



GARY R. HERBERT  
Governor

SPENCER J. COX  
Lieutenant Governor

# State of Utah

## DEPARTMENT OF NATURAL RESOURCES

MICHAEL R. STYLER  
Executive Director

### Division of Oil, Gas and Mining

JOHN R. BAZA  
Division Director

February 13, 2017

Nicole Caveny, Utah Federal Lands Coordinator  
Office of Surface Mining Reclamation and Enforcement  
Western Region  
1999 Broadway, Suite 3320  
Denver, Colorado 80202

Re: Decision Document, Flat Canyon Lease Addition, Skyline Mine, Canyon Fuel Company, LLC, C/007/0005, Task ID #5017

Dear Ms. Caveny,

The Division has completed our Decision Document for the Flat Canyon Lease Addition project at the Skyline Mine. Two copies of the entire package are enclosed as per your request. The package consists of the Decision Document, the Revised Permit with conditions, our Technical Analysis, the CHIA, our Findings, a Location Map, the Affidavits of Publication, the 510 C clearance, and copies of correspondence with various entities. The Division believes that the application is complete and accurate and is ready for federal mine plan approval.

This completes our portion of the process and we are forwarding this for your use in completing the NEPA and Secretarial approval portions of the mine plan approval. As you know the company is anxious to proceed into this new lease. Your prompt review and processing is requested. Please call me at (801) 538-5325 if there is any other information that you require.

Sincerely,

Daron R. Haddock  
Coal Program Manager

#### Enclosure

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Flat Canyon Lease Addition  
Canyon Fuel Company, LLC  
Skyline Mine  
C/007/0005  
Carbon County, Utah

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# DECISION DOCUMENT

Flat Canyon Lease Addition  
Canyon Fuel Company, LLC  
Skyline Mine  
C/007/0005  
Carbon County, Utah  
February 10, 2017

## **ACTION**

The permittee has applied to add the Flat Canyon Lease to the existing permit.

## **BACKGROUND**

The Skyline Mine is located in Carbon and Emery Counties, approximately five miles southwest of Scofield, Utah and 18 miles west of Helper, Utah. Canyon Fuel Company has operated the Skyline Mine since 1981 under Utah DOGM permit C0070005. Since that time, Skyline Mine has operated an underground mine on leasehold interests of approximately 10,733 acres and mined almost 100 million tons of coal. The existing mine facilities total approximately 125 acres of surface disturbance. Coal is primarily shipped by rail to industrial customers and power plants. Mining methods include both continuous miner and longwall panel extraction.

Canyon Fuel Company submitted a modification to their mine plan on October 13, 2015 for the inclusion of Flat Canyon Federal Coal Lease Tract UTU-77114 into their existing SMCRA permit. The Flat Canyon Coal Lease encompasses approximately 2,692 acres of federal coal reserves of the Wasatch Plateau Coal Field on National Forest system lands within the Manti-La Sal National Forest. The Flat Canyon lease is located in Sanpete County just west of the existing mine. Including this lease will extend the life of the Skyline Mine, by approximately 9 to 12 years.

The Flat Canyon lease contains a probable maximum of 42 million tons of mineable coal. This mining plan modification would authorize mining activities to produce up to 8 million tons per year of coal. However, it is anticipated that the mine would likely produce 3 to 4.5 million tons per year, which has been their general range of production over the past 10 years.

## **CHRONOLOGY FOR FLAT CANYON LEASE ADDITION**

October 13, 2015	Canyon Fuel Company, LLC submits an application to the Division for the Flat Canyon Lease Addition.
October 13, 2015	The Office of Surface Mining sends notification that an Environmental Assessment will be prepared.

November 20, 2015	The Division determines the application to be Administratively Complete.
November 23, 2015	The Division notifies state, federal and local planning agencies, (including Emery and Carbon counties) of the complete application and soliciting their comments.
January 29, 2016	Huntington-Cleveland Irrigation Company requests conference
February 9, 16, 23 and March 1, 2016	Publicized in the Sun Advocate and Emery County Progress for four consecutive weeks.
February 11, 18, 25 And March 3, 2016	Publicized in the Sanpete News for four consecutive weeks.
February 22, 2016	The Division requests additional information from Canyon Fuel Company, LLC
March 25, 2016	Huntington-Cleveland Irrigation Company submits revised comments to the Division
July 28, 2016	The Division holds a hearing with HCIC regarding their concerns about the lease addition. Parties were allowed an additional 7 days to make further comments after the hearing, but no comments were received.
September 2, 2016	Canyon Fuel Company, LLC submits a revised application to the Division
September 28, 2016	The Division notifies Sanpete County local agencies of the complete application and soliciting their comments.
January 5, 2017	The Division requests additional information from Canyon Fuel Company, LLC
January 10, 2017	Canyon Fuel Company, LLC submits a revised application to the Division
February 1, 2017	AVS Check completed with issue recommendation.
February 3, 2017	The Technical Analysis is completed.
February 3, 2017	The CHIA is completed.
February 10, 2017	Forest Service submits consent letter with one condition. The Decision Document is completed and application is approved.

## **ANALYSIS**

The Division of Oil, Gas and Mining has conducted an Administrative and Technical Analysis of the proposed Flat Canyon Lease addition and has produced a written TA. All appropriate State and Federal agencies have been consulted regarding this proposal. The Office of Surface Mining concluded that this action constituted a Federal Mine Plan Modification which requires approval by the Assistant Secretary of the Interior. A condition has been added to the permit which requires federal mine plan approval to be issued prior to Canyon Fuel Company, LLC being able to mine in the Flat Canyon Lease. OSM also concluded that a revised EA would be necessary. This EA is currently being developed and will become part of the Federal Mine Plan decision. The Manti Lasal National forest has been consulted and has provided their concurrence letter with one condition. That condition has been added to the Permit. See letter dated February 10, 2017. All requirements for public participation have been satisfied.

During the comment period, the Division received comments and a request for a hearing from the law firm of Smith Hartvigsen representing the Huntington Cleveland Irrigation Company. A hearing was held in Price, Utah on July 28, 2016 where Attorney Craig Smith presented the concerns of HCIC. He made it clear that HCIC did not oppose mining in the Flat Canyon addition, but they were concerned that the proposed mining activities could have an adverse impact to their water resources and wanted them protected. The Division explained the review process and assured HCIC that their concerns would be considered throughout.

Canyon Fuel Company was also given the opportunity to explain their plans and describe how the resources would be protected.

At the conclusion of the hearing, it was determined that the Division would make sure the mine plan had provided for the protection of the water resources. All parties were given an additional 7 days to provide any further comments. No other comments were received. The Division considered the comments of HCIC and concluded that additional analysis was needed.

An independent contractor (Loughlin Associates) was hired to conduct a review of the existing reports and the water monitoring proposed by the Company. Their report concluded that there was no evidence linking the mining in the Skyline mine to perceived impacts in Electric Lake and the Huntington Creek Drainage. The Division has also completed a Cumulative Hydrologic Impact Analysis which has determined that the proposed coal mining and reclamation operations have been designed to prevent material damage to the hydrologic balance outside the permit area.

The application meets the requirements of the Utah Coal Regulatory Program.

## **RECOMMENDATION**

It is recommended that approval be given for the addition of the Flat Canyon Lease.

FEDERAL

April 30, 2012  
Revised February 10, 2017

**PERMIT  
C/007/0005**

**STATE OF UTAH  
DEPARTMENT OF NATURAL RESOURCES  
DIVISION OF OIL, GAS AND MINING  
1594 West North Temple  
Box 145801  
Salt Lake City, Utah 84114-5801  
(801) 538-5340**

This permit, C/007/0005, is issued for the state of Utah by the Utah Division of Oil, Gas and Mining (DOGM) to:

**Canyon Fuel Company, LLC  
225 North 5<sup>th</sup> Street, Suite 900  
Grand Junction, Colorado 81501**

for the Skyline Mine. Canyon Fuel Company, LLC is the lessee of federal, state and fee-owned property. A performance bond is filed with the DOGM in the amount of \$5,799,000, payable to the state of Utah, Division of Oil, Gas and Mining and the Office of Surface Mining Reclamation and Enforcement (OSMRE). DOGM must receive a copy of this permit signed and dated by the permittee.

**Sec. 1 STATUTES AND REGULATIONS** - This permit is issued pursuant to the Utah Coal Mining and Reclamation Act of 1979, Utah Code Annotated (UCA) 40-10-1 et seq, hereafter referred to as the Act.

**Sec. 2 PERMIT AREA** - The permittee is authorized to conduct surface disturbing activities only as described in the approved Mining and Reclamation Plan and within areas covered by the Performance Bond which are within the described permit area at the Skyline Mine situated in the state of Utah, Carbon County, and located as follows:

**Township 12 South, Range 6 East, SLBM**

Section 26: Portions of SW1/4SW1/4

Section 34: Portions of NE1/4NE1/4

**Township 12 South, Range 7 East, SLBM**

Section 32: Portion SE1/4SE1/4

**Township 13 South, Range 6 East, SLBM**

Section 1: Portions of S1/2NW1/4, S1/2NE1/4,

Section 13: Portions of SW1/4, S1/2SE1/4

Section 23: Portions of E1/2NE1/4,

Section 24: Portions of W1/2, NE1/4,

Section 25: Portions of S1/2S1/2,  
Section 26: Portions of NW1/4NE1/4, N1/2NW1/4, SW1/4NW1/4  
Section 27: Portions of the S1/2NE1/4, S1/2NW1/4  
Section 35: Portions of NE1/4, S1/2,  
Section 36: Portions of N1/2NW1/4

**Township 13 South, Range 7 East, SLBM**

Section 4: Portions of S1/2NW1/4, NW1/4SW1/4,  
Section 5: Portions of E1/2NE1/4,  
Section 6: Portions of S1/2N1/2,  
Section 17: Portions of S1/2S1/2,  
Section 18: Portions of S1/2S1/2,  
Section 19: Portions of N1/2N1/2

**Township 14 South, Range 6 East, SLBM**

Section 2: Portions of W1/2NW1/4,  
Section 3: Portions of SE1/4NE1/4

This legal description is for the permit area of the Skyline Mine included in the mining and reclamation plan on file at the Division as shown on Drawing 1.6-3 Skyline Mines Permit Area.

**Sec. 3 AUTHORIZED MINING AREA** - The permittee is authorized to conduct underground coal mining and reclamation activities only as described in the approved Mining and Reclamation Plan and on lands where the "Right-of-Entry" has been acquired. This area includes the area above underground works and areas subject to subsidence and is described as follows:

**Township 12 South, Range 6 East, SLBM**

Section 25: SE1/4NE1/4, S1/2SE1/4, lots 3 and 4, SW1/4NE1/4,  
W1/2SE1/4, SW1/4  
Section 26: S1/2SE1/4, SE1/4SW1/4, lots 1-4, N1/2S1/2, SW1/4SW1/4  
Section 34: Portions of S1/2N1/2, S1/2, NE1/4NE1/4  
Section 35: All  
Section 36: W1/2, N1/2NE1/4, SW1/4NE1/4, NW1/4SE1/4, N1/2NE1/4

**Township 12 South, Range 7 East, SLBM**

Section 32: Portions of SE1/4SE1/4,

**Township 13 South, Range 6 East, SLBM**

Section 1: W1/2, portions of S1/2NE1/4  
Section 2: All,  
Section 3: All,  
Section 10: All,

Section 11: All,  
Section 12: W1/2SW1/4, W1/2NW1/4, NE1/4NW1/4,  
Section 13: W1/2, portions of S1/2SE1/4,  
Section 14: All,  
Section 15: E1/2NE1/4  
Section 21: lots 1-4, E1/2E1/2  
Section 22: All,  
Section 23: W1/2, NE1/4, W1/2SE1/4,  
Section 24: NW1/4, Portions of NE1/4,  
Section 25: Portions of SE1/4SW1/4,  
Section 26: W1/2, W1/2E1/2,  
Section 27: All,  
Section 28: lots 1-8, S1/2NW1/4, SW1/4  
Section 33: E1/2, E1/2W1/2, NW1/4NW1/4, SW1/4SW1/4  
Section 34: All,  
Section 35: All  
Section 36: Portions of N1/2NW1/4

**Township 13 South, Range 7 East, SLBM**

Section 4: Portions of W1/2,  
Section 5: Portions of NE1/4,  
Section 6: Portions of S1/2N1/2  
Section 17: Portions of S1/2S1/2  
Section 18: Portions of S1/2S1/2  
Section 19: Portions of N1/2NW

**Township 14 South, Range 6 East, SLBM**

Section 2: Portions of W1/2NW1/4  
Section 3: Portions of E1/2NE1/4  
Section 4: lots 1-4, S1/2N1/2, S1/2  
Section 5: lots 1-4, S1/2N1/2, S1/2

This legal description is for the authorized mining area of the Skyline Mine. The permittee is authorized to conduct coal mining and reclamation operations connected with mining on the foregoing described property subject to the conditions of the leases, the approved mining plan, including all conditions and all other applicable conditions, laws and regulations.

**Sec. 4 COMPLIANCE** - The permittee will comply with the terms and conditions of the permit, all applicable performance standards and requirements of the State Program.

**Sec. 5 PERMIT TERM** - This permit expires on April 30, 2017.

**Sec. 6 ASSIGNMENT OF PERMIT RIGHTS** - The permit rights may not be transferred, assigned or sold without the approval of the Director, DOGM. Transfer, assignment or sale of permit rights must be done in accordance with applicable regulations, including but not limited to 30 CFR 740.13(e) and R645-303.

**Sec. 7 RIGHT OF ENTRY** - The permittee shall allow the authorized representative of the DOGM, including but not limited to inspectors, and representatives of OSMRE, without advance notice or a search warrant, upon presentation of appropriate credentials, and without delay to:

- A. have the rights of entry provided for in 30 CFR 840.12, R645-400-110, 30 CFR 842.13 and R645-400-220; and,
- B. be accompanied by private persons for the purpose of conducting an inspection in accordance with R645-400-100 and 30 CFR 842, when the inspection is in response to an alleged violation reported by the private person.

**Sec. 8 SCOPE OF OPERATIONS** - The permittee shall conduct surface disturbing activities only on those lands specifically designated as within the permit area (in section 2 above) on the maps submitted in the mining and reclamation plan and permit application and approved for the term of the permit and which are subject to the performance bond. All coal mining and reclamation operations are to be conducted within the bounds of the authorized mining area.

**Sec. 9 ENVIRONMENTAL IMPACTS** - The permittee shall minimize any adverse impact to the environment or public health and safety through but not limited to:

- A. accelerated monitoring to determine the nature and extent of noncompliance and the results of the noncompliance;
- B. immediate implementation of measures necessary to comply; and
- C. warning, as soon as possible after learning of such noncompliance, any person whose health and safety is in imminent danger due to the noncompliance.

**Sec. 10 DISPOSAL OF POLLUTANTS** - The permittee shall dispose of solids, sludge, filter backwash or pollutants in the course of treatment or control of waters or emissions to the air in the manner required by the approved Utah State Program and the Federal Lands Program which prevents violation of any applicable state or federal law.

**Sec. 11 CONDUCT OF OPERATIONS** - The permittee shall conduct its operations:

- A. in accordance with the terms of the permit to prevent significant, imminent environmental harm to the health and safety of the public; and

B. utilizing methods specified as conditions of the permit by DOGM in approving alternative methods of compliance with the performance standards of the Act, the approved Utah State Program and the Federal Lands Program.

**Sec. 12 EXISTING STRUCTURES** - As applicable, the permittee will comply with R645-301 and R645-302 for compliance, modification, or abandonment of existing structures.

**Sec. 13 RECLAMATION FEE PAYMENT** - The permittee shall pay all reclamation fees required by 30 CFR part 870 for coal produced under the permit, for sale, transfer or use.

**Sec. 14 AUTHORIZED AGENT** - The permittee shall provide the names, addresses and telephone numbers of persons responsible for operations under the permit to whom notices and orders are to be delivered.

**Sec. 15 COMPLIANCE WITH OTHER LAWS** - The permittee shall comply with the provisions of the Water Pollution Control Act (33 USC 1151 et seq.) and the Clean Air Act (42 USC 7401 et seq), UCA 26-11-1 et seq, and UCA 26-13-1 et seq.

**Sec. 16 PERMIT RENEWAL** - Upon expiration, this permit may be renewed for areas within the boundaries of the existing permit in accordance with the Act, the approved Utah State Program and the Federal Lands Program.

**Sec. 17 CULTURAL RESOURCES** - If during the course of mining operations, previously unidentified cultural resources are discovered, the permittee shall ensure that the site(s) is not disturbed and shall notify DOGM. DOGM, after coordination with OSMRE, shall inform the permittee of necessary actions required. The permittee shall implement the mitigation measures required by DOGM within the time frame specified by DOGM.

**Sec. 18 APPEALS** - The permittee shall have the right to appeal as provided for under R645-300.

**Sec. 19 SPECIAL CONDITIONS** - There are special conditions associated with this permitting action attached as Attachment A.

The above conditions (Secs. 1-19) are also imposed upon the permittee's agents and employees. The failure or refusal of any of these persons to comply with these conditions shall be deemed a failure of the permittee to comply with the terms of this permit and the lease. The permittee shall require his agents, contractors and subcontractors involved in activities concerning this permit to include these conditions in the contracts between and among them. These conditions may be revised or amended, in writing, by the mutual consent of DOGM and the permittee at any time to adjust to changed conditions or to correct an oversight. DOGM may amend these conditions at any time without the consent of the permittee in order to make them consistent with any new federal or state statutes and any new regulations.

**THE STATE OF UTAH**

By: J. R. By

Date: 2/10/2017

I certify that I have read, understand and accept the requirements of this permit and any special conditions attached.

\_\_\_\_\_  
**Authorized Representative of the Permittee**

Date: \_\_\_\_\_

**ATTACHMENT A**  
**Special Conditions**  
**C/007/0005**  
**February 10, 2017**

- 1) Canyon Fuel Company, LLC must submit water quality data for the Skyline Mine in an electronic format through the Electronic Data Input web site, <http://linux1.ogm.utah.gov/cgi-bin/appx-ogm.cgi>
- 2) Canyon Fuel Company, LLC must submit cumulative monthly flow data for discharges into Electric Lake and Eccles Creek. This monthly data must be submitted in the first week of the following month.
- 3) Canyon Fuel Company, LLC must receive federal mine approval from the Secretary of the Interior and concurrence from the Office of Surface Mining. Mining is not authorized in the Flat Canyon Lease until the Mine Plan has been signed by the Assistant Secretary of the Interior.
- 4) To protect sage-grouse habitat, Canyon Fuel, LLC must locate new appurtenant surface facilities outside priority habitat management areas, unless no technically feasible alternative exists. If new appurtenant surface facilities cannot be located outside of priority habitat management areas, locate them within any existing disturbed areas, if possible. If location within an existing disturbed area is not possible, then construct new facilities to minimize disturbed areas while meeting mine safety standards and requirements in the established mine-plan approval process and locate the facilities in an area least harmful to greater sage-grouse habitat based on vegetation, topography, or other habitat features.



## Technical Analysis and Findings

### Utah Coal Regulatory Program

February 3, 2017

**PID:** C0070005  
**TaskID:** 5017  
**Mine Name:** SKYLINE MINE  
**Title:** FLAT CANYON LEASE ADDITION

#### General Contents

#### Violation Information

*Analysis:*

The minimum requirements for R645-301-113 were not met.

An AVS evaluation was generated on 10/18/2016. Three outstanding violations are listed. Violation #833-9006 Bowie Refined Coal LLC, Violation #C61014-P004/1 BRC Chinook LLC, Violation #C61014-P004/2 BRC Chinook LLC, linking entities are Rickmeier Advisors Inc.

Any outstanding violations in the Applicant Violator System must be settled prior to permit issuance.

An AVS evaluation was generated on 2/1/17. All violations are under settlement. No outstanding violations exist.

ssteab

#### Identification of Interest

*Analysis:*

The minimum requirements of R645-301-112 were met.

The Division performed a cross check with the Applicant Violator System and the MRP General Chapter 1, Appendix 1-1 Organizational Officers and Directors. No errors in the ownership and control information were identified.

ssteab

#### Right of Entry

*Analysis:*

The application meets the requirements of R645-301-114, Right of Entry for federal coal. Federal coal lease UTU-77114 gives Canyon Fuel Company, LLC right of entry to 2,692.16 acres, for twenty years, effective July 1, 2015. The leased lands are in T. 13 S., R. 6 E.: Sec 21, 28, and 33 and T. 14 S., R. 6 E.: Sec 4 and Sec 5, all within Sanpete County (Chap 1, p. 1-32). Importantly, the BLM ROD Attachment 2/Stipulation #22 requirement to provide plans for prevention of subsidence "prior to mining on the lease" was modified in the language of Lease UTU-71114 issued July 31, 2015 to read, "Prior to development of panels that would cause subsidence of" Boulger Reservoir or the Flat Canyon campground (Stipulations #25 and #26). A copy of the lease, with the precise legal description of the lands within the lease is found in App.118-A.

The application meets the requirements of R645-301-114 for 347 acres of fee coal which is included in the public notice for the application. In accordance with R645-301-521.141, Canyon Fuel Co., LLC. has stated an interest in an adjacent fee coal lease from the Collard Family Trust located in T. 13 S., R. 6 E.: NW1/4NW1/4 Sec 20 and N1/2 Sec 29 (Chap. 1 p. 1-24 and Plate 1.6-2 Mineral Ownership). This lease is included in the current mining plan described by Table 1.114 and documented in App. 118A.

pburton

## Legal Description

### Analysis:

#### Analysis:

The application meets the requirements R645-103-220, suitability and R645-301-521, legal description.

In accordance with R645-103-220, the area was determined suitable for underground mining by the BLM subject the stipulations listed in the BLM Record of Decision Attachment #2 and subject to the consent by the USFS. (Refer to BLM Record of Decision Federal Lease Sale Offering: Flat Canyon Coal Tract (UTU-77114), April 11, 2002). The BLM's stipulations require single seam mining (unless the USFS approves multiple seam mining), backfilling of all portals, a plan for mining under Boulger Reservoir, a plan for the Flat Canyon Campground two years prior, monitoring the gradient of the perennial streams within the lease (Boulger Creek, Swens Creek, Little Swens Creek and Flat Canyon Creek), and notification of any seismic events that trigger a Richter scale reading in excess of 3.0. These stipulations were included with the Coal Lease at issuance, although the numbering is different.

In accordance with R645-301-521, the application gives the legal description of the leased lands which is T. 13 S., R. 6 E.: Sec 21, 28, and 33 and T. 14 S., R. 6 E.: Sec 4 and Sec 5, all within Sanpete County (Chap 1, p. 1-32). A copy of the lease, with the precise legal description of the lands within the lease is found in App.118-A.

Both the Bureau of Land Management (BLM) and the U.S. Forest Service (USFS) recognize the fragile renewable resource lands within the Flat Canyon Lease. Each agency mentions the extreme importance of protecting the perennial streams, and the Boulger Dam and Reservoir from subsidence.

The USFS in their Record of Decision (ROD) agreed to the Selected Alternative to limit subsidence that would occur beneath perennial streams, under Boulger Dam and Reservoir, beneath State Route 264, and beneath the Flat Canyon Campground on National Forest Lands (The Decision. In. Record Of Decision FEIS Flat Canyon Lease Tract UTU -77114, USFS, 2002.). Special Coal Lease Stipulations Attachment 1 outlines the requirements for mining the Flat Canyon lease. The USFS Record of Decision (ROD) also requires incorporation into the Mining and Reclamation Plan, the monitoring and mitigation measures specified in Attachment 2 of the ROD. These USFS stipulations were also repeated in the coal lease.

R645-103-223, The Office of Surface Mining is currently in the process of preparing an Environmental Assessment relative to the Flat Canyon Lease. The Division is a cooperating agency in that process. The public notice for that EA was published in the Emery County Progress October 13 and 27, 2015. The comment period ended in mid-November, 2015. The EA has not yet been published. Therefore, federal mine plan modification approval is pending, and is required prior to permit issuance.

In accordance with R645-301-112.800, an interest in adjacent fee coal is stated in Chap. 1, p. 1-24.

pburton

## Permit Term

### Analysis:

#### Analysis:

The application meets the requirements of R645-301-116 Permit Term and R645-300-154, Right of Renewal. The five year permit issued October 22, 2013 was revised October 9, 2015 to include the North of Graben pad and shaft. The permit term expires on April 30, 2017. The Flat Canyon lease would extend the life of mine by 9 - 12 years (Incoming document 10132015a.5017 and Section 3.3)).

pburton

## Public Notice and Comment

### Analysis:

#### Analysis:

The affidavit of public notice filed in Appendix 118A of the application meets the requirements of R645-301-121, Filing and

public notice. The public notice was published in The Progress (Emery County), and the Sanpete newspaper, and in the Sun Advocate (Carbon County). (The lease is not within Carbon County however.) An affidavit of the public notice from all three papers will be provided with the application.

R645-301-525.700, Public Notice of Proposed Mining. Upon approval, the Permittee will send notification to surface owners prior to mining (i.e. such as the drafts provided in App 118A). The notice will be sent to the appropriate Sanpete County and Emery County water conservancy districts and the Huntington Cleveland Irrigation Company, surface landowners, and the Utah Department of Transportation.

pburton

## Identification of Interest

### Analysis:

#### Analysis:

There has been no change to the information on file with the Division, which meets the requirements of R645-301-112, Identification of Interests. The corporate ownership is filed in a "General Chapter 1" volume for all the Bowie Mines, last updated January 2015. The applicant is Canyon Fuel Co., LLC. Canyon Fuels address is listed in Chapter 1 of the MRP. Canyon Fuel Co. LLC is owned by Bowie Resource Holdings, LLC. and Bowie Resource Partners, LLC. both with corporate offices in Louisville, Kentucky. Ultimate ownership of the above companies is by Galena US Holdings Inc and Cedars Energy, LLC. both Galena US Holdings Inc and Cedars Energy LLC are in turn controlled by individuals and corporate entities. The ownership tree is illustrated on Figure 1-1 of General Chapter 1. The list of officers and directors for Canyon Fuel Co., LLC and all its owners is found in Appendix 1-1 of General Chapter 1, which remains unchanged since 2013. The Resident Agent is Eugene DiClaudio. He is also responsible for the AML fee payment.

The application meets the requirements of R645-301-112.500 and R645-301-112.600, surface and mineral ownership, because a copy of lease UTU-77114 issued to Canyon Fuel Company, LLC effective July 1, 2015 was provided. The lease encompasses 2,692.16 acres of federal coal (BLM) with the USFS as the surface managing agency. Both federal agencies have placed stipulations on the lease issuance.

Surface land ownership of leased areas and contiguous areas is shown on Dwg 1.6-1. Mineral ownership is shown on Dwg 1.6-2. Mineral and surface ownership was updated with this application, as outlined in Section 112.600 of the MRP.

pburton

## Violation Information

### Analysis:

#### Analysis:

The application meets the requirements of R645-301-113, violations, which requires that the applicant provide a list of all violation notices received by the applicant during a three year period preceding the application date. Section 113 and Table 1-2 of General Chapter 1 provide information on violations at Canyon Fuel Co., LLC mines and mines controlled by the owners of Canyon Fuel Co, LLC. This table was updated on October 5, 2015.

pburton

## Reporting of Technical Data

### Analysis:

The application meets the requirements of R645-301-130, Reporting of Technical Data, because, the application contains the following reports.

#### Appendix A-1 Vol. 2.:

Results of the 2015 Geomorphic Evaluation of Eccles Creek. Earthfax Engineering Group, LLC., (SLC UT) October 2015.  
Lease UTU-77114 Baseline Water Quality data of Proposed Additional Water Monitoring Sites Field and Lab Data (SW33-268, SW32-277, SW4-429, SW4-173, CS-30, CS-29, CS-28, CS-27, CS-31, SWS-590). SGS North America Inc., Minerals Services Division, Huntington, Utah. October 13, 2014 through September 15, 2015.

#### Appendix A-2 Vol. 2:

Western (Boreal) Toad Survey. Alpine Ecological, Allan R. Stevens, PhD (Greenwich, UT) Aug. 29, 2014.  
Prime Farmland Determination – NRCS, Joseph Dyer (Price UT). June 2014.  
USFWLS Species by County Review, Alpine Ecological, October 2015  
Vegetative Analysis of Seven Proposed Drill Sites and Seven Reference Sites. Alpine Ecological, August 2015.  
Subsidence Area Vegetative Monitoring Protocol. Alpine Ecological, October 2015.

**Appendix A-3, Vol. 2:**

Southwest Reserve Roof, Coal and Floor analysis ( 95-21-1, 95-28-1, 98-3-2C), Commercial Testing and Engineering, (Denver, CO) 1995 - 1999. Analysis of hole 99-3-1 was completed by Standard Laboratories, Casper WY.  
Southwest Reserves NEPA Analysis Area, 2011, Northern Goshawk, other Raptors and General wildlife Surveys. Western Land Services Inc. (Richfield, UT) 09.10.2011.  
Southwest Reserves NEPA Analysis Area, 2012, Northern Goshawk, other Raptors and General Wildlife Surveys. Western Land Services Inc. (Richfield, UT) 08.06.12.

**Appendix A-4, Vol. 2:**

Flat Canyon Lease Tract Final EIS, January 2002, jointly produced by USFS and BLM.  
Flat Canyon Record of Decision based on the Final Environmental Impact Statement for the Flat Canyon Lease Tract (UTU-77114). 2002, Manti-La Sal National Forest, Ferron-Price Ranger District.

**Appendix A-4, Confidential File:**

SHPO concurrence; Hopi Tribe concurrence; EPG email; NRHP site 42Sp445 map

**Appendix N and O, Vol 2:**

PHC Addendum Appendix N: Peterson Hydrologic (SLC, UT). Aug. 13, 2014. Investigation of Groundwater and Surface-Water Systems In the Flat Canyon Tract and Adjacent Area: Probable Hydrologic Consequences of Coal Mining in the Flat Canyon Tract, Sanpete County, Utah.  
PHC Addendum Appendix O: Peterson Hydrologic.(SLC, UT) Aug. 18, 2104. Groundwater Conditions in the Star Point Sandstone In the Vicinity of the Skyline Mine, 2014.

pburton

**Permit Application Format and Contents**

*Analysis:*

**Analysis:**

The application meets the requirements of R645-301-121 to contain current information and to be clear and concise with regards to the required timing and collection of baseline data for undermining Boulger Reservoir and Flat Canyon. While single seam mining beneath Boulger Reservoir and Flat Canyon campground is currently approved by the BLM lease Record of Decision, the Permittee specifies that neither Boulger Reservoir or Flat Canyon campground is currently proposed for undermining.

As discussed on page 3-6a, baseline data will be collected and a permitting action will occur prior to single seam undermining of Boulger Reservoir and the Flat Canyon Campground. And subsidence data required for mining two seams will also be collected as required by BLM permit (2002 BLM Record of Decision Stipulation #10 and Attachment #2 Supplement to Stipulation #9).

Monitoring well 15-21-2 was recently drilled as discussed in Section 2.2 and Section 2.3. Roof and floor analysis of 15-21-2 are included in Appendix A-3. Well 15-21-2 is within 0.5 miles of well 99-21-1, as shown on Dwg 2.3.6-1, Location of Hydrologic Monitoring Stations.

pburton

**Permit Application Format and Contents**

*Analysis:*

The amendment meets the State of Utah R645 requirements for Clear and Concise.

The water monitoring program map has been updated to clearly display active water monitoring sites, discontinued sites, and abandoned wells. Sites that are not monitored or where wells have been blocked have been removed from the water monitoring program. The water monitoring Drawing 2.3.6-1 clearly coincides with the water monitoring Table 2.3.7-1.

The water monitoring program map includes a reference in the bottom right referring the reader to Plate 1.6-3 identifying up to date lease boundaries. Lease boundaries with their respective lease names were not added to Drawing 2.3.6-1 in an effort to simplify future map updates.

The mine workings map in Appendix P Figure 9 is updated to show the current mine working plan. The map shows Boulger reservoir will not be undermined.

## Reporting of Technical Data

### Analysis:

The amendment meets the State of Utah R645 requirements for Reporting of Technical Data.

The amendment adequately reports all well information for all abandoned, discontinued, existing, and future wells within and adjacent to the current permit area and the proposed permit area. This information is summarized at the end of the water monitoring database (page 2-39 in Section 2.3) in Table 2.3.7-4, 'Summary Information on Groundwater Observation Wells'.

kstorrrar

## Environmental Resource Information

### General

#### Analysis:

The amendment meets the State of Utah R645 requirements for general contents of maps and plans.

The amendment now meets the minimum requirements of R645-301-521 due to information stated the mine plan details, plates, and drawings to address the Federal stipulations. The mine plan also details mining operations outside the provided legal description of the mine boundary, as shown on Drawing 1.6-3 so a note was added declaring "Any project mining shown beyond existing lease boundary lines is subject to future lease modification and approvals."

Specific Federal stipulations regarding the mining operations around the Flat Canyon Campground are outlined in BLM ROD Federal Stipulation #9 and #23. BLM ROD Federal stipulations regarding the mining operations around the USFS dam Boulger Reservoir are detailed in Federal stipulation #22. Several of the federal stipulations outlined in the previous Findings have changed within the final Lease agreement on 7/31/2015. The lease agreements stipulates that the Permittee is restricted to single seam full extraction mining are approved for areas under Boulger Reservoir, SR-264, and the Flat Canyon Campground pending final approval of all other baseline information as the Permittee's mining approaches the area.

Additionally, the mine plan shown on Plate 3.1.8-2 details mining operations outside the legal description detailed on drawing 1.6-3 as well as in Chapter 1. Specifically, the mine plan shows operations outside of the mine boundary for T.13., S.R.6.E. Section 32 and T.14.S., R.6E., Section 6 and Section 3. A note was added declaring "Any project mining shown beyond existing lease boundary lines is subject to future lease modification and approvals."

The amendment includes updates to Chapter 2, 3, and 4 to include the updated lease acres of the Flat Canyon Lease. The appendix A-4 was added to Volume to that contains a copy of the EIS. The FEIS was reviewed by the BLM Price Field Office staff and found the report to be adequate and current laws, additional information, and changing circumstances are not considered significant.

cparker

### Permit Area

#### Analysis:

The amendment meets the State of Utah R645 requirements for general contents of maps and plans detailing the Permit Area.

The amendment now meets the minimum requirements of R645-301-521 by detailing the permit area on all relevant maps and plans. The mine plan shown on Plate 3.1.8-2 details mining operations outside the legal description detailed on Drawing 1.6-3 as well as in Chapter 1. Specifically the mine plan shows operations outside of the mine boundary in T.13., S.R.6.E. Section 32 and T.14.S., R.6E., Section 6 and Section 3. A note was added declaring "Any project mining shown beyond existing lease boundary lines is subject to future lease modification and approvals."

cparker

## Historic and Archeological Resource Information

*Analysis:*

The amendment meets the State of Utah R645-301-411 requirements for historic and archeological resource information.

Cultural and historical resources are described and evaluated Section 3.1.12 of the FEIS, which is included with the amendment. This meets the requirements of R645-301-411.140.

A map showing the locations of cultural or historical resources listed or eligible for listing within the flat canyon permit and adjacent area is provided pursuant to R645-301-411.141.

In letter dated March 23, 2016, UTSHPO concurred that mining in the Flat Canyon Lease area does not include any disturbance outside the original APE and therefore will have No Adverse Effect. This fulfills requirements of R645-301-411-142.

ireinhart

### **Climatological Resource Information**

*Analysis:*

The amendment meets the State of Utah R645 requirements for Climatological Resource Information.

Section 2.6 of the approved MRP contains a description of climatological conditions in the Skyline Mine area. This information applies to the Flat Canyon Lease area as well. The permittee also submitted information prepared by Petersen Hydrologic that includes a discussion of climatic condition in the Flat Canyon Lease area. Information provides average annual seasonal precipitation amounts, monthly average temperatures, and other general climatic information.

adaniels

### **Vegetation Resource Information**

*Analysis:*

The amendment meets the State of Utah R645-301-321 requirements for vegetation resource information.

The vegetation across the project area is very diverse and dependent on elevation, slope, and available water resources. Vegetation resources are summarized in subsection 2.7.10 on page 2-63a. Although not technically deficient, this section warrants complete restructure for clarity and consistency. The vegetation types and maps referenced and described in the EIS should be included in the MRP and not referenced.

ireinhart

### **Fish and Wildlife Resource Information**

*Analysis:*

The amendment meets the State of Utah R645-301-322 requirements for fish and wildlife information.

Several tributaries to Upper Huntington Creek and Mud Creek have the potential to be impacted from mining operations. Swens and Little Swens provide little habitat for fish due to shallow pools and riffles. As noted in the amendment, Boulger Creek provides higher quality fish habitat and as such will be monitored for fish populations.

Although not provided in the amendment, Section 2.9.7 references tables 2.9-1 through 2.9-7 for resource information. A review of the existing MRP reveals tables are as follows: 2.9-1 covers all mammals, 2.9-2 covers all amphibians, 2.9-3 covers all reptiles, Table 2.9-4 is the County list, Table 2.9-5 is the state list, Table 2.9-6 is the USFS Manti-La Sal list, Table 2.9-7 is the federal list. These lists adequately identify wildlife resources of the area.

There is adequate information contained in the U.S. Fish and Wildlife Service's Review prepared by Alpine Ecological to support TES resources. References to the EIS should be removed and references should be to the Alpine Ecological report to reduce confusion between different sources of information.

As noted in the 2014 survey for the Western toads, inventories were completed in riparian areas and streams in Little Swens, Swens, Flat Canyon, Boulger Creeks and Huntington Creek. An adequate map of the survey locations is provided

with the report. No Western toads were located during the surveys.

In July of 2011 and 2012, surveys for Northern Goshawk, other nesting raptors, and general wildlife inventories were completed by a qualified wildlife biologist. During the inventory biologists documented audible responses or visual detections of raptors, mostly from Red Tailed Hawks. Northern Goshawk nests were not located. While some habitat exists for the Bald Eagles (winter), Migratory birds, Flammulated Owl and the Three-toed Woodpecker, no sightings have been noted.

ireinhart

## Land Use Resource Information

### Analysis:

The amendment meets the State of Utah R645-301-411 requirements for land use information.

Section 2.12 discusses land use which is wildlife habitat, grazing, recreation, natural gas transmission and forestry. The MRP fully evaluates land use resources in more depth. Several grazing allotments are within the proposed mining area. Table 2.12.1-1 includes production measurements in AUM's. Allotments within the Flat Canyon lease area have been added to table 2.12.1-1. Boulger Reservoir and Flat Canyon Campground are also within the mining areas. With this permit amendment, the mine plan does not include undermining or subsiding either area and therefore there should be no impact. Plate 2.12.1-1 has been updated to include the additional permit area and associated grazing allotments.

ireinhart

## Alluvial Valley Floors

### Analysis:

The amendment meets the State of Utah R645 requirements for Alluvial Valley Floors.

Alluvial Valley Floors rules are not applicable due to the absence of identified alluvial valley floors in the Flat Canyon Lease Area.

adaniels

## Geologic Resource Information

### Analysis:

The applicant has met the minimum requirements for Geologic Resource Information. Labeling errors with Drawing 2.2.4-1D have now been corrected. The Drawing is correctly labeled as Drawing 2.3.4-1D  
Section 2.2 of Chapter 2 includes a discussion of the geology and geotechnical data for the Flat Canyon Area.

Appendix A-3 includes analysis of the roof, floor and coal samples. Figure 4 of the Petersen Hydrologic Report shows the generalized geology map of the Flat Canyon Area.

Dwgs 2.2.7-1 and 2.3.4-1D show the structural geology and the seam isopachs. Also shows the structural profile of the area which includes a fence diagram using 9 drill holes as correlation.  
The existing MRP discusses plans for casing and sealing drill holes. No changes have been proposed with this revision. Flat Canyon Lease has low potential for generating acid and toxicity from the mining of the coal. Within the lease, the merged Flat Canyon / Lower O'Connor A and Lower O'Connor B seams will be mined. Lab analysis from drill holes show the coal and surrounding rock to be consistent with the materials generated in Mines #1 and #2 located to the east and Mine #3 in the North Lease. Table 2.2.8-2 has been updated to illustrate the sulfur and acid-forming potential in the seams to be mined. Plate 2.3.4-1 D provides a fence diagram of the stratigraphy and the seams to be mined.  
The chemical and acid-base potential analysis of the roof, coal, floor of selected drill holes are provided in Appendix A-3. The analysis shows a very low potential for acid forming materials to be generated, with only one of the floor samples showing a -1.5 acid base potential and all other samples were a positive number. Locations for holes 95-21-1 , 95-28-1 , 99-33-1, and 98-3-2C are available on Plate 2.3.4-1 D; sites used in the fence diagram.

dhaddock

## Hydro Sampling and Analysis

*Analysis:*

The amendment meets the State of Utah R645 rules for Sampling and Analysis.

Methods used to conduct water sampling are described in the Peterson Hydrologic Investigation of Groundwater and Surface-Water Systems in the Flat Canyon Tract and Adjacent Areas report. Laboratory analysis of water samples were performed by SGS Laboratories and Chemtech Ford Laboratory. These labs are both NELAC certified. Any isotopic analysis done of water samples were conducted at the University of Miami, Florida, the BYU Department of Geology, and Geochron Laboratories of Cambridge, Massachusetts.

adaniels

## **Hydro Baseline Information**

*Analysis:*

The amendment meets the State of Utah R645 requirements for Baseline Information.

The Peterson Hydrologic report goes into detail describing the type of baseline monitoring that has taken place in the Flat Canyon Lease area. See the Hydro Ground Water Monitoring Plan section and the Hydro Surface Water Monitoring Plan sections for an in depth analysis and findings.

Table 1, attached to this analysis is a summary of baseline water monitoring that has been conducted by the Permittee throughout the Flat Canyon Lease Area. The sampling location names correspond with water monitoring maps provided in the Peterson Hydrologic PHC report for Flat Canyon (Figures 2).

Baseline monitoring information has included springs, streams and well locations. Sampling parameters for groundwater have included total dissolved solids (TDS), temperature, pH, total iron, and total manganese. Also include is flow rates of springs or water levels in groundwater wells. Sampling parameters for surface water sampling has included total suspended solids (TSS), temperature, pH, total iron and total manganese. Flow rates of streams have also been provided. All of this data has been provided and is located in both PHC Addendum Volume 2 & Appendix N & O, and Appendix A-1 of Volume 2 of the proposed amendment.

### **Groundwater Baseline Information:**

The Permittee has sampled 18 springs for baseline parameters throughout the Flat Canyon lease area. These springs issue from each geologic formation that is exposed within the lease. These formations include the Price River formation, the Castlegate formation, and the Blackhawk formation. The sampling of these springs can be found in more detail in Table 1, attached to this analysis. Some of these springs have average flow rates as high as 35 gpm and as low as about 1 gpm. By collecting from springs that discharge from each formation, as well as selecting some springs that have high discharge rates and some that have low discharge rates, we are able to get a wide view of spring activities and trends throughout the lease. Most of the springs located in the lease produce water with a low TDS value, in the range of about 72 - 272 mg/L.

There are at least four groundwater wells that have been drilled throughout the lease area. These wells are 99-4-1, 20-4-1, 20-28-1, and 99-21-1. Well 99-21-1 has had depth monitored since 2001, wells 99-4-1 and 20-28-1 have had depth monitored since 2002, and well 20-4-1 has had depth monitored since 2002 but became blocked in 2014. Well 15-21-1 was being drilled in 2015, but due to the water monitoring plate not being a part of this submission, and analysis of this well will not be included at this point. The four wells listed above are all completed within the Star Point formation aquifer below the coal seams to be mined. These wells have a potentiometric head 700 to 1000 feet above the coal seam. There are no known outcrops of the Star Point formation within the Flat Canyon lease. Refer to Plate 2.3.6-1 for well locations.

### **Surface Water Baseline Information:**

The Permittee has had 12 stream monitoring locations which they have been monitoring for baseline parameters. Little Swens Canyon stream is a perennial stream with monitoring locations CS-27 and CS-17 located above and below proposed mining. Swens Canyon Stream is perennial, with monitoring locations CS-28 and CS-16 located above and below proposed mining. Flat Canyon stream is perennial and has monitoring locations C-6 and C-4 located above and below proposed mining. Boulder Canyon stream is perennial and has stream monitoring locations CS-31 and CS-2 located above and below proposed mining. Stream monitoring location UPL-10 is located at the inlet to Electric Lake from Huntington Creek and Stream monitoring location CS-10 is located on Huntington Creek just outside of the north east point of the Flat Canyon lease. These monitoring locations can be found on Plate 2.3.6-1 of the MRP and baseline collection data is shown on Table 1, attached to this analysis.

## Hydro Baseline Information

### Analysis:

The amendment meets the State of Utah R645 requirements for Baseline Information.

The amendment includes a full Spring and Seep survey done within and adjacent to the Flat Canyon Lease area. The Mayo and Associates map and accompanying report with photographs for the survey are found in Appendix A-1 Hydrology.

kstorrar

## Hydro Baseline Cumulative Impact Area

### Analysis:

The amendment meets the State of Utah R645 rules for Baseline Cumulative Impact Area.

Petersen Hydrologic submitted a report, "Groundwater Condition in the Star Point Sandstone", separate from their baseline monitoring report. This report summarizes groundwater conditions around the Skyline Mine, specifically in the Star Point Sandstone formation. This report uses a number of studies, and data collected over the years in the vicinity of the Flat Canyon Lease.

There are also four monitoring wells located in the area of the Flat Canyon Lease that are completed in the regional Star Point Formation aquifer below the coal seams to be mined. These wells have a potentiometric surface ranging from 700 to 1000 feet above the coal seam. This has remained consistent since pumping began in the #2 mine in 2001.

There are many springs in the lease area to be undermined. The campground spring has structures like collection boxes and conveyance pipes. The amendment provides a detailed description of all water resources within the lease area. The discussion of groundwater rights on page 2-30(l) has been expanded to state an investigation of the campground spring will occur prior to undermining the structure and associated spring source. The baseline documentation of the structure will be shared and discussed with DOGM and USFS personnel.

The proposed permit revision excludes the area of Boulger Reservoir from being undermined. If in the future, the mine plan changes, and the reservoir will be undermined, it will have to be permitted through the Division.

In the PHC submitted as Appendix N of the current PHC addendum volume 2, it is contemplated that discharges from the Skyline Mine during mining of the Flat Canyon Lease will possibly be in the range of 15,000 gpm. It goes on to state that if this kind of discharge is released into Eccles Creek, as is currently the plan, it could result in stream bank erosion, undercutting of valley side-slopes and sloughing, channel widening, and some headcutting. In 2002 the PHC was updated to include a report from a study conducted by EarthFax Engineering. This report was updated by EarthFax Engineering in 2015. The amendment commits on page 2-46b to conduct annual stream surveys on Eccles Creek if sustained mine discharges exceed 7,500 gpm and will be submitted in the annual report.

The amendment adequately addresses flow levels in Eccles Creek and their potential to damage the stream bed or banks. Page 2-45 of the MRP discusses the bed and banks of the creek will be stable at flows up to 30,000 gpm for only short periods of time. While Peterson's PHC Addendum Volume 2 Appendix N and the MRP page 2-46b assume flows up to 15,000 gpm are the bankfull discharge which may act as a channel maintenance force. During this rearranging it is expected additional suspended sediments may be elevated, but will not be detrimental to the ecosystem.

The amendment proposed to meet the requirements of lease stipulation #27 by monitoring the perennial streams, (as indicated on Figure 4-1) before and after mining takes place. This monitoring will include using survey grade equipment to monitor for stream channel changes and subsidence damage. The Permittee has proposed including this information in Appendix A1 of the MRP.

The perennial stream reaches are shown in Figure 4, submitted as page 2-41a of the MRP. The map has been updated to clearly indicate the stream names and the point at which the streams begin to flow perennially and the length of the perennial stream.

adaniels

## Hydro Baseline Cumulative Impact Area

*Analysis:*

The amendment meets the State of Utah R645 requirements for Baseline Cumulative Impact Area.

Faults and their associated names were overlaid on water monitoring Drawing 2.3.6-1 and the map was too cluttered and illegible in some monitoring locations. Therefore, the geologic structures have been left off of the drawing.

kstorrrar

## Hydro Modeling

*Analysis:*

The amendment meets the State of Utah R645 rules for Groundwater Modeling.

The amendment has provided an updated 2016 groundwater model titled, Update of Groundwater Flow Model, Skyline Mine Project, Utah. In addition to the updating all available data within the model to develop a better understanding of the groundwater regime in the Skyline mine, Appendix Q and Appendix P provide additional context regarding the model and its relevance to the Flat Canyon Lease addition.

adaniels

## Probable Hydrologic Consequences Determination

*Analysis:*

Appendix N of the PHC Addendum Volume 2, is a PHC report prepared by Petersen Hydrologic. The report gives a detailed description of the natural surface and ground water systems within the lease. This report overviews the baseline ground and surface water data that has been collected and contains a compilation of this data. Table 1, attached to this report overviews the spring and stream baseline monitoring that has taken place, and when these samples were collected. The report states that coal mining in the Flat Canyon Lease tract will likely not result in significant adverse impacts to the hydrologic balance. The amendment provides an addendum to the Investigation of Fault-related Groundwater Inflows at the Skyline Mine dated August 19, 2016. Currently, there are a number of conflicting studies conducted and reported between 2001 and 2005.

Electric Lake lies directly east of the mains proposed in the Flat Canyon lease. When high inflows of water were encountered in the mine beginning in 1999, a number of reports and studies were generated regarding speculation that modern components of mine water inflows may or may not be sourced from Electric Lake.

The Division has since hired Loughlin Water Associates, LLC to synthesize past reports addressing Electric Lake and inflows to the mine workings. The scope of work also made a determination on the lack connectivity of surficial and deep groundwater resources within and adjacent to the current and future mine workings.

adaniels

## Probable Hydrologic Consequences Determination

*Analysis:*

The amendment meets the State of Utah R645 requirements for Probable Hydrologic Consequences.

