

Report of Spring and Seep

Survey and Baseline Monitoring Activities

In the Wife and Andrew Dairy Canyon Areas

At the Skyline Mine

October 2012

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 will continue 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.

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 personnel and the landowner was conducted to insure filed water rights and developed water sources were inspected.

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).

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, evapotranspiration, 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.

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 Table 3.

Groundwater and Surface water Discharge and Chemical Composition

A minimal 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 collecting additional data and updating Tables 2 and 3 after the completion of the 2013 field season. Laboratory analysis for sites S25-32 and S26-1 are attached to this report.

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 Winter Quarters Canyon. TDS concentrations monitored at S25-32 has been recorded at 278 mg/l. Discharge at the spring has ranged from approximately 3.6 to 12 gpm. The pH levels have ranged from 7.23 to 7.39.

Groundwater discharging from Water Right 91-3917 (to be named S26-1) is also of the calcium-bicarbonate geochemical type. A similar composition to CS-21 in Woods Canyon Creek. TDS concentration at 91-3917 has been recorded at 298 mg/l. Discharge at the spring as been consistently at approximately 0.33 gpm. The pH levels have ranged from 6.76 to 7.05.

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. Perennial flow in Wife Creek begins approximately 0.3 miles outside of the area impacted by mining, and a spring located in the East Fork of Andrew Dairy Canyon is outside the area impacted from mining. Andrew Dairy Creek is only perennial in stretches outside the area of mining and is primarily ephemeral. Additional data for all these sites will be collected in the 2013 field season in an attempt to document seasonal variation.

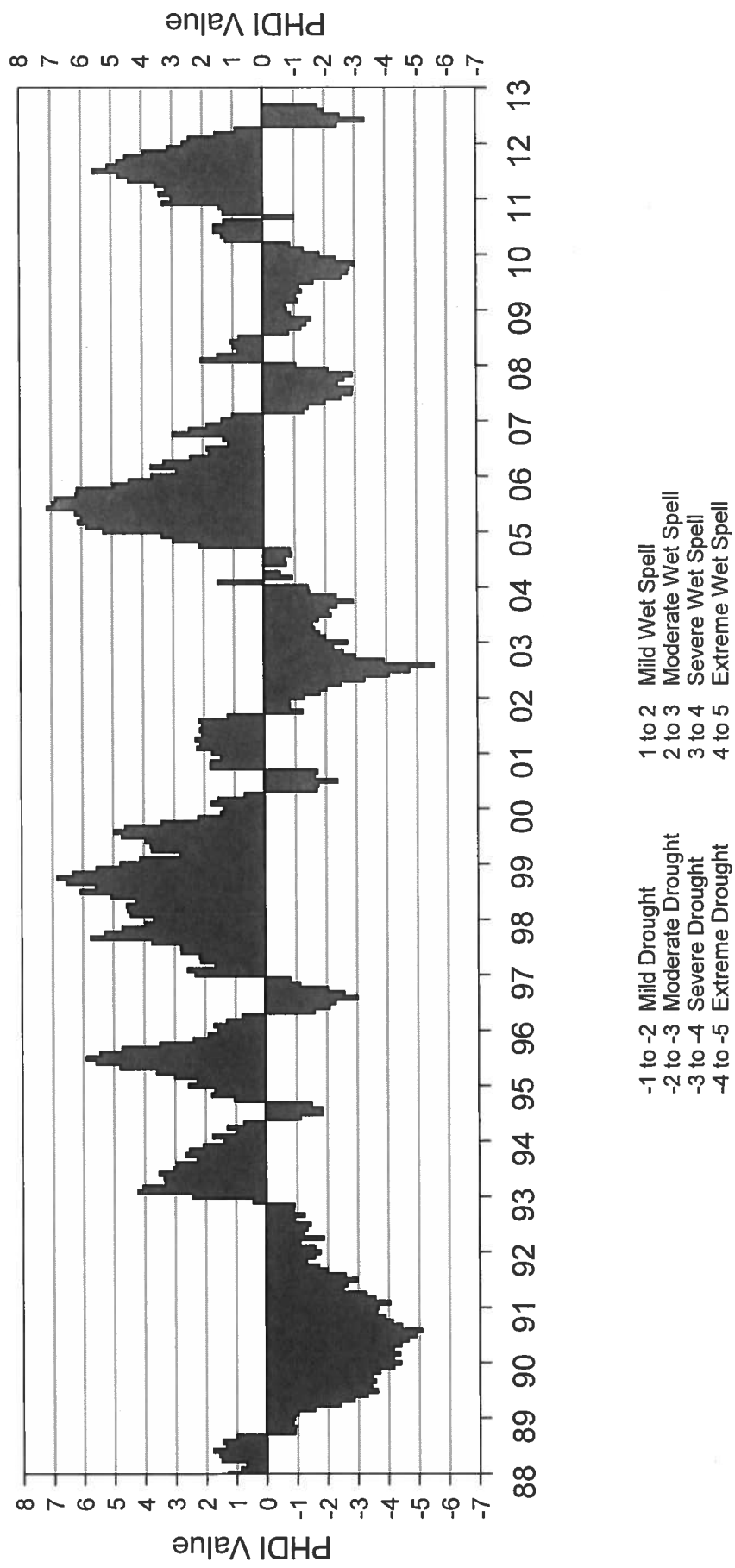


Figure 1 Plot of Palmer Hydrologic Drought Index for Utah Region 4.



