Canyon Fuel Company, LLC
A Subsidiary of Bowie Resource Holdings, LLC

Skyline Mine
Gregg A. Galecki, Environmental Engineer
HC35, Box 380
Helper, Utah 84526
(435) 448-2636
Fax (435) 448-2632

December 31, 2013

Mr. Daron R. Haddock
Coal Program Manager
Division of Oil, Gas, and Mining
1594 West North Temple
Salt Lake City, Utah 84114-5801

RECEIVED
JAN 3 2014
DIV. OF OIL, GAS & MINING

RE: North Lease Permit modification, Two (2) Clean Copies, Canyon Fuel Company, LLC, Skyline Mine, C/007/005, Task No. 4407

Dear Daron:

Attached to this letter are C1 and C2 forms outlining information submitted requested in Task No. 4407. The amendment is to extend the Skyline Mine North Lease area approximately 770.52 acres per the extension of BLM Coal Lease UTU-67939.

The application was considered conditionally-approved and would be fully-approved once concurrence from the Office of Surface Mining (OSM) and receipt of two (2) clean copies of the application. Attached is a copy of the letter received by Ms. Dana Dean, Associate Director of the Utah Division of Oil, Gas, and Mining, C1 and C2 forms for the application information, and two (2) hard-copy sets of the application information. One (1) set is for the Division with one (1) set to be returned to the Operator once incorporated.

If you have any questions regarding this information, please give me a call at (435) 448-2636.

Sincerely:

Gregg A. Galecki

Gregg A. Galecki
Canyon Fuel Company, LLC.
Environmental Engineer – Skyline Mines

United States Department of the Interior

OFFICE OF SURFACE MINING
RECLAMATION AND ENFORCEMENT
Western Region Office
1999 Broadway, Suite 3320
Denver, CO 80202-3050

December 4, 2013

Dana Dean, Associate Director
Division of Oil, Gas and Mining
P.O. Box 145801
Salt Lake City, Utah 84114-5801

Dear Ms. Dean,

The Office of Surface Mining Reclamation and Enforcement (OSM) Western Region is reversing its position on the Skyline Mine's lease modification for the Winter Quarters Federal Coal Lease UTU-67939. OSM has determined that, based on the criteria found in 30 CFR 746.18, the lease modification does not constitute a mining plan modification and approval of the mining plan by the Assistant Secretary for Land and Minerals Management is not required. This decision is based on review of new and existing information, including:

- The Mud Creek Basin and Upper Huntington Creek Basin October 7, 2013, Cumulative Hydrologic Impact Assessment
- Utah Division of Oil, Gas, and Mining (DOGM) October 22, 2013 Permitting Packet
- The Bureau of Land Management's Resource Recovery and Protection Plan
- Previously submitted documentation, including the November 2011, Environmental Assessment for the Modification of Winter Quarters Federal Coal Lease UTU-67939 (Skyline North)

Therefore, DOGM can remove special condition number three from the state permit C/007/0005, and Canyon Fuel Company, LLC can begin mining within the Winter Quarters Federal Coal Lease UTU-67939, as stipulated by permit C/007/0005.

If you have any questions regarding this decision please contact Elaine Ramsey at 303-293-5041 or Nicole Caveny at 303-293-5078.

Sincerely,

Robert C. Postle, Manager
Program Support Division

cc: Wes Sorensen, Canyon Fuel Company, LLC

APPLICATION FOR COAL PERMIT PROCESSING

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

Permittee: Canyon Fuel Company, LLC
Mine: Skyline Mine **Permit Number:** C/007/005
Title: North Lease – Lease Modification response to Task No. 4407 – Clean Copies
Description, Include reason for application and timing required to implement:
Modification to extend BLM Lease UTU-67939 by approximately 770 acres -- Clean Copies

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

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

Information submitted electronically in Adobe Acrobat .pdf format. (This number includes a copy for the Price Field Office.)

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

Wesley K Sorensen — Print Name
Wesley K Sorensen GM 12/31/13 — Sign Name, Position, Date

Subscribed and sworn to before me this 31st day of Dec, 2013

Kathleen Atwood — Notary Public

My commission Expires: 12-02, 2013
Attest: State of Utah } ss:
County of CARBON

KATHLEEN ATWOOD
NOTARY PUBLIC-STATE OF UTAH
COMMISSION# 650015
COMM. EXP. 12-02-2015

For Office Use Only:	Assigned Tracking Number:	Received by Oil, Gas & Mining

Form DOGM- C1 (Revised 3/22/2010)

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

Permittee: Canyon Fuel Company, LLC
Mine: Skyline Mine **Permit Number:** C/007/005
Title: North Lease - Lease Modification Response to Task No. 4407 – Clean Copies

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

			DESCRIPTION OF MAP, TEXT, OR MATERIAL TO BE CHANGED
☐ Add	☒ Replace	☐ Remove	Chapter 1 Table 1.114(page 1-23), pages 1-20 thru 1-23, 1-30 thru 1-34, 1-36, 1-37, 1-39
☒ Add	☐ Replace	☐ Remove	Chapter 1 Appendix 118-Affidafit of Legal Notice, Copies of Letters to Water Users and Landowners
☐ Add	☒ Replace	☐ Remove	Chapter 1, Plates1.6-2_rev7, 1.6-3_rev7
☐ Add	☒ Replace	☐ Remove	Chapter 2 Section 2.2, Page 2-21(b)
☐ Add	☒ Replace	☐ Remove	Chapter 2 Section 2.3 pages 2-29d, 2-30(j1), 2-30(k), ADD 2-30 (l), 2-35a, 2-36 and 2-36a (Table 2.3.7-1), 2-38
☐ Add	☒ Replace	☐ Remove	Chapter 2 Section 2.5 pages 2-51e, 2-51g
☐ Add	☒ Replace	☐ Remove	Chapter 2 Section 2.7 pages 2-61d, 2-62,
☐ Add	☒ Replace	☐ Remove	Chapter2 Section 2.8 page 2-67 and 2-68
☐ Add	☒ Replace	☐ Remove	Chapter 2 Section 2.9 page 2-99
☐ Add	☒ Replace	☐ Remove	Chapter 2 Section 2.10 page 2-111b
☐ Add	☒ Replace	☐ Remove	Chapter 2 Section 2.12 pages 2-122, 2-124
☐ Add	☒ Replace	☐ Remove	Chapter 2 Section 2.14 page 2-161
☐ Add	☒ Replace	☐ Remove	Chapter 2 , Plates 2.2.7-2_rev5, 2.3.5.1-1_rev6, 2.3.5.2-1_rev6, 2.3.6-1_rev15, 1.12.1-1_rev5
☒ Add	☐ Replace	☐ Remove	Appendix A-2, Volume 2; A Review of Potential Threatened, Endangered, & Sensitive Species in the North Lease Expansion Area, 2012, Mt. Nebo Scientific, Inc.
☒ Add	☐ Replace	☐ Remove	Appendix A-2 Volume 2: NRCS Prime Farmland Determination, Joseph Dyer
☒ Add	☐ Replace	☐ Remove	Appendix A-2 Volume 2; Habitat Assessment for Sensitive Wildlife Species Western Toad, …., Western Land Services, Inc. 11-01-12
☐ Add	☒ Replace	☐ Remove	Chapter 3 Section 3.3 page 3-81
☐ Add	☒ Replace	☐ Remove	Chapter 3, Plate 3.3-2_rev9
☐ Add	☒ Replace	☐ Remove	Chapter 4 Section 4.11 page 4-70
☐ Add	☒ Replace	☐ Remove	Chapter 4 Section 4.17 pages 4-92, and 4-98
☐ Add	☒ Replace	☐ Remove	Chapter 4 Plate 4.17.3-1A_rev8, 4.17.5-1_rev6
☒ Add	☐ Replace	☐ Remove	Addendum to Probable Hydrologic Consequences - Appendix L - Summary of the Spring and Seep Survey and Baseline Monitoring Activities In the Wife and Andrew Dairy Canyon Areas, 2011-2013
☒ Add	☐ Replace	☐ Remove	Addendum to Probable Hydrologic Consequences – Appendix L – Skyline North Lease Expansion Area Baseline Report V4, Petersen Hydrologic; September 21, 2013
☒ Add	☐ Replace	☐ Remove	Appendix A-2 Volume 2; Western Boreal Toad Surveys – Tech Memo, Alpine Ecological, Inc.

Any other specific or special instruction required for insertion of this proposal into the Mining and Reclamation Plan.	**Received by Oil, Gas & Mining**
Included are two (2) clean copies of the information listed. One (1) set for the Division and one (1) set for the Operator after the pages are stamped for incorporation into the M&RP.	

Ch. 1

Utah Power & Light Company
1407 West North Temple
Salt Lake City, Utah 84110

Helen Marakis
160 East 1st South
Price, Utah 84501

United States of America
Department of Agriculture
U.S. Forest Service
599 West Price River Drive
Price, Utah 84501

Virginia W. Mower
56 West 200 South
Fairview, Utah 84629

Kanawha & Hocking Coal & Coke Co.
P.O. Box 507
Clear Creek, Utah 84501

Euray Allred
P.O. Box 35
Fountain Green, Utah 84632

Nick and Koula Marakis
150 East 1st South
Price, Utah 84501

Bessie Oman (Milton)
61 South Main
Salt Lake City, Utah 84115

Greek Orthodox Church (Helinic)
P.O. Box 688
Price, Utah 84501

Union Pacific Railroad
1416 Dodge Street
Omaha, Nebraska 68179-0001

David G. and Rene L. Cunningham
995 East Hillside Drive
Provo, Utah 84604

George E. Liodakis
2655 E. Chalet Circle
Sandy, Utah 84093

The following list contains the names and addresses of the owners of mineral acreage contiguous to the mine permit boundary and are illustrated on Drawing 1.6-2 (excluding the waste rock disposal area and rail loadout):

Carbon County, Utah
Court House
Price, Utah 84501

Peper Estate
975 West 600 South
Orem, Utah 84058

C&B Coal
975 West 600 South
Orem, Utah 84058

Utah Power and Light Company
1407 West North Temple
Salt Lake City, Utah 84110

James and Linda Tracy
3148 North Timpview Drive
Provo, Utah 84604

United States of America
Department of the Interior
Bureau of Land Management
2370 South 2300 West
Salt Lake City, Utah 84119

Canyon Fuel Company, LLC
225 N. 5th Street, Ste 900
Grand Junction, Colorado 81501

Energy Fuels
Three Park Central, Suite 900
1515 Arapahoe
Denver, Colorado 80202

David G. and Rene L. Cunningham
995 East Hillside Drive
Provo, Utah 84604

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State of Utah
SITLA
675 East 500 South
Salt Lake City, UT 84102-8212

The following list contains the names and addresses of the owners of the lands contiguous to the waste rock disposal area:

Surface: Fontini Telonis, et al
P.O. Box AD
Price, Utah 84501

Coal: Western Reserve Coal Company
Denver, Colorado

112.700 MSHA Numbers [unchanged]

Since the mining operations comprising the Skyline Mining Project will utilize surface facilities in the same general area and will mine generally the same area in horizontal extent, the operations are treated in this Mining Permit Application as a single mining operation to be known as the "Skyline Mines." The "Skyline Mines" will involve a multiseam mining operation of three coal seams with certain areas being mined sequentially at different depths with slight variations due to geological and mining restraints. To distinguish the operations of mining one seam from the others, each operation has been named individually:

Mine Operation	Seam to Be Mined
Skyline Mine No. 1	Upper O'Connor
Skyline Mine No. 2	Lower O'Connor "A" Lower O'Connor "B" Flat Canyon Seam (If economical)

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The mine Safety and Health Administration numbers for the Skyline Mines are:

Skyline Mine No. 1 - 42-01435
Skyline Mine No. 3 - 42-01566

Table 1.114
Lease Acreage, Coal and Surface Ownership

Lease No. or Entity	Active Lease Acres	Date of Issuance	Coal Ownership	Surface Ownership / Action
U-147570	2,092.70	1-May-65	BLM	USFS
	-560.00	20-Dec-06		Relinquished
U-0142235	520	1-Oct-64	BLM	USFS
U-073120	557.22	1-Feb-64	BLM	USFS
U-044076	2,367.82	1-Sep-65	BLM	USFS
	121.50	19-Apr-01	BLM	USFS
U-020305	1,439.40	1-Mar-62	BLM	USFS
	-610.00	30-Jun-93		Assigned to U-70018
	-550.00	7-Sep-06		Relinquished
UTU-70018	610.00	30-Jun-93	BLM	USFS
	-610.00	15-Sep-06	BLM	Relinquished
UTU-67939	3,291	1-Sep-96	BLM	USFS, D.Euray Allred & Madelyn E. Allred Trust
	770.52	2-Apr-12	BLM	USFS, D.Euray Allred & Madelyn E. Allred Trust
C&B Energy	120	30-Jul-02	C&B Energy	Koula Marakis, Trust: George E. & Helen Liodakis & Liodakis Ranch
Carbon County	65	1-May-74	Carbon County	Canyon Fuel Company, LLC., Milton D. Oman, LTD,
	746.25	1-Aug-02	Carbon County	Koula Marakis, Trust: George E. & Helen Liodakis & Liodakis Ranch
Canyon Fuel Company, LLC	240	20-Dec-10	Canyon Fuel Company, LLC	D. Euray Allred & Madelyn E. Allred Trust

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Active Federal Coal Acreage	9,440.16
Active Non-Federal Coal Acreage	1171.25
Total Active Lease	10,611.41

Leasehold interests involve all or part of the leases which have been subleased and/or assigned to Canyon Fuel Company, LLC.

Acres listed in leasehold interest are identified both on Plate 1.6-2 and Plate 1.6-3; Landownership is identified on Plate 1.6-1.

114 Right-of-Entry Information

The Skyline Mines will be operated on the leasehold interests owned by Canyon Fuel Company, LLC. The lands on which mining is to occurs includes part of the Manti-LaSal National Forest, and both county and private leases (see Drawings 1.6-1 and 1.6-3 of the unmodified permit). Post mining land use of National Forest lands are outlined in the approved Manti-La Sal Forest Land Use Management Plan. The waste rock disposal area and Winter Quarters Ventilation Facility are on private land as also shown on Drawing 1.6-1. The leasehold interests involve all or a part of the following coal leases, which have been subleased and/or assigned to Canyon Fuel Company, LLC (additional information provided on Table 114.1):

Federal Lease

		Issued to	Date of Issuance
Utah - 020305		Emmett K. Olson	03/01/62
Utah - 044076		Armeda N. McKinnon	09/01/65
Utah - 0142235		Malcolm N. McKinnon	10/01/64
Utah - 0147570		Malcolm N. McKinnon	05/01/65
Utah - 073120		Independent Coal and Coke Company	02/01/64
Utah - 67939	Tract 1	Coastal States Energy Co.	09/01/96
	Tract 2	Canyon Fuel Company, LLC	04/02/12

County Lease	Issued to	Date of Issuance
Carbon County Coal Lease	Kanawha and Hocking Coal and Coke Company	5/1/74
Carbon County Coal Lease	Canyon Fuel Company, LLC	05/15/02

Private Lease	Issued to	Date of Issuance
UP&L Tract	Canyon Fuel Company, LLC	2/1/99
C&B Energy	Canyon Fuel Company, LLC	8/1/02
Peabody Natural Resources Company (formerly known as Hanson Natural Resources Company)	Canyon Fuel Company, LLC	12/16/10

The legal descriptions of the above listed coal leases are:

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Federal Coal Lease Serial #Utah-020305

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

Sec. 13:	SW-1/4 SW-1/4 (Lot 7);
Sec. 14:	SE-1/4 SE-1/4;
Sec. 23:	E-1/2 E-1/2; (relinquished)
Sec. 24:	W-1/2 NW-1/4, SE-1/4 NW-1/4, S-1/2;(SE1/4 relinquished)

Sec. 25: All (Lots 1 thru 4, S-1/2 N-1/2, S-1/2);(relinquished)

Sec. 26: E-1/2 E-1/2;(relinquished)

containing 279.4 acres;

Federal Coal Lease Serial #Utah-044076

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

Sec. 26: W-1/2 E-1/2, W-1/2;

Sec. 27: Lots 1, 2, 3, 4, E-1/2, E-1/2 W-1/2,

Sec. 34: Lots 1, 2, 3, 4, 5, 6, 7, 8, and S-1/2

Sec. 35: Lots 1, 2, 3, 4, 5, 6, 7, NE-1/4, E-1/2 NW-1/4, NE-1/4 SW-1/4, N-1/2 SW-1/4;

containing 2,489.32 acres;

Federal Coal Lease Serial #Utah-0142235

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

Sec. 11: S-1/2 S-1/2;

Sec. 14: W-1/2, SW-1/4 SE-1/4;

containing 520.00 acres;

Federal Coal Lease Serial #Utah-0147570

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

Sec. 10: Lots 3 and 4, E-1/2 SW-1/4 and SE-1/4;

Secs. 15 and 22: All;(relinquished all of Sec. 15 except E1/2NE1/4)

Sec. 23: W-1/2 E-1/2 and W-1/2;

containing 1,532.70 acres;

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Federal Coal Lease Serial #Utah-073120

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

Section 13: Lots 1, 2/ 3, 4, 5, 6, 8;

Section 14: NE-1/4, N-1/2 SE-1/4;

Section 24: NE-1/4 NW-1/4;
containing 557.22 acres

Federal Coal Lease Serial # UTU - 67939
Tract 1 T.12 S., R.6.E., SL Meridian, Utah
Section 26, S2SE, SESW
Section 34, Lots 1-4, S2NE, SENW, E2 SWNW, N2S2
Section 35, all
T.13S., R.6E., SL Meridian, Utah
Section 2, all
Section 3, all
Section 10, Lots 1-2, NE, E2NW;
Section 11, N2, N2S2
containing 3,291.0 Acres
Tract 2 T.12S, R.6E., SLM, Utah
Sec. 25, lots 3 and 4, SW1/4NE1/4, W1/2SE1/4, SW1/4
Sec. 26, lots 1-4, N1/2S1/4, SW1/4SW1/4
Sec. 34, NE1/4NE1/4
Containing 770.52 Acres
Carbon County Coal Lease
Township 12 South. Range 6 East SLB&M
Section 25: E1/2SE1/4, SE1/4NE1/4
Section 36:N1/2N1/2
S1/2SW1/4
containing 360.0 Acres
Township 13 South. Range 6 East SLB&M
Section 1: W1/2
Section 12: NW1/4NW1/4, SW¼SW¼
Section 24: Portion of W1/2 NE1/4
containing 465 Acres more or less

Pacificorp Coal Lease

Township 14 South, Range 6 East, SLB&M
Section 2: Lots 1, 2, 3, and 4; S1/2N1/2;S1/2 (All)
Section 3: Lots 1 and 2; S1/2NE1/4; E1/2SE1/4; E1/2W1/2SE1/4; NW1/4NW1/4SE1/4
containing 925.16 acres more or less

C&B Energy

Township 13 South. Range 6 East SLB&M
Section 12: NW1/4SW1/4, SW1/4NW1/4, NE1/4NW1/4
containing 120 acres more or less

Canyon Fuel Company, LLC (formerly Hanson Natural Resources)

Township 12 South, Range 6 East SLB&M
Section 36: N1/2SW1/4, S1/2NW1/4, SW1/4NE1/4, NW1/4SE
containing 240 acres more or less

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The leases above listed are subject to that certain Exchange Agreement date September 9, 1975 between Valley Camp of Utah, Inc. (now White Oak Mining and Construction) and Energy Fuels Corporation, a Colorado corporation. The effect of the Exchange Agreement was to transfer the ownership of coal rights such that Energy Fuels Corporation (now owned by Canyon Fuel Company, LLC) owns or controls the coal which is located north and west of the Connelville Fault. The Connelville Fault is the south-easterly boundary of the Skyline permit area, and the general location of the fault is shown on Drawing 1.6-1. Actual location of the fault may vary when encountered throughout actual mining operations. Where discrepancies exist between written text and field conditions, field conditions governed by a mutually acceptable agreement with White Oak Mining Company. The result of this agreement is that only a portion of the originally leased property is controlled by Canyon Fuel Company, LLC and is included in the permit area.

The right to enter the leaseholds conveyed by the Federal Coal leases in conferred to the lessees by the Mineral Leasing Act of 1920 and leases themselves. Approximately 10,611.41 acres are contained in the leaseholds of the leases (DWG No. 1.6-3). This is an Autocad ® generated number and the actual acreage may vary from this number with an actual ground survey. Due to limiting factors of "no or thin coal areas and vertical seam proximity area," restrictions of the Exchange Agreement or other restraints, underground coal mining will occur only on a portion of the Federal leases.

The right to enter the leasehold conveyed by Pacific Corporation is conferred to the lessees by the contract entered by the two parties on February 1, 1999, a copy of which is included in Appendix 117a of this chapter. The rights to enter the leaseholds in Section 12, T13S, R6E conveyed by Carbon County and C&B Coal were conferred to the lessees by the contract entered by the parties on July 30, 2002, a copies of which is included in Appendix 117a.

The permit area will include, in addition to leaseholds of the Federal Coal leases, areas for access roads, conveyor belts, utilities and facilities for loading unit trains and associated facilities. Rights-of-way and surface easements acquired originally by Coastal States Energy Company and Skyline Coal Company, and now owned by Canyon Fuel Company, LLC, allow, among other rights, the right to construct, operate, and maintain coal storage and train load-out facilities at the mouth of Eccles Canyon. These rights to enter, construct, operate, and maintain facilities were conferred by:

(1) Surface lease and easement agreements dated August 6, 1976 and April 24, 1981 and entered into by and between Helen, Nick, and Koula Marakis and Kanawha and Hocking Coal and Coke company allow the exclusive use and possession of the surface of the subject lands for purposes of granting access to and ingress and egress to and from other properties as well as other rights incidental to the transportation of coal across the leased acreage.

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(2) On August 3, 1978, Energy Fuels Corporation conveyed its exclusive and perpetual easement to Coastal States Energy Company (and now Canyon Fuel Company, LLC) for the purpose of constructing and maintaining a temporary coal storage and loading facility. The easement had been initially granted by Leon J. Nicolaides, et al., to Kanawha and Hocking Coal and Coke Company, Energy Fuels Corporation's predecessor in title.

(3) A Lease Agreement dated June 10, 1982 between Fotini Telonis, et al, and the Permittee grants the Permittee the right to use a 27.83 acre parcel located near Scofield, Utah, as a waste rock disposal site. The lease was amended both in August 2006 and March 2007 to increase the parcel to approximately 37.48 acres. See Appendix A in Section 3.2 for lease.

(4) A Quitclaim Deed dated May 24, 1991, from Kanawha and Hocking Coal and Coke Company to Coastal States Energy Company (and now Canyon Fuel Company, LLC) which deed conveyed to Coastal 42.57 acres of surface lands located in the SI/2SEI/4 of Section 17, T.13S., R.7E., SLB&M.

(5) A lease dated June 9, 2010, between the D. Euray Allred Family Trust and Ark Land Company, grants the use of approximately 12.7 acres of surface lands to Ark Land Company, located in the N1/2 of Section 1, T.13S., R.6E., SLB&M,. Both Ark Land Company and Canyon Fuel Company are wholly owned subsidiaries of Arch Coal, Inc. Ark Land Company in turn will conduct an inter-company perpetual and exclusive lease with Canyon Fuel Company, LLC. - Skyline Mine. The parcel is located in Winter Quarters Canyon approximately two (2) miles west of Scofield, Utah, as the Winter Quarters Ventilation Facility (WQVF). Additionally, the lease identifies "Easement Lands" which grants use of the road accessing the leased acres. See Appendix 118-A, Volume 1 of the M&RP for the easement. This lease was transferred to Canyon Fuel Company, LLC in 2013.

Power Line Addition

A parcel of land in Section 25 and 36, Township 13 South, Range 6 East, Salt Lake Base & Meridian, Carbon and Emery Counties.

Commencing at the Section Corners of 25, 26, 35, and 36, Township 13 South, Range 6 East, Salt Lake Base & Meridian, thence East along the North boundary of Section 36 for a distance of 500 feet, more or less, thence S20° 00' 00" W for a distance of 1,000 feet, more or less, herein called the point of beginning of the tract; thence N84° 20' 19" E a distance of 44.21 feet; thence N89° 08' 31" E a

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115 Status of Unsuitability Claims [unchanged]

The Bureau of Land Management has included the proposed permit area in the Wattis Planning Unit Study to determine the results of the application of the Departmental Coal Unsuitability Criteria as mandated by the Federal Lands Review, Section 552(6) of the Surface Mining Control and Reclamation Act of 1977 (P.L. 95 87).

Canyon Fuel Company, LLC recognizes, however, that the permit area may possibly undergo further examination during some phase of the permitting process to determine if it should be designated as an area unsuitable for mining. Canyon Fuel Company, LLC believes that the environmental baseline information contained in Volume 1 clearly demonstrates that the permit area should not be so designated as an area which is unsuitable for mining.

Canyon Fuel Company, LLC does not propose to conduct or locate surface facilities within 300 feet of any occupied dwellings.

116 Permit Term

The following information is presented to identify permit term requirements and stipulations.

The Date of Construction commenced on June 24, 1980 upon approval of the Mining and Reclamation Plan.

Although the initial permit application covered only a five year period of mining, the information presented below estimates the anticipated mining for the life of the mining operation.

	Mine No. 1	Mine No. 2	Mine No. 3
First Coal Produced	June, 1982	Oct., 1981	1992 Est.
Termination of Mining	Dec., 2012	Dec., 2015	June 2019
Horizontal Extent of Mine Workings (Life of Mine)	3,956 acres	312.58 acres	3,810.06 acres

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Vertical Extent of Mine Workings Workings (Life of Mine)	Surface to 1,500' max	Surface to 2,300' max	Surface to 1,500' max

The anticipated number of total surface land acres to be affected (life of mines) is less than the combined total of the affected acreages for each of the three mines due to the overlapping of mining operations which is inherent to this multi-seam mining operation. The total surface acreage to be disturbed by surface facilities associated with underground mining is 121.97 acres.

The following information was based on projection for the next five years (2012-2016).

	Mine No. 1	Mine No. 2	Mine No. 3
Extent of Horizontal Workings	240 acres	375 acres	1,400 acres
Extent of Vertical Workings	Surface to 1,250'	Surface to 2,250'	Surface to 2,125'

Permit Area

The construction/installation of surface facilities at the mine site, loading area, conveyor belt route, well houses, water tank pad, waste rock disposal site, and South Fork Breakout, and Winter Quarters Ventilation Facility comprise the Permit Area. The permit area acreage listed adequately accommodate areas of disturbance.

PERMIT AREAS TO BE RECLAIMED

AREA	ACREAGE
Loadout	13.86
Portal Yard	42.55
Water tanks and Well pads	0.26
Conveyor Bench	14.18
Waste Rock Disposal Site and Road	32.48
South Fork Breakout	0.96
James Canyon Buried Power Line	0.30
James Canyon Buried Pipeline	1.60
James Canyon Water Wells and Road	2.95
Winter Quarters Ventilation Facility	7.93
Winter Quarters Road (not reclaimed)	4.90
TOTAL	121.97

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Legal Description of Areas Authorized for Coal Mining and Reclamation Activities Adjacent Area

Township 12 South, Range 6 East, SLBM

Section 25: SE¼NE ¼, S½SE¼, lots 3 and 4, SW¼NE¼, W½SE¼, SW¼
Section 26: S ½SE¼, SE¼SW¼, lots 1-4, N½S½, SW¼SW¼
Section 34: Portions of the S½N½, S½, NE¼NE¼
Section 35: All
Section 36: W½ , N½NE¼,SW¼NE¼, NW¼SE ¼, N½NE¼

Township 12 South, Range 7 East, SLBM
Section 32: Portions of SE¼SE¼

Township 13 South, Range 6 East, SLBM

Section 1: Portions of S½NE¼ , W½
Section 2: All
Section 3: All
Section 10: All
Section 11: All
Section 12: W½SW¼ , W½NW¼ , NE¼NW¼
Section 13: W ½ , portions S½SE¼
Section 14: All
Section 15: W½NE¼
Section 22 All
Section 23: W½, NE¼, W½SE ¼
Section 24: NW ¼, portions of NE¼
Section 25: Portions of SE¼SW¼
Section 26: W½, W½E½
Section 27: All
Section 34: All
Section 35: All
Section 36: Portions of N½NW¼

Township 13 South, Range 7 East, SLBM

Section 4: Portions of W½ ,
Section 5: Portions of NE¼
Section 6: Portions of S½N½

Section 17: Portions of S½S½
Section 18: Portions of S½S½
Section 19: Portions of N½NW

Township 14 South, Range 6 East, SLBM

Section 2: W½NW¼ Section 3: E½NE¼

Total acres approved for Underground Coal Mining and Reclamation activities: 10,733.38

The acreage of 10,733.38 acres is an AutoCad ® generated number from drawing number 1.6-3 . The acreage includes active leases and areas within the permit boundary. The acreage does not include the ½-mile buffer identified around the Waste Rock disposal site.

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Ch. 1 Append 118-A

AFFIDAVIT OF PUBLICATION

STATE OF UTAH)

ss.

County of Carbon,)

I, Richard Shaw, 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 22nd day of January, 2013, and that the last publication of such notice was in the issue of such newspaper dated the 12th day of February 2013.

Richard Shaw – Publisher

Subscribed and sworn to before me this 12th day of February, 2013.

Notary Public My commission expires January 10, 2015 Residing at Price, Utah

Publication fee, $ 537.60

LINDA THAYN
NOTARY PUBLIC · STATE OF UTAH
COMMISSION# 604351
COMM. EXP. 01-10-2015

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-67939. The lease modification will increase the lease acreage by approximately 770.52 acres, with no additional surface disturbance proposed.

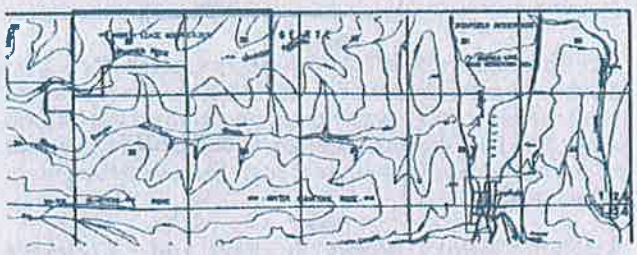
Underground coal mining will take place in coal reserves owned or leased by Canyon Fuel Company, LLC. A legal description of the proposed areas for additional underground mining activities is described as follows:

Proposed Additional Areas Authorized for Coal Mining and Reclamation Activities

Township 12 South, Range 6 East, SLBM

Section 25:	lots 3 and 4, SW¼NE¼, W½SE¼, SW¼
Section 26:	lots 1-4, N½ S½, SW¼ SW¼
Section 34:	NE¼NE¼

Total acres within Federal Coal Lease UTU-67939: 4,061.52



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 renewal 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, 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 January 22, 29, February 5 and 12, 2013.

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Div. of Oil, Gas & Mining

Ch. 1 Appendix 118-A

Canyon Fuel Company, LLC
A Subsidiary of Bowie Resource Holdings, LLC

Skyline Mine
Gregg A. Galecki, Environmental Engineer
HC35, Box 380
Helper, Utah 84526
(435) 448-2636
Fax (435) 448-2632

December 30, 2013

Coal Regulatory Program
Attn.: Darron Haddock
Division of Oil, Gas and Mining
1594 West North Temple, Suite 1210
Box 145801
Salt Lake City, Utah 84114-5801

RE: Copies of Certified Letters –North Lease Modification extension of Mining, Canyon Fuel Company, Skyline Mine, C/007/005,

Dear Mr. Haddock:

Included with this letter are copies of letters sent to landowners and water users in the North Lease area to notify them of future mining, per State regulation R645-301-525.700. Letters were sent to the Manti-LaSal National Forest Supervisor Ms. Alice Carlton, Forest Ranger Ms. Mesia Nyman, the Price River Water Improvement District, the Price River Water Users Association, and members of the Allred Family Trust.

If you have any questions, please give me a call at (435) 448-2636.

Sincerely,

Gregg A. Galecki

Gregg A. Galecki
Canyon Fuel Company, LLC
Environmental Engineer – Skyline Mine

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JAN 0 3 2014
Div. of Oil, Gas & Mining

Canyon Fuel Company, LLC
A Subsidiary of Bowie Resource Holdings, LLC

Skyline Mine
Wess Sorensen, General Manager
HC35, Box 380
Helper, Utah 84526
(435) 448-2619
Fax (435) 448-2632

*Via Certified Mail

December 30, 2013

Allred Family Trust
c/o Mr. Phil Allred
P.O. Box 96
Fountain Green, Utah 84632

RE: Canyon Fuel Company, LLC, Skyline Mines; Continued Mining in Federal Lease UTU-67939 commonly referred to as the "North Lease"

To Whom It May Concern:

As required by State mining regulations (R645-301-525.700), Canyon Fuel Company, LLC (CFC) Skyline Mines is notifying you of the mine's plan to expand mining further into Sections 25, 26, and 34 in Township 12 South, Range 6 East, SLB&M. CFC currently holds the coal leases in this area, commonly referred to as the "North Lease" and plans to continue to mine Federal Lease UTU-67939 underlying National Forest lands in these areas. Mining is ongoing and will continue through approximately 2018. No subsidence or surface disturbance will occur as the result of developing the mains in any of the areas listed. Minor surface subsidence may occur in areas where longwall mining will be conducted, but no surface or ground water flows will be interrupted or diminished as a result of this mining activity. Copies of the mine plan may be examined at the Carbon County Courthouse or at the Utah Division of Oil, Gas & Mining offices in Salt Lake City, Utah.

If you have any questions regarding this letter or would like to discuss future mining plans for the above referenced sections, please call Gregg Galecki at (435) 448-2636 or me at (435) 448-2619.

Sincerely,

Wess Sorensen
Mine Manager, Skyline Mine
Canyon Fuel Company, LLC.

xc:Angela Nance, Utah Division of Oil, Gas & Mining

INCORPORATED
JAN 0 3 2014
Div. of Oil, Gas & Mining

Canyon Fuel Company, LLC
A Subsidiary of Bowie Resource Holdings, LLC

Skyline Mine
Wess Sorensen, General Manager
HC35, Box 380
Helper, Utah 84526
(435) 448-2619
Fax (435) 448-2632

*Via Certified Mail

December 30, 2013

Allred Family Trust
c/o Ms. Naomi Bennion
4494 South 4515 West
Salt Lake City, Utah 84120

RE: Canyon Fuel Company, LLC, Skyline Mines; Continued Mining in Federal Lease UTU-67939 commonly referred to as the "North Lease"

To Whom It May Concern:

As required by State mining regulations (R645-301-525.700), Canyon Fuel Company, LLC (CFC) Skyline Mines is notifying you of the mine's plan to expand mining further into Sections 25, 26, and 34 in Township 12 South, Range 6 East, SLB&M. CFC currently holds the coal leases in this area, commonly referred to as the "North Lease" and plans to continue to mine Federal Lease UTU-67939 underlying National Forest lands in these areas. Mining is ongoing and will continue through approximately 2018. No subsidence or surface disturbance will occur as the result of developing the mains in any of the areas listed. Minor surface subsidence may occur in areas where longwall mining will be conducted, but no surface or ground water flows will be interrupted or diminished as a result of this mining activity. Copies of the mine plan may be examined at the Carbon County Courthouse or at the Utah Division of Oil, Gas & Mining offices in Salt Lake City, Utah.

If you have any questions regarding this letter or would like to discuss future mining plans for the above referenced sections, please call Gregg Galecki at (435) 448-2636 or me at (435) 448-2619.

Sincerely,

Wess Sorensen
Mine Manager, Skyline Mine
Canyon Fuel Company, LLC.

xc:Angela Nance, Utah Division of Oil, Gas & Mining

INCORPORATED
JAN 0 3 2014
Div. of Oil, Gas & Mining

Canyon Fuel Company, LLC
A Subsidiary of Bowie Resource Holdings, LLC

Skyline Mine
Wess Sorensen, General Manager
HC35, Box 380
Helper, Utah 84526
(435) 448-2619
Fax (435) 448-2632

*Via Certified Mail

December 30, 2013

Carbon Water Conservation District
c/o Richard Lee
P.O. Box 509
Helper, UT 84526

RE: Canyon Fuel Company, LLC, Skyline Mines; Continued Mining in Federal Lease UTU-67939 commonly referred to as the "North Lease"

To Whom It May Concern:

As required by State mining regulations (R645-301-525.700), Canyon Fuel Company, LLC (CFC) Skyline Mines is notifying you of the mine's plan to expand mining further into Sections 25, 26, and 34 in Township 12 South, Range 6 East, SLB&M. CFC currently holds the coal leases in this area, commonly referred to as the "North Lease" and plans to continue to mine Federal Lease UTU-67939 underlying National Forest lands in these areas. Mining is ongoing and will continue through approximately 2018. No subsidence or surface disturbance will occur as the result of developing the mains in any of the areas listed. Minor surface subsidence may occur in areas where longwall mining will be conducted, but no surface or ground-water flows will be interrupted or diminished as a result of this mining activity. Copies of the mine plan may be examined at the Carbon County Courthouse or at the Utah Division of Oil, Gas & Mining offices in Salt Lake City, Utah.

If you have any questions regarding this letter or would like to discuss future mining plans for the above referenced sections, please call Gregg Galecki at (435) 448-2636 or me at (435) 448-2619.

Sincerely,

Wess Sorensen
Mine Manager, Skyline Mine
Canyon Fuel Company, LLC.

xc:Angela Nance, Utah Division of Oil, Gas & Mining

INCORPORATE
JAN 0 3 2014
Div. of Oil, Gas & Mining

Canyon Fuel Company, LLC
A Subsidiary of Bowie Resource Holdings, LLC

Skyline Mine
Wess Sorensen, General Manager
HC35, Box 380
Helper, Utah 84526
(435) 448-2619
Fax (435) 448-2632

*Via Certified Mail

December 30, 2013

Allred Family Trust
c/o Ms. Jeanine Sorensen
1595 North 1400 West
Provo, Utah 84604

RE: Canyon Fuel Company, LLC, Skyline Mines; Continued Mining in Federal Lease UTU-67939 commonly referred to as the "North Lease"

To Whom It May Concern:

As required by State mining regulations (R645-301-525.700), Canyon Fuel Company, LLC (CFC) Skyline Mines is notifying you of the mine's plan to expand mining further into Sections 25, 26, and 34 in Township 12 South, Range 6 East, SLB&M. CFC currently holds the coal leases in this area, commonly referred to as the "North Lease" and plans to continue to mine Federal Lease UTU-67939 underlying National Forest lands in these areas. Mining is ongoing and will continue through approximately 2018. No subsidence or surface disturbance will occur as the result of developing the mains in any of the areas listed. Minor surface subsidence may occur in areas where longwall mining will be conducted, but no surface or ground water flows will be interrupted or diminished as a result of this mining activity. Copies of the mine plan may be examined at the Carbon County Courthouse or at the Utah Division of Oil, Gas & Mining offices in Salt Lake City, Utah.

If you have any questions regarding this letter or would like to discuss future mining plans for the above referenced sections, please call Gregg Galecki at (435) 448-2636 or me at (435) 448-2619.

Sincerely,

Wess Sorensen
Mine Manager, Skyline Mine
Canyon Fuel Company, LLC.

xc:Angela Nance, Utah Division of Oil, Gas & Mining

INCORPORATED
JAN 0 3 2014
Div. of Oil, Gas & Mining

Canyon Fuel Company, LLC
A Subsidiary of Bowie Resource Holdings, LLC

Skyline Mine
Wess Sorensen, General Manager
HC35, Box 380
Helper, Utah 84526
(435) 448-2619
Fax (435) 448-2632

*Via Certified Mail

December 30, 2013

Manti-LaSal National Forest
c/o Darren Olsen
599 West Price River Road
Price, Utah 84501

RE: Canyon Fuel Company, LLC, Skyline Mines; Continued Mining in Federal Lease UTU-67939 commonly referred to as the "North Lease"

To Whom It May Concern:

As required by State mining regulations (R645-301-525.700), Canyon Fuel Company, LLC (CFC) Skyline Mines is notifying you of the mine's plan to expand mining further into Sections 25, 26, and 34 in Township 12 South, Range 6 East, SLB&M. CFC currently holds the coal leases in this area, commonly referred to as the "North Lease" and plans to continue to mine Federal Lease UTU-67939 underlying National Forest lands in these areas. Mining is ongoing and will continue through approximately 2018. No subsidence or surface disturbance will occur as the result of developing the mains in any of the areas listed. Minor surface subsidence may occur in areas where longwall mining will be conducted, but no surface or ground water flows will be interrupted or diminished as a result of this mining activity. Copies of the mine plan may be examined at the Carbon County Courthouse or at the Utah Division of Oil, Gas & Mining offices in Salt Lake City, Utah.

If you have any questions regarding this letter or would like to discuss future mining plans for the above referenced sections, please call Gregg Galecki at (435) 448-2636 or me at (435) 448-2619.

Sincerely,

Wess Sorensen
Mine Manager, Skyline Mine
Canyon Fuel Company, LLC.

xc:Angela Nance, Utah Division of Oil, Gas & Mining

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Div. of Oil, Gas & Mining

Canyon Fuel Company, LLC
A Subsidiary of Bowie Resource Holdings, LLC

Skyline Mine
Wess Sorensen, General Manager
HC35, Box 380
Helper, Utah 84526
(435) 448-2619
Fax (435) 448-2632

*Via Certified Mail

December 30, 2013

Manti-LaSal National Forest
c/o Mr. Allen Rowley - Acting Forest Supervisor
599 W. Price River Drive
Price, Utah 84501

RE: Canyon Fuel Company, LLC, Skyline Mines; Continued Mining in Federal Lease UTU-67939 commonly referred to as the "North Lease"

To Whom It May Concern:

As required by State mining regulations (R645-301-525.700), Canyon Fuel Company, LLC (CFC) Skyline Mines is notifying you of the mine's plan to expand mining further into Sections 25, 26, and 34 in Township 12 South, Range 6 East, SLB&M. CFC currently holds the coal leases in this area, commonly referred to as the "North Lease" and plans to continue to mine Federal Lease UTU-67939 underlying National Forest lands in these areas. Mining is ongoing and will continue through approximately 2018. No subsidence or surface disturbance will occur as the result of developing the mains in any of the areas listed. Minor surface subsidence may occur in areas where longwall mining will be conducted, but no surface or ground water flows will be interrupted or diminished as a result of this mining activity. Copies of the mine plan may be examined at the Carbon County Courthouse or at the Utah Division of Oil, Gas & Mining offices in Salt Lake City, Utah.

If you have any questions regarding this letter or would like to discuss future mining plans for the above referenced sections, please call Gregg Galecki at (435) 448-2636 or me at (435) 448-2619.

Sincerely,

Wess Sorensen
Mine Manager, Skyline Mine
Canyon Fuel Company, LLC.

xc: Angela Nance, Utah Division of Oil, Gas & Mining

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Canyon Fuel Company, LLC
A Subsidiary of Bowie Resource Holdings, LLC

Skyline Mine
Wess Sorensen, General Manager
HC35, Box 380
Helper, Utah 84526
(435) 448-2619
Fax (435) 448-2632

*Via Certified Mail

December 30, 2013

Price River Watershed Conservation District
265 South Fairgrounds Rd
Price, Utah 84501

RE: Canyon Fuel Company, LLC, Skyline Mines; Continued Mining in Federal Lease UTU-67939 commonly referred to as the "North Lease"

Chairman Mathis:

As required by State mining regulations (R645-301-525.700), Canyon Fuel Company, LLC (CFC) Skyline Mines is notifying you of the mine's plan to expand mining further into Sections 25, 26, and 34 in Township 12 South, Range 6 East, SLB&M. CFC currently holds the coal leases in this area, commonly referred to as the "North Lease" and plans to continue to mine Federal Lease UTU-67939 underlying National Forest lands in these areas. Mining is ongoing and will continue through approximately 2018. No subsidence or surface disturbance will occur as the result of developing the mains in any of the areas listed. Minor surface subsidence may occur in areas where longwall mining will be conducted, but no surface or ground water flows will be interrupted or diminished as a result of this mining activity. Copies of the mine plan may be examined at the Carbon County Courthouse or at the Utah Division of Oil, Gas & Mining offices in Salt Lake City, Utah.

If you have any questions regarding this letter or would like to discuss future mining plans for the above referenced sections, please call Gregg Galecki at (435) 448-2636 or me at (435) 448-2619.

Sincerely,

Wess Sorensen
Mine Manager, Skyline Mine
Canyon Fuel Company, LLC.

xc:Angela Nance, Utah Division of Oil, Gas & Mining

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JAN 0 3 2014
Div. of Oil, Gas & Mining

Canyon Fuel Company, LLC
A Subsidiary of Bowie Resource Holdings, LLC

Skyline Mine
Wess Sorensen, General Manager
HC35, Box 360
Helper, Utah 84526
(435) 448-2619
Fax (435) 448-2632

*Via Certified Mail

December 30, 2013

Price River Water Improvement District
265 South Fairgrounds Rd
Price, Utah 84501

RE: Canyon Fuel Company, LLC, Skyline Mines; Continued Mining in Federal Lease UTU-67939 commonly referred to as the "North Lease"

To Whom It May Concern:

As required by State mining regulations (R645-301-525.700), Canyon Fuel Company, LLC (CFC) Skyline Mines is notifying you of the mine's plan to expand mining further into Sections 25, 26, and 34 in Township 12 South, Range 6 East, SLB&M. CFC currently holds the coal leases in this area, commonly referred to as the "North Lease" and plans to continue to mine Federal Lease UTU-67939 underlying National Forest lands in these areas. Mining is ongoing and will continue through approximately 2018. No subsidence or surface disturbance will occur as the result of developing the mains in any of the areas listed. Minor surface subsidence may occur in areas where longwall mining will be conducted, but no surface or ground water flows will be interrupted or diminished as a result of this mining activity. Copies of the mine plan may be examined at the Carbon County Courthouse or at the Utah Division of Oil, Gas & Mining offices in Salt Lake City, Utah.

If you have any questions regarding this letter or would like to discuss future mining plans for the above referenced sections, please call Gregg Galecki at (435) 448-2636 or me at (435) 448-2619.

Sincerely,

Wess Sorensen
Mine Manager, Skyline Mine
Canyon Fuel Company, LLC.

xc: Angela Nance, Utah Division of Oil, Gas & Mining

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JAN 0 3 2014
Div. of Oil, Gas & Mining

Canyon Fuel Company, LLC
A Subsidiary of Bowie Resource Holdings, LLC

Skyline Mine
Wess Sorensen, General Manager
HC35, Box 380
Helper, Utah 84526
(435) 448-2619
Fax (435) 448-2632

*Via Certified Mail

December 30, 2013

Price River Water Users Association
90 North 100 East
Price, Utah 84501

RE: Canyon Fuel Company, LLC, Skyline Mines; Continued Mining in Federal Lease UTU-67939 commonly referred to as the "North Lease"

To Whom It May Concern:

As required by State mining regulations (R645-301-525.700), Canyon Fuel Company, LLC (CFC) Skyline Mines is notifying you of the mine's plan to expand mining further into Sections 25, 26, and 34 in Township 12 South, Range 6 East, SLB&M. CFC currently holds the coal leases in this area, commonly referred to as the "North Lease" and plans to continue to mine Federal Lease UTU-67939 underlying National Forest lands in these areas. Mining is ongoing and will continue through approximately 2018. No subsidence or surface disturbance will occur as the result of developing the mains in any of the areas listed. Minor surface subsidence may occur in areas where longwall mining will be conducted, but no surface or ground water flows will be interrupted or diminished as a result of this mining activity. Copies of the mine plan may be examined at the Carbon County Courthouse or at the Utah Division of Oil, Gas & Mining offices in Salt Lake City, Utah.

If you have any questions regarding this letter or would like to discuss future mining plans for the above referenced sections, please call Gregg Galecki at (435) 448-2636 or me at (435) 448-2619.

Sincerely,

Wess Sorensen
Mine Manager, Skyline Mine
Canyon Fuel Company, LLC.

xc:Angela Nance, Utah Division of Oil, Gas & Mining

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JAN 0 3 2014
Div. of Oil, Gas & Mining

Ch. 2 Sec. 2.2

north of Winter Quarters Canyon. The ventilation facility will include a 20-foot diameter vertical shaft, and / or a 20-foot wide slope driven at 18 degrees down, and 8-foot diameter escape shaft. The 20-foot shaft will have a 12-inch thick concrete liner, the slope will have a 8-inch thick concrete invert with the ribs and roof having a minimum 3-inch thick shotcrete liner, and the escape shaft will have a 6-inch concrete liner. When sealing at reclamation, the shaft(s) per 30 CFR Part 75.1711-1 and R645-301-551 will be completely backfilled to the surface using an engineered fill. When sealing the slope, sealing will consist of solid, substantial, incombustible material, such as concrete blocks, bricks or tile, or shall be completely filled with incombustible material for a distance of at least 25 feet into the opening. See Section 4.9 for additional details.

2.2.13 Subsidence Monitoring

Please refer to Section 4.17 - Subsidence Control Plan for details of the Subsidence Monitoring program and commitments to mitigate any effects due to subsidence.

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Div. of Oil, Gas & Mining

Ch. 2 Sec. 2.3

Wells W22-2-2 and W14-2B have failed casings associated with subsidence. Well W22-2-1 is the shallow well paired with W22-2-2. At the time of the Vaughn Hansen Associates (1979) report, the deeper of these two wells had an artesian potentiometric head which rose to a level above the water level in the shallower well. By 1982 the water level in W22-2-2 had dropped below that of W22-2-1. This was probably due to both the drought and dewatering of the area by the mining operations.

As of 2013 almost eight (8) years of mining have been completed in the North Lease. Groundwater conditions have remained consistent with minimal, short-lived inflows being encountered in the Mine. As 900-1300 feet of overburden separate the mine workings from the springs and streams, no impacts to the water resources are anticipated. Water Rights 91-3917 and 91-1039 and will be added to the Skyline water monitoring program as sites S26-1 and S25-32, respectively. These sites are located directly above longwall mining activity and should identify any impacts due to mining. Water Rights 91-1043 and 91-1044 will be monitored with site CS-26 located in Lower Wife Creek. See PHC Addendum Appendix L for baseline water monitoring in the area. As has been demonstrated in the 30 years of water monitoring in Mines 1 and 2 located in the Huntington drainage, and the multiple years of water monitoring in the Winter Quarters areas of Mine #3, there has been no adverse effects to water quality. Summarized in the Peteresen Report (located in Appendix L), the low concentrations of TDS, total iron, and low manganese are due to a combination the flow regime, and abundance of carbonate minerals in the Blackhawk formation. Also, when increased total iron and total manganese concentrations have typically been noted they have been associated with high flow, high suspended sediment events, suggesting the increased load is associated with the presence of sediments in the surface water and not the stream water itself. The stiff diagrams included in the Petersen report identify how the water chemistry of the water monitoring sites is similar with the monitoring sites throughout the Skyline area.

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2.3.5 Uses of Water in the Aquifers

2.3.5.1 Surface Water Rights

The water rights on and adjacent to the Skyline property which were on record with the Utah Division of Water Rights as of, July, 2002 are listed in Volume 4. The locations of these water rights can be found on Plate 2.3.5.1-1.

In addition to those existing water rights identified in Volume 4, the Forest Service has water rights claims pending action in District Court for the Seventh Judicial District in and for Emery and Carbon Counties. The claims for U.S.F.S. water rights in Upper Huntington Creek, Upper Fish Creek, Eccles Creek and the South Fork of Eccles Creek are recognized by the Utah Division of Water Rights as perfected rights by diligence of use. However, these rights have not yet been recognized by the Seventh Judicial District Court. Therefore, they are still pending rights; however, they will be treated as an actual rights until the court makes its decision. The U.S.F.S.

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JAN 0 3 2014
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pending rights are: 93-3659 through 93-3667 and 93-3676 through 93-3679. These rights are listed in the water rights tables presented in Volume 4.

Surface water rights in the area are primarily for stockwatering and irrigation. Stockwatering rights are almost entirely directly on the stream. Irrigation rights are centered around the town of Scofield and in Flat Canyon, southwest of the center of the property. Irrigated lands consist almost entirely of pasture. Only stockwatering rights are present on the lease area.

2.3.5.2 Ground Water Rights

Ground water rights on and adjacent to the Skyline Property, on record with the Utah Division of Water Rights as of July, 2002, are listed in Volume 4, 1st and 2nd binders and presented on Plate 2.3.5.2-1. Again, rights are primarily for stockwatering and irrigation (mainly lawns and gardens). A limited number of wells are located in the area.

Ground water rights within the North Lease area include seven springs ([93-5, 93-3678, 91-1035, 91-1036, USFS] [91-3918, 91-3638, 91-3917,Allred]) and a water right number (91-463, assigned to Eureka Energy) designated as stockwatering on a reservoir. Three of the water rights are assigned to D. Euray Allred and the other four are assigned to the USFS. In conjunction with the lease modification in 2013, a review of existing groundwater rights that will now be undermined was conducted. Existing water rights as confirmed by Division of Water Rights personnel include 91-3916, 91-3917, and 91-3940 through 91-3944 (excluding 91-3942) and are used for stockwatering. These water rights are claimed by the USFS or the Euray Allred family. Based on field investigations and a field tour of the area with Mr. Phil Allred, springs 91-3917 and 91-1039 will be monitored. These springs are named S26-1 and S25-32,

INCORPORATED
JAN 0 3 2014
Div. of Oil, Gas & Mining

respectively. The landowner agrees with the monitoring locations

and felt monitoring of spring 91-3916 was not necessary since it has less consistent and lower flow and is not developed for use as the other two (2) springs. Based on DOGM request water rights 91-1043 and 91-1044 will be monitored with Lower Wife Creek named CS-26.

Also shown on Plate 2.3.5.2-1 are exchanges of Scofield Reservoir water for ground water in Pleasant Valley Creek Basin. These are also listed in Volume 4. All exchanges are wells, with the exception of 91-940. Most of the exchanges serve the industrial and domestic needs for mining companies in the area.

INCORPORATED
JAN 0 3 2014
Div. of Oil, Gas & Mining

completed in August 2002. Annual updates to the study have been submitted with the annual reports. This study concluded after the 2005 information was submitted based on the initial parameters of the study which indicated the study would last through one (1) year after discharge from the mine decreased to a sustained flow less than 5,000 gpm.

Samples obtained at the MC-sites were monitored for total flow, TDS, TSS, and total phosphorous. In addition a stream stability cross-section and reach survey was conducted approximately 75 yards downstream of the MC-6 monitoring location. The results of these analyses were reported with the other mine water quality monitoring reports while the study was being conducted (2002-2005).

Sites MD-1, JC-1, JC-3,and ELD-1 were also added to the monitoring site list. MD-1 is a composite sample of the all the water discharged from Skyline Mine to Eccles Creek. JC-1 and JC-3 are samples of the water discharged from the two James Canyon ground and mine dewatering wells. ELD-1 reports the total flow-only from both JC-1 and JC-3. MD-1 and ELD-1 are monitored for total flow and the results are reported to the Division on a monthly basis. Quarterly, MD-1, JC-1, and JC-3 are also monitored for TSS, TDS, and total phosphorous. Since JC-3 is a PacifiCorp UPDES site, it is monitored each month for flow, TSS, TDS, oil and grease, and total iron. Spring monitoring sites WQ1-1, WQ1-39, WQ3-6, WQ3-26, WQ3-41 WQ3-43, and WQ4-12 were added to the permit. Surface water sites CS-19, CS-20,and CS-21 were added as were wells 91-26-1 and 91-35-1. Springs S26-1 and S25-32 and Stream CS-26 were added with the North Lease Modification in 2013. All of these sites are in the North Lease area. Location of these samples sites are illustrated on Drawing 2.3.6-1.

Skyline Mine has also obtained numerous water samples from within the mine for age-dating purposes. Samples have been analyzed for both stable and unstable isotopes; the majority being analyzed for tritium and carbon 14 content. The analyses results of these samples is discussed in detail in the July 2002 Addendum to the PHC. The results of repeated tritium sampling and analysis in a few location in the mine, specifically those in the 9 and 10 Left panel areas that began in August 2001, suggest that the majority of the water is not younger than 50 years. Only a few carbon 14 samples have been obtained from these

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JAN 0 3 2014
Div. of Oil, Gas & Mining

Table 2.3.7-1
Comprehensive Water Quality Analytical Schedule
(Surface and Ground Water Stations)

Sample Site	1st Quarter						2nd[2] / 3rd[3] / 4th Quarters												
	Lab Analysis*[a]	Field parameters only*[1]	Monthly Flow	Dissolved Oxygen	TDS,TSS, T-P	O & G	Lab Analysis*[a]	Qtrly Field parameters* only	Quarterly Flow	Monthly Flow	Monthly Seasonal Flow	Quarterly Water Level Only	Dissolved Oxygen	TDS,TSS, T-P	O & G	Carbon 14	Tritium	Deuterium	Oxygen 18
Streams																			
CS-3							X								X				
CS-6**	X			X		X	X						X		X				
CS-7 (F-5)								X											
CS-8								X											
CS-9							X												
CS-10								X											
CS-11							X								X				
CS-12	X						X												
CS-13	X						X												
CS-14	X						X												
CS-16								X											
CS-17								X											
CS-18								X											
CS-19							X												
CS-20							X								X				
CS-21							X												
CS-22									X										
CS-23									X										
CS-24							X						X		X				
CS-25							X												
CS-26							X												
MD-1			X		X					X				X					
SRD-1			X							X									
F-10								X											
UP&L-10							X												
VC-6	X			X		X	X						X		X				
VC-9	X			X		X	X						X		X				
VC-10		X						X											
VC-11									X										
VC-12									X										
NL-1 through NL-42 (See Section 2.4.4)											X								

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JAN 0 3 2014
Div. of Oil, Gas & Mining

Table 2.3.7-1
Comprehensive Water Quality Analytical Schedule
(Surface and Ground Water Stations)
(continued)

Sample Site	1st Quarter: Lab Analysis*[a]	1st Quarter: Field parameters only*[1]	1st Quarter: Monthly Flow	1st Quarter: Dissolved Oxygen	1st Quarter: TDS, TSS, T-P	1st Quarter: O & G	2nd[2] / 3rd[3] / 4th Quarters: Lab Analysis*[a]	2nd[2] / 3rd[3] / 4th Quarters: Qtrly Field parameters* only	2nd[2] / 3rd[3] / 4th Quarters: Quarterly Flow	2nd[2] / 3rd[3] / 4th Quarters: Monthly Flow	2nd[2] / 3rd[3] / 4th Quarters: Monthly Seasonal Flow	2nd[2] / 3rd[3] / 4th Quarters: Quarterly Water Level Only	2nd[2] / 3rd[3] / 4th Quarters: Dissolved Oxygen	2nd[2] / 3rd[3] / 4th Quarters: TDS, TSS, T-P	2nd[2] / 3rd[3] / 4th Quarters: O & G	2nd[2] / 3rd[3] / 4th Quarters: Carbon 14	2nd[2] / 3rd[3] / 4th Quarters: Tritium	2nd[2] / 3rd[3] / 4th Quarters: Deuterium	2nd[2] / 3rd[3] / 4th Quarters: Oxygen 18
Streams (cont.)																			
WRDS #1							X								X				
WRDS #2							X								X				
WRDS #3							X								X				
WRDS #4							X								X				
EL-1																	X		
EL-2																	X		
Springs																			
S10-1							X												
S12-1							X												
S13-2								X											
S13-7							X												
S14-4								X											
S15-3								X									X		
S17-2							X												
S22-5								X											
S22-11								X											
S23-4								X											
S24-1 Sulfur Spring								X									X		
S24-12								X											
S25-32								X											
S26-1								X											
S26-13								X											
S34-12								X											
S35-8								X											
S36-12								X											
2-413								X									X		
3-290								X											
8-253																	X		
WQ1-1								X											
WQ1-39							X												
WQ3-6							X												
WQ3-26							X												
WQ3-41							X												
WQ3-43							X												
WQ4-12							X												
WQ36-1							X												

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JAN 0 3 2014
Div. of Oil, Gas & Mining

Table 2.3.7-3
MONITORING STATION IDENTIFICATION

ECCLES CANYON/MUD/FISH CREEK DRAINAGES

STREAM STATIONS - 14 Stations

CS-3	CS-6	CS-9	CS-11	CS-19	CS-20	CS-24
CS-21	VC-6	VC-9	VC-10	VC-11	VC-12	CS-25
CS-26	NL sites (varies)					

MINE DISCHARGE STATIONS - 4 Stations
CS-12 (Mine #3) CS-14 (Mine #1) MD-1 (Composite CS-12 & CS-14)
SRD-1 (Total Mine Site Discharge to Eccles Creek/Scofield Reservoir)*

FRENCH DRAIN STATIONS - 1 Station
CS-13

HUNTINGTON CANYON

STREAM STATIONS - 12 Stations

CS-7 (F-5)	CS-8	CS-10	CS-16	CS-17	CS-18
CS-22	CS-23	UPL-10	F-10	EL-1	EL-2

WASTE ROCK DISPOSAL SITE

STREAM STATIONS - 4 Stations
WRDS #1 WRDS #2 WRDS #3 WRDS #4

GROUNDWATER STATIONS

SPRINGS - 27 Stations

S10-1	S12-1	S13-2	S13-7	S14-4	S15-3	S17-2
S22-5	S22-11	S23-4	S24-1 Sulfur	S24-12	S26-13	S34-12
S35-8	S36-12	2-413	3-290	WQ1-39	WQ3-6	WQ3-26
WQ3-41	WQ3-43	WQ4-12	8-253	WQ1-1	WQ36-1	S25-32
S26-1						

WELLS (MONITORING) - 1 Well Stations

W79-10-1B	W79-14-2A	W79-26-1	W79-35-1A	W79-35-1B
92-91-03	W2-1(98-2-1)	W20-4-1	W20-4-2	W99-4-1
W99-21-1	W20- 28-1	JC-1	JC-3	91-26-1
91-35-1	ELD-1 (Total of JC-1 and JC-3)*	W08-1-5	WC-1 thru WC-9	

WELLS, CULINARY -Referenced but not monitored
W13-1 W13-2 W17-1 W17-3 W24-1

NATIONAL POLLUTION DISCHARGE ELIMINATION SYSTEM (NPDES)
001 Portal Area 002 Loadout Area 003 Waste Rock Area 004 Winter Quarters JC-3 James Canyon

* Sites are monitored for total flow only and the results are reported to the Division on a monthly basis.

INCORPORATED
JAN 0 3 2014
Div. of Oil, Gas & Mining

Ch. 2 Sec. 2.5

- 0.15 ac-ft/month (ET)
- 228,096 (gallons/year)
- 0.70 ac-ft/yr

Pond 002 (Rail Loadout) - 0.44 acre (surface area)
- 0.15 ac-ft/month (ET)
- 257,422 gallons/year
- 0.79 ac-ft/yr

Pond 003 (Refuse Pile) - 0.27 acre (surface area)
- 0.15 ac-ft/month (ET)
- 159,667 gallons/year
- 0.49 ac-ft/yr

Pond 004 (Winter Quarters) – 0.036 acre (surface area)
- 0.15 ac-ft/month (ET)
- 19,551 gallons/year
- 0.06 ac-ft/yr

Total Annual Pond Evaporation = 2.04ac-ft

Springs and Seeps Effects From Subsidence - Not Applicable to this calculation
Alluvial Aquifer Abstractions into Mine - Not Applicable
Deep Aquifer Pumpage - Not Applicable
Postmining Inflow - (0)
Direct Diversions - Not Applicable
Dust Suppression - 5,000 gallons/truck load. Data based on 2003 use; last fully active year. = 3.7 ac-ft/yr
Mine Discharge - last 6 month average = 3,757 gpm = 6,059 ac-ft/yr

Using the Windy Gap Process at the Mine site, water depletions include Mine Consumption, Ventilation Consumption, Coal Producing Consumption, Sediment Pond Evaporation, and Dust Suppression totaling approximately 94 acre-feet per year. The only addition to the system, as defined by the Windy Gap process is the mine discharge which is currently averaging approximately 6,060 acre-feet per year, indicating the Skyline Mine has a net gain of approximately 5,966 acre-feet year to the Colorado River drainage system.

2.5.3 Alternative Water Supply

OSM Regulation 30 CFR 783.17 requires that alternative sources of water supply be identified if mining impacts will result in the contamination, diminution, or interruption of existing sources. Because no significant adverse hydrologic impacts are expected as a result of mining in the Skyline permit area, no individual or collective source of alternative water supply has been identified.

INCORPORATED
JAN 0 3 2014
Div. of Oil, Gas & Mining

Very little ground water was encountered while mining in the northern portion of the existing permit area prior to the addition of the North Lease. The same geologic and hydrogeologic conditions are anticipated to occur in the North Lease as occurred in the northern portion of the existing permit area (Mine 3). From 2005 through 2009 no significant water has been encountered in the North Lease.Therefore, no significant inflows of ground water are anticipated as mining progresses into the North Lease area. Selected surface discharges of ground water and stream flows in the areas that could be impacted by mining activities have beenwill be monitored. Mining related surface impacts include subsidence and the ventilation facility in Winter Quarters Canyon (WQVF)is the only surface impact anticipated since no new surface facilities are currently planned for the in the North Lease area. The WQVF will be permitted to encompass approximately 7.93 acres with the disturbance being treated with a sedimentation pond. The sole purpose of the facility will be to provide ventilation to the mine. If impacts to the waters within the permit area are determined to have occurred, mitigation will be implemented immediately using BTCA as described previously.

