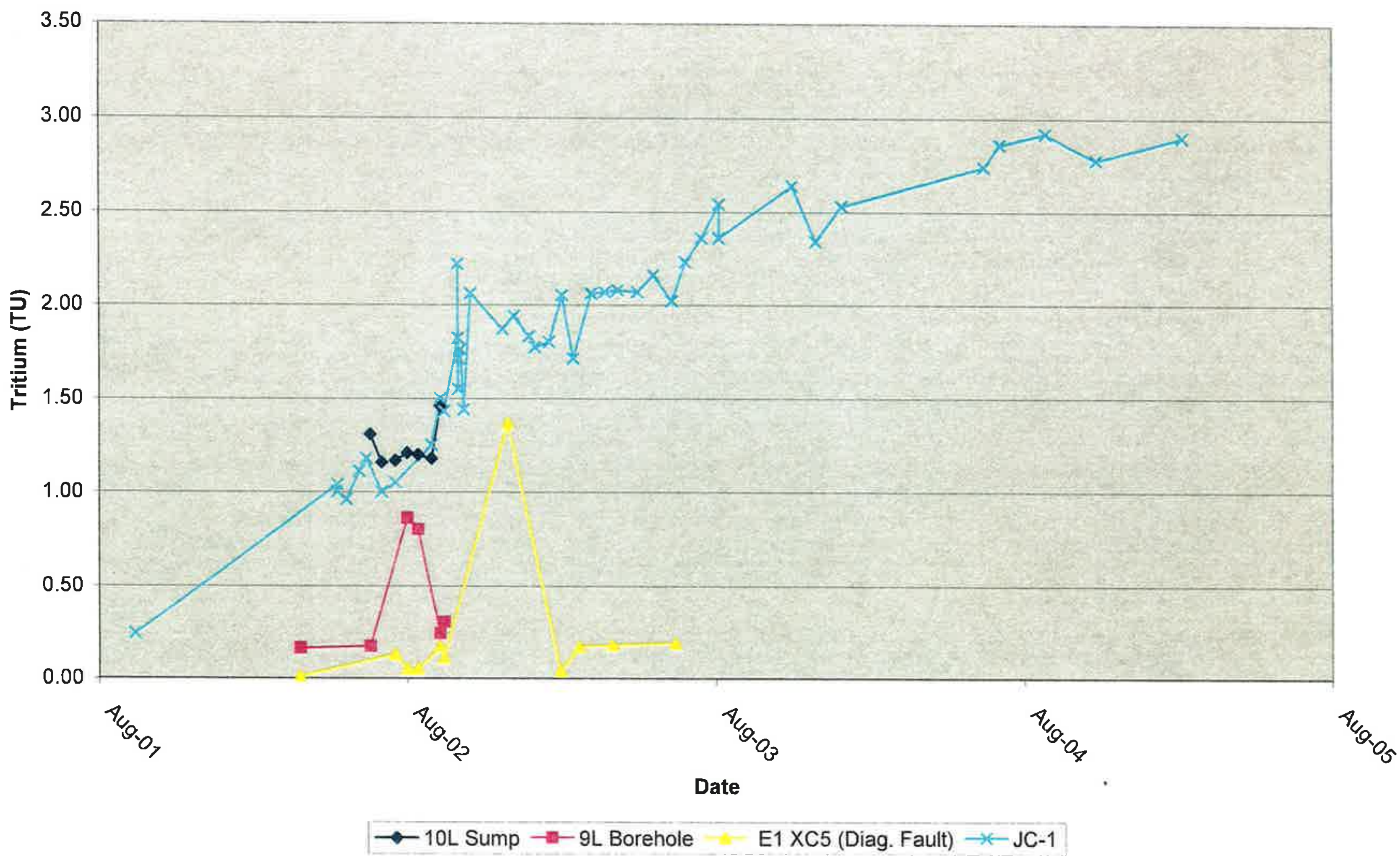


Figure 10 - Skyline Discharge to Eccles Creek

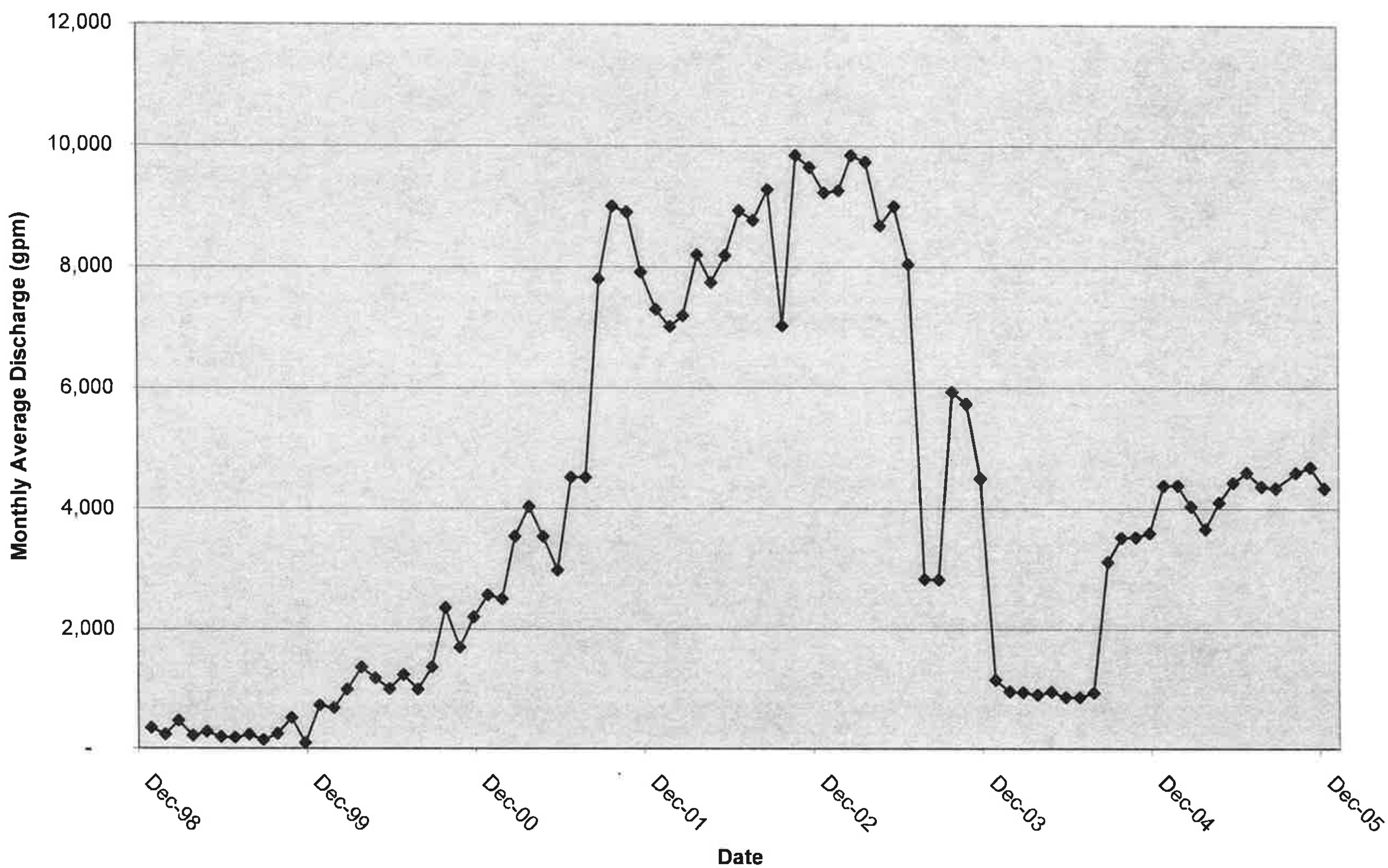


Figure 10a - Eccles Flow vs. "Normal"