MODIFIED ADJACENT AREA



MODIFIED ADJACENT AREA



MODIFIED ADJACENT AREA



Stiff Diagram

Stream and Spring locations near Lease Modification

Canyon Fuel Company, LLC
Skyline Mines

HC38 BOX 300, HELPER, UTAH 84526
435-440-6463

SCALE: None

DATE: 11/14/12

CK.BY: G. Galecki

REVISION:

DWG. NO.: Northern Baseline Map

DR.BY: GAG

0

CAD FILE:

Table 1 - Monitoring Locations

Site	Alternate ID	Location		Geology	Use
		UTM Zone 12, NAD83			
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 - Upper		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

Table 2 - Field Data

Site	Date	Time	Temp - C	pH	Sp. Cond	Flow
S25-32	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
S26-1	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
Wife Creek - Upper	10/3/2012	11:30	6	7.99	536	3.03
Wife Creek - Lower	10/4/2012	13:00	6.1	8.11	565	7.1
	11/15/2012	14:30	0	7.96	625	0.45
Andrew Dairy Creek - Lower	10/4/2012	12:45				Dry
	11/15/2012	14:45				Dry
E. Fork Andrew Dairy	10/5/2012	12:40	8.5	7.08	714	0.96



Certificate of Analysis

Lab Sample No.: 1208914-02

Name: Canyon Fuel Co., Skyline Mine	Mine Code: 21	Sample Date: 9/24/2012 1:00 PM
Sample Site: Nog-32 (S25-32)		Receipt Date: 9/25/2012 9:44 AM
Comments:		Sampler: Erik Petersen
Sample Type: Water		Site No.:
Field pH:		Field Temp. Deg. C :
Field Flow g/Min.:		Field Cond. umhos/cm:

Parameter	Sample Result	Minimum Reporting Limit	Units	Analysis Date/Time	Analyst Initials	Analytical Method	Flag
Calculations							
Anions, Total	6.3	0.01	meq/L	10/19/2012 16:50	DBH	SM 1030 E	
Cation/Anion Balance	-3.9		%	10/19/2012 16:50	DBH	SM 1030 E	
Cations, Total	5.9	0.01	meq/L	10/19/2012 16:50	DBH	SM 1030 E	
Hardness, Total as CaCO3	284	1	mg/L	10/19/2012 16:50	DBH	SM 2340 B	
Inorganic							
Acidity	ND	5.0	mg/L	10/8/2012 13:00	TSM	SM 2310 B	
Alkalinity - Bicarbonate (HCO3)	340	1.0	mg/L	9/30/2012 12:00	TSM	SM 2320 B	
Alkalinity - Carbonate (CO3)	ND	1.0	mg/L	9/30/2012 12:00	TSM	SM 2320 B	
Alkalinity - CO2	248	1.0	mg/L	9/30/2012 12:00	TSM	SM 2320 B	
Alkalinity - Hydroxide (OH)	ND	1.0	mg/L	9/30/2012 12:00	TSM	SM 2320 B	
Alkalinity - Total (as CaCO3)	279	1.0	mg/L	9/30/2012 12:00	TSM	SM 2320 B	
Chloride	7	1	mg/L	9/25/2012 17:00	TSM	EPA 300.0	
Nitrate + Nitrite (Total)	1.0	0.1	mg/L	9/28/2012 14:00	KSL	SM 4500 NO3-F	
Phosphorus, Total	0.08	0.01	mg/L	10/3/2012 6:00	TSM	SM 4500 PB5E	
Sulfate	27	1	mg/L	9/25/2012 17:00	TSM	EPA 300.0	
Total Dissolved Solids (TDS)	278	10	mg/L	9/27/2012 13:33	RMC	SM 2540 C	
Total Suspended Solids (TSS)	33	7	mg/L	10/1/2012 12:57	RMC	SM 2540 D	
Metals							
Boron, Dissolved	ND	0.05	mg/L	9/28/2012 16:57	PNM	EPA 200.7	
Barium, Dissolved	0.007	0.005	mg/L	9/28/2012 16:57	PNM	EPA 200.7	
Calcium, Dissolved	88.8	0.2	mg/L	9/28/2012 16:57	PNM	EPA 200.7	
Calcium, Total	90.1	0.2	mg/L	9/27/2012 22:17	PNM	EPA 200.7	
Copper, Dissolved	ND	0.005	mg/L	9/28/2012 16:57	PNM	EPA 200.7	
Iron, Dissolved	0.02	0.02	mg/L	9/28/2012 16:57	PNM	EPA 200.7	
Iron, Total	0.29	0.02	mg/L	9/27/2012 22:17	PNM	EPA 200.7	
Lead, Dissolved	0.02	0.02	mg/L	9/28/2012 16:57	PNM	EPA 200.7	
Magnesium, Dissolved	15.1	0.2	mg/L	9/28/2012 16:57	PNM	EPA 200.7	
Magnesium, Total	15.3	0.2	mg/L	9/27/2012 22:17	PNM	EPA 200.7	
Manganese, Dissolved	0.008	0.005	mg/L	9/28/2012 16:57	PNM	EPA 200.7	
Manganese, Total	0.012	0.005	mg/L	9/27/2012 22:17	PNM	EPA 200.7	
Potassium, Dissolved	1.0	0.5	mg/L	9/28/2012 16:57	PNM	EPA 200.7	
Sodium, Dissolved	3.9	0.5	mg/L	9/28/2012 16:57	PNM	EPA 200.7	