North of Winter Quarters Canyon, north of the Winter Quarters graben(NOG), the longwall panels were rotated 90 degrees to maximize coal recovery. This rotation accommodates coal recovery approximately ½-mile further to the east. A study conducted by Agapito Associates indicates mining can be safely conducted in areas with as little as 475 feet overburden without seeing adverse effects related to subsidence. A lease modification to the North Lease in 2013 extended mining slightly into the Fish Creek drainage. Approximately 690 acres of the 770 acre lease modification are being undermined in the Fish Creek drainage with overburden ranging from approximately 900-1300. Surface water drainages include Wife Creek, and two forks of Andrew Dairy Creek. All three (3) surface drainages are similar in that they are ephemeral in the reaches proposed for mining. An additional similarity they share for the majority of their entire length is springs in or very near the stream channel. These springs will flow a short distance in the stream channel prior to disappearing in the alluvium. The first such spring in Wife Canyon (S26-2) begins approximately 0.35 miles downstream of the area impacted by mining and runs approximately 50-100 feet before going subsurface. This spring is separated from the proposed mining by almost 800 feet of overburden above the coal seam. Only Wife Creek (CS-26) has demonstrated perennial flow as it enters Fish Creek, with such minimal flow (0.45 gpm) that there is only a minimal persistent groundwater-derived base flow component. Based on the elevation of the coal seam, both Wife and Andrew Dairy Creeks are above the coal seam their entire length. Water rights 91-3917 (Spring S26-1) and 91-1039 (Spring S25-32) are located within the proposed expansion area with overburden ranging from approximately 1,270 feet to 880 feet, respectively. Preliminary water quantity information for Spring S26-1 and S25-32 indicate flows of approximately 0.33 to 2.8 gpm and 3.5 to 12 gpm, respectively. Preliminary water quantity information for Stream CS-26 indicates flows from 0.45 to 40.4 gpm. Based on the amount of overburden separating the proposed mining from the surface hydrology, and the same Blackhawk formation containing shallow recharge sources that has been mined and monitored for over 30 years, there is minimal probability that the quantity of water within the Wife and Andrew Dairy drainages will be impacted by mining. Other sites identified during baseline water monitoring collected in 2012 and 2013 are located in PHC Addendum Appendix L.

The water quality in the same drainages has minimal probability of being adversely impacted due to the slightly alkaline nature of the Blackhawk formation, combining with the groundwaters that are generally near neutral to slightly alkaline which limits the solubility of metals such as total iron and total manganese into the groundwater system. Similarly, surface water quality is highly dependent on the overwhelming influence of the annual springtime snowmelt event on the surface-water discharge rates. A supplemental report located in Appendix A-1 by Petersen

INCORPORATED
JAN 0 3 2014
Div. of Oil, Gas & Mining

Hydrologic summarizes the similarities between the groundwater and surface water systems in the Fish Creek drainage with surrounding hydrologic systems that have been undermined and monitored for over 30 years. The Seeps and Springs survey located in the same appendix outlines and concurs with the similarities between the Fish Creek and Woods Canyon and Winter Quarters Canyon drainages. The portions of the Fish Creek drainage that are being undermined are solely within the Blackhawk Formation as predominately the entire Skyline lease areas have been.

In summary, the geology of the Blackhawk formation, the flow regime identified in the Wife and Andrew Dairy Creeks, the similarities in water quality of the baseline water monitoring sites with existing water monitoring sites, and the amount of overburden separating the coal to be mined from the surface hydrology support that no adverse impacts to the hydrology of these drainages are anticipated. This includes minimal likelihood of generation acid-forming or toxic-forming materials, changes to the sediment yield or stream flow alterations, and minimal potential to contaminate water supplies or water availablity. Due to the minimal contribution of water Wife and Andrew Dairy Creek add to both Fish Creek and Scofield Reservoir, no adverse impacts to the hydrologic balance to these waters are anticipated.
There has been some concern that Electric Lake has been impacted by the inflows of ground water to the Skyline Mine since 1998. As presented in the Addendum to the Probable Hydrologic Consequences, July 2002 and updated in October 2002, April 2003, and June 2004, a direct connection between the water in Electric Lake and the mine inflows cannot be found. However, the water flowing into the 10 Left area of the mine and discharging from the James Canyon JC-1 well contains a slight percentage of tritium. No other significant inflows of ground water into the mine contained tritium levels that would suggest a modern component of recharge. As stated by Petersen (Appendix A, Addendum to the Probable Hydrologic Consequences, July 2002, Updated October 2002):

> "It is calculated that the maximum modern component in the fault-related system could range from approximately 6.9 to 12.4 percent. It is also apparent that since routine sampling of the 10 Left groundwater system began in May 2002, the percentage of modern recharge in the groundwater system has not increased. Based on the potential modern recharge percentage calculations presented above, it is determined that of the total inflow to the 10 Left region
> (approximately 3,800 gpm), a maximum of approximately 262 to 471 gpm could have originated as modern recharge. Inasmuch as Canyon Fuel has been pumping approximately 2,200 gpm from the 10 Left groundwater system into Electric Lake since September 2001, the potential net impact to the Electric Lake watershed, were it occurring, would be completely mitigated by the current pumping. Additionally, groundwater that would not otherwise be available for use without the pumping activity is being added to the watershed. Since October 2002, PacifiCorp has increased the pumping rate at JC-1 to more than 4,000 gpm. Thus, currently, the amount of groundwater being pumped into Electric Lake from JC-1 represents

INCORPORATED
JAN 0 3 2014
Div. of Oil, Gas & Mining

Ch. 2 Sec. 2.7

Quarters Canyon area (North Lease Tract Area). This report was submitted to the USDA Forest Service. The report has been included in Appendix A-2.

Methodologies for this previous study relied on general vegetation mapping done by using existing information and limited ground-truthing techniques. Most of the mapping was done using existing maps and data from range analyses prepared by the USDA Forest Service (Manti-LaSal National Forest, Price, Utah).

Plant community named in the aforementioned study were revised to be consistent with the existing vegetation map of the permit area (Drawing 2.7.1-1a). The existing vegetation map of the area was revised using both black and white and color aerial photography. No field work or ground-truthing methods were implemented.

In October 2002 the vegetation at specific sites along the perennial streams within the North Lease was ground-truthed. This information is included in Appendix A-2 titled, "Riparian Plant Community Survey near Scofield, Utah - Winter Quarters and Woods Canyon 2002". Also in Appendix A-2 is "Biological Studies in Winter Quarters Canyon Creek and Woods Canyon Creek - A Study Plan" dated April 2005. The Study Plan outlines the method to be used to collect both qualitative and quantitative data to delineate areas of riparian vegetation. Using USFS Level III protocol transect lines will be established perpendicular to the stream channel at approximately 800-foot intervals for a baseline vegetation survey. Two years prior to longwall undermining any section of perennial streams, the transect interval will be increased to approximately 400-feet and surveyed each subsequent year through two years after mining has been completed for each longwall panel. The combined increase in transect interval and surveying the transects on an annual basis will provide adequate monitoring of the riparian areas. In addition, since riparian vegetation is closely related to the available flow in the perennial sections of the stream, additional flow monitoring sites have been established in the perennial sections of the stream that correspond to the longwall panels and areas of possible subsidence (See section 2.4.4 for monitoring plan details, Figure 2.3.6-2 for locations).Subsequent to the data collection outlined in the "Biological Studies Plan" in 2005, the baseline information will be submitted to the Division, to be included in Appendix A-2. All additional information will be submitted on an annual basis or as the information becomes available. The survey was expanded in 2010 to include additional portions of Woods Canyon Creek.

The North Lease area was expanded in 2013 to include a small area north of Woods Canyon in the Fish Creek drainage. Although not significantly different, an additional vegetation evaluation was conducted by Mt. Nebo Scientific, Inc., which confirmed the vegetation in the expansion is not significantly different from the rest of North Lease (See Appendix A-2)

INCORPORATED

JAN 0 3 2014

Div. of Oil Gas & Mining

Aspen

The Aspen community was the most common vegetation type of the Winter Quarters Tract Area.

Aspen (*Populus tremuloides*) was the dominant overstory species, whereas, depending on the area and environmental variables, snowberry (*Symphoricarpos oreophilus*) or Oregon grape (*Mahonia repens*) were the dominate understory species.

Conifer Timber

Also important by relative number of acres, these communities were dominated by Engelman spruce (*Picea engelmanii*) and subalpine fir (*Abies lasiocarpa*). Understory varied from relatively little to moderate ground cover, and often was comprised of gooseberry currant (*Ribes montigenum*).

Sagebrush

The Sagebrush communities that were mapped were dominated by Vasey sagebrush (*Artemisia tridentata* var. *vaseyana*) and various grass species i.e. slender wheatgrass (*Elymus trachycaulus*) and subalpine needlegrass (*Stipa columbiana*). Other common species of the community were low rabbitbrush (*Chrysothamnus viscidiflorus*), Louisiana sagewort (*Artemisia ludoviciana*), aster (*Aster* spp.), yarrow (*Achillea millefolium*) and Indian paintbrush (*Castilleja* spp.).

Although surface disturbances are not planned and the submittal of quantitative data was not necessary for the North Lease Tract Area, baseline quantitative data of many of the same communities located near the Skyline Mine site have been taken for previous studies. These additional data sets have also been included in Appendix Volume A-2 of the Skyline Mine MRP.

THREATENED & ENDANGERED PLANT SPECIES

Per personnel communication with Bob Thompson, USFS Botanist on November 1, 2002, "none of the currently listed USFS threatened, endangered or sensitive species are found in the Winter Quarter's Lease area". In addition to their being no species of concern in the USGFS Winter Quarter's Lease area, no surface disturbance is planned for the area.

An additional review was conducted by Mt. Nebo Scientific, Inc. in 2012 for the North Lease extension. No threatened, endangered or sensitive species were added or found in the area (See Appendix A-2).

HABITAT LOSS

In the unlikely event it is determined that mining-related subsidence causes material damage or a loss

INCORPORATED

JAN 0 3 2014

Div. of Oil, Gas & Mining

Ch. 2 Sec. 2.8

Huntington Creek has a diverse aquatic community with macroinvertebrate taxa representing all trophic levels. The successful cutthroat trout spawning and high number of resident trout evidence the high quality waters and habitat of Huntington Creek plus the ability of the macroinvertebrate community to support quality fisheries. Cutthroat trout, according to Utah Division of Wildlife Resources (UDWR) surveys, are increasing in numbers in Huntington Creek above Electric Lake. Trout produced in Huntington Creek provide an important part of the total number of fish in Electric Lake.

Winter Quarters Canyon Creek

As indicated in the 1995 environmental assessment prepared by the Forest Service and the Bureau of Land Management Winters Quarters Canyon Creek has a moderate population of macroinvertebrates. Perennial flow in the canyon has produced Stonefly larvae as far up as Box and Bob's Canyons. Mayfly nymphs were also found present in waters tested. Cutthroat trout were found within the creek east of the Forest Boundary on June 7, 1994 indicating fish are likely within perennial sections of the creek containing significant flows. A survey conducted in Winter Quarters Canyon Creek in October 2002 indicated similar conditions and species (See Appendix Volume A-3, Volume 2). The Winter Quarters Ventilation Facility pad was specifically designed to minimized any potential impacts to the stream. The pad was designed to stay a minimum of two(2) stream widths from the stream, (or approximately 24 feet), thus maintaining a buffer zone and avoiding impacts to both the stream and riparian areas. The macroinvertebrates are monitored on a scheduled basis to insure the health of the stream (see Plate 2.8.1-1 for locations, Table 2.8-1a for monitoring frequency). Refer to Section2.4.3 - sediment yield and next section for measures implemented to construct in the stream buffer zone.

Woods Canyon Creek

As indicated in the 1995 Environmental Assessment, Mayfly nymphs were found within the upper portions of Woods Canyon Creek in higher quantities than those found within Winter Quarters Canyon. Stonefly larvae were also found as high as the fork in the stream near the center of Section 34 (T 12 S, R 6 E). No fish were seen during the 1994 field survey although some may have been present. A survey conducted in Woods Canyon Creek in October 2002 indicated similar conditions (See Appendix Volume A-3, Volume 2). Another fish survey was conducted in 2010 to serve as baseline information for expanded mining located approximately ½ mile east and further downstream than previously conducted. Similar with the earlier surveys the stream is relatively shallow and does not provided ideal fish habitat, however a total of eight (8) fish were identified. An addition of both a macroinvertebrate and a fish monitoring location were set up to insure monitoring stations are established downstream of mining activities to fully evaluate any impacts from mining. Details are outlined later in this section.

Fish Creek

The North Lease area was extended in 2013 to include approximately 770 acres in the Fish Creek drainage.

INCORPORATED

JAN 0 3 2014

Div. of Oil, Gas & Mining

No perennial streams are being undermined. Wife Canyon has various springs that day-light in or near the stream channel, that run on the surface a short distance prior to disappearing into the alluvium. Both the East and West Forks of Andrew Dairy Canyon shows the same characteristics in short reaches. Approximately 900-1300 feet of overburden exist in the area being undermined, further minimizing any impacts. Andrew Dairy Spring, which exists immediately outside the area to be mined is being monitored as Spring S25-32. Water Right 91-3917 is a Spring located above the area to be mined and will be monitored S26-1. No monitoring of aquatic resources is necessary in these drainages.

UP Canyon - Scofield Waste Rock site

The Scofield Waste Rock site is located in UP Canyon at the confluence of two ephemeral unnamed drainages. No aquatic wildlife habitat has been noted in either drainage.

Project Impacts on Fisheries Resources

The surface facility disturbances in the portal area encroached on sections of all three upper Eccles Creek forks. In order to reduce sedimentation of these stream segments and the main stream, the tributaries and a section of Eccles Creek proper immediately below the tributary confluences were diverted into closed culverts. This modified approximately 4,200 feet of total stream habitat but did not reduce available fish habitat since fish were not found above the U.S. Forest boundary, prior to the diversion. Downstream drift of macroinvertebrates from the upper reaches of these forks still occurs as before.

At the coal loadout facilities near the mouth of the canyon (Station ECO5), approximately 600 feet of stream was moved to the north into a new channel. The new channel is 100 feet shorter but has nearly the same gradient (3 feet additional vertical drop/1,000 feet horizontal channel).

Degradation of Eccles Creek between the National Forest boundary and the coal loadout facilities should continue to be minimal since road and conveyor plans were developed and are being implemented to minimize effects on the stream.

Water being discharged from the mine is augmenting the Eccles Creek stream flow. This increased stream flow is especially beneficial during summer months when normal stream flows are low. Water temperatures are also moderated by this increased flow.

There should be little impact on Huntington Creek above Electric Lake. Impacts to date have been associated only with the construction of a new UDOT highway. Sediment control measures minimized the impact during the construction activity.

Prior to construction of the Winter Quarters Ventilation Facility (WQVF) silt fencing or similar best management practice will be installed along the entire length of the construction zone to minimize sediment and debris from entering the creek. Once construction is complete and other sediment controls are installed, these situation structures will be removed. During the life of the WQVF pad, long term sediment control will be implemented thorough a sediment pond (UPDES discharge point 004).

At this point in time there are believed to be no other potential impacts on either Winter Quarters or Woods Canyon Creeks.

INCORPORATED
JAN 0 3 2014
Div. of Oil, Gas & Mining

Ch. 2 Sec. 2.9

2.9.3 Endangered and Threatened Species

Passage of the Endangered Species Act of 1973 (Public Law 23-205) provided a legal basis for establishment of lists of endangered and threatened plants and wildlife (Tables 2.9-4, 2.9-5, and 2.9-6).

According to National Wildlife Federation (1977), Dalton (1978) and the Federal Register (1979), there are no endangered or threatened species of amphibians or reptiles, or any threatened mammals that inhabit the south-eastern region of Utah. Dalton (1978), however, indicates that one endangered species, the black-footed ferret, might be found in the Wasatch Plateau east of the Skyline Drive. Durrant (1952) reports that he knows "...of no occurrence of the black-footed ferret north of the Colorado River in Utah...". There are unconfirmed reports of black-footed ferrett sightings east of Castle Dale and Ferron in Emery County, Utah. Many hours have been spent trying to verify the presence of these animals. Up to now these efforts have been unsuccessful. Observations on all of the Skyline lease and immediate surrounding areas show no signs of prairie dog colonies nor sufficient ground squirrel populations to support ferret populations (Fig. 2.9.3-A).

In recent decades, the bald eagle has recovered from the endangered status and is now listed as threatened. Despite the recovery, very few nests have been identified in Utah as of 2000. The golden eagle is quite common in Utah and is not listed as threatened or endangered. The Skyline Mine permit area was flown in 2005 by DWR and no nests were identified for either eagle.

Threatened and Endangered, and sensitive species were re-evaluated in 2012 as part of the North Lease modification which extended the area approved for mining into portions of the Fish Creek drainage. The lease modification encompasses approximately 770 acres. A pre-survey investigation determined only the Western Toad needed a survey. The survey for the Western Toad was conducted in 2013 and determined they were not in the area. See Appendix Volume A-2 for Alpine Ecological report.

2.9.4 Impact Analysis and Protection of Wildlife

Numerous precautions were taken during construction of Skyline Mine to protect the wildlife resources. While the disturbances during the operational phase are greatly reduced, the following concerns have been and are still being considered: (1) surface disturbance, (2) loss of habitat, (3) noise, (4) human activity and (5) air pollution. Any one, all or a combination of the above perturbations can impact terrestrial vertebrates.

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JAN 0 3 2014
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Ch. 2 Sec 2.10

July 1, 2005. Details of the method of the survey are outlined in Appendix A-2, "Biological Studies in Winter Quarters Canyon Creek and Woods Canyon Creek - A Study Plan". Results of the survey will be provided in Appendix A-2, Volume 2 when completed.

Raptor surveys were conducted in 2005, 2007, 2008, 2009, 2011, and 2013 in the Winter Quarters area associated with drilling programs. Those surveys and the presence or lack of presence of raptors has not prohibited our work in the area. The raptor surveys are located with the respective exploration permits for each year. A summary report addressing the affects on raptors with the addition of the Winter Quarters Ventilation Facility is included in Appendix A-3, Volume 2. In 2009, an additional survey of the Northern goshawk, flammulated owl, and other comprehensive wildlife was conducted with similar results. No long term detrimental affects associated with the ventilation facility are anticipated. The 2011 survey identified a newly established goshawk nest in the lease modification area. This nest will continue to be monitored in future annual surveys, with additional lands to be monitored as mining advances in the North Lease modification area.

THREATENED & ENDANGERED SPECIES

No threatened or endangered species have been documented in studies surrounding the Winter Quarters Ventilation Facility that would prohibit construction. See Appendix A-2, Volume 2 and Appendix A-3, Volume 2 for reports.

Because no surface disturbance in planned for the North Lease Tract Area, no impact to endangered, threatened, or otherwise sensitive species should occur.

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JAN 0 3 2014
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Ch. 2 Sec. 2.12

2.12 LAND USE

INTRODUCTION

The Skyline property, located in the northern end of the Wasatch Plateau coal field, is the site of a system of underground coal mines developed by Coastal States Energy Company. The general area of the Skyline property lies within both Carbon and Emery counties in Townships 12, 13, and 14 South and Ranges 6 and 7 East, approximately seventy-eight air miles southeast of Salt Lake City, Utah and twenty-two air miles northwest of Price, Utah (refer to Figure 2.12-A). The portal and yard area are located in Eccles Canyon just west of and within the National Forest boundary line. A Utah State highway (SR-264) runs past the portal yard area east down Eccles Canyon to a coal loadout facility located at the canyon mouth. A conveyor system parallels the road from the mine to the loadout facility at the mouth of Eccles Canyon.

2.12.1 Existing Land Uses

Pre-mining land uses of the Skyline property and adjacent area consist of wildlife habitat, grazing, recreation, natural gas transmission and forestry.

Wildlife Habitat

A listing of wildlife thought to inhabit the permit area may be found in Table 2.9-1. A more detailed discussion of the wildlife may be found in the consultants report in Volume A-2.

Grazing

Seven (7) National Forest Sheep allotments are contained partially within the North lease area (refer to Map 2.12.1-1). The numbers of livestock and season of use data for each allotment are contained in Table 2.12.1-1.

Private lands east of the National Forest boundary are grazed by similar numbers of sheep both before and after 7/1 to 9/30 (U.S. Geological Survey, 1979).

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JAN 0 3 2014
Gas & Mining

TABLE 2.12.1-1

SHEEP ALLOTMENT DATA FOR THE FOUR ALLOTMENTS CONTAINED PARTIALLY WITHIN THE COAL LEASE AREA WITHIN THE NORTH LEASE AREA OFTHE SKYLINE MINE

Allotment	Sheep Numbers	Season of Use
Eccles Canyon	954	7/13 - 9/30
Granger Ridge	1062	7/1-9/30
Bean Ridge	1048	7/1-9/30
Mansion	565	7/1-10/10
East Gooseberry	269 (USFS land)	7/1-10/10
East Gooseberry	701 (Private land)	7/1-10/10
French Creek	1100	7/1-9/30

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JAN 0 3 2014

Div. of Oil, Gas & Mining

Ch 2. Sec 2.14

2.14 PRIME FARMLAND INVESTIGATION

A pre-application investigation was conducted by the Permittee to determine if any prime farmland would be impacted within the area of the proposed surface facilities in Eccles Canyon, and within Woods and Winter Quarters Canyons of the North Lease Tract. Based on the criteria in 30 CFR 783.27 paragraph (b), items 1 and 5, the Eccles Canyon area cannot be classified as prime farmland. This opinion is substantiated by Dr. Therom B. Hutchings, State Soil Scientist for the Soil Conservation Service (See Exhibit A).

A similar finding was made by the Natural Resources Conservation Service for the North Lease Tract (See Appendix Volume A-2). As shown in the Exhibit, "no prime farmland or farmland of statewide importance occurs on the recently acquired North Lease". Therefore, a negative determination for prime farmland classification of the Skyline project area is requested.

Leland Sassor of the Natural Resource Conservation Service (NRCS) was contacted in December 2008 concerning a Prime Farmland Determination in the location of the proposed Winter Quarters Ventilation Facility. Provided the information, he researched the area and confirmed (verbally) later that no Prime Farmland is identified in the area of the pad location. This is consistent with earlier determinations.
Joe Dyer of the NRCS was contacted in 2012 concerning a Prime Farmland Determination in the North Lease Modification expansion area. He determined no Prime Farmland exists in the lease expansion area (See Appendix Volume A-2 for his correspondence).

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Ch. 3 Sec. 3.3

3.3 TIMING OF OPERATION

The construction phase of the Skyline Mines project commenced in the summer of 1980. The construction phase included the dirtwork and installation of surface facilities and premining activities such as portal conveyor slope drivage. The construction phase continued during 1982 with the installation of surface facilities and portals. Construction is expected to continue throughout the life of the mines to support and maintain the operation.

No. 3 mine commenced coal production in October 1981. The total period of coal production is expected to be 38 years: life of Mine No.1, 30 years; life of Mine No.2, 27 years; and life of Mine No. 3, 38 years. Plate 3.3-1 shows Mine No. 1 (Upper O'connor Seam), Plate 3.3-2 shows Mine No. 3 (Lower O'Connor "A" and Flat Canyon Seams), and Plate 3.3-3 shows Mine No, 2 (Lower O'Connor B Seam. The timing and sequence of mining of any or all seams is dependent upon mining conditions. North Lease modifications are located on Plate 3.3-2.

Cessation of Operation

Prior to any temporary cessation of the Skyline mining operations for a period of 30 days or more, or as soon as it is determined that a temporary cessation will extend beyond 30 days, the Permittee will submit to the appropriate regulatory authority a notice of its intent to cease or abandon operations.

The Permittee's notice will state the exact number of surface acres and extent of subsurface strata which had been affected by underground or surface developments in the permit area prior to cessation or abandonment of mining. The cessation notice will also state the extent and kind of surface reclamation completed to date and the backfilling, regrading, revegetation, environmental monitoring, underground opening closures completed. It will also state water treatment activities the Permittee plans to continue during the temporary cessation period. During periods of temporary cessation, the Permittee will effectively support and maintain all surface access openings to underground operations, and secure surface facilities in areas

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JAN 0 3 2014
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Ch. 4 Sec. 4.11

impacts on the quantity of water in the area. When subsidence occurs, the subsidence cracks should seal rapidly, preventing deep percolation of water and subsequent loss of springs and other water sources. The location of a particular spring may change by a few feet, but no significant loss of water is anticipated as a result of mining. In over 30 years of mining since the mine opened in1981, inflows into the mine have varied due to changes in the geology from the underlying geology. Throughout the same time period the water quantity in the Blackhawk Formation has not recorded any adverse effects due to mining.

Although the Blackhawk Formation may be saturated above the mine workings, a relatively minor quantity of water is being encountered at each active face due to the impermeable nature of the formation and its inability to readily yield water. Water production at each active face is 10-15 gallons per minute with mine entries generally dry approximately 200 feet updip from the face. Flows of 1-2 gallons per minute occasionally continue from roof bolt holes.

Because of the westerly dip of the strata in the area, some subsurface water naturally moves from the Price River Basin towards Huntington Creek. However, because most water encountered in the mine would not be naturally discharged to the surface in the immediate area, no significant depletion will occur in the amount of water reaching either Huntington Creek or Eccles Creek.

Water quantity will remain generally unaffected due to the geological conditions in the mine area. Therefore, the Skyline Mines will have little or no adverse impact on the hydrological system.

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JAN 0 3 2014
Div. of Oil, Gas & Mining

Ch 4, Sec. 4.17

the Lower O'Connor "A"(See Section 4.17.3 Subsidence Prevention Measures). No buildings, pipelines, or maintained roads were found in the areas to be subsided as a result of implementing the North Lease mine plan. In 2010 the panels located north of the Winter Quarters Canyon graben (North-of-Graben), were rotated 90 degrees to maximize coal recovery further east that originally outlined in 2002. The modification did not impact any additional buildings, pipelines or maintained roads with the additional acreage being undermined. In 2013 a modification to the underground coal lease extended the mining area to the north to include the northern extent of Granger Ridge. A short jeep trail exists on the western portion of panel 14-Left where there is an estimated subsidence in the range of approximately 2 feet. The subsidence should not impact the trail, but it will be monitored for any necessary repairs.

As discussed in detail in Section 2.2 of this M&RP, the rocks in the North Lease area are in compression. The state of compression of the rocks in the North Lease area will likely allow the subsidence forces to be transmitted across fault and fracture planes thus resulting in uniform subsidence. Previous mining in Mine #3, where the rocks are also under compression, did not result in focused subsidence along faults or fractures. Indeed, in the southern portion of the mine permit area where the rocks are subjected to extensional forces, focused subsidence did not take place.

Drilling and field work conducted in the North Lease by Skyline geologist Mr. Mark Bunnell indicates the Castlegate Sandstone in the head of Winter Quarters and Woods Canyons in the permit area consist of two thin sandstone units, separated by slope-forming shale and siltstone. Because of the thinner, "ledge and slope" nature of the Castlegate in the permit area, the potential for subsidence-induced escarpment failures or landslides is minimal (3/3/05 M.Bunnell memo). As discussed in Section 4.17.3 and illustrated in Drawing 4.17.3-1A, the combination of geology, depth of cover, and mine plan should keep subsidence affects to a minimum (See Section 2.2 for detailed geology discussion). Drawings 4.17.1-1 and 4.17.1-2 illustrate that, if the maximum subsidence does occur, no reduction or significant alteration of the perennial stream flow should occur. This is due primarily to the existing

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JAN 0 3 2014
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renewable resources and surface improvements. The monitoring program secures adequate baseline data prior to any subsidence to quantify the existing surface renewable resources and surface improvements on and immediately adjacent to the permit area. The baseline data was established so that future programs of observation can be incorporated at regular intervals for comparison. The monitoring program establishes a system to locate, measure, and quantify the progressive and final effect of underground mining activities on the surface renewable resources and surface improvements. The system utilizes techniques which will provide a continuing record of change over time and an analytical method for location and measurement of a number of points over the permitted area. The continuum of data shall incorporate and be an extension of the baseline data.

A network of control monuments consistent with the desired photogrammetric map accuracy are being established over both the permit area and the immediate adjacent areas not expected to be disturbed by subsidence. The monuments are constructed as survey control points for monitoring the effects of subsidence on surface renewable resources and surface improvements (Map 4.17.5-1). The monuments are located and tied to a state plane coordinate system which is the same for both the surface and mine control surveys. This allows the surface survey to be superimposed over the subsurface mine workings. The monuments have the X, Y, and Z coordinates accurately measured and established by ground survey methods. During the photogrammetric exercise, control points are marked with rebar and white biodegradable sheeting. These will be reclaimed at the completion of the project as necessary.

The initial aerial photography covers the entire permit area and will be either color or black and white, flown at a scale such that elevations to within one foot vertically and horizontally ($\pm$ 0.5') can be attained by photogrammetric

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PHC Appendix L

Report of Spring and Seep

Survey and Baseline Monitoring Activities

In the Wife and Andrew Dairy Canyon Areas

At the Skyline Mine

September 2013

Summary of the Spring and Seep Survey and Baseline Monitoring Activities

In the Wife and Andrew Dairy Canyon Areas, 2011-2013

Introduction

As a condition for approval of a Lease Modification to extend mining at the Canyon Fuel Company, LLC Skyline Mine, additional baseline monitoring activities were necessary as the proposed mining extended slightly into the Fish Creek drainage potentially impacting the water resources in Wife Canyon and both the East and West Forks of Andrew Dairy Canyon. Baseline monitoring was initiated in 2011 and was continued through 2013. With the exception of the 2011 monitoring, data was collected by Skyline Mine personnel. The lease expansion area which covers approximately 770 acres is shown on Plate 1. The purpose of this document is to present and summarize the results of the spring and seep survey and baseline hydrologic monitoring activities.

Method of Study

Discharge Measurements

Discharge measurements for springs were typically performed using a calibrated container and stopwatch. Using an appropriately sized container, time-to-fill measurements were typically performed at least three (3) times at each location. An average time-to-fill value was used to calculate the reported discharge measurement. In cases of higher flow, a Marsh-McBirney, Inc. electromagnetic current flow meter was used.

Discharge Temperature Measurements

Temperature measurements were performed using a Taylor brand electronic digital thermometer. Discharge temperature measurements were collected as close to the spring as possible.

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JAN 0 3 2014

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Specific Conductance Measurements

Specific Conductance measurements were performed using a Extech EC400 conductivity meter with automatic temperature compensation. The instrument was calibrated weekly using traceable ASTM conductivity standard solutions.

pH Measurements

pH measurements were performed using Oakton pHTestr30 electronic pH meter with automatic temperature compensation. The instrument was calibrated weekly using traceable ASTM pH standard solutions.

Water Quality Laboratory Measurements

Water quality laboratory analyses were performed by Chemtech-Ford Analytical Laboratories of Murray, Utah.

Spring and Seep Field Survey

In conjunction with the spring and seep survey, coordination with the Utah Division of Water Rights (DWRi) personnel and the landowner was conducted to insure filed water rights and developed water sources were inspected. Water Rights personnel were invited to attend sampling on two (2) occasions, but schedules did not work out and they did not attend. Both Division of Oil, Gas, & Mining and DWRi personnel were able to visit many of the sites on September 13, 2013. The landowner participated in an inspection of all the proposed water monitoring sites.

The major surface-water drainages of Wife Canyon and both forks of Andrew Dairy Canyon were traversed on foot during the survey. The upland areas between the surface-water drainages were also traversed in selected locations or inspected from locations where the presence or absence of seeps or springs could be reasonably determined. Identified springs and seep locations were determined using a hand-held Garmin brand GPS. Locations were recorded in the field using UTM NAD 83 coordinate system. At each location, the discharge was measured and field water quality parameters were measured (temperature, pH, specific conductance, and flow). Subsequently, water chemistry analysis was conducted at five (5) of the six (6) locations identified.

Climate

A plot of the Palmer Hydrologic Drought Index for Utah Region 4 (which includes the Skyline Mine area) is presented in Figure 1. The PHDI is a monthly value generated by the National Climate Data Center (NCDC, 2012) that indicates wet and dry spells. The PHDI is calculated from several hydrologic parameters including precipitation, temperature, evapotransporation, soil water recharge, soil water loss, and runoff. Consequently, it is a useful tool for evaluating the relationship between climate, groundwater, and surface-water discharge data.

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JAN 0 3 2014

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Presentation of Data

Identified water source locations are shown on Plate 1. Geologic information is not identified on the map, but a check of the Utah Geologic Survey 30x60-minute mapping indicates the surface lithology is entirely the Blackhawk Formation with the exception of Quaternary alluvial deposits in the immediate vicinity of Fish Creek. Spring and Seep site details are located in Table 1. Discharge rate, and measured field water quality parameters are located in Table 2. Results of laboratory water chemistry analyses for selected monitoring sites are located in Appendix A.

Groundwater and Surface water Discharge and Chemical Composition

A number of monitoring events have been collected to date on the six (6) sites that have been identified at the time of this report. Skyline commits to continue to collect additional data and updating Tables 2 and 3 through the completion of the 2014 field season. Laboratory analysis for five (5) of the six (6) sites are attached to this report. Lower Andrew Dairy Creek, as it enters Fish Creek has been dry on every monitoring event and the stream does not appear to receive much flow at that location. In addition to the six (6) sites monitored, USGS monitoring station 09310500 located on Fish Creek has been included as Table 3.

Groundwater discharging from S25-32, (a.k.a Ledge Spring or NOG-32) is of the calcium-bicarbonate geochemical type with a slightly elevated magnesium concentration. This is similar to Spring WQ 36-1 located in Woods Canyon and WQ 3-6 in Winter Quarters Canyon. TDS concentrations monitored at S25-32 have been recorded from 278 mg/l to 380 mg/l. Discharge at the spring has ranged from approximately 3.6 to 12.1 gpm. The pH levels have ranged from 7.02 to 7.40.

Groundwater discharging from Water Right 91-3917 (to be named S26-1) is also of the calcium-bicarbonate geochemical type. This is similar to WQ 1-39 in Woods Canyon and WQ4-12 in Winter Quarters Canyon. TDS concentration at 91-3917 has been recorded at 308 mg/l in the fall and 276 mg/l to 316 mg/l in the spring. Discharge at the spring has ranged from approximately 0.29 to 2.8 gpm. The pH levels have ranged from 6.76 to 7.34.

Groundwater discharging from Wife Creek Spring (to be named S26-2) is also of the calcium-bicarbonate geochemical type. TDS concentrations at S26-2 have been recorded ranging from 328 mg/l to 340 mg/l. This is similar to WQ 1-36 in Woods Canyon. Discharge at the spring has ranged from 0.47 to 6.35 gpm. The pH levels have ranged from 7.3 to 7.48. A higher pH was noted in October 2012 (7.99) but the reading was collected too far down stream to be accurate.

Groundwater discharging from a spring located in the East Fork of Andrew Dairy canyon (S25-33) is also of the calcium-bicarbonate geochemical type. TDS concentrations at S25-33 have been recorded ranging from 360 mg/l to 412 mg/l. It is similar to WQ 3-43 located in Woods Canyon. Discharge at the spring has ranged from 0.96 to 5.0 gpm. The pH levels have ranged from 6.99 to 7.30.

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JAN 0 3 2014

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Surface water discharge locations include Wife Creek, Andrew Dairy Creek, and Fish Creek. Wife Creek (CS-26) has shown perennial flow as it enters Fish Creek, which is approximately 1.8 miles outside the proposed mining area. It is also of the calcium-bicarbonate geochemical type. TDS concentrations have been recorded ranging from 316 mg/l to 384 mg/l respectively. As far as water chemistry, Wife Creek is similar to CS-25 located in Woods Canyon. Flow rates in the creek have ranged from 0.45 to 40.4 gpm. The pH levels have ranged from 7.96 to 8.60. Andrew Dairy Creek at the confluence with Fish Creek has not recorded any flow in any of the sampling events. This is not surprising as the channel is not well-defined in the area with the bottom of the drainage being grass-lined. The confluence of Andrew Dairy Creek with Fish Creek is approximately 1.6 miles downstream of the proposed mining area. Fish Creek is has been monitored by USGS monitoring station 09310500 periodically from 1957 through 2012. TDS concentrations have ranged from 169 mg/l to 347 mg/l. It is similar to both CS-20 and CS-24 that are located in Winter Quarters. Flow rates have ranged from approximately 6 cu-ft/sec. to a high in 1984 of 1,220 cu-ft./sec. The pH levels have ranged from 7.7 to 8.6. For additional information on Fish Creek see Table 4.

Supplemental Spring and Seep Identifications

The proposed Lease Modification extension of mining plans indicate both Springs 91-3917(S26-1) and S25-32 are located on the margins of mining activity. Both have a minimum of 1,000 feet of overburden separating them from the mining activity. Wife Creek and the two forks of Andrew Dairy Creek are all similar in that they are intermittent in short sections. As defined, where in short reaches groundwater makes up the flow in the creek, the flow then goes subsurface after a short distance. Each of these drainages is otherwise ephemeral. None of the three drainages have perennial characteristics within the area proposed for mining.

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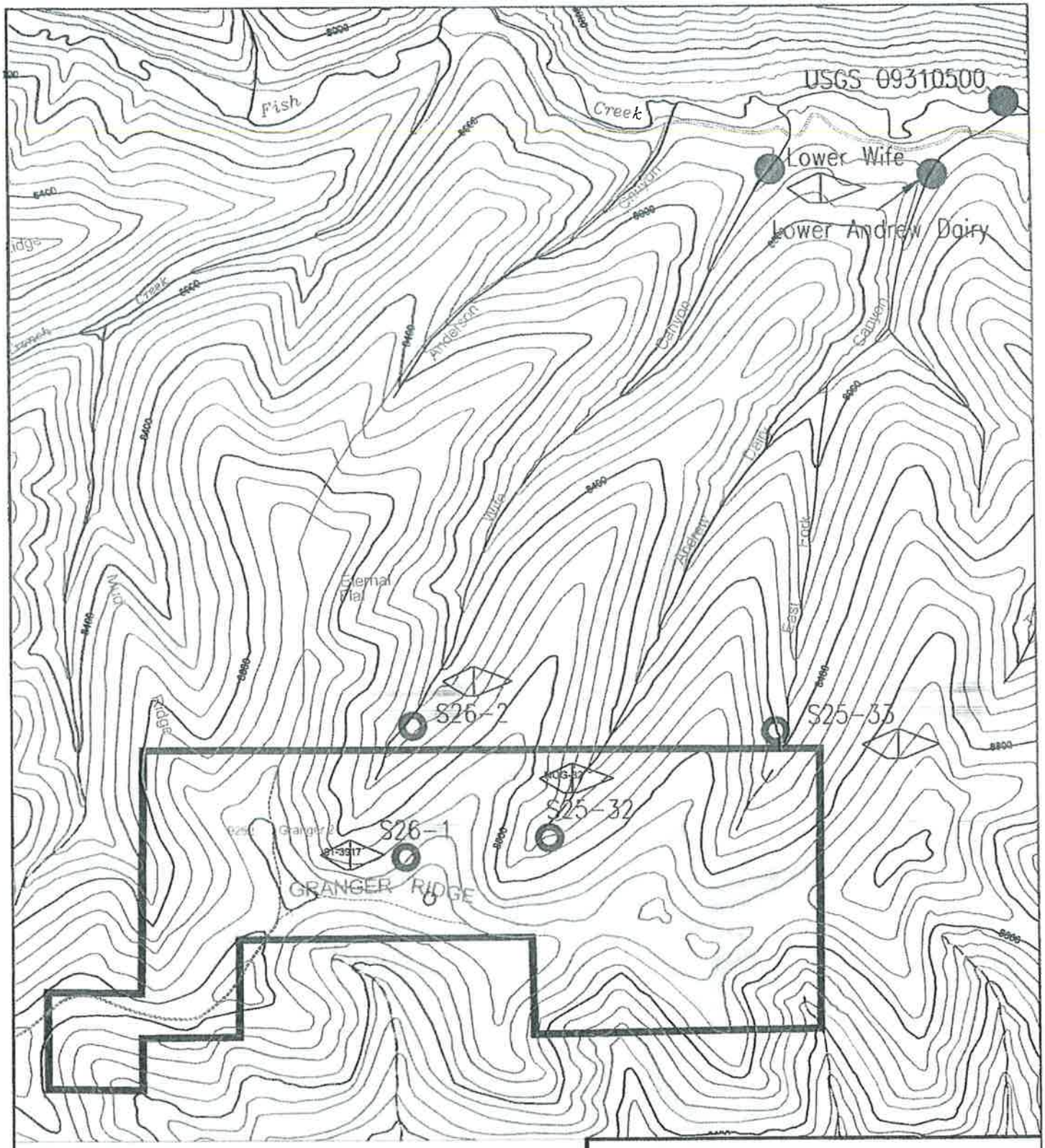

MODIFIED ADJACENT AREA

MODIFIED ADJACENT AREA

MODIFIED ADJACENT AREA

81-3917 SGW Dwellers

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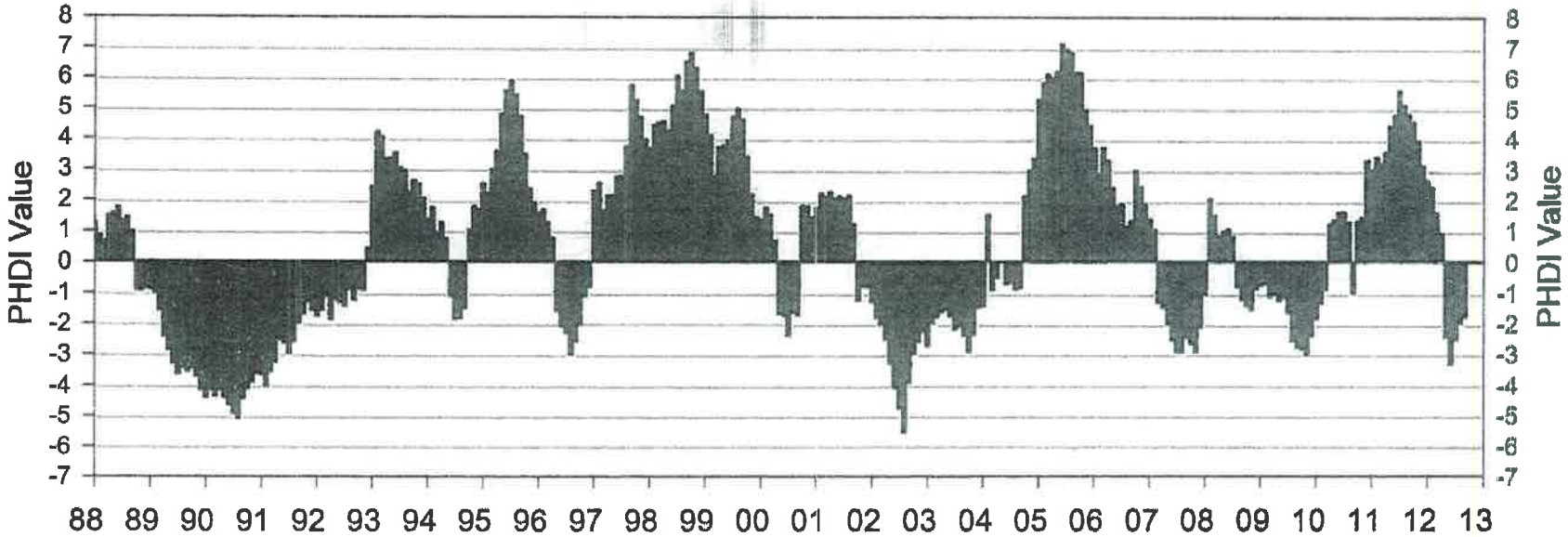
Stream and Spring locations near Lease Modification
Plate 1

Canyon Fuel Company, LLC
HC35 BOX 380, HELPER, UTAH 84526
435-448-8483
Skyline Mines

SCALE: None	DATE: 11/14/12	CK.BY: G. Galecki	REVISION: 0
DWG. NO.: Northern Baseline Map		DR.BY: GAG	
CAD FILE:			



-1 to -2 Mild Drought
-2 to -3 Moderate Drought
-3 to -4 Severe Drought
-4 to -5 Extreme Drought

1 to 2 Mild Wet Spell
2 to 3 Moderate Wet Spell
3 to 4 Severe Wet Spell
4 to 5 Extreme Wet Spell

Figure 1 Plot of Palmer Hydrologic Drought Index for Utah Region 4.

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Appendix A

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Table 1 - Monitoring Locations

Site	Alternate ID	Location UTM Zone 12, NAD83		Geology	Use
S25-32	NOG-32 Ledge Spring WR 91-1039	482147	4399558	Blackhawk Formation	Wildlife, stockwatering
S26-1	WR 91-3917	481506	4399682	Blackhawk Formation	Wildlife, stockwatering
Wife Creek Spring		481540	4400231	Blackhawk Formation	Wildlife, stockwatering
Wife Creek - Lower	WR 91-1043 WR 91-1044	483155	4402700	Blackhawk Formation	Wildlife, stockwatering
Andrew Dairy Creek - Lower	WR 91-1041	483887	4402683	Blackhawk Formation	Wildlife, stockwatering
E. Fork Andrew Dairy	WR 91-1040	483054	4400196	Blackhawk Formation	Wildlife, stockwatering

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Table 2 - Field Data

Site	Date	Time	Temp - C	pH	Sp. Cond	Flow
Springs						
S25-32 Spring	9/25/2011	13:30	5	7.39	562	12.1
	9/25/2012	13:00	5.4	7.23	573	4.93
	10/31/2012	13:10	4.8	7.02	586	3.61
	5/30/2013	10:30	3.6	7.25	587	12
	6/24/2013	12:36	4.7	7.4	613	6.88
	8/30/2013	11:30	4.8	7.1	602	5.45
S26-1 Spring	10/1/2012	14:00	5.8	6.76	499	0.33
	10/3/2012	12:00	5.9	7.05	494	0.33
	10/31/2012	14:00	4.9	7.16	495	0.33
	5/30/2013	11:30	2.7	7.34	423	2.8
	6/24/2013	12:00	3.6	7.21	429	1.23
	8/30/2013	9:00	6.5	7.00	478	0.29
S26-2 (Upper Wife Creek) Spring	10/3/2012	11:30	6	7.99	536	3.03
	5/30/2013	12:30	6	7.48	528	6.35
	6/24/2013	12:50	5.1	7.3	497	0.47
	8/30/2013	10:00	4.8	7.19	548	2.6
E. Fork Andrew Dairy (S25-33)	10/5/2012	12:40	8.5	7.08	714	0.96
	5/30/2013	9:30	4.6	7.27	647	5
	6/24/2013	13:39	6.6	7.3	667	2.58
	9/4/2013	10:00	7.9	6.99	672	1.25
Streams						
Lower Wife Creek (CS-26)	10/4/2012	13:00	6.1	8.11	565	7.1
	11/15/2012	14:30	0	7.96	625	0.45
	5/29/2013	13:00	9.6	8.02	571	34
	6/25/2013	9:39	7.5	8.6	573	40.4
	8/29/2013	13:50	11	7.96	557	10.2
Andrew Dairy Creek - Lower	10/4/2012	12:45				Dry
	11/15/2012	14:45				Dry
	5/29/2013	13:40				Dry
	6/25/2013	10:15				Dry
	8/29/2013	14:10				Dry

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JAN 0 3 2014

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CHEMTECH-FORD
LABORATORIES

Certificate of Analysis

Lab Sample No.: 1304647-01

Name: Canyon Fuel Co., Skyline Mine
Sample Site: S25-32
Comments:
Sample Matrix: Water

Sample Date: 5/30/2013 10:30 AM
Receipt Date: 6/5/2013 12:06 PM
Sampler: Gregg Galecki
Project:

Parameter	Sample Result	Minimum Reporting Limit	Units	Analysis Date/Time	Analyst Initials	Analytical Method	CAS No.	Flag
Calculations								
Hardness as CaCO3	292	1.3	mg/L	6/27/2013 9:46	AKL	SM 2340B		
Inorganic								
Acidity	ND	5.0	mg/L	6/13/2013 15:00	RMC	SM 2310 B		
Alkalinity - Bicarbonate (HCO3)	285	1.0	mg/L	6/21/2013 9:00	KRW	SM 2320 B	71-52-3	SPH
Alkalinity - Carbonate (CO3)	5.0	1.0	mg/L	6/21/2013 9:00	KRW	SM 2320 B	3812-32-6	SPH
Alkalinity - CO2	213	1.0	mg/L	6/21/2013 9:00	KRW	SM 2320 B	124-38-9	SPH
Alkalinity - Hydroxide (OH)	ND	1.0	mg/L	6/21/2013 9:00	KRW	SM 2320 B	14280-30-9	SPH
Alkalinity - Total (as CaCO3)	241	1.0	mg/L	6/21/2013 9:00	KRW	SM 2320 B	CTF10279	SPH
Nitrate + Nitrite, Total	1.0	0.1	mg/L	6/27/2013 9:00	KSL	SM 4500 NO3-F	CTF10163	
Phosphorus, Total as P	0.03	0.01	mg/L	6/26/2013 9:00	TSM	SM 4500 PB5E	7723-14-0	
Total Dissolved Solids (TDS)	368	20	mg/L	6/24/2013 0:00	RJ	SM 2540 C	CTF10226	SPH
Metals								
Boron, Dissolved	ND	0.05	mg/L	6/7/2013 18:18	PNM	EPA 200.7	7440-42-8	
Barium, Dissolved	0.008	0.005	mg/L	6/7/2013 18:18	PNM	EPA 200.7	7440-39-3	
Calcium, Dissolved	93.2	0.2	mg/L	6/26/2013 9:48	AKL	EPA 200.7	7440-43-9	
Calcium, Total	91.9	0.2	mg/L	6/27/2013 9:46	AKL	EPA 200.7	7440-43-9	
Copper, Dissolved	ND	0.005	mg/L	6/7/2013 18:18	PNM	EPA 200.7	7440-50-8	
Iron, Dissolved	ND	0.02	mg/L	6/7/2013 18:18	PNM	EPA 200.7	7439-89-6	
Lead, Dissolved	0.02	0.02	mg/L	6/7/2013 18:18	PNM	EPA 200.7	7439-92-1	
Magnesium, Total	15.3	0.2	mg/L	6/27/2013 9:46	AKL	EPA 200.7	7439-95-4	
Manganese, Dissolved	ND	0.005	mg/L	6/7/2013 18:18	PNM	EPA 200.7	7439-96-5	
Manganese, Total	ND	0.005	mg/L	6/27/2013 9:46	AKL	EPA 200.7	7439-96-5	
Potassium, Dissolved	1.0	0.5	mg/L	6/26/2013 9:48	AKL	EPA 200.7	7440-09-7	
Sodium, Dissolved	3.8	0.5	mg/L	6/26/2013 9:48	AKL	EPA 200.7	7440-23-5	

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CHEMTECH-FORD
LABORATORIES

Certificate of Analysis

Lab Sample No.: 1305485-01

Name:	Canyon Fuel Co., Skyline Mine	**Mine Code:**	21	**Sample Date:**	6/24/2013 12:36 PM
Sample Site:	S25-32			**Receipt Date:**	6/26/2013 10:05 AM
Comments:				**Sampler:**	Gregg Galecki
Sample Type:	Water			**Site No.:**	
Field pH:	7.4			**Field Temp. Deg. C :**	4.7
Field Flow g/Min.:	6.88			**Field Cond. umhos/cm:**	613

Parameter	Sample Result	Minimum Reporting Limit	Units	Analysis Date/Time	Analyst Initials	Analytical Method	Flag
Calculations							
Anions, Total	6.4	0.01	meq/L	7/10/2013 12:30	PNM	SM 1030 E	
Cation/Anion Balance	-1.2		%	7/10/2013 12:30	PNM	SM 1030 E	
Cations, Total	6.3	0.01	meq/L	7/10/2013 12:30	PNM	SM 1030 E	
Hardness, Total as CaCO3	303	1	mg/L	7/12/2013 8:00	PNM	SM 2340 B	
Inorganic							
Acidity	ND	5.0	mg/L	7/8/2013 9:30	KRW	SM 2310 B	
Alkalinity - Bicarbonate (HCO3)	341	1.0	mg/L	7/5/2013 18:32	KRW	SM 2320 B	
Alkalinity - Carbonate (CO3)	3.0	1.0	mg/L	7/5/2013 18:32	KRW	SM 2320 B	
Alkalinity - CO2	250	1.0	mg/L	7/5/2013 18:32	KRW	SM 2320 B	
Alkalinity - Hydroxide (OH)	ND	1.0	mg/L	7/5/2013 18:32	KRW	SM 2320 B	
Alkalinity - Total (as CaCO3)	285	1.0	mg/L	7/5/2013 18:32	KRW	SM 2320 B	
Chloride	8	1	mg/L	6/27/2013 10:00	TSM	EPA 300.0	
Nitrate + Nitrite, Total	1.0	0.1	mg/L	6/27/2013 13:00	KSL	SM 4500 NO3-F	
Phosphorus, Total as P	0.02	0.01	mg/L	7/1/2013 9:00	TSM	SM 4500 PB5E	
Sulfate	29	1	mg/L	6/27/2013 10:00	TSM	EPA 300.0	
Total Dissolved Solids (TDS)	360	20	mg/L	7/1/2013 0:00	RJ	SM 2540 C	
Total Suspended Solids (TSS)	6	4	mg/L	6/27/2013 14:19	IJH	SM 2540 D	
Metals							
Boron, Dissolved	ND	0.05	mg/L	7/9/2013 18:25	AKL	EPA 200.7	
Barium, Dissolved	0.008	0.005	mg/L	7/9/2013 18:25	AKL	EPA 200.7	
Calcium, Dissolved	94.6	0.2	mg/L	7/9/2013 18:25	AKL	EPA 200.7	
Calcium, Total	92.1	0.2	mg/L	6/30/2013 21:00	AKL	EPA 200.7	
Copper, Dissolved	ND	0.005	mg/L	7/9/2013 18:25	AKL	EPA 200.7	
Iron, Dissolved	ND	0.02	mg/L	7/9/2013 18:25	AKL	EPA 200.7	
Iron, Total	0.11	0.02	mg/L	6/30/2013 21:00	AKL	EPA 200.7	
Lead, Dissolved	ND	0.02	mg/L	7/9/2013 18:25	AKL	EPA 200.7	
Magnesium, Dissolved	16.3	0.2	mg/L	7/9/2013 18:25	AKL	EPA 200.7	
Magnesium, Total	15.6	0.2	mg/L	6/30/2013 21:00	AKL	EPA 200.7	
Manganese, Dissolved	ND	0.005	mg/L	7/9/2013 18:25	AKL	EPA 200.7	
Manganese, Total	0.005	0.005	mg/L	6/30/2013 21:00	AKL	EPA 200.7	
Potassium, Dissolved	1.1	0.5	mg/L	7/9/2013 18:25	AKL	EPA 200.7	
Sodium, Dissolved	3.9	0.5	mg/L	7/9/2013 18:25	AKL	EPA 200.7	

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LABORATORIES

Certificate of Analysis

Lab Sample No.: 1308484-04

Name:	Canyon Fuel Co., Skyline Mine	*Mine Code:* 21	*Sample Date:* 8/30/2013 11:30 AM
Sample Site:	S25-32		*Receipt Date:* 9/4/2013 1:00 PM
Comments:			*Sampler:* Gregg Galecki
Sample Type:	Water		*Site No.:*
Field pH:	7.10	*Field Temp. Deg. C:*	4.8
Field Flow g/Min.:	5.45	*Field Cond. umhos/cm:*	602

Parameter	Sample Result	Minimum Reporting Limit	Units	Analysis Date/Time	Analyst Initials	Analytical Method	Flag
Calculations							
Anions, Total	6.6	0.01	meq/L	9/11/2013 7:45	PNM	SM 1030 E	
Cation/Anion Balance	-0.8		%	9/11/2013 7:45	PNM	SM 1030 E	
Cations, Total	6.5	0.01	meq/L	9/11/2013 7:45	PNM	SM 1030 E	
Hardness, Total as CaCO3	314	1	mg/L	9/11/2013 7:45	PNM	SM 2340 B	
Inorganic							
Acidity	ND	5.0	mg/L	9/11/2013 16:30	KRW	SM 2310 B	
Alkalinity - Bicarbonate (HCO3)	345	1.0	mg/L	9/10/2013 22:02	KRW	SM 2320 B	
Alkalinity - Carbonate (CO3)	4.0	1.0	mg/L	9/10/2013 22:02	KRW	SM 2320 B	
Alkalinity - CO2	254	1.0	mg/L	9/10/2013 22:02	KRW	SM 2320 B	
Alkalinity - Hydroxide (OH)	ND	1.0	mg/L	9/10/2013 22:02	KRW	SM 2320 B	
Alkalinity - Total (as CaCO3)	289	1.0	mg/L	9/10/2013 22:02	KRW	SM 2320 B	
Chloride	7	1	mg/L	9/4/2013 16:00	TSM	EPA 300.0	
Nitrate + Nitrite, Total	1.0	0.1	mg/L	9/10/2013 16:00	TJS	SM 4500 NO3-F	
Phosphorus, Total as P	0.03	0.01	mg/L	9/10/2013 11:00	TSM	SM 4500 PB5E	
Sulfate	30	1	mg/L	9/4/2013 16:00	TSM	EPA 300.0	
Total Dissolved Solids (TDS)	380	20	mg/L	9/5/2013 11:26	JO	SM 2540 C	
Total Suspended Solids (TSS)	21	4	mg/L	9/5/2013 18:13	IJH	SM 2540 D	
Metals							
Boron, Dissolved	ND	0.05	mg/L	9/10/2013 12:14	TS	EPA 200.7	
Barium, Dissolved	0.010	0.005	mg/L	9/10/2013 12:14	TS	EPA 200.7	
Calcium, Dissolved	98.2	0.2	mg/L	9/10/2013 12:14	TS	EPA 200.7	
Calcium, Total	102	0.2	mg/L	9/6/2013 16:43	TS	EPA 200.7	
Copper, Dissolved	ND	0.005	mg/L	9/10/2013 12:14	TS	EPA 200.7	
Iron, Dissolved	0.10	0.02	mg/L	9/10/2013 12:14	TS	EPA 200.7	
Iron, Total	0.26	0.02	mg/L	9/6/2013 16:43	TS	EPA 200.7	
Lead, Dissolved	ND	0.02	mg/L	9/10/2013 12:14	TS	EPA 200.7	
Magnesium, Dissolved	16.8	0.2	mg/L	9/10/2013 12:14	TS	EPA 200.7	
Magnesium, Total	17.0	0.2	mg/L	9/6/2013 16:43	TS	EPA 200.7	
Manganese, Dissolved	0.005	0.005	mg/L	9/10/2013 12:14	TS	EPA 200.7	
Manganese, Total	ND	0.005	mg/L	9/6/2013 16:43	TS	EPA 200.7	
Potassium, Dissolved	1.2	0.5	mg/L	9/10/2013 12:14	TS	EPA 200.7	
Sodium, Dissolved	4.5	0.5	mg/L	9/10/2013 12:14	TS	EPA 200.7	

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LABORATORIES

Certificate of Analysis

Lab Sample No.: 1308484-02

Name:	Canyon Fuel Co., Skyline Mine	*Mine Code:* 21	*Sample Date:* 8/30/2013 9:00 AM
Sample Site:	S26-1		*Receipt Date:* 9/4/2013 1:00 PM
Comments:			*Sampler:* Gregg Galecki
Sample Type:	Water		*Site No.:*
Field pH:	7.00	*Field Temp. Deg. C:*	6.5
Field Flow g/Min.:	0.29	*Field Cond. umhos/cm:*	478

Parameter	Sample Result	Minimum Reporting Limit	Units	Analysis Date/Time	Analyst Initials	Analytical Method	Flag
Calculations							
Anions, Total	5.4	0.01	meq/L	9/11/2013 7:45	PNM	SM 1030 E	
Cation/Anion Balance	-1.4		%	9/11/2013 7:45	PNM	SM 1030 E	
Cations, Total	5.3	0.01	meq/L	9/11/2013 7:45	PNM	SM 1030 E	
Hardness, Total as CaCO3	255	1	mg/L	9/11/2013 7:45	PNM	SM 2340 B	
Inorganic							
Acidity	ND	5.0	mg/L	9/11/2013 16:30	KRW	SM 2310 B	
Alkalinity - Bicarbonate (HCO3)	295	1.0	mg/L	9/10/2013 22:02	KRW	SM 2320 B	
Alkalinity - Carbonate (CO3)	ND	1.0	mg/L	9/10/2013 22:02	KRW	SM 2320 B	
Alkalinity - CO2	213	1.0	mg/L	9/10/2013 22:02	KRW	SM 2320 B	
Alkalinity - Hydroxide (OH)	ND	1.0	mg/L	9/10/2013 22:02	KRW	SM 2320 B	
Alkalinity - Total (as CaCO3)	242	1.0	mg/L	9/10/2013 22:02	KRW	SM 2320 B	
Chloride	5	1	mg/L	9/4/2013 16:00	TSM	EPA 300.0	
Nitrate + Nitrite, Total	2.3	0.1	mg/L	9/10/2013 16:00	TJS	SM 4500 NO3-F	
Phosphorus, Total as P	0.04	0.01	mg/L	9/10/2013 11:00	TSM	SM 4500 PB5E	
Sulfate	20	1	mg/L	9/4/2013 16:00	TSM	EPA 300.0	
Total Dissolved Solids (TDS)	308	20	mg/L	9/5/2013 11:26	JO	SM 2540 C	
Total Suspended Solids (TSS)	ND	4	mg/L	9/5/2013 18:13	IJH	SM 2540 D	
Metals							
Boron, Dissolved	ND	0.05	mg/L	9/10/2013 12:06	TS	EPA 200.7	
Barium, Dissolved	0.008	0.005	mg/L	9/10/2013 12:06	TS	EPA 200.7	
Calcium, Dissolved	86.5	0.2	mg/L	9/10/2013 12:06	TS	EPA 200.7	
Calcium, Total	85.5	0.2	mg/L	9/16/2013 15:31	TS	EPA 200.7	
Copper, Dissolved	ND	0.005	mg/L	9/10/2013 12:06	TS	EPA 200.7	
Iron, Dissolved	ND	0.02	mg/L	9/10/2013 12:06	TS	EPA 200.7	
Iron, Total	0.04	0.02	mg/L	9/16/2013 15:31	TS	EPA 200.7	
Lead, Dissolved	ND	0.02	mg/L	9/10/2013 12:06	TS	EPA 200.7	
Magnesium, Dissolved	9.4	0.2	mg/L	9/10/2013 12:06	TS	EPA 200.7	
Magnesium, Total	9.9	0.2	mg/L	9/16/2013 15:31	TS	EPA 200.7	
Manganese, Dissolved	ND	0.005	mg/L	9/10/2013 12:06	TS	EPA 200.7	
Manganese, Total	ND	0.005	mg/L	9/16/2013 15:31	TS	EPA 200.7	
Potassium, Dissolved	1.0	0.5	mg/L	9/10/2013 12:06	TS	EPA 200.7	
Sodium, Dissolved	3.7	0.5	mg/L	9/10/2013 12:06	TS	EPA 200.7	

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Certificate of Analysis

Lab Sample No.: 1305485-03

Name:	Canyon Fuel Co., Skyline Mine	*Mine Code:*	21	*Sample Date:*	6/24/2013 12:00 PM
Sample Site:	S26-1			*Receipt Date:*	6/26/2013 10:05 AM
Comments:				*Sampler:*	Gregg Galecki
Sample Type:	Water			*Site No.:*	
Field pH:	7.21			*Field Temp. Deg. C :*	3.6
Field Flow g/Min.:	1.23			*Field Cond. umhos/cm:*	429