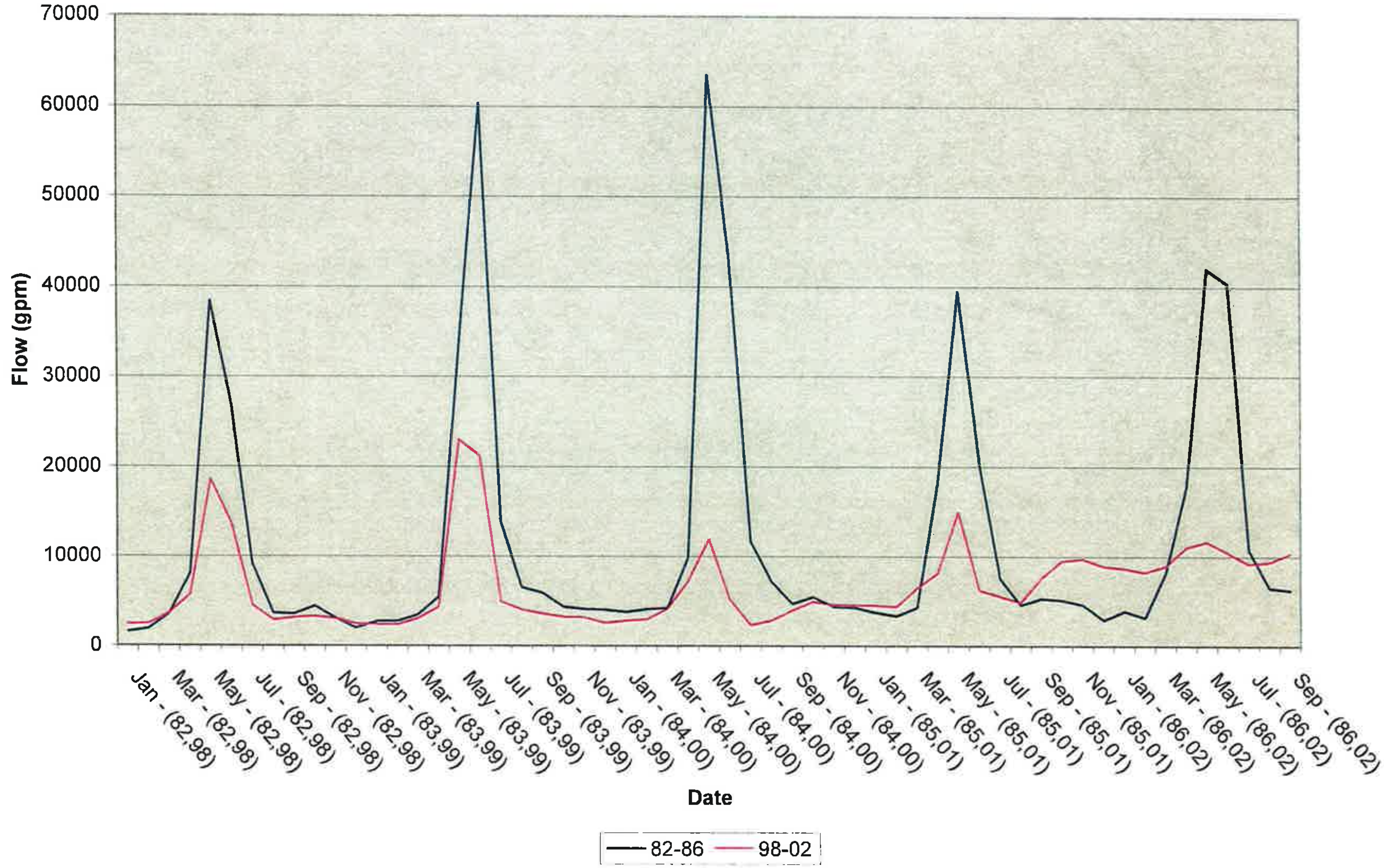


Figure 11 - Skyline Actual and Projected Cumulative Discharge by Drainage