The amendment adequately discusses the characteristics of the confined aquifer within the Star Point Sandstone and the aquifer's response to mining. Both Peterson (2017) and Section 2.5.2 provide a narrative regarding the response of the aquifer to mining. The relatively short duration of mining compared to glacial recharge periods, and the limited footprint of workings compared to the massive saturated Star Point formation will probably not cause the aquifer to transition from confined to unconfined. It is expected the potentiometric head will rebound once mining is complete and the pumps are shutoff.

The PHC believes the impermeable overburden between mine workings and Electric Lake will act to prevent impacts to surface waters. The lack of communication between Electric Lake and the Star Point Sandstone prevents the lake from acting as a constant head boundary between well water levels west of the lake and drawdown in Mine No. 2 and well JC-1 east of the lake.

The PHC estimates flows of up to 15,000 gpm may occur while mining in the Flat Canyon Lease. The mine has engineered

a dewatering pumping system capable of handling flows of this volume. This number was arrived at by gauging past experience and taking into account the structural geology within the Flat Canyon lease. The mine experienced maximum inflows in early 2000's of around 8,000 gpm when it contacted a fault/fracture zone. Since the Flat Canyon lease is further down dip they anticipate higher inflow rates than what was experienced in the early 2000's.

The potentiometric surface of the mine pool at final closure of the Skyline mine is shown on Plate 2.5.2-2. The mine pools that will develop post-mining will not reach the drift entry portals located near the top of Eccles creek canyon. From the portals, the mine workings extend to the north and south for miles straddling the Price River and San Rafael drainages. The final postmining groundwater flow and mine pools are also discussed in Section 2.5 and calculations are provided in Appendix S. The narrative and map compare the premining groundwater flow paths that will develop in the workings and show the mine pools will stay within the respective basins.

The Probable Hydrologic Consequences report by Peterson (2014) clarified the statement made regarding subsidence cracks. It has been the mine's experience that subsidence cracks have typically been along ridges where the ground is under more tension than in low lying valleys where streams are located.

kstorrrar

## Hydro GroundWater Monitoring Plan

### Analysis:

The information provided is sufficient to meet the requirements of the State of Utah R645-301 Coal Mining Rules.

Table 1, attached to this report, is a summary of baseline sampling. It includes spring monitoring locations, from which formation they discharge, and the amount of baseline data collected. Sites chosen for the operational monitoring have had more baseline sampling over the last two years. Sampling has included TDS, pH, total iron, total manganese, discharge information, as well as other lab parameters. This new sampling data has been submitted as part of the amendment.

Plate 2.3.6-1, the water monitoring map, is missing from the submittal. This needs to be submitted. Without this map it has made it difficult to evaluate the location of spring and well sampling locations.

There are many springs located throughout the Flat Canyon Lease area, so care has been taken to select springs that will give us the most information regarding groundwater flowing from each geologic formation, and monitoring that will establish the baseline conditions of springs with important uses and associated water rights.

There are four monitoring wells within the Flat Canyon Lease area. These are wells 99-21-1, 20-28-1, 99-4-1, and 20-4-1. Well 99-21-1 has had depth monitored since 2001, wells 99-4-1 and 20-28-1 have had depth monitored since 2002, and well 20-4-1 has had depth monitored since 2002 but became blocked in 2014. These wells were completed in the Starpoint Formation aquifer below the coal seam and have a potentiometric surface ranging from 700 to 1000 feet above the coal seam.

See the deficiency in the Monitoring and Sampling Location Maps section about the water monitoring map.

adaniels

## Hydro SurfaceWater Monitoring Plan

### Analysis:

The information provided is sufficient to meet the requirements of the State of Utah R645-301 Coal Mining Rules.

Table 1, attached to this report, is a summary of baseline sampling. It includes stream monitoring locations, and the amount of baseline data collected. Some of the stream monitoring locations have had many years of baseline data because they were part of the existing MRP's monitoring program. Stream sampling site that have been selected for operational monitoring have had additional baseline sampling conducted over the last two year. This data was included as part of the amendment. Also, CS-31 has been added upstream of mining in Boulger Canyon as an additional stream sampling location, and baseline sampling started on that location in 2015.

The surface water monitoring plan has been established to give baseline conditions of all of the perennial streams within the lease boundaries. Sampling locations were established so that any effects of mining could most easily be detected. This includes monitoring locations above and below proposed mining operations.

See the deficiency in the Monitoring and Sampling Location Maps section about the water monitoring map.

adaniels

## Maps Affected Area Boundary Maps

### Analysis:

The amendment meets the State of Utah R645 requirements for affect area boundary maps.

The amendment now meets the minimum requirements of R645-301-521.100 through-521.130 by updating all the relevant maps for the entire area shown on the mine plan as detailed on Plate 3.1.8-2. The Permittee corrected the mine boundary line on Drawing 1.6-3 to match the mine plan presented on Plate 3.1.8-2.

R645-301-521.110 requires previously mined areas to be shown on cross sections and maps. The Flat Canyon lease has not been previously mined. Drawing 2.2.7-7 shows the locations of previously mine operations within the permit area. The amendment meets the minimum requirements of R645-301-521.110.

cparker

## Maps Affected Area Boundary Maps

### Analysis:

The amendment meets the State of Utah R645-301-323 requirements for maps and aerial photographs.

The amendment includes maps of the permit and adjacent areas including vegetation resources on Figures 2.7.9-2 and 3.5. Maps of survey areas for wildlife are available in the wildlife reports. These maps provide the location and boundary of proposed reference areas, monitoring stations for fish and wildlife, and habitat features. Plate 2.12.1-1 shows land use and grazing allotments.

Ireinhart

## Maps Existing Structures and Facilities

### Analysis:

The amendment meets the State of Utah R645 requirements for existing structures and facilities maps.

R645-301-521.120 through-521.125 requires maps to clearly show existing surface and subsurface facilities. The amendment now meets the minimum requirements of R645-301-521.122 as it includes a drawing or plate that clearly calls out the existing surface and subsurface man made features within, passing through, or passing over the permit area such as SR-264, facilities such as buildings and pipelines associated with the Flat Canyon compound, and Boulger Reservoir/Dam on Plate 2.12.1-1

cparker

## Maps Existing Surface Configuration

### Analysis:

The amendment meets the State of Utah R645 requirements for existing surface configuration maps.

R645-301-521.140 requires maps to clearly show existing surface configuration. The amendment now meets the minimum requirements of R645-301-521.122 as it includes a drawing detailing the existing surface configuration.

cparker

## Maps Mine Working

### Analysis:

The amendment meets the State of Utah R645 requirements detailing mine workings.

R645-301-521.140 requires maps that clearly show all mine plans. The amendment now meets the minimum requires as all relevant existing drawings and plates were updated.

Drawing 1.6-2 was updated within the amendment to show the details of existing coal ownership within the Flat Canyon lease boundary (UTU-77114). The drawing meets the minimum requirements of R645-301-521.131.

Drawing 1.6-3 was updated within the amendment to detail the new permit boundary, lease boundary, and adjacent areas including the Flat Lease. The new mine boundary does not include T.13., S.R.6.E. Section 32 and T.14.S., R.6E., Section 6 and Section 3 which Plate 3.1.8-2 shows mining operations will be conducted. A note was added declaring "Any project mining shown beyond existing lease boundary lines is subject to future lease modification and approvals." This drawing coincides with the mine plan presented in Chapter 3 of the amendment and meets the minimum requirements of R645-301.521.141

Plate 2.12.1-1 was updated within the amendment to meet the minimum requirements of R645-301-521.120 clearly showing the items detail in -521.120 through-521.125.

Drawing 2.2.7-1 was updated in the amendment and meets the minimum requirements of R645-301-522 and R645-301-622 with all isopach contours and the seam isopach information for T.13., S.R.6.E. Section 32 and T.14.S., R.6E., Section 5 and Section 6. Plate 3.1.8-2 details mining operations to include the above sections. A note was added declaring "Any project mining shown beyond existing lease boundary lines is subject to future lease modification and approvals."

Drawing 2.2.7-3 was updated in the amendment and meets the minimum requirements of R645-301-522 and R645-301-622 due to information of the isopach that details for the lower O'Conner B seam for T.14.S., R.6E., Section 5 and Section 6. Plate 3.1.8-2 details mining operations to include the above sections.

Drawing 2.2.7-4 was updated in the amendment and meets the minimum requirements of R645-301-522 and R645-301-622 due to information of the Overburden details for the lower O'Conner B seam for T.14.S., R.6E., Section 5 and Section 6. Plate 3.1.8-2 details mining operations to include the above sections.

Drawing 2.2.4-1D The drawing was updated to show the flat canyon seam legend and planned reserve workings. The amendment meets the minimum requirements of R645-301-522.

cparker

## Maps Monitoring and Sampling Locations

### Analysis:

The amendment has included Map 2.3.6-1, the water monitoring map, in the submittal.

adaniels

## Maps Monitoring and Sampling Locations

### Analysis:

The amendment meets the State of Utah R645 requirements for Monitoring and Sampling Location Maps.

The monitoring location of springs S28-110, S4-429, S3-290, S32-279, S32-277 and many others shown in the PHC (Petersen, 2017) and Figure 2.3.6-1 have been corrected to match the surveyed location shown in in the Spring and Seep map (Mayo, 1997). It is understood a few spring locations shifted to recently produced maps because higher accuracy GPS locations were used.

kstorrar

## Maps Permit Area Boundary

### Analysis:

The amendment meets the State of Utah R645 requirements for permit area boundary maps.

The amendment now meets the minimum requirements of R645-301-521.140 as Drawing 1.6-3 was updated within the amendment to detail the new permit boundary, lease boundary, and adjacent areas to include the Flat Lease. A note was added declaring "Any project mining shown beyond existing lease boundary lines is subject to future lease modification and approvals." The new mine boundary does not include T.13., S.R.6.E. Section 32 and T.14.S., R.6E., Section 6 and

Section 3 which Plate 3.1.8-2 shows mining operations will be conducted within.

cparker

## Maps Subsurface Water Resources

### Analysis:

The information provided is sufficient to meet the requirements of State of Utah R645-301 Coal Mining Rules.

Plate 2.2.4-1D was added, and includes a structure profile cross section of the Flat Canyon Lease area. It includes a potentiometric surface established from a series of 4 wells throughout the lease.

Plate 2.3.4-2 maps a potentiometric surface for the entire Skyline permit area, including the flat canyon lease.

adaniels

## Maps Subsurface Water Resources

### Analysis:

The amendment meets the State of Utah R645 requirements for Subsurface Water Resources Maps.

The amendment provides an updated narrative and potentiometric surface plan view map of the confined regional aquifer within the Star Point sandstone below the workings. This is an important water resource to quantify prior to mining within the proposed permit area. The amendment provides the potentiometric head within wells along a geologic cross-section in Figure 9 of Appendix P. The table at the end of the water monitoring program shows the unit the wells are screened and the aquifer the water levels represent. Appendix O discusses the confined regional aquifer within the Star Point and shows wells within the aquifer west of Electric Lake and within the proposed permit area have responded to pumping in JC-1 and/or flooding of mine entries in 10-left. The water level depth of JC-2 will be incorporated into the map when the data becomes available. The contour intervals of the map were kept at 100'.

kstorrrar

## Maps Surface and Subsurface Ownershiip

### Analysis:

The amendment meets the State of Utah R645 requirements for surface and subsurface ownership maps.

The amendment meets the minimum requirements of R645-301-521.130 which requires landowners, right of entry, and public interest maps. The Flat Canyon lease includes about 3,792 acres that underlie the Manti-LaSal National Forest in Sanpete County about 10 miles Southwest of Scofield, Utah on the Wasatch Plateau. Coal of economic interest is in the Upper and Lower O'Connor, and Flat Canyon Coal beds, all located within the Blackhawk Formation. The intent of the Permittee is to mine approximately 41 million tons of coal. The surface estate is on 2,962 acres of Manti-La Sal National Forest and 1,100 acres privately owned. Plate 1.6-1 details the land owners for the various parcels in and adjacent to the permit boundary and was updated in the amendment.

cparker

## Maps Surface Water Resource

### Analysis:

The information provided is sufficient to meet the requirements of State of Utah R645-301 Coal Mining Rules.

Plate 2.3.6-1 includes surface water features. This includes reservoirs, streams, and ponds. Plate 2.3.5.1-1 is a map showing water rights within the Skyline permit area. This plate was updated with the submission and includes the entire lease area.

adaniels

## Maps Well

### Analysis:

The information provided is sufficient to meet the requirements of State of Utah R645-301-700 Coal Mining Hydrology Rules.

Plate 2.3.6-1 includes the location of groundwater monitoring wells within the Skyline lease area, including the Flat Canyon Lease area. Page 2-29e of the proposed changes to the MRP includes a description of the 4 monitoring wells that area located within the lease area. The 4 monitoring wells are completed in the Starpoint Formation aquifer below the coal seams to be mined. There is also discussion on the potentiometric surface established from these wells.

See the deficiency in the Monitoring and Sampling Location Maps section about the water monitoring map.

adaniels

## Operation Plan

### Mining Operations and Facilities

*Analysis:*

The amendment meets the State of Utah R645 requirements mining operations and facilities.

The amendment now meets the minimum requirements of R645-301-526 due to addressing the Federal Stipulations of the lease in Chapter 3 and Chapter 4, page 4-94. Specifically Plate 1.6-3 has been modified to include the Energy West boundary line and Plate 3.1.8-2 has been modified to show mining only within the lease boundary and will not include the undermining of Boulger Reservoir. All working in the southwest portion of the mine plan will be named Mine 4. Federal stipulations #10, #25 and #26 were addressed within the amendment in regards to minimizing subsidence under Boulger Reservoir and Flat Canyon Campground.

Chapter 3 of the Skyline MRP details the mining operations. Narrative was added to Section 3.1.2 and 4.17 to address the stipulation of the lease. The addition of the Flat Canyon lease will be mined utilizing longwall and room/pillar methods. A note was added declaring "Any project mining shown beyond existing lease boundary lines is subject to future lease modification and approvals" on relevant drawings.

cparker

### Existing Structures

*Analysis:*

The amendment meets the State of Utah R645 requirements for existing structures.

The amendment now meets the minimum requirements of R645-301-526 due to narrative added to Section 2.12 chapter 2 page 2-132 to include the discussion of the existing buildings of the Flat Canyon Campground, Boulger Reservoir, and SR-124. Narrative was also added to Section 3.1.7 indicating the research into no existing pipelines or wells within the flat canyon lease area. The amendment also references any procedures to meet the Federal stipulation 10 relevant to said existing structures.

cparker

### Relocation or Use of Public Roads

*Analysis:*

The amendment meets the State of Utah R645 requirements for relocation or use of public roads.

The amendment now meets the minimum requirements of R645-301-521.133 due to information detailing measure to be used such as a general mining method that will be employed under or within 100 ft of public roads to protect interest of the public in Section 4.17, Section 3.1.6 and section 4.17.4. The initial mining plan indicates that approximate 4,500 linear feet of SR 264 will potential be impacted by subsidence. The overburden ranges from approximately 700 to 1,300 feet with the maximum subsidence anticipated to range from 0.3 to 0.5 feet. Prior to undermining the Permittee will coordinate with UDO to insure if damage occurs repairs are prompt and in accordance with UDOT standards.

cparker

### Air Pollution Control Plan

*Analysis:*

The amendment meets the State of Utah R645-301-422 requirements for air pollution control plan.

A description of the coordination and compliance efforts with the Utah Division of Air Quality is evidenced by letter dated 7/13/15 from DEQ in which Approval Order to increase haulage of coal and to add stacking tube was approved. A copy of Approval Order AN0092007-03 and DAQE- AN100920001-15, dated 7/13/15 is provided. A more comprehensive air pollution control plan is outlined in section 4.22 of the MRP.

Irinhart

### **Coal Recovery**

*Analysis:*

The amendment meets the State of Utah R645 requirements for coal recovery.

The amendment now meets the minimum requirements of R645-301-522 due to a discussion on how the Federal stipulation will be met in Chapter 3. Specific panels need approval of mining by the Authorized Officer prior to development under Boulger Reservoir and Flat canyon campground. Plate 3.1.8-3 and 3.3-4 were updated to illustrate the mining in the southwest reserve to be named as Mine 4. Narrative was clarified in section 3.1.2, 3.1.6, 3.1.8 and 3.3 to discuss the coal mining sequencing.

cparker

### **Subsidence Control Plan Renewable Resource**

*Analysis:*

The amendment meets the State of Utah R645 requirements for subsidence control plan.

The minimum requirements of R645-301-525 are now met in the amendment as the Permittee addressed the Federal stipulations for UTU-77114, Flat Canyon Lease and present a clear subsidence plan for protected areas.

The amendment addresses R645-301-525.200 by detailing how no underground mining will be allowed under normally protected areas. The amendment includes an updated to Section 4.17 where a paragraph referencing Boulger Reservoir was added. The information states that the coal seam is approximately 1,200 feet below the reservoir, and that no adverse impacts are anticipated. The text goes on to detail that even though adverse impacts are anticipated the reservoir may be drained prior to undermining as a safety precaution and that both the reservoir and campground will not be undermined. Any future under mining of the reservoir or campground would be subject to stipulations #25 and 26 within the lease agreement.

cparker

### **Subsidence Control Plan Renewable Resource**

*Analysis:*

The amendment meets the State of Utah R645-301-332 requirements for anticipated impacts of subsidence on vegetation and fish and wildlife resources.

Section 4.17 describes the potential of subsidence on Boulger Reservoir and Flat Canyon Campground, neither of which are proposed at this time. If the mine wishes to undermine these features in the future, special stipulations in the lease require pre-approval from USFS on monitoring and mitigation plans.

Irinhart

### **Subsidence Control Plan Subsidence**

*Analysis:*

The amendment meets the State of Utah R645 requirements for performance standards for subsidence control.

The amendment addresses R645-301-525.200 by detailing how no underground mining will be allowed under normally

protected areas. The amendment includes an updated to Section 4.17 where a paragraph referencing Boulger Reservoir was added. The information states that the coal seam is approximately 1,200 feet below the reservoir, and that no adverse impacts are anticipated. The text goes on to detail that even though adverse impacts are anticipated the reservoir may be drained prior to undermining as a safety precaution and that both the reservoir and campground will not be undermined. Any future under mining of the reservoir or campground would be subject to stipulations #25 and 26 within the lease agreement.

cparker

### **Subsidence Control Plan Performance STD**

#### *Analysis:*

The amendment meets the State of Utah R645 requirements for performance standards for subsidence control.

The amendment meets the minimum requirements of R645-301-525.300 due to a discussion that addresses the measures the Permittee will conduct to address the Federal stipulations for mining under protected areas as detailed in R645-301-525.200.

cparker

### **Subsidence Control Plan Notification**

#### *Analysis:*

##### **Analysis:**

In accordance with R645-301-525.700, draft notices to the Emery County Conservancy District and the USFS are provided in Appendix 118A for the Flat Canyon Lease. Letters will be sent to the appropriate county water conservancy districts, USFS/Manti LaSal, as well as UDOT (Sec. 4.17.4 of the MRP).

pburton

### **Subsidence Control Plan Notification**

#### *Analysis:*

The amendment meets the State of Utah R645 requirements for Subsidence Control Plan Notification.

The amendment meets the minimum requirements of R645-301-525 due to a discussion that addresses the notification measures the Permittee will conduct to address the Federal stipulations for mining under protected areas as detailed in R645-301-525. UDOT will be contacted regarding any damages on SR 264 and the USFS will be contacted prior to the undermining of Boulger reservoir. Monitoring of sections of perennial streams being undermined using longwall methods will be monitored both before and after mining takes place, as detailed in Appendix A-1. Surveys will begin following mining within the first year with a report generated providing the pre and post mining survey within the Annual Report delivered to the Division. On ground surveys and survey grade equipment will be utilized.

cparker

### **Subsidence Control Plan Slides and Other Damage**

#### *Analysis:*

The amendment meets the State of Utah R645 requirements for performance standards for subsidence control.

The amendment meets the minimum requirements of R645-301-525.300 due to a discussion that addresses the measures the Permittee will conduct to address the Federal stipulations for mining under protected areas as detailed in R645-301-525.200.

cparker

### **Fish and Wildlife Protection and Enhancement Plan**

#### *Analysis:*

The amendment meets the State of Utah R645-301-333 requirements for using best technology currently available to minimize disturbance and adverse impacts to fish and wildlife resources.

As noted in section 2.8, tributaries to Upper Huntington Creek include Boulger, Burnout, Swens, and Little Swens Creeks, which contribute to fish populations in Electric Lake. These creeks are also important habitat for wildlife forage and drinking sources. The only creek to be monitored for fish, is Boulger Creek but all the creeks will be monitored for water flow and quantity. Since mine water is not proposed to be discharged into any of the creeks (except Eccles), macroinvertebrate monitoring in these additional creeks is not warranted. The concern is disrupted flow of the creeks due to undermining and not contamination of water quality from discharge. Table 2-72a is updated to show the schedule of fish monitoring on Boulger Creek starting in 2016 as is the same schedule for Eccles Creek. Macroinvertebrate monitoring in Eccles Creek will continue as defined in the MRP.

Conflicting language regarding undermining Boulger Reservoir causes confusion. Page 2-71a states "In the event Boulger Reservoir is undermined, additional permitting will outline the mitigation of possibly draining the reservoir. All necessary regulatory agency concerns will be addressed prior to undermining". However, on page 2-41 it states, "Drainage of the reservoir may be necessary during mining" and Section 4.17, page 4-94 discusses undermining Boulger Reservoir and Flat Canyon Campground. This plan is intermingling the approval of undermining the reservoir and campground and yet indicating that it would be a separate permitting action which is confusing.

ireinhart

## Vegetation

### Analysis:

The amendment meets the State of Utah R645-301-331 requirements for protection of vegetative resources.

Section 2.7.10, describes how riparian areas will be monitored by first collecting a baseline prior to undermining the creeks identified in figure 2.7.9-2 (Swens Canyon, Little Swens, and numerous reaches of Boulger). Additional monitoring after collection of baseline is not planned unless quarterly water monitoring reports fall below historic low flows. If flows fall below historic levels, monitoring will continue on annual basis until cause of lower flow is determined. Monitoring will follow methods outlined in Appendix A-2 (Subsidence Area Veg. Monitoring Protocol).

The permittee commits to update baseline vegetation data for riparian area along Eccles Creek. Due to potential increased mine water discharge, there could be additional impacts to Eccles Creek. In the event it is determined that flow causes material damage or loss of riparian habitat, the Permittee has committed to mitigate the damage as agreed upon by the Mine, DOGM, and DWR.

ireinhart

## Road Systems Classification

### Analysis:

The amendment meets the State of Utah R645 requirements for performance standards for road system classification.

The amendment did not contemplate and changes to this section of the MRP at this time.

cparker

## Road System Plans and Drawings

### Analysis:

The amendment meets the State of Utah R645 requirements for performance standards for road system plans and drawings.

The amendment did not contemplate and changes to this section of the MRP at this time.

cparker

## Road System Performance Standards

### Analysis:

The amendment meets the State of Utah R645 requirements for performance standards for road system performance standards.

The amendment did not contemplate and changes to this section of the MRP at this time.

cparker

## Road System Certification

### Analysis:

The amendment meets the State of Utah R645 requirements for performance standards for road system certification

The amendment did not contemplate and changes to this section of the MRP at this time.

cparker

## Road System Other Transportation Facilities

### Analysis:

The amendment meets the State of Utah R645 requirements for performance standards for road system other transportation facilities.

The amendment did not contemplate and changes to this section of the MRP at this time.

cparker

## Spoil Waste Disposals of Noncoal Mine Wastes

### Analysis:

The amendment meets the State of Utah R645 requirements for spoil and waste materials.

The amendment meets the minimum standards of R645-301-528 due to not changes in the MRP text. The amendment does not include any changes general description of noncoal mine waste disposal located in the current Chapter 3 Section 3.2.8 plans for noncoal mine wastes.

cparker

## Spoil Waste Coal Mine Waste

### Analysis:

The amendment meets the State of Utah R645 requirements for coal mine waste.

The amendment meets the minimum standards of R645-301-528 due to not changes in the MRP text. The amendment does not include any changes general description of coal mine waste disposal located in the current Chapter 3 Section 3.2.8 plans for coal mine wastes.

cparker

## Spoil Waste Refuse Piles

### Analysis:

The amendment meets the State of Utah R645 requirements for refuse piles.

The amendment meets the minimum standards of R645-301-528 due to not changes in the MRP text. The amendment does not include any changes general description of coal mine waste disposal located in the current Chapter 3 Section 3.2.8 plans for coal mine wastes.

cparker

## Spoil Waste Impounding Structures

### Analysis:

The amendment meets the State of Utah R645 requirements for impoundments

The amendment meets the minimum standards of R645-301-500 due to not changes in the MRP text. The amendment does not include any changes to the impoundments.

cparker

### **Spoil Waste Burning and Burned Waste Utilization**

*Analysis:*

The amendment meets the State of Utah R645 requirements for burning and burned waste.

The amendment meets the minimum standards of R645-301-500 due to not changes in the MRP text. The amendment does not include any changes to the burned waste.

cparker

### **Spoil Waste Coal Processing Waste to Abandoned**

*Analysis:*

The amendment meets the State of Utah R645 requirements for return of coal processing waste to abandoned underground workings.

The amendment meets the minimum standards of 645-301-528 due to not changes in the MRP text. The amendment does not include any changes general description of returning coal mine waste underground located in the current Chapter 3 Section 3.2.8 MRP.

cparker

### **Spoil Waste Excess Spoil**

*Analysis:*

The amendment meets the State of Utah R645 requirements for excess spoil.

The amendment meets the minimum standards of R645-301-500 due to not changes in the MRP text. The amendment does not include any changes to the excess spoil operations.

cparker

### **Hydrologic General**

*Analysis:*

The information provided is sufficient to meet the requirements of State of Utah R645-301 Coal Mining Rules.

The application to approve mining in the Flat Canyon lease does not include any surface disturbances. The Federal EIS for the lease does discuss the possibility of needing ventilation shafts for mining in the lease, but if shafts are needed they will go through the permitting process in the future.

The Permittee has revised their plan to undermine Boulger Reservoir. Currently the mine is not planning to mine under the reservoir, but will submit an amendment in the future to address this issue, and related lease stipulations, if their plans change.

adaniels

### **Hydrologic Ground Water Monitoring**

*Analysis:*

The amendment meets the State of Utah R645 requirements for Groundwater Monitoring.

The currently approved MRP contains a commitment to monitor inflows and conduct age dating on any mine inflows of groundwater if inflows of 800 gpm or more are encountered. This is a commitment that will continue through mining of the

## Flat Canyon Lease.

There are 5 additional springs that will be incorporated into the regular water monitoring program, and already have or will have baseline data collected on them. These springs represent discharge from the Price River Formation, Castlegate Sandstone, and Blackhawk Formation.

Spring S33-268 is a spring that is developed with a collection box and pipeline to provide water to the Forest Service Campground. While it will be difficult to get true spring flow measurements from this site, it will continue to be monitored due to its importance as a water source.

There are four water level monitoring wells within the Flat Canyon lease area, 99-21-1, 20-28-1, 99-4-1, and 20-4-1. These wells are completed in the Starpoint Formation, located just below the coal seams to be mined. These wells will continue to be monitored through the operational ground water monitoring program.

The amendment commits to monitoring sustained mine inflows greater than 800 gpm when accessible. In addition to quantity the water will be analyzed for quality parameters including tritium and a Microscopic Particulate Analysis on the 5-year baseline at these high inflow locations west of Electric Lake. The amendment includes DWG. No 2.3.6-3 which will be updated to identify the location where elevated sustained mine inflows are occurring in the Flat Canyon Lease.

adaniels

## Hydrologic Ground Water Monitoring

### *Analysis:*

The amendment meets the State of Utah R645 requirements for Groundwater Monitoring.

In order to better understand the complexity of the confined aquifer within the Star Point sandstone, the water level depth in JC-2 has been added to the water monitoring program. This well is directly adjacent to the production well JC-1 and will give an accurate water level within the Star Point Sandstone in the area. Well JC-1 has a strong influence for miles across the Star Point aquifer in addition to the mine workings to the north. They are the primary drivers creating steep gradients thus influencing groundwater levels in the confined aquifer across Upper Huntington creek basin. The groundwater monitoring plan will measure the water level in JC-2 quarterly when accessible.

The groundwater monitoring plan is designed to detect impacts to the hydrologic balance within and adjacent to the permit area and above, within, and below the coal seam and within and adjacent to the permit boundary. New wells were installed but were mistakenly left out of the groundwater monitoring plan. The well 15-21-2 was installed to replace well 99-21-1 that was blocked a couple years ago. Wells that were established within and adjacent to the Flat Canyon Lease in the late 1990's and early 2000's have provided a very strong baseline understanding of the aquifer within the Star Point Sandstone. With the baseline data and the replacement well a pre-mining potentiometric gradient can be established. With these wells the potentiometric gradient will be temporally monitored as mining progresses to the south.

Both the PHC and EIS reports discuss the surficial aquifers that discharge to streams within and adjacent to the permit area. The amendment includes a plan for monitoring these surficial aquifers within the Qal along the perennial streams in Boulger creek and Flat Canyon creek.

Piezometers will monitored surficial groundwater at two locations along the main branch of Boulger creek (upstream of Boulger Reservoir) and at one location along Boulger Creek below the confluence of Flat Canyon Creek. The piezometers are paired with surface water monitoring stations or they are along a cross-section that is perpendicular to flow.

The PHC and MRP text provides an adequate justification for not installing a well in the Upper Blackhawk formation. The Upper Blackhawk formation is primarily discontinuous lenses of clays and very low permeability deposits. Therefore a well in the Upper Blackhawk would be unable to give an accurate understanding of how the unit is hydrologically responding to mining activities.

The amendment discusses the difficulty of measuring potentiometric head within major faults prior to the initial contact of faults during mains development. From within the active workings, six horizontal cores have been drilled out roughly 4000 feet in order to better understand the geology of the Flat Canyon lease. The drill holes expelled water which is typical of exploration holes, however the volume and pressure of water did not appear to be unusually high. While these drill holes probably went through multiple faults they did not appear to hit a fault with an elevated potentiometric head that would have been relieved by the drill holes.

The amendment meets the State of Utah R645 requirements for Groundwater Monitoring of Springs.

The spring monitoring plan is designed to detect impacts to the hydrologic balance within the permit area. The plan has spaced monitoring locations evenly across the Flat Canyon Lease. The springs have been selected for flow and quality characteristics and the geologic unit they discharge from.

Springs will be operationally monitored in the major drainages within the lease boundaries including: Little Swens Canyon, Swens Canyon, Flat Canyon, and Boulger Canyon. The springs are distributed evenly across zones that will and will not be undermined.

During the Skyline field visit in November we visited the monitored spring 4-173. While standing at the spring it was apparent that a directly adjacent spring with a higher flow originated from the same catchment source. The adjacent spring is documented in the Mayo 1997 spring and seep survey as spring 4-169. In order to properly measure total flow from the catchment source the spring monitoring plan has included monitoring the paired springs 4-173 and 4-169. This is the same case with the following paired springs in the water monitoring program: S28-110 & S28-111, SW4-169 & SW4-173, S32-277 & 32-276.

The amendment meets the State of Utah R645 requirements for groundwater monitoring of inflow into the mine.

Mine workings in the Flat Canyon Lease will likely encounter significant amounts of water where entries bisect faults. The groundwater monitoring plan includes a commitment to monitor in-mine flows at locations where a significant amount of water (>800 gpm) is discharging into the mine over a sustained period. The plan must include Drawing 2.3.6-3 that will identify where the discharges occur and it will be updated to reflect in-mine water monitoring locations. These locations will be monitored operationally when the sites are accessible.

In order to insure groundwater at JC-1 and at flow measuring locations within the Flat Canyon Lease mine workings is discharging from the Star Point Sandstone aquifer additional water quality testing will be done at baseline or every 5 years. The groundwater will be tested using the Microscopic Particulate Analysis (MPA) at JC-1 and at flow measuring location(s) in the mine workings west of Electric Lake.

kstorrar

## Hydro Surface Water Monitoring

### Analysis:

The information provided is sufficient to meet the requirements of State of Utah R645-301 Coal Mining Rules.

The operational surface water monitoring program has been expanded to monitor four additional stream monitoring locations, CS-27, CS-28, CS-29, and CS-30. The points are to monitor stream sections along Little Swens Canyon, Swens Canyon, Flat Canyon and Boulger Canyon. Each of these canyons stream are perennial.

Stream monitoring locations CS-27 and CS-17 provide upstream of mining and downstream of mining monitoring along Little Swens Canyon respectively. CS-28 and CS-16 provide monitoring up and downstream of mining monitoring of Swens Canyon. CS-29 and CS-18 provide upstream and downstream of mining monitoring of Flat Canyon. CS-18 also provides a downstream of mining monitoring location for Boulger Canyon, and CS-30 is monitoring the stream from Boulger Canyon within mining. CS-310 was established upstream of mining in Boulger Canyon in 2015. New data from these sampling locations, sampled over the last two years, has been included with this submission.

adaniels

## Hydro Surface Water Monitoring

### Analysis:

The amendment meets the State of Utah R645 requirements for Surface Water Monitoring.

Both the PHC and EIS reports classify perennial streams within the Flat Canyon permit area as gaining along their length. These streams are clearly delineated in Figure 4-1. The proposed stream water monitoring plan is able to document increased flow along every perennial stream. Surface flow is measured at two or more locations before converging with another stream. These flow monitoring locations are seen on DRW 2.3.6-1.

kstorrar

## Hydrologic Acid and Toxic forming Materials

*Analysis:*

The information provided is sufficient to meet the requirements of State of Utah R645-301-700 Coal Mining Hydrology Rules.

Material from the new Flat Canyon lease area will be handled in a manner similar to the way coal is being handled at the site now. There are no proposed changes to handling acid or toxic forming materials. Coal mine waste will be managed in the currently permitted Skyline waste rock site.

adaniels

## **Hydrologic Transfer Wells**

*Analysis:*

The information provided is sufficient to meet the requirements of State of Utah R645-301-700 Coal Mining Hydrology Rules.

Water monitoring wells, under the current plan, are planned to be capped and sealed according to the rules set forth by the Utah Division of Water Rights.

adaniels

## **Hydrologic Discharge Into an Underground Mine**

*Analysis:*

The information provided is sufficient to meet the requirements of State of Utah R645-301-700 Coal Mining Hydrology Rules.

There are no new portals or underground openings proposed with this submission. There are no changes to the currently approved MRP regarding discharge into underground mines.

adaniels

## **Hydrologic Gravity Discharge From Underground Mine**

*Analysis:*

The information provided is sufficient to meet the requirements of State of Utah R645-301-700 Coal Mining Hydrology Rules.

There are no proposed changes to the way Skyline mine is discharging water from their underground workings. For more detailed analysis on how the higher volumes of discharge will be handled in Eccles Creek, see the sections of the findings titled "Baseline Cumulative Impact Area Information".

adaniels

## **Hydrologic Gravity Discharge From Underground Mine**

*Analysis:*

The amendment meets the State of Utah R645 requirements for Gravity Discharges from Underground Mines.

The amendment provides a final mine pool elevation map instead of showing the floor elevation of the current mine workings and of future projected workings in the Flat Canyon lease area.

The amendment provides a narrative in Section 2.5, supporting calculations in Appendix S, and map 2.5.2-2 of the mine pools that will develop after mining is complete. The calculations show the maximum hydraulic head that will develop following mine reclamation. The location and extent of current mine pool in Mine 2 and Old Mine 3 and the expected mine pools after mining is complete in the Flat Canyon area are clearly displayed. The shoreline of the future mine pools will reach about 8,500', this is below the elevation of the portals at 8573'. The mine does not anticipate gravity discharge from the portals once it is reclaimed.

The amendment discusses the water quality of future mine pools. The mine pool will not reach the surface so quality is not a major concern. However, the mine's experience with pumping well JC-3 has shown mine pools have a tendency to stratify with higher quality water at the top and lower quality water settling to the bottom. If there were to be any interaction with surface waters or shallow groundwater resources, which is considered unlikely, the mine will not degrade surface water quality.

kstorrar

## Hydrologic Water Quality Standards

### Analysis:

The information provided is sufficient to meet the requirements of State of Utah R645-301-700 Coal Mining Hydrology Rules.

The Skyline mine holds a current UPDES permit to cover their discharges from the mine and their sedimentation ponds. Their UPDES permit was recently renewed and is effective until April 30, 2020.

adaniels

## Hydrologic Diversion General

### Analysis:

The information provided is sufficient to meet the requirements of State of Utah R645-301-700 Coal Mining Hydrology Rules.

There is no new surface disturbance associated with this submission.

adaniels

## Hydrologic Diversion Perennial and Intermitten

### Analysis:

The information provided is sufficient to meet the requirements of State of Utah R645-301-700 Coal Mining Hydrology Rules.

There is no new surface disturbance associated with this submission.

adaniels

## Hydrologic Diversion Misc. Flows

### Analysis:

The information provided is sufficient to meet the requirements of State of Utah R645-301-700 Coal Mining Hydrology Rules.

There is no new surface disturbance associated with this submission.

adaniels

## Hydrologic Stream Buffer Zones

### Analysis:

The information provided is sufficient to meet the requirements of State of Utah R645-301-700 Coal Mining Hydrology Rules.

There is no new surface disturbance associated with this submission.

adaniels

## Hydrologic Sediment Control Measures

*Analysis:*

The information provided is sufficient to meet the requirements of State of Utah R645-301-700 Coal Mining Hydrology Rules.

There is no new surface disturbance associated with this submission.

adaniels

### **Hydrologic Siltation General**

*Analysis:*

The information provided is sufficient to meet the requirements of State of Utah R645-301-700 Coal Mining Hydrology Rules.

There is no new surface disturbance associated with this submission.

adaniels

### **Hydrologic Siltation Sedimentation**

*Analysis:*

The information provided is sufficient to meet the requirements of State of Utah R645-301-700 Coal Mining Hydrology Rules.

There is no new surface disturbance associated with this submission, and a new pond is not proposed.

adaniels

### **Hydrologic Siltation Treatment**

*Analysis:*

The information provided is sufficient to meet the requirements of State of Utah R645-301-700 Coal Mining Hydrology Rules.

There is no new surface disturbance associated with this submission.

adaniels

### **Hydrologic Exemptions**

*Analysis:*

The information provided is sufficient to meet the requirements of State of Utah R645-301-700 Coal Mining Hydrology Rules.

There is no new surface disturbance associated with this submission.

adaniels

### **Hydrologic Discharge Structures**

*Analysis:*

The information provided is sufficient to meet the requirements of State of Utah R645-301-700 Coal Mining Hydrology Rules.

There is no new surface disturbance associated with this submission.

adaniels

### **Hydrologic Impoundments**

*Analysis:*

The information provided is sufficient to meet the requirements of State of Utah R645-301-700 Coal Mining Hydrology Rules.

There is no new surface disturbance associated with this submission.

adaniels

### **Hydrologic Ponds Impoundments Banks Dams**

*Analysis:*

The information provided is sufficient to meet the requirements of State of Utah R645-301-700 Coal Mining Hydrology Rules.

There is no new surface disturbance associated with this submission.

adaniels

### **Support Facilities and Utility Installations**

*Analysis:*

The amendment meets the State of Utah R645 requirements for support facilities and utility installations.

The amendment meets the minimum requirements of R645-301-521.180 and -526 the require the description, plans, and drawing for each support facility to be constructed, used, or maintained within the proposed permit area. Future amendments are will likely come in association with ventilation shafts in the Flat Canyon area and text will need to be edited under Chapter 3 Section 3.2.8.

cparker

### **Signs and Markers**

*Analysis:*

The amendment meets the State of Utah R645 requirements for signs and markers.

The amendment meets the minimum requirements of R645-301-521.200 by the general discussion of signs in Chapter 3 section 3.2.7. No changes were made to the MRP to detail Flat Canyon operations specifically.

cparker

### **Explosives General**

*Analysis:*

The amendment meets the State of Utah R645 requirements for explosives.

The amendment meets the minimum requirements of R645-301-525 by the general discussion of explosives. No explosives on the surface will be needed at the time of this review.

cparker

### **Explosives Preblasting Survey**

*Analysis:*

The amendment meets the State of Utah R645 requirements for explosives.

The amendment meets the minimum requirements of R645-301-525 by the general discussion of explosives. No explosives on the surface will be needed at the time of this review.

cparker

## **Explosives General Performance Standards**

### *Analysis:*

The amendment meets the State of Utah R645 requirements for explosives.

The amendment meets the minimum requirements of R645-301-525 by the general discussion of explosives. No explosives on the surface will be needed at the time of this review.

cparker

## **Explosives Blasting Signs Warnings Access Control**

### *Analysis:*

The amendment meets the State of Utah R645 requirements for explosives.

The amendment meets the minimum requirements of R645-301-525 by the general discussion of explosives. No explosives on the surface will be needed at the time of this review.

cparker

## **Explosives Control of Adverse Effects**

### *Analysis:*

The amendment meets the State of Utah R645 requirements for explosives.

The amendment meets the minimum requirements of R645-301-525 by the general discussion of explosives. No explosives on the surface will be needed at the time of this review.

cparker

## **Explosives Records of Blasting Operations**

### *Analysis:*

The amendment meets the State of Utah R645 requirements for explosives.

The amendment meets the minimum requirements of R645-301-525 by the general discussion of explosives. No explosives on the surface will be needed at the time of this review.

cparker

## **Maps Affected Area**

### *Analysis:*

The amendment meets the State of Utah R645 requirements for affected area maps in operations.

The amendment meets the minimum requirements of R645-301-521.100 through-521.130 by updating all the relevant maps for the entire area shown on the mine plan as detailed on Plate 3.1.8-2.

cparker

## **Maps Facilities**

### *Analysis:*

The amendment meets the State of Utah R645 requirements for mining facilities maps.

R645-301-521.120 through-521.125 requires maps to clearly show existing surface and subsurface facilities. The amendment meets the minimum requirements as it includes a drawing or plate that clearly calls out the existing features such as SR-264, facilities such as buildings and pipelines associated with the Flat Canyon compound, and Boulder Reservoir/Dam.

## Maps Mine Workings

### Analysis:

The amendment meets the State of Utah R645 requirements for mine workings maps in operations.

R645-301-521.140 requires maps that clearly show all mine plans. The amendment meets the minimum requires as all relevant existing drawings and plates were updated.

- Drawing 1.6-2 was updated within the amendment to show the details of existing coal ownership within the Flat Canyon lease boundary (UTU-77114).
- Drawing 1.6-3 was updated within the amendment to detail the new permit boundary, lease boundary, and adjacent areas including the Flat Lease.
- Drawing 2.2.7-1 was updated to show seam isopach
- Drawing 2.2.4-1D was updated to show the flat canyon seam legend and planned reserve workings.

cparker

## Maps Monitoring and Sampling Locations

### Analysis:

The information provided is sufficient to meet the requirements of State of Utah R645-301-700 Coal Mining Hydrology Rules.

Water Monitoring Map 2.3.6-1 was updated to include new water monitoring locations, but was missing from this submission. See the deficiency in the Monitoring and Sampling Location Maps section about the water monitoring map.

adaniels

## Maps Monitoring and Sampling Locations

### Analysis:

The amendment meets that State of Utah R645 requirements for Monitoring Maps.

The PHC discusses the surficial alluvial aquifer within the Qal sediments, referring to this groundwater resource as the 'active-zone groundwater system'. Discharge from this water resource is the reason many of the streams within the proposed permit area are gaining along their length and flow perennially. This is an important source of water to quantify within the proposed permit area given its direct influence on stream flow. The largest deposit of Qal appears to be the glacial materials along Boulger Creek and Flat Canyon Creek.

A cross-sectional potentiometric map of the surficial aquifer contained within Qal sediments along Boulger and Flat Canyon creek will be added to permit after the installation of piezometers and collection of groundwater data at their locations.

kstorrrar

## Maps Certification Requirements

### Analysis:

The amendment meets the State of Utah R645 requirements for certification requirements.

R645-3010-512 minimum requirements are met as all mine drawings and plates are stamped by a Utah certified professional engineer with experience in underground mining operations upon final approval.

cparker

## Reclamation Plan

## General Requirements

### Analysis:

The amendment meets the State of Utah R645 requirements for general reclamation plan.

The minimum requirements of R645-301-540 are met within the amendment as there is no change to the existing MRP reclamation details.

cparker

## PostMining Land Use

### Analysis:

The amendment meets the State of Utah R645-301-412 requirements for postmining land use. Section 4.12 of the MRP adequately addresses PMLU of the permit area. There is no information regarding postmining land use in the amendment but the Flat Canyon Lease is not included in the "Permit Area" it is "Mining Area".

lreinhart

## WildLife Protection

### Analysis:

The amendment meets the State of Utah R645-301-342 requirements for a fish and wildlife plan for the reclamation and postmining phase of operation.

The Permittee commits to monitor riparian areas in the Flat Canyon Lease area where subsidence of creeks could reduce surface flow to the creek and impact aquatic habitat. If monitoring shows a fall below the recorded historic low-flow values the Permittee commits to using the BTCA to mitigate damage in coordination with the Division and USFS.

Due to a potential increases in discharge into Eccles Creek, increasing erosion could become a problem and impact the benthic community of the Creek. The permittee has committed to perform macroinvertebrate and fish studies as identified on table 2.8-1a. It is anticipated at the cessation of mining, stream-flow will return to the pre-mining condition, with the riparian vegetation showing a similar transition within a short time.

lreinhart

## Approximate Original Contour Restoration

### Analysis:

The amendment meets the State of Utah R645 requirements for general reclamation plan to AOC

The minimum requirements of R645-301-540 are met within the amendment as there is no change to the existing MRP reclamation details to restore AOC.

cparker

## Backfill and Grading General

### Analysis:

The amendment meets the State of Utah R645 requirements for backfill and grading.

The minimum requirements of R645-301-553 are met within the amendment as there is no change to the existing MRP grading reclamation details.

cparker

## Backfill and Grading Previously Mined

### Analysis:

The amendment meets the State of Utah R645 requirements for backfill and grading.

The minimum requirements of R645-301-553 are met within the amendment as there is no change to the existing MRP grading reclamation details.

cparker

### **Backfill and Grading on Steep Slopes**

*Analysis:*

The amendment meets the State of Utah R645 requirements for backfill and grading.

The minimum requirements of R645-301-553 are met within the amendment as there is no change to the existing MRP grading reclamation details.

cparker

### **Backfill and Grading Steep Special Provisions**

*Analysis:*

The amendment meets the State of Utah R645 requirements for backfill and grading.

The minimum requirements of R645-301-553 are met within the amendment as there is no change to the existing MRP grading reclamation details.

cparker

### **Mine Openings**

*Analysis:*

R645-301-641. The application meets the requirements for casing and sealing of exploration and boreholes. The existing MRP discusses plans for casing and sealing drill holes. No changes have been proposed with this revision.

dhaddock

### **Mine Openings**

*Analysis:*

The amendment meets the State of Utah R645 requirements for mine openings.

The minimum requirements of R645-301-529 and -551 are met within the amendment as there is no change to the existing MRP sealing of mine openings at the time of final reclamation.

cparker

### **Road System Reclamation**

*Analysis:*

The amendment meets the State of Utah R645 requirements for road systems reclamation.

The minimum requirements of R645-301-534 are met within the amendment as there is no change to the existing MRP reclamation of roads throughout the permitted area.

cparker

### **Road System Retention**

*Analysis:*

The amendment meets the State of Utah R645 requirements for road systems retention.

The minimum requirements of R645-301-534 and -552 are met within the amendment as there is no change to the existing MRP reclamation of roads that will be retained at the end of mining that exist throughout the permitted area.

cparker

## Hydrological Information Reclamation Plan

### Analysis:

The information provided is sufficient to meet the requirements of State of Utah R645-301-700 Coal Mining Hydrology Rules.

There is no new surface disturbance associated with this submission.

adaniels

## Contemporaneous Reclamation General

### Analysis:

The amendment meets the State of Utah R645-301-352 requirements for contemporaneous reclamation.

ireinhart

## Cessation of Operations

### Analysis:

The amendment meets the State of Utah R645 requirements for cessation of operations.

The minimum requirements of R645-301-515 and -541 are met within the amendment as there is no change to the existing MRP plan of communication with the appropriate parties in the event of the cessation of operations and final reclamation.

cparker

## Maps Affected Area Boundary

### Analysis:

The amendment meets the State of Utah R645 requirements for affected area boundary maps in reclamation.

The minimum requirements of R645-301-542 are met within the amendment as previously discussed in affected maps operations.

cparker

## Maps Bonded Area

### Analysis:

The amendment meets the State of Utah R645 requirements for bonded area map.

The amendment is currently being reviewed by the Division in an effort to expedite the significant revision process. No bonding information or maps were included within the amendment at this time.

cparker

## Maps Reclamation BackFilling and Grading

### Analysis:

The amendment meets the State of Utah R645 requirements for reclamation backfill and grading maps.

The minimum requirements of R645-301-542 are met within the amendment as there is no change to the existing MRP plan

cparker

## Maps Reclamation Facilities

### Analysis:

The amendment meets the State of Utah R645 requirements for reclamation facilities maps.

The minimum requirements of R645-301-542 are met within the amendment as there is no change to the existing MRP plan.

cparker

## Maps Reclamation Final Surface Configuration

### Analysis:

The amendment meets the State of Utah R645 requirements for final surface configuration maps.

The minimum requirements of R645-301-542 are met within the amendment as there is no change to the existing MRP plan.

cparker

## Maps Reclamation Monitoring and Sample Locations

### Analysis:

The information provided is sufficient to meet the requirements of State of Utah R645-301-700 Coal Mining Hydrology Rules.

Water Monitoring Map 2.3.6-1 was updated to include new water monitoring locations, but was missing from this submission. See the deficiency in the Monitoring and Sampling Location Maps section about the water monitoring map.

adaniels

## Maps Reclamation Surface and Subsurface Man Made

### Analysis:

The amendment meets the State of Utah R645 requirements for reclamation surface and subsurface manmade feature maps.