Parameter	Sample Result	Minimum Reporting Limit	Units	Analysis Date/Time	Analyst Initials	Analytical Method	Flag
Calculations							
Anions, Total	4.4	0.01	meq/L	7/10/2013 12:30	PNM	SM 1030 E	
Cation/Anion Balance	0.9		%	7/10/2013 12:30	PNM	SM 1030 E	
Cations, Total	4.5	0.01	meq/L	7/10/2013 12:30	PNM	SM 1030 E	
Hardness, Total as CaCO3	218	1	mg/L	7/12/2013 8:00	PNM	SM 2340 B	
Inorganic							
Acidity	ND	5.0	mg/L	7/8/2013 9:30	KRW	SM 2310 B	
Alkalinity - Bicarbonate (HCO3)	240	1.0	mg/L	7/5/2013 18:32	KRW	SM 2320 B	
Alkalinity - Carbonate (CO3)	ND	1.0	mg/L	7/5/2013 18:32	KRW	SM 2320 B	
Alkalinity - CO2	174	1.0	mg/L	7/5/2013 18:32	KRW	SM 2320 B	
Alkalinity - Hydroxide (OH)	ND	1.0	mg/L	7/5/2013 18:32	KRW	SM 2320 B	
Alkalinity - Total (as CaCO3)	197	1.0	mg/L	7/5/2013 18:32	KRW	SM 2320 B	
Chloride	4	1	mg/L	6/27/2013 10:00	TSM	EPA 300.0	
Nitrate + Nitrite, Total	2.4	0.5	mg/L	6/27/2013 13:00	KSL	SM 4500 NO3-F	
Phosphorus, Total as P	0.03	0.01	mg/L	7/1/2013 9:00	TSM	SM 4500 PB5E	
Sulfate	19	1	mg/L	6/27/2013 10:00	TSM	EPA 300.0	
Total Dissolved Solids (TDS)	276	20	mg/L	7/1/2013 0:00	RJ	SM 2540 C	
Total Suspended Solids (TSS)	ND	4	mg/L	6/27/2013 14:19	IJH	SM 2540 D	
Metals							
Boron, Dissolved	ND	0.05	mg/L	7/9/2013 18:33	AKL	EPA 200.7	
Barium, Dissolved	0.007	0.005	mg/L	7/9/2013 18:33	AKL	EPA 200.7	
Calcium, Dissolved	74.2	0.2	mg/L	7/9/2013 18:33	AKL	EPA 200.7	
Calcium, Total	73.9	0.2	mg/L	7/3/2013 12:07	ICP	EPA 200.7	
Copper, Dissolved	ND	0.005	mg/L	7/9/2013 18:33	AKL	EPA 200.7	
Iron, Dissolved	ND	0.02	mg/L	7/9/2013 18:33	AKL	EPA 200.7	
Iron, Total	ND	0.02	mg/L	7/3/2013 12:07	AKL	EPA 200.7	
Lead, Dissolved	ND	0.02	mg/L	7/9/2013 18:33	AKL	EPA 200.7	
Magnesium, Dissolved	8.0	0.2	mg/L	7/9/2013 18:33	AKL	EPA 200.7	
Magnesium, Total	8.0	0.2	mg/L	7/3/2013 12:07	ICP	EPA 200.7	
Manganese, Dissolved	ND	0.005	mg/L	7/9/2013 18:33	AKL	EPA 200.7	
Manganese, Total	ND	0.005	mg/L	7/3/2013 12:07	ICP	EPA 200.7	
Potassium, Dissolved	0.9	0.5	mg/L	7/9/2013 18:33	AKL	EPA 200.7	
Sodium, Dissolved	3.1	0.5	mg/L	7/9/2013 18:33	AKL	EPA 200.7	

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LABORATORIES

Certificate of Analysis

Lab Sample No.: 1304647-03

Name: Canyon Fuel Co., Skyline Mine
Sample Site: S26-1
Comments:
Sample Matrix: Water

Sample Date: 5/30/2013 11:30 AM
Receipt Date: 6/5/2013 12:06 PM
Sampler: Gregg Galecki
Project:

Parameter	Sample Result	Minimum Reporting Limit	Units	Analysis Date/Time	Analyst Initials	Analytical Method	CAS No.	Flag
Calculations								
Hardness as CaCO3	202	1.3	mg/L	6/27/2013 9:50	AKL	SM 2340B		
Inorganic								
Acidity	ND	5.0	mg/L	6/13/2013 15:00	RMC	SM 2310 B		
Alkalinity - Bicarbonate (HCO3)	248	1.0	mg/L	6/21/2013 9:00	KRW	SM 2320 B	71-52-3	SPH
Alkalinity - Carbonate (CO3)	ND	1.0	mg/L	6/21/2013 9:00	KRW	SM 2320 B	3812-32-6	SPH
Alkalinity - CO2	183	1.0	mg/L	6/21/2013 9:00	KRW	SM 2320 B	124-38-9	SPH
Alkalinity - Hydroxide (OH)	ND	1.0	mg/L	6/21/2013 9:00	KRW	SM 2320 B	14280-30-9	SPH
Alkalinity - Total (as CaCO3)	203	1.0	mg/L	6/21/2013 9:00	KRW	SM 2320 B	CTF10279	SPH
Nitrate + Nitrite, Total	3.6	0.2	mg/L	6/27/2013 9:00	KSL	SM 4500 NO3-F	CTF10163	
Phosphorus, Total as P	0.05	0.01	mg/L	6/26/2013 9:00	TSM	SM 4500 PB5E	7723-14-0	
Total Dissolved Solids (TDS)	316	20	mg/L	6/24/2013 0:00	RJ	SM 2540 C	CTF10226	SPH
Metals								
Boron, Dissolved	ND	0.05	mg/L	6/13/2013 22:21	PNM	EPA 200.7	7440-42-8	
Barium, Dissolved	0.005	0.005	mg/L	6/13/2013 22:21	PNM	EPA 200.7	7440-39-3	
Calcium, Dissolved	70.3	0.2	mg/L	6/26/2013 9:55	AKL	EPA 200.7	7440-43-9	
Calcium, Total	69.0	0.2	mg/L	6/27/2013 9:50	AKL	EPA 200.7	7440-43-9	
Copper, Dissolved	ND	0.005	mg/L	6/13/2013 22:21	PNM	EPA 200.7	7440-50-8	
Iron, Dissolved	ND	0.02	mg/L	6/13/2013 22:21	PNM	EPA 200.7	7439-89-6	
Lead, Dissolved	ND	0.02	mg/L	6/13/2013 22:21	PNM	EPA 200.7	7439-92-1	
Magnesium, Total	7.1	0.2	mg/L	6/27/2013 9:50	AKL	EPA 200.7	7439-95-4	
Manganese, Dissolved	ND	0.005	mg/L	6/13/2013 22:21	PNM	EPA 200.7	7439-96-5	
Manganese, Total	ND	0.005	mg/L	6/27/2013 9:50	AKL	EPA 200.7	7439-96-5	
Potassium, Dissolved	0.7	0.5	mg/L	6/26/2013 9:55	AKL	EPA 200.7	7440-09-7	
Sodium, Dissolved	3.4	0.5	mg/L	6/26/2013 9:55	AKL	EPA 200.7	7440-23-5	

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CHEMTECH-FORD
LABORATORIES

Certificate of Analysis

Lab Sample No.: 1304647-04

Name:	Canyon Fuel Co., Skyline Mine	**Sample Date:**	5/30/2013 12:30 PM
Sample Site:	Upper Wife S26-2	**Receipt Date:**	6/5/2013 12:06 PM
Comments:		**Sampler:**	Gregg Galecki
Sample Matrix:	Water	**Project:**	

Parameter	Sample Result	Minimum Reporting Limit	Units	Analysis Date/Time	Analyst Initials	Analytical Method	CAS No.	Flag
Calculations								
Hardness as CaCO3	266	1.3	mg/L	7/2/2013 13:08	AKL	SM 2340B		
Inorganic								
Acidity	ND	5.0	mg/L	6/13/2013 15:00	RMC	SM 2310 B		
Alkalinity - Bicarbonate (HCO3)	348	1.0	mg/L	6/21/2013 9:00	KRW	SM 2320 B	71-52-3	SPH
Alkalinity - Carbonate (CO3)	ND	1.0	mg/L	6/21/2013 9:00	KRW	SM 2320 B	3812-32-6	SPH
Alkalinity - CO2	255	1.0	mg/L	6/21/2013 9:00	KRW	SM 2320 B	124-38-9	SPH
Alkalinity - Hydroxide (OH)	ND	1.0	mg/L	6/21/2013 9:00	KRW	SM 2320 B	14280-30-9	SPH
Alkalinity - Total (as CaCO3)	286	1.0	mg/L	6/21/2013 9:00	KRW	SM 2320 B	CTF10279	SPH
Nitrate + Nitrite, Total	0.8	0.1	mg/L	6/27/2013 9:00	KSL	SM 4500 NO3-F	CTF10163	
Phosphorus, Total as P	0.04	0.01	mg/L	6/26/2013 9:00	TSM	SM 4500 PB5E	7723-14-0	
Total Dissolved Solids (TDS)	328	20	mg/L	6/24/2013 0:00	RJ	SM 2540 C	CTF10226	SPH
Metals								
Boron, Dissolved	ND	0.05	mg/L	6/13/2013 22:25	PNM	EPA 200.7	7440-42-8	
Barium, Dissolved	0.008	0.005	mg/L	6/13/2013 22:25	PNM	EPA 200.7	7440-39-3	
Calcium, Dissolved	90.2	0.2	mg/L	6/26/2013 9:59	AKL	EPA 200.7	7440-43-9	
Calcium, Total	85.5	0.2	mg/L	7/2/2013 13:08	AKL	EPA 200.7	7440-43-9	
Copper, Dissolved	ND	0.005	mg/L	6/13/2013 22:25	PNM	EPA 200.7	7440-50-8	
Iron, Dissolved	ND	0.02	mg/L	6/13/2013 22:25	PNM	EPA 200.7	7439-89-6	
Lead, Dissolved	ND	0.02	mg/L	6/13/2013 22:25	PNM	EPA 200.7	7439-92-1	
Magnesium, Total	12.7	0.2	mg/L	7/2/2013 13:08	AKL	EPA 200.7	7439-95-4	
Manganese, Dissolved	0.006	0.005	mg/L	6/13/2013 22:25	PNM	EPA 200.7	7439-96-5	
Manganese, Total	0.013	0.005	mg/L	7/2/2013 13:08	AKL	EPA 200.7	7439-96-5	
Potassium, Dissolved	1.0	0.5	mg/L	6/26/2013 9:59	AKL	EPA 200.7	7440-09-7	
Sodium, Dissolved	3.7	0.5	mg/L	6/26/2013 9:59	AKL	EPA 200.7	7440-23-5	

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AMENDED REPORT

CHEMTECH-FORD
LABORATORIES

Certificate of Analysis

Lab Sample No.: 1305485-04

Name:	Canyon Fuel Co., Skyline Mine	**Mine Code:**	21	**Sample Date:**	6/24/2013 12:50 PM
Sample Site:	Wife Spring S26-2			**Receipt Date:**	6/26/2013 10:05 AM
Comments:				**Sampler:**	Gregg Galecki
Sample Type:	Water			**Site No.:**	
Field pH:	7.30			**Field Temp. Deg. C :**	5.1
Field Flow g/Min.:	0.47			**Field Cond. umhos/cm:**	497

Parameter	Sample Result	Minimum Reporting Limit	Units	Analysis Date/Time	Analyst Initials	Analytical Method	Flag
Calculations							
Anions, Total	5.8	0.01	meq/L	7/10/2013 12:30	PNM	SM 1030 E	
Cation/Anion Balance	0.0		%	7/10/2013 12:30	PNM	SM 1030 E	
Cations, Total	5.5	0.01	meq/L	7/10/2013 12:30	PNM	SM 1030 E	
Hardness, Total as CaCO3	264	1	mg/L	7/12/2013 8:00	PNM	SM 2340 B	
Inorganic							
Acidity	ND	5.0	mg/L	7/8/2013 9:30	KRW	SM 2310 B	
Alkalinity - Bicarbonate (HCO3)	322	1.0	mg/L	7/5/2013 18:32	KRW	SM 2320 B	
Alkalinity - Carbonate (CO3)	ND	1.0	mg/L	7/5/2013 18:32	KRW	SM 2320 B	
Alkalinity - CO2	233	1.0	mg/L	7/5/2013 18:32	KRW	SM 2320 B	
Alkalinity - Hydroxide (OH)	ND	1.0	mg/L	7/5/2013 18:32	KRW	SM 2320 B	
Alkalinity - Total (as CaCO3)	265	1.0	mg/L	7/5/2013 18:32	KRW	SM 2320 B	
Chloride	4	1	mg/L	6/27/2013 10:00	TSM	EPA 300.0	
Nitrate + Nitrite, Total	0.8	0.1	mg/L	6/27/2013 13:00	KSL	SM 4500 NO3-F	
Phosphorus, Total as P	0.04	0.01	mg/L	7/1/2013 9:00	TSM	SM 4500 PB5E	
Sulfate	19	1	mg/L	6/27/2013 10:00	TSM	EPA 300.0	
Total Dissolved Solids (TDS)	320	20	mg/L	7/1/2013 0:00	RJ	SM 2540 C	
Total Suspended Solids (TSS)	21	4	mg/L	6/27/2013 14:19	LJH	SM 2540 D	
Metals							
Boron, Dissolved	ND	0.05	mg/L	7/9/2013 18:37	AKL	EPA 200.7	
Barium, Dissolved	0.008	0.005	mg/L	7/9/2013 18:37	AKL	EPA 200.7	
Calcium, Dissolved	85.0	0.2	mg/L	7/9/2013 18:37	AKL	EPA 200.7	
Calcium, Total	93.9	0.2	mg/L	7/3/2013 12:11	ICP	EPA 200.7	
Copper, Dissolved	ND	0.005	mg/L	7/9/2013 18:37	AKL	EPA 200.7	
Iron, Dissolved	ND	0.02	mg/L	7/9/2013 18:37	AKL	EPA 200.7	
Iron, Total	0.05	0.02	mg/L	7/3/2013 12:11	AKL	EPA 200.7	
Lead, Dissolved	ND	0.02	mg/L	7/9/2013 18:37	AKL	EPA 200.7	
Magnesium, Dissolved	12.7	0.2	mg/L	7/9/2013 18:37	AKL	EPA 200.7	
Magnesium, Total	14.0	0.2	mg/L	7/3/2013 12:11	ICP	EPA 200.7	
Manganese, Dissolved	ND	0.005	mg/L	7/9/2013 18:37	AKL	EPA 200.7	
Manganese, Total	0.005	0.005	mg/L	7/3/2013 12:11	ICP	EPA 200.7	
Potassium, Dissolved	1.1	0.5	mg/L	7/9/2013 18:37	AKL	EPA 200.7	
Sodium, Dissolved	3.5	0.5	mg/L	7/9/2013 18:37	AKL	EPA 200.7	

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Certificate of Analysis

Lab Sample No.: 1308484-03

Name:	Canyon Fuel Co., Skyline Mine	*Mine Code:* 21	*Sample Date:* 8/30/2013 10:00 AM
Sample Site:	Wife Spring S26-2		*Receipt Date:* 9/4/2013 1:00 PM
Comments:			*Sampler:* Gregg Galecki
Sample Type:	Water		*Site No.:*
Field pH:	7.19	*Field Temp. Deg. C:*	4.8
Field Flow g/Min.:	2.6	*Field Cond. umhos/cm:*	548

Parameter	Sample Result	Minimum Reporting Limit	Units	Analysis Date/Time	Analyst Initials	Analytical Method	Flag
Calculations							
Anions, Total	6.3	0.01	meq/L	9/11/2013 7:45	PNM	SM 1030 E	
Cation/Anion Balance	-4.3		%	9/11/2013 7:45	PNM	SM 1030 E	
Cations, Total	5.8	0.01	meq/L	9/11/2013 7:45	PNM	SM 1030 E	
Hardness, Total as CaCO3	279	1	mg/L	9/11/2013 7:45	PNM	SM 2340 B	
Inorganic							
Acidity	ND	5.0	mg/L	9/11/2013 16:30	KRW	SM 2310 B	
Alkalinity - Bicarbonate (HCO3)	349	1.0	mg/L	9/10/2013 22:02	KRW	SM 2320 B	
Alkalinity - Carbonate (CO3)	2.0	1.0	mg/L	9/10/2013 22:02	KRW	SM 2320 B	
Alkalinity - CO2	255	1.0	mg/L	9/10/2013 22:02	KRW	SM 2320 B	
Alkalinity - Hydroxide (OH)	ND	1.0	mg/L	9/10/2013 22:02	KRW	SM 2320 B	
Alkalinity - Total (as CaCO3)	290	1.0	mg/L	9/10/2013 22:02	KRW	SM 2320 B	
Chloride	4	1	mg/L	9/4/2013 16:00	TSM	EPA 300.0	
Nitrate + Nitrite, Total	0.9	0.1	mg/L	9/10/2013 16:00	TJS	SM 4500 NO3-F	
Phosphorus, Total as P	0.02	0.01	mg/L	9/10/2013 11:00	TSM	SM 4500 PB5E	
Sulfate	19	1	mg/L	9/4/2013 16:00	TSM	EPA 300.0	
Total Dissolved Solids (TDS)	340	20	mg/L	9/5/2013 11:26	JO	SM 2540 C	
Total Suspended Solids (TSS)	40	4	mg/L	9/5/2013 18:13	IJH	SM 2540 D	
Metals							
Boron, Dissolved	ND	0.05	mg/L	9/10/2013 12:10	TS	EPA 200.7	
Barium, Dissolved	0.009	0.005	mg/L	9/10/2013 12:10	TS	EPA 200.7	
Calcium, Dissolved	89.8	0.2	mg/L	9/10/2013 12:10	TS	EPA 200.7	
Calcium, Total	94.1	0.2	mg/L	9/6/2013 16:39	TS	EPA 200.7	
Copper, Dissolved	ND	0.005	mg/L	9/10/2013 12:10	TS	EPA 200.7	
Iron, Dissolved	ND	0.02	mg/L	9/10/2013 12:10	TS	EPA 200.7	
Iron, Total	0.13	0.02	mg/L	9/6/2013 16:39	TS	EPA 200.7	
Lead, Dissolved	ND	0.02	mg/L	9/10/2013 12:10	TS	EPA 200.7	
Magnesium, Dissolved	13.3	0.2	mg/L	9/10/2013 12:10	TS	EPA 200.7	
Magnesium, Total	13.4	0.2	mg/L	9/6/2013 16:39	TS	EPA 200.7	
Manganese, Dissolved	ND	0.005	mg/L	9/10/2013 12:10	TS	EPA 200.7	
Manganese, Total	ND	0.005	mg/L	9/6/2013 16:39	TS	EPA 200.7	
Potassium, Dissolved	1.1	0.5	mg/L	9/10/2013 12:10	TS	EPA 200.7	
Sodium, Dissolved	4.2	0.5	mg/L	9/10/2013 12:10	TS	EPA 200.7	

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LABORATORIES

Certificate of Analysis

Lab Sample No.: 1304647-02

Name:	Canyon Fuel Co., Skyline Mine	***Sample Date:***	5/30/2013 9 30 AM
Sample Site:	E. Fork Dairy S25-33	***Receipt Date:***	6/5/2013 12 06 PM
Comments:		***Sampler:***	Gregg Galecki
Sample Matrix:	Water	***Project:***	

Parameter	Sample Result	Minimum Reporting Limit	Units	Analysis Date/Time	Analyst Initials	Analytical Method	CAS No.	Flag
Calculations								
Hardness as CaCO3	314	1 3	mg/L	7/2/2013 13 04	AKL	SM 2340B		
Inorganic								
Acidity	ND	5 0	mg/L	6/13/2013 15:00	RMC	SM 2310 B		
Alkalinity - Bicarbonate (HCO3)	381	1 0	mg/L	6/21/2013 9 00	KRW	SM 2320 B	71-52-3	SPH
Alkalinity - Carbonate (CO3)	ND	1 0	mg/L	6/21/2013 9.00	KRW	SM 2320 B	3812-32-6	SPH
Alkalinity - CO2	278	1 0	mg/L	6/21/2013 9 00	KRW	SM 2320 B	124-38-9	SPH
Alkalinity - Hydroxide (OH)	ND	1 0	mg/L	6/21/2013 9 00	KRW	SM 2320 B	14280-30-9	SPH
Alkalinity - Total (as CaCO3)	313	1 0	mg/L	6/21/2013 9 00	KRW	SM 2320 B	CTF10279	SPH
Nitrate + Nitrite, Total	2 0	0 1	mg/L	6/27/2013 9 00	KSL	SM 4500 NO3-F	CTF10163	
Phosphorus, Total as P	0 20	0.01	mg/L	6/26/2013 9 00	TSM	SM 4500 PB5E	7723-14-0	
Total Dissolved Solids (TDS)	412	20	mg/L	6/24/2013 0 00	RJ	SM 2540 C	CTF10226	SPH
Metals								
Boron, Dissolved	ND	0.05	mg/L	6/7/2013 18 22	PNM	EPA 200 7	7440-42-8	
Barium, Dissolved	0 013	0 005	mg/L	6/7/2013 18 22	PNM	EPA 200 7	7440-39-3	
Calcium, Dissolved	101	0 2	mg/L	6/26/2013 9 52	AKL	EPA 200 7	7440-43-9	
Calcium, Total	95 2	0 2	mg/L	7/2/2013 13 04	AKL	EPA 200 7	7440-43-9	
Copper, Dissolved	ND	0 005	mg/L	6/7/2013 18:22	PNM	EPA 200 7	7440-50-8	
Iron, Dissolved	0 02	0 02	mg/L	6/7/2013 18 22	PNM	EPA 200 7	7439-89-6	
Lead, Dissolved	ND	0 02	mg/L	6/7/2013 18:22	PNM	EPA 200 7	7439-92-1	
Magnesium, Total	18 6	0 2	mg/L	7/2/2013 13 04	AKL	EPA 200 7	7439-95-4	
Manganese, Dissolved	0 015	0 005	mg/L	6/7/2013 18:22	PNM	EPA 200 7	7439-96-5	
Manganese, Total	0 066	0 005	mg/L	7/2/2013 13 04	AKL	EPA 200 7	7439-96-5	
Potassium, Dissolved	1 4	0 5	mg/L	6/26/2013 9 52	AKL	EPA 200 7	7440-09-7	
Sodium, Dissolved	6 2	0 5	mg/L	6/26/2013 9 52	AKL	EPA 200 7	7440-23-5	

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Certificate of Analysis

Lab Sample No.: 1305485-02

Name:	Canyon Fuel Co., Skyline Mine	**Mine Code:** 21	**Sample Date:** 6/24/2013 1:39 PM
Sample Site:	E. Fork Dairy 525-33		**Receipt Date:** 6/26/2013 10:05 AM
Comments:			**Sampler:** Gregg Galecki
Sample Type:	Water		**Site No.:**
Field pH:	7.3		**Field Temp. Deg. C:** 6.6
Field Flow g/Min.:	2.58		**Field Cond. umhos/cm:** 667

Parameter	Sample Result	Minimum Reporting Limit	Units	Analysis Date/Time	Analyst Initials	Analytical Method	Flag
Calculations							
Anions, Total	6.8	0.01	meq/L	7/10/2013 12:30	PNM	SM 1030 E	
Cation/Anion Balance	-0.3		%	7/10/2013 12:30	PNM	SM 1030 E	
Cations, Total	6.7	0.01	meq/L	7/10/2013 12:30	PNM	SM 1030 E	
Hardness, Total as CaCO3	322	1	mg/L	7/12/2013 8:00	PNM	SM 2340 B	
Inorganic							
Acidity	ND	5.0	mg/L	7/8/2013 9:30	KRW	SM 2310 B	
Alkalinity - Bicarbonate (HCO3)	343	1.0	mg/L	7/5/2013 18:32	KRW	SM 2320 B	
Alkalinity - Carbonate (CO3)	3.0	1.0	mg/L	7/5/2013 18:32	KRW	SM 2320 B	
Alkalinity - CO2	252	1.0	mg/L	7/5/2013 18:32	KRW	SM 2320 B	
Alkalinity - Hydroxide (OH)	ND	1.0	mg/L	7/5/2013 18:32	KRW	SM 2320 B	
Alkalinity - Total (as CaCO3)	286	1.0	mg/L	7/5/2013 18:32	KRW	SM 2320 B	
Chloride	12	1	mg/L	6/27/2013 10:00	TSM	EPA 300.0	
Nitrate + Nitrite, Total	2.5	0.5	mg/L	6/27/2013 13:00	KSL	SM 4500 NO3-F	
Phosphorus, Total as P	0.05	0.01	mg/L	7/1/2013 9:00	TSM	SM 4500 PB5E	
Sulfate	39	1	mg/L	6/27/2013 10:00	TSM	EPA 300.0	
Total Dissolved Solids (TDS)	384	20	mg/L	7/1/2013 0:00	RJ	SM 2540 C	
Total Suspended Solids (TSS)	45	7	mg/L	6/27/2013 14:19	IJH	SM 2540 D	
Metals							
Boron, Dissolved	ND	0.05	mg/L	7/9/2013 18:29	AKL	EPA 200.7	
Barium, Dissolved	0.013	0.005	mg/L	7/9/2013 18:29	AKL	EPA 200.7	
Calcium, Dissolved	97.5	0.2	mg/L	7/9/2013 18:29	AKL	EPA 200.7	
Calcium, Total	99.5	0.2	mg/L	6/30/2013 21:04	AKL	EPA 200.7	
Copper, Dissolved	ND	0.005	mg/L	7/9/2013 18:29	AKL	EPA 200.7	
Iron, Dissolved	ND	0.02	mg/L	7/9/2013 18:29	AKL	EPA 200.7	
Iron, Total	0.43	0.02	mg/L	6/30/2013 21:04	AKL	EPA 200.7	
Lead, Dissolved	0.02	0.02	mg/L	7/9/2013 18:29	AKL	EPA 200.7	
Magnesium, Dissolved	19.0	0.2	mg/L	7/9/2013 18:29	AKL	EPA 200.7	
Magnesium, Total	19.4	0.2	mg/L	6/30/2013 21:04	AKL	EPA 200.7	
Manganese, Dissolved	ND	0.005	mg/L	7/9/2013 18:29	AKL	EPA 200.7	
Manganese, Total	0.018	0.005	mg/L	6/30/2013 21:04	AKL	EPA 200.7	
Potassium, Dissolved	1.5	0.5	mg/L	7/9/2013 18:29	AKL	EPA 200.7	
Sodium, Dissolved	6.1	0.5	mg/L	7/9/2013 18:29	AKL	EPA 200.7	

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Certificate of Analysis

Lab Sample No.: 1308573-01

Name:	Canyon Fuel Co., Skyline Mine	*Mine Code:* 21	*Sample Date:* 9/4/2013 10:00 AM
Sample Site:	E Fork Dairy S25-33		*Receipt Date:* 9/5/2013 12:00 PM
Comments:			*Sampler:* Gregg Galecki
Sample Type:	Water		*Site No.:*
Field pH:	6.99		*Field Temp. Deg. C:* 7.9
Field Flow g/Min.:	1.25		*Field Cond. umhos/cm:* 672

Parameter	Sample Result	Minimum Reporting Limit	Units	Analysis Date/Time	Analyst Initials	Analytical Method	Flag
Calculations							
Anions, Total	7.3	0.01	meq/L	9/20/2013 9:00	PNM	SM 1030 E	
Cation/Anion Balance	-3.2		%	9/20/2013 9:00	PNM	SM 1030 E	
Cations, Total	6.8	0.01	meq/L	9/20/2013 9:00	PNM	SM 1030 E	
Hardness, Total as CaCO3	326	1	mg/L	9/20/2013 9:00	PNM	SM 2340 B	
Inorganic							
Acidity	ND	5.0	mg/L	9/11/2013 16:30	KRW	SM 2310 B	
Alkalinity - Bicarbonate (HCO3)	376	1.0	mg/L	9/12/2013 9:37	KRW	SM 2320 B	
Alkalinity - Carbonate (CO3)	ND	1.0	mg/L	9/12/2013 9:37	KRW	SM 2320 B	
Alkalinity - CO2	276	1.0	mg/L	9/12/2013 9:37	KRW	SM 2320 B	
Alkalinity - Hydroxide (OH)	ND	1.0	mg/L	9/12/2013 9:37	KRW	SM 2320 B	
Alkalinity - Total (as CaCO3)	309	1.0	mg/L	9/12/2013 9:37	KRW	SM 2320 B	
Chloride	12	1	mg/L	9/6/2013 17:00	TSM	EPA 300.0	
Nitrate + Nitrite, Total	2.2	0.1	mg/L	9/10/2013 16:00	TJS	SM 4500 NO3-F	
Phosphorus, Total as P	0.02	0.01	mg/L	9/10/2013 11:00	TSM	SM 4500 PB5E	
Sulfate	37	1	mg/L	9/6/2013 17:00	TSM	EPA 300.0	
Total Dissolved Solids (TDS)	360	20	mg/L	9/9/2013 10:59	RMC	SM 2540 C	
Total Suspended Solids (TSS)	ND	4	mg/L	9/8/2013 9:36	IJH	SM 2540 D	
Metals							
Boron, Dissolved	0.05	0.05	mg/L	9/20/2013 15:08	TS	EPA 200.7	
Barium, Dissolved	0.014	0.005	mg/L	9/19/2013 17:59	TS	EPA 200.7	
Calcium, Dissolved	99.1	0.2	mg/L	9/19/2013 17:59	TS	EPA 200.7	
Calcium, Total	103	0.2	mg/L	9/20/2013 12:58	TS	EPA 200.7	
Copper, Dissolved	ND	0.005	mg/L	9/19/2013 17:59	TS	EPA 200.7	
Iron, Dissolved	ND	0.02	mg/L	9/19/2013 17:59	TS	EPA 200.7	
Iron, Total	ND	0.02	mg/L	9/20/2013 12:58	TS	EPA 200.7	
Lead, Dissolved	0.02	0.02	mg/L	9/19/2013 17:59	TS	EPA 200.7	
Magnesium, Dissolved	19.1	0.2	mg/L	9/19/2013 17:59	TS	EPA 200.7	
Magnesium, Total	20.0	0.2	mg/L	9/20/2013 12:58	TS	EPA 200.7	
Manganese, Dissolved	ND	0.005	mg/L	9/19/2013 17:59	TS	EPA 200.7	
Manganese, Total	ND	0.005	mg/L	9/20/2013 12:58	TS	EPA 200.7	
Potassium, Dissolved	1.5	0.5	mg/L	9/19/2013 17:59	TS	EPA 200.7	
Sodium, Dissolved	6.2	0.5	mg/L	9/19/2013 17:59	TS	EPA 200.7	

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Certificate of Analysis

Lab Sample No.: 1304495-01

Name:	Canyon Fuel Co., Skyline Mine	**Mine Code:** 21	**Sample Date:** 5/29/2013 1:00 PM
Sample Site:	Lower Wife Creek CS-26		**Receipt Date:** 5/31/2013 2:30 PM
Comments:			**Sampler:** Gregg Galecki
Sample Type:	Water		**Site No.:**
Field pH:	8.02	**Field Temp. Deg. C:**	9.6
Field Flow g/Min.:	34.0	**Field Cond. umhos/cm:**	571

Parameter	Sample Result	Minimum Reporting Limit	Units	Analysis Date/Time	Analyst Initials	Analytical Method	Flag
Calculations							
Anions, Total	6.5	0.01	meq/L	6/14/2013 7:45	PNM	SM 1030 E	
Cation/Anion Balance	4.5		%	6/14/2013 7:45	PNM	SM 1030 E	
Cations, Total	7.1	0.01	meq/L	6/14/2013 7:45	PNM	SM 1030 E	
Hardness, Total as CaCO3	337	1	mg/L	6/14/2013 7:45	PNM	SM 2340 B	
Inorganic							
Acidity	ND	5.0	mg/L	6/12/2013 11:00	RMC	SM 2310 B	
Alkalinity - Bicarbonate (HCO3)	330	1.0	mg/L	6/11/2013 10:30	RMC	SM 2320 B	
Alkalinity - Carbonate (CO3)	ND	1.0	mg/L	6/11/2013 10:30	RMC	SM 2320 B	
Alkalinity - CO2	239	1.0	mg/L	6/11/2013 10:30	RMC	SM 2320 B	
Alkalinity - Hydroxide (OH)	ND	1.0	mg/L	6/11/2013 10:30	RMC	SM 2320 B	
Alkalinity - Total (as CaCO3)	271	1.0	mg/L	6/11/2013 10:30	RMC	SM 2320 B	
Chloride	8	1	mg/L	5/31/2013 17:00	TSM	EPA 300.0	
Nitrate + Nitrite, Total	0.3	0.1	mg/L	6/4/2013 11:00	KSL	SM 4500 NO3-F	
Phosphorus, Total as P	0.19	0.01	mg/L	6/6/2013 7:00	TSM	SM 4500 PB5E	
Sulfate	40	1	mg/L	5/31/2013 17:00	TSM	EPA 300.0	
Total Dissolved Solids (TDS)	316	20	mg/L	6/5/2013 16:46	QJP	SM 2540 C	
Total Suspended Solids (TSS)	180	20	mg/L	6/4/2013 15:00	JSH	SM 2540 D	
Metals							
Boron, Dissolved	ND	0.05	mg/L	6/6/2013 22:26	PNM	EPA 200.7	
Barium, Dissolved	0.015	0.005	mg/L	6/6/2013 22:26	PNM	EPA 200.7	
Calcium, Dissolved	81.9	0.2	mg/L	6/6/2013 22:26	PNM	EPA 200.7	
Calcium, Total	101	0.2	mg/L	6/7/2013 3:16	PNM	EPA 200.7	
Copper, Dissolved	ND	0.005	mg/L	6/6/2013 22:26	PNM	EPA 200.7	
Iron, Dissolved	ND	0.02	mg/L	6/6/2013 22:26	PNM	EPA 200.7	
Iron, Total	1.88	0.02	mg/L	6/7/2013 3:16	PNM	EPA 200.7	
Lead, Dissolved	ND	0.02	mg/L	6/6/2013 22:26	PNM	EPA 200.7	
Magnesium, Dissolved	18.3	0.2	mg/L	6/6/2013 22:26	PNM	EPA 200.7	
Magnesium, Total	20.6	0.2	mg/L	6/7/2013 3:16	PNM	EPA 200.7	
Manganese, Dissolved	ND	0.005	mg/L	6/6/2013 22:26	PNM	EPA 200.7	
Manganese, Total	0.145	0.005	mg/L	6/7/2013 3:16	PNM	EPA 200.7	
Potassium, Dissolved	1.5	0.5	mg/L	6/6/2013 22:26	PNM	EPA 200.7	
Sodium, Dissolved	6.8	0.5	mg/L	6/6/2013 22:26	PNM	EPA 200.7	

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Certificate of Analysis

Lab Sample No.: 1305485-05

Name:	Canyon Fuel Co., Skyline Mine	**Mine Code:** 21	**Sample Date:** 6/25/2013 9:39 AM
Sample Site:	Lower Wife CS-26		**Receipt Date:** 6/26/2013 10:05 AM
Comments:			**Sampler:** Gregg Galecki
Sample Type:	Water		**Site No.:**
Field pH:	8.6		**Field Temp. Deg. C:** 7.5
Field Flow g/Min.:	40.3		**Field Cond. umhos/cm:** 573

Parameter	Sample Result	Minimum Reporting Limit	Units	Analysis Date/Time	Analyst Initials	Analytical Method	Flag
Calculations							
Anions, Total	7.1	0.01	meq/L	7/10/2013 12:30	PNM	SM 1030 E	
Cation/Anion Balance	-6.8		%	7/10/2013 12:30	PNM	SM 1030 E	
Cations, Total	6.2	0.01	meq/L	7/10/2013 12:30	PNM	SM 1030 E	
Hardness, Total as CaCO3	296	1	mg/L	7/12/2013 8:00	PNM	SM 2340 B	
Inorganic							
Acidity	ND	5.0	mg/L	7/8/2013 9:30	KRW	SM 2310 B	
Alkalinity - Bicarbonate (HCO3)	370	1.0	mg/L	7/5/2013 18:32	KRW	SM 2320 B	
Alkalinity - Carbonate (CO3)	4.0	1.0	mg/L	7/5/2013 18:32	KRW	SM 2320 B	
Alkalinity - CO2	279	1.0	mg/L	7/5/2013 18:32	KRW	SM 2320 B	
Alkalinity - Hydroxide (OH)	ND	1.0	mg/L	7/5/2013 18:32	KRW	SM 2320 B	
Alkalinity - Total (as CaCO3)	318	1.0	mg/L	7/5/2013 18:32	KRW	SM 2320 B	
Chloride	8	1	mg/L	6/27/2013 10:00	TSM	EPA 300.0	
Nitrate + Nitrite, Total	0.3	0.1	mg/L	6/27/2013 13:00	KSL	SM 4500 NO3-F	
Phosphorus, Total as P	0.14	0.01	mg/L	7/1/2013 9:00	TSM	SM 4500 PB5E	
Sulfate	41	1	mg/L	6/27/2013 10:00	TSM	EPA 300.0	
Total Dissolved Solids (TDS)	384	20	mg/L	7/1/2013 0:00	JSH	SM 2540 C	
Total Suspended Solids (TSS)	134	4	mg/L	6/27/2013 14:19	IJH	SM 2540 D	
Metals							
Boron, Dissolved	ND	0.05	mg/L	7/9/2013 18:41	AKL	EPA 200.7	
Barium, Dissolved	0.014	0.005	mg/L	7/9/2013 18:41	AKL	EPA 200.7	
Calcium, Dissolved	85.7	0.2	mg/L	7/9/2013 18:41	AKL	EPA 200.7	
Calcium, Total	91.7	0.2	mg/L	6/30/2013 21:07	AKL	EPA 200.7	
Copper, Dissolved	ND	0.005	mg/L	7/9/2013 18:41	AKL	EPA 200.7	
Iron, Dissolved	ND	0.02	mg/L	7/9/2013 18:41	AKL	EPA 200.7	
Iron, Total	1.37	0.02	mg/L	6/30/2013 21:07	AKL	EPA 200.7	
Lead, Dissolved	ND	0.02	mg/L	7/9/2013 18:41	AKL	EPA 200.7	
Magnesium, Dissolved	19.9	0.2	mg/L	7/9/2013 18:41	AKL	EPA 200.7	
Magnesium, Total	19.5	0.2	mg/L	6/30/2013 21:07	AKL	EPA 200.7	
Manganese, Dissolved	ND	0.005	mg/L	7/9/2013 18:41	AKL	EPA 200.7	
Manganese, Total	0.099	0.005	mg/L	6/30/2013 21:07	AKL	EPA 200.7	
Potassium, Dissolved	1.3	0.5	mg/L	7/9/2013 18:41	AKL	EPA 200.7	
Sodium, Dissolved	6.5	0.5	mg/L	7/9/2013 18:41	AKL	EPA 200.7	

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Certificate of Analysis

Lab Sample No.: 1308484-01

Name:	Canyon Fuel Co., Skyline Mine	*Mine Code:* 21	*Sample Date:* 8/29/2013 1:50 PM
Sample Site:	Lower Wife Creek CS-26		*Receipt Date:* 9/4/2013 1:00 PM
Comments:			*Sampler:* Gregg Galecki
Sample Type:	Water		*Site No.:*
Field pH:	7.96	*Field Temp. Deg. C:*	11.0
Field Flow g/Min.:	10.3	*Field Cond. umhos/cm:*	557

Parameter	Sample Result	Minimum Reporting Limit	Units	Analysis Date/Time	Analyst Initials	Analytical Method	Flag
Calculations							
Anions, Total	5.8	0.01	meq/L	9/11/2013 7:45	PNM	SM 1030 E	
Cation/Anion Balance	3.2		%	9/11/2013 7:45	PNM	SM 1030 E	
Cations, Total	6.2	0.01	meq/L	9/11/2013 7:45	PNM	SM 1030 E	
Hardness, Total as CaCO3	291	1	mg/L	9/11/2013 7:45	PNM	SM 2340 B	
Inorganic							
Acidity	ND	5.0	mg/L	9/11/2013 16:30	KRW	SM 2310 B	
Alkalinity - Bicarbonate (HCO3)	286	1.0	mg/L	9/10/2013 22:02	KRW	SM 2320 B	
Alkalinity - Carbonate (CO3)	3.0	1.0	mg/L	9/10/2013 22:02	KRW	SM 2320 B	
Alkalinity - CO2	211	1.0	mg/L	9/10/2013 22:02	KRW	SM 2320 B	
Alkalinity - Hydroxide (OH)	ND	1.0	mg/L	9/10/2013 22:02	KRW	SM 2320 B	
Alkalinity - Total (as CaCO3)	240	1.0	mg/L	9/10/2013 22:02	KRW	SM 2320 B	
Chloride	8	1	mg/L	9/4/2013 16:00	TSM	EPA 300.0	
Nitrate + Nitrite, Total	0.4	0.1	mg/L	9/10/2013 16:00	TJS	SM 4500 NO3-F	
Phosphorus, Total as P	0.09	0.01	mg/L	9/10/2013 11:00	TSM	SM 4500 PB5E	
Sulfate	38	1	mg/L	9/4/2013 16:00	TSM	EPA 300.0	
Total Dissolved Solids (TDS)	356	20	mg/L	9/5/2013 11:26	JO	SM 2540 C	
Total Suspended Solids (TSS)	63	10	mg/L	9/4/2013 15:22	IJH	SM 2540 D	
Metals							
Boron, Dissolved	ND	0.05	mg/L	9/10/2013 12:02	TS	EPA 200.7	
Barium, Dissolved	0.018	0.005	mg/L	9/10/2013 12:02	TS	EPA 200.7	
Calcium, Dissolved	83.3	0.2	mg/L	9/10/2013 12:02	TS	EPA 200.7	
Calcium, Total	87.0	0.2	mg/L	9/6/2013 16:35	TS	EPA 200.7	
Copper, Dissolved	ND	0.005	mg/L	9/10/2013 12:02	TS	EPA 200.7	
Iron, Dissolved	ND	0.02	mg/L	9/10/2013 12:02	TS	EPA 200.7	
Iron, Total	0.83	0.02	mg/L	9/6/2013 16:35	TS	EPA 200.7	
Lead, Dissolved	ND	0.02	mg/L	9/10/2013 12:02	TS	EPA 200.7	
Magnesium, Dissolved	20.2	0.2	mg/L	9/10/2013 12:02	TS	EPA 200.7	
Magnesium, Total	19.2	0.2	mg/L	9/6/2013 16:35	TS	EPA 200.7	
Manganese, Dissolved	ND	0.005	mg/L	9/10/2013 12:02	TS	EPA 200.7	
Manganese, Total	0.053	0.005	mg/L	9/6/2013 16:35	TS	EPA 200.7	
Potassium, Dissolved	2.6	0.5	mg/L	9/10/2013 12:02	TS	EPA 200.7	
Sodium, Dissolved	7.2	0.5	mg/L	9/10/2013 12:02	TS	EPA 200.7	

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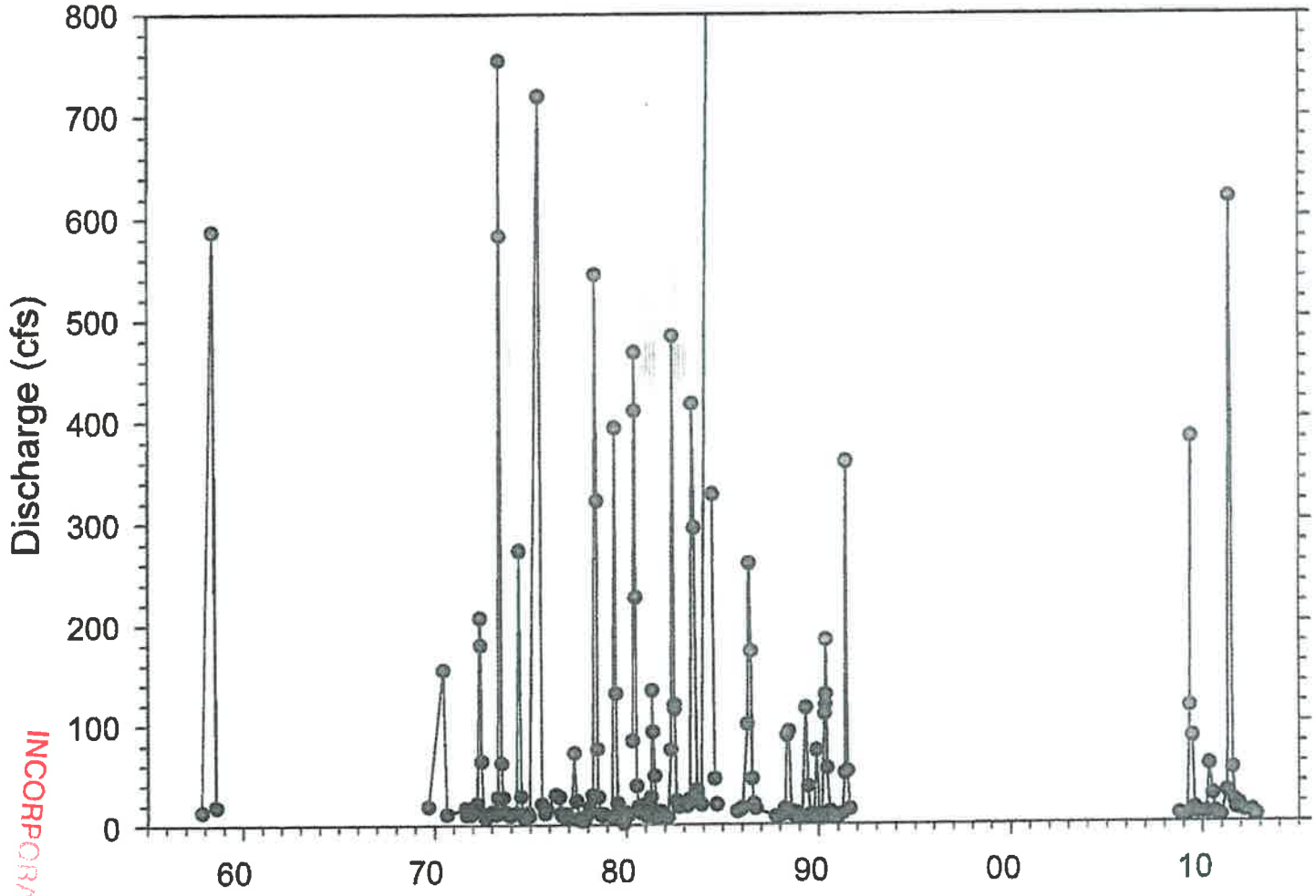
Fish Creek (USGS gaging station 09310500)



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PHC Appendix L

PETERSEN HYDROLOGIC

21 September 2013

Mr. Gregg Galecki
Canyon Fuel Company, LLC
Skyline Mine
HC 35 Box 380
Helper, Utah 84526

Gregg,

At your request, we have evaluated baseline monitoring information for the North Lease expansion area at the Skyline Mine. This investigation includes a characterization of the quality and quantity of groundwaters and surface-waters in the North Lease expansion and adjacent areas. The results of this characterization are presented in this letter report.

1.0 Introduction

The Canyon Fuel Company, LLC Skyline Mine surface facilities are located in Eccles Canyon, approximately 4 miles southwest of the town of Scofield, Utah in the Wasatch Plateau coal district (Figure 1). Operations at the Skyline Mine commenced in 1984. Currently, the mine is seeking to expand its permitted mining area to include the North Lease expansion area, which is situated immediately north of the existing Skyline Mine permit area (Figure 2).

To fulfill the baseline monitoring requirements for the North Lease expansion area (to characterize seasonal variation in water quantity and quality), Skyline Mine has collected hydrologic information from springs, streams, and wells in and around the North Lease

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The Skyline Mine hydrologic database includes data collected during literally thousands of monitoring events at more than 150 monitoring locations including springs, streams, wells, and in-mine locations in and around the mine area. The totality of the hydrologic data collected in and around the Skyline Mine over this 30-year period provides a level of characterization for groundwater and surface-water systems in and around the mine that is probably not surpassed by any comparable area in the state of Utah.

Including this introduction, this report contains the following sections:

1. Introduction
2. Methods of Study
3. Presentation of Data
4. Climate
5. Water quantity
6. Water quality
7. Conclusions
8. Recommendations
9. References Cited

2.0 Methods of Study

Baseline hydrologic monitoring data from the North Lease expansion area were provided to Petersen Hydrologic in electronic format by Canyon Fuel Company, LLC personnel. Other hydrologic monitoring data from the Skyline Mine were downloaded from the Utah Division of Oil, Gas and Mining on-line coal water quality database (UDOGM, 2013) and compiled into electronic format. Discharge rate and selected important water quality monitoring data were compiled into a Microsoft Excel spreadsheet for analysis. A complete listing of all monitoring data from the Skyline Mine is available from the Division's on-line coal water quality database (UDOGM, 2013).

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Discharge and field and laboratory water quality data have been collected intermittently since 1957 by the United States Geological Society from Fish Creek at gaging station 09310500 (USGS, 2013). These data were obtained electronically from the USGS internet site at http://www.usgs.gov and compiled into a Microsoft Excel spreadsheet for analysis in this investigation.

Plots of selected important water quality parameters (including discharge rate, specific conductance, pH, Temperature, total iron, total manganese, and total suspended solids) were constructed using the data available from the Division of Oil, Gas and Mining on-line coal water quality database. To evaluate the influence of climatic variability on water quantity and quality, a plot of the Palmer Hydrologic Drought Index was also incorporated into the graphs for analysis. The plots were constructed using SigmaPlot version 12.5 software. It should be noted that the y-axis on some of the plots has been scaled (zoomed-in) to maximize the usefulness of the plot.

Water quality characteristics of groundwaters and surface waters were analyzed graphically using Stiff (1951) diagrams.

3.0 Presentation of Data

The location of the Skyline Mine and the North Lease expansion area is shown on Figure 1. Stiff (1951) diagrams depicting water quality characteristics of groundwaters and surface waters in the North Lease expansion and surrounding areas at the Skyline Mine are shown on Figure 2. Plots of the Palmer Hydrologic Drought Index (PHDI) for Utah Region 4 (south-central Utah) and Utah Region 5 (northern mountains) are shown on Figure 3. In Figure 4, a series of plots of discharge rates and important water quality monitoring parameters are presented for monitoring sites in and adjacent to the North

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Lease expansion area. Plots are also provided for additional selected groundwater and surface-water monitoring sites at the Skyline Mine.

Baseline monitoring data including water quality and water quantity data for springs and streams is presented in Table 1. Average water quality characteristics and discharge rates for springs and streams are presented in Table 2. Baseline potentiometric data (water quantity) collected from groundwater monitoring wells in and near the expansion area are presented in Table 3. A table summarizing variability in water quantity and water quality in and adjacent to the North Lease expansion area is provided as Table 4. Discharge and water quality data from Fish Creek as monitored at station 09310500 is provided in Appendix A.

4.0 Climate

Plots of the Palmer Hydrologic Drought Index for Utah Regions 4 and 5 are presented in Figure 3. The Skyline Mine area is situated near the boundary between Utah Region 4 (south-central Utah) and Utah Region 5 (northern mountains). The PHDI is a monthly value generated by the National Climatic Data Center that indicates wet and dry spells. The PHDI is calculated from several hydrologic parameters including precipitation, temperature, evapotranspiration, soil water recharge, soil water loss, and runoff. Consequently, it is a useful tool for evaluating the relationship between climate and groundwater and surface water discharge data.

It is apparent in Figure 3 that in the past 35 years the region has experienced alternating periods of wetness and drought. Notable wet spells occurred in the mid-1980s, late 1990s, during the 2005-06 water year, and during the 2010-11 water year. Notable periods of drought occurred during the late 1980s and early 1990s, during the early to mid-2000s, and most recently during 2012 and 2013. During the most recent period of baseline monitoring at the North Lease expansion area, the region experienced severe to

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extreme wet conditions during 2011, followed by a continuous period of moderate to extreme drought that has persisted throughout 2012 and into the first half of 2013.

5.0 Water Quantity

5.1 *Surface Water*

Precipitation and snowmelt runoff waters in the southern portion of the lease expansion area drain through ephemeral washes into the Woods Canyon Creek drainage. The surface runoff waters in the northern portions of the expansion area drain northward into the Fish Creek drainage. Both Woods Canyon Creek and Fish Creek are perennial streams.

Woods Canyon Creek is monitored at Skyline Mine monitoring stations CS-21 (adjacent to the lease expansion area) and CS-19 (below the lease expansion area). Discharge in Woods Canyon Creek varies greatly by season with the largest flows coinciding with the springtime snowmelt runoff event and the period of seasonal high-flows from Blackhawk Formation groundwater systems in the drainage. During 2011 and 2012, the discharge in Woods Canyon Creek showed a large degree of both seasonal and climatic variability. During both years, the maximum discharge measured at CS-21 occurred during the second quarter monitoring event. The discharge rates measured during the low-flow (fourth quarter) season were much lower. During 2011 (an unusually wet year), the June high-flow discharge rate (5,395.6 gpm) exceeded the measured November low-flow rate (207.8 gpm) by a factor of nearly 26 (see plots in Figure 4). During 2012, the measured June high-flow discharge rate (372 gpm) exceeded the November low-flow rate (28.2 gpm) by a factor exceeding 13. The large difference between the measured June 2011 and June 2012 discharge rates demonstrates the influence of climatic variability (i.e. wet year versus dry year) on discharge rates in the Woods Canyon drainage. The 2011 (wet

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year) maximum flow rate exceeded the 2012 (dry year) maximum flow rate by more than 14 times.

The primary tributaries to Fish Creek within the North Lease expansion area include Wife Creek, Andrew Dairy Canyon, and the East Fork of Andrew Dairy Canyon (Figure 2). Discharge in Fish Creek varies greatly by season. The maximum and minimum flows measured in Fish Creek at monitoring station 09310500 during the period of record (October 1957-November 2012) were 1,220 cfs during May 1984 (an exceptionally wet year) and 0.6 cfs during November of 1979 (Appendix A). The average flow rate measured during this period was about 79 cfs (which is the greatest of any of the tributaries to Scofield Reservoir). During the most recent years (2011 and 2012) the flow rates in the creek have varied substantially by both season and climate. During 2011 the maximum flow measured during the second quarter (620 cfs) exceeded the fourth quarter 2011 low-flow measurement (14 cfs) by more than 44 times, demonstrating a very large degree of seasonal variation in the discharge in the drainage. Climatic variability is also readily apparent in the discharge data record for Fish Creek. During 2011 (a wet year) a maximum flow of 620 cfs was measured in the creek during the month of May (second quarter). In contrast, during 2012 (a dry year) the maximum flow measured during the second quarter was only 11 cfs. It is noted that discharge data are not available for May and June of 2012. However, the July 2011 measured discharge rate (54 cfs) was almost five times that measured during July of 2012 (11 cfs) demonstrating the same trend in climatic variability. The maximum historic measured discharge rate occurred during May 1984, which was a very wet year.

Discharge rates in the Fish Creek tributaries associated with the North Lease expansion area also exhibit seasonal and climatic variability (Table 1). Surface waters in the northwestern portion of the lease expansion area are tributary to the Wife Creek drainage. While only ephemeral drainage contributes appreciably to the flow in Wife Creek within the lease expansion area, more substantial flows are sometimes present in the lower reaches of Wife Creek where hydrologic monitoring of the drainage has occurred (Figure

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2). Discharge at the Wife Creek (Lower) site has varied from 0.45 gpm in November 2012 to 40.3 gpm during June 2013, demonstrating the large degree of seasonal variation in the discharge rate in the Wife Creek drainage. It is also noteworthy that during the fall of 2012, the discharge decreased dramatically from 7.1 gpm in October to 0.45 gpm in November. The marked decline in discharge over this short period of time suggests that there is not a persistent groundwater-derived baseflow component to the discharge in this creek (at least during drought conditions). The north-central and northeast portions of the lease modification area drain into the Andrew Dairy Creek drainage (Figure 2). While only ephemeral drainage contributes appreciably to the flow in Andrew Dairy Creek drainage in most of its extent within the lease expansion area, discharge from spring S25-32 flows down the surface water channel below the spring near the north-central margin of the expansion area (Figure 2). However, the discharge from the spring is completely lost to infiltration and/or evapotranspiration lower in the drainage. Discharge was not observed at the Andrew Dairy Creek – Lower site during 2012 or 2013. Additionally, the Andrew Dairy Creek stream channel near its confluence with Fish Creek is poorly defined and spread-out, suggesting that appreciable or sustained surface water flows are rarely present at this location (Personal communication, Gregg Galecki, 2013).

5.2 *Groundwater*

Springs

Discharge data are available for four springs identified on or adjacent to the North Lease expansion area (Figure 2, Table 1). All of these springs discharge from the Blackhawk Formation. Discharge rates at Blackhawk Formation springs and the characteristics of Blackhawk Formation groundwater systems that support springs in and around the Skyline Mine area have been characterized previously by Mayo and Associates (1996). Seasonal variability in discharge rate is readily apparent in Blackhawk Formation springs, demonstrating the influence of seasonal recharge to groundwater systems that support these springs. Based on an analysis of a very large quantity of hydrologic data, Mayo and Associates found that discharge rates measured from Blackhawk Formation springs in the

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area during the springtime tend to be two to three times as great as spring discharges during dry years. They also found that other than being controlled exclusively by the amount of precipitation received during a year, other factors such as the timing and duration of snowmelt may greatly affect groundwater recharge and hence spring discharge rates (Mayo and Associates, 1996). Mayo and Associates also found that Blackhawk Formation springs are recharged by snowmelt and that their discharge rates decline substantially during the summer and fall months. The importance of annual snowmelt recharge to Blackhawk Formation groundwater systems that support springs in the area is also evident by the elevated tritium contents and modern carbon-14 compositions in these springs. The discharge characteristics and seasonal variability of the springs observed at the North Lease expansion area are consistent with those identified previously by Mayo and Associates. In Figure 4, time-series plots of spring discharge rates (through 2012) are presented together with plots of the Palmer Hydrologic Drought Index for selected Blackhawk Formation springs (both high-flow springs and low-flow springs). The purpose of these plots is to demonstrate the well documented seasonal variation and climatic variability in spring discharge rates in the Skyline Mine area.

Spring S25-32 discharges near the bottom of Andrew Dairy Canyon in the north-central portion of the expansion area (Figure 2). Discharge measured at S25-32 has ranged from a low of 3.61 gpm during late October 2012 (a dry year) to maximum discharges near 12 gpm which were measured during September 2011 (a wet year) and also in May 2013 (a dry year). Climatic variability in the discharge from S25-32 is readily apparent by comparing the discharge measured on 25 September 2011 during a wet year (12.1 gpm) with the discharge measured exactly one year later on 25 September 2012 during a dry year (4.93 gpm). The observation that the spring's discharge during the wet year was almost 2.5 times that measured during the dry year demonstrates the influence of climatic variability on the discharge rate from this groundwater system. Seasonal variation in the discharge rate is evident in the fact that the third and fourth quarter discharge measurements are appreciably greater than those measured during the second quarter.

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Additionally, it is noteworthy that the discharge at S25-32 decreased by more than 40 percent over a period of only 25 days in May and June 2013 (Table 1).

Spring S26-1 is located on a northwest-facing hillside in the Wife Canyon drainage (Figure 2). Discharge measured at the spring has ranged from 0.29 gpm on 30 August 2013 to 2.80 gpm during the second quarter of 2013. The large difference between the low-flow measurement on 30 August 2013 and the high-flow measurement on 30 May 2013 demonstrates the seasonal variability in the spring discharge rate. In a manner similar to that at spring S25-32, the discharge at spring S26-1, during a 25 day period in May and June 2013, the decrease measured at the spring declined by more than 50 percent, documenting the substantial degree of seasonal variability at the spring.

Spring S26-2 (Wife Spring) discharges from the Blackhawk Formation near the bottom of Wife Canyon north of the expansion area (Figure 2). Discharge measured at S26-2 during October 2012 was 3.03 gpm. Discharge from the spring during the subsequent high-flow period in late May 2013 was more than twice this amount at 6.35 gpm, demonstrating the seasonal variability in discharge rate at the spring. It is interesting that the discharge rate measured at S26-2 during late June 2013 (0.47 gpm) was less than 10 percent that measured during the late May 2013 monitoring event (Table 1).

Spring S25-33 discharges in the East Fork of Andrew Dairy Canyon near the stream channel in the bottom of the canyon (Figure 2). Discharge rates measured at S25-33 (Figure 2; Table 1) show pronounced seasonal variation. Discharge measured at this spring has ranged from a low of 0.96 during October 2012 to a high of 5.00 gpm measured during early May 2013. The more than 500 percent increase in the measured discharge rate at the spring from the low-flow to high-flow season clearly demonstrates the influence of the annual snowmelt event on recharge to the Blackhawk Formation groundwater system that supports the spring. Like the other springs described above, the marked decline in the spring's discharge rate from May to June (by almost 50 percent) is appreciable.

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Groundwater Monitoring Wells

Measurements of water levels in the deep, Blackhawk Formation groundwater systems surrounding the mined coal seams has been performed quarterly since 2002 at wells 91-26-1 (on the lease expansion area) and 91-35-1 (south of the expansion area) (Figure 2; Table 3). The deep strata monitored by these wells do not outcrop in the expansion or adjacent area nor do they support springs or provide baseflow discharge to streams in the area. The water levels measured in these deep wells are more than 1,200 feet in elevation lower than the overlying land surface, illustrating the hydraulic disconnect between the deep groundwater systems associated with the coal horizons and the shallow, perched groundwater systems that support springs and seeps in the expansion area. The deep Blackhawk Formation groundwater systems intercepted by the mine workings during mining operations are characteristically ancient in origin and are not in good hydraulic communication with shallow recharge sources (Mayo and Associates, 1996).

6.0 Water Quality

Stiff (1951) diagrams depicting the solute chemical compositions of groundwater and surface waters in and adjacent to the Skyline Mine area are shown on Figure 2. Stiff diagrams are a useful analytical tool that allows the graphical representation of groundwater and surface-water solute compositions. The shape of the Stiff diagram is a reflection of the geochemical type of the water, while the size of the diagram is related to the total dissolved solids concentration of the water. In Table 4 a summary of seasonal variation in water quantity and water quality as reflected in important water quality parameters in groundwaters and surface waters is presented.

Groundwaters discharging from springs and surface waters flowing in streams in the Skyline Mine and adjacent areas commonly acquire their solute compositions through a series of well-documented chemical reactions (Mayo and Associates, 1996; Petersen Hydrologic, 2010). These are briefly summarized below.

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Carbon dioxide gas is produced naturally in the soil at concentrations greatly exceeding atmospheric concentrations by root-zone respiration and also by the decay of organic matter. Recharge water (rain and snow melt), upon entering the soil mantle, reacts with CO_2 to produce carbonic acid according to:

$$CO_2 + H_2O = H_2CO_{3\ (carbonic\ acid)} \qquad \text{(Equation 1)}$$

The produced carbonic acid subsequently dissociates into hydrogen ions (acid) and bicarbonate according to:

$$H_2CO_3 = H^+ + HCO_3^- \qquad \text{(Equation 2)}$$

The H^+ produced from Equation 2 reacts with carbonate minerals pervasive in the rocks of the Wasatch Plateau coal field, yielding calcium and magnesium ions and additional bicarbonate ions to the water according to:

$$CaCO_{3\ (calcite)} + H^+ = Ca^{2+} + HCO_3^- \qquad \text{(Equation 3)}$$

and

$$CaMg(CO_3)_{2\ (dolomite)} + 2H^+ = Ca^{2+} + Mg^{2+} + 2\ HCO_3^- \qquad \text{(Equation 4)}$$

Because of the limited solubility of calcite and dolomite in the absence of an additional source of CO_2, waters acquiring their solute compositions through the geochemical evolutionary pathway described in Equations 1 through 4 typically have relatively low TDS concentrations.

Groundwaters from formations containing soluble evaporite minerals often acquire a different solute geochemical type, and dissolved solids concentrations appreciably greater than that typically resulting from geochemical evolutionary pathway as described by equations 1-4 above. Surface waters flowing over sediments containing soluble evaporite minerals may also acquire elevated TDS concentrations and changed solute geochemical type. The geochemical reactions often responsible for these changes in chemical composition include:

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$$CaSO_4 \cdot 2H_2O_{(gypsum)} = Ca^{2+} + SO_4^{2-} + 2H_2O \qquad \text{(Equation 5)}$$

$$NaCl_{(halite)} = Na^{+} + Cl^{-} \qquad \text{(Equation 6)}$$

It should be noted that high-TDS waters, or waters with elevated sulfate, sodium, or chloride concentrations are not generally present in the Blackhawk Formation groundwater systems that support springs and provide baseflow to streams in the Skyline Mine area (Table 2, UDOGM, 2013). Accordingly, it is apparent that the mineral dissolution reactions described in Equations 5 and 6 above are not important contributors to the geochemical compositions of the Blackhawk Formation waters in the Skyline Mine area. However, it is apparent upon inspection of the solute chemical data for some waters in the Skyline Mine area that are adjacent to roadways to which road salt is applied during the winter months (e.g. CS-11) that moderately elevated sodium and chloride contents are sometimes present in these waters, likely as a result of the dissolution of the road salt and its migration into nearby waterways. Salted roadways are not present in the North Lease expansion or adjacent areas (Figure 2).