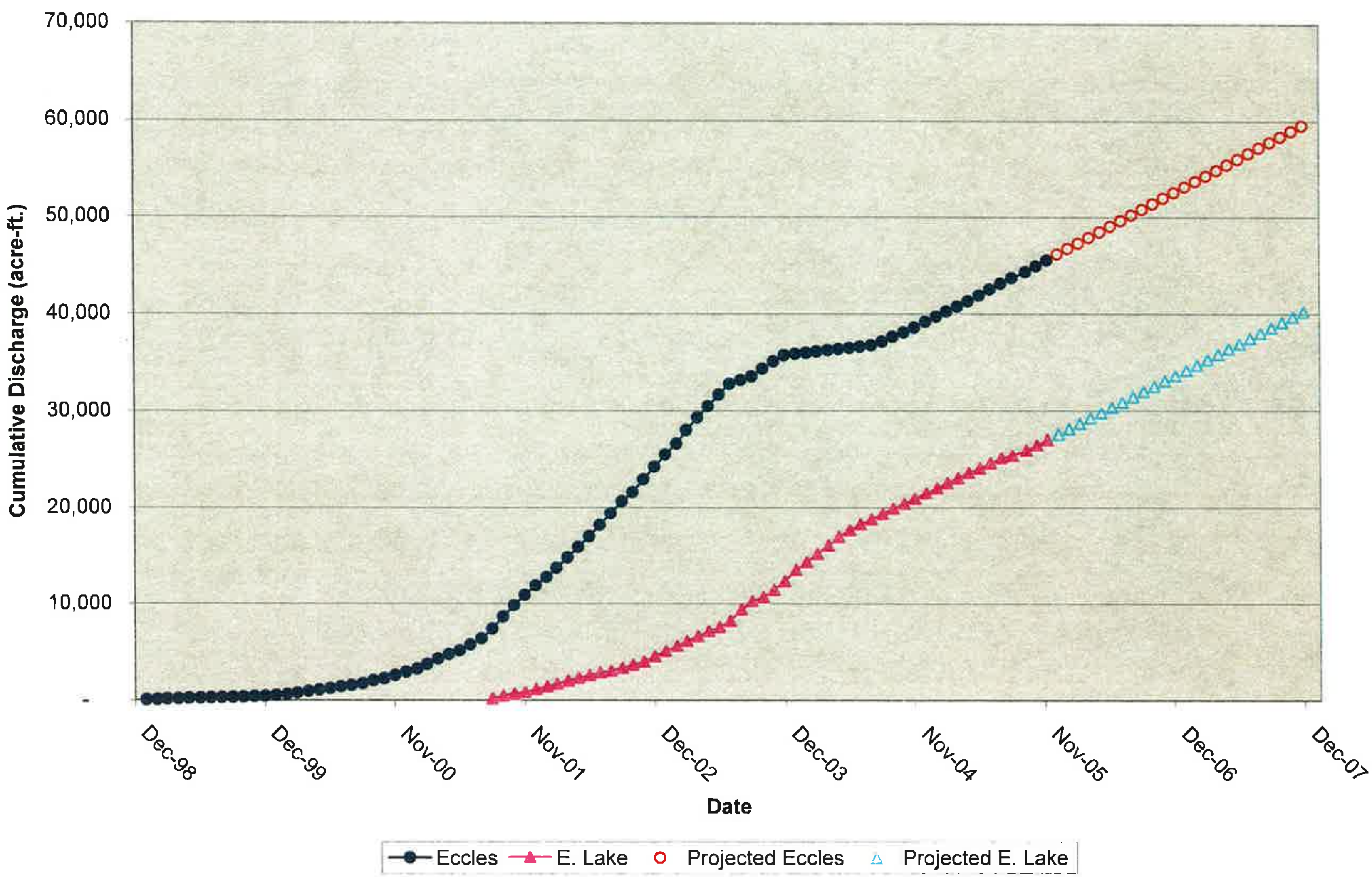


Figure 12 - Total Phosphorous in Mud Creek

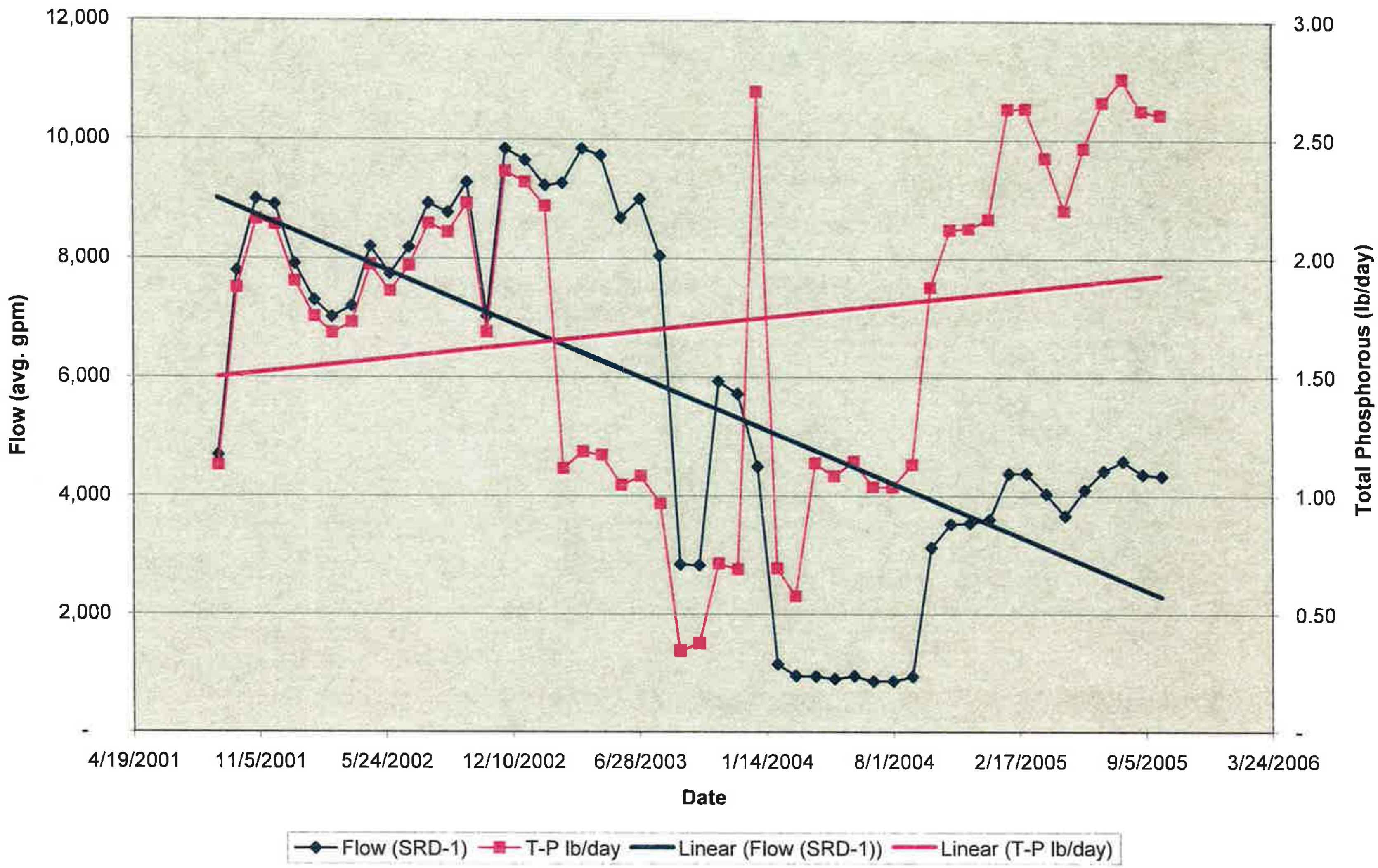


Figure 13 - Electric Lake