The minimum requirements of R645-301-542 are met within the amendment as there is no change to the existing MRP plan.

cparker

## Maps Reclamation Certification Requirments

### Analysis:

The amendment meets the State of Utah R645 requirements for certification requirements.

R645-3010-512 minimum requirements are met as all mine drawings and plates are stamped by a Utah certified professional engineer with experience in underground mining operations in the clean copies upon approval of the amendment.

cparker

## Bonding and Insurance General

### Analysis:

The amendment meets the State of Utah R645 requirements for general bonding and insurance.

The amendment meets the minimum requirements of R645-301-800 as the amendment is currently being reviewed by the Division in an effort to expedite the significant revision process. No bonding information or maps were included within the amendment at this time due to no surface disturbances associated with the current Flat Canyon lease.

### **Bonding Form of Bond**

*Analysis:*

The amendment meets the State of Utah R645 requirements for determination of bond amount.

The amendment meets the minimum requirements of R645-301-830.140 as the amendment is currently being reviewed by the Division in an effort to expedite the significant revision process. No bonding information or maps were included within the amendment at this time due to no surface disturbances associated with the current Flat Canyon lease.

cparker

### **Bonding Determination of Amount**

*Analysis:*

The amendment meets the State of Utah R645 requirements for determination of bond amount.

The amendment meets the minimum requirements of R645-301-830.140 as the amendment is currently being reviewed by the Division. No bonding information or maps were included within the amendment at this time due to no surface disturbances associated with the current Flat Canyon lease at this time that are not already permitted.

cparker

### **Bonding Terms and Conditions Liability Insurance**

*Analysis:*

The amendment meets the State of Utah R645 requirements for terms and conditions for liability insurance.

The amendment meets the minimum requirements of R645-301-850 as the amendment is currently being reviewed by the Division in an effort to expedite the significant revision process. The Skyline mine currently holds liability insurance through National Union Fire Ins Co, effective until 2/1/16. The insurance includes the required Marsh from, explosives and claims made per occurrence.

cparker

### **CHIA**

### **CHIA**

*Analysis:*

The CHIA will require a revision. This will be analyzed once all hydrologic information has been submitted to the Division and is ready for approval.

adaniels

**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

February 3, 2017

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## I. INTRODUCTION

The Skyline, White Oak, Blazon and the proposed 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 westernmost boundary extends just over the line into Sanpete County.

The Skyline Mine has workings in four different seams, the Upper O'Connor Seam (Mine No. 1), the Lower O'Connor B Seam (Mine No. 2), the Lower O'Connor A Seam (Mine No. 3) and the Flat Canyon Seam. 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 Mine No. 2 began in 1992. In 2017, the mine will begin development into Mine No. 4. 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 built a ventilation shaft, escape shaft, and access slope in Winter Quarters Canyon. The Winter Quarters Ventilation Fan facility disturbed approximately 8 acres near the center of Section 1, T. 13S, R. 6E.

A lease modification to the North Lease in 2013 extended the mining slightly into the Fish Creek drainage, adding approximately 770 acres.

The amendment to mine the Flat Canyon Federal Lease UTU-77114 also known as Mine No. 4, was approved by the Division in January 2017. The lease adds 2692 acres of Adjacent Area or area authorized for Coal Mining and Reclamation activities. The USDA Forest Service has sole ownership of the surface above the lease addition. The amendment to permit the lease did not include any plans for surface disturbance. However, the Swens Canyon ventilation

facility was permitted and built in 2016 within the Upper Huntington Creek watershed to ventilate mine workings extending into the Upper Huntington Creek basin.

### 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

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.

In February of 2008, a permit application package (PAP) was submitted for the Kinney #2 Mine. The Kinney #2 Mine was a proposed underground mine located just east of the town of Scofield

adjacent to State Road 96. The PAP for coal mining and reclamation activity was approved by the Division for the Kinney #2 Mine in June of 2011. However; active mining never occurred as the mine was never constructed due to financial constraints. Nonetheless, the permit application process produced a considerable amount of ground and surface water data. The Division felt that this data was valuable in advancing the overall understanding of the ground and surface water systems and thus included it in Cumulative Impact Area (See Figure 2). As a result, baseline data obtained during the review of the proposed Kinney #2 Mine and potential impacts to hydrologic resources have been included within this Cumulative Hydrologic Impact Assessment (CHIA). It should be noted that as the mine was never constructed, active water monitoring is not occurring at the site.

The proposed Kinney #2 permit area covered approximately 452 acres with a disturbed area footprint of 38 acres. Mining was 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. Coal was to have been extracted from multiple fault bounded reserve blocks. Mining was to be restricted to blocks of coal lying between faults. The project life of the mine was estimated to be 3 years with potential future expansion further to the south and east.

### 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 hydrologic resources that may be impacted from mining and reclamation activities and establish predictive parameters for assessing future potential impacts. (Part V)
5. Identify relevant standards against which predicted impacts (Part VI)

can be compared.

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)

The Cumulative Impact Area (CIA) boundary is shown in Figure 2 (Appendix A). 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 mining and reclamation operations may have on the water resources.

In October 2013, the CIA boundary was revised to include the Skyline Mine modification of the North Lease. This lease extends into the Upper Fish Creek Drainage, which contributes flow to Scofield Reservoir.

The CIA boundary was revised in June 2011 to incorporate the 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 the Flat Canyon Lease added in 2017) 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 proposed Kinney #2 permit boundary) as it drains into Scofield Reservoir and would be representative of the downstream drainage from the proposed 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. In 2013 the Skyline Mine modified their lease, extending into the Upper Fish Creek drainage which contributes flow into the reservoir. Scofield Reservoir is also considered the receiving body of any downstream drainage from the proposed Kinney #2 mine via the perennial reach of Miller Creek. Scofield Reservoir is the receiving water body from any intermittent flows from Eagle Canyon draining the proposed 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 downstream. 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.

Loughlin Water Associates were contracted by the Division in 2016 to synthesize past and present reports regarding Electric Lake and Skyline mine workings. They found no conclusive or convincing link that Mine No. 2 inflows were connected to the fluctuation in Electric Lake water levels in the early 2000's (Loughlin, 2016). In the subsequent 14 years since Electric Lake water levels hit their low mark, the levels quickly returned to normal and reached maximum capacity in 2008.

### **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**

##### Mud Creek Drainage

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 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/Mine-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 7,798 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 mostly been stable or trending downward since 2005 (Figure 10). In 2008 and 2009 the discharge averaged 3,400 gpm. The rate of discharge at CS-14 averaged 3,084 gpm from June 2010 to December 2016. This rate is skewed high because of elevated mine inflows in late 2011 through early 2012. Thus the median inflow of 2,734 gpm during the same period gives a more accurate picture of recent mine water discharge rates.

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. In 2015, Earthfax conducted stream surveys at the same reference reaches established in 2001 and studied through 2006. They found very little change bed elevation over the past nine years along the cross-sections and longitudinal profiles. This supports the conclusion the stream bed is well armored and the stream banks are well stabilized by vegetation and large woody debris.

#### Upper Fish Creek Drainage

Upper Fish Creek is a perennial tributary to Scofield Reservoir located North of Granger Ridge and will not be undermined in the Skyline North Lease. Within the Upper Fish Creek drainage area three surface drainages will be undermined with the North Lease modification, these include Wife Creek and two forks of Andrew Dairy Creek. These three drainages are ephemeral in nature within the Skyline North Lease area. Wife Creek becomes perennial as it meets Upper Fish Creek, while Andrew Dairy Creek has been dry during all baseline monitoring activities. The Skyline October 2013, North Lease modification added 690 acres within the Fish Creek drainage. The overburden within the area to be mined ranges from approximately 900-1300 feet.

#### Miller Creek

Miller Creek is a small tributary to Scofield Reservoir located in Section 21 T12S R7E and approximately two miles north of the proposed 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 and Electric Lake

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 average monthly outflow and storage volume since the dam was constructed in the late 1970's is shown on Figure 13. 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 don't need to collect accurate inflow numbers as long as the reservoir holds sufficient water for uses downstream. Standard water-balance budgets for reservoirs generally assume a surface-water and groundwater inflow and surface-water and groundwater outflow to determine change in storage. However, following the changed response in lake function, PacifiCorp began measuring the inflow into Electric Lake in July 2002 with a flume located on Upper Huntington Creek. The flume was recalibrated in June of 2003 and continues to collect flow data when it's not inundated. A second flume was installed in May of 2004 as the lake level inundated the first flume. This second flume was still below Boulger Creek. 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.).

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 the 1978-79 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.

Loughlin Water Associates reviewed all available data and reports through 2016 and concluded the following, “According to CFC (2005), neither Solomon (2005) nor Ozark Underground Lab (2005) present definitive evidence that the water presumably lost from Electric Lake between 2001 and 2003 was the result of a direct conduit via faults or fractures existing between Electric Lake and the mine. Groundwater inflows to the mine do contain small amounts of modern water, based on small tritium concentrations. Modern water could be sourced from Electric Lake through seepage losses into the Blackhawk and Star Point Sandstone formations or from recharge directly to the Star Point Sandstone where it crops out. Dye concentrations in the JC wells were several parts per billion (ppb) or less and the results were not convincing. The predicted rise in tritium concentration hypothesized by Solomon (2005) did not occur.”

“In our opinion, if Electric Lake was losing up to 5,000 directly into the mine, then the evidence from these studies should have been more conclusive or convincing. Additionally, large mine inflows began in March 1999, approximately two years prior to observed drops in lake levels, as shown on Figure 10. It is likely that depleted reservoir levels were triggered by drought conditions that persisted between 1999 and 2003. Figure 10 (Figure 13 within this CHIA) also shows that Electric Lake returned to normal levels around 2006 and approached maximum reservoir height and capacity each year between 2008 and 2011, while the mine was discharging between about 3,000 to 4,000 gpm. Figure 10 also shows that during the time when well JC-1 was not pumping or pumping at a lower rate, the reservoir height remained within the normal range that was noted before 1999.” (Loughlin, 2016)

## **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 proposed 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 proposed 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 proposed 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. Skyline's mine workings are shown on Figure 3A. A generalized cross-section of the Skyline Mine is presented on Figure 4. 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 Flat Canyon - usually lies on, or just above, the top of the Star Point Sandstone. Within the proposed 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.

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. 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 - Figure 4, Appendix A shows the 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. The east Gooseberry fault runs along the southwest corner of the CIA boundary. The fault displacement is 300' to 400' causing it to act as a flow barrier separating ground water conditions within the CIA boundary from ground water conditions outside or to the west/southwest of the CIA boundary.

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 (Figure 3, 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 Skyline water monitoring program includes a total of 39 springs, 16 ground water wells, 45 stream sites, and a commitment to monitor sustained in-mine flows >800 gpm when sites are accessible. Figure 5 (Appendix A) illustrates all of the Skyline water 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).

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 well JC-1, 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 Dec. 2016) 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 1), 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 proposed Kinney #2 permit area as being limited to minor, localized perched aquifer systems in the Blackhawk formation. The Hiawatha coal seam to have been mined was found to be dry within the proposed permit boundary. More significant sources of groundwater were found east of the proposed 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

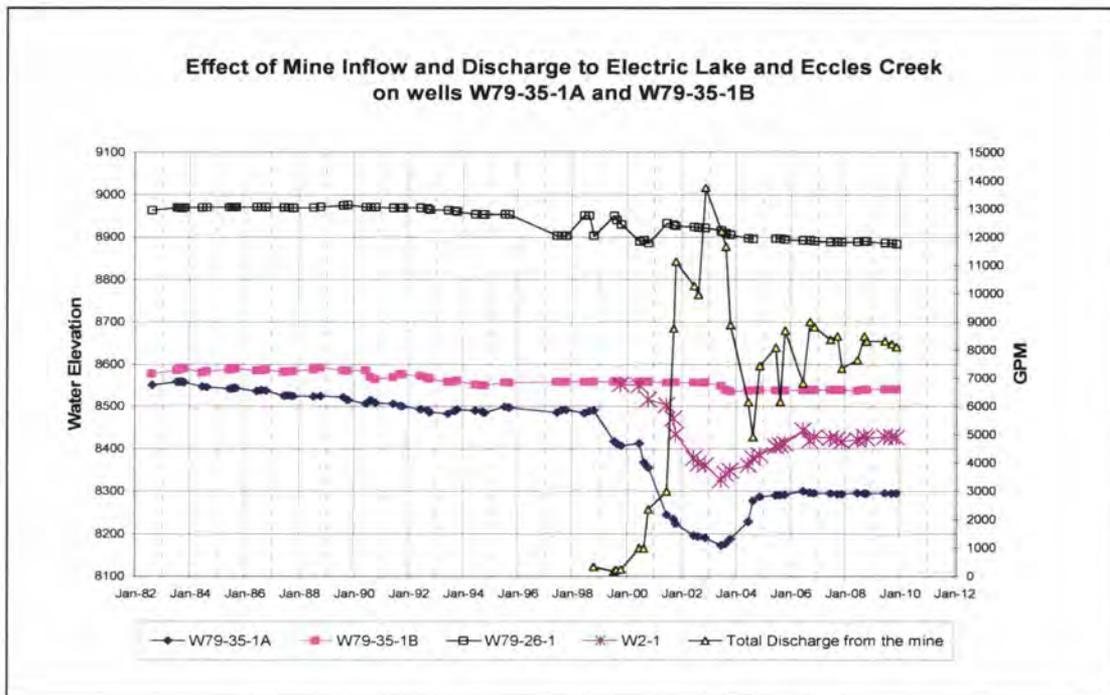
the Colombine coal seam or discharging groundwater that is moving horizontally along the Pleasant Valley fault system, or a combination of both. Baseline data is available for Sulfur Spring in Chapter 7 of the Kinney #2 PAP.

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 proposed Kinney #2 permit area 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 proposed Kinney #2 permit area. Drilling activities during the initial exploration phase for the proposed Kinney #2 mine found the Hiawatha coal seam to be dry in several borings drilled within the proposed permit boundary. The Hiawatha coal seam associated with proposed Kinney #2 is located approximately 280 feet above the Scofield Reservoir surface level and is essentially truncated by the Eastern Boundary Fault of Pleasant Valley. 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 1** – 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 13 deep 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. Exhibit 1 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.

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 (December 2016) 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 proposed permit boundary of the Kinney #2 Mine; 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 proposed permit boundary. 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 ( $2.4 \text{ ft}^2/\text{day}$ ). 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  $200 \text{ ft}^2/\text{day}$ . 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  $6 \times 10^{-6} \text{ ft}^{-1}$  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 proposed 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 proposed 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 proposed 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.

#### Groundwater Discharge to Streams

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 proposed Kinney #2 Mine was not to occur in Eagle Canyon graben where appreciable amounts of groundwater would likely be encountered

from the fault system. The Kinney #2 Permittee had proposed to monitor the groundwater quality within Eagle Canyon graben during the operational mining phase via an in-mine well. Because the proposed mining would not have crossed any major faults, groundwater flowing laterally along fault lines was not likely to be encountered as inflows during mining. Groundwater from overlying perched lenses of fluvial sand channels within the Blackhawk formation were 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 proposed 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 2. These inflows are cumulatively the largest ever to occur in an underground coal mine in Utah. However, as evidenced in Table 2, 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**

<b>Inflow Location</b>	<b>Date</b>	<b>Estimated Initial Flow, gpm</b>	<b>Estimated March 2003 Flow, gpm</b>	<b>Estimated March 2004 Flow, gpm</b>	<b>Estimated December 2004 Flow, gpm</b>	<b>2008 - 2009 Average Flow, gpm</b>
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						<b>3,400</b>
	<b>Totals</b>	<b>14,800</b>	<b>9,300</b>	<b>6,289</b>	<b>3,100</b>	<b>3,400</b>
	% of initial flow		63%	42%	21%	23%

Many investigations have been conducted by HCI and Petersen Hydrologic regarding Skyline mine in-flows and the hydrogeology within and adjacent to mine workings, including: the older Appendices C, G, H,I, J, K; and the most recent additions including Appendix N- *Investigation of Groundwater and Surface-water Systems In the Flat Canyon Tract and Adjacent Area Probable Hydrologic Consequences of Coal Mining in the Flat Canyon Tract, Sanpete County Utah, 2017*; Appendix O-*Groundwater Conditions in The Star Point Sandstone In the Vicinity of the Skyline Mine, 2014*; Appendix P-*Addendum to: Investigation of Fault-related Groundwater Inflows at the Skyline Mine, 2016*; and Appendix R-*Update of Groundwater Flow Model Skyline Mine Project, Utah, 2016*. These studies agree the major water source encountered within the mine is from the Star Point Sandstone. 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 <sup>14</sup>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 small component of modern water in the inflows, which is probably slowly introduced from up-gradient recharge sources such as ground water held in faults bisecting the permeable Star Point unit or where the Star Point Sandstone surficially outcrops.

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 1 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 proposed 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 PAP.

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 proposed Kinney #2 mine was to have been provided by the Town of Scofield via a connection from Mud Creek.

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. 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 is considered a mine-dewatering well. Peterson states, "The purpose of the well was to intercept groundwater in the fault/fracture zone associated with the then recently intercepted 10-Left inflow prior to its flowing into the Skyline Mine underground workings" (2016). This continues to be the case except now instead of flowing into mine workings, if JC-1 were to be shut off the groundwater would flow into Mine No. 2's mine pool. JC-1 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**

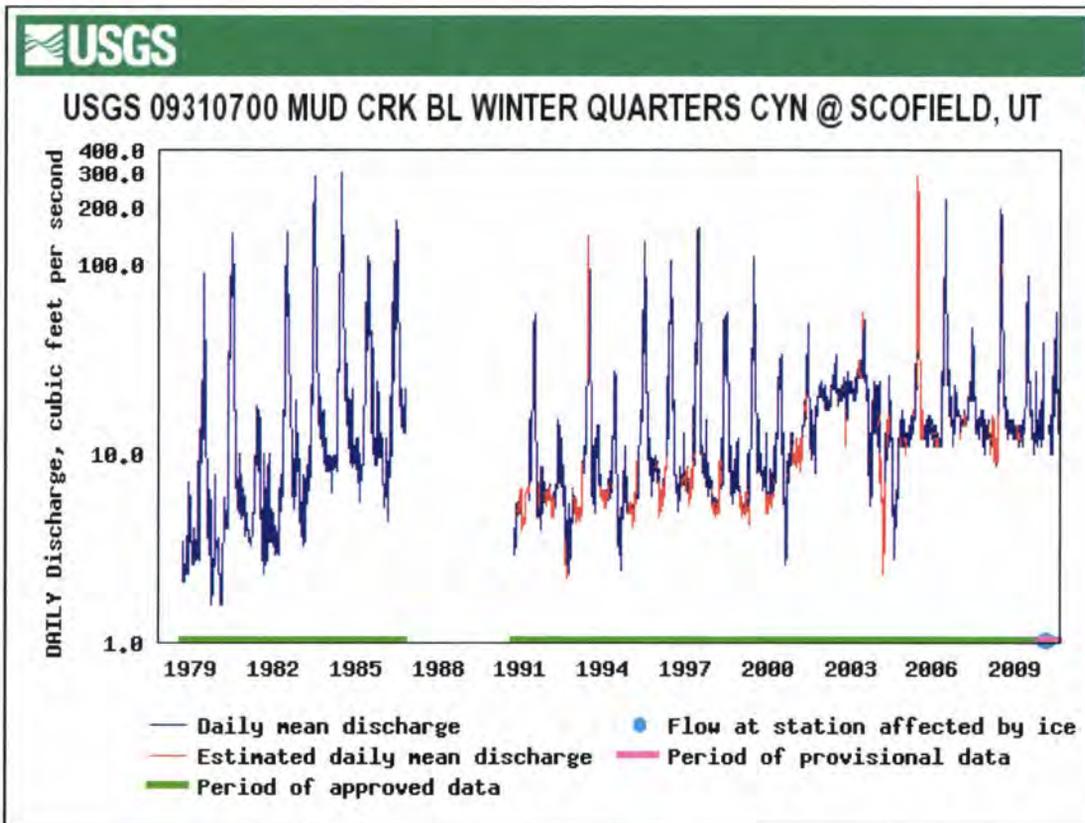
Surface water is monitored for quantity and quality at various stations operated by the USGS and the coal mine operators. Locations are shown on Figure 5 (Appendix A) and analysis results are found in the Skyline, White Oak MRP's and Kinney #2 PAP, the Mud Creek /Huntington Creek CHIA, the Division's 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 1<sup>st</sup> 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

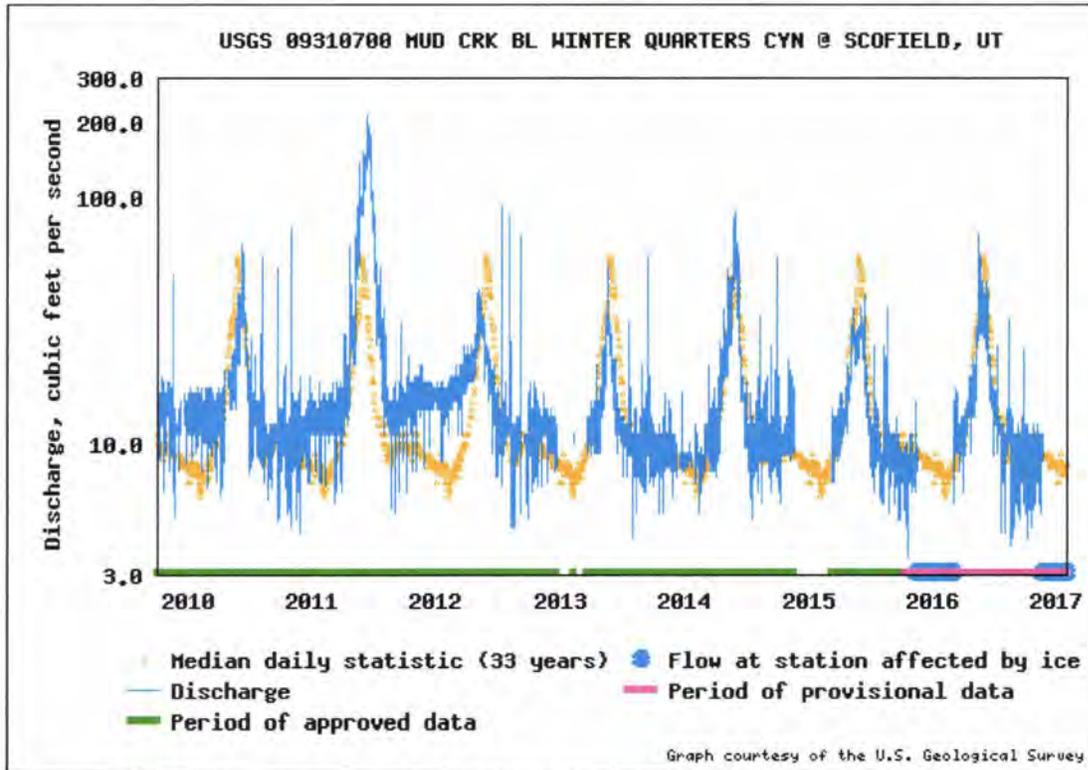
Average annual yield from the 22,000-acre Mud Creek drainage, as determined from continuous USGS measurements from 1978 to 2010 at station 09310700, was 16 cfs (equal to 6.3 inches of rain over the entire drainage per year, or 11,600 acre-ft/yr). Discharge rates are summarized in Table 3 and shown graphically in Exhibit 2. 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). All excess water produced in active mining areas and from the two mine pools must be pumped to Eccles and Mud Creek, the discharge is still averaging around 2,200 to 2,300 gpm. From September 2001 through December 2016 an additional 107,868 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/Mine-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 2 – Daily Mean Discharge of Mud Creek measured at USGS flow monitoring station 09310700 at Scofield, Utah.**



**Exhibit 2 (continued)** – 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.

In 2013, Skyline modified their lease to include several ephemeral washes that drain into Upper Fish Creek. Upper Fish Creek is a perennial creek flowing into Scofield Reservoir. The USGS has been collecting discharge data along Upper Fish Creek at station 09310500. An evaluation of data collected indicates that Upper Fish Creek discharge varies greatly by season and has an average flow rate of 79 cfs. The creek is fed by numerous tributaries, three of which are within the 2013 North Lease expansion area. These are the two forks of Andrew Dairy Creek and Wife Creek. Andrew Dairy Creek has been dry since monitoring started in 2012. Wife Creek's flow varies seasonally but since monitoring began in 2012, just above its confluence with Upper Fish Creek, Wife Creek has had a minimum flow of 0.45 gpm and a maximum flow of 40.4 gpm. Fish Creek is the greatest tributary contributor to Scofield Reservoir (Peterson, 2013, p. 6).

Skyline's 2017 Flat Canyon lease addition includes stream monitoring points above within and below the permit area along perennial streams within and adjacent to the permit area. The stream monitoring sites are on Boulger Creek, Flat Canyon Creek, Upper Huntington Creek, Swens Creek and Little Swens Creek.

The surface water hydrologic regime in the proposed 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 proposed Kinney #2 permit area in a west-east direction. None of these small washes had been observed 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 were identified along the Eagle Canyon Graben east of the Kinney #2 proposed 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.

Loughlin Water Associates reviewed all available data and reports through 2016 and concluded the following, "According to CFC (2005), neither Solomon (2005) nor Ozark Underground Lab (2005) present definitive evidence that the water presumably lost from Electric Lake between 2001 and 2003 was the result of a direct conduit via faults or fractures existing between Electric Lake and the mine. Groundwater inflows to the mine do contain small amounts of modern water, based on small tritium concentrations. Modern water could be sourced from Electric Lake through seepage losses into the Blackhawk and Star Point Sandstone formations or from recharge directly to the Star Point Sandstone where it crops out. Dye concentrations in the JC wells were several parts per billion (ppb) or less and the results were not convincing. The predicted rise in tritium concentration hypothesized by Solomon (2005) did not occur."

“In our opinion, if Electric Lake was losing up to 5,000 directly into the mine, then the evidence from these studies should have been more conclusive or convincing. Additionally, large mine inflows began in March 1999, approximately two years prior to observed drops in lake levels, as shown on Figure 10. It is likely that depleted reservoir levels were triggered by drought conditions that persisted between 1999 and 2003. Figure 10 (Figure 13 within this CHIA) also shows that Electric Lake returned to normal levels around 2006 and approached maximum reservoir height and capacity each year between 2008 and 2011, while the mine was discharging between about 3,000 to 4,000 gpm. Figure 10 also shows that during the time when well JC-1 was not pumping or pumping at a lower rate, the reservoir height remained within the normal range that was noted before 1999.” (Loughlin, 2016)

#### 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 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 (Dec. 2016) operates at around 4,000 gpm. Through December 2016, approximately 85,156 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. Since 2005 mine discharges have trended downward (Figure 10).

The Winter Quarters / North Lease area has minimal, if any effect on mine water discharge volumes. 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.

Mine inflows into the proposed Kinney #2 workings were 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 would not have been 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 proposed 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.

Baseline TDS data from the proposed Kinney #2 mine for Mud Creek 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
<b>Eccles Creek just above confluence with Mud Creek</b>				
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
<b>Mud Creek below White Oak Loadout</b>				
USGS	1979 - 1984	315 mg/L	390 mg/L	170 mg/L

Gauging Station	Date	Average	Maximum	Minimum
09310700				
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 proposed 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

Monitoring Station	Date	Average	Maximum	Minimum
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 springs in the proposed Kinney #2 permit 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 proposed 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 proposed 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 was 454 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 41 mg/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 electro-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 proposed 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](http://www.waterquality.utah.gov/TMDL/Scofield_Res_TMDL.pdf)), Kinney #2 mine would have had to modify their water monitoring plan for total phosphate instead of orthophosphate.

Nitrate did not exceed concentrations above 1.5 mg/L in surface water samples from the proposed Kinney #2. These concentrations were 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 <sup>(a)</sup>	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 0.44	0.69	**

Sulfur Spring	0.022	0.10		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
<b>Sampled by UDWR July 1988 (UDWR, 1988)</b>						
Sed. Pond Effluent	**	**	**	**	0.045	**
<b>Sampled by the Division 28 September, 1988</b>						
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
<b>Sampled by the Division 03 October, 1988</b>						
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
<b>Sampled by UDWR October 1988 (UDWR, 1988)</b>						
Sed. Pond Effluent	0.09	14.0	**	**	0.06	**
<b>Sampled by Skyline October 1988 (Utah Fuel Company, 1988)</b>						
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**

Sampled by the Division	Nitrite				Nitrate			
	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	*	*	<0.05	<0.05	*	*	<0.05	1.11

Outfall								
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\* 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 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 proposed permit area of the Kinney #2 mine identified 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 were planned for the Kinney #2 mine that would have had 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 <sup>2</sup>	Biomass (g/m <sup>2</sup> )	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<sup>2</sup>.

\*\* 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 electro-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 proposed 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 proposed Kinney #2 PAP, 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 proposed Kinney #2 mine was designed to control runoff in the disturbed area by directing all drainage to a sediment pond.

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

### **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 2, 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 proposed Kinney #2 mine is directly adjacent east of the Pleasant Valley alluvial valley floor created by Mud Creek draining into Scofield Reservoir. Mining was to occur well above the regional water table (as presented in Chapter 7 of the Kinney #2 PAP). The coal seam to have been 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 was 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 posed minimal potential for interrupting or impacting these drainages due to its proximity to the drainages and the utilization of first mining practices only (i.e. no planned subsidence). Additional ground water investigations were to have been conducted as mining progressed eastward in the proposed Kinney #2 Mine.

Additional contributions of flow from the Kinney #2 mine were 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.

### **Ground Water - Baseline Conditions**

#### **Ground Water Quality - General**

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 indicated 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 proposed 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.

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 proposed 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 proposed Kinney #2 area springs averaged at non-detectable concentrations.

Groundwater concentrations from the proposed Kinney #2 mine from three monitoring wells 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 showed spikes in iron concentrations since December of 2010. This well, along with CR-10-11 were installed in July 2010 in order to better characterize groundwater in Pleasant Valley to the west of the proposed 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 proposed 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 only demonstrated flow three times. Therefore, these concentrations of aluminum were not identified as likely 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 proposed 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 proposed 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**

	Estimated Flow (gpm)	pH	Dissolved Oxygen (ppm)	Specific Conductivity (Us)	Temp ( C )
<b>SPRINGS</b>					
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 1<sup>st</sup> 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 3<sup>rd</sup> 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.

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<sub>50</sub> 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 proposed 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.

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.

In the case of the proposed Kinney #2 mine, only limited amounts of groundwater were 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 were 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 has a minimal if not 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.

The potential for interruptions of groundwater flow patterns were identified for the proposed 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 Permittee had 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 were to have occurred, the Permittee had 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	<sup>M</sup> Sediments <sup>M</sup> Fish and Macroinvertebrates	<sup>M</sup> Flow <sup>M</sup> Sediments <sup>M</sup> Fish and Macroinvertebrates	<sup>M</sup> Sediments <sup>M</sup> TDS <sup>M</sup> pH <sup>M</sup> Nutrients <sup>M</sup> Specific cations and anions <sup>M</sup> Oil and Grease <sup>M</sup> Fish and Macroinvertebrates	<sup>M</sup> Flow <sup>M</sup> Sediments <sup>M</sup> Fish and Macroinvertebrates	<sup>M</sup> Flow <sup>M</sup> Sediments <sup>M</sup> Fish and Macroinvertebrates <sup>M</sup> TDS <sup>M</sup> pH <sup>M</sup> Nutrients <sup>M</sup> Specific cations and anions	<sup>M</sup> Flow Age dating Tracer dye Geophysics Groundwater monitoring Age dating	<sup>M</sup> Flow
Possible Cumulative Effect Outside Permit Areas	YES	YES	YES	YES	YES	YES	YES
POTENTIAL HYDROLOGIC IMPACTS	<sup>M</sup> 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.	<sup>M</sup> Flooding or streamflow alteration - increase or decrease in streamflow.	<sup>M</sup> 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.	<sup>M</sup> Subsidence damage to springs and streams - increased sediment load, diminution of flow, physical barrier to fish migration.	<sup>M</sup> 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.	<sup>M</sup> Loss of ground water or surface water availability - water rights, wildlife uses.	<sup>M</sup> Reduction of flow due to inter-basin 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 proposed 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 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<sub>50</sub> 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.

There is no water quality standard for oil and grease, but the UPDES permit limit for the White Oak and Skyline Mine 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  $^{210}\text{Pb}$  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:

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

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 disturbed approximately 8 acres near the center of Section 1, T. 13S, R. 6E. The Winter Quarters Ventilation Fan facility operates 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 2017, no adverse impacts are being observed for the Skyline mine, but any possible adverse trends are being documented.

### **Quantity**

#### **Increased Streamflow**

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.

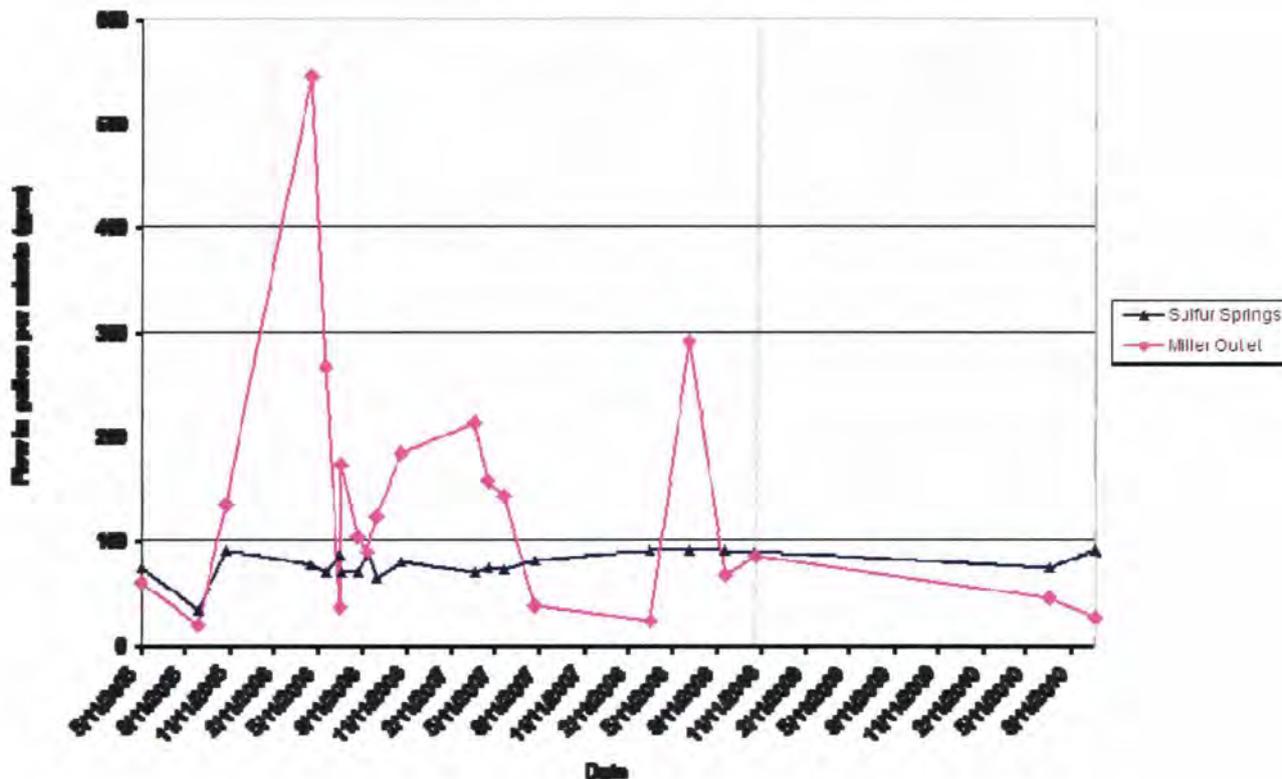
In October of 2003, pumping of mine inflow waters from Skyline Mine into Eccles Creek increased the streamflow from normal amounts of approximately 300 gpm, to as high as 10,500 gpm. From August 2001 to December 2005, the average discharge to Eccles Creek has been 5,601 gpm. Eccles Creek is well armored 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.

In Volume 2 Appendix N of the PHC, it is contemplated that discharges from the Skyline Mine during mining of the Flat Canyon Lease will increase to as much as 15,000 gpm with short duration discharges as high as 30,000 gpm. EarthFax Engineering resurveyed the cross-sections and longitudinal profiles in 2015 and found the stream bed and banks have not changed since the last survey in 2004. This suggests the stream bed is well armored and the banks are stabilized by vegetation and large woody debris. No major changes in stream geomorphology are expected during the anticipated increase in mine water discharges because of the streams resilience and resistance to downcutting or eroding.

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).

An increase of flow to the Miller Creek approximately one and one half miles north of the proposed Kinney #2 permit boundary was identified as a possibility 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.

**Surface Water Discharges into Scofield Reservoir**



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<sup>2</sup> 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<sub>2</sub>. The δ<sup>13</sup>C composition of the groundwater shows that it has not been influenced by external sources of CO<sub>2</sub>.

- 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<sub>2</sub>, Ar). <sup>14</sup>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 ± 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 modern 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- July 14 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.

**VII.** Loughlin Water Associates reviewed all available data and reports, including these mentioned here, in 2016 and concluded the following, “According to CFC (2005), neither Solomon (2005) nor Ozark Underground Lab (2005) present definitive evidence that the water presumably lost from Electric Lake between 2001 and 2003 was the result of a direct conduit via faults or fractures existing between Electric Lake and the mine. Groundwater inflows to the mine do contain small amounts of modern water, based on small tritium concentrations. Modern water could be sourced from Electric Lake through seepage losses into the Blackhawk and Star Point Sandstone formations or from recharge directly to the Star Point Sandstone where it crops out. Dye concentrations in the JC wells were several parts per billion (ppb) or less and the results were not convincing. The predicted rise in tritium concentration hypothesized by Solomon (2005) did not occur.”

“In our opinion, if Electric Lake was losing up to 5,000 directly into the mine, then the evidence from these studies should have been more conclusive or convincing. Additionally, large mine inflows began in March 1999, approximately two years prior to observed drops in lake levels, as shown on Figure 10. It is likely that depleted reservoir levels were triggered by drought conditions that persisted between 1999 and 2003. Figure 10 also shows that Electric Lake returned to normal levels around 2006 and approached maximum reservoir height and capacity each year between 2008 and 2011, while the mine was discharging between about 3,000 to 4,000 gpm. Figure 10 also shows that during the time when well JC-1 was not pumping or pumping at a lower rate, the reservoir height remained within the normal range that was noted before 1999.” (Loughlin, 2016)

#### 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.

## **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. 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 proposed Kinney #2 mine encountered only limited amounts of groundwater resources based on initial drilling activities. Data collected from the springs and seeps in and around the proposed permit area did not demonstrate 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 indicated a lack of significant groundwater movement in the subsurface. Greater groundwater movement is observed along the faults that bound the proposed Kinney #2 mine to the east and the west; however mining was not anticipated to cross these faults. As a result, the potential to encounter significant volumes of in-mine water was considered minimal.

### **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. The Blackhawk overburden will continue to act as an aquitard to the downward migration of surface water resources. The discontinuous clay lenses act to seal faults and fractures and subsidence cracks that propagate up from the workings. The confining pressure elevating the potentiometric surface above the elevation of the Star Point Sandstone will be locally relieved as mine workings cross faults. The large regional aquifer will continue to be under confined conditions causing the elevated potentiometric head to flow along a gradient towards workings and upwell at fault crossings within the mine. The pressure release from primary porosity within the Star Point Sandstone occurs very slowly at surface springs, faults/fractures and directly into the mine workings allowing it to remain under confining conditions for many years even as it is drawn down. This slow release of primary porosity to secondary flow paths will continue to elevate the potentiometric head within faults, further preventing connectivity with surface water systems along faults that may be perceived as preferential flow paths.

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 proposed 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. 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 proposed Kinney #2 mine were expected to be negligible. The approximate one square mile size of the permit boundary and a 38-acre surface disturbance area would have limited the amount of pollutants that could ultimately discharge to sensitive water resources in the region. Furthermore, the proposed surface facilities disturbance would have complied with the Surface Mining Control and Reclamation Act with all disturbed drainage being directed to a sediment pond.

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.

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 by the 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. The White Oak pad at the Eccles Creek crossing was removed in 2015. The culvert passing under the pad was in such disrepair it was acting as a fish barrier to upstream movement. When the pad was removed the stream was restored to be an open channel free flowing system once again and fish are able to migrate past this location further up Eccles Creek.

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.

## **IX. STATEMENT OF FINDINGS**

No evidence of material damage from the actual mining operations has been found. No probability of material damage from actual or anticipated mining operations has been found. The actual and proposed coal mining and reclamation operations have been designed to prevent material damage to the hydrologic balance outside the permit areas.

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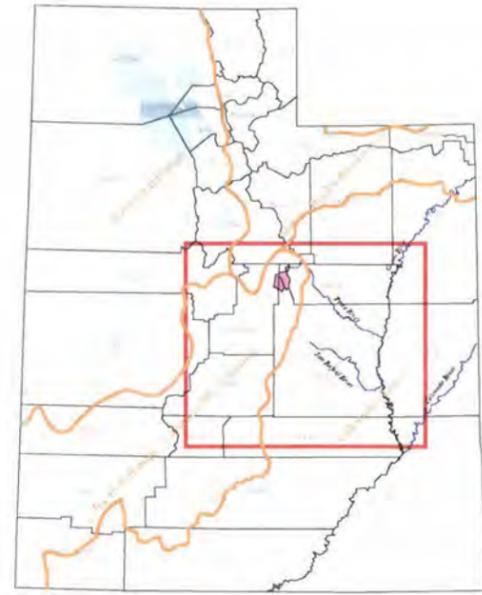
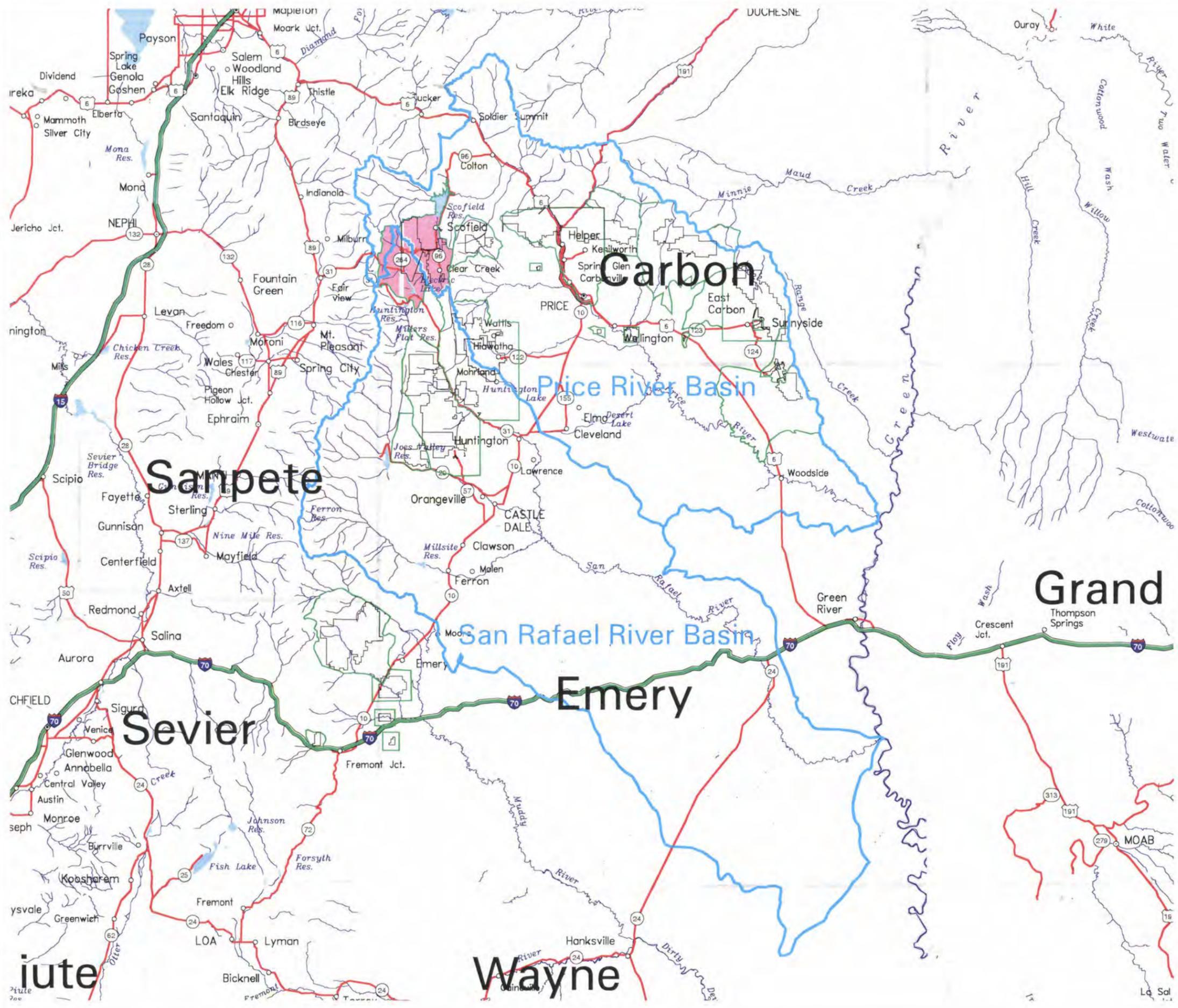
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# **Appendix A**



Location Map

- Mud Creek - Upper Huntington Creek Basin CIA Area
- Coal Fields
- Coal Permit Areas
- County Boundary
- CIA Areas
- Hydrologic Unit Boundary


**State of Utah**  
 Department of Natural Resources  
 Division of Oil, Gas and Mining

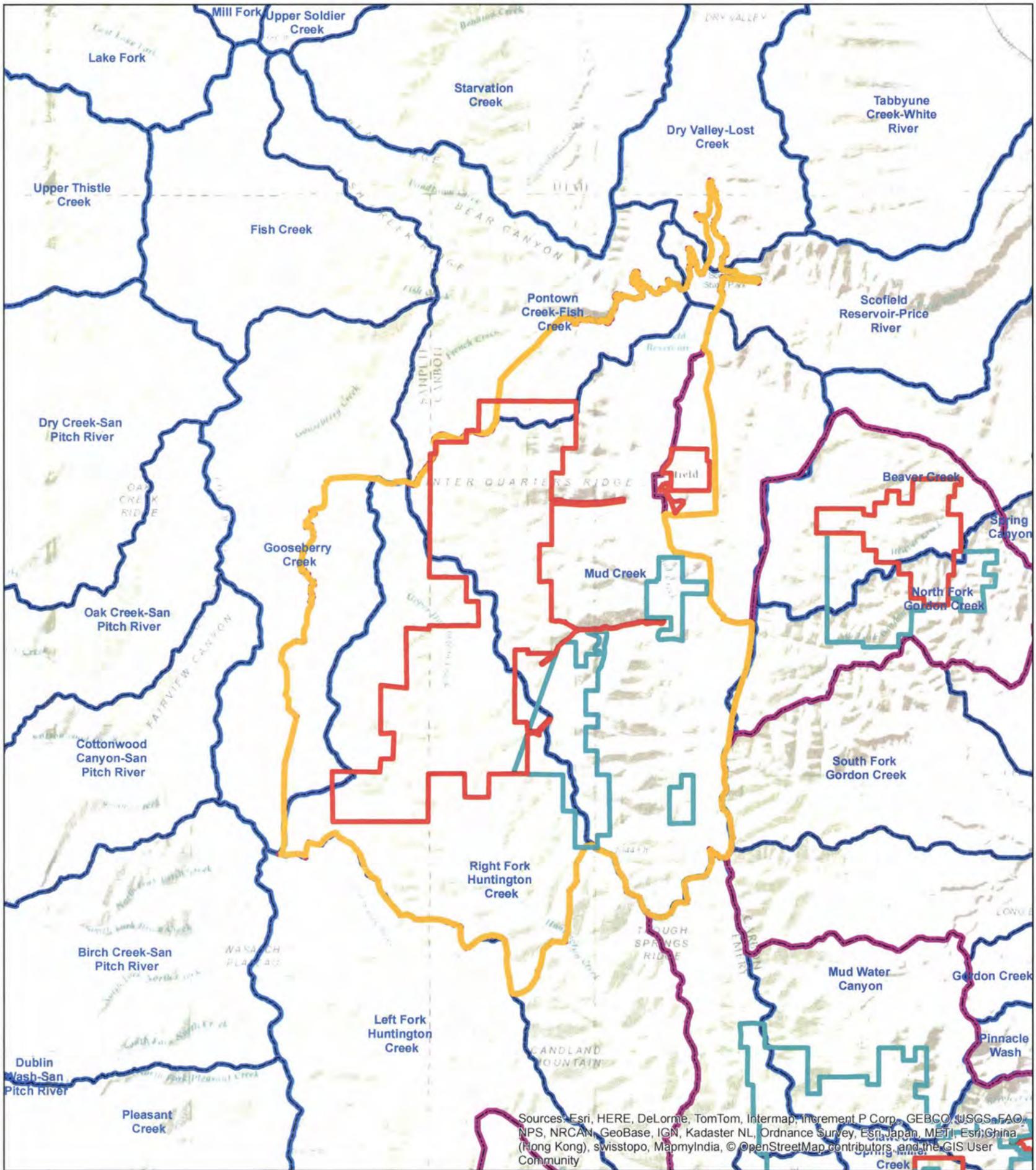
  
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**Cumulative Hydrologic Impact Assessment**  
**Mud Creek - Upper Huntington Creek Basin**