Waters rich in Ca^{2+} resulting from the dissolution of gypsum (Equation 5) may undergo ion exchange on clay minerals resulting in an increase in Na^{+} concentrations at the expense of exchanged Ca^{2+} ions according to:

$$Ca^{2+} + \text{Na-clay} = 2Na^{+} + \text{Ca-Clay} \qquad \text{(Equation 7)}$$

Ion exchange may also occur on zeolite minerals such as the sodium zeolite analcime according to:

$$2NaAlSi_2O_6 \cdot H_2O + Ca^{2+} = Ca(AlSi_2O6)_2 \cdot H_2O + 2Na^{+} \qquad \text{(Equation 8)}$$

The sulfide mineral pyrite, which is commonly present in underground coal mines in Utah and is sometimes present in unweathered surface outcrops of some overburden rocks in the Skyline Mine area, is oxidized when it comes into contact with oxygenated water. This reaction is represented in a simplified form as:

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$$FeS_{2\,(S)} + 7/2\ O_2 + H_2O = Fe^{2+} + 2SO_4^{2-} + 2H^+ \quad \text{(pyrite oxidation; Equation 9)}$$

This reaction, which may be facilitated and enhanced by the presence of certain bacteria, yields free, reduced iron (Fe^{2+}), sulfate, and H^+ (acid), and removes oxygen from the water. The liberation of H^+ in this reaction results in a temporary lowering of the pH, which facilitates the dissolution of carbonate minerals according to Equations 3 and 4. These two reactions result in an increase in the calcium, magnesium, and bicarbonate concentrations of the water and consume H^+, resulting in a rising of the pH. Because of the abundance of carbonate minerals in the coal fields of the western United States, the acid produced from pyrite oxidation is readily consumed in the reactions described above and acid-mine-drainage does not occur.

Water flowing in a surface stream that is fully aerated with near neutral pH generally will not contain more than a few micrograms per liter of dissolved iron (Hem, 1985). This is because oxygen is continuously present in an actively flowing stream and the Fe^{2+} is rapidly oxidized to Fe^{3+} according to:

$$Fe^{2+} + 1/4\ O_2 + H^+ = Fe^{3+} + 1/2\ H_2O \quad \text{(ferrous iron oxidation; Equation 10)}$$

The oxidized iron is subsequently precipitated as a solid (commonly as an amorphous iron hydroxide) which eventually settles to the bottom of the water body. This simplified reaction may be expressed as:

$$Fe^{3+} + 3H_2O = Fe(OH)_{3\,(s)} + 3H^+ \quad \text{(iron hydroxide precipitation; Equation 11)}$$

The H^+ produced in this reaction is consumed in the carbonate mineral dissolution reactions described above (Equations 3 and 4).

It has been noted that total iron (and less significantly total manganese) is sometimes present in surface waters at the Skyline Mine area (as well as in other regions within the Wasatch Plateau mining district), most notably during times when elevated total suspended solids are present (see Figure 4 and UDOGM, 2013). During times when surface waters run sediment-free, elevated total iron or total manganese concentrations

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are generally low (UDOGM, 2013). This suggests that the source of the total iron and/or total manganese is associated with the mineralogy of the suspended sediment included in the sampled water. To investigate the geochemical potential for sediments (suspended sediment and bed-load sediment) to contribute total iron and/or total manganese to a total metals analysis, Waddell (1986) investigated the mineralogical composition of suspended and bed-load sediments in Fish Creek. Waddell (1986) found that concentrations of iron (total recoverable) in the suspended and bed-load sediments ranged from 0.17 to 11.0 mg/L. Manganese concentrations were lower, ranging from 0.005 to 0.39 mg/L. The measured concentrations of iron and manganese in the sediments confirms the potential for the presence of sediments in the surface water to be the primary source of these constituents in the stream water (and not dissolved chemical species). Similarly, the occasional presence of total iron or total manganese in Blackhawk Formation spring groundwaters is likely associated with the physical presence of iron-bearing and/or manganese-bearing sediment in a water sample collected at a spring. This conclusion is based on the observation that 1) dissolved iron is only rarely detectable in appreciable quantities in Blackhawk Formation spring waters (UDOGM, 2013), and 2) appreciable suspended sediment is generally not transported through a porous aquifer matrix. Accordingly, when total iron or total manganese is detected in appreciable quantities in a water sample, it is most likely associated with the inclusion of iron-bearing or manganese-bearing sediments into the sampled, and subsequently acidified water. Commonly, this can occur when the physical conditions at a spring result in difficulties collecting a sediment-free water sample. This condition is often exacerbated when very fine grained particulates are present at the spring sampling location. The importance of this conclusion is that it demonstrates that there is generally a low potential for total iron and/or total manganese concentrations to be present in groundwaters discharging from the Blackhawk Formation. The overall low concentrations of total iron and total manganese concentrations measured in Blackhawk Formation springs both in the lease expansion area as well as the greater Skyline Mine area support this finding.

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6.1 *Surface Water*

Surface-water quality data have been collected from both the Woods Canyon Creek drainage as well as the Fish Creek drainage. The water quality characteristics of these surface waters, including seasonal variation in water quality are described below.

Surface waters in Woods Canyon Creek are of the calcium-bicarbonate chemical type with moderately elevated magnesium concentrations (Figure 2). This chemical type is consistent with the dissolution of carbonate minerals (calcite and dolomite) in the presence of soil-zone CO_2 gas (Equations 3 and 4). TDS concentrations in Woods Canyon Creek as monitored at CS-21 average 262 mg/L. Specific conductance values measured in Woods Canyon Creek average 414 µS/cm. There is a correlation between high-flow discharge in the creek and low specific conductance values. Temperatures in the stream exhibit marked seasonal variation, with the warmest temperatures corresponding with periods of warm air temperatures (Figure 4). pH values in the creek average 8.41 units, with minimal variation seasonally (Figure 4). Total suspended solids concentrations in the creek are generally low, with the highest values typically occurring during period of highest flow (Figure 4). The highest concentrations of total iron in the stream show a marked positive correlation with values of total suspended solids in the creek (the high values typically occur during the springtime high-flow periods (Figure 4). Values of total manganese are generally low (<0.1 gpm) under all seasonal conditions.

Surface waters in Fish Creek (as monitored at gaging station 09310500) are of the calcium bicarbonate geochemical type with moderately elevated magnesium concentrations (Figure 2). This chemical type is consistent with the dissolution of carbonate minerals (calcite and dolomite) in the presence of soil-zone CO_2 gas (Equations 3 and 4). The TDS concentrations of surface waters in Fish Creek average about 196 mg/L, ranging from 169 to 226 mg/L. The specific conductance of surface waters in Fish Creek average 347 mg/L with a wide distribution of measured specific conductance values (Appendix A). Water discharge temperatures in Fish Creek average 7.5 °C, with a

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correlation between prevailing seasonal air temperatures and stream temperatures (Appendix A). Measured pH values in Fish Creek are moderately alkaline, averaging 7.99 units and ranging from 7.7 to 8.6 units. Total suspended solids concentrations were measured in Fish Creek on two occasions. On 30 August 1983 a TSS concentration of 878 mg/L was measured in the creek. At that time the discharge in the creek was low, measured at 3.5 cfs. When TSS in the creek was measured on 23 May 1983, which was the date of the maximum historic measured discharge at 1,220 cfs, the TSS was 792 mg/L. The similarity of the late August low-flow TSS value and the maximum recorded high-flow TSS value is noteworthy and somewhat problematic.

Wife Creek as monitored near its confluence with Fish Creek (Figure 2) is of the calcium-bicarbonate chemical type with moderately elevated magnesium concentrations (Table 1). This chemical type is consistent with the dissolution of carbonate minerals (calcite and dolomite) in the presence of soil-zone CO_2 gas (Equations 3 and 4). The TDS concentration of the creek water measured during June 2013 was 384 mg/L, which is somewhat higher than the TDS concentrations measured in either Fish Creek or Woods Canyon Creek (UDOGM, 2013; Appendix A). The specific conductance of water in Wife Creek has ranged from 557 µS/cm on 29 August 2013 to 625 µS/cm in November 2012. The similarity between the low-flow (August 2013) value of 557 µS/cm and the high-flow values measured during May and June 2013 of 571 µS/cm and 573 µS/cm, respectively, suggests that there is no appreciable seasonal variation in this water quality parameter. Water discharge temperatures at Wife Creek ranged from 0.0 °C during November 2012 to 11.0 °C on 29 August 2013, reflecting the prevailing seasonal air temperatures. The pH values measured in the stream have ranged from 7.96 to 8.6, with no identifiable seasonal variation. Values of TSS measured in Wife Creek range from 63 to 180 mg/L.

No flow has been observed at the Andrew Dairy Creek monitoring site during the period of baseline monitoring activities (Table 2).

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6.2 *Ground Water*

All of the springs identified within the North Lease expansion area discharge from the Blackhawk Formation (it is the only geologic formation present at the surface over the extent of the North Lease expansion area). As indicated previously, the geochemical evolution and the chemical reactions through which groundwaters in the Blackhawk Formation acquire their solute chemical compositions at the Skyline Mine area are well documented (Mayo and Associates, 1996). The chemical compositions of Blackhawk Formation springs are controlled primarily by the nature and geochemical composition of the Blackhawk Formation bedrock and associated soils and colluvium with which waters interact. Because the Blackhawk Formation is not known to be appreciably different in the North Lease expansion area than it is in contiguous areas within the existing permit area, it is not unanticipated that the water quality characteristics of the Blackhawk Formation groundwaters within the expansion area are similar to those in adjacent areas within the Blackhawk Formation – which have been extensively monitored and evaluated for more than 30 years (see Figure 4, Table 2, UDOGM, 2013, Mayo and Associates, 1996).

It is observed generally that, while the overall solute geochemical type of essentially all springs and streams investigated in this report are similar, the TDS concentrations of some springs within the Skyline Mine and adjacent area have somewhat lower TDS concentrations that do some other springs (Figure 2). Additionally, individual springs often exhibit lower springtime high-flow TDS concentrations while higher TDS concentrations are measured during the late-season low-flow condition (UDOGM, 2013). Mayo and Associates (1996) indicated that this condition results when groundwater systems are overwhelmed with large influxes of snowmelt recharge water during the high-flow season. Under these conditions, recharge water may move through the system rapidly without having the opportunity to chemically react with the soil and bedrock minerals (Mayo and Associates, 1996). Similar factors are likely responsible for the

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observed seasonal variability in TDS concentrations in surface waters in and around the Skyline Mine area (i.e. during the springtime snowmelt runoff event, there is a large influx of low-TDS snowmelt water into the stream system that overwhelms the relatively smaller component of groundwater-derived baseflow in the stream).

Regionally, total iron and total manganese concentrations are generally low in spring discharge waters. Groundwaters are generally near neutral to slightly alkaline (UDOGM, 2013), which limits the solubility of these metals in the groundwater system. However, iron-bearing and manganese-bearing minerals are present in the soils and sediments of the Skyline Mine area as evidenced by the periodic detections of total iron and total manganese during periods of elevated TSS in streams and springs.

The solute composition of groundwater discharging at S25-32 is of the calcium-bicarbonate type with a moderately elevated magnesium concentration. The average measured TDS concentration is 347 mg/L. Seasonal variation in specific conductance is not appreciable. The minimum measured specific conductance value (562 μS/cm) is only about 8 percent lower than the maximum measured value of 613 μS/cm. Similarly, the pH values show little variability, ranging from 7.02 to 7.40 units. Discharge temperature varies from 3.6 to 5.4 °C. Values of total iron and total manganese are low, with maximum values of 0.29 and 0.012 mg/L, respectively.

The solute composition of groundwater discharging at S26-1 is of the calcium-bicarbonate type. The TDS concentrations measured at S26-1 average 300 mg/L. The values of specific conductance measured at S26-1 range from 423 to 499 μS/cm. Values measured during low-flow conditions during October of 2012 and August 2013 averaged 492 μS/cm, while values measured during high-flow conditions (May and June 2013) average 426 μS/cm, which represents about a 15 percent decrease in specific conductance during high-flow conditions relative to those measured during low-flow conditions. Measured pH values at S26-1 ranged from 6.76 to 7.34 units, with seasonal variability not readily apparent. Discharge temperature values measured at S26-1 ranged from 2.7

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to 6.5 °C. Values of total iron and total manganese are low, with maximum values for total iron of 0.04 mg/L and total manganese of <0.005 mg/L.

The solute composition of groundwater discharging at S26-2 is of the calcium-bicarbonate type with a moderately elevated magnesium concentration. The average TDS concentration measured at S26-2 is 329 mg/L. The average specific conductance value measured at S26-2 is 527 µS/cm, ranging from 497 to 548 µS/cm. Seasonal variability in measured specific conductance at S26-2 is small, varying by only about 10 percent. The pH values measured at the spring ranged from 7.19 to 7.99 units. Water discharge temperatures ranged from 4.8 to 6.0 °C, varying by only 1.2 degrees. Total iron and total manganese concentrations measured at S26-2 were low, with maximum values of 0.13 and 0.013 mg/L, respectively.

The solute composition of the spring in the East Fork of Andrew Dairy Spring (S25-33; Figure 2) is of the calcium-bicarbonate chemical type. TDS concentrations measured at the spring ranged from 360 to 412 mg/L. Specific conductance values measured at the spring ranged from 647 to 714 µS/cm. The lowest specific conductance value (647 µS/cm) was measured during May 2013, which corresponds with the highest measured discharge at the spring. The highest specific conductance value (714 µS/cm) was measured during the October 2012 monitoring event, which corresponds with the lowest measured discharge at the spring. The pH values measured at the spring range from 6.99 to 7.30. Discharge temperatures at the spring ranged from 4.6 to 8.5 °C. Values of total iron and total manganese were low, with maximum measured value of 0.43 and 0.066 mg/L, respectively.

7.0 Conclusions

Seasonal variability in groundwater and surface-water quantity and quality is demonstrated in the available hydrologic data. Due primarily to the geologic similarity of

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the North Lease expansion area to surrounding areas, the groundwater and surface-water quantity and quality within the North Lease expansion area is fundamentally similar to groundwater and surface-water quantity and quality in the surrounding Skyline Mine area. Groundwater and surface-water systems in the Skyline Mine area have been exhaustively characterized through more than 30 years of hydrologic monitoring and numerous hydrologic investigations.

Surface-water discharge rates in the greater Skyline Mine area, as well as in the North Lease expansion area, are significantly greater during the springtime high-flow season in response to the annual snowmelt event than are surface-water discharge rates observed during the late summer and fall seasons (Table 2; UDOGM, 2013). This condition is associated with the overwhelming influence of the annual springtime snowmelt event on surface-water discharge rates.

The dramatic seasonal decrease in discharge in lower Wife Canyon (to near dryness in the fall) demonstrates that there is not a substantial, persistent, groundwater-derived baseflow component to sustain appreciable discharge in this creek. Similarly, the lack of any discharge observed in lower Andrew Dairy Creek (or observed in the ephemeral drainages in the Woods Canyon Creek drainage) suggests that there is not a groundwater-derived baseflow component to sustain flow in these drainages.

Rates of discharge from springs in the Blackhawk Formation in the Skyline Mine area, and specifically in the North Lease expansion area, are greater during the springtime high-flow season than are discharge rates in the springs during the late summer and fall seasons (Table 2; UDOGM, 2013).

Mayo and Associates (1996) found that Blackhawk Formation springs in the Skyline Mine area contain abundant tritium and have modern carbon-14 compositions. These conditions, together with the appreciable seasonal variation in groundwater discharge

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rates, suggest that the springs (both regionally and in the North Lease expansion area) are in good hydraulic communication with shallow recharge sources.

There is little spatial variability in the solute geochemical type of Blackhawk Formation springs in the region. Blackhawk Formation groundwaters are of the calcium-bicarbonate or calcium-magnesium-bicarbonate solute type. TDS concentrations are generally low to moderate (Table 2; UDGOM, 2013). The overwhelming influence of the influx of annual snowmelt recharge to groundwater systems supporting some springs results in limited opportunity for the waters to chemically react with the soil and bedrock minerals present in the groundwater system.

8.0 Recommendations

We recommend the continued monitoring of groundwaters and surface waters in the North Lease expansion area as necessary prior to the beginning of mining operations in the area. The purpose of the ongoing hydrologic monitoring would be to augment the current characterization of groundwater and surface-water systems, and to further document the influence of seasonal and climatic variability on groundwater and surface-water resources in the area.

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Please feel free to contact me should you have any questions in this regard.

Sincerely,

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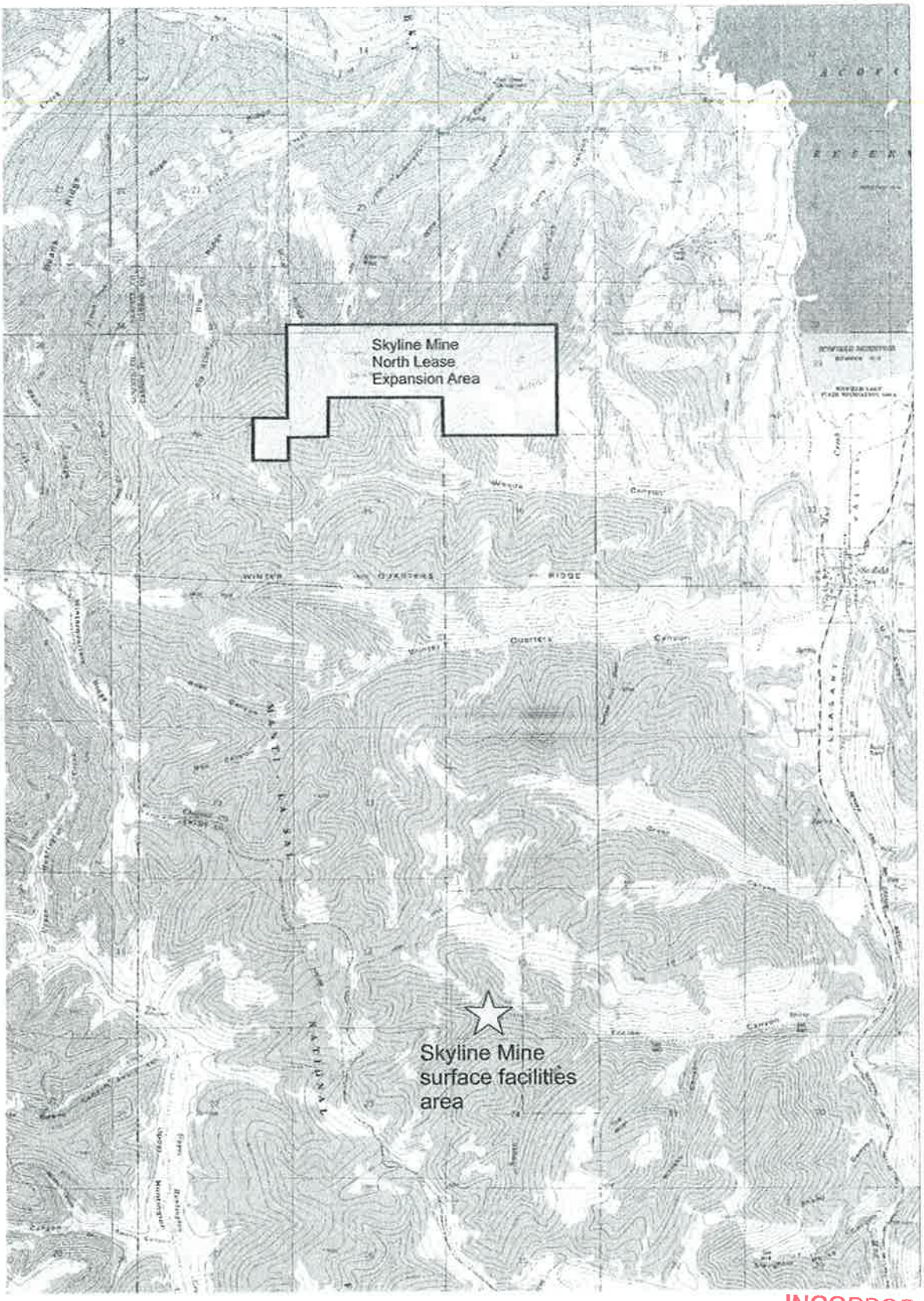

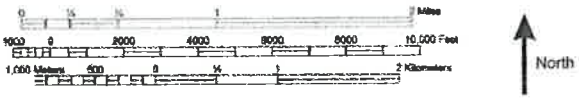

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Figure 1 Location of Skyline Mine North Lease expansion area.

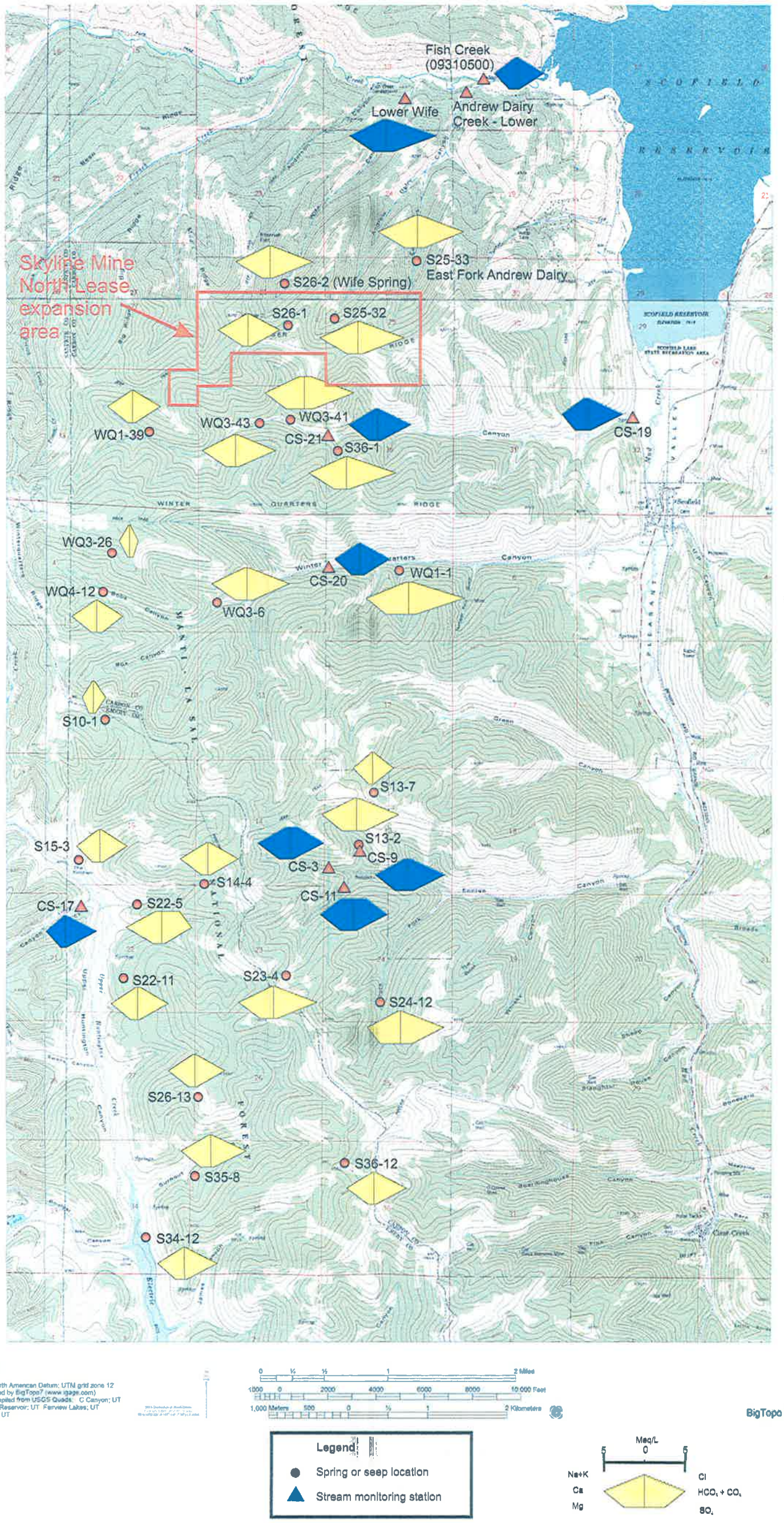

Figure 2 Stiff diagrams for selected spring and stream monitoring stations.

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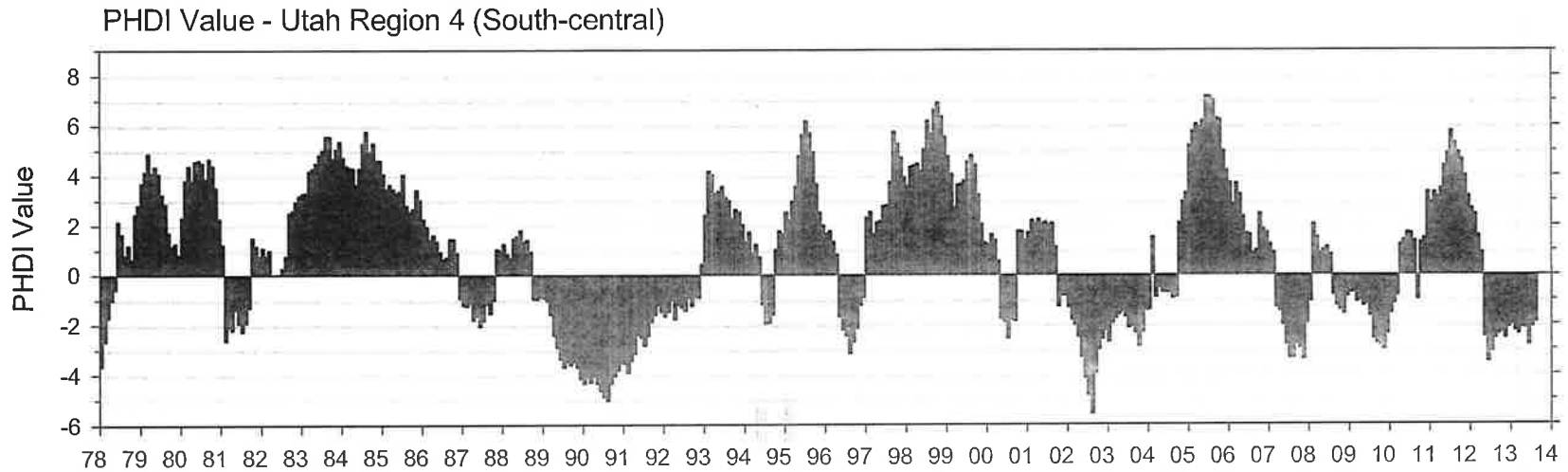

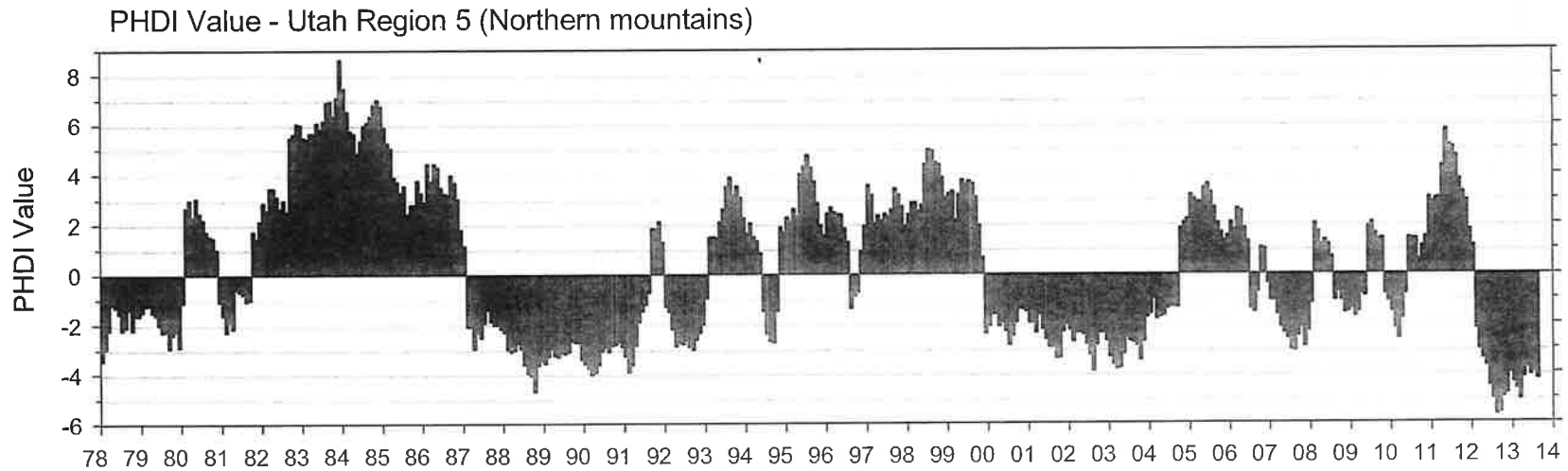

-1 to -2	Mild Drought	1 to 2	Mild Wet Spell
-2 to -3	Moderate Drought	2 to 3	Moderate Wet Spell
-3 to -4	Severe Drought	3 to 4	Severe Wet Spell
-4 to -5	Extreme Drought	4 to 5	Extreme Wet Spell

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Figure 3 Plots of Palmer Hydrologic Drought Index values for Utah Regions 4 and 5.

Figure 4

Plots of discharge rates, important water quality parameters, and drought indices for groundwaters and surface waters.

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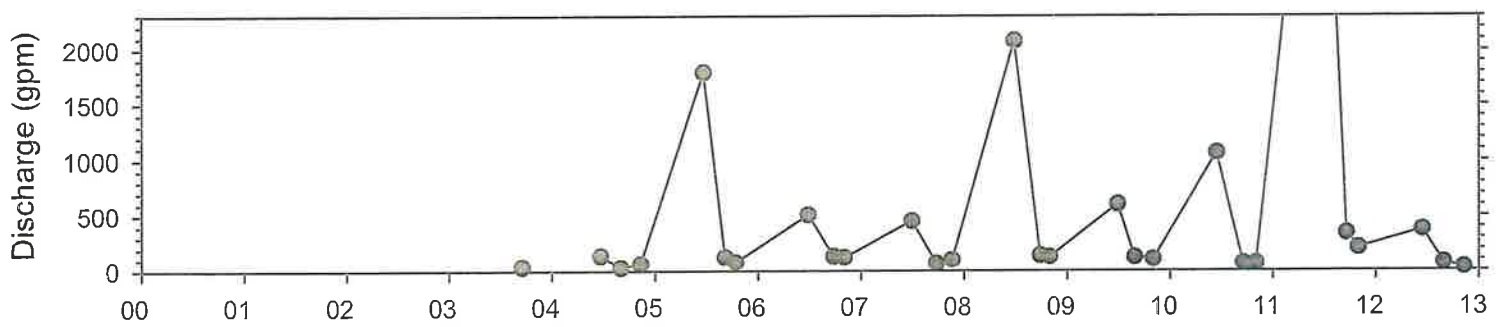

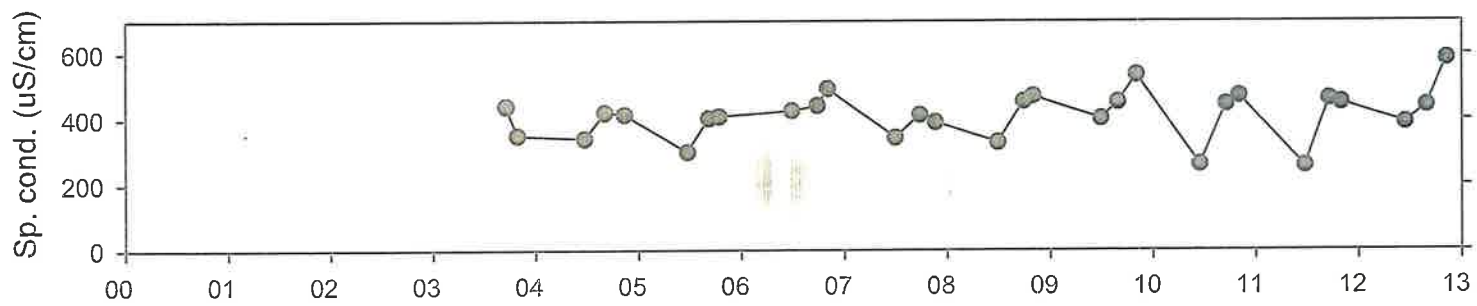

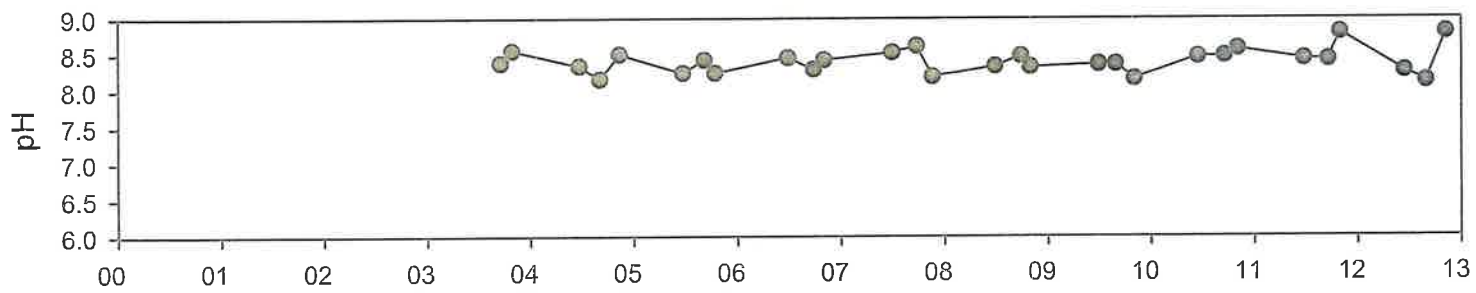

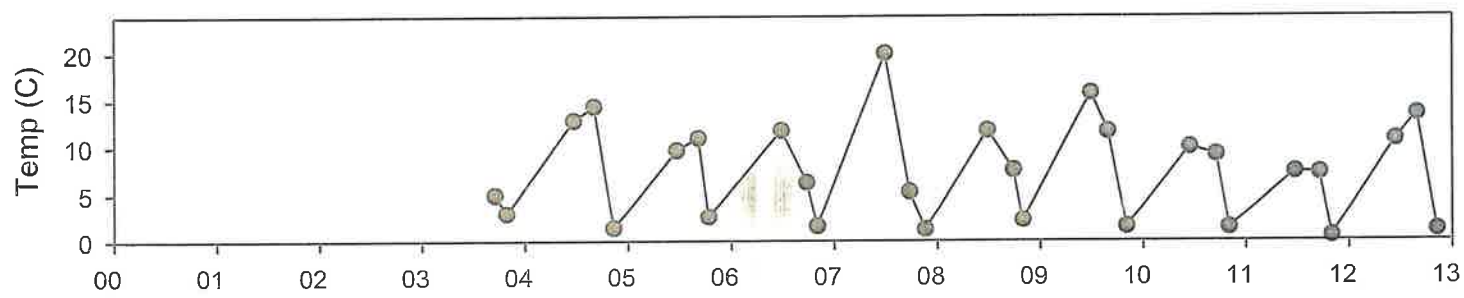

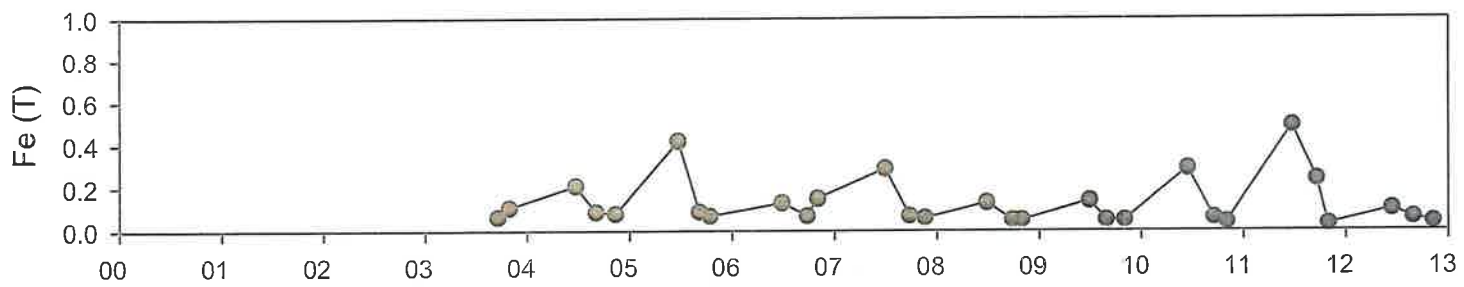

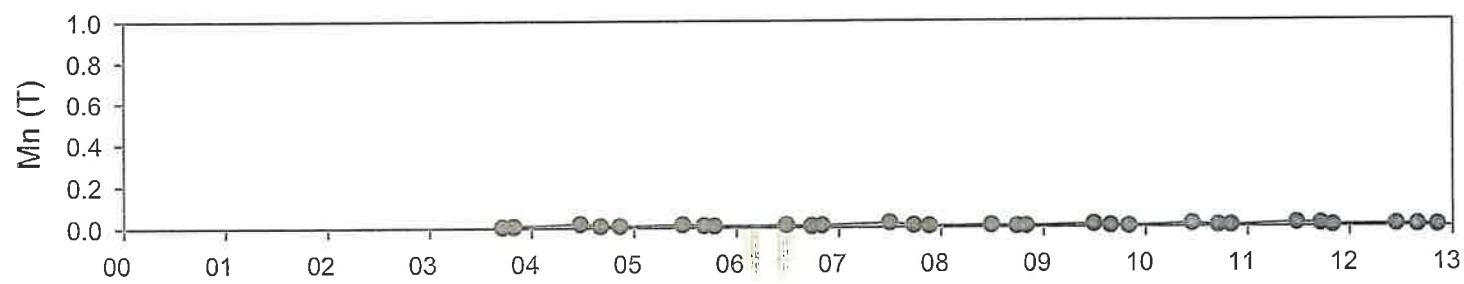

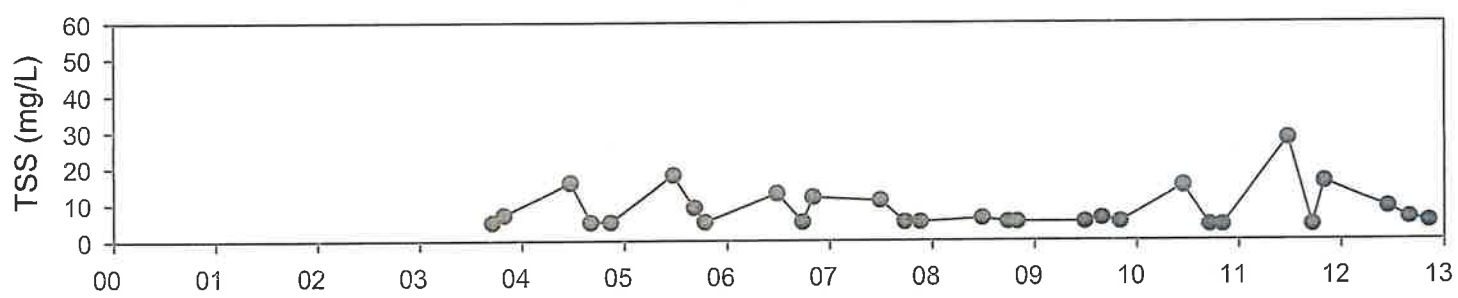

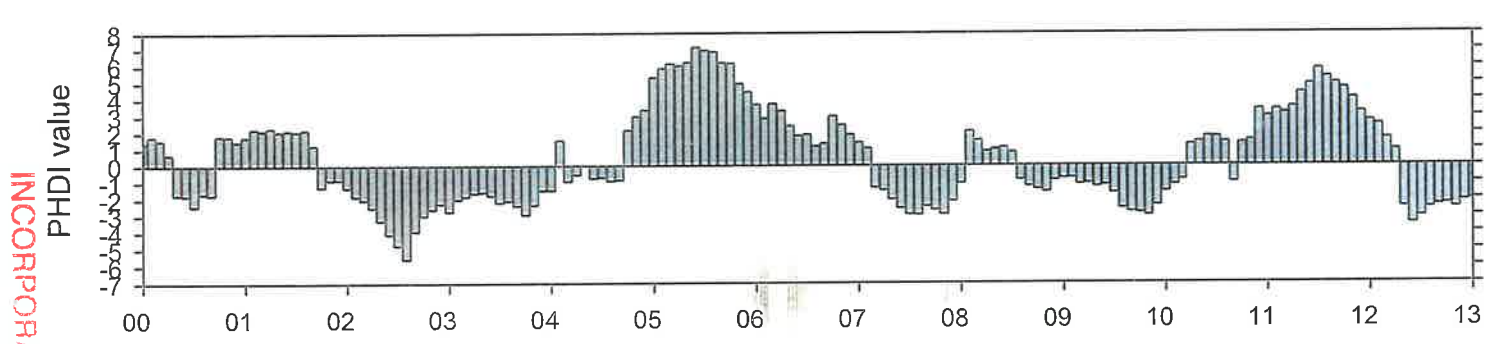

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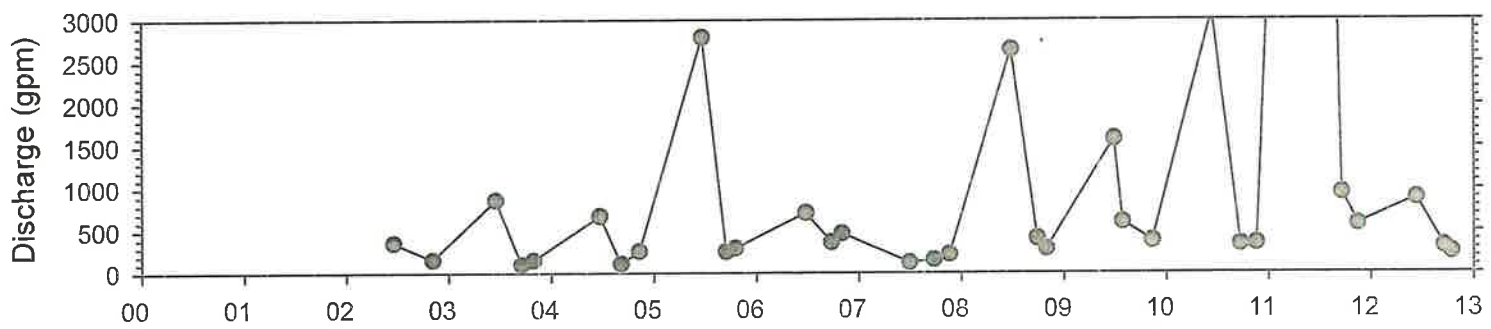

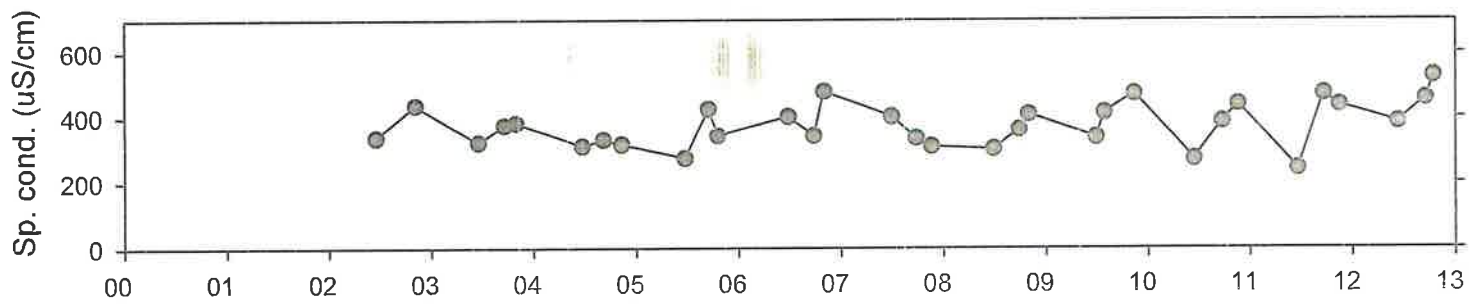

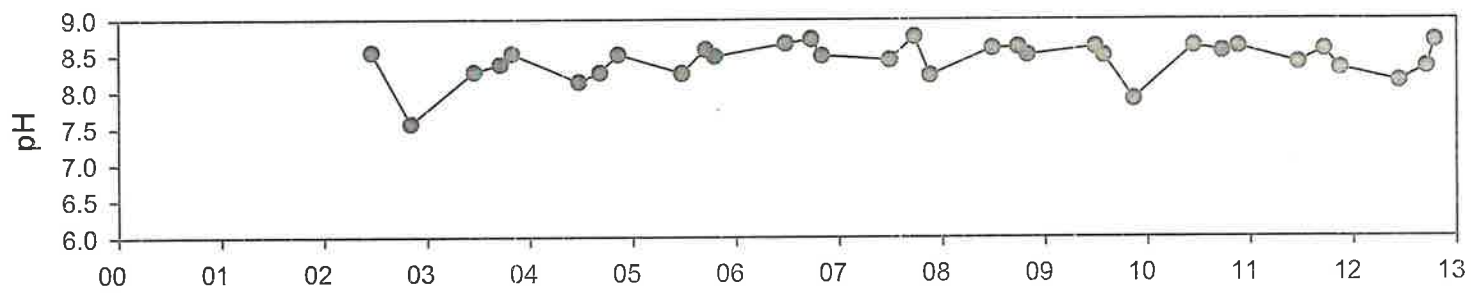

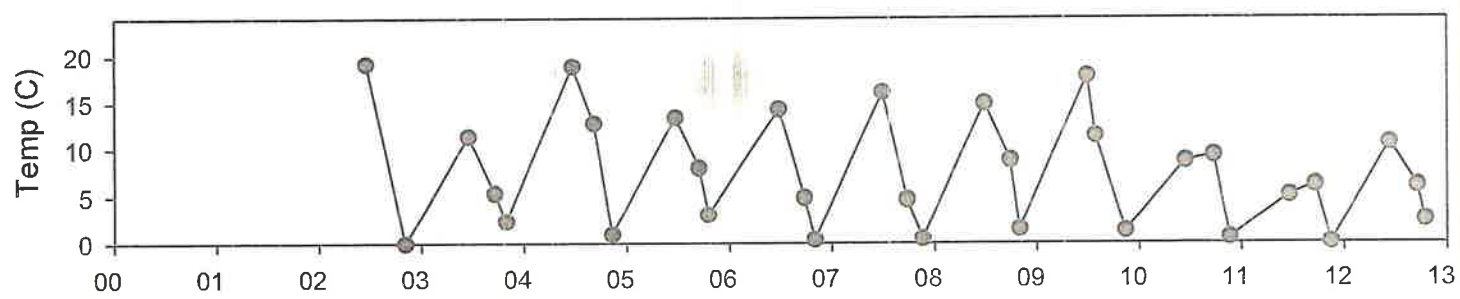

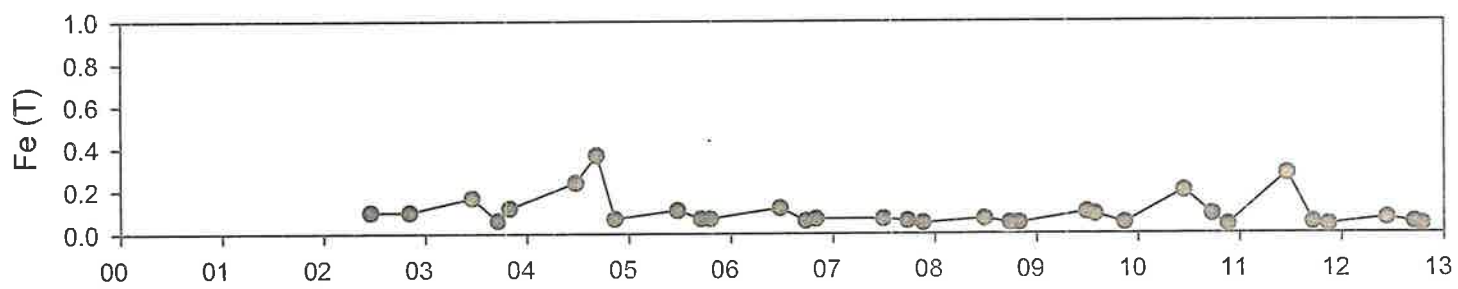

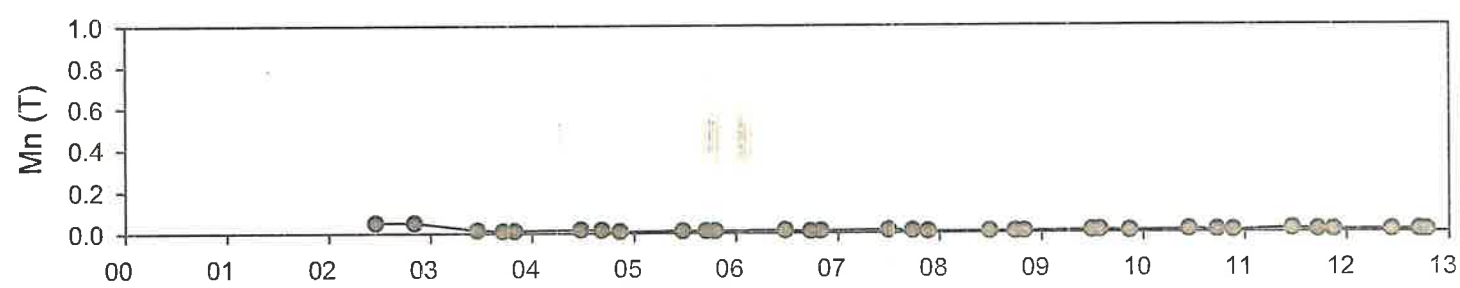

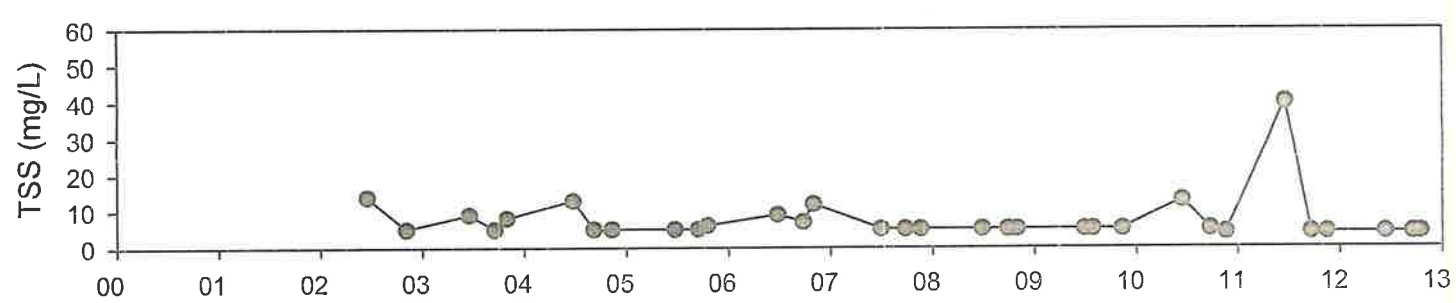

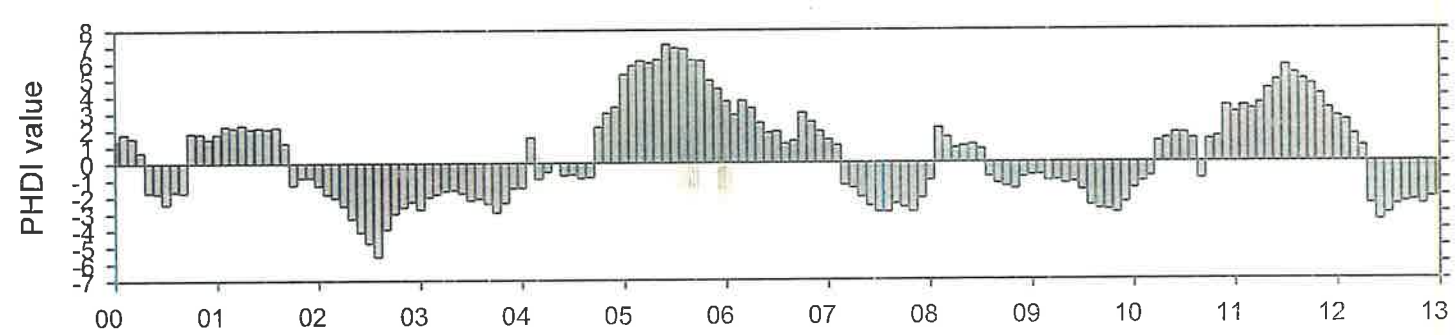

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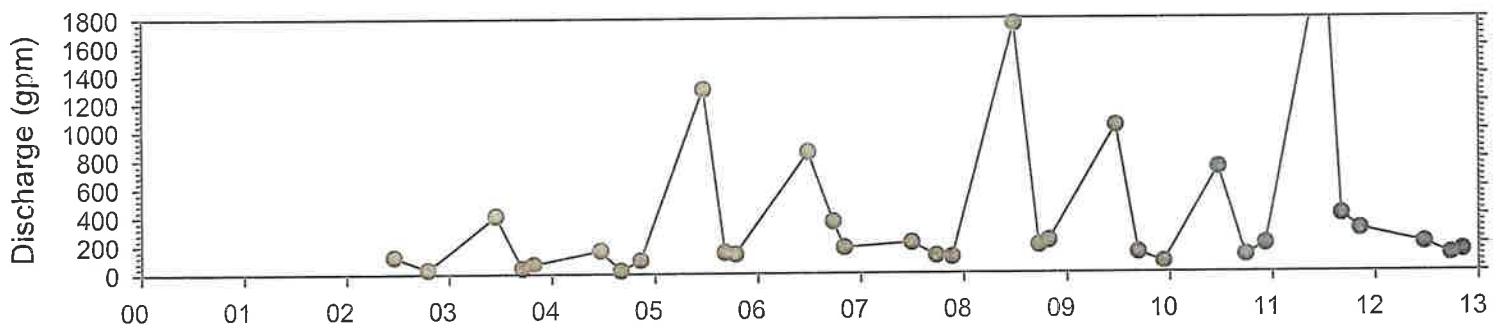
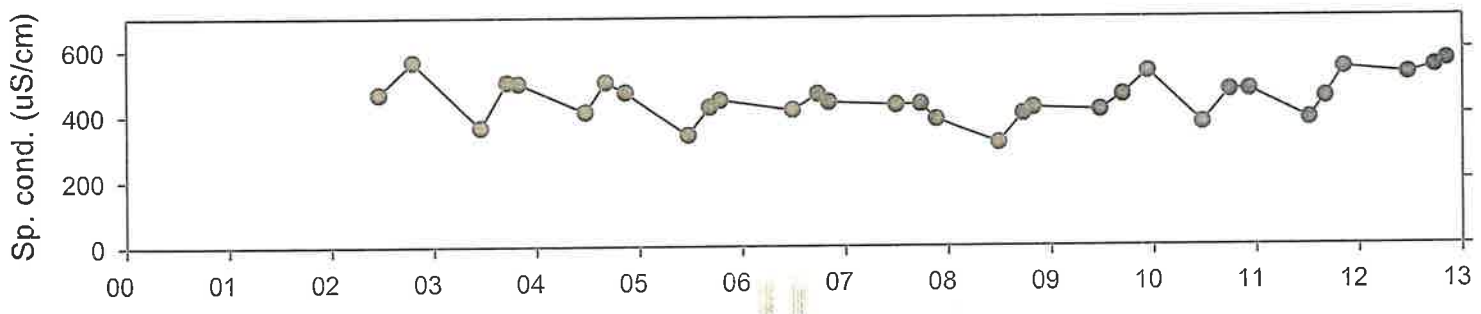
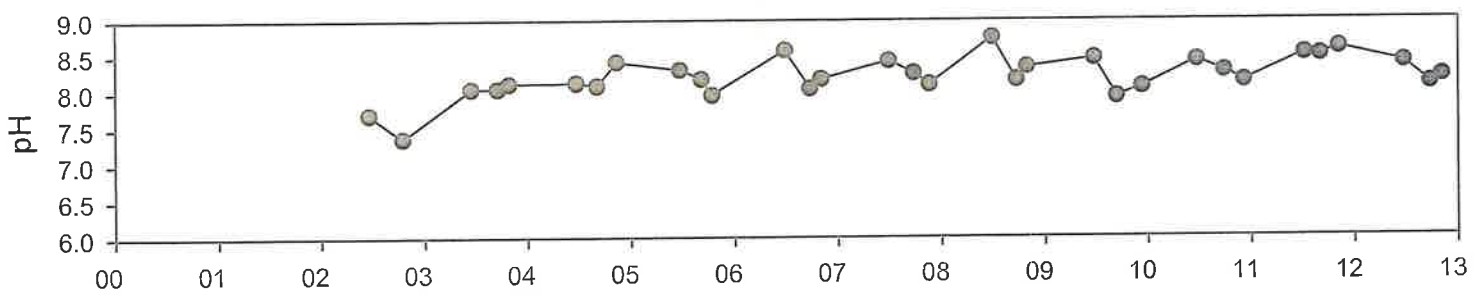
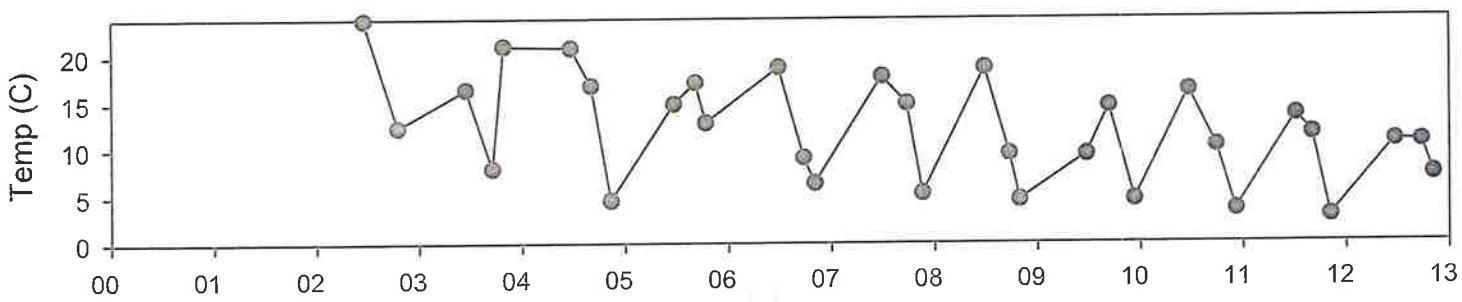
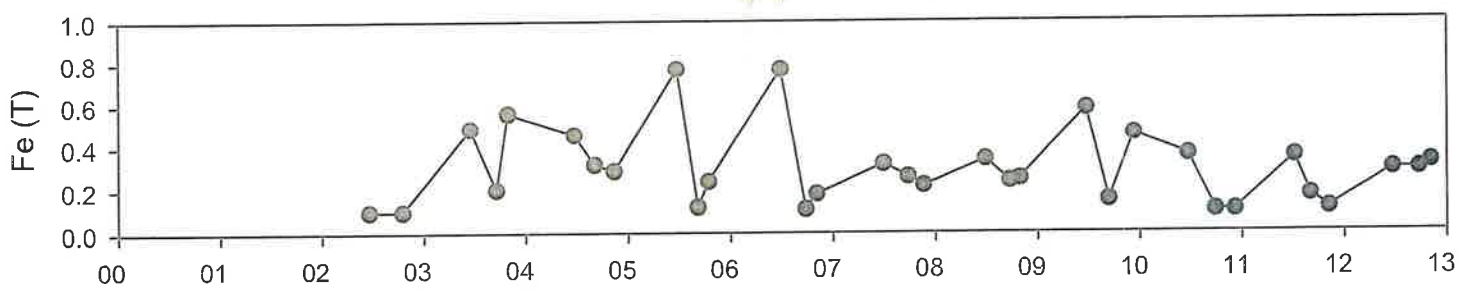
Creek CS-19

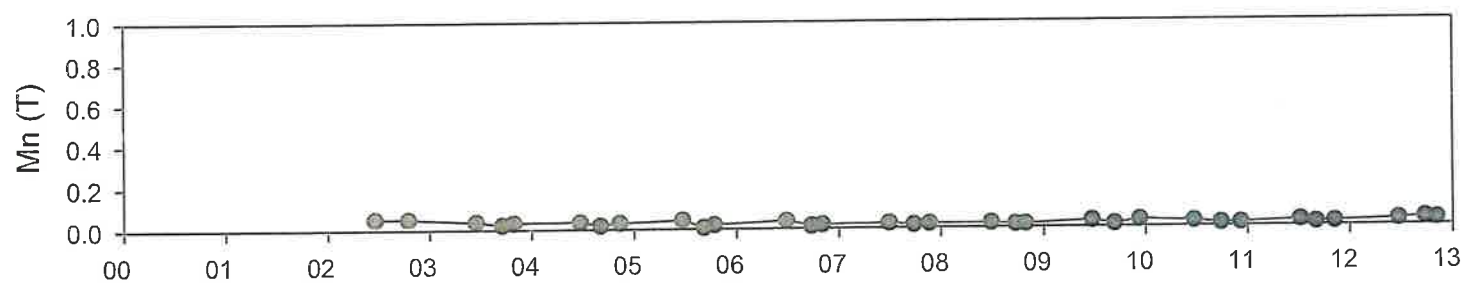


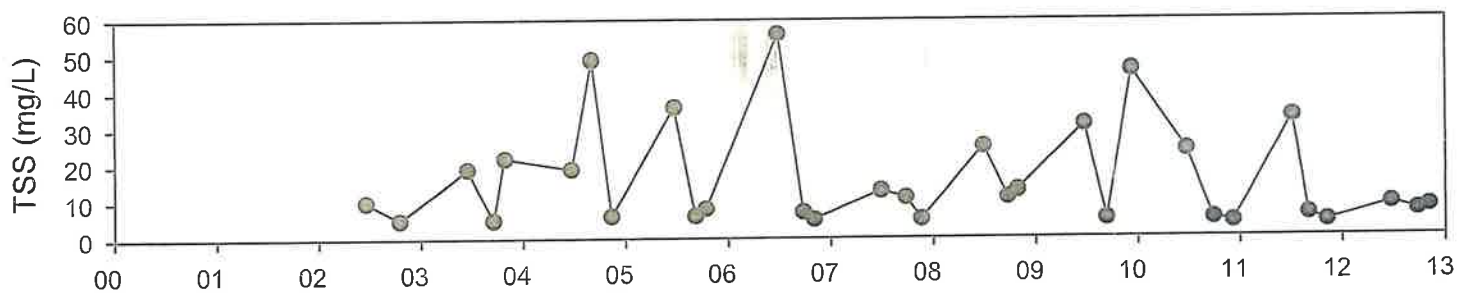


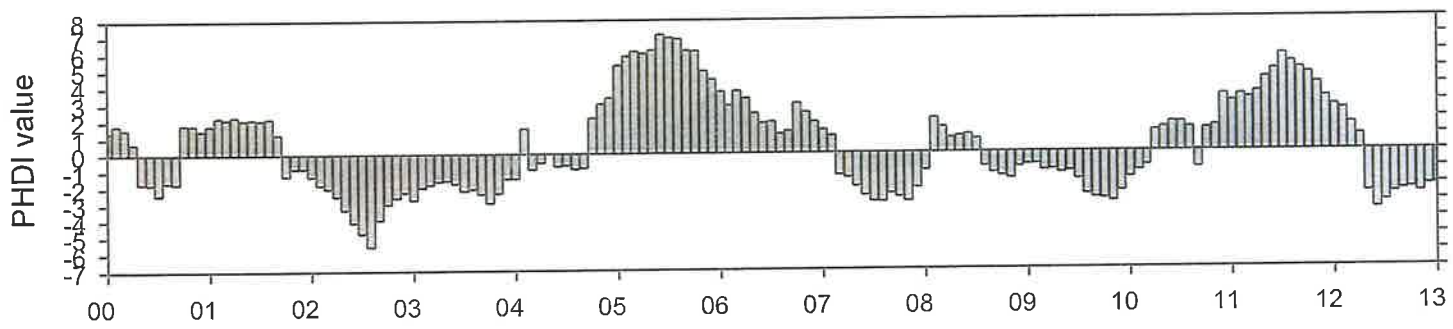












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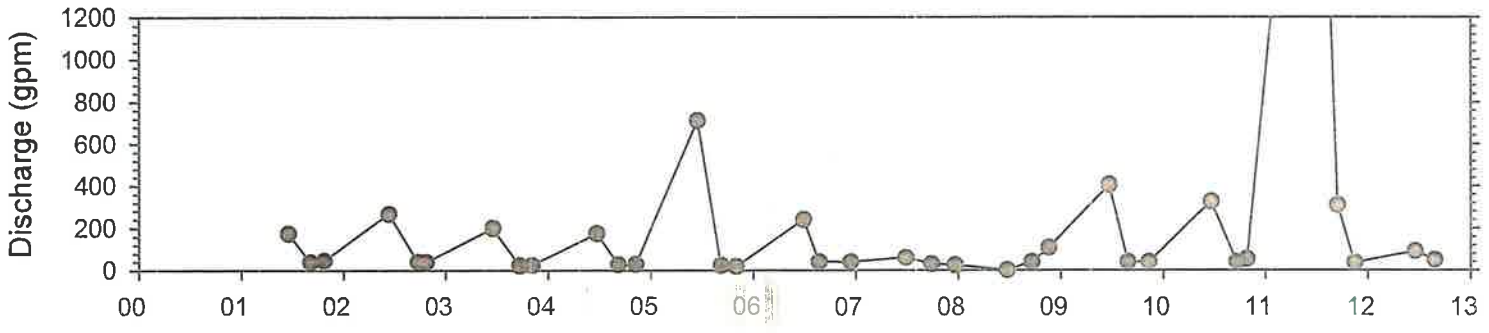
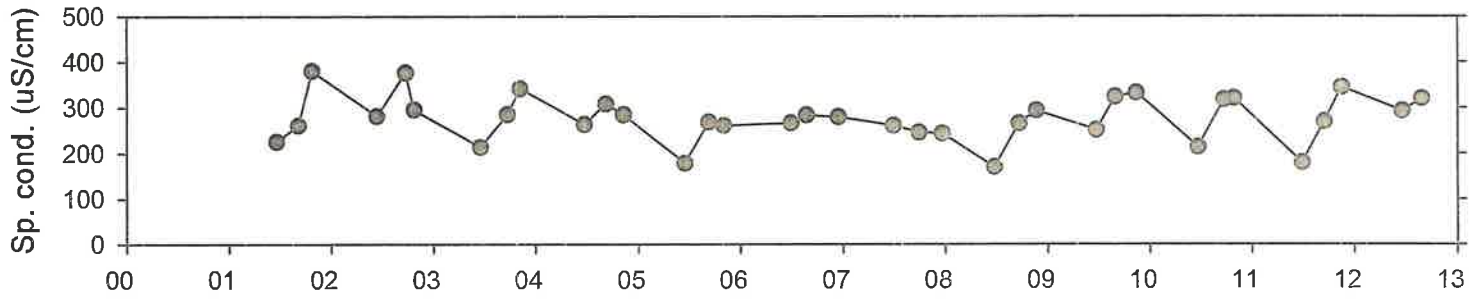
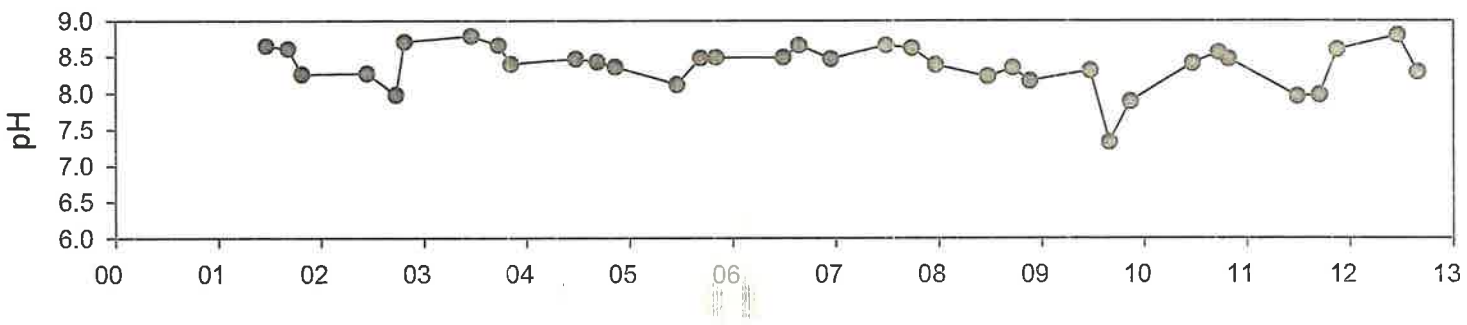
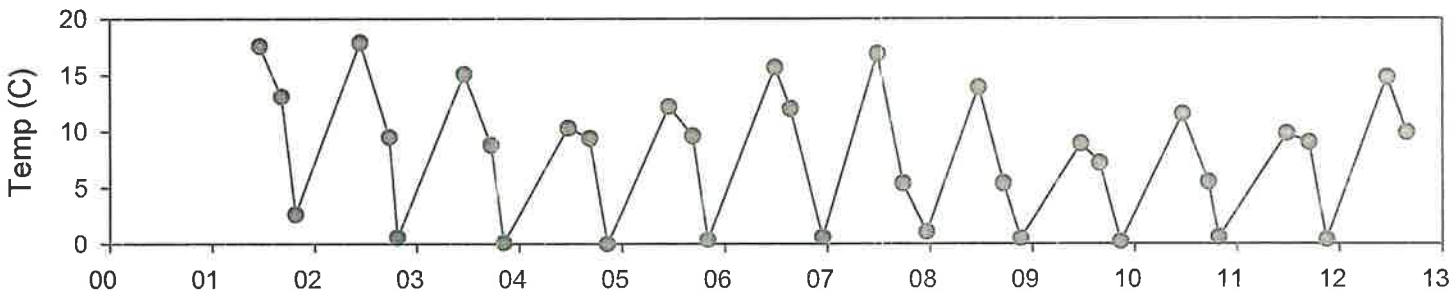
Div. of Oil, Gas & Mining