Storage vs. Discharge

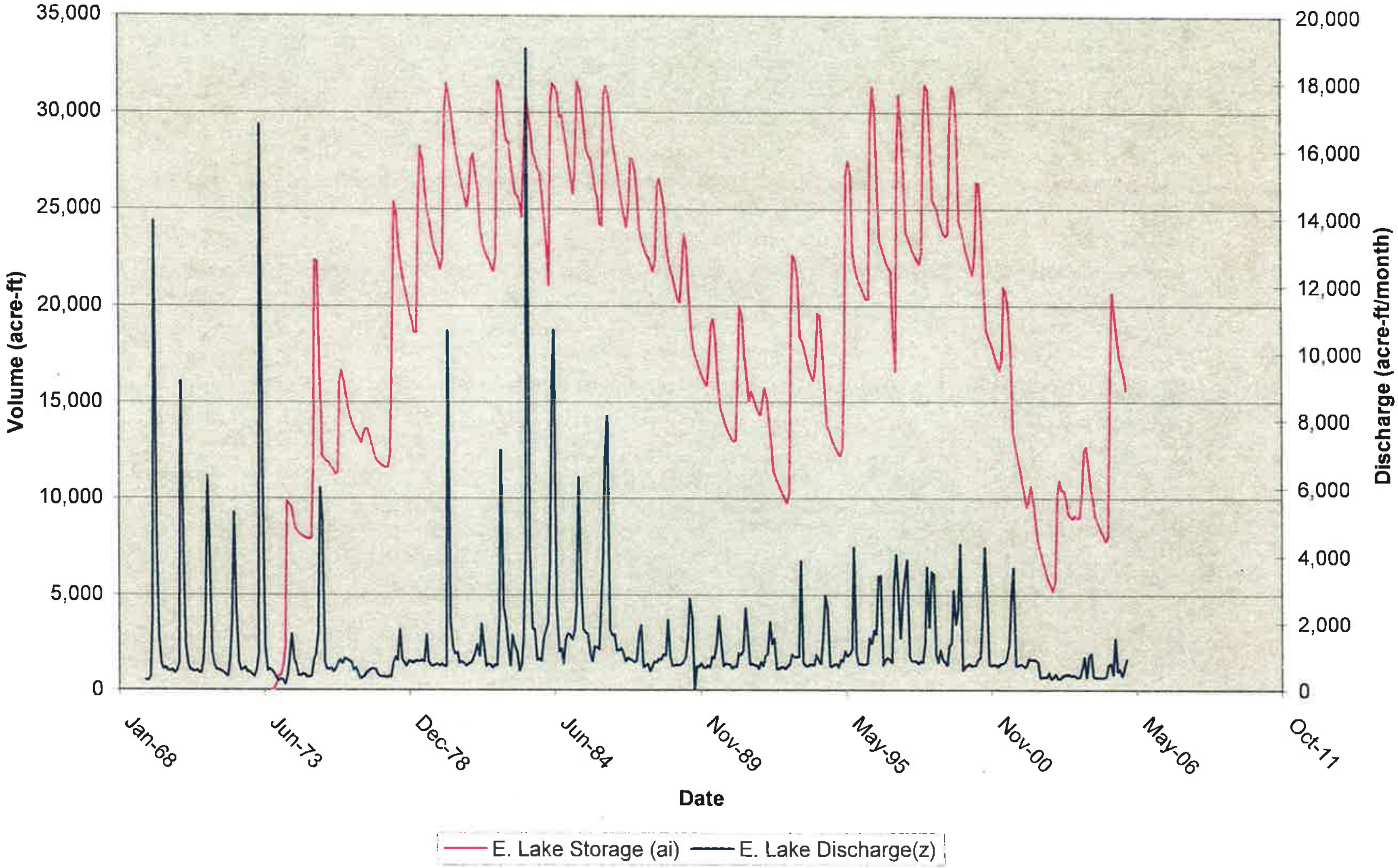


Figure 14 - Electric Lake, Calculated vs. Measured Inflows