**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

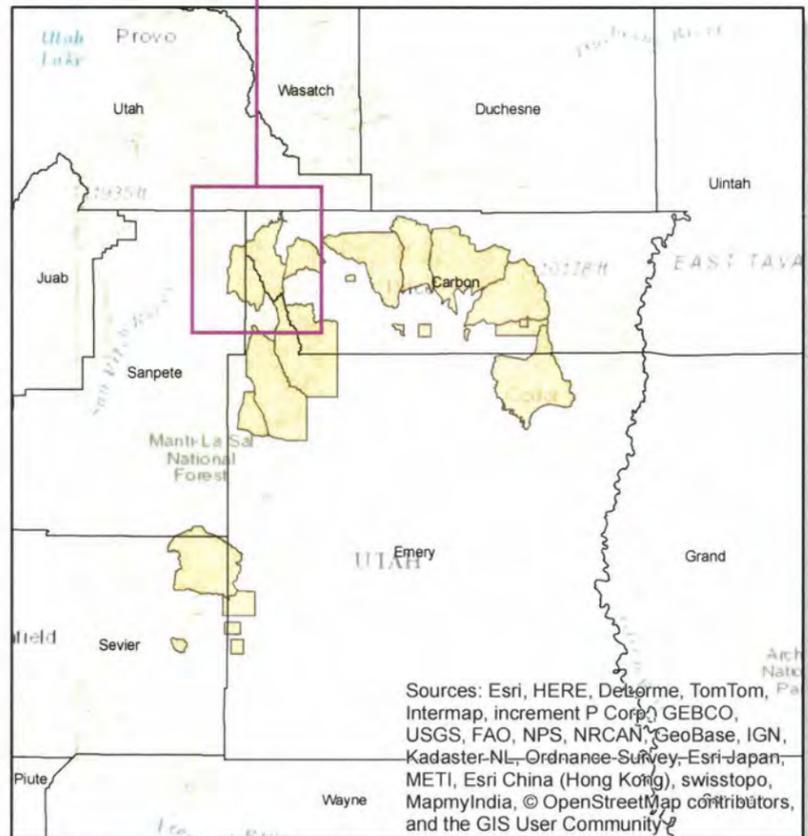
**Figure 2**  
**Location Map**  
January 2017

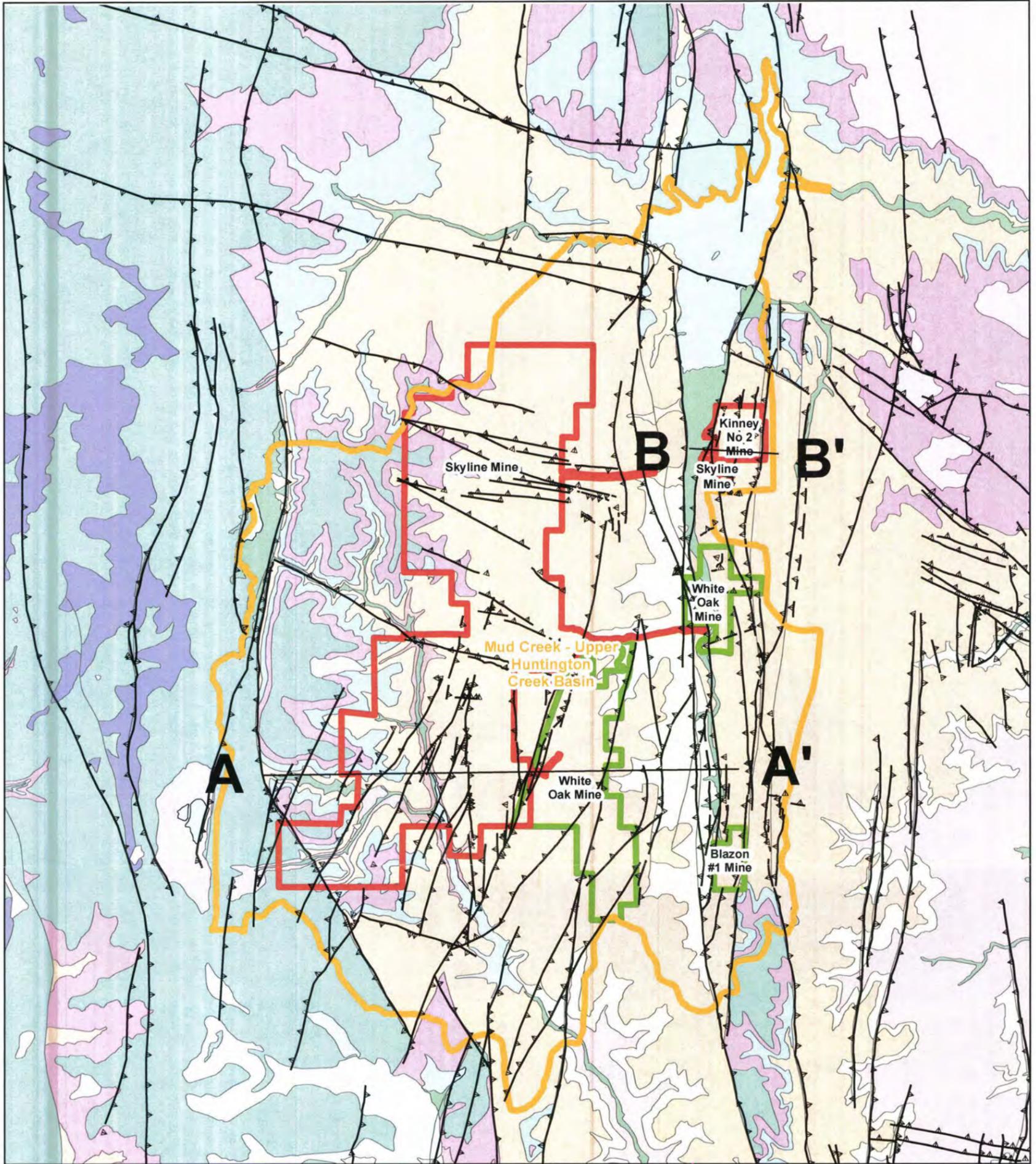
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- STATUS**
- █ Adjacent Area-Area Authorized for Coal Mining & Reclamation
  - █ Mud Creek - Upper Huntington Creek Basin
  - █ Other CIA Areas
  - █ Reclaimed
  - █ Subwatersheds
  - █ Huc10



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# Cumulative Impact Area Mud Creek - Upper Huntington Creek Basin

## Figure 3 Geology Map

January 2017

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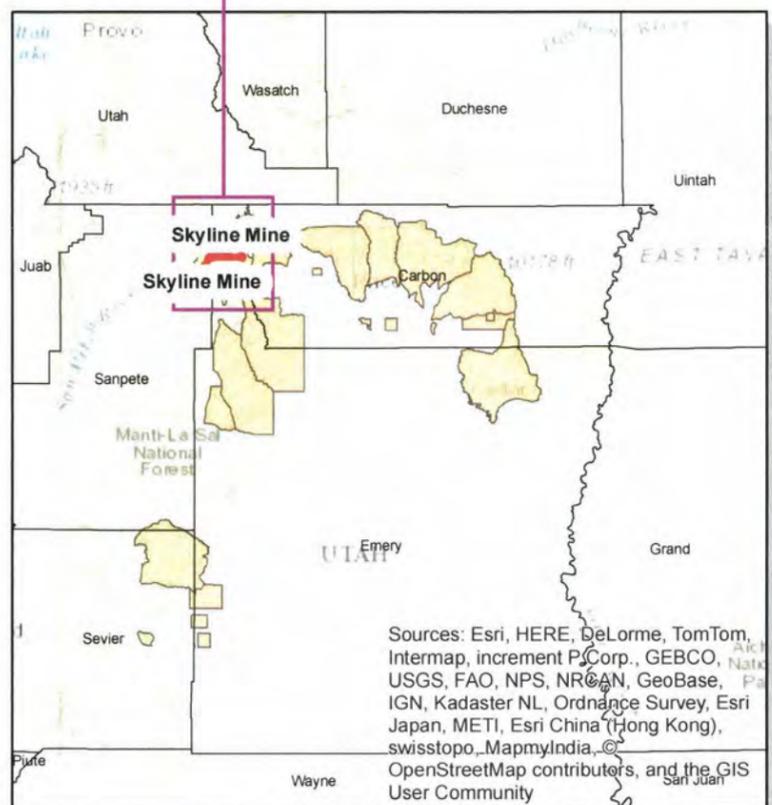
- |  |   |  |
|--|---|--|
| ▲ Faults                                   | Castlegate Sandstone                                    | Landslide blocks of the Green River Formation          |
| — Mud Creek - Upper Huntington Creek Basin | Coalesced alluvial-fan deposits                         | Mass-wasting deposits                                  |
| <b>Coal Permit Areas</b>                   | Colluvium   | Morainic deposits                                      |
| <b>STATUS</b>                              | Colton Formation  | North Horn Formation                                   |
| — Active                                   | Colton Formation and Flagstaff Limestone, undivided     | Pediment mantle  |
| — Reclaimed                                | Emery Sandstone Member of the Mancos Shale              | Price River Formation                                  |
| <b>Geology</b>                             | Flagstaff Limestone                                     | Star Point Sandstone                                   |
| <b>UNITNAME</b>                            | Flagstaff Limestone and North Horn Formation, undivided | Terrace deposits                                       |
| — Alluvium                                 | Green River Formation                                   | Upper part of the Blue Gate Member of the Mancos Shale |
| — Backhawk Formation                       | Indiana Group, undivided                                | Water  |
|  | Landslide deposits                                      |  |

A-A' Location approximate



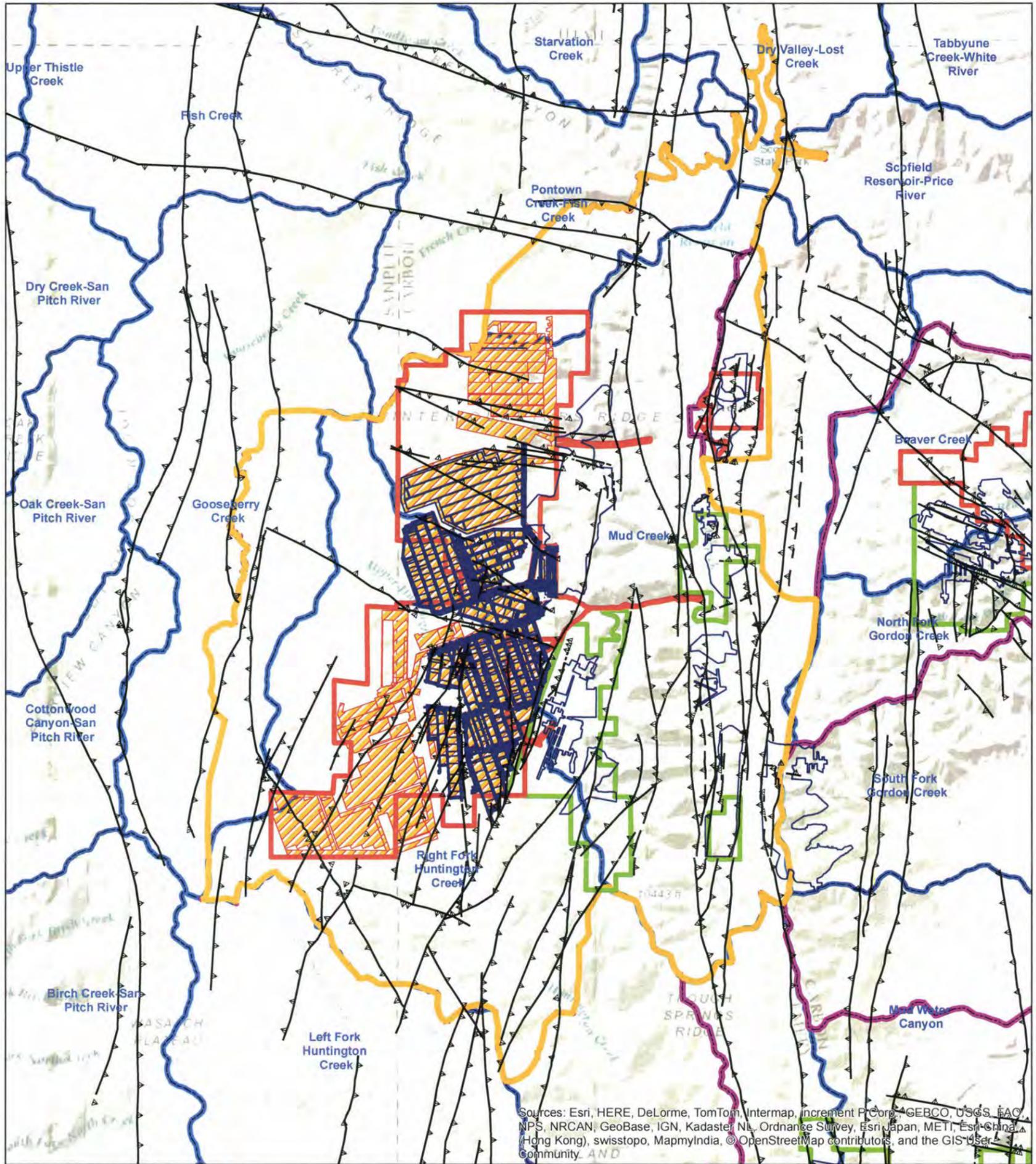
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Sources: Esri, HERE, DeLorme, TomTom, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, MapmyIndia, © OpenStreetMap contributors, and the GIS User Community

### CIA Areas



Sources: Esri, HERE, DeLorme, TomTom, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, MapmyIndia, © OpenStreetMap contributors, and the GIS User Community.

# Cumulative Impact Area Mud Creek - Upper Huntington Creek Basin

## Figure 3a

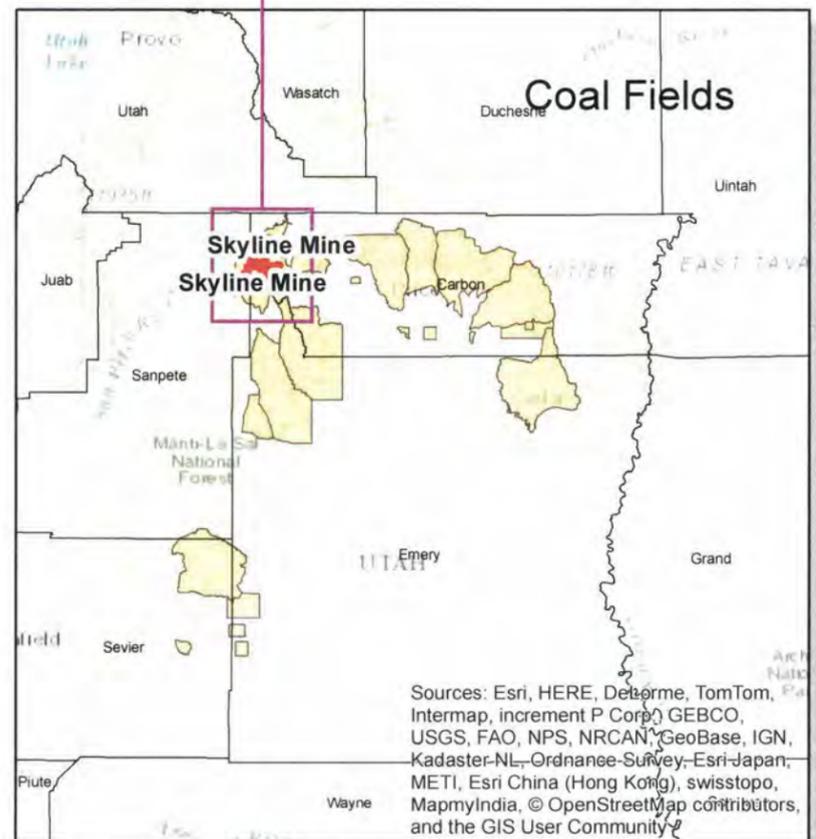
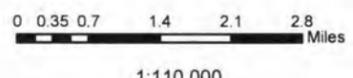
**Skyline Mine Mining and Geology**

January 2017

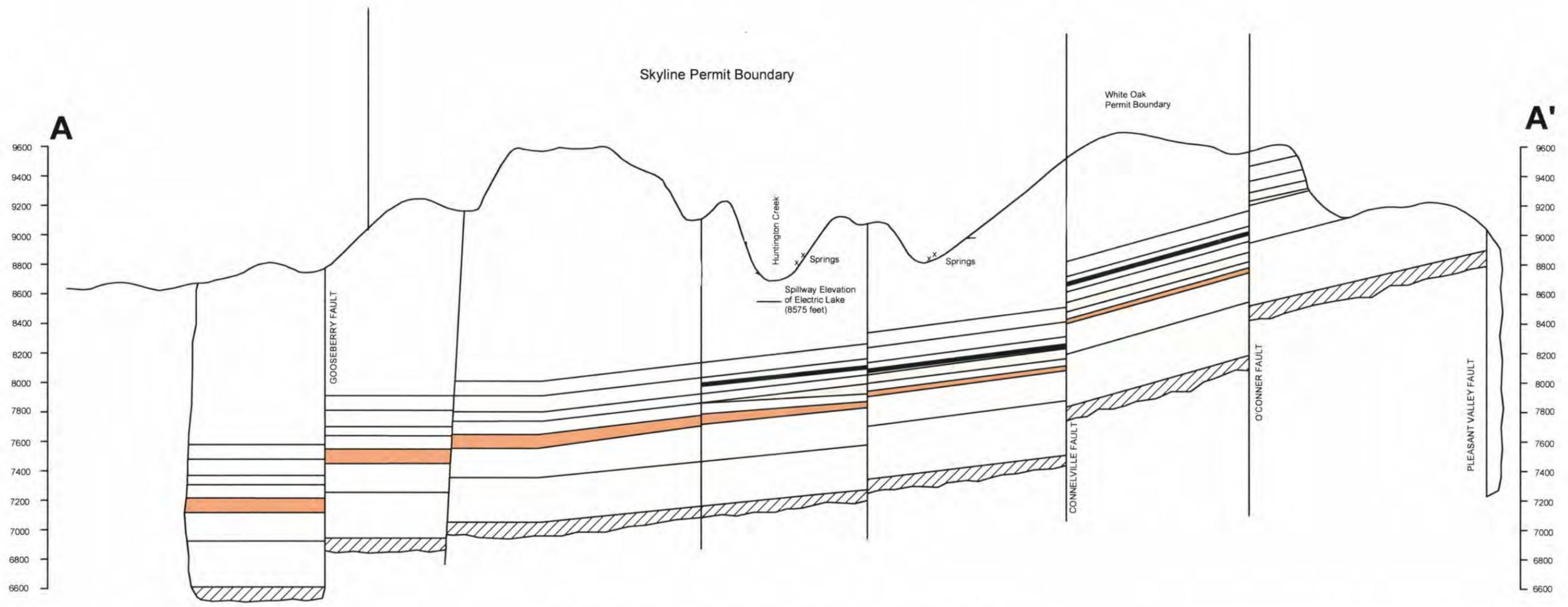
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**Legend**

- Faults
- Mine Areas**
- Adjacent Area: Area Authorized for Coal Mining & Reclamation
- Reclaimed
- Mud Creek - Upper Huntington Creek Basin
- Coal Mine Workings
- Subwatersheds
- Other CIA Areas



Sources: Esri, HERE, DeLorme, TomTom, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster-NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, MapmyIndia, © OpenStreetMap contributors, and the GIS User Community.



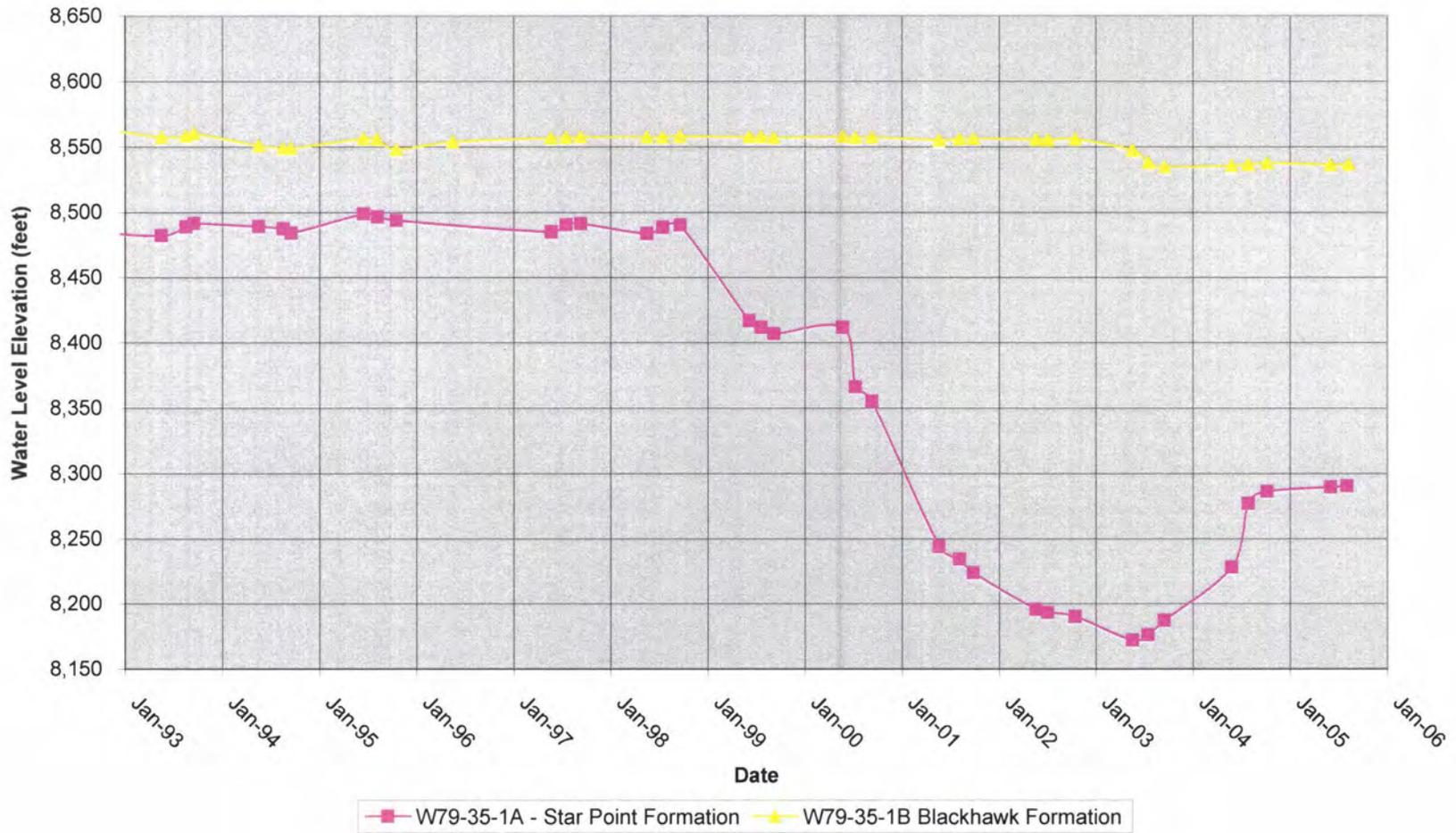
Hydrogeologic Cross-Section

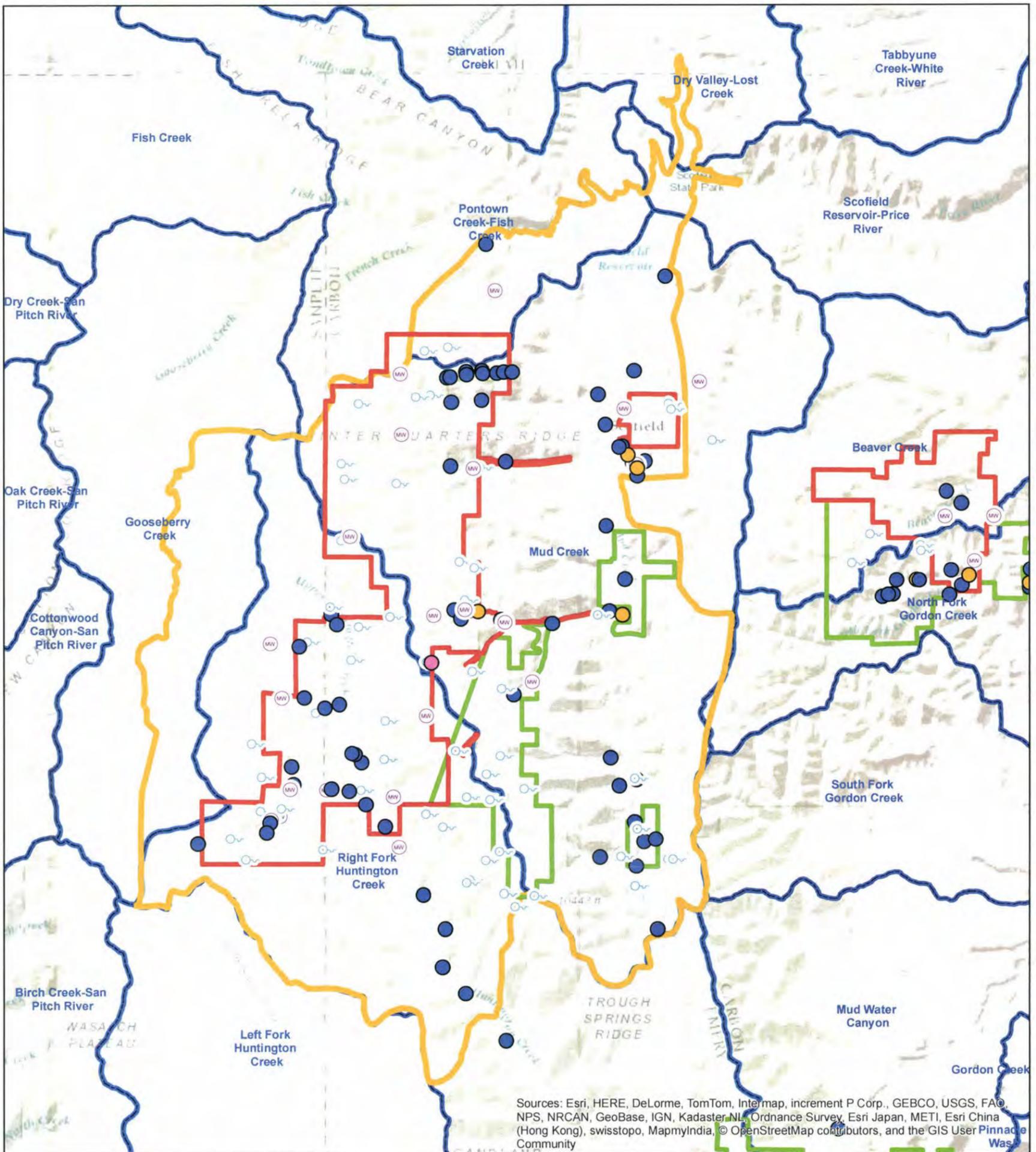
Cumulative Impact Area  
Mud Creek - Upper  
Huntington Creek Basin

Figure 4

No Flow Boundary
  Panther Sandstone
  Starpoint Sandstone
  Storrs Sandstone

Figure 4a - Star Point Formation / Blackhawk Formation Well Comparison

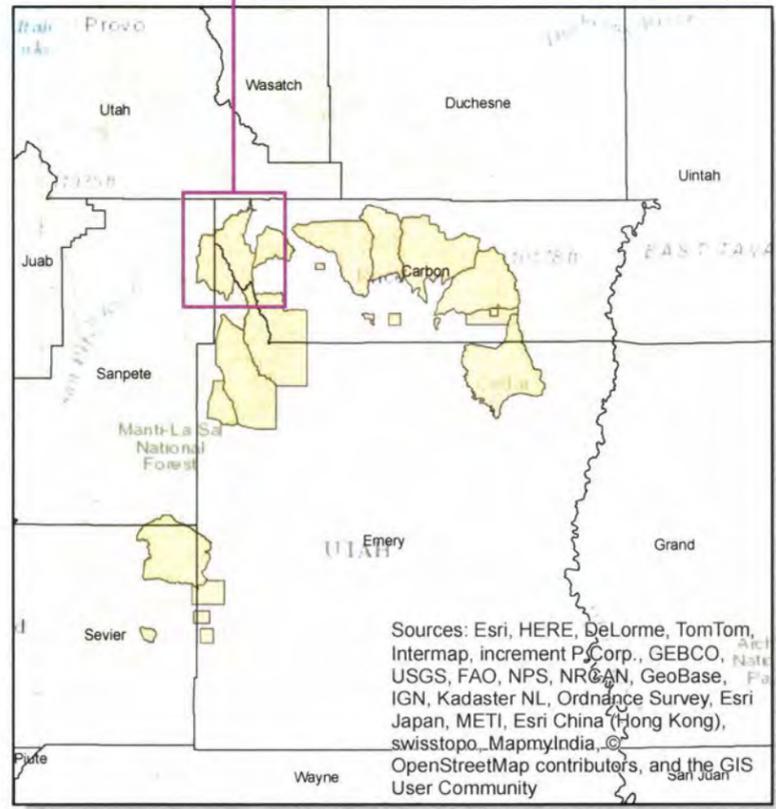




Sources: Esri, HERE, DeLorme, TomTom, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, MapmyIndia, © OpenStreetMap contributors, and the GIS User Community

# Cumulative Impact Area Mud Creek - Upper Huntington Creek Basin

**Figure 5**  
**Hydrology Map**  
January 2017



Sources: Esri, HERE, DeLorme, TomTom, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, MapmyIndia, © OpenStreetMap contributors, and the GIS User Community

- Legend**
- Water Monitoring Sites**
    - UPDES Permit discharge point
    - Stream
    - Other
    - Spring
    - Well
  - Mine Areas**
    - Adjacent Area: Area Authorized for Coal Mining & Reclamation
    - Reclaimed
    - Mud Creek - Upper Huntington Creek Basin
  - STATUS**
    - <all other values>
  - Subwatersheds**



0 0.25 0.5 1 1.5 2 Miles

1:110,000

Figure 5a - Springs vs. SWSI

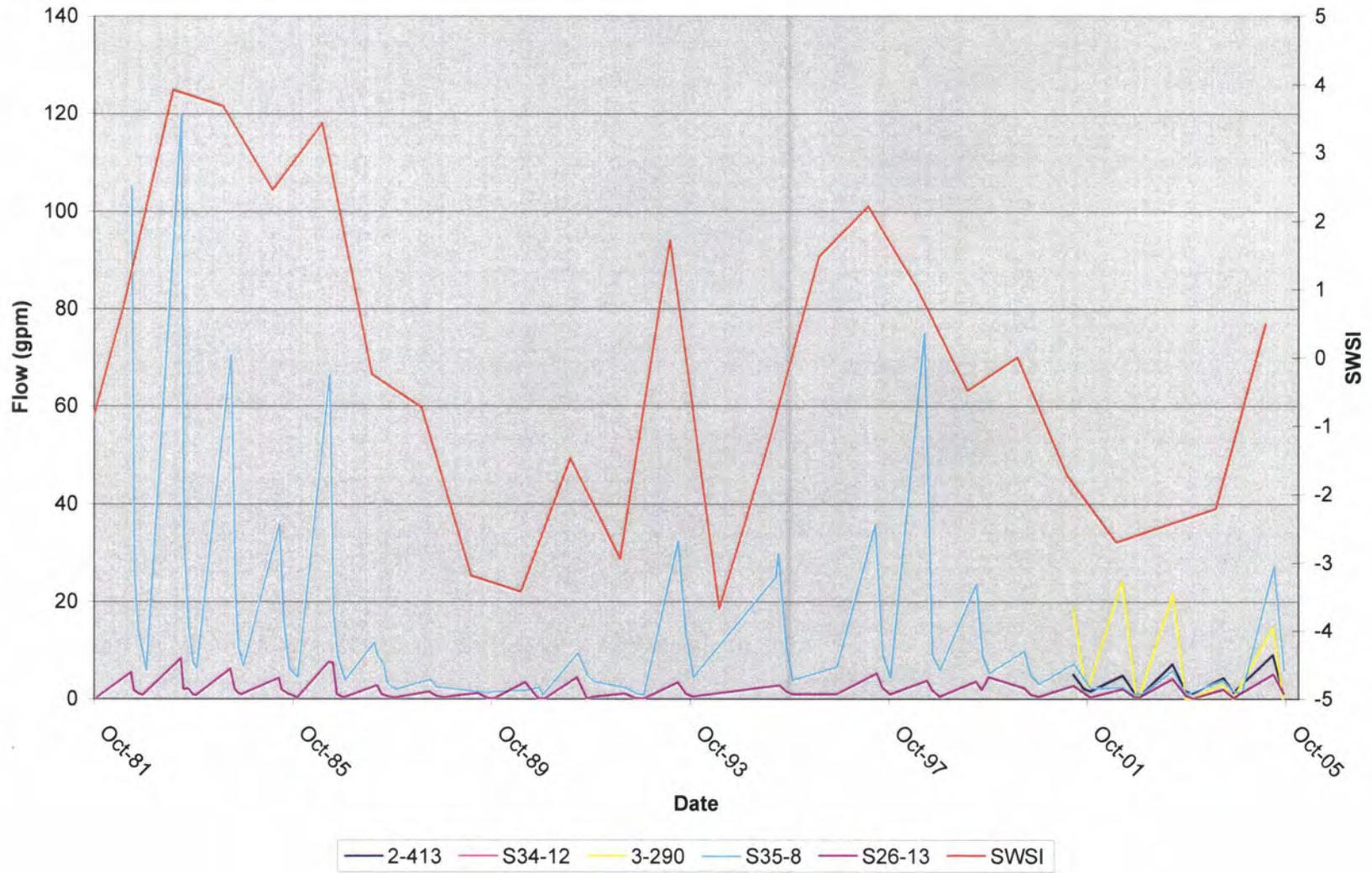
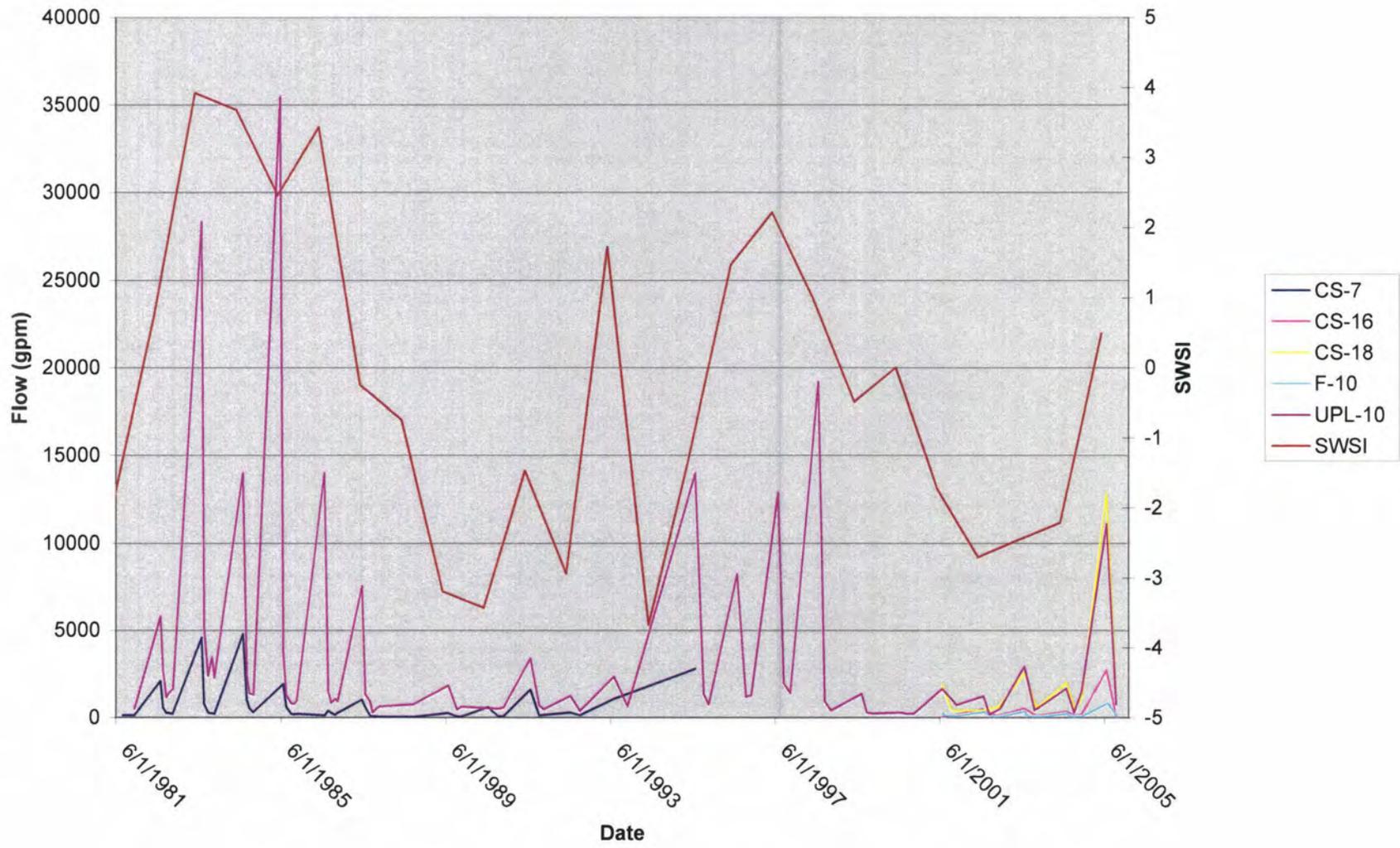
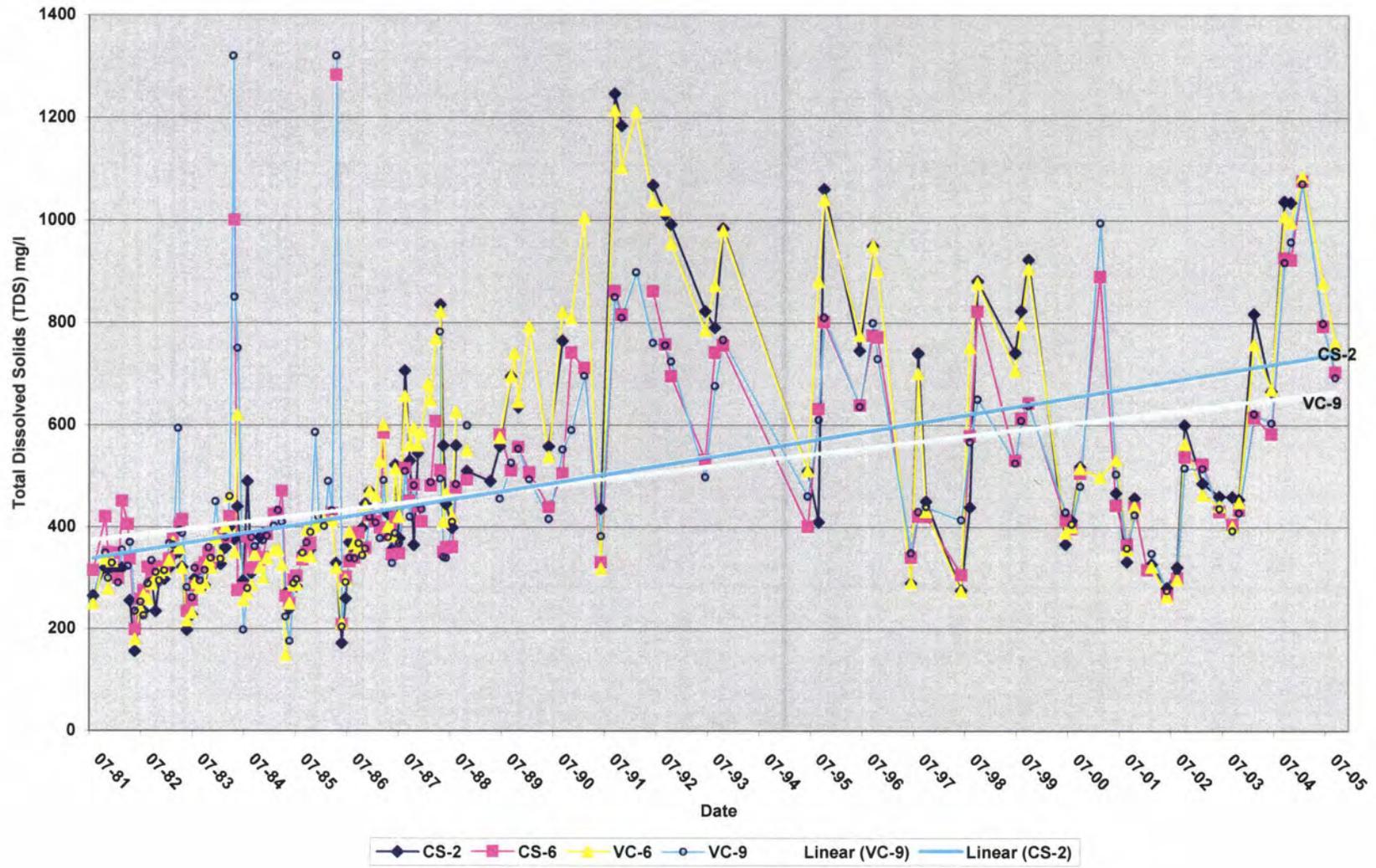


Figure 5b - Streams vs. SWSI



**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

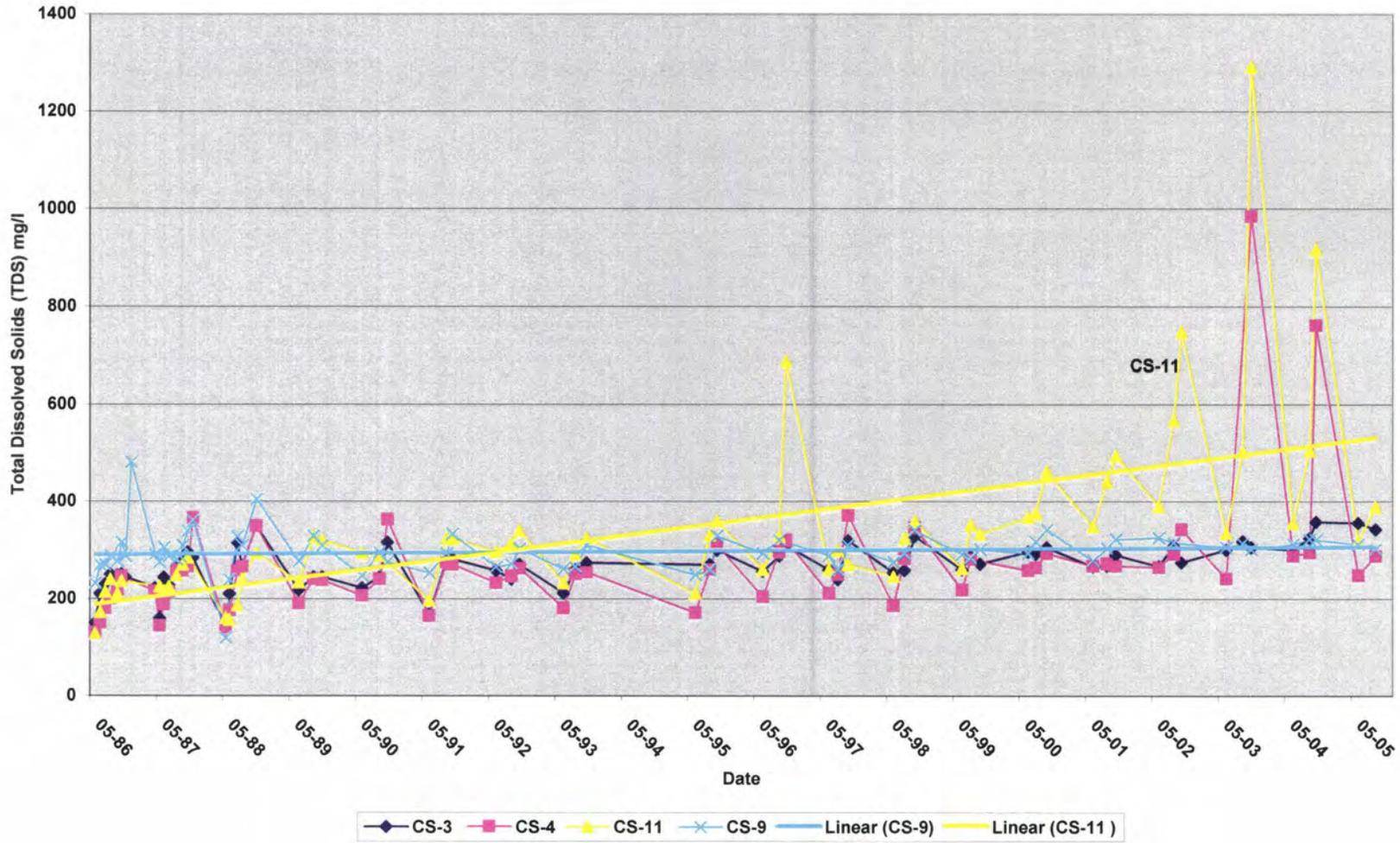


FIGURE 6C  
TDS in South Fork of Eccles Creek  
CS-1 & VC-10 1978-2002

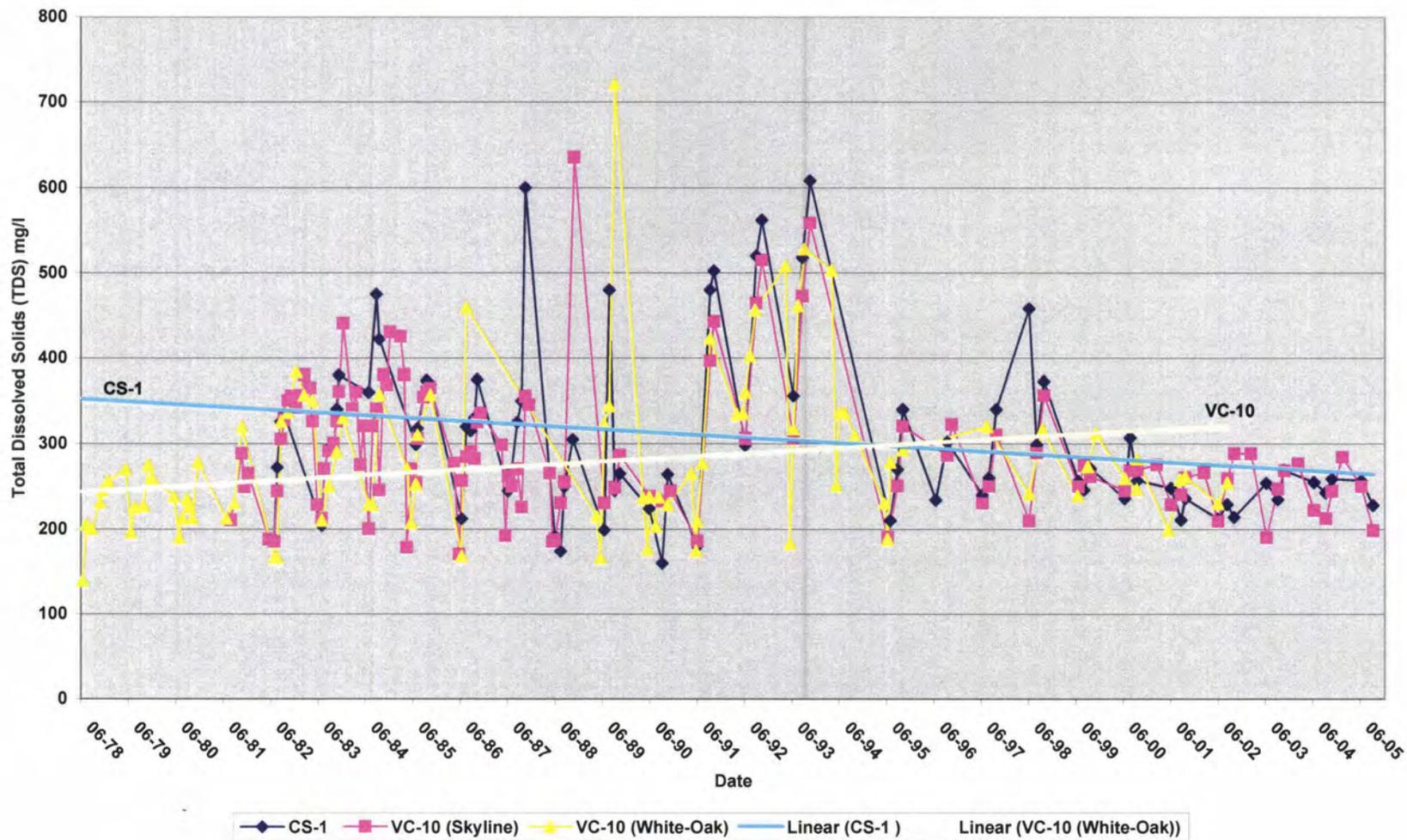
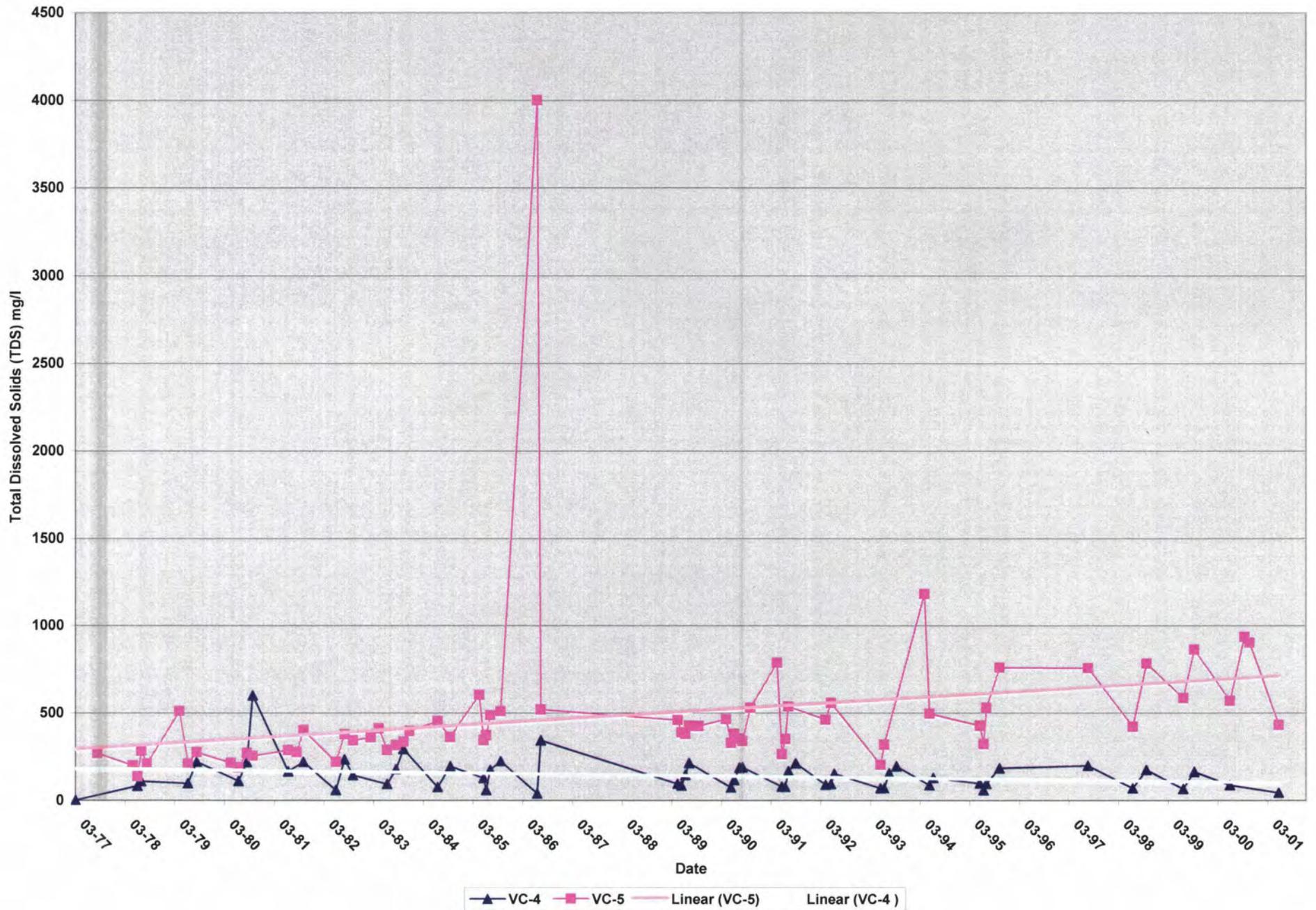
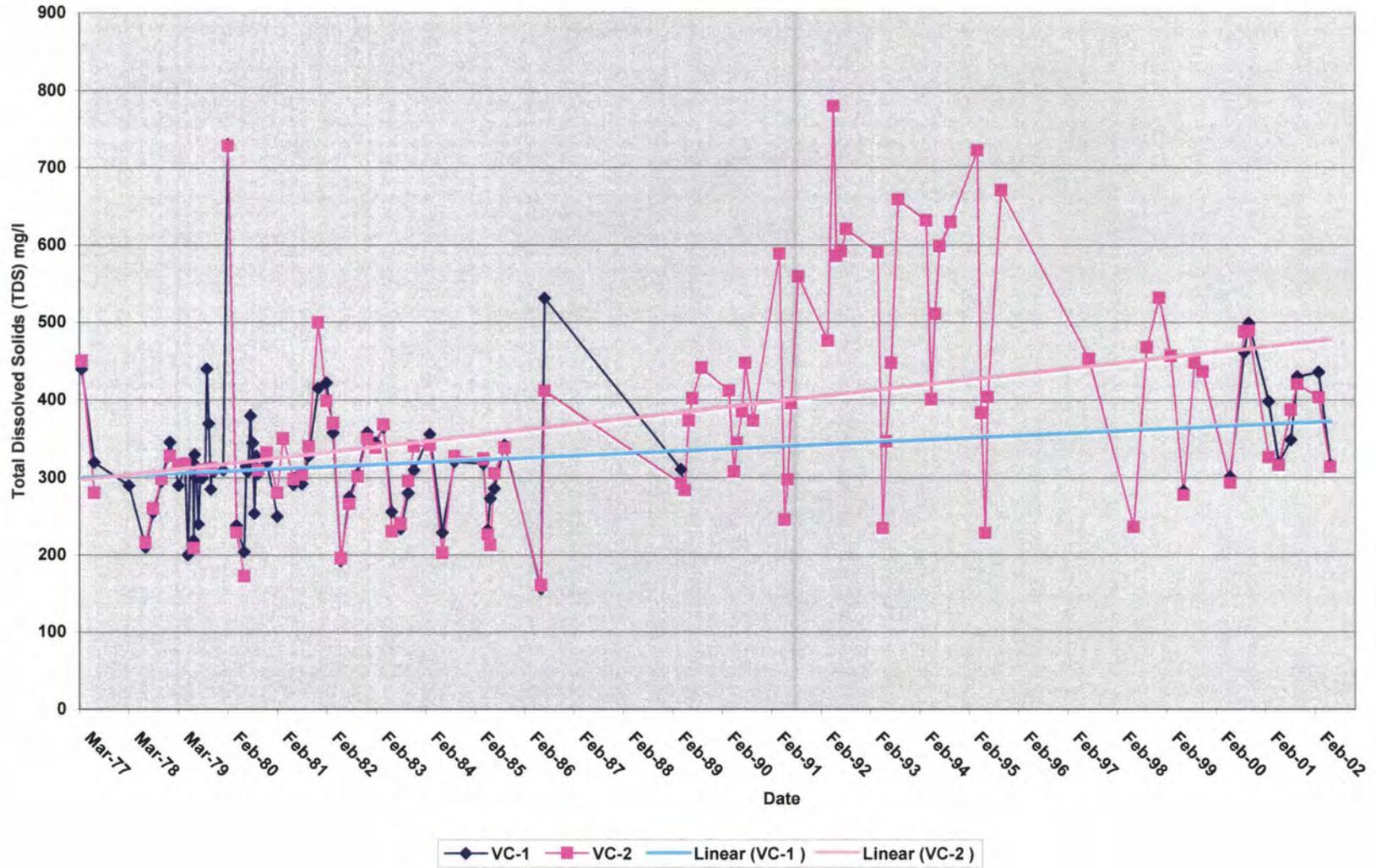