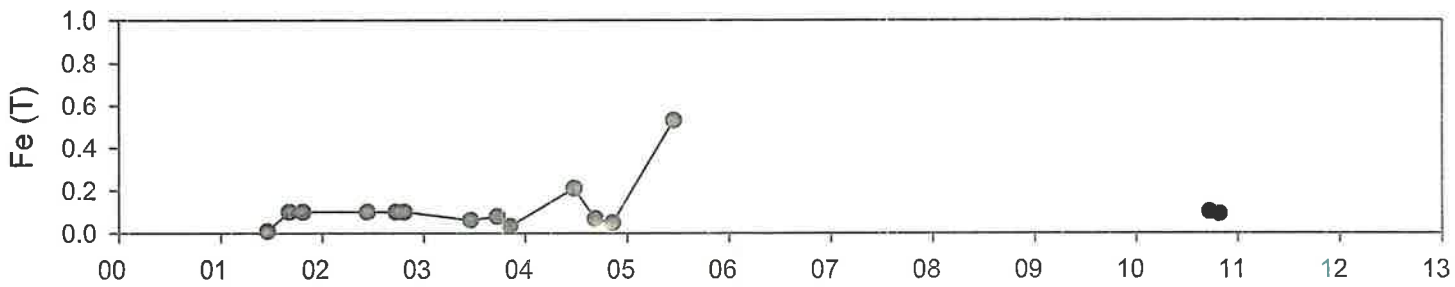
Creek CS-17

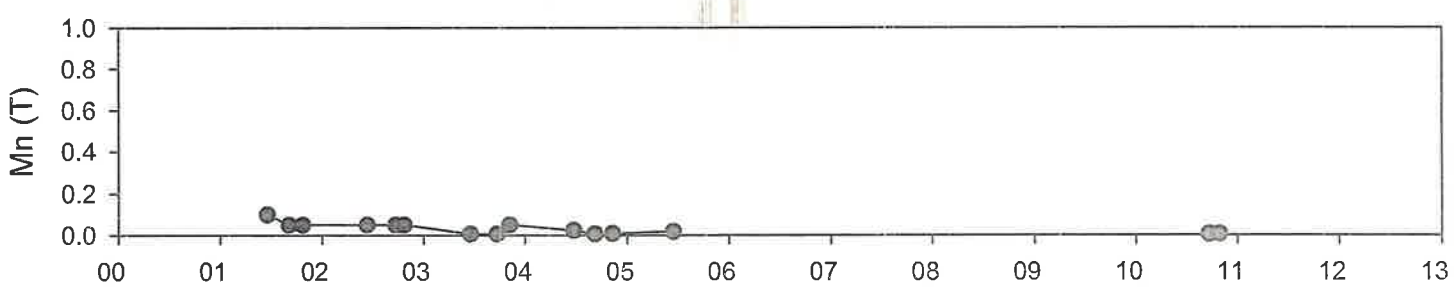


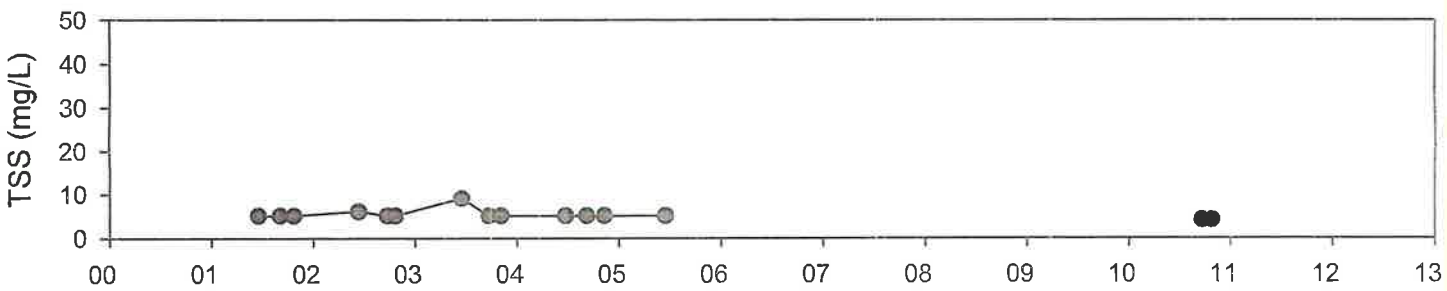


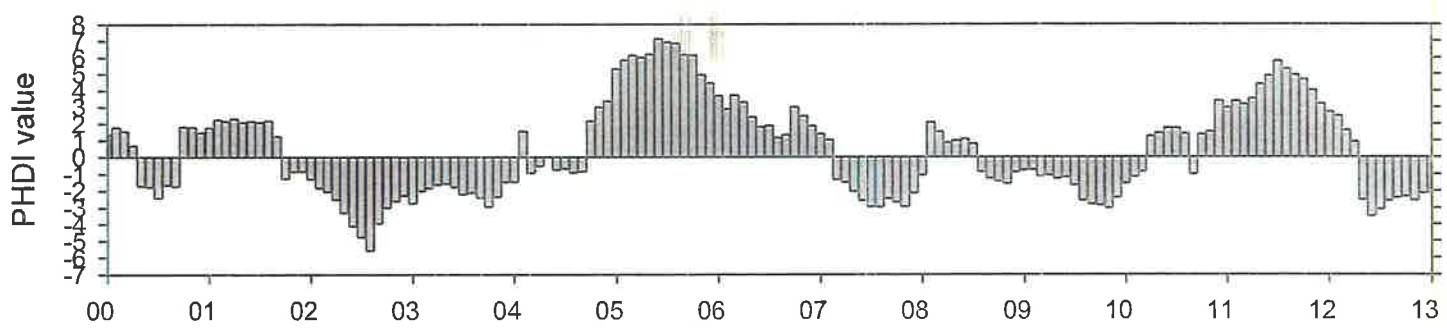












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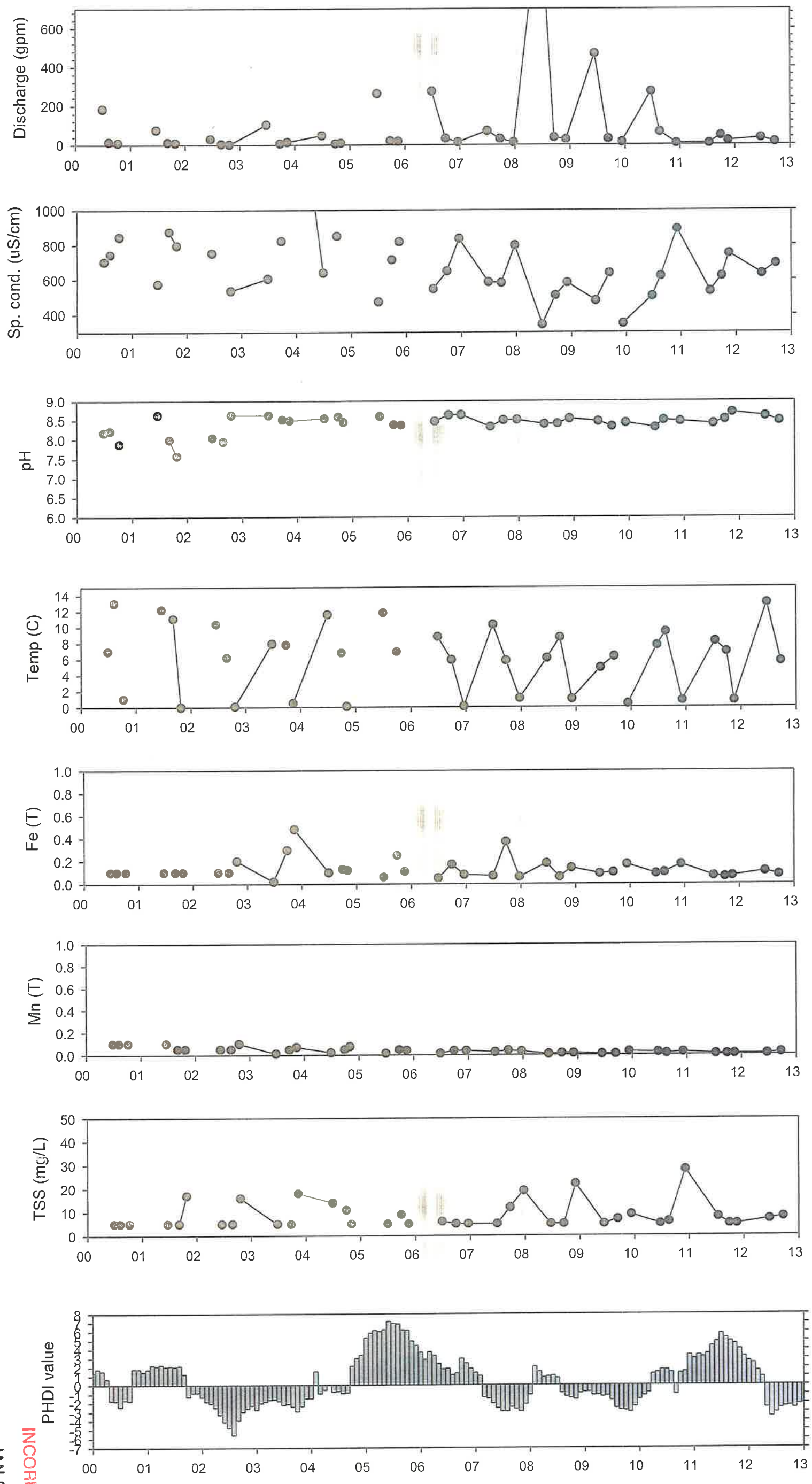
Creek CS-11



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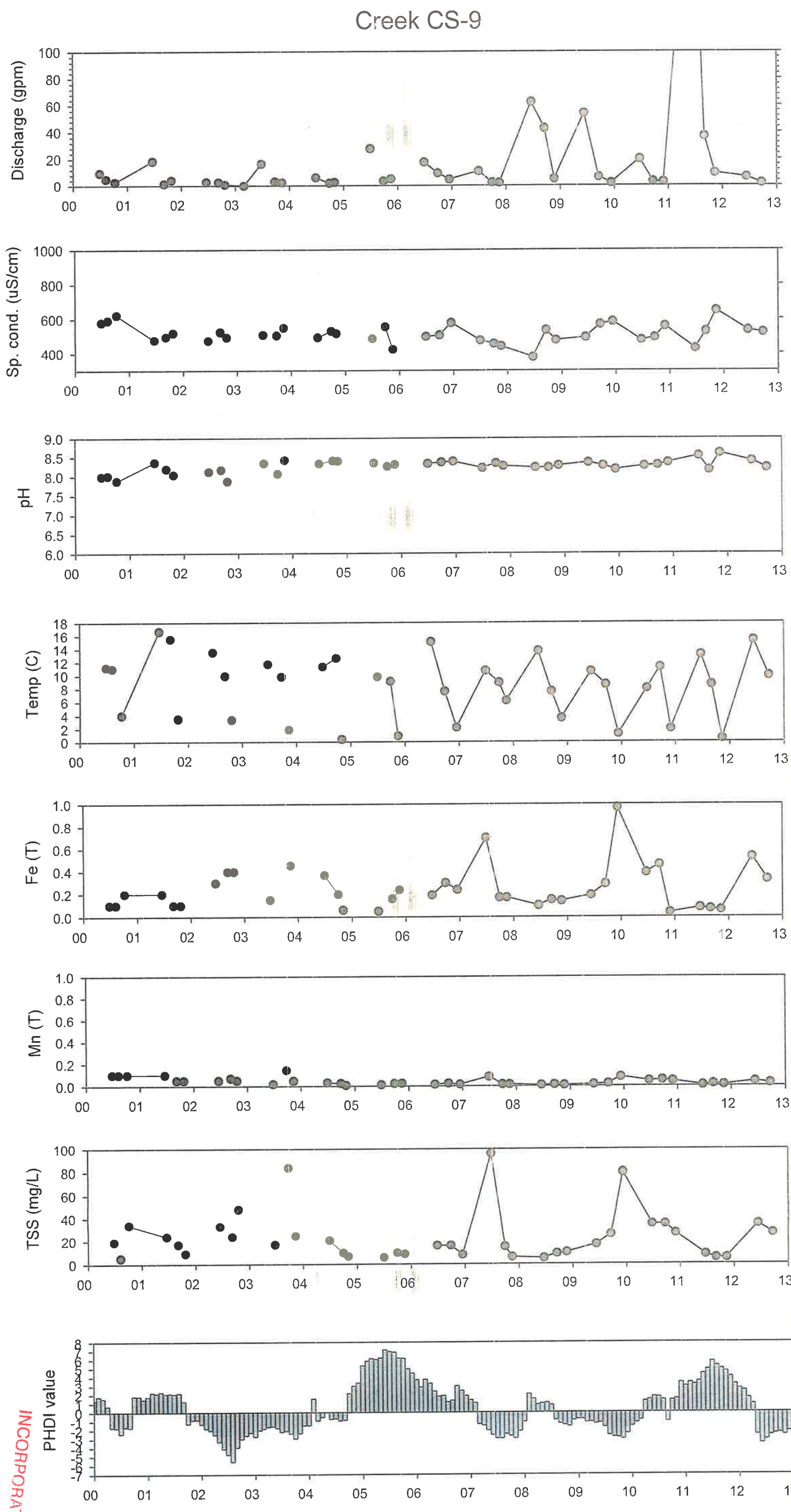

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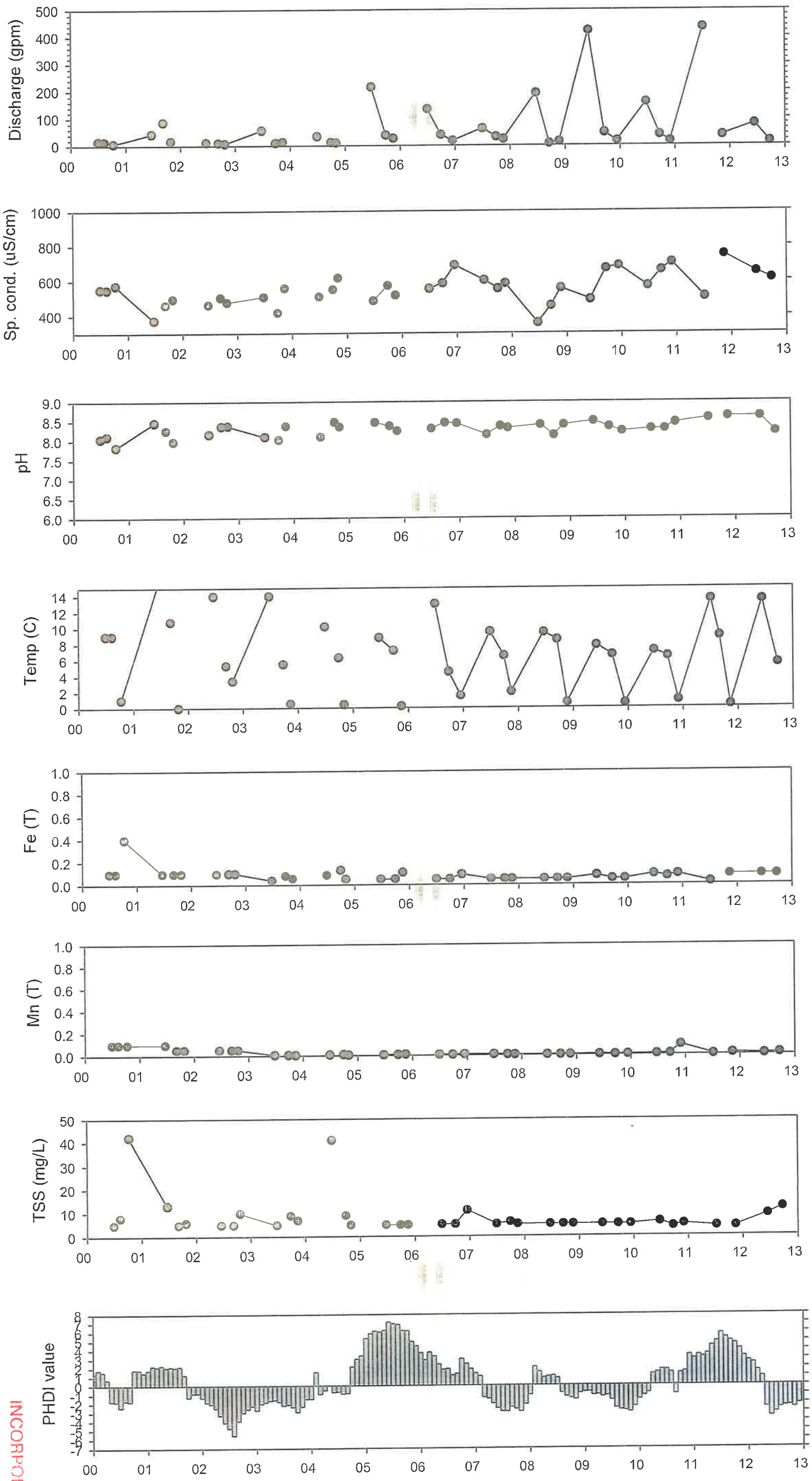
Creek CS-3



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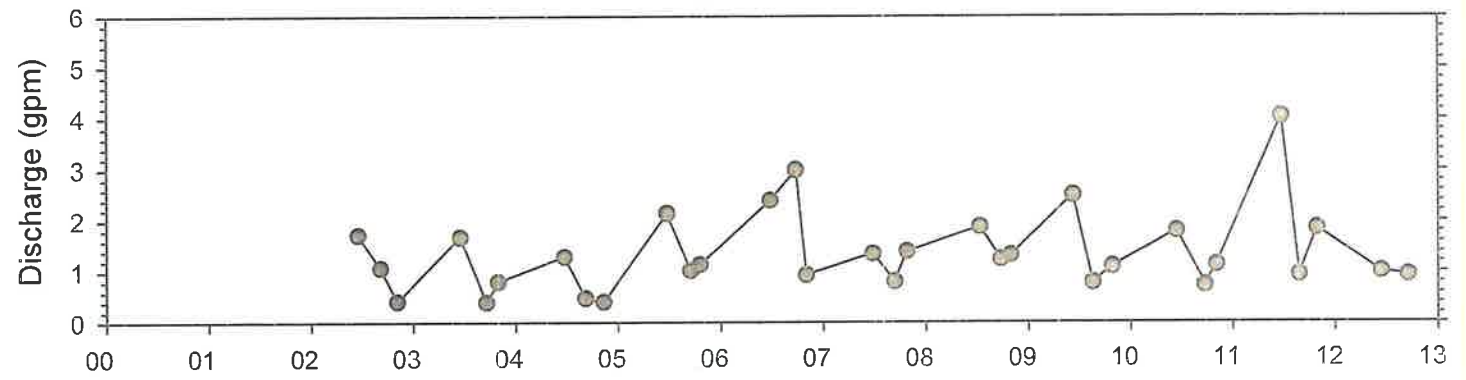
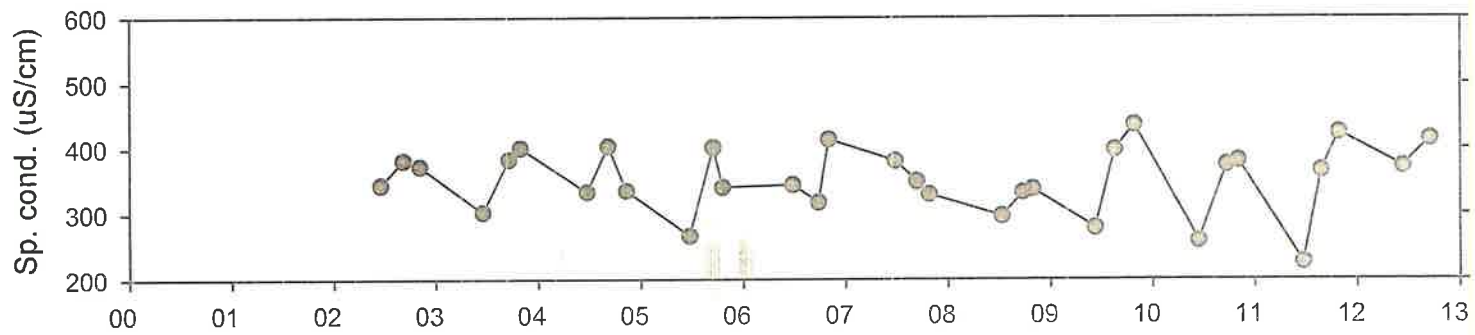
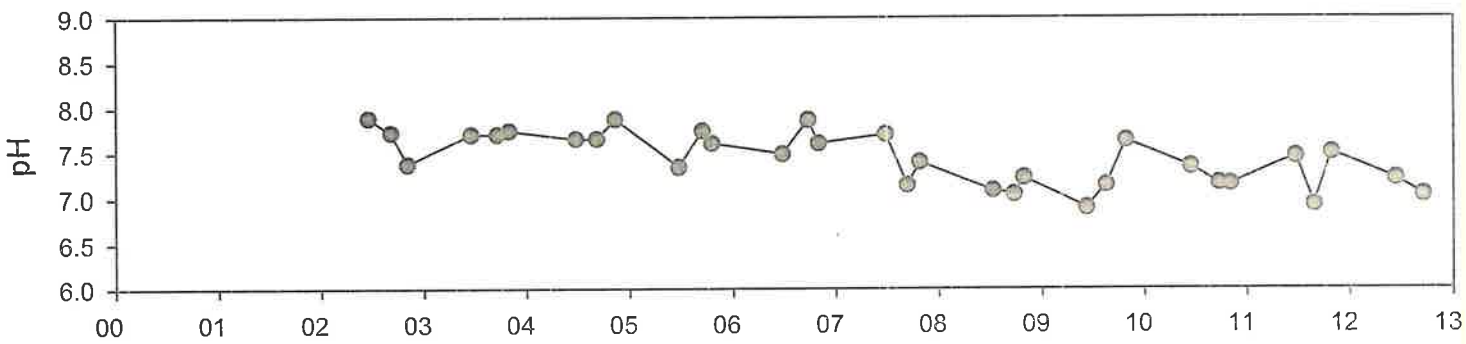
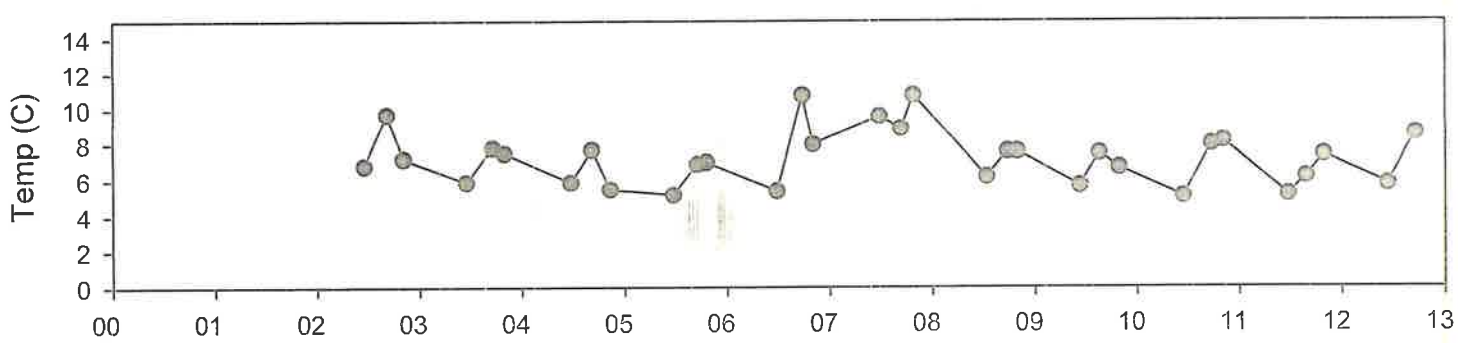
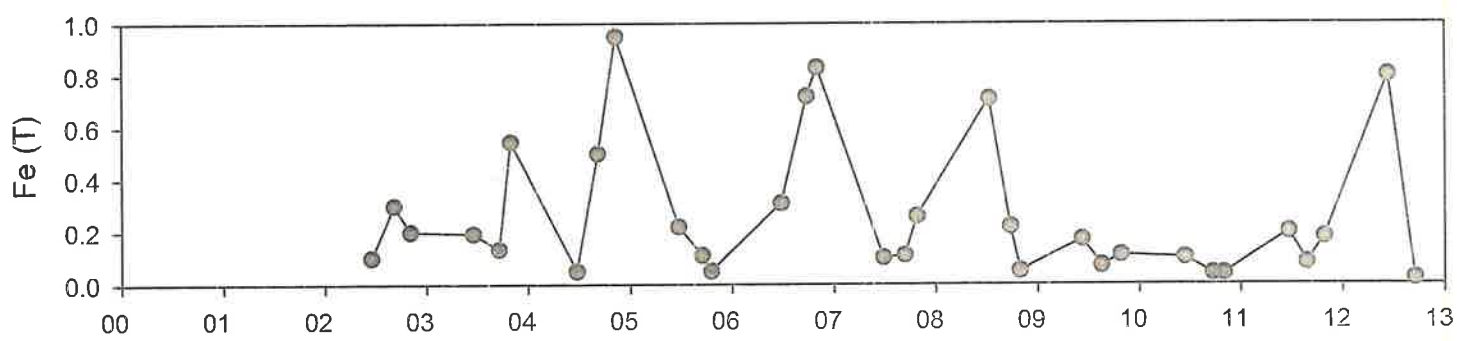
Spring WQ4-12

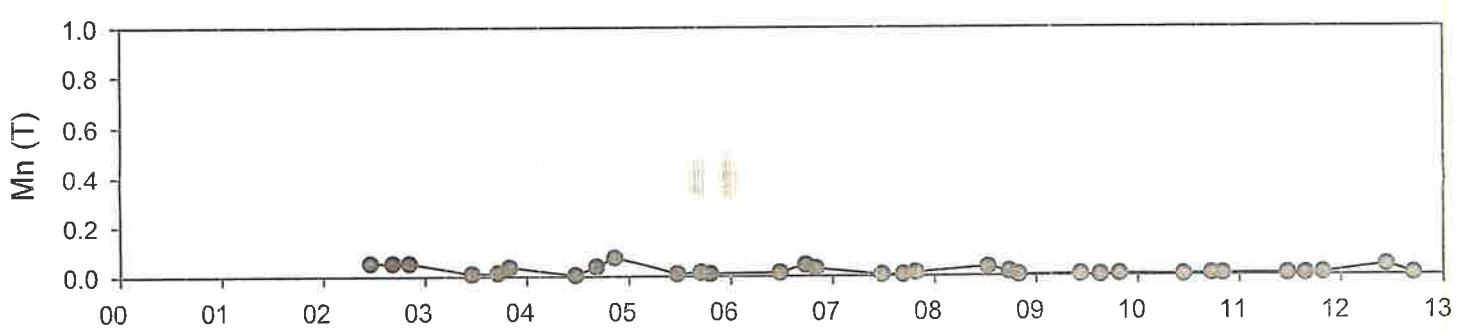


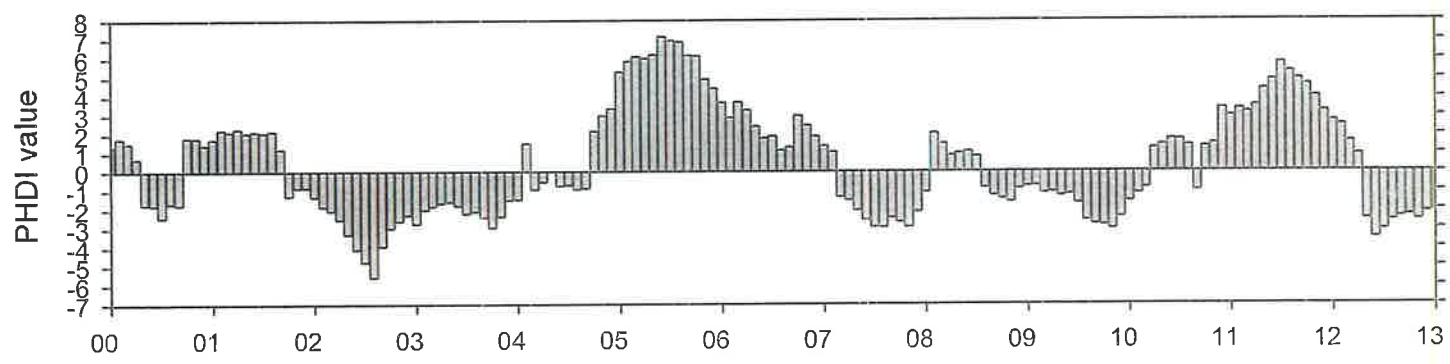












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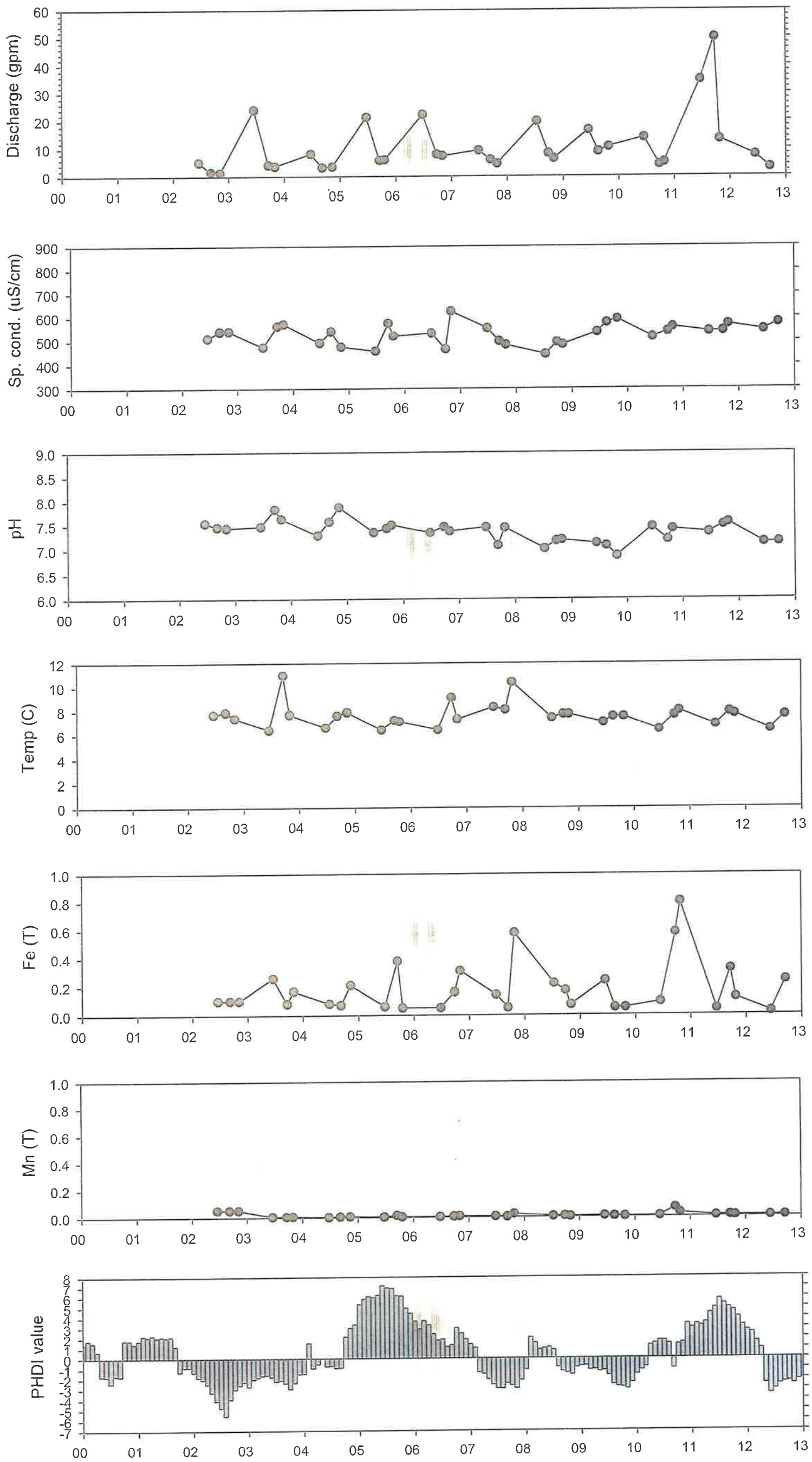
Spring WQ3-6



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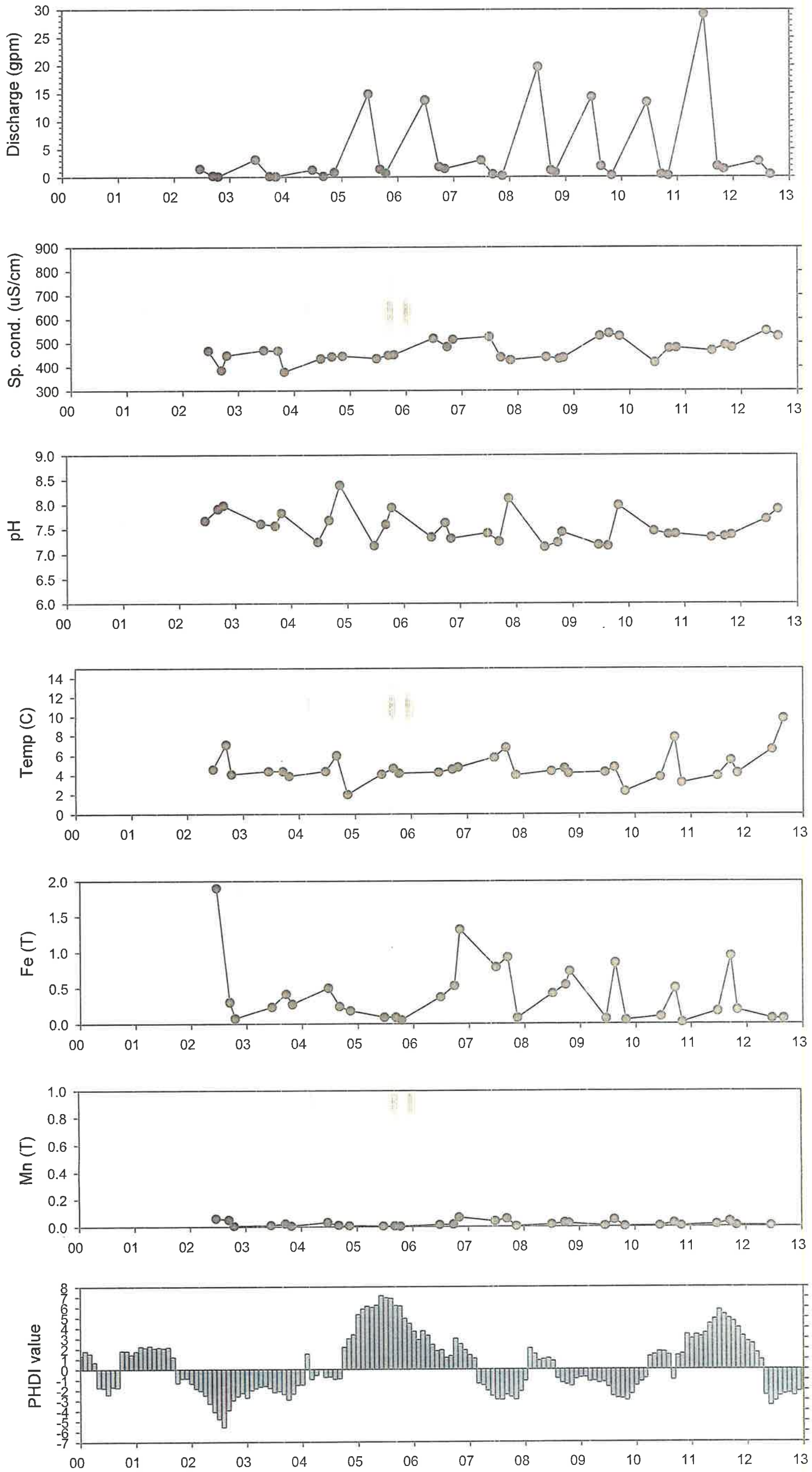
Spring WQ3-43



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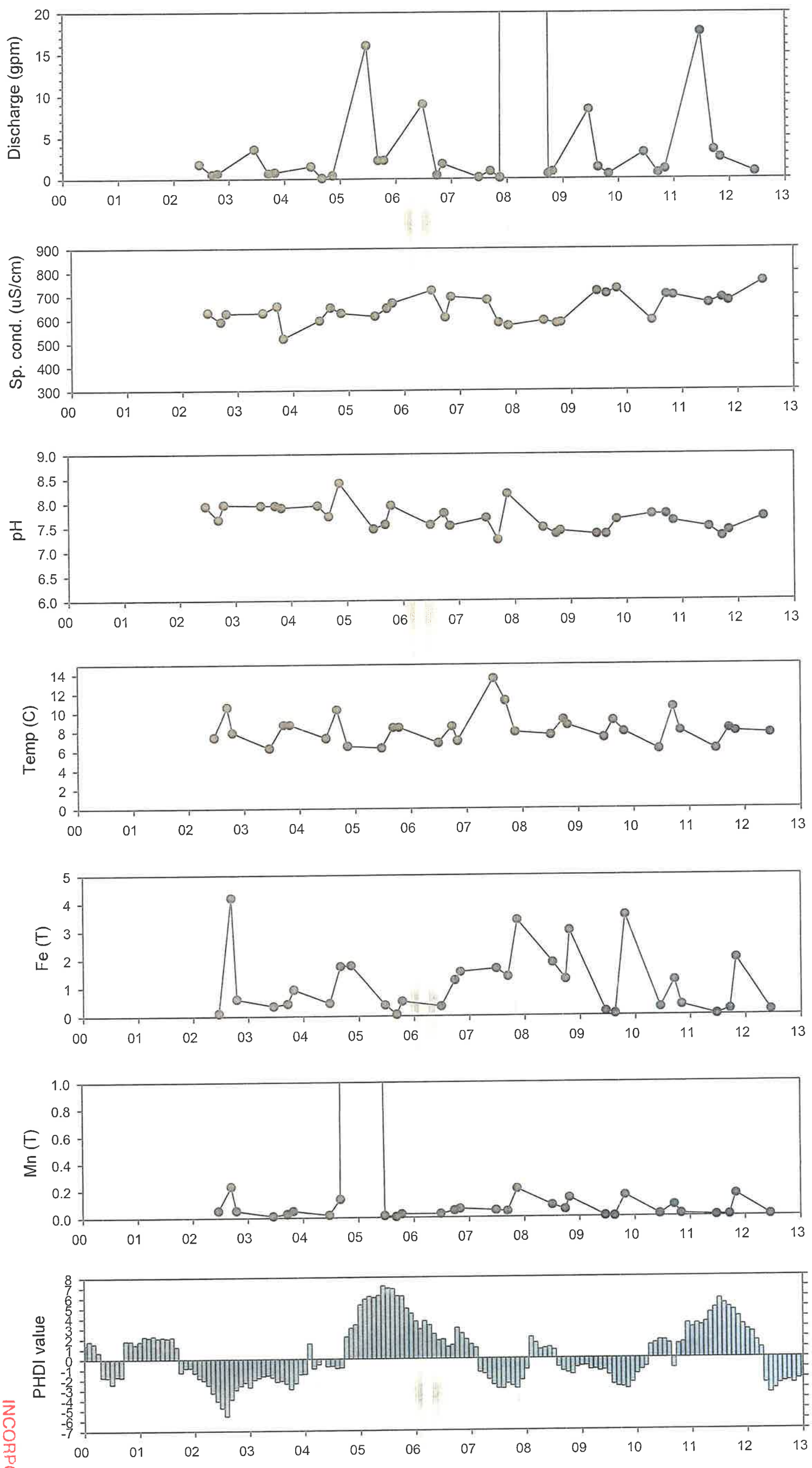
Spring WQ3-41



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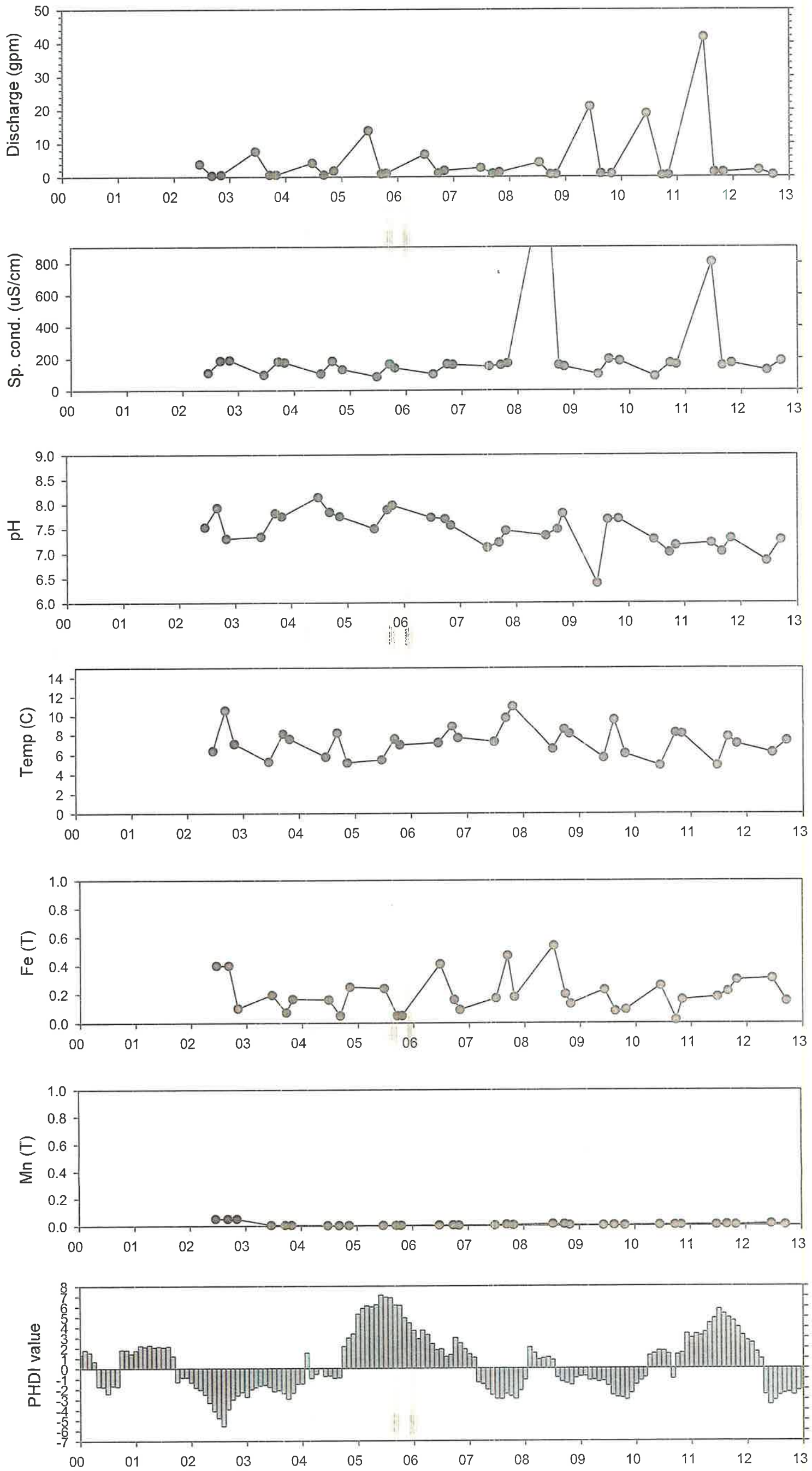
WQ3-26



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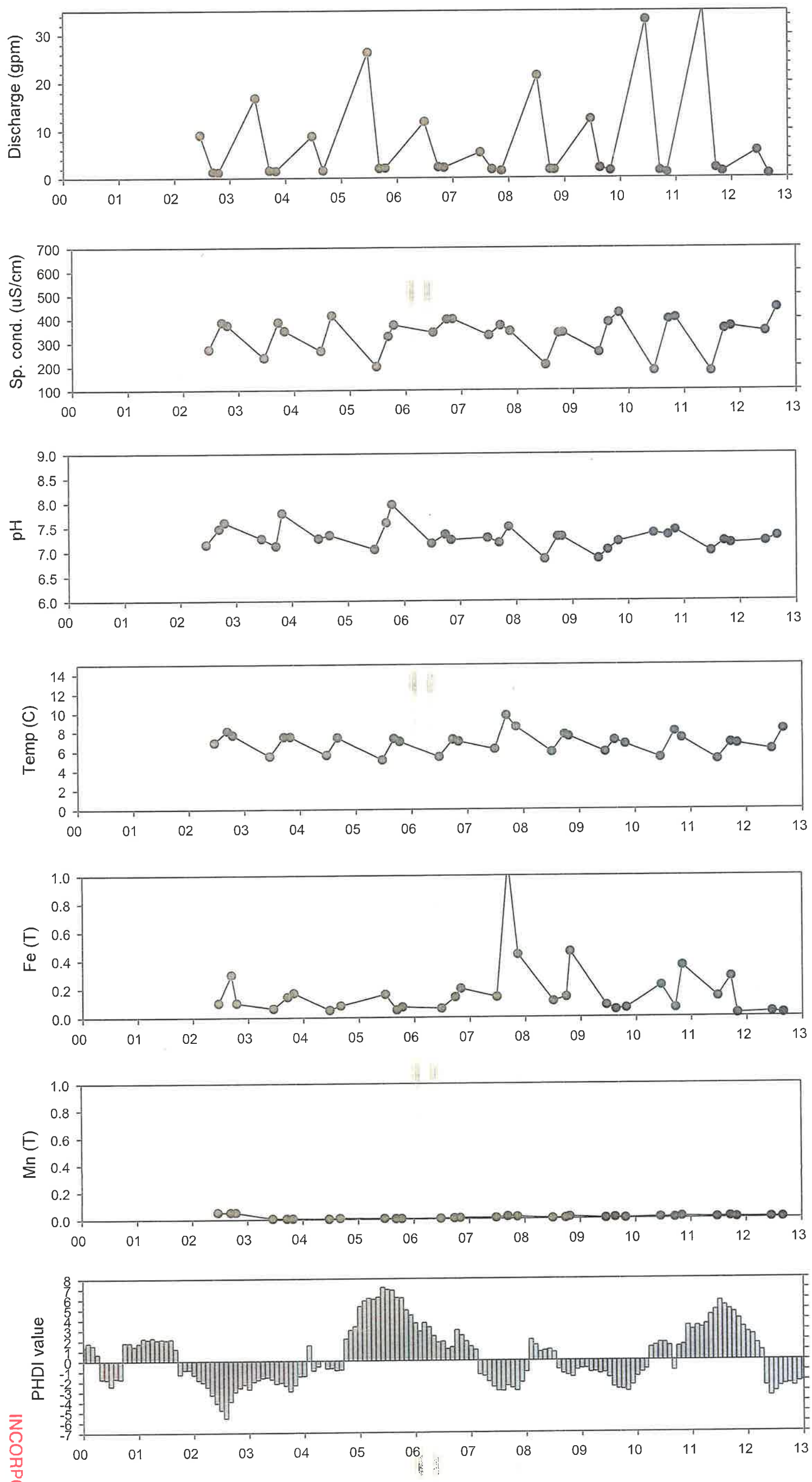
Spring WQ1-39



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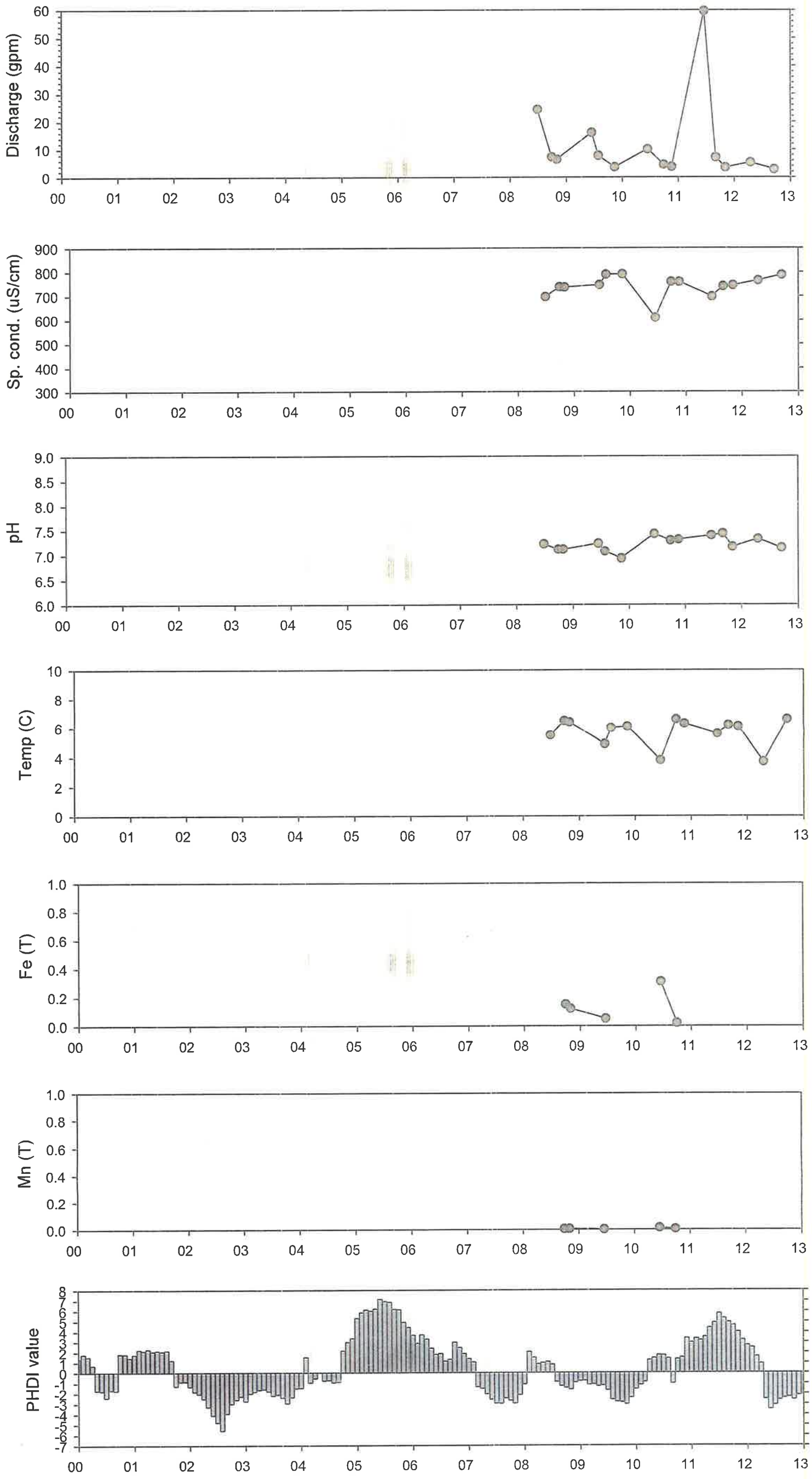
Spring WQ1-1



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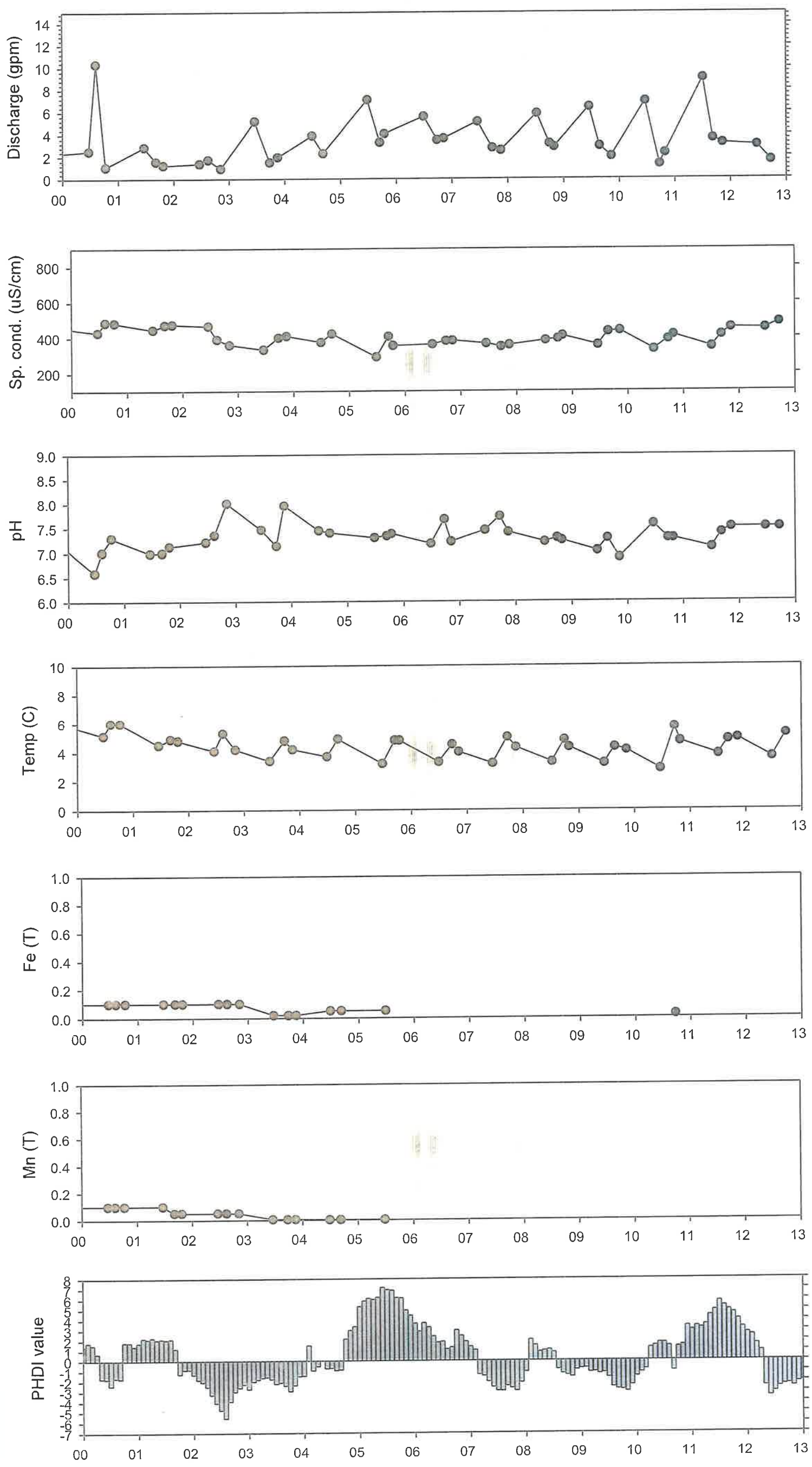
Spring S36-12



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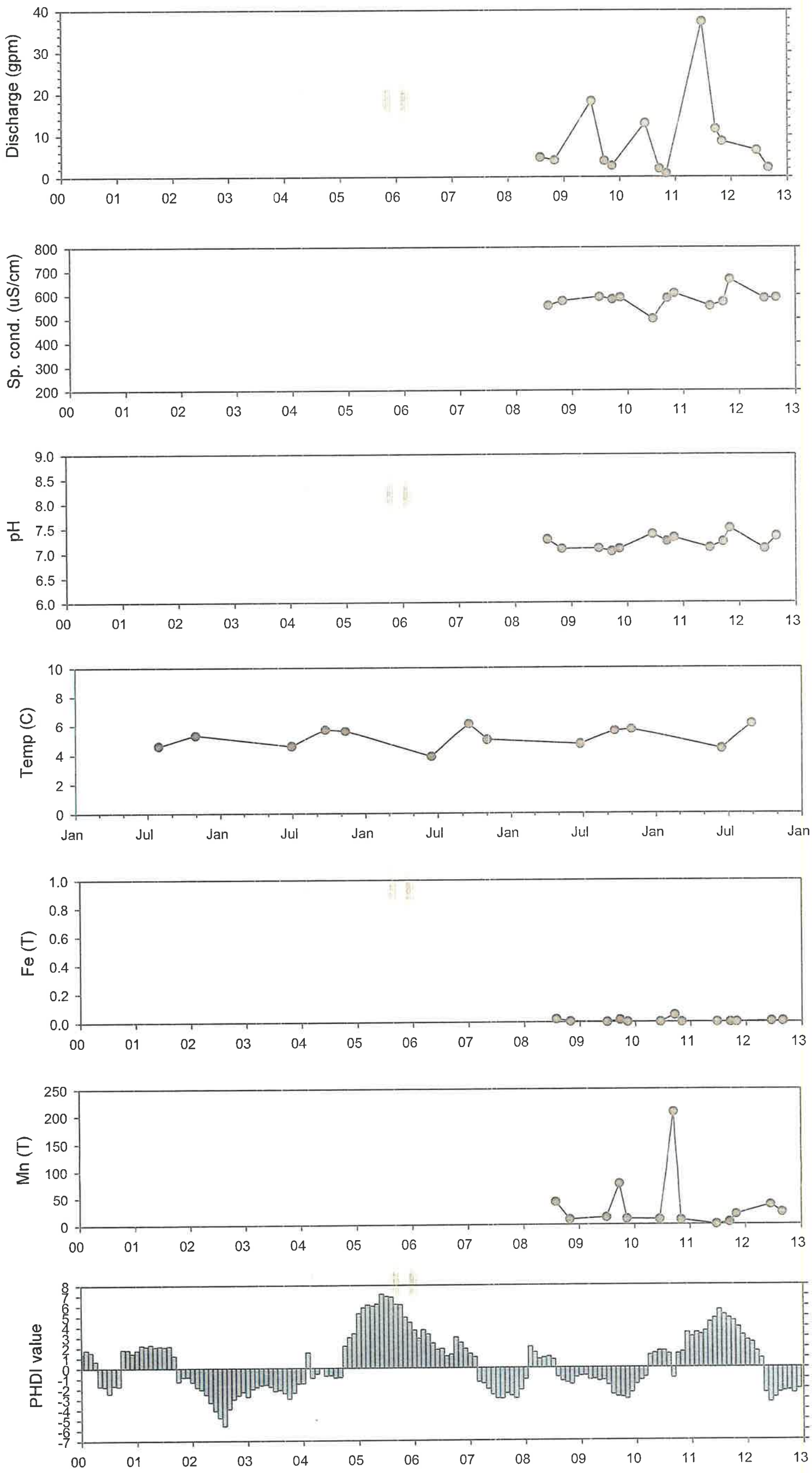
Spring 36-1