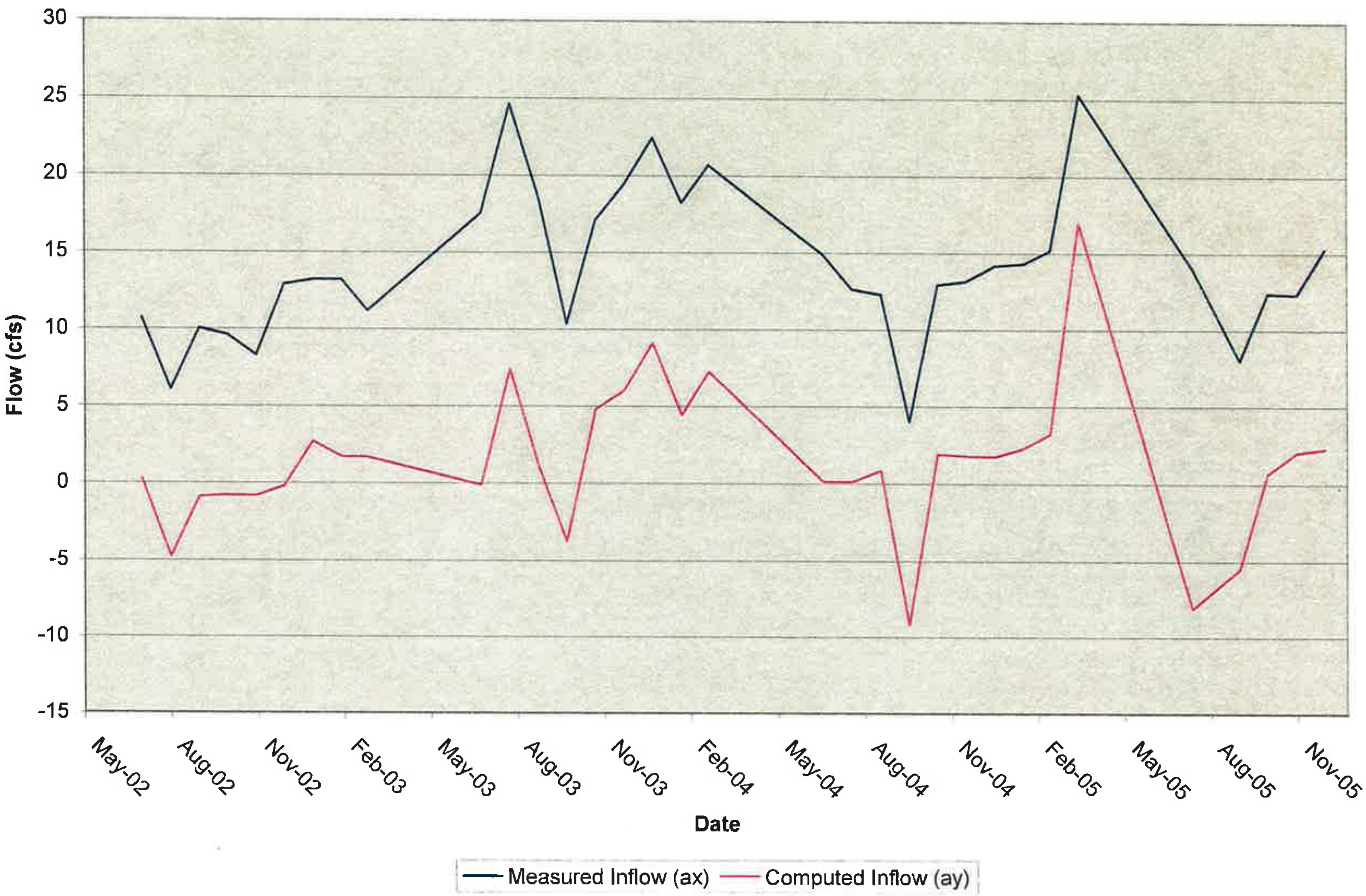
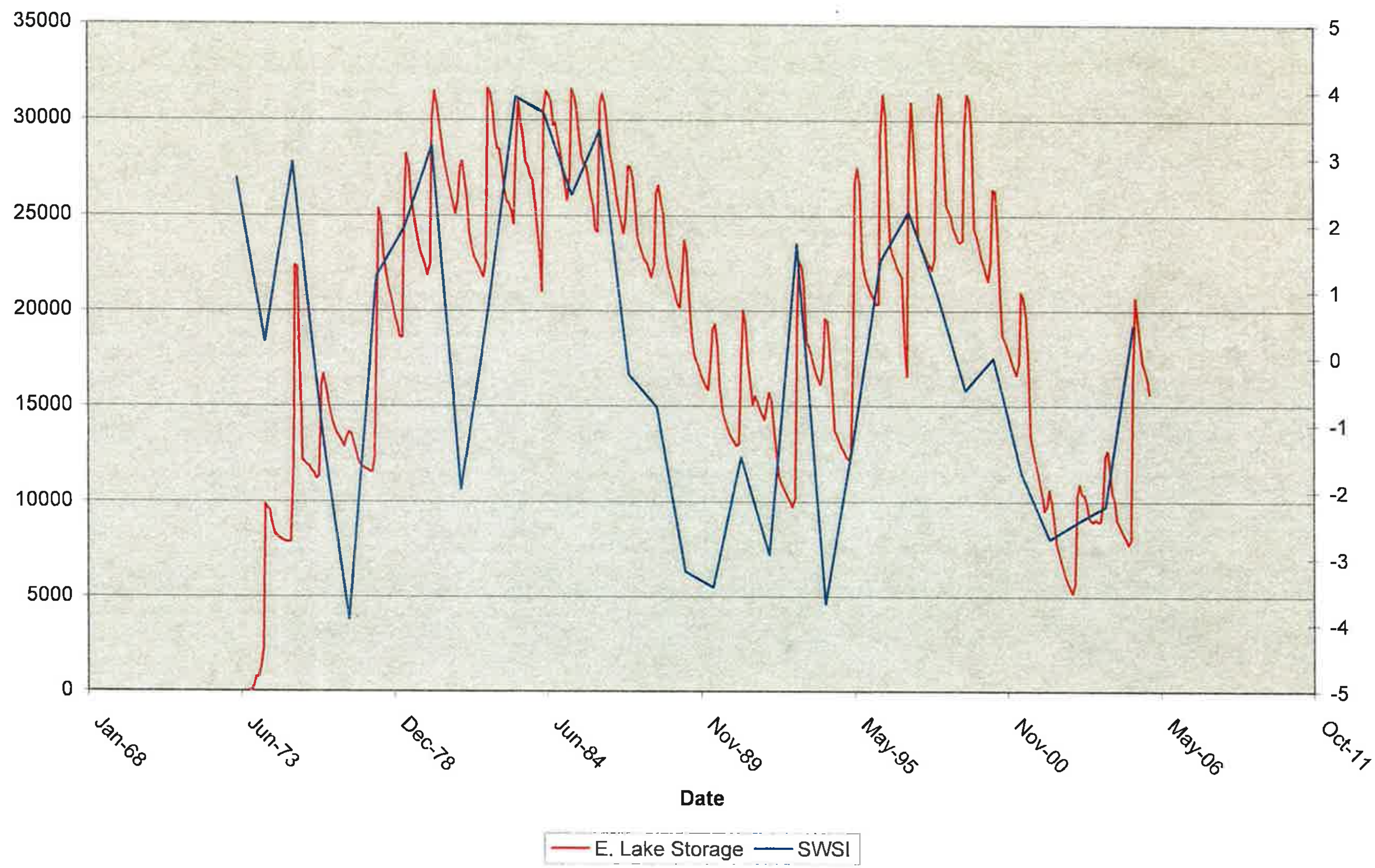


Figure 15 - Electric Lake vs. Surface Water Supply Index (SWSI)