CHEMTECH-FORD
LABORATORIES

Certificate of Analysis

Lab Sample No.: 1209449-01

Name: Canyon Fuel Co., Skyline Mine

Mine Code: 21

Sample Date: 10/3/2012 12:00 PM

Sample Site: 91-3917

Receipt Date: 10/9/2012 10:00 AM

Comments:

Sampler: Gregg Galecki

Sample Type: Water

Site No.:

Field pH: 7.05

Field Temp. Deg. C : 5.9

Field Flow g/Min.: 0.33

Field Cond. umhos/cm: 494

Parameter	Sample Result	Minimum Reporting Limit	Units	Analysis Date/Time	Analyst Initials	Analytical Method	Flag
Calculations							
Anions, Total	5.3	0.01	meq/L	10/24/2012 11:00	PNM	SM 1030 E	
Cation/Anion Balance	-3.5		%	10/24/2012 11:00	PNM	SM 1030 E	
Cations, Total	4.9	0.01	meq/L	10/24/2012 11:00	PNM	SM 1030 E	
Hardness, Total as CaCO ₃	237	1	mg/L	10/24/2012 11:00	PNM	SM 2340 B	
Inorganic							
Acidity	ND	5.0	mg/L	10/15/2012 12:00	TSM	SM 2310 B	
Alkalinity - Bicarbonate (HCO ₃)	285	1.0	mg/L	10/15/2012 9:00	TSM	SM 2320 B	
Alkalinity - Carbonate (CO ₃)	ND	1.0	mg/L	10/15/2012 9:00	TSM	SM 2320 B	
Alkalinity - CO ₂	213	1.0	mg/L	10/15/2012 9:00	TSM	SM 2320 B	
Alkalinity - Hydroxide (OH)	ND	1.0	mg/L	10/15/2012 9:00	TSM	SM 2320 B	
Alkalinity - Total (as CaCO ₃)	234	1.0	mg/L	10/15/2012 9:00	TSM	SM 2320 B	
Chloride	5	1	mg/L	10/10/2012 9:00	TSM	EPA 300.0	
Nitrate + Nitrite (Total)	2.4	1.0	mg/L	10/12/2012 13:00	KSL	SM 4500 NO ₃ -F	
Phosphorus, Total	0.04	0.01	mg/L	10/11/2012 10:00	TSM	SM 4500 PB5E	
Sulfate	20	1	mg/L	10/10/2012 9:00	TSM	EPA 300.0	
Total Dissolved Solids (TDS)	298	10	mg/L	10/10/2012 11:25	RMC	SM 2540 C	
Total Suspended Solids (TSS)	ND	4	mg/L	10/10/2012 12:00	RMC	SM 2540 D	
Metals							
Boron, Dissolved	ND	0.05	mg/L	10/9/2012 18:23	PNM	EPA 200.7	
Barium, Dissolved	0.007	0.005	mg/L	10/9/2012 18:23	PNM	EPA 200.7	
Calcium, Dissolved	80.2	0.2	mg/L	10/9/2012 18:23	PNM	EPA 200.7	
Calcium, Total	82.2	0.2	mg/L	10/9/2012 20:58	PNM	EPA 200.7	
Copper, Dissolved	ND	0.005	mg/L	10/9/2012 18:23	PNM	EPA 200.7	
Iron, Dissolved	ND	0.02	mg/L	10/9/2012 18:23	PNM	EPA 200.7	
Iron, Total	ND	0.02	mg/L	10/9/2012 20:58	PNM	EPA 200.7	
Lead, Dissolved	ND	0.02	mg/L	10/9/2012 18:23	PNM	EPA 200.7	
Magnesium, Dissolved	9.0	0.2	mg/L	10/9/2012 18:23	PNM	EPA 200.7	
Magnesium, Total	9.1	0.2	mg/L	10/9/2012 20:58	PNM	EPA 200.7	
Manganese, Dissolved	ND	0.005	mg/L	10/9/2012 18:23	PNM	EPA 200.7	
Manganese, Total	ND	0.005	mg/L	10/9/2012 20:58	PNM	EPA 200.7	
Potassium, Dissolved	0.9	0.5	mg/L	10/9/2012 18:23	PNM	EPA 200.7	
Sodium, Dissolved	3.4	0.5	mg/L	10/9/2012 18:23	PNM	EPA 200.7	