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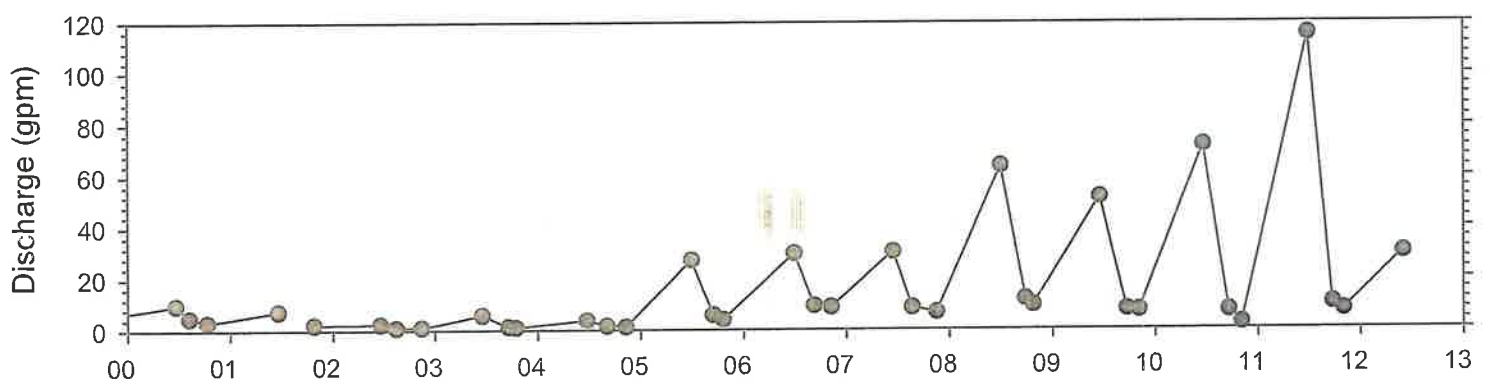
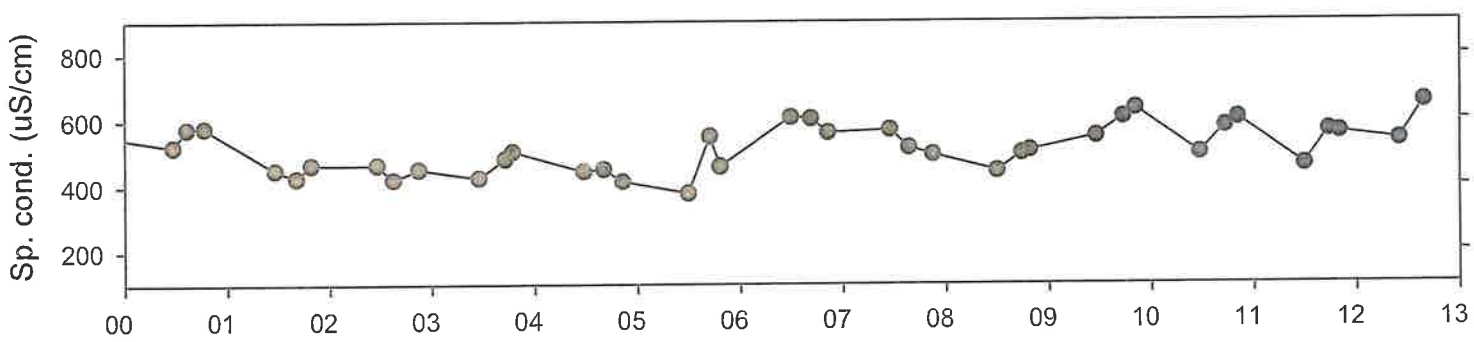
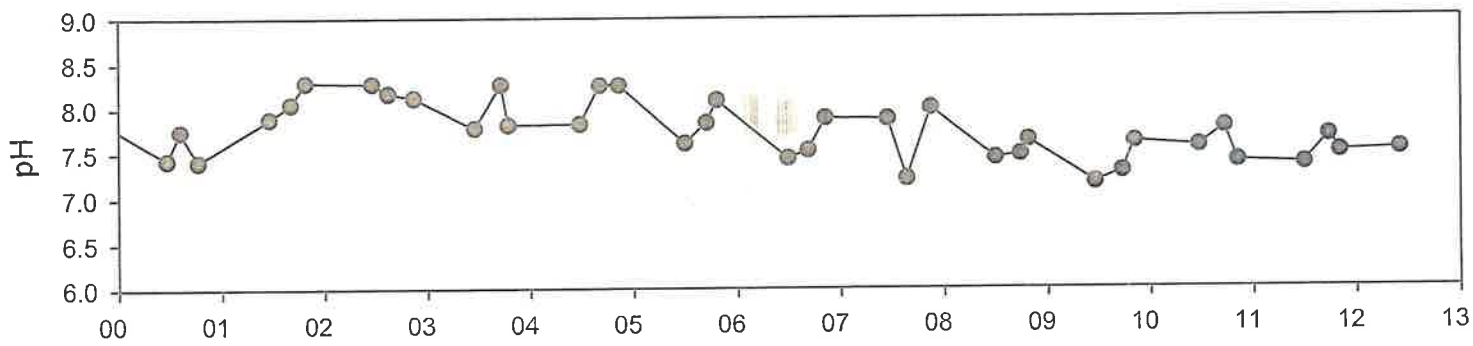
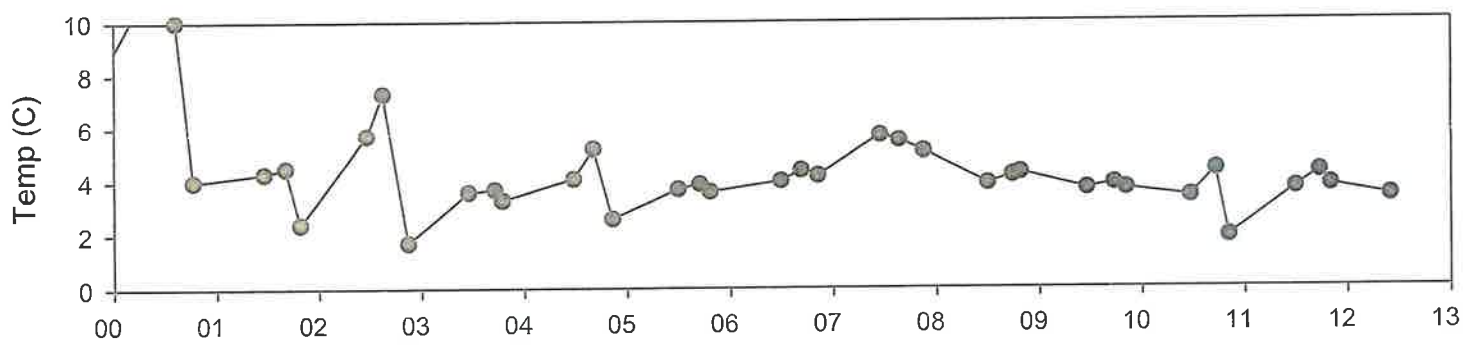
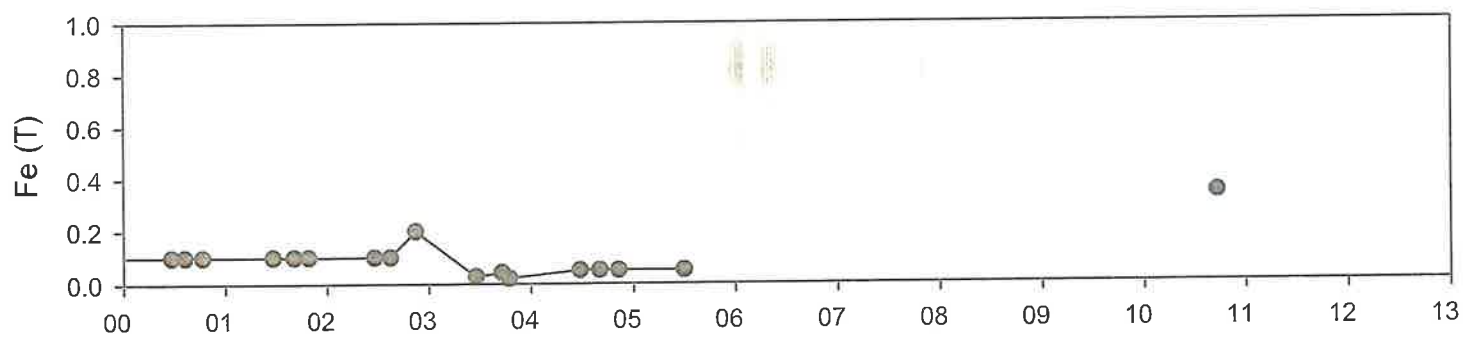
Spring S35-8

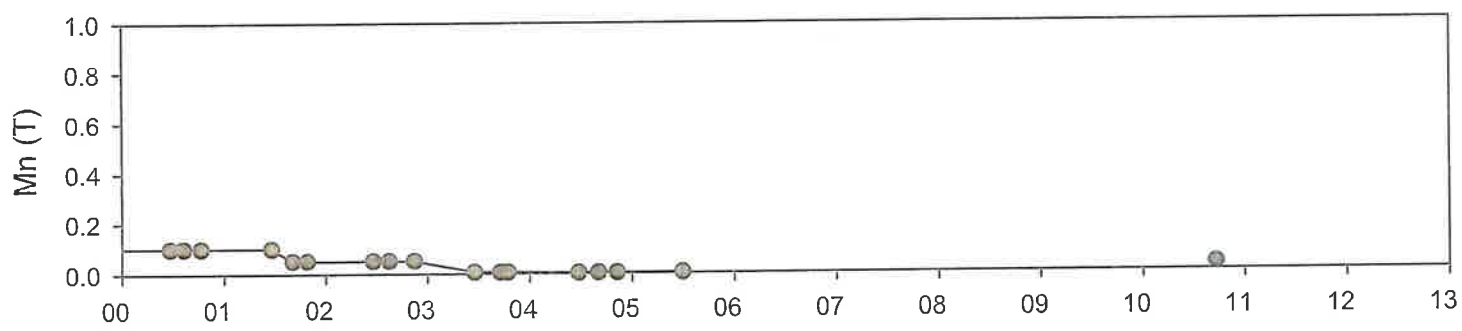


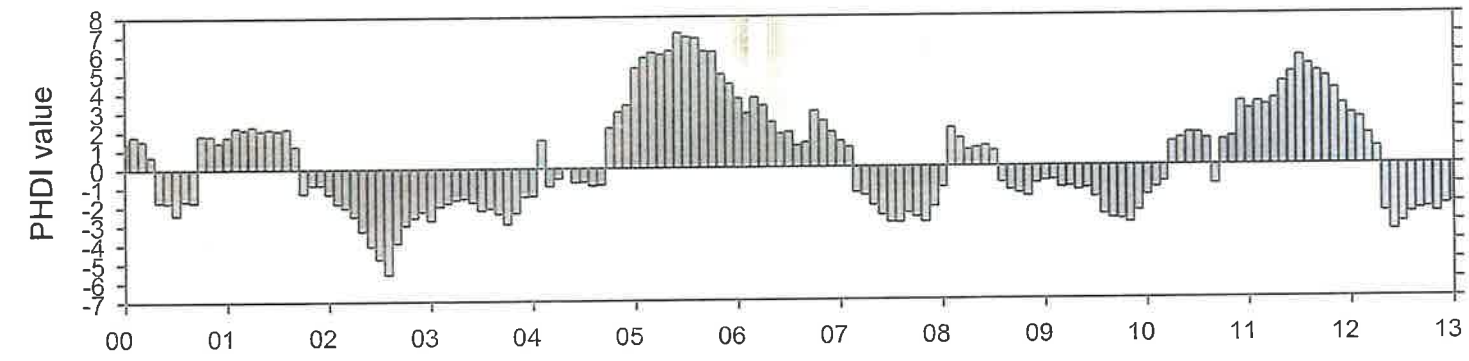












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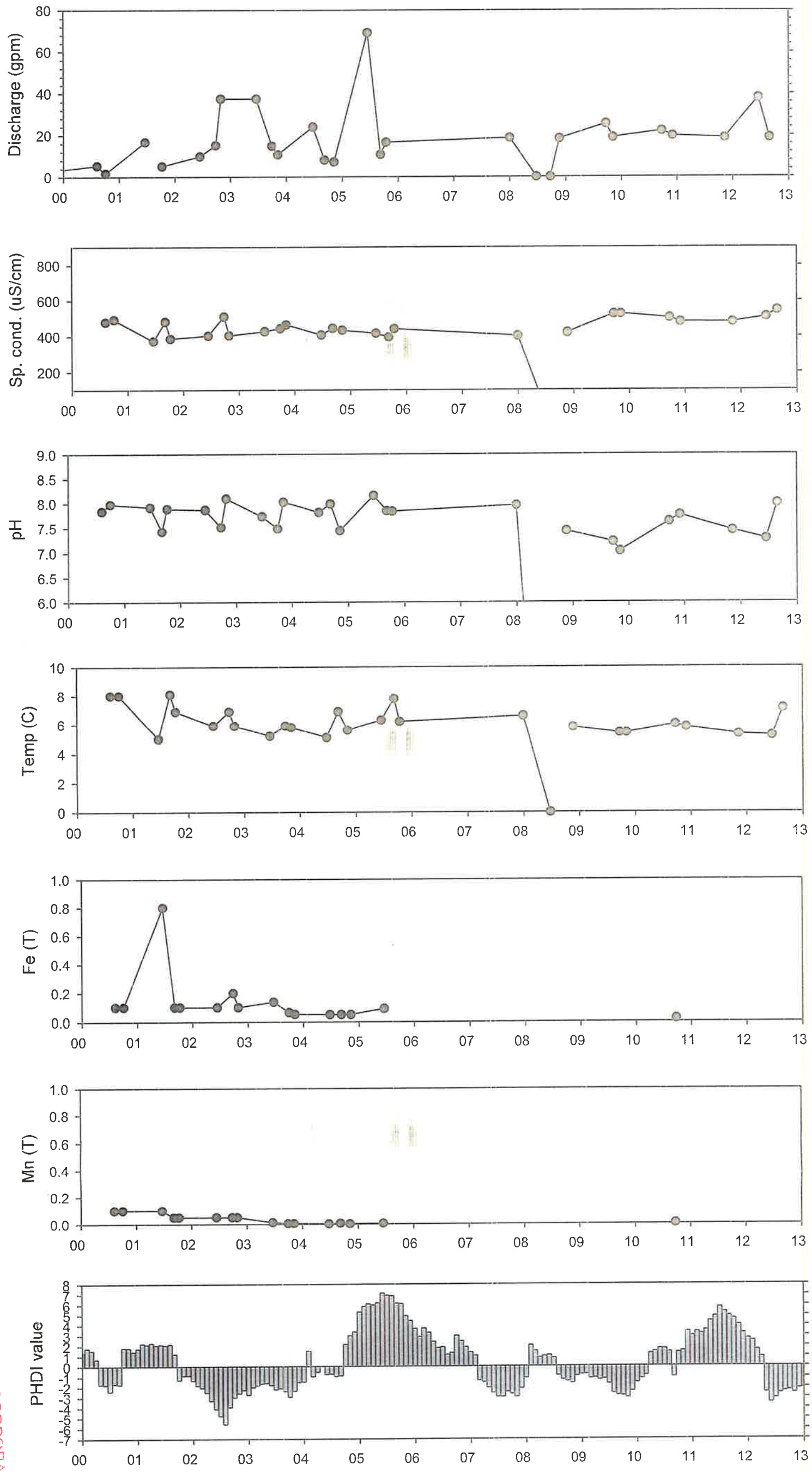
Spring S34-12



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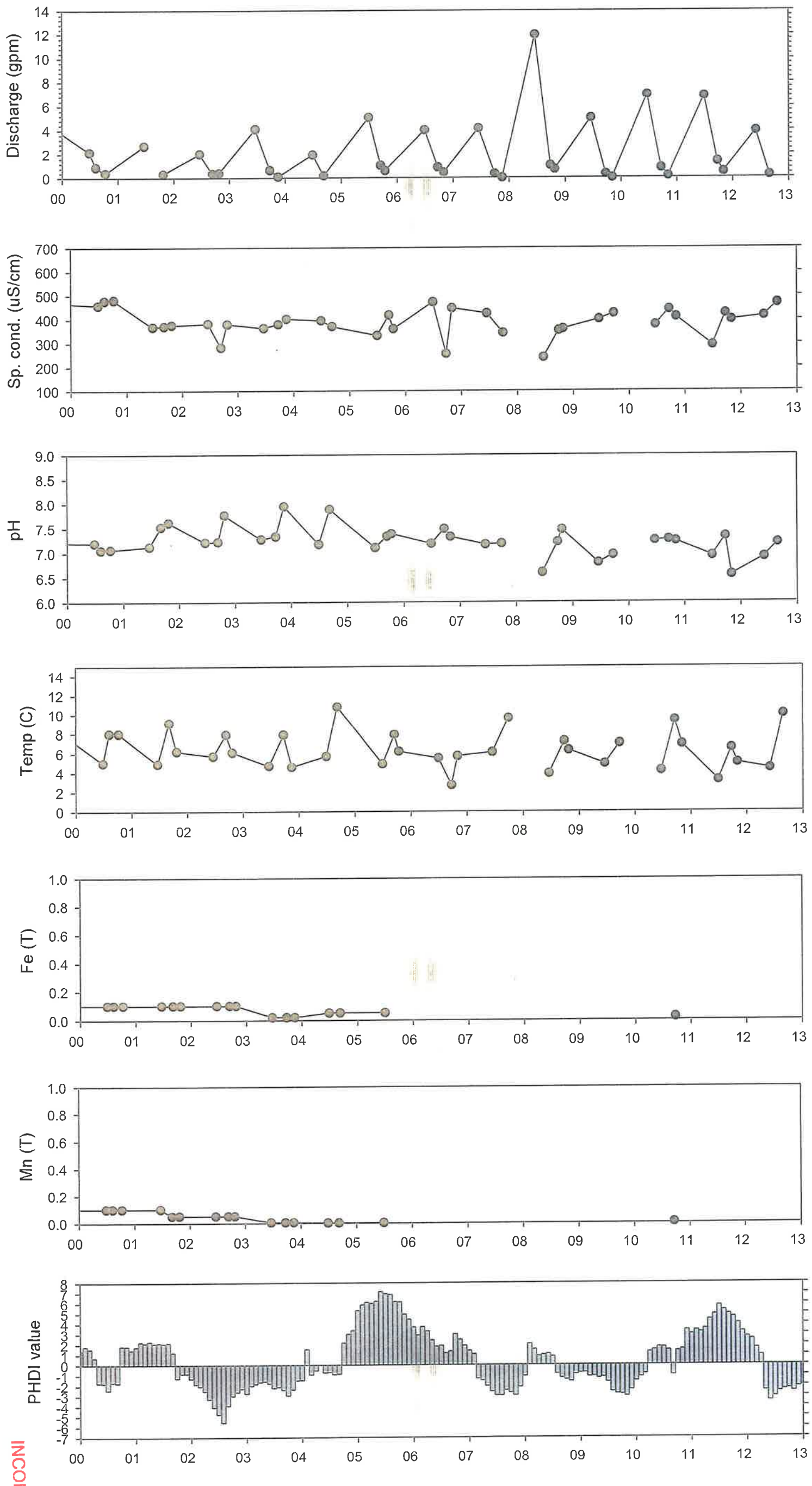
Spring S26-13



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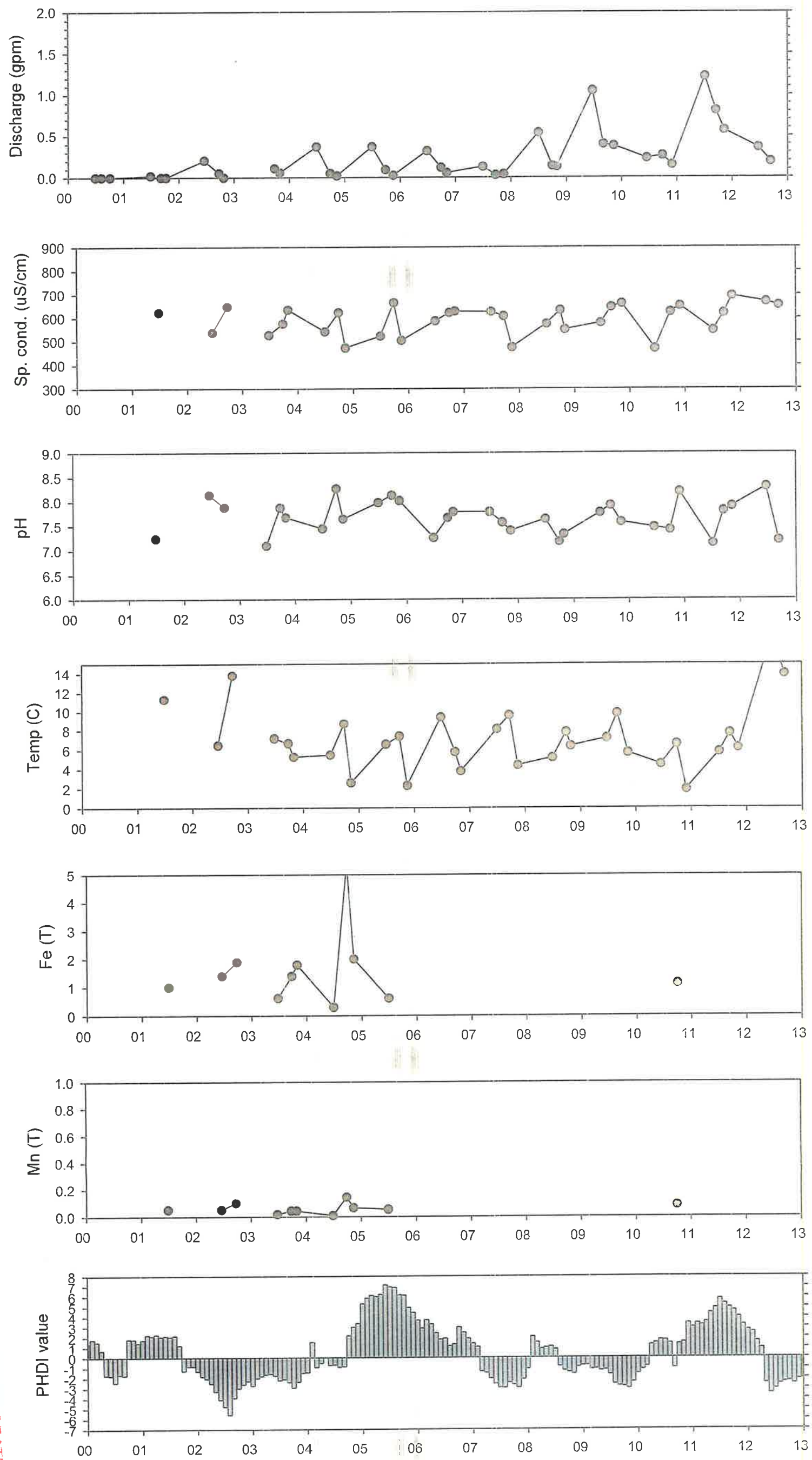
Spring S24-12



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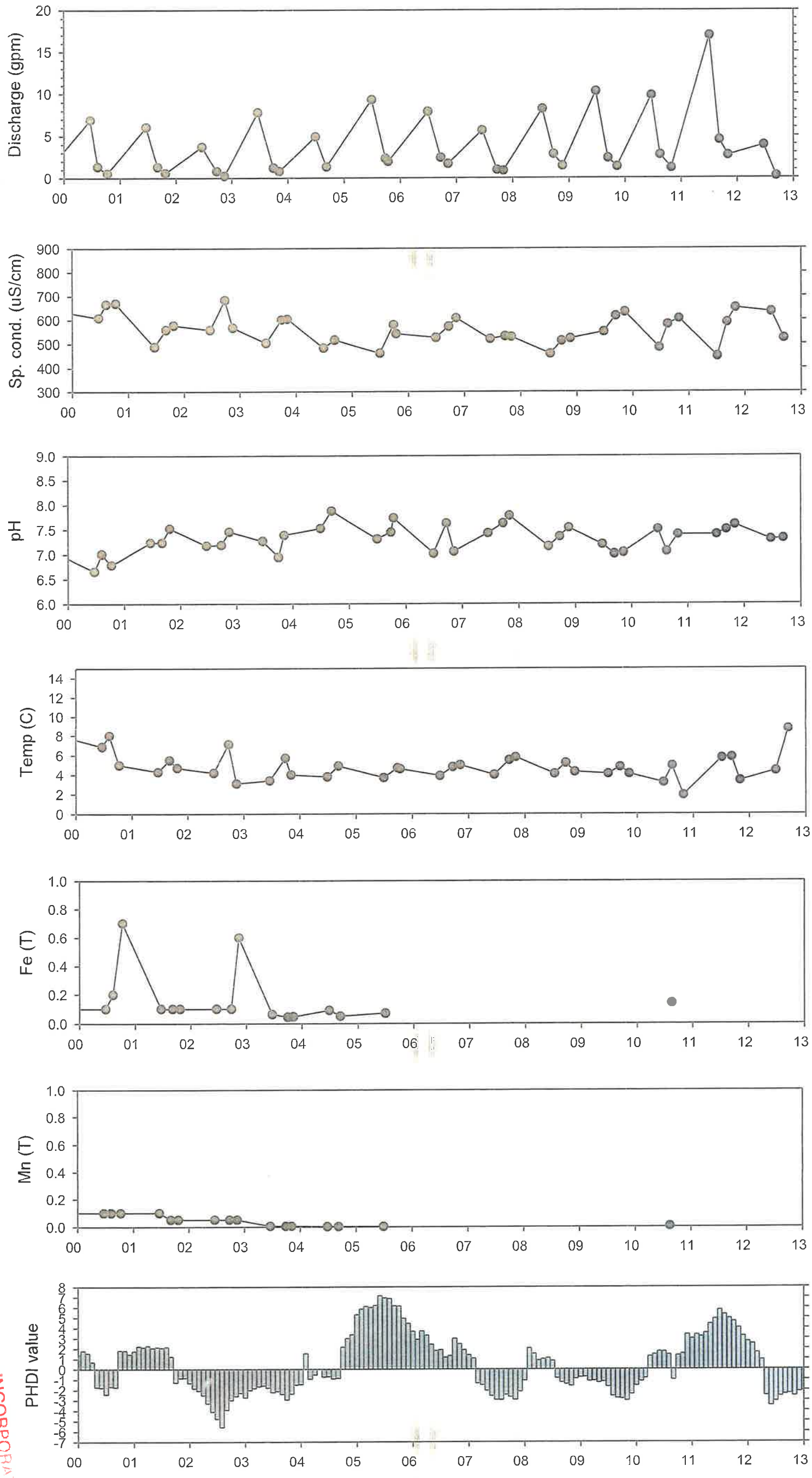
Spring S23-4



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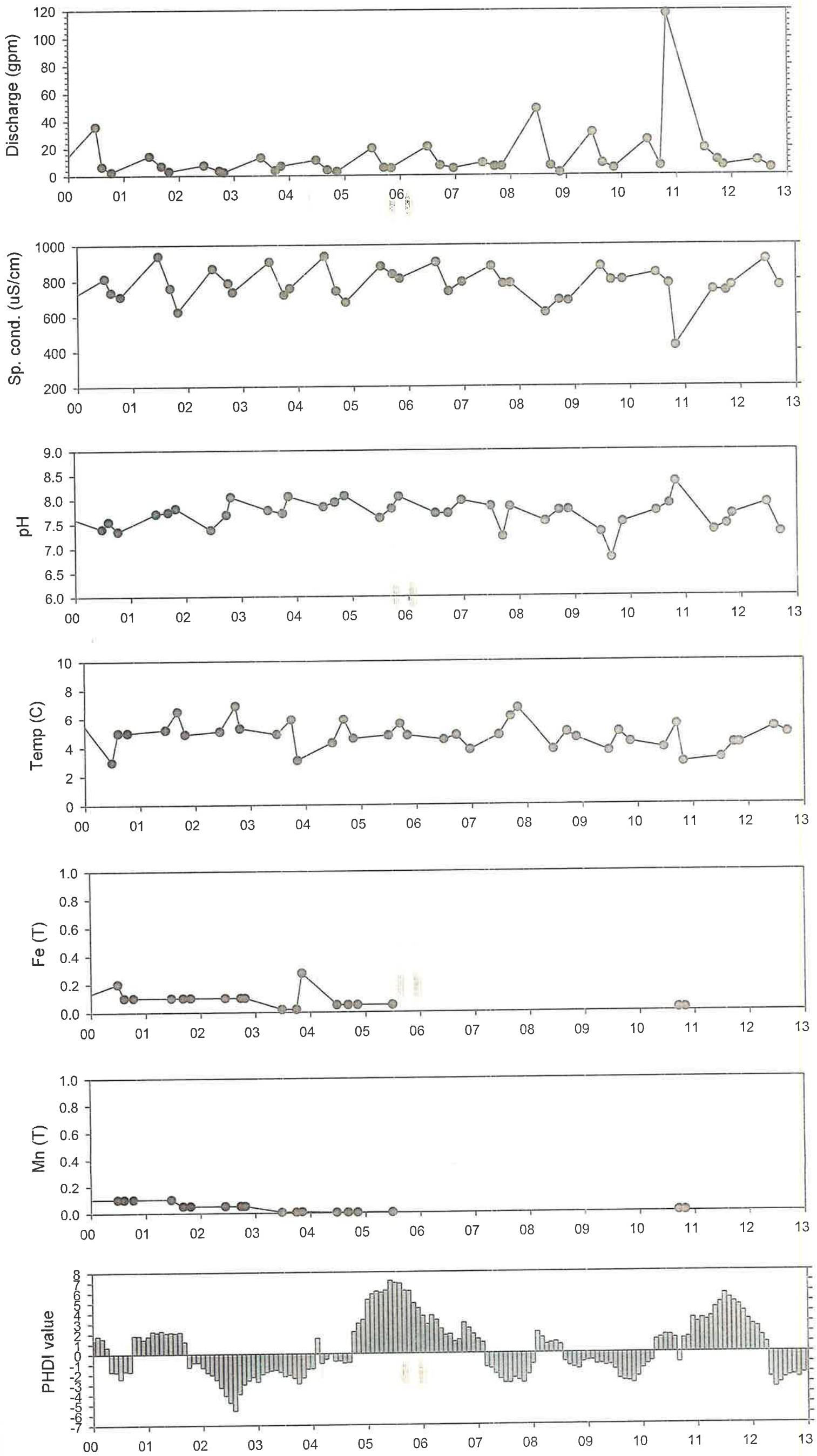
Spring S22-5



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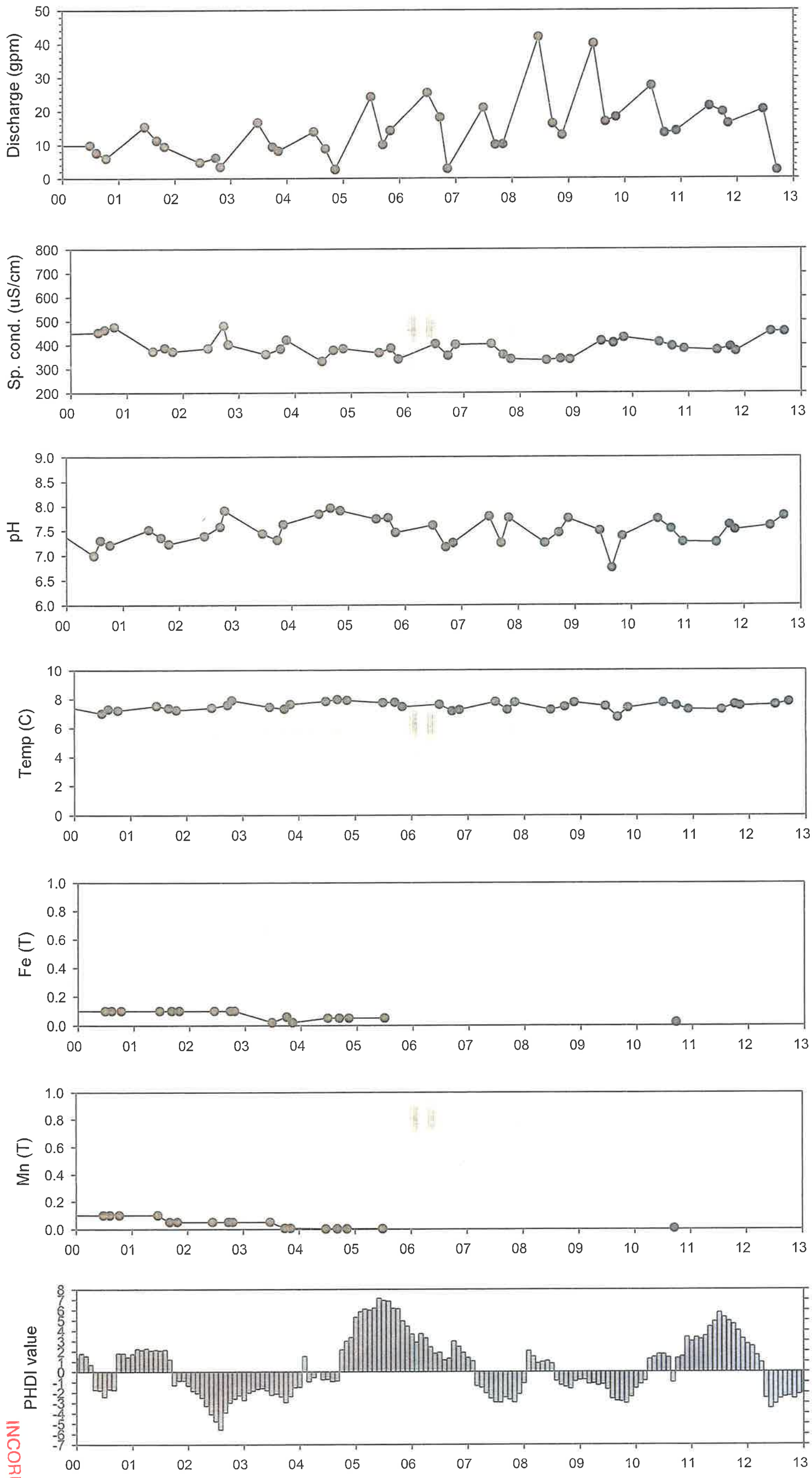
Spring S22-11



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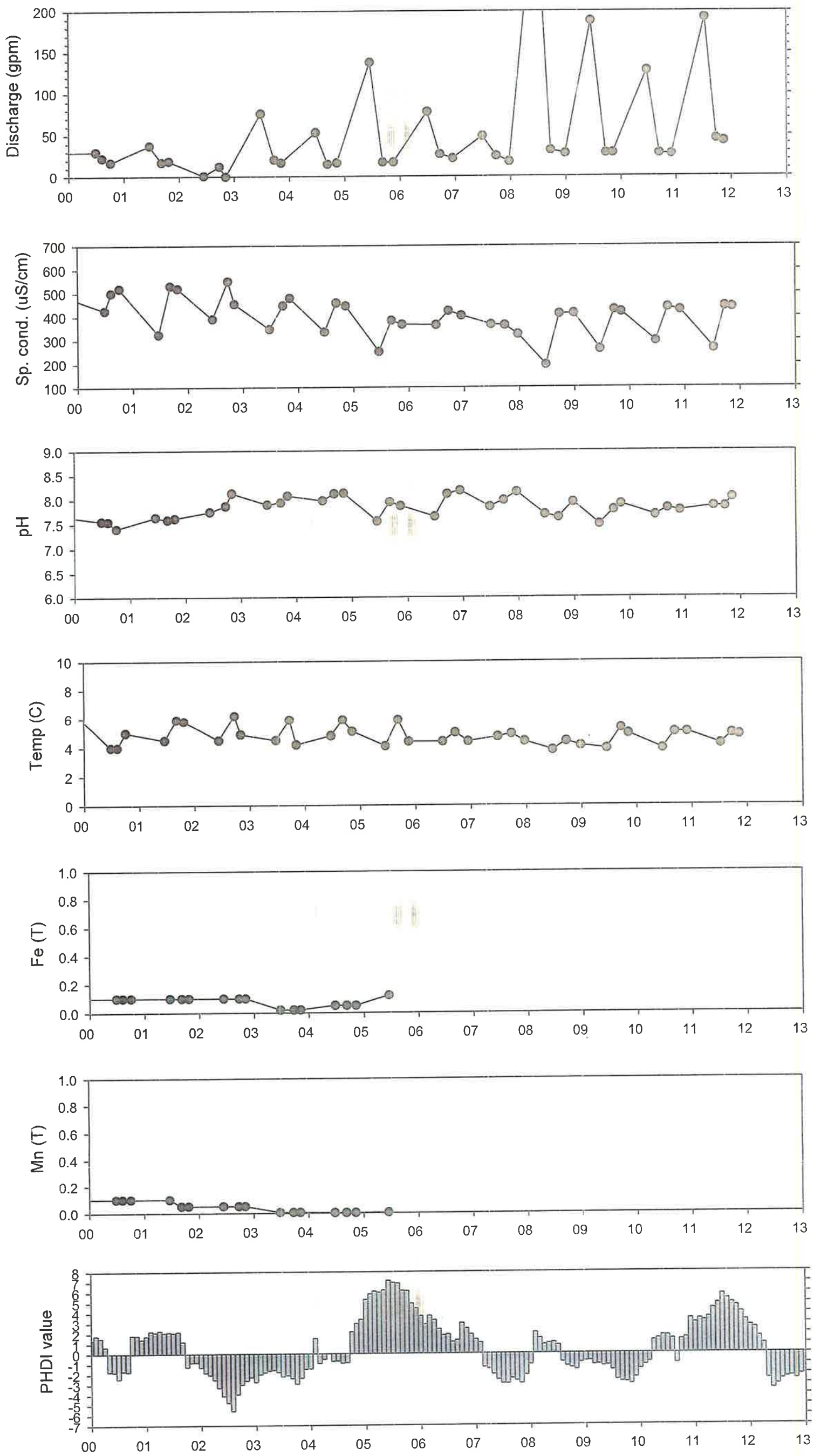
Spring S15-3



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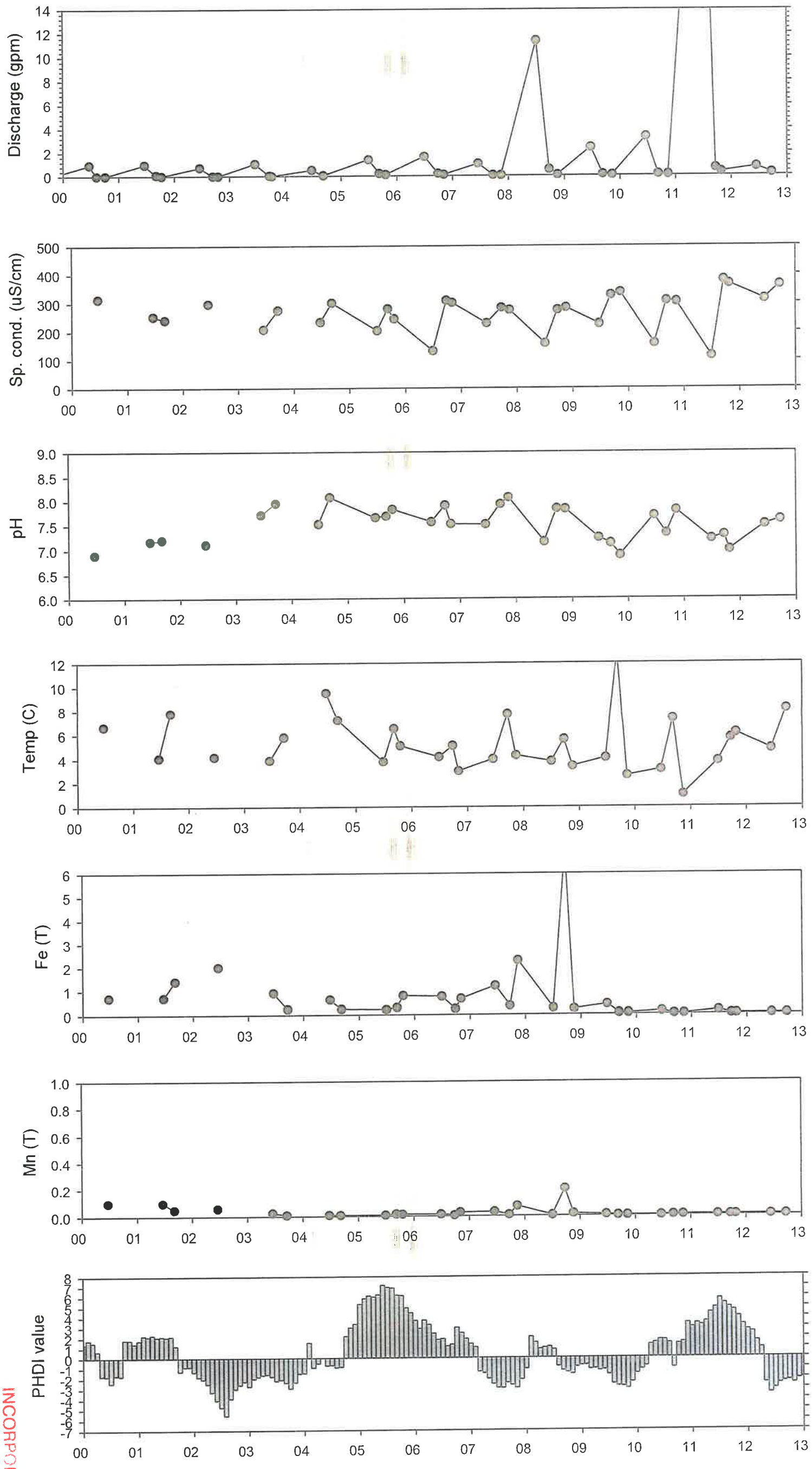
Spring S13-7



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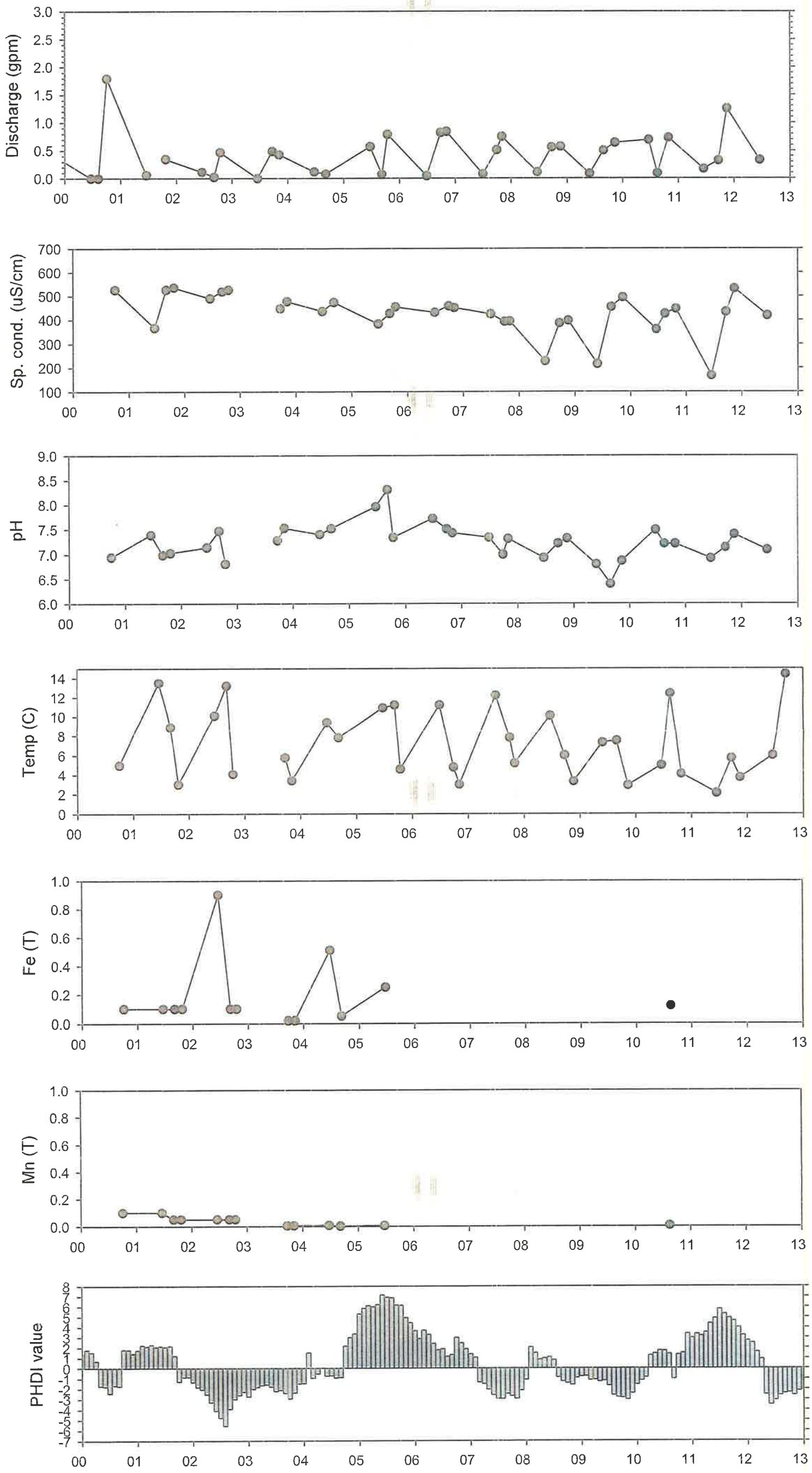
Spring S14-4



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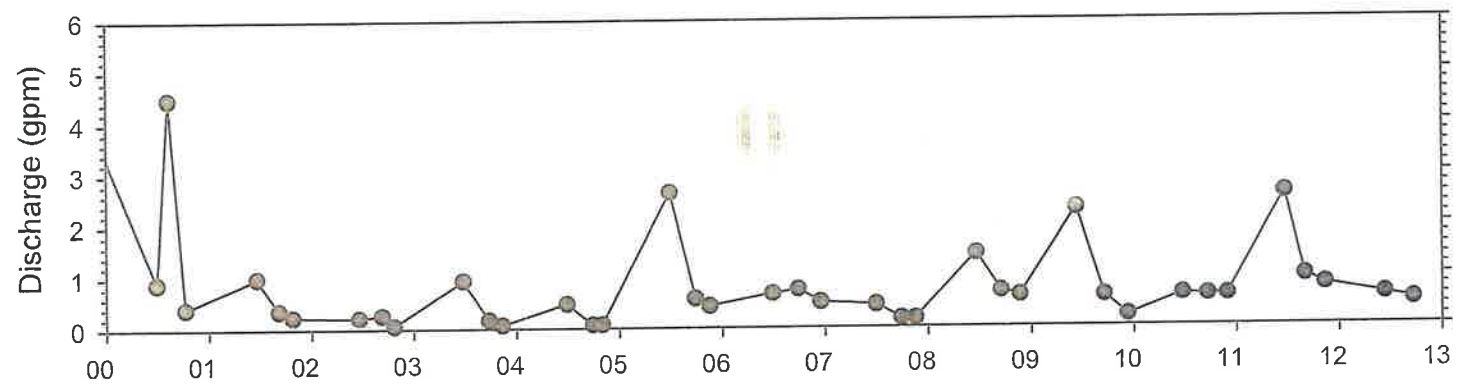
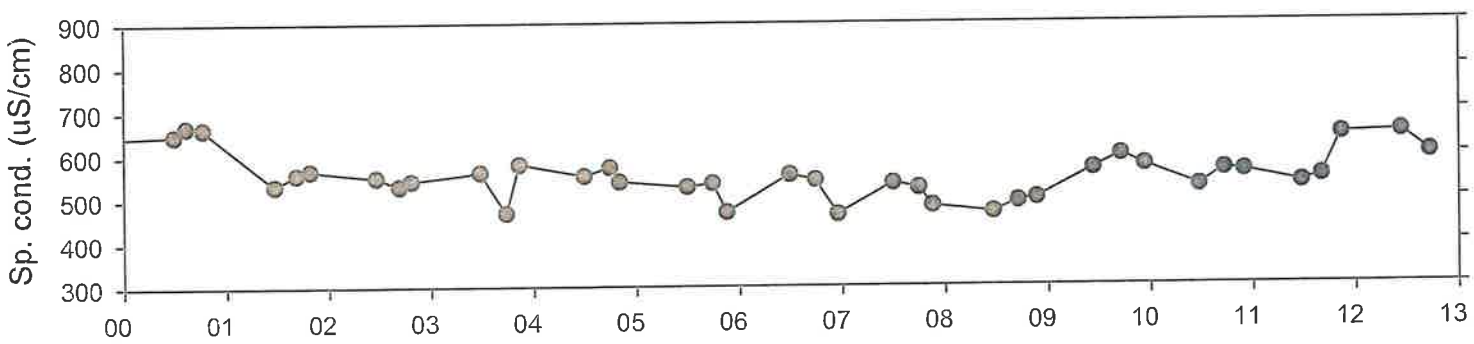
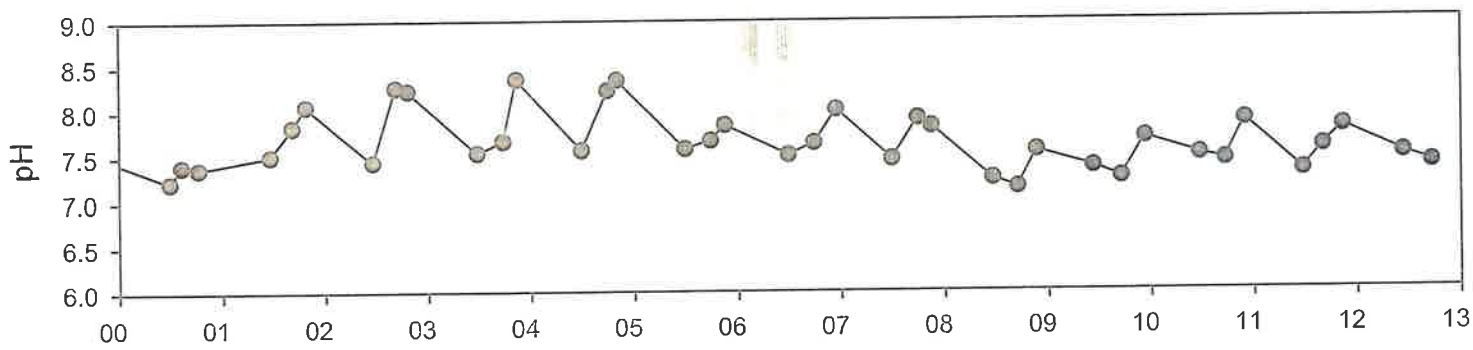
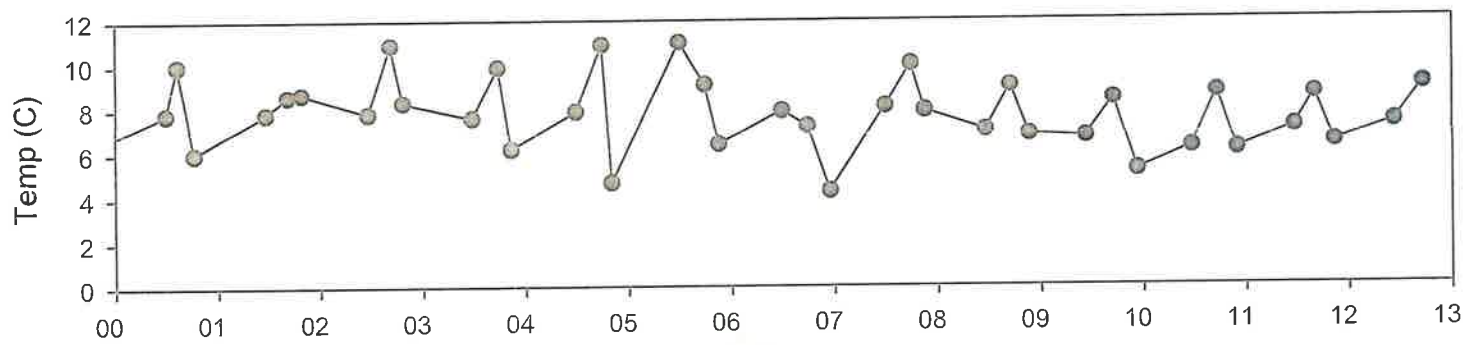
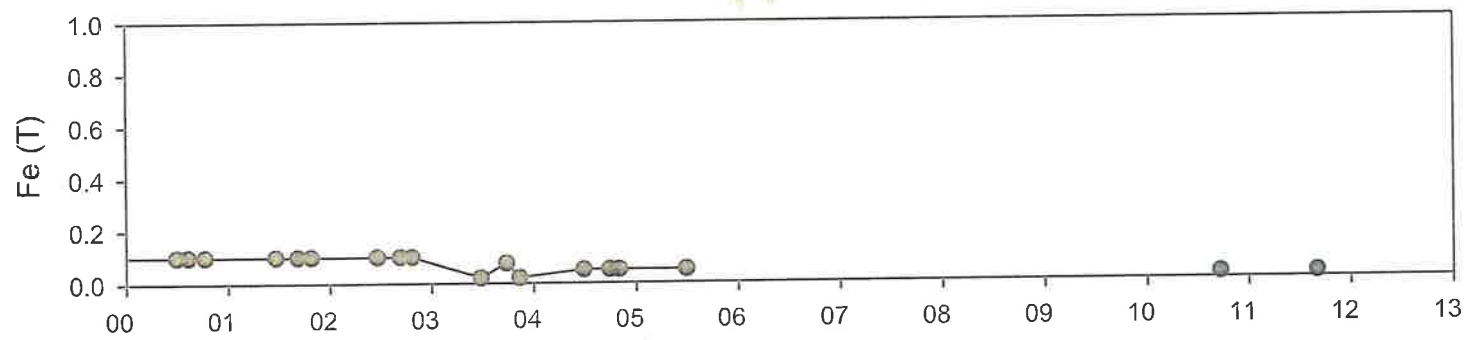
Spring S13-2

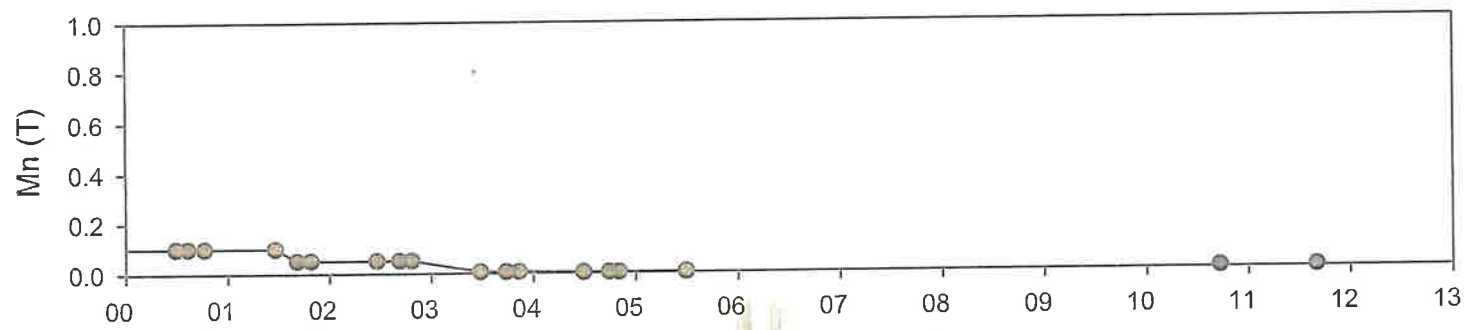


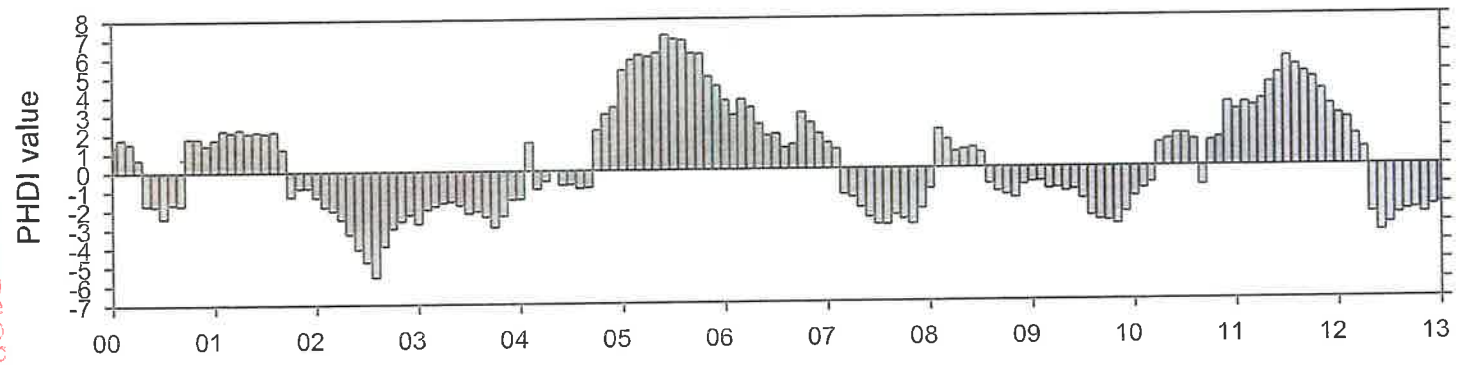












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Spring S10-1

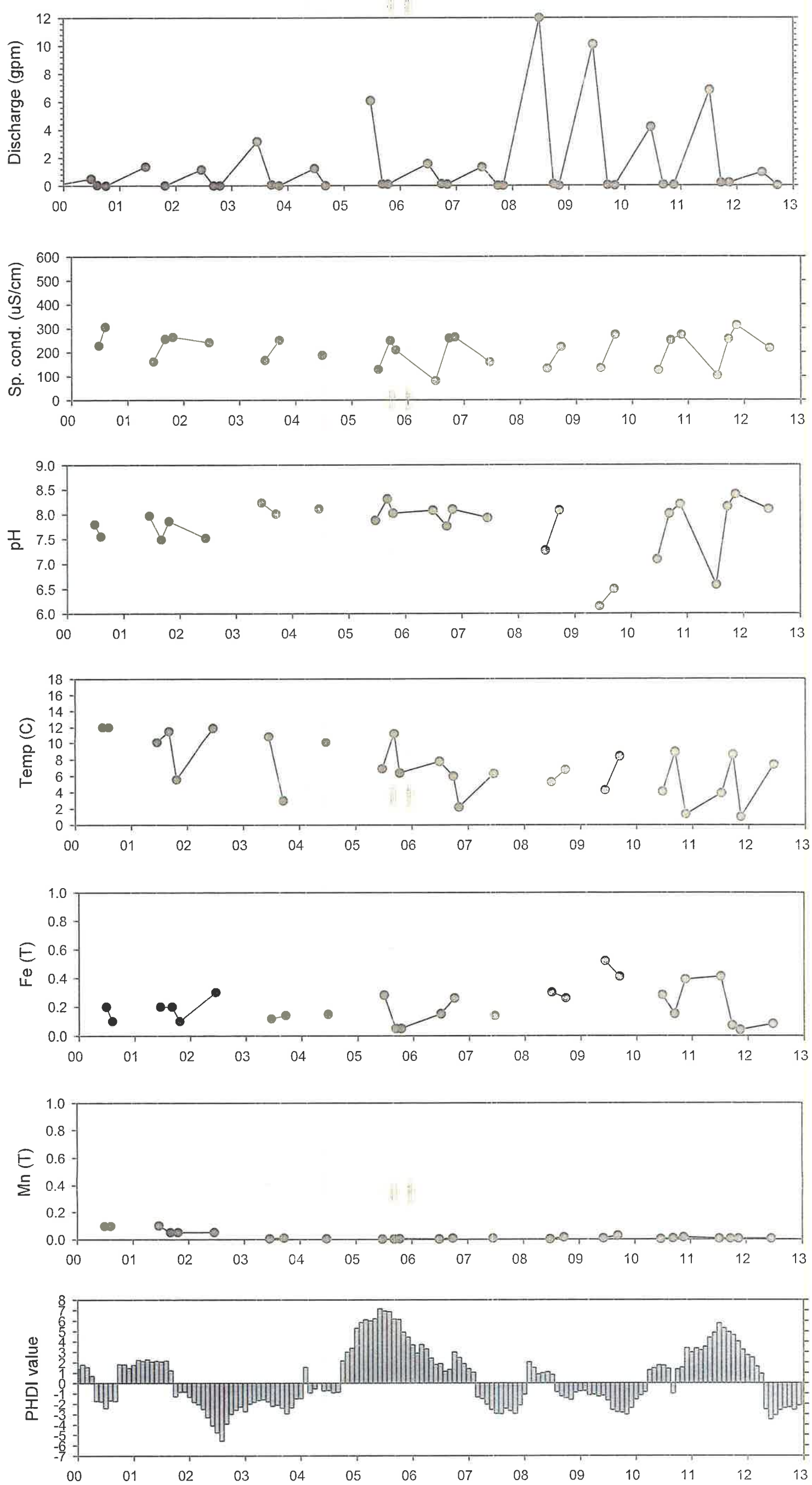

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Table 1 Baseline monitoring data for streams and springs (see Appendix A for Fish Creek baseline data).

Site	Date	Time	Flow (gpm)	T (°C)	pH (S.U.)	Sp. Cond (uS/cm)	TDS (mg/L)	TSS (mg/L)	Ca (d) (mg/L)	Mg (d) (mg/L)	Na (d) (mg/L)	K (d) (mg/L)	HCO3 (mg/L)	CO3 (mg/L)	SO4 (mg/L)	Cl (mg/L)	Hard. (mg/L)	Acidity (mg/L)	Alk (T) (mg/L)	NO2+NO3 (mg/L)	Phos (t) (mg/L)	B (d) (mg/L)	Ba (d) (mg/L)	Ca (t) (mg/L)	Cu (d) (mg/L)	Fe (d) (mg/L)	Fe (t) (mg/L)	Pb (d) (mg/L)	Mg (t) (mg/L)	Mn (d) (mg/L)	Mn (t) (mg/L)
Springs																															
S25-32	9/25/2011	13:30	12.1	5.0	7.39	562																									
S25-32	9/25/2012	13:00	4.93	5.4	7.23	573	278	33	88.8	15.1	3.9	1.0	340	<1	27	7	284	<5	279	1.0	0.08	<0.05	0.007	90.1	<0.005	0.02	0.29	0.02	15.3	0.008	0.012
S25-32	10/31/2012	13:10	3.61	4.8	7.02	586																									
S25-32	5/30/2013	10:30	12.0	3.6	7.25	587	368*		93.2		3.8	1.0	285*	5*			292	<5*	241	1.0	0.03	<0.05	0.008	91.9	<0.005	<0.02		0.02	15.3	<0.005	<0.005
S25-32	6/24/2013	12:36	6.88	4.7	7.40	613	360	6	94.6	16.3	3.9	1.1	341	3	29	8	303	<5	285	1.0	0.02	0.05	0.008	92.1	<0.005	<0.02	0.11	<0.02	15.6	<0.005	0.005
S25-32	8/30/2013	11:30	5.45	4.8	7.10	602	380	21	98.2	16.8	4.5	1.2	345	4	30	7	314	<5	289	1.0	0.03	<0.05	0.010	102	<0.005	<0.02	0.26	<0.02	17.0	0.005	<0.005
S26-1	10/1/2012	14:00	0.33	5.8	6.76	499																									
S26-1	10/3/2012	12:00	0.33	5.9	7.05	494	298	<4	80.2	9.0	3.4	0.9	285	<1	20	5	237	<5	234	2.4	0.04	<0.05	0.007	82.2	<0.005	<0.02	<0.02	<0.02	9.1	<0.005	<0.005
S26-1	10/31/2012	14:00	0.33	4.9	7.16	495																									
S26-1	5/30/2013	11:30	2.80	2.7	7.34	423	316*		70.3		3.4	0.7	248*	<1*			202	<5*	203	3.6	0.05	<0.05	0.005	69	<0.005	<0.02		<0.02	7.1	<0.005	<0.005
S26-1	6/24/2013	12:00	1.23	3.6	7.21	429	276	<4	74.2	8.0	3.1	0.9	240	<1	19	4	218	<5	197	2.4	0.03	<0.05	0.007	73.9	<0.005	<0.02	<0.02	<0.02	8.0	<0.005	<0.005
S26-1	8/30/2013	9:00	0.29	6.5	7.00	478	308	<4	86.5	9.4	3.7	1.0	295	<1	20	5	255	<5	242	2.3	0.04	<0.05	0.008	85.5	<0.005	<0.02	0.04	<0.02	9.9	<0.005	<0.005
S26-2 (Upper Wife)	10/3/2012	11:30	3.03	6.0	7.99	536																									
S26-2 (Upper Wife)	5/30/2013	12:30	6.35	6.0	7.48	528	328*		90.2		3.7	1.0	348*	<1*			266	<5*	286	0.8	0.04	<0.05	0.008	85.5	<0.005	<0.02		<0.02	12.7	0.006	0.013
S26-2 (Upper Wife)	6/24/2013	12:50	0.47	5.1	7.30	497	320	21	85.0	12.7	3.5	1.1	322	<1	19	4	264	<5	265	0.8	0.04	<0.05	0.008	93.9	<0.005	<0.02	0.05	<0.02	14.0	<0.005	0.005
S26-2 (Upper Wife)	8/30/2013	10:00	2.6	4.8	7.19	548	340	40	89.8	13.3	4.2	1.1	349	2	19	4	279	<5	290	0.9	0.02	<0.05	0.009	94.1	<0.005	<0.02	0.13	<0.02	13.4	<0.005	<0.005
S25-33 (East Fork Andrew Dairy)	10/5/2012	12:40	0.96	8.5	7.08	714																									
S25-33 (East Fork Andrew Dairy)	5/1/2013	9:30	5.00	4.6	7.27	647	412*		101		6.2	1.4	381*	<1*			314	<5*	313	2.0	0.20	<0.05	0.013	95.2	<0.005	0.02		<0.02	18.6	0.015	0.066
S25-33 (East Fork Andrew Dairy)	6/24/2013	13:39	2.58	6.6	7.30	667	384	45	97.5	19.0	6.1	1.5	343	3	39	12	322	<5	286	2.5	0.05	<0.05	0.013	99.5	<0.005	<0.02	0.43	0.02	19.4	<0.005	0.018
S25-33 (East Fork Andrew Dairy)	9/4/2013	10:00	1.25	7.9	6.99	672	360	360	99.1	19.1	6.2	1.5	376	<1	37	12	326	<5	309	2.2	0.02	0.05	0.014	103	<0.005	0.02	<0.02	0.02	20.0	<0.005	<0.005
Streams																															
Wife Creek - Lower	10/4/2012	13:00	7.1	6.1	8.11	565																									
Wife Creek - Lower	11/15/2012	14:30	0.45	0.0	7.96	625																									
Wife Creek - Lower	5/29/2013	13:00	34	9.6	8.02	571	316*	180	81.9	18.3	6.8	1.5	330*	<1	40	8	337	<5*	271	0.3	0.19	<0.05	0.015	101	<0.005	<0.02	1.88	<0.02	20.6	<0.005	0.145
Wife Creek - Lower	6/25/2013	9:39	40.3	7.5	8.6	573	384	134	85.7	19.9	6.5	1.3	370	4	41	8	296	<5	318	0.3	0.14	<0.05	0.014	91.7	<0.005	<0.02	1.37	<0.02	19.5	<0.005	0.099
Wife Creek - Lower	8/29/2013	13:50	10.2	11.0	7.96	557	356	63	83.3	20.2	7.2	2.6	286	3	38	8	291	<5	240	0.4	0.09	<0.05	0.018	87.0	<0.005	<0.02	0.83	<0.02	19.2	<0.005	0.053
Andrew Dairy Creek - Lower	10/4/2012	12:45	Dry	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Andrew Dairy Creek - Lower	11/15/2012	14:45	Dry	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Andrew Dairy Creek - Lower	5/29/2013	13:40	Dry	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Andrew Dairy Creek - Lower	6/24/2013		Dry																												
Andrew Dairy Creek - Lower	8/29/2013		Dry																												

*Sample analyzed after holding time expired

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Table 2 Average water quality values for selected springs and streams.