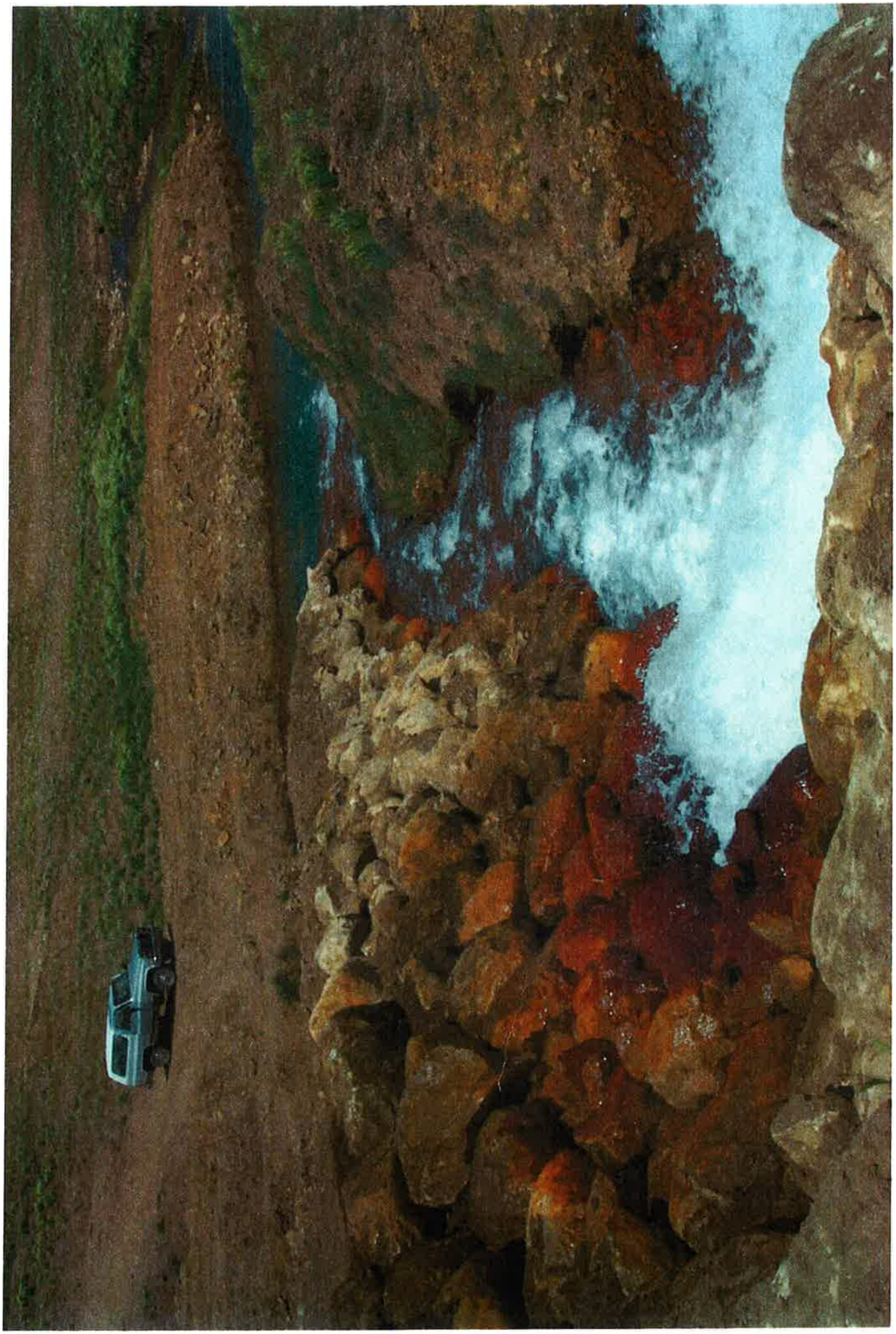


Photo 4. The slope that is to be the future site of the Kinney #2 mine. View looking northeast and due east of Scofield Reservoir

Photo 5 Eagle Seep 3 located in Eagle Canyon along the eastern margin of the Kinney #2 Permit Boundary

Photo 6 Aspen Spring - a spring-fed pond located in Eagle Canyon on the eastern margin of the Kinney #2 permit boundary

Exhibit 8

Fish and Wildlife Information

JON M. HUNTSMAN, JR.
Governor

GARY R. HERBERT
Lieutenant Governor

State of Utah

DEPARTMENT OF NATURAL RESOURCES

MICHAEL R. STYLER
Executive Director

Division of Wildlife Resources

JAMES F. KARPOWITZ
Division Director

August 13, 2007

Ben Grimes
Hansen, Allen & Luce Engineers
23 S. Carbon Avenue, Suite 21
Price, Utah 84501

Subject: Species of Concern Near the Proposed Coal Mine in Carbon County

Dear Ben Grimes:

I am writing in response to your email dated August 9, 2007 regarding information on species of special concern proximal to the proposed coal mine in Carbon County, Utah (Sections 26-35 of Township 12 South, Range 7 East, and Sections 2-6 of Township 13 South, Range 7 East, SLB&M).

The Utah Division of Wildlife Resources (UDWR) has records of occurrence for sandhill crane and bald eagle within the project area noted above. In addition, in the vicinity there are records of occurrence for northern flying squirrel and northern river otter.

The information provided in this letter is based on data existing in the Utah Division of Wildlife Resources' central database at the time of the request. It should not be regarded as a final statement on the occurrence of any species on or near the designated site, nor should it be considered a substitute for on-the-ground biological surveys. Moreover, because the Utah Division of Wildlife Resources' central database is continually updated, and because data requests are evaluated for the specific type of proposed action, any given response is only appropriate for its respective request.

In addition to the information you requested, other significant wildlife values might also be present on the designated site. Please contact UDWR's habitat manager for the southeastern region, Chris Wood, at (435) 636-0279 if you have any questions.

Please contact our office at (801) 538-4759 if you require further assistance.

Sincerely,

Sarah Lindsey

Sarah Lindsey
Information Manager
Utah Natural Heritage Program

cc: Chris Wood, SERO

Ben Grimes

From: "Ben Grimes" <halengpr@emerytelcom.net>
To: "Sarah Lindsey" <sarahlindsey@utah.gov>
Sent: Monday, August 13, 2007 12:21 PM
Subject: Re: Information Request

Thank you for the letter.

As I indicated in my first email, I need a (complete) list of mammals, birds, amphibians, snakes and fish that occur in the area, not just species of special interest. I have to provide these lists in the permit application to the Utah Division of Oil, Gas and Mining. Chris Wood told me you would be to provide me with this information.

If you have any questions please call me at (435) 650-7075.

Thank You,
Ben Grimes

----- Original Message -----
From: "Sarah Lindsey" <sarahlindsey@utah.gov>
To: "Ben Grimes" <halengpr@emerytelcom.net>
Cc: "Chris Wood" <CHRISWOOD@utah.gov>
Sent: Monday, August 13, 2007 10:29 AM
Subject: Re: Information Request

Mr. Grimes,

Attached is a letter in response to your request. Please contact me if you have any questions.

Sincerely,
Sarah Lindsey

Utah Natural Heritage Program
Division of Wildlife Resources
1594 West North Temple
Salt Lake City, UT 84114-6301
(801) 538-4759

>>> "Ben Grimes" <halengpr@emerytelcom.net> 8/9/2007 4:12 PM >>>
I am working on a permit application for a new coal mine in Carbon County and I need to include the following:

1. Species lists for mammals, birds, amphibians, snakes, and fish
2. Threatened and Endangered species

The attached PDF shows the area I need information for --- the large area inside the biggest black box.

If you have any questions please call me at (435) 650-7075.

Thank you,
Ben Grimes, Office Manager
HANSEN, ALLEN & LUCE ENGINEERS
PRICE, UAH

Ben Grimes

From: "Lenora Sullivan" <lenorasullivan@utah.gov>
To: <halengpr@emerytelcom.net>
Cc: "Chris Colt" <CHRISCOLT@utah.gov>
Sent: Monday, March 20, 2006 10:12 AM
Subject: Re: T&E Species Request

Dear Mr.Grimes:

I am writing in response to your email dated March 9, 2006 for information regarding species of special concern proximal to a coal mine project located in Carbon County, Utah [T012S 007E S27-29, 32-34; T013S 007E S3-5 SLB&M].

The Utah Division of Wildlife Resources (UDWR) does not have records of occurrence for any threatened, endangered, or sensitive species within the project boundaries. However, in the vicinity of the project, there are recent records of occurrence for winter roosting habitat for bald eagle, a federally-listed threatened bird, which is included on the Utah Sensitive Species List.

The information provided in this letter is based on data existing in the Utah Division of Wildlife Resources' central database at the time of the request. It should not be regarded as a final statement on the occurrence of any species on or near the designated site, nor should it be considered a substitute for on-the-ground biological surveys. Moreover, because the Utah Division of Wildlife Resources' central database is continually updated, and because data requests are evaluated for the specific type of proposed action, any given response is only appropriate for its respective request.

In addition to the information you requested, other significant wildlife values might also be present on the designated site. Please contact UDWR's habitat manager for the southeastern region, Chris Colt, at (435) 636-0279 if you have any questions.

Please contact our office at (801) 538-4759 if you require further assistance.

Sincerely,

Lenora B. Sullivan
Information Manager
Utah Natural Heritage Program

cc: Chris Colt, SERO

>>> <halengpr@emerytelcom.net> 03/09/2006 1:36 PM >>>
We are working on a coal mine permit application with the Utah Div of Oil, Gas and Mining and need consultation on T&E species for the proposed Kinney No 2 Mine area. The area is in Carbon County. The attached PDF map shows the area of interest.