FIGURE 6D  
TDS in Whiskey Creek  
VC-4 & VC-5 1977-2001



**FIGURE 7**  
**TDS in Mud Creek Below Eccles**  
VC-1 & VC-2 1977-2002



**FIGURE 8**  
**TDS in Upper Huntington Creek**  
**CS-7, CS-8, CS-10 & UPL-10 1981-2002**

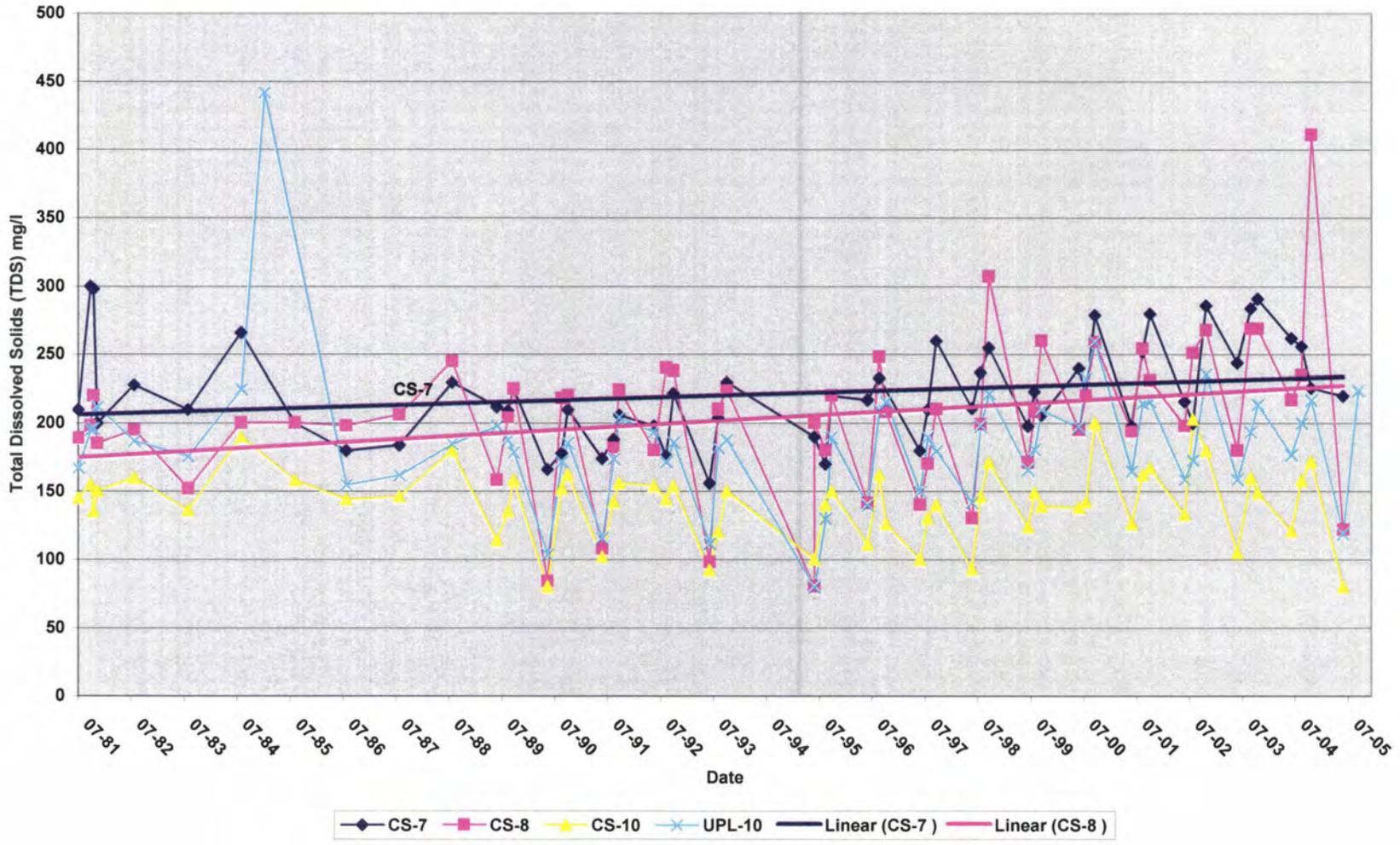
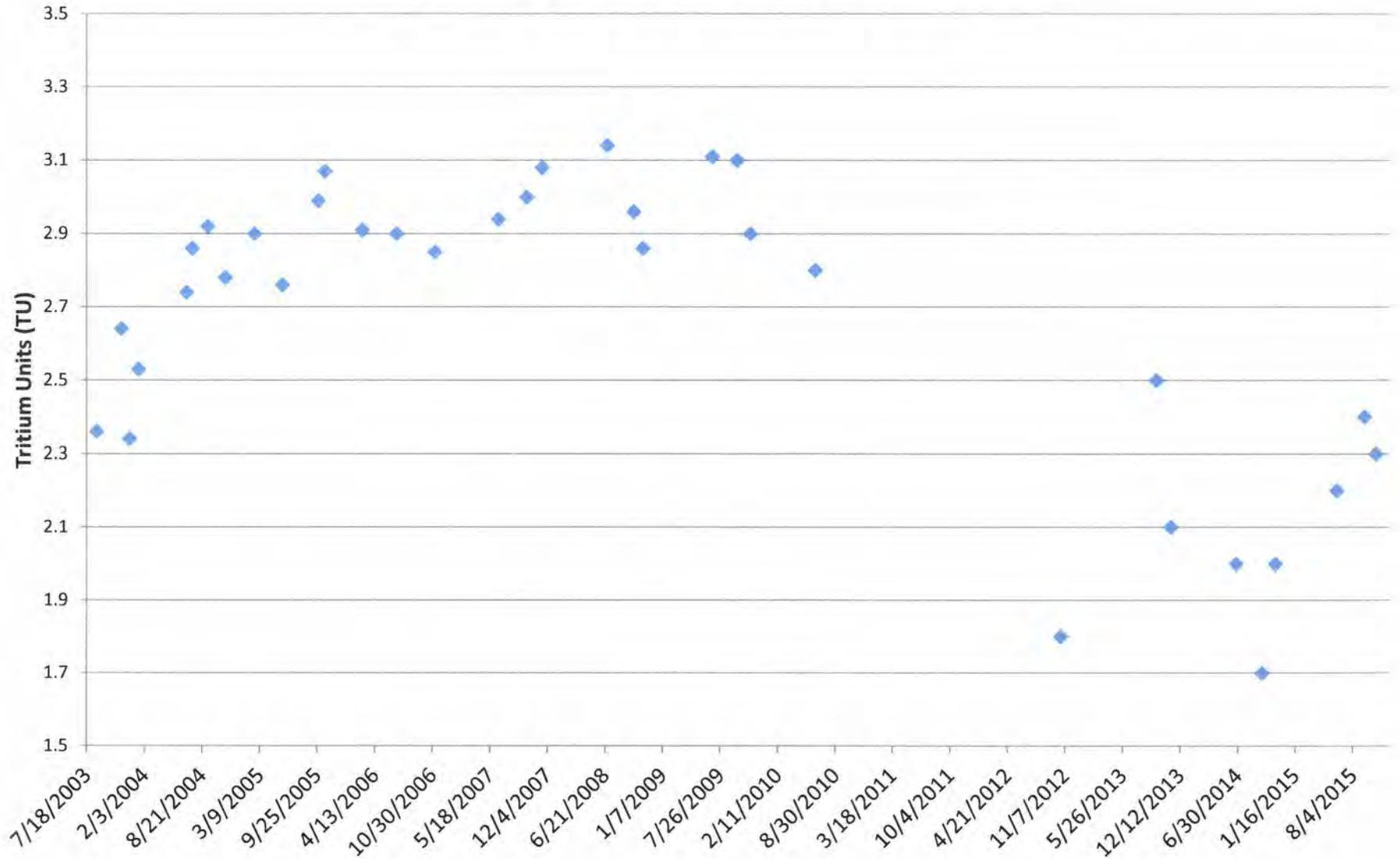


Figure 9 - Tritium Concentration in JC-1



**Figure 10 - Skyline Discharge to Eccles Creek**

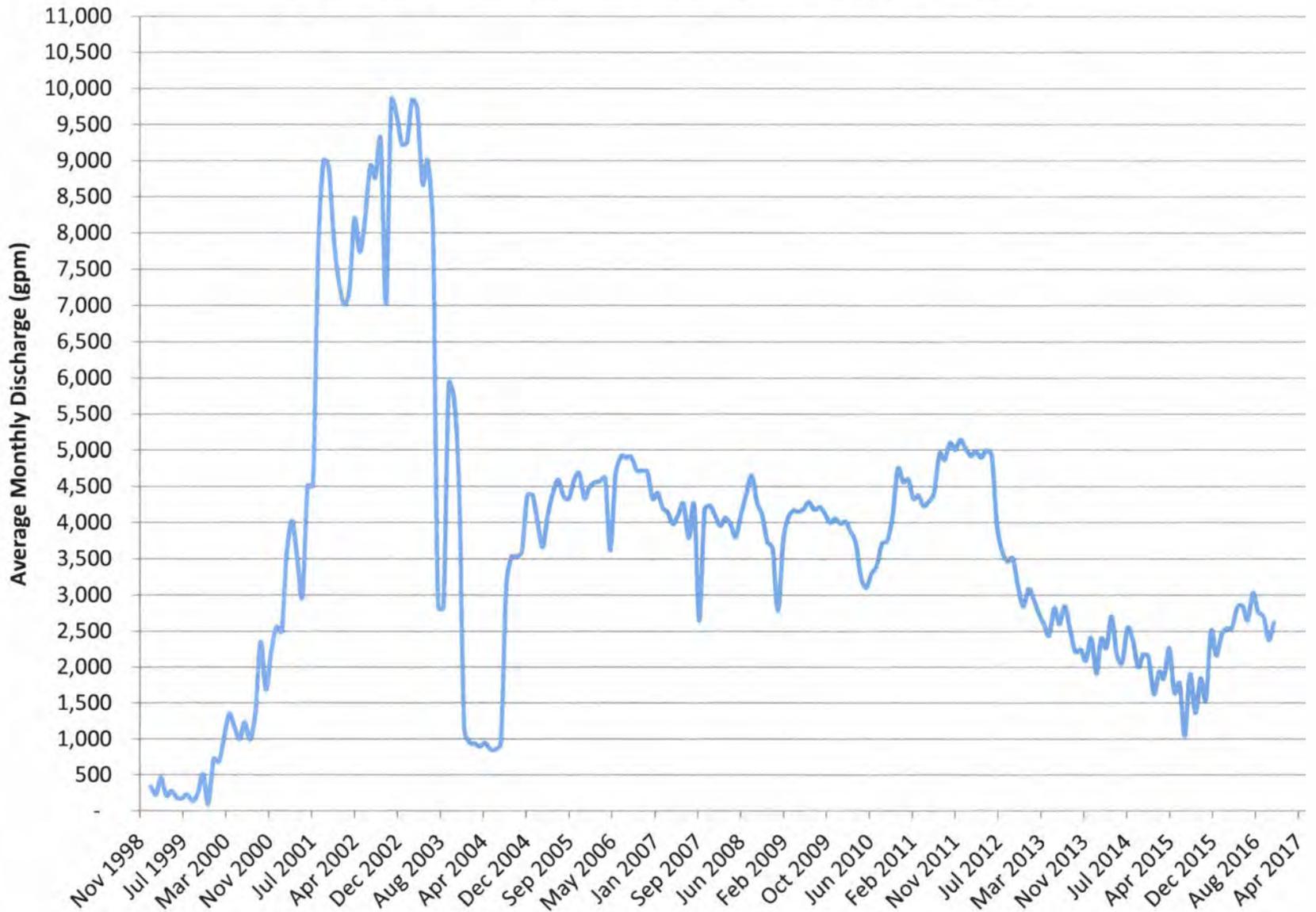
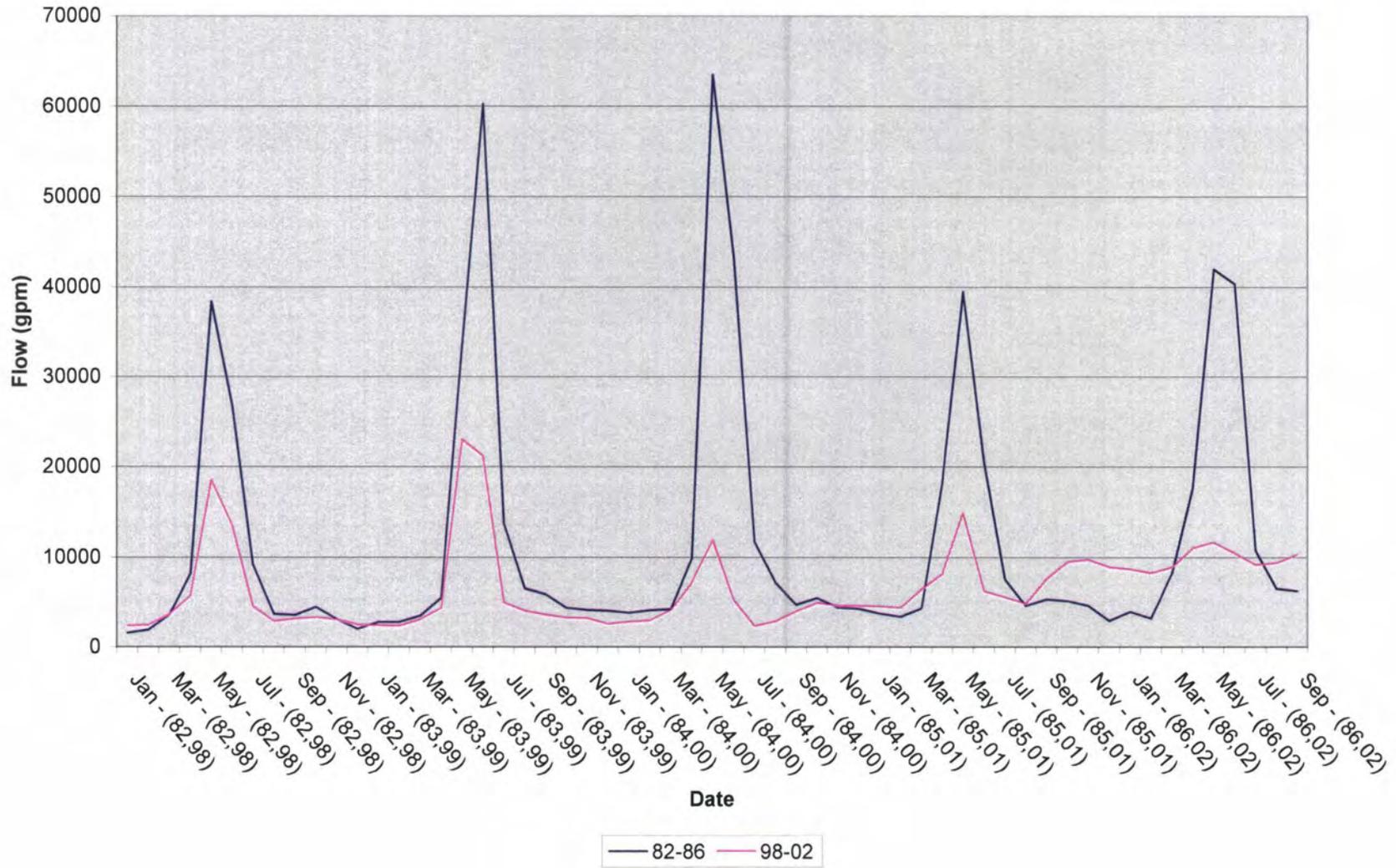


Figure 10a - Eccles Flow vs. "Normal"



**Figure 11 - Skyline Cumulative Discharge to Eccles Creek and Electric Lake**

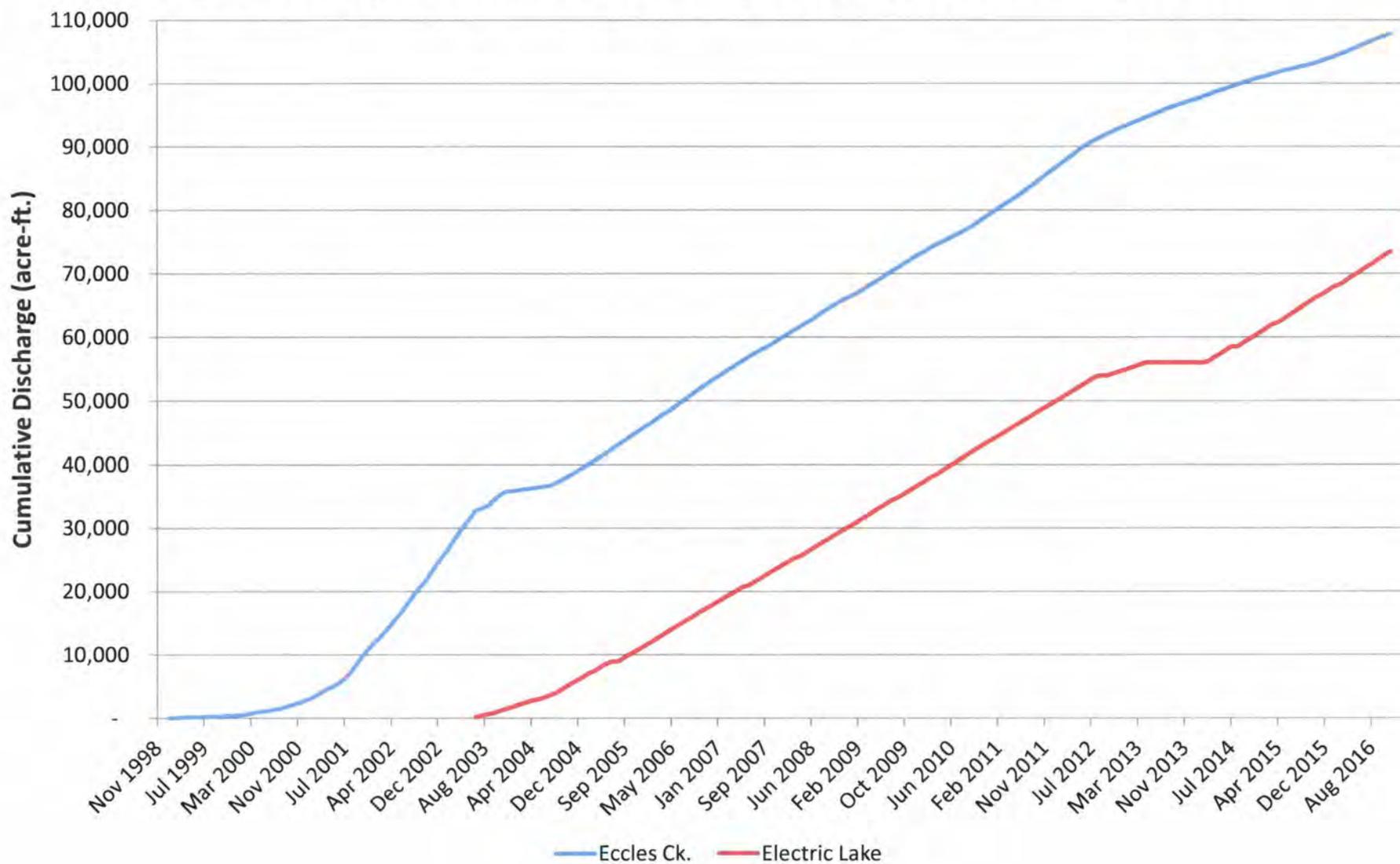


Figure 12 - Total Phosphorous in Mud Creek

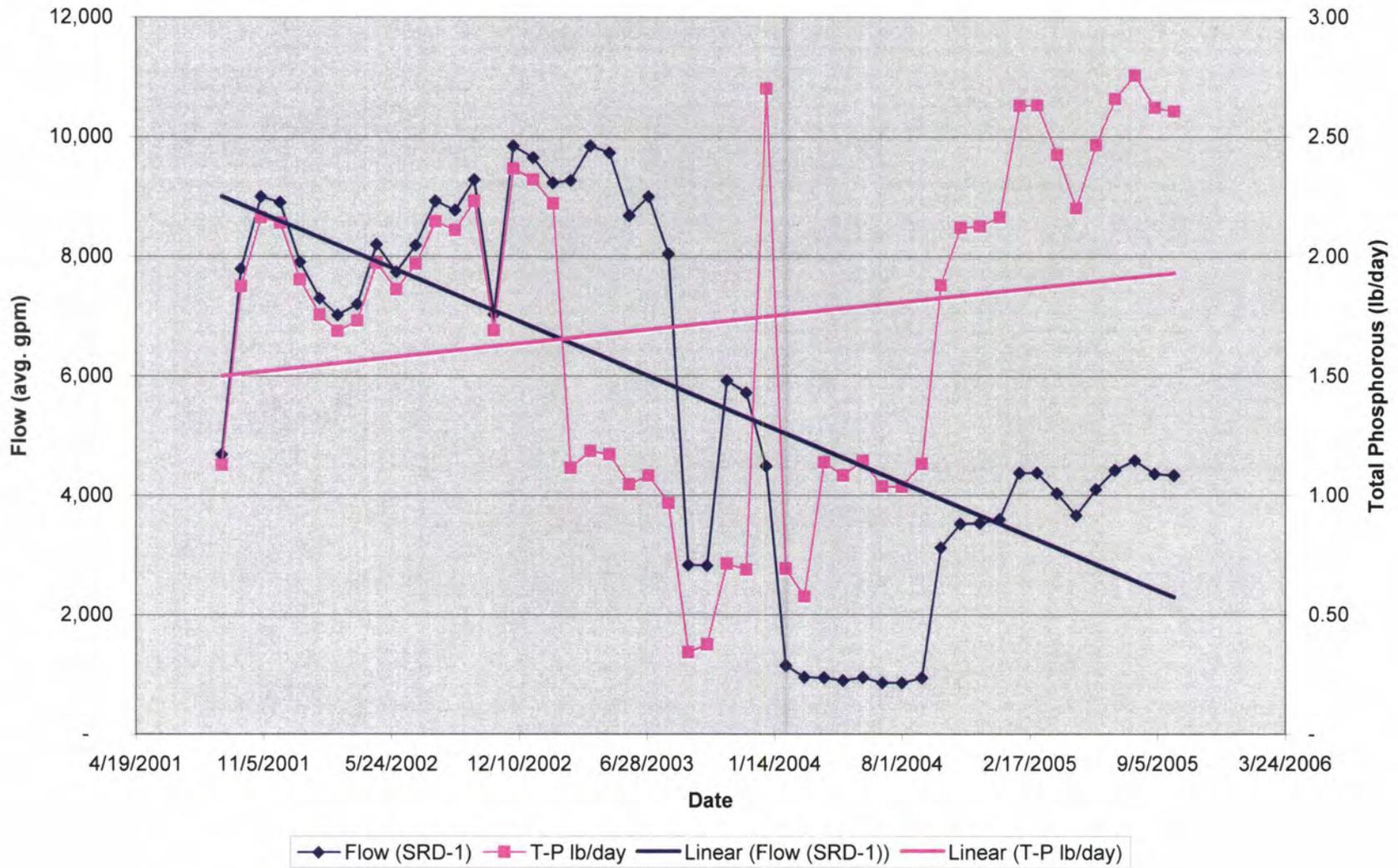


Figure 13 - Electric Lake History

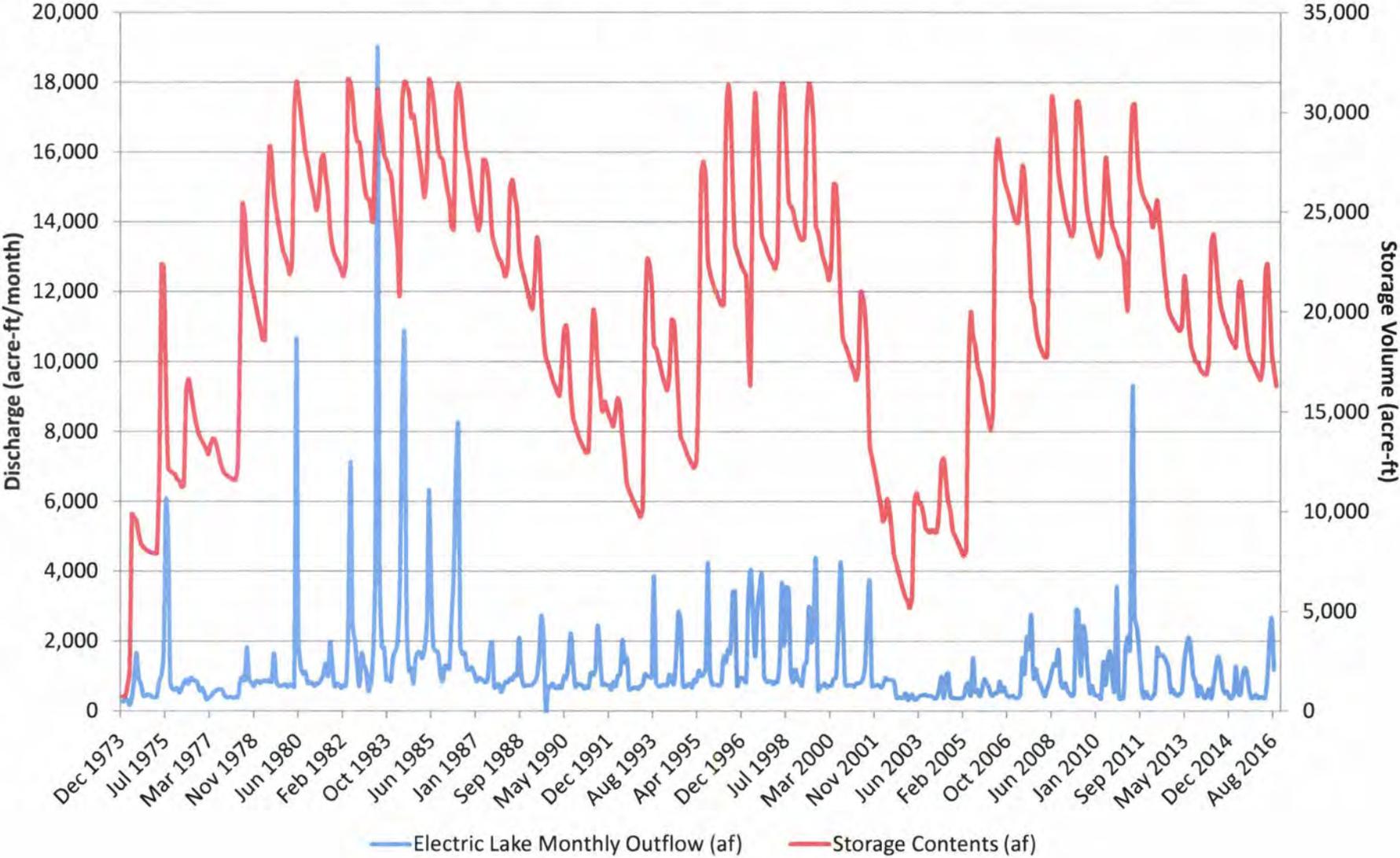


Figure 14 - Electric Lake, Calculated vs. Measured Inflows

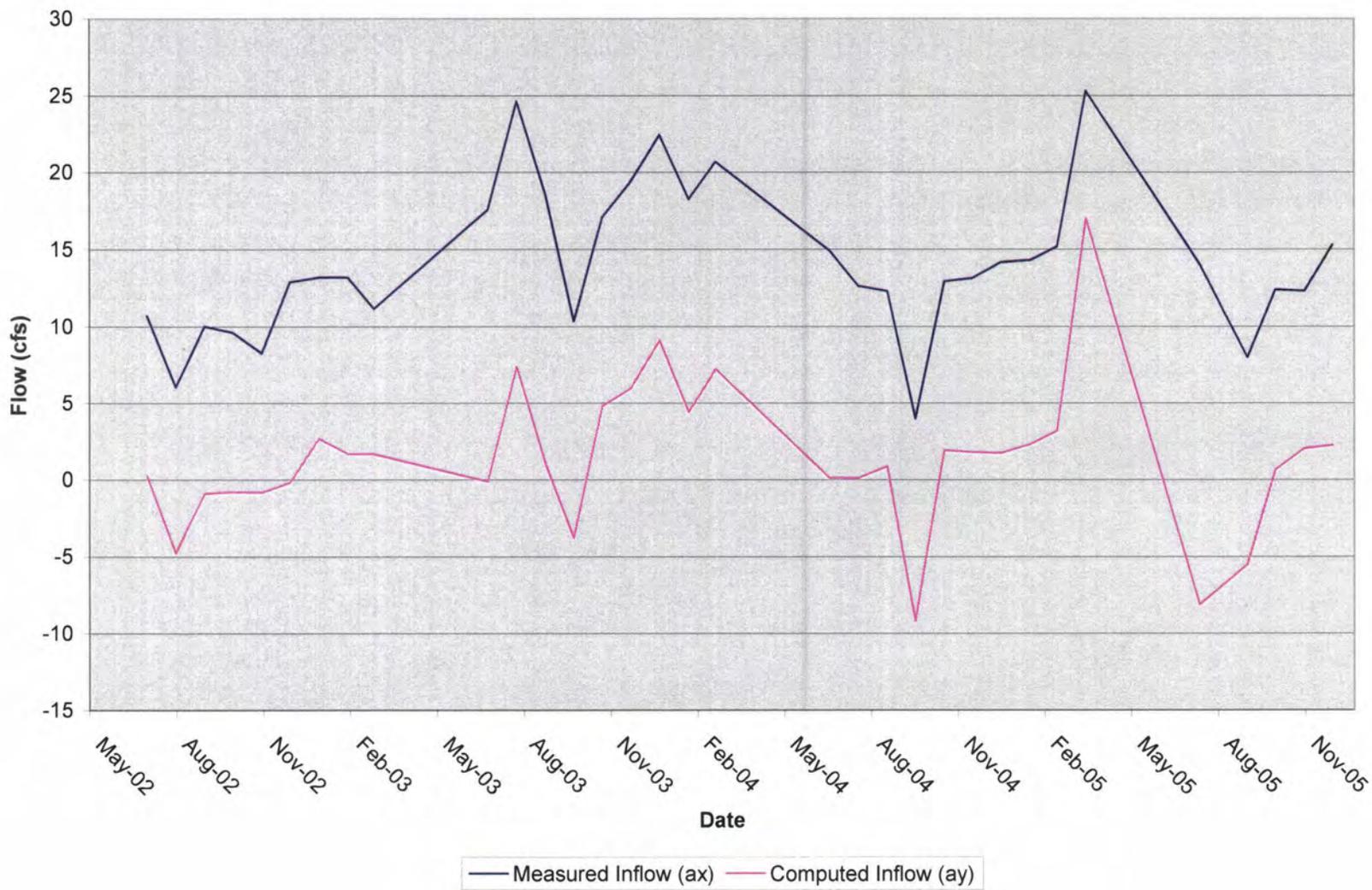
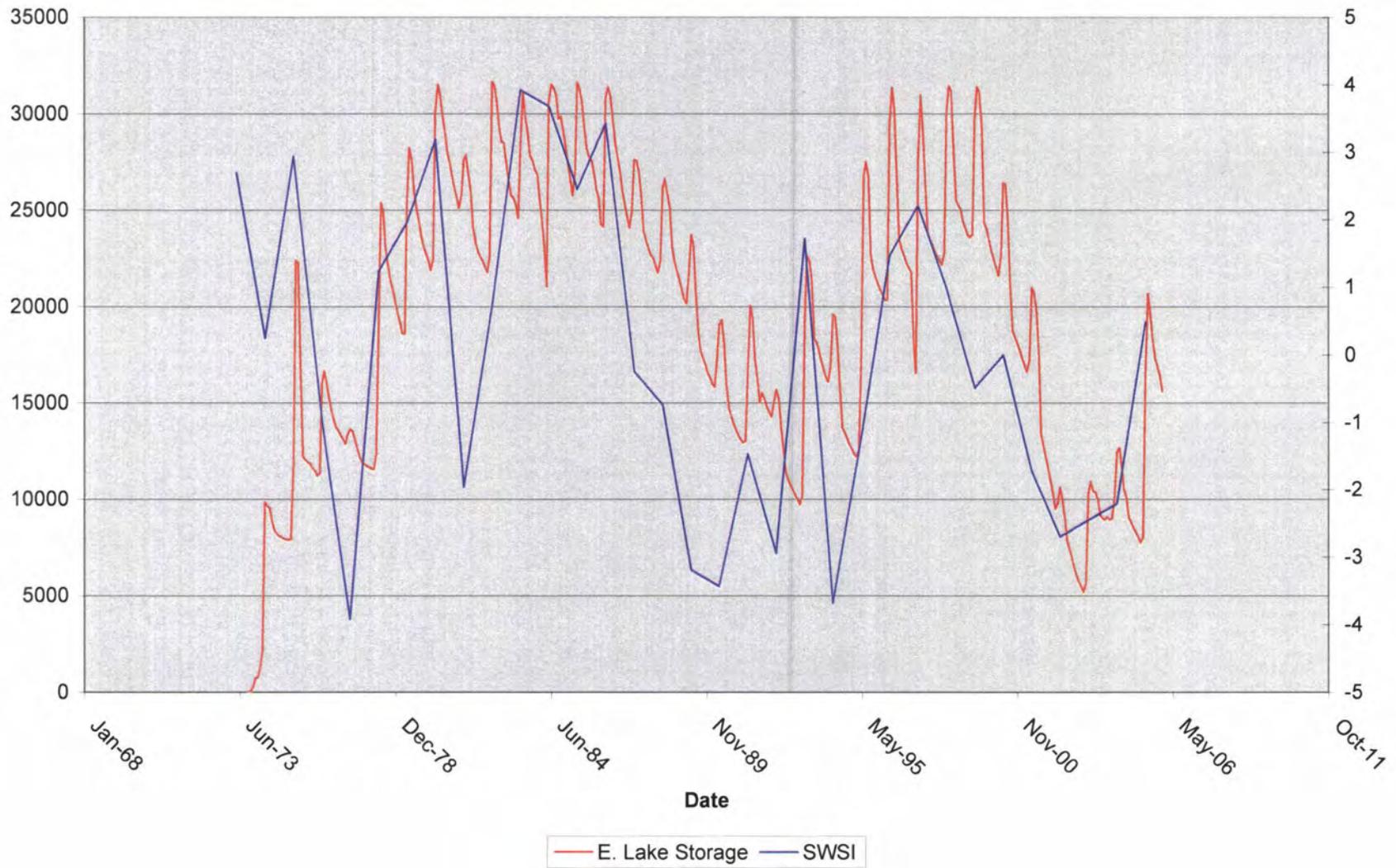


Figure 15 - Electric Lake vs. Surface Water Supply Index (SWSI)









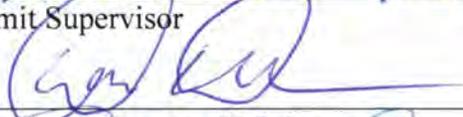
## **FINDINGS**

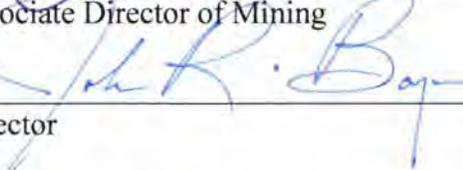
Canyon Fuel Company, LLC  
Skyline Mine  
Flat Canyon Lease Addition  
C/007/0005  
Carbon County, Utah  
February 3, 2017

1. The permit application for the addition of the Flat Canyon Lease is accurate and complete and all requirements of the Surface Mining Control and Reclamation Act, and the approved Utah State Program are in compliance. See Technical Analysis dated February 3, 2017. (R645-300-133.100)
2. The applicant proposes acceptable practices for the reclamation of the disturbed lands. The Division has determined that reclamation, as required by the Act can be feasibly accomplished following the approved plan. (R645-300.133.170)
3. An assessment of the probable cumulative impacts of all anticipated coal mining and reclamation activities in the general area on the hydrologic balance has been conducted by the Division and no significant impacts were identified. The Mining and Reclamation Plan (MRP) proposed under the revised application has been designated to prevent damage to the hydrologic balance in the permit area and in associated off-site areas (R645-300-133.400 and UCA 4-10-111 (2)(C)).
4. The proposed lands to be included in the area are:
  - a. Not included within an area designated unsuitable for underground coal mining operations (R645-300-133.220);
  - b. Not within an area under study for designated land unsuitable for underground coal mining operations (R645-300-122.210);
  - c. Not any lands subject to the prohibitions or limitation of 30 CFR 761.11 {a} (national parks, etc), 761.11 {f} (public buildings, etc.) and 761.11 {g} (cemeteries);
  - d. Not within 100 feet of a public road except at the location where the public road accesses the property (R645-300-133.220); and
  - e. Not within 300 feet of any occupied dwelling (R645-300-133.220).
5. The operations would not affect the continued existence of any threatened or endangered species or result in the destruction or adverse modification of their critical habitats as determined under the Endangered Species Act of 1973. See Technical Analysis dated February 3, 2017. (16 USC 1531 et seq.) (R645-300-133.50)
6. The Division's issuance of a permit is in compliance with the National Historic Preservation Act and implementing regulations (36 CFR 800). See Technical Analysis dated February 3, 2017. (R645-300-133.600)

7. The applicant has the legal rights to enter and complete mining activities in the permit area. (R645-300-133.300)
8. A 510(c) report has been run on the Applicant Violator System (AVS), which shows that prior violations or applicable laws and regulations have been corrected; neither Canyon Fuel Company, LLC nor any affiliated company are delinquent in payment of fees for the Abandoned Mine Reclamation Fund; and the applicant does not control and has not controlled mining operations with demonstrated pattern of willful violations of the Act of such nature, duration and with such resulting irreparable damage to the environment as to indicate an intent not to comply with the provisions of the Act (A 510(c) report was run on February 1, 2017, see memo to file. (R645-300-133.730)
9. The coal mining and reclamation operations to be performed under the permit will not be inconsistent with other operations anticipated to be performed in the areas adjacent to the proposed permit area.
10. The applicant has posted a surety bond for the Skyline Mine in the amount of \$5,799,000 in the form of a surety bond held with Lexon Insurance Co/Ironshore Indemnity Inc. (R645-300-134)
11. No lands designated as prime farmlands or alluvial valley floors occur in the permit area. See Technical Analysis dated February 3, 2017. (R645-3-2-313.100 and R645-302-321.100)
12. The proposed postmining land use will not be affected by this action.
13. The Division has made all specific approvals required by the Act, the Cooperative Agreement and the Federal Lands Program.
14. All procedures for the public participation required by the Act, and the approved Utah State Program are in compliance. The public advertisement was published February 9, 16, 23 and March 1, 2016 in the Sun Advocate and Emery County Progress and published February 11, 18, 25 and March 3, 2016 in the Sanpete News. (R645-300-120)
15. All existing structures at the mine comply with performance standards. (R645-300-133.720)

  
\_\_\_\_\_  
Permit Supervisor

  
\_\_\_\_\_  
Associate Director of Mining

  
\_\_\_\_\_  
Director

C/007/005 Incoming ✓  
CC: Priscilla  
#5017



United States Department of the Interior

OFFICE OF SURFACE MINING  
RECLAMATION AND ENFORCEMENT

Western Region Office  
1999 Broadway, Suite 3320  
Denver, CO 80202-3050



RECEIVED

OCT 13 2015

October 9, 2015

DIV. OF OIL, GAS & MINING

Dear Interested Public Land User,

The U.S. Department of the Interior (DOI), Office of Surface Mining Reclamation and Enforcement (OSMRE), Western Region, will prepare an environmental assessment (EA) for the mining plan modification for the Canyon Fuel Company, LLC's (Canyon Fuel) Skyline Mine (the Project). Skyline Mine is located approximately five miles southwest of Scofield, in Carbon County, Utah. To comply with the Mineral Leasing Act 1920 (MLA), the DOI Assistant Secretary for Land and Minerals Management (ASLM) must approve the Project before any mining and reclamation can occur on lands containing leased Federal coal.

Skyline Mine is an underground operation proposing to modify their Surface Mining Control and Reclamation Act of 1977 Permit Area to include approximately 2,692 acres of federal coal within the Flat Canyon Coal Lease Tract (UTU77114) and to access approximately 1,100 acres of private coal reserves. Coal occurs in two seams throughout the project area and the majority of these seams could be mined, using longwall mining technology, to produce approximately 36 million tons of coal and extend the life of the Skyline Mine by 9 to 12 years. UTU77114 was issued by the Bureau of Land Management, and by consent of the Manti-La Sal National Forest, on September 11, 2015.

OSMRE is preparing this EA to evaluate the environmental impacts resulting from the Project, pursuant to the requirements of the National Environmental Policy Act of 1969. The EA will disclose the potential for direct, indirect, and cumulative impacts to the environment from the Project. Further, this EA will update, clarify, and provide new and additional environmental information for the Project. As a result of the EA process, OSMRE will determine whether or not there are significant environmental impacts. An environmental impact statement will be prepared if the EA identifies significant impacts. If a finding of no significant impact is reached, and pursuant to 30 CFR 746.13, OSMRE will prepare and submit to the ASLM a mining plan decision document recommending approval, disapproval, or conditional approval of the mining plan. The ASLM will approve, disapprove, or conditionally approve the mining plan approval document within the mining plan decision document. OSMRE is soliciting public comments. Your comments will help to determine the issues and alternatives that will be evaluated in the EA. You are invited to direct these comments to:

OSMRE WR  
C/O: Nicole Caveny  
Skyline Mine EA  
1999 Broadway, Suite 3320  
Denver, CO 80202-3050

Comments may also be emailed to: OSM-NEPA-UT@OSMRE.gov, ensure the subject line reads: ATTN: OSMRE, Skyline Mine, Flat Canyon MPDD EA. Comments should be received or postmarked no later than November 9, 2015, in order to be considered during the preparation of the EA. Comments received, including names and addresses of those who comment, will be considered part of the public record for this project and will be available for public inspection. Additional information regarding the Project may be obtained from Nicole Caveny, telephone number (303) 293-5078. When available, the EA and other supporting documentation will be posted at and may be obtained from <http://www.wrcc.osmre.gov/initiatives/skylinemine.shtm>.

Sincerely,

A handwritten signature in black ink, appearing to read "Marcelo Calle". The signature is fluid and cursive, with the first name "Marcelo" written in a larger, more prominent script than the last name "Calle".

Marcelo Calle, Manager  
Field Operations Branch



GARY R. HERBERT  
Governor

SPENCER J. COX  
Lieutenant Governor

# State of Utah

DEPARTMENT OF NATURAL RESOURCES

MICHAEL R. STYLER  
Executive Director

Division of Oil, Gas and Mining

JOHN R. BAZA  
Division Director

November 20, 2015

Corey Heaps, Mine Manager  
Canyon Fuel Company, LLC  
HC 35 Box 380  
Helper, Utah 84526

Subject: Determination of Administrative Completeness for Addition of Flat Canyon Lease, Canyon Fuel Company, LLC, Skyline Mine, C/007/0005, Task ID #5017

Dear Mr. Heaps:

The Division has completed a review of the information you submitted on October 13, 2015. This application is considered to be administratively complete. A copy of our review worksheet is enclosed for your information and records.

A technical review of your plan has been initiated. Technical deficiencies will be forwarded to you as reviews are completed. The Division will also coordinate with other agencies and incorporate their comments into our review process. Issues raised will need to be resolved prior to permit issuance.

At this time you should publish a Notice of Complete Application for adding the Flat Canyon Lease to the Skyline Mine as required by R645-300-121. A copy of the publication should be sent to the Division as soon as it is available. You should also insure that a copy of the application is on file at the appropriate County Courthouse. The Division will complete a technical analysis, which must find that your application is technically complete. We anticipate that additional information may be necessary to make your application technically complete and look forward to working with you throughout the permitting process. Please call if you have any questions.

Thank you for your help in the permitting process.