	Flow (gpm)	T (°C)	pH (S.U.)	Sp. Cond. uS/cm	TDS (mg/L)	TSS (mg/L)	Ca (d) (mg/L)	Mg (d) (mg/L)	Na (d) (mg/L)	K (d) (mg/L)	HCO3 (mg/L)	CO3 (mg/L)	SO4 (mg/L)	Cl (mg/L)	Fe (t) (mg/L)	Mn (t) (mg/L)
Springs (Blackhawk Formation)																
S10-1	2.7	7.5	7.38	180	109	17	28	7	2	1	93	<5	12	3	0.26	0.03
S13-2	1.0	8.2	7.42	571	345	32	86	22	7	1	318	<5	55	7	0.12	0.04
S13-7	4.5	5.5	7.33	269	154	69	48	6	2	1	159	<5	5	3	0.53	0.03
S14-4	2.2	6.5	7.02	403	226	8	69	10	4	1	230	<5	15	6	0.18	0.04
S15-3	90.5	5.3	7.54	351	201	5	57	11	6	1	206	<5	18	5	0.13	0.04
S22-11	34.9	4.6	7.34	396	226	5	66	11	5	1	232	<5	12	8	0.06	0.04
S22-5	15.9	5.4	7.48	575	317	6	89	12	18	1	225	<5	18	50	0.09	0.03
S23-4	2.8	7.3	7.12	512	304	212	87	21	4	2	328	<5	20	3	2.33	0.06
S24-12	0.5	7.8	7.69	593	368	49	82	31	7	2	327	<5	69	5	0.59	0.03
S26-13	1.9	6.4	6.96	388	219	4	66	10	4	2	229	<5	13	4	0.08	0.04
S34-12	14.1	6.5	7.43	432	233	17	67	14	3	1	251	<5	12	2	0.10	0.03
S35-8	16.2	5.0	7.57	463	251	7	75	16	4	1	269	<5	18	3	0.07	0.04
S36-1	8.9	5.2	7.22	580	338	38	94	18	4	1	374	<5	16	7	0.02	0.01
S36-12	3.9	4.8	7.12	404	219	9	68	9	4	1	247	<5	11	3	0.06	0.04
WQ1-1	11.6	5.7	7.23	741	450	32	105	34	5	3	424	<5	44	9	0.19	0.01
WQ1-39	7.1	6.9	7.29	336	217	29	62	7	2	1	210	<5	15	2	0.17	0.01
WQ3-26	4.6	7.4	7.47	211	106	24	26	2	2	1	64	<5	21	2	0.20	0.01
WQ3-41	41.0	8.4	7.69	649	415	116	98	27	13	2	375	<5	50	18	1.11	0.88
WQ3-43	4.2	4.8	7.55	468	289	36	83	14	4	1	301	<5	19	4	0.41	0.02
WQ3-6	10.9	7.6	7.37	530	322	60	87	17	5	2	321	<5	36	4	0.01	0.01
WQ4-12	1.4	7.3	7.44	353	227	42	63	8	3	1	196	<5	33	2	0.26	0.02
Creeks																
CS-3	163	6.9	8.01	476	285	18	79	16	8	1	260	<5	21	22	0.25	0.05
CS-9	91	8.7	7.98	511	303	66	80	18	6	1	284	<5	35	8	0.76	0.08
CS-11	173	6.2	8.12	547	324	46	80	18	32	1	263	<5	25	38	0.67	0.05
CS-17	204	7.9	8.38	278	171	7	47	7	2	1	240	<5	9	2	0.12	0.03
CS-19	389	12.2	8.21	452	270	16	63	18	8	2	269	<5	21	7	0.30	0.02
CS-20	1145	7.5	8.44	377	229	7	62	12	3	2	218	<5	25	3	0.10	0.01
CS-21	516.3	7.5	8.41	414	262	8	71	13	4	4	251	<5	20	5	0.13	0.01

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Table 3 Monitoring well measurements.

Well 91-26-1			Well 91-35-1		
Date	Water Level	Water Elevation	Date	Water Level	Water Elevation
6/13/2002	1296.35	7954.65	6/13/2002	1213.70	8021.30
9/9/2002	1310.10	7940.90	9/5/2002	1224.50	8010.50
11/4/2002	1303.16	7947.84	11/4/2002	1223.65	8011.35
6/16/2003	1302.30	7948.70	6/17/2003	1223.94	8011.06
9/17/2003	1302.79	7948.21	9/17/2003	1223.94	8011.06
10/28/2003	1301.00	7950.00	10/30/2003	1223.62	8011.38
6/22/2004	1304.05	7946.95	6/22/2004	1223.71	8011.29
9/6/2004	1301.51	7949.49	9/2/2004	1223.53	8011.47
6/25/2005	1302.79	7948.21	6/22/2005	1222.85	8012.15
9/6/2005	1300.40	7950.60	9/6/2005	1223.51	8011.49
10/13/2005	1299.66	7951.34	10/13/2005	1223.38	8011.62
6/28/2006	1298.41	7952.59	6/29/2006	1223.67	8011.33
9/26/2006	1296.81	7954.19	9/26/2006	1224.08	8010.92
11/2/2006	1297.81	7953.19	11/2/2006	1222.43	8012.57
6/16/2007	1295.48	7955.52	6/29/2007	1224.38	8010.62
9/21/2007	1296.56	7954.44	9/21/2007	1222.64	8012.36
11/2/2007	1295.85	7955.15	11/2/2007	1221.19	8013.81
6/26/2008	1296.90	7954.10	6/26/2008	1225.60	8009.40
9/12/2008	1296.25	7954.75	9/24/2008	1225.95	8009.05
11/14/2008	1295.04	7955.96	11/14/2008	1223.95	8011.05
6/26/2009	1301.06	7949.94	6/26/2009	1233.55	8001.45
9/9/2009	1295.70	7955.30	9/9/2009	1229.07	8005.93
10/27/2009	1295.52	7955.48	11/4/2009	1230.55	8004.45
6/20/2010	1298.14	7952.86	6/20/2010	1235.79	7999.21
9/14/2010	1297.10	7953.90	9/14/2010	1250.00	7985.00
11/8/2010	1300.00	7951.00	11/8/2010	1230.00	8005.00
7/8/2011	1302.42	7948.58	7/12/2011	1264.59	7970.41
9/15/2011	1309.55	7941.45	9/20/2011	1273.50	7961.50
11/11/2011	1312.60	7938.40	11/11/2011	1275.85	7959.15
6/16/2012	1332.22	7918.78	6/16/2012	1295.18	7939.82
8/27/2012	1337.10	7913.90	8/28/2012	1323.80	7911.20
10/25/2012	1339.10	7911.90	11/8/2012	1280.00	7955.00

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Table 3 Variability in discharge and important water quality parameters.

	Springs				Creeks		
	S25-32	S26-1	S26-2	S25-33	Wife Creek	And. Dry. Ck.	Fish Creek
Discharge (gpm)							
Average	7.5	0.885	3.11	2.45	18.4	0	35,500
Max	12.1	2.8	6.35	5.00	40.3	0	547,500
Min	3.61	0.29	0.47	0.96	0.45	0	269
Temperature (°C)							
Average	4.7	4.9	5.5	6.9	6.8	---	7.5
Max	5.4	6.5	6	8.5	11.0	---	22.5
Min	3.6	2.7	4.8	4.6	0.0	---	0
pH (S.U.)							
Average	7.23	7.09	7.49	7.16	8.13	---	8.0
Max	7.4	7.34	7.99	7.30	8.6	---	8.6
Min	7.02	6.76	7.19	6.99	7.96	---	7.7
Specific Conductance (uS/cm)							
Average	587	470	527	675	578	---	347
Max	613	499	548	714	625	---	640
Min	562	423	497	647	557	---	25
Total Dissolved Solids (mg/L)							
Average	347	300	329	385	352	---	196
Max	380	316	340	412	384	---	226
Min	278	276	320	360	316	---	169
TSS (mg/L)							
Average	20	<4	30.5	203	126	---	---
Max	33	<4	40	360	180	---	---
Min	6	<4	21	45	63	---	---
Total Iron (mg/L)							
Average	0.22	0.026	0.09	0.23	1.36	---	2.36
Max	0.29	0.04	0.13	0.43	1.88	---	11
Min	0.11	<0.2	0.05	<0.02	0.83	---	0.19
Total Manganese (mg/L)							
Average	0.007	<0.005	0.008	0.030	0.099	---	0.105
Max	0.012	<0.005	0.013	0.066	0.145	---	0.400
Min	<0.005	<0.005	<0.005	<0.005	0.053	---	0.02

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Appendix A

Fish Creek water quantity and water quality data as monitored at gaging station 09310500

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Appendix A Fish Creek discharge and water quality data (USGS gage site 09310500).

Date	Time	Flow (cfs)	Flow (cfs inst.)	T (°C)	pH field (S.U.)	pH lab (S.U.)	Sp. Cond. (uS/cm)	D.O. (mg/L)	TSS (mg/L)	TDS (mg/L)	TDS (sum) (mg/L)	Ca (mg/L)	Mg (mg/L)	Na (mg/L)	K (mg/L)	HCO3 (mg/L)	CO3 (mg/L)	Cl (mg/L)	SO4 (mg/L)	F (mg/L)	NO2 (mg/L)	NO3 (mg/L)	NH3 (mg/L)	N(t) (mg/L)	O-Phos. (mg/L)	Phos (t) (mg/L)	Hard. mg/L CaCO3	Si (mg/L)	As (d) (ug/L)	B (d) (ug/L)	Cd (t) (ug/L)	Cr (t) (ug/L)	Cu (t) (ug/L)	Fe (rec) (ug/L)	Fe (d) (ug/L)	Pb (d) (ug/L)	Mn (t) (ug/L)	Mn (d) (ug/L)	Sr (d) (ug/L)	Zn (d) (ug/L)	Zn (t) (ug/L)	Li (d) (ug/L)	Se (d) (ug/L)	Hg (rec) (ug/L)
10/24/1957			14		8		349									211	0		17								190																	
5/19/1958			588		8.1		329			181	188	55	8.3	5.1		210	0	2	6.4		0.43						170	6.1																
7/28/1958			19		8		317			169	175	46	11	5.2		195	0	2.2	10		0						160	4.4																
8/28/1969			19	15	7.7		319			187	179	46	14	2.6	0.7	196	0	4	11	0.2	0						170	4.2		60														
6/7/1970			155	10	7.8		349			208	198	59	10	1.7	1.2	230	0	2.3	5.8	0.1	0.16						190	3.6		0														
8/19/1970			11	14.5	8.1		310			172	168	42	11	2.5	0.6	186	0	2.5	13	0.1	0						150	4.5		10														
8/9/1971	10:00	17		13.5			320																																					
9/2/1971	13:15	10		15			300																																					
9/29/1971	9:40	10		10			350																																					
11/4/1971	10:05	10		1			310																																					
3/14/1972	9:25	22		0.5			400																																					
5/8/1972	10:55	207		4			360																																					
5/15/1972	14:45	180		11			340																																					
6/7/1972	15:25	64		15.5			320																																					
7/18/1972	11:50	11		15.5			305																																					
8/24/1972	13:50	6.9		14.5			320																																					
10/12/1972	8:20	9.1		6.5			310																																					
10/12/1972	9:00	9.1		6.5			310																																					
1/23/1973	12:40	14		0			340																																					
2/23/1973	11:55	13		0			420																																					
3/20/1973	9:15	11		0			390																																					
4/18/1973	10:00	28		0.5			400																																					
5/16/1973	9:05	755		3			340																																					
5/23/1973	11:40	583		6.5			380																																					
6/26/1973	15:15	62		19			380																																					
7/17/1973	12:30	28		17			320																																					
8/15/1973	13:40	14		18			340																																					
10/10/1973	12:10	12		3.5			340																																					
12/3/1973	10:40	9.1		0			370																																					
4/10/1974	10:45	12		0.5			400																																					
5/20/1974	15:35	273		9			350																																					
7/1/1974	12:40	29		16			340																																					
8/14/1974	9:05	10		12			320																																					
9/10/1974	13:50	6.2		16			340																																					
10/9/1974	10:30		8.2	7.5			360																																					
11/12/1974	12:25		12	1			360																																					
12/12/1974	12:15		8.9	0			350																																					
6/4/1975	13:10		720	7.5			250																																					
8/11/1975	13:00		21	17.5			300																																					
10/4/1975	19:15		12	10.5			320																																					
11/12/1975	14:35		16	0			325																																					
4/27/1976	11:00		30	3			310																																					
6/30/1976	8:03		28	12			300																																					
8/4/1976	13:00		12	20			320																																					
9/9/1976	9:00		8.8	9.5			310																																					
10/13/1976	10:15		7.2	4			345																																					
11/18/1976	15:16		11	1.5			340																																					
12/16/1976	10:50		7.4	0			360																																					
1/18/1977	12:10		5.9	0			420																																					
2/16/1977	15:00		5.8	0			400																																					
4/14/1977	12:15		72	0.5			340																																					
5/24/1977	17:00		24	8.5			320																																					
7/27/1977	19:30		6.6	11			390																																					
8/24/1977	10:45		3.6	9			350																																					
9/20/1977	9:30		3.1	7			360																																					
10/28/1977	14:10		4.9	9			360																																					
11/30/1977	12:00		8.9	0			300																																					
1/27/1978	14:10		18	0			400																																					
3/30/1978	17:20		30	0			400																																					
5/16/1978	9:20		545	3			290																																					
6/12/1978	13:50		322	4			300																																					
6/29/1978	14:20		76	14			340																																					
7/18/1978	14:50		28	10			300																																					
8/29/1978	16:10		11	17.5			290																																					
9/27/1978	13:30		8.9	11.5			320																																					
11/16/1978	10:15		10	0			540																																					
4/3/1979	13:00		7.8	0			420																																					
5/18/1979	9:20		393	3.5			300																																					
6/12/1979	17:50		131	18			360																																					
7/18/1979	11:00		22	19.5	8.3		335	8			191	55	12	2.9	0.6			2.9	15	0.2							190	4.7		< 20					160	300			150	< 20		20	

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Date	Time	Flow (cfs)	Flow (cfs inst.)	T (°C)	pH field (S.U.)	pH lab (S.U.)	Sp. Cond. (uS/cm)	D.O. (mg/L)	TSS (mg/L)	TDS (mg/L)	TDS (sum) (mg/L)	Ca (mg/L)	Mg (mg/L)	Na (mg/L)	K (mg/L)	HCO3 (mg/L)	CO3 (mg/L)	Cl (mg/L)	SO4 (mg/L)	F (mg/L)	NO2 (mg/L)	NO3 (mg/L)	NH3 (mg/L)	N(t) (mg/L)	O-Phos. (mg/L)	Phos (t) (mg/L)	Hard. mg/L caco3	Si (mg/L)	As (d) (ug/L)	B (d) (ug/L)	Cd (t) (ug/L)	Cr (t) (ug/L)	Cu (t) (ug/L)	Fe (rec) (ug/L)	Fe (d) (ug/L)	Pb (d) (ug/L)	Mn (t) (ug/L)	Mn (d) (ug/L)	Sr (d) (ug/L)	Zn (d) (ug/L)	Zn (t) (ug/L)	Li (d) (ug/L)	Se (d) (ug/L)	Hg (rec) (ug/L)
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8/16/1979	11:14		15	10.5			330																																					
9/19/1979	13:40		8	13			320																																					
10/18/1979	14:40		8	8			300																																					
11/15/1979	14:20		0.6	2.5			487				347	94	18	6.1	1.4			8.7	55	0.1	0	0	0	2.1	0	0	310	6.7	0	20					10	M				M			0	
11/15/1979	15:35			0.8			332				202	57	14	2.4	0.8			3.4	17	0.1	0	0	0	1.4	0	0	200	4.6	1	10					20	M				< 3			0	
12/13/1979	10:30		12	0			380														0.16	0	0	5.3	0	0																		
2/6/1980	9:25		10	0			390																																					
2/21/1980	18:15			3.5			407														0.21	0	0	2.5	0	0			0	20						M				M			0	
4/24/1980	15:00		84	7			332														0.29	0	0	4.6	0	0			0							M				10			0	
5/28/1980	11:55		410	6			330				189	60	9.2	1.9	0.6			2.2	5.8	0.1	0.46	0	0	4.7	0.12	0.12	190	4.6	1	30					10	0				< 3			0	
5/29/1980	15:30		468	11			300																																					
6/19/1980	10:15		227	12.5			330																																					
7/15/1980	15:00		39	21			315																																					
7/15/1980	15:45		39	18.7			331				189	52	12	2.5	0.7			2.5	11	1.3	0	0	0	2.7	0	0	180	4.1	1	30					20	0				< 3			0	
8/14/1980	15:50		18	18			310																																					
8/20/1980	10:20		14	8.4			329				192	49	12	2.6	0.8			3.9	23	0.1	0	0	0	1.9	0	0	170	4.6	1	0					30	0				< 3			0	
10/8/1980	15:30		12	14			300																																					
11/25/1980	10:15		20	0			290																																					
1/14/1981	10:35		8.8	0			410																																					
2/6/1981	15:35		11	0			365																																					
4/13/1981	13:25		28	8			370																																					
4/27/1981	13:40		134	6			305																																					
5/13/1981	12:55		93	9			340																																					
6/16/1981	14:30		49	16			320																																					
7/15/1981	14:55		14	22.5			315																																					
8/6/1981	13:50		6.2	20.5			290																																					
10/6/1981	16:25		13	13			280																																					
12/1/1981	12:35		12	0			300																																					
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4/20/1982	10:35		75				420																																					
5/21/1982	18:30		484	9			355																																					
6/24/1982	18:40		120	11			375																																					
6/25/1982	8:20		115	10.5			385																																					
8/6/1982	15:45		24	20.5			350																																					
9/16/1982	14:25		18	9			370																																					
3/2/1983	10:30		19	0		8.2	400			207									14				0.07		0.06									190	20		20							
4/19/1983	9:50		25	1.5		8.4	395			222									16				< 0.060		0.092									210	20		30							
5/25/1983	10:40		417	4.5		8.2	410			197									7.8				< 0.000		0.092									2700	100		150							
6/29/1983	8:15		295	9		8.2	640			226		67	11	2.7	0.7			3.1	9.3	0.1							213	4		20				1100	10		70	20						
8/30/1983	13:45		29	13	7.9	8.3	360	7.9		195		52	12	3.1				4.1	16					< 3.5			179							500	20		50	20						< 0.1
8/30/1983	14:25		35		8	8.2	390		878	190		49	11	2.9				3.5	15					< 7.5			168							11000	40		400	10						0.1
11/21/1983	16:00		20	0		8.1	25			212		58	13	3.3				3.5	18				0.05				198							840	30		30	20						
5/23/1984	8:20	893	1220	3.5	7.7	8.1	350	10.1	792	187		53	8	1.9				2.1	7.4				0.58		0.061		170				< 1	15	20	8200	120	M	290	10		20	50			< 0.1
5/31/1984	14:30			14.5																																								
6/15/1984	11:00		328	8	7.7	8.4	380			213		64	10	2.3				2.2	8.9				0.04		0.031		201							750	M		40	10						
7/31/1984	13:45		46	16	8	8.2	340	9.5		187		56	13	2.9				3.5	13				0.05		< 0.031		193				< 1	9	80	240	20	< 1	30	20		< 3	10			0.8
9/11/1984	12:30																																											
9/11/1984	12:30	20																																										
10/24/1984	12:25			0	8.6	8.3	370	11		190		55	13	3.3				4.2	18				< 0.010		0.031		191							230	10		40	30						< 0.1
10/2/1985			13	8			350																																					
12/6/1985	14:50		15	0			420																																					
1/10/1986	14:10		17	0			420																																					
4/15/1986	15:30		100	5																																								
5/13/1986	10:15		260	3.5			370																																					
6/17/1986	9:20		173	9.5			350																																					
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8/12/1986	10:40		21	16			330																																					
9/18/1986	9:40		16	9.5			290																																					
10/7/1987	12:50		7.7	9			370																																					
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2/1/1988	15:00		8.9	0			400																																					
3/30/1988	12:40		16	0			285																																					
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6/2/1988	15:10		93	12.5			390																																					
7/26/1988	11:50		13	18			240																																					
8/30/1988	9:15		8.6	13			180																																					
10/4/1988	14:30		7.4	11			200																																					
11/30/1988	10:20		11	0			420																																					
2/14/1989	11:00		6.7	0			435																																					
4/27/1989	9:30		116	2			320																																					
6/8/1989	9:10		38	10.5			340																																					

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		Flow	Flow	T	pH field	pH lab	Sp. Cond.	D.O.	TSS	TDS	TDS (sum)	Ca	Mg	Na	K	HCO3	CO3	Cl	SO4	F	NO2	NO3	NH3	N(t)	O-Phos.	Phos (t)	Hard.	Si	As (d)	B (d)	Cd (t)	Cr (t)	Cu (t)	Fe (rec)	Fe (d)	Pb (d)	Mn (t)	Mn (d)	Sr (d)	Zn (d)	Zn (t)	Li (d)	Se (d)	Hg (rec)
Date	Time	(cfs)	(cfs inst.)	(°C)	(S.U.)	(S.U.)	(uS/cm)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	mg/L CaCO3	(mg/L)	(ug/L)	(ug/L)	(ug/L)	(ug/L)	(ug/L)	(ug/L)	(ug/L)	(ug/L)	(ug/L)	(ug/L)	(ug/L)	(ug/L)	(ug/L)	(ug/L)	(ug/L)	(ug/L)
7/26/1989	10:15		9.9	13.5			350																																					
8/23/1989	10:25		7.8	13.5			290																																					
10/3/1989	16:05		6.7	11			300																																					
11/14/1989	16:40		74	2			220																																					
1/10/1990	13:25		10	0			420																																					
2/20/1990	10:35		5.6	0			450																																					
4/18/1990	11:40		110	3			115																																					
5/2/1990	16:05		119	7			285																																					
5/3/1990	11:00		129	7.5			290																																					
5/10/1990	12:10		184	7.5			320																																					
6/6/1990	12:10		56	14			310																																					
7/26/1990	13:00		13	18			280																																					
8/1/1990	15:00			19																																								
8/29/1990	14:35		6.5	17			265																																					
10/10/1990	14:10		7.2	8			330																																					
12/4/1990	15:40		5.4	0			430																																					
3/19/1991	11:10		10	0			440																																					
5/8/1991	9:55		51	4			370																																					
5/22/1991	9:45		359	6			260																																					
6/27/1991	11:05		53	9.5			400																																					
8/7/1991	9:45		15	12.5			280																																					
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11/18/2008	11:30		6.1	0.5			215																																					
1/15/2009	11:30		6.1	0			110																																					
3/12/2009	11:00		7.7	0.5			330																																					
4/23/2009	13:30		116	6.3			370																																					
5/7/2009	11:30		381	4.5			370																																					
5/14/2009	11:25			5.5			330																																					
6/10/2009	13:25		86	11.9			377																																					
7/28/2009	10:00		14	14.8			340																																					
9/14/2009	10:50		9.5	10			242																																					
10/7/2009	10:00		9.3	1.9			368																																					
11/17/2009	11:20		9.3	0.4			436																																					
1/8/2010	13:00		9	0.3			636																																					
3/12/2010	9:45		9.4	0.3			373																																					
4/26/2010	10:21		58	2.1			380																																					
7/6/2010	11:50		28	13.7			362																																					
8/20/2010	10:10		10	11.7			356																																					
10/15/2010	11:40		6.5	5.8			381																																					
12/8/2010	10:35		6.3	0.3			433																																					
4/5/2011	10:40		31	0.3			424																																					
5/16/2011	10:32		620	3.2			334																																					
7/20/2011	9:35		54	12.6			387																																					
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10/20/2011	12:59		14	5.7			417																																					
11/17/2011	12:34		18	0			429																																					
3/6/2012	12:06		11	0			420																																					
4/27/2012	11:01			4.4			332																																					
7/24/2012	12:07		11	18.4			348																																					
9/14/2012	14:59		6.4	15.4			359																																					
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11/7/2012	11:40		6.9	2			388																																					
11/29/2012	13:28		7.6	0.7			435																																					

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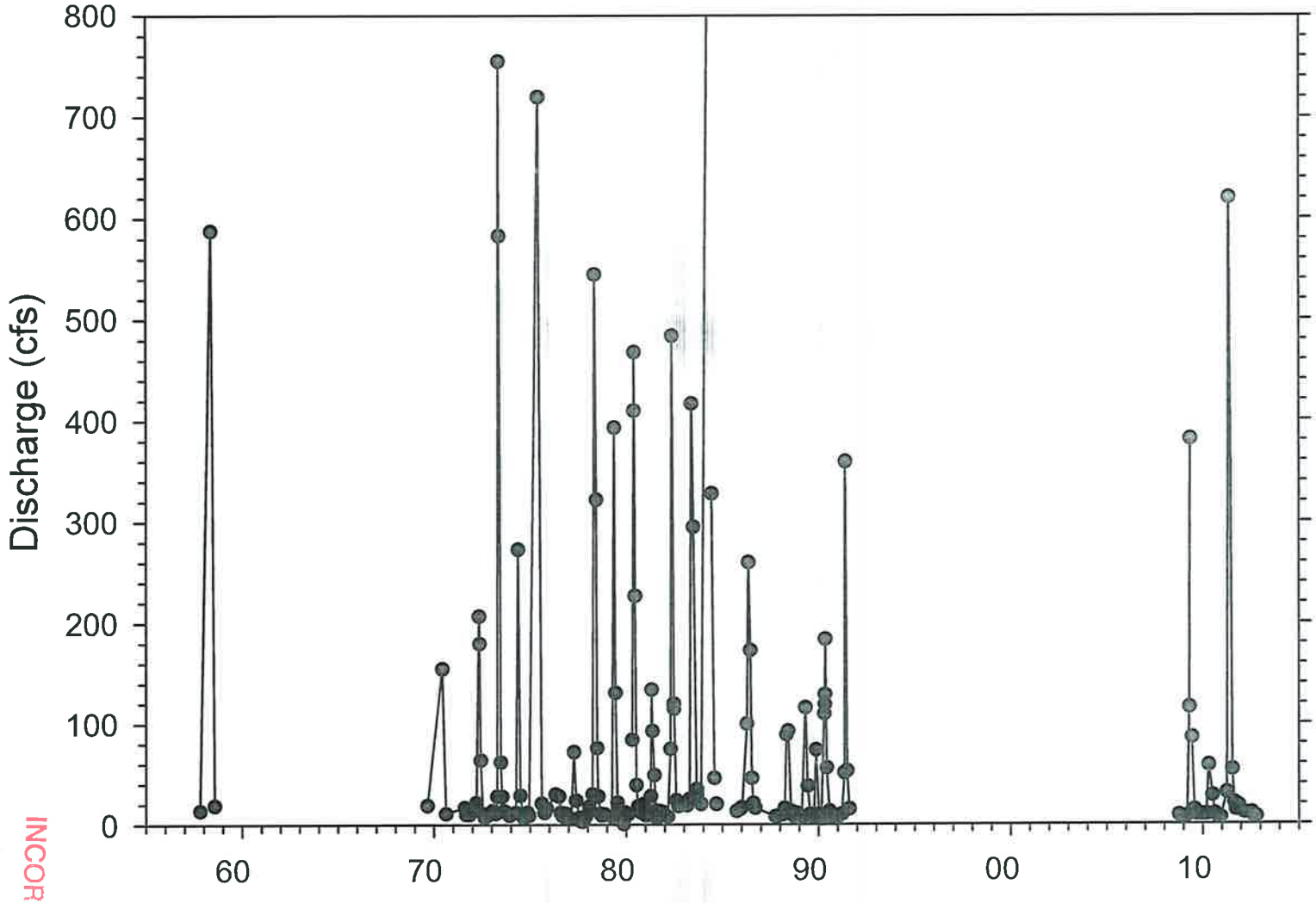
Fish Creek (USGS gaging station 09310500)



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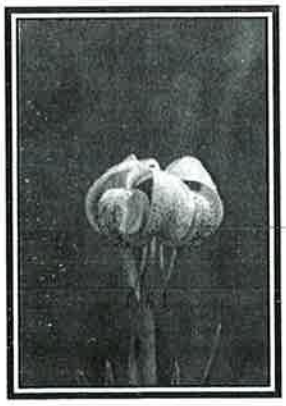
A Review of Potential Threatened, Endangered & Sensitive Species in the North Lease Expansion Area

2012

at the
Skyline Mine
Carbon & Sanpete Counties
Utah



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for

CANYON FUEL COMPANY, LLC
Skyline Mines
HC 35 Box 380
Helper, Utah 84526

February 2012

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TABLE OF CONTENTS

INTRODUCTION. 1

METHODS. 2

RESULTS 2

INCORPORATED

JAN 0 3 2014

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INTRODUCTION

The Skyline Mine is located on the Wasatch Plateau in central Utah. This underground coal mine plans to expand their North Lease mining activities northward into a new area called "North Lease Expansion". The new area is comprised of approximately 770 acres of land. No surface disturbance from operations above-ground is planned for this area, however, some surface subsidence does occur in areas following underground mining.

The vegetation of the entire permit area for the Skyline Mine was mapped several years ago. In those areas where surface disturbance was planned, the plant communities that would be impacted were quantitatively sampled along with "Reference Areas" that will eventually be used for future revegetation success standards of the reclaimed areas. In the past, a sensitive species inventory was also conducted for the entire permit area, at least where above-ground operations and underground coal mining were being conducted.

Because the Skyline Mine is now planning to extend mining into a new area, the North Lease Expansion, a review of the current lists of threatened, endangered or otherwise sensitive plants and animals has been conducted, as well as the potential of their presence within the permit area and a discussion about possible impacts from surface disturbance. This report does *not* include raptor species; surveys for their presence have been addressed in separate reports.

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JAN 0 3 2014
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METHODS

A review of the most current information for those species that have been federally listed as *threatened* or *endangered* by Utah counties was conducted. Additionally, a review of those species listed as *sensitive* by the USDA Forest Service, Manti-La Sal National Forest was also conducted.

Skyline Mine's current vegetation map (VEGETATION TYPES; DWG. NO. 2.7.1-1a; Revision 5; 07/20/10) was used to note the plant communities that have been previously mapped in the North Lease, including the expansion area. This review assisted in the determination of the potential for each threatened, endangered or sensitive (TES) species. The review did not include fieldwork or onsite TES surveys of these species in the North Lease Expansion area.

RESULTS

Table 1 shows the list of federally listed plant and animal species for Carbon and Sanpete Counties, Utah, the counties in which the North Lease Expansion is located. The table also provides the status of each species and remarks as to the likelihood of occurrence in the North Lease Expansion area as well as comments about potential impacts that could be caused by mining underground and the subsequent surface subsidence that could occur. Table 2 shows the similar information for those species listed as sensitive in the Manti-La Sal National Forest.

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Table 1: Federally listed threatened, endangered & candidate species in Sanpete and Carbon Counties, Utah. The table includes notes regarding potential impacts to them as a result of the proposed underground coal mining in the Skyline Mine's North Lease Expansion.

NOTE: This list was compiled using known species occurrences and species observations from the Utah Natural Heritage Program's Biodiversity Tracking and Conservation System (BIOTICS). This list includes both current and historic records. (Last updated on January 12, 2012).

Scientific Name	Common Name	Status*	Site-Specific Notes
Astragalus montii	Heliotrope milkvetch	T	This species is known to occur only in Flagstaff Limestone, a formation that is not present in the North Lease Expansion area. There should be no impacts to this species as a result of underground mining in the area.
Canus lupus	Gray Wolf	E	Although once common in Utah, the gray wolf was extirpated (exterminated) from the state by early settlers. Although they have been reintroduced in adjacent states, and may move into the state, efforts for reintroduction to Utah is not known. There should be no impacts to this species as a result of underground mining in the area.
Centrocercus urophasianus	Greater sage-grouse	C	Greater sage-grouse inhabit sagebrush zones in Utah's mountain valleys and foothills. No brooding or winter habitat for this species is shown on the DWR database. There should be no impacts to this species as a result of underground mining in the area.
Cynomys parvidens	Utah prairie-dog	T	Habitat for this prairie-dog does not exist in the North Lease Expansion area. There should be no impacts to this species as a result of underground mining in the area.
Gila cypha	Humpback chub	E	Humpback chubs in Utah are now confined to a few white-water areas in the Colorado, Green, and White Rivers. These rivers do not occur in the study area and above-ground operations are not planned that could cause surface disturbance in the North Lease Expansion. Accordingly, no downstream impacts to the Colorado River system will occur. There should be no impacts to this species as a result of underground mining in the area.

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Table 1: Federally listed threatened, endangered & candidate species in Sanpete and Carbon Counties, Utah. The table includes notes regarding potential impacts to them as a result of the proposed underground coal mining in the Skyline Mine's North Lease Expansion.

NOTE: This list was compiled using known species occurrences and species observations from the Utah Natural Heritage Program's Biodiversity Tracking and Conservation System (BIOTICS). This list includes both current and historic records. (Last updated on January 12, 2012).

Gila elegans	Bonytail	E	The bonytail is a very rare minnow originally native to the Colorado River system. This river habitat does not occur in the study area and above-ground operations are not planned that could cause surface disturbance in the North Lease Expansion. Accordingly, no downstream impacts to the Colorado River system will occur. There should be no impacts to this species as a result of underground mining in the area.
Lynx canadensis	Canada lynx	T	State of Utah, Division of Wildlife Resources (DWR) distribution maps show that the general area on the Wasatch Plateau in Sanpete County may be "critical habitat" for this species. The Canada lynx range extends from Canada and Alaska south to Maine, the Rocky Mountains, and also to the Great Lakes region. DWR biologists state that, *although sightings of the Canada lynx in Utah over the past twenty years are exceedingly rare, the USDA Forest Service recently announced that Canada lynx hair was found in the Manti-La Sal National Forest during 2002.* The preferred habitat of the Canada lynx is montane coniferous forest, where it often hunts snowshoe hares. Coniferous forests are some of the plant communities in the North Lease Expansion area. If the Canada lynx happen to be present in the North Lease Expansion area, and if subsidence were to occur, it would likely have little or no impact on the species.
Mustela nigripes	Black-footed ferret	Ex	Black-footed ferret habitat is primarily prairie grasslands. The ferret has a diet consisting of almost 90% prairie dogs. This habitat and food source does not occur in the study area. There should be no impacts to this species as a result of underground mining in the area.
Penstemon grahamii	Graham beardtongue	T (P)	*Penstemon grahamii* is uncommon and mostly found on shale and talus ledges in the Green River formation. This formation does not outcrop in the North Lease Expansion area. There should be no impacts to this species as a result of underground mining in the area.

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Table 1: Federally listed threatened, endangered & candidate species in Sanpete and Carbon Counties, Utah. The table includes notes regarding potential impacts to them as a result of the proposed underground coal mining in the Skyline Mine's North Lease Expansion.

NOTE: This list was compiled using known species occurrences and species observations from the Utah Natural Heritage Program's Biodiversity Tracking and Conservation System (BIOTICS). This list includes both current and historic records. (Last updated on January 12, 2012).

Ptychocheilus lucius	Colorado pikeminnow	E	The Colorado pikeminnow is a fish that prefers medium to large rivers. With the loss of habitat they are now restricted to the upper Colorado River system. This river habitat does not occur in the study area and above-ground operations are not planned that could cause surface disturbance in the North Lease Expansion. Accordingly, no downstream impacts to the Colorado River system will occur. There should be no impacts to this species as a result of underground mining in the area.
Sclerocactus wetlandicus	Uinta Basin hookless cactus	T	*Sclerocactus wetlandicus* (also known as *S. glaucus* and *S. whipplei var. roseus*) generally occurs on cobblely, gravelly, or rocky surfaces on river terrace deposits along the White and Green Rivers of Utah.. *Sclerocactus wetlandicus* occurs on varying exposures, but is more abundant on south facing exposures, and on slopes to about 30 percent grade; it is most abundant at the point where terrace deposits break from level tops to steeper side slopes. Plant communities and species associated with this species are bud sage, shadscale, black sagebrush and horsebrush. There is no habitat for this cactus at or adjacent to the North Lease Expansion area. There should be no impacts to this species as a result of underground mining in the area.
Ursus arctos	Brown bear	T Extirpated	The brown or grizzly bear was extirpated from Utah in the 1920s. It probably once occurred in the Wasatch Plateau. Although this project area my be suitable habitat for the brown bear, it does not presently exist there. This habitat would not be impacted by the proposed mining in the area in a way that would negatively affect this species' habitat.

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Table 1: Federally listed threatened, endangered & candidate species in Sanpete and Carbon Counties, Utah. The table includes notes regarding potential impacts to them as a result of the proposed underground coal mining in the Skyline Mine's North Lease Expansion.

NOTE: This list was compiled using known species occurrences and species observations from the Utah Natural Heritage Program's Biodiversity Tracking and Conservation System (BIOTICS). This list includes both current and historic records. (Last updated on January 12, 2012).

Xyrauchen texanus	Razorback sucker	E	This species prefers slow backwater habitats and impoundments in the Colorado River system. DWR distribution maps of this species for Carbon County shows to occur near the Green River in extreme eastern portion of the county. This river and others do not occur in the study area. Above-ground operations are not planned that could cause surface disturbance in the North Lease Expansion. Accordingly, no downstream impacts to the Colorado River system will occur. There should be no impacts to this species as a result of underground mining in the area.

* Status
C = Candidate
E = Endangered
T = Threatened
Ex = Extirpated
P = Proposed

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Table 2: Sensitive species with known distribution or habitat in the Manti-La Sal National Forest. The table includes notes regarding potential impacts to them as a result of the proposed underground coal mining in the Skyline Mine's North Lease Expansion. (Raptors were not included).

NOTE: This list was compiled using information from the USDA Forest Service Intermountain Region. (Last updated on July 27, 2011).

Allium geyeri var. chatterleyi	Chatterley Onion	There is not much habitat for this plant species in the North Lease Expansion. Furthermore, according to Welsh et al, A Utah Flora (2008), it has not been collected in Carbon or Sanpete counties – it is a San Juan County endemic. Therefore, any subsidence from underground mining would not impact this species.
Androsace chamaejasme ssp. carinata	Sweet-flowered rock jasmine	In Utah, this plant species is mostly known to be in alpine tundra habitat and in the La Sal Mountains. This habitat does not exist in the North Lease Expansion. Therefore, any subsidence from underground mining would not impact this species.
Aquilegia flavescens var. rubicunda	Link Trail columbine	This plant has been collected quite often by the author, and always at the south end of the Wasatch Plateau in shady or wet areas in Castlegate Ss formation. Welsh et al. 2008 calls the species an Emery and Sevier County Endemic. Although it is possible it could exist in the North Lease Expansion area, with the limited habitat there, it is unlikely. There should be no impacts to this species as a result of underground mining in the area.
Astragalus iselyi	Isely's milkvetch	This endemic plant has only been collected in Morrison and Paradox formations in pinyon-juniper and salt desert shrub communities. These formations and habitats are not found in the North Lease Expansion area. There should be no impacts to this species as a result of underground mining in the area.
Bufo boreas	Boreal Toad	The boreal toad occupies relatively higher elevation habitats when compared to other western amphibians. DWR has historical records that is occured in elevations from 5,150 ft to nearly 10,500 ft. In 2004, Thompson et al. documented the toad historical and current populations. At that time no breeding populations were shown in the Wasatch Plateau on their map. However, historically, there were observations in the Wasatch Plateau in 3 locations including near Ephraim, Fairview and Juab. A survey for boreal toads was conducted in

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Table 2: Sensitive species with known distribution or habitat in the Manti-La Sal National Forest. The table includes notes regarding potential impacts to them as a result of the proposed underground coal mining in the Skyline Mine's North Lease Expansion. (Raptors were not included).

NOTE: This list was compiled using information from the USDA Forest Service Intermountain Region. (Last updated on July 27, 2011).

		Winter Quarters and Woods Canyons (including their tributaries) in the North Lease area by *Mt. Nebo Scientific* (2005). No toads were found at that time. Conclusions in the study suggested that the lack of suitable habitat to be responsible for their absence. The bottomline here is there may be some small isolated springs and wetlands in the North Lease Expansion area, but these habitats are limited and, judging from historical records, likelihood for the presence of toads in the area seems remote. Nonetheless, if subsidence impacted these sites, and the toads were present, these populations could be impacted.
Centrocercus urophasianus	Greater sage-grouse	Refer to Table 1 for information about this species.
Coccyzus americanus	Yellow-billed cuckoo	The DWR information reports that historically, cuckoos were probably common to uncommon summer residents in Utah and across the Great Basin. The current distribution of yellow-billed cuckoos in Utah is poorly understood, though they appear to be an extremely rare breeder in lowland riparian habitats statewide. There are few riparian areas in the North Lease Expansion area and their distribution is not known. The occurrence of the bird in the study area would be extremely unlikely. There should be no impacts to this species as a result of underground mining in the area.
Corynorhinus townsendii townsendii	Townsend's Western Big-Eared Bat	In Utah, the Townsend's big-eared bat usually occurs in elevations below 9,000 ft. These bats occur in many types of habitats and are often near forested areas like those in the project area. They are often found in caves, mines, and buildings that are used for day roosting and winter hibernation (DWR). It is possible that this species could occur in the project area, but the proposed underground mining would have very little impact to its habitat (unless there is an unknown cave in the project area that subsequent subsidence impacted).
Cryptantha creutzfeldtii	Creutzfeldt-flower cryptanth	This plant grows primarily in heavy soils derived from Mancos Shale and shadscale associated plant communities. This habitat is not in the North Lease Expansion area. There should be no impacts to this species as a result of underground mining in the area.

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Table 2: Sensitive species with known distribution or habitat in the Manti-La Sal National Forest. The table includes notes regarding potential impacts to them as a result of the proposed underground coal mining in the Skyline Mine's North Lease Expansion. (Raptors were not included).

NOTE: This list was compiled using information from the USDA Forest Service Intermountain Region. (Last updated on July 27, 2011).

Cymopterus beckii	Pinnate spring-parsley	This is an endemic plant known in Utah only in Wayne and San Juan Counties. There should be no impacts to this species as a result of underground mining in the area.
Draba abajoensis	Abajo peak draba	In Utah, *Draba abajoensis* (or *D. spectabilis*) has most often been collected in the Abajo and La Sal Mountains in San Juan and Grand Counties; it is much less commonly collected in the southern Wasatch Plateau in Emery County. It is possible, but highly unlikely, that this plant could exist in the North Lease Expansion area of Carbon or Sanpete Counties. There should be no impacts to this species as a result of underground mining in the area.
Erigeron mancus	La Sal daisy	Like the common name suggests, the La Sal daisy grows at high elevations in the La Sal Mountains in southeastern Utah. It is endemic to that portion of Utah. There should be no impacts to this species as a result of underground mining in the area.
Erigeron kachinensis	Kachina daisy	A Colorado Plateau endemic, this plant species has only been collected in southeastern Utah in San Juan County. There will be no impacts to this species as a result of underground mining in the area.
Euderma maculatum	Spotted bat	DWR database report that spotted bats may be found in a variety of habitats, ranging from deserts to forested mountains; they roost and hibernate in caves and rock crevices. Like the Townsend's western big-eared bat reported above, is possible that this species could occur in the project area, but the proposed underground mining would have very little impact to its habitat, unless there is an unknown cave or rock crevice in the project area that subsequent subsidence impacted.
Hedysarum occidentale var. canone	Canyon sweetvetch	The author has collected this plant on numerous occasions. The plant could be in the North Lease Expansion area but its habitat is probably limited there. Even though it is considered a sensitive species, the plant can be locally abundant on the Wasatch Plateau and Book Cliffs. There should be no impacts to the overall populations of this species as a result of

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Table 2: Sensitive species with known distribution or habitat in the Manti-La Sal National Forest. The table includes notes regarding potential impacts to them as a result of the proposed underground coal mining in the Skyline Mine's North Lease Expansion. (Raptors were not included).

NOTE: This list was compiled using information from the USDA Forest Service Intermountain Region. (Last updated on July 27, 2011).

		underground mining in the area.
Lomatium latilobum	Canyonlands lomatium	This is a Navajo Basin endemic species that grow in Entrada Ss in San Juan and Grand Counties in Utah; it also can be found in Mesa County, Colorado. Its habitat and geologic formation is not found in the North Lease Expansion area. There should be no impacts to this species as a result of underground mining in the area.
Oncorhynchus clarki pleuriticus	Colorado River cutthroat trout	DWR distribution maps do not show this fish in the area. This cutthroat trout is now rare in its historic range – the upper Colorado River drainage of Utah, Wyoming, Colorado, Arizona, and New Mexico. The Colorado River cutthroat trout only occurs naturally in isolated high-elevation headwater streams. No stream habitat that could support this species exists in the North Lease Expansion area. There should be no impacts to this species as a result of underground mining in the area.
Oncorhynchus clarki utah	Bonneville cutthroat trout	DWR distribution maps do not show this fish in the area. Additionally, their database states that "pure Bonneville cutthroat trout are rare throughout their historic range, but several Utah populations exist, including populations in Bear Lake and Strawberry Reservoir". No stream habitat that could support this species exists in the North Lease Expansion area. There should be no impacts to this species as a result of underground mining in the area.
Ovis canadensis *(O. c. canadensis)* *(O. c. californiana)* *(O. c. nelsoni)*	Bighorn Sheep includes: (Rocky Mountain bighorn sheep, California bighorn sheep, and desert bighorn sheep)	DWR distribution maps suggest none of these 3 subspecies occur in the study area, probably a consequence of the lack of rugged and rocky terrain that they prefer. There should be no impacts to this species as a result of underground mining in the area.
Picoides tridactylus	Three-toed woodpecker	In Utah, this woodpecker nests and winters in coniferous forests, one of the common communities in the North Lease Expansion area. They generally nest above 8,000 ft elevation in this state (DWR 1998, Hill et al. 2001). They can remain on their territories year-round, and with the Wasatch Plateau's recent bark beetle infestations where the woodpeckers seem to thrive, they are probably common in the area.

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Table 2: Sensitive species with known distribution or habitat in the Manti-La Sal National Forest. The table includes notes regarding potential impacts to them as a result of the proposed underground coal mining in the Skyline Mine's North Lease Expansion. (Raptors were not included).

NOTE: This list was compiled using information from the USDA Forest Service Intermountain Region. (Last updated on July 27, 2011).

		A survey for three-toed woodpeckers was conducted in the North Lease Area by *Mt. Nebo Scientific* (2005). Although several drumming sounds were identified, they all turned out to be hairy woodpeckers. No three-toed woodpeckers were observed at that time. It is possible that this species could occur in the expansion area, but the proposed underground mining and any subsequent subsidence would have very little impact to its habitat (unless it caused downing of a significant amount of beetle infested trees).
Rana luteiventris	Columbia spotted frog	In Utah, numerous springs occur in the Bonneville Basin which encompasses an area that was once covered by the ancient Lake Bonneville. Several aquatic species have maintained an existence in these springs including the Columbia spotted frog (Conservation Agreement and Strategy, DWR). Consequently, populations of these frogs are highly fragmented. DWR biologists also report that very little information is available, particularly, quantitative information, on the historic occurrence of spotted frog in Utah. Results from a survey by Ross (1993) indicated that the closest population of spotted frog to the project area was at lower elevations in the San Pitch River near Fairview, Utah. A survey for spotted frogs was conducted in Winter Quarters and Woods Canyons (including their tributaries) in the North Lease Area by *Mt. Nebo Scientific* (2005). No frogs were found at that time. Conclusions in the study suggested that the lack of suitable habitat to be responsible for their absence. Like to boreal toad findings above, the bottomline here is there may be some small isolated springs and wetlands in the North Lease Expansion, but these habitats are limited and, judging from historical records, likelihood for the presence of toads in the area seems remote. Nonetheless, if subsidence impacted these sites, and the toads were present, these populations could be impacted. It is unlikely the spotted frog occurs in the project area, so there should be no impacts to this species as a result of underground mining there.

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Table 2: Sensitive species with known distribution or habitat in the Manti-La Sal National Forest. The table includes notes regarding potential impacts to them as a result of the proposed underground coal mining in the Skyline Mine's North Lease Expansion. (Raptors were not included).

NOTE: This list was compiled using information from the USDA Forest Service Intermountain Region. (Last updated on July 27, 2011).

Salix arizonica	Arizona willow	In Utah, this plant has been collected more south of the project area in Garfield, Iron, Sanpete and Sevier Counties on the Wasatch, Paunsaugunt, Fish Lake, and Markagunt Plateaus. It is possible that this species could also reach far enough north to be found in the North Lease Expansion area. That said, it is unlikely with the limited riparian habitat that exists in the lease area, that any subsidence disturbance would impact the overall populations in Utah.
Senecio musiniensis	Musinea groundsel	Although a Wasatch Plateau endemic, this plant has only been found in Flagstaff Limestone barrens, a formation and habitat that is non-existent in the North Lease Expansion area. There should be no impacts to this species as a result of underground mining in the area.
Silene petersonii	Maguire campion	This Utah endemic plant has only been collected in Claron and Flagstaff Limestone formations, neither of which exist in the North Lease Expansion area. There will be no impacts to this species as a result of underground mining in the area.

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Append A-2
Vol. 2

Joseph Dyer
NRCS Area Resource Soil Scientist
540 Price River Dr.
Price Utah 84501

Gregg Galecki
Environmental Engineer
Canyon Fuel Company
Skyline mine
8C 35 Box 380
Helper Ut. 84526

Dear Gregg

Enclosed please find Prime Farm Forms AD-1006 and CPA-106 regarding your Prime Farmland request for the Skyline mine. Please file these for your future reference

Joseph Dyer

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U.S. DEPARTMENT OF AGRICULTURE
Natural Resources Conservation Service

NRCS-CPA-106
(Rev. 1-91)

FARMLAND CONVERSION IMPACT RATING FOR CORRIDOR TYPE PROJECTS

PART I *(To be completed by Federal Agency)*	3. Date of Land Evaluation Request 3/8/12 — 4. Sheet 1 of 1
1. Name of Project Skyline mine	5. Federal Agency Involved NRCS
2. Type of Project	6. County and State Carbon Co. Utah
PART II *(To be completed by NRCS)*	1. Date Request Received by NRCS — 2. Person Completing Form Joseph Dyer
3. Does the corridor contain prime, unique statewide or local important farmland? (If no, the FPPA does not apply - Do not complete additional parts of this form). YES ☐ NO ☑	4. Acres Irrigated — Average Farm Size
5. Major Crop(s)	6. Farmable Land in Government Jurisdiction Acres: % — 7. Amount of Farmland As Defined in FPPA Acres: %
8. Name Of Land Evaluation System Used	9. Name of Local Site Assessment System — 10. Date Land Evaluation Returned by NRCS

PART III *(To be completed by Federal Agency)*	Alternative Corridor For Segment			
	Corridor A	Corridor B	Corridor C	Corridor D
A. Total Acres To Be Converted Directly				
B. Total Acres To Be Converted Indirectly, Or To Receive Services				
C. Total Acres In Corridor	0	0	0	0
PART IV *(To be completed by NRCS) Land Evaluation Information*				
A. Total Acres Prime And Unique Farmland				
B. Total Acres Statewide And Local Important Farmland				
C. Percentage Of Farmland In County Or Local Govt. Unit To Be Converted				
D. Percentage Of Farmland in Govt. Jurisdiction With Same Or Higher Relative Value				
PART V *(To be completed by NRCS) Land Evaluation Information Criterion Relative value of Farmland to Be Serviced or Converted (Scale of 0 - 100 Points)*				
PART VI *(To be completed by Federal Agency) Corridor Assessment Criteria (These criteria are explained in 7 CFR 658.5(c))* — Maximum Points				
1. Area in Nonurban Use — 15				
2. Perimeter in Nonurban Use — 10				
3. Percent Of Corridor Being Farmed — 20				
4. Protection Provided By State And Local Government — 20				
5. Size of Present Farm Unit Compared To Average — 10				
6. Creation Of Nonfarmable Farmland — 25				
7. Availability Of Farm Support Services — 5				
8. On-Farm Investments — 20				
9. Effects Of Conversion On Farm Support Services — 25				
10. Compatibility With Existing Agricultural Use — 10				
TOTAL CORRIDOR ASSESSMENT POINTS — 160	0	0	0	0
PART VII *(To be completed by Federal Agency)*				
Relative Value Of Farmland (From Part V) — 100				
Total Corridor Assessment (From Part VI above or a local site assessment) — 160	0	0	0	0
TOTAL POINTS *(Total of above 2 lines)* — 260	0	0	0	0

1. Corridor Selected:	2. Total Acres of Farmlands to be Converted by Project:	3. Date Of Selection:	4. Was A Local Site Assessment Used? YES ☐ NO ☐

5. Reason For Selection:

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Signature of Person Completing this Part: Joseph Dyer — DATE 09/28/2012

NOTE: Complete a form for each segment with more than one Alternate Corridor

U.S. Department of Agriculture

FARMLAND CONVERSION IMPACT RATING

RECEIVED

JAN 0 3 2014

PART I *(To be completed by Federal Agency)*	Date Of Land Evaluation Request 3/8/12
Name Of Project Skyline Mine	Federal Agency Involved NRCS DIV. OF OIL
Proposed Land Use	County And State Carbon County Utah
PART II *(To be completed by NRCS)*	Date Request Received By NRCS

Does the site contain prime, unique, statewide or local important farmland? *(If no, the FPPA does not apply -- do not complete additional parts of this form).*	Yes ☐	No ☑	Acres Irrigated / Average Farm Size
Major Crop(s)	Farmable Land In Govt. Jurisdiction Acres: %		Amount Of Farmland As Defined in FPPA Acres: %
Name Of Land Evaluation System Used	Name Of Local Site Assessment System		Date Land Evaluation Returned By NRCS

PART III *(To be completed by Federal Agency)*	Alternative Site Rating			
	Site A	Site B	Site C	Site D
A. Total Acres To Be Converted Directly				
B. Total Acres To Be Converted Indirectly				
C. Total Acres In Site	0.0	0.0	0.0	0.0
PART IV *(To be completed by NRCS)* Land Evaluation Information				
A. Total Acres Prime And Unique Farmland				
B. Total Acres Statewide And Local Important Farmland				
C. Percentage Of Farmland In County Or Local Govt. Unit To Be Converted				
D. Percentage Of Farmland In Govt. Jurisdiction With Same Or Higher Relative Value				
PART V *(To be completed by NRCS)* Land Evaluation Criterion Relative Value Of Farmland To Be Converted *(Scale of 0 to 100 Points)*	0	0	0	0

PART VI *(To be completed by Federal Agency)* Site Assessment Criteria *(These criteria are explained in 7 CFR 658.5(b)*	Maximum Points				
1. Area In Nonurban Use					
2. Perimeter In Nonurban Use					
3. Percent Of Site Being Farmed					
4. Protection Provided By State And Local Government					
5. Distance From Urban Builtup Area					
6. Distance To Urban Support Services					
7. Size Of Present Farm Unit Compared To Average					
8. Creation Of Nonfarmable Farmland					
9. Availability Of Farm Support Services					
10. On-Farm Investments					
11. Effects Of Conversion On Farm Support Services					
12. Compatibility With Existing Agricultural Use					
TOTAL SITE ASSESSMENT POINTS	160	0	0	0	0
PART VII *(To be completed by Federal Agency)*					
Relative Value Of Farmland *(From Part V)*	100	0	0	0	0
Total Site Assessment *(From Part VI above or a local site assessment)*	160	0	0	0	0
TOTAL POINTS *(Total of above 2 lines)*	260	0	0	0	0

Site Selected:	Date Of Selection	Was A Local Site Assessment Used? Yes ☐ No ☐

Reason For Selection:

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(See Instructions on reverse side)

Form AD-1006 (10-83)

This form was electronically produced by National Production Services Staff

Append. A-2
Vol. 2

Habitat Assessment for Sensitive Wildlife Species western toad, Columbia spotted frog, Townsend's western big-eared bat, spotted bat, and three-toed woodpecker.

Prepared for:

Skyline Mine
Gregg Galecki
Environmental Engineer
Canyon Fuel Company, LLC

Prepared By:

Western Land Services, Inc
195 North 100 East, Suite 201
Richfield, UT 84701
Phone: (435) 896-5501

WESTERN LAND SERVICES, INC

11.01.12

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JAN 0 3 2014
Div. of Oil, Gas & Mining

Table of Contents

Contents

1.0 INTRODUCTION.....1

2.0 HABITAT OVERVIEW.....2

3.0 SPECIES HABITAT ASSESSMENT.....4

4.0 MANAGEMENT RECOMMENDATIONS.....5

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JAN 0 3 2014

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Habitat Suitability Research and Assessment

1.0 Introduction

As requested by Skyline Mine, a habitat assessment was completed for the five species western (boreal) toad (*Bufo boreas),* Columbia spotted frog (*Rana luteiventris*), spotted bat *(Euderma maculatum),* Townsend's western big-eared bat (*Corynorhinus townsendii),* and three-toed woodpecker *(Picoides tridactylus).* This assessment summarizes the results of a multiple tiered assessment process including a literature search of species' life history, ecology, habitat requirements, multiple GIS databases and a classification of representative vegetative communities in the area. Vegetative communities in the area were classified during the summer of 2012 by Dr. Allan Stevens. Initially databases such as the Utah Conservation Database Center (UCDC) were utilized to characterize species distributions and general habitat requirements. George Oliver's *Bats of Utah* was reviewed for information regarding Townsend's western big-eared bat and spotted bat habitat. The Columbia spotted frog Conservation Agreement and Strategy was also reviewed. The Utah Natural Heritage Program's 2003 progress report was consulted for each species. GAP predicted analysis of habitat value was also considered in this assessment.

2.0 Habitat Overview

The vegetative communities in the areas near Skyline Mine are diverse. The vegetation is dependent on elevation, slope, and water resources. Riparian areas are dominated by typical high elevation riparian species. The bottoms of the valleys that are drier are dominated by mountain big sagebrush and silver sagebrush communities. South and East facing slopes, at higher elevations are dominated by quaking aspen communities. However, there are some areas that are open on South and East facing slopes. These open areas are typically grass and tall forb communities. However, a significant number of the open areas are dominated by false hellebore. The North and West facing slopes are dominated by conifer communities. The tree species within the conifer community are mostly dead or dying, and most areas have an abundance of deadfall due to beetle infestations. Because of the deadfall and dead trees the forbs and grasses within the conifer communities are very diverse and most areas have a solid understory. The tops of the ridges in the survey area vary with some being dominated by shrub communities such as mountain big sagebrush, elderberry or chokecherry while others are dominated by grass and tall forb communities. Some of the ridge tops are dominated by cluster tarweed. The following is a list of vegetative species found within the 2012 raptor survey area which is similar to the project area.

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Tree Species	
Scientific Name	Common Name
Abies concolor	White fir
Abies lasiocarpa	Subalpine Fir
Picea engelmannii	Engelmann Spruce
Picea pungens	Blue Spruce
Populus tremuloides	Quaking Aspen

Pseudotsuga menziesii	Douglas fir

Shrub Species

Scientific Name	Common Name
Artemisia cana	Silver Sagebrush
Artemisia tridentata vaseyana	Mountain Big Sagebrush
Potentilla fruticosa	Bush Cinquefoil
Prunus virginiana	Chokecherry
Ribes inerme	Whitestem Gooseberry
Ribes viscosissimum	Sticky Currant
Salix boothii	Booth's Willow
Salix drumondiana	Drummond Willow
Salix exigua	Coyote Willow
Sambucus racemosa	Red Elderberry
Symphoricarpos oreophilus	Mountain Snowberry

Forb Species

Scientific Name	Common Name
Achelia millefolium	Western Yarrow
Aconitum columbianum	Monkshood
Agoseris glauca	Pale Agoseris
Artemisia ludoviciana	Louisiana Sagebrush
Aquilegia spp.	Columbine
Aster spp.	Aster
Balsamorhiza sagittata	Arrowleaf Balsamroot
Castilleja spp.	Indian Paintbrush
Crisium spp.	Thistle
Claytonia lanceolata	Lanceleaf Springbeauty
Collomia lincaris	Slenderleaf Collomia
Cynogglossum officinale	Houndstongue
Delphinium occidentale	Western Larkspur
Erigerion eatonii	Eaton Fleeabane
Fritillaria atropurpurea	Purplespot Fritillary
Geranium richardsonii	Richardson Geranium
Gilia spp.	Gilia
Helenium hoopesii	Orange Sneezeweed
Lathyrus pauciflorus	Utah Sweetpea
Ligusticum porteri	Porter Ligusticum
Lupinus alpestris	Mountain Lupine
Lupinus argenteus	Silvery Lupine
Madia glomerata	Cluster Tarweed
Mertensia ciliate	Mountain Blubells
Osmorhiza occidentalis	Sweetanise
Penstemon rydbergii	Rydberg Penstemon
Penstemon strictus	Rocky Mountain Penstemon

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Phacilia spp.	Phacilia
Potentilla gracilis	Beauty Cinquefoil
Rudbeckia occidentalis	Western Coneflower
Senecio serra	Butterweed Groundsel
Taraxacum officinale	Common Dandelion
Tragopogon dubius	Yellow Salsify
Veratrum californicum	False Hellebore
Vicia Americana	American Vetch
Viguiera multiflora	Showy Goleneye
Wyethia amplexicaulis	Mulears Wyethia

Grasses and Grasslike Plants	
Scientific Name	Common Name
Agropyron scibneri	Scribner Wheatgrass
Agropyron smithii	Western Wheatgrass
Agropyron trachycaulum	Slender Wheatgrass
Agrostis exarata	Spike Bentgrass
Bromus anomalus	Nodding Brome
Bromus carinatus	Mountain Brome
Calamagrostis Canadensis	Bluejoint Reedgrass
Calamagrostis stricta	Slimstem Reedgrass
Carex spp.	Sedge
Dactylis glomerata	Orchardgrass
Deschampsia cespitosa	Tufted Hairgrass
Eleocharis spp.	Spikerush
Festuca idahoensis	Idaho Fescue
Festuca ovina	Sheep Fescue
Juncus spp.	Rush
Koelaria marcrantha	Prairie Junegrass
Melica bulbosa	Oniongrass
Muhlenbergia richardsonis	Mat Muhly
Phleum alpinum	Alpine Timothy
Phleum pretense	Timothy
Poa fendleriana	Mutton Bluegrass
Poa pratensis	Kentucky Bluegrass
Stipa Columbiana	Subalpine Needlegrass
Stipa lettermani	Letterman Needlegrass
Stipa nelsonii	Nelson's Nedlegrass
Trisetum spicatum	Spike Trisetum

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3.0 Species Habitat Assessments

Western (Boreal) Toad (*Bufo boreas)*

The western toad occurs in the montane areas of central and northern Utah where it is found in association with permanent water bodies in a variety of habitats, including riparian, mountain shrub, mixed conifer, and aspen-conifer assemblages. Breeding sites are in small pools, beaver ponds, reservoirs, and backwaters and side channels of creeks and rivers (UNHP 2003).

According to the UNHP 2003 progress report there are only records of occurrence in the area of Skyline Mine prior to 1983. The mapping scale within the report makes it difficult to determine exact locations. The UCDC cites the last observation within the Scofield map quadrant was on 6-18-1950. This is the same quadrant as Skyline Mine.

There is suitable habitat for western toad within the Fish Creek Drainage and the lower reaches of the tributaries which feed it; specifically Wife's Canyon and the ephemeral flows in east and west forks of Andrew Dairy Canyon.

Columbia Spotted Frog (*Rana luteiventris*)

The Columbia spotted frog occurs in scattered locations in the Bonneville Basin of western Utah, including parts of the Wasatch Mountains, the San Pitch River Drainage, and isolated springs and wetlands of the West Desert. Within this region, populations are tied to aquatic habitat with perennial sources of water. Breeding invariably occurs in small pools or ponds. Typically, breeding sites have little or no current and are surrounded by dense aquatic vegetation. Floating mats of vegetation are often present, and the bottom substrate is typically deep, fine silt (UNHP 2003).