Would you please review your records and indicate if there have been any T&E species identified within the area marked on the map.

Please reply to my email address, and by hard copy.

If you have any questions please call Ben Grimes at (435) 650-7075.

Thank
you.

This message was sent using Endymion MailMan.
http://www.endymion.com/products/mailman/

Ben Grimes

From: "Ben Grimes" <halengpr@emerytelcom.net>
To: <sarahlindsey@utah.gov>
Sent: Thursday, August 09, 2007 4:12 PM
Attach: List MapRequest_0001.pdf
Subject: Information Request

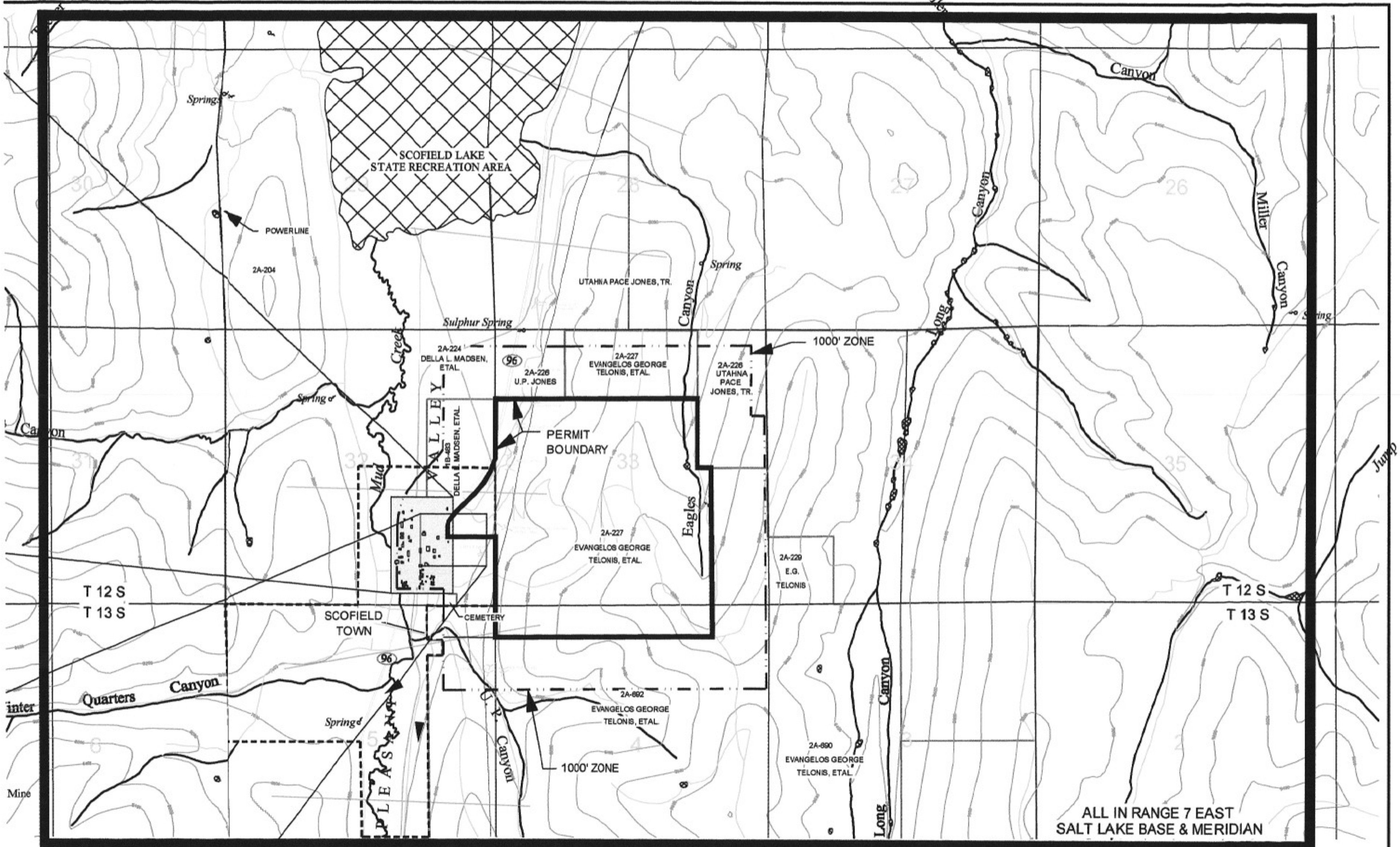
I am working on a permit application for a new coal mine in Carbon County and I need to include the following:

1. Species lists for mammals, birds, amphibians, snakes, and fish
2. Threatened and Endangered species

The attached PDF shows the area I need information for --- the large area inside the biggest black box.

If you have any questions please call me at (435) 650-7075.

Thank you,
Ben Grimes, Office Manager
HANSEN, ALLEN & LUCE ENGINEERS
PRICE, UAH



NEED SPECIES LISTS -MAMMALS, BIRDS, AMPHIBIANS, SNAKES ETC
AND T & E SPECIES FOR THIS AREA

From:
Mike Erkkila <rmerkkila@hotmail.com>
To:
ghuntbbc <ghuntbbc@aol.com>

Date:
Tue, Apr 5, 2011 4:44 pm

SCOFIELD TOWN

INCORPORATED MARCH 7, 1892

Carbon County, Utah

SCOFIELD ROUTE

BOX 700

HELPER, UTAH 84526

(435) 448-9221

FAX (435) 448-9207

Greg Hunt

Carbon Resources,

The Town Council felt that this LOI from 2009 was still in place and would honor it. They felt it would be a good idea to wait until Carbon Resources emerges from chapter 11 to sign a definitive agreement.

Cordially,

Mike Erkkila

Scofield Mayor

Letter of Intent

Carbon Resources, LLC
PO Box 11789
Albuquerque, NM 87192

Gentlemen:

Scofield Town, a political subdivision of the State of Utah ("the town"), and Carbon Resources, LLC, a Nevada limited liability company ("Carbon"), hereby declare their mutual intent to enter into an agreement ("Agreement") to provide and receive sewer and water services.

Scofield Town, owns and operates a municipal sewer and potable water system both having capacity exceeding the towns needs, and owns water rights in Scofield Reservoir with point of diversion rights on Mud Creek, within the Scofield City Limits.

Carbon Resources, LLC owns surface lands and the rights to mine coal from the planned Kinney No. 2 Mine which in part lies within the Scofield City Limits. Carbon Resources anticipates the need for sewer, potable and non-potable water services in order to operate the planned mine. Furthermore, Carbon desires to purchase from Scofield Town said services.