Sincerely,

Daron R. Haddock  
Coal Program Manager

DRH/sqs  
Enclosure

O:\007005.SKY\WG5017 FLAT CANYON\ADMINISTRATIVECOMPLETE.DOC



**ADMINISTRATIVE COMPLETENESS REVIEW WORKSHEET  
(R645-100)**

**DATE:** 11/19/15

**REVIEWER(S):** Lisa Reinhart, Daron Haddock, Suzanne Steab, Cheryl Parker

**APPLICANT:** Canyon Fuel Company, LLC, Southwest Reserve- Flat Canyon Lease

**MINE NAME:** Skyline **FILE NO.:** C/007/0005

**"Administratively Complete Application"** means an application for permit approval or approval for coal exploration, where required, which the Division determines to contain information addressing each application requirement of the State Program and to contain all information necessary to initiate processing and public review.

**Directions:** The categories listed below correspond to the minimum requirements for information necessary to initiate processing and public review. If a category is checked the Applicant has met the Completeness requirement for that category. If a category is not checked, the Completeness requirements have not been met. If a category is Not Applicable, enter NA in check box. The comments column will identify the deficiency and what is necessary to correct it.

**Comments**

			<b>Comments</b>
301-112	Identification of Interests	<u>X</u>	Refer to Chapter 1 information, revised on Sept. 25, 2015 (112.500-112.800).
100	Applicant's Business Structure	<u>NA</u>	No change to existing permit
210	Applicant's Name/Address/Phone	<u>NA</u>	No change to existing permit
220	Resident Agent's Name/Address/Phone	<u>NA</u>	no change to existing permit
230	Name/Address/Phone of AML Fees Payer	<u>NA</u>	No change to existing permit
300	Corporate Structure & Ownership	<u>NA</u>	No change to existing permit
400	Identify Other Mining Operations in US	<u>NA</u>	No change to existing permit
500	Surface & Mineral Ownership	<u>X</u>	The application contains a copy of lease UTU-77114 issued to Canyon Fuel Company, LLC effective July 1, 2015. The lease encompasses 2,692.16 acres of Federal coal (BLM) with the USFS as the surface managing agency.
600	Ownership Contiguous to Permit	<u>X</u>	Plate 1.6-3 and Plate 1.6-2 and Section 112.600 show the ownership.
700	MSHA Numbers	<u>NA</u>	extension of an underground mine.
800	Interest in Contiguous Lands	<u>X</u>	discussed on page1-24.

301-113	Violation Information	<u>X</u>	AVS reported generated 10/28/15. No violations retrieved in the OSM AVS system.
100	Suspension or Revocation Information	<u>NA</u>	No suspensions or revocations have occurred with Canyon Fuel.
300	List of Violations - 3 Previous Years	<u>X</u>	There is no change to the existing Table 1-2.

301-114	Right of Entry	<u>X</u>	The application contains a copy of lease UTU-77114 issued to Canyon Fuel Company, LLC effective July 1, 2015. The lease encompasses 2,692.16 acres of Federal coal (BLM) with the USFS as the surface managing agency.
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301-115	Status of Unsuitability Claims	<u>X</u>	There are no unsuitability claims within the area of the Flat Canyon lease.
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301-116	Permit Term	<u>X</u>	The Existing permit issued in 2012 expires April 30, 2017. The Permit carries a right of successive renewal. This lease will extend the life of the mine.
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301-117	Insurance	<u>X</u>	No change to the insurance policy will occur as a result of this lease addition.  See App. 118A for a draft of the public notice. The notice will be published upon the finding of an administratively complete application. Proof of publication will be required prior to permit issuance.  This is an extension of an underground mine.
	Proof of Publication	<u>X</u>	
	Facilities and Structures Used in Common	<u>NA</u>	

301-118	Filing Fee	<u>NA</u>	
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301-123	Notarized Signature of Responsible Official	<u>X</u>	Corey Heaps, General Manager
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301-130	<b>Information Collection:          Technical Data Accompanied by Names of          Persons or Organizations that Collected and          Analyzed the Data - Dates of Collections - and          Analysis of the Data and Description of the          Methodology Used to Collect and          Analyze Data</b>	<u>X</u>  2002 Flat Canyon EIS produced by USFS and BLM is found in Vol.2, App.. A-3. The PHC in Vol 2., App. N and O was written by Petterson Hydrologic, Inc. Peterson Hydrologic Investigation of Groundwater and Surface-Water Systems Aug 13, 2014. Peterson Hydrologic, Aug. 18, 2014, Groundwater conditions in the Star Point Sandstone... Alpine Ecological, Western (Borial) Toad Survey August 29, 2014.
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301-200	Soils	<u>NA</u>	This lease addition entails only the lease area boundary change, but does not include details of surface disturbance. There is no disturbance planned for any areas within the lease. Disturbed area located outside of the lease, but associated with the lease addition was reviewed separately, see Swen's Canyon Task 4777.
211	Description of Pre-mining Soil Resources	<u>NA</u>	
221	Prime Farmland Investigation	<u>X</u>	Prime Farmland communication is included in Vol. A-2. This is an extension of an underground mine.
222	Soil Survey	<u>NA</u>	No surface disturbance planned.
224	Substitute Topsoil Info (When Proposed)	<u>NA</u>	No surface disturbance planned.
230	Operation Plan Topsoil Handling/Removal/Storage	<u>NA</u>	No surface disturbance planned.
240	Reclamation Plan Soil Redistribution/Stabilization	<u>NA</u>	No surface disturbance planned.

301-300	Biology	<u>X</u>	Raptor, general wildlife and sensitive species information has been addressed with the addition of necessary surveys and additional information provided in the vegetation (2.7), terrestrial wildlife (2.8), and raptor sections (2.9), respectively.
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320	Vegetation Information	<u>X</u>	Section 2.7 Vegetation has been modified to include subsection 2.7.10 Southwest Reserve Flat Canyon area (pg 2-63a) to generally describe the area and clarify that no surface disturbance is currently planned in the lease area. Detailed veg info is within the EIS.
322	Fish and Wildlife Information	<u>x</u>	<p>Section 2.8 Aquatic Wildlife Resources has been updated to include a description of the aquatic resources. As determined by the EIS, both Swens and Little Swens provide little habitat for fish so only Boulger Creek will be monitored for fish using methods consistent with previously conducted surveys on James, Burnout, Eccles, Woods, and Winter Quarters creeks.</p> <p>Section 2.9 Terrestrial Wildlife includes raptor/wildlife/sensitive species surveys conducted over the lease area.</p> <p>Table 2.9-4 has been updated (2-2015) to include a current list of threatened, endangered, and candidate species.</p> <p>The existing MRP contains general wildlife info adequate to cover this amendment.</p>
323	Maps/Photos Vegetation-Fish-Wildlife Areas	<u>X</u>	<p>Appendix A-3 contains an analysis and maps of the Northern Goshawk and other raptor surveys.</p> <p>Figure 2.7.9-2 shows monitoring locations for riparian areas.</p> <p>Figure 3.5 is a map of the vegetation of the area.</p>
330	Operation Plan Vegetation-Fish-Wildlife Protection	<u>X</u>	Since there is no surface disturbance or known TES species to occur in the area, the only wildlife and veg impacts of operations would be in relation to subsidence and would be minimal. Section 2.8 includes monitoring of Boulger creek for fish. Although it is not modified in this ammendment, the comitment to conduct annual raptor surveys of areas to be subsided is identified in 4.18.2 page 4-103 of the MRP and applies.
341	Reclamation Plan for Revegetation	<u>x</u>	Not applicable since there is no surface disturbance proposed.
342	Fish & Wildlife Plan for Reclamation Phase	<u>x</u>	Not applicable since there is no surface disturbance proposed.

301-400	Land Use and Air Quality	<u>X</u>	Section 2.1 pg 2-4e contains a narrative on cultural resources. The FEIS contains a detailed impact analysis to cultural resources. Letters from Hopi tribe and SHPO are provided as appendix A-4. An updated Air Quality permit documenting consultation with UDAQ is provided.
411	Pre-Mining Land Use Information (Includes Cultural Resources)	<u>X</u>	Land use is discussed in Section 2.12 and has been updated to include the Flat Canyon Lease area. Table 2.12.1-1 has been updated to include production measurements in AUM's.
412	Post-Mining Land Use Information	<u>X</u>	Not applicable since there is no surface disturbance proposed. Post mining land use information is consistent with existing information in the MRP.

301-500	Engineering	<u>X</u>	The Permit application appears to address the relevant engineering R645-301-500 rules, see discussion below
510 520	General Description of Operation Plan (Maps, Locations, Cross-Sections, Narrative, Descriptions & Calculations)	<u>X</u>	The Permit contains the proposed coal mining and reclamation operations with attendant maps, plan, cross section in Chapter 2. The application includes details under certification requirements to address R645-301-512. The application contains text detailing MSHA approval for relevant impoundments and closure of openings to address R645-301-514. The application includes text detailing reporting and emergency procedures for slides, impoundment breaches, and temporary cessation to address R645-301-515.210. The application includes details under operations including narratives, plans with maps, cross section, and calculations to address R645-301-520
522	Coal Recovery Description	<u>X</u>	The application includes text that appears to address R645-301-522 coal recovery rules
523	Mining Methods	<u>X</u>	The application includes text that appears to address R645-301-523 mining rules
524	Blasting and Explosives Plan	<u>X</u>	The application includes text that appears to address R645301-524 blasting regulations
525	Subsidence Control Plan	<u>X</u>	The application includes text that appears to address R645-301-525 subsidence regulations.
526	Mine Facilities Description (Narrative, Plans, Maps) Including Existing Structures & Support Facilities	<u>X</u>	The application includes narratives, maps, and figures that appear to address R645-301-526 describing mining facilities.

527	Transportation Facilities <b>(Including Plans &amp; Maps)</b>	<u>X</u>	The application includes text that appears to address R645-301-527 transportation facilities regulations.
528	Coal Mine Waste Plans <b>(Description &amp; Designs)</b>	<u>X</u>	The application includes text that appears to address R645-301-528 handling and disposal of noncoal and coal mine waste regulations
529	Management of Mine Openings <b>(Design)</b>	<u>X</u>	The application includes text that appears to address the management of mine openings according to R645-301-529 regulations.
531	General Plans for Structures	<u>X</u>	The application includes text detailing the general operation design criteria and plans for structures meeting R645-301-526 regulations
532	Sediment Control	<u>X</u>	The application includes text addressing R645-301-532 sediment controls.
533	Impoundments	<u>X</u>	The application includes text addressing R645-301-533 impounments.

301-534	Roads <b>(Plans, Drawings, Designs, &amp; Specifications)</b>	<u>X</u>	The applicaiont includes text addressing R645-301-534 road operations, designs, and controls
535	Spoil	<u>X</u>	The application includes text addressing R645-301-535 stating it does not apply
536	Coal Mine Waste	<u>X</u>	The application includes text addressing how coal mine waste will be handled according to R645-301-536.
537	Regraded Slopes	<u>X</u>	The application includes text addressing R645-301-537 stating it does not apply
540 541-542	Reclamation Narrative, Maps and Plans	<u>X</u>	The application includes text addressing R645-301-540 general reclamation of the site
551	Casing and Sealing <b>Underground Openings</b>	X	The application includes text addressing R645-301-550 addressing relevant reclamation design criteria in regards to casing and sealing of underground openings
553	Backfilling and Grading Description	<u>X</u>	The application includes text address R645-301-553 by detailing any relevant backfill and grading assoicated with the mining operations.

301-600	Geology	<u>X</u>	Section 2.2 of Chapter 2 includes a discussion of the geology and geotechnical data for the Flat Canyon Area.
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621	Description of Geology (Permit & Adjacent Area)	<u>X</u>	Appendix A-3 includes Analysis of the roof, floor and coal samples. Figure 4 of the Petersen Hydrologic Report shows the geeralized geology map of the Flat Canyon Area.
622	Geologic Cross-Sections, Maps, and Plans	<u>X</u>	Dwgs 2.2.7-1 and 2.2.4-1D show the structural geology and the seam isopachs. Also shows the structural profile of the area which includes a fence diagram using 9 drill holes as correlation.
630	Plans for Casing and Sealing Holes	<u>X</u>	The existing MRP discusses plans for casing and sealing drill holes. No changes have been proposed with this revision.

301-700	Hydrology	<u>X</u>	Adequate
721	Description of Hydrologic Resources (Permit and Adjacent Area)	<u>X</u>	Adequate
722	Cross-Sections and Maps <b>Subsurface Water - Surface Water - Monitoring Stations - Wells</b>	<u>X</u>	Adequate
723	Sampling and Analysis	<u>X</u>	Adequate
724	Baseline Information <b>Ground Water - Surface Water - Geology - Climatological &amp; Supplemental; If Needed</b>	<u>X</u>	Adequate
728	PHC Determination	<u>X</u>	Adequate
730	General Operation Plan <b>Minimize Disturbance to Hydrologic Balance &amp; Compliance with Clean Water Act</b>	<u>X</u>	Adequate
731	Ground and Surface Water Protection	<u>X</u>	Adequate
732	Sediment Control Measures	<u>X</u>	Adequate

301-740	Plans and Designs <b>Operation and Reclamation Plan Sediment Control Measures</b>	<u>X</u>	Adequate
	Siltation Structures	<u>X</u>	Adequate

	Sediment Ponds	<u>X</u>	Adequate
	Other Treatment Facilities	<u>X</u>	Adequate
	Diversions	<u>X</u>	Adequate
	Road Drainage	<u>X</u>	Adequate
	Impoundments	<u>X</u>	Adequate
	Discharge Structures	<u>X</u>	Adequate
	Disposal of Excess Spoil	<u>X</u>	Adequate
	Coal Mine Waste	<u>X</u>	Adequate
	Disposal of Non-Coal Mine Waste	<u>X</u>	Adequate
	Casing and Sealing of Wells	<u>X</u>	Adequate

301-800	Bonding and Insurance	<u>X</u>	The application appears to address R645-301-800 bonding and insurance
820	<b>Applicant Have Adequate Bond at Permit Issuance</b>	<u>X</u>	Canyon Fuels currently maintains bonds for their properties through Ironshor Indemnity Inc.
830	Bond Estimate and Calculations Provided	<u>X</u>	The application appears to address R645-301-830 rules by including relevant bonding details
890	Certificate of Insurance Provided	<u>X</u>	The application includes a certificate of Insurance.

302-200	Special Categories of Mining	<u>NA</u>	
210	Experimental Practices Mining	<u>NA</u>	
220	Mountaintop Removal Mining	<u>NA</u>	
230	Steep Slope Mining	<u>NA</u>	
240	Auger Mining	<u>NA</u>	

250	In Situ Processing Activities	<u>NA</u>	
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302-260	Coal Processing Plants (Not Located Within Permit Area of Mine)	<u>NA</u>	
270	Variances From Approximate Original Contour Restoration Requirements	<u>NA</u>	
280	Variances for Delay in Contemporaneous Reclamation Requirement in Combined Surface and Underground Coal Mining Activities	<u>NA</u>	
290	Small Operator Assistance Program (SOAP)	<u>NA</u>	

302-300	Special Areas of Mining	<u>NA</u>	
301	Prime Farmland	<u>NA</u>	
302	Alluvial Valley Floors	<u>NA</u>	No surface disturbance

O:\FORMS\VACR\_FRM1.DOC

November 23, 2015

«NAME»«TITLE»  
«ORGANIZATION»  
«ADDRESS»  
«CITY», «STATE» «ZIP\_CODE»

*See Attached.  
mailing list.*

Subject: Agency Notification of Flat Canyon Lease Addition, Canyon Fuel Company, LLC,  
Skyline Mine, C/007/0005, Task ID #5017

Dear «SALUTATION»:

On November 20, 2015 the Utah Division of Oil, Gas and Mining has determined that the Canyon Fuel Company, LLC permit application for the Flat Canyon Lease Addition to the Skyline Mine permit is administratively complete. The lease addition will add 2,692.16 acres to the authorized mining area of this site. In compliance with the Utah Coal Mining Rules R645-300-121.300, R645-300-121.310, R645-300-121.320, and the Utah Coal Mining Act (UCA Section 40-10-1 et. seq.), notice is hereby given to all local, state and federal agencies having a jurisdiction or an interest in the area of the operations that this application is available for review.

The Skyline Mine Flat Canyon Lease Addition is located in Carbon County, as shown on the attached map.

The legal description of the proposed expansion area is as follows:

Federal Coal Lease Serial # UTU - 771114

T.13 S., R.6.E., SL Meridian, Utah

Section 21, lots 1-4, E1/2E1/2;

Section 28, Lots 1-8, S1/2NW1/4, SW1/4;

Section 33, E1/2, E1/2W1/2, NW1/4NW1/4, SW1/4SW1/4;

T. 14 S., R.6 E, SL Meridian, Utah

Section 4, lots 1-4, S1/2N1/2, S1/2;

Section 5, lots 1-4, S1/2N1/2, S1/2;

Containing 2,692.16

This permit application is available for public review at:

Coal Regulatory Program	Carbon County Courthouse
Division of Oil, Gas & Mining	120 East Main Street
1594 West North Temple, Suite 1210	Price, Utah 84501
P.O. Box 145801	
Salt Lake City, Utah 84114-5801	

Please send your comments by January 29, 2016 to:

Coal Regulatory Program  
Division of Oil, Gas & Mining  
P.O. Box 145801  
Salt Lake City, Utah 84114-5801

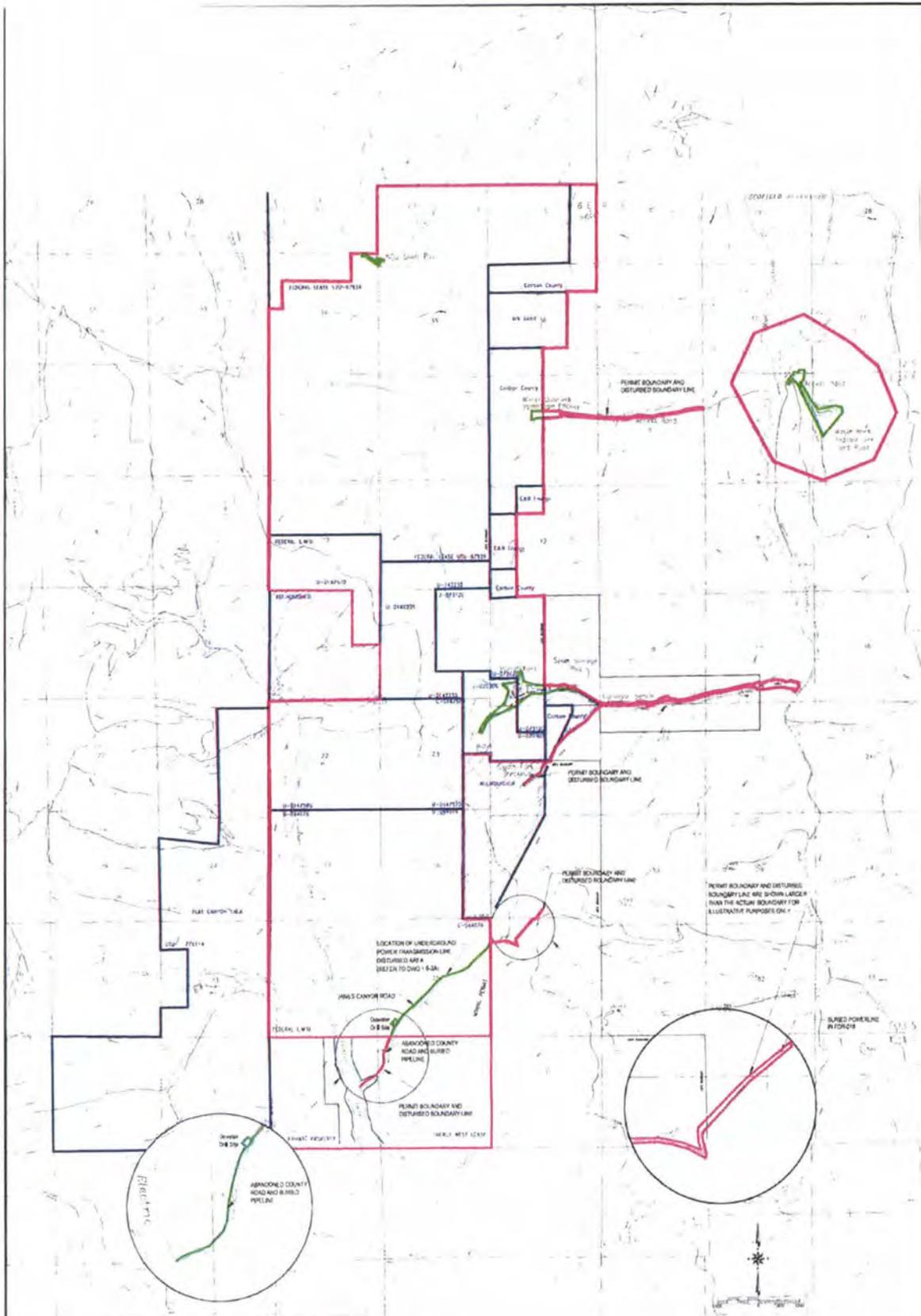
If you have any questions, please call me at (801) 538-5325.

Sincerely,



Daron R. Haddock  
Coal Program Manager

SALUTATION	NAME	TITLE	ORGANIZATION	ADDRESS	CITY	STATE	ZIP CODE
Dr. Merritt	Christopher Merritt	, SHPO Compliance	Utah Division of State History	300 S Rio Grande Street	Salt Lake City	Utah	84101
Mr. Ariotti	Dave Ariotti	, District Engineer	Department of Environmental Quality	P.O. Box 800	Price	Utah	84501
Mr. Bankert	Roger Bankert	, Minerals Support Supervisor	Bureau of Land Management	440 West 200 South, Suite 500	Salt Lake City	Utah	84101-1345
Mr. Boehms	Alan Boehms		Office of Surface Mining	1999 Broadway, Suite 3320	Denver	Colorado	80202-3050
Mr. Brady	Keith Brady	, Commissioner	Emery County Commission	P.O. Box 629	Castle Dale	Utah	84513
Mr. Cowley	Paul Cowley	, Commissioner	Emery County Commission	P.O. Box 629	Castle Dale	Utah	84513
Mr. Crist	Larry Crist	, Field Supervisor	U.S. Fish & Wildlife Service	2369 West Orton Circle, Suite 50	West Valley City	Utah	84119
Mr. Davis	Allyn Davis	, District Manager	Mine Safety and Health Administration	P.O. Box 25367, DFC	Denver	Colorado	80225-0367
Mr. Domeier	Mike Domeier	, Utah State Soil Scientist	Natural Resource Conservation	125 South State St. Room 4402	Salt Lake City	Utah	84147
Mr. Fillmore	Carl Fillmore	, District Manager	North Emery Water Users Association	P.O. Box 129	Cleveland	Utah	84518
Mr. Forbush	Kirk Forbush	, Regional Engineer	Division of Water Rights	P.O. Box 664	Richfield	Utah	84701-0563
Mr. Geary	Edward Geary	, Chairman	Emery County Public Lands Council	P.O. Box 1298	Castle Dale	Utah	84513
Mr. Harja	John Harja	, Senior Policy Analyst	Public Lands Policy Coordination Office	P.O. Box 141107	Salt Lake City	Utah	84114-1107
Mr. Hopes	Casey Hopes	, Commissioner	Carbon County Commission	120 East Main Street	Price	Utah	84501
Mr. Humphrey	Jay Mark Humphrey	, District Manager	Emery Water Conservancy District	P.O. Box 998	Castle Dale	Utah	84513
Mr. Lee	Richard Lee	, Chairman of the Board	Carbon Water Conservancy District	P.O. Box 509	Helper	Utah	84526
Mr. Levanger	David Levanger		Carbon County Planning & Zoning	120 East Main Street	Price	Utah	84501
Mr. McElprang	Lee McElprang	, Chairman	Emery Water Conservancy District	P.O. Box 998	Castle Dale	Utah	84513
Mr. McKenzie	Jeff McKenzie		Bureau of Land Management	440 West 200 South, Suite 500	Salt Lake City	Utah	84101-1345
Mr. Mellor	Jake Mellor	, Commissioner	Carbon County Commission	120 East Main Street	Price	Utah	84501
Mr. Migliori	Ethan Migliori	, Chairman	Emery County Commission	P.O. Box 629	Castle Dale	Utah	84513
Mr. Pentecost	Brian Pentecost	, Forest Supervisor	U.S. Forest Service	599 West Price River Drive	Price	Utah	84501
Mr. Peterson	Ray Peterson	, Director	Emery County Public Lands	P.O. Box 1298	Castle Dale	Utah	84513
Mr. Potter	Jae Potter	, Commissioner	Carbon County Commission	120 East Main Street	Price	Utah	84501
Mr. Richens	Jeff Richens	, District Manager	Price River Water Improvement District	P.O. Box 903	Price	Utah	84501
Mr. Smith	J. Craig Smith		Smith Hartvigsen, PLLC	175 South Main Street, Suite 300	Salt Lake City	Utah	84111
Mr. Stilson	Marc Stilson	, Regional Engineer	Division of Water Rights	P.O. Box 718	Price	Utah	84501
Mr. Ure	David Ure	, Director	Trust Lands Administration	675 East 500 South, Suite 500	Salt Lake City	Utah	84102
Mr. Ward	Dennis Ward	, President	Huntington-Cleveland Irrigation Company	P.O. Box 327	Huntington	Utah	84528
Mr. Westwood	Brad Westwood	, Director	Utah Division of State History	300 S Rio Grande Street	Salt Lake City	Utah	84101
Ms. Bradley	Sarah Bradley		Price River Water Users	375 South Carbon Avenue, Suite A10	Price	Utah	84501
Ms. Clarke	Kathleen Clarke	, Director	Public Lands Policy Coordination Office	P.O. Box 141107	Salt Lake City	Utah	84114-1107



DATE: 08/11/2010 10:00:00 AM  
 USER: jk  
 PROJECT: Skyline Mine Permit Area

SYMBOL	DESCRIPTION
(Red line)	PERMIT BOUNDARY AND DISTURBED BOUNDARY LINE
(Green line)	LOCATION OF UNDERGROUND POWER TRANSMISSION LINE DISTURBED AREA (REFER TO DWG 1-8-3A)
(Black line)	ABANDONED COUNTY ROAD AND BURIED PIPELINE
(Blue line)	SUNBELT POWERLINE R/W CORNER

SYMBOL	DESCRIPTION
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(Blue line)	SUNBELT POWERLINE R/W CORNER

**SKYLINE MINE PERMIT AREA**



**Canyon Fuel Company, LLC**  
 Skyline Mines

10



GARY R. HERBERT  
*Governor*

SPENCER J. COX  
*Lieutenant Governor*

# State of Utah

DEPARTMENT OF NATURAL RESOURCES

MICHAEL R. STYLER  
*Executive Director*

Division of Oil, Gas and Mining

JOHN R. BAZA  
*Division Director*

September 28, 2016

Scott Bartholomew, Commissioner  
Sanpete County Commission  
160 N. Main Street, Suite 202  
Manti, Utah 84642

Subject: Agency Notification of Flat Canyon Lease Addition, Canyon Fuel Company, LLC,  
Skyline Mine, C/007/0005, Task ID #5017

Dear Commissioner Bartholomew:

On November 20, 2015 the Utah Division of Oil, Gas and Mining has determined that the Canyon Fuel Company, LLC permit application for the Flat Canyon Lease Addition to the Skyline Mine permit is administratively complete. The lease addition will add 2,692.16 acres to the authorized mining area of this site. In compliance with the Utah Coal Mining Rules R645-300-121.300, R645-300-121.310, R645-300-121.320, and the Utah Coal Mining Act (UCA Section 40-10-1 et. seq.), notice is hereby given to all local, state and federal agencies having a jurisdiction or an interest in the area of the operations that this application is available for review.

The Skyline Mine Flat Canyon Lease Addition is located in Sanpete County, as shown on the attached map.

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T.13 S., R.6.E., SL Meridian, Utah

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T. 14 S., R.6 E, SL Meridian, Utah

Section 4, lots 1-4, S1/2N1/2, S1/2;

Section 5, lots 1-4, S1/2N1/2, S1/2;

Containing 2,692.16



This permit application is available for public review at:

Coal Regulatory Program  
Division of Oil, Gas & Mining  
1594 West North Temple, Suite 1210Manti, Utah 84642  
P.O. Box 145801  
Salt Lake City, Utah 84114-5801

Sanpete County Courthouse  
160 North Main Street  
Manti, Utah 84642

Please send your comments by October 28, 2016 to:

Coal Regulatory Program  
Division of Oil, Gas & Mining  
P.O. Box 145801  
Salt Lake City, Utah 84114-5801

If you have any questions, please call me at (801) 538-5325.

Sincerely,



Daron R. Haddock  
Coal Program Manager



GARY R. HERBERT  
Governor

SPENCER J. COX  
Lieutenant Governor

# State of Utah

## DEPARTMENT OF NATURAL RESOURCES

MICHAEL R. STYLER  
Executive Director

### Division of Oil, Gas and Mining

JOHN R. BAZA  
Division Director

September 28, 2016

Kevin Christensen  
Sanpete Economic Development  
P.O. Box 148  
Manti, Utah 84642

Subject: Agency Notification of Flat Canyon Lease Addition, Canyon Fuel Company, LLC,  
Skyline Mine, C/007/0005, Task ID #5017

Dear Mr. Christensen:

On November 20, 2015 the Utah Division of Oil, Gas and Mining has determined that the Canyon Fuel Company, LLC permit application for the Flat Canyon Lease Addition to the Skyline Mine permit is administratively complete. The lease addition will add 2,692.16 acres to the authorized mining area of this site. In compliance with the Utah Coal Mining Rules R645-300-121.300, R645-300-121.310, R645-300-121.320, and the Utah Coal Mining Act (UCA Section 40-10-1 et. seq.), notice is hereby given to all local, state and federal agencies having a jurisdiction or an interest in the area of the operations that this application is available for review.

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Containing 2,692.16



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Division of Oil, Gas & Mining  
1594 West North Temple, Suite 1210  
P.O. Box 145801  
Salt Lake City, Utah 84114-5801

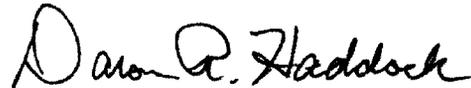
Sanpete County Courthouse  
160 North Main Street  
Manti, Utah 84642

Please send your comments by October 28, 2016 to:

Coal Regulatory Program  
Division of Oil, Gas & Mining  
P.O. Box 145801  
Salt Lake City, Utah 84114-5801

If you have any questions, please call me at (801) 538-5325.

Sincerely,



Daron R. Haddock  
Coal Program Manager



GARY R. HERBERT  
Governor

SPENCER J. COX  
Lieutenant Governor

# State of Utah

## DEPARTMENT OF NATURAL RESOURCES

MICHAEL R. STYLER  
Executive Director

### Division of Oil, Gas and Mining

JOHN R. BAZA  
Division Director

September 28, 2016

Russell Cowley, Director  
Six County Commissioners Organization  
P.O. Box 820  
Richfield, Utah 84701

Subject: Agency Notification of Flat Canyon Lease Addition, Canyon Fuel Company, LLC,  
Skyline Mine, C/007/0005, Task ID #5017

Dear Mr. Cowley:

On November 20, 2015 the Utah Division of Oil, Gas and Mining has determined that the Canyon Fuel Company, LLC permit application for the Flat Canyon Lease Addition to the Skyline Mine permit is administratively complete. The lease addition will add 2,692.16 acres to the authorized mining area of this site. In compliance with the Utah Coal Mining Rules R645-300-121.300, R645-300-121.310, R645-300-121.320, and the Utah Coal Mining Act (UCA Section 40-10-1 et. seq.), notice is hereby given to all local, state and federal agencies having a jurisdiction or an interest in the area of the operations that this application is available for review.

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T. 14 S., R.6 E, SL Meridian, Utah

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Section 5, lots 1-4, S1/2N1/2, S1/2;

Containing 2,692.16



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

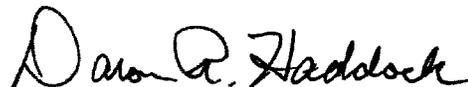
Sanpete County Courthouse  
160 North Main Street  
Manti, Utah 84642

Please send your comments by October 28, 2016 to:

Coal Regulatory Program  
Division of Oil, Gas & Mining  
P.O. Box 145801  
Salt Lake City, Utah 84114-5801

If you have any questions, please call me at (801) 538-5325.

Sincerely,



Daron R. Haddock  
Coal Program Manager



GARY R. HERBERT  
*Governor*

SPENCER J. COX  
*Lieutenant Governor*

# State of Utah

DEPARTMENT OF NATURAL RESOURCES

MICHAEL R. STYLER  
*Executive Director*

Division of Oil, Gas and Mining

JOHN R. BAZA  
*Division Director*

September 28, 2016

Steve Frischknecht, Commissioner  
Sanpete County Commission  
160 N. Main Street, Suite 202  
Manti, Utah 84642

Subject: Agency Notification of Flat Canyon Lease Addition, Canyon Fuel Company, LLC,  
Skyline Mine, C/007/0005, Task ID #5017

Dear Commissioner Frischknecht:

On November 20, 2015 the Utah Division of Oil, Gas and Mining has determined that the Canyon Fuel Company, LLC permit application for the Flat Canyon Lease Addition to the Skyline Mine permit is administratively complete. The lease addition will add 2,692.16 acres to the authorized mining area of this site. In compliance with the Utah Coal Mining Rules R645-300-121.300, R645-300-121.310, R645-300-121.320, and the Utah Coal Mining Act (UCA Section 40-10-1 et. seq.), notice is hereby given to all local, state and federal agencies having a jurisdiction or an interest in the area of the operations that this application is available for review.

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T. 14 S., R.6 E, SL Meridian, Utah

Section 4, lots 1-4, S1/2N1/2, S1/2;

Section 5, lots 1-4, S1/2N1/2, S1/2;

Containing 2,692.16



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Coal Regulatory Program  
Division of Oil, Gas & Mining  
1594 West North Temple, Suite 1210Manti, Utah 84642  
P.O. Box 145801  
Salt Lake City, Utah 84114-5801

Sanpete County Courthouse  
160 North Main Street  
Manti, Utah 84642

Please send your comments by October 28, 2016 to:

Coal Regulatory Program  
Division of Oil, Gas & Mining  
P.O. Box 145801  
Salt Lake City, Utah 84114-5801

If you have any questions, please call me at (801) 538-5325.

Sincerely,



Daron R. Haddock  
Coal Program Manager



GARY R. HERBERT  
Governor

SPENCER J. COX  
Lieutenant Governor

# State of Utah

## DEPARTMENT OF NATURAL RESOURCES

MICHAEL R. STYLER  
Executive Director

### Division of Oil, Gas and Mining

JOHN R. BAZA  
Division Director

September 28, 2016

Scott Olsen, Zoning Administrator  
160 N. Main Street, Suite 201  
Manti, Utah 84642

Subject: Agency Notification of Flat Canyon Lease Addition, Canyon Fuel Company, LLC,  
Skyline Mine, C/007/0005, Task ID #5017

Dear Mr. Olsen:

On November 20, 2015 the Utah Division of Oil, Gas and Mining has determined that the Canyon Fuel Company, LLC permit application for the Flat Canyon Lease Addition to the Skyline Mine permit is administratively complete. The lease addition will add 2,692.16 acres to the authorized mining area of this site. In compliance with the Utah Coal Mining Rules R645-300-121.300, R645-300-121.310, R645-300-121.320, and the Utah Coal Mining Act (UCA Section 40-10-1 et. seq.), notice is hereby given to all local, state and federal agencies having a jurisdiction or an interest in the area of the operations that this application is available for review.

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T. 14 S., R.6 E, SL Meridian, Utah

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Section 5, lots 1-4, S1/2N1/2, S1/2;

Containing 2,692.16



This permit application is available for public review at:

Coal Regulatory Program  
Division of Oil, Gas & Mining  
1594 West North Temple, Suite 1210Manti, Utah 84642  
P.O. Box 145801  
Salt Lake City, Utah 84114-5801

Sanpete County Courthouse  
160 North Main Street

Please send your comments by October 28, 2016 to:

Coal Regulatory Program  
Division of Oil, Gas & Mining  
P.O. Box 145801  
Salt Lake City, Utah 84114-5801

If you have any questions, please call me at (801) 538-5325.

Sincerely,



Daron R. Haddock  
Coal Program Manager



GARY R. HERBERT  
Governor

SPENCER J. COX  
Lieutenant Governor

# State of Utah

## DEPARTMENT OF NATURAL RESOURCES

MICHAEL R. STYLER  
Executive Director

### Division of Oil, Gas and Mining

JOHN R. BAZA  
Division Director

September 28, 2016

Claudia Jarrett, Commissioner  
Sanpete County Commission  
160 N. Main Street, Suite 202  
Manti, Utah 84642

Subject: Agency Notification of Flat Canyon Lease Addition, Canyon Fuel Company, LLC,  
Skyline Mine, C/007/0005, Task ID #5017

Dear Commissioner Jarrett:

On November 20, 2015 the Utah Division of Oil, Gas and Mining has determined that the Canyon Fuel Company, LLC permit application for the Flat Canyon Lease Addition to the Skyline Mine permit is administratively complete. The lease addition will add 2,692.16 acres to the authorized mining area of this site. In compliance with the Utah Coal Mining Rules R645-300-121.300, R645-300-121.310, R645-300-121.320, and the Utah Coal Mining Act (UCA Section 40-10-1 et. seq.), notice is hereby given to all local, state and federal agencies having a jurisdiction or an interest in the area of the operations that this application is available for review.

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Section 5, lots 1-4, S1/2N1/2, S1/2;

Containing 2,692.16



This permit application is available for public review at:

Coal Regulatory Program  
Division of Oil, Gas & Mining  
1594 West North Temple, Suite 1210Manti, Utah 84642  
P.O. Box 145801  
Salt Lake City, Utah 84114-5801

Sanpete County Courthouse  
160 North Main Street  
Manti, Utah 84642

Please send your comments by October 28, 2016 to:

Coal Regulatory Program  
Division of Oil, Gas & Mining  
P.O. Box 145801  
Salt Lake City, Utah 84114-5801

If you have any questions, please call me at (801) 538-5325.

Sincerely,



Daron R. Haddock  
Coal Program Manager





C/007/005 Incoming  
CC: Priscilla  
Amanda  
Steve C.

RECEIVED

MAR 25 2016

DIV. OF OIL, GAS & MINING

#5017

J. CRAIG SMITH  
[jcsmith@SHutah.law](mailto:jcsmith@SHutah.law)

NATHAN S. BRACKEN  
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March 25, 2016

*Via Hand Delivery*

Coal Regulatory Program  
Utah Division of Oil, Gas and Mining  
1594 West North Temple, Suite 1210  
Salt Lake City, Utah 84114-5801

Re: ***Flat Canyon Lease Addition, Canyon Fuel Company, LLC. Skyline Mine,  
C/007/0005, Task ID #5017***

Huntington-Cleveland Irrigation Company re-submits the enclosed comments regarding Canyon Fuel Company's permit application for the Flat Canyon Lease Addition to the Skyline Mine, which the Division of Oil and Gas and Mining has determined is administratively complete. These comments are attached as Exhibit "A."

Huntington-Cleveland originally submitted these comments on January 29, 2016, in response to a letter it received from the Division dated November 23, 2015, attached as Exhibit "B," which requested comments on the amendment. The Division later informed Huntington-Cleveland that this was in error. Consequently, Huntington-Cleveland is resubmitting its comments per the notice it received from the Division on February 9, 2016, announcing the official comment period for the Flat Canyon Lease application.

Please let me know if you have any questions.

Sincerely,

SMITH HARTVIGSEN, PLLC

J. Craig Smith  
Nathan S. Bracken  
*Attorneys for Huntington-Cleveland*

cc: Huntington-Cleveland Irrigation Company

Encl.

# **EXHIBIT A**



**FILE COPY**

J. CRAIG SMITH  
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NATHAN S. BRACKEN  
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January 29, 2016

*Via Hand Delivery*

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

RECEIVED

JAN 29 2016

DIV. OF OIL, GAS & MINING

**Re: Flat Canyon Lease Addition, Canyon Fuel Company, LLC, Skyline Mine,  
C/007/0005, Task ID #5017**

Huntington-Cleveland Irrigation Company (“**Huntington-Cleveland**” or the “**Company**”) hereby submits the following comments regarding Canyon Fuel Company’s (“**CFC**”) permit application (the “**Application**”) for the Flat Canyon Lease Addition (“**Addition**”) to the Skyline Mine, which the Division of Oil and Gas (“**DOG M**”) has determined is administratively complete.

#### **I. Huntington-Cleveland Overview**

Huntington-Cleveland is a non-profit mutual water company and is the largest holder of “state-appropriated water” in the Huntington Creek Drainage as this term is used in Section 40-40-18(15)(c) of the Utah Code. The Company relies on its water rights to provide water for its many shareholders, which include nearly all of the agricultural users in northern Emery County as well as the municipalities of Huntington, Cleveland, and Elmo for culinary drinking water. Huntington-Cleveland also provides water for Pacificorp/Rocky Mountain Power, its largest shareholder, for the operation of the Huntington Power Plant. Importantly, Water Right 93-1134, one of the water rights held by Huntington-Cleveland, is a diligence claim that the Proposed Determination for the San Rafael Adjudication recognizes as the most senior right in the drainage, with an 1885 priority date. In sum, Huntington-Cleveland is the largest and most senior water right holder in the Huntington Creek drainage.

The Addition will, if approved, allow additional mining within the Huntington Creek drainage upon which the Company relies for water to its shareholders and ultimately the public. Under Utah water law, Huntington-Cleveland’s right to obtain its state-appropriated water extends from its approved points of diversion on Huntington Creek and springs in Huntington Canyon to the “farthest limits of the watershed.”<sup>1</sup> Thus, all of the surface and underground water that feeds the various gaining portions of Huntington Creek as well as the springs and seeps in the Huntington Creek drainage make up Huntington-Cleveland’s state-appropriated water.

<sup>1</sup> See *College Irrigation Co. v. Logan River & Black Smith Fork Irrigation Co.*, 780 P.2d 1241, 1244 (Utah 1989); *Richards Irrigation Co. v. Westview Irrigation Co.*, 80 P.2d 458, 465 (Utah 1938).



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NATHAN S. BRACKEN  
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January 29, 2016

*Via Hand Delivery*

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

**Re: Flat Canyon Lease Addition, Canyon Fuel Company, LLC, Skyline Mine,  
C/007/0005, Task ID #5017**

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<sup>1</sup> See *College Irrigation Co. v. Logan River & Black Smith Fork Irrigation Co.*, 780 P.2d 1241, 1244 (Utah 1989); *Richards Irrigation Co. v. Westview Irrigation Co.*, 80 P.2d 458, 465 (Utah 1938).

## **II. DOGM Should Ensure that the Application Will not Impair Huntington-Cleveland's Water Rights**

Huntington-Cleveland recognizes the importance of mining for Emery County, and does not oppose Application, provided that DOGM ensures that CFC can carry out its proposed mining and reclamation activities without adversely affecting the hydrologic balance of water resources in the Addition and surrounding areas and causing unaddressed contamination, diminution, or interruption of Huntington-Cleveland's state appropriated water.

The Addition is located in the Huntington-Cleveland Creek Drainage and underlies Boulger Reservoir. Huntington-Cleveland is concerned about impacts to the water sources that supply its rights. Specifically, removing coal and allowing overlying material to fall in its place creates subsidence, which could cause the overlying material to become fractured. This, in turn, could cause groundwater or water that flows into the mine from the surface that would otherwise remain in the Huntington-Cleveland Creek Drainage to migrate through the fractured material into the Price River Drainage or elsewhere, thereby limiting the amount of water available to satisfy the Company's water rights.

The concern over adverse consequences to state appropriated water is not theoretical. As DOGM is well aware, a drastic loss of water from Electric Lake and the concurrent flooding of Skyline Mine occurred when mining directly beneath Electric Lake took place a decade ago. The timing between the large increase of inflow into the Mine and a precipitous drop in the water level of Electric Lake is difficult to ascribe to an unrelated coincidence, which had never occurred in the previous forty year history of Electric Lake. This event provides but one example of mining intercepting water flow in the Huntington Creek drainage. As you are aware, the environmental review of the Flat Canyon Tract and Record of Decision predates the Electric Lake Skyline Mine events. No effort has been made to update these studies in light of the Electric Lake/Skyline Mine events. We have attached, as **Exhibit A**, one post event report previously submitted to DOGM authored by D. Kip Solomon, Ph. D, a University of Utah Professor, who concluded that Electric Lake was indeed being drained through fractures caused by mining activity in the Skyline Mine. Although there are differing theories as to the cause of the loss of water from the lake and the flooding of the mine, Huntington-Cleveland believes there is sufficient evidence to show, at the very least, that the mining activities in the Skyline Mine directly below Electric Lake caused water to drain from the lake into the mine. The Company also notes that DOGM was unable to pinpoint the source of the water that flooded the mine, and was therefore unable to rule out Electric Lake as the source of the large mine inflow.

A similar concern regarding the impact of mining activity on water quality also has recent precedent in the Huntington Creek drainage. Elevated levels of iron in water are currently being discharged from the idle Crandall Canyon Mine operated by Genwell Resources, Inc. This requires monitoring, treatment and a bond. Even if water quantity is not affected by mining activity in the Addition, water quality could be and needs to also be addressed through the permit process.

Huntington-Cleveland is concerned that the proposed mining activities in the Addition could create similar impacts for its other water sources in the area, including Boulger Reservoir, which is within the Addition. Several other reservoirs which store water for the Company, Cleveland Reservoir, Huntington Reservoir and Rolfson Reservoir, are only a few miles away from the Addition and are hydrologically connected to other water sources that are located within the Addition. If the proposed mining activities alter or diminish the water sources that supply water for Huntington-Cleveland's state appropriated rights, including Boulger Reservoir, such a result would adversely impact the Company and have severe consequences on all who live, work and farm in Northern Emery County.

In 2005, Huntington-Cleveland submitted comments on CFC's application to amend the Skyline Mine Mining and Reclamation Plan to allow subsidence in the North Lease of the Project. Those comments, attached as **Exhibit B**, provided a detailed explanation of the reasons why mining activities in the area could impact water resources. Although these earlier comments pertained to the North Lease, Huntington-Cleveland believes they provide a useful overview of the possible connection between mining activities and hydrology in the overall Skyline Mine permit area. The Company therefore urges DOGM to consider these general concerns in evaluating the Application.

### **III. DOGM Should Require the Applicant to Have a Feasible, Effective Plan in Place to Replace Water that is Lost, Interrupted, or Contaminated**

Section 40-40-18(15)(c) of the Utah Code expressly states that permittees "shall promptly replace **any state-appropriated water** in existence prior to the application for a surface coal mining and reclamation permit, which has been affected by contamination, diminution, or interruption resulting from underground coal mining operations" (emphasis added). Rule 645-301-731.530 of the Utah Administrative Code further requires the use of baseline hydrologic and geologic information to determine the impact of mining activities upon water supplies.

Given these requirements, Huntington-Cleveland respectfully requests that DOGM include the following conditions in any permit it may approve for the Addition. First, it requests that any determination regarding possible hydrological impacts recognize that it is possible that CFC's proposed mining and reclamation activities could impact the water rights and water supply of Huntington-Cleveland, including the possible migration of water from one drainage to another.

Second, Huntington-Cleveland requests that DOGM require, pursuant to Section 40-40-18(15)(c), that CFC replace any water from the Huntington-Creek drainage that is contaminated, interrupted, or diminished as a result of any mining activities that it may undertake in the Addition.

Third, Huntington-Cleveland requests that DOGM ensure that CFC identify specific replacement water that is both physically and legally available to CFC and the Huntington Creek drainage that will be immediately provided in the event of interruption, diminution or contamination of water in the Huntington Creek drainage due to the mining activities. The legal

and physical ability of CFC to provide specific replacement water should be demonstrated as a condition of Permit Approval.

Fourth, in order to identify and evaluate any adverse impacts to water resources that may occur to baseline hydrologic conditions, Huntington-Cleveland proposes the following conditions for any permit DOGM may issue for the Addition:

1. Monitoring quantity and quality of all water captured, produced or used in the mining operations in the Addition.
2. All water that is pumped in or out of the Addition should be run through a magnetic flow meter with real time measuring and reporting. Reporting should be monthly and the results of such reporting should be made available to Huntington-Cleveland.
3. All meters should be inspected on a semi-annual basis by the Division of Water Rights to ensure the meters are working properly, with the results of such inspections being made available to Huntington-Cleveland. The Company is also be willing to perform these inspections should the Division of Water Rights be unwilling or unable to do so.
4. CFC should repair and remediate all surface damage in the Addition that its mining operations may cause as soon as possible after the damage has been reported to protect the watershed.

#### **IV. CONCLUSION**

In sum, Huntington-Cleveland does not oppose mining generally or in the Addition as mining is critical to the economy of Emery County, but is concerned that the proposed mining activities have the potential to adversely impact water resources in the area and the Company's state-appropriated water rights. For this reason, Huntington-Cleveland urges DOGM to include the above conditions and protections in any permit that it may approve for CFC to protect its water rights and water sources in the Addition and surrounding areas. The Company further believes its requested conditions will go a long way in providing such protections. Huntington-Cleveland is also willing to work collaboratively with CFC and the DOGM to discuss other ways of protecting or augmenting water resources in the Addition and the Huntington Creek drainage. Consequently, the Company requests a hearing to provide the parties with an opportunity to discuss and address these and further critical issues.

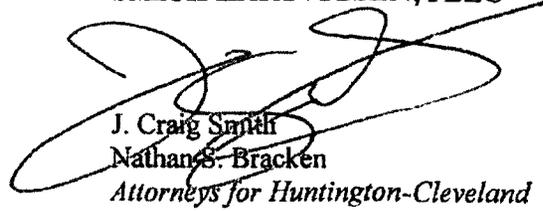
Huntington-Cleveland hopes that a common understanding can be reached as to how to protect its water rights and water resources in the Addition and surrounding areas. Nevertheless, it reserves its right to appeal any permit issued for the Addition to the Board of Oil, Gas, and Mining.