According to the UNHP 2003 progress report there are no records of occurrence in the vicinity of Skyline Mine. There are no records of occurrence reported in the Scofield quadrat by the UCDC.

Suitable habitat, as defined by the UNHP, for Columbia spotted frog is not present with the vicinity of Skyline Mine or the areas of potential subsidence. Small ponds which have a combination of little or no water current, soil substrates with deep fine silt, and floating mats of vegetation on which to place egg masses during the breeding season, have not been encountered within or near the project area.

Spotted Bat (*Euderma maculatum*)

This species is broadly distributed throughout eastern and southern Utah and has rarely been encountered elsewhere in the state. Within the Utah range, the majority of records are from deep, narrow, rocky canyons, particularly those bounded by precipitous cliff faces. Crevices in cliff walls are the primary roosting sites. Individuals forage over open sagebrush steppe, desert scrub, or montane meadow habitat, sometimes considerable distances from roosting habitat (UNHP 2003).

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According to the UNHP 2003 progress report there are no records of occurrence in the vicinity of Skyline Mine. There are no records of occurrence reported in the Scofield quadrat by the UCDC. The GAP habitat analysis does not predict suitable habitat near Skyline Mine.

Suitable habitat, as described by the UNHP, has not been observed in the vicinity of the project area.

Townsend's Western Big-Eared Bat (*Corynorhinus townsendii)*
Populations occur statewide at middle and low elevations, generally below 9,000 ft. but are absent from flat desert habitats lacking appropriate roosting sites. This species occurs in a wide variety of habitats including sagebrush steppe, pinyon-juniper, mountain shrub, and mixed conifer associations. The primary habitat component, however, is the availability of caves or mines for roost sites. Because required roost conditions vary seasonally and individuals typically do not move long distances between roost sites, highest population densities generally occur in areas with complexes of mines or caves offering diverse roost habitat conditions (UNHP 2003).

According to the UNHP 2003 progress report there are no records of occurrence in the vicinity of Skyline Mine. There are no records of occurrence reported in the Scofield quadrat by the UCDC. Suitable roosting habitat, as described by the UNHP, has not been observed in the vicinity of the project area.

Three-toed Woodpecker *(Picoides tridactylus)*
Populations occur in the Wasatch and Uinta mountains in the north, the La Sal and Abajo mountains in the southeast, and the mountains and high-elevation plateaus in the south-central part of the state. This species forages primarily on scaly barked conifers, such as lodgepole pine and fir, and breeding habitat is primarily spruce-fir forest. Populations tend to be irruptive in response to high food availability, particularly outbreaks of wood-boring beetles. (UNHP 2003).

According to the UNHP 2003 progress report there are no records of occurrence in the vicinity of Skyline Mine. There are no records of occurrence reported in the Scofield quadrat by the UCDC.

Although there are no records of occurrence in the UNHP or the UCDC, suitable nesting and foraging habitat is present in coniferous stands within the project area. Habitat was observed during the course of previous inventories within the project area.

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Management Recommendations
In summary, there is suitable habitat for three-toed woodpecker in the top of Wife and Andrew Dairy Canyon drainages. Western toad habitat may be located approximately 0.35 miles from the external boundary of the project area, at which point water becomes perennial, and habitat may also exist in two springs within the project boundary and two short segments of surface water which are located just outside of the project boundary. Townsend's western big-eared bat may have suitable foraging habitat, but the area lacks abandoned mines and caves, within the project area, which are utilized for roosting, a key

life history and habitat component. Species Columbia spotted frog and spotted bat do not have suitable habitat within the project area; therefore there are no recommended surveys for those species.

Three toed woodpecker has suitable habitat in the upper extents of Wife and Andrew Dairy Canyons, on slopes with northern aspects and coniferous stand cover. It is anticipated that an influx in the three toed woodpecker population will accompany ecological changes south of the area as a result of the Seeley wildfire which is greater than five miles from the project area. Inventories for three-toed woodpeckers should coincide with the annual raptor surveys in areas of suitable habitat which have the potential for subsidence.

Western toad habitat is associated with the aquatic environments. Records indicate the most recent recorded observation in the Scofield map quadrant was in 1950 (UNHP). This does not indicate current occupancy in the project area. The nearest perennial or permanent water source, a key habitat component (UNHP), is approximately 0.35 miles from the external boundary of the project. Springs S25-32 and S26-1 are within the project area and should be surveyed for the presence of western toad. Water in upper Wife Creek and the East Fork of Andrew Dairy Creek are located near the project boundary and therefore should also be inventoried for the presence/absence. The following table outlines stream flows as measured in the drainages and springs within or near the project area.

Date	Location	Rate of Flow (gpm)
10/3/12	Upper Wife Creek[2]	3
10/4/12	Lower Wife Creek	7
10/4/12	Lower Andrew Creek	0 (Dry)
10/5/12	East Fork of Andrew Dairy Creek[2]	0.96 (100 ft in length)[3]
9/25/12	Spring S25-32[1]	4.93 (300 ft in length)[3]
10/1/12	Spring S26-1[1]	0.33 (8sq ft total size)[3]

1- Within the project boundary 2- Location near project boundary 3- Estimates

Foraging habitat for Townsend's western big-eared bat is present, but diverse roosting habitat is not present within the research area. The Western Bat Working Group recommends roosting surveys for this species as passive and active acoustic monitoring may yield false results due to the acoustical metrics of the bat's echolocation call. Literature regularly refers to this species as the whispering bat. Random passive or active acoustical monitoring, even along water ways, is unlikely lead to a conclusive determination of presence or absence. In the event acoustical monitoring was to occur, a negative result would not necessarily indicate species absence. However, if abandoned mine or cave complexes are encountered, passive monitoring may be utilized more effectively to determine species presence or absence, as calls are more likely to be recorded at entrances of roost sites. While raptor inventories across areas of potential subsidence occur, researchers should also document any shafts, adits or other openings which could support roosting bats. Those openings should be evaluated for roosting potential and utilization by bats.

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Append A-2
Vol. 2

Technical Memorandum

To: Gregg Galecki
Environmental Engineer
Skyline Mine

From: Alpine Ecological
HC80 Box 570
Greenwich, UT 84732

Date: 10/4/2013

Re: **Western (Boreal) Toad (*Bufo boreas*) Surveys**

Methodology

According to the UNHP 2003 progress report there are western toad records of occurrence in the area of Skyline Mine prior to 1983. The mapping scale within the report makes it difficult to determine exact locations. The Utah Conservation Database Center (UCDC) cites the last observation within the Scofield map quadrant was on 6/18/1950. This is the same quadrant as Skyline Mine. However, as required, western toad surveys were conducted around five springs within suitable habitat; the springs surveyed are Upper Wife Creek, East Fork of Andrew Dairy, S25-32, and S26-1 and are displayed on Figure 1. Surveys were conducted on June 14, 2013 by walking tightly spaced meandering transects around each of the springheads and extended into any areas of surface flow.

Results

Upper Wife Creek: No evidence of western toad was observed during course of this inventory.

East Fork of Andrew Dairy: No evidence of western toad was observed during course of this inventory.

S26-1: No evidence of western toad was observed during course of this inventory.

S25-32: No evidence of western toad was observed during course of this inventory.

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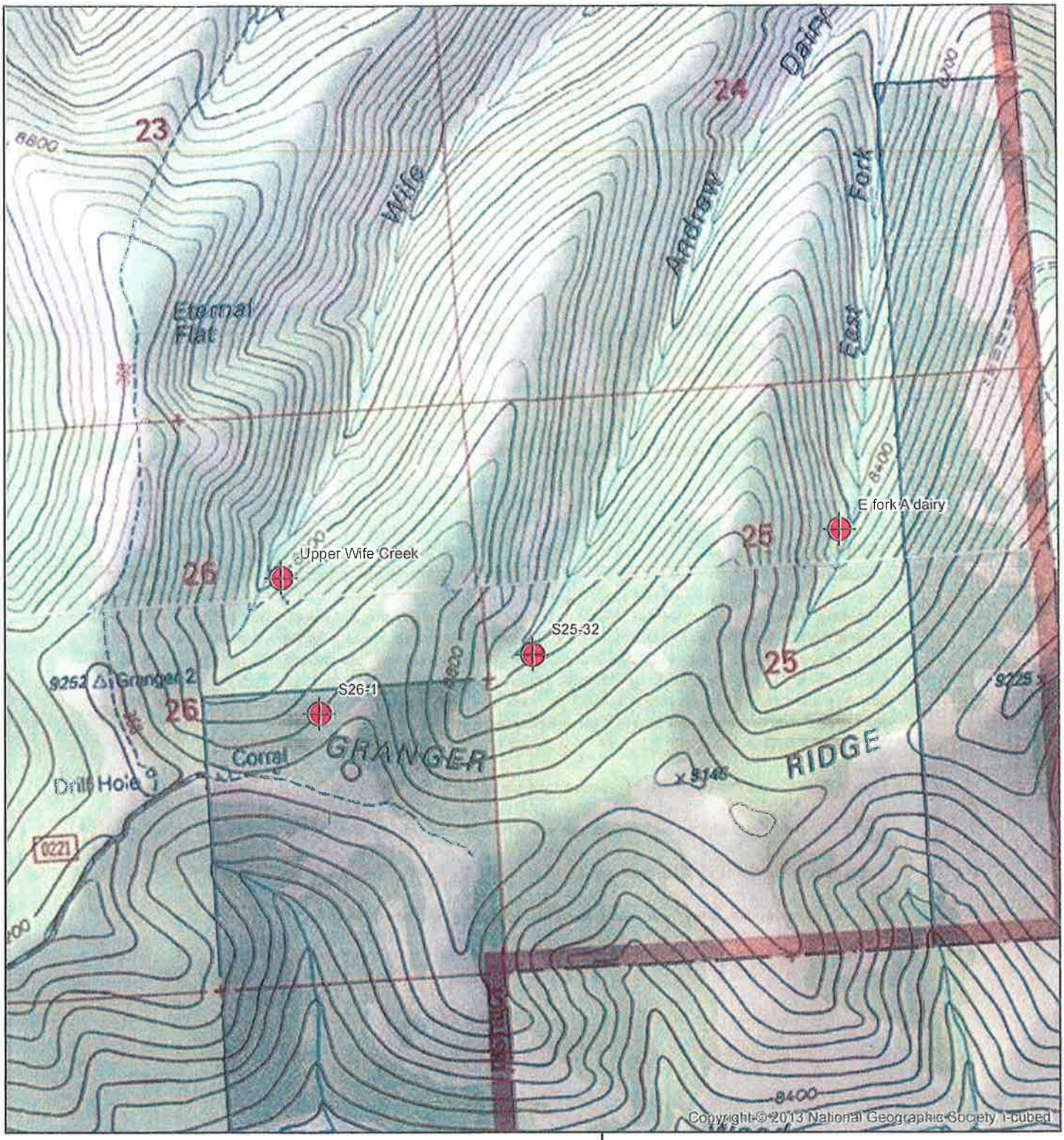

Spring Survey Area

N

Skyline Mine
Western Toad Surveys 2013

FIGURE 1
Spring Survey Areas

DATE DRAWN
7/31/13

SCALE
0.1 0.05 0 0.1
Miles

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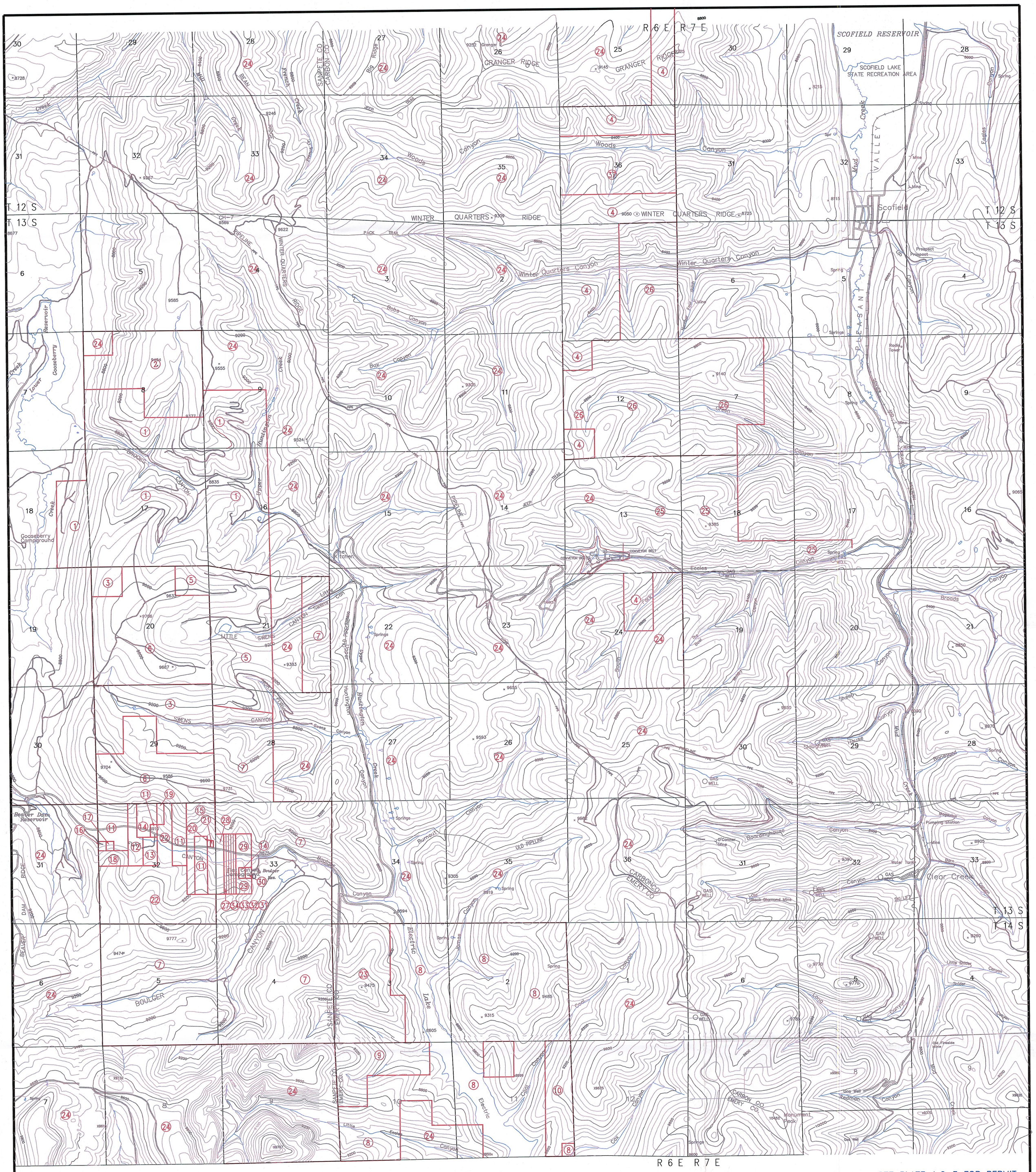

LEGEND

1 Gooseberry Enterprises, Inc.
2 50% Mason 50% Peterson Ent.
3 Collard Family Trust, Leased to CFC
4 Carbon County (Leased to Canyon Fuel Co., LLC)
5 Church of Jesus Christ of LDS
6 State of Utah
7 U-7714, State of Utah
8 Utah Power & Light
9 Chevron
10 75% L. Uhl 25% Mave H. & Harvey R. Carson & Jim Davis
11 C.K. Cox Family Corp.
12 E. Odell Cox
13 Dee Cox
14 Elmer N. Fillis
15 Cox Inc.
16 Leif M. Greco
17 Dwight W. Peterson
18 Robert S. Hansen
19 W. Chad Cox Family Inc.
20 Margaret B. Bench
21 Anna Marie Kellett
22 Anderson Flat Canyon Ranch
23 T. & L. Tracey & D. & R. Cunningham
24 United States of America
25 Arkland
26 C & B Energy (Leased to Canyon Fuel Co., LLC)
27 Jeffery V. Jensen et. al.
28 Shirley Cox Trust
29 Little Hollow Development L.C.
30 Donald B. Cox et. al.
31 Terry R. Cox et. al.
32 G. Wayne Mower et. al.
33 Leslie Scott Watson et. al.
34 Sandra Lynn Shelly et. al.
35 Jeffery V. Jensen et. al.
36 Energy Fuels (Leased to Canyon Fuel Co., LLC)
37 Canyon Fuel Company, LLC

COAL OWNERSHIP BOUNDARY

NOTES:
1. COORDINATE BASE ON MINE GRID DATA.
2. MAP DIGITIZED FROM 1:24000 USGS QUADRANGLE MAPS, SCOFIELD, UTAH AND FAIRVIEW LAKES, UTAH.
3. MINE FACILITY, CONVEYOR, AND NEW ECCLES CANYON ROAD LOCATIONS FROM EXISTING RECORD DATA AND INCORPORATED TO MAP IN BEST FIT LOCATIONS.
4. UTM GRID TICK VALUES SHOWN ARE IN METERS.

BASE PREPARED BY INTERMOUNTAIN AERIAL SURVEYS, SALT LAKE CITY, UTAH – M96147

2000' 0' 1000' 2000'

CONTOUR INTERVAL: 80 Feet

SEE PLATE 1.6-3 FOR PERMIT AND ADJACENT AREAS

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LICENSED PROFESSIONAL GEOLOGIST
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5248584
12-31-13
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DATE	No.	REVISIONS	DR.	CK.BD.
AUG 02	1			VSM
OCT. 02	2			VSM
NOV 02	3			VSM
OCT 07	4	Modified Permit Boundary (BIC & WASTE ROCK), Corrected Carbon Co. ownership/modified legend	BR	GG
DEC 09	5	MODIFIED PERMIT BOUNDARY	AB	GG
JULY 10	6	REMOVED PERMIT BOUNDAY, ADDED LOCATION NOTE	JH	GG
Oct 12	7	Changed Hansen Natural Resources to Canyon Fuel Company, LLC in Legend – #37	GG	GG

Coal Ownership

Canyon Fuel Company, LLC
Skyline Mines
HC35 BOX 380, HELPER, UTAH 84526
435-448-6463

SCALE: 1" = 2000'	DATE: 2/20/01	CK.BY:C. HANSEN
DWG. NO.: 1.6-2		DR.BY:JLP
CAD FILE: 1.6-2REV7		

REVISION: 7
10/1/2013

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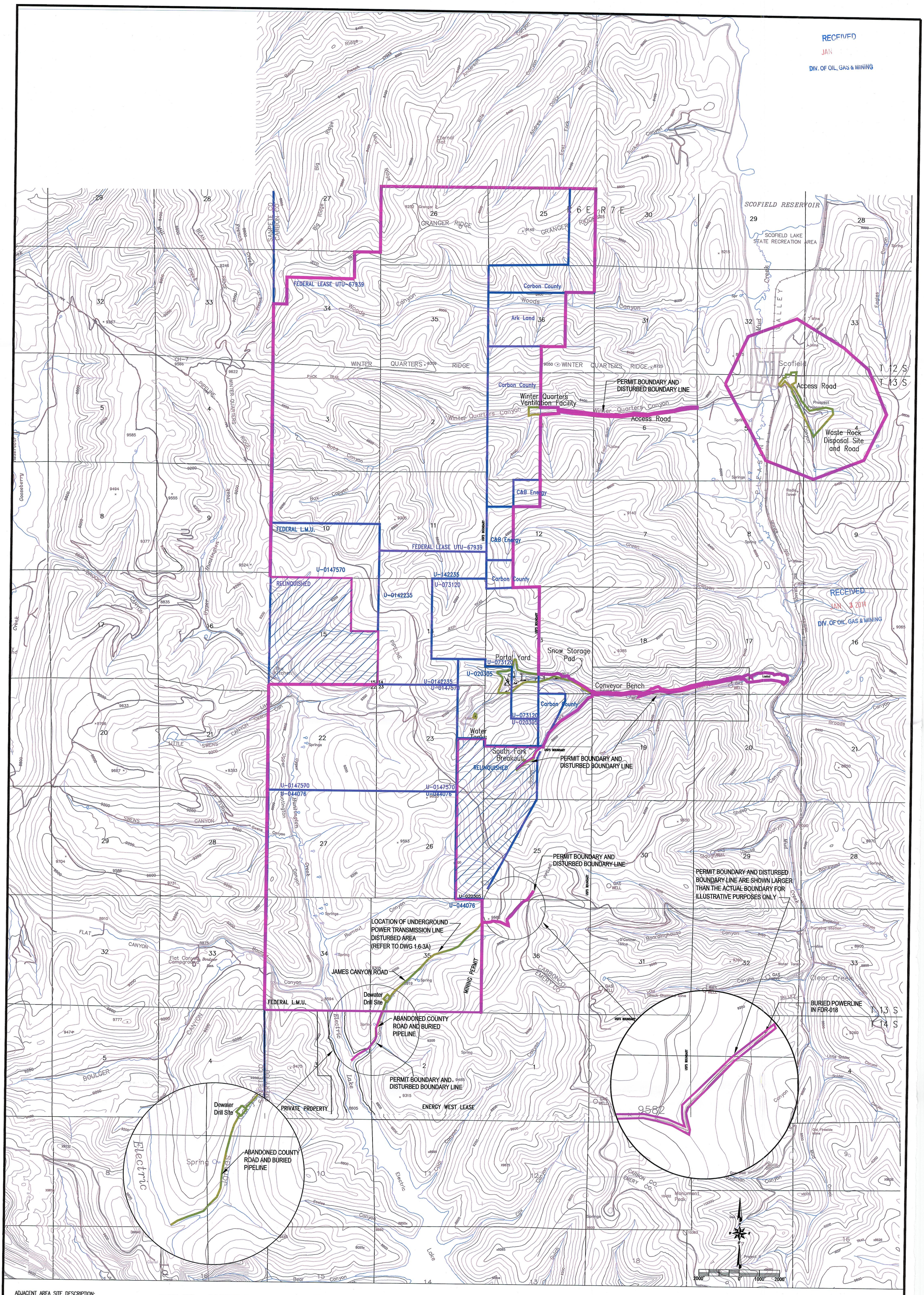

ADJACENT AREA SITE DESCRIPTION:
Active Lease Areas, Permit Boundary, and 1/2 Mile beyond Waste Rock Disposal Site

13,525 ACRES SITE PERMIT BOUNDARY

PERMIT AREA	SITE DESCRIPTION
13.86	RAIL LOADOUT
42.55	PORTAL YARD
0.26	WATER TANKS & WELL PADS
0.96	SOUTH FORK PORTALS
14.18	CONVEYOR BENCH
32.48	WASTE ROCK DISPOSAL SITE
7.93	WINTER QUARTERS VENTILATION FACILITY
4.90	WINTER QUARTERS ROAD (not reclaimed)
1.60	JAMES CANYON BURIED PIPELINE
0.30	JAMES CANYON BURIED POWER LINE
2.95	JAMES CANYON WATER WELLS AND ROAD
121.97	

LEASE ACREAGE WITHIN ADJACENT AREA

FEDERAL COAL	ACREAGE
U-0147570	1532.70
U-0142235	520.0
U-073120	557.22
U-044076	2489.32
U-020305	279.40
UTU-67939	4061.52
TOTAL	9,440.16

NON-FEDERAL COAL	ACREAGE
C&B COAL	120.00
CARBON COUNTY	811.25
ARK LAND COMPANY	240.00
TOTAL	1,171.25

NOT ALL ACREAGE FOR EACH LEASE IS WITHIN THE PERMIT BOUNDARY, REFER TO PART 1, TABLE 1.114.

LEGEND
- ADJACENT AREA: Areas Authorized for Coal Mining and Reclamation Activities (SEE CHIA FOR HYDROLOGIC ADJACENT AREA)
- PERMIT BOUNDARY
- LEASE BOUNDARY

NOTES:
1. COORDINATE BASE ON MINE GRID DATA.
2. MAP DIGITIZED FROM 1:24000 USGS QUADRANGLE MAPS, SCOFIELD, UTAH AND FAIRVIEW LAKES, UTAH.
3. MINE FACILITY, CONVEYOR, AND NEW ECCLES CANYON ROAD LOCATIONS FROM EXISTING RECORD DATA AND INCORPORATED TO MAP IN BEST FIT LOCATIONS.
4. UTM GRID TICK VALUES SHOWN ARE IN METERS.

BASE PREPARED BY INTERMOUNTAIN AERIAL SURVEYS, SALT LAKE CITY, UTAH – M96147

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JAN 3 2014
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DATE	No.	REVISIONS	DR. / CHKD.
AUG 02	1		/VSM
NOV 02	2		/VSM
JUNE 07	3	MODIFIED PERMIT BOUNDARY (IBC & WASTE ROCK) SKYLINE MINES PERMIT AREA, LEASE AREAS.	BR /GG
MAR 2010	4	ADDED ADJACENT AREA, MODIFIED PERMIT AND LEASE BOUNDARIES	AB /GG
JUL 2010	5	ADDED WINTER QUARTERS ACCESS ROAD	AB /GG
AUG 2010	6	MODIFIED ADJACENT AREA	AB /GG
OCT 2012	7	Modified Adjacent Area with Lease Mod. and Relinquishments	GG /GG

SKYLINE MINE PERMIT AREA

Canyon Fuel Company, LLC
HC35 BOX 380, HELPER, UTAH 84526
435-448-6463
Skyline Mines

SCALE: 1" = 2000'	DATE: 9/24/01	CK.BY: G. Galecki	REVISION: 7
DWG. NO.: 1.6-3		DR.BY: JLP/CDH	10/19/12
CAD FILE: 1.6-3REV7			

LEGEND

MANTI - LA SAL	MANTI - LA SAL NATIONAL FOREST
Bob Wright (GZA)	USFS GRAZING ALLOTMENT AREA
--- PIPE ---	QUESTAR GAS PIPELINE
⊙	WELLS
○	ABANDONED GAS WELLS
■	USGS GAUGING STATION (ABANDONED)
●	WATER TANK

NOTES:
1. COORDINATE BASE ON MINE GRID DATA.
2. MAP DIGITIZED FROM 1:24000 USGS QUADRANGLE MAPS, SCOFIELD, UTAH AND FAIRVIEW LAKES, UTAH.
3. MINE FACILITY, CONVEYOR, AND NEW ECCLES CANYON ROAD LOCATIONS FROM EXISTING RECORD DATA AND INCORPORATED TO MAP IN BEST FIT LOCATIONS.
4. UTM GRID TICK VALUES SHOWN ARE IN METERS.

BASE PREPARED BY INTERMOUNTAIN AERIAL SURVEYS, SALT LAKE CITY, UTAH – M96147

2000' 0 1000' 2000'

CONTOUR INTERVAL: 80 Feet

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SEE PLATE 1.6-3 FOR PERMIT AND ADJACENT AREAS

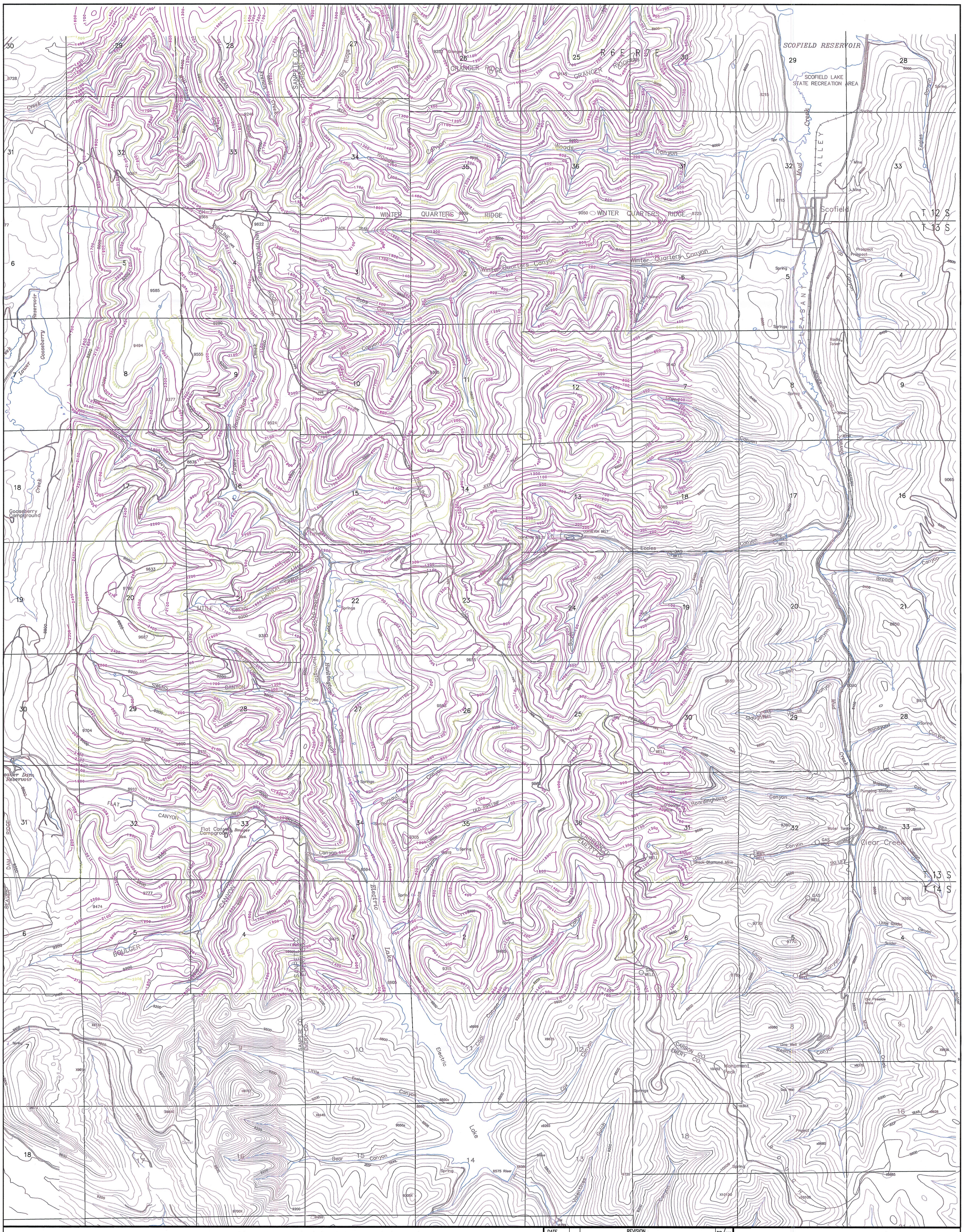
DATE	No.	REVISIONS	DR.\CK.
AUG 02			VSM
JUNE 07			BR\GG
DEC 09	3	MODIFIED PERMIT BOUNDARY	AB\GG
JULY 10	4	REMOVED PERMIT BOUNDARY, ADDED LOCATION NOTE	JH\GG
Oct 12	5	ADDED FRENCH CREEK AND BEAN RIDGE UNITS	GG\GG

LAND USE

Canyon Fuel Company, LLC
HC35 BOX 380, HELPER, UTAH 84526
435-448-8483
Skyline Mines

SCALE: 1" = 2000'	DATE: 3/7/02	CK.BY:VSM
DWG. NO.: 2.12.1-1		DR.BY:VSM
CAD FILE: 2.12.1-1REV5		

REVISION: 5
10-1-2013



MAP LEGEND

ISOPACH LINES

2000' — 500' Contour interval

1400 — 100' Contour interval

SEE PLATE 1.6-3 FOR PERMIT AND ADJACENT AREAS

NOTES:
1. COORDINATE BASE ON MINE GRID DATA.
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3. MINE FACILITY, CONVEYOR, AND NEW ECCLES CANYON ROAD LOCATIONS FROM EXISTING RECORD DATA AND INCORPORATED TO MAP IN BEST FIT LOCATIONS.
4. UTM GRID TICK VALUES SHOWN ARE IN METERS.

LICENSED PROFESSIONAL GEOLOGIST
GREGG GALECKI
5248584
12-31-13
STATE OF UTAH

2000' 0' 1000' 2000'

BASE PREPARED BY INTERMOUNTAIN AERIAL SURVEYS, SALT LAKE CITY, UTAH – M96147

CONTOUR INTERVAL: 80 Feet

DATE		REVISION	DR./CHKD.
09/04/02	1		CDH
06/19/07	2	MODIFIED PERMIT BOUNDARY (IBC & WASTE ROCK) UPDATED LOWER O'CONNOR "A" OVERBURDEN MAP	BR/GG
DEC 09	3	MODIFIED PERMIT BOUNDARY	AB/GG
JULY 10	4	REMOVED PERMIT BOUNDARY, ADDED LOCATION NOTE	JH/GG
OCT 13	5	Updated and extended Lower O'Connor "A" Overburden	GG/GG

LOWER O'CONNOR "A"/FLAT CANYON OVERBURDEN MAP

Canyon Fuel Company, LLC
Skyline Mines
HC35 BOX 380, HELPER, UTAH 84526
435-448-6463

SCALE: 1" = 2000'	DATE: 09/04/02	CK.BY: C. HANSEN	REVISION: 5
DWG. NO.: 2.2.7-2		DR.BY: M. BUNNELL	10-1-2013

CAD FILE: P:\PERMITS\SKY\MRP Approved\drawings\2.2.7-2REV5

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JAN 3 2014
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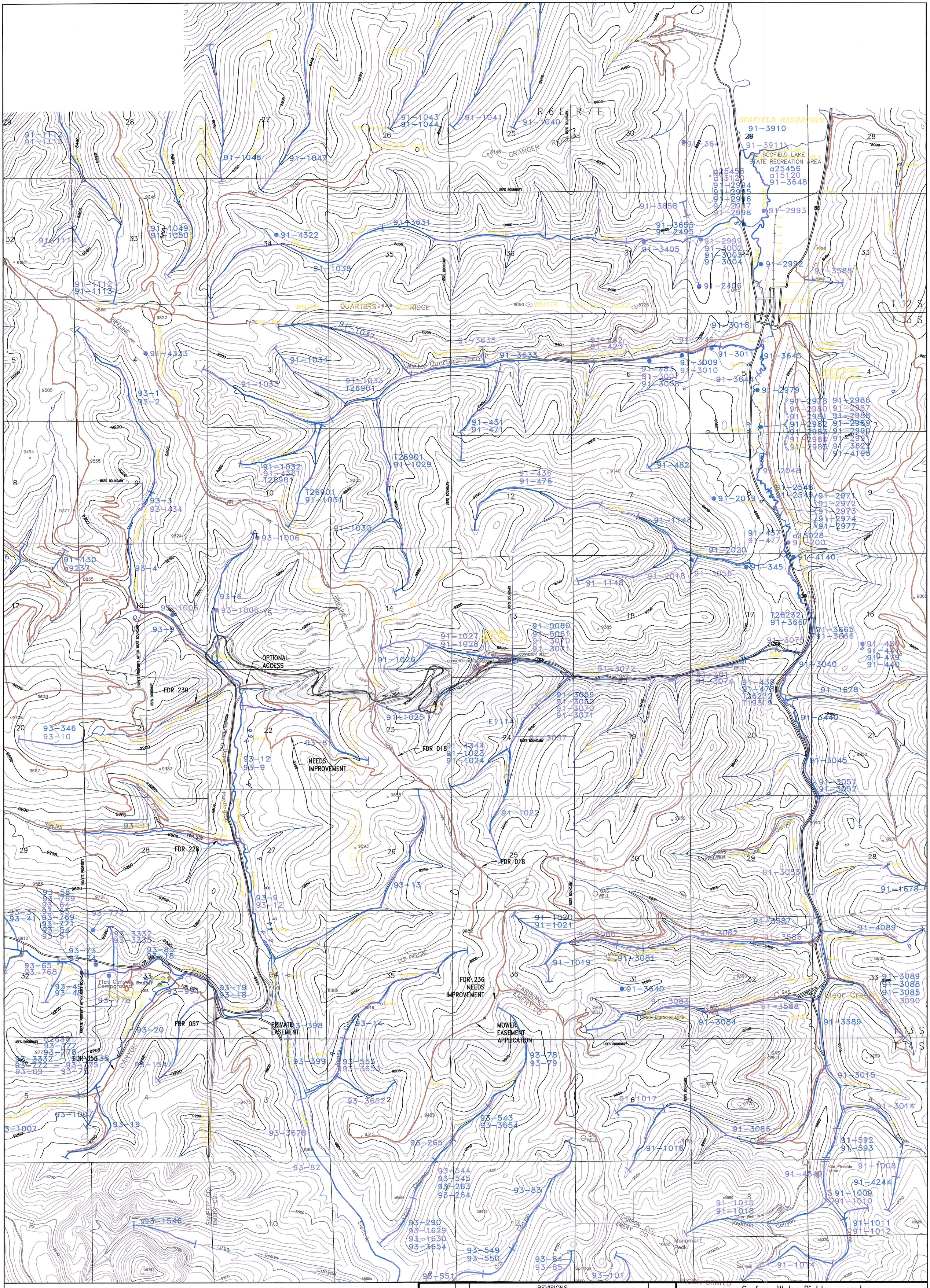

I, Gregg A. Galecki, certify the Water Right information supplied to me by the Utah Division of Water Rights is plotted as accurately as the information allows.

NOTES:
1. COORDINATE BASE ON MINE GRID DATA.
2. MAP DIGITIZED FROM 1:24000 USGS QUADRANGLE MAPS, SCOFIELD, UTAH AND FAIRVIEW LAKES, UTAH.
3. MINE FACILITY, CONVEYOR, AND NEW ECCLES CANYON ROAD LOCATIONS FROM EXISTING RECORD DATA AND INCORPORATED TO MAP IN BEST FIT LOCATIONS.
4. UTM GRID TICK VALUES SHOWN ARE IN METERS.

BASE PREPARED BY INTERMOUNTAIN AERIAL SURVEYS, SALT LAKE CITY, UTAH – M96147

LICENSED PROFESSIONAL GEOLOGIST
GREGG GALECKI
5248584
12-31-13
STATE OF UTAH

2000' 0' 1000' 2000'

CONTOUR INTERVAL: 80 Feet

REVISIONS

DATE	No.		BY
AUG 02	1		VSM
OCT 02	2		VSM
Oct 07	3		BR\GG
DEC 09	4	MODIFIED PERMIT BOUNDARY	AB\GG
JULY 10	5	REMOVED PERMIT BOUNDARY, ADDED LOCATION NOTE	JH\GG
Oct 13	6	EXTENDED COVERAGE TO NORTH	GG\GG

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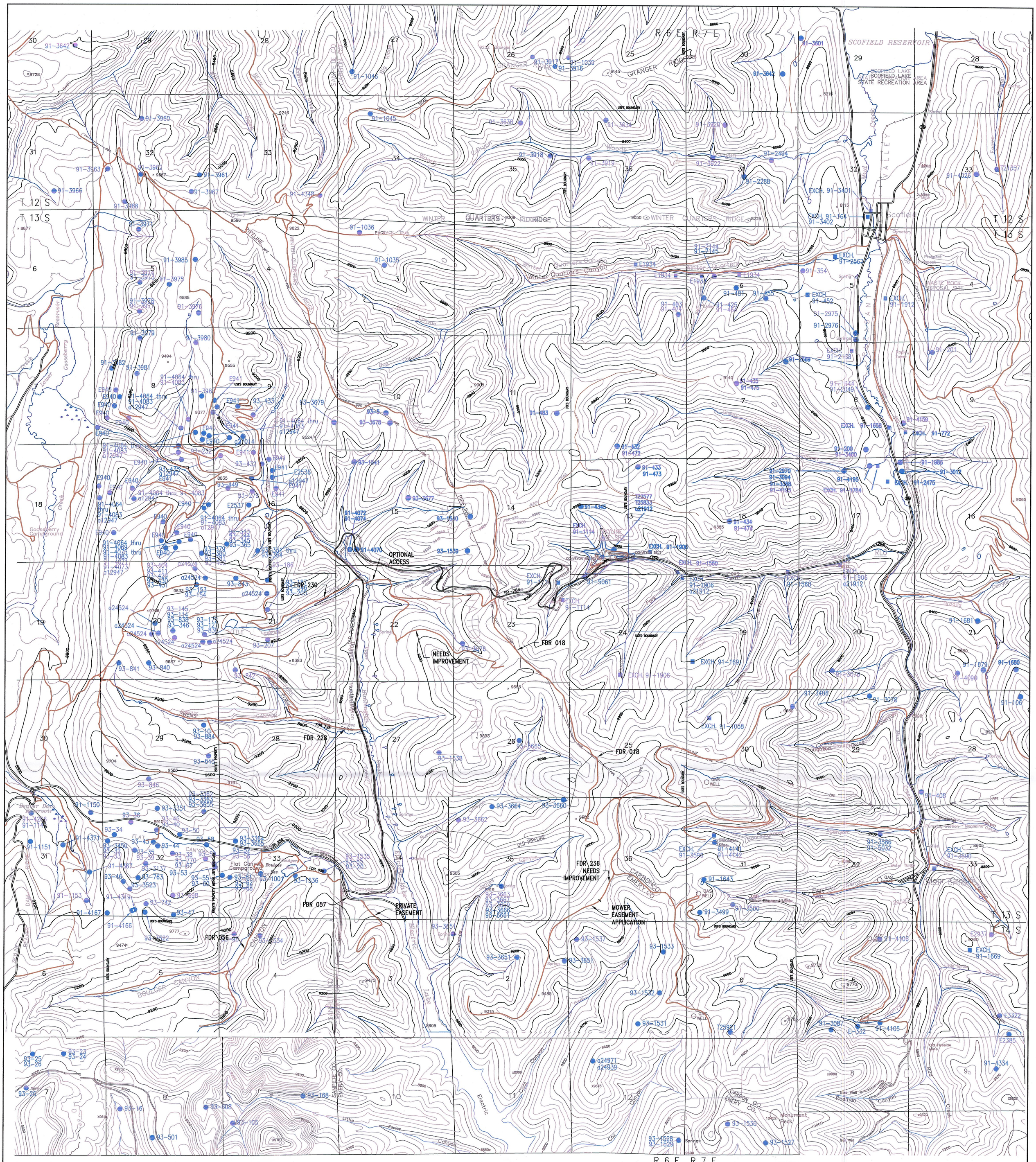
Surface Water Rights on and Adjacent to the Skyline Property

Canyon Fuel Company, LLC
Skyline Mines

HCR 35 BOX380, HELPER, UT, 84526
435-448-2632

CAD FILE: 2.3.5.1-1rev6	DATE: 8/20/96	CK.BY:GAG
DWG. NO.: 2.3.5.1-1	SCALE: 1" = 2000'	DR.BY:DRB

REVISION: 6
10-1-13



LEGEND

91-1643 WATER RIGHT LOCATION

EXCH. 91-1643 WATER RIGHT EXCHANGE LOCATION

NOTES:
1. COORDINATE BASE ON MINE GRID DATA.
2. MAP DIGITIZED FROM 1:24000 USGS QUADRANGLE MAPS, SCOFIELD, UTAH AND FAIRVIEW LAKES, UTAH.
3. MINE FACILITY, CONVEYOR, AND NEW ECCLES CANYON ROAD LOCATIONS FROM EXISTING RECORD DATA AND INCORPORATED TO MAP IN BEST FIT LOCATIONS.
4. UTM GRID TICK VALUES SHOWN ARE IN METERS.

BASE PREPARED BY INTERMOUNTAIN AERIAL SURVEYS, SALT LAKE CITY, UTAH – M96147

2000' 0' 1000' 2000'

CONTOUR INTERVAL: 80 Feet

LICENSED PROFESSIONAL GEOLOGIST
GREGG GALECKI
5248584
12-31-13
STATE OF UTAH

INCORPORATED
JAN 0 3 2014
Div. of Oil, Gas & Mining

DATE	No.		BY
AUG 02	1		VSM
OCT 02	2		VSM
Oct 07	3	MODIFIED PERMIT BOUNDARY (IBC & WASTE ROCK) MODIFIED PERMIT BOUNDARY	BR\GG
DEC 09	4	MODIFIED PERMIT BOUNDARY	AB\GG
JULY 10	5	REMOVED PERMIT BOUNDARY, ADDED LOCATION NOTE	JH\GG
Oct 13	6	MODIFIED LOCATION OF 91-3917 PER DWRi data	GG\GG

Ground Water RIghts on and Adjacent to the Skyline Property

Canyon Fuel Company, LLC
Skyline Mines

HCR 35 BOX380, HELPER, UT, 84526
435-448-2632

CAD FILE: 2.3.5.2-1_rev6	DATE: 08/20/96	CK.BY:DRB\VSM
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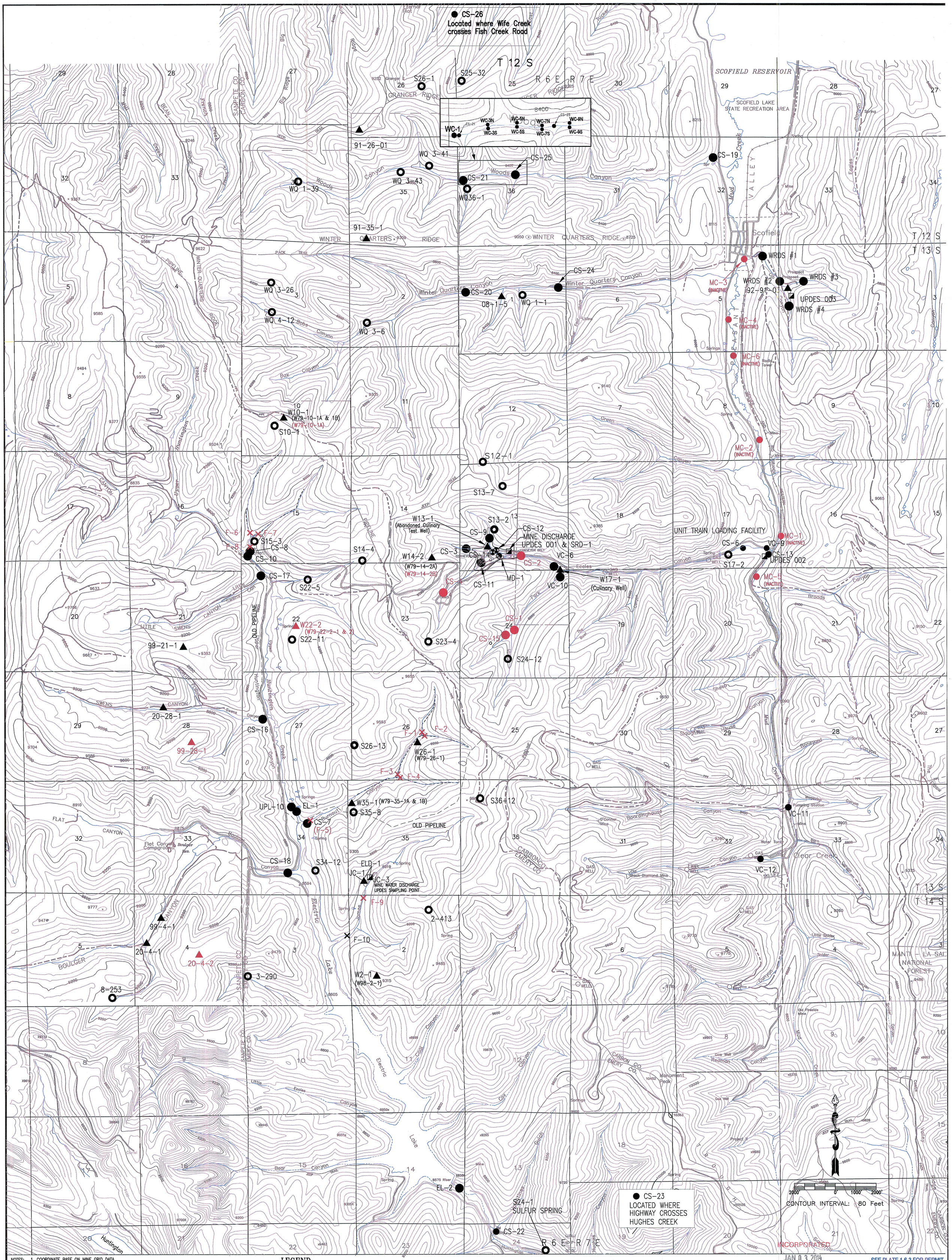
REVISION: 6
10-1-2013



SEE PLATE 1.6-3 FOR PERMIT AND ADJACENT AREAS

NOTES:
1. COORDINATE BASE ON MINE GRID DATA.
2. MAP DIGITIZED FROM 1:24000 USGS QUADRANGLE MAPS, SCOFIELD, UTAH AND FAIRVIEW LAKES, UTAH.
3. MINE FACILITY, CONVEYOR, AND NEW ECCLES CANYON ROAD LOCATIONS FROM EXISTING RECORD DATA AND INCORPORATED TO MAP IN BEST FIT LOCATIONS.
4. UTM GRID TICK VALUES SHOWN ARE IN METERS.

LOCATIONS F-1 THROUGH F-4 AND F-6 THROUGH F-8 ARE PART OF A USFS SUBSIDENCE STUDY ON BURNOUT CREEK AND NOT PART OF THE M&RP WATER MONITORING PROGRAM
F-5 AND CS-7 ARE THE SAME LOCATION

BASE PREPARED BY INTERMOUNTAIN AERIAL SURVEYS, SALT LAKE CITY, UTAH – M96147

LEGEND

- STREAM
- SPRING
- WELL – MONITORING
- MINE DISCHARGE
- STREAM SUBSIDENCE POINTS
- FLUME LOCATION
- UPDES DISCHARGE POINTS
- DISCONTINUED/ABANDONED

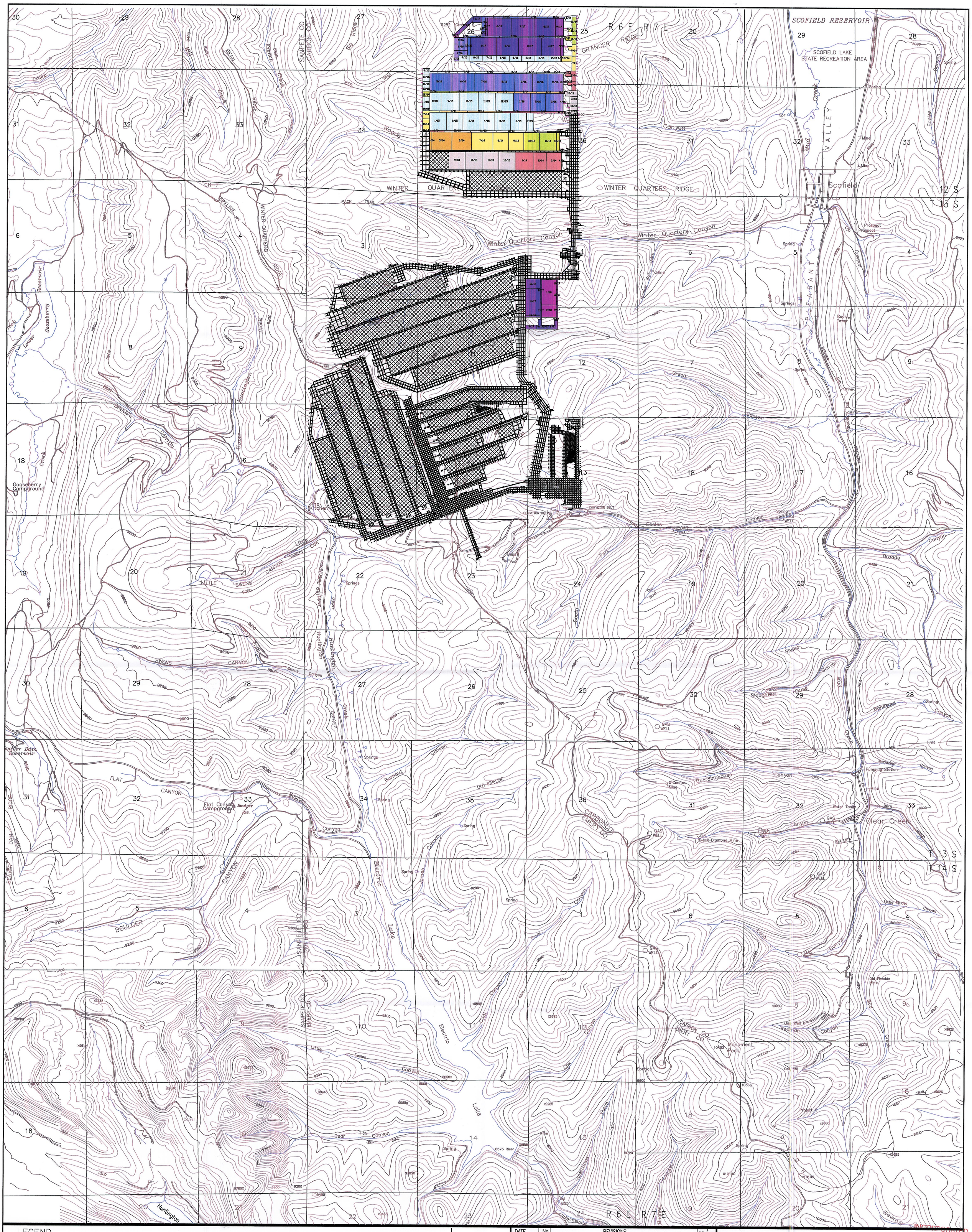
DATE	No.	REVISIONS	DR/CHKD.	DATE	No.	REVISIONS	DR/CHKD.
09/04/02	1		/GAG	AUG 09	10	Updated Current Water Monitoring Sites, Discontinued W99-28-1, CS-4, F-9 and Removed the Permit Boundary	ARB/GAG
10/07/02	2		/GAG				
04/03/03	3		/GAG	DEC 09	11	MODIFIED PERMIT BOUNDARY and Discontinued F-1 – F-8	ARB/GAG
06/04/03	4		/GAG	JULY 10	12	REMOVED PERMIT BOUNDARY, ADDED LOCATION NOTE	JLH/GAG
03/19/04	5		/GAG	SEPT	13	RELOCATED CS-24, ADDED CS-25 AND WQ36-1	ARB/GAG
06/18/04	6		/GAG	JULY 11	14	Added WC-1 thru WC-9S, Discontinued W20-4-2	ARB/GAG
11/19/04	7		/CDH	OCT 12	15	Added NOG Sites S25-32. S26-1and CS-26	ARB/GAG
05/05/05	8		/CDH				
JUNE 07	9	MODIFIED PERMIT BOUNDARY (IBC & WASTE ROCK) ADDED WQ1-1; INACTIVATED MC SITES	BR/GG				

Location of Hydrologic Monitoring Stations

Canyon Fuel Company, LLC
HC35 BOX 380, HELPER, UTAH 84526
435-448-6463
Skyline Mines

SCALE: 1" = 2000'	DATE: 04-04-01	CK.BY:CDH
DWG. NO.: 2.3.6-1		DR.BY:JLP
CAD FILE: 2.3.6-1REV15		

REVISION: 15
10/1/2013



LEGEND

- 4th Quarter 2013
- 1st Quarter 2014
- 2nd Quarter 2014
- 4th Quarter 2014
- 3rd Quarter 2014
- 2015
- 2016–2017
- 2018
- AS MINED

SEE PLATE 1.6-3 FOR PERMIT AND ADJACENT AREAS

NOTES:

1. COORDINATE BASE ON MINE GRID DATA.
2. MAP DIGITIZED FROM 1:24000 USGS QUADRANGLE MAPS, SCOFIELD, UTAH AND FAIRVIEW LAKES, UTAH.
3. MINE FACILITY, CONVEYOR, AND NEW ECCLES CANYON ROAD LOCATIONS FROM EXISTING RECORD DATA AND INCORPORATED TO MAP IN BEST FIT LOCATIONS.
4. UTM GRID TICK VALUES SHOWN ARE IN METERS.

2000' 0' 1000' 2000'

BASE PREPARED BY INTERMOUNTAIN AERIAL SURVEYS, SALT LAKE CITY, UTAH – M96147

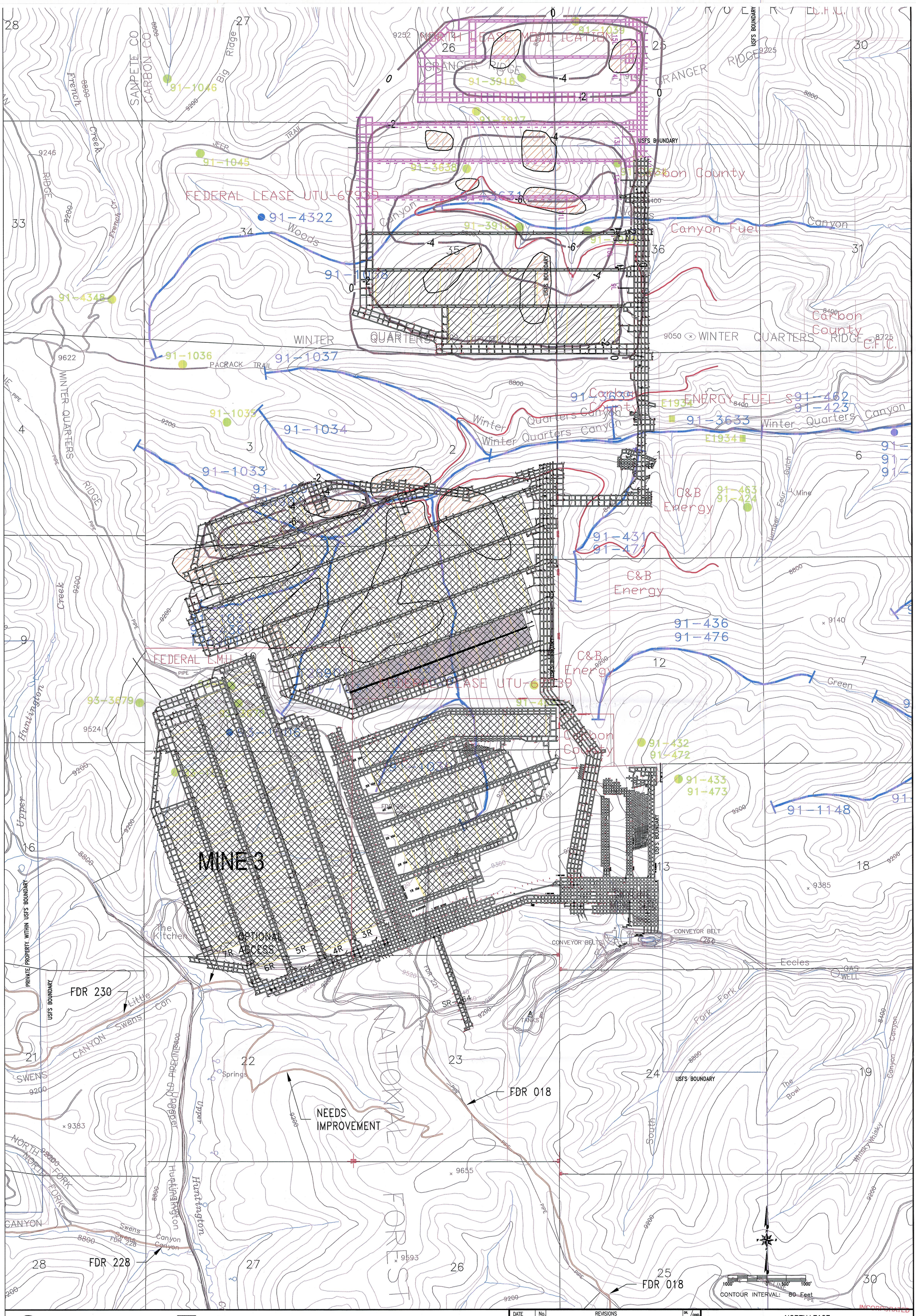
CONTOUR INTERVAL: 80 Feet

DATE	No.	REVISIONS	DR./CHKD.
09/04/02	1	CREATED MAP	/CDH
10/07/02	2		/CDH
05/05/05	3		/CDH
06/30/05	4		/CDH
06/19/07	5	MODIFIED PERMIT BOUNDARY (IBC & WASTE ROCK) UPDATED FIVE YEAR PROJECTED MINE PLAN	BR/GG
OCT 09	6	Modified Permit Boundary and Mine Timing	AB/GG
JULY 10	7	REMOVED PERMIT BOUNDARY, ADDED LOCATION NOTE	JH/GG
SEPT 10	8	MODIFIED PANEL ORIENTATION AND MINING TIMING	AB/GG
OCT 13	9	Modified timing, added 13 Left through 15 Left	GG/GG

LOWER O'CONNER "A" \FLAT CANYON
FIVE YEAR PROJECTED MINE PLAN

Canyon Fuel Company, LLC
Skyline Mines
HC35 BOX 380, HELPER, UTAH 84526
435-448-6463

SCALE: 1" = 2000'	DATE: 09/04/02	CK.BY:C. Hansen	REVISION: 9
DWG. NO.: 3.3-2		DR.BY:	10-1-13
CAD FILE: 3.3-2REV9			



AREAS WHERE MINOR SURFACE CRACKING MAY OCCUR

-2- POTENTIAL SUBSIDENCE CONTOUR

700' FT. OF OVERBURDEN OVER LOWER O'CONNOR "A" SEAM

91-3638 GROUND WATER RIGHT LOCATION AND NUMBER

91-3635 SURFACE WATER RIGHT LOCATION AND NUMBER

93-1006 SURFACE WATER DIVERSION LOCATIONS

PROJECTED NORTH LEASE WORKINGS

MINED BEHIND SEALS

MINED NOT SEALED

SEE PLATE 1.6-3 FOR PERMIT AND ADJACENT AREAS

NOTES:

1. COORDINATE BASE ON MINE GRID DATA.
2. MAP DIGITIZED FROM 1:24000 USGS QUADRANGLE MAPS, SCOFIELD, UTAH AND FAIRVIEW LAKES, UTAH.
3. MINE FACILITY, CONVEYOR, AND NEW ECCLES CANYON ROAD LOCATIONS FROM EXISTING RECORD DATA AND INCORPORATED TO MAP IN BEST FIT LOCATIONS.
4. UTM GRID TICK VALUES SHOWN ARE IN METERS.

BASE PREPARED BY INTERMOUNTAIN AERIAL SURVEYS, SALT LAKE CITY, UTAH – M96147

DATE	No.	REVISIONS	DR. / CHKD.
05/05/05	1		/CDH
08/29/05	2		/CDH
10/19/05	3		JT /GG
06/14/07	4	MODIFIED PERMIT BOUNDARY (IBC) UPDATED PROJECTED MINE PLAN	BR /GG
Oct 09	5	Modified Permit Boundary	AB /GG
JULY 10	6	REMOVED PERMIT BOUNDARY, ADDED LOCATION NOTE	JH /GG
SEPT 10	7	MODIFIED PANEL ORIENTATION, SUBSIDENCE CONTOURS AND AREAS OF POSSIBLE SURFACE CRACKING	AB /GG
OCT 13	8	Updated mined areas, added panels 13 Left through 15 Left, modified 8 Left through 12 Left	GG /GG

NORTH LEASE
PRE-SUBSIDENCE SURVEY MAP

INCORPORATED
JAN 0 3 2014
Div. of Oil, Gas & Mining

Canyon Fuel Company, LLC
Skyline Mines
HC35 BOX 380, HELPER, UTAH 84526
435-448-6463

SCALE: 1" = 1000'	DATE: 11/04/02	CK.BY: C. HANSEN	REVISION: 8
DWG. NO.: 4.17.3-1A		DR.BY: C. HANSEN	10-1-2013
CAD FILE: 4.17.3-1AREV8			

X 23 86-16 **SUBSIDENCE MONITORING POINT**

SEE PLATE 1.6-3 FOR PERMIT AND ADJACENT AREAS

NOTES:
1. COORDINATE BASE ON MINE GRID DATA.
2. MAP DIGITIZED FROM 1:24000 USGS QUADRANGLE MAPS, SCOFIELD, UTAH AND FAIRVIEW LAKES, UTAH.
3. MINE FACILITY, CONVEYOR, AND NEW ECCLES CANYON ROAD LOCATIONS FROM EXISTING RECORD DATA AND INCORPORATED TO MAP IN BEST FIT LOCATIONS.
4. UTM GRID TICK VALUES SHOWN ARE IN METERS.

BASE PREPARED BY INTERMOUNTAIN AERIAL SURVEYS, SALT LAKE CITY, UTAH – M96147

2000' 0' 1000' 2000'

DATE	No.	REVISIONS	APP.	DWN.	TKS.	DK.
09/04/02	1	CREATED MAP		CDH		
11/19/02	2	UP DATED SUBSIDENCE POINTS		CDH		
06/14/07	3	MODIFIED PERMIT BOUNDARY (IBC & WASTE ROCK)	GG	BR		
SEPT 09	4	MODIFIED PERMIT BOUNDARY		GG		AB
JULY 10	5	REMOVED PERMIT BOUNDARY, ADDED LOCATION NOTE		GG		JH
10/1/13	6	Updated survey control points	GG	GG		

SUBSIDENCE MONITORING POINTS

Canyon Fuel Company, LLC
HC35 BOX 380, HELPER, UTAH 84526
435-448-6463
Skyline Mines

SCALE: 1" = 1000'	DATE: 09/04/02	CK.BY: C. Hansen	REVISION:
DWG. NO.: 4.17.5-1		DR.BY: C. Hansen	6
CAD FILE: 4.17.5-1REV6			10/1/13