Scofield Town, pursuant to a resolution of the Scofield Town Council passed on the 8th Day of December 2008, does hereby declare its intent to enter into said agreement with Carbon Resources to provide sewer, and water services, as needed for the operation of the planned Kinney No. 2 Mine. Terms of said agreement will be negotiated in good faith and both parties agree to make every effort to complete said negotiations and sign said agreement no latter than June 1 2009.

For Scofield Town:

By: MIKE EKKKILA
(Print)

Signature: Mike Ekkila Date: 2-11-09

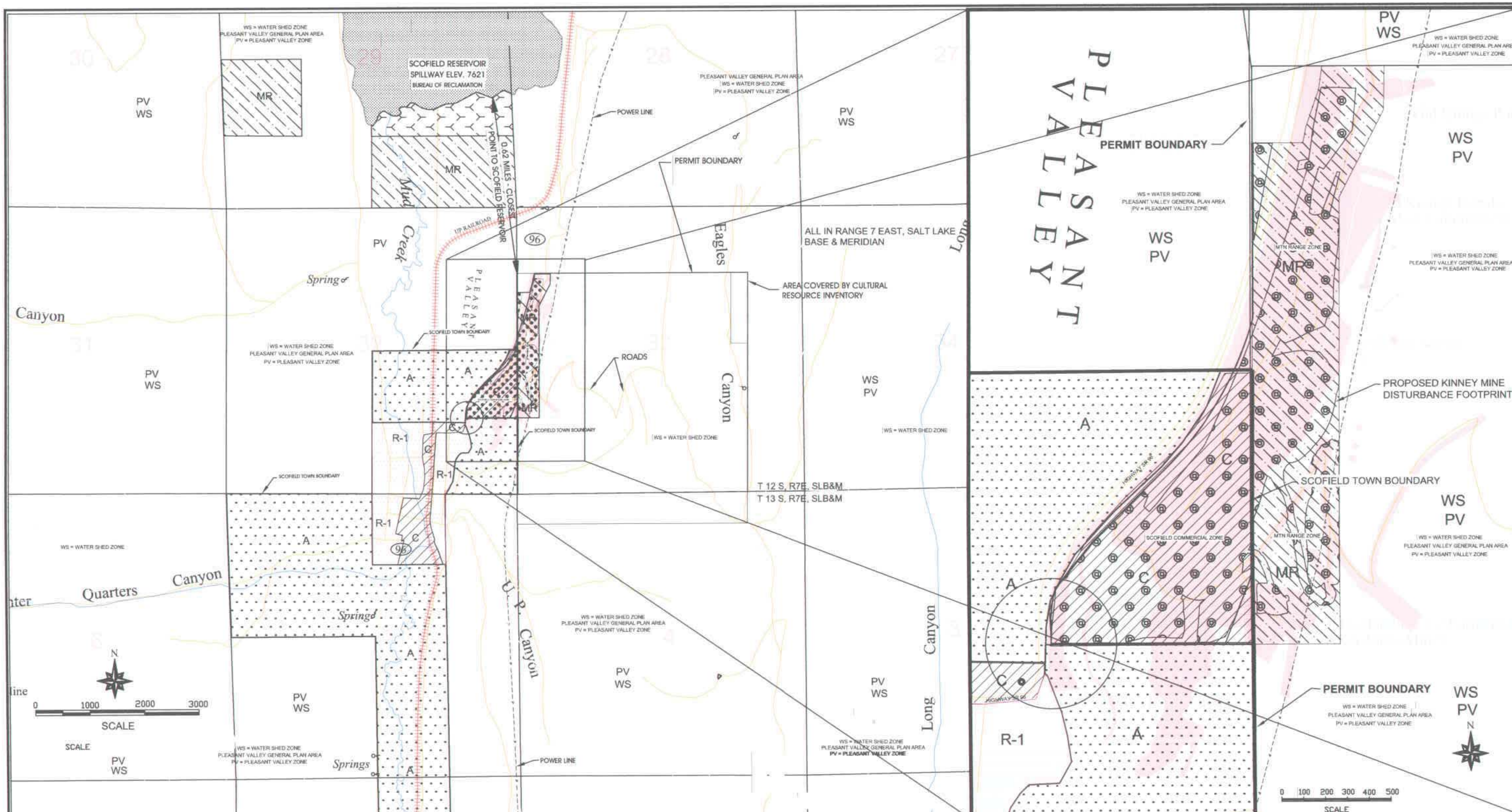
Title: MAYOR

Agreed to by Carbon Resources, LLC:

By: CLAY WISDOM
(Print)

Signature: [signature] Date: 2-16-09

Title: CFO



LEGEND

LEGISLATED ZONES

- CARBON COUNTY (SEE NOTE 4) PLEASANT VALLEY GENERAL PLAN AREA PV - PLEASANT VALLEY ZONE WS = WATER SHED ZONE ALL OF MAP EXCEPT AS SHOWN BELOW
- CARBON COUNTY MR = MOUNTAIN RANGE ZONE
- C - SCOFIELD COMMERCIAL ZONE
- A - SCOFIELD AGRICULTURAL ZONE
- R-1 - SCOFIELD RESIDENTIAL ZONE

LAND DESIGNATIONS

- PRE-SMCRA MINING DISTURBANCE
- BOR = BUREAU OF RECLAMATION PROPERTY & SCOFIELD RESERVOIR
- BLM PROPERTY
- KINNEY MINE PROPOSED DISTURBANCE FOOTPRINT
- 300 FOOT RADIUS FROM PERMIT BOUNDARY WITH OCCUPIED DWELLING

NOTES

1. PERMIT BOUNDARY AREA COVERED BY CULTURAL RESOURCE INVENTORY.
2. CONTOUR INTERVAL 200 FT.
3. REFER TO PERMIT TEXT FOR ZONE DEFINITIONS.
4. THE ENTIRE MAP AREA IS INCLUDED IN THE CARBON COUNTY PLEASANT VALLEY GENERAL PLAN AREA, AND THE PLEASANT VALLEY ZONE. THE ENTIRE MAP IS INCLUDED IN THE CARBON COUNTY WATER SHED ZONE UNLESS SHOWN BY A HATCH PATTERN AS SHOWN IN THE LEGEND. SEE PERMIT TEXT, CHAPTER 4, R645-301-411.130.

This map is in the Kinney Coordinate System (KCS). It was projected from State Plane NAD83 to a vertical datum of 8,000 ft. using a Combined Factor (CF) of 1.0047927. To project back, add 7,000,000 to Northing and 1,700,000 to Easting, then divide by the CF.

NO.	REVISION	DATE	BY	CHKD
8				
7				
6				
5				
4				
3				
2				
1	REVISED LAYOUT	1/09	B.G.	G.H.

Carbon Resources LLC

KINNEY NO. 2 MINE
MAP 4
REGIONAL
LAND USE MAP

DRAWN BY: B.G. DATE: 9/10
APPROVED BY: G.H. DATE: 9/10

Carbon Resources P.O. Box 954 Sedla Park, NM 87047