Thank you for considering the Company's comments. Please contact me with any questions.

Letter to the Coal Regulatory Program  
January 29, 2016  
Page 5 of 5

Sincerely,

**SMITH HARTVIGSEN, PLLC**



J. Craig Smith  
Nathan S. Bracken  
*Attorneys for Huntington-Cleveland*

cc: Huntington-Cleveland Irrigation Company

4829-4576-0301, v. 5

PRELIMINARY DRAFT

Analysis of Groundwater Flow from Electric Lake Towards the  
Skyline Mine

June, 2005

D. Kip Solomon  
Ph.D.

## **Abstract**

This report documents analyses of tritium, noble gases, and chlorofluorocarbons (collectively referred to as environmental tracers) that have been performed on waters collected in the vicinity of Electric Lake and Skyline Mine. These analyses provide insights regarding groundwater flow and the transport of solutes dissolved in this groundwater. They have been used to develop a conceptual hydrologic model that describes interactions between the surface and subsurface hydrologic systems.

The primary conclusion of this report is that substantial quantities of surface water in the vicinity of Electric Lake are being diverted towards subsurface discharge points (mine workings and dewatering wells.) The rapid introduction of surface water is likely to have resulted from fractures that were either intercepted, created, or enlarged as mining activities moved towards Electric Lake in 1999. The basis for this conclusion is that the isotopic character of subsurface discharge is evolving towards that of surface water with this evolution commencing in approximately 2001. A mathematical model of flow and transport along fracture pathways predicts that the isotopic character of subsurface discharge will continue to evolve for more than 10 years as water in pores surrounding fracture pathways is gradually replaced by surface water. While the model predicts a gradual evolution in the chemical and isotopic character of subsurface discharge, it predicts a rapid (nearly instantaneous) effect on the surface water hydrology. The model is fully consistent with losses on the order of 5000 gal/min of water from Electric Lake as documented by water balance studies.

This report is organized as follows. Evidence that shows the presence of surface water in subsurface discharge is first presented. The most direct evidence comes from a large number of tritium analyses, and is supported by a smaller number of dissolved gas measurements. These data are then evaluated in the context of a mathematical model that simulates the transport of environmental tracers along fracture pathways. Finally, the data and mathematical modeling are discussed in terms of a conceptual model for the impact of subsurface flow on the surface water hydrology of the site. For reference, an overview of the use of environmental tracers to evaluate groundwater flow is presented in Appendix A.

This report was originally prepared in May, 2004. It has been updated to include tritium data from samples collected through March, 2005.

## **Evidence for the Presence of Surface Water in Subsurface Discharge**

### ***Tritium***

Tritium is a radioactive isotope of hydrogen with a half-life and 12.3 years. Tritium in natural waters is derived mostly from nuclear sources (reactors, weapons testing and productions, etc.) and because of its half-life is present at only very low concentrations in subsurface water that is older than about 50 years. Figure 1 shows tritium values as a

function of time for samples collected from wells JC1, JC3, and from underground mine workings. Also shown in Figure 1 are tritium values obtained by the Skyline Mine. Tritium data are located in Table 1. The most prominent feature of Figure 1 is the consistent increase in tritium with time. For example, the tritium value for JC1 was 0.2 TU in September of 2001 and has risen to 2.99 TU in March of 2005. While the only long-term time series is from well JC1, it is clear from Figure 1 that this well is also representative of water in mine workings (which could not be sampled directly after 2002 due to flooding in the mine.) Table 1 also shows tritium values from various surface sources including Electric Lake and Huntington Creek. These values range from 7.7 to 12.6 TU with an average of about 9.2 TU. The continuous increase in tritium through time with values reaching 2.99 TU (March 2005) can only occur by the rapid and downward movement of surface water to subsurface discharge points.

### ***Tritium/Helium-3***

In addition to tritium, samples were collected for analysis of dissolved gases. Dissolved noble gases (especially helium-3) can be combined with tritium to estimate groundwater ages. The utility of groundwater dating using tritium and helium-3 has been well documented in the scientific literature (Poreda et al. 1988; Solomon et al., 1992; Solomon et al. 1993; Cook and Solomon, 1997; Solomon and Cook, 2000.) These samples were analyzed at the University of Utah and the results are shown in Table 2. Also shown are calculated values such as the apparent age of the water (or recharge year) and the amount of terrigenic <sup>4</sup>He (He that is derived from radioactive decay in the subsurface.)

Apparent tritium/helium-3 ages were 18 and 16 years for samples collected from JC1 and JC3 in 2003. Because this water is a mixture of old and young water (discussed later in more detail) the age calculation is sensitive to the isotopic composition of He produced in the subsurface (terrigenic He) and this value is not well known. As a result, there is significant uncertainty in these ages, probably on the order  $\pm 7$  years. In a mixture of young and old water, the tritium/helium-3 age is biased strongly towards the young fraction. Thus, I interpret these ages to represent the mean travel time of tritium moving from the surface towards the well intake. However, there is a broad range of travel times even within the young (tritiated) fraction of water that discharges at the wells. Thus, the apparent ages should not be confused with the shortest travel times in this system but rather is more representative of the mean travel time for the young fraction of water. Furthermore, as shown with the mathematical model later in this report, the travel distance divided by the apparent travel time does NOT provide a measure of fluid velocity in fracture pathways. This is because exchange with pore water that surrounds fracture pathways influences the chemical and isotopic composition of discharging waters.

### ***CFCs***

Samples were also analyzed for dissolved chlorofluorocarbons (CFC) that can also be used to estimate the occurrence of surface water in subsurface flow systems (Busenberg and Plummer, 1992, Cook and Solomon, 1997.) Apparent CFC recharge years were

computed and are shown in Table 3. Because CFC ages are determined using absolute concentrations, they are highly affected by dilution of young water with old (CFC-free) water. Thus, the CFC ages shown in Table 3 do NOT represent travel times. They are included in Table 3 to show that the apparent age has been declining through time as more and more young water makes it to the well intakes. The primary value of the CFCs is that they can be used to indicate the fraction of old versus young water that is discharging from the wells (discussed in next section of this report.)

### **Fraction of Surface Water in Subsurface Discharge**

While the environmental tracer data clearly indicate the presence of “young” surface water in subsurface discharge, the data also indicate that older groundwater is also discharging. The analysis below provides estimates of the fraction of young surface water that is discharging from the subsurface.

The tritium value for JC1 was 0.2 TU in September of 2001 and had risen to 2.99 TU in March of 2005. Tritium in surface waters ranges from 7.7 to 12.6 TU with an average of about 9.2 TU. A simple binary mixing model can be developed to estimate the fraction of young surface water that has discharged in JC1 as a function of time. Because the tritium content of the old fraction is insignificant, the fraction of modern water (MF) can simply be computed as

$$MF = \text{“Mixture Tritium”} / \text{“Modern Tritium”}.$$

The results of this calculation are shown in Figure 2. The calculation was made using concentrations of both 9 and 12 TU for “Modern Tritium” and do not account for radioactive decay. The fraction of modern water ranges from near zero in 2001 to 0.33 (33%) in March of 2005. Figure 2 also shows linear regressions of the results for both the 9 and 12 TU values for “Modern Tritium.” The linear trends intercept the x axis (date) in May, 2001 (i.e. the date when the “Modern Fraction” is 0.) This linear mixing model was applied only to the data between 2001 and 2003 because non-linear behavior is clear in the data beyond 2004. The change in slope of the tritium versus time curve in early 2004 is probably the result of changes made in pumping within the mine.

Another indicator of the fraction of modern water present in JC1 discharge comes from the CFC data. An optimization technique (using the Solver in Microsoft Excel) was used to find the modern fraction that best fits all three of the CFC values measured (CFC-11, CFC-12, and CFC-113.) The results of these calculations are shown in Table 4. The CFC concentration of the old fraction was assumed to be 0. As shown in Table 4, the modern fraction in JC1 changed from 0.02 in March 2003 to 0.44 in August 2003. While these values are not in perfect agreement with the tritium results, they show the same general pattern of an increasing fraction of modern water with time. The CFC concentration of the old fraction is not well known and may in fact be greater than zero due to gas transport in the vadose zone. CFC concentrations greater than zero for the old fraction would result in a lower modern fraction that is closer to the tritium results. While the CFC results are less reliable than the tritium, they nevertheless show the same

trend and both techniques indicate that at the present point in time significant amounts of modern surface waters are discharging in the subsurface.

Both the tritium and CFC data indicate that significant amounts of modern surface waters are discharging in the subsurface. The estimate of 33% modern water discharging from JC1 is probably a minimum value as it neglects both radioactive decay and exchange with old water in the Star Point Sandstone (discussed in the next section.) The effects of radioactive decay depend on the mean travel time of fluids in the subsurface and are not known precisely. Postulated mean travel times of 2, 5 and 10 years result in the calculated fraction of modern water discharging in JC1 being 37%, 44%, and 58% for the data collected in March 2005 when only radioactive decay is considered.

### **Simulation of Tritium Transport**

The environmental tracer data clearly show a gradual increase in the presence of surface water at subsurface discharge points. On the other hand, water balance calculations show that major losses from Electric Lake began in late 1999 and have continued to the present. Furthermore, in April 2003 a dye tracer test was started by injecting 50 pounds of eosine dye mixture and 35 pounds of fluorescein mixture on the bottom of Electric Lake. Small, but above background concentrations of fluorescein were detected in JC1 discharge in June, 2003. The appearance of detectable dye in approximately 65 days suggests a minimum fluid velocity that is on the order of 30 m/day (approximately 8400 feet in 65 days.) A subsequent dye test was initiated in February of 2004 and the dye was detected in JC1 in early 2005 suggesting a velocity on the order of 7.2 m/day. This rapid transport is strong evidence for fluid movement along fractures rather than intergranular flow. However, the 65- and 355-day dye travel times and the rapid onset of losses from Electric Lake might appear to be inconsistent with the tritium and CFC binary mixing results (i.e. years to reach a modern fraction that approaches 1.) However, as discussed below, these results are consistent with a model of rapid fluid flow along fractures accompanied with mass exchange (due to molecular diffusion) into the surrounding porous matrix. This model illustrates how a rapid onset of the diversion of surface water accompanied with large fluid velocities along fracture pathways is consistent with a more gradual increase in tritium and other environmental tracers.

Fluid and solute transport in a fractured rock mass are controlled by both advection and molecular diffusion. Fluid velocities along fracture pathways can be very large (tens to thousands of meters per day) and very large quantities of fluid can be conveyed through millimeter-size fractures. When a dissolved tracer is introduced into the fracture flow system, it will be transported rapidly by flowing water (advection), but due to its thermal energy will tend to migrate out of the fracture into the surrounding porous matrix. This process is known as matrix diffusion (Grisak and Pickens, 1980; Tang et al., 1981; Sudicky, 1989) and results in a net tracer movement that can be substantially less than the fluid velocity in the fracture. When fractures exist in rocks that contain minimal intergranular porosity, the effects of matrix diffusion are small. In contrast, when small fractures exist in rocks or sediments with high intergranular porosity, the net transport rate of tracer can be orders of magnitude less than the fluid velocity in the fractures.

An analogy to matrix diffusion is when heat is introduced to one end of an efficient heat exchanger. Even though the fluid velocity inside the heat exchanger may be large, high temperature fluid introduced at one end does not rapidly appear at the downstream end of the exchanger because of heat loss out of the system. In fact, depending on the efficiency of the exchanger and the heat capacity of the surrounding system, the temperature at the downstream end may never reach that of the inlet and can remain at a significantly lower temperature. If the exchanger is surrounded by an insulator (as in the case when fractures are in crystalline rocks that have minimal matrix porosity), the temperature at the downstream end will rapidly approach that of the inlet.

I have utilized a computer program known as CRAFLUSH, developed by E. A. Sudicky at the University of Waterloo to simulate tritium transport. CRAFLUSH evaluates an analytical solution to differential equations that describe fluid advection in a system of parallel fractures along with molecular diffusion into the surrounding matrix. Figure 3 is a conceptual diagram that illustrates this model. Input data for two separate model runs (e12.dat and e15.dat) are shown below. The input concentration was set to 10 TU as a rounded average of the values measured in surface water.

#### ***Input Data for Model e12.dat***

SOURCE CONCENTRATION AT FRACTURE ORIGIN= 10.0000 TU  
INITIAL CONCENTRATION IN MATRIX AND FRACTURES= .0000 TU  
VELOCITY IN FRACTURE= 25000.000 m/yr  
FRACTURE DISPERSIVITY= 1.000 m  
FRACTURE APERTURE= 0.8000E-03 m  
FRACTURE SPACING= 1.000 m  
MATRIX POROSITY= .100  
MATRIX TORTUOSITY= .500  
DIFF. COEFF. IN WATER= 0.3150E-01 m<sup>2</sup>/yr  
FRACTURE RETARDATION FACTOR= 1.000  
MATRIX RETARDATION FACTOR= 1.000  
HALF-LIFE= 0.124E+02 yr

#### ***Input Data for Model e15.dat***

SOURCE CONCENTRATION AT FRACTURE ORIGIN= 10.0000 TU  
INITIAL CONCENTRATION IN MATRIX AND FRACTURES= .0000 TU  
VELOCITY IN FRACTURE= 35000.000 m/yr  
FRACTURE DISPERSIVITY= 1.000 m  
FRACTURE APERTURE= 0.2500E-03 m  
FRACTURE SPACING= 1.000 m  
MATRIX POROSITY= .200  
MATRIX TORTUOSITY= .700  
DIFF. COEFF. IN WATER= 0.3150E-01 m<sup>2</sup>/yr  
FRACTURE RETARDATION FACTOR= 1.000  
MATRIX RETARDATION FACTOR= 1.000

HALF-LIFE= 0.124E+02 yr

In model e12.dat the fluid velocity in the fracture was set to 25,000 m/yr, and in model e15.dat the velocity was set to 350,000 m/yr. Other differences in the models are in the fracture aperture (fracture width) and the matrix porosity. Model e12.dat uses a matrix porosity of 10% and a fracture aperture of 0.8 mm, whereas model e15.dat uses a matrix porosity of 20% and a fracture aperture of 0.25 mm. Also, model e12.dat is for a transport distance of 2000 m whereas e15.dat uses a transport distance of 4000 m. These models cover a range of possible values that are reasonable for the system.

The results of these simulations are shown in Figure 4 along with observed tritium values from well JC1. Both of the models provide a good fit with the observed data, although the most recent values (late 2004 to early 2005) fall below the simulated values. This illustrates that the models are not unique (i.e. there are many combinations of parameters such as matrix porosity and fracture aperture that can fit the data equally well); however, these results show that it is possible to transport tritium from the surface without having the tritium concentration rapidly change to that of the input value. Furthermore, the model is consistent with the very rapid transport of small concentrations of dye.

An important result from the CRAFLUSH model is that the tritium concentration in JC1 will continue to increase in the coming years, but not in a linear fashion. Both the simulations shown in Figure 4 (e12.dat and e15.dat) predict that tritium will approach a stable value of about 6 TU. More than 10 years are required in both simulations to reach this steady state value. This value is less than the input value of 10 TU because of radioactive decay. A simulation was performed with input parameters identical to e12.dat except with no radioactive decay. Approximately 25 years were required to reach a concentration near 10 TU at a distance of 2000 m from the source. The difference between the simulation without and with radioactive decay represents the approximate amount of tritiogenic  $^3\text{He}$  in the water. The ratio of tritiogenic  $^3\text{He}$  to tritium is used to calculate the tritium/helium-3 age. The simulated age varies with time and is about 1 year after 2 years of transport and increases to about 8 years when the tritium value reaches a steady state. This increase in the apparent age is consistent with observations (see Table 1), but the absolute values of the observed ages are greater than the simulated values. This may be a result of the inherent uncertainty in the observed ages due to uncertainty in the  $^3\text{He}/^4\text{He}$  ratio of terrigenic He. Nevertheless, the observed and simulated ages are of the same order of magnitude and both show a general increase with time.

A final important point about the tritium transport model is that all subsurface discharge is assumed to come from transport along fracture pathways that are connected to surface water. It is likely that some intergranular flow occurs in the vicinity of dewatering wells and mine discharge that mixes with fracture flow before discharging. A more realistic model of tritium transport might include both fracture and intergranular flow. Indeed, the fact that the most recent tritium data (late 2004 to early 2005) fall below the model may indicate the presence of a component of "old" intergranular flow. However, additional

site characterization is needed before such a model could be implemented in a meaningful manner. The CRAFLUSH model is not intended to be a precise representation of subsurface flow conditions at the site. Rather, it demonstrates that it is physically possible to rapidly transport measured losses from Electric Lake towards subsurface discharge points while having the chemical signal of the discharge gradually approach that of the surface water.

### **Fluid Flow Rates**

The CRAFLUSH model includes fluid flow only in the fractures with intergranular flow being negligible. JC1 has been pumping approximately 4000 gal/min throughout the year 2003 with an additional 3000 to 5000 gal/min from JC3 beginning in July of 2003 to mid 2004. Water balance studies have shown that losses from Electric Lake are on the order of 5000 gal/min in 2002 and 2003. To evaluate the viability of a model in which all flow occurs in fractures, I have computed the total fluid flow rate possible for the two fracture apertures used in simulations e12.dat and e15.dat. This was done using the well-known cubic law that relates the total fluid flow to the cube of the fracture aperture as follows:

$$Q = \frac{\rho g W b^3}{12 \mu} i$$

where, Q is the fluid flow rate [m<sup>3</sup>/s], ρ is the fluid density [kg/m<sup>3</sup>], W is the total length of fractures (map view) [m], b is the fracture aperture [m], I is the hydraulic gradient, and μ is the fluid viscosity [kg/m/s]. The water level in Electric Lake is approximately 8500 feet. On 6/19/2002 the water level in an observation well in Burnout Canyon (Well 79-35-1) was 8195 feet (Canyon Fuels Map No. PHC A-4). If this water level is representative of JC1, then the vertical hydraulic gradient is approximately (8500-8195)/700 = 0.44 (where 700 is the depth of the observation well below Electric Lake.) Setting Q to 0.315 m<sup>3</sup>/s (5000 gal/min), with ρ = 1000 kg/m<sup>3</sup> and μ = 0.0013 kg/m/s, it is possible to calculate the length of fractures (W) necessary to transmit 5000 gal/min from Electric Lake for the two different values of aperture (0.8 and 0.25 mm) used in the transport simulations. The results show that for an aperture of 0.8 mm a total length of 2226 m is needed. Electric Lake is approximately 200 m wide, and thus 11 fractures that extend the width of the lake that each has an aperture of 0.8 mm are sufficient to transmit 5000 gal/min of water from Electric Lake to subsurface discharge points. For an aperture of 0.25 mm, a total length of about 72,935 m, or 365 fractures that extends across Electric Lake is sufficient to transmit 5000 gal/min.

Although both of the simulations (e12.dat and e15.dat) provide reasonable fits to the observed data, it is important to note that fluid velocity used in simulation e12.dat is significantly less than the velocity that would occur along a fracture with an aperture of 0.8 mm when the hydraulic gradient is 0.44. In contrast, the velocity used in simulation e15.dat is consistent with an aperture of 0.25 mm (as used in the simulation) and a hydraulic gradient of about 0.3 that is similar to the gradient discussed above. Thus, only one of the two simulations presented appears to be consistent with both the time series of tritium in discharge and the observed hydraulic gradient. This suggests that a moderate

number of fractures ( $\approx 350$ ) with apertures that are on the order of 0.25 mm may be responsible for fluid and mass transport in this system.

### **Conceptual Model**

The environmental tracer data presented in this report are consistent with the following conceptual model. Pore waters within the Star Point Sandstone are part of a regional flow system that has a mean residence time on the order of thousands of years. This age is consistent with both the  $^4\text{He}$  measurements presented in this report, and  $^{14}\text{C}$  measurements presented by Mayo and Morris (2000.) It is highly unlikely that these pore waters are connate and hydraulically isolated from the near surface flow system. Instead, it is likely that sluggish (but finite) flow occurs in this system as a result of regional hydraulic gradients and the generally low permeability of shale-rich members of the Blackhawk and Star Point Sandstone formations. Superimposed on this regional flow system are fast fracture flow paths. A small number of these pathways may have existed prior to mining activities, but both water balance calculations and evolving (changing with time) environmental tracer data indicate that the onset of significant flow is coincident with mining activities in this area.

Tritiated water from the surface began moving towards subsurface discharge points at the onset of losses from Electric Lake. Initially, much of the discharge would have the isotopic and chemical character of old stored water, but is now evolving towards the character of surface water. In this model, the subsurface discharge may include a significant draining of old stored water as well as having a large impact on the surface water system.

### **Alternative Model**

If one considers only the tritium data at a selected point in time, it is possible to explain small values in subsurface discharge resulting from a steady-state mixture of minor amounts of surface water with large amounts of old groundwater. For example, in September 2001 the tritium content of JC1 was 0.2 TU and this represents a modern fraction of only about 2 %. Without the benefit of other data, one might conclude that the majority of subsurface discharge is derived from the Star Point Sandstone that generally contains tritium-free water. Tritium in discharge is conveyed from the surface and mixes with the old water in the Star Point Sandstone. A characteristic feature of this model is that the majority of discharge is derived from stored water with only a modest input of modern water from the surface. Furthermore, this conceptual model implies that in the future, water will continue to drain from the Star Point Sandstone as it represents a very large volume of water. In other words, this alternative conceptual model represents a steady state mixture between mostly stored water and a small amount of surface water that will continue for a long period of time. However, when one considers (1) the increasing nature of the tritium and other environmental tracer data (2) large losses from Electric Lake beginning in 1999, and (3) the detection of dye in JC1 discharge, **this alternative conceptual model is not viable.**

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## Appendix A

### Overview of Tritium, Dissolved Gases, and Chlorofluorocarbons as Indicators of Groundwater Flow

#### *Tritium*

Tritium ( $^3\text{H}$ ) is a radioactive isotope of hydrogen (12.43 year half-life.) Large amount of  $^3\text{H}$  were introduced into the atmosphere as a result of thermonuclear weapons testing in the 1950s and 1960s. Small quantities are also produced naturally in the upper atmosphere mainly through the bombardment of nitrogen by the flux of neutrons in cosmic radiation. Prior to 1950 the  $^3\text{H}$  activity of precipitation ranged from about 3 to 6 TU (1 TU represents one molecule of  $^3\text{H}^1\text{HO}$  in  $10^{18}$  molecules of  $^1\text{H}_2\text{O}$ ) in North America. In the mid 1960s, the  $^3\text{H}$  activity of precipitation rose to more than 3000 TU in Ottawa, Canada, and to over 8000 TU in Salt Lake City. Although  $^3\text{H}$  can also be produced in the subsurface (mostly through spontaneous fission of  $^6\text{Li}$ ;  $^6\text{Li}(n,\alpha)^3\text{H}$ ), the activity in water resulting from average crustal rocks should be less than about 0.2 TU (Lehmann et al., 1993).

Because (1) of the spike-like input of into groundwater, and (2) because it is a part of the water molecule,  $^3\text{H}$  is one of the most widely used dating methods in hydrology. In North America groundwater that originated as precipitation prior to 1950 should have a present day  $^3\text{H}$  activity of less than 0.5 TU. The simplest use of  $^3\text{H}$  is to distinguish pre-1950 ("pre-bomb) water from post-1950 water.

If the history of  $^3\text{H}$  activity in recharge is well known, it is possible to obtain a more precise estimate of age. However, long-term  $^3\text{H}$  records exist for only selected stations (see <http://isohis.iaea.org/> for a comprehensive data base) and temporal variations (from season to season and even from storm to storm) make it difficult to define the  $^3\text{H}$  input activity precisely at a given site. As a result, it is typically not possible to collect a single water sample and derive a precise age (e.g.  $\pm 5$  or 10 years) from a measurement of  $^3\text{H}$  only.

#### *Dissolved Gases*

Gases dissolved in groundwater can be derived from either exchange with the atmosphere of the vadose zone, or can be generated within the aquifer. Noble gases that are primarily derived from the atmosphere include neon, argon, krypton, and xenon. Gases that are derived mostly from the atmosphere, but can be produced in significant amounts in the subsurface include nitrogen and helium.

For gases that are derived primarily from the atmosphere, the concentration in groundwater depends on the following.

1. The temperature at the water table (recharge temperature.)

2. The salinity at the water table.
3. The atmospheric pressure at the water table (controlled mostly by the elevation.)
4. The degree to which the water table fluctuates up and down trapping air bubbles which then dissolve (excess air.)

Items 1 through 3 result from equilibrium processes and the concentration associated with each of these can be calculated precisely using solubility equations. In contrast, item number 4 (excess air) is commonly observed in groundwater samples, but is difficult to estimate from a theoretical point of view. In practice, the concentration of each dissolved gas is expressed as follows:

$$C_i = P_t X_i K_i + X_i EA \quad (1)$$

where  $P_t$  is the total atmospheric pressure (and depends on elevation),  $X_i$  is the mole fraction of gas  $i$  in the atmosphere (e.g. 0.78 for  $N_2$ ;  $5.24 \times 10^{-6}$  for  $^4He$ ),  $K_i$  is Henry's coefficient for gas  $i$  (and depends on temperature and salinity), and  $EA$  is the amount of excess air. If a series of dissolved gases are measured (that have either no or minimal subsurface source), then equation (1) can be written for each gas. This system of equations is then solved simultaneously to obtain estimates of the input parameters (e.g. temperature, atmospheric pressure, etc.) that best fit the observed data. Usually, the salinity of the water at the water table is low (and therefore does not significantly affect the concentration), and the elevation of recharge (and therefore the atmospheric pressure) is known. Under such conditions the only unknowns are the recharge temperature and the amount of excess air. If three or more atmospherically derived gases are measured, the determination of recharge temperature and excess air is relatively unique with a typical uncertainty in recharge temperature being  $\pm 2$  °C.

For gases that are derived from the atmosphere but are also produced in the subsurface, the concentration in groundwater depends on items 1 through 4 above, but also depends on the amount produced in the subsurface. The processes that produce gas in the subsurface are specific to each gas and are discussed below.

1. Dissolved nitrogen is mostly derived from the atmosphere, but can be produced in the subsurface as a result of denitrification of nitrates. Thus, values of dissolved nitrogen that are in excess of atmospheric solubility generally indicate that geochemical conditions in the aquifer are causing nitrate ( $NO_3^-$ ) to be reduced to nitrogen gas ( $N_2$ ).
2. Dissolved helium-4 is mostly derived from the atmosphere that contains 5.24 ppmv helium-4. However, as uranium and thorium decay to stable daughters, helium-4 is produced. This production occurs mostly within minerals in the subsurface. If these minerals completely retained the helium-4, there would be essentially no source for groundwater. However, most minerals do not retain helium-4 but rather it is released (e.g. due to solid state diffusion) into groundwater that flows past the minerals. As a result, the concentration of helium-4 in groundwater depends on the rate at which it is being released from minerals, and on the amount of time the water is in contact with these minerals

(i.e. the travel time.) It is often assumed that the release of helium-4 from minerals is equal to the production from uranium and thorium decay (i.e. after a steady state is obtained in the mineral.) To the extent that the U and Th concentrations in minerals and the  $^4\text{He}$  release rate is spatially constant,  $^4\text{He}$  concentrations above atmospheric solubility indicate groundwater travel times. Helium-4 produced in the subsurface is known as terrigenic  $^4\text{He}$  and is estimated by subtracting the atmospheric concentration of  $^4\text{He}$  from the measured value.

3. Dissolved helium-3 is mostly derived from the atmosphere that contains  $7.252 \times 10^{-6}$  ppmv (i.e. 7.252 parts of  $^3\text{He}$  for every  $10^{12}$  parts of air). However, when groundwater contains tritium ( $^3\text{H}$ ),  $^3\text{He}$  will be produced as a result of  $^3\text{H}$  decay. Because the decay of  $^3\text{H}$  is a first order rate process, the production of  $^3\text{He}$  in the subsurface depends on the travel time. Thus, measurements of both  $^3\text{H}$  and  $^3\text{He}$  can be used to date groundwater. The amount of  $^3\text{He}$  in groundwater that is derived from  $^3\text{H}$  decay is known as tritiogenic  $^3\text{He}$  and is estimated by subtracting the atmospheric concentration of  $^3\text{He}$  from the measured value. Helium-3 can also be produced by neutrons in the subsurface interacting with lithium-6; however, this is typically only significant in waters that are older than a few hundred years. Atmospheric concentrations of  $^3\text{H}$  were low prior to 1950, and then increased dramatically as a result of above-ground testing of thermonuclear weapons. As a result, the use of  $^3\text{H}$  and  $^3\text{He}$  to date groundwater is generally limited to waters younger than 1950. In practice the ratio of  $^3\text{He}$  to  $^4\text{He}$  (known as R) is typically reported rather than the absolute concentration. Furthermore, this ratio is usually referenced to the ratio of  $^3\text{He}$  to  $^4\text{He}$  in air ( $R_a$ ). For example, a reported value for  $R/R_a$  of 1.100 means that the  $^3\text{He}$  to  $^4\text{He}$  ratio of the sample was 1.1 times greater than air. The air ratio ( $R_a$ ) is  $1.384 \times 10^{-6}$ . To compute the absolute concentration of  $^3\text{He}$  from the reported value, multiply the  $R/R_a$  value by  $1.384 \times 10^{-6}$  and then multiply this by the absolute concentration reported for  $^4\text{He}$ .

### **Chlorofluorocarbons**

Chlorofluorocarbons (CFCs) are stable volatile organic compounds that were first produced in the 1930s as refrigerants and have since been used for a variety of industrial and domestic purposes. The global distribution and temporal variations of CFCs are relatively well known as a result of extensive atmospheric measurements since 1978 at stations throughout the world.

The concentration of CFCs in recharging groundwater is given by Henry's law:

$$C_{CFC} = K_{CFC,T} P_{CFC}$$

where  $K$  is the Henry's law constant for the  $i$ th CFC compound at temperature  $T$ , and  $P$  is the atmospheric partial pressure of the  $i$ th CFC compound. By combining the atmospheric CFC growth curves and Henry's law solubilities at a given temperature it is possible to determine the expected concentrations of CFCs in water recharged between

approximately 1950 and the present. Thus, measurements of CFCs dissolved in groundwater can be related to the year in which the water was in equilibrium with the atmosphere providing a measure of groundwater travel times.

Table 1 Results of Tritium Analyses.

Site	Date	Tritium (TU)
10L Sump	7/2/02	1.31
10L Sump	7/16/02	1.16
10L Sump (alternate)	8/1/02	1.19
10L Sump	8/15/02	1.21
10L Sump	8/28/02	1.20
10L Sump (alternate)	9/13/02	1.18
10L Sump	9/23/02	1.46
9L Borehole XC59	4/10/02	0.16
9L Horizontal Borehole	7/2/02	0.17
9L Horizontal Borehole	8/15/02	0.86
9L Horizontal Borehole	8/28/02	0.83
9 Left Horizontal Borehole	9/23/02	0.24
JC-1	26-Sep-01	0.24
JC-1	24-May-02	1.00
JC-1	24-May-02	1.04
JC-1	4-Jun-02	0.96
JC-1	19-Jun-02	1.11
JC-1	28-Jun-02	1.18
JC-1	16-Jul-02	1.09
JC-1	1-Aug-02	1.22
JC-1	13-Sep-02	1.25
JC-1	24-Sep-02	1.50
JC-1	28-Sep-02	1.42
JC-1 argon purged	10-Dec-02	1.62
JC-1 triple rinsed	10-Dec-02	1.69
JC-1 argon purged	11-Dec-02	1.66
JC-1 triple rinsed	11-Dec-02	1.64
JC-1	31-Jan-03	1.80
JC-1	15-Feb-03	2.12
JC-1	10-Mar-03	1.59
JC-1	10-Mar-03	2.50
JC-1	10-Mar-03	1.70
JC-1	26-Mar-03	2.05
JC-1	21-Apr-03	1.94
JC-1	19-May-03	2.17
JC-1	7-Aug-03	2.43
JC-1	3-Sep-03	2.48
JC-1	23-Dec-03	2.57
JC-1	4-Mar-04	2.59

Site	Date	Tritium (TU)
JC-1	15-Apr-04	2.68
JC-1	4-Aug-04	2.72
JC-1	11-Oct-04	1.72
JC-1	28-Dec-04	2.91
JC-1	17-Feb-05	2.80
JC-1	17-Mar-05	2.99
JC-3	7-Aug-03	1.45
JC-3	20-Oct-03	2.23
JC-3	23-Dec-03	1.81
JC-3	4-Mar-04	1.94
JC-3	15-Apr-04	1.70
Upper Electric Lake	26-Aug-01	12.6
E. Lake-1 Mid Lake	24-May-02	7.67
E.Lake-2 North End	24-May-02	8.52
North End Shallow Elect.	11-Jul-02	8.48
North End Deep Elect.	11-Jul-02	8.49
South End Shallow Elect.	11-Jul-02	8.57
South End Deep Elect.	11-Jul-02	8.74
Huntington Creek	7-Aug-03	10.5

Table 2 Results of Dissolved Gas Analyses, Tritium, and Calculated Water Age.

Sample ID	Sample Date	Location	N <sub>2</sub> (ccSTP/g)	Ar <sup>40</sup> (ccSTP/g)	Ne <sup>20</sup> (ccSTP/g)	He <sup>4</sup> (ccSTP/g)	<sup>3</sup> R/R <sub>a</sub>	Tritium (TU)	Apparent Age (yr)	Ter <sup>1</sup> He <sup>4</sup> (ccSTP/g)
<b>2002 Samples</b>										
EL1-1	23-Sep-02	XC5E	0.0221	5.53E-04	3.00E-07	1.93E-07	0.426	0.0		1.1E-07
EL2-1	24-Sep-02	10 Left	0.0182	4.59E-04	2.37E-07	9.10E-08	0.701	1.6	4.0	2.8E-08
EL2-2	25-Sep-02	10 Left	0.0178	4.48E-04	2.15E-07	8.02E-08	0.717	1.6	6.1	2.4E-08
EL3-1	26-Sep-02	9L	0.0188	5.27E-04	2.55E-07	8.78E-08	0.693	0.3		1.9E-08
EL3-2	27-Sep-02	9L	0.0237	5.54E-04	2.60E-07	1.00E-07	0.699	0.3		3.0E-08
<b>2003 Samples</b>										
JC1-2	26-Mar-03	James Cny	0.0130	3.24E-04	1.62E-07	5.62E-08	0.844	1.8	18.0	1.5E-08
JC3-a	7-Aug-03	James Cny	0.0157	3.64E-04	1.87E-07	6.21E-08	0.838	1.5	15.7	1.3E-08

<sup>3</sup>R is the <sup>3</sup>He/<sup>4</sup>He ratio of the sample, R<sub>a</sub> is the <sup>3</sup>He/<sup>4</sup>He ratio of the air standard (1.384 X 10<sup>-6</sup>)

Table 3 Results of CFC Analyses and Apparent Recharge Years.

SAMPLE ID and Collection Date	CFC-11 (pmoles/kg)	CFC-12 (pmoles/kg)	CFC-113 (pmoles/kg)	CFC-11 Rech. year	CFC-12 Rech. year	CFC-113 Rech. year
JC1-A mar 26, 2003	0.105	0.124	0.000	1956	1957	1943
JC1-C mar 26, 2003	0.118	0.131	0.000	1956.5	1957.5	1943
JC1-E mar 26, 2003	0.053	0.021	0.000	1953.5	1947.5	1943
JC1-B mar 26, 2003	0.076	0.029	0.000	1954.5	1948.5	1943
JC1-D mar 26, 2003	0.136	0.182	0.000	1957	1959.5	1943
JC1-F mar 26, 2003	0.066	0.031	0.000	1954.5	1949	1943
JC1-A aug 7, 2003	2.235	1.446	0.193	1974	1977.5	1981.5
JC1-B aug 7, 2003	2.263	1.444	0.158	1974	1977.5	1980
JC1-C aug 7, 2003	2.292	1.457	0.179	1974	1977.5	1980.5
JC1-D aug 7, 2003	2.352	1.483	0.190	1974	1977.5	1981
JC1-E aug 7, 2003	2.345	1.494	0.207	1974	1978	1982
JC1-F aug 7, 2003	2.347	1.519	0.204	1974	1978	1982
JC3-A aug 7, 2003	2.401	1.486	0.206	1974.5	1977.5	1982
JC3-B aug 7, 2003	2.444	1.466	0.214	1974.5	1977.5	1982
JC3-C aug 7, 2003	2.443	1.442	0.205	1974.5	1977.5	1982
JC3-D aug 7, 2003	2.362	1.513	0.221	1974.5	1978	1982.5
JC3-E aug 7, 2003	2.390	1.489	0.200	1974.5	1977.5	1981.5
JC3-F aug 7, 2003	2.359	1.513	0.196	1974.5	1978	1981.5

Table 4 CFC Concentrations (average of replicates) and Results of Binary Mixing Calculations.

<b>SAMPLE and Collection Date</b>	<b>CFC-11 (pmoles/kg)</b>	<b>CFC-12 (pmoles/kg)</b>	<b>CFC-113 (pmoles/kg)</b>	<b>Modern Fraction</b>	<b>CFC-11 modern fraction (pmoles/kg)</b>	<b>CFC-12 modern fraction (pmoles/kg)</b>	<b>CFC-113 modern fraction (pmoles/kg)</b>	<b>CFC-11 mixture (pmoles/kg)</b>	<b>CFC-12 mixture (pmoles/kg)</b>	<b>CFC-113 mixture (pmoles/kg)</b>
JC1 Mar 26, 2003	0.092	0.087	0.000	0.021	5.652	2.901	0.552	0.120	0.062	0.012
JC1 Aug 7, 2003	2.305	1.474	0.188	0.439	5.652	2.901	0.552	2.480	1.273	0.242
JC3 Aug 7, 2003	2.400	1.485	0.207	0.452	5.652	2.901	0.552	2.552	1.310	0.249

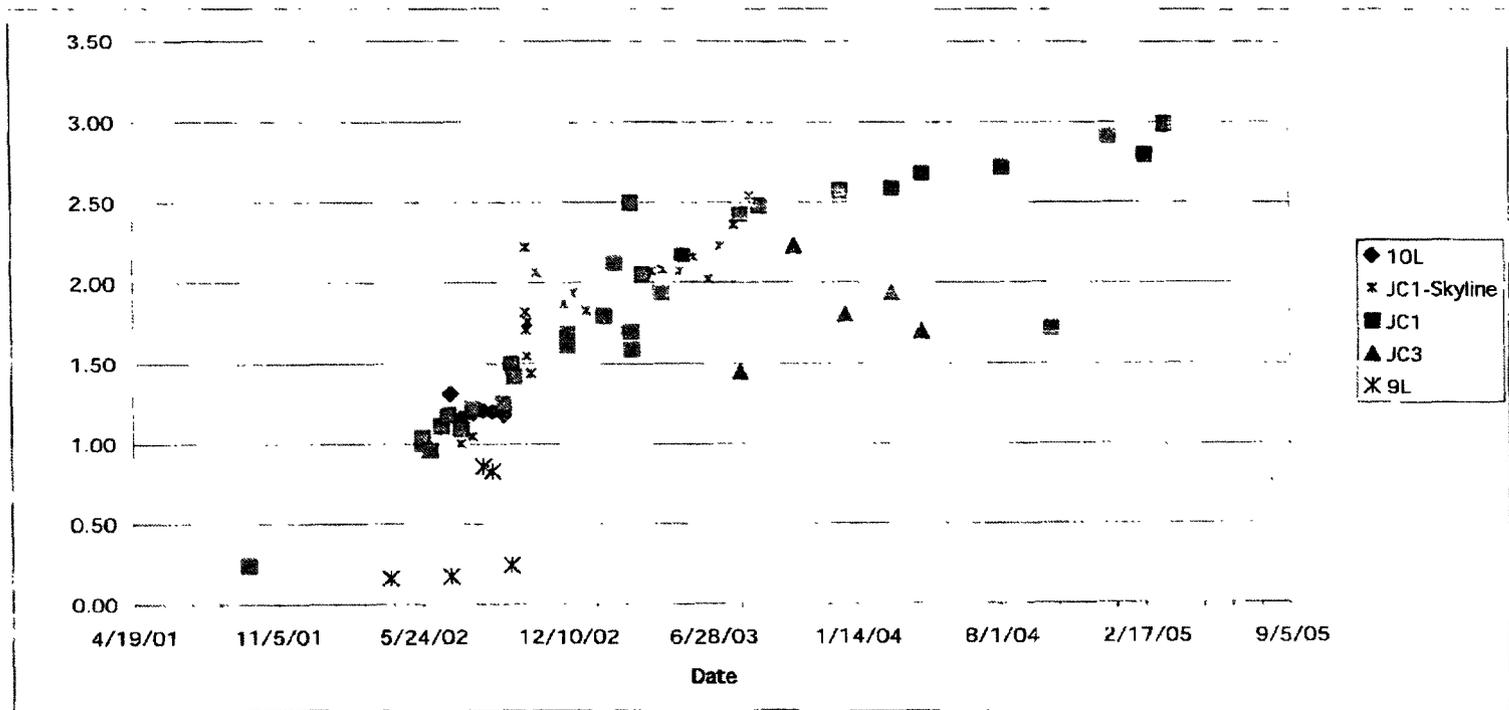


Figure 1 Time series of tritium values from underground mine workings (10L and 9L) and dewater wells (JC1 and JC3) in the vicinity of Electric Lake. The change in the slope of the data in early 2004 is likely a result of a decrease in mine dewatering that occurred in early 2004.

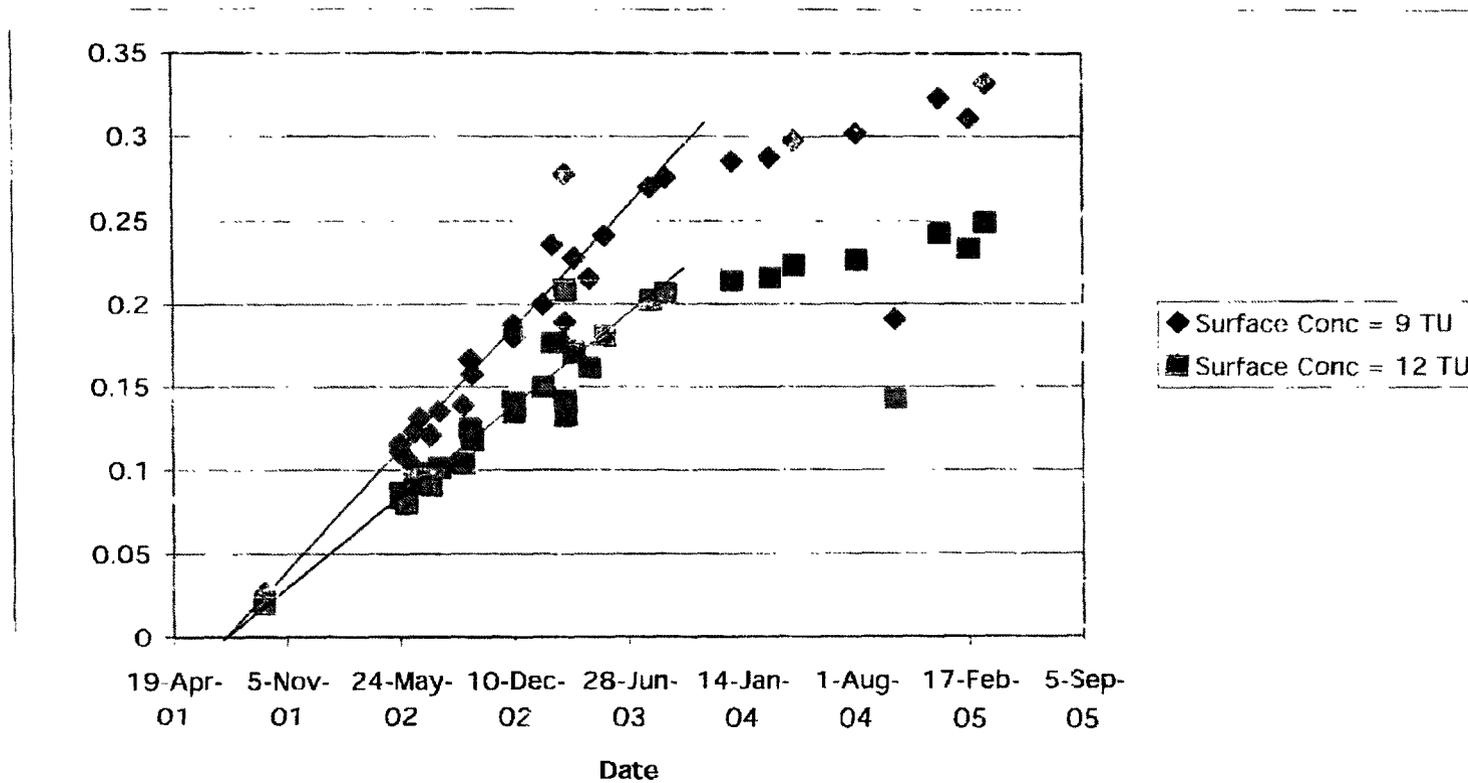


Figure 2 Computed fraction of modern water in discharge of well JC1 using a modern tritium values of 9 and 12 TU. The modern fractions was computed assuming a binary mixture of tritium-free and modern water, and does not account for radioactive decay. The data extrapolate to a modern fraction of zero in mid 2001.

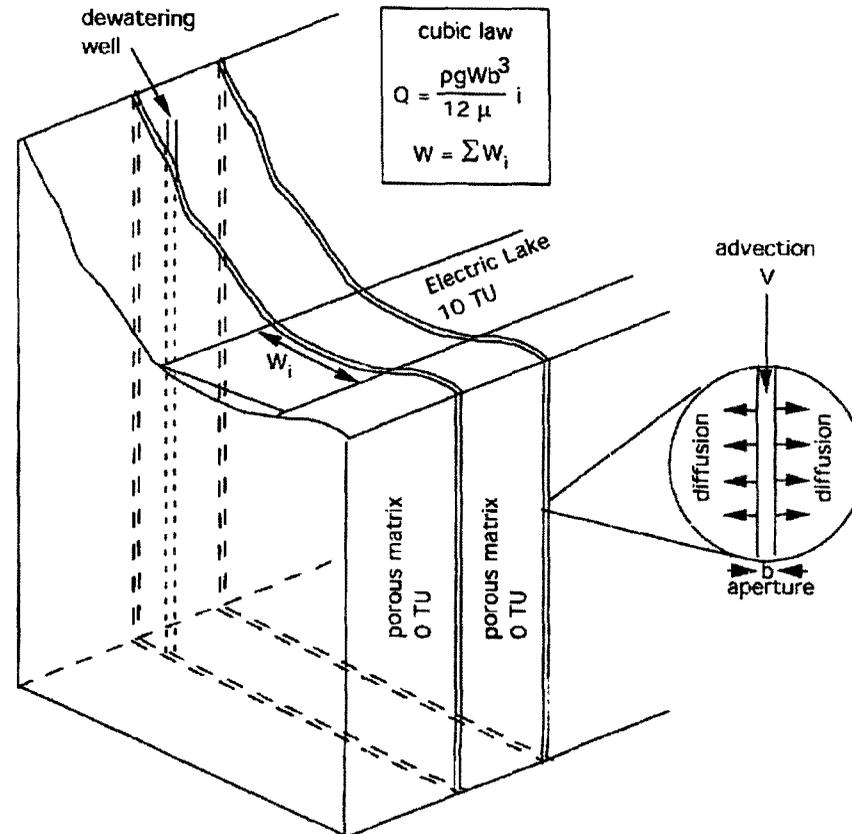


Figure 3 Conceptual diagram of tritium transport model. Fluid movement is rapid along fracture pathways, but dissolved solutes can exchange via diffusion with the surround porous matrix. The net solute transport rate is much less than the fluid velocity.

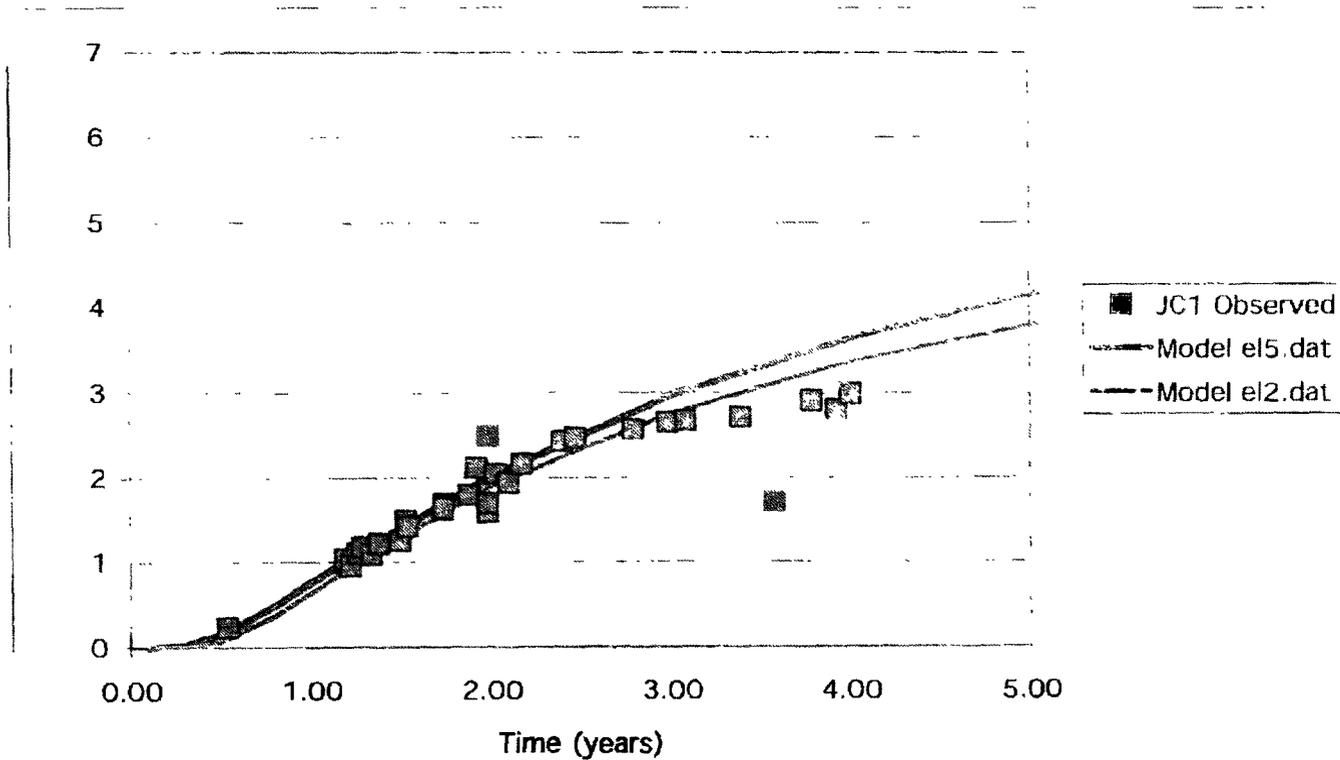


Figure 4 Comparison of observed and modeled tritium values for JC1 using a parallel fracture transport model that accounts for advection in fractures and diffusion into the surround porous matrix. While the model fits the observed data well, a sensitivity analysis shows that different combinations of input values fit the observed data equally well and thus the model does not uniquely define the physical properties of the system. However, the model does show that the observed increase in tritium can occur by flow along fractures that connect surface water (Electric Lake) and the well intake.

**S M I T H | H A R T V I G S E N** PLLC  
ATTORNEYS AT LAW

215 South State Street  
Suite 650  
Salt Lake City, Utah 84111

T 801.413.1600  
F 801.413.1620  
www.smithhartvigsen.com

J. CRAIG SMITH  
jesmith@smithlawonline.com

January 7, 2005

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

Via Hand Delivery

RECEIVED

JAN 07 2005

1594 WEST NORTH TEMPLE

**Re: Canyon Fuel Company, LLC's Application to Amend the Skyline Mine Mining and Reclamation Plan C/007/005 to Allow Subsidence in the "North Lease."**

Dear Ms. Grubaugh-Littig:

The purpose of this letter is to provide the comments of Huntington-Cleveland Irrigation Company ("Huntington-Cleveland") to the above referenced Application in response to the request for such comment published in the *Sun Advocate* on December 9, 2004.

Huntington-Cleveland's concerns relate to impacts of mining on the hydrologic balance of the Huntington Creek drainage and water replacement to address any such impacts. Huntington-Cleveland is particularly concerned with the astounding loss of water from Electric Lake, a part of the Huntington Creek drainage. The participation of Huntington-Cleveland in the permit process will be most beneficial in ascertaining what water replacement requirements should be added to the permit.

As the Division is undoubtedly aware, Huntington-Cleveland is the largest holder of state-appropriated water in the Huntington Creek drainage, as such phrase is used in Utah Code Annotated section 40-10-18(15)(c). Water rights of Huntington-Cleveland provide water for beneficial use of its shareholders which include not only nearly all of the agricultural users in northern Emery County but also the municipalities of Huntington, Cleveland and Elmo and domestic use in the unincorporated county surrounding these communities. In addition and of critical importance to the present discussion, Huntington-Cleveland provides water for the use of its largest stockholder, Pacificorp/Utah Power, for the operation of the Huntington Power Plant. These demands for water have been impacted by Applicant's mining operation. As recognized in the most recent CHIA, "[t]he agricultural needs of the Huntington-Cleveland area were at a minimum or were not met during the 2003 growing season due to minimal water being delivered."

Under Utah Water Law, Huntington-Cleveland's right to state-appropriated water extends from its various approved points of diversion on Huntington Creek and springs in Huntington

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Canyon to the "farthest limits of the watershed." See *College Irrigation Co. v. Logan River & Bluck Smith Fork Irrigation Co.*, 780 P.2d 1241, 1244 (Utah 1989); *Richlands Irrigation Co. v. Westview Irrigation Co.*, 80 P.2d 458, 465 (Utah 1938). Thus all of the surface and underground water which feeds various springs, seeps in the Huntington Creek drainage, and gaining portions of Huntington Creek are part of Huntington-Cleveland's state-appropriated water. Such area of water right extends into permit areas of the Skyline Mine. Even though the proposed amendment appears to change only areas underlying the Price River Basin, there remains potential for impacts to the critical balance between river basins. In short, Huntington-Cleveland is concerned with the possibility of additional interbasin exchange—specifically, loss of Huntington Creek water into the Price River Drainage.

Huntington-Cleveland does not oppose continued mining by Applicant in the North Lease, so long as such mining as well as mining and reclamation within the remaining permit area can be accomplished without affecting the hydrologic balance and causing any unaddressed contamination, diminution or interruption of State Appropriated water for which Huntington-Cleveland holds the right. See Utah Code Ann. § 40-10-18(15)(c). Huntington-Cleveland believes that, given the studies showing mining-related losses to Electric Lake, it is necessary to update and revise the current PHC and CHIA to acknowledge the hydrologic impact of mining in the Skyline Mine permit area and to provide suitable water replacement provisions. The current versions of the PHC and the CHIA seek to explain away any connection between the large mine-water inflows starting in 1999 (and intensifying in 2001 and 2002) and the drastic loss of water from Electric Lake. However, the position that there is no connection is unreasonable given the substantial evidence to the contrary.

Although this comment letter is not intended to give an exhaustive history or analysis of the water issues surrounding Skyline Mine,<sup>1</sup> Huntington-Cleveland would like to briefly set forth the evidence which it believes mandates amendment of the current PHC and CHIA. As a preliminary matter, the loss of water from Electric Lake may only be a perceptible manifestation of water loss from other sources. Applicant and DOGM have apparently discounted the possibility of a connection between the increased inflows and the loss of water from Electric Lake for two reasons: first, Pacificorp, the owner of Electric Lake, did not measure the in-flows of Electric Lake directly until 2002; and second, age dating and other tracking methods have not shown a *direct* connection between the water in the mine and surface water. Huntington-Cleveland has no reason to doubt either of these underlying facts. However, these facts are insufficient to outweigh the numerous facts that support the opposite conclusion—that there is in fact a connection.

First, the CHIA states that "it is hard to have *complete* confidence in the [Pacificorp Report] because the majority of inflow are a 'back-calculation' of data." CHIA, 21 (emphasis added). As an initial matter, the threshold of "complete confidence" is not appropriate. Indeed, it would be difficult to have "complete confidence" in any study, but that does not justify disregarding a study completely. Furthermore, as noted in the *Hydrologic Framework of the Skyline Mines Area*, by Kravits Geological Services, LLC ("Kravits Report"), most of the

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<sup>1</sup> A more exhaustive analysis is set forth in *Hydrologic Framework of the Skyline Mines Area*, by Kravits Geological Services, LLC. DOGM received a copy of this report on March 19, 2004.

analyses showing adverse impacts on Electric Lake are not based on the back-calculated inflow values. Kravits Report, 12-13. Another analysis compares calculated inflow values to the measured inflow numbers to show the trend of increased error as it relates to pumping and reduced outflow numbers. Thus, there is plenty of evidence of a connection without relying on back-calculated inflow numbers.

Second, both the PHC and the CHIA rely heavily on age dating and other source-tracking analyses to substantiate the conclusion that there is no connection between the mine inflows and surface or near-surface sources. While the conclusion that "no direct conduit exists between the mine and the lake" may be justified based on the data, PHC A-13, the conclusion that there is no connection at all between the mine water and surface water is not justified. By all reports, the source-aquifer is enormous. That being the case, it is entirely reasonable, indeed probable based on the evidence, that a conduit exists to recharge the aquifer at some remote point as aquifer water enters the mine. The correlation between the amount of water pumped from JC1 and JC3 and the increased losses of water from the Lake is strong proof of such a conduit because there would be no such correlation if the aquifer was truly "isolated." See Kravits Report, 7. Due to the size of the aquifer, it may take a long time for dyes or other indicators of surface or near-surface water to show up in the mine. Furthermore, although the PHC implies that the significant losses in Electric Lake are due to the drought (PHC A-9), the Kravits Report shows that the Lake responses are totally unlike the effects to the Lake during past droughts. Kravits Report, 10. The spurious Lake responses started in 1999, the same time that Skyline Mine was unexpectedly inundated by water—an inundation which underscored the deficiencies of the PHC and CHIA in place at the time which forecasted no such inundation. Though circumstantial, the fact that these events happened at roughly the same time makes a connection more likely than not. Finally, to Huntington-Cleveland's knowledge, neither the mine nor the DOGM has set forth any other potential cause of the radical change in Electric Lake behavior. Thus, the PHC and CHIA conclusion that there is no connection is against the weight of the evidence. There is a connection between surface and near-surface water sources and the mine, and the PHC and CHIA should be amended to recognize that connection.

Ironically, although the CHIA recognizes that "changes in the potentiometric surface [from draining the aquifer] may influence recharge and movement of ground water through the overlying unsaturated zone," the CHIA totally discounts the potential consequences of just such an "influence" by simply concluding that "the potentiometric surface is expected to recover to approximate pre-mining conditions after mining ceases." See CHIA, 58. As noted in the Kravits Report, the post-mining potentiometric surface will likely be more than 400 feet deeper than pre-mining surface at some locations, so the CHIA's ultimate conclusion is severely suspect. See Kravits Report, 19. Furthermore, even if the potentiometric surface were to return to pre-mining levels, there is ample evidence that, currently and over the past 5 years, the mine dewatering has had a significant influence on the movement of surface and underground water. As water is taken from the aquifer, the conclusion is inescapable that water from the Huntington Creek drainage, has been lost to compensate for the lost underground water. Thus, DOGM should act now to ensure replacement of Huntington-Cleveland's water that has been diminished as a result of the Applicant's mining activity.

Letter to Pam Grubaugh-Littig  
January 7, 2005  
Page 4 of 5

Ultimately, Huntington-Cleveland is looking to the Division, pursuant to the Division's obligations under Utah law, to require the Applicant and Permit Holder to replace water from the Huntington Creek drainage that is contaminated, interrupted, or diminished due to underground Coal Mining. It is our understanding that the Administrative Rules which put into effect Utah Code Ann. §40-10-18(15)(c) require that a determination be made if underground mining activities may result in contamination, diminution or interruption of State-Appropriated Water (Rule R645-301-728.350). If there has been contamination, diminution or interruption of State-Appropriated Water, then the Rules require a prompt replacement of such contaminated, diminished or interrupted water supply (Rule R645-301-731.530). As a hydrologic connection between the water encountered in the Skyline Mine and Electric Lake (along with other water sources which feed the Huntington Creek drainage) is evident, Huntington-Cleveland expects the Division to put in place a mechanism to require the Permit Holder to promptly replace the water lost from the Huntington Creek drainage as required by Utah law and Division Rule, including an appropriate adjustment to the bond amount to guarantee such prompt replacement (R645-301-525.550).

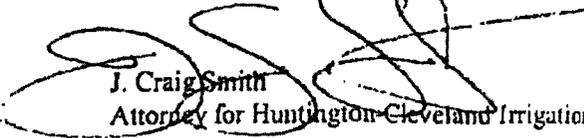
Much of this comment letter has been directed to the loss of water from Huntington Creek, the aquifer, and Electric Lake. Huntington-Cleveland recognizes that the amendment at issue is apparently remote from Electric Lake. However, this does not mean that the application will not have any effect on the Huntington Creek drainage. First, as you know, subsidence results from removing coal and allowing the overlying material to fall in the missing coal's place. In the process, the overlying material becomes fractured. Groundwater can move more easily, at least initially, through the fractured material. Thus, there is a risk that water from the Huntington Creek drainage will migrate into the newly fractured material and be lost into the Price River Basin. Furthermore, the post-mining potentiometric surface could be further lowered by water flowing to the additional fractured material which was previously virtually impermeable. Thus, there is even more danger of "continued and permanent hydrologic effect upon the local and regional aquifer system." Kravits Report, 19. The potential, additional dangers caused by continued subsidence makes it more critical than ever that the Division provide for protection of the hydrologic balance and water replacement to affected water right holders where appropriate.

Finally, Huntington-Cleveland hereby requests a hearing to resolve these issues and work towards necessary revisions to the PHC/CHIA. Huntington-Cleveland also reserves its rights of appeal of the Permit to the Board of Oil, Gas & Mining.

I appreciate your attention in this important matter. Please feel free to contact me with any questions.

Yours truly,

SMITH HARTVIGSEN, PLLC



J. Craig Smith

Attorney for Huntington-Cleveland Irrigation Co.

*Letter to Pam Grubaugh-Littig*  
*January 7, 2005*  
*Page 5 of 5*

cc: Board of Directors, Huntington-Cleveland  
Dennis Ward, President  
Sherrel Ward, Vice President  
Kay Jensen, Secretary  
Jerry D. Olds, P.E., State Engineer  
Mark Page, Regional Engineer

# **EXHIBIT B**



GARY R. HERBERT  
Governor

SPENCER J. COX  
Lieutenant Governor

## State of Utah

DEPARTMENT OF NATURAL RESOURCES

MICHAEL R. STYLER  
*Executive Director*

Division of Oil, Gas and Mining

JOHN R. BAZA  
*Division Director*

November 23, 2015

RECEIVED

NOV 25 2015

SMITH HARTVIGSEN

J. Craig Smith  
Smith Hartvigsen, PLLC  
175 South Main Street, Suite 300  
Salt Lake City, Utah 84111

Subject: Agency Notification of Flat Canyon Lease Addition, Canyon Fuel Company, LLC,  
Skyline Mine, C/007/0005, Task ID #5017

Dear Mr. Smith:

On November 20, 2015 the Utah Division of Oil, Gas and Mining has determined that the Canyon Fuel Company, LLC permit application for the Flat Canyon Lease Addition to the Skyline Mine permit is administratively complete. The lease addition will add 2,692.16 acres to the authorized mining area of this site. In compliance with the Utah Coal Mining Rules R645-300-121.300, R645-300-121.310, R645-300-121.320, and the Utah Coal Mining Act (UCA Section 40-10-1 et. seq.), notice is hereby given to all local, state and federal agencies having a jurisdiction or an interest in the area of the operations that this application is available for review.

The Skyline Mine Flat Canyon Lease Addition is located in Carbon County, as shown on the attached map.

The legal description of the proposed expansion area is as follows:

Federal Coal Lease Serial # UTU - 771114

T.13 S., R.6.E., SL Meridian, Utah

Section 21, lots 1-4, E1/2E1/2;

Section 28, Lots 1-8, S1/2NW1/4, SW1/4;

Section 33, E1/2, E1/2W1/2, NW1/4NW1/4, SW1/4SW1/4;

T. 14 S., R.6 E, SL Meridian, Utah

Section 4, lots 1-4, S1/2N1/2, S1/2;

Section 5, lots 1-4, S1/2N1/2, S1/2;

Containing 2,692.16



This permit application is available for public review at:

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

Carbon County Courthouse  
120 East Main Street  
Price, Utah 84501

Please send your comments by January 29, 2016 to:

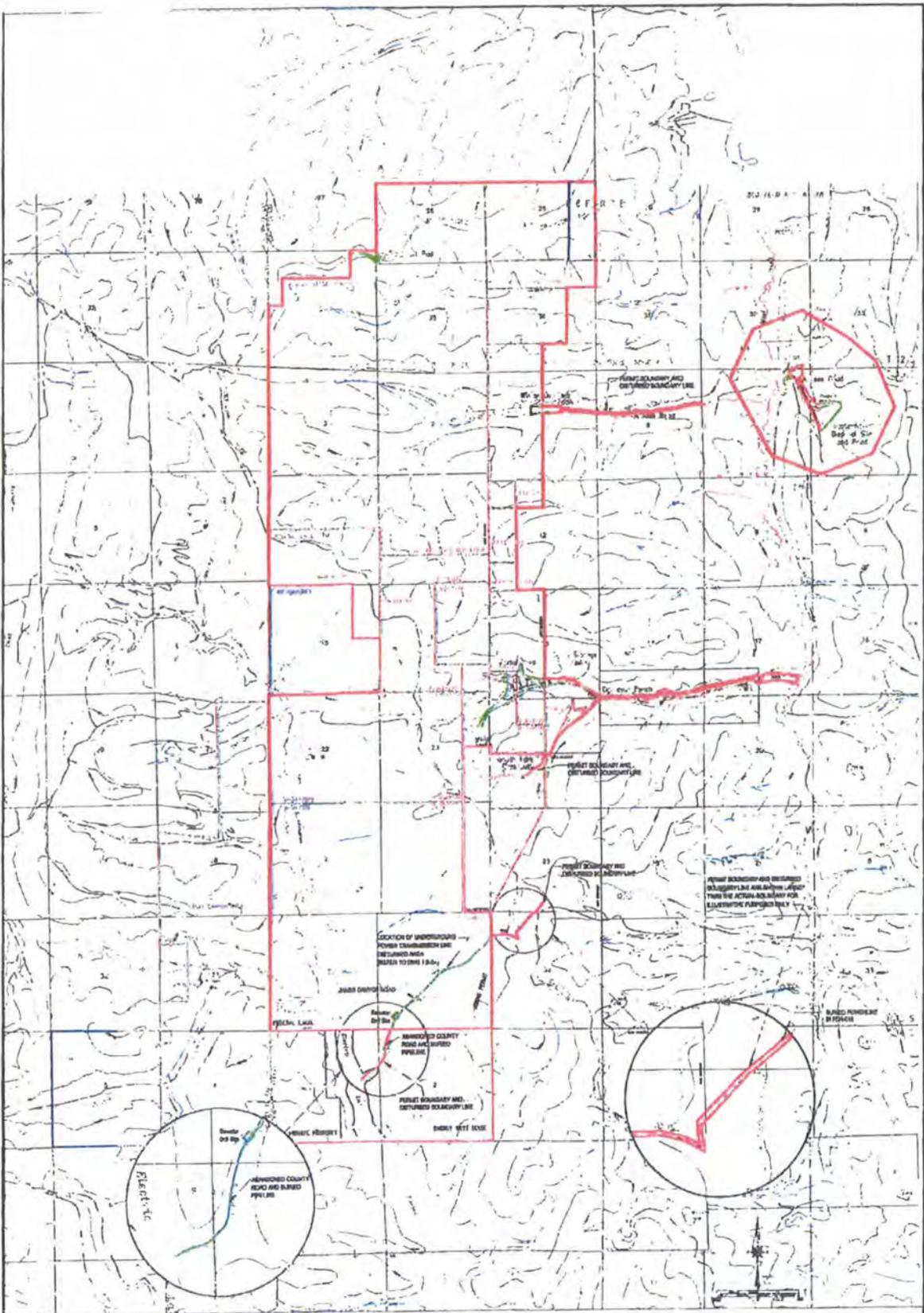
Coal Regulatory Program  
Division of Oil, Gas & Mining  
P.O. Box 145801  
Salt Lake City, Utah 84114-5801

If you have any questions, please call me at (801) 538-5325.

Sincerely,



Daron R. Haddock  
Coal Program Manager

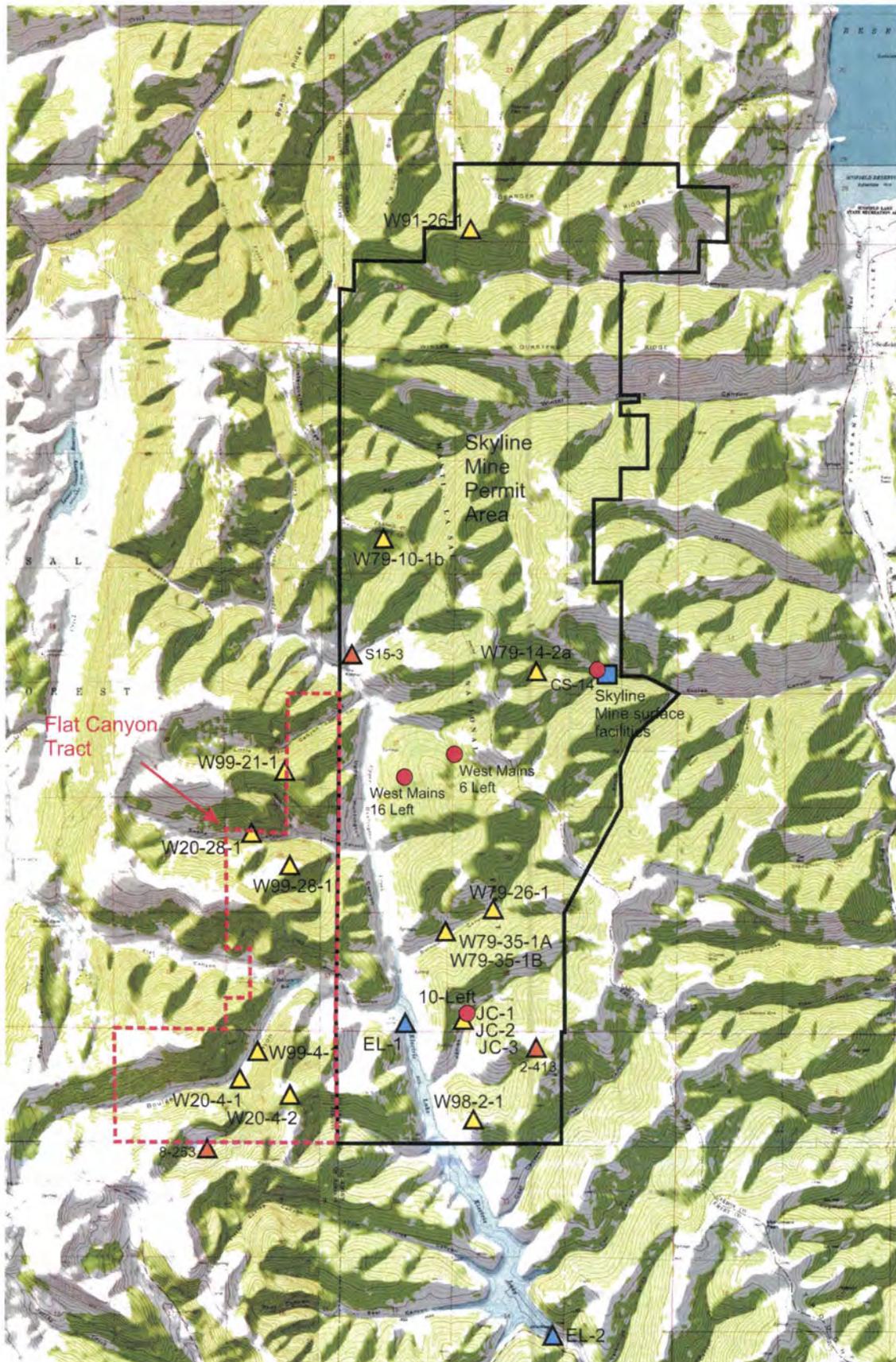


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NO.	DESCRIPTION	DATE	BY
1	ISSUED	12/15/10	CF
2	REVISION	12/15/10	CF
3	REVISION	12/15/10	CF
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5	REVISION	12/15/10	CF
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9	REVISION	12/15/10	CF
10	REVISION	12/15/10	CF

**SKYLINE MINE PERMIT AREA**  
  
**Canyon Fuel Company, Inc.**  
 Skyline Mines  
 1000 Skyline Mine Road  
 Skyline, AZ 85901  
 PHONE: (928) 428-1234  
 FAX: (928) 428-1234  
 E-MAIL: info@skylinemines.com  
 WWW: www.skylinemines.com  
 DATE: 12/15/10  
 SHEET NO: 10  
 OF 10



1927 North American Datum, UTM grid zone 12  
 Generated by BigTop™ mine map.com  
 Map compiled from USGS Quads: 14 Canyon UT, Skyline Reservoir UT, Kannev Lakes UT, Skyline UT, Huntington Reservoir UT, Candland Mountain UT

Figure 1 Location map for the Skyline Mine area.

- ▲ Spring quarterly tritium sampling location
- ▲ Electric Lake quarterly tritium sampling location
- ▲ Monitoring well location
- In-Mine groundwater underground sampling location

**AFFIDAVIT OF PUBLICATION**

STATE OF UTAH)

ss.

County of Carbon,)

I, Jenni Fasselin, on oath, say that I am the Publisher of the Sun Advocate, a twice-weekly newspaper of general circulation, published at Price, State of Utah a true copy of which is hereto attached, was published in the full issue of such newspaper for 4 (Four) consecutive issues, and on the Utah legals.com website, the first publication was on the 9th day of February, 2016, and that the last publication of such notice was in the issue of such newspaper dated the 1st day of March 2016

*Jenni Fasselin*

Jenni Fasselin – Publisher

Subscribed and sworn to before me this 1st day of March, 2016.

*Linda Hayn*

Notary Public My commission expires January 10, 2019 Residing at Price, Utah

Publication fee, \$ 571.20



**LEGAL NOTICE**

Canyon Fuel Company, LLC, has filed a complete application with the Division of Oil, Gas and Mining for a revision of the existing Mining and Reclamation Plan, C/007/0005 for the Skyline Mine. Canyon Fuel Company, LLC operates the Skyline Mines with surface facilities located in Eccles Canyon which is approximately 4 miles southwest of the town of Scofield, Utah. The revision includes the addition of acreage associated with Federal Coal Lease, UTU-77114. The lease modification will increase the lease acreage by approximately 2,692 acres, with no additional surface disturbance proposed.

Underground coal mining will take place in coal reserves owned or leased by Canyon Fuel Company, LLC. A legal description of the proposed areas for additional underground mining activities is described as follows:

**Proposed Additional Areas Authorized for Coal Mining and Reclamation Activities**

The federal Coal Lease Tract UTU-77114 consists of approximately 2,692 acres located in:

T.13 S., R.6 E., S1 Meridian, Utah

- Section 21, lots 1-4, E1/2E1/2;
- Section 28, Lots 1-8, S1/2NW1/4, SW1/4;
- Section 33, E1/2, E1/2W1/2, NW1/4NW1/4, SW1/4SW1/4;

T. 14 S., R. 6 E., S1 Meridian, Utah

- Section 4, lots 1-4, S1/2N1/2, S1/2;
- Section 5, lots 1-4, S1/2N1/2, S1/2;

Privately-owned coal (non-federal) adjacent to the Federal Coal Lease Tract UTU-77114 consists of approximately 347 acres located in:

T.14 S., R. 6 E., S1 Meridian, Utah

- Section 3, Lots 3 & 4, S1/2NW1/4; SW1/4; W1/2SW1/4SE1/4; SW1/4NW1/4SE1/4

Total approximate acres within the application: 3,039 acres

The address of the applicant is: Canyon Fuel Company, LLC  
225 North 5th Street, Suite 900  
Grand Junction, CO 81501

After filing, copies of this permit application will be available for inspection at the following location: Utah Division of Oil, Gas and Mining, 1594 West North Temple, Suite 1210, Salt Lake City, Utah; Emery County Courthouse, 75 East Main St., Castle Dale, Utah; Sanpete County Courthouse 160 North Main, Manti, Utah; and the Utah Division of Oil, Gas, and Mining website under the Coal Permit files.

Written comments or requests regarding this permit renewal must be made within 30 days of the last publication of this notice, and may be addressed to the Utah Division of Oil, Gas and Mining, 1594 West North Temple, Suite 1210 Salt Lake City, Utah 84114-5801.

Published in the Sun Advocate February 9, 16, 23 and March 1, 2016.

**AI FIDAVIT OF PUBLICATION**

STATE OF UTAH)

ss.

County of Emery,)

I, Jenni Fasselin, on oath, say that I am the Publisher of the Emery County Progress, a weekly newspaper of general circulation, published at Castle Dale, State of Utah and County aforesaid, and that a certain notice, a true copy of which is hereto attached, was published in the full issue of such newspaper for 4 (Four) consecutive issues, and on the Utah legals.com webwsite; the first publication was on the 9th day of February, 2016, and that the last publication of such notice was in the issue of such newspaper dated the 1st day of March, 2016.

Jenni Fasselin – Publisher

Subscribed and sworn to before me this 1st day of March 2016.

Notary Public My commission expires January 10, 2019 Residing at Price, Utah

Publication fee, \$ 408.00



**LEGAL NOTICE**

Canyon Fuel Company, LLC, has filed a complete application with the Division of Oil, Gas and Mining for a revision of the existing Mining and Reclamation Plan, C/007/0005 for the Skyline Mine. Canyon Fuel Company, LLC operates the Skyline Mines with surface facilities located in Eccles Canyon which is approximately 4 miles southwest of the town of Scofield, Utah. The revision includes the addition of acreage associated with Federal Coal Lease, UTU-77114. The lease modification will increase the lease acreage by approximately 2,692 acres, with no additional surface disturbance proposed.

Underground coal mining will take place in coal reserves owned or leased by Canyon Fuel Company, LLC. A legal description of the proposed areas for additional underground mining activities is described as follows:

**Proposed Additional Areas Authorized for Coal Mining and Reclamation Activities**

The federal Coal Lease Tract UTU-77114 consists of approximately 2,692 acres located in:

T.13 S., R.6 E., S1 Meridian, Utah  
Section 21, lots 1-4, E1/2E1/2;  
Section 28, Lots 1-8, S1/2NW1/4, SW1/4;  
Section 33, E1/2, E1/2W1/2, NW1/4NW1/4, SW1/4SW1/4;

T. 14 S., R. 6 E., S1 Meridian, Utah  
Section 4, lots 1-4, S1/2N1/2, S1/2;  
Section 5, lots 1-4, S1/2N1/2, S1/2;

Privately-owned coal (non-federal) adjacent to the Federal Coal Lease Tract UTU-77114 consists of approximately 347 acres located in:

T.14 S., R. 6 E., S1 Meridian, Utah  
Section 3, Lots 3 & 4, S1/2NW1/4; SW1/4; W1/2SW1/4SE1/4;  
SW1/4NW1/4SE1/4

Total approximate acres within the application: 3,039 acres

The address of the applicant is: Canyon Fuel Company, LLC  
225 North 5th Street, Suite 900  
Grand Junction, CO 81501

After filing, copies of this permit application will be available for inspection at the following location: Utah Division of Oil, Gas and Mining, 1594 West North Temple, Suite 1210, Salt Lake City, Utah; Emery County Courthouse, 75 East Main St., Castle Dale, Utah; Sanpete County Courthouse 160 North Main, Manti, Utah; and the Utah Division of Oil, Gas, and Mining website under the Coal Permit files.

Written comments or requests regarding this permit renewal must be made within 30 days of the last publication of this notice, and may be addressed to the Utah Division of Oil, Gas and Mining, 1594 West North Temple, Suite 1210, Salt Lake City, Utah 84114-5801.

Published in the Emery County Progress February 9, 16, 23 and March 1, 2016.

AFFIDAVIT OF PUBLICATION

COUNTY OF SANPETE }  
STATE OF UTAH } ss:

I, Daniela M. Vazquez, employee of Sanpete News Company, Inc., publisher of the Sanpete Messenger, a newspaper of general circulation published weekly at Manti, Sanpete County, Utah, do solemnly swear that the

**Legal Notice – Canyon Fuel Co. – Revision of existing Mining and Reclamation Plan**

As per clipping attached, was published once a week three successive week(s) in the regular and entire issue of said newspaper and not in a supplement thereof, commencing with the issue dated February 11, 2016 and ending with the issue dated March 3, 2016.

*Daniela Vazquez*

Subscribed and sworn to before me this 2<sup>nd</sup> day of February 2016.

*Ellen Howe*  
Notary Public signature



Notary public residing at Manti, Utah

My Commission will expire 5-6-2016

## LEGAL NOTICE

Canyon Fuel Company, LLC, has filed a complete application with the Division of Oil, Gas and Mining for a revision of the existing Mining and Reclamation Plan, C/007/0005 for the Skyline Mine. Canyon Fuel Company, LLC operates the Skyline Mines with surface facilities located in Eccles Canyon which is approximately 4 miles southwest of the town of Scofield, Utah. The revision includes the addition of acreage associated with Federal Coal Lease, UTU-77114. The lease modification will increase the lease acreage by approximately 2,692 acres, with no additional surface disturbance proposed.

Underground coal mining will take place in coal reserves owned or leased by Canyon Fuel Company, LLC. A legal description of the proposed areas for additional underground mining activities is described as follows:

### Proposed Additional Areas Authorized for Coal Mining and Reclamation Activities

The federal Coal Lease Tract UTU-77114 consists of approximately 2,692 acres located in:

T.13 S., R.6.E., SL Meridian, Utah  
Section 21, lots 1-4, E1/2E1/2;  
Section 28, Lots 1-8, S1/2NW1/4, SW1/4,  
Section 33, E1/2, E1/2W1/2, NW1/4NW1/4, SW1/4SW1/4;

T. 14 S., R.6 E, SL Meridian, Utah  
Section 4, lots 1-4, S1/2N1/2, S1/2;  
Section 5, lots 1-4, S1/2N1/2, S1/2;

Privately-owned coal (non-federal) adjacent to the Federal Coal Lease Tract UTU-77114 consists of approximately 347 acres located in:

T.14 S., R. 6 E., SL Meridian, Utah  
Section 3, Lots 3 & 4, S1/2NW1/4; SW1/4; W1/2SW1/4SE1/4  
SW1/4NW1/4SE1/4

Total approximate acres within the application: 3,039 acres

The address of the applicant is: Canyon Fuel Company, LLC  
225 North 5th Street, Suite 90  
Grand Junction, CO 81501

After filing, copies of this permit application will be available for inspection at the following location: Utah Division of Oil, Gas and Mining, 1594 West North Temple, Suite 1210, Salt Lake City, Utah; Emery County Courthouse, 75 East Main St., Castle Dale, Utah; Sanpete County Courthouse, 160 North Main, Mantua, Utah; and the Utah Division of Oil, Gas, and Mining website under the Coal Permit files.

Written comments or requests regarding this permit renewal must be made within 30 days of the last publication of this notice, and may be addressed to the Utah Division of Oil, Gas and Mining, 1594 West North Temple, Suite 1210, Salt Lake City, Utah 84114-5801.

Published in the Sanpete Messenger Feb. 11, 18, 25, March 3, 2016



GARY R. HERBERT  
*Governor*

SPENCER J. COX  
*Lieutenant Governor*

# State of Utah

## DEPARTMENT OF NATURAL RESOURCES

MICHAEL R. STYLER  
*Executive Director*

### Division of Oil, Gas and Mining

JOHN R. BAZA  
*Division Director*

February 1, 2017

TO: Internal File

FROM: Daron R. Haddock, Permit Supervisor 

RE: Compliance Review for Section 510 (c) Findings, Canyon Fuel Company, LLC

As of the writing of this memo, there are no NOVS or COs which are not corrected or in the process of being corrected. There are no finalized Civil Penalties, which are outstanding and overdue in the name of Canyon Fuel Company, LLC. Canyon Fuel Company, LLC does not demonstrate a pattern of willful violations, nor have they been subject to any bond forfeitures for any operation in the state of Utah.

The recommendation from the Applicant Violator System (AVS) denotes that all connected entities either do not have any civil penalties or are under a settlement agreement (attached).

O:\007005.SKY\WG5017 FLAT CANYON\DECISION DOCUMENT FLAT CANYON\510C.DOC

## Permit Evaluation

Permit Number C0070005 SEQ:8  
 Permittee Name 142816 Canyon Fuel Company LLC  
 Date Of Narrative 2/1/2017 3:26:36 PM  
 Requestor suzanne.steab

**CAUTION: The Applicant/Violator System (AVS) is an informational database. Permit eligibility determinations are made by the regulatory authority with jurisdiction over the permit application not by the AVS. Results which display outstanding violations may not include critical information about settlements or other conditions that affect permit eligibility. Consult the AVS Office at 800-643-9748 for verification of information prior to making decisions on these results.**

### 12 Violations Found.

<b>1: Revoked Permit</b>	<u>11</u>	IL	Permit:11	Conditional	1/9/2004
Violator 1:	146616 Jader Coal Company LLC				
<b>2: Revoked Permit</b>	<u>128</u>	IL	Permit:128	Conditional	1/9/2004
Violator 1:	146616 Jader Coal Company LLC				
<b>3: Revoked Permit</b>	<u>167</u>	IL	Permit:167	Conditional	1/9/2004
Violator 1:	146616 Jader Coal Company LLC				
<b>4: Revoked Permit</b>	<u>172</u>	IL	Permit:172	Conditional	1/9/2004
Violator 1:	146616 Jader Coal Company LLC				
<b>5: Revoked Permit</b>	<u>192</u>	IL	Permit:192	Conditional	1/9/2004
Violator 1:	146616 Jader Coal Company LLC				
<b>6: Revoked Permit</b>	<u>228</u>	IL	Permit:228	Conditional	1/9/2004
Violator 1:	146616 Jader Coal Company LLC				
<b>7: Revoked Permit</b>	<u>252</u>	IL	Permit:252	Conditional	1/9/2004
Violator 1:	146616 Jader Coal Company LLC				
<b>8: Revoked Permit</b>	<u>267</u>	IL	Permit:267	Conditional	1/9/2004
Violator 1:	146616 Jader Coal Company LLC				
<b>9: Revoked Permit</b>	<u>8</u>	IL	Permit:8	Conditional	1/9/2004
Violator 1:	146616 Jader Coal Company LLC				
<b>10: Bond Forfeiture</b>	<u>8970262</u>	KY	Permit:8970262	Conditional	8/13/1993
Violator 1:	107269 Malachi Coal Company Incorporated				
<b>11: Bond Forfeiture</b>	<u>8970302</u>	KY	Permit:8970302	Conditional	1/8/2001
Violator 1:	101447 Flaget Fuels Inc				
<b>12: Bond Forfeiture</b>	<u>8970302</u>	KY	Permit:8970302	Conditional	1/8/2001
Violator 1:	101447 Flaget Fuels Inc				

## Evaluation OFT

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### Entities: 18

249039 Halas Energy LLC - ()  
 ---101448 John Joseph Siegel Jr - (Manager)  
 ---101448 John Joseph Siegel Jr - (Member)  
 ---249034 Cedars Energy LLC - (Subsidiary Company)  
 ---101448 John Joseph Siegel Jr - (Manager)  
 ---254567 Bowie Resource Partners, LLC - (Subsidiary Company)  
 ---101448 John Joseph Siegel Jr - (Corporate Officer)  
 ---101448 John Joseph Siegel Jr - (Director)  
 ---128807 James J Wolff - (Chief Financial Officer)  
 ---129465 Eugene E Diclaudio - (Chief Operations Officer)  
 ---153972 Paul Warner - (Senior Vice President)  
 ---254566 Bowie Resource Holdings, LLC - (Subsidiary Company)  
 ---101448 John Joseph Siegel Jr - (Corporate Officer)  
 ---128807 James J Wolff - (Chief Financial Officer)  
 ---129465 Eugene E Diclaudio - (Chief Operations Officer)  
 ---142816 Canyon Fuel Company LLC - (Subsidiary Company)  
 ---101448 John Joseph Siegel Jr - (Chief Executive Officer)  
 ---128807 James J Wolff - (Chief Financial Officer)  
 ---129465 Eugene E Diclaudio - (Chief Operations Officer)  
 ---129465 Eugene E Diclaudio - (Director)  
 ---129465 Eugene E Diclaudio - (President)  
 ---153972 Paul Warner - (Vice President)  
 ---254573 Brian Settles - (General Counsel)  
 ---254573 Brian Settles - (Secretary)

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 -----254573 Brian Settles - (Secretary)  
 -----254573 Brian Settles - (Senior Vice President)  
 -----254617 Bruce Lindsay - (Senior Vice President)  
 -----254618 Grant Quasha - (Corporate Officer)  
 -----254573 Brian Settles - (General Counsel)  
 -----254573 Brian Settles - (Secretary)  
 -----254573 Brian Settles - (Senior Vice President)  
 -----254617 Bruce Lindsay - (Senior Vice President)  
 -----254618 Grant Quasha - (Corporate Officer)  
 -----254620 Jesus Fernandez - (Director)  
 -----259469 Carlos Pons - (Director)  
 254568 Galena US Holdings, Inc. - ()  
 ---254567 Bowie Resource Partners, LLC - (Subsidiary Company)  
 ---101448 John Joseph Siegel Jr - (Corporate Officer)  
 ---101448 John Joseph Siegel Jr - (Director)  
 ---128807 James J Wolff - (Chief Financial Officer)  
 ---129465 Eugene E Diclaudio - (Chief Operations Officer)  
 ---153972 Paul Warner - (Senior Vice President)  
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 ---254573 Brian Settles - (Secretary)  
 ---254573 Brian Settles - (Vice President)  
 ---254617 Bruce Lindsay - (Vice President)  
 ---254618 Grant Quasha - (Vice President)  
 ---153972 Paul Warner - (Senior Vice President)  
 ---254573 Brian Settles - (General Counsel)  
 ---254573 Brian Settles - (Secretary)  
 ---254573 Brian Settles - (Senior Vice President)  
 ---254617 Bruce Lindsay - (Senior Vice President)  
 ---254618 Grant Quasha - (Corporate Officer)  
 ---254573 Brian Settles - (General Counsel)  
 ---254573 Brian Settles - (Secretary)  
 ---254573 Brian Settles - (Senior Vice President)  
 ---254617 Bruce Lindsay - (Senior Vice President)  
 ---254618 Grant Quasha - (Corporate Officer)  
 ---254620 Jesus Fernandez - (Director)  
 ---259469 Carlos Pons - (Director)  
 ---254574 Jeffrey Kopp - (President)  
 ---254575 Bryan Keogh - (Treasurer)  
 ---254576 Jesus Fernandez Lopez - (Secretary)

## Narrative

2/1/2017 - Violations 1-12 are coded "conditional," indicating a settlement, payment plan, or pending challenge. Linking entity is John Joseph Siegel Jr. Any state evaluating an entity with conditional state violations, particularly for the purpose of a permitting action, is reminded that they should contact the state(s) that entered the violation(s) to confirm the conditional status of those state violations. DB



File Code: 2820

Date: February 9, 2017

Daron Haddock  
Coal Program Manager  
Utah Division of Oil, Gas and Mining  
1594 West North Temple, Suite 1210  
Salt lake City, Utah 84114-5801

Dear Mr. Haddock

The Manti-La Sal National Forest (FS) has completed review of the mine plan Modification, Task #8046 for permit C/007/005 for Bowie Resources, LLC's Skyline Mine. The modification addresses mining the Flat Canyon Federal Coal Lease, UTU-77114. The FS is responding as the federal land management agency (FLMA) according to 30 CFR 994.30, Article VI (C)(2).

The FS consented to the Bureau of Land Management (BLM) leasing these lands in February 2013. The BLM issued the lease on July 1, 2015.

FS review has shown that the proposed mine plan modification is consistent with special coal lease stipulations for use and protection of non-mineral resources on NFS lands within the lease.

With respect to the post-mining land use, according to the Manti-La Sal Forest Plan (1986), the surface lands are managed principally for wood-fiber production and harvest, watershed protection and improvement, rangeland managements and riparian area management. Any surface disturbance and subsequent reclamation must be designed to support these post-mining land uses.

With respect to protection of non-mineral resources, the FS finds the proposed resource monitoring plan adequate. According to lease stipulation 18, the Lessee is responsible to replace any surface or developed groundwater resources identified for protection that may be lost or adversely affected by mining operations. This is to maintain existing riparian habitat, fishery habitat, livestock and wildlife use or other land uses. The FS identifies all water resources identified for monitoring as being subject to this stipulation. On another note, it is unclear how the Lessee plans to comply with lease stipulation 27.

The lands in the permit modification/revision area contain 22 acres of priority sage grouse habitat as shown on the map in Attachment A. The FS September 2015 Greater Sage-grouse Record of Decision for Idaho and Southwest Montana, Nevada and Utah, amended FS land management plans for sage-grouse management, including the Manti-La Sal Forest Plan. The amendment includes the following standard for leased coal mines (GRSG-M-CML-ST-093):

"In priority habitat management areas and sagebrush focal areas do not authorize new appurtenant surface facilities related to existing underground mines unless no technically feasible alternative exists. If new appurtenant surface facilities associated with existing mine leases cannot be located outside of priority habitat management areas and sagebrush focal areas, locate them within any existing disturbed areas, if possible. If location within an existing disturbed area is not possible, then construct new facilities to minimize disturbed areas while meeting mine safety standards and requirements as identified by the



Mine Safety and Health Administration mine-plan approval process and locate the facilities in an area least harmful to greater sage-grouse habitat based on vegetation, topography, or other habitat features..”

To implement this standard, the FS requires that the following condition be included in the permit modification/revision approval:

*To protect sage-grouse habitat, locate new appurtenant surface facilities outside priority habitat management areas, unless no technically feasible alternative exists. If new appurtenant surface facilities cannot be located outside of priority habitat management areas, locate them within any existing disturbed areas, if possible. If location within an existing disturbed area is not possible, then construct new facilities to minimize disturbed areas while meeting mine safety standards and requirements in the established mine-plan approval process and locate the facilities in an area least harmful to greater sage-grouse habitat based on vegetation, topography, or other habitat features.*

If you have any questions or concerns, please contact Jeff Salow at 435-636-3596 or [jsalow@fs.fed.us](mailto:jsalow@fs.fed.us).

Sincerely,

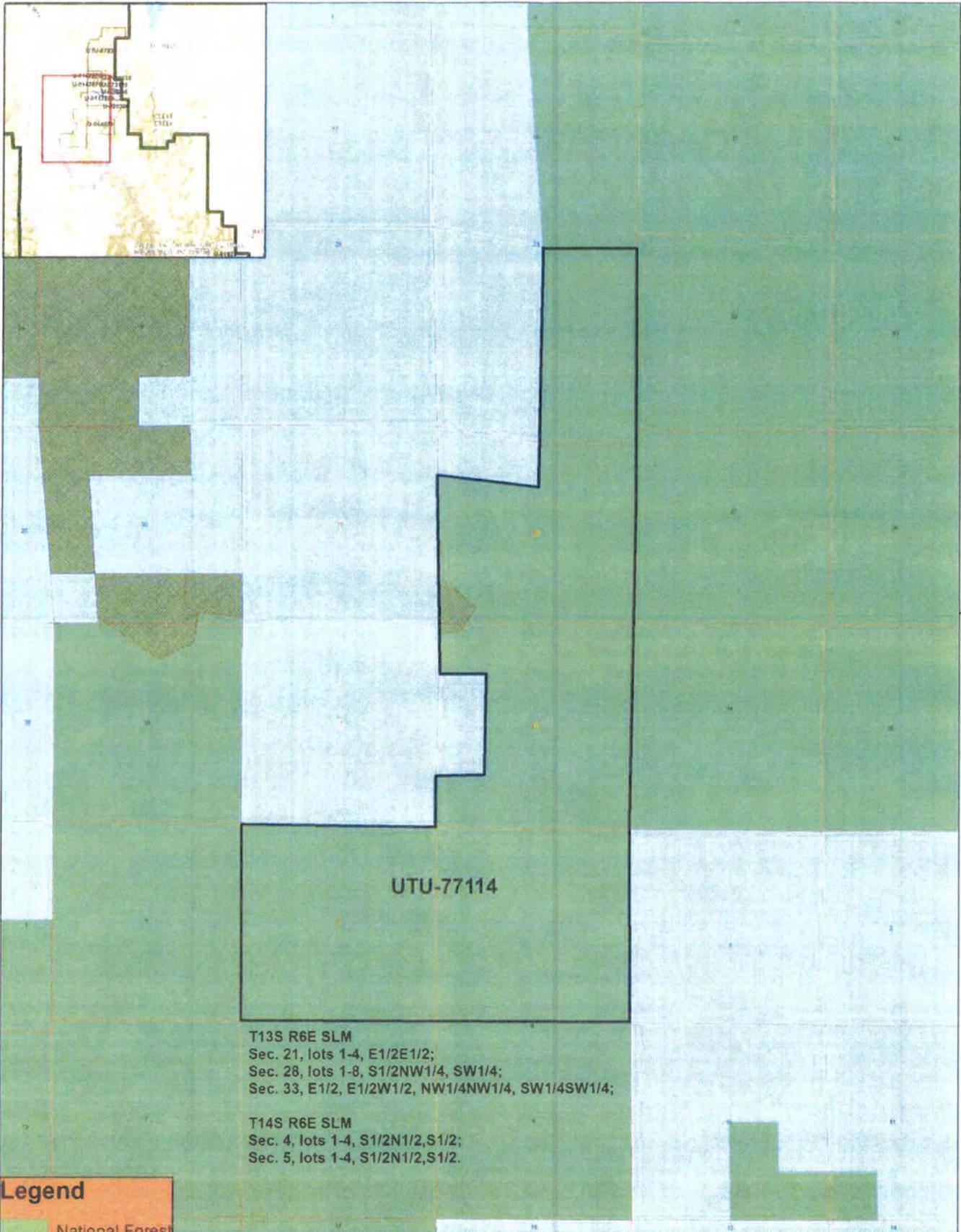


BRIAN M. PENTECOST

Forest Supervisor

Enclosure

cc: Nicole Caveny, OSMRE, Becky Hammond, FS



UTU-77114

T13S R6E SLM  
 Sec. 21, lots 1-4, E1/2E1/2;  
 Sec. 28, lots 1-8, S1/2NW1/4, SW1/4;  
 Sec. 33, E1/2, E1/2W1/2, NW1/4NW1/4, SW1/4SW1/4;

T14S R6E SLM  
 Sec. 4, lots 1-4, S1/2N1/2, S1/2;  
 Sec. 5, lots 1-4, S1/2N1/2, S1/2.

**Legend**

- National Forest
- Private
- UT general
- UT priority

Sage Grouse General Habitat  
 Coal Lease UTU-77114  
 November 23, 2016



The Forest Service uses the most current and complete data available. GIS data and product accuracy may vary. They may be derived from sources of varying accuracy. Accuracy may vary based on modeling or interpretation. Incomplete data may result in errors. Using GIS products for purposes other than those for which they were created may yield inaccurate or misleading results. The Forest Service reserves the right to correct, update, modify, or replace GIS products without notification.